ENGINE

ENGINE MECHANICAL (4HK1, 6HK1)

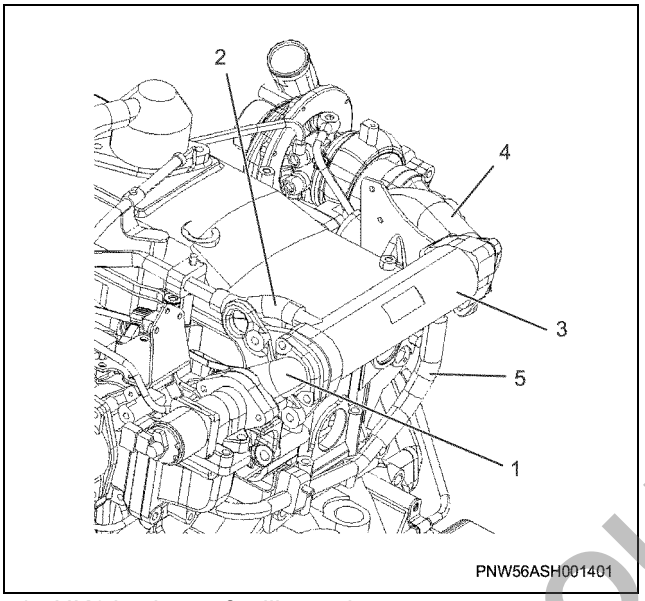
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4. Remove the turbocharger.
   Refer to the “Turbocharger and Exhaust Manifold”.
5. Remove the left-hand EGR adapter and right-hand EGR pipe.
6. Remove the EGR water feed pipe.
7. Remove the EGR water return pipe.
8. Remove the EGR cooler.
9. Remove the water feed pipe for coolant water for the EGR cooler and the water return pipe.



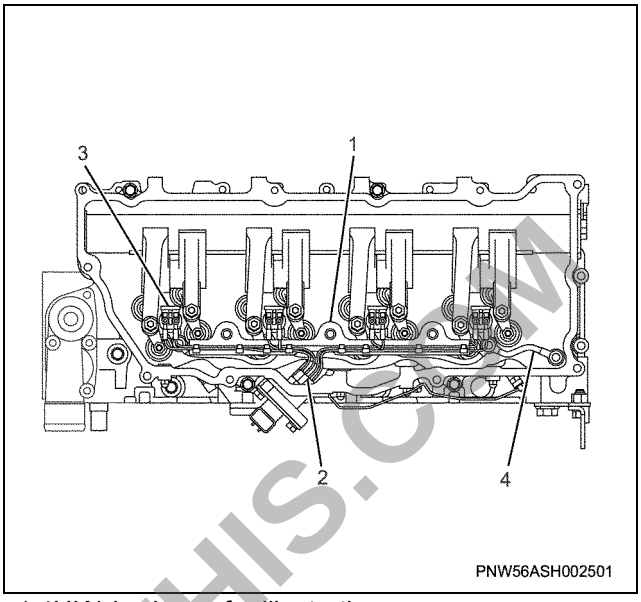
* 4HK1 is shown for illustration.

Name

1. EGR Adapter
2. Water Return Pipe
3. EGR Cooler
4. EGR Pipe
5. Water Feed Pipe

---

10. Remove the fan guide bracket.
11. Remove the left-hand intake pipe between the inter-cooler and the inlet duct.
12. Remove the cylinder head cover.
    Refer to “Cylinder Head Cover”.
13. Remove radiator upper hose.
14. Loosen the fuel injector terminal nuts alternately to the same level, and remove the terminal.
15. Loosen the fuel injector harness bracket bolt, remove the inside connector, and remove the harness bracket.
16. Remove the nozzle leak-off pipe (4).



* 4HK1 is shown for illustration.

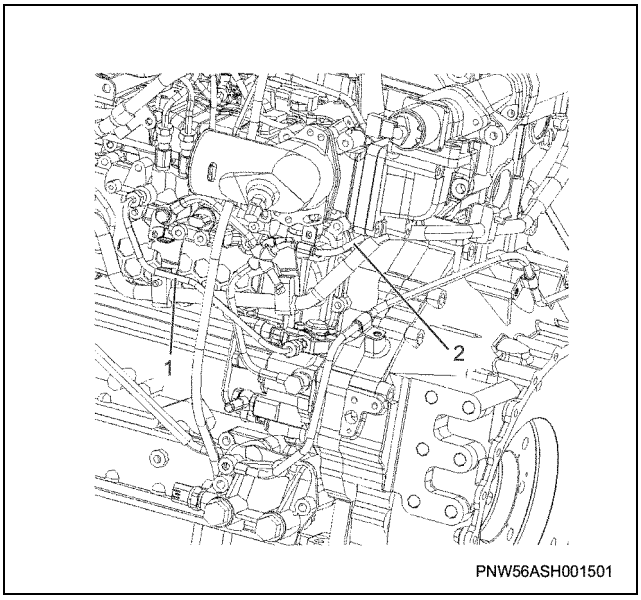
Name

1. Harness Bracket
2. Harness Connector
3. Fuel Injector Terminal Nut
4. Nozzle Leak-Off Pipe

---

17. Remove the fuel leak-off hose.
18. Remove the fuel leak-off pipe (2).

4HK1



Name

1. High Pressure Pipe
2. Leak-Off Pipe

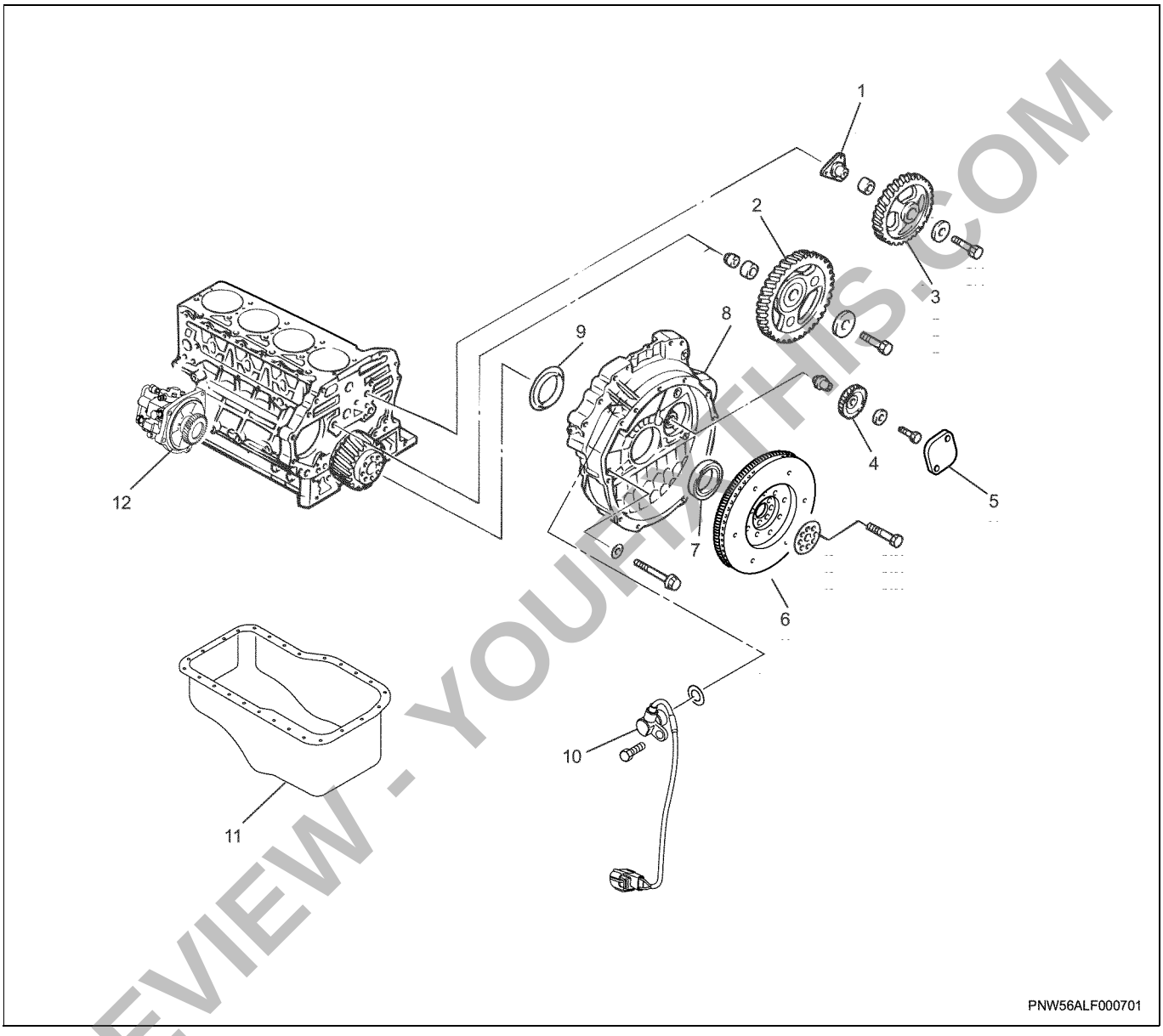
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Timing Gear Train

Components

4HK1



Name

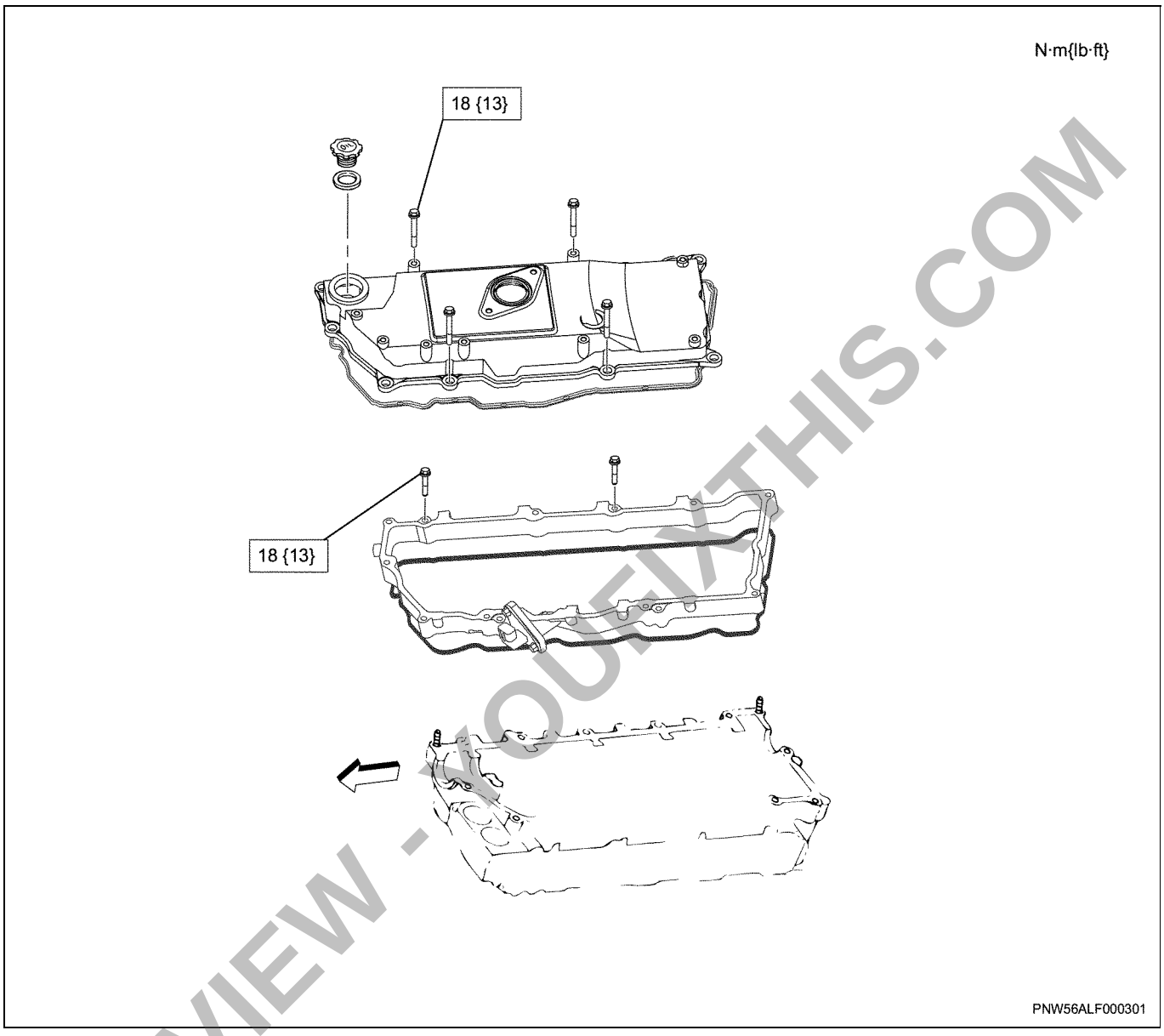
1. Idle Gear B Shaft
2. Idle Gear A
3. Idle Gear B
4. PTO Idle Gear
5. PTO Idle Gear Cover
6. Flywheel
7. Rear Oil Seal
8. Flywheel Housing
9. Slinger
10. Crankshaft Position Sensor
11. Oil Pan
12. Fuel Supply Pump

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Torque Specifications

4HK1



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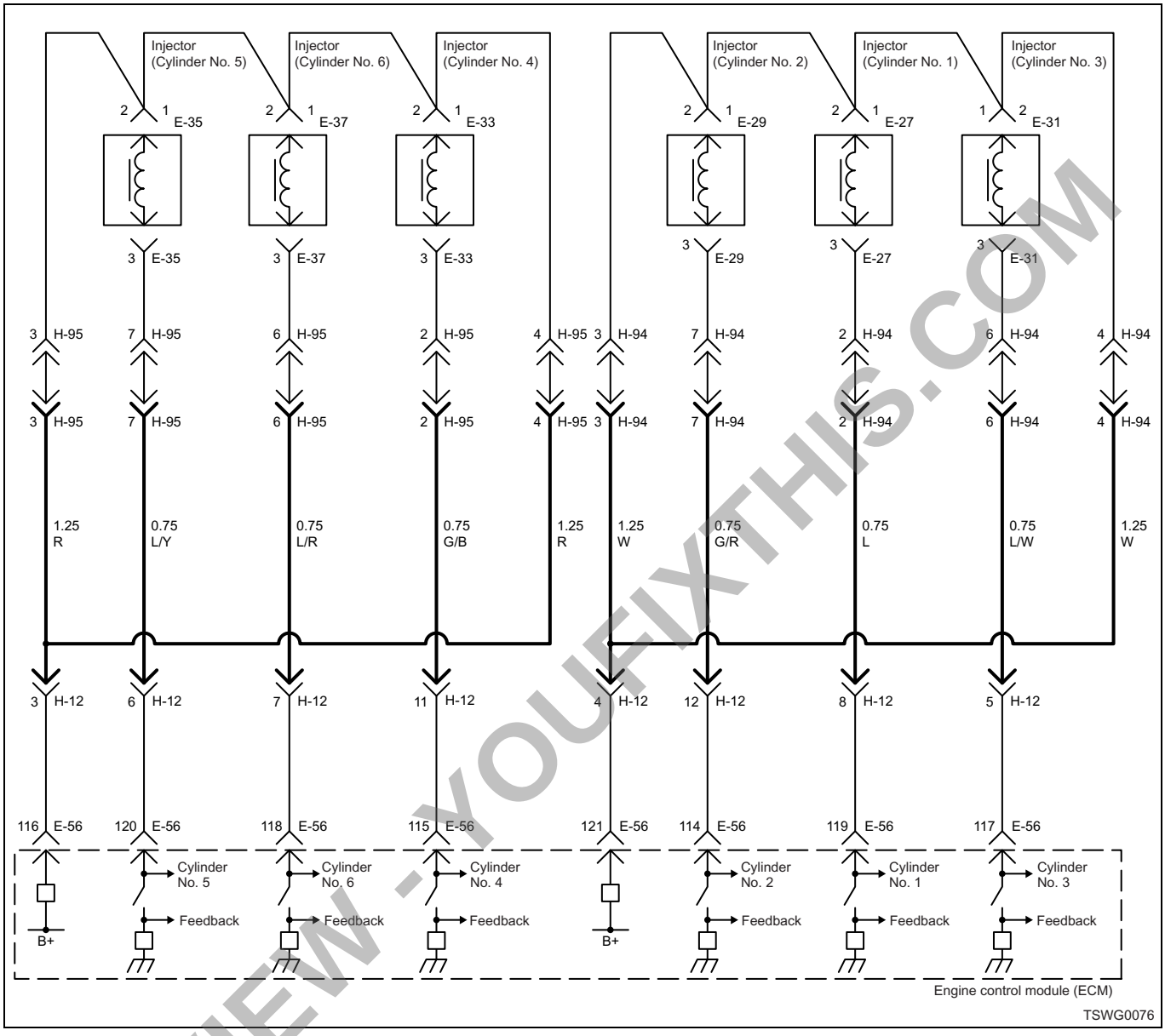
Main Data and Specifications

Item			Engine model 4HK1
Type			Diesel/4-cycle/water cooled-type, inline four-cylinder OHC
Combustion chamber form			Direct injection type
Cylinder liner type			Dry type
Number of cylinders - cylinder bore × strokes		mm (in)	4-115 (4.53) × 125 (4.92)
Displacement		cc (cu.in)	5193 (317)
Compression ratio			17.5
Compression pressure		MPa (psi)/rpm	3.23 (468)/200
Idle speed		rpm	800
Valve clearance	Intake	mm (in)	0.4 (0.016) (cold)
	Exhaust		0.4 (0.016) (cold)
Ignition type			Compressed ignition
Injection order			1 - 3 - 4 - 2
Lubricating system			
Lubricating type			Pressure type
Oil pump type			Gear type
Volume of lubricating oil		L (qts)	13.0 (13.7) — 20.5 (21.7)
Oil filter type			Full flow filter (cartridge type)
Oil cooling type			Built-in, water-cooling
Cooling system			
Cooling type			Water cooling type
Radiator type			Corrugated fin (pressure type)
Water pump type			Centrifugal, belt type
Thermostat type			2 wax-type units
Thermostat valve-opening temperature		°C (°F)	85 (185)
Volume of coolant		L (qts)	14 (14.8) (incl. radiator)
Fuel system			
Injection pump type			Electronic control common rail type
Governor type			Electronic type
Timer type			Electronic type
Injection nozzle type			Multi-hole type 7-hole and ϕ 0.16 mm (0.0063 in) inside diameter
Charging system			
Generator type			AC type
Power output		V/A	24 - 50
Regulator type			IC

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6HK1



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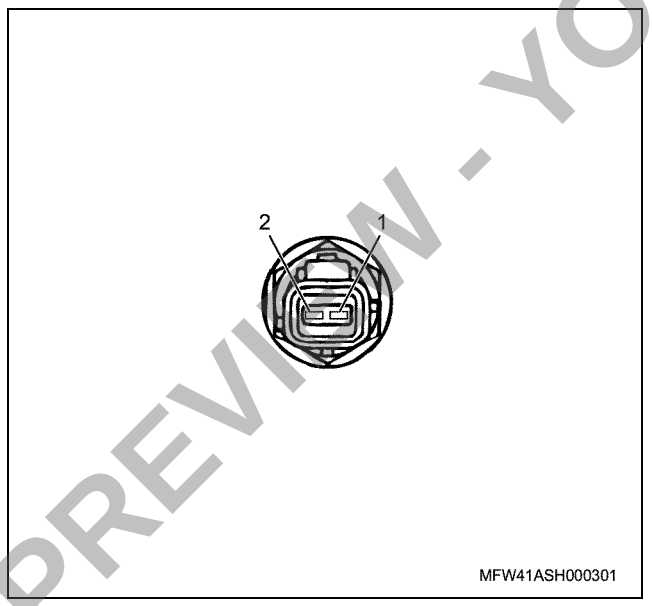
Description of circuit

The injector performs fuel injection. The injector is installed in the engine head. The engine control module (ECM) controls the fuel injection amount and timing by controlling the energizing time to the injector. Also, it generates the voltage for injector operation and energizes the pressurized voltage (more than 100 V) to the injector. For injector operation, the voltage applied to the injector will be sent back the to the ECM through injector as a signal, and the ECM controls this signal.

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Step	Action	Value	YES	NO
13	1. Start the engine. 2. Check the display of “Fuel temperature”. Does the display of “Fuel temperature” show error value?	214°C (Displayed error value)	Go to Step 14.	Go to “Diagnostic aid”.
14	Check for installation condition of the FT sensor, ECM and coupling connector. 1. Check for play or looseness in the connection. 2. If the trouble is detected, repair or replace as required. Is the trouble detected?	—	Go to Step 11.	Go to Step 15.
15	1. Check for followings in the signal circuit between ECM and FT sensor using breaker box or DMM. Refer to “Breaker box inspection procedure”. • Short circuit to FT sensor ground circuit • Short circuit to ground 2. If the trouble is detected, repair or replace as required. Is the trouble detected?	—	Go to Step 11.	Go to Step 6.

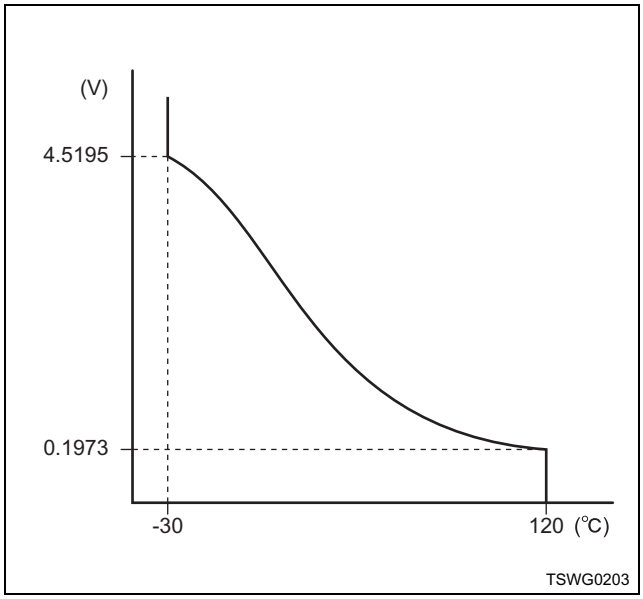
About FT sensor



Name
1. GND
2. Signal

Characteristics of FT sensor

The output voltage of FT sensor changes according to the fuel temperature. The scan tool with CAN communication displays a fixed value when the value exceeds the threshold voltage. Therefore, judge as it is more than the threshold value if the value of –30°C or 120°C is not changed.
When error occurs, error value (214°C) is displayed.
The following illustration shows the correlation between physical value and voltage displayed in the scan tools with CAN communication.
Tech2 and scan tools with KW communication can display both voltage and physical value.



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Back-up mode

- Fuel temperature default setting
  (at starting: −20°C, at running: 70°C)

Recovery from failure

Refer to “List of diagnostic trouble code” and “About recovery from failure” in this section for recovery from failure.

The conditions to clear the MIL/DTC

- The current trouble turns to past trouble (history) when the condition is out of the range from DTC set condition (recovery from failure).
- Using the scan tool, or memory clear switch and diagnostic switch operation enables to clear DTCs.

Diagnostic aid

- When the engine cold (before starting engine), check if the temperatures of the FT sensor and IAT sensor are close.

If the intermittent trouble is suspected, followings may be the cause.

- Improper connection of harness connector
- Defective harness routing
- Worn harness cladding
- Wire disconnection inside harness cladding

Following inspections are necessary to detect these causes.

- Improper connection of harness connector and ECM connector
  - Poor connection of terminal from connector
  - Unmatched terminals are fitted.
  - Damage of connector lock
  - Poor contact between terminal and wire
- Damaged harness
  - Visually check the harness for damage.
  - Check the relevant items on the scan tool data display while moving the connector and the harness which are related to the sensor. The variation of the display indicates the faulty part.

Test description

Numbers below indicate step numbers in the chart.
3. In the case of current trouble, the “Fuel temperature sensor” displays more than the specified value. In this case, identify the cause by referring to “Diagnostic aid”.
5. If the “Fuel temperature sensor” displays more than the specified value when the FT sensor connector is removed, the circuit beyond the sensor is normal including ECM.

Step	Action	Value	YES	NO
1	Perform the OBD system check. Is the procedure completed?	—	Go to Step 2.	Perform “OBD system check”, and Go to Step 2.
2	Is the scan tool (KW communication) available?	—	Go to Step 3.	Go to Step 13.
3	Check the value for FT sensor using scan tool. 1. Connect the scan tool. 2. Start the engine. 3. Check the value for “Fuel temperature sensor” using scan tool. Is the “Fuel temperature sensor” less than the specified value?	0.1V	Go to Step 4.	Go to “Diagnostic aid”.
4	Check for installation condition of the FT sensor, ECM and coupling connector. 1. Check for play or looseness in the connection. 2. If the trouble is detected, repair or replace as required. Is the trouble detected?	—	Go to Step 11.	Go to Step 5.
5	1. Turn the key switch to “OFF”. 2. Disconnect the FT sensor connector. 3. Turn the key switch to “ON”. 4. Check the value for “Fuel temperature sensor” using scan tool. Is the “Fuel temperature sensor” more than the specified value?	4.8V	Go to Step 7.	Go to Step 6.

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• Check a crack in the exhaust manifold visually.

Carefully inspect he turbocharger for abrasion and/or excessive wear. Make any necessary adjustments, repairs, and/or part replacements.

Wheel shaft axial play

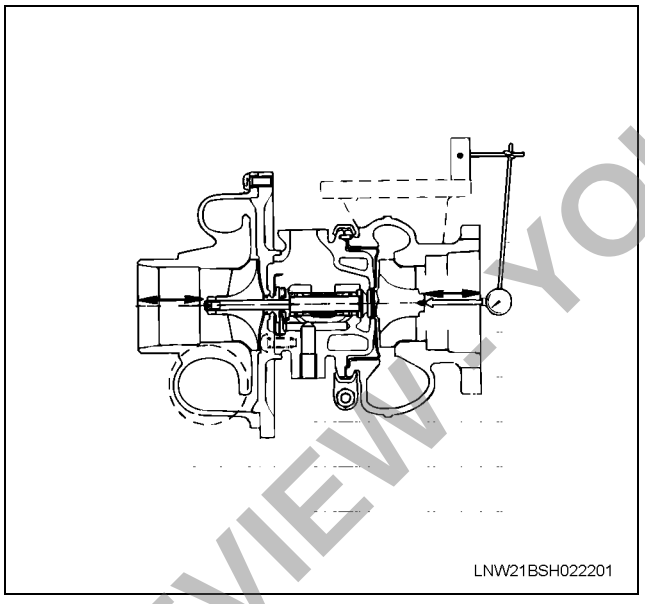
Use a dial gauge to measure the wheel axle shaft play when a force of 12 N (2.6 lb) is alternately applied to both sides of the compressor wheel.

4HK1

Axial play	mm (in)
Standard	0.03 – 0.06 (0.0012 – 0.0024)
Limit	0.09 (0.0035)

6HK1

Axial play	mm (in)
Standard	0.06 – 0.09 (0.0024 – 0.0036)
Limit	0.11 (0.0043)



Wheel shaft and bearing clearance

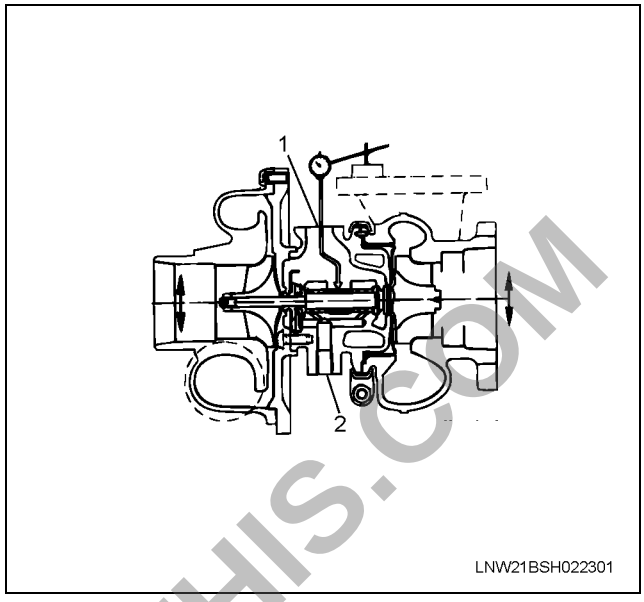
Use a dial gauge to measure the clearance between the wheel shaft and the bearing.

4HK1

Clearance	mm (in)
Standard	0.056 – 0.127 (0.0022 – 0.0050)
Limit	0.14 (0.0055)

6HK1

Clearance	mm (in)
Standard	0.10 – 0.17 (0.0039 – 0.0067)
Limit	0.205 (0.0081)



Name

1. Oil Outlet
2. Oil Inlet

Installation

1. Put the gasket in to install the exhaust manifold.
   • 4HK1: Tighten up with the 2 nuts and 6 bolts according to the order given on the figure.

Tightening torque: 34 N·m (25 lb ft)

• 6HK1: Tighten up with the 12 nuts according to the order given on the figure.

Tightening torque: 55 N·m (40 lb ft)
34 N·m (25 lb ft) for (7) only

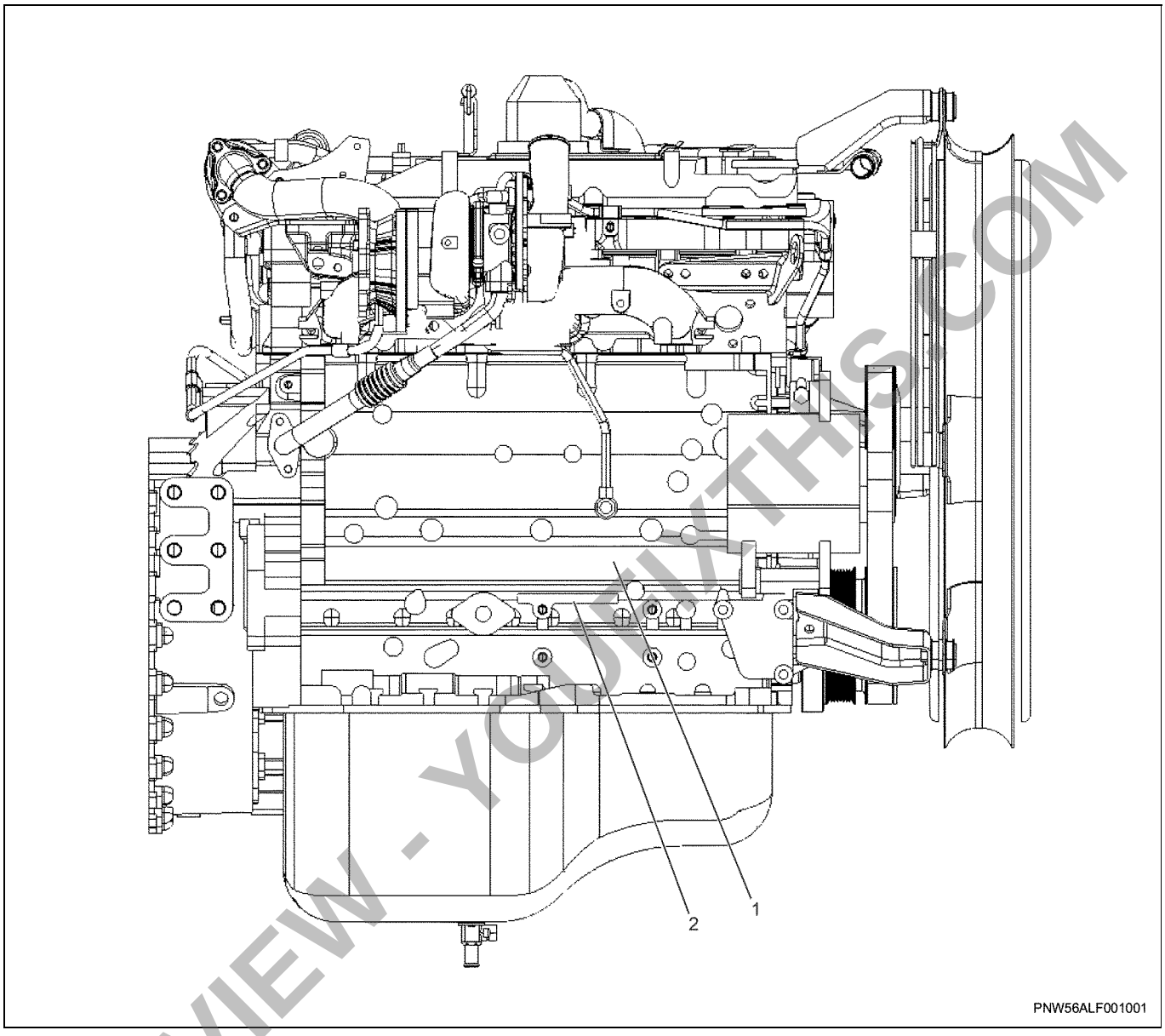
Caution:
Do not tighten up too much because it hampers expansion and contraction due to the heat from the manifold.

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How to read the model

4HK1



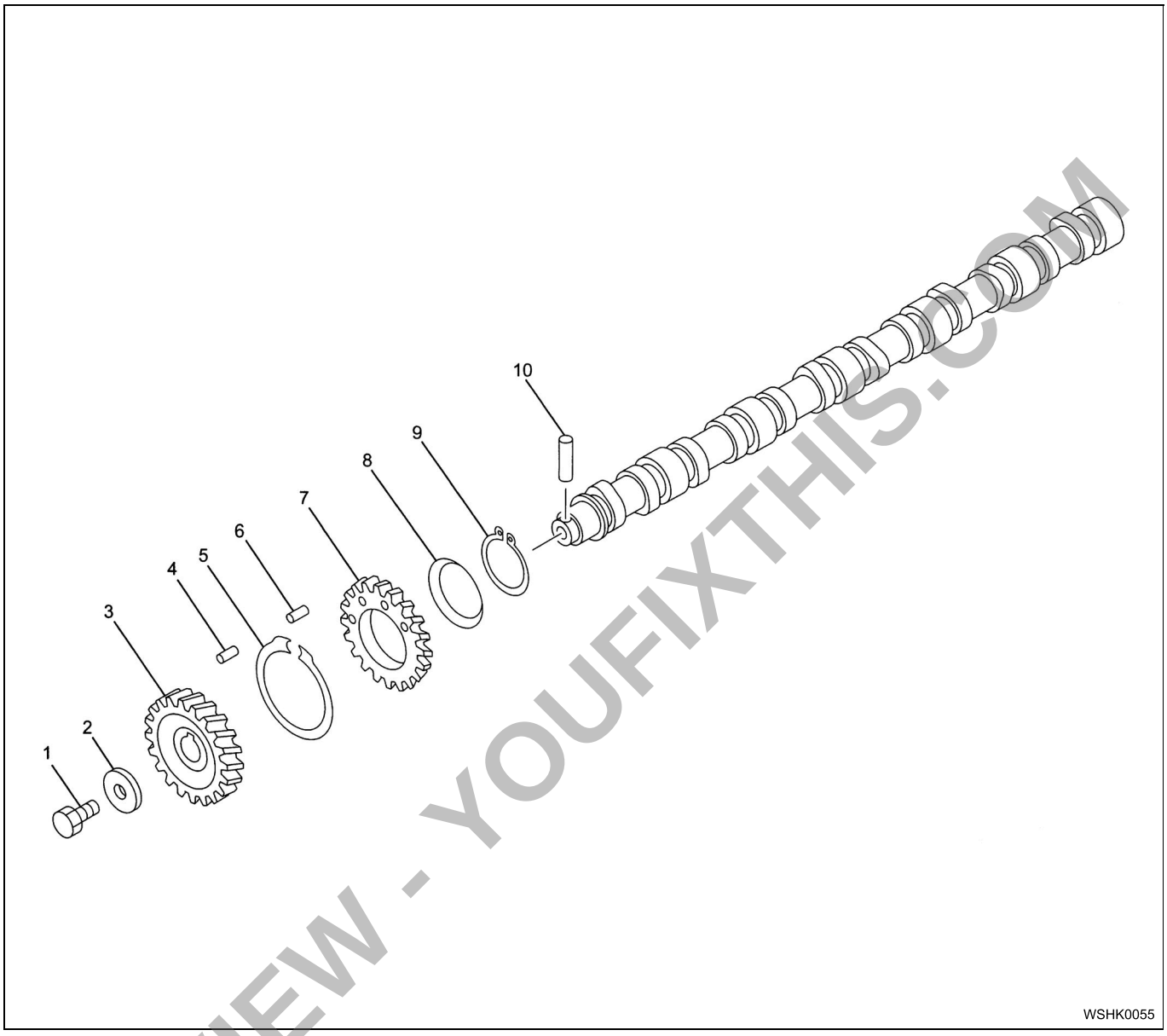
Name

1. Cast The Engine Model
2. Stamp An Engine Number

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6HK1



Name

1. Bolt
2. Washer
3. Gear
4. Pin
5. Spring
6. Pin
7. Sub Gear
8. Dish Spring
9. Snap Ring
10. Pin
11. Camshaft

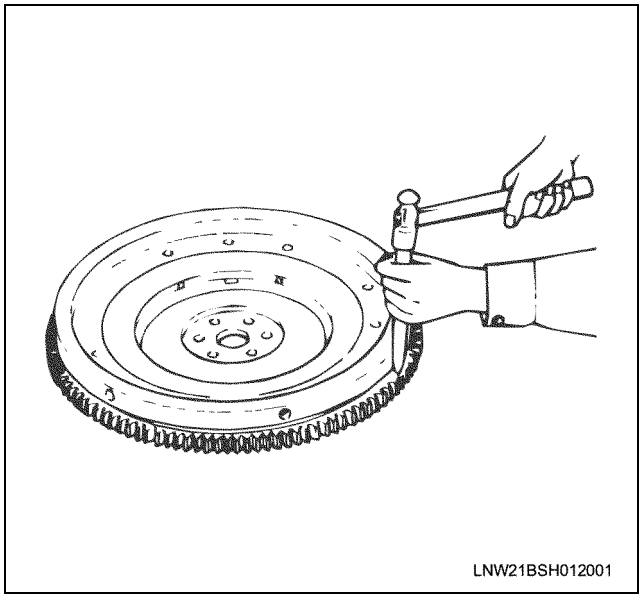
Removal

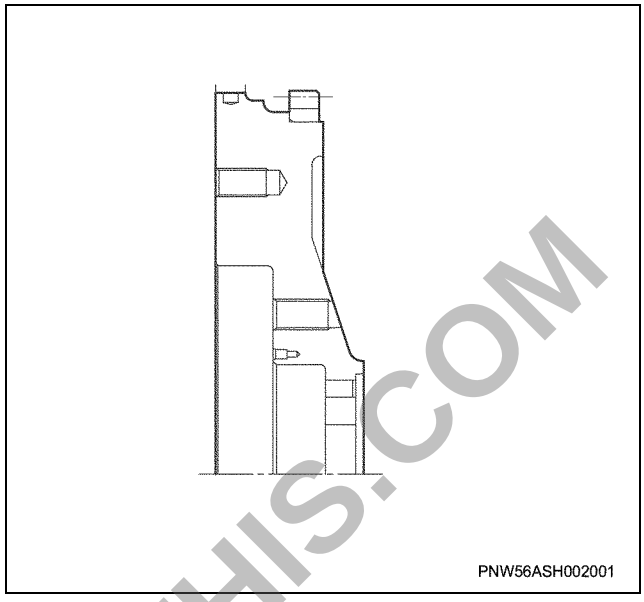
1. Remove the cylinder head cover.
   Refer to “Cylinder Head Cover”.
2. Remove the rocker arm shaft ASM.
   Refer to “Rocker Arm Shaft ASM”.
3. Remove the camshaft bearing cap.
4. Remove the bearing upper.
5. Remove the camshaft ASM.
6. Remove the bearing lower.

Caution:
Put the removed bearings in order with a tag, for example, by cylinder.

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LNW21BSH012001


PNW56ASH002001

Inspection

1. Visual check
   - Inspect the flywheel friction surface for cracks and damages, and replace it if it has abnormality.
   - Inspect the tooth part of the ring gear, replace the ring gear if it has damage or serious wear.
2. Measurement of the friction surface
   - Measure the depth of the flywheel friction surface.
   - Adjust it if the measured value is within the standard value and the limit.
   - If the measured value exceeds the limit, replace the flywheel.

Depth of the friction surface of the flywheel mm (in)	
Standard	19 (0.75)
Limit	20 (0.79)

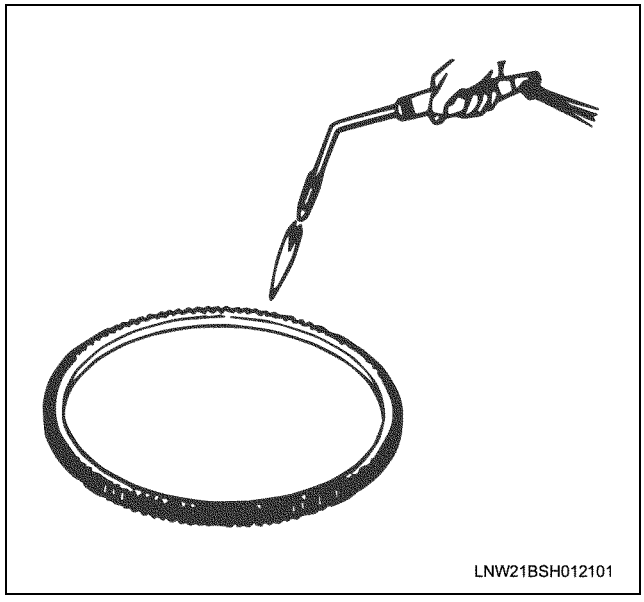
Depth = From the pressure installation surface to the friction surface.

Installation

1. Install the ring gear.
   - After heating the ring gear with a gas burner equally, install it in the flywheel.
   - In the case of shrinkage cooling of the ring gear, maintain the flatness by applying weight of 68.6 kN (15,400 lbf).

Caution:

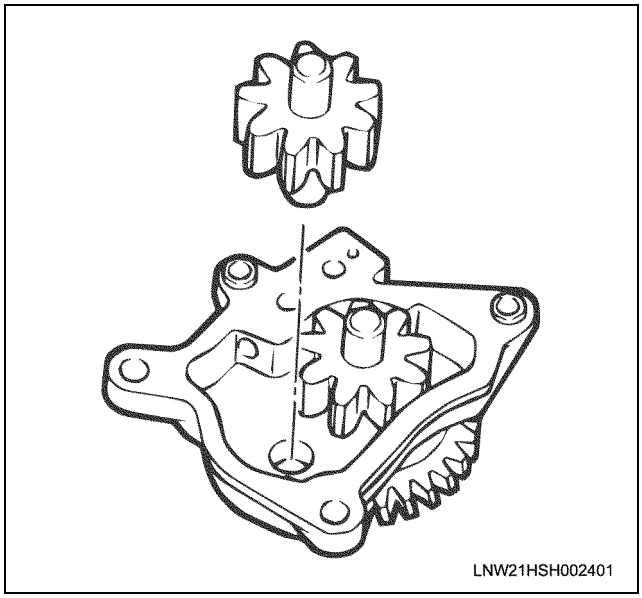
- Install the ring gear so that the side with a pattern faces forward.
- Shrink fit the ring gear to the flywheel.
  Make sure that flywheel and ring gear adhesion is complete.


LNW21BSH012101

2. Install the flywheel.
3. Install the washer.
   - Install the flywheel to match with the knock pins of the crankshaft, tighten them in the order shown in the illustration.

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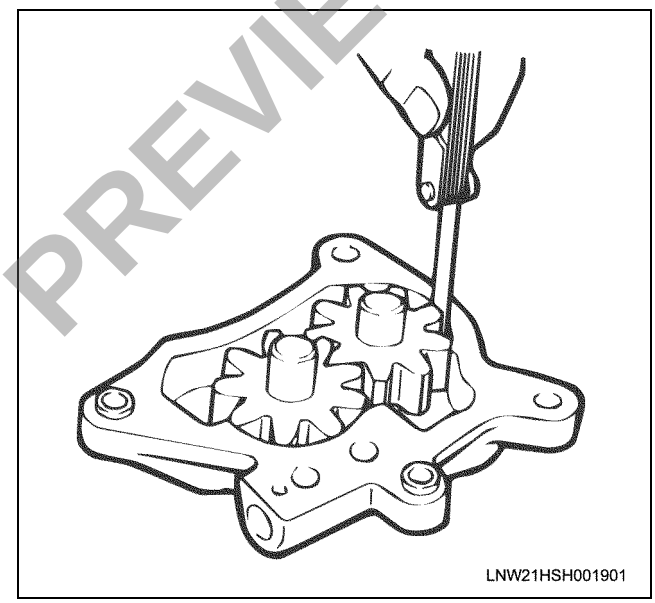
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Inspection

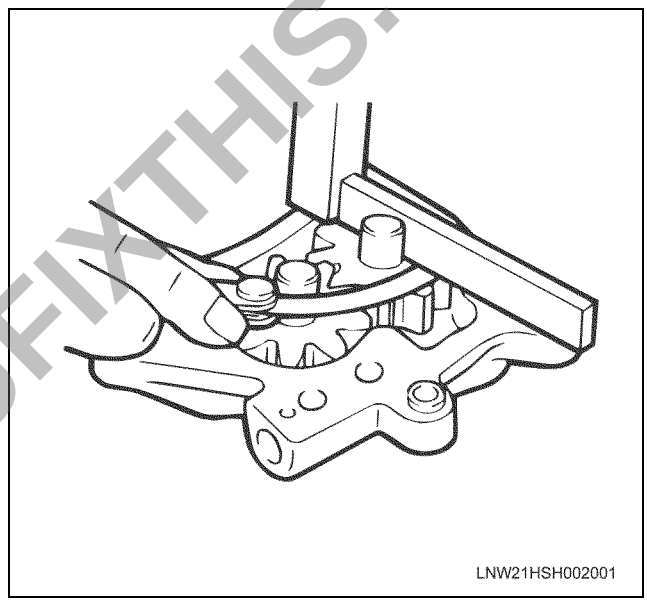
1. Measure the clearance between the gear and the inner wall of the oil pump body.
   - Measure the clearance between the gear and oil pump body using a thickness gauge.
   - If the gap between the gear and the body inner wall exceeds the limit, replace the gear ASM or the driven gear ASM.

Clearance between the gear and inner wall of the body	mm (in)
Standard	0.125 ~ 0.220 (0.0049 ~ 0.0087)
Limit	0.30 (0.0118)



2. Measure the clearance between the gear side surface and the upper surface of the oil pump body.
   - Measure the clearance between the gear surface and the upper surface of the oil pump body using the thickness gauge and square.
   - If the gap between the gear and the body inner wall exceeds the limit, replace the gear ASM or the driven gear ASM.

Clearance between the gear side surface and the upper surface of the oil pump body	mm (in)
Standard	0.064 ~ 0.109 (0.0025 ~ 0.0043)
Limit	0.20 (0.0079)



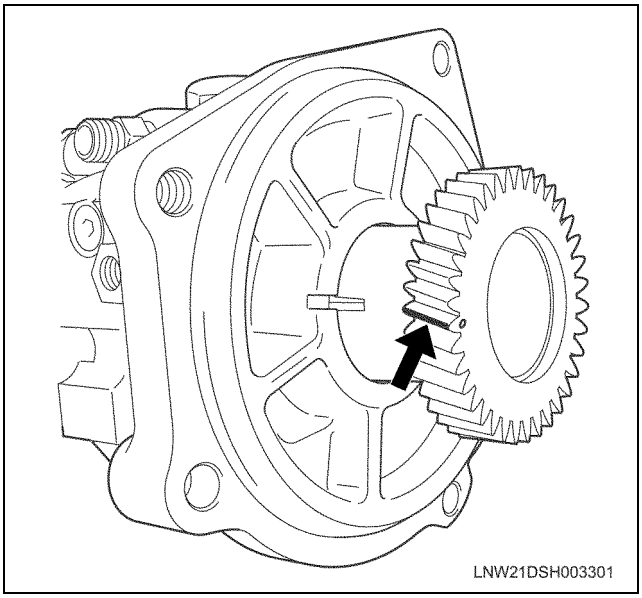
3. Measure the clearance between the driven gear shaft and the bush.
   - Measure the outside diameter of the driven gear shaft using a micrometer.

Outside diameter of the driven gear shaft	mm (in)
Standard	15.989 ~ 16.000 (0.62949 ~ 0.62992)
Limit	15.900 (0.62598)

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4. Apply white paint to the top of the fuel supply pump gear tooth directly above the stamped 'O' mark. Refer to the illustration.

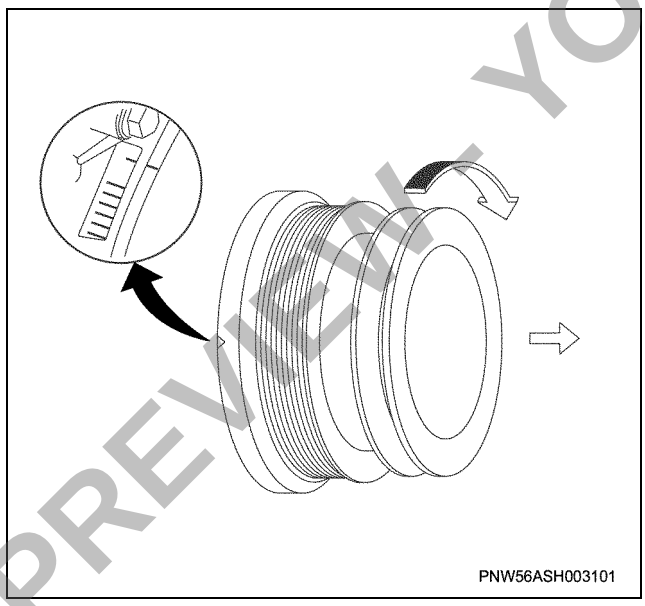


* 4HK1 is shown for illustration.

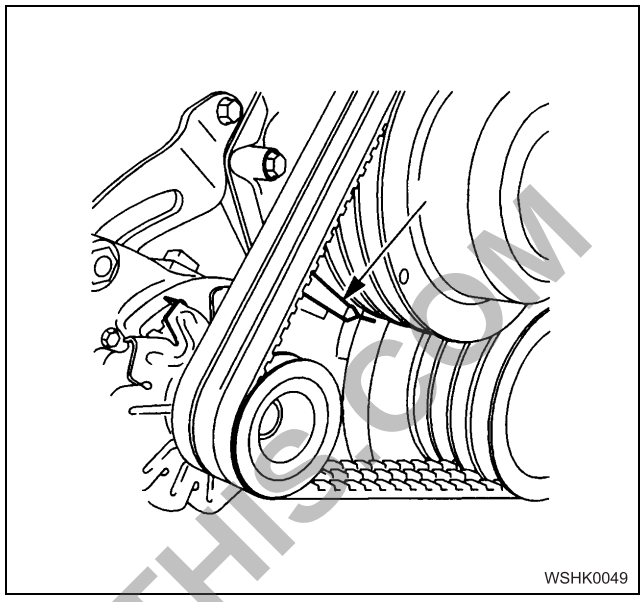
5. Turn the crankshaft in the normal direction of engine rotation until the No. 1 or No. 4 cylinder is at TDC on the compression stroke.

Refer to the illustration.

4HK1



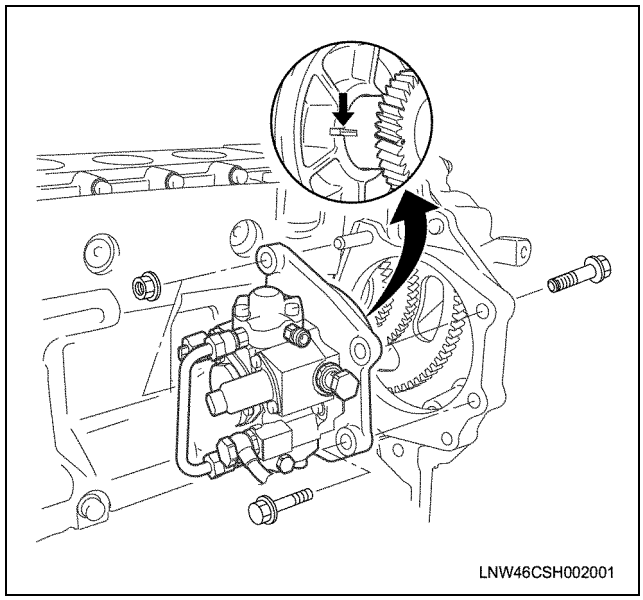
6HK1



6. Remove the oil drain adapter.
7. Install the O-ring to the fuel supply pump.
8. Align the slits as shown in the illustration.
9. Insert the stud bolts into the guides and temporarily tighten them.

Caution:

- If the stud bolts (cylinder block side) have been loosened or replaced, apply Loctite 262 to the recessed portion of the bolts.



* 4HK1 is shown for illustration.

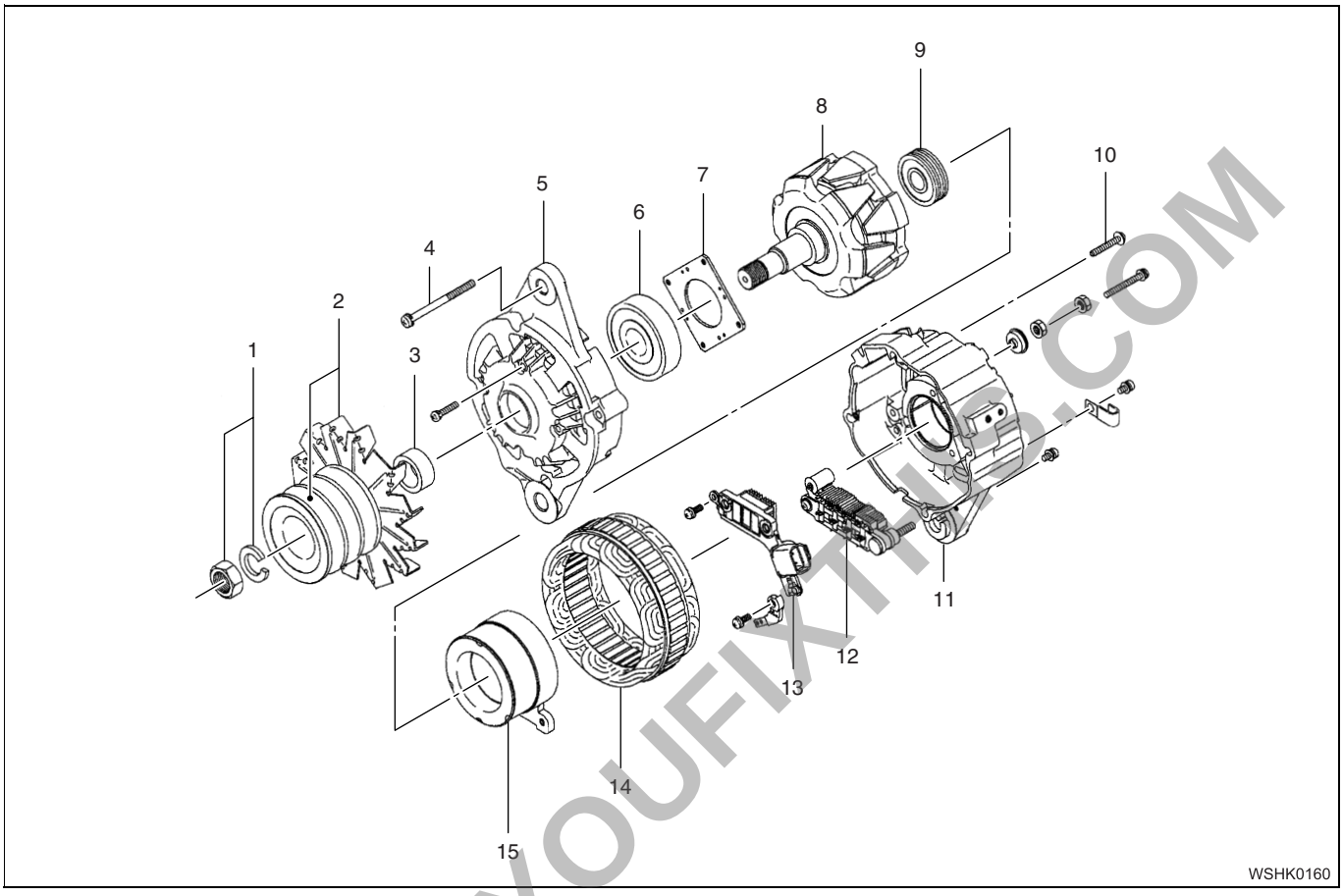
- Check that the round alignment mark (white paint) is positioned as shown in the illustration when viewed from the plug hole. If necessary, reposition the gear.
- Tighten the stud bolts and the nuts to the specified torque.

Tightening torque Nut: 50 N·m (37 lb ft)
Bolt: 76 N·m (56 lb ft)

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Disassembly and Inspection of Generator



Name

1. Nut Washer
2. Pulley, Fan
3. Collar
4. Through Bolt
5. Front Bracket
6. Ball Bearing
7. Retainer
8. Rotor Assembly
9. Ball Bearing
10. Screw
11. Cover
12. Rectifier Assembly
13. Regulator Assembly
14. Stator Assembly
15. Field Coil Assembly

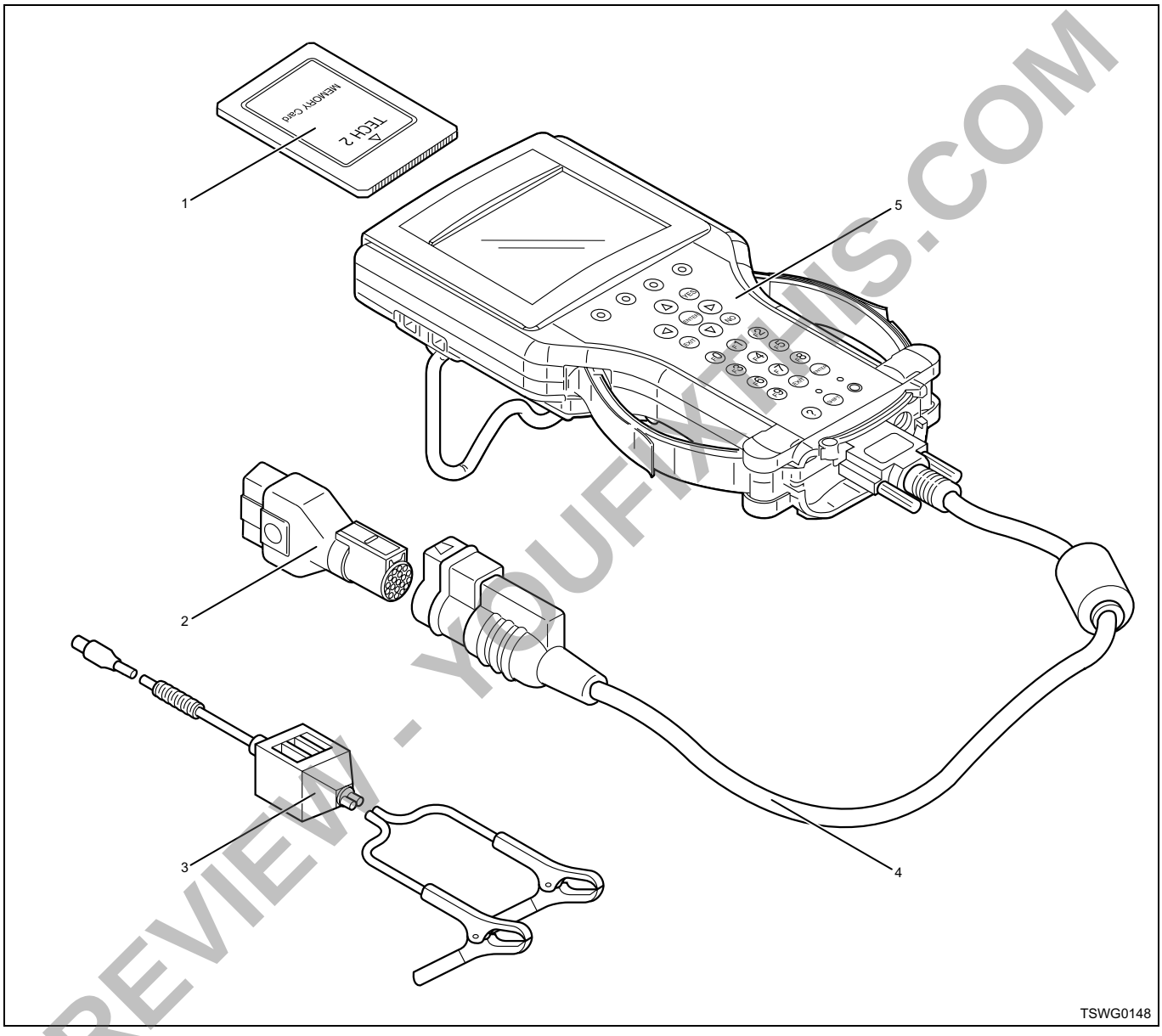
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How to use trouble diagnosis-related tool

How to use Tech2

Components of Tech2



Name
1. PCMCIA card
2. SAE 16/19 adapter
3. Power cable
4. DLC cable
5. Tech2

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10. Confirm that the lamp goes off and repeat check of the remaining cylinders as steps 8 and 9.
11. Replace the injector in the cylinder of which engine vibration level and exhaust noise did not change.

Note:
For work procedure, refer to "Engine section" in the service manual.

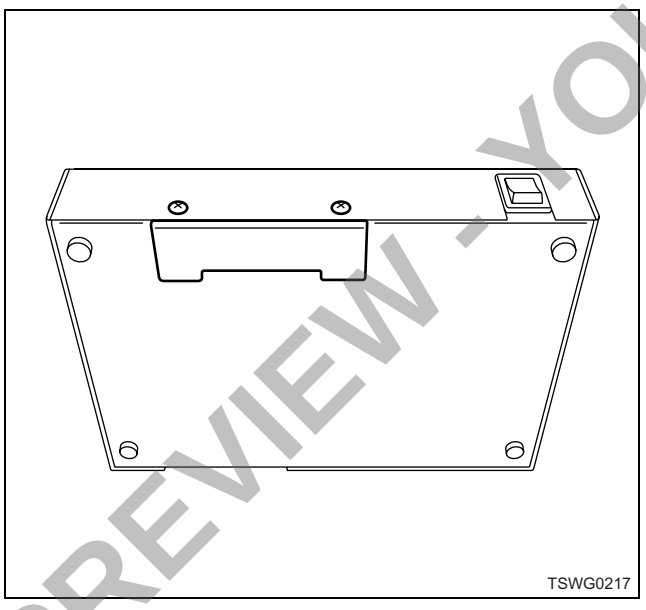
12. Remove the test harness and restore the injector harness.

Note:
DTC will be detected if disconnecting or connecting the harness with the key switch to ON. Turn it to OFF during work.

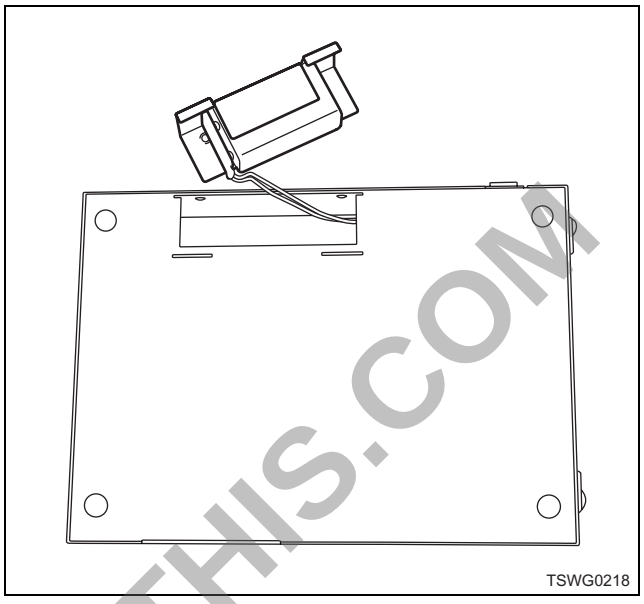
13. Start the engine and return the idle speed at specified one.
14. Clear the DTC.
15. Perform a test drive, and check that there are no faults.

Battery Replacement

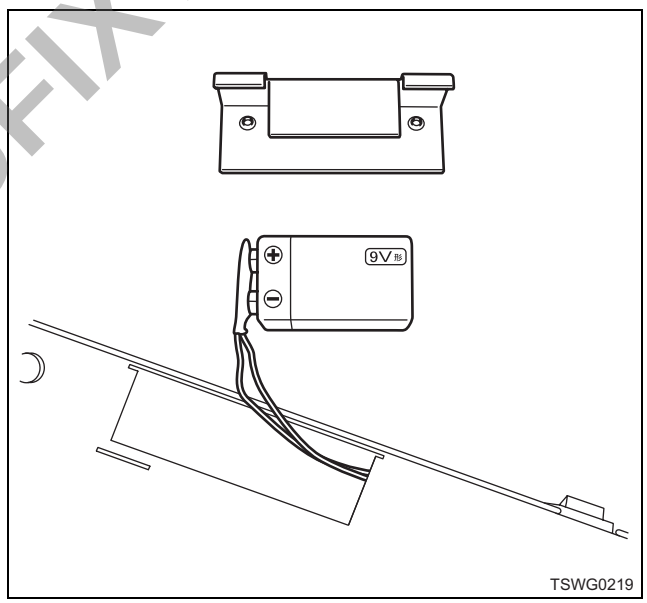
1. Remove the two screws on the side of the body.



2. Pull out the battery holder.



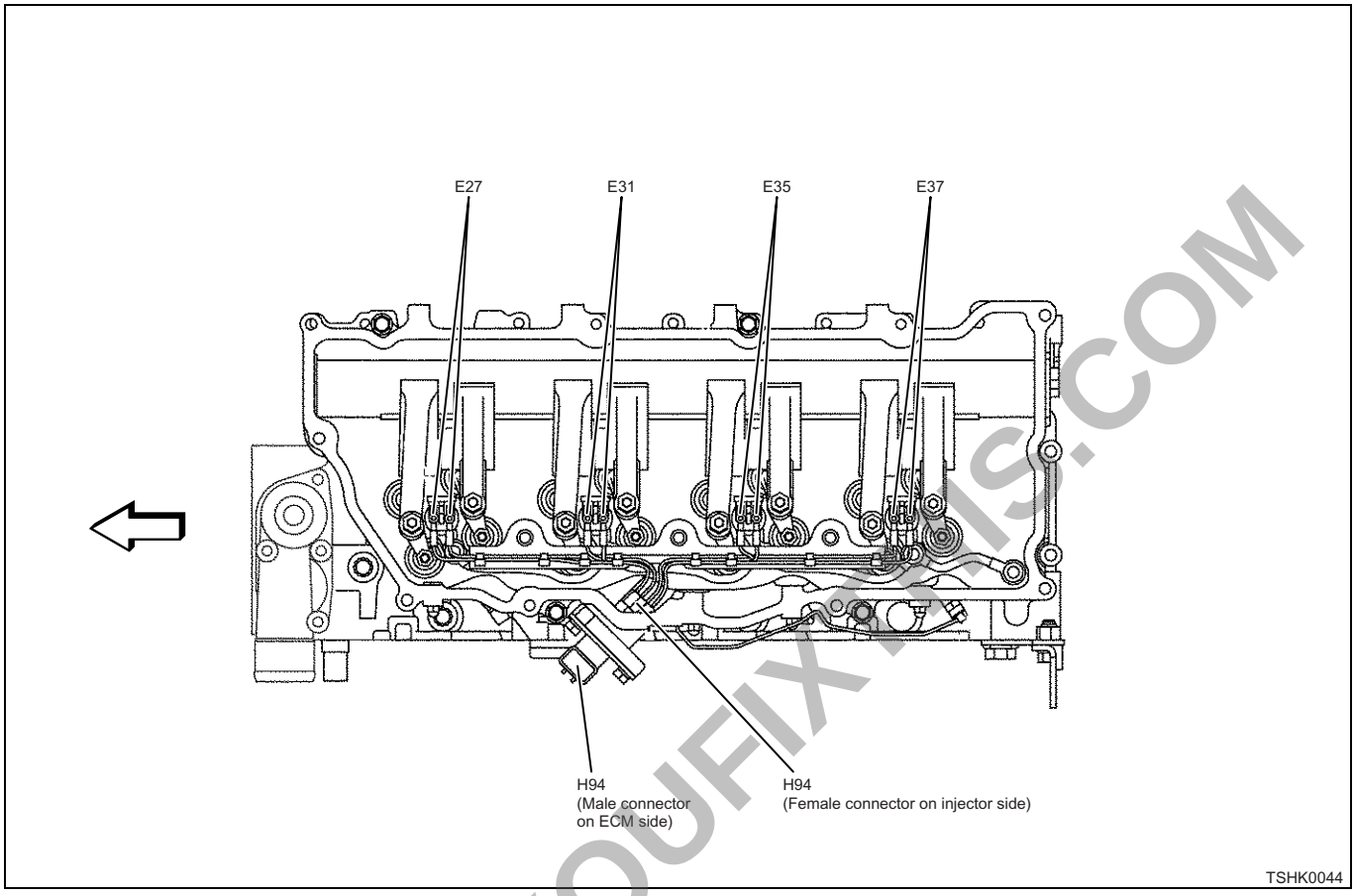
3. Remove the battery from the holder.



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Cylinder head



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DTC	Flash code	DTC description	Item to be detected	Preconditions when DTC is set	DTC set condition	Fault judgment period	Behavior when trouble occurs	Diagnos is lamp	Recovery from failure
P0090	247	SCV drive system open circuit, +B short or ground short	Open/short circuit of SCV/ harness	• Main relay power supply voltage is 18V or more. • DTC P1630 is not detected. • SCV drive duty is between 10 — 90%.	When SCV drive current exceeds specified value for 2 seconds or more, or when difference between target and actual current exceeds specified value for 2 seconds or more.	Approx. 2 sec.	Engine stall and/or engine blow up are possible depending on the condition of open/short circuit. Black smoke emitted, excessive output Back-up: Limited injection amount 3 (multi-injection stopped) Target RP upper limit (80MPa)	ON	*2
P0107	71	Barometric pressure sensor fault (low voltage fault)	Open/short circuit/ deterioration of sensor or harness	• Key switch input voltage is 18V or more. • DTC P1630 or P1632 is not detected.	Barometric pressure sensor voltage is lower than 0.5 V.	Approx. 5 sec.	Due to back-up equivalent to 2500m • Black smoke emitted at high altitude • Output shortage at low altitude Back-up: Barometric pressure default setting (80 kPa) EGR stopped	ON	*2
P0108		Barometric pressure sensor fault (high voltage fault)	Short circuit in sensor or harness	• Key switch input voltage is 18V or more. • DTC P1630 or P1632 is not detected.	Barometric pressure sensor voltage is more than 3.8 V.	Approx. 5 sec.	Due to back-up equivalent to 2500m • Black smoke emitted at high altitude • Output shortage at low altitude Back-up: Barometric pressure default setting (80 kPa) EGR stopped	ON	*2
P0112	22	Intake air temperature sensor fault (low voltage fault)	Short circuit in sensor or harness	• Key switch input voltage is 18V or more. • DTC P1630 or P1632 is not detected.	Intake air temperature sensor voltage is less than 0.1 V.	Approx. 4 sec.	Not in particular Back-up: Specified back-up value (depending on the machine manufacturer)	ON	*2
P0113		Intake air temperature sensor fault (high voltage fault)	Open/short circuit/ deterioration of sensor or harness	• Key switch input voltage is 18V or more. • DTC P1630 or P1632 is not detected. • 3 minutes or more has elapsed after starting engine.	Intake air temperature sensor voltage is more than 4.95 V when 3 minutes or more has elapsed after starting engine.	Approx. 4 sec.	Not in particular Back-up: Intake air temperature default setting (at starting: −10°C, at running: 25°C) EGR stopped	ON	*2

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Step	Action	Value	YES	NO
5	1. Turn the key switch to “OFF”. 2. Disconnect the IAT sensor connector. 3. Short the IAT sensor connector signal terminal to the ground terminal using jump cable. 4. Turn the key switch to “ON”. 5. Check the value for “Intake air temperature sensor” using scan tool. Is the “Intake air temperature sensor” less than the specified value?	0V/−40°C	Go to Step 9.	Go to Step 6.
6	1. Check the signal circuit between ECM and IAT sensor for short circuit to the power supply circuit or ignition power supply circuit using breaker box or DMM. Refer to “Breaker box inspection procedure”. **Important:** If the IAT sensor circuit is shorted to the power supply circuit, the sensor may be broken. 2. If the trouble is detected, repair as required. Is the trouble detected?	—	Go to Step 13.	Go to Step 7.
7	1. Check for followings in the signal circuit between ECM and IAT sensor using breaker box or DMM. Refer to “Breaker box inspection procedure”. • Open circuit • High resistance 2. If the trouble is detected, repair or replace as required. Is the trouble detected?	—	Go to Step 13.	Go to Step 8.
8	1. Check for followings in the ground circuit between ECM and IAT sensor using breaker box or DMM. Refer to “Breaker box inspection procedure”. • Open circuit • High resistance 2. If the trouble is detected, repair or replace as required. Is the trouble detected?	—	Go to Step 13.	Go to Step 10.
9	Replace the IAT sensor. Is the procedure completed?	—	Go to Step 13.	—
10	Is EMPS available?	—	Go to Step 11.	Go to Step 12.

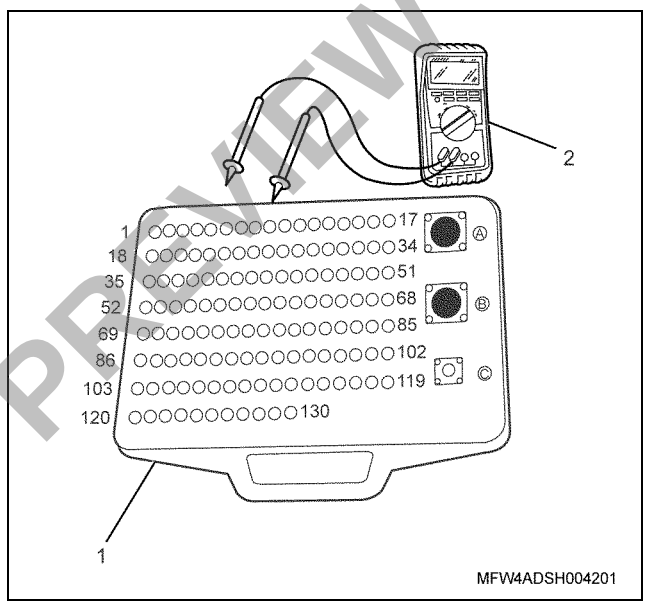
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Step	Action	Value	YES	NO
12	Replace the ECM. **Note:** **EGR valve position learning is required after replacing or rewriting the ECM.** **Refer to "Engine Control System, Engine control module (ECM), Installation of ECM" in this section for learning of EGR.** Is the procedure completed?	—	Go to Step 13.	—
13	Check the DTC again. 1. Connect all the harnesses. 2. Clear the DTC. Refer to "How to clear diagnosis trouble code (DTC)" of "Procedure of trouble diagnosis" in this section for how to clear DTCs. 3. Turn the key switch to "OFF" for more than 10 seconds. 4. Test run with the "Preconditions when DTC is set". 5. Check the DTC. Is DTC P0202 detected?	—	Go to Step 2.	Go to Step 14.
14	Check if other DTC is detected. Is other DTC detected?	—	Go to each DTC diagnosis.	Verify repair.

Breaker box inspection procedure

Perform the inspection in the following procedure if there is such an instruction to use breaker box in the step. After inspection, return to the diagnostic step.



Name
1. Breaker box
2. DMM

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Step	Action	Value	YES	NO
13	1. Check the version of ECM software. 2. Rewrite the software if version upgraded is necessary. Refer to “How to use flush tool” in this section for check and rewriting of ECM. **Note:** **EGR valve position learning is required after replacing or rewriting the ECM.** **Refer to “Engine Control System, Engine control module (ECM), Installation of ECM” in this section for learning of EGR.** Is the procedure completed?	—	Go to Step 15.	Go to Step 14.
14	Replace the ECM. **Note:** **EGR valve position learning is required after replacing or rewriting the ECM.** **Refer to “Engine Control System, Engine control module (ECM), Installation of ECM” in this section for learning of EGR.** Is the procedure completed?	—	Go to Step 15.	—
15	Check the DTC again. 1. Connect all the harnesses. 2. Clear the DTC. Refer to “How to clear diagnosis trouble code (DTC)” of “Procedure of trouble diagnosis” in this section for how to clear DTCs. 3. Turn the key switch to “OFF” for more than 10 seconds. 4. Test run with the “Preconditions when DTC is set”. 5. Check the DTC. Is DTC P0340 detected?	—	Go to Step 2.	Go to Step 16.
16	Check if other DTC is detected. Is other DTC detected?	—	Go to each DTC diagnosis.	Verify repair.

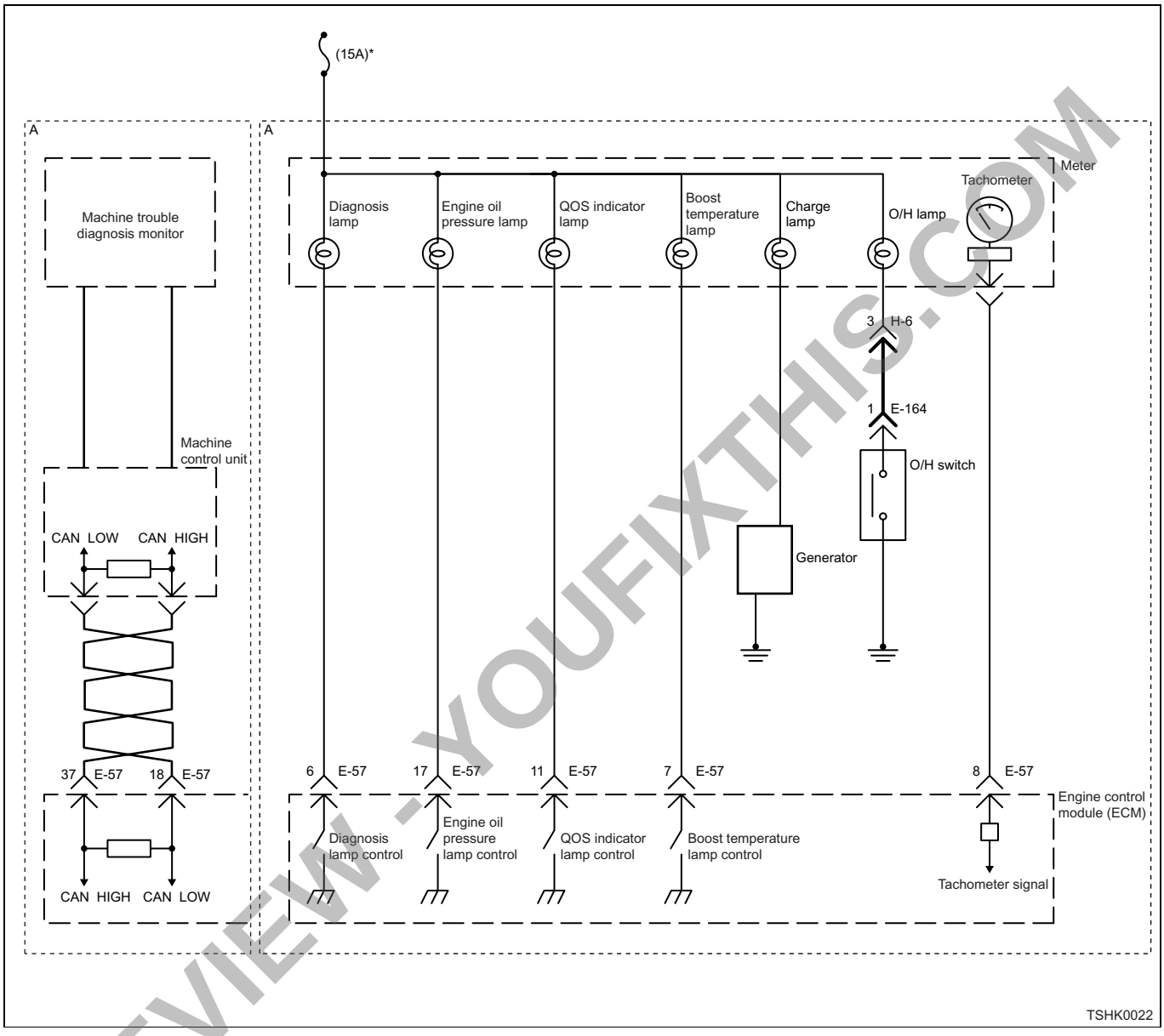
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DTC: P0650 (Flash code 77)

Check engine lamp circuit fault

(*: Specifications (fuse current value etc.) vary depending on each machine. Refer to the machine manual.)



Description of circuit

The power supply voltage is supplied to the diagnosis lamp via key switch, and the signal from ECM will turn the lamp on. The ECM turns the diagnosis lamp on during lamp check with the key switch “ON” and when DTC is detected. Also when the diagnosis connector is connected, it blinks the diagnosis lamp according to the DTC detected. A monitor circuit is provided inside the ECM to monitor the lamp operation.
The ECM sets the DTC when the output to the diagnosis lamp does not match with the check engine lamp operation.

Main trouble symptom

Operationality is not affected.

Preconditions when DTC is set

- Key switch input voltage is 18V or more.
- DTC P0650 is not detected.

DTC set condition

- No diagnosis lamp monitor signal exists for 1.5 seconds or more.

Back-up mode

- Back-up: No back-up action

Recovery from failure

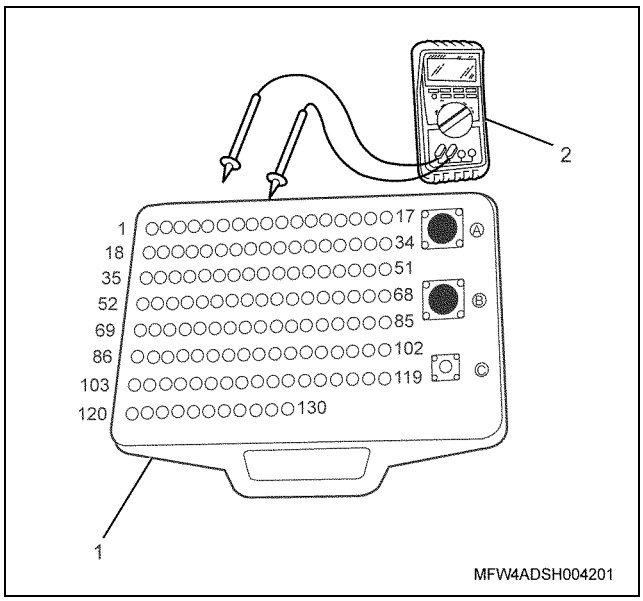
Refer to “List of diagnostic trouble code” and “About recovery from failure” in this section for recovery from failure.

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Breaker box inspection procedure

Perform the inspection in the following procedure if there is such an instruction to use breaker box in the step. After inspection, return to the diagnostic step.



Name
1. Breaker box
2. DMM

Step	Item to be checked	Inspection method	Measuring condition	Terminal No.	Normal value	Abnormal value
5	Open circuit/ high resistance	Resistance measurement	• Remove the ECM-side harness connector from the coupling connector. • Key switch “OFF”	121 - Female-side terminal (4H: No. 1, 6H: No. 3)	100Ω or less	10MΩ or more
	Short circuit to ground	Resistance measurement	• Remove the ECM-side harness connector from the coupling connector. • Key switch “OFF”	121 - Ground	10MΩ or more	100Ω or less
9	Short circuit to ground	Resistance measurement	• Remove the ECM-side harness connector from the coupling connector. • Key switch “OFF”	119 - Ground	10MΩ or more	100Ω or less

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The conditions to clear the MIL/DTC

- The current trouble turns to past trouble (history) when the condition is out of the range from DTC set condition (recovery from failure).
- The diagnosis lamp will go off after the code turns to history code and the key switch is turned “OFF” then “ON” again.
- Using the scan tool, or memory clear switch and diagnostic switch operation enables to clear DTCs.

Test description

Numbers below indicate step numbers in the chart.
2. Measure at the harness connector-side.
3. Measure at the harness connector-side.

Step	Action	Value	YES	NO
1	Perform the OBD system check. Is the procedure completed?	—	Go to Step 2.	Go to “OBD system check”.
2	1. Turn the key switch to “OFF”. 2. Disconnect the barometric pressure sensor connector. 3. Connect the DMM between the barometric pressure sensor power supply terminal and the ground. 4. Turn the key switch to “ON”. Is the DMM indication more than the specified value?	5.5V	Go to Step 4.	Go to Step 3.
3	1. Turn the key switch to “OFF”. 2. Disconnect the barometric pressure sensor connector. 3. Connect the DMM between the barometric pressure sensor power supply terminal and the ground. 4. Turn the key switch to “ON”. Is the DMM indication less than the specified value?	4.5V	Go to Step 5.	Go to “Diagnostic aid”.
4	1. Check the power supply circuit between barometric pressure sensor and ECM for short circuit to the battery power supply circuit or ignition power supply circuit using breaker box or DMM. Refer to “Breaker box inspection procedure”. 2. If the trouble is detected, repair as required. Is the trouble detected?	—	Go to Step 9.	Go to Step 6.
5	1. Check the power supply circuit between barometric pressure sensor and ECM for ground short circuit using breaker box or DMM. Refer to “Breaker box inspection procedure”. 2. If the trouble is detected, repair as required. Is the trouble detected?	—	Go to Step 9.	Go to Step 6.
6	Is EMPS available?	—	Go to Step 7.	Go to Step 8.

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