

QR019CHB CVT

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GENERAL INFORMATION

Description

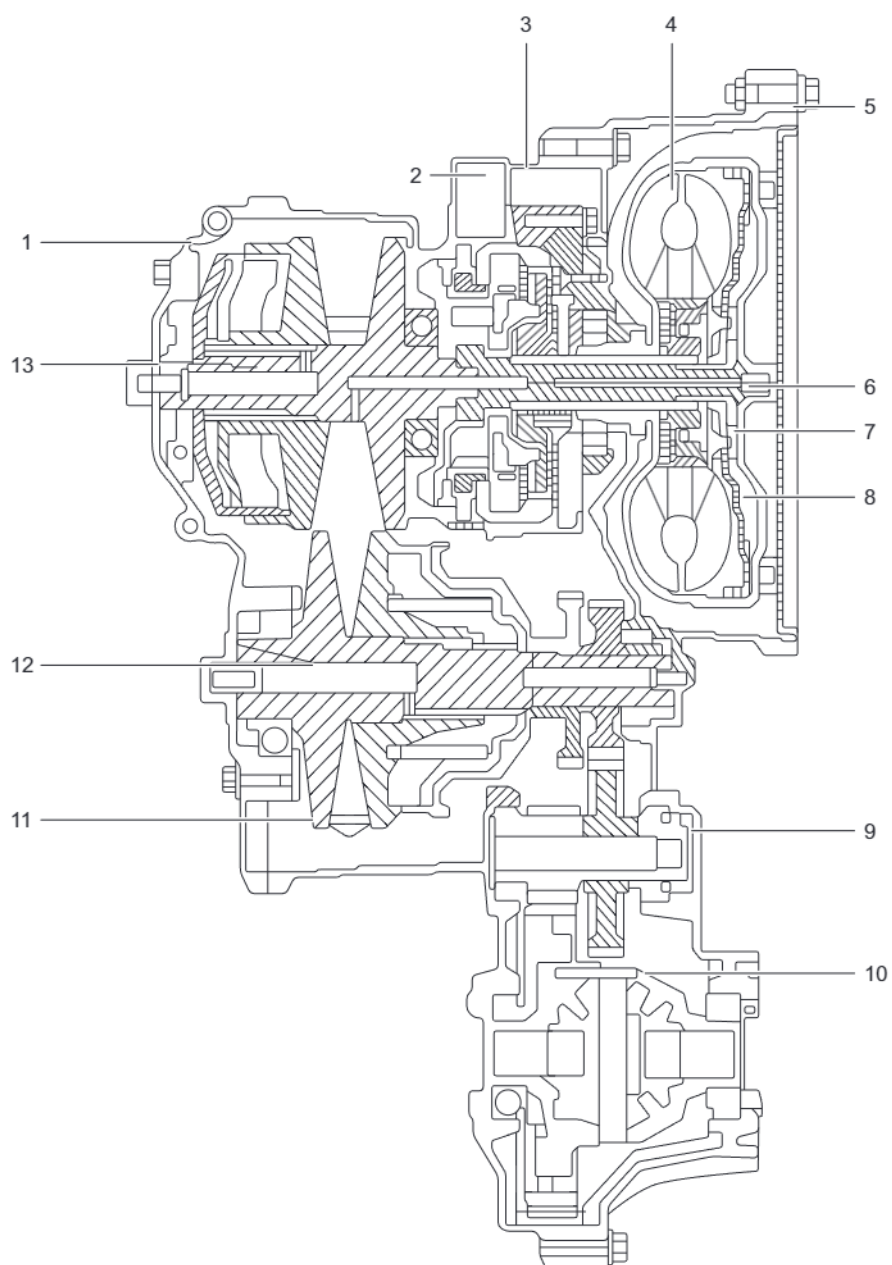
Continuous Variable Transmission (CVT) is a kind of continuous mechanical transmission. The most difference between CVT and common gear-type transmission is that CVT uses two groups of pulleys for driving instead of complex and heavy gear combined drive. It shifts speeds by changing the contact radius of drive pulley and driven pulley.

CVT mainly consists of following components:

- Torque converter
- Planetary gear system
- Drive and driven pulley system (transmission system)
- Steel belt (steel belt consists of two groups of metal rings and hundreds of metal plates)
- Oil pump
- Valve body

QR019CHB CVT features with:

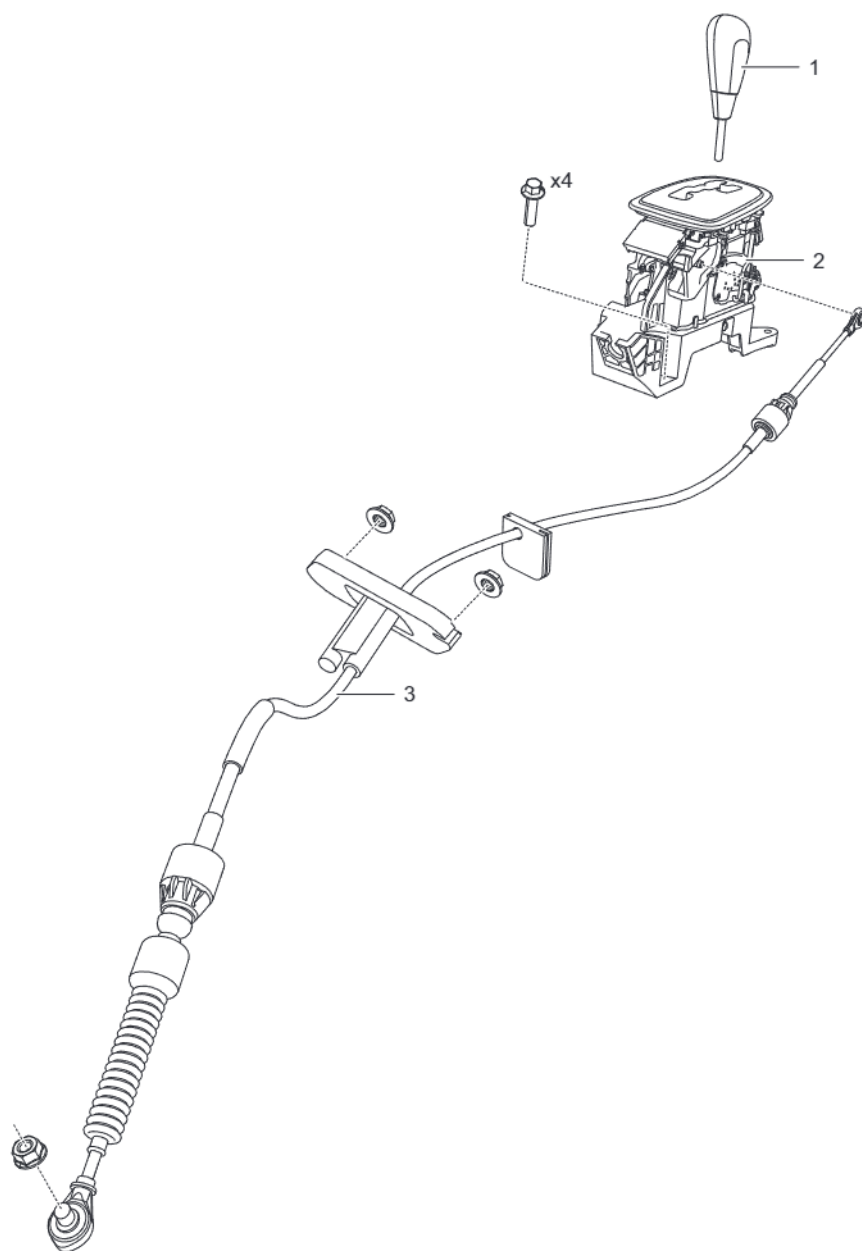
- Automatic and manual modes.
- Electronic hydraulic control.
- At D gear, it realizes automatic continuous variable speeds; at M gear, it realizes manual 7-gear variable speeds, providing users with dual driving fun.
- It can keep engine lowest speed at a certain vehicle speed.
- It can reduce vehicle emission and NVH (Noise, Vibration, Harshness).
- It can improve vehicle economy and reduce fuel consumption.
- Accelerator pedal responses rapidly when accelerating. Acceleration is gentle and smooth without impact.



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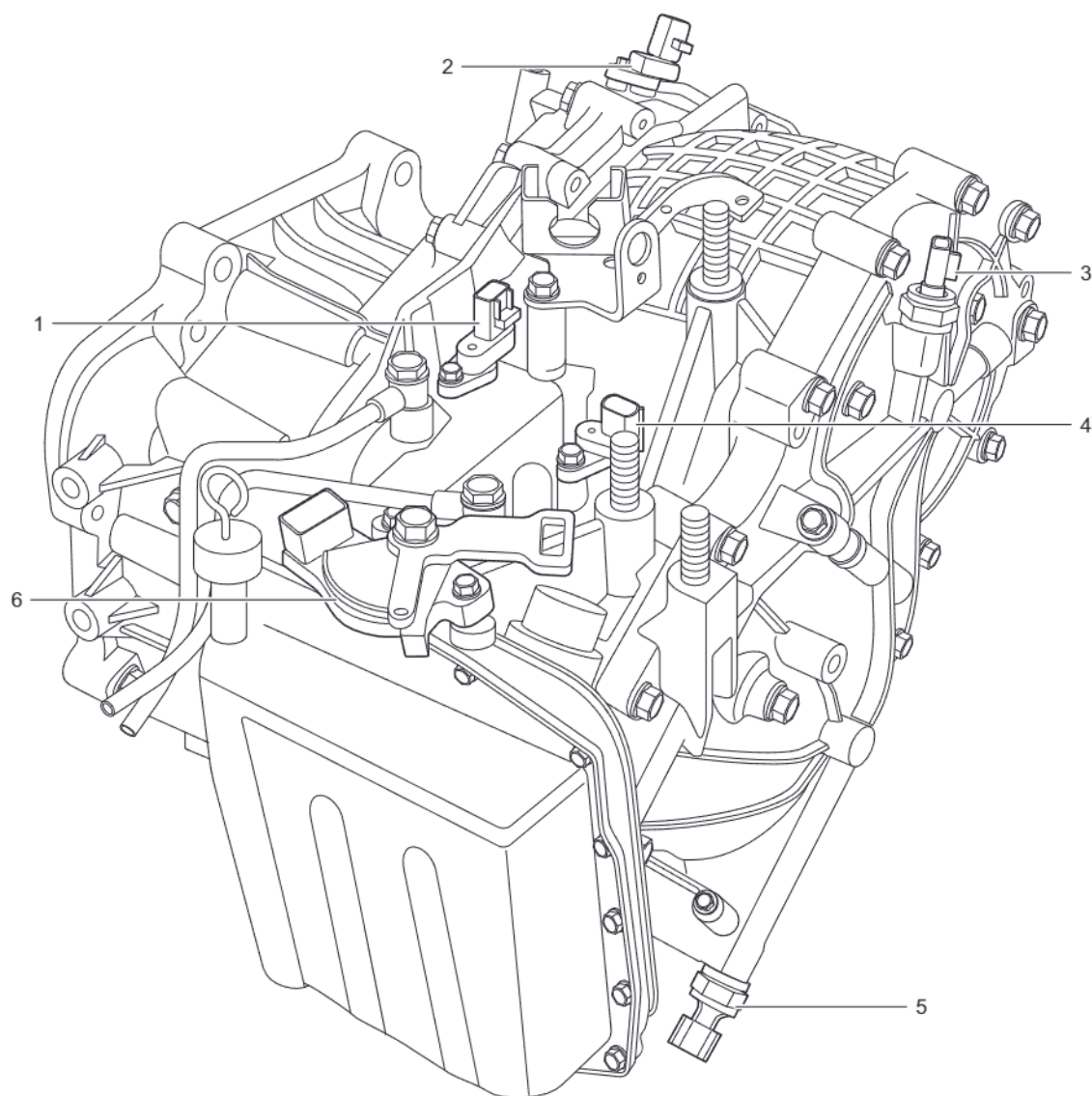
1 - Rear Case	2 - Drive Clutch
3 - Transmission Case	4 - Torque Converter
5 - Torque Converter Case	6 - Input Shaft
7 - Oil Pump Thrust Gasket	8 - Oil Pump
9 - Output Shaft	10 - Differential
11 - Steel Belt	12 - Output Pulley Shaft
13 - Input Pulley Shaft	



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1 - Gear Shift Lever Knob	2 - Gear Shift Control Mechanism
3 - Gear Shift Cable	



RT21180030

1 - Turbine Speed Sensor

2 - Secondary Shaft Speed Sensor

3 - Secondary Shaft Pressure Sensor

4 - Primary Shaft Speed Sensor

5 - Primary Shaft Pressure Sensor

6 - Gear Range Switch

Precautions

1. During removal and installation, make sure that gear shift lever is at "N" position.
2. When installing gear shift arm and gear range switch, 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 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 transmission.
6. When installing torque converter onto transmission, make sure that oil pump drive slot is installed in place; otherwise it will cause abnormal damage to transmission.
7. When assembling engine and transmission, make sure that four connecting bolts of engine flywheel and torque converter are not ignored.
8. When assembling engine and transmission, make sure that all connecting bolts are installed correctly and completely, and torques meet the specifications.
9. When disassembling and assembling engine and transmission, make sure that torque converter does not drop down.
10. When assembling engine and transmission, make sure that dust deflector is not ignored.
11. When replacing transmission sensors and oil seals, make sure that they are installed in place and bolt torques meet the specifications.
12. Take measures to avoid foreign matter entering transmission, when removing or installing cooling oil pipes and radiator. And check fluid level and make sure that there is no leakage after installation.

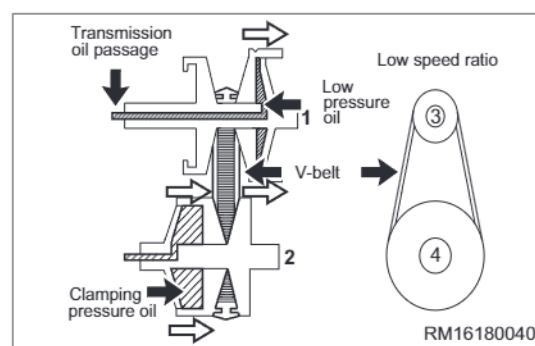
Operation

Speed Ratio Change Principle

CVT uses a metal belt and V-shape drive and driven pulleys with width-variable slot for power transition. Drive and driven pulleys consist of movable and fixed discs. The pulley close to oil cylinder could slide on the pulley shaft and the one on other side is fixed. The movable and fixed discs are of cone structure. Their cones form a V-shape slot for engagement of V-shape metal belt. It changes working radius of the engagement of cones and V-shape metal belt to shift speed by axial movement of the movable disc when working.

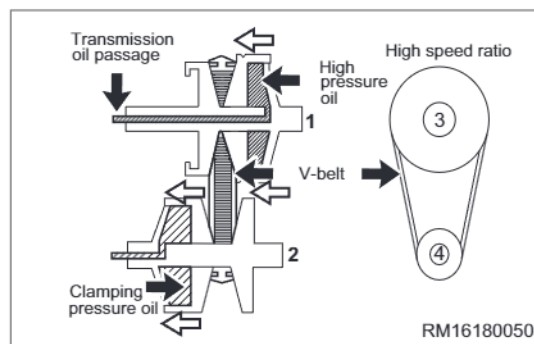
Right illustration shows the low speed ratio:

1. Input pulley
2. Output pulley
3. Input circle
4. Output circle



Right illustration shows the high speed ratio:

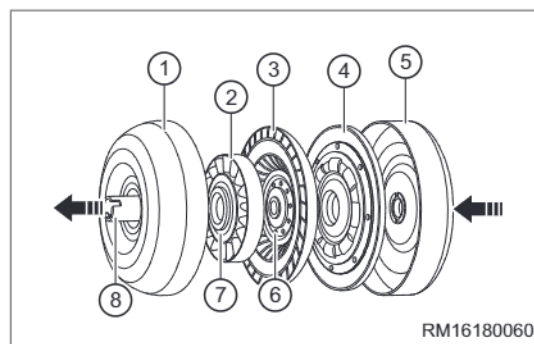
1. Input pulley
2. Output pulley
3. Input circle
4. Output circle



Torque Converter

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

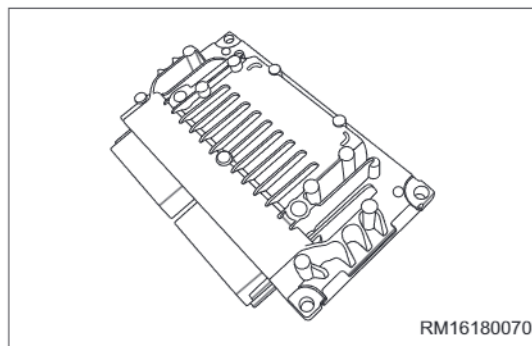
Torque converter could ensure stable start and even acceleration of vehicle. Hydraulic vibration absorption could eliminate or reduce the impact and dynamic load in transmission system, extending the service life of components of engine and transmission system.



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

Transmission Control Unit (TCU)

Transmission control unit (TCU) is installed on battery tray. It receives input signals of switches and sensors and mainly controls the operation of gear shifting and locking solenoid. Transmission gears are regulated by electronic gear shift system. TCU processes input signals and regulates transmission hydraulic system by exploiting the information received.

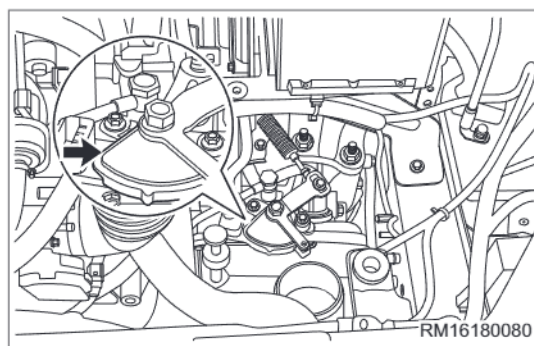


Electronic control system consists of components below:

- Transmission control unit (TCU)
- Pressure control solenoid
- Torque converter solenoid
- Clutch control solenoid
- Gear shift lever locking solenoid
- Turbine speed sensor
- Primary shaft speed sensor
- Secondary shaft speed sensor
- Oil pressure sensor
- Transmission fluid temperature sensor
- Gear range switch
- Manual mode switch

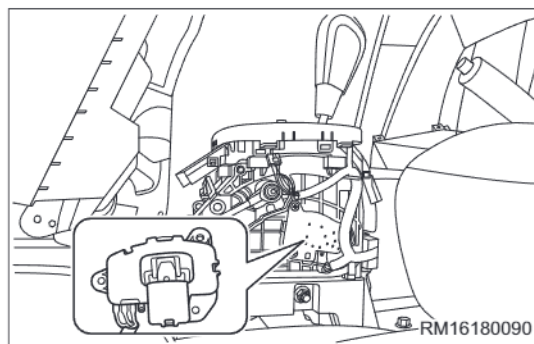
Gear Range Switch

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



Manual Mode Switch

No matter whether vehicle is static or running, you could push gear shift lever to shift between "M" and "D" gear. On gear shift mechanism panel, there are two gears of "+" and "-" at the "M" gear, they are also called manual shift-up and manual shift-down.

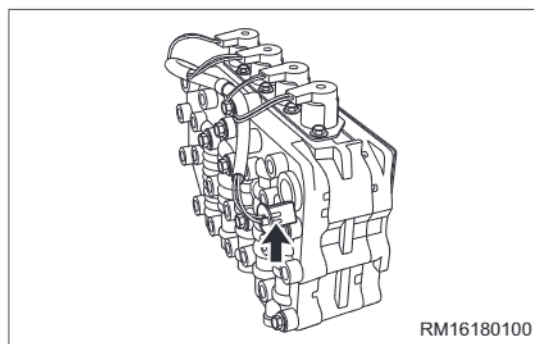


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- M+: push gear shift lever once to "M+" and transmission will be increased one gear.
- M-: push gear shift lever once to "M-" and transmission will be reduced one gear.
- In automatic mode, when engine speed is too low, it will automatically shift down; and shift up when engine speed is high.
- In manual mode, driver should shift up the gear in advance based on experience to prevent engine speed entering the red area of tachometer.

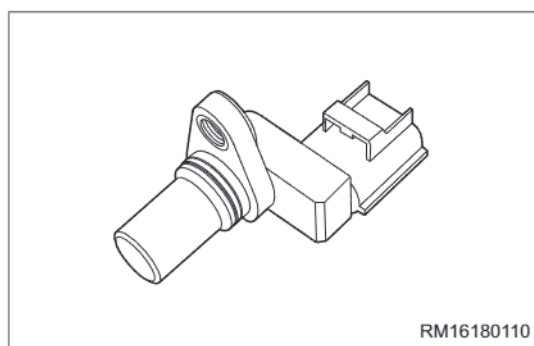
Transmission Fluid Temperature Sensor

Transmission fluid temperature sensor is located in valve body. The sensor converts transmission fluid temperature signals into electronic signals and sends them to transmission control unit (TCU).



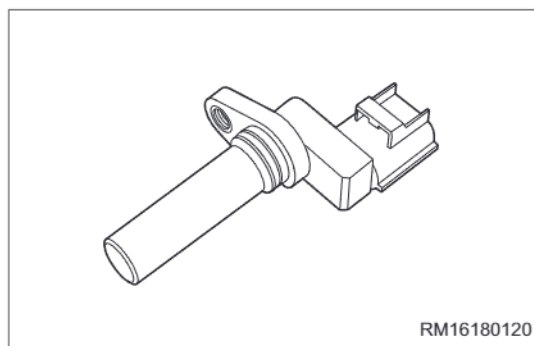
Primary Shaft Speed Sensor

TCU calculates the primary shaft speed based on impulse signals. It is mainly used for operations of torque converter locking, clutch engagement and transmission control.



Turbine/Secondary Shaft Speed Sensor

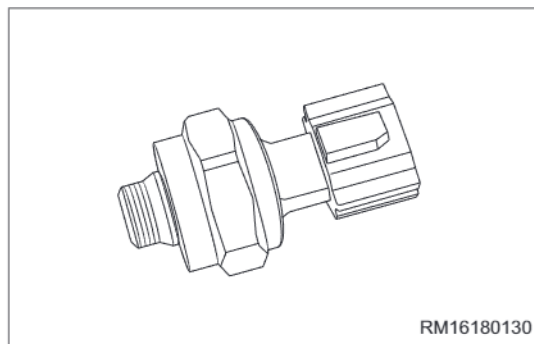
TCU calculates turbine and secondary shaft speeds based on impulse signals. It is mainly used for operations of torque converter locking, clutch engagement and transmission control.



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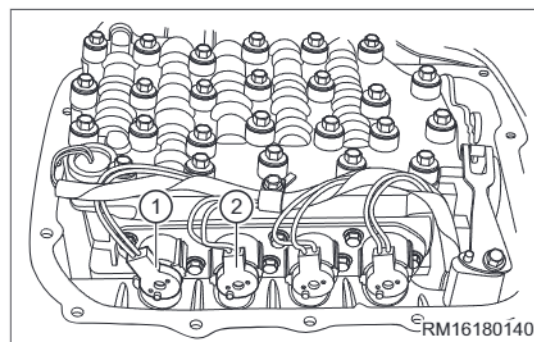
Fluid Pressure Sensor

Transmission fluid pressure sensor is used to monitor CVT pulley shaft pressure and send signals to TCU.



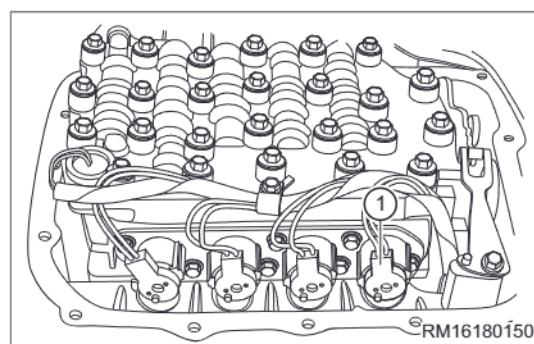
Oil Pressure Control Solenoid

Input and output pulley shaft oil pressure control solenoids (1) and (2) are installed on valve body. TCU receives accelerator pedal signals, gear signals and speed signals, then sends operation requirements to start oil pressure control solenoid for changing speed ratio of the CVT.



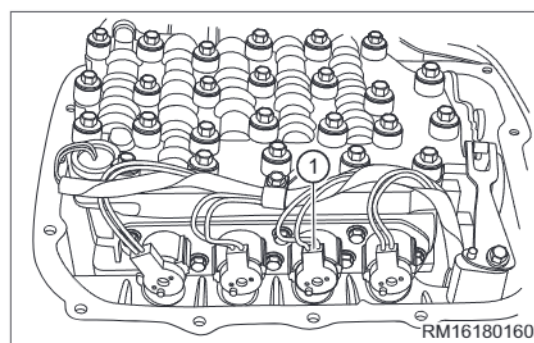
Clutch Pressure Control Solenoid

Clutch pressure control solenoid (1) is installed on valve body. TCU receives accelerator pedal signals, gear signals and speed signals, then sends operation requirements to start clutch pressure control solenoid for changing clutch engagement.



Torque Converter Pressure Control Solenoid

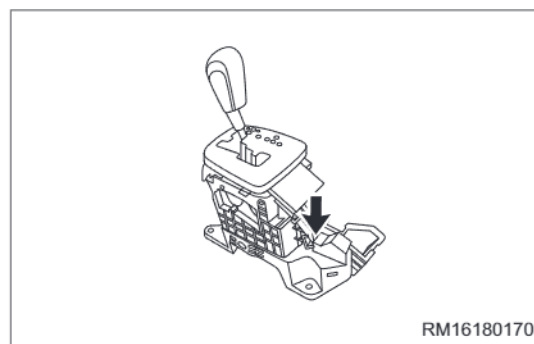
Torque converter pressure control solenoid (1) is installed on valve body. TCU receives accelerator pedal signals, gear signals and speed signals, then sends operation requirements to start torque converter pressure control solenoid for locking torque converter.



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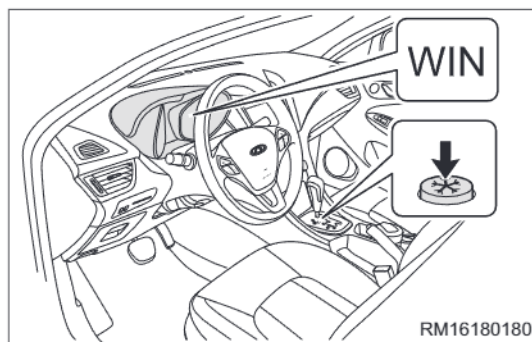
Gear Shift Lock Solenoid

Gear shift lock solenoid (arrow) is installed in 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.

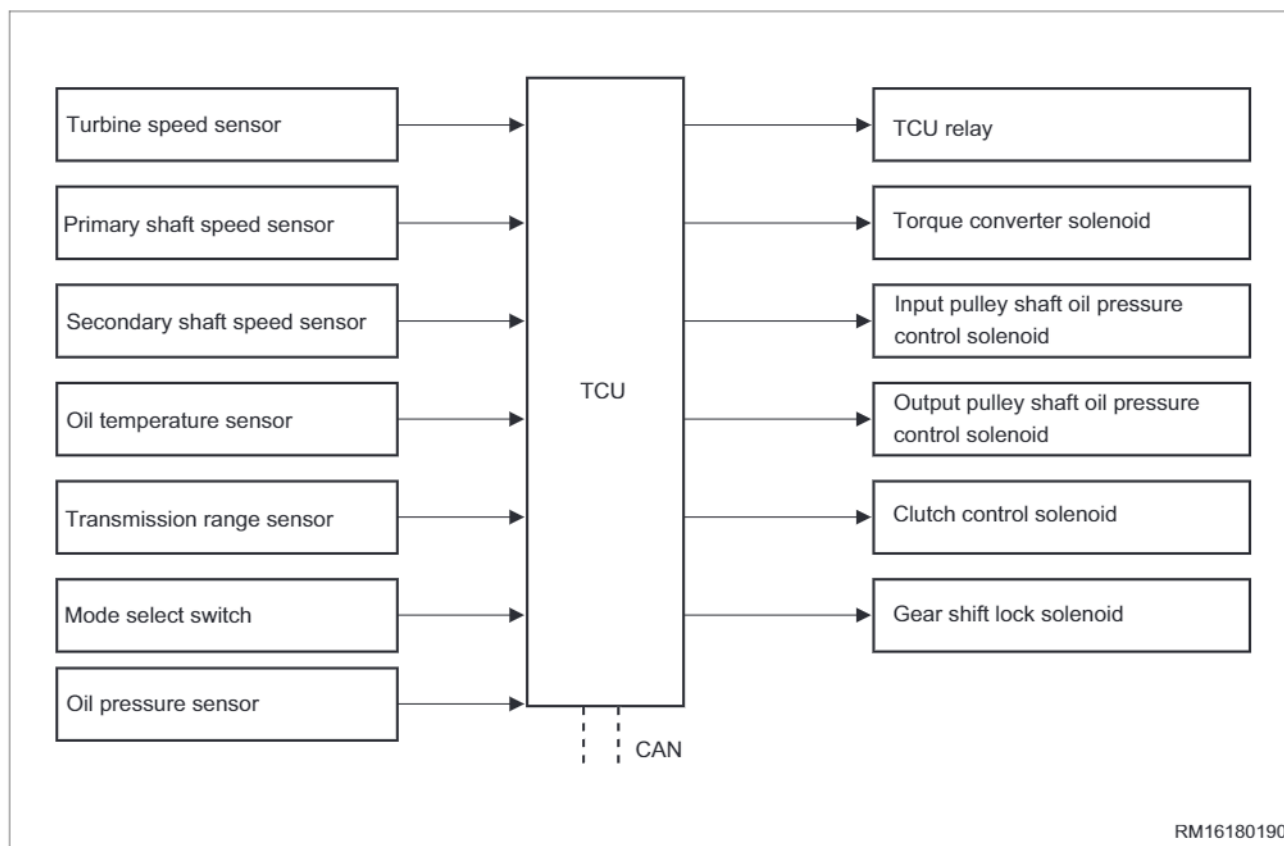


Snow Mode

Snow mode is a forward gear driving mode specifically designed for snow, wet or slippery roads. It can effectively avoid vehicle slip when departing on these roads and improve vehicle maneuverability. In auto mode gear position, press snow mode switch, "WINTER" will appear on multi-information display and the system enters snow mode.

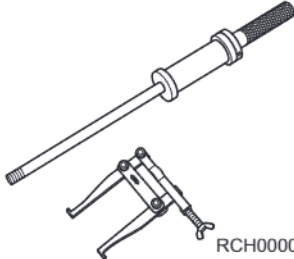
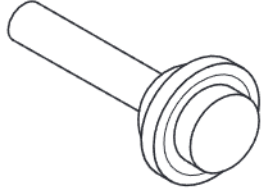


System Control Logic

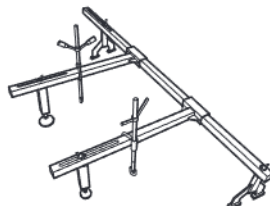
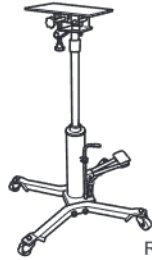


Tools

Special Tools

Puller	 RCH0000059
Differential Oil Seal Installer	 RCH0000009

General Tools

Engine Equalizer	 RCH0000026
Transmission Carrier	 RCH0000005

Specifications

Torque Specifications

Description	Torque (N·m)
Transmission Drain Plug	29 - 34
Primary Shaft Speed Sensor Fixing Bolt	10 - 12
Secondary Shaft Speed Sensor Fixing Bolt	10 - 12
Turbine Speed Sensor Fixing Bolt	10 - 12
Primary Shaft Pressure Sensor	15 - 22
Secondary Shaft Pressure Sensor	15 - 22
Gear Shift Cable to Arm Nut	16 - 20
Valve Body Case Fixing Bolt	10 - 12
Gear Range Switch Fixing Bolt	10 - 12
Gear Shift Arm Fixing Nut	18 - 25
Gear Shift Control Mechanism Fixing Bolt	18 - 22
Gear Shift Cable Dust Boot Fixing Bolt	8 - 10
TCU Fixing Bolt	6 - 8
Transmission Ground Wire Harness Fixing Bolt	18 - 22
Engine to Upper Part of Transmission Bolt	75 - 85
Dust Deflector Fixing Bolt	45 - 55
Flywheel to Torque Converter Bolt	50 - 60
Transmission to Engine Front Bolt	75 - 85
Transmission to Engine Bolt	75 - 85
Valve Body Fixing Bolt	8 - 10
Transmission Fluid Cooler Fixing Bolt	22 - 28
Auxiliary Fascia Console Front Right Extension Panel Assembly	1.5 ± 0.5

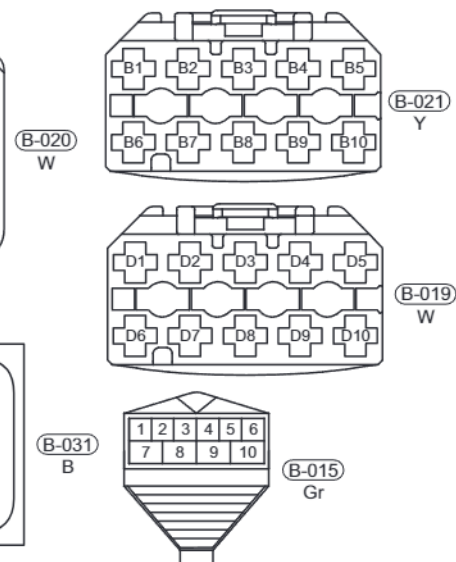
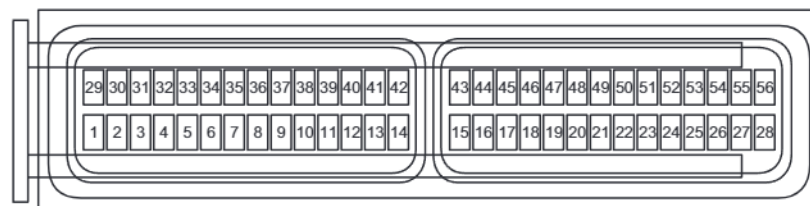
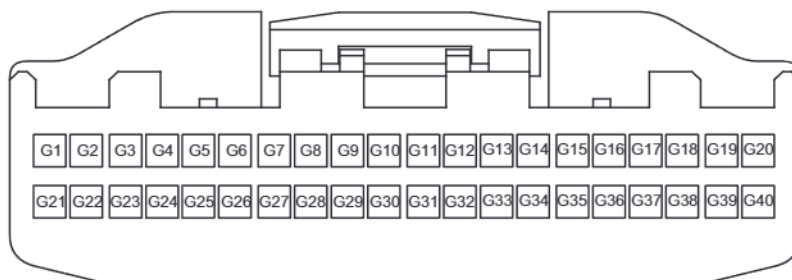
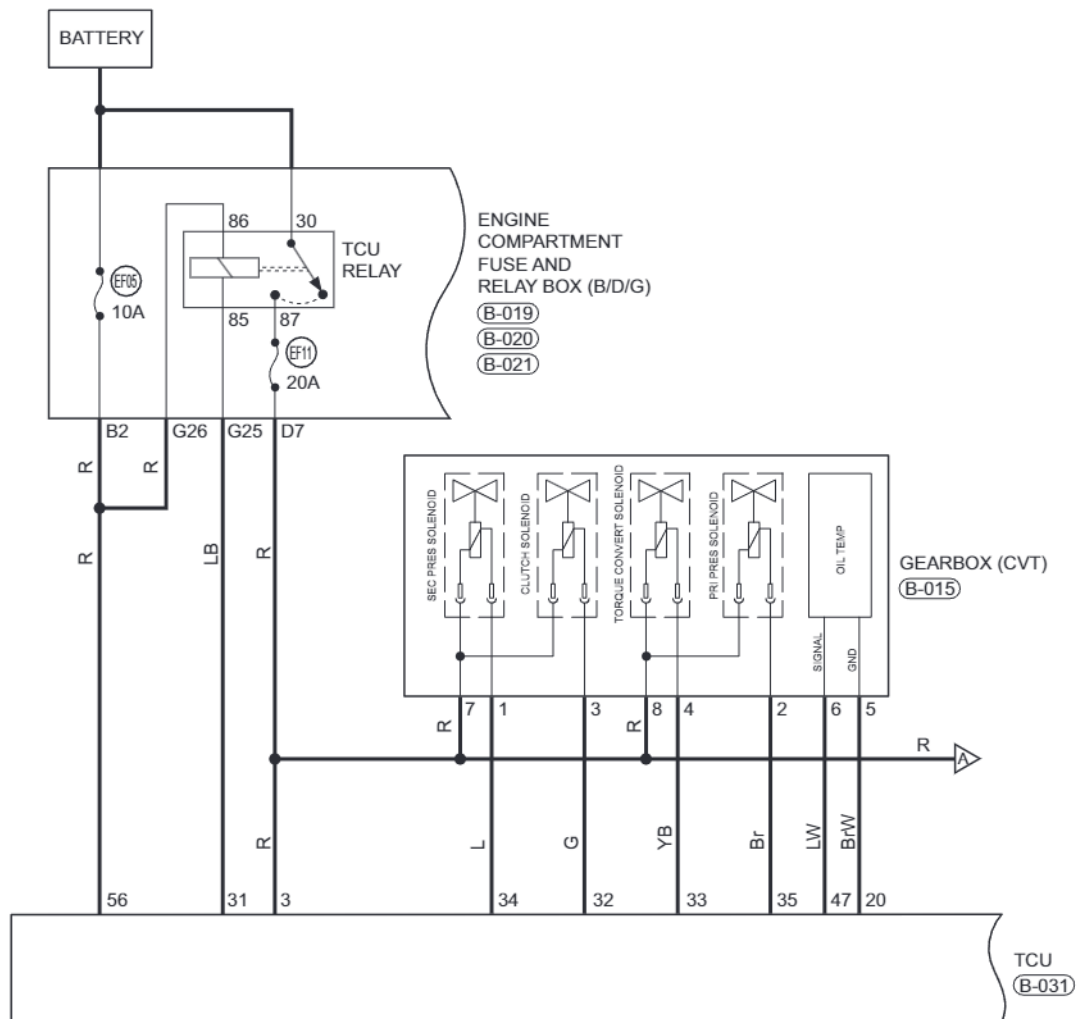
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General Specifications

Item	Parameter
Model	QR019CHB
Type	CVT
Central Distance (mm)	204
Maximum Input Torque (N·m)	190
Final Drive Ratio	5.141
Pulley Speed Ratio Scope	0.44 - 2.39
Solenoid Quantity	4
Gear Shift Positions	P, R, N, D, L, M (manual mode)
Fluid Type	SP - III
Transmission Fluid Capacity (L)	8.0 ± 0.2

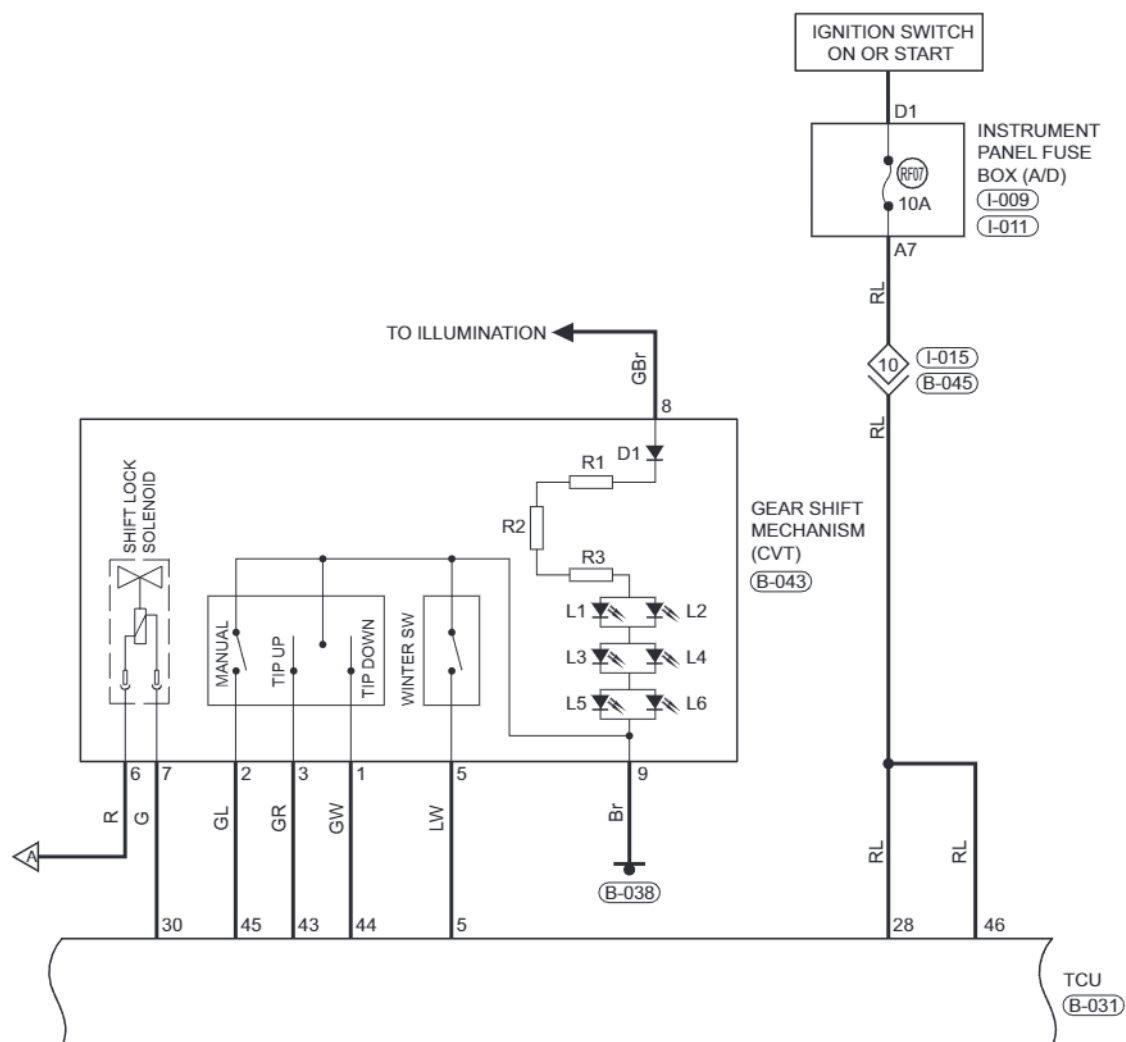
Circuit Diagram

TCU (Page 1 of 5)

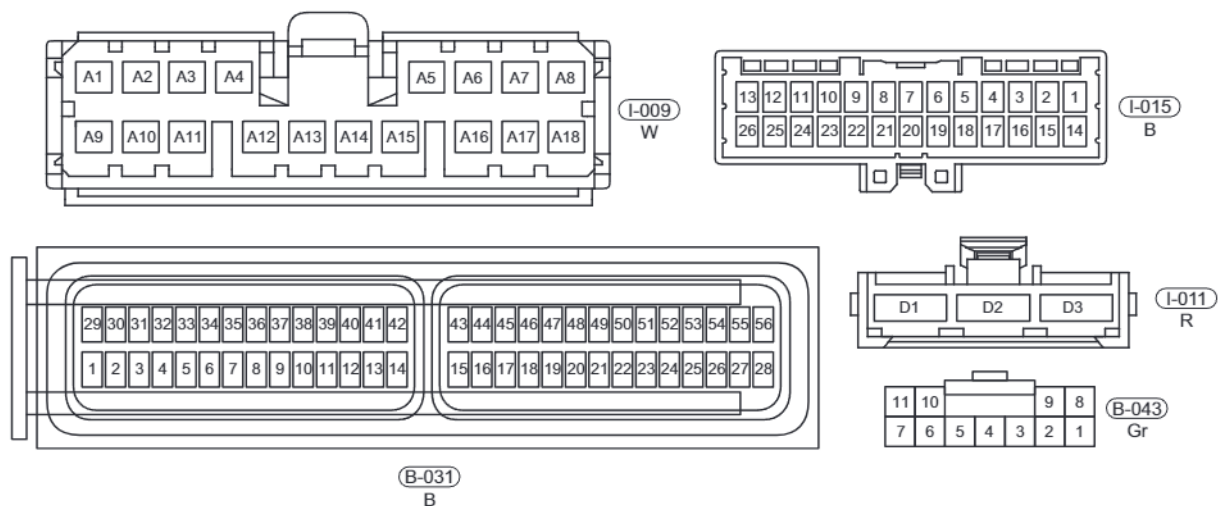


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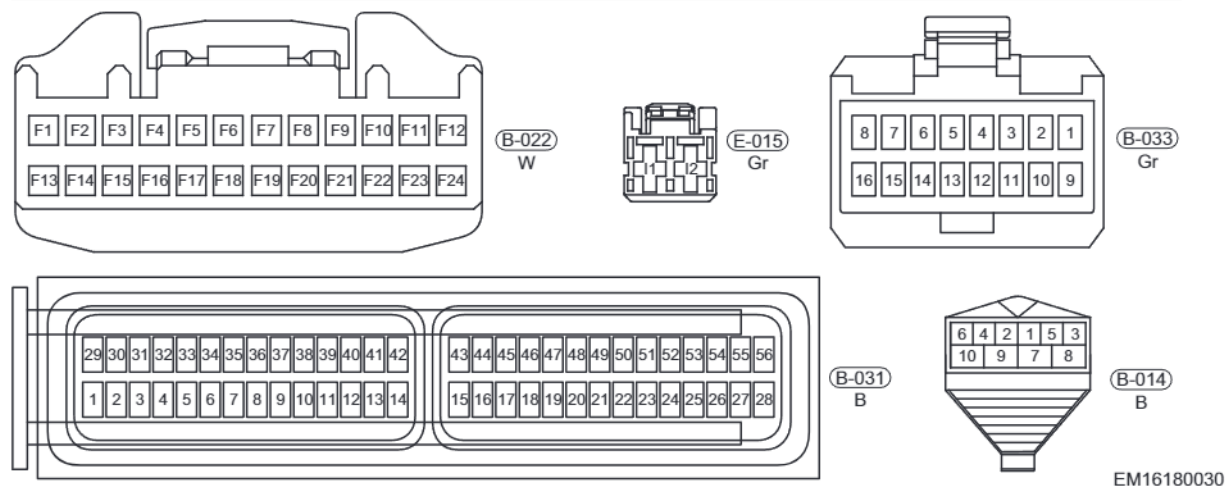
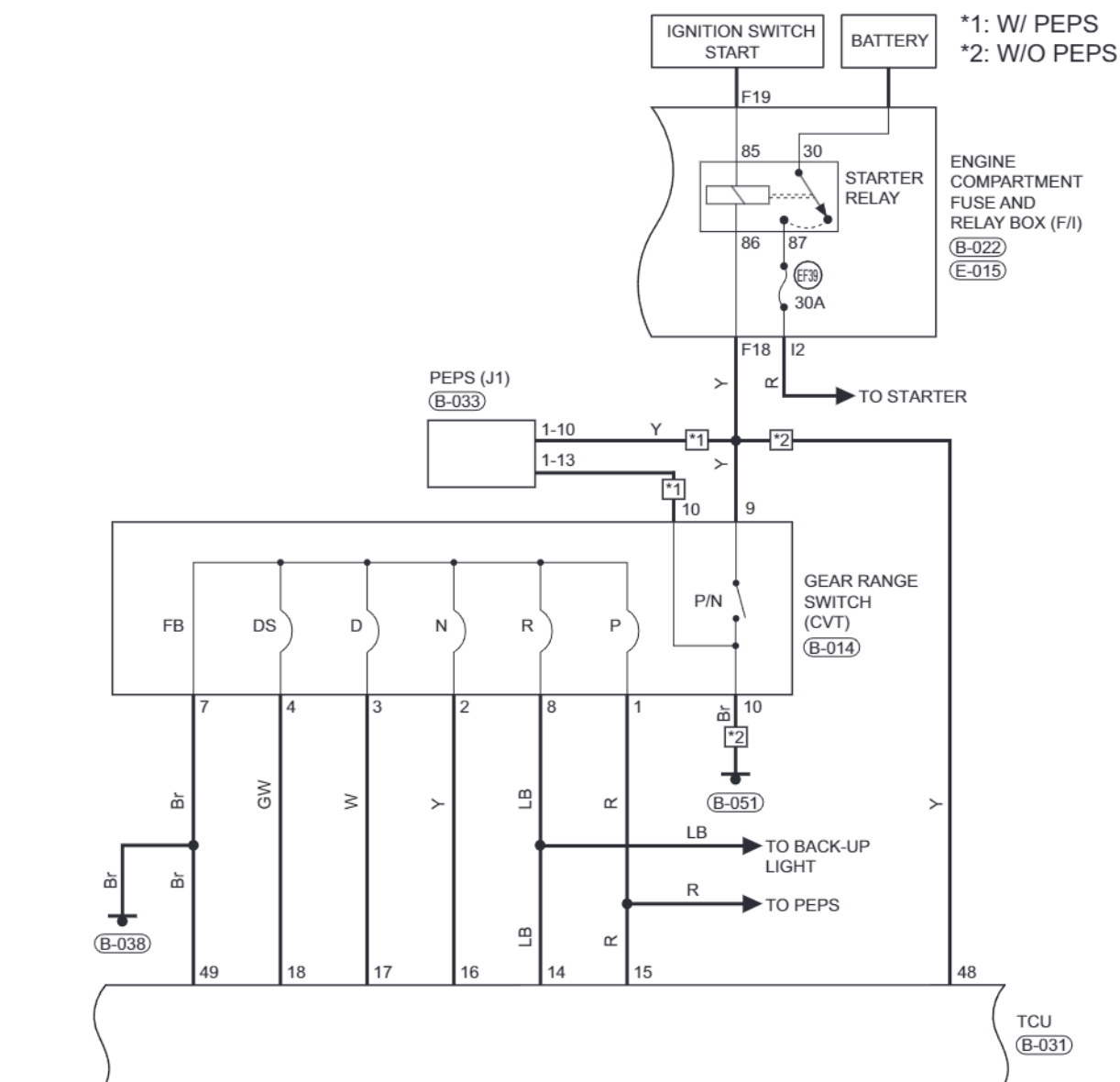
TCU (Page 2 of 5)



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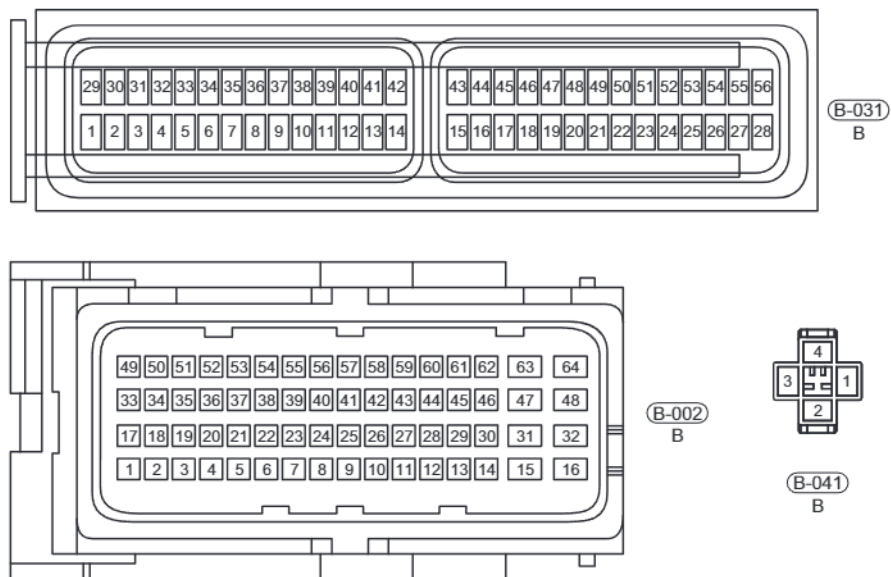
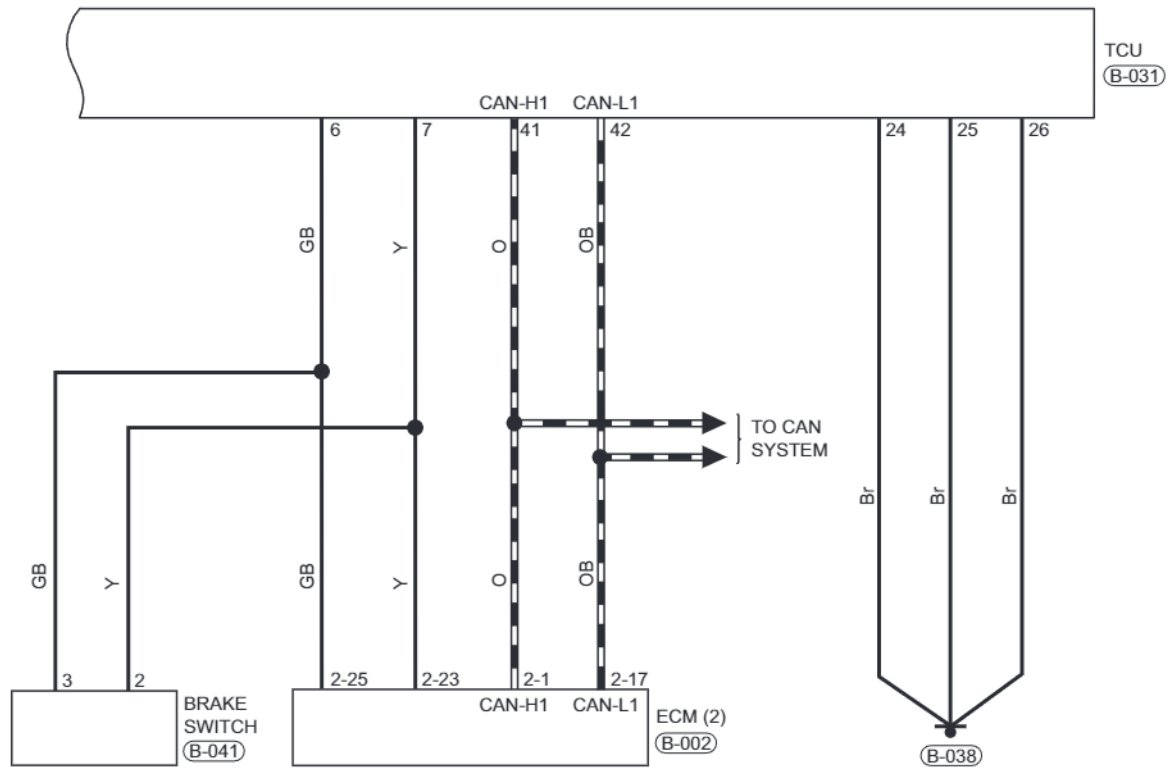


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TCU (Page 5 of 5)



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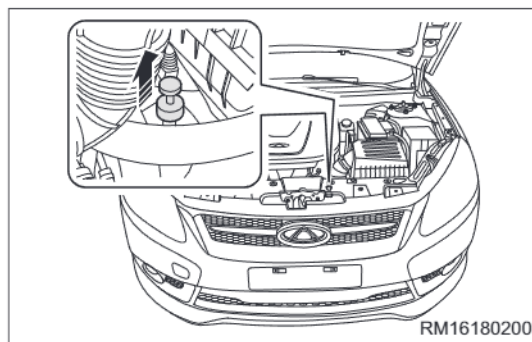
Transmission Control Unit (TCU) Terminal List

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	-	29	-
2	-	30	Shift Solenoid Lock
3	Solenoid Power Feedback	31	TCU Relay
4	-	32	Clutch Solenoid
5	Win Mode Switch	33	Torque Converter Solenoid
6	Brake Switch 1	34	Output Pulley Oil Pressure Solenoid
7	Brake Switch 2	35	Input Pulley Oil Pressure Solenoid
8	Primary Shaft Pressure Sensor Power	36	Secondary Shaft Pressure Sensor Power
9	-	37	-
10	Primary Shaft Pressure Sensor Ground	38	-
11	Primary Shaft Pressure Sensor Signal	39	-
12	Secondary Shaft Pressure Sensor Signal	40	-
13	Secondary Shaft Pressure Sensor Ground	41	CAN High
14	Reverse Gear Switch	42	CAN Low
15	P Gear Switch	43	Shift-Up Switch
16	Neutral Switch	44	Shift-Down Switch
17	D Gear Switch	45	Manual Mode Switch
18	Low Speed Gear Switch	46	KL15
19	Secondary Shaft Speed Sensor Ground	47	Oil Temperature Sensor Signal
20	Oil Temperature Sensor Ground	48	P/N (W/O PEPS)
21	Turbine Speed Sensor Ground	49	Shift Position Power Feedback
22	Turbine Speed Sensor Signal	50	Secondary Shaft Speed Sensor Signal
23	Primary Shaft Speed Sensor Ground	51	Primary Shaft Speed Sensor Signal
24	Ground	52	-
25	Ground	53	-
26	Ground	54	Secondary Shaft Speed Sensor Power
27	Primary Shaft Speed Sensor Power	55	Turbine Speed Sensor Power
28	KL15	56	Power Supply

DIAGNOSIS & TESTING

Transmission Fluid Level and Quality Inspection

1. After vehicle runs for 5 min, the temperature will reach normal working conditions (ATF temperature 60 - 80°C, and engine coolant temperature 80 - 100°C).
2. Park vehicle on a flat ground and pull parking brake lever.
3. Start up the engine to make it run at idle speed, and then fully depress brake pedal and move shift lever for five times at each gear. Finally, place the lever at "P" or "N" position.
4. Pull out automatic transmission fluid dipstick and clean it with non-wool paper; then insert the dipstick into filling pipe as much as possible and then take out to observe whether it reaches the "HOT" position.



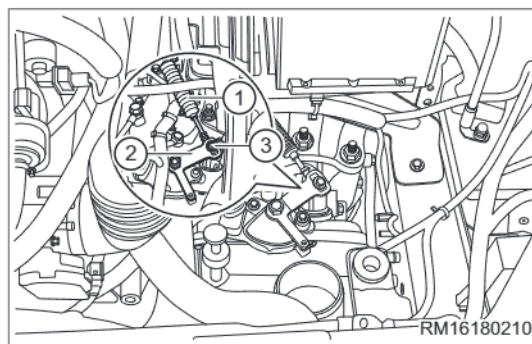
5. Check the transmission fluid:
 - If fluid becomes brown, replace automatic transmission fluid and check vehicle for working conditions.
 - If fluid becomes milk white or cloudy, or there is water in the fluid, replace automatic transmission fluid and check for leaking location.
 - If fluid becomes black with a lot of powders and there is abnormal wear in the CVT, replace automatic transmission fluid and check vehicle for normal working.

Gear Shift Cable Inspection and Adjustment

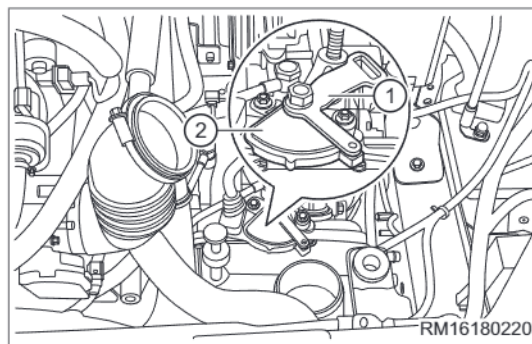
Shift gear lever from "N" gear to other gears to check whether the lever can be shifted to other gears smoothly and precisely, and also check whether gear indicators can indicate the gear correctly.

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

1. Park the vehicle at a safe place and pull the parking brake lever.
2. Change the shift lever to the "N" position.
3. Turn off all electrical equipment and the ignition switch.
4. Disconnect the negative battery cable.
5. Remove the air filter assembly (See page 10-12).
6. Remove the connecting nut (3) of the gear shift cable (1) and shift arm (2). Disconnect the gear shift cable from the shift arm.



7. Loosen the gear range switch fixing bolts, and adjust the relative position of the gear range switch and shift arm to make the holes of gear shift arm (1) and gear range switch (2) coincident.



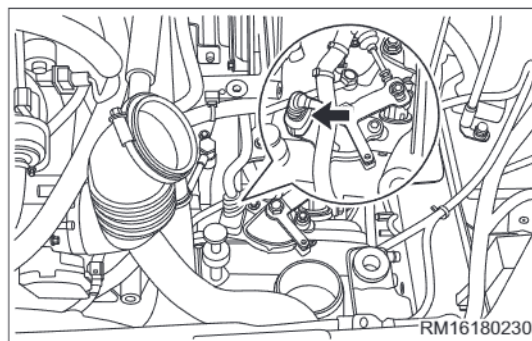
8. Use a proper tool to fix the gear shift arm and gear range switch, and then tighten the bolts to the specified torque.
9. Start engine only when the gear lever is at the "P" or "N" gear.

CAUTION

- The ledge of gear shift cable must be placed into the slot of shift arm.

Gear Range Switch Inspection

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly (See page 10-12).
4. Disconnect the gear range switch wire harness connector.



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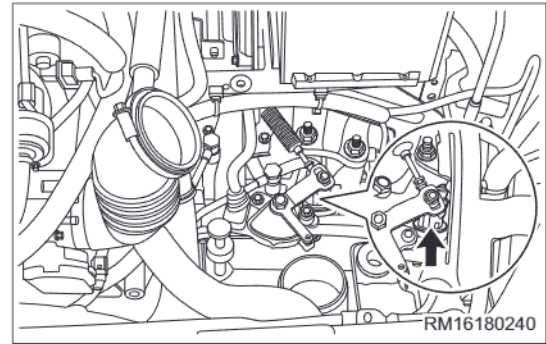
5. Check for continuity between the terminals of gear range switch wire harness connector according to the table below.

Gearshift Position	Terminal	Specified Condition
P	1 - 7, 9 - 10	Continuity
R	7 - 8	
N	2 - 7, 9 - 10	
D	3 - 7	
L	4 - 7	

If result is not as specified, replace the gear range switch.

Transmission Fluid Temperature Sensor Inspection

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the transmission wire harness connector.

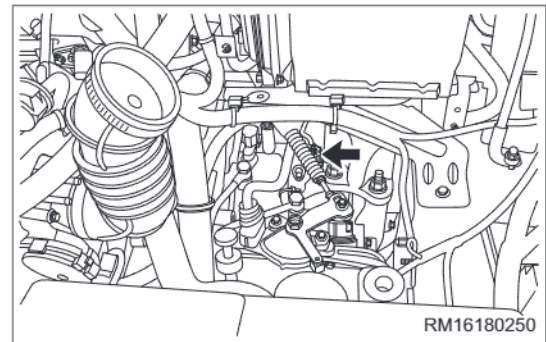


3. Remove the air filter assembly (See page 10-12).
4. Check for resistance between the transmission wire harness connector terminals 5 - 6.

Item	Terminal	Temperature (°C (°F))	Resistance (kΩ)
Gear Box	5 - 6	20 (68)	6.5
		80 (176)	0.9

Primary Shaft Speed Sensor Inspection

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the primary shaft speed sensor connector.



3. Remove the air filter assembly (See page 10-12).
4. Check for resistance between terminals of primary shaft speed sensor as shown in the table below at normal temperature.

HINT:

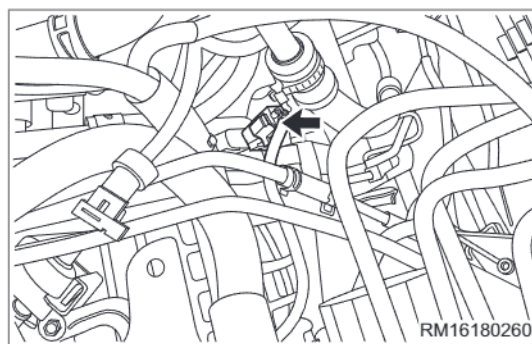
Inner parts of the sensor are triode and capacitor, and will be affected greatly by environment and usage condition. Therefore, actual measured value is within specified value plus/minus 15% in the table below.

Item	Multimeter Connection		Specified Condition (MΩ)
	+	-	
Primary Shaft Speed Sensor	1	3	3.313
	3	1	6.56
	1	2	1.649
	3	2	11.56

Turbine/Secondary Shaft Speed Sensor Inspection

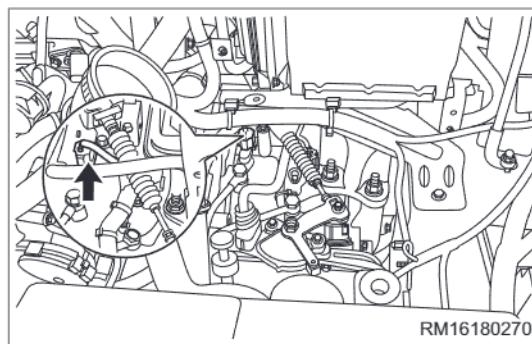
Secondary Shaft Speed Sensor Inspection

1. Turn off all electrical equipment and the ignition switch.
2. Remove the air filter assembly (See page 10-12).
3. Disconnect the secondary shaft speed sensor connector.



Turbine Shaft Speed Sensor Inspection

1. Turn off all electrical equipment and the ignition switch.
2. Remove the air filter assembly (See page 10-12).
3. Disconnect the turbine shaft speed sensor connector.



4. Check for resistance between terminals of turbine/secondary shaft speed sensor as shown in the table below at normal temperature.

HINT:

Inner parts of the sensor are triode and capacitor, and will be affected greatly by environment and usage condition. Therefore, actual measured value is within specified value plus/minus 15% in the table below.

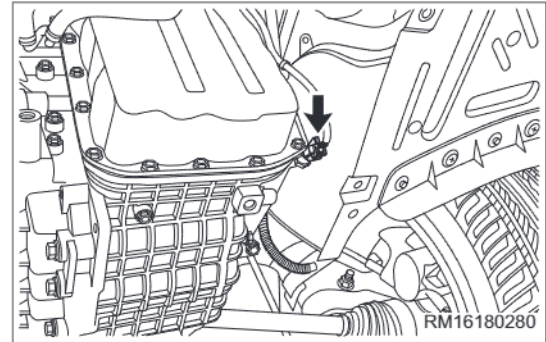
18

Item	Multimeter Connection		Specified Condition (MΩ)
Turbine/Secondary Shaft Speed Sensor	+	-	
	1	3	3.397
	3	1	6.79
	1	2	1.77
	3	2	11.9

Primary/Secondary Shaft Pressure Sensor Inspection

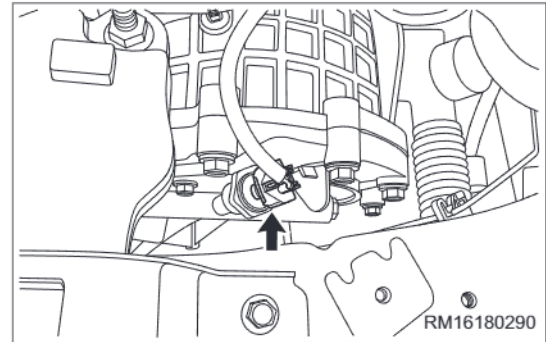
Primary Shaft Pressure Sensor Inspection

1. Turn off all electrical equipment and the ignition switch.
2. Remove the engine lower protector (See page 49-22).
3. Disconnect the primary shaft pressure sensor connector.



Secondary Shaft Pressure Sensor Inspection

1. Turn off all electrical equipment and the ignition switch.
2. Remove the battery and battery tray (See page 16-9).
3. Disconnect the secondary shaft pressure sensor connector.



4. Check for resistance between terminals of primary/secondary shaft pressure sensor as shown in the table below at normal temperature.

HINT:

Inner parts of the sensor are triode and capacitor, and will be affected greatly by environment and usage condition. Therefore, actual measured value is within specified value plus/minus 15% in the table below.

Item	Multimeter Connection	Specified Condition (k Ω)
Primary/Secondary Shaft Pressure Sensor	1 - 3	45.77
	2 - 1	10.06

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.

Symptoms	Suspected Area	See page
With power-on or ignited, P gear is not released after applying brake	Brake switch or circuit	26-22
	Gear shift lock solenoid	-
High impact during static gear shifting	Turbine speed sensor	18-105
	Circuit or connector	-
	Solenoid	-
Vehicle fails to move when D/R gear is engaged, or engaged gear is different from gear shown in the instrument	Gear shift cable and transmission shift arm (assembled incorrectly)	18-108
Variable speed anomaly, jumbled speed shifting in driving; abnormal driving and poor comfort	Oil pressure switch	13-16
	Circuit or connector	-
	Speed sensor	-
Vehicle fails to run after gear is engaged, but gear indication is normal	Transmission fluid pump	-
	Solenoid	-
Vehicle fails to run when reverse gear is engaged	Transmission planetary gear system	-
Vehicle stalls when D/R gear is engaged	Radiator oil pipes (incorrectly assembled, bent or folded)	-
	Locking clutch (abnormal)	-
Abnormal noise of transmission in acceleration	Transmission fluid (insufficient)	18-100
Reduced power and speed in high speeding driving	Thermal protection of transmission	-

18 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 occurs, and perform diagnosis tests and repair procedures.
3. If diagnostic trouble code (DTC) cannot be deleted, it is a current malfunction.
4. Only use a digital multimeter to measure voltage of electrical systems.
5. Refer to any Technical Bulletin that may apply to malfunction.
6. Visually check related wire harnesses.
7. Inspect and clean all transmission control module (TCU) grounds 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 followings:

- Check if connectors are loose.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Wiggle related wire harnesses and connectors and observe if signal is interrupted in related circuit.
- If possible, try to duplicate the conditions under which the DTC was set.
- Look for the data that has changed or the DTC to reset during wiggle test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect mounting areas of instrument cluster, wire harness or wire harness connector and so on for damage, foreign matter, etc. that will cause incorrect signals.

Ground Inspection

Groundings are very important to entire circuit system, which are normal or not can seriously affect entire circuit system. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) and oxidation can increase load resistance. This situation will seriously affect the normal operation of the circuit. Check the ground points as follows:

1. Remove the 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 a good condition.
4. Reinstall the 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 all wire harnesses are clean, securely fastened and providing a good ground path.

Diagnostic Trouble Code (DTC) Chart

DTC Code	DTC Definition
P1700	Unexpected Interrupt
P0700	Transmission Control System (MIL Request)
P0701	Transmission Control System Performance
P0702	Transmission Control System Electrical
P0703	Brake Switch 'B' Circuit
P0705	Gear Range Switch 'A' Circuit (PRNDL Input)
P0706	Gear Range Switch 'A' Circuit Range (PRNDL Input)
P0707	Gear Range Switch 'A' Circuit Low (PRNDL Input)
P0708	Gear Range Switch 'A' Circuit High (PRNDL Input)
P0709	Gear Range Switch 'A' Circuit Intermittent (PRNDL Input)
P0715	Input/Turbine Speed Sensor Circuit
P0716	Input/Turbine Speed Sensor Circuit Range
P0717	Input/Turbine Speed Sensor Circuit No Signal
P0718	Input/Turbine Speed Sensor Circuit Intermittent
P0719	Brake Switch 'B' Circuit Low
P071A	Transmission Sport Mode Switch Circuit
P071B	Transmission Sport Mode Switch Circuit Low

DTC Code	DTC Definition
P071C	Transmission Sport Mode Switch Circuit High
P071D	Transmission Winter Mode Switch Circuit
P071E	Transmission Winter Mode Switch Circuit Low
P071F	Transmission Winter Mode Switch Circuit High
P0720	Output Speed Sensor Circuit
P0721	Output Speed Sensor Circuit Range/Performance
P0722	Output Speed Sensor Circuit No Signal
P0723	Output Speed Sensor Circuit Intermittent
P0724	Brake Switch 'B' Circuit High
P0725	Engine Speed Input Circuit
P0726	Engine Speed Input Circuit Range/Performance
P0727	Engine Speed Input Circuit No Signal
P0728	Engine Speed Input Circuit Intermittent
P0730	Incorrect Gear Ratio
P0740	Torque Converter Clutch Circuit Open
P0741	Torque Converter Clutch Circuit Performance
P0742	Torque Converter Clutch Circuit Stuck On
P0743	Torque Converter Clutch Circuit Electrical
P0744	Torque Converter Clutch Circuit Intermittent
P0745	Pressure Control Solenoid 'A'
P0746	Pressure Control Solenoid 'A' Stuck Off
P0747	Pressure Control Solenoid 'A' Stuck On
P0748	Pressure Control Solenoid 'A' Electrical
P0749	Pressure Control Solenoid 'A' Intermittent
P0775	Pressure Control Solenoid 'B'
P0776	Pressure Control Solenoid 'B' Stuck Off
P0777	Pressure Control Solenoid 'B' Stuck On
P0778	Pressure Control Solenoid 'B' Electrical
P0779	Pressure Control Solenoid 'B' Intermittent
P0791	Intermediate Shaft Speed Sensor 'A' Circuit
P0792	Intermediate Shaft Speed Sensor 'A' Circuit Range
P0793	Intermediate Shaft Speed Sensor 'A' Circuit No Signal
P0794	Intermediate Shaft Speed Sensor 'A' Circuit Intermittent
P0811	Drive Clutch 'A' Slippage
P0814	Transmission Range Display Circuit
P0815	Upshift Switch Circuit
P0816	Downshift Switch Circuit

DTC Code	DTC Definition
P0817	Starter Disable Circuit Open
P081A	Starter Disable Circuit Low
P081B	Starter Disable Circuit High
P081C	Park Input Circuit
P081D	Neutral Input Circuit
P081E	Reverse Clutch 'B' Slippage
P0826	Up and Down Shift Switch Circuit
P0827	Up and Down Shift Switch Circuit Low
P0828	Up and Down Shift Switch Circuit High
P1811	Continuous Clutch Slippage
P0840	Transmission Fluid Pressure Sensor 'A' Circuit
P0841	Transmission Fluid Pressure Sensor 'A' Circuit Range
P0842	Transmission Fluid Pressure Sensor 'A' Circuit Low
P0843	Transmission Fluid Pressure Sensor 'A' Circuit High
P0844	Transmission Fluid Pressure Sensor 'A' Circuit Intermittent
P0845	Transmission Fluid Pressure Sensor 'B' Circuit
P0846	Transmission Fluid Pressure Sensor 'B' Circuit Range/Performance
P0847	Transmission Fluid Pressure Sensor 'B' Circuit Low
P0848	Transmission Fluid Pressure Sensor 'B' Circuit High
P0849	Transmission Fluid Pressure Sensor 'B' Circuit Intermittent
P0850	Park/Neutral Switch Input Circuit
P0851	Park/Neutral Switch Input Circuit Low
P0852	Park/Neutral Switch Input Circuit High
P0853	Drive Switch Input Circuit
P0854	Drive Switch Input Circuit Low
P0855	Drive Switch Input Circuit High
P0863	TCM Communication Circuit
P0864	TCM Communication Circuit Range
P0865	TCM Communication Circuit Low
P0866	TCM Communication Circuit High
P0867	Transmission Fluid Pressure
P0868	Transmission Fluid Pressure Low
P0869	Transmission Fluid Pressure High
P0880	TCM Power Input Signal
P0881	TCM Power Input Signal Range
P0882	TCM Power Input Signal Low
P0883	TCM Power Input Signal High



DTC Code	DTC Definition
P0884	TCM Power Input Signal Intermittent
P0885	TCM Power Relay Control Circuit Open
P0886	TCM Power Relay Control Circuit Low
P0887	TCM Power Relay Control Circuit High
P0888	TCM Power Relay Sense Circuit
P0889	TCM Power Relay Sense Circuit Range/Performance
P0890	TCM Power Relay Sense Circuit Low
P0891	TCM Power Relay Sense Circuit High
P0892	TCM Power Relay Sense Circuit Intermittent
P0894	Transmission Component Slipping
P0897	Transmission Fluid Deteriorated
P0900	Clutch Actuator Circuit Open
P0901	Clutch Actuator Circuit Range
P0902	Clutch Actuator Circuit Low
P0903	Clutch Actuator Circuit High
P0928	Gear Shift Lock Solenoid Control Circuit Open
P0929	Gear Shift Lock Solenoid Control Circuit Range
P0930	Gear Shift Lock Solenoid Control Circuit Low
P0931	Gear Shift Lock Solenoid Control Circuit High
P0932	Hydraulic Pressure Sensor Circuit
P0933	Hydraulic Pressure Sensor Range
P0934	Hydraulic Pressure Sensor Circuit Low
P0935	Hydraulic Pressure Sensor Circuit High
P0936	Hydraulic Pressure Sensor Circuit Intermittent
P0937	Hydraulic Oil Temperature Sensor Circuit
P0938	Hydraulic Oil Temperature Sensor Range
P0939	Hydraulic Oil Temperature Sensor Circuit Low
P0940	Hydraulic Oil Temperature Sensor Circuit High
P0941	Hydraulic Oil Temperature Sensor Circuit Intermittent
P0955	Auto Shift Manual Mode Circuit
P0956	Auto Shift Manual Mode Circuit Range/Performance
P0957	Auto Shift Manual Mode Circuit Low
P0958	Auto Shift Manual Mode Circuit High
P0959	Auto Shift Manual Mode Circuit Intermittent
P0960	Pressure Control Solenoid 'A' Control Circuit Open
P0961	Pressure Control Solenoid 'A' Control Circuit Range
P0962	Pressure Control Solenoid 'A' Control Circuit Low

DTC Code	DTC Definition
P0963	Pressure Control Solenoid 'A' Control Circuit High
P0964	Pressure Control Solenoid 'B' Control Circuit Open
P0965	Pressure Control Solenoid 'B' Control Circuit Range
P0966	Pressure Control Solenoid 'B' Control Circuit Low
P0967	Pressure Control Solenoid 'B' Control Circuit High
P0970	Pressure Control Solenoid 'C' Control Circuit Low
P0971	Pressure Control Solenoid 'C' Control Circuit High
P1900	Clutch Solenoid Control Circuit
P1928	Shift-Lock Solenoid Control Circuit
P1785	Power Relay Drive Circuit
P1745	Second Speed Sensor Plausible
P2797	Auxiliary Transmission Fluid Pump Performance
P2798	Auxiliary Transmission Fluid Pump Control Circuit Low

Data Stream List

By reading "Data Stream List" on diagnostic tester, working state of switches, sensors, and actuators can be checked without removing any component. Before fault diagnosis of transmission electrical control system, observation and analysis of data is the first step in troubleshooting, this can reduce troubleshooting time.

WARNING

- Following table lists the data under normal conditions, only for reference. Do not determine the failure just based on these standard values. Generally, compare a normal vehicle to the vehicle in diagnosis under the same state to determine the data of diagnosis vehicle under current state is normal or not.

TCU (Transmission Control Unit) Configuration

Gear	Data Stream Item	Engine Idle Speed
P	Transmission engagement gear	P gear
	Driver request	0.00%
	Battery voltage	13.00 V
R	Transmission engagement gear	Reverse
	Driver request	0.00%
	Battery voltage	13.00 V
N	Transmission engagement gear	N gear
	Driver request	0.00%
	Battery voltage	13.00 V
D	Transmission engagement gear	D gear
	Driver request	0.00%
	Battery voltage	13.00 V

Gear	Data Stream Item	Engine Idle Speed
L	Transmission engagement gear	Low speed gear
	Driver request	0.00%
	Battery voltage	13.00 V
M-1	Transmission engagement gear	First gear
	Driver request	0.00%
	Battery voltage	13.00 V

TCU (Transmission Control Unit) Input Inspection

Gear	Data Stream Item	Engine Idle Speed
P	Transmission engagement gear	P gear
	Drive pulley pressure	1.9 Bar
	Oil temperature	71°C
	Driven pulley pressure	10 Bar
	Driver request	0.00%
	Engine torque signal in CAN	5.00%
	Engine coolant temperature	93.00°C
R	Transmission engagement gear	Reverse
	Drive pulley pressure	1.1 Bar
	Oil temperature	72°C
	Driven pulley pressure	10 Bar
	Driver request	0.00%
	Engine torque signal in CAN	11%
	Engine coolant temperature	93.7°C
N	Transmission engagement gear	N gear
	Drive pulley pressure	2.1 Bar
	Oil temperature	73°C
	Driven pulley pressure	9.9 Bar
	Driver request	0.00%
	Engine torque signal in CAN	5%
	Engine coolant temperature	94.5°C
D	Transmission engagement gear	D gear
	Drive pulley pressure	1.1 Bar
	Oil temperature	74°C
	Driven pulley pressure	9.5 Bar
	Driver request	0.00%
	Engine torque signal in CAN	1.1%
	Engine coolant temperature	95.25°C

Gear	Data Stream Item	Engine Idle Speed
L	Transmission engagement gear	Low speed gear
	Drive pulley pressure	1.0 Bar
	Oil temperature	74°C
	Driven pulley pressure	8.2 Bar
	Driver request	0.00%
	Engine torque signal in CAN	9%
	Engine coolant temperature	96°C
M-1	Transmission engagement gear	First gear
	Drive pulley pressure	0.9 Bar
	Oil temperature	76°C
	Driven pulley pressure	9.2 Bar
	Driver request	0.00%
	Engine torque signal in CAN	11%
	Engine coolant temperature	90.75°C

TCU (Transmission Control Unit) Output Inspection

Data Stream Item	Engine Idle Speed
Clutch duty ratio	99.70%
TCC (torque converter clutch) duty ratio	0.00%
Drive pulley duty ratio	49.241%
Driven pulley duty ratio	76.135%
Transmission engagement gear (transmission position)	P gear
Transmission engagement gear (transmission working mode)	Common code
Transmission engagement gear (transmission fault)	Non-default
Coolant temperature signal in CAN	93°C
Oil temperature	77°C

Dynamic Inspection

Data Stream Item	Engine Idle Speed
Multi-function switch position	P gear
Engine speed	702.75 rpm
Turbine speed	702 rpm
Vehicle speed	0.00 km/h
Driver request	0.00 NM
Drive pulley pressure	2.063 Bar
Driven pulley pressure	10.076 Bar
Oil temperature	79°C
Engine coolant temperature	92.25°C

Speed Inspection

Data Stream Item	Engine Idle Speed
Driver request	0.00%
Engine speed	702.75 rpm
Turbine speed	7.2 rpm
Vehicle speed	0.00 km/h
Drive pulley speed	0 rpm
Driven pulley speed	0 rpm

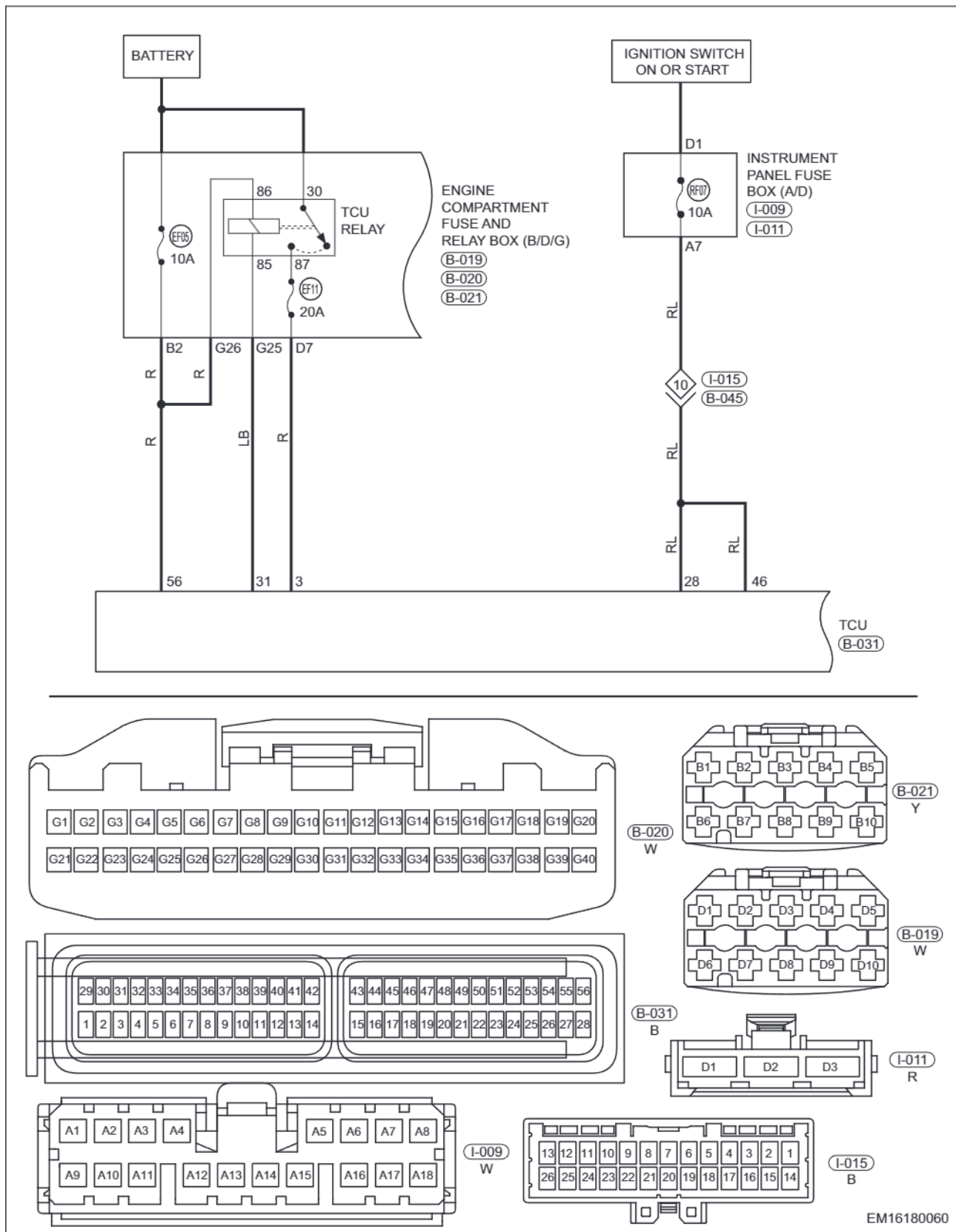
CAN Network

Data Stream Item	Engine Idle Speed
Engine speed	702.75 rpm
Driver request	0.00%
Vehicle speed	0.00 km/h
Engine coolant temperature	90.75°C
Driver request	0.00 NM
Torque converter status	Unlock

Power Supply and Ground Circuit Test

Power Supply Circuit Test

Power Supply Circuit



Check TCU Power Circuit Value

Terminal No.	Item	Condition	Value
28	Ignition Switch	Ignition Switch ON	11 to 14 V
46	Ignition Switch	Ignition Switch ON	11 to 14 V
3	Battery Power	-	11 to 14 V
31	Battery Power	-	11 to 14 V
56	Battery Power	-	11 to 14 V

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

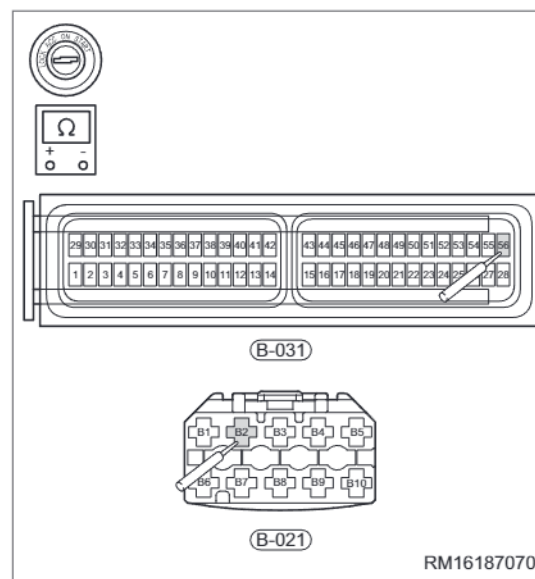
Diagnosis Procedure

1 Check TCU power supply circuit 1 (engine compartment fuse and relay box - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect wire harness connectors B-021 and B-031.
- Check wire harness connectors B-021 and B-031 with a digital multimeter according to the table below.

Normal Condition

Multimeter Connection	Condition	Specified Condition
B-021 (B2) - B-031 (56)	Always	Continuity



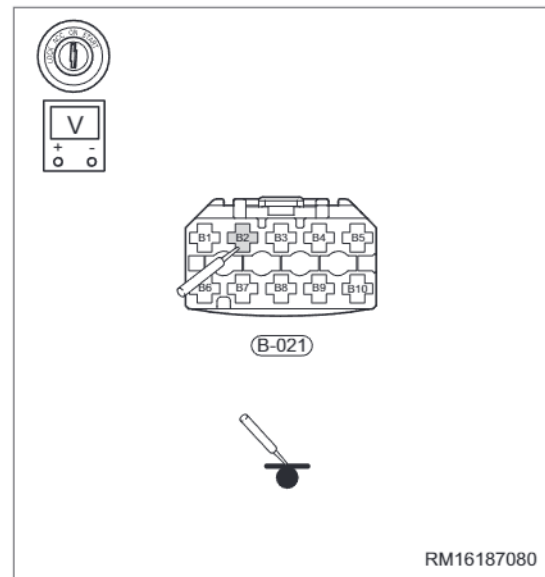
- e. Connect connectors.
- f. Connect the negative battery cable.
- g. Check wire harness connectors B-021 and B-031 with a digital multimeter according to the table below.

HINT:

When using a digital multimeter to check the connecting condition of connectors, measure the system voltage from backside of connector.

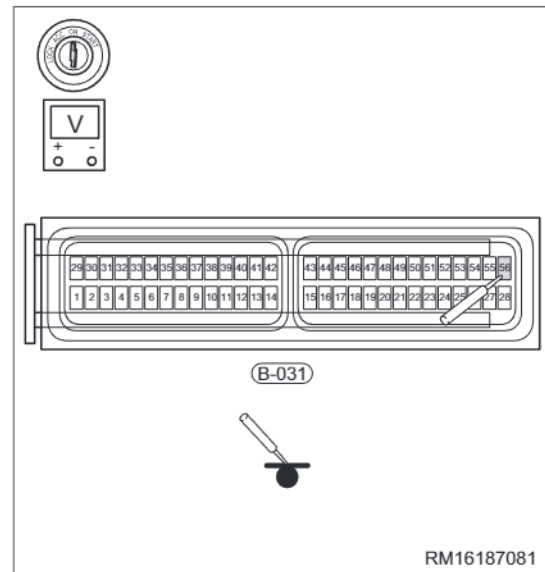
Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-021 (B2) - Body ground	Always	11 to 14 V

**Standard Voltage**

Multimeter Connection	Condition	Specified Condition
B-031 (56) - Body ground	Always	11 to 14 V

NG Go to step 2

**OK****18**

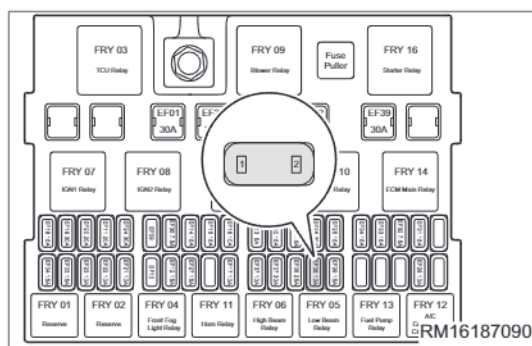
Go to step 3

2 Check TCU fuse EF05

- Remove fuse EF05 from engine compartment fuse and relay box.
- Check fuse with a digital multimeter according to the table below.

Normal Condition

Multimeter Connection	Condition	Specified Condition
Fuse (1) - Fuse (2)	Always	Continuity



NG

Replace fuse EF05

OK

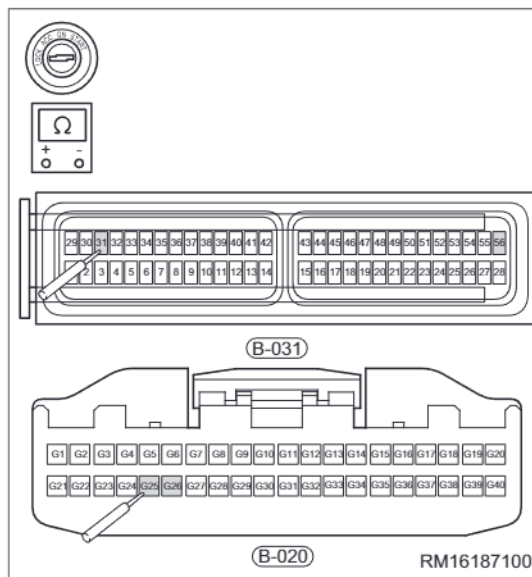
Replace TCU power supply circuit 1 (engine compartment fuse and relay box - TCU)

3 Check TCU power supply circuit 2 (engine compartment fuse and relay box - TCU)

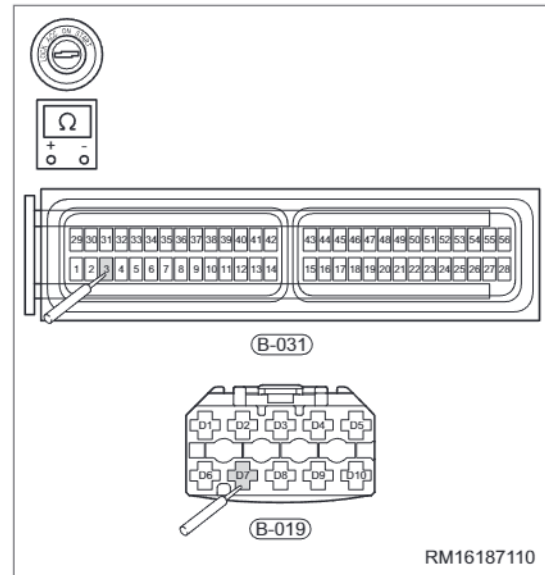
- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect wire harness connectors B-020, B-019 and B-031.
- Check wire harness connectors B-020, B-019 and B-031 with a digital multimeter according to the table below.

Normal Condition

Multimeter Connection	Condition	Specified Condition
B-020 (G25) - B-031 (31)	Always	Continuity
B-020 (G26) - B-031 (56)	Always	Continuity



Multimeter Connection	Condition	Specified Condition
B-019 (D7) - B-031 (3)	Always	Continuity



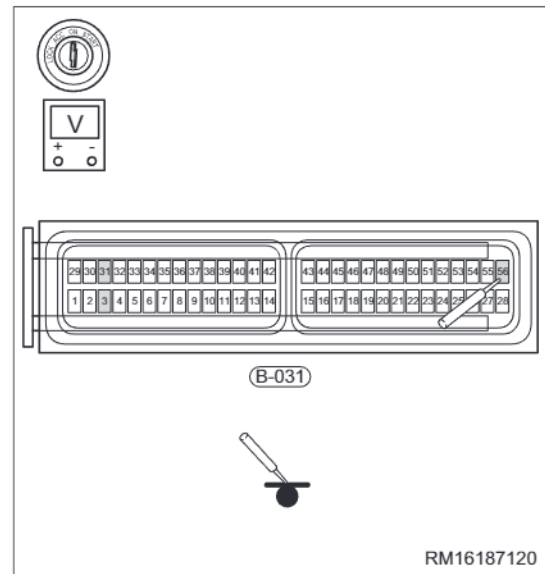
- Connect connectors.
- Connect the negative battery cable.
- Check wire harness connectors B-020 and B-031 with a digital multimeter according to the table below.

HINT:

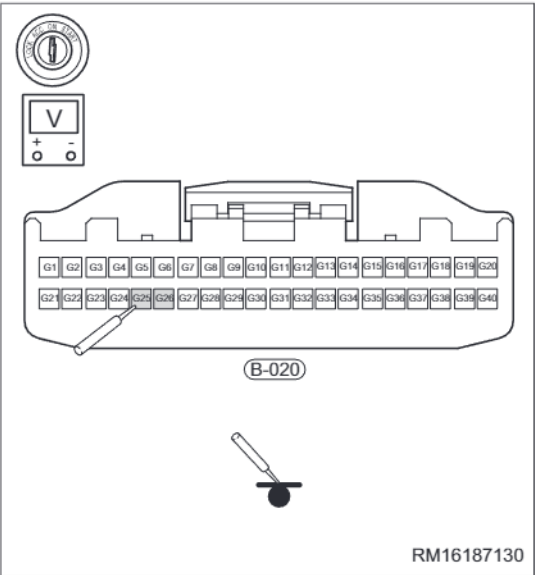
When using a digital multimeter to check the connecting condition of connectors, measure the system voltage from backside of connector.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-031 (31) - Body ground	Always	11 to 14 V
B-031 (56) - Body ground	Always	11 to 14 V
B-031 (3) - Body ground	Always	11 to 14 V

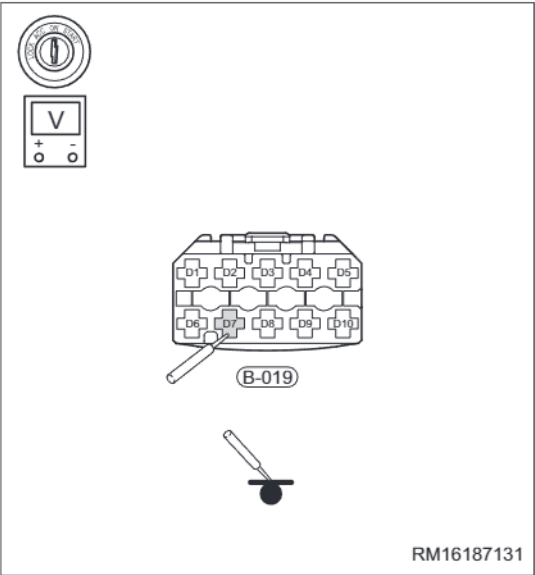


Multimeter Connection	Condition	Specified Condition
B-020 (G25) - Body ground	Always	11 to 14 V
B-020 (G26) - Body ground	Always	11 to 14 V



Multimeter Connection	Condition	Specified Condition
B-019 (D7) - Body ground	Always	11 to 14 V

NG Go to step 4



18

OK

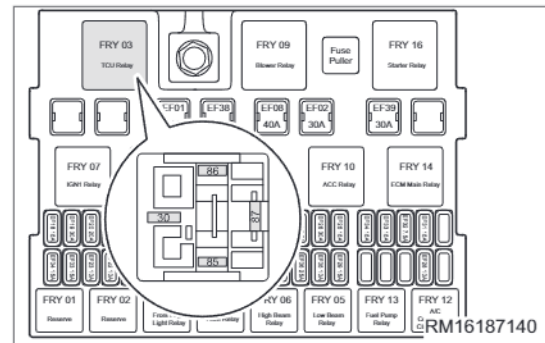
Go to step 5

4 Check TCU relay

- Remove TCU relay from engine compartment fuse and relay box.
- Check TCU relay with a digital multimeter according to the table below.

Normal Condition

Multimeter Connection	Condition	Specified Condition
30 - 87	Battery positive 85 - Battery negative 86 (battery voltage not applied)	No continuity
30 - 87	Battery positive 85 - Battery negative 86 (battery voltage applied)	Continuity



NG

Replace TCU relay

OK

Replace TCU power supply circuit 2 (engine compartment fuse and relay box - TCU)

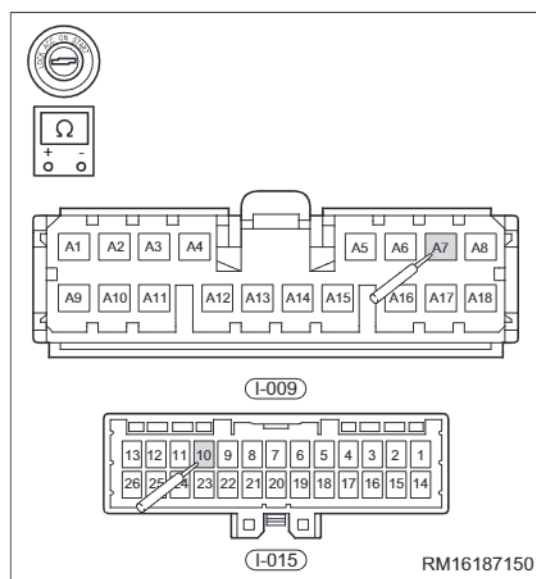
5

Check TCU power supply circuit 3 (instrument panel fuse box - TCU)

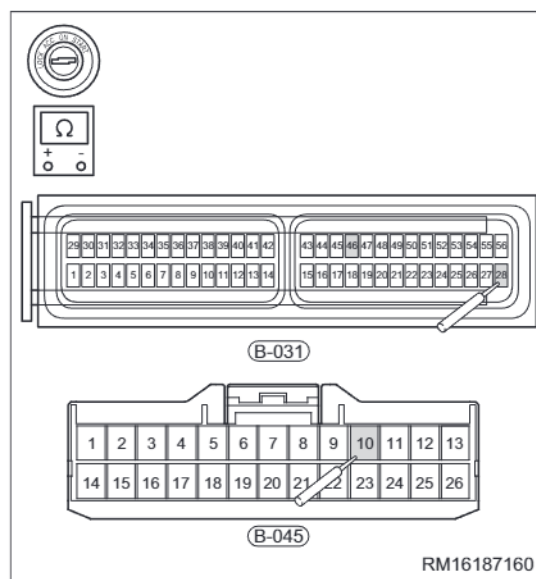
- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect wire harness connectors I-009, I-015 (B-045) and B-031.
- Check wire harness connectors I-009, I-015 (B-045) and B-031 with a digital multimeter according to the table below.

Normal Condition

Multimeter Connection	Condition	Specified Condition
I-009 (A7) - I-015 (10)	Always	Continuity



Multimeter Connection	Condition	Specified Condition
B-045 (10) - B-031 (28, 46)	Always	Continuity



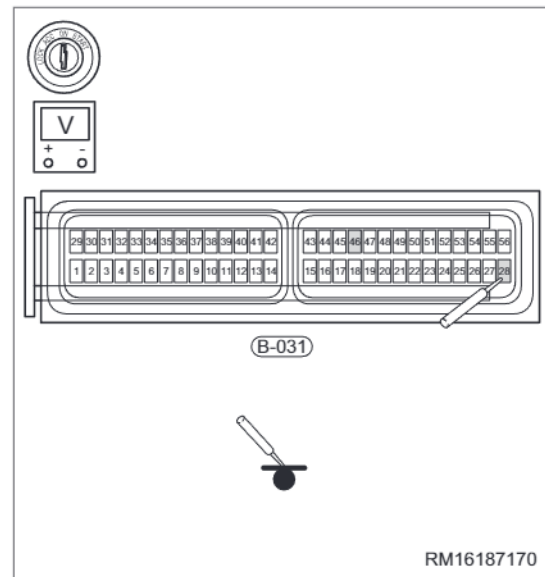
- e. Connect connectors.
- f. Connect the negative battery cable.
- g. Check wire harness connectors I-009, I-015 (B-045) and B-031 with a digital multimeter according to the table below.

HINT:

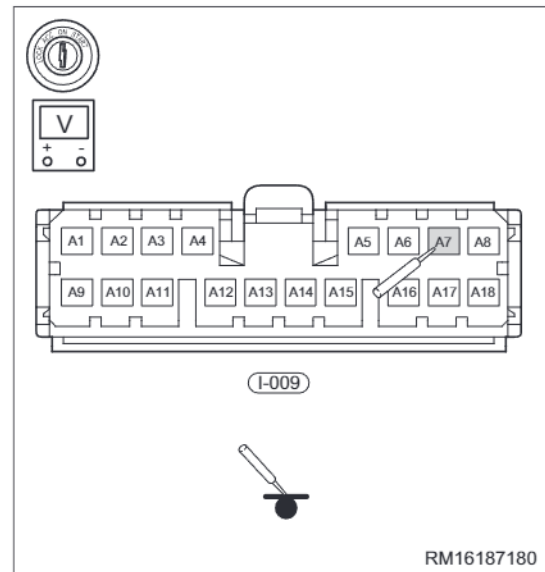
When using a digital multimeter to check the connecting condition of connectors, measure the system voltage from backside of connector.

Standard Voltage

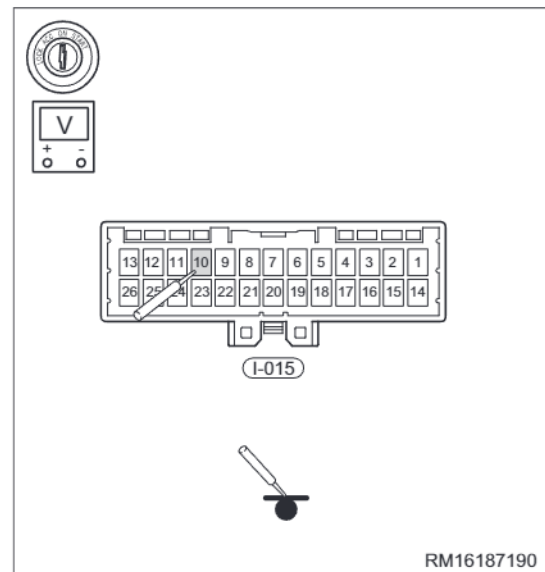
Multimeter Connection	Condition	Specified Condition
B-031 (28, 46) - Body ground	Ignition switch ON	11 to 14 V

**Standard voltage:**

Multimeter Connection	Condition	Specified Condition
I-009 (A7) - Body ground	Ignition switch ON	11 to 14 V



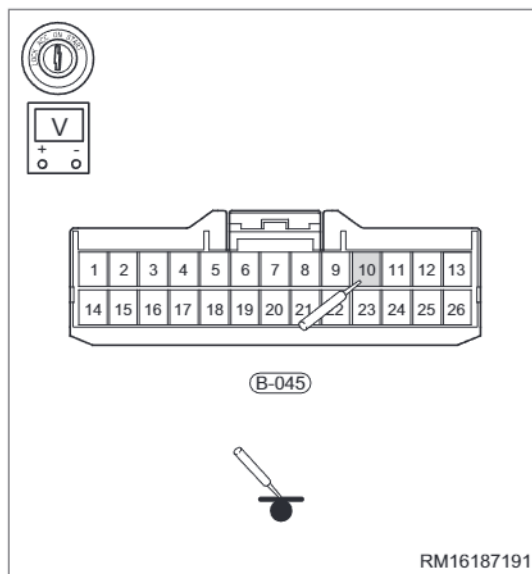
Multimeter Connection	Condition	Specified Condition
I-015 (10) - Body ground	Ignition switch ON	11 to 14 V



Multimeter Connection	Condition	Specified Condition
B-045 (10) - Body ground	Ignition switch ON	11 to 14 V

NG

Go to step 6



RM16187191

OK

Go to step 7

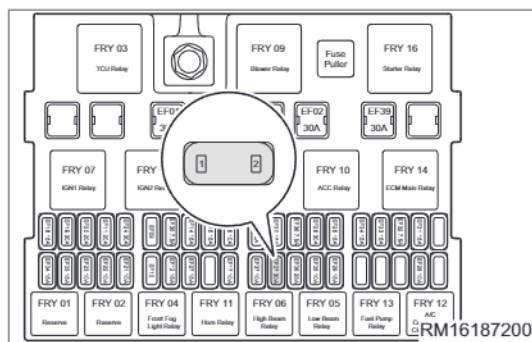
6

Check TCU fuse RF07

- Remove fuse EF07 from engine compartment fuse and relay box.
- Check fuse RF07 with a digital multimeter according to the table below.

Normal Condition

Multimeter Connection	Condition	Specified Condition
Fuse (1) - Fuse (2)	Always	Continuity



RM16187200

18

NG

Replace fuse RF07

OK

Replace TCU power supply circuit 3 (engine compartment fuse and relay box - TCU)

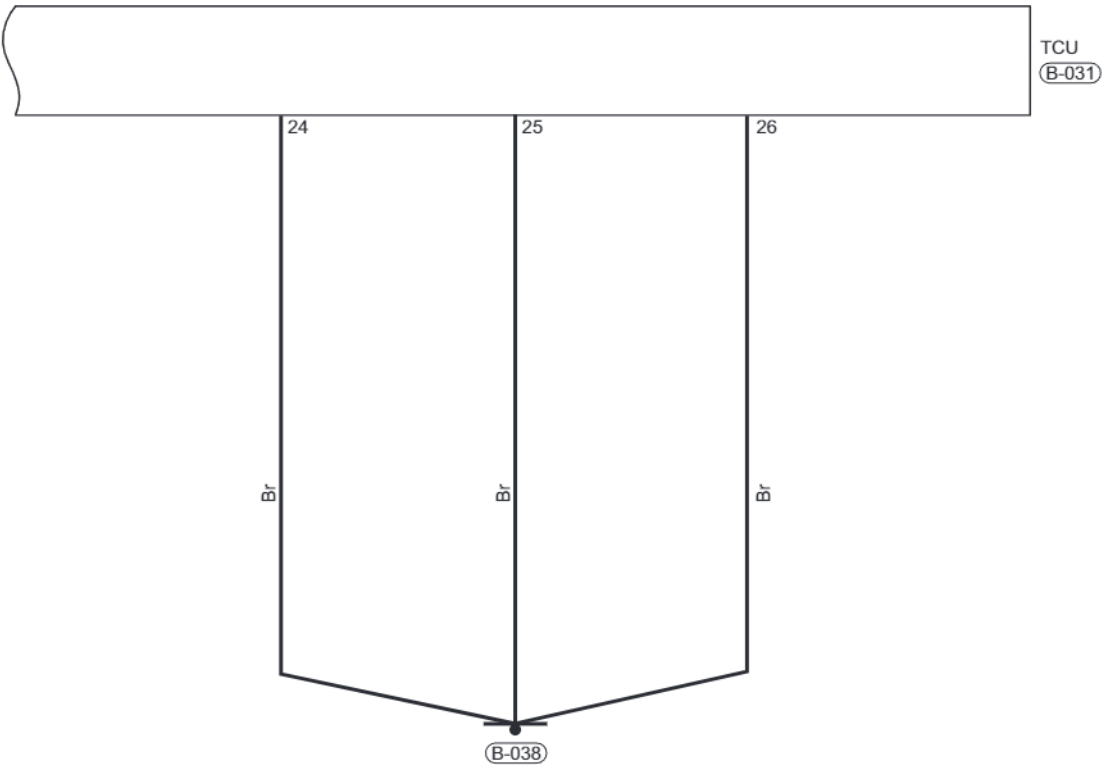
7**Check TCU**

- a. Turn off all electrical equipment and the ignition switch.
- b. Disconnect the negative battery cable.
- c. Replace the TCU on malfunctioning vehicle with a new one.
- d. Check if fault still exists.

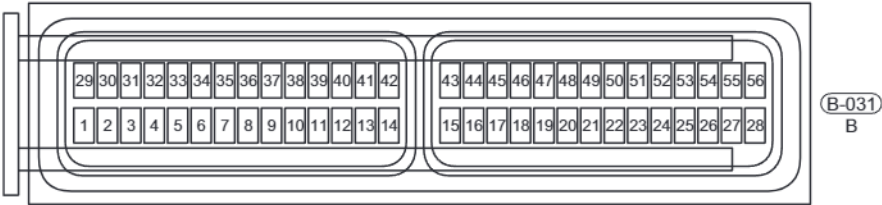
NG**Replace TCU**

Ground Circuit Test

Ground Circuit



18



EM16180210

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

1	Check TCU ground
----------	-------------------------

- Turn off all electrical equipment and the ignition switch.
- Remove ground point B-038.
- visually check ground point for oxidation or dirt.

NG	Go to step 2
-----------	---------------------

OK

Repair ground point

2 Check TCU ground wire harness (ground point E-038 - TCU)

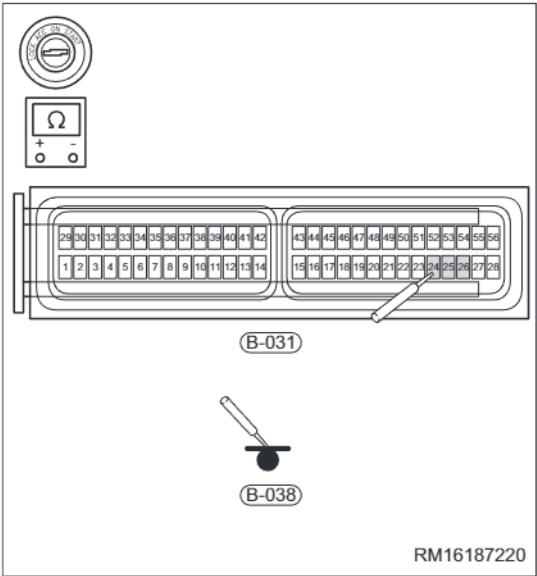
- a. Turn off all electrical equipment and the ignition switch.
- b. Disconnect the negative battery cable.
- c. Remove ground point B-038 and TCU wire harness connector B-031.
- d. Check B-038 and B-031 with a digital multimeter according to the table below.

Normal Condition

Multimeter Connection	Condition	Specified Condition
B-038 - B-031 (24, 25, 26)	Always	Continuity

NG

Replace TCU ground wire harness
(ground point E-038 - TCU)



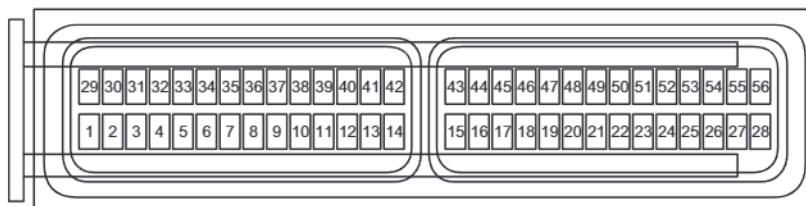
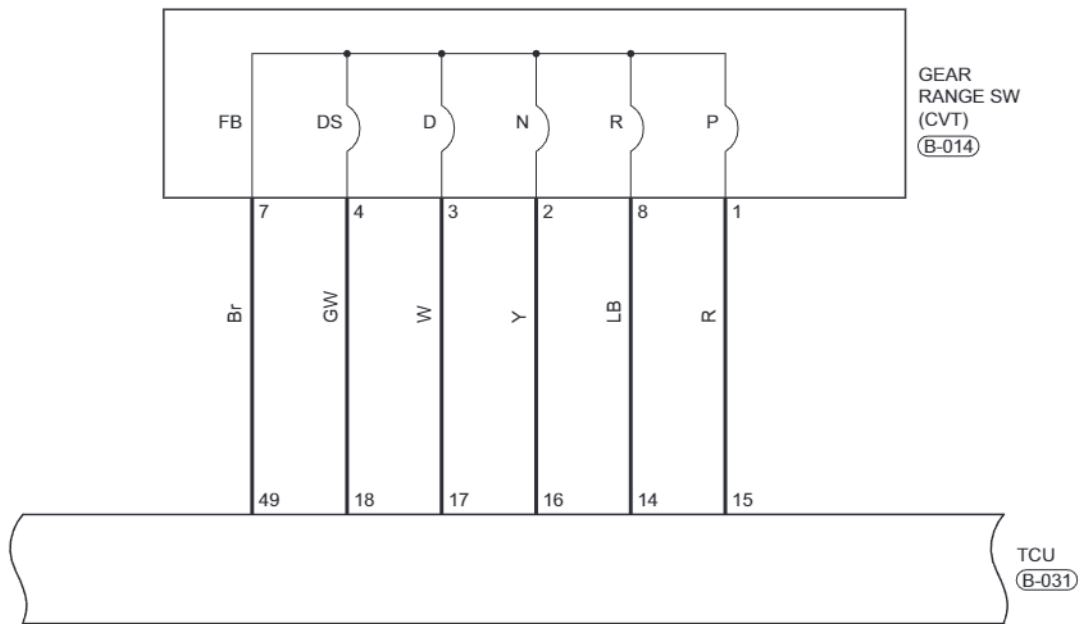
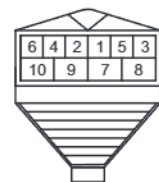
OK

Replace TCU

DTC

P0705

Gear Range Switch 'A' Circuit (P-R-N-D-L Input)

(B-031)
B(B-014)
B

EM16180230

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0705	Transmission Range Sensor 'A' Circuit (P-R-N-D-L Input)	Start engine and shift between P-R-N-D-L gears	If multiple TCU reading gear signals exist (more than 1)	• Gear range switch • Gear signal circuit short circuit to ground • TCU digital signal circuit failure

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

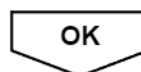
Diagnosis Procedure**HINT:**

After the fault is eliminated, verify DTC and symptom again.

1	Check gear range switch
----------	--------------------------------

- a. Check gear range switch ([See page 18-108](#)).

NG	Replace gear range switch
-----------	----------------------------------

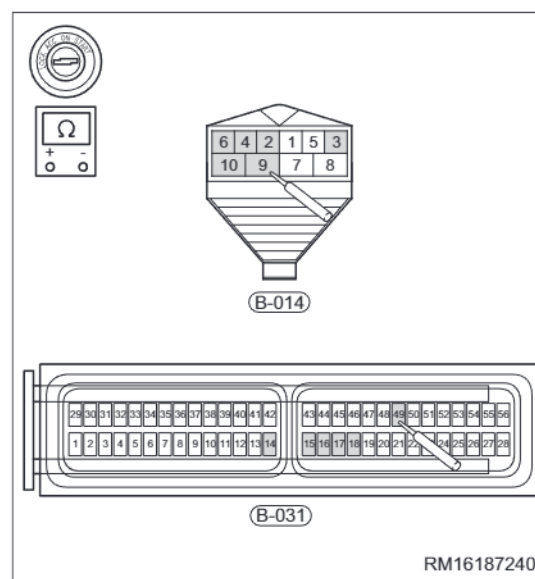


2 Check wire harness or connector (Gear range switch - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect gear range switch wire harness connector B-014 and TCU wire harness connector B-031.
- Check connectors B-014 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-014 (9, 2, 6, 3, 10, 4) - B-031 (49, 18, 17, 16, 14, 15)	Always	Continuity

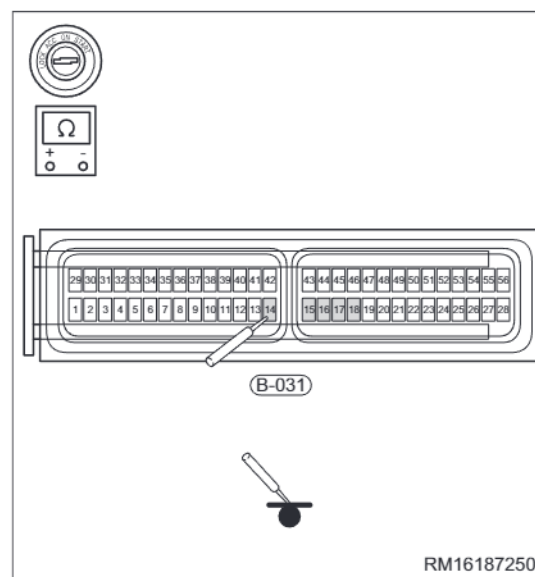


Check for Short

Multimeter Connection	Condition	Specified Condition
B-031 (18, 17, 16, 14, 15) - Body ground	Always	Continuity

NG

Replace wire harness or connector (gear range switch - TCU)



OK

3 Recheck DTC

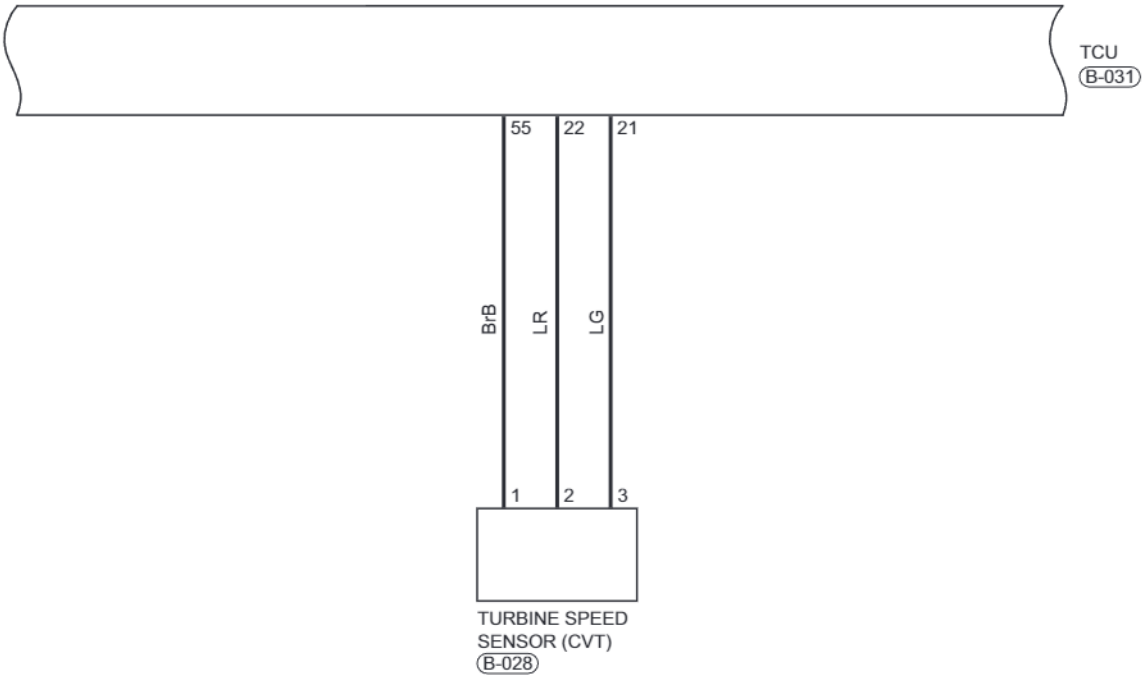
- Using X-431 3G diagnostic tester, read TCU DTC.
- Refer to "DTC Confirmation Procedure".
- Check if DTC P0705 still exists.

YES

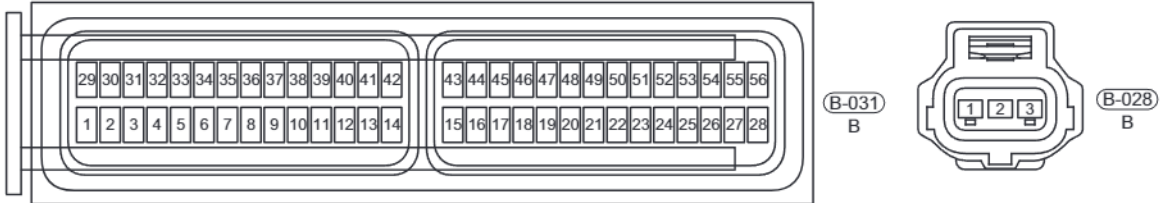
Replace TCU

DTC	P0715	Input/Turbine Speed Sensor Circuit
-----	-------	------------------------------------

DTC	P0716	Input/Turbine Speed Sensor Circuit Range
-----	-------	--



18



EM16180260

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0715	Input/Turbine Speed Sensor Circuit	Start engine and keep it at following status for at least 10 seconds: idle speed or accelerator not more than 10%, at P or N gear, engine speed not less than idle speed	Turbine speed signal is higher than standard value within a period	• Incorrect installation of turbine speed sensor • Signal circuit open or short circuit • Turbine speed sensor power circuit poor contact • Turbine speed sensor failure • TCU signal circuit failure
P0716	Input/Turbine Speed Sensor Circuit Range		Difference between engine speed and turbine speed exceeds standard value and keep for 900 ms	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

HINT:

After the fault is eliminated, verify DTC and symptom again.

1	Check turbine speed sensor
----------	-----------------------------------

a. Replace turbine speed sensor on malfunctioning vehicle with a new one.
b. Check if fault is eliminated.

NO

Go to step 2

YES

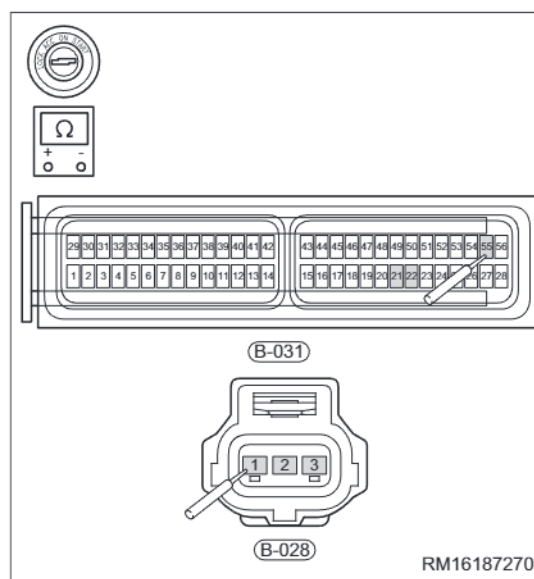
Replace turbine speed sensor

2 Check wire harness or connector (turbine speed sensor - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect turbine speed sensor wire harness connector B-028 and TCU wire harness connector B-031.
- Check connectors B-028 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-028 (1, 2, 3) - B-031 (55, 22, 21)	Always	Continuity

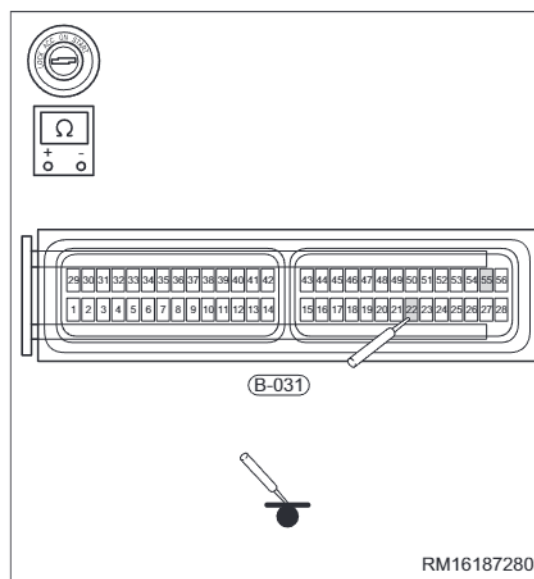


Check for Short

Multimeter Connection	Condition	Specified Condition
B-031 (55, 22) - Body ground	Always	No continuity

NG

Replace wire harness or connector (turbine speed sensor - TCU)



OK

3 Recheck DTC

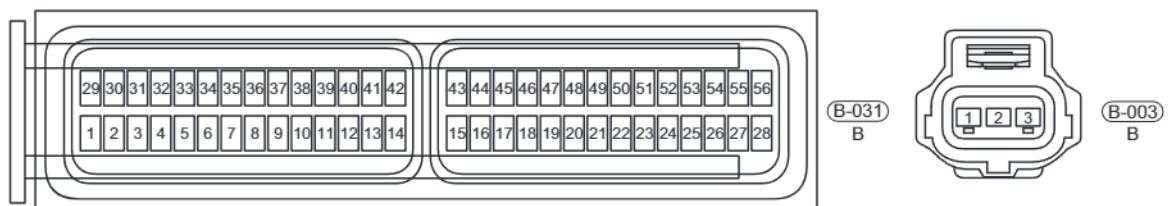
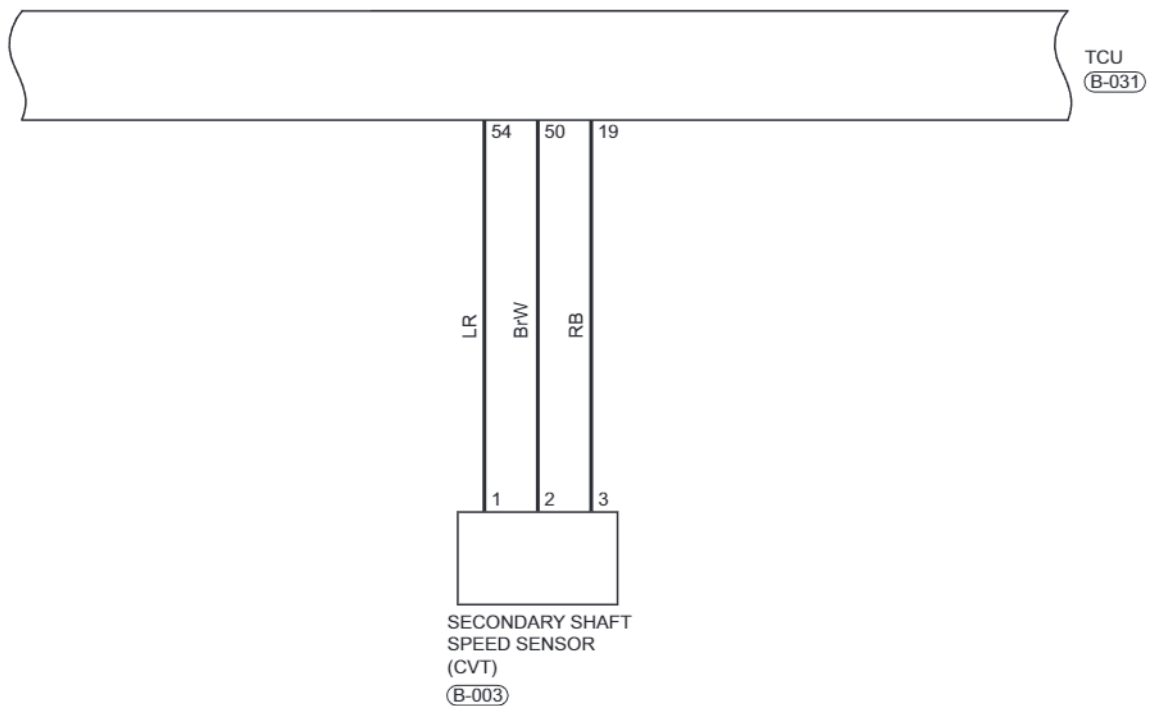
- Using X-431 3G diagnostic tester, read TCU DTC.
- Refer to "DTC Confirmation Procedure".
- Check if DTC P0715, P0716 still exist.

YES

Replace TCU

DTC	P0720	Output Speed Sensor Circuit
-----	-------	-----------------------------

DTC	P1745	Second Speed Sensor Plausible
-----	-------	-------------------------------



EM16180290

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0720	Output Speed Sensor Circuit	Start engine and keep it at following status for at least 1 min: throttle opening not less than 10%, at D gear, engine speed higher than 800 rpm	Output speed signal is higher than allowable value within a period	- Incorrect installation of output speed sensor - Signal circuit open or short circuit
P1745	Second Speed Sensor Plausible	Start engine and keep it at following status for at least 30 seconds: throttle opening higher than 10%, at D gear, vehicle speed higher than 10 km/h	Difference between output speed after conversing vehicle speed signal and actual measured speed is higher than limit	- Output speed sensor power circuit poor contact - Output speed sensor failure - TCU signal circuit failure

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

18

HINT:

After the fault is eliminated, verify DTC and symptom again.

1

Check second speed sensor

- Replace second speed sensor on malfunctioning vehicle with a new one.
- Check if fault is eliminated.

NO

Go to step 2

YES

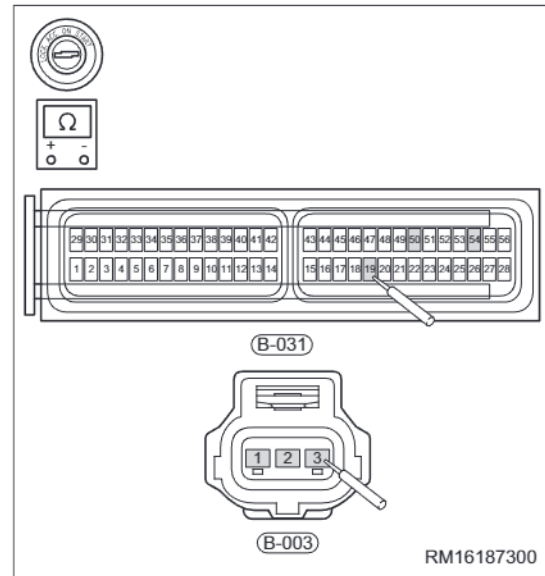
Replace second speed sensor

2 Check wire harness or connector (second speed sensor - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect second speed sensor wire harness connector B-003 and TCU wire harness connector B-031.
- Check connectors B-003 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-003 (1, 2, 3) - B-031 (54, 50, 19)	Always	Continuity

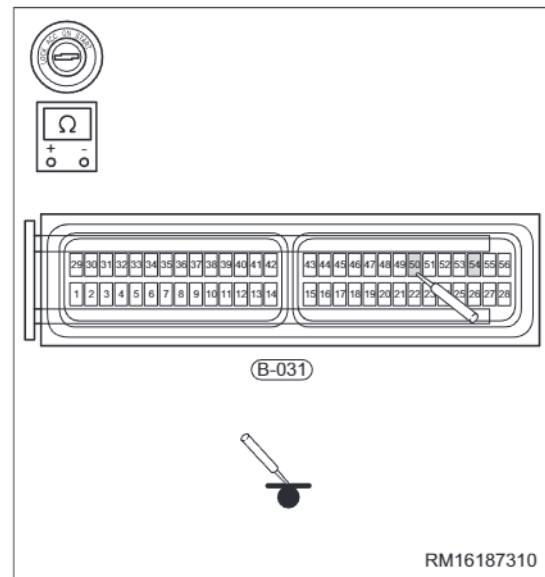


Check for Short

Multimeter Connection	Condition	Specified Condition
B-031 (54, 50) - Body ground	Always	No continuity

NG

Replace wire harness or connector
(second speed sensor - TCU)



OK

3 Recheck DTC

- Using X-431 3G diagnostic tester, read TCU DTC.
- Refer to "DTC Confirmation Procedure".
- Check if DTC P0720, P1745 still exist.

YES

Replace TCU

DTC	P0730	Incorrect Gear Ratio
-----	-------	----------------------

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0730	Incorrect Gear Ratio	Start engine and keep it at following status for at least 1 min: throttle opening not less than 15%, at D gear, vehicle speed not less than 18 km/h	Absolute value of difference of target speed ratio and actual speed ratio is higher than standard value	- Speed ratio control valve body circuit seized - Solenoid wire harness or connector open circuit or short circuit - Auxiliary oil pressure control failure or too low

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure**HINT:**

After the fault is eliminated, verify DTC and symptom again.

18

1	Carry out following preliminary checks
----------	---

- Engine wire harness (check for looseness, dirt and other fault)
- Transmission sensor (check for damage, dirt and other fault)
- Are all checks OK?

NO	Repair fault
-----------	---------------------

YES

2 Check transmission system

- a. Use diagnostic tester to check the transmission system.
- b. Is there any DTC except for P0730?

NO**Repair these DTCs fault****YES****3 Read data stream**

- a. Use diagnostic tester to read data stream related to engine and transmission system speed sensor for abnormality.
- b. Transmission system should be normal.
- c. Is check result normal?

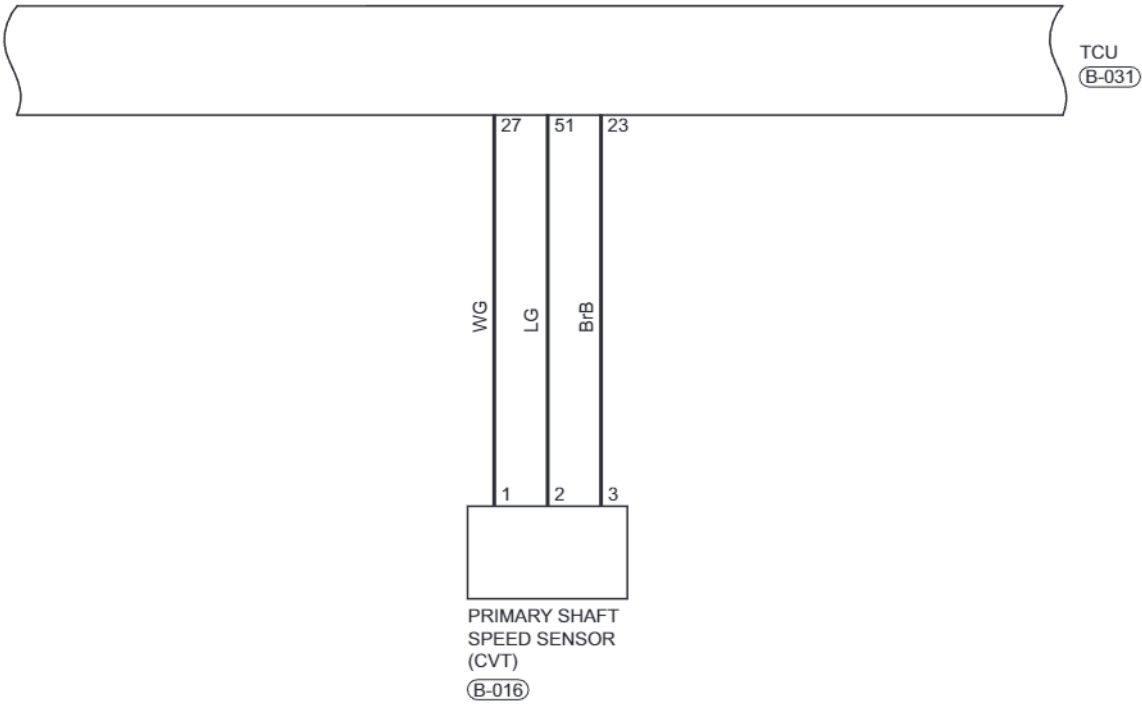
NO**Repair fault****YES****4 Check for DTCs**

- a. Using X-431 3G diagnostic tester, select Read Code.
- b. Refer to "DTC Confirmation Procedure".
- c. Is DTC P0730 still present?

NO**Replace solenoid and wire harness assembly****YES****System is normal****18**

DTC	P0791	Intermediate Shaft Speed Sensor 'A' Circuit
-----	-------	---

DTC	P0792	Intermediate Shaft Speed Sensor 'A' Circuit Range
-----	-------	---



18



EM16180320

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0791	Intermediate Shaft Speed Sensor 'A' Circuit	Start engine and keep it at following status for at least 1 min: throttle opening not less than 10%, at D gear, engine speed higher than 800 rpm	Input speed signal is higher than allowable value within a period	• Incorrect installation of input speed sensor • Signal circuit open or short circuit • Input speed sensor power circuit poor contact • Input speed sensor failure • TCU signal treatment circuit failure
P0792	Intermediate Shaft Speed Sensor 'A' Circuit Range	Start engine and keep it at following status for at least 10 seconds: throttle opening not less than 10%, at D gear, engine speed higher than 800 rpm	Input speed signal exceeds standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

HINT:

After the fault is eliminated, verify DTC and symptom again.

1 Check intermediate shaft speed sensor

- Replace intermediate shaft speed sensor on malfunctioning vehicle with a new one.
- Check if fault is eliminated.

NO

Go to step 2

YES

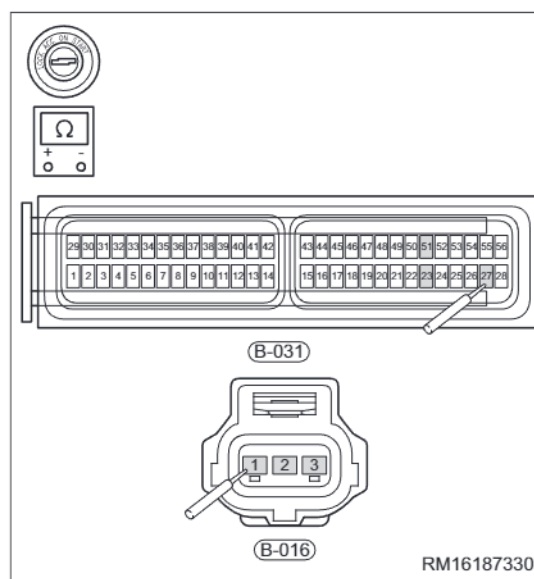
Replace intermediate shaft speed sensor

2 Check wire harness or connector (intermediate shaft speed sensor - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect intermediate shaft speed sensor wire harness connector B-016 and TCU wire harness connector B-031.
- Check connectors B-016 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-016 (1, 2, 3) - B-031 (27, 51, 23)	Always	Continuity

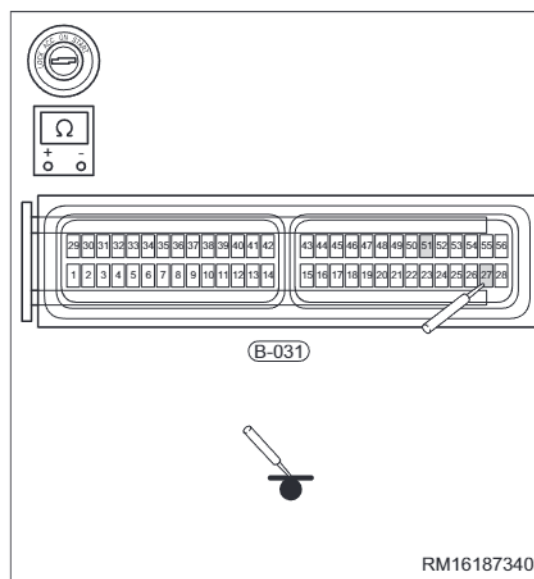


Check for Short

Multimeter Connection	Condition	Specified Condition
B-031 (27, 51) - Body ground	Always	No continuity

NG

Replace wire harness or connector
(intermediate shaft speed sensor - TCU)



OK

3 Recheck DTC

- Using X-431 3G diagnostic tester, read TCU DTC.
- Refer to "DTC Confirmation Procedure".
- Check if DTC P0791, P0792 still exist.

YES

Replace TCU

DTC	P0811	Drive Clutch 'A' Slippage
DTC	P081E	Reverse Clutch 'B' Slippage
DTC	P0894	Transmission Component Slipping

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0811	Drive Clutch 'A' Slippage	Start engine and keep it at following status for at least 30 seconds: apply brake, at D gear	High slippage speed of forward/reverse clutch input and output speed	- Clutch control valve core seized - Clutch control solenoid short circuit to power - Clutch friction plate serious wearing or sinter
P081E	Reverse Clutch 'B' Slippage	Start engine and keep it at following status for at least 30 seconds: apply brake, at R gear		
P0894	Transmission Component Slipping	Start engine and make the operation as following: 20% - 50% throttle opening, at D gear, vehicle speed higher than 30 km/h, constant driving time not less than 30 seconds	Torque converter locking clutch is engaged for a long time or high slippage speed exists after engagement	- Solenoid circuit open circuit or short circuit - TCU torque converter locking control solenoid failure - Hydraulic control circuit fault

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

18

Diagnosis Procedure

HINT:

After the fault is eliminated, verify DTC and symptom again.

1	Carry out following preliminary checks
----------	---

- Transmission sensor wire harnesses (check for looseness, dirt and other fault)
- Transmission sensor (check for damage, dirt and other fault)
- Are all checks OK?



NO

Repair fault

YES

2

Check transmission system

- a. Use diagnostic tester to check transmission system.
- b. Is there any DTC except for P0811, P081E, P0894?

NO

Repair these DTCs fault

YES

3

Read data stream

- a. Use diagnostic tester to read data stream related to engine and transmission system for abnormality.
- b. Transmission system should be normal.
- c. Is check result normal?

NO

Diagnose abnormal data stream fault

YES

4

Check for DTCs

- a. Using X-431 3G diagnostic tester, select Read Code.
- b. Refer to "DTC Confirmation Procedure".
- c. Is DTC P0811, P081E or P0894 still present?

NO

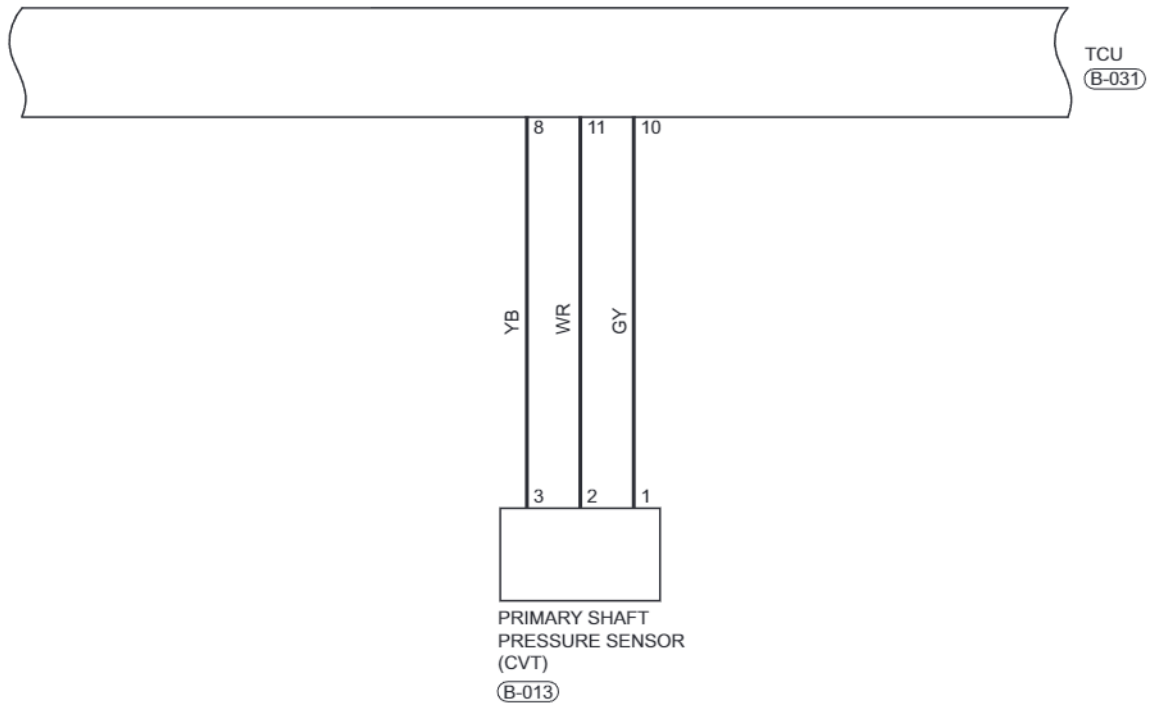
Replace solenoid and wire harness assembly

YES

18

System is normal

DTC	P0842	Transmission Fluid Pressure Sensor 'A' Circuit Low
DTC	P0843	Transmission Fluid Pressure Sensor 'A' Circuit High



EM16180350

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0842	Transmission Fluid Pressure Sensor 'A' Circuit Low	Start engine and wait for at least 10 seconds	Transmission fluid pressure sensor 'A' oil pressure is less than allowable min. value	- Transmission fluid pressure sensor 'A' failure - Signal circuit open or short circuit - TCU signal circuit failure
P0843	Transmission Fluid Pressure Sensor 'A' Circuit High		Transmission fluid pressure sensor 'A' oil pressure is more than allowable max. value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

HINT:

After the fault is eliminated, verify DTC and symptom again.

1 Check primary shaft pressure sensor

- Replace primary shaft pressure sensor on malfunctioning vehicle with a new one.
- Check if fault is eliminated.

NO

Go to step 2

YES

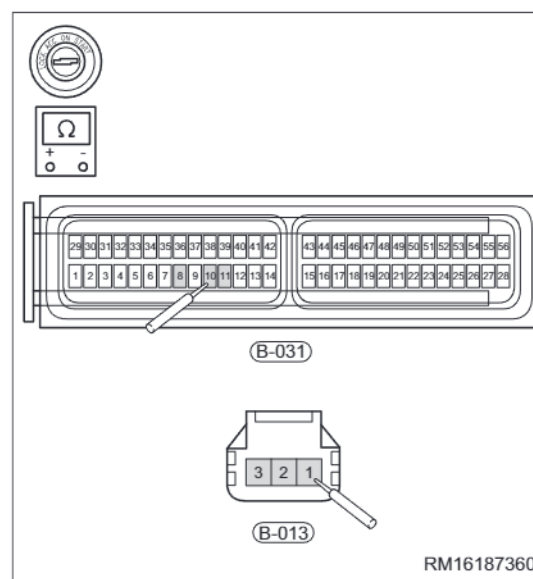
Replace primary shaft pressure sensor

2 Check wire harness or connector (primary shaft pressure sensor - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect primary shaft pressure sensor wire harness connector B-013 and TCU wire harness connector B-031.
- Check connectors B-013 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-013 (1, 2, 3) - B-031 (10, 11, 8)	Always	Continuity

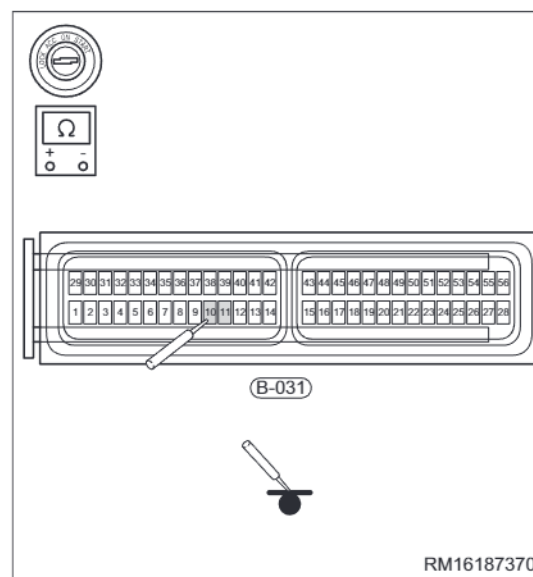


Check for Short

Multimeter Connection	Condition	Specified Condition
B-031 (10, 11) - Body ground	Always	No continuity

NG

Replace wire harness or connector
(primary shaft pressure sensor - TCU)



OK

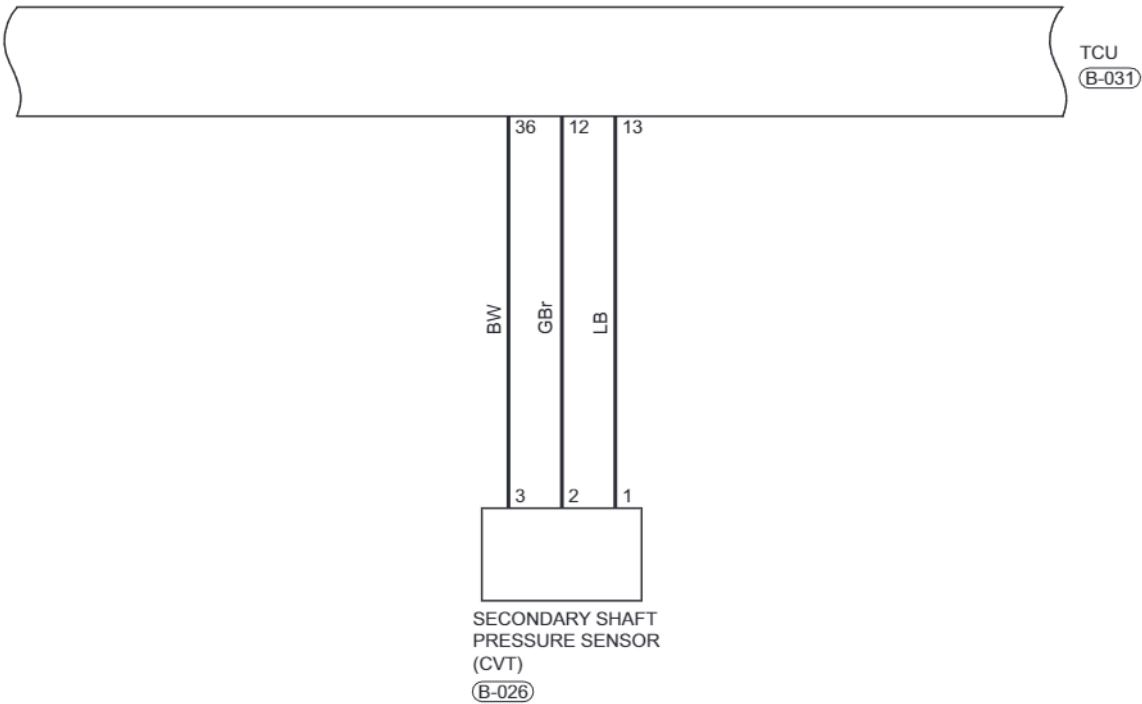
3 Recheck DTC

- Using X-431 3G diagnostic tester, read TCU DTC.
- Refer to "DTC Confirmation Procedure".
- Check if DTC P0842, P0843 still exist.

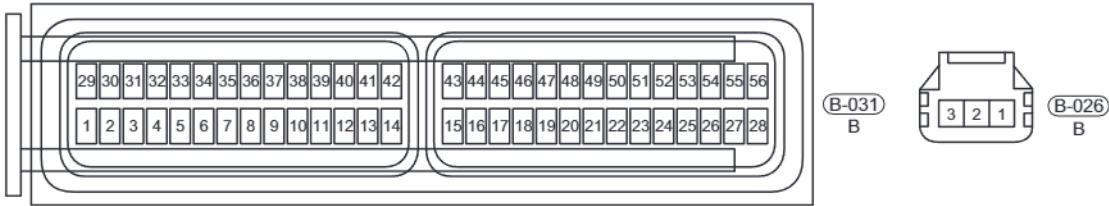
YES

Replace TCU

DTC	P0847	Transmission Fluid Pressure Sensor 'B' Circuit Low
DTC	P0848	Transmission Fluid Pressure Sensor 'B' Circuit High



18



EM16180380

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0847	Transmission Fluid Pressure Sensor 'B' Circuit Low	Start engine and wait for at least 10 seconds	Transmission fluid pressure sensor 'B' oil pressure is less than allowable min. value	- Transmission fluid pressure sensor 'B' failure - Signal circuit open or short circuit - TCU signal circuit failure
P0848	Transmission Fluid Pressure Sensor 'B' Circuit High		Transmission fluid pressure sensor 'B' oil pressure is more than allowable max. value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

HINT:

After the fault is eliminated, verify DTC and symptom again.

1 Check second shaft pressure sensor

- Replace second shaft pressure sensor on malfunctioning vehicle with a new one.
- Check if fault is eliminated.

NO

Go to step 2

YES

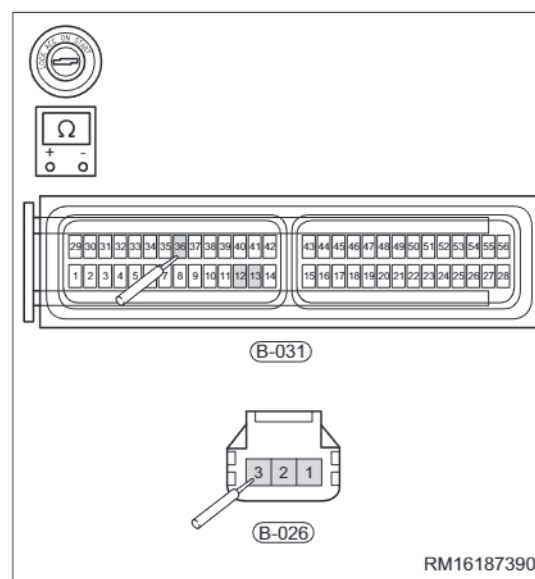
Replace second shaft pressure sensor

2 Check wire harness or connector (second shaft pressure sensor - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect second shaft pressure sensor wire harness connector B-026 and TCU wire harness connector B-031.
- Check connectors B-026 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-026 (1, 2, 3) - B-031 (13, 12, 36)	Always	Continuity

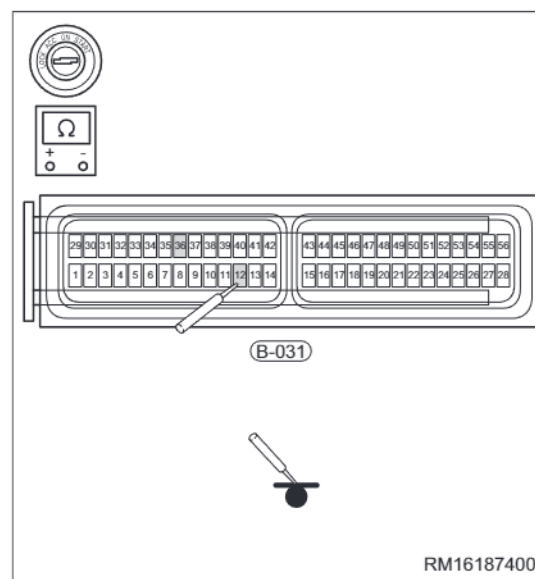


Check for Short

Multimeter Connection	Condition	Specified Condition
B-031 (36, 12) - Body ground	Always	No continuity

NG

Replace wire harness or connector
(second shaft pressure sensor - TCU)



OK

3 Recheck DTC

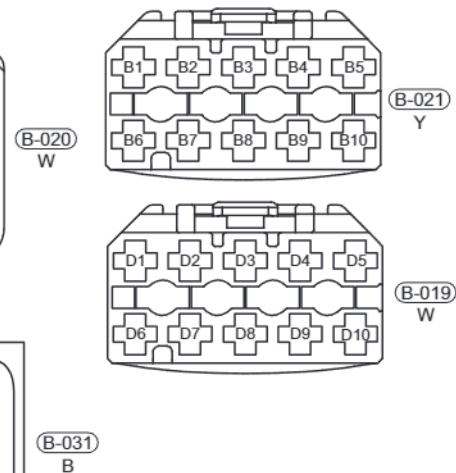
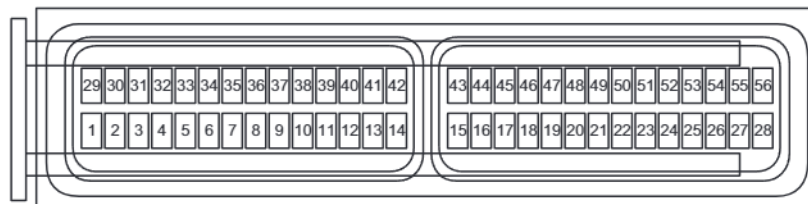
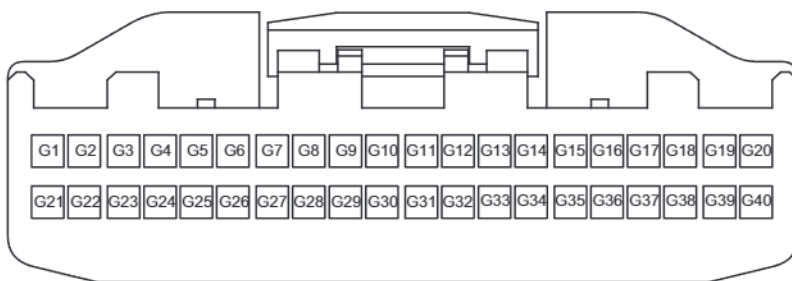
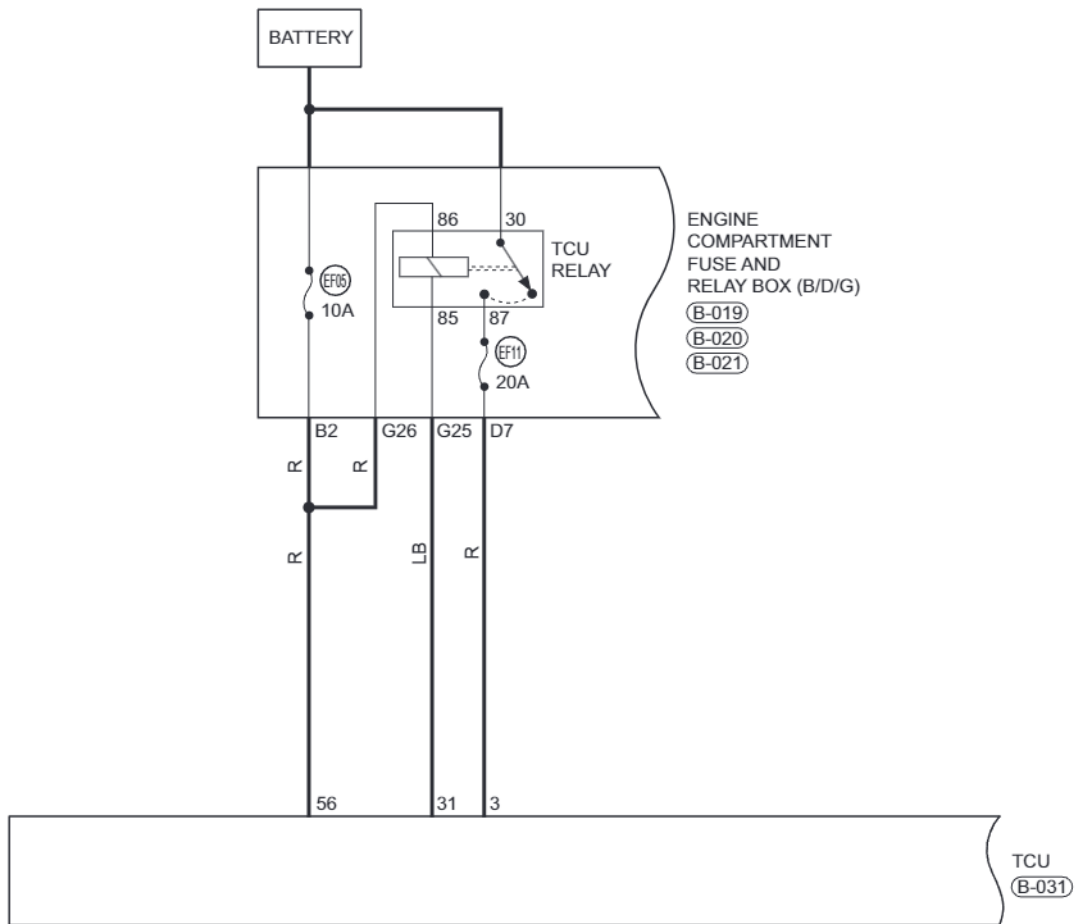
- Using X-431 3G diagnostic tester, read TCU DTC.
- Refer to "DTC Confirmation Procedure".
- Check if DTC P0847, P0848 still exist.

YES

Replace TCU

DTC	P0890	TCM Power Relay Sense Circuit Low
-----	-------	-----------------------------------

DTC	P0891	TCM Power Relay Sense Circuit High
-----	-------	------------------------------------



EM16180410

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0890	TCM Power Relay Sense Circuit Low	Start engine and wait for at least 10 seconds	TCU power command is sent, solenoid output feedback voltage is less than standard value	- Solenoid circuit open circuit or short circuit - TCU power relay failure
P0891	TCM Power Relay Sense Circuit High		TCU power command is not sent, solenoid output feedback voltage is higher than standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

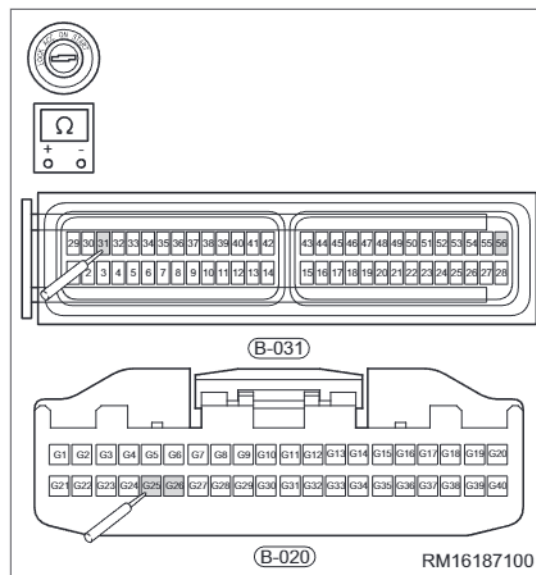
1 Check TCU power supply circuit 2 (engine compartment fuse and relay box - TCU)

18

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect wire harness connectors B-020, B-019 and B-031.
- Check wire harness connectors B-020, B-019 and B-031 with a digital multimeter according to the table below.

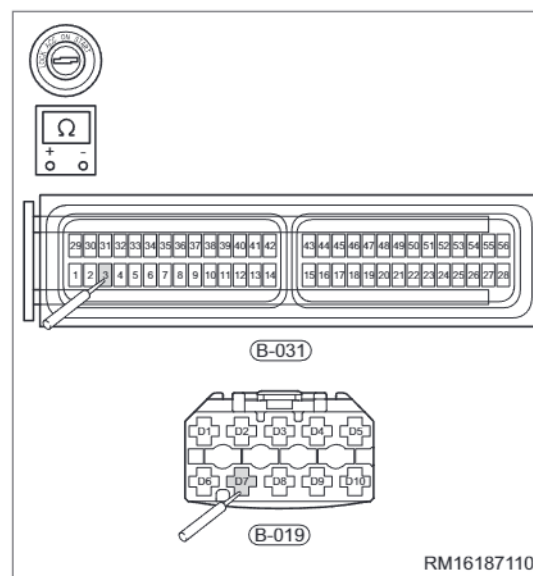
Check for Open

Multimeter Connection	Condition	Specified Condition
B-020 (G25) - B-031 (31)	Always	Continuity
B-020 (G26) - B-031 (56)	Always	Continuity



Check for Open

Multimeter Connection	Condition	Specified Condition
B-019 (D7) - B-031 (3)	Always	Continuity



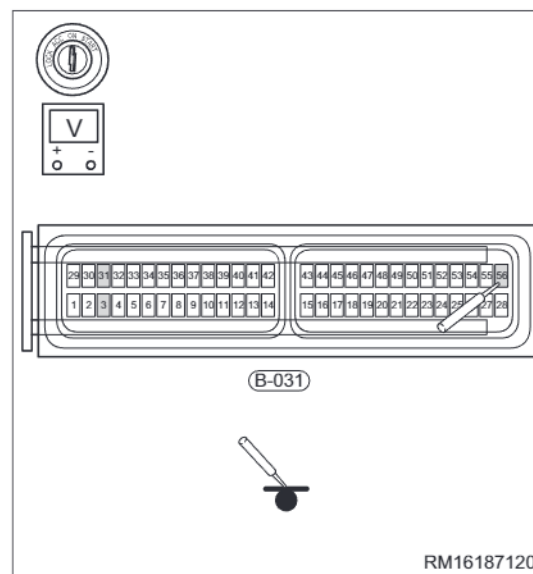
- e. Connect connectors.
- f. Connect the negative battery cable.
- g. Check wire harness connectors B-020 and B-031 with a digital multimeter according to the table below.

HINT:

When using a digital multimeter to check the connecting condition of connectors, measure the system voltage from backside of connector.

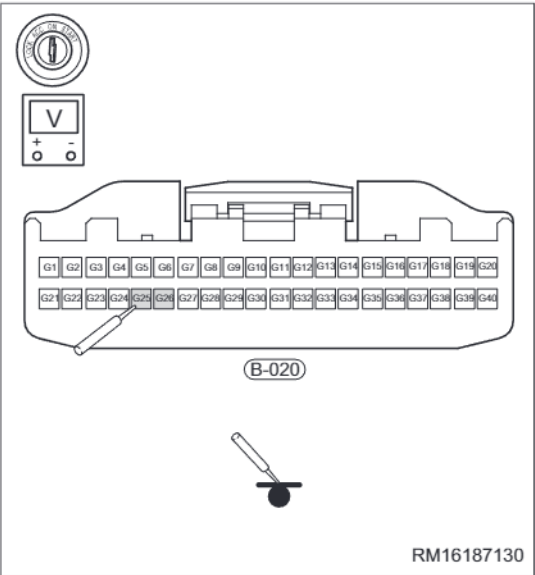
Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-031 (31) - Body ground	Always	11 to 14 V
B-031 (56) - Body ground	Always	11 to 14 V
B-031 (3) - Body ground	Always	11 to 14 V



Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-020 (G25) - Body ground	Always	11 to 14 V
B-020 (G26) - Body ground	Always	11 to 14 V

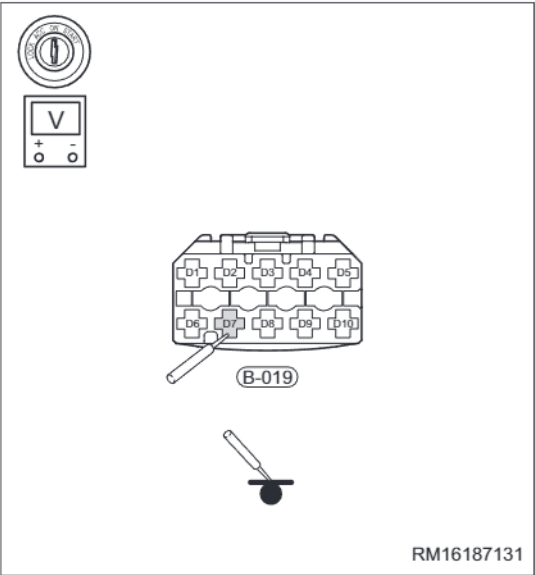


Standard Voltage

Multimeter Connection	Condition	Specified Condition
B-019 (D7) - Body ground	Always	11 to 14 V

NG

Go to step 2



18

OK

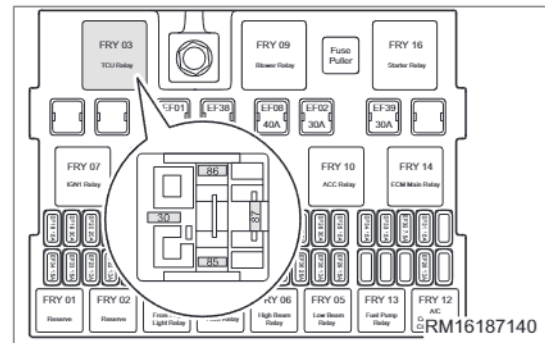
Go to step 3

2 Check TCU relay

- Remove TCU relay from engine compartment fuse and relay box.
- Check TCU relay with a digital multimeter according to the table below.

Normal Condition

Multimeter Connection	Condition	Specified Condition
30 - 87	Battery positive 85 - Battery negative 86 (battery voltage not applied)	No continuity
30 - 87	Battery positive 85 - Battery negative 86 (battery voltage applied)	Continuity



NG

Replace TCU relay

OK

Replace TCU power supply circuit 2 (engine compartment fuse and relay box - TCU)

3 Recheck DTC

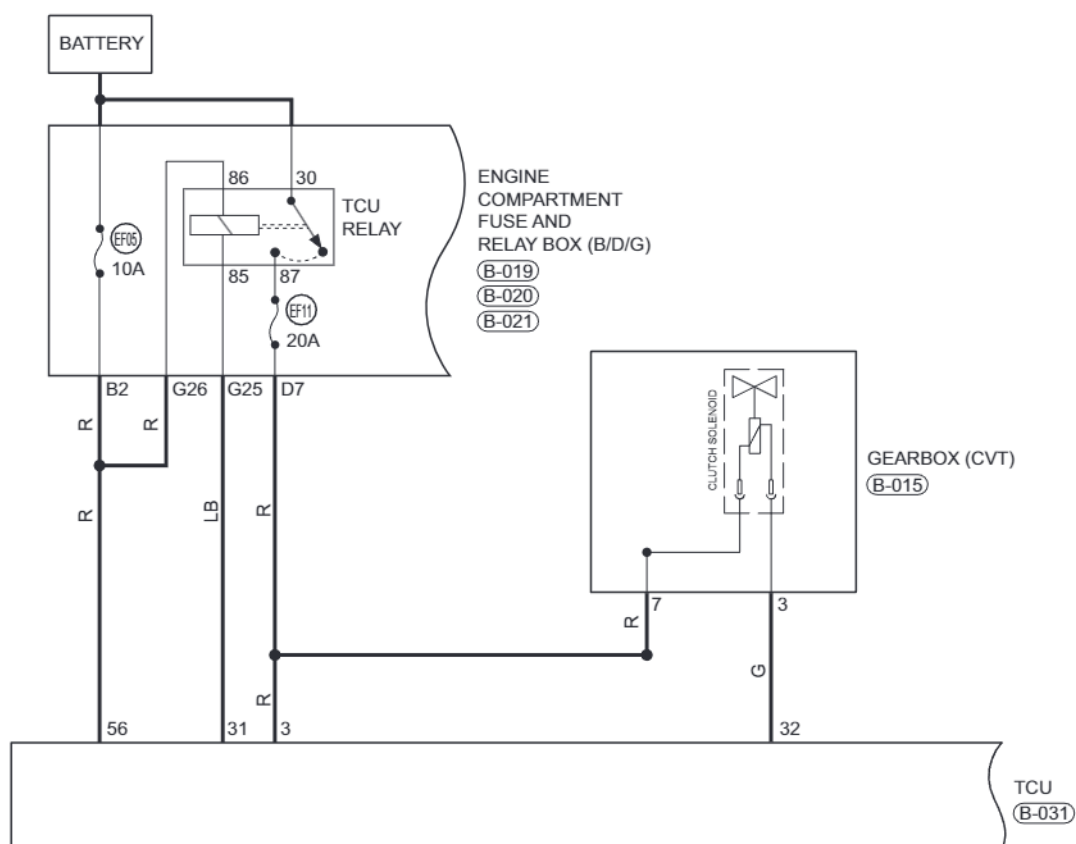
- Using X-431 3G diagnostic tester, read TCU DTC.
- Refer to "DTC Confirmation Procedure".
- Check if DTC P0890, P0891 still exist.

YES

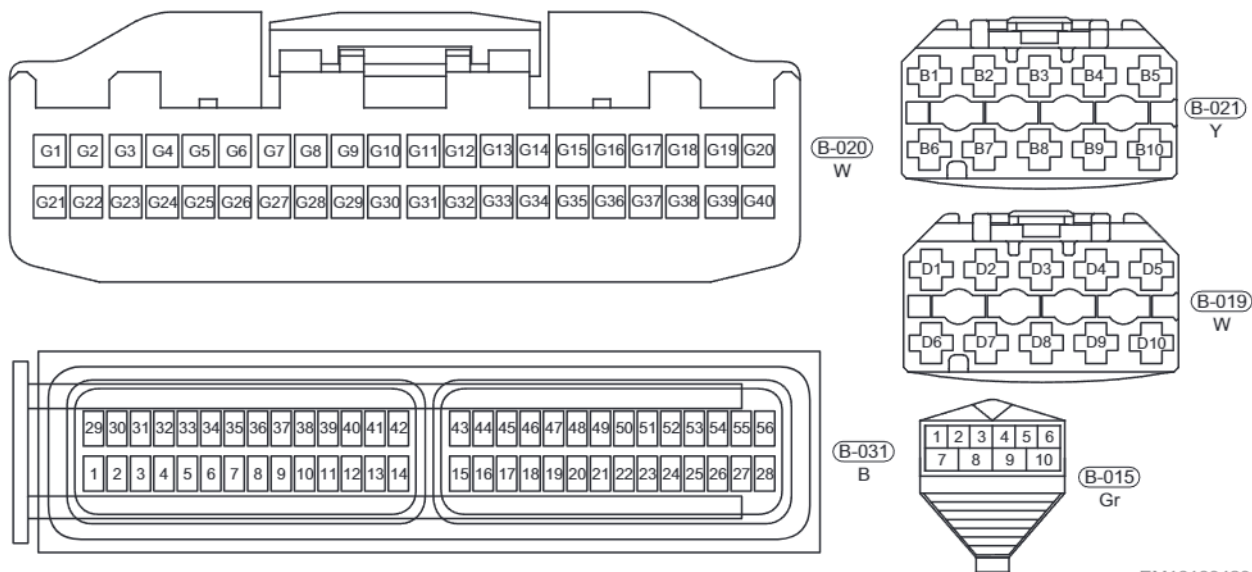
18

Replace TCU

DTC	P0900	Clutch Actuator Circuit Open
DTC	P0902	Clutch Actuator Circuit Low
DTC	P0903	Clutch Actuator Circuit High



18



EM16180420

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0900	Clutch Actuator Circuit Open	Start engine and engage D or R gear for at least 5 seconds	Solenoid output feedback voltage is normal, clutch solenoid feedback current is less than standard value	• Solenoid circuit open circuit or short circuit • Clutch control solenoid failure
P0902	Clutch Actuator Circuit Low		When the solenoid output feedback voltage is normal, clutch solenoid feedback current is higher than standard value	
P0903	Clutch Actuator Circuit High		When solenoid output feedback voltage is normal, clutch solenoid feedback current is less than standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

18

Diagnosis Procedure

HINT:

After the fault is eliminated, verify DTC and symptom again.

1 Check transmission connector

- Disconnect transmission connector.
- Check transmission connector.

NG

Repair or replace connector



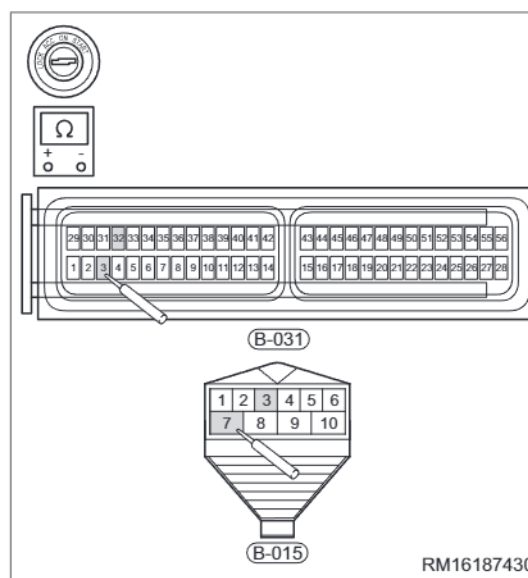
OK

2 Check wire harness or connector (transmission connector - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect transmission wire harness connector B-015 and TCU wire harness connector B-031.
- Check connectors B-015 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-015 (7, 3) - B-031 (3, 32)	Always	Continuity

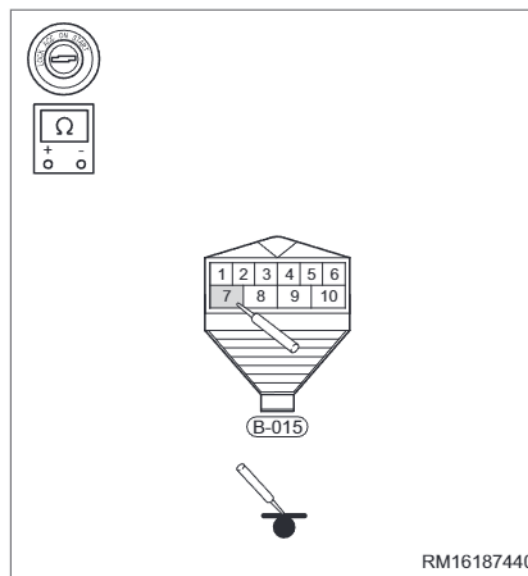


Check for Short

Multimeter Connection	Condition	Specified Condition
B-015 (7) - Body ground	Always	No continuity

NG

Replace wire harness or connector (transmission connector - TCU)



OK

3**Recheck DTC**

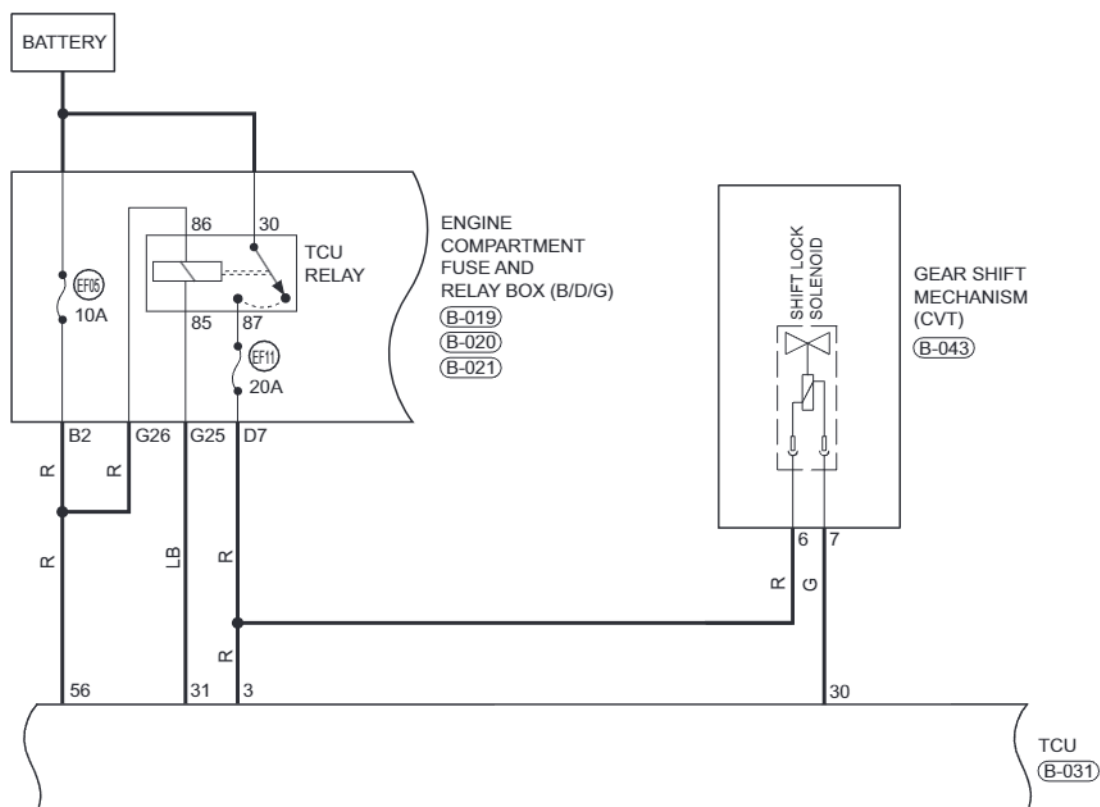
- a. Using X-431 3G diagnostic tester, read TCU DTC.
- b. Refer to "DTC Confirmation Procedure".
- c. Check if DTC P0900, P0902, P0903 still exist.

YES**Replace TCU**

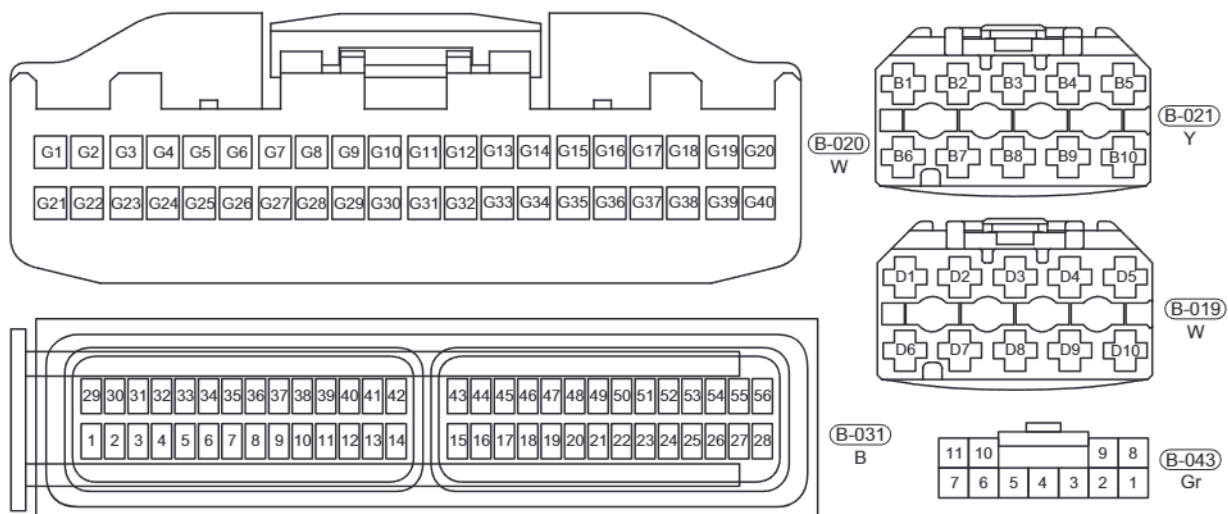
DTC	P0928	Gear Shift Lock Solenoid Control Circuit Open
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DTC	P0930	Gear Shift Lock Solenoid Control Circuit Low
-----	-------	--

DTC	P0931	Gear Shift Lock Solenoid Control Circuit High
-----	-------	---



18



EM16180450

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0928	Gear Shift Lock Solenoid Control Circuit Open	Start engine, apply brake and then shift from P gear to R gear	Solenoid output feedback voltage is normal, gear shifting solenoid feedback current is less than standard value	- Solenoid circuit open circuit or short circuit - Gear shifting lock solenoid failure
P0930	Gear Shift Lock Solenoid Control Circuit Low		When solenoid output feedback voltage is normal, gear shifting lock solenoid feedback current is higher than standard value	
P0931	Gear Shift Lock Solenoid Control Circuit High		Solenoid output feedback voltage is normal, gear shifting solenoid feedback current is less than standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

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Diagnosis Procedure

HINT:

After the fault is eliminated, verify DTC and symptom again.

1

Check gear shift mechanism connector

- Turn ignition switch to LOCK.
- Remove auxiliary fascia console assembly ([See page 46-10](#)).
- Disconnect gear shift mechanism wire harness connector B-043.
- Check gear shift mechanism connector.

NG

Repair or replace connector



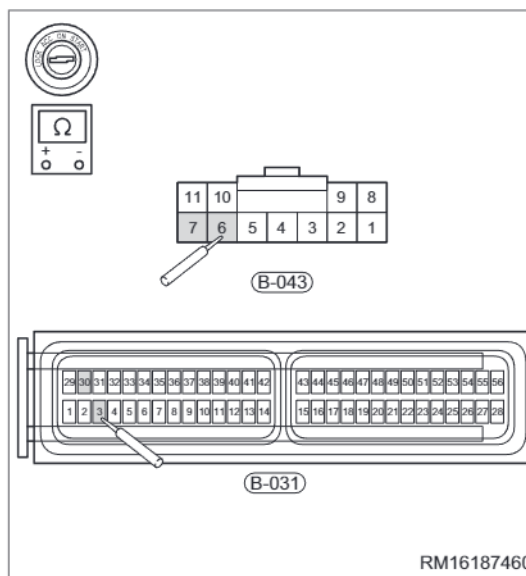
OK

2 Check wire harness or connector (gear shift mechanism connector - TCU)

- Disconnect TCU wire harness connector B-031.
- Check connectors B-043 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-043 (6, 7) - B-031 (3, 30)	Always	Continuity

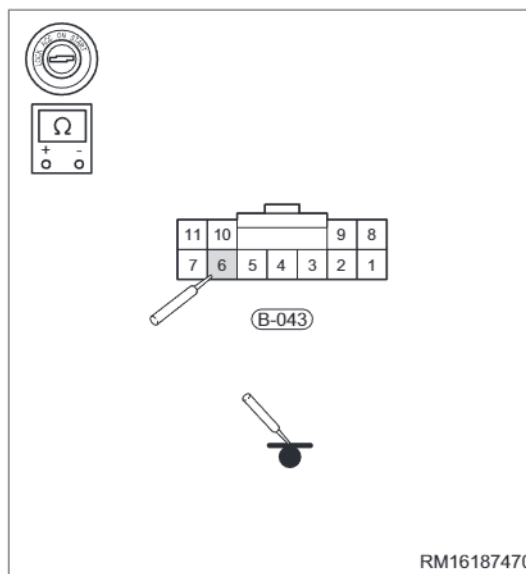


Check for Short

Multimeter Connection	Condition	Specified Condition
B-043 (6) - Body ground	Always	No continuity

NG

Replace wire harness or connector (gear shift mechanism connector - TCU)



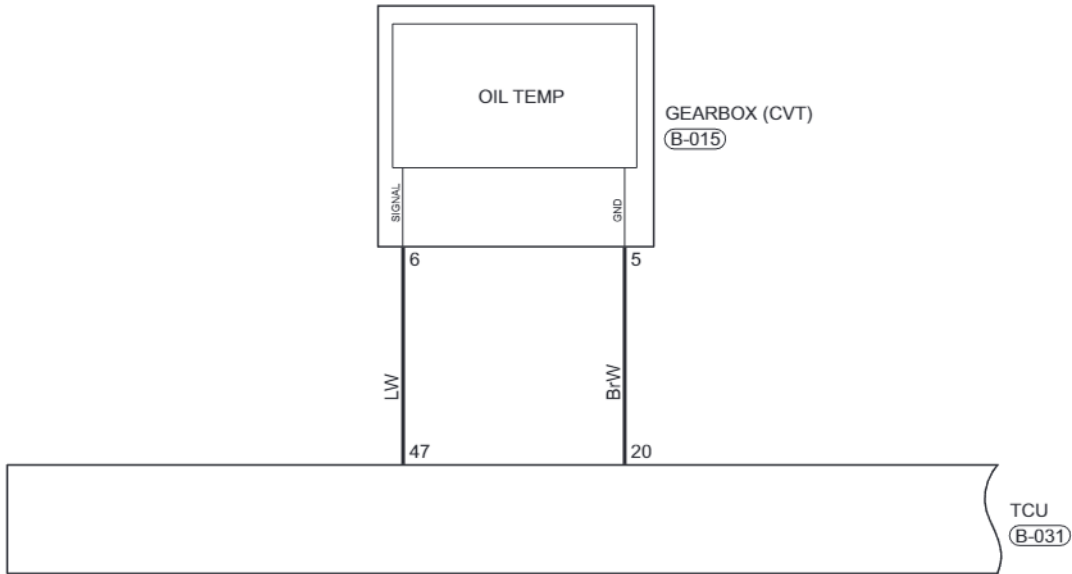
OK

3**Recheck DTC**

- a. Using X-431 3G diagnostic tester, read TCU DTC.
- b. Refer to "DTC Confirmation Procedure".
- c. Check if DTC P0928, P0930, P0931 still exist.

YES**Replace TCU**

DTC	P0938	Hydraulic Oil Temperature Sensor Range
DTC	P0939	Hydraulic Oil Temperature Sensor Circuit Low
DTC	P0940	Hydraulic Oil Temperature Sensor Circuit High



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EM16180480

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0938	Hydraulic Oil Temperature Sensor Range	Start engine and wait for at least 3 seconds	CVT oil temperature sensor voltage is less than high oil temperature Standard value	- CVT oil temperature sensor failure - Signal circuit open or short circuit - TCU signal circuit failure
P0939	Hydraulic Oil Temperature Sensor Circuit Low		CVT oil temperature sensor voltage is less than standard min. value	
P0940	Hydraulic Oil Temperature Sensor Circuit High		When CVT oil temperature sensor voltage is higher than standard max. value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

HINT:

After the fault is eliminated, verify DTC and symptom again.

1

Check transmission connector

- Disconnect transmission connector.
- Check transmission connector.

NG

Repair or replace connector

OK

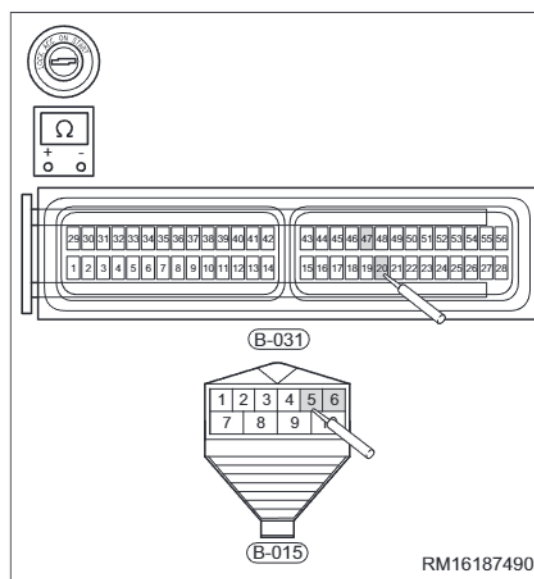
2

Check wire harness or connector (transmission connector - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect transmission wire harness connector B-015 and TCU wire harness connector B-031.
- Check connectors B-015 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-015 (6, 5) - B-031 (47, 20)	Always	Continuity

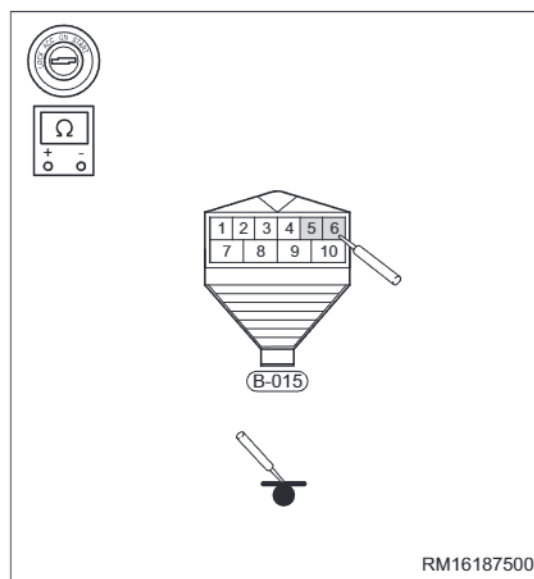


Check for Short

Multimeter Connection	Condition	Specified Condition
B-015 (6, 5) - Body ground	Always	No continuity

NG

Replace wire harness or connector
(transmission connector - TCU)



OK

3

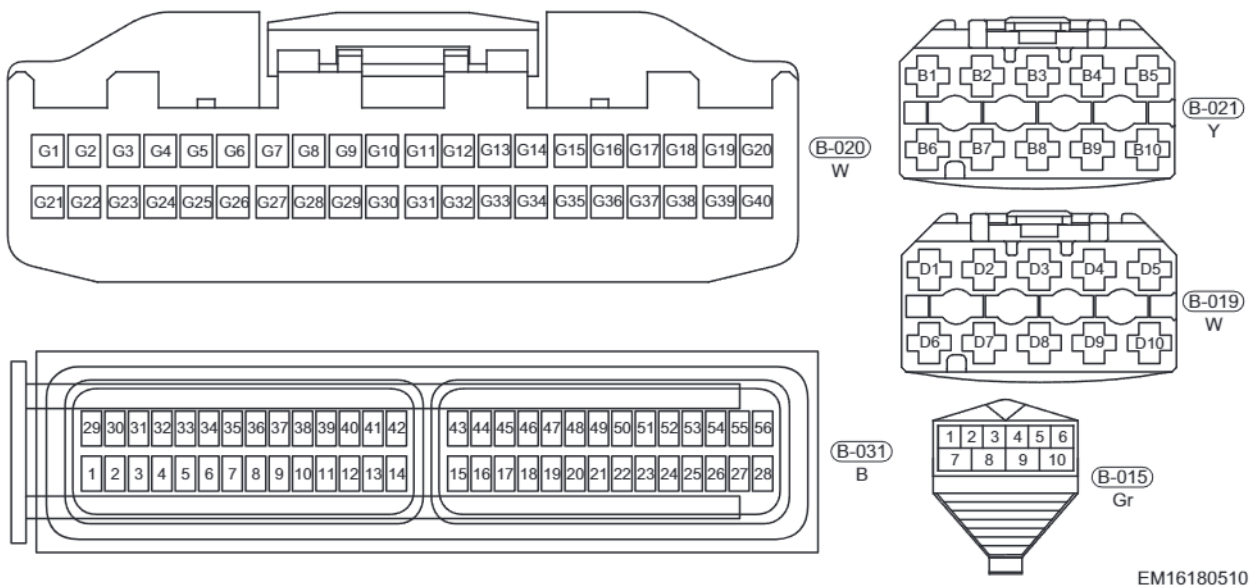
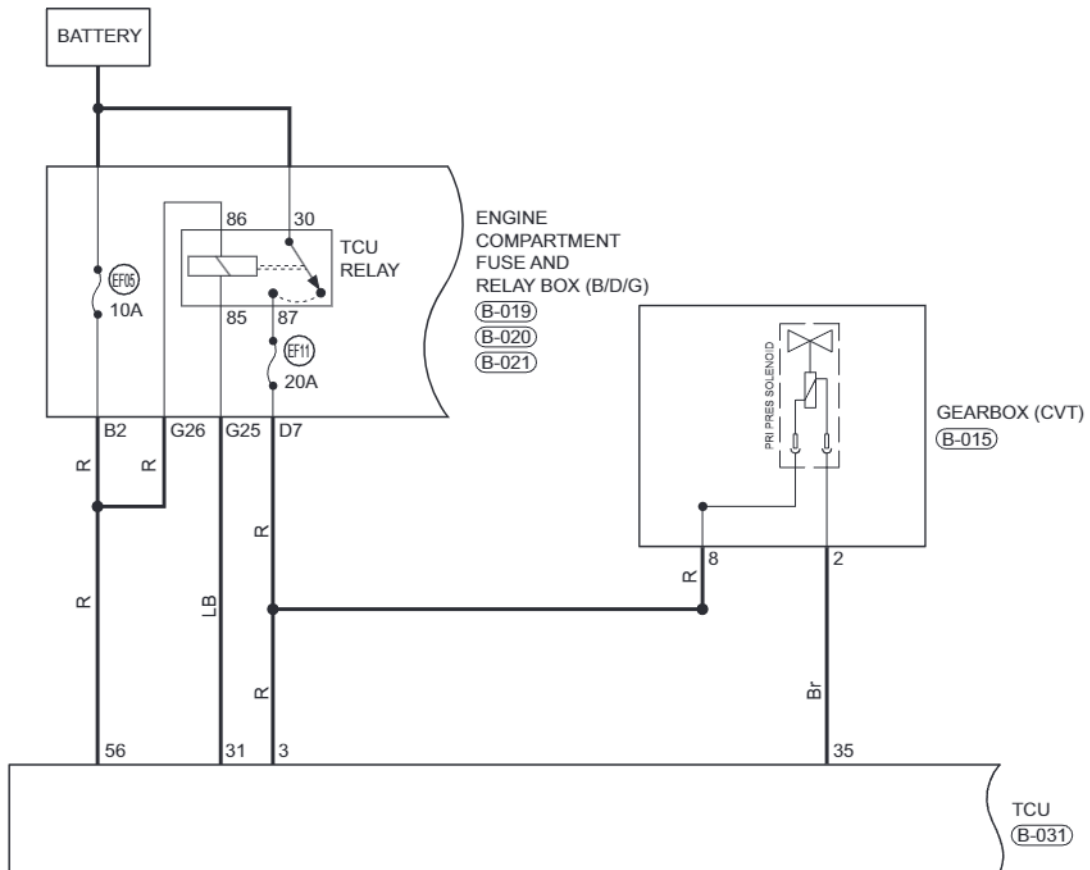
Recheck DTC

- Using X-431 3G diagnostic tester, read TCU DTC.
- Refer to "DTC Confirmation Procedure".
- Check if DTC P0938, P0939, P0940 still exist.

YES

Replace TCU

DTC	P0960	Pressure Control Solenoid 'A' Control Circuit Open
DTC	P0962	Pressure Control Solenoid 'A' Control Circuit Low
DTC	P0963	Pressure Control Solenoid 'A' Control Circuit High



DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0960	Pressure Control Solenoid 'A' Control Circuit Open	Start engine and wait for at least 3 seconds	Solenoid output feedback voltage is normal, oil pressure control solenoid 'A' feedback current is less than standard value	- Solenoid circuit open circuit or short circuit - Oil pressure control solenoid 'A' failure
P0962	Pressure Control Solenoid 'A' Control Circuit Low		Solenoid output feedback voltage is normal, oil pressure control solenoid 'A' feedback current is higher than standard max value	
P0963	Pressure Control Solenoid 'A' Control Circuit High		Solenoid output feedback voltage is normal, oil pressure control solenoid 'A' feedback current is less than standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

HINT:

After the fault is eliminated, verify DTC and symptom again.

1 Check transmission connector

- Disconnect transmission connector.
- Check transmission connector.

NG

Repair or replace connector

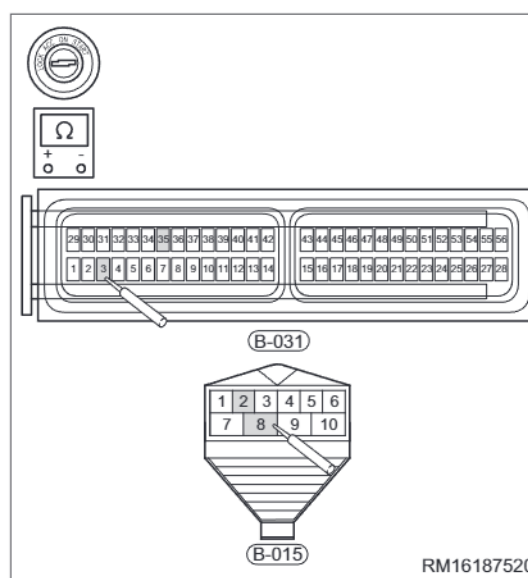
OK

2 Check wire harness or connector (transmission connector - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect transmission wire harness connector B-015 and TCU wire harness connector B-031.
- Check connectors B-015 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-015 (8, 2) - B-031 (3, 35)	Always	Continuity

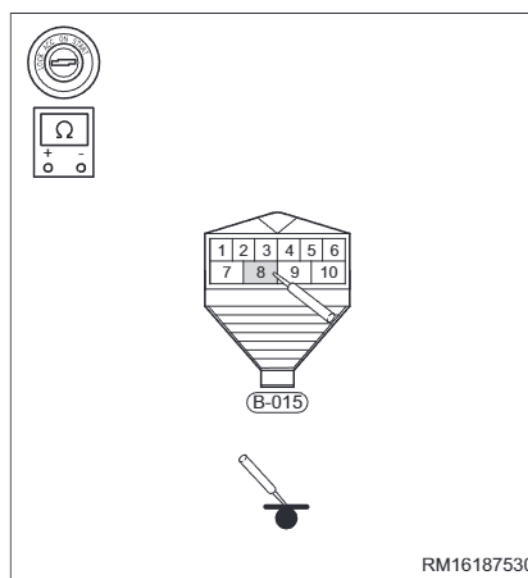


Check for Short

Multimeter Connection	Condition	Specified Condition
B-015 (8) - Body ground	Always	No continuity

NG

Replace wire harness or connector (transmission connector - TCU)



OK

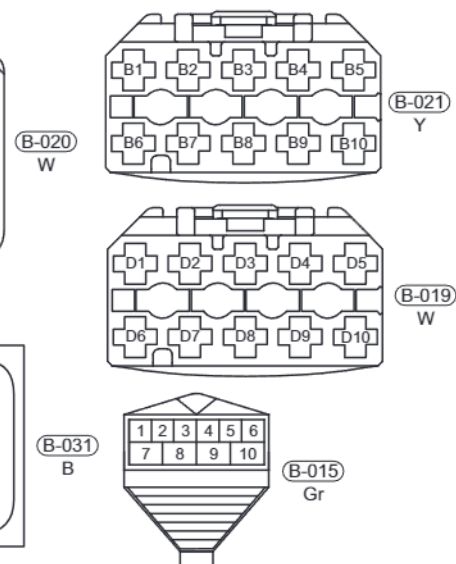
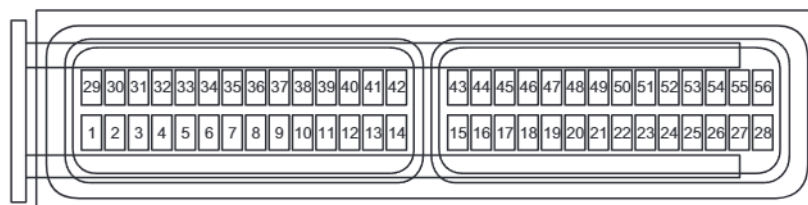
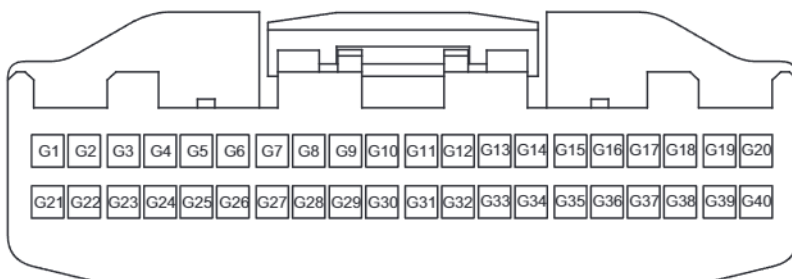
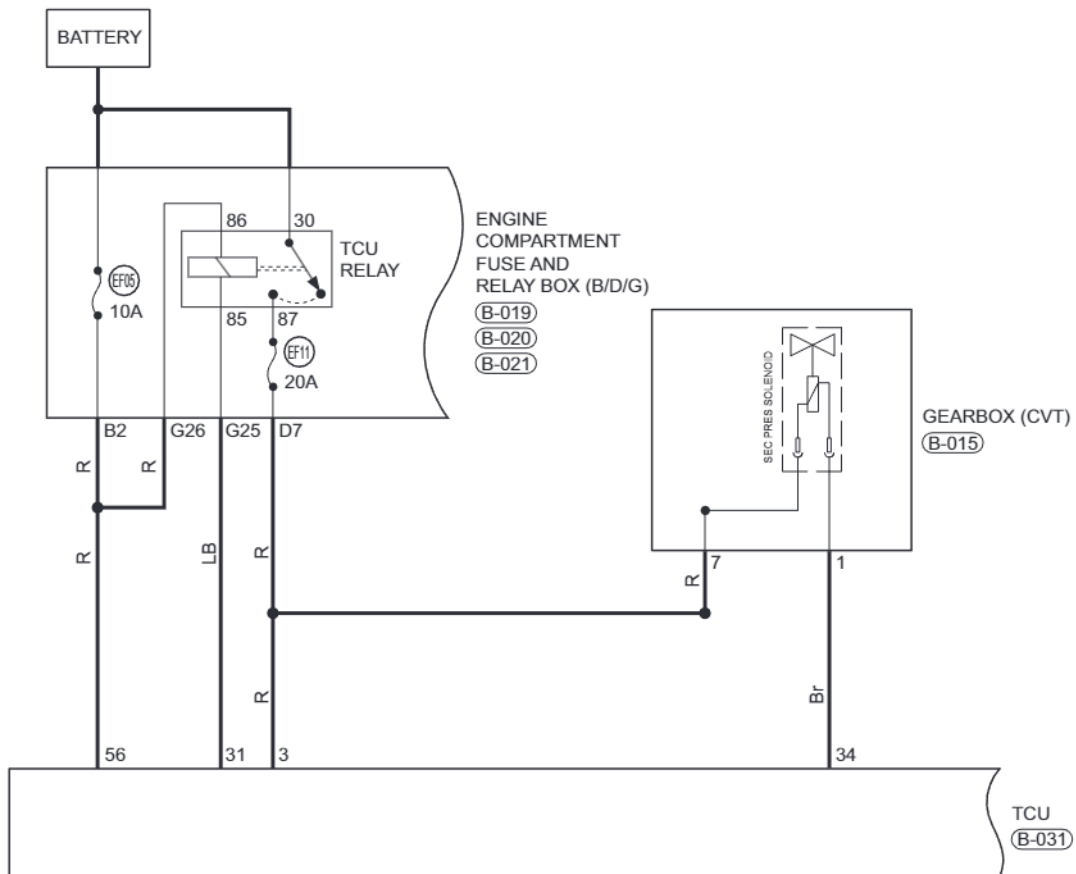
3 Recheck DTC

- a. Using X-431 3G diagnostic tester, read TCU DTC.
- b. Refer to "DTC Confirmation Procedure".
- c. Check if DTC P0960, P0962, P0963 still exist.

YES

Replace TCU

DTC	P0964	Pressure Control Solenoid 'B' Control Circuit Open
DTC	P0966	Pressure Control Solenoid 'B' Control Circuit Low
DTC	P0967	Pressure Control Solenoid 'B' Control Circuit High



EM16180540

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0964	Pressure Control Solenoid 'B' Control Circuit Open	Start engine and wait for at least 3 seconds	Solenoid output feedback voltage is normal, oil pressure control solenoid 'B' feedback current is less than standard value	• Solenoid circuit open circuit or short circuit • Oil pressure control solenoid 'B' failure
P0966	Pressure Control Solenoid 'B' Control Circuit Low		Solenoid output feedback voltage is normal, oil pressure control solenoid 'B' feedback current is higher than standard max value	
P0967	Pressure Control Solenoid 'B' Control Circuit High		Solenoid output feedback voltage is normal, oil pressure control solenoid 'B' feedback current is less than standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

HINT:

After the fault is eliminated, verify DTC and symptom again.

1 Check transmission connector

- Disconnect transmission connector.
- Check transmission connector.

NG

Repair or replace connector

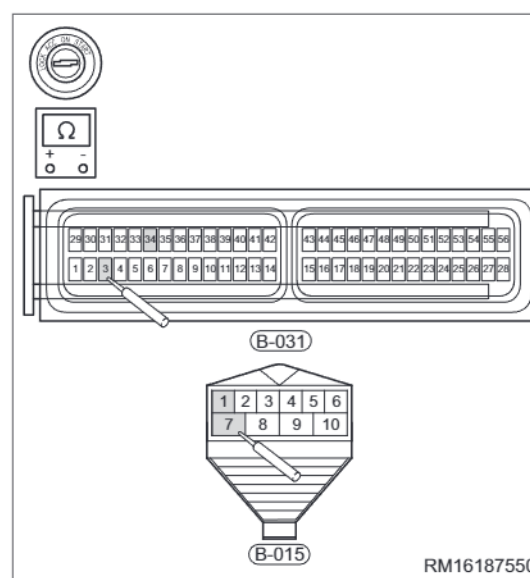
OK

2 Check wire harness or connector (transmission connector - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect transmission wire harness connector B-015 and TCU wire harness connector B-031.
- Check connectors B-015 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-015 (7, 1) - B-031 (3, 34)	Always	Continuity

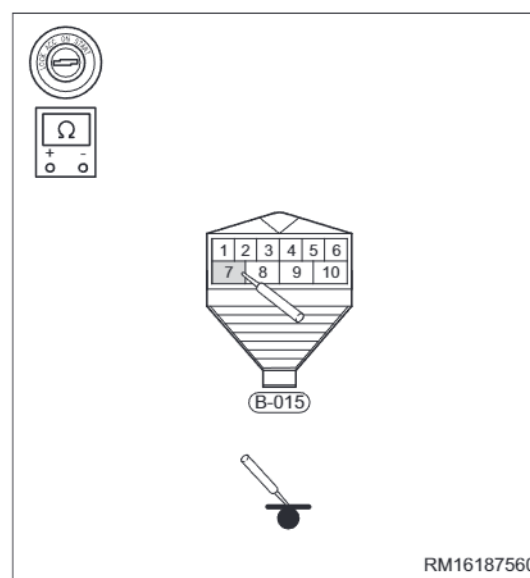


Check for Short

Multimeter Connection	Condition	Specified Condition
B-015 (7) - Body ground	Always	No continuity

NG

Replace wire harness or connector (transmission connector - TCU)



18

OK

3 Recheck DTC

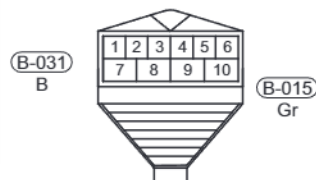
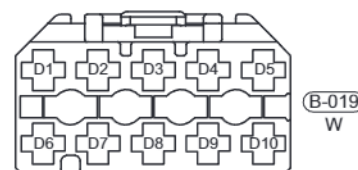
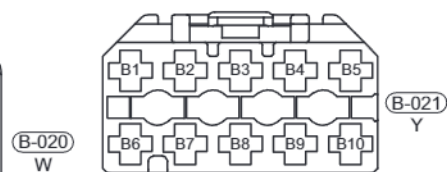
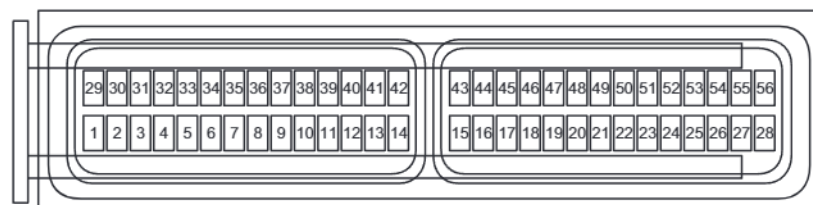
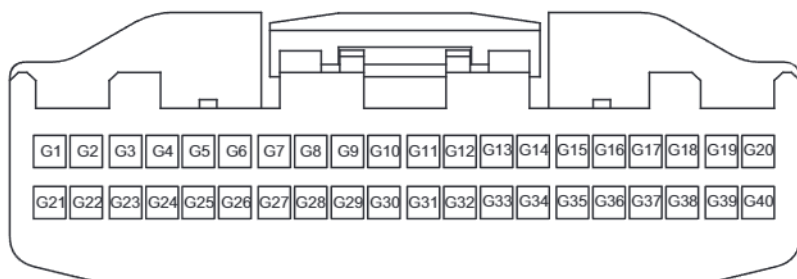
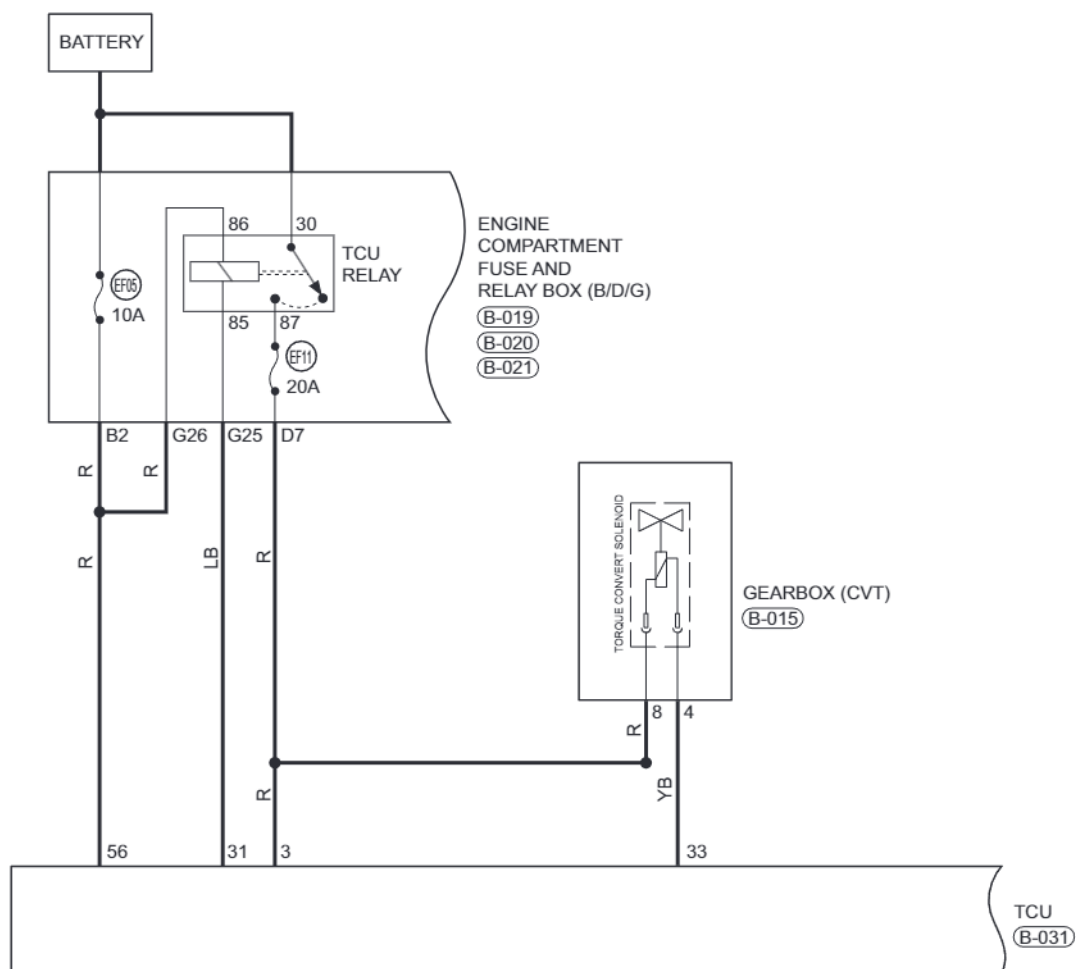
- a. Using X-431 3G diagnostic tester, read TCU DTC.
- b. Refer to "DTC Confirmation Procedure".
- c. Check if DTC P0964, P0966, P0967 still exist.

YES

Replace TCU

DTC	P0970	Pressure Control Solenoid 'C' Control Circuit Open
-----	-------	--

DTC	P0971	Pressure Control Solenoid 'C' Control Circuit Low
-----	-------	---



EM16180070

18



DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0964	Pressure Control Solenoid 'B' Control Circuit Open	Start engine and wait for at least 3 seconds	Solenoid output feedback voltage is normal, oil pressure control solenoid 'C' feedback current is less than standard value	- Solenoid circuit open circuit or short circuit - Oil pressure control solenoid 'C' failure
P0971	Pressure Control Solenoid 'B' Control Circuit Low		Solenoid output feedback voltage is normal, oil pressure control solenoid 'C' feedback current is higher than standard max. value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure**18****HINT:**

After the fault is eliminated, verify DTC and symptom again.

1**Check transmission connector**

- Disconnect transmission connector.
- Check transmission connector.

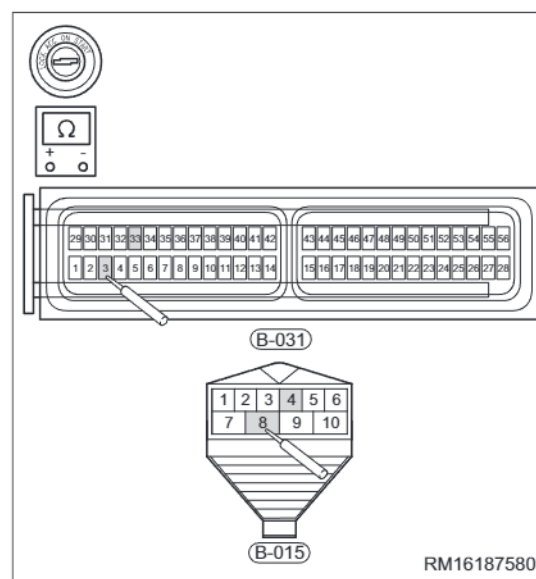
NG**Repair or replace connector****OK**

2 Check wire harness or connector (transmission connector - TCU)

- Turn off all electrical equipment and the ignition switch.
- Disconnect the negative battery cable.
- Disconnect transmission wire harness connector B-015 and TCU wire harness connector B-031.
- Check connectors B-015 and B-031 with a digital multimeter according to the table below.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-015 (8, 4) - B-031 (3, 33)	Always	Continuity

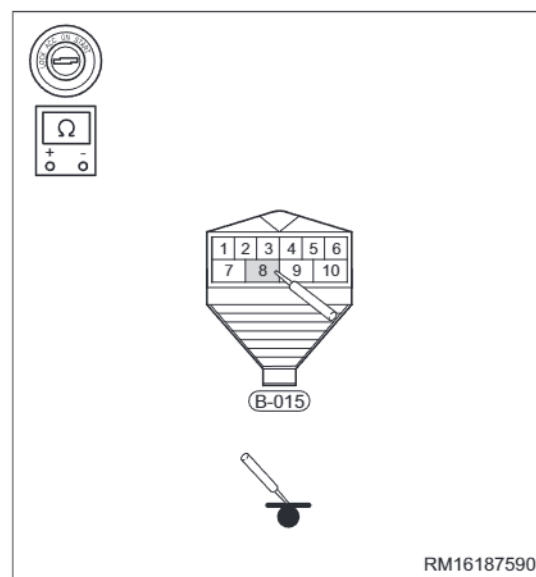


Check for Short

Multimeter Connection	Condition	Specified Condition
B-015 (8) - Body ground	Always	No continuity

NG

Replace wire harness or connector (transmission connector - TCU)



OK

3 Recheck DTC

- Using X-431 3G diagnostic tester, read TCU DTC.
- Refer to "DTC Confirmation Procedure".
- Check if DTC P0970, P0971 still exist.

YES

Replace TCU

DTC	P2797	Auxiliary Transmission Fluid Pump Performance
------------	--------------	--

DTC	P2798	Auxiliary Transmission Fluid Pump Control Circuit Low
------------	--------------	--

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P2797	Auxiliary Transmission Fluid Pump Performance	Start engine and wait for at least 10 seconds	Difference of target oil pressure and actual oil pressure is higher than value in table.	- Oil pressure control valve core seized - Hydraulic system pressure failure
P2798	Auxiliary Transmission Fluid Pump Control Circuit Low		Difference of target oil pressure and actual oil pressure is higher than value in table, and is maintained for over 700 ms.	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing following procedures.

- Turn ignition switch to LOCK.
- 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.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in TCU.
- Turn ignition switch to LOCK and wait for a few seconds.
- Turn ignition switch to ON, and then select Read Code.
- 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. Please refer to Intermittent DTC Troubleshooting.

18

Diagnosis Procedure

HINT:

After the fault is eliminated, verify DTC and symptom again.

1	Carry out following preliminary checks
----------	---

- Transmission wire harness connector (check for looseness, dirt and other fault).
- Transmission wire harness (check for damage, dirt and other fault).
- Are all checks OK?

NO	Repair fault
-----------	---------------------

YES

2 Check transmission system

- a. Check transmission system with diagnostic tester.
- b. Is there any DTC except for P2797 and P2798?

NO**Repair these DTCs fault****YES****3 Read data stream**

- a. Use diagnostic tester to read data stream related to transmission system oil pressure sensor for abnormality.
- b. Transmission system should be normal.
- c. Is check result normal?

NO**Repair fault****YES****4 Check for DTCs**

- a. Using X-431 3G diagnostic tester, select Read Code.
- b. Refer to "DTC Confirmation Procedure".
- c. Is DTC P2797 or P2798 still present?

NO**Replace solenoid and wire harness assembly****YES****System is normal****18**

ON-VEHICLE SERVICE

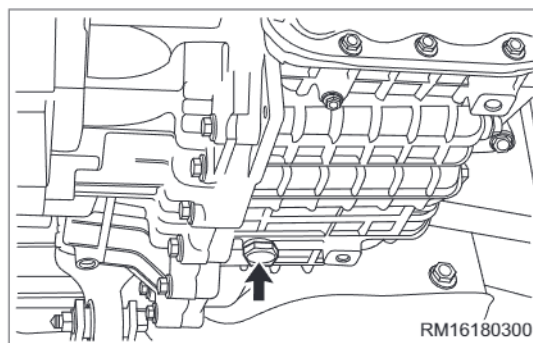
Automatic Transmission Fluid (ATF) Replacement

CAUTION

- Replace washer after removing drain plug every time.
- If automatic transmission fluid level is too low, add ATF until it reaches "HOT" position.

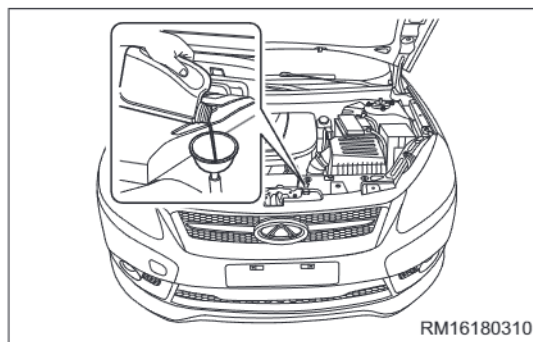
Draining

1. Turn off all electrical equipment and the ignition switch.
2. Raise vehicle with a lift.
3. Place a collection vessel under the oil outlet of transmission.
4. Unscrew drain plug to drain ATF. After draining, replace drain plug washer and tighten the plug.
(Tightening torque: 29 - 34 N·m)



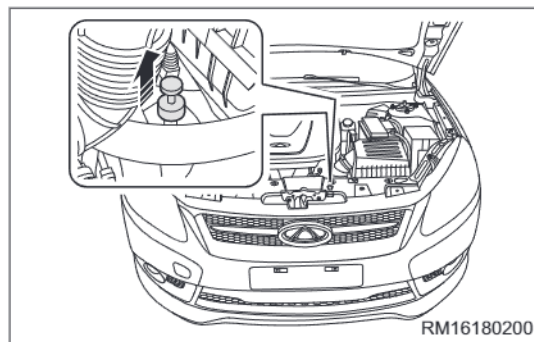
Filling

1. Add new ATF along oil dipstick pipe (filling quantity is equal to that of the drained).
2. Start engine to make it run for 1 - 2 min.
3. Step on brake pedal and move shift lever at each gear and place it to "N" or "P" position.



Inspection

1. After vehicle runs for 5 min, the temperature will reach normal working conditions (ATF temperature 60 - 80°C, and engine coolant temperature 80 - 100°C).
2. Park vehicle on a flat ground and pull parking brake lever.
3. Start engine to make it run at idle speed, and then fully depress brake pedal and move shift lever for five times at each gear. Finally, place the lever at "P" or "N" position.
4. Pull out automatic transmission fluid dipstick and clean it with a piece of non-wool paper; then insert the dipstick into filling pipe as much as possible and then take out to observe whether it reaches the "HOT" position.



Differential Oil Seal

Removal

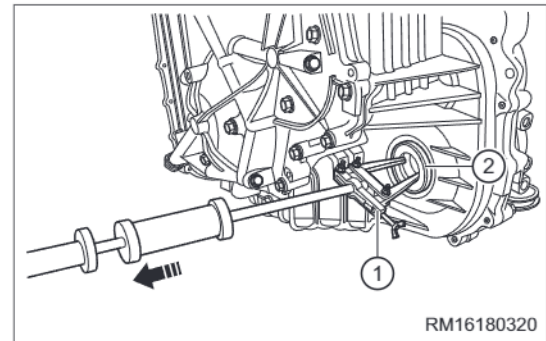
CAUTION

- After oil seal is removed, use a new one during installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the axle shaft.
4. Using the special tool (1), remove the differential oil seal (2).

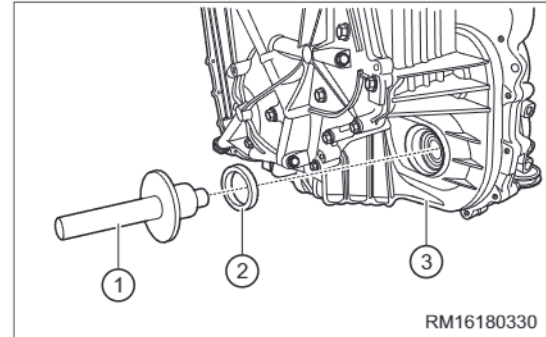
HINT:

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



Installation

1. Apply automatic transmission fluid on inner ring of the oil seal.
2. Use the special tool (1) to install the differential oil seal (2) to transmission (3).



CAUTION

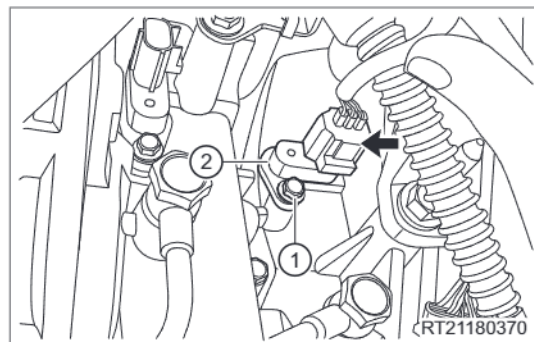
- When installing oil seal, apply force evenly and prevent oil seal from deformation and damage.
- Keep transmission fluid seal open and oil seal clean, to avoid foreign matter entering transmission.
- Do not apply other sealant on oil seal.
- Do not wear velutinous gloves when installation.
- After installing oil seal, make sure that oil seal end surface and transmission case are on the same plane.

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

Primary Shaft Speed Sensor

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery and battery tray (See page 16-7).
4. Remove the air filter assembly (See page 10-12).
5. Disconnect the primary shaft speed sensor wire harness connector (arrow).
6. Remove the fixing bolt (1) of primary shaft speed sensor and take out the primary shaft speed sensor (2).
(Tightening torque: 10 - 12 N·m)



Installation

Installation is in the reverse order of removal.

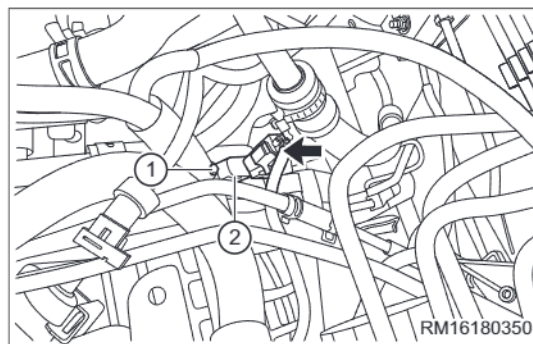
CAUTION

- Keep clean of sensor and contact surfaces between sensor and transmission, and avoid dust or impurity entering transmission.
- During installation, apply automatic transmission fluid on O-ring of the sensor.

Secondary Shaft Speed Sensor

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly (See page 10-12).
4. Disconnect the secondary shaft speed sensor wire harness connector (arrow).
5. Remove the fixing bolt (1) of secondary shaft speed sensor and take out the secondary shaft speed sensor (2).
(Tightening torque: 10 - 12 N·m)



Installation

Installation is in the reverse order of removal.

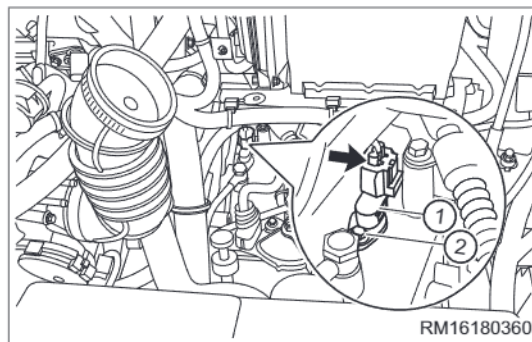
CAUTION

- Keep clean of sensor and contact surfaces between sensor and transmission, and avoid dust or impurity entering transmission.
- During installation, apply automatic transmission fluid on O-ring of the sensor.

Turbine Speed Sensor

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery and battery tray (See page 16-7).
4. Remove the air filter assembly (See page 10-12).
5. Disconnect the turbine speed sensor wire harness connector (arrow).
6. Remove the fixing bolt (2) of turbine speed sensor and take out the turbine speed sensor (1).
(Tightening torque: 10 - 12 N·m)



Installation

Installation is in the reverse order of removal.

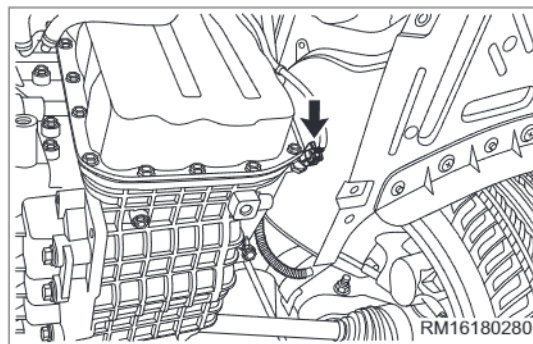
CAUTION

- Keep clean of sensor and contact surfaces between sensor and transmission, and avoid dust or impurity entering transmission.
- During installation, apply automatic transmission fluid on O-ring of the sensor.

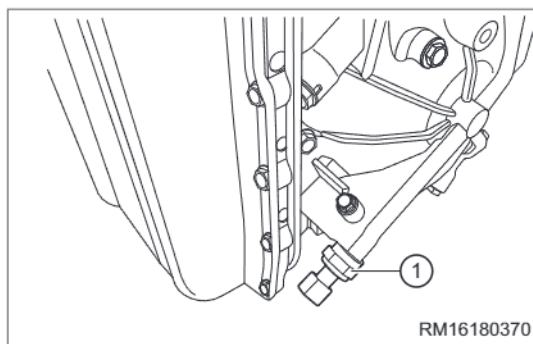
Primary Shaft Pressure Sensor

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Raise vehicle with a lift.
4. Drain the automatic transmission fluid ([See page 18-100](#)).
5. Disconnect the wire harness connector of primary shaft pressure sensor.



6. Remove the primary shaft pressure sensor (1).
(Tightening torque: 15 - 22 N·m)



Installation

Installation is in the reverse order of removal.

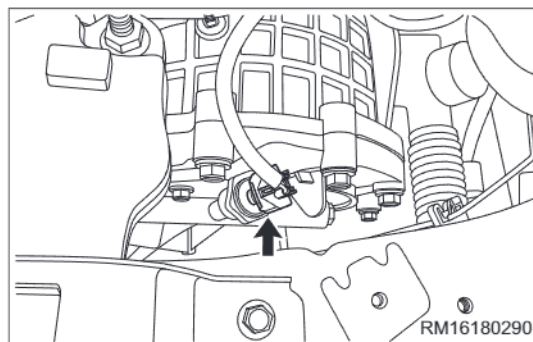
CAUTION

- Keep clean of sensor and contact surfaces between sensor and transmission, and avoid dust or impurity entering transmission.
- During installation, apply automatic transmission fluid on O-ring of the sensor.
- Add automatic transmission fluid ([See page 18-100](#)).

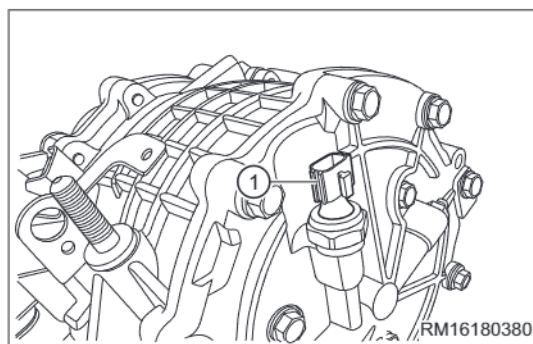
Secondary Shaft Pressure Sensor

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air filter assembly (See page 10-12).
4. Disconnect the wire harness connector of secondary shaft pressure sensor (arrow).



5. Remove the secondary shaft pressure sensor (1).
(Tightening torque: 15 - 22 N·m)



Installation

Installation is in the reverse order of removal.

CAUTION

- Keep clean of sensor and contact surfaces between sensor and transmission, and avoid dust or impurity entering transmission.
- During installation, apply automatic transmission fluid on O-ring of the sensor.

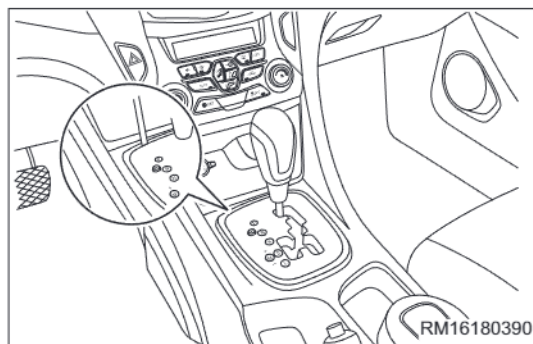
Gear Range Switch

Removal

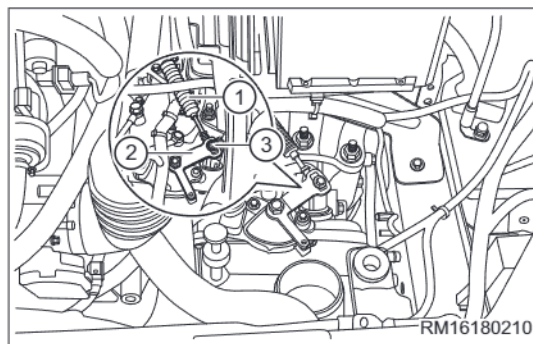
CAUTION

- When removing and installing gear range switch, make sure that gear shift lever is at "N" position.

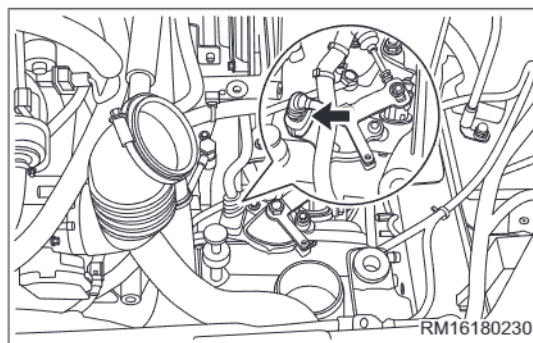
1. Apply the parking brake.
2. Turn off all electrical equipment and the ignition switch.
3. Disconnect the negative battery cable.
4. Remove the battery and battery tray (See page 16-7).
5. Remove the shift knob cover, insert a brass bar or similar tool (arrow) into the gap between upper left part of shift mechanism and auxiliary fascia console to release shift mechanism locking device and move shift lever to N position.



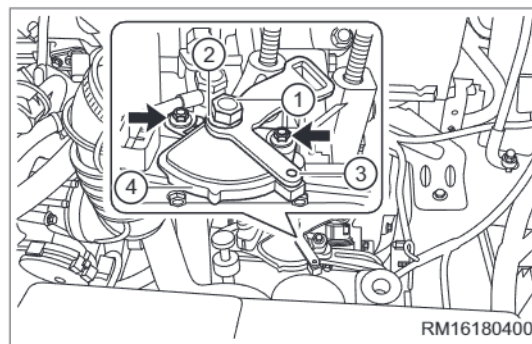
6. Remove the connecting nut (3) between gear shift cable (1) and arm (2).
(Tightening torque: 16 - 20 N·m)



7. Disconnect the gear range switch wire harness connector (arrow).



8. Remove the gear shift arm fixing nut (1).
(Tightening torque: 18 - 25 N·m)
9. Take out the gear shift arm spring gasket (2).
10. Take out the gear shift arm (3).
11. Remove the gear range switch fixing bolts (arrow).
- (Tightening torque: 10 - 12 N·m)
12. Take out the gear range switch (4).



Installation

Installation is in the reverse order of removal.

CAUTION

- After spring gasket of gear shift arm is removed, use a new spring gasket during installation.
- During installation, align the hole of gear shift arm to the hole of gear range switch and fix them with a proper tool.
- After installation, inspect gear shift lever position. Adjust gear shift cable as necessary.

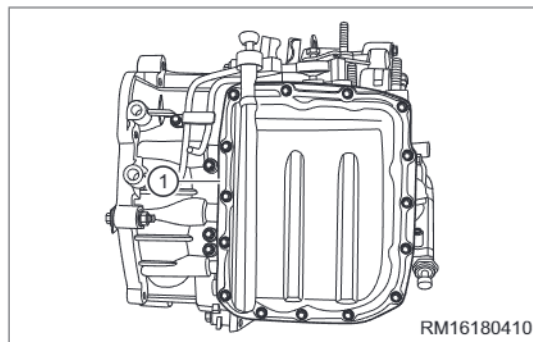
Valve Body Case

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Raise vehicle with a lift.
4. Drain the transmission fluid (See page 18-100).
5. Remove the valve body case fixing bolts and remove the valve body case (1).
(Tightening torque: 10 - 12 N·m)

HINT:

When removing valve body, do not damage the joint surface of transmission case.



Installation

Installation is in the reverse order of removal.

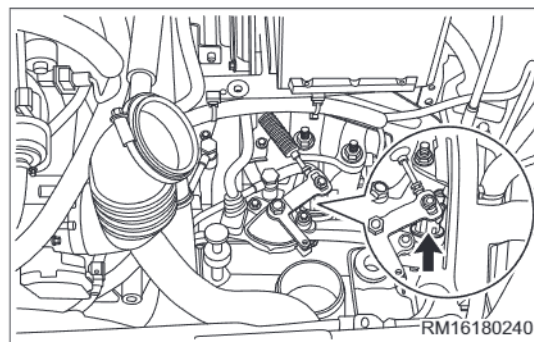
CAUTION

- Before installation, clear sealant residues on the joint surface of transmission case and clean it up.
- Keep installation parts clean and avoid foreign matter entering transmission.
- During installation, apply sealant on joint surfaces of the valve body case and transmission evenly.
- After adding fluid, inspect for fluid leakage.

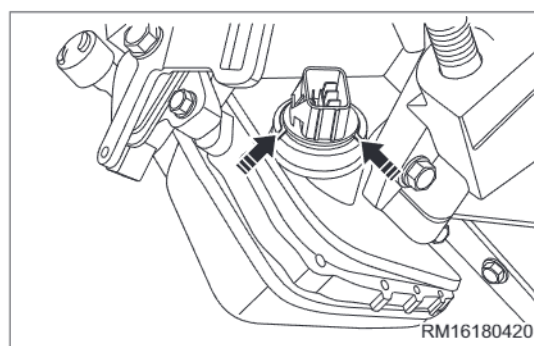
Valve Body

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery and battery tray ([See page 16-7](#)).
4. Disconnect the wire harness connector of transmission solenoid as shown in illustration.

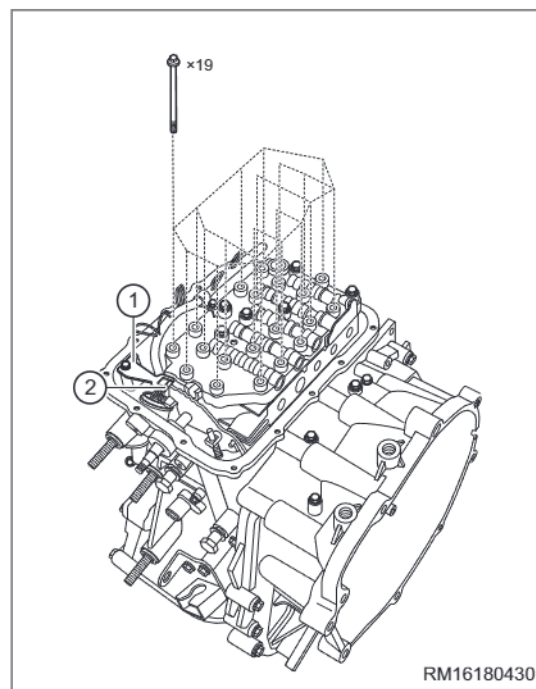


5. Use a proper tool to remove the transmission solenoid wire harness assembly clamp.

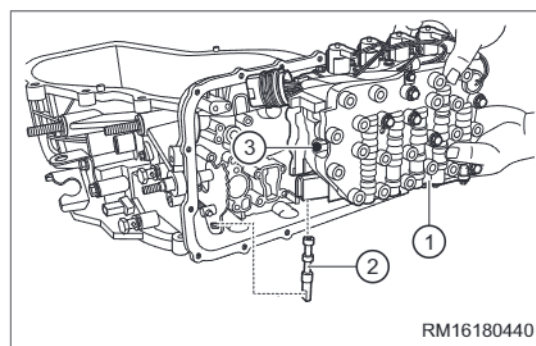


6. Remove the gear range switch ([See page 18-108](#)).
7. Raise vehicle with a lift.
8. Drain the transmission fluid ([See page 18-100](#)).
9. Remove the valve body case ([See page 18-110](#)).

10. Remove the positioning plate fixing bolt (1).
11. Remove the positioning plate (2).
12. Remove the valve body fixing bolts.
(Tightening torque: 8 - 10 N·m)

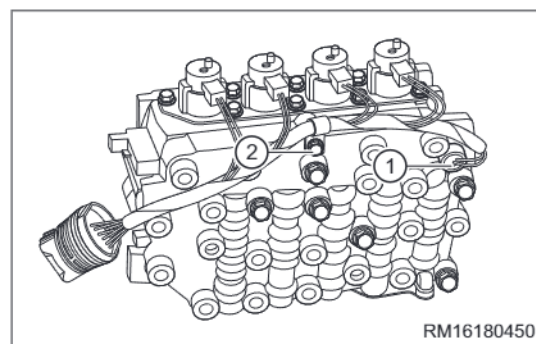


13. Remove the valve body (1), steel ball (3) and drive lever (2).



14. Remove the transmission fluid temperature sensor (1) from the valve body.
15. Remove the wire harness bracket fixing bolt (2).
16. Remove the solenoid press plate fixing bolts.

18



17. Take out the solenoid and wire harness assembly.

Installation

Installation is in the reverse order of removal.

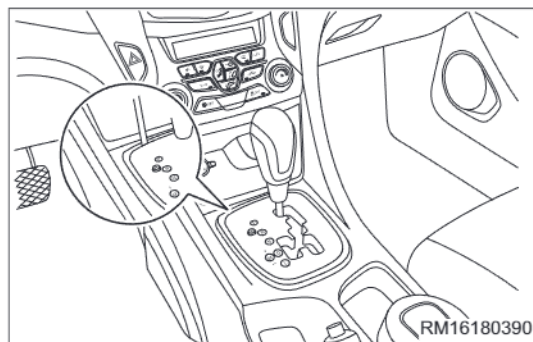
CAUTION

- Before installation, clear sealant residues on the joint surface of transmission case and clean it up.
- Keep installation parts clean and avoid foreign matter entering transmission.
- During installation, apply automatic transmission fluid on O-ring of solenoid wire harness assembly.
- During installation, apply sealant on joint surfaces of the of valve body case and transmission evenly.
- After adding fluid, inspect for fluid leakage.

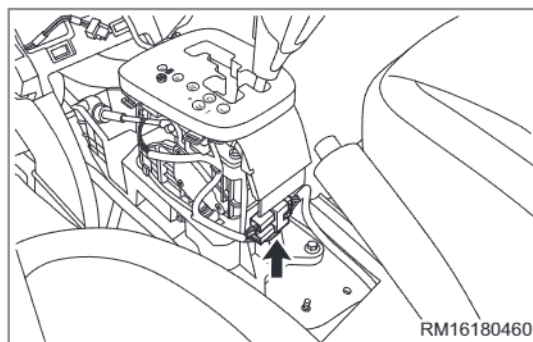
Gear Shift Control Mechanism

Removal

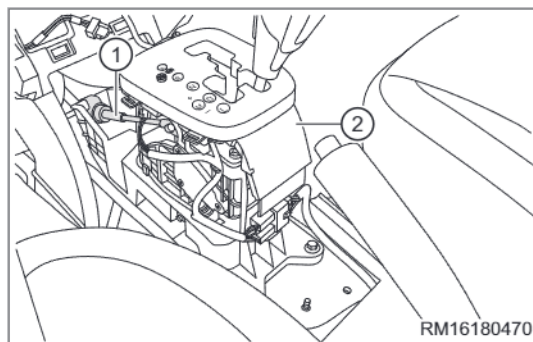
1. Apply the parking brake.
2. Turn off all electrical equipment and the ignition switch.
3. Disconnect the negative battery cable.
4. Remove the shift knob cover, insert a brass bar or similar tool (arrow) into the gap between upper left part of shift mechanism and auxiliary fascia console to release shift mechanism locking device and move shift lever to N position.



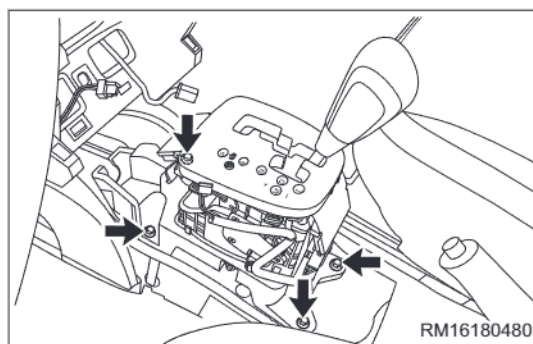
5. Remove the auxiliary fascia console assembly (See page 46-10).
6. Disconnect the gear shift control mechanism wire harness connector (arrow).



7. Disconnect the transmission gear shift cable (1) from gear shift control mechanism (2).



8. Remove the gear shift control mechanism fixing bolts. (Tightening torque: 18 - 22 N·m)
9. Take out the gear shift control mechanism.



Installation

Installation is in the reverse order of removal.

CAUTION

- After installation, inspect gear shift lever for gear shift positions. Adjust gear shift cable as necessary ([See page 18-21](#)).

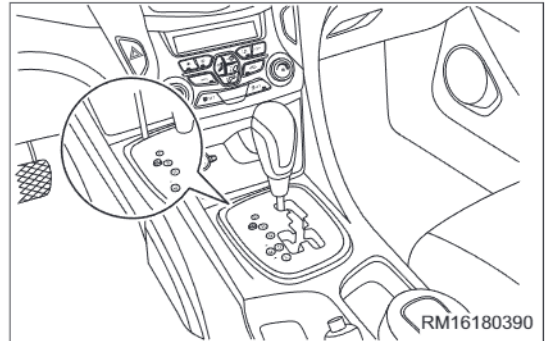
Gear Shift Cable

Removal

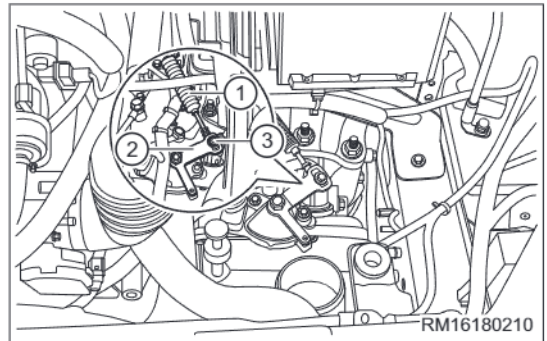
CAUTION

- When removing and installing gear shift cable, make sure that gear shift lever is at "N" position.

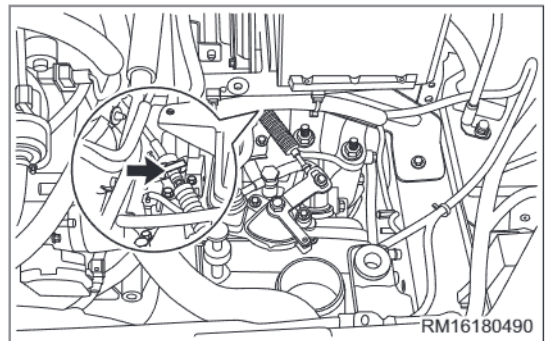
1. Apply the parking brake.
2. Turn off all electrical equipment and the ignition switch.
3. Disconnect the negative battery cable.
4. Remove the shift knob cover, insert a brass bar or similar tool (arrow) into the gap between upper left part of shift mechanism and auxiliary fascia console to release shift mechanism locking device and move shift lever to N position.



5. Disconnect the transmission gear shift cable from gear shift control mechanism (See page 18-114).
6. Remove the air filter assembly (See page 10-12).
7. Remove the connecting nut (3) between gear shift cable (1) and arm (2). Disconnect the gear shift cable from shift arm.
(Tightening torque: 16 - 20 N·m)



8. Remove the gear shift cable flexible shaft clamp.



9. Remove the gear shift cable dust boot fixing bolts from vehicle body.
(Tightening torque: 8 - 10 N·m)
10. Take out the gear shift cable.

Installation

Installation is in the reverse order of removal.

CAUTION

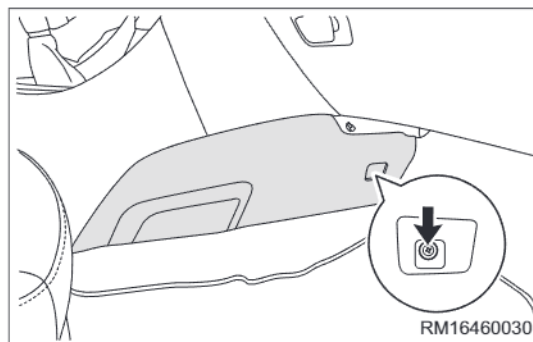
- After installation, inspect gear shift lever for gear shift positions. Adjust gear shift cable as necessary ([See page 18-21](#)).

TCU

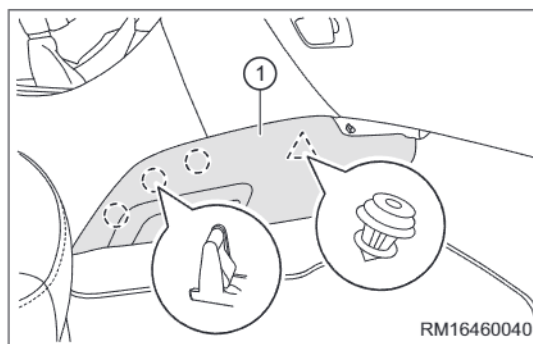
Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the auxiliary fascia console front right extension panel assembly.

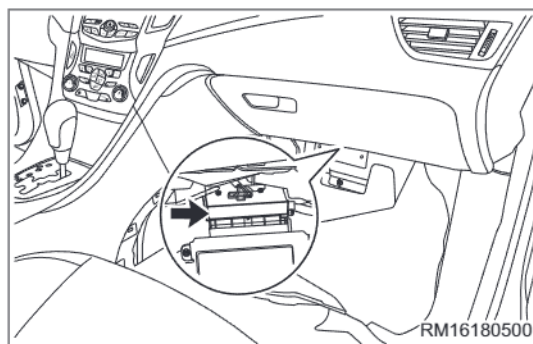
- a. Remove the fixing screw (arrow) from auxiliary fascia console front right extension panel assembly.
(Tightening torque: 1.5 ± 0.5 N·m)



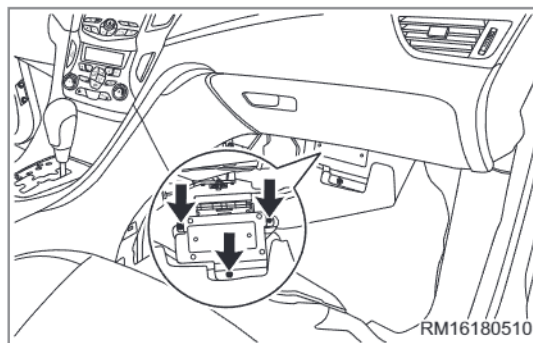
- b. Using a screwdriver wrapped with protective tape, pry off the clips from auxiliary fascia console front right extension panel assembly, and remove the auxiliary fascia console front right extension panel assembly (1).



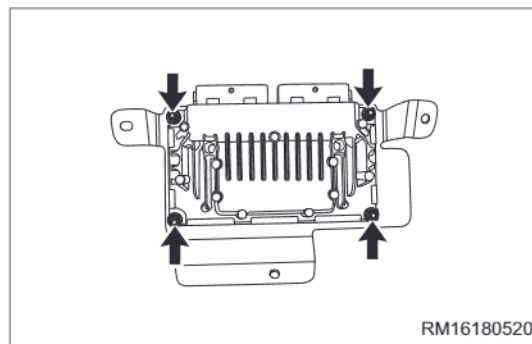
4. Disconnect the TCU connector.



5. Remove the TCU mounting bracket fixing nuts.
(Tightening torque: 7 ± 1 N·m)



6. Remove the TCU fixing bolts (arrow).
(Tightening torque: $6 \pm 1 \text{ N}\cdot\text{m}$)



Installation

Installation is in the reverse order of removal.

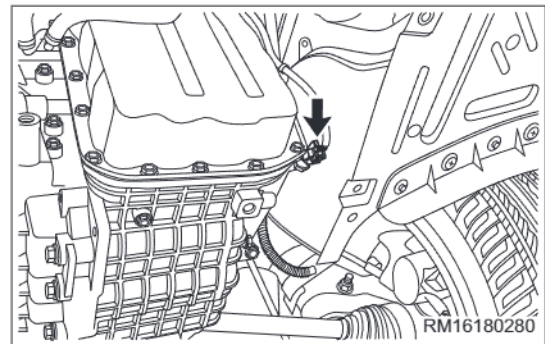
CVT Assembly

Removal

CAUTION

- In removal and installation of transmission, make sure that torque converter does not drop from the transmission.
- Do not scratch or damage parts in removal and installation.

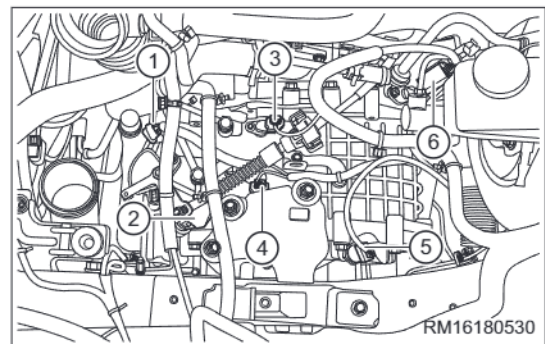
1. Apply the parking brake.
2. Turn off all electrical equipment and the ignition switch.
3. Disconnect the negative battery cable.
4. Drain the automatic transmission fluid ([See page 18-100](#)).
5. Remove the air filter assembly ([See page 10-12](#)).
6. Remove the battery ([See page 16-7](#)).
7. Remove the battery tray ([See page 16-7](#)).
8. Remove the starter ([See page 15-71](#)).
9. Remove the engine speed sensor ([See page 06-272](#)).
10. Remove the engine lower protector ([See page 49-22](#)).
11. Disconnect the primary shaft pressure sensor wire harness connector (arrow).



18

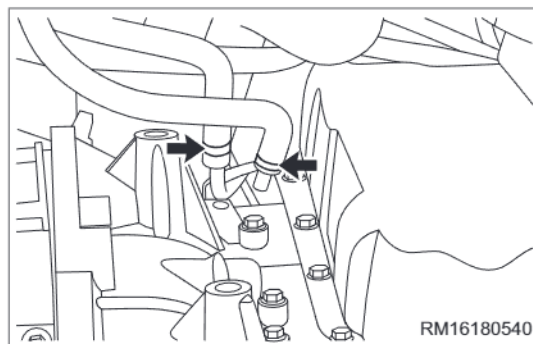
12. Disconnect the wire harness connectors on the transmission:

- Gear range switch connector (1);
- Transmission solenoid wire harness connector (2);
- Turbine speed sensor wire harness connector (3);
- Primary shaft speed sensor wire harness connector (4);
- Secondary shaft pressure sensor wire harness connector (5);
- Secondary shaft speed sensor wire harness connector (6).

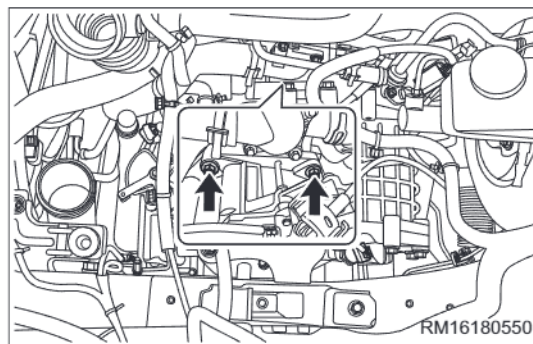


13. Remove the shift cable at transmission side.
14. Disconnect the connection of gear shift cable on the transmission ([See page 18-116](#)).

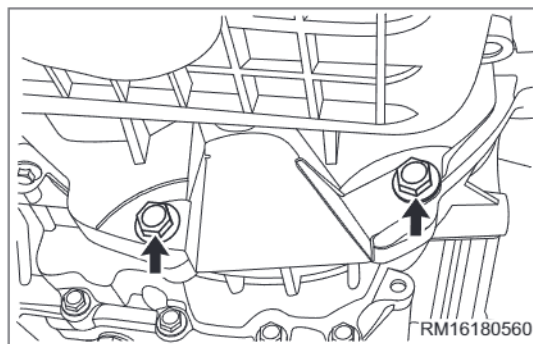
15. Remove the transmission fluid coolant hose clamps (arrow) and detach the hoses.



16. Use engine equalizer to fix the engine assembly.
 17. Remove the engine, rear and left mountings (See page 07-62).
 18. Remove the bolts connected with engine at the upper part of transmission.
 (Tightening torque: 75 - 85 N·m)



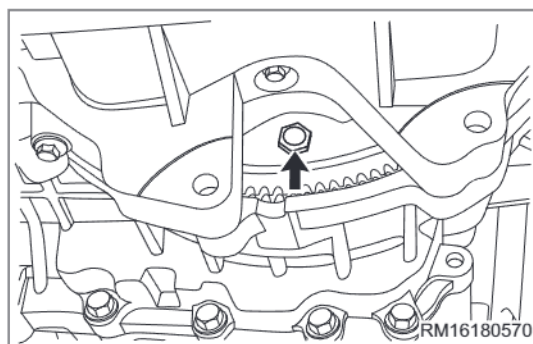
19. Raise vehicle with a lift.
 20. Remove the dust deflector fixing bolts, and take out the dust deflector.
 (Tightening torque: 45 - 55 N·m)



21. Turn the crankshaft and turn the connecting bolt of flywheel and torque converter to the middle section of U slot to lock the crankshaft bolts. Remove 4 connecting bolts of the flywheel and torque converter.
 (Tightening torque: 50 - 60 N·m)

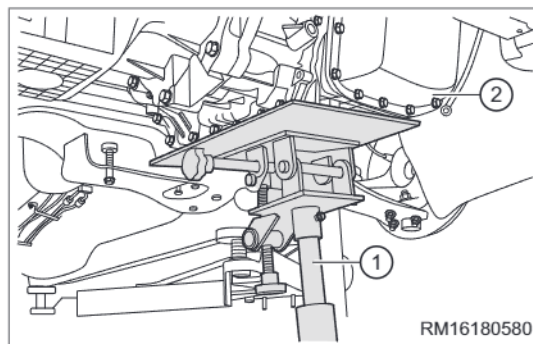
HINT:

Crankshaft should rotate clockwise viewing from the front of engine.

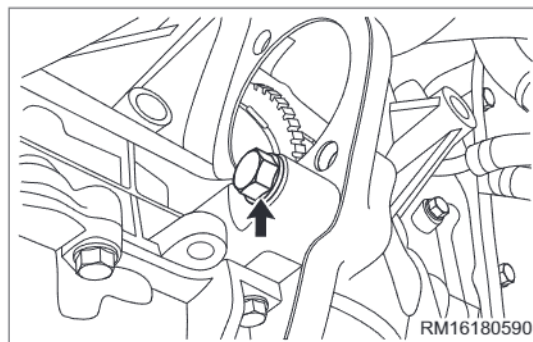


22. Remove the axle shaft.

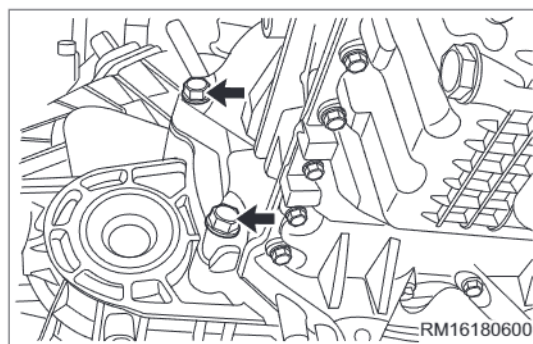
23. Use transmission carrier (1) to support the transmission (2).



24. Remove the transmission and engine front connecting bolt (1).
(Tightening torque: 75 - 85 N·m)

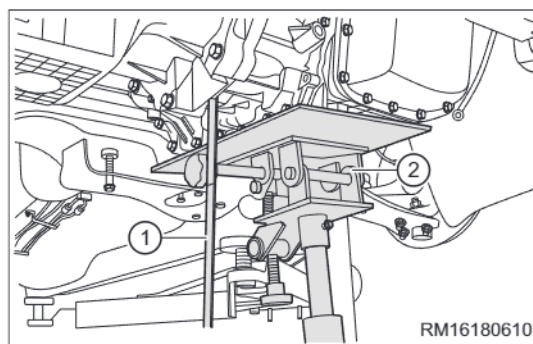


25. Remove the transmission and engine connecting bolts (arrow).
(Tightening torque: 75 - 85 N·m)



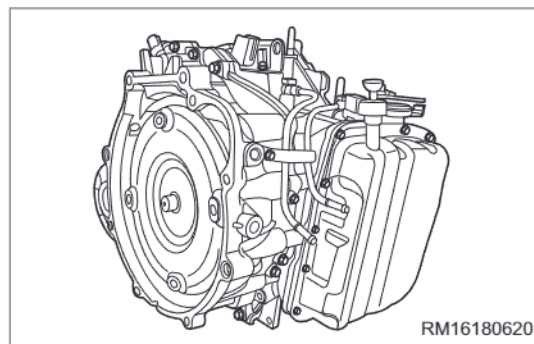
26. Remove the engine rear mounting.

27. Use a proper tool (1) to separate the transmission (2) from the engine.



28. Take out the transmission plate.

29.Remove the transmission.



Installation

Installation is in the reverse order of removal.

CAUTION

- Turn crankshaft clockwise from the front of engine.
- When installing torque converter, temporarily tighten bolts and then tighten them to specified torque.
- Keep transmission parts clean, and prevent foreign matter from entering into transmission.
- Add automatic transmission fluid.
- After installation, inspect gear shift lever for gear shift positions. Adjust gear shift cable as necessary.

