QR416AHA

GENERAL INFORMATION

Description

QR416AHA hydraulic automatic transmission can realize speed change automatically by combining hydraulic transmission device and planetary gear. It consists of hydraulic torque converter, planetary gear mechanism, gear shift actuator, gear shift control system and gear shift control mechanism, etc. For AT model, it is not required to shift gears using clutch, which has less gear positions with great speed change and stable connection.

In the transmission management system, sensors are used as input part to measure various physical signals (temperature and speed, etc.), and converts them into corresponding electrical signals; the function of TCU is to receive input signals from sensors and perform calculation according to set procedure, producing corresponding control signals and outputting them to power drive circuit. The power drive circuit drives each actuator to perform various actions, thus making the engine run according to preset program.

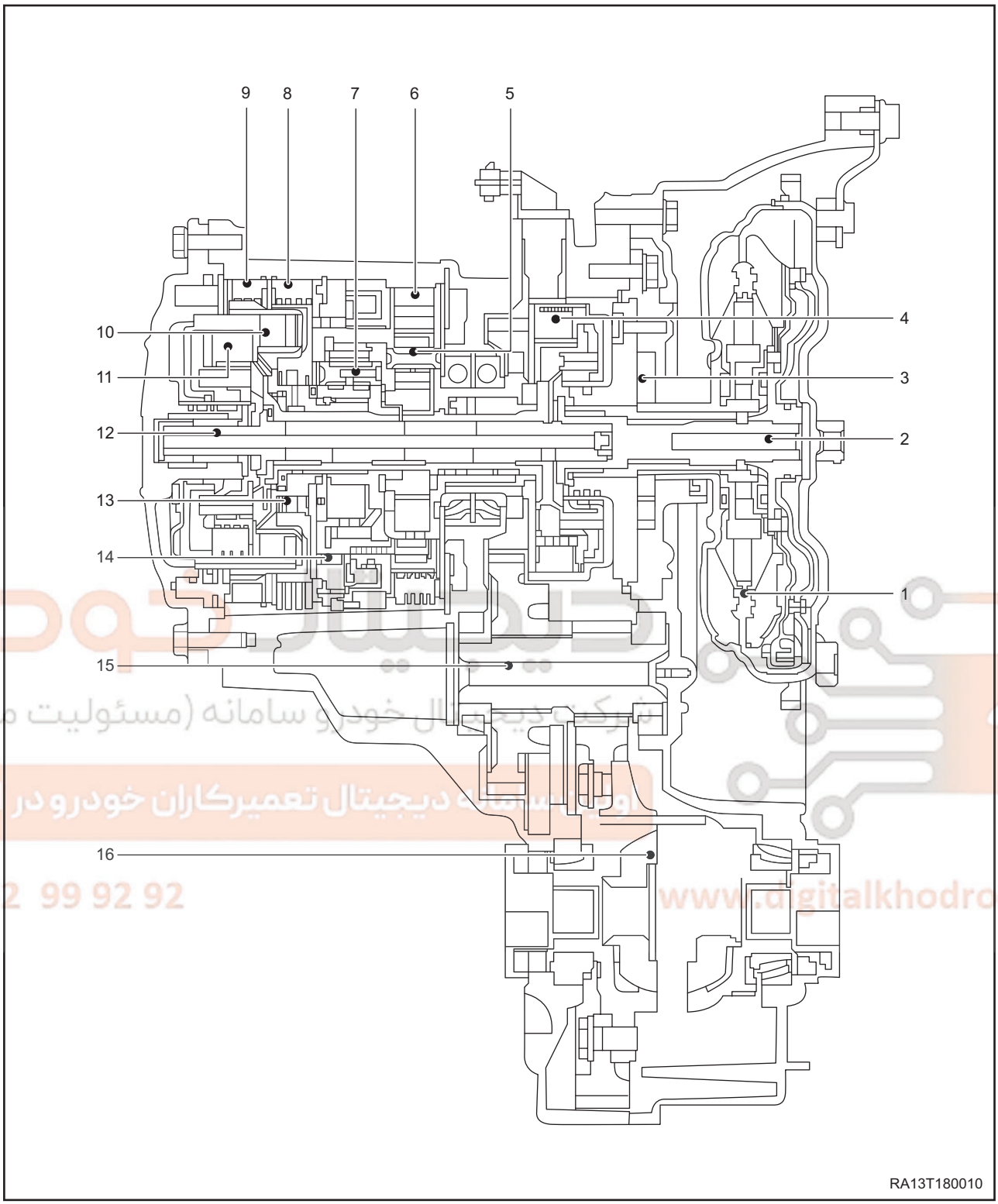
QR416AHA transmission mainly consists of following components:

- Hydraulic torque converter
- Oil pump
- Input shaft assembly
- Output shaft assembly
- Differential assembly
- Planetary gear mechanism
- Transmission case

QR416AHA transmission features with:

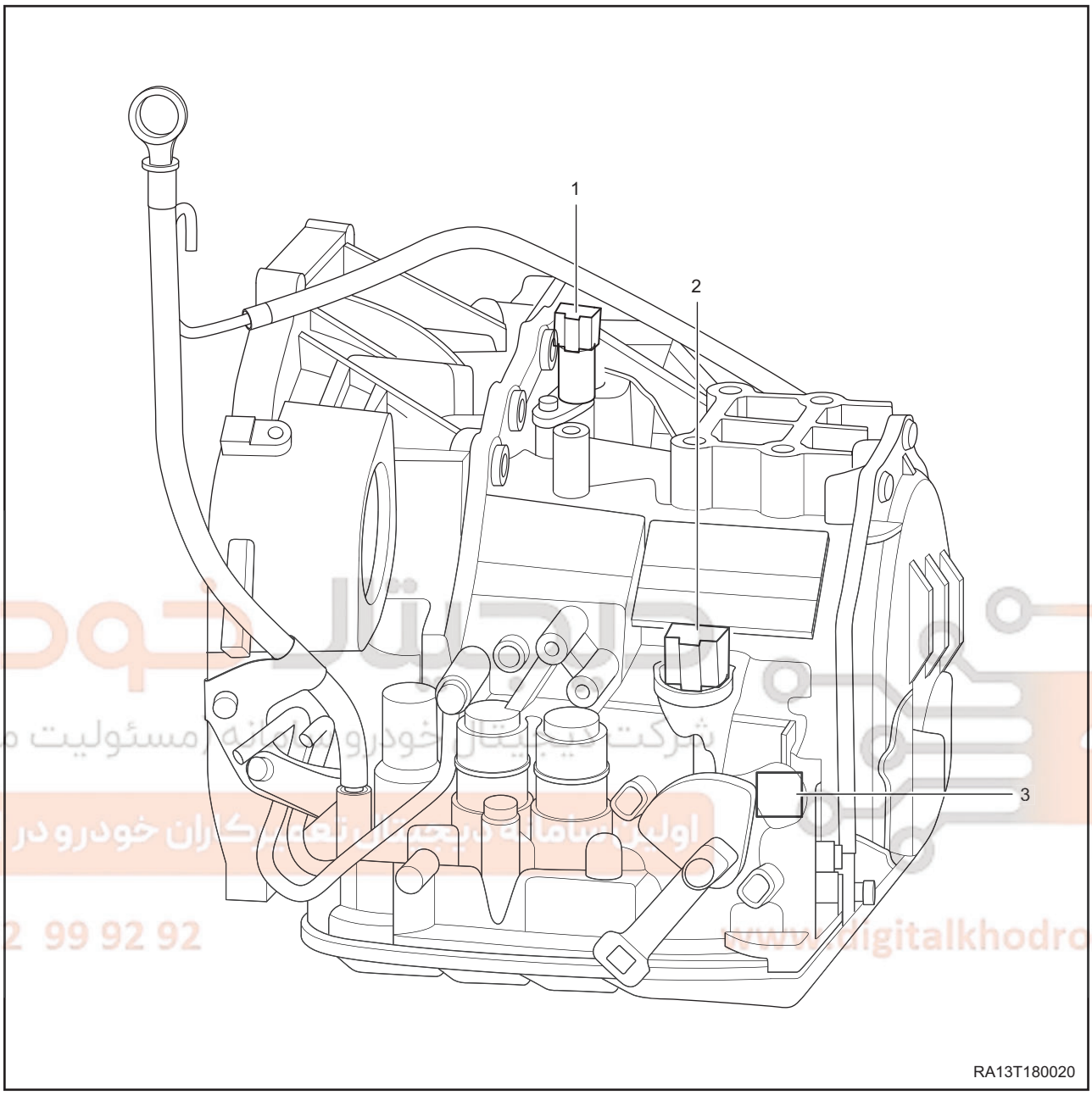
- Mature technology
- Good reliability
- Large torque output

Internal Structure Diagram



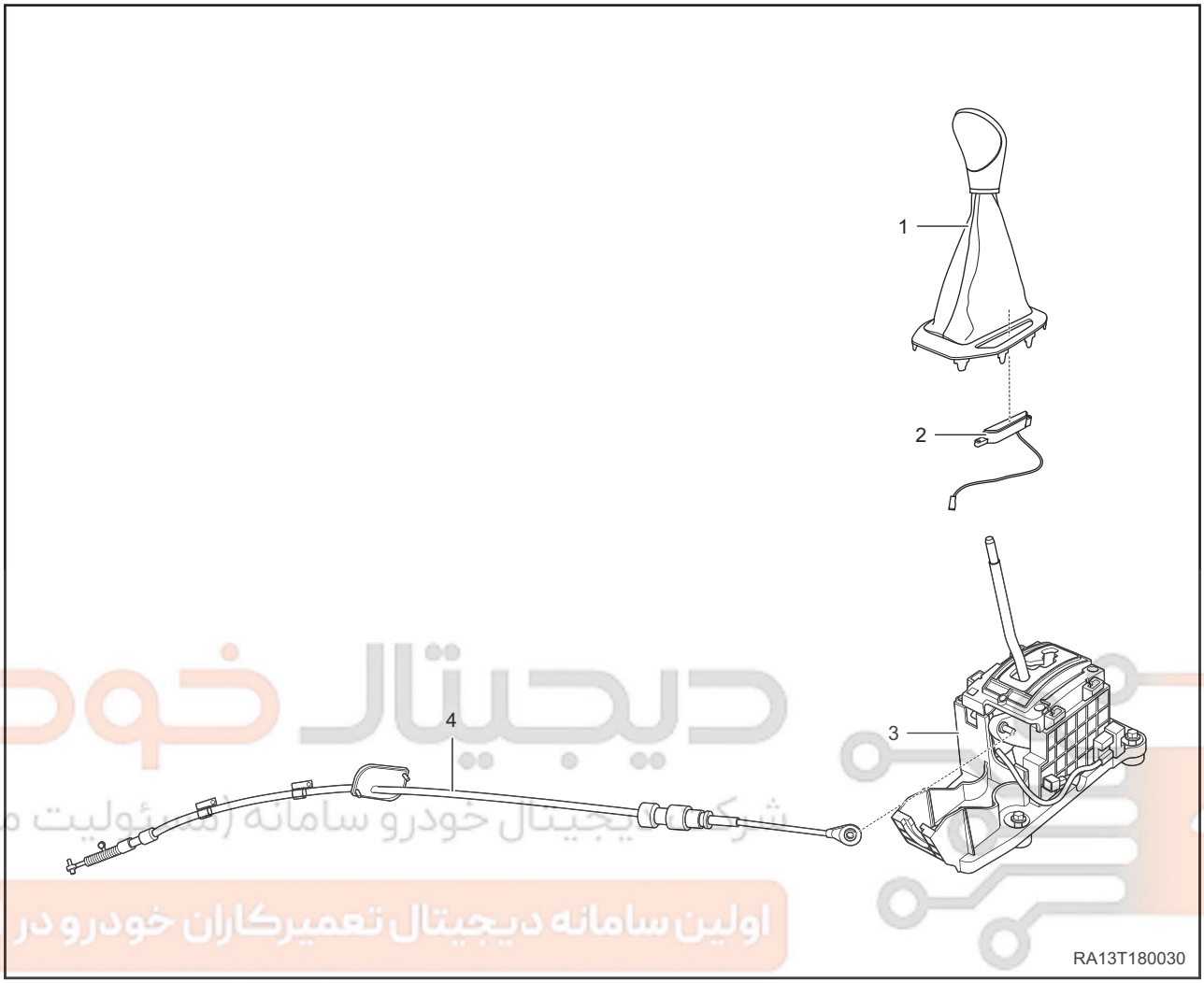
1 - Hydraulic Torque Converter	2 - Input Shaft
3 - Oil Pump Assembly	4 - C1 Clutch
5 - Front Planetary Gear Set	6 - B3 Brake
7 - Rear Planetary Gear Set	8 - B2 Brake
9 - B1 Brake	10 - C3 Clutch
11 - C2 Clutch	12 - Intermediate Shaft
13 - F1 One-way Clutch	14 - F2 One-way Clutch
15 - Input Shaft Assembly	16 - Differential Assembly

Main Electronic Element



1 - Speed Sensor Set	2 - Wire Harness Assembly Connector
3 - Gear Switch Assembly	

Gear Shift Control Mechanism



1 - Gear Shift Boot Assembly	2 - Gear Position Indicating Panel Assembly
3 - Gear Shift Control Mechanism Assembly	4 - Gear Shift Cable Assembly

Precautions

General service requirements

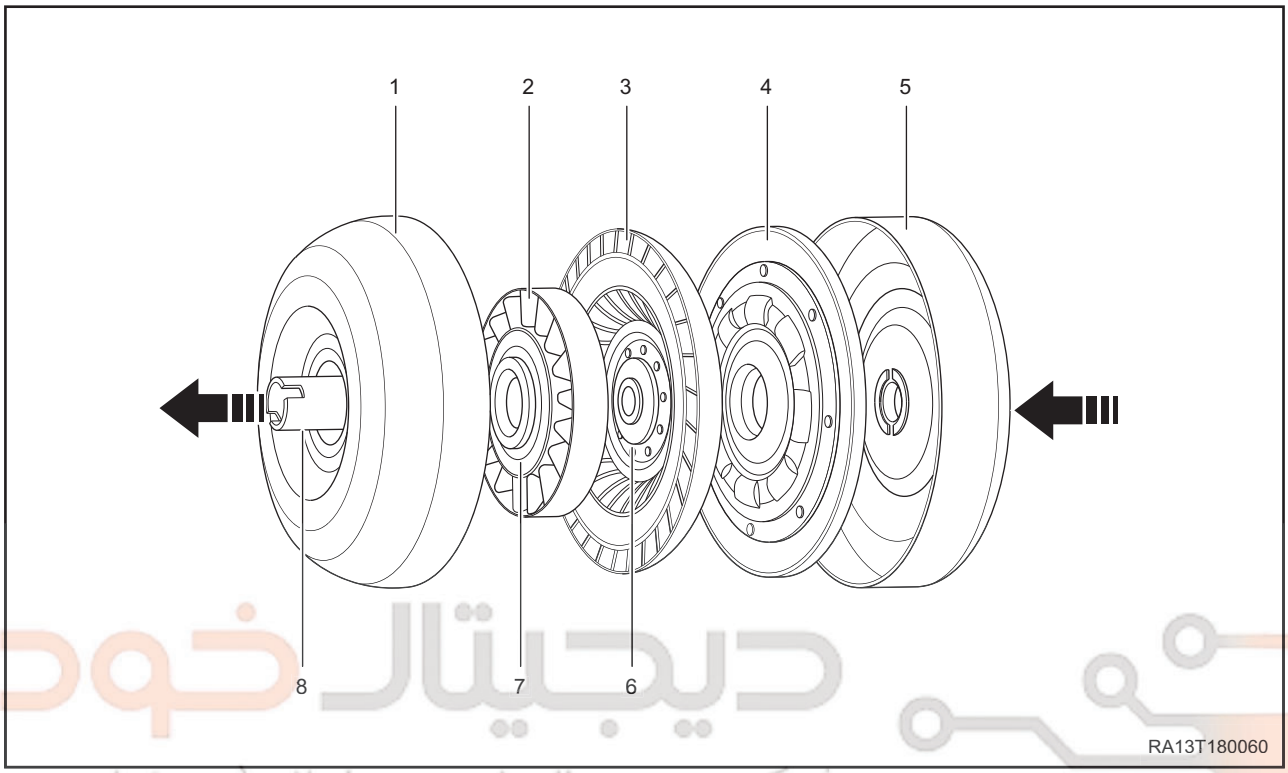
- Only digital multimeter can be used to perform inspection for engine management system.
- Use genuine components to perform service work, otherwise appropriate engine management system operation cannot be guaranteed.
- Only use unleaded gasoline during servicing.
- Please observe normative service and diagnostic flowchart to perform service work.
- Never disassemble components of engine management system during servicing.
- When holding electronic elements (TCU and sensor etc.) during servicing, take extra care not to drop them on the ground.
- Set up a consciousness of environmental protection and dispose of the waste effectively that is produced during servicing.

Precautions during servicing

1. During removal and installation, make sure that shift lever is at "N" position.
2. When installing the gear shift arm and transmission range sensor, use a proper tool to fix them, and then tighten bolts to specified torque.
3. Components of transmission are of high precision, so take care in removal and installation and do not scratch or damage any component.
4. When installing the oil seal, apply force evenly and do not cause deformation or damage of oil seal.
5. Keep transmission components clean when removing and installing transmission components to prevent foreign matter from entering the transmission.
6. When installing the torque converter onto transmission, make sure that oil pump drive slot is installed in place; otherwise it will cause abnormal damage to the transmission.
7. When assembling engine and transmission, make sure that all connecting bolts are installed correctly and completely, and torques meet the specifications.
8. When disassembling and assembling engine and transmission, make sure that torque converter does not drop down.
9. When assembling engine and transmission, make sure that dust baffle is not ignored.
10. When replacing transmission sensors and oil seals, make sure that they are installed in place and bolt torques meet the specifications.
11. Take measures to avoid foreign matter entering the transmission, when removing or installing the cooling oil pipes and radiator. And check fluid level and make sure that there is no leakage after installation.

System Function

Hydraulic Torque Converter



1 - Pump Wheel	2 - Turbine
3 - Front Case	4 - Bearing
5 - Guide Wheel and One-way Clutch	6 - Clutch Assembly
7 - Welded Hub	8 - Drive Hub

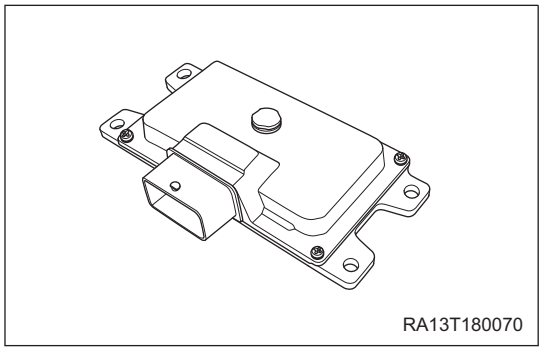
Hydraulic Torque Converter

Torque converter is used to keep stable start, reduce torsional vibration of transmission system and prevent overload of the transmission system.

Torque converter could ensure stable start and even acceleration of the vehicle. The hydraulic vibration absorption could eliminate or reduce the impact and dynamic load in transmission system, extending the service life of components of engine and transmission system.

Transmission Control Unit (TCU)

Transmission control unit of QR416AHA transmission is installed at driver side, behind lower left instrument panel protector. It collects information from turbine speed sensor, gear switch, transmission oil temperature, gear shift mechanism switch and processes the information via CAN network, and it controls gear up-shift and down-shift by actuator inside of transmission.

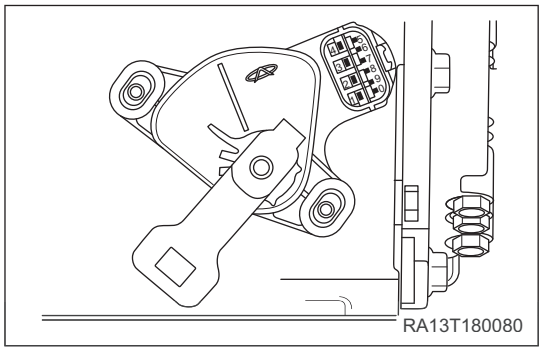


Electronic control system consists of components below:

- Transmission Control Unit (TCU)
- Turbine speed sensor
- Gear shift switch
- Gear shift lock solenoid valve
- Hydraulic torque converter lock clutch solenoid valve
- Gear shift solenoid valve

Gear Shift Switch

Transmission range sensor is located at the top of transmission. It is used to input current gear signal into TCU, and the TCU will output operation requirements to control the clutch and transmission for gear shifting. Engine can be started only when the gear shift lever is at parking (P) and neutral (N) gears, thus avoiding misoperation.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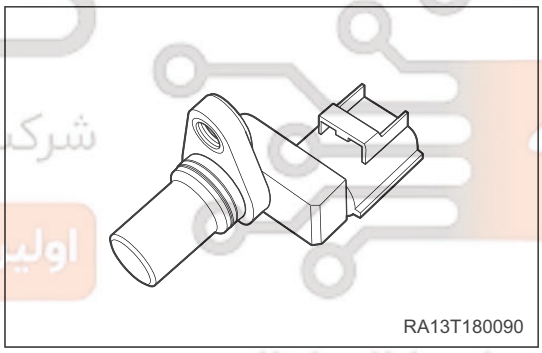
Turbine Speed Sensor

TCU controls locking time of lock clutch according to turbine speed supplied by turbine speed sensor.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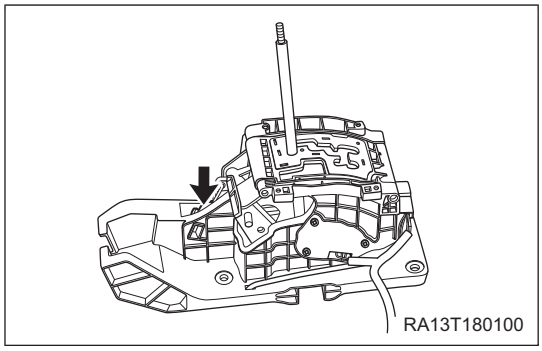
Gear Shift Solenoid Valve

Gear shift lock solenoid valve (arrow) is installed in the transmission gear shift control mechanism. Before moving out of "P" gear, brake pedal should be fully depressed and the ignition switch set to "ON" position.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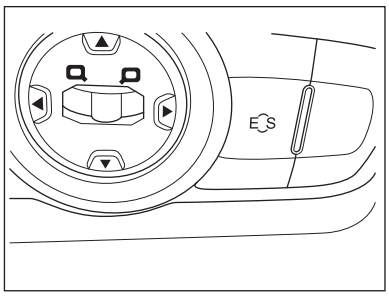
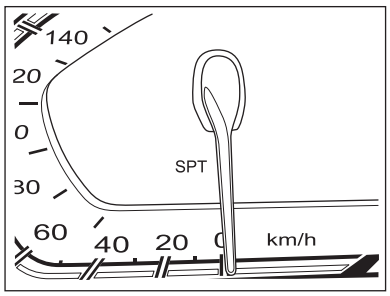
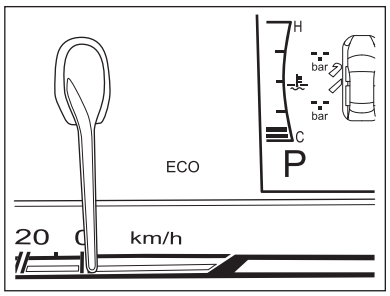
Sport Mode Switch



Mode Switching Button



Sport Mode

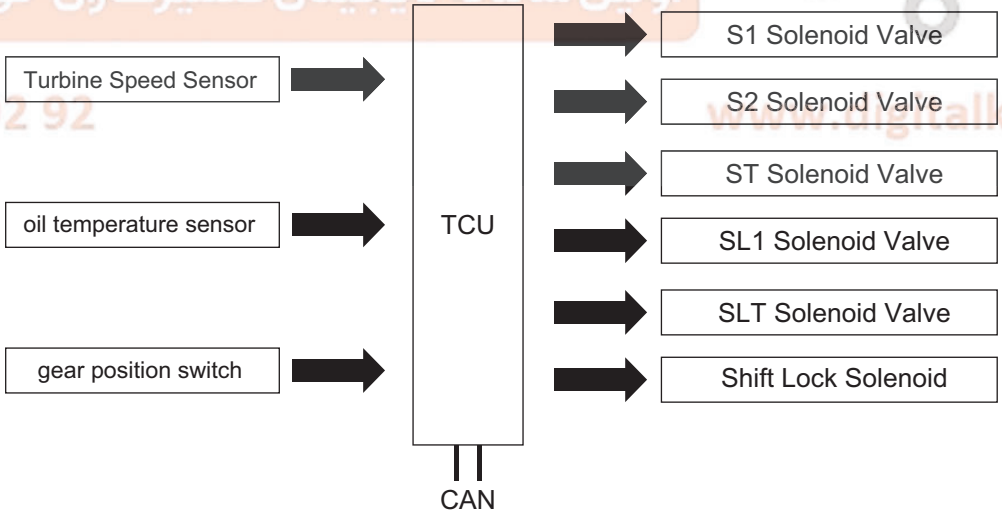


ECO mode

RA13T180110

This transmission is equipped with sport mode and ECO mode. Default mode is ECO mode. After pressing mode switching button manually, transmission will response the status under different modes and instrument cluster will display different mode indicator. Sport mode switch is integrated into top of rear view mirror adjustment panel.

System Control Logic



RA13T180120

Specifications

Torque Specifications

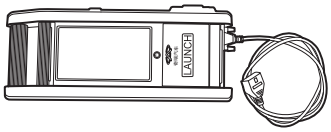
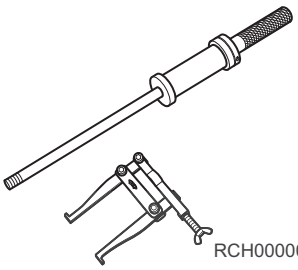
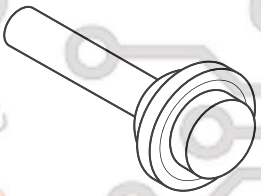
Description	Torque (N·m)
Coupling Bolt Between Transmission and Engine	50 ± 5
Coupling Bolt Between Drive Plate and Hydraulic Torque Converter	55 ± 5
Transmission Control Flexible Shaft Bracket Set Bolt	22 ± 3.5
Drain plug	44 ± 4
Turbine Speed Sensor Fixing Bolt	5.4 ± 0.5
Gear Switch Assembly Fixing Bolt	5.4 ± 0.5
Oil Outlet Pipe Set Hollow Bolt	30 ± 3
Transmission Oil Dipstick Sleeve Set Bolt	11 ± 1
Oil Pressure Detection Port Plug	7.8 ± 1
TCU Fixing Bolt	9 ± 1.5
Gear Switch Lock Nut	6.9 ± 2
Gear Shift Arm Fixing Bolt	13 ± 0.6

Basic Parameters

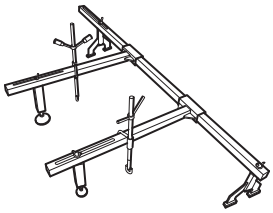
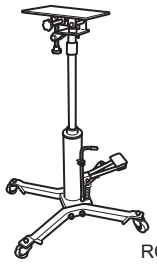
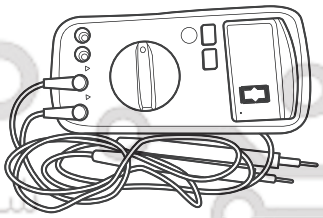
Item		Parameter
Model		QR416HA
Type		Hydraulic automatic torque converter (AT)
Arrangement Type		Transverse FWD
Clutch Type at Driving		Hydraulic torque converter
Central Distance (mm)		185
Maximum Input Torque (N·m)		160
Speed Ratio at Gears	1st	2.848
	2nd	1.553
	3rd	1.000
	4th	0.701
	Rev	2.344
Primary Reduction Ratio		1.019
Final Drive Ratio		4.053
Fluid Type		C6AT-15 (referred to as ATF)
Transmission Oil Capacity (L)		6.35 ~ 6.81 L

Tools

Special Tools

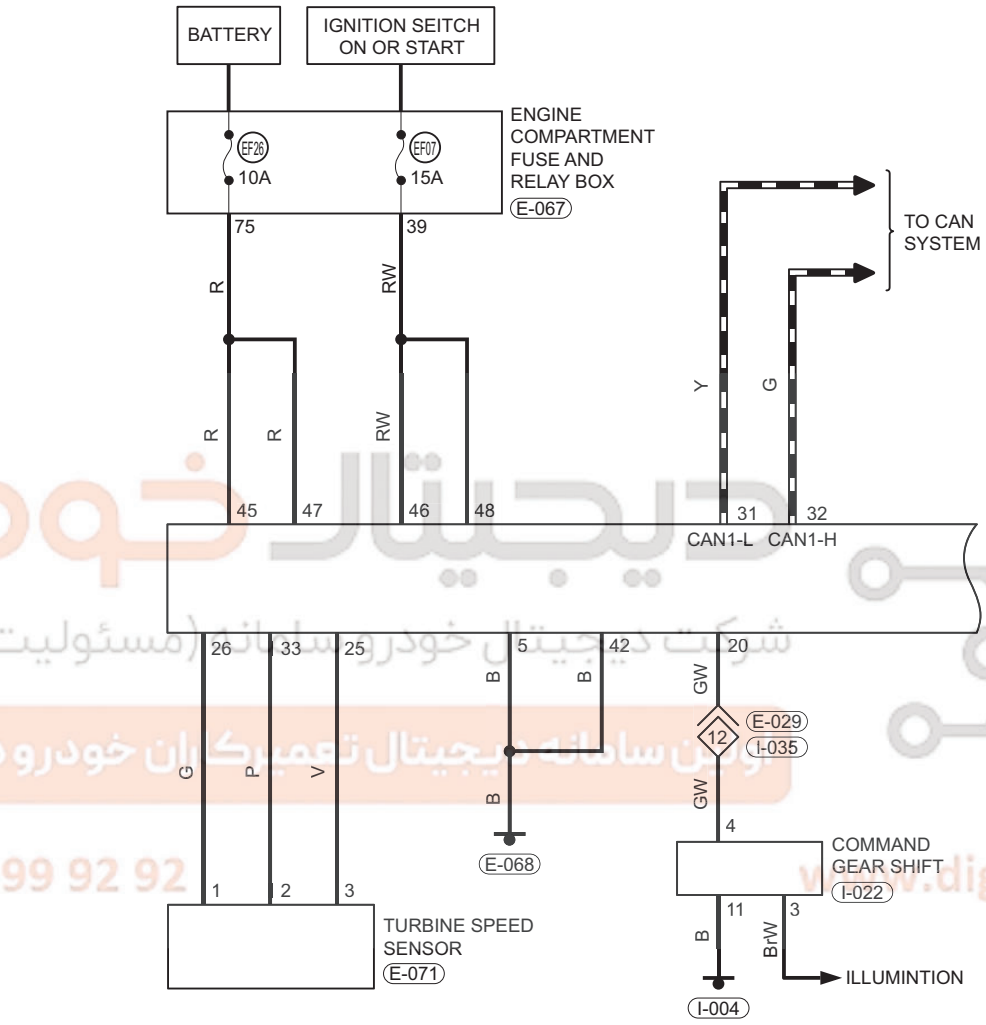
X-431 3G Diagnostic Tester	 RCH0000001
Puller	 RCH0000059
Differential Oil Seal Installer	 RCH0000009

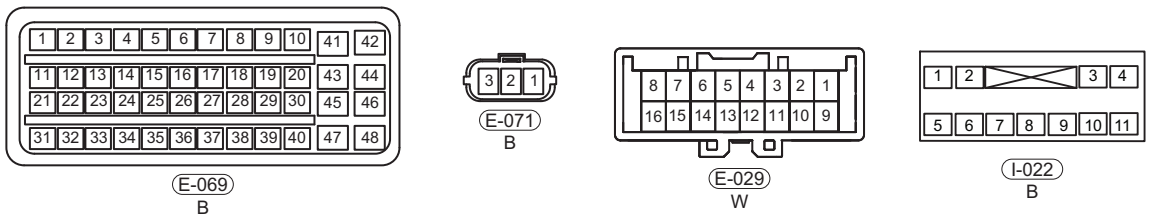
General Tools

Engine Equalizer	 RCH0000026
Transmission Carrier	 RCH0000005
Digital Multimeter	 RCH0000002

Circuit Diagram

Transmission Management System (Page 1 of 2)





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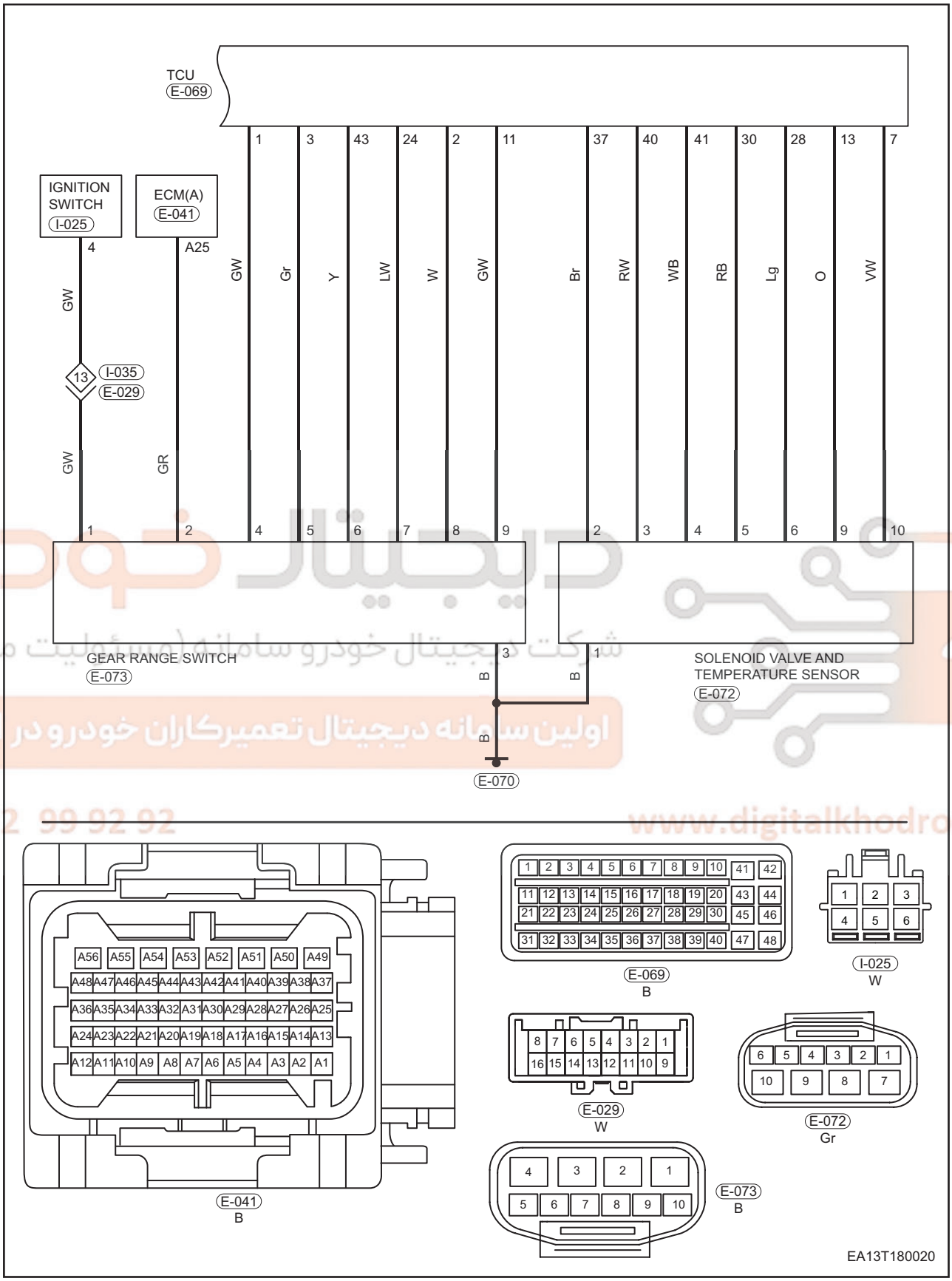
Transmission Management System (Page 2 of 2)



TCU Terminal Definition

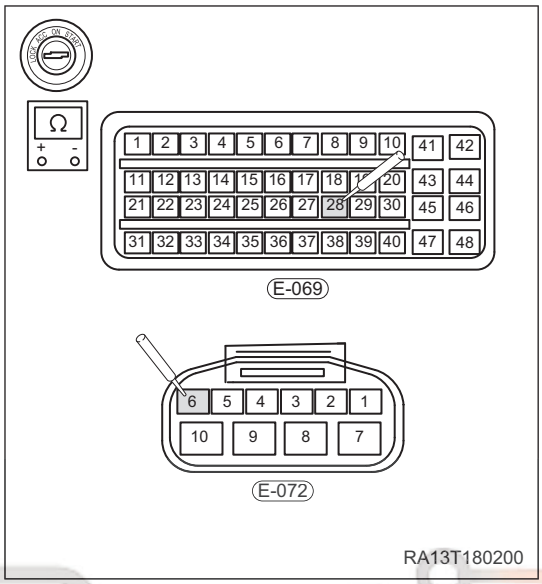
TCU Connector

Terminal No.	Description	Terminal No.	Description
1	Reverse Switch	25	Turbine Speed Sensor Ground
2	Neutral Switch	26	Turbine Speed Sensor Power Supply
3	D Gear Switch	27	-
4	Manual Mode Switch	28	ST Solenoid Valve
5	GND	29	-
6	-	30	S1 Solenoid Valve
7	Oil Temperature Sensor Ground	31	CAN Low
8	-	32	CAN High
9	-	33	Turbine Speed Sensor Signal
10	-	34	Vehicle Speed Sensor Signal
11	P Gear Switch	35	PADDLE_DOWN Switch
12	3rd Gear Switch	36	-
13	Oil Temperature Sensor Signal	37	SL1 Solenoid Valve Switch
14	TIP_DOWN Switch	38	-
15	TIP_UP Switch	39	-
16	Winter Mode Switch	40	SLT Solenoid Valve Switch
17	-	41	S2 Solenoid Valve
18	-	42	-
19	Winter Mode LED	43	L Gear Switch
20	Shift Lock Solenoid Valve	44	-
21	PADDLE_UP Switch	45	VBATT Monitor
22	Sport Mode Switch	46	VIGN
23	Sport Mode Indicator	47	VBATT
24	2nd Gear Switch	48	VIGN Monitor

DIAGNOSIS & TESTING

Transmission Oil Level and Quality Inspection

1. Run vehicle so that transmission oil temperature will reach normal working conditions (80 ± 5 ℃).
2. Park vehicle on a flat ground and pull parking brake lever.
3. Under idling status, depress and hold brake pedal and move shift lever at each gear. Finally, place the lever at "P" or "N" position.
4. Pull out oil dipstick and clean it with non-wool paper; then insert the dipstick in place again and then pull out to observe whether it reaches the "HOT" position.
5. When transmission oil temperature is at 20 ～ 30 ℃ , perform inspection at "COLD". Inspection method is the same as above: pull out oil dipstick and clean it with non-wool paper; then insert the transmission oil dipstick in place again and then pull out to observe whether it reaches the "COLD" position.



6. Check the transmission fluid status:

- If fluid becomes black with irritating burnt flavor, replace ATF and check vehicle conditions.
- If fluid becomes milk white or cloudy, or there is water in the fluid, replace ATF and check for leaking point.
- If fluid becomes black with a lot of powders and there is abnormal wear in 4AT, replace ATF and check vehicle for normal working.

CAUTION

- If ATF level is lower than Min "HOT", fill ATF from filler until fluid level reaches center position within "HOT" range.
- Use non-wool paper to wipe the dipstick, never use cloth or other items.
- Flush oil cooler simultaneously when replacing oil.

Gear Shift Cable Adjustment and Inspection

Shift gear lever from "N" gear to other gears to check whether the lever can be shifted to other gears smoothly and precisely, and also check whether gear indicators can indicate the gear correctly.

If gear indicators indicate incorrectly, adjust them as shown below:

1. Park vehicle at a safe place and pull parking brake lever.
2. Change shift lever to "N" position.
3. Turn off all electrical equipment and the ignition switch.
4. Disconnect the negative battery cable.
5. Remove battery, battery tray and tray bracket (See page 16-9).
6. Remove connecting nut (3) of gear shift cable (1) and shift arm (2). Disconnect gear shift cable from shift arm.
7. Loosen transmission range sensor fixing bolts, and adjust relative position of transmission range sensor and shift arm to make the holes of gear shift arm (1) and transmission range sensor (2) coincident.

8. Use a proper tool to fix gear shift arm and transmission range sensor, and then tighten bolts to specified torque.
9. Start engine only when gear lever is at "P" or "N" gear.

CAUTION

- Ledge of gear shift cable must be placed into slot of shift arm.

Gear Switch Assembly Inspection

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove air filter assembly, and disconnect gear switch assembly wire harness connector.
4. Using a digital multimeter, measure internal of gear switch assembly and circuit in continuity corresponding to each gear.

Gear Position	Terminal	Detection Condition
P	1 - 2, 3 - 9	Continuity
R	3 - 4	Continuity
N	1 - 2, 3 - 8	Continuity
D	3 - 5	Continuity
2	3 - 7	Continuity
L	3 - 6	Continuity

If detection result is error, replace the gear switch assembly.

Transmission Oil Temperature Sensor

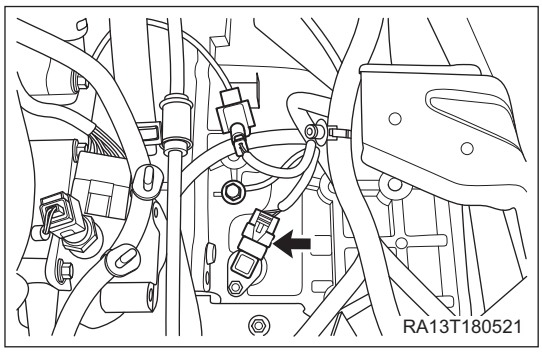
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove air filter assembly, and disconnect transmission wire harness assembly connector.
4. Using a digital multimeter, measure terminals "9" and "10" of transmission wire harness assembly, and observe the resistance. For relationship of resistance and temperature, refer to table below. Resistance error should be about 10%.

Terminal	Temperature (°C)	Resistance (kΩ)
9-10	-40	100.9
	-20	28.6
	0	9.4
	20	3.5
	40	1.5
	60	0.67
	80	0.33
	100	0.18
	120	0.1

If detection result is error, replace the transmission wire harness assembly.

Turbine Speed Sensor Inspection

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Disconnect the turbine speed sensor connector.



4. Using a digital multimeter, measure terminals of transmission wire harness assembly, and observe the resistance according to table below.

Terminal	Temperature (°C)	Resistance (MΩ)
1 - 3	25	38.1 ± 2
2 - 3		29.4 ± 2

The measurement result cannot be completely used for troubles caused by turbine speed sensor, and it is necessary to combine combined with other detection methods.

Problem Symptoms Table

HINT:

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

Symptom	Suspected Area	See page
With ignited, P gear cannot be released after applying brake	Brake switch or circuit	26-24
	Gear shift lock solenoid valve	-
High impact during static gear shifting	Turbine speed sensor	18-20
	Circuit or connector	-
	Solenoid valve	-
Vehicle fails to run when reverse gear is engaged	Transmission planetary gear system	Continuity
Vehicle stalls when D/R gear is engaged	Radiator oil pipes (incorrectly assembled, bent or folded)	Continuity
	Locking clutch (abnormal)	-
Reduced power and speed in high speeding driving	Thermal protection of transmission	Continuity
Abnormal noise of transmission in acceleration	Transmission fluid (insufficient)	18-74

If detection result is error, replace the gear switch assembly.

Diagnostic Help

1. Connect X-431 3G Diagnostic tester (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
2. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
3. If DTC cannot be deleted, the malfunction is current.
4. Only use a digital multimeter to measure the voltage of electronic system.
5. Refer to any Technical Bulletin that may apply to the malfunction.
6. Visually check related wire harness.
7. Check and clean all Transmission Control Module (TCU) ground that are related to latest DTC.
8. 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 following:

- Check if connectors are loose.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Monitor X-431 3G diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if related circuit signal 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.
- Look for broken, bent, protruded or corroded terminals.
- Look for broken, bent, protruded or corroded terminals.
- Use data recorder and/or oscilloscope to help diagnose intermittent malfunctions.
- Remove Transmission Control Module (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) can increase resistance which will change the way in which a circuit works.

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

1. Remove ground bolt or nut.
2. Check all contact surfaces for tarnish, dirt and rust, etc.
3. Clean as necessary to ensure that contacting is in good condition.
4. Reinstall ground bolt or nut securely.
5. Check if add-on accessories interfere with ground circuit.
6. If several wire harnesses are crimped into one ground eyelet terminal, check if they are installed correctly. Make sure that all wires are clean, securely fastened and good contacted without crimping any excessive insulation coat.

Stall Test

Preparations before stall test:

- Check engine oil level, add oil as necessary.
- Warm up the engine after driving about 10 minutes, so that ATF temperature reaches 50 to 80°. Check ATF level, add ATF as necessary.

- Apply parking brake, and block wheel with stopper so that wheel cannot rotate.

Stall test method:

- Start engine, depress brake pedal and move shift lever to "D".
- Depress and hold brake pedal, and gradully depress accelerator pedal simultaneously.
- Rapidly read stall speed, then move away the foot from accelerator pedal quickly.

CAUTION

During test, time for depressing accelerator pedal should not be more than 5 seconds.

- Run engine at least 1 minute and cool down the transmission oil temperature.
- Set shift lever in "R" and repeat above procedures.

Reference values for stall test:

Turn ignition switch off and then to ON. Wait for 1 minute to finish throttle self-learning.

	D	R	Prospective Trouble Area
Stall Speed	H	O	Low speed clutch and brake
	O	H	Reverse clutch and reverse brake
	L	L	Engine and hydraulic torque converter one-way clutch
	H	H	Low line pressure, clutch, brake

Reference values for stall speed: 2500 rpm

- O: stall speed is within standard value.
- H: stall speed is more than standard value.
- L: stall speed is less than standard value.

WARNING

Be care to perform stall test, because it may damage the internal of transmission.

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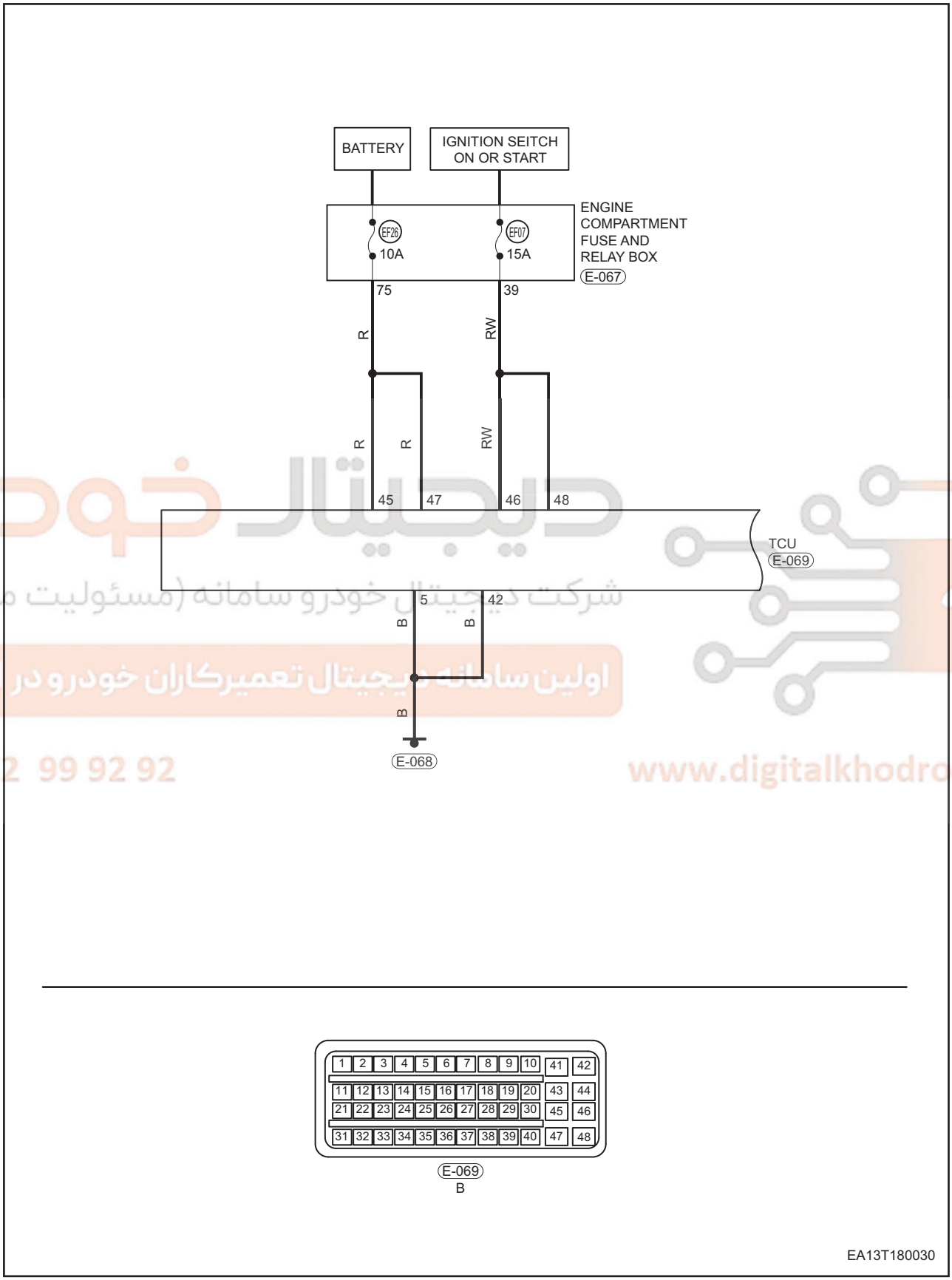
Diagnostic Trouble Code (DTC) Chart

P0750-72	Gear Shift Solenoid Valve "A" Abnormal Open
P0750-73	Gear Shift Solenoid Valve "A" Abnormal Close
P0750-11	Gear Shift Solenoid Valve "A" Control Cir. Short to Ground
P0750-15	Gear Shift Solenoid Valve "A" Control Cir. Short to Power Supply or Open
P0755-72	Gear Shift Solenoid Valve "B" Abnormal Open
P0755-73	Gear Shift Solenoid Valve "B" Abnormal Close
P0755-11	Gear Shift Solenoid Valve "B" Control Cir. Short to Ground
P0755-15	Gear Shift Solenoid Valve "B" Control Cir. Short to Power Supply or Open
P0705-29	Transmission Abnormal Gear Position Signal
P0710-11	Transmission Temperature Sensor Cir. Short to Ground

P0710-15	Transmission Temperature Sensor Cir. Short to Power Supply or Open
P0715-00	Turbine Speed Abnormal Signal Range
P0785-11	Gear Shift Solenoid Valve "C" Control Cir. Short to Ground
P0785-15	Gear Shift Solenoid Valve "C" Control Cir. Short to Power Supply or Open
P0745-00	Pressure Control Solenoid Valve Abnormal
P0745-11	Pressure Control Solenoid Valve Control Cir. Short to Ground
P0745-15	Pressure Control Solenoid Valve Control Cir. Short to Power Supply
P0743-72	Hydraulic Torque Converter Lock Clutch Solenoid Valve Abnormal Open
P0743-73	Hydraulic Torque Converter Lock Clutch Solenoid Valve Abnormal Close
P0743-11	Hydraulic Torque Converter Lock Clutch Solenoid Valve Control Cir. Short to Ground
P0743-15	Hydraulic Torque Converter Lock Clutch Solenoid Valve Control Cir. Short to Power Supply or Open
P0731-00	1st Gear Ratio Abnormal
P0732-00	2nd Gear Ratio Abnormal
P0733-00	3rd Gear Ratio Abnormal
P0734-00	4th Gear Ratio Abnormal
P0736-00	R Gear Ratio Abnormal
P0930-11	Gear Shift Lock Solenoid Valve Control Cir. Short to Ground
P0930-15	Gear Shift Lock Solenoid Valve Control Cir. Short to Power Supply or Open
C0031-86	Front Left Wheel Speed Signal Invalid
C0034-86	Front Right Wheel Speed Signal Invalid
C0037-86	Rear Left Wheel Speed Signal Invalid
C003A-86	Rear Right Wheel Speed Signal Invalid
P0500-29	Vehicle Speed Signal Invalid
P0504-00	Brake Speed Signal Invalid
P0725-00	Engine Speed Signal Abnormal
U0073-88	CAN Bus Off
U0401-86	Received EMS Signal Abnormal
U0121-87	Lost Communication With ABS
U0100-87	Lost Communication With EMS
P0863-00	TCU Communication Abnormal

TCU Power Supply Circuit & Ground Circuit Testing

Power Supply Circuit



DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using diagnostic tester, select Read Datastream.
- If datastream is not detected, malfunction indicated by datastream is current. Go to diagnosis procedure - Step 1.
- If datastream is detected, malfunction indicated by datastream is intermittent (See page 18-21).

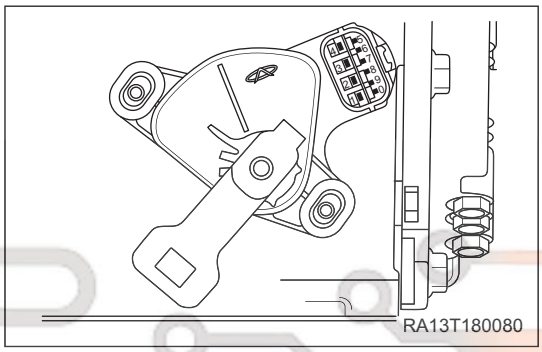
Diagnosis Procedure

1	Check TCU power supply circuit

a. Turn ignition switch to ON.

b. Disconnect the TCU connector E-069.

c. Check voltage between terminal of TCU connector E-069 and body ground.



Multimeter Connection	Condition	Specified Condition
E-069 (46,48,47,45) - Body ground	Always	11 to 14 V

OK → OK

NG

2	Check TCU fuse

a. Unplug TCU fuses EF07 (15A) and EF26 (10A) from engine compartment fuse and relay box.

b. Check resistance of fuse.

Standard resistance: less than 1 Ω

NG → Replace TCU fuse

OK

3	Check wire harness and connector (TCU - engine compartment fuse and relay box)

a. Disconnect the engine compartment fuse and relay box connector E-067.

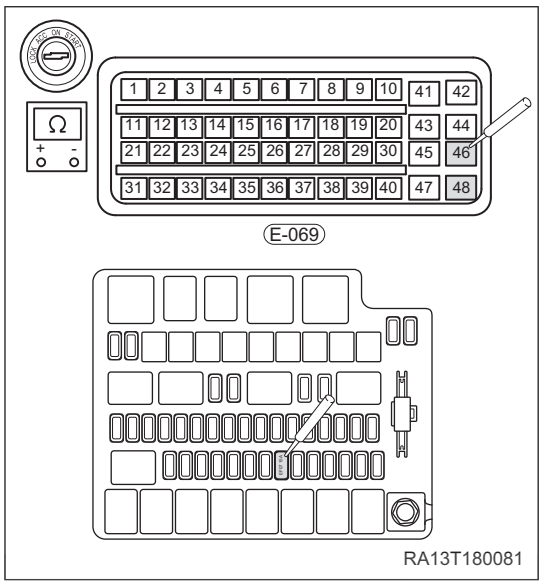
b. Check wire harness between connector terminals on wire harness side.

Check for Open

Multimeter Connection	Specified Condition
E-069 (46,48) - E-067 (39)	Continuity
E-069 (45,47) - E-067 (75)	Continuity

Check for Short

Multimeter Connection	Specified Condition
E-069 (46,48) or E-067 (39) - Body ground	No continuity
E-069 (46, 28) or E-067 (39) - Battery positive	
E-069 (45, 47) or E-067 (75) - Body ground	
E-069 (45, 47) or E-067 (75) - Battery positive	



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

OK ↓

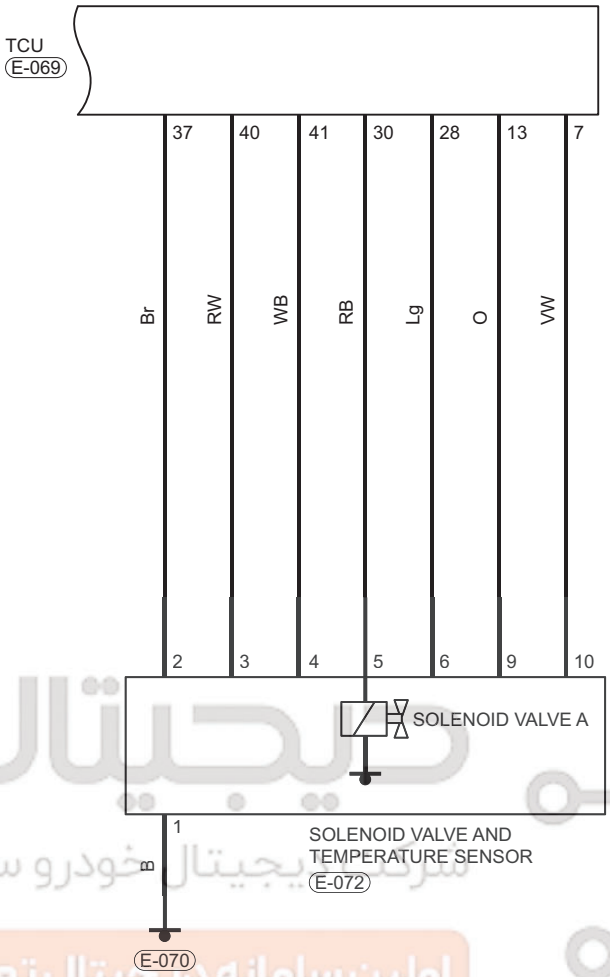
4	Check engine fuse and relay box

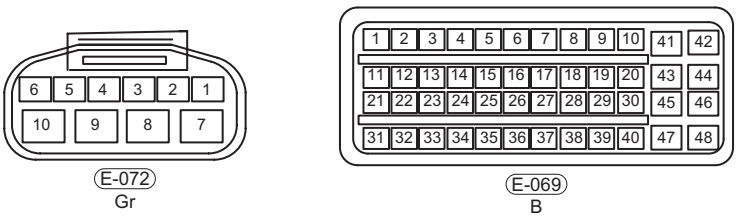
NG → **Repair or replace engine fuse and relay box**

OK ↓

Replace TCU

DTC	P0750-72	Gear Shift Solenoid Valve "A" Abnormal Open
DTC	P0750-73	Gear Shift Solenoid Valve "A" Abnormal Close
DTC	P0750-11	Gear Shift Solenoid Valve "A" Control Cir. Short to Ground
DTC	P0750-15	Gear Shift Solenoid Valve "A" Control Cir. Short to Power Supply or Open





EA13T180040

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0750-72	Gear Shift Solenoid Valve "A" Abnormal Open	Ignition switch ON Engine runs, target gear position and actual gear position information is not consistent	• Gear shift control solenoid valve wire harness failure • Gear shift control solenoid valve A failure • Gear shift control solenoid valve A related circuit failure
P0750-73	Gear Shift Solenoid Valve "A" Abnormal Close		
P0750-11	Gear Shift Solenoid Valve "A" Control Cir. Short to Ground	Ignition switch ON Engine runs, target gear position and actual gear position information is not consistent, driver chip input signal is low level and detection signal is high level	
P0750-15	Gear Shift Solenoid Valve "A" Control Cir. Short to Power Supply or Open		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Start engine, move shift lever to D gear, slightly depress accelerator pedal so that vehicle speed reaches 70 km/h, then release accelerator pedal and hold it for 5 seconds.
- Check DTC again, if DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent (See page 18-21).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information. Clear DTCs after repair is finished.

Diagnosis Procedure

1	Check TCU ground point

a. Turn ignition switch to LOCK.

b. Check the TCU ground point E-068.

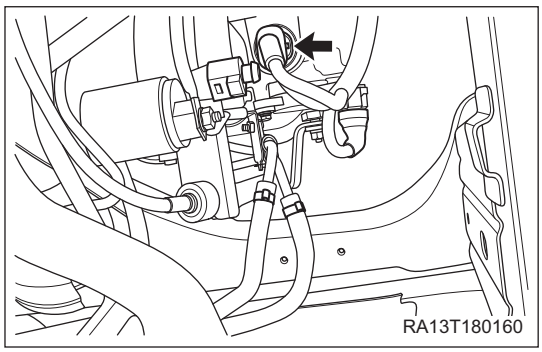
NG → **Repair or replace ground wire harness or ground point**

OK

2	Check wire harness assembly connector

a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Check the solenoid valve and temperature sensor connector.



NG → **Repair or replace connector**

OK

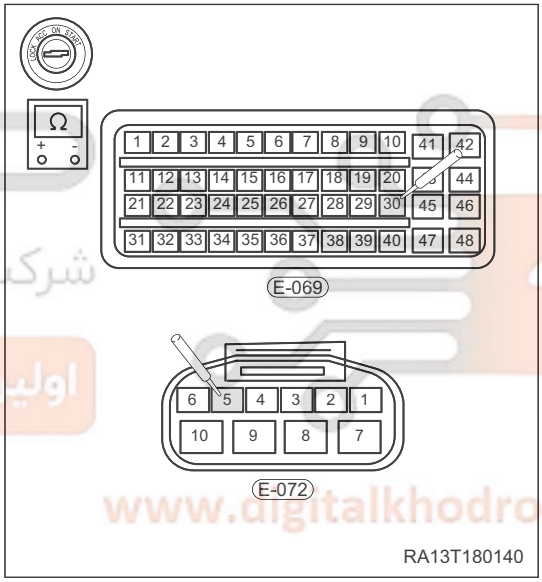
3	Check solenoid valve "A" control circuit

a. Turn ignition switch to LOCK.

b. Disconnect the TCU wire harness connector E-069.

c. Disconnect the solenoid valve and temperature sensor connector E-072.

d. Check wire harness between wire harness connector terminal and solenoid valve and temperature sensor connector terminal.



Check for Open

Multimeter Connection	Condition	Specified Condition
E-069 (30) - E-072 (5)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-069 (30) or E-072 (5) - Body ground	Always	No continuity
E-069 (30) or E-072 (5) - Battery positive	Always	No continuity

NG → **Replace wire harness or connector**

OK

4	Check solenoid valve "A"

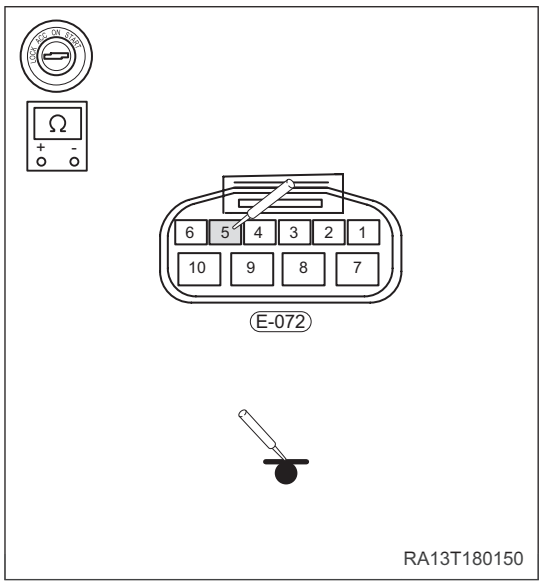
a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Measure resistance between solenoid valve and temperature sensor connector E-072 and transmission case ground.

Standard Resistance

Multimeter Connection	Condition	Specified Condition (Ω)
E-072 (5) - Case ground	Resistance measurement	13 ± 1

- Resistance error should be about 10%.



NG → **Repair or replace solenoid valve "A"**

OK

5	Check for DTCs

a. Using X-431 3G diagnostic tester, read TCU DTC.

b. Refer to "DTC Confirmation Procedure".

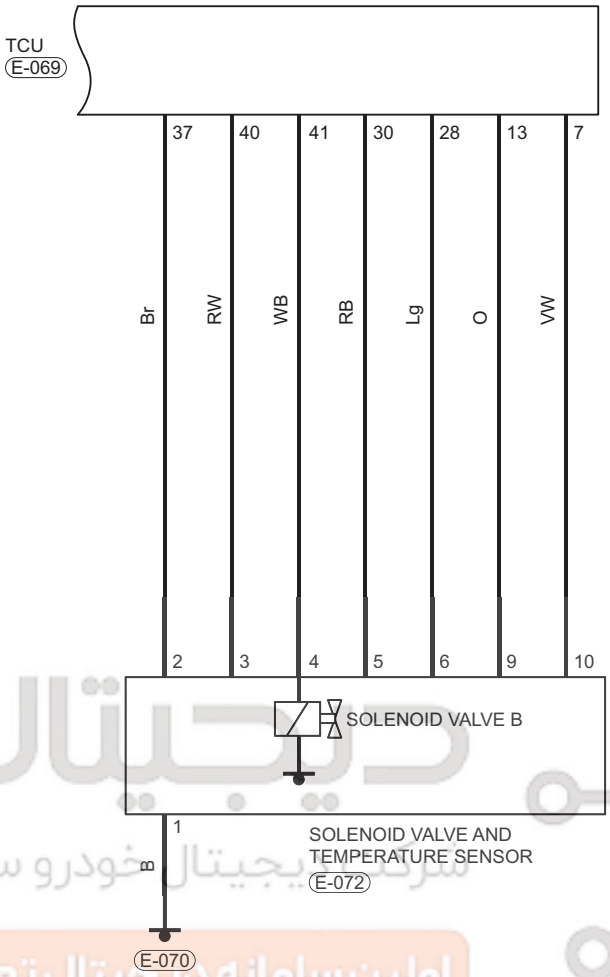
c. Check if DTC P0750-72, P0750-73, P0750-11, P0750-15 still exist.

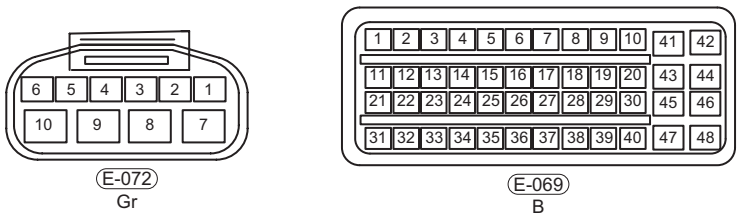
NG → **Replace TCU**

OK

System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0755-72	Gear Shift Solenoid Valve "B" Abnormal Open
DTC	P0755-73	Gear Shift Solenoid Valve "B" Abnormal Close
DTC	P0755-11	Gear Shift Solenoid Valve "B" Control Cir. Short to Ground
DTC	P0755-15	Gear Shift Solenoid Valve "B" Control Cir. Short to Power Supply or Open





EA13T180050

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0755-72	Gear Shift Solenoid Valve "B" Abnormal Open	Ignition switch ON Engine runs, target gear position and actual gear position information is not consistent	• Gear shift control solenoid valve wire harness failure • Gear shift control solenoid valve B failure • Gear shift control solenoid valve B related circuit failure
P0755-73	Gear Shift Solenoid Valve "B" Abnormal Close		
P0755-11	Gear Shift Solenoid Valve "B" Control Cir. Short to Ground	Ignition switch ON Engine runs, target gear position and actual gear position information is not consistent, driver chip input signal is low level and detection signal is high level	
P0755-15	Gear Shift Solenoid Valve "B" Control Cir. Short to Power Supply or Open		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Start engine, move shift lever to D gear, slightly depress accelerator pedal so that vehicle speed reaches 70 km/h, then release accelerator pedal and hold it for 5 seconds.
- Check DTC again, if DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent (See page 18-21).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information. Clear DTCs after repair is finished.

Diagnosis Procedure

1	Check TCU ground point

a. Turn ignition switch to LOCK.

b. Check the TCU ground point E-068.

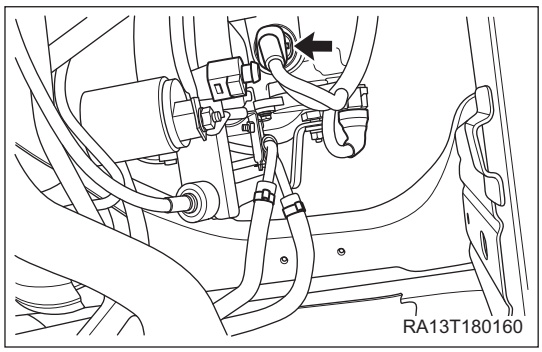
NG → **Repair or replace ground wire harness or ground point**

OK

2	Check wire harness assembly connector

a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Check the solenoid valve and temperature sensor connector.



NG → **Repair or replace connector**

OK

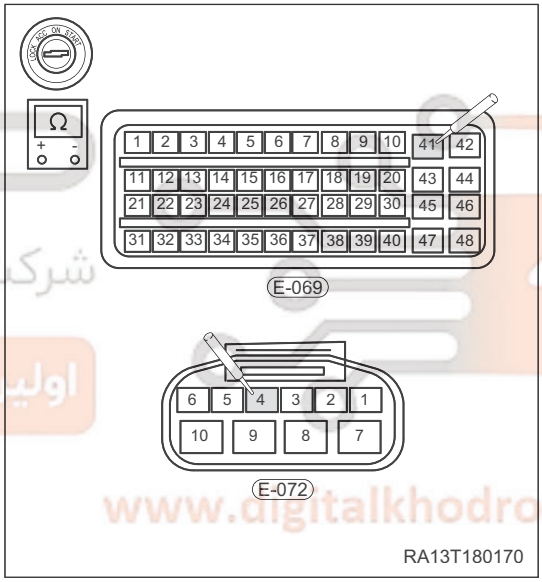
3	Check solenoid valve "B" control circuit

a. Turn ignition switch to LOCK.

b. Disconnect the TCU wire harness connector E-069.

c. Disconnect the solenoid valve and temperature sensor connector E-072.

d. Check wire harness between wire harness connector terminal and solenoid valve and temperature sensor connector terminal.



Check for Open

Multimeter Connection	Condition	Specified Condition
E-069 (41) - E-072 (4)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-069 (41) or E-072 (4) - Body ground	Always	No continuity
E-069 (41) or E-072 (4) - Battery positive	Always	No continuity

NG → **Replace wire harness or connector**

OK

18

4	Check solenoid valve "B"

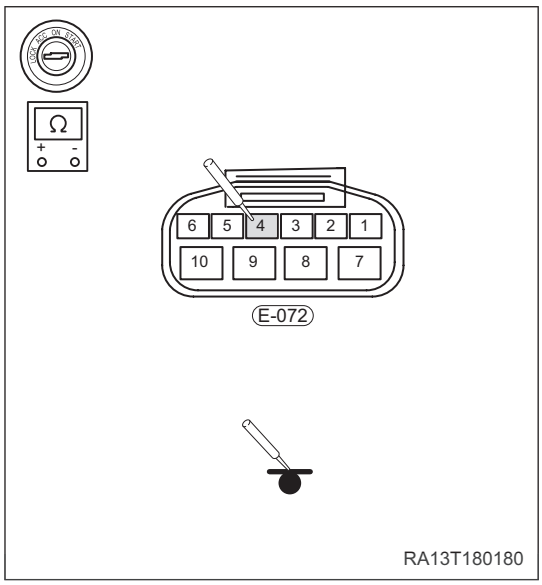
a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Measure resistance between solenoid valve and temperature sensor connector E-072 and transmission case ground.

Standard Resistance

Multimeter Connection	Condition	Specified Condition (Ω)
E-072 (4) - Case ground	Resistance measurement	13±1

- Resistance error should be about 10%.



NG → **Repair or replace solenoid valve "B"**

OK

5	Check for DTCs

a. Using X-431 3G diagnostic tester, read TCU DTC.

b. Refer to "DTC Confirmation Procedure".

c. Check if DTC P0755-72, P0755-73, P0755-11, P0755-15 still exist.

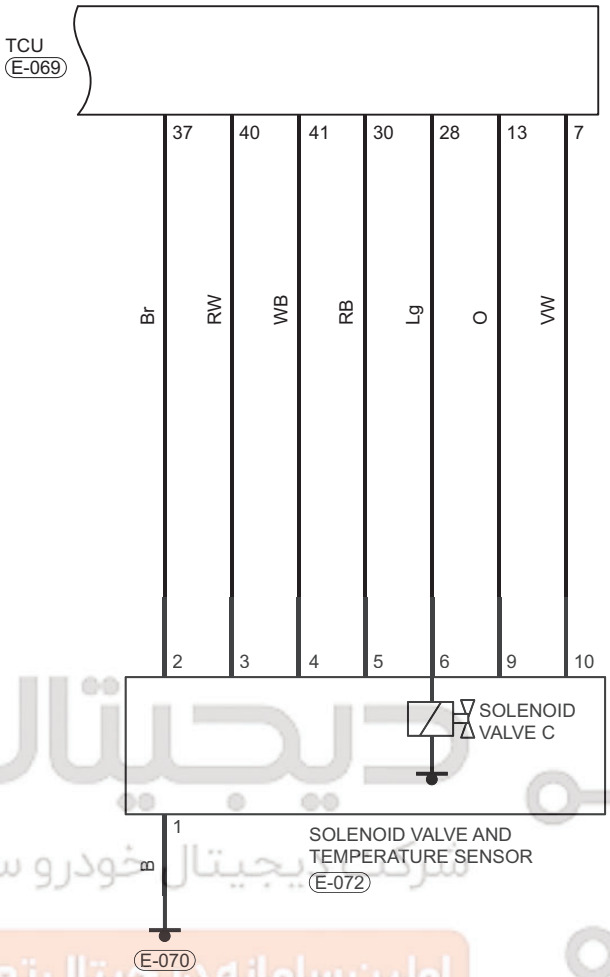
NG → **Replace TCU**

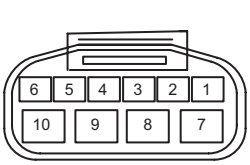
OK

18 **System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.**

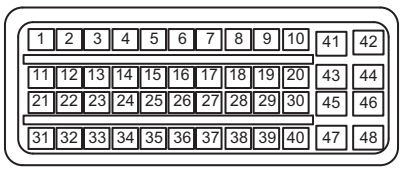
DTC	P0785-11	Gear Shift Solenoid Valve "C" Control Cir. Short to Ground

DTC	P0785-15	Gear Shift Solenoid Valve "C" Control Cir. Short to Power Supply or Open





E-072
Gr



E-069
B

EA13T180060

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0785-11	Gear Shift Solenoid Valve "C" Control Cir. Short to Ground	Ignition switch ON Driver chip input signal is low level and detection signal is high level	• Gear shift control solenoid valve wire harness failure • Gear shift control solenoid valve C failure
P0785-15	Gear Shift Solenoid Valve "C" Control Cir. Short to Power Supply or Open		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Start engine, move shift lever to D gear, slightly depress accelerator pedal so that vehicle speed reaches 70 km/h, then release accelerator pedal and hold it for 10 seconds.
- Check DTC again, if DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent (See page 18-21).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information. Clear DTCs after repair is finished.

Diagnosis Procedure

1	**Check TCU ground point**

a. Turn ignition switch to LOCK.

b. Check the TCU ground point E-068.

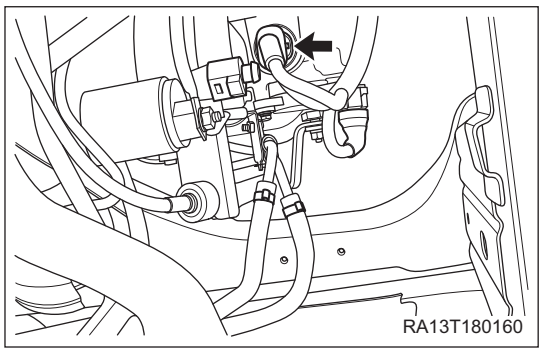
NG → **Repair or replace ground wire harness or ground point**

OK

2	Check wire harness assembly connector

a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Check the solenoid valve and temperature sensor connector.



NG → **Repair or replace connector**

OK

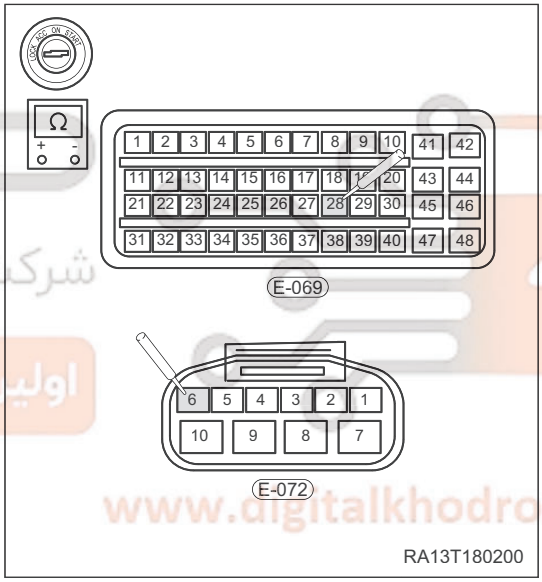
3	Check solenoid valve "C" control circuit

a. Turn ignition switch to LOCK.

b. Disconnect the TCU wire harness connector E-069.

c. Disconnect the solenoid valve and temperature sensor connector E-072.

d. Check wire harness between wire harness connector terminal and solenoid valve and temperature sensor connector terminal.



Check for Open

Multimeter Connection	Condition	Specified Condition
E-069 (28) - E-072 (6)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-069 (28) or E-072 (6) - Body ground	Always	No continuity
E-069 (28) or E-072 (6) - Battery positive	Always	No continuity

NG → **Replace wire harness or connector**

OK

4	Check solenoid valve "C"

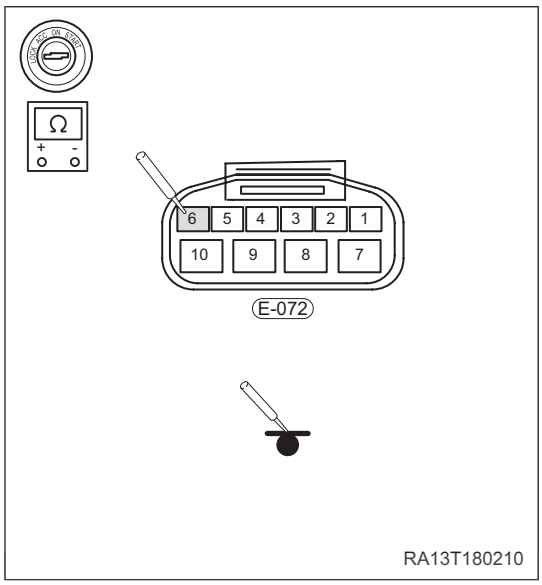
a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Measure resistance between solenoid valve and temperature sensor connector E-072 and transmission case ground.

Standard Resistance

Multimeter Connection	Condition	Specified Condition (Ω)
E-072 (6) - Case ground	Resistance measurement	13±1

- Resistance error should be about 10%.



NG → **Repair or replace solenoid valve "C"**

OK

5	Check for DTCs

a. Using X-431 3G diagnostic tester, read TCU DTC.

b. Refer to "DTC Confirmation Procedure".

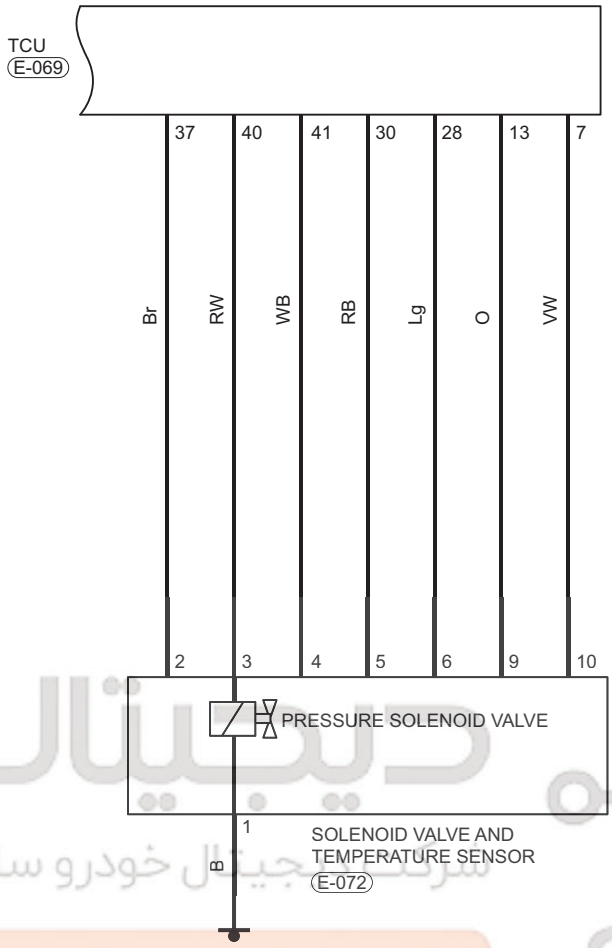
c. Check if DTC P0785-11, P0785-15 still exist.

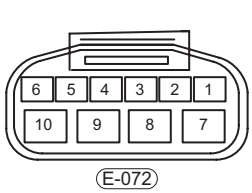
NG → **Replace TCU**

OK

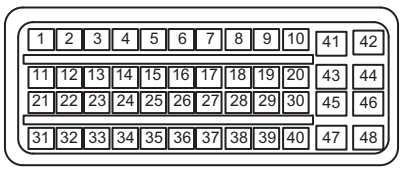
System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0745-00	Pressure Control Solenoid Valve Abnormal
DTC	P0745-11	Pressure Control Solenoid Valve Control Cir. Short to Ground
DTC	P0745-15	Pressure Control Solenoid Valve Control Cir. Short to PowerSupply





E-072
Gr



E-069
B

EA13T180070

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0745-00	Pressure Control Solenoid Valve Abnormal	Difference between actual current and target current of solenoid valve is too large	• Pressure solenoid valve wire harness failure • Pressure control solenoid valve failure
P0745-11	Pressure Control Solenoid Valve Control Cir. Short to Ground		
P0745-15	Pressure Control Solenoid Valve Control Cir. Short to Power Supply		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Start engine, move shift lever to D gear, slightly depress accelerator pedal so that vehicle speed reaches 70 km/h, then release accelerator pedal and hold it for 10 seconds.
- Check DTC again, if DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent (See page 18-21).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information. Clear DTCs after repair is finished.

Diagnosis Procedure

1	Check TCU ground point

a. Turn ignition switch to LOCK.

b. Check the TCU ground point E-068.

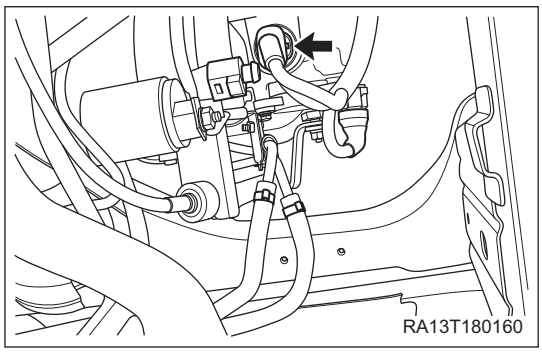
NG → **Repair or replace ground wire harness or ground point**

OK →

2	Check wire harness assembly connector

a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Check the solenoid valve and temperature sensor connector.



NG → **Repair or replace connector**

OK

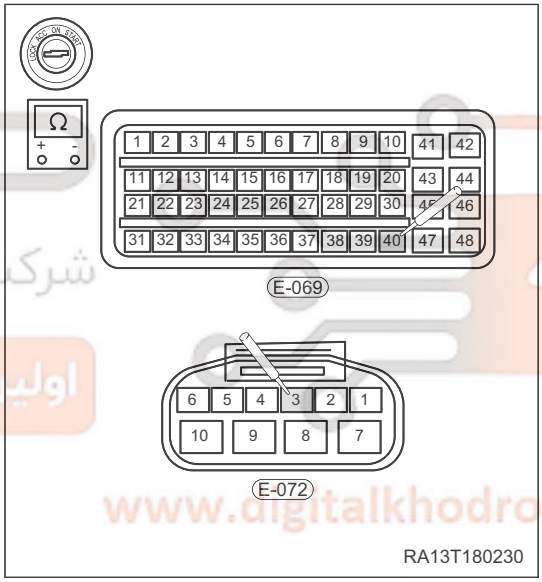
3	Check pressure solenoid valve control circuit

a. Turn ignition switch to LOCK.

b. Disconnect the TCU wire harness connector E-069.

c. Disconnect the solenoid valve and temperature sensor connector E-072.

d. Check wire harness between wire harness connector terminal and solenoid valve and temperature sensor connector terminal.



Check for Open

Multimeter Connection	Condition	Specified Condition
E-069 (40) - E-072 (3)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-069 (40) or E-072 (3) - Body ground	Always	No continuity
E-069 (40) or E-072 (3) - Battery positive	Always	No continuity

NG → **Replace wire harness or connector**

OK

4	Check pressure control solenoid valve

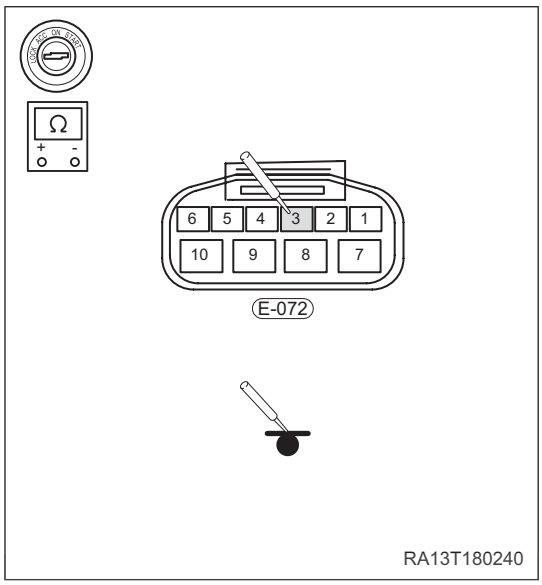
a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Measure resistance between solenoid valve and temperature sensor connector E-072 and transmission case ground.

Standard Resistance

Multimeter Connection	Condition	Specified Condition (Ω)
E-072 (3) - Case ground	Resistance measurement	5.3 ± 0.3

- Resistance error should be about 10%.



NG → **Repair or replace pressure control solenoid valve**

OK

5	Check for DTCs

a. Using X-431 3G diagnostic tester, read TCU DTC.

b. Refer to "DTC Confirmation Procedure".

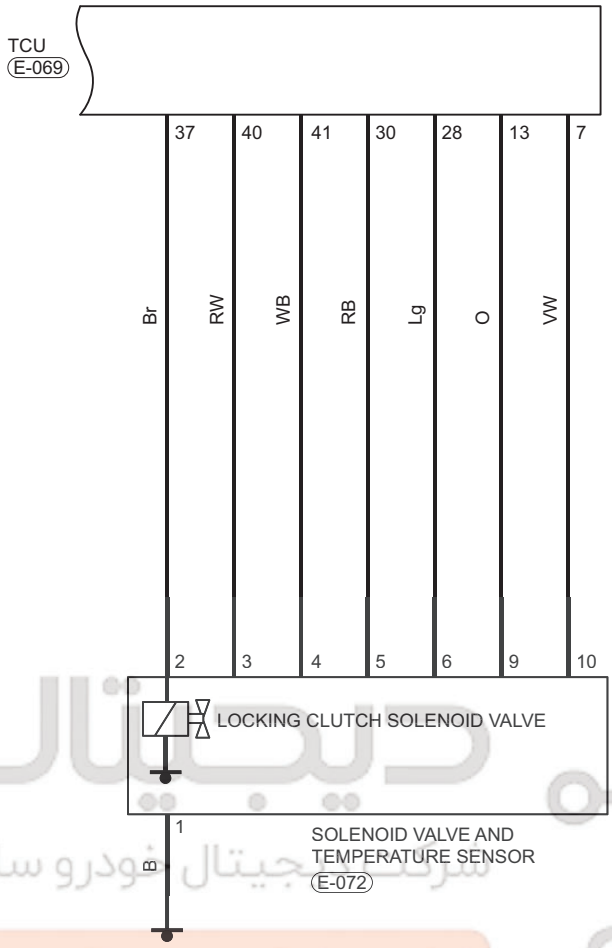
c. Check if DTC P0745-00, P0745-11, P0745-15 still exist.

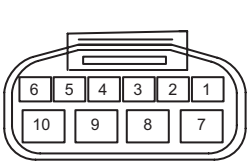
NG → **Replace TCU**

OK

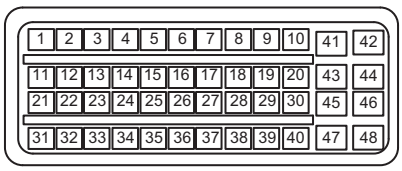
System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0743-72	Hydraulic Torque Converter Lock Clutch Solenoid Valve AbnormalOpen
DTC	P0743-73	Hydraulic Torque Converter Lock Clutch Solenoid Valve AbnormalClose
DTC	P0743-11	Hydraulic Torque Converter Lock Clutch Solenoid Valve ControlCir. Short to Ground
DTC	P0743-15	Hydraulic Torque Converter Lock Clutch Solenoid Valve Control Cir. Short to Power Supply or Open





E-072
Gr



E-069
B

EA13T180080

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0743-72	Hydraulic Torque Converter Lock Clutch Solenoid Valve Abnormal Open	Slip speed is still more than a certain value after hydraulic torque converter request locks	• Hydraulic torque converter failure • Hydraulic torque converter lock control solenoid valve • Wire harness failure
P0743-73	Hydraulic Torque Converter Lock Clutch Solenoid Valve Abnormal Close		
P0743-11	Hydraulic Torque Converter Lock Clutch Solenoid Valve Control Cir. Short to Ground	Ignition switch ON When driver chip input signal is high level, detection signal is low level	
P0743-15	Hydraulic Torque Converter Lock Clutch Solenoid Valve Control Cir. Short to Power Supply or Open		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Start engine, move shift lever to D gear, slightly depress accelerator pedal so that vehicle speed reaches 70 km/h, then release accelerator pedal and hold it for 10 seconds.
- Check DTC again, if DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent (See page 18-21).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information. Clear DTCs after repair is finished.

Diagnosis Procedure

1	Check TCU ground point

a. Turn ignition switch to LOCK.

b. Check the TCU ground point E-068.

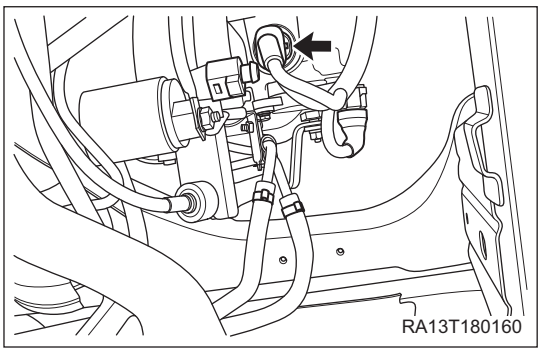
NG → **Repair or replace ground wire harness or ground point**

OK →

2	Check wire harness assembly connector

a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Check the solenoid valve and temperature sensor connector.



NG → **Repair or replace connector**

OK

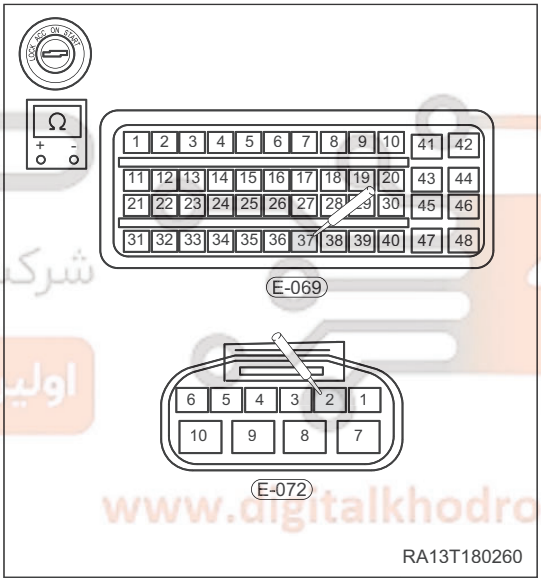
3	Check lock clutch solenoid valve controlcircuit

a. Turn ignition switch to LOCK.

b. Disconnect the TCU wire harness connector E-069.

c. Disconnect the solenoid valve and temperature sensor connector E-072.

d. Check wire harness between TCU wire harness connector terminal and solenoid valve and temperature sensor connector terminal.



Check for Open

Multimeter Connection	Condition	Specified Condition
E-069 (37) - E-072 (2)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-069 (37) or E-072 (2) - Body ground	Always	No continuity
E-069 (37) or E-072 (2) - Body ground	Always	No continuity

NG → **Replace wire harness or connector**

OK

4	Check lock clutch solenoid valve

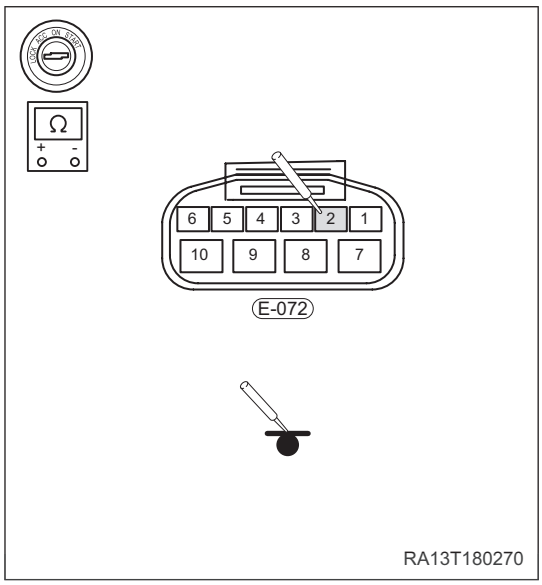
a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Measure resistance between solenoid valve and temperature sensor connector E-072 and transmission case ground.

Standard Resistance

Multimeter Connection	Condition	Specified Condition (Ω)
E-072 (2) - Case ground	Resistance measurement	13 ± 1

- Resistance error should be about 10%.



NG → **Repair or replace lock clutch solenoid valve**

OK

5	Check for DTCs

a. Using X-431 3G diagnostic tester, read TCU DTC.

b. Refer to "DTC Confirmation Procedure".

c. Check if DTC P0743-72, P0743-73, P0743-11, P0743-15 still exist.

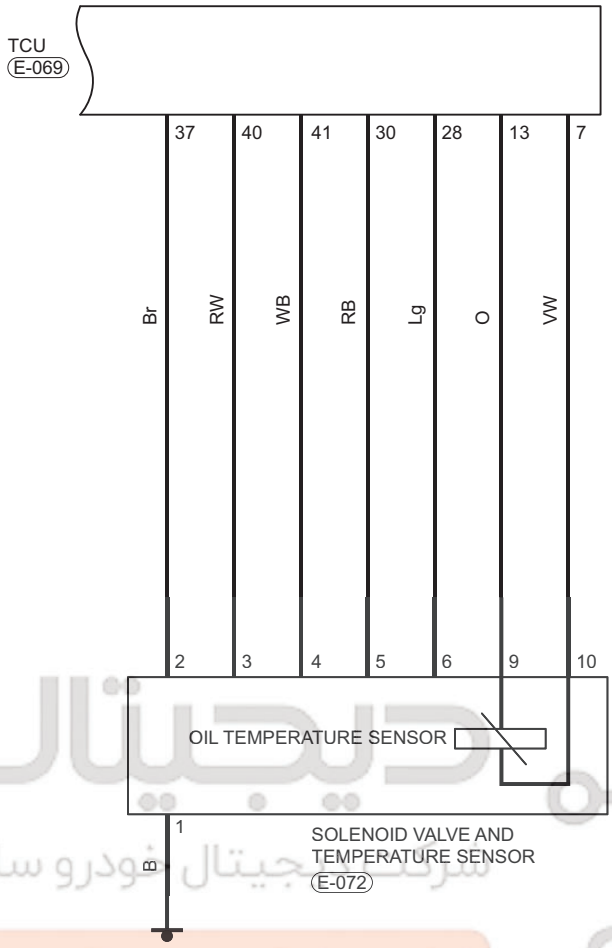
NG → **Replace TCU**

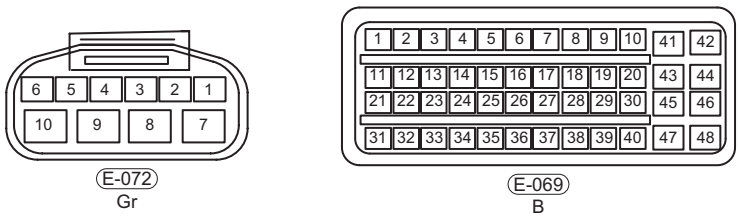
OK

System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0710-11	Transmission Temperature Sensor Cir. Short to Ground

DTC	P0710-15	Transmission Temperature Sensor Cir. Short to Power Supplyor Open





EA13T180090

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0710-11	Transmission Temperature Sensor Cir. Short to Ground	When resistance monitored by oil temperature sensor is less than given minimum value	• Oil temperature sensor failure • Signal circuit is short to ground • TCU signal processing circuit failure
P0710-15	Transmission Temperature Sensor Cir. Short to Power Supply or Open		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Start engine, move shift lever to D gear, slightly depress accelerator pedal so that vehicle speed reaches 70 km/h, then release accelerator pedal and hold it for 10 seconds.
- Check DTC again, if DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent (See page 18-21).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information. Clear DTCs after repair is finished.

Diagnosis Procedure

1	**Check TCU ground point**

a. Turn ignition switch to LOCK.

b. Check the TCU ground point E-068.

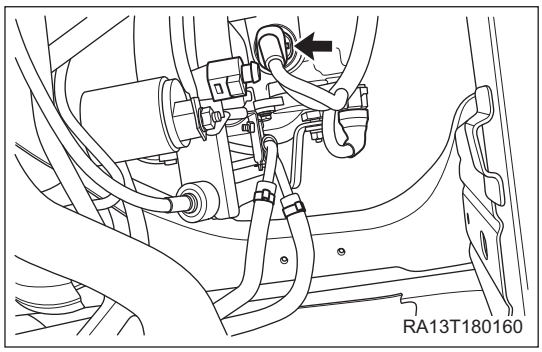
NG → **Repair or replace ground wire harness or ground point**

OK

2	Check wire harness assembly connector

a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Check the solenoid valve and temperature sensor connector.



NG → **Repair or replace connector**

OK

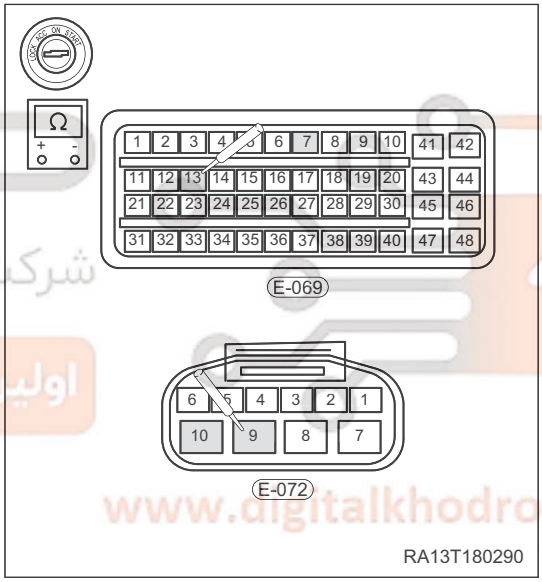
3	Check oil temperature sensor circuit

a. Turn ignition switch to LOCK.

b. Disconnect the TCU wire harness connector E-069.

c. Disconnect the solenoid valve and temperature sensor connector E-072.

d. Check wire harness between TCU wire harness connector terminal and solenoid valve and temperature sensor connector terminal.



Check for Open

Multimeter Connection	Condition	Specified Condition
E-069 (13) - E-072 (9) E-069 (07) - E-072 (10)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-069 (13) or E-072 (9) - Body ground	Always	No continuity
E-069 (07) or E-072 (10) - Battery positive	Always	No continuity

NG → **Replace wire harness or connector**

OK

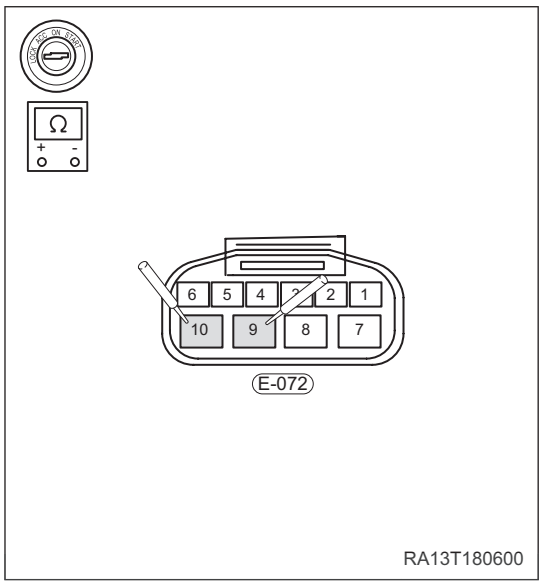
18

4	Check transmission temperature sensor

a. Disconnect the solenoid valve and temperature sensor connector E-072.

b. Measure resistance between solenoid valve and temperature sensor connector E-072 and transmission case ground.

Standard Resistance (See page 18-19)



NG → **Repair or replace transmission temperature sensor**

OK

5	Check for DTCs

a. Using X-431 3G diagnostic tester, read TCU DTC.

b. Refer to "DTC Confirmation Procedure".

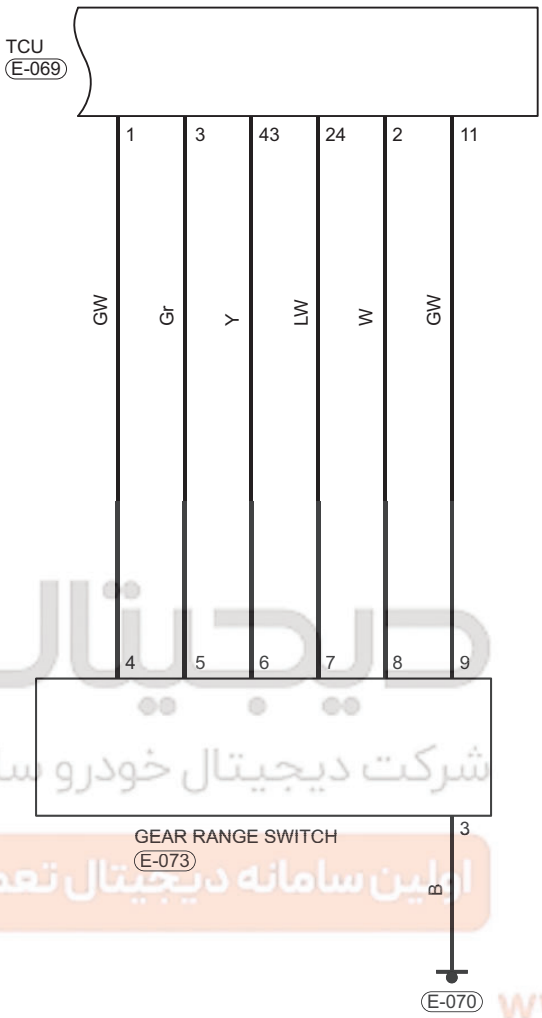
c. Check if DTC P0710-11, P0710-15 still exist.

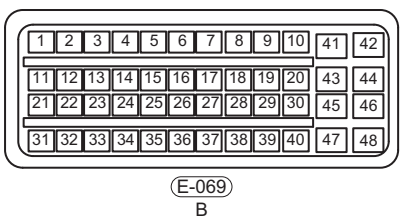
NG → **Replace TCU**

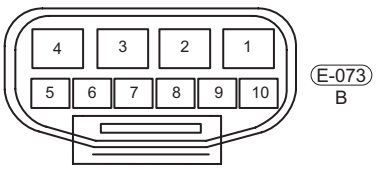
OK

System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0705-29	Transmission Abnormal Gear Position Signal







EA13T180100

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0705-29	Transmission Abnormal Gear Position Signal	When there are more gear position signals that are read or there are no gear position signals	• Poor matching of gear shift cable • Gear shift switch failure • Gear shift cable wire harness failure

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Start engine, change gear position in order of P-R-N-D-2-L-2-D-N-R-P and hold each gear for 15 seconds.
- Check DTC again, if DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent (See page 18-21).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information. Clear DTCs after repair is finished.

Diagnosis Procedure

1	Check TCU ground point

a. Turn ignition switch to LOCK.

b. Check the TCU ground point E-068.

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

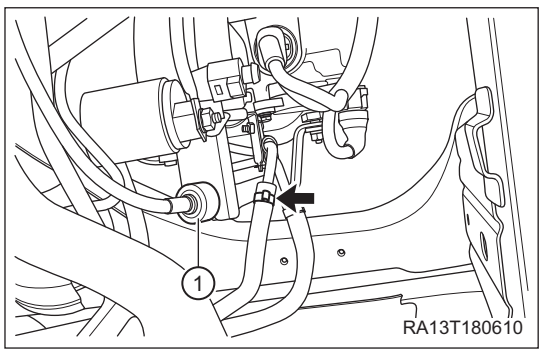
OK

2	Check gear shift switch connector

a. Disconnect the gear shift switch connector E-073.

b. Check the gear shift switch connector.

NG → **Repair or replace connector**



OK

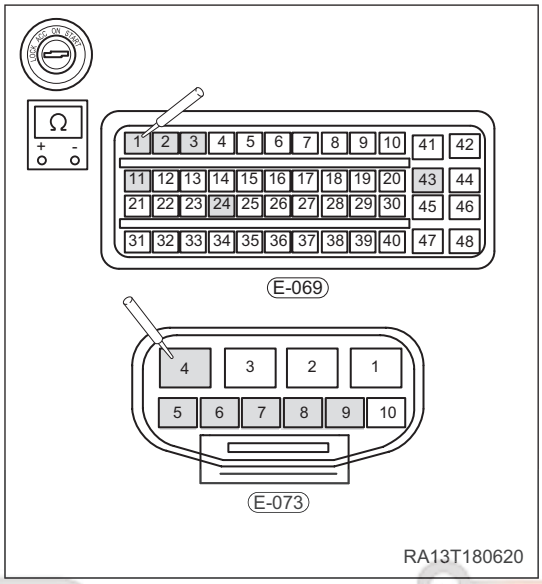
3	Check gear shift switch circuit

a. Turn ignition switch to LOCK.

b. Disconnect the TCU wire harness connector E-069.

c. Disconnect the solenoid valve and temperature sensor connector E-072.

d. Check wire harness between TCU wire harness connector and solenoid valve and temperature sensor connector terminal.



Check for Open

Multimeter Connection	Condition	Specified Condition
E-069 (1) - E-073 (4) E-069 (3) - E-073 (5) E-069 (43) - E-073 (6) E-069 (24) - E-073 (7) E-069 (2) - E-073 (8) E-069 (11) - E-073 (9)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-073 (4,5,6,7,8,9) or E-063 (1,3,43,24,2,11) - Body ground	Always	No continuity
E-073 (4,5,6,7,8,9) or E-063 (1,3,43,24,2,11) - Battery positive	Always	No continuity

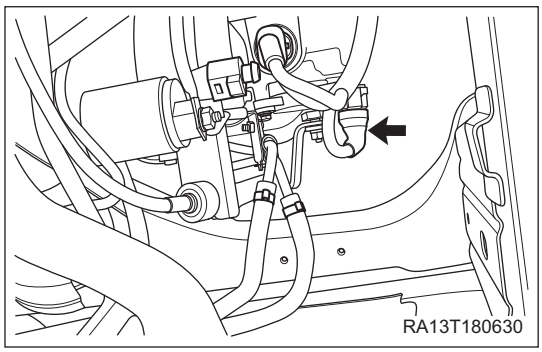
NG → Replace wire harness or connector

OK

4	Check gear switch assembly

a. Disconnect the gear switch assembly E-073.

b. Check for internal continuity of gear switch assembly.



NG → Repair or repalce gear switch assembly

OK

5	Check for DTCs

a. Using X-431 3G diagnostic tester, read TCU DTC.

b. Refer to "DTC Confirmation Procedure".

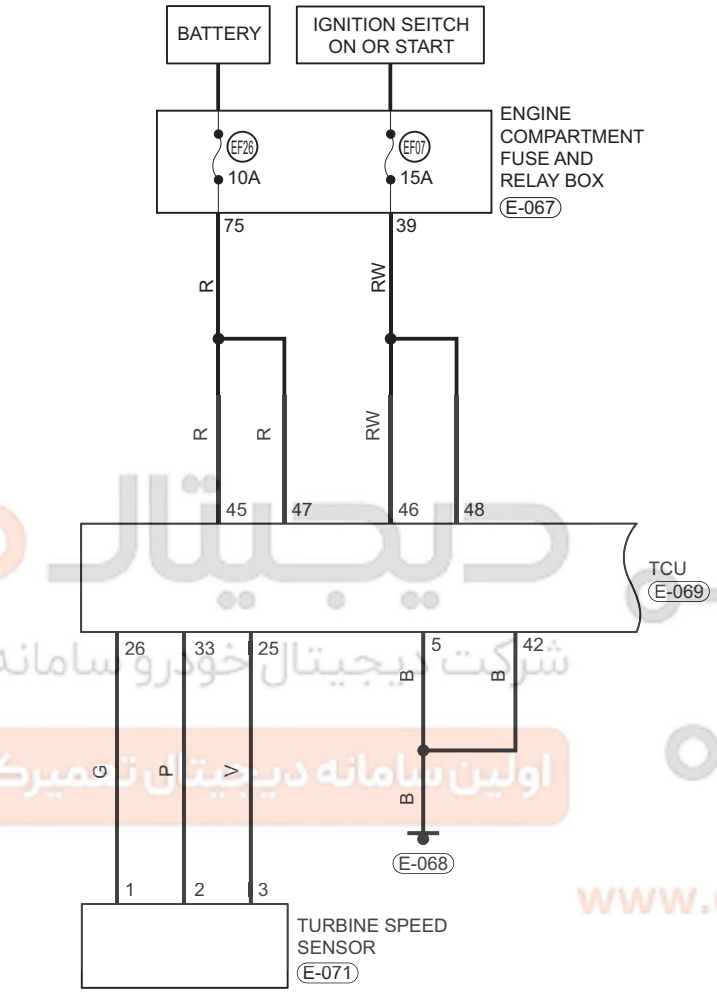
c. Check if DTC P0705-29 still exists.

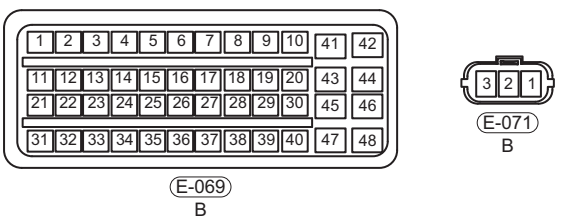
NG → Replace TCU

OK

System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0715-00	Turbine Speed Abnormal Signal Range





EA13T180110

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0715-00	Turbine Speed Abnormal Signal Range	Turbine speed is invalid or more than maximum value, or less than minimum value during driving	• Oil temperature sensor failure • Sensor circuit is poorly contacted or short • Sensor failure

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Start engine, move shift lever to any position of D, R, 2, L, slightly depress accelerator pedal so that vehicle speed reaches 20 km/h, and hold it for more than 30 seconds.
- Check DTC again, if DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent (See page 18-21).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information. Clear DTCs after repair is finished.

Diagnosis Procedure

1	**Check TCU ground point**

a. Turn ignition switch to LOCK.

b. Check the TCU ground point E-068.

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

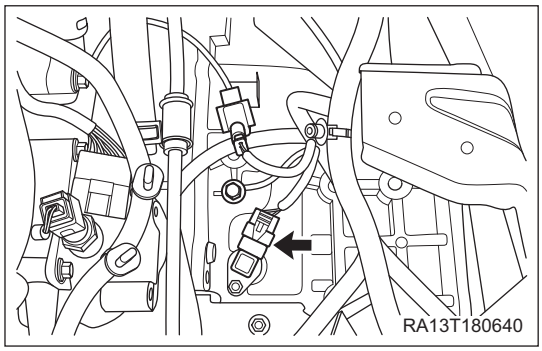
OK

2	**Check turbine speed sensor connector**

a. Disconnect the turbine speed sensor connector E-071.

b. Check the turbine speed sensor connector.

NG → **Repair or replace connector**



OK

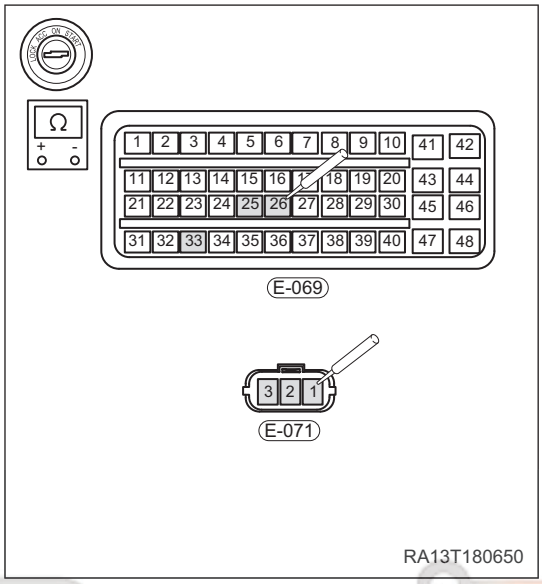
3	Check turbine speed sensor circuit

a. Turn ignition switch to LOCK.

b. Disconnect the TCU wire harness connector E-069.

c. Disconnect the turbine speed sensor connector E-071.

d. Check wire harness between TCU wire harness connector terminal and turbine speed sensor connector terminal.



Check for Open

Multimeter Connection	Condition	Specified Condition
E-069 (26) - E-071 (1) E-069 (33) - E-071 (2) E-069 (25) - E-071 (3)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-069 (26,33,25) or E-071 (1,2,3) - Body ground	Always	No continuity
E-069 (26,33,25) or E-071 (1,2,3) - Battery positive	Always	No continuity

NG → Replace wire harness or connector

18

OK

4	Turbine Speed Sensor

a. Disconnect the turbine speed sensor connector E-072.

b. Measure resistance of turbine speed sensor connector E-072.

NG → Repair or replace turbine speed sensor connector

OK

5	Check for DTCs

a. Using X-431 3G diagnostic tester, read TCU DTC.

b. Refer to "DTC Confirmation Procedure".

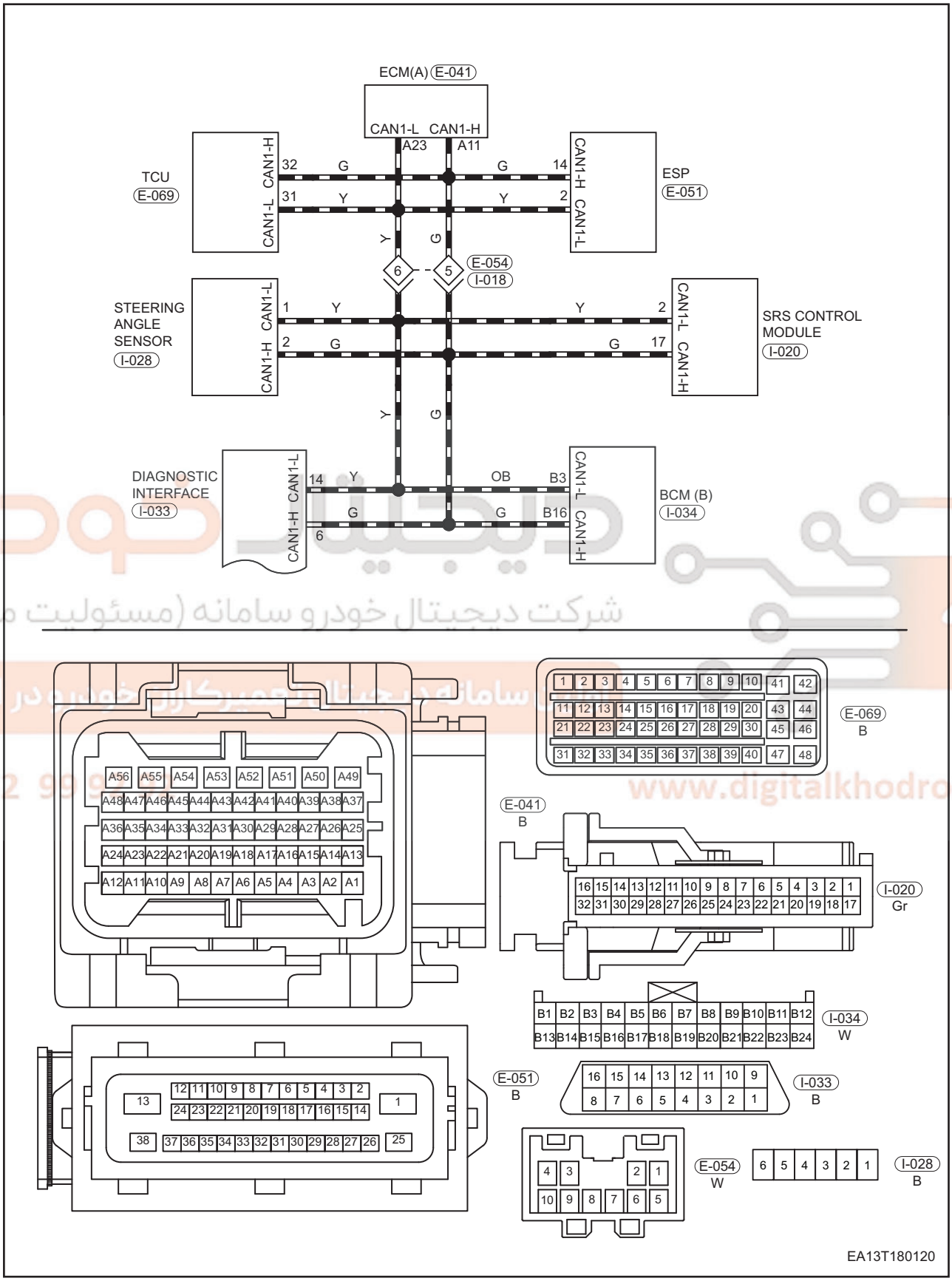
c. Check if DTC P0715-00 still exists.

NG → Replace TCU

OK

System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0863-00	TCU Communication Abnormal



DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0863-00	TCU Communication Abnormal	When TCU cannot communicate with other control units	• TCU wire harness failure • TCU failure

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Start engine for more than 10 seconds.
- Check DTC again, if DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent (See page 18-21).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information. Clear DTCs after repair is finished.

Diagnosis Procedure

1	Check TCU ground point

a. Turn ignition switch to LOCK.

b. Check the TCU ground point E-068.

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

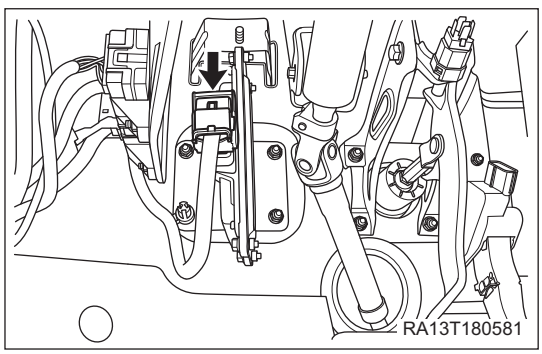
OK

2	Check TCU wire harness connector

a. Disconnect the TCU wire harness connector E-069.

b. Check the TCU wire harness connector.

NG → **Repair or replace connector**



OK

3	**Check for DTCs**

a. Using X-431 3G diagnostic tester, read TCU DTC.

b. Refer to "DTC Confirmation Procedure".

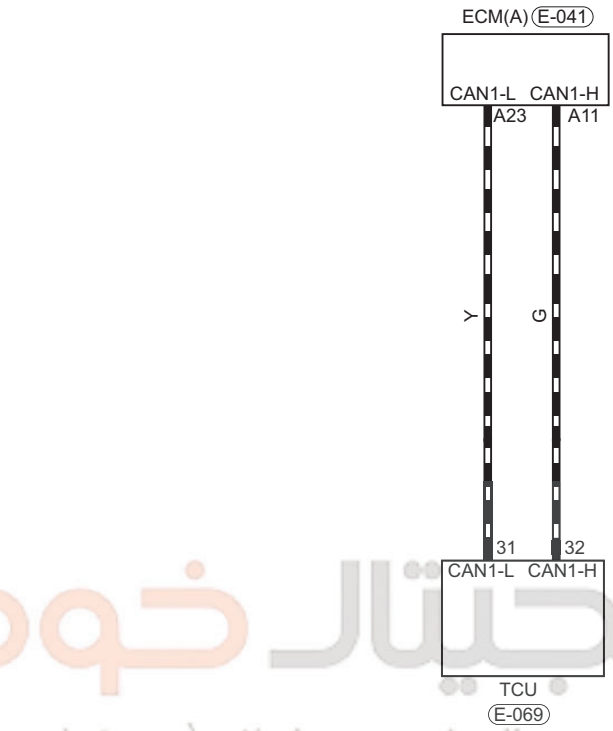
c. Check if DTC P0715-00 still exists.

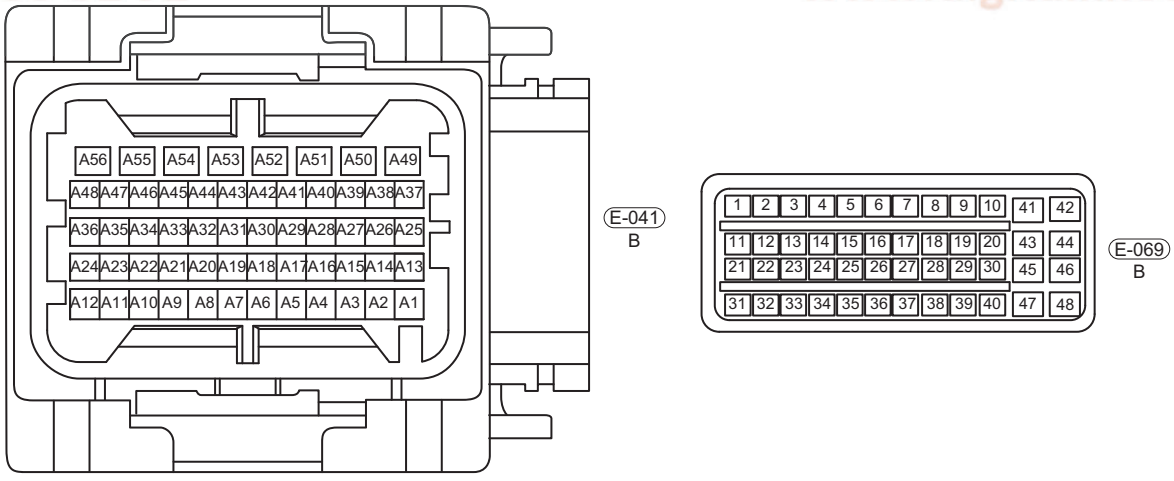
NG → **Replace TCU**

OK

System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	U0100-87	Lost Communication With EMS





EA13T180121

DTC	DTC Definition	DTC Detection Condition	Possible Cause
U0100-87	Lost Communication With EMS	Engine speed and torque signals, etc. are sent by vehicle CAN network	• Engine speed sensor failure • CAN circuit failure

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Start engine and wait for at least 1 minute.
- Check DTC again, if DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent (See page 18-21).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information. Clear DTCs after repair is finished.

Diagnosis Procedure

1	Check TCU ground point

a. Turn ignition switch to LOCK.

b. Check the TCU ground point E-068.

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

OK

2	Check engine speed sensor

a. Check engine speed sensor in engine management system (See page 06-111).

NG → **Repair or replace engine speed sensor**

OK

3	Check CAN network circuit

a. Check ECU connector and circuit.

NG → Repair or replace connector

OK

4	Check for DTCs

a. Using X-431 3G diagnostic tester, read TCU DTC.

b. Refer to "DTC Confirmation Procedure".

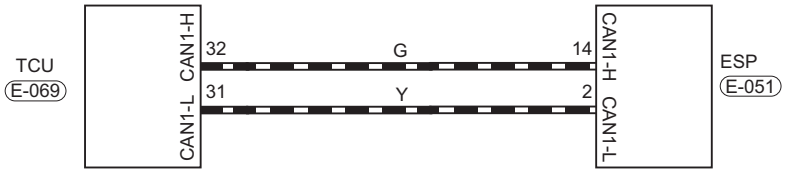
c. Check if DTC U0100-87 still exists.

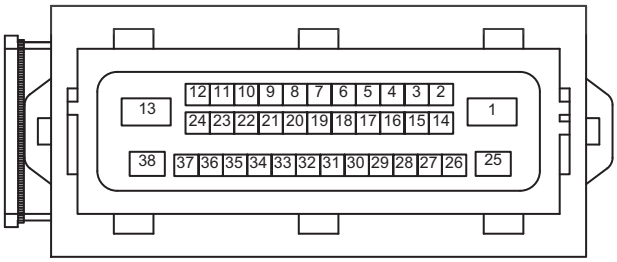
NG → Replace TCU or ECU.

OK

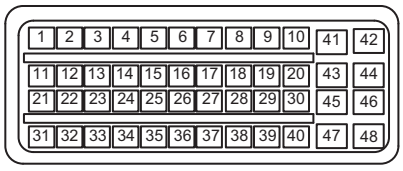
System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	U0121-87	Lost Communication With ABS





E-051
B



E-069
B

EA13T180130

DTC	DTC Definition	DTC Detection Condition	Possible Cause
U0121-87	Lost Communication With ABS	When ABS signal value received from TCM equals to default failed value	• ABS signal sensor failure • CAN signal circuit failure

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Start engine and wait for at least 1 minute.
- Check DTC again, if DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent (See page 18-21).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information. Clear DTCs after repair is finished.

Diagnosis Procedure

1	Check TCU ground point

a. Turn ignition switch to LOCK.

b. Check the TCU ground point E-068.

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

OK

2	Check ABS singal sensor

a. Check the ABS signal sensor (See page 25-14).

NG → **Repair or replace ABS signal sensor**

OK

3	Check CAN network circuit

a. Check ABS connector and circuit

NG → **Repair or replace connector**

OK

4	Check for DTCs

a. Using X-431 3G diagnostic tester, read TCU DTC.

b. Refer to "DTC Confirmation Procedure".

c. Check if DTC U0121-87 still exists.

NG → **Replace TCU or ECU.**

OK

System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

ON-VEHICLE SERVICE

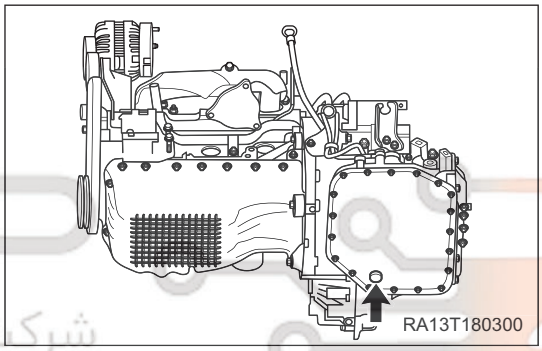
Automatic Transmission Fluid (ATF) Replacement

CAUTION

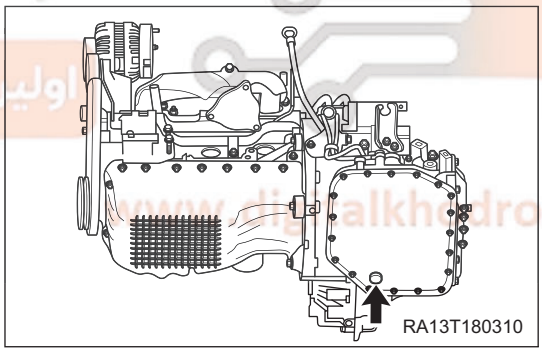
- Replace transmission oil only when engine stops and transmission cools down.
- Before installation, replace drain/retaining plug washer with a new one.

Draining

1. Turn off all electrical equipment and the ignition switch.
2. Raise the vehicle to a proper height.
3. Place a recovering container under transmission drain hole.
4. Using a wrench, loosen the transmission oil filler plug (arrow).



5. Using a wrench, remove the transmission drain plug (arrow). Replace drain plug washer and tighten drain plug after draining transmission oil.
   (Tightening torque: 44 ± 4 N·m)



ENVIRONMENTAL PROTECTION

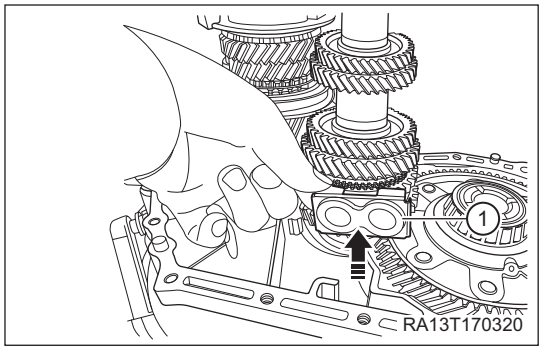
- Drained transmission oil should be collected with a recovering container.

Filling Transmission Oil

CAUTION

- Only use transmission oil approved by Chery Automobile Co., Ltd.

1. Make sure that transmission drain plug has been tightened in place.
2. Using a filling tool, fill transmission oil into transmission filler, and filling amount should be drained ATF level.



HINT:

If transmission is spare part, it is not necessary to drain oil. Fill a certain amount of ATF after installing new transmission.

Transmission Oil Type

Transmission Oil Type	C6AT-15 (ATF)
Filling Capacity	6.58 ± 0.23 L

CAUTION

- Genuine C6AT-15 fluid must be used for 4AT.
- Avoid fluid splashing to high temperature part during filling, and leaked part should be wiped off after filling.

HINT:

It is recommended to replace ATF once after driving at 40000 km, and it is not necessary to replace ATF in later maintenance.

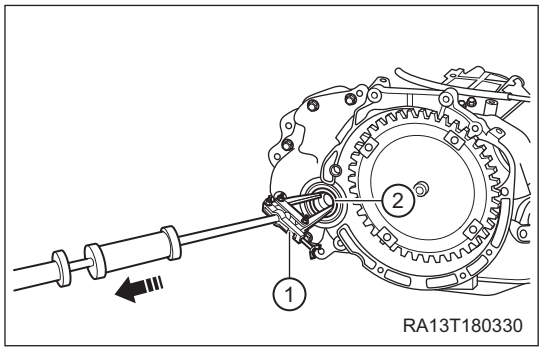
Differential Oil Seal

Removal

Use same procedures for right and left sides.

Procedures listed below are for left side.

1. Remove the left wheel (See page 24-7).



2. Remove the left drive shaft assembly (See page 20-5).

WARNING

- Be sure to wear necessary safety equipment to prevent accidents.

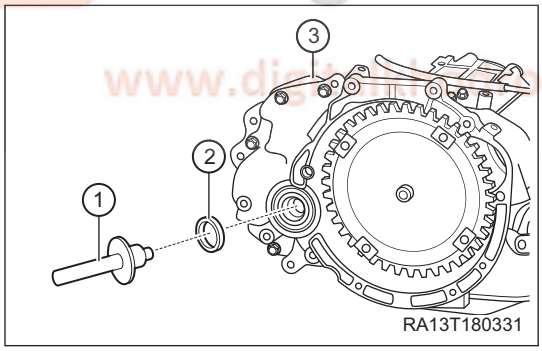
3. Using a special tool (1), remove the differential oil seal (2).

HINT:

Do not damage joint surface of oil seal and housing during removal.

Installation

1. Apply an appropriate amount of transmission oil to new oil seal outer race.
2. Using a special tool and hammer, tap in oil seal and install it in place.



CAUTION

- Do not scratch oil seal mounting hole during disassembly.
- When assembling, apply force evenly and prevent oil seal from deformation and damage.
- Keep transmission oil seal clean, to avoid foreign matter entering transmission. Do not apply other sealant or adhesive on oil seal. Use clean gloves or clean hands during operation.

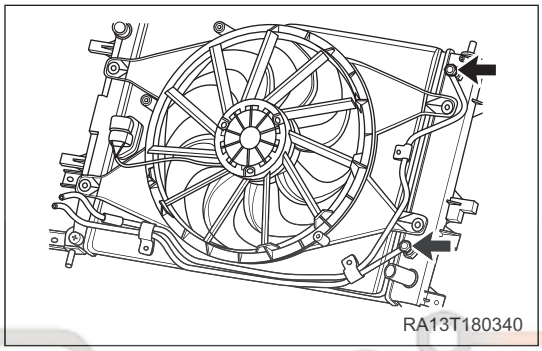
3. Fill transmission oil.

Other procedures are in the reverse order of removal.

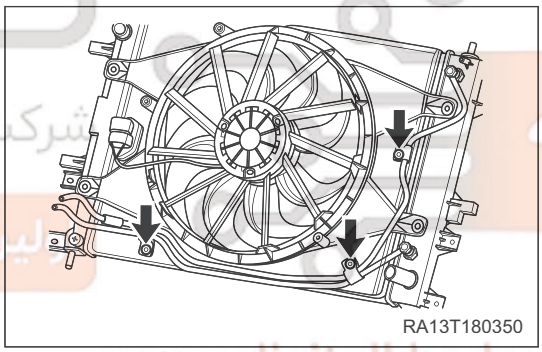
Transmission Oil Cooling Line Set

Removal

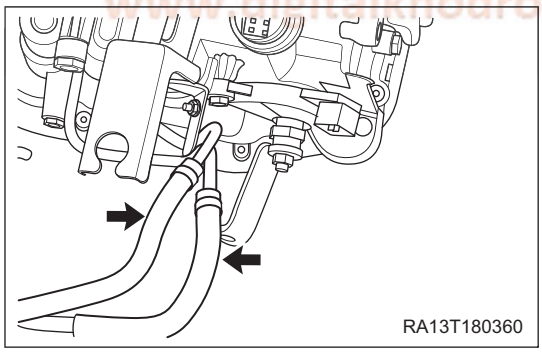
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery (See page 16-7).
4. Remove the battery tray (See page 16-9).
5. Remove the air filter assembly (See page 10-10).
6. Drain transmission oil.
7. Separate transmission oil cooling line set and radiator assembly.
   a. Remove 2 hollow bolts between transmission oil cooling line set and radiator assembly.
   b. Separate transmission oil cooling line set from radiator assembly.


RA13T180340

8. Remove 3 fixing bolts from transmission oil cooling line set.


RA13T180350

9. Remove transmission oil inlet/outlet cooling line set and transmission cooling pipe assembly.
   a. Remove clamping ring from transmission cooling pipe assembly.
   b. Separate the transmission cooling pipe assembly.


RA13T180360

10. Remove the oil cooling pipe set.

Installation

Installation is in the reverse order of removal.

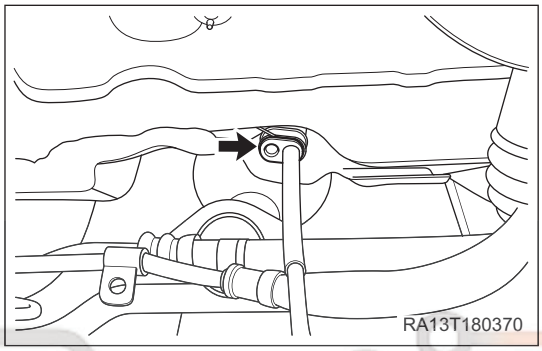
CAUTION

- Confirm that transmission oil inlet and return cooling pipes are not twisted, crossed or deformed, etc.
- When installing hose to pipe, first apply a small amount of clean automatic transmission oil to inner wall of hose for assembly.
- When installing hose to pipe joint, install hose to inner limit.

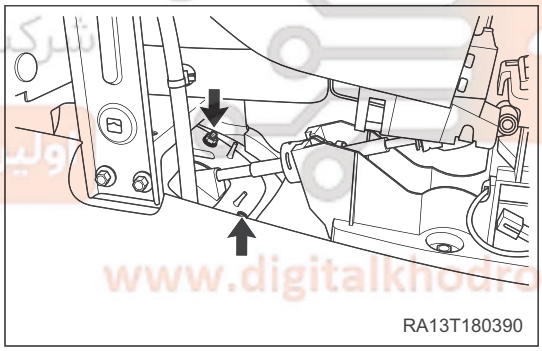
Gear Select and Shift Cable

Removal

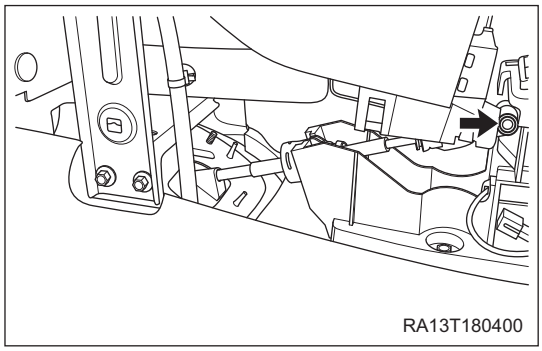
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery (See page 16-7).
4. Remove the battery tray (See page 16-9).
5. Remove the air filter assembly (See page 10-10).
6. Remove fixing bolt between gear select and shift cable and engine block (See page 07-57).
7. Remove the exhaust pipe front heat insulator (See page 11-14).
8. Remove fixing bolt between gear select and shift cable and body chassis.


RA13T180370

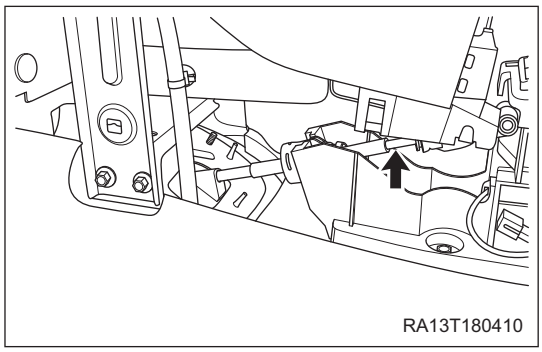
9. Remove coupling bolt between gear select and shift cable and gear switch (See page 07-57).
10. Remove the auxiliary fascia console assembly (See page 46-8).
11. Remove fixing bolts (arrow) between gear select and shift cable and body.


RA13T180390

12. Disconnect gear select and shift cable from gear shift control mechanism.
    a. Remove cotter pins (arrow) connecting gear select and shift cable with gear shift control mechanism.


RA13T180400

b. Remove gear select and shift cable from gear shift control mechanism assembly.



13.Remove the gear select and shift cable.

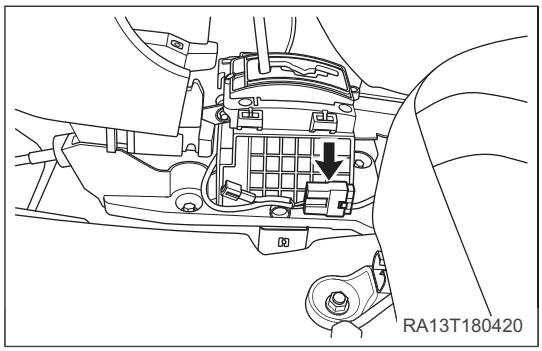
Installation

Installation is in the reverse order of removal.

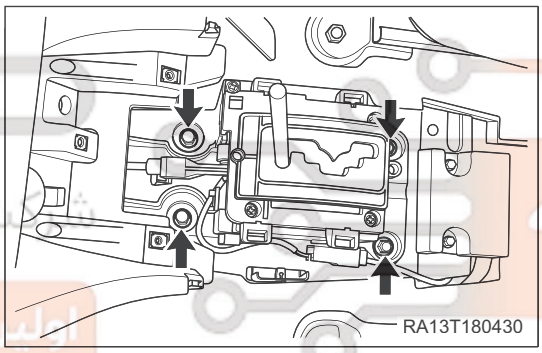
Gear Shift Control Mechanism

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the auxiliary fascia console (See page 46-8).
4. Separate gear shift control mechanism and gear select and shift cable.
5. Remove the gear shift control mechanism.
   a. Unplug wire harness connector (arrow) from gear shift control mechanism.



   b. Remove 4 tightening bolts (arrow) from gear shift control mechanism, and remove gear shift control mechanism.
   (Tightening torque: 23 ± 2 N·m)



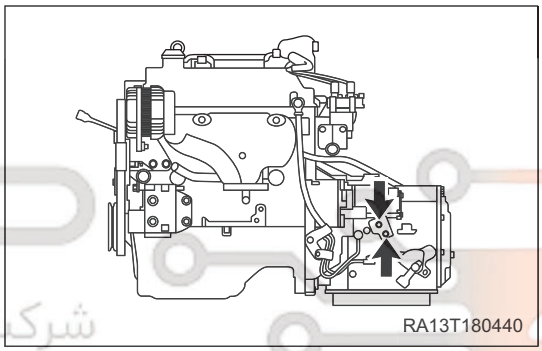
Installation

Installation is in the reverse order of removal.

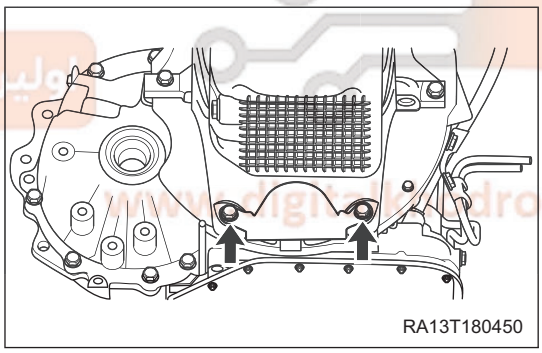
Transmission Assembly

Disassembly

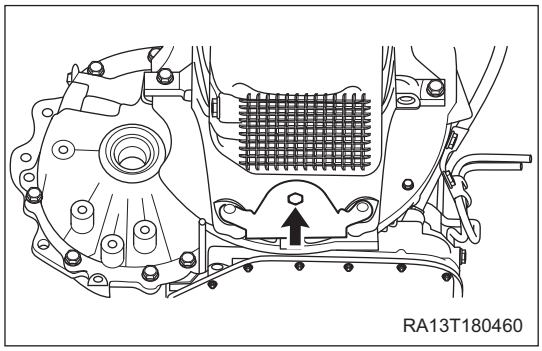
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery (See page 16-7).
4. Remove the battery tray (See page 16-9).
5. Remove the air filter assembly (See page 10-10).
6. Drain transmission oil (See page 18-74).
7. Remove the front wheels (See page 24-7).
8. Remove the drive shaft (See page 20-5).
9. Remove wire harness connector between power assembly and engine compartment (See page 07-59).
10. Remove mounting bolt, cooling hose, gear select and shift cable, etc., and then remove power assembly from vehicle (See page 07-57).
11. Remove 2 fixing bolts (arrow) from transmission control flexible shaft bracket set, and remove transmission control flexible shaft bracket set.


RA13T180440

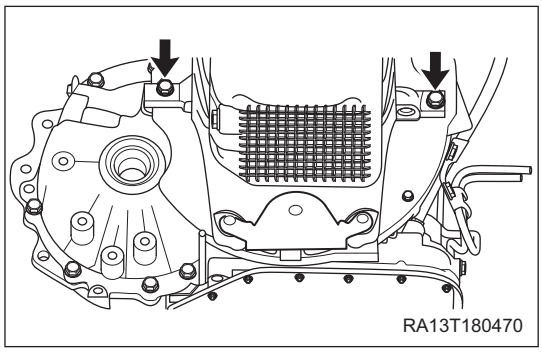
12. Loosen 2 fixing bolts from lower baffle plate, and remove lower baffle plate.


RA13T180450

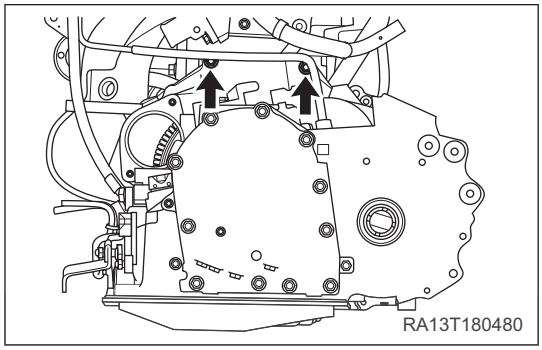
13. Rotate crankshaft, turn coupling bolts between drive plate and hydraulic torque converter to center position of U-groove, then lock the crankshaft and remove 4 bolts.


RA13T180460

14. Loosen 2 coupling bolts between engine and transmission on both sides.



15. Loosen 2 coupling bolts between engine and upper part of transmission, then separate engine and transmission.



CAUTION

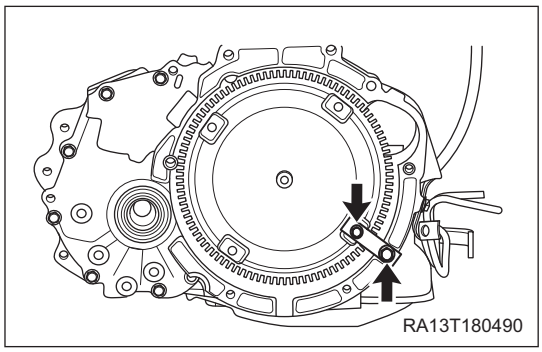
During separation, hydraulic torque converter should not fall down. If it falls down, contact the after-sale service department.

Assembly

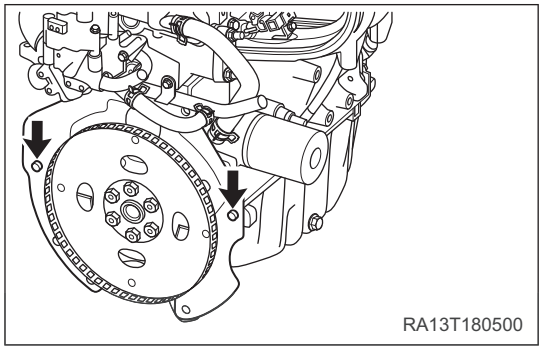
CAUTION

- Before assembling components, wash them clean.
- Remove seal gum residues from cases.
- Make sure that joint surface of cases is free of oil, and uniformly apply seal gum.
- Make sure joint surface of case and shift assembly is free of oil, and uniformly apply seal gum.
- Tighten bolts to specified torques.

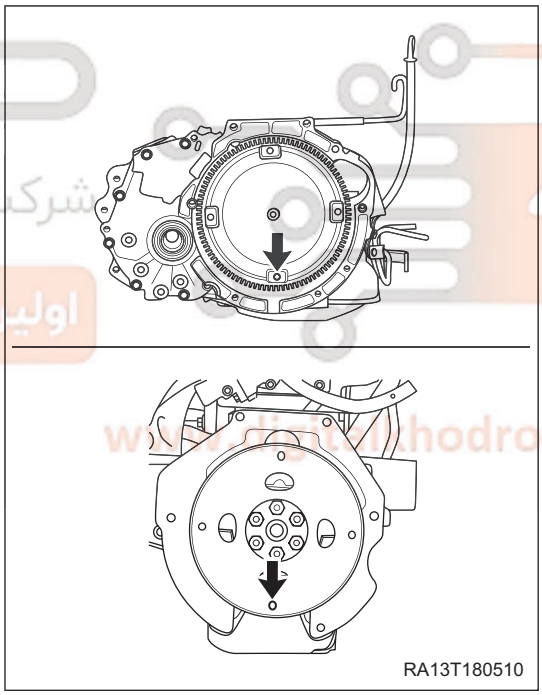
1. For spare transmission, first loosen 2 bolts and remove shift lever (arrow).


RA13T180490

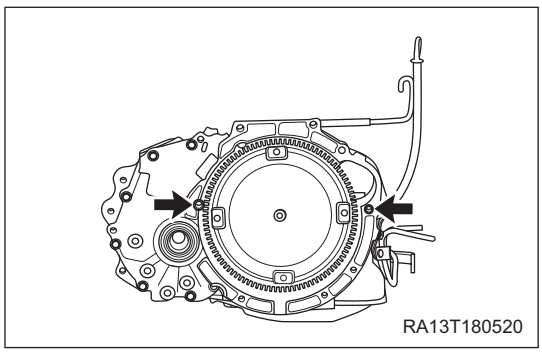
2. Install upper baffle plate to rear end surface of engine, and align two engine dowel pins.


RA13T180500

3. For easy assembly, tighten coupling bolt between hydraulic torque converter and drive plate. Rotate hydraulic torque converter so that one bolt hole of torque converter is roughly at positon indicated by arrow; rotate drive plate so that one unthreaded hole of drive plate is roughly at center positon of engine U-groove.


RA13T180510

4. Assemble engine and transmission assembly, and locate them with 2 engine dowel pins.
   a. Install 2 coupling bolts to transmission side.
   b. Install 2 coupling bolts to engine side.
   (Tightening torque: 50 ± N·m)


RA13T180520

CAUTION

- During assembly, hydraulic torque converter should not fall down. If it falls down, contact the after-sale service department.

Other installation procedures are in the reverse order of removal.

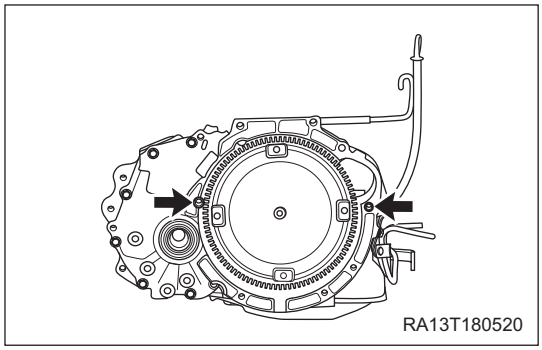
CAUTION

- After installation, add transmission oil and check transmission oil level.

Transmission External Accessory

Removal of Turbine Speed Sensor

1. Remove the turbine speed sensor.
   a. Remove turbine speed sensor fixing bolts (arrow) from transmission assembly, and remove turbine speed sensor.


RA13T180520

Installation

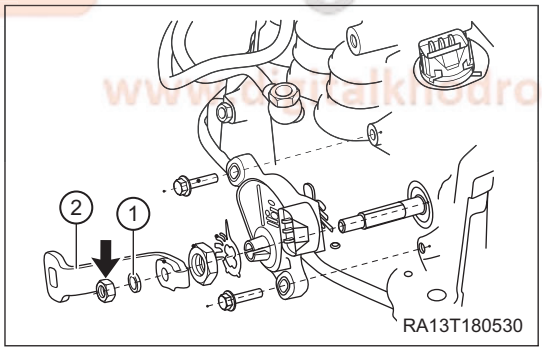
1. Apply ATF to O-ring of turbine speed sensor set, then insert it into case mounting hose, to make sure that sensor end surface and case end surface are attached firmly and secured with bolt.
   (Tightening torque: 5.4 ± 0.5 N·m)

CAUTION

- Make sure no dirt or foreign matter enters transmission from sensor mounting hole.
- When connecting connector, check that pin is not bent or damaged, then connect the connector.

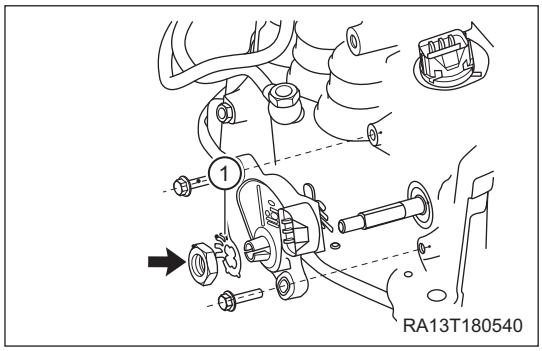
Removal of Gear Switch Assembly

1. Remove the gear shift arm.
   a. Remove a fixing bolt from gear shift arm, and remove elastic washer (1) and gear shift arm (2).



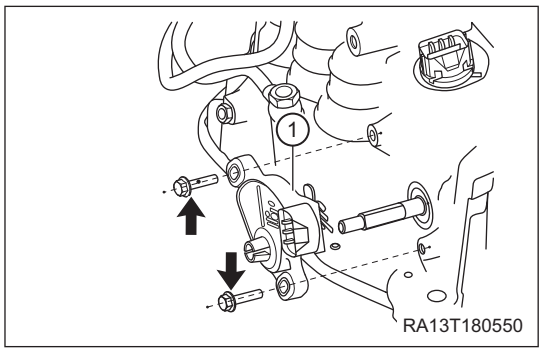
RA13T180530

   b. Remove lock nut from gear switch, and remove thrust washer (1).



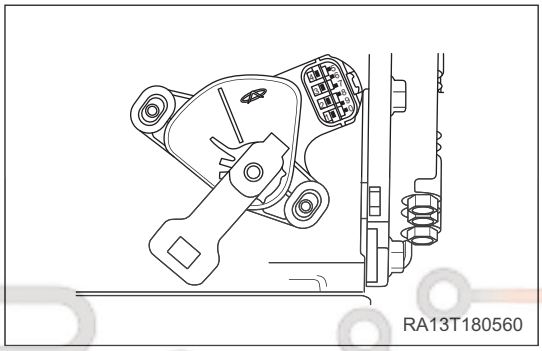
RA13T180540

c. Remove bolt elastic washer and plate washer set from gear switch, and remove gear switch assembly (1).

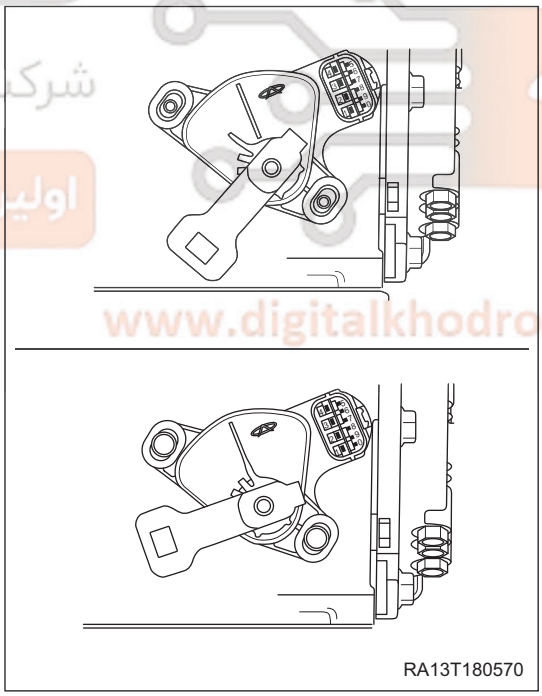


Installation

1. Install the gear switch assembly.
   a. Install new thrust washer and gear shift arm, rotate gear shift arm counterclockwise until it cannot be rotated. After loosing gear shift arm, it should be at P gear.



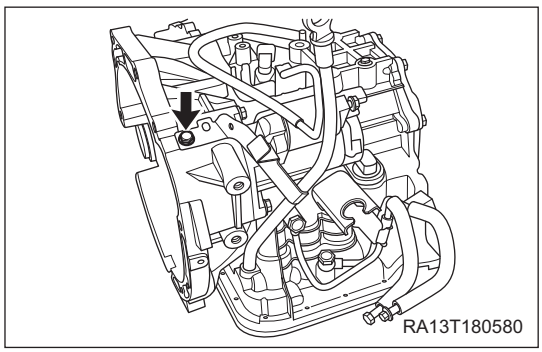
   b. Rotate gear shift arm clockwise, and set it at N gear in order of P → R → N. Center longer pointer protruded on thrust washer and mark line protruded on gear switch assembly. Tighten 2 bolt elastic washer and plate washer sets to secure the gear switch assembly.
   (Tightening torque: 5.4 ± 0.5 N·m)



2. Remove gear shift arm, tighten gear switch lock nut, turn over thrust washer (except for N gear pointer) to clamp the lock nut, whicl will prevent loosening.
   (Tightening torque: 6.9 ± 2 N·m)
3. Install gear shift arm and elastic washer, and tighten fixing nut.
   (Tightening torque: 13 ± 0.6 N·m)

Removal of Oil Dipstick and Oil Dipstick Sleeve Set

1. Pull out transmission oil dipstick set, and check O-ring for damage. If damaged, replace O-ring.
2. Unplug the ventilation plug rubber pipe set.
3. Remove fixing bolt from transmission oil dipstick sleeve set, remove plate washer, pull out transmission oil dipstick sleeve set, and check O-ring for damage. If damaged, replace O-ring.



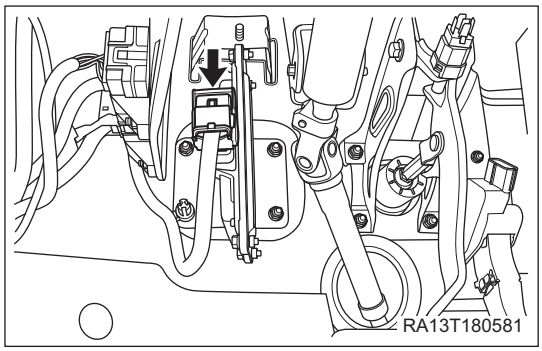
Installation

1. Apply ATF to O-ring of oil dipstick sleeve set, and insert it into case mounting hole. Install plate washer set and tighten fixing bolt.
   (Tightening torque: 11 ± 1 N·m)
2. Install ventilation plug rubber pipe set, to make sure rubber pipe covers the protrusion.
3. Apply ATF to O-ring of transmission oil dipstick set and insert it into transmission oil dipstick sleeve set.

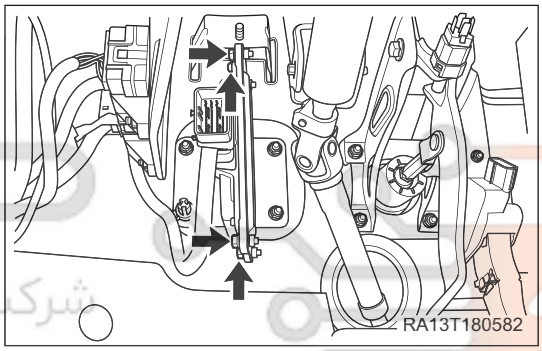
TCU

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the lower left instrument panel protector.
4. Disconnect the TCU wire harness connector.



5. Remove 4 fixing bolts from TCU, and remove TCU assembly.
   (Tightening torque: 9 ± 1.5 N·m)



Installation

1. Installation is in the reverse order of removal.

CAUTION

- Be careful when connecting and disconnecting TCU connector, do not bend or damage the pin.

- MEMO -