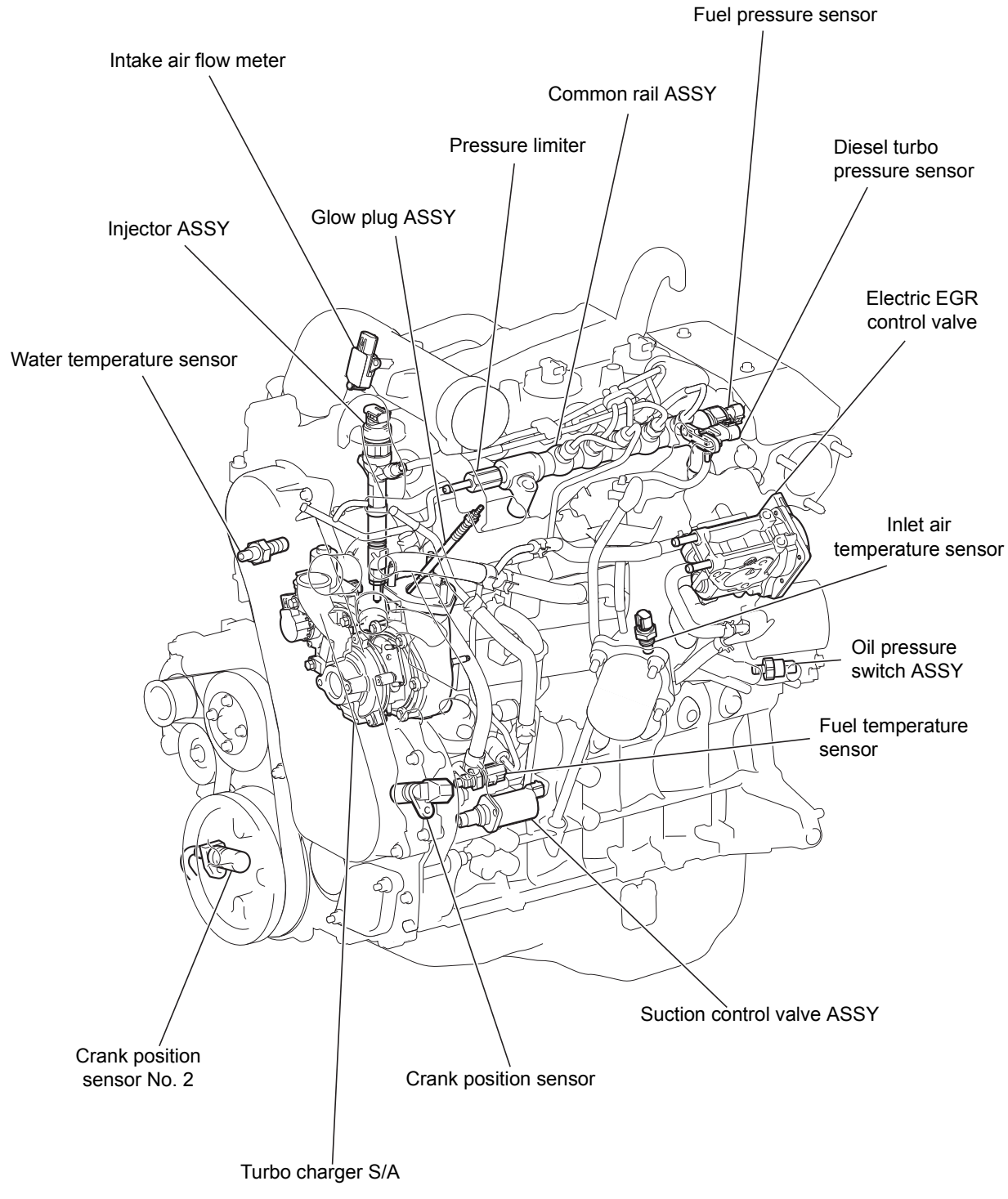
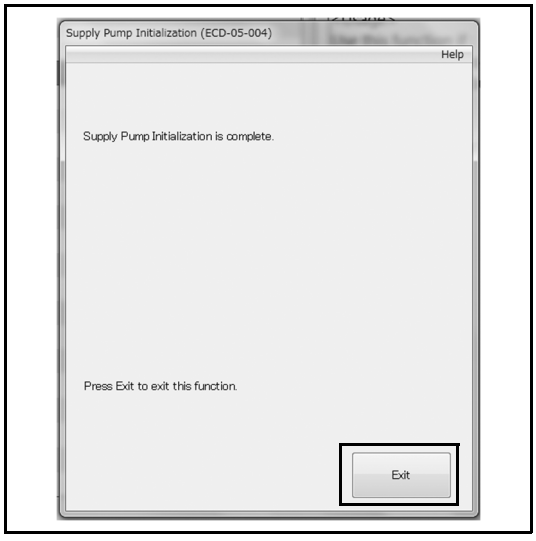
TROUBLESHOOTING

PARTS LAYOUT DRAWING





(5) <Procedure 4/4>
Supply Pump Initialization is complete, press [Exit].
(6) Start up the engine for warm up.

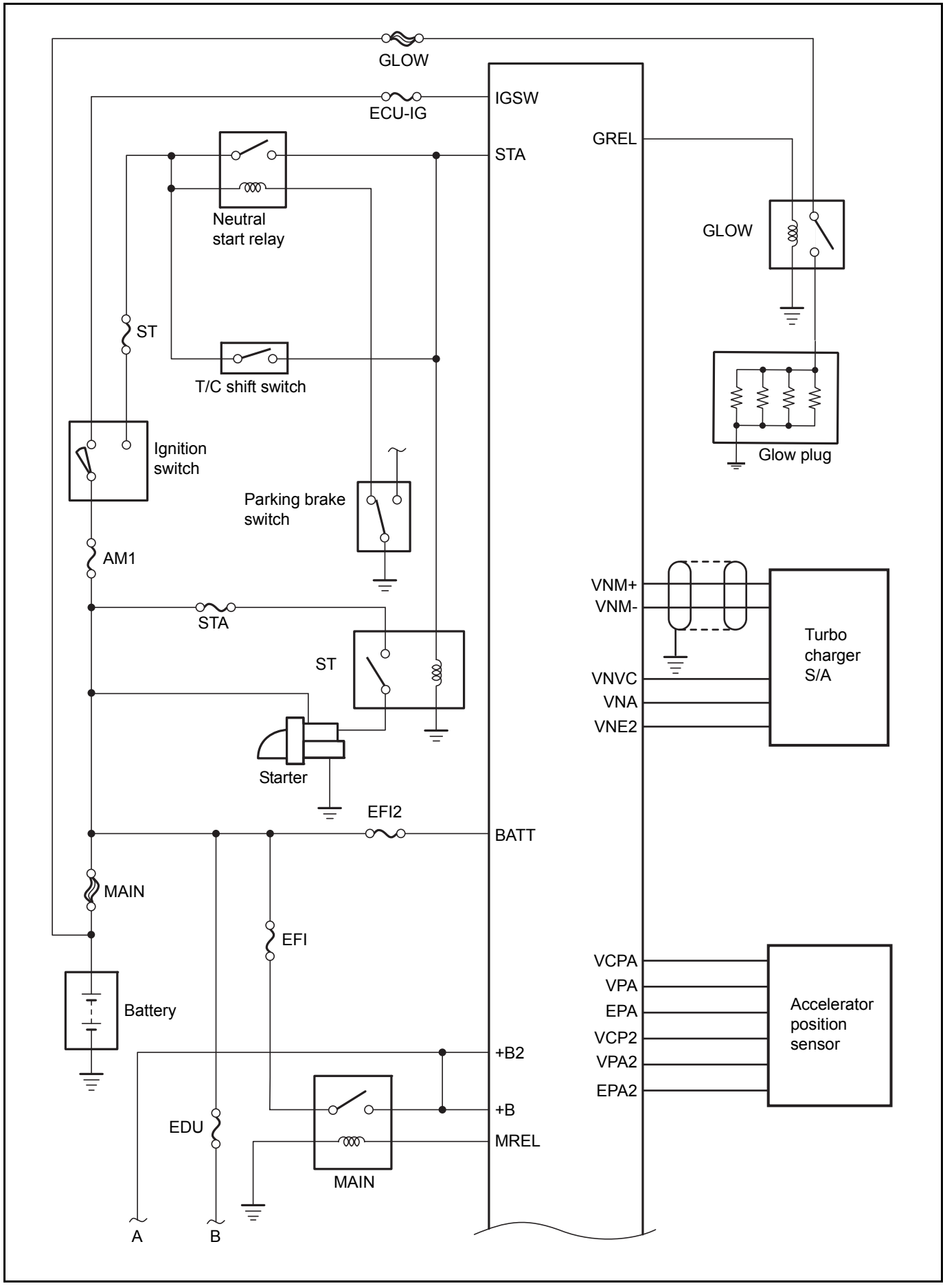
Caution:
Do not perform racing immediately after the engine is started.

Note:
- **If the Engine does not start, do it again <procedure 1/4>.**
- **The engine warm-up state shall be acondition water temperature is 60 °C (140 °F) or more and fuel temperature is 20 °C (68 °F) or more.**
  (a) To check water temperature, in the 'Engine Diagnostic Program' select [Data monitor] and monitor [Coolant Temp]
  Reference 60 °C (140 °F) or more
  (b) To check fuel temperature, in the 'Engine Diagnostic Program' Select [Data monitor] and monitor [Fuel Temperature]
  Reference 20 °C (68 °F) or more
- **When fuel temperature does not increase due toan environment to be measured, increase engine speed litlle by little until it reaches NMR (No load Maximum Revolution), make it the steady state, and then increase the temperature. Do not perform racing rapidly.**

(7) Run at idle for one minute or more in the state after engine warm-up.

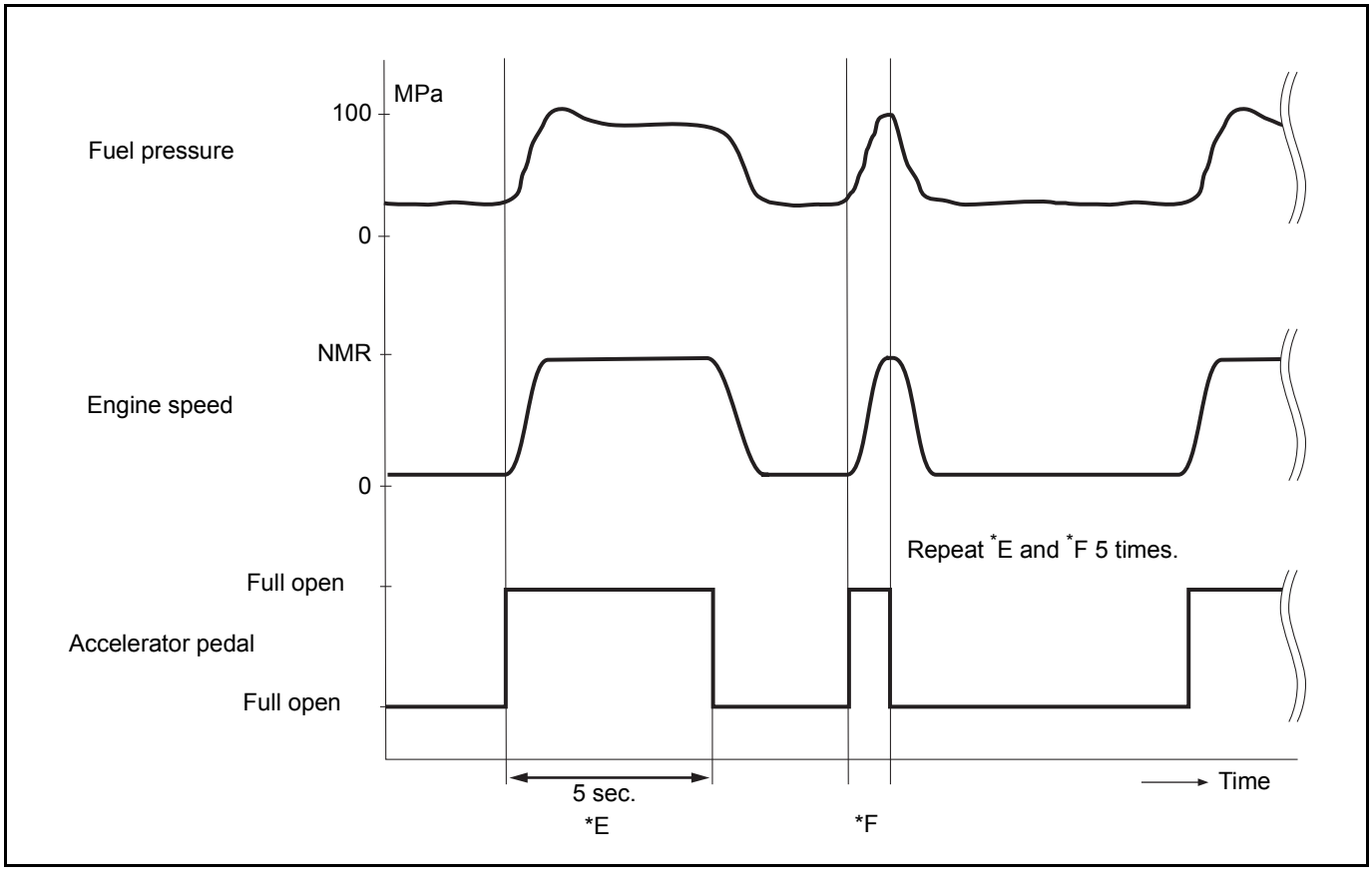
(8) The initializatin is now completed.

CIRCUIT DIAGRAM



Item name	Description/ Display range	Reference	Remarks
Injector Memory Error	• Indicates abnormal injector memory. • Display range: Normal/Abnormal	Normal	• When the ID code is not input in the new engine control computer, or when the ID code of another injector ASSY or the ID code exceeding the setting range is input in the new engine control computer, DTC P062F is output and the EEPROM abnormality (QR code) is displayed. • Abnormal memory displays results calculated by the engine control computer. Symptoms when outside the reference: Rough idling, poor drivability, black smoke, white smoke, knocking
Injection Pressure Correction	• Indicates injection pressure feedback correction amount. • Display range: -500 to 780 mm^3/st	-400 to 400mm^3/st: For standard temperature	• When the actual fuel pressure is equal to common rail target fuel pressure, injection pressure feedback correction amount becomes 0. • Injection pressure feedback correction amount is used to diagnose the supply pump of an abnormal system. • When injection pressure feedback correction amount is large, it indicates that a difference between the actual fuel pressure and common rail target fuel pressure is also large. • When injection pressure feedback correction amount is a positive value, fuel pressure transport amount increases due to insufficient fuel pressure. When it is a negative value, the amount decreases due to excessively increased rail pressure. • When the suction control valve ASSY is not closed properly, rail pressure becomes excessively large. Therefore, injection feedback correction amount and a pump current correction learned value will shift to the negative side. • It displays a value calculated by the engine control computer.
Target Common Rail Pressure	• Indicates common rail target fuel pressure. • Display range: 0 to 655350 kPa	20000 to 200000 kPa: During engine rotating	• Inspect the actual fuel pressure, comparing to common rail target fuel pressure. • During idling after warm-up, when the actual fuel pressure is stable within 5000 kPa of target fuel pressure, this condition is considered as normal. • It displays a value calculated by the engine control computer.

7. Press [Trouble Code] on the 'Engine Diagnostic Program' and read the detected diagnosis code.
   (1) When no diagnosis code is output, air bleeding is completed.
   (2) Perform the following work if a diagnosis code is output.
8. Implement the fuel system check (fuel system parts replacement). (See page 1-16 for the procedure.)
9. Press [Trouble Code] and [Clear] on the 'Engine Diagnostic Program' and delete the detected diagnosis code.
10. Start up and warm up the engine.
11. Keep the accelerator pedal fully open for 5 seconds and then release the pedal. (*E)
12. Make the accelerator pedal fully open and release the pedal when NMR is reached. (*F)
13. Perform above (*E) and (*F) 5 times.
14. Press [Trouble Code] on the 'Engine Diagnostic Program' and read the detected diagnosis code.



Result

Result	Go to
Diagnosis code is output.	A
Diagnosis code is not output.	B

B

Diagnosis code is detected due to running out of fuel, not failure of parts.

A

DTC	P0115	Engine Coolant Temperature Sensor Circuit

DTC	P0117	Engine Coolant Temperature Sensor Circuit Low

DTC	P0118	Engine Coolant Temperature Sensor Circuit High

Circuit description

The resistance value of thermistor included in the water temperature sensor varies with the change in water temperature. The water temperature sensor is connected to the engine control computer in the same manner as the inlet air temperature sensor. Even if a disconnection or short circuit occurs in the water temperature sensor while the engine is cool and thus the water and supply pump fuel temperatures are low, the engine can be started or warmed with the supply pump fuel temperature taken as water temperature.

P0115

DTC check pattern	DTC detection conditions 1. Diagnosis conditions 2. Abnormal status 3. Abnormal period 4. Others	Inspection position
0.5 sec. or longer with ignition key switch ON	1. Ignition key switch ON 2. Disconnection or shorting of water temperature sensor circuit 3. 0.5 sec. or longer 4. 1 trip	• Wire harness or connector • Water temperature sensor • Engine control computer

P0117

DTC check pattern	DTC detection conditions 1. Diagnosis conditions 2. Abnormal status 3. Abnormal period 4. Others	Inspection position
0.5 sec. or longer with ignition key switch ON	1. Ignition key switch ON 2. Shorting of water temperature sensor circuit 3. 0.5 sec. or longer 4. 1 trip	• Wire harness or connector • Water temperature sensor • Engine control computer

P0118

DTC check pattern	DTC detection conditions 1. Diagnosis conditions 2. Abnormal status 3. Abnormal period 4. Others	Inspection position
0.5 sec. or longer with ignition key switch ON	1. Ignition key switch ON 2. Disconnection of water temperature sensor circuit 3. 0.5 sec. or longer 4. 1 trip	• Wire harness or connector • Water temperature sensor • Engine control computer

Related Data List

DTC No.	Data list
P0115 P0117 P0118	Engine cooling water temperature

DTC	P0335	Crankshaft Position Sensor Circuit

DTC	P0339	Crankshaft Position Sensor Circuit Intermittent

Circuit description

The crank position sensor system consists of the crank angle sensor plate and pickup coil. The crank angle sensor plate has 34 projections with 2 lost teeth for a top dead center detection, and it is installed to the crankshaft. The pickup coil outputs a signal 34 times per engine rotation. The engine control computer determines the cylinder and the phase or angle of camshaft based on G signal, and detects the crankshaft angle and engine speed based on NE signal.

P0335

DTC check pattern	DTC detection conditions 1. Diagnosis conditions 2. Abnormal status 3. Abnormal period 4. Others	Inspection position
Cranking or engine start	1. During cranking 2. NE signal is not input 3. 4.7 sec. or longer 4. 1 trip	• Wire harness or connector • Crank position sensor No. 2 • Crank angle sensor plate • Engine control computer
3 sec. or longer after engine start	1. After the engine start (600 r/min or more) 2. NE signal is not input 3. 3 sec. or longer 4. 1 trip	

P0339

DTC check pattern	DTC detection conditions 1. Diagnosis conditions 2. Abnormal status 3. Abnormal period 4. Others	Inspection position
5 sec. or more with a minimum engine speed of 1000 r/min	1. Engine speed 1000 r/min or more 3 seconds after STA ON → OFF 2. NE signal is not input. 3. 0.05 sec. or more 4. 1 trip	• Wire harness or connector • Crank position sensor No. 2 • Crank angle sensor plate • Engine control computer

Related Data List

DTC No.	Data list
P0335 P0339	Engine speed

Note:

If P0335 and P0339 are stored, the following symptoms may occur.

- Hard starting
- Misfire
- Knocking
- Black smoke
- White smoke
- Insufficient output
- Engine stalling

2	'Engine Diagnostic Program' active test implementation (EGR target opening degree bank 1)

SST 09111-36760-71 (09991-70201)

1. Turn ON the ignition switch.
2. Press [Active test], select [EGR taget opening degree bank1] on the 'Engine Diagnostic Program'.
3. Select [Target EGR Pos.] and [Actual EGR Valve Pos.] from the data list item, then press [Start].
4. Implement the active test.
   Reference The value of [Actual EGR Valve Pos.] must follow that of [Target EGR Pos.].

NG → **Go to step 4.**

OK

3	'Engine Diagnostic Program' active test implementation (EGR target opening degree bank 1)

SST 09111-36760-71 (09991-70201)

1. Remove the electric EGR control valve ASSY.
   (See page 2-12 for the procedure.)
2. After removing the electric EGR control valve ASSY, connect the connector.
3. Turn ON the ignition switch.
4. Press [Active test], select [EGR taget opening degree bank1] on the 'Engine Diagnostic Program'.
5. When performing the active test, check if the valve of the electric EGR control valve ASSY opens and closes.
   Reference The valve opens and closes.
6. Check that the electric EGR control valve ASSY is fully closed.
   Reference The electric EGR control valve ASSY is fully closed.

Note:

- **Hold the electric EGR control valve ASSY against the light to confirm that the valve completely contacts with the valve seat.**
- **If light leaks from the valve, the electric EGR control valve ASSY is not fully closed.**
- **If there is a large volume of deposits on the electric EGR control valve ASSY or intake manifold, remove them.**

7. Install the electric EGR control valve ASSY.
   (See page 2-12 for the procedure.)

OK → **Go to step 5.**

NG

4	Replacement of electric EGR control valve ASSY

1. Replace the electric EGR control valve ASSY.
   (See page 2-12 for the procedure.)

Note:
Before replacing the electric EGR control valve ASSY, inspect the connecting condition of the wire harness and connector. If abnormal, replace or repair the wire harness or connector.

Next → **Go to step 6.**

4	Diagnosis code reading

SST 09111-36760-71 (09991-70201)

1. Start the engine.
2. Repeat engine stopping operation three times after continuing idling state for more than 5 seconds.
3. According to the instruction of the 'Engine Diagnostic Program' screen, read the diagnosis code. (See page 1-13 for the procedure.)

Result

Result	Go to
Diagnosis code is not output.	A
P0627 is output or engine start is impossible.	B

B → **Go to step 8.**

A

End

5	Suction control valve ASSY replacement

1. Replace the suction control valve ASSY. (See page 3-11 for the procedure.)

Next

6	Air bleeding of the fuel system

1. Perform the air bleeding of fuel system.

Next

7	Supply pump learned value initialization

SST 09111-36760-71 (09991-70201)

1. Turn the ignition key switch ON.
2. Press [Trouble code] on the 'Engine Diagnostic Program' and delete the detected diagnosis code.
3. Perform the supply pump learned value initialization.

Note:

- **Clear the diagnosis code before performing the learned value initialization.**
- **See page 1-16 for the procedure of supply pump learned value initialization.**

Next → **Go to step 10.**

8	Engine control computer replacement

1. Replace the engine control computer.

Next → **Go to step 10.**

P2120

DTC check pattern	DTC detection conditions 1. Diagnosis conditions 2. Abnormal status 3. Abnormal period 4. Others	Inspection position
• For 3 sec. or longer with ignition key switch ON and accelerator fully open • For 3 sec. or longer with ignition key switch ON and accelerator pedal half depressed • For 3 sec. or longer with ignition key switch ON and accelerator fully open	1. Ignition key switch ON 2. VPA voltage is 4.8 V or more, or VPA voltage is 0.2 V or less and VPA2 opening degree is 2.7 ° or more (VPA circuit abnormality). 3. 0.5 sec. or longer 4. 1 trip	• Accelerator position sensor (potentiometer) • Wire harness or connector • Engine control computer

P2122

DTC check pattern	DTC detection conditions 1. Diagnosis conditions 2. Abnormal status 3. Abnormal period 4. Others	Inspection position
• For 3 sec. or longer with ignition key switch ON and accelerator fully open • For 3 sec. or longer with ignition key switch ON and accelerator pedal half depressed • For 3 sec. or longer with ignition key switch ON and accelerator fully open	1. Ignition key switch ON 2. VPA voltage is 0.2 V or less and VPA2 opening degree is 2.7 ° or more (VPA circuit disconnection). 3. 0.5 sec. or longer 4. 1 trip	• Accelerator position sensor (potentiometer) • Wire harness or connector • Engine control computer

P2123

DTC check pattern	DTC detection conditions 1. Diagnosis conditions 2. Abnormal status 3. Abnormal period 4. Others	Inspection position
• For 3 sec. or longer with ignition key switch ON and accelerator fully open • For 3 sec. or longer with ignition key switch ON and accelerator pedal half depressed • For 3 sec. or longer with ignition key switch ON and accelerator fully open	1. Ignition key switch ON 2. VPA voltage is 4.8 V or more (VPA short circuit). 3. 2 sec. or longer 4. 1 trip	• Accelerator position sensor (potentiometer) • Wire harness or connector • Engine control computer

Inspection procedure

Caution:
- **When replacing the engine control computer, make sure to perform the supply pump ASSY learned value initialization and injector ID writing. (See page 1-16 for the procedure.)**
- **When replacing the engine control computer, perform the initialization and writing of ID code. (See page 1-16 for the procedure.)**

1	**Does the glow indicator lamp light up?**

1. Turn the ignition key switch ON and check if the glow indicator lamp light up.

Result

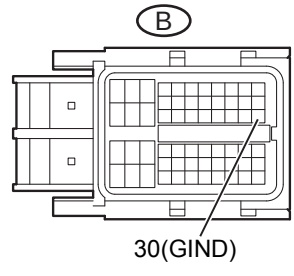
Result	Go to
Glow indicator plug does not light up.	A
Glow indicator lamp lights up for 0.5 sec. or longer.	B

B → **Go to step 4.**

A

2	**Engine control computer inspection (voltage inspection)**

Engine control computer
Connector on the machine side



Note:
See page 0-13 for the inspection procedure and notes of wire harness and connectors.

1. Disconnect the connector B in the engine control computer.
2. Turn the ignition key switch ON.
3. Measure the voltage between terminals using a tester. (See page 1-33 for the terminal layout.)

Voltage value

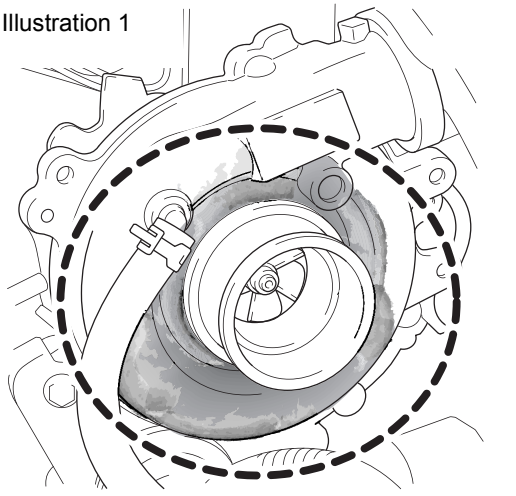
Inspection terminal	Inspection condition	Reference
B-30 (GIND) - Body ground	Ignition key switch ON	11 to 14 V

NG → **Go to step 3.**

OK

Engine control computer replacement

Illustration 1



Note:

- **This illustration is different from the turbo charger S/A of 1KD engine.**
- **In case of oil stain as shown in illustration 1, this may be because of oil scattered from the peripheral components of turbo charger S/A or because of oil leak from the air cleaner hose. Oil stain on the outer surface of turbo charger S/A is not oil leak from the turbo charger S/A (external oil leak). This is not related to white smoke, either. To identify the actual oil leak which occurs outside of the turbo charger S/A, check only the seal part shown in the illustration below.**

Illustration 2

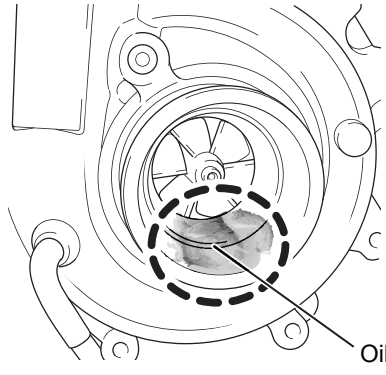
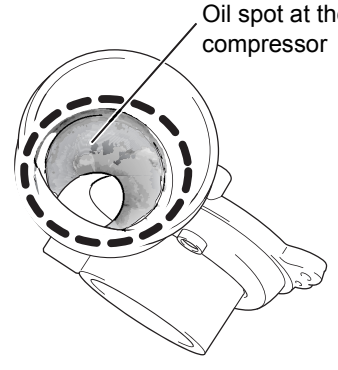


Illustration 3



Note:

- **This illustration is different from the turbo charger S/A of 1KD engine.**
- **Since blowby gas, including oil mist, is returned to the intake system by PCV, certain quantity of oil is introduced into the intake system. Oil level at the compressor inlet (shown in illustration 2) is normal. This is not oil leak (internal oil leak) from the turbo charger S/A. Oil level at the compressor outlet (shown in illustration 3) is also normal.**
- **Surface of compressor impeller may sometimes become black due to blowby gas, but this is not abnormal.**

3	'Engine Diagnostic Program' data reading (stored data reading)

1. Read the data of [MAP] and [MAF] at NMR, which was saved in step 2.

Result

Result	Go to
[MAF] is 20 g/sec. (2.65 lb/min) or more and [MAP] is 105 kPa or more.*1	A
[MAP] is less than 90 kPa.*2	B
Other than the above *3	C

NOTICE:
Data above was measured under the standard atmospheric pressure. The values may be affected by various factors, such as altitude and weather.
Standard atmospheric pressure is 101 kPa. For every 100 m (328 feet) ascending, atmospheric pressure decreases by 1 kPa. Atmospheric pressure changes by weather.
***1: The fuel system may be defective.**
***2: The turbo charger S/A system may be defective.**
***3: The intake system may be defective or EGR valve may be defective (valve stuck open or does not close).**

B → **Go to step 11.**

C → **Go to step 24.**

A

4	'Engine Diagnostic Program' data reading (stored data reading)

1. Read the data of [Fuel Press], [Target Common Rail Pressure] and [MAP] at NMR, which was saved in step 2.

Result

Result	Go to
[MAP] at NMR is less than 115 kPa.	A
Difference between [Fuel Press] and [Target Common Rail Pressure] is 20000 kPa or more.	B
Other than the above	C

NOTICE:
- **Data above was measured under the standard atmospheric pressure. The values may be affected by various factors, such as altitude and weather.**
- **Standard atmospheric pressure is 101 kPa. For every 100 m (328 feet) ascending, atmospheric pressure decreases by 1 kPa. Atmospheric pressure changes by weather.**
- **When the operation of turbo charger S/A is not smooth, the value of [MAP] saved at an insufficient power time does not reach the target. When the accelerator pedal is pressed fully and [Engine Speed] is at NMR, [MAP] is 115 kPa or more.**

B → **Go to step 18.**

C → **Go to step 24.**

A

3. Engine start inspection

   (1) Inspect if the engine starts.

NOTICE:

- **Engine should be cranked by two rotations at minimum when engine starting because ECD system electrically detects the fuel injected cylinder.**
- **If it does not start, inspect relevant portions, referring to the LIST OF SYMPTOMS (See page 1-8 for the procedure.)**

4. Air filter inspection (See the machine repair manual for the procedure.)

5. Idle speed inspection

   (1) Inspect idling.

   Reference: Refer to repair manual of the vehicle (after warm-up, during idling)

6. Fuel pressure inspection

   SST: 09240-36770-71

   (1) According to the instruction of the screen, press [Data monitor] and monitor [Fuel Press] and measure fuel pressure.

   Reference: 30000 to 50000 kPa (after warm-up, during idling)

7. Fuel property

   Inspect if a proper fuel is used as described in the Operator's Manual.

Diesel fuel

For 8FD35U to 8FD80U model

Use only ultra low-sulfur fuel defined by ASTM D0975 No.2-D S15.
Refer to the following table for details.
Detailed Requirement for ASTM D0975 No.2-D S15

Property	Unit	Value
Distillation Temperature	°C 90 %	282 to 338
Kinematic Viscosity	mm2/s at 40 °C	1.9 to 4.1
Sulfur	ppm (µ g/g) max	15
Cetane index	-, min	40
Aromaticity	%vol, max	35
Lubricity, HFRR	µm, max	520

NOTICE:

- **Do not use bio-diesel fuel. Damage to engine will occur.**
- **In cold weather, use winter diesel fuel to prevent clogging of the fuel filter caused by paraffin precipitation. In hot weather, do not use winter diesel fuel. Damage to engine will occur.**
- **Do not use deteriorated fuel which has been stored for a long period of time or impure fuel in which foreign material, water and etc. is included.**
- **If fuel is frozen or becomes wax-like substance in winter season, engine may be hard starting, rough idle after starting or engine rotation is impossible to increase. In that case, fuel for winter use should be used. Melt the wax generated in the fuel filter by warming.**