<SUPPLEMENT-I>

ENGINE CONTROL SYSTEM

SECTION EC

MODIFICATION NOTICE:

• The RD28ETi engine has been replaced by the ZD30DDTi engine.

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Special Service Tool



Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to NISSAN MODEL Y61 is as follows (The composition varies according to the destination and optional equipment.):

• For a frontal collision

The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

• For a side collision

The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS section** of this Service Manual. **WARNING:**

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.

Alphabetical & Numerical Index for DTC

ALPHABETICAL INDEX FOR DTC

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC	MI illumination	Reference page
ACCEL POS SENSOR	0403	Х	EC-1125
ACCEL POS SW (F/C)	0203	Х	EC-1100
A/T COMM LINE	0504	—	EC-1148
COOLANT TEMP SEN	0103	Х	EC-1092
CRANK POS SEN (TDC)	0407	Х	EC-1140
ECM 2	0301	Х	EC-1117
ECM 10	0802	Х	EC-1187
ECM 11	0804		EC-1189
ECM 14	0807	Х	EC-1191
ECM 15	0903	—	EC-1200
ECM RLY	0902	Х	EC-1196
EGR VOLUME CONT/V	1003	Х	EC-1207
FUEL CUT SYSTEM1	1004	Х	EC-1215
INT/AIR VOLUME	0406	—	EC-1138
MASS AIR FLOW SEN	0102	Х	EC-1086
NATS MALFUNCTION	1401 - 1408	—	EL section
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	0505	_	_
OVER HEAT	0208	Х	EC-1105
P1·CAM POS SEN	0701	Х	EC-1153
P2-TDC PULSE SIG	0702	Х	EC-1159
P3-PUMP COMM LINE	0703	Х	EC-1165
P4·SPILL/V CIRC	0704	Х	EC-1171
P5-PUMP C/MODULE	0705	Х	EC-1177
P6·SPILL VALVE	0706	Х	EC-1171
P7·F/INJ TIMG FB	0707	Х	EC-1180
P9·FUEL TEMP SEN	0402	Х	EC-1119
TURBO PRESSURE	0905	Х	EC-1202
VEHICLE SPEED SEN	0104	Х	EC-1096

TROUBLE DIAGNOSIS — INDEX

Alphabetical & Numerical Index for DTC (Cont'd)

NUMERICAL INDEX FOR DTC

X: Applicable —: Not applicable

DTC	Items (CONSULT-II screen terms)	MI illumination	Reference page
0102	MASS AIR FLOW SEN	Х	EC-1086
0103	COOLANT TEMP SEN	Х	EC-1092
0104	VEHICLE SPEED SEN	Х	EC-1096
0203	ACCEL POS SW (F/C)	Х	EC-1100
0208	OVER HEAT	Х	EC-1105
0301	ECM 2	Х	EC-1117
0402	P9-FUEL TEMP SEN	Х	EC-1119
0403	ACCEL POS SENSOR	Х	EC-1125
0406	INT/AIR VOLUME		EC-1138
0407	CRANK POS SEN (TDC)	Х	EC-1140
0504	A/T COMM LINE		EC-1148
0505	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_
0701	P1-CAM POS SEN	Х	EC-1153
0702	P2-TDC PULSE SIG	Х	EC-1159
0703	P3-PUMP COMM LINE	Х	EC-1165
0704	P4·SPILL/V CIRC	Х	EC-1171
0705	P5-PUMP C/MODULE	Х	EC-1177
0706	P6·SPILL VALVE	Х	EC-1171
0707	P7·F/INJ TIMG FB	Х	EC-1180
0802	ECM 10	Х	EC-1187
0804	ECM 11	—	EC-1189
0807	ECM 14	Х	EC-1191
0902	ECM RLY	Х	EC-1196
0903	ECM 15	_	EC-1200
0905	TURBO PRESSURE	Х	EC-1202
1003	EGR VOLUME CONT/V	Х	EC-1207
1004	FUEL CUT SYSTEM1	Х	EC-1215
1401 - 1408	NATS MALFUNCTION	_	EL section





ECM harness protector

Precautions

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cable while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.
- Do not disassemble ECM.
- If a battery terminal is disconnected, the memory will return to the ECM value. The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a problem. Do not replace parts because of a slight variation.
- When ECM is removed for inspection, make sure to ground the ECM mainframe.







When connecting ECM harness connector, tighten securing bolt until the gap between the orange indicators disappears.

●: 3.0 - 5.0 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)

When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in the circuit, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in) away from adjacent harnesses, to prevent an ECM system malfunc-

PRECAUTIONS

Precautions (Cont'd)

- tion due to receiving external noise, degraded operation of ICs, etc.
- Keep ECM parts and harnesses dry.







• Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-1068.

- If MI illuminates or blinks irregularly when engine is running, water may have accumulated in fuel filter. Drain water from fuel filter. If this does not correct the problem, perform specified trouble diagnostic procedures.
- After performing each TROUBLE DIAGNOSIS, perform "DTC Confirmation Procedure" or "Overall Function Check".

The DTC should not be displayed in the "DTC Confirmation Procedure" if the repair is completed. The "Overall Function Check" should be a good result if the repair is completed.

- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



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PRECAUTIONS

Precautions (Cont'd)

- Do not disconnect pump harness connector with engine running.
- Do not disassemble electronic fuel injection pump. If NG, take proper action.
- Do not disassemble injection nozzle. If NG, replace injection nozzle.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the crankshaft position sensor (TDC).
- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.
- 1) Keep the antenna as far as possible away from the ECM.
- 2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
 Do not let them run parallel for a long distance.
- 3) Adjust the antenna and feeder line so that the standingwave ratio can be kept smaller.
- 4) Be sure to ground the radio to vehicle body.

ECCS-D Component Parts Location



*: Only models for cold areas

ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi ECCS-D Component Parts Location (Cont'd)

Electronic control fuel injection pump



SEF220Z

ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi



ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi

ECCS-D Component Parts Location (Cont'd)





Circuit Diagram

TEC095M



System Diagram

SEF222Z

Vacuum Hose Drawing



- 1. Swirl control valve control solenoid valve to 3-way connector
- Swirl control valve control solenoid valve to swirl control valve actuator
- 3. Vacuum gallery to 3-way connector
- Intake air control valve control solenoid valve to intake air control valve actuator
- 5. Intake air control valve control
- solenoid valve to 3-way connector6. Variable nozzle turbocharger control solenoid valve to vacuum tank
- 7. Vacuum tank to vacuum gallery
- Variable nozzle turbocharger control actuator to vacuum damper
- Variable nozzle turbocharger control solenoid valve to vacuum damper

Refer to "System Diagram", EC-1016 for vacuum control system.

- 10. Variable nozzle turbocharger control solenoid valve to resonator
- 11. Vacuum pump to vacuum gallery
- 12. Exhaust gas control valve control
- solenoid valve to 3-way connector
- Exhaust gas control valve control solenoid valve to exhaust gas control valve actuator

EC-1017

ENGINE AND EMISSION CONTROL OVERALL SYSTEM ZD30DDTi

Input (Sensor)	ECM Function	Output (Actuator)
• Electronic control fuel injection pump	Fuel injection control	Electronic control fuel injection pump
Crankshaft position sensor (TDC) Engine conjunt temperature concerned	Fuel injection timing control	Electronic control fuel injection pump
Accelerator position sensor	Fuel cut control	Electronic control fuel injection pump
 Accelerator position switch 	Glow control system	Glow relay & glow lamp
 Accelerator switch (F/C) Park/Neutral position (PNP) switch 	On board diagnostic system	MIL (On the instrument panel)
Ignition switch	EGR volume control	EGR volume control valve
Battery voltage	Cooling fan control	Cooling fan relay
 Venicle speed sensor Air conditioner switch 	Air conditioning cut control	Air conditioner relay
Mass air flow sensorStop lamp switch	Variable nozzle turbocharger control	Variable nozzle turbocharger control sole- noid valve
Heat up switch Charge air processes*1	Swirl control valve control	Swirl control valve control solenoid valve
• Charge all pressure sensor 1	Intake air control valve control	Intake air control valve control solenoid valve
	Exhaust gas control valve control*2	Exhaust gas control valve control solenoid valve*2

System Chart

*1: This sensor is not used to control the engine system under normal conditions. *2: For models for cold areas

Fuel Injection Control System

DESCRIPTION

System description

Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. The ECM determines the appropriate fuel injection control. Under each control, the amount of fuel injected is compensated to improve engine performance.

Pulse signals are exchanged between ECM and electronic control fuel injection pump (control unit is builtin). The fuel injection pump control unit performs duty control on the spill valve (built into the fuel injection pump) according to the input signals to compensate the amount of fuel injected to the preset value.

Start control Input/output signal chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (TDC)	Engine speed	Fuel injection con-	Electronic control fuel injec-
Ignition switch	Start signal		tion bomb



When the ECM receives a start signal from the ignition switch, the ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in the ECM. The program is determined by the engine speed and engine coolant temperature.

For better startability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. The ECM ends the start control when the engine speed reaches the specific value, and shifts the control to the normal or idle control.

Idle control Input/output signal chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (TDC)	Engine speed		
Park/Neutral position (PNP) switch	Gear position	Fuel injection con- trol (Idle control) tion pump	
Battery	Battery voltage		Electronic control fuel injec-
Accelerator position switch	Idle position		tion pump
Vehicle speed sensor	Vehicle speed		
Air conditioner switch	Air conditioner signal		
Heat up switch	Heat up switch signal		

When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature and heat up switch signal.

EC-1019

ENGINE AND EMISSION BASIC CONTROL SYSTEM DESCRIPTION



Fuel Injection Control System (Cont'd)

Normal control Input/output signal chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (TDC)	Engine speed	Fuel injection con- trol (Normal con- trol)	
Accelerator position sensor	Accelerator position		Electronic control fuel injec-
Vehicle speed sensor	Vehicle speed		



The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor (TDC) detects engine speed and the accelerator position sensor detects accelerator position. These sensors send signals to the ECM.

The fuel injection data, predetermined by correlation between various engine speeds and accelerator positions, are stored in the ECM memory, forming a map. The ECM determines the optimal amount of fuel to be injected using the sensor signals in comparison with the map.

Maximum amount control Input/output signal chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Mass air flow sensor	Amount of intake air	Fuel injection con- trol (Maximum amount control)	
Engine coolant temperature sensor	Engine coolant temperature		Electronic control fuel injec-
Crankshaft position sensor (TDC)	Engine speed		tion pump
Accelerator position sensor	Accelerator position		

The maximum injection amount is controlled to an optimum by the engine speed, intake air amount, engine coolant temperature, and accelerator opening in accordance with the driving conditions. This prevents the oversupply of the injection amount caused by decreased air density at a high altitude or during a system failure.

Deceleration control

Input/output signal chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Accelerator switch (F/C)	Accelerator position	Fuel injection con- trol (Deceleration control)	Electronic control fuel injec-
Crankshaft position sensor (TDC)	Engine speed		tion pump

The ECM sends a fuel cut signal to the electronic control fuel injection pump during deceleration for better fuel efficiency. The ECM determines the time of deceleration according to signals from the accelerator switch (F/C) and crankshaft position sensor (TDC).

Fuel Injection Timing Control System

DESCRIPTION

The target fuel injection timing in accordance with the engine speed and the fuel injection amount are recorded as a map in the ECM beforehand. The ECM and the injection pump control unit exchange signals and perform feedback control for optimum injection timing in accordance with the map.

Air Conditioning Cut Control

DESCRIPTION

Input/output signal chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Air conditioner switch	Air conditioner "ON" signal	Air conditioner cut control	Air conditioner relay
Accelerator position sensor	Accelerator valve opening angle		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		

System description

This system improves acceleration when the air conditioner is used.

When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds.

When engine coolant temperature becomes excessively high, the air conditioner is turned off. This continues until the engine coolant temperature returns to normal.

Fuel Cut Control (at no load & high engine speed)

DESCRIPTION

Input/output signal chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Vehicle speed sensor	Vehicle speed		
Park/Neutral position (PNP) switch	Neutral position		
Accelerator position switch or Accelerator switch (F/C)	Accelerator position	Fuel cut control	Electronic control fuel injec- tion pump
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (TDC)	Engine speed		

If the engine speed is above 2,700 rpm with no load (for example, in neutral and engine speed over 2,700 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:

This function is different from deceleration control listed under "Fuel Injection Control System", EC-1019.

Crankcase Ventilation System

DESCRIPTION

In this system, blow-by gas is sucked into the air inlet pipe after oil separation by oil separator in the rocker cover.





INSPECTION

Ventilation hose

- 1. Check hoses and hose connections for leaks.
- 2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.

Injection Tube and Injection Nozzle

REMOVAL AND INSTALLATION

CAUTION:

- Do not disassemble injection nozzle assembly. If NG, replace injection nozzle assembly.
- Plug flare nut with a cap or rag so that no dust enters the nozzle. Cover nozzle tip for protection of needle.





Injection tube

Removal

- 1. Mark the cylinder Nos. to the injection tubes, then disconnect them.
- Marking should be made at proper locations and by the proper method, so that they are not erased by fuel, etc.
- 2. Remove the clamps, then disconnect the tubes one by one.
 Avoid letting leaked fuel get on the interior walls of the engine compartment.

Take special care to prevent fuel from getting on the engine mount insulator.

Injection Tube and Injection Nozzle (Cont'd) Installation

- Install the injection tubes, referring to the markings made during removal.
- Install the injection tubes in the order of No. 3, No. 4, No. 1, and No. 2.



Injection nozzle oil seal

Removal

Using a tool such as a flat-bladed screwdriver, pry the flange of the seal, then remove it.

Installation

After the injection nozzle assembly is installed, push the seal from the cylinder head side until it contacts the flange.

• Replace the oil seal with new one when the injection nozzle assembly is removed. (It is not necessary to replace the oil seal when only injection tubes are removed.)

Spill tube

Installation

- After the spill tube is installed, check the airtightness of the spill tube.
- After the bolts are tightened, the joint of the spill tube gasket might be broken. However, this will not affect function.



Injection nozzle assembly

Removal

- 1. Remove the nozzle support, then pull out the injection nozzle assembly by turning it clockwise/counterclockwise.
- 2. Using a tool such as a flat-head screwdriver, remove the copper washer inside the cylinder head.

CAUTION:

Do not disassemble the injection nozzle. Installation

- 1. Insert the nozzle gasket to the cylinder head hole.
- 2. Attach the O-ring to the mounting groove of the nozzle side, then insert it in the cylinder head.

TEST AND ADJUSTMENT

WARNING:

When using nozzle tester, be careful not to allow diesel fuel sprayed from nozzle to contact your hands or body, and make sure your eyes are properly protected with goggles.



Injection Tube and Injection Nozzle (Cont'd) Inspection for spill tube airtightness

Before the rocker cover is installed, perform the inspection as follows.

- 1. Connect the handy vacuum pump to the spill hose.
- 2. Check that the airtightness is maintained after the negative pressure shown below is applied.
 - Standard:
 - -53.3 to -66.7 kPa (-533 to -667 mbar, -400 to -500 mmHg, -15.75 to -19.69 inHg)

Air bleeding of fuel piping

After the repair, bleed air in the piping by pumping the priming pump up and down until it becomes heavy.



Injection pressure test

1. Install injection nozzle assembly to injection nozzle tester and bleed air from flare nut.

- 2. Pump the tester handle slowly (one time per second) and watch the pressure gauge.
- 3. Read the pressure gauge when the injection pressure just starts dropping.
 - Initial injection pressure:

```
Used
```

19,026 kPa (190.3 bar, 194 kg/cm², 2,759 psi) New

19,516 - 20,497 kPa (195.2 - 205.0 bar, 199 - 209 kg/cm², 2,830 - 2,972 psi)

Limit

- 16,182 kPa (161.8 bar, 165 kg/cm², 2,346 psi)
- The injection nozzle assembly has a 2-stage pressure injection function. However, the judgement should be made at the first stage of the valve opening pressure.



Injection Tube and Injection Nozzle (Cont'd) Spray pattern test

- 1. Check spray pattern by pumping tester handle one full stroke per second.
 - NG spray pattern: Does not inject straight and strong (B in the figure).

Fuel drips (C in the figure).

- Does not inject evenly (D in the figure).
- 2. If the spray pattern is not correct, replace injection nozzle assembly.

Electronic Control Fuel Injection Pump

REMOVAL AND INSTALLATION

CAUTION:

When removing or installing the timing chain as incidental work of the fuel injection pump removal/ installation, always secure the internal mechanism of the idler gear with bolts before removing or installing the fuel injection pump sprocket. Do not refer to the procedure for "TIMING CHAIN" in EM section based on No. 1 cylinder compression top dead center. (Unless otherwise specified.)



Electronic Control Fuel Injection Pump (Cont'd) REMOVAL

1. Remove the following:

- Engine coolant draining
- Charge air cooler
- Air inlet pipe
- Throttle body
- Rocker cover
- Oil level gauge guide
- EGR guide tube
- EGR volume control solenoid valve
- Fuel hose
- Injection tube
- Radiator upper hose
- Radiator shroud
- Cooling fan
- Drive belt
- Vacuum pipe
- Vacuum pump
- 2. Move the power steering pump.





- 3. Remove the harness connector from the fuel injection pump.
- After pulling the connector stopper all the way back, remove the connector.
- When the stopper is pulled all the way back, the interlockedconnector will come off.

As for installation, when the connector is pushed all the way forward until the stopper locks, the interlocked-connector is inserted.

- 4. Remove the fuel injection pump rear bracket.
- 5. Remove the chain cover.
- Remove the installation bolts A, B, and C shown in the figure (left).

CAUTION:

During chain cover removal, seal the opening to prevent foreign objects from getting into the engine.

- 6. Fix the internal mechanism of the idler gear (scissors gear structure).
- a. Remove the plug on the front side of the gear case.
- b. While turning the crankshaft pulley clockwise, check the tightening bolt hole of the idler gear internal mechanism through the plug hole.
- Conduct the visual check using a mirror.
- When checking, note that there are 2 other holes (with no thread) beside the tightening bolt hole on the idler gear.

EC-1027

JEF262Z

BASIC SERVICE PROCEDURE



Electronic Control Fuel Injection Pump (Cont'd)

c. Install the tightening bolt [Part No.: 81-20620-28, thread diameter: M6, under head: 20 mm (0.79 in), pitch: 1.0 mm (0.039 in)] to the idler gear tightening bolt hole, and tighten to the specified torque:

CAUTION:

- To protect the idler gear from damage, do not use the substitute part for the tightening bolt.
- Hereafter, do not turn the crankshaft to avoid hitting tightening bolt head against the gear case.
- Do not remove the idler gear tightening bolt before installations of the timing chain and related parts are completed.
- 7. Make mating marks on the cam sprocket, fuel injection pump sprocket, and timing chain with paint.
- 8. Make mating marks on the fuel injection pump gear and idler gear with paint.
- 9. Remove the chain tensioner.
- (1) Loosen the upper and lower installation bolts.
- (2) While holding the chain tensioner by hand, remove the upper installation bolt to release the spring tension.
- (3) Remove the lower installation bolt first, and then the chain tensioner.
- Since the chain tensioner does not have a mechanism to prevent the plunger pop-out, watch out for the fall of the plunger and spring. (Return prevention mechanism is available.)
- 10. Remove the timing chain slack guide.
- 11. Remove the cam sprocket and timing chain at the same time.
- Make mating marks on each sprocket and timing chain.
- Hold the hexagon head of the camshaft on the exhaust manifold side, and loosen the cam sprocket installation bolt.
 CAUTION:

Do not loosen the installation bolt using a chain tension.

- 12. Remove the fuel injection pump sprocket and gear as an assembly.
- Fix the fuel injection pump gear with the pulley holder (SST), and loosen the installation bolt for removal.
- Try not to move the pump shaft when removing.
- Connect the sprocket and gear with a dowel pin, and tighten them together with the installation bolt.



BASIC SERVICE PROCEDURE



Electronic Control Fuel Injection Pump (Cont'd)

- 13. Make the mating marks on the fuel injection pump flange and front plate with paint.
- 14. Remove installation bolts first, and then fuel injection pump toward the rear side of the engine.
- When the fuel injection pump is stationary, it can still be retained by the dowel without all bolts.

CAUTION:

Do not disassemble or adjust the fuel injection pump.

INSTALLATION

- The injection timing adjustment to correct the installation angle deviation is not necessary. Install the pump in the proper position according to the dowel and installation bolts.
- 1. Install the fuel injection pump from the rear side of the engine.
- Match the dowel of the spacer to the dowel hole of the pump side for installation.
- Replace the seal washer of the installation bolt with a new one.
- 2. Align the mating marks of the fuel injection pump flange and front plate, and then adjust the approximate flange position.
- Each hole [6 mm (0.24 in) dia.] is used as a reference point for the fuel injection pump flange, fuel injection pump gear, and fuel injection pump sprocket.
- Only during removal/installation at No. 1 cylinder compression top dead center, can the hole [6 mm (0.24 in) dia.] of the pump body be aligned.
- 3. Install the fuel injection pump sprocket and gear as an assembly.
- Align the mating marks of the idler gear and fuel injection pump gear properly.

- 4. Tighten the installation bolt of the fuel injection pump sprocket.
- Fix the fuel injection pump gear with the pulley holder (SST), and tighten the installation bolt.

CAUTION:

Before tightening the installation bolt, check again that the mating marks of the idler gear and fuel injection pump gear are aligned.

BASIC SERVICE PROCEDURE



Electronic Control Fuel Injection Pump (Cont'd)

- 5. Install the cam sprocket and timing chain at the same time.
- Align the mating marks of the fuel injection pump sprocket and cam sprocket, and install the timing chain.
- Holding the hexagon head of the camshaft with a wrench, tighten the cam sprocket installation bolt.

CAUTION:

Do not tighten the installation bolt using a chain tension.

- 6. Install the timing chain, related parts, and the chain cover. Refer to EM section, "TIMING CHAIN".
- 7. Remove the tightening bolt of the idler gear internal mechanism.
- 8. Apply the liquid gasket to the screw of the plug, and tighten the plug.
 - . 7.9 9.8 N⋅m (0.8 1.0 kg-m, 70 86 in-lb)
 - Use Genuine Liquid Gasket or equivalent.
- 9. Install the fuel injection pump rear bracket.
- Tighten all the installation bolts temporarily, and then tighten them firmly with both surfaces of the fuel injection pump and cylinder block attached to the installation surface.

- 10. Connect the harness connector of the fuel injection pump.
- Insert the harness connector until the stopper is completely locked.
- When the connector is pushed fully to lock the stopper, the interlocked-connector is inserted.

11. Installation is in the reverse order of removal.

JEF260Z



Air Bleeding

Pump the priming pump to bleed air.

- When air is bled completely, the pumping of the priming pump suddenly becomes heavy. Stop operation at that time.
- If it is difficult to bleed air by the pumping of the priming pump (the pumping of the priming pump does not become heavy), disconnect the fuel supply hose between the fuel filter and the injection pump. Then, perform the operation described above, and make sure that fuel comes out. (Use a pan, etc. so as not to spill fuel. Do not let fuel get on engine and other parts.) After that, connect the hose, and then bleed air again.

DTC and MI Detection Logic

When a malfunction is detected, the malfunction (DTC) is stored in the ECM memory. The MI will light up each time the ECM detects malfunction. For diagnostic items causing the MI to light up, refer to "TROUBLE DIAGNOSIS — INDEX", EC-1006.

Diagnostic Trouble Code (DTC)

HOW TO READ DTC

The DTC can be read by the following methods.

Without CONSULT-II

ECM displays the DTC by a set of four digit numbers with MI illumination in the diagnostic test mode II (Self-diagnostic results). Example: 0102, 0407, 1004, etc.

With CONSULT-II

CONSULT-II displays the DTC in "SELF-DIAG RESULTS" mode. Examples: "CRANK POS SEN (TDC)", etc.

• Output of the trouble code means that the indicated circuit has a malfunction. However, in the Mode II it does not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.

CONSULT-II can identify them. Therefore, using CONSULT-II (if available) is recommended.

HOW TO ERASE DTC

How to erase DTC (() With CONSULT-II)

1.If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.

- 2. Touch "ENGINE".
- 3. Touch "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

 If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 9 seconds and then turn it "ON" again.



The emission related diagnostic information in the ECM can be erased by selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT-II.

How to erase DTC (Without CONSULT-II)

1.If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.

Diagnostic Trouble Code (DTC) (Cont'd)

- 2. Change the diagnostic test mode from Mode II to Mode I by using the data link connector. (See EC-1035.)
- The emission related diagnostic information in the ECM can be erased by changing the diagnostic test mode.
- If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.
- Erasing the emission-related diagnostic information using CONSULT-II is easier and quicker than switching the diagnostic test mode using the data link connector.

r			
	SELF DIAG RESU	LTS	
	DTC RESULTS	TIME	
	NATS MALFUNCTION	0	
			SEF2522

NATS (Nissan Anti-Theft System)

- If the security indicator lights up with the ignition switch in the "ON" position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform selfdiagnostic results mode with CONSULT-II using NATS program card. Refer to "NATS (Nissan Anti-Theft System)" in EL section.
- Confirm no self-diagnostic results of NATS is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.
 - When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card. Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NATS initialization and NATS ignition key ID registration, refer to CON-SULT-II operation manual, NATS.



Malfunction Indicator (MI)

DESCRIPTION

The MI is located on the instrument panel.

- 1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
- If the MI does not light up, refer to EL section ("WARNING LAMPS AND CHIME") or see EC-1276.
- 2. When the engine is started, the MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.

If MI illuminates or blinks irregularly after starting engine, water may have accumulated in fuel filter. Drain water from fuel filter. Refer to MA section.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION ZD30DDTi

Malfunction Indicator (MI) (Cont'd) On board diagnostic system function

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit. (See EC-1276.)
	Engine running	MALFUNCTION WARNING	This is a usual driving condition. When ECM detects a malfunction, the MI will light up to inform the driver that a malfunction has been detected.
Mode II	Ignition switch in ON position	SELF-DIAGNOSTIC RESULTS	This function allows DTCs to be read.

ZD30DDTi

How to switch diagnostic test modes



*1: EC-1276

*2: EC-1034

*3: EC-1276

SEE372YB

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION ZD30DDTi

Malfunction Indicator (MI) (Cont'd)

Diagnostic test mode I — Bulb check

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL section, "WARNING LAMPS AND CHIME" or see EC-1276.

Diagnostic test mode I — Malfunction warning

MI	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

Diagnostic test mode II — Self-diagnostic results

In this mode, DTC is indicated by the number of blinks of the MI as shown below.





Long (0.6 second) blinking indicates the two LH digits of number and short (0.3 second) blinking indicates the two RH digits of number. For example, the MI blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC "1003". In this way, all the detected malfunctions are classified by their DTC numbers. The DTC "0505" refers to no malfunction. (See TROUBLE DIAGNOSIS — INDEX, EC-1006.)

How to erase diagnostic test mode II (Self-diagnostic results)

The DTC can be erased from the backup memory in the ECM when the diagnostic test mode is changed from Diagnostic Test Mode II to Diagnostic Test Mode I. (Refer to "How to Switch Diagnostic Test Modes", EC-1035.)

- If the battery terminal is disconnected, the DTC will be lost from the backup memory within 24 hours.
- Be careful not to erase the stored memory before starting trouble diagnoses.
ZD30DDTi

Malfunction Indicator (MI) (Cont'd)

Relationship between MI, DTC, CONSULT-II and driving patterns



- *1: When a malfunction is detected, MI will light up.
- *2: When the same malfunction is detected in two consecutive driving patterns, MI will stay lit up.
- *3: MI will go off after vehicle is driven three times without any malfunctions.
- *4: When a malfunction is detected for the first time, the DTC will be stored in ECM.
- *5: The DTC will not be displayed any longer after vehicle is driven 40 times without the same malfunction. (The DTC still remain in ECM.)
- *6: Other screens except SELF-DI-AGNOSTIC RESULTS & DATA MONITOR (AUTO TRIG) cannot display the malfunction. DATA MONITOR (AUTO TRIG) can display the malfunction at the moment it is detected.



CONSULT-II

CONSULT-II INSPECTION PROCEDURE

- 1. Turn ignition switch OFF.
- 2. Connect CONSULT-II to data link connector, which is located under the driver side dash panel.

SELECT SYSTEM	
OLLEOT OTOTEM	
ENGINE	
	SEF995X

- 3. Turn ignition switch ON.
- 4. Touch "START".
- 5. Touch "ENGINE".
- 6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.

]	SELECT DIAG MODE	
	SELF-DIAG RESULTS	
	DATA MONITOR	
	ACTIVE TEST	
	ECM PART NUMBER	
I		SEF320Y

CONSULT-II (Cont'd) ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

			DIAGNOSTIC TEST MODE			
ltem			SELF-DIAG RESULTS	DATA MONI- TOR	ACTIVE TEST	
		Engine coolant temperature sensor	Х	Х		
		Vehicle speed sensor	Х	Х		
		Accelerator position sensor	Х	Х	Х	
		Accelerator position switch	Х	Х		
		Accelerator switch (F/C)	Х	Х		
۲S		Crankshaft position sensor (TDC)	Х	Х		
PAF		Ignition switch (start signal)		Х		
NT		Park/Neutral position (PNP) switch		Х		
ONE		Battery voltage		X		
MP		Air conditioner switch		Х		
о С		Mass air flow sensor	Х	Х		
ROL		Stop lamp switch	Х	Х		
DNT		Heat up switch		Х		
ŭ		Charge air pressure sensor	Х			
GIN		Glow relay		Х	Х	
Ē		EGR volume control valve	Х	Х	Х	
		Cooling fan relay	Х	Х	Х	
	OUTPUT	Air conditioner relay		Х		
		Variable nozzle turbocharger control solenoid valve		Х		
		Swirl control valve control solenoid valve		Х	Х	
		Exhaust gas control valve control solenoid valve		Х		

X: Applicable

SELF-DIAGNOSTIC MODE

Regarding items detected in "SELF-DIAG RESULTS" mode, refer to "TROUBLE DIAGNOSIS — INDEX", EC-1006.

DATA MONITOR MODE

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CKPS·RPM (TDC) [rpm]	0	0	 The engine speed computed from the crankshaft position sensor (TDC) signal is displayed. 	
CMPS·RPM·PUMP [rpm]	0	0	 The engine speed computed from the pulse signal sent from electronic control fuel injection pump is displayed. 	
COOLAN TEMP/S [°C] or [°F]	0	0	• The engine coolant temperature (deter- mined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.

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CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
VHCL SPEED SE [km/h] or [mph]	0	0	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
FUEL TEMP SEN [°C] or [°F]	0	0	• The fuel temperature (sent from elec- tronic control fuel injection pump) is dis- played.	
ACCEL POS SEN [V]	0	0	 The accelerator position sensor signal voltage is displayed. 	
FULL ACCEL SW [ON/OFF]	0	0	 Indicates [ON/OFF] condition from the accelerator position switch signal. 	
ACCEL SW (FC) [OPEN/CLOSE]	0	0	 Indicates [OPEN/CLOSE] condition from the accelerator switch (FC) signal. 	
OFF ACCEL SW [ON/OFF]	0	0	 Indicates [ON/OFF] condition from the accelerator position switch signal. 	
SPILL/V [°CA]		0	 The control position of spill valve (sent from electronic control fuel injection pump) is displayed. 	
BATTERY VOLT [V]	0	0	 The power supply voltage of ECM is dis- played. 	
P/N POSI SW [ON/OFF]	0	0	 Indicates [ON/OFF] condition from the park/neutral position switch signal. 	
START SIGNAL [ON/OFF]	0	0	 Indicates [ON/OFF] condition from the starter signal. 	 After starting the engine, [OFF] is dis- played regardless of the starter signal.
AIR COND SIG [ON/OFF]	0	0	 Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. 	
BRAKE SW [ON/OFF]	0	0	 Indicates [ON/OFF] condition from the stop lamp switch signal. 	
IGN SW [ON/OFF]	0	0	 Indicates [ON/OFF] condition from igni- tion switch signal. 	
WARM UP SW [ON/OFF]	0		 Indicates [ON/OFF] condition from the heat up switch signal. 	
MAS AIR/FL SE [V]	0	0	 The signal voltage of the mass air flow sensor is displayed. 	• When the engine is stopped, a certain value is indicated.
DECELER F/CUT [ON/OFF]		0	 The [ON/OFF] condition from decelera- tion fuel cut signal (sent from electronic control fuel injection pump) is displayed. 	
INJ TIMG C/V [%]		0	• The duty ratio of fuel injection timing control valve (sent from electronic control fuel injection pump) is displayed.	
AIR COND RLY [ON/OFF]		0	• Indicates the control condition of the air conditioner relay (determined by ECM according to the input signals).	
GLOW RLY [ON/OFF]		0	 The glow relay control condition (deter- mined by ECM according to the input signal) is displayed. 	

ZD30DDTi

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
COOLING FAN [ON/OFF]		0	 Indicates the control condition of the cooling fans (determined by ECM according to the input signal). ON Operates. OFF Stopped. 	
EGR VOL CON/V [step]		0	 Indicates the EGR volume control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 	
VNT S/V 1 [%]			 Indicates the variable nozzle turbo- charger control solenoid valve control value computed by the ECM according to the input signals. 	
BARO SEN [kPa]	0		• The barometric pressure (determined by the signal voltage from the barometric pressure sensor built into the ECM) is displayed.	
SWRL CON S/V 1 [ON/OFF]		0	 The control condition of the swirl control valve control solenoid valve (determined by ECM according to the input signals) is indicated. ON Swirl control valve is closed. OFF Swirl control valve is opened. 	
EXH/GAS REG V [ON/OFF]			 The control condition of the exhaust gas control valve control solenoid valve (computed by ECM according to the input signals) is indicated. ON Exhaust gas control valve is closed. OFF Exhaust gas control valve is opened. 	 This item is applicable for cold area models. On other models, "OFF" is always dis- played.

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION CONSULT-II (Cont'd)

ZD30DDTi

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
COOLING FAN	 Ignition switch: ON Operate the cooling fan at "LOW", "HI" speed and turn "OFF" using CONSULT-II. 	Cooling fan moves at "LOW", "HI" speed and stops.	 Harness and connector Cooling fan motor Cooling fan relay
OFF ACCEL PO SIG	• Clears the self-learning fully closer ECM.	d accelerator position, detected by ac	celerator position sensor, from the
GLOW RLY	 Ignition switch: ON (Engine stopped) Turn the glow relay "ON" and "OFF" using CONSULT-II and listen to operating sound. 	Glow relay makes the operating sound.	 Harness and connector Glow relay
INJ TIMING*	 Engine: Return to the original trouble condition Retard the injection timing using CONSULT-II. 	If trouble symptom disappears, see CHECK ITEM.	 Electronic control fuel injection pump
SWIRL CONT S/V1	 Ignition switch: ON Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound. 	Solenoid valve makes an operating sound.	Harness and connectorSolenoid valve
EGR VOL CONT/V	 Ignition switch: ON Change EGR volume control valve opening step using CON-SULT-II. 	EGR volume control valve makes an operating sound.	Harness and connectorEGR volume control valve

*: When using this item, DTC 0707 "P7 F/INJ TIMG FB" may be detected. If so, erase it because it is not a malfunction.





CONSULT-II (Cont'd)

REAL TIME DIAGNOSIS IN DATA MONITOR MODE

CONSULT-II has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

- 1) "AUTO TRIG" (Automatic trigger):
- The malfunction will be identified on the CONSULT-II screen in real time.

In other words, DTC will be displayed if the malfunction is detected by ECM.

At the moment a malfunction is detected by ECM, "MONI-TOR" in "DATA MONITOR" screen is changed to "Recording Data ... xx%" as shown at left, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, "REAL-TIME DIAG" screen is displayed. If "STOP" is touched on the screen during " Recording Data ... xx%", "REAL-TIME DIAG" screen is also displayed.

The recording time after the malfunction detection and the recording speed can be changed by "TRIGGER POINT" and "Recording Speed". Refer to CONSULT-II OPERATION MANUAL.

- 2) "MANU TRIG" (Manual trigger):
- DTC will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM. DATA MONITOR can be performed continuously even though a malfunction is detected.

Use these triggers as follows:

- 1) "AUTO TRIG"
- While trying to detect the DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent. When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC will be displayed. (Refer to GI section, "Incident Simulation Tests" in "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".)
- 2) "MANU TRIG"
- If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT-II to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.

ZD30DDTi

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION CONSULT-II (Cont'd)





WHEN Date, Frequencies WHERE..... Road conditions

Symptoms

..... Operating conditions,

Weather conditions,

SEF907L

HOW

Introduction

The engine has an ECM to control major systems such as fuel injection control, fuel injection timing control, glow control system, etc. The ECM accepts input signals from sensors and instantly drives electronic control fuel injection pump. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no problems such as vacuum leaks, or other problems with the engine.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems. A road test with CONSULT-II or a circuit tester connected should be performed. Follow the "Work Flow", EC-1047.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example on next page should be used.

Start your diagnosis by looking for "conventional" problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.

DIAGNOSTIC WORKSHEET

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one shown below in order to organize all the information for troubleshooting.

TROUBLE DIAGNOSIS — INTRODUCTION

Introduction (Cont'd) Worksheet sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
	Startability	□ Inpossible to start □ No combus □ Partial combustion affected by th □ Partial combustion when engine □ Possible but hard to start □ Othe	tion Partial combustion rrottle position is cool ers []
Symptoms	🗌 Idling	No fast idle Unstable H Others [High idle 🗌 Low idle
e j mpreme	Driveability	Stumble Surge Knock Others [☐ Lack of power]
	Engine stall	At the time of start While idling While accelerating While dece	ว alerating ing
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night [☐ In the daytime
Frequency		All the time Under certain con	ditions 🗌 Sometimes
Weather conc	litions	□ Not affected	
	Weather	Fine Raining Snowing	Others []
	Temperature	🗌 Hot 🗌 Warm 🗌 Cool 🗌] Cold 🗌 Humid °F
Engine conditions		Cold During warm-up .	After warm-up I 4,000 6,000 8,000 rpm
Road conditions		🗌 In town 🗌 In suburbs 🗌 Hig	Jhway 🗌 Off road (up/down)
Driving conditions		Not affected At starting While idling While accelerating While cruis While decelerating While turni Vehicle speed	□ At racing sing ng (RH/LH)
Malfunction indicator lamp		Turned on	

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Work Flow

	Ct			1				
		•					1	
	Listen to customer complain	TIONS. hts. (Get symptom	s.)					STEP I
]	
	CHECK DTC.	*]	
	Check and PRINT OUT (wr related service bulletins for If DTC is not available even	ite down) DTC. Pa information. n if MI lights up, d	aste it on repa drain water froi	ir order sheet. Then c m fuel filter. *1	lear. Also c	heck	*2	STEP II
	Symptoms collected		No or	symptoms, except MI DTC exists at STEP I	lights up, I.]	
	Verify the symptom by drivi	ng in the condition	n the customer	described.	 		*3	STEP III
1	Normal Code (at STEP II)	Malfunction Co	de (at STEP II	l)				
		•					1	
	INCIDENT CONFIRMATION Verify the DTC by performi	ng the "DTC Confi	irmation Proce	dure".			*3	STEP IV
		_	_					
	Choose the appropriate act	ion.					*4	STEP V
	Malfunction Code (at S	TEP II or IV)	Normal Code	(at both STEP II and	IV)			
		•	BASIC INS	PECTION				
			SYMPTOM B	ASIS (at STEP I or III]			
		Perform inspecti	ons according	to Symptom Matrix Cr	hart.			
	•		,					
	TROUBLE DIAGNOSIS FOI	R DTC XXXX.			*	5		STEP VI
			7					
		REPAIR/R	REPLACE					
			7					
N	G Confirm that the incident is Confirmation Procedure (or (already fixed) DTCs in EC	completely fixed OVERALL FUNCT M.	by performing TON CHECK).	BASIC INSPECTION a Then, erase the unner	nd DTC cessary]	STEP VII
			ОК				1	
		CHECI	K OUT]	SEE374YB
								02101112
*1	Refer to MA section ("Check and Replacing Fuel Filter an Draining Water", "ENGINE M TENANCE").	ing *3 d 1AIN-	If the incider perform "TRO FOR INTERI EC-1076.	nt cannot be verified, OUBLE DIAGNOSIS MITTENT INCIDENT"	', *5	Refer FOR EC-10	to "TROUBL POWER SUF 077. Ifunctioning p	E DIAGNOSIS PPLY",
*2	If time data of "SELF-DIAG RESULTS" is other than "0", form "TROUBLE DIAGNOSI FOR INTERMITTENT INCID EC-1076.	*4 S ENT",	If the on boa cannot be pe power supply	ard diagnostic system erformed, check main y and ground circuit.	0	detec DIAG TENT	ted, perform NOSIS FOR INCIDENT",	"TROUBLE INTERMIT- EC-1076.

TROUBLE DIAGNOSIS — INTRODUCTION

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Work Flow (Cont'd) DESCRIPTION FOR WORK FLOW

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORKSHEET", EC-1045.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II) the DTC, then erase the DTC. Refer to EC-1032. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. Study the relationship between the cause, specified by DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. Refer to EC-1055.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" is useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the DTC by using CONSULT-II. During the DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076. In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC XXXX. If the normal code is indicated, proceed to the Basic Inspection, EC-1049. Then perform inspections according to the Symptom Matrix Chart. Refer to EC-1055.
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) "Harness Layouts". Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CON- SULT-II. Refer to EC-1068 or EC-1065. The "Diagnostic Procedure" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to GI section ("Cir- cuit Inspection", "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"). Repair or replace the malfunction parts. If the malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC Confirmation Procedure" and confirm the normal code (DTC No. 0505) is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) DTC in ECM. (Refer to EC-1032.)

Basic Inspection

Precaution:

Perform Basic Inspection without electrical or mechanical loads applied;

- Shift lever is in neutral position,
- Heat up switch is OFF,
- Headlamp switch is OFF,
- Air conditioner switch is OFF,
- Rear defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.

1	INSPECTION START				
1. Checl 2. Checl 3. Open • Harne • Vacuu • Wiring	 Check service records for any recent repairs that may indicate a related problem. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to MA section. Open engine hood and check the following: Harness connectors for improper connections Vacuum hoses for splits, kinks, or improper connections Wiring for improper connections, pinches, or cuts 				
	SEF142I				
4. Start	engine and warm it up to the	e normal operating temperature.			
	►	GO TO 2.			
2	PREPARATION FOR CHE	CKING IDLE SPEED			
With CC Connect	With CONSULT-II Connect CONSULT-II to the data link connector.				

Without CONSULT-II

Install diesel tacho tester to the vehicle.

▶ GO TO 3.

3	CHECK IDLE SPEED						
With CC 1. Selec 2. Read	With CONSULT-II 1. Select "CKPS·RPM (TDC)" in "DATA MONITOR" mode with CONSULT-II. 2. Read idle speed.						
		DATA MONITOR					
		MONITOR NO DTC					
		CKPS-RPM (TDC) XXX rpm					
Without Check ic	SEF817Y Without CONSULT-II Check idle speed						
7501	23 1911	OK or NG					
ОК	•	INSPECTION END					
NG	•	GO TO 4.					
4	CHECK FOR INTAKE AIR	LEAK					
Listen fo	or an intake air leak after the	mass air flow sensor.					
		OK or NG					
ОК	•	GO TO 5.					
NG	►	Repair or replace.					
5	BLEED AIR FROM FUEL	SYSTEM					
1. Stop e 2. Using	engine. priming pump, bleed air fro	m fuel system. Refer to "Air Bleeding", EC-1031.					
	•	GO TO 6.					

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6	CHECK IDLE SPEED AGA	AIN											
With CC 1. Start 2. Selec 3. Read	With CONSULT-II 1. Start engine and let it idle. 2. Select "CKPS·RPM (TDC)" in "DATA MONITOR" mode with CONSULT-II. 3. Read idle speed.												
		DATA MONITOR											
		MONITOR NO DTC											
		CKPS-RPM (TDC) XXX rpm SEF817Y											
Without 1. Start 2. Checl 75	t CONSULT-II engine and let it idle. k idle speed. 0±25 rpm												
		OK or NG											
ОК	•	INSPECTION END											
NG	•	GO TO 7.											
7 Drain wa	DRIN WATER FROM FUE ater from fuel filter. Refer to ").	L FILTER MA section ("Checking and Replacing Fuel Filter and Draining Water", "ENGINE MAINTE-											
	•	GO TO 8.											

8	CHECK IDLE SPEED AG	IN										
With CO 1. Start e 2. Select 3. Read	Vith CONSULT-II . Start engine and let it idle. . Select "CKPS·RPM (TDC)" in "DATA MONITOR" mode with CONSULT-II. . Read idle speed.											
		DATA MONITOR										
		MONITOR NO DTC										
		CKPS-RPM (TDC) XXX rpm										
		SEF817Y										
Without 1. Start e 2. Check 750	CONSULT-II engine and let it idle. (idle speed. D±25 rpm											
		OK or NG										
OK	•	INSPECTION END										
NG	•	GO TO 9.										

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TROUBLE DIAGNOSIS — BASIC INSPECTION Basic Inspection (Cont'd)

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9	9 CHECK AIR CLEANER FILTER											
Check a	Check air cleaner filter for clogging or breaks.											
	OK or NG											
OK	ЭК ► GO TO 10.											
NG	NG Replace air cleaner filter.											
-	I											
10	CHECK FUEL INJECTION	INOZZLE										
Check f	uel injection nozzle opening	pressure. Refer to "Injection pressure test", EC-1025.										
		OK or NG										
OK	ЭК ► GO TO 11.											
NG	NG ► Replace fuel injection nozzle assembly.											

NG		Replace fuel inject		embly.	
11	CHECK IDLE SPEED AG	AIN			
With CC 1. Start 2. Selec 3. Read	DNSULT-II engine and let it idle. t "CKPS·RPM (TDC)" in "D <i>f</i> idle speed.	TA MONITOR" mo	de with CONS	SULT-II.	
		Г	DATA MONI	TOR	
		м	IONITOR	NO DTC	
		с	KPS-RPM (TDC)	XXX rpm	
			SEF817Y	,	
Without	CONSULT-II				
1. Start 2 Checl	engine and let it idle.				
75	0±25 rpm				
			OK or N	G	
ОК	•)		
NG	•	GO TO 12.			
12	CHECK COMPRESSION	PRESSURE			

Check compression pressure. Refer to EM section, "MEASUREMENT OF COMPRESSION PRESSURE".											
OK or NG											
ОК	►	GO TO 13.									
NG	►	Follow the instruction of "MEASUREMENT OF COMPRESSION PRESSURE".									

13	CHECK IDLE SPEED AG	NN
With CO 1. Start e 2. Select 3. Read	NSULT-II engine and let it idle. "CKPS·RPM (TDC)" in "D <i>I</i> idle speed.	TA MONITOR" mode with CONSULT-II.
		DATA MONITOR
		MONITOR NO DTC
		CKPS-RPM (TDC) XXX rpm
		SEF817Y
Without 1. Start e 2. Check 750	CONSULT-II engine and let it idle. t idle speed. D±25 rpm	
		OK or NG
OK	►	INSPECTION END
NG	•	Replace electronic control fuel injection pump.

Symptom Matrix Chart

						SY	MPTO	DM							
SYSTEM — Basic engine control sys-		HARD/NO START/RESTART	(EXCP. HA)			ENGINE STALL									
SYSTEM — Basic engine control system	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	erence page	ture of symptom, Check point
Warranty symptom code		A	A			AB		AC	AD	A	E	A	.F	Ref	Fea
Electronic control fuel injection pump mainframe	4	4	4	4	4	4	4	4	4	5	5	3	4		*1
Injection nozzle	3	3	3	3	3	3	3	3	3	4	4		3	EC-1023	*2
Glow system	1	1	1	1										EC-1221	
Engine body	3	3	3	3	3	3	3		3	4	4		3	EM section	*3
EGR system										3	3			EC-1207	
Air cleaner and ducts										3	3			MA section	*4

1 - 5: The numbers refer to the order of inspection.

(continued on next page)
*1: Fuel injection system malfunction or fuel injection timing control system malfunction may be the cause.
*2: Depends on open-valve pressure and spray pattern.
*3: Caused mainly by insufficient compression pressure.
*4: Symptom varies depending on off-position of air duct, etc.

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

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Symptom Matrix Chart (Cont'd)

SYSTEM — Basic engine control system		HUNTING TION -URN TO IDLE GH ENGINE COOLANT TEMPERATURE			ONSUMPTION	NSUMPTION		ABNURMIAL SMURE CULUR	IDER CHARGE)	illuminates.	SULT-II?			ck point
	ROUGH IDLE/HUNTI	IDLING VIBRATION	SLOW/NO RETURN '	OVERHEAT/HIGH EN	EXCESSIVE FUEL C	EXCESSIVE OIL CON	BLACK SMOKE	WHITE SMOKE	DEAD BATTERY (UN	Ifunction indicator lamp	1 be detected by CON	el cut	erence page	ature of symptom, Che
Warranty symptom code	AG	AH	AJ	AK	AL	AM	A	P	HA	Ma	Car	Fue	Ref	Fea
Electronic control fuel injection pump mainframe	4	4	3		4		5	4		3	3	3		*1
Injection nozzle	3	3					4						EC-1023	*2
Glow system								1					EC-1221	
Engine body	3	3		3	3	3		3					EM section	*3
EGR system							3						EC-1207	
Air cleaner and ducts							3				3		MA section	*4

1 - 5: The numbers refer to the order of inspection.

(continued on next page)
*1: Fuel injection system malfunction or fuel injection timing control system malfunction may be the cause.
*2: Depends on open-valve pressure and spray pattern.
*3: Caused mainly by insufficient compression pressure.
*4: Symptom varies depending on off-position of air duct, etc.

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

ZD30DDTi

Symptom Matrix Chart (Cont'd)

	SYSTEM — ENGINE CONTROL system							SY	MPT	ОM							
				HARD/NO START/RESTART	(EXCP. HA)			ENGINE STALL									
SYS			NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	erence page	tture of symptom, Check point
Warra	nty symptom code			A	A			AB		AC	AD	A	Ε	A	F	Rei	Fe
	Electronic control fuel injection pump	*a, *b		1		1	1	1	1	1	1	1	1	1	1	_	
ROL	circuit	*c, *d					<u>'</u>	<u> </u>	Ľ	Ľ							
ONT	Mass air flow sensor circuit	*a, *c								1		1	1			EC-1086	
О Ш		*b								Ľ						20 1000	
ENGIN	Engine coolant temperature sensor circuit	*a, *b			1		1		1						1	EC-1092	*1
Ш	Vehicle speed sensor circuit	*a, *b											1			EC-1096	

1 - 5: The numbers refer to the order of inspection. (continued on next page) *a: Open *b: Short *c: Ground short *d: Nage

*d: Noise *1: Compensation according to engine coolant temperature does not function.

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Symptom Matrix Chart (Cont'd)

							5	SYMF	тог	Л						
SYSTEM — ENGINE CONTROL system		Malfunction	NG		TO IDLE	VGINE COOLANT TEMPERATURE	ONSUMPTION	NSUMPTION			NDER CHARGE)	o illuminates.	SULT-II?			ck point
			ROUGH IDLE/HUNTI	IDLING VIBRATION	SLOW/NO RETURN	OVERHEAT/HIGH EN	EXCESSIVE FUEL C	EXCESSIVE OIL COI	BLACK SMOKE	WHITE SMOKE	DEAD BATTERY (UN	Ifunction indicator lamp	n be detected by CON	el cut	erence page	ature of symptom, Che
Warra	nty symptom code		AG	AH	AJ	AK	AL	AM	A	P	HA	Ma	Ca	Fue	Rei	Ъе
	Electronic control fuel injection pump	*a, *b								1		1	1	1	_	
ROL	circuit	*c, *d							1							
DNT	Mass air flow sensor circuit	*a, *c											1		EC-1086	
ы		*b							1						LC-1000	
ENGIN	Engine coolant temperature sensor circuit	*a, *b	1	1								1	1		EC-1092	*1
-	Vehicle speed sensor circuit	*a, *b											1		EC-1096	

1 - 5: The numbers refer to the order of inspection.

1 - 5: The numbers refer to the order of inspection.
(continued on next page)
*a: Open
*b: Short
*c: Ground short
*d: Noise
*1: Compensation according to engine coolant temperature does not function.

ZD30DDTi **TROUBLE DIAGNOSIS — GENERAL DESCRIPTION**

Symptom Matrix Chart (Cont'd)

								SY	MPT	ЮM							
				HARD/NO START/RESTART	(EXCP. HA)			ENGINE STALL									
SYSTEM — ENGINE CONTROL system		Malfunction	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	sference page	ature of symptom, Check point
Warra	nty symptom code			A	A			AB		AC	AD	A	Æ	A	\F	Re	Ъе
	Accelerator switch (EC) circuit	*a, *b								1						EC-1100	
		*c														201100	
	Fuel cut system line	*a, *c														EC-1215	
		*b	1				1	1	1							L0-1215	*2
	Accelerator position sensor circuit	*a, *b								1		1	1			EC-1125	
_	Crankshaft position sensor (TDC)	*a, *b														EC 1140	
IRO	circuit	*d										1	1			LC-1140	
E CONT	Charge air pressure sensor circuit	*a, *b, *c										1	1			EC-1202	
UID	Swirl control valve control solenoid	*a, *b														EC-1246	
ЙШ	valve circuit	*c								1	1	1	1			EC-1240	
	Variable nozzle turbocharger control	*a, *b										1	1			EC 1261	
	solenoid valve circuit	*с										1	1			EC-1201	
	Intake air control valve control sole- noid valve circuit	*c	1	1	1	1	1	1	1	1						EC-1254	
	Exhaust gas control valve control solenoid valve circuit	*с						1	1	1		1	1			EC-1269	

1 - 5: The numbers refer to the order of inspection. (continued on next page) *a: Open *b: Short *c: Ground short *d: Noise *2: Engine rung on ofter turning ignition quitch OEE

*2: Engine runs on after turning ignition switch OFF.

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION Symptom Matrix Chart (Cont'd)

ZD30DDTi

			•				ç	SYMF	ртог	N.			,			
SY		NG		TO IDLE	VGINE COOLANT TEMPERATURE	ONSUMPTION	NSUMPTION			NDER CHARGE)	o illuminates.	SULT-11?			ck point	
	Varranty symptom code		ROUGH IDLE/HUNTI	IDLING VIBRATION	SLOW/NO RETURN	OVERHEAT/HIGH EN	EXCESSIVE FUEL C	EXCESSIVE OIL COI	BLACK SMOKE	WHITE SMOKE	DEAD BATTERY (UN	alfunction indicator lamp	an be detected by CON	el cut	sference page	ature of symptom, Che
Warra	nty symptom code		AG	AH	AJ	AK	AL	AM	A	P	HA	R	ů	Ъц	Re	Ъе
	Accelerator switch (FC) circuit	*a, *b										1	1		EC-1100	
		*0 *0										1	1			
	Fuel cut system line	a, c *b										1		1	EC-1215	*2
	Accelerator position sensor circuit	*a, *b										1	1		EC-1125	
ROL	Crankshaft position sensor (TDC) cir-	*a, *b	1	1								1	1		EC-1140	
TNO	Charge air pressure sensor circuit	u *a *b *c										1	1		FC-1202	
Щ	Swirt control volvo control colonoid	*a *h							1						20 1202	
NGIN	valve circuit	*c					1		1	1					EC-1246	
ENG	Variable nozzle turbocharger control	*a, *b					1		1							
	solenoid valve circuit	*c					1						1		EC-1261	
	Intake air control valve control sole- noid valve circuit	*с													EC-1254	
	Exhaust gas control valve control solenoid valve circuit	*c	1	1		1	1	1	1						EC-1269	

1 - 5: The numbers refer to the order of inspection.

(continued on next page) *a: Open *b: Short

*c: Ground short *d: Noise *2: Engine runs on after turning ignition switch OFF.

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

ZD30DDTi

Symptom Matrix Chart (Cont'd)

								SY	MPT	ЮM							
			HARD/NO START/RESTART	(EXCP. HA)			ENGINE STALL										
SYSTEM — ENGINE CONTROL system		Malfunction	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	TOW IDLE	erence page	ture of symptom, Check point
	Warranty symptom code		AA					AB		AB AC		A	E	А	۲.	Re	це
	Start signal circuit	*a, *b			1	1										EC-1230	*3
	PNP switch circuit	*a, *b							1							FC-1233	
_		*C															
NTRO	Accelerator position switch (Idle) cir- cuit	*a, *c *b					1		1	1		1	1		1	EC-1125	*4
ENGINE CON	Accelerator position switch (Full) cir- cuit	*a, *b								1		1	1			EC-1125	
		*а		1			1	1	1							EC 1077	
		*b														EC-10//	*5
	Power supply for ECM circuit	*а														EC-1077	
		*b														20-1077	

1 - 5: The numbers refer to the order of inspection. (continued on next page)

*a: Open *b: Short *c: Ground short

*d: Noise
*3: Start control does not function.
*4: Accelerator position sensor NG signal is output.
*5: Engine does not stop.

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION Symptom Matrix Chart (Cont'd)

ZD30DDTi

				1				SYME		VI	1		1			
SYS		DG		to Idle	VGINE COOLANT TEMPERATURE	ONSUMPTION	NSUMPTION		- ABNURIMAL SMURE CULUR	NDER CHARGE)	o illuminates.	SULT-11?			ick point	
		Malfunction	ROUGH IDLE/HUNTI	IDLING VIBRATION	SLOW/NO RETURN	OVERHEAT/HIGH EN	EXCESSIVE FUEL C	EXCESSIVE OIL CO	BLACK SMOKE	WHITE SMOKE	DEAD BATTERY (UN	Ilfunction indicator lamp	n be detected by CON	el cut	ference page	ature of symptom, Che
Warra	nty symptom code		AG	AH	AJ	AK	AL	AM	A	P	HA	Ma	Ca	Fue	Rei	Це
	Start signal circuit	*a, *b													EC-1230	*3
	PNP switch circuit	*a, *b	1	1											FC-1233	
		*c														
ROI	Accelerator position switch (Idle) cir-	*a, *c													FC-1125	
TNC	cuit	*b										1	1		20 1120	*4
INE CC	Accelerator position switch (Full) cir- cuit	*a, *b										1	1		EC-1125	
5NG		*а													EC 4077	
ш		*b													20-10/7	*5
	Power supply for ECM circuit	*a										1	1	1	EC-1077	
		*b													LO-1077	

1 - 5: The numbers refer to the order of inspection. (continued on next page)
*a: Open
*b: Short

*c: Ground short *d: Noise

*3: Start control does not function.
*4: Accelerator position sensor NG signal is output.
*5: Engine does not stop.

ZD30DDTi **TROUBLE DIAGNOSIS — GENERAL DESCRIPTION**

Symptom Matrix Chart (Cont'd)

								SY	MPT	ОM							
				HARD/NO	(EXCP. HA)			ENGINE STALL									
SYSTEM — ENGINE CONTROL system		Malfunction	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	ference page	ature of symptom, Check point
	Warranty symptom code	1		A	A			AB		AC	AD	A	E	A	۲.	Re	ц.
	EGR volume control valve circuit	*a, *b														EC-1207	
		*C															*8
	Glow relay circuit	*a	1	1	1	1										FC-1221	*9
OL		*b															*10
NTR	ECM relay (Self-shutoff) circuit	*a					1	1	1							FC-1077	
SO		*b															*11
ENGINE (ECM, Connector circuit	*a, *b	2	2	2	2	2	2	2	2	2	2	2	2	2	EC-1117, 1187, 1200	
	Air conditioner relay circuit	*а														EC 1075	*12
		*b														LO-1275	*13
	Air conditioner quitch girquit	*a, *c														EC 1075	*13
		*b														EC-12/3	*14

1 - 5: The numbers refer to the order of inspection.

a: Open
b: Short
c: Ground short
c: Ground short

*d: Noise

a. Noise
*8: Does not stop operating.
*9: Glow lamp does not turn on.
*10: Glow lamp does not turn off. *11: Ground short makes engine unable to stop.
*12: Air conditioner does not operate.
*13: Air conditioner does not stop operating.

*14: Air conditioner does not work.

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

Symptom Matrix Chart (Cont'd)

ZD30DDTi

			-				ę	SYMF	ртоі	M			-			
SYS		SNI.		TO IDLE	NGINE COOLANT TEMPERATURE	CONSUMPTION	NSUMPTION			NDER CHARGE)	p illuminates.	ISULT-II?			ack point	
		Malfunction	ROUGH IDLE/HUNT	IDLING VIBRATION	SLOW/NO RETURN	OVERHEAT/HIGH E	EXCESSIVE FUEL O	EXCESSIVE OIL CO	BLACK SMOKE	WHITE SMOKE	DEAD BATTERY (UI	alfunction indicator lam	In be detected by CON	el cut	ference page	ature of symptom, Che
Warra	nty symptom code		AG	AH	AJ	AK	AL	AM	A	νP	HA	Ma	Ca	лц	Re	Це
	EGR volume control valve circuit	*a, *b													FC-1207	
		*c							1						20 1201	*8
	Glow relay circuit	*a								1					FC-1221	*9
Ы		*b														*10
NTR	ECM relay (Self-shutoff) circuit	*a												1	FC-1077	
CO		*b	1	1											20 10/1	*11
IGINE (ECM, Connector circuit	*a, *b	2	2	2	2	2	2	2	2	2	2	2	2	EC-1117, 1187, 1200	
Ш	Air conditioner relev circuit	*а													EC 1075	*12
		*b													L0-1270	*13
	Air conditionar switch circuit	*a, *c													EC-1275	*13
		*b													EC-1275	*14

1 - 5: The numbers refer to the order of inspection.

*a: Open *b: Short

*c: Ground short

*d: Noise

*8: Does not stop operating.

*9: Glow lamp does not turn on.
*10: Glow lamp does not turn off.
*11: Ground short makes engine unable to stop.

*12: Air conditioner does not operate.

*13: Air conditioner does not stop operating.

*14: Air conditioner does not work.

CONSULT-II Reference Value in Data Monitor Mode

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
- * Specification data may not be directly related to their components signals/values/operations.

CONE	SPECIFICATION			
Tachometer: Connect	Almost the same speed as the			
Run engine and compare tachometer inc	CONSULT-II value.			
• Engine: After warming up	More than 70°C (158°F)			
• Turn drive wheels and compare speedor	Almost the same speed as the CONSULT-II value			
• Engine: After warming up		More than 40°C (104°F)		
Ignition switch: ON	Accelerator pedal: fully released	0.40 - 0.60V		
(Engine stopped)	Accelerator pedal: fully depressed	Approx. 4.5V		
Ignition switch: ON	Accelerator pedal: fully depressed	ON		
(Engine stopped)	Except above	OFF		
Ignition switch: ON	Accelerator pedal: fully released	CLOSE		
(Engine stopped)	Accelerator pedal: slightly open	OPEN		
Ignition switch: ON	Accelerator pedal: fully released	ON		
(Engine stopped)	Accelerator pedal: slightly open			
• Engine: After warming up	Approx. 13°CA			
Ignition switch: ON (Engine stopped)	11 - 14V			
	Shift lever: Park/Neutral	ON		
Ignition switch: ON	Except above	OFF		
• Ignition switch: $ON \rightarrow START \rightarrow ON$	$OFF\toON\toOFF$			
	Air conditioner switch: OFF	OFF		
• Engine. After warming up, the the engine	Air conditioner switch: ON (Compressor operates.)	ON		
	Brake pedal: depressed	ON		
• Ignition switch: ON	Brake pedal: released	OFF		
• Ignition switch: $ON \rightarrow OFF$		$ON\toOFF$		
	Heat up switch: ON	ON		
• Ignition switch. ON	Heat up switch: OFF	OFF		
 Engine: After warming up Air conditioner switch: OFF Shift lever: Neutral position No-load 	Idle	1.6 - 2.0V		
• Engine: After warming up	Idle	OFF		
• Engine: After warming up, idle the engine	Approx. 50 - 70%			
	Air conditioner switch: OFF	OFF		
• Engine: After Warming up, idle the engine	Air conditioner switch: ON (Compressor operates.)	ON		
• Refer to EC-1221.				
• When cooling fan is stopped.	OFF			
• When cooling fan operates.		ON		
	CONE • Tachometer: Connect • Run engine and compare tachometer inc • Engine: After warming up • Turn drive wheels and compare speedor • Engine: After warming up • Ignition switch: ON (Engine stopped) • Ignition switch: ON (Engine stopped) • Ignition switch: ON (Engine stopped) • Ignition switch: ON (Engine stopped) • Ignition switch: ON (Engine stopped) • Ignition switch: ON (Engine stopped) • Ignition switch: ON × START → ON • Ignition switch: ON → START → ON • Ignition switch: ON → OFF • Ignition switch: ON → OFF • Ignition switch: ON • Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No-load • Engine: After warming up • Engine: After warming up • Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No-load • Engine: After warming up, idle the engine • Engine: After warming up, idle the engine • Refer to EC-1221. • When cooling fan is stopped. • When cooling fan operates.	CONDITION Tachometer: Connect Run engine and compare tachometer indication with the CONSULT-II value. Engine: After warming up Turn drive wheels and compare speed-weter indication with the CONSULT-II value Engine: After warming up Ignition switch: ON		

CONSULT-II Reference Value in Data Monitor Mode (Cont'd)

MONITOR ITEM	CONE	DITION	SPECIFICATION
	 Engine: After warming up Air conditioner switch: "OFF" 	After 1 minute of idling	More than 10 steps
	Shift lever: Neutral positionNo-load	Revving engine from idle to 3,200 rpm	0 step
	Engine: After warming upAir conditioner switch: "OFF"	Idle	Approx. 56%
	Shift lever: Neutral positionNo-load	2,000 rpm	Approx. 20%
BARO SEN	• Ignition switch: ON		Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm ² , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm ² , 12.90 psi) Approx. 1,500 m (4,922 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm ² , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm ² , 11.36 psi)
SWRL CON S/V 1	 Lift up the vehicle Engine: After warming up let it idle for more than 1 second. 	Shift lever: Except "P" and "Neutral" posi- tions	ON
	Air conditioner switch: "OFF"No-load	Shift lever: Neutral position	OFF
EXH/GAS REG V*	 Vehicle: Stopped Engine speed: Below 1,200 rpm Engine coolant temperature: Below 87°C Heat up switch: ON 	: (189°F)	ON
	Except above		OFF

*: This item is applicable for cold area models. On other models, "OFF" is always displayed.

Major Sensor Reference Graph in Data Monitor Mode

The following are the major sensor reference graphs in "DATA MONITOR" mode.

ACCEL POS SEN, "CKPS·RPM (TDC)", "MAS AIR/FL SE"

Below is the data for "ACCEL POS SEN", "CKPS·RPM (TDC)" and "MAS AIR/FL SE" when revving engine quickly up to 3,000 rpm under no load after warming up engine to the normal operating temperature. Each value is for reference, the exact value may vary.





ECM Terminals and Reference Value PREPARATION

- 1. ECM is located behind the instrument lower panel. For this inspection, remove the driver's side instrument lower cover.
- 2. Remove ECM harness protector.

- 3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
 - Open harness securing clip to make testing easier.
 - Use extreme care not to touch 2 pins at one time.
 - Data is for comparison and may not be exact.



SEF367I

Be sure ECM unit is properly grounded before checking.

ECM Terminals and Reference Value (Cont'd)

ECM HARNESS CONNECTOR TERMINAL LAYOUT



ECM INSPECTION TABLE

Remarks: Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
			Engine is running.	BATTERY VOLTAGE (11 - 14V)
2	R/W	control solenoid valve	Ignition switch "OFF" For a few seconds after turning ignition switch "OFF"	Approximately 0.1V
4	B/Y	ECM relay (Self-shutoff)	Ignition switch "ON" Ignition switch "OFF" For a few seconds after turning ignition switch "OFF"	Approximately 0.25V
			Ignition switch "OFF" A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)

ECM Terminals and Reference Value (Cont'd)

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
			Engine is running. Warm-up condition Idle speed	Approximately 5.7V
	Y/B	Tachometer	Engine is running. Warm-up condition Engine speed is 2,000 rpm	Approximately 6V
11	BR/Y	Exhaust gas control valve control solenoid valve	Engine is running. Engine speed is below 1,200 rpm Engine coolant temperature is below 87°C (189°F) Stop the vehicle Heat up switch is "ON"	Approximately 0.1V
			Engine is running. Except the above condition	BATTERY VOLTAGE (11 - 14V)
			Engine is running. Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
14		Cooling fan relay	Engine is running. Cooling fan is operating	Approximately 0.1V
			Engine is running. Air conditioner switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
15	Y/L	Air conditioner relay	Engine is running. Both air conditioner switch and blower fan switch are "ON" (Compressor is operating)	Approximately 0.1V
16			Ignition switch "ON" Glow lamp is "ON"	Approximately 1V
	L/VV	Glow lamp	Ignition switch "ON" Glow lamp is "OFF"	BATTERY VOLTAGE (11 - 14V)

ECM Terminals and Reference Value (Cont'd)

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
17	G/Y	Stop Jamp switch	Ignition switch "ON" Brake pedal fully released	Approximately 0V
	0,1	Stop lamp Switch	Ignition switch "ON" Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)
			Ignition switch "ON"	Approximately 1V
18	G	Malfunction indicator	Engine is running.	BATTERY VOLTAGE (11 - 14V)
19	LG/R	Engine coolant tempera- ture sensor	Engine is running.	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
			Ignition switch "ON"	Approximately 0V
20	R/W	Start signal	Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
			Engine is running. Air conditioner switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
21	LG/B	Air conditioner switch	Engine is running. Both air conditioner switch and blower fan switch are "ON" (Compressor is operating)	Approximately 0.1V
22	P/B	Park/Neutral position	Ignition switch "ON" Gear position is "Neutral" (M/T models) Gear position is "P" or "N" (A/T models)	Approximately 0V
		Switch	Ignition switch "ON" Except the above gear position	BATTERY VOLTAGE (11 - 14V)
		Accelerator position sen-	Ignition switch "ON" Accelerator pedal fully released	0.4 - 0.6V
23	vv	sor	Ignition switch "ON" Accelerator pedal fully depressed	Approximately 4.5V
24	PU/W	A/T signal No. 1	Engine is running. Warm-up condition	Voltage goes high up once in a few seconds
			iale speea	SEF448Z

ECM Terminals and Reference Value (Cont'd)

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
			Engine is running. Lift up the vehicle In 1st gear position Vehicle speed is 10 km/h (6 MPH)	0 - Approximately 4.8V
26	L/OR	venicie speed sensor	Engine is running. Lift up the vehicle In 2nd gear position Vehicle speed is 30 km/h (19 MPH)	Approximately 2.2V
29	R/L	Accelerator switch (F/C)	Ignition switch "ON" Accelerator pedal fully released Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V) Approximately 0V
			Accelerator pedal depressed Engine is running. Warm-up condition Idle speed	Approximately 0V
30	P	A/T signal No. 3	Engine is running. Warm-up condition Engine speed is 2,000 rpm	Approximately 7.7V
31	R/L	Accelerator position	Ignition switch "ON" Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			Ignition switch "ON" Accelerator pedal depressed	Approximately 0V
32	W/G	Accelerator position	Ignition switch "ON" Accelerator pedal released	Approximately 0V
-		switch (Full)	Ignition switch "ON" Accelerator pedal fully depressed	BATTERY VOLTAGE (11 - 14V)
33	G/Y	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ZD30DDTi

ECM Terminals and Reference Value (Cont'd)

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
35	R	Mass air flow sensor	Engine is running. Warm-up condition Idle speed	1.6 - 2.0V
37	P/B	A/T signal No. 2	Engine is running. Warm-up condition Idle speed	Voltage goes high up once in a few seconds (V) 10 5 0
38	B/Y	Ignition switch	Ignition switch "OFF"	0V BATTERY VOLTAGE
				(11 - 14V)
39 43	B B	ECM ground	Engine is running.	Approximately 0V
40	R/B	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
42	L/G	Engine is running.	Approximately 0V	
64	Y/G	Data link connector	Lidle speed (CONSULT-II is connected and	Approximately 0V
65	Y/R		turned on)	Less than 9V
		Crankshaft position sen-	Engine is running. Warm-up condition Idle speed	Approximately 0V
44 [L	L Crankshaft position sen- sor (TDC)		Approximately 0V
			Engine is running. Warm-up condition Engine speed is 2,000 rpm	(V) 20 10 0 -5 ms
				SEF334Y

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ZD30DDTi

ECM Terminals and Reference Value (Cont'd)

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
46	L	Charge air pressure sen- sor	Engine is running. Warm-up condition Idle speed	Approximately 2.0V
47	B/W	Crankshaft position sen- sor (TDC) ground	Engine is running. Warm-up condition Idle speed	Approximately 0V
48	G/R	Accelerator position sen- sor power supply	Ignition switch "ON"	Approximately 5V
49	W	Sensor's power supply	Ignition switch "ON"	Approximately 5V
50	В	Sensors' ground	Engine is running. Warm-up condition Idle speed	Approximately 0V
51	L/W	Accelerator position sen- sor ground	Engine is running. Warm-up condition Idle speed	Approximately 0V
52	L/B	Electronic control fuel injection pump	Engine is running.	Approximately 0.1V
53	L/R	Electronic control fuel injection pump	Engine is running.	Approximately 1.0V
54	L/B	Swirl control valve con- trol solenoid valve	Engine is running. Warm-up condition At idle speed for more than 1 second Lift up the vehicle Gear position is in positions other than "P" and "Neutral"	Approximately 0.1V
			Engine is running. Idle speed Lift up the vehicle Gear position is in "P" or "Neutral"	BATTERY VOLTAGE (11 - 14V)
56 61 116	W W W	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
58	L/OR	A/T signal No. 4	Engine is running. Warm-up condition Idle speed	Voltage goes high up once in a few seconds (V) 10 5 0 SEF448Z

TROUBLE DIAGNOSIS — GENERAL DESCRIPTION ZD30DDTi

ECM Terminals and Reference Value (Cont'd)

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
50			Ignition switch "ON" Heat up switch is "ON"	Approximately 0V
59	BR/W	neat up switch	Ignition switch "ON" Heat up switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
<u> </u>	DAA	Accelerator position sen-	Ignition switch "ON" Accelerator pedal fully released	0.4 - 0.6V
68	B/VV	sor signal output	Ignition switch "ON" Accelerator pedal fully depressed	Approximately 4.5V
		Variable nozzle turbo- charger control solenoid valve	Engine is running. Warm-up condition Idle speed	Approximately 6.8V
101	R/B		Engine is running. Warm-up condition Engine speed is 2,000 rpm	Approximately 11V
102	G/R	Current return	Engine is running.	BATTERY VOLTAGE (11 - 14V)
103 105 109 115	L/Y L/W L R/L	EGR volume control valve	Engine is running. Warm-up condition Idle speed	0.1 - 14V
106 112 118	B B B	ECM ground	Engine is running.	Approximately 0V
111	LG/B	Glow relay	Refer to "GLOW CONTROL SYSTEM", EC-1221.	

Description

Intermittent incidents (I/I) may occur. In many cases, the problem resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific problem area.

COMMON I/I REPORT SITUATIONS

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than "0".
	The symptom described by the customer does not recur.
IV	DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for XXXX does not indicate the problem area.

Diagnostic Procedure

1	INSPECTION START			
Erase D	Erase DTCs. Refer to "HOW TO ERASE DTC", EC-1032.			
	GO TO 2.			
2	CHECK GROUND TERMINALS			

Check ground terminals for corroding or loose connection. Refer to GI section ("GROUND INSPECTION", "Circuit Inspection").

OK or NG			
ОК	GO TO 3.		
NG	Repair or replace.		

3	SEARCH FOR ELECTRICAL INCIDENT				
Perform GI section, "Incident Simulation Tests".					
	OK or NG				
OK	OK INSPECTION END				
NG	•	Repair or replace.			

Main Power Supply and Ground Circuit

ECM TERMINALS AND REFERENCE VALUE

Remarks: Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	B/Y	ECM relay (Self-shutoff)	Ignition switch "ON" Ignition switch "OFF" For a few seconds after turning ignition switch "OFF"	Approximately 0.25V
			Ignition switch "OFF" A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
			Ignition switch "OFF"	0V
38	B/Y	Ignition switch	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
39 43	B B	ECM ground	Engine is running.	Approximately 0V
56 61 116	W W W	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
102	G/R	Current return	Engine is running.	BATTERY VOLTAGE (11 - 14V)
106 112 118	B B B	ECM ground	Engine is running.	Approximately 0V

ZD30DDTi

Main Power Supply and Ground Circuit (Cont'd)

WIRING DIAGRAM





TEC096M

Main Power Supply and Ground Circuit (Cont'd)

EC-MAIN-02







Main Power Supply and Ground Circuit (Cont'd)

DIAGNOSTIC PROCEDURE

1	INSPECTION START				
Start engine. Is engine running?					
	Yes or No				
Yes	•	GO TO 14.			
No	No F GO TO 2.				

2 CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch "ON".

2. Check voltage between ECM terminal 38 and ground with CONSULT-II or tester.



3 DETECT MALFUNCTIONING PART Check the following. • • Harness connectors M51, F6 • • Fuse block (J/B) connector M2 •

• 10A fuse

• Harness for open or short between ECM and fuse

4	CHECK ECM GROUND C	RCUIT FOR OPEN AND SHORT			
1. Turn i 2. Discou 3. Check Co 4. Also c	 Turn ignition switch "OFF". Disconnect ECM harness connector. Check harness continuity between ECM terminals 39, 43, 106, 112, 118 and engine ground. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 				
OK or NG					
ОК	•	GO TO 6.			
NG	•	GO TO 5.			

ZD30DDTi

Main Power Supply and Ground Circuit (Cont'd)

DETECT MALFUNCTIONING PART

Check the following.

5

Joint connector-3Harness for open or short between ECM and engine ground



ZD30DDTi

Main Power Supply and Ground Circuit (Cont'd)



9	CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT				
 Disconnect ECM harness connector. Check harness continuity between ECM terminal 4 and ECM relay terminal 2. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 					
OK or NG					
ОК	OK ► GO TO 11.				
NG	NG F GO TO 10.				

ZD30DDTi

Main Power Supply and Ground Circuit (Cont'd)

10 DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M52, F7

• Harness for open or short between ECM and ECM relay

Repair open circuit or short to ground or short to power in harness or connectors.

11 CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Check harness continuity between ECM terminals 56, 61, 116 and ECM relay terminal 5. Refer to Wiring Diagram. **Continuity should exist.**

2. Also check harness for short to ground and short to power.

οк	or	NG
----	----	----

ОК	GO TO 13.
NG	GO TO 12.

12 DETECT MALFUNCTIONING PART

Check the following.

13

• Harness connectors M50, F5

• Harness for open or short between ECM and ECM relay

Repair open circuit or short to ground or short to power in harness or connectors.

CHECK ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.

2. Check continuity between ECM relay terminals 3 and 5, 7 and 6.



Main Power Supply and Ground Circuit (Cont'd)

	1		
14	CHECK ECM POWER SU	PPLY CIRCUIT-V	
1. Reco 2. Turn 3. Chec	1. Reconnect all harness connectors disconnected. 2. Turn ignition switch "ON". 3. Check voltage between ECM terminal 102 and ground with CONSULT-II or tester.		
	ECM CONNECTOR 102 Voltage: Battery voltage		
		OK or NG	
OK	•	GO TO 16.	
NG	►	GO TO 15.	
15		NG PART	
 Check til Harne Fuse 10A fil Harne 	 Check the following. Harness connectors M52, F7 Fuse block (J/B) connector M2 10A fuse Harness for open or short between ECM and fuse 		
	 Repair open circuit or short to ground or short to power in harness or connectors. 		
	I		
16	16 CHECK ECM POWER SUPPLY CIRCUIT-VI		
 1. Turn ignition switch "OFF". 2. Disconnect ECM relay. LHD models ECM relay Fuse block View with driver side lower View with driver side lower SEF225Z 3. Disconnect ECM harness connector. 4. Check harness continuity between ECM terminals 56, 61, 116 and ECM relay terminal 5. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. 			
	►		
NG			

ZD30DDTi

Main Power Supply and Ground Circuit (Cont'd)

17 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors M50, F5 • Harness for open or short between ECM and ECM relay

Repair open circuit or short to ground or short to power in harness or connectors.

18 CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 39, 43, 106, 112, 118 and engine ground. Refer to Wiring Diagram. Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

ОК	GO TO 20.
NG	GO TO 19.

19	DETECT MALFUNCTION	NG PART	
Check the following.			
 Harne 	 Joint connector-3 Harness for open or short between ECM and engine ground 		
	Repair open circuit or short to ground or short to power in harness or connectors.		
20	CHECK INTERMITTENT I	NCIDENT	

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.

INSPECTION END



Component Description

The mass air flow sensor (MAFS) is placed in the stream of intake air. It measures the intake air flow rate by measuring a part of the entire intake air flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the ECM must supply more electric current to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE	 Engine: After warming up Air conditioner switch: "OFF" Shift lever: Neutral position No-load 	Idle	1.6 - 2.0V

ECM Terminals and Reference Value

Specification data are reference values, and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	R	Mass air flow sensor	Engine is running. Warm-up condition Idle speed	1.6 - 2.0V
49	W	Sensor's power supply	Ignition switch "ON"	Approximately 5V
50	в	Sensor's ground	Engine is running. Warm-up condition Idle speed	Approximately 0V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• An excessively high or low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)Mass air flow sensor



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON", and wait at least 6 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 3 seconds.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1089.

- 1) Turn ignition switch "ON", and wait at least 6 seconds.
- 2) Start engine and wait at least 3 seconds.
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1089.



Wiring Diagram

TEC098M



Diagnostic Procedure (Cont'd)



Diagnostic Procedure (Cont'd)

7	CHECK MASS AIR FLOW	SENSOR		
1. Reco 2. Start 3. Chec	nnect harness connectors di engine and warm it up to no k voltage between ECM terr	sconnected. ormal operating temperature ninal 35 (Mass air flow sens	e. sor signal) and ground.	
	ECM CONNECTOR	H.S.	Condition	Voltage V
	35		Ignition switch "ON" (Engine stopped.)	Approx. 1.0
		Съ О сн	Idle (Engine is warmed-up to normal operating temperature.)	1.6 - 2.0
1 '			Idle to about 4,000 rpm*	1.6 - 2.0 to Approx. 4.0
		Ļ	 Check for linear voltage rise being increased to about 4,0 	in response to engine 000 rpm.
		S	EF400Y	
4. If the Then	voltage is out of specification repeat above check.	on, disconnect MAFS harne	ss connector and connect it agai	n.
		Oł	(or NG	
OK	•	GO TO 8.		
NG	•	Replace mass air flow sen	sor.	
8	CHECK INTERMITTENT II	NCIDENT		
Refer to	"TROUBLE DIAGNOSIS F	OR INTERMITTENT INCIDI	ENT", EC-1076.	

► INSPECTION END



0 20 40 60 80 100 (32) (68) (104) (140) (176) (212

SEE012P

emperature °C (°F)

0.2

Description

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Engine coolant tempera- ture °C (°F)	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.3	0.68 - 1.00
90 (194)	1.0	0.236 - 0.260

These data are reference values and measured between ECM terminal 19 (Engine coolant temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/ output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• An excessively high or low voltage from the sensor is entered to ECM.	 Harness or connectors (The sensor circuit is open or shorted.) Engine coolant temperature sensor

3	DATA MO	DNITOR	
	MONITOR	NO DTC	
	CKPS-RPM (TDC) XXX rpm	
		-	

DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 5 seconds.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1094.

- 1) Turn ignition switch "ON" and wait at least 5 seconds.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1094.

Wiring Diagram



TEC099M

EC-1093

Diagnostic Procedure



ZD30DDTi

Diagnostic Procedure (Cont'd)

4 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E230, F12
- Harness connectors F6, M51
- Harness connectors M88, E106
- Harness for open or short between engine coolant temperature sensor and ECM
- Harness for open or short between engine coolant temperature sensor and TCM (Transmission control module)



6	CHECK INTERMITTENT INCIDENT		
Refer to	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.		
	•	INSPECTION END	



Description

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
		Engine is running. Lift up the vehicle In 1st gear position Vehicle speed is 10 km/h (6 MPH)	0 - Approximately 4.8V	
26	L/OR	Vehicle speed sensor	Engine is running. Lift up the vehicle In 2nd gear position Vehicle speed is 30 km/h (19 MPH)	Approximately 2.2V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	 Harness or connector (The vehicle speed sensor circuit is open or shorted.) Vehicle speed sensor





Overall Function Check

Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a DTC might not be confirmed.

WITH CONSULT-II

- 1) Lift up the vehicle.
- 2) Start engine.
- 3) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT-II.

The vehicle speed on CONSULT-II should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

4) If NG, go to "Diagnostic Procedure", EC-1099.

- 1) Lift up the vehicle.
- 2) Start engine.
- 3) Rotate drive wheel by hand.
- 4) Check voltage between ECM terminal 26 and ground with tester.

Voltage should vary between 0 - 4.8V.

5) If NG, go to "Diagnostic Procedure", EC-1099.

Wiring Diagram



TEC100M

Diagnostic Procedure

1	CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT				
1. Turn i 2. Disco 3. Checl Conti 4. Also d	 Turn ignition switch "OFF". Disconnect ECM harness connector and combination meter harness connector. Check harness continuity between ECM terminal 26 and combination meter terminal 26. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 				
		OK or NG			
OK	•	GO TO 3.			
NG	•	GO TO 2.			
2	DETECT MALFUNCTIONI	NG PART			
Check the Harne Joint of Harne	Check the following. • Harness connectors M52, F7 • Joint connector-1 • Harness for open or short between ECM and combination meter				
	Repair open circuit or short to ground or short to power in harness or connectors.				
0					
3 Maka ai					
wake su	ire that speedometer function	ns propeny:			
OK	•	GO TO 5.			
NG	•	GO TO 4.			
4	CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT				
 Check the following. Harness connectors E70, E201 Harness connectors M86, E104 or M21, E127 Harness for open or short between combination meter and vehicle speed sensor 					
OK	•	Check vehicle speed sensor and combination meter. Refer to EL section			

Papair open grout or short to ground or short to power in horness or connectors

5	CHECK INTERMITTENT I	NCIDENT	
Refer to	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.		
	•	INSPECTION END	



Description

The accelerator switch is installed to the accelerator pedal assembly. The switch senses accelerator position and sends an ON-OFF signal to the ECM. The ECM uses the signal to control the fuel cut operation at deceleration for better fuel efficiency.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
	 Ignition switch: ON (Engine stopped) 	Accelerator pedal: fully released	CLOSE
ACCEL SW (FC)		Accelerator pedal: slightly open	OPEN
DECELER F/CUT	 Engine: After warming up 	Idle	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	R/L	Accelerator switch (F/C)	Ignition switch "ON" Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			Ignition switch "ON" Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• The OFF signal (short) is sent to the ECM for a certain period of time even when the accelerator pedal is not being depressed.	 Harness or connectors (The switch circuit is shorted.) Accelerator switch (F/C)



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Fully depress and fully release accelerator pedal, and wait 15 seconds.
- 4) Repeat step 3 at least 29 times.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1103.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Fully depress and fully release accelerator pedal, and then wait 15 seconds.
- 3) Repeat step 2 at least 29 times.
- 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 6) If DTC is detected, go to "Diagnostic Procedure", EC-1103.

Wiring Diagram



Diagnostic Procedure

DTC 0203 ACCEL POS SW (F/C) Diagnostic Procedure (Cont'd)

ZD30DDTi

5	CHECK ACCELERATOR	SWITCH (F/C)					
Check c	continuity between accelerate	or switch (F/C) connector terminals 1	and 3 under the following	g conditions.			
Accelerator switch (F/C) connector							
	TRUK		Conditions	Continuity			
Accelerator pedal fully released Should not ex							
			Accelerator pedal depressed	Should exist.			
	Accelerator pedal SEF274Z						
		OK or NG					
ОК	•	GO TO 6.					
NG	►	Replace accelerator pedal assembl	у.				
6	CHECK INTERMITTENT INCIDENT						
Refer to	"TROUBLE DIAGNOSIS FO	OR INTERMITTENT INCIDENT", EC	-1076.				

► INSPECTION END

Description

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed		Cooling fan relay
Engine coolant temperature sensor	Engine coolant temperature	Cooling fan con-	
Air conditioner switch	Air conditioner "ON" signal		

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, air conditioner ON signal. The control system has 2-step control [ON/OFF].

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	Engine: After warming up, idle	Air conditioner switch: OFF	OFF
	the engine	Air conditioner switch: ON (Compressor operates.)	ON
	• When cooling fan is stopped.		OFF
COOLING FAI	When cooling fan operates.		ON

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	L	Cooling fan relay	Engine is running. Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			Engine is running. Cooling fan is operating	Approximately 0.1V

On Board Diagnosis Logic

This diagnosis continuously monitors the engine coolant temperature.

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

Malfunction is detected when	Check Items (Possible Cause)
 Cooling fan does not operate properly (Overheat). Cooling fan system does not operate properly (Overheat). Engine coolant was not added to the system using the proper filling method. 	 Harness or connectors (The cooling fan circuit is open or shorted.) Cooling fan Radiator hose Radiator Radiator cap Water pump Thermostat Fan belt Engine coolant temperature sensor For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-1116.

CAUTION:

When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE"). Also, replace the engine oil.

- 1) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA section ("Anti-freeze Coolant Mixture Ratio", "RECOMMENDED LUBRICANTS AND FLUIDS").
- 2) After refilling coolant, run engine to ensure that no water-flow noise is emitted.





Overall Function Check

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed. **WARNING:**

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

WITH CONSULT-II

- The coolant level in the reservoir tank and radiator.
 Allow engine to cool before checking coolant level.
 If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following store and go to
- below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1109.2) Confirm whether customer filled the coolant or not. If cus-
- Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1109.
- 3) Turn ignition switch "ON".
- 4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II and make sure that cooling fans operate when touching "HIGH" or "LOW".
 - If NG, go to "Diagnostic Procedure", EC-1109.

WITHOUT CONSULT-II

- Check the coolant level in the reservoir tank and radiator.
 Allow engine to cool before checking coolant level.
 If the coolant level in the reservoir tank and/or radiator is
 - below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1109.
- Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1109.
- 3) Disconnect engine coolant temperature sensor harness connector.
- 4) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
- 5) Start engine and make sure that cooling fan operates. **Be careful not to overheat engine.**
- 6) If NG, go to "Diagnostic Procedure", EC-1109.

ZD30DDTi

Wiring Diagram


Diagnostic Procedure

1	INSPECTION START					
Do you l	Do you have CONSULT-II?					
		Yes or No				
Yes	•	GO TO 2.				
No	►	GO TO 3.				

2	CHECK COOLING FAN O	PERATION			
With CO	ONSULT-II				
1. Turn	ignition switch "ON".				
2. Perfo	orm "COOLING FAN" in "AC	TIVE TEST" mod	e with CONSULT	-11.	
			ACTIVE TES	т	
			COOLING FAN	OFF	
			MONITOR		
			COOLAN TEMP/S	XXX .C	
	SEE646X				
3 Maka	sure that cooling fan-1 one	rates			
J. Wake	5. Wake Sure that cooling ran-1 operates.				
			OK or NO	3	
ОК	►	GO TO 12.			
NG	•	GO TO 4.			

DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd)

3	CHECK COOLING FAN O	PERATION			
Without 1. Turn i 2. Disco 3. Conne 4. Resta	 Nithout CONSULT-II 1. Turn ignition switch "OFF". 2. Disconnect engine coolant temperature sensor harness connector. 3. Connect 150Ω resistor to engine coolant temperature sensor harness connector. 4. Restart engine and make sure that cooling fan operates. 				
	Cooling tan Engine coolant temperature sensor harness connector				
MEC475B OK or NG					
ОК	►	GO TO 12.			
NG	•	GO TO 4.			

DTC 0208 OVER HEAT

ZD30DDTi

Diagnostic Procedure (Cont'd)



Repair open circuit or short to ground or short to power in harness or connectors.

DTC 0208 OVER HEAT

Diagnostic Procedure (Cont'd)

6	CHECK COOLING FAN G	ROUND CIRCUIT FOR OPEN AND SHORT			
1. Turn i 2. Discor	. Turn ignition switch "OFF". 2. Disconnect cooling fan motor-1 harness connector.				
	Cooling fan motor harness connector				
2 Chaol		SEF691V			
3. Check minals	s 2, 4 and body ground. Re	fer to Wiring Diagram.			
4. Also c	nuity should exist. check harness for short to g	round and short to power.			
		OK or NG			
ОК		GO TO 7.			
NG		Repair open circuit or short to ground or short to power in harness or connectors.			
7	CHECK COOLING FAN O	UTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT			
 Disconnect ECM harness connector. Check harness continuity between ECM terminal 14 and cooling fan relay-1 terminal 1. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 					
OK		GO TO 9.			
NG		GO TO 8.			
8	DETECT MALFUNCTION	NG PART			
Check th Harnes Harnes Harnes	Check the following. • Harness connectors E127, M21 • Harness connectors M52, F7 • Harness for open or short between cooling fan relay-1 and ECM				

Repair open circuit or short to ground or short to power in harness or connectors.

ZD30DDTi

DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd)

9	CHECK COOLING FAN RELAY-1				
Check c	ontinuity between cooling fa	n relay-1 terminals 3 and 5 und	er the following conditions.		
	2		Conditions	Continuity	
				Continuity	
			12V direct current supply between terminals 1 and 2	Yes	
		2×1	No current supply	No	
		3			
	SEF608X				
		OK or	NG		
ОК	►	GO TO 10.			
NG	•	Replace cooling fan relay.			

10	CHECK COOLING FAN M	OTOR-1					
Supply	Supply battery voltage between the following terminals and check operation.						
					Termi	nals	
	(FUSE) CIE			Speed -	(+)	(-)	
		DISCONNECT	Cooling fan	Low	1	4	
		T.S. []	motor-1	High	1,3	2,4	_
		SE OK	F292Z or NG				
ОК	•	GO TO 11.					
NG	•	Replace cooling fan motor.					

11	CHECK INTERMITTENT INCIDENT				
Perform	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.				
► INSPECTION END					

DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd)

12	CHECK COOLING SYSTE	CHECK COOLING SYSTEM FOR LEAK			
Apply pro Testir CAUTIO Higher t	Apply pressure to the cooling system with a tester, and check if the pressure drops. Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm ² , 23 psi) CAUTION: Higher than the specified pressure may cause radiator damage.				
	Hose adapter EG17650301 (J33984-A)				
Pressur	e should not drop.				
		OK or NG			
OK	►	GO TO 14.			
NG	•	GO TO 13.			
13	DETECT MALFUNCTIONI	NG PART			
 Hose Radiat Water 	tor tor pump (Refer to LC section,	"Water Pump".)			
	Repair or replace.				
14	CHECK RADIATOR CAP				
Apply pr	Apply pressure to cap with a tester and check radiator cap relief pressure.				
Radiator cap relief pressure: 79 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm², 11 - 14 psi) OK or NG					
OK	•	GO TO 15.			
NG	•	Replace radiator cap.			

ZD30DDTi

DTC 0208 OVER HEAT Diagnostic Procedure (Cont'd)

15	CHECK THERMOSTAT				
1. Remo	1. Remove thermostat.				
2. Chec	2. Check valve seating condition at normal room temperatures.				
3. Chec	k valve opening temperature	and valve lift.			
			SLC343		
Valve 82	opening temperature: °C (180°F) [standard] (Mod	els for cold areas)			
76. Valve	5°C (170°F) [standard] (Mo e lift:	dels for except cold ar	eas)		
Mo	ore than 10 mm/95°C (0.394	l in/203°F)			
4. Chec	k if valve is closed at 5°C (9	°F) below valve opening	temperature. For details, refer to L	C section, "Thermostat".	
			OK or NG		
OK	•	GO TO 16.			
NG	•	Replace thermostat.			
16			ISOR		
10 1 Rom(JOR		
2. Chec	k resistance between engine	e coolant temperature ser	nsor terminals 1 and 2 as shown in	the figure.	
			<reference data=""></reference>		
			Temperature °C (°F)	Resistance $k\Omega$	
			20 (68)	2.1 - 2.9	
			50 (122)	0.68 - 1.00	
	-		90 (194)	0.236 - 0.260	
			SEF304X OK or NG	Deceptable	
OK	•	GO TO 17.			
NG	•	Replace engine coolant	temperature sensor.		

EC-1115

DTC 0208 OVER HEAT

ZD30DDTi

Diagnostic Procedure (Cont'd)

17 **CHECK MAIN 12 CAUSES**

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1116.

► INSPECTION END

Main 12 Causes of Overheating

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	 Blocked radiator Blocked condenser Blocked radiator grille Blocked bumper 	Visual	No blocking	_
	2	Coolant mixture	Coolant tester	30 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRI- CANTS" in MA section.
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAIN- TENANCE" in MA sec- tion.
	4	 Radiator cap 	Pressure tester	78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm ² , 11 - 14 psi) 59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm ² , 9 - 14 psi) (Limit)	See "System Check", "ENGINE COOLING SYS- TEM" in LC section.
ON*2	5	Coolant leaks	Visual	No leaks	See "System Check", "ENGINE COOLING SYS- TEM" in LC section.
ON*2	6	Thermostat	 Touch the upper and lower radiator hoses 	Both hoses should be hot.	See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM" in LC section.
ON*1	7	Cooling fan	• Visual	Operating	See "DTC 0208 OVER HEAT", EC-1105.
OFF	8	Combustion gas leak	• Color checker chemical tester 4 gas analyzer	Negative	_
ON*3	9	 Coolant temperature gauge 	 Visual 	Gauge less than 3/4 when driving	—
		Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAIN- TENANCE" in MA sec- tion.
OFF*4	10	• Coolant return from res- ervoir tank to radiator	• Visual	Should be initial level in reservoir tank	See "ENGINE MAINTE- NANCE" in MA section.
OFF	11	Cylinder head	 Straight gauge feeler gauge 	0.1 mm (0.004 in) Maxi- mum distortion (warping)	See "Inspection", "CYLIN- DER HEAD" in EM sec- tion.
	12	 Cylinder block and pis- tons 	● Visual	No scuffing on cylinder walls or piston	See "Inspection", "CYLIN- DER BLOCK" in EM sec- tion.

*1: Engine running at idle.

*2: Engine running at 3,000 rpm for 10 minutes. *3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to "OVERHEATING CAUSE ANALYSIS" in LC section.



Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• ECM calculation function is malfunctioning.	ECM (ECCS-D control module)



DTC Confirmation Procedure

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 2 seconds.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1118.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Start engine and wait at least 2 seconds.
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1118.

Diagnostic Procedure

1	INSPECTION START				
With CO	NSULT-II				
1. Turn i	gnition switch "ON".				
2. Select	t "SELF DIAG RESULTS" n	ode with CONSULT-II.			
3. Touch	"ERASE".				
4. Perfor	m "DTC Confirmation Proce	edure", EC-1117, again.			
5. Is the	malfunction displayed again	1?			
Without	CONSULT-II				
1. Turn i	gnition switch "ON".				
2. Erase	the Diagnostic Test Mode	I (Self-diagnostic results) memory.			
3. Perfor	m "DTC Confirmation Proce	dure", EC-1117, again.			
4. Perfor	m "Diagnostic Test Mode II	(Self-diagnostic results)".			
5. Is the	5. Is the DTC 0301 or 0901 displayed again?				
Yes or No					
Yes	•	Replace ECM.			
No	•	INSPECTION END			



Description

SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

CONSULT-II Reference Value in Data Monitor Mode

Remarks: Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL TEMP SEN	Engine: After warming up		More than 40°C (104°F)
SPILL/V	• Engine: After warming up		Approx. 13°CA
INJ TIMG C/V	• Engine: After warming up, idle the engine.		Approx. 50 - 70%
DECELER F/CUT	• Engine: After warm- ing up		OFF
BARO SEN	Idle Ignition switch: ON		Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm ² , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm ² , 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm ² , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm ² , 11.36 psi)

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	G/Y	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
40	R/B	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
52	L/B	Electronic control fuel injection pump	Engine is running.	Approximately 0.1V
53	L/R	Electronic control fuel injection pump	Engine is running.	Approximately 0.35V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible cause)
• An improper voltage signal from fuel temperature sensor	 Harness or connectors
(Built-into electronic control fuel injection pump) is sent to	(Electronic control fuel injection pump circuit is open or
injection pump control unit.	shorted.) Electronic control fuel injection pump



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1123.

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1123.

ZD30DDTi



Wiring Diagram

TEC113M

Diagnostic Procedure



DTC 0402 P9·FUEL TEMP SEN

ZD30DDTi

Diagnostic Procedure (Cont'd)

4 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F4, EC4

• Harness for open or short between electronic control fuel injection pump and engine ground

Repair open circuit or short to ground or short to power in harness or connectors.

5 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals. Refer to Wiring Diagram. Electronic control fuel injection pump ECM 33 2 40 5 52 8 53 MTBI 0444 Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK GO TO 7. NG GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. • Harness connectors F4, EC4

• Harness for open or short between electronic control fuel injection pump and ECM

Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT					
Refer to	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.					
	OK or NG					
OK	•	Replace electronic control fuel injection pump.				
NG	•	Repair open circuit or short to ground or short to power in harness or connectors.				

Description

The accelerator position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.

The accelerator position switch detects Off-accelerator switch signal and Full-accelerator switch signal and send these signals to the ECM. The ECM will then determine engine idle conditions. These signals are also used for diagnosing the accelerator position sensor.



CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONE	SPECIFICATION	
ACCEL POS SEN	Ignition switch: ON	Accelerator pedal: released	0.40 - 0.60V
	(Engine stopped)	Accelerator pedal: depressed	Approx. 4.5V
	Ignition switch: ON (Engine stopped)	Accelerator pedal: fully depressed	ON
FULL ACCEL SW		Except above	OFF
OFF ACCEL SW	Ignition switch: ON	Accelerator pedal: fully released	ON
	(Engine stopped)	Accelerator pedal: slightly open	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
		Accelerator position sen-	Ignition switch "ON" Accelerator pedal fully released	0.4 - 0.6V
23	vv	sor	Ignition switch "ON" Accelerator pedal fully depressed	Approximately 4.5V
24	D/I	Accelerator position switch	Ignition switch "ON" Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
31 R/L	K/L	(Idle)	Ignition switch "ON" Accelerator pedal depressed	Approximately 0V
22		Accelerator position switch	Ignition switch "ON" Accelerator pedal released	Approximately 0V
32	W/G	(Full)	Ignition switch "ON" Accelerator pedal fully depressed	BATTERY VOLTAGE (11 - 14V)
48	G/R	Accelerator position sen- sor power supply	Ignition switch "ON"	Approximately 5V
51	L/W	Accelerator position sen- sor ground	Engine is running. Warm-up condition Idle speed	Approximately 0V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• The relation between sensor and switch signal is not in the normal range during the specified accelerator position.	 Harness or connectors (The sensor circuit is open or shorted.) Accelerator position sensor Accelerator position switch Accelerator switch (F/C)



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Depress and release fully accelerator pedal slowly.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1130.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Depress and release fully accelerator pedal slowly.
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1130.





Wiring Diagram





TEC107M

Diagnostic Procedure



-	CHECK OV	ERALL FUN	NCTION				
With (1. Tur 2. Sel 3. Chr	CONSULT-II rn ignition switcl lect "FULL ACC eck "FULL ACC	h "ON". EL SW" and EL SW" and	d "OFF AC d "OFF AC	CEL SW" in "DAT, CEL SW" signal u	A MONITOR" mode with the following co	with CONSULT-II. nditions.	
[DATA MONI	TOR					
	MONITOR	NO DTC				Conditions	
	FULL ACCEL SW OFF ACCEL SW	OFF ON	Acceler fully de	rator pedal pressed	ON	Accelerator pedal fully released	ON ON
			Except	above	OFF	Accelerator pedal	OFF
Witho	out CONSULT-I	I h "ON"			SEF416Y		
Withc 1. Tur 2. Cho	The second secon	I h "ON". ween ECM t	terminals 3	1, 32 and ground	SEF416Y under the following c Voltage (ECM terminal 32)	conditions.	Voltage (ECM terminal 31)
Withc 1. Tur 2. Cho	H.S. CONSULT-I CONSULT-I rn ignition switch eck voltage betw H.S. CONNECT ECM OCC 31 32	I h "ON". ween ECM t	terminals 3	Conditions Accelerator pedal	SEF416Y under the following c Voltage (ECM terminal 32) Battery voltage	Conditions.	Voltage (ECM terminal 31) Battery voltage
Withc 1. Tur 2. Cho	ECM OCC		terminals 3	Conditions Conditions Accelerator pedal fully depressed Except above	SEF416Y under the following c Voltage (ECM terminal 32) Battery voltage Approx. 0V	Conditions. Conditions Accelerator pedal fully released Accelerator pedal depressed	Voltage (ECM terminal 31) Battery voltage Approx. 0V
Withc 1. Tur 2. Chu	ECM CC 31 32		terminals 3	Conditions Conditions Accelerator pedal fully depressed Except above	SEF416Y under the following c (ECM terminal 32) Battery voltage Approx. 0V SEF417Y OK or NG	Conditions. Conditions Accelerator pedal fully released Accelerator pedal depressed	Voltage (ECM terminal 31) Battery voltage Approx. 0V
Withc 1. Tur 2. Chu Chu OK	CONSULT-I in ignition switcl eck voltage betw Image: State of the s		terminals 3	Conditions Conditions Accelerator pedal fully depressed Except above	SEF416Y Under the following c (ECM terminal 32) Battery voltage Approx. 0V SEF417Y OK or NG	Conditions. Conditions Accelerator pedal fully released Accelerator pedal depressed	Voltage (ECM terminal 31) Battery voltage Approx. 0V

DTC 0403 ACCEL POS SENSOR

Diagnostic Procedure (Cont'd)



• Harness for open or short between ECM and accelerator position sensor

Repair harness or connectors.

Ŭ	CHECK ACCELERATOR	POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT				
1. Turn 2. Loose	. Turn ignition switch "OFF". 2. Loosen and retighten engine ground screw.					
	2. Loosen and retighten engine ground screw.					
		SEF227Z				
3. Checl Conti	k harness continuity betwee i nuity should exist.	n accelerator position sensor terminal 3 and engine ground. Refer to Wiring Diagram.				
4. Also (check harness for short to g	round and short to power.				
		OK or NG				
OK	•	GO TO 7.				
NG	•	GO TO 6.				
6						
 Harne Harne 	Check the following. • Harness connectors F7, M52 (RHD models) • Harness for open or short between ECM and accelerator position consor					
	ess for open or short betwee	en ECM and accelerator position sensor				
	ess for open or short betwee	en ECM and accelerator position sensor Repair open circuit or short to ground or short to power in harness or connectors.				
	ss for open or short betwee	en ECM and accelerator position sensor Repair open circuit or short to ground or short to power in harness or connectors.				
7	CHECK ACCELERATOR	en ECM and accelerator position sensor Repair open circuit or short to ground or short to power in harness or connectors. POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT				
7 1. Disco 2. Checl Cc 3. Also d	CHECK ACCELERATOR nnect ECM harness connect k harness continuity betweet ontinuity should exist. check harness for short to g	POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT tor. n ECM terminal 23 and accelerator position sensor terminal 2. Refer to Wiring Diagram. round and short to power.				
7 1. Disco 2. Checl Cc 3. Also	CHECK ACCELERATOR nnect ECM harness connect k harness continuity betweet ontinuity should exist. check harness for short to g	Repair open circuit or short to ground or short to power in harness or connectors. POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT ctor. In ECM terminal 23 and accelerator position sensor terminal 2. Refer to Wiring Diagram. pround and short to power. OK or NG				
7 1. Disco 2. Chect 3. Also o OK	CHECK ACCELERATOR nnect ECM harness connect k harness continuity between portinuity should exist. check harness for short to g	POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT tor. n ECM terminal 23 and accelerator position sensor terminal 2. Refer to Wiring Diagram. position and short to power. OK or NG GO TO 9.				
7 1. Disco 2. Check Cc 3. Also C OK NG	CHECK ACCELERATOR nnect ECM harness connect k harness continuity betwee ontinuity should exist. check harness for short to g	en ECM and accelerator position sensor Repair open circuit or short to ground or short to power in harness or connectors. POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT ctor. n ECM terminal 23 and accelerator position sensor terminal 2. Refer to Wiring Diagram. ground and short to power. OK or NG GO TO 9. GO TO 8.				
7 1. Disco 2. Checl Cc 3. Also OK NG	CHECK ACCELERATOR CHECK ACCELERATOR CHECK ACCELERATOR Charness continuity betwee Continuity should exist. Check harness for short to g	en ECM and accelerator position sensor Repair open circuit or short to ground or short to power in harness or connectors. POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT ctor. in ECM terminal 23 and accelerator position sensor terminal 2. Refer to Wiring Diagram. ground and short to power. OK or NG GO TO 9. GO TO 8.				
7 1. Disco 2. Checl Cc 3. Also C OK NG 8	CHECK ACCELERATOR CHECK ACCELERATOR CHECK ACCELERATOR Charness continuity betwee Check harness for short to g Check harness for short to g CHECT MALFUNCTION	en ECM and accelerator position sensor Repair open circuit or short to ground or short to power in harness or connectors. POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT ctor. n ECM terminal 23 and accelerator position sensor terminal 2. Refer to Wiring Diagram. round and short to power. OK or NG GO TO 9. GO TO 8.				
7 1. Disco 2. Checl Cc 3. Also OK NG 8 Check tl • Harne	CHECK ACCELERATOR CHECK ACCELERATOR CHECK ACCELERATOR Charness continuity betwee Continuity should exist. Check harness for short to g DETECT MALFUNCTION The following. CHECK ST. M52 (RH	POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT tor. n ECM terminal 23 and accelerator position sensor terminal 2. Refer to Wiring Diagram. round and short to power. OK or NG GO TO 9. GO TO 9. GO TO 8. NG PART				
7 1. Disco 2. Checl Cc 3. Also o OK NG 8 Check th • Harne • Harne	CHECK ACCELERATOR CHECK ACCELERATOR CHECK ACCELERATOR CHECK ACCELERATOR Charness continuity betwee Check harness for short to g CHECT MALFUNCTION CHECT MALFUNCTION CHE following. CHECT ST, M52 (RH CHESS for open or short betwee CHECT ST, M52 (RH CHESS FOR OPEN OF SHORT BETWEE CHECT ST, M52 (RH CHESS STOR OPEN OF SHORT BETWEE CHECT STOR OPEN OF SHOR	en ECM and accelerator position sensor Repair open circuit or short to ground or short to power in harness or connectors. POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT ctor. n ECM terminal 23 and accelerator position sensor terminal 2. Refer to Wiring Diagram. ground and short to power. OK or NG GO TO 9. GO TO 8. NG PART ID models) en ECM and accelerator position sensor				

			Diagnostic		som aj			
9 CHECK A	CHECK ACCELERATOR POSITION SENSOR							
With CONSULT-II 1. Reconnect all di 2. Turn ignition sw 3. Select "DATA M 4. Check the indica	sconnected harne itch "ON". IONITOR" mode v ation of "ACCEL F	ess connec with CONSI POS SEN"	ors. JLT-II. under the following condition	ns.				
DATA MONITOR								
MONITOR NO DTC								
	CKPS-RPM (TDC)	XXX rpm						
	ACCEL POS SEN	XXXV	Throttle valve	conditions AC	CEL POS SEN			
	ACCELLOCOLL		Completely closed (a)	0.4 - 0.6V			
			Partially open	Bet	tween (a) and (b)			
			Completely open (b)		Approx. 4.5V			
			SEF818Y OK or NG					
ОК	•	GO TO 11						
NG	•	Replace a	ccelerator pedal assembly.					
10 CHECK A	CCELERATOR	POSITION	SENSOR					
Without CONSUL 1. Reconnect all di 2. Turn ignition sw 3. Check voltage b	Without CONSULT-II 1. Reconnect all disconnected harness connectors. 2. Turn ignition switch "ON". 3. Check voltage between ECM terminal 23 and ground under the following conditions. Image: Im							
	ECM O	CONNECTOR		rottle valve conditions	Voltage			
	23		Comp	letely closed (a)	0.4 - 0.6V			
	. i		Partia	lly open	Between (a) and (b)			
Completely open (b) Approx. 4.5V SEF407Y								
			OK or NG					
ОК	•	GO TO 12						
NG	•	Replace a	ccelerator pedal assembly.					
11 RESET A	CCELERATOR F	POSITION	SENSOR IDLE POSITION	MEMORY				
With CONSULT-II								
1. Turn ignition sw	itch "ON".							

- Select "OFF ACCEL PO SIG" in "ACTIVE TEST" mode with CONSULT-II.
 Touch "CLEAR".

▶ GO TO 13.

DTC 0403 ACCEL POS SENSOR

ZD30DDTi

Diagnostic Procedure (Cont'd)

12 RESET ACCELERATOR POSITION SENSOR IDLE POSITION MEMORY

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.

2. Let engine idle for 10 minutes.

▶ GO TO 13.

13	CHECK INTERMITTENT I	NCIDENT					
Refer to	"TROUBLE DIAGNOSIS F	OR INTERMITTENT INCIDENT", EC-1076.					
	•	INSPECTION END					
	I						
14	CHECK ACCELERATOR	POSITION SWITCH POWER SUPPLY CIRCUIT					
1. Turn	ignition switch "OFF".						
3. Turn	2. Disconnect accelerator position switch harness connector. Accelerator position switch harness connector						
4. Chec	k voltage between accelerat	Image: Construct the second					
	Voltage: Battery voltage						
		SEF346X OK or NG					
ОК	•	GO TO 16.					
NG	•	GO TO 15.					
15	DETECT MALFUNCTIONI	NG PART					
Check t	he following. ess connectors M50, F5 (LH	D models)					

• Harness for open or short between accelerator position switch and ECM relay

- Harness for open or short between accelerator position switch and ECM
- Repair harness or connectors.

DTC 0403 ACCEL POS SENSOR Diagnostic Procedure (Cont'd)

16	CHECK ACCELERATOR POSITION SWITCH INPUT SIGNAL CIRCUIT-I FOR OPEN AND SHORT								
1. Turn i 2. Discou 3. Check Co 4. Also c	 Turn ignition switch "OFF". Disconnect ECM harness connector. Check harness continuity between accelerator position switch terminal 6 and ECM terminal 31. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 								
	OK or NG								
OK	► GO TO 18.								
NG	•	GO TO 17.							
		Į.							
17	DETECT MALFUNCTION	NG PART							
Check the Harne Harne	ne following. ss connectors M52, F7 (RH ss for open or short betwee	ID models) in ECM and accelerato	r position switch						
	•	Repair open circuit or	short to ground or sho	ort to power in harnes	ss or connectors.				
18	CHECK ACCELERATOR	POSITION SWITCH IN	PUT SIGNAL CIRCU	IT-II FOR OPEN AND) SHORT				
1. Check Co 2. Also c	c harness continuity betwee ntinuity should exist. check harness for short to g	n accelerator position s round and short to pow	witch terminal 4 and f ver.	ECM terminal 32. Ref	er to Wiring Diagram.				
OK		GO TO 20							
NG		GO TO 19							
	F								
19	DETECT MALFUNCTION	NG PART							
Check th • Harne • Harne	ne following. ss connectors M52, F7 (RH ss for open or short betwee	D models) n ECM and accelerato	r position switch						
	►	Repair open circuit or	short to ground or sho	ort to power in harnes	ss or connectors.				
00									
20 Chaolic au		POSITION SWITCH	nolo 4 and 5 5 and 6	under the following o	enditione				
Спеск с	ontinuity between acceleration	or position switch termi	nais 4 and 5, 5 and 6	under the following c	onditions.				
₩		Between terminal	s 4 and 5	Botwoon terminal	s 5 and 6				
Т		Conditions	Continuity	Conditions	Continuity				
	<u>456</u> <u>456</u>	Accelerator pedal fully depressed	Should exist.	Accelerator pedal fully released	Should exist.				
Except above Should not exist. Accelerator pedal Should not exist. Accelerator pedal Should not exist.									
L				I					
			SEF418Y OK or NG						
OK (With	n CONSULT-II)	GO TO 21.							
OK (With	nout CONSULT-II)	GO TO 22.							
NG	•	Replace accelerator p	edal assembly.						

Diagnostic Procedure (Cont'd)

21 RESET ACCELERATOR POSITION SENSOR IDLE POSITION MEMORY

With CONSULT-II

1. Turn ignition switch "ON".

2. Select "OFF ACCEL PO SIG" in "ACTIVE TEST" mode with CONSULT-II.

3. Touch "CLEAR".

GO TO 23.

22 RESET ACCELERATOR POSITION SENSOR IDLE POSITION MEMORY

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.

2. Let engine idle for 10 minutes.

GO TO 23.

23 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.

► INSPECTION END

Malfunction is detected when	Check Items (Possible Cause)
 An excessively high voltage from the mass air flow sensor is sent to ECM when engine is running. 	 Air duct Charge air cooler Variable nozzle turbocharger control system Variable nozzle turbocharger Mass air flow sensor Harness or connectors (The mass air flow sensor circuit is shorted.)

On Board Diagnosis Logic

DTC Confirmation Procedure

NOTE: If DTC 0406 "INT AIR VOL" displayed with DTC 0102 "MASS AIR FLOW SEN", perform trouble diagnosis for DTC 0102 "MASS AIR FLOW SEN" first. (See EC-1086.)

DATA M	DATA MONITOR	
MONITOR	MONITOR NO DTC	
CKPS-RPM (TDC	C) XXX rpm	
	DATA M MONITOR CKPS-RPM (TDC	DATA MONITOR NO DTC MONITOR NO DTC CKPS-RPM (TDC) XXX rpm

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Drive vehicle.
- 5) Maintain the engine speed more than 4,000 rpm for at least 10 seconds.
- 6) If DTC is detected, go to "Diagnostic Procedure", EC-1139.

- 1) Start engine and warm it up to normal operating temperature.
- 2) Drive vehicle.
- 3) Maintain the engine speed more than 4,000 rpm for at least 10 seconds.
- 4) Stop vehicle.
- 5) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 7) If DTC is detected, go to "Diagnostic Procedure", EC-1139.

ZD30DDTi

Diagnostic Procedure

1	CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	•	GO TO 2.
NG	•	Repair or replace.

2 CHECK VARIABLE NOZZLE TURBOCHARGER OVERALL FUNCTION 1. Start engine and let it idle. 2. Make sure that variable nozzle turbocharger control actuator rod moves when revving engine up to 3,000 rpm and returning to idle. Variable nozzle turbocharger control actuator 🦯 SEF320Z OK or NG GO TO 3. OK NG Go to "Diagnostic Procedure" in "VARIABLE NOZZLE TURBOCHARGER CONTROL SOLE-NOID VALVE", EC-1264.

3 CHECK MASS AIR FLOW SENSOR

1. Start engine and warm it up to normal operating temperature.

2. Check voltage between ECM terminal 35 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch "ON" (Engine stopped.)	Approx. 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.6 - 2.0
Idle to about 4,000 rpm*	1.6 - 2.0 to Approx. 4.0

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

SEF400Y

3. If the voltage is out of specification, disconnect MAFS harness connector and connect it again. Then repeat above check.

OK or NG		
ОК	GO TO 4.	
NG	Replace mass air flow sensor.	

4	CHECK INTERMIT INCIDENT		
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.			
	•	INSPECTION END	



Description

The crankshaft position sensor (TDC) monitors engine speed by means of signals from the sensing plate (with three protrusions) installed to the crankshaft pulley. The data signal output is detected at ATDC 70° and sent to the ECM. The sensor signal is used for fuel injection control and fuel injection timing control.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (TDC)	 Tachometer: Connect Run engine and compare tachometer indication with the CONSULT-II value. 	Almost the same speed as the CONSULT-II value.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
		Crankshaft position sensor (TDC)	Engine is running. Warm-up condition Idle speed	Approximately 0V
44	L		Engine is running. Warm-up condition Engine speed is 2,000 rpm	Approximately 0V
47	B/W	Crankshaft position sensor (TDC) ground	Engine is running. Warm-up condition Idle speed	Approximately 0V

ZD30DDTi

Malfunction is detected when	Check Items (Possible Cause)
 An improper signal from the sensor is sent to ECM during engine running and cranking. 	 Harness or connectors (The sensor circuit is open.) Crankshaft position sensor (TDC)

On Board Diagnosis Logic



DTC Confirmation Procedure

Before performing the following procedure, confirm that battery voltage is more than 10V.

- 1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 2) Crank engine for at least 1 second.
- 3) Start engine and run it for at least 2 seconds at idle speed.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1143.

- 1) Crank engine for at least 1 second.
- 2) Start engine and run it for at least 2 seconds at idle speed.
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1143.

Wiring Diagram

ZD30DDTi





TEC104M

Diagnostic Procedure



DTC 0407 CRANK POS SEN (TDC)

ZD30DDTi

Diagnostic Procedure (Cont'd)

4 DETECT MALFUNCTIONING PART

Check the following.Joint connector-4

• Harness for open or short between crankshaft position sensor (TDC) and engine ground

Repair open circuit or short to ground or short to power in harness or connectors.




DTC 0407 CRANK POS SEN (TDC)

ZD30DDTi

Diagnostic Procedure (Cont'd)



SEF295Z OK or NG			
ОК	OK 🕨 GO TO 9.		
NG	IG ► Replace crankshaft position sensor (TDC).		
9 CHECK INTERMITTENT INCIDENT			
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.			

-	-	-	-	-
			INSPECTION END	

On Board Diagnosis Logic

The ECM checks if battery voltage is within the tolerance range for the engine control system.

Malfunction is detected when	Check Items (Possible Cause)
• An abnormally high voltage from the battery is sent to ECM.	 Incorrect jump starting Battery Alternator ECM

DTC Confirmation Procedure

With CONSULT-II

- 1) Check the following.
- Jumper cables are connected for jump starting.
- Battery or alternator has been replaced. If the result is "Yes" for one item or more, skip the following steps and go to "Diagnostic Procedure", EC-1146.
- 2) Check that the positive battery terminal is connected to battery properly. If NG, reconnect it properly.
- 3) Check that the alternator functions properly. Refer to EL section ("CHARGING SYSTEM").
- 4) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
- 5) Wait one minute.
- 6) If DTC is detected, go to "Diagnostic Procedure", EC-1146. If DTC is not detected, go to next step.
- 7) Start engine and wait one minute at idle.
- 8) If DTC is detected, go to "Diagnostic Procedure", EC-1146.

Without CONSULT-II

- 1) Check the following.
- Jumper cables are connected for jump starting.
- Battery or alternator has been replaced.
 If the result is "Yes" for one item or more, skip the following steps and go to "Diagnostic Procedure", EC-1146.
- 2) Check that the positive battery terminal is connected to battery properly. If NG, reconnect it properly.
- 3) Check that the alternator functions properly. Refer to EL section ("CHARGING SYSTEM").
- 4) Turn ignition switch "ON" and wait one minute.
- 5) Turn ignition switch "OFF", wait 5 seconds and then turn "ON".
- 6) Perform "Diagnostic Test Mode II (Self-diagnostic result)" with ECM.
- 7) If DTC is detected, go to "Diagnostic Procedure", EC-1146.
- If DTC is not detected, go to next step.
- 8) Start engine and wait one minute at idle.
- 9) Turn ignition switch "OFF", wait 5 seconds and then turn "ON".
- 10) Perform "Diagnostic Test Mode II (Self-diagnostic result)" with ECM.
- 11) If DTC is detected, go to "Diagnostic Procedure", EC-1146.

Diagnostic Procedure

1	INSPECTION START		
Are jump	Are jumper cables connected for the jump starting?		
Yes or No			
Yes	•	GO TO 3.	
No	•	GO TO 2.	

DTC 0502 BATTERY VOLTAGE

Diagnostic Procedure (Cont'd)

2	CHECK BATTERY AND ALTERNATOR		
Check t Refer to	Check that the proper type of battery and alternator is installed. Refer to EL section ("BATTERY" and "CHARGING SYSTEM").		
		OK or NG	
ОК	OK 🕨 GO TO 5.		
NG	►	Replace with a proper one.	
3	CHECK JUMPER CABLE	SINSTALLATION	
Check t	hat the jumper cables are co	onnected in the correct sequence.	
	Stream and years of desired and we dedice being jump started boosting t t t t t t t t t t t t t		
ОК	DK ► GO TO 4.		
NG	IG Reconnect jumper cables properly.		

4	CHECK BATTERY FOR BOOSTER	
Check t	hat the battery for the boost	er is a 12V battery.
		OK or NG
ОК	•	GO TO 5.
NG	•	Change the vehicle for booster.
	1	
5	PERFORM DTC CONFIRMATION PROCEDURE AGAIN	
Perform "DTC Confirmation Procedure", EC-1146, again.		

	OK or NG
ОК ►	GO TO 6.
NG	Replace ECM.

6	CHECK ELECTRICAL PA	RTS DAMAGE	
 Check the following for damage. Wiring harness and harness connectors for burn Fuses for short 			
OK	►	INSPECTION END	
NG	►	Repair or replace malfunctioning part.	

System Description

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/ deceleration.

Voltage signals are exchanged between ECM and TCM (Transmission control module).

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24 37 58	PU/W P/B L/OR	A/T signal No. 1 A/T signal No. 2 A/T signal No. 4	Engine is running. Warm-up condition Idle speed	Voltage goes high up once in a few seconds (V) 10 5 0 SEF448Z
30	P	A/T signal No. 3	Engine is running. Warm-up condition Idle speed	Approximately 0V
30		741 Signal No. 5	Engine is running. Warm-up condition Engine speed is 2,000 rpm	Approximately 7.7V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• ECM receives incorrect voltage from TCM (Transmission con- trol module) continuously.	 Harness or connectors [The circuit between ECM and TCM (Transmission control module) is open or shorted.]



DTC Confirmation Procedure

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT-II

- 1) Start engine.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Set selector lever to "D" position.
- 4) Accelerate up to 60 km/h (37 MPH) gradually on the accelerator pedal.

Do not accelerate with shift down.

- 5) Stop the vehicle with engine running.
- 6) If DTC is detected, go to "Diagnostic Procedure", EC-1151.



Overall Function Check

Use this procedure to check the overall function of the A/T control circuit. During this check, a DTC might not be confirmed.

Without CONSULT-II

- 1) Start engine.
- 2) Read the voltage signal between ECM terminals 24, 30, 37, 58 and ground with an oscilloscope.
- 3) Verify that the oscilloscope screen shows the signal wave as shown under "ECM Terminals and Reference Value" on the previous page.
- 4) If NG, go to "Diagnostic Procedure", EC-1151.

ZD30DDTi



Wiring Diagram

TEC109M

Diagnostic Procedure

1	CHECK INPUT SIGNAL C	IRCUIT			
1. Turn	ignition switch "OFF".				
2. Disco	onnect ECM harness connect	tor and TCM (Transmission control module) harness connector.			
		LHD models ECM Driver's side instrument lower cover removed			
3. Cheo	SEF792V				
		FCM TCM			
		24 5			
		30 7			
		37 6			
		58 9			
		MTBL0532			
C	ontinuity should exist.				
		OK or NG			
OK	•	GO TO 3.			
NG		GO TO 2.			
-	-				
2	DETECT MALFUNCTIONI	NG PART			
Check the following. • Harness connectors E106, M88 • Harness connectors M51, F6 • Harness connectors E104, M86 (RHD models) • Harness for open or short between ECM and TCM (Transmission control module)					
	▶	Repair harness or connectors.			

DTC 0504 A/T COMM LINE Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL C	IRCUIT		
 Check harness continuity between ECM terminal 24 and ground, ECM terminal 30 and ground, ECM terminal 37 and ground, ECM terminal 58 and ground. Refer to Wiring Diagram. Continuity should not exist. Also check harness for short to ground and short to power. 				
		OK or NG		
OK	ЭК Б О ТО 5.			
NG	IG DO TO 4.			
4	DETECT MALFUNCTIONING PART			
Check the harness for open or short between ECM and TCM (Transmission control module).				

the harness for open or shor	between ECM and TCM (Transmission control module).
•	Repair open circuit short to ground or short to power in harness.

5	CHECK INTERMITTENT INCIDENT				
Refer to	efer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.				
	•	INSPECTION END			



Description

SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

CONSULT-II Reference Value in Data Monitor Mode

Remarks: Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL TEMP SEN	Engine: After warming up		More than 40°C (104°F)
SPILL/V	Engine: After warmin	ig up	Approx. 13°CA
INJ TIMG C/V	• Engine: After warming up, idle the engine.		Approx. 50 - 70%
DECELER F/CUT	Engine: After warm- ing up Idle		OFF
BARO SEN	Ignition switch: ON		Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm ² , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm ² , 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm ² , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm ² , 11.36 psi)

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	G/Y	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
40	R/B	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
52	L/B	Electronic control fuel injection pump	Engine is running.	Approximately 0.1V
53	L/R	Electronic control fuel injection pump	Engine is running.	Approximately 0.35V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible cause)
• An improper voltage signal from cam position sensor (Built-	 Harness or connectors
into electronic control fuel injection pump) is sent to injection	(Electronic control fuel injection pump circuit is open or
pump control unit.	shorted.) Electronic control fuel injection pump



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1157.

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1157.

ZD30DDTi



Wiring Diagram

TEC113M

Diagnostic Procedure



DTC 0701 P1·CAM POS SEN

ZD30DDTi

Diagnostic Procedure (Cont'd)

4 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F4, EC4

• Harness for open or short between electronic control fuel injection pump and engine ground

Repair open circuit or short to ground or short to power in harness or connectors.

5 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals. Refer to Wiring Diagram. Electronic control fuel injection pump ECM 33 1 2 40 5 52 8 53 MTBI 0444 Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK GO TO 7. NG GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. • Harness connectors F4, EC4 • Harness for open or short between electronic control fuel injection pump and ECM

7	CHECK INTERMITTENT INCIDENT				
Refer to	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.				
	OK or NG				
OK	OK Replace electronic control fuel injection pump.				
NG	►	Repair open circuit or short to ground or short to power in harness or connectors.			

Repair open circuit or short to ground or short to power in harness or connectors.



Description

SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

CONSULT-II Reference Value in Data Monitor Mode

Remarks: Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL TEMP SEN	Engine: After warming up		More than 40°C (104°F)
SPILL/V	Engine: After warmin	ig up	Approx. 13°CA
INJ TIMG C/V	• Engine: After warming up, idle the engine.		Approx. 50 - 70%
DECELER F/CUT	Engine: After warm- ing up Idle		OFF
BARO SEN	Ignition switch: ON		Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm ² , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm ² , 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm ² , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm ² , 11.36 psi)

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	G/Y	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
40	R/B	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
52	L/B	Electronic control fuel injection pump	Engine is running.	Approximately 0.1V
53	L/R	Electronic control fuel injection pump	Engine is running.	Approximately 0.35V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible cause)
 Injection pump control unit input signal [Crankshaft position sensor (TDC) signal] processing function is malfunctioning. 	 Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.) Electronic control fuel injection pump



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC 0407 is detected, go to "Diagnostic procedure", EC-1143.

If DTC 0702 is detected, go to "Diagnostic Procedure", EC-1163.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC 0407 is detected, go to "Diagnostic Procedure", EC-1143.

If DTC 0702 is detected, go to "Diagnostic Procedure", EC-1163.

ZD30DDTi



Wiring Diagram

TEC113M

Diagnostic Procedure



DTC 0702 P2·TDC PULSE SIG

ZD30DDTi

Diagnostic Procedure (Cont'd)

4 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F4, EC4

• Harness for open or short between electronic control fuel injection pump and engine ground

Repair open circuit or short to ground or short to power in harness or connectors.

5 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals. Refer to Wiring Diagram. Electronic control fuel injection pump ECM 33 1 2 40 5 52 8 53 MTBI 0444 Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK GO TO 7. NG GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. • Harness connectors F4, EC4 • Harness for open or short between electronic control fuel injection pump and ECM

7	CHECK INTERMITTENT INCIDENT				
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.					
OK or NG					
ОК	OK Replace electronic control fuel injection pump.				
NG	►	Repair open circuit or short to ground or short to power in harness or connectors.			

Repair open circuit or short to ground or short to power in harness or connectors.



Description

SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

CONSULT-II Reference Value in Data Monitor Mode

Remarks: Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL TEMP SEN	• Engine: After warming up		More than 40°C (104°F)
SPILL/V	Engine: After warmin	ig up	Approx. 13°CA
INJ TIMG C/V	• Engine: After warming up, idle the engine.		Approx. 50 - 70%
DECELER F/CUT	Engine: After warm- ing up Idle		OFF
BARO SEN	Ignition switch: ON		Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm ² , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm ² , 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm ² , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm ² , 11.36 psi)

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	G/Y	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
40	R/B	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
52	L/B	Electronic control fuel injection pump	Engine is running.	Approximately 0.1V
53	L/R	Electronic control fuel injection pump	Engine is running.	Approximately 0.35V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible cause)
 Injection pump control unit receives incorrect voltage signal from ECM continuously. 	 Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.) Electronic control fuel injection pump



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1169.

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1169.

ZD30DDTi



Wiring Diagram

TEC113M

Diagnostic Procedure



DTC 0703 P3·PUMP COMM LINE

ZD30DDTi

Diagnostic Procedure (Cont'd)

4 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F4, EC4

• Harness for open or short between electronic control fuel injection pump and engine ground

Repair open circuit or short to ground or short to power in harness or connectors.

5 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals. Refer to Wiring Diagram. Electronic control fuel injection pump ECM 33 1 2 40 5 52 8 53 MTBL0444 Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK GO TO 7. NG GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. • Harness connectors F4, EC4 • Harness for open or short between electronic control fuel injection pump and ECM

7	CHECK INTERMITTENT INCIDENT			
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.				
OK or NG				
OK	•	Replace electronic control fuel injection pump.		
NG	►	Repair open circuit or short to ground or short to power in harness or connectors.		

Repair open circuit or short to ground or short to power in harness or connectors.



Description

SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

CONSULT-II Reference Value in Data Monitor Mode

Remarks: Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL TEMP SEN	Engine: After warming up		More than 40°C (104°F)
SPILL/V	Engine: After warmin	g up	Approx. 13°CA
INJ TIMG C/V	• Engine: After warming up, idle the engine.		Approx. 50 - 70%
DECELER F/CUT	Engine: After warm- ing up Idle		OFF
BARO SEN	• Ignition switch: ON		Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm ² , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm ² , 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm ² , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm ² , 11.36 psi)

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	G/Y	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
40	R/B	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
52	L/B	Electronic control fuel injection pump	Engine is running.	Approximately 0.1V
53	L/R	Electronic control fuel injection pump	Engine is running.	Approximately 0.35V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible cause)
• Spill valve (Built-into electronic control fuel injection pump) does not function properly.	 Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.) Electronic control fuel injection pump



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1175.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1175.



Wiring Diagram

TEC113M

Diagnostic Procedure



DTC 0704 P4·SPILL/V CIRC, DTC 0706 P6·SPILL VALVE ZD30DDTi

Diagnostic Procedure (Cont'd)

4 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F4, EC4

• Harness for open or short between electronic control fuel injection pump and engine ground

Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK COMMUNICATIO	N LINE FOR OPEN	AND SHORT	
1. Chec	k continuity between the fol	lowing terminals. Ref	fer to Wiring Diagram.	
			Electronic control fuel injection pump	ECM
			1	33
			2	40
			5	52
			8	53
MTBL0444 Continuity should exist. 2. Also check harness for short to ground and short to power.				
OK	• • • • • • • • • • • • • • • • • • •	GO TO 7.		
NG	•	GO TO 6.		
		1		
6	6 DETECT MALFUNCTIONING PART			
Check th	ne following.			

• Harness connectors F4, EC4

• Harness for open or short between electronic control fuel injection pump and ECM

Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT		
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.			
OK or NG			
OK	•	Replace electronic control fuel injection pump.	
NG	•	Repair open circuit or short to ground or short to power in harness or connectors.	



Description

SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

CONSULT-II Reference Value in Data Monitor Mode

Remarks: Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL TEMP SEN	Engine: After warming up		More than 40°C (104°F)
SPILL/V	Engine: After warmin	ig up	Approx. 13°CA
INJ TIMG C/V	• Engine: After warming up, idle the engine.		Approx. 50 - 70%
DECELER F/CUT	Engine: After warm- ing up Idle		OFF
BARO SEN	• Ignition switch: ON		Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm ² , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm ² , 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm ² , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm ² , 11.36 psi)

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM CONDITION		DATA (DC Voltage)
33	G/Y	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
40	R/B	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
52	L/B	Electronic control fuel injection pump	Engine is running.	Approximately 0.1V
53	L/R	Electronic control fuel injection pump	Engine is running.	Approximately 0.35V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible cause)
• Injection pump control unit does not function properly.	Electronic control fuel injection pump



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1179.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1179.

Diagnostic Procedure

1	INSPECTION START			
With CONSULT-II 1. Turn ignition switch "ON". 2. Select "SELF DIAG RESULTS" mode with CONSULT-II. 3. Touch "ERASE". 4. Perform "DTC Confirmation Procedure", EC-1179, again. 5. Is the malfunction displayed again?				
Without CONSULT-II 1. Turn ignition switch "ON". 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. 3. Perform "DTC Confirmation Procedure", EC-1179, again. 4. Perform "Diagnostic Test Mode II (Self-diagnostic results)". 5. Is the DTC 0705 displayed again?				
Yes or No				
Yes	►	Replace electronic control fuel injection pump.		
No	•	INSPECTION END		



Description

SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.
CONSULT-II Reference Value in Data Monitor Mode

Remarks: Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL TEMP SEN	Engine: After warming up		More than 40°C (104°F)
SPILL/V	Engine: After warmin	ig up	Approx. 13°CA
INJ TIMG C/V	• Engine: After warming up, idle the engine.		Approx. 50 - 70%
DECELER F/CUT	• Engine: After warm- ing up		OFF
BARO SEN	Ignition switch: ON		Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm ² , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm ² , 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm ² , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm ² , 11.36 psi)

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	G/Y	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
40	R/B	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
52	L/B	Electronic control fuel injection pump	Engine is running.	Approximately 0.1V
53	L/R	Electronic control fuel injection pump	Engine is running.	Approximately 0.35V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible cause)
• Fuel injection timing control system does not function properly.	 Harness or connectors (Electronic control fuel injection pump circuit is open or shorted.) Electronic control fuel injection pump Improper fuel quality "INJ TIMING" in "ACTIVE TEST" mode with CONSULT-II.*

*: When using this item, DTC may be detected. If so, erase it because it is not a malfunction.



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) Keep engine speed at more than 2,000 rpm for at least 10 seconds.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1184.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Keep engine speed at more than 2,000 rpm for at least 10 seconds.
- 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 6) If DTC is detected, go to "Diagnostic Procedure", EC-1184.

ZD30DDTi



Wiring Diagram

TEC113M



DTC 0707 P7·F/INJ TIMG FB

ZD30DDTi

Diagnostic Procedure (Cont'd)

4 DETECT MALFUNCTIONING PART

Check the following.

5

- Harness connectors M50, F5
- Harness connectors F4, EC4
- Harness for open or short between electronic control fuel injection pump and ECM

• Harness for open or short between electronic control fuel injection pump and ECM relay

Repair open circuit or short to ground or short to power in harness or connectors.

CHECK ELECTRONIC CONTROL FUEL INJECTION PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".

2. Check harness continuity between electronic control fuel injection pump terminal 6 and ground. Refer to Wiring Diagram. **Continuity should exist.**

3. Also check harness for short to ground and short to power.

 OK or NG
 GO TO 7.

 NG
 > GO TO 6.

6	DETECT MALFUNCTIONI	NG PART
 Check the following. Harness connectors F4, EC4 Harness for open or short between electronic control fuel injection pump and engine ground 		
		Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK COMMUNICATION LINE FOR OPEN AND SHORT				
1. Che	ck continuity between the foll	owing terminals. Ref	er to Wiring Diagram.		
			Electronic control fuel injection pump	ECM	
			1	33	
			2	40	
			5	52	
	8 53				
C 2. Also	MTBL0444 Continuity should exist. 2. Also check harness for short to ground and short to power.				
			OK or NG		
ОК	•	GO TO 9.			
NG	►	GO TO 8.			
8	8 DETECT MALFUNCTIONING PART				

Check the following.

- Harness connectors F4, EC4
- \bullet Harness for open or short between electronic control fuel injection pump and ECM

Repair open circuit or short to ground or short to power in harness or connectors.

DTC 0707 P7·F/INJ TIMG FB Diagnostic Procedure (Cont'd)

9	CHECK INTERMITTENT INCIDENT		
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.			
OK or NG			
OK	•	Replace electronic control fuel injection pump.	
NG	•	Repair open circuit or short to ground or short to power in harness or connectors.	



Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• An excessively high or low voltage from the absolute pressure sensor (built-into ECM) is sent to ECM.	ECM (ECCS-D control module)



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Start engine and wait at least 2 seconds.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1188.



-) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Start engine and wait at least 2 seconds.
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1188.

1	INSPECTION START	ISPECTION START	
With CC	NSULT-II		
1. Turn i	gnition switch "ON".		
2. Select	t "SELF DIAG RESULTS" n	node with CONSULT-II.	
3. Touch	1 "ERASE".		
4. Perfor	m "DTC Confirmation Proce	edure", EC-1187, again.	
5. Is the	malfunction displayed again	n?	
Without 1. Turn i 2. Erase 3. Perfor 4. Perfor	Without CONSULT-II 1. Turn ignition switch "ON". 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. 3. Perform "DTC Confirmation Procedure", EC-1187, again. 4. Perform "Diagnostic Test Mode II (Self-diagnostic results)"		
5. Is the DTC 0802 displayed again?			
Yes or No			
Yes	•	Replace ECM.	
No	•	INSPECTION END	



Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• ECM input signal processing function is malfunctioning.	• ECM (ECCS-D control module)



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 1 second.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1190.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 1 second.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1190.

1	INSPECTION START	CTION START	
With CC	NSULT-II		
1. Turn i	gnition switch "ON".		
2. Select	t "SELF DIAG RESULTS" n	node with CONSULT-II.	
3. Touch	n "ERASE".		
4. Perfor	m "DTC Confirmation Proce	edure", EC-1189, again.	
5. Is the	malfunction displayed again	n?	
Without CONSULT-II 1. Turn ignition switch "ON". 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. 3. Perform "DTC Confirmation Procedure", EC-1189, again. 4. Perform "Diagnostic Test Mode II (Self-diagnostic results)". 5. Is the DTC 0802 displayed again?			
Yes or No			
Yes	•	Replace ECM.	
No	•	INSPECTION END	



Description

The stop lamp switch is installed to brake pedal bracket. The switch senses brake pedal position and sends an ON-OFF signal to the ECM. The ECM uses the signal to control the fuel injection control system.

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17	G/X	Stop Jamp switch	Ignition switch "ON" Brake pedal fully released	Approximately 0V
	0/1		Ignition switch "ON" Brake pedal depressed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• An irregular voltage signal from the switch is sent to ECM.	 Harness or connectors (The stop lamp switch circuit is open or shorted.) Stop lamp switch



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Depress and release brake pedal more than 10 times.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1193.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Depress and release brake pedal more than 10 times.
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1193.

Wiring Diagram



1 CHECI	CHECK STOP LAMP SWITCH CIRCUIT				
1. Turn ignition	switch "ON".				
2. Check the sto	op lamp when depre	ssing and releasi	ing the stop lamp switch.		
			Stop lamp switch	Stop lamp	
			Fully released	Not illuminated	
	Depressed Illuminated				
			MTBL0443		
			OK or NG		
ОК	►	GO TO 4.			
NG DO TO 2.					

2 CHECK STOP LAMP SWIT	2 CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT			
1. Turn ignition switch "OFF".				
2. Disconnect stop lamp switch harne	2. Disconnect stop lamp switch harness connector.			
Stop lamp switch				
	SEF275Z			
3 Turn ignition switch "ON"				
4. Check voltage between stop lamp	switch terminal 1 and ground with CONSULT-II or tester.			
	C C C C C C C C C C C C C C C C C C C			
T.S.				
Voltage: Battery voltage				
SEF435Y				
OK or NG				
ОК	GO TO 4.			
NG ► 0	GO TO 3.			

DTC 0807 ECM 14

ZD30DDTi

Diagnostic Procedure (Cont'd)

3 DETECT MALFUNCTIONING PART Check the following. • Fuse block (J/B) connector M3 • 10A fuse • Harness for open and short between stop lamp switch and fuse Repair open circuit or short to ground or short to power in harness or connectors. 4 CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Disconnect stop lamp switch harness connector. Steering column Stop lamp switch SEF275Z 4. Check harness continuity between ECM terminal 17 and stop lamp switch terminal 2. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. OK or NG OK GO TO 6. NG GO TO 5. 5 DETECT MALFUNCTIONING PART Check the following.

- Harness connectors M52, F7
- Harness for open or short between ECM and stop lamp switch

Repair open circuit or short to ground or short to power in harness or connectors.

DTC 0807 ECM 14

Diagnostic Procedure (Cont'd)

6	CHECK STOP LAMP SWITCH						
Check c	Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.						
1 7	Conditions Continuity						
Stop	Iamp I			Brake pedal fully released	Should not exist.		
switc	switch Brake pedal depressed Should exist.						
	SEF276Z OK or NG						
ОК	ЭК ► GO TO 7.						
NG	NG Replace stop lamp switch.						
7	7 CHECK INTERMITTENT INCIDENT						
Refer to	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.						

► INSPECTION END

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	B/Y	ECM relay (Self-shutoff)	Ignition switch "ON" Ignition switch "OFF" For a few seconds after turning ignition switch "OFF"	Approximately 0.25V
			Ignition switch "OFF" A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
			Ignition switch "OFF"	0V
38 B/Y	Ignition switch	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)	
56 61 116	W W W	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• An irregular voltage signal from the ECM relay is sent to ECM.	 Harness or connectors (ECM relay circuit is open or shorted.) ECM relay



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON".
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1198.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1198.

ZD30DDTi

Wiring Diagram



TEC123M



DTC 0902 ECM RLY

ZD30DDTi

Diagnostic Procedure (Cont'd)

4 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors M50, F5

• Harness for open or short between ECM and ECM relay

Repair open circuit or short to ground or short to power in harness or connectors.

CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 4 and ECM relay terminal 2. Refer to Wiring Diagram. **Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG

OK NG

6

7

5

GO TO 7.GO TO 6.

DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M52, F7

• Harness for open or short between ECM and ECM relay

Repair open circuit or short to ground or short to power in harness or connectors.

CHECK ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.

2. Check continuity between ECM relay terminals 3 and 5, 6 and 7.



8	CHECK INTERMITTENT INCIDENT		
Refer to	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.		
	•	INSPECTION END	



Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• ECM input signal processing function is malfunctioning.	ECM (ECCS-D control module)



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON".
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1201.

WITHOUT CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Turn ignition switch "OFF", wait at least 20 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1201.

1	INSPECTION START				
With CC	NSULT-II				
1. Turn i	gnition switch "ON".				
2. Select	t "SELF DIAG RESULTS" n	node with CONSULT-II.			
3. Touch	1 "ERASE".				
4. Perfor	m "DTC Confirmation Proce	edure", EC-1200, again.			
5. Is the	malfunction displayed again	n?			
Without	CONSULT-II				
1. Turn i	gnition switch "ON".				
2. Erase	the Diagnostic Test Mode	II (Self-diagnostic results) memory.			
3. Perfor	m "DTC Confirmation Proce	edure", EC-1200, again.			
4. Perfor	m "Diagnostic Test Mode II	(Self-diagnostic results)".			
5. Is the	5. Is the DTC 0903 displayed again?				
Yes or No					
Yes	res ► Replace ECM.				
No	INSPECTION END				



Component Description

The charge air pressure sensor detects pressure in the exit side of the charge air cooler. The sensor output voltage to the ECM increases as pressure increases. The charge air pressure sensor is not used to control the engine system under normal conditions.

ECM Terminals and Reference Value

Specification data are reference values, and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	L	Charge air pressure sen- sor	Engine is running. Warm-up condition Idle speed	Approximately 2.0V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible Cause)
• An excessively high or low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)Charge air pressure sensor



DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON".
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Wait at least 1 second.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1205.



- 1) Turn ignition switch "ON" and wait at least 1 second.
- 2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 4) If DTC is detected, go to "Diagnostic Procedure", EC-1205.

ZD30DDTi



Wiring Diagram

TEC119M



Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG			
ОК	GO TO 4.		
NG	GO TO 3.		

DETECT MALFUNCTIONING PART

Check the following.

3

- Harness connectors F6, M51 (A/T models)
- Harness connectors M88, E106 (A/T models)
- \bullet Harness for open or short between ECM and charge air pressure sensor
- Harness for open or short between TCM (Transmission control module) and charge air pressure sensor

Repair open circuit or short to ground or short to power in harness or connectors.

DTC 0905 TURBO PRESSURE

Diagnostic Procedure (Cont'd)

4	CHECK CHARGE AIR PR	ESSURE SENSOR INF	PUT SIGNAL CIRCUIT FOR OPEN	AND SHORT		
1. Disco 2. Chec Co 3. Also	 Disconnect ECM harness connector. Check harness continuity between ECM terminal 46 and charge air pressure sensor terminal 2. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 					
			OK or NG			
ОК	•	GO TO 5.				
NG	•	Repair open circuit or	short to ground or short to power in	harness or connectors.		
_						
 1. Remove charge air pressure sensor with its harness connector connected. 2. Turn ignition switch "ON". 3. Use pump to apply pressure to charge air pressure sensor as shown in the figure. CAUTION: Always calibrate the pressure pump gauge when using it. Inspection should be done at room temperature [10 - 30°C (50 - 86°F)]. 4. Check the output voltage between charge air pressure sensor terminal 2 and engine ground. Pressure (Relative to atmospheric pressure) Voltage V 0 kPa (0 mbar, 0 inHg) 1.9 - 3.0 +40 kPa (400 mbar, 300 mmHg, 0 inHg) The voltage should be 0.6 to 1.0V higher than the value measured above. 						
SEF449Z OK or NG						
UK NG						
NG	•	Replace charge air pre	essure sensor.			
6	CHECK INTERMITTENT INCIDENT					

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.

► INSPECTION END

Description SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Electronic controlled fuel injection pump	Fuel injection signal		
Crankshaft position sensor (TDC)	Engine speed		
Vehicle speed sensor	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position	EGR volume control	EGR volume control valve
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation		
Electrical load	Electrical load signal		
PNP switch	Park/Neutral position signal		

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.

- Engine stopped
- Engine starting
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle
- Low battery voltage





Description (Cont'd) COMPONENT DESCRIPTION

EGR volume control valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
	 R VOL CON/V Engine: After warming up Air conditioner switch: "OFF" Shift lever: Neutral position No-load 	After 1 minute at idle	More than 10 steps
EGR VOL CON/V		Revving engine up to 3,200 rpm quickly	0 step

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103 105 109 115	L/Y L/W L R/L	EGR volume control valve	Engine is running. Warm-up condition Idle speed	0.1 - 14V

			_
2	DATA MO		
	MONITOR	NO DTC	
	CKPS-RPM (TDC)	XXX rpm	
			SEF817Y

DTC Confirmation Procedure

WITH CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- 3) Turn ignition switch "OFF", and immediately turn "ON" within 1 second.
- 4) Start engine and let it idle.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1210.

WITHOUT CONSULT-II

- 1) Start engine and warm it up to normal operating temperature.
- 2) Turn ignition switch "OFF", and immediately turn "ON" within 1 second.
- 3) Start engine and let it idle.
- Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 6) If DTC is detected, go to "Diagnostic Procedure", EC-1210.

ZD30DDTi



Wiring Diagram

TEC116M



DTC 1003 EGR VOLUME CONT/V Diagnostic Procedure (Cont'd)

2 CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-II				
1. Turn ignition switch "OFF". 2. Disconnect ECM relay.				
LHD models ECM relay View with driver side lower instrument panel removed				
3. Check harness continuity between ECM relay terminal 7 and EGR volume control valve terminals 2 and 5. Refer to Wiring Dia-				
gram. Continuity should exist.				
OK or NG				
ОК 🕨 GO TO 4.				
NG DO TO 3.				
Check the following. • Harness connectors M50, F5 • Harness for open or short between EGR volume control valve and ECM relay				
Repair open circuit of short to ground of short to power in namess of connectors.				
4 CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-III				
Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.				
Voltage: Battery voltage				
SEF297Z OK or NG				
OK ► GO TO 5.				
5 DETECT MALFUNCTIONING PART				
Check the following. • Harness connectors E127, M21 • 10A fuse • Harness for open or obert between ECM relay and better /				
 Repair open circuit or short to ground or short to power in harness or connectors. 				

DTC 1003 EGR VOLUME CONT/V

ZD30DDTi

Diagnostic Procedure (Cont'd)



Repair open circuit or short to ground or short to power in harness or connectors.

NG

DTC 1003 EGR VOLUME CONT/V

ZD30DDTi

Diagnostic Procedure (Cont'd)



SEF819Y OK or NG			
ОК	GO TO 11.		
NG	Replace EGR volume control valve.		

EC-1213

Diagnostic Procedure (Cont'd)

10	CHECK EGR VOLUME CONTROL VALVE-II			
 1. Remove EGR volume control valve. 2. Reconnect ECM harness connector and EGR volume control valve harness connector. 3. Turn ignition switch "ON" and "OFF". 4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position. 				
OK	OK ▶ GO TO 11.			
NG	NG ▶ Replace EGR volume control valve.			
11	11 CHECK INTERMITTENT INCIDENT			

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.

► INSPECTION END



Description

SYSTEM DESCRIPTION

The ECM and the electronic control fuel injection pump control unit (abbreviated as the injection pump control unit) perform the real time communication (signal exchange).

The ECM transmits the signals of the target fuel injection amount, target fuel injection timing, and engine speed, etc., and receives the signals of the pump speed and fuel temperature, etc. from the injection pump control unit.

By those signals, the injection pump controls the optimum fuel injection amount and injection timing of the spill valve and timing control valve.

Injection pump control unit has an on board diagnostic system, which detects malfunctions related to sensors or actuators builtinto electronic control fuel injection pump. These malfunction information are transferred through the line (circuit) from injection pump control unit to ECM.

FUEL INJECTION AMOUNT CONTROL

In accordance with the target fuel injection amount signal from the ECM, the injection amount is controlled by controlling the spill valve in the injection pump and by changing the needle opening time.

FUEL INJECTION TIMING CONTROL

Based on the target fuel injection timing signal from the ECM, the injection timing is controlled in accordance with the timer spring by performing the duty control of the timing control valve in the injection pump and by adjusting the pressure of the timer piston high pressure chamber.

FUEL TEMPERATURE SENSOR

The sensor detects the fuel temperature in the injection pump and calibrates the injection amount change by the fuel temperature.

CAM RING POSITION SENSOR

The sensor detects the passing of the protrusion on the sensor wheel in the injection pump by the semiconductor magnetic resistance element sensor. The cam ring position sensor synchronizes with the cam ring, and detects the actual advance amount. The injection pump control unit measures the injection pump revolution by the signal of the cam ring position sensor.

CONSULT-II Reference Value in Data Monitor Mode

Remarks: Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL TEMP SEN	Engine: After warmin	ig up	More than 40°C (104°F)
SPILL/V	Engine: After warmin	ig up	Approx. 13°CA
INJ TIMG C/V	• Engine: After warming up, idle the engine.		Approx. 50 - 70%
DECELER F/CUT	• Engine: After warm- ing up	Idle	OFF
BARO SEN	• Ignition switch: ON		Altitude Approx. 0 m (0 ft): Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm ² , 14.59 psi) Approx. 1,000 m (3,281 ft): Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm ² , 12.90 psi) Approx. 1,500 m (4,992 ft): Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm ² , 12.06 psi) Approx. 2,000 m (6,562 ft): Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm ² , 11.36 psi)

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	G/Y	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
40	R/B	Electronic control fuel injection pump	Engine is running. Warm-up condition Idle speed	Approximately 2.5V
52	L/B	Electronic control fuel injection pump	Engine is running.	Approximately 0.1V
53	L/R	Electronic control fuel injection pump	Engine is running.	Approximately 0.35V

On Board Diagnosis Logic

Malfunction is detected when	Check Items (Possible cause)
• Fuel cut control system does not function properly.	 Harness or connectors (Electronic control fuel circuit is open or shorted.) Electronic control fuel


DTC Confirmation Procedure

WITH CONSULT-II

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- 2) Select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1219.

- 1) Turn ignition switch "ON" and wait at least 2 seconds.
- Start engine and run it for at least 2 seconds at idle speed. (If engine does not run, turn ignition switch to "START" for at least 2 seconds.)
- 3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
- 4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
- 5) If DTC is detected, go to "Diagnostic Procedure", EC-1219.

ZD30DDTi



Wiring Diagram

TEC113M

Diagnostic Procedure



DTC 1004 FUEL CUT SYSTEM1

ZD30DDTi

Diagnostic Procedure (Cont'd)

4 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F4, EC4

• Harness for open or short between electronic control fuel injection pump and engine ground

Repair open circuit or short to ground or short to power in harness or connectors.

5 CHECK COMMUNICATION LINE FOR OPEN AND SHORT 1. Check continuity between the following terminals. Refer to Wiring Diagram. Electronic control fuel injection pump ECM 33 1 2 40 5 52 8 53 MTBL0444 Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG GO TO 7. OK NG GO TO 6. 6 DETECT MALFUNCTIONING PART Check the following. • Harness connectors F4, EC4 • Harness for open or short between electronic control fuel injection pump and ECM

7	CHECK INTERMITTENT INCIDENT					
Refer to	Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.					
	OK or NG					
ОК	•	Replace electronic control fuel injection pump.				
NG	•	Repair open circuit or short to ground or short to power in harness or connectors.				

Repair open circuit or short to ground or short to power in harness or connectors.

EC-1220

Description SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (TDC)	Engine speed		Glow lamp, Glow relay
Engine coolant tem- perature sensor	Engine coolant tem- perature	control	↓ Glow plugs

When engine coolant temperature is more than approximately 75°C (167°F), the glow relay turns off, inactivating the quick-glow control until coolant temperature drops below approximately 55° C (131°F).

When coolant temperature is lower than approximately 75°C (167°F):

Ignition switch ON

After ignition switch has turned to ON, the glow relay turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug.

Cranking

The glow relay turns ON, allowing current to flow through glow plug.

• Starting

After engine has started, current continues to flow through glow plug (after-glow mode) for a certain period in relation to engine coolant temperature.

When engine speed exceeds approximately 4,800 rpm, current flow through glow plug is interrupted.

The glow indicator lamp turns ON for a certain period of time in relation to engine coolant temperature at the time glow relay is turned ON.

COMPONENT DESCRIPTION

Glow plug

• The glow plug is provided with a ceramic heating element to obtain a high-temperature resistance. It glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow relay.

 This engine uses two types of glow plugs. Type A has a blue or yellow paint mark. Type B has no paint mark.

The location of the paint mark is shown in the figure. **WARNING:**

Do not use two types of glow plugs at the same time.



SEF280Z

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16 L/W	1.000	W Glow indicator lamp	Ignition switch "ON" Glow indicator lamp is "ON"	Approximately 1V
			Ignition switch "ON" Glow indicator lamp is "OFF"	BATTERY VOLTAGE (11 - 14V)
111	LG/B	Glow relay	Refer to "SYSTEM DESCRIPTION", EC-1221.	

ZD30DDTi

Wiring Diagram



TEC105M

EC-1223

Diagnostic Procedure

1	INSPECTION START					
Check fu	Check fuel level, fuel supplying system, starter motor, etc.					
OK or NG						
OK	•	GO TO 2.				
NG	•	Correct.				

2	CHECK INSTALLATION	
Check t	hat all glow plug connecting	plate nuts are installed properly.
		View with charge air cooler removed Connecting plate nuts Di 0- 1.4 N·m (0.1 - 0.15 kg·m, 9 - 13 in-lb) Glow plug harness connector SEF233Z OK or NG
OK (Wit	h CONSULT-II)	GO TO 3.
OK (Wit	hout CONSULT-II)	GO TO 4.
NG	•	Install properly.

3	CHECK GLOW INDICATO	CHECK GLOW INDICATOR LAMP OPERATION					
With CC	NSULT-II						
1. Turn i	gnition switch "ON".						
2. Select	t "COOLAN TEMP/S" in "DA	TA MONITOR" mod	de with CONS	SULT-II.			
Confir	m that "COOLAN TEMP/S"	indicates below 75°	°C (167°F). If i	it indicates	s above 75°C (167°F), cool down engine.		
		Γ	DATA MONI	TOR			
		м	ONITOR	NO DTC			
		CC	OOLAN TEMP/S	XXX °C			
		L			l		
			SEF013	/			
4 Turn i	unition switch "OFF" wait a	t least 5 seconds ar	nd then turn "(ON"			
 Make sure that glow indicator lamp is turned "ON" for 1.5 seconds or more after turning ignition switch "ON", and then turned "OFF". 							
			OK or N	G			
		00 TO 5		-			
UK		GO TO 5.					
NG	►	GO TO 6.					

Diagnostic Procedure (Cont'd)



GLOW CONTROL SYSTEM

Diagnostic Procedure (Cont'd)

6 CHECK GLOW INDICATOR LAMP POWER SUPPLY CIRCUIT 1. Turn ignition switch "OFF". 2. Disconnect combination meter harness connector M32. 3. Turn ignition switch "ON". 4. Check voltage between combination meter terminal 9 and ground with CONSULT-II or tester. Voltage: Battery voltage SEF296Z OK or NG OK GO TO 8. NG GO TO 7. 7 DETECT MALFUNCTIONING PART Check the following. 1. Fuse block (J/B) connector M3 2. 10A fuse 3. Harness for open or short between combination meter and fuse Repair open circuit or short to ground or short to power in harness or connectors. CHECK GLOW INDICATOR LAMP OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 8 1. Turn ignition switch "OFF". 2. Disconnect ECM harness connector. 3. Disconnect combination meter harness connector M34. 4. Check harness continuity between ECM terminal 16 and combination meter terminal 30. Refer to Wiring Diagram. Continuity should exist. 5. Also check harness for short to ground and short to power. OK or NG OK GO TO 10. NG GO TO 9. 9 DETECT MALFUNCTIONING PART Check the following. 1. Harness connectors M51, F6 2. Harness for open or short between combination meter and ECM Repair open circuit or short to ground or short to power in harness or connectors. CHECK COMBINATION METER 10 Check combination meter and glow indicator lamp. Refer to EL section ("METER AND GAUGES"). OK or NG OK GO TO 18.

Repair or replace combination meter or glow indicator lamp.

EC-1226

NG

Diagnostic Procedure (Cont'd)



GLOW CONTROL SYSTEM

ZD30DDTi

Diagnostic Procedure (Cont'd)

14 DETECT MALFUNCTIONING PART Check the following. • Harness connectors E127, M21 • Harness connectors M51, F6 • Harness for open or short between glow relay and ECM Repair open circuit or short to ground or short to power in harness or connectors. 15 CHECK HARNESS CONTINUITY BETWEEN GLOW RELAY AND GLOW PLUG FOR OPEN AND SHORT 1. Disconnect glow plug harness connector. 2. Check harness continuity between glow relay terminal 5 and glow plug harness connector. Refer to Wiring Diagram. Continuity should exist. 3. Also check harness for short to ground and short to power. OK or NG OK GO TO 16. NG Repair open circuit or short to ground or short to power in harness or connectors. 16 DETECT MALFUNCTIONING PART Check the following. • Harness connectors E67, E223 • Harness connectors E225, E241 • Harness for open or short between glow relay and glow plug Repair open circuit or short to ground or short to power in harness or connectors.

17	CHECK GLOW RELAY				
Check	continuity between glow relay	<i>i</i> terminals 3 and 5 und	er the follow	ing conditions.	
	5			Conditions	Continuity
				12V direct current supply between terminals 1 and 2	Yes
	3 <u>- </u>			No current supply	No
				Operation takes less than 1 se	econd.
			SEF433Y OK or NG		
OK	•	GO TO 18.			

GLOW CONTROL SYSTEM Diagnostic Procedure (Cont'd)

18	CHECK GLOW PLUG						
1. Remo 2. Chec	1. Remove glow plug connecting plate. 2. Check glow plug resistance.						
View with charge air cooler and throttle body removed							
		SEF236Z					
 NOTE: Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one. If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one. If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool. Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque. If - 20 N·m (1.5 - 2.1 kg-m. 11 - 15 ft-lb) 							
OK or NG							
ок	•	GO TO 19.					
NG	NG ► Replace glow plug.						
10							
Pofor to							
	Relet to TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT, EC-1076.						

► INSPECTION END

Wiring Diagram



Diagnostic Procedure

1 CHECK START SIG	NAL OVERALL FU				
With CONSULT-II					
1. Turn ignition switch "ON".					
2. Check "START SIGNAL" ir	"DATA MONITOR"	mode with C	ONSULT-II under the following c	onditions.	
	MONITORING	NO FAIL			
	START SIGNAL	OFF			
	CLSD TH/P SW	ON			—
	AIR COND SIG P/N POSI SW	OFF ON	Condition	"START SIGNAL"	
					_
			Ignition switch "START	UN	_
		0	FFOOAV		
		5	EF604X		
Without CONSULT-II	terminal 20 and are	und under the	following conditions		
Check voltage between ECM	terminal 20 and gro				
		ا			
	H.S.	ىر			
20			Condition	Voltage	
			Ignition switch "START"	Battery voltage	
(Cst)			Other positions	Approximately 0V	
	I				
	Ţ				
	-				
		0			
		S OF			
ОК		N END			
NG	► GO TO 2.				
-					
2 CHECK START SIG	NAL INPUT SIGNA				
1. Turn ignition switch "OFF"					
2. Disconnect ECM harness	connector and ignitio	on switch harn	ess connector.		
3. Check harness continuity b	between ECM termin	nal 20 and igni	tion switch terminal 6. Refer to V	Viring Diagram.	
Continuity should exis	st.				
4. Also check harness for she	ort to ground and sh	ort to power.			

OK or NG				
ОК 🕨	GO TO 4.			
NG	GO TO 3.			

DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors M52, F7

• 7.5A fuse

3

• Fuse block (J/B) connectors M3, E112

• Harness for open or short between ECM and ignition switch

Repair open circuit or short to ground or short to power in harness or connectors.

ZD30DDTi

START SIGNAL Diagnostic Procedure (Cont'd)

4	CHECK INTERMITTENT INCIDENT				
Refer to	er to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.				
	► INSPECTION END				

Description

When the gear position is in "Neutral", neutral position is "ON". ECM detects the position because the continuity of the line (the "ON" signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONE	SPECIFICATION	
	• Ignition quitable ON	Shift lever: Park/Neutral	ON
P/IN POSI 5W		Except above	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	P/B	Park/Neutral position switch	Ignition switch "ON" Gear position is "Neutral" (M/T models) Gear position is "P" or "N" (A/T models)	Approximately 0V
			Ignition switch "ON" Except the above gear position	BATTERY VOLTAGE (11 - 14V)



Wiring Diagram

TEC108M

Diagnostic Procedure FOR M/T MODELS



PARK/NEUTRAL POSITION (PNP) SWITCH Diagnostic Procedure (Cont'd)

ZD30DDTi

2 CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT				
1. Turn ignition switch "OFF".				
2. Disconnect park/neutral position (PNP) switch harness connector.				
2. Disconnect park/neutral position (PNP) switch namess connector. View from under vehicle Propeller shaft PNP switch harness connector PNP switch SEF281Z				
Continuity should exist.				
4. Also check harness for short to ground and short to power.				
OK or NG				
NG • GO 10 3.				
3 DETECT MAI FUNCTIONING PART				
	_			
 Harness connectors E202, E69 Harness for open or short between PNP switch and body ground 				
Repair open circuit or short to ground or short to power in harness or connectors.				
	_			
4 CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT				
 Disconnect ECM harness connector. Check harness continuity between ECM terminal 22 and PNP switch terminal 1. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 				
OK or NG				
OK ► GO TO 6.				
NG F GO TO 5.				
5 DETECT MALFUNCTIONING PART				
Check the following. • Harness connectors F7, M52 • Harness connectors M21, E127 • Harness connectors E70, E201 • Harness for open or short between PNP switch and ECM				
Repair open circuit or short to ground or short to power in harness or connectors.				
6 CHECK PARK/NEUTRAL POSITION SWITCH				
Refer to MT section ("POSITION SWITCH CHECK").				
OK or NG				

EC-1236

Replace park/neutral position switch.

NG

PARK/NEUTRAL POSITION (PNP) SWITCH

ZD30DDTi

Diagnostic Procedure (Cont'd)

CHECK INTERMITTENT INCIDENT

7

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.

► INSPECTION END

FOR A/T MODELS

1	CHECK OVERALL FUNCTION								
With CC 1. Turn 2. Selec 3. Chect	With CONSULT-II 1. Turn ignition switch "ON". 2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. 3. Check "P/N POSI SW" signal under the following conditions.								
	DATA MONITOR								
	MONITOR NO DTC								
	P/N	POSI SW	ON	Shift lever position	P/N POSI SW				
				Neutral position	ON	-			
				Except the above position	OFF	-			
Without 1. Turn 2. Check	SEF049Y Without CONSULT-II 1. Turn ignition switch "ON". 2. Check voltage between ECM terminal 22 and ground under the following conditions.								
	22			Condition (Gear p	osition)	Voltage V			
				Neutral position		Approx. 0V			
Except the above position Battery voltage									
	SEF419Y OK or NG								
OK		► INSPEC	TION END						
NG		► GO TO 2	2.						

2 CHECK PNP SWITCH CIRCUIT With CONSULT-II 1. Select "A/T" and then select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. 2. Check "P/N POSI SW" signal under the following conditions. DATA MONITOR MONITOR NO DTC P/N POSI SW ON Shift lever position P/N POSI SW Neutral position ON Except the above position OFF SEF049Y OK or NG OK GO TO 9. NG GO TO 4. 3 CHECK PNP SWITCH CIRCUIT Without CONSULT-II 1. Turn ignition switch "OFF". 2. Disconnect TCM (Transmission control module) harness connector. TCM LH door SEF792V 3. Turn ignition switch "ON". 4. Check voltage between TCM terminal 36 and ground under the following conditions.



PARK/NEUTRAL POSITION (PNP) SWITCH Diagnostic Procedure (Cont'd)

ZD30DDTi

4	CHECK PNP SWITCH PO	WER SUPPLY CIRCUIT						
1. Turn i	1. Turn ignition switch "OFF". 2. Disconnect PNP switch barness connector							
3. Turn ignition switch "ON".								
4. Check voltage between PNP switch terminal 3 and ground with CONSULT-II or tester.								
	T.S.							
		Voltage: Battery voltage						
		voltage. Dattery voltage						
		SEF299Z OK or NG						
ОК		GO TO 6.						
NG	•	GO TO 5.						
5	DETECT MALFUNCTION	NG PART						
Check the Fuse • 7.5A feature	ne following. block (J/B) connector E112 use uss for open or short betwee	n PNP switch and fuse						
• Hame		Repair open circuit or short to ground or short to power in harness or connectors.						
6	CHECK PNP SWITCH INP	PUT SIGNAL CIRCUIT FOR OPEN OR SHORT-I						
1. Turn i 2. Disco 3. Checl	ignition switch "OFF". nnect TCM (Transmission c k harness continuity betweel CONDITION 1	ontrol module) harness connector. n TCM terminal 36 and PNP switch terminals 7, 9 under the following conditions. CONDITION 2						
	H.S.							
2	5 26 27 28 29 30 31 32 33	Conditions Continuity						
34 44	4 35 36 37 38 39 40 41 42 3 44 45 36 46 47 48	7 343536373839404142 9 7 1 Should exist. 434445 36 44748 9 7 2 Should not exist						
4 0	SEF300Z							
4. AISU (LIEUK HAIHESS IUI SHUIL LO G	OK or NG						
ОК		GO TO 8.						
NG		GO TO 7.						

PARK/NEUTRAL POSITION (PNP) SWITCH

ZD30DDTi

Diagnostic Procedure (Cont'd)

7 DETECT MALFUNCTIONING PART

Check the following.Diode E103

• Harness for open or short between PNP switch and TCM (Transmission control module)

Repair open circuit or short to ground or short to power in harness or connectors.

8 CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to "TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS" in AT section.

OK or NG

OK 🕨	GO TO 9.
NG	Replace park/neutral position (PNP) switch.

9	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT-II					
 Turn ignition switch "OFF". Disconnect ECM harness connector. Check harness continuity between ECM terminal 22 and TCM terminal 14. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 						
		OK or NG				
ОК	•	GO TO 11.				
NG	NG DO TO 10.					
	-					

10 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F7, M52

Harness connectors M21, E127

• Harness for open or short between ECM and TCM (Transmission control module)

Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK INTERMITTENT INCIDENT				
Perform	Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.				
	•	INSPECTION END			



Component Description

The heat up switch is located on the lower side of the instrument panel. This switch is used to speed up the heater's operation when the engine is cold.

When the ECM received the heat up switch "ON" signal, the ECM increases the engine idle speed to 1,100 to 1,200 rpm to warm up engine quickly.

This system works when all conditions listed below are met.

Heat up switch	ON
Engine coolant temperature	Below 105°C (221°F)
Shift lever	"P" or "N"
Accelerator pedal	Fully released

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONE	SPECIFICATION	
	• Ignition switch: ON	Heat up switch: ON	ON
WARM OF SW	• Ignition switch: ON	Heat up switch: OFF	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
59		11	Ignition switch "ON" Heat up switch is "OFF".	0V
	DR/VV	near up switch	Ignition switch "ON" BATTERY VOL Heat up switch is "ON". (11 - 14V)	BATTERY VOLTAGE (11 - 14V)

ZD30DDTi

Wiring Diagram



Diagnostic Procedure

1	INSPECTION START				
Do you l	Do you have CONSULT-II?				
		Yes or No			
Yes	•	GO TO 2.			
No	•	GO TO 3.			

2	CHECK OVERALL	FUNC	TION					
With CO	Vith CONSULT-II							
1. Turn	ignition switch "ON".							
2. Chec	2. Check "WARM UP SW" in "DATA MONITOR" mode with CONSULT-II under the following conditions.							
	DATA M	ONITOR						
	MONITOR	NO	DTC					
	WARM HE SW							
	WARM OP SW	UFI			Conditions	WARM UP SW		
					Heat-up switch is "OFF"	OFF		
					Heat-up switch is "ON"	ON		
				SEI	F302Z			
				OK	or NG			
OK			INSPECTION EN	D				
NG		►	GO TO 4.					

3 CHECK OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch "ON".

2. Check voltage between ECM terminal 59 and ground under the following conditions.



HEAT UP SWITCH

Diagnostic Procedure (Cont'd)

4 CHECK HEAT UP SWITCH POWER SUPPLY CIRCUIT

- 1. Turn heat up switch "OFF".
- 2. Turn ignition switch "OFF".
- 3. Disconnect heat up switch harness connector.
- 4. Turn ignition switch "ON".
- 5. Check voltage between heat up switch terminal 6 and ground with CONSULT-II or tester.



Voltage: Battery voltage



5 DETECT MALFUNCTIONING PART Check the following. Fuse block (J/B) connector M3 • Fuse block (J/B) connector M3 • 10A fuse • Harness for open or short between heat up switch and fuse • Harness for open or short between heat up switch and fuse • Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK HEAT UP SWITC	H INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT		
1. Turn	1. Turn ignition switch "OFF".			
2. Disco	nnect ECM harness connect	tor.		
3. Chec	k harness continuity betwee	n ECM terminal 59 and heat up switch terminal 5. Refer to Wiring Diagram.		
Co	ontinuity should exist.			
4. Also	4. Also check harness for short to ground and short to power.			
OK or NG				
ОК	ЭК ► GO TO 8.			
NG	NG DO TO 7.			
7	DETECT MALFUNCTIONING PART			
Check t	Check the following			

Check the following.

• Harness connectors M51, F6

 \bullet Harness for open or short between heat up switch and ECM

Repair open circuit or short to ground or short to power in harness or connectors.

HEAT UP SWITCH Diagnostic Procedure (Cont'd)

8	CHECK HEAT UP SWITC	н			
Check continuity between heat up switch terminals 5 and 6 under the following conditions.					
			Conditions	Continuity	
			Heat-up switch is "OFF".	Should not exist.	
	l l	Ω	Heat-up switch is "ON".	Should exist.	
			SEF305Z OK or NG		
OK	►	GO TO 9.			
NG	•	Replace heat up swite	ch.		
9 CHECK INTERMITTENT INCIDENT					
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.					
	►	INSPECTION END			

SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Description SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Ignition switch	Start signal	Swirl	Swirl control valve control solenoid valve ↓ Vacuum signal Swirl control valve actuator
Crankshaft position sensor (TDC)	Engine speed	control	
PNP switch	Park/Neutral position signal	valve	
Engine coolant temperature sensor	Engine coolant temperature	control	↓ Swirl control valve

This system has a swirl control valve in the throttle body.

While idling and during low engine speed operation, the swirl control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a swirl in the combustion chamber.

Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.

Also, except when idling and during low engine speed operation, this system opens the swirl control valve. In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow.

The solenoid valve controls swirl control valve's shut/open condition. This solenoid valve is operated by the ECM.

PNP switch	Engine speed	Engine cool- ant tempera- ture	Swirl control valve control solenoid valve	Swirl control valve
	Less than	Less than 50°C (122°F)	OFF	Open
OFF	1,250 rpm	More than 50°C (122°F)	ON	Closed
OFF	More than	Less than 50°C (122°F)	OFF	Open
	1,250 rpm	More than 50°C (122°F)	OFF	Open
ON	_		OFF	Open



SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

ZD30DDTi



Description (Cont'd) COMPONENT DESCRIPTION

Swirl control valve control solenoid valve

The swirl control valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply vacuum pump vacuum to the swirl control valve actuator. This operation closes the swirl control valve. When the ECM sends an OFF signal, the vacuum signal is cut and the swirl control valve opens.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONE	DITION	SPECIFICATION
SWRL CONT S/V	 Lift up the vehicle Engine: After warming up, let it idle for more than 1 second. 	Shift lever: Except "P" and "Neutral" position	ON
	Air conditioner switch: OFFNo-load	Shift lever: "Neutral" position	OFF

ECM Terminals and Reference Value

Specification data are reference values and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
54	54 L/B	Swirl control valve control solenoid valve	Engine is running. Warm-up condition At idle speed for more than 1 second. Lift up the vehicle Gear position is except "P" and "Neutral"	Approximately 0.1V
			Engine is running. Idle speed Lift up the vehicle Gear position is "P" or "Neutral"	BATTERY VOLTAGE (11 - 14V)

ZD30DDTi

Wiring Diagram



ZD30DDTi

Diagnostic Procedure

1	INSPECTION START		
Do you	Do you have CONSULT-II?		
		Yes or No	
Yes		GO TO 2.	
No		GO TO 3.	
	1		
2	CHECK OVERALL FUNC	TION	
With Co 1. Start 2. Selec 3. Toucl 4. Make	Vith CONSULT-II 1. Start engine and let it idle. 2. Select "SWIRL CONT S/V 1" in "ACTIVE TEST" mode with CONSULT-II. 3. Touch "ON" and "OFF" alternately on CONSULT-II screen. 4. Make sure that swirl control valve actuator rod moves according to "SWIRL CONT S/V 1" indication. Image: screen s		
		SEF307Z	
ок	•		
NG	· · ·	GO TO 4.	
L			
3 CHECK OVERALL FUNCTION			
 Without CONSULT-II 1. Lift up the vehicle. 2. Start engine and warm it up to normal operating temperature. 3. Run engine at idle speed. 4. Make sure that swirl control valve actuator rod moves when shifting the shift lever to "P" or "Neutral" position and then to positions other than "P" and "Neutral". 			

	Swirl control valve actuator
	SEF308Z OK or NG
ОК 🕨	INSPECTION END
NG	GO TO 5.

Diagnostic Procedure (Cont'd)

4 CHECK VACUUM SOURCE

With CONSULT-II

- 1. Turn ignition switch "OFF".
- 2. Disconnect vacuum hose connected to swirl control valve actuator.
- 3. Start engine and let it idle.
- 4. Select "SWIRL CONT S/V 1" in "ACTIVE TEST" mode with CONSULT-II.
- 5. Touch "ON" and "OFF" alternately on CONSULT-II screen.
- 6. Check vacuum hose for vacuum existence under the following conditions.



CHECK VACUUM SOURCE

Without CONSULT-II

5

- 1. Turn ignition switch "OFF".
- 2. Disconnect vacuum hose connected to swirl control valve actuator.
- 3. Lift up the vehicle.
- 4. Start engine and warm it up to normal operating temperature.
- 5. Run engine at idle speed
- 6. Check vacuum hose for vacuum existence under the following conditions.



Condition	Vacuum
Shift lever is in positions other than "P" and "Neutral".	Should exist.
Shift lever is in "P" or "Neutral" position.	Should not exist.

	SEF310Z OK or NG
OK 🕨	GO TO 7.
NG	GO TO 6.

SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)



7 CHECK VACUUM HOSE		
1. Turn ignition switch "OFF".		
2. Check vacuum hoses and vacuu	m gallery for clogging, cracks or improper connection.	
Clogging Improper connection SEF109L		
OK	CO TO 8	
UK P		
NG	Repair or replace vacuum hoses and vacuum gallery.	

SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)


SWIRL CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

11 CHECK SWIRL CONTROL VALVE CONTROL SOLENOID VALVE With CONSULT-II 1. Reconnect all disconnected harness connectors. 2. Turn ignition switch "ON". 3. Select "SWIRL CONT S/V 1" in "ACTIVE TEST" mode with CONSULT-II. 4. Check air passage continuity of swirl control valve control solenoid valve under the following conditions. ACTIVE TEST SWIRL CONT S/V 1 ON MONITOR CKPS-RPM (TDC) 750 rpm Air passage continuity SWIRL CONT S/V 1 between A and B SWRL CON S/V 1 ON Yes ON OFF No SEF313Z Without CONSULT-II 1. Apply 12V direct current between swirl control valve control solenoid valve terminals. 2. Check air passage continuity of swirl control valve control solenoid valve under the following conditions. Air passage continuity between A and B Condition FUSE 12V direct current supply between Yes terminals 1 and 2 No supply No SEF335X OK or NG OK GO TO 12. NG Replace swirl control valve control solenoid valve. 12 CHECK INTERMITTENT INCIDENT

12			
Perform	arform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.		
	•	INSPECTION END	



Description

Vibration when stopping the engine can be controlled by cutting intake air right before the fuel is cut. The intake air control valve control solenoid valve controls the ON-OFF load of the intake air control valve actuator. As a result, the intake air control valve control solenoid valve will be turned ON when the ignition switch is turned OFF with the engine running and when the engine stalls. After the engine has stopped, the intake air control valve control solenoid valve will return to fully open.

ECM Terminals and Reference Value

Specification data are reference values, and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	R/W Intake air control valve control solenoid valve	Intake air control valve	Engine is running.	BATTERY VOLTAGE (11 - 14V)
		Ignition switch "OFF" For a few seconds after engine stops	Approximately 0.1V	

ZD30DDTi

Wiring Diagram



TEC122M

Diagnostic Procedure



- 3. Start engine and let it idle.
- 4. Check vacuum hose for vacuum existence under the following conditions.

CAPANO /

Condition	Vacuum
For a few seconds after turning ignition switch OFF	Should exist.
Except above.	Should not exist.

	4 1 111	/ /\	
			SEF316Z OK or NG
ОК	►	GO TO 3.	
NG	►	GO TO 4.	



4	CHECK VACUUM HOSE		
3. Turn	ignition switch "OFF".		
4. Chec	k vacuum hoses and vacuur	m gallery for clogging, cracks or improper connection.	
		Clogging	
	SEF109L OK or NG		
ОК	•	GO TO 5.	
NG	•	Repair or replace vacuum hoses and vacuum gallery.	



6	CHECK INTAKE AIR CON	TROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT-II		
1. Turn 2. Disco	1. Turn ignition switch "OFF". 2. Disconnect ECM relay.			
	LHD models ECM relay View with driver side lower instrument panel removed			
		SEF225Z		
3. Chec Wiring Co 4. Also	k harness continuity betwee g Diagram. ontinuity should exist. check harness for short to g	n intake air control valve control solenoid valve terminal 2 and ECM relay terminal 7. Refer to round and short to power.		
		OK or NG		
ОК	•	GO TO 8.		
NG	•	GO TO 7.		
7	DETECT MALFUNCTIONI	NG PART		
Check the Harne Harne	he following. ess connectors M50, F5 ess for open or short betwee	n intake air control valve control solenoid valve and ECM relay		
		Repair open circuit or short to ground or short to power in harness or connectors.		
8	CHECK INTAKE AIR CON	ITROL VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT-III		
Check v	roltage between ECM relay	erminal 6 and ground with CONSULT-II or tester.		
Voltage: Battery voltage SEF297Z OK or NG				
		SEF297Z OK or NG		
ОК	•	SEF297Z OK or NG GO TO 10.		
OK NG	► ►	Image: SEF297Z OK or NG GO TO 10. GO TO 9.		
ОК NG 9	DETECT MALFUNCTIONI	SEF297Z OK or NG GO TO 10. GO TO 9. NG PART		
OK NG 9 Check tl • Harne • 10A ft	► ► DETECT MALFUNCTIONI he following. ess connectors M21, E127 use use	SEF297Z OK or NG GO TO 10. GO TO 9. NG PART		
OK NG 9 Check ti • Harne • 10A fr • Harne	► ► DETECT MALFUNCTIONI he following. ess connectors M21, E127 use ess for open or short betwee	SEF297Z OK or NG GO TO 10. GO TO 9. NG PART		

10	CHECK ECM RELAY				
 Apply 12V direct current between ECM relay terminals 1 and 2. Check continuity between ECM relay terminals 3 and 5, 6 and 7. 					
			Condition 12V direct current supply between terminals 1 and 2 OFF SEF296X	Continuity Yes No	
OK		GO TO 13	UK OF NG		
NG		Replace ECM relay.			
11	CHECK INTAKE AIR CON SHORT	ITROL VALVE CONTRO	L SOLENOID VALVE OUTPUT SI	GNAL CIRCUIT FOR OPEN OR	
1. Turn I 2. Disco 3. Check Diagra Co 4. Also c	 Turn ignition switch "OFF". Disconnect ECM harness connector. Check harness continuity between ECM terminal 2 and intake air control valve control solenoid valve terminal 1. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. 				
ОК	•	GO TO 12			
NG	►	Repair open circuit or sh	nort to ground or short to power in l	harness or connectors.	
12	CHECK INTAKE AIR CON	ITROL VALVE CONTRO	L SOLENOID VALVE		
1. Apply 2. Check	12V direct current between k air passage continuity of in	intake air control valve c ntake air control valve cor	ontrol solenoid valve terminals. htrol solenoid valve under the follow	ving conditions.	
	Condition Air passage continuity between A and B				
			terminals 1 and 2	Yes	
THE BAT		No supply	No		
			SEF335X OK or NG		
ОК	•	GO TO 13.			
NG	•	Replace intake contro	l valve control solenoid valve.		
·	ſ	1			

13	CHECK INTERMITTENT INCIDENT		
Perform	'erform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.		
	•	INSPECTION END	



Description

The load from the variable nozzle turbocharger control solenoid valve controls the actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted.



The variable nozzle turbocharger control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONE	DITION	SPECIFICATION
	 Engine: After warming up Air conditioner switch: "OFF" 	Idle	Approx. 56%
	Shift lever: Neutral positionNo-load	2,000 rpm	Approx. 20%

ECM Terminals and Reference Value

Specification data are reference values, and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/B	Variable nozzle turbo- charger control solenoid valve	Engine is running. Warm-up condition Idle speed	Approximately 6.8V
			Engine is running. Warm-up condition Engine speed is 2,000 rpm	Approximately 11V

ZD30DDTi

Wiring Diagram





Diagnostic Procedure

1	CHECK OVERALL FUNCT	TION		
1. Start 2. Make idle.	 Start engine and let it idle. Make sure that variable nozzle turbocharger control actuator rod moves when revving engine up to 3,000 rpm and returning to idle. 			
	Variable nozzle turbocharger control actuator			
		OK or NG		
OK	►			
NG	NG F GO TO 2.			
2	CHECK VACUUM SOURC	E		
1. Turn 2. Disco 3. Start 4. Checl	ignition switch "OFF". nnect vacuum hose connec engine and let it idle. k vacuum hose for vacuum h	ted to variable nozzle turbocharger control actuator.		
	Variable nozzle turbocharger control actuator Variable nozzle turbocharger Variable nozzle turbocharger Variable nozzle turbocharger Vacuum should exist.			
	SEF321Z OK or NG			
ОК	•	GO TO 3.		
NG	•	GO TO 5.		



Diagnostic Procedure (Cont'd)



OK or NG

EC-1265

Repair or replace vacuum hoses and vacuum gallery.

GO TO 9.

OK

NG



5 CHECK VACUUM HOSE 1. Turn ignition switch "OFF". 2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection. ✓ Split Clogging ✓ Clogging ✓ Improper connection SEF109L OK ØK ØG TO 6. NG



	Diagnostic Procedure (Cont'd)
7	DETECT MALFUNCTIONING PART
Check t • Harne • Harne • Fuse • 10A f • Harne	the following. ess connectors M21, E127 ess connectors E69, E202 block (J/B) connector M2 ruse ess for open or short between variable nozzle turbocharger control solenoid valve and fuse
	Repair open circuit or short to ground or short to power in harness or connectors.
8	CHECK VARIABLE NOZZLE TURBOCHARGER CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR
	OPEN OR SHORT
1. Turn 2. Disco 3. Chec to Wi C a 4. Also	ignition switch "OFF". onnect ECM harness connector. k harness continuity between ECM terminal 101 and variable nozzle turbocharger control solenoid valve terminal 1. Refer iring Diagram. ontinuity should exist. check harness for short to ground and short to power.

OK or NG			
ОК	GO TO 10.		
NG	GO TO 9.		

9	DETECT MALFUNCTIONING PART			
Check the Harne Harne	 Check the following. Harness connectors E230, F12 Harness for open or short between variable nozzle turbocharger control solenoid valve and ECM 			
	•	Repair open circuit or short to ground or short to power in harness or connectors.		

Diagnostic Procedure (Cont'd)



Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.

► INSPECTION END



Description

With the heat up switch ON, engine speed is increased and the exhaust gas control valve is closed, which helps to promote heating and improve heating performance.

The exhaust gas control valve control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the solenoid valve is bypassed to apply vacuum pump vacuum to the exhaust gas control valve actuator. This operation closes the exhaust gas control valve. When the ECM sends an OFF signal, the vacuum signal is cut and the exhaust gas control valve opens.

CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EXH/GAS REG V	 Vehicle: Stopped Engine speed: Below 1,200 rpm Engine coolant temperature: Below 87°C (189°F) Heat up switch: ON 	ON
	Except above	OFF

ECM Terminals and Reference Value

Specification data are reference values, and are measured between each terminal and ground. **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	BR/Y	R/Y Exhaust gas control valve control solenoid valve	Engine is running. Engine speed is below 1,200 rpm Engine coolant temperature is below 87°C (189°F) Stop the vehicle Heat up switch is "ON"	Approximately 0.1V
			Engine is running. Except the above condition	BATTERY VOLTAGE (11 - 14V)

ZD30DDTi

Wiring Diagram



Diagnostic Procedure

1	INSPECTION START				
Do you have CONSULT-II?					
		Yes or No			
Yes	•	GO TO 2.			
No	•	GO TO 3.			
2	CHECK OVERALL FUNC	ΓΙΟΝ-Ι			
2 CHECK OVERALL FUNCTION-I With CONSULT-II 1. Turn ignition switch "ON". 2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II. 3. Make sure that "COOLAN TEMP/S" indication is below 60°C (140°F). If out of range, cool down the engine. NOTE: The following procedure should be performed before the engine coolant temperature reaches 87°C (189°F). 4. Disconnect vacuum hose connected to exhaust gas control valve actuator. 5. Start engine and let it idle. 6. Check vacuum hose for vacuum existence under the following conditions. Image: Select "COOLAN TEMP/S" indication is below for valve actuator. 5. Start engine and let it idle. 6. Check vacuum hose for vacuum existence under the following conditions. Image: Select ** Coolant temperature reaches 87°C (189°F). 4. Disconnect vacuum hose for vacuum existence under the following conditions. Image: Select ** Coolant temperature reaches 87°C (189°F). Image: Select ** Coolant temperature re					
OK	•	GO TO 4.			
NG	•	GO TO 5.			

Diagnostic Procedure (Cont'd)

ZD30DDTi

CHECK OVERALL FUNCTION-I

Without CONSULT-II

3

7. Turn ignition switch "ON".

8. Make sure that voltage between ECM terminal 19 and ground is more than 1.88V. If out of range, cool down the engine. **NOTE:**

The following procedure should be performed before the voltage becomes less than 1.06V.

9. Disconnect vacuum hose connected to exhaust gas control valve actuator.

10. Start engine and let it idle.

11. Check vacuum hose for vacuum existence under the following conditions.



4 CHECK OVERALL FUNCTION-II

1. Turn ignition switch "OFF".

OK NG

2. Remove exhaust gas control valve actuator from exhaust tube.

3. Install a vacuum pump to exhaust gas control valve actuator.

4. Make sure that the exhaust gas control valve moves smoothly when applying vacuum of -86.6 to -93.3 kPa (-866 to -933 mbar, -650 to -700 mmHg, -25.59 to -27.56 inHg) and releasing it.

	SEF319Z OK or NG
•	INSPECTION END
•	Replace exhaust gas control valve assembly.

EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE

Diagnostic Procedure (Cont'd)

5 CHECK VACUUM HOSE

- 1. Turn ignition switch "OFF".
- 2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection.





ZD30DDTi

EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE

ZD30DDTi

Diagnostic Procedure (Cont'd)

DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M21, E127
- Fuse block (J/B) connector M2
- 10A fuse

7

• Harness for open or short between exhaust gas control valve control solenoid valve and fuse

Repair open circuit or short to ground or short to power in harness or connectors.

8 CHECK EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch "OFF".

2. Disconnect ECM harness connector.

3. Check harness continuity between ECM terminal 11 and exhaust gas control valve control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

ок 🕨	GO TO 10.
NG	GO TO 9.

9 DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors M21, E127

• Harness connectors M50, F5

• Harness for open or short between exhaust gas control valve control solenoid valve and ECM

Repair open circuit or short to ground or short to power in harness or connectors.

10 CHECK EXHAUST GAS CONTROL VALVE CONTROL SOLENOID VALVE 1. Apply 12V direct current between exhaust gas control valve control solenoid valve terminals. 2. Check air passage continuity of exhaust gas control valve control solenoid valve under the following conditions. Air passage continuity between A and B Condition FUSE 12V direct current supply between Yes terminals 1 and 2 No supply No SEE335X OK or NG OK GO TO 11. NG Replace exhaust gas control valve control solenoid valve.

11	CHECK INTERMITTENT INCIDENT		
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-1076.			
	•	INSPECTION END	

Wiring Diagram



EC-1275

ZD30DDTi

Wiring Diagram



TEC112M

General Specifications

			Unit:	rpm
Engine			ZD30DDTi	
Idle speed				
Maximum engine speed			4,300	
		Injection Pu	ump Numbers	
Engine		Part number	Pump assembly number	
ZD30DDTi		16700 VG100	109342-4023	
		Injection No	ozzle	
			Unit: kPa (bar, kg/cm²,	psi)
	Used		19,026 (190.3, 194, 2,759)	
Initial injection pressure	New		19,516 - 20,497 (195.2 - 205.0, 199 - 209, 2,830 - 2,972)	
	Limit		16,182 (161.8, 165, 2,346)	
		Engine Coc	plant Temperature Sensor	
Tempe	erature °C (°F)		Resistance kΩ	
	20 (68)		2.1 - 2.9	
50 (122)			0.68 - 1.00	
90 (194)			0.236 - 0.260	
		Crankshaft	Position Sensor (TDC)	
Resistance [at 20°C (68°F)] Ω			1,287 - 1,573	
		Glow Plug		
Resistance [at 20°C (68°F)] Ω			Approximately 0.5	
		Accelerator	r Position Sensor	
Throttle	valve conditions		Resistance between terminals 2 and 3 k Ω [at 25°C (77°F)]	
Completely closed			Approximately 0.5	
Partially open			0.5 - 4	
Completely open			Approximately 4	
		EGR Volum	ne Control Valve	
Resistance [at 25°C (77°F)] Ω			13 - 17	