025CHC

025CHC

025CHC TRANSMISSION CONTROL SYSTEM

Warnings and Precautions

Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

1. Be sure to wear necessary safety equipment to prevent accidents when removing and repairing.

Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

1. During removal and installation of TCU, antistatic equipment should be worn to avoid damage to electronic components in TCU.

System Overview

System Components Diagram

1	Transmission Assembly	2	TCU Module
3	Electronic Shift Module Assembly		

System 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:

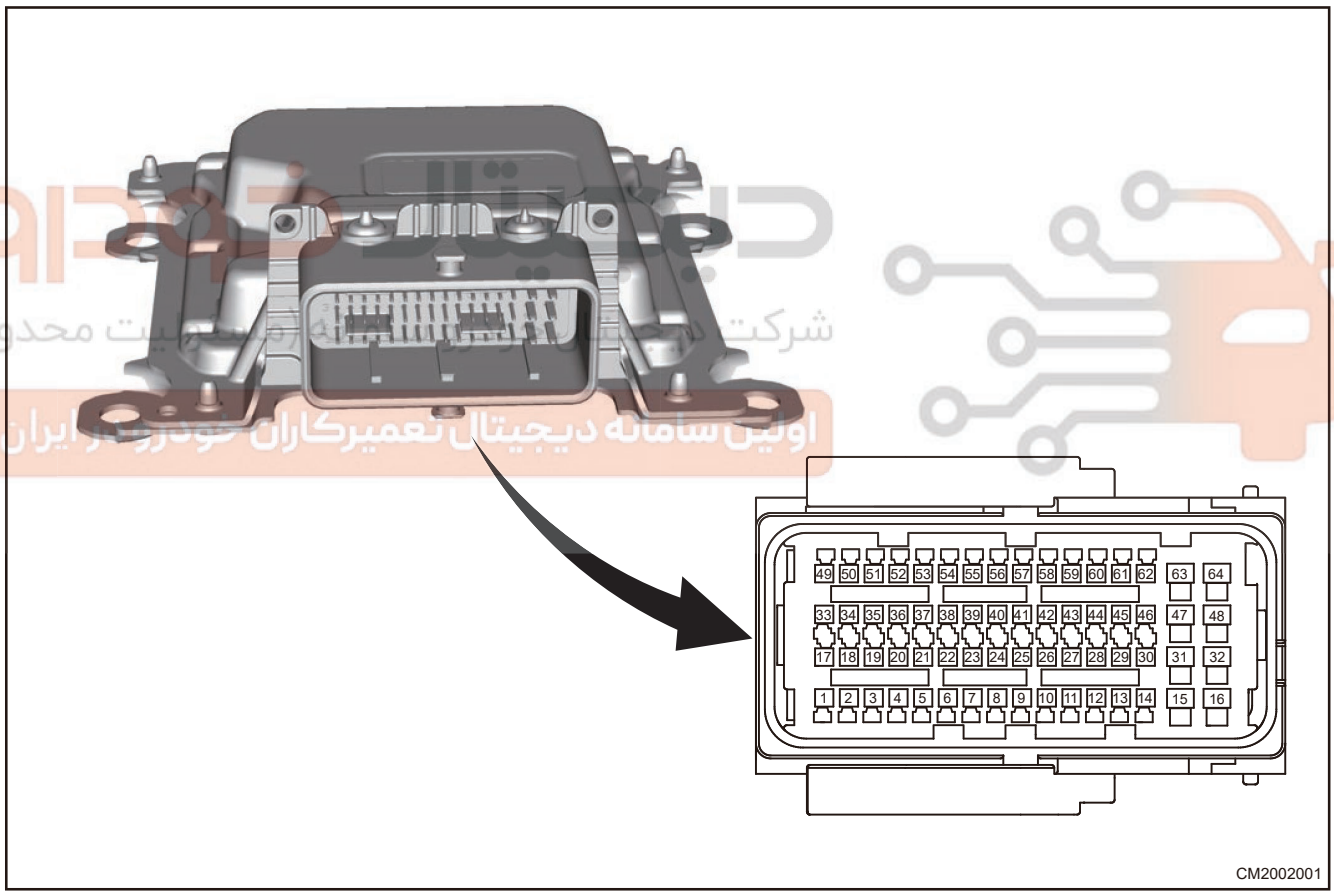
1. Transmission Control Unit (TCU) sends command signals to the solenoid valves in hydraulic system according to the requirements under the vehicle driving conditions (vehicle speed, load, engine speed, etc.).

2. The solenoid valve continuously adjusts the operating state according to the commands from TCU. The combination of 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.

System Circuit Diagram

Terminal Definition

Transmission Module Terminal Definition
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. TCU processes the input signal and adjusts the transmission hydraulic system by using received information.



PIN	Definition	PIN	Definition
1	NC	33	Input Pulley Shaft Pressure Control Valve Low Side
2	NC	34	NC
3	NC	35	NC
4	NC	36	Hydraulic Torque Converter Control Valve Low Side

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PIN	Definition	PIN	Definition
5	Transmission Oil Temperature Sensor Signal	37	NC
6	Output Pulley Shaft Oil Pressure Sensor Signal	38	NC
7	Private CAN Low	39	Range Sensor 1
8	Private CAN High	40	NC
9	NC	41	Turbine Speed Sensor Signal
10	NC	42	NC
11	All Vehicle CAN Low	43	NC
12	All Vehicle CAN High	44	Input Pulley Shaft Speed Sensor Ground
13	NC	45	NC
14	NC	46	Output Pulley Shaft Speed Sensor Power Supply
15	Main Oil Pressure Control Valve High Side	47	KL_30
16	Input/Output Pulley Shaft Pressure Control Valve High Side	48	KL_30
17	NC	49	NC
18	NC	50	Clutch Control Valve Low Side
19	Output Pulley Shaft Oil Pressure/ Temperature Sensor Ground	51	Output Pulley Shaft Pressure Control Valve Low Side
20	Input Pulley Shaft Oil Pressure/Range Sensor Ground	52	Main Oil Pressure Control Valve Low Side
21	ECO Mode	53	NC
22	Input Pulley Shaft Oil Pressure Sensor Signal	54	NC
23	NC	55	NC
24	NC	56	Range Sensor 2
25	NC	57	Turbine/Output Pulley Shaft Speed Sensor Ground
26	Output Pulley Shaft Speed Sensor Signal	58	Input Pulley Shaft Speed Sensor Signal
27	NC	59	NC
28	NC	60	NC
29	Input Pulley Shaft Oil Pressure/Range Sensor Power Supply	61	Turbine Speed Sensor Power Supply

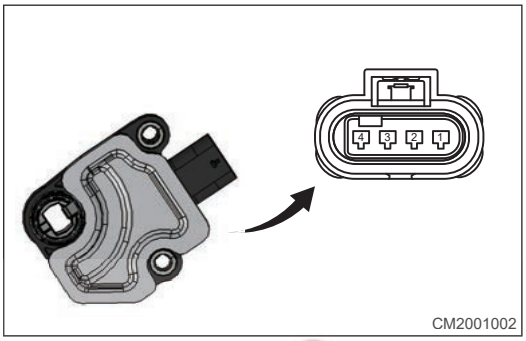
PIN	Definition	PIN	Definition
30	Output Pulley Shaft Oil Pressure Sensor Power Supply	62	Input Pulley Shaft Speed Sensor Power Supply
31	KL15	63	Power Supply Ground 1
32	Hydraulic Torque Converter/Clutch Control Valve High Side	64	Power Supply Ground 2

Note: NC is the null pin, KL15 is the switch power, KL30 is the battery power

Wire Harness and Sensor Terminal Definition

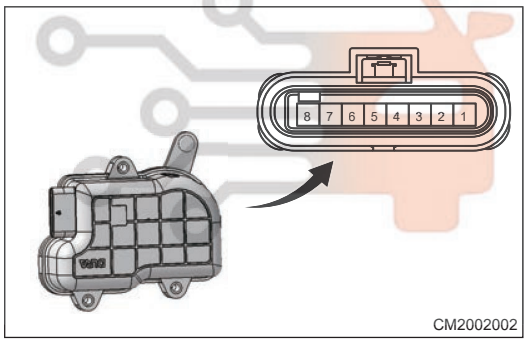
1. Range Sensor
   a. Pin Definition

PIN	Definition
1	Power Supply (VCC)
2	Output Signal 1 (GEAR1)
3	Signal Ground (GND)
4	Output Signal 2 (GEAR2)



2. Electronic Shift Actuator
   a. Pin Definition

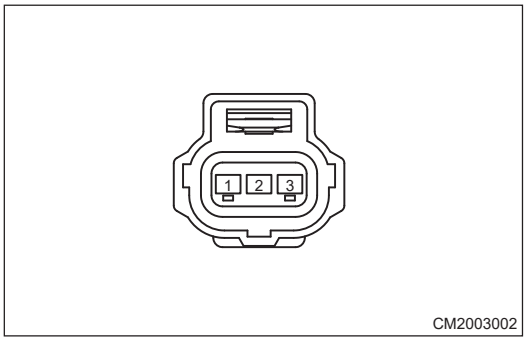
PIN	Definition
1	Power Supply (VCC)
2	/
3	CAN Signal Low (CANL)
4	CAN Signal High (CANH)
5	/
6	/
7	KL15 Ignition (IGN)
8	Ground (GND)



Gear switch performs gear shifting according to gear position information sent by TCU.

3. Speed Sensor
   a. Pin Definition

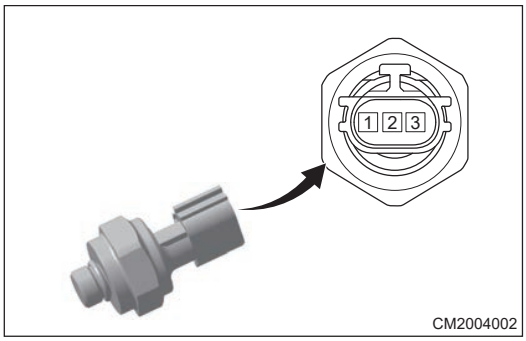
PIN	Definition
1	Signal Ground (GND)
2	Output Signal (Vout)
3	Power Supply (VCC)



The speed sensor of 025CHC continuously variable transmission uses two models, a total of three speed sensors.

4. Oil Pressure Sensor
   a. Pin Definition

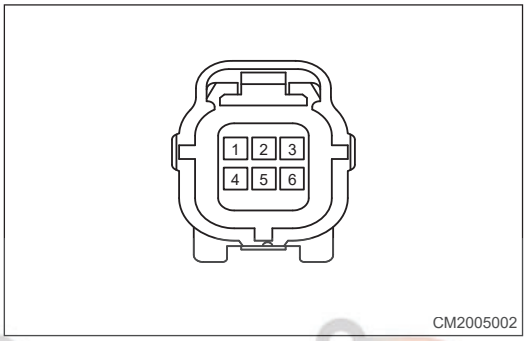
PIN	Definition
1	Signal Ground (GND)
2	Output Signal (Vout)
3	Power Supply (VCC)



025CHC transmission uses two oil pressure sensors (-input shaft, output shaft) in total:

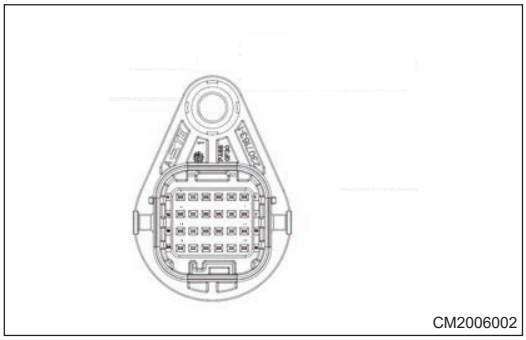
5. Transmission Peripheral Wire Harness Assembly
   a. Pin Definition

PIN	Definition
1	Output Pulley Shaft Pressure Sensor Ground
2	Output Pulley Shaft Pressure Sensor Signal
3	Output Pulley Shaft Pressure Sensor Power Supply
4	Output Pulley Shaft Speed Sensor Power Supply
5	Output Pulley Shaft Speed Sensor Signal
6	Output Pulley Shaft Speed Sensor Ground



6. Wire Harness Main Connector

a. Pin Definition



PIN	Definition
1	Null
2	Null
3	Null
4	Null
5	Null
6	Null
7	Oil Temperature Signal +
8	Oil Temperature Signal -
9	Input Shaft Solenoid Valve Signal +
10	Input Shaft Solenoid Valve Signal -
11	TC Solenoid Valve Signal +
12	TC Solenoid Valve Signal -
13	Main Oil Pressure Solenoid Valve Signal +
14	Main Oil Pressure Solenoid Valve Signal -
15	Clutch Solenoid Valve Signal +
16	Clutch Solenoid Valve Signal -
17	Output Shaft Solenoid Valve Signal +
18	Output Shaft Solenoid Valve Signal -
19	Null
20	Null
21	Null
22	Null
23	Null
24	Null

Resistance:

a. When measuring PIN9 - PIN10 at 20℃, the resistance is 5.3 ± 0.3 Ω;

b. When measuring PIN11 - PIN12 at 20℃, the resistance is 5 + 0.2/-0.4 Ω;

c. When measuring PIN13 - PIN14 at 20℃, the resistance is 5.3 ± 0.3 Ω;

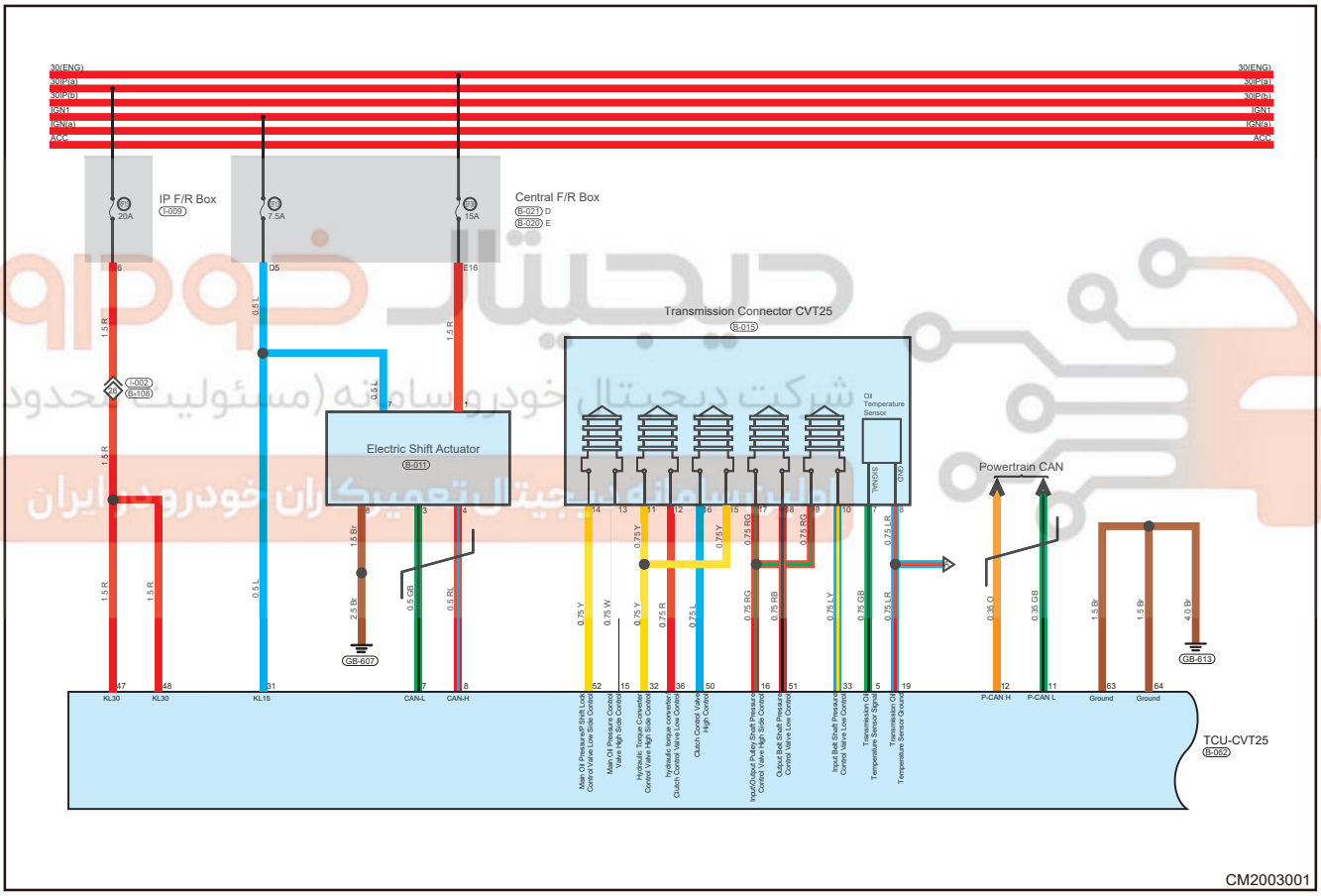
d. When measuring PIN15 - PIN16 at 20℃, the resistance is 5.3 ± 0.3 Ω;

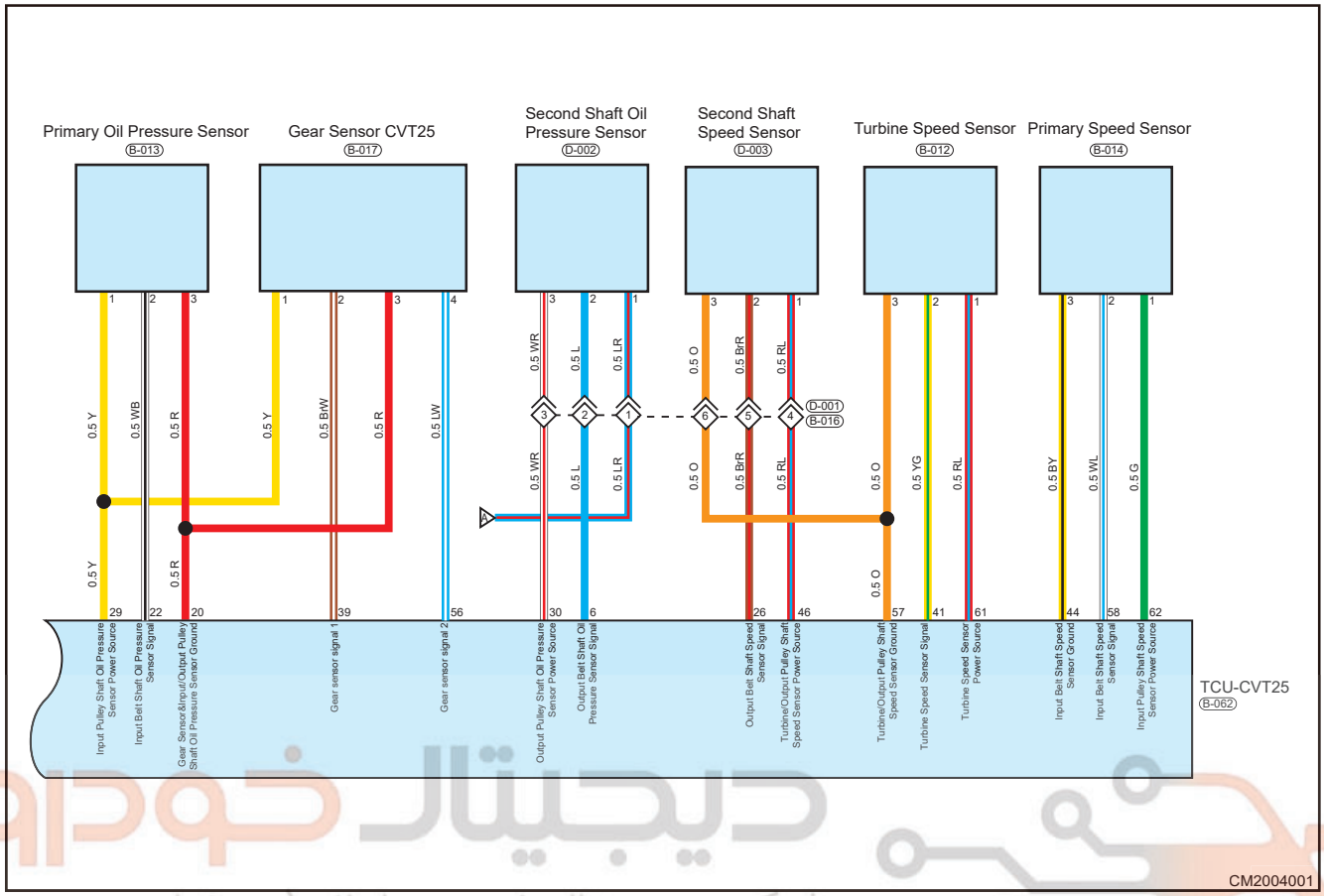
e. When measuring PIN17 - PIN18 at 20℃, the resistance is 5.3 ± 0.3 Ω;

f. Measure resistance of PIN7 - PIN8, refer to the following table for the relationship between resistance and transmission oil temperature:

Temperature (°C)	-40	-30	-20	-10	0	10	20	25	40
Resistance (KΩ)	120.33	66.77	38.65	23.24	14.45	9.26	6.10	5.00	4.12
Temperature (°C)	40	50	60	70	80	90	100	110	120
Resistance (KΩ)	2.85	2.01	1.44	1.06	0.78	0.59	0.45	0.35	0.28

Circuit Diagram





DIAGNOSIS & TEST

DTC Diagnosis Description

The possible cause of most faults is due to the poor connection of sensors and wire harness connectors. Therefore, it is necessary to thoroughly check if the connectors and lines corresponding to each fault are loose, poorly connected, winding, corroded, with dirt, aging and other abnormalities.
In view of the fact that some faults may be caused by the failure to clear the history faults in TCU after maintenance, it is necessary to clear DTCs first:

Clear DTCs:

1. IG is in OFF position;
2. Connect the diagnostic tester;
3. IG is in ON position;
4. Diagnostic tester enters the automatic transmission (CVT) system, read the DTC;
5. Clear DTCs;
6. Then operate the vehicle according to the fault activation conditions:
   a. Vehicle is normally driven, and the vehicle speed is required to be ⩾ 40kph;
   b. Decelerate until the vehicle stops, turn off the vehicle and KL15 power, lock the vehicle, and wait for three minutes;
   c. Start again, vehicle is normally driven, and the vehicle speed is required to be ⩾ 40kph;
7. Check if DTC occurs again;
8. Transmission system resumes;
9. Exit the diagnostic tester system;
10. Disconnect the diagnostic tester;

11. IG is in OFF position;

⚠ Caution
• For emission type faults, after troubleshooting, three driving cycles must be performed to clear DTCs.

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean all Transmission Control Unit (TCU) ground related to latest DTC.
- 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 operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

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

System Diagnosis Procedure

Hint:

- Use following procedures to troubleshoot the transmission control system.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.
Standard voltage: Not less than 12 V.

NG → **Replace battery**

OK

3	**Customer problem analysis**

Next

4	**Read DTCs**

NG → **Perform repair according to problem symptoms table**

OK

5	**Read DTCs (current DTC and history DTC)**

NG → **Troubleshoot according to Intermittent DTC malfunction procedures**

OK

6	**Repair according to Diagnostic Trouble Code (DTC) chart**

Next

7	**Adjust, repair or replace**

Next

8	Conduct test and confirm malfunction has been repaired

Next → End

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
P096200	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	• Wire harness or connector failure • Line Solenoid Failure • TCU failure	• Check wire harness or connector • Replace main oil pressure control solenoid valve • Replace TCU
P096300	Line Solenoid Short to BAT			
P096000	Line Solenoid Open Load			
P095900	Line Solenoid Performance failure			
P096600	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	• Wire harness or connector failure • Primary Solenoid Failure • TCU failure	• Check wire harness or connector • Replace transmission valve body assembly • Replace TCU
P096700	Primary Solenoid Short to BAT			
P096400	Primary Solenoid Open Load			
P097200	Primary Solenoid Performance failure			
P097000	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	• Wire harness or connector failure • Output Pulley Control Solenoid Fault • TCU failure	• Check wire harness or connector • Replace transmission valve body assembly • Replace TCU
P097100	Secondary Solenoid Short to BAT			
P096800	Secondary Solenoid Open Load			
P097300	Secondary Solenoid Performance failure			
P272000	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	• Wire harness or connector failure • Clutch Control Solenoid Valve Fault • TCU failure	• Check wire harness or connector • Replace transmission solenoid valve assembly • Replace TCU
P272100	Clutch Solenoid Short to BAT			
P271800	Clutch Solenoid Open Load			
P271600	Clutch Solenoid Performance failure			
P272900	TCC Solenoid Short to GND	TCU detects that the solenoid valve is short to power supply, short to	• Wire harness or connector failure • TCC Solenoid Failure	• Check wire harness or connector • Replace transmission
P273000	TCC Solenoid Short to BAT			

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
P272700	TCC Solenoid Open Load	ground or open, the fault is established	• TCU failure	solenoid valve assembly • Replace TCU
P272500	TCC Solenoid Performance failure			
P084300	Primary Pressure Sensor Short to BAT	When the transmission input pulley pressure exceeds the set threshold, the fault is established	• Incorrect installation of input pulley pressure sensor • Input pulley pressure sensor fault • Wire harness or connector failure • TCU failure	• Reinstall input pulley pressure sensor • Replace the input pulley pressure sensor • Check wire harness or connector • Replace TCU
P084200	Primary Pressure Sensor Short to GND			
P084800	Secondary Pressure Sensor Short to BAT	When the transmission output pulley sensor oil pressure exceeds the set threshold, the fault is established	• Incorrect installation of output pulley shaft pressure sensor • Output pulley shaft pressure sensor • Wire harness or connector failure • TCU failure	• Reinstall output pulley shaft pressure sensor • Replace output pulley shaft pressure sensor • Check wire harness or connector • Replace TCU
P084700	Secondary Pressure Sensor Short to GND			
P171000	Primary Pressure Sensor Supply Abnormal	When the transmission pressure sensor voltage exceeds the set threshold, the fault is established	• Wire harness or connector failure • Input pulley pressure sensor fault • TCU failure	• Check wire harness or connector • Replace the input pulley pressure sensor • Replace TCU
P171100	Secondary Pressure Sensor Supply Abnormal	When the transmission pressure sensor voltage is lower than or higher than the set threshold, the fault is established	• Wire harness or connector failure • Output Pulley Pressure Sensor Fault • TCU failure	• Check wire harness or connector • Replace output pulley pressure sensor • Replace TCU
P079200	Input Pulley Speed Sensor Fault	When the input speed exceeds the set threshold during driving, the fault is established	• Incorrect installation of input pulley shaft speed signal sensor	• Reinstall input pulley shaft speed signal sensor correctly • Replace input pulley shaft

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
			• Input pulley shaft speed signal sensor fault • Wire harness or connector failure	speed signal sensor • Check wire harness or connector
P072100	Output Pulley Speed Sensor Fault	When the output speed exceeds the set threshold during driving, the fault is established	• Incorrect installation of output pulley shaft speed signal sensor • Output pulley shaft speed signal sensor fault • Wire harness or connector failure	• Reinstall output pulley shaft speed signal sensor correctly • Replace output pulley shaft speed signal sensor • Check wire harness or connector
P071600	Turbine speed sensor fault	When the turbine speed exceeds the set threshold during driving, the fault is established	• Incorrect installation of turbine speed sensor • Turbine speed sensor fault • Turbine speed sensor wire harness or connector failure • TCU failure	• Reassembly turbine speed sensor • Replace turbine speed sensor • Check turbine speed sensor wire harness or connector • Replace TCU
P094000	Oil Temperature Sensor Short to BAT/OL	When the CVT oil temperature sensor voltage exceeds the threshold, the fault is established	• Oil Temperature Sensor Fault • Wire harness or connector failure • TCU failure	• Replace oil temperature sensor • Check wire harness or connector • Replace TCU
P093900	Oil Temperature Sensor Short to GND			
P070600	Range Switch Signal Out of Range	When TCU detects that there are multiple P/R/N/D gear signals simultaneously or no gear signals, the fault is established	• Wire harness or connector failure • Abnormality in electronic shift actuator • Abnormality in range sensor • TCU failure	• Check wire harness and connector • Check electronic shift actuator • Check range sensor • Replace TCU
P280300	Range Sensor SCB	When the range sensor signal is short to power supply, the fault is established		

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
P280200	Range Sensor SCG/ OL	When the range sensor signal is short to ground or open, the fault is established		
P280500	Range Sensor Signal Check	When the checksum error occurs for range sensor signal, the fault is established		
P073000	Ratio Error	When the absolute value of the difference between target ratio and actual ratio is greater than the set threshold, the fault is established	• Transmission electrical appliances fail • Transmission hydraulic system failure • Abnormality in engine actual torque • Abnormal wear of transmission components	• Replace invalid transmission electrical appliances • Check and repair transmission hydraulic system • Check engine actual torque • Replace abnormally worn components of transmission
P279700	Primary Pressure Control Issue	When the difference between target oil pressure and actual oil pressure is greater than the set threshold, the fault is established	• Pulley pressure sensor signal fault • Pulley pressure control solenoid valve fault • Hydraulic system fault	• Replace pulley pressure sensor • Replace transmission valve body assembly • Check and repair hydraulic system
P279800	Secondary Pressure Control Issue			
P081E00	Clutch (Reverse) Slip	When the forward/ reverse clutch input and output speed difference has a large slip differential speed after engaging or locking, the fault is established	• Turbine speed sensor fault • Clutch Control Solenoid Valve Fault • Hydraulic system leakage • Clutch lining damaged	• Replace turbine speed sensor • Replace valve body assembly • Check and repair hydraulic system • Replace clutch lining
P081100	Clutch (Drive) Slip			
P089400	TCC Slip	When there is a large slip differential speed between engine speed and turbine speed after the hydraulic torque converter locking clutch is engaged,	• Hydraulic torque converter locking control solenoid valve fault • Wire harness or connector failure	• Replace hydraulic torque converter locking control solenoid valve

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
		the fault is established	• Hydraulic control circuit fault • Hydraulic torque converter fault	• Check wire harness or connector • Check and repair hydraulic control circuit • Replace hydraulic torque converter
P021800	Trans Oil Temperature Out of Range	When the oil temperature is higher than 128℃, the fault is established	• Oil Temperature Sensor Fault • Transmission cooling system failure	• Replace oil temperature sensor • Check and repair transmission cooling system
P176700	Trans Oil Temperature Critical	When the oil temperature is higher than 135℃, the fault is established		
P086300	Solenoid Driver Communication Failure	TCU detects the corresponding abnormality, triggering the diagnosis	• The vehicle abnormality causes TCU can not operate normally, such as the power supply is abnormal • TCU failure	• Check battery • Check wire harness or connector • Replace TCU
P062F00	NVM (Non Volatile Memory) Failure			
P162F00	NVM (Non Volatile Memory) Abnormal			
P060400	RAM (Random Access Memory) Abnormal			
P060500	ROM (Read Only Memory) Abnormal			
P160C00	PLL Fault			
P060B00	ADC Fault			
P060700	Time Slice Fault			
P060A00	Monitor Unit Fault			
P160B00	VDD Out of Range			
P061300	Safety Other Fault			
U014087	Lost Communication with BCM	TCU cannot obtain or receive the signal on CAN network	• Relevant controller sensor failure • Abnormal vehicle CAN network	• Check relevant controller sensor • Refer to CAN Network Diagnosis of vehicle
U010087	Lost Communication with ECM			
U012987	Lost communication with BSM			

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
U012687	Lost Communication with SAM			
U014687	Lost Communication with CGW			
U119387	Lost Communication with EGS			
U042281	Invalid Data from BCM			
U040181	Invalid Data from ECM			
U041881	Invalid Data from BSM			
U042881	Invalid Data from SAM			
P175000	Invalid Engine Speed Signal			
P175100	Invalid Engine Actual Torque Signal			
P175200	Invalid Brake Pedal Signal			
P175300	Invalid Gas Pedal Signal			
P175400	Invalid Vehicle Speed Signal			
P175500	Invalid Front Left Speed Signal			
P175600	Invalid Front Right Speed Signal			
P175700	Invalid Rear Left Speed Signal			
P175800	Invalid Rear Right Speed Signal			
P175900	Invalid Engine Coolant Signal			
P176000	Invalid Odormeter Signal			
P176100	ABS Invalid			
P176200	Invalid Master Cylinder Pressure Signal			

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
P095600	Manual Mode Fault	• When in P gear, any signal of M, M+, M- is detected, the fault is established • When in D gear, three signals of M, M+, M- are detected at the same time, the fault is established • When in D gear, two signals of M +, M- are detected, the fault is established	• Wire harness or connector failure • Abnormality in manual mode switch • TCU operates abnormally	• Check wire harness or connector • Replace manual mode switch • Replace TCU
U007388	TCU Bus Off	CAN network fails, and TCU cannot communicate with other controllers	• Short in vehicle CAN bus wire harness • CAN modules of other nodes in the vehicle CAN network are abnormal • TCU internal is abnormal	• Check CAN bus • Check CAN modules of other nodes in the vehicle CAN network • Replace TCU
P071500	Unreasonable Turbine Speed Signal	After TCU detects that the sensor signal change rate is greater than the set threshold, the fault is established	• Wire harness or connector failure • Sensor failure • TCU failure	• Check wire harness or connector • Replace sensor • Replace TCU
P079100	Unreasonable Primary Speed Signal			
P072000	Unreasonable Secondary Speed Signal			
P093700	Unreasonable Oil Temperature Signal	When engine is cold, after TCU detects that the deviation between oil temperature sensor signal and ambient temperature is greater than the set threshold, the fault is established	• Wire harness or connector failure • Oil Temperature Sensor Fault	• Check wire harness or connector • Replace oil temperature sensor

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
P084000	Unreasonable Primary Pressure Signal	After TCU detects that the sensor signal is greater than the set threshold when the vehicle is powered on and the engine is not started, the fault is established	• Input/output pulley shaft pressure sensor fault • Wire harness or connector failure • TCU failure	• Replace input/ output pulley shaft pressure sensor • Check wire harness or connector • Replace TCU
P084500	Unreasonable Secondary Pressure Signal			
P178000	SBW CAN Bus Off	The communication between SBW and TCU is abnormal, triggering a fault	• Wire harness or connector failure • TCU failure • SBW fault	• Check wire harness or connector • Replace TCU • Replace SBW
P178100	Lost Communication with TCU			
P178200	Invalid Data From TCU			
P178300	SBW Safety Fault	The electronic shift actuator detects the corresponding abnormality, triggering a fault	• SBW triggers a fault due to the vehicle abnormality, for example, the abnormal KL30 power off • SBW Mechanical Fault	• Check wire harness or connector • Replace SBW
P178400	SBW Internal Communication Fault			
P178500	SBW External Input Fault	The electronic shift actuator power supply is overvoltage or undervoltage, triggering a fault	• Undervoltage or overvoltage • SBW fault	• Check power supply voltage • Check wire harness or connector • SBW fault
P178600	SBW Electrical Fault	The electronic shift actuator detects the corresponding abnormality, triggering a fault	• SBW triggers a fault due to the vehicle abnormality, for example, the abnormal KL30 power off • SBW Mechanical Fault	• Check wire harness or connector • Replace SBW
P178700	SBW Over Temperature	The internal temperature of electronic shift actuator is too high, triggering an alarm	• The electronic shift actuator is damaged • The shift of electronic shift actuator is blocked • Abnormal vehicle cooling system	• Check and repair electronic shift actuator • Check and repair vehicle cooling system

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
P178800	SBW Not Self-learning	The electronic shift actuator detects the corresponding abnormality, triggering a fault	• SBW triggers a fault due to the vehicle abnormality, for example, the abnormal KL30 power off • SBW Mechanical Fault	• Check wire harness or connector • Replace SBW
P178900	SBW PID Control Fault			
P179000	SBW Mechanical Fault	The electronic shift actuator detects that the shift angle change is too small after receiving the shift command or the gear angle change is too large when the shift command is not received	• The electronic shift connecting rod is not installed in place • Electronic shift actuator failure	• Reinstall electronic shift connecting rod • Replace electronic shift actuator
P172500	Lost Communication with SBW	The communication between SBW and TCU is abnormal, triggering a fault	• Wire harness or connector failure • TCU failure • SBW fault	• Check wire harness or connector • Replace TCU • Replace SBW
P172600	Invalid Data From SBW			
P172700	SBW Wrong Action	When the actual gear of electronic shift actuator does not match the target gear, a fault is triggered	• The electronic shift connecting rod is not installed in place • Physical factors prevent electronic shift actuator from shifting • Electronic shift actuator hardware problem	• Check electronic shift connecting rod • Check electronic shift actuator for gear shift • Replace electronic shift actuator
P172888	TCU CAN2 Bus Off	The communication between SBW and TCU is abnormal, triggering a fault	• Wire harness or connector failure • TCU failure • SBW fault	• Check wire harness or connector • Replace TCU • Replace SBW
P173100	EGS Request Invalid	TCU cannot obtain or receive the signal on CAN network	• Relevant controller sensor failure	• Check relevant controller sensor • Refer to CAN Network

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
			• Abnormal vehicle CAN network	Diagnosis of vehicle
P088300	TCU System Over Voltage	Voltage is too high: Circuit voltage is higher than 16 V	• Wire harness or connector failure • Battery failure • TCU failure	• Check wire harness and connector • Check battery • Replace TCU
P088200	TCU System Under Voltage	Voltage is too low: Circuit voltage is lower than 9 V		
P171900	EOL Anti-theft Configuration not Done	Anti-theft verification fails and triggers fault	• Anti-theft configuration is not done • Anti-theft verification fails	• Check Anti-theft System • Rematch anti-theft system
P172000	Anti-theft Verification Fails			
P060D00	MCU Self-check Failure	TCU detects the corresponding abnormality, triggering the diagnosis	• The vehicle abnormality causes TCU can not operate normally, such as the power supply is abnormal • TCU failure	• Check battery • Check wire harness or connector • Replace TCU
P070200	Safety Cut Off Test Failure	TCU detects the corresponding abnormality, triggering the diagnosis	• The vehicle abnormality causes TCU can not operate normally, such as the battery voltage is too low, the two poles of the battery are in poor contact, and the ground contact is poor, etc. • TCU internal circuit is abnormal	• Check battery • Check wire harness or connector • Replace TCU

DTC Diagnosis Procedure

DTC	P088300	TCU System Over Voltage
DTC	P088200	TCU System Under Voltage

Description
The operating voltage of TCU system is the vehicle KL30 input voltage, that is, the battery voltage.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

04 - 025CHC

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	**Measure battery voltage**

(a) Using a multimeter, check if the voltage of the two poles of battery is normal.

NG → **Repair or replace as needed, and perform DTC clearing operation**

OK ↓

2	**Check wire harness and connector**

(a) Turn ignition switch to OFF.
(b) Disconnect TCU and wire harness connector.
(c) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace wire harness or connector as needed; Perform DTC clearing operation**

OK ↓

3	**Check TCU power supply**

(a) Pull out the TCU connector, use a multimeter to measure the voltage of TCU connector terminal KL30 to ground, requirement: 9 - 16 V.

NG → **Repair or replace wire harness or connector as needed; Perform DTC clearing operation**

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 output

OK
Same DTCs are not output

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

DTC	**P070600**	**Range Switch Signal Out of Range**
DTC	**P280300**	**Range Sensor SCB**
DTC	**P280200**	**Range Sensor SCG/OL**
DTC	**P280500**	**Range Sensor Signal Check**

Description
The transmission range sensor (PRND) signal is processed by TCU. It is mainly used to judge the driver's intention and provide important information for clutch engagement and transmission control function.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

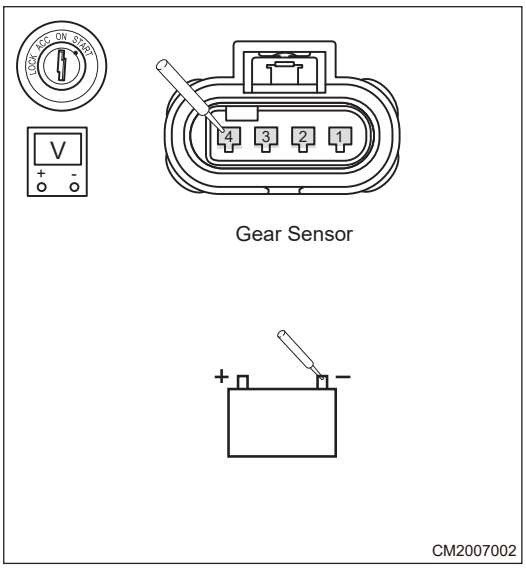
1	**Check wire harness and connector**

(a) Disconnect the negative battery cable.
(b) Check if related wire harnesses are worn, pinched or broken.
(c) Check if related connector terminals are loose, broken, bent or corrosive.

(d) Disconnect the range sensor connector.

(e) Vehicle power is turned on.

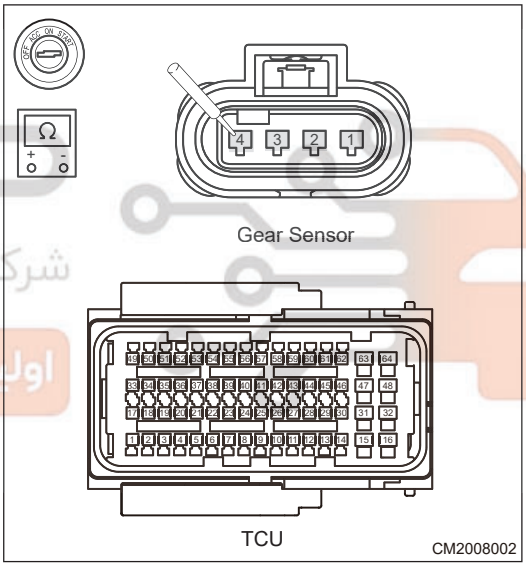
(f) Use a multimeter to measure voltage of each terminal of range sensor connector.
a. Check voltage between terminals 2, 4 of range sensor connector and body ground, it should be 0 V;
b. Check voltage between terminal 3 of range sensor connector and body ground, it should be 0 V;
c. Check voltage between terminal 1 of range sensor connector and body ground, it should be 5 V.



(g) Disconnect the negative battery cable.

(h) Disconnect the TCU connector.

(i) Use a multimeter to measure resistance between terminals 1, 2, 3, 4 of range sensor connector and TCU connector (connected terminals) to check for an open or short in the wire harness between range sensor and TCU.



NG → **Repair or replace wire harness or connector as needed**

OK

2	**Check range sensor**

(a) Replace range sensor with a new one to compare and verify.

OK → **Replace range sensor**

NG

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 output

OK
Same DTCs are not output

OK → **System operates normally**

NG → **Replace TCU control module assembly**

DTC	P086300	Solenoid Driver Communication Failure
DTC	P062F00	NVM Broken
DTC	P162F00	NVM Save Failure
DTC	P060400	RAM Fault
DTC	P060500	ROM Fault
DTC	P160C00	PLL Fault
DTC	P060B00	AD Fault
DTC	P060700	Time Slice Fault
DTC	P060A00	Monitor Unit Fault
DTC	P160B00	VDD Out of Range
DTC	P061300	Safety Other Fault
DTC	P060D00	MCU Self-check Failure

Description
If the above faults occur during TCU operation, TCU will operate abnormally due to internal faults of TCU or external factors.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Reconfirm DTCs**

(a) Turn KL15 power off for vehicle, wait for ten minutes after vehicle locked, then power on; use diagnostic tester to clear (DTC).
(b) Check if the same DTCs are output.

OK	**Confirm that system is normal**
NG	**Replace TCU control module assembly**

DTC	**U007388**	**TCU Bus Off**

Description
TCU is a node on the CAN network and communicates with other nodes of the vehicle through CAN.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

Refer to CAN Network Diagnosis of vehicle.

DTC	**P070200**	**Safety Cut Off Test Failure**

Description
If this fault occurs during TCU operation, TCU will operate abnormally due to internal faults of TCU or external factors.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Clear DTCs**

(a) Turn off the vehicle, release the brake, turn off the emergency flasher, unplug the diagnostic tester, etc., lock the vehicle and wait for three minutes, then power on and start vehicle, and check if the current drive cycle fault becomes history fault.

OK	**Perform DTC clearing operation**

NG

2	Check wire harness and connector

(a) Turn ignition switch to OFF, check TCU and TCU wire harness terminal connector, and confirm that they are installed in place and connected properly.

(b) Disconnect TCU connector, and check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

NG → **Repair or replace wire harness or connector as needed**

OK

3	Reconfirm DTCs

(a) Connect all the connectors.

(b) Connect the negative battery cable.

(c) Use diagnostic tester to clear DTCs.

(d) Start the engine.

(e) Check if the same DTCs are still output.

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	P095600	Manual Mode Fault

Description

The transmission manual mode signal is mainly used to judge the driver's intention and provide important information for clutch engagement and transmission control function.

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

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

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the TCU connector.

(c) Check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

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

OK

2	**Check shift mechanism**

(a) Check if shift mechanism operates normally.

NG → **Repair or replace shift mechanism**

OK

3	**Reconfirm DTCs**

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	**P071600**	**Turbine speed sensor fault**

Description
The turbine speed signal is processed by TCU circuit and is a pulse signal. TCU calculates the turbine speed based on the pulse signal. It is mainly used for hydraulic torque converter locking, clutch engagement and transmission control function.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check wire harness and connector**

(a) Turn ignition switch to OFF.

(b) Disconnect the turbine speed sensor connector and TCU connector.

(c) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

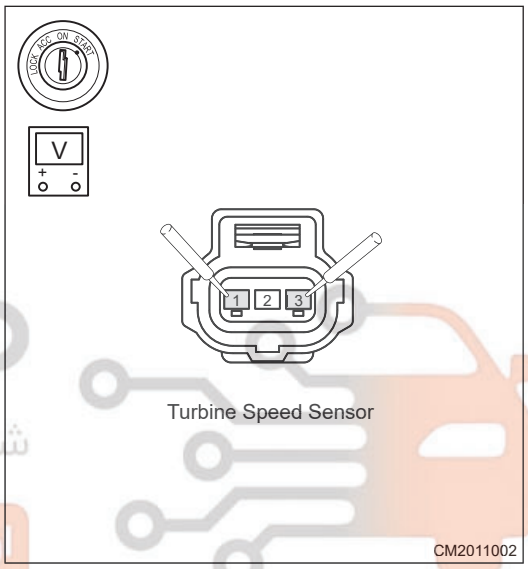
2	**Check turbine speed sensor power supply voltage**

(a) Turn ignition switch to OFF.

(b) Disconnect the turbine speed sensor connector.

(c) Turn ignition switch to ON.

(d) Use a multimeter to measure the voltage between terminal 1 and terminal 3 of turbine speed sensor connector, it should be 9 V.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

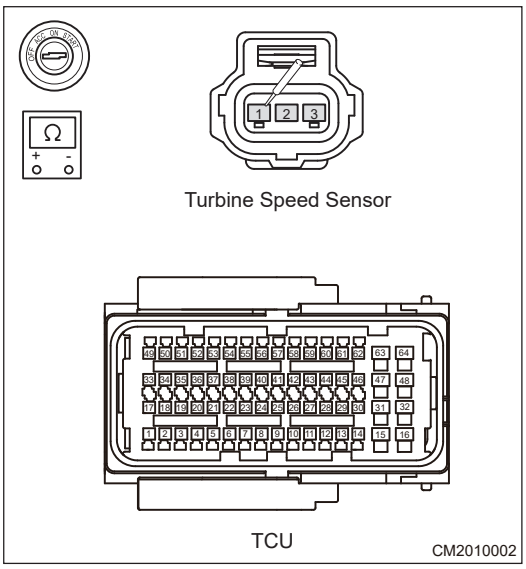
3	**Check wire harness and connector (Turbine sensor - TCU)**

(a) Turn ignition switch to OFF.

(b) Disconnect the TCU connector.

(c) Disconnect the turbine speed sensor connector.

(d) Use a multimeter to check for continuity between TCU connector (connected terminals) and terminals 1, 2, 3 of turbine speed sensor to check for an open or short in the wire harness between turbine speed sensor and TCU.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK →

4	**Check turbine speed sensor**

(a) Replace turbine speed sensor with a new one to compare and verify.

OK → **Replace turbine speed sensor**

NG →

5	**Confirm DTCs again**

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module**

DTC	P079200	Input Pulley Speed Sensor Fault

Description
The input pulley shaft speed signal is processed by TCU circuit and is a pulse signal. TCU calculates the input pulley speed based on the pulse signal. It is mainly used for hydraulic torque converter locking, clutch engagement and transmission control function.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	Check wire harness and connector

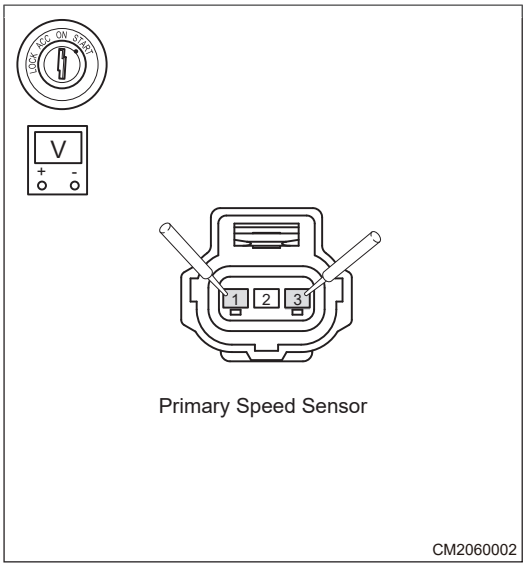
(a) Turn ignition switch to OFF.
(b) Disconnect the input pulley speed sensor connector and TCU connector.
(c) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

2	Check input pulley speed sensor power supply voltage

(a) Turn ignition switch to OFF.
(b) Disconnect the input pulley speed sensor connector.
(c) Turn ignition switch to ON.
(d) Use a multimeter to measure the voltage between terminal 1 and terminal 3 of input pulley speed sensor connector, it should be 9 V.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

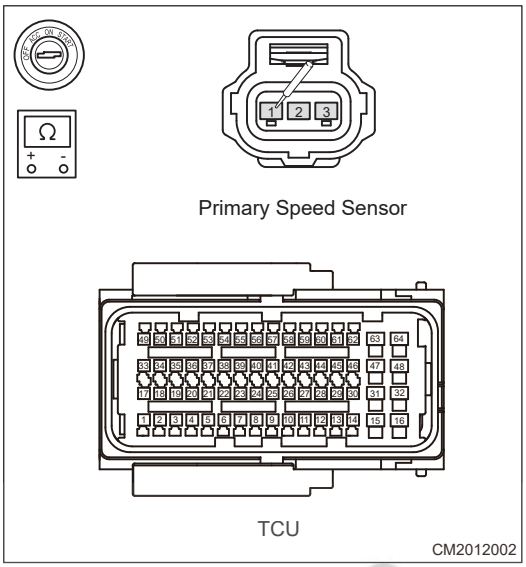
3	Check wire harness and connector (Input pulley speed sensor - TCU)

(a) Turn ignition switch to OFF.

(b) Disconnect the TCU connector.

(c) Disconnect the input pulley speed sensor connector.

(d) Use a multimeter to check for continuity between TCU connector (connected terminals) and terminals 1, 2, 3 of input pulley speed sensor connector to check for an open or short in the wire harness between input pulley speed sensor and TCU.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

4	Check input pulley speed sensor

(a) Replace input pulley speed sensor with a new one to compare and verify.

OK → **Replace input pulley speed sensor**

NG

5	Confirm DTCs again

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module**

DTC	P072100	Output Pulley Speed Sensor Fault

Description
The output pulley shaft speed signal is processed by TCU circuit and is a pulse signal. TCU calculates the output pulley speed based on the pulse signal. It is mainly used for vehicle speed and transmission control function.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	Check wire harness and connector

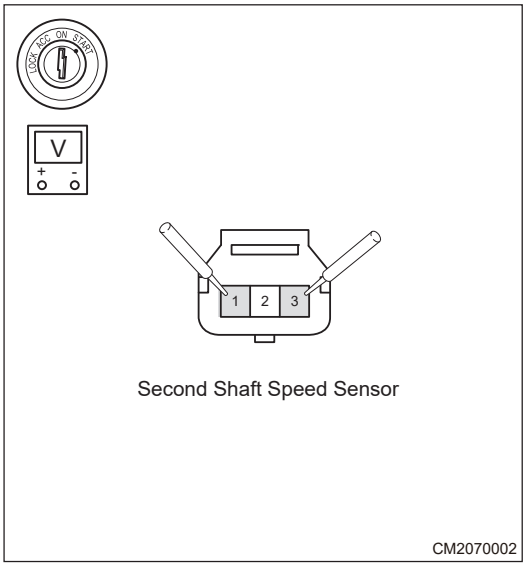
(a) Turn ignition switch to OFF.
(b) Disconnect the output pulley speed sensor connector and TCU connector.
(c) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

2	Check output pulley speed sensor power supply voltage

(a) Turn ignition switch to OFF.
(b) Disconnect the output pulley speed sensor connector.
(c) Turn ignition switch to ON.
(d) Use a multimeter to measure the voltage between terminal 1 and terminal 3 of output pulley speed sensor connector, it should be 9 V.



NG

Repair or replace as needed; Using diagnostic tester, clear history DTC

OK

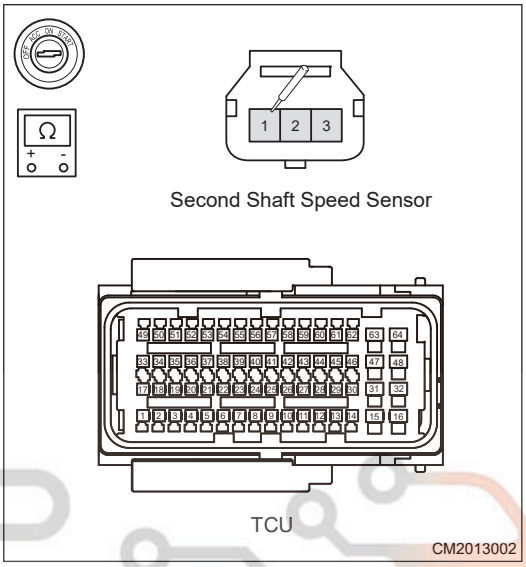
3	**Check wire harness and connector (Output pulley speed sensor - TCU)**

(a) Turn ignition switch to OFF.

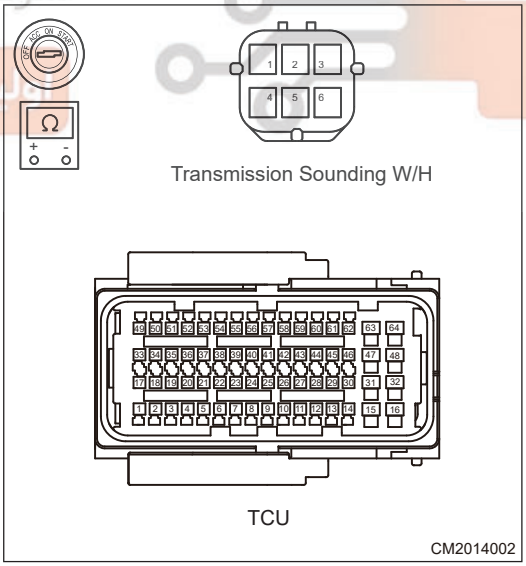
(b) Disconnect the TCU connector.

(c) Disconnect the output pulley speed sensor connector.

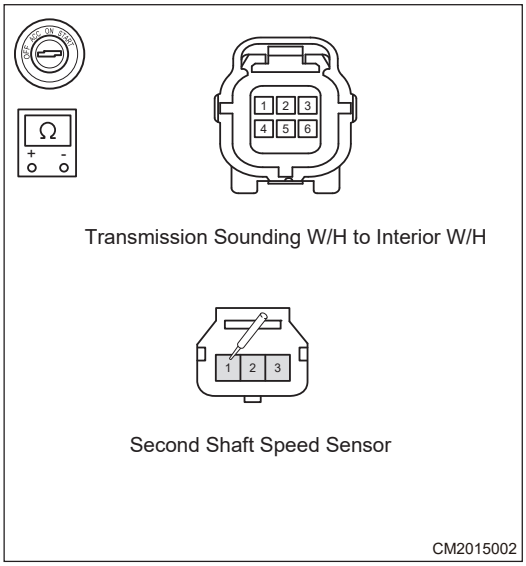
(d) Use a multimeter to check for continuity between TCU connector (connected terminals) and terminals 1, 2, 3 of output pulley speed sensor to check for an open or short in the wire harness between output pulley speed sensor and TCU.



(e) Use a multimeter to check for continuity between TCU connector (connected terminals) and transmission peripheral sensor adapter connector (connected terminals) to check for an open in the wire harness between TCU and sensor adapter connector.



(f) Use a multimeter to check for continuity between transmission wire harness connector (connected terminals) and terminals 1, 2, 3 of output pulley speed sensor connector to check for an open in the wire harness between transmission wire harness connector and output pulley speed sensor.



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

OK

4	Check output pulley speed sensor

(a) Replace output pulley speed sensor with a new one to compare and verify.

OK → **Replace output pulley speed sensor**

NG

5	Confirm DTCs again

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	**P084300**	**Primary Pressure Sensor Signal Short to BAT**
DTC	**P084200**	**Primary Pressure Sensor Signal Short to GND**

Description
TCU detects the transmission input pulley shaft pressure through input pulley shaft pressure sensor.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check wire harness and connector**

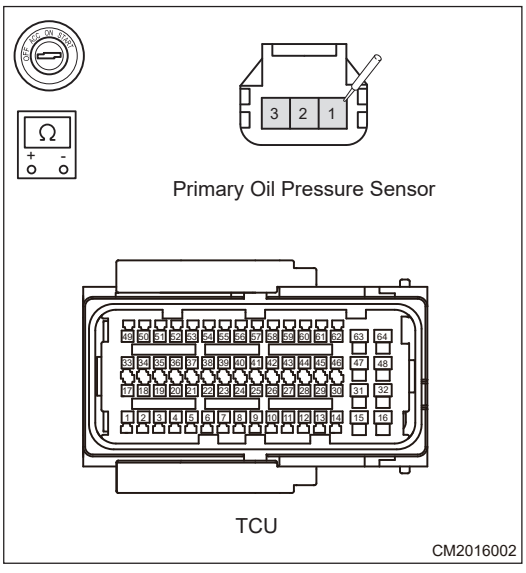
(a) Turn ignition switch to OFF.
(b) Disconnect the input pulley shaft pressure sensor connector and TCU connector.
(c) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

2	**Check wire harness and connector (Input pulley pressure sensor - TCU)**

(a) Turn ignition switch to OFF.
(b) Disconnect the TCU connector.
(c) Disconnect the input pulley pressure sensor connector.
(d) Use a multimeter to check for continuity and resistance between TCU connector (connected terminals) and terminals 1, 2, 3 of input pulley pressure sensor connector to check if input pulley pressure sensor is short to ground or power supply.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

3	**Check input pulley pressure sensor**

(a) Replace input pulley pressure sensor with a new one to compare and verify.

OK → **Replace input pulley oil pressure sensor**

NG

4	**Confirm DTCs again**

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	P171000	Primary Pressure Sensor Supply Abnormal

Description
TCU detects the transmission input pulley shaft pressure through pressure sensor.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check wire harness and connector**

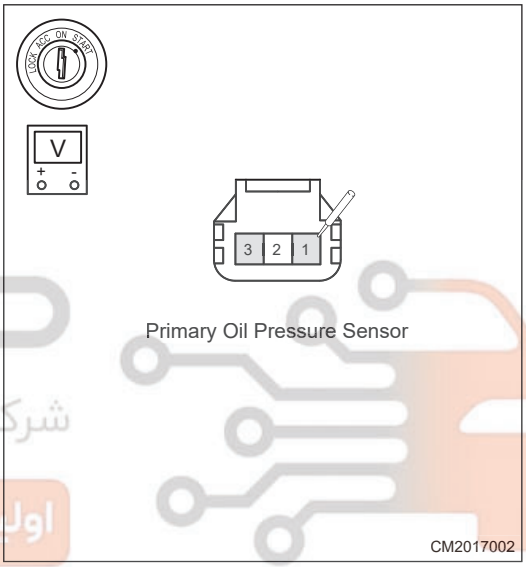
(a) Turn ignition switch to OFF.
(b) Disconnect the input pulley pressure sensor connector and TCU connector.
(c) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK ↓

2	**Check input pulley pressure sensor power supply voltage**

(a) Turn ignition switch to OFF.
(b) Disconnect the input pulley pressure sensor connector.
(c) Turn ignition switch to ON. Use a multimeter to measure the voltage between terminal 1 and terminal 3 of input pulley pressure sensor connector, it should be 5 V under normal conditions.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK ↓

3	**Check input pulley pressure sensor**

(a) Replace input pulley pressure sensor with a new one to compare and verify.

NG → **Replace the input pulley pressure sensor**

OK ↓

4	**Confirm DTCs again**

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

OK	**Confirm that system is normal**
NG	**Replace TCU control module assembly**

DTC	**P084800**	**Secondary Pressure Sensor Short to BAT**
DTC	**P084700**	**Secondary Pressure Sensor Short to GND**

Description
TCU detects the transmission output pulley shaft pressure through output pulley shaft pressure sensor.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check wire harness and connector**

(a) Turn ignition switch to OFF.
(b) Disconnect the output pulley pressure sensor connector and TCU connector.
(c) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG	**Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

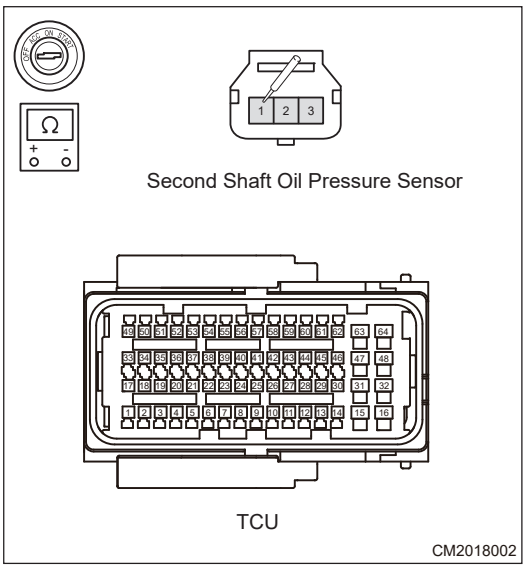
2	**Check wire harness and connector (Output pulley pressure sensor - TCU)**

(a) Turn ignition switch to OFF.

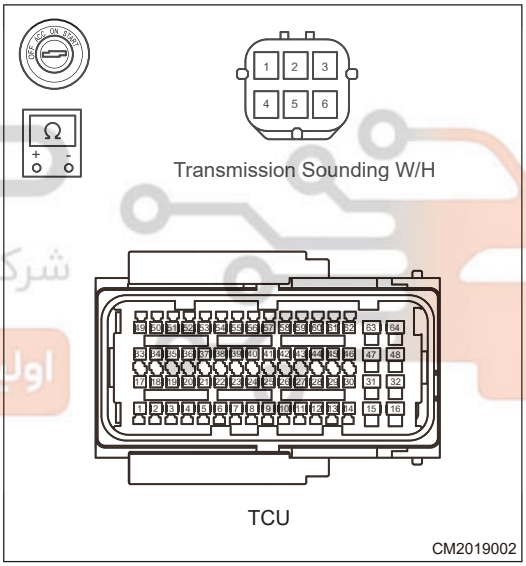
(b) Disconnect the TCU connector.

(c) Disconnect the output pulley pressure sensor connector.

(d) Use a multimeter to check for continuity and resistance between TCU connector (connected terminals) and terminals 1, 2, 3 of output pulley pressure sensor to check for an open or short.



(e) Use a multimeter to check for continuity and resistance between TCU connector (connected terminals) and transmission peripheral sensor adapter connector (- connected terminals) to check for an open or short.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

3	**Check output pulley pressure sensor**

(a) Replace output pulley pressure sensor with a new one to compare and verify.

OK → **Replace output pulley pressure sensor**

NG

4	Confirm DTCs again

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	P171100	Secondary Pressure Sensor Supply Abnormal

Description
TCU detects the transmission output shaft pressure through pressure sensor.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	Check wire harness and connector

(a) Turn ignition switch to OFF.
(b) Disconnect the output pulley pressure sensor connector and TCU connector.
(c) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

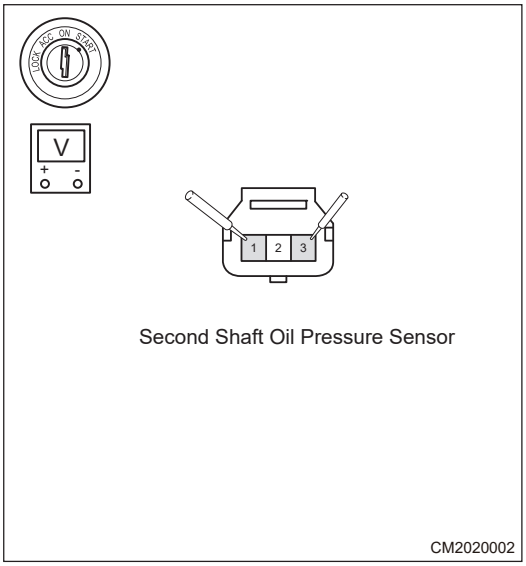
2	Check wire harness and connector (Output pulley pressure sensor - TCU)

(a) Turn ignition switch to OFF.

(b) Disconnect the output pulley shaft pressure sensor connector.

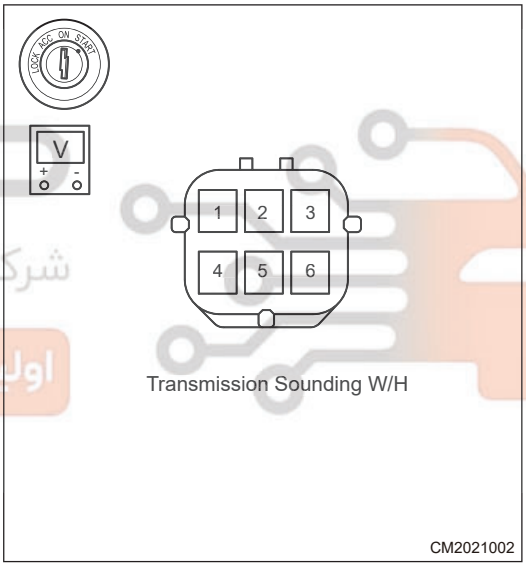
(c) Turn ignition switch to ON.

(d) Use a multimeter to measure the voltage between terminal 1 and terminal 3 of output pulley pressure sensor connector, it should be 5 V under normal conditions.



(e) Disconnect the transmission wire harness terminal sensor adapter connector.

(f) Use a multimeter to measure the voltage between the connector terminals at the transmission wire harness terminal corresponding to the terminals 1, 3 of output pulley pressure sensor connector.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

3	**Check output pulley pressure sensor**

(a) Replace output pulley pressure sensor with a new one to compare and verify.

OK → **Replace output pulley pressure sensor**

NG

4	Confirm DTCs again

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	P096200	Line Solenoid Short to GND
DTC	P096300	Line Solenoid Short to BAT
DTC	P096000	Line Solenoid Open Load
DTC	P095900	Line Solenoid Performance failure

Description
TCU adjusts the system pressure by controlling this solenoid valve.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	Check wire harness and connector

(a) Turn ignition switch to OFF.
(b) Check TCU connector and transmission valve body assembly connector, confirm that they are installed in place and connected properly.
(c) Disconnect transmission valve body assembly connector and TCU connector.
(d) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

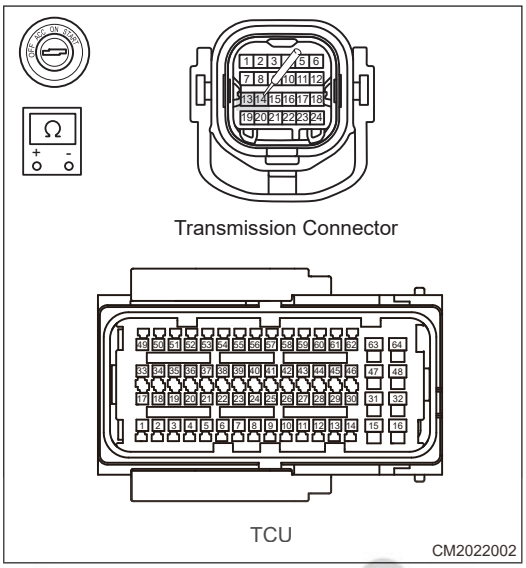
2	Check wire harness and connector (Main oil pressure control solenoid valve - TCU)

(a) Turn ignition switch to OFF.

(b) Disconnect the TCU connector.

(c) Disconnect transmission valve body assembly connector.

(d) Check for continuity between TCU wire harness connector (connected terminals) and terminals 13, 14 of transmission valve body assembly connector to check for an open or short.



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

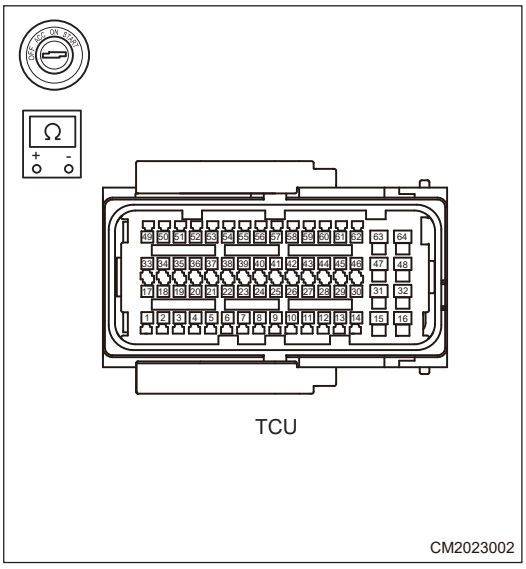
OK

3	Check main oil pressure control solenoid valve

(a) Disconnect the negative battery cable.

(b) Disconnect the TCU connector.

(c) Use a multimeter to measure the resistance between the main oil pressure control solenoid valve terminals corresponding to TCU connector, resistance range at normal temperature: 5.3 ± 0.3 Ω.



NG → **Replace transmission solenoid valve assembly**

OK

4	**Confirm DTCs again**

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	P096600	Primary Solenoid Short to GND
DTC	P096700	Primary Solenoid Short to BAT
DTC	P096400	Primary Solenoid Open Load
DTC	P097200	Primary Solenoid Performance failure

Description
TCU adjusts the system pressure by controlling this solenoid valve.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check wire harness and connector**

(a) Turn ignition switch to OFF.

(b) Check TCU connector and transmission valve body assembly connector, confirm that they are installed in place and connected properly.

(c) Disconnect transmission valve body assembly connector and TCU connector.

(d) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

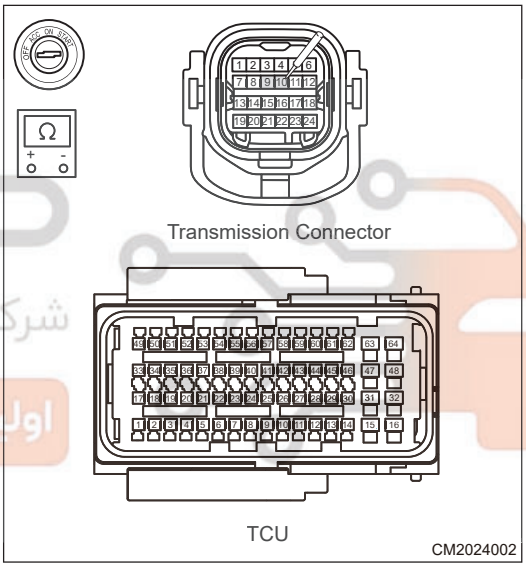
2	**Check wire harness and connector (Input pulley control solenoid valve - TCU)**

(a) Turn ignition switch to OFF.

(b) Disconnect the TCU connector.

(c) Disconnect transmission valve body assembly connector.

(d) Use a multimeter to check for continuity between TCU connector (connected terminals) and terminals 9, 10 of transmission valve body assembly connector to check for an open or short.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

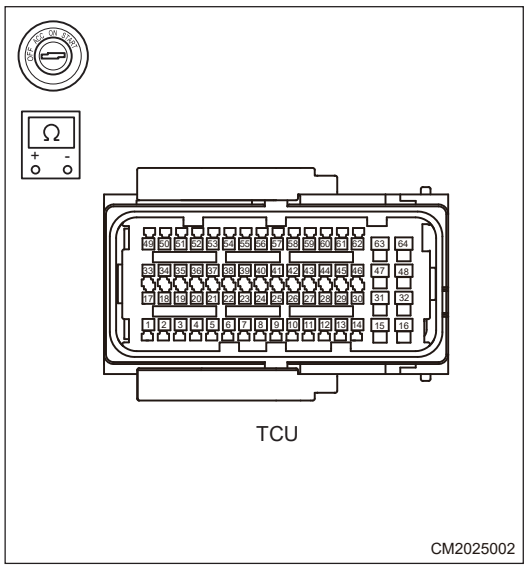
OK

3	**Check input pulley control solenoid valve**

(a) Turn ignition switch to OFF.

(b) Disconnect the TCU connector.

(c) Use a multimeter to measure the resistance between the terminals of the input pulley control solenoid valve corresponding to TCU connector, resistance range at normal temperature: 5.3 ± 0.3 Ω.



NG → **Replace transmission solenoid valve assembly**

OK →

4	**Confirm DTCs again**

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	**P097000**	**Secondary Solenoid Short to GND**
DTC	**P097100**	**Secondary Solenoid Short to BAT**
DTC	**P096800**	**Secondary Solenoid Open Load**
DTC	**P097300**	**Secondary Solenoid Performance failure**

Description
TCU adjusts the system pressure by controlling this solenoid valve.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.

- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check wire harness and connector**

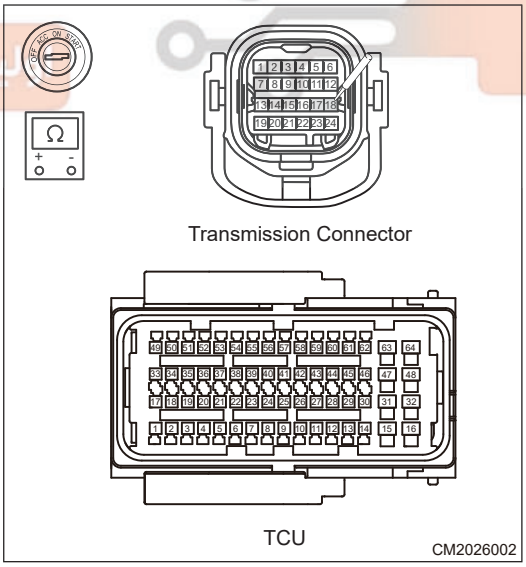
(a) Turn ignition switch to OFF.
(b) Check TCU connector and transmission valve body assembly connector, confirm that they are installed in place and connected properly.
(c) Disconnect transmission valve body assembly connector and TCU connector.
(d) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

2	**Check wire harness and connector (Output pulley control solenoid valve - TCU)**

(a) Turn ignition switch to OFF.
(b) Disconnect the TCU connector.
(c) Disconnect transmission valve body assembly connector.
(d) Use a multimeter to check for continuity between TCU connector (connected terminals) and terminals 17, 18 of transmission valve body assembly connector to check for an open or short.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

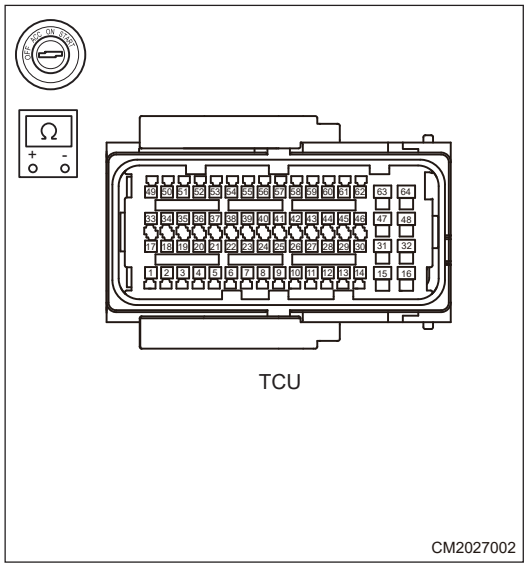
OK

3	Check output pulley control solenoid valve

(a) Turn ignition switch to OFF.

(b) Disconnect the TCU connector.

(c) Use a multimeter to measure the resistance between the corresponding terminals of the output pulley control solenoid valve on TCU connector, resistance range at normal temperature: 5.3 ± 0.3 Ω.



NG → **Replace transmission solenoid valve assembly**

OK →

4	Confirm DTCs again

(a) Connect all the connectors.

(b) Connect the negative battery cable.

(c) Use diagnostic tester to clear DTCs.

(d) Start the engine.

(e) Check if the same DTCs are still output.

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	P272900	TCC Solenoid Short to GND
DTC	P273000	TCC Solenoid Short to BAT
DTC	P272700	TCC Solenoid Open Load
DTC	P272500	TCC Solenoid Performance failure

Description

TCU adjusts the system pressure by controlling this solenoid valve.

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	Check wire harness and connector

(a) Turn ignition switch to OFF.

(b) Check TCU connector and transmission valve body assembly connector, confirm that they are installed in place and connected properly.

(c) Disconnect transmission valve body assembly connector and TCU connector.

(d) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK →

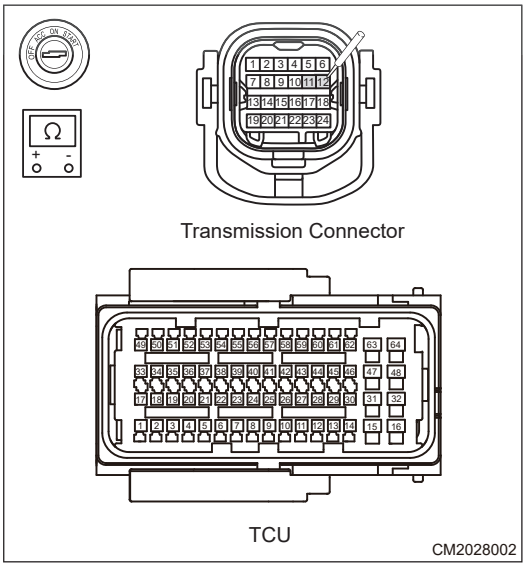
2	Check wire harness and connector (Hydraulic torque converter control solenoid valve - TCU)

(a) Turn ignition switch to OFF.

(b) Disconnect the TCU connector.

(c) Disconnect transmission valve body assembly connector.

(d) Use a multimeter to check for continuity between TCU connector (connected terminals) and terminals 11, 12 of transmission valve body assembly connector to check for an open or short.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

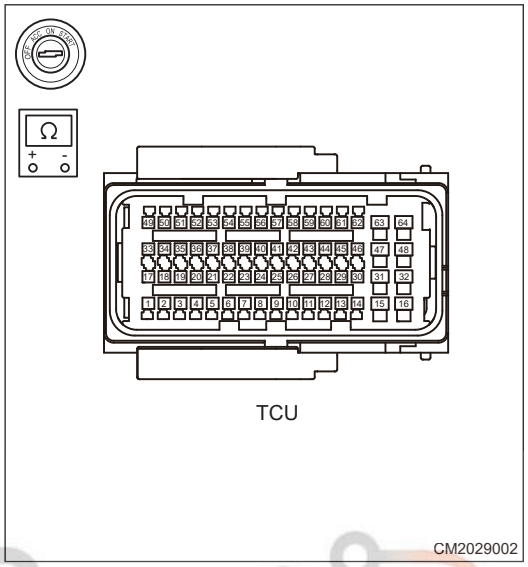
OK

3	Check hydraulic torque converter control solenoid valve

(a) Turn ignition switch to OFF.

(b) Disconnect the TCU connector.

(c) Use a multimeter to measure the resistance between the terminals of torque converter control solenoid valve corresponding to TCU connector, resistance range at normal temperature: 5.3 + 0.2/ - 0.4 Ω.



NG → **Replace transmission solenoid valve assembly**

OK

4	Confirm DTCs again

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	P272000	Clutch Solenoid Short to GND
DTC	P272100	Clutch Solenoid Short to BAT
DTC	P271800	Clutch Solenoid Open Load
DTC	P271600	Clutch Solenoid Performance failure

Description
TCU adjusts the system pressure by controlling this solenoid valve.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	Check wire harness and connector

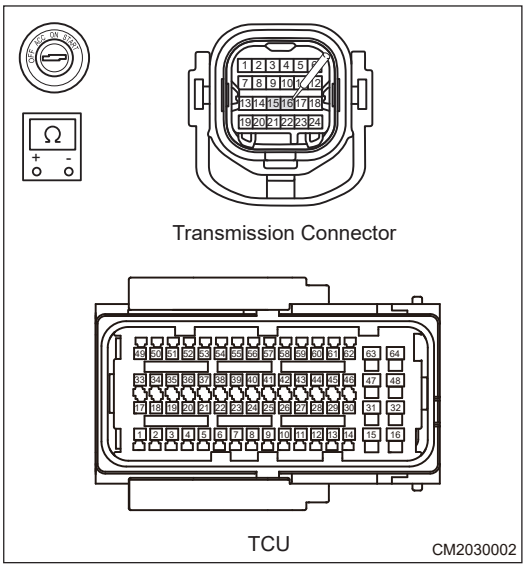
(a) Turn ignition switch to OFF.
(b) Check TCU connector and transmission valve body assembly connector, confirm that they are installed in place and connected properly.
(c) Disconnect transmission valve body assembly connector and TCU connector.
(d) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

2	Check wire harness and connector (Clutch control solenoid valve - TCU)

(a) Turn ignition switch to OFF.
(b) Disconnect the TCU connector.
(c) Disconnect transmission valve body assembly connector.
(d) Use a multimeter to check for continuity between TCU connector (connected terminals) and terminals 15, 16 of transmission valve body assembly connector to check for an open or short.



NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

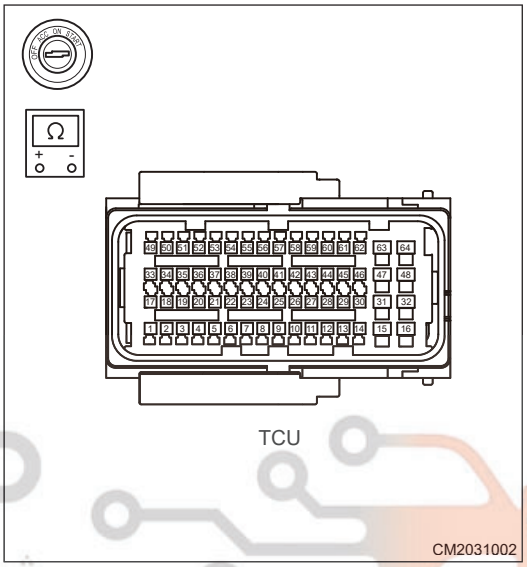
OK

3	Check clutch control solenoid valve

(a) Turn ignition switch to OFF.

(b) Disconnect the TCU connector.

(c) Use a multimeter to measure the resistance between the terminals of clutch control solenoid valve corresponding to TCU connector, resistance range at normal temperature: 5.3 ± 0.3 Ω.



NG → **Replace transmission solenoid valve assembly**

OK

4	Confirm DTCs again

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	**P094000**	**Oil Temperature Sensor Short to BAT/OL**
DTC	**P093900**	**Oil Temperature Sensor Short to GND**

Description
TCU detects the transmission fluid temperature through oil temperature sensor.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	Check wire harness and connector

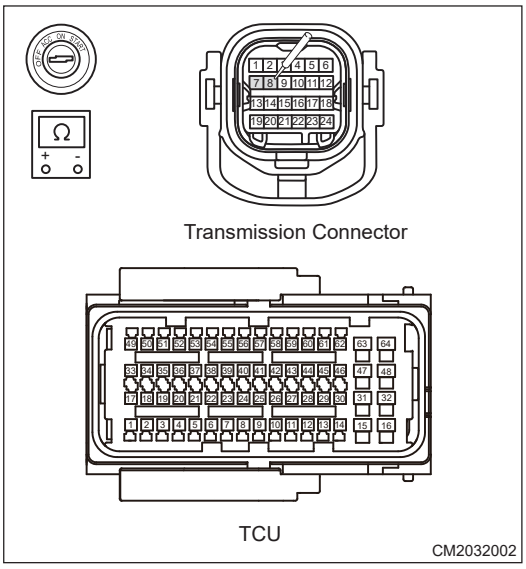
(a) Turn ignition switch to OFF.
(b) Check TCU connector and transmission valve body assembly connector, confirm that they are installed in place and connected properly.
(c) Disconnect transmission valve body assembly connector and TCU connector.
(d) Check each PIN for looseness, disengagement, bending, corrosion, aging or damage, etc.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

2	Check wire harness and connector (Oil temperature sensor - TCU)

(a) Turn ignition switch to OFF.
(b) Disconnect the TCU connector.
(c) Disconnect transmission solenoid valve assembly connector.
(d) Use a multimeter to check for continuity between TCU connector (connected terminals) and terminals 7, 8 of transmission valve body assembly connector to check for an open or short.

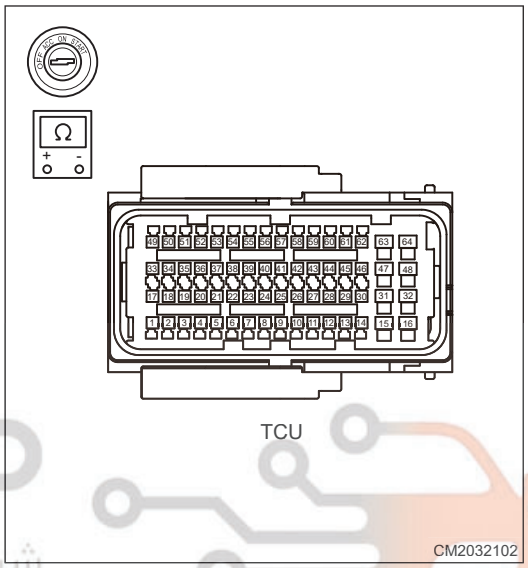


NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

OK

3	**Check oil temperature sensor**

(a) Connect the transmission solenoid valve connector, use a multimeter to measure the resistance between the terminals of oil temperature sensor corresponding to TCU connector, and refer to the following table for the relationship between resistance and temperature:



Temperature (°C)	-40	-30	-20	-10	0	10	20	25	30
Resistance (KΩ)	120.33	66.77	38.65	23.24	14.45	9.26	6.10	5.00	4.12
Temperature (°C)	40	50	60	70	80	90	100	110	120
Resistance (KΩ)	2.85	2.01	1.44	1.06	0.78	0.59	0.45	0.35	0.28

NG → **Replace oil temperature sensor**

OK

4	**Confirm DTCs again**

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

OK	**Confirm that system is normal**
NG	**Replace TCU control module assembly**

DTC	**P021800**	**Trans Oil Temperature Out of Range**
DTC	**P176700**	**Trans Oil Temperature Critical**

Description
TCU detects the transmission fluid temperature through oil temperature sensor.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check wire harness, connector and oil temperature sensor**

(a) Refer to the operation of P094000 and P093900.

NG	**Repair or replace wire harness or connector, oil temperature sensor**

OK

2	**Check cooling system**

(a) Check if transmission oil cooler installation and line connection, etc. are abnormal.
(b) Check if vehicle cooling system is abnormal.

NG	**Repair or replace faulty area**

OK

3	**Confirm DTCs again**

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	**P081E00**	**Clutch (Reverse) Slip**
DTC	**P081100**	**Clutch (Drive) Slip**

Description
The clutch control is used to achieve quick, smooth engagement of D/R gear.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check turbine speed sensor**

(a) Refer to inspection method for turbine speed sensor.

NG → **Repair or replace wire harness, connector or sensor as needed**

OK

2	**Check clutch control solenoid valve**

(a) Refer to inspection method for clutch solenoid valve fault.

NG → **Repair or replace wire harness, connector or clutch solenoid valve as needed**

OK

3	Check hydraulic system for leakage

(a) Check if clutch pressure is normal.

NG → **Replace or repair faulty area**

OK

4	Check clutch lining

(a) Check if clutch lining is normal.

NG → **Replace clutch lining**

OK

5	Confirm DTCs again

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	P089400	TCC Slip

Description
TCU obtains the hydraulic torque converter locking control target according to the current driving mode, vehicle speed and accelerator pedal signal, and realizes the locking clutch closing control.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	Check hydraulic torque converter locking control solenoid valve and wire harness

(a) Refer to inspection method for hydraulic torque converter locking control solenoid valve DTC.

NG → **Repair or replace as needed**

OK ↓

2	Check hydraulic control circuit

(a) Check hydraulic torque converter hydraulic control circuit.

NG → **Repair or replace as needed**

OK ↓

3	Check hydraulic torque converter

(a) Check hydraulic torque converter.

NG → **Replace or repair it as needed**

OK ↓

4	Confirm DTCs again

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	**P071500**	**Unreasonable Turbine Speed Signal**
DTC	**P079100**	**Unreasonable Primary Speed Signal**
DTC	**P072000**	**Unreasonable Secondary Speed Signal**

Description
TCU detects the transmission turbine speed, input pulley speed and output pulley speed signals through turbine speed sensor, input pulley speed sensor and output pulley speed sensor.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check wire harness and connector**

(a) Refer to P071600 wire harness troubleshooting method for P071500.
(b) Refer to P079200 wire harness troubleshooting method for P079100.
(c) Refer to P072100 wire harness troubleshooting method for P072000.

NG → **Repair or replace as needed**

OK

2	**Check sensor**

(a) Replace turbine speed sensor with a new one to compare and verify.
(b) Replace input/output pulley shaft speed sensor with a new one to compare and verify.

OK → **Replace sensor**

NG

3	**Confirm DTCs again**

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

OK	**Confirm that system is normal**
NG	**Replace TCU control module assembly**

DTC	P093700	Unreasonable Oil Temperature Signal

Description
TCU detects the transmission turbine speed, input pulley speed and output pulley speed signals through turbine speed sensor, input pulley speed sensor and output pulley speed sensor.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check wire harness and connector**

(a) Refer to P093900 and P094000 wire harness troubleshooting method for P093700.

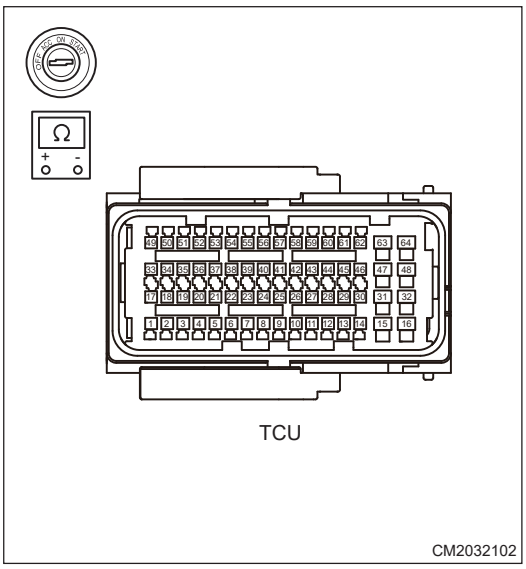
NG	**Repair or replace as needed**

OK

2	**Check oil temperature sensor**

(a) Turn ignition switch to OFF.
(b) Disconnect the TCU connector.

(c) Use a multimeter to measure the resistance between the terminals of oil temperature sensor corresponding to TCU connector.



Refer to the following table for the relationship between resistance and transmission oil temperature:

Temperature (°C)	-40	-30	-20	-10	0	10	20	25	40
Resistance (KΩ)	120.33	66.77	38.65	23.24	14.45	9.26	6.10	5.00	4.12
Temperature (°C)	40	50	60	70	80	90	100	110	120
Resistance (KΩ)	2.85	2.01	1.44	1.06	0.78	0.59	0.45	0.35	0.28

NG → **Repair or replace as needed**

OK

3	**Confirm DTCs again**

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	P279700	Primary Pressure Control Issue
DTC	P279800	Secondary Pressure Control Issue

Description
TCU controls the pulley shaft oil pressure according to the current oil pressure and the target oil pressure to realize gear ratio control.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check input/output pulley shaft pressure sensor**

(a) Refer to inspection method for input/output pulley pressure sensor.

NG → **Repair or replace as needed**

OK ↓

2	**Check input/output pulley shaft pressure control solenoid valve**

(a) Refer to inspection method for input/output pulley shaft pressure control solenoid valve.

NG → **Repair or replace as needed**

OK ↓

3	**Check hydraulic system**

(a) Make sure that the CAN communication is normal. After 10 seconds of starting the engine, use the refresh tool to collect a piece of data. Data collection requirements:
  (i) P/N idling data.
  (ii) The normal driving data of the vehicle, the vehicle speed is required to be more than 40 km/h.
(b) Analyze the data.

NG → **Repair or replace as needed**

OK

4	Confirm DTCs again

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

DTC	P084000	Unreasonable Primary Pressure Signal
DTC	P084500	Unreasonable Secondary Pressure Signal

Description
TCU detects the transmission input shaft and output shaft pressure signals through input shaft and output shaft pressure sensors.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	Check input/output pulley shaft pressure sensor wire harness or connector

(a) Refer to P084200 and P084300 wire harness troubleshooting method for P084000.
(b) Refer to P084700 and P084800 wire harness troubleshooting method for P084500.

NG → **Repair or replace as needed**

OK

2	Verify input/output pulley shaft pressure sensor

(a) Replace input/output pulley shaft pressure sensor with a new one to verify.

OK	**Replace input/output pulley shaft pressure sensor**

NG

3	**Confirm DTCs again**

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

OK	**Confirm that system is normal**
NG	**Replace TCU control module assembly**

DTC	**P073000**	**Ratio Error**

Description
TCU obtains the target ratio according to the current driving mode, vehicle speed and accelerator pedal signal, the actual ratio is calculated according to the input pulley shaft speed and the output pulley shaft speed, and the transmission control module realizes ratio control through comprehensive feedback control according to the above information.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check transmission electrical appliances**

(a) Refer to inspection method for input/output pulley shaft speed signal.
(b) Refer to inspection method for input/output pulley shaft pressure sensor.
(c) Refer to inspection method for input/output pulley shaft pressure control valve.

NG	**Repair or replace as needed**

OK

2	**Check hydraulic system**

(a) Refer to inspection method for input/output pulley pressure signal.

NG → **Repair or replace as needed**

OK ↓

3	**Check engine torque**

(a) Check and troubleshoot engine torque.

NG → **Repair or replace as needed**

OK ↓

4	**Check transmission components**

(a) Check and analyze the transmission.

NG → **Repair or replace abnormally worn components of transmission as needed**

OK ↓

5	**Confirm DTCs again**

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

OK → **Confirm that system is normal**

NG → **Replace TCU control module assembly**

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	BCM Data Received Abnormal
DTC	U040181	ECM Data Received Abnormal
DTC	U041881	BSM Data Received Abnormal
DTC	U042881	SAM Data Received Abnormal
DTC	P175000	Invalid Engine Speed Signal
DTC	P175100	Invalid Engine Actual Torque Signal
DTC	P175200	Invalid Brake Pedal Signal
DTC	P175300	Invalid Gas Pedal Signal
DTC	P175400	Invalid Vehicle Speed Signal
DTC	P175500	Invalid Front Left Speed Signal
DTC	P175600	Invalid Front Right Speed Signal
DTC	P175700	Invalid Rear Left Speed Signal
DTC	P175800	Invalid Rear Right Speed Signal
DTC	P175900	Invalid Engine Coolant Signal
DTC	P176000	Invalid Odormeter Signal
DTC	P176100	ABS Invalid
DTC	P176200	Invalid Master Cylinder Pressure Signal
DTC	U014687	Lost Communication with CGW
DTC	U119387	Lost Communication with EGS
DTC	P173100	EGS Request Invalid

Description
TCU performs information interaction with other controllers through vehicle CAN.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	**Check fuse**

(a) Check the resistance of corresponding fuse.

Standard resistance: Less than 1 Ω

NG → **Replace fuse**

OK

2	Check sensor

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

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

OK

3	Check CAN network

(a) Check if vehicle CAN network is abnormal.

OK → **Confirm that system is normal**

NG → **Check and repair CAN network**

DTC	P178300	SBW Safety Fault
DTC	P178400	SBW Internal Communication Fault
DTC	P178600	SBW Electrical Fault
DTC	P178800	SBW Not Self-learning
DTC	P178900	SBW PID Control Fault

Description
The above faults occur during the operation of electronic shift actuator, indicating that the electronic shift actuator system is operating abnormally.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	Check electronic shift actuator

(a) Turn off vehicle KL15 power, wait for three minutes, disconnect the positive battery terminal.
(b) Power on again and start, perform multiple shift tests.

NG → **Replace SBW**

OK → **Confirm if the system is normal. Use diagnostic tester to clear history DTC**

DTC	P178100	Lost Communication with TCU
DTC	P178200	Invalid Data From TCU
DTC	P172500	Lost Communication with SBW
DTC	P172600	Invalid Data From SBW
DTC	P172888	TCU CAN2 Bus Off
DTC	P178000	SBW CAN Bus Off

Description
SBW performs information interaction with TCU through CAN2.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	Check wire harness and connector

(a) Turn off the vehicle, release the brake, turn off the emergency flasher, unplug the diagnostic tester, etc., lock the vehicle and wait for three minutes, then disconnect the positive battery terminal.
(b) Disconnect SBW connector, and check each pin of SBW connector for looseness, disengagement, bending, corrosion, aging or damage, etc.
(c) Disconnect TCU connector, and check each pin of TCU connector for looseness, disengagement, bending, corrosion, aging or damage, etc.
(d) Connect SBW connector and TCU connector, power on again and start, perform multiple shift tests.

NG → **Repair or replace as needed; Using diagnostic tester, clear history DTC**

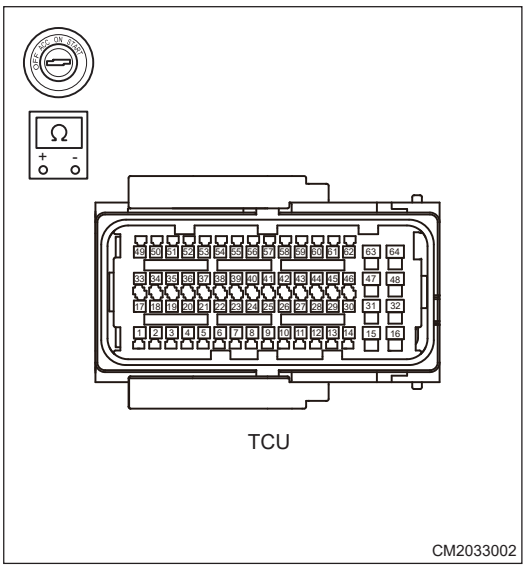
OK

2	Check wire harness and connector

(a) Turn ignition switch to OFF.

(b) Disconnect the TCU connector.

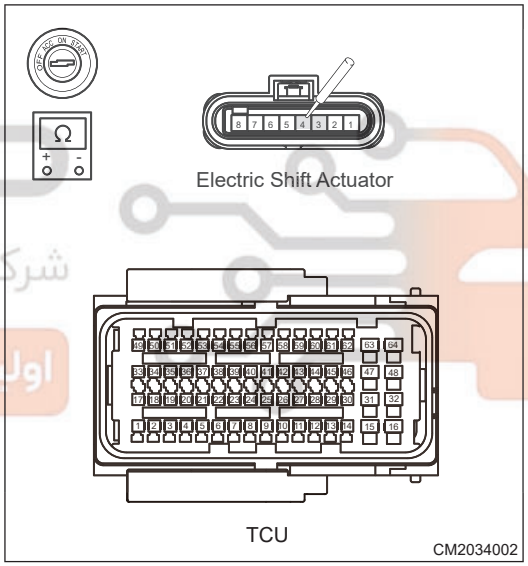
(c) Use a multimeter to measure the resistance between CAN lines corresponding to TCU wire harness connector terminal. Standard resistance is about 120 Ω.



(d) Disconnect the electronic shift actuator connector.

(e) Use a multimeter to check for continuity between TCU wire harness connector (connected terminals) and terminals 3, 4 of electronic shift actuator connector to check for an open or short.

(f) Use a multimeter to check for continuity between TCU wire harness connector and terminals 3, 4 corresponding to electronic shift actuator connector.



NG → **Repair or replace wire harness or connector as needed**

OK →

3	**Check electronic shift actuator (SBW)**

(a) Replace electronic shift actuator with a new one to compare and verify.

NG → **Replace SBW**

OK

4	Confirm DTCs again

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

OK	Confirm that system is normal

NG	Replace TCU control module assembly

DTC	P171900	EOL Anti-theft Configuration Not Done

Description
TCU checks according to the vehicle off-line EOL information and if the current vehicle is equipped with PEPS module.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	Check TCU

(a) Check if it is the original TCU, for example: check if the VIN of the vehicle is consistent with the VIN stored inside the TCU.

Inconsi-stent	Determine the source of TCU, check the model by reading the TCU software version, and make anti-theft matching again

Consist-ent	Check TCU EOL information (Refer to vehicle Repair Manual for fault inspection, such as reading the EOL matching status)

DTC	P172000	Anti-theft verification fails

Description
TCU and IMMO verify anti-theft algorithm, control P gear unlock.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	Check TCU

(a) Check if it is the original TCU, for example: check if the VIN of the vehicle is consistent with the VIN stored inside the TCU.

Inconsi-stent → **Determine the source of TCU, check the model by reading the TCU software version, and make anti-theft matching again**

Consiste-nt

2	Check TCU anti-theft matching information

(a) Refer to vehicle Repair Manual for fault inspection.

NG → **Anti-theft rematching**

OK

3	Check PEPS controller module

(a) Check if PEPS module is on-line.

NG → **Refer to to PEPS system to check and repair**

OK

4	**Check IMMO controller module**

(a) Check IMMO controller module.

NG → **Repair or replace as needed**

DTC	**P179000**	**SBW Mechanical Fault**

Description
The electronic shift detects an abnormal shift and cannot shift.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check shift connecting rod installation position.**

(a) Disconnect the negative battery.
(b) Adjust electronic shift connecting rod position.
(c) Perform gear self-learning again.
(d) Power on and start, perform multiple shift tests.

OK → **Using diagnostic tester, clear history DTC. Confirm that system is normal**

NG → **Replace SBW**

DTC	**P178700**	**SBW Over Temperature**

Description
Temperature is monitored inside the electronic shift actuator.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	**Check cooling system**

(a) Power off and lock the vehicle, open the engine compartment cover to cool down for a period of time, then power on and start, and check the shift.
(b) Check vehicle cooling system.

NG → **Repair or replace as needed**

OK

2	**Check electronic shift actuator**

(a) Check electronic shift actuator for blocking detection.

NG → **Repair or replace as needed**

OK

3	**Replace electronic shift actuator**

(a) Replace electronic shift actuator with a new one to compare and verify.

OK → **Replace SBW**

DTC	P172700	SBW Wrong Action

Description
The electronic shift actuator will shift to the specified gear after receiving the shift command.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	**Check electronic shift actuator**

(a) Check if the shift rocker arm of electronic shift actuator is blocked.

NG → **Repair or replace as needed**

OK ↓

2	**Perform electronic shift self-learning again**

(a) Refer to the electronic shift self-learning to relearn.
(b) Power off then power on again and start, perform multiple shift tests.

NG → **Replace SBW**

OK → **Confirm if the system is normal. Use diagnostic tester to clear history DTC**

DTC	P178500	SBW External Input Fault

Description
The power supply voltage will affect the operation of electronic shift actuator.

DTC Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

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

1	**Check electronic shift actuator**

(a) Turn ignition switch to OFF.
(b) Disconnect SBW and wire harness terminal connector, and check each PIN for looseness, disengagement, corrosion, aging or damage, etc.

NG → **Repair or replace as needed**

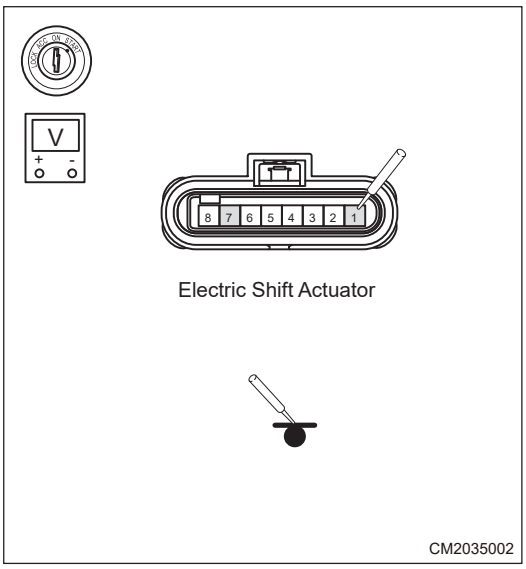
OK ↓

2	**Check wire harness**

(a) Disconnect the electronic shift actuator connector.

(b) Turn ignition switch to ON.

(c) Use a multimeter to measure voltage between terminals 1, 7 of electronic shift actuator connector and body ground, it should be 9 - 16 V.



NG → **Repair or replace as needed**

OK

3	**Replace electronic shift actuator**

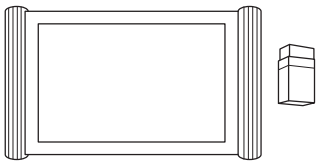
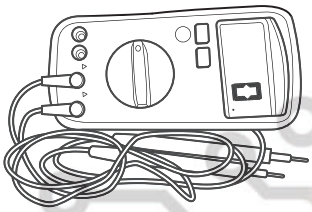
(a) Replace electronic shift actuator with a new one to compare and verify.

OK → **Replace SBW**

On-vehicle Service

Tools

General Tools

Tool Name	Tool Drawing
Diagnostic Tester	 S00001
Digital Multimeter	 S00002

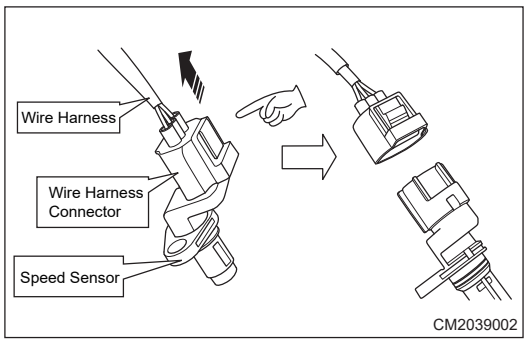
Speed Sensor Connector

Removal

⚠ Caution

- 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.

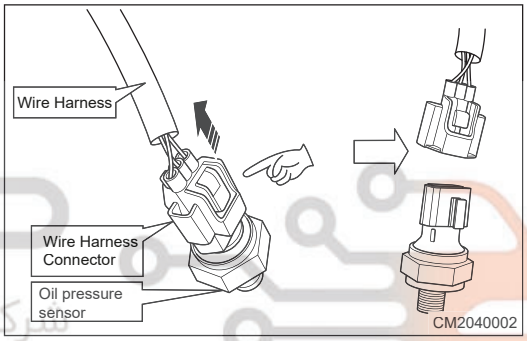
⚠ Caution
• Connectors must be installed in place.

Oil Pressure Sensor Connector

Removal

⚠ Caution
• 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.

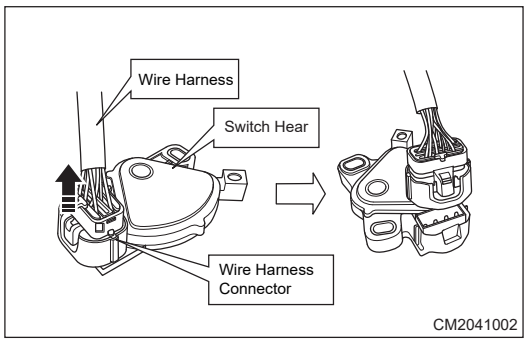
⚠ Caution
• Connectors must be installed in place.

Range Switch Connector

Removal

⚠ Caution
• 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.

⚠ Caution

- Connectors must be installed in place.

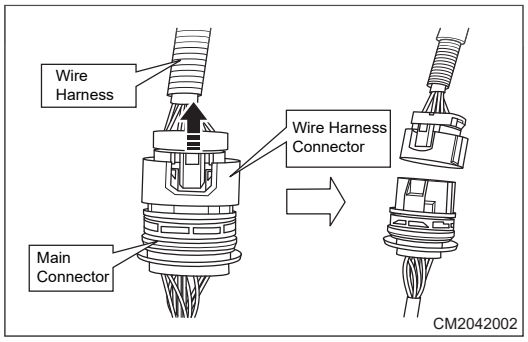
Wire Harness Main Connector

Removal

⚠ Caution

- 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), and flip the handle upward.
2. Pull up the wire harness connector at the same time.



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

Installation

1. Installation is in the reverse order of removal.

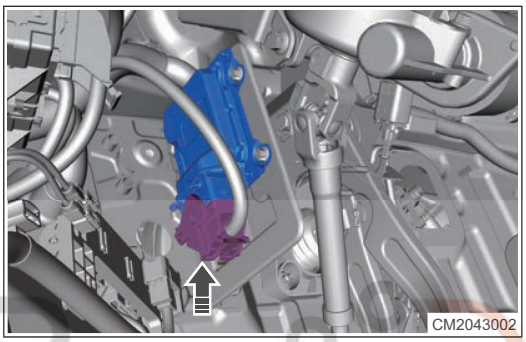
⚠ Caution

- Make sure that the connector is inserted into place while installing, when it is inserted in place, it will make a "click" sound.
- In the process of disassembly and assembly, alignment is required to avoid the occurrence of bending of pins.

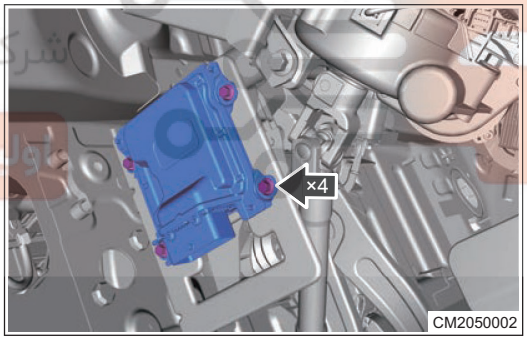
Transmission Control Module

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.

⚠ Caution

- Replace TCU with a new one to perform transmission self-learning.

Matching Learning

Transmission Self-Learning

Transmission self-learning should be performed in following conditions, failure to do so may cause unsmooth gear shifting and starting:

1. For the first driving of a new vehicle;
2. Replace TCU with a new one;

3. Replace valve body assembly, hydraulic torque converter, forward and reverse clutch set and transmission.

The transmission needs to clear the self-learning value with diagnostic tester after replacing the above components. After the vehicle power is turned off and then start again, perform self-learning according to the self-learning steps;
The specific operation of hydraulic torque converter lock clutch self-learning is as follows:

1. Start the engine and shift to D;
2. Accelerate the vehicle to 50 kph;
3. Release the accelerator pedal and do not depress the brake pedal. The vehicle will slide to below 10 kph;
4. Repeat steps 2 and 3 for three times;
5. Turn off the ignition key and self-learning is completed after waiting for 10 seconds.

The specific operation of forward clutch self-learning is as follows:

1. Release the parking brake after starting the engine;
2. 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;
3. Repeat step 2 for more than five times;
4. Turn off the ignition key and self-learning is completed after waiting for 10 seconds.

The specific operation of reverse clutch self-learning is as follows:

1. Release the parking brake after starting the engine;
2. 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;
3. Repeat step 2 for more than five times;
4. 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.

Electronic Shift Actuator Self-learning
Transmission self-learning should be performed in following conditions, otherwise there will be abnormal shifts:

1. Replace electronic shift actuator.
2. Electronic shift actuator was removed and installed again (such as replace the valve body).
3. Electronic shift part fault code alarms (such as P179000, P173100).

The specific operation of self-learning is as follows:

1. Vehicle power is turned on without starting;
2. First shift to N;
3. Then shift to P;
4. Finally shift to N;
5. Perform self-learning with diagnostic tester (It is required to perform self-learning in N);
   a. Select “T19C” vehicle model on diagnostic tester

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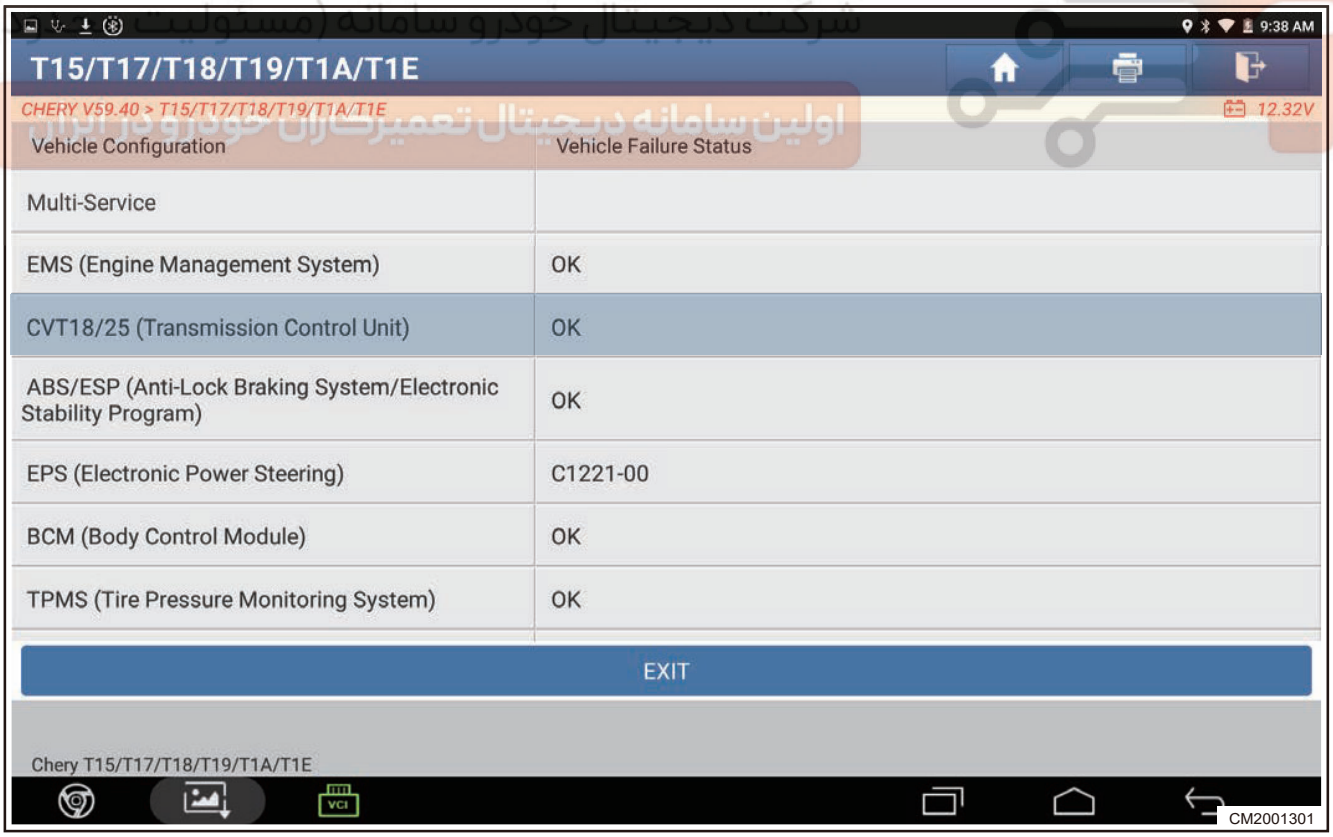
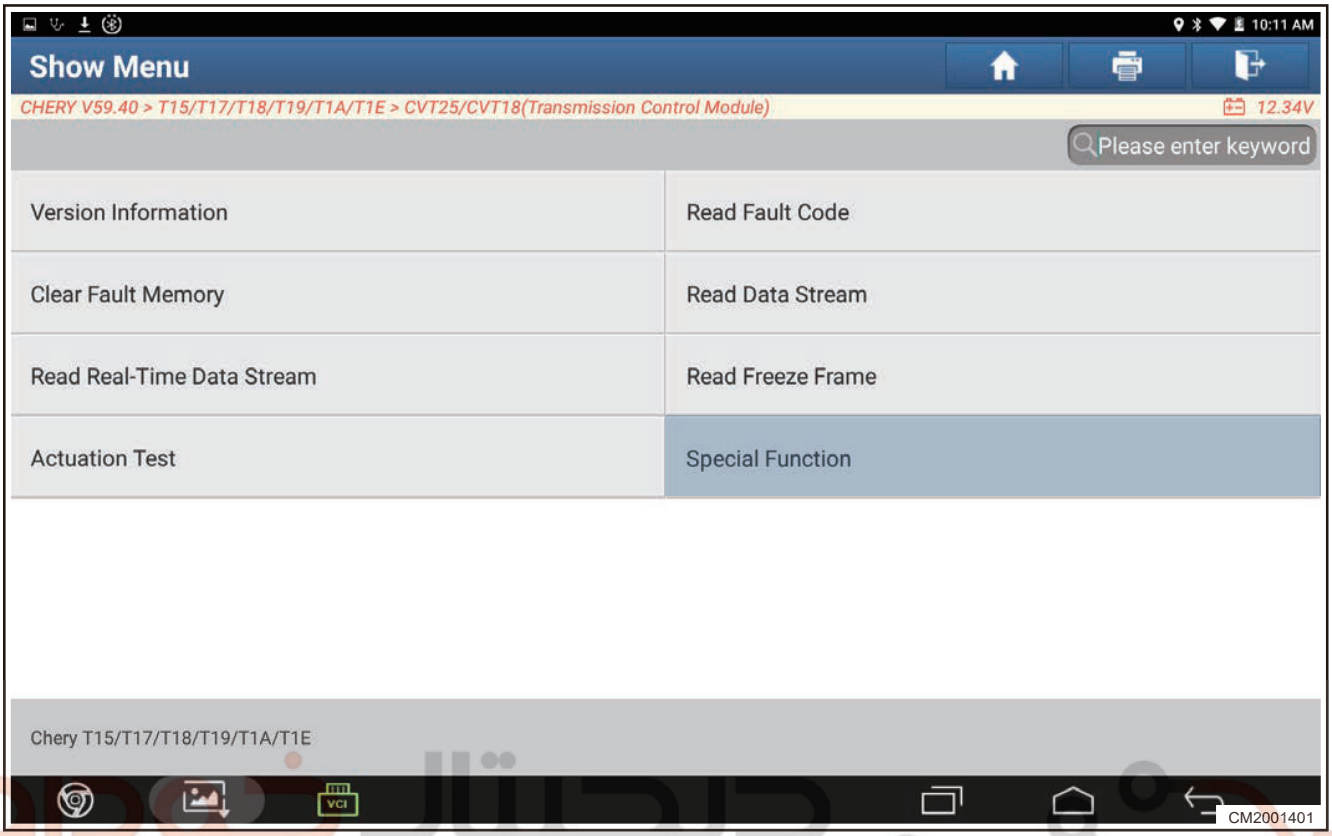
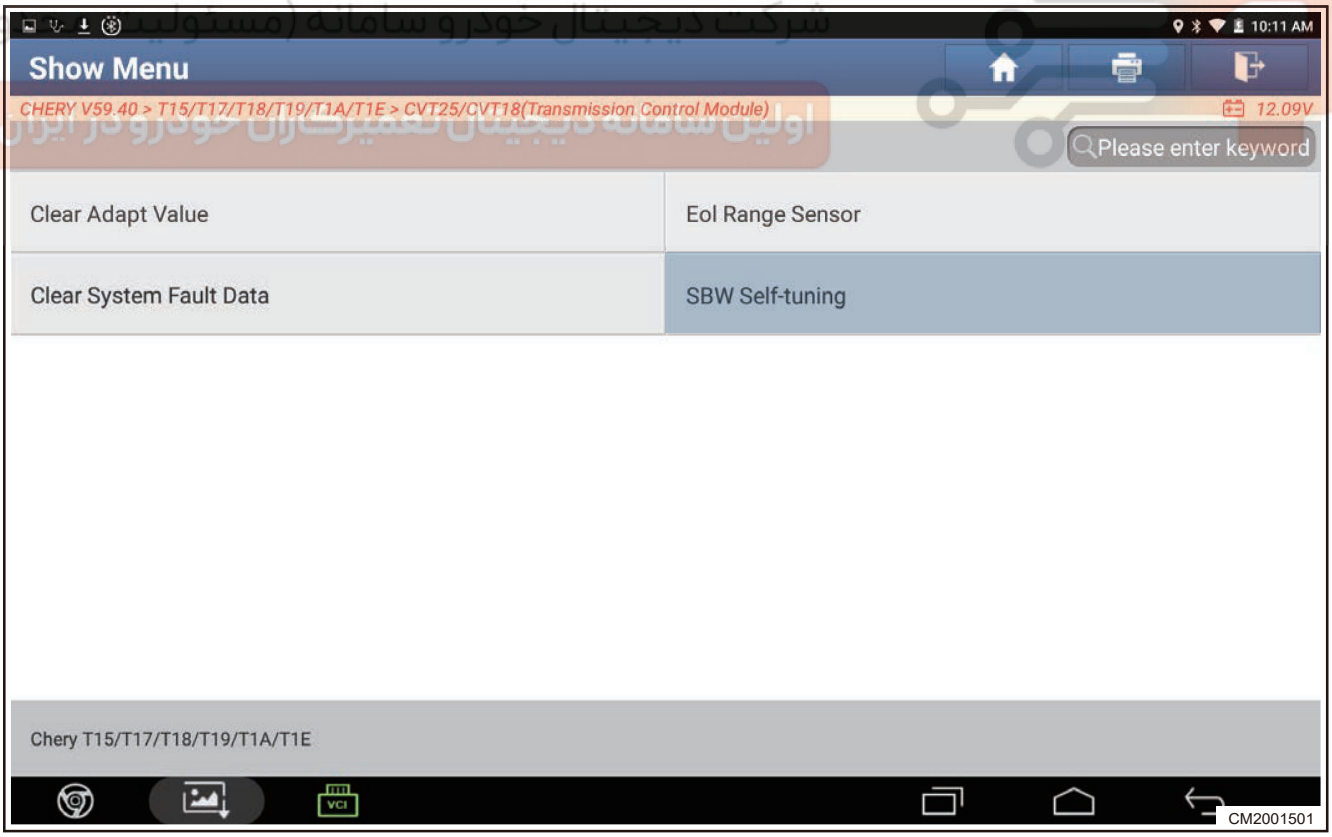
b. Select “CVT25 (Transmission Control Unit)”



c. Select “Special Function”



d. Select “SBW Self-learning”



e. After conditions of learning are met, learning is successful

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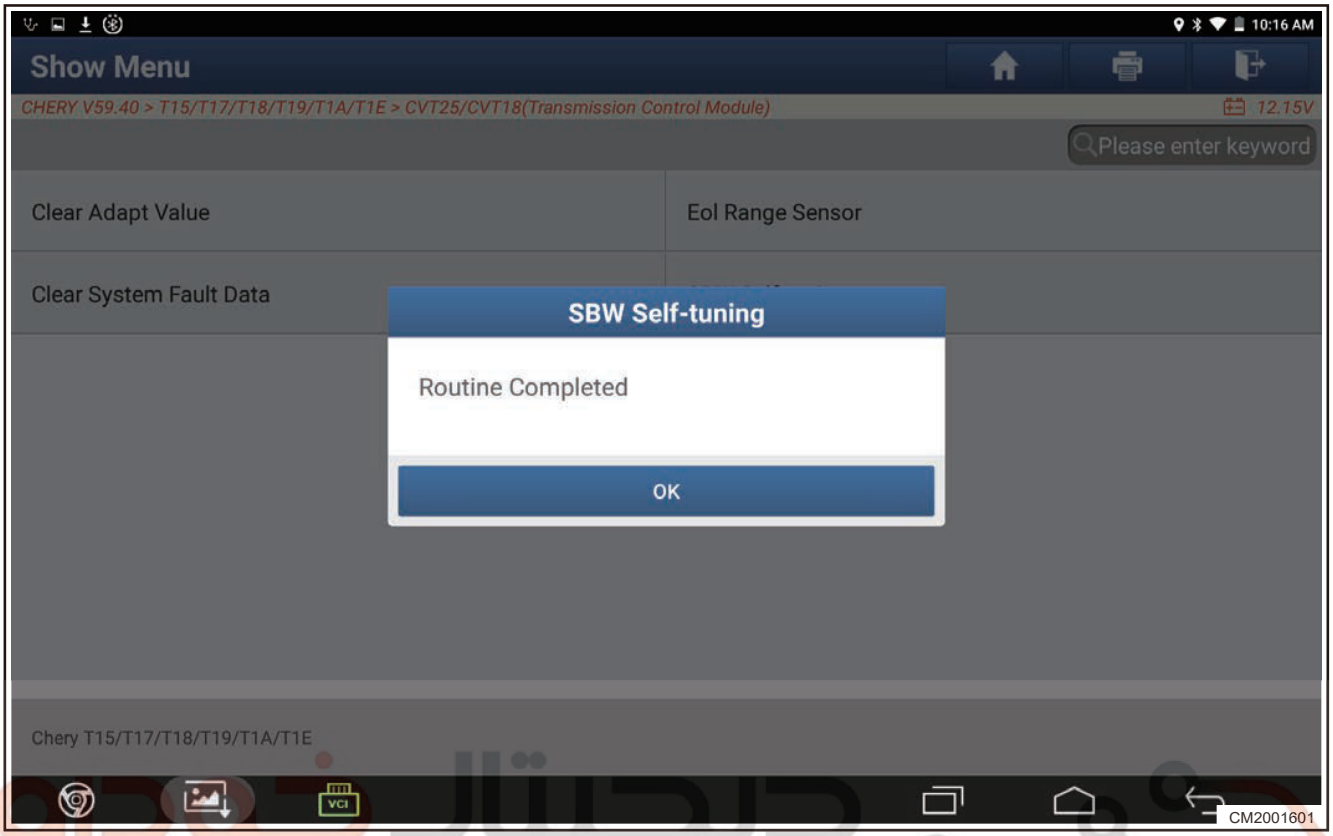
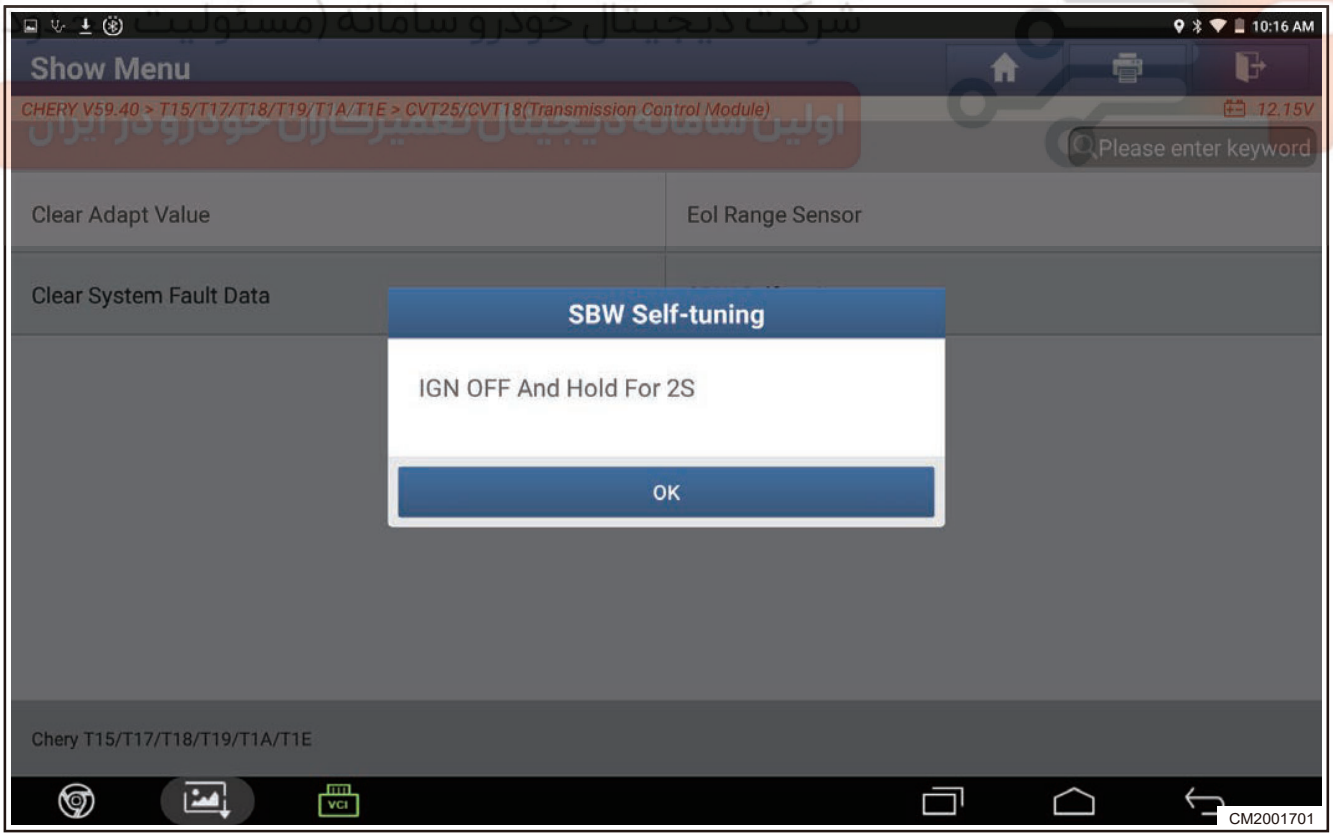


f. Vehicle power is turned off normally and self-learning is completed



⚠ Caution

- The diagnostic tester prompts that the self-learning has failed, first check whether the meter displays N gear.
- If it is not in N, first shift to N position, and then repeat the self-learning according to the above steps.
- If it is in N, adjust the electronic shift connecting rod according to the data, and then perform self-learning again according to the above steps.

025CHC TRANSMISSION ASSEMBLY

Warnings and Precautions

Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

1. Be sure to wear necessary safety equipment to prevent accidents when removing and repairing.
2. Appropriate force should be applied when removing transmission. Be careful not to operate roughly.

Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

1. The components of automatic transmission require high precision. During the disassembly and assembly process, you must be careful not to cause scratches or damage to these components.
2. During the process of engine and transmission separation, pay attention not to damage the peripheral accessories of transmission. If there is any damage, replace it according to the requirements.
3. When inserting the propeller shaft or pulling out the differential, the differential oil seal must not be damaged. If there is any damage, it must be replaced with a new oil seal.
4. The replaced components and oil must be disposed of in accordance with relevant local regulations.
5. To avoid oil contamination, the container used to store transmission oil must be a special container (the container must not be used to store other liquids or items), and the container must be kept clean.
6. In case of oil spillage, the transmission oil needs to be added depends on the actual situation.
7. The oil is a part of transmission system. It must be sent back to manufacturer together with transmission for further analysis if required.

System Overview

Description

Brief 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. 025CHC+electronic shift series automatic transmission can not only realize the best matching between 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 synchronously has functions such as start and stop.

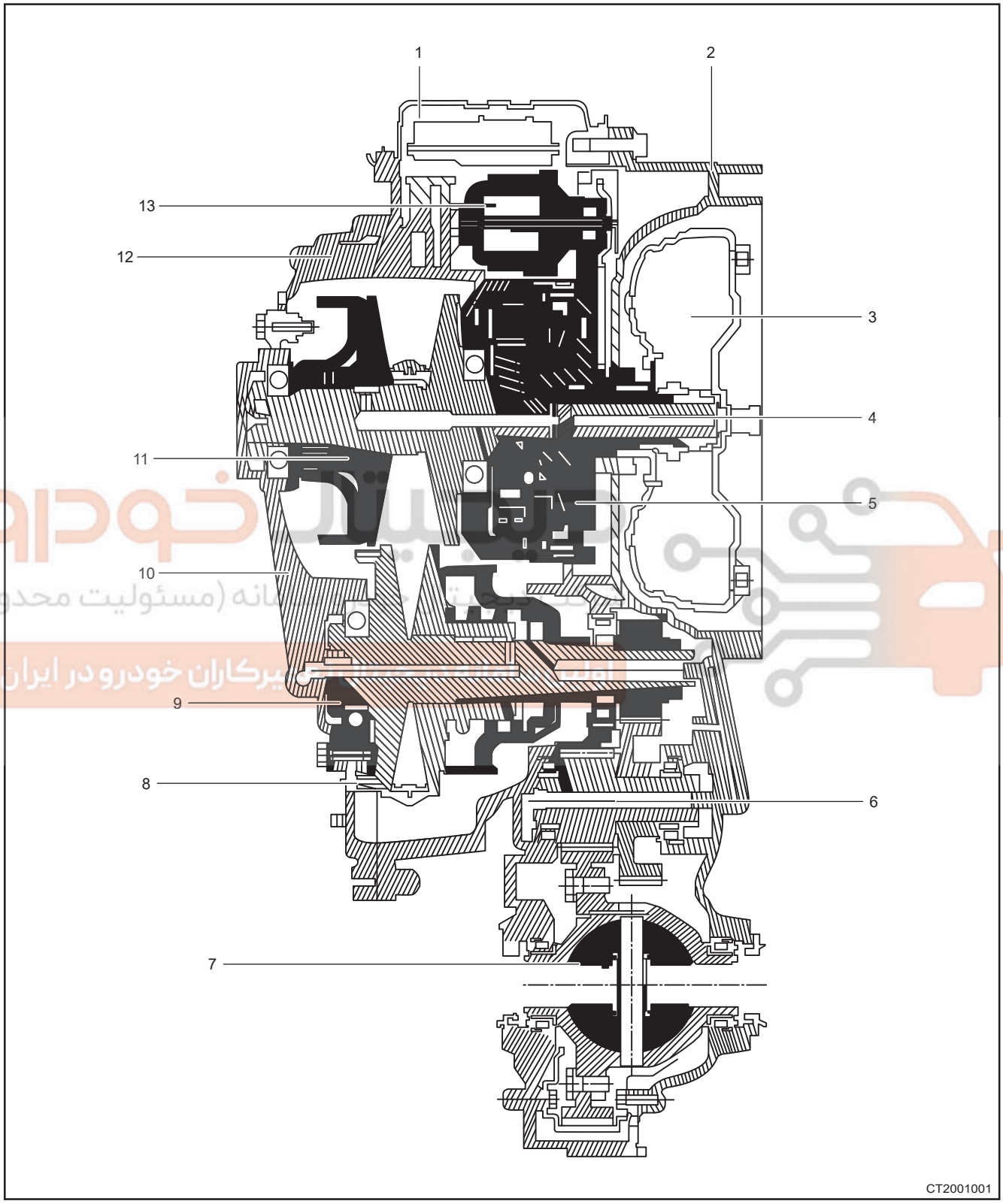
Basic Principle

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 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 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.

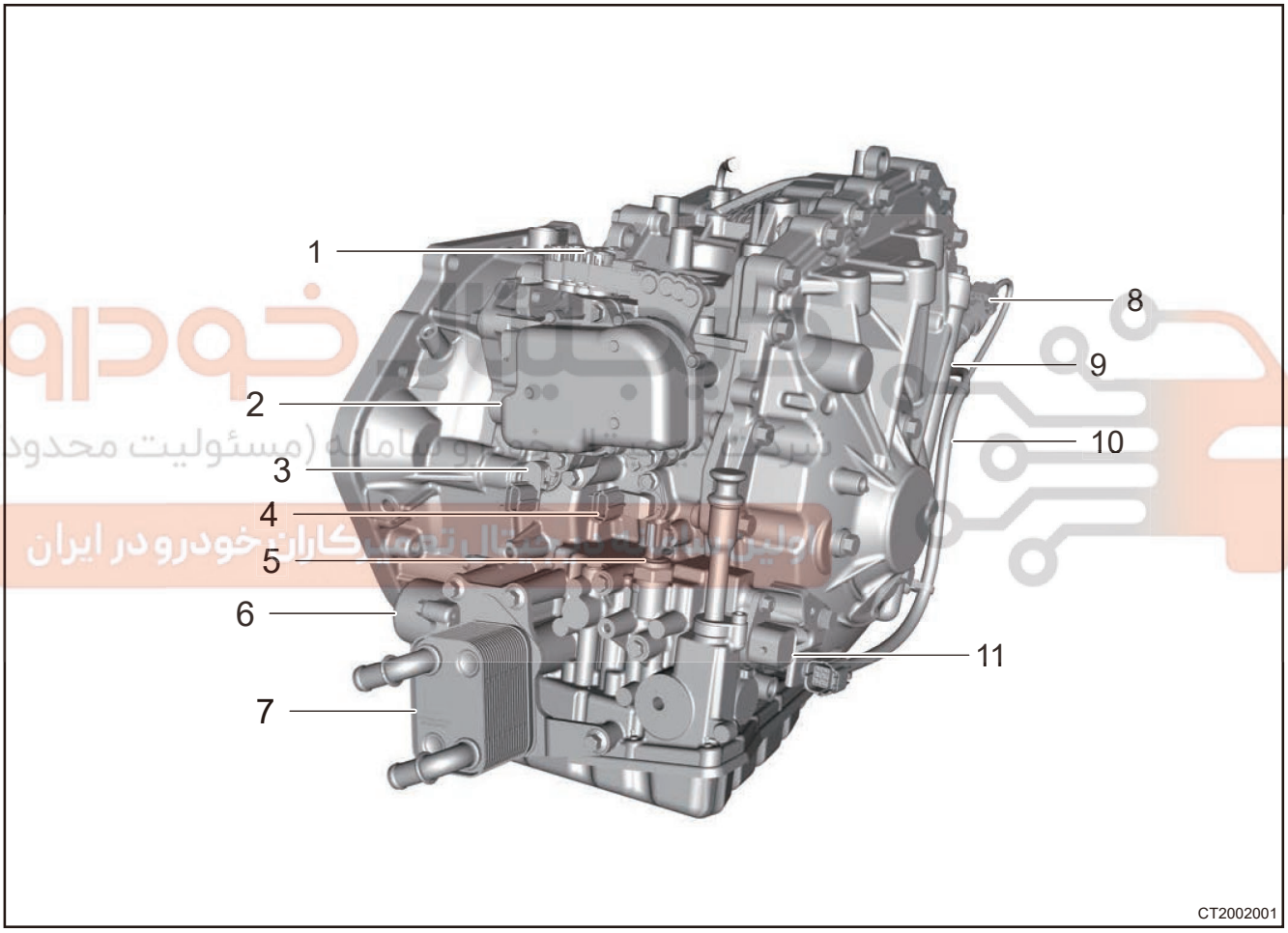
Components Diagram

Transmission Internal Construction



1	Transmission Case Assembly	2	Torque Converter Case Assembly
3	Hydraulic Torque Converter Assembly	4	Input Shaft Assembly
5	Forward Clutch Assembly	6	Output Shaft Assembly
7	Differential Assembly	8	Steel Belt
9	Output Pulley Shaft Assembly	10	Rear Case Assembly
11	Input Pulley Shaft Assembly	12	Transmission Case Assembly
13	Oil Pump Assembly		

External Components Diagram



1	Range Sensor	2	Electronic Shift Actuator
3	Speed Sensor (Turbine)	4	Speed Sensor (Input Shaft)
5	Oil Pressure Sensor (Primary Shaft)	6	External Filter Case
7	Oil Cooler	8	Oil Pressure Sensor (Second Shaft)

9	Speed Sensor (Output Shaft)	10	Transmission Peripheral Wire Harness Assembly
11	Wire Harness Connector (Valve Body Wire Harness)		

Gear Position Introduction

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.

- When the transmission is in P (or N) gear, the engine can be started, and cannot be started in other gears;
- Shift to P gear only after the vehicle is completely stopped, otherwise the mechanical part of transmission may be damaged;
- 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;
- Do not park on a large slope. The safe parking slope is not more than 30%.

R (Reverse) Gear
Use this gear to drive backwards.

- 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.

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.

- When the transmission is in N (or P) gear, the engine can be started, and cannot be started in other gears;
- 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;
- It is forbidden to shift to N gear while vehicle is running at high speed and engine is stalling and neutral coasting, otherwise the transmission may be damaged.

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.

- Confirm that the vehicle is completely stopped before shifting to D;
- Confirm the surrounding environment and personnel safety before driving in D.

M (Manual Mode) Gear
Push the shift lever to M position to execute M mode by default:

- “+”: Push the shift lever to “+” once to increase the transmission by one gear;
- “-”: Push the shift lever to “-” once to decrease the transmission by one gear;

The CVT transmission with n simulated forward gears (the number of simulated gears varies according to demand), 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.
The driver can manually shift up and down to achieve a shift effect similar to that of a manual transmission and experience more driving pleasure.

⚠ Caution

- In manual mode, you can switch between 1 to n forward gears in sequence (the number of simulated gears varies according to your needs).
- 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.
- In manual mode, when the vehicle speed decreases, it will automatically downshift; when the engine speed is too high, the transmission will automatically upshift.
- 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.

Use for Transmission

025CHC CVT includes: 1 parking gear (P gear), 1 reverse gear (R gear), 1 neutral gear (N gear) and 1 forward gear (D gear), which can be shifted by the shift lever.
According to configuration, 025CHC CVT can also provide: M (manual mode), (SPORT) SPORT mode and (ECO) ECO mode.

⚠ Caution

- Manual mode can be switched by shift lever.
- Mode priority: Manual mode has the highest priority. SPORT mode and ECO mode cannot be triggered at the same time. When manual mode and SPORT mode (or ECO mode) are triggered at the same time, the system defaults to manual mode.

Before using a vehicle equipped with 025CHC CVT, you need to know the following information:

1. Before shifting transmission from stop gear (N or P) to driving gear (D or R), set engine to idling status, depress brake pedal or 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. 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;
4. If accelerator pedal is depressed suddenly during driving, the transmission will quickly shift to low gear, engine speed and power will increase;
5. 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.

ECO Mode
Press the ECO mode button and TCU selects ECO mode program. Press the mode button again to exit ECO mode.

⚠ Caution

- You can decide if you need the ECO mode according to different vehicle needs.

SPORT Mode
Press the SPORT mode button and TCU selects SPORT mode program. Press the mode button again to exit SPORT mode.

⚠ Caution

- You can decide if you need the SPORT mode according to different vehicle needs.

Vehicle Towing

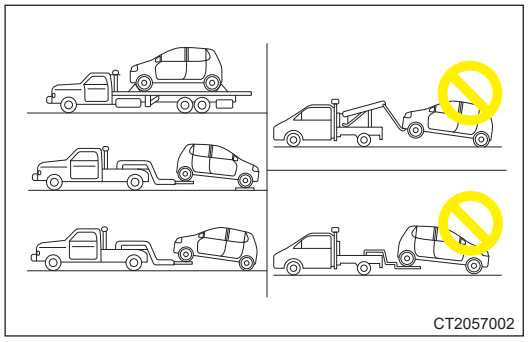
1. Towing using the correct method can avoid unnecessary secondary damage to the vehicle.

   a. Use flatbed truck or large flatbed trolley to tow the vehicle after it is fully supported.
   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.

⚠ Caution

- Do not use soft traction to pull the drive wheel.
- Do not use soft traction to pull the non-drive wheel.



ON-VEHICLE SERVICE

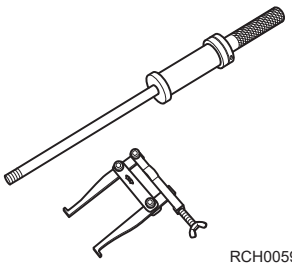
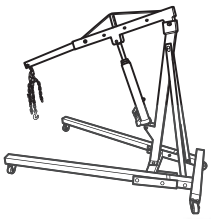
Specifications

Basic Parameters

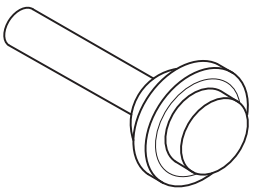
Items	Parameters
Type	025CHC+electronic shift
Type	Continuously Variable Transmission (CVT)
Layout	Transverse front-drive
Start Clutch Device	Hydraulic torque converter
Control Method	Electronic hydraulic control
Dimensions (L × W × H)	365 mm × 442 mm × 647 mm
Factory weight (-including 1.8 L remaining oil)	87 kg
Central Distance	197mm
Maximum Allowable Input Torque	250 N·m
Final Drive Ratio	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

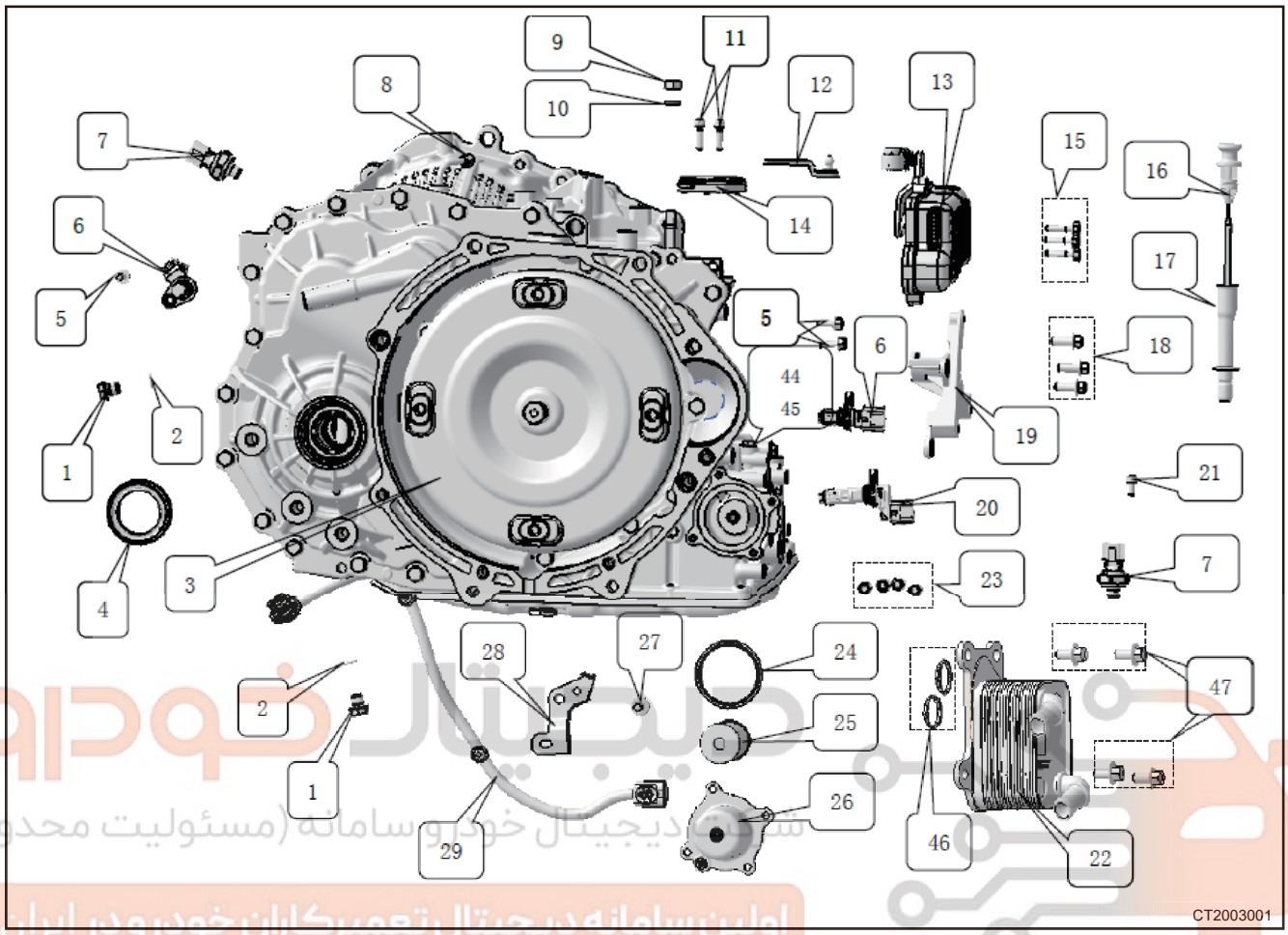
General Tools

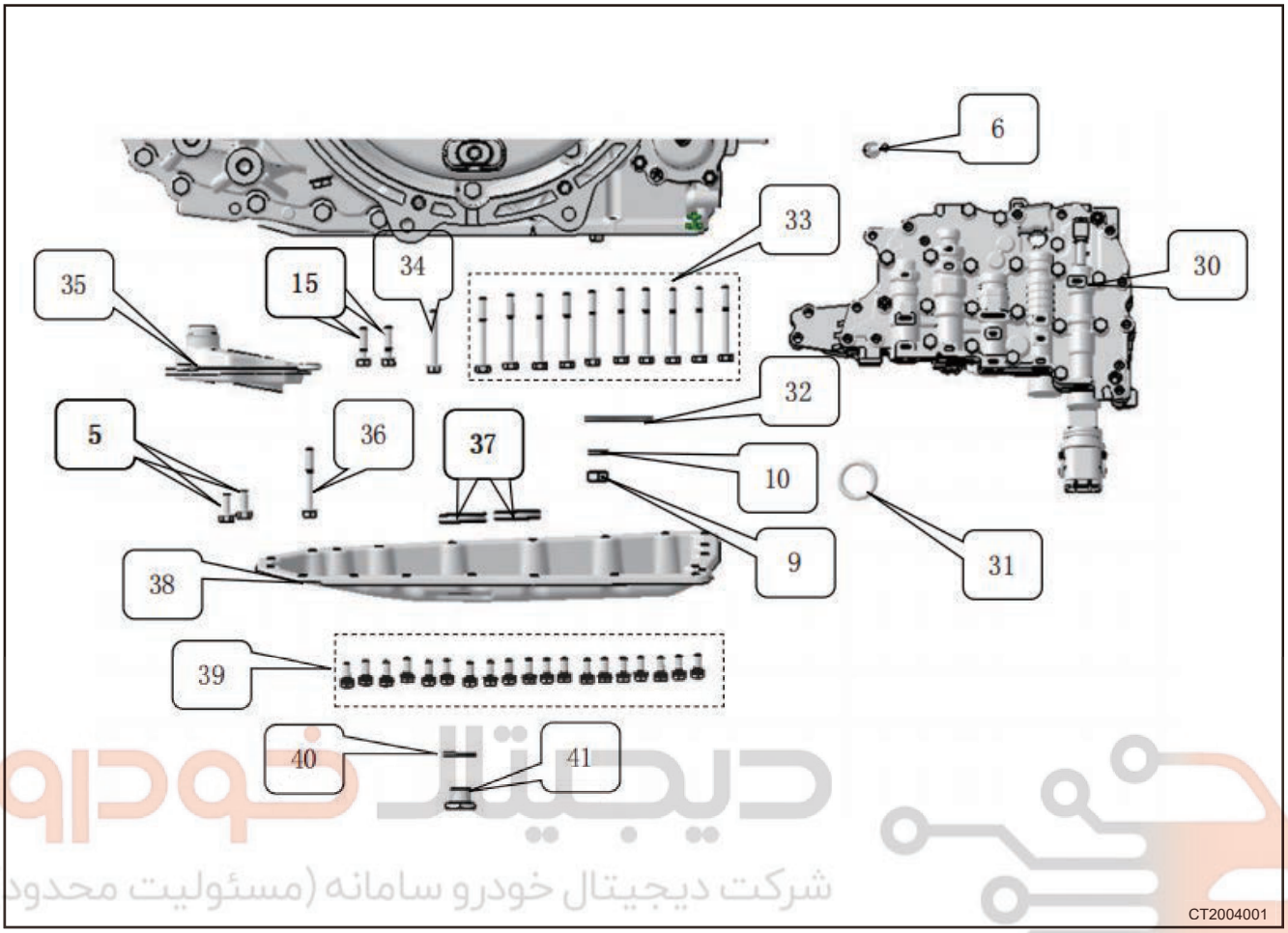
Tool Name	Tool Drawing
Bearing Puller	 RCH0059006
Engine Hoist	 S00032
Transmission Carrier	 RCH0005006

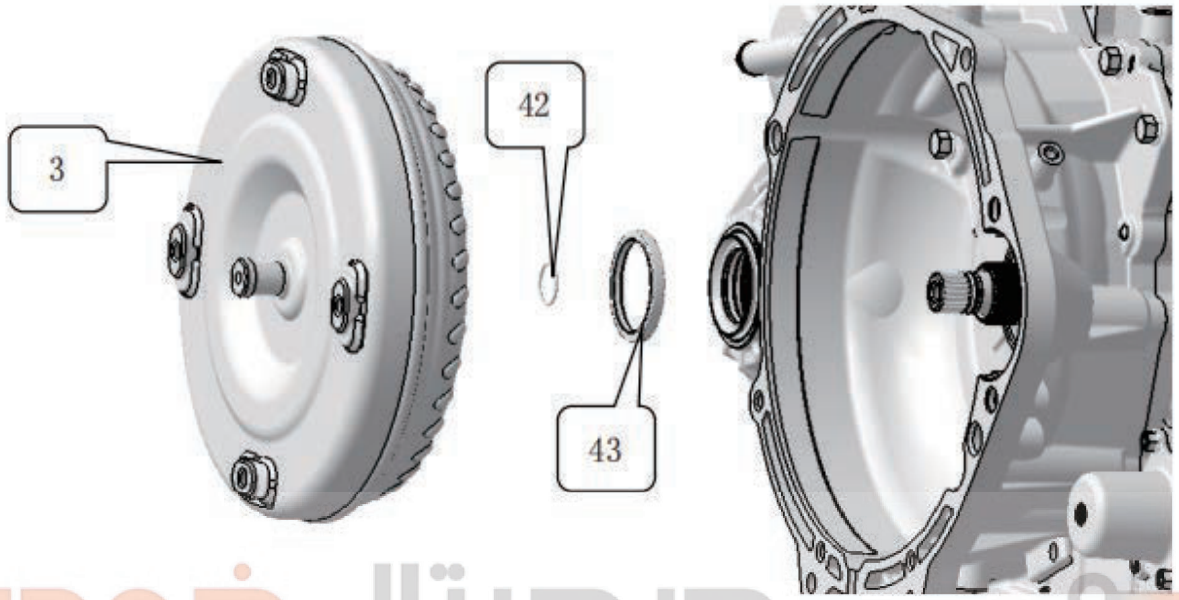
Special Tool

Tool Name	Tool Drawing
Differential Oil Seal Installer	 RCH0009006

Repairable List







CT2005001

No.	Part No.	Part Name	Quanti-ty	Note
1	019CHA-1502172	Oil Pressure Detection Bolt	2	19 ~ 25 N·m
2	019CHA-1502171	Oil Pressure Detection Bolt (M12) O-ring	2	
3	/	Hydraulic Torque Converter Assembly	1	☆
4	019CHA-1502106	Differential Oil Seal	2	★
5	Q1880616F36	Hexagon Flange Bolt - Extra Large Series M6X16	6	8 ~ 10 N·m
6	025CHA-1504240 025CHA-1504240BA	Speed Sensor (Short)	2	Interconvertible
7	025CHA-1504210	Oil Pressure Sensor Assembly	2	
8	025CHA - 1502126	Breather Cap	1	
9	Q341C10F36	Nut	2	18 ~ 25 N·m
10	Q40310F9	Spring Washer_M10	2	★
11	Q218B0622F36	Inner Hexagon Socket Cap Screw	2	8 ~ 10 N·m

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No.	Part No.	Part Name	Quanti-ty	Note
12	025CHA-1506606 0CF25A-1506606BA	Rocker Arm - Transmission	1	Interconvertible
13	025CHA-1506600 0CF25A-1506600BA	Electronic Shift Module Assembly	1	Interconvertible
14	025CHA-1504220 0CF25A-1504220BA	Range Sensor	1	Interconvertible
15	Q1860625F36	Hexagon Flange Bolt - Extra Large Series	5	8 ~ 10 N·m
16	025CHA-1503210	Oil Dipstick Set	1	
17	025CHA-1503220	Oil Dipstick Sleeve Pipe Set	1	
18	Q1820820F36	Hexagon Flange Bolt	3	19 ~ 25 N·m
19	025CHA-1506604 0CF25A-1506604BA	Electronic Shift Actuator Bracket	1	Interconvertible
20	025CHA-1504230 025CHA-1504230BA	Speed Sensor (Long)	1	Interconvertible
21	Q218B0612F36	Inner Hexagon Socket Cap Screw		8 ~ 10 N·m
22	0CF28AE-1501140	Oil Cooler	1	
23	Q1860620F36	Hexagon Flange Bolt M6x20	4	8 ~ 10 N·m
24	025CHA-1506531	Gasket - External Filter and Transmission Case	1	
25	025CHA-1506510	External Filter Assembly	1	
26	025CHA-1506501	External Filter Case	1	
27	Q1820814F36	Hexagon Flange Bolt	1	20 ~ 26 N·m
28	025CHA-1504118	Fixing Bracket - Peripheral Wire Harness Assembly	1	
29	025CHA-1506500BA	Transmission Peripheral Wire Harness Assembly	1	
30	025CHA-1506100	Valve Body and Wire Harness Assembly	1	
31	025CHA-1502606	Valve Body and Transmission Case O-Ring	1	
32	025CHA-1506532	Manual Shift Valve Drive Arm	1	
33	Q1860655F36	Hexagon Flange Bolt - Extra Large Series	10	8 ~ 10 N·m
34	Q1860645F36	Hexagon Flange Bolt - Extra Large Series	1	8 ~ 10 N·m
35	025CHA-1506400 0CF25A-1506400BA	Filter Assembly - Oil Pump	1	

No.	Part No.	Part Name	Quanti-ty	Note
36	Q1860650F36	Hexagon Flange Bolt - Extra Large Series	1	8 ~ 10 N·m
37	025CHA-1506522	Magnet	2	
38	025CHA-1506521	Valve Body Case	1	★
39	Q1410616F61	Hexagon Head Bolt and Conical Spring Washer Set M6 x 16	19	8 ~ 10 N·m
40	QR523-1701103	Drain Plug Flat Washer	1	★
41	QR523-1701102	Drain Plug	1	
42	025CHA-1509103	Input Shaft to Hydraulic Torque Converter O-ring	1	
43	025CHA-1502204	Hydraulic Torque Converter Oil Seal	1	★
44	019CHA-1502182	Oil Pressure Detection Bolt	4	8 ~ 10 N·m
45	019CHA-1502181	Oil Pressure Detection Bolt (M8) O-ring	4	
46	0CF18A-1509103	Seal Ring - External Oil Cooler and Case	2	
47	Q1820816F36	Hexagon Flange Bolt	4	13 ~ 15 N·m
48	025CHA-1502201X	Torque Converter Case	1	
49	025CHA-1502230	Differential Lower Oil Deflector Assembly	1	
50	025CHA-1504133	Positioning Bolt	7	8 ~ 10 N·m
51	025CHA-1502202	Oil Guide Pipe	1	
52	025CHA-1502203	Oil Guide Pipe Bracket	1	
53	FQ1420616F34E	Hexagon Head Bolt and Spring Washer Set M6×16	1	8 ~ 10 N·m
54	/	Differential Assembly	1	
55	/	Output Shaft Assembly	1	
56	025CHA-1502205	Differential Upper Oil Deflector	1	
57	Q32006F36	Hexagon Flange Nut M6	2	8 ~ 10 N·m
58	025CHA-1502616	Sprocket Oil Deflector	1	
59	513MHA-1701508	Differential Rear Bearing Adjusting Shim	1	Option
60	025CHA-1508500 0CF25A-1508500BA	Chain	1	Interconvertible
61	025CHA-1508400	Driven Sprocket Assembly	1	

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No.	Part No.	Part Name	Quanti-ty	Note
62	025CHA-1502602	Pressure Plate	1	
63	025CHA-1508301	Drive Sprocket	1	
64	025CHA-1502608	Hexagon Flange Bolt	2	20 ~ 26 N·m
65	025CHA-1502617	Chain Oil Deflector	1	
66	Q1860835F36	Hexagon Flange Bolt - Extra Large Series	1	20 ~ 26 N·m
67	019CHA-1502117	Bearing Baffle Plate O-ring	1	
68	025CHA-1508100 025CHA-1508100BA	Oil Pump Assembly	1	
69	Q218B0870F36	Inner Hexagon Socket Cap Screw	3	20 ~ 26 N·m
70	025CHA-1502601	Sprocket Snap Ring	1	
71	025CHA-1509200	Planet Carrier Assembly	1	
72	025CHA-1509300	Sun Gear Set	1	
73	025CHA-1502604	Forward Clutch Thrust Bearing	1	Option
74	025CHA-1502618	Planetary Gear Train Thrust Bearing	3	
75	025CHA-1509100	Input Shaft and Forward Clutch Assembly	1	
76	FQ186C1035F36	Hexagon Flange Bolt - Extra Large Series	23	42 ~ 54 N·m
77	025CHA-1502603	Washer between Drive Sprocket and Oil Separator	1	
78	025CHA-1508206	Forward Clutch Seal Ring	2	
79	Q1860830F36	Hexagon Flange Bolt - Extra Large Series	7	20 ~ 26 N·m
80	025CHA-1508210	Oil Separator Assembly	1	
81	025CHA-1502108	Output Shaft Adjusting Shim	1	Option
82	025CHA-1504130	Gear Positioning Steel Sheet Set	1	
83	025CHA-1502127	Breather Pipe	1	★
84	/	Case Seal Gum	/	△
85	025CHA-4004011	Automatic Transmission Oil (CVTF WCF-1)	7.3 L	△

Hint:

- ★ means that this part is a non-reusable part, that is, if it is necessary to be disassembled during the maintenance, it must be replaced with a new one.
- ☆ Not all general parts of the series.
- △ Both automatic transmission oil and case seal gum are designated octane number, do not mix them!

⚠ Caution
• The automatic transmission is a high-precision component, which has extremely high requirements for cleanliness. Therefore, in the process of repairing and replacing the transmission components, ensure that the site is clean and wear clean gloves (or clean hands) to operate.

Transmission Oil Maintenance

Maintenance Period

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

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

Transmission oil standard

1. Transmission oil selection standard:

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

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.

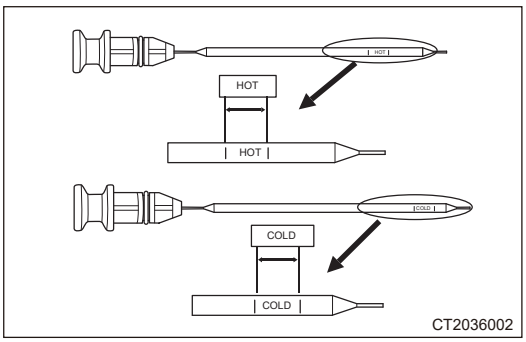
⚠ Caution
• The transmission oil must not be replaced by other oil to avoid damage to the transmission.

Transmission oil level inspection

Please check the oil level in the following order:

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, etc. around the oil dipstick and sleeve;
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.

⚠ Caution

- It is not allowed to increase the automatic transmission oil temperature by depressing on the accelerator rapidly at idling.
- Please use the "HOT" mark on transmission oil dipstick as the standard for measuring the quantity of transmission oil. The "COLD" (or "C") mark is for reference only.
- Under the hot oil condition of transmission, the temperature of engine, radiator and its piping system is very high, fan may start with it, so care should be taken to avoid burns during operation.
- If the transmission oil level is too low, the transmission oil pump will suck in air while running, resulting in each clutch or brake working badly due to insufficient working pressure.
- If the transmission oil level is too high, the rotating parts of transmission will stir liquid to produce foam while rotating at high speed, which can also result in each clutch or brake working badly due to insufficient working pressure.

Transmission Oil Draining/Refilling

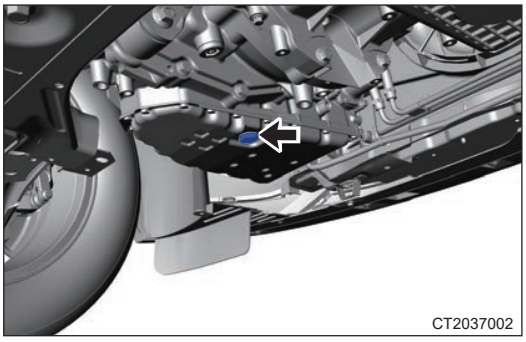
Transmission Oil Draining

⚠ Warning

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

1. Raise vehicle with a lift.

2. Remove the transmission drain plug.



⚠ Caution

- Filler plug washer is non-reusable component, and replace it after each removal.

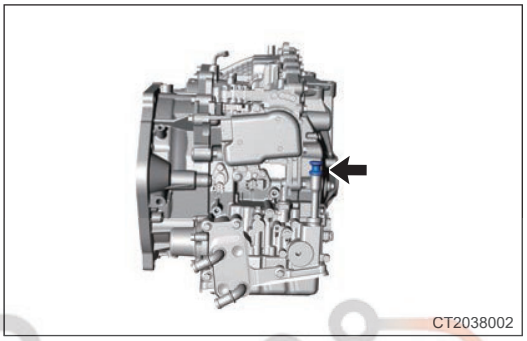
3. Drain the transmission oil.
4. Reinstall and tighten the drain plug, do not miss the seal washer.
   Tightening torque: 42 - 50 N·m

Transmission Oil Refilling

⚠ Warning

- 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. Confirm that the drain plug is tightened, do not miss the seal washer.
2. Pull out the oil dipstick set and fill the new transmission oil from oil dipstick set 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 5.5 ± 0.1 L of oil directly.

3. Check the oil level as required after filling.
4. Install the oil dipstick set.

⚠ Caution

- When wiping the oil dipstick set, use lint-free paper to prevent foreign matter from falling into the transmission.
- There are high-temperature parts in engine compartment. To avoid accidents, remember not to spill ATF on high-temperature parts.
- After the automatic transmission oil is filled, the spilled oil must be wiped.
- When replacing the automatic transmission oil, the oil cooler on vehicle needs to be cleaned.
- The replaced automatic transmission oil needs to be recycled with recycling tools to avoid environmental pollution.

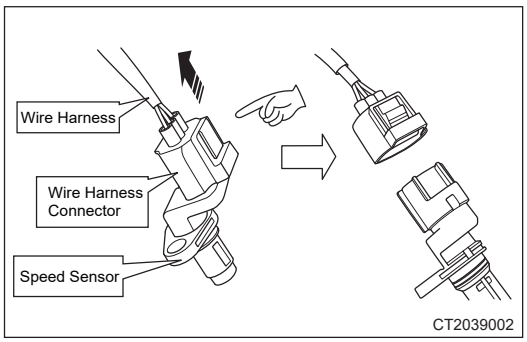
Speed Sensor Connector

Removal

⚠ Caution

- 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.

1. Pull up the wire harness connector (arrow) while pressing and holding the connector lock mechanism (- finger direction).



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

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- Make sure that the connector is inserted into place while installing: When it is inserted in place, it will make a "click" sound.
- In the process of disassembly and assembly, alignment is required to avoid the occurrence of bending of pins.

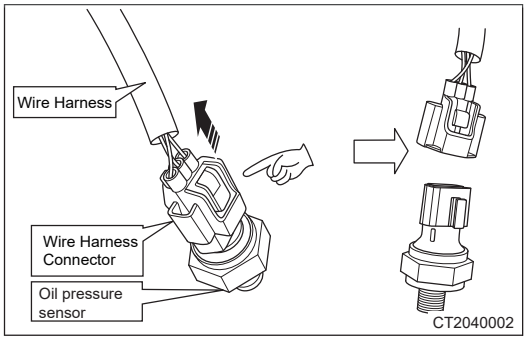
Oil Pressure Sensor Connector

Removal

⚠ Caution

- 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.

1. Pull up the wire harness connector (arrow) while pressing and holding the connector lock mechanism (- finger direction).



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

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- Make sure that the connector is inserted into place while installing: When it is inserted in place, it will make a "click" sound.
- In the process of disassembly and assembly, alignment is required to avoid the occurrence of bending of pins.

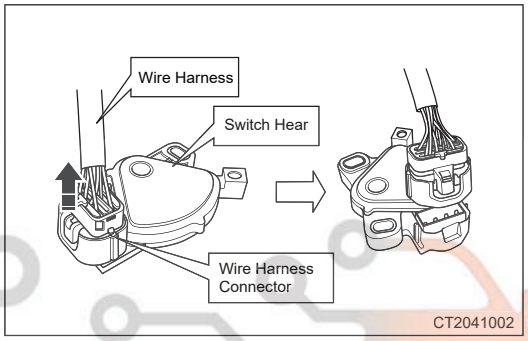
Range Sensor Connector

Removal

⚠ Caution

- 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.

1. Press the connector lock mechanism (arrow).



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

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- When the range 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 range sensor.
- Make sure that the connector is inserted into place while installing: When it is inserted in place, it will make a "click" sound.
- In the process of disassembly and assembly, alignment is required to avoid the occurrence of bending of pins.

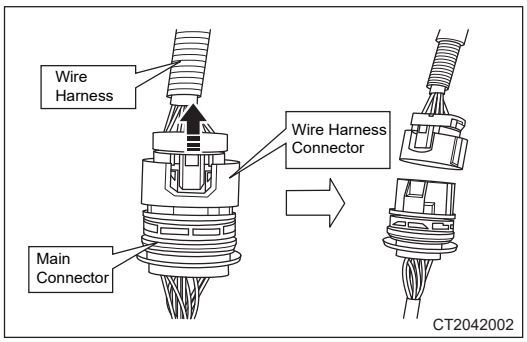
Wire Harness Main Connector

Removal

⚠ Caution

- 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.

1. Press the connector lock mechanism (arrow), and flip the handle upward.
2. Pull up the wire harness connector at the same time.



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

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- Make sure that the connector is inserted into place while installing, when it is inserted in place, it will make a "click" sound.
- In the process of disassembly and assembly, alignment is required to avoid the occurrence of bending of pins.

Differential Oil Seal

Removal

Hint:

- Use same procedures for right and left sides.
- Removal 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. Remove left drive shaft oil seal from transmission assembly.

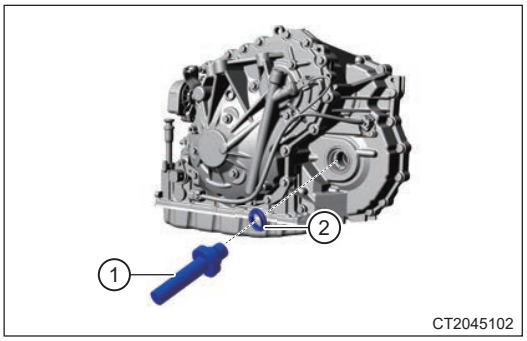
⚠ Caution

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

5. Removal is completed.

Installation

1. Apply appropriate amount of automatic transmission oil to the inner and outer race of oil seal.
2. Align the oil seal with the transmission, and install it to the transmission with differential oil seal installation fixture.



3. Add the specified transmission oil.

⚠ Caution

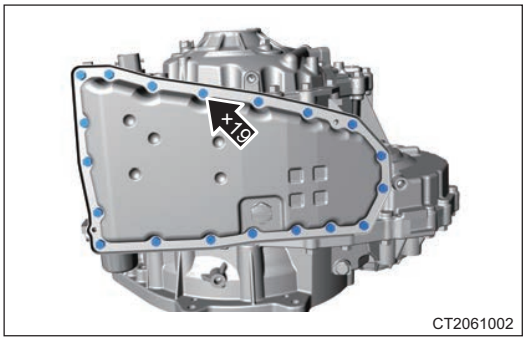
- Due to the interference fit between the oil seal and the transmission, it will inevitably be deformed and damaged during removing, and the deformed and damaged parts cannot be used continuously.
- Uniform force is required during oil seal installation, and the oil seal should not be deformed or damaged.
- The components of automatic transmission require high precision. During the disassembly and assembly process, you must be careful not to cause scratches or damage to these components, such as the machined surface of the case, etc.
- When connecting the propeller shaft, an oil seal protective sleeve must be used to prevent the splines and snap rings on propeller shaft from damaging the oil seal.
- Verticality shall be ensured during oil seal assembly, and the end surface shall not be tilted.

Valve Body Case

Removal

1. Turn off electrical equipments and engine switch.
2. Disconnect the negative battery cable.
3. Remove the engine lower protector assembly.
4. Drain the transmission oil.
5. Remove 19 coupling bolts between valve body case and transmission case.

   Tightening torque: 8 - 10 N·m



6. Remove the valve body case assembly.

Hint:

- Seal gum is applied between valve body case and transmission case. If it is hard to remove, tap it lightly to loosen it before removing, and appropriate force should be applied to avoid damage.

Installation

1. Installation is in the reverse order of removal.

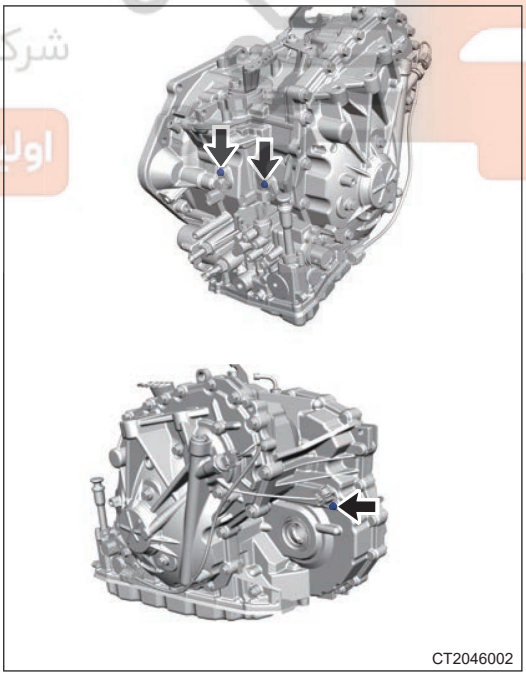
⚠ Caution
• Before installation, wipe the case joint surface clean. • Before installation, wipe two magnets in valve body clean and install them in the specified positions. • Apply seal gum to the flange surface of valve body case, and the application line needs to be located on the sealing surface inside the bolt mounting hole.

2. Add the 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. Remove 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

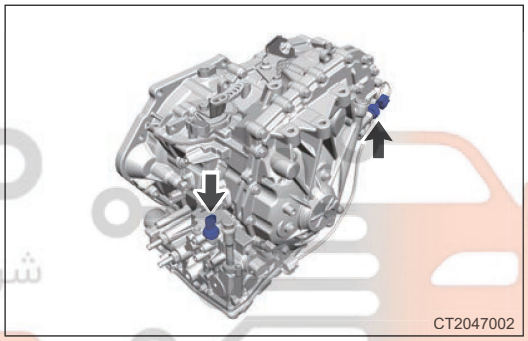
- Apply proper amount of automatic transmission oil to sensor O-ring.
- When connecting connector, check the pin connecting condition to confirm that the inserted pin is not bent or damaged, and then connect the connector.

2. Other installation procedures are in the reverse order of removal.

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. Remove 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.

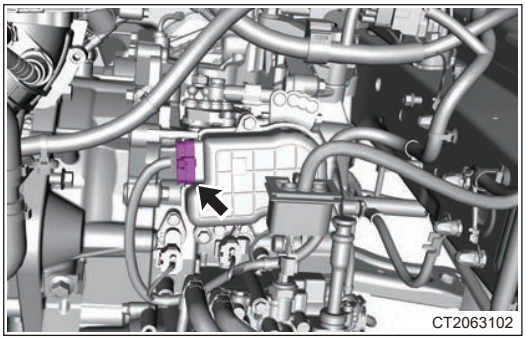
2. Other installation procedures are in the reverse order of removal.

Electronic Shift Module

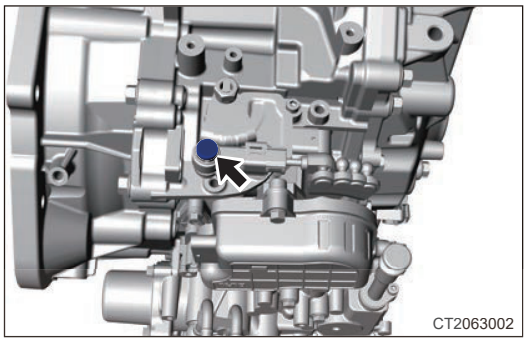
Removal

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.

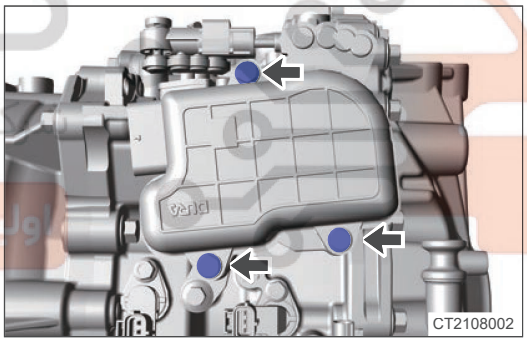


5. Press connecting rod mechanism (arrow), disconnect the connecting rod mechanism and gear shift mechanism.



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

   Tightening torque: 8 - 10 N·m



7. Remove the electronic shift module.

Installation

⚠ Warning

- Make sure that the connector is inserted into place while installing: When it is inserted in place, it will make a "click" sound.
- In the process of disassembly and assembly, alignment is required to avoid the occurrence of bending of pins.
- After electronic shift actuator was replaced or removed and installed again, it is necessary to perform electronic shift actuator self-learning.

1. Installation is in the reverse order of removal.

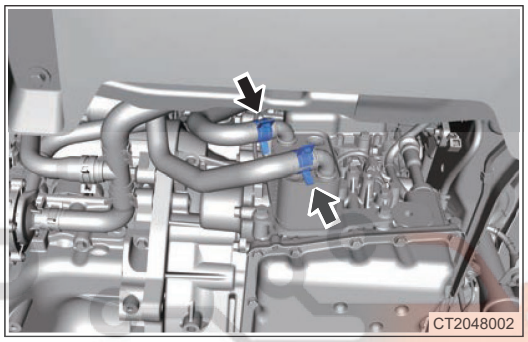
Oil Cooler

Removal

⚠ Caution

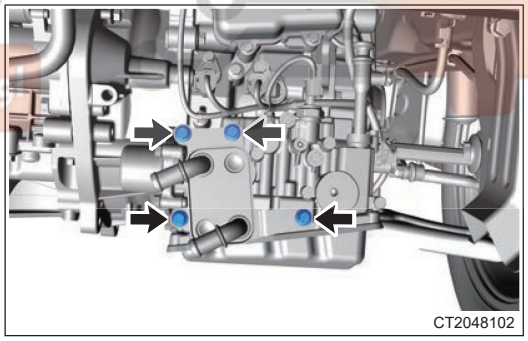
- During removal and installation, do not operate violently to avoid damaging the transmission oil pipe assembly.
- Avoid foreign objects entering the transmission from the oil pipe assembly nozzle.
- The transmission cooling hose is connected to the internal oil passage of the transmission, so it is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

1. Drain the transmission oil.
2. Drain the coolant.
3. Remove the water tank lower protector assembly.
4. Remove clamps from cooling pipe inlet hose, separate cooling pipe inlet hose from oil cooler assembly.



5. Remove 4 fixing bolts from oil cooler.

   Tightening torque: 13 ~ 15 N·m



6. Remove oil cooler and seal ring.

Installation

⚠ Caution

- Seal ring is a vulnerable product. For reused seal ring, always confirm that seal ring is free from scratches and damage before assembly, and remember not to miss it.

1. Assemble seal ring to the corresponding sealing groove of transmission case in place.
2. Firmly press oil cooler against seal ring and install it in place, then tighten 4 fixing bolts.

   Tightening torque: 13 ~ 15 N·m

3. Other installation procedures are in the reverse order of removal.

⚠ Caution

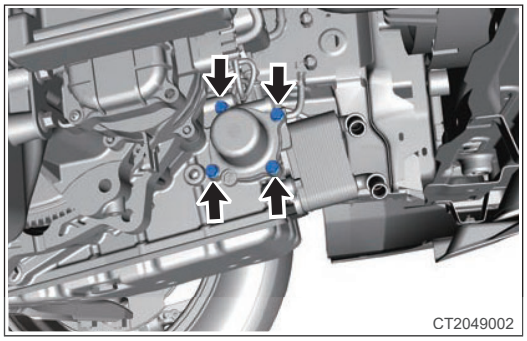
- The clamp must be clamped in the correct position during installation.

External Filter Assembly

Removal

1. Drain the transmission oil.
2. Remove the engine 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 (external filter and transmission case).

Installation

1. Insert the external filter assembly opening into the corresponding boss on transmission case.
2. Apply the external filter gasket with CVTF and install it on the transmission case.
3. Cover the external filter case, and the holes are aligned with the holes of transmission case.
4. Install 4 fixing bolts between external filter case and transmission.

   Tightening torque: 8 - 10 N·m

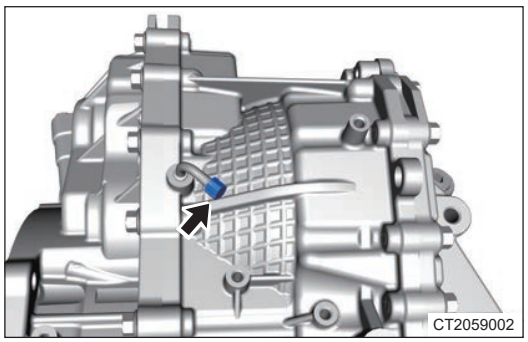
5. Install the engine lower protector assembly.
6. Fill the specified transmission oil.

Breather Cap

Removal

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

4. Unplug breather cap (arrow) from transmission assembly directly.



5. Removal is completed.

Installation

1. Installation is in the reverse order of removal.

Transmission Assembly

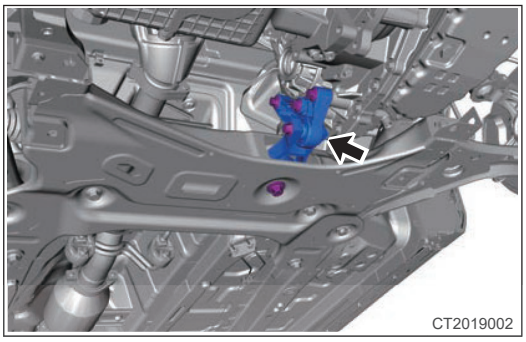
Removal

⚠ 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.
  a. 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.
- During separation of engine and transmission, pay attention not to damage the peripheral accessories of transmission, such as rubber cooling pipe, 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.
      Tightening torque: 6 ± 1 N·m
   c. Remove the crankshaft position sensor.

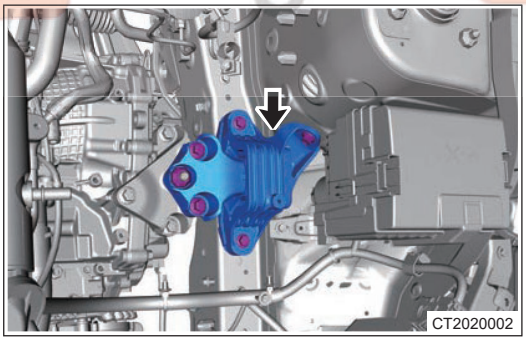
7. Remove the front wheel tire.
8. Remove the engine lower protector.
9. Drain the coolant.
10. Drain the transmission oil.
11. Remove the drive shaft.
12. Remove the transmission ground wire, disconnect the speed sensor connector and the oil pressure sensor connector, and move away the wire harness.
13. Disconnect the range sensor connector and the electronic shift actuator module connector.
14. Remove the cooling pipe hose assembly.
15. Remove the rear mounting cushion and bracket.


CT2019002

⚠ Caution

- During removal and installation, do not operate violently to avoid damaging the transmission.
- Before removing and installing the tightening bolts, it is necessary to check whether the threaded holes of the transmission are damaged. If there is any abnormality, it needs to be repaired.

16. Use an engine equalizer to hang the engine.
17. Remove the left mounting cushion.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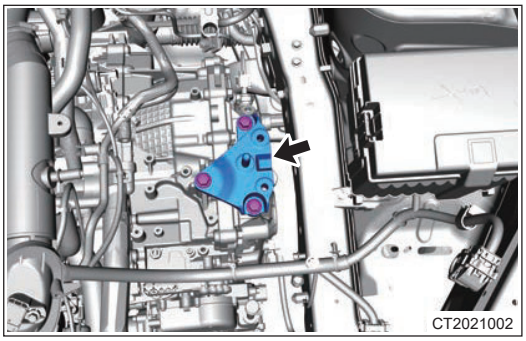
18. Remove the left mounting bracket.


CT2021002

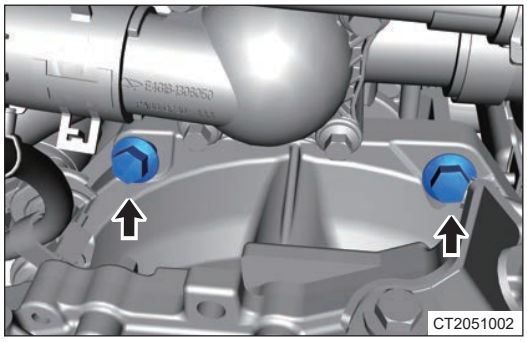
⚠ Caution

- During removal and installation, do not operate violently to avoid damaging the transmission.
- Before removing and installing the tightening bolts, it is necessary to check whether the threaded holes of the transmission are damaged. If there is any abnormality, it needs to be repaired.

19. Separate engine and transmission.

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

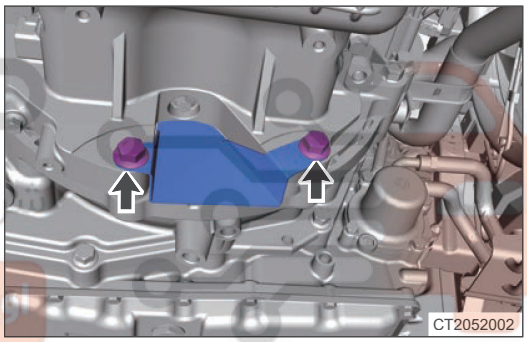
Tightening torque: 60 ± 5 N·m



b. Remove the starter.

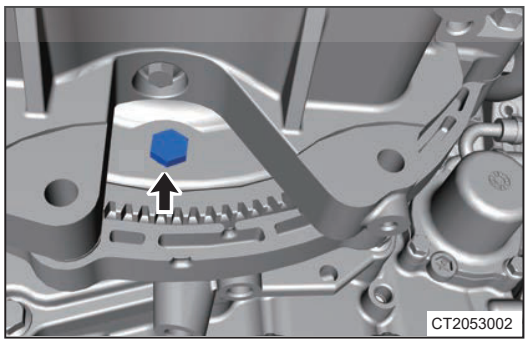
c. Remove 2 fixing bolts between dust plate and transmission, and remove the dust plate.

Tightening torque: 50 ± 5 N·m



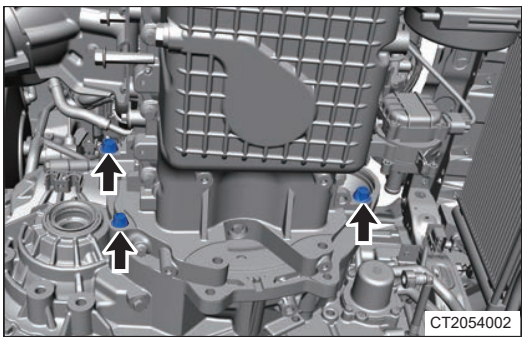
d. Remove the hydraulic torque converter fixing bolts (4 in total, evenly distributed in the circumference).

Tightening torque: 55 ± 5 N·m



e. Remove 3 fixing bolts between transmission and engine.

Tightening torque: 60 ± 5 N·m



f. Remove the transmission assembly.

Installation

⚠ Caution

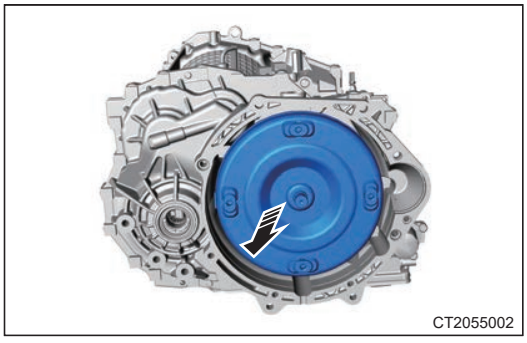
- During assembly, attention should be paid to ensure that the hydraulic torque converter does not come out.
  a. If the hydraulic torque converter accidentally falls off, it needs to be reinstalled under the guidance of relevant technicians, do not forcibly install it to avoid damaging the internal 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 the specified transmission oil.
3. Add the specified coolant.

Hydraulic torque converter

Removal

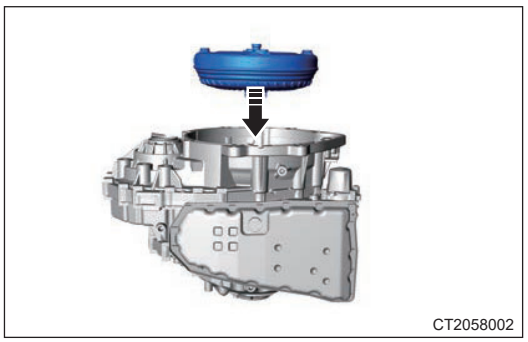
1. Remove the transmission assembly.
2. Install 2 M10 bolts to hydraulic torque converter and take out hydraulic torque converter carefully.



Installation

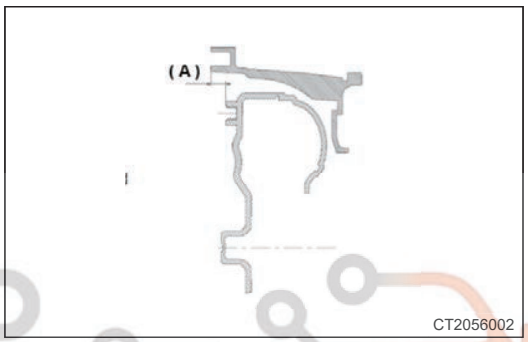
1. Apply proper amount of automatic transmission oil to hydraulic torque converter claws accessory.

2. Align hydraulic torque converter claws with mounting slots inside transmission, and install it into transmission smoothly.



3. Rotate hydraulic torque converter gently so that claws on hydraulic torque converter completely enter sprocket groove.

4. Check the installation dimension A of hydraulic torque converter. The dimension A is required to be ⩾ 11.7 mm.



⚠ Caution

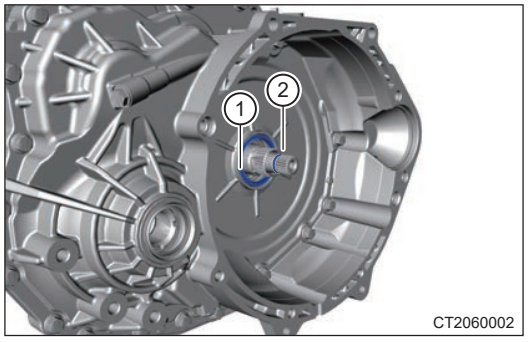
- Prevent dust or oil stains and other foreign matters from entering into transmission through hydraulic torque converter oil seal.
- Prevent hydraulic torque converter from damaging hydraulic torque converter oil seal .
- Hydraulic torque converter has high requirements for moment of inertia. Please operate with care and do not cause scratches or damage.

Transmission Disassembly and Assembly

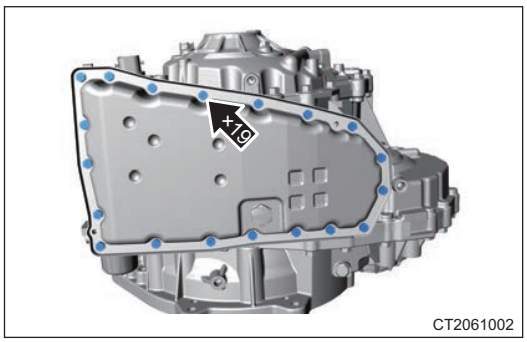
Disassembly

1. Remove the hydraulic torque converter assembly.

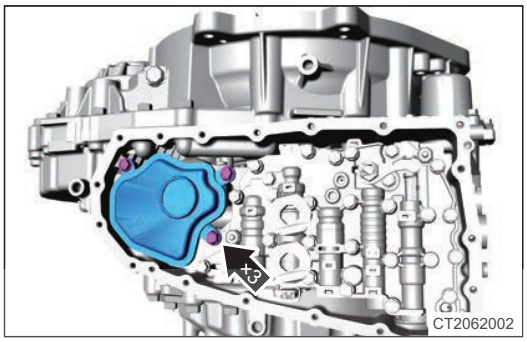
2. Remove hydraulic torque converter oil seal (1), remove O-ring input shaft to hydraulic torque converter (2).



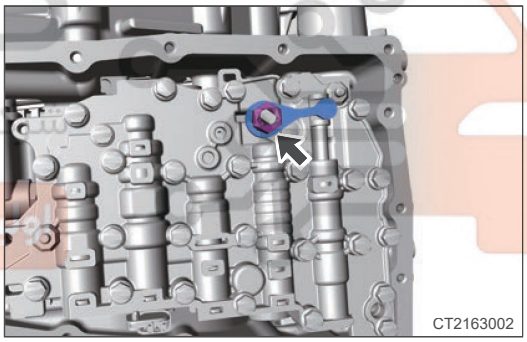
3. Remove 19 fixing bolts (arrow) and valve body case.
   Tightening torque: 8 - 10 N·m



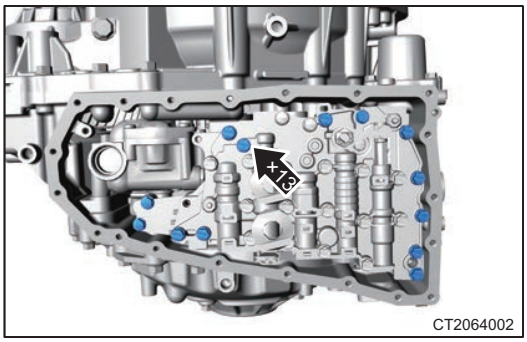
4. Remove valve body case, remove 3 fixing bolts (arrow) from filter assembly.
   Tightening torque: 8 - 10 N·m



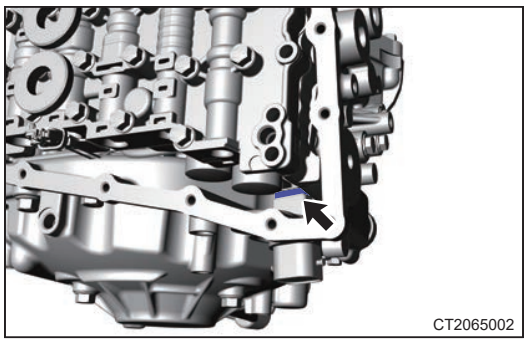
5. Remove fixing nut (arrow) from manual shift valve drive arm.
   Tightening torque: 18 - 25 N·m



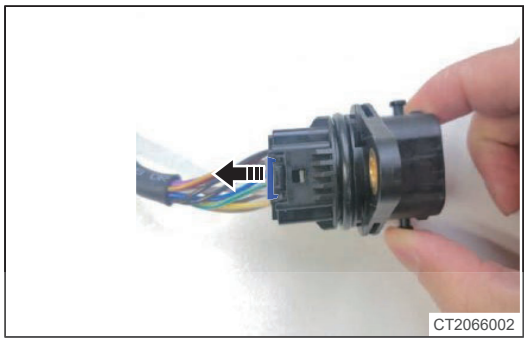
6. Remove 13 fixing bolts (arrow) from valve body and wire harness assembly.
   Tightening torque: 8 - 10N·m



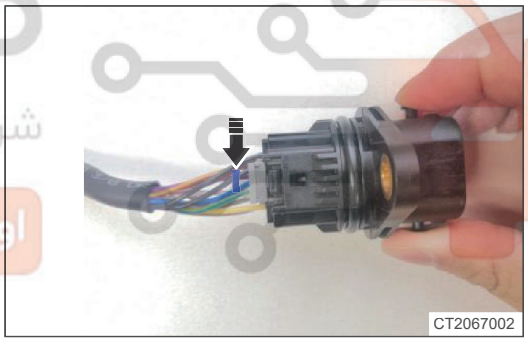
7. Disconnect connector (arrow) from valve body and wire harness assembly.



   a. Unplug the connector lock mechanism (arrow) first.



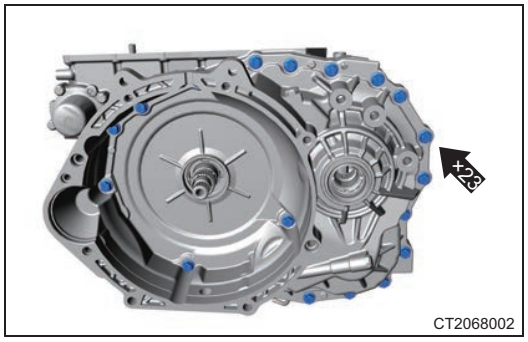
   b. Press connector lock mechanism (arrow) to unplug connector.



   c. Remove the valve body and wire harness assembly.

8. Remove 23 fixing bolts (arrow) from torque converter case.

   Tightening torque: 42 - 54 N·m

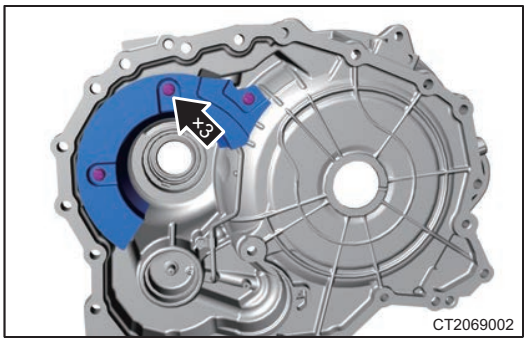


Warning

- Because the transmission seal gum has strong adhesive force in dry state, it is necessary to use crowbar and small hammer here.
- There are three tapping points reserved on transmission case, which should be struck evenly and gently. Violent operation is strictly prohibited.

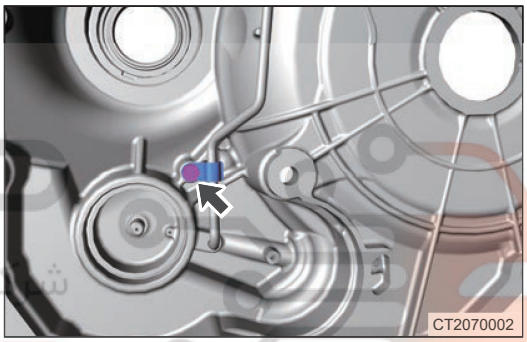
9. Remove 3 fixing bolts of differential upper oil deflector from torque converter case, and remove differential upper oil deflector.

   Tightening torque: 8 - 10 N·m

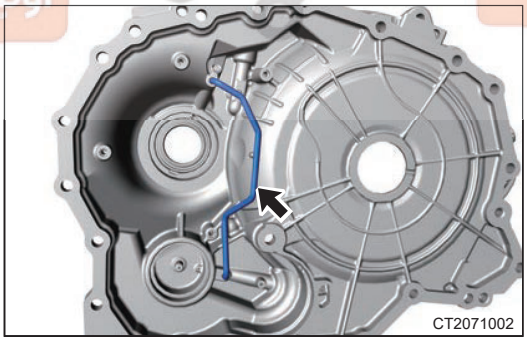


10. Remove fixing bracket bolt (arrow) of oil guide pipe from torque converter case.

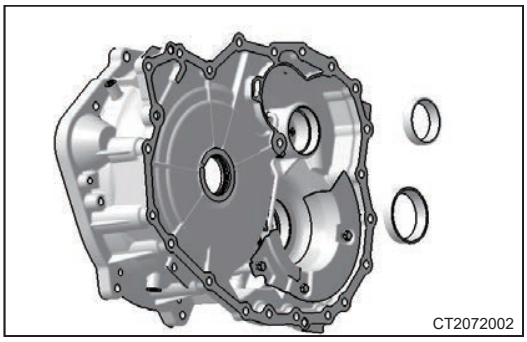
    Tightening torque: 8 - 10 N·m



11. Remove oil guide pipe (arrow) from torque converter case.



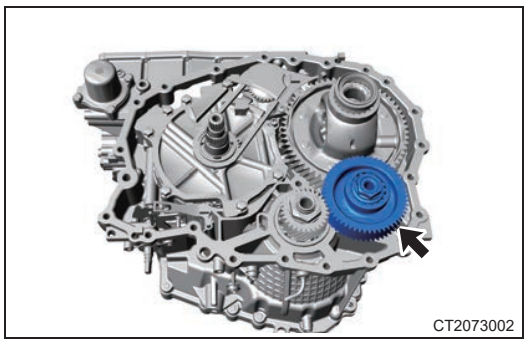
12. Remove the differential bearing outer race, output shaft bearing outer race with a puller.



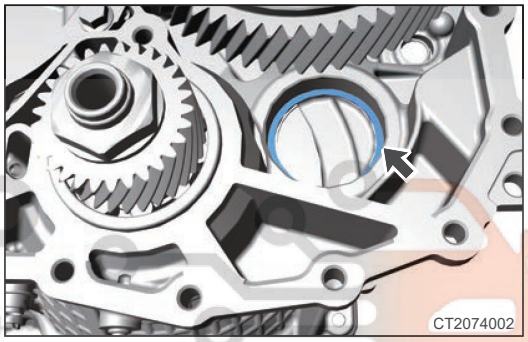
Warning

- The outer race of output shaft bearing and the outer race of differential bearing are disposable parts.
- Do not damage sealing/mounting surface of torque converter case when removing three bearing outer races.

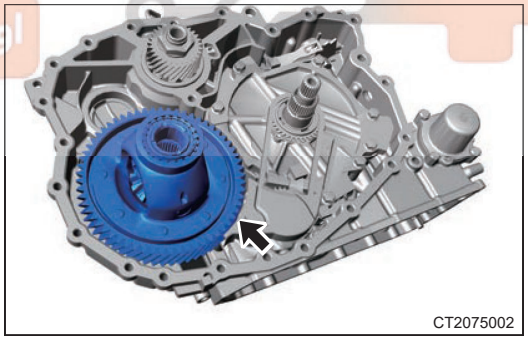
13. Remove the output shaft assembly (arrow).


CT2073002

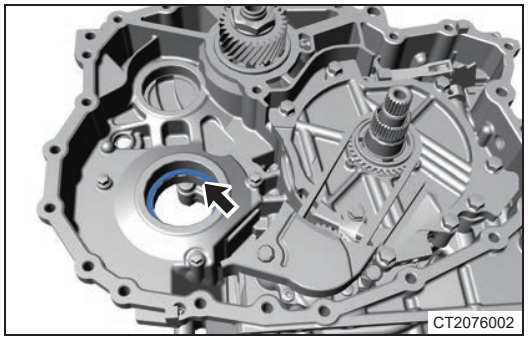
14. Remove the output shaft adjusting shim (arrow)


CT2074002

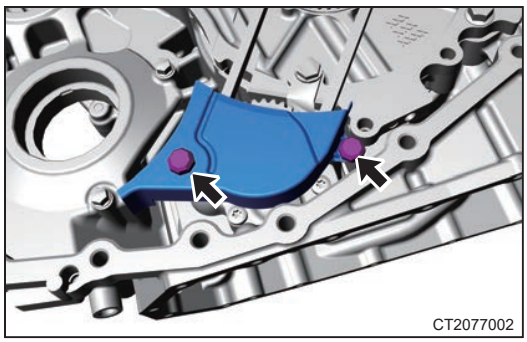
15. Remove the differential assembly (arrow).


CT2075002

16. Remove the differential rear bearing adjusting shim (arrow).

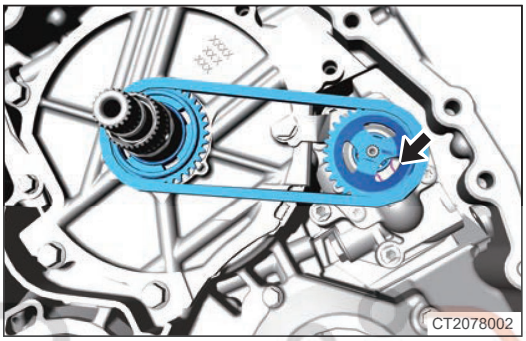

CT2076002

17. Remove 2 fixing bolts (arrow) and sprocket oil deflector.
    Tightening torque: 8 - 10 N·m

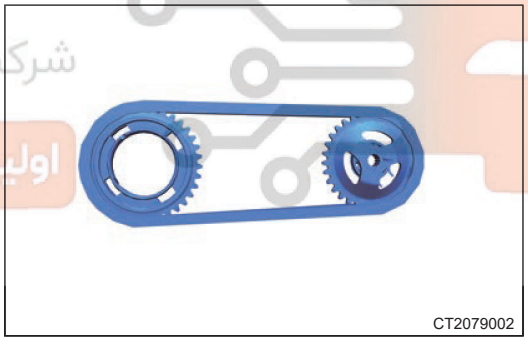


18. Remove drive/driven sprocket and chain.

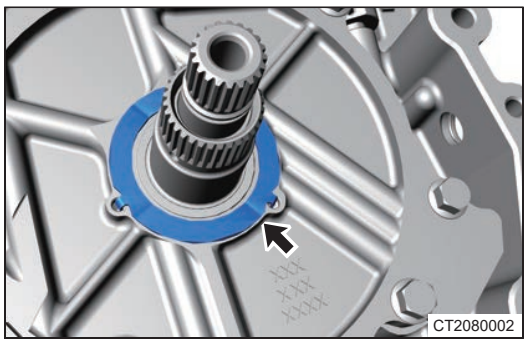
    a. Rotate driven sprocket to expose snap ring (arrow), then use snap spring calipers to support snap ring sprocket bearing and lift up driven sprocket at the same time.



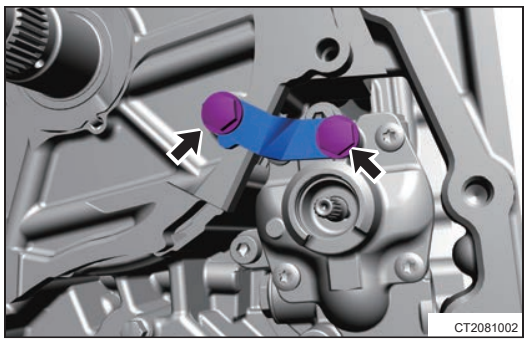
    b. Remove driven sprocket assembly, chain and drive sprocket synchronously.



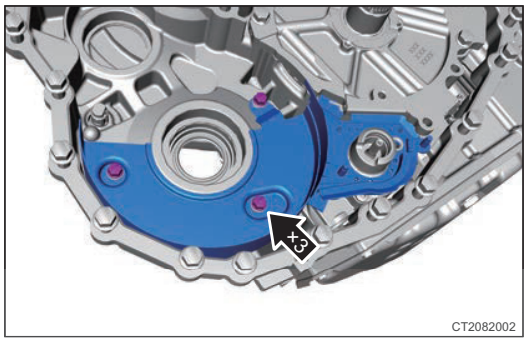
    c. Remove the washer between drive sprocket and oil separator.



19. Remove 2 fixing bolts (arrow) and pressing plate.
    Tightening torque: 20 ~ 26 N·m

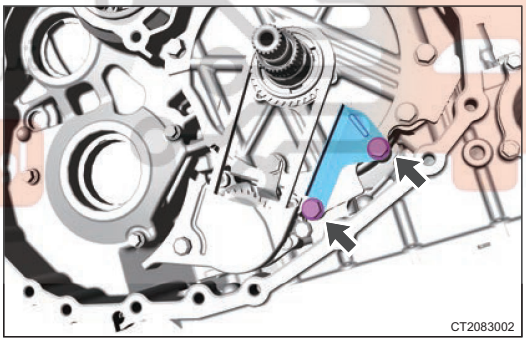


20. Remove 3 fixing bolts (arrow) and differential lower oil deflector assembly.
    Tightening torque: 8 - 10 N·m

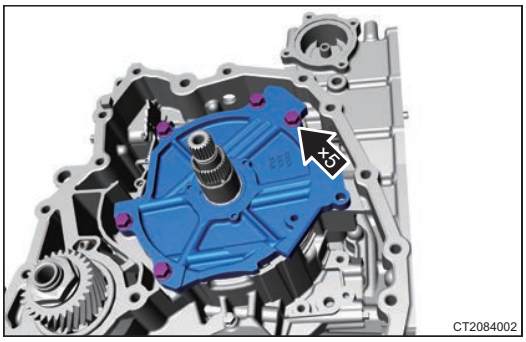


21. Remove the oil separator assembly.

    a. Remove 2 fixing bolts (arrow) and chain oil deflector.
    Tightening torque: 20 - 26 N·m

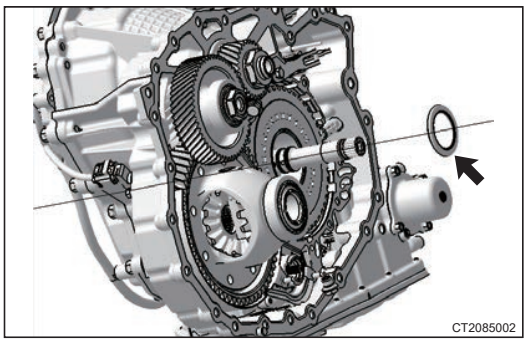


    b. Remove 5 fixing bolts (arrow) and oil separator assembly.
    Tightening torque: 20 - 26 N·m



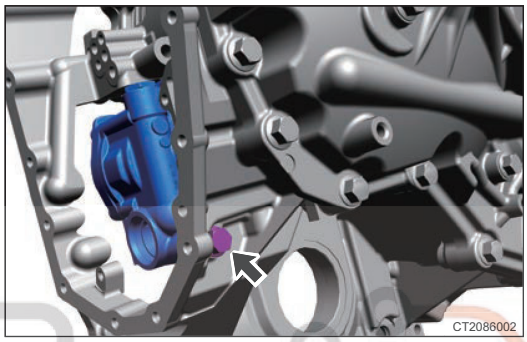
    c. Remove 2 forward clutch seal ring from oil separator assembly.

22. Remove the forward clutch thrust bearing (arrow).

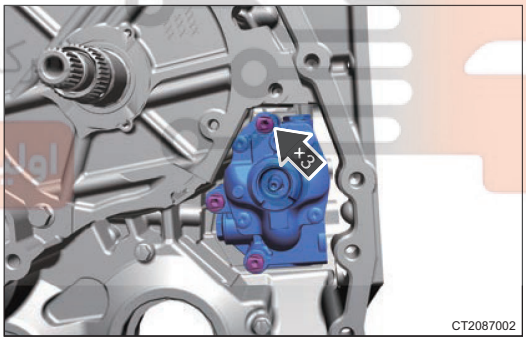


23. Remove the oil pump assembly.

a. Remove 1 fixing bolt (arrow) from oil pump assembly, remove bolt and O-ring bearing deflector.
Tightening torque: 20 - 26 N·m



b. Remove 3 fixing bolts (arrow) and oil pump assembly.
Tightening torque: 20 - 26 N·m



Assembly

1. Install oil pump assembly, apply CVTF to O-ring and put it into groove of oil pump bolt mounting hole of transmission case.
Tightening torque: 20 - 26 N·m

2. Install the forward clutch thrust bearing.

a. Select proper forward clutch thrust bearing, and apply appropriate amount of automatic transmission oil, and put it in place.

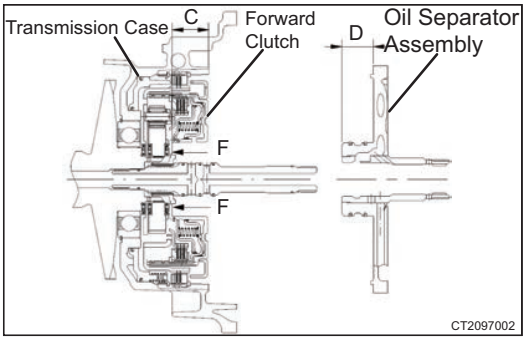
b. Forward clutch thrust bearing selection.

a. As shown in above illustration, apply a force of 1050 ± 50 N in direction of F.

b. Measure distance C.

c. Measure distance D on oil separator assembly.

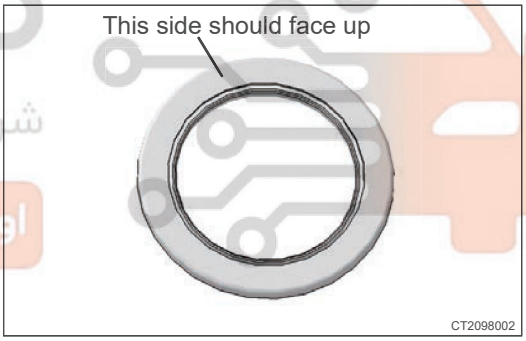
d. Calculate E = C - D, then select and install thrust bearing according to the table below.



E	Selected Part No.	Bearing Thickness (± 0.05)
4.274 ⩽ E < 4.452	025CHA-1502604AA	3.924
4.452 ⩽ E < 4.629	025CHA-1502604AB	4.102
4.629 ⩽ E < 4.807	025CHA-1502604AC	4.279
4.807 ⩽ E < 5.007	025CHA-1502604AD	4.457

⚠ Warning

- The installation direction of thrust bearing is upward as shown in illustration below.



3. Install the oil separator assembly.

a. Apply CVTF to two forward clutch seal rings, and install them in two sealing grooves on oil separator assembly in place.

b. Install oil separator assembly with seal ring to transmission case.

c. Place chain oil deflector in the corresponding position on oil separator assembly.

d. Screw in 7 hexagon flange bolts (install chain oil deflector) and tighten them diagonally.
Tightening torque: 20 - 26 N·m

⚠ Warning

- Remove O-ring input shaft to torque converter before removing oil separator assembly.
- To replace oil separator assembly, it is necessary to re-select forward clutch thrust bearing.

4. Install the differential lower oil deflector assembly.
Tightening torque: 8 - 10 N·m

5. Install the pressure plate.
Tightening torque: 8 - 10 N·m

6. Install drive/driven sprocket and chain.

   a. Install washer between drive sprocket and oil separator, and put three claws into three grooves of oil separator.

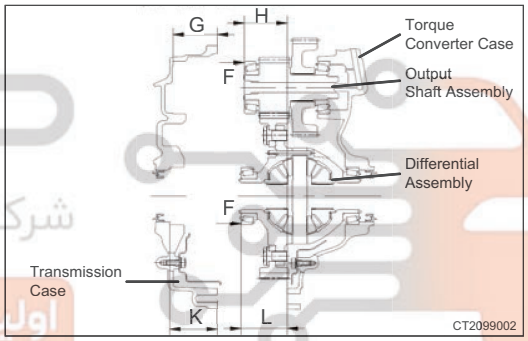
   b. At the same time, install sprocket chain. After drive sprocket is installed in place (the side with greater height from end face to tooth surface is upward), use snap spring calipers to support sprocket bearing snap ring, and at the same time press down driven sprocket assembly. After driven sprocket is installed in place, release snap spring calipers and confirm that snap ring is stuck in snap ring groove of sprocket bearing.

   c. Install the sprocket oil deflector.
      Tightening torque: 8 - 10 N·m

7. Install output shaft assembly, and differential assembly.

   a. According to requirements, select appropriate size of differential bearing adjusting shim and put it into bearing seat.
   b. According to requirements, select appropriate size of output shaft bearing adjusting shim and put it into bearing seat.

   c. Output shaft adjusting shim selection.
      a. Place torque converter case assembly (the joint surface with transmission case upward) on workbench and fix it.
      b. Install output shaft assembly to torque converter case in place.
      c. Measure distances G and H in above illustration respectively.
      d. When measuring distance H, apply a pressure of 300 ± 25 N on outer race of bearing and rotate for several turns.
      e. Calculate J = G - H, then select shim according to the table below, and install it after applying CVTF.



J	Selected Part No.	Shim Thickness (± 0.01)
0.74 ≤ J < 0.77	025CHA-1502108AA	0.88
0.77 ≤ J < 0.8	025CHA-1502108AB	0.91
0.8 ≤ J < 0.83	025CHA-1502108AC	0.94
0.83 ≤ J < 0.86	025CHA-1502108AD	0.97
0.86 ≤ J < 0.89	025CHA-1502108AE	1
0.89 ≤ J < 0.92	025CHA-1502108AF	1.03
0.92 ≤ J < 0.95	025CHA-1502108AG	1.06
0.95 ≤ J < 0.98	025CHA-1502108AH	1.09
0.98 ≤ J < 1.01	025CHA-1502108AJ	1.12
1.01 ≤ J < 1.04	025CHA-1502108AK	1.15
1.04 ≤ J < 1.07	025CHA-1502108AL	1.18
1.07 ≤ J < 1.1	025CHA-1502108AM	1.21
1.1 ≤ J < 1.13	025CHA-1502108AN	1.24
1.13 ≤ J < 1.16	025CHA-1502108AP	1.27
1.16 ≤ J < 1.19	025CHA-1502108AQ	1.3
1.19 ≤ J < 1.22	025CHA-1502108AR	1.33
1.22 ≤ J < 1.25	025CHA-1502108AS	1.36
1.25 ≤ J < 1.28	025CHA-1502108AT	1.39

d. Differential rear bearing adjusting shim selection.
e. Place torque converter case assembly (the joint surface with transmission case upward) on workbench and fix it.
f. Install differential assembly to torque converter case in place.
g. Measure distances K and L in above illustration respectively.
h. When measuring distance L, apply a pressure of 300 ± 25 N on outer race of bearing and rotate for several turns.
i. Calculate M = K - L, then select shim according to the table below, and install it after applying CVTF.

M	Selected Part No.	Shim Thickness (± 0.012)
0.72 ≤ M < 0.8	513MHA-1701508AA	0.93
0.8 ≤ M < 0.87	513MHA-1701508AB	1.01
0.87 ≤ M < 0.95	513MHA-1701508AC	1.08
0.95 ≤ M < 1.02	513MHA-1701508AD	1.16
1.02 ≤ M < 1.1	513MHA-1701508AE	1.23
1.1 ≤ M < 1.18	513MHA-1701508AF	1.31
1.18 ≤ M < 1.26	513MHA-1701508AG	1.39

8. Install new differential bearing outer race and output shaft bearing outer race.

9. Install differential upper oil deflector, oil guide pipe and oil guide bracket to hydraulic torque converter case.
   Tightening torque: 8 - 10 N·m

10. Install the torque converter case.

    a. Lay CVT transmission case flat, clean original gum on sealing surface of transmission case, and there should be no convex residual gum on sealing surface.

    b. Apply new specified seal gum (Loctite 5460).

⚠ Warning

- Make sure there are no foreign matters in transmission cavity, and make sure scraping gum does not fall into transmission cavity.
- When cleaning original seal gum on sealing surface of transmission case, do not scratch sealing surface of transmission case.
- Application line needs to be located on sealing surface of case inside bolt mounting hole.
- Ensure quality of gum application, there should be no broken gum, uneven coating, bubble in application line.

    c. Install 23 fixing bolts to torque converter case.
    Tightening torque: 42 - 54 N·m

⚠ Caution

- For a new torque converter case, it needs to install two oil pressure detection bolts and corresponding O-rings.
  Tightening torque: 19 - 25 N·m

11. Install the valve body and wire harness assembly.

⚠ Warning

- Make sure O-ring valve body and transmission case are intact.
- Before installing valve body and wire harness assembly, confirm O-ring valve body and transmission case are installed in place.
- When electronic shift actuator connecting rod is assembled to transmission rocker arm, rocker arm transmission position must be consistent with that when it is separated.
- It is necessary to learn after removing and installing electronic shift module assembly.

12. Install the filter assembly.
    Tightening torque: 8 - 10 N m

13. Install the valve case assembly.
    Tightening torque: 8 - 10 N·m

14. Install hydraulic torque converter oil seal, install O-ring input shaft to hydraulic torque converter.
15. Install hydraulic torque converter assembly.

Matching and Learning

Electronic Shift Actuator Self-learning

Transmission self-learning should be performed in following conditions, otherwise there will be abnormal shifts:

1. Replace electronic shift actuator.
2. Electronic shift actuator was removed and installed again.
3. Electronic shift part fault code alarms.

The specific operation of self-learning is as follows:

1. Vehicle power is turned on without starting;
2. First shift to N;
3. Then shift to P;
4. Finally shift to N;
5. Perform self-learning with diagnostic tester (It is required to perform self-learning in N);
6. Vehicle power is turned off normally and self-learning is completed.

⚠ Caution

- The diagnostic tester prompts that the self-learning has failed, first check whether the meter displays N gear.
- If it is not in N, first shift to N position, and then repeat the self-learning according to the above steps.
- If it is in N, adjust the electronic shift connecting rod according to the data, and then perform self-learning again according to the above steps.

Transmission Self-Learning

Transmission self-learning should be performed in following conditions, failure to do so may cause unsmooth gear shifting and starting:

1. For the first driving of a new vehicle;
2. Replace TCU with a new one;
3. Replace valve body assembly, hydraulic torque converter, forward and reverse clutch set and transmission.

The transmission needs to clear the self-learning value with diagnostic tester after replacing the above components. After the vehicle power is turned off and then start again, perform self-learning according to the self-learning steps;

The specific operation of hydraulic torque converter lock clutch self-learning is as follows:

1. Start the engine and shift to D;
2. Accelerate the vehicle to 50 kph;
3. Release the accelerator pedal and do not depress the brake pedal. The vehicle will slide to below 10 kph;
4. Repeat steps 2 and 3 for three times;
5. Turn off the ignition key and self-learning is completed after waiting for 10 seconds.

The specific operation of forward clutch self-learning is as follows:

1. Release the parking brake after starting the engine;
2. 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;
3. Repeat step 2 for more than five times;
4. Turn off the ignition key and self-learning is completed after waiting for 10 seconds.

The specific operation of reverse clutch self-learning is as follows:

1. Release the parking brake after starting the engine;

2. 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;
3. Repeat step 2 for more than five times;
4. 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.

ELECTRONIC SHIFT

Warnings and Precautions

Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

1. When removing electronic shift module assembly, be sure to wear safety equipment to prevent accidents.

Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

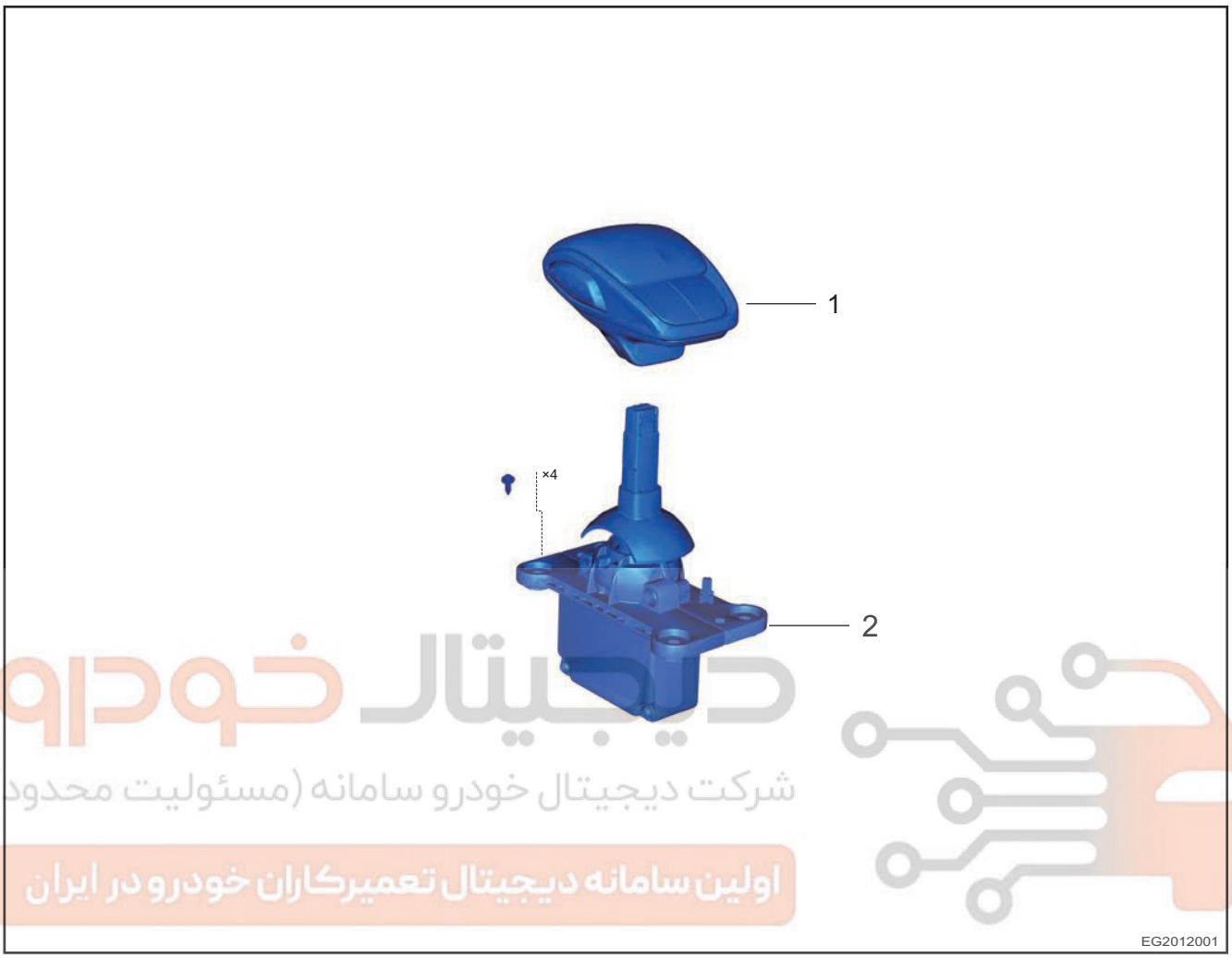
1. Appropriate force should be applied, when removing upper cover plate assembly. Be careful not to operate roughly.

System Overview

System Description

Electronic shift module (EGS) and the transmission is not the traditional mechanical way, but a safer and faster electronic control mode, eliminating the traditional mechanical shift mode, all using electronic signals to substitute. Its advantage is that the driver's wrong shift operation will be judged by the computer to see if it will cause damage to the transmission, so as to better protect the transmission and correct the bad shift habits. As a luxurious, high-technology configuration, electronic shift lever eliminates the traditional mechanical shifting mechanism and provides us with a more convenient operation.

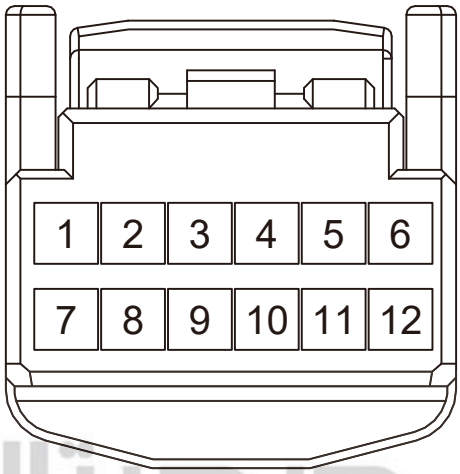
System Diagram



1	Shift Lever Assembly	2	Electronic Shift Module Assembly

System Circuit Diagram

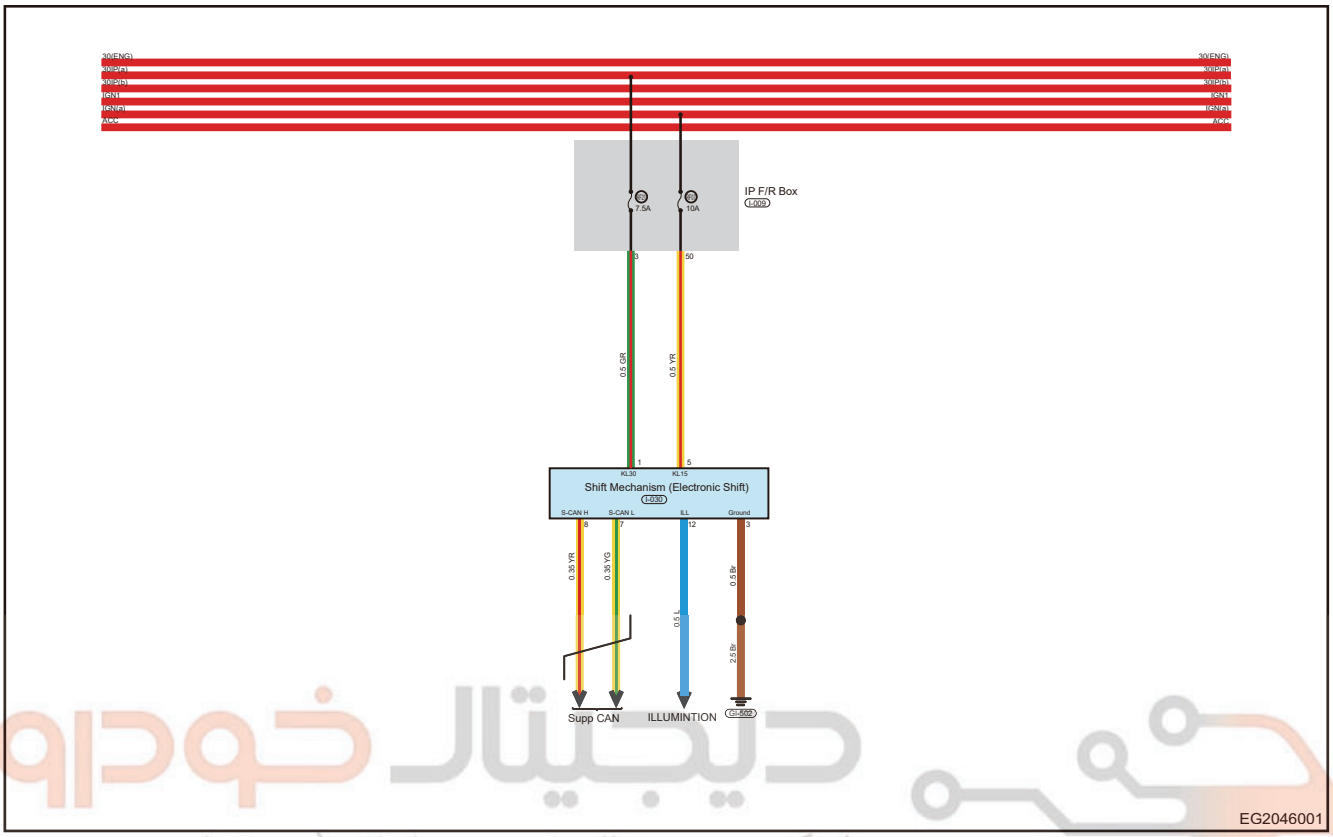
Automatic Gear Shift Mechanism Terminal Definition



EG2045001

Terminal No.	Description	Terminal No.	Description
1	KL30	7	S-CAN L
2	-	8	S-CAN H
3	Ground	9	-
4	-	10	-
5	KL15	11	-
6	-	12	ILL

Circuit Diagram



Diagnosis & Testing

Problem Symptoms Table

Hint:

- Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Problem	Suspected Area
Automatic Shift Control Mechanism Lost Communication With EMS Automatic Shift Control Mechanism Lost Communication With TCU Automatic Shift Control Mechanism Lost Communication With BSM Automatic Shift Control Mechanism Lost Communication With ICM Automatic Shift Control Mechanism Lost Communication With BCM	Wire harness or connector is damaged
	CAN bus hardware circuit malfunction
	Damaged electronic shift lever
	EGS module
	It is possible that associated module had been replaced when battery is not removed

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.

- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

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.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Check for broken, bent, protruded or corroded terminals.
- Check electronic shift control system components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

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 operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

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

Diagnosis Procedure

Hint:

- Use following procedures to troubleshoot the electronic shift system.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.
Standard Condition
Standard voltage: Not less than 12 V.

NG → **Replace battery**

OK

3	**Customer problem analysis**

Next

4	**Read DTCs**

NG → **Perform repair according to problem symptoms table**

OK

5	**Read DTCs (current DTC and history DTC)**

NG → **Troubleshoot according to Intermittent DTC malfunction procedures**

OK

6	**Repair according to Diagnostic Trouble Code (DTC) chart**

Next

7	**Adjust, repair or replace**

Next

8	**Conduct test and confirm malfunction has been repaired**

Next → **End**

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Possible Cause	Maintenance Advice
C1950-16	Battery Voltage Below Threshold	• Power supply system failure • Wire harness or connector is damaged • EGS failure	• Check and repair power supply system • Check wire harness or connector • Replace EGS
C1951-17	Battery Voltage Above Threshold		
C1952-00	FW Stuck	• Wire harness or connector failure • EGS failure	• Check wire harness or connector • Replace EGS
C1953-00	BW Stuck		
C1954-00	TIP+ Stuck		
C1955-00	TIP- Stuck		
C1956-49	Light Detection Fault		
C1957-49	Heavy Detection Fault		
C1958-48	Program Cycle Violated		
C1959-13	Park Button 1 Open Circuit		
C195A-11	Park Button 1 Short to GND		
C195B-12	Park Button 1 Short to Power Supply		
C195C-92	Park Button Stuck		
C195D-13	Park Button 2 Open Circuit		
C195E-11	Park Button 2 Short to GND		
C195F-12	Park Button 2 Short to VCC		
C1960-92	Park Button 2 Pressed for 60s		
C1961-38	Invalid PWM for Overlight		
C1962-46	Calibration Parameters be Corruped	• Calibration Parameters be Corruped • EGS failure	• Recalibrate again • Replace EGS
U0073-88	CAN Bus Off	• CAN network failure • EGS failure	• Check and repair CAN network • Replace EGS
U0100-87	Lost Communication with EMS		
U0101-87	Lost Communication with TCU		
U0129-87	Lost Communication with BSM		

DTC	DTC Definition	Possible Cause	Maintenance Advice
U0155-87	Lost Communication with ICM		
U0401-81	Invalid Data Received from EMS-Invalid Serial Data Received		
U0402-81	Invalid Data Received from TCU		
U0418-81	Invalid Data Received from BSM-Invalid Serial Data Received		
U0423-81	Invalid Data Received from ICM		
U0140-87	Lost Communication with BCM		

DTC Diagnosis Procedure

DTC	C1950-16	Battery Voltage - Circuit Voltage Below Threshold
DTC	C1951-17	Battery Voltage - Circuit Voltage Above Threshold

DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

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

1	**Check battery voltage**

(a) Check if battery voltage is normal.
(b) Check battery voltage with multimeter voltage band.

NG → **Check and repair battery**

OK

2	**Check EGS module power supply fuse**

(a) Check if “EGS module” power supply fuse in instrument panel fuse and relay box is blown.

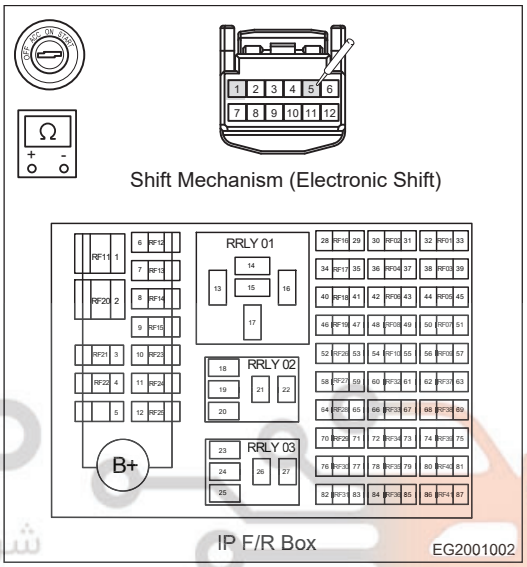
NG → **Replace fuse**

OK

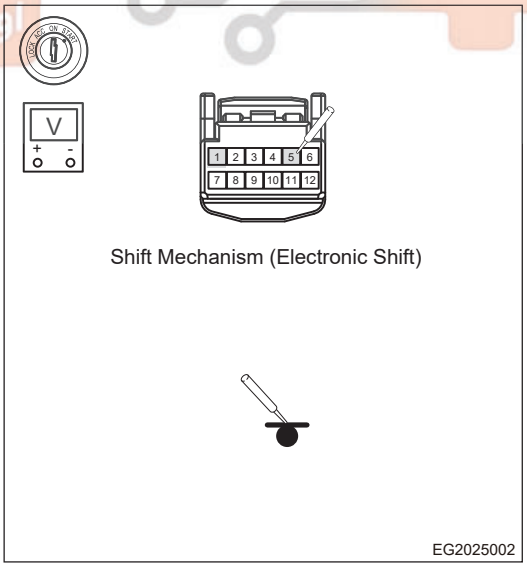
3	Check supply circuit

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the electronic shift module connector.

(d) Use digital multimeter to measure resistance between terminal 1, 5 of electronic shift module and instrument panel fuse and relay box (connected terminals) to check circuit for open.



(e) Use a multimeter to measure voltage between terminals 1, 5 of electronic shift module and body ground, it should be not less than 12 V.



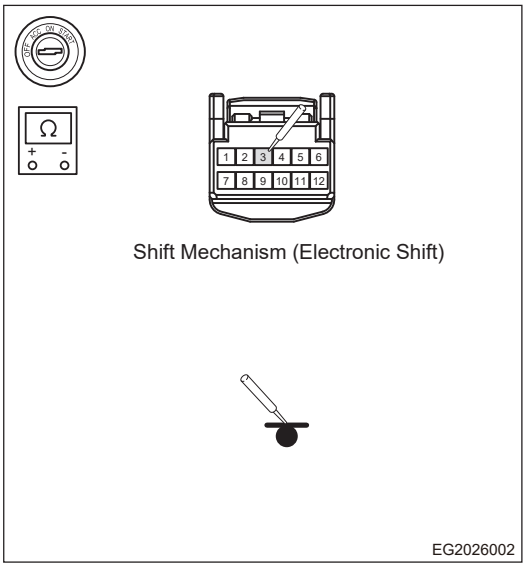
NG → **Repair or replace related wire harness**

OK

4	Check EGS shift module ground

(a) Turn ENGINE START STOP switch to ON.

(b) Using voltage band of multimeter to measure resistance between terminal 3 of electronic shift module and body ground to check ground wire for open.



NG → **Check wire harness or deal with ground points**

OK →

5	Reconfirm DTCs

(a) Connect all connectors.

(b) Connect the negative battery cable.

(c) Turn ENGINE START STOP switch to ON.

(d) Check if DTC exists.

OK → **Confirm system is normal**

NG → **Replace EGS shift module assembly**

DTC	C1952-00	FW Stuck
DTC	C1953-00	BW Stuck
DTC	C1954-00	TIP+ Stuck
DTC	C1955-00	TIP Stuck
DTC	C1956-49	Light Detection Fault
DTC	C1957-49	Heavy Detection Fault
DTC	C1958-48	Program Cycle Violated

DTC	C1959-13	Park Button 1 Open Circuit
DTC	C195A-11	Park Button 1 Short to GND
DTC	C195B-12	Park Button 1 Short to VCC
DTC	C195C-92	Park Button 1 Pressed for 60s
DTC	C195D-13	Park Button 2 Open Circuit
DTC	C195E-11	Park Button 2 Short to GND
DTC	C195F-12	Park Button 2 Short to VCC
DTC	C1960-92	Park Button 2 Pressed for 60s
DTC	C1961-38	Invalid PWM for Overlight

DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check the DTCs in system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

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

Hint:

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

1	**Check shift lever and shift module connector**

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery cable.
(c) Disconnect shift lever/shift module connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG → **Repair or replace shift lever/shift module**

OK

2	**Check EGS module power supply fuse**

(a) Check if “EGS module” power supply fuse in instrument panel fuse and relay box is blown.

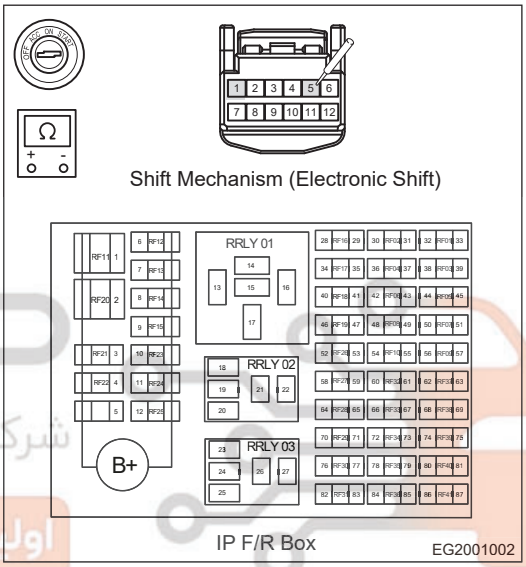
NG → **Replace fuse**

OK ↓

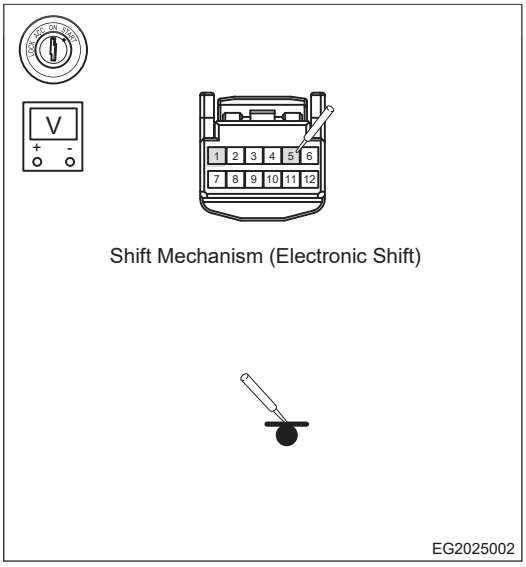
3	**Check supply circuit**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the electronic shift module connector.

(d) Using voltage band of multimeter to measure resistance between terminal 1, 5 of electronic shift module and instrument panel fuse and relay box (connected terminals) to check circuit for open.



(e) Use a multimeter to measure voltage between terminals 1, 5 of electronic shift module and body ground, it should be not less than 12 V.



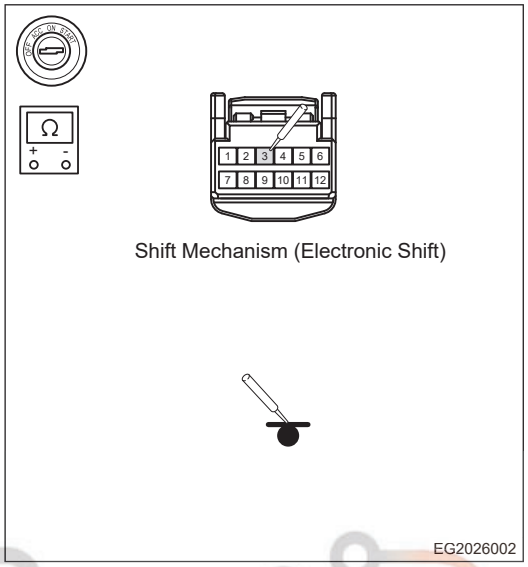
NG → **Repair or replace related wire harness**

OK

4	Check EGS shift module ground

(a) Turn ENGINE START STOP switch to ON.

(b) Use a multimeter to measure resistance between terminal 3 of electronic shift module and body ground to check ground wire for open.



NG → **Check wire harness or deal with ground points**

OK

5	Reconfirm DTCs

(a) Connect all connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK → **Confirm system is normal**

NG → **Replace EGS shift module assembly**

DTC	U0073-88	Control Module Communication Bus Off CAN Busoff
DTC	U0100-87	Lost Communication With EMS
DTC	U0101-87	Lost Communication With TCU
DTC	U0129-87	Lost Communication With BSM

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DTC	**U0155-87**	**Lost Communication With ICM**
DTC	**U0140-87**	**Lost Communication With BCM**

DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check the DTCs in system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

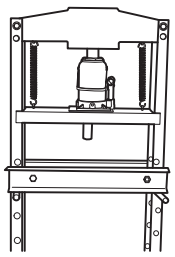
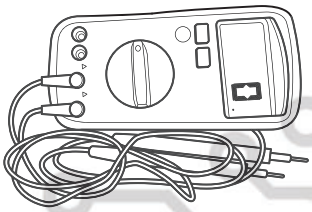
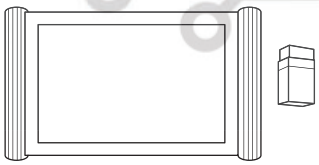
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**(Refer to CAN system)**

On-vehicle Service

Tools

General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020
Digital Multimeter	 S00002
X-431 PAD Diagnostic Tester	 S00001

Specifications

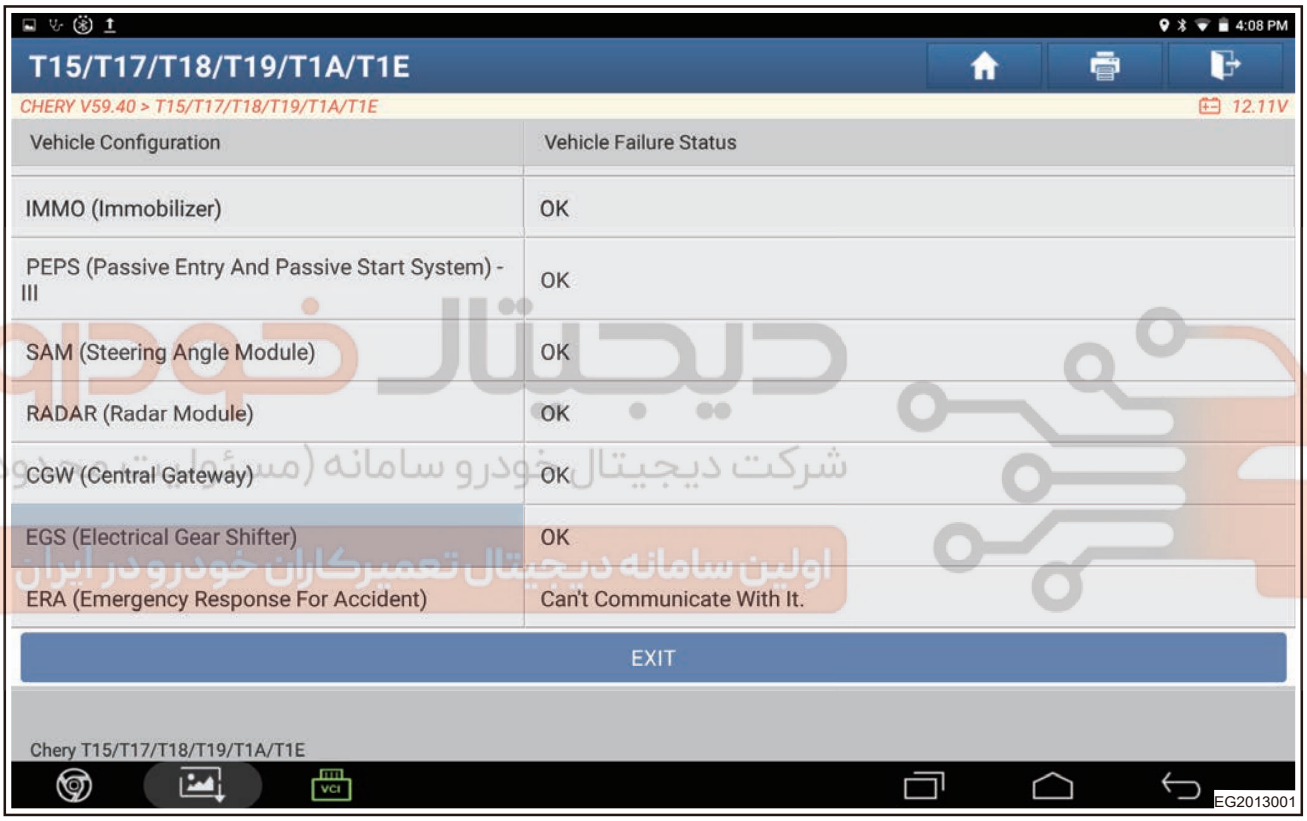
Torque Specifications

Item	Tightening torque
Automatic Shift Control Mechanism Fixing Screw	1.5 ± 0.5 N·m
Electronic Shift Control Mechanism Fixing Bolt	5 ± 1 N·m

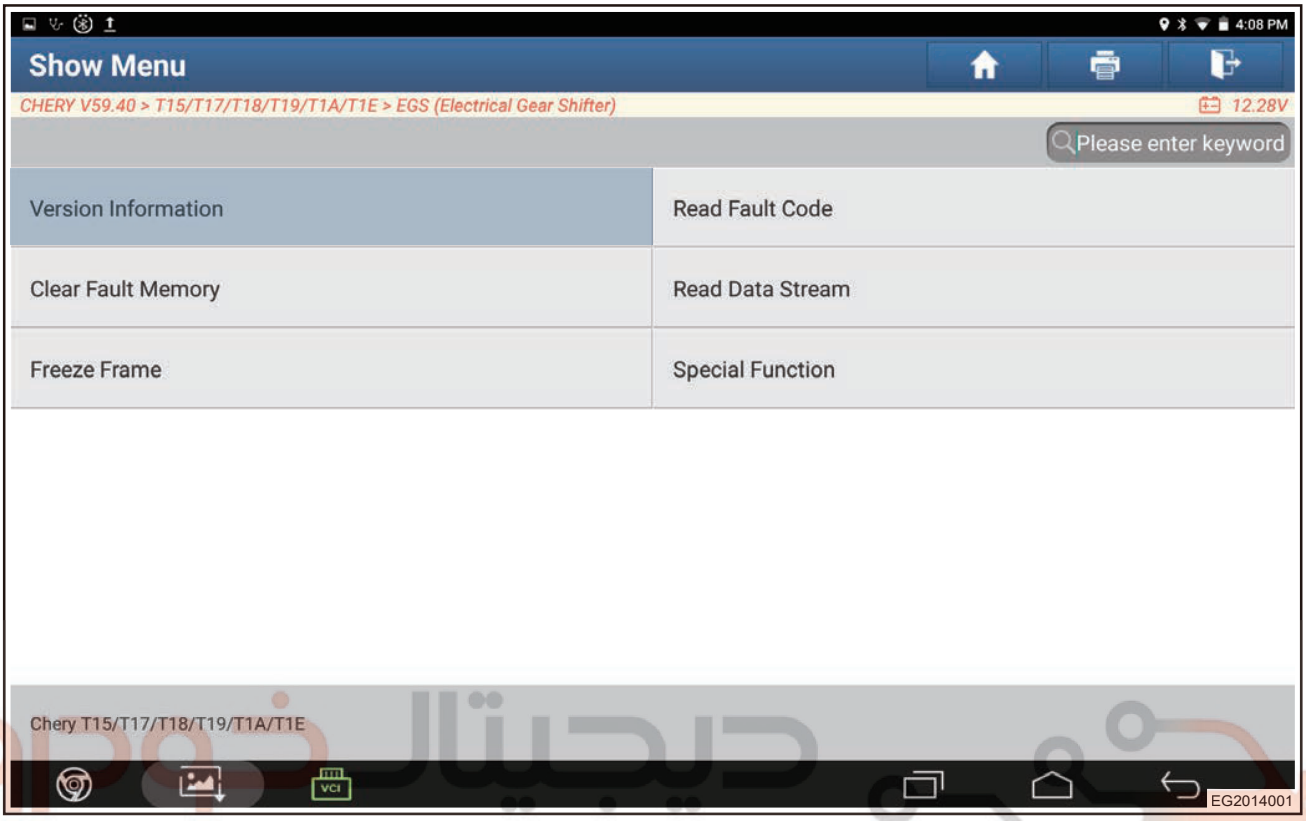
Method for Distinguishing Manufactures of Electronic Shift Lever

Warning
• When removing shift lever assembly, be sure to wear safety equipment to prevent accidents. • Appropriate force should be applied, when removing shift lever assembly. Be careful not to operate roughly.

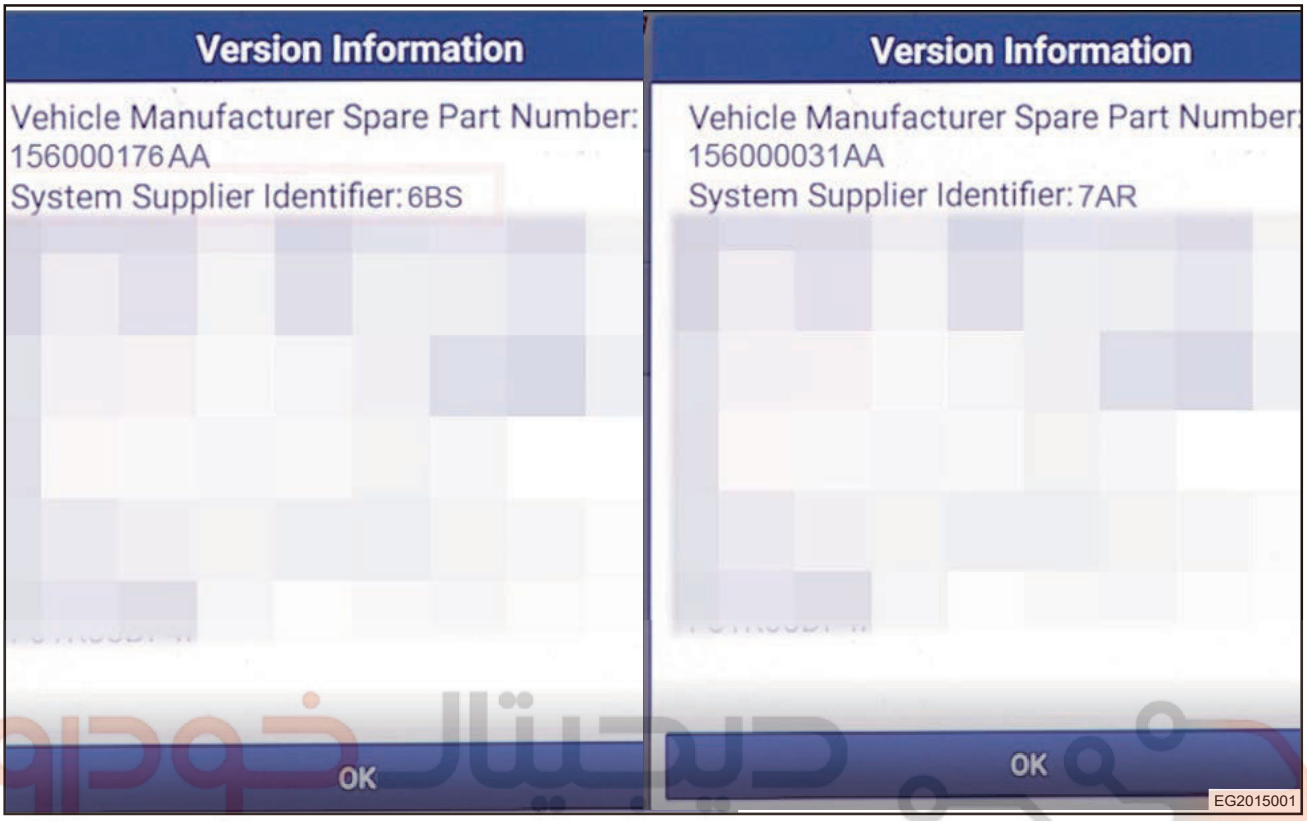
1. Connect the diagnostic tester.
2. Turn the ENGINE START STOP switch to ON.
3. Operate diagnostic tester to enter EGS system.



4. Click “Version Information”.



5. Read manufacturer code.



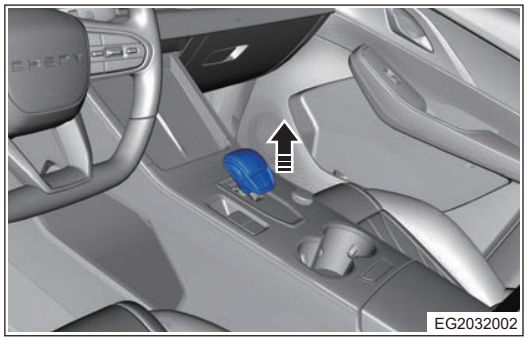
a.6BS belongs to Wuhu Qifeng, and 7AR belongs to Ficosa.

Shift Lever Assembly

Removal

Warning
• When removing shift lever assembly, be sure to wear safety equipment to prevent accidents. • Appropriate force should be applied, when removing shift lever assembly. Be careful not to operate roughly.

1. Disconnect the negative battery cable.
2. Remove the shift lever assembly (6BS).
   a. Remove shift lever assembly in direction of arrow.



Installation

⚠ Caution

- Insert shift lever assembly along the direction of shift lever of shift control mechanism, until shift lever reaches the lower limit (there will be a slight sound of a snap ring in place), and shift lever can not be pushed down.
- Slightly apply force to push the lever upward after assembly, confirm it is assembled in place.
- Do not hit the lever to avoiding damaging connector.

1. Installation is in the reverse order of removal.

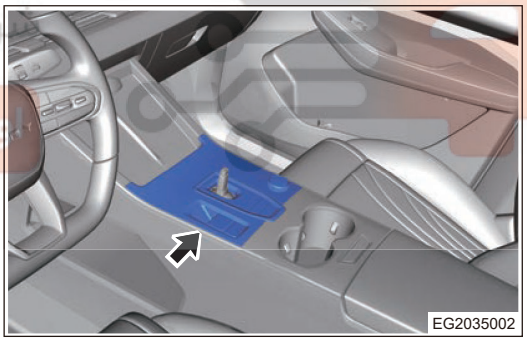
Electronic Shift Mechanism Assembly

Removal

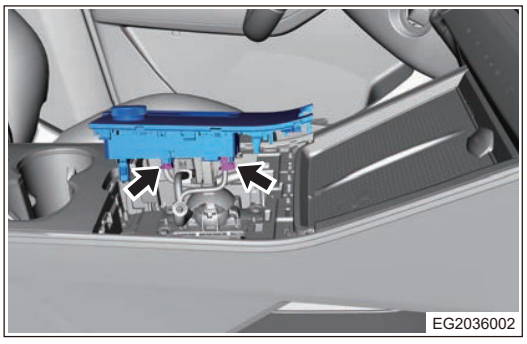
⚠ Warning

- When removing shift control mechanism assembly, be sure to wear safety equipment to prevent accidents.
- Appropriate force should be applied, when removing shift control mechanism assembly. Be careful not to operate roughly.

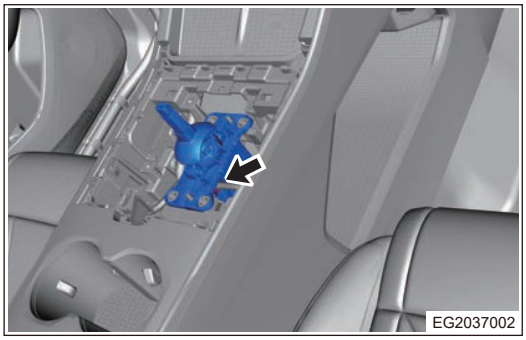
1. Turn ignition switch to OFF.
2. Disconnect the negative battery cable.
3. Remove the shift knob assembly.
4. Pry off auxiliary fascia console control panel assembly (-arrow) carefully with an interior crow plate.



5. Disconnect each switch connector (arrow), and remove upper cover plate assembly.

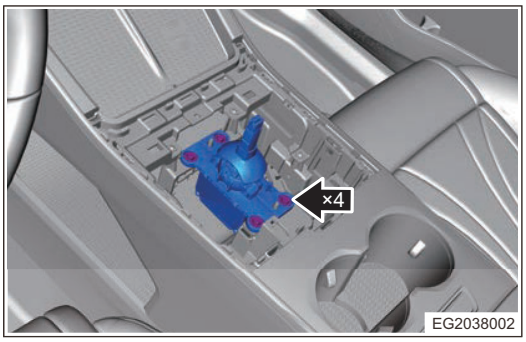


6. Disconnect the electronic shift control mechanism assembly wire harness connector (arrow).



7. Remove 4 fixing bolts (arrow) from electronic shift control mechanism assembly, then remove electronic shift control mechanism assembly.

   Tightening torque: 5 ± 1 N m



Installation

⚠ Caution

- After replacing electronic shift mechanism assembly, use the diagnostic tester to write VIN code.
- Insert shift lever assembly along the direction of shift lever of shift control mechanism, until shift lever reaches the lower limit (there will be a slight sound of a snap ring in place), and shift lever can not be pushed down.
- Slightly apply force to push the lever upward after assembly, confirm it is assembled in place.
- Do not hit the lever to avoiding damaging connector.

1. Installation is in the reverse order of removal.

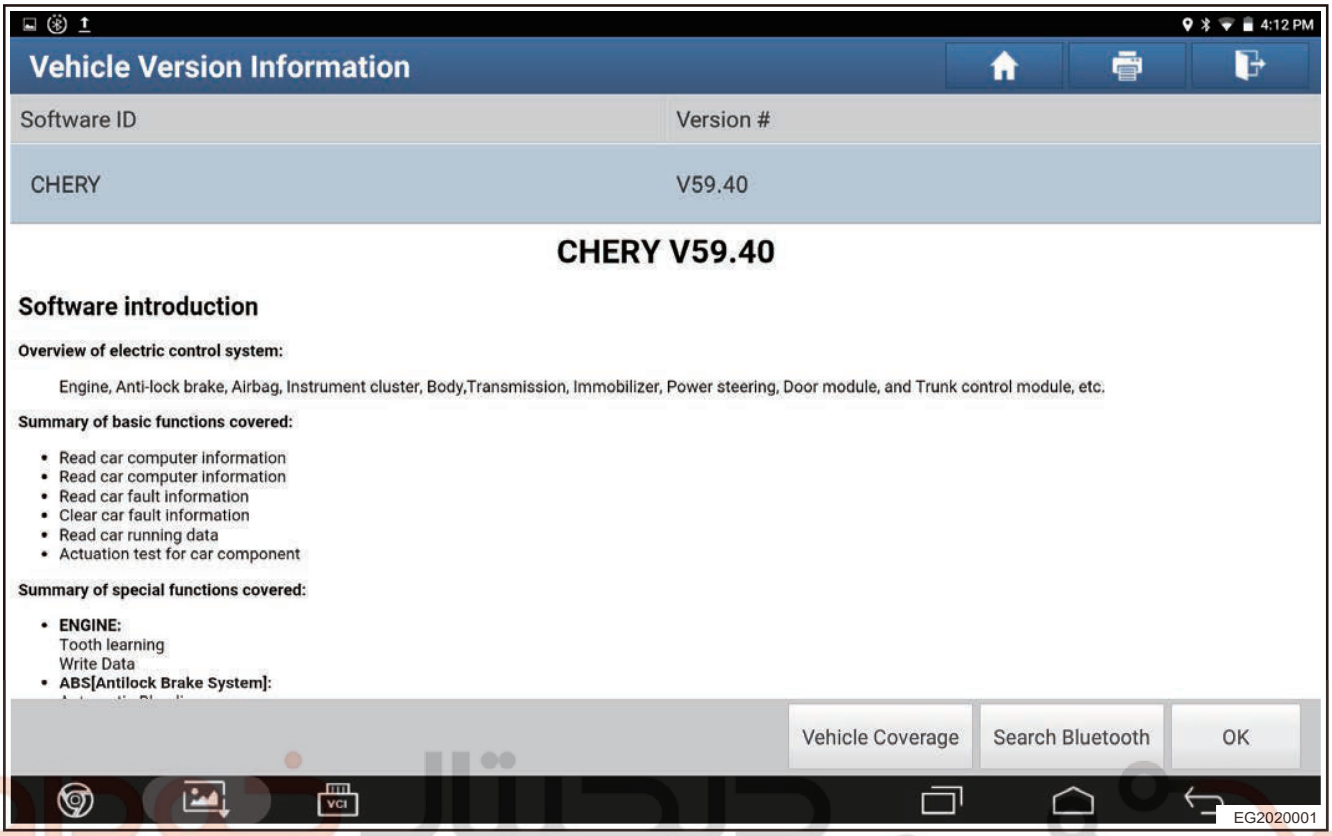
Matching Learning

Write VIN Code

Hint:

- After replacing electronic shift mechanism assembly, use the diagnostic tester to write VIN code.

1. Connect diagnostic tester, and select “CHERY”.
2. Select Vehicle Version Information (Version ⩾ V59.40), and click “OK”.



3. Select “T19” model.

4. Select “EGS (Electrical Gear Shifter)”.

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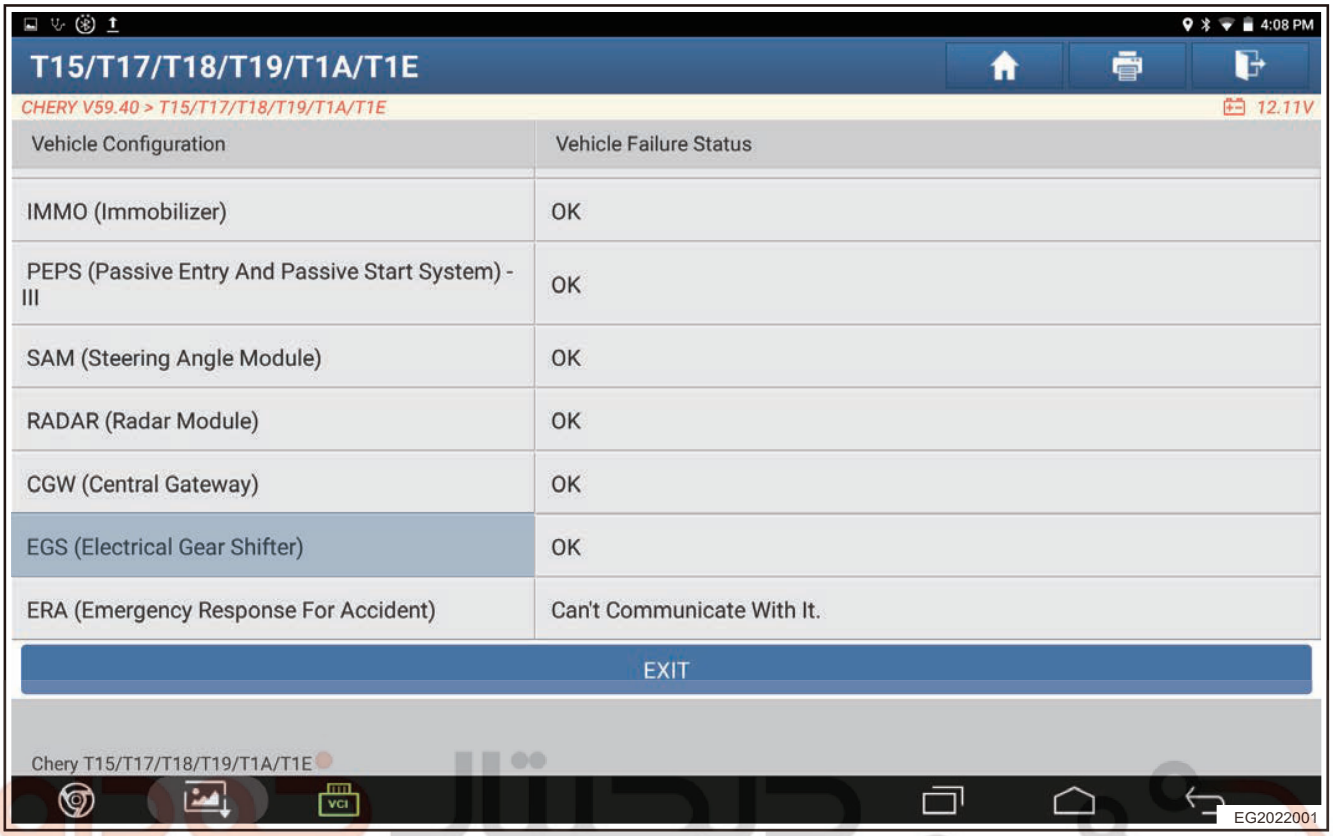
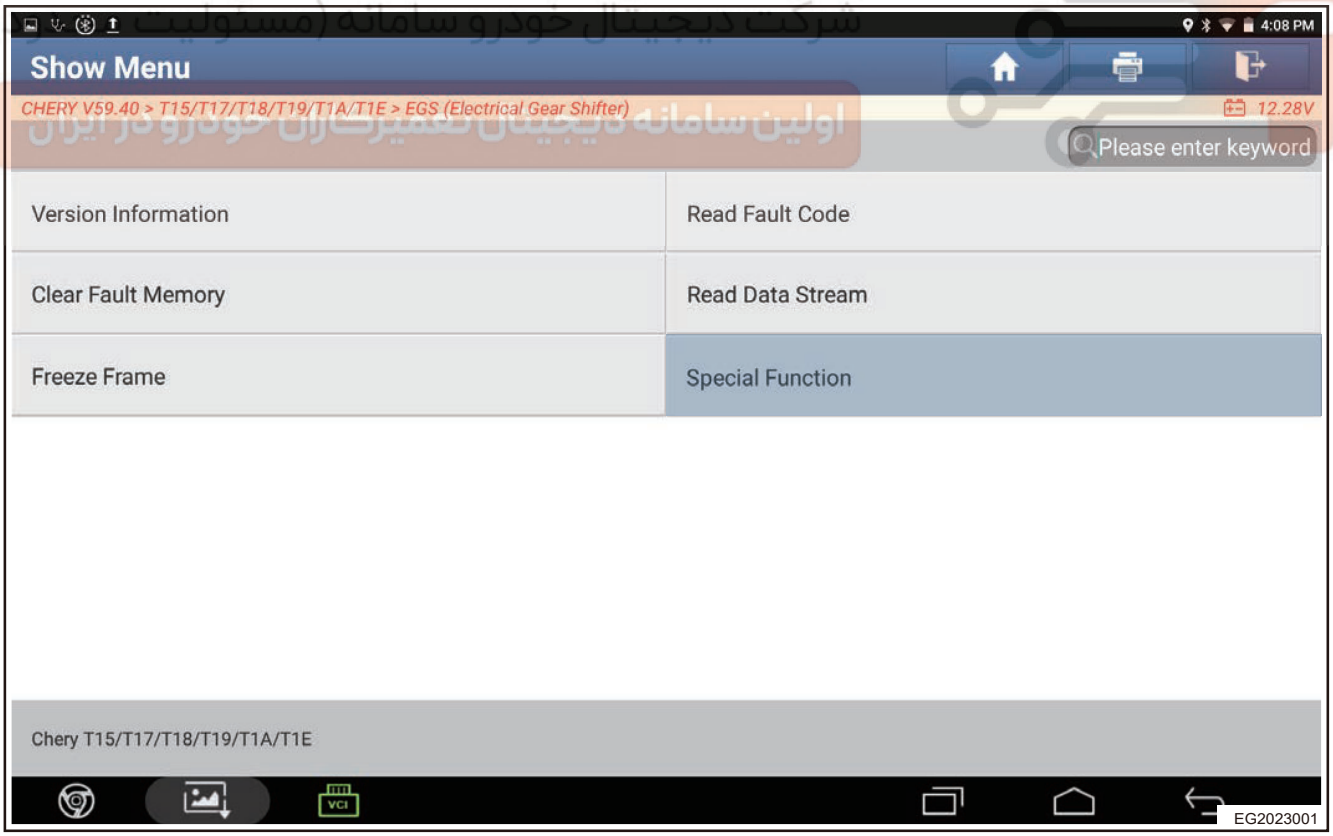
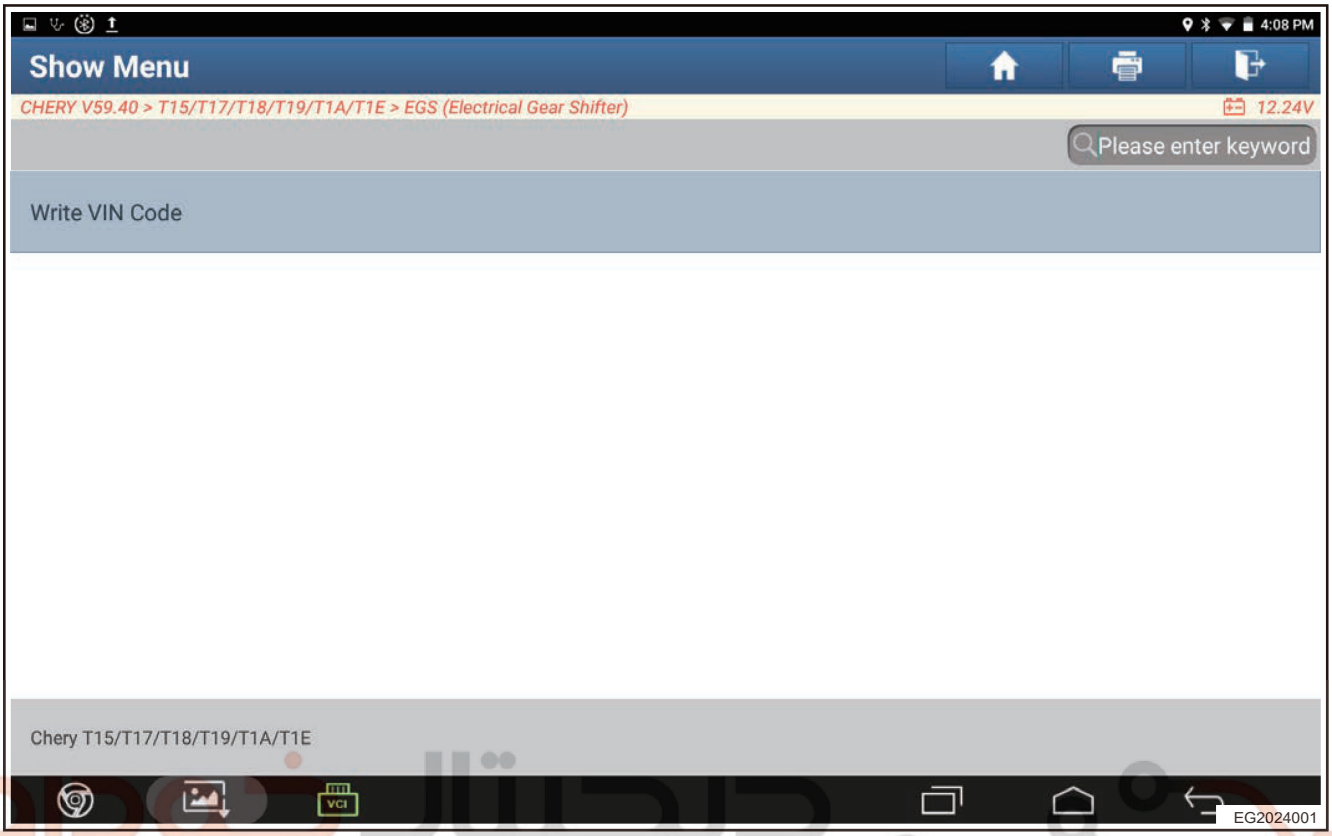


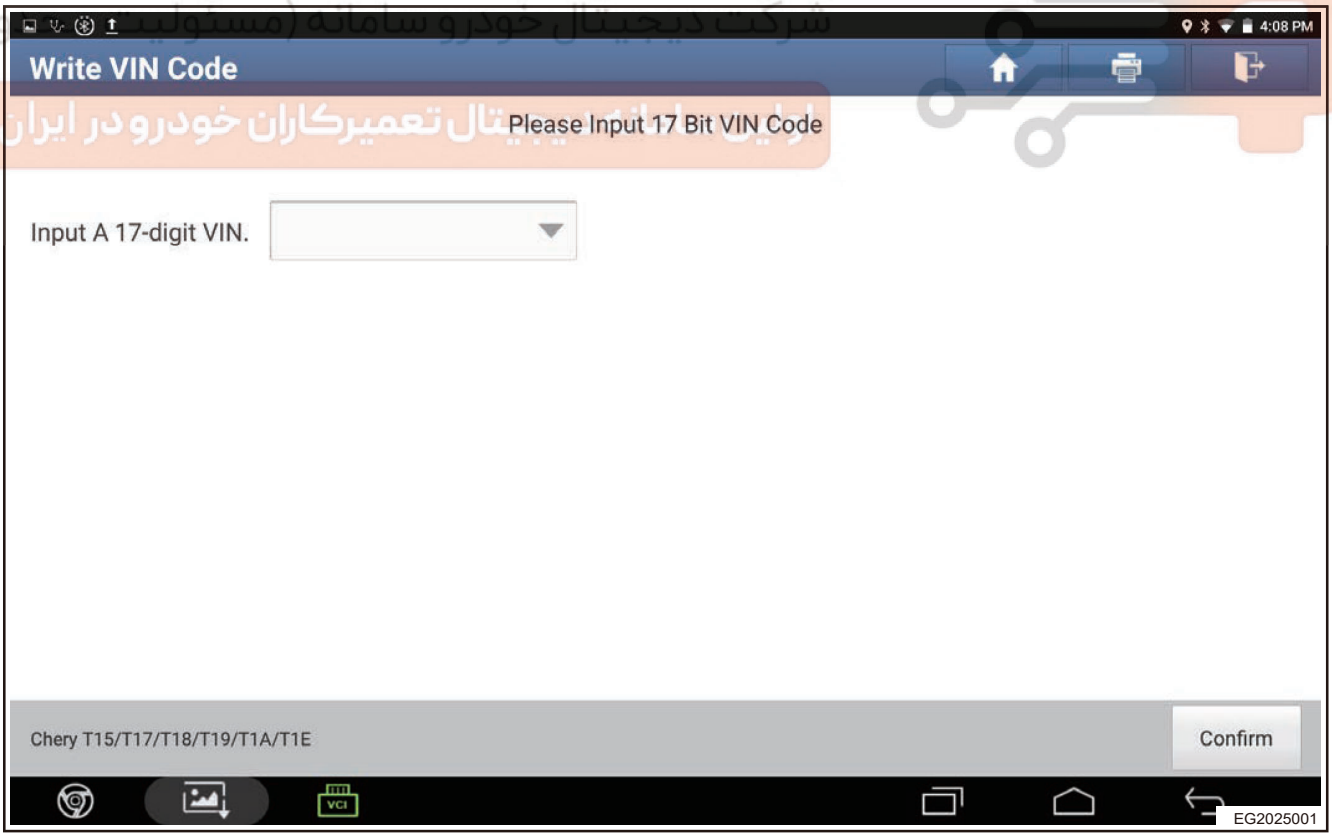
5. Select “Special Function”.



6. Select “Write VIN Code”.



7. Write VIN code. After confirming information, click “OK”.



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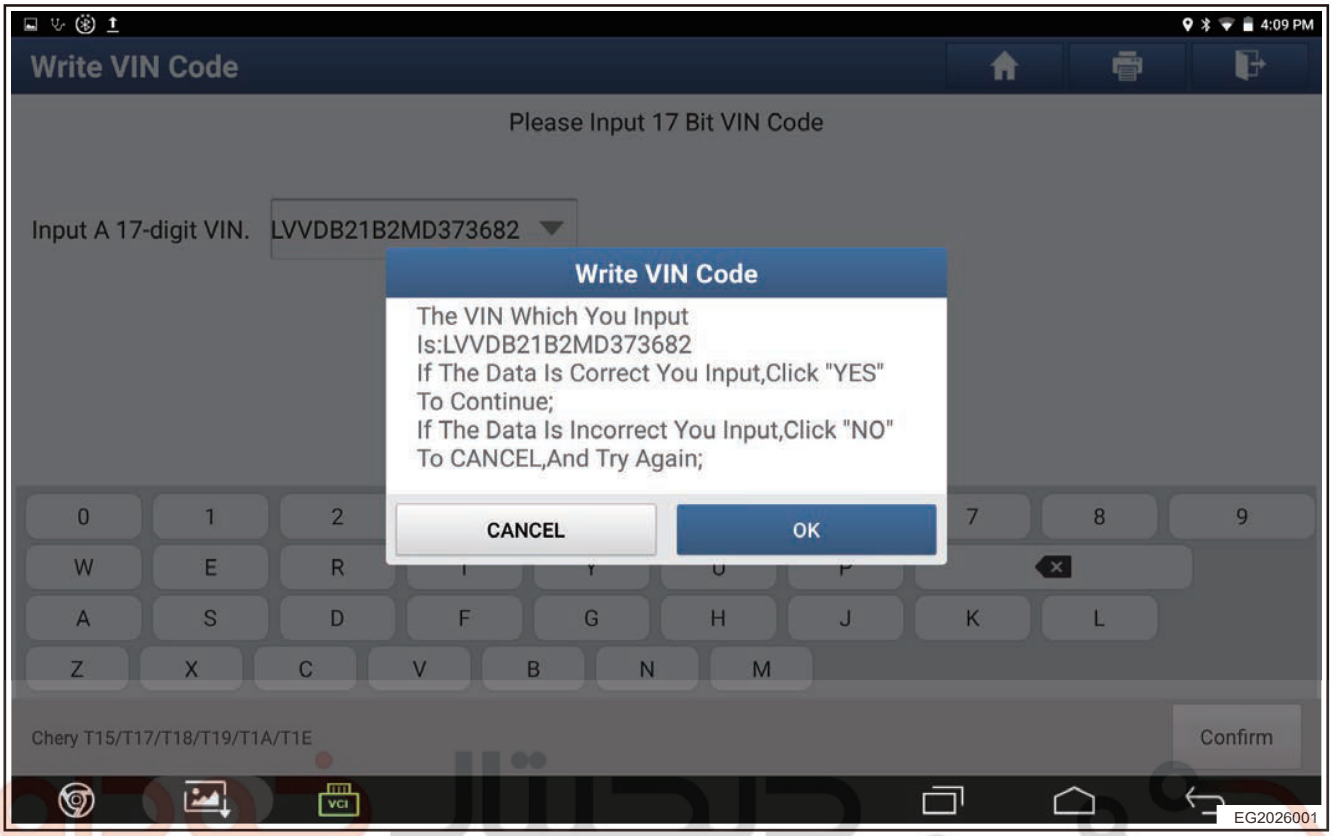
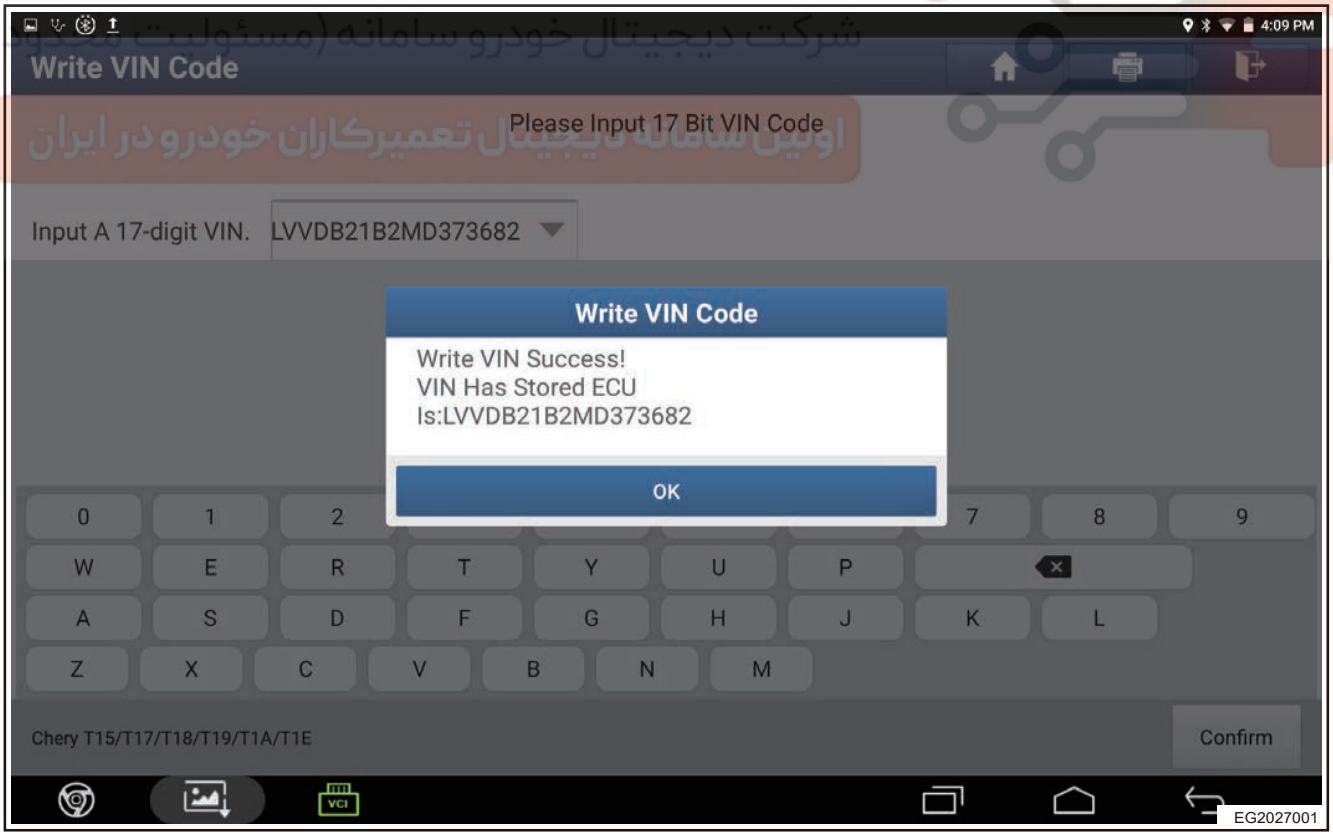


8. Interface shows “Write VIN Success!”, click “OK”.



DRIVE SHAFT

Warnings and Precautions

Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

1. Be sure to wear safety equipment to prevent accidents, when removing drive shaft assembly.

Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

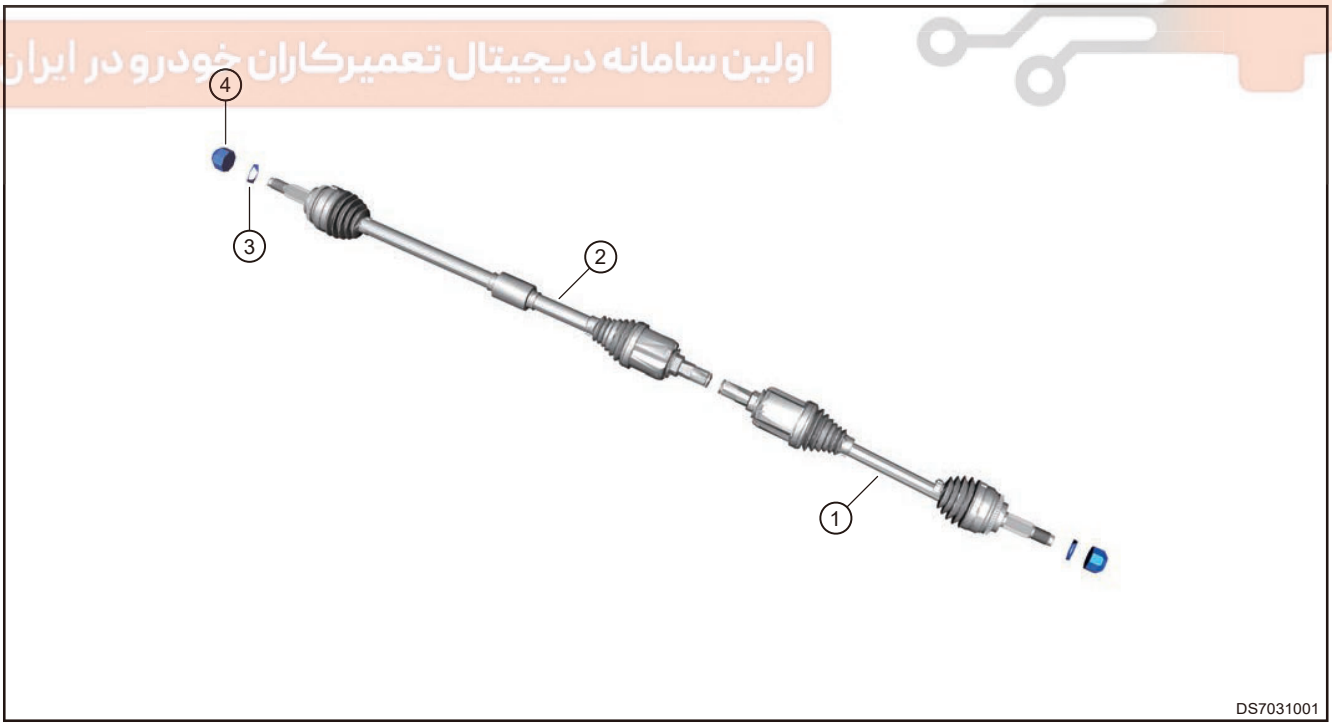
1. Appropriate force should be applied, when removing drive shaft assembly. Be careful not to operate roughly.
2. When loosening staked part of nut, it is necessary to loosen it completely, otherwise, threads of drive shaft assembly will be damaged.

System Overview

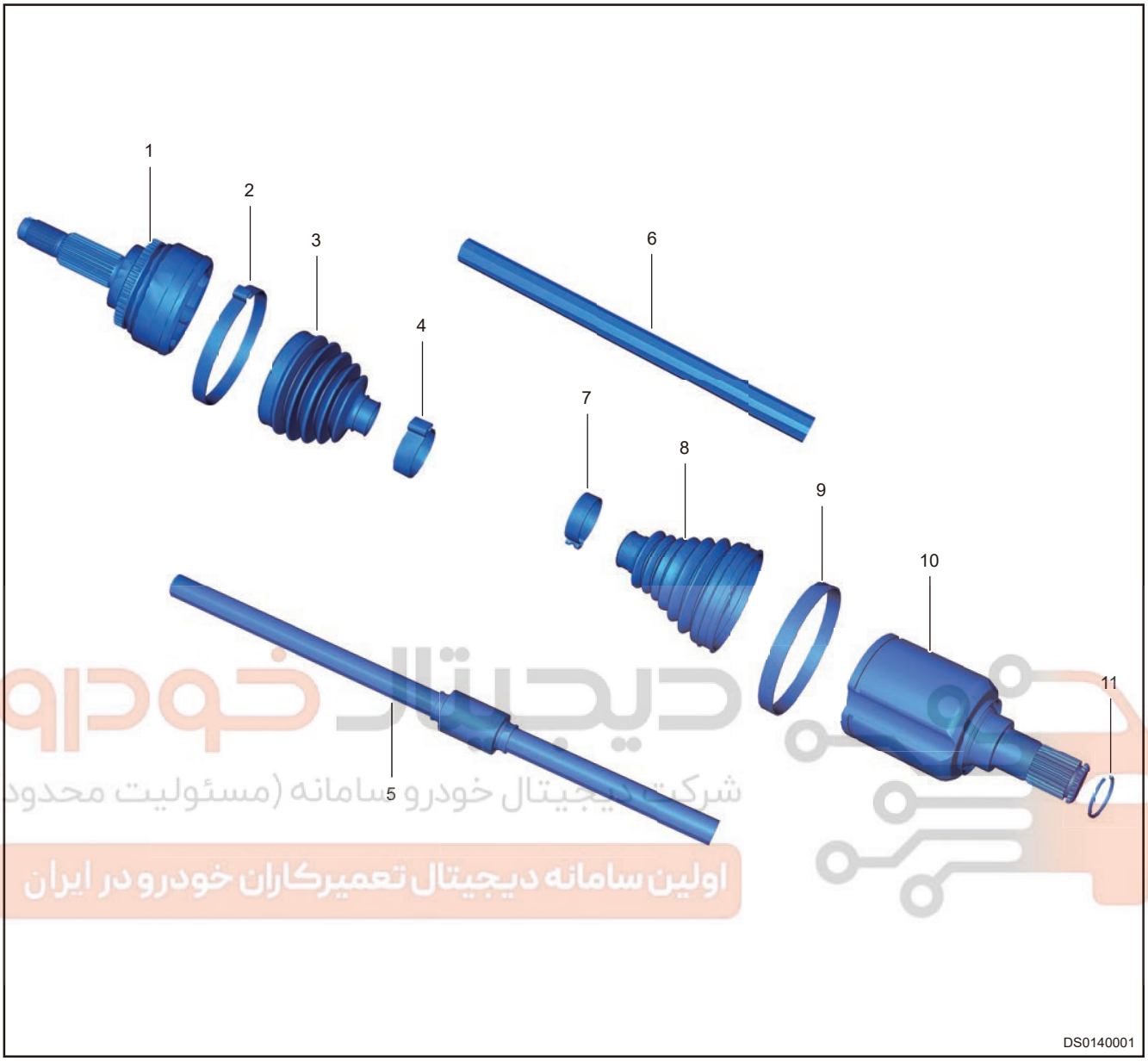
System Description

Drive shaft, which is a solid shaft, transmits torque between differential and drive wheels. Generally, the inner end of drive shaft is connected with drive shaft gear by spline, and the outer end is connected with wheel hub. Drive shaft transmits torque from differential to wheels, thus rotating the wheels to run vehicle.

System Components Diagram



1	Front Left Drive Shaft Assembly	3	Washer
2	Front Right Drive Shaft Assembly	4	Hexagon Flange Face Self-locking Nut



1	Outer Ball Cage	7	Inner Ball Cage Small Clamp
2	Outer Ball Cage Large Clamp	8	Inner Ball Cage Boot
3	Outer Ball Cage Boot	9	Inner Ball Cage Large Clamp
4	Outer Ball Cage Small Clamp	10	Inner Ball Cage
5	Front Right Drive Shaft Assembly Body	11	Differential Spring Retainer
6	Front Left Drive Shaft Assembly Body		

On-vehicle Service

Drive Shaft Assembly

Hint:

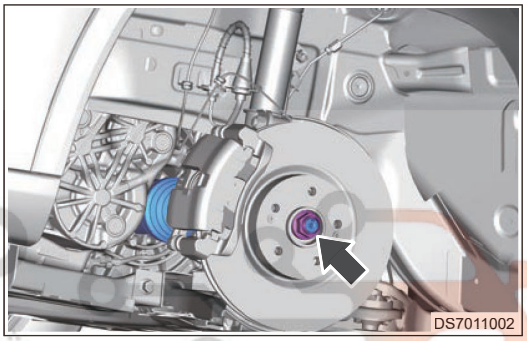
- Use same removal and installation procedures for left drive shaft and right drive shaft assembly.
- Removal procedures listed below are for left drive shaft.

Removal

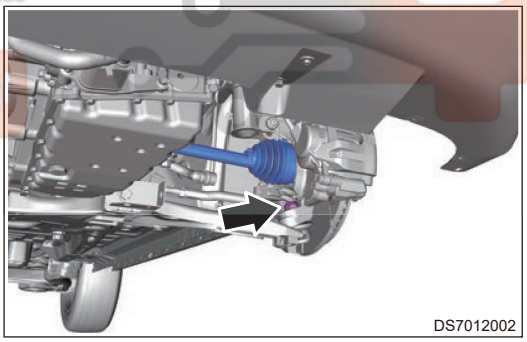
⚠ Warning

- Be sure to wear safety equipment to prevent accidents, when removing front left drive shaft assembly.
- Appropriate force should be applied, when removing front left drive shaft assembly. Be careful not to operate roughly.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the front left wheel.
4. Drain the transmission oil.
5. Remove front left drive shaft locking nut (arrow) while applying brake.


DS7011002

6. Remove coupling nut (arrow) between front left steering knuckle and control arm ball pin, and separate control arm ball pin from steering knuckle with tools.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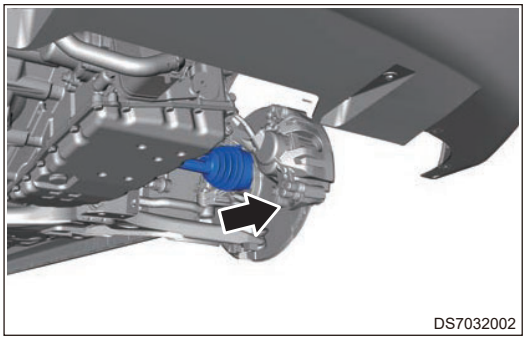
7. Detach the front left drive shaft outer ball cage spline from spline groove of front hub.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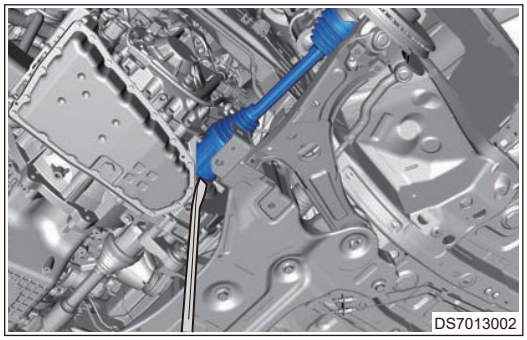
8. Carefully pry out the inner ball cage spline inserted into transmission end with crowbar.



9. Remove the front left drive shaft assembly.

Installation

⚠ Caution

- Do not pull shaft lever and outer ball cage end during assembly to avoid inner ball cage tripod joint slipping out excessively from interior of housing. Otherwise, inner end boot will be squeezed when it is intruded again, causing oil leakage and affecting its service life. Confirmation method after assembling in place: When an obvious metallic sound between drive shaft and transmission positioning surface is heard, hold the inner ball cage sliding sleeve and pull it outward. If it cannot be pulled out, it indicates that it has been installed in place.
- When the inner ball cage is inserted into transmission, be careful not to make spline to scratch differential oil seal, or it will cause damage to oil seal main lip.
- Take particular care to prevent contact and collision between the sealing boot and hard objects such as tools rack and chassis parts during the assembly and transport; If there are any damages or scratch traces of the boot during assembly, the sample must be replaced and do not assemble it to vehicle privately.
- Do not hold the sealing boot with hands to prevent wrinkles from forming on sealing boot during installation.
- Protect the threads, spline and installation surface to prevent from forming defects such as nick, scratch.
- Make sure that there is no excessive pivot angle, excessive impact, excessive stretch and excessive compression on both ends of universal joint during fixture and assembly operation to avoid contact between drive shaft internal end sealing boot and tripod universal joint.
- Serious tensile deformation of boot is strictly prohibited during assembly.

1. Insert the front left drive shaft inner ball cage spline into transmission output end so that snap ring drops in transmission left output end snap spring groove.

⚠ Caution

- Check if snap spring retainer is assembled in place after assembly.

2. Insert outer ball cage spline of front left drive shaft assembly into spline groove of front hub, and install hexagon flange self-locking nut.
3. Install the coupling nut between front left steering knuckle and control arm ball pin.
4. Tighten the axle front left drive shaft locking nut while applying brake.

   Tightening torque:
   270 ± 20 N·m
5. Fill the transmission oil.
6. Install the front left wheel.

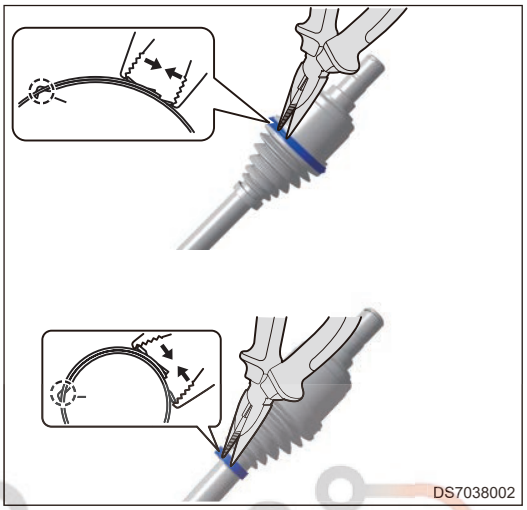
Inner Ball Cage

Removal

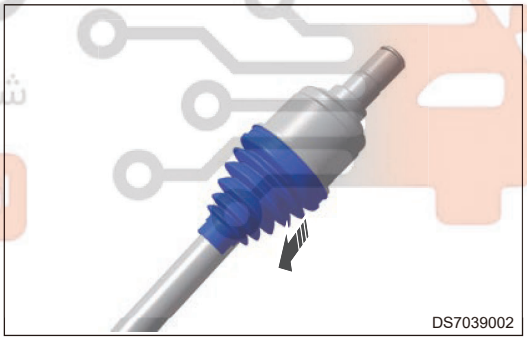
Warning

- DO NOT put matchmarks on the rotating surface of rotary drum.
- Operate carefully to prevent dust boot from being damaged.

1. Remove the drive shaft assembly.
2. Using needle nose pliers, remove the inner ball cage dust boot clamps.

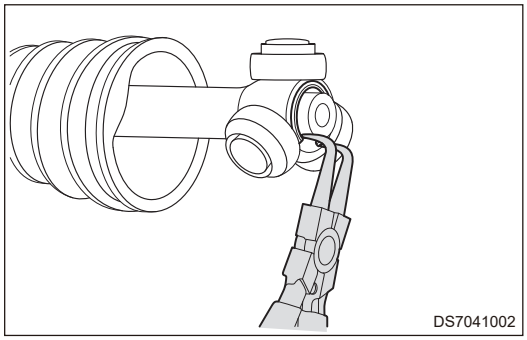


3. Separate the dust boot from inner ball cage in direction of arrow.

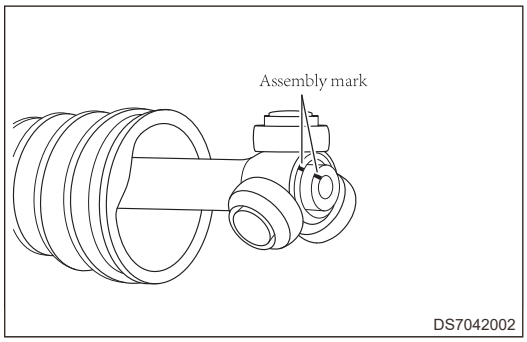


4. Remove the inner ball cage in direction of arrow, and place it on a piece of clean cloth.

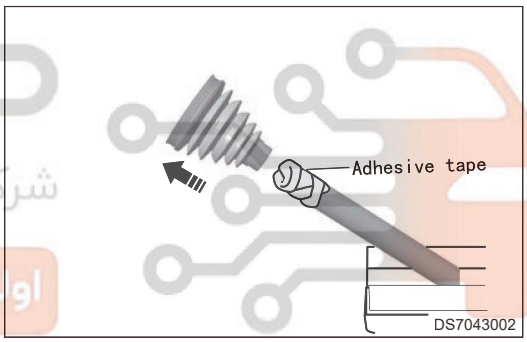
5. Using snap spring calipers, remove the positioning snap spring of tripod.



6. Put matchmarks on the tripod and drive shaft, and remove the tripod.



7. Wrap tape on the spline of drive shaft, and remove dust boot.



8. Remove the tape.

Installation

⚠ Caution

- Check if spline of drive shaft is in good condition. If it is deformed or damaged, replace it.
- Check if dust boot is in good condition. If it is scratched or broken, replace it.
- Check if positioning snap spring of tripod is deformed. If it is deformed, replace it.
- Refill grease during installation, and install with a new clamp.

1. Wrap tape on the spline of drive shaft, and install dust boot.
2. Install the tripod based on matchmarks on the tripod and drive shaft.
3. Using snap spring calipers, install the positioning snap spring of tripod.
4. Install the inner ball cage.
5. Using needle nose pliers, install the inner ball cage dust boot clamp.

Outer Ball Cage

Removal

Warning

- Use same disassembly and assembly procedures for outer ball cage of left / right drive shaft assemblies.

1. Remove the drive shaft assembly.
2. Using a screwdriver, pry out striker of outer ball cage dust boot outer clamp and remove outer ball cage dust boot outer clamp.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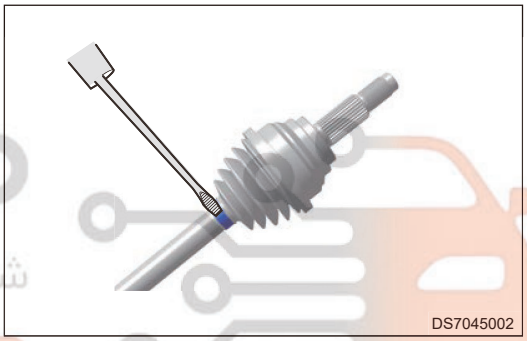
3. Using a screwdriver, pry out striker of outer ball cage dust boot inner clamp and remove outer ball cage dust boot inner clamp.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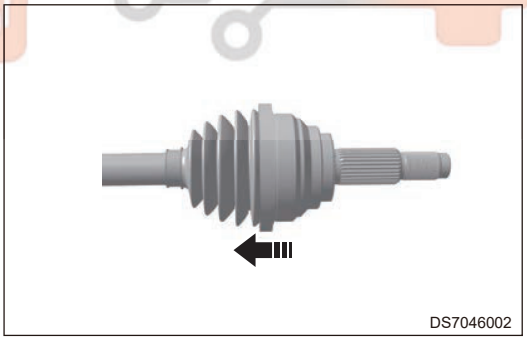
4. Slide the outer dust boot carefully into the inner ball cage side in direction of arrow.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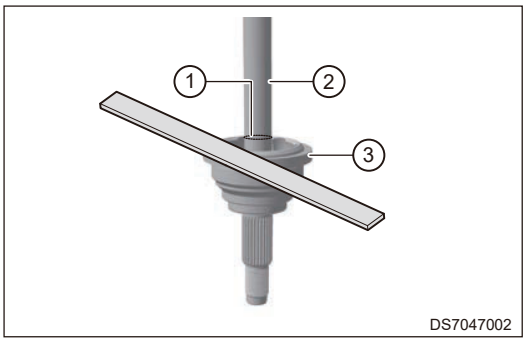
5. Put matchmarks (1) on area at same height as drive shaft assembly (2) and edge of outer ball cage (3) for correct installation.



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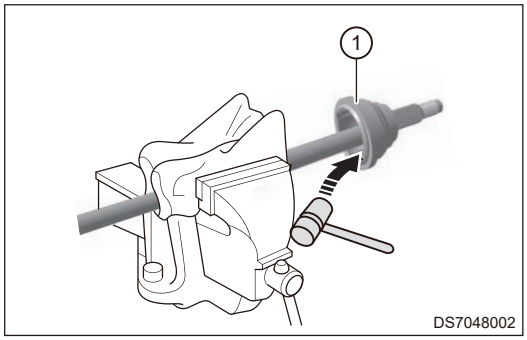
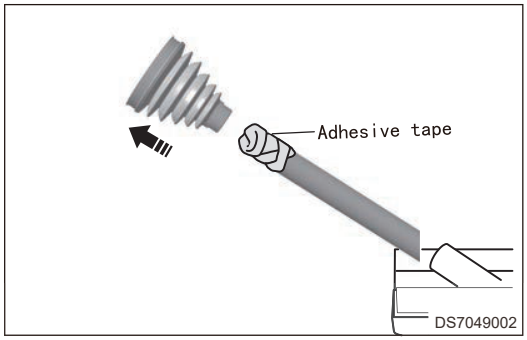
6. Wrap the drive shaft assembly with a piece of cloth and put it onto a vise. Secure the vise to prevent drive shaft assembly from shaking. Expand the internal positioning snap spring of outer ball cage with snap spring calipers, then tap outer ball cage with a hammer and remove outer ball cage (1).



7. Remove the left drive shaft from vise.
8. Remove the internal positioning snap spring of outer ball cage.
9. Wrap tape on the spline of drive shaft, and remove dust boot.



10. Remove the tape.

Installation

⚠ Caution

- Check if spline of drive shaft is in good condition. If it is deformed or damaged, replace it.
- Check if dust boot is in good condition. If it is scratched or broken, replace it.
- Refill grease during installation, and install with a new clamp.

1. Wrap tape on the spline of drive shaft, and install dust boot.
2. Install outer ball cage and internal positioning snap spring.
3. Install the outer ball cage dust boot.
4. Install the outer ball cage dust boot inner clamp.
5. Install the outer ball cage dust boot outer clamp.