

Introduction

This Troubleshooting Manual explains troubleshooting of the engine electronic control fuel injection system (common rail type) and main unit of the hydraulic excavator equipped with 6WG1 type engine. (SH700-5, HS800-5)

Extensive use of this manual is useful for performing accurate and quick maintenance procedures.

Sumitomo (S.H.I) Construction Machinery Manufacturing Co.,Ltd
Customer Support Dept.

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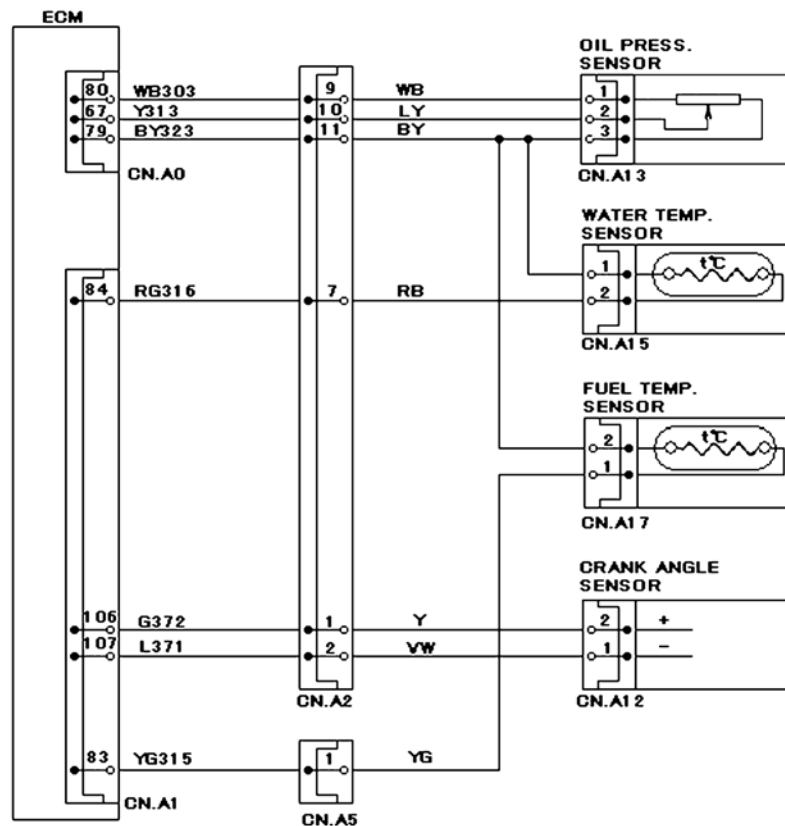
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6 → Block diagram



TSHK0030

7 → Recovery from failure

3 - 10 min. required for trouble judgment

8 → Preconditions when DTC is set

- Key switch input voltage is 18 V or higher.
- DTC: 1630, 1633 are not detected.

9 → Diagnostic aid

- If the engine coolant temperature increases after the engine is started, the thermistor will begin to open (85°C) and the engine coolant temperature will stabilize.
- In order to check the performance of the ECT sensor, use the engine coolant temperature-resistance graph to perform inspection at various temperatures. When there is a sensor abnormality, this may have an effect on operation performance.

If an intermittent problem is suspected, the cause may be one of the following.

- Harness connector connection problem
- Harness routing problem
- Breakage in harness covering due to friction
- Wire disconnection within harness covering

RTSSA-0004E

6	Circuit explanation System circuit diagram related to trouble
7	Recovery from failure Record of recovery to normal operation after trouble was eliminated.
8	Preconditions when diagnostic trouble code is set Conditions for judging presence of trouble with preconditions met.
9	Diagnostic aid All of the causes of expected trouble are listed, and important ideas for diagnosis are gathered. Make sure to read this before trouble diagnosis.

Terminology explanation

Diagnostic trouble code

Each time that the key switch is turned ON, the ECM and computer A performs a self-test for most all of the wiring and component parts. If a system problem is detected, this is saved in the memory of the ECM and computer A and back-up control is performed depending on the diagnostic trouble code. Also, abnormalities that affect the shovel main unit will cause a message to be displayed to inform the operator.

Ignition cycle

The ignition cycle refers to the machine operation cycle of turning the key ON, running the machine, and turning the key OFF used to satisfy the prescribed main unit diagnosis criteria.

Data link connector (DLC)

The equipment for communicating with the control unit is a data link connector (DLC). Also, the DLC is provided in order to connect with scan tools. The general uses of scan tools are shown below.

- Identification of saved diagnostic trouble codes
- Reading of serial data

Note:

See the main unit manual as the DLC installation location and whether or not there is a DLC will vary according to the shovel main unit.

ECM OFF

If the key switch is turned OFF, power to the ECM will be completely turned OFF and the ECM will go into the ECM OFF state after about 10 sec. or more.

Comprehensive diagnosis operations of component parts monitoring

To make the engine operate normally, comprehensive diagnosis of component parts is necessary.

Input component parts:

Confirm the input component parts in order to inspect for circuit disconnections and values outside of the prescribed range.

The following are sensors for input component parts, but sensors are not limited to just these.

- Crankshaft position (CKP) sensor
- G sensor
- Coolant temperature sensor
- Boost pressure sensor
- Common rail pressure sensor

Output component parts:

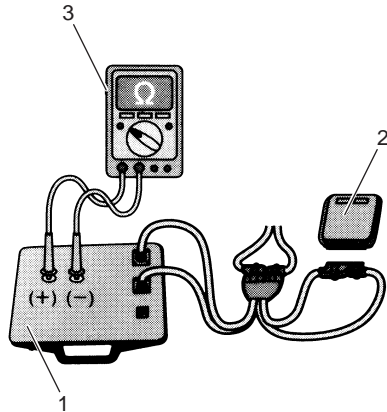
Output component parts diagnose whether responses to control unit commands are appropriate or not. Confirm whether there are any circuit disconnections and whether any values are outside the prescribed ranges.

The following are circuits in output components parts that are checked, but circuits are not limited to just these.

- PCV
- Lamp, relay control
- EGR valve

2. Resistance inspection and measurement

- Crankshaft position sensor
- G sensor
- PCV, etc.



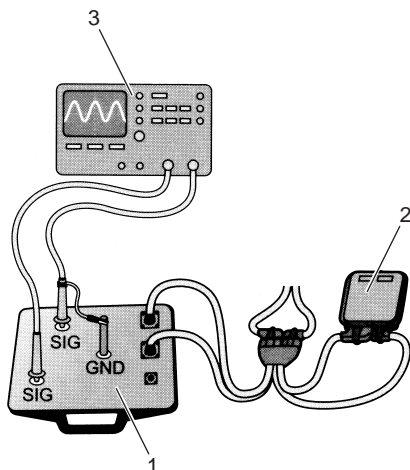
TSWG0053

Name

1. Breaker box
2. ECM
3. Digital multi-meter

3. Inspection and measurement with oscilloscope

- Crankshaft position (CKP) sensor signal
- G sensor signal, etc.



TSWG0054

Name

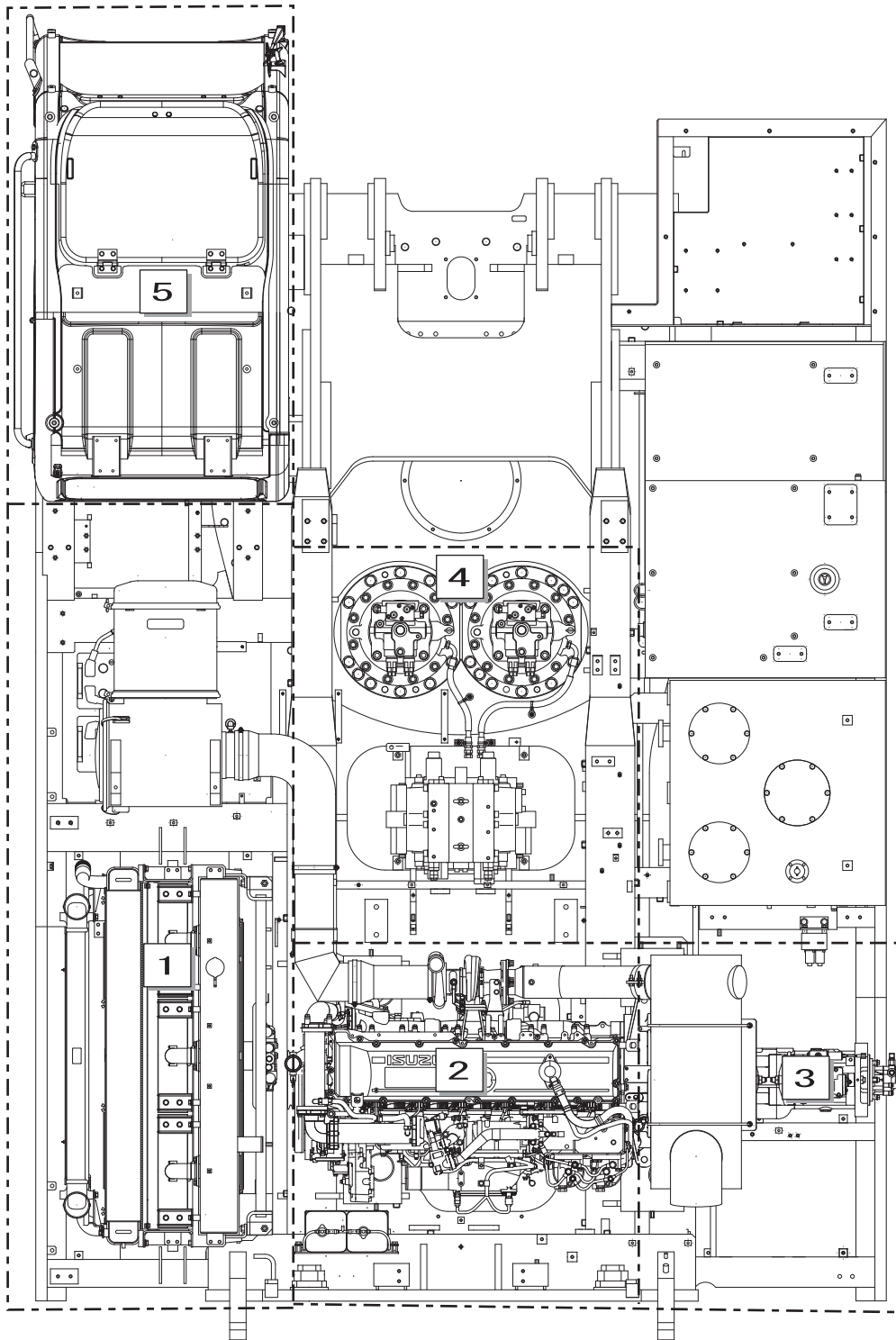
1. Breaker box
2. ECM
3. Oscilloscope

Caution:

The ECM and sensors can be damaged if measurement cable interference or a measurement terminal mistake occurs on the breaker box during inspection and measurement. Use sufficient caution when performing work.

Trubleshoot

Overall view

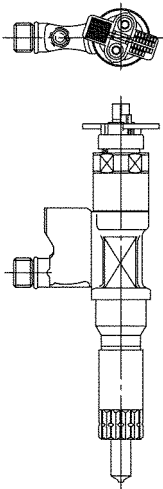


WE01010-087

1	Main unit left side (radiator compartment)
2	Engine
3	Main unit right side (pump compartment)
4	Main unit center section
5	In cab

Trubleshoot

Injector



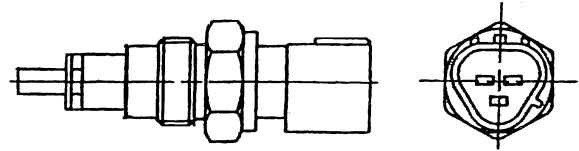
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The injectors are installed on the cylinder head sections. They are controlled by the engine control unit (ECM) and perform fuel injection. The ECM, by internally boosting the injector drive voltage and applying it to the injector and by controlling the electrified time of the injector, controls the fuel injection quantity and injection timing.

Note:

See the "Engine" section in the Service Manual for the work procedures.

Coolant temperature sensor

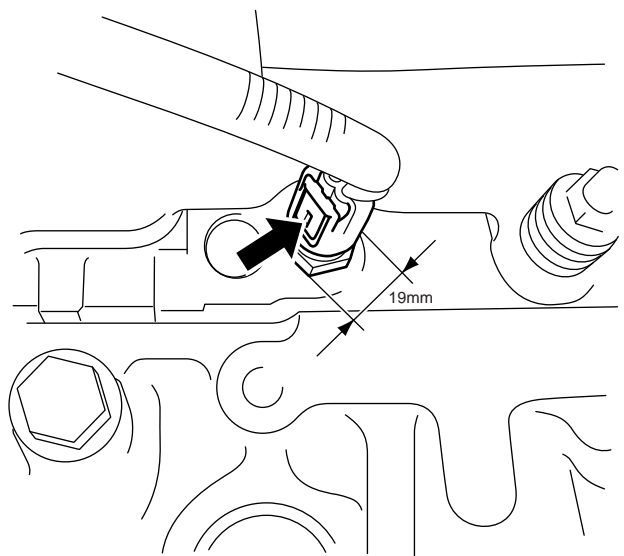


TSWG0017

The coolant temperature sensor is installed on the engine block, and the thermistor changes the resistance in accordance with the temperature. Resistance is low when the engine coolant temperature is high and high when engine coolant temperature is low. The engine control module (ECM) applies 5 V to the coolant temperature sensor through pull-up resistance, calculates the engine coolant temperature from the voltage change, and this is used in various types of control such as fuel injection control. Voltage is low if the resistance is small (high temperature) and high if the resistance is large (low temperature).

Removal

- Remove the connector, then remove the sensor with a 19 mm wrench.



TSWG0186

Installation

- Apply Loctite 572 to install.
Tightening torque: 19.6 - 29.4 N•m

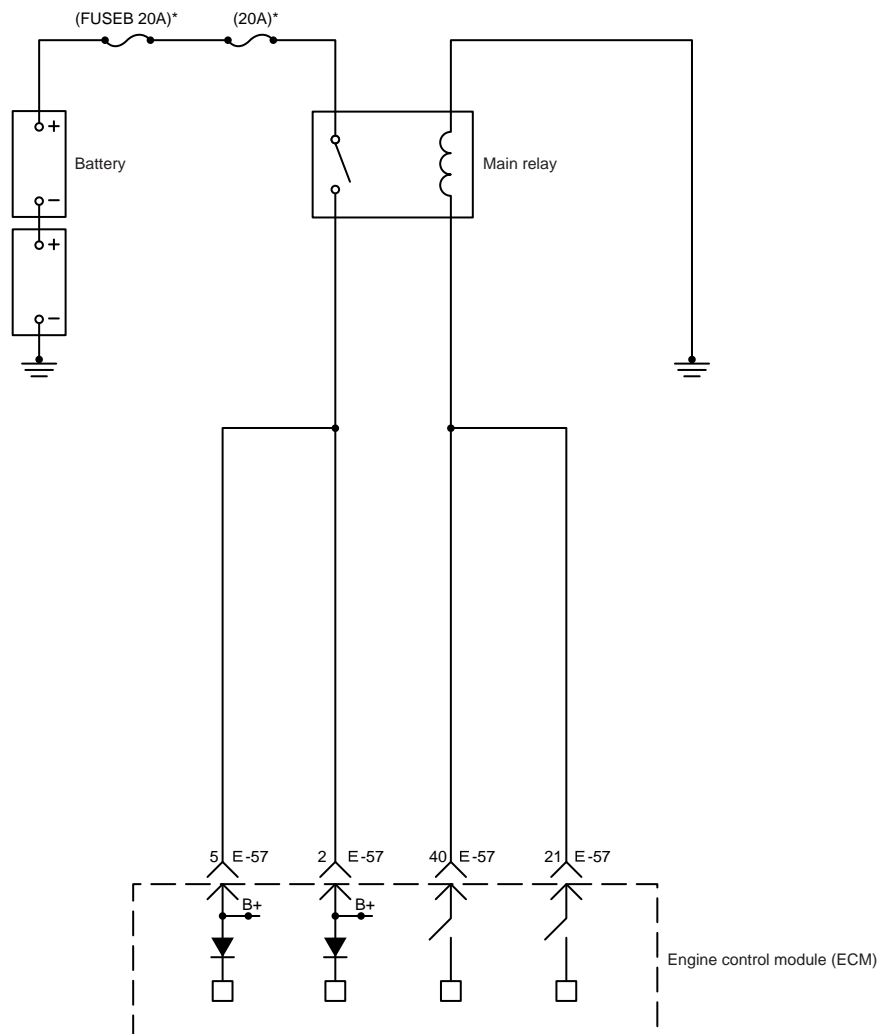
Troubleshoot

Circuit Diagram

(For how to read the wiring diagram, see "Wiring diagrams".)

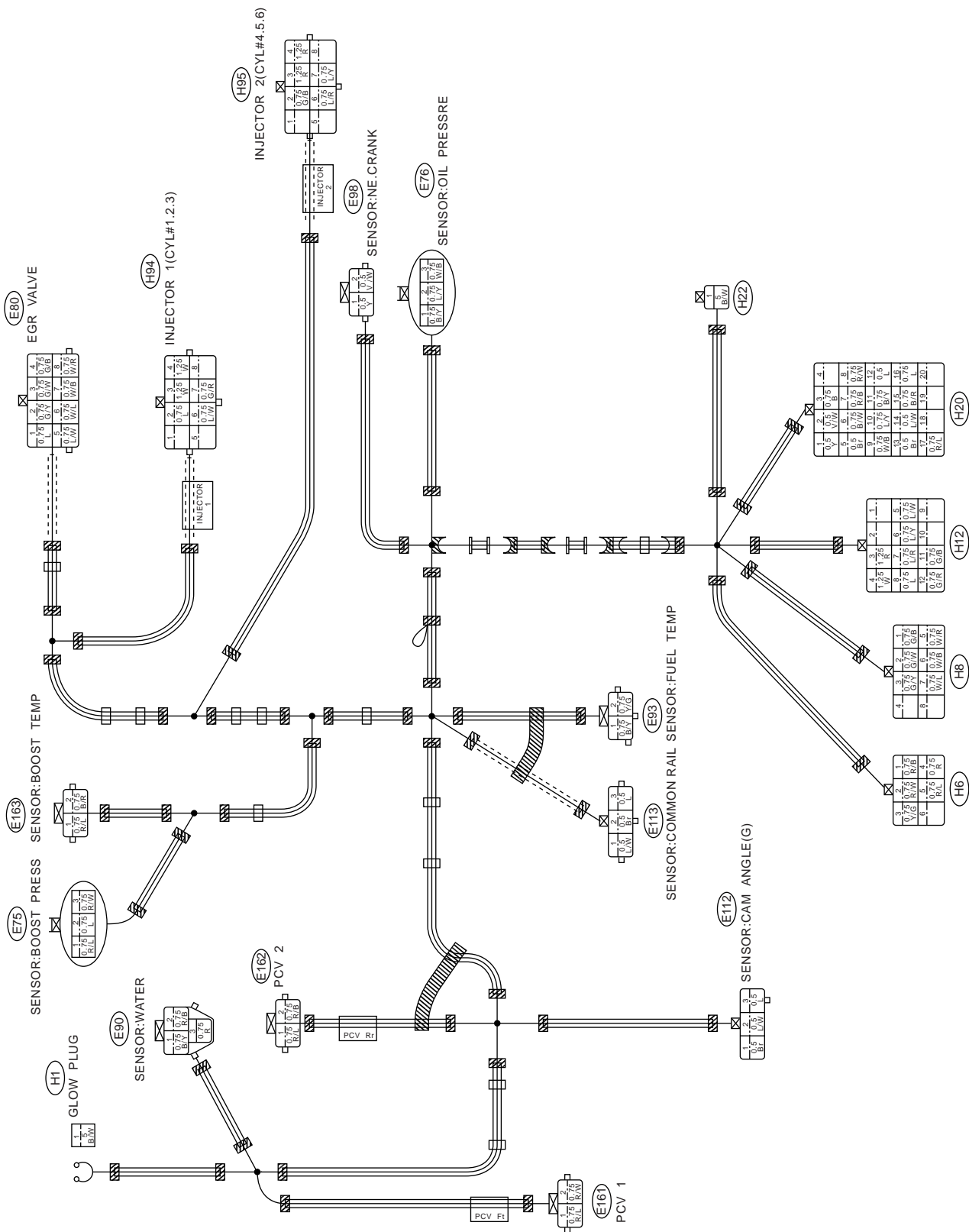
Main relay circuit

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



Troubleshoot

82641-358



Trubleshoot

Test explanation

The numbers below correspond to the diagnosis chart step numbers.

4. If these DTCs are detected, engine may not start.

Step	Action	Value	Yes	No
1	1. Turn the emergency stop switch "OFF". 2. Turn the key switch "ON". 3. Confirm the diagnostic trouble code. Have the diagnostic trouble codes 0340, 0341, 1345 or 1625 been detected?	-	Go to diagnosis for the detected diagnostic trouble code.	Go to step 2.
2	1. Use the breaker box or circuit tester to inspect whether any of the conditions below are present in the circuit between the key switch and ECM. See "Function Inspection List", "Checking the Start System", and "Breaker Box Inspection Procedure". <ul style="list-style-type: none"> • Disconnection • High resistance 2. Repair as necessary if a problem is detected. Was a problem detected?	-	Go to step 9.	Go to step 3.
3	1. Turn the key switch "OFF". 2. Remove the starter cut relay. 3. Check the conduction between the starter cut relay switch side terminals. Was a problem detected?	-	Go to step 4.	Go to step 5.
4	Replace the starter cut relay. Is the action complete?	-	Go to step 9.	-
5	1. Turn the key switch to "OFF". 2. Remove the starter relay. 3. Connect the battery to the starter relay coil-side terminal. 4. Check for continuity between the starter relay switch-side terminals. Is the trouble detected?	-	Go to step 6.	Go to step 7.
6	Replace the starter relay. Is the procedure completed?	-	Go to step 10.	-
7	Turn the key switch to the "START" position. Did the starter operate?	-	Go to diagnostic aid.	Go to step 8.
8	1. Inspect whether there is a disconnection or high resistance in the circuits listed below. <ul style="list-style-type: none"> • Between the key switch and starter cut relay • Between the starter cut relay and safety relay • Between the starter cut relay and ground • Between the starter cut relay and fuse 2. Repair as necessary if a problem is detected. Was a problem detected?	-	Go to step 11.	Go to step 9.
9	1. See the "Electrical System" section in "Engine" of the Service Manual and perform inspection. 2. Repair as necessary if a problem is detected. Was a problem detected?	-	Go to step 13.	Go to step 10.
10	Is there an EMPS?	-	Go to step 11.	Go to step 13.

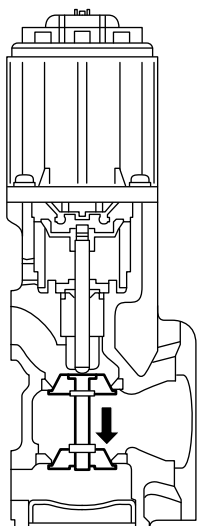
Trubleshoot

Circuit explanation

The ECM controls the EGR valve based on the engine speed, engine coolant temperature, intake air temperature, fuel injection quantity, and atmospheric pressure. The EGR valve is driven by the EGR motor, and the degree of opening of the EGR valve is detected by the EGR sensor.

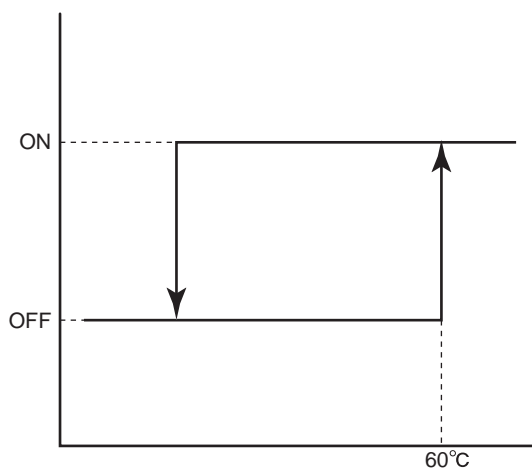
Step	Action	Value	Yes	No
1	1. Turn the key switch "ON". 2. Confirm the diagnostic trouble code. Has a diagnostic trouble code been detected?	-	Go to diagnosis for the detected diagnostic trouble code.	Go to step 2.
2	1. Remove the EGR valve. 2. Check the EGR valve for sticking, clogging, or the like. 3. Repair as necessary if a problem is detected. Was a problem detected?	-	Go to step 3.	System normal
3	Replace the EGR valve. When EGR valve or ECM replacement has been implemented, it is necessary to perform EGR valve position learning according to the procedure below. If this procedure is not implemented, EGR diagnostic trouble codes may be detected. 1. Turn the key switch "ON". 2. Turn the key switch "OFF". 3. Wait about 10 sec. Is the action complete?	-	Go to step 4.	-
4	1. Check for damage or gas leaks in the EGR pipe. 2. Repair as necessary if a problem is detected. Is the action complete?	-	Go to step 5.	-
5	1. Turn the key switch "ON". 2. Confirm the diagnostic trouble code. Has a diagnostic trouble code been detected?	-	Go to diagnosis for the detected diagnostic trouble code.	-

EGR valve inspection



TSWG0150

EGR hysteresis



TSWG0206

Hold the EGR valve with a finger and check that opening and closing are smooth. Also, check that the valve is completely closed when the finger is released.

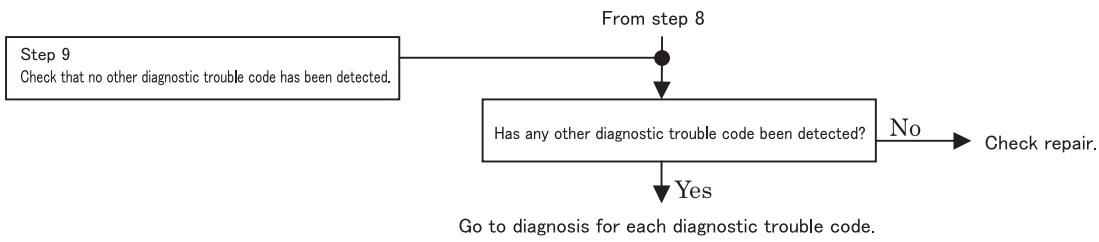
Troubleshoot

Screen Display Details

Message display list

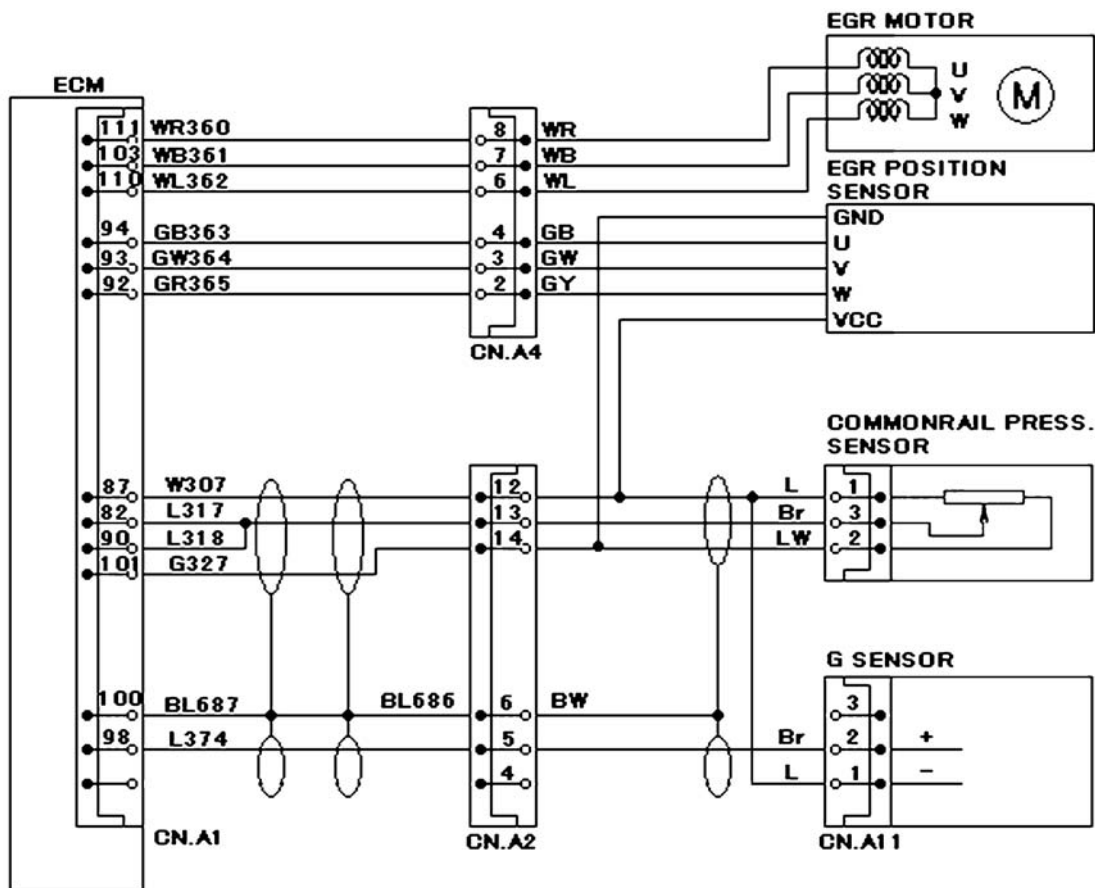
Display	Message type	Display ON timing	Display OFF timing
LOW OIL PRESS.	Warning	When "Engine oil pressure abnormally low" trouble occurs	None Does not go off during the key ON cycle
CHECK ENGINE	Warning	When "ECM mismatch" trouble occurs Also, when a DTC is sent from the ECM	None Does not go off during the key ON cycle
ELEC. PROBLEM (*1)	Warning	When any of the trouble below occurs "Sensor; Pressure (P1)", "Sensor; Pressure (P2)", "Sensor; Pressure (N1)", "Sensor; Pressure (N2)", "Sensor; Pressure (Overload)", "Sensor; Pressure (Bottom)", "Sensor; Pressure (Rod)", "Sensor; Pressure (Upper)", "Sensor; Pressure (Swing)", "Sensor; Pressure (Travel)" "Sensor; Fuel level", "Sensor; Oil temperature", "Sensor; Angle (Boom)", "Sensor; Angle (Arm)", "Sensor; Angle (Offset)", "Pressure switch; Return filter clog" "Solenoid; Swing brake", "Solenoid; Travel high-speed", "Solenoid; Power save" "Relay; Feed pump automatic stop", "Solenoid; Option return circuit", "Solenoid; Free swing" "Solenoid; Fan reverse", "Air conditioner signal output", "Buzzer; Liftcrane" "Beacon and solenoid; Bucket lock", "Solenoid; Lever lock" "Proportional valve; Pump horsepower", "Proportional valve; Pump flow" "Proportional valve; Fan", "Proportional valve; Boom", "Proportional valve; Offset", "Proportional valve; Arm", "Communication monitor", "Communication ECM", "Communication computer B", "Communication computer S", "CAN bus"	None Does not go off during the key ON cycle
OVER HEAT	Warning	When any of the trouble below occurs "Abnormally high coolant temperature 1", "Abnormally high oil temperature"	When all the troubles below are recovered from "Abnormally high coolant temperature 1" "Abnormally high oil temperature"
LOW COOLANT	Warning	When "Coolant level low" trouble occurs	None Does not go off during the key ON cycle
ALTERNATOR	Warning	When "Abnormally low alternator voltage" trouble occurs	None Does not go off during the key ON cycle
CHECK HYD. OIL FILTER	Warning	When "Return filter clogged" trouble occurs	None Does not go off during the key ON cycle
AIR FILTER	Warning	When "Air cleaner clogged" trouble occurs	None Does not go off during the key ON cycle
BOOST TEMP. HIGH	Warning	When the "Abnormally high boost temperature 1" trouble occurs	When the "Abnormally high boost temperature 1" trouble is recovered from
LOW FUEL	Warning	When "Fuel level low" trouble occurs	When "Fuel level low" trouble is recovered from
SWITCH TO 1-PUMP	Alert	When the breaker mode is ON and 2 pumps flow is ON	When the conditions on the left are no longer met
ENGINE STOP	Alert	When the engine emergency stop switch is ON	When the conditions on the left are no longer met
WATCH OUT FOR THE LOAD!	Alert	When a hanging load 90 % or more of the rated load is hung (liftcrane)	When the conditions on the left are no longer met
OVERLOAD!	Alert	When a hanging load 100 % or more of the rated load is hung (liftcrane)	When the conditions on the left are no longer met
HANGING GEAR INTERFERENCE!	Alert	When the hanging height exceeds the liftcrane's rated height (liftcrane)	When the conditions on the left are no longer met
WATCH OUT FOR CAB INTERFERENCE!	Alert	When the interference prevention function is ON and the attachment comes close to the cab	When the conditions on the left are no longer met
INTERFERENCE PREVENTION DEVICE OFF!	Alert	When the interference prevention function is switched OFF	When the conditions on the left are no longer met

Troubleshoot



E0088-2

Block diagram



TSHK0028

Preconditions when DTC is set

1st stage

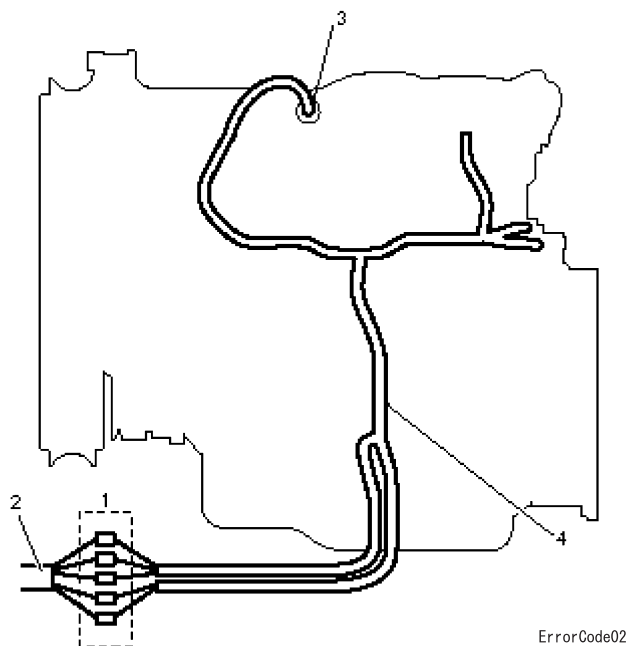
- Key switch input voltage is 16 V or higher.
- DTC: 0088, 0192, 0193, and 1635 are not detected.
- Actual common rail pressure is at least 2 MPa and engine speed is at least 70 min⁻¹.

2nd stage

- Battery voltage is normal.
- DTC: 0088, 0192, 0193, and 1635 are not detected.
- Actual common rail pressure is at least 2 MPa and engine speed is at least 70 min⁻¹.

Trubleshoot

Inspection procedures for sensors on actual machine



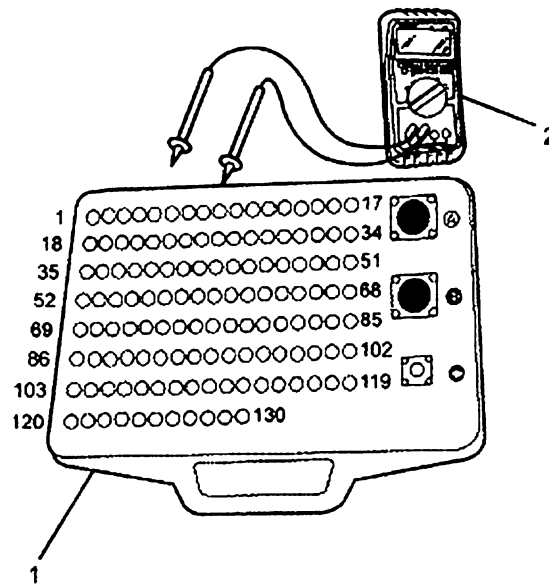
Name

1. Engine-actual machine intermediate connector
2. Actual machine harness
3. Sensor connector
4. Engine harness

1. Disconnect the intermediate connectors and perform sensor inspection from the engine harness connector.
2. Disconnect the connector from the sensor and short circuit the sensor connector wiring.
3. Inspect the harness disconnection from the intermediate connector.
 - If there is an abnormality in both procedures 1 and 2, repair the harness and repeat inspection from procedure 1.
 - If there is an abnormality in procedure 1 only, replace the sensor.

Breaker box inspection procedure

For steps in which breaker box usage is indicated, perform inspection with the following procedure.
Return to diagnosis step after inspection.



Name

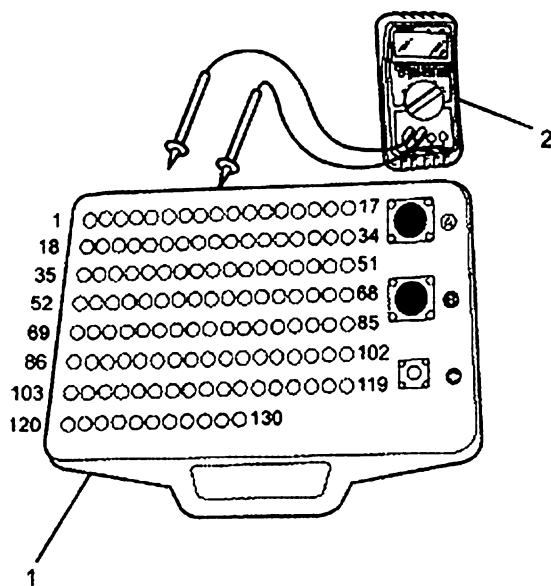
1. Breaker box
2. DMM

Step	Inspection item	Inspection method	Measurement condition	Measurement terminal No.	Normal value	Abnormal value
6, 16	Disconnection/ high resistance	Resistance measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "OFF" 	61-Sensor connector power supply terminal	100 Ω or lower	10 MΩ or higher
7,17	Short circuit with GND circuit/GND	Resistance measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "OFF" 	71-60 71-GND	10 MΩ or higher	100 Ω or lower
	Disconnection/ high resistance	Resistance measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "OFF" 	71-Sensor connector signal terminal	100 Ω or lower	10 MΩ or higher

Trubleshoot

Breaker box inspection procedure

For steps in which breaker box usage is indicated, perform inspection with the following procedure. Return to diagnosis step after inspection.



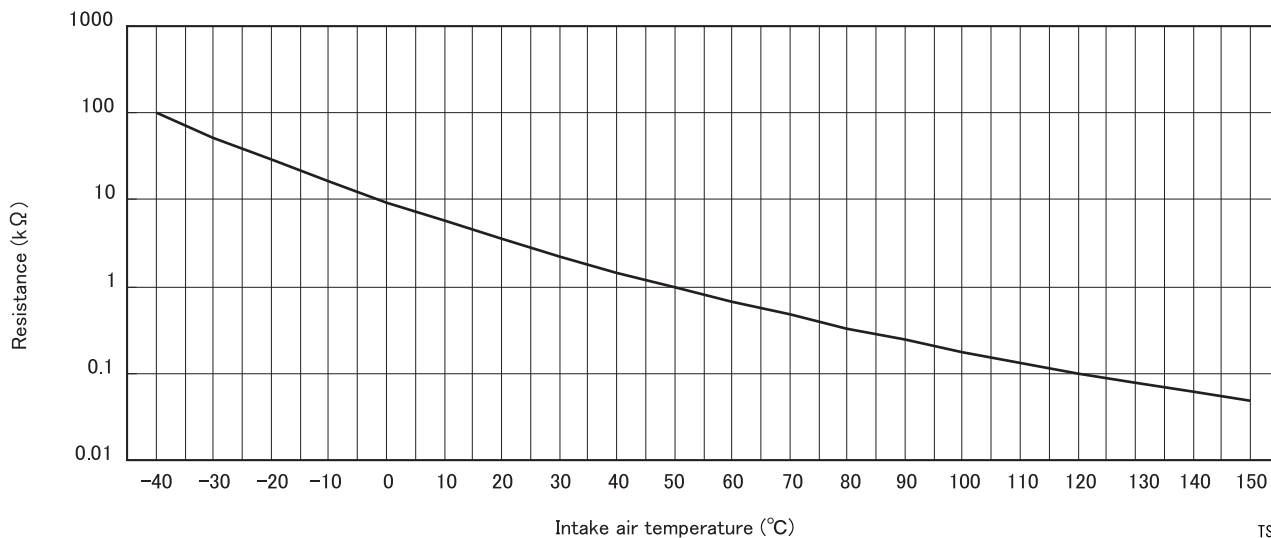
ErrorCode01

Name

1. Breaker box
2. DMM

Step	Inspection item	Inspection method	Measurement condition	Measurement terminal No.	Normal value	Abnormal value
6, 15	Short circuit with GND circuit/GND	Resistance measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "OFF" 	72-60 72-GND	10 M Ω or higher	100 Ω or lower

Intake air temperature - resistance graph

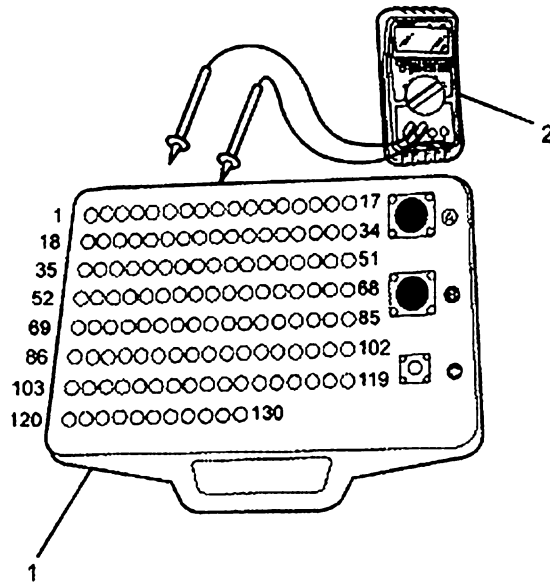


TSWG0060

Trubleshoot

Breaker box inspection procedure

For steps in which breaker box usage is indicated, perform inspection with the following procedure. Return to diagnosis step after inspection.



Name

1. Breaker box
2. DMM

Step	Inspection item	Inspection method	Measurement condition	Measurement terminal No.	Normal value	Abnormal value
6,15	Short circuit with GND circuit/GND	Resistance measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "OFF" 	84-79 84-GND	10 MΩ or higher	100 Ω or lower

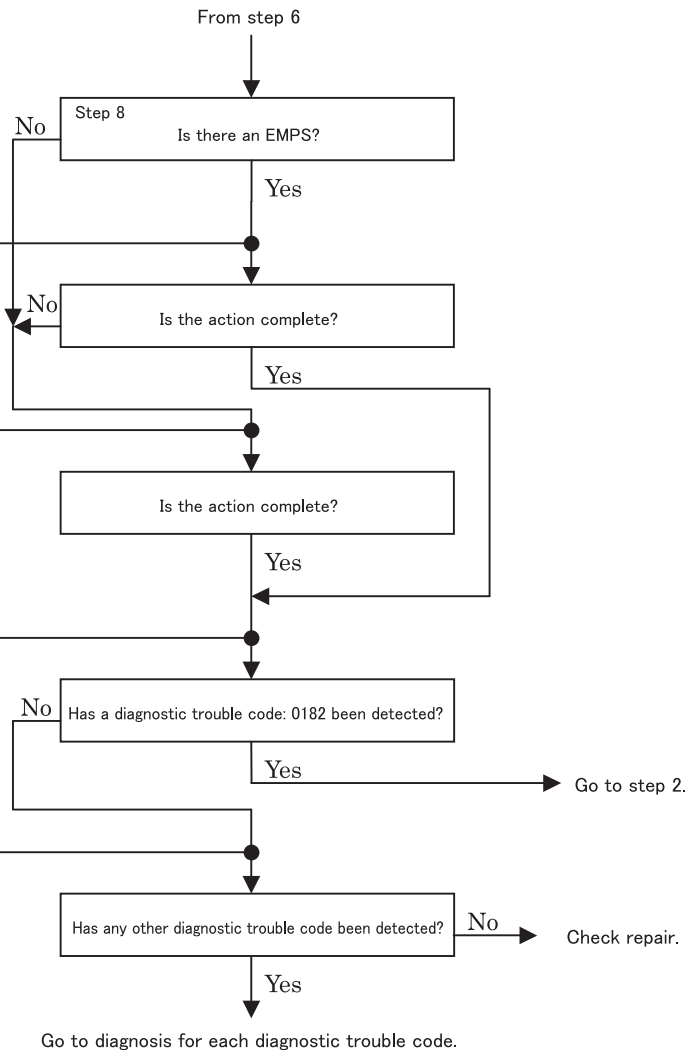
Troubleshoot

Step 9
 1. Check the ECM software version.
 2. Perform rewriting if updating the ECM software version is necessary.
 For details on checking the ECM and the rewriting, see "How to Use EMPS" in this chapter.
 Note:
 When ECM replacement or rewriting is performed, perform EGR learning.
 [EGR learning method]
 1. Turn the key switch "ON".
 2. Turn the key switch "OFF".
 3. Wait about 10 sec.

Step 10
 Replace the ECM.
 Note:
 When ECM replacement or rewriting is performed, perform EGR learning.
 [EGR learning method]
 1. Turn the key switch "ON".
 2. Turn the key switch "OFF".
 3. Wait about 10 sec.

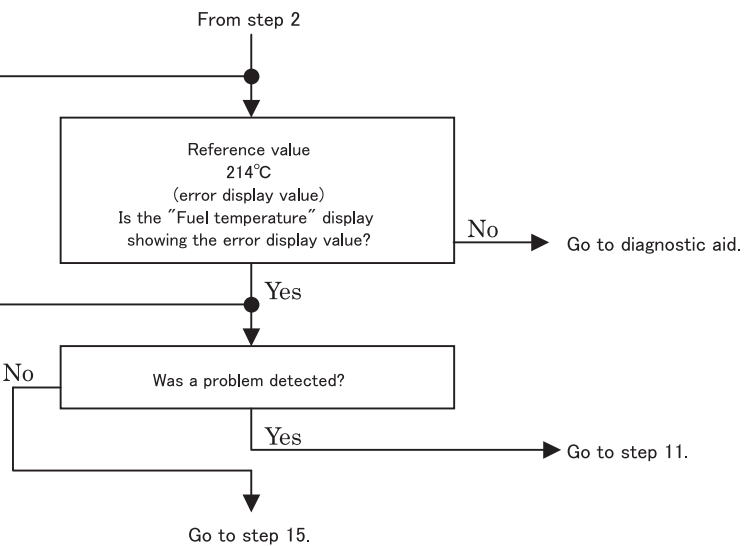
Step 11
 Recheck the diagnostic trouble code.
 1. Connect all harnesses.
 2. Delete the diagnostic trouble code.
 (See the service support DIAG (trouble diagnosis) screen for information on deleting diagnostic trouble codes.)
 3. Turn the key switch "OFF" for at least 10 sec.
 4. Perform a test drive under the "Preconditions when diagnostic trouble code is set".
 5. Confirm the diagnostic trouble code.

Step 12
 Check that no other diagnostic trouble code has been detected.



Step 13
 1. Start the engine.
 2. Check the "Fuel temperature" display.
 Because backup mode is entered after the trouble judgment, the fuel temperature display is 214°C.

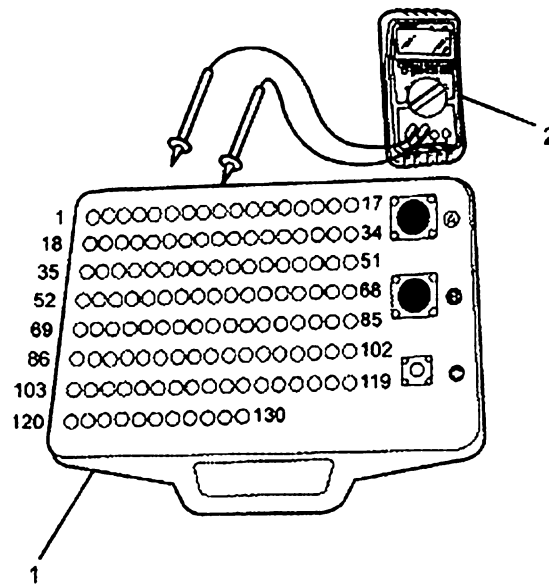
Step 14
 Check the installation status of the FT sensor, the ECM and the intermediate connector.
 1. Inspect whether there is any backlash or looseness in the installation of the connectors.
 2. Repair or replace as necessary if a problem is detected.



E0182-2

Breaker box inspection procedure

For steps in which breaker box usage is indicated, perform inspection with the following procedure. Return to diagnosis step after inspection.



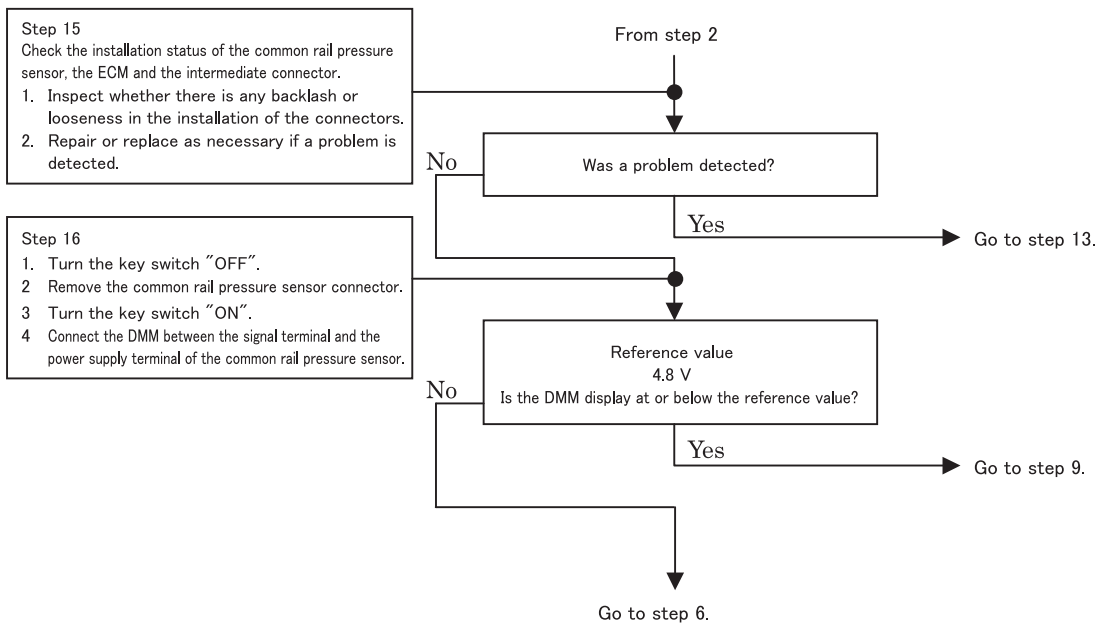
ErrorCode01

Name

1. Breaker box
2. DMM

Step	Inspection item	Inspection method	Measurement condition	Measurement terminal No.	Normal value	Abnormal value
6, 17	Short circuit with power supply circuit	Voltage value measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "ON" 	83-GND	0 V	18 V or higher
7, 18	Disconnection/high resistance	Resistance measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "OFF" 	83-Sensor connector signal terminal	100 Ω or lower	10 MΩ or higher
8, 19	Disconnection/high resistance	Resistance measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "OFF" 	79-Sensor connector GND terminal	100 Ω or lower	10 MΩ or higher

Troubleshoot



E0193-3

Step 8
 Check the installation of the ECM connector.
 1. Turn the key switch "OFF".
 2. Remove the ECM.
 3. Inspect whether there is any backlash or looseness in the installation of the connectors.
 4. Repair as necessary if a problem is detected.

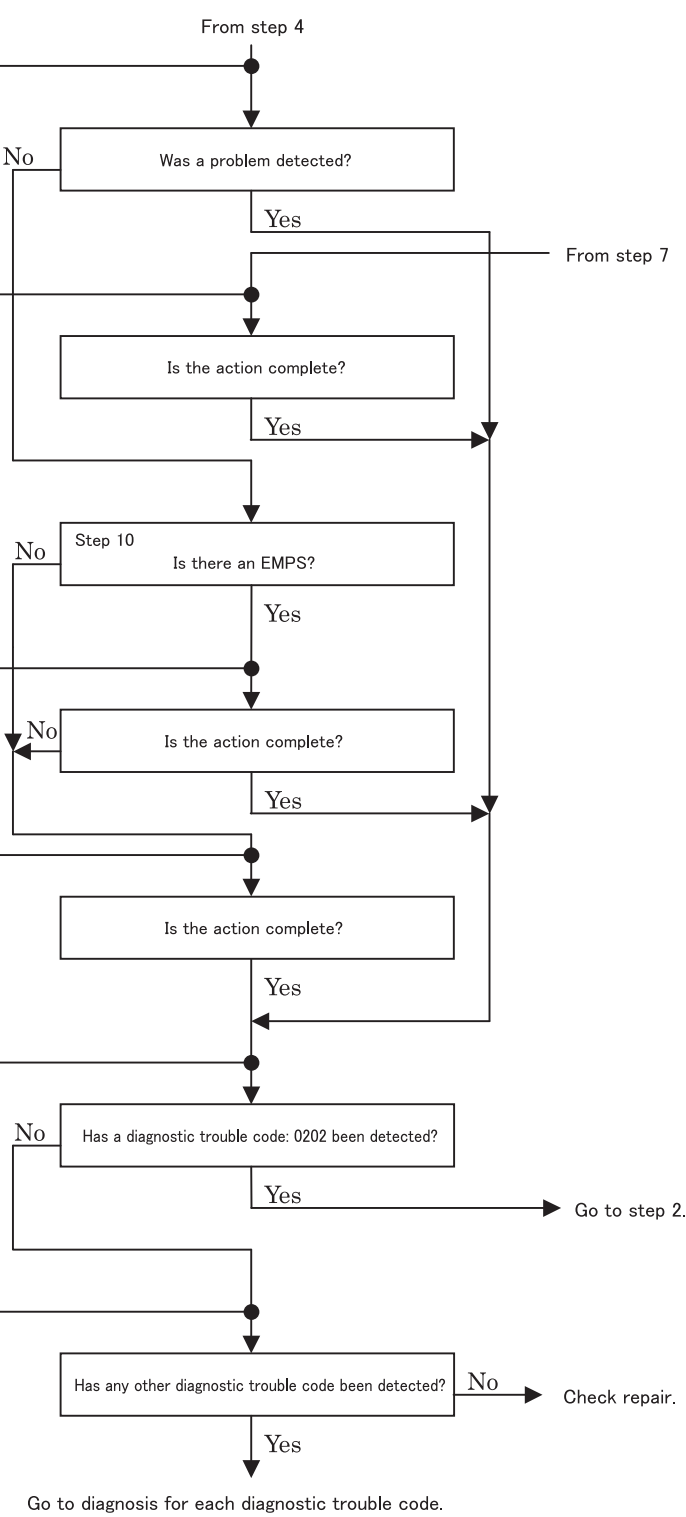
Step 9
 1. Replace the No. 2 cylinder injector.
 Note:
 See the "Engine" section in the Service Manual for the work procedures.
 There are two kinds of injectors. Be sure to use the same kind of one which was used before replacement.

Step 11
 1. Check the ECM software version.
 2. Perform rewriting if updating the ECM software version is necessary.
 For details on checking the ECM and the rewriting, see "How to Use EMPS".
 Note:
 When ECM replacement or rewriting is performed, perform EGR learning.
 [EGR learning method]
 1. Turn the key switch "ON".
 2. Turn the key switch "OFF".
 3. Wait about 10 sec.

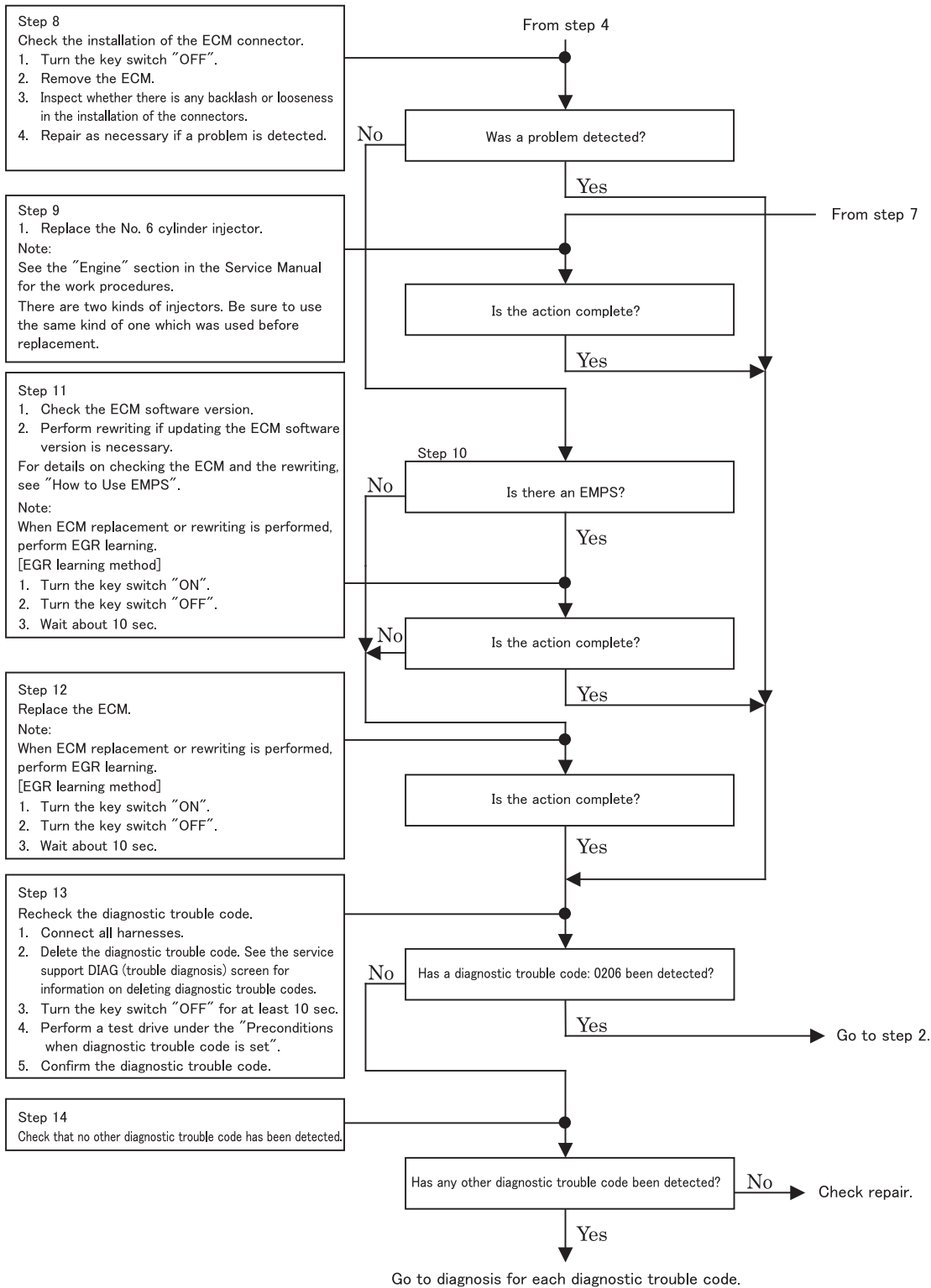
Step 12
 Replace the ECM.
 Note:
 When ECM replacement or rewriting is performed, perform EGR learning.
 [EGR learning method]
 1. Turn the key switch "ON".
 2. Turn the key switch "OFF".
 3. Wait about 10 sec.

Step 13
 Recheck the diagnostic trouble code.
 1. Connect all harnesses.
 2. Delete the diagnostic trouble code.
 See the service support DIAG (trouble diagnosis) screen for information on deleting diagnostic trouble codes.
 3. Turn the key switch "OFF" for at least 10 sec.
 4. Perform a test drive under the "Preconditions when diagnostic trouble code is set".
 5. Confirm the diagnostic trouble code.

Step 14
 Check that no other diagnostic trouble code has been detected.



Troubleshoot

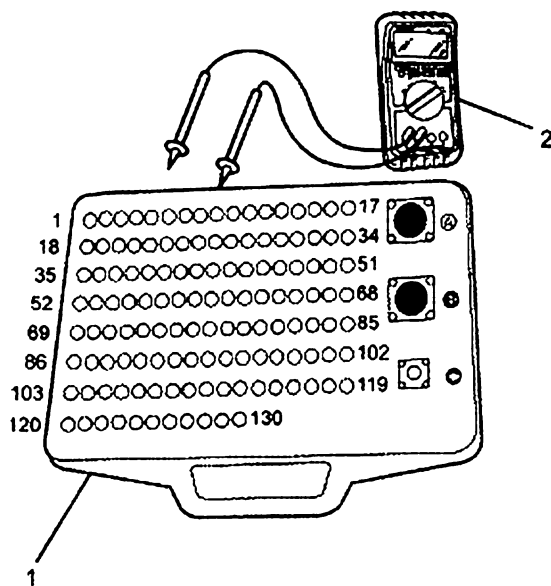


E0206-2

Troubleshoot

Breaker box inspection procedure

For steps in which breaker box usage is indicated, perform inspection with the following procedure. Return to diagnosis step after inspection.



Name

1. Breaker box
2. DMM

Step	Inspection item	Inspection method	Measurement condition	Measurement terminal No.	Normal value	Abnormal value
6, 17	Disconnection/ high resistance	Resistance measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "OFF" 	95-Sensor connector signal terminal	100 Ω or lower	10 MΩ or higher
7, 18	Short circuit with GND circuit/GND	Resistance measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "OFF" 	91-109 91-GND	10 MΩ or higher	100 Ω or lower
	Disconnection/ high resistance	Resistance measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "OFF" 	91-Sensor connector signal terminal	100 Ω or lower	10 MΩ or higher

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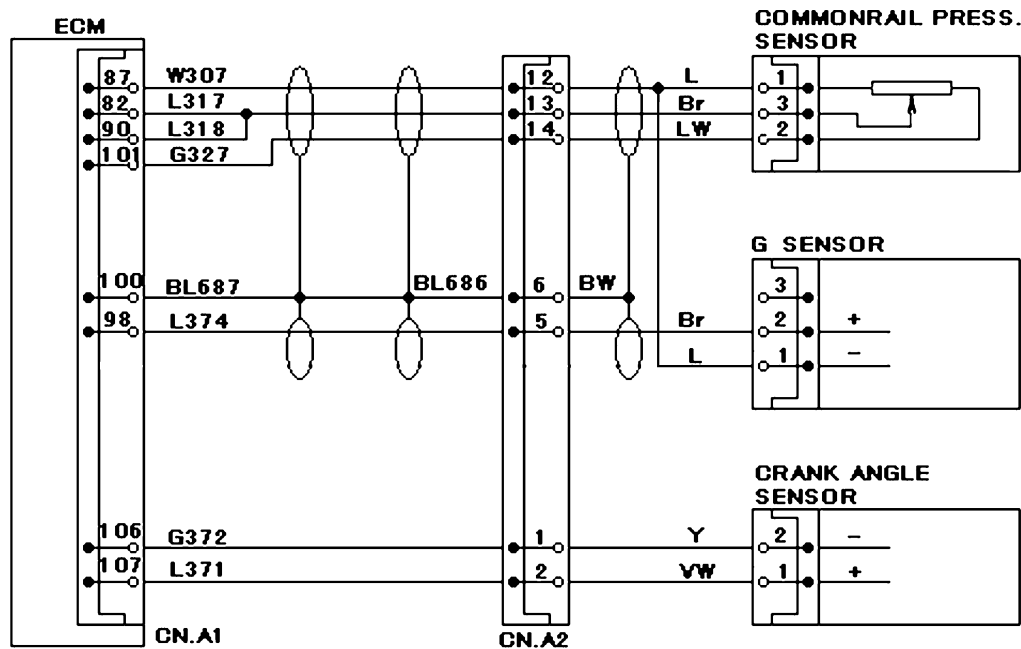


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Troubleshoot

Block diagram



TSHK0033

Recovery from failure

During trouble judgment, about 10 sec. of cranking is necessary.

Preconditions when DTC is set

- G sensor signal is normal.
- DTC: 0335, 0336, 0340, 0341 and 1345 are not detected.
- Engine running

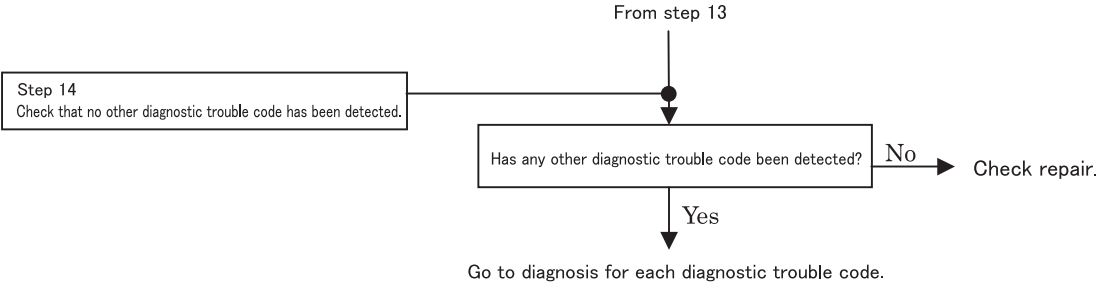
Diagnostic aid

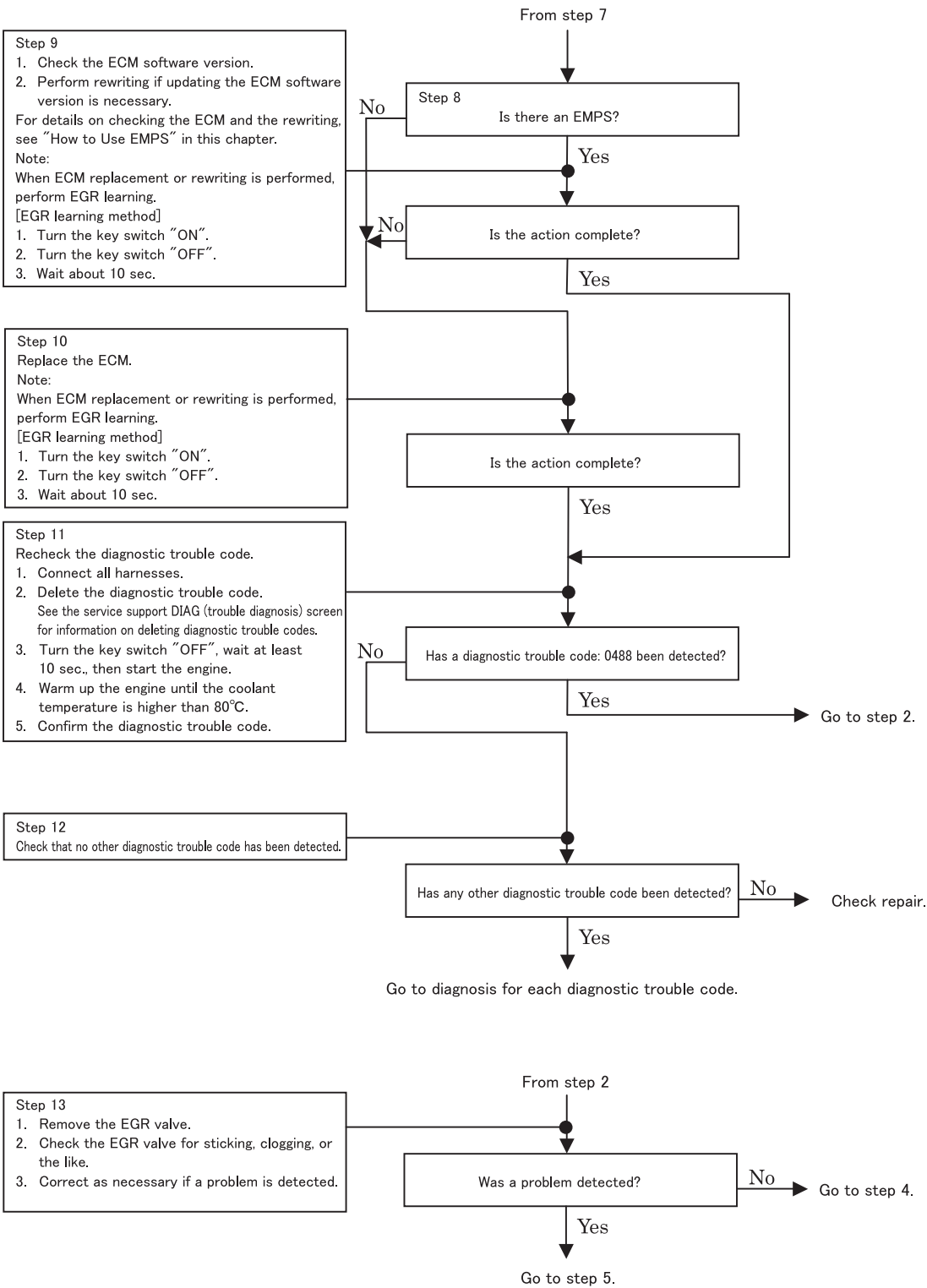
If an intermittent problem is suspected, the cause may be one of the following.

- Harness connector connection problem
- Harness routing problem
- Breakage in harness covering due to friction
- Wire disconnection within harness covering

In order to detect these causes, the following inspection is necessary.

- Harness connector and ECM connector connection problem
 - Terminal has come out from connector
 - Connection between non-matching terminals
 - Damage to connector lock
 - Terminal and wire connection problem
- Harness damage
 - Inspect the external appearance to check for any harness damage.
 - While moving the connector or harness related to a sensor, confirm the display of the related item in the scan tool data display. The display change shows the trouble location.
- With CKP sensor abnormalities, a DTC will not be detected unless the crank rotates 14 times. Especially with low rotation such as during idling, the engine will stall before the crank rotates 14 times if there is no CKP signal. Accordingly, because no DTC is detected and backup mode is not entered, restarting after engine stalling is possible and specifying the problem location will be difficult. When there is an engine stalling problem, increase engine rotation to the maximum with no load and inspect whether a CKP sensor problem is detected during 14 rotations of the crank. If a CKP sensor problem is detected at the maximum rotation with no load, a DTC will be detected. For intermittent trouble, increase engine rotation to the maximum with no load and inspect whether DTC 0355 is detected.





E0488-2

Step 8
 1. Use the breaker box or DMM to check whether the conditions below are present in the GND circuit between the ECM and engine oil pressure sensor. See the Breaker Box Inspection Procedure.
 Note:
 If there is no breaker box, see the Inspection procedures for sensors on actual machine.
 • Disconnection
 • High resistance
 2. Repair or replace as necessary if a problem is detected.

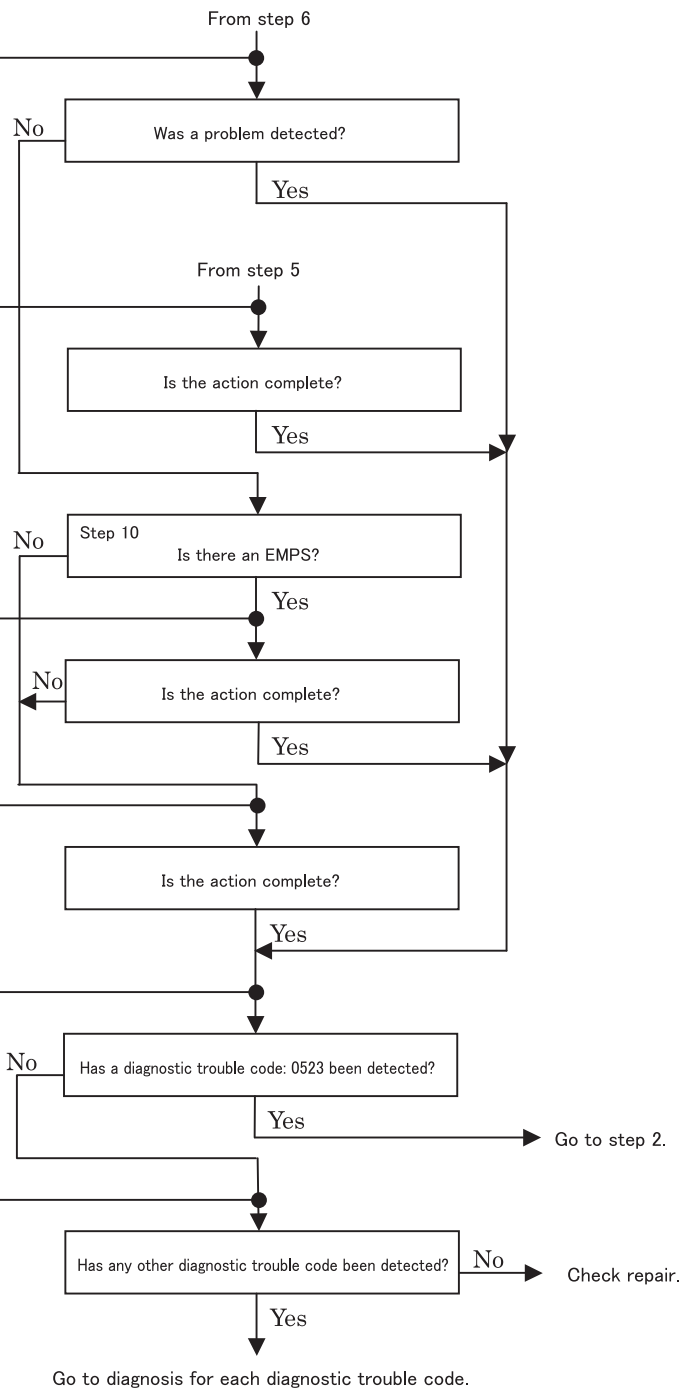
Step 9
 Replace the engine oil pressure sensor.

Step 11
 1. Check the ECM software version.
 2. Perform rewriting if updating the ECM software version is necessary.
 For details on checking the ECM and the rewriting, see "How to Use EMPS".
 Note:
 When ECM replacement or rewriting is performed, perform EGR learning.
 [EGR learning method]
 1. Turn the key switch "ON".
 2. Turn the key switch "OFF".
 3. Wait about 10 sec.

Step 12
 Replace the ECM.
 Note:
 When ECM replacement or rewriting is performed, perform EGR learning.
 [EGR learning method]
 1. Turn the key switch "ON".
 2. Turn the key switch "OFF".
 3. Wait about 10 sec.

Step 13
 Recheck the diagnostic trouble code.
 1. Connect all harnesses.
 2. Delete the diagnostic trouble code. See the service support DIAG (trouble diagnosis) screen for information on deleting diagnostic trouble codes.
 3. Turn the key switch "OFF" for at least 10 sec.
 4. Perform a test drive under the "Preconditions when diagnostic trouble code is set".
 5. Confirm the diagnostic trouble code.

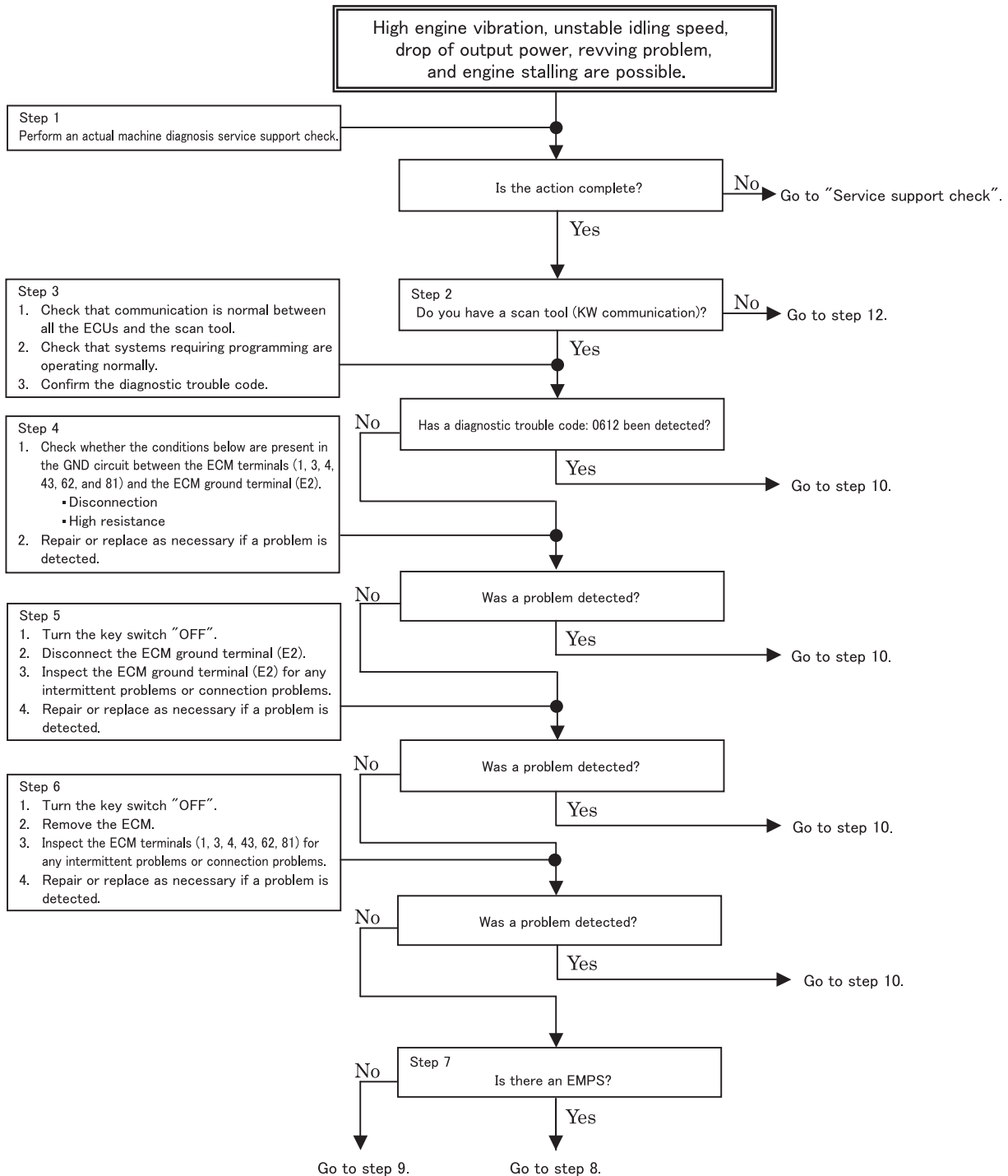
Step 14
 Check that no other diagnostic trouble code has been detected.



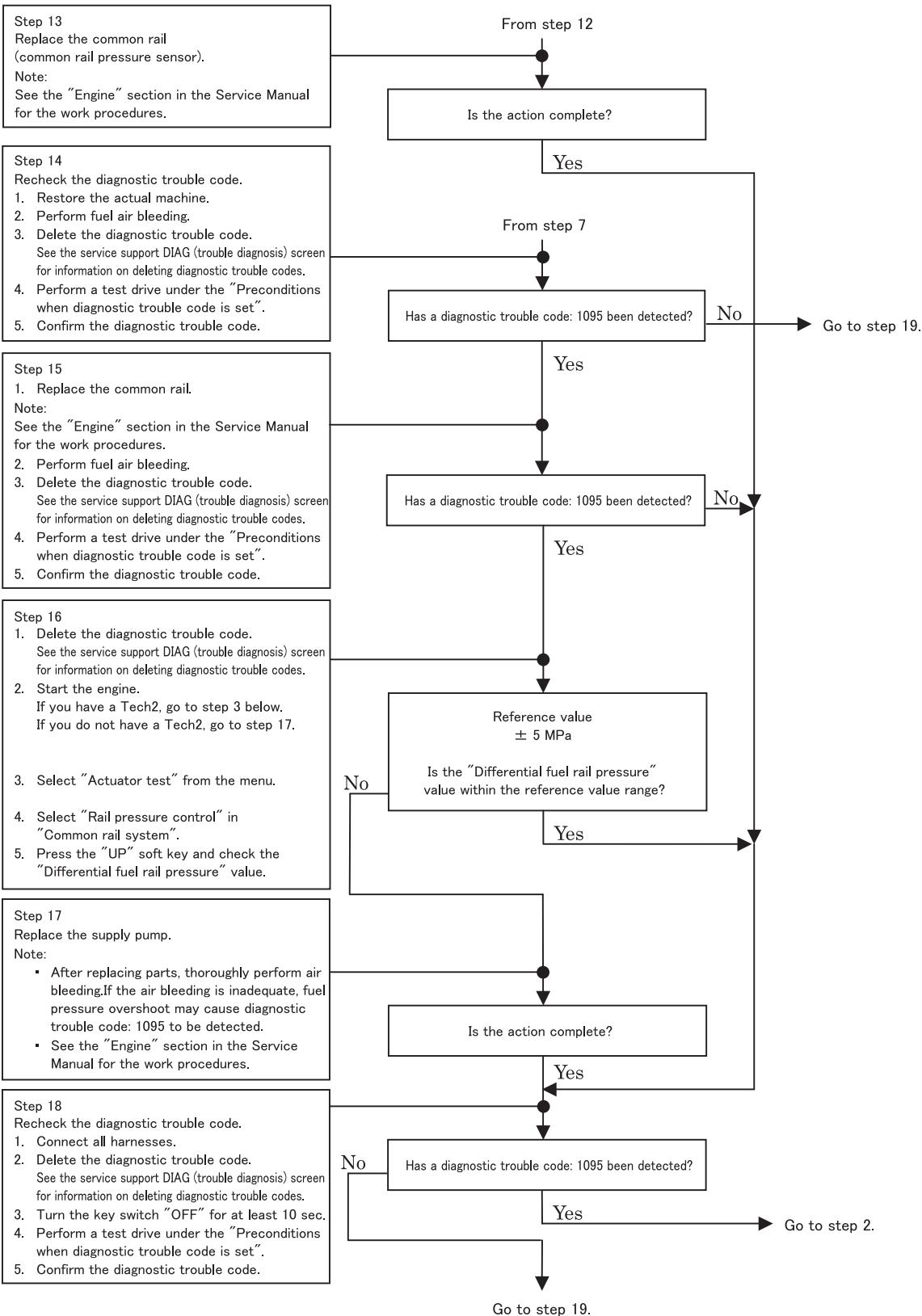
Trubleshoot

DTC: 0612

Charge Circuit Abnormality (bank 2)



E0612-1

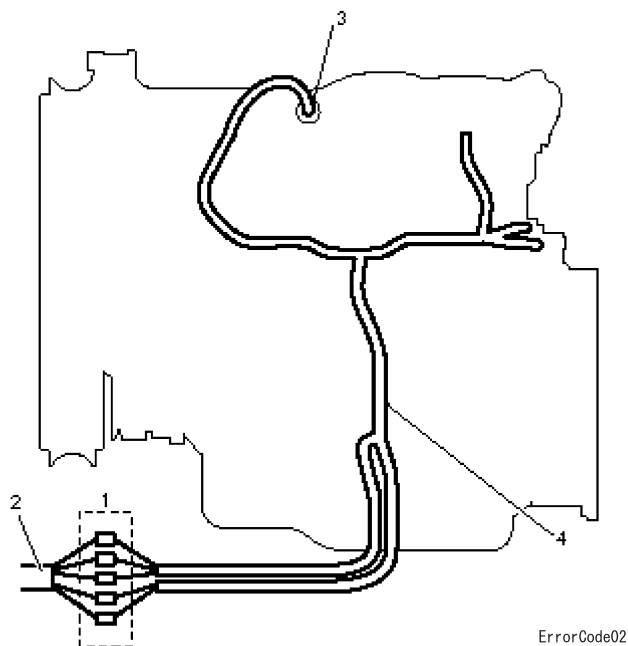


Go to step 19.

E1095-3

Trubleshoot

Inspection procedures for sensors on actual machine



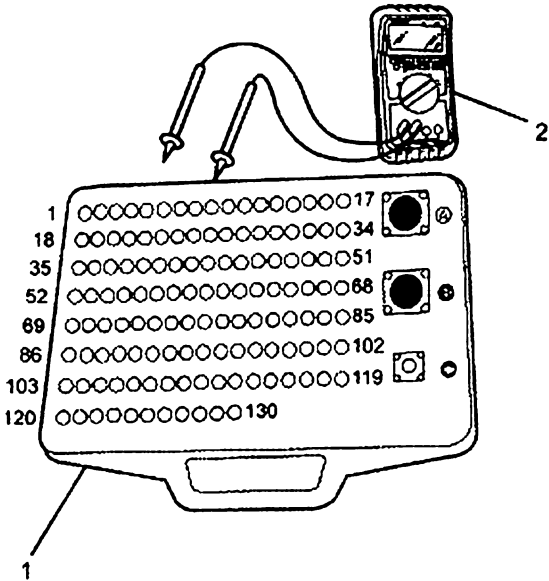
Name

1. Engine-actual machine intermediate connector
2. Actual machine harness
3. Sensor connector
4. Engine harness

1. Disconnect the intermediate connectors and perform sensor inspection from the engine harness connector.
2. Disconnect the connector from the sensor and short circuit the sensor connector wiring.
3. Inspect the harness disconnection from the intermediate connector.
 - If there is an abnormality in both procedures 1 and 2, repair the harness and repeat inspection from procedure 1.
 - If there is an abnormality in procedure 1 only, replace the sensor.

Breaker box inspection procedure

For steps in which breaker box usage is indicated, perform inspection with the following procedure. Return to diagnosis step after inspection.



Name

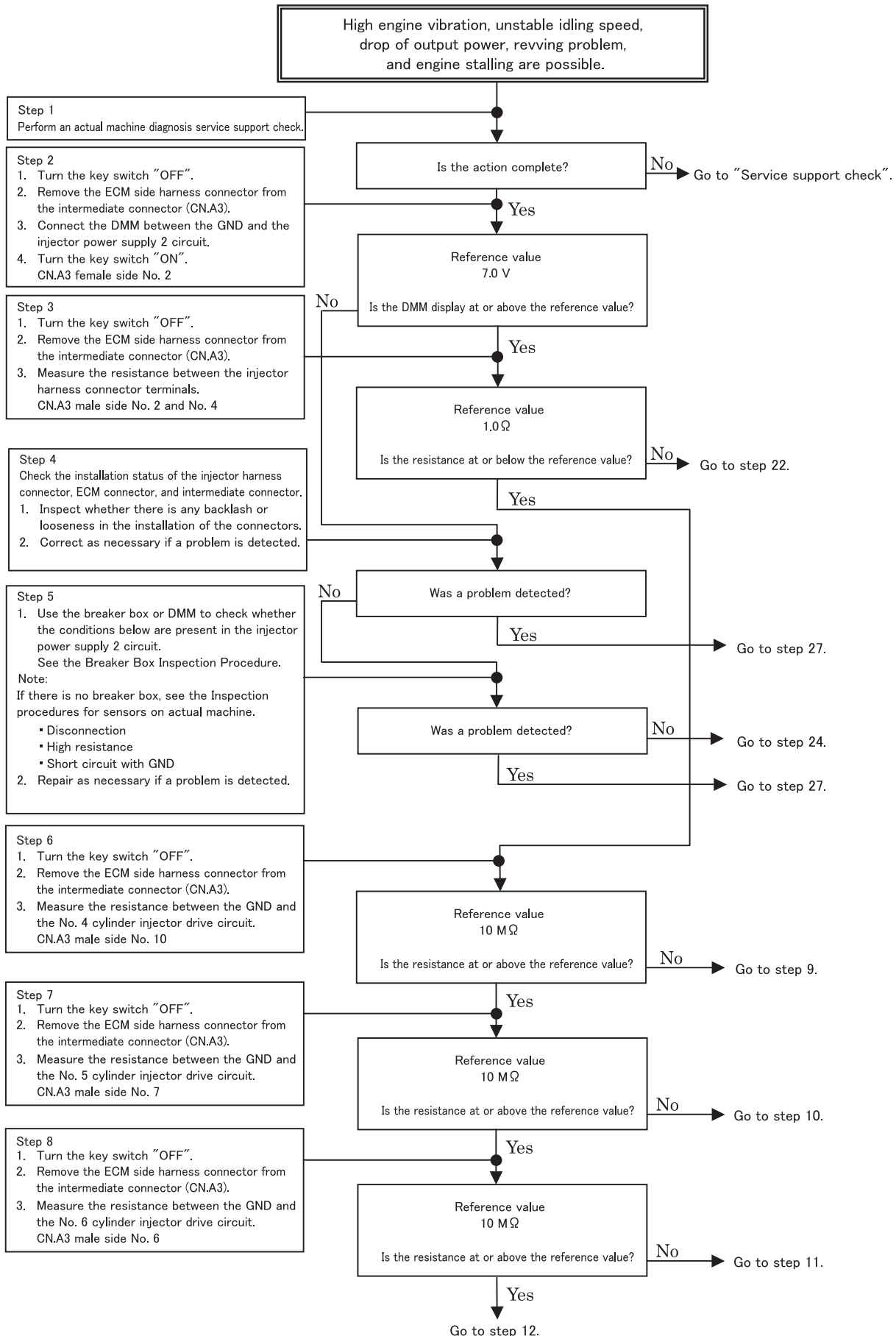
- 1. Breaker box
- 2. DMM

Step	Inspection item	Inspection method	Measurement condition	Measurement terminal No.	Normal value	Abnormal value
5	Short circuit with other signal circuit	Voltage value measurement	<ul style="list-style-type: none"> • Remove the sensor connector. • Key switch "ON" 	84-GND	0 V	1 V or higher

Trubleshoot

DTC: 1262

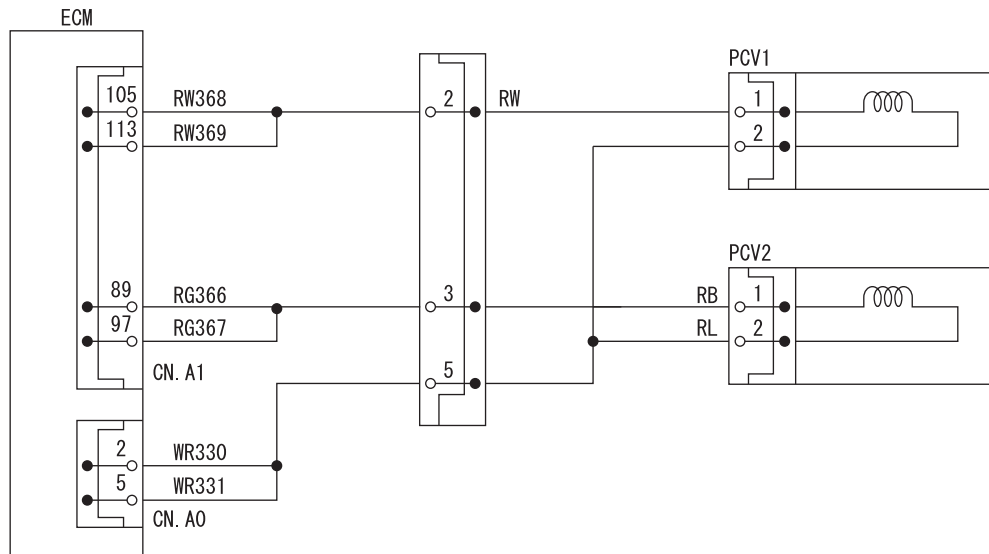
Injector Common 2 Drive System Abnormality



E1262-1

Troubleshoot

Block diagram



TSHK0027

Preconditions when DTC is set

- Main relay power supply voltage is 16V or higher.
- DTC : 0090, 0092, 1292 is not detected.
- 300 min⁻¹ or more, or actual rail pressure exceeds target rail pressure

Diagnostic aid

If an intermittent problem is suspected, the cause may be one of the following.

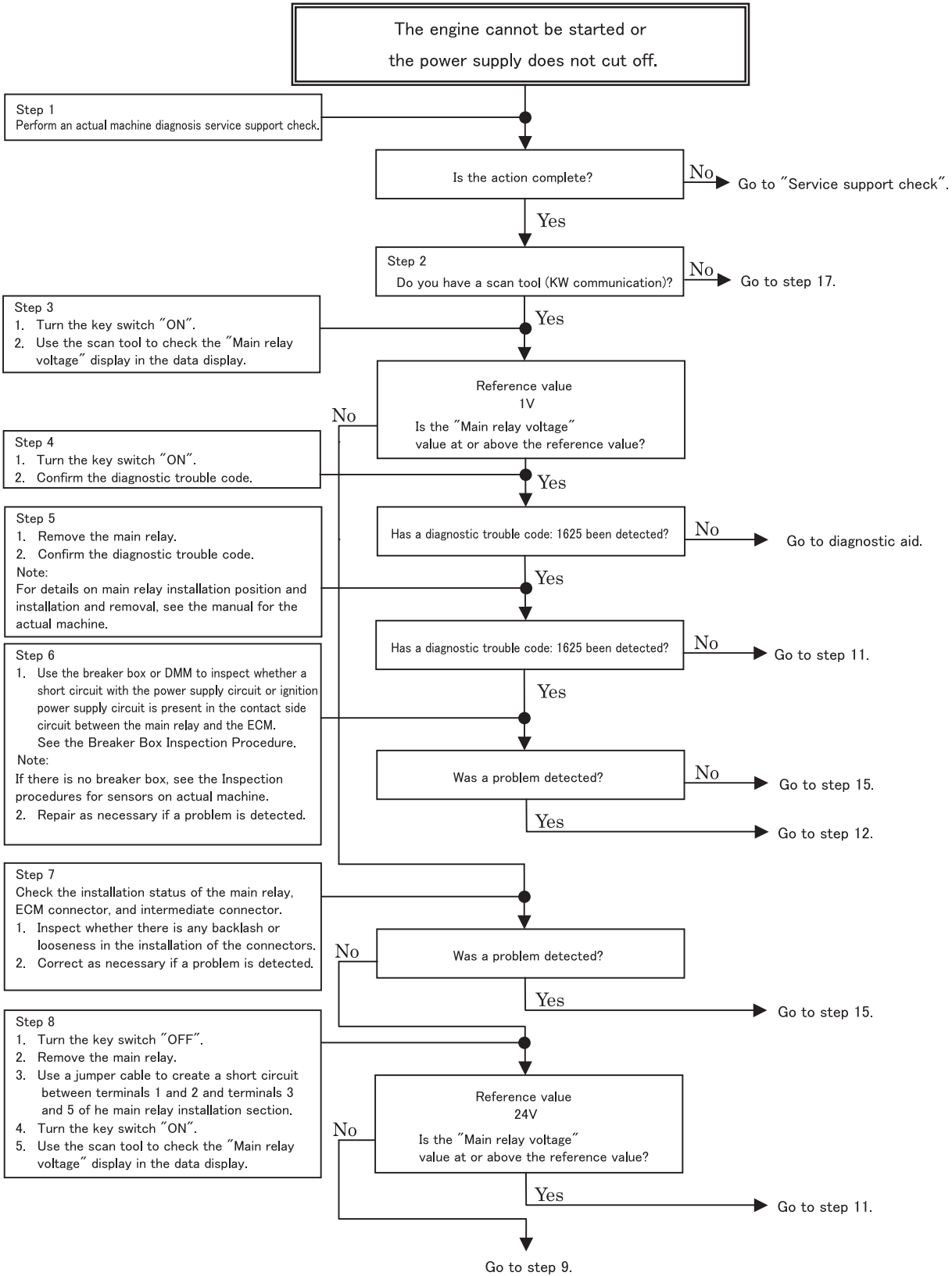
- Harness connector connection problem
- Harness routing problem
- Breakage in harness covering due to friction
- Wire disconnection within harness covering

In order to detect these causes, the following inspection is necessary.

- Harness connector and ECM connector connection problem
 - Terminal has come out from connector
 - Connection between non-matching terminals
 - Damage to connector lock
 - Terminal and wire connection problem
- Harness damage
 - Inspect the external appearance to check for any harness damage.
 - While moving the connector or harness related to a sensor, confirm the display of the related item in the scan tool data display. The display change shows the trouble location.

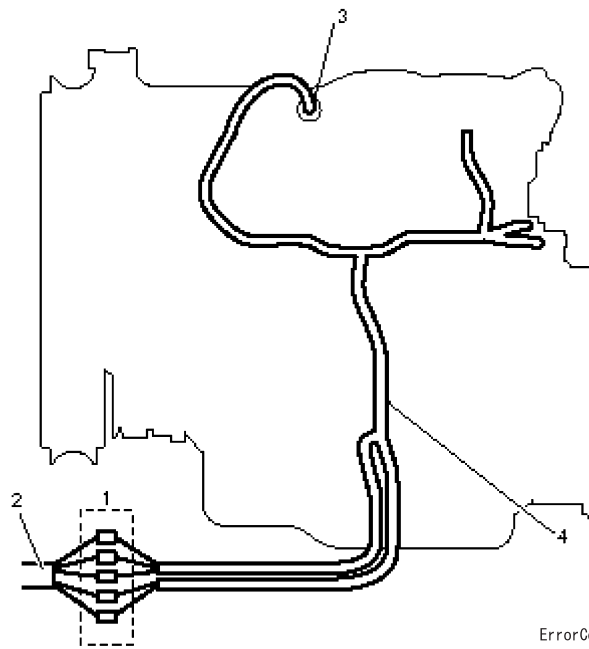
DTC: 1625

Main Relay System Abnormality



E1625-1

Inspection procedures for sensors on actual machine



Name

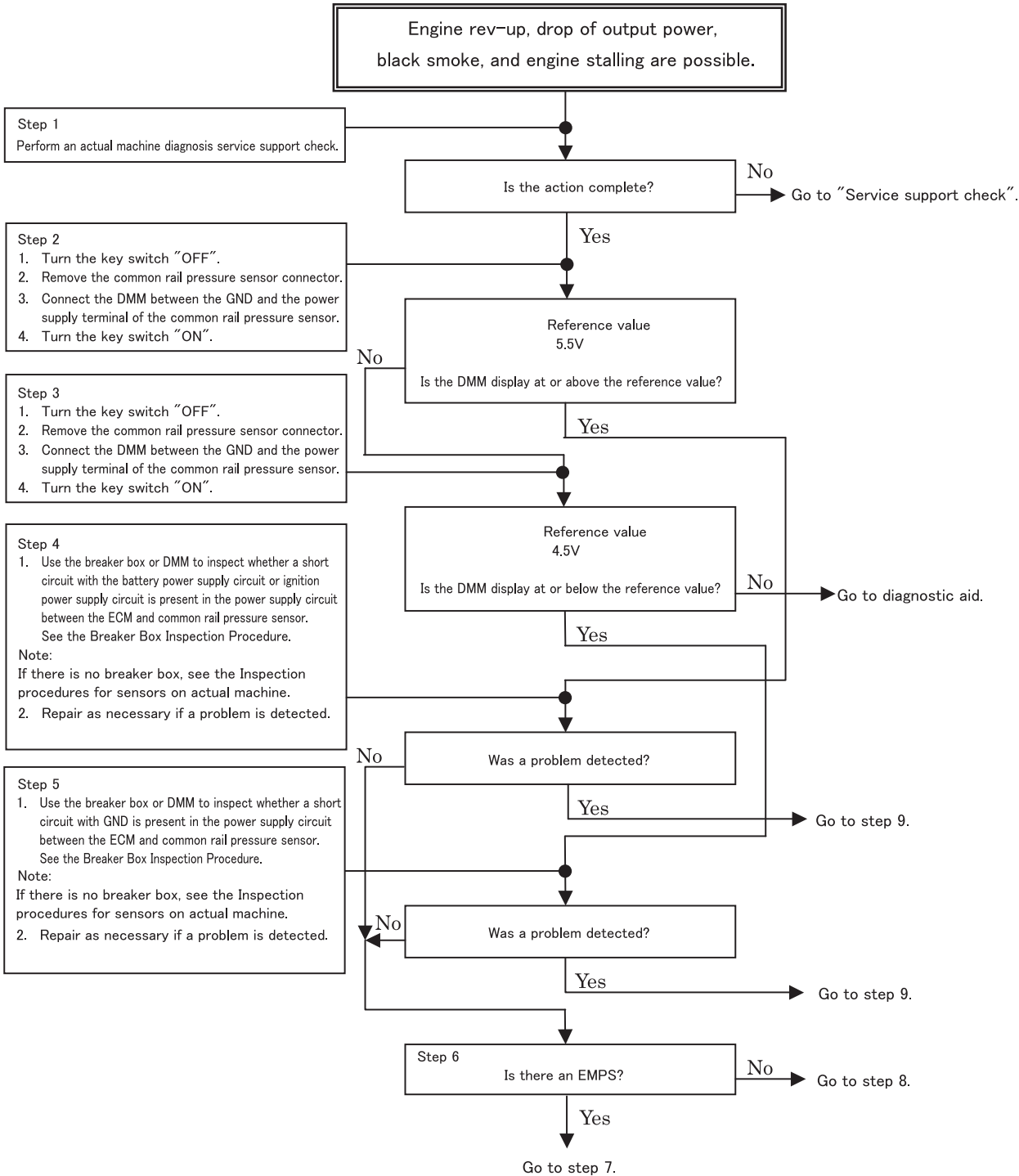
1. Engine-actual machine intermediate connector
2. Actual machine harness
3. Sensor connector
4. Engine harness

1. Disconnect the intermediate connectors and perform sensor inspection from the engine harness connector.
2. Disconnect the connector from the sensor and short circuit the sensor connector wiring.
3. Inspect the harness disconnection from the intermediate connector.
 - If there is an abnormality in both procedures 1 and 2, repair the harness and repeat inspection from procedure 1.
 - If there is an abnormality in procedure 1 only, replace the sensor.

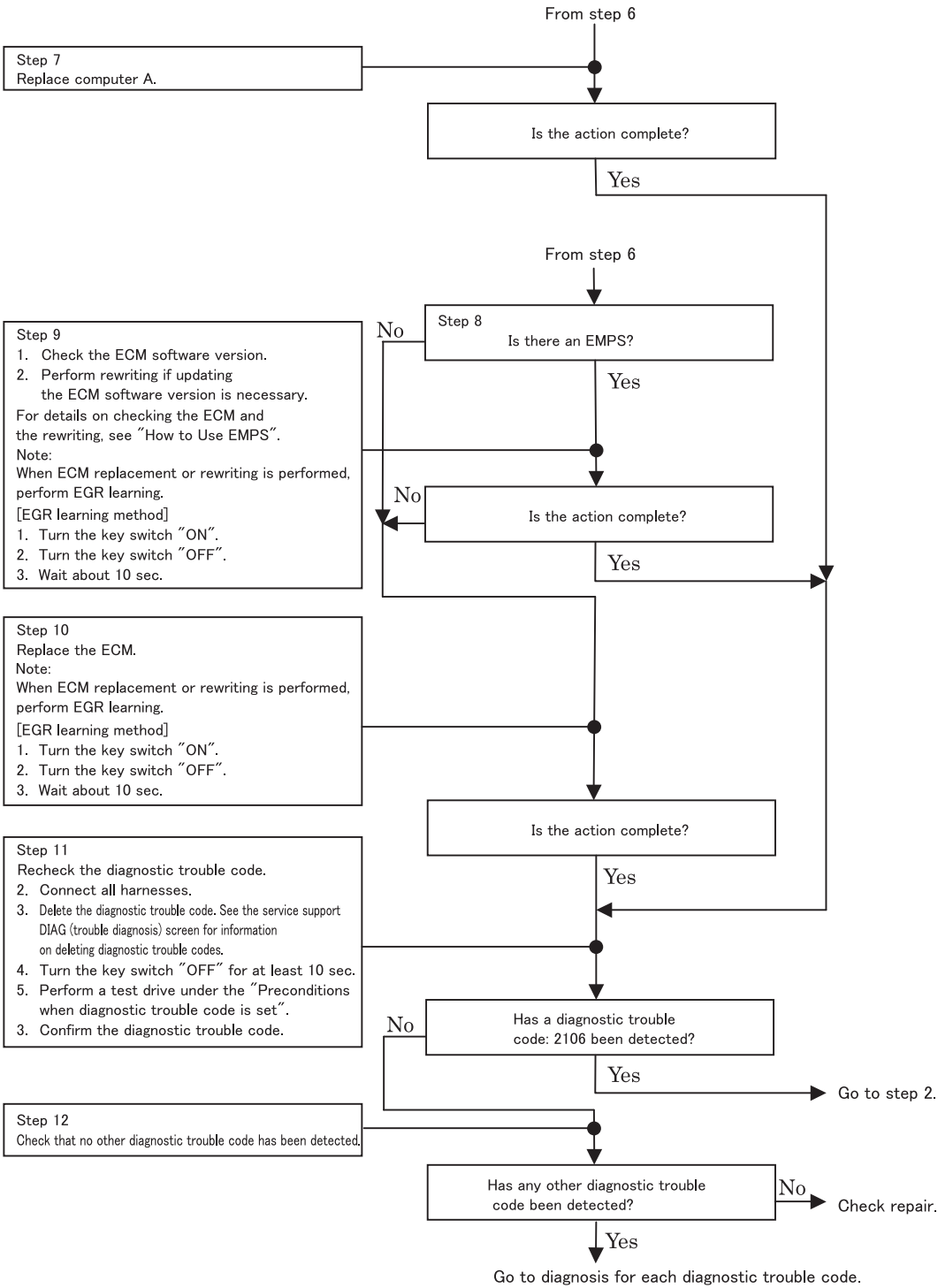
DTC: 1635

5 V Power Supply 5 Voltage Abnormality

(common rail pressure sensor, EGR position sensor power supply)



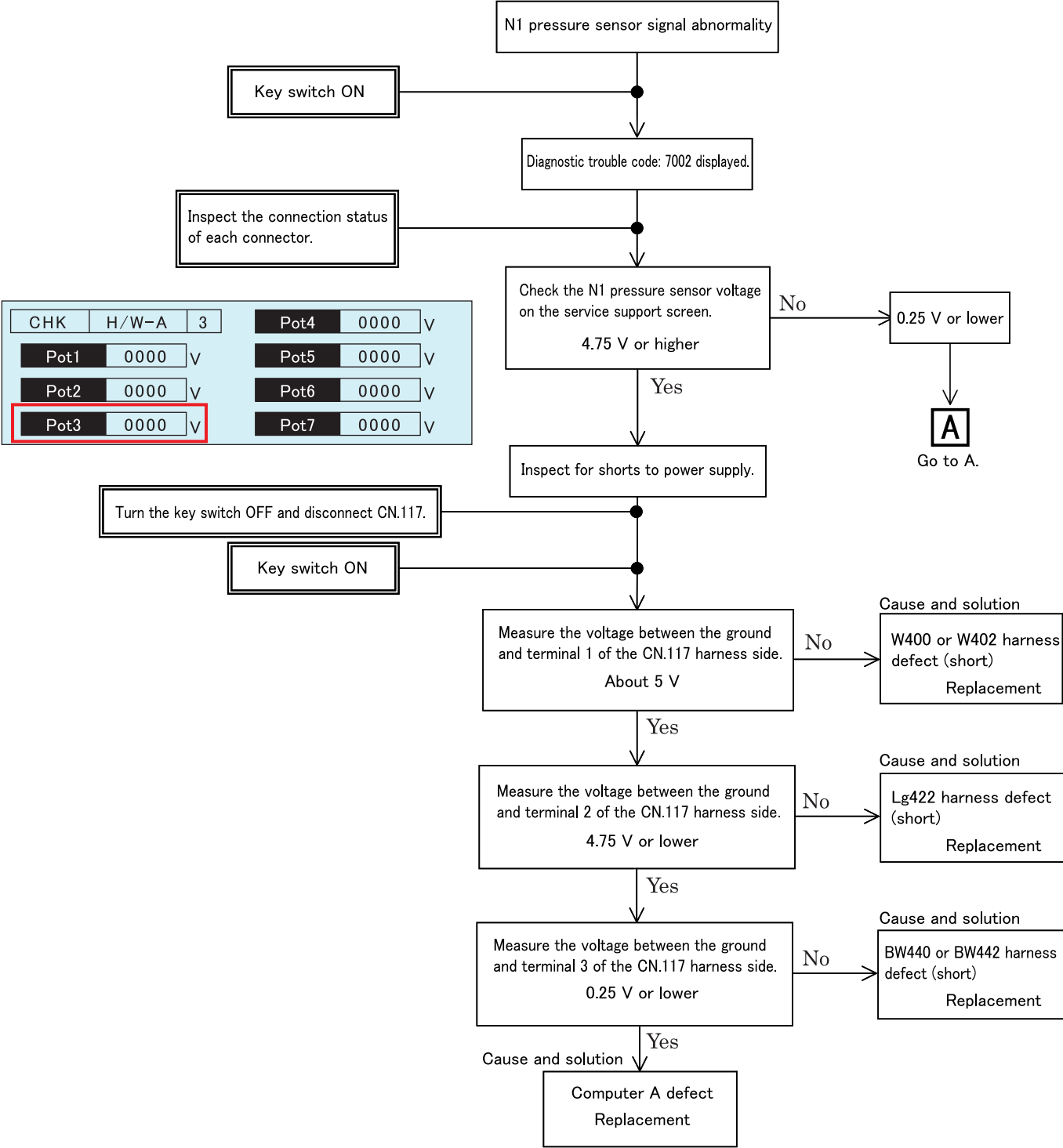
E1635-1



E2106-2

DTC: 7002

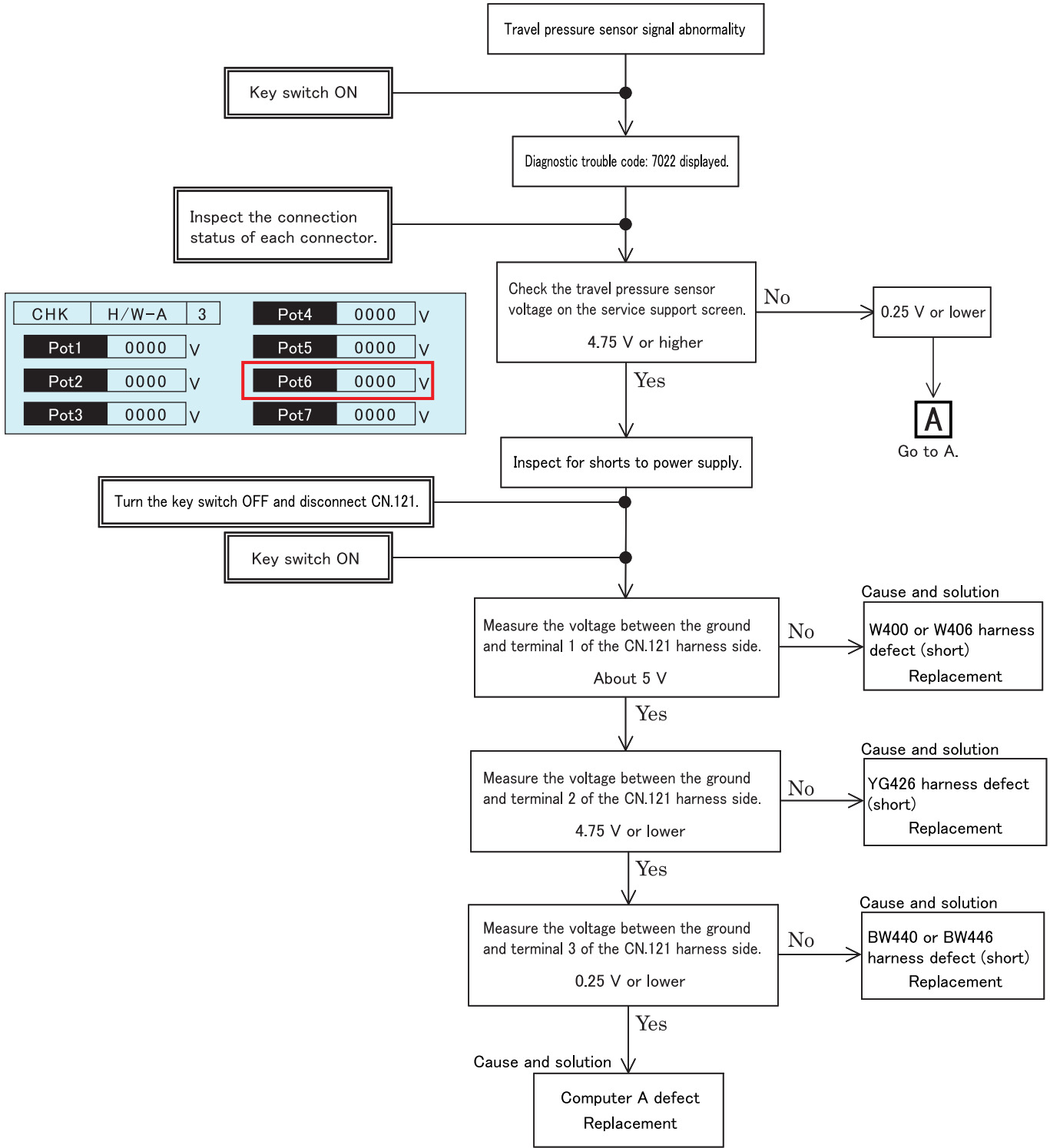
N1 Pressure Sensor Signal Abnormality



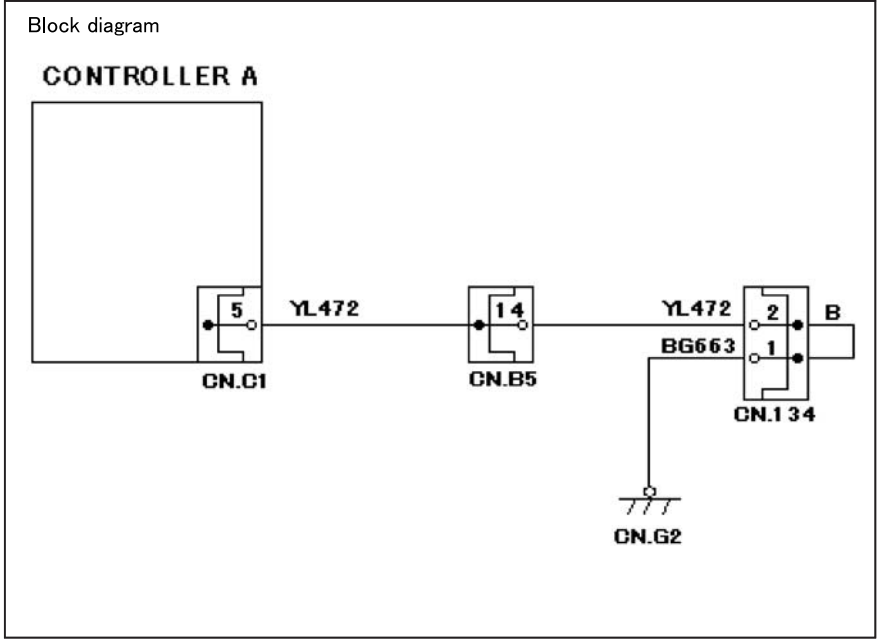
7002-1

DTC: 7022

Travel Pressure Sensor Signal Abnormality



7022-1

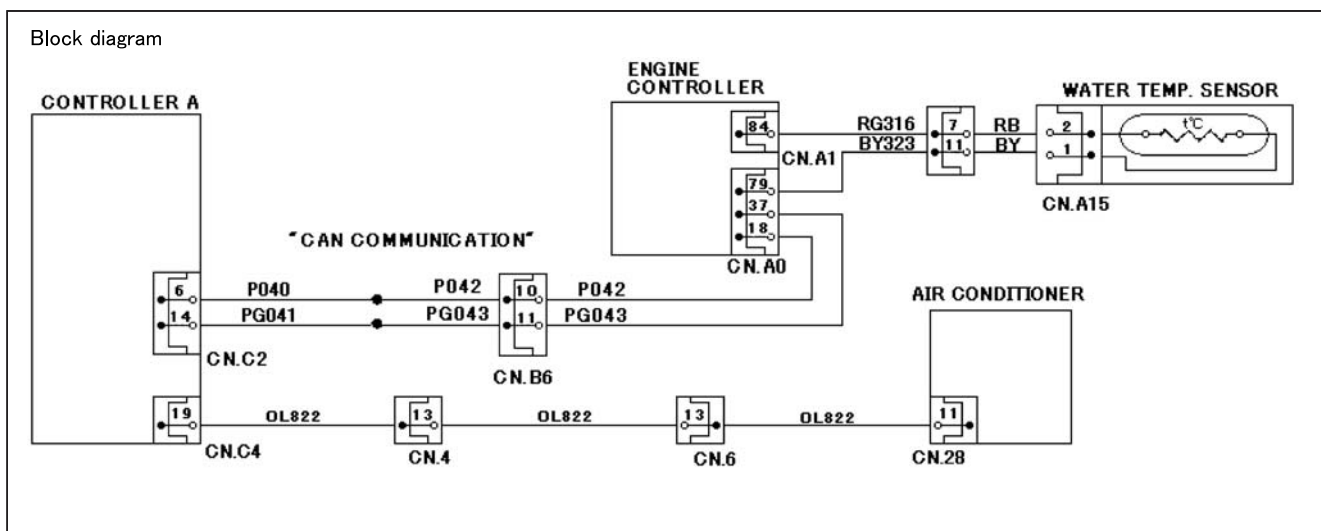
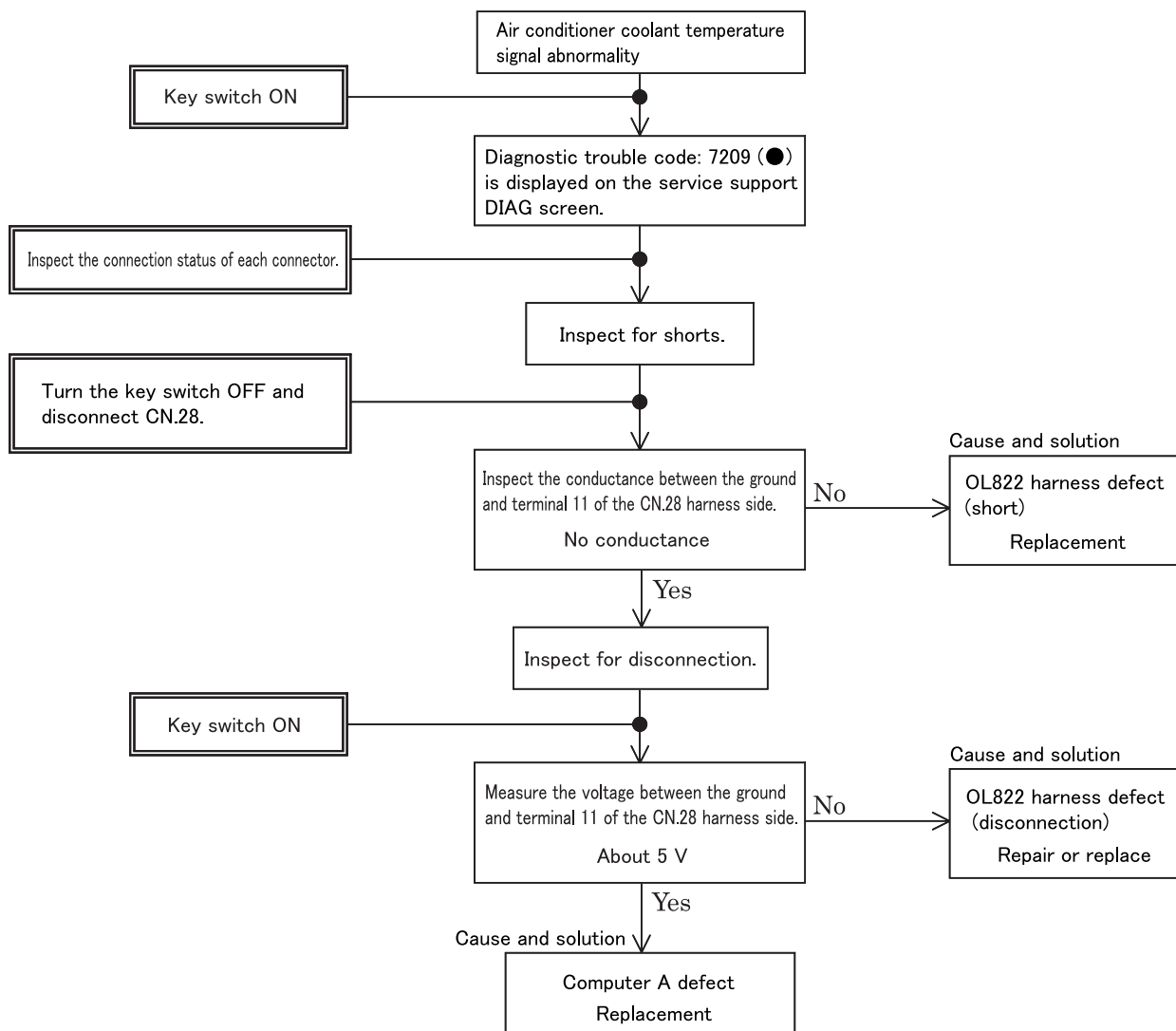


7063-4

Troubleshoot

DTC: 7209

Air Conditioner Coolant Temperature Signal Abnormality

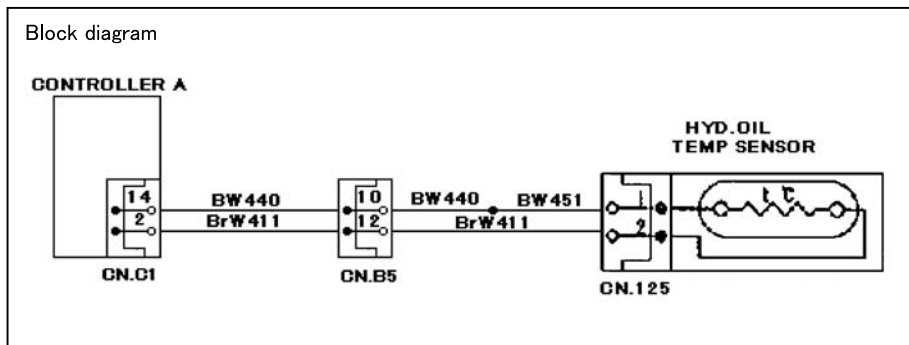
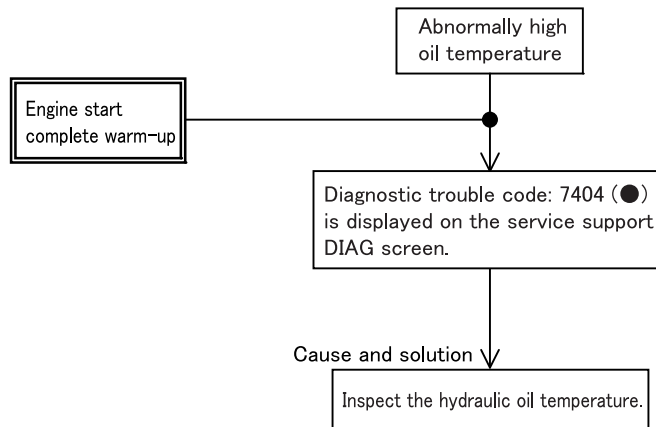


7209-1

Troubleshoot

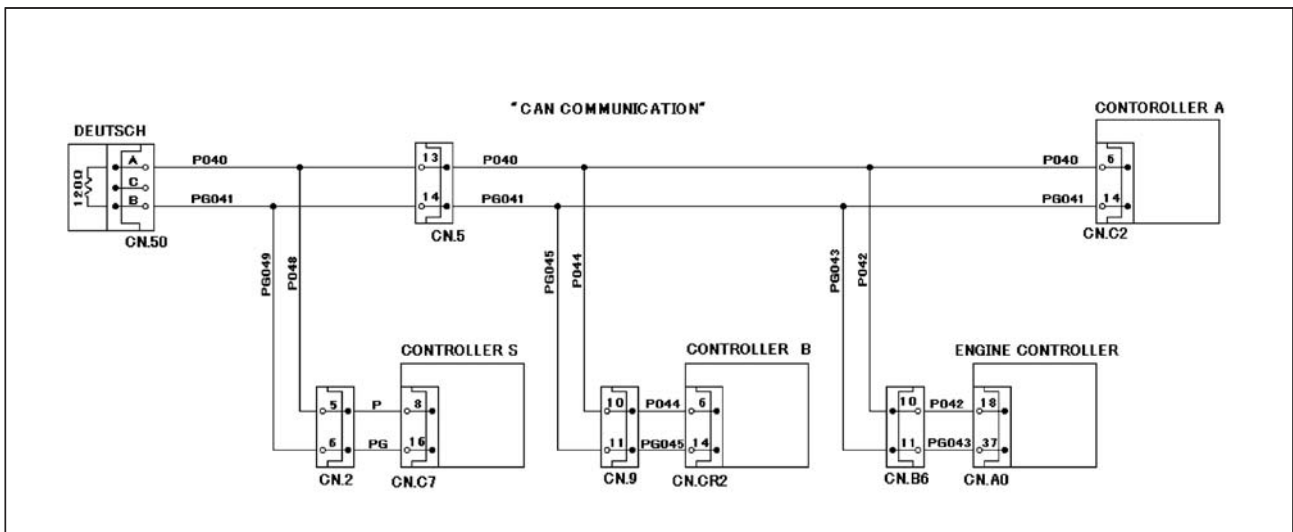
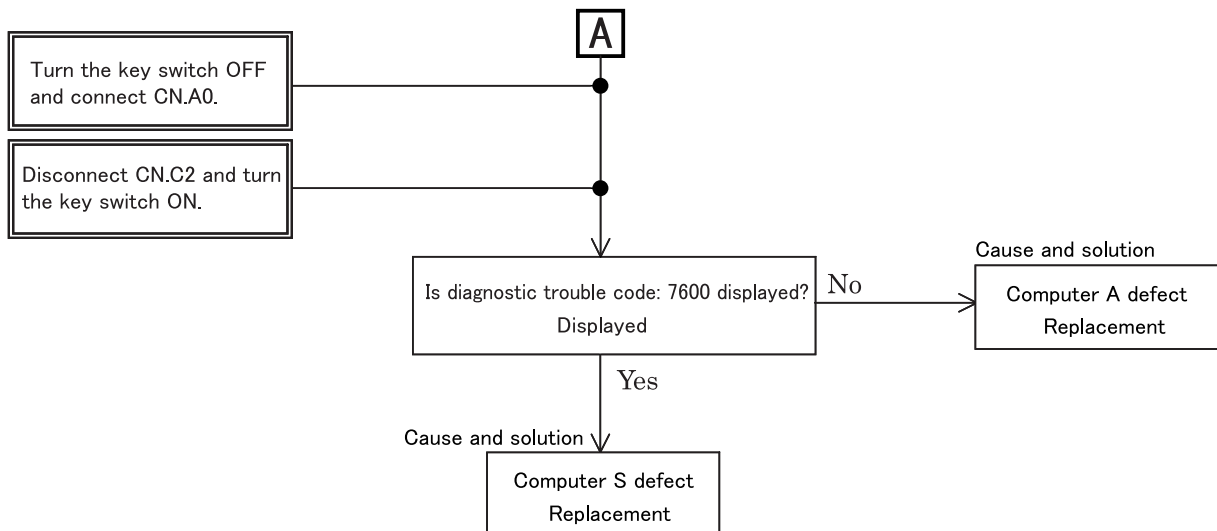
DTC: 7404

Abnormally High Oil Temperature (95 °C or higher)



7404

Troubleshoot



7600-2

Engine Stalling

Preliminary inspection

Before using this section, implement a "Service support monitor check" and check all of the following items.

- Check whether there is an excessive load on the main unit side.
- The ECM and shovel controller are operating correctly.
- Check diagnostic trouble codes.
- If there is a CKP sensor abnormality, the engine should be cranked for at least 14 sec. at a speed of at least 60 min⁻¹ because the abnormality will not be diagnosed unless the crank rotates at least 14 times.
- Check the condition of the main unit and find applicable symptoms in the problem symptom list. Implement the procedure indicated in the symptom chart.
- Confirm with the customer that the stipulated engine oil and fuel are being used.

Visual inspection

Some symptoms detection procedures require careful visual inspection. This allows for problems to be repaired without performing further inspection, which saves valuable time.

The following items are included in this inspection.

- Check for connector connection problems (connections are properly connected up to a clicking sound being heard).
Especially important for CKP and G sensors.
- Check for correct wiring connections, tightness, and disconnections
- Check whether the power supply for commercially-available accessories is being diverged from the ECM power supply.
- Check whether the ECM ground is dirty and check that it is securely installed in the correct location.
- Check that pipes and hoses for fuel, air, and oil are not broken or twisted and that they are correctly connected. Thoroughly check for any leaking or clogging.

- Check for fuel leaks and damage and denting on pipes in the fuel system.
- Suction air system parts abnormality
- Exhaust system parts abnormality

Diagnostic aid

- Fuel system abnormality (fuel cut-off, fuel freezing, air entering fuel line, filter abnormality (main, gauze clogging), line abnormality, fuel quality, fuel tank (debris, fuel suction abnormality)
- Suction air system abnormality (filter clogging, suction air line abnormality)
- Supply pump abnormality (no fuel pressure feed)
- Common rail abnormality (flow damper or pressure limiter is activated, degradation of sealability)
- Injector abnormality (Fuel is not injected.)
- System is down due to trouble
- Engine main unit abnormality (seizing, compression pressure deficiency, other mechanical trouble)
- ACG trouble
- Trouble related to main unit-side devices (hydraulic pump, etc.)
- Effect of electrical components installed after purchasing (wireless devices, lights, etc.)
- ECM trouble (main unit, power supply, GND)
- Perform inspection to check whether there are any connector connection problems, abnormalities involving friction or breaking in harnesses, and whether any wires inside harnesses are touching another circuit and causing a short. Also, perform function diagnosis inspection, check operations and control in each area, and repair any abnormalities.

Step	Action	Value	Yes	No
1	Perform "Trouble Diagnosis by Service Support" Is the action complete?	-	Go to step 2.	-
2	Check that there is no excessive load on the main unit side. Perform repair or replacement for any locations where problems are found. Note: For information about inspection and repair, see the Service Text. Is the action complete?	-	Go to step 3.	-

Trubleshoot

Step	Action	Value	Yes	No
7	Check the coupling of the supply pump for damage. If the trouble is detected, repair as required. Is the procedure completed?	-	Go to step 8.	-
8	Check the engine symptoms again. Have the engine symptoms normalized?	-	Go to step 12.	Go to step 9.
9	Is there an EMPS?	-	Go to step 10.	Go to step 11.
10	1. Check the ECM software version. 2. Perform rewriting if updating the ECM software version is necessary. Note: When ECM replacement or rewriting is performed, perform EGR learning. Is the action complete?	-	Go to step 12.	Go to step 11.
11	Check the mechanical parts of the engine and repair any abnormalities. <ul style="list-style-type: none"> ▪ Compression pressure ▪ Valve system ▪ Injector ▪ Timing gear ▪ Piston/crank-related Is the action complete?	-	Go to step 12.	-
12	Repair the main unit and check repair. Is the action complete?	-	Check repair.	Go to step 2.

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