QR019CHB CVT

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GENERAL INFORMATION

Description

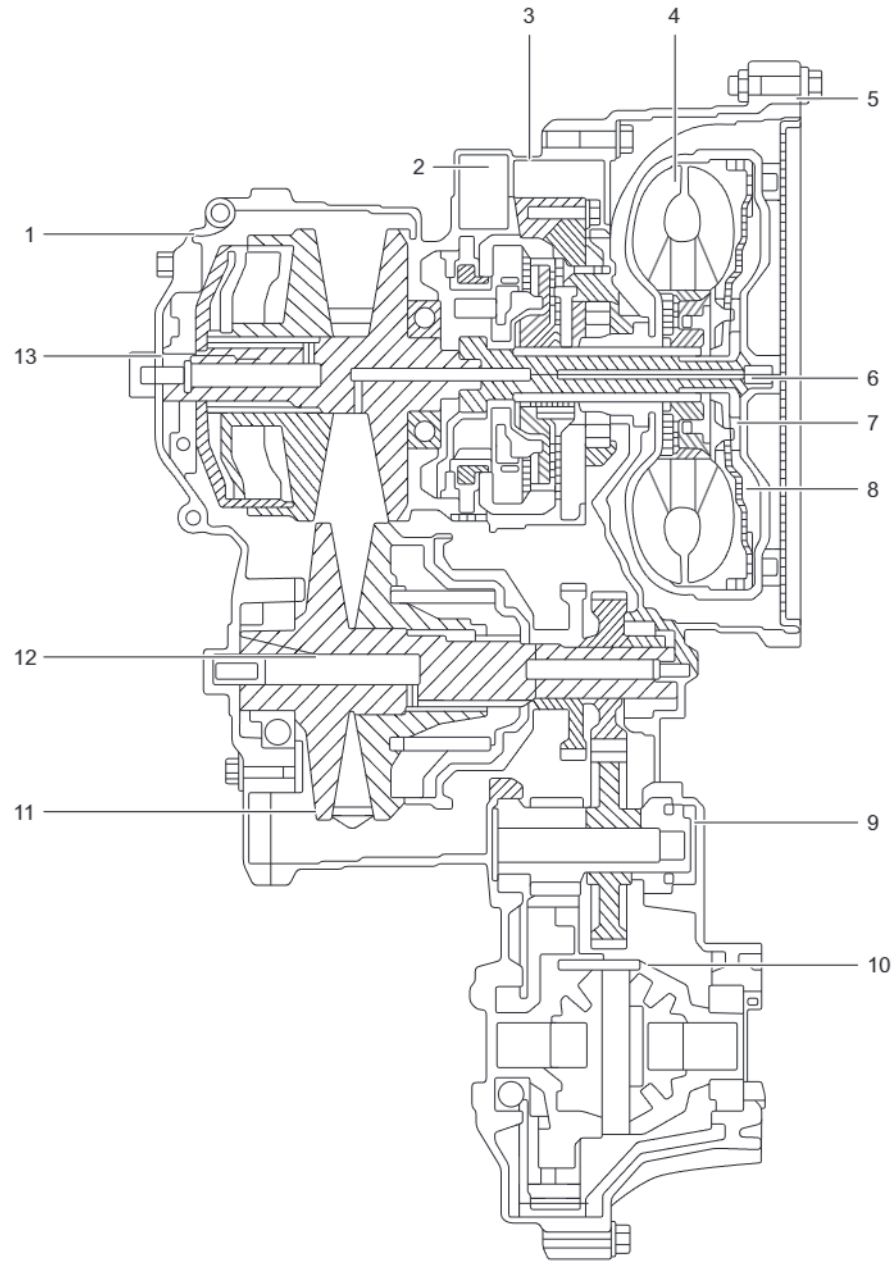
Continuous Variable Transmission (CVT) is a kind of continuous mechanical transmission. The most difference between CVT and common gear-type transmission is that CVT uses two groups of pulleys for driving instead of complex and heavy gear combined drive. It shifts speeds by changing the contact radius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

CVT mainly consists of the following components:

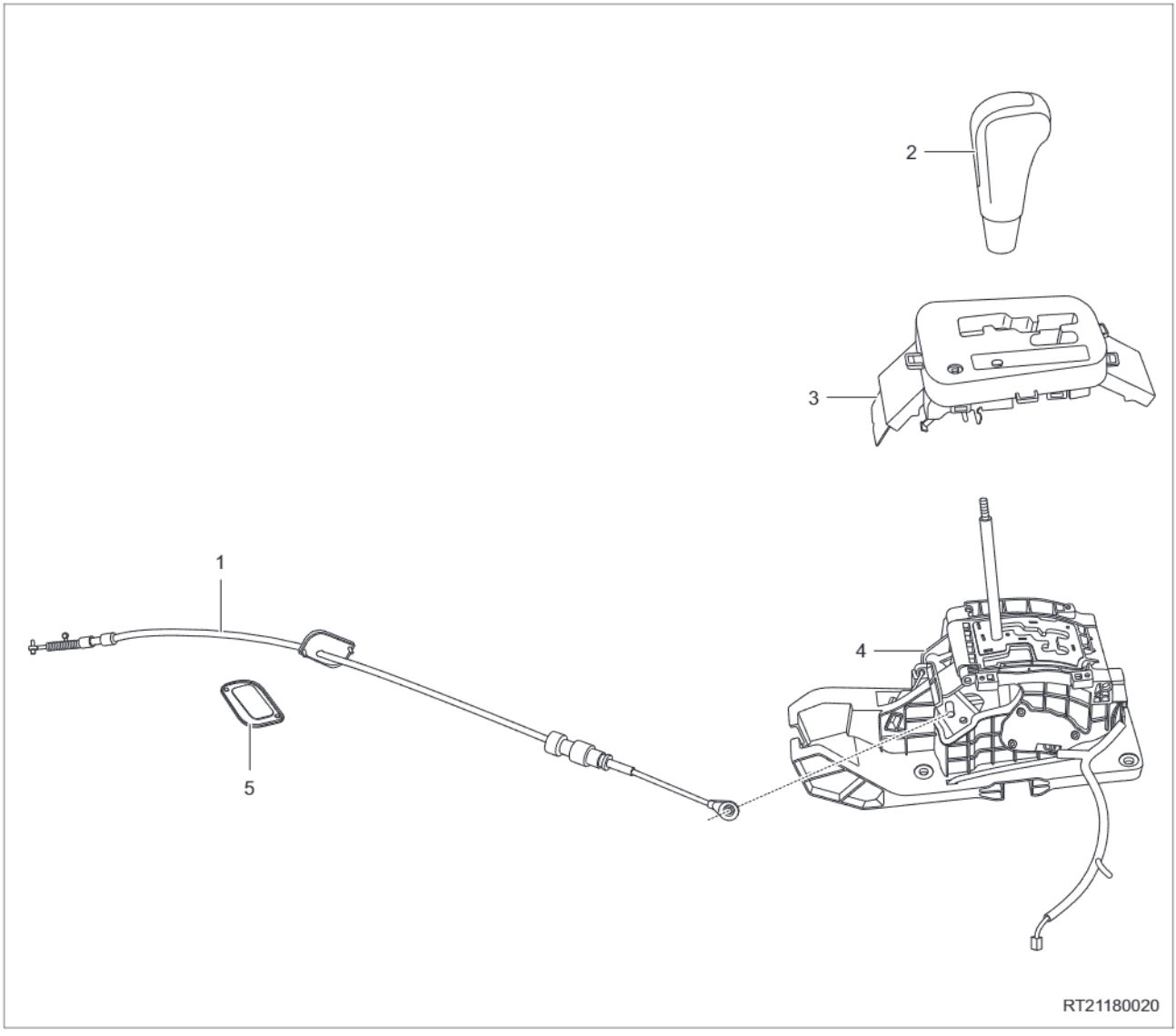
- Torque converter
- Planetary gear system
- Drive and driven pulley system (transmission system)
- Steel belt (steel belt consists of two groups of metal rings and hundreds of metal plates)
- Oil pump
- Valve body

QR019CHB CVT features with:

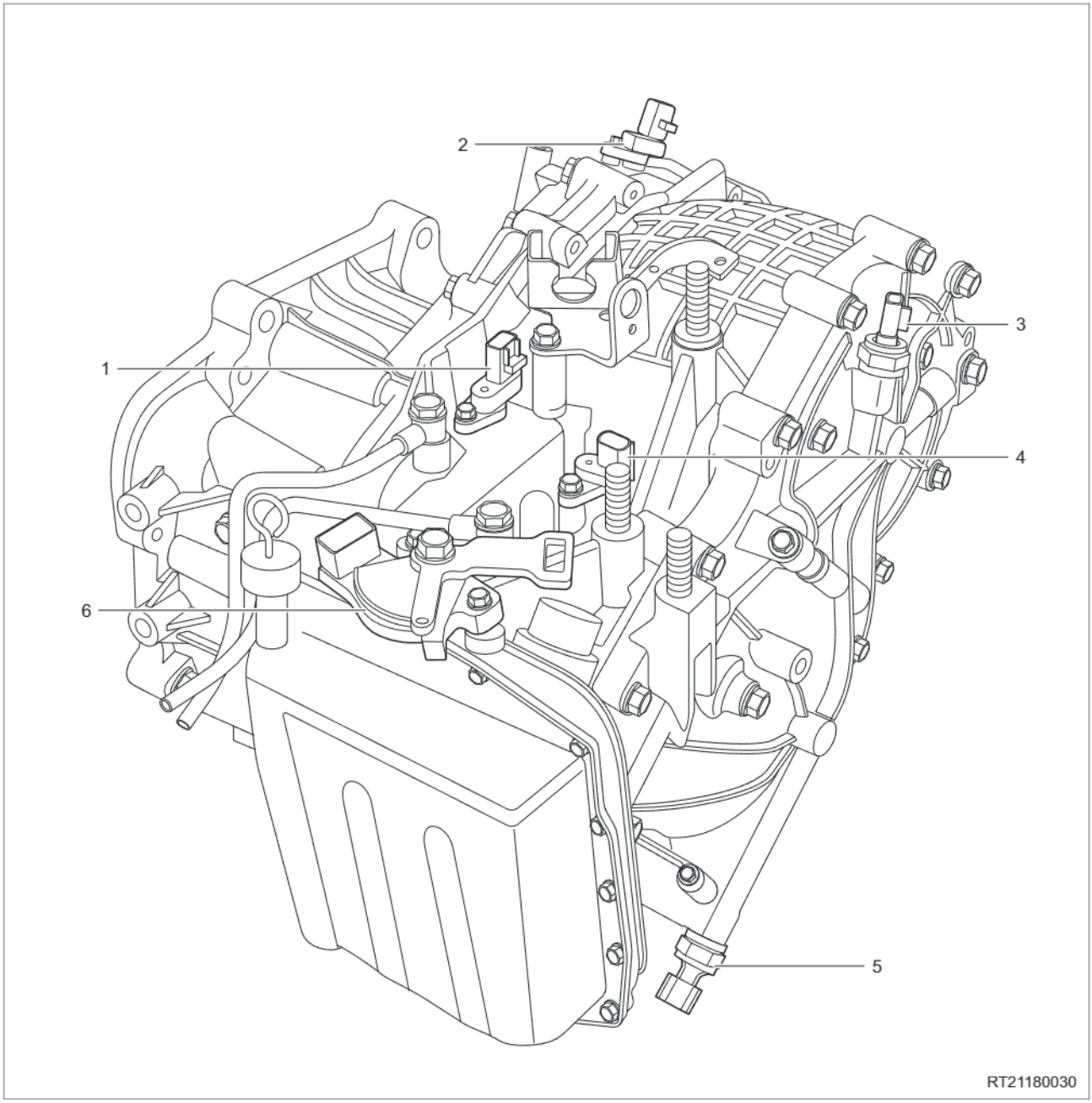
- Automatic and manual modes.
- Electronic hydraulic control.
- At D gear, it realizes automatic continuous variable speeds; at M gear, it realizes manual 7-gear variable speeds, providing users with dual driving fun.
- It can keep engine lowest speed at a certain vehicle speed.
- It can reduce vehicle 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.



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	



1 - Gear Shift Cable	2 - Gear Shift Lever Knob
3 - Gear Indicator Panel	4 - Gear Shift Control Mechanism
5 - Gear Shift Cable Dust Boot	



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 - Transmission Range Sensor

Precautions

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

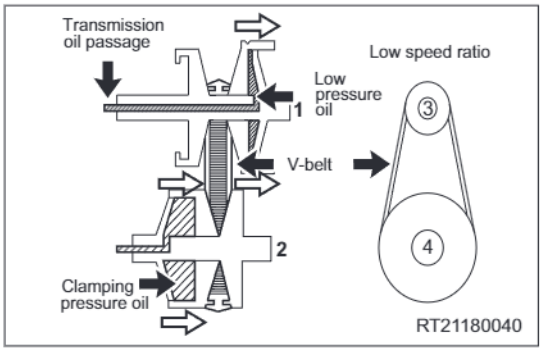
Operation

Speed Ratio Change Principle

The CVT uses a metal belt and V-shape drive and driven pulleys with width-variable slot for the power transition. The drive and driven pulleys consist of movable and fixed discs. The pulley close to the 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 the V-shape metal belt. It changes the working radius of the engagement of the cones and V-shape metal belt to shift the speed by the axial movement of the movable disc when working.

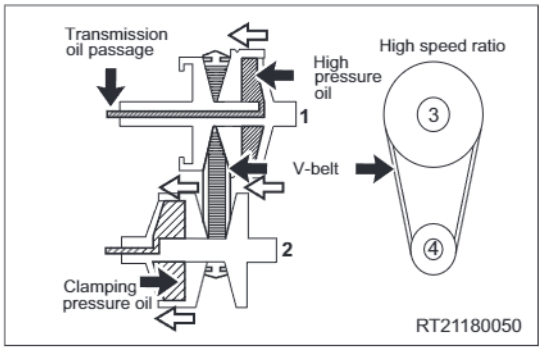
Right illustration shows the low speed ratio:

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



Right illustration shows the high speed ratio:

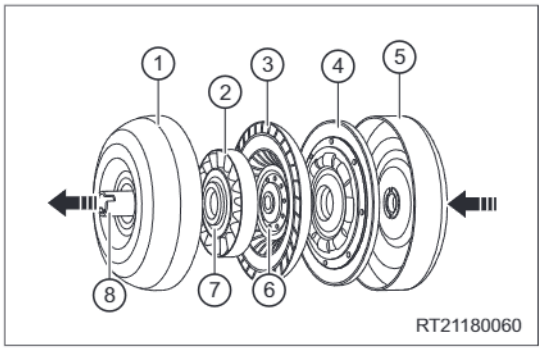
1. Input pulley
2. Output pulley
3. Input circle
4. Output circle



Torque Converter

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

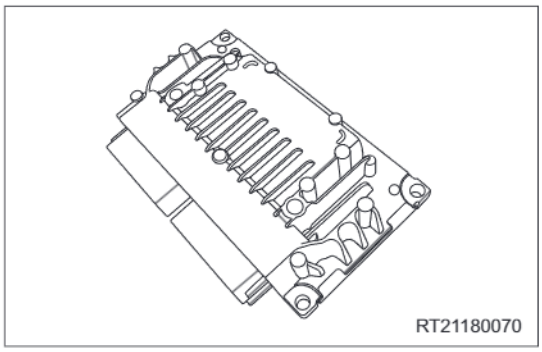
The torque converter could ensure stable start and even acceleration of the vehicle. The hydraulic vibration absorption could eliminate or reduce the impact and dynamic load in the transmission system, extending the service life of the components of the engine and transmission system.



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)

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

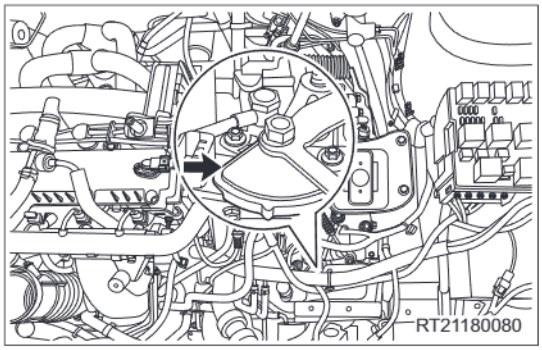


Electronic control system consists of the components below:

- 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
- Transmission range sensor
- Manual mode switch

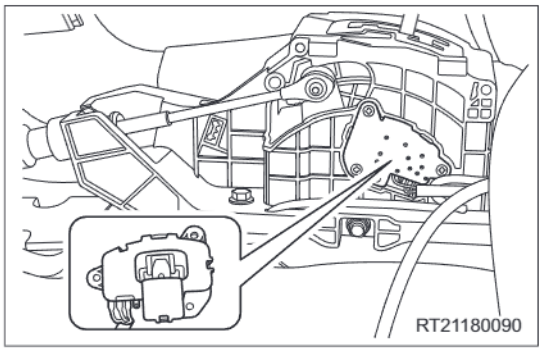
Transmission Range Sensor

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



Manual Mode Switch

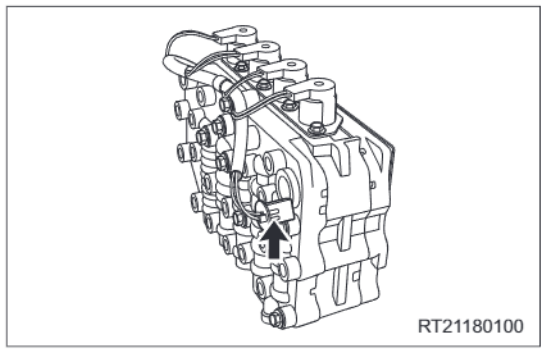
No matter whether the vehicle is static or running, you could push the gear shift lever to shift between "M" and "D" gear. On the gear shift mechanism panel, there are two gears of "+" and "-" at the "M" gear, they are also called manual shift-up and manual shift-down.



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

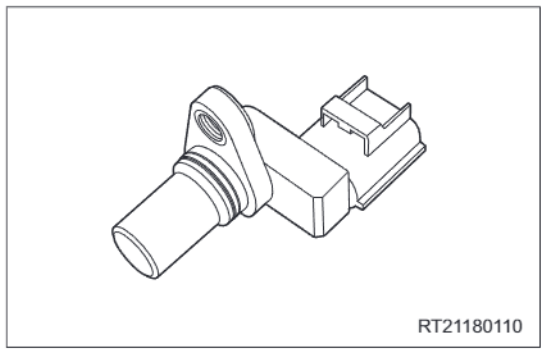
Transmission Fluid Temperature Sensor

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



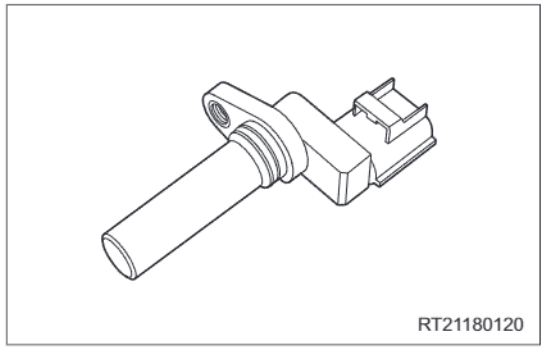
Primary Shaft Speed Sensor

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



Turbine/Secondary Shaft Speed Sensor

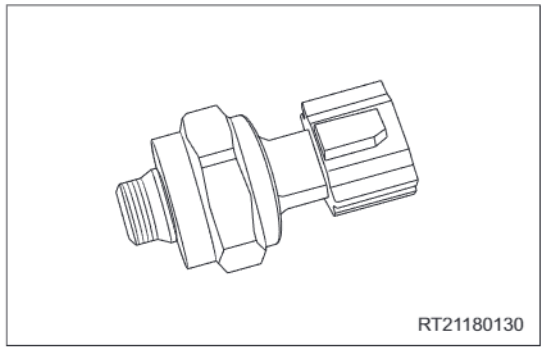
The TCU calculates the turbine and secondary shaft speeds based on the impulse signals. It is mainly used for the operations of torque converter locking, clutch engagement and transmission control.



18

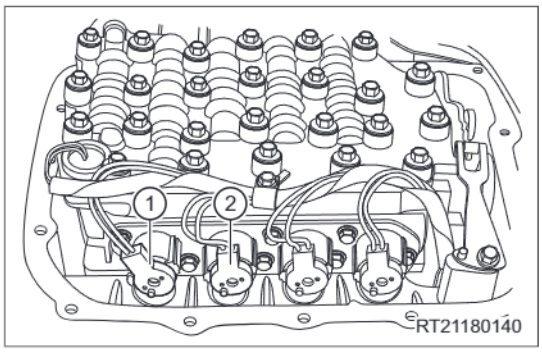
Fluid Pressure Sensor

The transmission fluid pressure sensor is used to monitor the CVT pulley shaft pressure and send the signals to the TCU.



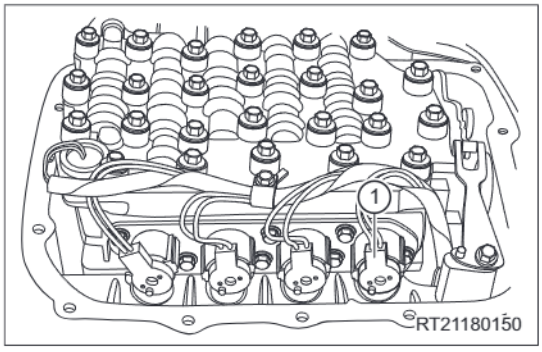
Oil Pressure Control Solenoid

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



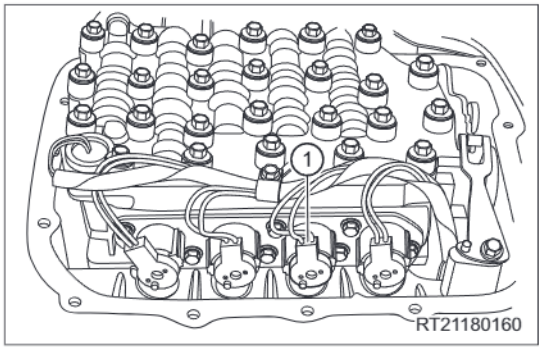
Clutch Pressure Control Solenoid

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



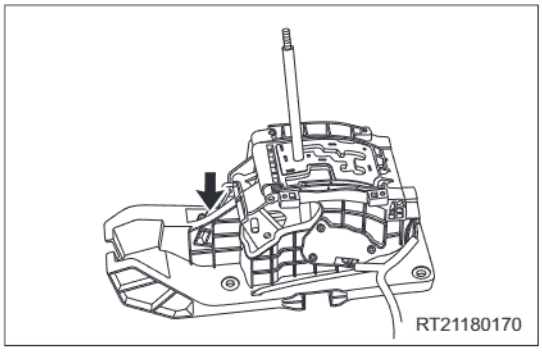
Torque Converter Pressure Control Solenoid

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



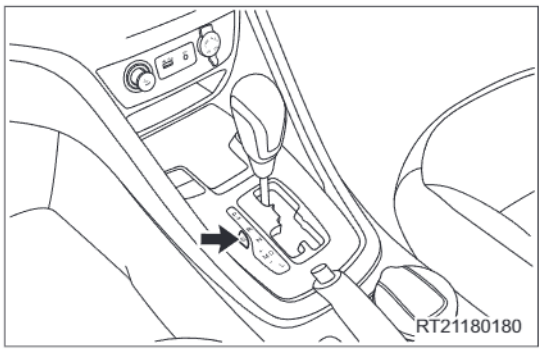
Gear Shift Lock Solenoid

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

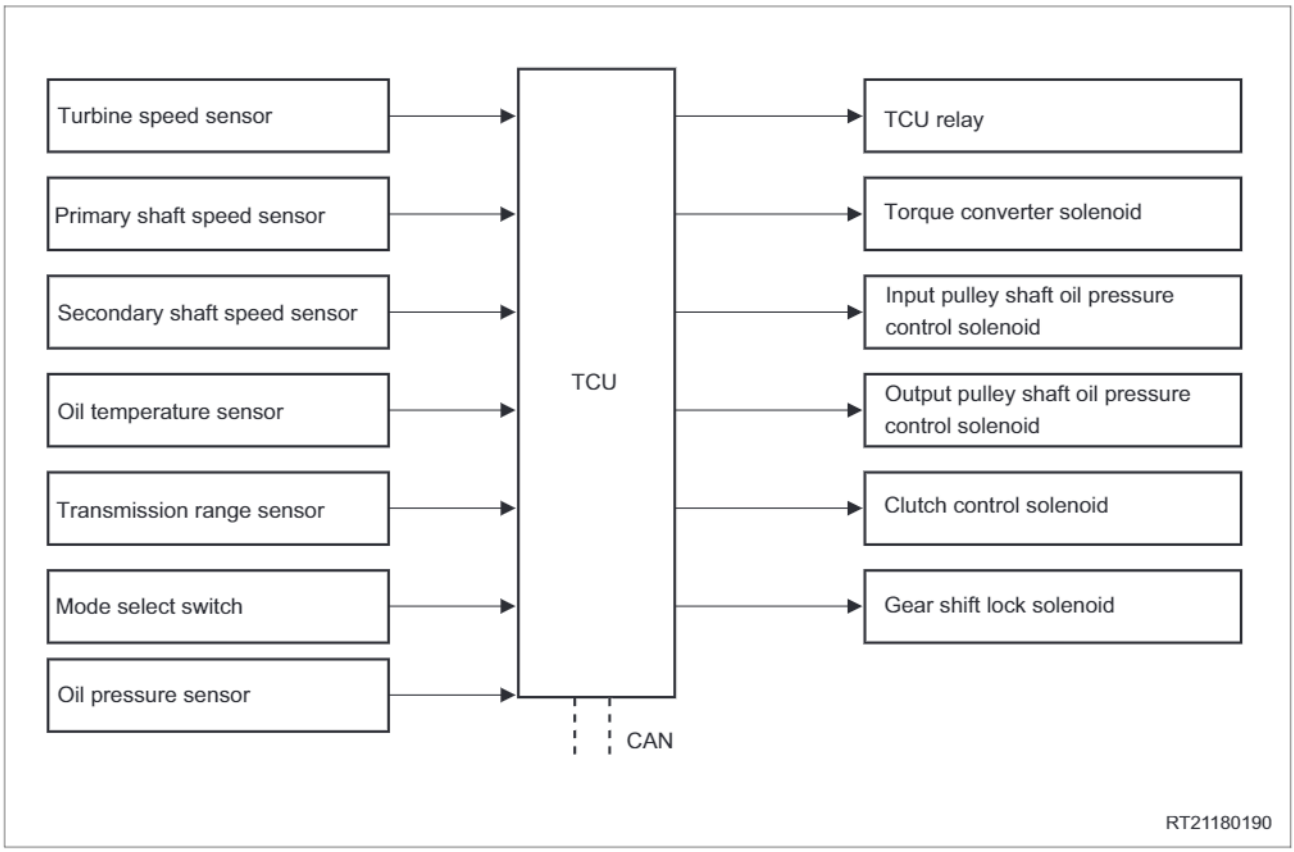


Sport Mode Switch

The transmission is equipped with sport mode, which can be switched on with the sport mode switch on the gear shift indication panel.

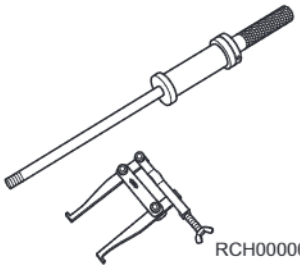
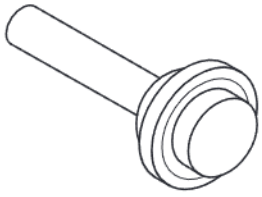


System Control Logic

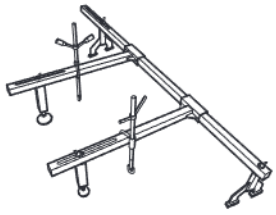
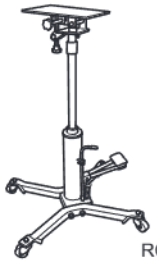


Tools

Special Tools

Puller	 RCH0000059
Differential Oil Seal Installer	 RCH0000009

General Tools

Engine Equalizer	 RCH0000026
Transmission Carrier	 RCH0000005

Specifications

Torque Specifications

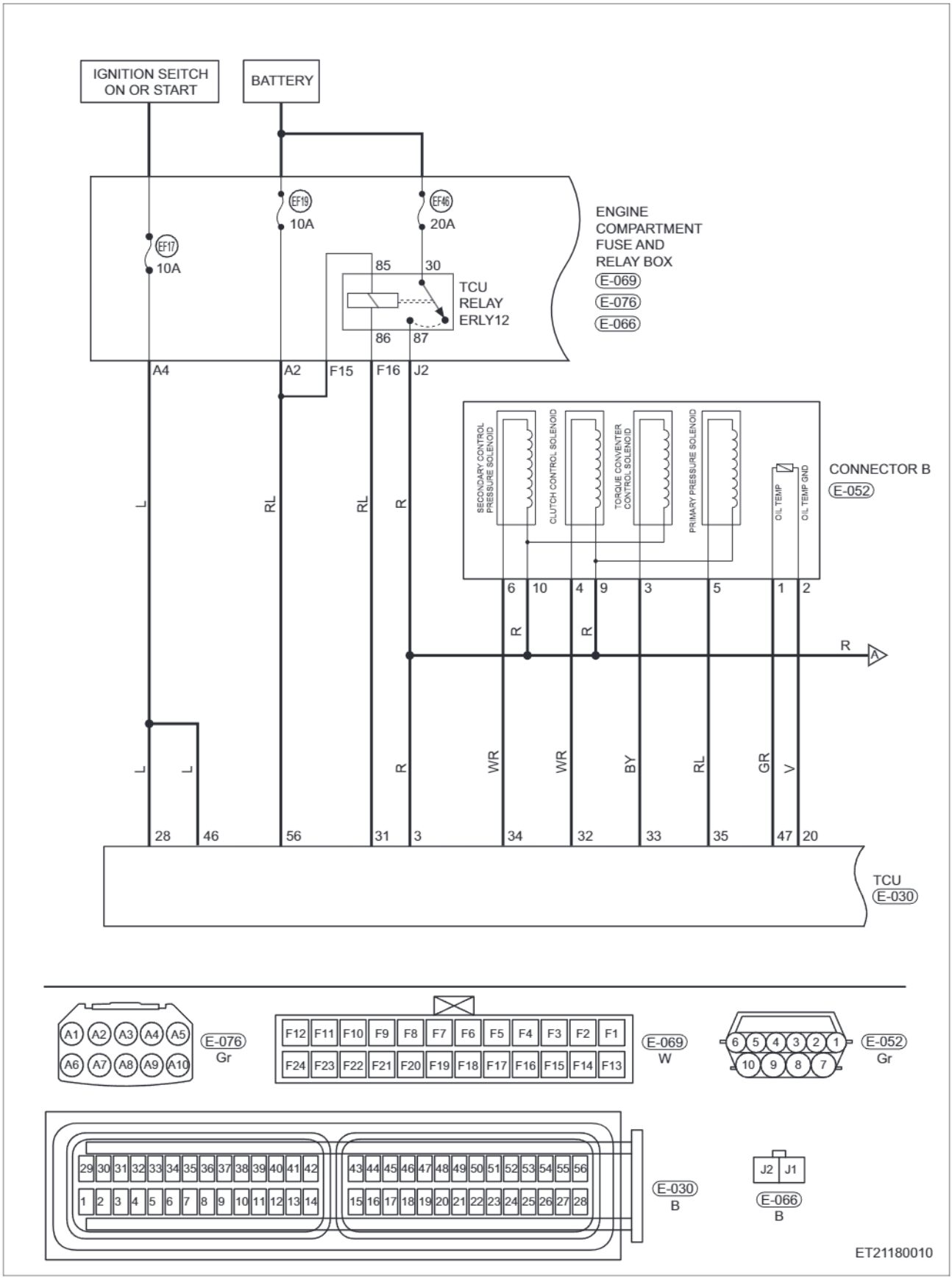
Description	Torque (N·m)
Transmission Drain Bolt	29 - 34
Primary Shaft Speed Sensor Fixing Bolt	10 - 12
Secondary Shaft Speed Sensor Fixing Bolt	10 - 12
Turbine Speed Sensor Fixing Bolt	10 - 12
Primary Shaft Pressure Sensor	15 - 22
Secondary Shaft Pressure Sensor	15 - 22
Gear Shift Cable to Arm Nut	16 - 20
Valve Body Case Fixing Bolt	10 - 12
Transmission Range Sensor 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 Baffle 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

General Specifications

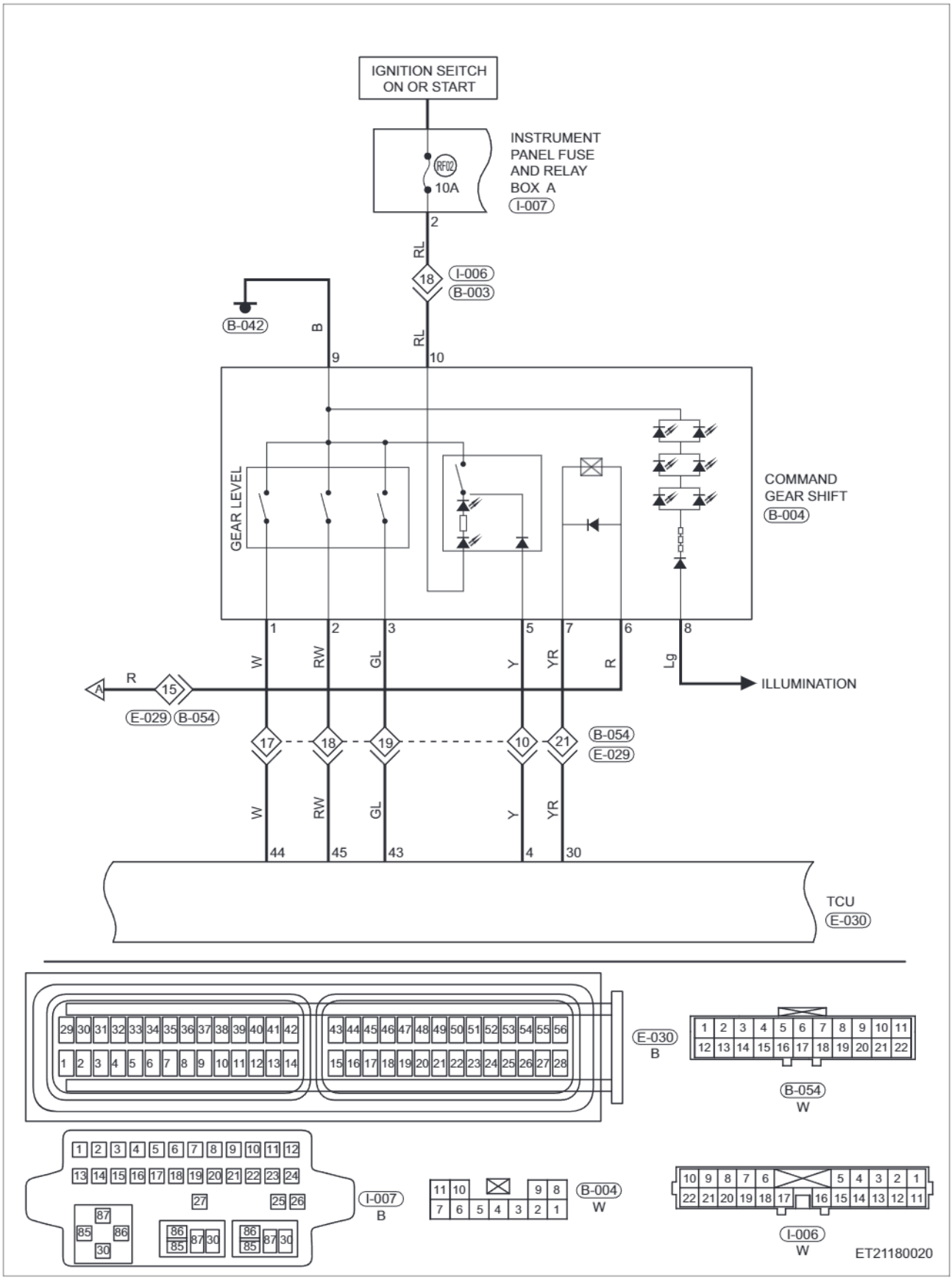
Item	Parameter
Model	QR019CHB
Type	CVT
Central Distance (mm)	204
Maximum Input Torque (N·m)	190
Final Drive Ratio	5.141
Pulley Speed Ratio Scope	0.44 - 2.39
Solenoid Quantity	4
Gear Shift Positions	P, R, N, D, L, M (manual mode)
Fluid Type	SP - III
Transmission Fluid Capacity (L)	8.0 ± 0.2

Circuit Diagram

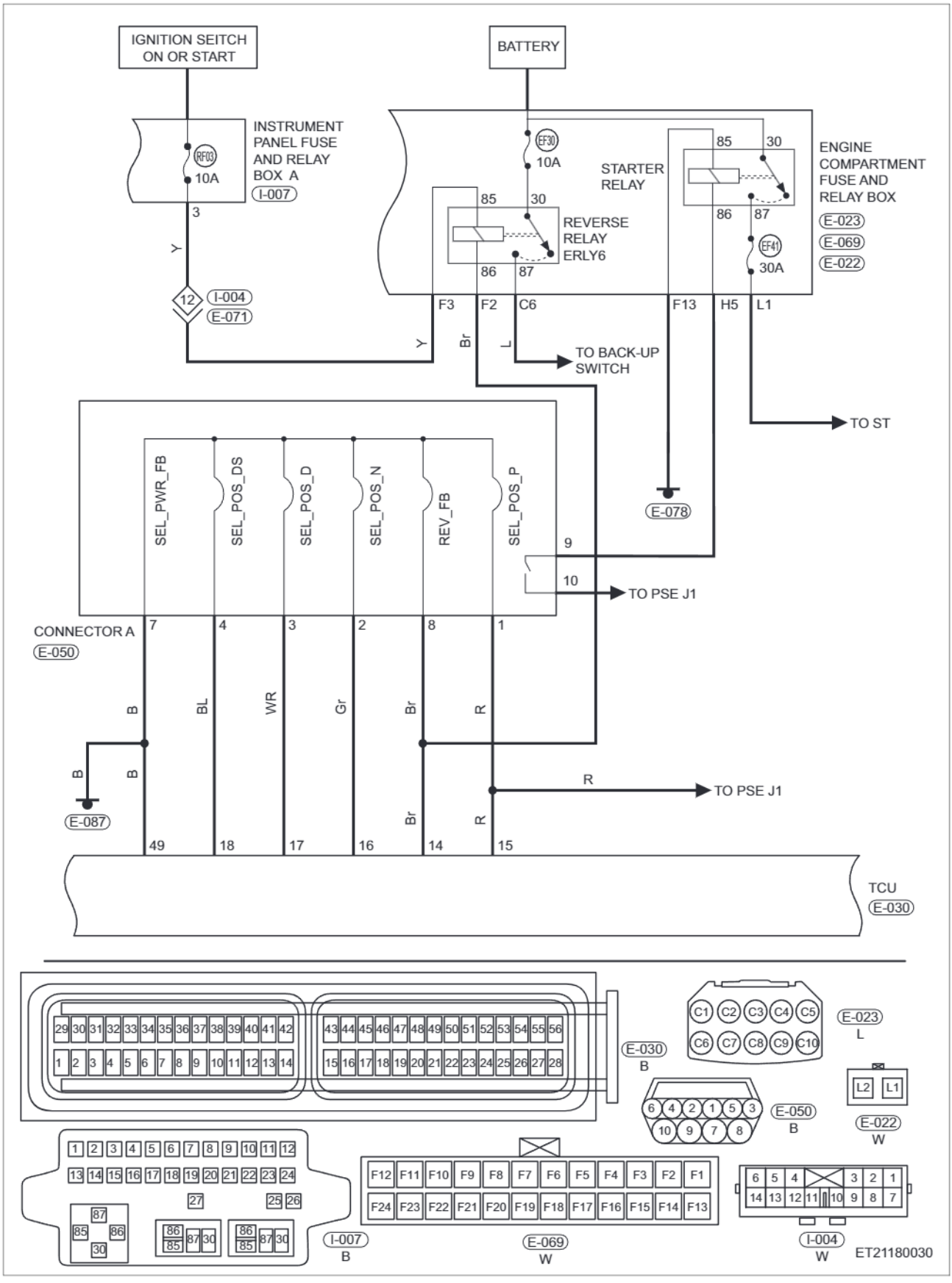
TCU (Page 1 of 5)



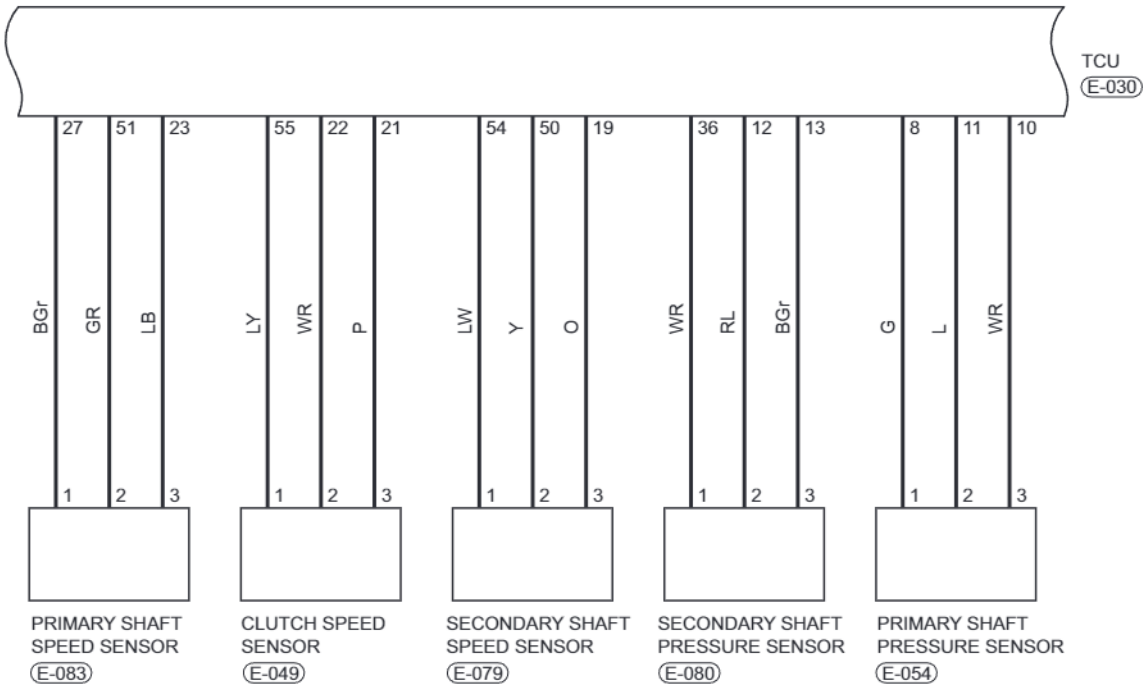
TCU (Page 2 of 5)

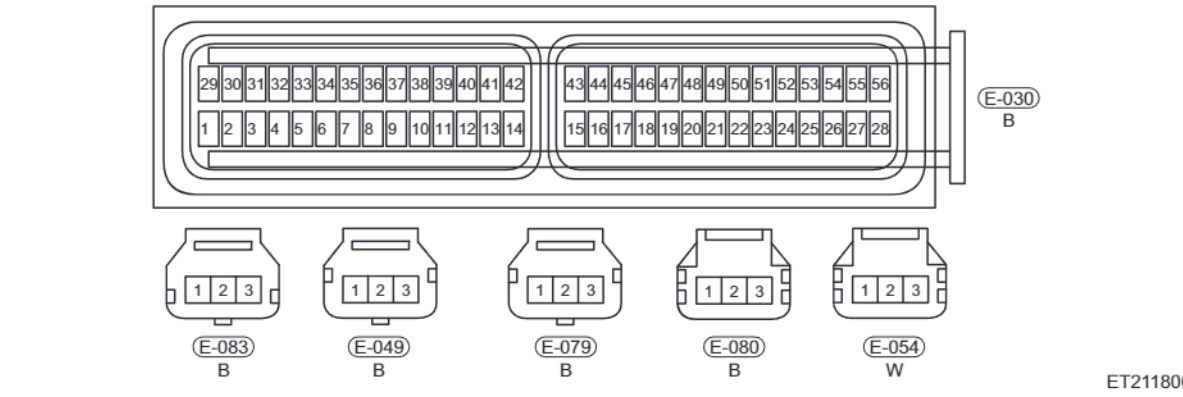


TCU (Page 3 of 5)



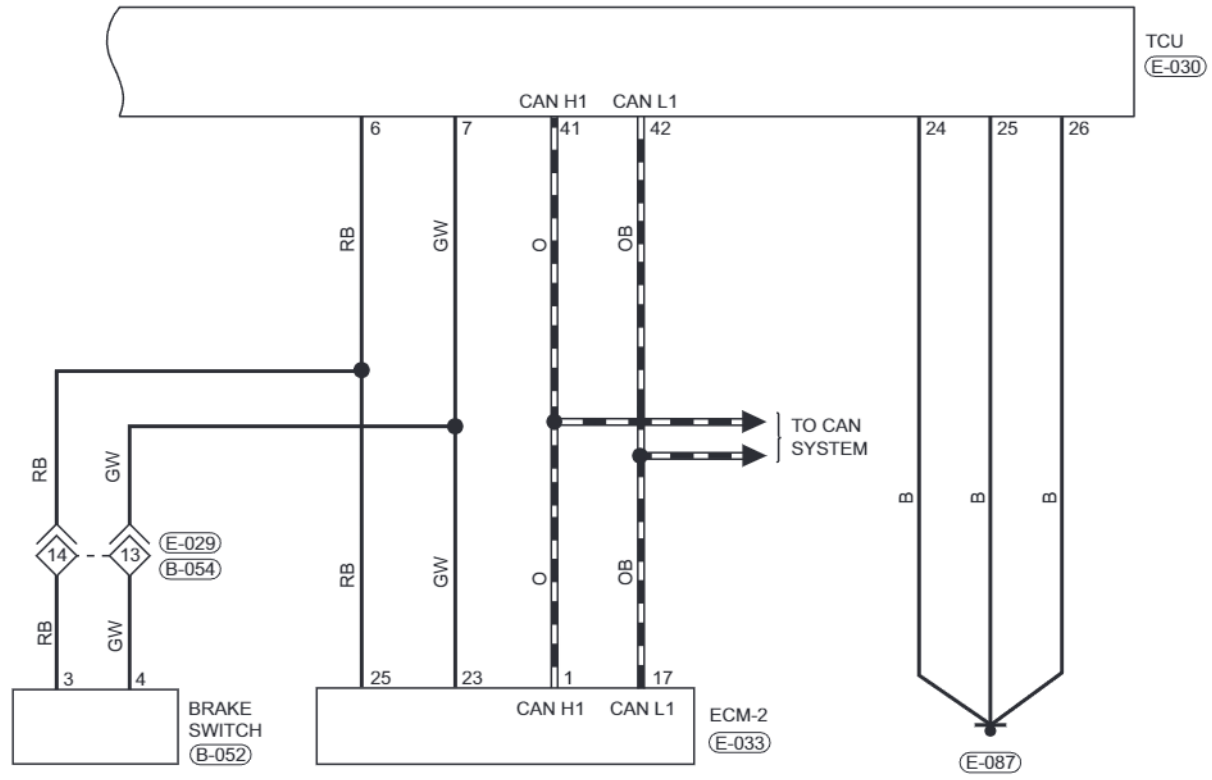
TCU (Page 4 of 5)

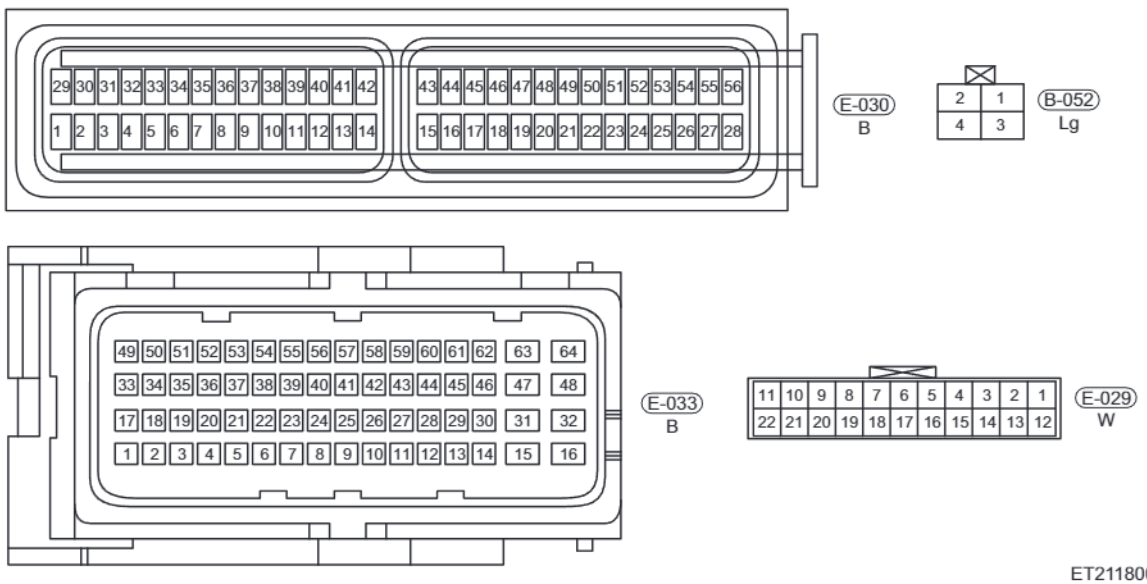




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TCU (Page 5 of 5)





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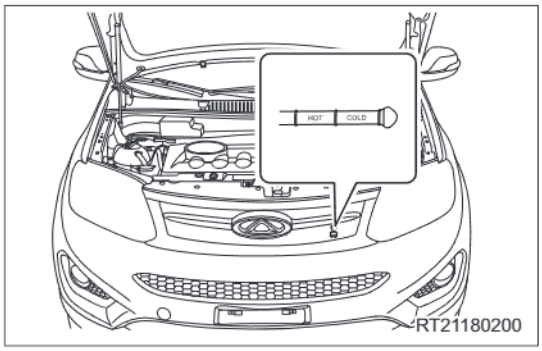
Transmission Control Unit (TCU) Pin-Out Table

Pin	Circuit Identification	Pin	Circuit Identification
1	-	29	-
2	-	30	Shift Solenoid Lock
3	Solenoid Power Feedback	31	TCU Relay
4	-	32	Clutch Solenoid
5	Winter 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
10	Primary Shaft Pressure Sensor Ground	37	Winter Mode Switch Illumination Ground
11	Primary Shaft Pressure Sensor Signal	38	-
12	Secondary Shaft Pressure Sensor Signal	39	-
13	Secondary Shaft Pressure Sensor Ground	40	-
14	Reverse Gear Switch	41	CAN High
15	P Gear Switch	42	CAN Low
16	Neutral Switch	43	Shift-Up Switch
17	D Gear Switch	44	Shift-Down Switch
18	Low Speed Gear Switch	45	Manual Mode Switch
19	Secondary Shaft Speed Sensor Ground	46	KL15
20	Oil Temperature Sensor Ground	47	Oil Temperature Sensor Signal
21	Turbine Speed Sensor Ground	48	P/N Signal Feedback
22	Turbine Speed Sensor Signal	49	Shift Position Power Feedback
23	Primary Shaft Speed Sensor Ground	50	Secondary Shaft Speed Sensor Signal
24	Ground	51	Primary Shaft Speed Sensor Signal
25	Ground	52	-
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 the vehicle runs for 5 min, the temperature will reach the normal working conditions (ATF temperature 60 - 80°C, and the engine coolant temperature 80 - 100°C).
2. Park the vehicle on a flat ground and pull the parking brake lever.
3. Start up the engine to make it run at idle speed, and then fully depress the brake pedal and move the shift lever for five times at each gear. Finally, place the lever at "P" or "N" position.
4. Pull out the automatic transmission fluid dipstick and clean it with non-wool paper; then insert the dipstick into the filling pipe as much as possible and then take out to observe whether it reaches the "HOT" position.



5. Check the transmission fluid:

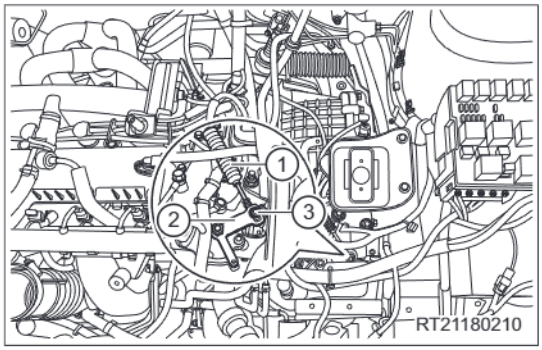
- If the fluid becomes brown, replace the automatic transmission fluid and check the vehicle for working conditions.
- If the fluid becomes milk white or cloudy, or there is water in the fluid, replace the automatic transmission fluid and check for the leaking location.
- If the fluid becomes black with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

Gear Shift Cable Inspection and Adjustment

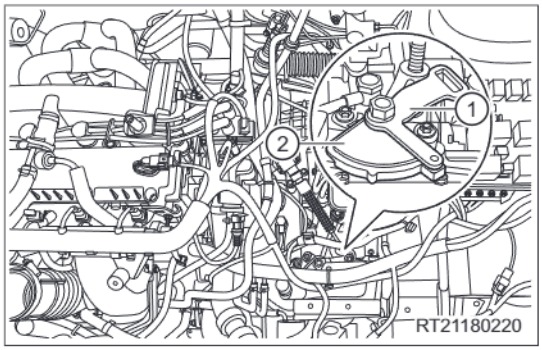
Shift the gear lever from "N" gear to other gears to check whether the lever can be shifted to other gears smoothly and precisely, and also check whether the gear indicators can indicate the gear correctly.

If the 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 the electrical devices and ignition switch.
4. Disconnect the negative battery cable.
5. Remove the battery, battery tray and tray bracket (See page 16-7).
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 transmission range sensor fixing bolts, and adjust the relative position of the transmission range sensor and shift arm to make the holes of gear shift arm (1) and transmission range sensor (2) coincident.



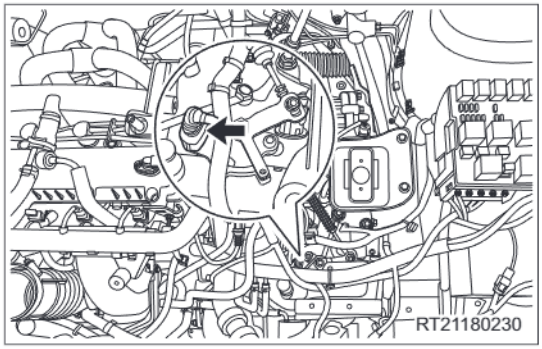
8. Use a proper tool to fix the gear shift arm and transmission range sensor, and then tighten the bolts to the specified torque.
9. Start engine only when the gear lever is at the "P" or "N" gear.

CAUTION

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

Transmission Range Sensor Inspection

1. Turn off all the electrical devices and ignition switch.
2. Disconnect the negative battery cable.
3. Disconnect the transmission range sensor wire harness connector.



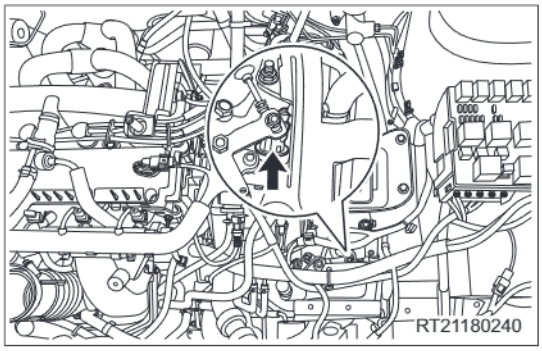
4. Check for continuity between the terminals of transmission range sensor wire harness connector according to the table below.

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 transmission range sensor.

Transmission Fluid Temperature Sensor Inspection

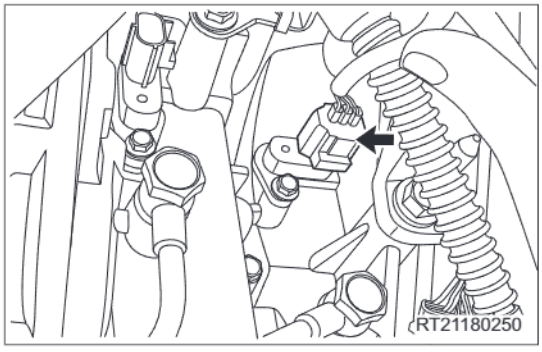
1. Turn off all the electrical devices and ignition switch.
2. Disconnect the transmission wire harness connector.
3. Check for resistance between the transmission wire harness connector terminals 1 and 2.



Item	Terminal	Temperature (°C (°F))	Resistance (KΩ)
Gear Box	1 - 2	20 (68)	6.5
		80 (176)	0.9

Primary Shaft Speed Sensor Inspection

1. Turn off all the electrical devices and ignition switch.
2. Disconnect the primary shaft speed sensor connector.
3. Check for resistance between the terminals of primary shaft speed sensor as shown in the table below at normal temperature.

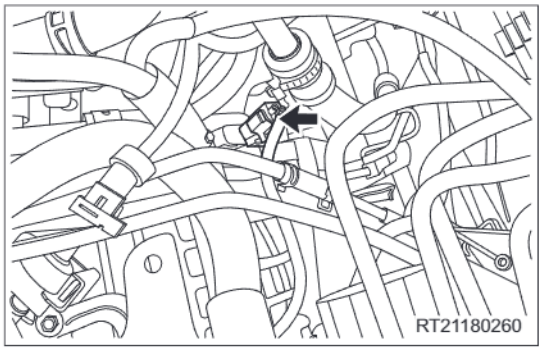


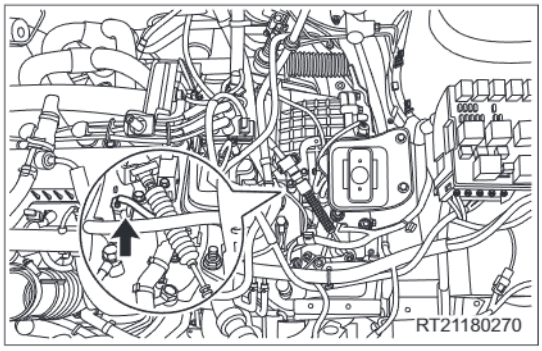
HINT:
The inner parts of the sensor are triode and capacitor, and will be affected greatly by the environment and usage condition. Therefore, the actual measured value is within the specified value plus/minus 15% in the table below.

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

1. Turn off all the electrical devices and ignition switch.
2. Disconnect the turbine/secondary shaft speed sensor connector.





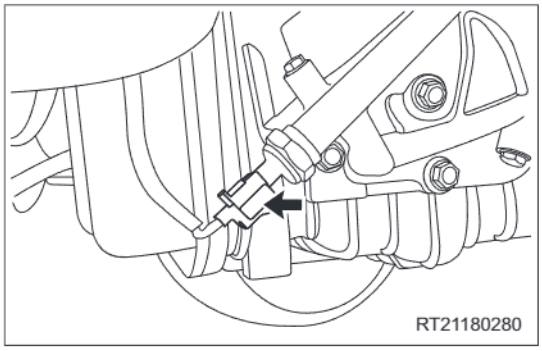
3. Check for resistance between the terminals of turbine/secondary shaft speed sensor as shown in the table below at normal temperature.

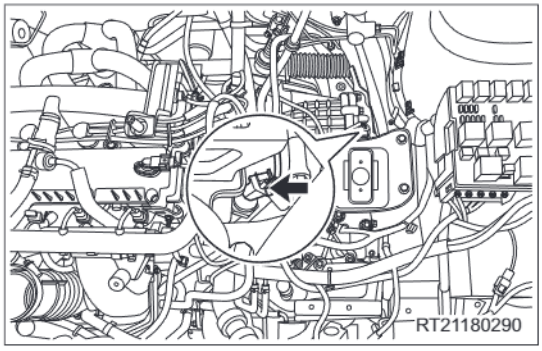
HINT:
The inner parts of the sensor are triode and capacitor, and will be affected greatly by the environment and usage condition. Therefore, the actual measured value is within the specified value plus/minus 15% in the table below.

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

1. Turn off all the electrical devices and ignition switch.
2. Disconnect the primary/secondary shaft pressure sensor connector.





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

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

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

Problem Symptoms Table

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

Symptoms	Suspected Area	See page
With power-on or ignited, P gear is not released after applying brake	Brake switch or circuit	26-26
	Gear shift lock solenoid	-
High impact during static gear shifting	Turbine speed sensor	18-116
	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)	18-127
Variable speed anomaly, jumbled speed shifting in driving; abnormal driving and poor comfort	Oil pressure switch	13-16
	Circuit or connector	-
	Speed sensor	06-249
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)	12-29
	Locking clutch (abnormal)	-
Abnormal noise of transmission in acceleration	Transmission fluid (insufficient)	18-110
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 by the data network.
2. Confirm that the 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 the voltage of electrical systems.
5. Refer to any Technical Bulletin that may apply to the malfunction.
6. Visually check the related wire harnesses.
7. Inspect and clean all engine control module (ECM) grounds that are related to the latest DTC.
8. If multiple trouble codes were set, use the circuit diagrams and look for any common ground circuit or power supply circuit applied to the 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 the 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 the wiggle test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect the 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 the 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. The operations to check the ground points are 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 the 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	Transmission Range Sensor 'A' Circuit (PRNDL Input)
P0706	Transmission Range Sensor 'A' Circuit Range (PRNDL Input)
P0707	Transmission Range Sensor 'A' Circuit Low (PRNDL Input)
P0708	Transmission Range Sensor 'A' Circuit High (PRNDL Input)
P0709	Transmission Range Sensor '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

DTC Code	DTC Definition
P071B	Transmission Sport Mode Switch Circuit Low
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

DTC Code	DTC Definition
P0816	Downshift Switch Circuit
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

DTC Code	DTC Definition
P0883	TCM Power Input Signal High
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

DTC Code	DTC Definition
P0962	Pressure Control Solenoid 'A' Control Circuit Low
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 the "Data Stream List" on the diagnostic tester, the working state of the switches, sensors, and actuators can be checked without removing any component. Before the fault diagnosis of the transmission electrical control system, the observation and analysis of data is the first step in troubleshooting, this can reduce the troubleshooting time.

⚠ WARNING

- The 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

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

Gear	Data Stream Item	Engine Idle Speed
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
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

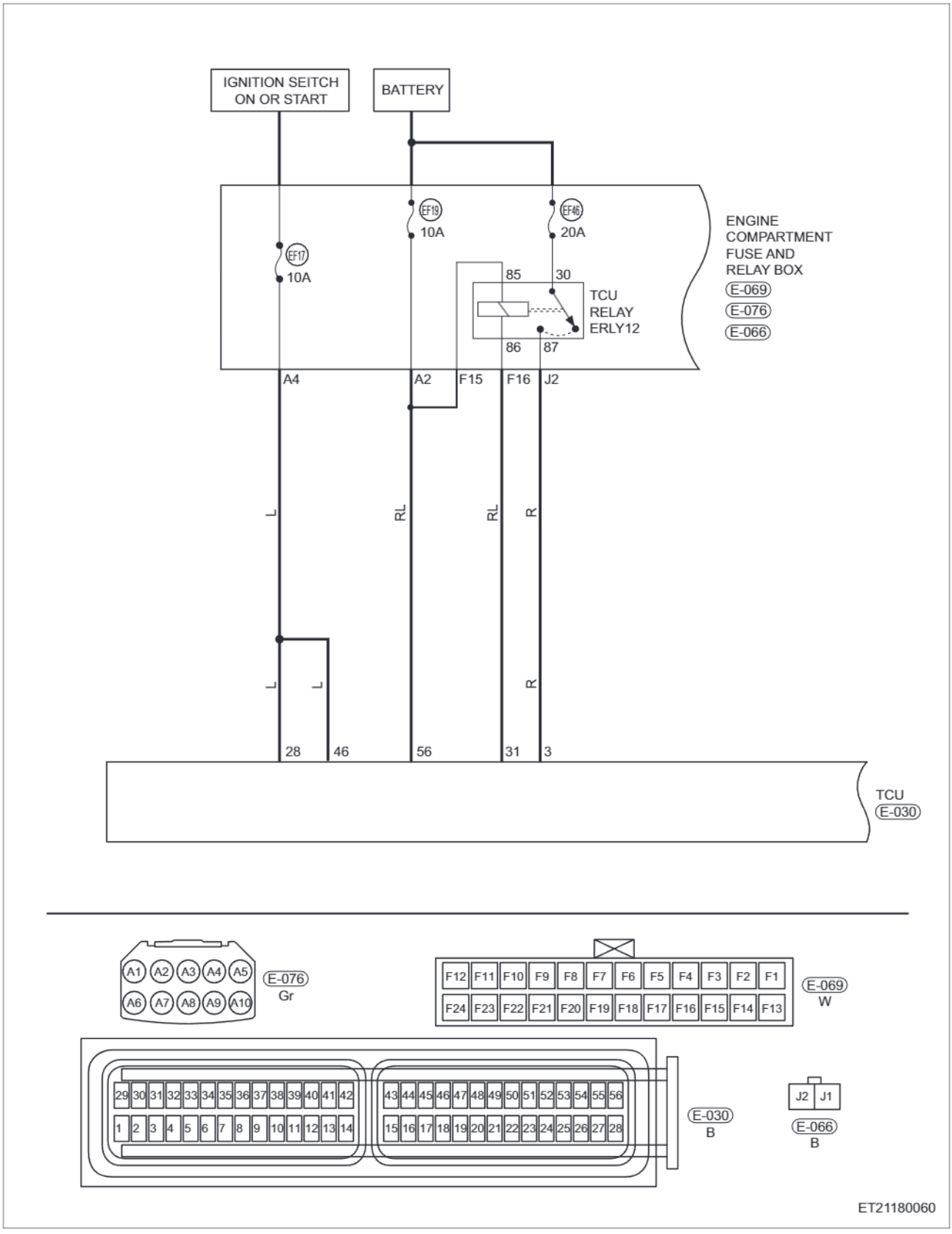
CAN Network

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	Voltage (11 - 14 V)
46	Ignition Switch	Ignition Switch ON	Voltage (11 - 14 V)
56	Battery Power	-	Voltage (11 - 14 V)
3	Battery Power	-	Voltage (11 - 14 V)
31	Battery Power	-	Voltage (11 - 14 V)

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis procedure

1	**Check if TCU power fuse EF17, EF19 and EF46 are normal**

NG → **Replace failed fuse**

OK

2	**Check if TCU relay 12 operates normally**

NG → **Replace TCU relay 12**

OK

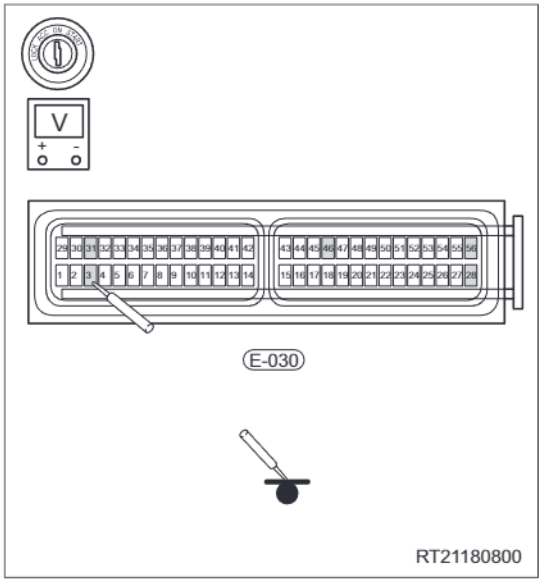
3	**Check if ignition switch to fuse box TCU fuse and relay circuit and battery to fuse box TCU fuse and relay circuit are normal**

NG → **Repair or replace failed circuit**

OK

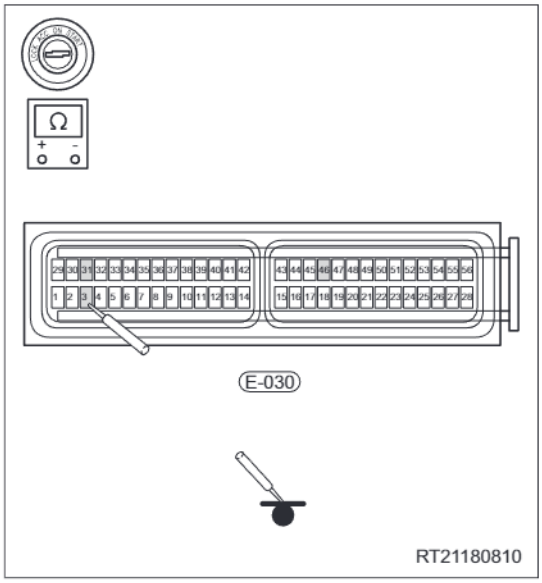
4	Check engine wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the connector E-030.
c. Connect the negative battery cable.
d. Check if the output voltage of the terminal 3, 28, 31, 46 and 56 of connector E-030 is normal.



e. Check for continuity between terminal 3, 28, 31, 46 and 56 of connector E-030 and ground.

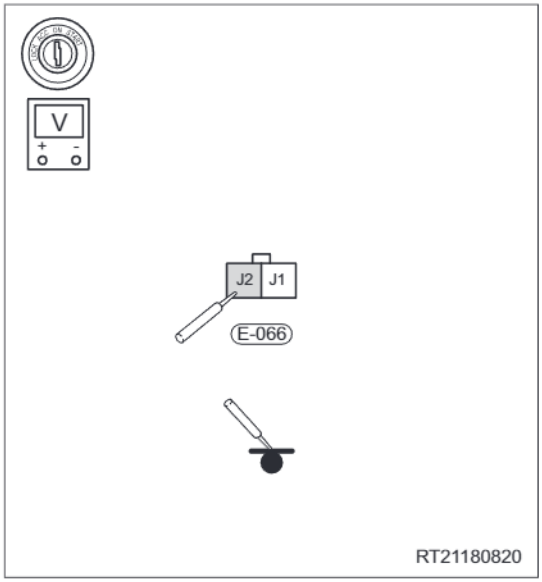
NG → Replace engine wire harness



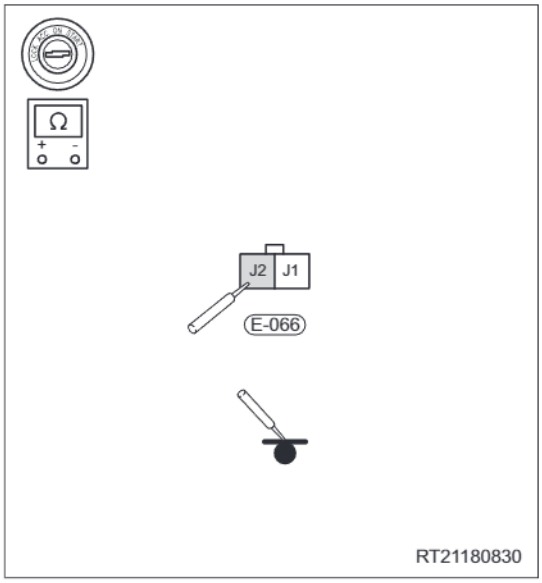
OK

5	Check engine compartment fuse and relay box

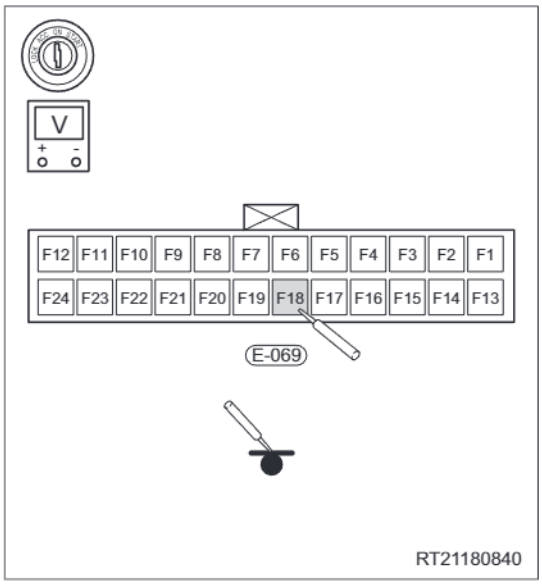
a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the connector E-066, E-069 and E-076.
c. Check if the output voltage of the terminal J2 of connector E-066 is normal.



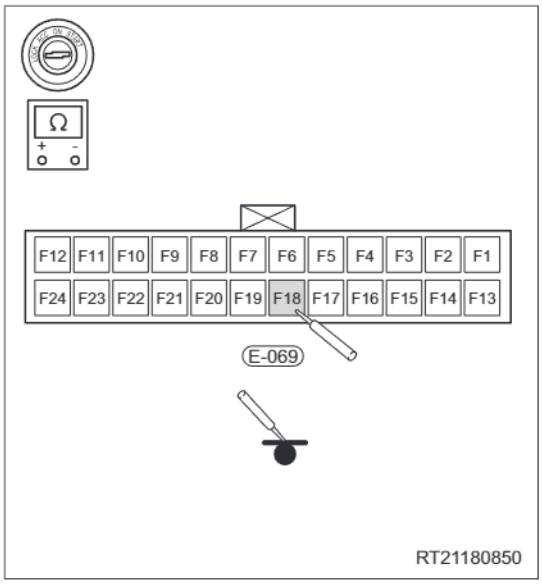
d. Check if the terminal J2 of connector E-066 and ground is conductive.



e. Check if the output voltage of the terminal F18 of connector E-069 is normal.

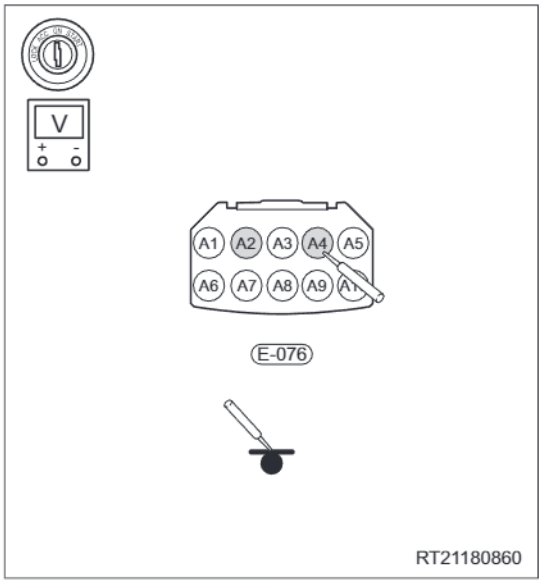


f. Check if the terminal F18 of connector E-069 and ground is conductive.

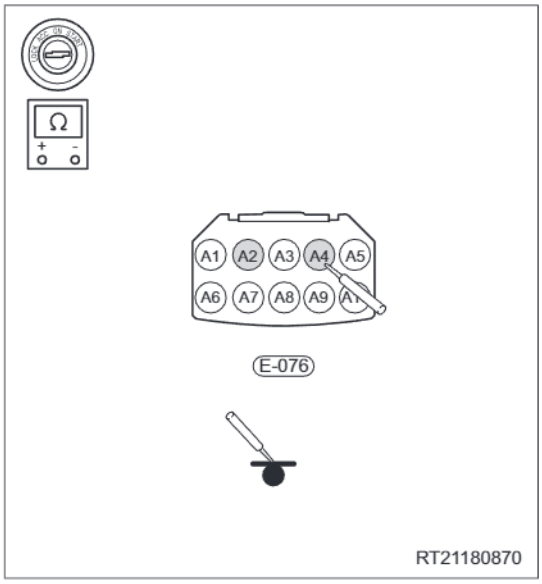


18

g. Check if the output voltage of the terminal A2 and A4 of connector E-076 is normal.



h. Check if the terminal A2 and A4 of connector E-076 and ground is conductive.

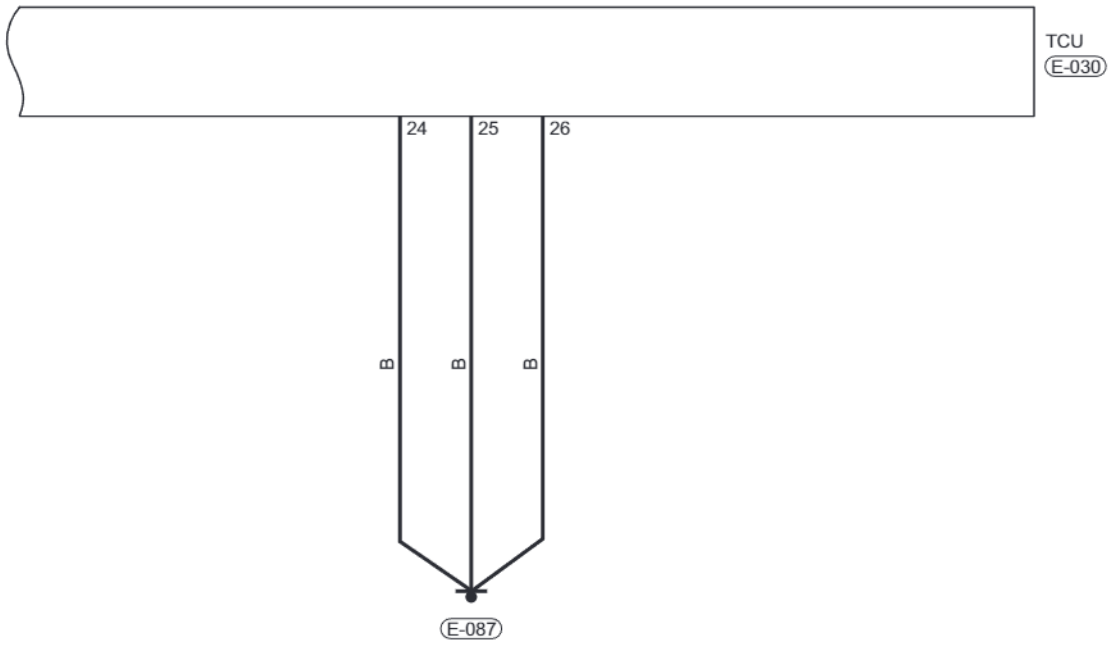


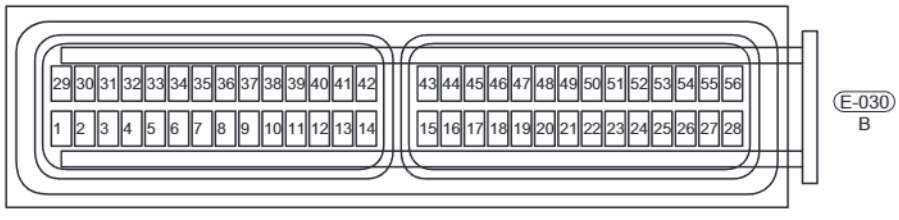
NG → **Replace compartment fuse and relay box**

OK → **Replace TCU**

Ground Circuit Test

Ground Circuit





ET21180070

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

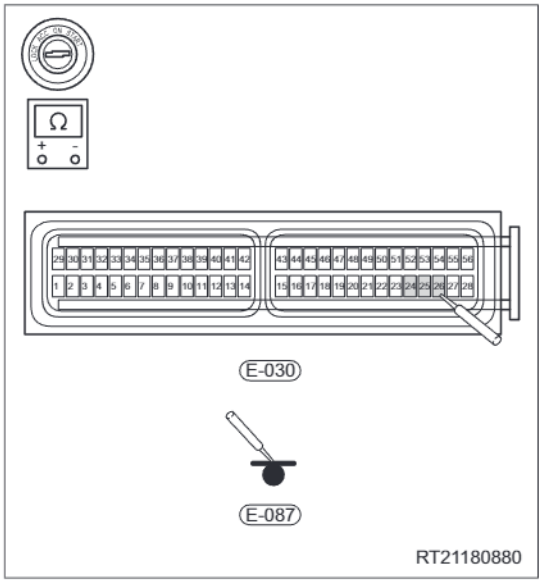
1	Check ground for dirty or oxidized

NG → Clean transmission ground contact point

OK ↓

2	Check ground circuit for continuity

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the TCU connector E-030.
c. Check for continuity between the terminals 24, 25 and 26 of connector E-030 and ground E-087.



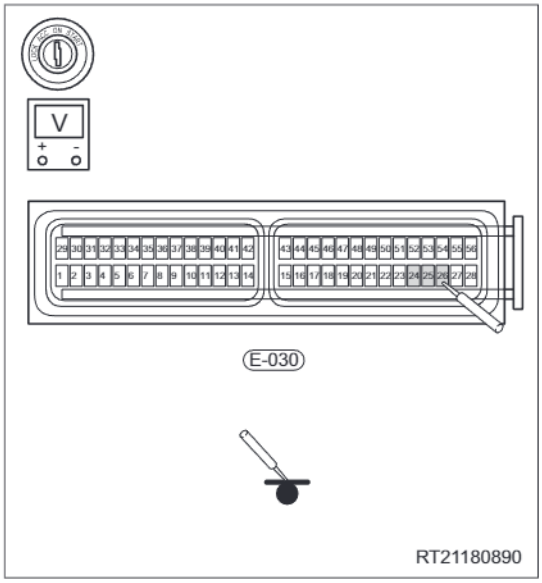
NG → Repair or replace failed circuit

OK ↓

18

3	Check if there is voltage in ground circuit

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the TCU connector E-030.
c. Connect the negative battery cable.
d. Check if there is voltage between the terminals 24, 25 and 26 of TCU connector E-030 and ground.

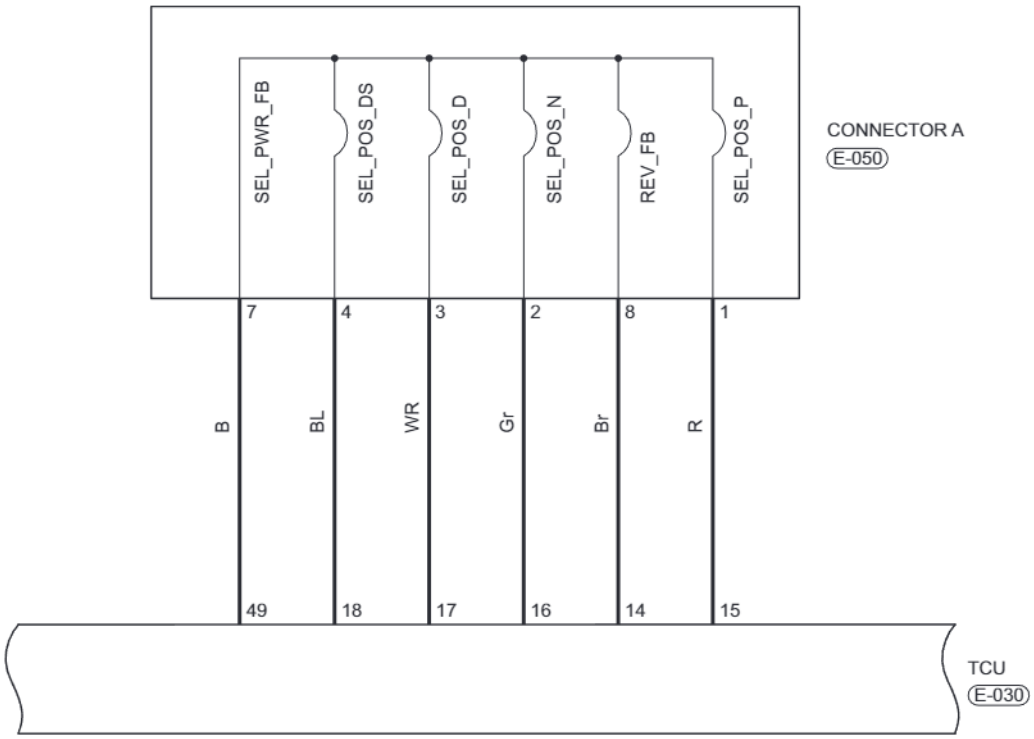


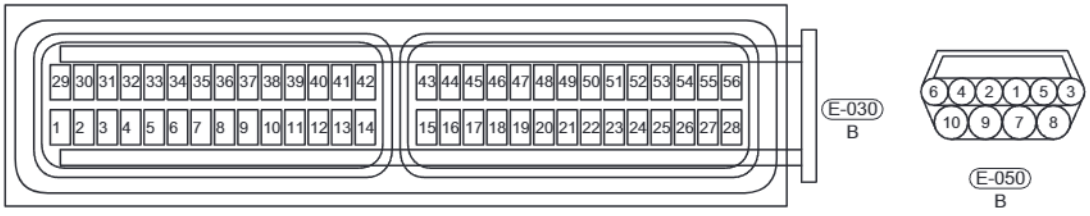
NG → **Repair or replace failed circuit**

OK

Replace TCU

DTC	P0705	Transmission Range Sensor 'A' Circuit (P-R-N-D-L Input)





ET21180080

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)	• Transmission range sensor failure • 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 the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	Check wire harness connector

a. Turn ignition switch to LOCK.
b. Disconnect the gear selector connector.
c. Check if the gear selector connector is dirty, oxidized, loose or damaged.

NG → Repair fault

OK

2	Check transmission range sensor

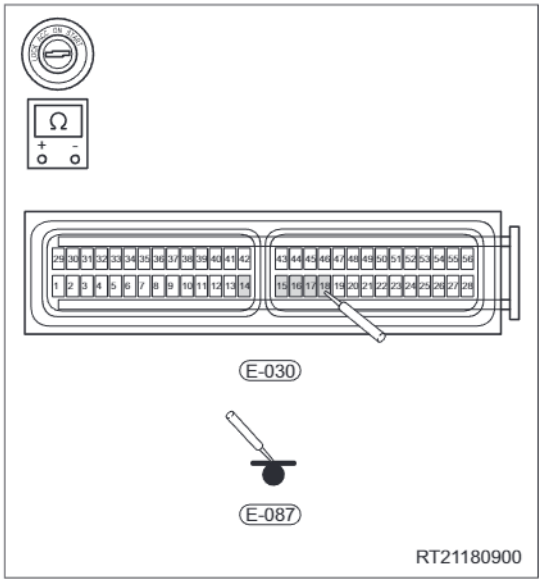
a. Turn ignition switch to LOCK.
b. Disconnect the negative battery cable.
c. Disconnect the transmission range sensor connector and shift the lever to each gear.
d. Check if the terminals of the transmission range sensor connector connects well (See page 18-119).

NG → Replace transmission range sensor

OK

3	Check wire harness connector U-010

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between the terminals 14, 15, 16, 17 and 18 of wire harness connector E-030 and ground.

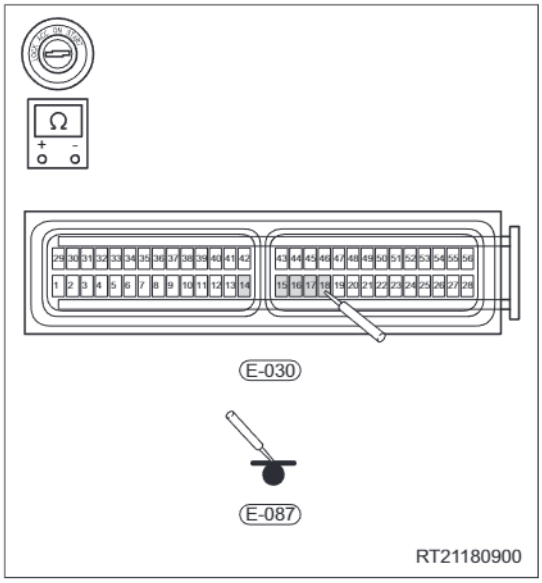


NG → Repair or replace failed circuit

OK

4	Check TCU wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connectors E-030 and E-050.
c. Check for continuity between the terminals 14, 15, 16, 17 and 18 of wire harness connector E-030 and terminals of 1, 2, 3, 4 and 8 of connector E-050.



NG → Repair or replace failed circuit

OK

5	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0705 still exists.

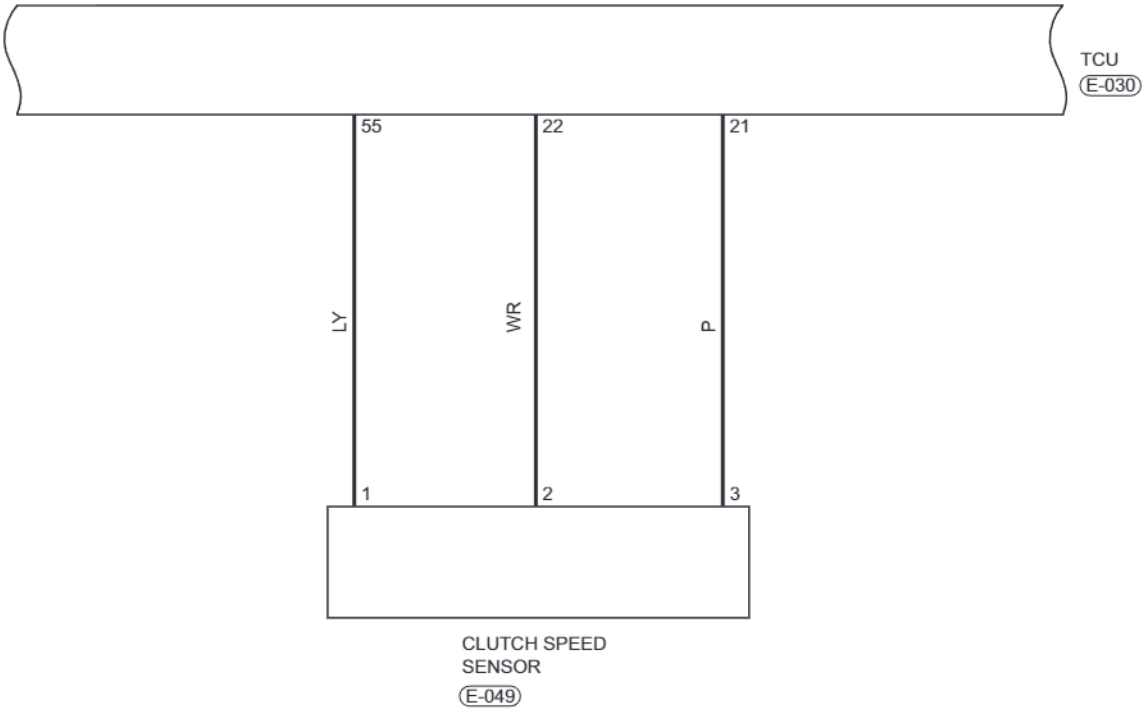
NG → Replace TCU

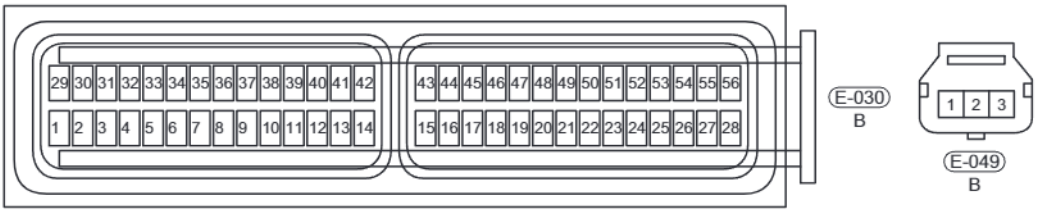
OK

System is normal

DTC	P0715	Input/Turbine Speed Sensor Circuit

DTC	P0716	Input/Turbine Speed Sensor Circuit Range





ET21180090

DTC Code	DTC Definition	DTC Detection Condition	Warning Light 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 the 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 900ms	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	Check wire harness connector

18

a. Turn ignition switch to LOCK.
b. Disconnect the turbine speed sensor connector.
c. Check if the turbine speed sensor connector is dirty, oxidized, loose or damaged.

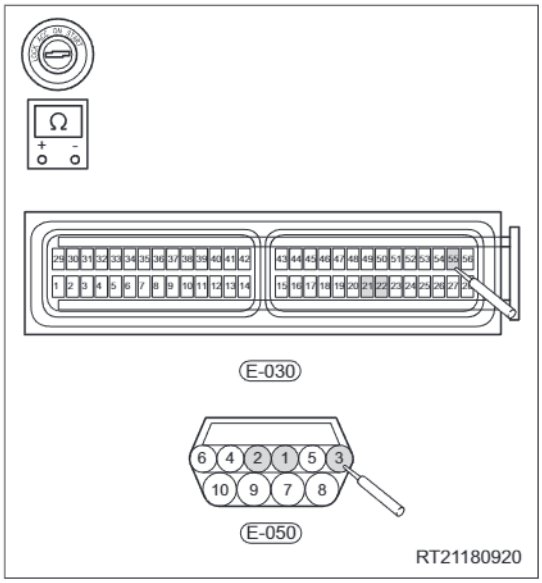
NG → Repair fault

OK

2	Check engine compartment wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connectors E-030 and E-049.
c. Check for continuity between the terminals 21, 22 and 55 of wire harness connector E-030 and terminals 3, 2 and 1 of connector E-049.

NG → **Replace engine compartment wire harness**

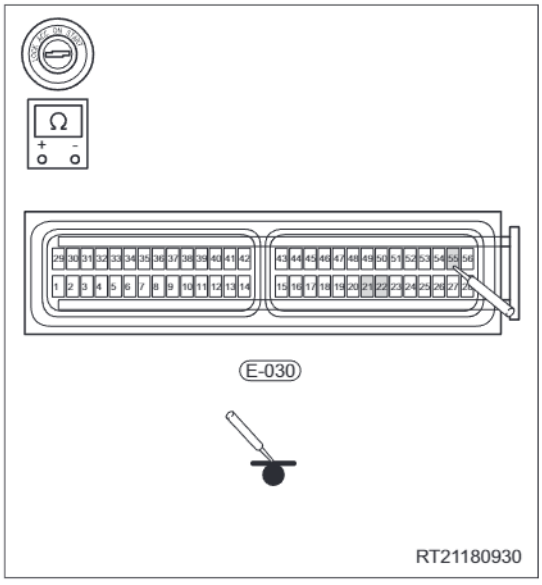


OK

3	Check if TCU wire harness connector E-030 and ground is conductive

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between the terminals 21, 22 and 55 of wire harness connector E-030 and ground.

NG → **Repair or replace failed circuit**

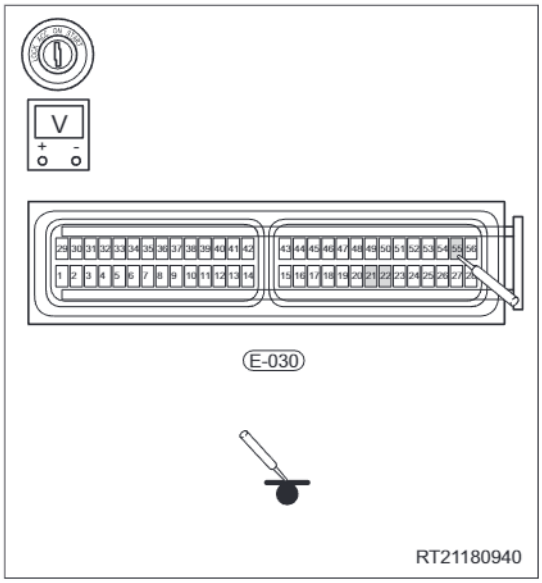


OK

18

4	Check if TCU wire harness connector E-030 is short to power

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check if the terminals 21, 22 and 55 of wire harness connector E-030 are short to power.



NG → **Repair or replace failed circuit**

OK

5	Check turbine speed sensor

a. Correctly install a new turbine speed sensor.
b. Check whether the system is normal.

NG → **Diagnosis complete**

OK

6	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0715 or P0716 still exists.

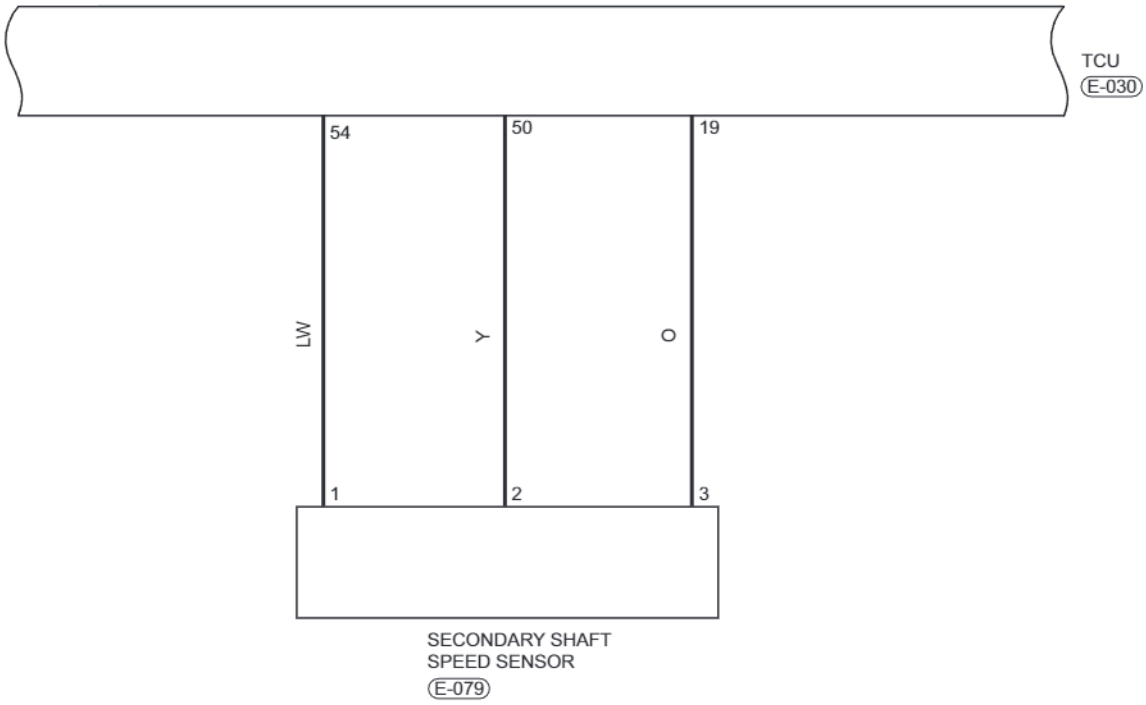
NG → **Replace TCU**

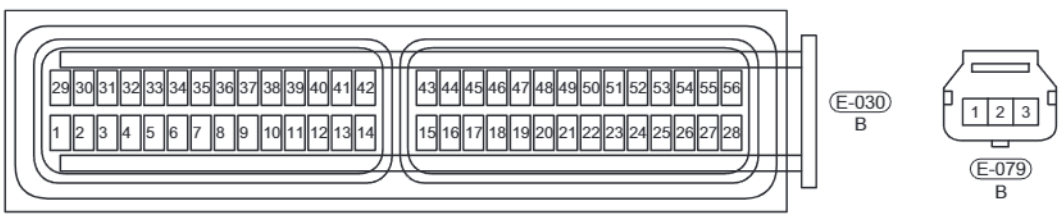
OK

System is normal

DTC	P0720	Output Speed Sensor Circuit

DTC	P1745	Second Speed Sensor Plausible





ET21180100

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 the allowable value within a period	• Incorrect installation of the output speed sensor • Signal circuit open or short circuit • Output speed sensor power circuit poor contact • Output speed sensor failure • TCU signal circuit failure
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	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	Check wire harness connector

a. Turn ignition switch to LOCK.
b. Disconnect the secondary speed sensor connector.
c. Check if the secondary speed sensor connector is dirty, oxidized, loose or damaged.

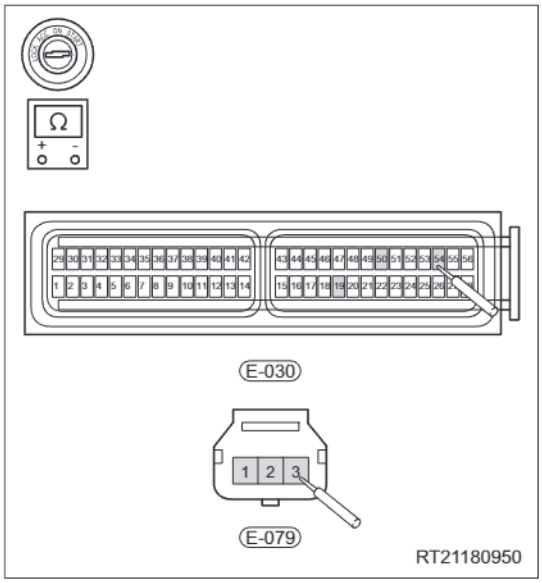
NG → Repair fault

OK →

2	Check TCU wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connectors E-030 and E-079.
c. Check for continuity between the terminals 19, 50 and 54 of wire harness connector E-030 and terminals 3, 2 and 1 of connector E-079.

NG → **Repair or replace failed circuit**

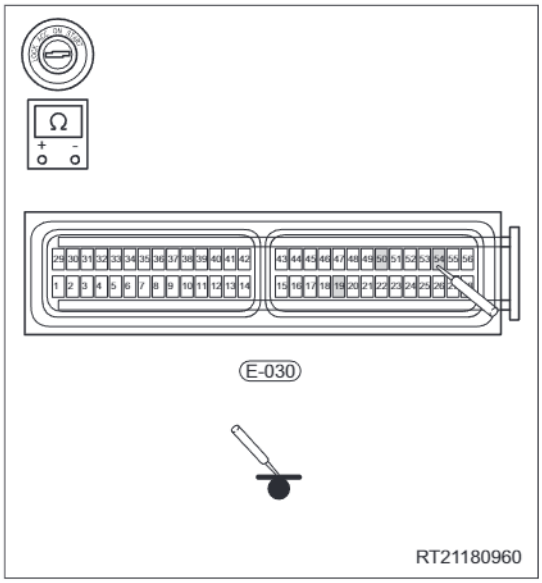


OK

3	Check if TCU wire harness connector E-030 and ground is conductive

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between the terminals 19, 50 and 54 of wire harness connector E-030 and ground.

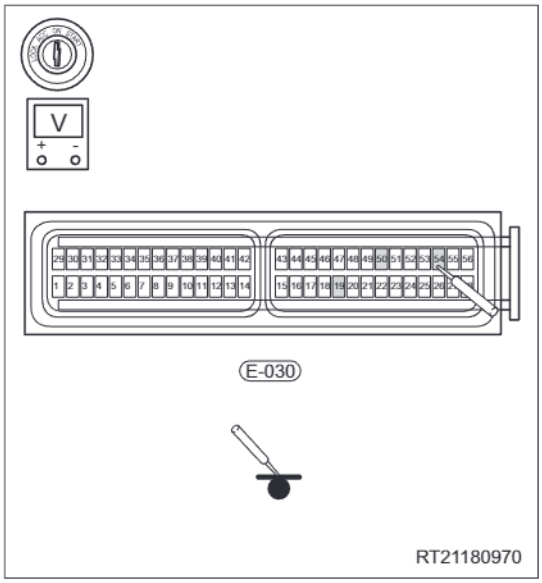
NG → **Repair or replace failed circuit**



OK

4	Check if TCU wire harness connector E-030 is short to power

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check if the terminals 19, 50 and 54 of wire harness connector E-030 are short to power.



NG → **Repair or replace failed circuit**

OK

5	Check secondary shaft speed sensor

a. Correctly install a new secondary shaft speed sensor.
b. Using the X-431 3G diagnostic tester, check whether the system is normal.

NG → **Diagnosis complete**

OK

6	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0720 or P1745 still exists.

NG → **Replace TCU**

OK

System is normal

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	The absolute value of difference of target speed ratio and actual speed ratio is higher than the 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 the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the 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

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

NG → **Repair fault**

OK

2	Check transmission system

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

NG → Repair these DTCs fault

OK

3	Read data stream

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

NG → Repair fault

OK

4	Check for DTC

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

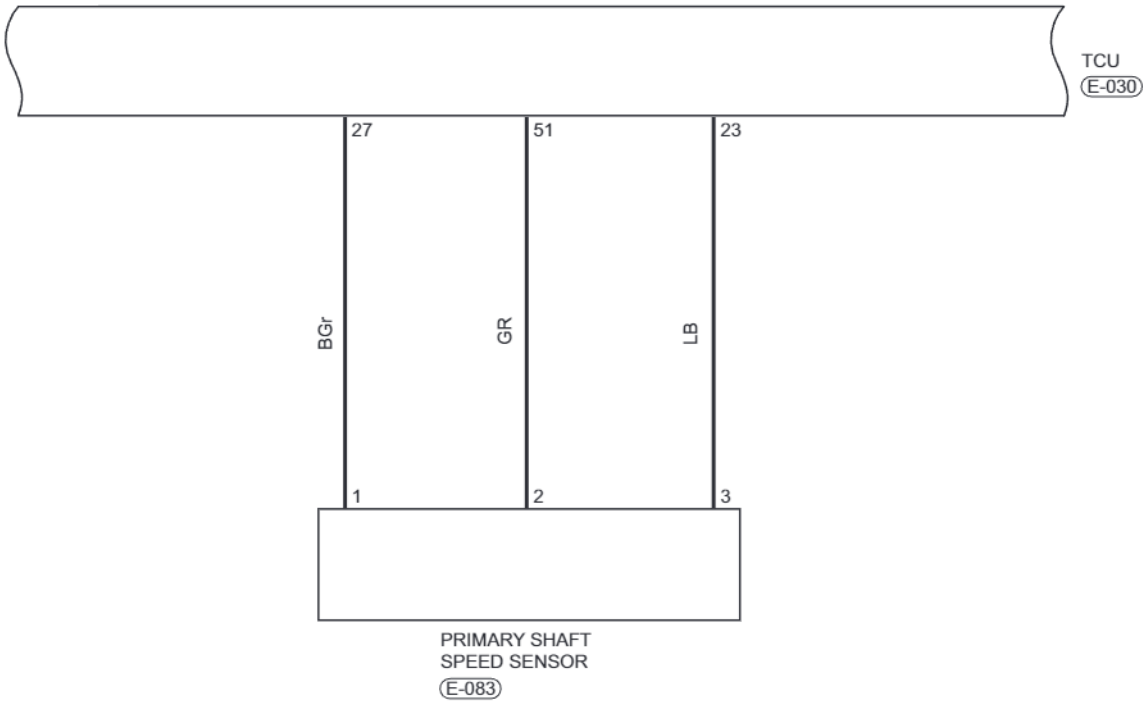
NG → Replace solenoid and wire harness assembly

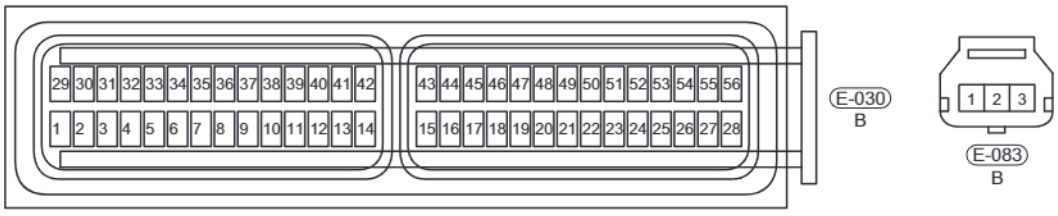
OK

System is normal

DTC	P0791	Intermediate Shaft Speed Sensor 'A' Circuit

DTC	P0792	Intermediate Shaft Speed Sensor 'A' Circuit Range





ET21180110

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	The input speed signal is higher than the allowable value within a period	• Incorrect installation of the 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	The input speed signal exceeds the standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	Check wire harness connector

a. Turn ignition switch to LOCK.
b. Disconnect the primary shaft speed sensor connector.
c. Check if the primary shaft speed sensor connector is dirty, oxidized, loose or damaged.

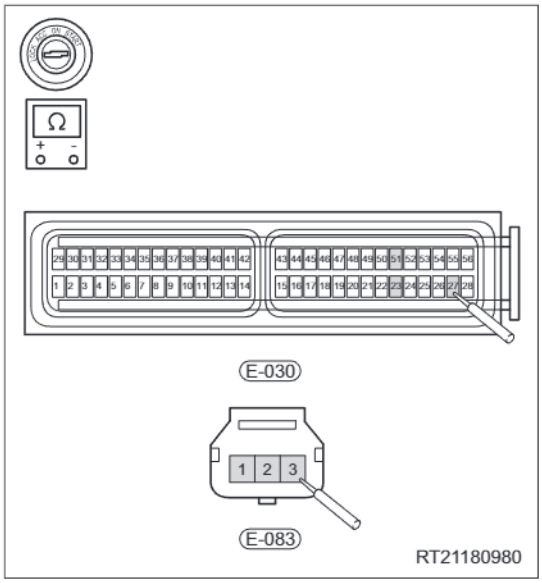
NG → Repair fault

OK

2	Check TCU wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connectors E-030 and E-083.
c. Check for continuity between the terminals 23, 27 and 51 of wire harness connector E-030 and terminals 3, 1 and 2 of connector E-083.

NG → Repair or replace failed circuit

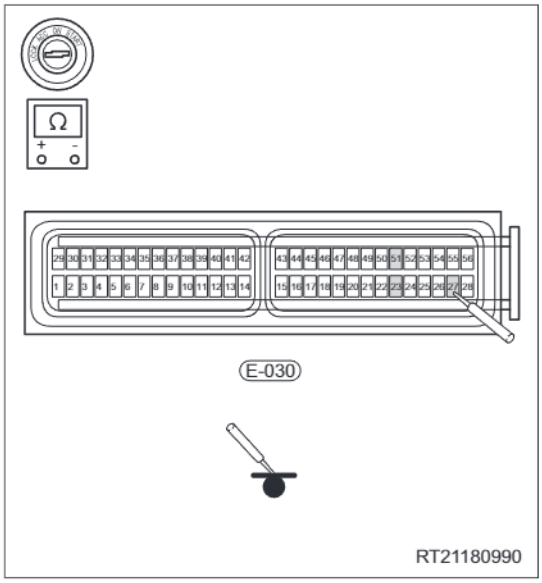


OK

3	Check if TCU wire harness E-030 and ground is conductive

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between the terminals 23, 27 and 51 of wire harness connector E-030 and ground.

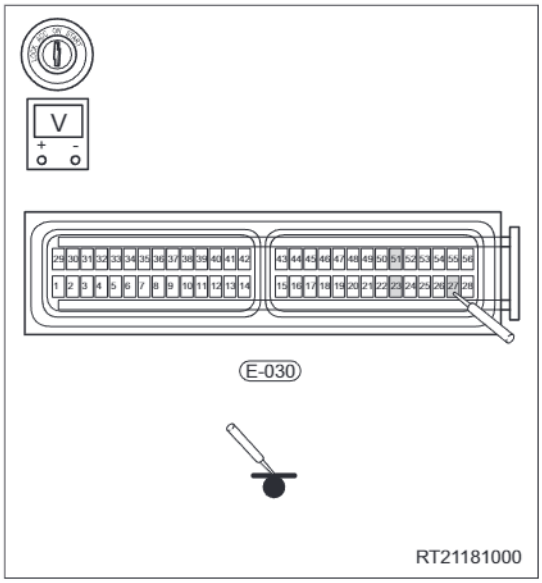
NG → Repair or replace failed circuit



OK

4	Check if TCU wire harness connector E-030 is short to power

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check if the terminals 23, 27 and 51 of wire harness connector E-030 are short to power.



NG → **Repair or replace failed circuit**

OK

5	Check primary shaft speed sensor

a. Correctly install a new primary shaft speed sensor.
b. Using the X-431 3G diagnostic tester, check whether the system is normal.

NG → **Diagnosis complete**

OK

6	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0791 or P0792 still exists.

NG → **Replace TCU**

OK

System is normal

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 the forward/ reverse clutch input and output speed	• Clutch control valve core seized • Clutch control solenoid short circuit to the power • Clutch friction plate serious wearing or sinter
P811E	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	The 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 the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	Carry out following preliminary checks

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

NG → **Repair fault**

OK ↓

2	Check transmission system

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

NG → **Repair these DTCs fault**

OK ↓

3	Read data stream

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

NG → **Diagnose abnormal data flow fault**

OK ↓

4	Check for DTC

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?

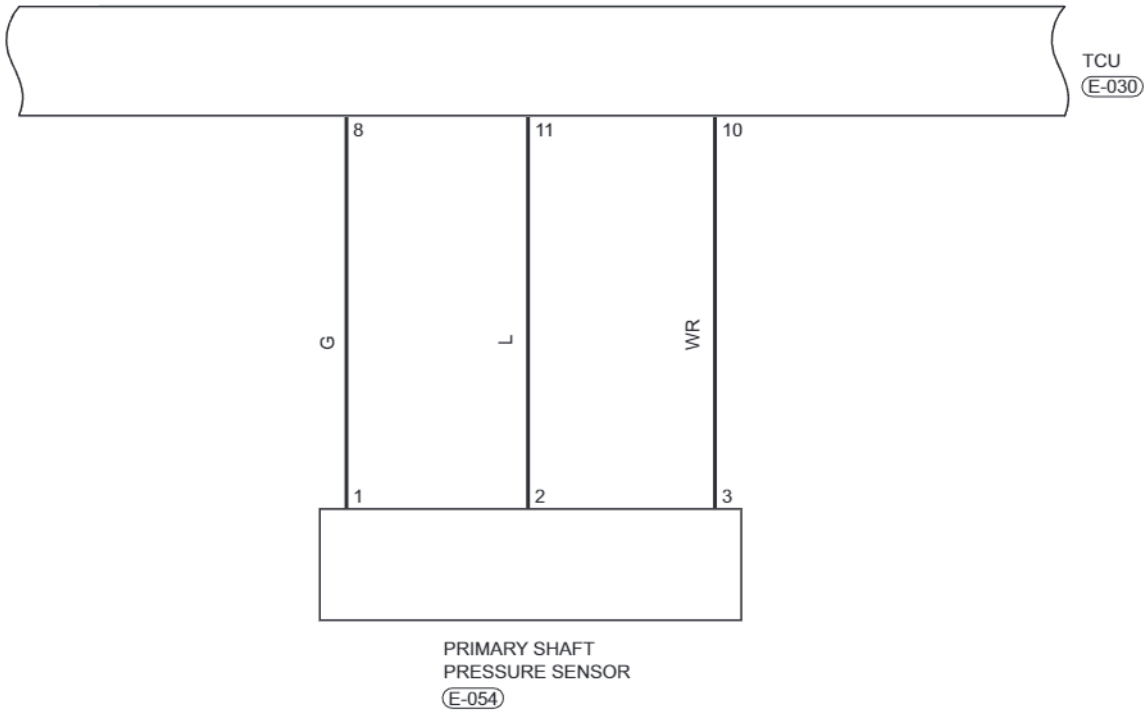
NG → **Replace solenoid and wire harness assembly**

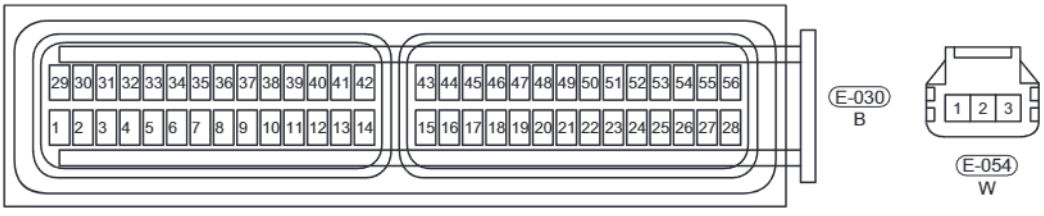
OK ↓

System is normal

DTC	P0842	Transmission Fluid Pressure Sensor 'A' Circuit Low

DTC	P0843	Transmission Fluid Pressure Sensor 'A' Circuit High





ET21180120

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	The transmission fluid pressure sensor 'A' oil pressure is less than the 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		The transmission fluid pressure sensor 'A' oil pressure is more than the allowable max value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	Check wire harness connector

a. Turn ignition switch to LOCK.
b. Disconnect the primary shaft pressure sensor connector.
c. Check if the primary shaft pressure sensor connector is dirty, oxidized, loose or damaged.

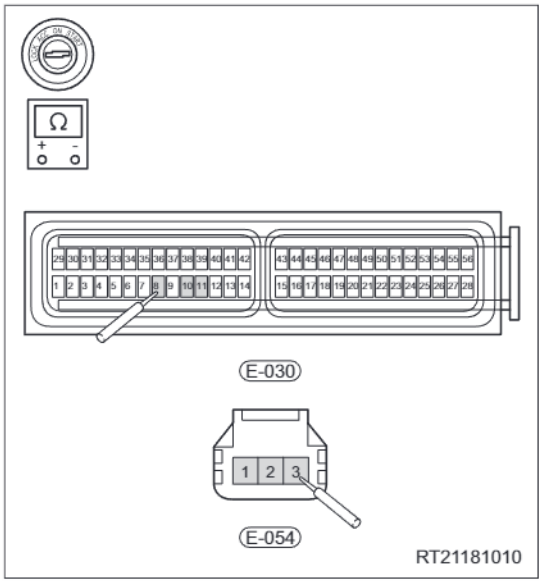
NG → Repair fault

OK

2	Check TCU wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connectors E-030 and E-054.
c. Check for continuity between the terminals 8, 10 and 11 of wire harness connector E-030 and terminals 1, 3 and 2 of connector E-054.

NG → **Repair failed circuit**

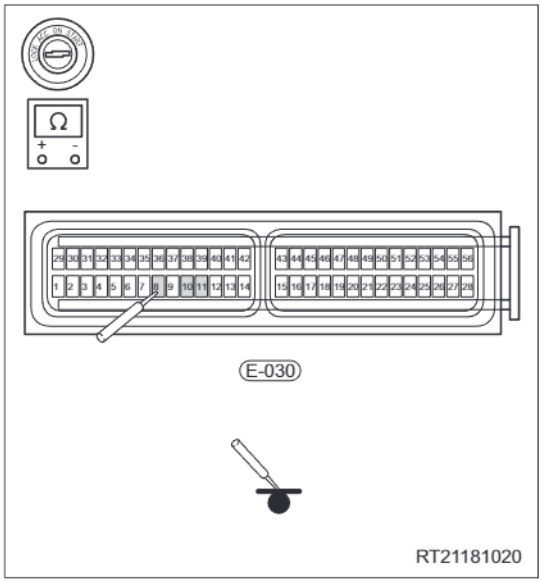


OK

3	Check if TCU wire harness E-030 and ground is conductive

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between the terminals 10, 11 and 8 of wire harness connector E-030 and ground.

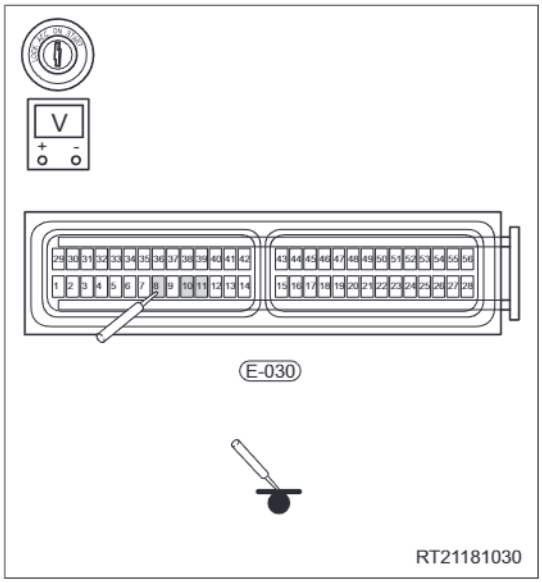
NG → **Repair or replace failed circuit**



OK

4	Check if TCU wire harness connector E-030 is short to power

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check if the terminals 10, 11 and 8 of wire harness connector E-030 are short to power.



NG → **Repair or replace failed circuit**

OK

5	Check primary shaft pressure sensor

a. Correctly install a new primary shaft pressure sensor.
b. Using the X-431 3G diagnostic tester, check whether the system is normal.

NG → **Diagnosis complete**

OK

6	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0842 or P0843 still exists.

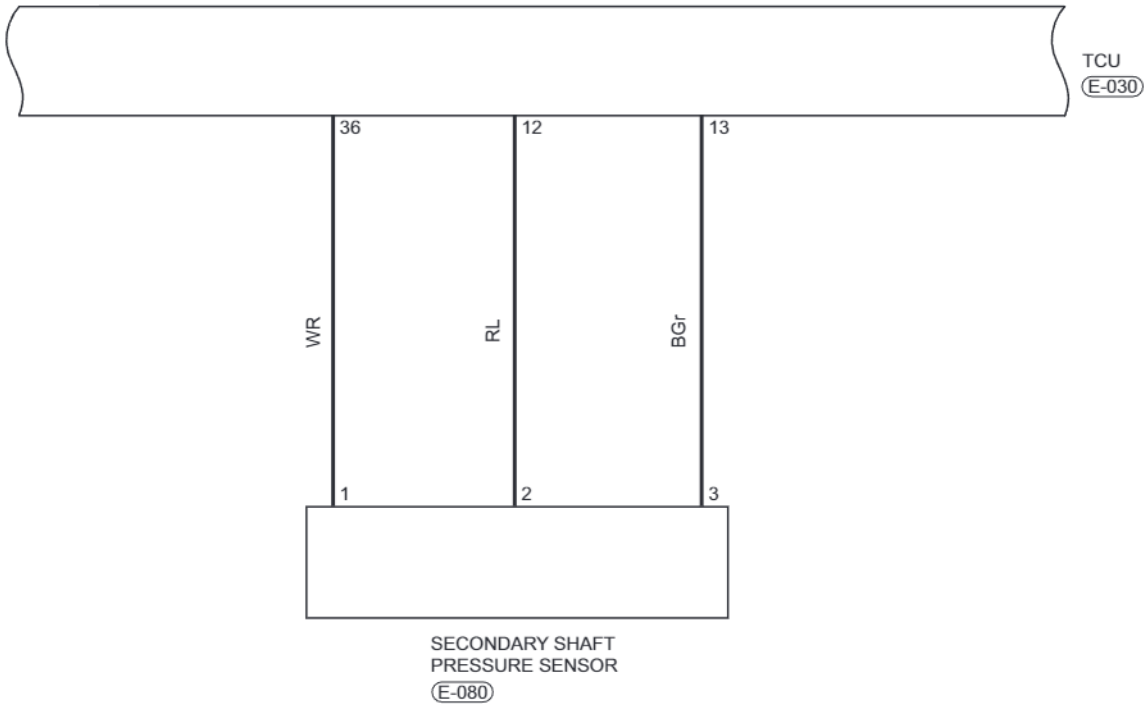
NG → **Replace TCU**

OK

System is normal

DTC	P0847	Transmission Fluid Pressure Sensor 'B' Circuit Low

DTC	P0848	Transmission Fluid Pressure Sensor 'B' Circuit High





ET21180130

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	The transmission fluid pressure sensor 'B' oil pressure is less than the 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		The transmission fluid pressure sensor 'B' oil pressure is more than the allowable max value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	Check wire harness connector

a. Turn ignition switch to LOCK.
b. Disconnect the secondary shaft pressure sensor connector.
c. Check if the secondary shaft pressure sensor connector is dirty, oxidized, loose or damaged.

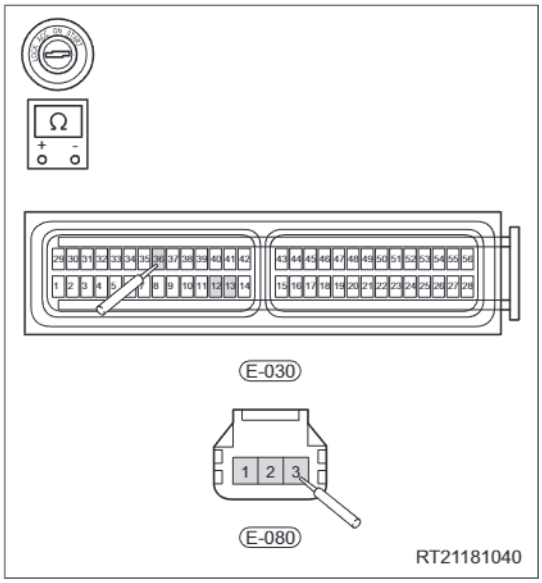
NG → Repair fault

OK →

2	Check TCU wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connectors E-030 and E-080.
c. Check for continuity between the terminals 12, 13, and 36 of wire harness connector E-030 and terminals 2, 3 and 1 of connector E-080.

NG → **Repair failed circuit**

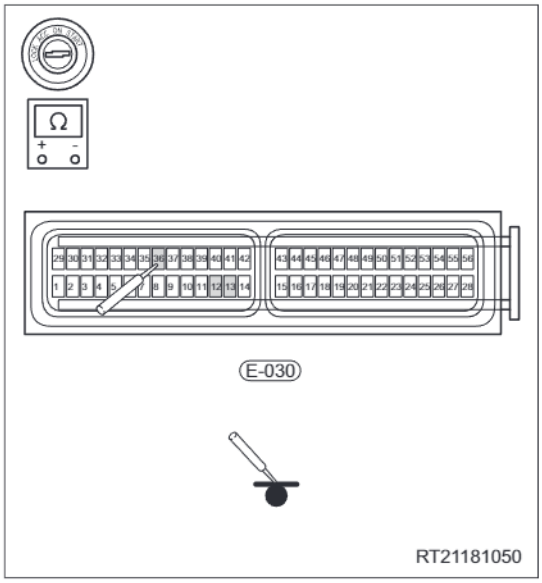


OK

3	Check if TCU wire harness E-030 and ground is conductive

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between the terminals 12, 13 and 36 of wire harness connector E-030 and ground.

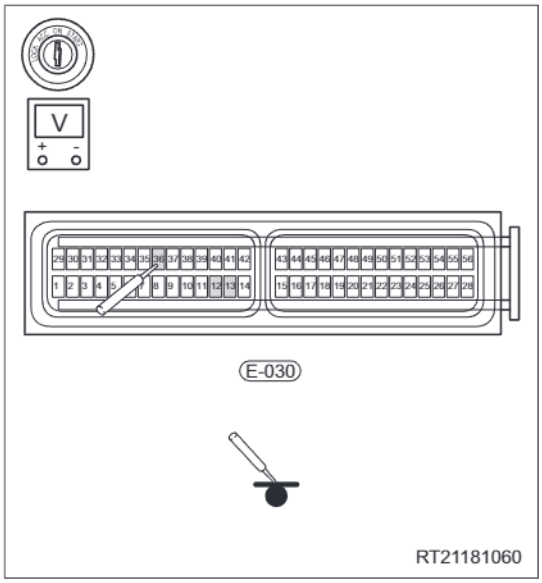
NG → **Repair or replace failed circuit**



OK

4	Check if the TCU wire harness connector E-030 is short to power

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check if the terminals 12, 13, and 36 of wire harness connector E-030 are short to power.



NG → **Repair or replace failed circuit**

OK

5	Check secondary shaft pressure sensor

a. Correctly install a new secondary shaft pressure sensor.
b. Using the X-431 3G diagnostic tester, check whether the system is normal.

NG → **Diagnosis complete**

OK

6	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0847 or P0848 still exists.

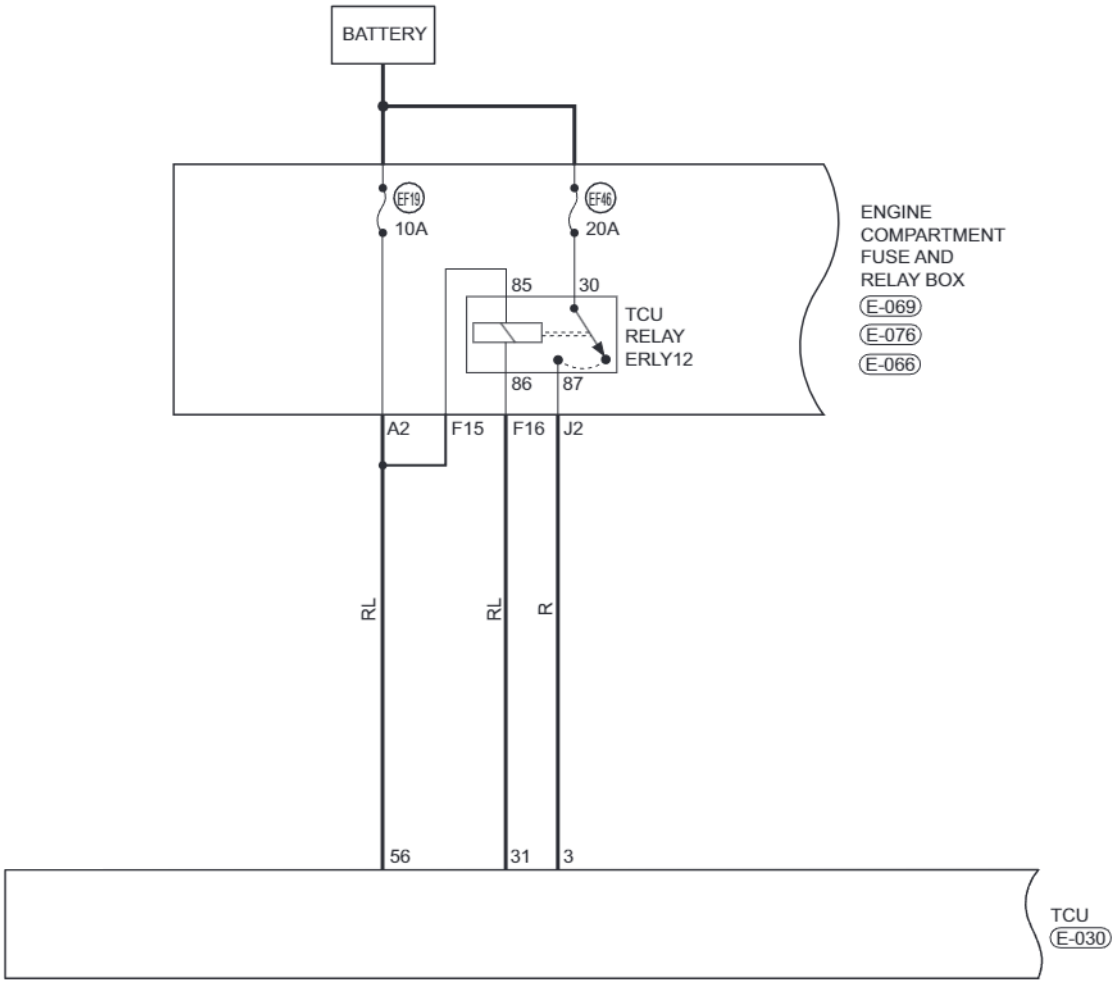
NG → **Replace TCU**

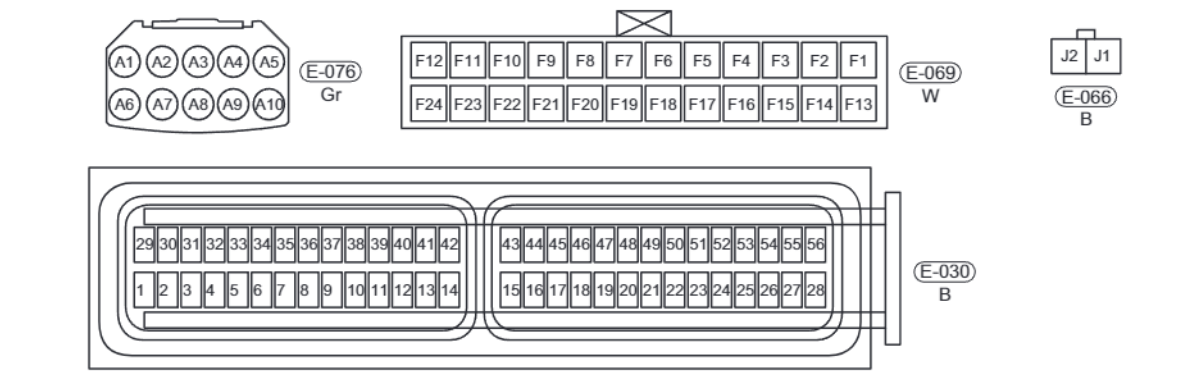
OK

System is normal

DTC	P0890	TCM Power Relay Sense Circuit Low

DTC	P0891	TCM Power Relay Sense Circuit High





ET21180140

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 the 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 the standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	**Check if TCU power fuse EF19 and EF46 are normal**

NG → **Replace failed fuse**

OK

2	**Check if battery to fuse box TCU fuse and relay circuit are normal**

NG → **Repair or replace failed circuit**

OK

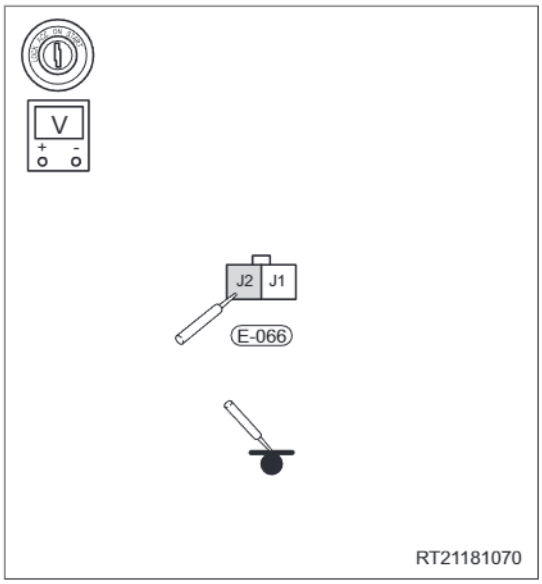
3	Check if TCU relay 12 operates normally

NG → Repair TCU relay 12

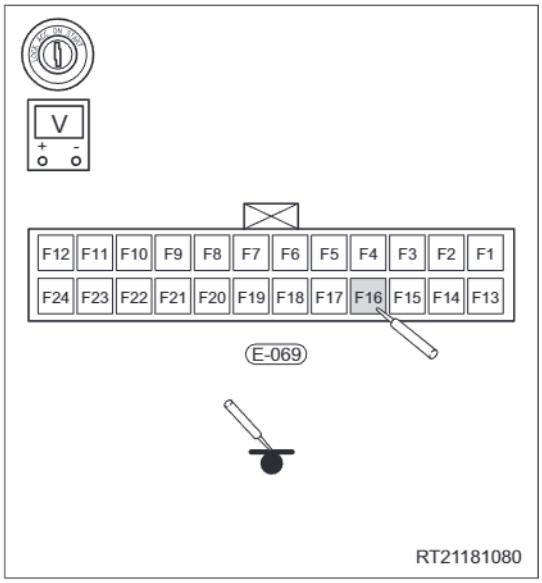
OK

4	Check engine compartment fuse and relay box

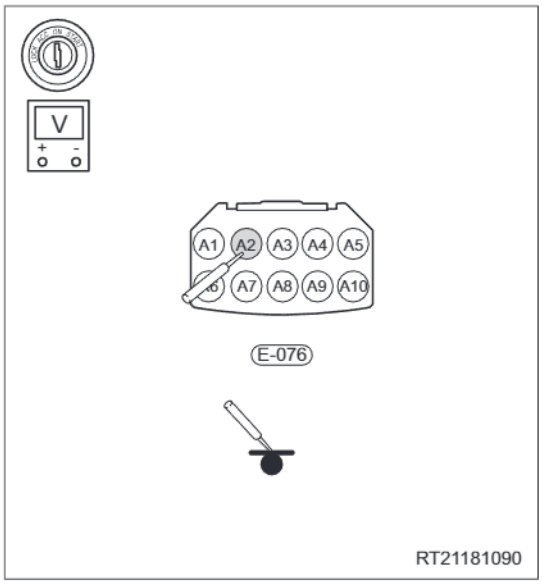
a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the connector E-066, E-069 and E-076.
c. Connect the negative battery cable.
d. Check if the output voltage of the terminals J2 of connector E-066 is normal.



e. Check if the output voltage of the terminals F16 of connector E-069 is normal.



f. Check if the output voltage of the terminals A2 of connector E-076 is normal.



NG → **Replace fuse box**

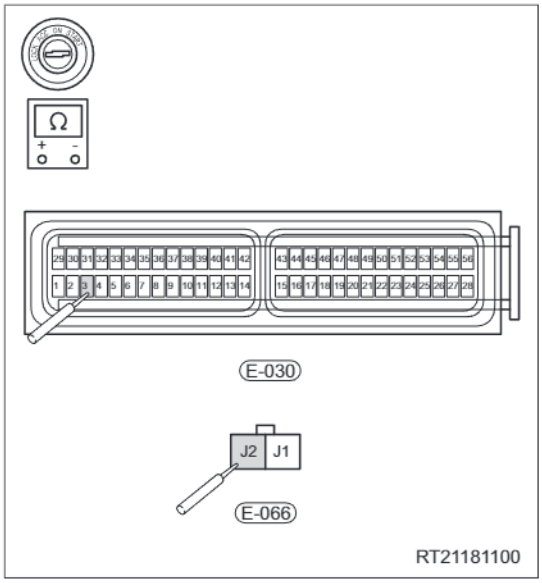
OK

5	Check engine compartment wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.

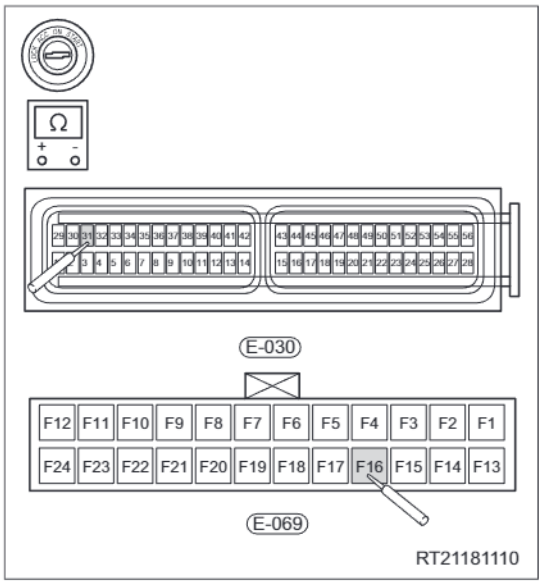
b. Disconnect the connectors E-030, E-066, E-069 and E-076.

c. Check for continuity between the terminal 3 of connector E-030 and terminal J2 of connector E-066.

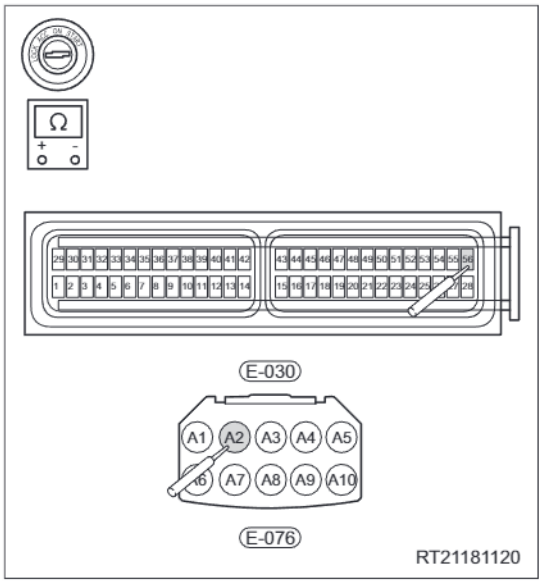


18

d. Check for continuity between the terminal 31 of connector E-030 and terminal F16 of connector E-069.



e. Check for continuity between terminal 56 of connector E-030 and terminal A2 of connector E-076.



NG → **Replace engine compartment wire harness**

OK

6	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.

b. Check if DTC P0890 or P0891 still exists.

NG → **Replace TCU**

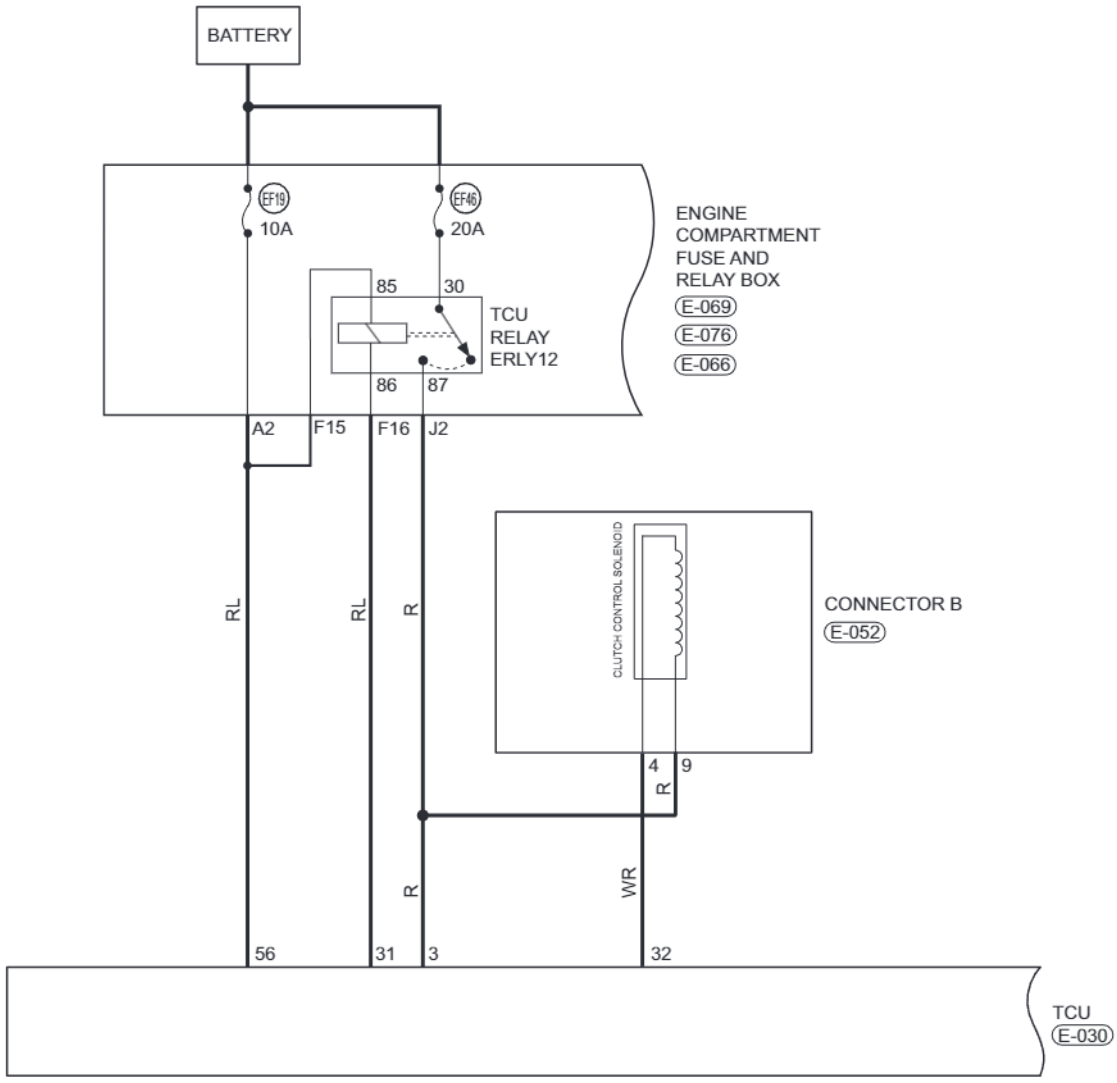
OK

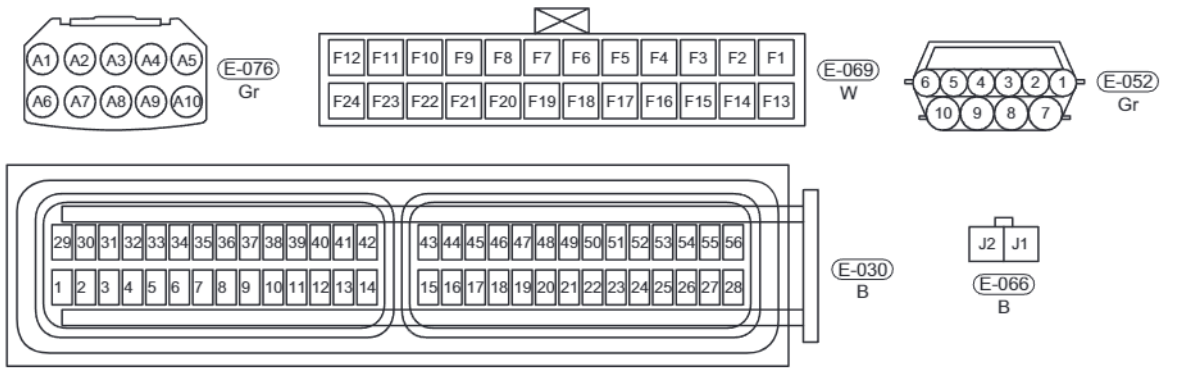
System is normal

DTC	P0900	Clutch Actuator Circuit Open

DTC	P0902	Clutch Actuator Circuit Low

DTC	P0903	Clutch Actuator Circuit High


BATTERY
EF19
10A
EF46
20A
ENGINE
COMPARTMENT
FUSE AND
RELAY BOX
E-069
E-076
E-066
85
30
TCU
RELAY
ERLY12
86
87
A2
F15
F16
J2
RL
RL
R
CLUTCH CONTROL SOLENOID
CONNECTOR B
E-052
4
9
R
R
WR
56
31
3
32
TCU
E-030


A1 A2 A3 A4 A5
A6 A7 A8 A9 A10
E-076
Gr
F12 F11 F10 F9 F8 F7 F6 F5 F4 F3 F2 F1
F24 F23 F22 F21 F20 F19 F18 F17 F16 F15 F14 F13
E-069
W
6 5 4 3 2 1
10 9 8 7
E-052
Gr
29 30 31 32 33 34 35 36 37 38 39 40 41 42
1 2 3 4 5 6 7 8 9 10 11 12 13 14
43 44 45 46 47 48 49 50 51 52 53 54 55 56
15 16 17 18 19 20 21 22 23 24 25 26 27 28
E-030
B
J2 J1
E-066
B

ET21180150

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	The solenoid output feedback voltage is normal, clutch solenoid feedback current is less than the 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 the standard value	
P0903	Clutch Actuator Circuit High		When the solenoid output feedback voltage is normal, clutch solenoid feedback current is less than the standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	Check wire harness connector

a. Turn ignition switch to LOCK.
b. Disconnect the transmission wire harness connector.
c. Check if the transmission wire harness connector is dirty, oxidized, loose or damaged.

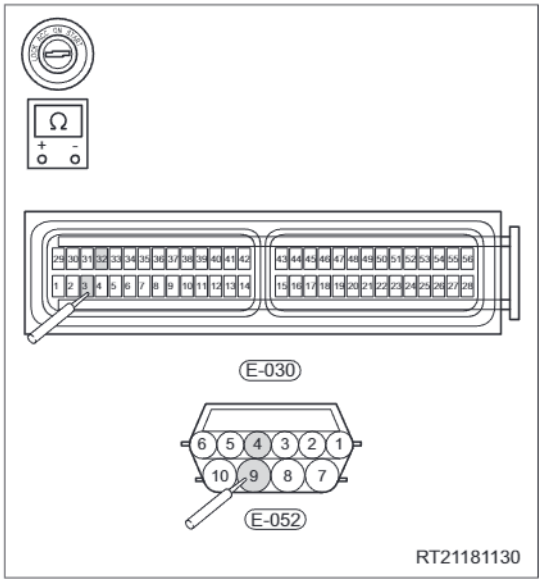
NG → Repair fault

OK

2	Check engine compartment wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the connectors E-052 and E-030.
c. Check for continuity between the terminal 4 and 9 of connector E-052 and terminal 32 and 3 of connector E-030.

NG → Repair or replace failed circuit

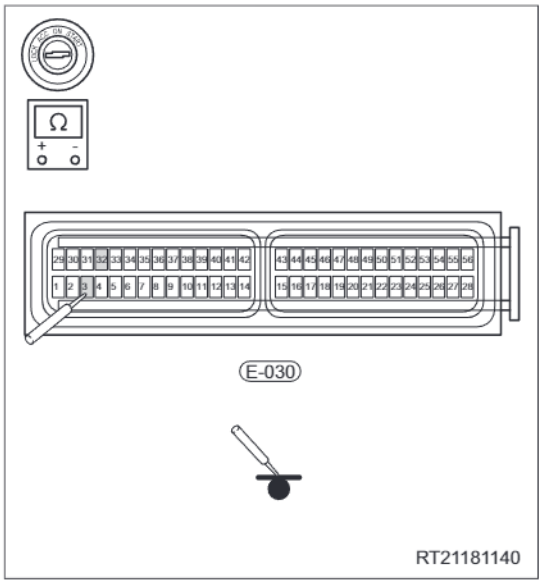


OK

3	Check for continuity between wire harness connector E-030 and ground

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between the terminals 3 and 32 of wire harness connector E-030 and ground.

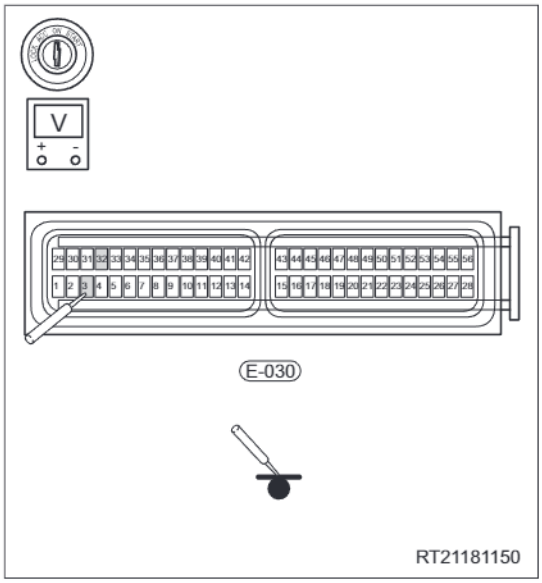
NG → Repair or replace failed circuit



OK

4	Check if transmission wire harness connector E-030 is short to power

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check if the terminals 3 and 32 of wire harness connector E-030 is short to power.



NG → **Repair or replace failed circuit**

OK

5	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0900, P0902 or P0903 still exists.

NG → **Replace solenoid and wire harness assembly**

OK

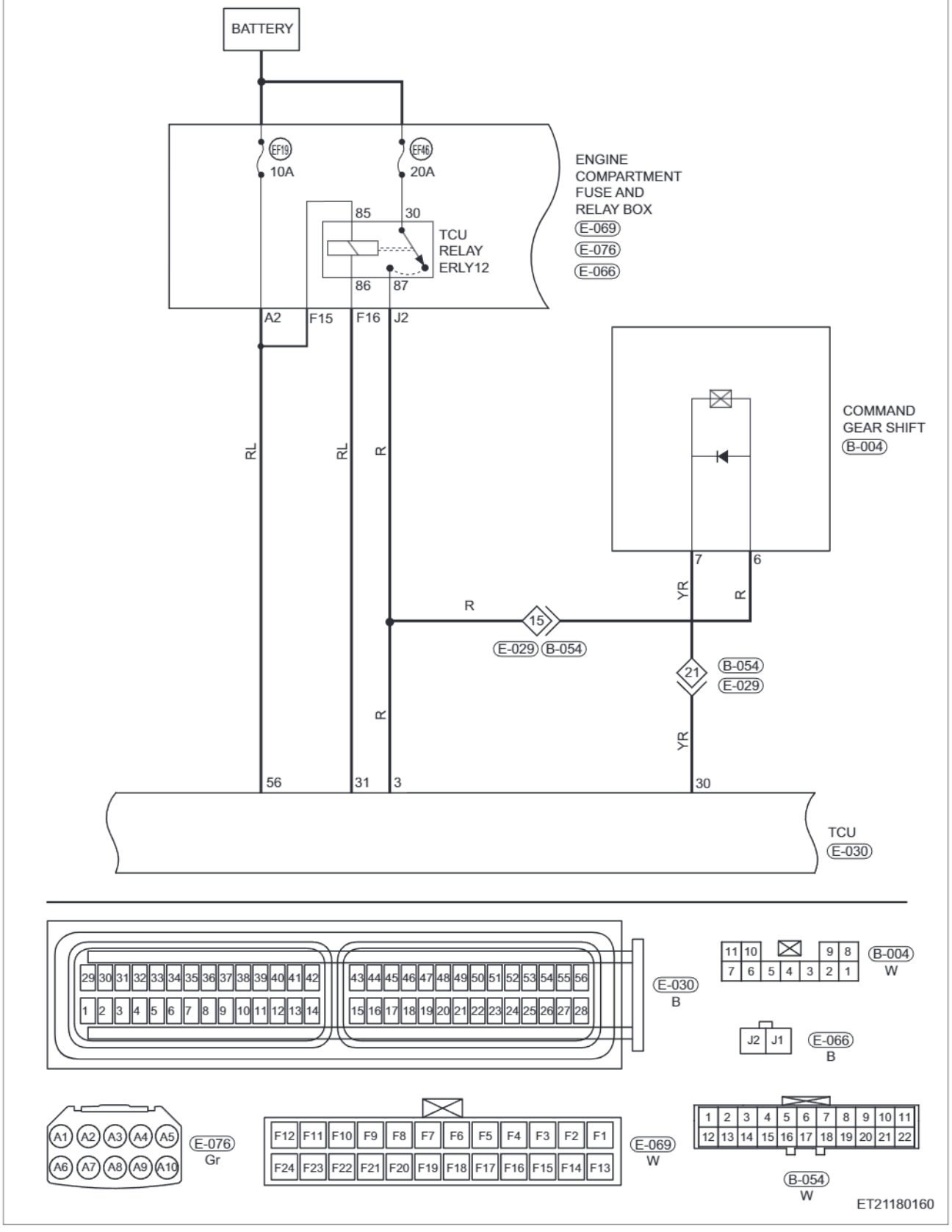
System is normal

18

DTC	P0928	Gear Shift Lock Solenoid Control Circuit Open

DTC	P0930	Gear Shift Lock Solenoid Control Circuit Low

DTC	P0931	Gear Shift Lock Solenoid Control Circuit High


BATTERY
EF19
10A
EF46
20A
85
30
TCU
RELAY
ERLY12
86
87
ENGINE
COMPARTMENT
FUSE AND
RELAY BOX
E-069
E-076
E-066
A2
F15
F16
J2
RL
RL
R
COMMAND
GEAR SHIFT
B-004
7
6
YR
R
R
15
E-029
B-054
21
B-054
E-029
R
YR
56
31
3
30
TCU
E-030
29 30 31 32 33 34 35 36 37 38 39 40 41 42
1 2 3 4 5 6 7 8 9 10 11 12 13 14
43 44 45 46 47 48 49 50 51 52 53 54 55 56
15 16 17 18 19 20 21 22 23 24 25 26 27 28
E-030
B
11 10 9 8
7 6 5 4 3 2 1
B-004
W
J2 J1
E-066
B
A1 A2 A3 A4 A5
A6 A7 A8 A9 A10
E-076
Gr
F12 F11 F10 F9 F8 F7 F6 F5 F4 F3 F2 F1
F24 F23 F22 F21 F20 F19 F18 F17 F16 F15 F14 F13
E-069
W
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
B-054
W
ET21180160

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	The solenoid output feedback voltage is normal, gear shifting solenoid feedback current is less than the standard value	• Solenoid circuit open circuit or short circuit • Gear shifting lock solenoid failure
P0930	Gear Shift Lock Solenoid Control Circuit Low		When the solenoid output feedback voltage is normal, gear shifting lock solenoid feedback current is higher than the standard value	
P0931	Gear Shift Lock Solenoid Control Circuit High		The solenoid output feedback voltage is normal, gear shifting solenoid feedback current is less than the standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	Check wire harness connector

a. Turn ignition switch to LOCK.
b. Disconnect the gear selector connector.
c. Check if the gear selector connector is dirty, oxidized, loose or damaged.

NG → Repair fault

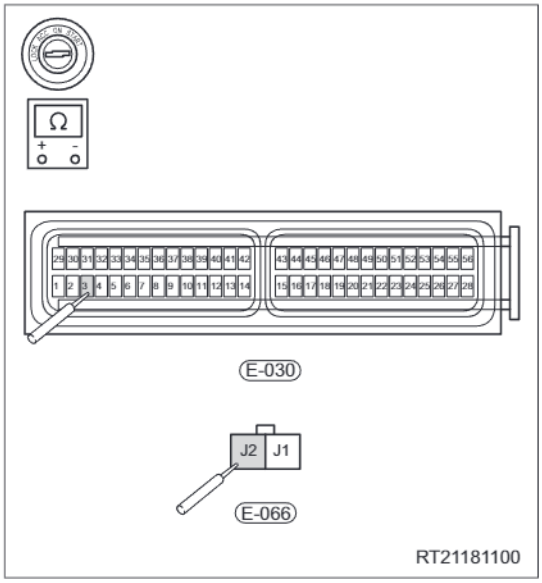
OK

2	Check engine compartment wire harness

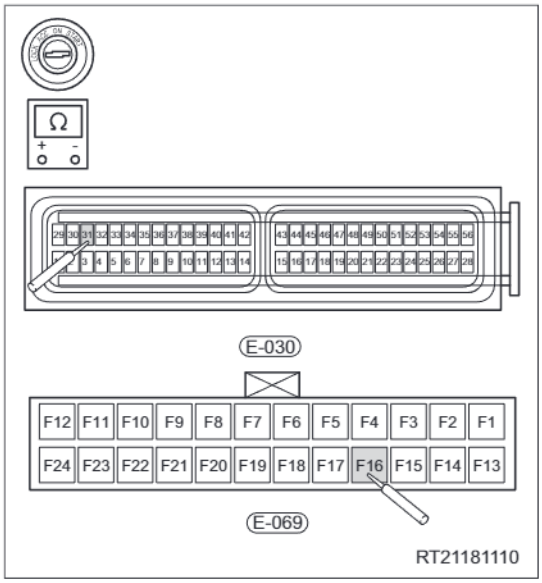
a. Turn ignition switch to LOCK and disconnect the negative battery cable.

b. Disconnect the connectors E-029, E-030, E-066, E-069 and E-076.

c. Check for continuity between terminal 3 of connector E-030 and terminal J2 of connector E-066.

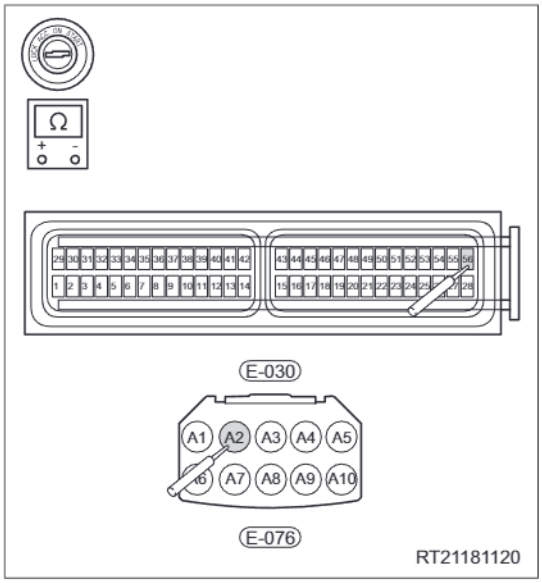


d. Check for continuity between terminal 31 of connector E-030 and terminal F16 of connector E-069.

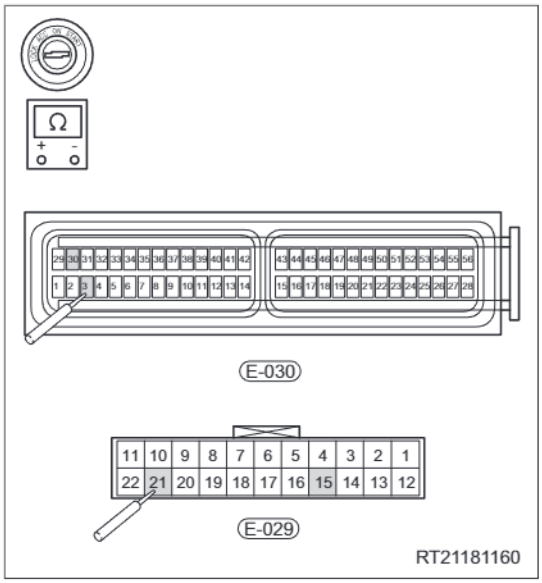


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e. Check for continuity between terminal 56 of connector E-030 and terminal A2 of connector E-069.



f. Check for continuity between terminals 3 and 30 of connector E-030 and terminals 15 and 21 of connector E-029.



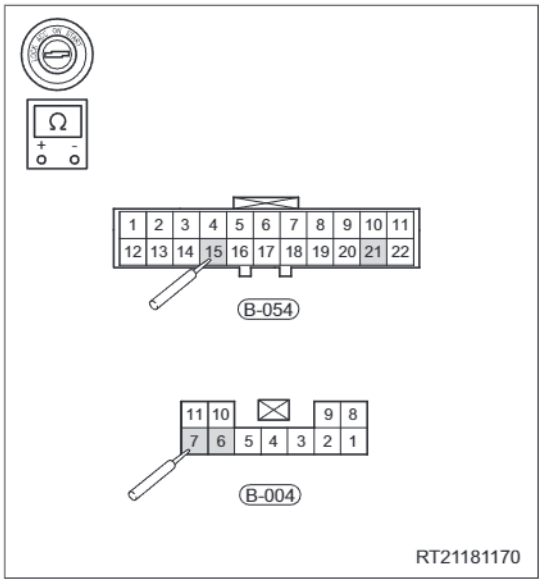
NG → **Repair or replace failed circuit**

OK

3	Check body wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector B-054 and B-004.
c. Check for continuity between terminals 15 and 21 of connector B-054 and terminals 6 and 7 of connector B-004.

NG → **Repair or replace failed circuit**

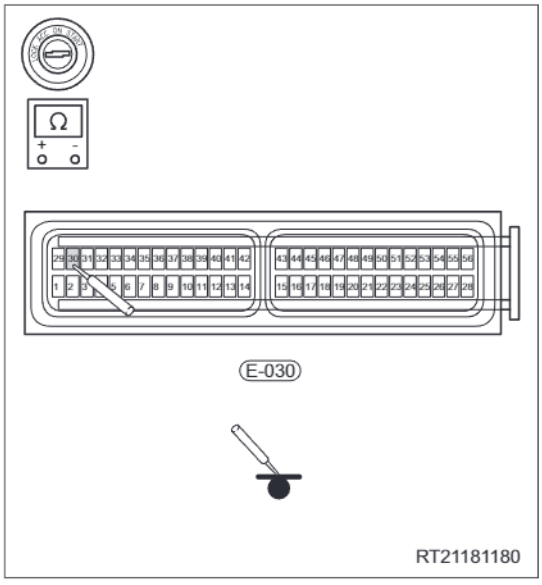


OK

4	Check for continuity between transmission wire harness E-030 and ground

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between terminal 30 of wire harness connector E-030 and ground.

NG → **Repair or replace failed circuit**

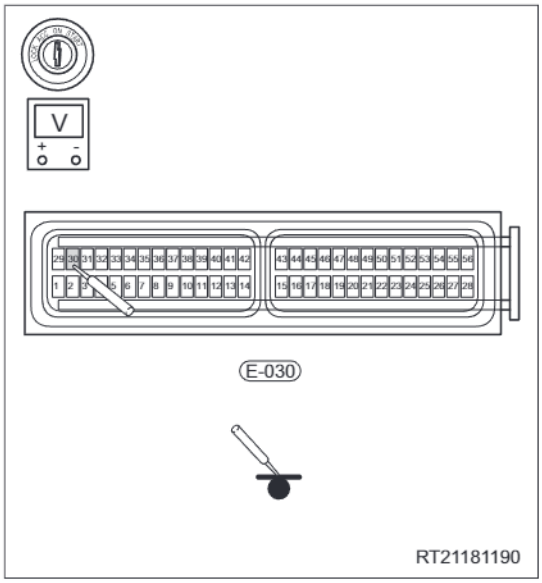


OK

18

5	Check if transmission wire harness connector E-030 is short to power

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Connect the negative battery cable.
d. Check if the terminal 30 of wire harness connector E-030 is short to power.



NG → **Repair or replace failed circuit**

OK

6	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0928, P0930 or P0931 still exists.

NG → **Replace gear shift mechanism**

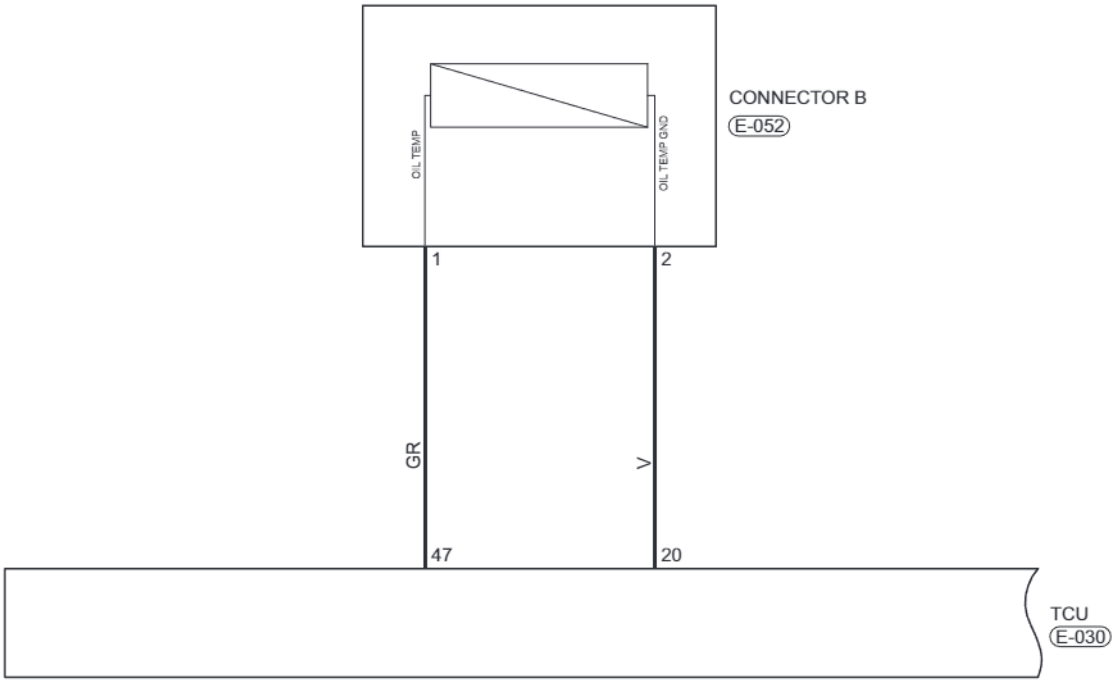
OK

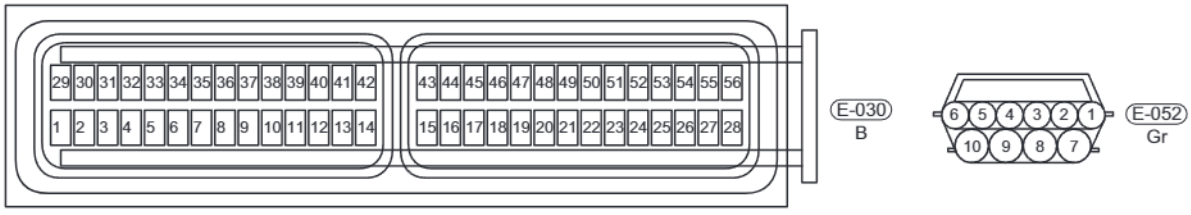
System is normal

DTC	P0938	Hydraulic Oil Temperature Sensor Range

DTC	P0939	Hydraulic Oil Temperature Sensor Circuit Low

DTC	P0940	Hydraulic Oil Temperature Sensor Circuit High





ET21180170

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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	The CVT oil temperature sensor voltage is less than the 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		The CVT oil temperature sensor voltage is less than the standard min value	
P0940	Hydraulic Oil Temperature Sensor Circuit High		When the CVT oil temperature sensor voltage is higher than the standard max value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the 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 wire harness connector

a. Turn ignition switch to LOCK.
b. Disconnect the transmission wire harness connector.
c. Check if the transmission wire harness connector is dirty, oxidized, loose or damaged.

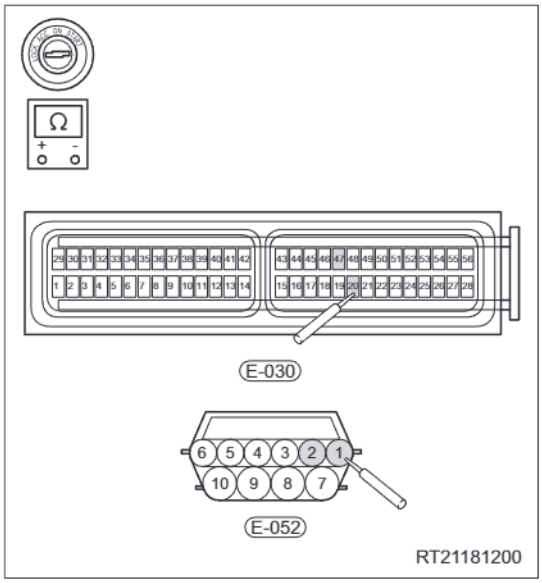
NG → Repair fault

OK

2	Check engine compartment wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connectors E-030 and E-052.
c. Check for continuity between terminals 20 and 47 of wire harness connector E-030 and terminals 2 and 1 of connector E-052.

NG → Repair or replace failed circuit

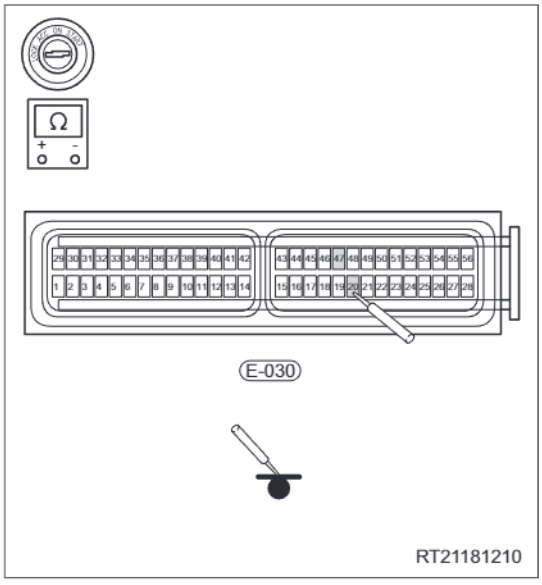


OK

3	Check for continuity between transmission wire harness connector E-030 and ground

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between terminals 20 and 47 of wire harness connector E-030 and ground.

NG → Repair or replace failed circuit

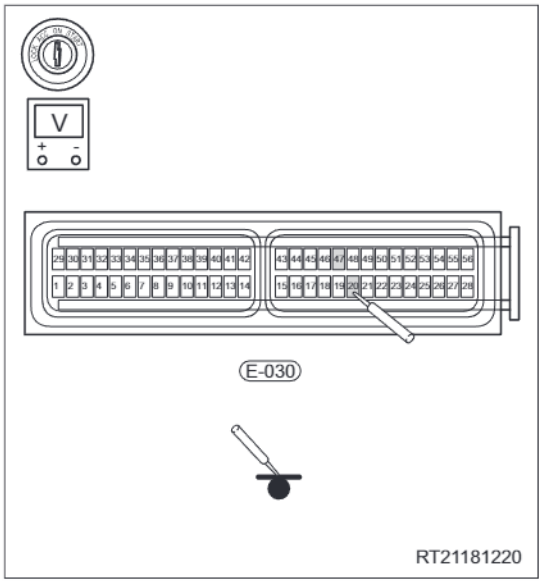


OK

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4	Check if transmission wire harness connector E-030 is short to power

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check if the terminals 20 and 47 of wire harness connector E-030 are short to power.



NG → Repair or replace failed circuit

OK

5	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0938, P0939 or P0940 still exists.

NG → Replace wire harness assembly

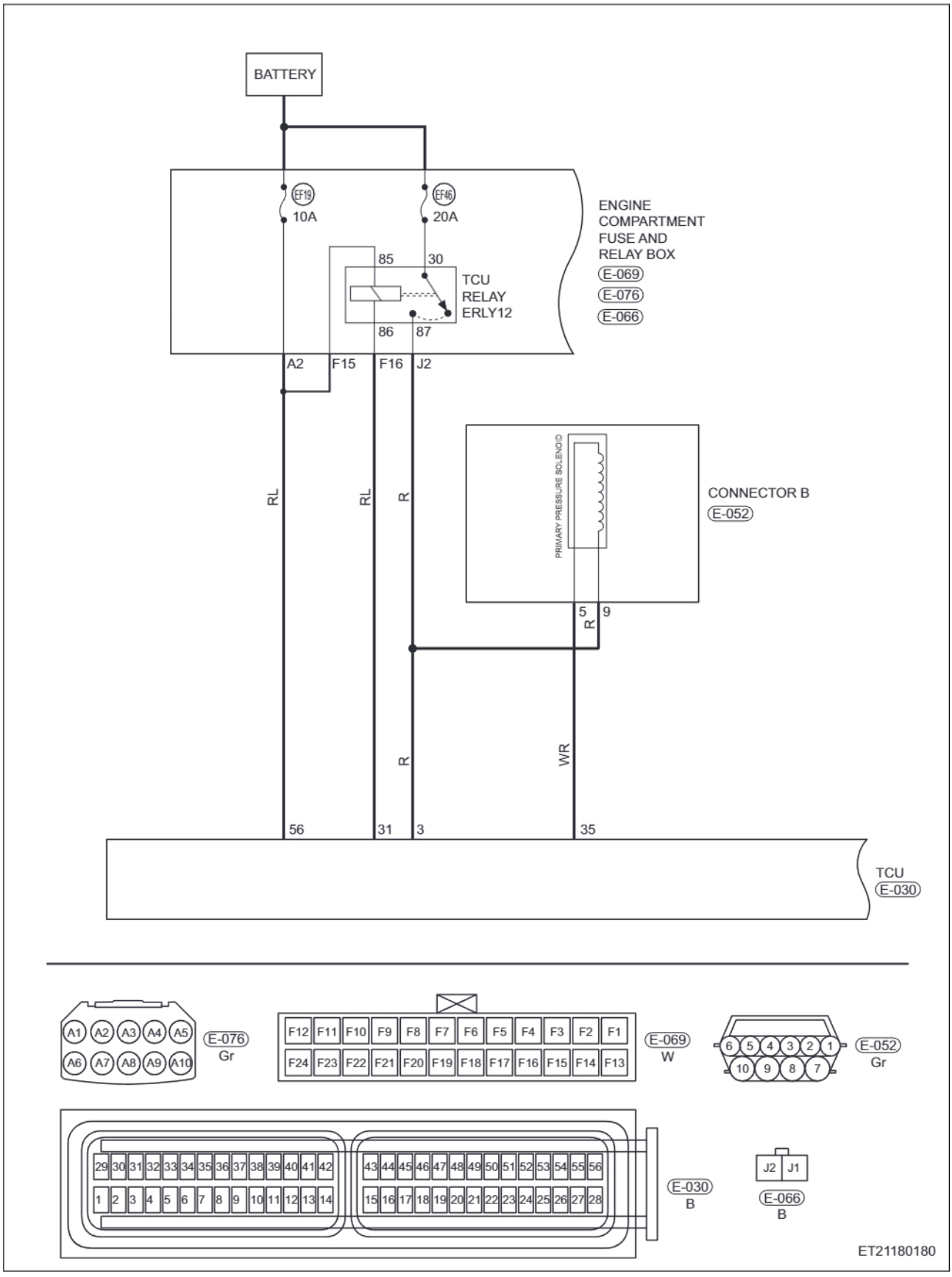
OK

System is normal

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


BATTERY
EF19
10A
EF46
20A
ENGINE COMPARTMENT FUSE AND RELAY BOX
E-069
E-076
E-066
85
30
TCU RELAY ERLY12
86
87
A2
F15
F16
J2
RL
RL
R
PRIMARY PRESSURE SOLENOID
CONNECTOR B
E-052
5
R
9
R
WR
56
31
3
35
TCU
E-030
A1 A2 A3 A4 A5
A6 A7 A8 A9 A10
E-076
Gr
F12 F11 F10 F9 F8 F7 F6 F5 F4 F3 F2 F1
F24 F23 F22 F21 F20 F19 F18 F17 F16 F15 F14 F13
E-069
W
6 5 4 3 2 1
10 9 8 7
E-052
Gr
29 30 31 32 33 34 35 36 37 38 39 40 41 42
1 2 3 4 5 6 7 8 9 10 11 12 13 14
43 44 45 46 47 48 49 50 51 52 53 54 55 56
15 16 17 18 19 20 21 22 23 24 25 26 27 28
E-030
B
J2 J1
E-066
B
ET21180180

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	The solenoid output feedback voltage is normal, oil pressure control solenoid 'A' feedback current is less than the standard value	• Solenoid circuit open circuit or short circuit • Oil pressure control solenoid 'A' failure
P0962	Pressure Control Solenoid 'A' Control Circuit Low		The solenoid output feedback voltage is normal, oil pressure control solenoid 'A' feedback current is higher than the standard max value	
P0963	Pressure Control Solenoid 'A' Control Circuit High		The solenoid output feedback voltage is normal, oil pressure control solenoid 'A' feedback current is less than the standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	**Check wire harness connector**

a. Turn ignition switch to LOCK.

b. Disconnect the transmission wire harness connector.

c. Check if the transmission wire harness connector is dirty, oxidized, loose or damaged.

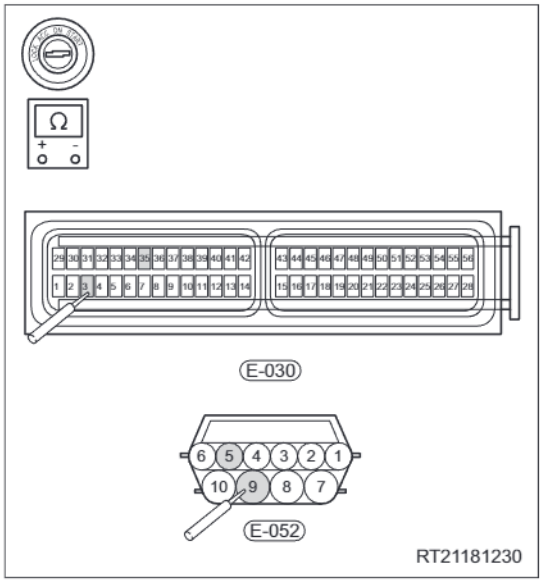
NG → **Repair fault**

OK

2	Check engine compartment wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connectors E-052 and E-030.
c. Check for continuity between terminals 5 and 9 of wire harness connector E-052 and terminals 35 and 3 of connector E-030.

NG → **Repair or replace failed circuit**

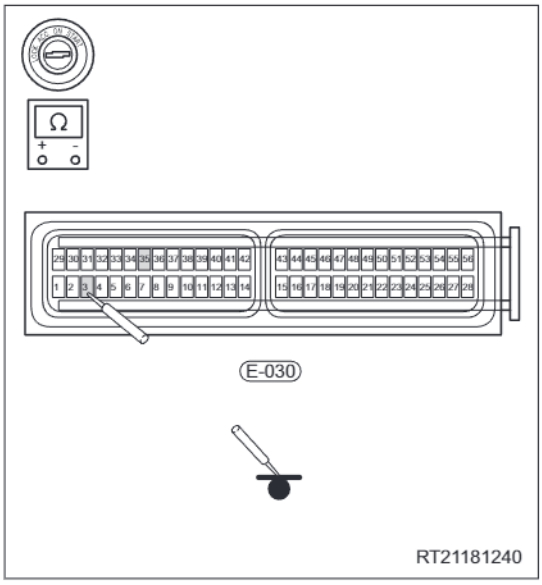


OK

3	Check for continuity between wire harness connector E-030 and ground

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between terminals 3 and 35 of wire harness connector E-030 and ground.

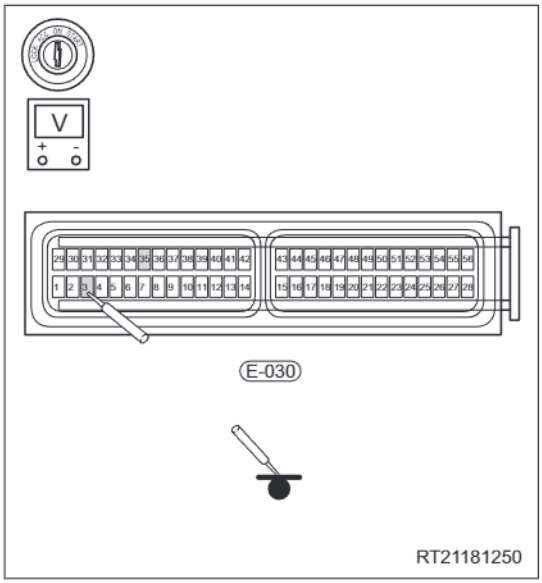
NG → **Repair or replace failed circuit**



OK

4	Check if transmission wire harness connector E-030 is short to power

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check if terminals 3 and 35 of wire harness connector E-030 is short to power.



NG → Repair or replace failed circuit

OK

5	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0960, P0962 or P0963 still exists.

NG → Replace solenoid and wire harness assembly

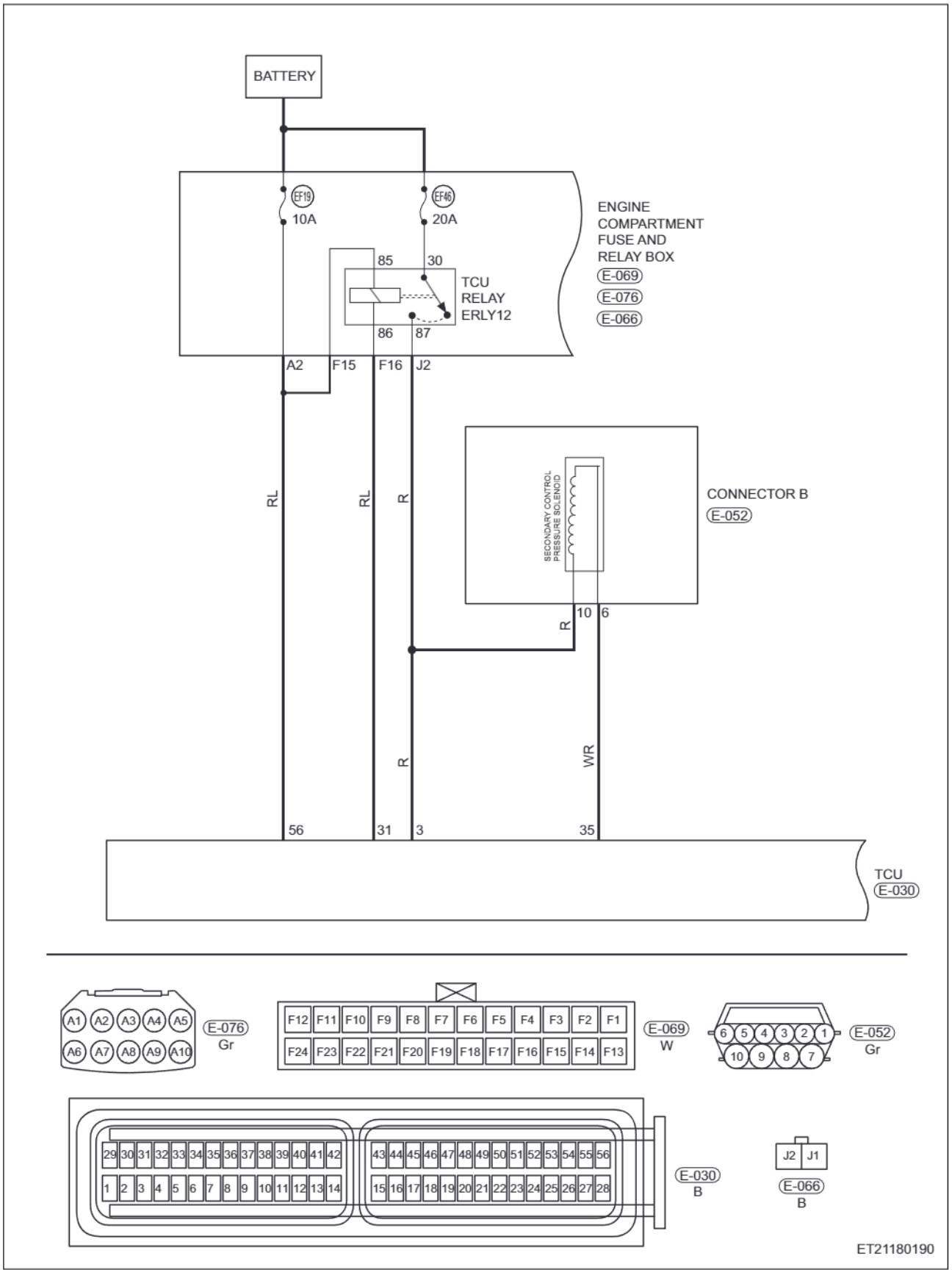
OK

System is normal

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


BATTERY
EF19
10A
EF46
20A
ENGINE COMPARTMENT FUSE AND RELAY BOX
E-069
E-076
E-066
85
30
TCU RELAY ERLY12
86
87
A2
F15
F16
J2
RL
RL
R
SECONDARY CONTROL PRESSURE SOLENOID
CONNECTOR B
E-052
R
10
6
R
WR
56
31
3
35
TCU
E-030
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10
E-076
Gr
F12 F11 F10 F9 F8 F7 F6 F5 F4 F3 F2 F1
F24 F23 F22 F21 F20 F19 F18 F17 F16 F15 F14 F13
E-069
W
6 5 4 3 2 1 10 9 8 7
E-052
Gr
29 30 31 32 33 34 35 36 37 38 39 40 41 42
1 2 3 4 5 6 7 8 9 10 11 12 13 14
43 44 45 46 47 48 49 50 51 52 53 54 55 56
15 16 17 18 19 20 21 22 23 24 25 26 27 28
E-030
B
J2 J1
E-066
B
ET21180190

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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	When the solenoid output feedback voltage is normal, oil pressure control solenoid B feedback current is less than the standard value	• Solenoid circuit open circuit or short circuit • Oil pressure control solenoid B failure
P0966	Pressure Control Solenoid 'B' Control Circuit Low		The solenoid output feedback voltage is normal, oil pressure control solenoid B feedback current is higher than the standard max value	
P0967	Pressure Control Solenoid 'B' Control Circuit High		The solenoid output feedback voltage is normal, oil pressure control solenoid B feedback current is less than the standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	**Check wire harness connector**

a. Turn ignition switch to LOCK.

b. Disconnect the wire harness connector.

c. Check if the transmission wire harness connector is dirty, oxidized, loose or damaged.

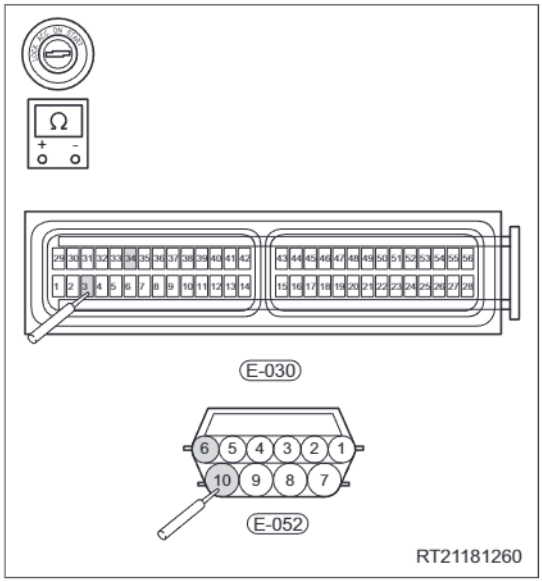
NG → **Repair fault**

OK

2 Check engine compartment wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connectors E-052 and E-030.
c. Check for continuity between the terminals 6 and 10 of wire harness connector E-052 and terminals 34 and 3 of connector E-030.

NG → **Repair or replace failed circuit**

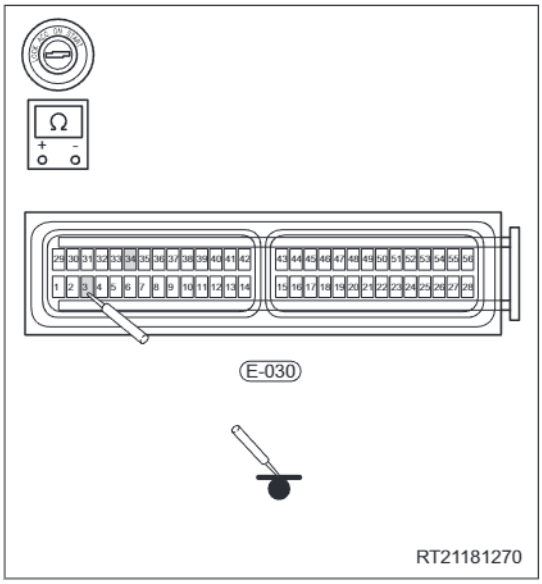


OK

3 Check for continuity between wire harness connector E-030 and ground

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between terminals 3 and 34 of wire harness connector E-030 and ground.

NG → **Repair or replace failed circuit**

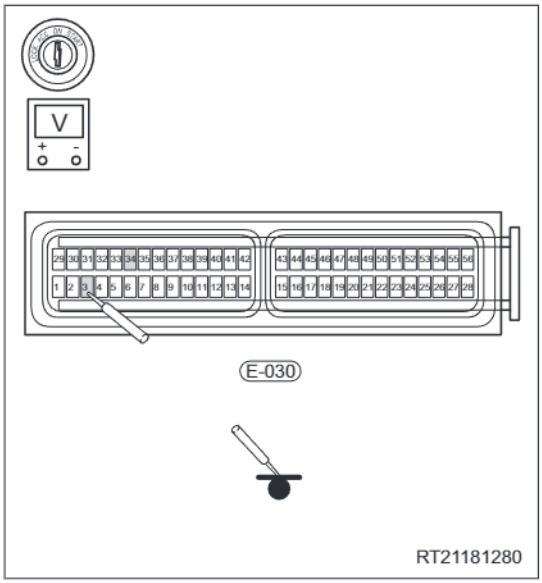


OK

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4	Check if transmission wire harness connector E-030 is short to power

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check if terminals 3 and 34 of wire harness connector E-030 is short to power.



NG → **Repair or replace failed circuit**

OK

5	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0964, P0966 or P0967 still exists.

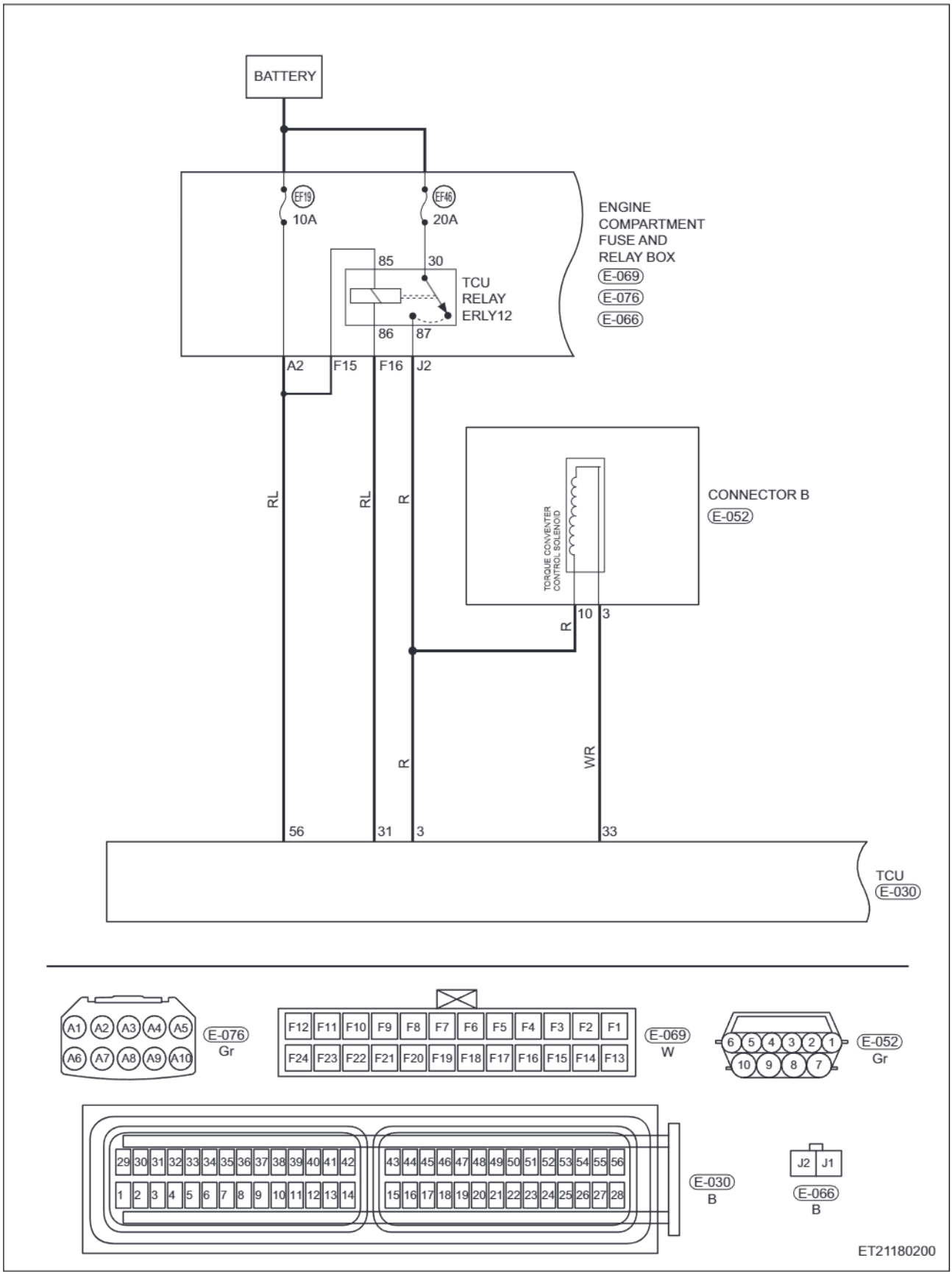
NG → **Replace solenoid and wire harness assembly**

OK

System is normal

DTC	P0970	Pressure Control Solenoid 'C' Control Circuit Low

DTC	P0971	Pressure Control Solenoid 'C' Control Circuit High


BATTERY
EF19
10A
EF46
20A
85
30
TCU
RELAY
ERLY12
86
87
ENGINE
COMPARTMENT
FUSE AND
RELAY BOX
E-069
E-076
E-066
A2
F15
F16
J2
RL
RL
R
CONNECTOR B
E-052
TORQUE CONVENTER
CONTROL SOLENOID
R
10
3
R
WR
56
31
3
33
TCU
E-030
A1 A2 A3 A4 A5
A6 A7 A8 A9 A10
E-076
Gr
F12 F11 F10 F9 F8 F7 F6 F5 F4 F3 F2 F1
F24 F23 F22 F21 F20 F19 F18 F17 F16 F15 F14 F13
E-069
W
6 5 4 3 2 1
10 9 8 7
E-052
Gr
29 30 31 32 33 34 35 36 37 38 39 40 41 42
1 2 3 4 5 6 7 8 9 10 11 12 13 14
43 44 45 46 47 48 49 50 51 52 53 54 55 56
15 16 17 18 19 20 21 22 23 24 25 26 27 28
E-030
B
J2 J1
E-066
B
ET21180200

DTC Code	DTC Definition	DTC Detection Condition	DTC Set Condition	Possible Cause
P0970	Pressure Control Solenoid 'C' Control Circuit Low	Start engine and wait for at least 3 seconds	The solenoid output feedback voltage is normal, oil pressure control solenoid 'C' feedback current is higher than the standard max value	• Solenoid circuit open circuit or short circuit • Oil pressure control solenoid 'C' failure
P0971	Pressure Control Solenoid 'C' Control Circuit High		The solenoid output feedback voltage is normal, oil pressure control solenoid 'C' feedback current is less than the standard value	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the 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 wire harness connector

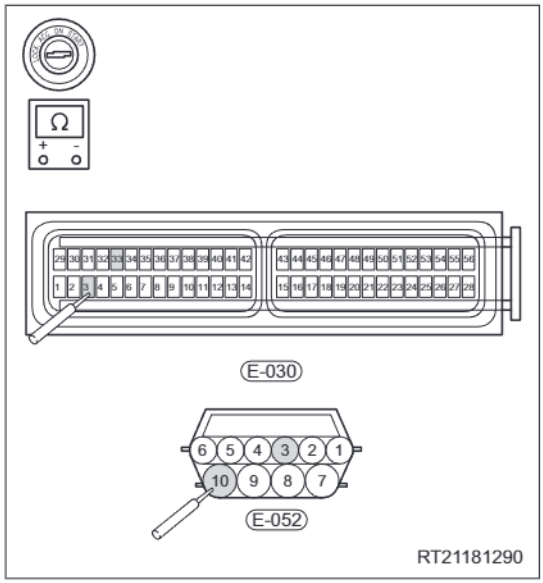
a. Turn ignition switch to LOCK.
b. Disconnect the transmission wire harness connector.
c. Check if the transmission wire harness connector is dirty, oxidized, loose or damaged.

NG → Repair fault

OK

2	Check engine compartment wire harness

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connectors E-052 and E-030.
c. Check for continuity between terminals 3 and 10 of connector E-052 and terminals 33 and 3 of connector E-030.

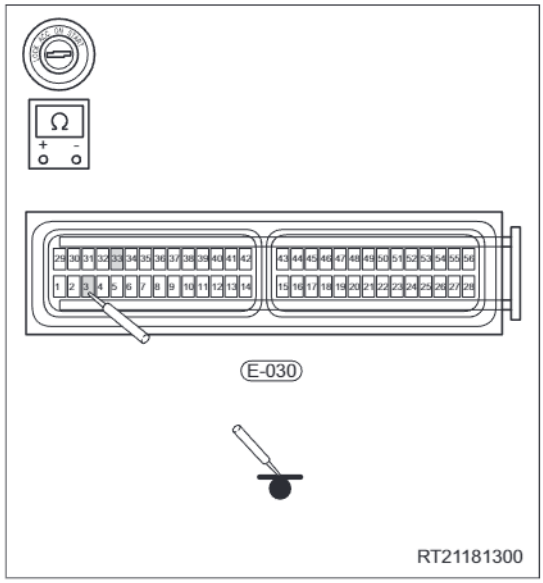


NG → Repair or replace failed circuit

OK

3	Check for continuity between wire harness connector E-030 and ground

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Check for continuity between terminals 33 and 3 of wire harness connector E-030 and ground.

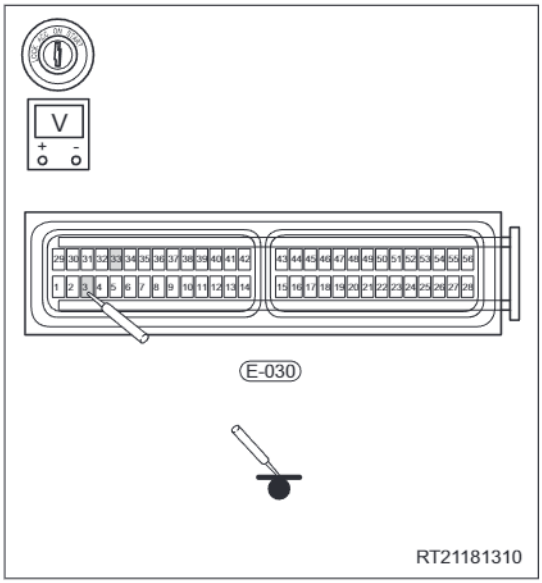


NG → Repair or replace failed circuit

OK

4	Check if transmission wire harness connector E-030 is short to power

a. Turn ignition switch to LOCK and disconnect the negative battery cable.
b. Disconnect the wire harness connector E-030.
c. Connect the negative battery cable.
d. Check if the terminal 33 of wire harness connector E-030 is short to power.



NG → **Repair or replace failed circuit**

OK

5	Check for DTC

a. Using X-431 3G diagnostic tester, select Read Code.
b. Check if DTC P0970 or P0971 still exists.

NG → **Replace solenoid and wire harness assembly**

OK

System is normal

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	The difference of the target oil pressure and actual oil pressure is higher than the table value	• Oil pressure control valve core seized • Hydraulic system pressure failure
P2798	Auxiliary Transmission Fluid Pump Control Circuit Low		The difference of the target oil pressure and actual oil pressure is higher than table value, and is maintained for over 700 ms	

DTC Confirmation Procedure:

Confirm that battery voltage is between 11 and 14 V before performing the 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 by the data network.
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester to record and clear the DTCs stored in the 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, the malfunction indicated by the DTC is current. Go to the diagnosis procedure - Step 1.
- If DTC is not detected, the malfunction indicated by the DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

Diagnosis Procedure

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

1	Carry out following preliminary checks

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

NG → Repair fault

OK

2	Check transmission system

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

NG → Repair these DTCs fault

OK ↓

3	Read data flow

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

NG → Repair fault

OK ↓

4	Check for DTC

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

NG → Replace solenoid and wire harness assembly

OK ↓

System is normal

ON-VEHICLE SERVICE

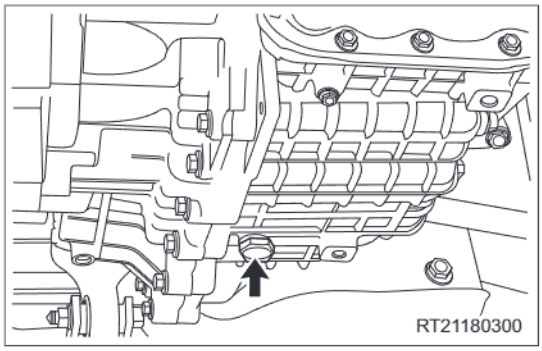
Automatic Transmission Fluid (ATF) Replacement

CAUTION

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

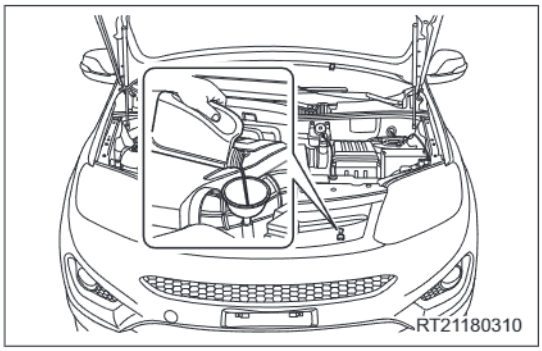
Draining

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



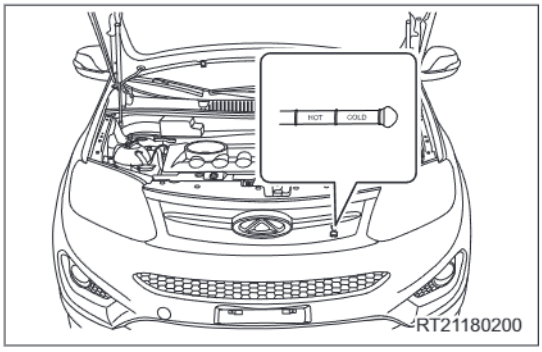
Filling

1. Add new ATF along the 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 the brake pedal and move the shift lever at each gear and place it to "N" or "P" position.



Inspection

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



Differential Oil Seal

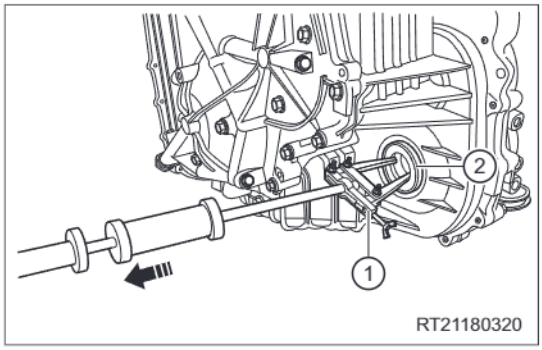
Removal

CAUTION

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

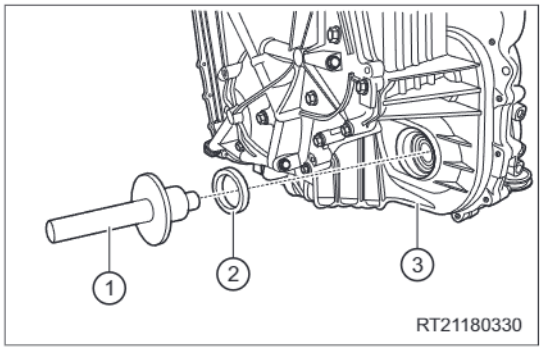
1. Turn off all the electrical devices and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the axle shaft.
4. Using the special tool (1), remove the differential oil seal (2).

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



Installation

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

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

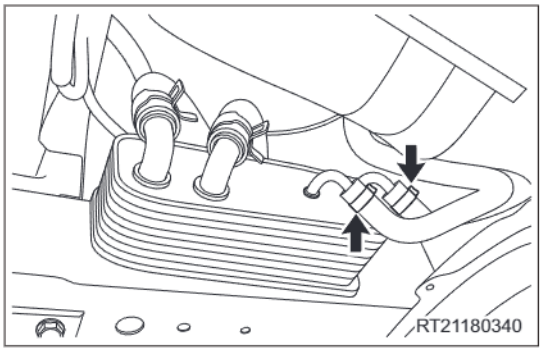
Transmission Fluid Cooler

Removal

CAUTION

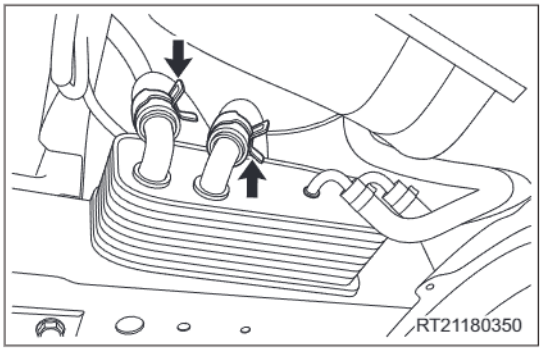
- Do not perform the following removal process with the engine running to avoid causing serious injury.

1. Drain the coolant (See page 12-13).
2. Remove the engine lower protector assembly (See page 48-29).
3. Remove the clamps and disconnect the cooling water pipes.

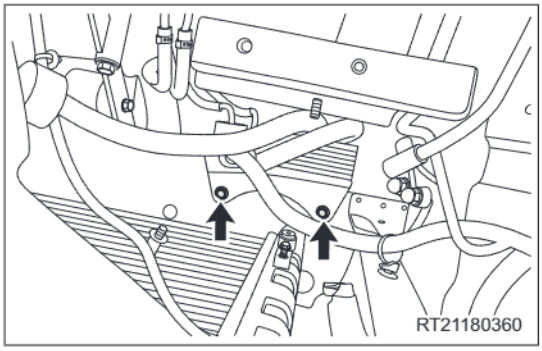


4. Remove the clamps and disconnect the transmission fluid pipes.

   HINT:
   Use appropriate tools to plug the transmission fluid pipes after removing them to prevent transmission fluid leakage.



5. Remove the transmission fluid cooler fixing bolts and remove the transmission fluid cooler.
   (Tightening torque: 22 - 28 N·m)



Installation

Installation is in the reverse order of removal.

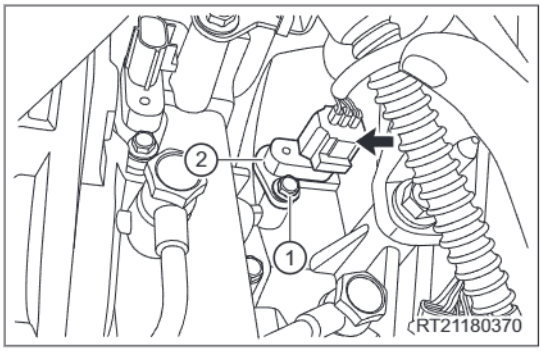
CAUTION

- Check if transmission fluid is in the normal position. If not, add transmission fluid.

Primary Shaft Speed Sensor

Removal

1. Turn off all the electrical devices and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery, battery tray and tray bracket (See page 16-7).
4. Remove the air filter (See page 10-17).
5. Disconnect the primary shaft speed sensor wire harness connector.
6. Remove the fixing bolt (1) of the 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.

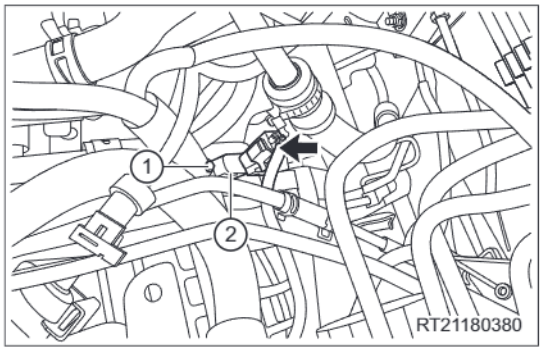
CAUTION

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

Secondary Shaft Speed Sensor

Removal

1. Turn off all the electrical devices and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air filter (See page 10-17).
4. Disconnect the secondary shaft speed sensor wire harness connector (arrow).
5. Remove the fixing bolt (1) of the 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.

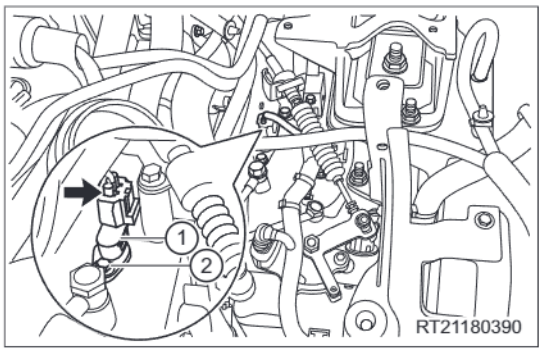
CAUTION

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

Turbine Speed Sensor

Removal

1. Turn off all the electrical devices and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the battery, battery tray and tray bracket (See page 16-7).
4. Remove the air filter (See page 10-17).
5. Disconnect the turbine speed sensor wire harness connector (arrow).
6. Remove the fixing bolt (2) of the 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.

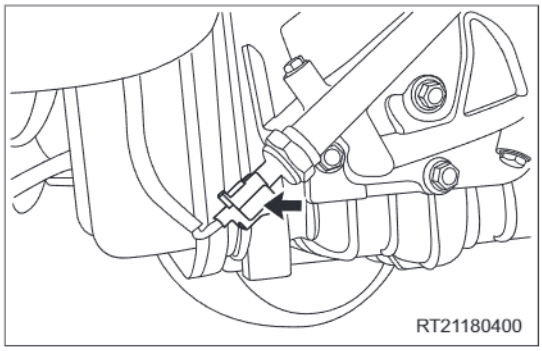
CAUTION

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

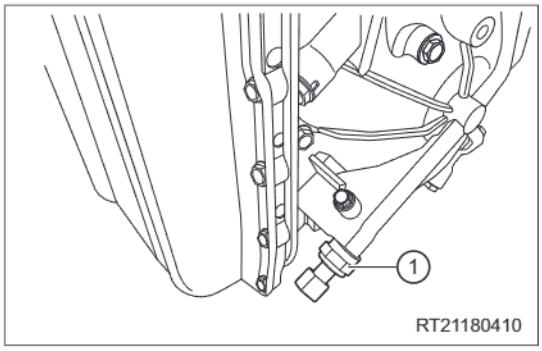
Primary Shaft Pressure Sensor

Removal

1. Turn off all the electrical devices and ignition switch.
2. Disconnect the negative battery cable.
3. Raise the vehicle with a lifter.
4. Drain the automatic transmission fluid (See page 18-110).
5. Disconnect the wire harness connector of the primary shaft pressure sensor.


RT21180400

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



RT21180410

Installation

Installation is in the reverse order of removal.

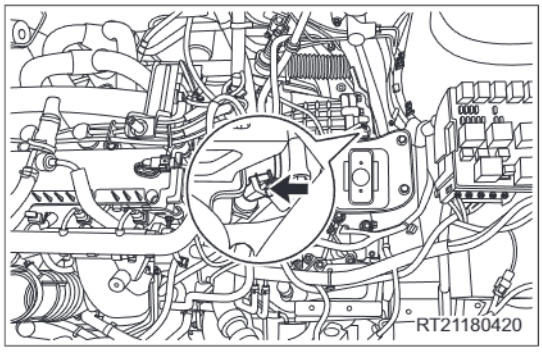
CAUTION

- Keep clean of sensor and contact surface between sensor and transmission, and avoid dust or impurity entering the transmission.
- During installation, apply automatic transmission fluid on the O ring of the sensor.
- Add automatic transmission fluid (See page 18-110).

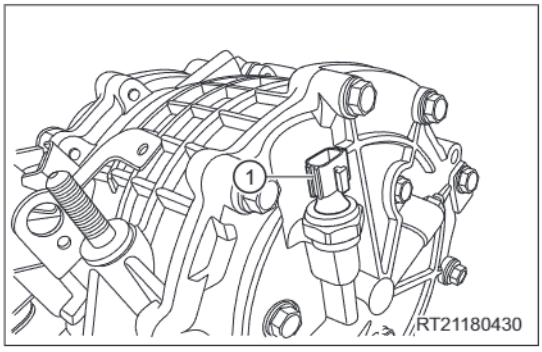
Secondary Shaft Pressure Sensor

Removal

1. Turn off all the electrical devices and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air filter (See page 10-17).
4. Disconnect the wire harness connector of the 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 surface between sensor and transmission, and avoid dust or impurity entering the transmission.
- During installation, apply automatic transmission fluid on the O ring of the sensor.

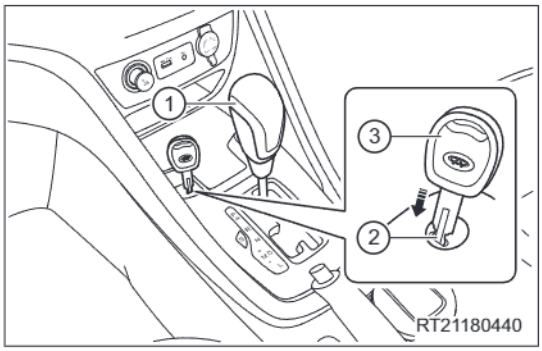
Transmission Range Sensor

Removal

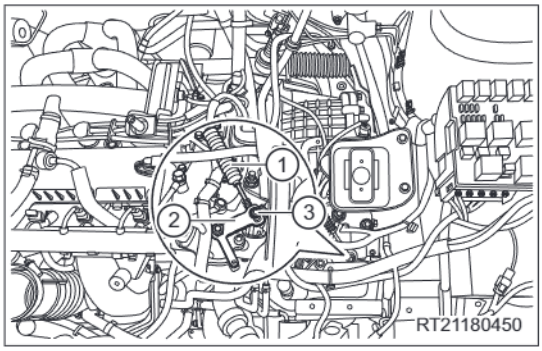
CAUTION

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

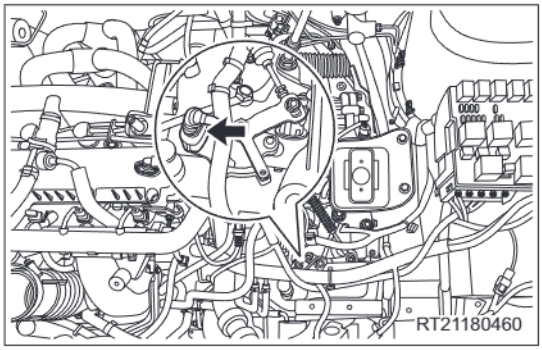
1. Apply the parking brake.
2. Turn off all the electrical devices and ignition switch.
3. Disconnect the negative battery cable.
4. Remove the battery, battery tray and tray bracket (See page 16-7).
5. Insert the mechanical key (3) in the emergency unlock hole (2) and press the mechanical key to hold down the emergency unlock switch, and move the shift lever (1) to the N (neutral) position to release the shift lock.



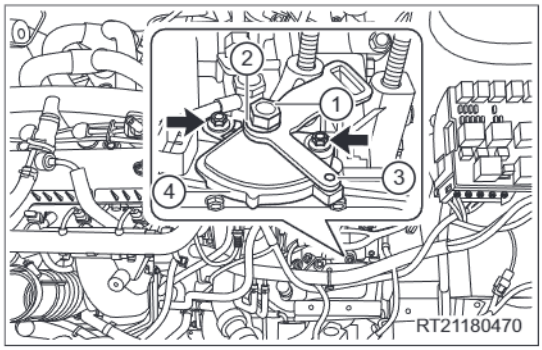
6. Remove the gear shift cable (1) and arm (2) connecting nut (3).
(Tightening torque: 16 - 20 N·m)



7. Disconnect the transmission range sensor 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 transmission range sensor fixing bolts (arrow).
    (Tightening torque: 10 - 12 N·m)
12. Take out the transmission range sensor (4).



Installation

Installation is in the reverse order of removal.

CAUTION

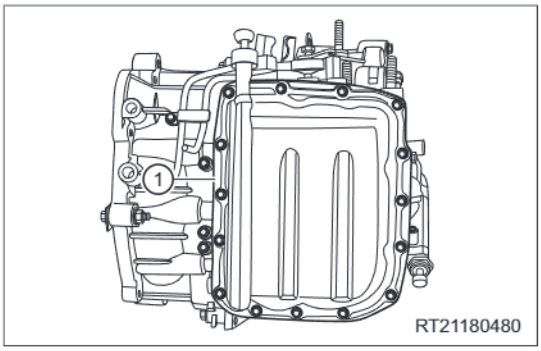
- After the spring gasket of the gear shift arm is removed, use a new spring gasket during installation.
- During installation, align the hole of gear shift arm to the hole of transmission range sensor and fix them with a proper tool.
- After installation, inspect the gear shift lever position. Adjust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

Valve Body Case

Removal

1. Turn off all the electrical devices and ignition switch.
2. Disconnect the negative battery cable.
3. Raise the vehicle with a lifter.
4. Drain the transmission fluid (See page 18-110).
5. Remove the valve body case fixing bolts and remove the valve body case (1).
   (Tightening torque: 10 - 12 N·m)

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



Installation

Installation is in the reverse order of removal.

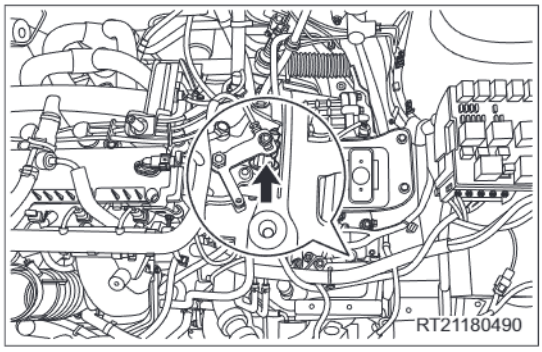
CAUTION

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

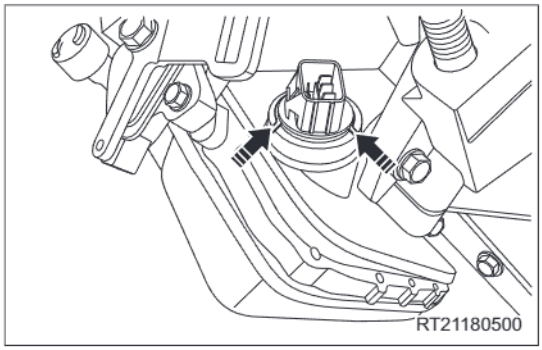
Valve Body

Removal

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

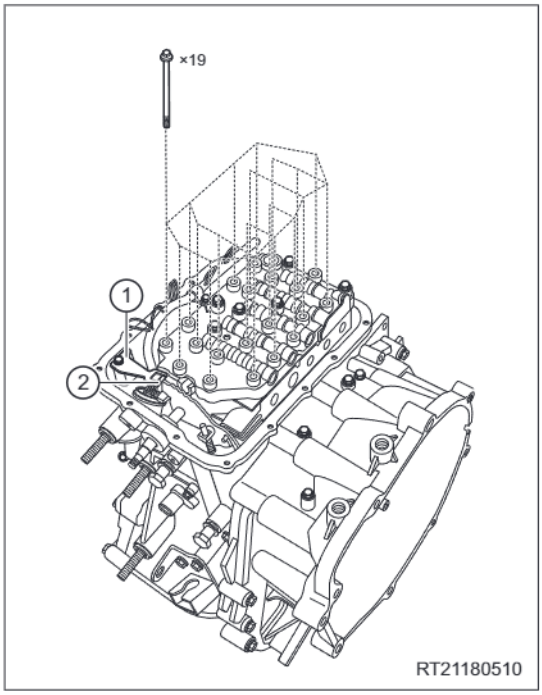


5. Use a proper tool to remove the transmission solenoid wire harness assembly clamp.

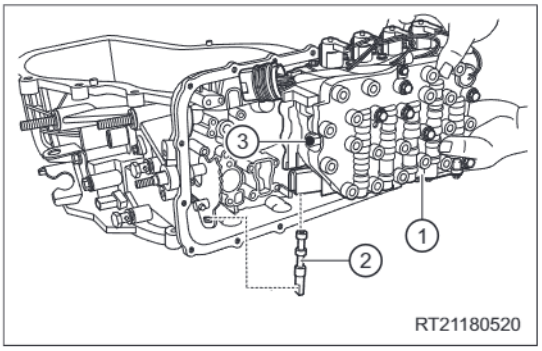


6. Remove the transmission range sensor (See page 18-119).
7. Raise the vehicle with a lifter.
8. Drain the transmission fluid (See page 18-110).
9. Remove the valve body case (See page 18-121).

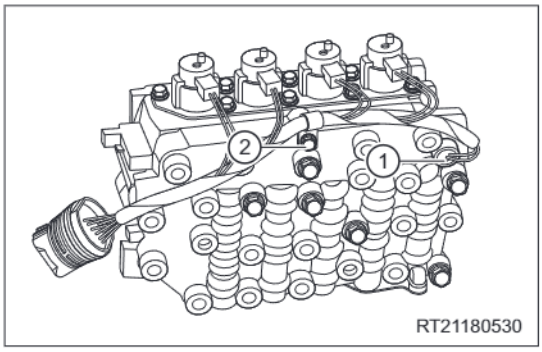
10. Remove the positioning plate fixing bolt (1).
11. Remove the positioning plate (2).
12. Remove the valve body fixing bolts.
    (Tightening torque: 8 - 10 N·m)



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.



17. Take out the solenoid and wire harness assembly.

Installation

Installation is in the reverse order of removal.

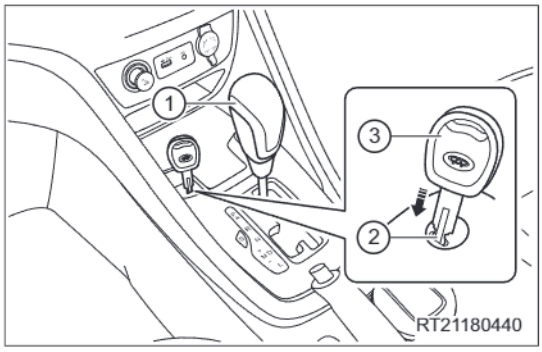
CAUTION

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

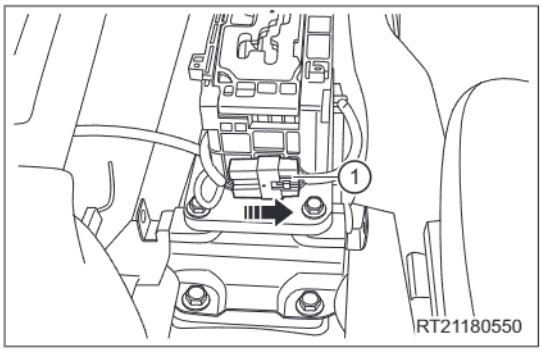
Gear Shift Control Mechanism

Removal

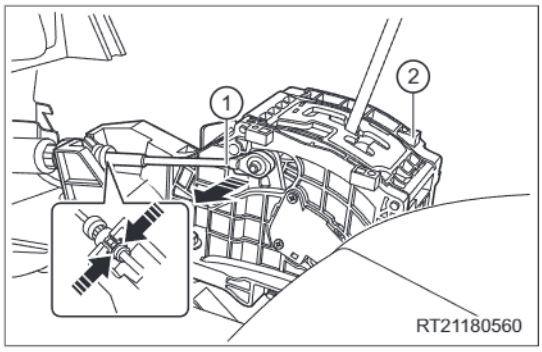
1. Apply the parking brake.
2. Turn off all the electrical devices and ignition switch.
3. Disconnect the negative battery cable.
4. Insert the mechanical key (3) in the emergency unlock hole (2) and press the mechanical key to hold down the emergency unlock switch, and move the shift lever (1) to the N (neutral) position to release the shift lock.



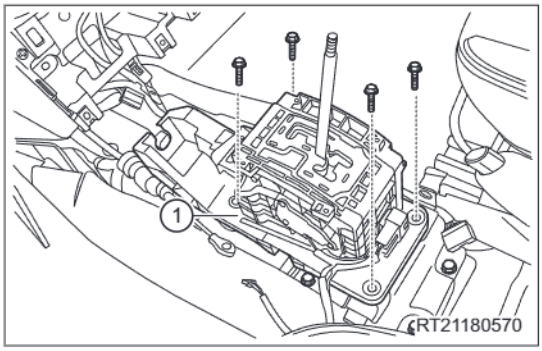
5. Remove the auxiliary fascia console assembly (See page 45-9).
6. Disconnect the gear shift control mechanism wire harness connector (1).



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



Installation

Installation is in the reverse order of removal.

CAUTION

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

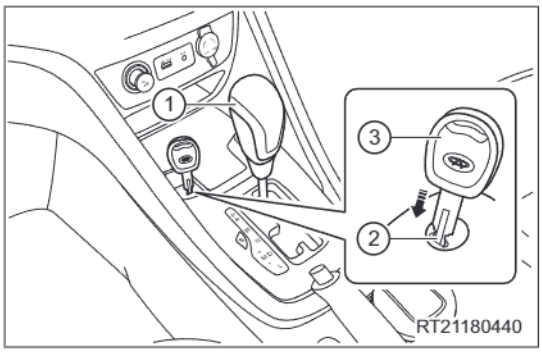
Gear Shift Cable

Removal

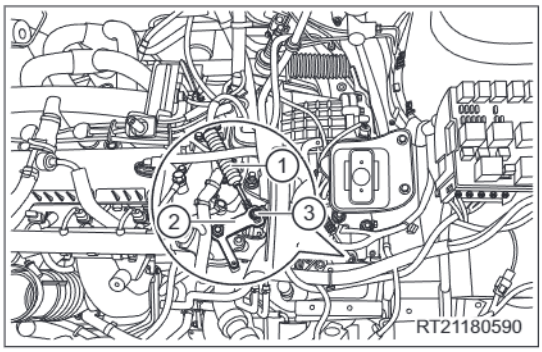
CAUTION

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

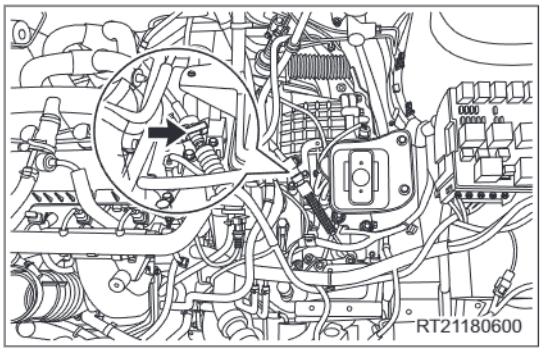
1. Apply the parking brake.
2. Turn off all the electrical devices and ignition switch.
3. Disconnect the negative battery cable.
4. Insert the mechanical key (3) in the emergency unlock hole (2) and press the mechanical key to hold down the emergency unlock switch, and move the shift lever (1) to the N (neutral) position to release the shift lock.



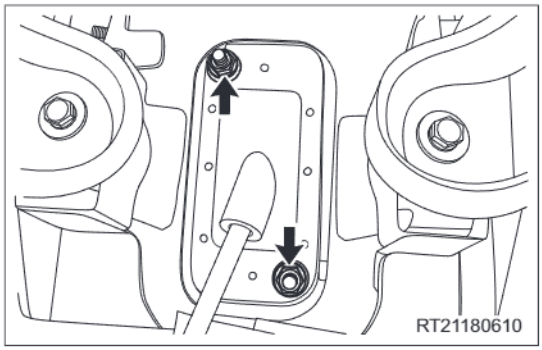
5. Disconnect the transmission gear shift cable from the gear shift control mechanism (See page 18-125).
6. Remove the air filter (See page 10-17).
7. Remove the connecting nut (3) between the gear shift cable (1) and arm (2). Disconnect the gear shift cable from the shift arm.
   (Tightening torque: 16 - 20 N·m)



8. Remove the gear shift cable flexible shaft clamp.



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



10. Take out the gear shift cable.

Installation

Installation is in the reverse order of removal.

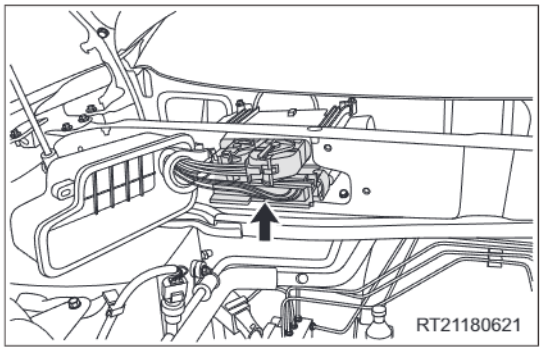
CAUTION

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

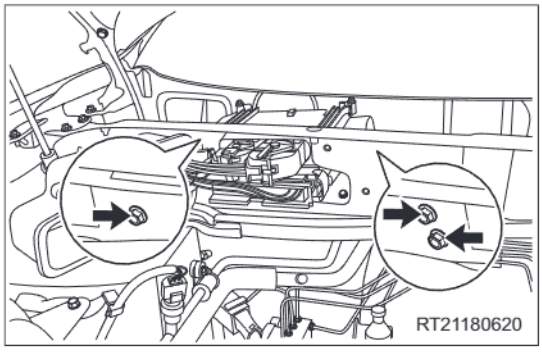
TCU

Removal

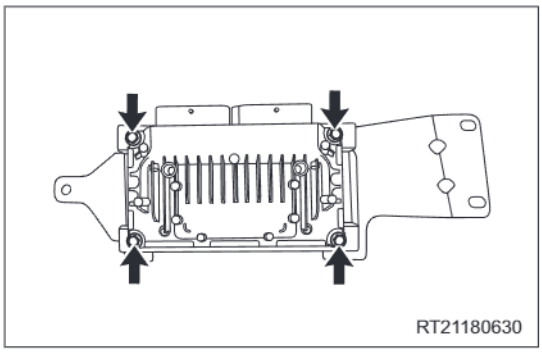
1. Turn off all the electrical devices and ignition switch.
2. Disconnect the negative battery cable.
3. Remove the TCU and ECM connector protective cover.
4. Disconnect the TCU and ECM connector.



5. Remove the TCU mounting bracket.



6. Remove the TCU fixing bolts (arrow).
   (Tightening torque: 6 - 8 N·m)



Installation

Installation is in the reverse order of removal.

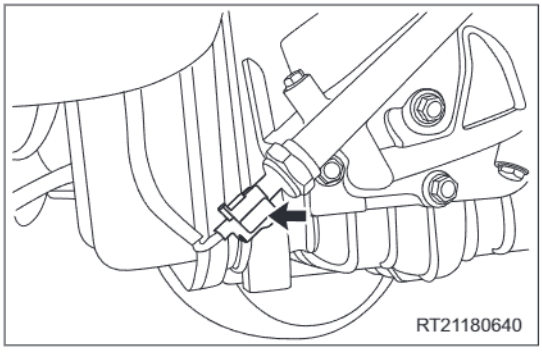
CVT Assembly

Removal

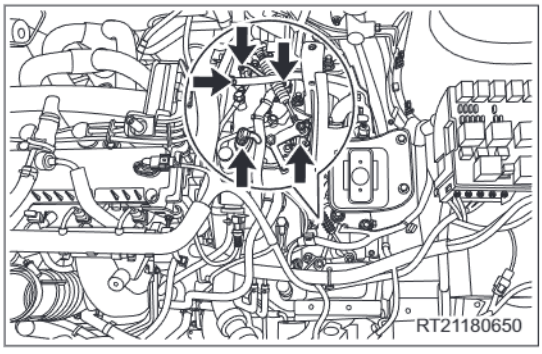
CAUTION

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

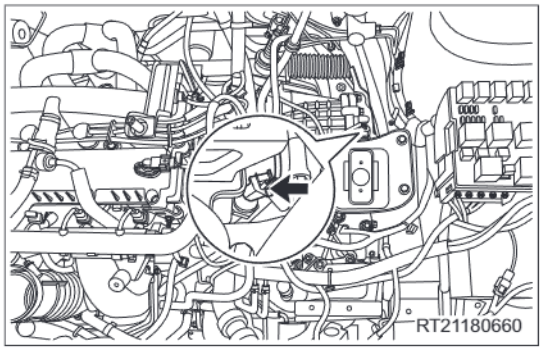
1. Apply the parking brake.
2. Turn off all the electrical devices and ignition switch.
3. Disconnect the negative battery cable.
4. Drain the automatic transmission fluid (See page 18-110).
5. Remove the air filter (See page 10-17).
6. Remove the battery (See page 16-7).
7. Remove the battery tray (See page 16-9).
8. Remove the starter (See page 15-64).
9. Remove the engine speed sensor (See page 06-249).
10. Disconnect the primary shaft pressure sensor wire harness connector (arrow).



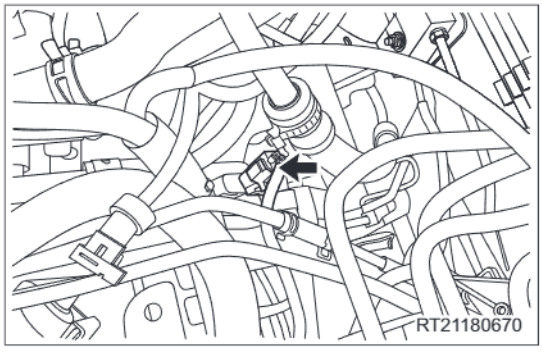
11. Disconnect the wire harness connectors on the transmission:
    - Transmission range sensor connector;
    - Transmission solenoid wire harness connector;
    - Turbine speed sensor wire harness connector;
    - Primary shaft speed sensor wire harness connector;
    - Remove the transmission ground wire harness fixing bolt;
      (Tightening torque: 18 - 22 N·m)



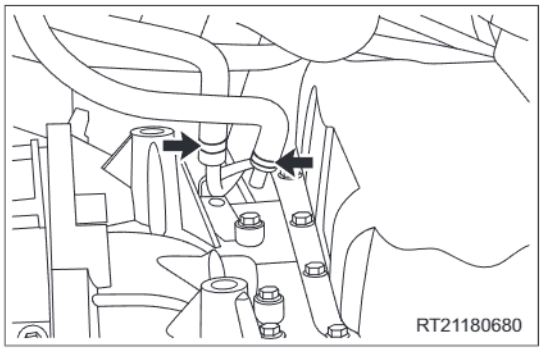
- Secondary shaft pressure sensor wire harness connector;



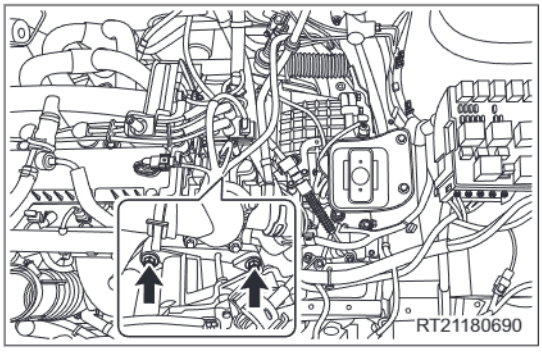
- Secondary shaft speed sensor wire harness connector.



12. Disconnect the connection of the gear shift cable on the transmission (See page 18-127).
13. Remove the transmission fluid coolant hose clamps (arrow) and detach the hoses.

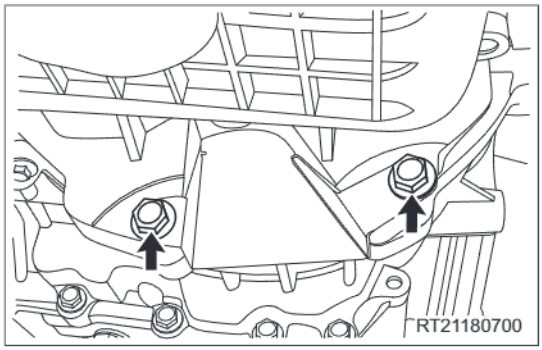


14. Use engine equalizer to fix the engine assembly.
15. Remove the engine front, rear and left mountings (See page 07-64).
16. Remove the bolts connected with the engine at the upper part of the transmission.
(Tightening torque: 75 - 85 N·m)



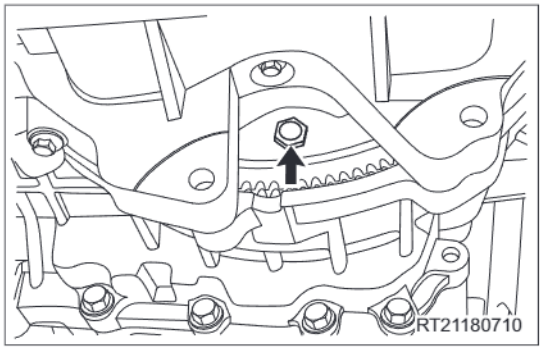
17. Raise the vehicle with a lifter.

18. Remove the dust baffle fixing bolts, and take out the dust baffle.
(Tightening torque: 45 - 55 N·m)



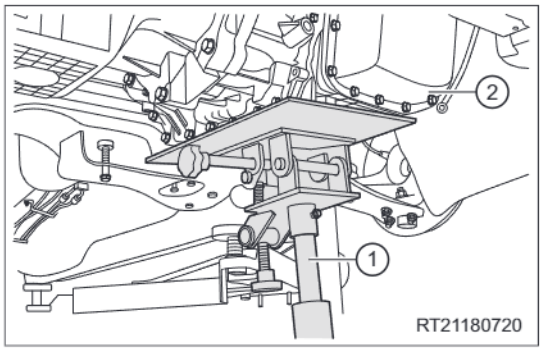
19. Turn the crankshaft and turn the connecting bolt of flywheel and torque converter to the middle section of U slot to lock the crankshaft bolts. Remove 4 connecting bolts of the flywheel and torque converter.
(Tightening torque: 50 - 60 N·m)

HINT:
The crankshaft should rotate clockwise viewing from the front of the engine.

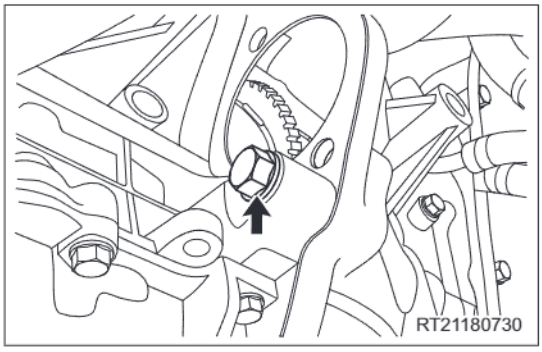


20. Remove the axle shaft.

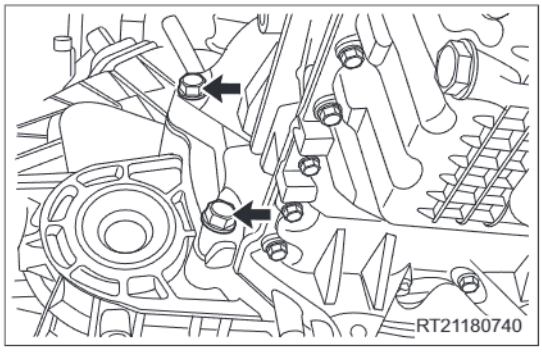
21. Use transmission carrier (1) to support the transmission (2).



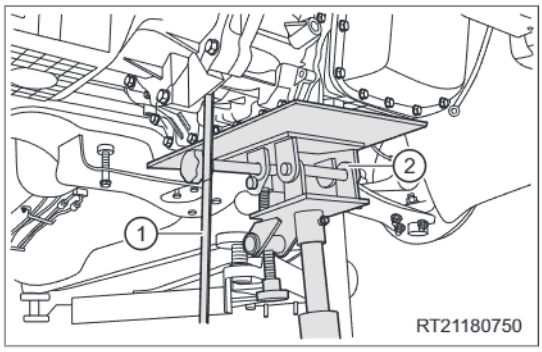
22. Remove the transmission and engine front connecting bolt (1).
(Tightening torque: 75 - 85 N·m)



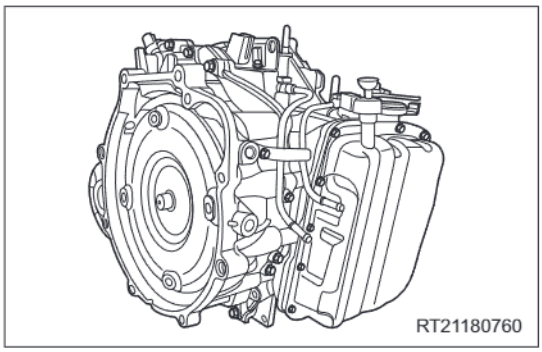
23. Remove the transmission and engine connecting bolts (arrow).
(Tightening torque: 75 - 85 N·m)



24. Remove the engine rear mounting.
25. Use a proper tool (1) to separate the transmission (2) from the engine.



26. Take out the transmission plate.
27. 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 the bolts and then tighten them to the specified torque.
- Keep transmission parts clean, and prevent foreign matter from entering into the transmission.
- Add automatic transmission fluid.
- After installation, inspect the gear shift lever for gear shift positions. Adjust the gear shift cable as necessary.