TROUBLESHOOTING

Diesel Engine Diagnosis

GENERAL

1. Diesel engine problems are usually caused by the engine or fuel system. The injection pump is very rarely the cause of fuel system problems.
2. Before beginning fuel system tests, first check that the engine compression, valve timing and other major systems are within specifications.

PRELIMINARY CHECKS

1. Before performing fuel system checks, ensure that the engine is in good running condition. If necessary, first check the compression, timing and major components or systems.
2. Check the air filter, and clean or replace it if necessary.
3. Check that there is sufficient fuel in the tank.
4. Check if the fuel is contaminated with gasoline or other foreign elements. Only good—quality diesel fuel should be used.
5. Bleed air from the system by pumping the priming.
6. Check for water in the fuel filter and fuel tank, and drain as necessary.
7. If the engine will not crank or if it cranks slowly, first troubleshoot the electrical system.

PRECAUTION:

1. **The basic troubleshooting procedures for the diesel engine (valve clearance, compression, bearings, valves, pistons, etc.) are the same checks you would make for gasoline engine.**
2. **Repair of the injection pump requires considerable skill and use of a special test bench.**

EG

	See page	CH-3	CH-3	CH-3	ST-23	ST-24	ST-3, 6, 7	ST-5, 9	EG-141, 146, 152	EG-138	EG-177	–	EG-179	–	–	–	–	EG-22	EG-14	–	EG-76	–
	Suspect area	Battery	Battery Terminal	Fusible Link	Starter	Starter Relay	Pre-Heating System	Glow Plug or Intake Heater	Injection Nozzle	Fuel Filter	Delivery Valve	Fuel Line	Fuel Cut Solenoid	ACSD	Fuel Quality	No Fuel	Fuel Leakage	Ignition Timing	Air Cleaner	Accelerator Cable	Timing Gear and Camshaft	Ignition Switch
	Symptom																					
Does not start	Engine does not crank	2	1	3	6	4																5
	Engine cranks normally								5			2	1	6				4				
Difficult to start	Engine cranks slowly	2	1		3																	
	Engine cranks normally						1	2														
Poor idling	High engine idle speed													3						1		
	Rough idle with warm engine								6		7						2	5				
Others	Lack of power								9	6					12		5	8	1	2		
	Engine suddenly stops												2		4	1					3	
	Engine does not shut off with key												1									2
	Excessive exhaust smoke								4	3								2	1			
	Excessive fuel consumption								8						10		5	7	1			
	Engine overheat																	7				
	Low oil pressure																					
	High oil pressure																					
	Engine noise when warm								2									1				

HINT: When inspecting a wire harness or circuit the Electrical Wiring Diagram repair manual should be referred to and the circuits of related systems also should be checked.

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	See page	EG-24	EG-24	–	EG-15, 16, 17	EG-230	CH-4	EG-27	EG-227	EG-231, 232	–	EG-243	EG-249	–	–	–	EG-100	EG-90	EG-35, 55	EG-93	–	
	Suspect area / Symptom	Idle Speed	Maximum Speed	Valve Timing	Compression	Thermostat	Fan Belt	Fluid Coupling	Water Pump	Radiator and Radiator Cap	Coolant Leakage	Oil Pump	Relief Valve	Oil Pressure Switch	Clutch Slipping	Brake Grabbing	Connecting Rod Bearing	Crankshaft Bearing	Cylinder Head	Cylinder Block	Flywheel	
Does not start	Engine does not crank			8																	7	
	Engine cranks normally			3																		
Difficult to start	Engine cranks slowly																4	5				
	Engine cranks normally																					
Poor idling	High engine speed					2																
	Rough idle with warm engine	1		4	3																	
Others	Lack of power		7	11	10										3	4						
	Engine suddenly stops																					
	Engine does not shut off with key																					
	Excessive exhaust smoke																					
	Excessive fuel consumption	4	6		9										2	3						
	Engine overheat					5	2	3	6	4	1								8	9		
	Low oil pressure											3	2	1			4	5				
	High oil pressure												1									
	Engine noise when warm																					

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EG

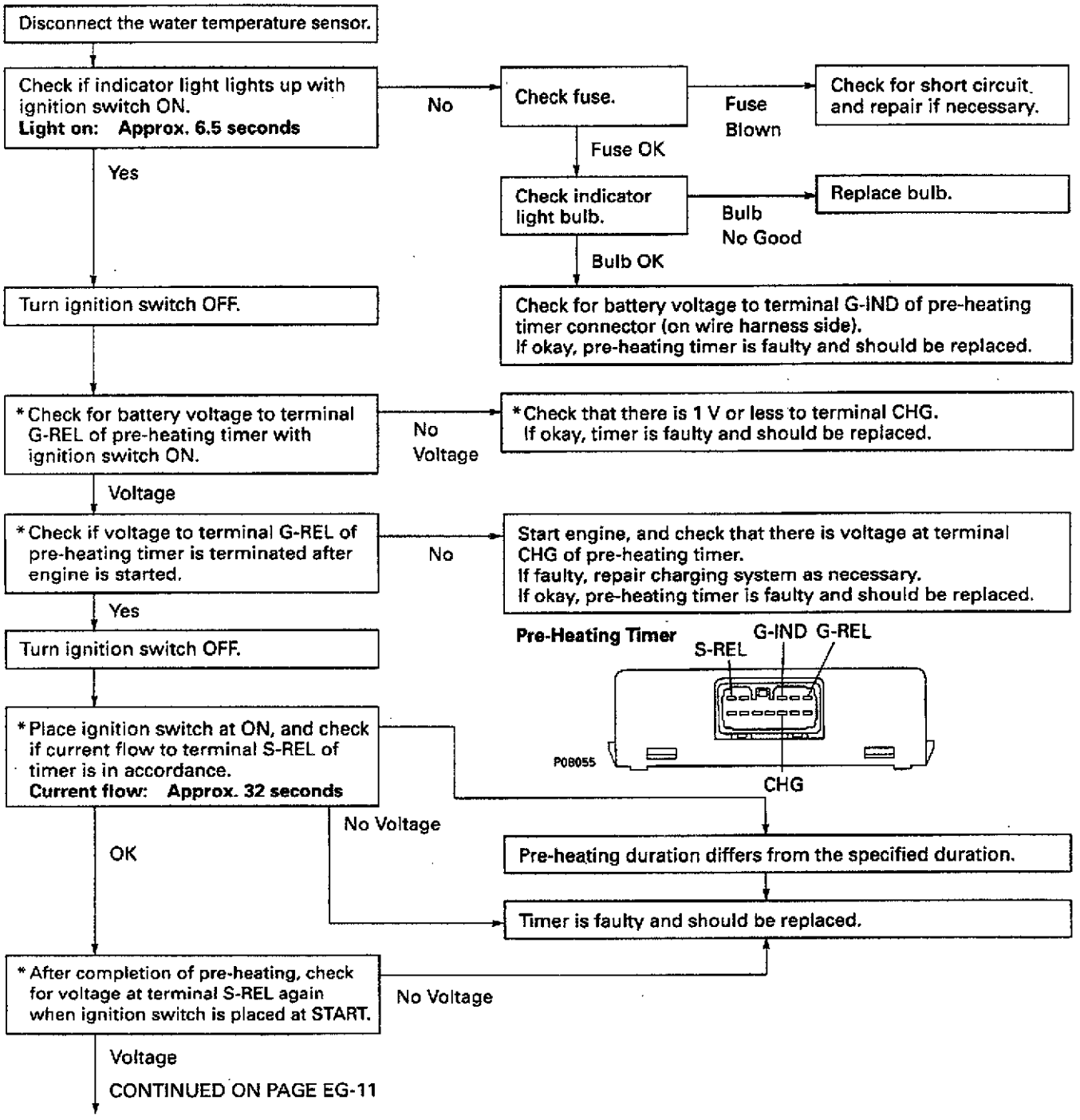
Diesel Electrical System Diagnosis (Engine does not start cold) for 3B

HINT:

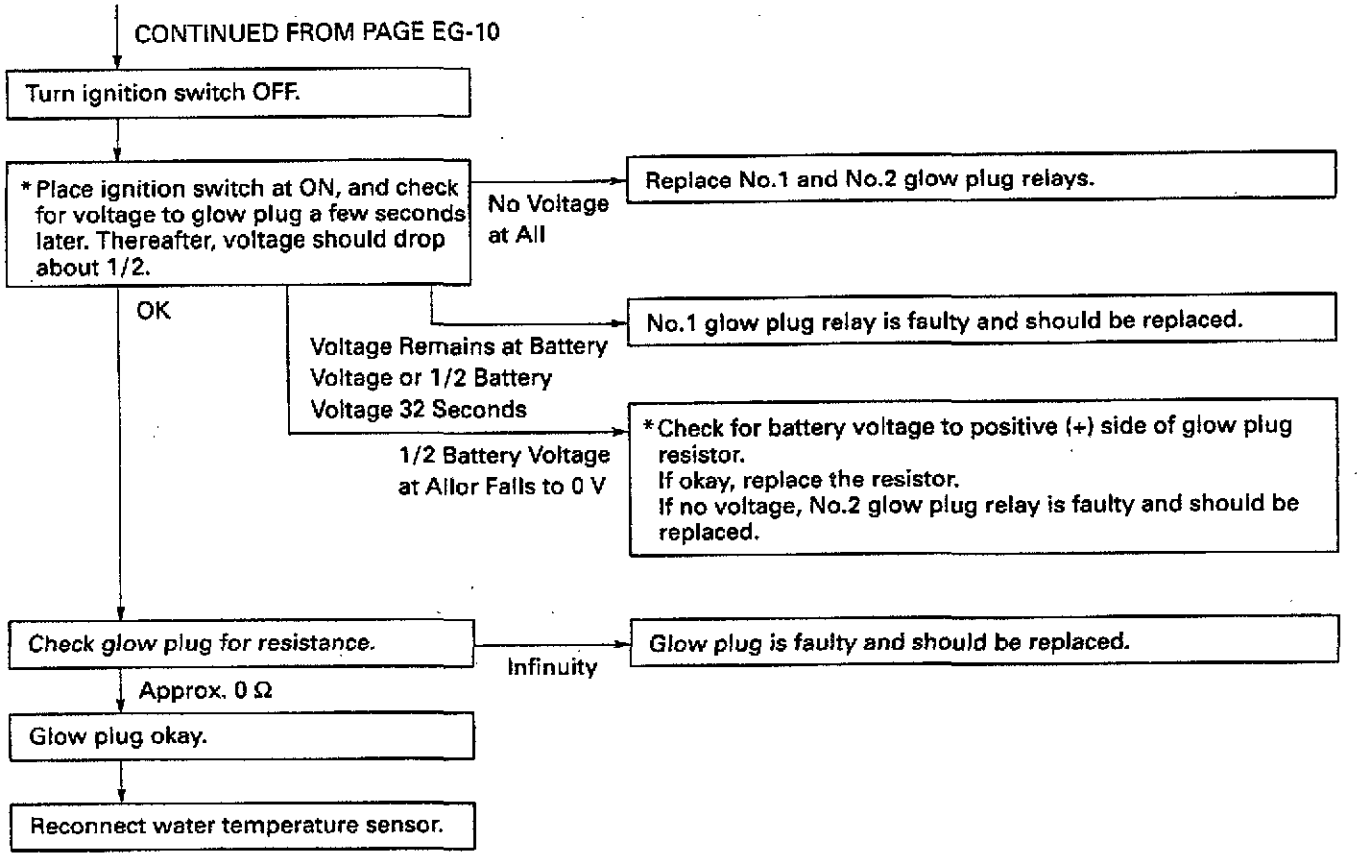
- Battery voltage at 12 V — Ignition switch OFF.
- Engine cranks normally.
- Fusible link okay.
- Check the voltage marked with an asterisk (*) just as the ignition switch is placed at ON because the voltage will change.

EG

PRE—HEATING SYSTEM (Super Glow Type/BB)

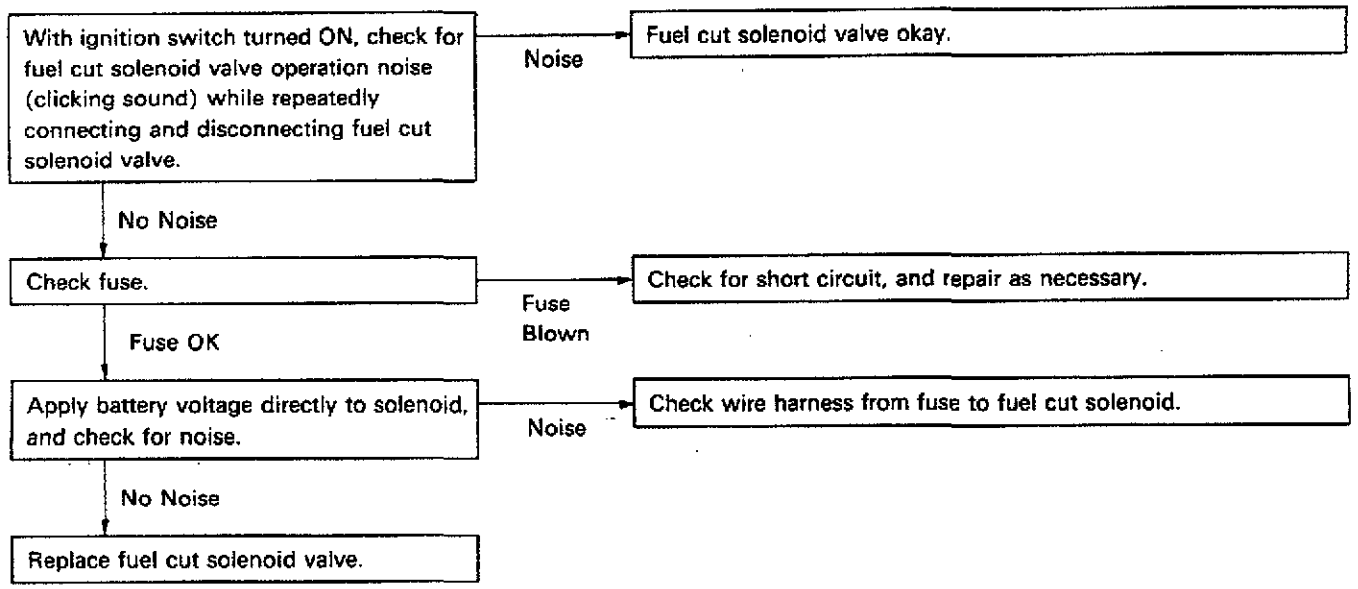


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V06808

FUEL CUT SOLENOID VALVE



V06663

Diesel Electrical System Diagnosis (Engine does not start cold) for 14B

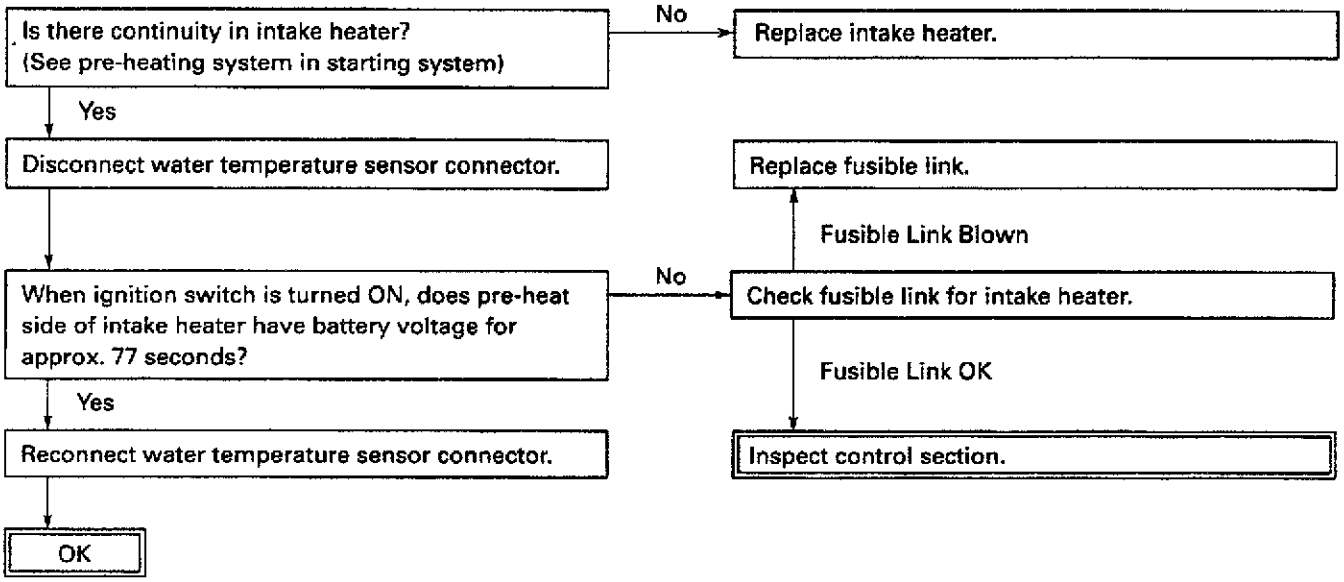
HINT:

- Battery voltage at 12 V — Ignition switch OFF.
- Engine cranks normally.
- Fusible link okay.

EG

PRE-HEATING SYSTEM

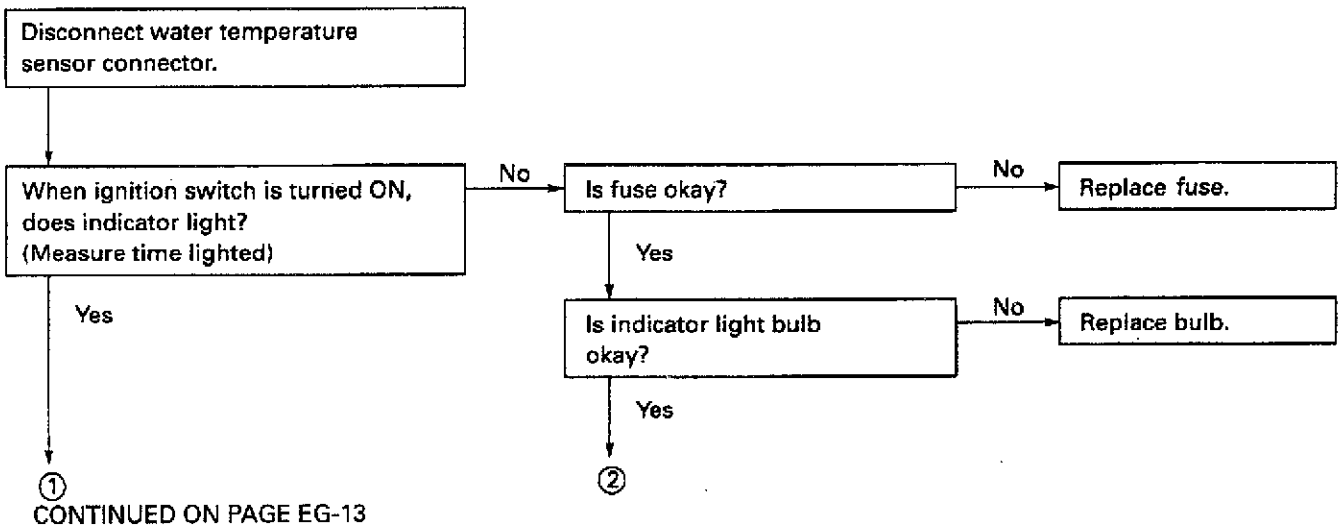
1. Inspect power supply section



V06809

2. Inspect control section

HINT: Perform this inspection with the intake heater lead wire properly connected.



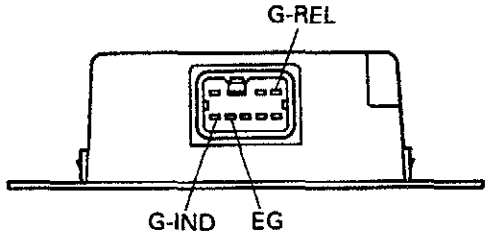
CONTINUED ON PAGE EG-13

V06810

CONTINUED FROM PAGE EG-12

①

Pre-Heating Timer



P23658

②

Is there grounding of terminal EG of pre-heating timer?

No → Open circuit or ground faulty in wire harness between terminal EG of pre-heating timer and body ground.

Yes

Is there battery voltage to terminal G-IND of pre-heating timer (on wire harness side)?

Yes → Replace pre-heating timer.

No → Open circuit in wire harness between terminal G-IND of pre-heating timer and indicator *light.*

Is lighting time correct?
Approx. 5 seconds

No → Replace pre-heating timer.

Yes

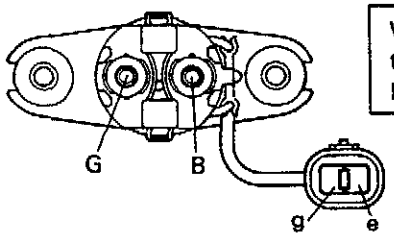
Is there battery voltage between terminal G of intake heater relay *and body ground for approx.* 77 seconds with ignition switch ON?

No → Is intake heater relay okay? (See pre-heating system in *Starting System)*

No → Replace intake heater relay.

Yes

Intake Heater Relay (BB)



P23686

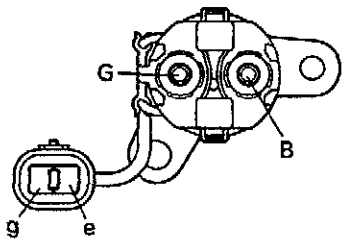
Yes

When ignition switch is turned ON, does terminal G-REL of pre-heating timer have battery voltage for approx. 77 seconds?

No → Replace pre-heating timer.

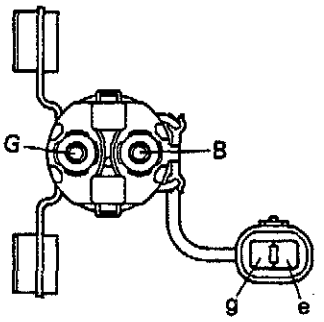
Yes

Intake Heater Relay (BU111, 141)



P23687

Intake Heater Relay (BU211)



P23688

Reconnect water temperature sensor connector.

Inspect power supply section.

- Open circuit in wire harness between terminal G-REL of pre-heating timer and terminal g of intake heater relay.
- Open circuit or ground faulty in wire harness between terminal e of intake heater relay and body ground.

EG

V06822