ENGINE CONTROL SYSTEM

SECTION **EC**

CONTENTS

APPLICATION NOTICE
How to Check Vehicle Type

Confirm K9K engine type with model written on identification plate (refer to GI-44, "IDENTIFICATION INFORMATION"), then refer to service information in EC section.

Vehicle type	Engine type	Service information
xTKxxxxK12Vxx	Euro3 48 kW	K9K-Type 1
xTKxxxxK12Yxx	Euro3 60 kW	
xTKxxxxK12Txx	Euro4 50 kW	K9K-Type 2
xTKxxxxK12Uxx	Euro4 63 kW	

DIESEL EQUIPMENT
Cleanliness

CLEANLINESS INSTRUCTIONS WHICH MUST BE FOLLOWED WHEN WORKING ON THE HIGH PRESSURE DIRECT INJECTION SYSTEM

Risks relating to contamination

The system is very sensitive to contamination. The risks caused by the introduction of contamination are:
– damage or destruction of the high pressure injection system and the engine,
– seizing or leaking of a component.

All After-Sales operations must be performed under very clean conditions. This means that no impurities (particles a few microns in size) get into the system during dismantling or into the circuits via the fuel unions.

The cleanliness principle must be applied from the filter to the injectors.

WHAT ARE THE SOURCES OF CONTAMINATION?

Contamination is caused by:
– metal or plastic chips,
– paint,
– fibres:
  - boxes,
  - brushes,
  - paper,
  - clothing,
  - cloths,
– foreign bodies such as hair,
– ambient air,
– etc.

IMPORTANT: It is not possible to clean the engine using a high pressure washer because of the risk of damaging connections. In addition, moisture may collect in the connectors and create electrical connection problems.

INSTRUCTIONS TO BE FOLLOWED BEFORE ANY WORK IS CARRIED OUT ON THE INJECTION SYSTEM

- Ensure that you have the plugs for the unions to be opened (bag of plugs sold at the Parts Stores - Nissan part No.: 16830 BN700, Renault part No.: 77 01 206 804). Plugs are to be used once only. After use, they must be thrown away (once used they are soiled and cleaning is not sufficient to make them reusable). Unused plugs must be thrown away.

- Ensure that you have hermetically resealable plastic bags for storing removed parts. Stored parts will therefore be less subject to the risk of impurities. The bags must be used only once, and after use they must be thrown away.

- Lint-free towelettes to be used for injection pump related service purpose. The use of a normal cloth or paper for cleaning purposes is forbidden. These are not lint-free and may contaminate the fuel circuit of the system. Each lint-free cloth should only be used once.

INSTRUCTIONS TO BE FOLLOWED BEFORE OPENING THE FUEL CIRCUIT

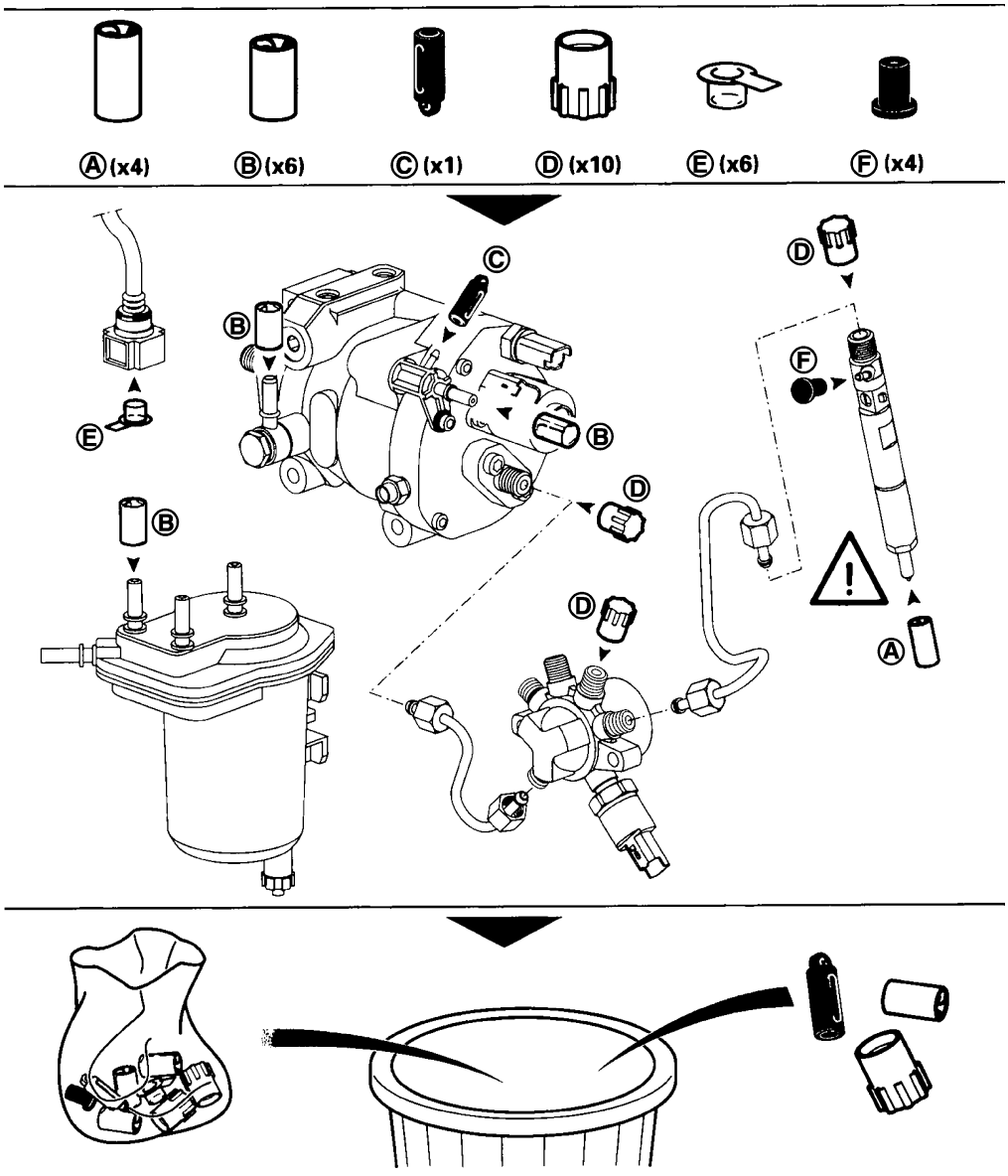
- For each operation, use new thinner (used thinner contains impurities). Pour it into a clean receptacle.
- For each operation, use a clean brush which is in good condition (the brush must not shed its bristles).
- Use a brush and thinners to clean the connections to be opened.
- Blow compressed air over the cleaned parts (tools, cleaned the same way as the parts, connections and injection system zone). Check that no bristles remain adhered.
- Wash your hands before and during the operation if necessary.
- When wearing leather protective gloves, cover these with latex gloves.

INSTRUCTIONS TO BE FOLLOWED DURING THE OPERATION

- As soon as the circuit is open, all openings must be plugged to prevent impurities from entering the system. The plugs to be used are available from the Parts Stores - Nissan part No.: 16830 BN700, Renault part No.: 77 01 206 804. They must not, under any circumstances, be reused.
- Close the hermetically sealed bag, even if it has to be reopened shortly afterwards. Ambient air carries contamination.
- All components of the injection system that are removed must be stored in a hermetically sealed plastic bag once the plugs have been inserted.
- The use of a brush, thinner, bellows, sponge or normal cloth is strictly forbidden once the circuit has been opened. These items are likely to allow impurities to enter the system.
- A new component replacing an old one must not be removed from its packaging until it is to be fitted to the vehicle.

Instructions For Fitting The Plugs

Nissan part number: 16830 BN700
(Renault part number: 77 01 206 804)



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CAUTION:

- **The engine must not run with:**
  - **Diesel containing more than 10% diester**
  - **Petrol, even in very small amounts.**
- **The system can inject the diesel into the engine at a pressure of up to 140,000 kPa (1,400 bar, 1,428 kg/cm^2, 20,300 psi). Before carrying out any work, check that the injector rail is no longer pressurized and that the fuel temperature is not too high.**
- **You must respect the cleaning and safety advice specified in this document for any work on the high pressure injection system.**

The high pressure injection system is intended to deliver a specific quantity of diesel to the engine at a specific time.

DESCRIPTION

- **DELPHI and type "DDCR"** injection controlling **112 terminals** ECM.

- The system consists of:
– a priming pump on the low pressure circuit,
– a diesel fuel filter,
– a high pressure pump incorporating a low pressure pump (transfer pump),
– a flow actuator attached to the pump,
– an injector rail,
– a pressure sensor located in the rail,
– four solenoid injectors,
– a fuel temperature sensor,
– an engine coolant temperature sensor,
– an intake (upstream) air temperature sensor,
– a camshaft position sensor (cylinder reference sensor),
– a turbocharger air pressure sensor,
– a knock sensor (accelerometer),
– an EGR solenoid valve,
– an accelerator pedal potentiometer,
– and an ECM.

- The "common rail" direct high pressure injection system works sequentially (based on the operation of multipoint injection for petrol engines).

- This new injection system reduces operating noise, reduces the volume of pollutant gases and particles and produces high engine torque at low engine speeds thanks to a pre-injection procedure.

- The high pressure pump generates the high pressure sent to the injector rail. The flow actuator on the pump controls the quantity of diesel engine fuel supplied according to the demand determined by the ECM. The rail supplies each injector through a steel pipe.

- The ECM:
  - determines the value of injection pressure necessary for the engine to operate well and then controls the pressure regulator. It checks that the pressure value is correct by analysing the value transmitted by the pressure sensor located on the rail,
  - determines the injection time necessary to deliver the right quantity of diesel and the moment when injection should be started,
  - controls each injector electrically and individually after determining these two values.

- The injected flow to the engine is determined by:
  - the duration of injector control,
  - the injector opening and closing speed,
  - the needle travel (determined by a constant for the type of injector),
  - the nominal hydraulic flow of the injector (unique to each injector),
  - the high pressure rail pressure controlled by the ECM.

- The ECM controls:
  - the idle speed adjustment,
  - the exhaust gas flow reinjected into the inlet,
  - the fuel supply control (advance, flow and rail pressure),
  - the cooling fan control,
  - the heat adjustment of the coolant circuit (thermoplungers),
  - the glow plug (pre/post heating) control.

- The high pressure pump is supplied at low pressure by an integrated low pressure pump (transfer pump). It supplies the rail whose pressure is controlled for charge by the flow actuator and for discharging by the injector valves. Falls in pressure can be compensated for in this way. The flow actuator allows the high pressure pump to provide just the amount of diesel fuel necessary to maintain the pressure in the rail. Thanks to this element, heat generation is minimised and engine output improved.
  In order to discharge the rail using the injector valves, the valves are controlled by short electrical impulses:
  - short enough not to open the injector, (through the return circuit from the injectors),
  - long enough to open the valves and discharge the rail.

- The ECM controls the cooling fans and the coolant temperature warning light on the instrument panel.

IMPORTANT

- **The engine must not operate with:**
  – **diesel engine fuel containing more than 10% diester,**
  – **petrol, even in tiny quantities.**

- **The system can inject the diesel into the engine at a pressure up to 1400 bars. Before carrying out any work, check that the injector rail is not under pressure and that the fuel temperature is not too high.**

- **You must respect the cleaning and safety advice specified in this document for any work on the high pressure injection system.**

- **Removal of the interior of the pump and injectors is prohibited. Only the flow actuator, the fuel temperature sensor and the venturi can be replaced.**

- **For safety reasons, it is strictly forbidden to slacken a high pressure pipe union when the engine is running.**

- **It is not possible to remove the pressure sensor from the fuel rail because this may cause circuit contamination problems. If the pressure sensor fails, the pressure sensor, the rail and the five high pressure pipes must be replaced.**

- **It is strictly forbidden to remove any injection pump pulley marked number 070 575. If the pump is being replaced, the pulley must be replaced.**

- **It is forbidden to repair the wiring connecting the knock sensor (accelerometer) and the CKP sensor (engine speed sensor). If the wiring should fail, it has to be replaced with new wiring.**

- **Applying 12 volts directly to any component in the system is prohibited.**

- **Ultrasonic carbon removal and cleaning are prohibited.**

- **Never start the engine without the battery being connected correctly.**

- **Disconnect the injection system ECM when carrying out any welding work on the vehicle.**

- **It is essential to replace all the disconnected air inlet plastic pipes.**

There is a 16 digit code on the injectors called individual injector correction. This code is specific to each injector, and takes into account differences in manufacture and specifies the flow injected by each of them.

When an injector is replaced, it is necessary to program the code of the new injector into the ECM.

When an ECM is replaced, it is necessary to program the codes of the four injectors.

<u>There are two possibilities:</u>

- **If it is possible to communicate with the ECM:**
  - **read out the data from the ECM using the "SAVE DATA FOR REPLACE" in "WORK SUPPORT" mode with CONSULT-II**
  - **turn ignition switch OFF.**
  - **remove battery negative cable.**
  - **change the ECM**
  - **reprogram the data from the "WRITE DATA AFTER REPLACE" in "WORK SUPPORT" mode with CONSULT-II to the replaced ECM**
  - **after replacement, ensure that the ECM has not detected malfunctions relating to the injector codes and check that the instrument panel warning light is off.**

- **If it is not possible to communicate with the ECM:**
  - **turn ignition switch OFF.**
  - **remove battery negative cable.**
  - **change the ECM**
  - **read the data on the injectors**
    Refer to EC-K9K-44 for individual injector correction value location.
  - **enter the data in the ECM using the "ENTER INJCTR CALIB DATA" in "WORK SUPPORT" mode with CONSULT-II manually**
  - **reconfigure the different elements such as the power-assisted steering pump assembly and the thermoplungers etc.**
  - **using CONSULT-II, ensure that the ECM has not detected malfunctions relating to the injector codes and check that the instrument panel warning light is off.**

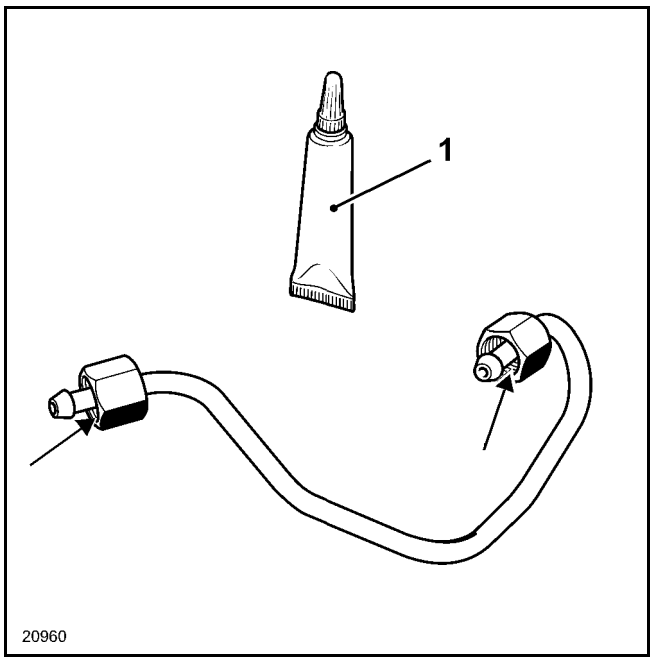
All the high pressure pipe removed must be systematically replaced along with the clips.

TIGHTENING THE HIGH PRESSURE PIPES

NOTE: fit the pump/rail pipe before the rail/injector pipes.

Rail-pump pipe

– Undo the rail,
– Grease the threads of the high pressure pipe nuts,
– Insert the high pressure pipe olive into the taper of the high pressure pump outlet,
– Insert the high pressure pipe olive into the taper of the high pressure rail inlet.
– Move the nut into position by hand, on the rail side then the pump side,
– Tighten the rail,
– Tighten the high pressure pipe nuts on the rail side then on the pump side.



Rail/injector pipes

– Undo the rail,
– Grease the threads of the high pressure pipe nuts,
– Insert the high pressure pipe olive into the taper of the high pressure injector inlet,
– Insert the high pressure pipe olive into the taper of the high pressure rail outlet,
– Move the nuts into position by hand, on the injector side then the rail side,
– Tighten the rail,
– Ensure that the new clip, supplied with the new high pressure pipe, is fitted,
– Tighten the nuts of the high pressure pipes on the injector side first and then on the fuel rail side.

NOTE: Before fitting a new high pressure pipe, move back the nuts on the pipe then lightly lubricate the nut threads with the oil from the sachet (1) provided in the parts kit.

CHECKING SEALING AFTER REPAIR

After any operation, check that there are no diesel leaks.

Reprime the circuit using the priming pump.

Start the engine and allow to warm up at idle speed, visually inspecting for any fuel leaks.

Apply tracing fluid around the high pressure connections of the pipe that has been replaced.

Once the engine coolant temperature is above **50°C** and provided there are no malfunctions present, carry out a road test, taking the engine speed up to **4000 rpm** at least once to check that there are no leaks.

Perform a visual inspection after the road test to make sure that there are no high pressure leaks.

Clean off the tracing fluid.

REPLACING THE ECM

The system can be reprogrammed using CONSULT-II.

Before an ECM is replaced in after-sales, the following must be done.

- Check the individual correction value from "WORK SUPPORT" mode using print out function of CONSULT-II.
- After replacing ECM, enter each injector's individual correction value using "WORK SUPPORT" mode with CONSULT-II.
- Also set the system configuration using "CONFIGURATION" mode with CONSULT-II.

REPLACING THE INJECTORS

NOTE: Individual injector correction is a factory calibration carried out on each injector to adjust the flow of each one precisely, taking into account differences in manufacture.

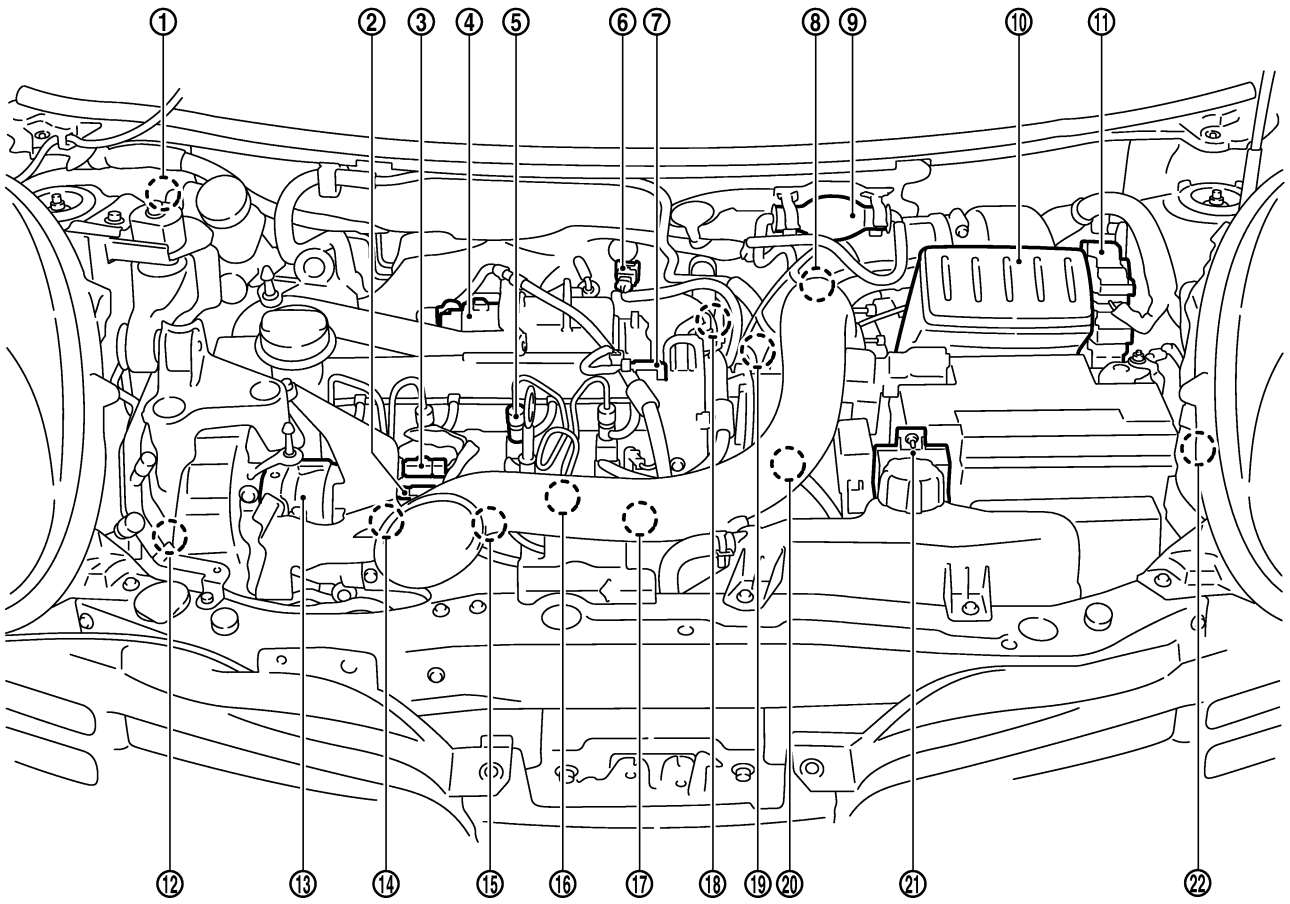
The correction values are written on a label affixed to each injector then entered in the ECM which can then control each injector by taking account of their differences in manufacture.

The system can be programmed "WORK SUPPORT" mode with CONSULT-II.

The correction values (16 digit code) must be replaced after replacing an injector. (Refer to special features)

- **Entering each injector's individual correction value**, when replacing the ECM.

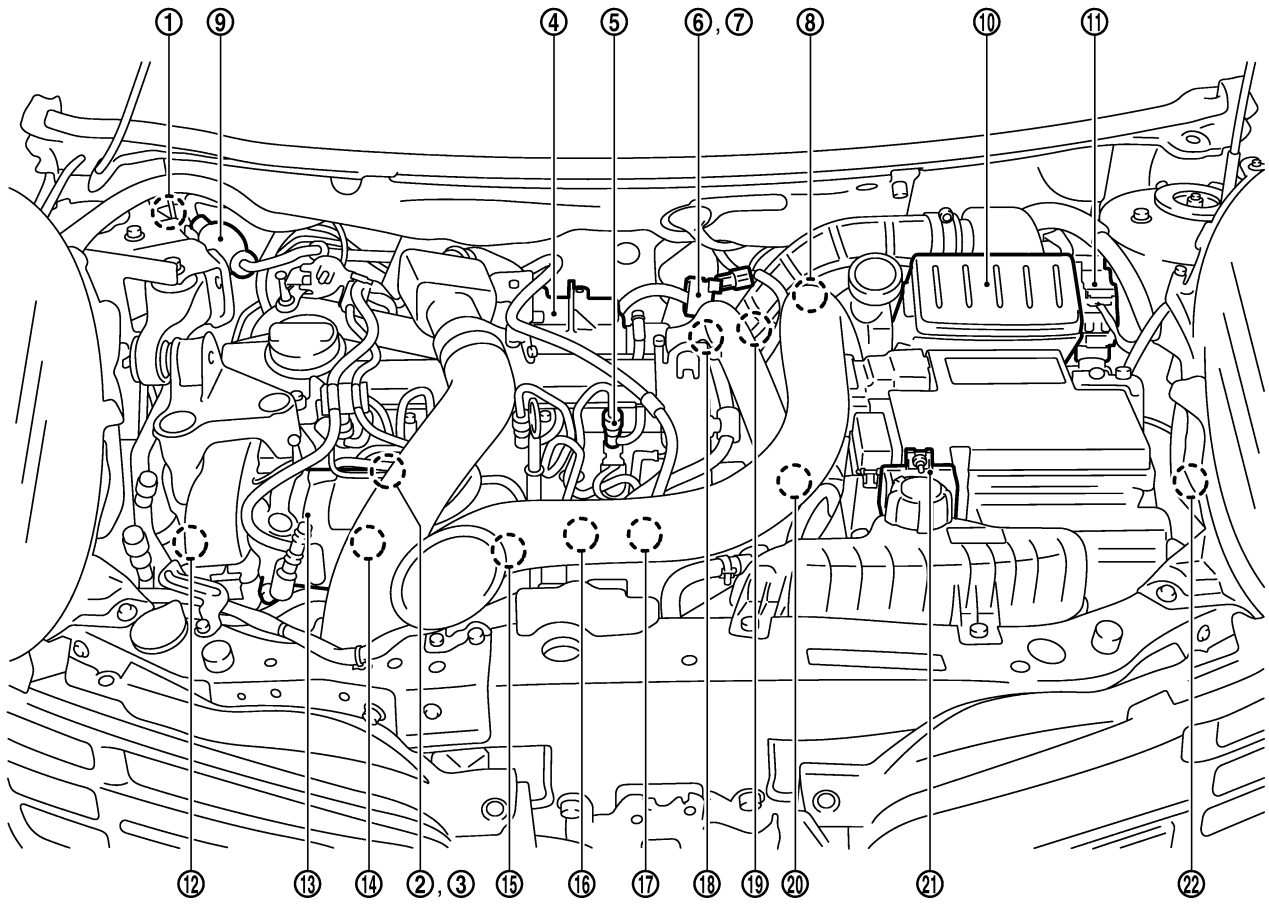
Models without intercooler
Engine cover removed



YEC670E

1. Fuel filter (LHD models)
2. Venturi
3. Fuel temperature sensor
4. EGR control solenoid valve
5. Injector
6. Turbocharger air temperature sensor
7. Turbocharger boost pressure sensor
8. Fuel filter (RHD models)
9. Priming pump (RHD models)
10. Air cleaner
11. ECM
12. Camshaft position sensor
13. High pressure pump
14. Fuel flow actuator
15. Knock sensor (Accelerometer)
16. Spherical injector rail
17. Common rail fuel pressure sensor
18. Engine coolant temperature sensor
19. Intake air temperature sensor
20. Crankshaft position sensor
21. Glow relay (control) unit
22. IPDM E/R

Models with intercooler
Engine cover removed



YEC671E

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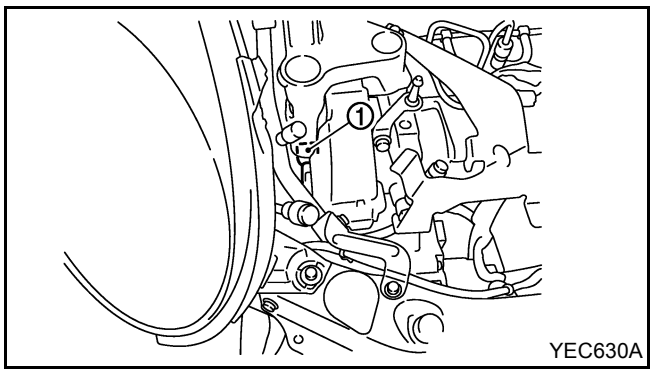
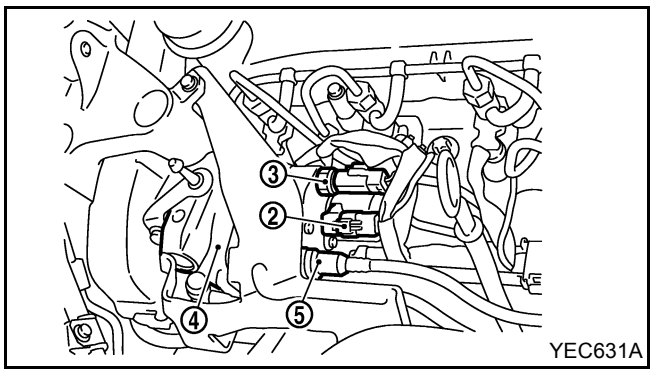
1 Camshaft position sensor

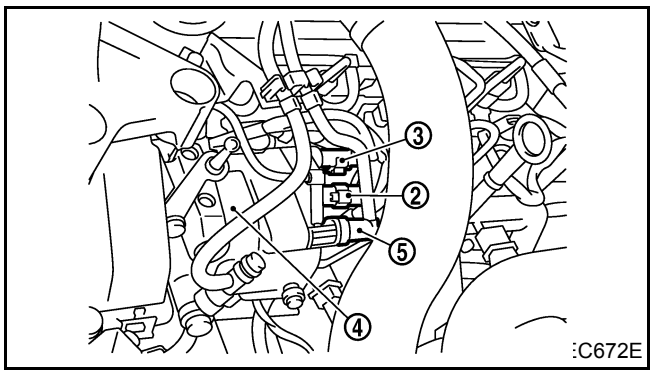


2 Fuel flow actuator
3 Fuel temperature sensor
4 High pressure pump
5 Venturi

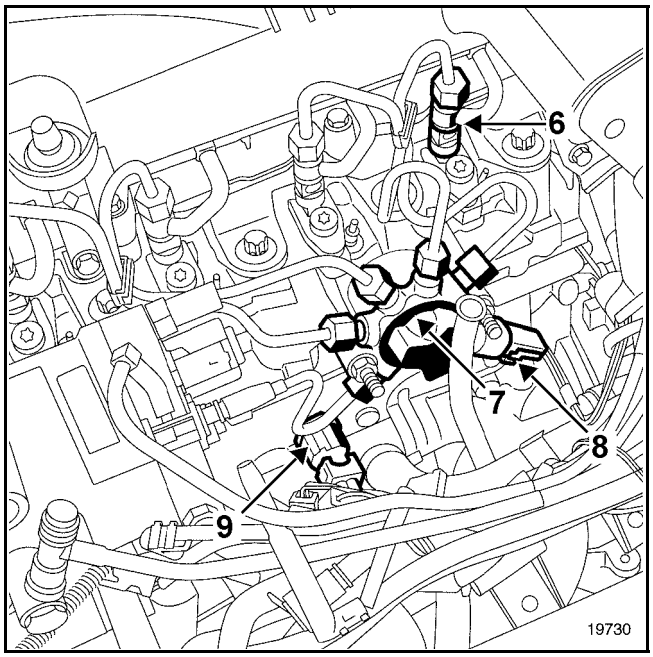
Models without intercooler



Models with intercooler

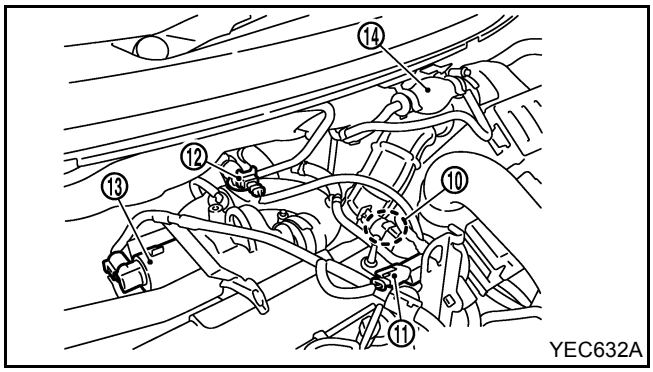


6 Injector
7 Injector rail
8 Rail pressure sensor
9 Knock sensor (Accelerometer)

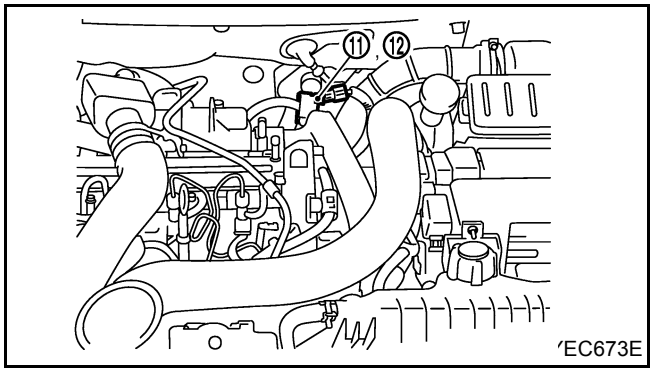


10 Intake air temperature sensor
11 Turbocharger boost pressure sensor
12 Turbocharger air temperature sensor
13 EGR control solenoid valve
14 Priming bulb (RHD models)

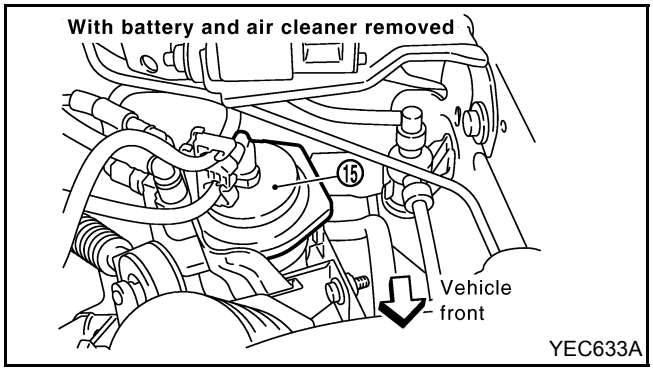
Models without intercooler

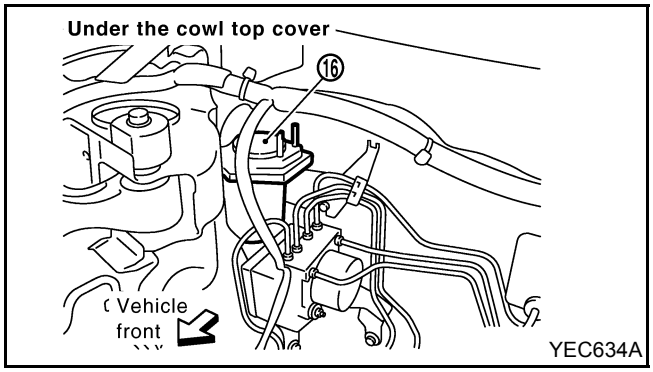


Models with intercooler

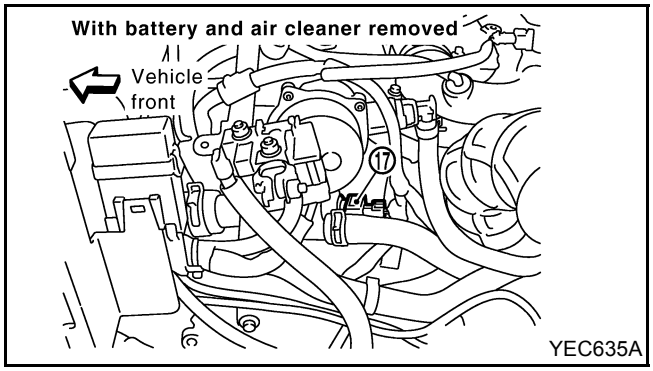


15 Fuel filter (RHD models)
16 Fuel filter (LHD models)

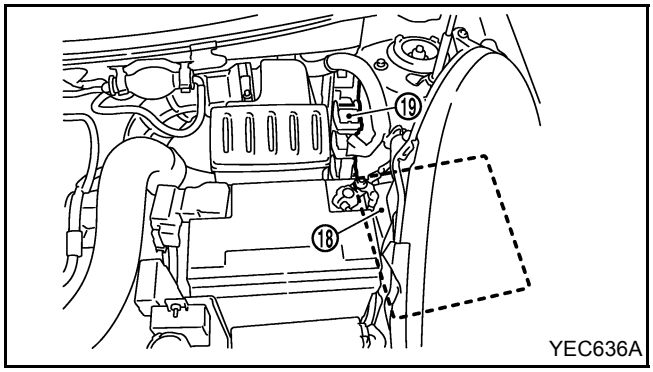




17 Engine coolant temperature sensor



18 IPDM E/R
19 ECM

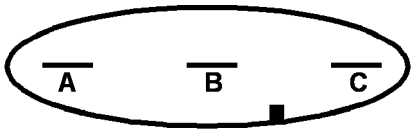


Vehicles	Engines							
	Type	Suffix	Bore (mm, in)	Stroke (mm, in)	Displacement cm^3 (cu in)	Compression ratio	Catalytic converter	Emission control standard
K12	K9K	750	76 (2.99)	80.5 (3.17)	1,461 (89.15)	18.25/1	228	EU 00
		752						Euro 2

ENGINE SPEED (rpm)			SMOKE OPACITY	
IDLE SPEED	Max. - no load	Max. - under load	Homologation value	Max. - legal
800 ± 50 900 or more* : without intercooler 875 or more* : with intercooler	5000 ± 100	4800 ± 100	1.5 m^{-1} (46%)	3 m^{-1} (70%)

*: A/C ON

DESCRIPTION	MARQUE/TYPE	SPECIAL NOTES
High pressure pump	DELPHI	0 to 1400 bars continuous pressure
Fuel pump	DELPHI	Incorporated into the high pressure pump
Common rail fuel pressure sensor	DELPHI	Incorporated into the rail Non measurable resistance
Injectors	DELPHI	Solenoid injector Maximum pressure **1400 bar** Non measurable resistance
Diesel flow actuator	DELPHI	Located on the high pressure pump Resistance: **5.3 ± 0.5 Ω at 20ºC**
ECM	DELPHI	ECM (computer) (112 terminals)
Pre/postheating unit (glow)	NAGARES BED 7-12	With pre-postheating function controlled by the ECM (computer)
Pre-heater plugs (glow)	BERU	Resistance: **Less than 1 Ω** connector disconnected
Accelerator pedal potentiometer (APP sensor)	CTS	Double track potentiometer Resistance: – terminals 1: 4 (earth) and 6 (+5 V): **1.7 ± 0.9 kΩ** – terminals 2: 5 (earth) and 3 (+5 V): **2.85 ± 2.05 kΩ**
Intake air temperature sensors	JAEGER	CTN thermistor Resistance: **5000 ± 6800 Ω at - 40°C** **9500 ± 900 Ω at - 10°C** **2051 ± 120 Ω at 25°C** **810 ± 47 Ω at 50°C** **310 ± 17 Ω at 80°C**

DESCRIPTION	MARQUE/TYPE	SPECIAL NOTES
Fuel temperature sensor	DELPHI	Located on the high pressure pump CTN thermistor Resistance: **2.2 kΩ at 25°C**
Engine coolant temperature sensor	ELTH	CTN thermistor Resistance: **76000 ± 7000 Ω at - 40°C** **12500 ± 1130 Ω at - 10°C** **2252 ± 112 Ω at 25°C** **810 ± 40 Ω at 50°C** **280 ± 8 Ω at 80°C** **115 ± 3 Ω at 110°C** **88 ± 2 Ω at 120°C**
Crankshaft position (Engine speed) sensor	MGI	Variable reluctance sensor Resistance: **760 Ω**
Atmospheric pressure sensor	DELPHI	Built into the computer
Turbocharger boost pressure sensor	DELCO ELECTRONICS	Resistance: – terminals A and B: **9 kΩ** – terminals A and C: **4 kΩ** – terminals B and C: **5 kΩ**  *DI1330*
Camshaft position sensor	SAGEM	Hall effect sensor
Knock sensor (accelerometer)	SAGEM	Non measurable resistance
Turbocharger air temperature and turbocharger boost pressure sensor	BOSCH / LDF6T 20-250	Pressure sensor with a negative temperature coefficient thermistor Supply voltage **+5V** Resistance between terminals 1 and 2: – **20,376 Ω ± 1110.5 at −25°C** – **15,614 Ω ± 829 at −20°C** – **9426 Ω ± 475 at −10°C** – **5887 Ω ± 281.5 at 0°C** – **3791 Ω ± 172.5 at 10°C** – **2511 Ω ± 109 at 20°C** – **1715.5 Ω ± 71 at 30°C** – **1200 Ω ± 47 at 40°C** – **851 Ω ± 32 at 50°C** – **612 Ω ± 22 at 60°C** – **446 Ω ± 15 at 70°C** – **330 Ω ± 11 at 80°C** 4-track connector: – 1: earth – 2: air temperature sensor signal – 3: **+5V** supply – 4: pressure sensor signal

DESCRIPTION	MARQUE/TYPE	SPECIAL NOTES
EGR solenoid valve EGR valve position potentiometer	PIERBURG	Resistance: – terminals 4 and 6: **8 ± 0.5 Ω at 25°C** Incorporated into the EGR solenoid valve Resistance: – terminals 2 and 3: **1 ± 0.5 kΩ at 20°C** – terminals 1 and 2: **4 ± 1.6 kΩ at 20°C**

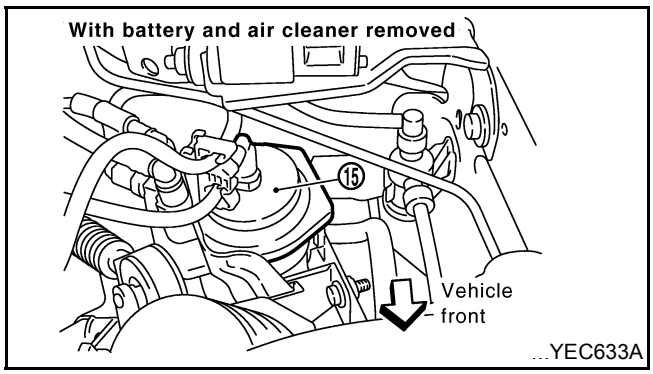
IMPORTANT: Before carrying out any work, wait for the fuel temperature to drop.

REMOVAL - REFITTING

Disconnect the battery.

Remove fuel filter:

RHD models
After removing battery and air cleaner
15Fuel filter (RHD models)



LHD models
After removing front wipers, cowl top cover, front wiper motor assembly and cowl top panel/tray.

Release the diesel fuel filter from its support.

Fit the new diesel fuel filter (do not remove the plugs until the last moment).

Disconnect all the snap fasteners beginning with the three vertical snap fasteners. Prevent the snap fasteners from coming into contact with the environment.

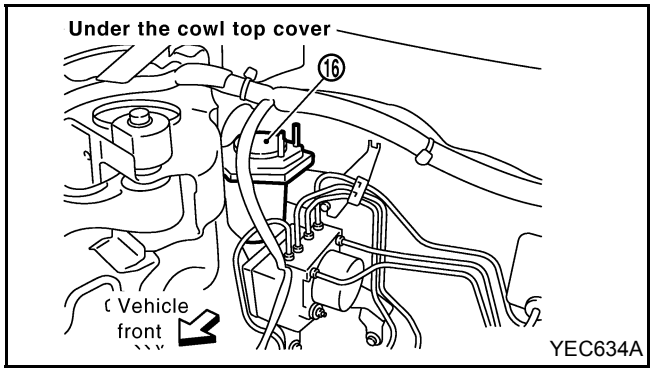
Disconnect the pump outlet snap fastener last of all; reconnect it immediately when the new filter is installed.

Reconnect the other snap fasteners.

Prime the system using the priming bulb (automatic degassing).

Reconnect the battery.

16Fuel filter (LHD models)



IMPORTANT: It is strictly forbidden to remove any injection pump pulley marked number 070 575. If the pump is being replaced, the pulley must be replaced.

SPECIAL TOOLING REQUIRED	
Nissan No. KV113E0010 (Mot. 1566)	Tool for removing and refitting high pressure pipes

EQUIPMENT REQUIRED

Low torque wrench

High pressure pipe wrench (for example, Facom "DM19" wrench).

Pipe socket for tightening the injector-rail high pressure pipes (for example, Facom Crowfoot 18-17 wrench).

Pipe socket for tightening the pump-rail high pressure pipe (for example, Facom Crowfoot 19-17 wrench).

TIGHTENING TORQUES (in daNm)	
High pressure pipe nuts	3.8
Rail nuts	2.8 ± 0.3
Filler neck nut on the rail	2.1
High pressure pump mounting bolts	2.1 ± 2

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

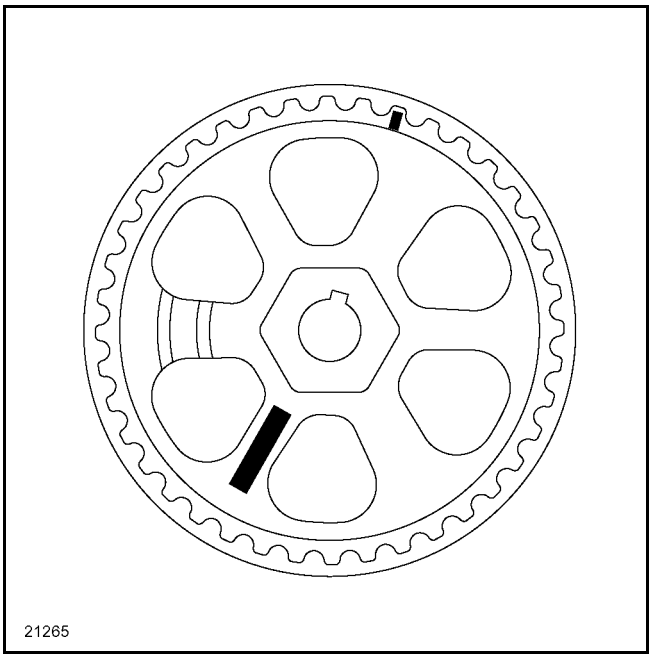
Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

REMOVAL

YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

It is strictly forbidden to remove any injection pump pulley marked **number 070 575** (see diagram). If the pump is being replaced, the pulley must be replaced.



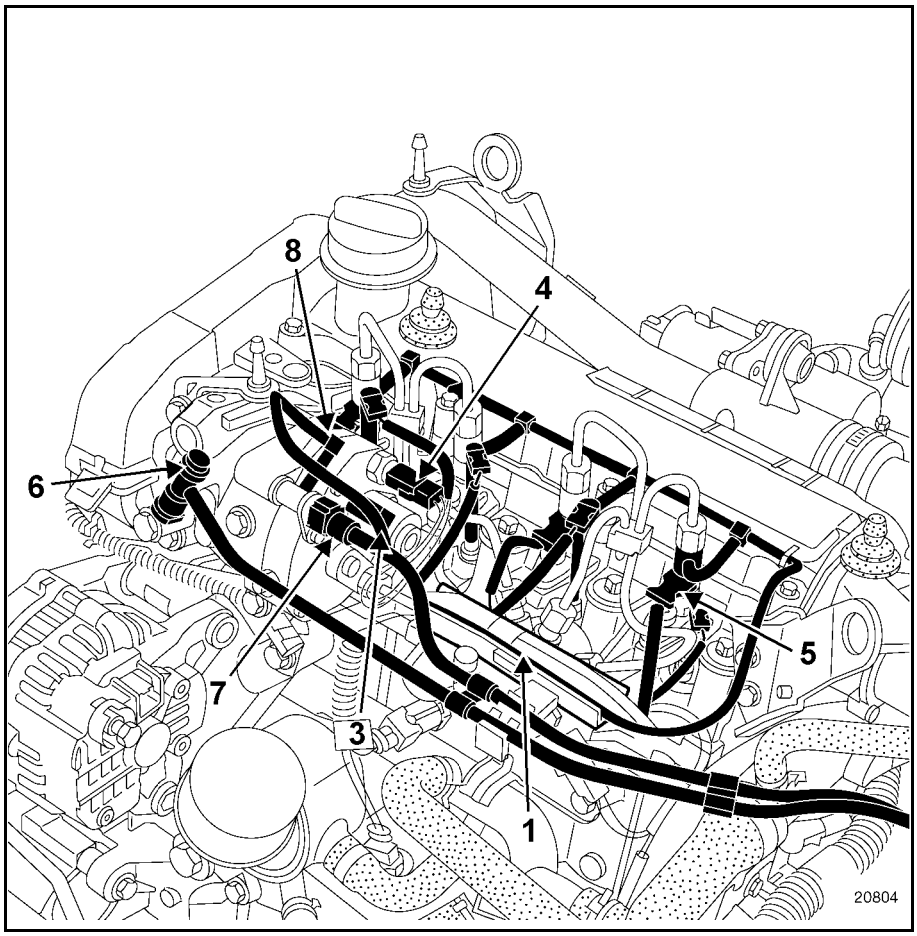
The high pressure pump may be removed after having first removed the timing belt

Disconnect the battery.

Remove:
– the neck (1) located on the fuel rail,
– the dipstick guide and plug the hole.

Undo the mounting nuts of the rail (2) a few turns.

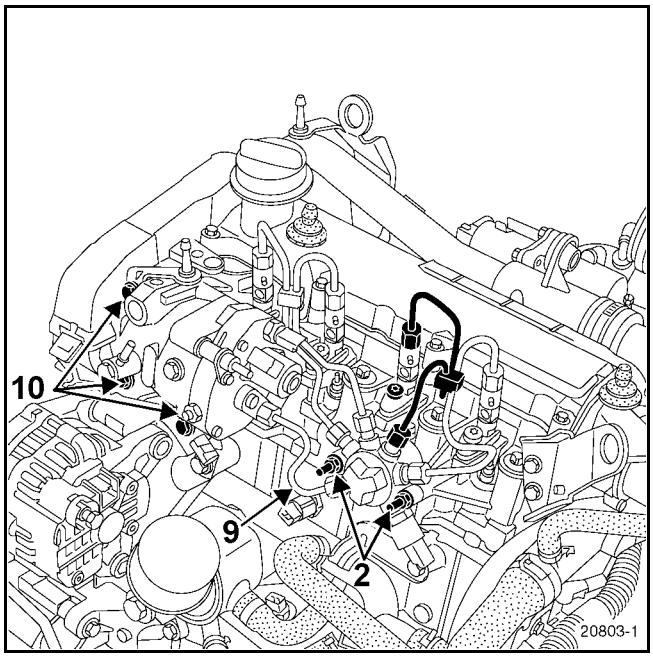
Carefully disconnect:
– the connectors from the flow actuator (3) and fuel temperature sensor (4),
– the pre-heater (glow) plugs and the injectors (5),
– the return pipe (8) connecting the injector with the pump.



Remove the high pressure pipe (9) connecting the pump to the rail. To do this:
– undo the nut on the pump side then the nut on the rail side,
– Move the nut along the tube keeping the olive in contact with the taper.

Plug all the holes of the injection circuit.

Remove the three mounting bolts (10) from the injection pump then remove it.



REFITTING

Fit the pump then position the mounting bolts without tightening them.

IMPORTANT: All the high pressure pipes removed must be systematically replaced.

Before fitting the new high pressure pipe, lightly lubricate the nut threads with the oil from the sachet provided in the new parts kit.

Refit the high pressure pipe, to do this:
– remove the protective plugs,
– insert the high pressure pipe olive into the taper of the high pressure pump outlet,
– insert the high pressure pipe olive into the taper of the high pressure rail inlet.

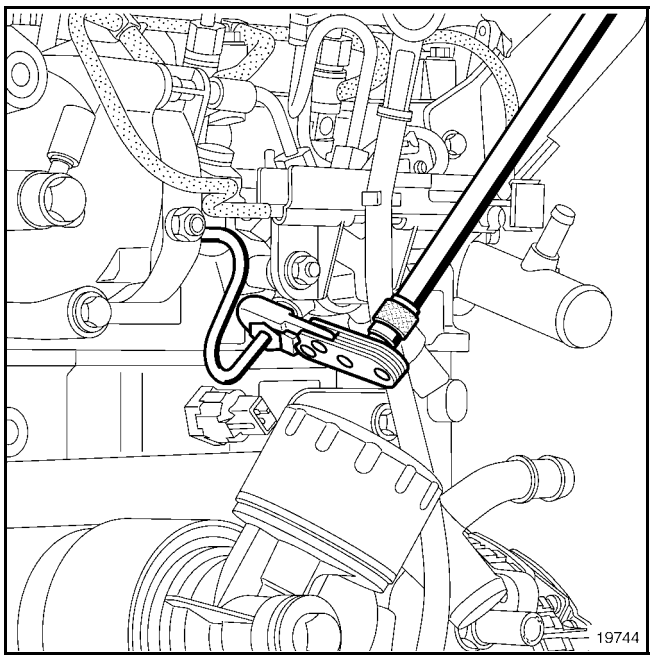
Finger tighten the nuts of the high pressure pipe starting with the one located on the rail side.

Tighten the mounting bolts (10) on the high pressure pump to a torque of **2.1 daN.m**.

IMPORTANT: Do not touch the pipes with the wrench when torque tightening.

Using the recommended tools, tighten the following in the order and to the torques shown:
– the nut on the rail side to **3.8 daN.m**,
– the nut on the pump side to **3.8 daN.m**,

Tighten the rail mounting nuts to a torque setting of **2.8 daNm**.



Refit in the reverse order to removal for the other refitting operations.

Test the sealing of the high pressure after it has been repaired (refer to **"Special features"**).

Flow actuator

EQUIPMENT REQUIRED
Low torque wrench
Pipe socket for tightening the high pressure pipe (for example, Facom Crowfoot 18-17 wrench).

TIGHTENING TORQUES (in daNm)	
Flow actuator mounting bolt	**0.55 ± 0.06**

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

REMOVAL

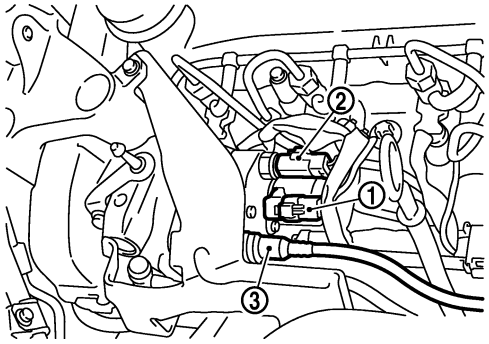
YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

Disconnect the battery.

Remove the engine cover.

Disconnect the connector from the flow actuator (1) and from the fuel temperature sensor carefully (2).

With air cleaner removed



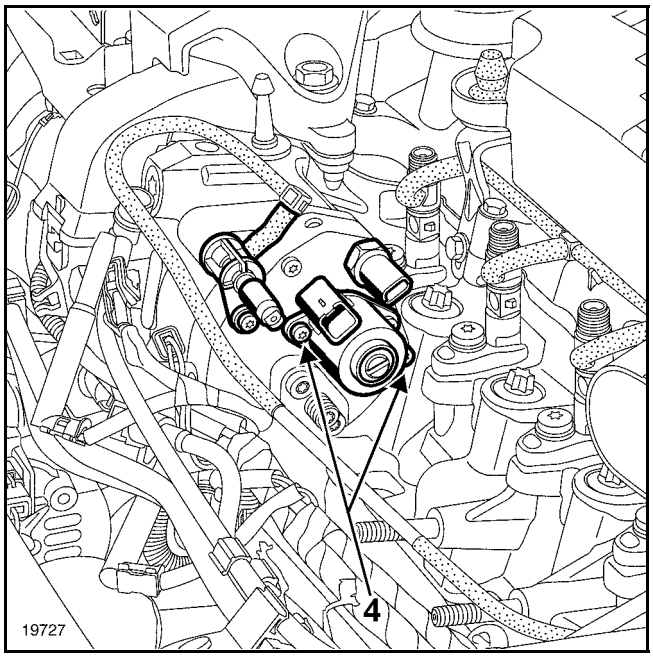
YEC637A

Disconnect the fuel return pipe (3).

Remove the high pressure pipe from injector no. 4 (refer to high pressure pipes).

Plug the holes in the injection circuit.

Disconnect the pre-heater plug and the injectors from cylinders 3 and 4.



Unscrew the two retaining bolts from the bracket (4).

Withdraw the flow actuator (by hand using small successive turns. Do not use the electrical connector as a lever arm).

REFITTING

Remove the new component from its packaging just before fitting it.

NOTE: Do not lubricate the seals with grease or used diesel oil. Use the applicator provided in the kit for the new part.

Position the actuator. (Important: when fitting the regulator, do not mark the seal.)

Position the two mounting bolts then tighten them.

Fit a new high pressure pipe to injector no. 4 plus a new clip (refer to high pressure pipes).

Reconnect:
– the diesel return pipe,
– the electrical connectors.

Refit in the reverse order to removal for the other refitting operations.

Test the sealing of the high pressure circuit after it has been repaired (refer to **"Special features"**).

Fuel temperature sensor

EQUIPMENT REQUIRED
Low torque wrench

TIGHTENING TORQUES (in daNm)	
Fuel temperature sensor	1.5 ± 0.15

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

REMOVAL

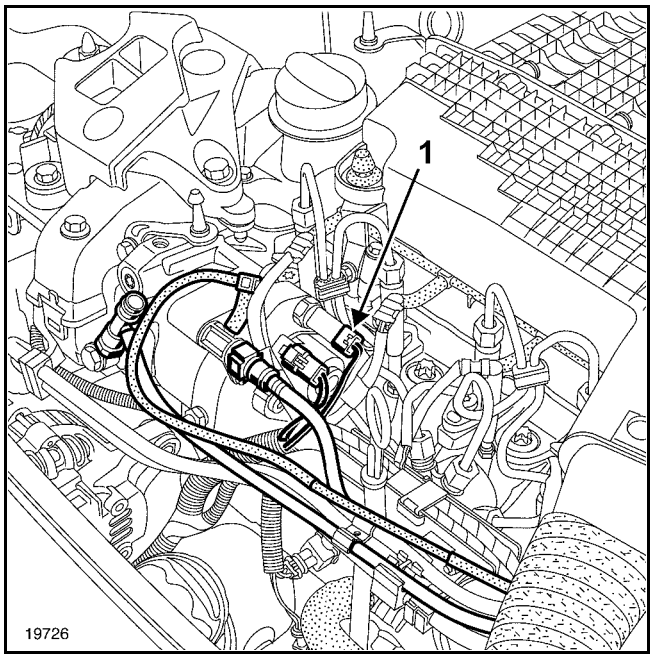
YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

Disconnect the battery.

Remove the engine cover.

Disconnect the connector from the fuel temperature sensor carefully (1).

Undo then remove the fuel temperature sensor.



REFITTING

Grease the O-ring with the lubricant from the sachet provided with the new part.

Take care not to damage the O-ring when installing the sensor.

Position the fuel temperature sensor then tighten to torque.

Reconnect:
– the electrical connector.
– the battery.

Test the sealing of the high pressure after it has been repaired (refer to **"Special features"**).

EQUIPMENT REQUIRED
Low torque wrench

TIGHTENING TORQUES (in daNm)	
Venturi mounting bolts	0.55 ± 0.06

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

REMOVAL

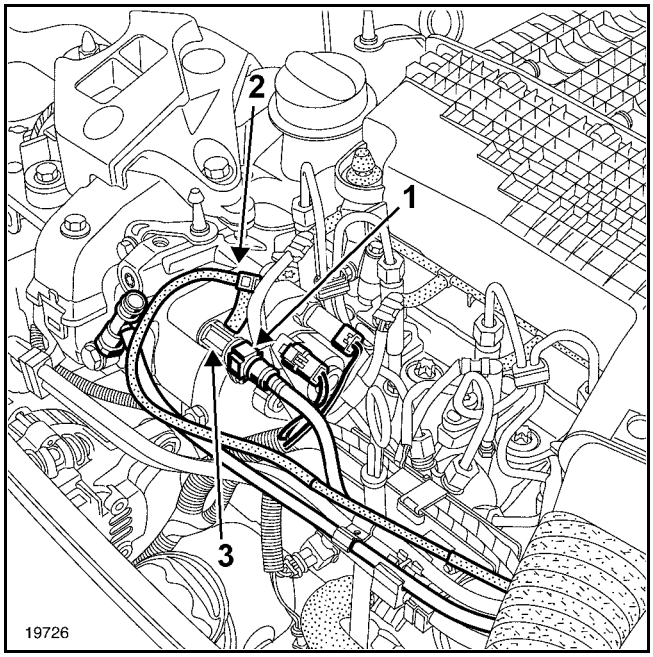
YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

Disconnect the battery.

Remove the engine cover.

Disconnect:
– the fuel return pipe on the pump (1).
– the return pipe (2) connecting the injector with the pump.

Remove the venturi mounting bolts (3) then take it out.



REFITTING

Grease the O-ring with the lubricant from the sachet provided with the new part.

Take care not to damage the O-ring when installing the venturi.

Position the venturi then tighten it to torque.

Reconnect the different pipes.

Test the sealing of the high pressure circuit after it has been repaired (refer to **"Special features"**).

SPECIAL TOOLING REQUIRED	
Nissan No. KV113E0010 (Mot. 1566)	**Tool for removing and refitting high pressure pipes**

EQUIPMENT REQUIRED
Low torque wrench
High pressure pipe wrench (for example, Facom "DM19" wrench).
Pipe socket for tightening the injector-rail high pressure pipes (for example, Facom Crowfoot 18-17 wrench).
Pipe socket for tightening the pump-rail high pressure pipe (for example, Facom Crowfoot 19-17 wrench).

TIGHTENING TORQUES (in daNm)	
High pressure pipe nuts	**3.8**
Rail nuts	**2.8 ± 0.3**
Filler neck nut on the rail	**2.1**

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

IMPORTANT: The pressure sensor cannot be separated from the rail.

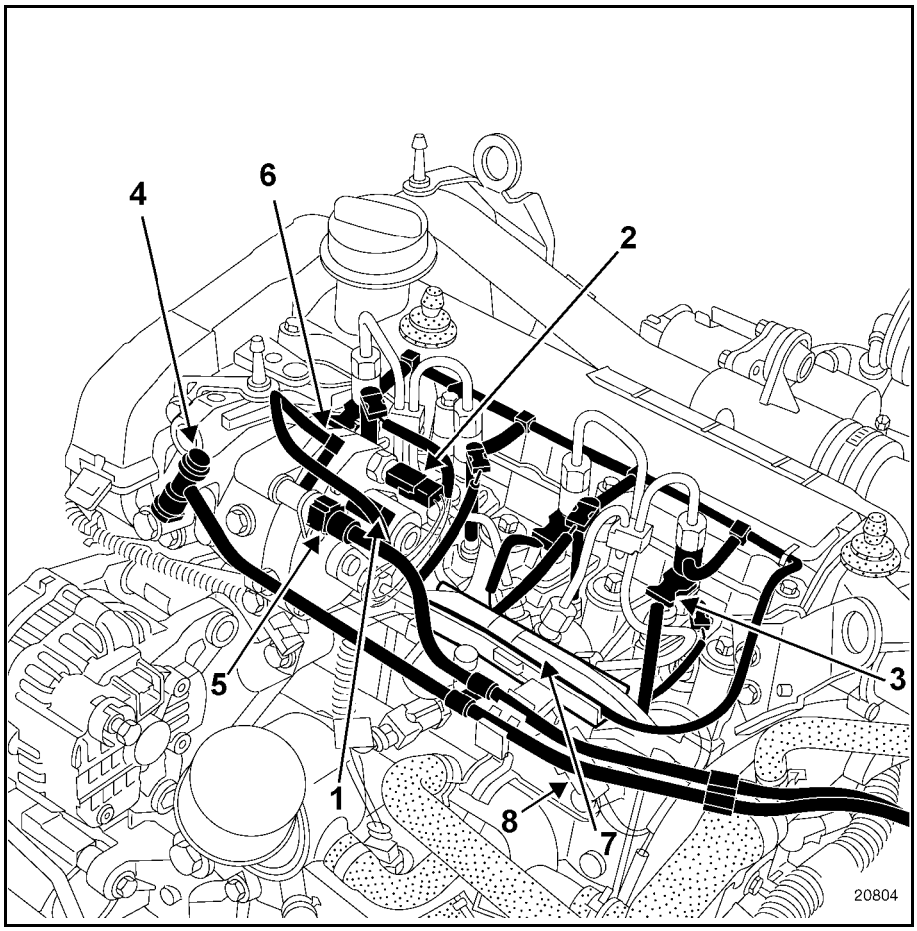
REMOVAL

YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

Disconnect the battery.

Remove the engine cover.

Carefully disconnect:
– the connectors from the flow actuator (1),
– the connectors from the fuel temperature sensor (2),
– the injector connectors (3),
– the glow (heater) plugs,
– on the pump, the fuel supply (4) and return (5) pipes.
– the return pipe (6) connecting the injectors with the pump.



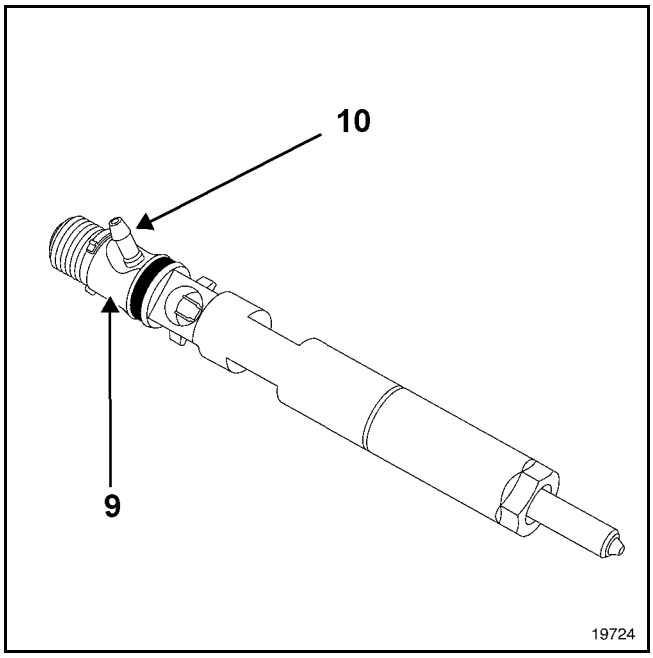
Remove:
– the neck (7) located on the fuel rail,
– the dipstick guide and plug the hole.

Disconnect the pressure sensor connector from the rail (8).

Remove the clips connecting the high pressure pipes.

IMPORTANT: When undoing the high pressure pipes, it is essential to maintain the central union of the injector (9).

IMPORTANT: Do not damage the injector's leak return duct (10).



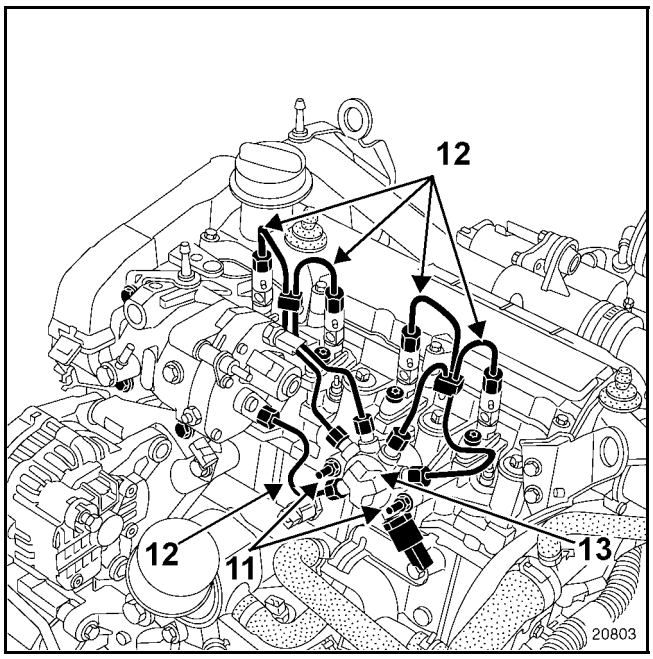
Undo the mounting nuts of the rail (11) a few turns.

**NOTE: Undo the nut on the pump side or the injector side, then the nut located on the rail side.
Undo the nuts for each pipe in turn.
Move the nut along the pipe keeping the olive in contact with the taper.**

Remove all the high pressure pipes (12).

Plug all the holes in the injection circuit.

Remove the rail (13).



REFITTING

IMPORTANT: All the high pressure pipes removed must be replaced as a matter of course.

Fit a new high pressure rail on the studs.

Finger tighten the nuts.

Before fitting the new high pressure pipes, lightly lubricate the nut threads with the oil from the sachet provided in the new parts kit.

NOTE: Fit the pump/rail pipe before the rail/injector pipes.

Fit the pump-rail high pressure pipe:

– remove the protective plugs from the high pressure pump outlet, the high pressure rail inlet and the pipe.
– insert the high pressure pipe olive into the taper of the high pressure pump outlet,
– insert the high pressure pipe olive into the taper of the high pressure rail inlet.
– finger tighten the nuts of the high pressure pipe starting with the one located on the rail side.

Fit the rail-injector high pressure pipe:

IMPORTANT: When tightening the high pressure pipes, it is essential to maintain the central union of the injector (10).

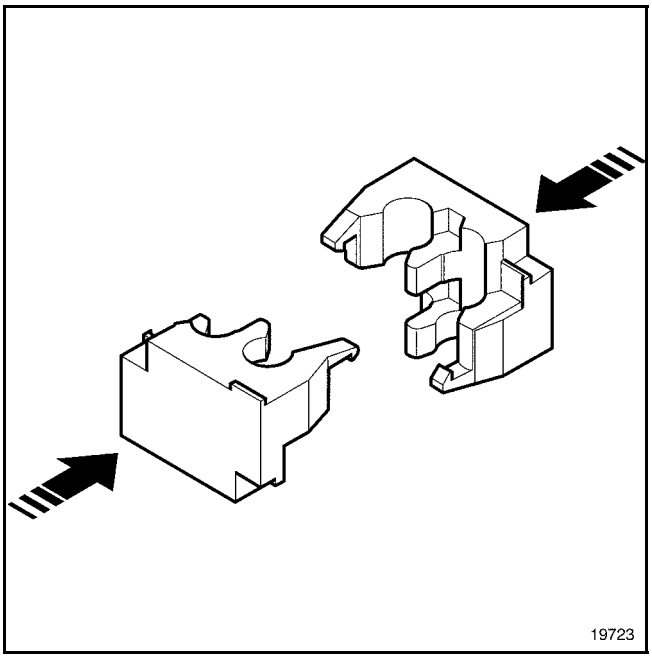
– remove the protective plugs from the high pressure rail outlet, the injector high pressure inlet and the pipe.
– insert the high pressure pipe olive into the taper of the high pressure injector inlet,
– insert the high pressure pipe olive into the taper of the high pressure rail outlet.
– finger tighten the nuts of the high pressure pipe starting with the one located on the injector side.

Fit the remaining high pressure pipes as you did previously.

NOTE: The order in which the pipes are installed is not important.

Fit the clips supplied with the new pipes onto the high pressure pipes:
– Insert the first half of the clip using adjustable pliers,
– Insert the second half of the clip using adjustable pliers.

IMPORTANT: Pay attention to the direction of installation of the second clip. The tabs located in the centre of the clip will only fit together in one position.



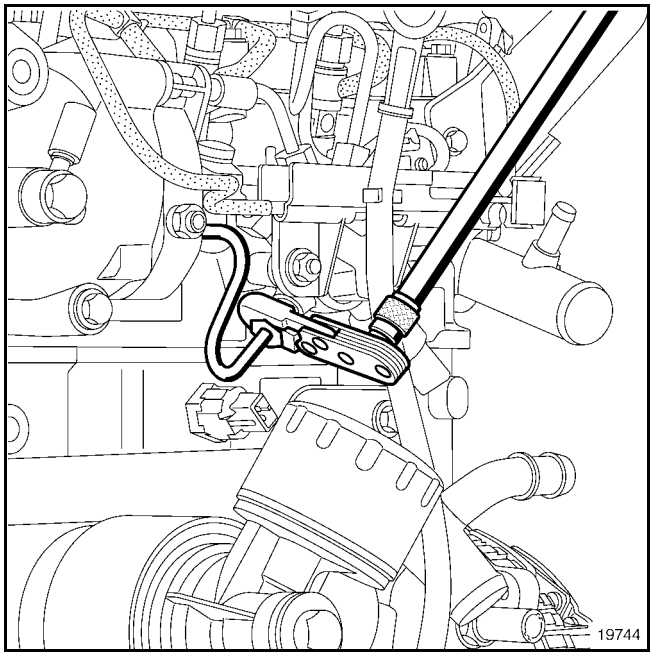
Tighten the rail nuts to a torque of **2.8 daNm.**

IMPORTANT: Do not touch the pipes with the wrench when torque tightening.

IMPORTANT: Follow the order and tightening torque of the high pressure pipes.

Using the recommended tools, tighten the nuts on the rail - pump high pressure pipe:

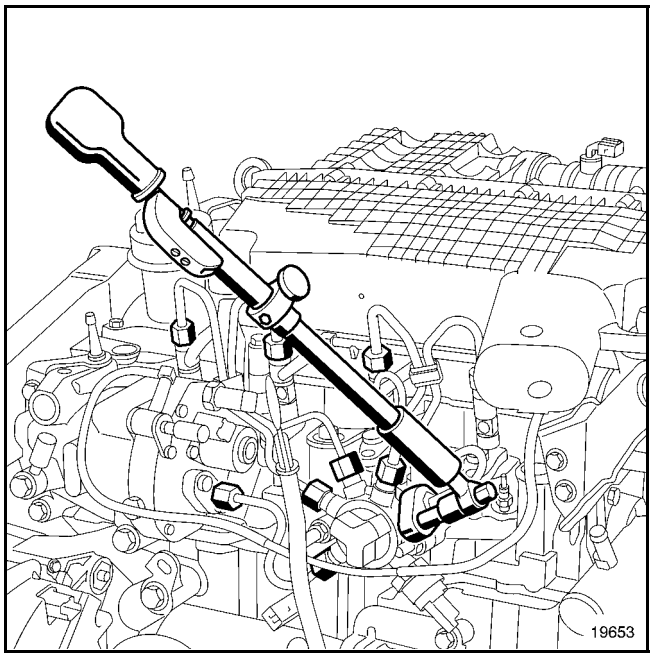
– tighten the nut on the rail side to a torque of **3.8 daN.m**.
– tighten the nut on the pump side to a torque of **3.8 daN.m**.



Using the recommended tools, tighten the nuts on the rail - injector high pressure pipes:

– tighten the nut on the injector side to a torque of **3.8 daN.m**.
– tighten the nut on the rail side to a torque of **3.8 daN.m**.

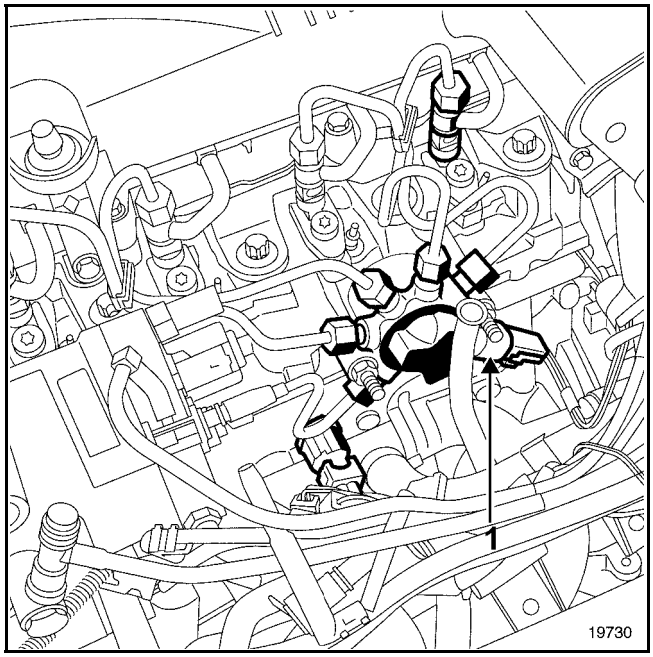
NOTE: Tighten one pipe fully before moving on to the next pipe.



Refit in the reverse order to removal for the other refitting operations.

Test the sealing of the high pressure after it has been repaired (refer to **"Special features"**).

The pressure sensor (1) cannot be separated from the fuel rail. If the pressure sensor malfunctions, the pressure sensor assembly - rail and high pressure pipes - must be replaced (refer to **fuel rail** section).



SPECIAL TOOLING REQUIRED	
Nissan No. KV113E0010 (Mot. 1566)	Tool for removing and refitting high pressure pipes

EQUIPMENT REQUIRED
Low torque wrench
High pressure pipe wrench (for example, Facom DM19 wrench).
Pipe socket for tightening the injector-rail high pressure pipes (for example, Facom Crowfoot 18-17 wrench).
Pipe socket for tightening the pump-rail high pressure pipe (for example, Facom Crowfoot 19-17 wrench).

TIGHTENING TORQUES (in daNm)	
High pressure pipe nuts	3.8
Rail nuts	2.8 ± 0.3
Injector mounting	2.8 ± 0.3
Filler neck nut on the rail	2.1

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

IMPORTANT: It is forbidden to open an injector. If you open an injector by mistake, you will have to change it. This is because of the manufacturing and installation tolerances and because there is a risk of contaminating the inside of the injector.
The rod filter of the injector must not be removed.

REMOVAL

NOTE: It is possible to replace a single high pressure pipe.

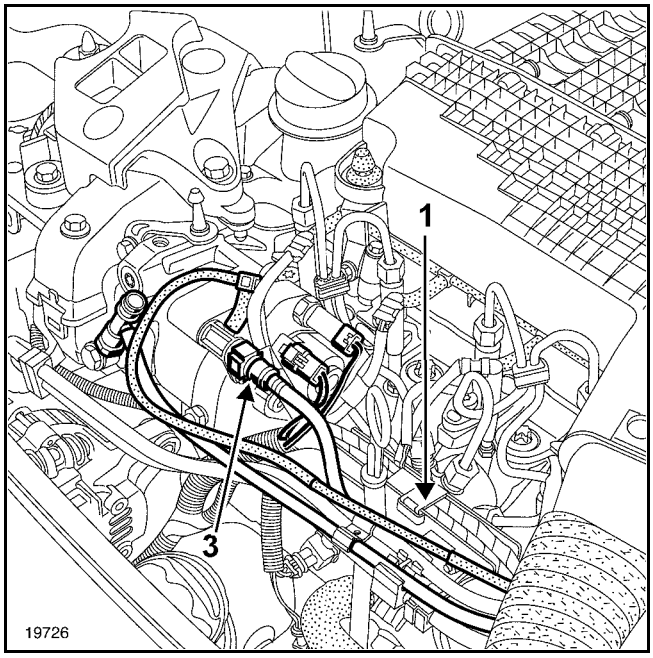
YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

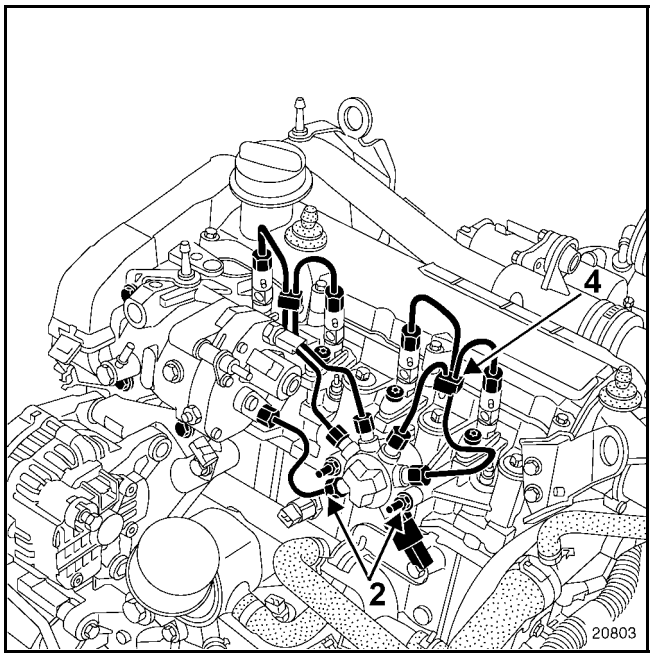
Disconnect the battery.

Remove:
– the engine cover,
– the neck (1) located on the high pressure rail,
– the dipstick guide then plug the hole.

Undo the mounting nuts of the rail (2) a few turns.

Disconnect:
– the fuel return pipe (3),
– the injector electrical connector.





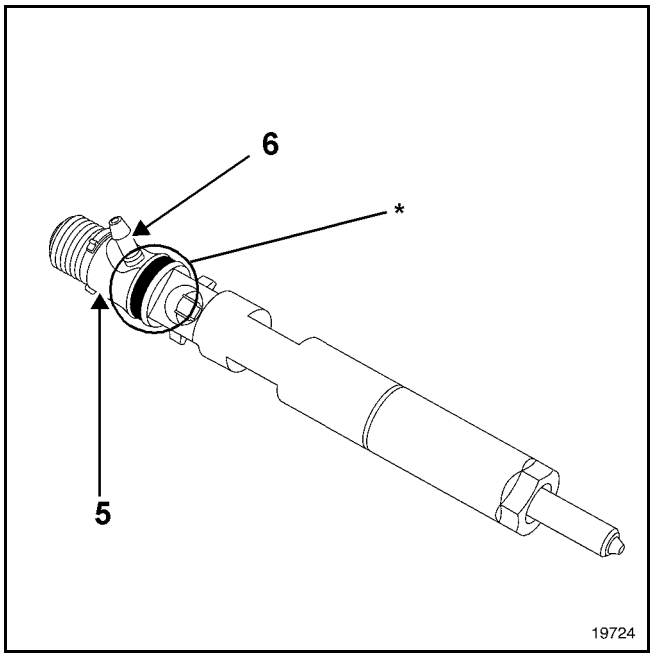
Remove the clip (4) connecting the high pressure pipes.

IMPORTANT: When undoing the high pressure pipes, it is essential to maintain the central union of the injector (5).

Undo the nut on the injector side, then the nut located on the rail side of the high pressure pipe.

Move the nut along the tube keeping the olive in contact with the taper.

IMPORTANT: Do not damage the injector's leak return duct (6).



* 16 digit code

Remove the high pressure pipe (7).

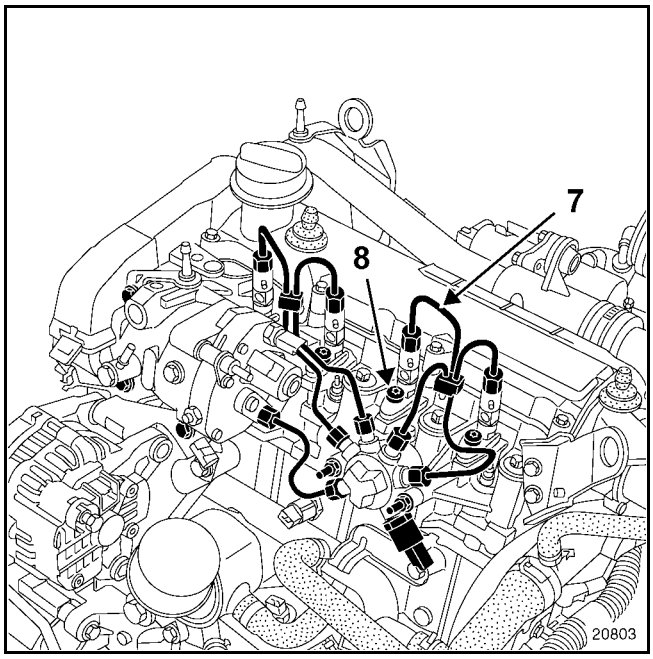
Disconnect the diesel return pipe on the injector.

Plug all the holes of the injection circuit.

Unscrew the injector bracket (8).

Remove the injector.

Pull off the flameshield washer.



REFITTING

NOTE: Read the 16 digit code on the new injector before refitting it and programming the code into the ECM using the CONSULT-II (see section "Special features, Replacing injectors"). The code is unique to each injector, it specifies the flow.

Clean the injector sockets and the injector bodies, as well as their brackets using a lint-free cloth (use the wipes recommended for this purpose, dipped in clean solvent.

Dry off using a different new wipe.

Replace the flameshield washer with a new one.

Position the injector.

Tighten its mounting clamp to a torque of **2.8 daN.m**.

IMPORTANT: All the high pressure pipes removed must be systematically replaced.

Before fitting the new high pressure pipe, lightly lubricate the nut threads with the oil from the sachet provided in the new parts kit.

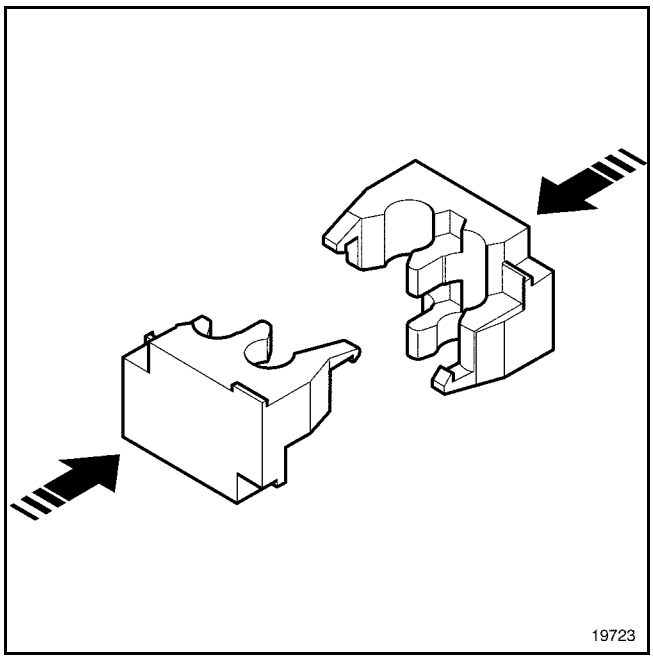
Fit the high pressure pipe:

– remove the protective plugs from the rail, the injector inlet and the pipe.
– insert the high pressure pipe olive into the taper of the injector inlet,
– insert the high pressure pipe olive into the taper of the rail outlet.

Move the nut into position by hand, injector side first then the rail side.

Fit a new clip supplied with the new pipes onto the high pressure pipes:
– Insert the first half of the clip using adjustable pliers,
– Insert the second half of the clip using adjustable pliers.

IMPORTANT: Pay attention to the direction of installation of the second clip. The tabs located in the centre of the clip will only fit together in one position.

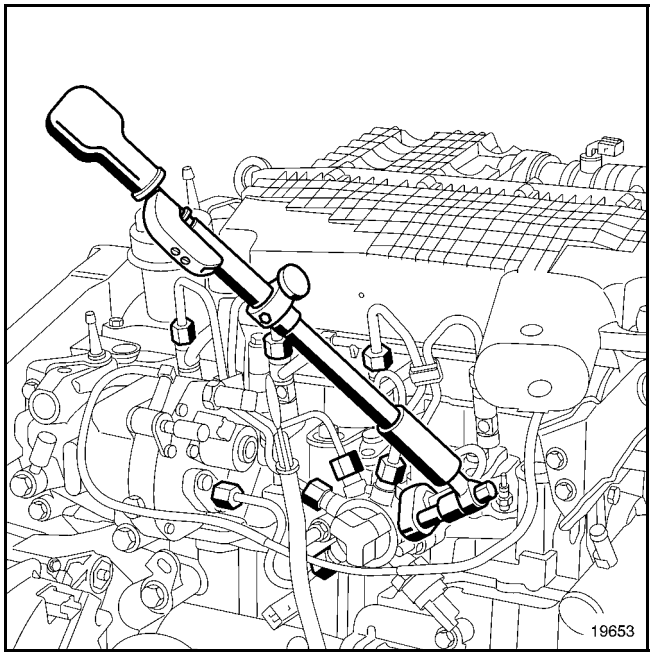


Tighten the rail nuts to a torque of **2.8 daNm.**

IMPORTANT: Do not touch the pipes with the wrench when torque tightening.

IMPORTANT: When tightening the high pressure pipes, it is essential to maintain the central union of the injector.

Using the recommended tools, tighten the following in the order and to the torques shown:
– the nut on the injector side to a torque of **3.8 daN.m**.
– the nut on the rail side to a torque of **3.8 daN.m**.



Refit in the reverse order to removal for the other refitting operations.

Test the sealing of the high pressure after it has been repaired (refer to **"Special features"**).

SPECIAL TOOLING REQUIRED	
Nissan No. KV113E0010 (Mot. 1566)	Tool for removing and refitting high pressure pipes

EQUIPMENT REQUIRED
Low torque wrench
High pressure pipe wrench (for example, Facom DM19 wrench).
Pipe socket for tightening the injector-rail high pressure pipes (for example, Facom Crowfoot 18-17 wrench).
Pipe socket for tightening the pump-rail high pressure pipe (for example, Facom Crowfoot 19-17 wrench).

TIGHTENING TORQUES (in daNm)	
High pressure pipe nuts	3.8
Rail nuts	2.8 ± 0.3
Filler neck nut on the rail	2.1

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

REMOVAL

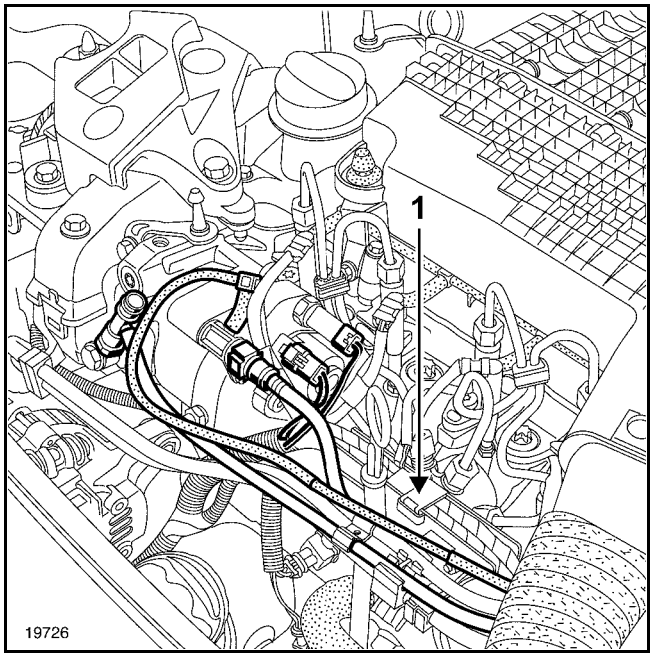
NOTE: It is possible to replace a single high pressure pipe.

YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

Disconnect the battery.

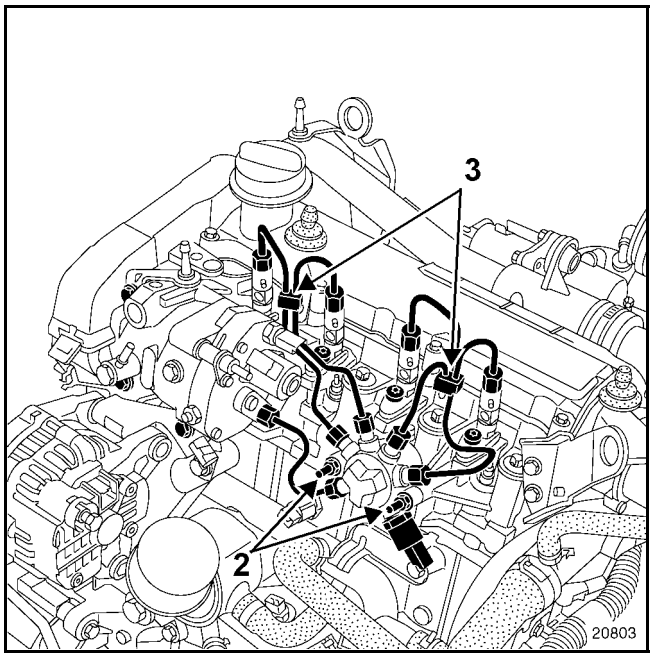
Remove:
– the engine cover,
– the neck (1) located on the high pressure rail,
– the dipstick guide then plug the hole.

Undo the mounting nuts of the rail (2) a few turns.



Remove the clip (3) connecting the high pressure pipes.

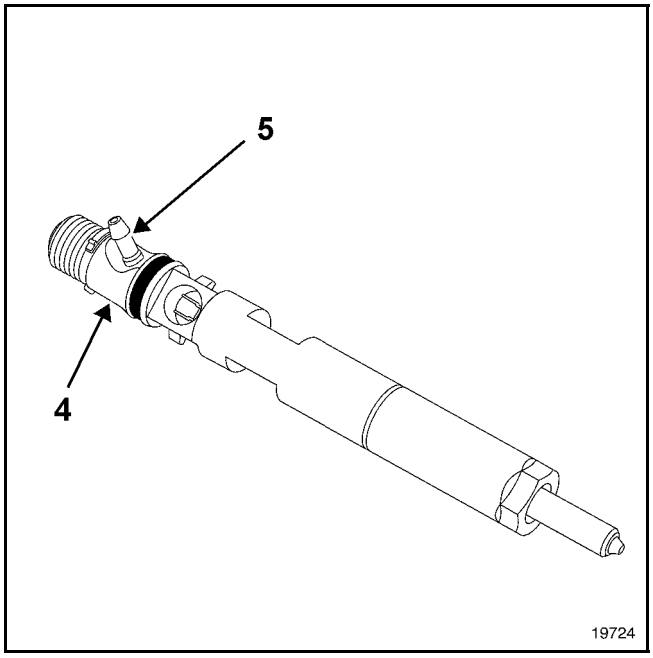
IMPORTANT: When undoing the high pressure pipes, it is essential to maintain the central union of the injector (4).



Undo the nut on the pump side or the injector side, then the nut located on the rail side.

Move the nut along the tube keeping the olive in contact with the taper.

IMPORTANT: Do not damage the injector's leak return duct (5).



Remove the high pressure pipe(s).

Plug all the holes of the injection circuit.

REFITTING

NOTE: Fit the pump/rail pipe before the rail/injector pipes.

Before fitting the new high pressure pipes, lightly lubricate the nut threads with the oil from the sachet provided in the new parts kit.

Fit the pump-rail high pressure pipe:

– remove the protective plugs from the high pressure pump outlet, the high pressure rail inlet and the pipe.
– insert the high pressure pipe olive into the taper of the high pressure pump outlet,
– insert the high pressure pipe olive into the taper of the high pressure rail inlet.
– finger tighten the nuts of the high pressure pipe starting with the one located on the rail side.

Fit the rail-injector high pressure pipe:

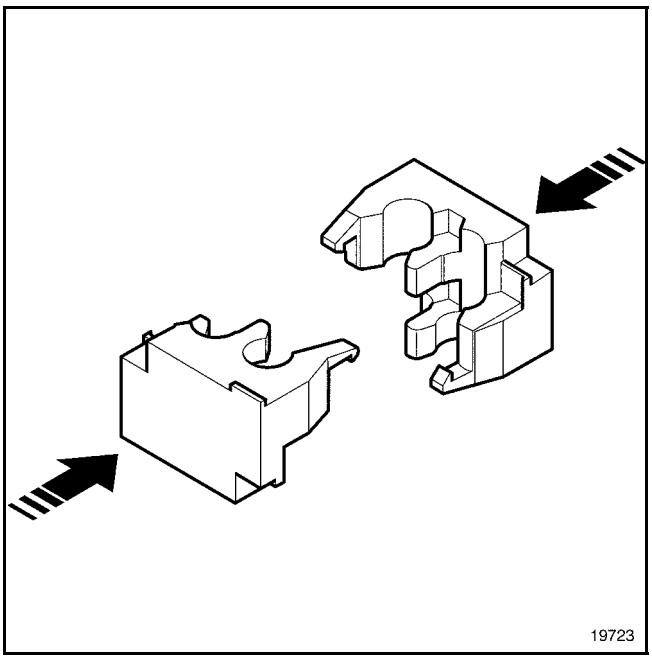
– remove the protective plugs from the high pressure rail outlet, the injector high pressure inlet and the pipe.
– insert the high pressure pipe olive into the taper of the high pressure injector inlet,
– insert the high pressure pipe olive into the taper of the high pressure rail outlet,
– finger tighten the nuts of the high pressure pipe starting with the one located on the injector side.

Fit the remaining high pressure pipes as you did previously.

IMPORTANT: All the high pressure pipes removed must be systematically replaced.

Fit a new clip supplied with the new pipes onto the high pressure pipes:
– insert the first half of the clip using adjustable pliers,
– insert the second half of the clip using adjustable pliers.

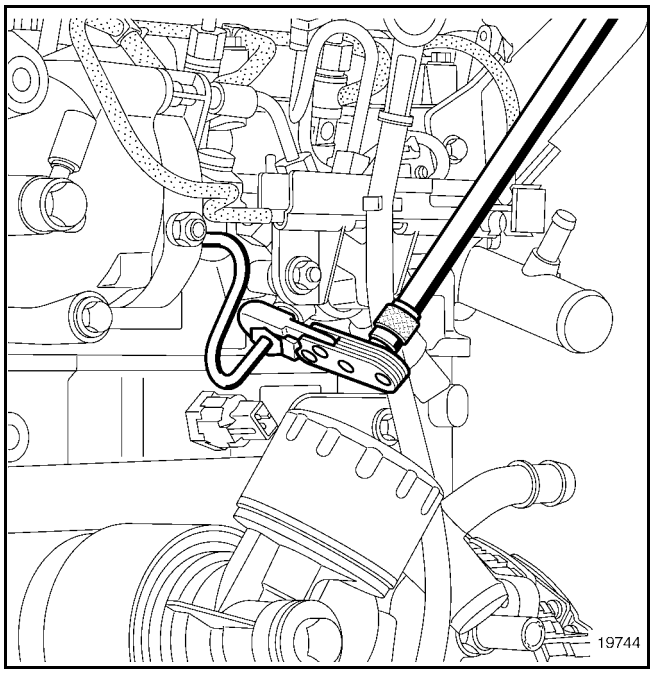
IMPORTANT: Pay attention to the direction of installation of the second clip. The tabs located in the centre of the clip will only fit together in one position.



Tighten the rail nuts to a torque of **2.8 daN.m.**

IMPORTANT: Do not touch the pipes with the wrench when torque tightening.

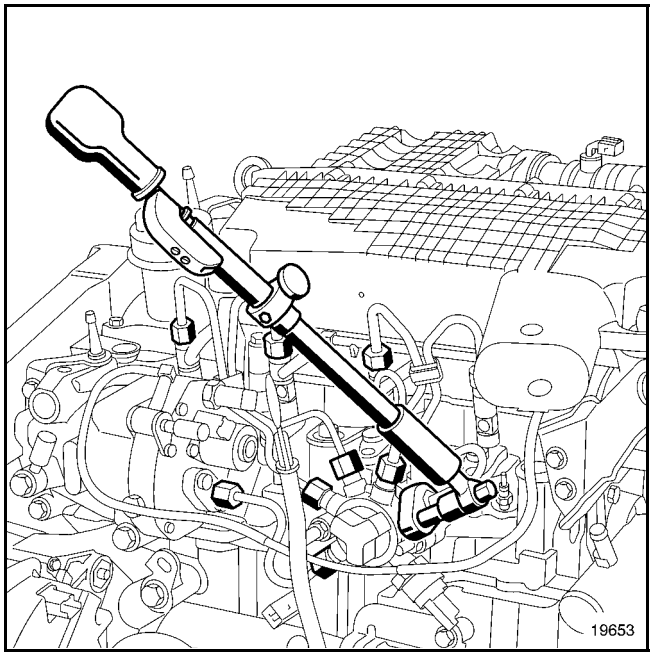
Using the recommended tools, tighten the following in the order and to the torques shown:
– the nut on the pump - rail high pressure pipe starting with the one located on the rail side to a torque of **3.8 daN.m**.
– the nut on the pump side to a torque of **3.8 daN.m**.



IMPORTANT: When tightening the high pressure pipes, it is essential to maintain the central union of the injector (4).

Using the recommended tools, tighten the following in the order and to the torques shown:
– the nut on the injector side to a torque of **3.8 daN.m**.
– the nut on the rail side to a torque of **3.8 daN.m**.

NOTE: Tighten one pipe fully before moving on to the next pipe.



Refit in the reverse order to removal for the other refitting operations.

Test the sealing of the high pressure after it has been repaired (refer to **"Special features"**).

NOTE: When replacing an ECM, it is necessary to program the individual injector correction and the other vehicle configurations using CONSULT-II.

REPLACING THE ECM

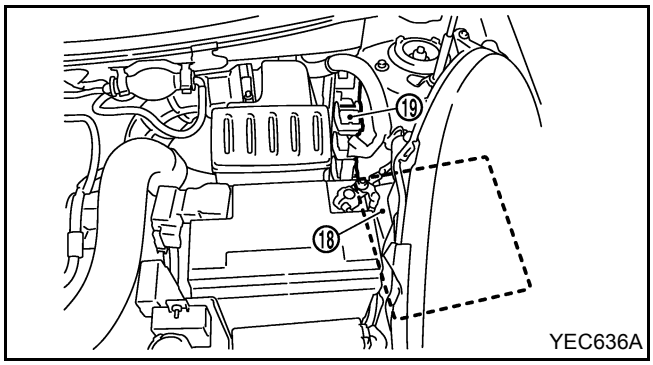
Before an ECM is replaced in after-sales, the following must be checked using CONSULT-II:

- Injectors individual correction value (16 digit code)
- System configulation

REMOVAL

Disconnect:
– the battery,
– the ECM harness connectors.

Remove the mounting nuts from the ECM (19).



REFITTING

Fit the new ECM, taking care to engage the positioning tab, then fit the ECM on its mounting studs.

Tighten the ECM mounting nuts.

Reconnect the ECM.

Connect the battery.

Turn the engine on and read the DTC using the CONSULT-II.

If necessary repair the DTC that appear then clear them.

Check that the vehicle is operating correctly.

This vehicle is fitted with an engine immobilizer system which is controlled by a key recognition system.

REPLACING THE ECM

The ECM are supplied without a code but they must all be programmed with one.

If an ECM is replaced, it must be programmed with the code of the vehicle and the correct operation of the engine immobilizer function must be checked. (Refer to BL section.)

WARNING:

These vehicles have a special ECM which does not function unless it is coded.

Consequently, it is strongly recommended that you do not carry out tests using ECMs borrowed from the warehouse or on another vehicle to prevent coding and uncoding problems which may leave the ECM useless.

UNCODING PROCEDURE

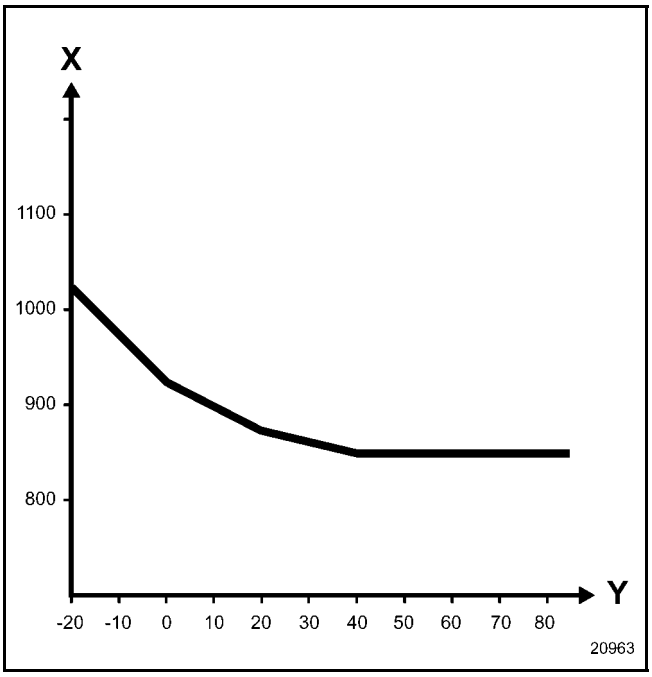
If the ECM has learnt a code and must be returned to the workshop it is imperative that you uncode it before removing it. (See the repair manual or the engine immobilizer TSB).

The ECM takes over calculation of the idle speed to maintain the idle speed at the recommended level and to compensate for any variation in the mechanical or electrical couple as regards:
– the engine coolant temperature,
– battery voltage,
– the gear selected on the transmission,
– the electrical consumers (climate control system, cooling fan assembly etc.),
– any malfunctions found.

At the engine operating temperature, without high electrical consumer, the idle speed is **800 ± 50 rpm**.

IDLE SPEED CORRECTION ACCORDING TO ENGINE COOLANT TEMPERATURE

X. Engine speed in **rpm**
Y. Temperature in °**C**



SPEED ADJUSTMENT WHEN THERE IS AN ACCELERATOR PEDAL POSITION SENSOR (POTENTIOMETER) MALFUNCTION

- **If one or both terminals** of the accelerator pedal position sensor (potentiometer) are suspected, the ECM overrides the idle speed to maintain it at **1300 rpm**. This defect mode limits performance. The orange injection warning light lights up and flashes.

- **If the accelerator pedal position sensor (potentiometer) is blocked**, **is no longer being supplied, or is not transmitting an output signal,** the ECM overrides the idle speed to maintain it at **1300 rpm**. This mode limits performance. The orange injection warning light lights up and flashes.

- In both cases, when the brake pedal is depressed, the idle speed is stabilised at the **recommended speed**.

- **If the information from the accelerator pedal position sensor (potentiometer) and the brake switch information does not correspond, the speed is changed to 1300 rpm.**

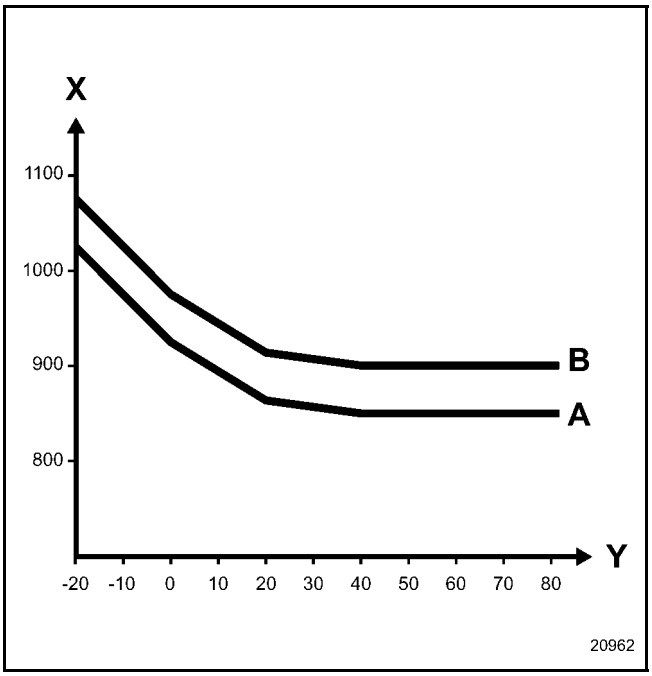
IDLE SPEED ADJUSTMENT WHEN THERE IS AN INJECTOR CODE MALFUNCTION

When there is an injector code malfunction, the ECM overrides the idle speed to maintain it at **1300 rpm**. This mode limits performance. The orange injection warning light lights up and flashes.

CORRECTION OF THE IDLING SPEED ACCORDING TO THE GEAR RATIOS

The idling speed is modified according to the gear selected in the transmission:
– **in neutral, 1st and 2nd gear**, the speed is (at the engine operating temperature) **850 rpm** (graph **A**),
– **for the other gears**, the speed is (at the engine operating temperature) **900 rpm** (graph **B**).

X. Engine speed in **rpm**
Y. Temperature in °**C**



AIR CONDITIONING CONTROL

The compressor is a variable displacement type.

The air conditioning relays are controlled by wires:

COMPRESSOR OPERATION PROGRAMMING

During certain stages of operation, the ECM stops the compressor from functioning.

Engine starting program

The compressor is prevented from operating for **4 seconds** after the engien has started.

Thermal protection program

The compressor is not engaged when the engine temperature is higher than **115** °**C** or from **110** °**C** at high speed, **4500 rpm** for more than **3 seconds.**

Fan assembly control programming

At idling speed and also when driving, with the air conditioning activated, the speed of the fan assembly is determined according to the refrigerant fluid pressure and the vehicle speed.

Recovery of performance

When pressure is applied to the accelerator pedal above **70%**, the compressor is disengaged for **5 seconds**.

Recovery of output when the vehicle starts moving

In order to help the vehicle move off, the air conditioning compressor is disengaged if the position of the accelerator pedal is above **35 %** and the idling speed less than **1250 rpm**.

Anti-stall protection

The compressor is disengaged if the engine speed is lower than **750 rpm.**

Engine overspeed timed protection program

The compressor is disengaged when the speed reaches **4500 rpm** for more than **3 seconds**.

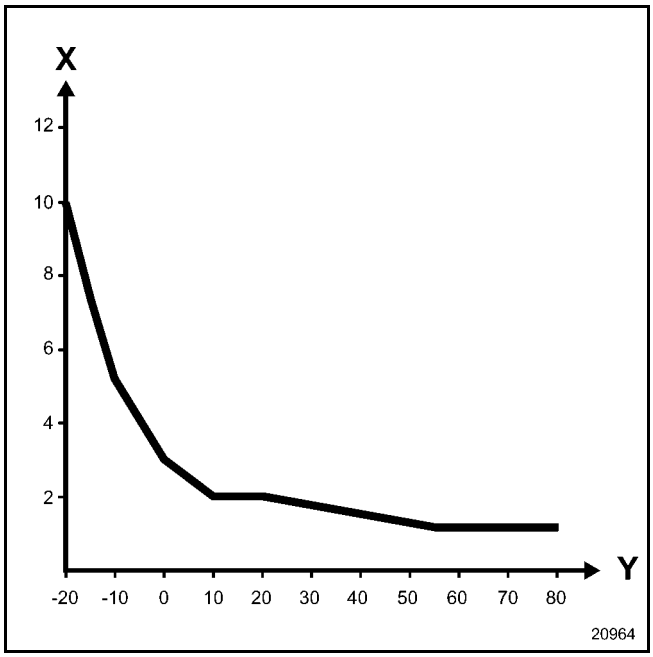
NOTE: The time between the compressor being disengaged twice is always greater than **10 seconds**.

The pre/postheating function is controlled by the preheating unit.

PRE/POSTHEATING (glow plug) OPERATING PRINCIPLE

1) Ignition on "preheating"

a) Variable preheating
The time period for the warning light to light up and the feed to heater plugs depends on the coolant temperature and the battery voltage.



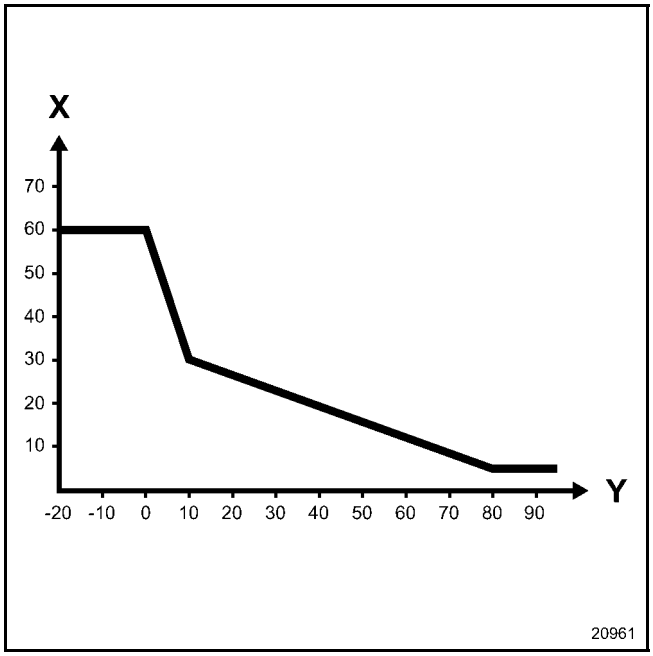
X. Time in seconds
Y. Temperature in °C

Whatever the situation, the preheating warning light cannot be lit for more than **15 seconds** (except in the event of an engine coolant temperature sensor malfunction).

b) Fixed preheating
After the warning light goes out the plugs remain supplied for a fixed period of **5 seconds**.

2) "Post heating" with the engine running

During this phase the plugs are supplied continuously according to engine coolant temperature.



X. Time in seconds
Y. Temperature in °C

For idle speed without pressing the accelerator pedal.

The resistance of a glow plug is **0.6** Ω.

TIGHTENING TORQUE (in daNm)	
Glow plug	**1.5**

Plugs may be removed without having to open the high pressure circuit.

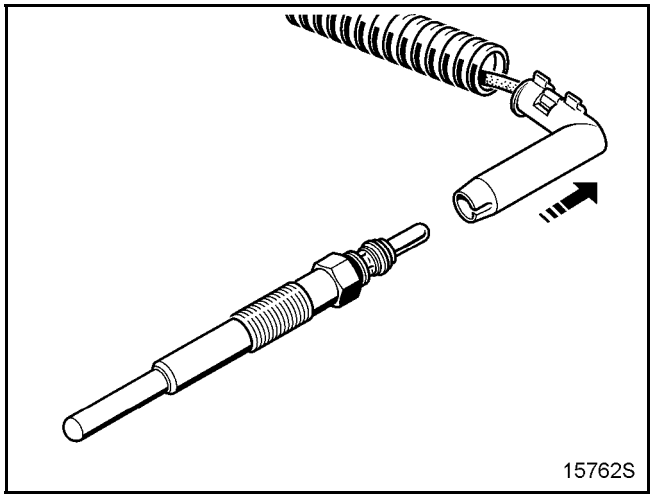
REMOVAL

Disconnect the battery.

Unclip the plug connector.

Clean the outside of the plug to avoid any dirt entering the cylinder.

Loosen and remove the plugs.



To undo the plug on cylinder 4 use a **10 mm** long radio socket attached to a universal joint. Once the plug is loosened use a hose to unscrew it completely.

REFITTING

Proceed in the reverse order to removal.

The cooling fan unit is controlled by the ECM.

COOLING FAN ASSEMBLY OPERATION WITH THE ENGINE RUNNING

The cooling fan assembly is controlled:

- at slow speed if the engine coolant temperature exceeds **99°C** or if there is an engine coolant temperature sensor malfunction, and is switched off when the temperature falls below **96°C**.
- at high speed if the engine coolant temperature exceeds **102°C** or if there is a low speed malfunction, and is switched off when the temperature falls below **99°C.**

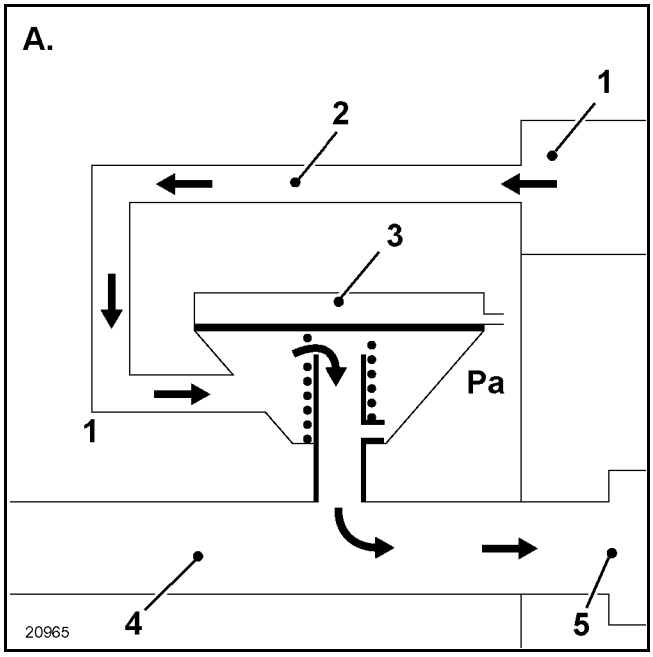
The cooling fan assembly low and high speeds are controlled when the air conditioning function is selected on the instrument panel.

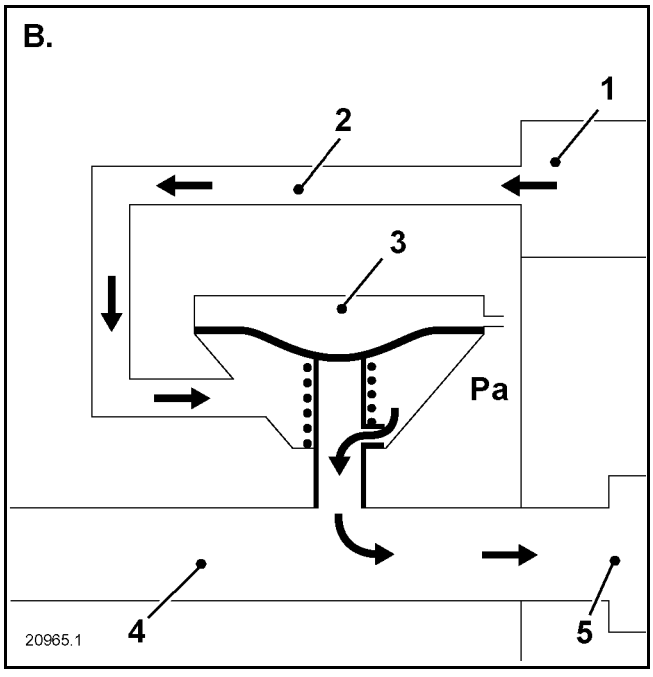
If the low speed setting is suspected, the high speed setting operates under the low speed conditions.

OPERATION OF THE ENGINE COOLANT TEMPERATURE WARNING LIGHT

The engine coolant temperature warning light remains lit if the engine coolant temperature exceeds **114°C**. It goes out when the temperature falls below **111°C**.

CIRCUIT DIAGRAM





1 Cylinder head cover
2 Oil vapour rebreathing duct
3 Oil vapour recirculation valve
4 Air inlet duct
5 Turbocharger
Pa Atmospheric pressure

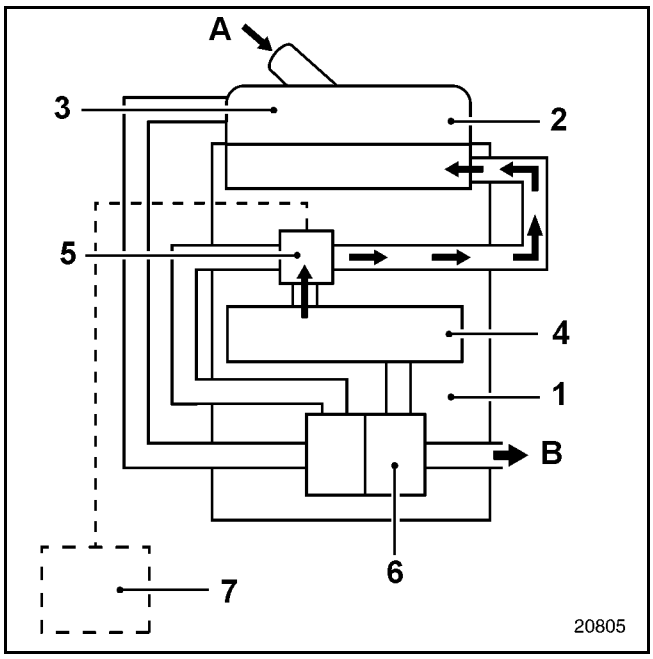
A. When there is a low charge, the vacuum in the air intake duct is below the spring set point. The oil vapours are extensively rebreathed by the vacuum in the air intake duct.

B. When there is a medium or high charge, the pressure in the air intake duct exhausts the valve diaphragm, the oil vapours are breathed in small quantities via a calibrated hole.

CHECKING

To ensure the correct operation of the anti-pollution system, the oil vapour rebreathing circuit must be kept clean and in good condition.

CIRCUIT DIAGRAM

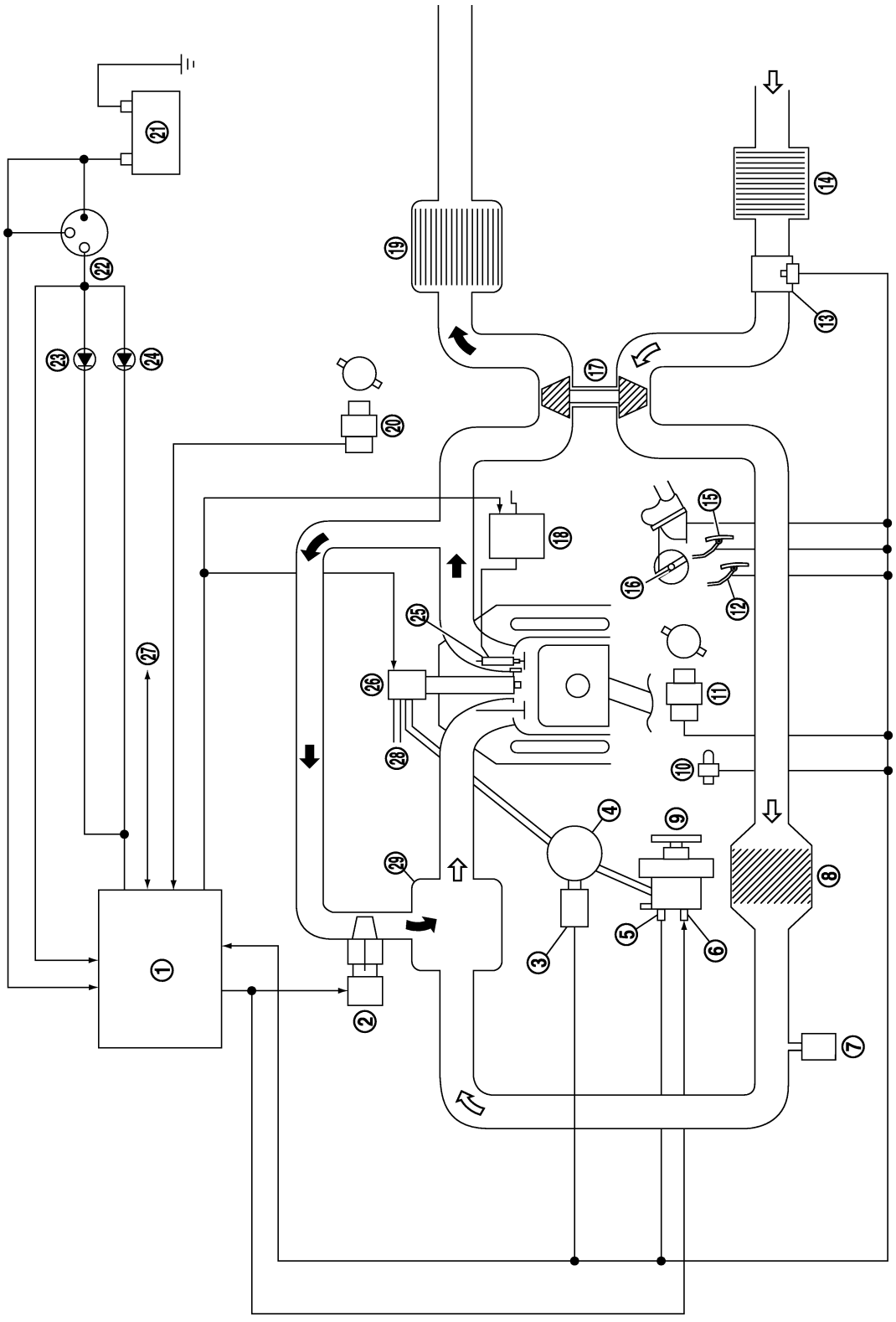


1 Engine
2 Air filter unit
3 Air distributor
4 Exhaust manifold
5 EGR unit with solenoid valve
6 Turbocharger
7 ECM
A Air inlet
B Exhaust gas outlet

PURPOSE OF THE EGR SYSTEM

Exhaust gas recirculation is used to reduce the nitrogen oxide (NOx) content of the exhaust gases.

The ECM authorises gas to pass by controlling a solenoid valve.



YEC860A

1. ECM
2. EGR control solenoid valve
3. Fuel rail pressure sensor
4. Fuel rail
5. Fuel temperature sensor
6. Fuel flow actuator (Fuel pressure regulator)
7. Turbocharger boost pressure sensor (60 kW engine models)
8. Turbocharger air cooler (60 kW engine models)
9. Fuel pump
10. Engine coolant temperature sensor
11. Crankshaft position sensor
12. Clutch switch
13. Intake air temperature sensor
14. Air cleaner
15. Stop lamp switch
16. Accelerator pedal position sensor
17. Turbocharger
18. Glow relay unit
19. Catalyst
20. Camshaft position sensor
21. Battery
22. Ignition switch
23. Malfunction indicator
24. Glow lamp
25. Glow plug
26. Fuel injector
27. CAN communication
28. Fuel return
29. Intake manifold

DIESEL INJECTION
Trouble diagnosis - Introduction

1. SCOPE OF THIS DOCUMENT

This document presents the trouble diagnosis method applicable to all ECMs with the following specifications:

Vehicle(s): **K12** with **K9K** *Function concerned:* **DELPHI K9 DIESEL DIRECT COMMON RAIL INJECTION** (DDCR)	Name of ECM: **DDCR INJECTION** Program No.: **BE 88** VDIAG No.: 44

2. PREREQUISITES FOR TROUBLE DIAGNOSIS

To begin trouble diagnosis, it is essential to have the following items available:

Documentation type

Diagnostic procedures:
– Assisted with CONSULT-II, Service Manual.
– Wiring diagrams.

Specia tool required PLUGGED RAIL tools

3. REMINDERS

Trouble diagnosis:

There are **present** DTCs and **stored** DTCs (which appeared in a certain context and have since disappeared or which are still present but have not had trouble diagnosis performed on them in the current context).

The "present" or "stored" status of DTCs must be considered when activating the diagnostic tool after power is supplied to the ECM (without activating the system components).

Deal with **present DTCs** according to the procedure specified in the corresponding DTC trouble diagnosis.

For stored DTCs, note the DTCs displayed and follow the instructions in the **Notes** section.

If the DTC is **confirmed** when the instructions in the **Notes** section are applied, the malfunction is present. Deal with the DTC.

If the DTC is not confirmed, check:
– the electrical lines which correspond to the malfunction,
– the connectors for these lines (for oxidation, bent pins, etc.),
– the resistance of the malfunction component,
– the condition of the wires (melted or cut insulation, wear).

Conformity check

The conformity check is designed to check the states and data monitor items which do not display any DTCs on the diagnostic tool when inconsistent. This phase therefore allows:
– diagnoses malfunctions that do not have a DTC display, and which may correspond to a customer complaint.
– Checks that the system is operating correctly and that there is no risk of a DTC reappearing after repairs.

This section gives the trouble diagnosis procedures for states and parameters and the conditions for checking them.

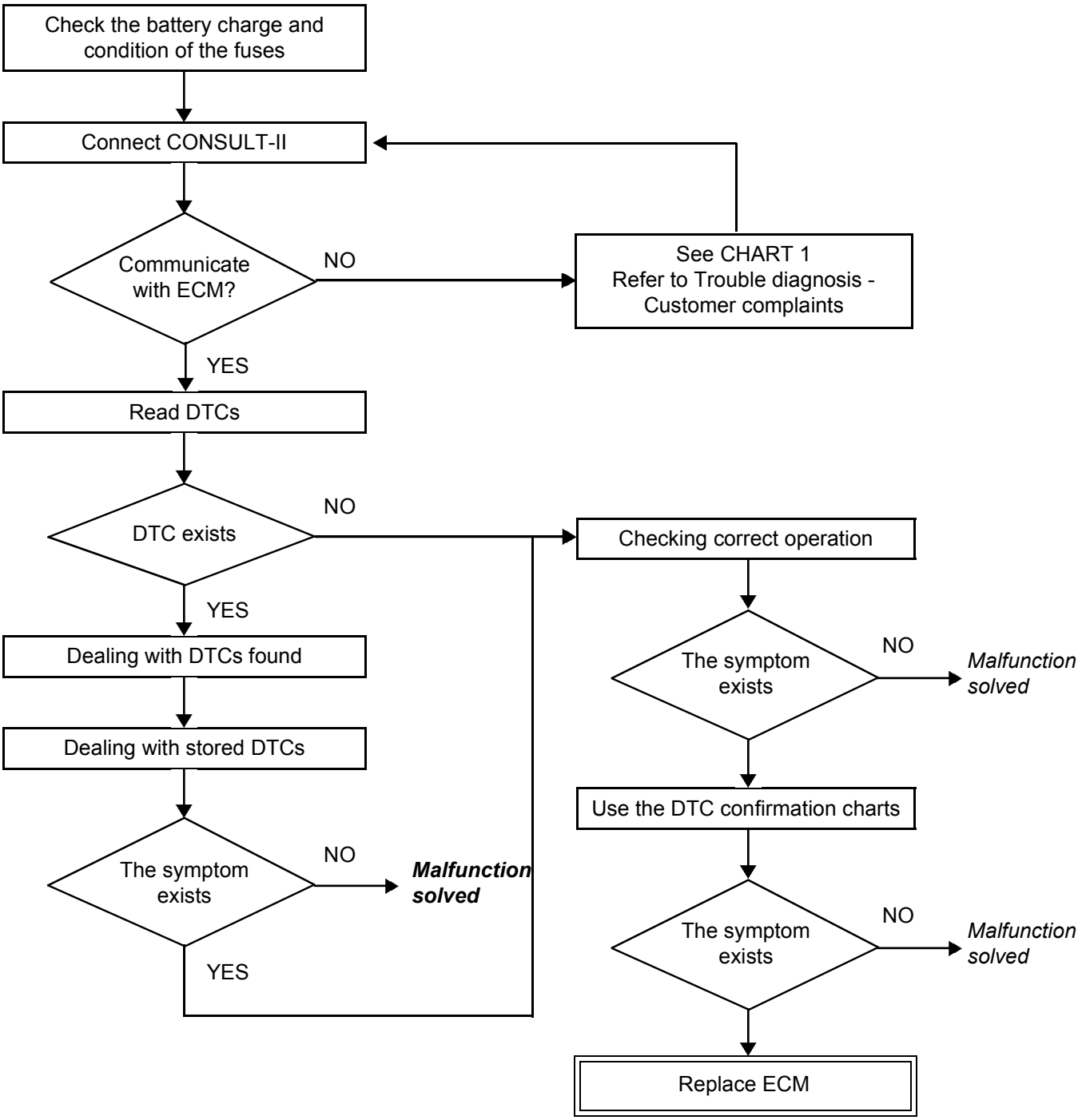
If a state is not operating normally or a data monitor value is outside permitted tolerance values, you should consult the corresponding trouble diagnosis page.

Customer complaints - trouble diagnosis

If the test with the CONSULT-II is OK, but the customer complaint still present, the malfunction should be treated by **customer complaints**.

A synopsis of the general procedure to follow is provided on the next page in the form of a flow chart.

4. DIAGNOSTIC PROCEDURE



5. SAFETY INSTRUCTIONS

All work on components requires that the safety rules be obeyed to prevent damage or injury:
– Make sure the battery is properly charged to avoid damaging the ECMs with a low charge.
– Use the proper tools.

Cleanliness instructions which must be followed when working on the high-pressure direct injection system:

Risks relating to contamination:

The system is very sensitive to contamination. The risks caused by the introduction of contamination are: damage to or destruction of the high-pressure injection system and the engine, seizing or incorrect sealing of a component.

All After-Sales operations must be performed under very clean conditions. This means that no impurities (particles a few microns in size) get into the system during dismantling or into the circuits via the fuel unions.

The cleanliness guidelines must be applied from the filter through to the injectors.

- What are the sources of contamination?

Contamination is caused by:
- metal or plastic chips,
- paint,
- fibres from: cardboard,
  brushes,
  paper,
  clothing,
  cloths.
- foreign bodies such as hair,
- ambient atmosphere,
- etc.

WARNING:
Before working on the injection system, ensure that the system pressure is nearing 0 bar.

CAUTION: it is not possible to clean the engine using a high-pressure washer because of the risk of damaging the connections. In addition, moisture may collect in the connectors and cause electrical connection malfunctions.

5. SAFETY INSTRUCTIONS (CONTINUED):

Instructions to be followed before any work is carried out on the injection system:

- Ensure that you have the plugs for the unions to be opened (bag of plugs available from the Parts Stores, NISSAN part No:**16830 BN700**, Renault part No: **77 01 206 804**). Plugs are to be used once only. After use, they must be thrown away (once used they are soiled and cleaning is not sufficient to make them reusable). Unused plugs must be thrown away.
- Ensure that you have hermetically resealable plastic bags for storing removed parts. There is less risk of parts stored in this way being exposed to contamination. The bags must be used only once, and after use they must be thrown away.
- Ensure that lint-free towelettes are used for injection pump related service purposes. The use of a normal cloth or paper for cleaning purposes is prohibited. They are not lint-free and may contaminate the fuel circuit of the system. A lint-free cloth should only be used once.

5. SAFETY INSTRUCTIONS (CONTINUED):

Instructions to be followed before opening the fuel circuit:

Use new thinner for each operation (used thinner contains impurities). Pour it into a clean receptacle.

For each operation, use a clean brush in good condition (the brush must not shed its bristles).

Use a brush and thinners to clean the connections to be opened.

Blow compressed air over the cleaned parts (tools, cleaned the same way as the parts, connections and injection system zone). Check that no bristles remain adhering.

Wash your hands before and during the operation if necessary.

When wearing leather protective gloves, cover them with latex gloves.

Instructions to be followed during the operation:

As soon as the circuit is open, all openings must be plugged to prevent impurities from entering the system. The plugs to be used are available from the Parts Stores. They must not, under any circumstances, be reused .

Close the resealable bag, even if it has to be reopened shortly afterwards. The ambient atmosphere carries impurities.

All components removed from the injection system must be stored in a hermetically sealed plastic bag once the plugs have been inserted.

The use of a brush, thinner, bellows, sponge or normal cloth is strictly forbidden once the circuit has been opened. These items are likely to allow contaminants to enter the system.

A new component replacing an old one must not be removed from its packaging until it is to be fitted to the vehicle.

SYSTEM OPERATION

The high-pressure injection system is designed to deliver a precise quantity of diesel to the engine at a specific time.

It is fitted with a "DDCR" type **112-terminals DELPHI** made ECM.

The system consists of:

- a priming bulb on the low-pressure circuit,
- a diesel filter,
- a high-pressure pump combined with a low-pressure pump (transfer pump),
- a high-pressure regulator mounted on the pump,
- an injector rail,
- a pressure sensor located in the rail,
- four solenoid injectors,
- a fuel temperature sensor,
- an engine coolant temperature sensor,
- an intake air temperature sensor,
- a camshaft position sensor,
- a crankshaft position sensor,
- a turbocharger boost pressure sensor,
- a knock sensor (accelerometer),
- an EGR control valve,
- an accelerator pedal position sensor,
- an ECM,
- a mass air flow sensor,

The **common rail** high-pressure direct injection system works sequentially (based on the operation of multipoint injection for petrol engines).

This injection system reduces operating noise, reduces the volume of pollutant gases and particles and produces high engine torque at low engine speeds thanks to a pre-injection procedure.

The high-pressure pump generates the high-pressure sent to the injector rail. The actuator located on the pump controls the quantity of diesel supplied, according to the demand determined by the ECM. The rail supplies each injector through a steel pipe.

The ECM:
It determines the value of injection pressure necessary for the engine to operate correctly and then controls the pressure regulator. It checks that the pressure value is correct by analyzing the value transmitted by the common rail pressure sensor located on the rail.
It determines the injection time necessary to deliver the right quantity of diesel and the moment when injection should start,
It controls each injector electrically and individually after determining these two values.

The injected flow to the engine is determined by:
- the duration of injector control,
- the common rail pressure (regulated by the ECM),
- the injector opening and closing speed,
- the needle travel (determined by a constant for the type of injector),
- the nominal hydraulic flow of the injector (specific to each injector).

The ECM controls:
- the idle speed regulation,
- the EGR control into the intake manifold,
- the fuel supply monitoring (advance, flow and common rail pressure),
- the cooling fan,
- the air conditioning,
- the glow plug control (pre/post heating),

The high-pressure pump is supplied at low-pressure by an integrated low-pressure pump (transfer pump).
It supplies the rail the pressure in which is controlled for charging by the fuel flow actuator and for discharging by the injector valves. Drops in pressure may also be compensated for. The flow actuator allows the high-pressure pump to supply the exact quantity of diesel fuel required to maintain the pressure in the rail. This feature allows heat generation to be minimised and engine output to be improved.
Before discharging the rail using the injector valves, the valves are controlled by short electrical impulses:
short enough not to open the injector, (passing through the return circuit from the injectors),
and long enough to open the valves and discharge the rail.

The fan assembly and coolant temperature warning light on the instrument panel are controlled by the ECM (centralised coolant temperature management function).

The connections between the vehicle's various control units are multiplexed. Therefore, the malfunction warning lights on the instrument panel are lit via the CAN communication line.

There is no vehicle speed sensor in the transmission (transaxle). The vehicle speed signal on the instrument panel is transmitted by the ABS control unit or the wheel speed sensor via a wire connection and is then transmitted on the CAN by the instrument panel.

Some vehicles have a sensor located in the filter for detecting water in the diesel. If there is water present in the diesel, the orange injection and pre/postheating (glow) warning light comes on.

IMPORTANT

The engine must not operate with:
- diesel containing more than **10 %** diester,
- petrol, even in tiny quantities.

The system injects the diesel fuel into the engine at a pressure of up to 1400 bar. Before carrying out any work, check that the injector rail is not pressurised and that the fuel temperature is not too high.

You must respect the cleaning and safety advice specified in this document for any work on the high-pressure injection system.

Removal of the internal parts of the pump and injectors is prohibited. Only the fuel flow actuator, the fuel temperature sensor and the venturi can be replaced.

For safety reasons, it is strictly forbidden to undo a high-pressure pipe union when the engine is running.

It is not possible to remove the common rail fuel pressure sensor from the fuel rail because this may cause circuit contamination malfunction. If the pressure sensor fails, the pressure sensor, the rail and the five high-pressure pipes must be replaced.

It is strictly forbidden to remove any injection pump pulley bearing the number 070 575. If the pump is being replaced, the pulley must be replaced.

Applying 12 V directly to any component in the system is prohibited.

Ultrasonic decoking and cleaning are prohibited.

Never start the engine unless the battery is connected correctly.

Disconnect the injection system computer when carrying out any welding work on the vehicle.

It is essential to replace all the disconnected air inlet plastic pipes.

Functions included

Air conditioning control assistance:

For vehicles with air conditioning, the ECM can deactivate the air conditioning in certain conditions of use:
- when requested by the driver,
- when starting the engine,
- if the engine overheats (in order to reduce the power the engine has to supply),
- when the engine speed is very high (to protect the compressor),
- during transition phases (e.g. under heavy acceleration when overtaking, anti-stalling and moving off strategies). These conditions are only taken into account when they occur repeatedly, so as to prevent system instabilities (incorrect deactivation).
- when reading certain malfunctions.

Cold loop air conditioning control:

The air conditioning is controlled in a cold loop and this function is controlled by several control units. The ECM is responsible for:
- Authorising requests for cold according to passenger compartment, refrigerant pressure, coolant temperature.
- Calculating the power absorbed by the compressor (from the refrigerant pressure).
- The control of the fan assembly according to the vehicle speed, refrigerant pressure and engine coolant temperature.

The driver asks for the air conditioning to be switched on using the air conditioning switch. This request for cold air is either authorised or not, depending on the measured pressure. If this pressure is outside the operating limits, the cold loop strategy is not activated.

Note:
Requests to operate the fan assembly can be made by the ECM but these are sent on the CAN. These requests depend on the air conditioning but also on the coolant temperature and vehicle speed.

Thermal regulation of the passenger compartment heating circuit:

In a direct injection engine, fuel is injected directly into the combustion chamber. This leads to heat being lost through the upper part of the engine and consequently, the cylinder head cooling circuit is smaller in size.

The effect of this is that the temperature of the coolant which flows through this circuit rises more slowly. However, this coolant is used by the passenger compartment heating system. In very cold conditions, it is therefore difficult to reach a comfortable passenger compartment temperature quickly.

WARNING LAMP CONTROL

Instrument panel display:

The ECM displays certain information on the instrument panel relating to engine operation. This concerns five functions: MI (Malfunction Indicator) for the EOBD (European On Board Diagnostic), pre/post heating (glow), coolant temperature and engine malfunctions: Severity 1 (non-critical malfunction) and Severity 2 (stop immediately). These five functions are represented by 3 warning lights or messages displayed by the ECM.

Pre/post heating (glow) warning light:

This warning light is used as an operating indicator light and as a system malfunction indicator light:
– Permanently lit during + after turning ignition switch "ON": indicates preheating of the glow plugs.

After preheating and an automatic 3 second off period, the warning light will come on if a level 1 malfunction occurs (leading to reduced operation and reduced safety levels). The driver should carry out repairs as soon as possible.

Temperature/emergency stop warning light:

This warning light is used as an operating indicator light and as a system malfunction indicator light. It lights up for **3 seconds** when the ignition is switched on (automatic test procedure controlled by the instrument panel).
– Permanently on: indicates engine overheating or a level 2 malfunction.

If the malfunction reaches a critical level, the injection is cut off automatically after a few seconds.
In the event of overheating, it is up to the driver whether to stop the vehicle or continue driving.

PROGRAMMING OF WARNING LIGHTS ON THE INSTRUMENT PANEL:

Orange SERVICE warning light (level 1):

This warning light comes on and is **accompanied by the injection faulty message**.

The driver should carry out repairs as soon as possible.

Red STOP warning light (level 2):

This warning light comes on and is **accompanied by the injection malfunction message**.

The driver should carry out repairs as soon as possible.

Excess pollution orange OBD warning light:

This warning light, in the form of an engine symbol, comes on for about 3 seconds when the ignition is switched on then goes out. It never comes on when the engine is running.

CONNECTION

ECM harness connector (E61), 32-terminals

Terminal No.	Item
1	CAN H
2	K-line (Data link connector)
3	Not used
4	Not used
5	Stop lamp switch
6	Accelerator position sensor 2 ground
7	CAN L
8	Not used
9	Not used
10	Not used
11	Not used
12	Accelerator position sensor 2 signal
13	Not used
14	Not used
15	Not used
16	Not used
17	Not used
18	Accelerator pedal position sensor 2 power supply
19	Not used
20	Not used
21	Not used
22	Ignition switch signal
23	Not used
24	Not used
25	Not used
26	Not used
27	Not used
28	Accelerator position sensor 1 ground
29	Accelerator position sensor 1 power supply
30	Accelerator position sensor 1 signal
31	Not used
32	Not used

ECM harness connector (F134), 48-terminals and 32-terminals

Terminal No.	Item
33	Not used
34	APP sensor shield ground
35	Not used
36	Not used
37	Not used
38	EGR volume control valve
39	Fuel flow actuator
40	Not used
41	Knock sensor (accelerometer) shield ground
42	Not used
43	Not used
44	Knock sensor (accelerometer) power supply
45	Knock sensor (accelerometer ground)
46	Not used
47	Common rail pressure sensor power supply
48	Turbocharger boost pressure sensor power
49	EGR volume control solenoid valve
50	Not used
51	Intake air temperature sensor power supply
52	Turbocharger air temperature sensor power supply
53	Engine coolant temperature sensor power supply
54	Fuel temperature sensor power supply
55	Crankshaft position sensor power supply
56	Camshaft position sensor
57	Common rail fuel pressure sensor
58	Turbocharger boost pressure sensor
59	EGR volume control valve
60	Not used
61	Intake air temperature sensor ground
62	Turbocharger air temperature sensor ground (models without intercooler)
63	Engine coolant temperature sensor ground
64	Fuel temperature sensor ground
65	Crankshaft position sensor ground
66	Camshaft position sensor ground
67	Common rail fuel pressure sensor ground
68	Turbocharger boost pressure sensor ground (models without intercooler) Turbocharger boost pressure and temperature sensor's ground (models with intercooler)
69	EGR volume control valve
70	Not used

CONNECTION

ECM harness connector (F134), 48-terminals and 32-terminals (continued)

Terminal No.	Item
71	Not used
72	Not used
73	Injector 2 ground
74	Injector 2 power supply
75	Injector 4 ground
76	Injector 4 power supply
77	Injector 3 ground
78	Injector 3 power supply
79	Injector 1 ground
80	Injector 1 power supply
81	Not used
82	Not used
83	Refrigerant pressure sensor power supply
84	Not used
85	Not used
86	Not used
87	Not used
88	Not used
89	Refrigerant pressure sensor
90	Glow relay
91	Not used
92	Not used
93	Not used
94	Not used
95	Not used
96	Not used
97	Not used
98	Glow relay
99	Not used
100	Not used
101	Not used
102	Not used
104	ECM power supply
105	Not used
106	Not used
107	Refrigerant pressure sensor ground
108	Not used
109	ECM power supply
110	ECM power supply
111	ECM ground
112	ECM ground

DTC and DF code table:

DTC	DF code	Diagnostic tool headings
P0087	**DF130**	Fuel flow capacity function
P0089	**DF053**	Fuel rail pressure regulation function
P0110	**DF039**	Intake air temperature sensor circuit
P0115	**DF001**	Engine coolant temperature sensor circuit
P0180	**DF098**	Fuel temperature sensor circuit
P0190	**DF007**	Common rail pressure sensor circuit
P0200	**DF052**	Injector control circuit
P0201	**DF026**	Injector circuit cylinder 1
P0202	**DF027**	Injector circuit cylinder 2
P0203	**DF028**	Injector circuit cylinder 3
P0204	**DF029**	Injector circuit cylinder 4
P0225	**DF008**	Accelerator pedal position sensor 1 circuit
P0231	**DF024**	Low-pressure actuator control circuit
P0235	**DF089**	Turbocharger boost pressure sensor circuit
P0301	**DF059**	Cylinder 1 misfire
P0302	**DF060**	Cylinder 2 misfire
P0303	**DF061**	Cylinder 3 misfire
P0304	**DF062**	Cylinder 4 misfire
P0325	**DF121**	Knock sensor circuit
P0335	**DF005**	Crankshaft position sensor circuit
P0340	**DF112**	Camshaft position sensor circuit
P0380	**DF025**	Glow plug diagnostic connection
P0382	**DF017**	Glow plug control circuit
P0400	**DF114**	EGR solenoid valve circuit
P0403	**DF016**	EGR control circuit
P0409	**DF010**	EGR position sensor circuit
P0500	**DF014**	Vehicle speed sensor circuit
P0513	**DF037**	Immobiliser
P0530	**DF049**	Refrigerant pressure sensor circuit
P0560	**DF047**	ECM supply voltage

DTC and DF code table:

DTC	DF code	Diagnostic tool headings
P0571	**DF050**	Brake switch circuit
P0604	**DF107**	ECM memory
P0606	**DF038**	ECM
P0608	**DF113**	Sensor supply voltage
P0609	**DF122**	Supply voltage for accelerator pedal position sensor 2
P0685	**DF015**	ECM relay control circuit
P2120	**DF009**	Accelerator pedal position sensor 2 circuit
P2226	**DF003**	Atmospheric pressure sensor circuit
P2264	**DF057**	Water in fuel sensor circuit
C001	**DF116**	Multiplex network (CAN circuit)

ECM REPLACEMENT, PROGRAMMING OR REPROGRAMMING OPERATION

Following items can be (re)programmed via the DLC using the CONSULT-II
- System configuration
- Injector's indivisual correction parameter (value)

Before replacing the ECM in after-sales operations, the following data must be readout using CONSULT-II:

– The **individual injector correction** parameters to be noted to appropriate paper or CONSULT-II copying function.

NOTE: The individual injector correction value for each injector must be entered manually after the ECM has been replaced or (re)programmed by reading the individual injector correction value on each injector (Refer to replacing injectors).

IMPORTANT: It is not possible to test an ECM from the parts stores because it cannot be fitted to any other vehicle.

REPLACING THE INJECTORS

NOTE: The individual injector correction is a calibration made on **each injector** in the factory in order to **adjust its flow** precisely.

These correction values are written on a label affixed to each injector then entered into the computer which then controls each injector taking into account its individual **manufacturing variations**.

When replacing one or more injectors, the parameters of the injector output concerned must be modified. **The system can be configured using the CONSULT-II** (Refer to injector).

P0089 **DF053** **STORED**	COMMON RAIL FUEL PRESSURE REGULATION FUNCTION 1.DEF : At minimum limit 2.DEF : At maximum limit 3.DEF : Below minimum threshold 4.DEF : Above maximum threshold 5.DEF : High flow current < minimum 6.DEF : High flow current > maximum 7.DEF : Low flow current < minimum 8.DEF : Low flow current > mimimum

NOTES	**Special notes:** If **DTC P0089** is present: engine may stop with malfunction indicator lights up **(levels 1 and 2)**.
	Priority when dealing with a number of DTCs: If DTC **P0089** and **DTC P0180 or P0190** are present, deal with **P0180 or P0190** first.
	Conditions for applying the diagnostic procedure to the stored DTCs: The fault is declared present with the **engine running**.

4.DEF ***6.DEF*** ***8.DEF***	***NOTES***	**Special notes:** None.

Check the fuel flow actuator connection. Repair if necessary.
Measure the resistance between **terminal 1 and 2 of the fuel flow actuator,** if it is not approximately **5.3 Ω ± 0.5 Ω at 20°C, replace the actuator.**
Check the condition of the ECM (**F134**) harness connector and replace it if necessary.
Check the insulation, continuity **and absence of interference resistance of the connection:** ● ECM (**F134**) terminal 39 and fuel flow actuator harness connector terminal 2 (Refer to wiring diagram "EC-IMV/D-01".) Repair if necessary.
Check: – **that fuel is present** in the tank, – **that there is no air** in the fuel circuit, – the condition of the **fuel filter**. Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0089 **DF053** Cont'd	

1.DEF ***2.DEF*** ***3.DEF*** ***5.DEF*** ***7.DEF***	***NOTES***	**Special notes:** None.

Check **for fuel** in the tank.
Carry out **Test 7 "High pressure system check"**.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

DTC P0087 Fuel flow capacity function

P0087 **DF130** **STORED**	FLOW CAPACITY FUNCTION

NOTES	**Special notes:** If this DTC is present, engine may stop when malfunction indicator illuminates (levels 1 and 2).
	Condition for applying the diagnostic procedure to stored DTCs: The DTC is declared present **when the engine is running**

Check the **connection** of the fuel flow actuator **(IMV)** and repair if necessary.
Measure the resistance across terminals 1 and 2 of the fuel flow actuator. **Replace the flow actuator** if the resistance is not approximately **5.3** Ω ± **0.5** Ω **at 20 °C**.
Check the condition of the ECM (**F134**) harness connector. Repair if necessary.
Check the **insulation, continuity and absence of unwanted resistance** on the following connection: ● ECM (**F134**) terminal 39 and fuel flow actuator harness connector 2. Repair if necessary
Check: - **that fuel is present** in the tank, - **that there is no air** in the fuel circuit, - the condition of the **fuel filter**. Repair if necessary.
If the DTC persists, carry out a **"HIGH-PRESSURE PUMP" test (see TEST section)**.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0110 **DF039** **PRESENT**	INTAKE AIR TEMPERATURE SENSOR CIRCUIT CC.0 : Short circuit to earth (ground) CO.1 : Open circuit or short circuit + 12V

NOTES	**Priority when dealing with a number of DTCs:** If DTCs P0110 and P0608 are present, deal with DTC P0608 (sensor voltage supply) first.
	Special notes: None

Check the condition of the **intake air temperature sensor harness connector** and repair it if necessary.
Check the condition of the ECM harness connector (F134) and repair if necessary.
At the terminal, measure the **resistance** of the **intake air temperature sensor,** if it is not approximately **2051** Ω ± **120** Ω **at 25** °**C** replace the air temperature sensor.
Check the **insulation, continuity and absence of interference resistance** of the connections: ● ECM (F134) terminal 51 and intake air temperature sensor harness connector terminal 1 ● ECM (F134) terminal 61 and intake air temperature sensor harness connector terminal 2 (Refer to wiring diagram "EC-IATS-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0115 **DF001** **PRESENT**	ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT CC.0 : Short circuit to earth (ground) CO.1 : Open circuit or short circuit to + 12V

NOTES	**Special notes:** If DTC **P0115** with low speed cooling fan motor operation is present . If cooling fan 1 is suspected, then cooling fan motor 2 is switched on for vehicles with air conditioning.

Check the condition of the **engine coolant temperature sensor harness connector.**
Repair it if necessary.

Check the condition of the ECM harness connector (F134) and repair if necessary.

At the terminal, measure the **resistance** of the **engine coolant temperature sensor,** if it is not approximately **2252** Ω ± **112.16** Ω **at 25** °**C,** replace the engine coolant temperature sensor.

Check the **insulation, continuity and absence of interference resistance** of the connections:

- ECM (F134) terminal 63 and ECT sensor terminal 1
- ECM (F134) terminal 53 and ECT sensor terminal 4
  (Refer to wiring diagram "EC-ECTS-01".)

Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0180 **DF098** **PRESENT**	FUEL TEMPERATURE SENSOR CIRCUIT CC.0 : Short circuit to earth (ground) CO.1 : Open circuit or short circuit + 12V

NOTES	**Special notes:** None.

Check the condition of the **fuel temperature sensor harness connector** and repair it if necessary.
Check the condition of the ECM harness connector (F134) and repair if necessary.
At the terminal, measure the **resistance** of the **fuel temperature sensor,** if it is not approximately **2.2k Ω at 25 °C,** replace the fuel temperature sensor.
Check the **insulation, continuity and absence of interference resistance** of the connections: ● ECM (F134) terminal 64 and fuel temperature sensor harness connector terminal 1 ● ECM (F134) terminal 54 and fuel temperature sensor harness connector terminal 2 (Refer to wiring diagram "EC-FTS-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0190 **DF007** **STORED**	COMMON RAIL FUEL PRESSURE SENSOR CIRCUIT 1.DEF : Inconsistency 2.DEF : Below minimum threshold 3.DEF : Above maximum threshold CC.0 : Short circuit to earth (ground) CO.1 : Open circuit or short circuit to + 12V

NOTES	**Priority when dealing with a number of DTCs:** If DTCs **P0190** and **P0608** are both present, deal with DTC **P0608** (sensor voltage supply) first.
	Conditions for applying the diagnostic procedure to the stored DTC: The DTC is declared present after the engine is started.
	If **P0190 is present, the engine stops and is impossible to restart.** **Malfunction indicator lights up (level 1).**

Check the condition of the **common rail fuel pressure sensor harness connector** and repair if necessary.

Check the condition of the **ECM harness connector** (F134) and repair if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections:**

- ECM (F134) terminal 67 and common rail fuel pressure sensor harness connector terminal 2
- ECM (F134) terminal 57 and common rail fuel pressure sensor harness connector terminal 3
- ECM (F134) terminal 47 and common rail fuel pressure sensor harness connector terminal 1

(Refer to wiring diagram "EC-CRFPS-01".)
Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0200 **DF052** **PRESENT**	INJECTOR CONTROL CIRCUIT CC.0 : Short circuit to earth CC.1 : Short circuit to + 12 volts

NOTES	**Conditions for applying the diagnostic procedure to the stored DTC:** DTC declared present: **engine at idle speed.**
	Priorities when dealing with more than one DTC: If DTC **P0200** and DTCs **P0201, P0202, P0203 and P0204** are present, the diagnostic procedure remains the same, but you can determine the suspected injector.
	Special notes: The engine stalls when the DTC appears. **Level 1 warning light comes on**.

Turn off the ignition switch and check the injector **connections**. Repair if necessary.
Disconnect the injectors and turn on the ignition switch on. Check to see if the DTC is still present. Using CONSULT-II, check for the changes to P0200. Is P0200 present or stored?

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0200 PRESENT	If the DTC **disappears when the injectors are disconnected**, check the condition of the **ECM harness connector** (F134) and replace it if necessary. Check the **insulation, continuity and absence of interference resistance of the connections:** ● ECM (F134) terminal 80 and No.1 injector terminal 2 (+) ● ECM (F134) terminal 79 and No.1 injector terminal 1 (ground) ● ECM (F134) terminal 74 and No.2 injector terminal 2 (+) ● ECM (F134) terminal 73 and No.2 injector terminal 1 (ground) ● ECM (F134) terminal 78 and No.3 injector terminal 2 (+) ● ECM (F134) terminal 77 and No.3 injector terminal 1 (ground) ● ECM (F134) terminal 76 and No.4 injector terminal 2 (+) ● ECM (F134) terminal 75 and No.4 injector terminal 1 (ground) (Refer to wiring diagram "EC-INJECT-01 and -02".) Repair if necessary.
P0200 STORED	Injector(s) malfunctioning. Replace the injector identified by **P0201 to P0204** if present. If none of the faults identifying the malfunctioning injector circuit are present: – Switch off the engine. – Reconnect one of the four injectors. – Switch the ignition back on and, if the malfunctioning reappears as present, replace the reconnected injector. **Carry out the same procedure for the remaining injectors.**

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

DTC P0201 Injector circuit cylinder 1

P0201 **DF026** **PRESENT** **OR** **STORED**	CYLINDER 1 INJECTOR CIRCUIT CO : Open circuit CC : Short circuit 1.DEF : At minimum stop

NOTES	**Conditions for applying the diagnostic procedure to the stored DTC:** STC declared present: **engine at idlie speed**.
	Special notes: When this DTC appears, the idle speed is stuck at **1000 rpm**, with engine noise, unstable engine speed, reduced engine performance and **malfunction indicator lights up (level 1)**.

CO ***CC***	***NOTES***	**Special notes:** None.

With the ignition switched off, wait 15 seconds.
Check the connection and condition of the **injector 1 harness connector**.
Repair if necessary.

Check the condition of the ECM harness connector (F134) and replace it if necessary.

Use command **"INJECTOR CYLINDER 1"** with CONSULT.
If 5 actuation cycles of injector 1 cannot be heard working, connect the cylinder 2 injector harness connector to the cylinder 1 injector and use command **"INJECTOR CYLINDER 2"**.
Does this injector actuation cycle work?

YES	Injector 1 is not malfunctioning, malfunction with injector 1 control circuit. Check **for continuity and make sure there is no extraneous resistance on the following connections**: ● ECM (F134) terminal 80 and injector 1 harness connector terminal 2. ● ECM (F134) terminal 79 and injector 1 harness connector terminal 1. Also check for insulation between these 2 connections. (Refer to wiring diagram "EC-INJECT-02"). Repair if necessary. If the DTC persists, replace ECM.
NO	Injector 1 malfunctioning, replace the cylinder 1 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0201 **DF026** **PRESENT** **OR** **STORED** Cont'd	

1.DEF	***NOTES***	**Special notes:** None.

Check that the injector correction value is correctly programmed into the ECM.

- Check the knock sensor shielding on ECM (**F134**) harness connector terminal 41.
  (Refer to wiring diagram "EC-INJECT-02".)

Check that the knock sensor is secure on the engine.
If the DTC persists, replace the cylinder 1 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0202 **DF027** **PRESENT** **OR** **STORED**	CYLINDER 2 INJECTOR CIRCUIT CO : Open circuit CC : Short circuit 1.DEF : At minimum stop

NOTES	**Conditions for applying the diagnostic procedure to the stored DTC:** DTC declared present: **engine at idlie speed**.
	Special notes: When this DTC appears, the idle speed is stuck at **1000 rpm**, with engine noise, unstable engine speed, reduced engine performance and **malfunction indicator light comes on (level 1)**.

CO ***CC***	***NOTES***	**Special notes:** None.

With the ignition switched off, wait 15 seconds.
Check the connection and condition of the **injector 1 harness connector**.
Repair if necessary.

Check the condition of the ECM harness connector (F134) and replace it if necessary.

Use command **"INJECTOR CYLINDER 2"** with CONSULT.
If 5 actuation cycles of injector 2 cannot be heard working, connect the cylinder 3 injector harness connector to the cylinder 2 injector and use command **"INJECTOR CYLINDER 3"**.
Does this injector actuation cycle work?

YES	Injector 2 is not malfunctioning, malfunction with injector 2 control circuit. Check **for continuity and make sure there is no extraneous resistance on the following connections**: ● ECM (F134) terminal 74 and injector 2 harness connector terminal 2. ● ECM (F134) terminal 73 and injector 2 harness connector terminal 1. Also check for insulation between these 2 connections. (Refer to wiring diagram "EC-INJECT-02"). Repair if necessary. If the DTC persists, replace ECM.
NO	Injector 2 malfunctioning, replace the cylinder 2 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0202 **DF027** **PRESENT** **OR** **STORED** Cont'd	

1.DEF	***NOTES***	**Special notes:** None.

Check that the injector correction value is correctly entered on the ECM.

- Check the knock sensor shielding on ECM (F134) harness connector terminal 41.
  (Refer to wiring diagram "EC-INJECT-02".)

Check that the knock sensor is secure on the engine.
If the DTC persists, replace the cylinder 2 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0203 DF028 PRESENT OR STORED	CYLINDER 3 INJECTOR CIRCUIT CO : Open circuit CC : Short circuit 1.DEF : At minimum stop

NOTES	**Conditions for applying the diagnostic procedure to the stored DTC:** STC declared present: **engine at idlie speed**.
	Special notes: When this DTC appears, the idle speed is stuck at **1000 rpm**, with engine noise, unstable engine speed, reduced engine performance and **malfunction indicator light comes on (level 1)**.

CO CC	***NOTES***	**Special notes:** None.

Switch off the ignition and wait **15 seconds**. Check the connection and condition of the **injector connector**. Repair if necessary.
Check the condition of the **ECM harness connector** (F134). Repair if necessary.
Use **"INJECTOR 3 CYLINDER"** in active test mode with CONSULT-II. If 5 actuation cycles of injector 3 cannot be heard working, connect the cylinder 4 injector harness connector to the cylinder 3 injector and use command **"INJECTOR 4 CYILINDER"**. **Does this injector actuation cycle work?**

YES	Injector 3 is not malfunctioning, malfunction with injector 3 control circuit. Check **for continuity and make sure there is no extraneous resistance on the connections**: ● ECM (F134) terminal 78 and injector 3 terminal 2. ● ECM (F134) terminal 77 and injector 3 terminal 1. Also check for insulation between these 2 connections. (Refer to wiring diagram "EC-INJECT-02"). Repair if necessary. If the DTC persists, replace ECM.
NO	Injector 3 malfunctioning, replace the cylinder 3 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0203 **DF028** **PRESENT** **OR** **STORED** Cont'd	

1.DEF	***NOTES***	**Special notes:** None.

Check that the injector correction value is correctly entered on the ECM.

- Check the knock sensor shielding on ECM (F134) harness connector terminal 41.
  (Refer to wiring diagram "EC-INJECT-02".)

Check that the knock sensor is secure on the engine.
If the DTC persists, replace the cylinder 3 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0204 DF029 PRESENT OR STORED	INJECTOR CYLINDER 4 CONTROL CIRCUIT CO : Open circuit CC : Short circuit 1.DEF : At minimum stop

NOTES	**Conditions for applying the diagnostic procedure to the stored DTC:** STC declared present: **engine at idlie speed**.
	Special notes: When this DTC appears, the idle speed is stuck at **1000 rpm**, with engine noise, unstable engine speed, reduced engine performance and **malfunction indicator light comes on (level 1)**.

CO CC	***NOTES***	**Special notes:** None.

Switch off the ignition and wait **15 seconds**. Check the connection and condition of the **injector connector**. Repair if necessary.
Check the condition of the **ECM harness connector** (F134). Repair if necessary.
Use **"INJECTOR 4 CYLINDER"** in active test mode with CONSULT-II. If 5 actuation cycles of injector 4 cannot be heard working, connect the cylinder 1 injector harness connector to the cylinder 1 injector and use command **"INJECTOR 1 CYILINDER"**. **Does this injector actuation cycle work?**

NO	Injector 4 is not malfunctioning, malfunction with injector 4 control circuit. Check **for continuity and make sure there is no extraneous resistance on the connections**: ● ECM (F134) terminal 76 and injector 4 terminal 2. ● ECM (F134) terminal 75 and injector 4 terminal 1. Also check for insulation between these 2 connections. (Refer to wiring diagram "EC-INJECT-02"). Repair if necessary. If the DTC persists, replace ECM.
YES	Injector 4 malfunctioning, replace the cylinder 4 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0204 **DF029** **PRESENT** **OR** **STORED** Cont'd	

1.DEF	***NOTES***	**Special notes:** None.

Check that the injector correction value is correctly entered on the ECM.

- Check the knock sensor shielding on ECM (F134) harness connector terminal 41.
  (Refer to wiring diagram "EC-INJECT-02".)

Check that the knock sensor is secure on the engine.
If the DTC persists, replace the cylinder 4 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0225 **DF008** **PRESENT**	PEDAL SENSOR CIRCUIT TRACK 1 (APP SENSOR 1) 1.DEF : Inconsistency CO.0 : Open circuit or short circuit to earth (ground) CC.1 : Short circuit to 12 volts 2.DEF : No signal 3.DEF : Blocked component

NOTES	**Priority when dealing with a number of DTCs:** If DTCs **P0225** and **P0608** are both present, deal with **DTC P0608 "SENSOR SUPPLY VOLTAGE"** first.
	Special notes: if **DTC P0225** is present: engine speed maintained **above 1000 rpm**, and malfunction indicator lights up **(level 1)**. If **DTC P0225 and DTC P2120** both present: engine speed is fixed at **1300 rpm and** the malfunction indicator lights up **(level 1)**.

1.DEF ***3.DEF***	***NOTES***	**Special notes:** None.

Disconnect ECM harness connector (E61) from the ECM and the connector from the APP sensor and test the insulation between the two lines.

- ECM (E61) terminal 30 and 29 (Refer to wiring diagram).

Repair if necessary.
Replace the APP sensor if the DTC persists.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0225 **DF008** **(Cont'd)**	

CO.0 **CC.1** **2.DEF**	***NOTES***	**Special notes:** None.

Check the condition of the **APP sensor harness connector** and repair it if necessary.
Check the condition of the ECM harness connector (E61) and replace it if necessary.
Measure the **resistance** at the **APP sensor terminals:** **terminal 4** (+5 V) **and terminal 2** (ground) If it is not approximately **1.7 kΩ ± 0.9 kΩ**, replace the pedal potentiometer.
Check the **insulation, continuity and absence of interference resistance of the connections:** ● ECM (E61) terminal 29 and APP sensor harness connector terminal 4 ● ECM (E61) terminal 30 and APP sensor harness connector terminal 3 ● ECM (E61) terminal 28 and APP sensor harness connector terminal 2 (Refer to wiring diagram "EC-APPS-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0231 **DF024** **PRESENT**	LOW-PRESSURE ACTUATOR CONTROL CIRCUIT CO.0 : Open circuit or short circuit to earth CC.1 : short circuit to 12 volts

NOTES	**Special notes:** If fault **P0231** is present with **CO.0 or CC.1 level 1** warning light comes on. The fuel flow actuator is fully opened and the engine is stopped to prevent it from racing.

Check the connection and condition of the **fuel flow actuator connector**.
Repair if necessary.

Check the condition of the ECM harness connector (F134).
Repair if necessary.

Measure the resistance between the terminals **1 and 2 of the fuel flow actuator**.
Replace the flow actuator if the resistance is not approximately **5.3** Ω ± **0.5** Ω **at 20** °**C**.

Check the **insulation, continuity and absence of unwanted resistance** on the following connection:

- ECM (F134) terminal 39 and fuel flow actuator harness connector terminal 2.
  (Refer to wiring diagram "EC-IMV/D-01".)

Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0235 **DF089** **PRESENT**	TURBOCHARGER BOOST PRESSURE SENSOR CIRCUIT 1.DEF : Permanent low signal 2.DEF : Permanent high signal 3.DEF : Below minimum threshold 4.DEF : Above maximum threshold 5.DEF : Inconsistency 6.DEF : At maximum stop 7.DEF : At minimum stop

NOTES	**Priority when dealing with a number of DTCs:** in the event of a combination of faults **P0235** and **P0608** are both present, deal with **DTC P0608 "SENSOR SUPPLY VOLTAGE"** first.
	Special notes: Malfunction indicator lights up **(level 1)**.

1.DEF **2.DEF** **3.DEF** **4.DEF**	Check the condition of the **TC boost pressure sensor harness connector** and repair if necessary.
	Check the condition of the **ECM harness connector** (F134) and replace it if necessary.
	Check the **insulation, continuity and absence of interference resistance of the connections:** ● ECM (F134) terminal 68 and TC boost pressure sensor harness connector terminal 2 ● ECM (F134) terminal 58 and TC boost pressure sensor harness connector terminal 3 ● ECM (F134) terminal 48 and TC boost pressure sensor harness connector terminal 1 (Refer to wiring diagram "EC-TCBST-01" models without intercooler, "EC-TCBST-02" models with intercooler.) Repair if necessary.

5.DEF **6.DEF** **7.DEF**	Visually check that the turbocharger circuit is leak tight. Repair if necessary.
	Remove the air supply ducts and check that they are not blocked. Repair if necessary.
	Check the consistency between the **BARO pressure and TC boost pressure sensor**. With the engine stopped, the pressure should be approximately the same between the two sensors. Replace the TC boost pressure sensor if necessary.
	Check the **turbocharger**. Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0301 **DF059** **STORED**	CYLINDER 1 MISFIRE

NOTES	**Special notes:** If **DTC0301** is present, engine speed maintained at **1000 rpm, engine performance is reduced to 75 % and the malfunction indicator lights up (level 1)**.
	Condition for applying diagnostic procedure to the stored DTCs: DTC declared present: **engine at idle speed**.
	Priority when dealing with a number of DTCs: in the event of a combination of **DTC P0201 (CC or CO)** and **DTC P0301** deal with **DTC P0201 "CYLINDER 1 INJECTOR CONTROL CIRCUIT" (CC or CO)** first. **Priority when dealing with a number of DTCs:** in the event of a combination of **DTC P0089 (1.DEF, 2.DEF, 7.DEF)** and **DTC P0301** deal with **DTC P0089 "Pressure regulation"** first.

Check the tightness of the **cylinder** and repair if necessary.
Check the **valve clearances** and adjust them if necessary.
Check the **air inlet conduits** and the **EGR valve** and clean them if necessary.
Replace the injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0302 **DF060** **STORED**	CYLINDER 2 MISFIRE

NOTES	**Special notes:** If **DTC0302** is present, engine speed maintained at **1000 rpm, engine performance is reduced to 75 % and the malfunction indicator lights up (level 1)**.
	Condition for applying diagnostic procedure to the stored DTCs: DTC declared present: **engine at idle speed**.
	Priority when dealing with a number of DTCs: in the event of a combination of **DTC P0202 (CC or CO)** and **DTC P0302** deal with **DTC P0202 "CYLINDER 2 INJECTOR CONTROL CIRCUIT" (CC or CO)** first. **Priority when dealing with a number of DTCs:** in the event of a combination of **DTC P0089 (1.DEF, 2.DEF, 7.DEF)** and **DTC P0302** deal with **DTC P0089 "Pressure regulation"** first.

Check the tightness of the **cylinder** and repair if necessary.
Check the **valve clearances** and adjust them if necessary.
Check the **air inlet conduits** and the **EGR valve** and clean them if necessary.
Replace the injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0303 **DF061** **STORED**	CYLINDER 3 MISFIRE

NOTES	**Special notes:** If **DTC0303** is present, engine speed maintained at **1000 rpm, engine performance is reduced to 75 % and the malfunction indicator lights up (level 1)**.
	Condition for applying diagnostic procedure to the stored DTCs: DTC declared present: **engine at idle speed**.
	Priority when dealing with a number of DTCs: in the event of a combination of **DTC P0203 (CC or CO)** and **DTC P0303** deal with **DTC P0203 "CYLINDER 3 INJECTOR CONTROL CIRCUIT" (CC or CO)** first. **Priority when dealing with a number of DTCs:** in the event of a combination of **DTC P0089 (1.DEF, 2.DEF, 7.DEF)** and **DTC P0303** deal with **DTC P0089 "Pressure regulation"** first.

Check the tightness of the **cylinder** and repair if necessary.
Check the **valve clearances** and adjust them if necessary.
Check the **air inlet conduits** and the **EGR valve** and clean them if necessary.
Replace the injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0304 **DF062** **STORED**	CYLINDER 4 MISFIRE

NOTES	**Special notes:** If **DTC0304** is present, engine speed maintained at **1000 rpm, engine performance is reduced to 75 % and the malfunction indicator lights up (level 1)**.
	Condition for applying diagnostic procedure to the stored DTCs: DTC declared present: **engine at idle speed**.
	Priority when dealing with a number of DTCs: in the event of a combination of **DTC P0204 (CC or CO)** and **DTC P0304** deal with **DTC P0204 "CYLINDER 4 INJECTOR CONTROL CIRCUIT" (CC or CO)** first. **Priority when dealing with a number of DTCs:** in the event of a combination of **DTC P0089 (1.DEF, 2.DEF, 7.DEF)** and **DTC P0304** deal with **DTC P0089 "Pressure regulation"** first.

Check the tightness of the **cylinder** and repair if necessary.
Check the **valve clearances** and adjust them if necessary.
Check the **air inlet conduits** and the **EGR valve** and clean them if necessary.
Replace the injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0325 **DF121** **STORED**	KNOCK SENSOR CIRCUIT (ACCELEROMETER CIRCUIT)

NOTES	**Processing priority in the event of a number of DTCs:** If DTCs **P0115, P0180, P2226** are present, first deal with DTCs **P2226: Coolant temperature, P0180: Fuel temperature, and P2226: Atmospheric pressure**. A DTC on one of these sensors could lead to an incorrect trouble diagnosis on the knock sensor (accelerometer).
	Conditions for applying the diagnostic procedure to the stored DTC: DTC declared present: **engine at idle speed.**

Check the **conformity of the injectors** fitted to the vehicle in relation to the **type of vehicle and engine number** (low injector, high or very high pressure).

Check the knock sensor connection.
Repair if necessary.

Check the condition of the **ECM harness connector** (F134) and the sensor shielding on track **ECM** (F134) **terminal 41**. Repair if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections:**

- ECM (F134) terminal 45 and knock sensor harness connector terminal 1
- ECM (F134) terminal 44 and knock sensor harness connector terminal 2

(Refer to wiring diagram "EC-KS-01".)
Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0335 **DF005** **PRESENT** **OR** **STORED**	CRANKSHAFT POSITION SENSOR CIRCUIT (FLYWHEEL) 1.DEF : Inconsistency 2.DEF : No signal 3.DEF : Too many additional teeth 4.DEF : Teeth missing 5.DEF : Additional teeth 6.DEF : Too many teeth missing

NOTES	**Special notes:** If **1.DEF, 2.DEF, 3.DEF, 6.DEF present: engine stops** and malfunction indicator lights up **(level 1)**. If **4.DEF, 5.DEF**, 75 % engine performance, malfunction indicator will not light up.
	Conditions for applying diagnostic procedure for stored DTCs: DTC declared present with the engine **cranking or idling**.

Check the condition of the **crankshaft position sensor harness connector** and repair if necessary.
Check the condition of the ECM harness connector (F134) and repair if necessary.
At the terminal, measure the **resistance** of the **crankshaft position sensor,** if it is not approximately **760**Ω replace the flywheel signal sensor.
Check the **insulation, continuity and absence of interference resistance of the connections:** ● ECM (F134) terminal 55 and crankshaft position sensor harness connector terminal 1 ● ECM (F134) terminal 65 and crankshaft position sensor harness connector terminal 2 (Refer to wiring diagram "EC-CKPS-01".) Repair if necessary.
Check that the flywheel ring gear is not suspected (missing teeth).

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0340 **DF112** **STORED**	CAMSHAFT POSITON SENSOR CIRCUIT 1.DEF : Signal Absent 2.DEF : Inconsistency

NOTES	**Priority when dealing with a number of DTCs:** If DTCs **P0340** and **P0608** are both present, deal with DTC **P0608** (sensor voltage supply) first.
	Conditions for applying the diagnostic procedure to the stored DTC: The DTC is declared **present** when the **engine is started or at idle speed (800±50 rpm).**

Check the condition of the **camshaft position sensor harness connector** and repair if necessary.
Check the condition of the **ECM harness connector** (F134) and repair if necessary.
Check the **insulation, continuity and absence of interference resistance of the connections:** ● ECM (F134) terminal 56 and CMP sensor harness connector terminal 2 ● ECM (F134) terminal 66 and CMP sensor harness connector terminal 3 ● Check power supply between CMP sensor harness connector terminal 1 and IPDM E/R terminal 33 (Refer to wiring diagram "EC-CMPS-01".) If necessary, replace the sensor.
Check the timing gear setting. Refer to "EM section".

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0380 **DF025** **PRESENT**	GLOW PLUG DIAGNOSTIC CONNECTION CO : open circuit

NOTES	**Special notes:** This DTC only detects an open circuit.

Check the condition and connection of the **glow relay harness connector.** Change it if necessary.
Check the condition and connection of the **glow plug harness connectors.** Change them, if necessary.
Check the condition of the ECM harness connector (F134) and replace it if necessary.
Measure the resistance of each **glow plug**. The resistance should be **less than 2 Ω.** If not, replace the suspected plugs.
Check the **insulation, continuity and absence of interference resistance of the connection:** ● ECM (F134) terminal 98 and glow relay harness connector terminal 1 (Refer to wiring diagram "EC-GLOW-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

DTC P0382 Glow plug relay control circuit

P0382 **DF017** **PRESENT**	GLOW RELAY CONTROL CIRCUIT (PRE HEAT) CC.1 : Short circuit to +12 volts CC.0 : Open circuit or short circuit to earth (ground)

NOTES	**Special notes:** If **P0382** is present starting is difficult (or impossible when cold). **CC.1:** plugs permanently controlled with risk of being damaged and risk of damaging the engine.

Check the condition and connection of the glow relay unit **connector**.
Repair if necessary.

Check the condition of the ECM harness connector (F134) and repair if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections:**

- Glow relay (E102) terminal 5 for power supply circuit
- ECM (F134) terminal 98 and glow relay harness connector terminal 1
- ECM (F134) terminal 90 and glow relay harness connector terminal 6
  (Refer to wiring diagram "EC-GLOW-01".)

Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0400 **DF114** **STORED**	EGR CONTROL SOLENOID VALVE CIRCUIT 1.DEF : At minimum stop 2.DEF : At maximum stop 3.DEF : Inconsistency 4.DEF : Valve jammed 5.DEF : Valve clogged

NOTES	**Condition for applying the diagnostic procedure to the DTC stored:** DTC is declared present **at idle speed**.
	Special notes: If **DTC P0400** is present, engine will be unsteady, with possible stalling. Starting problems, or even impossible when cold, with malfunction indicator lights up **(level 1)"**.

Check the condition and connection of the EGR volume control solenoid valve harness connector and repair it if necessary.
Check the condition of the ECM harness connector (F134) and repair if necessary.
Measure the resistance between **terminal 4 and 6 of the EGR volume control solenoid valve,** if it is not approximately **8**Ω ± **0.5**Ω **at 25**°, replace the solenoid valve.
Check the insulation, continuity and absence of interference resistance of the connections: ● EGR volume control solenoid valve terminal 4 for power supply circuit ● ECM (F134) terminal 38 and EGR volume control solenoid valve harness connector terminal 6 (Refer to wiring diagram "EC-EGRC/V-01".) Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0403 **DF016** **STORED**	EGR VOLUME CONTROL SOLENOID VALVE CIRCUIT CC.1 : Short circuit to +12 volts CO.0 : Open circuit or short circuit to earth (ground)

NOTES	**Conditions for applying the diagnostic procedure to the DTC stored:** DTC declared present: **at idle speed.**
	Special notes: If DTC **P0403** is present **Malfunction indicator (level 1)** lights up. Difficult to start engine or even impossible when cold.

Check the condition and connection of EGR volume control solenoid valve harness connector and repair it if necessary.

Check the condition of the ECM harness connector (F134) and repair if necessary.

Measure the resistance at the EGR volume control solenoid valve harness connector terminal.
Replace the solenoid valve if resistance is not approximately 4 kΩ ± 1.6 kΩ at 20°C between terminals 1 and 2 and approximately 1kΩ ± 0.5kΩ at 20°C between terminals 2 and 3.

Check the insulation, continuity and absence of interference resistance of the connections:
- EGR volume control solenoid valve terminal 4 for power supply circuit
- ECM (F134) terminal 38 and EGR volume control solenoid valve harness connector terminal 6 (Refer to wiring diagram "EC-EGRC/V-01".)

Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0408 **DF010** **STORED**	EGR VALVE POSITION SENSOR CIRCUIT CO.0 : Open circuit or short circuit to earth (ground) CC.1 : Short-circuit to + 12V 1.DEF : Above minimum threshold 2.DEF : Below maximum threshold

NOTES	**Priority when dealing with a number of DTCs:** If DTCs **P0409** and **P0608** are both present, deal with DTC **P0608** first.
	Conditions for applying the diagnostic procedure to the stored DTC: The DTC is **declared present** after **starting the engine**.

Check the condition of the **EGR volume control** solenoid valve harness connector and repair if necessary.

Check the condition of the **ECM harness connector** (F134) and repair if necessary.

Measure the **resistance** at the **EGR control solenoid valve terminal,** if it is not approximately **4 kΩ ± 1.6kΩ at 20°C** between **terminals 1 and 2** and approximately **1 kΩ ± 0.5kΩ at 20°C** between **terminals 2 and 3**, replace the solenoid valve.

Check the **insulation, continuity and absence of interference resistance of the connections:**

- ECM (F134) terminal 49 and EGR volume control solenoid valve harness connector terminal 1
- ECM (F134) terminal 59 and EGR volume control solenoid valve harness connector terminal 3
- ECM (F134) terminal 69 and EGR volume control solenoid valve harness connector terminal 2
  (Refer to wiring diagram "EC-EGRC/V-01".)

Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0500 **DF014** **PRESENT**	VEHICLE SPEED INFORMATION

NOTES	**Special notes:** None.

For this type of vehicle, the ABS control unit or an additional unit (if the vehicle does not have ABS) transmits the vehicle speed on the CAN.
Test the multiplex network to be able to work on the CAN (Malfunction on the CAN H and CAN L lines between the ECM and the ABS). Also check there are no malfanctions in the ABS part or in the system which supplies the vehicle speed.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0513 **DF037** **PRESENT**	IMMOBILISER

NOTES	**Special notes:** None.

Carry out a trouble diagnosis on the multiplex network. (LAN section)
Refer to the trouble diagnosis for the keyless vehicle function. (BL section)

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0530 **DF049** **STORED**	REFRIGERANT FLUID SENSOR CIRCUIT CO.1 : Open circuit or short circuit to + 12 volts CC.0 : Short circuit to earth

NOTES	**Conditions for applying the diagnostic procedure to the stored DTC:** DTC declared present: **engine and the air conditioning are activating**.
	Priority when dealing with a number of DTCs: If DTC **P0530** and **P0608** are both present, deal with **DTC P0608 "SENSOR SUPPLY VOLTAGE"** first.

Check the **pressure sensor connection**.
Repair if necessary.

Check the condition of the **ECM (F134) harness connector**.
Repair if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections**:

- ECM (F134) terminal 83 and refrigerant pressure sensor harness connector terminal 3
- ECM (F134) terminal 89 and refrigerant pressure sensor harness connector terminal 2
- ECM (F134) terminal 107 and refriqerant pressure sensor harness connector terminal 1
  (Refer to wiring diagram "EC-RP/SEN-01".)

Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0560 **DF047** **STORED**	COMPUTER SUPPLY VOLTAGE (ECM) 1.DEF : Above maximum threshold 2.DEF : Below minimum threshold

NOTES	**Condition for applying the diagnostic procedure to stored DTC:** the DTC is declared present **when the engine is running above 1000 rpm**.

Check **the battery voltage** when the ignition is switched on. If the **battery voltage < 10 V** recharge the battery.
Check the condition of the **battery terminals**. Repair if necessary.
Check the vehicle's **charge circuit**. Repair if necessary.
Check the condition of the **ECM (E61) harness connector**. Repair if necessary.
Check the **insulation, continuity and absence of interference resistance of the connections**: ● ECM (E61) terminal 22 and fuse block (M16) harness connector. ● ECM (F34) terminal 111, 112 and engine ground. (Refer to wiring diagram "EC-MAIN-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0571 DF050 PRESENT OR STORED	STOP LIGHT SWITCH CIRCUIT 1.DEF : Signal absent 2.DEF : Inconsistency

NOTES	Conditions for applying diagnostic procedure to a stored DTC: the DTC is declared present when the ignition is switched on, when decelerating or when the brake pedal is depressed. Deal with the DTC even if it is stored.

Check the **switch connection** and repair if necessary.
Check for the presence of **+ 12 volts** on the switch supply. Repair if necessary.
Check the condition of the ECM harness connector (E61) and repair if necessary.
Check that the **switch is working.** Change it if necessary.
Check the **insulation, continuity and absence of interference resistance of the connections:** ● Stop lamp switch terminal 1 for power supply circuit ● ECM (E61) terminal 5 and stop lamp switch harness connector terminal 2 (Refer to wiring diagram "EC-BRK/SW-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0604 **DF107** **STORED**	ECM MEMORY

NOTES	**Conditions for applying the diagnostic procedure to the stored DTC**: The DTC is declared present: **with the engine running.**
	If DTC **P0604** is present: it is impossible to stop and restart the engine. **Malfunction indicator lights up (level 1).**

Re-enter **injector's individual correction value** using the **CONSULT-II.**
If the DTC persists, replace the **ECM.**

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0606 **DF038** **PRESENT**	ECM 1.DEF : Analogue/digital converter 2.DEF : Write EEPROM memory 3.DEF : Read EEPROM memory 4.DEF : Injection calibration data 5.DEF : Memory self-test 6.DEF : Non refreshed watchdog 7.DEF : Interference on the injector control line 8.DEF : Watchdog activation

NOTES	None.

7.DEF	Check the condition of the ECM harness connector (F134). Repair it if necessary.
	Check the **insulation, continuity and absence of interference resistance** of the connections: ● ECM (F134) terminal 80 and No.1 injector terminal 2 ● ECM (F134) terminal 79 and No.1 injector terminal 1 ● ECM (F134) terminal 74 and No.2 injector terminal 2 ● ECM (F134) terminal 73 and No.2 injector terminal 1 ● ECM (F134) terminal 78 and No.3 injector terminal 2 ● ECM (F134) terminal 77 and No.3 injector terminal 1 ● ECM (F134) terminal 76 and No.4 injector terminal 2 ● ECM (F134) terminal 75 and No.4 injector terminal 1 (Refer to wiring diagram "EC-INJECT-01 AND -02".) Repair if necessary.
	If the DTC persists, replace ECM.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0606 **DF038** Continued	

4.DEF	Check the condition of the ECM harness connector (F134). Repair it if necessary.
	Check that the **individual injection correction (value)** matches the injectors. If NG, write the individual correction value codes (see "Trouble diagnosis - Introduction").
	If the value corresponds correctly to the injectors, **replace ECM.**

1.DEF **2.DEF** **3.DEF** **5.DEF** **6.DEF** **8.DEF**	**Replace ECM.**

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0608 **DF113** **PRESENT**	SENSOR SUPPLY VOLTAGE 1.DEF : AT minimum stop 2.DEF : AT maximum stop

NOTES	**Priority when dealing with a number of DTCs:** If DTCs **P0608 and P0190, P0225, P0409, P0110, P0530, P0100, P0235** are present, deal with DTC **P0608 "SENSOR SUPPLY VOLTAGE"** first.
	Special notes: If DTC **P0608** is present: the engine stops immediately and it is impossible to restart. Malfunction indicator lights up **(Level 1)**.

Check the condition and connection of all the sensor connectors **as follows:**
- engine coolant temperature sensor
- turbocharger boost pressure sensor
- common rail fuel pressure sensor
- APP sensor
- EGR valve position sensor
- camshaft position sensor

Repair if necessary.

Check the condition of **ECM harness connector** (F134) **and** (E61) and repair them if necessary.

Connect the bornier in place of the ECM and check the **insulation, continuity and absence of interference resistance** of the connections:
- ECM (F134) terminal 83 and refrigerant pressure sensor harness connector terminal 1
- ECM (F134) terminal 48 and turbocharger boost pressure sensor harness connector terminal 1
- ECM (F134) terminal 47 and common rail fuel pressure sensor harness connector terminal 1
- ECM (E61) terminal 29 and APP sensor 1 harness connector terminal 2
- ECM (F134) terminal 49 and EGR control valve harness connector terminal 1
- Power supply circuit between IPDM E/R terminal 33 and camshaft position sensor harness connector terminal 1
  (Refer to wiring diagram)

Repair if necessary.

If the DTC persists, **apply the trouble diagnosis strategy** to each sensor **supplied by an external terminal.**

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0609 **DF122** **PRESENT**	SUPPLY VOLTAGE PEDAL POTENTIOMETER TRACK 2 (APP sensor 2) CO.1 : Open circuit or short circuit to + 12 volts CC.0 : Short circuit to earth

NOTES	**Special notes:** When this fault appears, the idle speed is set to 1000 rpm, engine performance is reduced to 75 % and the **level 1 warning light comes on**.

CC.0	***NOTES***	**Special notes:** None.

Check the condition of the **APP sensor harness connector**. Repair if necessary.
Check the condition of the **ECM** (E61) **harness connector**. Repair if necessary.
Measure the **resistance** at the **APP sensor** terminals: **APP sensor** harness connector terminals 1 and 5 (+5V) Replace the potentiometer pedal if the resistance is not approximately **2.85 kΩ ± 2.05 kΩ**.
Disconnect **ECM** (E61) and the **APP sensor harness connector**. Check **the insulation to ground** of the connection on **terminal 18** of **ECM harness connector** (E61). Repair if necessary.
Check **the continuity of the connection** between: **APP sensor** terminal 5 and **ECM** (E61) terminal 18 Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0609 **DF122** **CONTINUED**	

CO.1	***NOTES***	**Special notes:** None.

Check the condition of the **APP sensor harness connector**. Repair if necessary.
Check the condition of the **ECM (E61) harness connector**. Repair if necessary.
Measure the **resistance** at the **APP sensor** terminals: **APP sensor** harness connector terminals 1 and 5 (+5V) Replace the APP sensor if the resistance is not approximately **2.85 kΩ ± 2.05 kΩ**.
Check the **insulation, continuity and absence of interference resistance of the connection**: ● **ECM (E61)** terminal 18 and **APP sensor** harness connector terminal 5. Repair if necessary.
Disconnect **ECM (E61) harness connector** and the **APP sensor harness connector**. Check **the insulation to +12 volts** of the connection on **terminal 18** of **ECM harness connector (E61)**. Repair if necessary.
Check **the continuity of the connections**: ● ECM (E61) terminal 18 and APP sensor 1 harness connector terminal 5 ● ECM (E61) terminal 6 and APP sensor 1 harness connector terminal 1 Repair if necessary.
Disconnect **ECM harness connector** and the **APP sensor harness connector**. **Check the insulation** between **terminal 18 and terminal 12** on **ECM harness connector (E61).** Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0685 **DF015** **PRESENT**	ECM RELAY CONTROL CIRCUIT 1.DEF : Permanent low signal 2.DEF : Permanent high signal

NOTES	**Special notes**: The ECM relay is incorporated in the IPDM E/R.

Check the main relay supply fuse in the IPDM E/R: (20A).
Change it if necessary.

Check the condition and connection of the IPDM E/R connector and replace it if necessary.

Check the condition of the **ECM harness connector** (F134) and replace it if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections:**

- ECM (F134) terminal 104 and IPDM E/R terminal 29
- ECM (F134) terminal 109, 110 and IPDM E/R terminal 32
- ECM (F134) terminal 111, 112 and ground
  (Refer to wiring diagram "EC-MAIN-01".)

Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P2120 **DF009** **PRESENT**	ACCELERATOR PEDAL POSITION SENSOR 2 CO.0 : Open circuit or short circuit to eartrh (ground) CC.1 : Short circuit to + 12V

NOTES	**Priority when dealing with a number of DTCs:** If DTCs **P2120** and **P0609** are both present, deal with DTC **P0609** first.
	Special note: If DTC **P2120** is present: engine speed maintained above **1000 rpm.** **Malfunction indicator lights up (level 1).** If DTCs **P2120 and P0225** are present: engine speed fixed at **1300 rpm.** **Malfunction indicator lights up (level 1).**

CO.0	***NOTES***	**Special notes:** None.

Check the condition of the **APP harness connector** and repair it if necessary.
Check the condition of the **ECM harness connector** (E61) and repair if necessary.
Measure the **resistance** at the **APP sensor terminal:** **terminal 1** (ground) **and terminal 5** (+5 V) If it is not approximately **2.85 kΩ ± 2.05 kΩ**, replace the APP sensor.
Check **the insulation against earth (ground) and the continuity of the connection:** ● ECM (E61) terminal 12 and APP sensor harness connector terminal 6 (Refer to wiring diagram "EC-APPS-01 or 02".) Repair if necessary.
Check the continuity of the connection between: ● ECM (E61) terminal 18 and APP sensor harness connector terminal 5 (Refer to wiring diagram "EC-APPS-01 or 02".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P2120 **DF009** CONTINUED 3	

CC.1	***NOTES***	**Special notes:** None.

Check the condition of the **APP sensor harness connector** and repair it if necessary.
Check the condition of the **ECM harness connector** (E61) and replace it if necessary.
Measure the **resistance** at the **APP sensor terminals:** APP sensor terminal 1 (Ground) and 5 (+ 5V) If it is not approximately **2.85 kΩ ± 2.05 kΩ**, replace the APP sensor.
Check the **insulation, continuity and absence of interference resistance of the connection:** ● ECM (E61) terminal 12 and APP sensor harness connector terminal 6 (Refer to wiring diagram "EC-APPS-01".) Repair if necessary.
Check **the insulation against + 12 volts of the connections:** ● ECM (E61) terminal 18 and APP sensor harness connector terminal 5 (Refer to wiring diagram "EC-APPS-01".) Repair if necessary.
Check **the continuity of the connections:** ● ECM (E61) terminal 6 and APP sensor harness connector terminal 1 ● ECM (E61) terminal 18 and APP sensor harness connector terminal 5 (Refer to wiring diagram "EC-APPS-01".)
Disconnect connector (E61) from the computer and the connector from the APP sensor and test the insulation between the two lines: ● ECM (E61) terminal 12 and 18 (Refer to wiring diagram "EC-APPS-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P2226 **DF003** **PRESENT**	ATMOSPHERIC PRESSURE SENSOR CIRCUIT(BARO) CC.1 : Short-circuit to + 12 volts CO.0 : Open circuit or short circuit to earth (ground)

NOTES	**Special note**: None.

Replace the ECM.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

PC001 **DF116** **PRESENT**	MULTIPLEX NETWORK (CAN COMMUNICATION LINE) 1.DEF: Carry out the multiplex network trouble diagnosis

CAN Communication Line

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
For the input/output signal chart, refer to LAN section.

Diagnostic Procedure

1. INSPECTION START

1. Turn ignition switch "ON".

2. Select "CAN DIAG SUPPORT MNTR" in "DATA MONITOR" mode with CONSULT-II.

3. Print out the CONSULT-II screen.

Example

OK data

DATA MONITOR	
MONITOR	
TRANSMIT DIAG	OK
METER/M&A	OK
EPS	UNKWN
BCM	OK
VDC/TCS/ABS	OK
IPDM E/R	OK
TCM	OK
ICC	UNKWN
AWD/4WD	UNKWN
e4WD	UNKWN

YEC855A

Check that the print out data is matched with above. If NG, go to "CAN COMMUNICATION" in LAN section.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

SUMMARY TABLE OF DDCR INJECTION PARAMETERS:

Tool parameter code	Diagnostic tool description
PR005	EGR valve opening setpoint
PR008	Rail pressure setpoint
PR010	Rail regulation setting (reference)
PR017	Fuel flow
PR030	Accelerator pedal position
PR032	Inlet pressure
PR035	Atmospheric pressure
PR037	Refrigerant pressure
PR038	Rail pressure
PR051	EGR valve position feedback
PR055	Engine speed
PR059	Inlet air temperature
PR061	External air temperature
PR063	Fuel temperature
PR064	Coolant temperature
PR074	Battery voltage
PR077	EGR valve position sensor voltage
PR080	Rail pressure sensor voltage
PR081	Inlet temperature sensor voltage
PR086	Accelerator pedal position sensor 1 voltage
PR088	Accelerator pedal position sensor 2 voltage
PR089	Vehicle speed
PR125	Power used by the AC compressor
PR127	Heating resistor maximum authorised power
PR132	Air flow

SUMMARY TABLE OF DDCR INJECTION STATES:

TOOL STATE CODE	Diagnostic tool description
ET001	Computer + after ignition feed
ET003	Immobiliser
ET004	Air conditioning authorised
ET006	Code programmed
ET008	EGR solenoid control
ET012	Primary brake contact
ET013	Secondary brake contact
ET018	Air conditioning request
ET021	High-speed fan request
ET022	Fan low-speed request
ET023	Fast idle speed request
ET038	Engine
ET040	Clutch pedal
ET042	Cruise control - speed limiter
ET076	Starting
ET079	Air conditioning present
ET088	Request to start compressor

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

ECM STATES AND PARAMETERS:

Order	Function	Parameter or state check or action	Display and notes	Trouble diagnosis
1	**Battery voltage**	**PR074:** Battery voltage	**12 V < PR074 < 13.5 V**	**In the event of a malfunction, run the trouble diagnostic procedure for the "Charging circuit".**
2	**Engine speed**	**PR055:** Engine speed	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**
3	**Accelerator pedal position**	**PR030:** Accelerator pedal position **0%**	**Gives the position of the accelerator pedal as a %.** **PR030 = 0 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for malfunctions **Pedal sensor circuit, track 1 and track 2** (**P0225** and **P2120**) and **P0608** "Sensor reference voltage".
4	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**
5	**External air temperature**	**PR061:** External air temperature	**Gives the external air temperature in °C. This parameter is controlled by the BCM and transmitted to the injection on the multiplex network.** Default value: 20 °C.	**In the event of a malfunction, apply the trouble diagnostic procedure for this malfunction described in the BCM document.**

ECM STATES AND PARAMETERS:(Continued 1)

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
6	**Intake air temperature**	**PR059:** Intake air temperature Cold = PR061 Warm: 30 °C	**Gives the inlet air temperature in °C. This information is provided by the air temperature/ pressure sensor.** Default value: 30 °C.	**In the event of a malfunction, refer to parameter interpretation PR059 "Inlet air temperature".**
7	**Fuel temperature**	**PR063:** Fuel temperature Cold = PR064 Warm: 50C	**Gives the fuel temperature in °C. This value is given by the fuel temperature sensor.** Default value: 30 °C.	**In the event of a malfunction, apply the diagnostic procedure for malfunction DF098 Fuel temperature sensor circuit.**
8	**Air circuit pressure**	**PR035:** Atmospheric pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the computer.**	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
		PR032 Inlet pressure	**Shows the pressure in the inlet circuit in mbar.**	
9	**Rail pressure**	**PR038:** Rail pressure Warm or cold - 90 bar <PR038> 90 bar	**Gives the pressure of the diesel in the injection rail in Bar. This pressure is supplied by the sensor on the rail.** Default value: 2000 Bar.	**In the event of a malfunction, apply the diagnostic procedure for malfunction P0190 Rail pressure sensor circuit.**

ECM STATES AND PARAMETERS:(Continued 2)

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
10	**Engine**	**ET038:** Engine **+ after ignition feed**	**Gives the current status of the engine.** – **+ after ignition feed** – **CRANKING** – **RUNNING** – **MAINTAINED SUPPLY:** Supply maintained during the power latch phase. – **Stalled: When the engine has stalled.** – **PROTECTED:** When a level 2 malfunction appears or when the engine speed is limited to a certain engine speed.	**NONE.**
11	**Immobiliser**	**ET003:** Immobiliser **INACTIVE**	**Gives the status of the immobiliser system.** – **INACTIVE:** The ECM has recognised the immobiliser code transmitted by the Inteligent Key unit or BCM. – **ACTIVE:** The ECM does not recognise the immobiliser code transmitted by the Inteligent Key unit or BCM.	If **ACTIVE, follow the associated "help" given in the tool.**
12	**Code programmed**	**ET006: Code programmed YES**	**States whether the immobiliser code has been programmed by the computer or not.** – **YES:** Code programmed – **NO:** Code not programmed by the ECM.	If **NO, replace ECM.**
13	**Vehicle speed**	**PR089:** Vehicle speed	**Gives the vehicle speed in kph. This parameter is transmitted by the ABS computer or vehicle speed ECU. This information is transmitted to the injection on the multiplex network.**	**Test the multiplex network. Refer to ABS or vehicle speed ECU trouble diagnosis.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

START SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**ECM + after ignition feed**	**ET001:** ECM + after ignition feed **PRESENT**	**Indicates that the computer is supplied with a + after ignition feed.** **– Present** **– Absent**	**In the event of a malfunction, carry out the diagnostic procedure for P0560 "Computer supply voltage" or P0685 "Main relay circuit".**
2	**Starting**	**ET076:** Starting **AUTHORISED**	**Indicates whether or not starting has been authorised by the injection** **AUTHORISED: The injection has given starting authorisation.** **PROHIBITED: The injection has not given starting authorisation.**	**If PROHIBITED carry out a full diagnostic procedure on the preheating system.**
3	**Engine**	**ET038:** Engine **+ after ignition feed**	**Gives the current status of the engine.** **– + after ignition feed** **– CRANKING** **– RUNNING** **– MAINTAINED SUPPLY: Supply maintained during the power latch phase.** **– Stalled: When the engine has stalled.** **– Protected: When a malfunction appears or when the engine speed is limited to a certain engine speed.**	**NONE.**
4	**Battery voltage**	**PR074:** Battery voltage	**12 < PR074 < 13.5 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

PROTECTION SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Immobiliser**	**ET003:** Immobiliser **INACTIVE**	**Gives the status of the immobiliser system.** **– INACTIVE: The injection computer has recognised the immobiliser code transmitted by the Inteligent Key unit or BCM.** **– ACTIVE: The ECM does not recognise the immobiliser code transmitted by the Inteligent Key unit or BCM.**	If **ACTIVE, follow the associated "help" given in the tool.**
2	**Code programmed**	**ET006:** Code programmed **YES**	**States whether the immobiliser code has been programmed by the computer or not.** **– YES: Code programmed** **– NO: Code not programmed by the ECM.**	If **NO, replace ECM.**
3	**Battery voltage**	**PR074:** Battery voltage	**12 V < PR074 < 13.5 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

SUB SYSTEM COLD LOOP:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Air conditioning present**	**ET079:** Air conditioning present **YES**	**States whether the vehicle is fitted with air conditioning or not.** – **YES:** Air conditioning is detected by the injection computer. – **NO:** Air conditioning is not detected by the injection computer.	**If not consistent with the vehicle equipment, carry out the multiplex network test and apply the relevant procedure.**
2	**Compressor engagement request**	**ET088:** Request to start compressor **INACTIVE**	**The injection requests the IPDM E/R (via the multiplex network) to start the compressor** – **ACTIVE:** The multiplex network should not be suspected on the Automatic Transmission, IPDM E/R or Inteligent Key unit or BCM system. The Inteligent Key unit or BCM should request the injection to be engaged. The coolant pressure sensor should not be suspected. Satisfactory engine operating conditions (coolant temperature, engine load etc.). – **INACTIVE: One of the above conditions has not been fulfilled.**	**NONE.**

SUB SYSTEM COLD LOOP (Continuation 1):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
3	Air conditioning authorisation	**ET004:** Air conditioning authorised **NO**	**Non operational information, designed solely for trouble diagnosis purposes.** – **YES:** Satisfactory engine operating conditions (coolant temperature, engine load etc.). The vehicle is not in a specific movement phase (hill start or stop etc.). – **NO:** One of the above conditions has not been fulfilled.	**NONE.**
4	**Refrigerant pressure**	**PR037:** Refrigerant pressure	**Gives the value in BAR for the refrigerant fluid in the system.** **2 Bar < PR037 < 27 Bar** Default value: 0 Bar.	**If there is a problem: apply the diagnostic procedure for P0530 "Refrigerant fluid sensor circuit". If the DTC persists, replace the refrigerant sensor.**
5	**Engine speed**	**PR055:** Engine speed	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the trouble diagnosis procedure for P0335 Engine speed sensor circuit.**
6	**Fast idle speed request**	**ET023:** Fast idle speed request **ABSENT**	**The Inteligent Key unit or BCM requests fast idle speed from the injection.** – **ABSENT:** The Inteligent Key unit or BCM did not make the request – **PRESENT:** The Inteligent Key unit or BCM has made a request	**If ET023is incorrect, carry out a multiplex network test using the diagnostic tool. If the test is correct refer to the Inteligent Key unit or BCM trouble diagnosis.**
7	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

SUBSYSTEM: COLD LOOP (continuation 2)

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
8	**Vehicle speed**	**PR089:** Vehicle speed	**Gives the vehicle speed in kph. This parameter is transmitted by the ABS control unit. This information is transmitted to the injection on the multiplex network.**	**Test the multiplex network. Refer to ABS trouble diagnosis.**
9	**Power used by the AC compressor**	**PR125:** Power used by the AC compressor **0 WATT**	**Gives the power used by the compressor**	**NONE.**
10	**Fan speed request ***	**ET022:** Fan low-speed request **INACTIVE**	**The injection requests the IPDM E/R to start the fans.** – **INACTIVE:** Engine speed = 0 rpm. – **ACTIVE:** Engine speed = idle speed, correct refrigerant pressure and vehicle speed = 0 km/h or high coolant temperature.	**NONE.**
11	**Fan speed request ***	**ET021:** High-speed fan request **INACTIVE**	**The injection requests the IPDM E/R to start the fans.** – **INACTIVE:** Engine speed = 0 rpm. – **ACTIVE:** Engine speed = idle speed. Refrigerant pressure > 15 Bar, vehicle speed = 0 km/h or high coolant temperature.	**NONE.**

***: When climate control is requested with the engine at idle speed and vehicle speed = 0 km/h, ET022 will always be "ACTIVE" and ET021 "INACTIVE" (except refrigerant pressure> 15 bar, vehicle speed = 0 km/h and high coolant temperature). The fans are prevented from operating under certain coolant temperature conditions when driving.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

HEATING SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

LPG/FUEL CIRCUIT SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Fuel temperature**	**PR063:** Fuel temperature Cold = PR064 Warm: 50 °C	**Gives the fuel temperature in °C.** Default value: 30 °C.	**In the event of a malfunction, perform the diagnostic procedure for malfunction: P0180 "Fuel temperature sensor circuit".**
2	**Fuel flow**	**PR017:** Fuel flow **0.0 mg/piston stroke**	**Shows the fuel flow injected in mg/piston stroke for each injector.** PR017 = 0 mg/piston stroke.	**NONE.**
3	**Rail pressure**	**PR038:** rail pressure Cold and warm: - 90 bar <PR038> 90 bar	**Gives the pressure of the diesel in the injection rail in Bar. This pressure is supplied by the sensor on the rail.** Default value: 2000 Bar.	**In the event of a malfunction, apply the diagnostic procedure for malfunction P0190 Rail pressure sensor circuit.**
4	**Rail pressure setpoint**	**PR008:** Rail pressure setpoint **375 bar** (Engine starting pressure instruction) Cold: 500 Bar Warm: 300 Bar	**Gives a theoretical pressure value for optimum engine operation.** 300 bar < PR008 < 500 bar.	**NONE.**
5	**Rail pressure sensor voltage**	**PR080:** Rail pressure sensor voltage Cold: 0.5 V Cold: 4.5 V	**Shows the voltage delivered by the computer on the rail pressure sensor.** 0.5 V < PR080 < 4.5 V Default value: 4.5 V	**NONE.**
6	**Engine speed**	**PR055:** Engine speed.	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

PRE-HEATING/IGNITION SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**
2	**External air temperature**	**PR061:** External air temperature	**Gives the external air temperature in °C. This parameter is controlled by the Inteligent Key unit or BCM and transmitted to the ECM on the multiplex network.** Default value: 20 °C.	**In the event of a malfunction, apply the diagnostic procedure for this malfunction described in the Inteligent Key unit or BCM document.**
3	**Inlet air temperature**	**PR059:** Inlet air temperature Cold = PR061 Warm: 30 °C	**Gives the inlet air temperature in °C. This information is provided by the air temperature/ pressure sensor.** Default value: 30 °C.	**In the event of a malfunction, refer to parameter interpretation PR059 "Inlet air temperature".**
4	**Battery voltage**	**PR074:** Battery voltage	**12 V < PR074 < 13.5 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

AIR CIRC SUBFUNCTION (TURBOCHARGING/INLET.):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Inlet air temperature**	**PR059:** Inlet air temperature Cold = PR061 Warm: 30 °C	**Gives the inlet air temperature in °C. This information is provided by the air temperature/ pressure sensor.** Default value: 30 °C.	**In the event of a malfunction, refer to parameter interpretation PR059 "Inlet air temperature".**
2	**Air circuit pressure**	**PR035:** Atmospheric pressure **PR032:** Inlet pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the computer.** **Shows the pressure in the inlet circuit in mbar.**	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
3	**Air flow**	**PR132:** Air flow	**Air flow estimated by the injection computer.**	**NONE.**
4	**Inlet temperature sensor voltage**	**PR081:** Inlet temperature sensor voltage	**Shows the voltage delivered by the computer to supply the inlet temperature sensor**	**NONE.**
5	**Engine speed**	**PR055:** Engine speed	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

ENGINE COOLING SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

DRIVER PARAMETERS SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Accelerator pedal position**	**PR030:** Accelerator pedal position **0 %**	Indicates the percentage of the pedal position between no load and full load position **0 % < PR030 < 100 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for malfunction **Pedal sensor circuit, track 1 and track 2** (**P0225** and **P2120**) and **P0608** "Sensor reference voltage".
2	**Pedal potentiometer tracks voltage**	**PR086:** Pedal potentiometer track 1 voltage **16 %** **PR088:** Pedal potentiometer track 2 voltage **7 %**	**Shows the voltage supply percentage for tracks 1 and 2 of the pedal potentiometer.** **10 % < PR086 < 20 %** **5 % < PR088 < 15 %.**	**In the event of a malfunction**, apply the **diagnostic procedure** for malfunction **Pedal sensor circuit, track 1 and track 2** (**P0225** and **P2120**) and **P0608** "Sensor reference voltage".

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

ANTIPOLLUTION / OBD SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**EGR electronic control**	**ET008:** EGR solenoid control **INACTIVE**	**Shows the condition of the EGR valve control.** – **INACTIVE:** The valve is not controlled by the computer. – **ACTIVE:** The valve is controlled by the computer.	**NONE.**
2	**Atmospheric pressure**	**PR035:** Atmospheric pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the computer.**	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
3	**Air flow**	**PR132:** Air flow	**Air flow estimated by the injection computer.**	**NONE.**
4	**Fuel flow**	**PR017:** Fuel flow **0.0 mg/piston stroke**	**Shows the fuel flow out of the high-pressure pump in mg/piston stroke.**	**NONE.**
5	**EGR solenoid valve control**	**PR005:** EGR valve opening setpoint Warm or cold = - 50	**Gives a theoretical EGR valve opening value for optimum engine operation.** PR005 = PR051	**NONE.**

ANTIPOLLUTION / OBD SUBFUNCTION (cont.):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
6	**EGR valve position feedback**	**PR051:** EGR valve position feedback Warm or cold = - 50	**Gives the actual value of the EGR valve position.** PR051 = PR005	**NONE.**
7	**EGR valve position sensor voltage**	**PR077:** EGR valve position sensor voltage **1.09 V**	**Gives the EGR valve voltage according to its position.** – **INACTIVE:** The valve is not controlled by the computer. – **ACTIVE:** The valve is controlled by the computer. **0.5 V < PR077 < 4.8 V**	**NONE.**
8	**Accelerator pedal position**	**PR030:** Accelerator pedal position **0 %**	**Indicates the percentage of the pedal position between no load and full load position** **PR030 = 0 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for malfunction **Pedal sensor circuit, track 1 and track 2** (**P0225** and **P2120**) and **P0608** "Sensor reference voltage".
9	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

MAIN COMPUTER STATES AND PARAMETERS:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Battery voltage**	**PR074:** Battery voltage.	**13 V < PR074 < 14 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**
2	**Engine speed**	**PR055:** Engine speed. Cold: 900 rpm V Warm: 805 rpm	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**
3	**Accelerator pedal position**	**PR030:** Accelerator pedal position **0 %**	**Gives the position of the accelerator pedal as a %.** **PR030 = 0 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for DTCs **P0225** and **P2120** Pedal sensor circuit, track 1 and track 2 and **P0608** "Sensor reference voltage".
4	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**
5	**External air temperature**	**PR061:** External air temperature	**Gives the external air temperature in °C. This parameter is controlled by the Inteligent Key unit or BCM and transmitted to the injection on the multiplex network.** Default value: 20 °C.	**In the event of a malfunction, apply the diagnostic procedure for this malfunction described in the Inteligent Key unit or BCM document.**

MAIN COMPUTER STATES AND PARAMETERS:(Continued 1)

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
6	**Inlet air temperature**	**PR059:** Inlet air temperature Cold = PR061 Warm: 30 °C	**Gives the inlet air temperature in °C. This information is provided by the air temperature/ pressure sensor.** Default value: 20 °C.	**In the event of a malfunction, refer to parameter interpretation PR059 "Inlet air temperature".**
7	**Fuel temperature**	**PR063:** Fuel temperature Cold = PR064 Warm: 50 °C	**Gives the fuel temperature in °C. This value is given by the fuel temperature sensor.** Default value: 30 °C.	**In the event of a malfunction, apply the diagnostic procedure for malfunction P0180 Fuel temperature sensor circuit.**
8	**Air circuit pressure**	**PR035:** Atmospheric pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the computer.** 600 mbar < Cold < 1050 mbar 600 mbar < Warm < 1050 mbar	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
		PR032: Inlet pressure	**Shows the pressure in the inlet circuit in mbar.** PR032 = local atmospheric pressure	
9	**Rail pressure**	**PR038:** Rail pressure Cold: 260 Bar Warm: 230 Bar	**Gives the pressure of the diesel in the injection rail in Bar. This pressure is supplied by the sensor on the rail.** Default value: 2000 Bar.	**In the event of a malfunction, apply the diagnostic procedure for malfunction P0190 Rail pressure sensor circuit.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

START SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Computer + after ignition feed**	**ET001:** Computer + after ignition feed **PRESENT**	**Indicates that the computer is supplied with a + after ignition feed.** **– Present** **– Absent**	**In the event of a malfunction, carry out the diagnostic procedure for P0560 "Computer supply voltage" or P0685 "Main relay circuit".**
2	**Starting**	**ET076:** Starting **AUTHORISED**	**Indicates whether or not starting has been authorised by the injection** **AUTHORISED: The injection has given starting authorisation.** **PROHIBITED: The injection has not given starting authorisation.**	**If PROHIBITED, carry out a full diagnostic procedure on the preheating system.**
3	**Engine**	**ET038:** Engine **+ after ignition feed**	**Gives the current status of the engine.** **– + after ignition feed** **– CRANKING** **– RUNNING** **– MAINTAINED SUPPLY: Supply maintained during the power latch phase.** **– Stalled: When the engine has stalled.** **– Protected: When a malfunction appears or when the engine speed is limited to a certain engine speed.**	**NONE.**
4	**Battery voltage**	**PR074:** Battery voltage	**13 V < PR074 < 14 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

PROTECTION SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Immobiliser**	**ET003:** Immobiliser **INACTIVE**	**Gives the status of the immobiliser system.** **– INACTIVE: The injection computer has recognised the immobiliser code transmitted by the UCH.** **– ACTIVE: The injection computer does not recognise the immobiliser code transmitted by the Inteligent Key unit or BCM.**	If **ACTIVE, follow the associated "help" given in the tool.**
2	**Code programmed**	**ET006:** Code programmed **YES**	**States whether the immobiliser code has been programmed by the computer or not.** **– YES:** Code programmed **– NO: Code not programmed by the ECM.**	If **NO, replace ECM.**
3	**Battery voltage**	**PR074:** Battery voltage	**13 V < PR074 < 14 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

SUB SYSTEM COLD LOOP:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Air conditioning present**	**ET079:** Air conditioning present **YES**	**States whether the vehicle is fitted with air conditioning or not.** – **YES:** Air conditioning is detected by the ECM. – **NO:** Air conditioning is not detected by the ECM.	**If not consistent with the vehicle equipment, carry out the multiplex network test and apply the relevant procedure.**
2	**Compressor engagement request**	**ET088:** Request to start compressor **INACTIVE**	**The injection requests the IPDM E/R (via the multiplex network) to start the compressor** – **ACTIVE:** The multiplex network should not be faulty on the Automatic Transmission, IPDM E/R. The UCH should request the injection to be engaged. The refrigerant pressure sensor should not be faulty. Satisfactory engine operating conditions (coolant temperature, engine load etc.). – **INACTIVE:** One of the above conditions has not be fulfilled or no request has been made by the driver so **ET004 = NO**.	**NONE.**

SUB SYSTEM COLD LOOP (Continuation 1):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
3	Air conditioning authorisation	**ET004:** Air conditioning authorised **NO**	**Non operational information, designed solely for trouble diagnosis purposes.** – **YES:** Satisfactory engine operating conditions (coolant temperature, engine load etc.). The vehicle is not in a specific movement phase (hill start or stop etc.). – **INACTIVE:** One of the above conditions has not be fulfilled or no request has been made by the driver so **ET088 = INACTIVE**.	**NONE.**
4	**Refrigerant pressure**	**PR037:** Refrigerant pressure.	**Gives the value in BAR for the refrigerant fluid in the system.** **2 Bar < PR037 < 27 Bar** Default value: 0 Bar.	**If there is a problem: apply the diagnostic procedure for P0530 "Refrigerant fluid sensor circuit". If the DTC persists, replace the refrigerant sensor.**
5	**Engine speed**	**PR055:** Engine speed Cold: 900 rpm V Warm: 805 rpm	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**

SUBSYSTEM: COLD LOOP (continuation 2)

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
6	**Fast idle speed request**	**ET023:** Fast idle speed request **ABSENT**	**The BCM requests fast idle speed from the injection.** – **ABSENT:** The IPDM E/R did not make the request – **PRESENT:** The IPDM E/R has made a request	**If ET023 is incorrect, carry out a multiplex network test using the diagnostic tool. If the test is correct refer to the IPDM E/R diagnostic procedure**
7	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**
8	**Vehicle speed**	**PR089:** Vehicle speed	**Gives the vehicle speed in kph. This parameter is transmitted by the ABS control unit. This information is transmitted to the injection on the multiplex network.**	**Test the multiplex network.** **Refer to ABS trouble diagnosis.**

COLD LOOP SUBSYSTEM (continuation 3):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
9	**Power used by the AC compressor**	**PR125:** Power used by the AC compressor **0 WATT**	**Gives the power used by the compressor**	**NONE.**
10	**Fan speed request ***	**ET022:** Fan low-speed request **INACTIVE**	**The injection requests the IPDM E/R to start the fans.** – **INACTIVE:** The request is not made by the injection because ET088 = INACTIVE and ET004 = NO. – **ACTIVE:** The request is made by the injection. ET088 = ACTIVE and ET004 = YES. (correct refrigerant pressure and vehicle speed = 0 km/h or high coolant temperature).	**NONE.**
		ET021: High-speed fan request **INACTIVE**	**The injection requests the UPC to start the fans.** – **INACTIVE:** The request is not made by the injection because ET088 = INACTIVE and ET004 = NO. – **ACTIVE:** The request is made by the injection. ET088 = ACTIVE and ET004 = YES. Refrigerant pressure > 15 Bar, vehicle speed = 0 km/h or high engine coolant temperature.	

***: When climate control is requested with the engine at idle speed and vehicle speed = 0 km/h, ET022 will always be "ACTIVE" and ET021 "INACTIVE" (except refrigerant pressure> 15 bar, vehicle speed = 0 km/h and high coolant temperature). The fans are prevented from operating under certain coolant temperature conditions when driving.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

HEATING SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

LPG/FUEL CIRCUIT SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Fuel temperature**	**PR063:** Fuel temperature Cold = PR064 Warm: 50 °C	**Gives the fuel temperature in °C.** Default value: 30 °C.	**In the event of a malfunction, perform the diagnostic procedure for DTC P0180 "Fuel temperature sensor circuit".**
2	**Fuel flow**	**PR017:** Fuel flow 10 < Cold < 2 mg/ piston stroke 4 < Warm < 6 mg/ piston stroke	**Shows the fuel flow injected in mg/ piston stroke for each injector.**	**None.**
3	**Rail pressure**	**PR038:** Rail pressure Cold: 260 Bar Warm: 230 Bar	**Gives the pressure of the diesel in the injection rail in Bar. This pressure is supplied by the sensor on the rail.** Default value: 2000 Bar.	**In the event of a malfunction, apply the diagnostic procedure for DTC P0190 Rail pressure sensor circuit.**
4	**Rail pressure setpoint**	**PR008:** Rail pressure specification **375 bar**. (Engine starting pressure specification). Cold: 260 Bar Warm: 230 Bar	**Gives a theoretical pressure value for optimum engine operation.**	**None.**
5	**Rail pressure sensor voltage**	**PR080:** Rail pressure sensor voltage	**Shows the voltage delivered by the computer on the rail pressure sensor.** 0.5 V (0 bar) < PR080 < 4.5 V (1600 bar)	**None.**
6	**Engine speed**	**PR055:** Engine speed. Cold: 900 rpm V Warm: 805 rpm	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for DTC P0335 Engine speed sensor circuit.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

PRE-HEATING/IGNITION SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**
2	**External air temperature**	**PR061:** External air temperature	**Gives the external air temperature in °C. This parameter is controlled by the BCM and transmitted to the injection on the multiplex network.** Default value: 20 °C.	**In the event of a malfunction, apply the diagnostic procedure for this malfunction described in the BCM document.**
3	**Inlet air temperature**	**PR059:** Inlet air temperature Cold = PR061 Warm: 30 °C	**Gives the inlet air temperature in °C. This information is provided by the air temperature/ pressure sensor.** Default value: 30 °C.	**In the event of a malfunction, refer to parameter interpretation PR059 "Inlet air temperature".**
4	**Battery voltage**	**PR074:** Battery voltage	**12 V < PR074 < 14 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

AIR CIRC SUBFUNCTION (TURBOCHARGING/INLET.):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Inlet air temperature**	**PR059:** Inlet air temperature Cold = PR061 Warm: 30 °C	**Gives the inlet air temperature in °C. This information is provided by the air temperature/ pressure sensor.** Default value: 30 °C.	**In the event of a malfunction, refer to parameter interpretation PR059 "Inlet air temperature".**
2	**Air circuit pressure**	**PR035:** Atmospheric pressure **PR032:** Inlet pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the ECM.** **Shows the pressure in the inlet circuit in mbar.**	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
3	**Air flow**	**PR132:** Air flow 350 < Cold < 400 mg/piston stroke 300 < Warm < 350 mg/piston stroke	**Air flow estimated by the ECM.**	**None.**
4	**Inlet temperature sensor voltage**	**PR081:** Inlet temperature sensor voltage	**Shows the voltage delivered by the computer to supply the inlet temperature sensor**	**None.**
5	**Engine speed**	**PR055:** Engine speed. Cold: 900 rpm V Warm: 805 rpm	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

ENGINE COOLING SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

DRIVER PARAMETERS SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Accelerator pedal position (APP sensor)**	**PR030:** Accelerator pedal position **0 %**	**Indicates the percentage of the pedal position between no load and full load position** **0 % < PR030 < 100 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for DTCs **P0225** and **P2120** Pedal sensor circuit, track 1 and track 2 and **P0608** "Sensor reference voltage"
2	**Pedal potentiometer tracks voltage (APP sensor)**	**PR086:** Pedal potentiometer track 1 voltage **16 %** **PR088:** Pedal potentiometer track 2 voltage **7 %**	**Shows the voltage supply percentage for tracks 1 and 2 of the pedal potentiometer.** **10 % < PR086 < 20 %** **5 % < PR088 < 15 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for DTCs **P0225** and **P2120** Pedal sensor circuit, track 1 and track 2 and **P0608** "Sensor reference voltage"

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

ANTIPOLLUTION / OBD SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**EGR solenoid valve control**	**ET008:** EGR solenoid control **INACTIVE**	**Shows the condition of the EGR valve control.** – **INACTIVE:** The valve is not controlled by the computer. – **ACTIVE:** The valve is controlled by the computer.	**None.**
2	**Atmospheric pressure**	**PR035:** Atmospheric pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the ECM.**	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
3	**Air flow**	**PR132:** Air flow 350 < Cold < 400 mg/piston stroke 300 < Warm < 350 mg/piston stroke	**Air flow estimated by the ECM.**	**None.**
4	**Fuel flow**	**PR017:** Fuel flow 10 < Cold < 12 mg/piston stroke 4 < Warm < 6 mg/piston stroke	**Shows the fuel flow out of the high-pressure pump in mg/piston stroke.**	**None.**
5	**EGR valve opening setpoint**	**PR005:** EGR valve opening setpoint Warm: 20%	**Gives a theoretical EGR valve opening value for optimum engine operation.**	**None.**

ANTIPOLLUTION / OBD SUBFUNCTION (cont.):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
6	**EGR valve position feedback**	**PR051:** EGR valve position feedback Warm approximately 20%	**Gives the actual value of the EGR valve position.** Default value: 30%	**NONE.**
7	**EGR valve position sensor voltage**	**PR077:** EGR valve position sensor voltage	**Gives the EGR valve voltage according to its position.** – **INACTIVE:** The valve is not controlled by the computer. – **ACTIVE:** The valve is controlled by the computer. **0.5 V < PR077 < 4.8 V**	**NONE.**
8	**Accelerator pedal position**	**PR030:** Accelerator pedal position **0 %**	**Indicates the percentage of the pedal position between no load and full load position 0 < PR030 < 100 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for DTCs **P0225** and **P2120** Pedal sensor circuit, track 1 and track 2 and **P0608** "Sensor reference voltage"
9	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

PR059	INLET AIR TEMPERATURE SENSOR

NOTES	**Special notes:** Only perform the checks if the parameter is incorrect.

Check the condition of the turbocharger air temperature pressure sensor connections.
If necessary replace the sensor.
Measure the **resistance** across **terminals 1 and 2** of the air temperature - pressure sensor:

8950 < R in Ω at **- 10** °**C < 9901**
7054 < R in Ω at **- 5** °**C < 7784**
5605 < R in Ω at **- 0** °**C < 6169**
3618 < R in Ω at **- 10** °**C < 3964**
2400 < R in Ω at **- 20** °**C < 2620**
1645 < R in Ω at **- 30** °**C < 1787**

Replace the air temperature - pressure sensor, if necessary.

PR064	ENGINE COOLANT TEMPERATURE

NOTES	**Special notes:** Only perform the checks if the parameter is incorrect.

Check the condition of the engine coolant temperature sensor connections.
If necessary replace the sensor.
Measure the **resistance** between terminals **1** and **4** of the **coolant temperature sensor**.

- **R at - 10 °C =** 12.46 kΩ ± 1128 Ω.
- **R at 25 °C =** 2252 Ω ± 112.6 Ω.
- **R at 50 °C =** 811.4 Ω ± 38.4 Ω.
- **R at 80 °C =** 282.6 Ω ± 7.83 Ω.

If the value is incorrect, replace the engine coolant temperature sensor.

NOTES	**Only consult the tests after following the diagnostic procedure chart.**

Some specific checks are grouped under the << tests >> heading and are used as required in different diagnostic charts.

TEST 1: Low pressure circuit check

TEST 2: Electrical circuit check

TEST 3: Injector check

TEST 4: Parameter check

TEST 5: Air inlet circuit check

TEST 6: ECM check

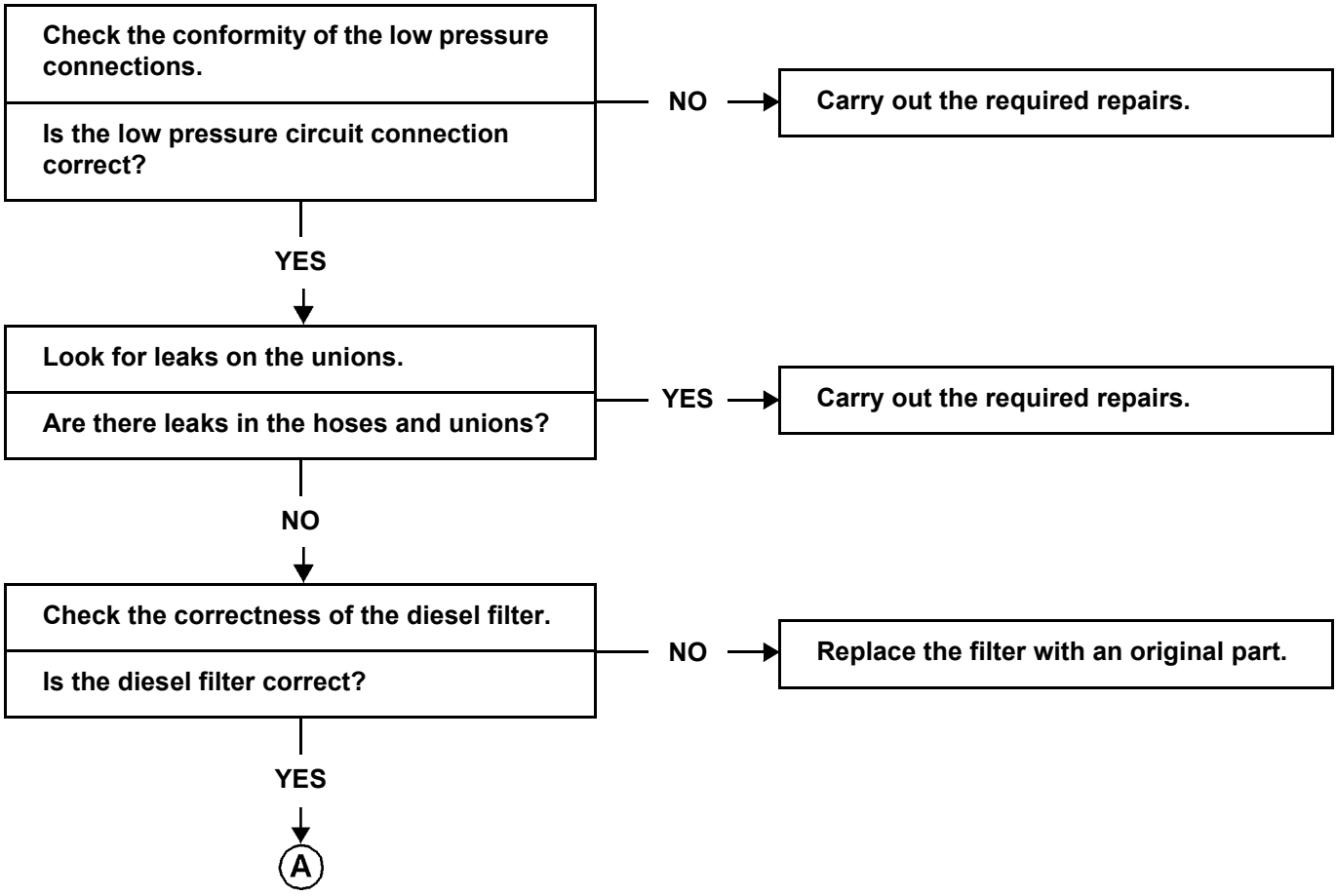
TEST 7: High pressure pump check

TEST 8: High pressure circuit tightness check

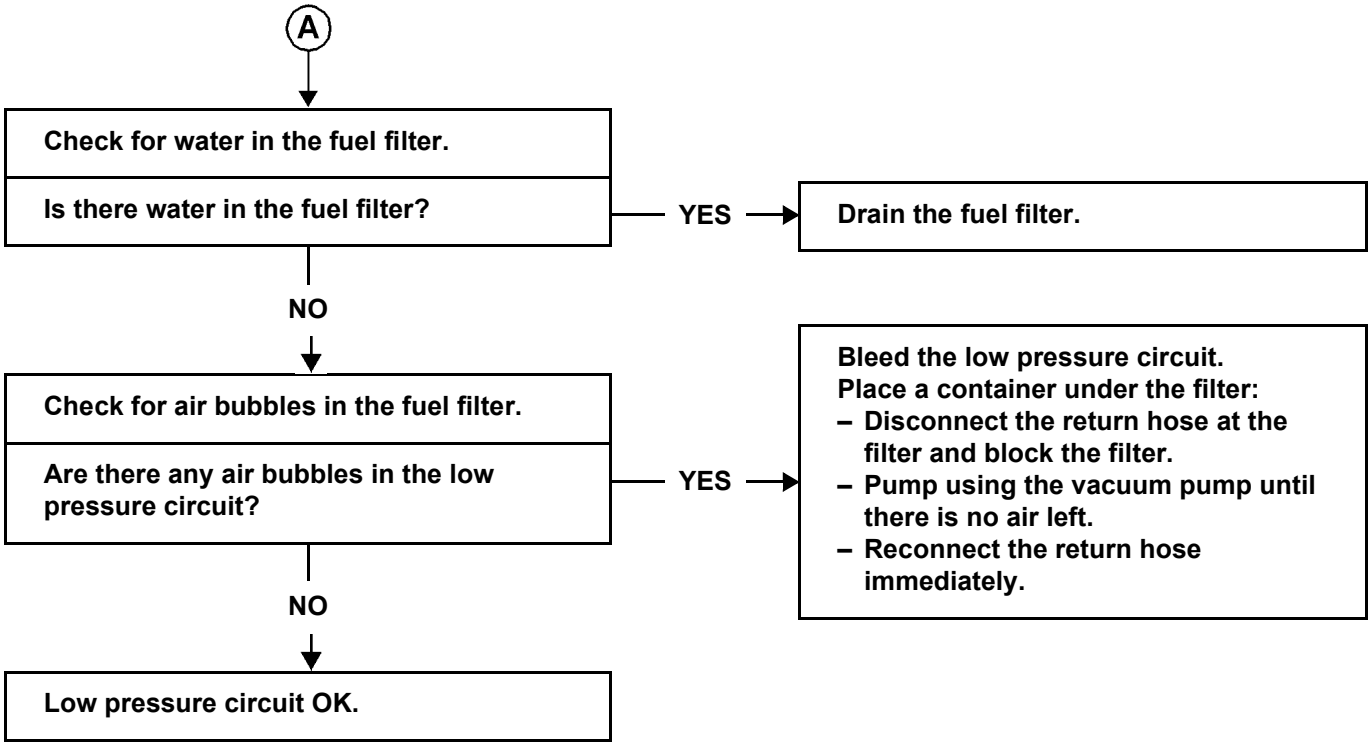
TEST 9: Injector tightness check

TEST 10: Injector return flow in starting phase

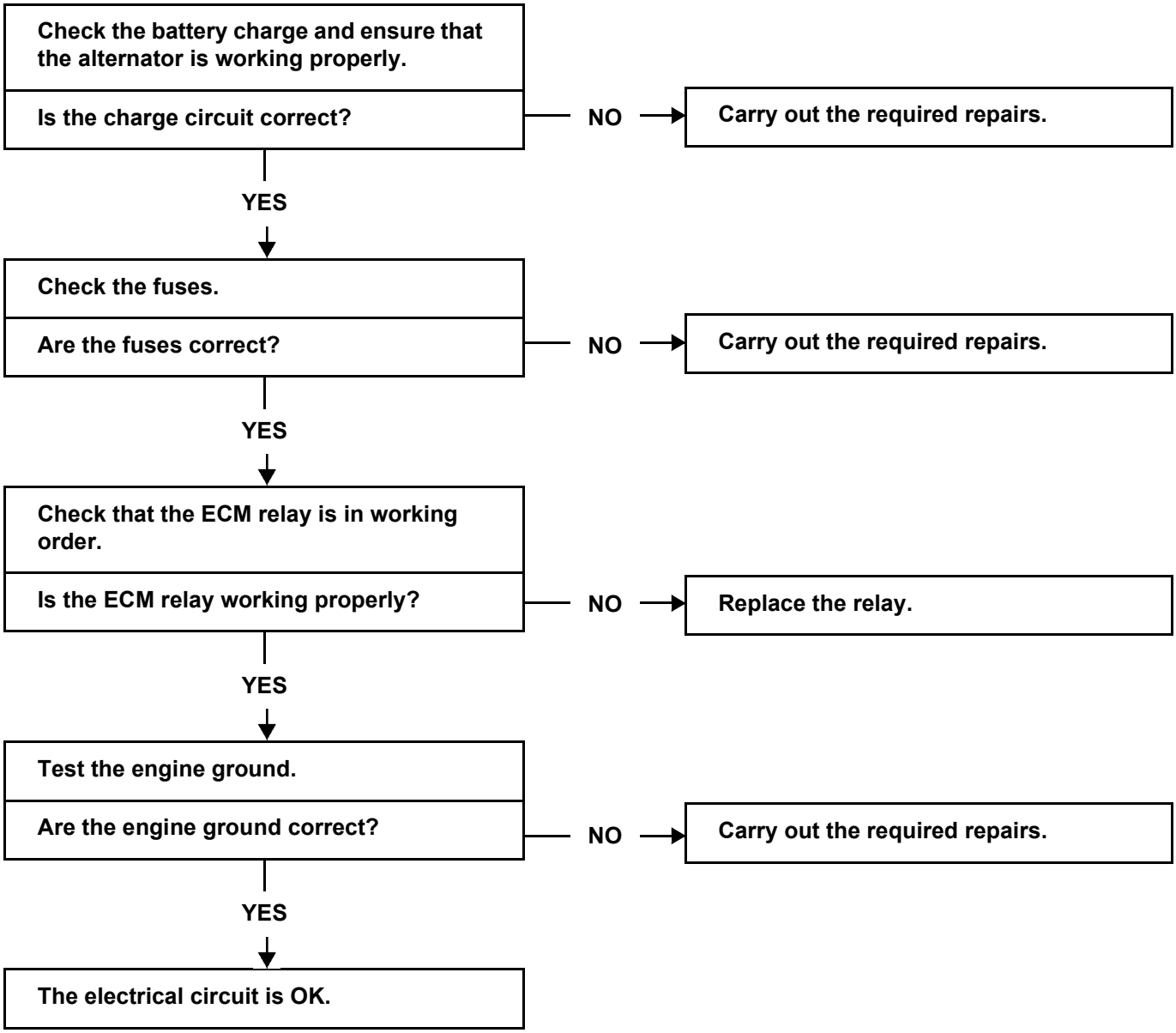
TEST 1	LOW PRESSURE CIRCUIT CHECK



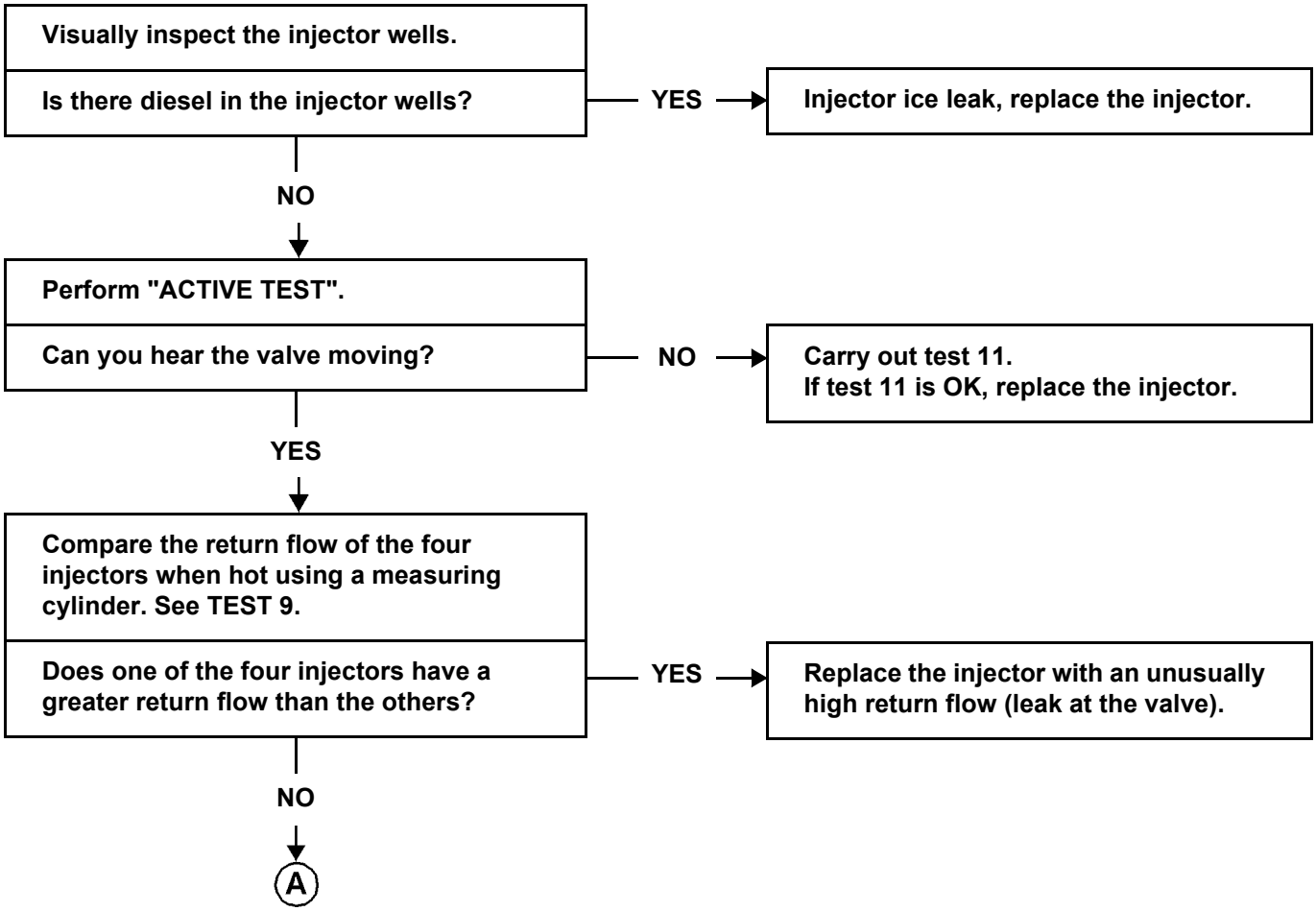
TEST 1 Cont'd	



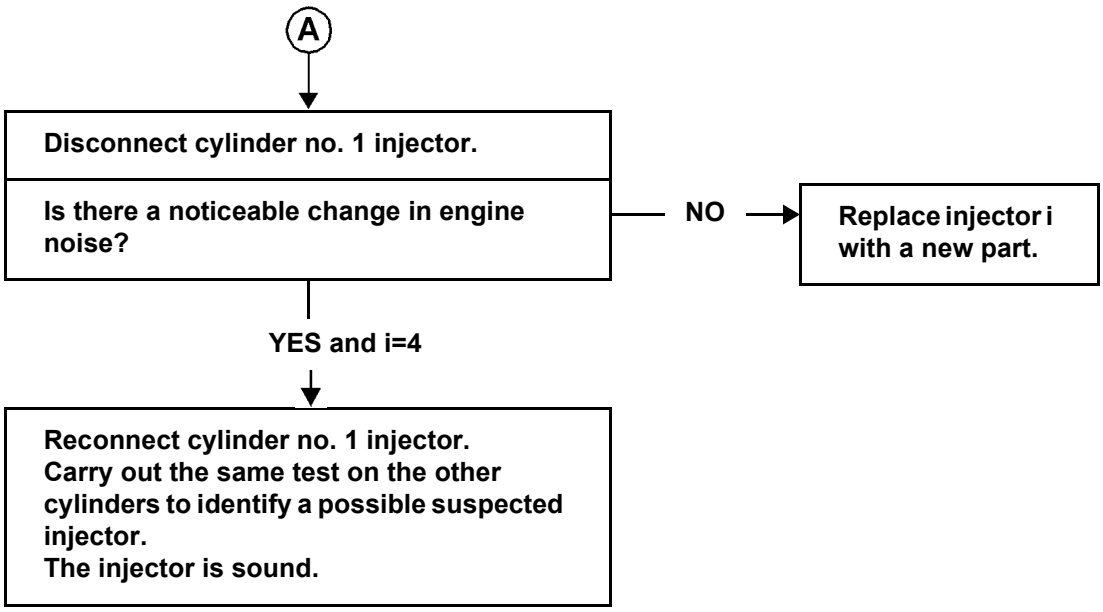
TEST 2	ELECTRICAL CIRCUIT CHECK



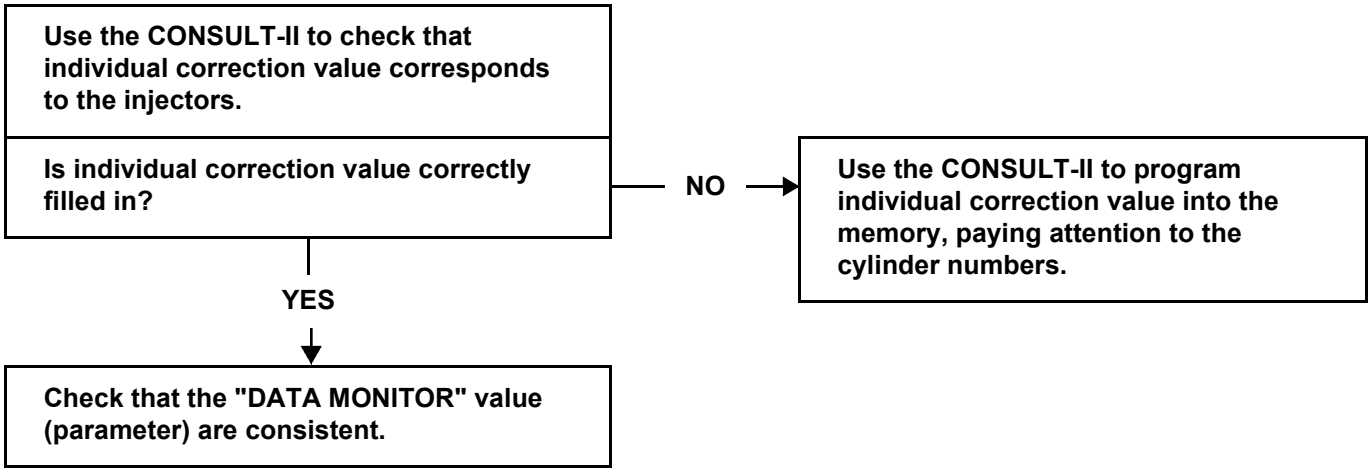
TEST 3	INJECTOR CHECK



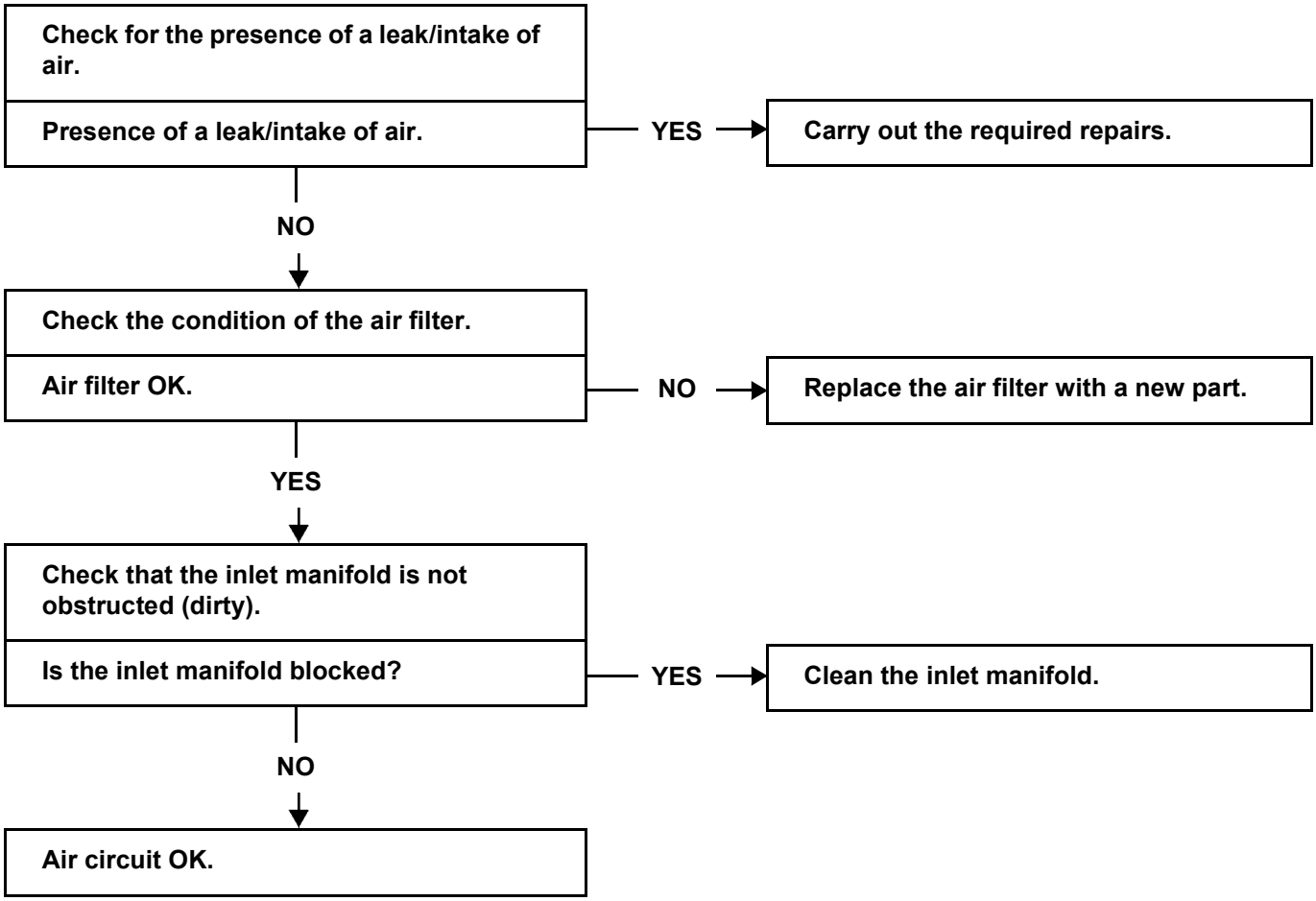
TEST 3 Cont'd	



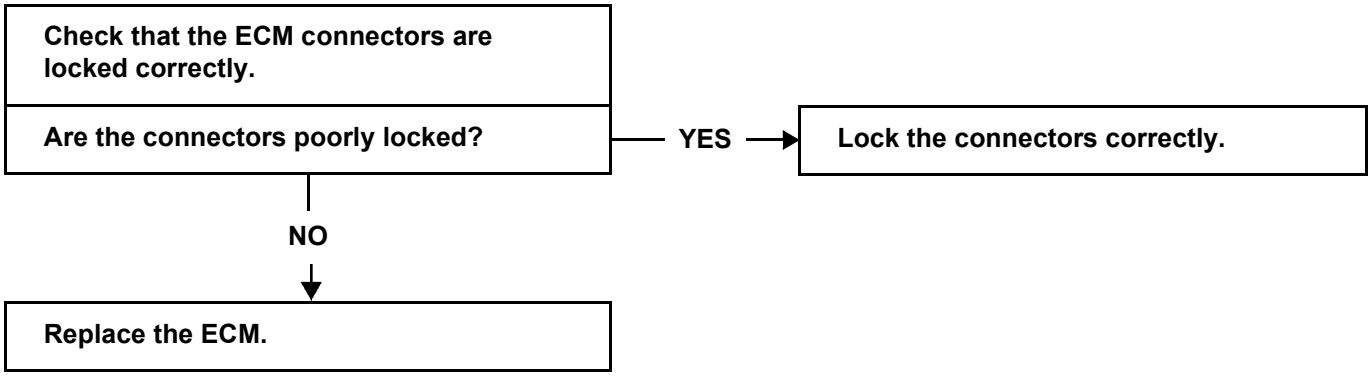
TEST 4	PARAMETER CHECK



TEST 5	AIR INLET CIRCUIT CHECK



TEST 6	ECM CHECK (COMPUTER)



TEST 7	High pressure system check

NOTES	**Special notes:** Certain malfunctions make it impossible to carry out this test, deal with them first. **IMPORTANT: It is useless and dangerous to engage the starter motor for more than 5 seconds.**

It is possible to check the high pressure supply pump capacity by carrying out the following procedure:
- **With the ignition off, disconnect** the low pressure actuator from the pump (**IMV brown connector**) and connect a test adaptor (test IMV).
- Disconnect the 4 injectors.
- Switch on the ignition, connect the fault finding tool and re-establish dialogue with the injection system.
- On the screen, display **Main states and parameters** of the ECM.
- Brake and press the "START" button. **The starter will cut out automatically** after **5 secs**.
- Read the maximum rail pressure value **PR038** during the test on the fault finding tool.

Is the rail pressure greater than 1050 bar?

NO

Is the rail pressure greater than 900 bar?

NO

Make sure that the ignition circuit is working correctly (minimum engine speed **200 rpm**). Switch off the ignition and reconnect the 4 injectors and low pressure actuator electrically. Switch the ignition back on, and clear the injection faults using the fault finding tool.

Carry out TEST 11.

YES

Repeat the test when cold. Coolant temperature = Ambient air temperature.

Is the rail pressure greater than 1050 bar?

YES

NO

Carry out fault finding on the injectors by checking the return volume of the 4 injectors.
See TEST 9 or TEST 10 if the engine does not start.

Is **TEST 9 or TEST 10** correct?

NO

Replace the faulty injector(s).

YES

Replace the high pressure pump.

YES

The pump can supply the operating pressure. Switch off the ignition and reconnect the 4 injectors and low pressure actuator electrically. Switch the ignition back on, and clear the injection faults using the fault finding tool.
Carry out fault finding on the injectors by checking the return volume of the 4 injectors **(See TEST 9 injector sealing check).**

TEST 8	High-pressure circuit leak check

NOTES	**Special notes:** Certain malfunctions make it impossible to carry out this test, deal with them first.

There is a command that performs a leak test on the high-pressure circuit when the engine is running.
This command can detect a leak on the high-pressure circuit if a union is improperly fitted or bolted, but cannot detect a small leak if a union is not torque tightened.
This command can only be used if the engine temperature is **above 60°C**.

Use command **AC029 "high pressure circuit sealing test"** the engine will automatically carry out one cycle of 4 accelerations to raise the pressure in the rail and check whether there are leaks in the high pressure circuit.

Watch out for any objects (tools, etc) on the sides of the engine housing during the four accelerations (vibrations possible).

TEST 9	Injector leak check

NOTES	**Special notes:** Certain faults make it impossible to carry out this test, deal with them first.

Command AC029 also allows you to check the return volume of each injector to detect a leak inside the injectors.

Tooling required:
- **It is essential to use 4 transparent pipes with an internal diameter of 4 mm and a length of approximately 50 cm.**
- **4 graduated measuring cylinders.**

PROCEDURE
- Check that the engine coolant temperature is **above 60°C**.
- Switch off the ignition.
- Disconnect the return pipes from the 4 injectors.
- Fit a plug in the pump venturi tube to prevent the low-pressure circuit from depriming.
- Connect the 4 transparent pipes with an internal diameter of **4 mm** and a length of **50 cm** in place of the return pipes.
- Immerse these 4 pipes into 4 graduated measuring cylinders.

Having carried out these preparations, start the engine, then let it run for **2 minutes** at idle speed.
- **Activate** command **AC029 "high pressure circuit sealing test"**: the engine will automatically perform one cycle of 4 accelerations to raise the pressure in the rail and measure the leaks inside the injectors in these conditions.
- **Once the cycle is complete, activate command AC029 again** for the correct reading of the return volume of each injector.
  At the end of both cycles, the return volume of each injector should be **35 ml at maximum**. If the return volume of one of the injectors is above **35 ml**, replace the faulty injector.
- Disconnect the 4 transparent pipes and reconnect the injector return circuit.

Watch out for any objects (tools, etc.) at the sides of the engine housing during the four cycles (vibrations possible).

TEST 10	Injector return flow in starting phase.

NOTES	**Special notes:** Certain faults make it impossible to carry out this test, deal with them first. **IMPORTANT: It is useless and dangerous to engage the starter motor for more that 5 seconds.**

In the event the engine does not start, only the static leak can be measured, that is the leak with the injector closed, inactive and not subject to any high pressure.

Make sure that the starting circuit is working correctly (minimum speed 200 rpm).

Tooling required:

- **It is essential to use four transparent pipes with an internal diameter of 4 mm and approximately 50 cm long.**
- **A test adapter (TEST IMV)**

PROCEDURE:

1 – Switch off the ignition.
2 – Disconnect the four injector return pipes.
3 – Fit a plug in the pump venturi tube to prevent the low-pressure circuit from depriming.
4 – Connect the four transparent pipes with an internal diameter of **4 mm** and a length of **approximately 50 cm**.
5 – Disconnect the low pressure actuator from the pressure (brown IMV connector) and connect the test adapter (test IMV).
6 – **Electrically disconnect the 4 injectors.**
7 – Switch on the ignition, brake and press the "START" button. **The starter cuts in automatically after 5 seconds.**
8 – Measure the amount of diesel in each pipe.

Replace the injector(s) whose leak return is greater than 10 cm.

Disconnect the four transparent diesel pipes and reconnect the injector return circuit.

Disconnect the test IMV and reconnect the low pressure actuator to the pump.

TEST 11	Diesel filter check

Check the conformity of the diesel filter.

Is the diesel filter correct?

NO → **Replace the filter with an original part.**

YES ↓

Switch off the ignition, analyse the diesel fuel in the diesel filter.
- Disconnect the diesel supply and return hoses from the filter.
- Block the filter inlets and outlets straight away with appropriate plugs.
- Remove the filter from its holder and **shake it well**, keeping the caps in place and empty the contents of the filter into a glass container by lifting up a protective cap and undoing the bleed screw.

Can you see at the bottom of the container a deposit of black particles?

YES ↓

Pass a magnet beneath the container to collect only all the metal particles. Take the magnet away from the container.

Do the particles collected using the magnet cover a surface area greater than 1 cm^2?

YES ↓

Replace the entire injection system.

NO ↓

Diesel filter correct.

NO ↓

Diesel filter correct.

NOTES	**Only consult this customer complaint after a complete check using the diagnostic tool.**

No communication with the ECM — **CHART 1**

Starting malfunction

- **The engine does not start** — **CHART 2**
- **The engine starts with difficulty or starts then stalls** — **CHART 3**
- **Starting difficult with warm engine** — **CHART 4**

Idle speed malfunction

- **Rough idle speed (pumping)** — **CHART 5**
- **Idle speed too high or too low** — **CHART 6**

Behaviour while driving

- **Unexpected acceleration/deceleration and engine stalling** — **CHART 7**
- **Response malfunction** — **CHART 8**
- **Engine stop (timing)** — **CHART 9**
- **Engine jerking** — **CHART 10**
- **Lack of power** — **CHART 11**
- **Too much power** — **CHART 12**

Road holding (continued)

- Excessive consumption — CHART 13
- Overspeed when lifting off accelerator or changing gear — CHART 14
- Engine dies when pulling away — CHART 15
- The engine does not stop — CHART 16

Noise, odours or smoke

- Clanking engine, noisy engine — CHART 17
- Squalling noise — CHART 18
- General mechanical noises — CHART 19
- Blue, white or black smoke — CHART 20
- Exhaust odours — CHART 21
- Diesel odours — CHART 22
- Smoke (blue, white or black) on acceleration — CHART 23

CHART 1	NO COMMUNICATION WITH THE ECM

NOTES	**Only consult this customer complaint after a complete check using the diagnostic tool.**

Ensure that the diagnostic tool is not causing the fault by trying to establish dialogue with a computer on another vehicle. If the tool is not at fault, and dialogue cannot be established with any other computer on the same vehicle, the cause could be a faulty computer interfering on the multiplex network.
Check the voltage of the battery and carry out the operations necessary to obtain a voltage which is to specification (**9.5 volts < U battery < 17.5 volts**).

Perform fault finding on the multiplex network using the diagnostic tool.

Check **the ECM earth (ground) point** on the left hand front shock absorber cage.

Check:
– the connection between the CONSULT-II and the DLC (wiring in good condition),
– the engine and passenger compartment fuses.

Check for the presence of **+ 12 volts before ignition** on **terminal 16**, **+ 12 volts after ignition** on **terminal 8** and an **earth (ground)** on **terminals 4 and 5** of the diagnostic socket.
Repair if necessary.

Connect the CONSULT-II and check the **insulation, continuity and absence of interference resistance of the connections:**

- ECM (F134) terminal 109 and IPDM E/R harness connector terminal 32
- ECM (F134) terminal 110 and IPDM E/R harness connector terminal 32
- ECM (E61) terminal 22 and Fuse block (M16)
- ECM (F134) terminal 104 and IPDM E/R harness connector terminal 29
- ECM (F134) terminal 111 and ground
- ECM (F134) terminal 112 and ground
- ECM (E61) terminal 2 and DLC terminal 7
  (Refer to wiring diagram "EC-MAIN-01".)

Repair if necessary.

CHART 2	THE ENGINE DOES NOT START

NOTES	Only consult this customer complaint after a complete check using the CONSULT-II.

Check that the fuel tank is correctly filled and that the fuel type is suitable.

Is the fuel type suitable and the tank correctly filled?

NO → **Refill the fuel tank correctly.**

YES

Is the starter motor working properly?

NO → **Carry out the required repairs.**

YES

Check the low pressure circuit using TEST 1.

Check for leaks in the high pressure circuit.

Check the electrical circuit using TEST 2.

Ⓐ

CHART 2 CONTINUED 1	

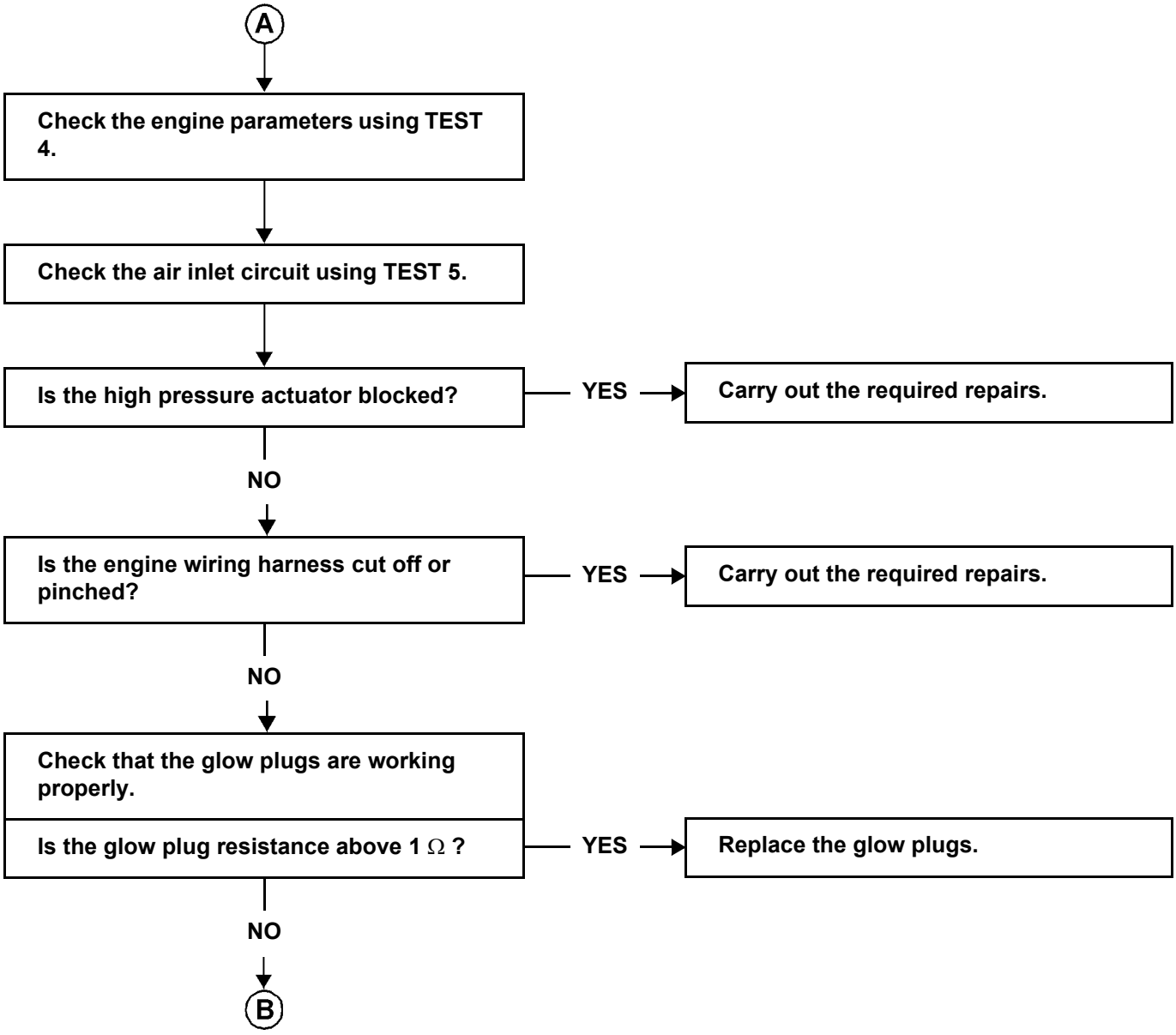
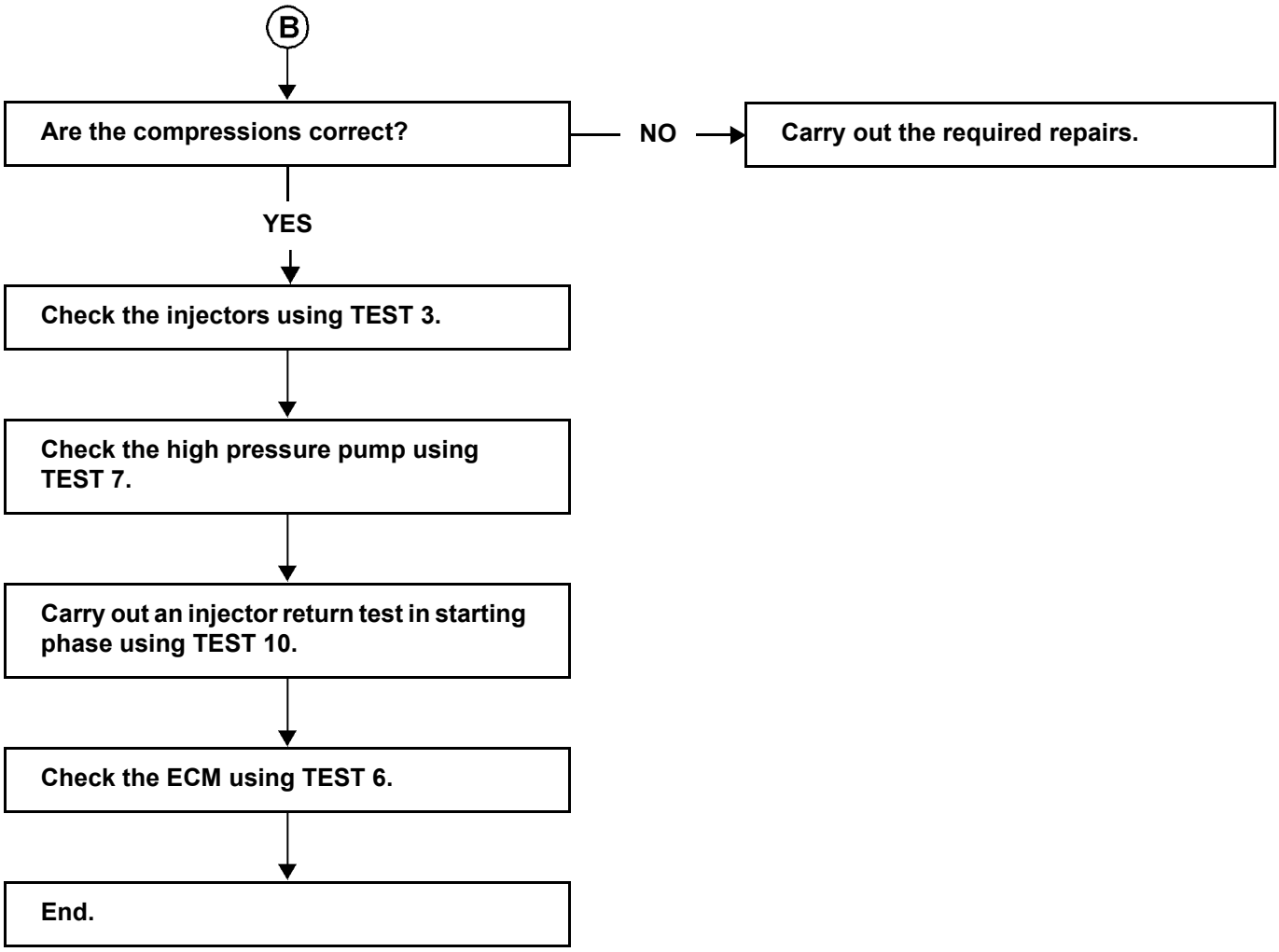


CHART 2 CONTINUED 2	



AFTER REPAIR	Check that the system is operating correctly.

CHART 3	THE ENGINE STARTS WITH DIFFICULTY OR STARTS THEN STALLS

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

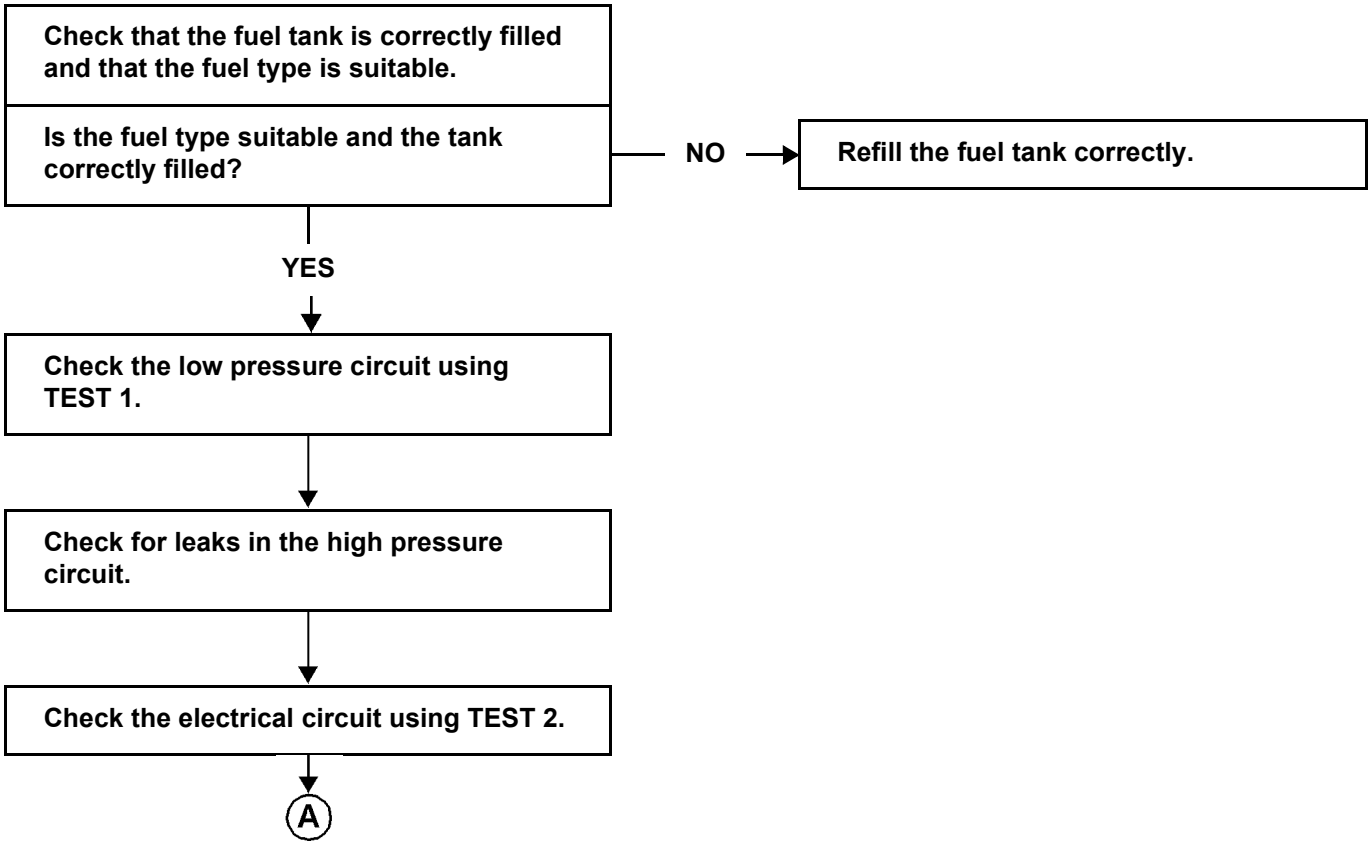


CHART 3 CONTINUED 1	

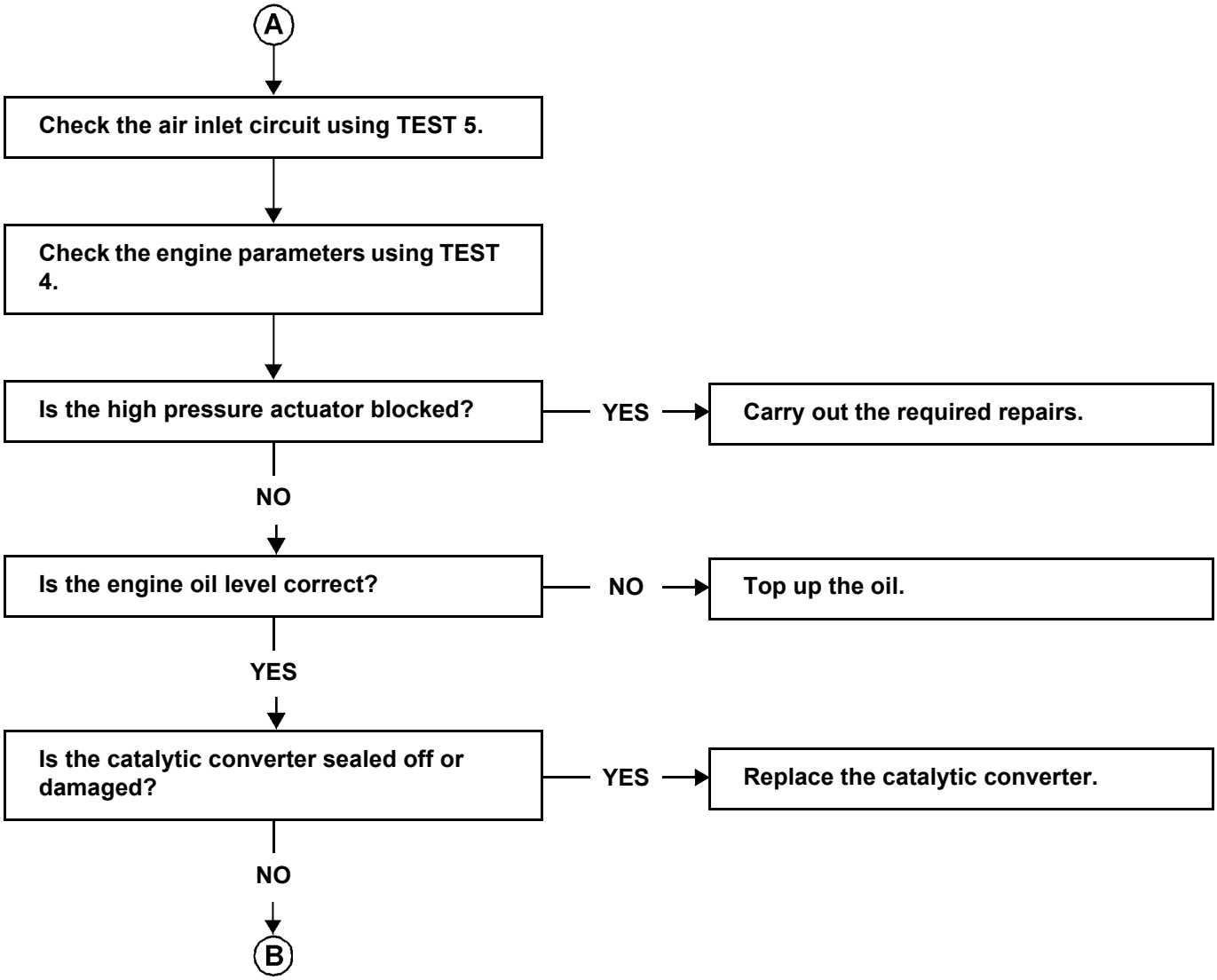


CHART 3 CONTINUED 2	

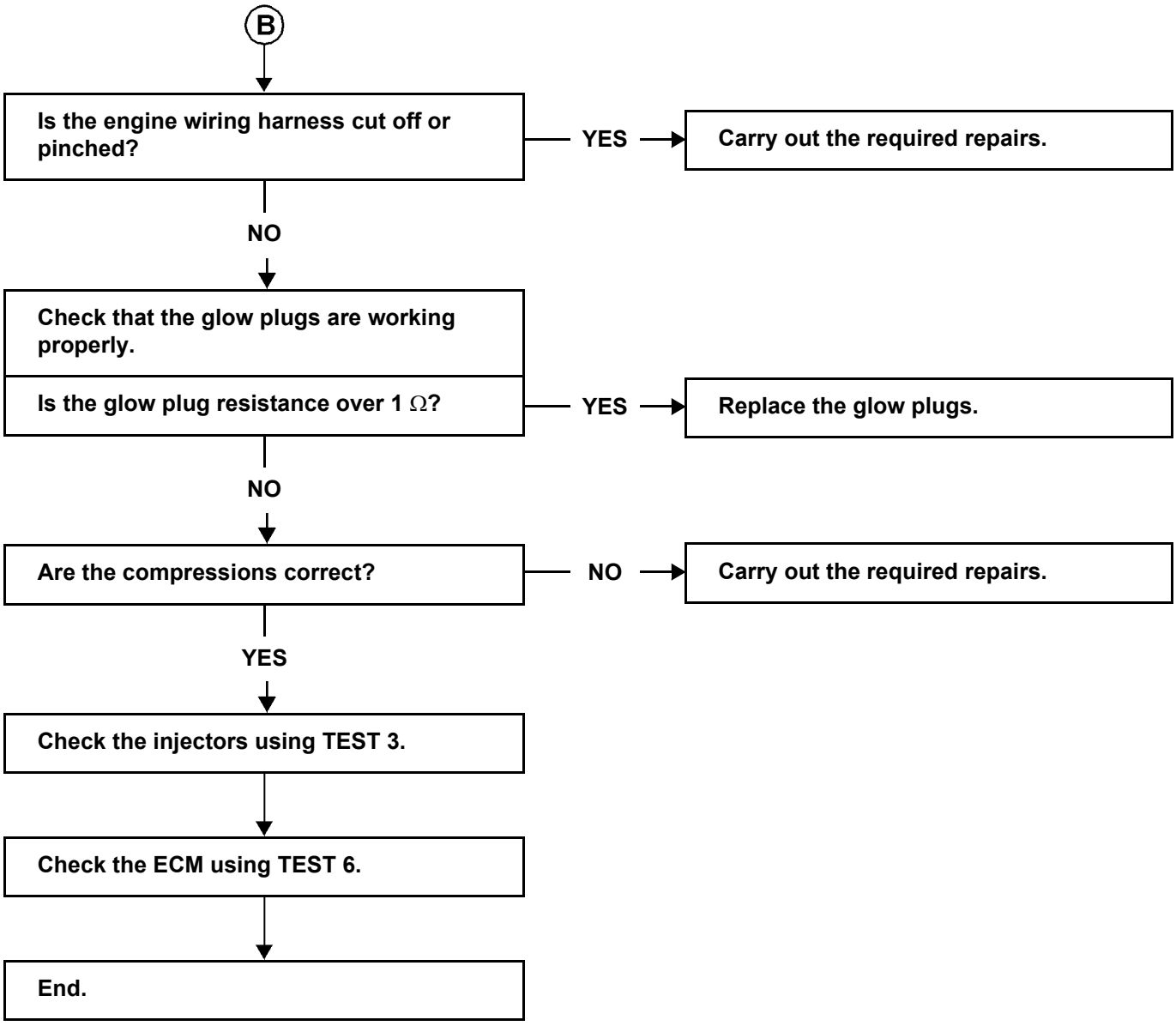


CHART 4	STARTING DIFFICULT WITH WARM ENGINE

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

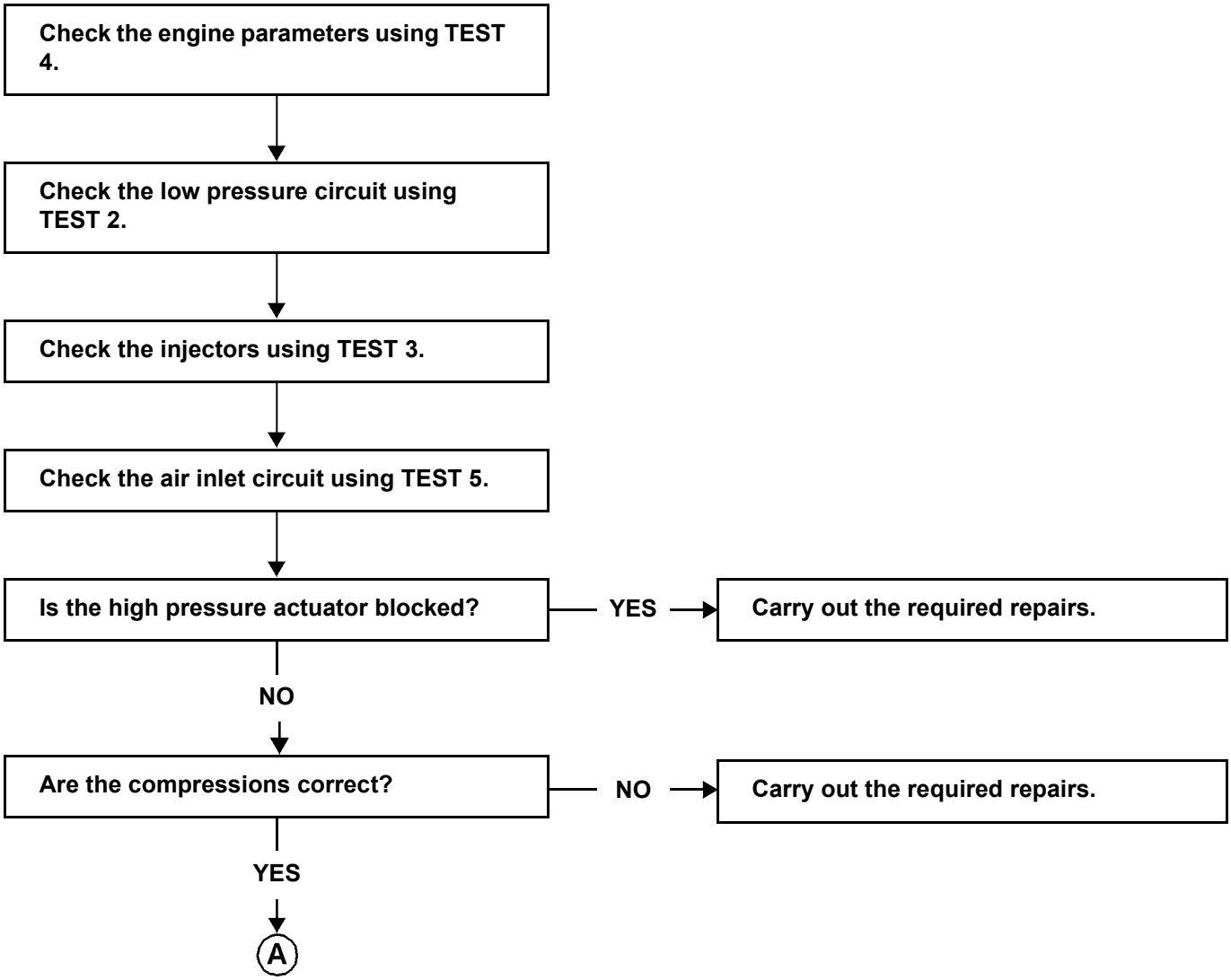


CHART 4 Cont'd	

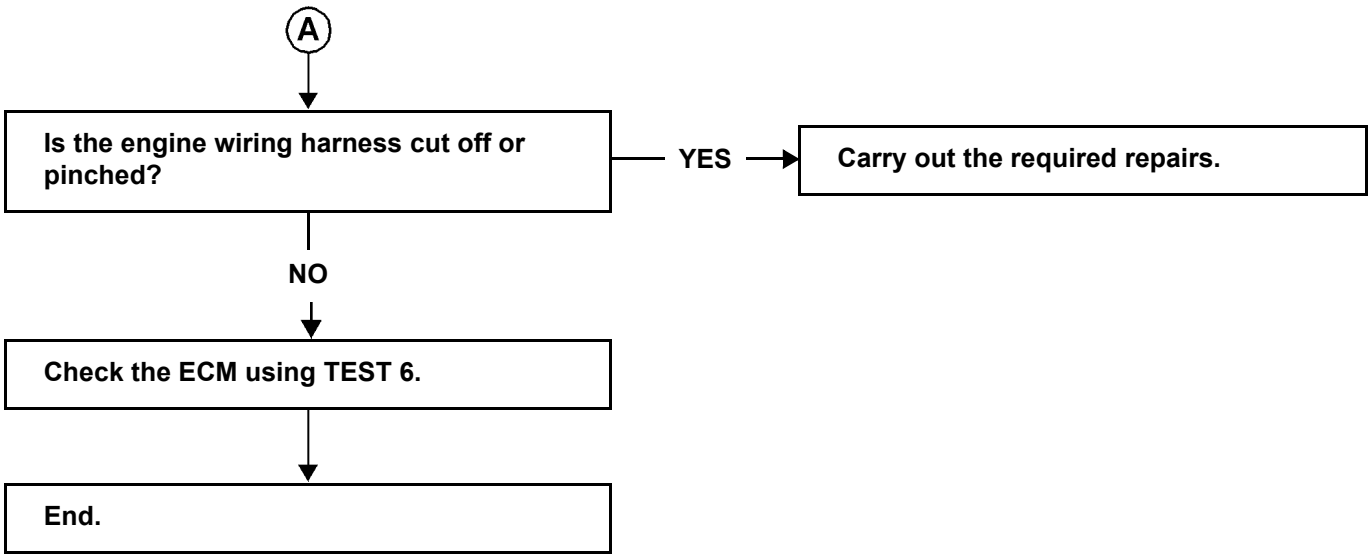


CHART 5	ROUGH IDLE SPEED (PUMPING)

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

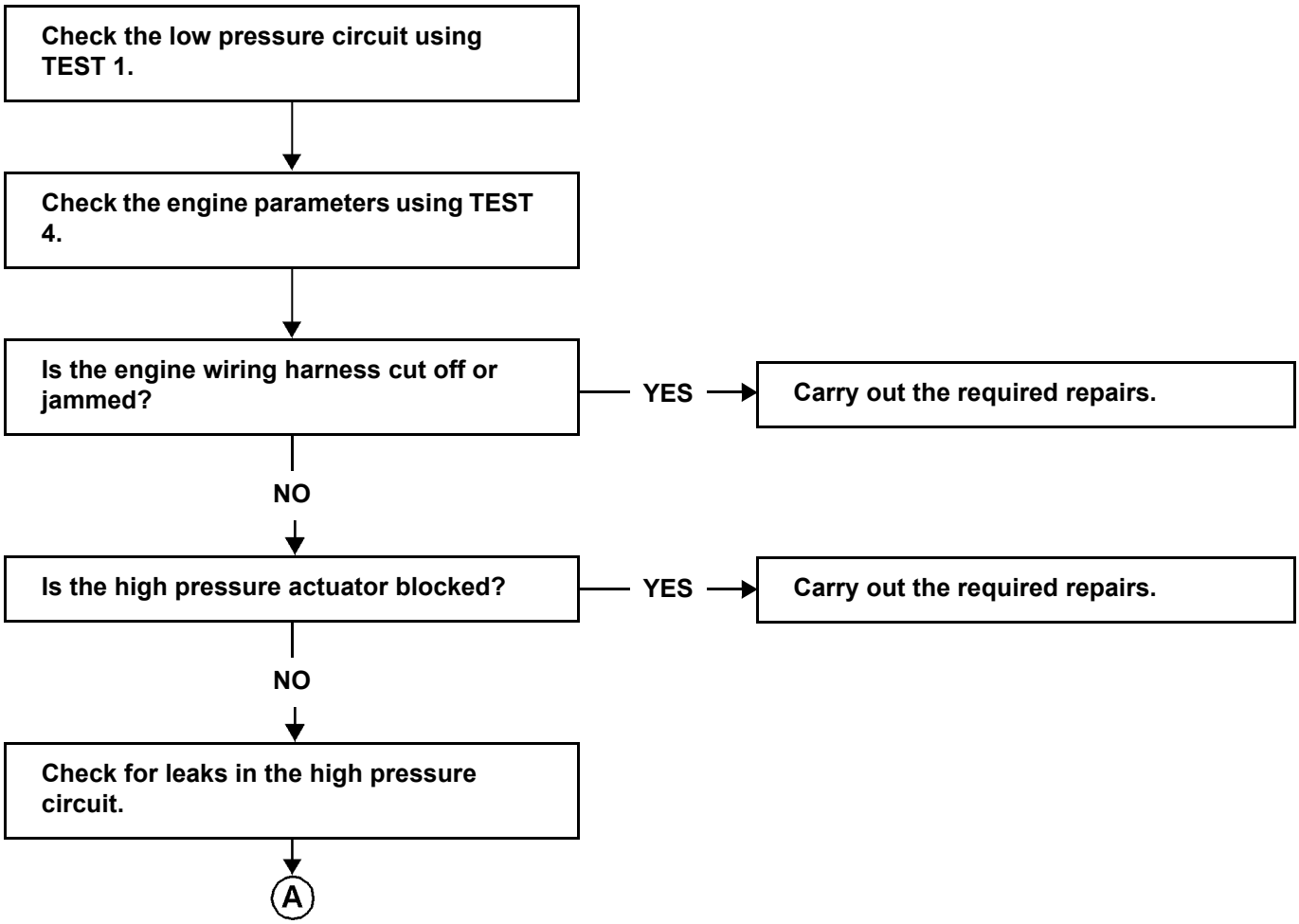


CHART 5 Cont'd	

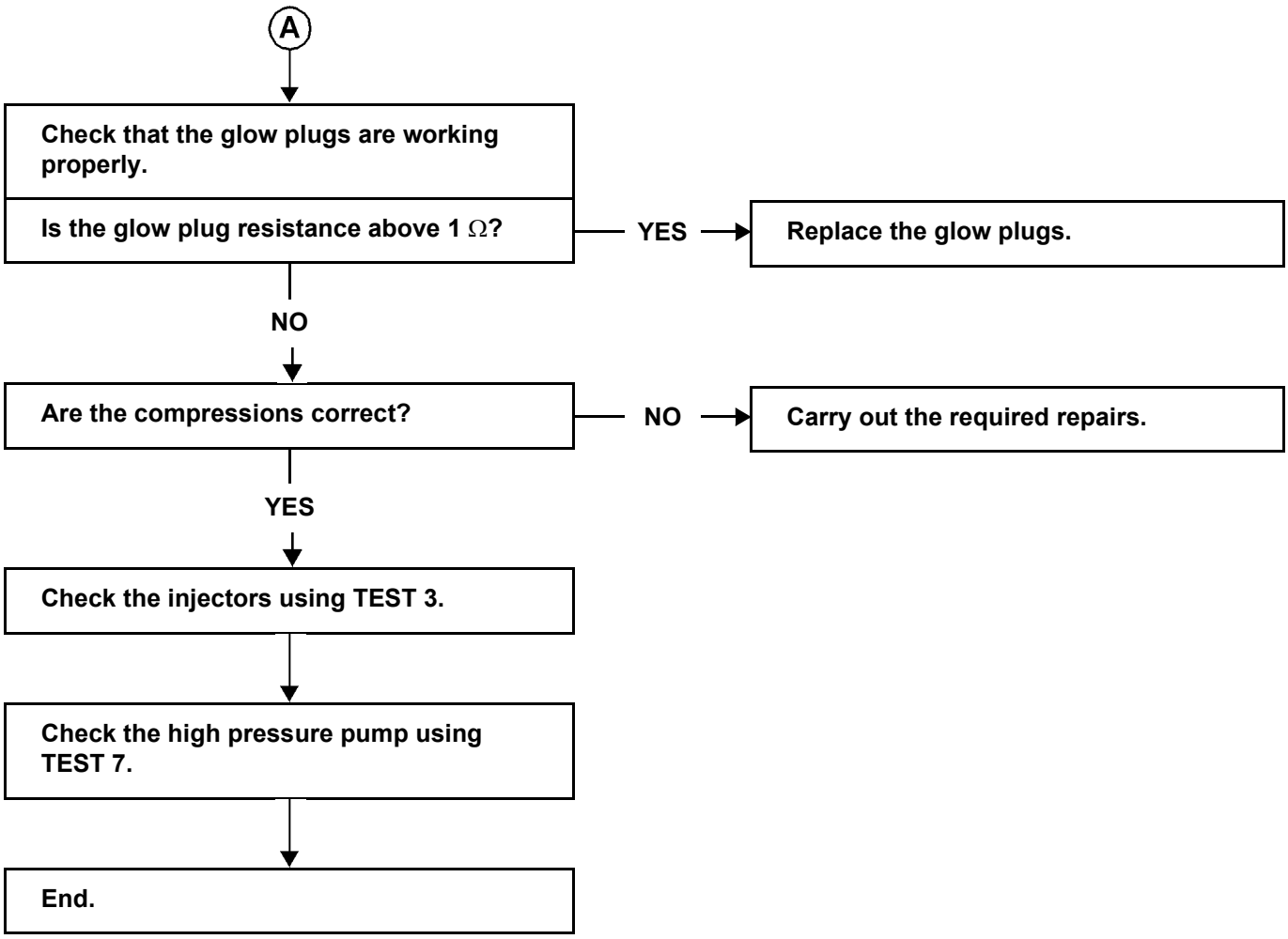


CHART 6	IDLE SPEED TOO HIGH/TOO LOW

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

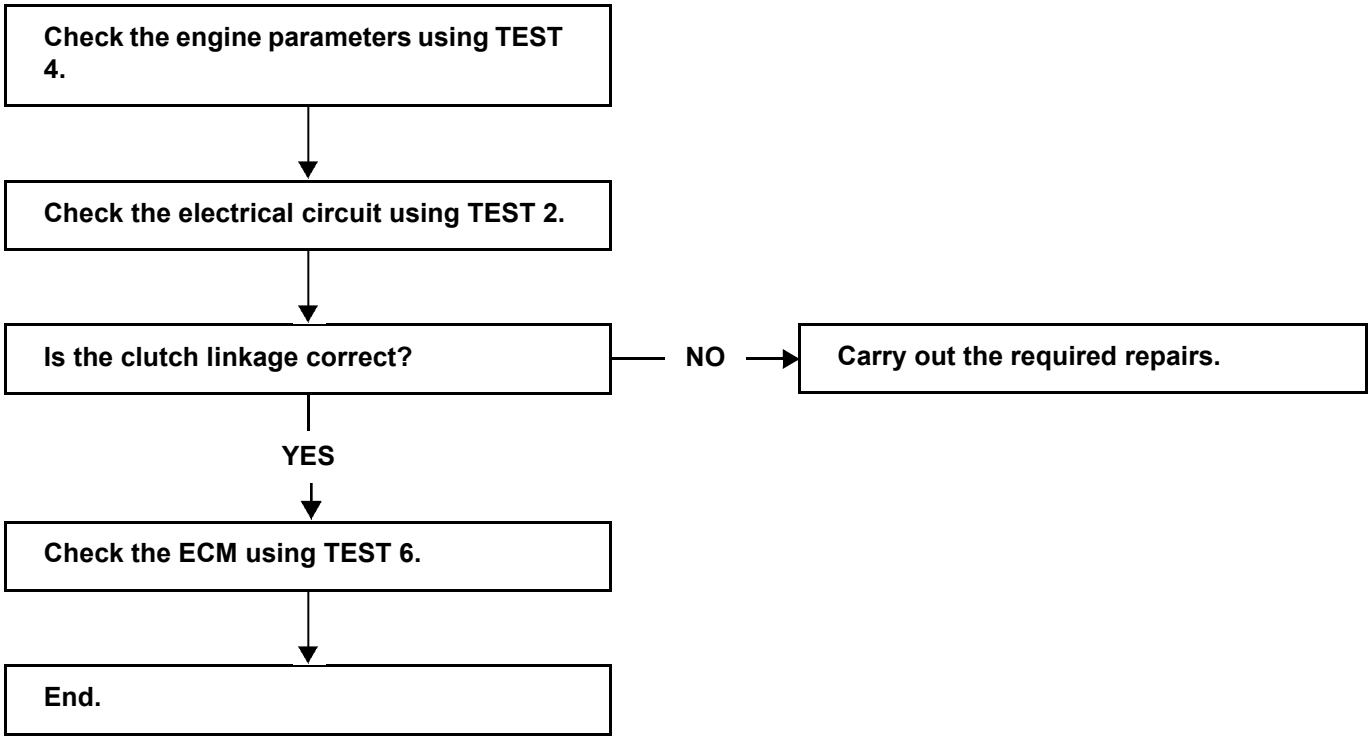


CHART 7	UNEXPECTED ACCELERATION/DECELERATION AND ENGINE OVERCHARGING

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

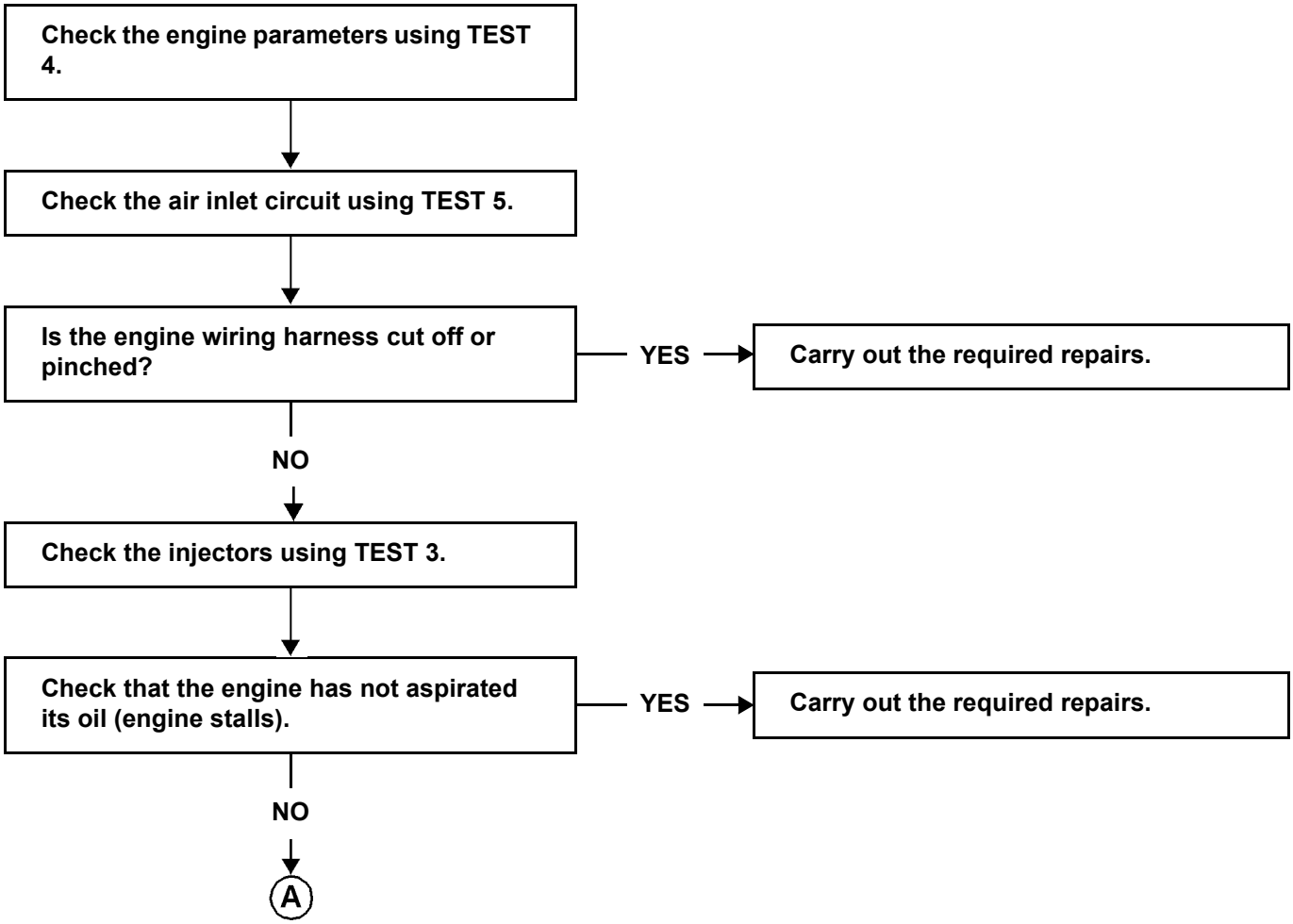


CHART 7 Cont'd	

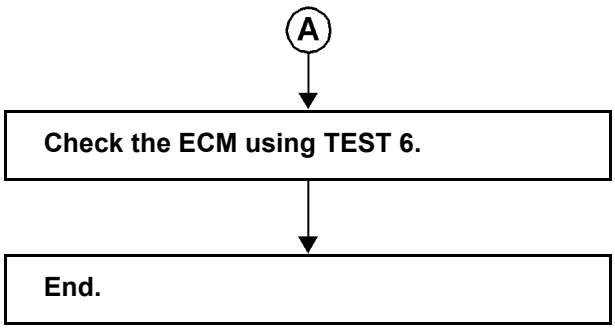


CHART 8	RESPONSE MALFUNCTION

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

Check the air inlet circuit using TEST 5.

↓

Check the engine parameters using TEST 4.

↓

Check that the turbocharger is working properly.

Is the turbocharger correct? — **NO** → **Carry out the required repairs.**

YES

↓

Check the low pressure circuit using TEST 1.

↓

Are the compressions correct? — **NO** → **Carry out the required repairs.**

YES

↓

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CHART 8 Cont'd	

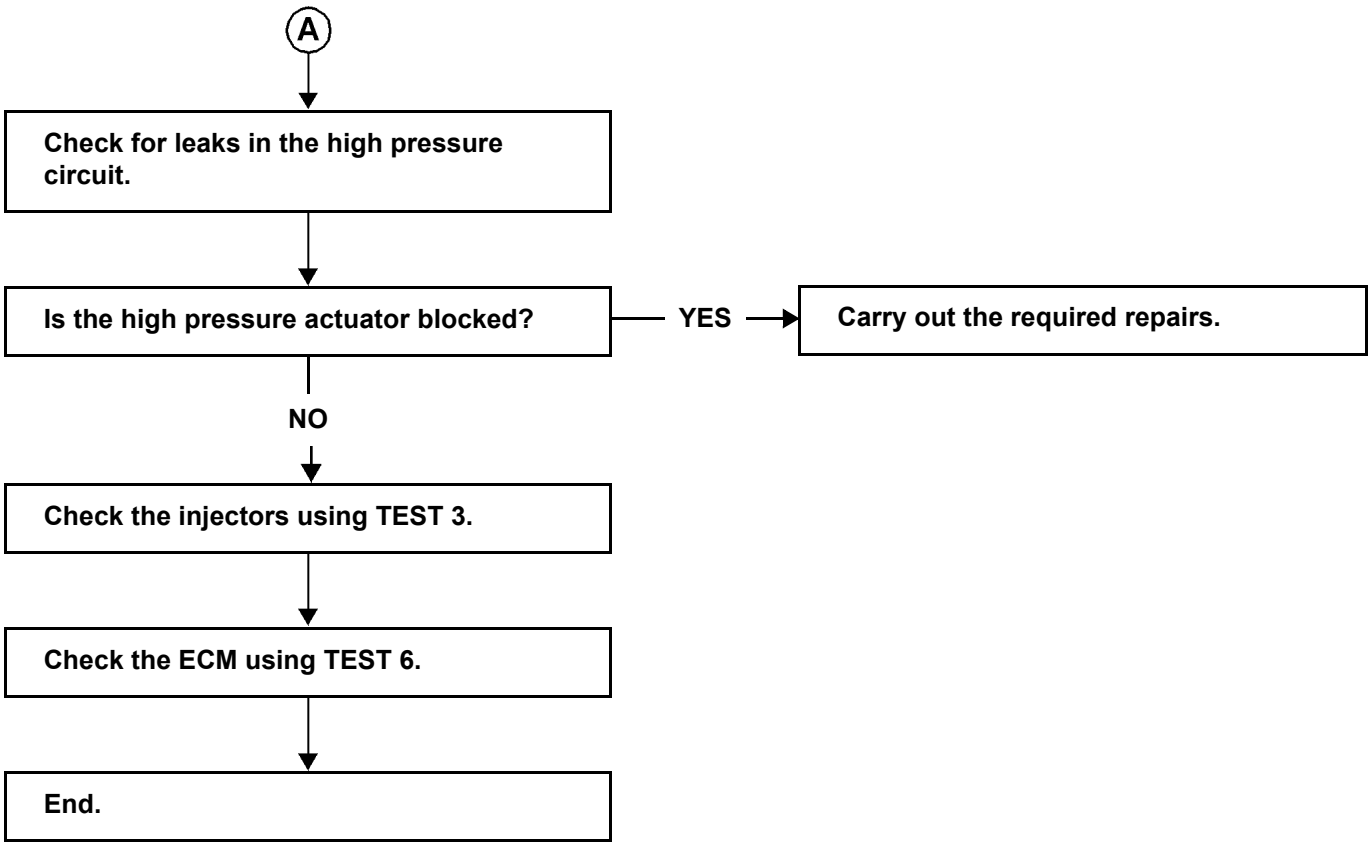

CHART 9	ENGINE STOP/STALLING

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

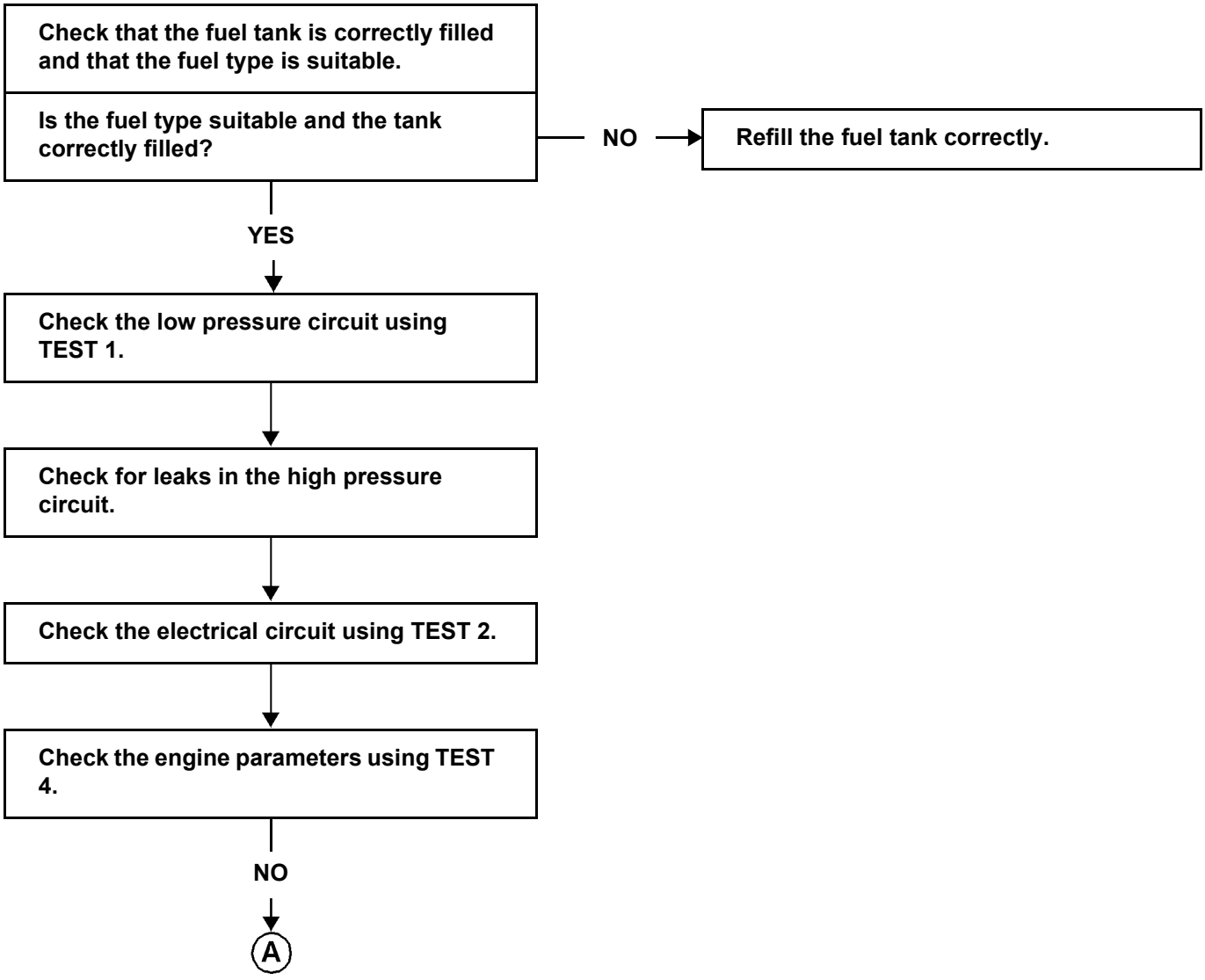

CHART 9 CONTINUED 1	

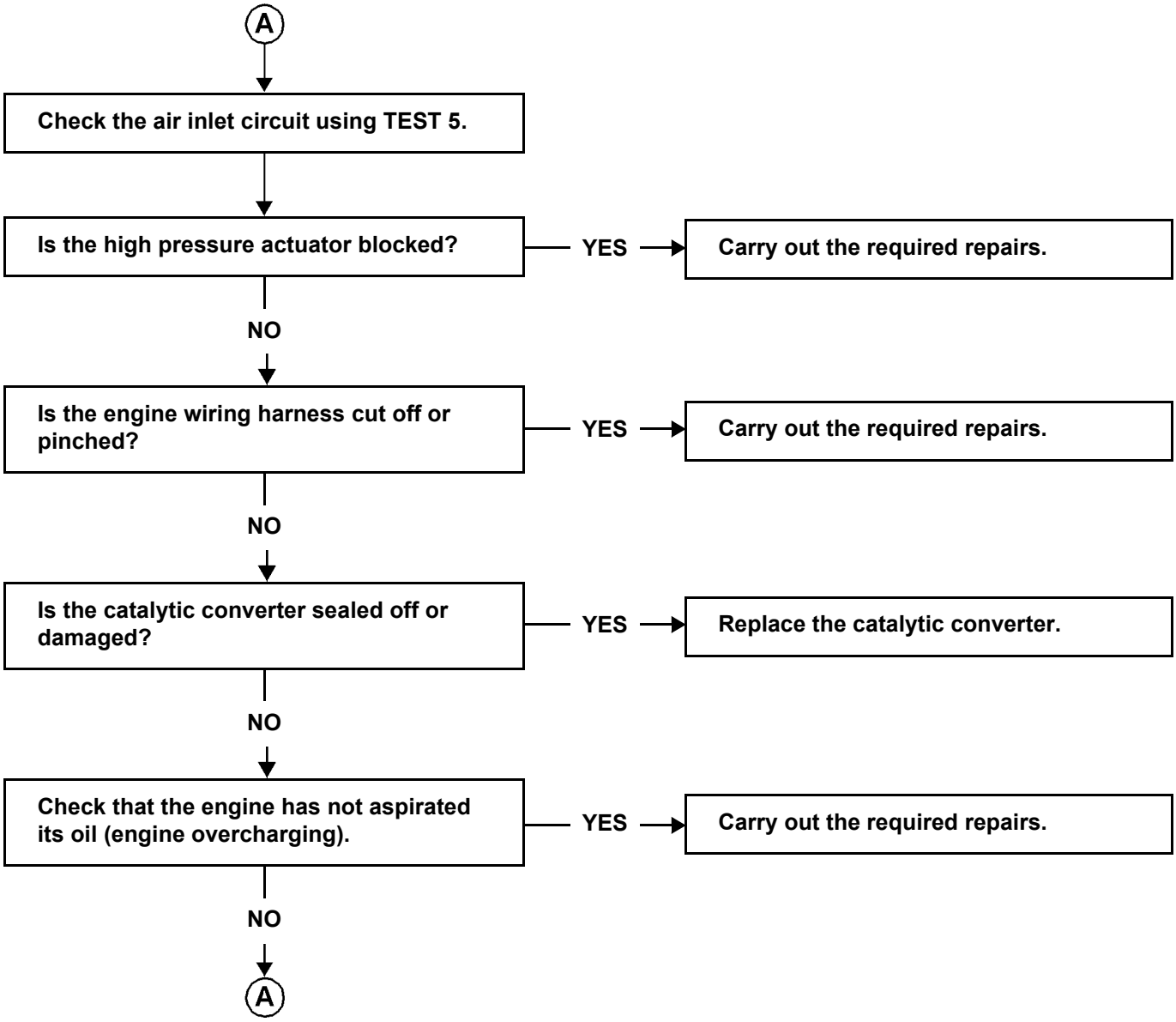

CHART 9 CONTINUED 2	

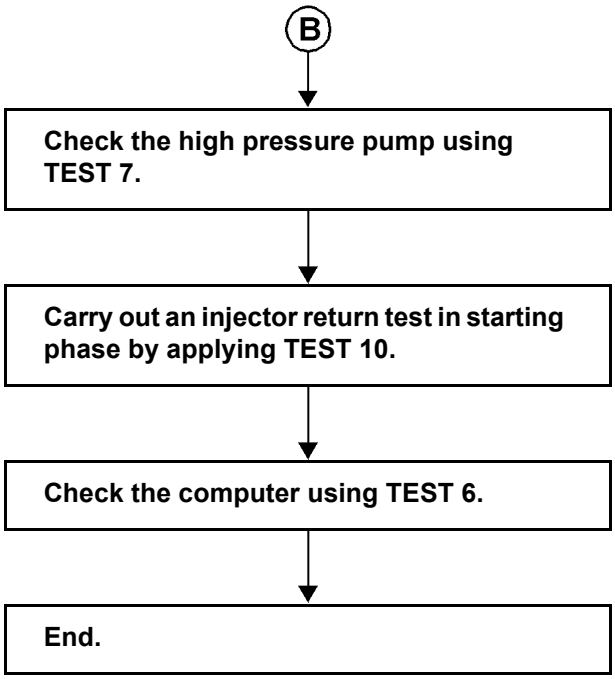

CHART 10	ENGINE JERKING

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

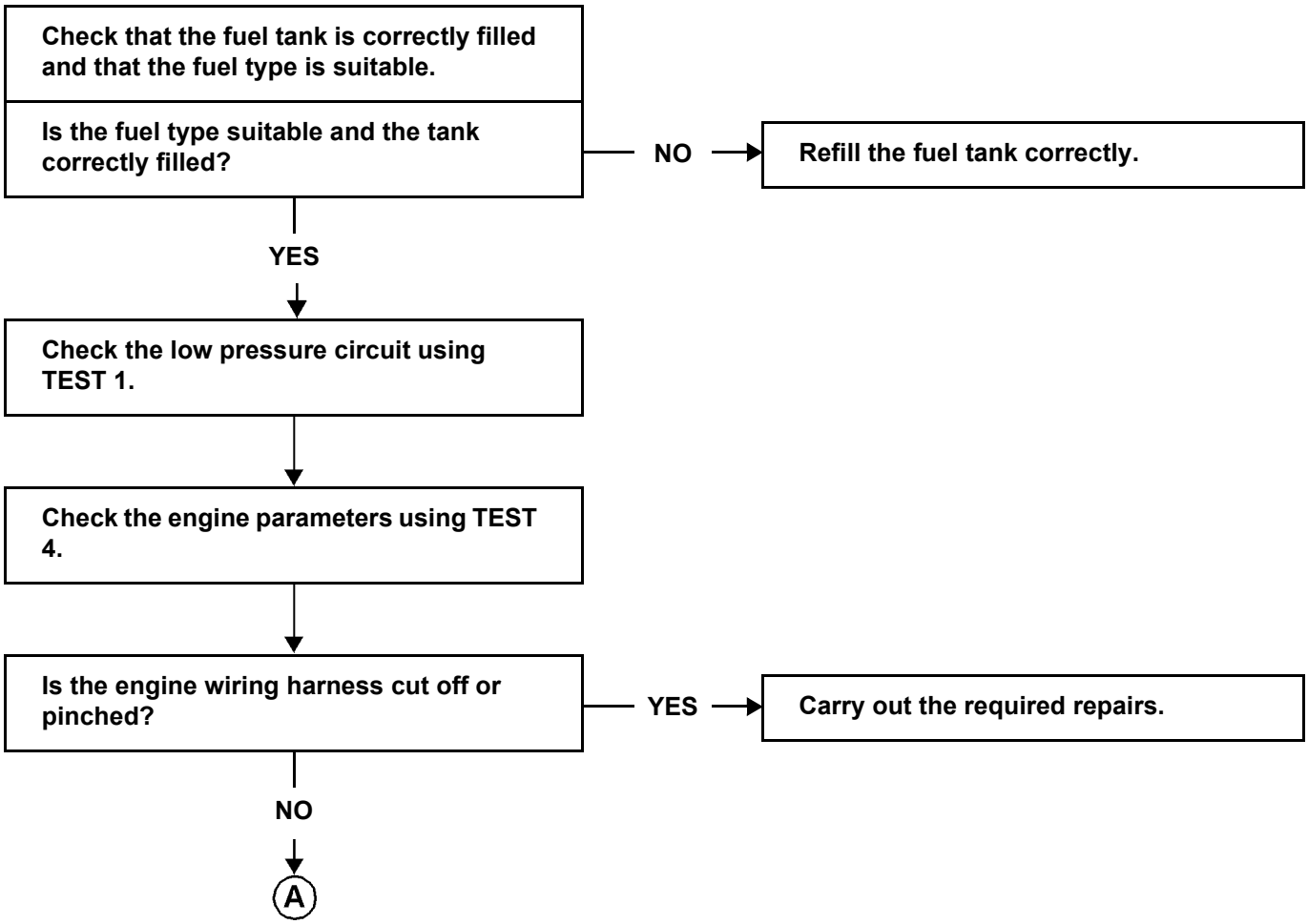

CHART 10 CONTINUED 1	

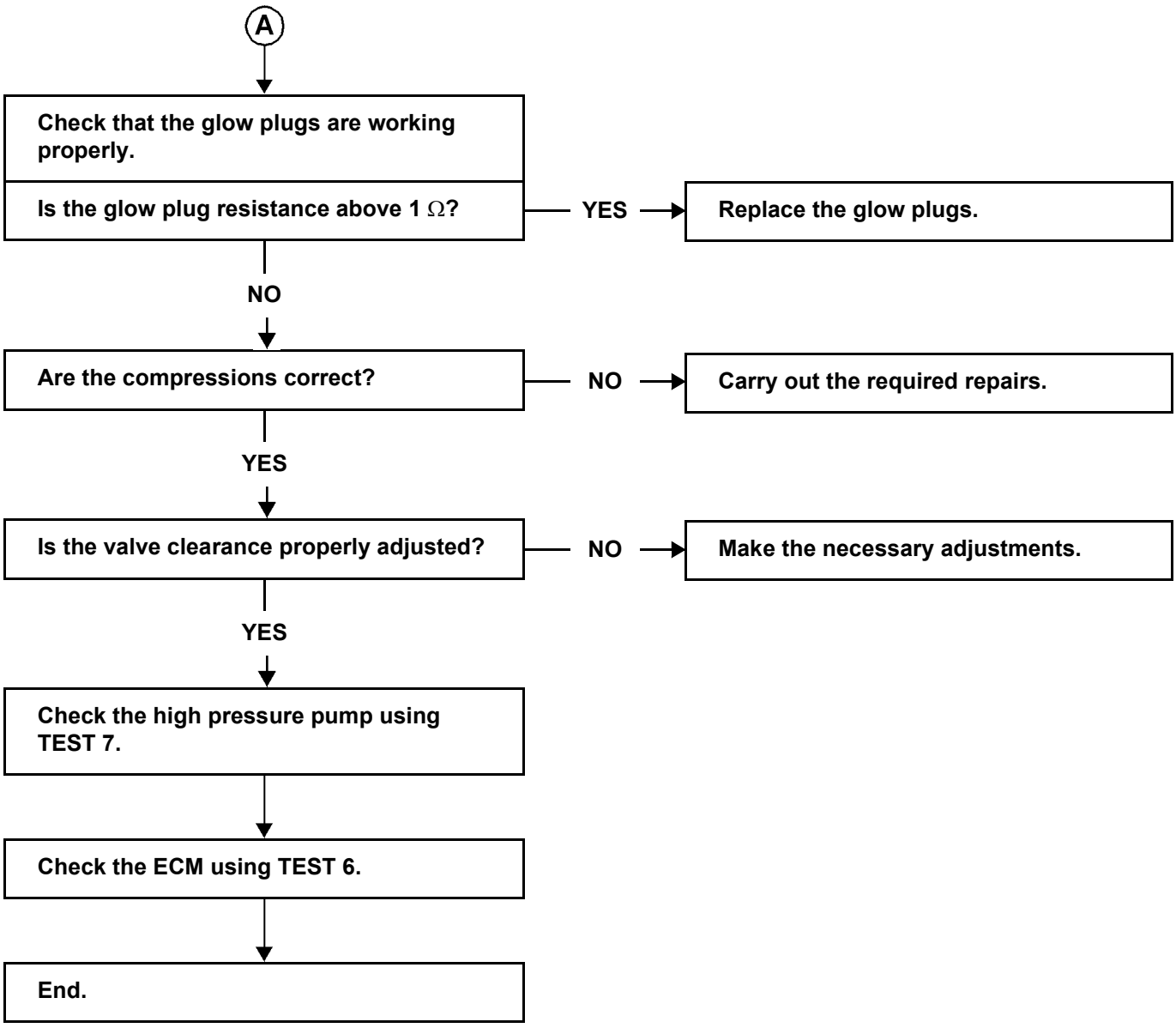

CHART 11	LACK OF POWER

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

Check the engine parameters using TEST 4.

↓

Check the air inlet circuit using TEST 5.

↓

Is the engine oil level correct? — **NO** → **Top up the oil.**

YES

↓

Is the catalytic converter sealed off or damaged? — **YES** → **Replace the catalytic converter.**

NO

↓

Check that the turbocharger is working properly.

Is the turbocharger correct? — **NO** → **Carry out the required repairs.**

YES

↓

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CHART 11 Cont'd	

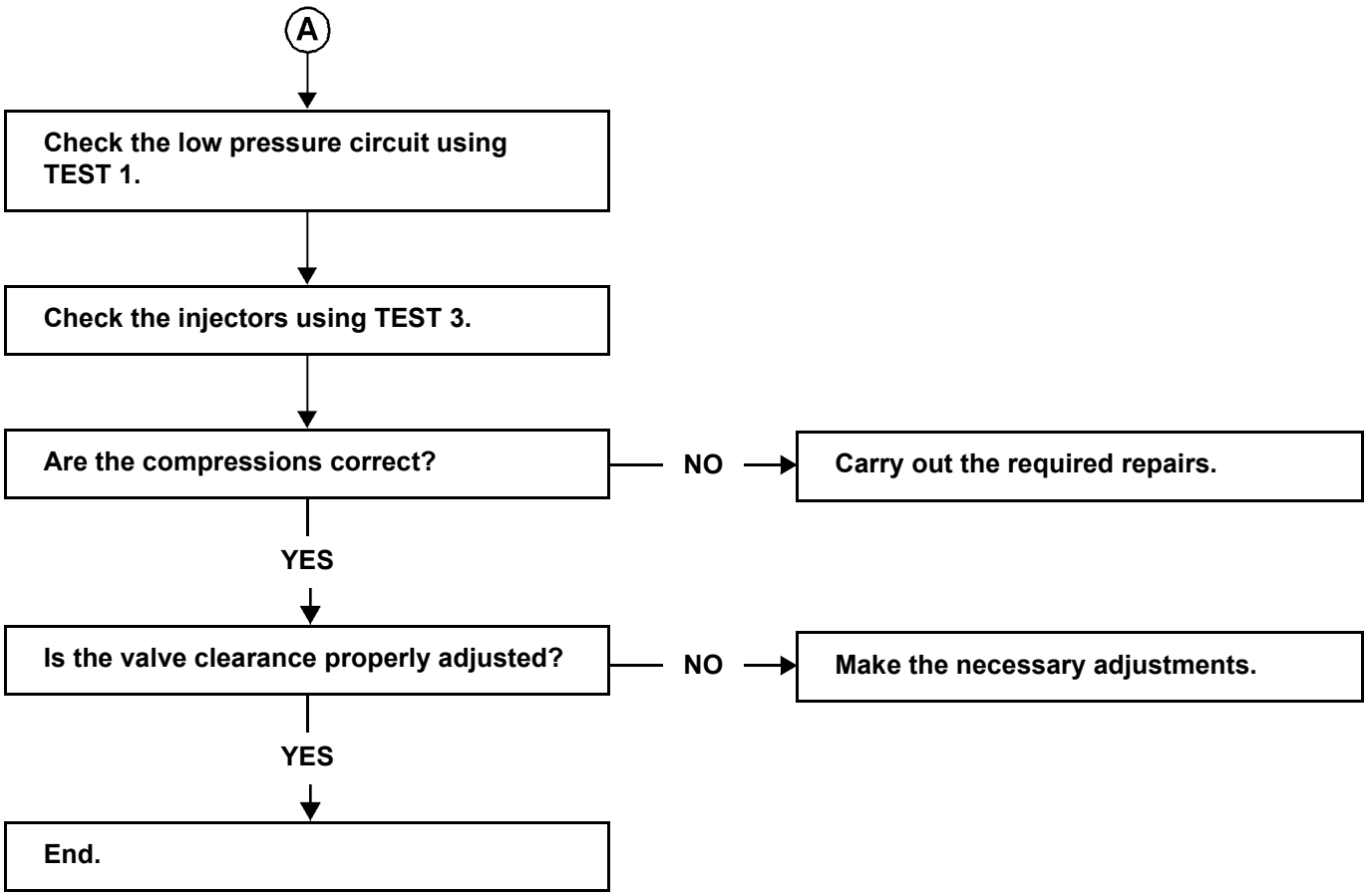


CHART 12	TOO MUCH POWER

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

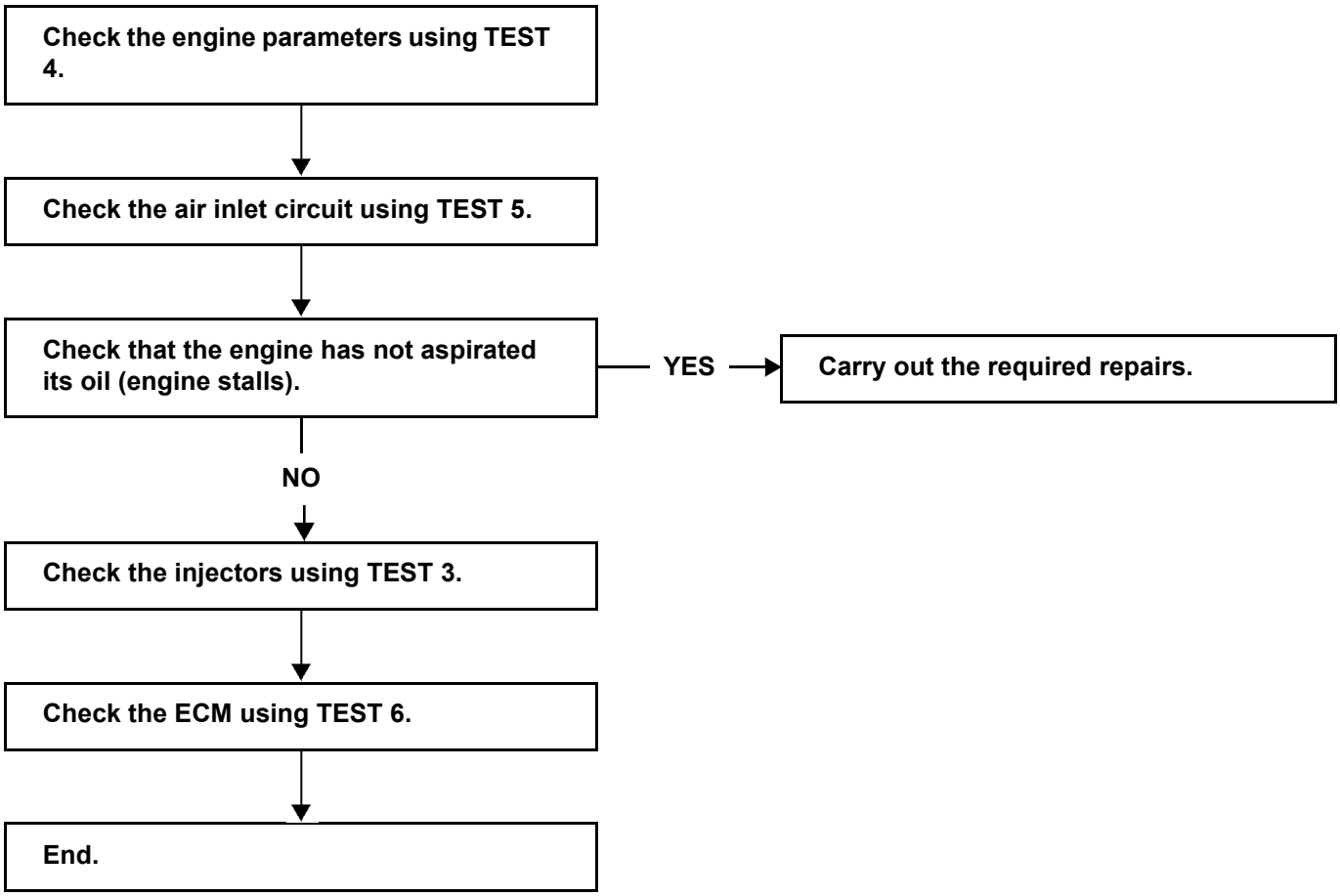


CHART 13	EXCESSIVE CONSUMPTION

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

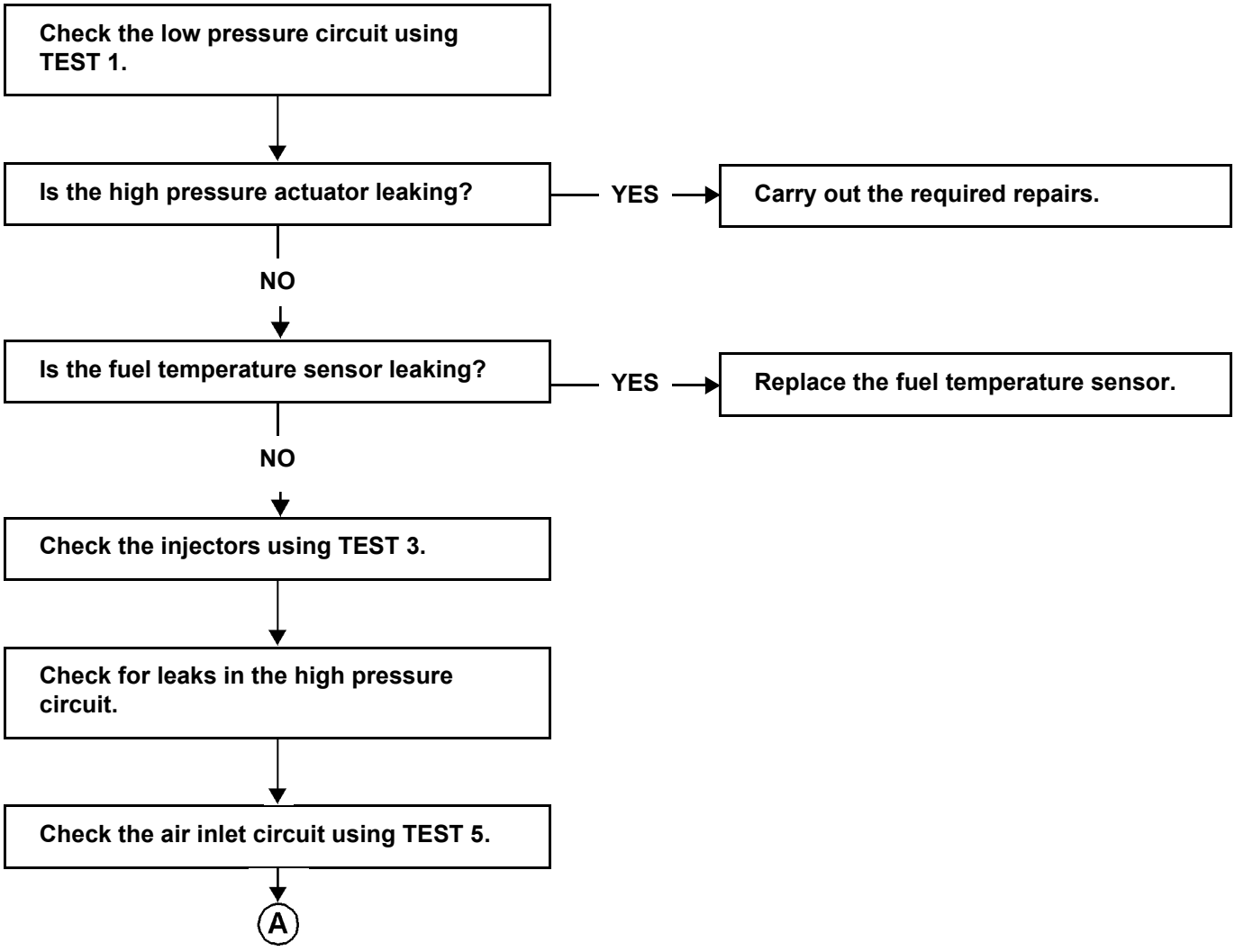


CHART 13 CONTINUED 1	

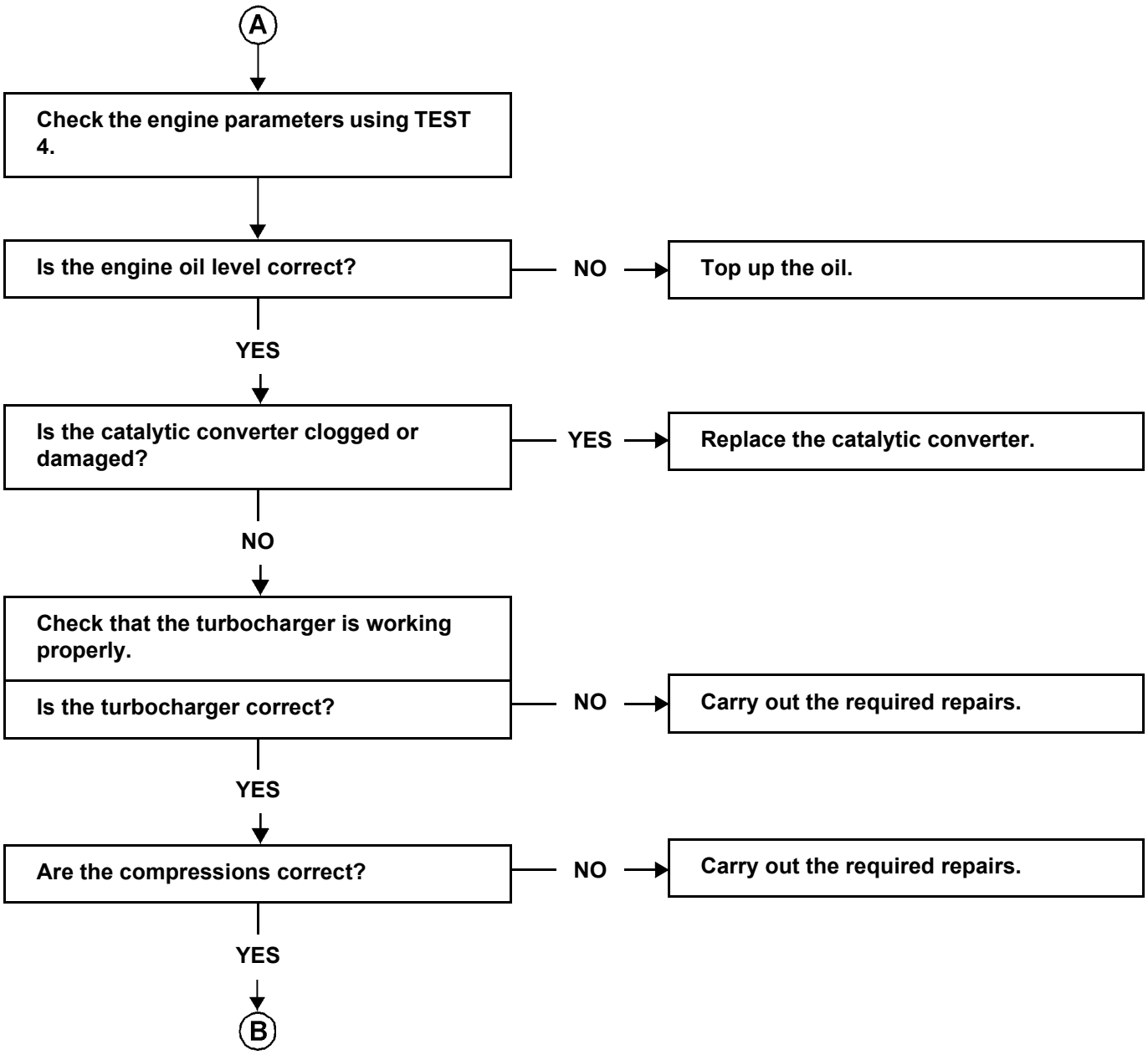


CHART 13 CONTINUED 2	

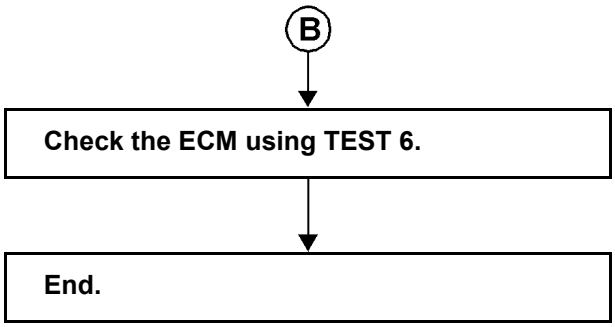


CHART 14	OVERSPEED WHEN LIFTING OFF ACCELERATOR OR CHANGING GEAR

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

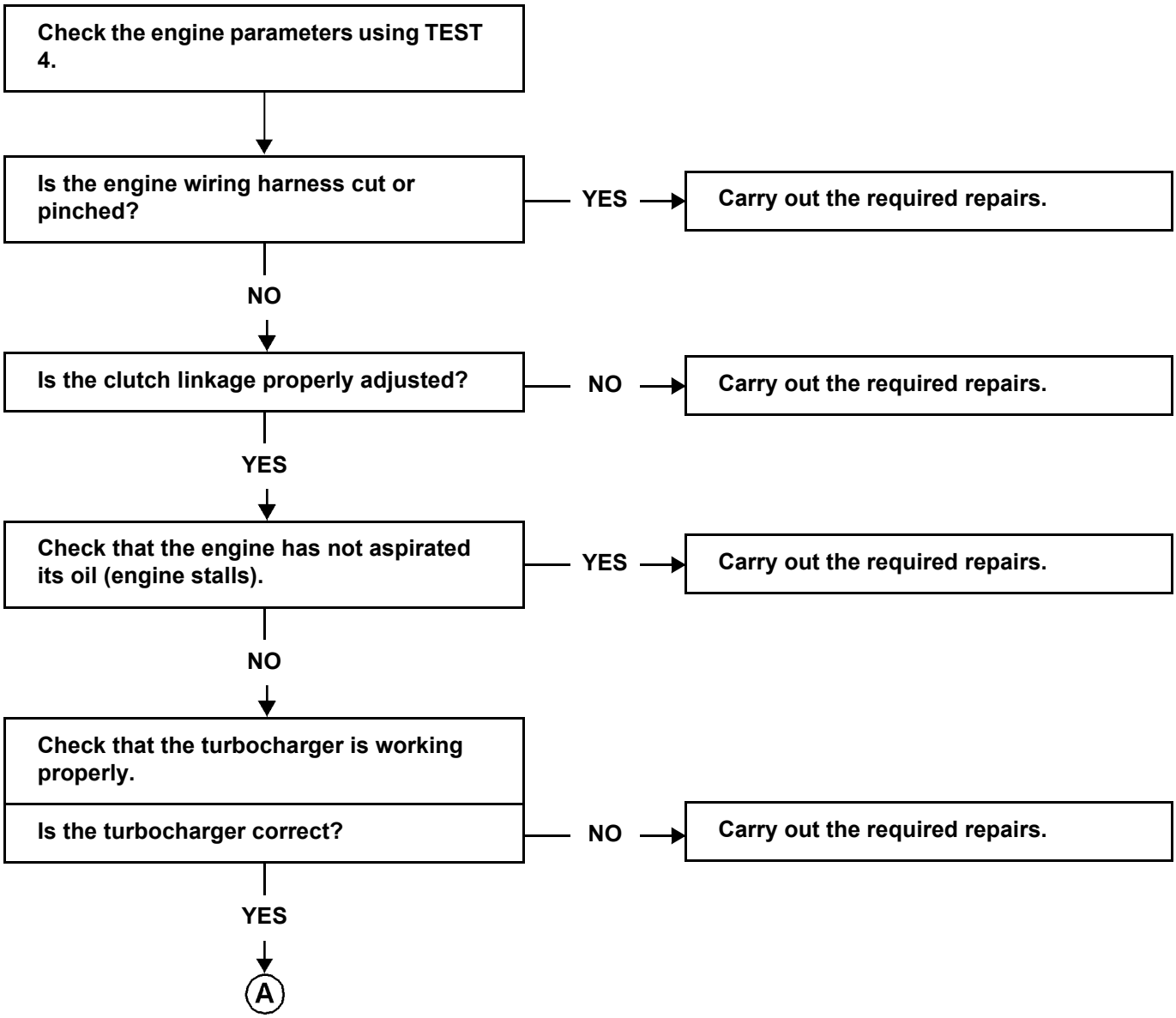


CHART 14 Cont'd	

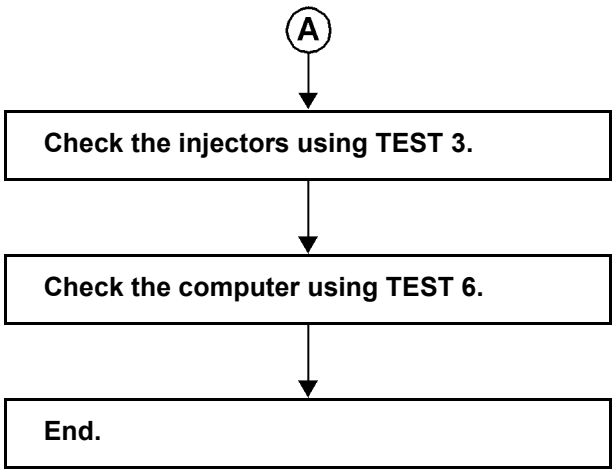


CHART 15	ENGINE DIES ON PULLING AWAY

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

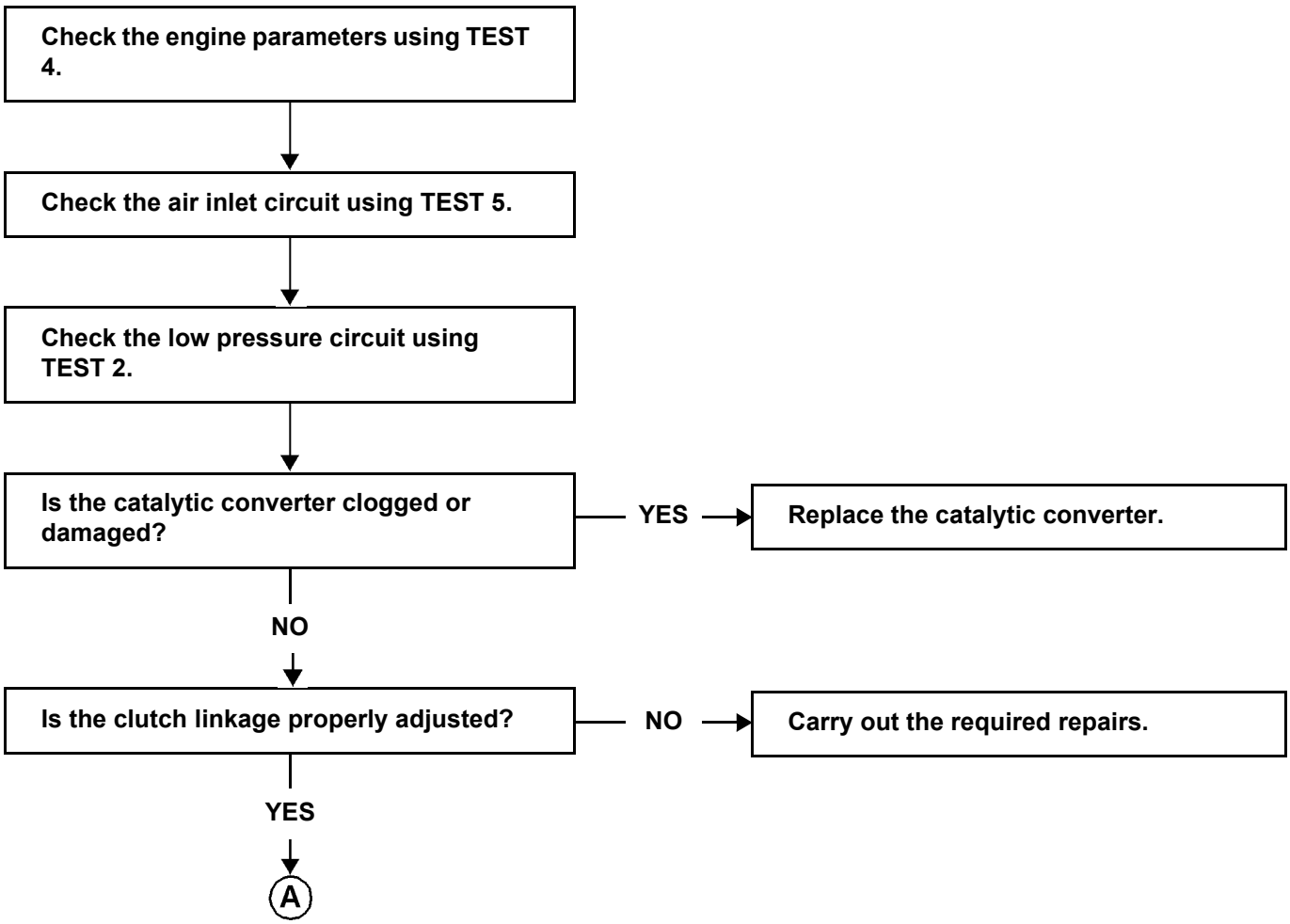


CHART 15 Cont'd	

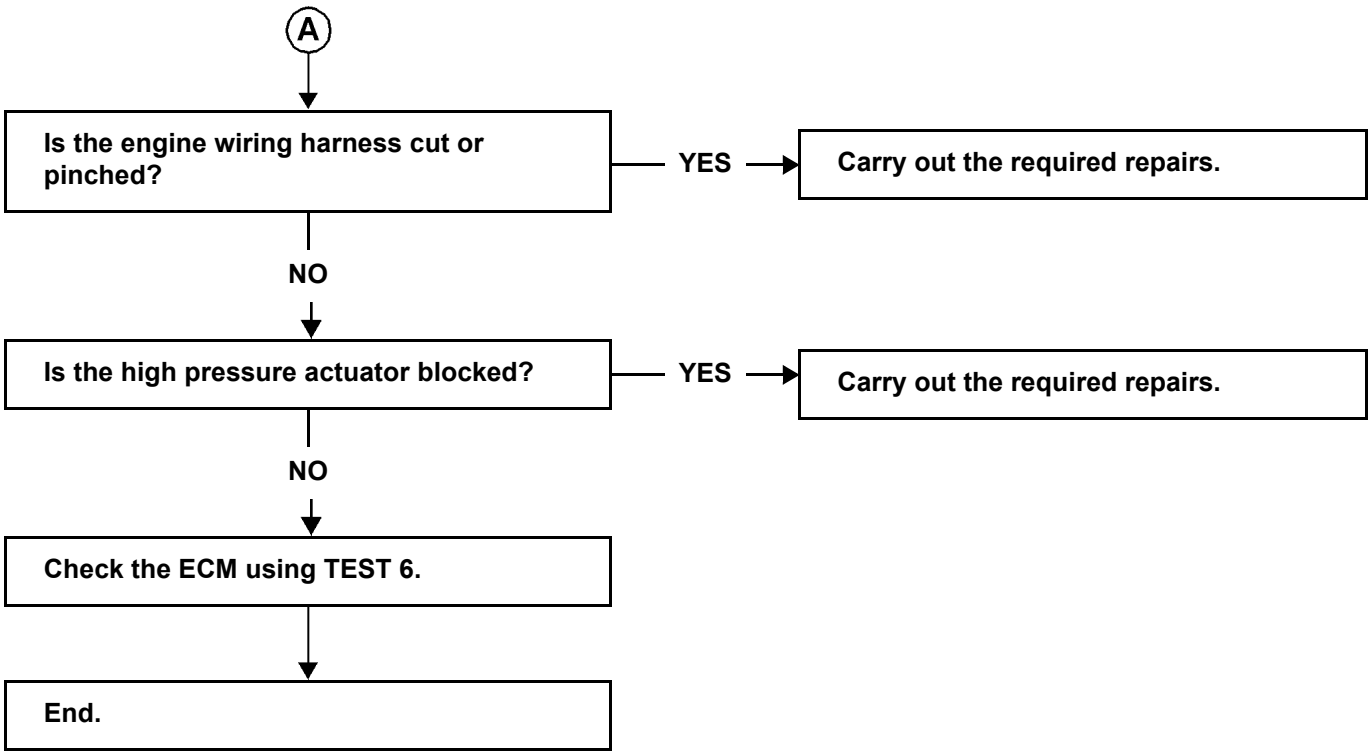


CHART 16	THE ENGINE DOES NOT STOP

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

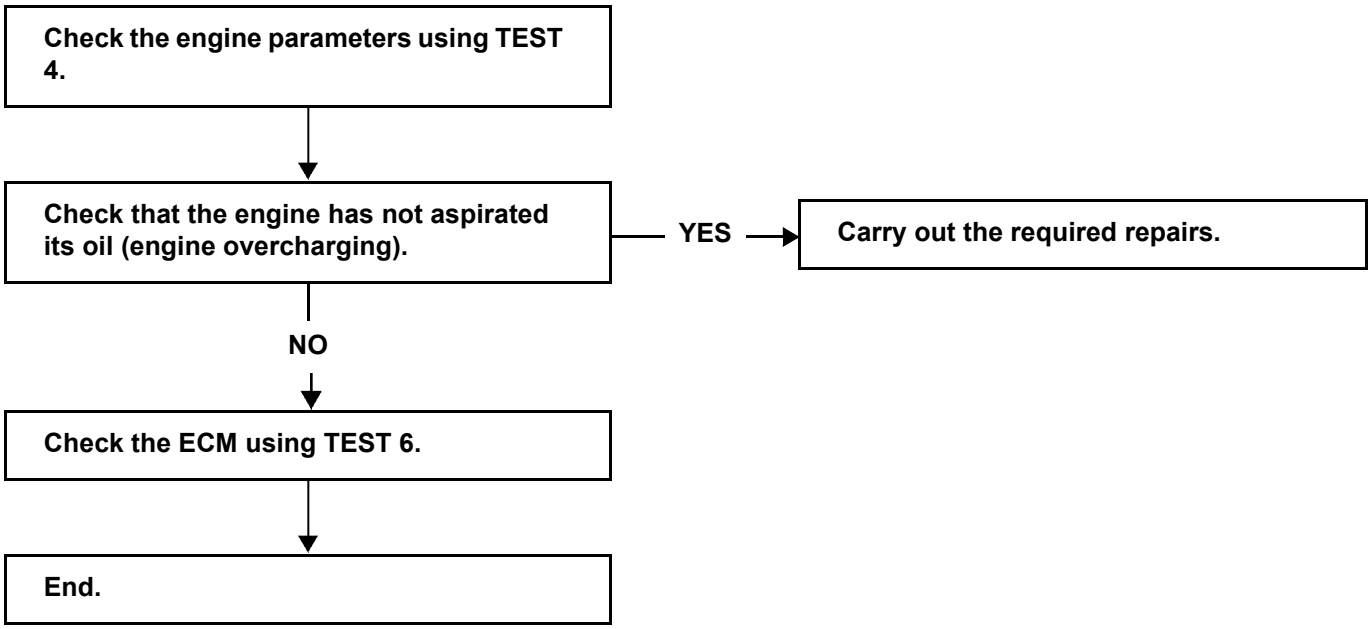


CHART 17	CLANKING ENGINE, NOISY ENGINE

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

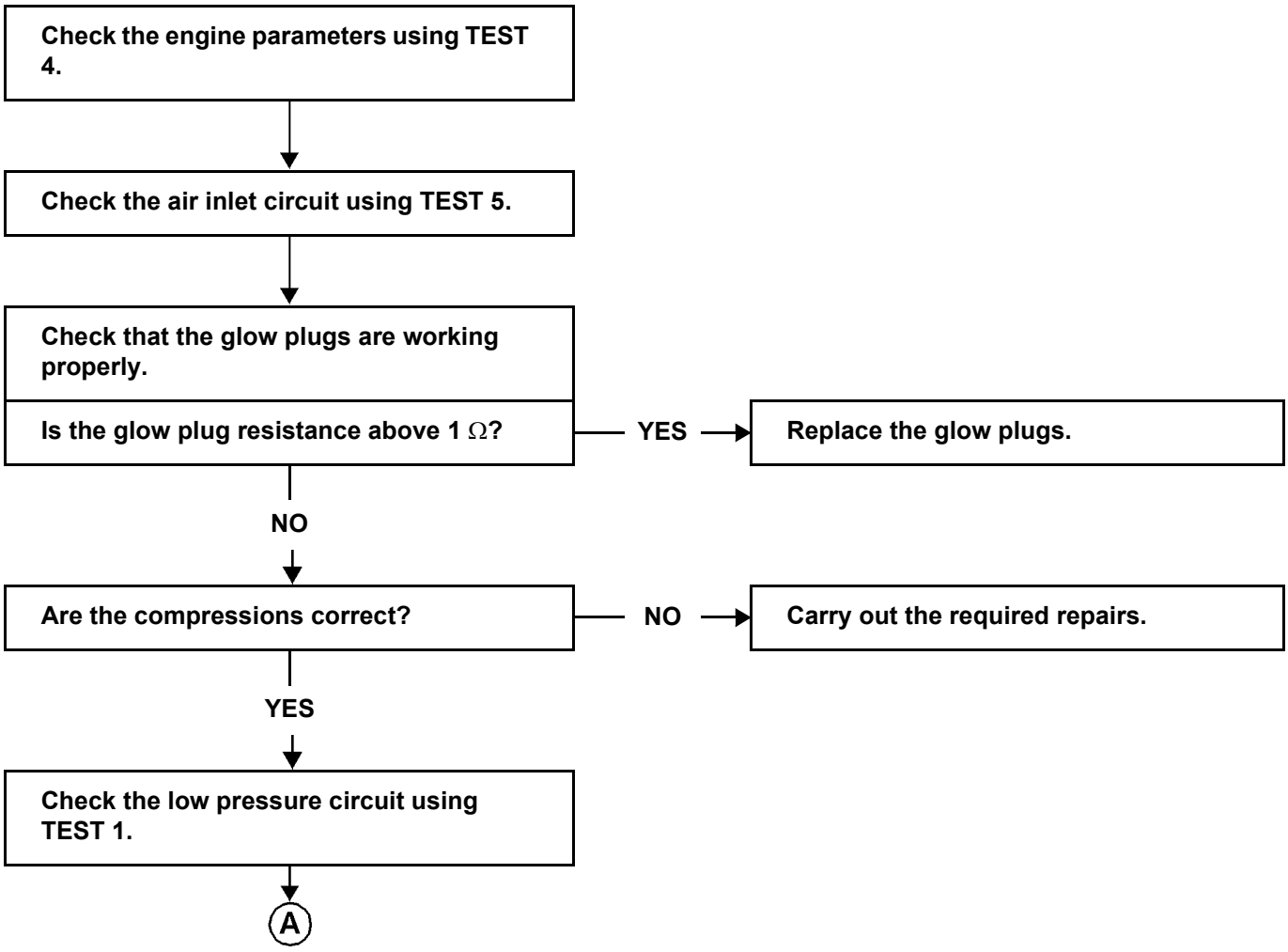


CHART 17 Continued	

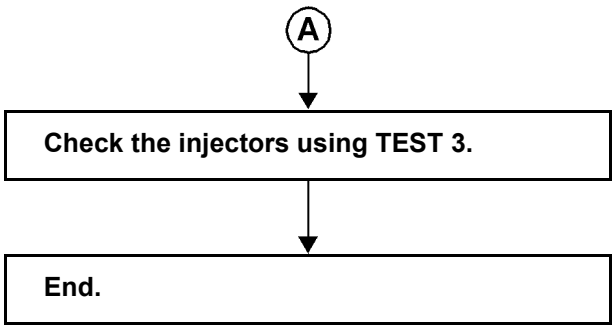


CHART 18	SQUALLING NOISE

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

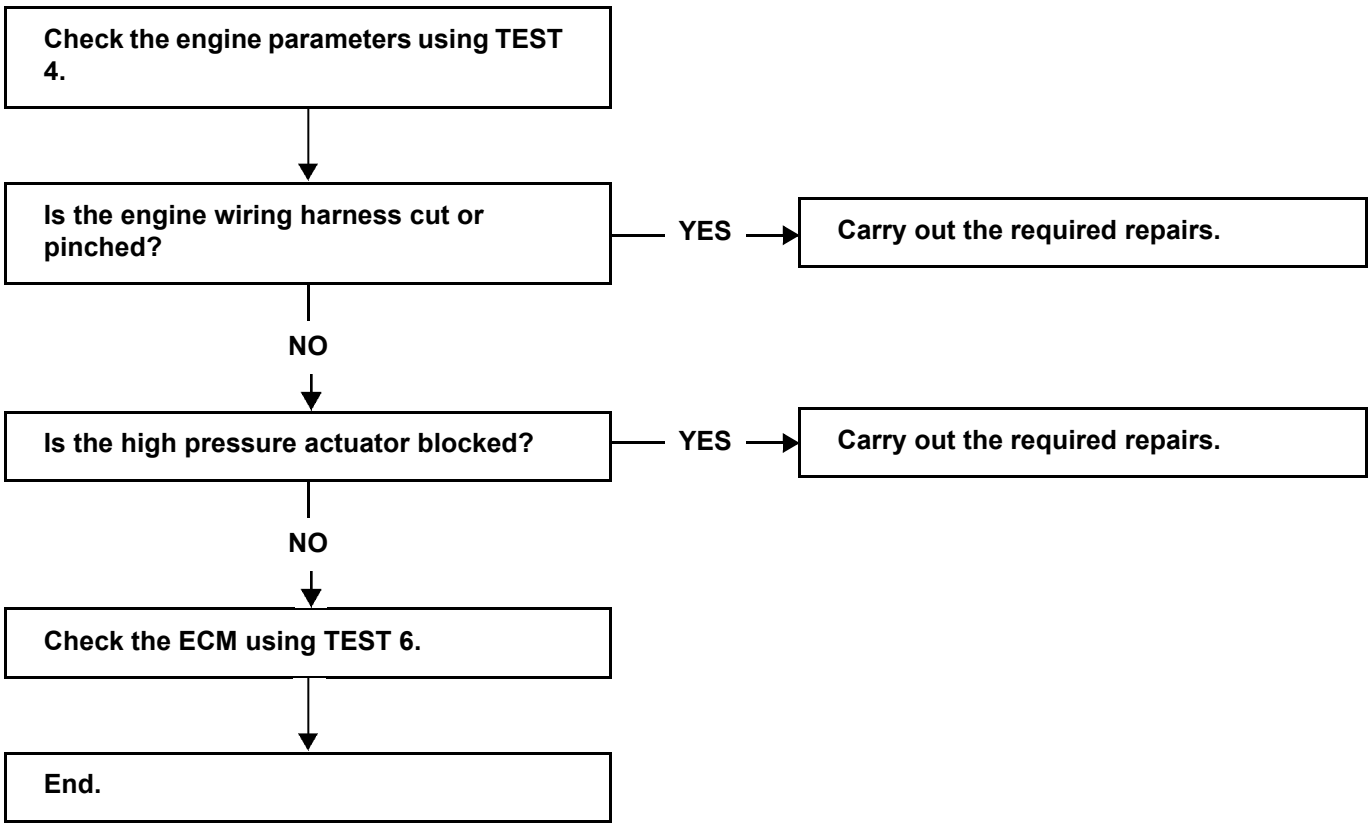


CHART 19	VARIOUS MECHANICAL NOISES

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

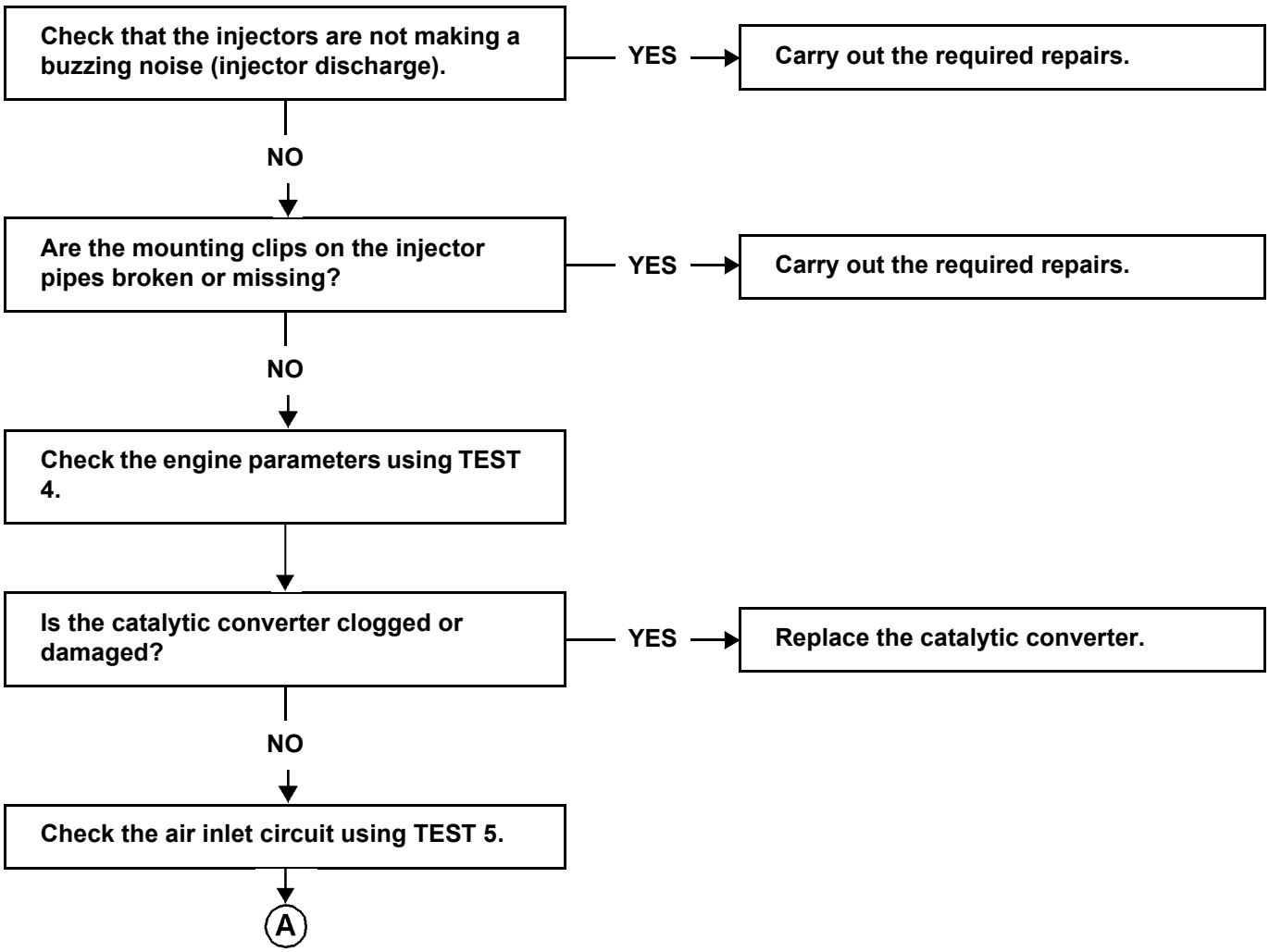


CHART 19 Cont'd	

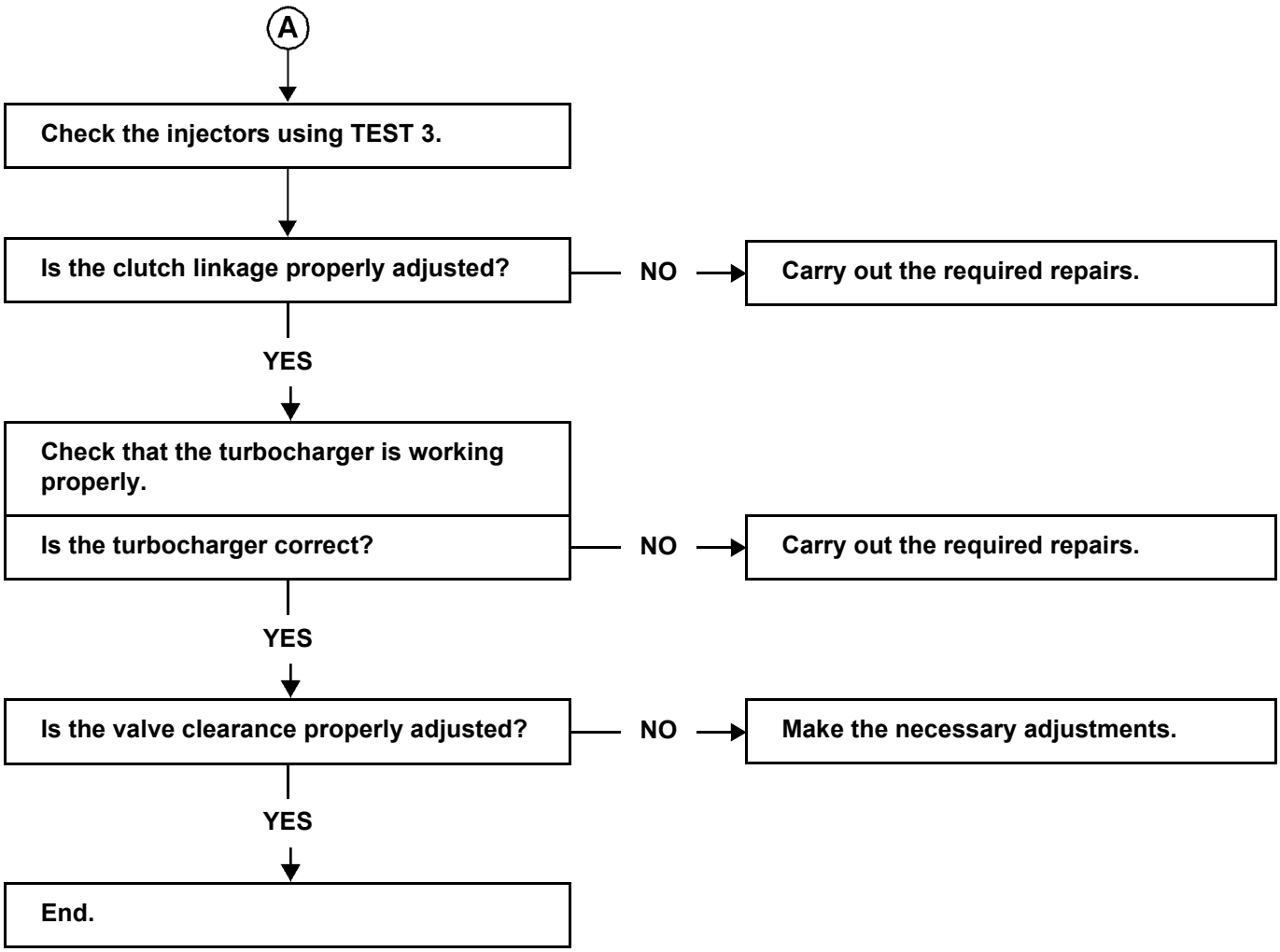


CHART 20	EXHAUST ODOURS

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

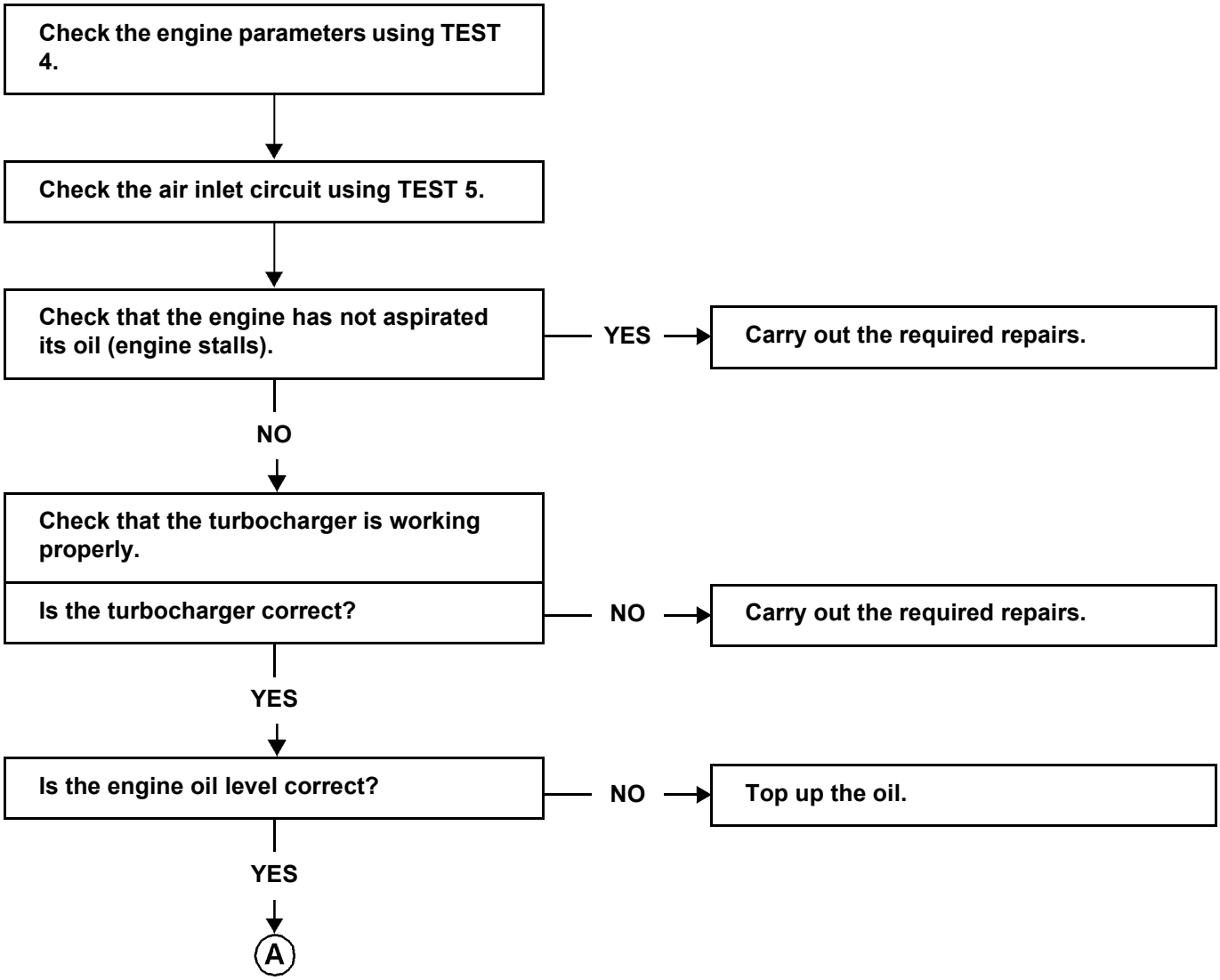


CHART 20 Cont'd	

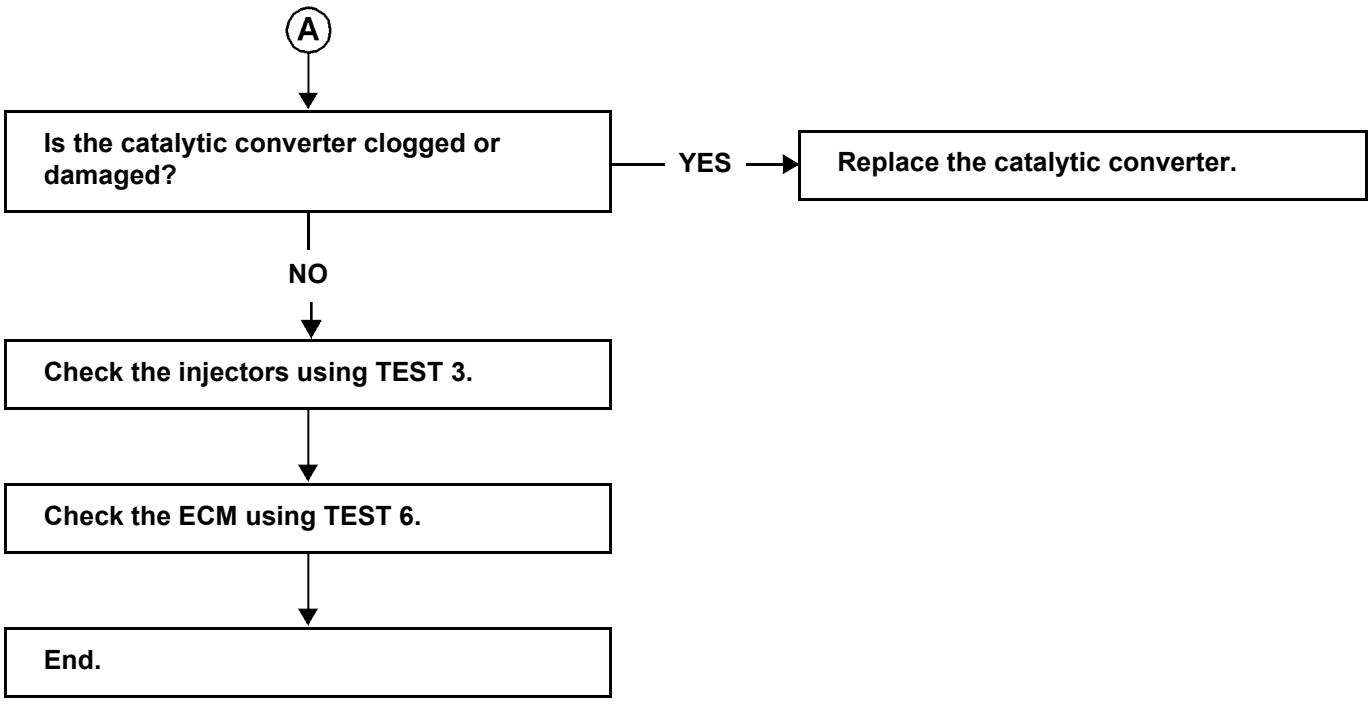


CHART 21	DIESEL ODOURS

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

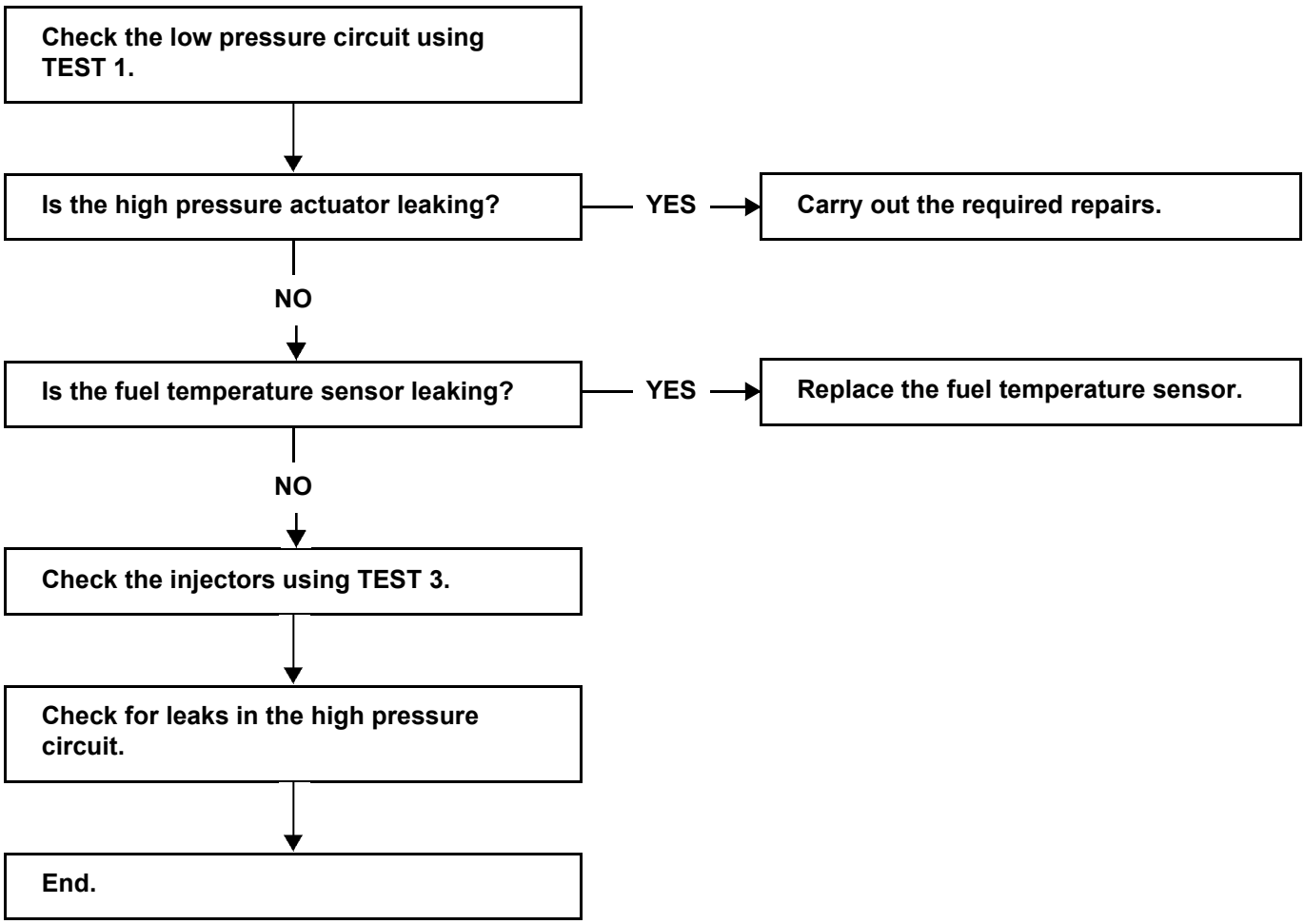


CHART 22	BLUE, WHITE OR BLACK SMOKE

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

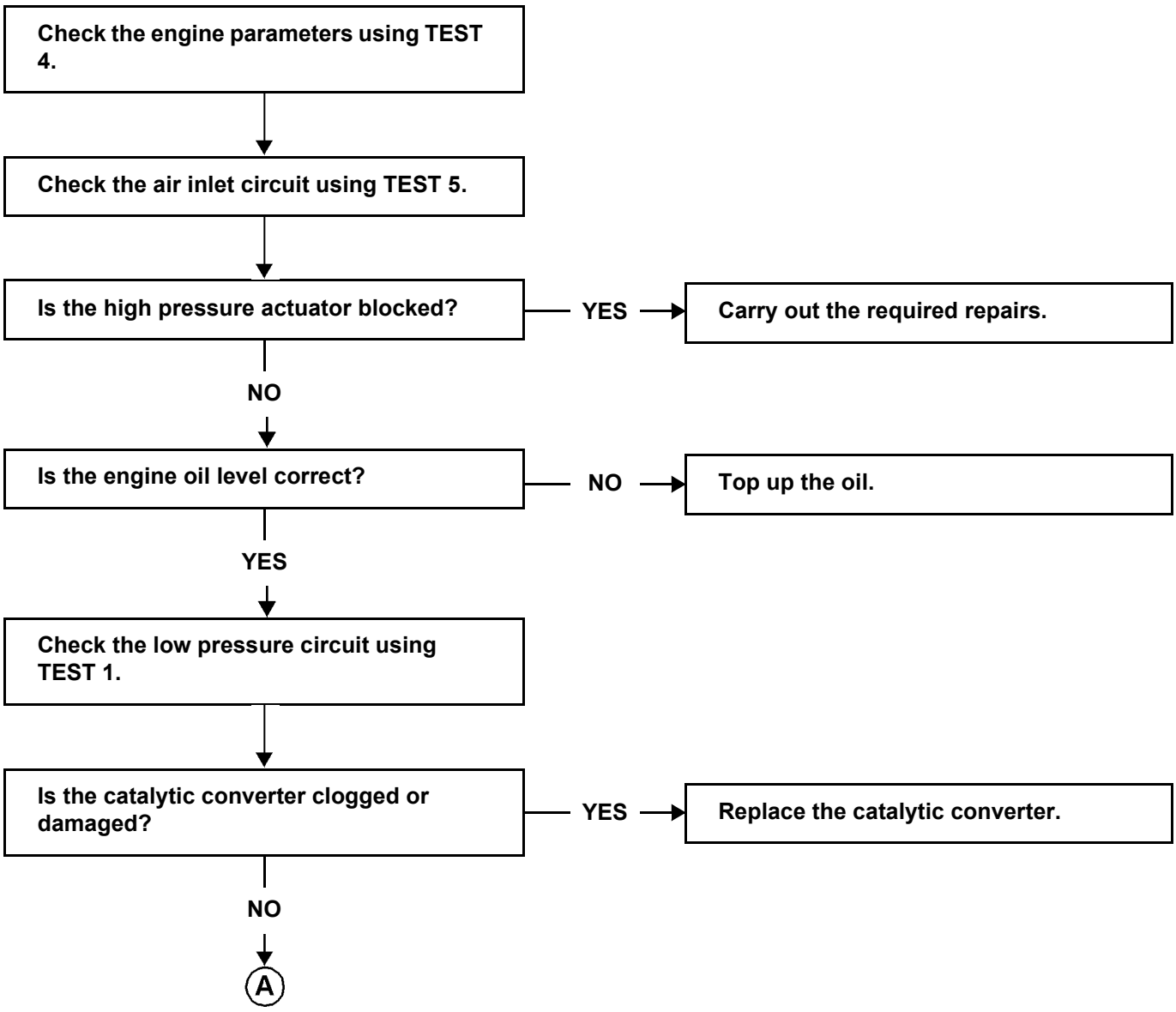


CHART 22 Cont'd	

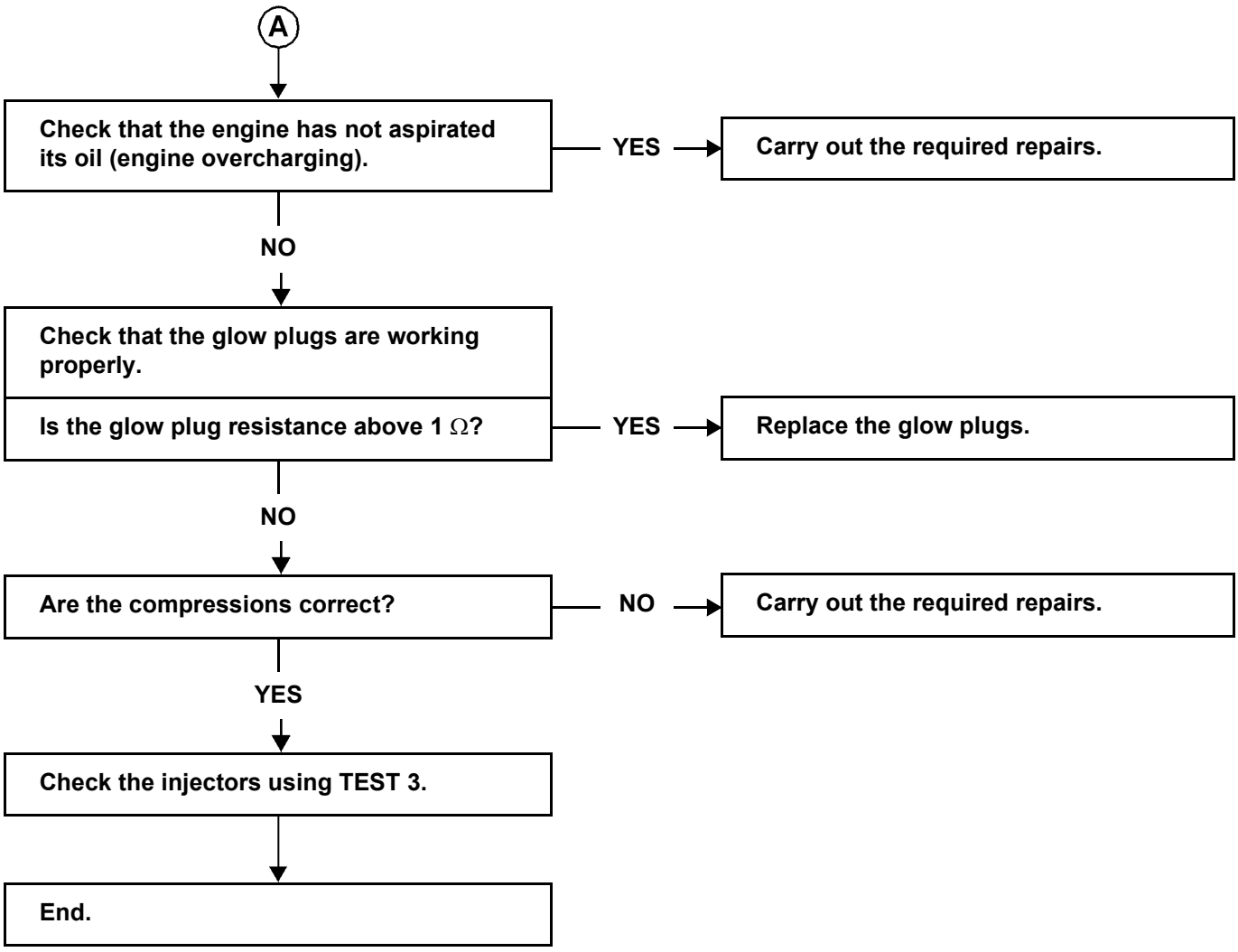


CHART 23	SMOKE (BLUE, BLACK OR WHITE) ON ACCELERATING

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

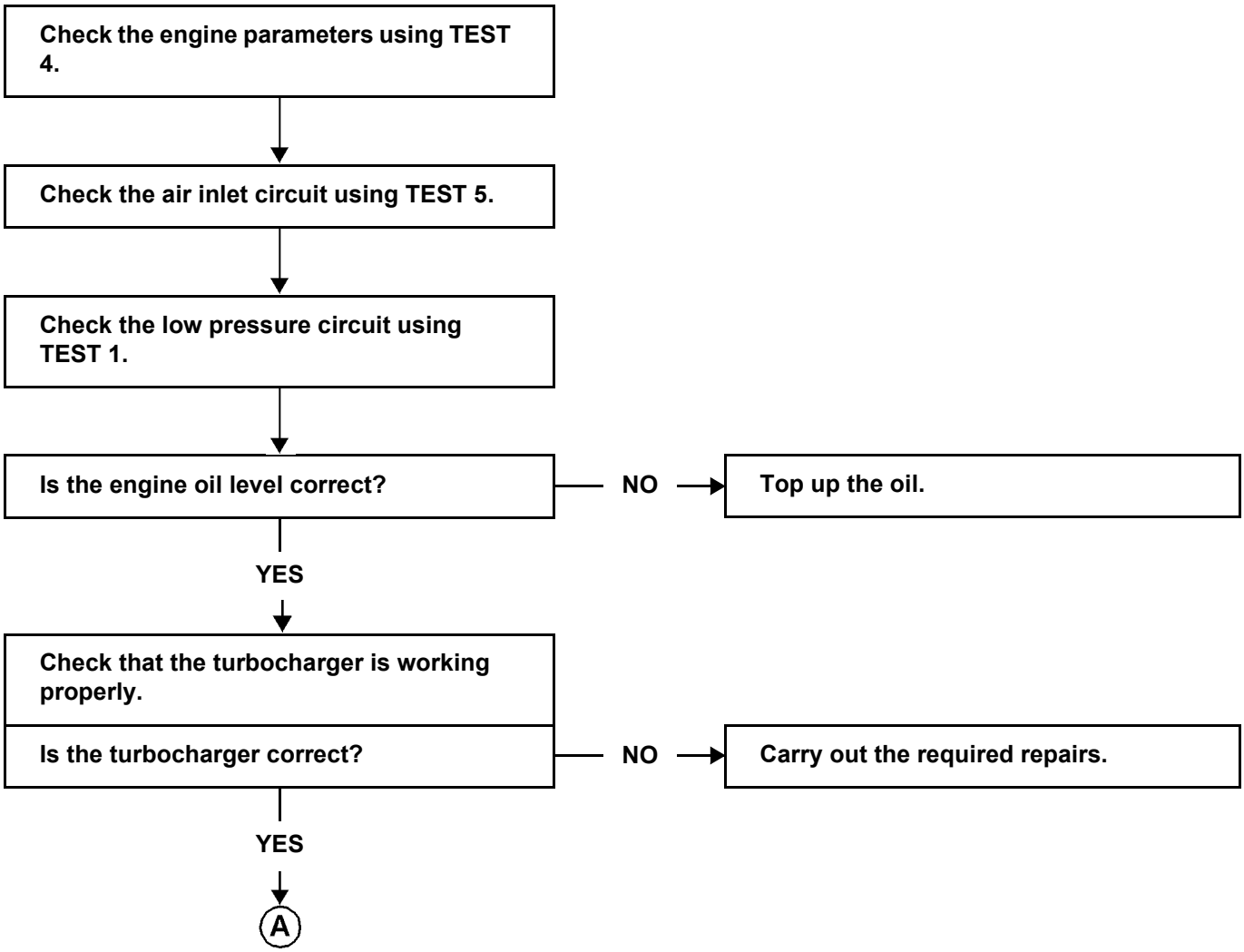


CHART 23 CONTINUED 1	

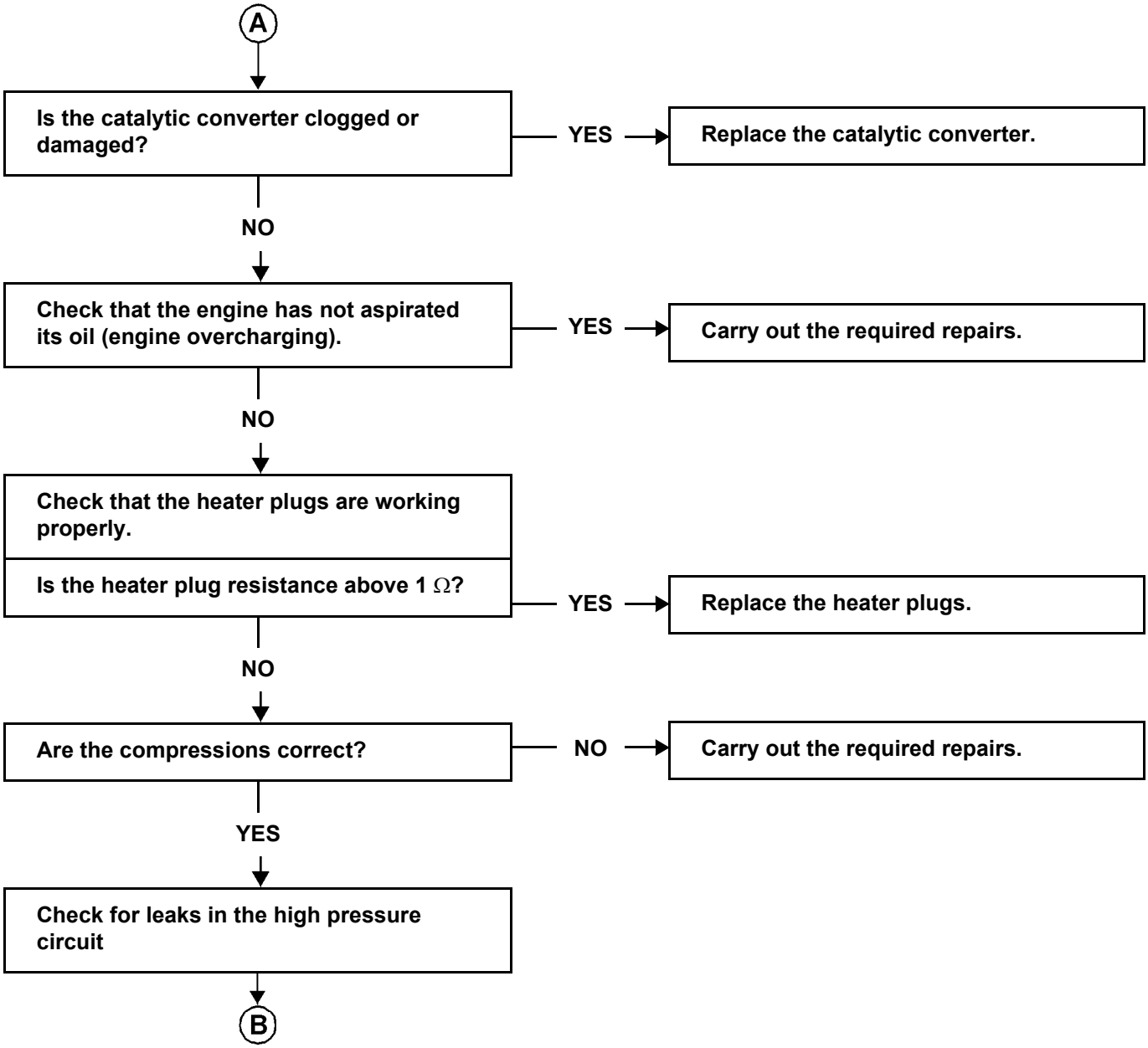
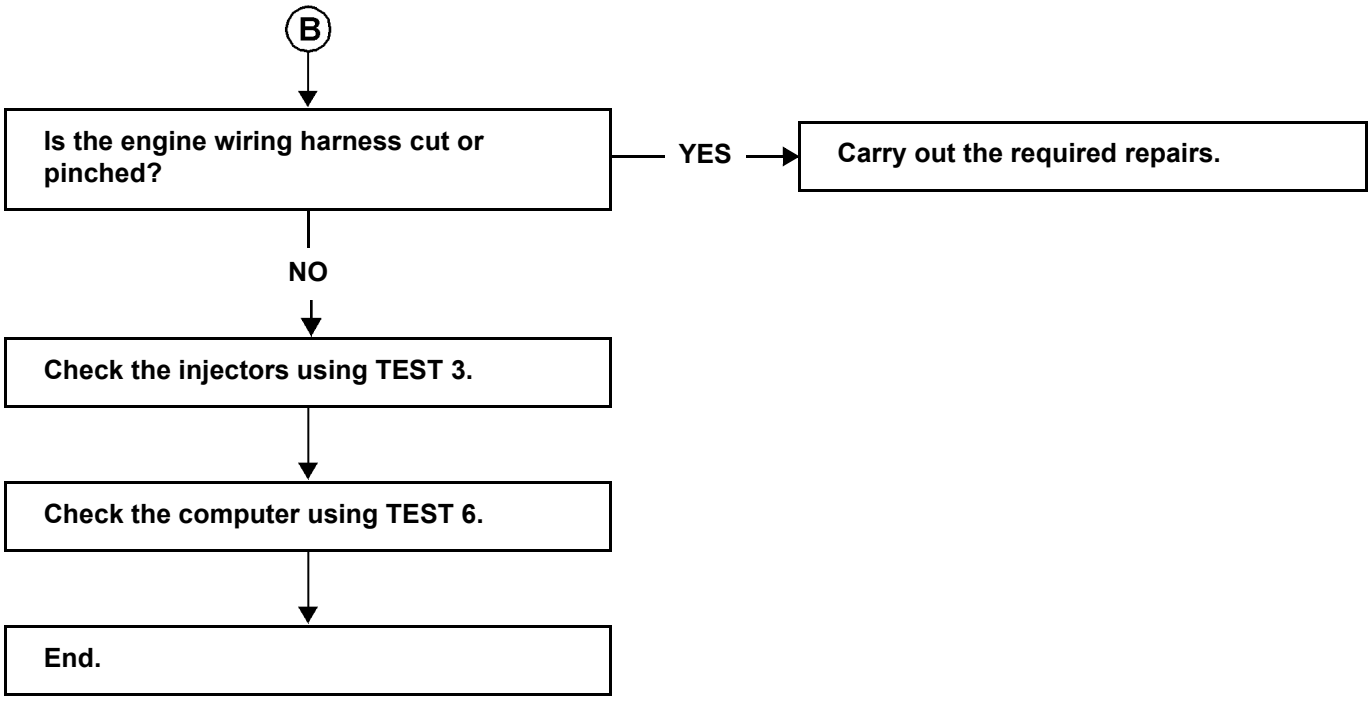


CHART 23 Cont'd	



DIESEL EQUIPMENT
Cleanliness

CLEANLINESS INSTRUCTIONS WHICH MUST BE FOLLOWED WHEN WORKING ON THE HIGH PRESSURE DIRECT INJECTION SYSTEM

Risks relating to contamination

The system is very sensitive to contamination. The risks caused by the introduction of contamination are:
– damage or destruction of the high pressure injection system and the engine,
– seizing or leaking of a component.

All After-Sales operations must be performed under very clean conditions. This means that no impurities (particles a few microns in size) get into the system during dismantling or into the circuits via the fuel unions.

The cleanliness principle must be applied from the filter to the injectors.

WHAT ARE THE SOURCES OF CONTAMINATION?

Contamination is caused by:
– metal or plastic chips,
– paint,
– fibres:
  - boxes,
  - brushes,
  - paper,
  - clothing,
  - cloths,
– foreign bodies such as hair,
– ambient air,
– etc.

IMPORTANT: It is not possible to clean the engine using a high pressure washer because of the risk of damaging connections. In addition, moisture may collect in the connectors and create electrical connection malfunctions.

INSTRUCTIONS TO BE FOLLOWED BEFORE ANY WORK IS CARRIED OUT ON THE INJECTION SYSTEM

- Ensure that you have the plugs for the unions to be opened (bag of plugs sold at the Parts Stores - Nissan part No.: 16830 BN700, Renault part No.: 77 01 206 804). Plugs are to be used once only. After use, they must be thrown away (once used they are soiled and cleaning is not sufficient to make them reusable). Unused plugs must be thrown away.

- Ensure that you have hermetically resealable plastic bags for storing removed parts. Stored parts will therefore be less subject to the risk of impurities. The bags must be used only once, and after use they must be thrown away.

- Lint-free towelettes to be used for injection pump related service purpose. The use of a normal cloth or paper for cleaning purposes is forbidden. These are not lint-free and may contaminate the fuel circuit of the system. Each lint-free cloth should only be used once.

INSTRUCTIONS TO BE FOLLOWED BEFORE OPENING THE FUEL CIRCUIT

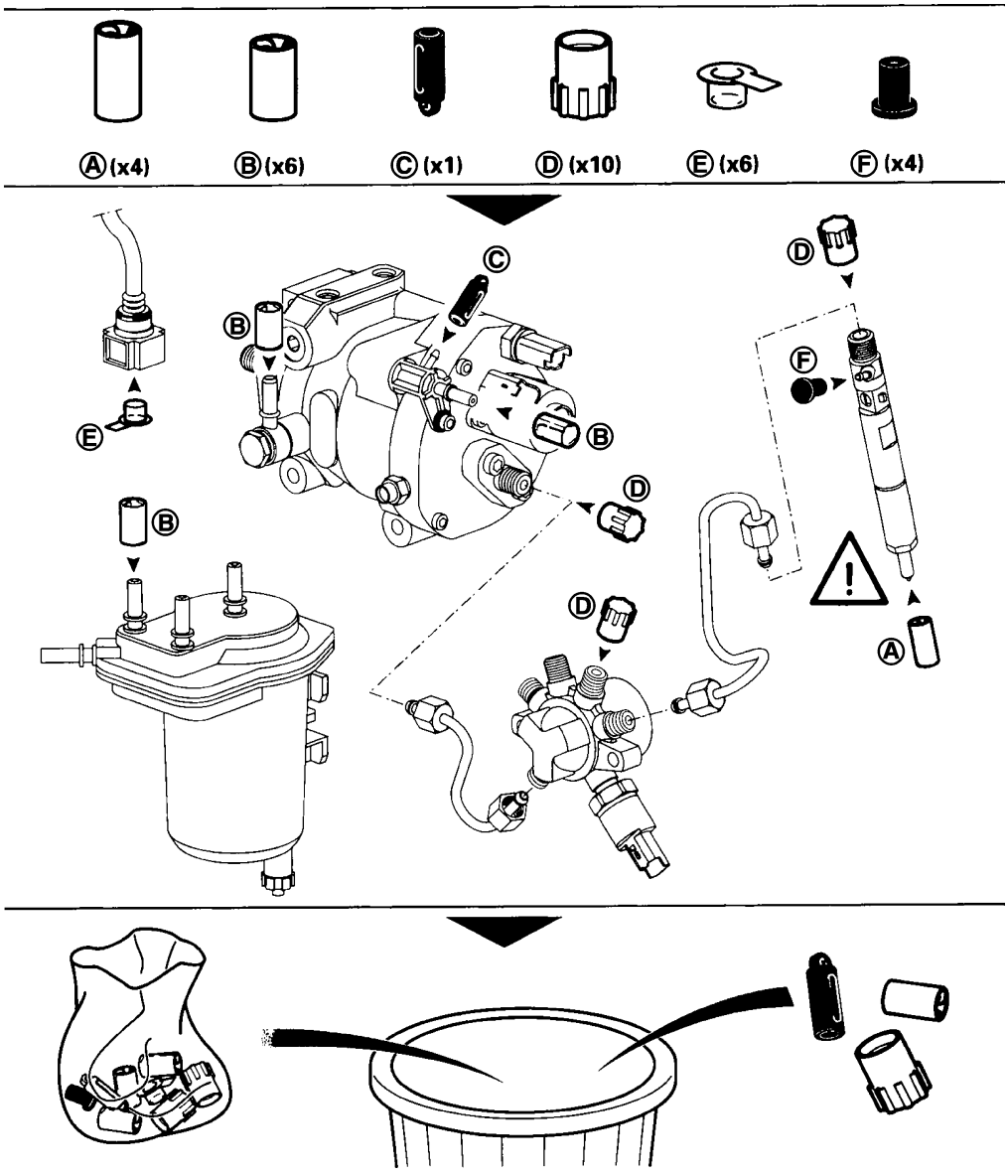
- For each operation, use new thinner (used thinner contains impurities). Pour it into a clean receptacle.
- For each operation, use a clean brush which is in good condition (the brush must not shed its bristles).
- Use a brush and thinners to clean the connections to be opened.
- Blow compressed air over the cleaned parts (tools, cleaned the same way as the parts, connections and injection system zone). Check that no bristles remain adhered.
- Wash your hands before and during the operation if necessary.
- When wearing leather protective gloves, cover these with latex gloves.

INSTRUCTIONS TO BE FOLLOWED DURING THE OPERATION

- As soon as the circuit is open, all openings must be plugged to prevent impurities from entering the system. The plugs to be used are available from the Parts Stores - Nissan part No.: 16830 BN700, Renault part No.: 77 01 206 804. They must not, under any circumstances, be reused.
- Close the hermetically sealed bag, even if it has to be reopened shortly afterwards. Ambient air carries contamination.
- All components of the injection system that are removed must be stored in a hermetically sealed plastic bag once the plugs have been inserted.
- The use of a brush, thinner, bellows, sponge or normal cloth is strictly forbidden once the circuit has been opened. These items are likely to allow impurities to enter the system.
- A new component replacing an old one must not be removed from its packaging until it is to be fitted to the vehicle.

Instructions For Fitting The Plugs

Nissan part number: 16830 BN700
(Renault part number: 77 01 206 804)



MBIB0321E

CAUTION:

- **The engine must not run with:**
  - **Diesel containing more than 10% diester**
  - **Petrol, even in very small amounts.**
- **The system can inject the diesel into the engine at a pressure of up to 140,000 kPa (1,400 bar, 1,428 kg/cm^2, 20,300 psi). Before carrying out any work, check that the injector rail is no longer pressurized and that the fuel temperature is not too high.**
- **You must respect the cleaning and safety advice specified in this document for any work on the high pressure injection system.**

The high pressure injection system is intended to deliver a specific quantity of diesel to the engine at a specific time.

DESCRIPTION

- **DELPHI DCM1.2 Common Rail** injection system controlling **112 terminals** ECM.
  Refer to system diagram of system components for details.

- The system consists of:
– a priming pump on the low pressure circuit,
– a diesel fuel filter,
– a high pressure pump incorporating a low pressure pump (transfer pump),
– a flow actuator attached to the pump,
– an injector rail,
– a pressure sensor located in the rail,
– four solenoid injectors,
– a fuel temperature sensor,
– an engine coolant temperature sensor,
– an intake (upstream) air temperature sensor,
– a camshaft position sensor (cylinder reference sensor),
– a turbocharger air pressure sensor,
– a knock sensor (accelerometer),
– an EGR solenoid valve,
– an accelerator pedal potentiometer,
– and an ECM.

- The "common rail" direct high pressure injection system works sequentially (based on the operation of multipoint injection for petrol engines).

- This new injection system reduces operating noise, reduces the volume of pollutant gases and particles and produces high engine torque at low engine speeds thanks to a pre-injection procedure.

- The high pressure pump generates the high pressure sent to the injector rail. The flow actuator on the pump controls the quantity of diesel engine fuel supplied according to the demand determined by the ECM. The rail supplies each injector through a steel pipe.

- The ECM:
  - determines the value of injection pressure necessary for the engine to operate well and then controls the pressure regulator. It checks that the pressure value is correct by analysing the value transmitted by the pressure sensor located on the rail,
  - determines the injection time necessary to deliver the right quantity of diesel and the moment when injection should be started,
  - controls each injector electrically and individually after determining these two values.

- The injected flow to the engine is determined by:
  - the duration of injector control,
  - the injector opening and closing speed,
  - the needle travel (determined by a constant for the type of injector),
  - the nominal hydraulic flow of the injector (unique to each injector),
  - the high pressure rail pressure controlled by the ECM.

- The ECM controls:
  - the idle speed adjustment,
  - the exhaust gas flow reinjected into the inlet,
  - the fuel supply control (advance, flow and rail pressure),
  - the cooling fan control,
  - the heat adjustment of the coolant circuit (thermoplungers),
  - the glow plug (pre/post heating) control.

- The high pressure pump is supplied at low pressure by an integrated low pressure pump (transfer pump). It supplies the rail whose pressure is controlled for charge by the flow actuator and for discharging by the injector valves. Falls in pressure can be compensated for in this way. The flow actuator allows the high pressure pump to provide just the amount of diesel fuel necessary to maintain the pressure in the rail. Thanks to this element, heat generation is minimised and engine output improved.
  In order to discharge the rail using the injector valves, the valves are controlled by short electrical impulses:
  - short enough not to open the injector, (through the return circuit from the injectors),
  - long enough to open the valves and discharge the rail.

- The ECM controls the cooling fans and the coolant temperature warning light on the instrument panel.

IMPORTANT

- **The engine must not operate with:**
  - **diesel engine fuel containing more than 10% diester,**
  - **petrol, even in tiny quantities.**
- **The system can inject the diesel into the engine at a pressure up to 1400 bars. Before carrying out any work, check that the injector rail is not under pressure and that the fuel temperature is not too high.**
- **You must respect the cleaning and safety advice specified in this document for any work on the high pressure injection system.**
- **Removal of the interior of the pump and injectors is prohibited. Only the flow actuator, the fuel temperature sensor and the venturi can be replaced.**
- **For safety reasons, it is strictly forbidden to slacken a high pressure pipe union when the engine is running.**
- **It is not possible to remove the pressure sensor from the fuel rail because this may cause circuit contamination malfunctions. If the pressure sensor fails, the pressure sensor, the rail and the five high pressure pipes must be replaced.**
- **It is strictly forbidden to remove any injection pump pulley marked number 070 575. If the pump is being replaced, the pulley must be replaced.**
- **It is forbidden to repair the wiring connecting the knock sensor (accelerometer) and the CKP sensor (engine speed sensor). If the wiring should fail, it has to be replaced with new wiring.**
- **Applying 12 volts directly to any component in the system is prohibited.**
- **Ultrasonic carbon removal and cleaning are prohibited.**
- **Never start the engine without the battery being connected correctly.**
- **Disconnect the injection system ECM when carrying out any welding work on the vehicle.**
- **It is essential to replace all the disconnected air inlet plastic pipes.**

There is a 16 digit code on the injectors called individual injector correction. This code is specific to each injector, and takes into account differences in manufacture and specifies the flow injected by each of them.

When an injector is replaced, it is necessary to program the code of the new injector into the ECM.

When an ECM is replaced, it is necessary to program the codes of the four injectors.

<u>There are two possibilities:</u>

- **If it is possible to communicate with the ECM:**
  - **read out the data from the ECM using the "SAVE DATA FOR REPLACE" in "WORK SUPPORT" mode with CONSULT-II**
  - **turn ignition switch OFF.**
  - **remove battery negative cable.**
  - **change the ECM**
  - **reprogram the data from the "WRITE DATA AFTER REPLACE" in "WORK SUPPORT" mode with CONSULT-II to the replaced ECM**
  - **after replacement, ensure that the ECM has not detected malfunctions relating to the injector codes and check that the instrument panel warning light is off.**

- **If it is not possible to communicate with the ECM:**
  - **turn ignition switch OFF.**
  - **remove battery negative cable.**
  - **change the ECM**
  - **read the data on the injectors**
    Refer to EC-K9K-256 for individual injector correction value location.
  - **enter the data in the ECM using the "ENTER INJCTR CALIB DATA" in "WORK SUPPORT" mode with CONSULT-II manually**
  - **reconfigure the different elements such as the power-assisted steering pump assembly and the thermoplungers etc.**
  - **using CONSULT-II, ensure that the ECM has not detected malfunctions relating to the injector codes and check that the instrument panel warning light is off.**

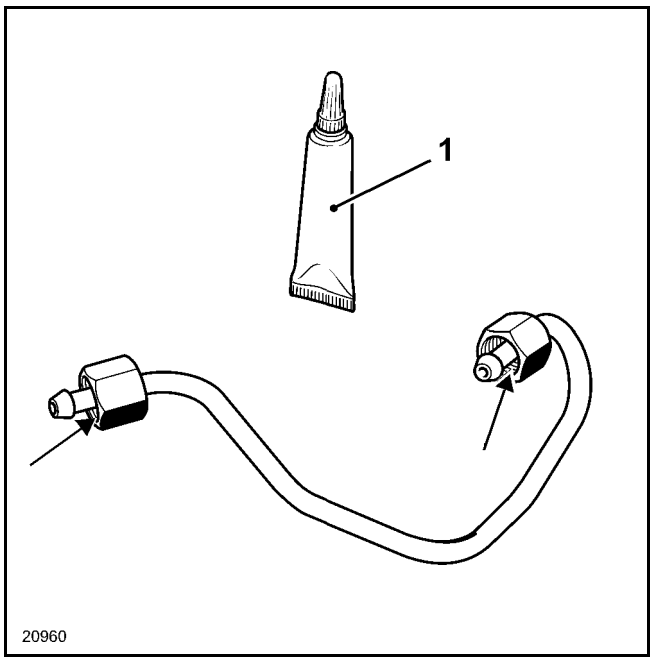
All the high pressure pipe removed must be systematically replaced along with the clips.

TIGHTENING THE HIGH PRESSURE PIPES

NOTE: fit the pump/rail pipe before the rail/injector pipes.

Rail-pump pipe

– Undo the rail,
– Grease the threads of the high pressure pipe nuts,
– Insert the high pressure pipe olive into the taper of the high pressure pump outlet,
– Insert the high pressure pipe olive into the taper of the high pressure rail inlet.
– Move the nut into position by hand, on the rail side then the pump side,
– Tighten the rail,
– Tighten the high pressure pipe nuts on the rail side then on the pump side.



Rail/injector pipes

– Undo the rail,
– Grease the threads of the high pressure pipe nuts,
– Insert the high pressure pipe olive into the taper of the high pressure injector inlet,
– Insert the high pressure pipe olive into the taper of the high pressure rail outlet,
– Move the nuts into position by hand, on the injector side then the rail side,
– Tighten the rail,
– Ensure that the new clip, supplied with the new high pressure pipe, is fitted,
– Tighten the nuts of the high pressure pipes on the injector side first and then on the fuel rail side.

NOTE: Before fitting a new high pressure pipe, move back the nuts on the pipe then lightly lubricate the nut threads with the oil from the sachet (1) provided in the parts kit.

CHECKING SEALING AFTER REPAIR

After any operation, check that there are no diesel leaks.

Reprime the circuit using the priming pump.

Start the engine and allow to warm up at idle speed, visually inspecting for any fuel leaks.

Apply tracing fluid around the high pressure connections of the pipe that has been replaced.

Once the engine coolant temperature is above **50°C** and provided there are no malfunctions present, carry out a road test, taking the engine speed up to **4000 rpm** at least once to check that there are no leaks.

Perform a visual inspection after the road test to make sure that there are no high pressure leaks.

Clean off the tracing fluid.

REPLACING THE ECM

The system can be reprogrammed using CONSULT-II.

Before an ECM is replaced in after-sales, the following must be done.

- Check the individual correction value from "WORK SUPPORT" mode using print out function of CONSULT-II.
- After replacing ECM, enter each injector's individual correction value using "WORK SUPPORT" mode with CONSULT-II.
- Also set the system configuration using "CONFIGURATION" mode with CONSULT-II.

REPLACING THE INJECTORS

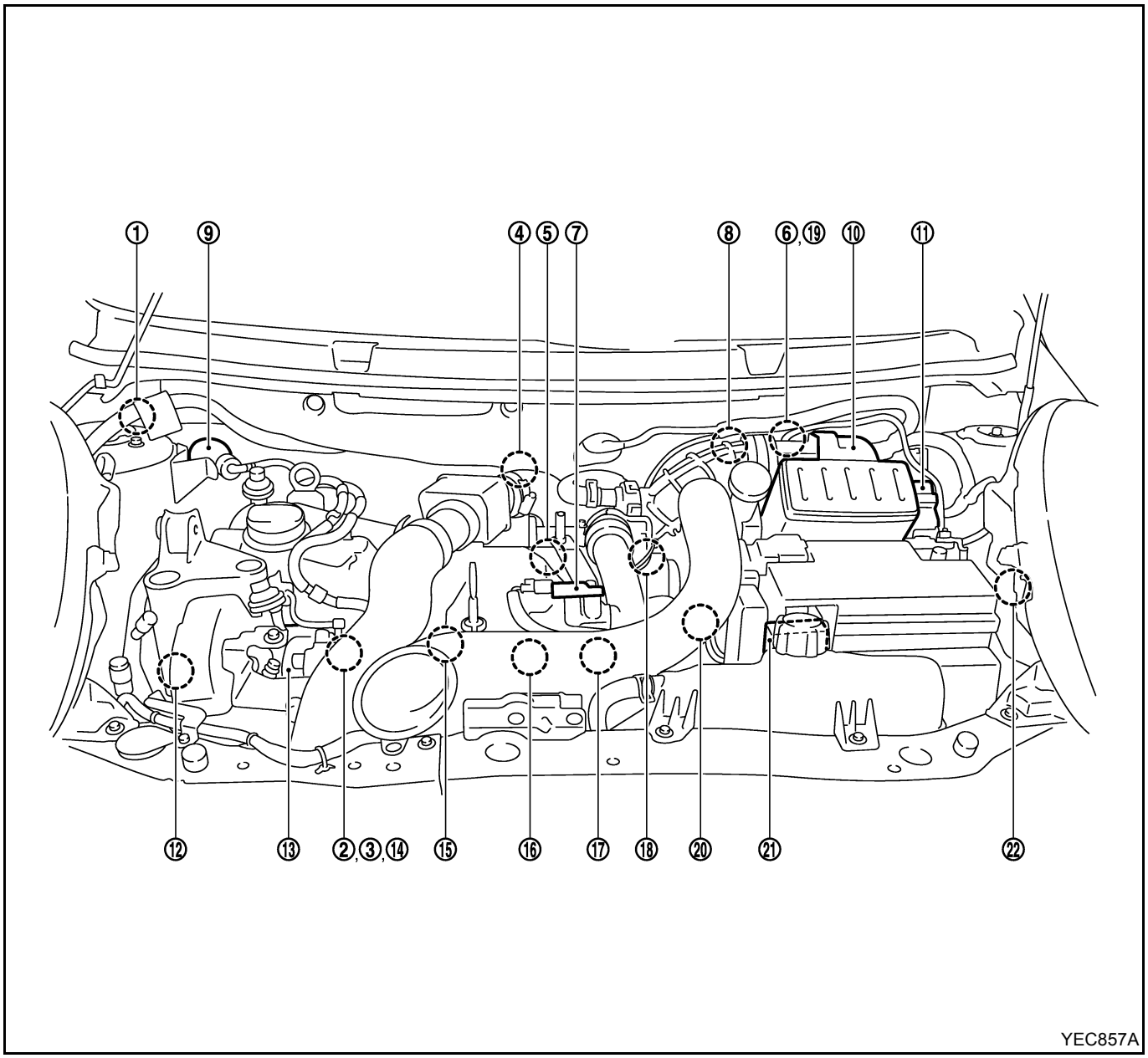
NOTE: Individual injector correction is a factory calibration carried out on each injector to adjust the flow of each one precisely, taking into account differences in manufacture.

The correction values are written on a label affixed to each injector then entered in the ECM which can then control each injector by taking account of their differences in manufacture.

The system can be programmed "WORK SUPPORT" mode with CONSULT-II.

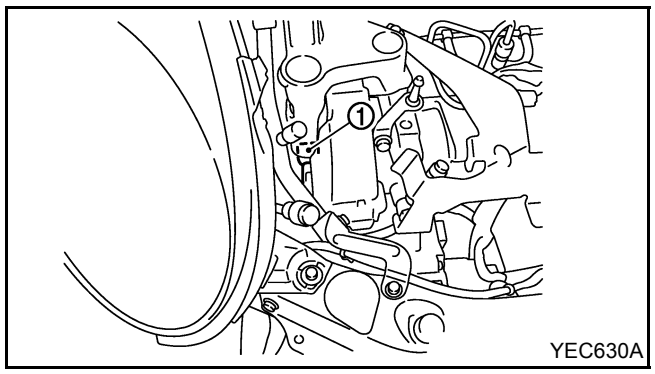
The correction values (16 digit code) must be replaced after replacing an injector. (Refer to special features)

- **Entering each injector's individual correction value**, when replacing the ECM.

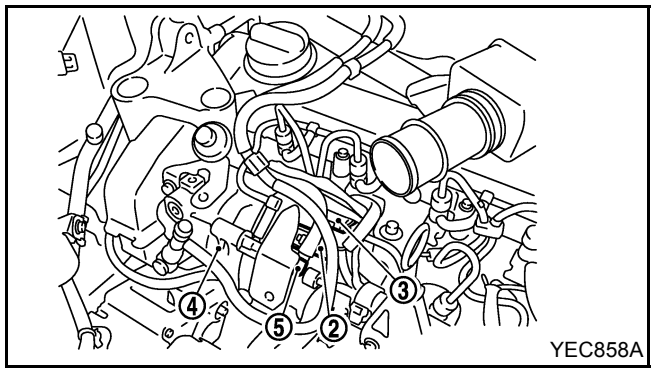


1. Fuel filter (LHD models)
2. Venturi
3. Fuel temperature sensor
4. EGR control solenoid valve
5. Injector
6. Mass air flow sensor
7. Turbocharger boost pressure sensor
8. Fuel filter (RHD models)
9. Priming pump (LHD models)
10. Air cleaner
11. ECM
12. Camshaft position sensor
13. High pressure pump
14. Fuel flow actuator
15. Knock sensor (Accelerometer)
16. Spherical injector rail
17. Common rail fuel pressure sensor
18. Engine coolant temperature sensor
19. Intake air temperature sensor
20. Crankshaft position sensor
21. Glow relay (control) unit
22. IPDM E/R

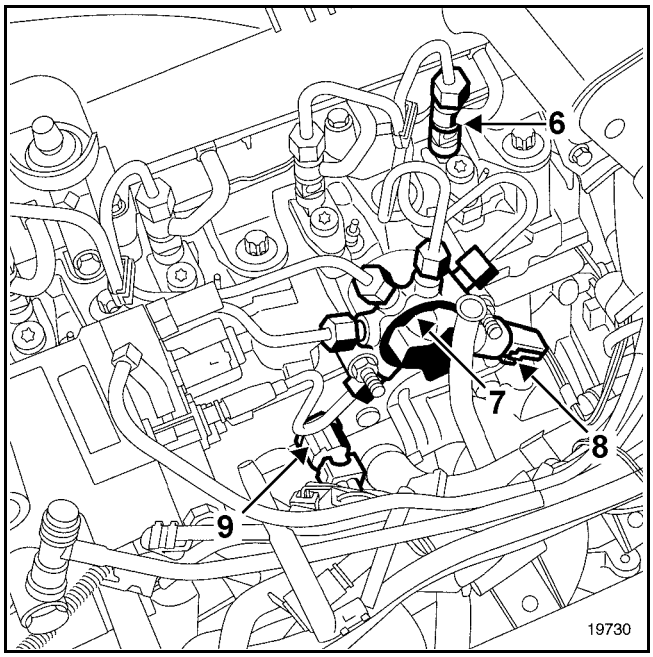
1 Camshaft position sensor



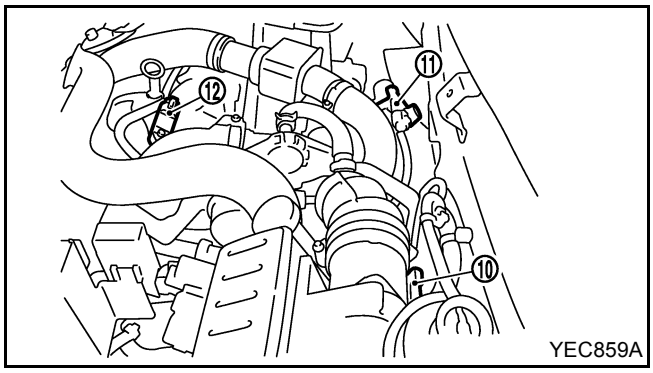
2 Fuel flow actuator
3 Fuel temperature sensor
4 High pressure pump
5 Venturi



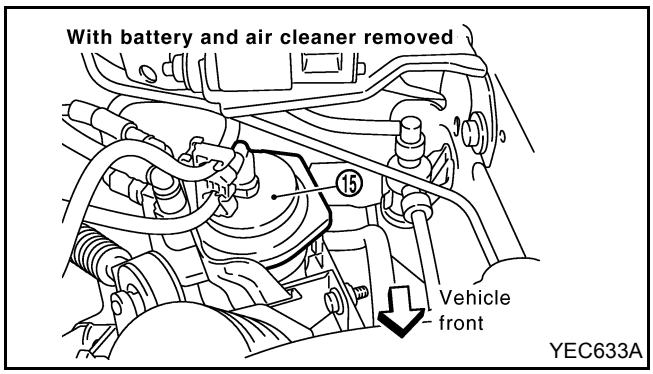
6 Injector
7 Injector rail
8 Rail pressure sensor
9 Knock sensor (Accelerometer)

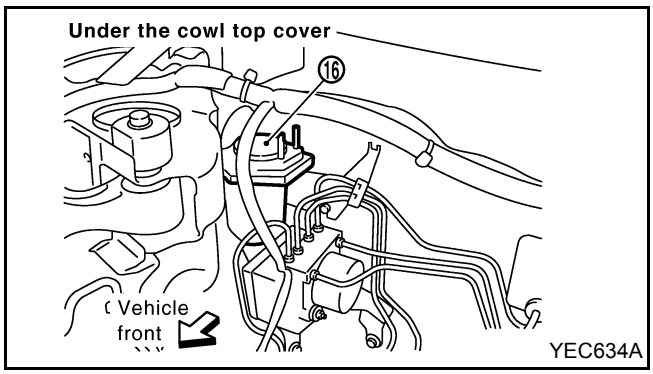


10 Mass air flow sensor and intake air temperature sensor
11 EGR control solenoid valve
12 Turbocharger boost pressure sensor

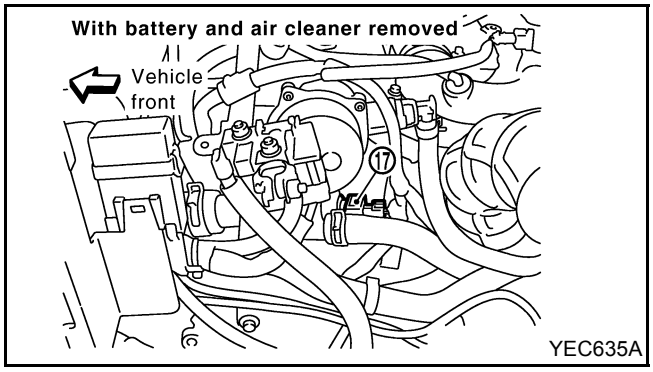


15 Fuel filter (RHD models)
16 Fuel filter (LHD models)

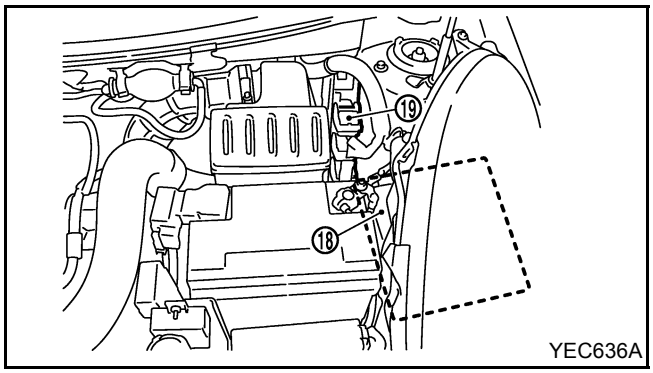




17 Engine coolant temperature sensor



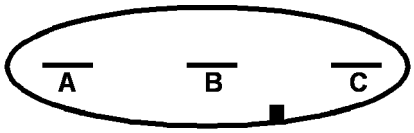
18 IPDM E/R
19 ECM



Vehicles	Engines							
	Type	Suffix	Bore (mm, in)	Stroke (mm, in)	Displacement cm^3 (cu in)	Compression ratio	Catalytic converter	Emission control standard
K12	K9K	274 276	76 (2.99)	80.5 (3.17)	1,461 (89.15)	18.25/1	228	Euro 4

ENGINE SPEED (rpm)			SMOKE OPACITY	
IDLE SPEED	Max. - no load	Max. - under load	Homologation value	Max. - legal
800 ± 50	4500 ± 150	5000 ± 150	2.26 m^{-1} (46%)	3 m^{-1} (73%)

DESCRIPTION	MARQUE/TYPE	SPECIAL NOTES
High pressure pump	DELPHI	0 to 1400 bars continuous pressure
Fuel pump	DELPHI	Incorporated into the high pressure pump
Common rail fuel pressure sensor	DELPHI	Incorporated into the rail Non measurable resistance
Injectors	DELPHI	Solenoid injector Maximum pressure **1600 bar** Non measurable resistance
Diesel flow actuator	DELPHI	Located on the high pressure pump Resistance: **5.3 ± 0.5 Ω at 20ºC**
ECM	DELPHI	ECM (computer) (112 terminals)
Pre/postheating unit (glow)	NAGARES BED 7-12	With pre-postheating function controlled by the ECM (computer)
Pre-heater plugs (glow)	BERU or CHAMPION	Resistance: **Less than 0.6 Ω** connector disconnected
Accelerator pedal potentiometer (APP sensor)	CTS	Double track potentiometer Resistance: – terminals 1: 4 (earth) and 6 (+5 V): **1.7 ± 0.9 kΩ** – terminals 2: 5 (earth) and 3 (+5 V): **2.4 ± 1.2 kΩ**
Intake air temperature sensors	JAEGER	CTN thermistor Resistance: **5000 ± 6800 Ω at - 40°C** **9500 ± 900 Ω at - 10°C** **2051 ± 120 Ω at 25°C** **810 ± 47 Ω at 50°C** **310 ± 17 Ω at 80°C**

DESCRIPTION	MARQUE/TYPE	SPECIAL NOTES
Fuel temperature sensor	DELPHI	Located on the high pressure pump CTN thermistor Resistance: **2.2 kΩ at 25°C**
Engine coolant temperature sensor	ELTH	CTN thermistor Resistance: **76000 ± 7000 Ω at - 40°C** **12500 ± 1130 Ω at - 10°C** **2252 ± 112 Ω at 25°C** **810 ± 40 Ω at 50°C** **280 ± 8 Ω at 80°C** **115 ± 3 Ω at 110°C** **88 ± 2 Ω at 120°C**
Crankshaft position (Engine speed) sensor	MGI	Variable reluctance sensor Resistance: **760 Ω**
Atmospheric pressure sensor	DELPHI	Built into the computer
Turbocharger boost pressure sensor	DELCO ELECTRONICS	Resistance: – terminals A and B: **9 kΩ** – terminals A and C: **4 kΩ** – terminals B and C: **5 kΩ**  *DI1330*
Camshaft position sensor	SAGEM	Hall effect sensor
Knock sensor (accelerometer)	SAGEM	Non measurable resistance
Turbocharger air temperature and turbocharger boost pressure sensor	BOSCH / LDF6T 20-250	Pressure sensor with a negative temperature coefficient thermistor Supply voltage **+5V** Resistance between terminals 1 and 2: – **20,376 Ω ± 1110.5 at −25°C** – **15,614 Ω ± 829 at −20°C** – **9426 Ω ± 475 at −10°C** – **5887 Ω ± 281.5 at 0°C** – **3791 Ω ± 172.5 at 10°C** – **2511 Ω ± 109 at 20°C** – **1715.5 Ω ± 71 at 30°C** – **1200 Ω ± 47 at 40°C** – **851 Ω ± 32 at 50°C** – **612 Ω ± 22 at 60°C** – **446 Ω ± 15 at 70°C** – **330 Ω ± 11 at 80°C** 4-track connector: – 1: earth – 2: air temperature sensor signal – 3: **+5V** supply – 4: pressure sensor signal

DESCRIPTION	MARQUE/TYPE	SPECIAL NOTES
EGR solenoid valve EGR valve position potentiometer	PIERBURG	Resistance: – terminals 4 and 6: **8 ± 0.5 Ω at 25°C** Incorporated into the EGR solenoid valve Resistance: – terminals 2 and 3: **1 ± 0.5 kΩ at 20°C** – terminals 1 and 2: **4 ± 1.6 kΩ at 20°C**
Thermoplungers	BERU	Resistance: **0.6 ± 0.7 Ω at 20°C**

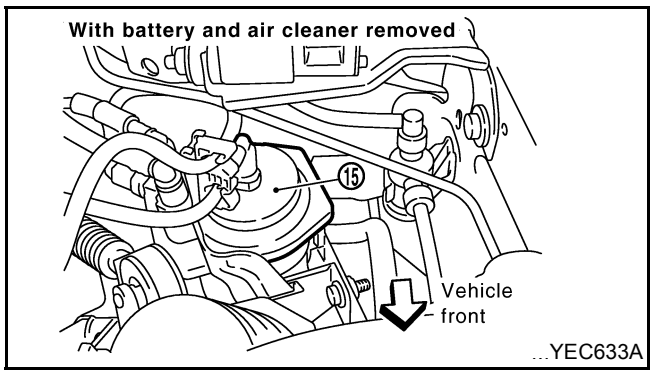
IMPORTANT: Before carrying out any work, wait for the fuel temperature to drop.

REMOVAL - REFITTING

Disconnect the battery.

Remove fuel filter:

RHD models
After removing battery and air cleaner
15Fuel filter (RHD models)



LHD models
After removing front wipers, cowl top cover, front wiper motor assembly and cowl top panel/tray.

Release the diesel fuel filter from its support.

Fit the new diesel fuel filter (do not remove the plugs until the last moment).

Disconnect all the snap fasteners beginning with the three vertical snap fasteners. Prevent the snap fasteners from coming into contact with the environment.

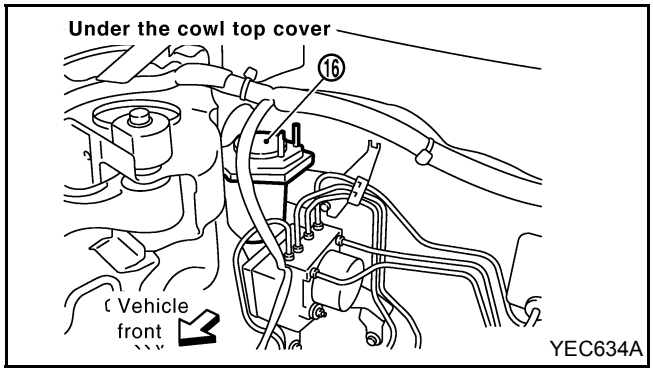
Disconnect the pump outlet snap fastener last of all; reconnect it immediately when the new filter is installed.

Reconnect the other snap fasteners.

Prime the system using the priming bulb (automatic degassing).

Reconnect the battery.

16Fuel filter (LHD models)



IMPORTANT: It is strictly forbidden to remove any injection pump pulley marked number 070 575. If the pump is being replaced, the pulley must be replaced.

SPECIAL TOOLING REQUIRED	
Nissan No. KV113E0010 (Mot. 1566)	Tool for removing and refitting high pressure pipes

EQUIPMENT REQUIRED

Low torque wrench

High pressure pipe wrench (for example, Facom "DM19" wrench).

Pipe socket for tightening the injector-rail high pressure pipes (for example, Facom Crowfoot 18-17 wrench).

Pipe socket for tightening the pump-rail high pressure pipe (for example, Facom Crowfoot 19-17 wrench).

TIGHTENING TORQUES (in daNm)	
High pressure pipe nuts	3.8
Rail nuts	2.8 ± 0.3
Filler neck nut on the rail	2.1
High pressure pump mounting bolts	2.1 ± 2

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

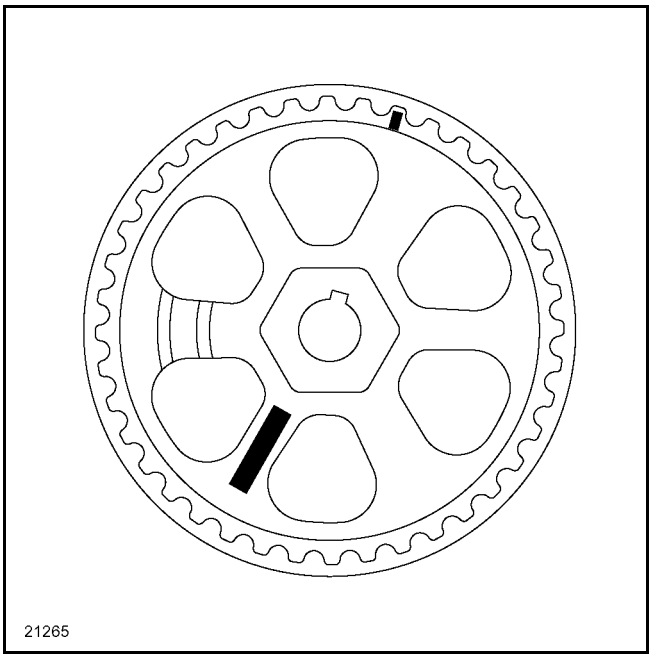
Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

REMOVAL

YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

It is strictly forbidden to remove any injection pump pulley marked **number 070 575** (see diagram). If the pump is being replaced, the pulley must be replaced.



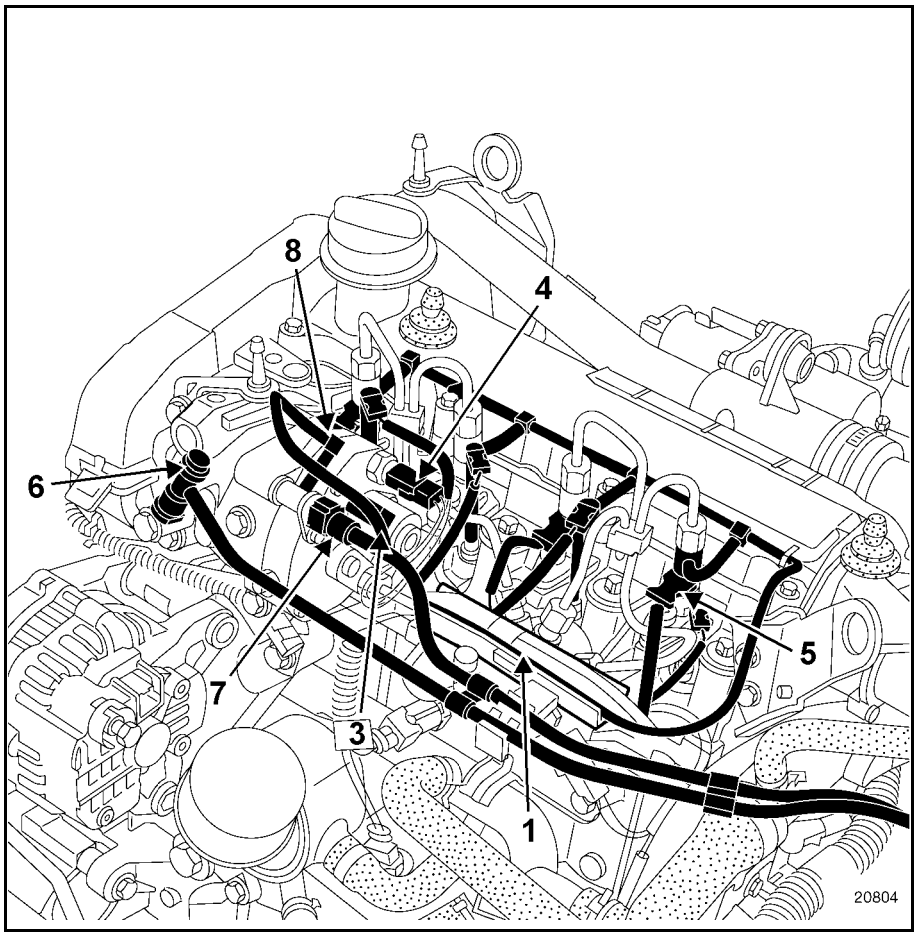
The high pressure pump may be removed after having first removed the timing belt

Disconnect the battery.

Remove:
– the neck (1) located on the fuel rail,
– the dipstick guide and plug the hole.

Undo the mounting nuts of the rail (2) a few turns.

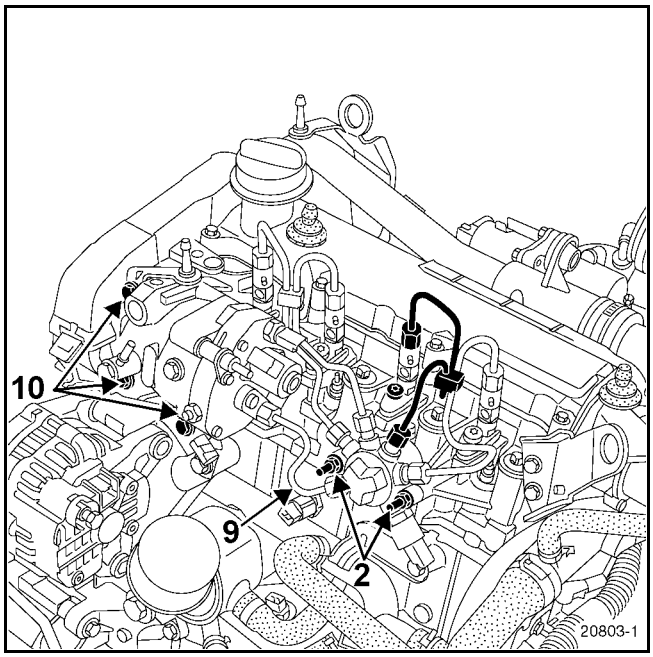
Carefully disconnect:
– the connectors from the flow actuator (3) and fuel temperature sensor (4),
– the pre-heater (glow) plugs and the injectors (5),
– the return pipe (8) connecting the injector with the pump.



Remove the high pressure pipe (9) connecting the pump to the rail. To do this:
– undo the nut on the pump side then the nut on the rail side,
– Move the nut along the tube keeping the olive in contact with the taper.

Plug all the holes of the injection circuit.

Remove the three mounting bolts (10) from the injection pump then remove it.



REFITTING

Fit the pump then position the mounting bolts without tightening them.

IMPORTANT: All the high pressure pipes removed must be systematically replaced.

Before fitting the new high pressure pipe, lightly lubricate the nut threads with the oil from the sachet provided in the new parts kit.

Refit the high pressure pipe, to do this:
– remove the protective plugs,
– insert the high pressure pipe olive into the taper of the high pressure pump outlet,
– insert the high pressure pipe olive into the taper of the high pressure rail inlet.

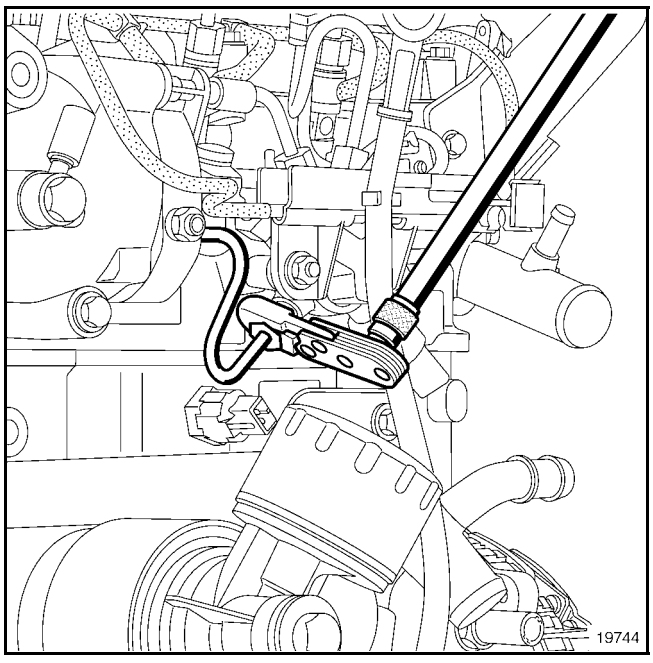
Finger tighten the nuts of the high pressure pipe starting with the one located on the rail side.

Tighten the mounting bolts (10) on the high pressure pump to a torque of **2.1 daN.m**.

IMPORTANT: Do not touch the pipes with the wrench when torque tightening.

Using the recommended tools, tighten the following in the order and to the torques shown:
– the nut on the rail side to **3.8 daN.m**,
– the nut on the pump side to **3.8 daN.m**,

Tighten the rail mounting nuts to a torque setting of **2.8 daNm**.



Refit in the reverse order to removal for the other refitting operations.

Test the sealing of the high pressure after it has been repaired (refer to **"Special features"**).

EQUIPMENT REQUIRED
Low torque wrench
Pipe socket for tightening the high pressure pipe (for example, Facom Crowfoot 18-17 wrench).

TIGHTENING TORQUES (in daNm)	
Flow actuator mounting bolt	**0.55 ± 0.06**

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

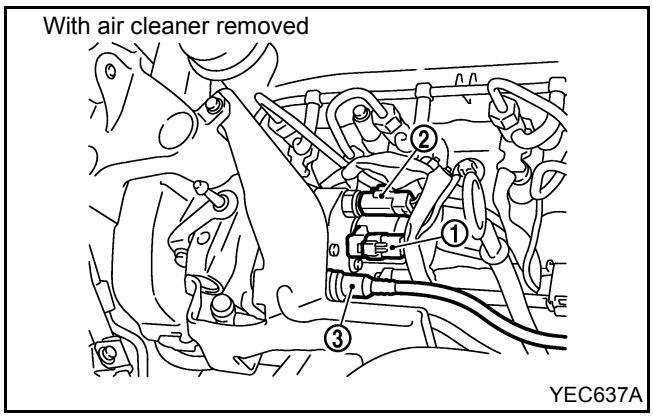
REMOVAL

YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

Disconnect the battery.

Remove the engine cover.

Disconnect the connector from the flow actuator (1) and from the fuel temperature sensor carefully (2).

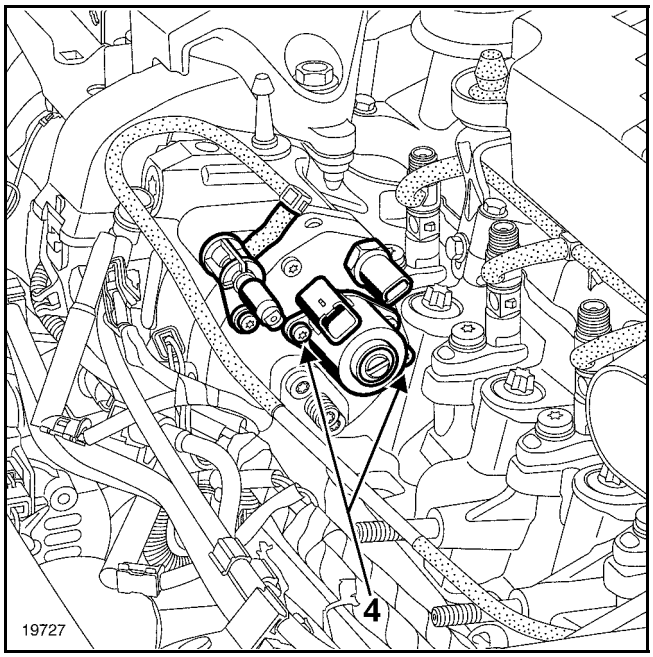


Disconnect the fuel return pipe (3).

Remove the high pressure pipe from injector no. 4 (refer to high pressure pipes).

Plug the holes in the injection circuit.

Disconnect the pre-heater plug and the injectors from cylinders 3 and 4.



Unscrew the two retaining bolts from the bracket (4).

Withdraw the flow actuator (by hand using small successive turns. Do not use the electrical connector as a lever arm).

REFITTING

Remove the new component from its packaging just before fitting it.

NOTE: Do not lubricate the seals with grease or used diesel oil. Use the applicator provided in the kit for the new part.

Position the actuator. (Important: when fitting the regulator, do not mark the seal.)

Position the two mounting bolts then tighten them.

Fit a new high pressure pipe to injector no. 4 plus a new clip (refer to high pressure pipes).

Reconnect:
– the diesel return pipe,
– the electrical connectors.

Refit in the reverse order to removal for the other refitting operations.

Test the sealing of the high pressure circuit after it has been repaired (refer to **"Special features"**).

Fuel temperature sensor

EQUIPMENT REQUIRED
Low torque wrench

TIGHTENING TORQUES (in daNm)	
Fuel temperature sensor	1.5 ± 0.15

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

REMOVAL

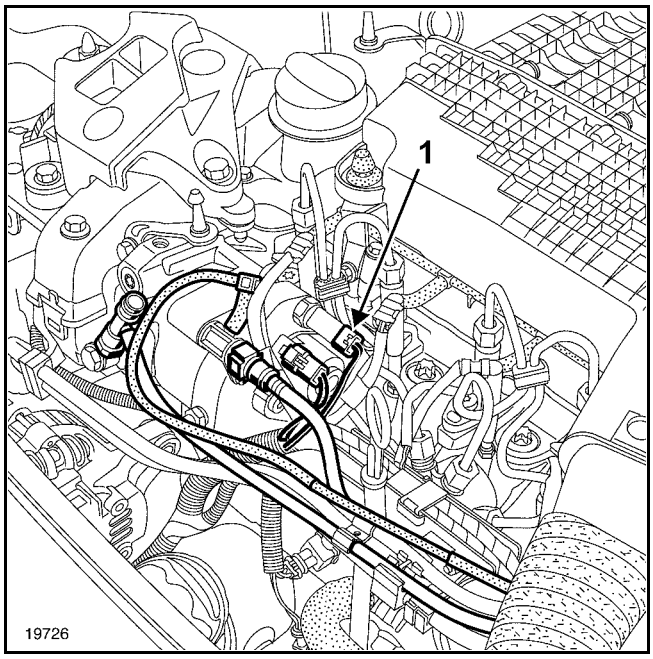
YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

Disconnect the battery.

Remove the engine cover.

Disconnect the connector from the fuel temperature sensor carefully (1).

Undo then remove the fuel temperature sensor.



REFITTING

Grease the O-ring with the lubricant from the sachet provided with the new part.

Take care not to damage the O-ring when installing the sensor.

Position the fuel temperature sensor then tighten to torque.

Reconnect:
– the electrical connector.
– the battery.

Test the sealing of the high pressure after it has been repaired (refer to **"Special features"**).

EQUIPMENT REQUIRED
Low torque wrench

TIGHTENING TORQUES (in daNm)	
Venturi mounting bolts	0.55 ± 0.06

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

REMOVAL

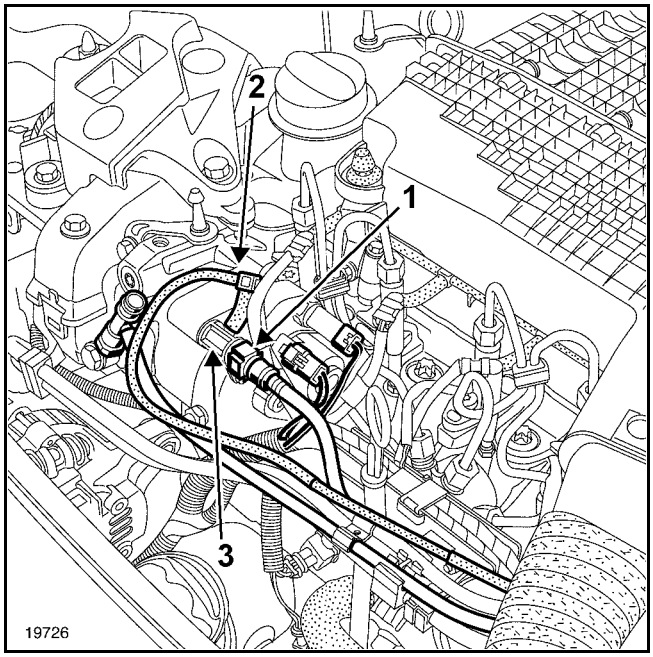
YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

Disconnect the battery.

Remove the engine cover.

Disconnect:
– the fuel return pipe on the pump (1).
– the return pipe (2) connecting the injector with the pump.

Remove the venturi mounting bolts (3) then take it out.



REFITTING

Grease the O-ring with the lubricant from the sachet provided with the new part.

Take care not to damage the O-ring when installing the venturi.

Position the venturi then tighten it to torque.

Reconnect the different pipes.

Test the sealing of the high pressure circuit after it has been repaired (refer to **"Special features"**).

SPECIAL TOOLING REQUIRED	
Nissan No. KV113E0010 (Mot. 1566)	**Tool for removing and refitting high pressure pipes**

EQUIPMENT REQUIRED

Low torque wrench

High pressure pipe wrench (for example, Facom "DM19" wrench).

Pipe socket for tightening the injector-rail high pressure pipes (for example, Facom Crowfoot 18-17 wrench).

Pipe socket for tightening the pump-rail high pressure pipe (for example, Facom Crowfoot 19-17 wrench).

TIGHTENING TORQUES (in daNm)	
High pressure pipe nuts	**3.8**
Rail nuts	**2.8 ± 0.3**
Filler neck nut on the rail	**2.1**

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

IMPORTANT: The pressure sensor cannot be separated from the rail.

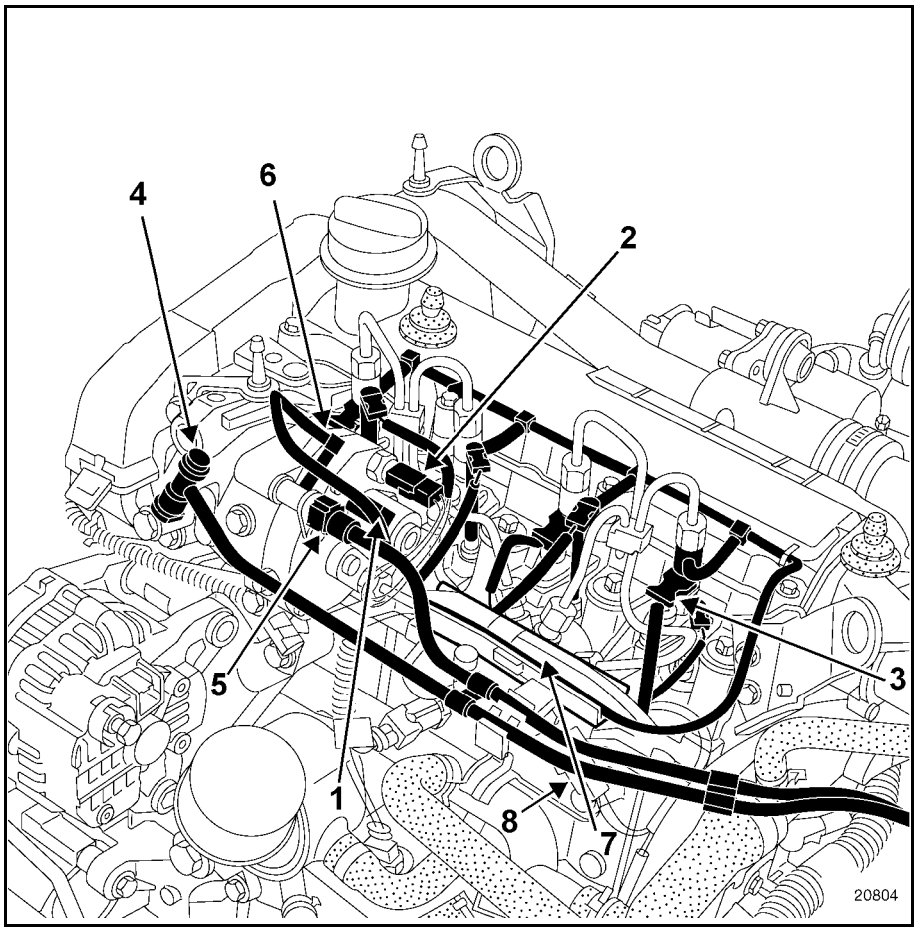
REMOVAL

YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

Disconnect the battery.

Remove the engine cover.

Carefully disconnect:
– the connectors from the flow actuator (1),
– the connectors from the fuel temperature sensor (2),
– the injector connectors (3),
– the glow (heater) plugs,
– on the pump, the fuel supply (4) and return (5) pipes.
– the return pipe (6) connecting the injectors with the pump.



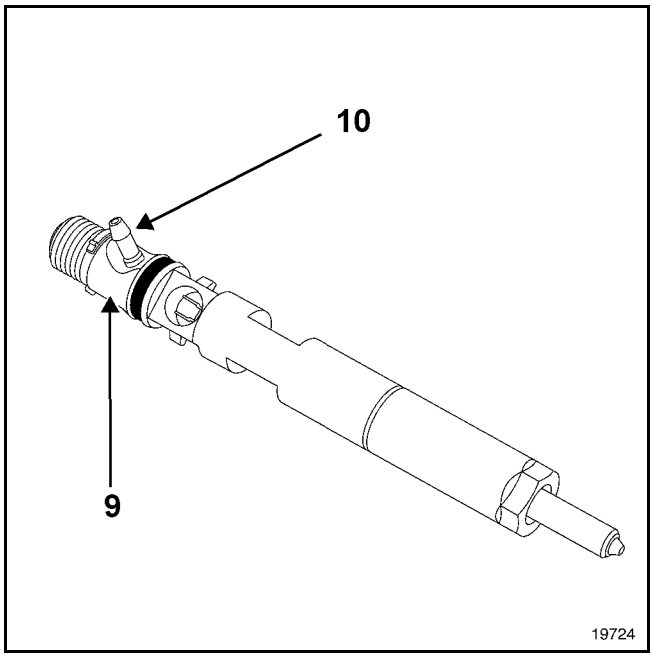
Remove:
– the neck (7) located on the fuel rail,
– the dipstick guide and plug the hole.

Disconnect the pressure sensor connector from the rail (8).

Remove the clips connecting the high pressure pipes.

IMPORTANT: When undoing the high pressure pipes, it is essential to maintain the central union of the injector (9).

IMPORTANT: Do not damage the injector's leak return duct (10).



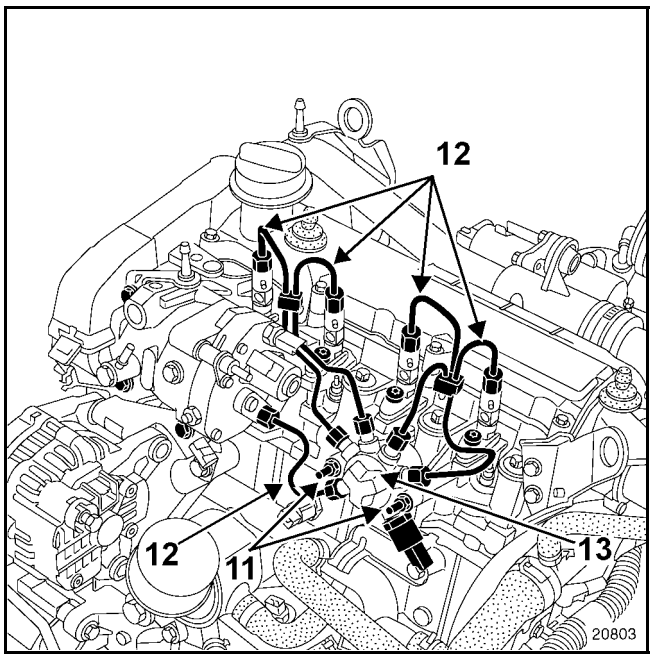
Undo the mounting nuts of the rail (11) a few turns.

**NOTE: Undo the nut on the pump side or the injector side, then the nut located on the rail side.
Undo the nuts for each pipe in turn.
Move the nut along the pipe keeping the olive in contact with the taper.**

Remove all the high pressure pipes (12).

Plug all the holes in the injection circuit.

Remove the rail (13).



REFITTING

IMPORTANT: All the high pressure pipes removed must be replaced as a matter of course.

Fit a new high pressure rail on the studs.

Finger tighten the nuts.

Before fitting the new high pressure pipes, lightly lubricate the nut threads with the oil from the sachet provided in the new parts kit.

NOTE: Fit the pump/rail pipe before the rail/injector pipes.

Fit the pump-rail high pressure pipe:

– remove the protective plugs from the high pressure pump outlet, the high pressure rail inlet and the pipe.
– insert the high pressure pipe olive into the taper of the high pressure pump outlet,
– insert the high pressure pipe olive into the taper of the high pressure rail inlet.
– finger tighten the nuts of the high pressure pipe starting with the one located on the rail side.

Fit the rail-injector high pressure pipe:

IMPORTANT: When tightening the high pressure pipes, it is essential to maintain the central union of the injector (10).

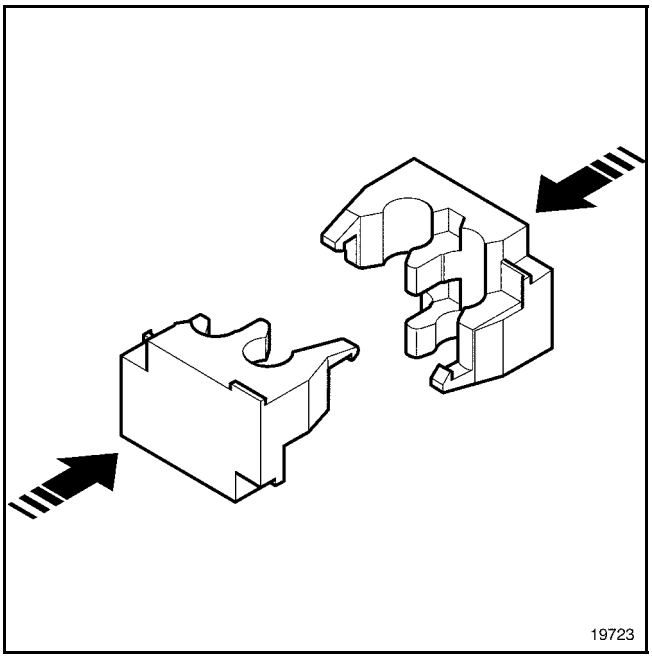
– remove the protective plugs from the high pressure rail outlet, the injector high pressure inlet and the pipe.
– insert the high pressure pipe olive into the taper of the high pressure injector inlet,
– insert the high pressure pipe olive into the taper of the high pressure rail outlet.
– finger tighten the nuts of the high pressure pipe starting with the one located on the injector side.

Fit the remaining high pressure pipes as you did previously.

NOTE: The order in which the pipes are installed is not important.

Fit the clips supplied with the new pipes onto the high pressure pipes:
– Insert the first half of the clip using adjustable pliers,
– Insert the second half of the clip using adjustable pliers.

IMPORTANT: Pay attention to the direction of installation of the second clip. The tabs located in the centre of the clip will only fit together in one position.



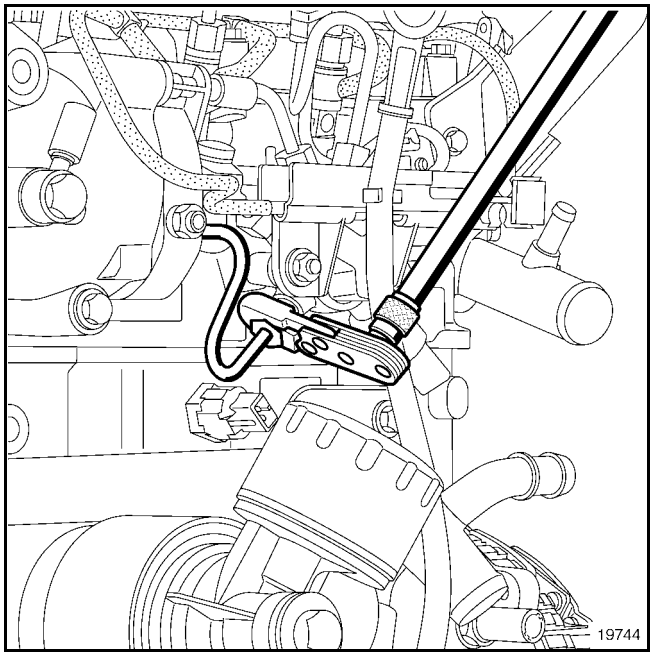
Tighten the rail nuts to a torque of **2.8 daNm.**

IMPORTANT: Do not touch the pipes with the wrench when torque tightening.

IMPORTANT: Follow the order and tightening torque of the high pressure pipes.

Using the recommended tools, tighten the nuts on the rail - pump high pressure pipe:

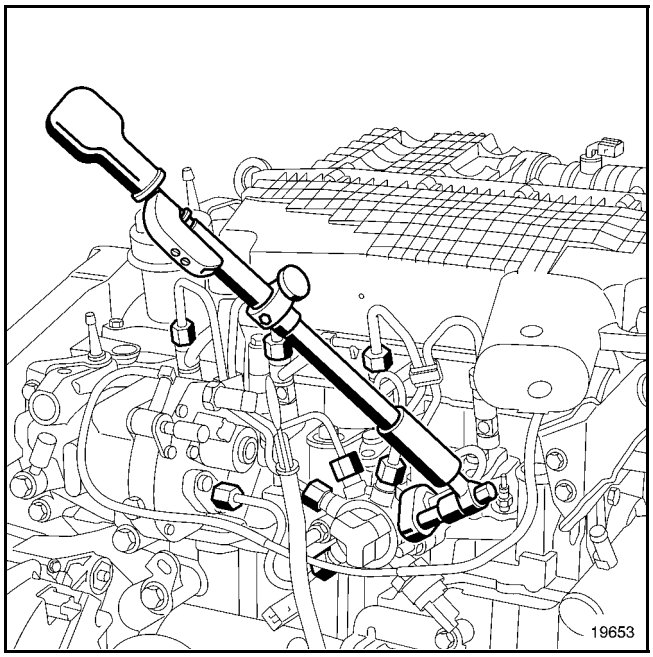
– tighten the nut on the rail side to a torque of **3.8 daN.m**.
– tighten the nut on the pump side to a torque of **3.8 daN.m**.



Using the recommended tools, tighten the nuts on the rail - injector high pressure pipes:

– tighten the nut on the injector side to a torque of **3.8 daN.m**.
– tighten the nut on the rail side to a torque of **3.8 daN.m**.

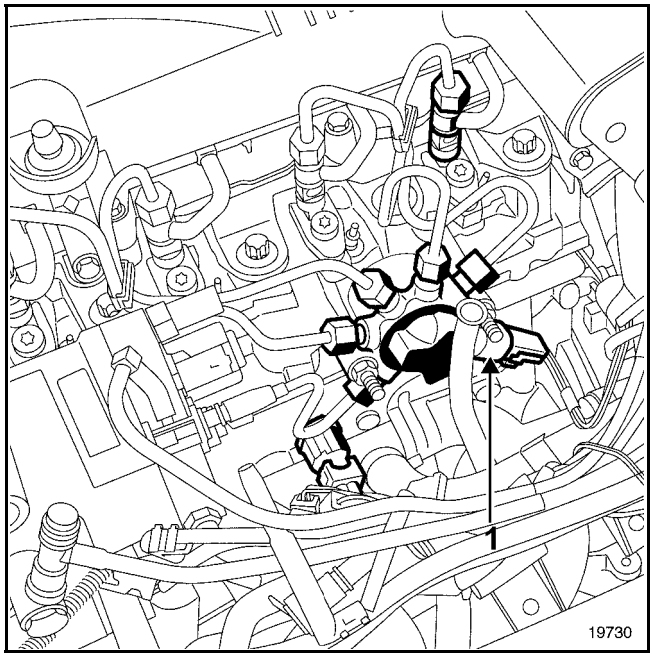
NOTE: Tighten one pipe fully before moving on to the next pipe.



Refit in the reverse order to removal for the other refitting operations.

Test the sealing of the high pressure after it has been repaired (refer to **"Special features"**).

The pressure sensor (1) cannot be separated from the fuel rail. If the pressure sensor malfunctions, the pressure sensor assembly - rail and high pressure pipes - must be replaced (refer to **fuel rail** section).



SPECIAL TOOLING REQUIRED	
Nissan No. KV113E0010 (Mot. 1566)	**Tool for removing and refitting high pressure pipes**

EQUIPMENT REQUIRED
Low torque wrench
High pressure pipe wrench (for example, Facom DM19 wrench).
Pipe socket for tightening the injector-rail high pressure pipes (for example, Facom Crowfoot 18-17 wrench).
Pipe socket for tightening the pump-rail high pressure pipe (for example, Facom Crowfoot 19-17 wrench).

TIGHTENING TORQUES (in daNm)	
High pressure pipe nuts	**3.8**
Rail nuts	**2.8 ± 0.3**
Injector mounting	**2.8 ± 0.3**
Filler neck nut on the rail	**2.1**

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

IMPORTANT: It is forbidden to open an injector. If you open an injector by mistake, you will have to change it. This is because of the manufacturing and installation tolerances and because there is a risk of contaminating the inside of the injector.
The rod filter of the injector must not be removed.

REMOVAL

NOTE: It is possible to replace a single high pressure pipe.

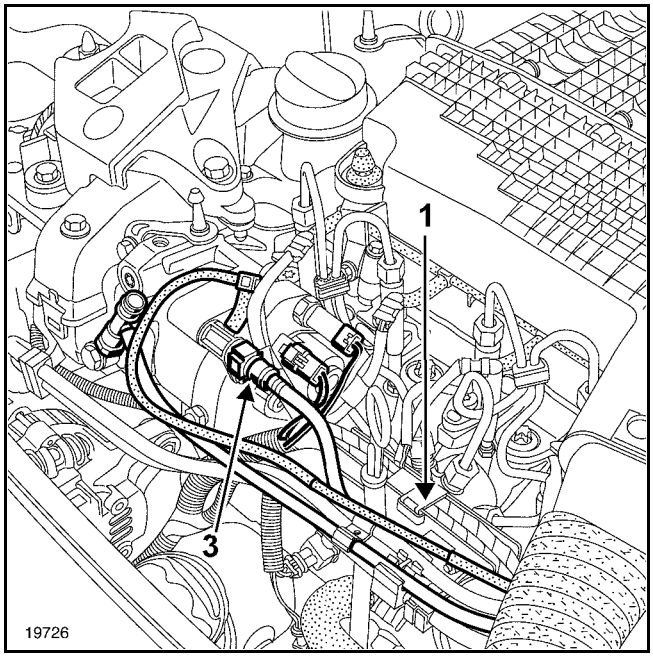
YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

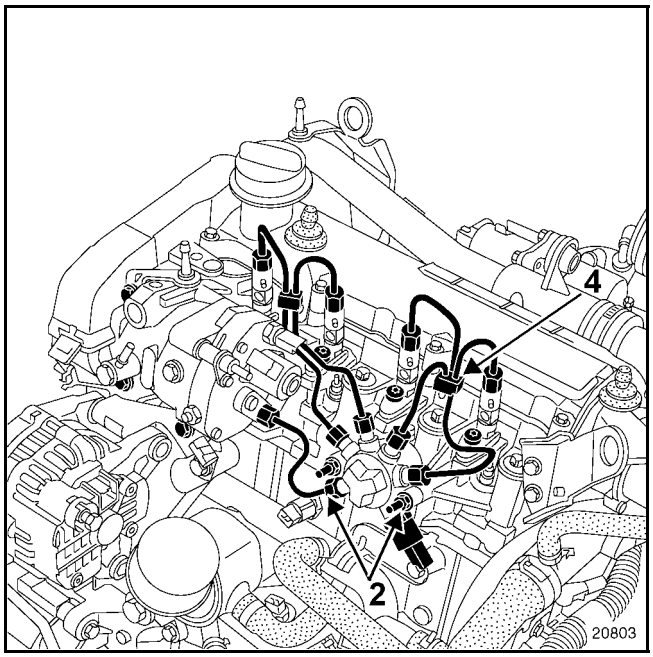
Disconnect the battery.

Remove:
– the engine cover,
– the neck (1) located on the high pressure rail,
– the dipstick guide then plug the hole.

Undo the mounting nuts of the rail (2) a few turns.

Disconnect:
– the fuel return pipe (3),
– the injector electrical connector.





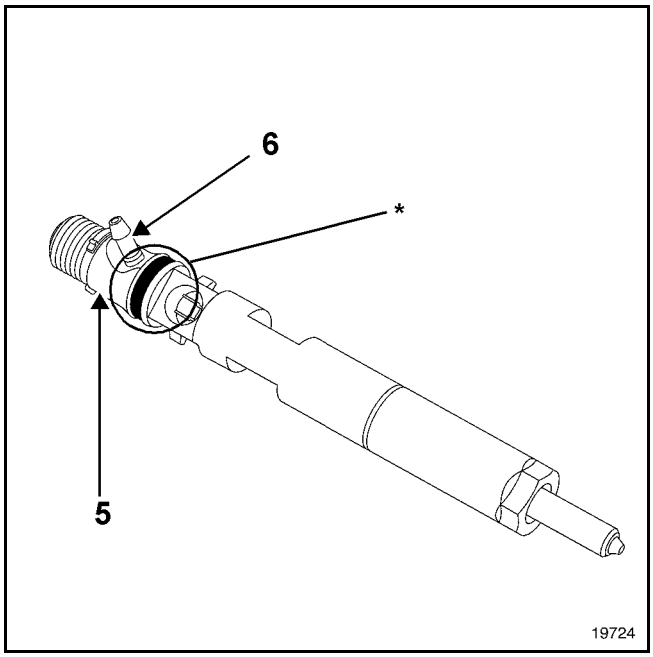
Remove the clip (4) connecting the high pressure pipes.

IMPORTANT: When undoing the high pressure pipes, it is essential to maintain the central union of the injector (5).

Undo the nut on the injector side, then the nut located on the rail side of the high pressure pipe.

Move the nut along the tube keeping the olive in contact with the taper.

IMPORTANT: Do not damage the injector's leak return duct (6).



* 16 digit code

Remove the high pressure pipe (7).

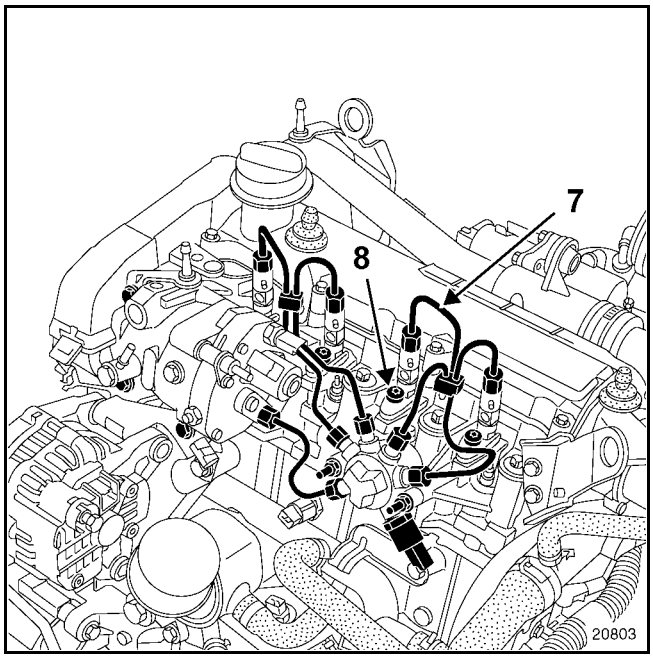
Disconnect the diesel return pipe on the injector.

Plug all the holes of the injection circuit.

Unscrew the injector bracket (8).

Remove the injector.

Pull off the flameshield washer.



REFITTING

NOTE: Read the 16 digit code on the new injector before refitting it and programming the code into the ECM using the CONSULT-II (see section "Special features, Replacing injectors"). The code is unique to each injector, it specifies the flow.

Clean the injector sockets and the injector bodies, as well as their brackets using a lint-free cloth (use the wipes recommended for this purpose, dipped in clean solvent.

Dry off using a different new wipe.

Replace the flameshield washer with a new one.

Position the injector.

Tighten its mounting clamp to a torque of **2.8 daN.m**.

IMPORTANT: All the high pressure pipes removed must be systematically replaced.

Before fitting the new high pressure pipe, lightly lubricate the nut threads with the oil from the sachet provided in the new parts kit.

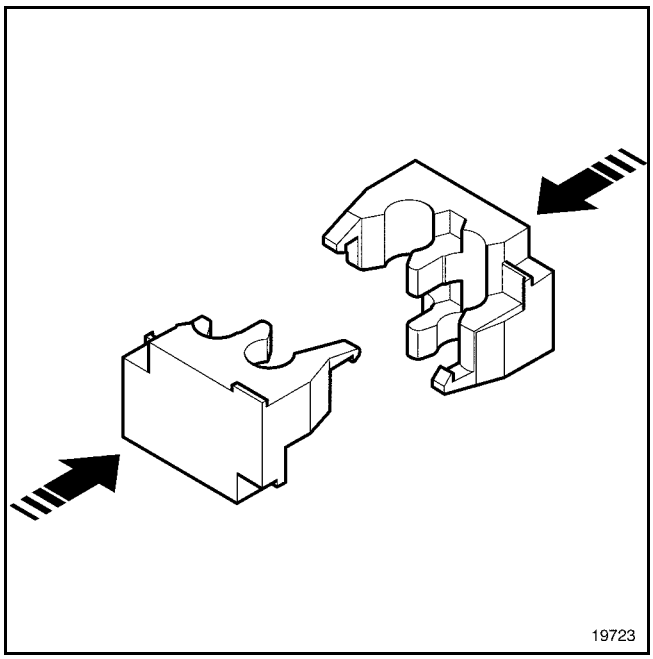
Fit the high pressure pipe:

– remove the protective plugs from the rail, the injector inlet and the pipe.
– insert the high pressure pipe olive into the taper of the injector inlet,
– insert the high pressure pipe olive into the taper of the rail outlet.

Move the nut into position by hand, injector side first then the rail side.

Fit a new clip supplied with the new pipes onto the high pressure pipes:
– Insert the first half of the clip using adjustable pliers,
– Insert the second half of the clip using adjustable pliers.

IMPORTANT: Pay attention to the direction of installation of the second clip. The tabs located in the centre of the clip will only fit together in one position.

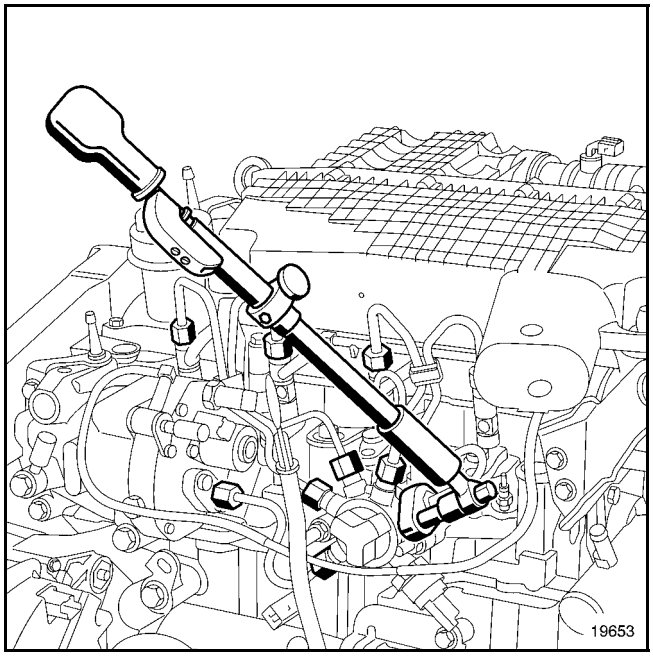


Tighten the rail nuts to a torque of **2.8 daNm.**

IMPORTANT: Do not touch the pipes with the wrench when torque tightening.

IMPORTANT: When tightening the high pressure pipes, it is essential to maintain the central union of the injector.

Using the recommended tools, tighten the following in the order and to the torques shown:
– the nut on the injector side to a torque of **3.8 daN.m**.
– the nut on the rail side to a torque of **3.8 daN.m**.



Refit in the reverse order to removal for the other refitting operations.

Test the sealing of the high pressure after it has been repaired (refer to **"Special features"**).

SPECIAL TOOLING REQUIRED	
Nissan No. KV113E0010 (Mot. 1566)	Tool for removing and refitting high pressure pipes

EQUIPMENT REQUIRED
Low torque wrench
High pressure pipe wrench (for example, Facom DM19 wrench).
Pipe socket for tightening the injector-rail high pressure pipes (for example, Facom Crowfoot 18-17 wrench).
Pipe socket for tightening the pump-rail high pressure pipe (for example, Facom Crowfoot 19-17 wrench).

TIGHTENING TORQUES (in daNm)	
High pressure pipe nuts	3.8
Rail nuts	2.8 ± 0.3
Filler neck nut on the rail	2.1

IMPORTANT: Before carrying out any work, connect the CONSULT-II, set up communication with the ECM and check that the injection rail is not under pressure.

Wait until the fuel temperature drops.

Order the special high pressure injection circuit plug kit.

REMOVAL

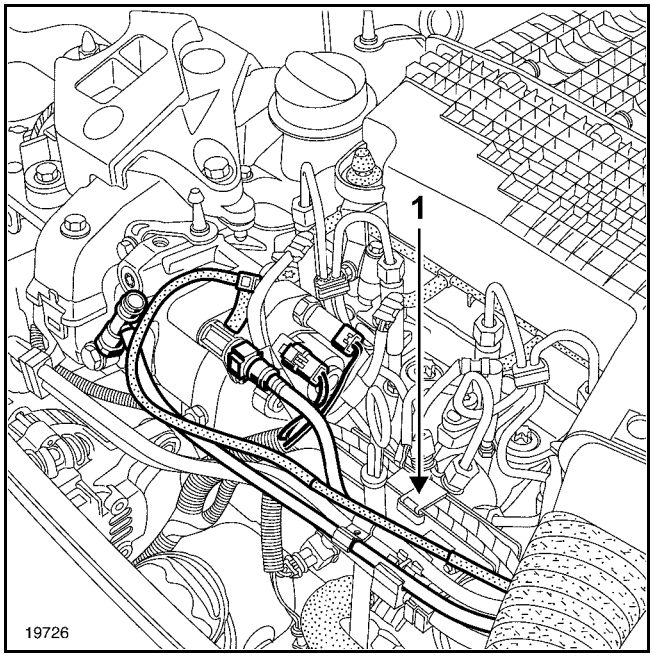
NOTE: It is possible to replace a single high pressure pipe.

YOU SHOULD FOLLOW THE CLEANNESS INSTRUCTIONS CLOSELY

Disconnect the battery.

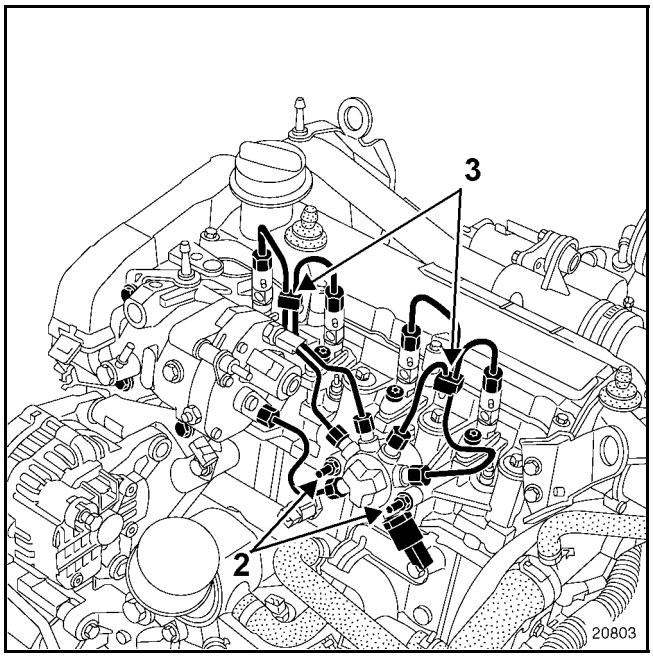
Remove:
– the engine cover,
– the neck (1) located on the high pressure rail,
– the dipstick guide then plug the hole.

Undo the mounting nuts of the rail (2) a few turns.



Remove the clip (3) connecting the high pressure pipes.

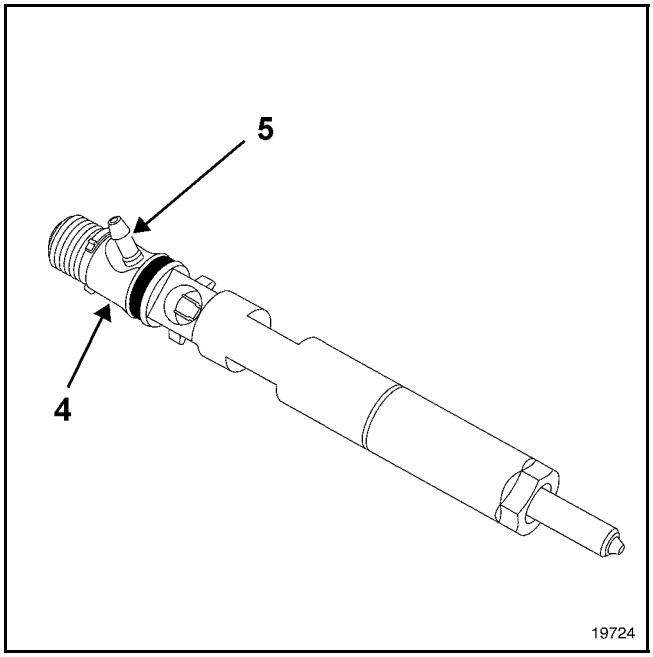
IMPORTANT: When undoing the high pressure pipes, it is essential to maintain the central union of the injector (4).



Undo the nut on the pump side or the injector side, then the nut located on the rail side.

Move the nut along the tube keeping the olive in contact with the taper.

IMPORTANT: Do not damage the injector's leak return duct (5).



Remove the high pressure pipe(s).

Plug all the holes of the injection circuit.

REFITTING

NOTE: Fit the pump/rail pipe before the rail/injector pipes.

Before fitting the new high pressure pipes, lightly lubricate the nut threads with the oil from the sachet provided in the new parts kit.

Fit the pump-rail high pressure pipe:

– remove the protective plugs from the high pressure pump outlet, the high pressure rail inlet and the pipe.
– insert the high pressure pipe olive into the taper of the high pressure pump outlet,
– insert the high pressure pipe olive into the taper of the high pressure rail inlet.
– finger tighten the nuts of the high pressure pipe starting with the one located on the rail side.

Fit the rail-injector high pressure pipe:

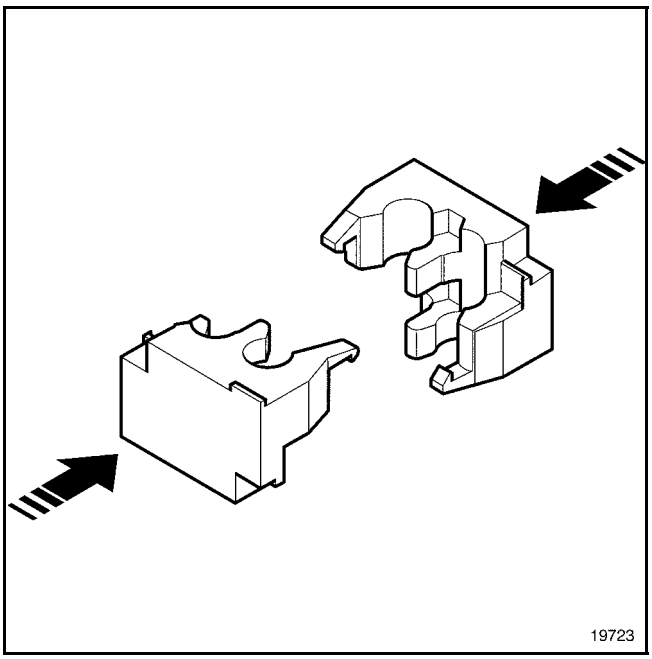
– remove the protective plugs from the high pressure rail outlet, the injector high pressure inlet and the pipe.
– insert the high pressure pipe olive into the taper of the high pressure injector inlet,
– insert the high pressure pipe olive into the taper of the high pressure rail outlet,
– finger tighten the nuts of the high pressure pipe starting with the one located on the injector side.

Fit the remaining high pressure pipes as you did previously.

IMPORTANT: All the high pressure pipes removed must be systematically replaced.

Fit a new clip supplied with the new pipes onto the high pressure pipes:
– insert the first half of the clip using adjustable pliers,
– insert the second half of the clip using adjustable pliers.

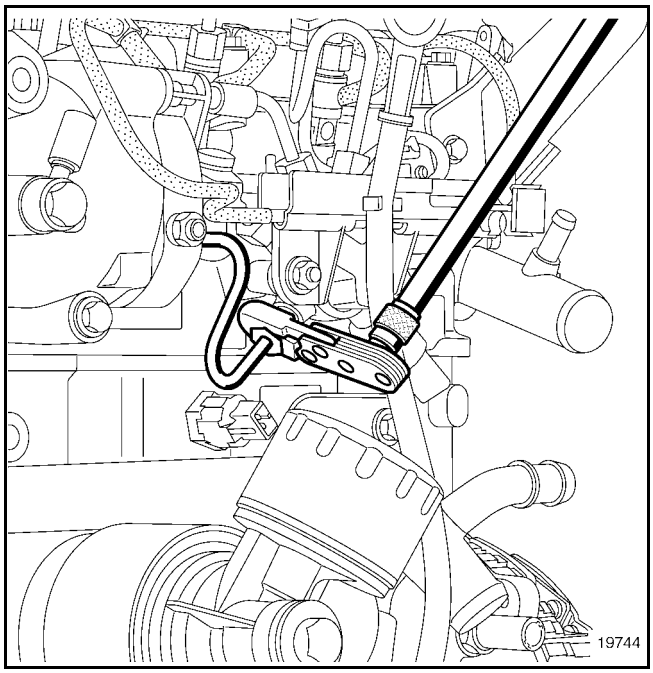
IMPORTANT: Pay attention to the direction of installation of the second clip. The tabs located in the centre of the clip will only fit together in one position.



Tighten the rail nuts to a torque of **2.8 daN.m.**

IMPORTANT: Do not touch the pipes with the wrench when torque tightening.

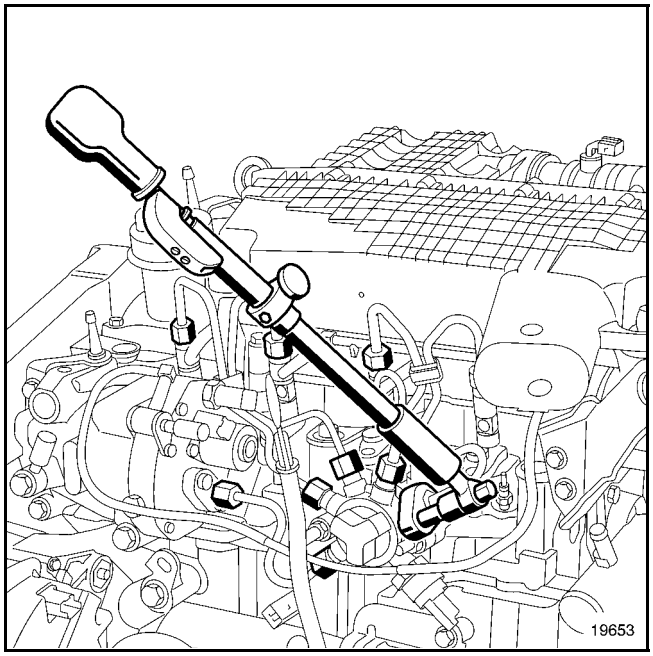
Using the recommended tools, tighten the following in the order and to the torques shown:
– the nut on the pump - rail high pressure pipe starting with the one located on the rail side to a torque of **3.8 daN.m**.
– the nut on the pump side to a torque of **3.8 daN.m**.



IMPORTANT: When tightening the high pressure pipes, it is essential to maintain the central union of the injector (4).

Using the recommended tools, tighten the following in the order and to the torques shown:
– the nut on the injector side to a torque of **3.8 daN.m**.
– the nut on the rail side to a torque of **3.8 daN.m**.

NOTE: Tighten one pipe fully before moving on to the next pipe.



Refit in the reverse order to removal for the other refitting operations.

Test the sealing of the high pressure after it has been repaired (refer to **"Special features"**).

NOTE: When replacing an ECM, it is necessary to program the individual injector correction and the other vehicle configurations using CONSULT-II.

REPLACING THE ECM

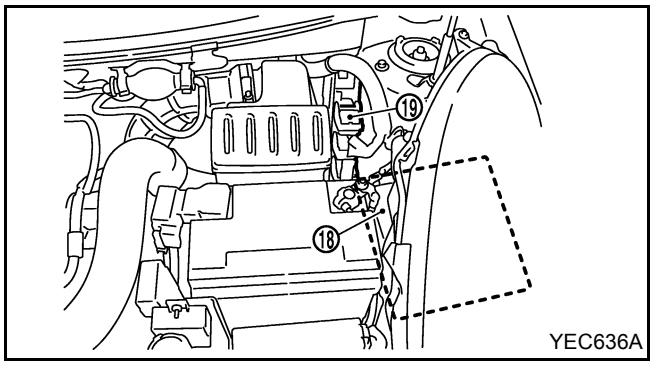
Before an ECM is replaced in after-sales, the following must be checked using CONSULT-II:

- Injectors individual correction value (16 digit code)
- System configulation

REMOVAL

Disconnect:
– the battery,
– the ECM harness connectors.

Remove the mounting nuts from the ECM (19).



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REFITTING

Fit the new ECM, taking care to engage the positioning tab, then fit the ECM on its mounting studs.

Tighten the ECM mounting nuts.

Reconnect the ECM.

Connect the battery.

Turn the engine on and read the DTC using the CONSULT-II.

If necessary repair the DTC that appear then clear them.

Check that the vehicle is operating correctly.

This vehicle is fitted with an engine immobilizer system which is controlled by a key recognition system.

REPLACING THE ECM

The ECM are supplied without a code but they must all be programmed with one.

If an ECM is replaced, it must be programmed with the code of the vehicle and the correct operation of the engine immobilizer function must be checked. (Refer to BL section.)

WARNING:

These vehicles have a special ECM which does not function unless it is coded.

Consequently, it is strongly recommended that you do not carry out tests using ECMs borrowed from the warehouse or on another vehicle to prevent coding and uncoding malfunctions which may leave the ECM useless.

UNCODING PROCEDURE

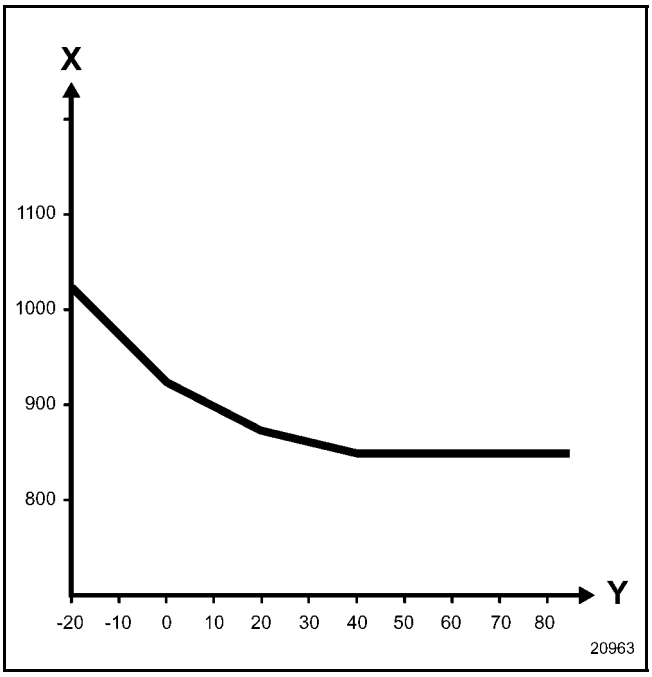
If the ECM has learnt a code and must be returned to the workshop it is imperative that you uncode it before removing it. (See the repair manual or the engine immobilizer TSB).

The ECM takes over calculation of the idle speed to maintain the idle speed at the recommended level and to compensate for any variation in the mechanical or electrical couple as regards:
– the engine coolant temperature,
– battery voltage,
– the gear selected on the transmission,
– the electrical consumers (climate control system, cooling fan assembly etc.),
– any malfunctions found.

At the engine operating temperature, without high electrical consumer, the idle speed is **800 ± 50 rpm**.

IDLE SPEED CORRECTION ACCORDING TO ENGINE COOLANT TEMPERATURE

X. Engine speed in **rpm**
Y. Temperature in °**C**



SPEED ADJUSTMENT WHEN THERE IS AN ACCELERATOR PEDAL POSITION SENSOR (POTENTIOMETER) MALFUNCTION

- **If one or both terminals** of the accelerator pedal position sensor (potentiometer) are suspected, the ECM overrides the idle speed to maintain it at **1100 rpm**. This defect mode limits performance. The orange injection warning light lights up and flashes.

- **If the accelerator pedal position sensor (potentiometer) is blocked**, **is no longer being supplied, or is not transmitting an output signal,** the ECM overrides the idle speed to maintain it at **1300 rpm**. This mode limits performance. The orange injection warning light lights up and flashes.

- In both cases, when the brake pedal is depressed, the idle speed is stabilised at the **recommended speed**.

- **If the information from the accelerator pedal position sensor (potentiometer) and the brake switch information does not correspond, the speed is changed to 1100 rpm.**

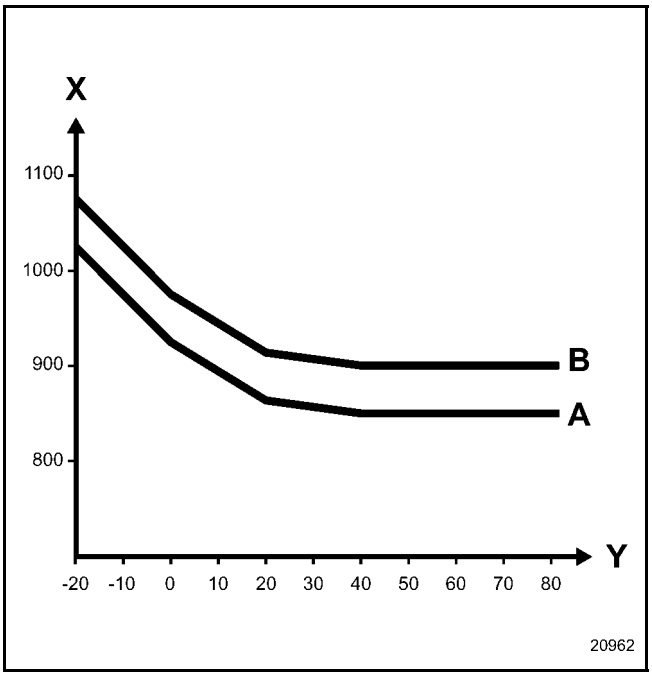
IDLE SPEED ADJUSTMENT WHEN THERE IS AN INJECTOR CODE MALFUNCTION

When there is an injector code malfunction, the ECM overrides the idle speed to maintain it at **1300 rpm**. This mode limits performance. The orange injection warning light lights up and flashes.

CORRECTION OF THE IDLING SPEED ACCORDING TO THE GEAR RATIOS

The idling speed is modified according to the gear selected in the transmission:
– **in neutral, 1st and 2nd gear**, the speed is (at the engine operating temperature) **850 rpm** (graph **A**),
– **for the other gears**, the speed is (at the engine operating temperature) **900 rpm** (graph **B**).

X. Engine speed in **rpm**
Y. Temperature in °**C**



AIR CONDITIONING CONTROL

The compressor is a variable displacement type.

The air conditioning relays are controlled by wires:

COMPRESSOR OPERATION PROGRAMMING

During certain stages of operation, the ECM stops the compressor from functioning.

Engine starting program

The compressor is prevented from operating for **4 seconds** after the engien has started.

Thermal protection program

The compressor is not engaged when the engine temperature is higher than **115** °**C** or from **110** °**C** at high speed, **4500 rpm** for more than **3 seconds.**

Fan assembly control programming

At idling speed and also when driving, with the air conditioning activated, the speed of the fan assembly is determined according to the refrigerant fluid pressure and the vehicle speed.

Recovery of performance

When pressure is applied to the accelerator pedal above **70%**, the compressor is disengaged for **5 seconds**.

Recovery of output when the vehicle starts moving

In order to help the vehicle move off, the air conditioning compressor is disengaged if the position of the accelerator pedal is above **35 %** and the idling speed less than **1250 rpm**.

Anti-stall protection

The compressor is disengaged if the engine speed is lower than **750 rpm.**

Engine overspeed timed protection program

The compressor is disengaged when the speed reaches **4500 rpm** for more than **3 seconds**.

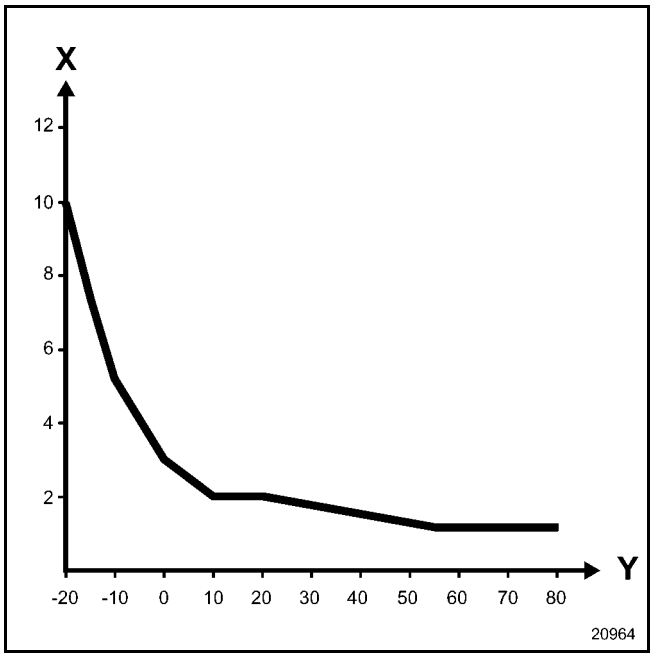
NOTE: The time between the compressor being disengaged twice is always greater than **10 seconds**.

The pre/postheating function is controlled by the preheating unit.

PRE/POSTHEATING (glow plug) OPERATING PRINCIPLE

1) Ignition on "preheating"

a) Variable preheating
The time period for the warning light to light up and the feed to heater plugs depends on the coolant temperature and the battery voltage.



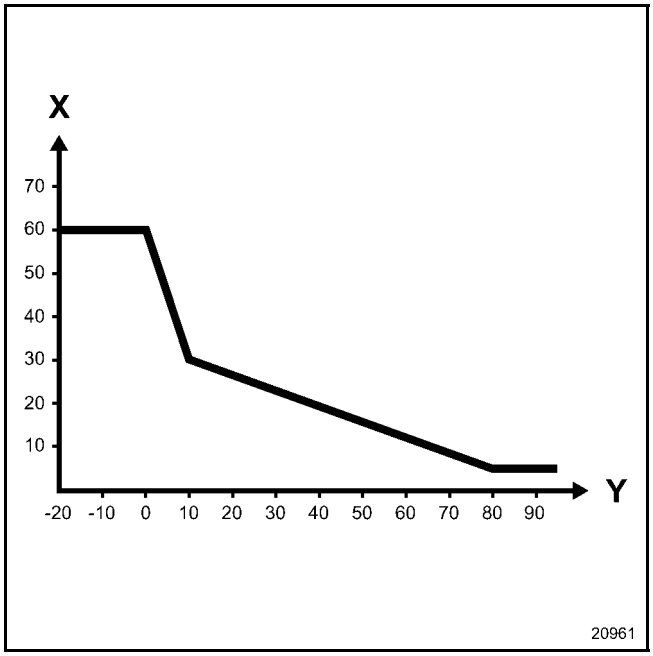
X. Time in seconds
Y. Temperature in °C

Whatever the situation, the preheating warning light cannot be lit for more than **15 seconds** (except in the event of an engine coolant temperature sensor malfunction).

b) Fixed preheating
After the warning light goes out the plugs remain supplied for a fixed period of **5 seconds**.

2) "Post heating" with the engine running

During this phase the plugs are supplied continuously according to engine coolant temperature.



X. Time in seconds
Y. Temperature in °C

For idle speed without pressing the accelerator pedal.

The resistance of a glow plug is **0.6** Ω.

TIGHTENING TORQUE (in daNm)	
Glow plug	**1.5**

Plugs may be removed without having to open the high pressure circuit.

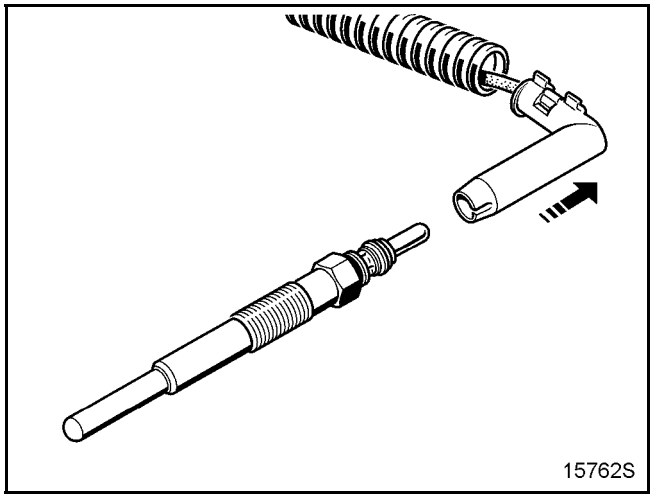
REMOVAL

Disconnect the battery.

Unclip the plug connector.

Clean the outside of the plug to avoid any dirt entering the cylinder.

Loosen and remove the plugs.



To undo the plug on cylinder 4 use a **10 mm** long radio socket attached to a universal joint. Once the plug is loosened use a hose to unscrew it completely.

REFITTING

Proceed in the reverse order to removal.

The cooling fan unit is controlled by the ECM.

COOLING FAN ASSEMBLY OPERATION WITH THE ENGINE RUNNING

The cooling fan assembly is controlled:

- at slow speed if the engine coolant temperature exceeds **99**°**C** or if there is an engine coolant temperature sensor malfunction, and is switched off when the temperature falls below **96**°**C**.
- at high speed if the engine coolant temperature exceeds **102**°**C** or if there is a low speed malfunction, and is switched off when the temperature falls below **99**°**C.**

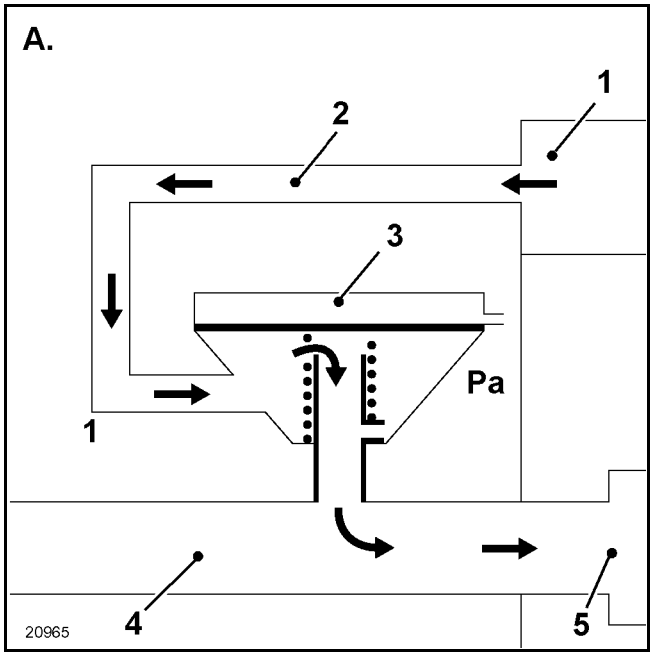
The cooling fan assembly low and high speeds are controlled when the air conditioning function is selected on the instrument panel.

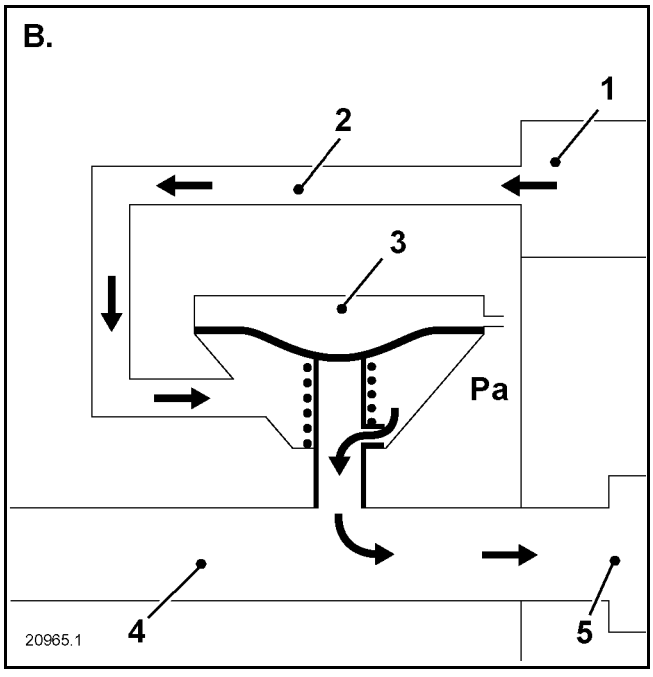
If the low speed setting is suspected, the high speed setting operates under the low speed conditions.

OPERATION OF THE ENGINE COOLANT TEMPERATURE WARNING LIGHT

The engine coolant temperature warning light remains lit if the engine coolant temperature exceeds **114**°**C**. It goes out when the temperature falls below **111**°**C**.

CIRCUIT DIAGRAM





1 Cylinder head cover
2 Oil vapour rebreathing duct
3 Oil vapour recirculation valve
4 Air inlet duct
5 Turbocharger
Pa Atmospheric pressure

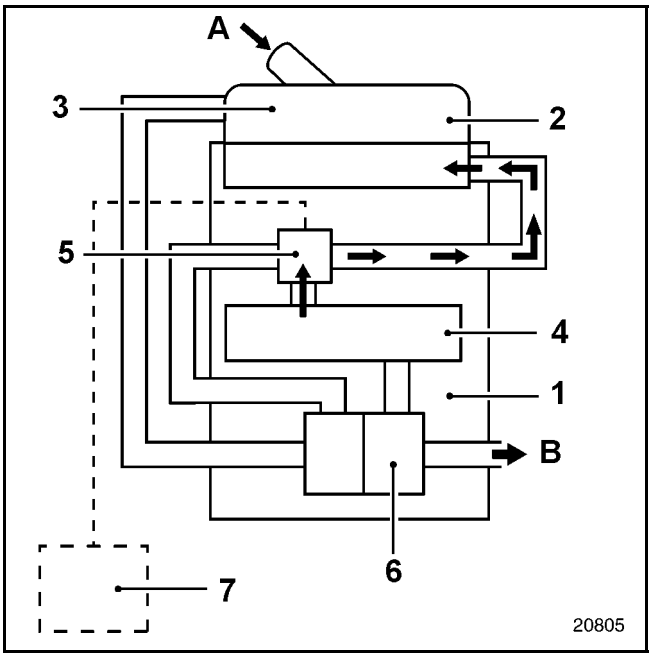
A. When there is a low charge, the vacuum in the air intake duct is below the spring set point. The oil vapours are extensively rebreathed by the vacuum in the air intake duct.

B. When there is a medium or high charge, the pressure in the air intake duct exhausts the valve diaphragm, the oil vapours are breathed in small quantities via a calibrated hole.

CHECKING

To ensure the correct operation of the anti-pollution system, the oil vapour rebreathing circuit must be kept clean and in good condition.

CIRCUIT DIAGRAM



1 Engine
2 Air filter unit
3 Air distributor
4 Exhaust manifold
5 EGR unit with solenoid valve
6 Turbocharger
7 ECM
A Air inlet
B Exhaust gas outlet

PURPOSE OF THE EGR SYSTEM

Exhaust gas recirculation is used to reduce the nitrogen oxide (NOx) content of the exhaust gases.

The ECM authorises gas to pass by controlling a solenoid valve.

OPERATING PRINCIPLE

The valve is controlled by an **RCO** (Opening Cyclic Ratio) signal sent by the ECM. The RCO signal modulates the opening of the valve and consequently the quantity of exhaust gas directed back to the inlet manifold.

The ECM continuously carries out a test to detect the position of the **EGR** valve.

NOTE: the position of the EGR control solenoid valve is determined by the calculation of the amount of air taken in by the engine.

OPERATING CONDITIONS

The parameters which determine the activation of the EGR control solenoid valve are as follows:
– engine coolant temperature,
– intake air temperature,
– atmospheric pressure,
– accelerator pedal position,
– injected diesel flow,
– the engine speed.

Operating point for the EGR control solenoid valve test:

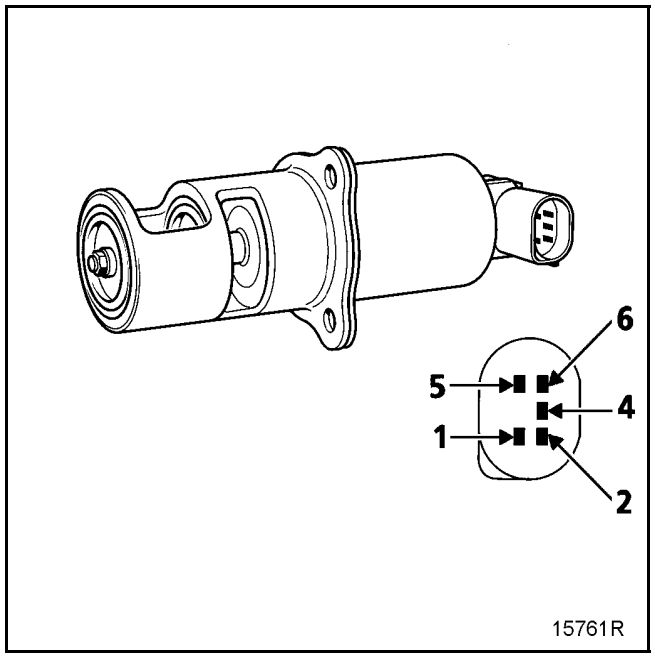
The EGR control valve is activated when:
– the intake air temperature is **> 15°C** and the engine coolant temperature is **> 70°C**,
– or the intake air temperature is **> 50°C** and the engine coolant temperature is **> 40°C**,
– the engine speed is between **850 and 1000 rpm**,
– the injected diesel flow is between **2 and 5 mg/stroke**,
– the atmospheric pressure is between **980 and 1000 mb**.

In this case, the diagnostic tool can read an **RCO** value of the position of the EGR control solenoid valve equal to **16 %**.

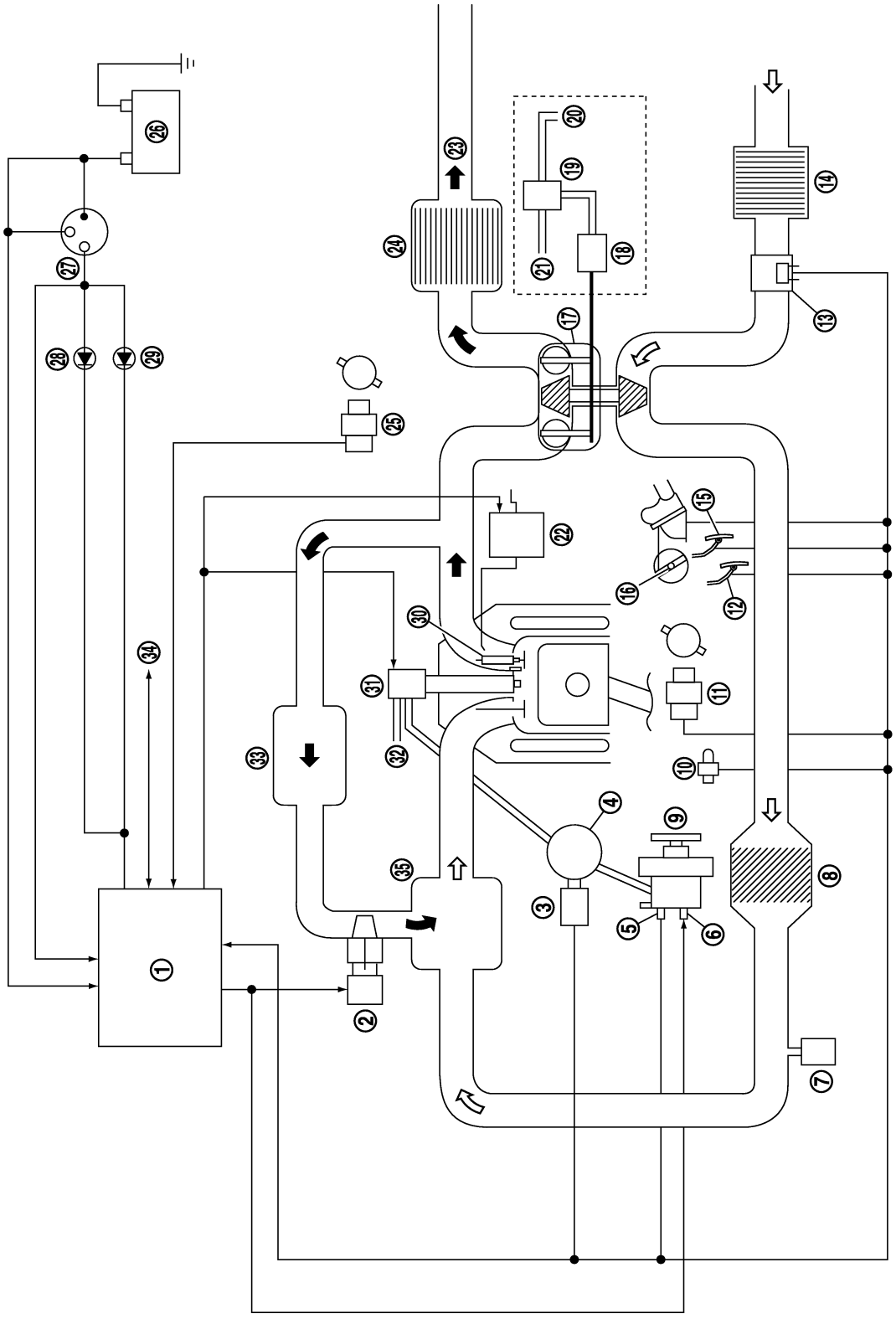
EGR function is disabled if:
– the battery voltage is less than **9 volts**,
– engine speed is below **500 rpm.**
– the mapping (engine speed/load) exceeds a given threshold,
– the air conditioning compressor is activated.

The **EGR** control solenoid valve is not supplied for **2 seconds** after the engine starts.

If there is a malfunction in:
– the EGR valve,
– the turbocharger boost pressure sensor,
the supply to the EGR control solenoid valve is cut.



1 Position potentiometer signal (sensor signal)
2 Position potentiometer earth (sensor ground)
3 Position potentiometer feed (sensor power)
4 Solenoid earth control (ground control)
5 Not used
6 Solenoid feed (power supply)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YEC856A

1. ECM
2. EGR control solenoid valve
3. Fuel rail pressure sensor
4. Fuel rail
5. Fuel temperature sensor
6. Fuel flow actuator (Fuel pressure regulator)
7. Turbocharger boost pressure sensor
8. Turbocharger air cooler
9. Fuel pump
10. Engine coolant temperature sensor
11. Crankshaft position sensor
12. Clutch switch
13. Mass air flow sensor and intake air temperature sensor
14. Air cleaner
15. Stop lamp switch
16. Accelerator pedal position sensor
17. Turbocharger
18. Actuator
19. TC boost control solenoid valve (63 kW engine models only)
20. Vaccum side
21. Ambient
22. Glow relay unit
23. Exhaust gas
24. Catalyst
25. Camshaft position sensor
26. Battery
27. Ignition switch
28. Malfunction indicator
29. Glow lamp
30. Glow plug
31. Fuel injector
32. Fuel return
33. EGR cooler
34. CAN communication
35. Intake manifold

DIESEL INJECTION
Trouble diagnosis - Introduction

1. SCOPE OF THIS DOCUMENT

This document presents the trouble diagnosis method applicable to all ECMs with the following specifications:

Vehicle(s): **K12** with **K9K** *Function concerned:* **DELPHI, DIRECT DIESEL INJECTION, COMMON RAIL MULTI INJECTION**	Name of ECM: **INJECTION DCM1.2** Program No.: **4D** VDIAG No.: 48

2. PREREQUISITES FOR TROUBLE DIAGNOSIS

To begin trouble diagnosis, it is essential to have the following items available:

Documentation type

Diagnostic procedures:
– Assisted with CONSULT-II, Service Manual.
– Wiring diagrams.

Specia tool required PLUGGED RAIL tools

3. REMINDERS

Trouble diagnosis:

There are **present** DTCs and **stored** DTCs (which appeared in a certain context and have since disappeared or which are still present but have not had trouble diagnosis performed on them in the current context).

The "present" or "stored" status of DTCs must be considered when activating the diagnostic tool after power is supplied to the ECM (without activating the system components).

Deal with **present DTCs** according to the procedure specified in the corresponding DTC trouble diagnosis.

For stored DTCs, note the DTCs displayed and follow the instructions in the **Notes** section.

If the DTC is **confirmed** when the instructions in the **Notes** section are applied, the malfunction is present. Deal with the DTC.

If the DTC is not confirmed, check:
– the electrical lines which correspond to the malfunction,
– the connectors for these lines (for oxidation, bent pins, etc.),
– the resistance of the malfunction component,
– the condition of the wires (melted or cut insulation, wear).

Conformity check

The conformity check is designed to check the states and data monitor items which do not display any DTCs on the diagnostic tool when inconsistent. This phase therefore allows:
– diagnoses malfunctions that do not have a DTC display, and which may correspond to a customer complaint.
– Checks that the system is operating correctly and that there is no risk of a DTC reappearing after repairs.

This section gives the trouble diagnosis procedures for states and parameters and the conditions for checking them.

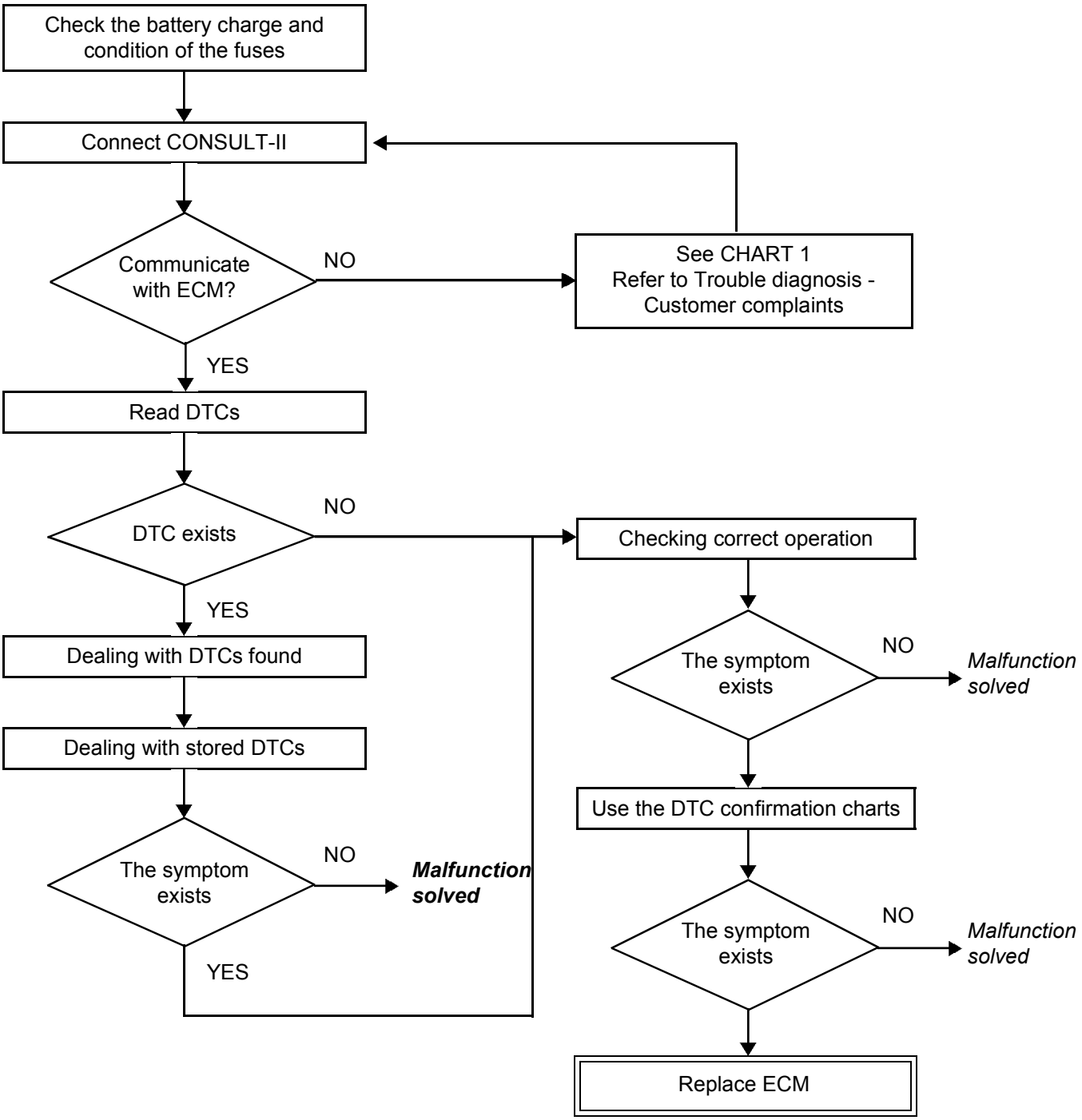
If a state is not operating normally or a data monitor value is outside permitted tolerance values, you should consult the corresponding trouble diagnosis page.

Customer complaints - trouble diagnosis

If the test with the CONSULT-II is OK, but the customer complaint still present, the malfunction should be treated by **customer complaints**.

A synopsis of the general procedure to follow is provided on the next page in the form of a flow chart.

4. DIAGNOSTIC PROCEDURE



4. DIAGNOSTIC PROCEDURE (continued)

Wiring Control

Diagnostics malfunctions

Removing the connectors and/or handling the wirings may temporarily remove the origin of a DTC.
The measurements of the electrical voltages, resistance and insulation are generally correct, especially when the DTC is not present at the time of the analysis (stored DTC).

Visual Check
Look for impacts under the bonnet and in the passenger compartment.
Perform a careful check of the protections, insulation and correct running of wirings.
Look for traces of oxidation.

Tactile Check
While manipulating the wirings, use the diagnostic tool to detect a change in DTC states from "stored" to "present".
Ensure that the connectors are correctly engaged.
Apply light stresses to the connectors.
Gently manipulate the wiring harness.
If a change of state occurs, try to isolate the origin of the incident.

Examination of Each Element
Disconnect the connectors and check the appearance of the clips and blades and their crimping (no crimping on the insulating part).
Check that the clips and blades are properly engaged in the receptacles.
Ensure that there is no rebounding of clips or blades at the time of connection.
Check the contact pressure of the clips using a suitable model blade.

Resistance Control
Test the continuity of the lines in their entirety, then section by section.
Try to create a short-circuit to earth, on the + **12 V** or with another wire.

If a DTC is detected, repair or replace the wiring.

5. SAFETY INSTRUCTIONS

All work on components requires that the safety rules be obeyed to prevent damage or injury:
– Make sure the battery is properly charged to avoid damaging the ECMs with a low charge.
– Use the proper tools.

Cleanliness instructions which must be followed when working on the high-pressure direct injection system:

Risks relating to contamination:

The system is very sensitive to contamination. The risks caused by the introduction of contamination are: damage to or destruction of the high-pressure injection system and the engine, seizing or incorrect sealing of a component.

All After-Sales operations must be performed under very clean conditions. This means that no impurities (particles a few microns in size) get into the system during dismantling or into the circuits via the fuel unions.

The cleanliness guidelines must be applied from the filter through to the injectors.

- What are the sources of contamination?

Contamination is caused by:
- metal or plastic chips,
- paint,
- fibres from: cardboard,
  brushes,
  paper,
  clothing,
  cloths.
- foreign bodies such as hair,
- ambient atmosphere,
- etc.

WARNING:
Before working on the injection system, ensure that the system pressure is nearing 0 bar.

CAUTION: it is not possible to clean the engine using a high-pressure washer because of the risk of damaging the connections. In addition, moisture may collect in the connectors and cause electrical connection malfunctions.

5. SAFETY INSTRUCTIONS (CONTINUED):

Instructions to be followed before any work is carried out on the injection system:

- Ensure that you have the plugs for the unions to be opened (bag of plugs available from the Parts Stores, NISSAN part No:**16830 BN700**, Renault part No: **77 01 206 804**). Plugs are to be used once only. After use, they must be thrown away (once used they are soiled and cleaning is not sufficient to make them reusable). Unused plugs must be thrown away.
- Ensure that you have hermetically resealable plastic bags for storing removed parts. There is less risk of parts stored in this way being exposed to contamination. The bags must be used only once, and after use they must be thrown away.
- Ensure that lint-free towelettes are used for injection pump related service purposes. The use of a normal cloth or paper for cleaning purposes is prohibited. They are not lint-free and may contaminate the fuel circuit of the system. A lint-free cloth should only be used once.

Instructions to be followed before opening the fuel circuit:

Use new thinner for each operation (used thinner contains impurities). Pour it into a clean receptacle.

For each operation, use a clean brush in good condition (the brush must not shed its bristles).

Use a brush and thinners to clean the connections to be opened.

Blow compressed air over the cleaned parts (tools, cleaned the same way as the parts, connections and injection system zone). Check that no bristles remain adhering.

Wash your hands before and during the operation if necessary.

When wearing leather protective gloves, cover them with latex gloves.

Instructions to be followed during the operation:

As soon as the circuit is open, all openings must be plugged to prevent impurities from entering the system. The plugs to be used are available from the Parts Stores. They must not, under any circumstances, be reused .

Close the resealable bag, even if it has to be reopened shortly afterwards. The ambient atmosphere carries impurities.

All components removed from the injection system must be stored in a hermetically sealed plastic bag once the plugs have been inserted.

The use of a brush, thinner, bellows, sponge or normal cloth is strictly forbidden once the circuit has been opened. These items are likely to allow contaminants to enter the system.

A new component replacing an old one must not be removed from its packaging until it is to be fitted to the vehicle.

System overview

The **DCM1.2** injection system used on the **K9K** engine is an electronically-controlled high-pressure injection system. The fuel is compressed by a high-pressure pump and then stored in a rail that feeds the injectors. Injection takes place when a current pulse i applied to the injector holder. The injection delivery is proportional to the rail pressure and the length of pulse applied, and the start of injection is synchronised with the start of the pulse.

The circuit comprises two sub-systems that can be distinguished from one another by the pressure level of the fuel:
- the low-pressure circuit comprises the reservoir, the diesel filter, the transfer pump and the injector holder return pipes;
- the high-pressure circuit consists of the HP pump, the rail, the injector holders and the HP tubes.

Finally, there are a certain number of regulation sensors and actuators that allow command and control of the system as a whole.

Functions performed:

Function: Fuel supply management (advance, delivery and pressure).

Quantity of fuel injected and regulation of injection advance.

The injection control parameters are the quantities to be injected and their respective advances.

These are calculated by the ECM on the basis of information from the following sensors:
- engine speed (crankshaft + cam for synchronisation),
- accelerator pedal,
- pressure charge,
- air temperature(flow meter),
- air pressure (calculated delivery),
- water temperature,
- rail pressure,
- atmospheric pressure.

The quantities to be injected and their respective advances are converted into:
- a reference tooth
- the time between this tooth and the start of the pulse
- the time for which the injector holder is fed

An electrical current (pulse) is sent to each injector holder as a function of the previously calculated data. The system performs between one and four injections (a pilot injection, a pre-injection, a main injection and a post-injection). The general principle is to calculate a total delivery injected which will then be distributed across the deliveries of the various injections to promote efficient combustion and a reduction in pollutant emissions.

An accelerometer is used to control some of the deviations when the fuel is injected. This plays a number of roles:
- protection of the engine by detecting injection losses (disabled on the basic version);
- checking of the pilot quantity by measurement of the deviations and dispersions.

By modifying the duration on the one hand and the injection advance on the other, it is possible to readjust the quantity of fuel injected and the instant of ignition of the mixture.

Rail pressure control

The quality of combustion is influenced by the size of the droplets atomised in the cylinder.
In the combustion chamber, smaller drops of fuel will have time to burn completely and not produce smoke or non-burned particles. To meet anti-pollution requirements it is necessary to reduce the size of the droplets and thus the injection holes.

The smaller these holes are, the less fuel can be introduced at a given pressure which limits the power. To overcome this malfunction it is necessary to increase the quantity of fuel injected which in practice means increasing the pressure (and the number of openings of the injector nozzles). In the case of the Delphi Common Rail, the pressure can reach **1600 bar** in the rail and must be permanently controlled. The measurement circuit is comprised an active pressure sensor on the rail linked to an analogue port of the ECM.

The high-pressure pump is fed at low pressure (**5 bar**) by an integral transfer pump. This feeds the rail, the pressure of which is controlled for the charging by the fuel flow actuator (**IMV**) and for discharge by the injector valves. This allows drops in pressure to be compensated. The fuel flow actuator allows the HP pump to only supply the quantity of diesel necessary to maintain the pressure in the rail. Thanks to this device, the generation of heat is minimised and the efficiency of the engine is improved.

In order to discharge the rail using the injector valves, the valves are operated by means of small electrical pulses:
– sufficiently small not to open the injector (the fuel passes through the return circuit from the injectors),
– sufficiently long to open the valves and discharge the rail.

Surplus fuel is fed back to the fuel filter or to the reservoir according to its delivery. In the event of non-actuation of the IMV, the pressure in the rail is limited by a pressure relief valve fitted on the pump.

Idling control

The ECM is responsible for idling control. In practice it has to take into account the instantaneous power level to be delivered as a function of the following elements:
- engine coolant temperature,
- gear ratio selected,
- battery charge,
- whether electrical consumers (additional heating, climate control, engine ventilator set, heated wind-screen, etc.) are on or off,
- system malfunctions detected.

Individual injector correction (C2I)

The injectors of the DCM1.2 system must be calibrated with correction values in order to accurately set their delivery. Calibration of each injector is performed for various pressures on a test bed and the characteristics are shown on a label attached to the injector holder body. These individual correction values are then entered in the ECM memory thereby allowing it to operate the injectors taking into account their manufacturing variance.

Measurement of the angular position

Crankshaft position sensor (CKPS):
Measurement of the angular position is performed by means of a magneto-inductive sensor that is excited by machined into the flywheel of the crankshaft. This flywheel comprises sixty teeth with a spacing of six degrees, less two missing teeth to form a notch.

Camshaft position sensor (CMPS):
A second sensor (Hall effect) excited by a tooth machined in the drive pulley of the HP pump (in synch with the cam shaft), rotates at half the speed of the engine and provides information on the operation of the injection cycle.

By comparing the signals from these two sensors, the angular position subsystem (APS) of the ECM is capable of providing the system as a whole with the following synchronisation information: the angular position of the flywheel, the speed, the number of the active injector and the advance in the injection cycle.
This module also provides the system with information on the speed of rotation.

"New pump housing fuel flow" strategy ("pump fuel flow")

Lubrication of the pump is by means of a fuel flow cycle during which the pump is filled and comes up to pressure before transferring the diesel to the rail.
This lubrication is performed using a strategy known as "**new pump housing fuel flow**" which prevents starting for around 10 seconds, which is the time needed for filling of the pump and starting.
For vehicles equipped with keys, if the key is released before this "first start-up" phase it is not necessary to perform a power latch before proceeding to restart the vehicle.
This strategy applies following an initial start-up in the factory and then whenever there is a **change of ECM** if the rail pressure parameters are not copied over to the new ECM, or also following reprogramming of the injection ECM.

Variable low capacity (VLC) function

Due to the combination of a number of parameters such as the temperature of the diesel, wear of parts, clogging of the diesel filter, and so on, the system’s limit may be reached during its lifetime. In this case, the pressure in the rail cannot be maintained because of a lack of capacity of the pump. In the event of a lack of pump capacity, therefore, this strategy will reduce the delivery required to a value that allows the pressure controller to re-check the pressure.

The customer will notice a drop in vehicle performance when this strategy is implemented (as confirmed by **ET563 "Variable low capacity function**"). This is a normal operational state of the injection system.

EGR valve operation

The EGR system (exhaust gas recirculation) is comprised a **direct current proportional EGR valve** with integral potentiometer to read the position of the valve. The EGR position is controlled in a closed circuit via the potentiometer and/or the change in the estimated air delivery.

Air delivery calculation

The delivery of fresh air that enters the engine is indicated by a hot wire ratio-metric sensor. This flow meter allows management of the quantity of exhaust gas to be recirculated in order to guarantee the best recirculation rates. A fresh air temperature sensor is incorporated in the flow meter.
Measurement of the air delivery allows closed-circuit control via the EGR valve.

Turbo control

K9K 276 engines:
The turbo system is comprised an electric valve that allows control of the waste gate in order to create a boot pressure or a depression in the admission circuit.

K9K 274 engine:
The turbo system is self-regulating and does not need to be controlled by the ECM.

Function: Stored functions

Climate control management assistance

With climate controlled models, the DCM1.2 system offers the possibility of deactivating the air conditioning under certain usage conditions:

- intentional interruption by the driver,
- during the start-up phases,
- in the event of overheating (in order to reduce the power to be supplied by the engine),
- when the speed is maintained at a very high level (protection of the compressor),
- for temporary periods (such as strong acceleration demands during overtaking, anti-stalling and moving off). These conditions are only taken into account where they occur repeatedly, in order to avoid instability of the system (untimely deactivations),
- when certain malfunctions arise.

Cold loop climate control

The climate control is the cold loop type and its management shared between a number of ECM. The ECM is responsible for:

- managing the demand for cold as a function of the controls in the passenger compartment and the pressure value,
- determining the power absorbed by the compressor from the pressure,
- determining the engine ventilator set commands as a function of the speed of the vehicle and the pressure.

The driver turns on the climate control from the instrument panel. The information is sent to the ECM via the CAN system. This demand for cold is authorised or declined as a function of the measured pressure. If this pressure is outside the operational limits, the cold loop strategy is not activated.

Note:
These demands for operation of the air cooling set can be made from the ECM but they pass via the CAN. These demands are a function of the climate control, but also the engine coolant temperature and the speed of the vehicle.

Passenger compartment climate control

A direct injection engine is characterised by injection of the fuel directly into the combustion chamber. The result is a reduction in heat losses from the upper part of the engine and consequently a smaller cylinder head cooling circuit is needed.

The effect of this reduction is that the temperature of the water passing through is increased more slowly This water is then used by the passenger compartment heating system. During severe cold spells, therefore, it becomes difficult to quickly reach a comfortable temperature in the passenger compartment.

In order to limit the heating delay, air heating resistors are incorporated in the passenger compartment heating circuit. The passenger compartment heating unit determines the need to operate the heating resistors, the UPC physically controls the heating resistors and the ECM determines on the one hand as a function of the alternator the operational power limits of the heating resistors and on the other when to disable the heating resistors as a function of the engine speed, the load and the speed of the vehicle.

Speed limiter/cruise control

When activated the vehicle **cruise control** function allows the speed of the vehicle to be maintained at a pre-selected speed whatever the driving conditions encountered. Using control keys the driver is able to increase or decrease the speed of the vehicle.

The **cruise control** function can be deselected either by the control buttons or by deactivating the cruise control function selection switch, or by detection of system events such as pressing the brake or clutch pedals, or when system errors are detected such as inconsistent vehicle speed or excessive vehicle deceleration.

The **cruise control** function can also be temporarily disabled when the driver so wishes by pressing a pedal and causing the control setting to be exceeded, thereby taking control of the vehicle again and exceeding the pre-set speed. The pre-set speed is reverted to when the driver releases the accelerator pedal.

It is possible to reactivate the vehicle speed control and to revert to the last pre-set speed following deactivation of the function for any reason during the same vehicle usage cycle (no interruption to the microprocessor power supply). The vehicle will attempt to regain the preset speed by means of a controlled increase in speed.

When activated via the selection switch **the speed limiter function** allows the speed of the vehicle to be limited to a preset value.
The driver drives the vehicle normally using the accelerator pedal up to the preset speed. If the driver tries to exceed this speed, the system does not take account of the pedal demand and controls the vehicle speed as the cruise control would, subject to the accelerator being sufficiently depressed.
As in the case of the cruise control, it is possible to change the preset speed by pressing the control buttons either intermittently or continuously.
For safety reasons, it is possible to exceed the preset speed by depressing the accelerator pedal so that it exceeds a pedal position limiting value. The vehicle will then be completely controlled by the latter until its speed falls below the preset value again when the limiter again becomes active.

The driver has the following commands for controlling the **cruise control/speed limiter**:
– accelerator pedal,
– brake pedal,
– clutch pedal (except on automatic transmission),
– function selection switch for choosing the **cruise** control or **speed limiter** operating mode.

Instrument panel display

The **ECM** controls the display on the instrument panel of certain information relating to the operation of the engine. Five functions are involved here: The **OBD** malfunction indicator light for the **EOBD** (European On Board Diagnostics), the pre-/post-heating, the engine coolant temperature and engine malfunctions: **Severity level 1** (non-critical fault) and **Severity level 2** (emergency stop). These five functions are represented by five lights or messages given out by the on-board ECM

Pre-/post-heating lamp

This lamp indicates that the pre-heating has been activated.

Engine coolant temperature light

This light is used as an indicator of engine overheating.
– In the event of overheating, it is up to the driver whether to stop the vehicle or not.

OBD light

The **OBD** malfunction indicator light is used to alert the driver to the existence of injection malfunctions involving excessive pollution or if the **EOBD** system is deactivated.

The ECM makes a request for lighting of the **OBD** malfunction indicator light only where there is a malfunction present at the end of three consecutive cycles
The 3-second visual check upon powering up (automatic test procedure controlled by the instrument panel) is performed by the ECM.
In the event of a confirmed **OBD** malfunction by lighting of the **OBD** light, no flashing of the light must be observed following the lighting test. Moreover the instrument panel gives out the message "**Check anti-pollution**".
The lighting of this light can also be demanded by the gearbox microprocessor where fitted.

Note: This light is only lit if the vehicle **EOBD** approved.

Severity level 1 warning light

In the event of a minor malfunction, the ECM may request the display of a severity level 1 warning. Generally the instrument panel lights the service light and/or issues the message "Check injection". Refer to the instrument panel operation.

Note: The service light lights if the instrument panel is configured with cruise control and speed limiter present but this function has not yet been detected by the injection calculator.

Severity level 2 warning light

In the event of a major malfunction, the microprocessor requests the display of a severity level 2 warning light. Generally the instrument panel lights the STOP light and/or issues the message "Defective injection". Refer to the instrument panel operation.

DTCs causing the OBD malfunction indicator to light

DTC number	Diagnostic tool description	Characterisation
P0409/DF010	EGR position sensor circuit (Min limit and max limit on position)	**1.DEF** **2.DEF**
P0201/DF026	Cylinder 1 injector control circuit	**CO-CC**
P0202/DF027	Cylinder 2 injector control circuit	**CO-CC**
P0203/DF028	Cylinder 3 injector control circuit	**CO-CC**
P0204/DF029	Cylinder 4 injector control circuit	**CO-CC**
P062F/DF648	ECM	**2.DEF**
P0400/DF114	EGR electrolvalve circuit (EGR valve blocked open)	**4.DEF**

CONNECTION

ECM harness connector (E61), 32-terminals

Terminal No.	Item
1	CAN H
2	K-line (Data link connector)
3	Not used
4	Not used
5	Stop lamp switch
6	Accelerator position sensor 2 ground
7	CAN L
8	Not used
9	Not used
10	Not used
11	Not used
12	Accelerator position sensor 2 signal
13	Not used
14	Not used
15	Not used
16	Not used
17	Not used
18	Accelerator pedal position sensor 2 power supply
19	Not used
20	Not used
21	Not used
22	Ignition switch signal
23	Not used
24	Not used
25	ECM ground
26	ECM ground
27	ECM ground
28	Accelerator position sensor 1 ground
29	Accelerator position sensor 1 power supply
30	Accelerator position sensor 1 signal
31	Not used
32	ECM ground

ECM harness connector (F134), 48-terminals and 32-terminals

Terminal No.	Item
33	Not used
34	APP sensor shield ground
35	TC boost control solenoid valve (63 kW engine models)
36	Not used
37	EGR control solenoid valve
38	Not used
39	Fuel flow actuator (fuel pressure regulator)
40	Not used
41	Knock sensor (accelerometer) shield ground
42	Not used
43	Not used
44	Knock sensor (accelerometer) power supply
45	Knock sensor (accelerometer) ground
46	Not used
47	Common rail pressure sensor power supply
48	Turbocharger boost pressure sensor power
49	EGR position sensor power
50	Mass air flow sensor power
51	Intake air temperature sensor power supply
52	Turbocharger air temperature sensor power supply
53	Engine coolant temperature sensor power supply
54	Fuel temperature sensor power supply
55	Crankshaft position sensor power supply
56	Camshaft position sensor signal
57	Common rail fuel pressure sensor signal
58	Turbocharger boost pressure sensor signal
59	EGR position sensor signal
60	Mass air flow signal
61	Not used
62	Not used
63	Engine coolant temperature sensor ground
64	Fuel temperature sensor ground
65	Crankshaft position sensor ground
66	Camshaft position sensor ground
67	Common rail fuel pressure sensor ground
68	Turbocharger boost pressure sensor ground

CONNECTION

ECM harness connector (F134), 48-terminals and 32-terminals (continued)

Terminal No.	Item
69	EGR control solenoid valve ground
70	Mass air flow sensor ground
71	Not used
72	Not used
73	Injector 2 ground
74	Injector 2 power supply
75	Injector 4 ground
76	Injector 4 power supply
77	Injector 3 ground
78	Injector 3 power supply
79	Injector 1 ground
80	Injector 1 power supply
81	Not used
82	Not used
83	Refrigerant pressure sensor power supply
84	Not used
85	Not used
86	Not used
87	Not used
88	Not used
89	Refrigerant pressure sensor signal
90	Glow relay diagnostic signal
91	Not used
92	Water in fuel sensor signal (if equipped)
93	Not used
94	Not used
95	Not used
96	Not used
97	Water in fuel sensor ground (if equipped)
98	Glow relay control
99	Not used
100	Not used
101	Not used
102	Not used
104	ECM power supply
105	Not used
106	Not used
107	Refrigerant pressure sensor ground
108	Not used
109	ECM power supply
110	ECM power supply
111	Not used
112	Not used

DTC and DF code table:

DTC	DF code	Diagnostic tool headings
P0016	**DF195**	Camshaft position sensor circuit
P0045	**DF261**	Torbocharger boost control solenoid valve
P0070	**DF002**	Ambient air temperature circuit (IAT sensor)
P0087	**DF130**	Fuel flow capacity function
P0089	**DF053**	Fuel rail pressure regulation function
P0100	**DF056**	Mass air flow sensor
P0115	**DF001**	Engine coolant temperature sensor circuit
P0170	**DF859**	Insufficient individual injection adjusting
P0180	**DF098**	Fuel temperature sensor circuit
P0190	**DF007**	Common rail pressure sensor circuit
P0200	**DF052**	Injector control circuit
P0201	**DF026**	Injector circuit cylinder 1
P0202	**DF027**	Injector circuit cylinder 2
P0203	**DF028**	Injector circuit cylinder 3
P0204	**DF029**	Injector circuit cylinder 4
P0225	**DF008**	Accelerator pedal position sensor 1 circuit
P0231	**DF024**	Low-pressure actuator control circuit
P0235	**DF089**	Turbocharger boost pressure sensor circuit
P0263	**DF059**	Misfiring on cylinder 1
P0266	**DF060**	Misfiring on cylinder 2
P0269	**DF061**	Misfiring on cylinder 3
P0272	**DF062**	Misfiring on cylinder 4
P0325	**DF121**	Knock sensor circuit
P0335	**DF005**	Crankshaft position sensor circuit
P0340	**DF112**	Camshaft position sensor circuit
P0380	**DF025**	Glow plug diagnostic connection
P0382	**DF017**	Glow plug control circuit
P0400	**DF114**	EGR solenoid valve circuit
P0403	**DF016**	EGR control circuit
P0409	**DF010**	EGR position sensor circuit
P0487	**DF209**	EGR position sensor circuit
P0500	**DF014**	Vehicle speed sensor circuit

DTC and DF code table:

DTC	DF code	Diagnostic tool headings
P0513	**DF037**	Immobiliser
P0530	**DF049**	Refrigerant pressure sensor circuit
P0560	**DF047**	ECM supply voltage
P0571	**DF050**	Brake switch circuit
P0575	**DF051**	Regulator function/speed limit
P0604	**DF107**	ECM memory
P0606	**DF038**	ECM
P0641	**DF113**	Sensor supply voltage
P0651	**DF122**	Supply voltage APP sensor 2
P0685	**DF015**	ECM relay control circuit
P0703	**DF631**	Brake switch circuit
P2120	**DF009**	Accelerator pedal position sensor 2 circuit
P2226	**DF003**	Atmospheric pressure sensor circuit
P2264	**DF057**	Water in fuel sensor circuit
PC101	**DF099**	Multiplex network (CAN circuit)

ECM REPLACEMENT, PROGRAMMING OR REPROGRAMMING OPERATION

Following items can be (re)programmed via the DLC using the CONSULT-II
- System configuration
- Injector's indivisual correction parameter (value)

Before replacing the ECM in after-sales operations, the following data must be readout using CONSULT-II:

– The **individual injector correction** parameters to be noted to appropriate paper or CONSULT-II copying function.

NOTE: The individual injector correction value for each injector must be entered manually after the ECM has been replaced or (re)programmed by reading the individual injector correction value on each injector (Refer to replacing injectors).

IMPORTANT: It is not possible to test an ECM from the parts stores because it cannot be fitted to any other vehicle.

REPLACING THE INJECTORS

NOTE: The individual injector correction is a calibration made on **each injector** in the factory in order to **adjust its flow** precisely.

These correction values are written on a label affixed to each injector then entered into the computer which then controls each injector taking into account its individual **manufacturing variations**.

When replacing one or more injectors, the parameters of the injector output concerned must be modified. **The system can be configured using the CONSULT-II** (Refer to injector).

P0016 **DEF195** **PRESENT** **OR** **STORED**	CAMSHAFT POSITION (CMP) SENSOR CIRCUIT

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs:** The DTC is declared **present** when cranking the engine or at idle speed.

Check the connection and condition of the **CMP sensor harness connector** and repair if necessary.
Check the presence of **+12V** on the CMP sensor harness connector terminal 1 and repair if necessary.
Check the connection and condition of the **ECM harness connector** (F134) and repair if necessary.
Check the **insulation, continuity and absence of interference resistance of the connections:** ● ECM (F134) terminal 56 and CMP sensor harness connector terminal 2. ● ECM (F134) terminal 66 and CMP sensor harness connector terminal 3. ● Check power supply between CMP sensor harness connector terminal 1 and IPDM E/R terminal 33. (Refer to wiring diagram "EC-CMPS-01".) If necessary, replace the sensor.
Check the timing gear setting. Refer to "EM section".

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0045 DEF261 PRESENT OR STORED	TURBOCHARGER BOOST CONTROL SOLENOID VALVE CIRCUIT **C0.0 : Open circuit or short circuit to earth (ground)** **CC.1 : Short circuit to +12V**

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs:** The DTC is declared present when the ignition switch is in the ON position. **Special notes:** If DTC P0045 is present, air flow regulation is cut, EGR valve is closed and boost pressure regulation is cut. Suspected injection message displayed on the instrument panel and reduced performance.

Ensure that the turbo is operating correctly, check the air inlet circuit (for obstructions, etc.), check the boost pressure signal, check the transmission setting when there is a change of speed.
Check the connection and condition of the **TC boost control solenoid valve harness connector** and repair if necessary.
Check the connection and condition of the **ECM harness connector** (F134) and repair if necessary.
Measure the resistance at the TC boost control solenoid valve terminal, if it is not **Approximately 20 Ω ± 2 Ω at 23°C** between terminal 1 and 2, replace solenoid valve.
Check the insulation, continuity and absence of interference resistance of the connections: ● ECM (F134) terminal 35 and TC boost control solenoid valve harness connector terminal 2 ● Check power supply between TC boost control solenoid valve harness connector terminal 1 and IPDM E/R terminal 33 (Refer to wiring diagram "EC-TCC/V-01".) If necessary, replace the solenoid valve. Check the turbocharger and its circuit. Refer to "EM and LC sections".
If the DTC persists, replace ECM.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0070 **DEF002** **PRESENT** **OR** **STORED**	AMBIENT AIR TEMPERATURE CIRCUIT (IAT SENSOR) **CO.1 : Open circuit or short circuit to +12V** **CC.1 : Short circuit to earth (ground)**

NOTES	Special note: None

Check the connection and condition of the **intake air temperature sensor harness connector** and repair if necessary.

Check the condition of the **ECM harness connector** (F134) and repair if necessary.

Measure the resistance at the intake air temperature sensor harness connector between terminal 5 and 6 and if NG, replace the valve.
at -40°C: **41225** Ω < Ω < **47492** Ω
at -20°C: **14260** Ω < Ω < **16022** Ω
at 0°C: **5497** Ω < Ω < **6050** Ω
at 20°C: **2353** Ω < Ω < **2544** Ω
at 40°C: **1114** Ω < Ω < **1186** Ω
at 60°C: **568.9** Ω < Ω < **597.4** Ω
at 80°C: **310** Ω < Ω < **321.6** Ω
at 100°C: **180.4** Ω < Ω < **185.1** Ω

Check the **insulation, continuity and absence of interference resistance of the connections:**
- ECM (F134) terminal 51 and intake air temperature sensor harness connector terminal 5.
- ECM (F134) terminal 70 and intake air temperature sensor harness connector terminal 6.

(Refer to wiring diagram "EC-IATS-02".)
If necessary, replace the sensor.

If the DTC persists, replace ECM.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0087 DEF130 PRESENT OR STORED	FUEL FLOW CAPACITY FUNCTION

NOTES	Condition for applying the diagnostic procedure to the stored DTCs: The DTC is declared present with the engine running.
	Special notes: If this DTC is present: engine may stop when malfunction indicator lights up (level 2).

Check the **connection** of the fuel flow actuator **(IMV)** and repair if necessary. If necessary, replace the solenoid valve.
Measure the resistance across terminals 1 and 2 of the fuel flow actuator. **Replace the flow actuator** if the resistance is not approximately **5.3 Ω±0.5 Ω at 20°C**.
Check the condition of the ECM (**F134**) harness connector. Repair if necessary.
Check the **insulation, continuity and absence of unwanted resistance** on the following connection: ● ECM (**F134**) terminal 39 and fuel flow actuator harness connector 2. Repair if necessary. Check: - **that fuel is present** in the tank, - **that there is no air** in the fuel circuit, - the condition of the **fuel filter**. Repair if necessary.
If the DTC persists, carry out a **"HIGH-PRESSURE PUMP" test (see TEST section)**.
If the malfunction persists, replace fuel flow actuator.
If the DTC persists, replace the ECM.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0089 **DF053** **PRESENT** **OR** **STORED**	COMMON RAIL FUEL PRESSURE REGULATION FUNCTION 1.DEF : At minimum limit 2.DEF : At maximum limit 3.DEF : Below minimum threshold 4.DEF : Above maximum threshold 5.DEF : High flow current < minimum 6.DEF : High flow current > maximum 7.DEF : Low flow current < minimum 8.DEF : Low flow current > maximum

NOTES	**Special notes:** If **DTC P0089** is present: engine may stop with malfunction indicator lights up.
	Priority when dealing with a number of DTCs: If DTC **P0089** and **DTC P0180 or P0190** are present, deal with **P0180 or P0190** first.
	Conditions for applying the diagnostic procedure to the stored DTCs: The fault is declared present with the **engine running**.

Check the fuel flow actuator connection. Repair if necessary.
Check the presence of +12V on the fuel flow actuator harness connector terminal 1 and repair if necessary.
Measure the resistance between **terminal 1 and 2 of the fuel flow actuator,** if it is not approximately **5.3 Ω ± 0.5 Ω at 20°C, replace the actuator.**
Check the condition of the ECM (F134) harness connector and replace it if necessary.
Check the insulation, continuity **and absence of interference resistance of the connection:** ● ECM (F134) terminal 39 and fuel flow actuator harness connector terminal 2 (Refer to wiring diagram "EC-IMV/D-01".) Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0100 DEF056 PRESENT OR STORED	MASS AIR FLOW SENSOR CIRCUIT 1.DEF : Permanent low level 2.DEF : Permanent high level 3.DEF : Blow minimum threshold 4.DEF : Above maximum threshold 5.DEF : Parameter at minimum limit 6.DEF : Parameter at maximum limit.

NOTES	**Priority when dealing with a number of DTCs:** If DTCS P0100 and P0235 are present, deal with DTC P0235 first.
	Conditions for applying the diagnostic procedure to the stored DTCs: If the DTC P0100 is present: Mass air flow sensor function will stop and close the EGR valve.

Check that the air filter is not obstructed. Check that the air filter is not clogged, and that there is no obstruction of the inlet circuit from there air filter outlet to the inlet pipe.
Check the MAF sensor connections.
Check the presence of **+12V** on the MAF sensor harness connector terminal 3 and repair if necessary.
Check the connection of the ECM (**F134**) harness connector. Repair if necessary.
Check for the **continuity, absence of interference resistance and insulation** on the following connections: ECM (**F134**) terminal 50 and MAF sensor harness connector 2. ECM (**F134**) terminal 60 and MAF sensor harness connector 1. ECM (**F134**) terminal 70 and MAF sensor harness connector 6. Check for the presence of **an earth** on **terminal 6** of the MAF sensor harness connector.
If the DTC persists and remains present, replace the MAF sensor.
If the DTC persists, replace ECM.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0115 DEF001 PRESENT OR STORED	ECT SENSOR CIRCUIT CC.0 : Short circuit to earth (ground) CO.1 : Short circuit or open circuit to + 12V

NOTES	**Special notes:** If **DTC P0115 present** fan assembly activated at low speed **(fan assembly** 1). If **fan assembly 1** suspected, **fan assembly 2** activated for vehicles fitted with air conditioning.

Check the connection and condition of the engine coolant temperature sensor harness connectors. Repair it if necessary.
Check the ECM (F134) harness connections. Repair if necessary.
Measure the **resistance** of the coolant temperature sensor between **terminals 1 and 4** of its black connector. Replace the sensor if the resistance is not: **2252** ± **112.16** Ω **at 25°C**.
Check the insulation, continuity and absence of interference resistance of the connections: ● ECM (F134) terminal 63 and ECT sensor terminal 1 ● ECM (F134) terminal 53 and ECT sensor terminal 4 (Refer to diagram "EC-ECTS-01".) Repair if necessary.
If the DTC persists and remains present, replace the ECT sensor.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

DTC P0170 Insufficient individual injection adjusting

P0170 DEF859 PRESENT OR STORED	INSUFFICIENT INDIVIDUAL INJECTION ADJUSTING MALFUNCTION

NOTES	**Priority when dealing with number of DTCs:** If DTC P0170 and DTCs P0201, P0202, P0203 and P0204 are preset, deal with: – P0200 Injector control circuit – P0201 Injector circuit cylinder 1 – P0202 Injector circuit cylinder 2 – P0203 Injector circuit cylinder 3 – P0204 Injector circuit cylinder 4

Drive the vehicle with recommended driving cycle. (Please obtain recommended driving cycle for mechanics.)

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0180 DF098 PRESENT OR STORED	FUEL TEMPERATURE SENSOR CIRCUIT CC.0 : Short circuit to earth (ground) CO.1 : Open circuit or short circuit + 12V

NOTES	**Special notes:** None.

Check the condition of the **fuel temperature sensor harness connector** and repair it if necessary.
Check the condition of the ECM harness connector (F134) and repair if necessary.
At the terminal, measure the **resistance** of the **fuel temperature sensor,** if it is not approximately **2.2k Ω at 25 °C,** replace the fuel temperature sensor.
Check the **insulation, continuity and absence of interference resistance** of the connections: ● ECM (F134) terminal 64 and fuel temperature sensor harness connector terminal 1 ● ECM (F134) terminal 54 and fuel temperature sensor harness connector terminal 2 (Refer to wiring diagram "EC-FTS-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0190 **DF007** **PRESENT** **OR** **STORED**	COMMON RAIL FUEL PRESSURE SENSOR CIRCUIT 1.DEF : Inconsistency 2.DEF : Below minimum threshold 3.DEF : Above maximum threshold 4.DEF : Value outside of tolerance CC.0 : Short circuit to earth (ground) CO.1 : Open circuit or short circuit to + 12V

NOTES	**Priority when dealing with a number of DTCs:** If DTCs **P0190** and **P0608** are both present, deal with DTC **P0608** (sensor voltage supply) first.
	Conditions for applying the diagnostic procedure to the stored DTCs: The DTC is declared present after the engine is started.
	If **P0190 is present, the engine stops and is impossible to restart.** **Malfunction indicator lights up (level 2).**

Check the condition of the **common rail fuel pressure sensor harness connector** and repair if necessary.

Check the condition of the **ECM harness connector** (F134) and repair if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections:**

- ECM (F134) terminal 67 and common rail fuel pressure sensor harness connector terminal 2
- ECM (F134) terminal 57 and common rail fuel pressure sensor harness connector terminal 3
- ECM (F134) terminal 47 and common rail fuel pressure sensor harness connector terminal 1
  (Refer to wiring diagram "EC-CRFPS-01".)

Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0200 **DF052** **PRESENT** **OR** **STORED**	INJECTOR CONTROL CIRCUIT CC.0 : Short circuit to earth CC.1 : Short circuit to + 12 volts

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs:** DTC declared present: **engine at idle speed.**
	Priorities when dealing with more than one DTC: If DTC **P0200** and DTCs **P0201, P0202, P0203 and P0204** are present, the diagnostic procedure remains the same, but you can determine the suspected injector.
	Special notes: The engine stalls when the DTC appears. **Malfunction indicator lights up (level 2)**.

Turn off the ignition switch and check the injector **connections**. Repair if necessary.
Disconnect the injectors and turn on the ignition switch on. Check to see if the DTC is still present. Using CONSULT-II, check for the changes to P0200. Is P0200 present or stored?

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0200 PRESENT	If the DTC **disappears when the injectors are disconnected**, check the condition of the **ECM harness connector** (F134) and replace it if necessary. Check the **insulation, continuity and absence of interference resistance of the connections:** ● ECM (F134) terminal 80 and No.1 injector terminal 2 (+) ● ECM (F134) terminal 79 and No.1 injector terminal 1 (ground) ● ECM (F134) terminal 74 and No.2 injector terminal 2 (+) ● ECM (F134) terminal 73 and No.2 injector terminal 1 (ground) ● ECM (F134) terminal 78 and No.3 injector terminal 2 (+) ● ECM (F134) terminal 77 and No.3 injector terminal 1 (ground) ● ECM (F134) terminal 76 and No.4 injector terminal 2 (+) ● ECM (F134) terminal 75 and No.4 injector terminal 1 (ground) (Refer to wiring diagram "EC-INJECT-01 and -02".) Repair if necessary.
P0200 STORED	Injector(s) malfunctioning. Replace the injector identified by **P0201 to P0204** if present. If none of the faults identifying the malfunctioning injector circuit are present: – Switch off the engine. – Reconnect one of the four injectors. – Switch the ignition back on and, if the malfunctioning reappears as present, replace the reconnected injector. **Carry out the same procedure for the remaining injectors.**

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

DIESEL INJECTION
DTC P0201 Injector circuit cylinder 1

P0201 **DF026** **PRESENT** **OR** **STORED**	CYLINDER 1 INJECTOR CIRCUIT CO : Open circuit CC : Short circuit 1.DEF : At minimum stop 2.DEF : At maximum stop

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs:** STC declared present: **engine at idlie speed**.
	Special notes: When this DTC appears, the idle speed is stuck at **1000 rpm**, with engine noise, unstable engine speed, reduced engine performance and **malfunction indicator lights up (level 1)**.

CO ***CC***	***NOTES***	**Special notes:** None.

With the ignition switched off, wait 15 seconds.
Check the connection and condition of the **injector 1 harness connector**.
Repair if necessary.

Check the condition of the ECM harness connector (F134) and replace it if necessary.

Use command **"INJECTOR CYLINDER 1"** with CONSULT.
If 5 actuation cycles of injector 1 cannot be heard working, connect the cylinder 2 injector harness connector to the cylinder 1 injector and use command **"INJECTOR CYLINDER 2"**.
Does this injector actuation cycle work?

YES	Injector 1 is not malfunctioning, malfunction with injector 1 control circuit. Check **for continuity and make sure there is no extraneous resistance on the following connections**: ● ECM (F134) terminal 80 and injector 1 harness connector terminal 2. ● ECM (F134) terminal 79 and injector 1 harness connector terminal 1. Also check for insulation between these 2 connections. (Refer to wiring diagram "EC-INJECT-02"). Repair if necessary. If the DTC persists, replace ECM.
NO	Injector 1 malfunctioning, replace the cylinder 1 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0201 **DF026** **PRESENT** **OR** **STORED** Cont'd	

1.DEF ***2.DEF***	***NOTES***	**Special notes:** None.

Check that the injector correction value is correctly programmed into the ECM.

- Check the knock sensor shielding on ECM (**F134**) harness connector terminal 41.
  (Refer to wiring diagram "EC-INJECT-02".)

Check that the knock sensor is secure on the engine.
If the DTC persists, replace the cylinder 1 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

DTC P0202 Injector circuit cylinder 2

P0202 **DF027** **PRESENT** **OR** **STORED**	CYLINDER 2 INJECTOR CIRCUIT CO : Open circuit CC : Short circuit 1.DEF : At minimum stop 2.DEF : At maximum stop

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs:** DTC declared present: **engine at idlie speed**.
	Special notes: When this DTC appears, the idle speed is stuck at **1000 rpm**, with engine noise, unstable engine speed, reduced engine performance and **malfunction indicator light comes on (level 1)**.

CO ***CC***	***NOTES***	**Special notes:** None.

With the ignition switched off, wait 15 seconds.
Check the connection and condition of the **injector 1 harness connector**.
Repair if necessary.

Check the condition of the ECM harness connector (F134) and replace it if necessary.

Use command **"INJECTOR CYLINDER 2"** with CONSULT.
If 5 actuation cycles of injector 2 cannot be heard working, connect the cylinder 3 injector harness connector to the cylinder 2 injector and use command **"INJECTOR CYLINDER 3"**.
Does this injector actuation cycle work?

YES	Injector 2 is not malfunctioning, malfunction with injector 2 control circuit. Check **for continuity and make sure there is no extraneous resistance on the following connections**: ● ECM (F134) terminal 74 and injector 2 harness connector terminal 2. ● ECM (F134) terminal 73 and injector 2 harness connector terminal 1. Also check for insulation between these 2 connections. (Refer to wiring diagram "EC-INJECT-02"). Repair if necessary. If the DTC persists, replace ECM.
NO	Injector 2 malfunctioning, replace the cylinder 2 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0202 **DF027** **PRESENT** **OR** **STORED** Cont'd	

1.DEF ***2.DEF***	***NOTES***	**Special notes:** None.

Check that the injector correction value is correctly entered on the ECM.

- Check the knock sensor shielding on ECM (F134) harness connector terminal 41.
  (Refer to wiring diagram "EC-INJECT-02".)

Check that the knock sensor is secure on the engine.
If the DTC persists, replace the cylinder 2 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0203 **DF028** **PRESENT** **OR** **STORED**	CYLINDER 3 INJECTOR CIRCUIT CO : Open circuit CC : Short circuit 1.DEF : At minimum stop 2.DEF : At maximum stop

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs:** STC declared present: **engine at idlie speed**.
	Special notes: When this DTC appears, the idle speed is stuck at **1000 rpm**, with engine noise, unstable engine speed, reduced engine performance and **malfunction indicator light comes on (level 1)**.

CO ***CC***	***NOTES***	**Special notes:** None.

Switch off the ignition and wait **15 seconds**. Check the connection and condition of the **injector connector**. Repair if necessary.
Check the condition of the **ECM harness connector** (F134). Repair if necessary.
Use **"INJECTOR 3 CYLINDER"** in active test mode with CONSULT-II. If 5 actuation cycles of injector 3 cannot be heard working, connect the cylinder 4 injector harness connector to the cylinder 3 injector and use command **"INJECTOR 4 CYILINDER"**. **Does this injector actuation cycle work?**

YES	Injector 3 is not malfunctioning, malfunction with injector 3 control circuit. Check **for continuity and make sure there is no extraneous resistance on the connections**: ● ECM (F134) terminal 78 and injector 3 terminal 2. ● ECM (F134) terminal 77 and injector 3 terminal 1. Also check for insulation between these 2 connections. (Refer to wiring diagram "EC-INJECT-02"). Repair if necessary. If the DTC persists, replace ECM.
NO	Injector 3 malfunctioning, replace the cylinder 3 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0203 **DF028** **PRESENT** **OR** **STORED** Cont'd	

1.DEF ***2.DEF***	***NOTES***	**Special notes:** None.

Check that the injector correction value is correctly entered on the ECM.

- Check the knock sensor shielding on ECM (F134) harness connector terminal 41.
  (Refer to wiring diagram "EC-INJECT-02".)

Check that the knock sensor is secure on the engine.
If the DTC persists, replace the cylinder 3 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0204 **DF029** **PRESENT** **OR** **STORED**	INJECTOR CYLINDER 4 CONTROL CIRCUIT CO : Open circuit CC : Short circuit 1.DEF : At minimum stop 2.DEF : At maximum stop

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs:** STC declared present: **engine at idlie speed**.
	Special notes: When this DTC appears, the idle speed is stuck at **1000 rpm**, with engine noise, unstable engine speed, reduced engine performance and **malfunction indicator light comes on (level 1)**.

CO ***CC***	***NOTES***	**Special notes:** None.

Switch off the ignition and wait **15 seconds**. Check the connection and condition of the **injector connector**. Repair if necessary.
Check the condition of the **ECM harness connector** (F134). Repair if necessary.
Use **"INJECTOR 4 CYLINDER"** in active test mode with CONSULT-II. If 5 actuation cycles of injector 4 cannot be heard working, connect the cylinder 1 injector harness connector to the cylinder 1 injector and use command **"INJECTOR 1 CYILINDER"**. **Does this injector actuation cycle work?**

NO	Injector 4 is not malfunctioning, malfunction with injector 4 control circuit. Check **for continuity and make sure there is no extraneous resistance on the connections**: ● ECM (F134) terminal 76 and injector 4 terminal 2. ● ECM (F134) terminal 75 and injector 4 terminal 1. Also check for insulation between these 2 connections. (Refer to wiring diagram "EC-INJECT-02"). Repair if necessary. If the DTC persists, replace ECM.
YES	Injector 4 malfunctioning, replace the cylinder 4 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0204 **DF029** **PRESENT** **OR** **STORED** Cont'd	

1.DEF ***2.DEF***	***NOTES***	**Special notes:** None.

Check that the injector correction value is correctly entered on the ECM.

- Check the knock sensor shielding on ECM (F134) harness connector terminal 41.
  (Refer to wiring diagram "EC-INJECT-02".)

Check that the knock sensor is secure on the engine.
If the DTC persists, replace the cylinder 4 injector.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0225 **DF008** **PRESENT** **OR** **STORED**	PEDAL SENSOR CIRCUIT TRACK 1 (APP SENSOR 1) CO.0 : Open circuit or short circuit to earth (ground) CC.1 : Short circuit to 12 volts 1.DEF : Inconsistency between APP sensors 1 and 2 2.DEF : No signal 3.DEF : Blocked component

NOTES	**Priority when dealing with a number of DTCs:** If DTCs **P0225** and **P0641** are both present, deal with **DTC P0641 "SENSOR SUPPLY VOLTAGE"** first.
	Special notes: if **DTC P0225** is present: engine speed maintained **above 1000 rpm**, engine performance is reduced and malfunction indicator lights up **(level 1)**. If **DTC P0225 and DTC P2120** both present: engine speed is fixed at **1800 rpm** engine performance is reduced **and** the malfunction indicator lights up **(level 1)**.

1.DEF ***3.DEF***	***NOTES***	**Special notes:** None.

Disconnect ECM harness connector (E61) from the ECM and the connector from the APP sensor and test the insulation between the two lines.

- ECM (E61) terminal 30 and 29 (Refer to wiring diagram).

Repair if necessary.
Replace the APP sensor if the DTC persists.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0225 **DF008** **(Cont'd)**	

CO.0 **CC.1** **2.DEF**	***NOTES***	**Special notes:** None.

Check the condition of the **APP sensor harness connector** and repair it if necessary.
Check the condition of the ECM harness connector (E61) and replace it if necessary.
Measure the **resistance** at the **APP sensor terminals:** **terminal 4** (+5 V) **and terminal 2** (ground) If it is not approximately **800** Ω < Ω < **2600** Ω, replace the pedal potentiometer.
Check the **insulation, continuity and absence of interference resistance of the connections:** ● ECM (E61) terminal 29 and APP sensor harness connector terminal 4 ● ECM (E61) terminal 30 and APP sensor harness connector terminal 3 ● ECM (E61) terminal 28 and APP sensor harness connector terminal 2 (Refer to wiring diagram "EC-APPS-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0231 **DF024** **PRESENT** **OR** **STORED**	LOW PRESSURE ACTUATOR CONTROL CIRCUIT CC.0 : Short circuit or open circuit to earth (ground) CC.1 : Short circuit to + 12V

NOTES	**Special notes:** If **DTC P0231** is present with **CO.0** or **CC.1** warning light comes on (level 1 and 2). The fuel flow actuator is fully opened and the engine is stopped to prevent it from racing.

Check the connection and condition of the fuel flow actuator harness connectors.
Repair if necessary.

Check the connection and condition of the ECM (F134) harness connections.
Repair if necessary.

Measure the **resistance** of the **terminals 1 and 4** of the fuel flow actuator.
Replace the sensor if the resistance is not: **5.3** $\Omega \pm 0.5\ \Omega$ **at 20°C**.

Check the insulation, continuity and absence of unwanted resistance on the following connection:

- ECM (F134) terminal 39 and fuel flow actuator harness connector terminal 2.

(Refer to wiring diagram "EC-IMC/D-01")
Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0235 DF089 PRESENT OR STORED	TURBOCHARGER BOOST PRESSURE SENSOR CIRCUIT 1.DEF : Permanent low signal 2.DEF : Permanent high signal 3.DEF : Below minimum threshold 4.DEF : Above maximum threshold 5.DEF : Inconsistency 6.DEF : At maximum stop 7.DEF : At minimum stop

NOTES	**Priority when dealing with a number of DTCs:** in the event of a combination of DTCs **P0235** and **P0641** are both present, deal with **DTC P0641 "SENSOR SUPPLY VOLTAGE"** first.
	Special notes: Malfunction indicator lights up **(level 1)**.

1.DEF 2.DEF 3.DEF 4.DEF	Check the condition of the **TC boost pressure sensor harness connector** and repair if necessary.
	Check the condition of the **ECM harness connector** (F134) and replace it if necessary.
	Check the **insulation, continuity and absence of interference resistance of the connections:** ● Ensure that the **+5V** is present on the TC boost pressure sensor terminal 48. ● Ensure that the **earth** is present on the TC boost pressure sensor terminal 68. ● ECM (F134) terminal 68 and TC boost pressure sensor harness connector terminal 2 ● ECM (F134) terminal 58 and TC boost pressure sensor harness connector terminal 3 ● ECM (F134) terminal 48 and TC boost pressure sensor harness connector terminal 1 (Refer to wiring diagram "EC-TCBST-01" models without intercooler, "EC-TCBST-02" models with intercooler.) Repair if necessary.
5.DEF 6.DEF 7.DEF	Visually check that the turbocharger circuit is leak tight. Repair if necessary.
	Remove the air supply ducts and check that they are not blocked. Repair if necessary.
	Check the consistency between the **BARO pressure and TC boost pressure sensor**. With the engine stopped, the pressure should be approximately the same between the two sensors. Replace the TC boost pressure sensor if necessary.
	Check the **turbocharger**. Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0263 DEF059 PRESENT OR STORED	MISFIRING ON CYLINDER 1

NOTES	**Special notes:** If **DTC P0263 is stored**, engine speed maintained at **1000 rpm, engine performance is reduced and the malfunction indicator lights up (level 1)**.
	Condition for applying the diagnostic procedure to stored DTCs: The DTC is declared present when the engine speed is at idle speed.
	Priority when dealing with a number of DTCs: in the event of a combination of **DTC0201 (CC or CO)** and **P0263**, deal with **DTC0201 "Cylinder 1 injector control circuit" (CC or CO)** first. **Priority when dealing with a number of DTCs:** in the event of a combination of **DTC0089 (1.DEF, 2.DEF, 7.DEF)** and **DTC0263**, deal with **DTC0089 "Pressure regulation"** first.

Check the engine compression. Repair if necessary.
Check the **valve clearance** and adjust if necessary.
Check the **inlet tracts** and the **EGR valve** and clean them if necessary.
Replace **the injector**.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0266 **DEF060** **PRESENT** **OR** **STORED**	MISFIRING ON CYLINDER 2

NOTES	**Special notes:** If **DTC P0266 is stored**, engine speed maintained at **1000 rpm, engine performance is reduced and the malfunction indicator lights up (level 1)**.
	Condition for applying the diagnostic procedure to stored DTCs: The DTC is declared present when the engine is at idle speed.
	Priority when dealing with a number of DTCs: in the event of a combination of **DTC0202 (CC or CO)** and **P0266**, deal with **DTC0202 "Cylinder 1 injector control circuit" (CC or CO)** first. **Priority when dealing with a number of DTCs:** in the event of a combination of **DTC0089 (1.DEF, 2.DEF, 7.DEF)** and **DTC0266**, deal with **DTC0089 "Pressure regulation"** first.

Check the engine compression. Repair if necessary.
Check the **valve clearance** and adjust if necessary.
Check the **inlet tracts** and the **EGR valve** and clean them if necessary.
Replace **the injector**.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0269 DEF061 PRESENT OR STORED	MISFIRING ON CYLINDER 3

NOTES	**Special notes:** If **DTC P0269 is stored**, engine speed maintained at **1000 rpm, engine performance is reduced and the malfunction indicator lights up (level 1)**.
	Condition for applying the diagnostic procedure to stored DTCs: The DTC is declared present when the engine speed is at idle speed.
	Priority when dealing with a number of DTCs: in the event of a combination of **DTC0202 (CC or CO)** and **P0269**, deal with **DTC0202 "Cylinder 1 injector control circuit" (CC or CO)** first. **Priority when dealing with a number of DTCs:** in the event of a combination of **DTC0089 (1.DEF, 2.DEF, 7.DEF)** and **DTC0269**, deal with **DTC0089 "Pressure regulation"** first.

Check the engine compression. Repair if necessary.
Check the **valve clearance** and adjust if necessary.
Check the **inlet tracts** and the **EGR valve** and clean them if necessary.
Replace **the injector**.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0272 **DEF062** **PRESENT** **OR** **STORED**	MISFIRING ON CYLINDER 4

NOTES	**Special notes:** If **DTC P0272 is stored**, engine speed maintained at **1000 rpm, engine performance is reduced and the malfunction indicator lights up (level 1)**.
	Condition for applying the diagnostic procedure to stored DTCs: The DTC is declared present when the engine is at idle speed.
	Priority when dealing with a number of DTCs: in the event of a combination of **DTC0202 (CC or CO)** and **P0272**, deal with **DTC0202 "Cylinder 1 injector control circuit" (CC or CO)** first. **Priority when dealing with a number of DTCs:** in the event of a combination of **DTC0089 (1.DEF, 2.DEF, 7.DEF)** and **DTC0272**, deal with **DTC0089 "Pressure regulation"** first.

Check the engine compression. Repair if necessary.
Check the **valve clearance** and adjust if necessary.
Check the **inlet tracts** and the **EGR valve** and clean them if necessary.
Replace **the injector**.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0325 DF121 PRESENT OR STORED	KNOCK SENSOR CIRCUIT (ACCELEROMETER CIRCUIT)

NOTES	**Processing priority in the event of a number of DTCs:** If DTCs **P0115, P0180, P2226** are present, first deal with DTCs **P2226: Coolant temperature, P0180: Fuel temperature, and P2226: Atmospheric pressure**. A DTC on one of these sensors could lead to an incorrect trouble diagnosis on the knock sensor (accelerometer).
	Conditions for applying the diagnostic procedure to the stored DTCs: DTC declared present: **engine at idle speed.**

Check the **conformity of the injectors** fitted to the vehicle in relation to the **type of vehicle and engine number** (low injector, high or very high pressure).

Check the knock sensor connection.
Repair if necessary.

Check the condition of the **ECM harness connector** (F134) and the sensor shielding on track **ECM** (F134) **terminal 41**. Repair if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections:**

- ECM (F134) terminal 45 and knock sensor harness connector terminal 1
- ECM (F134) terminal 44 and knock sensor harness connector terminal 2

(Refer to wiring diagram "EC-KS-01".)
Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0335 **DF005** **PRESENT** **OR** **STORED**	CRANKSHAFT POSITION SENSOR CIRCUIT (FLYWHEEL) 1.DEF : Inconsistency 2.DEF : No signal 3.DEF : Too many additional teeth 4.DEF : Teeth missing 5.DEF : Additional teeth 6.DEF : Too many teeth missing

NOTES	**Special notes:** If **1.DEF, 2.DEF, 3.DEF, 6.DEF present: engine stops** and malfunction indicator lights up **(level 2)**. If **4.DEF or 5.DEF** is present, engine performance is reduced, malfunction indicator will not light up.
	Conditions for applying diagnostic procedure to the stored DTCs: DTC declared present with the engine **cranking or idling**.

Check the condition of the **crankshaft position sensor harness connector** and repair if necessary.
Check the condition of the ECM harness connector (**F134**) and repair if necessary.
At the terminal, measure the **resistance** of the **crankshaft position sensor,** if it is not approximately **760**Ω replace the flywheel signal sensor.
Check the **insulation, continuity and absence of interference resistance of the connections:** ● ECM (**F134**) terminal 55 and crankshaft position sensor harness connector terminal 1 ● ECM (**F134**) terminal 65 and crankshaft position sensor harness connector terminal 2 (Refer to wiring diagram "EC-CKPS-01".) Repair if necessary.
Check that the flywheel ring gear is not suspected (missing teeth).

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0340 **DF112** **PRESENT** **OR** **STORED**	CAMSHAFT POSITON SENSOR CIRCUIT 1.DEF : Signal Absent

NOTES	**Priority when dealing with a number of DTCs:** If DTCs **P0340** and **P0608** are both present, deal with DTC **P0608** (sensor voltage supply) first.
	Conditions for applying the diagnostic procedure to the stored DTCs: The DTC is declared present when the **engine is cranking or at idle speed.**

Check the condition of the **camshaft position sensor harness connector** and repair if necessary.

Check the condition of the **ECM harness connector** (F134) and repair if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections:**

- ECM (F134) terminal 56 and CMP sensor harness connector terminal 2
- ECM (F134) terminal 66 and CMP sensor harness connector terminal 3
- Check power supply between CMP sensor harness connector terminal 1 and IPDM E/R terminal 33 (Refer to wiring diagram "EC-CMPS-01".)

If necessary, replace the sensor.

Check the timing gear setting. Refer to "EM section".

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0380 **DF025** **PRESENT** **OR** **PRESENT**	GLOW PLUG DIAGNOSTIC CONNECTION

NOTES	**Special notes:** This DTC only detects an open circuit.

Check the condition and connection of the **glow relay harness connector.** Change it if necessary.
Check the condition and connection of the **glow plug harness connectors.** Change them, if necessary.
Check the condition of the ECM harness connector (F134) and replace it if necessary.
Check the presence of +12V on the glow relay harness connector terminal 5 and repair if necessary.
Measure the resistance of each **glow plug**. The resistance should be **less than 2 Ω.** If not, replace the suspected plugs.
Check the **insulation, continuity and absence of interference resistance of the connection:** ● ECM (F134) terminal 98 and glow relay harness connector terminal 1 (Refer to wiring diagram "EC-GLOW-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0382 **DF017** **PRESENT** **OR** **STORED**	GLOW RELAY CONTROL CIRCUIT (PRE HEAT) CC.1 : Short circuit to +12 volts C0.0 : Open circuit or short circuit to earth (ground)

NOTES	**Special notes:** If **P0382** is present: starting is difficult (or impossible when cold). If C0.0: continuous operation of the glow plugs permanently controlled with risk of being damaged and risk of damaging the engine.

Check the condition and connection of the glow relay unit **connector**.
Repair if necessary.

Check the condition of the ECM harness connector (F134) and repair if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections:**

- Glow relay (E102) terminal 5 for power supply circuit
- ECM (F134) terminal 98 and glow relay harness connector terminal 1
- ECM (F134) terminal 90 and glow relay harness connector terminal 6
  (Refer to wiring diagram "EC-GLOW-01".)

Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0400 DF114 PRESENT OR STORED	EGR CONTROL SOLENOID VALVE CIRCUIT 1.DEF : At minimum stop 2.DEF : At maximum stop 3.DEF : Inconsistency 4.DEF : Valve jammed 5.DEF : Valve clogged

NOTES	**Condition for applying the diagnostic procedure to the stored DTCs:** DTC is declared present: **engine is running**.
	Special notes: If **DTC P0400** is present, engine will be unsteady, with possible stalling. Starting malfunctions, or even impossible when cold, with malfunction indicator lights up **(level 2)"**.

Check the condition and connection of the EGR volume control solenoid valve harness connector and repair it if necessary.
Check the condition of the ECM harness connector (F134) and repair if necessary.
Measure the resistance between **terminal 4 and 6 of the EGR volume control solenoid valve,** if it is not approximately **8**Ω ± **0.5**Ω **at 25**°, replace the solenoid valve.
Check the insulation, continuity and absence of interference resistance of the connections: ● EGR volume control solenoid valve terminal 4 for power supply circuit ● ECM (F134) terminal 38 and EGR volume control solenoid valve harness connector terminal 6 (Refer to wiring diagram "EC-EGRC/V-01".) Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0403 **DF016** **PRESENT** **OR** **STORED**	EGR VOLUME CONTROL SOLENOID VALVE CIRCUIT CC.1 : Short circuit to +12 volts CO.0 : Open circuit or short circuit to earth (ground) CO : Open circuit 1.DEF : Overheat detection

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs:** DTC declared present: **at idle speed.**
	Special notes: If DTC **P0403** is present **Malfunction indicator (level 1)** lights up. Difficult to start engine or even impossible when cold.

Check the condition and connection of EGR volume control solenoid valve harness connector and repair it if necessary.

Check the condition of the ECM harness connector (F134) and repair if necessary.

Measure the resistance at the EGR volume control solenoid valve harness connector terminal.
Replace the solenoid valve if resistance is not approximately 4 kΩ ± 1.6 kΩ at 20°C between terminals 1 and 2 and approximately 1kΩ ± 0.5kΩ at 20°C between terminals 2 and 3.

Check the insulation, continuity and absence of interference resistance of the connections:
- EGR volume control solenoid valve terminal 4 for power supply circuit
- ECM (F134) terminal 38 and EGR volume control solenoid valve harness connector terminal 6 (Refer to wiring diagram "EC-EGRC/V-01".)

Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0409 DEF010 PRESENT OR STORED	EGR POSITION SENSOR CIRCUIT 1.DEF : Above maximum threshold 2.DEF : Below minimum threshold

NOTES	**Priority when dealing with a number of DTCs:** If **DTC P0409** and P0641 are both present, deal with DTC P0641 first.

Check the connection and condition of the EGR position sensor harness connectors. Repair if necessary.
Check the ECM (F134) harness connections. Repair if necessary.
Check for the **continuity, absence of interference resistance and insulation** on the following connections: ECM (F134) terminal 49 and EGR position sensor harness connector 1. ECM (F134) terminal 59 and EGR position sensor harness connector 3. Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0487 **DEF209** **PRESENT** **OR** **STORED**	EGR POSITION SENSOR CIRCUIT CO.0 : Short circuit or open circuit to earth (ground) CC.1 : Short circuit to + 12V

NOTES	**Priority when dealing with a number of DTCs:** If **DTC P0487** and P0641 are both present, deal with DTC P0641 first.

Check the connection and condition of the EGR position sensor harness connectors. Repair if necessary.
Check the ECM (**F134**) harness connections. Repair if necessary.
Check for the **continuity, absence of interference resistance and insulation** on the following connections: ECM (**F134**) terminal 49 and EGR position sensor harness connector 1. ECM (**F134**) terminal 59 and EGR position sensor harness connector 3. Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0500 DF014 PRESENT OR STORED	VEHICLE SPEED INFORMATION

NOTES	**Special notes:** None.

For this type of vehicle, the ABS control unit or an additional unit (if the vehicle does not have ABS) transmits the vehicle speed on the CAN.
Test the multiplex network to be able to work on the CAN (Malfunction on the CAN H and CAN L lines between the ECM and the ABS). Also check there are no malfanctions in the ABS part or in the system which supplies the vehicle speed.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0513 DF037 PRESENT OR STORED	IMMOBILISER

NOTES	**Special notes:** None.

Carry out a trouble diagnosis on the multiplex network. (LAN section)
Refer to the trouble diagnosis for the keyless vehicle function. (BL section)

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0530 DF049 PRESENT OR STORED	REFRIGERANT FLUID SENSOR CIRCUIT C0.1 : Open circuit or short circuit to + 12 volts CC.0 : Short circuit to earth

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs:** Apply the above diagnostic procedure whether the DTC is present or stored.
	Priority when dealing with a number of DTCs: If DTC **P0530** and **P0641** are both present, deal with **DTC P0641 "SENSOR SUPPLY VOLTAGE"** first.

Check the **pressure sensor connection**.
Repair if necessary.

Check the condition of the **ECM (F134) harness connector**.
Repair if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections**:

- ECM (F134) terminal 83 and refrigerant pressure sensor harness connector terminal 3
- ECM (F134) terminal 89 and refrigerant pressure sensor harness connector terminal 2
- ECM (F134) terminal 107 and refriqerant pressure sensor harness connector terminal 1
  (Refer to wiring diagram "EC-RP/SEN-01".)

Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0560 **DF047** **PRESENT** **OR** **STORED**	COMPUTER SUPPLY VOLTAGE (ECM) 1.DEF : Above maximum threshold 2.DEF : Below minimum threshold

NOTES	**Condition for applying the diagnostic procedure to the stored DTCs:** The DTC is declared present **when the engine is running above 1000 rpm**.

Check **the battery voltage** when the ignition is switched on.
If the **battery voltage < 11 V** recharge the battery.

Check the condition of the **battery terminals**.
Repair if necessary.

Check the vehicle's **charge circuit**.
Repair if necessary.

Check the condition of the **ECM (E61) harness connector**.
Repair if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections**:

- ECM (E61) terminal 22 and fuse block (M16) harness connector.
- ECM (F34) terminal 111, 112 and engine ground.
  (Refer to wiring diagram "EC-MAIN-01".)

Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0571 **DF050** **PRESENT** **OR** **STORED**	STOP LIGHT SWITCH CIRCUIT C0.0 : Open circuit or short circuit to earth (ground) 1.DEF : Signal absent

NOTES	**Special notes:** The DTC is declared present when the ignition is switched on, when decelerating or when the brake pedal is depressed.
	Conditions for applying diagnostic procedure to the stored DTCs: Apply the above diagnostic procedure whether the DTC is stored or present.

Check the **switch connection** and repair if necessary.
Check for the presence of **+ 12 volts** on the switch supply. Repair if necessary.
Check the condition of the ECM harness connector (E61) and repair if necessary.
Check that the **switch is working.** Change it if necessary.
Check the **insulation, continuity and absence of interference resistance of the connections:** ● Stop lamp switch terminal 1 for power supply circuit ● ECM (E61) terminal 5 and stop lamp switch harness connector terminal 2 (Refer to wiring diagram "EC-BRK/SW-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0604 **DF107** **PRESENT** **OR** **STORED**	ECM MEMORY

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs**: The DTC is declared present with the **engine running.**
	If DTC **P0604** is present: it is impossible to stop and restart the engine. Malfunction indicator lights up **(level 2).**

Re-enter **injector's individual correction value** using the **CONSULT-II.**
If the DTC persists, replace the **ECM.**

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0606 **DF038** **PRESENT** **OR** **STORED**	ECM 1.DEF : Analogue/digital converter 2.DEF : Injection calibration data 3.DEF : Memory self-test 4.DEF : Non refreshed watchdog 5.DEF : Interference on the injector control line 6.DEF : Watchdog activation

NOTES	**Special notes:** This DTC appears: When the engine speed is set to 1,300 rpm, a louder sound is heard coming from the engine, and the malfunction indicator on the instrument panel lights up (level 1). When the engine is stopped, and the malfunction indicator lights up (level 2).

1.DEF ***3.DEF*** ***4.DEF*** ***6.DEF***	***NOTES***	**Special notes:** None.

Replace ECM.

2.DEF	***NOTES***	**Special notes:** None.

Check the condition of the ECM harness connector (F134). Repair it if necessary.
Check that the **individual injection correction (value)** matches the injectors. If NG, write the individual correction value codes (see "Trouble diagnosis - Introduction").
If the value corresponds correctly to the injectors, **replace ECM.**
Replace ECM.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0606 **DF038** Continued	

5.DEF	***NOTES***	**Special notes:** None.

Check the condition of the ECM harness connector (F134).
Repair it if necessary.

Check the **insulation, continuity and absence of interference resistance** of the connections:

- ECM (F134) terminal 80 and No.1 injector terminal 2
- ECM (F134) terminal 79 and No.1 injector terminal 1
- ECM (F134) terminal 74 and No.2 injector terminal 2
- ECM (F134) terminal 73 and No.2 injector terminal 1
- ECM (F134) terminal 78 and No.3 injector terminal 2
- ECM (F134) terminal 77 and No.3 injector terminal 1
- ECM (F134) terminal 76 and No.4 injector terminal 2
- ECM (F134) terminal 75 and No.4 injector terminal 1

(Refer to wiring diagram "EC-INJECT-01 AND -02".)
Repair if necessary.

If the DTC persists, replace ECM.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0641 **DF113** **PRESENT** **OR** **STORED**	SENSOR SUPPLY VOLTAGE CIRCUIT 1.DEF : At minimum stop 2.DEF : At maximum stop

NOTES	**Order of priority in the event of more than one DTC:** If DTCs **P0641 and P0225, P2120, P0409, P0530, P0190, P0100, P0235** are present, deal with **P0641** first.
	Special notes: If DTC **P0641** is present, the engine stops immediately and cannot be restarted. Malfunction indicator lights up (level 1).

Check the condition and connection of all the sensor connectors **as follows:**
– engine coolant pressure sensor
– turbocharger air pressure sensor
– common rail fuel pressure sensor
– APP sensor
– EGR valve position sensor
– camshaft position sensor
– mass air flow sensor
Repair if necessary.

Check the condition and connection of the ECM (F134) **and** (E61) harness connections.
Repair if necessary.

Check the **insulation, continuity and absence of interference resistance** of the connections:
- ECM (F134) terminal 83 and refrigerant pressure sensor harness connector terminal 1
- ECM (F134) terminal 48 and turbocharger air pressure sensor harness connector terminal 1
- ECM (F134) terminal 47 and common rail fuel pressure sensor harness connector terminal 1
- ECM (F134) terminal 29 and APP sensor 1 harness connector terminal 2
- ECM (F134) terminal 49 and EGR control valve harness connector terminal 1
- Power supply circuit between IPDM E/R terminal 33 and camshaft position sensor harness connector terminal 1

(Refer to wiring diagram.)
Repair if necessary.

If the DTC persists, **apply the diagnostic procedure for** each sensor **with a 5V supply**.
Disconnect one by one the sensors in the above list checking for each disconnection of the DTC changes from the "present" to the "stored" state. If the defective sensor is located, check its wiring connection and its conformity. Replace the sensor if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0651 **DF122** **PRESENT** **OR** **STORED**	Supply voltage APP sensor 2 CO.1 : Open circuit or short circuit to + 12V CC.0 : Short circuit to earth (ground)

NOTES	**Special notes:** When this DTC is pesent, the idle speed is set to 1000 rpm, engine performance is reduced and the malfunction indicator lights up (level 1).

CC.0	***NOTES***	**Special notes:** None.

Check the connection and condition of the **APP sensor harness connector**.
Repair if necessary.

Check the connection and condition of the ECM (F134) **and** (E61) harness connectors.
Repair if necessary.

Measure the **resistance** at the **APP sensor** terminals 1 and 5 (+5V)
Replace the potentiometer pedal if the resistance is not approximately **2.85** Ω ± **2.05** Ω.

Disconnect **ECM** and the **APP sensor harness connector**.
Check **the insulation to ground** of the connection on **terminal 18** of **ECM harness connector**.
Repair if necessary.

CO.1	***NOTES***	**Special notes:** None.

Check the connection and condition of the **APP sensor harness connector**.
Repair if necessary.

Check the connection and condition of the ECM (F134) **and** (E61) harness connectors.
Repair if necessary.

Measure the **resistance** at the **APP sensor** terminals 1 and 5 (+5V)
Replace the potentiometer pedal if the resistance is not approximately **2.85** Ω ± **2.05** Ω.

Disconnect **ECM** and the **APP sensor harness connector**.
– Check **for insulation** on **ECM** (F134) **terminals between 6 and 18**.
– Check **the insulation from the +12 feed** (power) of the connection on terminal 18 of the ECM (F134) harness connector.
Repair if necessary.

Check **the continuity of the connection** between:
APP sensor terminal 5 and **ECM** terminal 18
APP sensor terminal 6 and **ECM** terminal 1
Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0685 DF015 PRESENT OR STORED	ECM RELAY CONTROL CIRCUIT 1.DEF : Permanent low signal 2.DEF : Permanent high signal

NOTES	**Special notes**: The ECM relay is incorporated in the IPDM E/R.

Check the main relay supply fuse in the IPDM E/R: (20A).
Change it if necessary.

Check the condition and connection of the IPDM E/R connector and replace it if necessary.

Check the condition of the **ECM harness connector** (F134) and replace it if necessary.

Check the **insulation, continuity and absence of interference resistance of the connections:**

- ECM (F134) terminal 104 and IPDM E/R terminal 29
- ECM (F134) terminal 109, 110 and IPDM E/R terminal 32
- ECM (F134) terminal 111, 112 and ground
  (Refer to wiring diagram "EC-MAIN-01".)

Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P0703 **DF631** **PRESENT** **OR** **STORED**	BRAKE SWITCH CIRCUIT (STOP LAMP CIRCUIT) 1.DEF : Signal absent 2.DEF : Inconsistency

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs:** The DTC is declared present when the ignition switched is on, when decelerating or when the brake pedal is depressed. Deal with the DTC even if it is stored.

Check the connection and condition of the **switch** connector. Repair if necessary.
Check for the **+ 12V feed (power)** on the switch supply. Repair if necessary.
Check the connection and condition of the ECM (F134) and (E61) and harness connector. Repair if necessary.
Check that the **switch is working**. Repair if necessary.
Check the **insulation, continuity and absence of interference resistance of the connections:** ● Stop lamp switch terminal 1 for power supply circuit ● ECM terminal 5 and stop lamp switch harness connector terminal 2 (Refer to wiring diagram "EC-BRK/SW-01 an EC-BRK/SW-02".) Repair if necessary.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

P2120 **DF009** **PRESENT** **OR** **STORED**	ACCELERATOR PEDAL POSITION SENSOR 2 CO.0 : Open circuit or short circuit to eartrh (ground) CC.1 : Short circuit to + 12V

NOTES	**Priority when dealing with a number of DTCs:** If DTCs **P2120** and **P0651** are both present, deal with DTC **P0651** first.
	Special note: If DTC **P2120** is present: engine speed maintained above **1000 rpm.** **Malfunction indicator lights up (level 1).** If DTCs **P2120 and P0225** are present: engine speed fixed at **1800 rpm.** **Malfunction indicator lights up (level 1).**

CO.0	***NOTES***	**Special notes:** None.

Check the condition of the **APP harness connector** and repair it if necessary.
Check the condition of the **ECM harness connector** (E61) and repair if necessary.
Measure the **resistance** at the **APP sensor terminal:** **terminal 1** (ground) **and terminal 5** (+5 V) If it is not approximately **2.85 kΩ ± 2.05 kΩ**, replace the APP sensor.
Check **the insulation against earth (ground) and the continuity of the connection:** ● ECM (E61) terminal 12 and APP sensor harness connector terminal 6 (Refer to wiring diagram "EC-APPS-01 or 02".) Repair if necessary.
Check the continuity of the connection between: ● ECM (E61) terminal 18 and APP sensor harness connector terminal 5 (Refer to wiring diagram "EC-APPS-01 or 02".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P2120 **DF009** CONTINUED 3	

CC.1	***NOTES***	**Special notes:** None.

Check the condition of the **APP sensor harness connector** and repair it if necessary.
Check the condition of the **ECM harness connector** (E61) and replace it if necessary.
Measure the **resistance** at the **APP sensor terminals:** APP sensor terminal 1 (Ground) and 5 (+ 5V) If it is not approximately **2.85 kΩ ± 2.05 kΩ**, replace the APP sensor.
Check the **insulation, continuity and absence of interference resistance of the connection:** ● ECM (E61) terminal 12 and APP sensor harness connector terminal 6 (Refer to wiring diagram "EC-APPS-01".) Repair if necessary.
Check **the insulation against + 12 volts of the connections:** ● ECM (E61) terminal 18 and APP sensor harness connector terminal 5 (Refer to wiring diagram "EC-APPS-01".) Repair if necessary.
Check **the continuity of the connections:** ● ECM (E61) terminal 6 and APP sensor harness connector terminal 1 ● ECM (E61) terminal 18 and APP sensor harness connector terminal 5 (Refer to wiring diagram "EC-APPS-01".)
Disconnect connector (E61) from the computer and the connector from the APP sensor and test the insulation between the two lines: ● ECM (E61) terminal 12 and 18 (Refer to wiring diagram "EC-APPS-01".) Repair if necessary.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P2226 **DF003** **PRESENT** **OR** **STORED**	ATMOSPHERIC PRESSURE SENSOR CIRCUIT(BARO) CC.1 : Short-circuit to + 12 volts CO.0 : Open circuit or short circuit to earth (ground)

NOTES	**Special note**: The sensor is integrated into ECM.

Replace the ECM.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

P2264 **DF057** **PRESENT** **OR** **STORED**	WATER IN FUEL SENSOR CO.1 : Open circuit or short circuit to + 12 V CC.0 : Short circuit to earth

NOTES	**Conditions for applying the diagnostic procedure to the stored DTCs:** The DTC is declared present **with the engine running and the malfunction indicator lights up (level 1)**.

Check whether there is any water in the fuel filter, clean and replace the fuel filter if necessary.
Check the condition and connection of the **water fuel sensor** harness connector. Repair if necessary.
Check the connection and condition of the ECM (F134) harness connector. Repair if necessary.
Check the **insulation, continuity and absence of interference resistance of the connections:** ● ECM terminal 92 and water in fuel sensor harness connector terminal 2. ● ECM terminal 97 and water in fuel sensor harness connector terminal 3. ● Water in fuel sensor terminal 1 and ECM relay terminal (+after ignition). Repair if necessary.
Bleed the fuel filter. Clear the ECM memory. Carry out a road test followed by another check with the CONSULT-II.

AFTER REPAIR	Follow the instructions to confirm repair. Deal with any other possible DTCs. Erase the stored DTCs after repair.

PC001 **DF116** **PRESENT**	MULTIPLEX NETWORK (CAN COMMUNICATION LINE) 1.DEF: Carry out the multiplex network trouble diagnosis

CAN Communication Line

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
For the input/output signal chart, refer to LAN section.

Diagnostic Procedure

1. INSPECTION START

1. Turn ignition switch "ON".

2. Select "CAN DIAG SUPPORT MNTR" in "DATA MONITOR" mode with CONSULT-II.

3. Print out the CONSULT-II screen.

Example

OK data

DATA MONITOR	
MONITOR	
TRANSMIT DIAG	OK
METER/M&A	OK
EPS	UNKWN
BCM	OK
VDC/TCS/ABS	OK
IPDM E/R	OK
TCM	OK
ICC	UNKWN
AWD/4WD	UNKWN
e4WD	UNKWN

YEC855A

Check that the print out data is matched with above. If NG, go to "CAN COMMUNICATION" in LAN section.

AFTER REPAIR	Deal with any other possible DTCs. Erase the stored DTCs after repair.

SUMMARY TABLE OF DDCR INJECTION PARAMETERS:

Tool parameter code	Diagnostic tool description
PR005	EGR valve opening setpoint
PR008	Rail pressure setpoint
PR010	Rail regulation setting (reference)
PR017	Fuel flow
PR030	Accelerator pedal position
PR032	Inlet pressure
PR035	Atmospheric pressure
PR037	Refrigerant pressure
PR038	Rail pressure
PR051	EGR valve position feedback
PR055	Engine speed
PR059	Inlet air temperature
PR061	External air temperature
PR063	Fuel temperature
PR064	Coolant temperature
PR074	Battery voltage
PR077	EGR valve position sensor voltage
PR080	Rail pressure sensor voltage
PR081	Inlet temperature sensor voltage
PR086	Accelerator pedal position sensor 1 voltage
PR088	Accelerator pedal position sensor 2 voltage
PR089	Vehicle speed
PR125	Power used by the AC compressor
PR127	Heating resistor maximum authorised power
PR132	Air flow

SUMMARY TABLE OF DDCR INJECTION STATES:

TOOL STATE CODE	Diagnostic tool description
ET001	Computer + after ignition feed
ET003	Immobiliser
ET004	Air conditioning authorised
ET006	Code programmed
ET008	EGR solenoid control
ET012	Primary brake contact
ET013	Secondary brake contact
ET018	Air conditioning request
ET021	High-speed fan request
ET022	Fan low-speed request
ET023	Fast idle speed request
ET038	Engine
ET040	Clutch pedal
ET042	Cruise control - speed limiter
ET076	Starting
ET079	Air conditioning present
ET088	Request to start compressor

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

ECM STATES AND PARAMETERS:

Order	Function	Parameter or state check or action	Display and notes	Trouble diagnosis
1	**Battery voltage**	**PR074:** Battery voltage	**12 V < PR074 < 14.4 V**	**In the event of a malfunction, run the trouble diagnostic procedure for the "Charging circuit".**
2	**Engine speed**	**PR055:** Engine speed	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**
3	**Accelerator pedal position**	**PR030:** Accelerator pedal position **0%**	**Gives the position of the accelerator pedal as a %.** **PR030 = 0 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for malfunctions **Pedal sensor circuit, track 1 and track 2** (**P0225** and **P2120**) and **P0641** "Sensor reference voltage".
4	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**
5	**Air temperature**	**PR730:** Intake air temperature	**Indicates the value of the inlet manifold air temperature in °C. This information is provided by IAT sensor incorporated into the mass air flow sensor.**	**In the event of a malfunction, refer to DTC P0100.**

ECM STATES AND PARAMETERS:(Continued 1)

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
6	**Fuel temperature**	**PR063:** Fuel temperature Cold = PR064 Warm: 50C	**Gives the fuel temperature in °C. This value is given by the fuel temperature sensor.** Default value: 30 °C.	**In the event of a malfunction, apply the diagnostic procedure for malfunction DF098 Fuel temperature sensor circuit.**
7	**Air circuit pressure**	**PR035:** Atmospheric pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the computer.**	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
		PR032 Inlet pressure	**Shows the pressure in the inlet circuit in mbar.**	
8	**Rail pressure**	**PR038:** Rail pressure Warm or cold - 90 bar <PR038> 90 bar	**Gives the pressure of the diesel in the injection rail in Bar. This pressure is supplied by the sensor on the rail.** Default value: 2000 Bar.	**In the event of a malfunction, apply the diagnostic procedure for malfunction P0190 Rail pressure sensor circuit.**

ECM STATES AND PARAMETERS:(Continued 2)

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
9	**Engine**	**ET038:** Engine **+ after ignition feed**	**Gives the current status of the engine.** – **+ after ignition feed** – **CRANKING** – **RUNNING** – **MAINTAINED SUPPLY:** Supply maintained during the power latch phase. – **Stalled: When the engine has stalled.** – **PROTECTED:** When a level 2 malfunction appears or when the engine speed is limited to a certain engine speed.	**NONE.**
10	**Immobiliser**	**ET003:** Immobiliser **INACTIVE**	**Gives the status of the immobiliser system.** – **INACTIVE:** The ECM has recognised the immobiliser code transmitted by the Inteligent Key unit or BCM. – **ACTIVE:** The ECM does not recognise the immobiliser code transmitted by the Inteligent Key unit or BCM.	If **ACTIVE, follow the associated "help" given in the tool.**
11	**Code programmed**	**ET006: Code programmed YES**	**States whether the immobiliser code has been programmed by the computer or not.** – **YES:** Code programmed – **NO:** Code not programmed by the ECM.	If **NO, replace ECM.**
12	**Vehicle speed**	**PR089:** Vehicle speed	**Gives the vehicle speed in kph. This parameter is transmitted by the ABS computer or vehicle speed ECU. This information is transmitted to the injection on the multiplex network.**	**Test the multiplex network. Refer to ABS or vehicle speed ECU trouble diagnosis.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

START SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**ECM + after ignition feed**	**ET001:** ECM + after ignition feed **PRESENT**	**Indicates that the computer is supplied with a + after ignition feed.** **– Present** **– Absent**	**In the event of a malfunction, carry out the diagnostic procedure for P0560 "Computer supply voltage" or P0685 "Main relay circuit".**
2	**Starting**	**ET076:** Starting **AUTHORISED**	**Indicates whether or not starting has been authorised by the injection** **AUTHORISED: The injection has given starting authorisation.** **PROHIBITED: The injection has not given starting authorisation.**	**If PROHIBITED carry out a full diagnostic procedure on the preheating system.**
3	**Engine**	**ET038:** Engine **+ after ignition feed**	**Gives the current status of the engine.** **– + after ignition feed** **– CRANKING** **– RUNNING** **– MAINTAINED SUPPLY: Supply maintained during the power latch phase.** **– Stalled: When the engine has stalled.** **– Protected: When a malfunction appears or when the engine speed is limited to a certain engine speed.**	**NONE.**
4	**Battery voltage**	**PR074:** Battery voltage	**12 < PR074 < 13.5 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

PROTECTION SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Immobiliser**	**ET003:** Immobiliser **INACTIVE**	**Gives the status of the immobiliser system.** **– INACTIVE: The injection computer has recognised the immobiliser code transmitted by the Inteligent Key unit or BCM.** **– ACTIVE: The ECM does not recognise the immobiliser code transmitted by the Inteligent Key unit or BCM.**	If **ACTIVE, follow the associated "help" given in the tool.**
2	**Code programmed**	**ET006:** Code programmed **YES**	**States whether the immobiliser code has been programmed by the computer or not.** **– YES: Code programmed** **– NO: Code not programmed by the ECM.**	If **NO, replace ECM.**
3	**Battery voltage**	**PR074:** Battery voltage	**12 V < PR074 < 13.5 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

SUB SYSTEM COLD LOOP:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Air conditioning present**	**ET079:** Air conditioning present **YES**	**States whether the vehicle is fitted with air conditioning or not.** – **YES:** Air conditioning is detected by the injection computer. – **NO:** Air conditioning is not detected by the injection computer.	**If not consistent with the vehicle equipment, carry out the multiplex network test and apply the relevant procedure.**
2	**Compressor engagement request**	**ET088:** Request to start compressor **INACTIVE**	**The injection requests the IPDM E/R (via the multiplex network) to start the compressor** – **ACTIVE:** The multiplex network should not be suspected on the Automatic Transmission, IPDM E/R or Inteligent Key unit or BCM system. The Inteligent Key unit or BCM should request the injection to be engaged. The coolant pressure sensor should not be suspected. Satisfactory engine operating conditions (coolant temperature, engine load etc.). – **INACTIVE: One of the above conditions has not been fulfilled.**	**NONE.**

SUB SYSTEM COLD LOOP (Continuation 1):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
3	Air conditioning authorisation	**ET004:** Air conditioning authorised **NO**	**Non operational information, designed solely for trouble diagnosis purposes.** – **YES:** Satisfactory engine operating conditions (coolant temperature, engine load etc.). The vehicle is not in a specific movement phase (hill start or stop etc.). – **NO:** One of the above conditions has not been fulfilled.	**NONE.**
4	**Refrigerant pressure**	**PR037:** Refrigerant pressure	**Gives the value in BAR for the refrigerant fluid in the system.** **2 Bar < PR037 < 27 Bar** Default value: 0 Bar.	**If there is a malfunction: apply the diagnostic procedure for P0530 "Refrigerant fluid sensor circuit". If the DTC persists, replace the refrigerant sensor.**
5	**Engine speed**	**PR055:** Engine speed	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the trouble diagnosis procedure for P0335 Engine speed sensor circuit.**
6	**Fast idle speed request**	**ET023:** Fast idle speed request **ABSENT**	**The Inteligent Key unit or BCM requests fast idle speed from the injection.** – **ABSENT:** The Inteligent Key unit or BCM did not make the request – **PRESENT:** The Inteligent Key unit or BCM has made a request	**If ET023 is incorrect, carry out a multiplex network test using the diagnostic tool. If the test is correct refer to the Inteligent Key unit or BCM trouble diagnosis.**
7	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

SUBSYSTEM: COLD LOOP (continuation 2)

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
8	**Vehicle speed**	**PR089:** Vehicle speed	**Gives the vehicle speed in kph. This parameter is transmitted by the ABS control unit. This information is transmitted to the injection on the multiplex network.**	**Test the multiplex network. Refer to ABS trouble diagnosis.**
9	**Power used by the AC compressor**	**PR125:** Power used by the AC compressor **0 WATT**	**Gives the power used by the compressor**	**NONE.**
10	**Fan speed request ***	**ET022:** Fan low-speed request **INACTIVE**	**The injection requests the IPDM E/R to start the fans.** – **INACTIVE:** Engine speed = 0 rpm. – **ACTIVE:** Engine speed = idle speed, correct refrigerant pressure and vehicle speed = 0 km/h or high coolant temperature.	**NONE.**
11	**Fan speed request ***	**ET021:** High-speed fan request **INACTIVE**	**The injection requests the IPDM E/R to start the fans.** – **INACTIVE:** Engine speed = 0 rpm. – **ACTIVE:** Engine speed = idle speed. Refrigerant pressure > 15 Bar, vehicle speed = 0 km/h or high coolant temperature.	**NONE.**

***: When climate control is requested with the engine at idle speed and vehicle speed = 0 km/h, ET022 will always be "ACTIVE" and ET021 "INACTIVE" (except refrigerant pressure> 15 bar, vehicle speed = 0 km/h and high coolant temperature). The fans are prevented from operating under certain coolant temperature conditions when driving.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

HEATING SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

LPG/FUEL CIRCUIT SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Fuel temperature**	**PR063:** Fuel temperature Cold = PR064 Warm: 50 °C	**Gives the fuel temperature in °C.** Default value: 30 °C.	**In the event of a malfunction, perform the diagnostic procedure for malfunction: P0180 "Fuel temperature sensor circuit".**
2	**Fuel flow**	**PR017:** Fuel flow **0.0 mg/piston stroke**	**Shows the fuel flow injected in mg/piston stroke for each injector.** PR017 = 0 mg/piston stroke.	**NONE.**
3	**Rail pressure**	**PR038:** rail pressure Cold and warm: - 90 bar <PR038> 90 bar	**Gives the pressure of the diesel in the injection rail in Bar. This pressure is supplied by the sensor on the rail.** Default value: 2000 Bar.	**In the event of a malfunction, apply the diagnostic procedure for malfunction P0190 Rail pressure sensor circuit.**
4	**Rail pressure setpoint**	**PR008:** Rail pressure setpoint **375 bar** (Engine starting pressure instruction) Cold: 500 Bar Warm: 300 Bar	**Gives a theoretical pressure value for optimum engine operation.** 300 bar < PR008 < 500 bar.	**NONE.**
5	**Rail pressure sensor voltage**	**PR080:** Rail pressure sensor voltage Cold: 0.5 V Cold: 4.5 V	**Shows the voltage delivered by the computer on the rail pressure sensor.** 0.5 V < PR080 < 4.5 V Default value: 4.5 V	**NONE.**
6	**Engine speed**	**PR055:** Engine speed.	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

PRE-HEATING/IGNITION SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**
2	**External air temperature**	**PR730:** Intake air temperature	**Indicates the value of the inlet manifold air temperature in °C. This information is provided by IAT sensor incorporated into the mass air flow sensor.**	**In the event of a malfunction, refer to DTC P0100.**
3	**Inlet air temperature**	**PR059:** Inlet air temperature Cold = PR061 Warm: 30 °C	**Gives the inlet air temperature in °C. This information is provided by the air temperature/ pressure sensor.** Default value: 30 °C.	**In the event of a malfunction, refer to parameter interpretation PR059 "Inlet air temperature".**
4	**Battery voltage**	**PR074:** Battery voltage	**12 V < PR074 < 14.4 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

AIR CIRC SUBFUNCTION (TURBOCHARGING/INLET.):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Inlet air temperature**	**PR059:** Inlet air temperature Cold = PR061 Warm: 30 °C	**Gives the inlet air temperature in °C. This information is provided by the air temperature/ pressure sensor.** Default value: 30 °C.	**In the event of a malfunction, refer to parameter interpretation PR059 "Inlet air temperature".**
2	**Air circuit pressure**	**PR035:** Atmospheric pressure **PR032:** Inlet pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the computer.** **Shows the pressure in the inlet circuit in mbar.**	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
3	**Air flow**	**PR132:** Air flow	**Air flow estimated by the injection computer.**	**NONE.**
4	**Inlet temperature sensor voltage**	**PR081:** Inlet temperature sensor voltage	**Shows the voltage delivered by the computer to supply the inlet temperature sensor**	**NONE.**
5	**Engine speed**	**PR055:** Engine speed	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

ENGINE COOLING SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

DRIVER PARAMETERS SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Accelerator pedal position**	**PR030:** Accelerator pedal position **0 %**	Indicates the percentage of the pedal position between no load and full load position **0 % < PR030 < 100 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for malfunction **Pedal sensor circuit, track 1 and track 2** (**P0225** and **P2120**) and **P0641** "Sensor reference voltage".
2	**Pedal potentiometer tracks voltage**	**PR086:** Pedal potentiometer track 1 voltage **16 %** **PR088:** Pedal potentiometer track 2 voltage **7 %**	**Shows the voltage supply percentage for tracks 1 and 2 of the pedal potentiometer.** **10 % < PR086 < 20 %** **5 % < PR088 < 15 %.**	**In the event of a malfunction**, apply the **diagnostic procedure** for malfunction **Pedal sensor circuit, track 1 and track 2** (**P0225** and **P2120**) and **P0641** "Sensor reference voltage".

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given for reference purposes only. **Application condition:** engine **off, ignition on**.

ANTIPOLLUTION / OBD SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**EGR electronic control**	**ET008:** EGR solenoid control **INACTIVE**	**Shows the condition of the EGR valve control.** – **INACTIVE:** The valve is not controlled by the computer. – **ACTIVE:** The valve is controlled by the computer.	**NONE.**
2	**Atmospheric pressure**	**PR035:** Atmospheric pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the computer.**	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
3	**Air flow**	**PR132:** Air flow	**Air flow estimated by the injection computer.**	**NONE.**
4	**Fuel flow**	**PR017:** Fuel flow **0.0 mg/piston stroke**	**Shows the fuel flow out of the high-pressure pump in mg/piston stroke.**	**NONE.**
5	**EGR solenoid valve control**	**PR005:** EGR valve opening setpoint Warm or cold = - 50	**Gives a theoretical EGR valve opening value for optimum engine operation.** PR005 = PR051	**NONE.**

ANTIPOLLUTION / OBD SUBFUNCTION (cont.):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
6	**EGR valve position feedback**	**PR051:** EGR valve position feedback Warm or cold = - 50	**Gives the actual value of the EGR valve position.** PR051 = PR005	**NONE.**
7	**EGR valve position sensor voltage**	**PR077:** EGR valve position sensor voltage **1.09 V**	**Gives the EGR valve voltage according to its position.** – **INACTIVE:** The valve is not controlled by the computer. – **ACTIVE:** The valve is controlled by the computer. **0.5 V < PR077 < 4.8 V**	**NONE.**
8	**Accelerator pedal position**	**PR030:** Accelerator pedal position **0 %**	**Indicates the percentage of the pedal position between no load and full load position** **PR030 = 0 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for malfunction **Pedal sensor circuit, track 1 and track 2** (**P0225** and **P2120**) and **P0641** "Sensor reference voltage".
9	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

MAIN COMPUTER STATES AND PARAMETERS:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Battery voltage**	**PR074:** Battery voltage.	**12 V < PR074 < 14.4 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**
2	**Engine speed**	**PR055:** Engine speed. Cold: 900 rpm Warm: 805 rpm	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**
3	**Accelerator pedal position**	**PR030:** Accelerator pedal position **0 %**	**Gives the position of the accelerator pedal as a %.** **PR030 = 0 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for DTCs **P0225** and **P2120** Pedal sensor circuit, track 1 and track 2 and **P0641** "Sensor reference voltage".
4	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**
5	**External air temperature**	**PR061:** Intake air temperature	**Indicates the value of the inlet manifold air temperature in °C. This information is provided by IAT sensor incorporated into the mass air flow sensor.**	**In the event of a malfunction, refer to DTC P0100.**

MAIN COMPUTER STATES AND PARAMETERS:(Continued 1)

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
6	**Inlet air temperature**	**PR059:** Inlet air temperature Cold = PR061 Warm: 30 °C	**Gives the inlet air temperature in °C. This information is provided by the air temperature/ pressure sensor.** Default value: 20 °C.	**In the event of a malfunction, refer to parameter interpretation PR059 "Inlet air temperature".**
7	**Fuel temperature**	**PR063:** Fuel temperature Cold = PR064 Warm: 50 °C	**Gives the fuel temperature in °C. This value is given by the fuel temperature sensor.** Default value: 30 °C.	**In the event of a malfunction, apply the diagnostic procedure for malfunction P0180 Fuel temperature sensor circuit.**
8	**Air circuit pressure**	**PR035:** Atmospheric pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the computer.** 600 mbar < Cold < 1050 mbar 600 mbar < Warm < 1050 mbar	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
		PR032: Inlet pressure	**Shows the pressure in the inlet circuit in mbar.** PR032 = local atmospheric pressure	
9	**Rail pressure**	**PR038:** Rail pressure Cold: 260 Bar Warm: 230 Bar	**Gives the pressure of the diesel in the injection rail in Bar. This pressure is supplied by the sensor on the rail.** Default value: 2000 Bar.	**In the event of a malfunction, apply the diagnostic procedure for malfunction P0190 Rail pressure sensor circuit.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

START SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Computer + after ignition feed**	**ET001:** Computer + after ignition feed **PRESENT**	**Indicates that the computer is supplied with a + after ignition feed.** **– Present** **– Absent**	**In the event of a malfunction, carry out the diagnostic procedure for P0560 "Computer supply voltage" or P0685 "Main relay circuit".**
2	**Starting**	**ET076:** Starting **AUTHORISED**	**Indicates whether or not starting has been authorised by the injection** **AUTHORISED: The injection has given starting authorisation.** **PROHIBITED: The injection has not given starting authorisation.**	**If PROHIBITED, carry out a full diagnostic procedure on the preheating system.**
3	**Engine**	**ET038:** Engine **+ after ignition feed**	**Gives the current status of the engine.** **– + after ignition feed** **– CRANKING** **– RUNNING** **– MAINTAINED SUPPLY: Supply maintained during the power latch phase.** **– Stalled: When the engine has stalled.** **– Protected: When a malfunction appears or when the engine speed is limited to a certain engine speed.**	**NONE.**
4	**Battery voltage**	**PR074:** Battery voltage	**13 V < PR074 < 14 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

PROTECTION SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Immobiliser**	**ET003:** Immobiliser **INACTIVE**	**Gives the status of the immobiliser system.** **– INACTIVE: The injection computer has recognised the immobiliser code transmitted by the UCH.** **– ACTIVE: The injection computer does not recognise the immobiliser code transmitted by the Inteligent Key unit or BCM.**	If **ACTIVE, follow the associated "help" given in the tool.**
2	**Code programmed**	**ET006:** Code programmed **YES**	**States whether the immobiliser code has been programmed by the computer or not.** **– YES:** Code programmed **– NO: Code not programmed by the ECM.**	If **NO, replace ECM.**
3	**Battery voltage**	**PR074:** Battery voltage	**13 V < PR074 < 14 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

SUB SYSTEM COLD LOOP:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Air conditioning present**	**ET079:** Air conditioning present **YES**	**States whether the vehicle is fitted with air conditioning or not.** – **YES:** Air conditioning is detected by the ECM. – **NO:** Air conditioning is not detected by the ECM.	**If not consistent with the vehicle equipment, carry out the multiplex network test and apply the relevant procedure.**
2	**Compressor engagement request**	**ET088:** Request to start compressor **INACTIVE**	**The injection requests the IPDM E/R (via the multiplex network) to start the compressor** – **ACTIVE:** The multiplex network should not be faulty on the Automatic Transmission, IPDM E/R. The UCH should request the injection to be engaged. The refrigerant pressure sensor should not be faulty. Satisfactory engine operating conditions (coolant temperature, engine load etc.). – **INACTIVE:** One of the above conditions has not be fulfilled or no request has been made by the driver so **ET004 = NO**.	**NONE.**

SUB SYSTEM COLD LOOP (Continuation 1):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
3	Air conditioning authorisation	**ET004:** Air conditioning authorised **NO**	**Non operational information, designed solely for trouble diagnosis purposes.** – **YES:** Satisfactory engine operating conditions (coolant temperature, engine load etc.). The vehicle is not in a specific movement phase (hill start or stop etc.). – **INACTIVE:** One of the above conditions has not be fulfilled or no request has been made by the driver so **ET088 = INACTIVE**.	**NONE.**
4	**Refrigerant pressure**	**PR037:** Refrigerant pressure.	**Gives the value in BAR for the refrigerant fluid in the system.** **2 Bar < PR037 < 27 Bar** Default value: 0 Bar.	**If there is a malfunction: apply the diagnostic procedure for P0530 "Refrigerant fluid sensor circuit". If the DTC persists, replace the refrigerant sensor.**
5	**Engine speed**	**PR055:** Engine speed Cold: 900 rpm Warm: 805 rpm	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**

SUBSYSTEM: COLD LOOP (continuation 2)

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
6	**Fast idle speed request**	**ET023:** Fast idle speed request **ABSENT**	**The BCM requests fast idle speed from the injection.** – **ABSENT:** The IPDM E/R did not make the request – **PRESENT:** The IPDM E/R has made a request	**If ET023 is incorrect, carry out a multiplex network test using the diagnostic tool. If the test is correct refer to the IPDM E/R diagnostic procedure**
7	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**
8	**Vehicle speed**	**PR089:** Vehicle speed	**Gives the vehicle speed in kph. This parameter is transmitted by the ABS control unit. This information is transmitted to the injection on the multiplex network.**	**Test the multiplex network. Refer to ABS trouble diagnosis.**

COLD LOOP SUBSYSTEM (continuation 3):

Order	Function	Parameter or state Check or action		Display and notes	Trouble diagnosis
9	**Power used by the AC compressor**	**PR125:**	Power used by the AC compressor **0 WATT**	**Gives the power used by the compressor**	**NONE.**
10	**Fan speed request ***	**ET022:**	Fan low-speed request **INACTIVE**	**The injection requests the IPDM E/R to start the fans.** – **INACTIVE:** The request is not made by the injection because ET088 = INACTIVE and ET004 = NO. – **ACTIVE:** The request is made by the injection. ET088 = ACTIVE and ET004 = YES. (correct refrigerant pressure and vehicle speed = 0 km/h or high coolant temperature).	**NONE.**
		ET021:	High-speed fan request **INACTIVE**	**The injection requests the UPC to start the fans.** – **INACTIVE:** The request is not made by the injection because ET088 = INACTIVE and ET004 = NO. – **ACTIVE:** The request is made by the injection. ET088 = ACTIVE and ET004 = YES. Refrigerant pressure > 15 Bar, vehicle speed = 0 km/h or high engine coolant temperature.	

***: When climate control is requested with the engine at idle speed and vehicle speed = 0 km/h, ET022 will always be "ACTIVE" and ET021 "INACTIVE" (except refrigerant pressure> 15 bar, vehicle speed = 0 km/h and high coolant temperature). The fans are prevented from operating under certain coolant temperature conditions when driving.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

HEATING SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

LPG/FUEL CIRCUIT SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Fuel temperature**	**PR063:** Fuel temperature Cold = PR064 Warm: 50 °C	**Gives the fuel temperature in °C.** Default value: 30 °C.	**In the event of a malfunction, perform the diagnostic procedure for DTC P0180 "Fuel temperature sensor circuit".**
2	**Fuel flow**	**PR017:** Fuel flow 10 < Cold < 2 mg/ piston stroke 4 < Warm < 6 mg/ piston stroke	**Shows the fuel flow injected in mg/ piston stroke for each injector.**	**None.**
3	**Rail pressure**	**PR038:** Rail pressure Cold: 260 Bar Warm: 230 Bar	**Gives the pressure of the diesel in the injection rail in Bar. This pressure is supplied by the sensor on the rail.** Default value: 2000 Bar.	**In the event of a malfunction, apply the diagnostic procedure for DTC P0190 Rail pressure sensor circuit.**
4	**Rail pressure setpoint**	**PR008:** Rail pressure specification **375 bar**. (Engine starting pressure specification). Cold: 260 Bar Warm: 230 Bar	**Gives a theoretical pressure value for optimum engine operation.**	**None.**
5	**Rail pressure sensor voltage**	**PR080:** Rail pressure sensor voltage	**Shows the voltage delivered by the computer on the rail pressure sensor.** 0.5 V (0 bar) < PR080 < 4.5 V (1600 bar)	**None.**
6	**Engine speed**	**PR055:** Engine speed. Cold: 900 rpm V Warm: 805 rpm	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for DTC P0335 Engine speed sensor circuit.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

PRE-HEATING/IGNITION SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**
2	**External air temperature**	**PR061:** Intake air temperature	**Indicates the value of the inlet manifold air temperature in °C. This information is provided by IAT sensor incorporated into the mass air flow sensor.**	**In the event of a malfunction, refer to DTC P0100.**
3	**Inlet air temperature**	**PR059:** Inlet air temperature Cold = PR061 Warm: 30 °C	**Gives the inlet air temperature in °C. This information is provided by the air temperature/ pressure sensor.** Default value: 30 °C.	**In the event of a malfunction, refer to parameter interpretation PR059 "Inlet air temperature".**
4	**Battery voltage**	**PR074:** Battery voltage	**12 V < PR074 < 14.4 V**	**In the event of a malfunction, run the diagnostic procedure for the "Charging circuit".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

AIR CIRC SUBFUNCTION (TURBOCHARGING/INLET.):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Inlet air temperature**	**PR059:** Inlet air temperature Cold = PR061 Warm: 30 °C	**Gives the inlet air temperature in °C. This information is provided by the air temperature/ pressure sensor.** Default value: 30 °C.	**In the event of a malfunction, refer to parameter interpretation PR059 "Inlet air temperature".**
2	**Air circuit pressure**	**PR035:** Atmospheric pressure **PR032:** Inlet pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the ECM.** **Shows the pressure in the inlet circuit in mbar.**	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
3	**Air flow**	**PR132:** Air flow 350 < Cold < 400 mg/piston stroke 300 < Warm < 350 mg/piston stroke	**Air flow estimated by the ECM.**	**None.**
4	**Inlet temperature sensor voltage**	**PR081:** Inlet temperature sensor voltage	**Shows the voltage delivered by the computer to supply the inlet temperature sensor**	**None.**
5	**Engine speed**	**PR055:** Engine speed. Cold: 900 rpm V Warm: 805 rpm	**Gives the engine's rotational speed in rpm.**	**In the event of a malfunction, apply the diagnostic procedure for P0335 Engine speed sensor circuit.**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

ENGINE COOLING SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

DRIVER PARAMETERS SUB FUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**Accelerator pedal position (APP sensor)**	**PR030:** Accelerator pedal position **0 %**	**Indicates the percentage of the pedal position between no load and full load position** **0 % < PR030 < 100 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for DTCs **P0225** and **P2120** Pedal sensor circuit, track 1 and track 2 and **P0641** "Sensor reference voltage"
2	**Pedal potentiometer tracks voltage (APP sensor)**	**PR086:** Pedal potentiometer track 1 voltage **16 %** **PR088:** Pedal potentiometer track 2 voltage **7 %**	**Shows the voltage supply percentage for tracks 1 and 2 of the pedal potentiometer.** **10 % < PR086 < 20 %** **5 % < PR088 < 15 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for DTCs **P0225** and **P2120** Pedal sensor circuit, track 1 and track 2 and **P0641** "Sensor reference voltage"

NOTES	Only carry out conformity check after a **full check** using the diagnostic tool. The values indicated in this conformity check are given as examples. **Test conditions:** Engine **at idle speed**.

ANTIPOLLUTION / OBD SUBFUNCTION:

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
1	**EGR solenoid valve control**	**ET008:** EGR solenoid control **INACTIVE**	**Shows the condition of the EGR valve control.** – **INACTIVE:** The valve is not controlled by the computer. – **ACTIVE:** The valve is controlled by the computer.	**None.**
2	**Atmospheric pressure**	**PR035:** Atmospheric pressure	**Gives the atmospheric pressure in mbar. The sensor is incorporated in the ECM.**	**If not consistent, check PR035 = PR032 = local atmospheric pressure, with the engine stopped and ignition on.**
3	**Air flow**	**PR132:** Air flow 350 < Cold < 400 mg/piston stroke 300 < Warm < 350 mg/piston stroke	**Air flow estimated by the ECM.**	**None.**
4	**Fuel flow**	**PR017:** Fuel flow 10 < Cold < 12 mg/piston stroke 4 < Warm < 6 mg/piston stroke	**Shows the fuel flow out of the high-pressure pump in mg/piston stroke.**	**None.**
5	**EGR valve opening setpoint**	**PR005:** EGR valve opening setpoint Warm: 20%	**Gives a theoretical EGR valve opening value for optimum engine operation.**	**None.**

ANTIPOLLUTION / OBD SUBFUNCTION (cont.):

Order	Function	Parameter or state Check or action	Display and notes	Trouble diagnosis
6	**EGR valve position feedback**	**PR051:** EGR valve position feedback Warm approximately 20%	**Gives the actual value of the EGR valve position.** Default value: 30%	**NONE.**
7	**EGR valve position sensor voltage**	**PR077:** EGR valve position sensor voltage	**Gives the EGR valve voltage according to its position.** – **INACTIVE:** The valve is not controlled by the computer. – **ACTIVE:** The valve is controlled by the computer. **0.5 V < PR077 < 4.8 V**	**NONE.**
8	**Accelerator pedal position**	**PR030:** Accelerator pedal position **0 %**	**Indicates the percentage of the pedal position between no load and full load position** **0 < PR030 < 100 %**	**In the event of a malfunction**, apply the **diagnostic procedure** for DTCs **P0225** and **P2120** Pedal sensor circuit, track 1 and track 2 and **P0641** "Sensor reference voltage"
9	**Coolant temperature**	**PR064:** Coolant temperature Warm: 90 °C	**Gives the coolant temperature in °C.** Default value: 80 °C.	**In the event of a malfunction, refer to parameter interpretation PR064 "Coolant temperature".**

PR059	INLET AIR TEMPERATURE SENSOR

NOTES	**Special notes:** Only perform the checks if the parameter is incorrect.

Check the condition of the turbocharger air temperature pressure sensor connections.
If necessary replace the sensor.
Measure the **resistance** across **terminals 1 and 2** of the air temperature - pressure sensor:

8950 < R in Ω at **- 10** °**C < 9901**
7054 < R in Ω at **- 5** °**C < 7784**
5605 < R in Ω at **- 0** °**C < 6169**
3618 < R in Ω at **- 10** °**C < 3964**
2400 < R in Ω at **- 20** °**C < 2620**
1645 < R in Ω at **- 30** °**C < 1787**

Replace the air temperature - pressure sensor, if necessary.

PR064	ENGINE COOLANT TEMPERATURE

NOTES	**Special notes:** Only perform the checks if the parameter is incorrect.

Check the condition of the engine coolant temperature sensor connections.
If necessary replace the sensor.
Measure the **resistance** between terminals **1** and **4** of the **coolant temperature sensor**.

- **R at - 10 °C =** 12.46 kΩ ± 1128 Ω.
- **R at 25 °C =** 2252 Ω ± 112.6 Ω.
- **R at 50 °C =** 811.4 Ω ± 38.4 Ω.
- **R at 80 °C =** 282.6 Ω ± 7.83 Ω.

If the value is incorrect, replace the engine coolant temperature sensor.

NOTES	**Only consult the tests after following the diagnostic procedure chart.**

Some specific checks are grouped under the "tests" heading and are used as required in different diagnostic charts.

TEST 1: Low pressure circuit check

TEST 2: Electrical circuit check

TEST 3: Injector check

TEST 4: Parameter check

TEST 5: Air inlet circuit check

TEST 6: ECM check

TEST 7: High pressure pump check

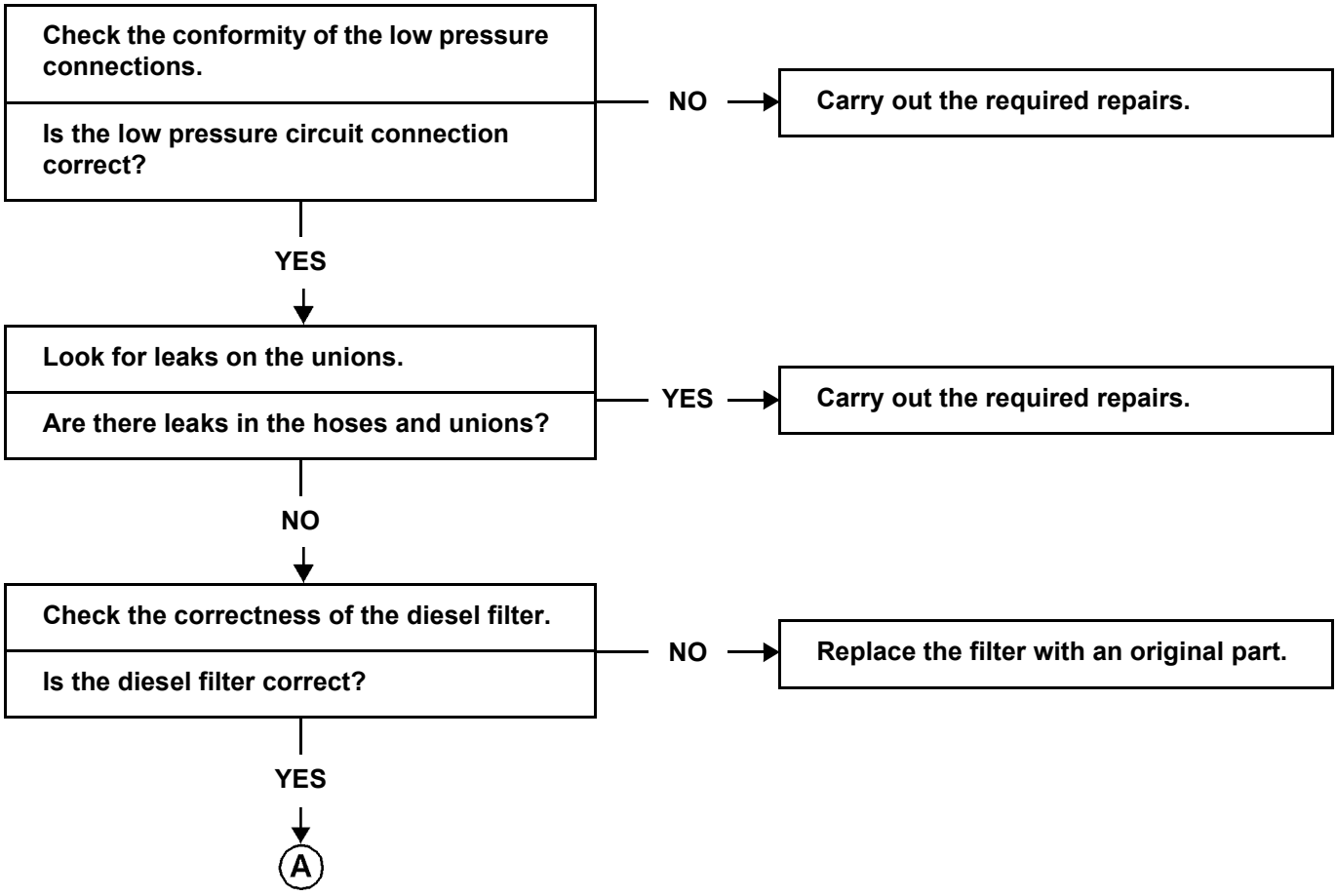
TEST 8: High pressure circuit leak check

TEST 9: Injector leak check

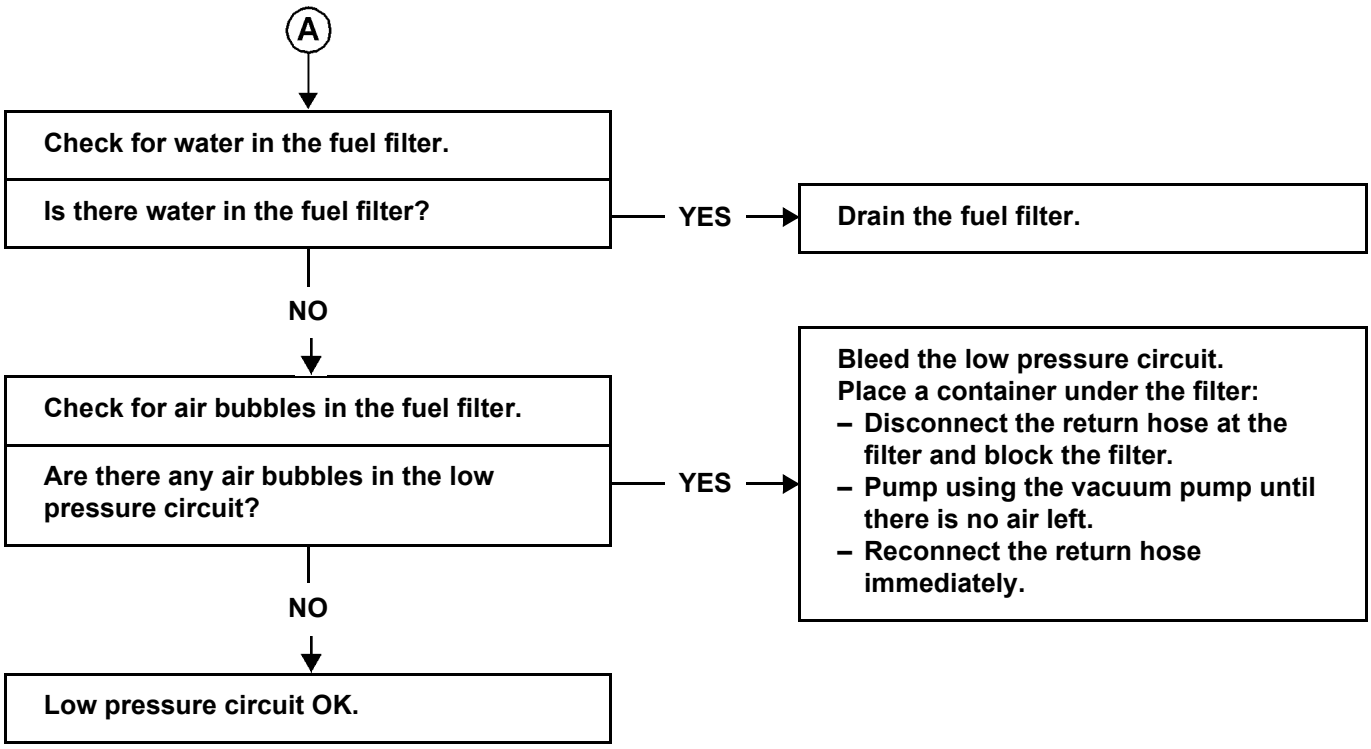
TEST 10: Injector return flow in starting phase

TEST 11: Diesel filter check

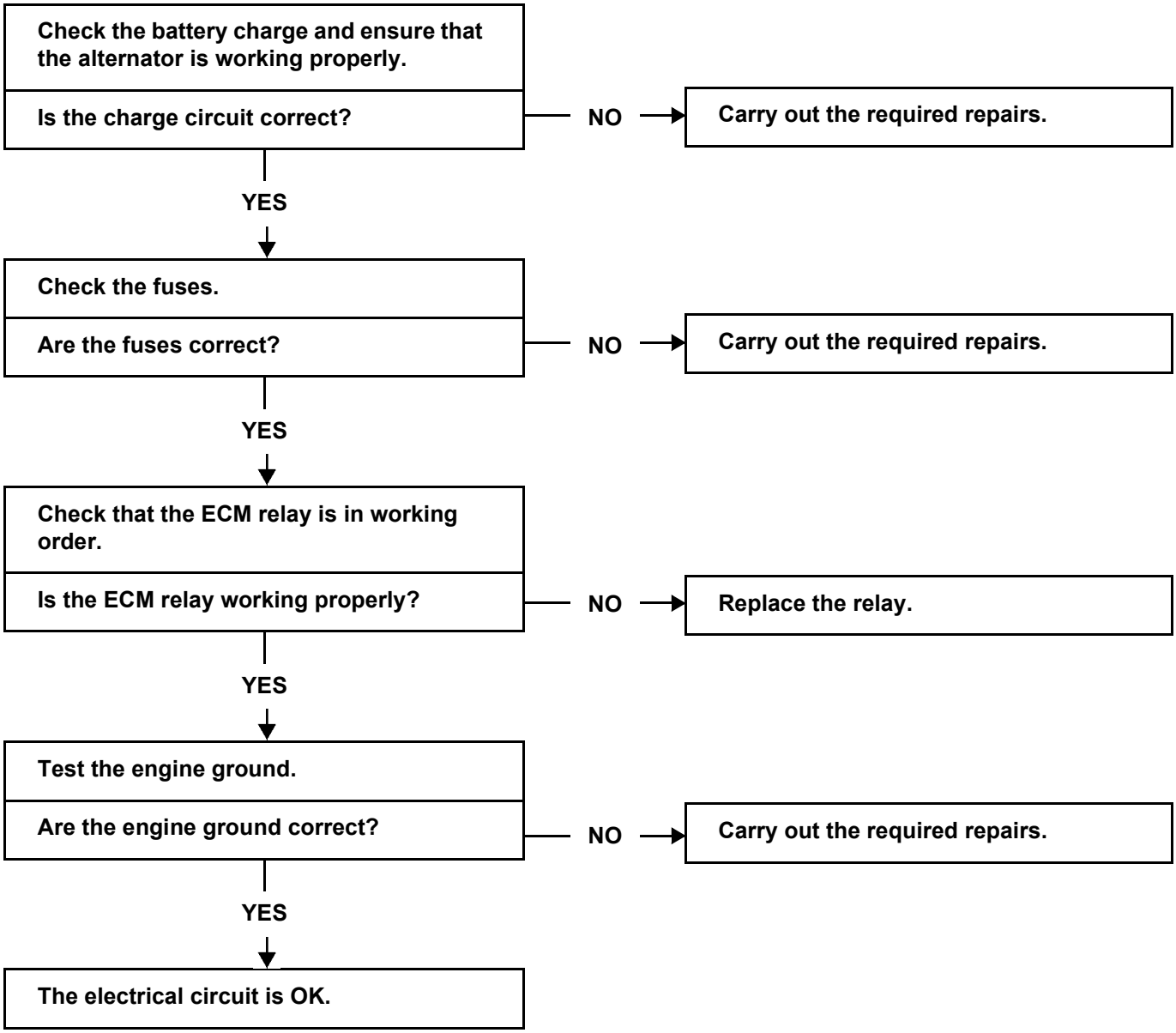
TEST 1	LOW PRESSURE CIRCUIT CHECK



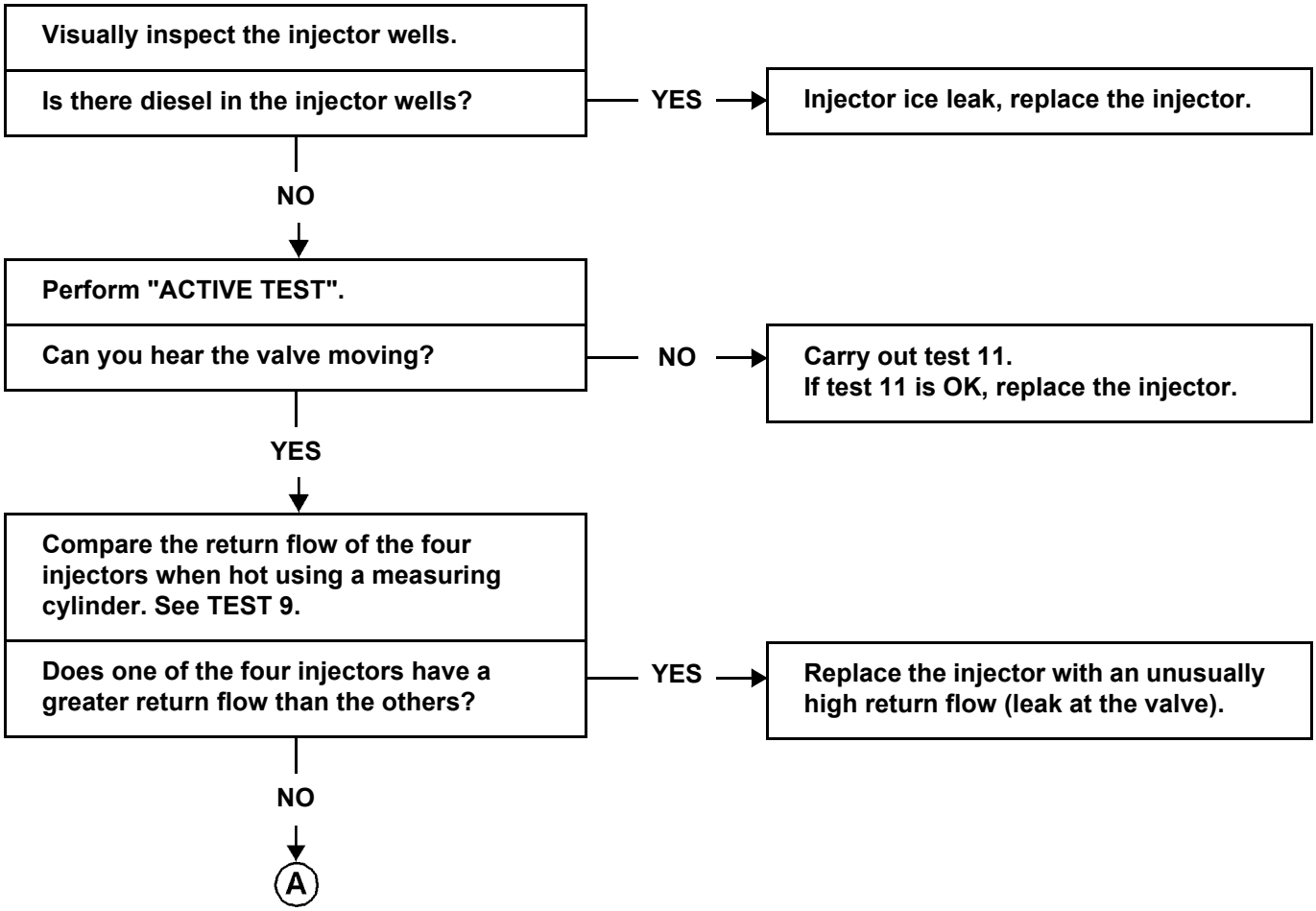
TEST 1 Cont'd	



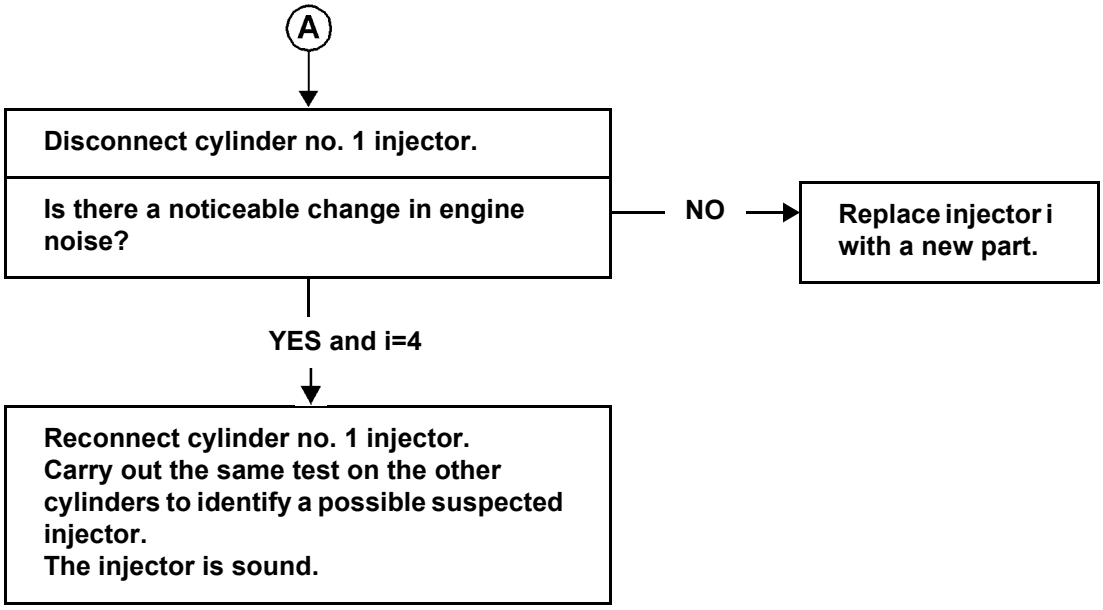
TEST 2	ELECTRICAL CIRCUIT CHECK



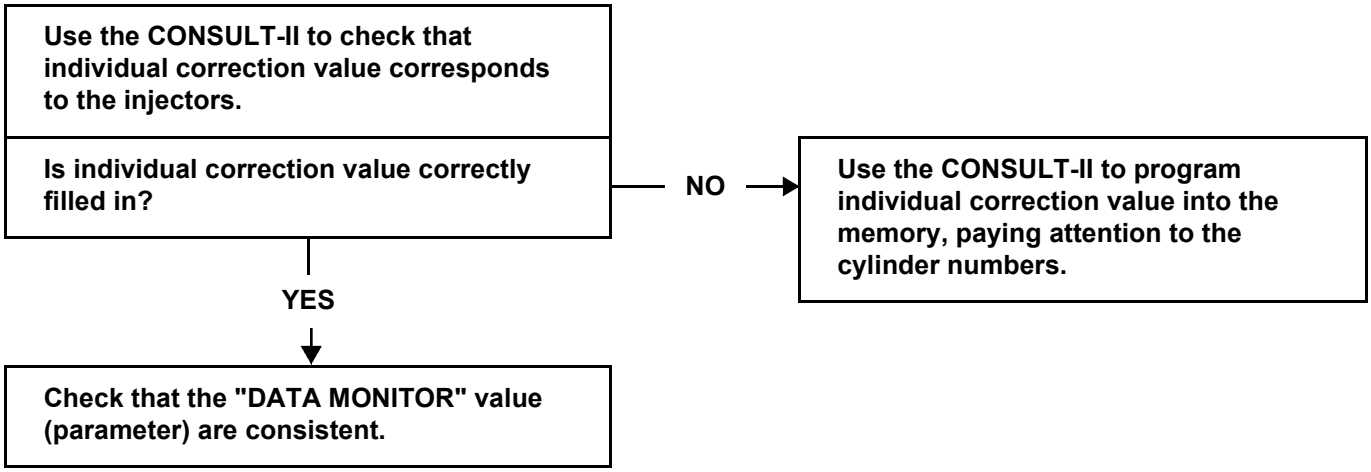
TEST 3	INJECTOR CHECK



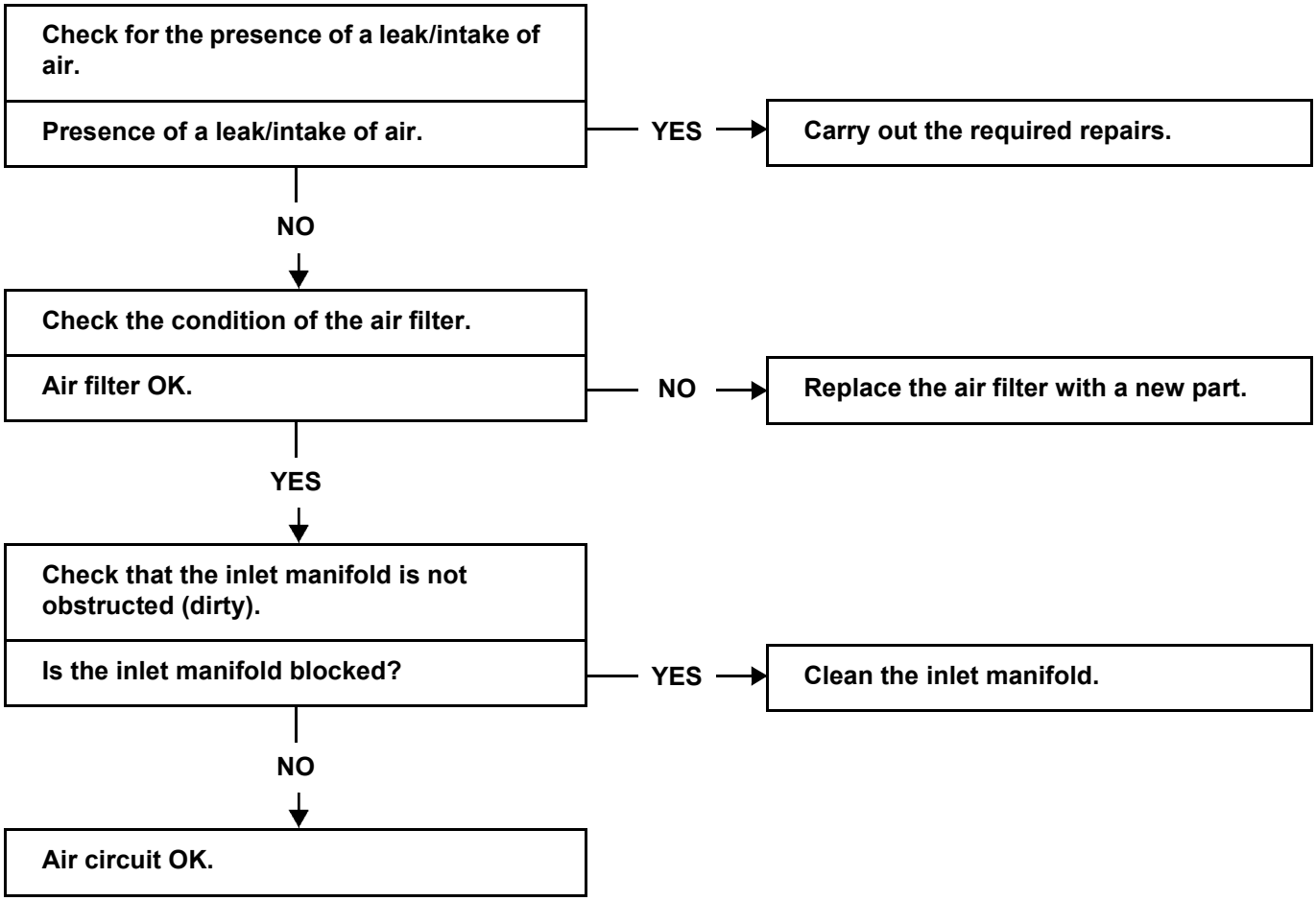
TEST 3 Cont'd	



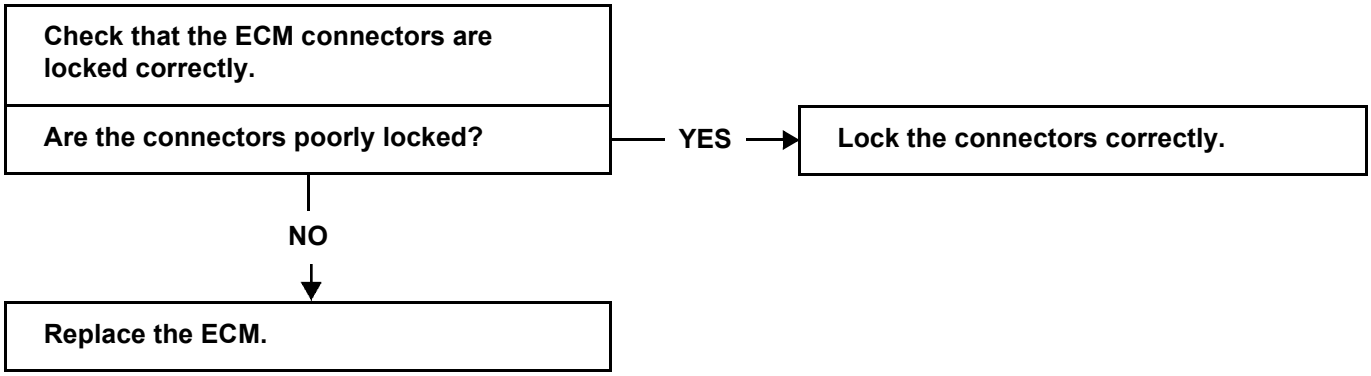
TEST 4	PARAMETER CHECK



TEST 5	AIR INLET CIRCUIT CHECK



TEST 6	ECM CHECK (COMPUTER)



TEST 7	High pressure system check

NOTES	**Special notes:** Certain malfunctions make it impossible to carry out this test, deal with them first. **IMPORTANT: It is useless and dangerous to engage the starter motor for more than 5 seconds.**

It is possible to check the high pressure supply pump capacity by carrying out the following procedure:
- **With the ignition off, disconnect** the low pressure actuator from the pump (**IMV brown connector**) and connect a test adaptor (test IMV).
- Disconnect the 4 injectors.
- Switch on the ignition, connect the fault finding tool and re-establish dialogue with the injection system.
- On the screen, display **Main states and parameters** of the ECM.
- Brake and press the "START" button. **The starter will cut out automatically** after **5 secs**.
- Read the maximum rail pressure value **PR038** during the test on the fault finding tool.

Is the rail pressure greater than 1050 bar?

NO

Is the rail pressure greater than 900 bar?

NO

Make sure that the ignition circuit is working correctly (minimum engine speed **200 rpm**). Switch off the ignition and reconnect the 4 injectors and low pressure actuator electrically. Switch the ignition back on, and clear the injection faults using the fault finding tool.

Carry out TEST 11.

YES

Repeat the test when cold. Coolant temperature = Ambient air temperature.

Is the rail pressure greater than 1050 bar?

YES

NO

Make sure that the ignition circuit is working correctly (minimum engine speed **200 rpm**). Switch off the ignition and reconnect the 4 injectors and low pressure actuator electrically. Switch the ignition back on, and clear the injection faults using the fault finding tool.

Carry out TEST 11.

YES

The pump can supply the operating pressure. Switch off the ignition and reconnect the 4 injectors and low pressure actuator electrically. Switch the ignition back on, and clear the injection faults using the fault finding tool.
Carry out fault finding on the injectors by checking the return volume of the 4 injectors **(See TEST 9 injector sealing check).**

Carry out fault finding on the injectors by checking the return volume of the 4 injectors.
See TEST 9 or TEST 10 if the engine does not start.

Is **TEST 9 or TEST 10** correct?

NO

Replace the faulty injector(s).

YES

Replace the high pressure pump.

TEST 8	High-pressure circuit leak check

NOTES	**Special notes:** Certain malfunctions make it impossible to carry out this test, deal with them first.

There is a command that performs a leak test on the high-pressure circuit when the engine is running.
This command can detect a leak on the high-pressure circuit if a union is improperly fitted or bolted, but cannot detect a small leak if a union is not torque tightened.
This command can only be used if the engine temperature is **above 60°C**.

Use command **AC029 "high pressure circuit sealing test"** the engine will automatically carry out one cycle of 4 accelerations to raise the pressure in the rail and check whether there are leaks in the high pressure circuit.

Watch out for any objects (tools, etc) on the sides of the engine housing during the four accelerations (vibrations possible).

TEST 9	Injector leak check

NOTES	**Special notes:** Certain faults make it impossible to carry out this test, deal with them first.

Command AC029 also allows you to check the return volume of each injector to detect a leak inside the injectors.

Tooling required:
- **It is essential to use 4 transparent pipes with an internal diameter of 4 mm and a length of approximately 50 cm.**
- **4 graduated measuring cylinders.**

PROCEDURE
- Check that the engine coolant temperature is **above 60°C**.
- Switch off the ignition.
- Disconnect the return pipes from the 4 injectors.
- Fit a plug in the pump venturi tube to prevent the low-pressure circuit from depriming.
- Connect the 4 transparent pipes with an internal diameter of **4 mm** and a length of **50 cm** in place of the return pipes.
- Immerse these 4 pipes into 4 graduated measuring cylinders.

Having carried out these preparations, start the engine, then let it run for **2 minutes** at idle speed.
- **Activate** command **AC029 "high pressure circuit sealing test"**: the engine will automatically perform one cycle of 4 accelerations to raise the pressure in the rail and measure the leaks inside the injectors in these conditions.
- **Once the cycle is complete, activate command AC029 again** for the correct reading of the return volume of each injector.
  At the end of both cycles, the return volume of each injector should be **35 ml at maximum**. If the return volume of one of the injectors is above **35 ml**, replace the faulty injector.
- Disconnect the 4 transparent pipes and reconnect the injector return circuit.

Watch out for any objects (tools, etc.) at the sides of the engine housing during the four cycles (vibrations possible).

TEST 10	Injector return flow in starting phase.

NOTES	**Special notes:** Certain faults make it impossible to carry out this test, deal with them first. **IMPORTANT: It is useless and dangerous to engage the starter motor for more that 5 seconds.**

In the event the engine does not start, only the static leak can be measured, that is the leak with the injector closed, inactive and not subject to any high pressure.

Make sure that the starting circuit is working correctly (minimum speed 200 rpm).

Tooling required:

- **It is essential to use four transparent pipes with an internal diameter of 4 mm and approximately 50 cm long.**
- **A test adapter (TEST IMV)**

PROCEDURE:

1 – Switch off the ignition.
2 – Disconnect the four injector return pipes.
3 – Fit a plug in the pump venturi tube to prevent the low-pressure circuit from depriming.
4 – Connect the four transparent pipes with an internal diameter of **4 mm** and a length of **approximately 50 cm**.
5 – Disconnect the low pressure actuator from the pressure (brown IMV connector) and connect the test adapter (test IMV).
6 – **Electrically disconnect the 4 injectors.**
7 – Switch on the ignition, brake and press the "START" button. **The starter cuts in automatically after 5 seconds.**
8 – Measure the amount of diesel in each pipe.

Replace the injector(s) whose leak return is greater than 10 cm.

Disconnect the four transparent diesel pipes and reconnect the injector return circuit.

Disconnect the test IMV and reconnect the low pressure actuator to the pump.

TEST 11	Diesel filter check

Check the conformity of the diesel filter.

Is the diesel filter correct?

NO → **Replace the filter with an original part.**

YES ↓

Switch off the ignition, analyse the diesel fuel in the diesel filter.
- Disconnect the diesel supply and return hoses from the filter.
- Block the filter inlets and outlets straight away with appropriate plugs.
- Remove the filter from its holder and **shake it well**, keeping the caps in place and empty the contents of the filter into a glass container by lifting up a protective cap and undoing the bleed screw.

Can you see at the bottom of the container a deposit of black particles?

YES ↓

Pass a magnet beneath the container to collect only all the metal particles. Take the magnet away from the container.

Do the particles collected using the magnet cover a surface area greater than 1 cm^2?

YES ↓

Replace the entire injection system.

NO ↓

Diesel filter correct.

NO ↓

Diesel filter correct.

NOTES	**Only consult this customer complaint after a complete check using the diagnostic tool.**

No communication with the ECM — **CHART 1**

Starting malfunction

- **The engine does not start** — **CHART 2**
- **The engine starts with difficulty or starts then stalls** — **CHART 3**
- **Starting difficult with warm engine** — **CHART 4**

Idle speed malfunction

- **Rough idle speed (pumping)** — **CHART 5**
- **Idle speed too high or too low** — **CHART 6**

Behaviour while driving

- **Unexpected acceleration/deceleration and engine stalling** — **CHART 7**
- **Response malfunction** — **CHART 8**
- **Engine stop (timing)** — **CHART 9**
- **Engine jerking** — **CHART 10**
- **Lack of power** — **CHART 11**
- **Too much power** — **CHART 12**

Road holding (continued)

- Excessive consumption — CHART 13
- Overspeed when lifting off accelerator or changing gear — CHART 14
- Engine dies when pulling away — CHART 15
- The engine does not stop — CHART 16

Noise, odours or smoke

- Clanking engine, noisy engine — CHART 17
- Squalling noise — CHART 18
- General mechanical noises — CHART 19
- Blue, white or black smoke — CHART 20
- Exhaust odours — CHART 21
- Diesel odours — CHART 22
- Smoke (blue, white or black) on acceleration — CHART 23

CHART 1	NO COMMUNICATION WITH THE ECM

NOTES	**Only consult this customer complaint after a complete check using the diagnostic tool.**

Ensure that the diagnostic tool is not causing the fault by trying to establish dialogue with a computer on another vehicle. If the tool is not at fault, and dialogue cannot be established with any other computer on the same vehicle, the cause could be a faulty computer interfering on the multiplex network.
Check the voltage of the battery and carry out the operations necessary to obtain a voltage which is to specification (**9.5 volts < U battery < 17.5 volts**).

Perform fault finding on the multiplex network using the diagnostic tool.

Check **the ECM earth (ground) point** on the left hand front shock absorber cage.

Check:
– the connection between the CONSULT-II and the DLC (wiring in good condition),
– the engine and passenger compartment fuses.

Check for the presence of **+ 12 volts before ignition** on **terminal 16**, **+ 12 volts after ignition** on **terminal 8** and an **earth (ground)** on **terminals 4 and 5** of the diagnostic socket.
Repair if necessary.

Connect the CONSULT-II and check the **insulation, continuity and absence of interference resistance of the connections:**

- ECM (F134) terminal 109 and IPDM E/R harness connector terminal 32
- ECM (F134) terminal 110 and IPDM E/R harness connector terminal 32
- ECM (E61) terminal 22 and Fuse block (M16)
- ECM (F134) terminal 104 and IPDM E/R harness connector terminal 29
- ECM (F134) terminal 32 and ground
- ECM (F134) terminal 26 and ground
- ECM (E61) terminal 2 and DLC terminal 7
  (Refer to wiring diagram "EC-MAIN-01".)

Repair if necessary.

CHART 2	THE ENGINE DOES NOT START

NOTES	Only consult this customer complaint after a complete check using the CONSULT-II.

Check that the fuel reservoir is correctly filled and with the right fuel.

↓

Check the engine oil and coolant levels.

↓

Check the inlet air circuit using TEST 5.

↓

Is the catalytic converter clogged or deteriorated? — **YES** → **Replace the catalytic converter.**

↓ **NO**

Check the electrical circuit using TEST 2.

↓

Is the distribution properly adjusted? — **NO** → **Perform the required repairs.**

↓ **YES**

Visually check the condition of the engine wiring harness.

↓

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CHART 2 CONTINUED 1	

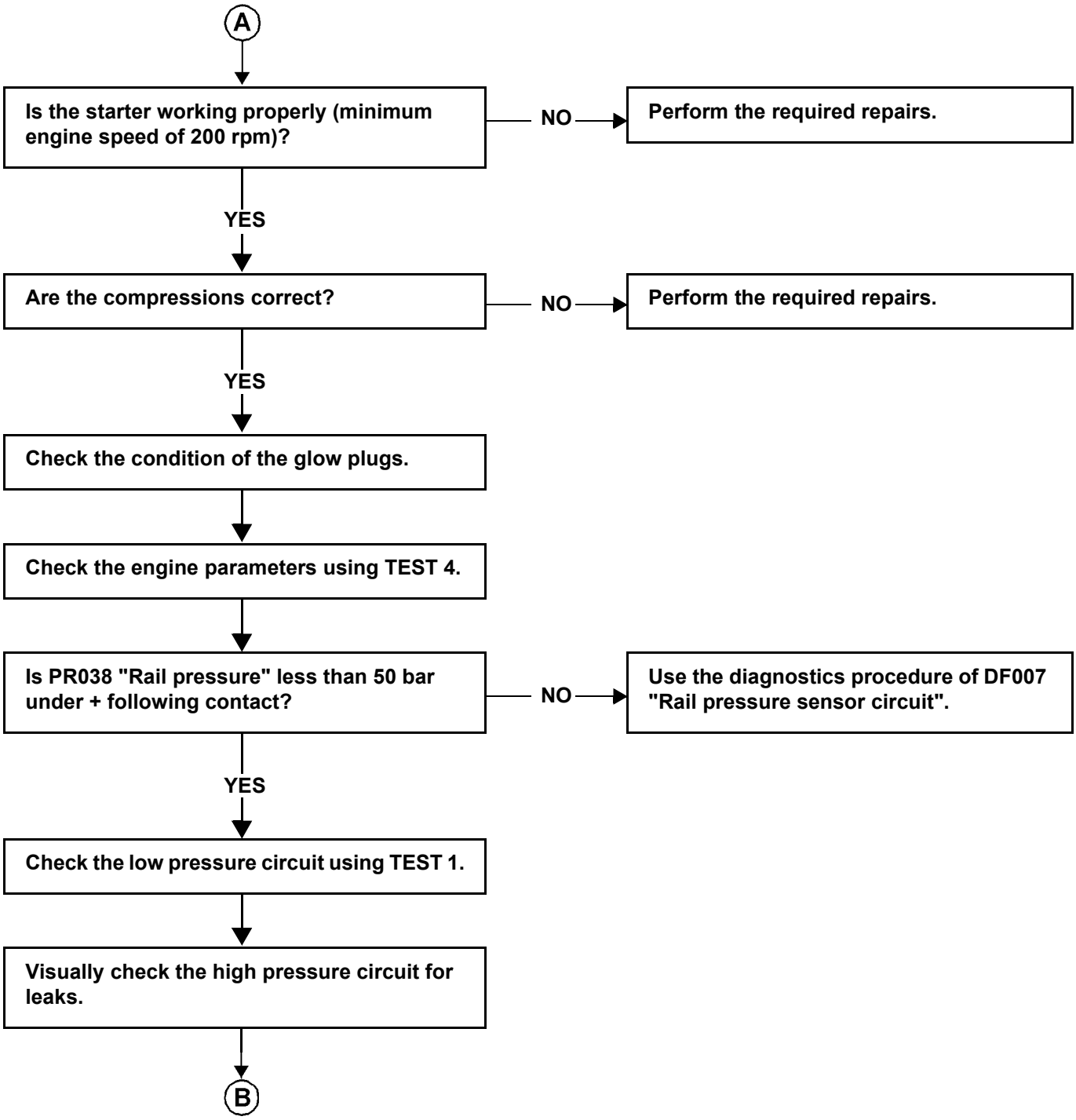
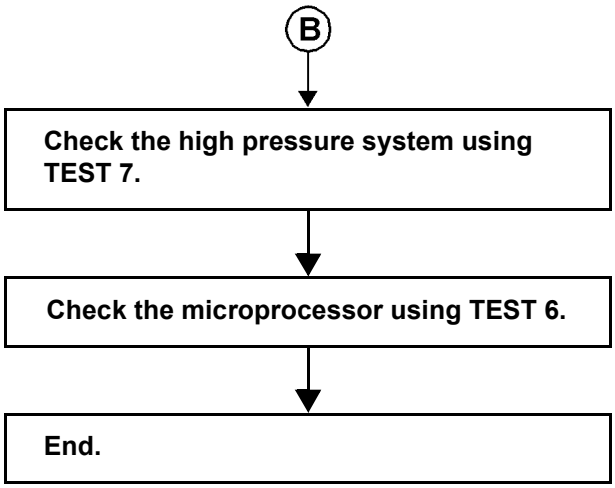


CHART 2 CONTINUED 2	



AFTER REPAIR	Check that the system is operating correctly.

CHART 3	THE ENGINE STARTS WITH DIFFICULTY OR STARTS THEN STALLS

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

Check that the fuel reservoir is correctly filled and with the right fuel.

↓

Check the engine oil and coolant levels.

↓

Check the inlet air circuit using TEST 5.

↓

Is the catalytic converter clogged or deteriorated? — **YES** → **Replace the catalytic converter.**

NO

↓

Is the distribution properly adjusted? — **NO** → **Perform the required repairs.**

YES

↓

Are the compressions correct? — **NO** → **Perform the required repairs.**

YES

↓

Check the condition of the glow plugs.

↓

Ⓐ

CHART 3 CONTINUED 1	

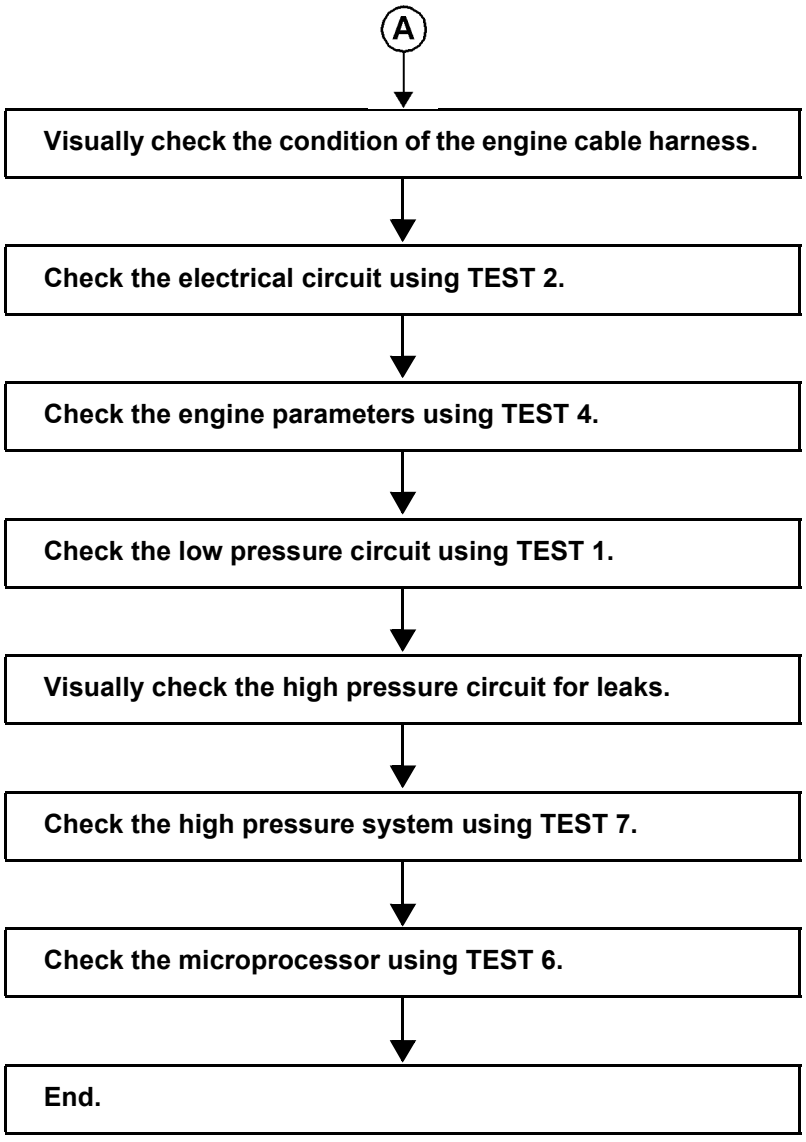


CHART 4	STARTING DIFFICULT WITH WARM ENGINE

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

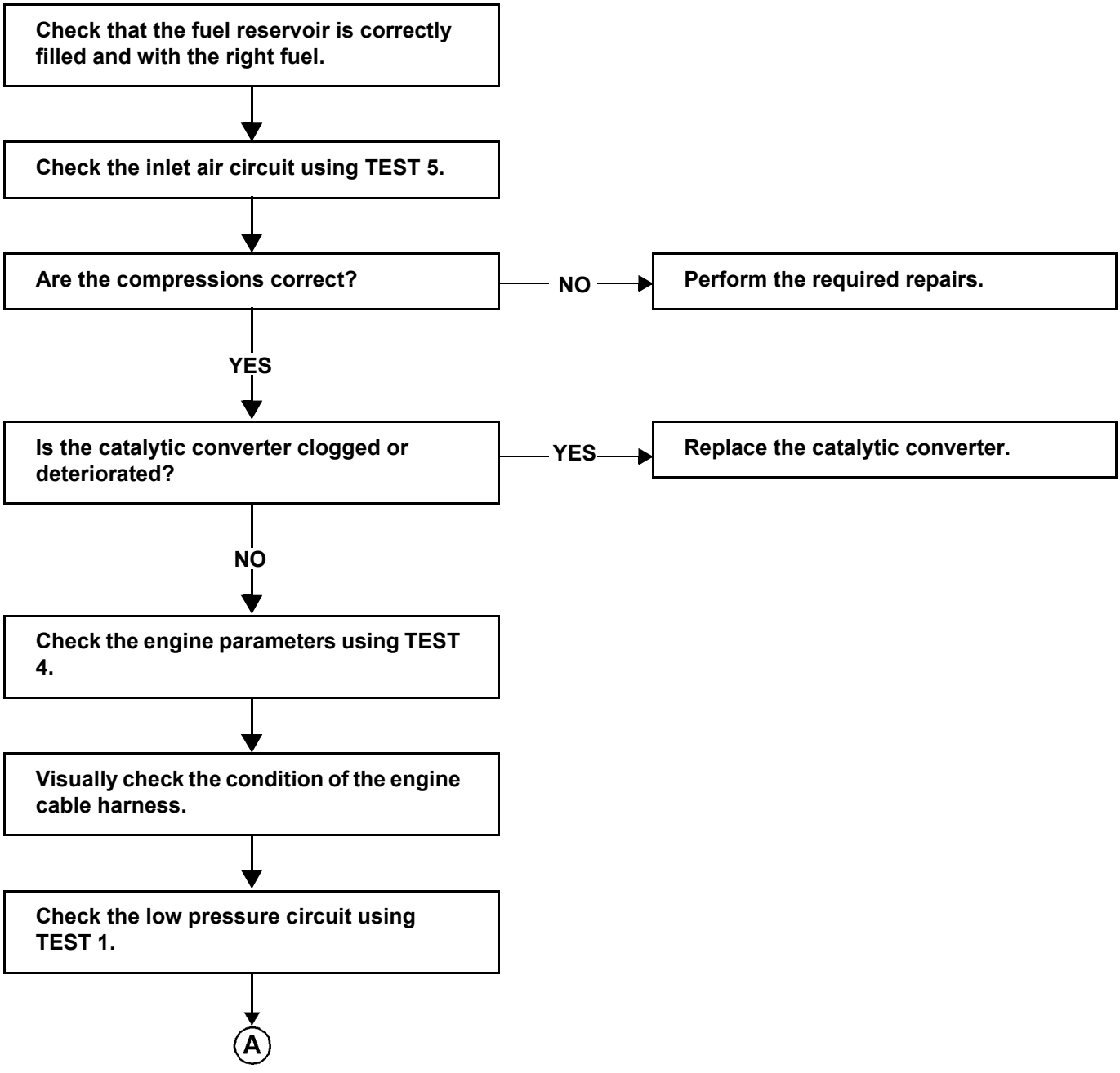


CHART 4 Cont'd	

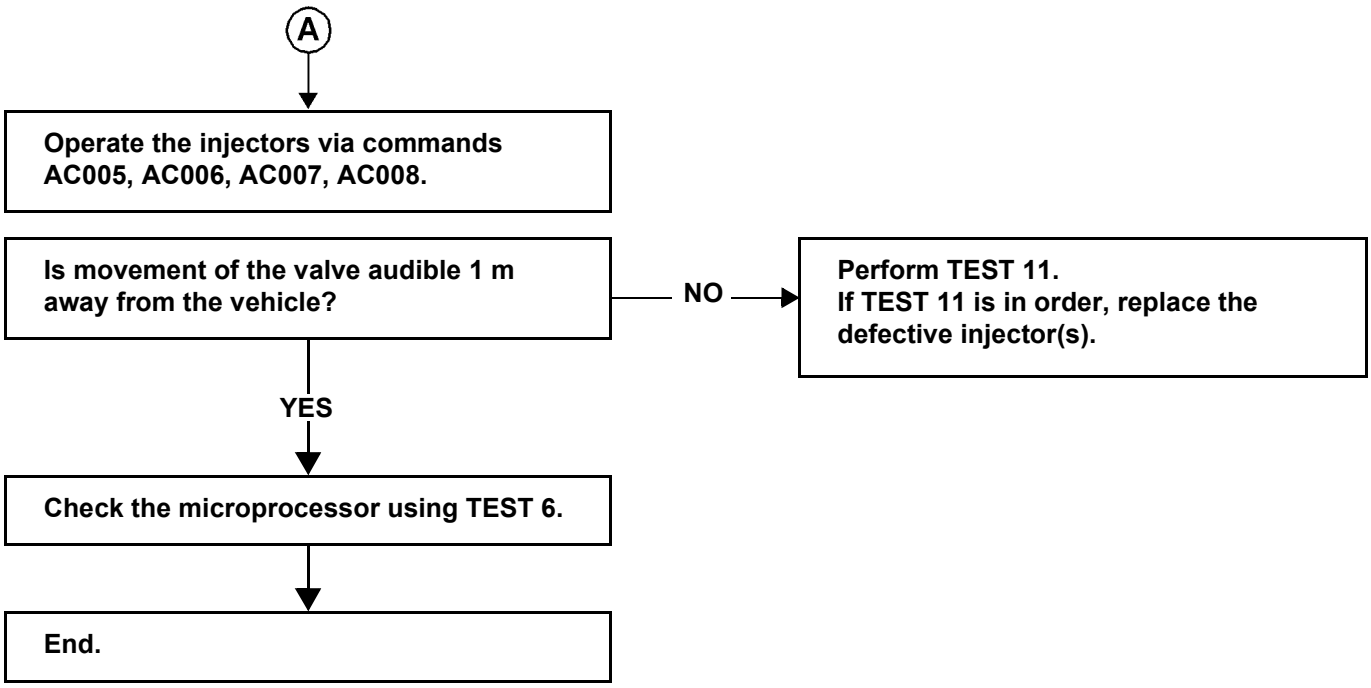


CHART 5	ROUGH IDLE SPEED (PUMPING)

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

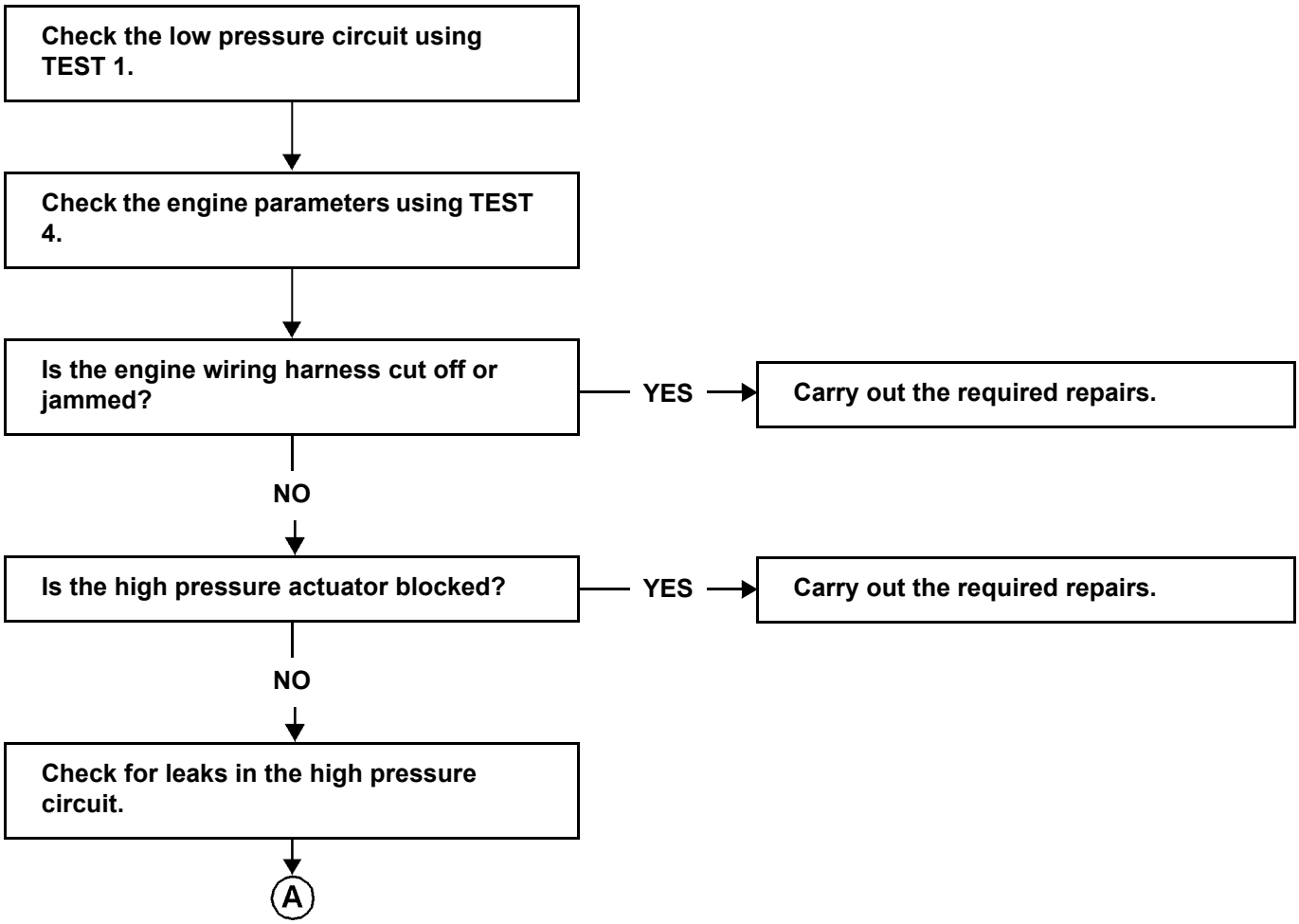


CHART 5 Cont'd	

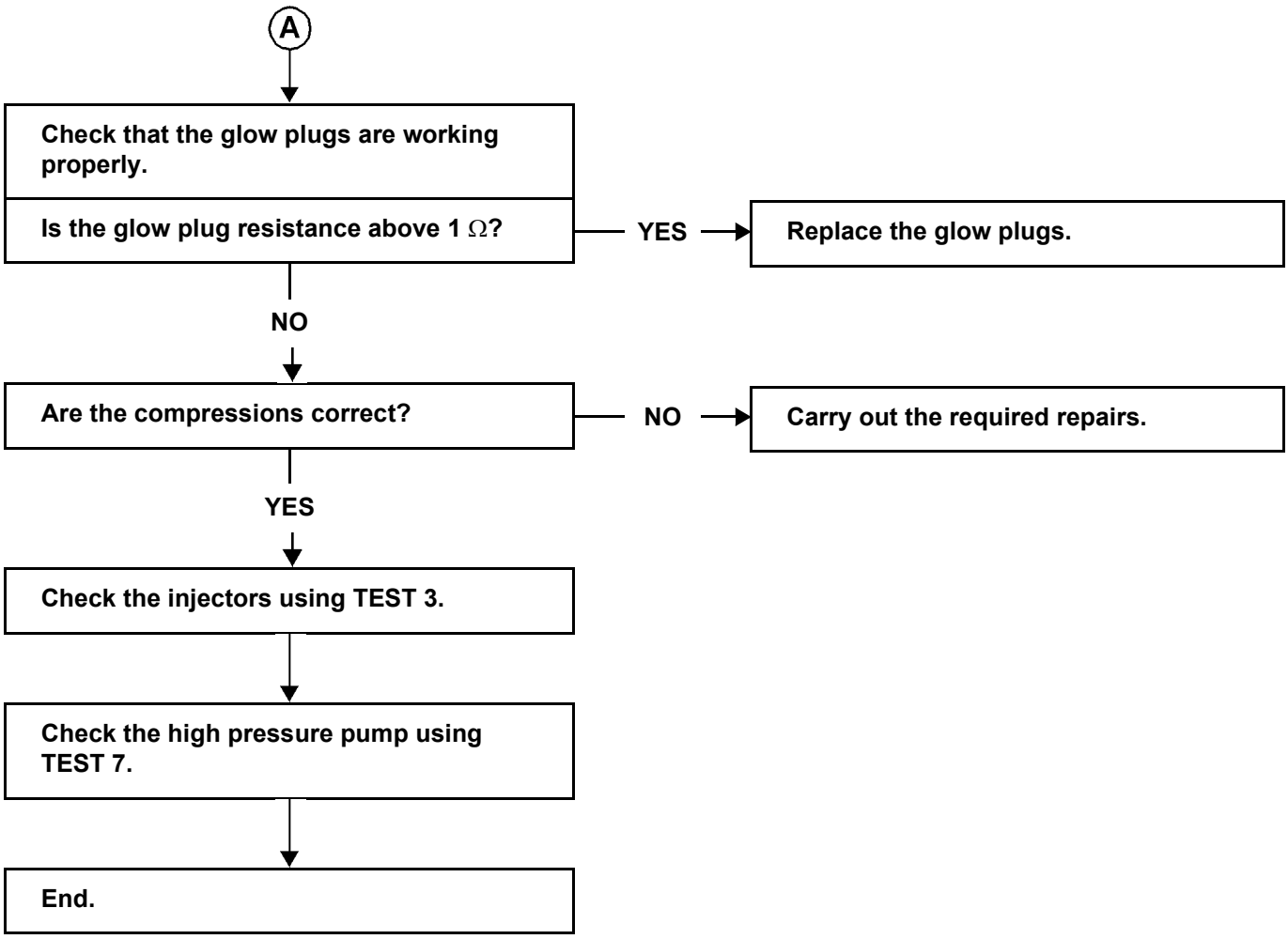


CHART 6	IDLE SPEED TOO HIGH/TOO LOW

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

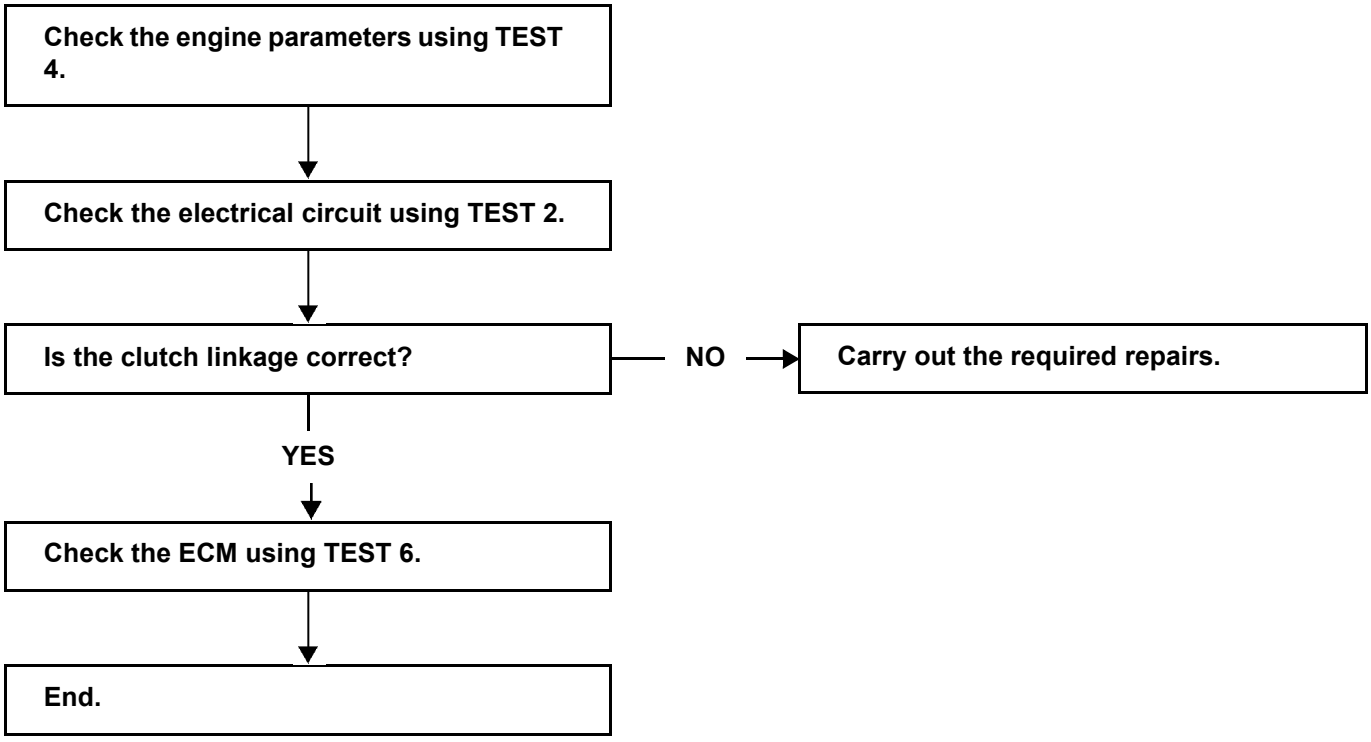


CHART 7	UNEXPECTED ACCELERATION/DECELERATION AND ENGINE OVERCHARGING

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

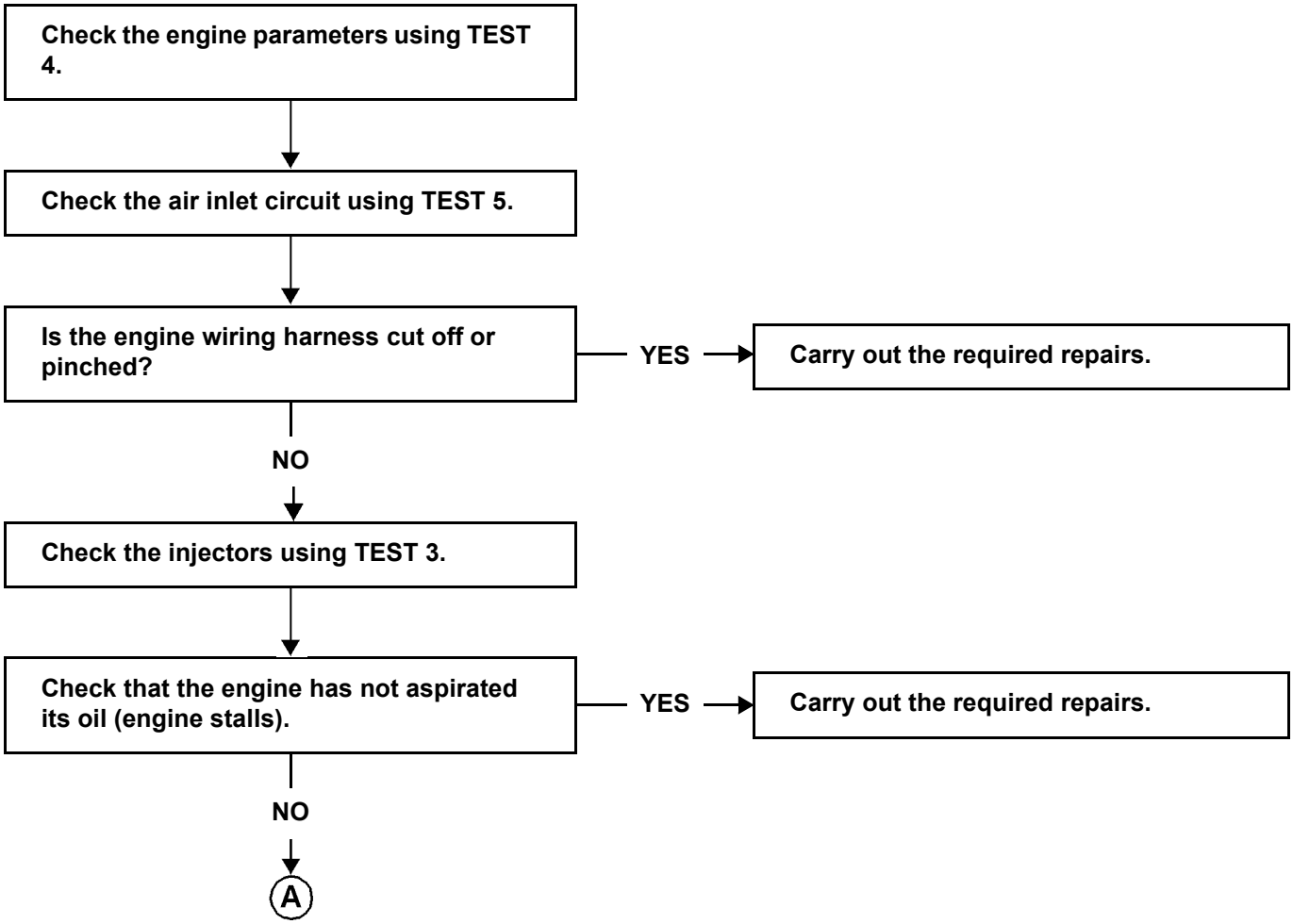


CHART 7 Cont'd	

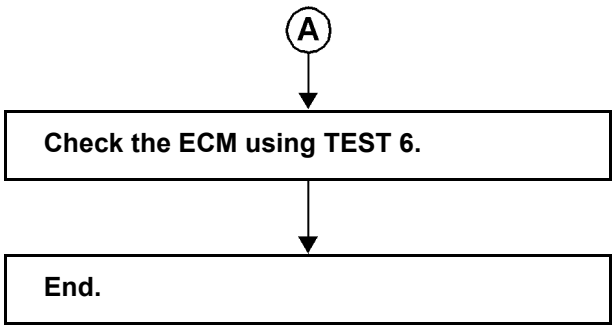


CHART 8	RESPONSE MALFUNCTION

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

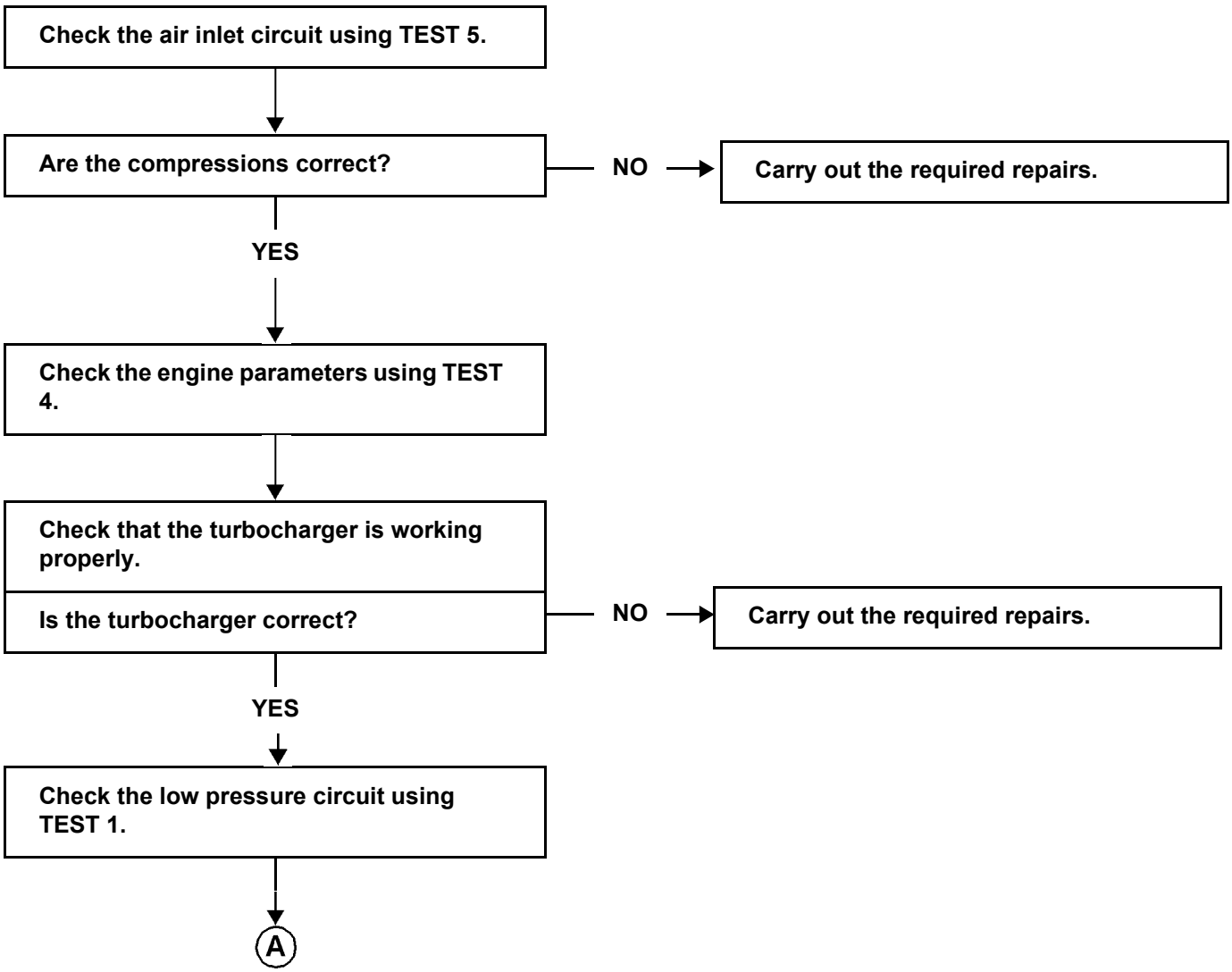


CHART 8 Cont'd	

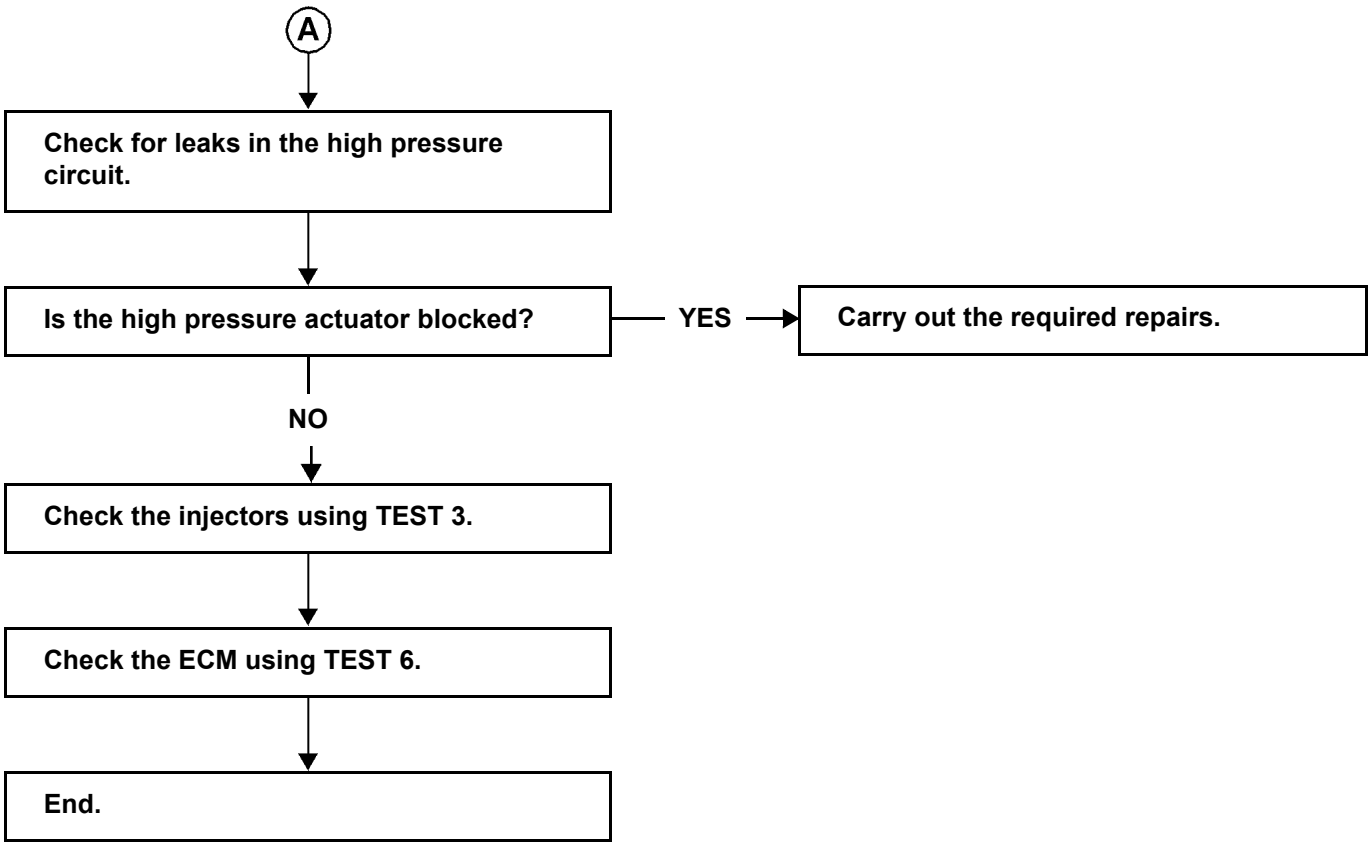


CHART 9	ENGINE STOP/STALLING

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

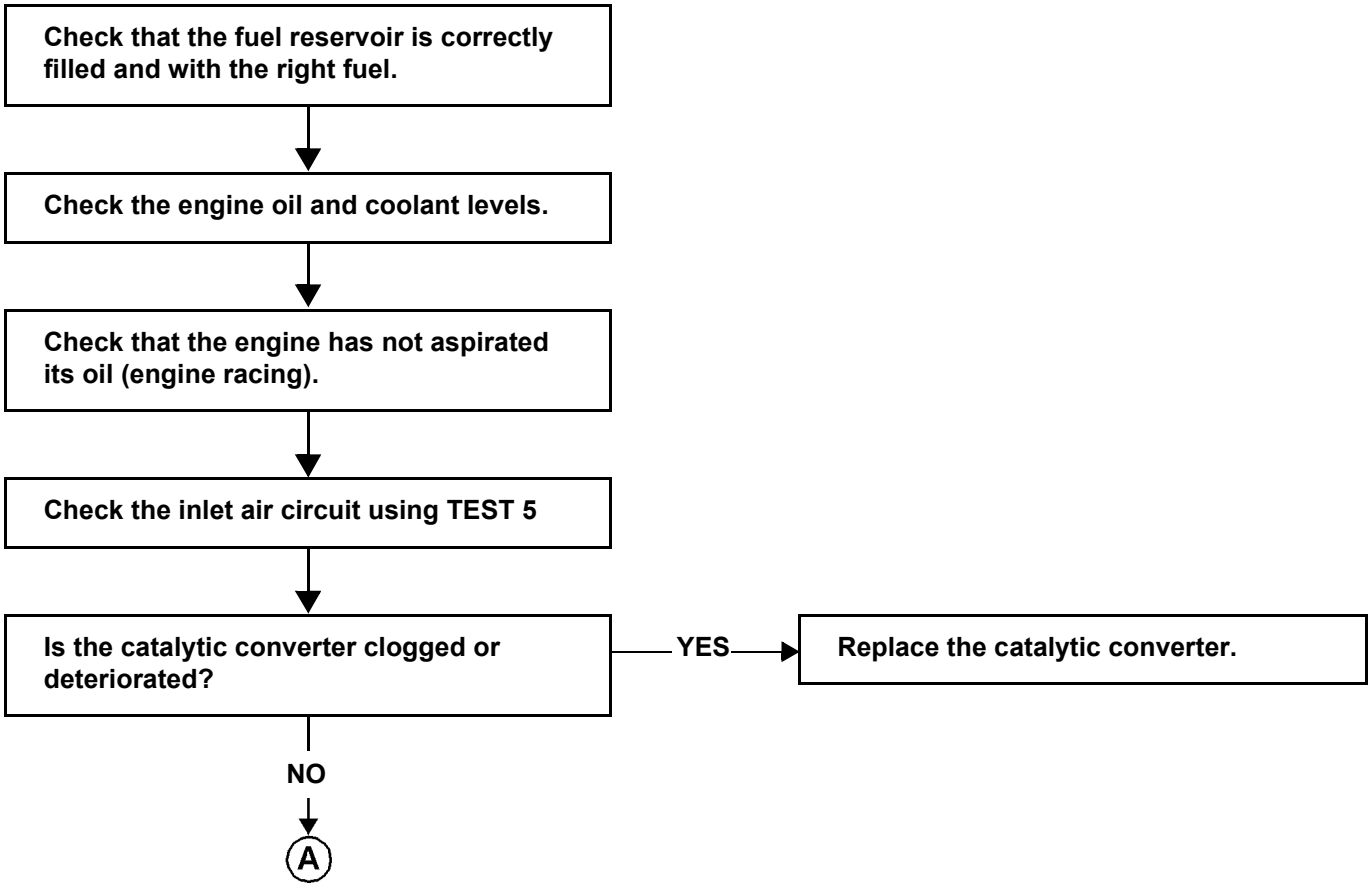


CHART 9 CONTINUED 1	

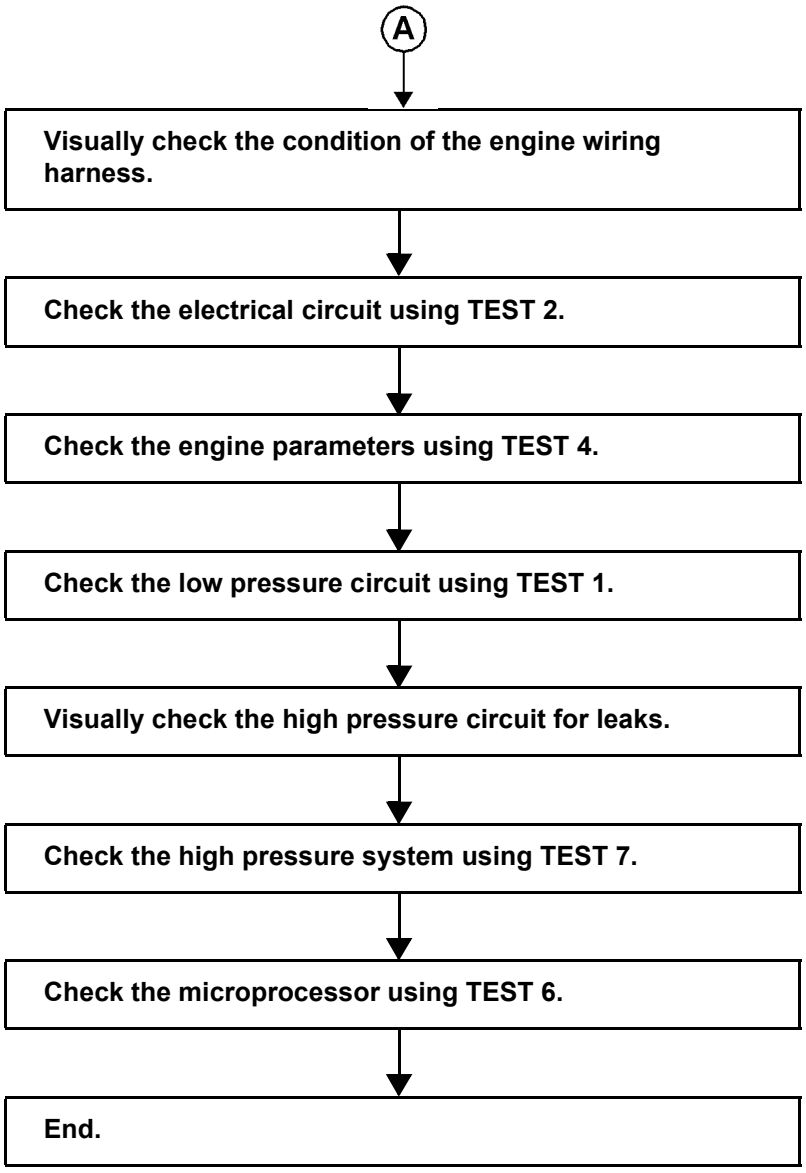


CHART 10	ENGINE JERKING

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

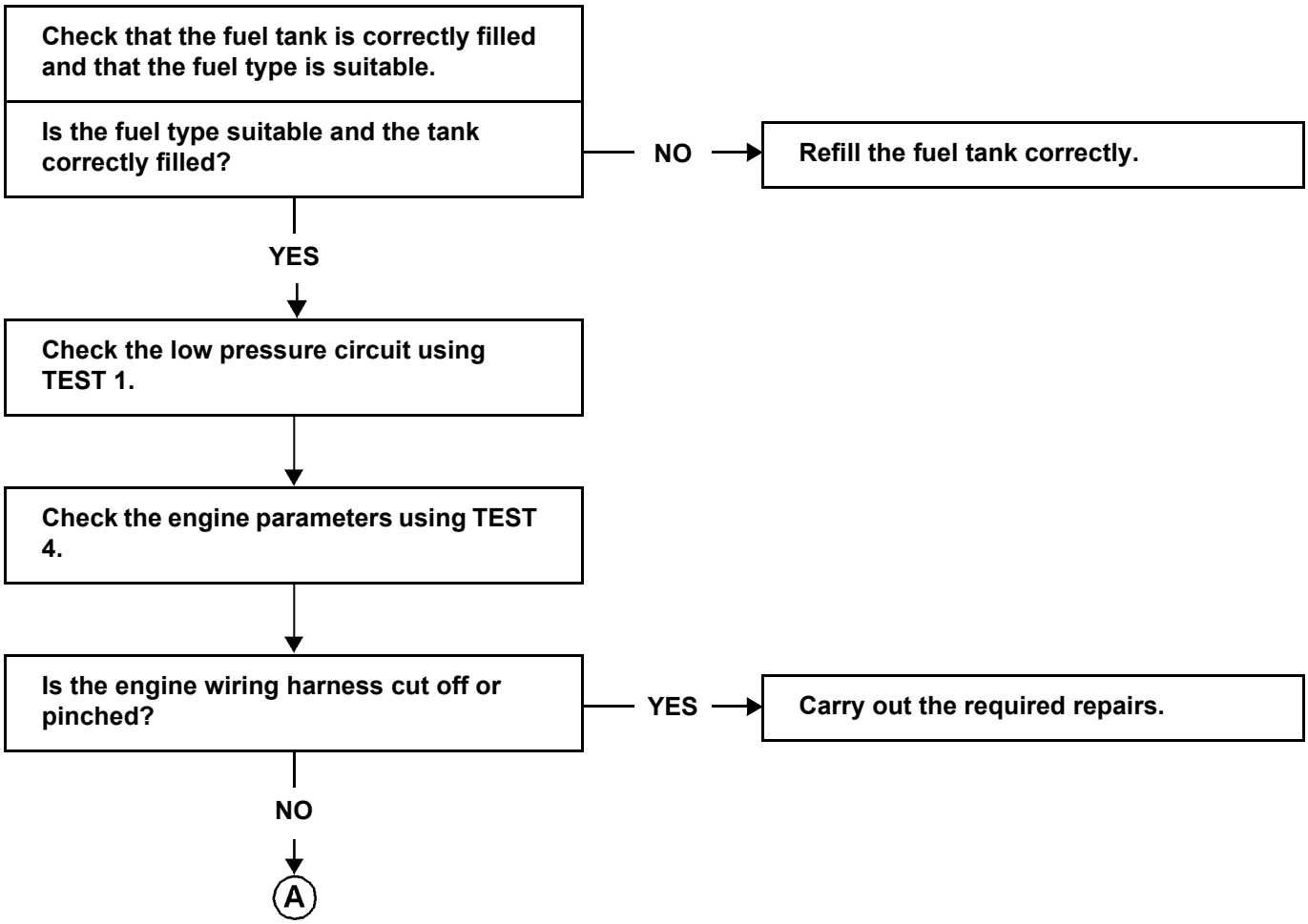


CHART 10 CONTINUED 1	

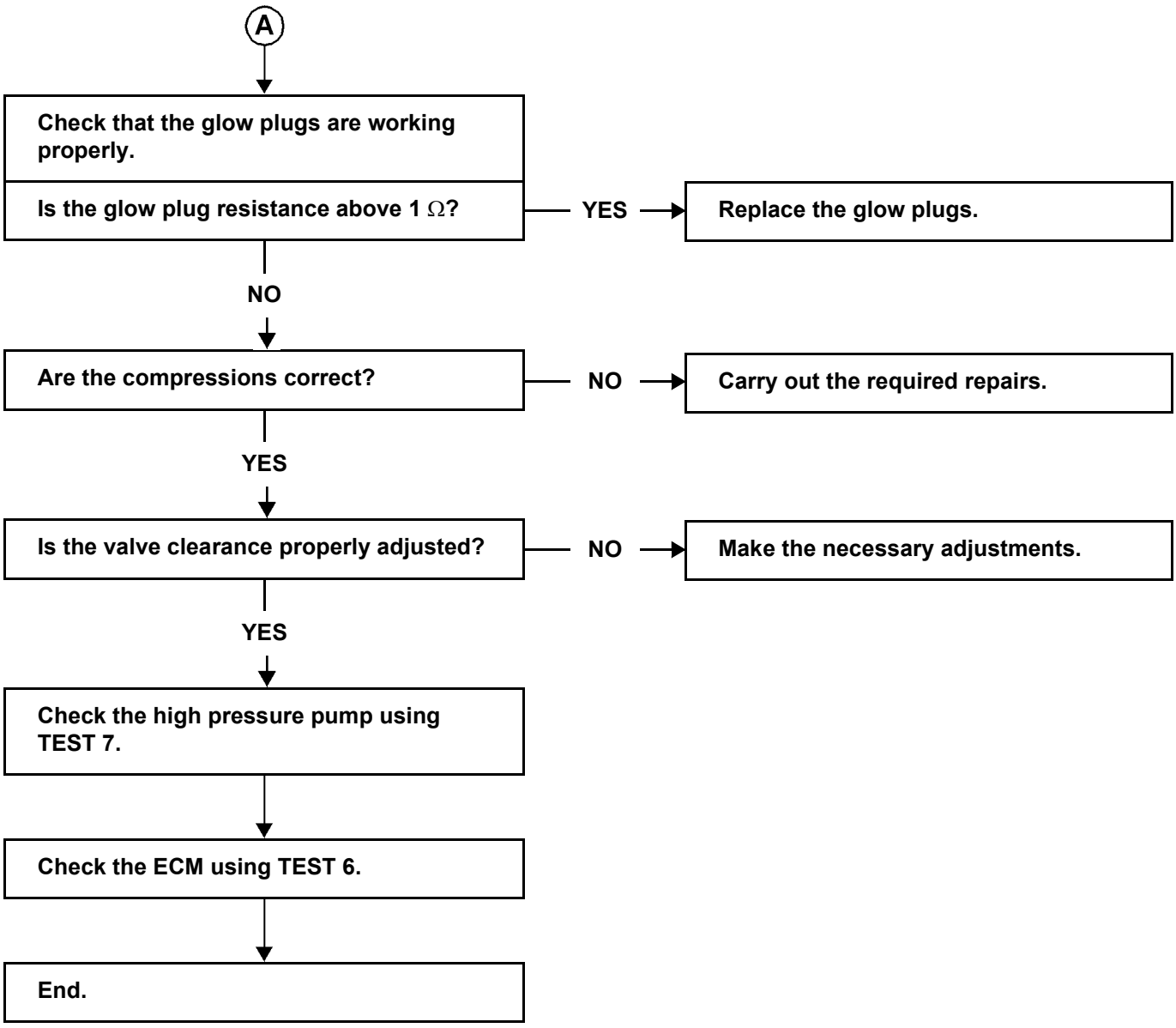


CHART 11	LACK OF POWER

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

Check the engine parameters using TEST 4.

↓

Check the air inlet circuit using TEST 5.

↓

Is the engine oil level correct? — **NO** → **Top up the oil.**

YES

↓

Is the catalytic converter sealed off or damaged? — **YES** → **Replace the catalytic converter.**

NO

↓

Check that the turbocharger is working properly.

Is the turbocharger correct? — **NO** → **Carry out the required repairs.**

YES

↓

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CHART 11 Cont'd	

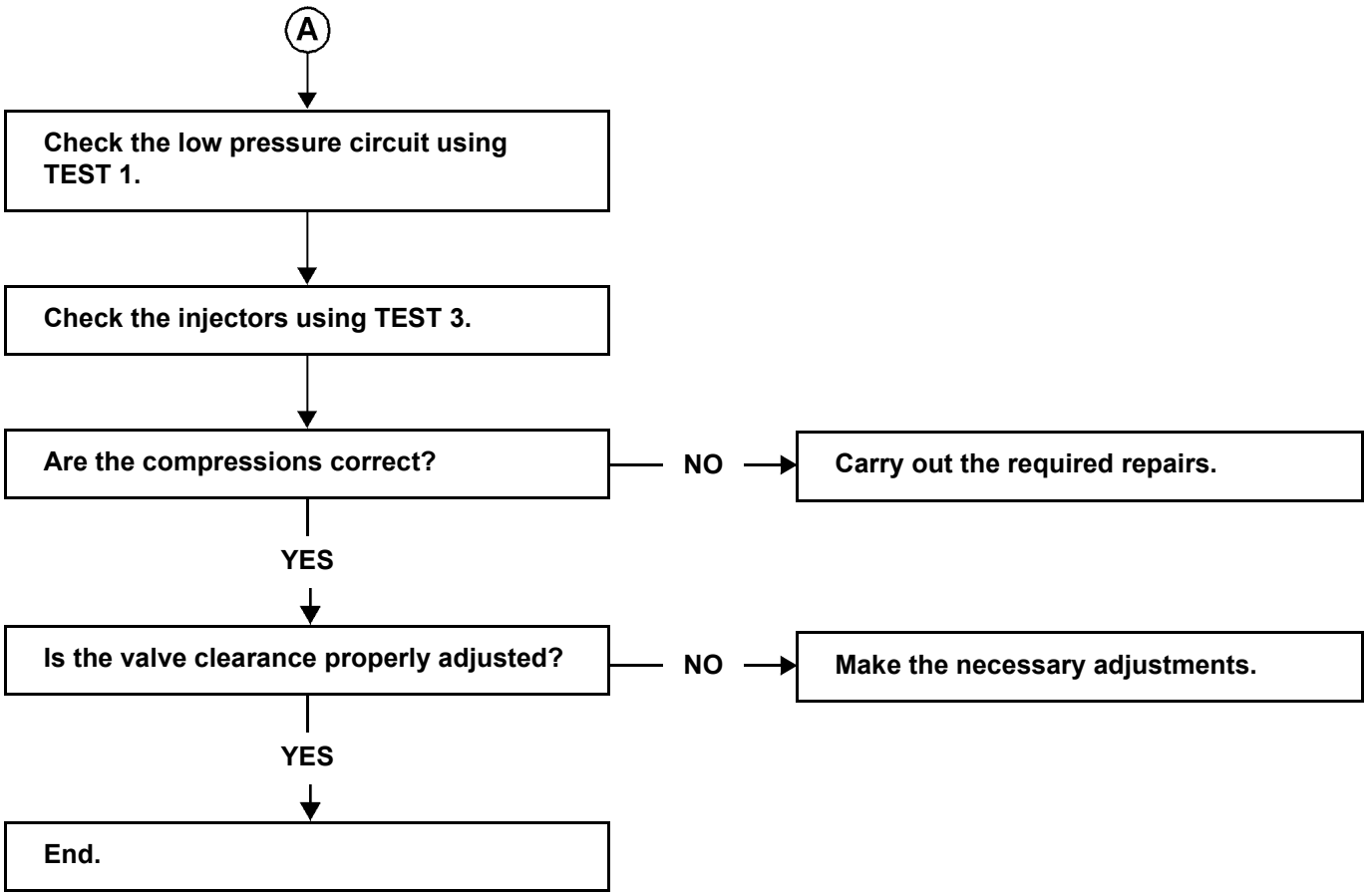


CHART 12	TOO MUCH POWER

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

Check the engine parameters using TEST 4.

↓

Check the air inlet circuit using TEST 5.

↓

Check that the engine has not aspirated its oil (engine stalls).

YES → **Carry out the required repairs.**

NO

↓

Check the injectors using TEST 3.

↓

Check the ECM using TEST 6.

↓

End.

CHART 13	EXCESSIVE CONSUMPTION

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

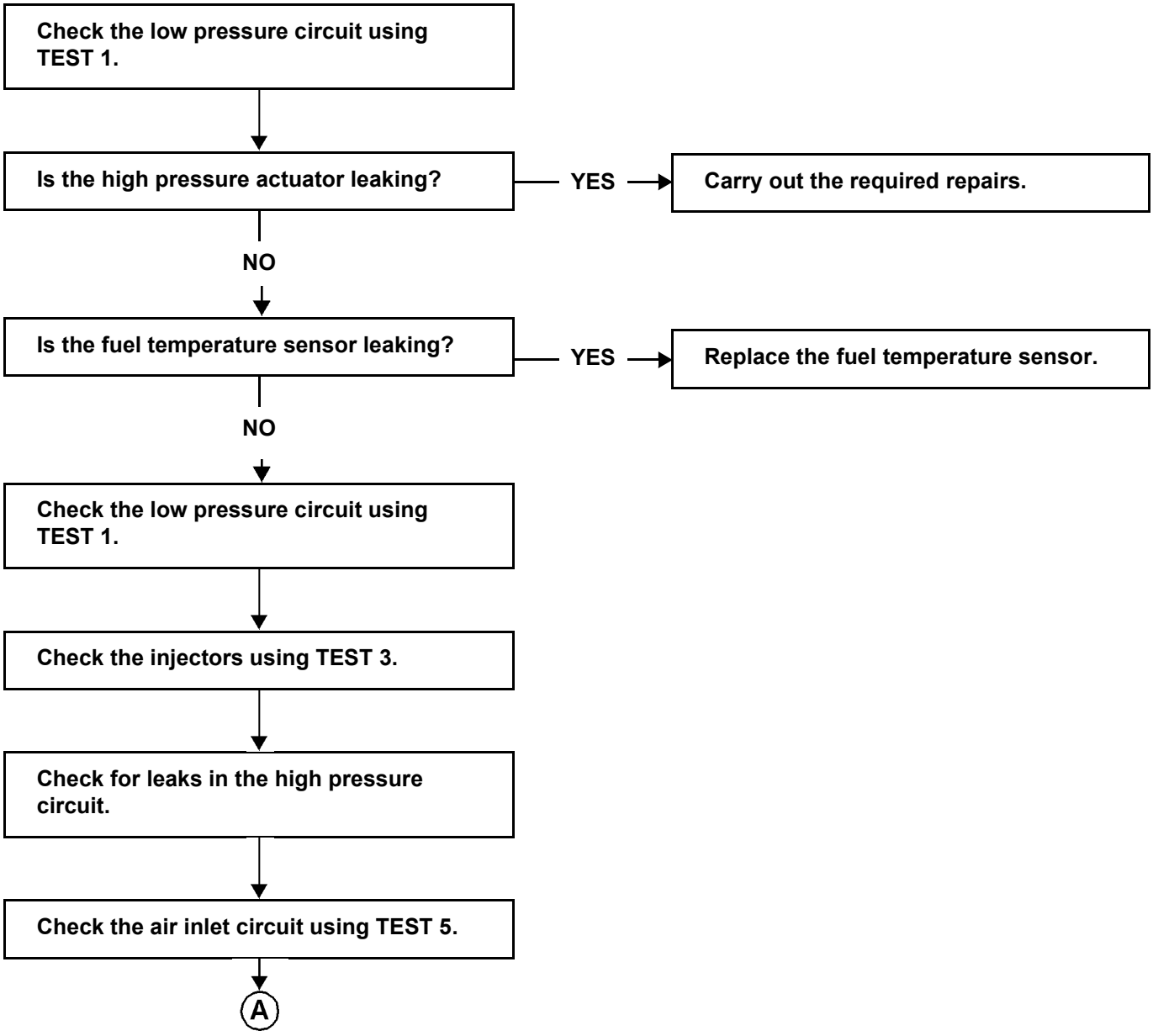


CHART 13 CONTINUED 1	

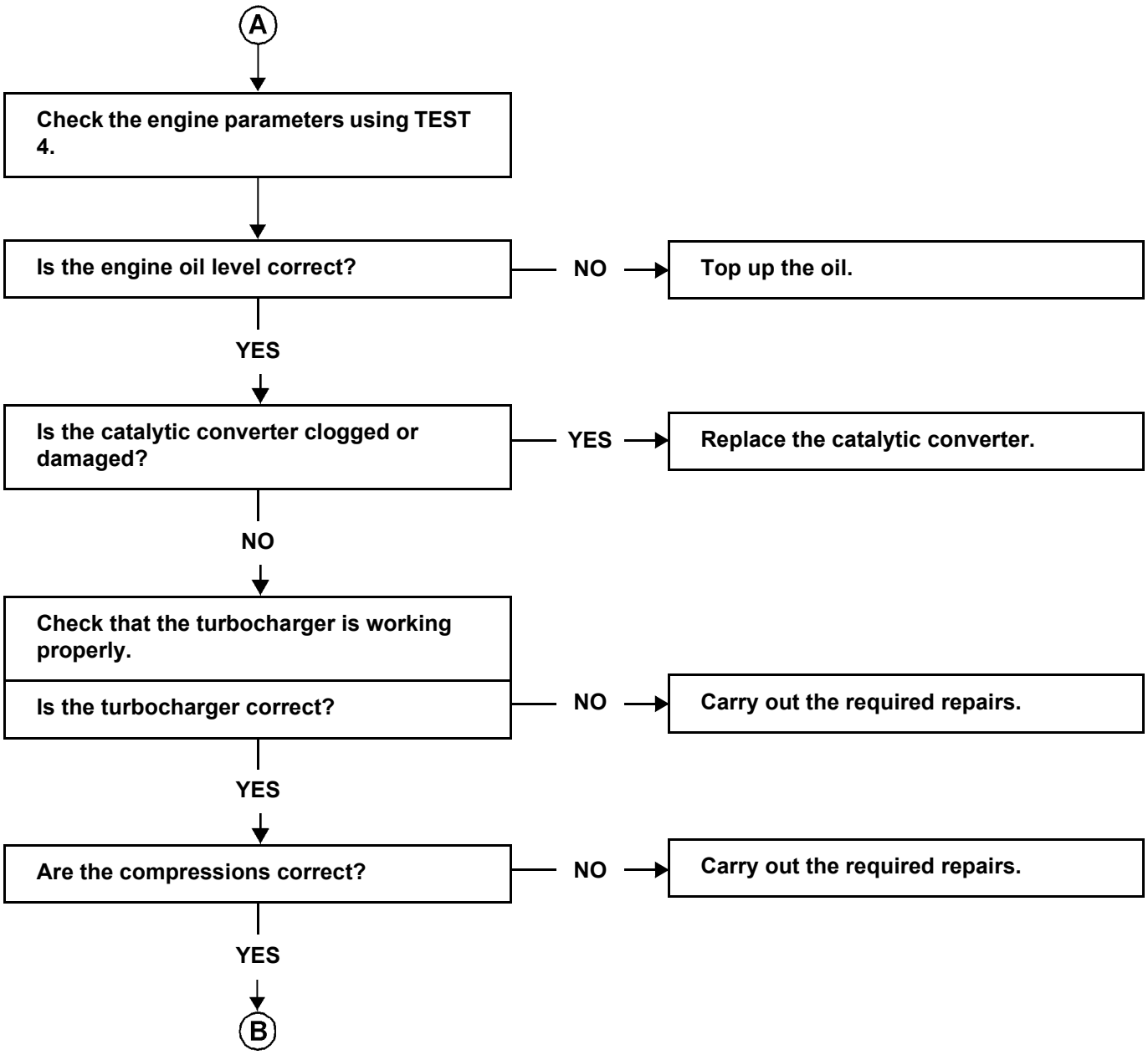


CHART 13 CONTINUED 2	

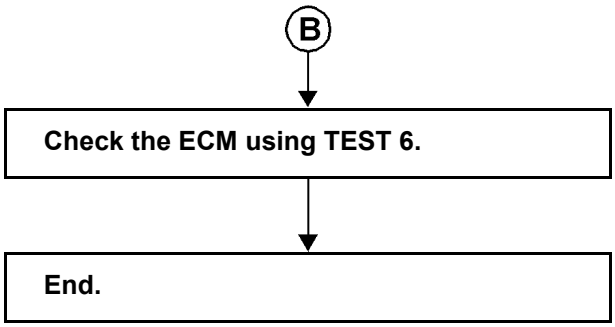


CHART 14	OVERSPEED WHEN LIFTING OFF ACCELERATOR OR CHANGING GEAR

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

Check that there is no obstacle obstructing the accelerator pedal travel (carpet, hard spot, etc.).

↓

Check the engine parameters using TEST 4.

↓

Is the engine wiring harness cut or pinched? — **YES** → **Carry out the required repairs.**

↓ **NO**

Is the clutch linkage properly adjusted? — **NO** → **Carry out the required repairs.**

↓ **YES**

Check that the engine has not aspirated its oil (engine stalls). — **YES** → **Carry out the required repairs.**

↓ **NO**

Check that the turbocharger is working properly.

Is the turbocharger correct? — **NO** → **Carry out the required repairs.**

↓ **YES**

Ⓐ

CHART 14 Cont'd	

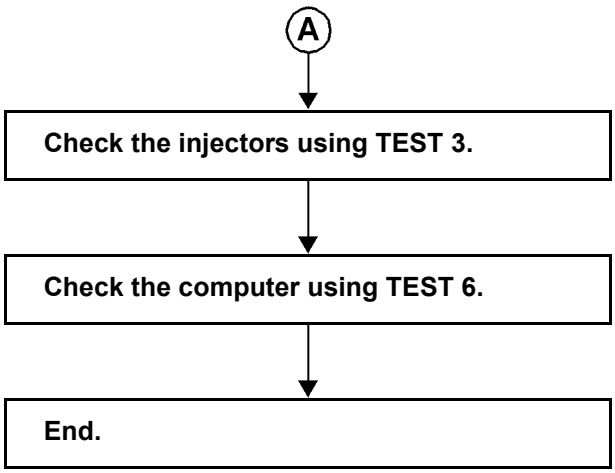


CHART 15	ENGINE DIES ON PULLING AWAY

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

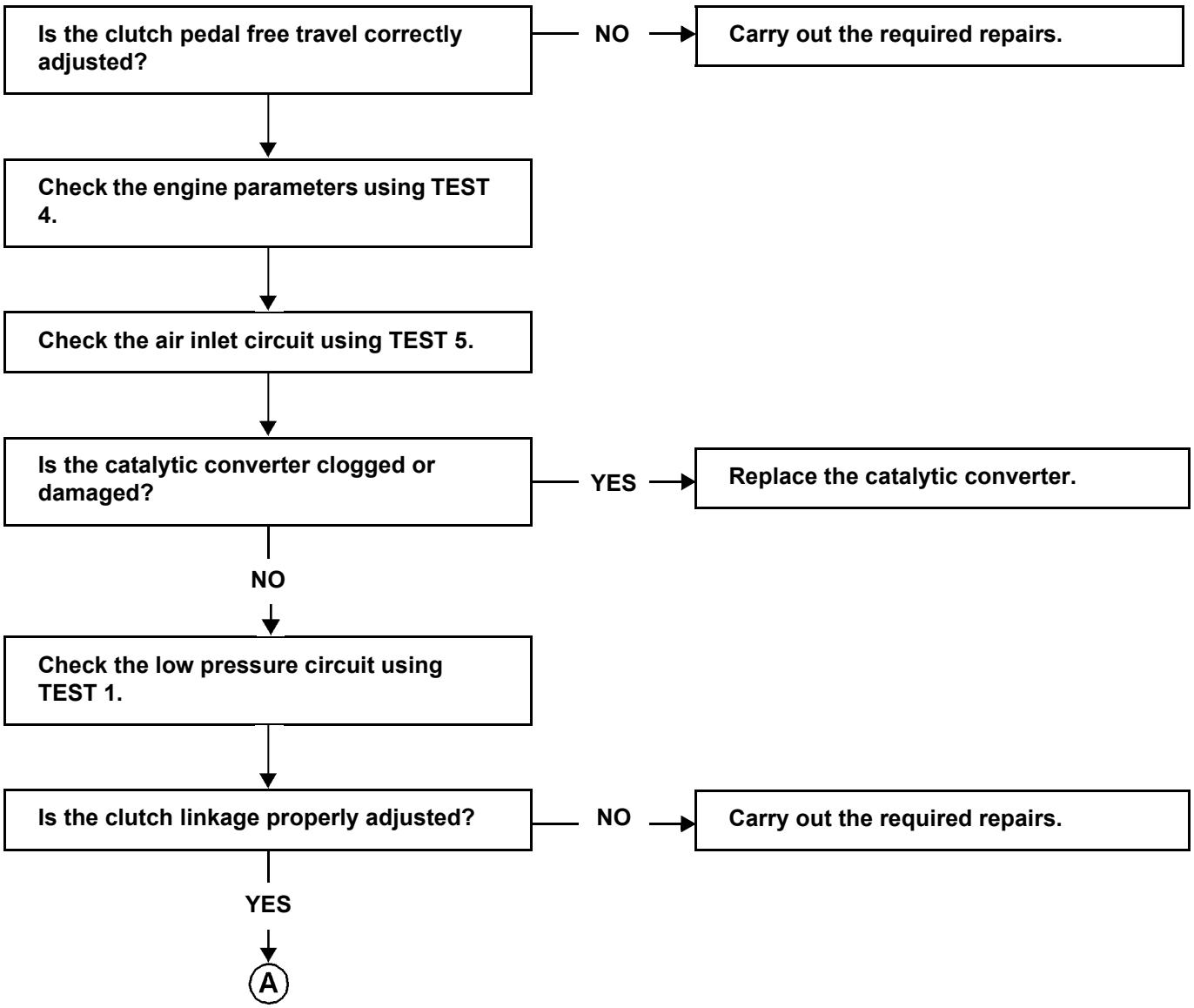


CHART 15 Cont'd	

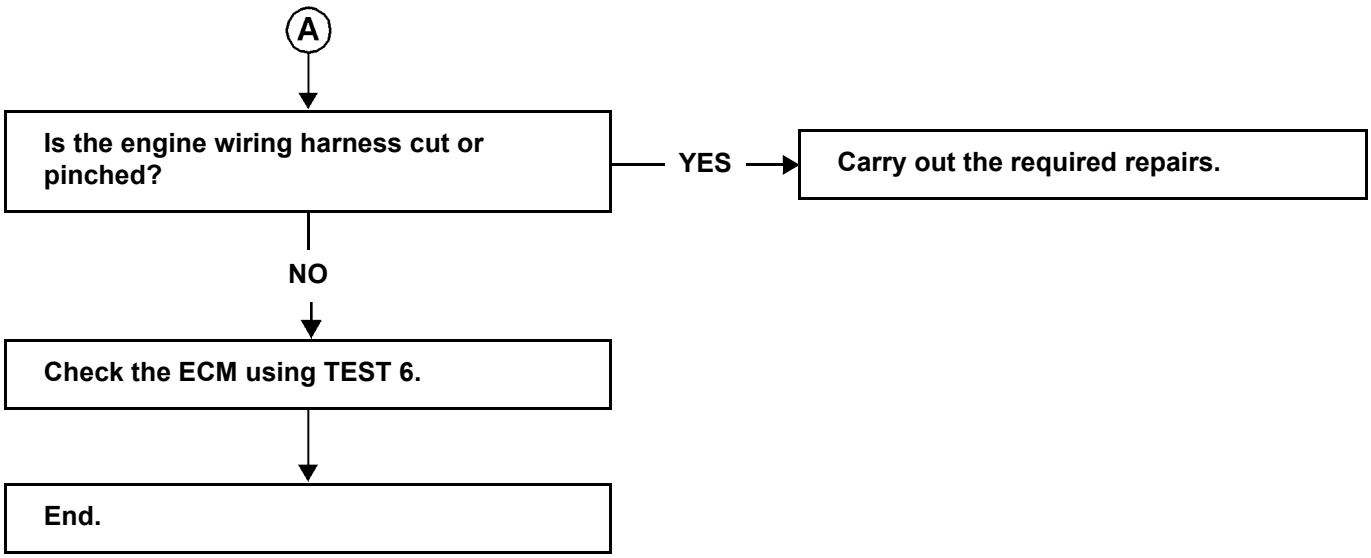


CHART 16	ENGINE BACKFIRES, ENGINE NOISE

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

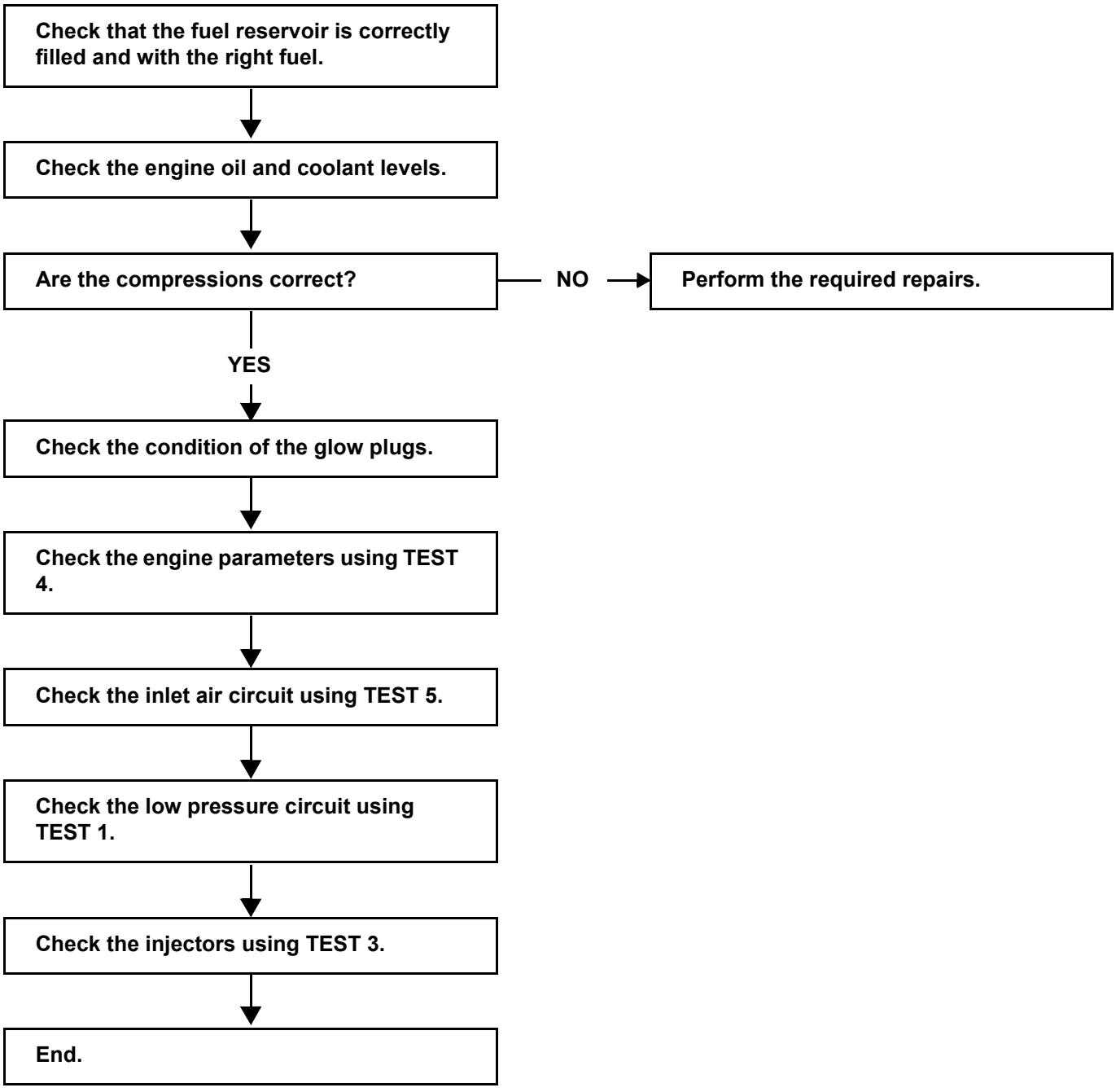


CHART 17	CLANKING ENGINE, NOISY ENGINE

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

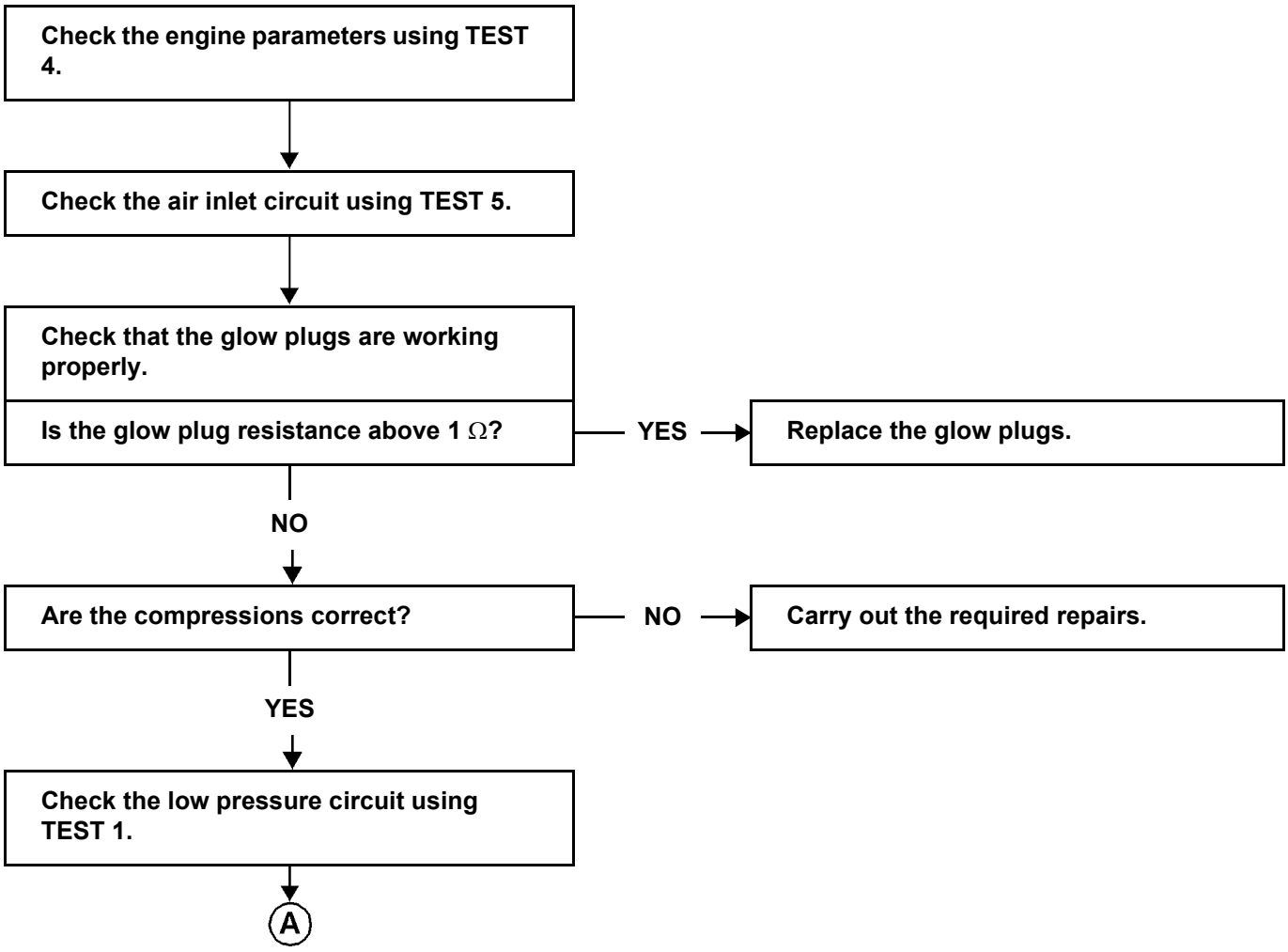


CHART 17 Continued	

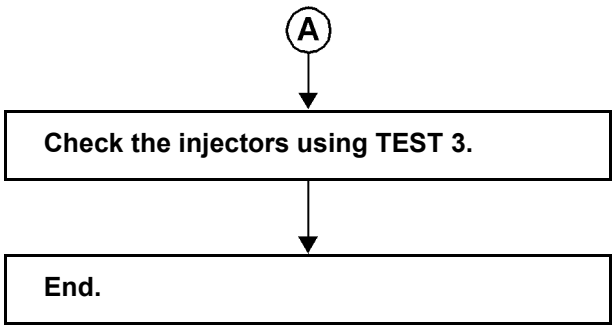


CHART 18	SQUALLING NOISE

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

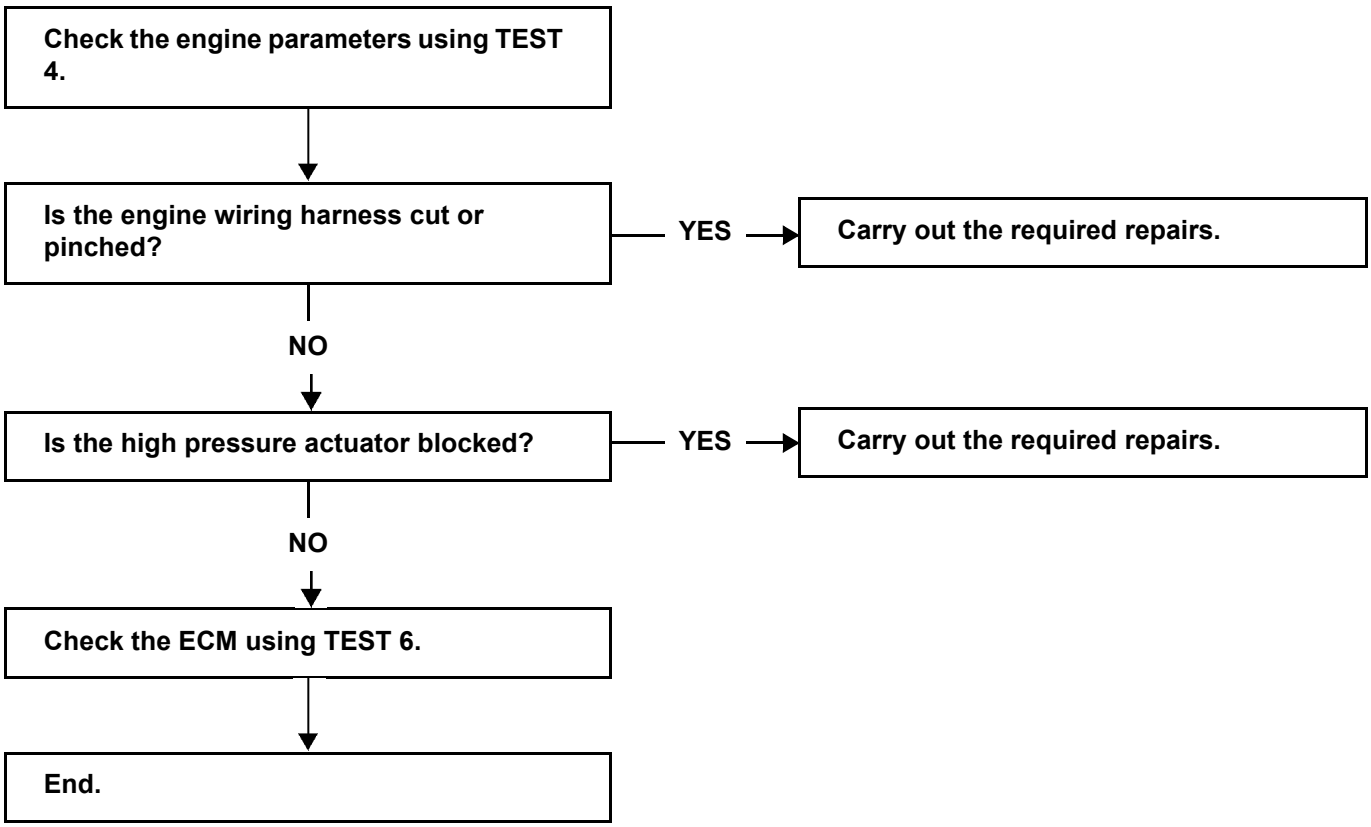


CHART 19	VARIOUS MECHANICAL NOISES

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

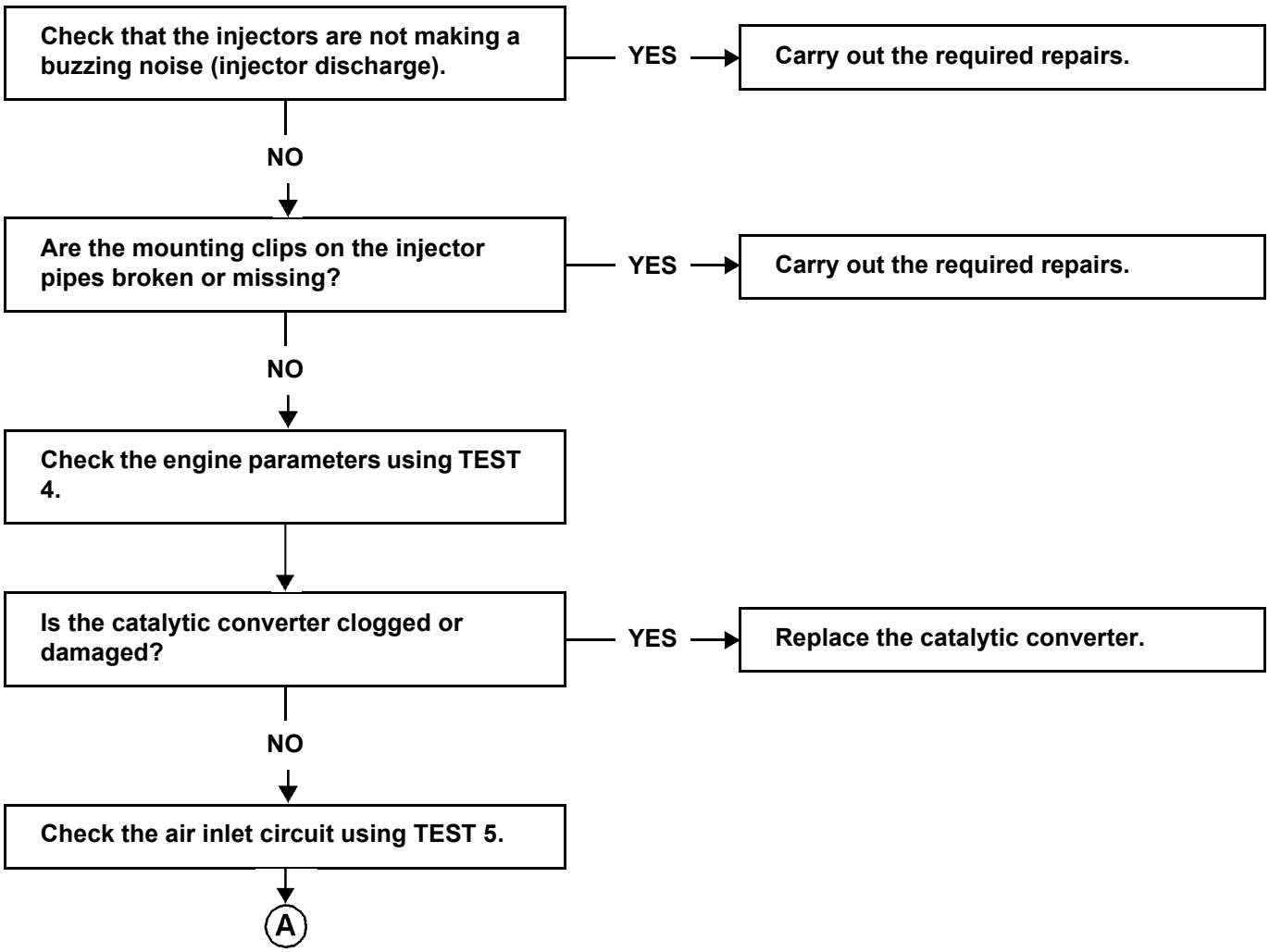


CHART 19 Cont'd	

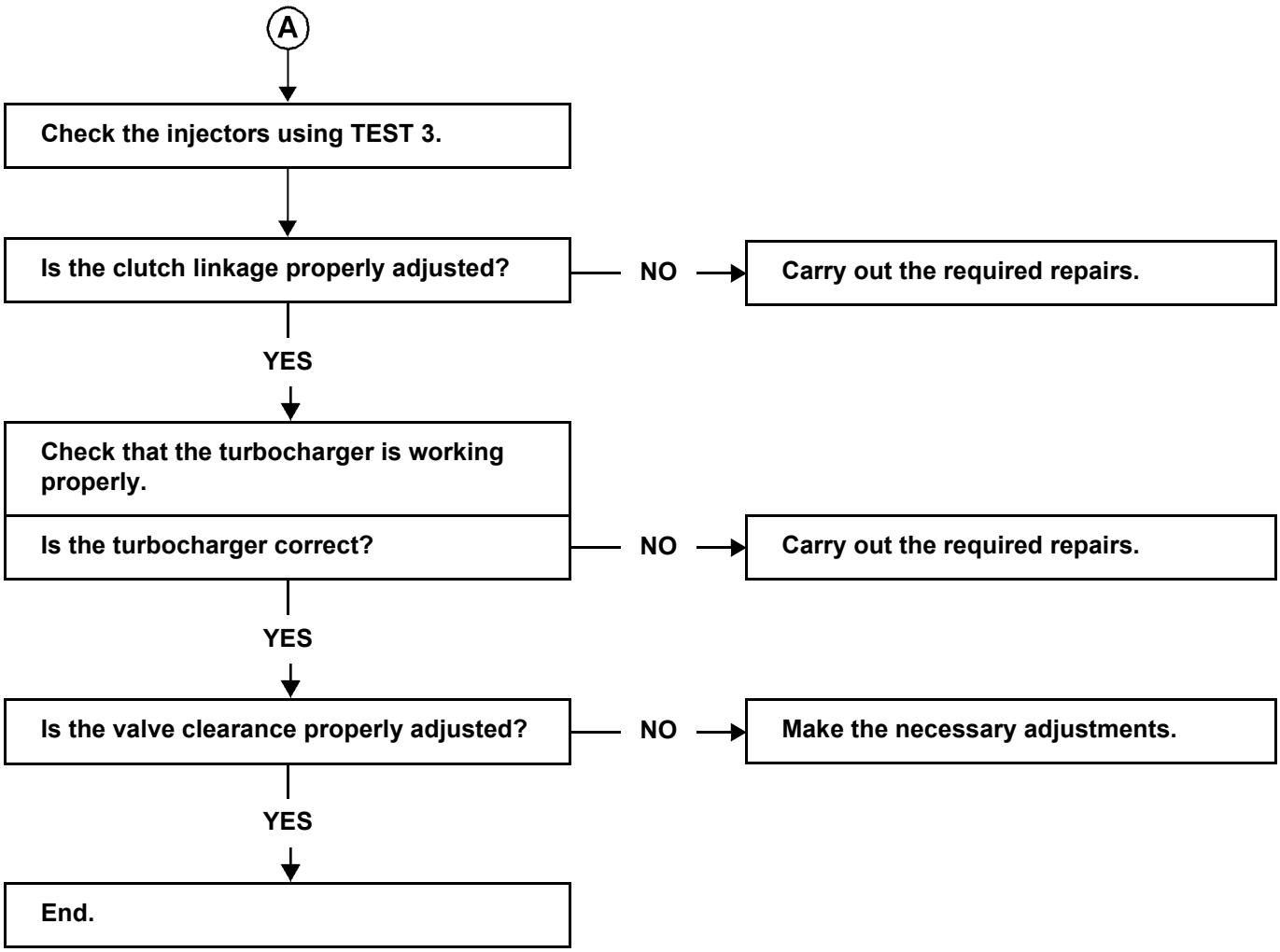


CHART 20	EXHAUST ODOURS

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

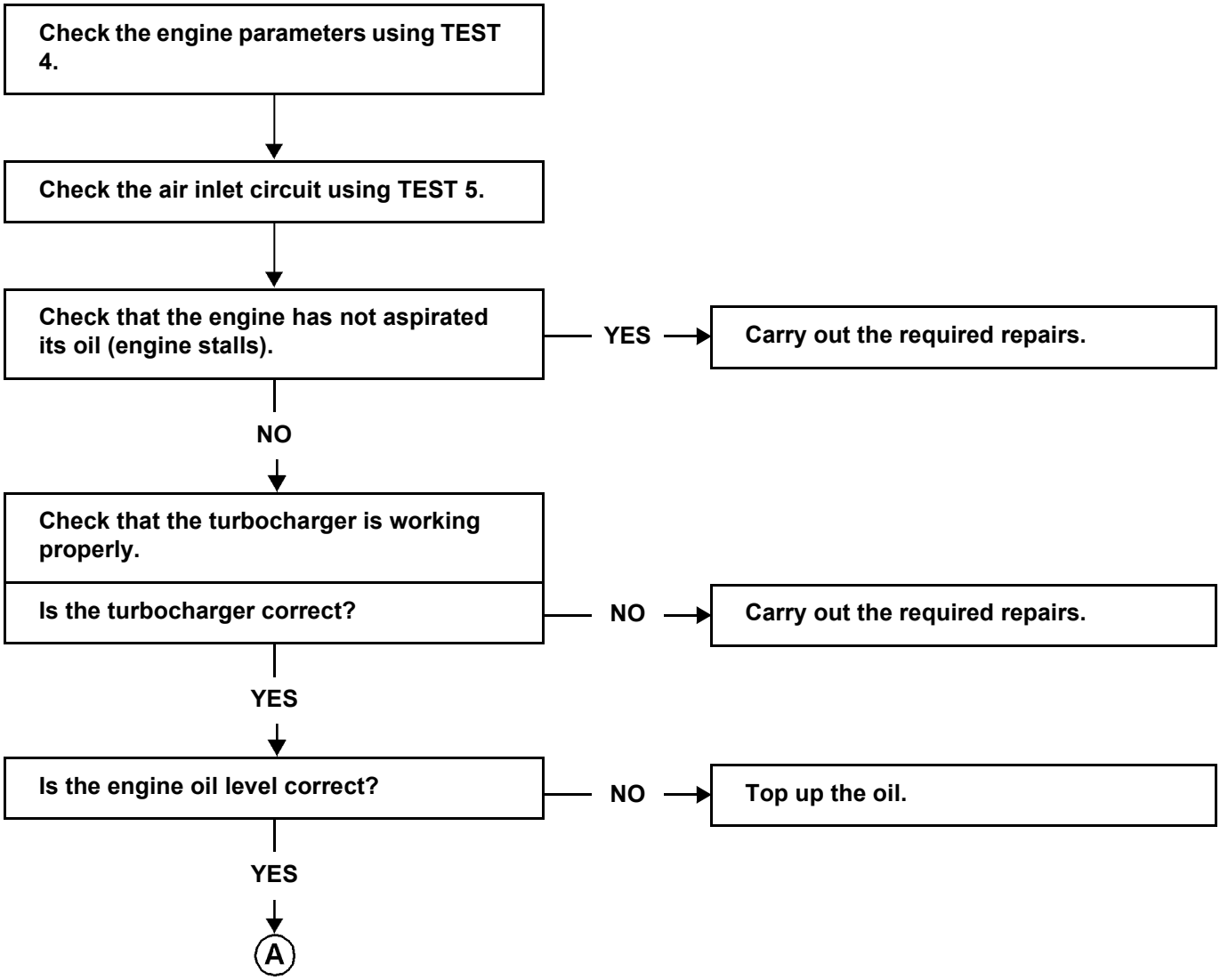


CHART 20 Cont'd	

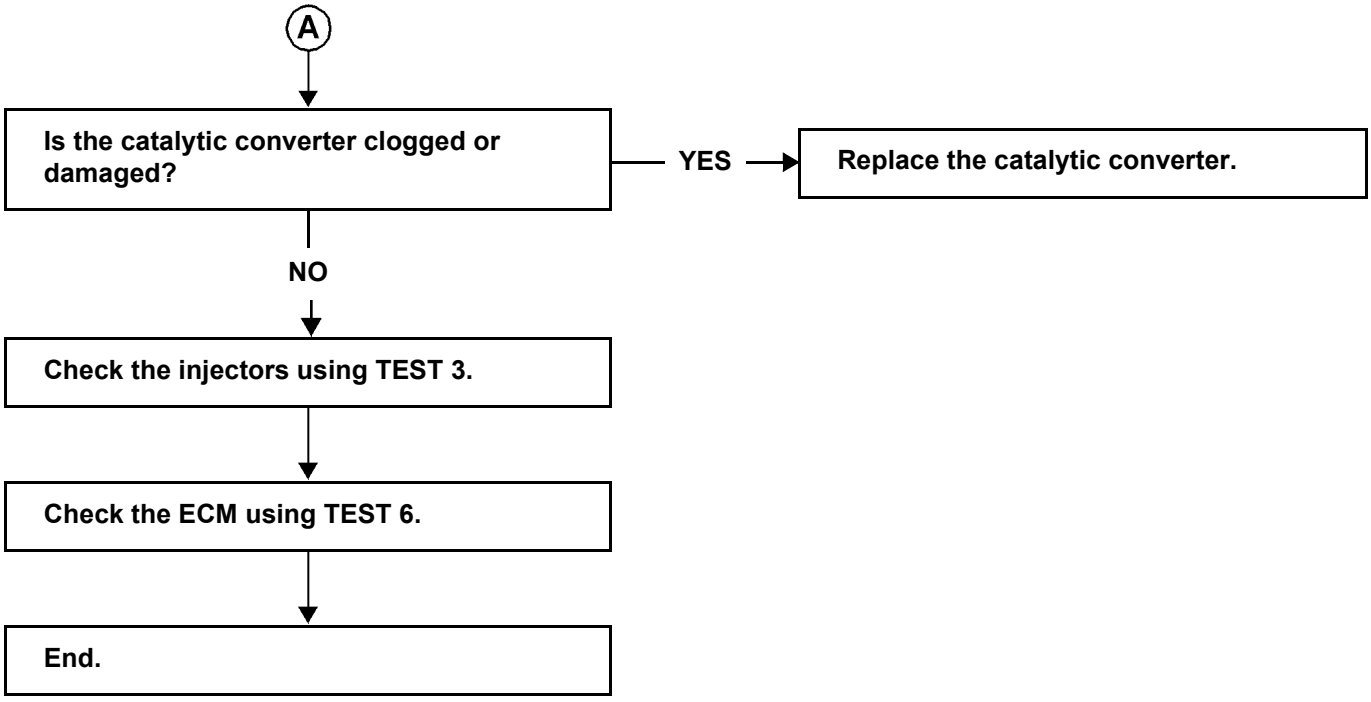


CHART 21	DIESEL ODOURS

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

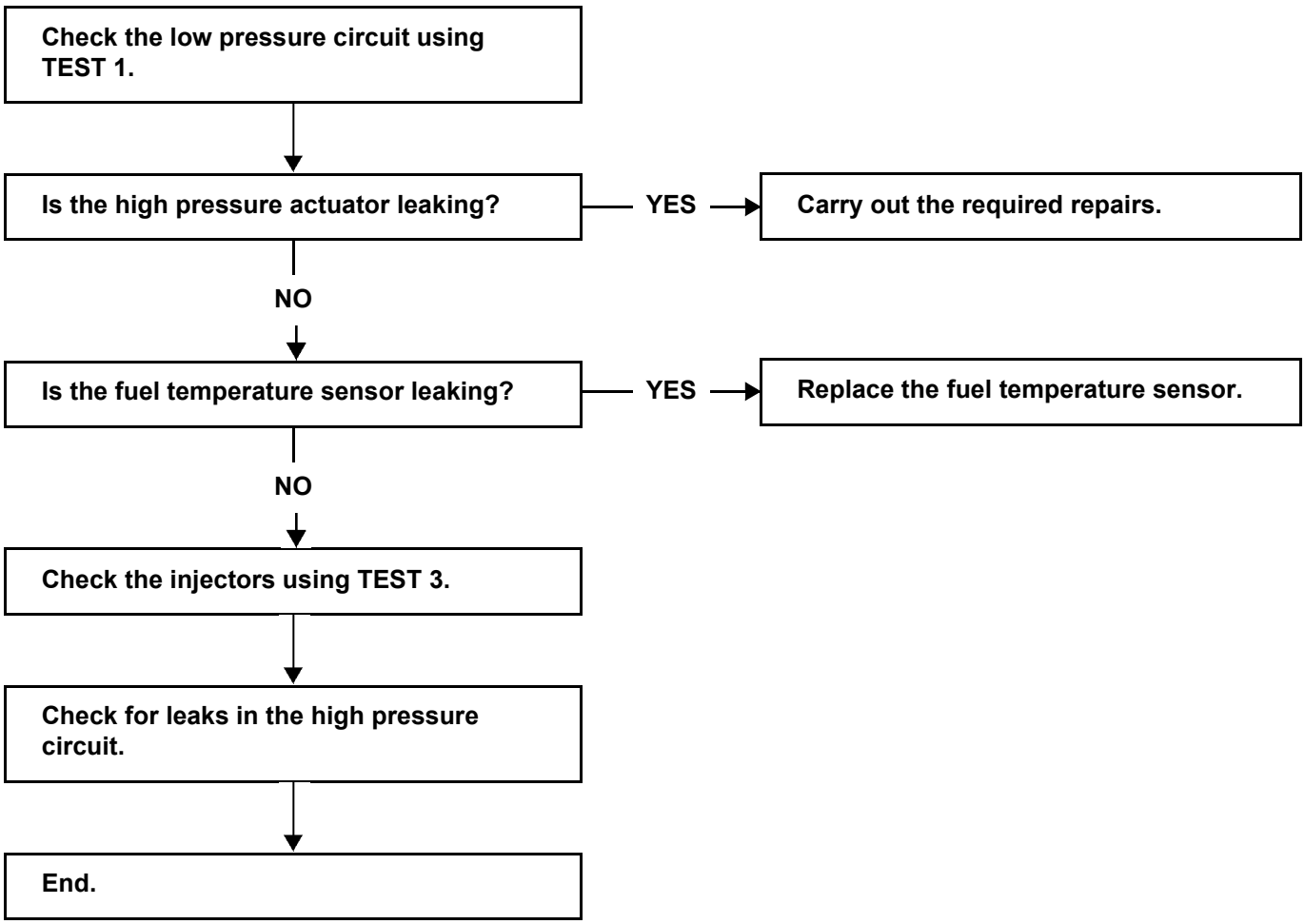


CHART 22	BLUE, WHITE OR BLACK SMOKE

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

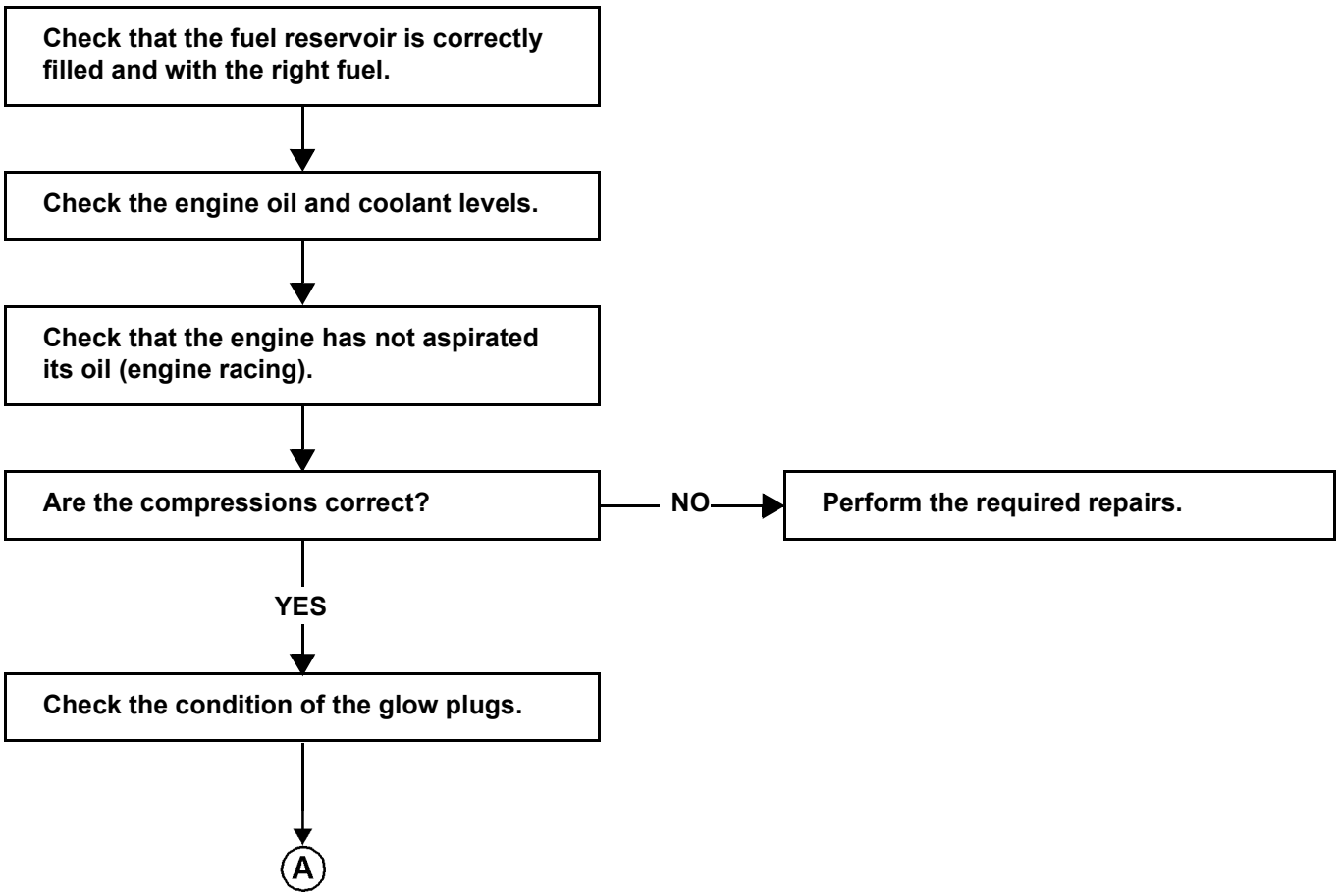


CHART 22 Cont'd	

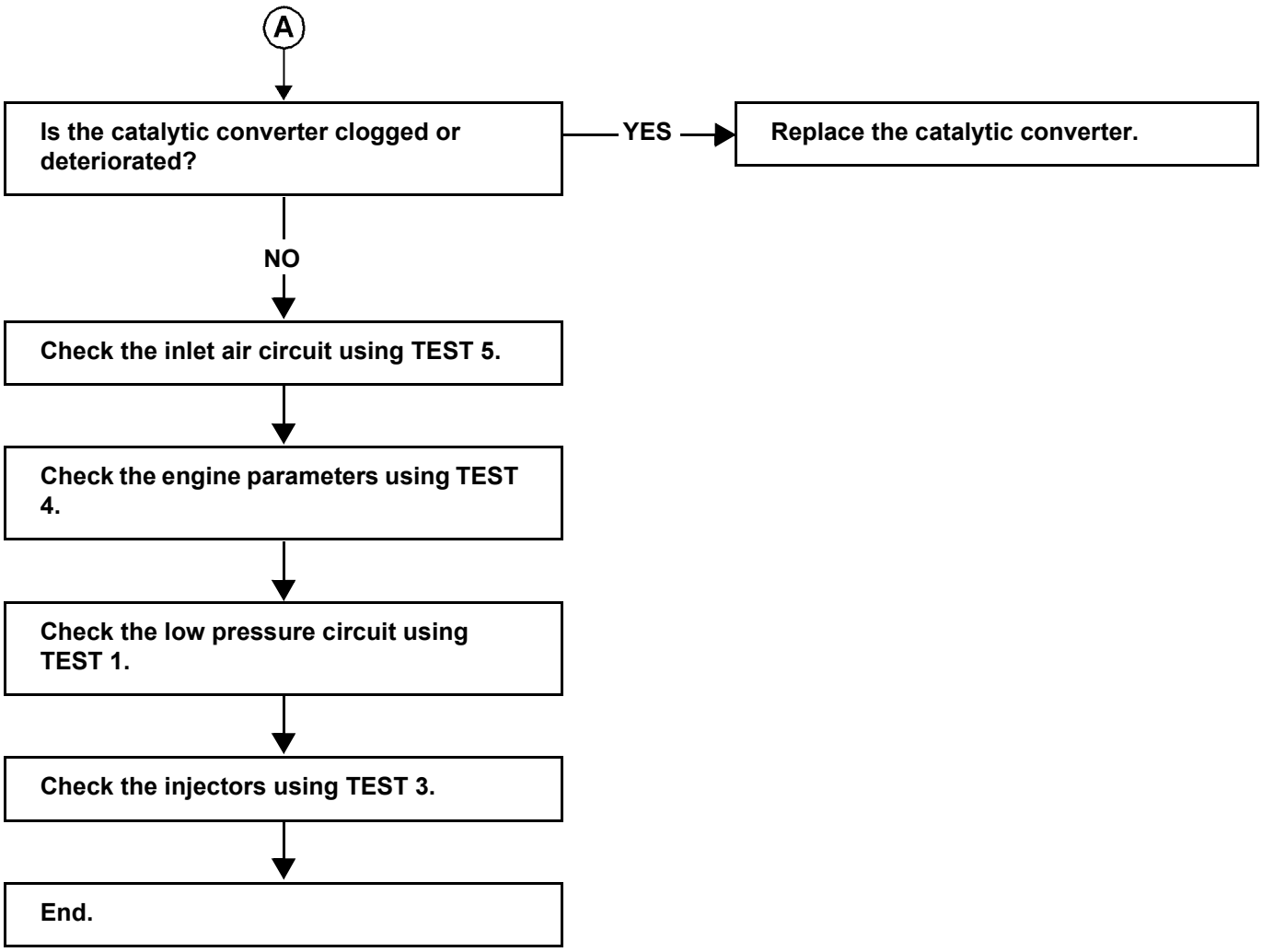


CHART 23	SMOKE (BLUE, BLACK OR WHITE) ON ACCELERATING

NOTES	Only consult this customer complaint after a complete check using the diagnostic tool.

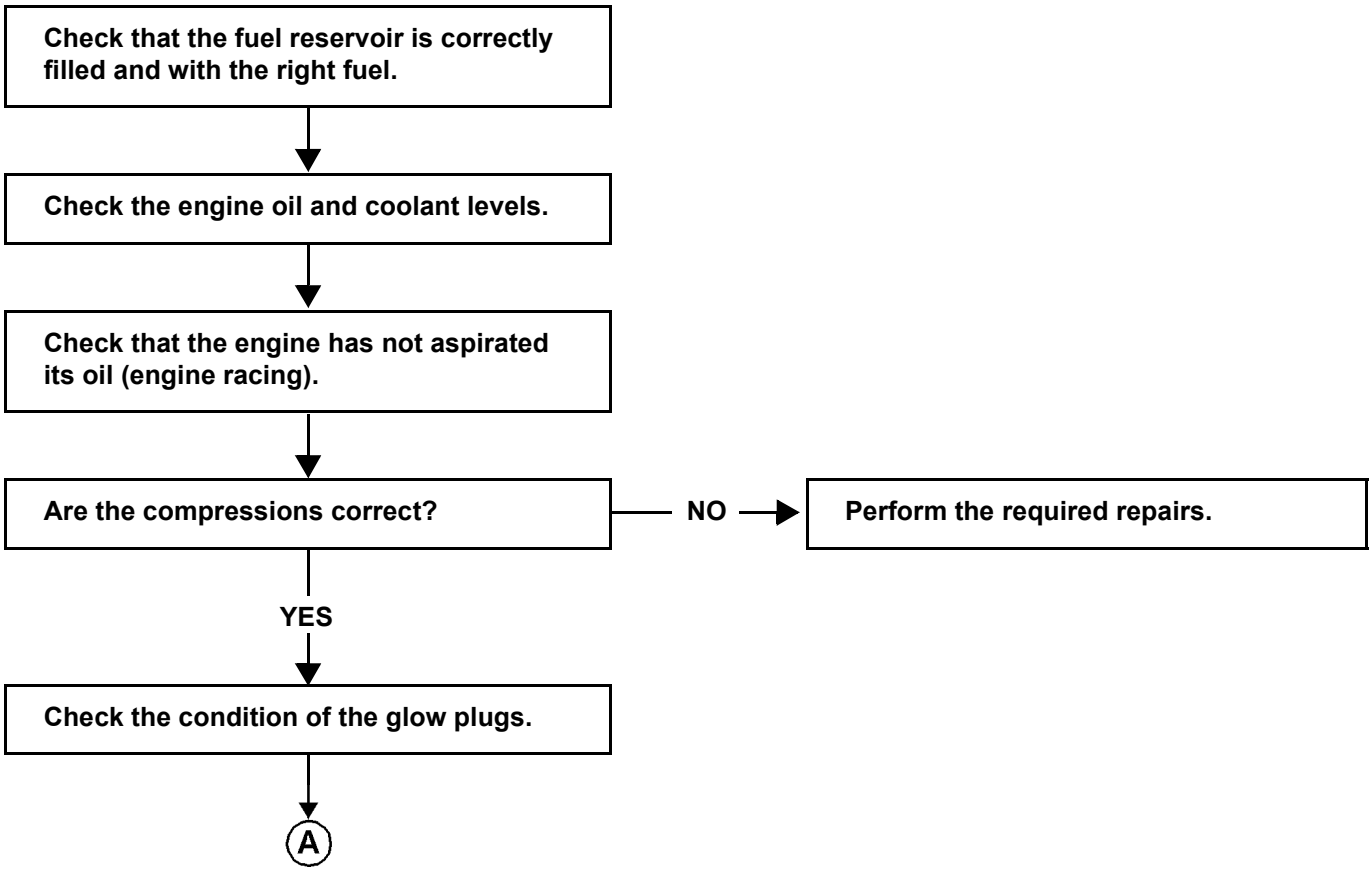


CHART 23 CONTINUED 1	

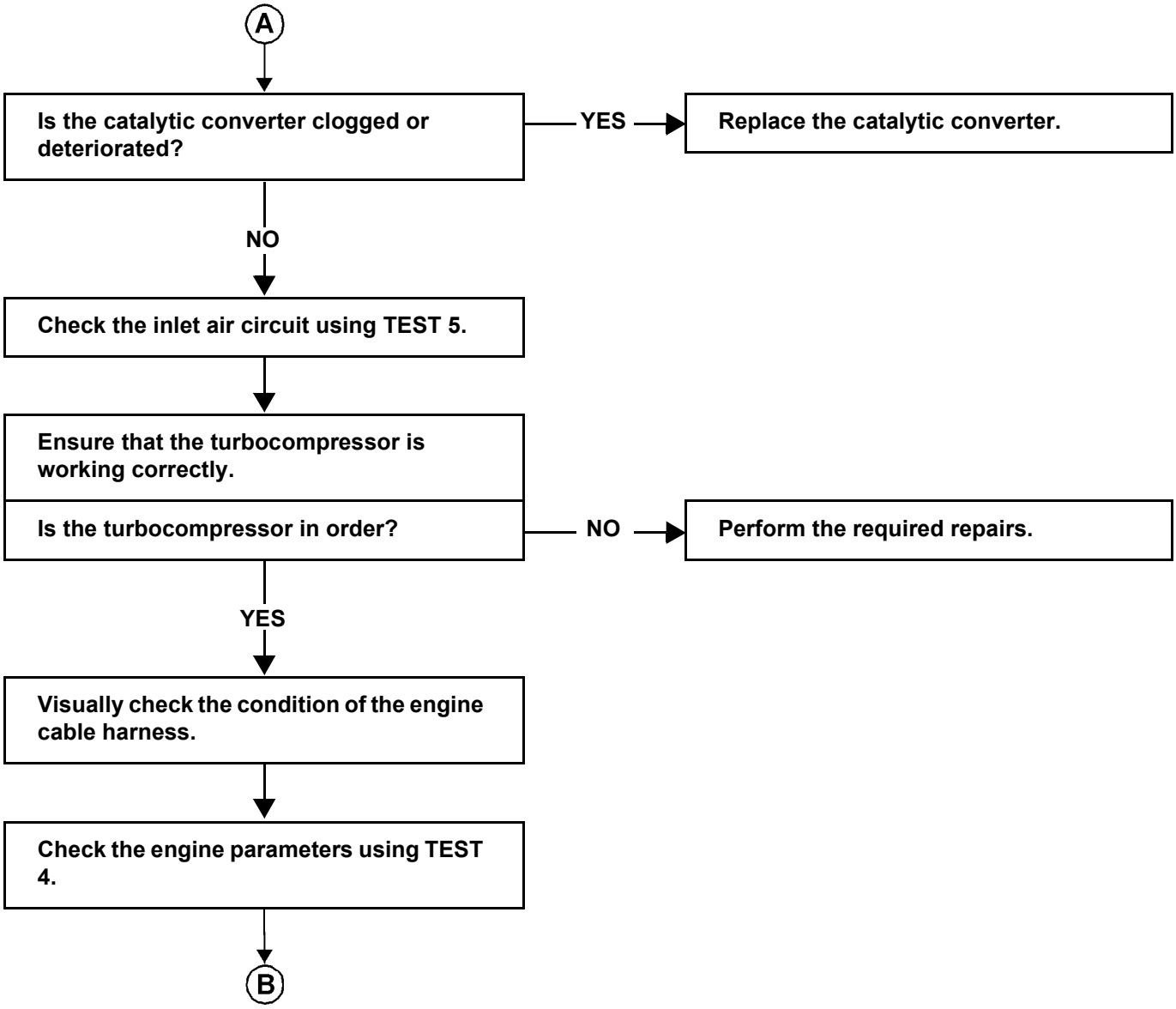
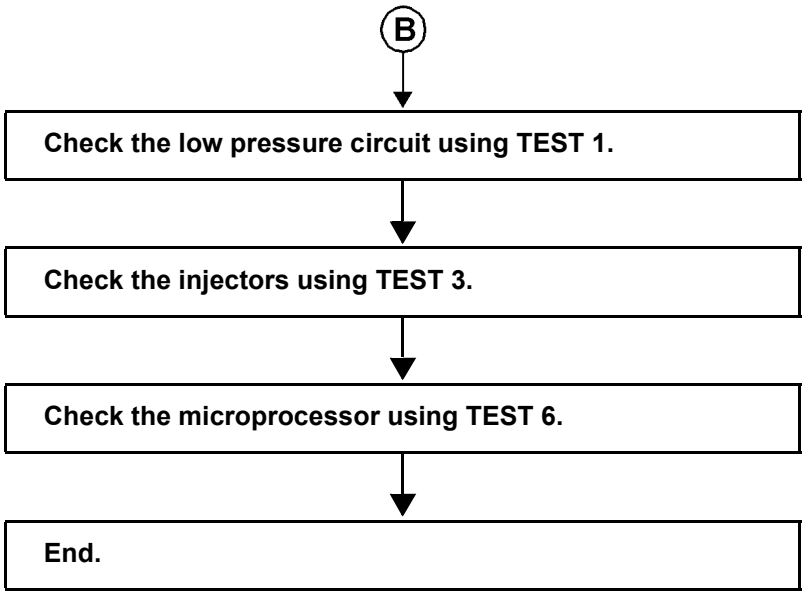
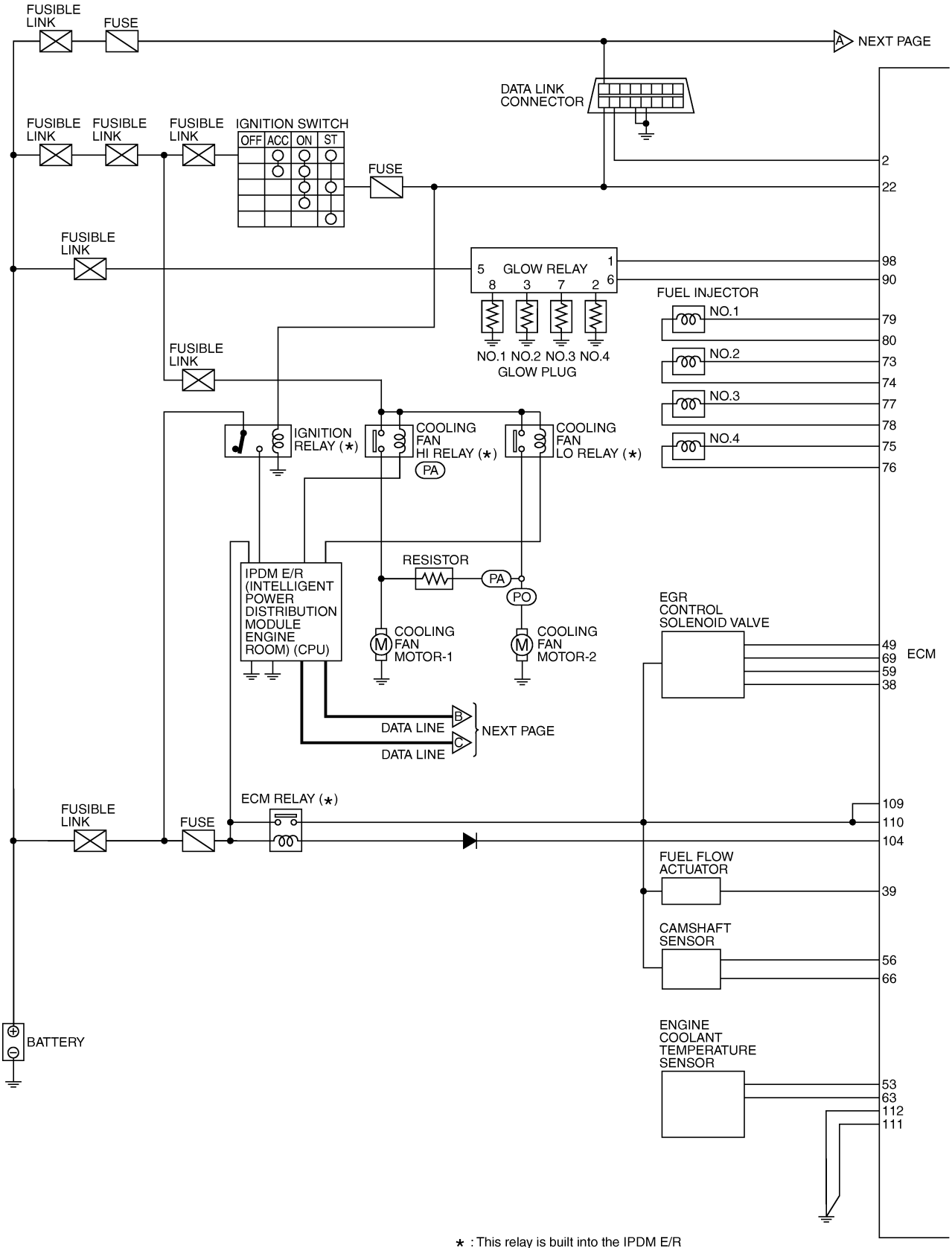


CHART 23 Cont'd	



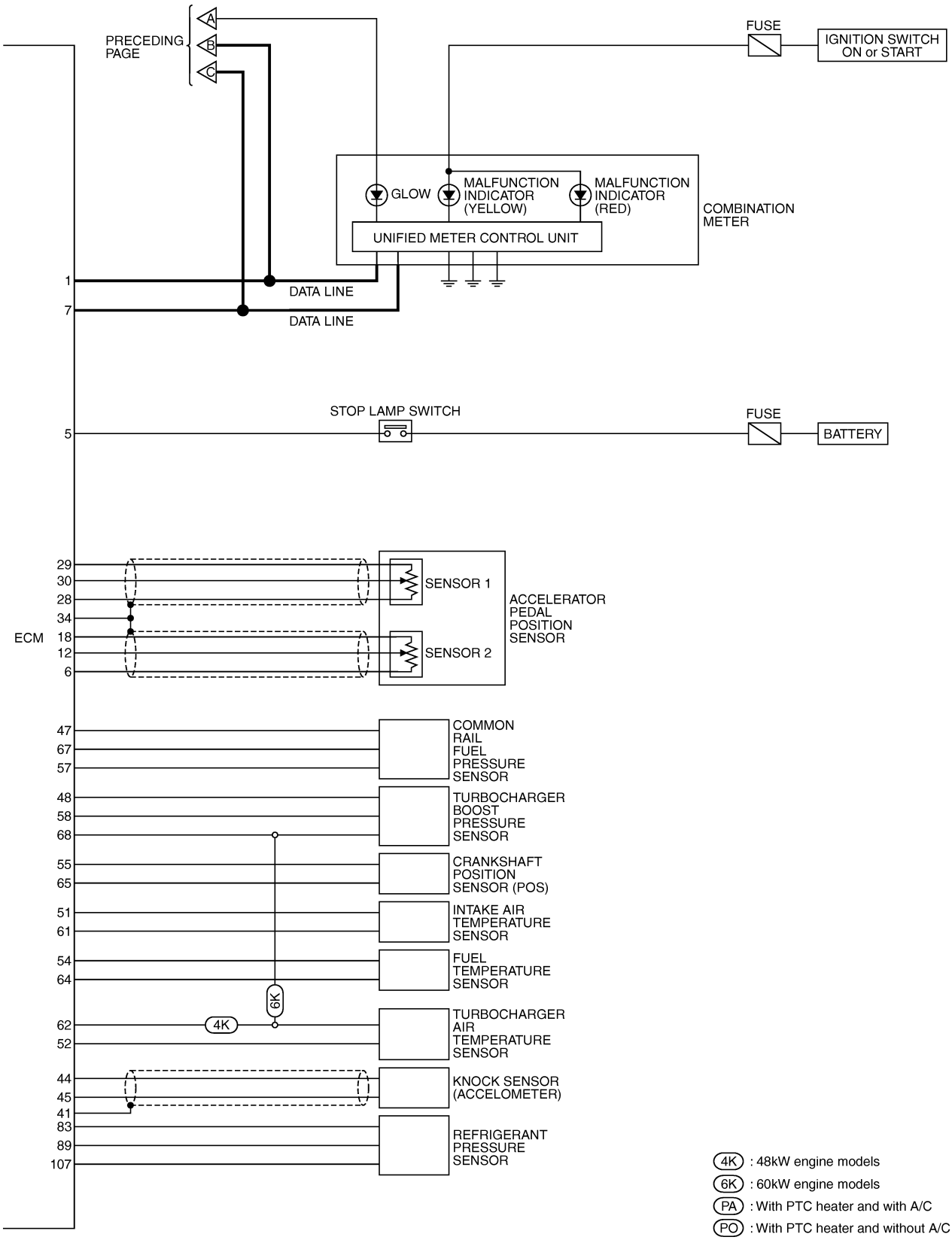
Euro 3 48 kW and 60 kW engine models

(Refer to EC-K9K-5 to confirm engine type.)



* : This relay is built into the IPDM E/R (Intelligent power distribution module engine room).

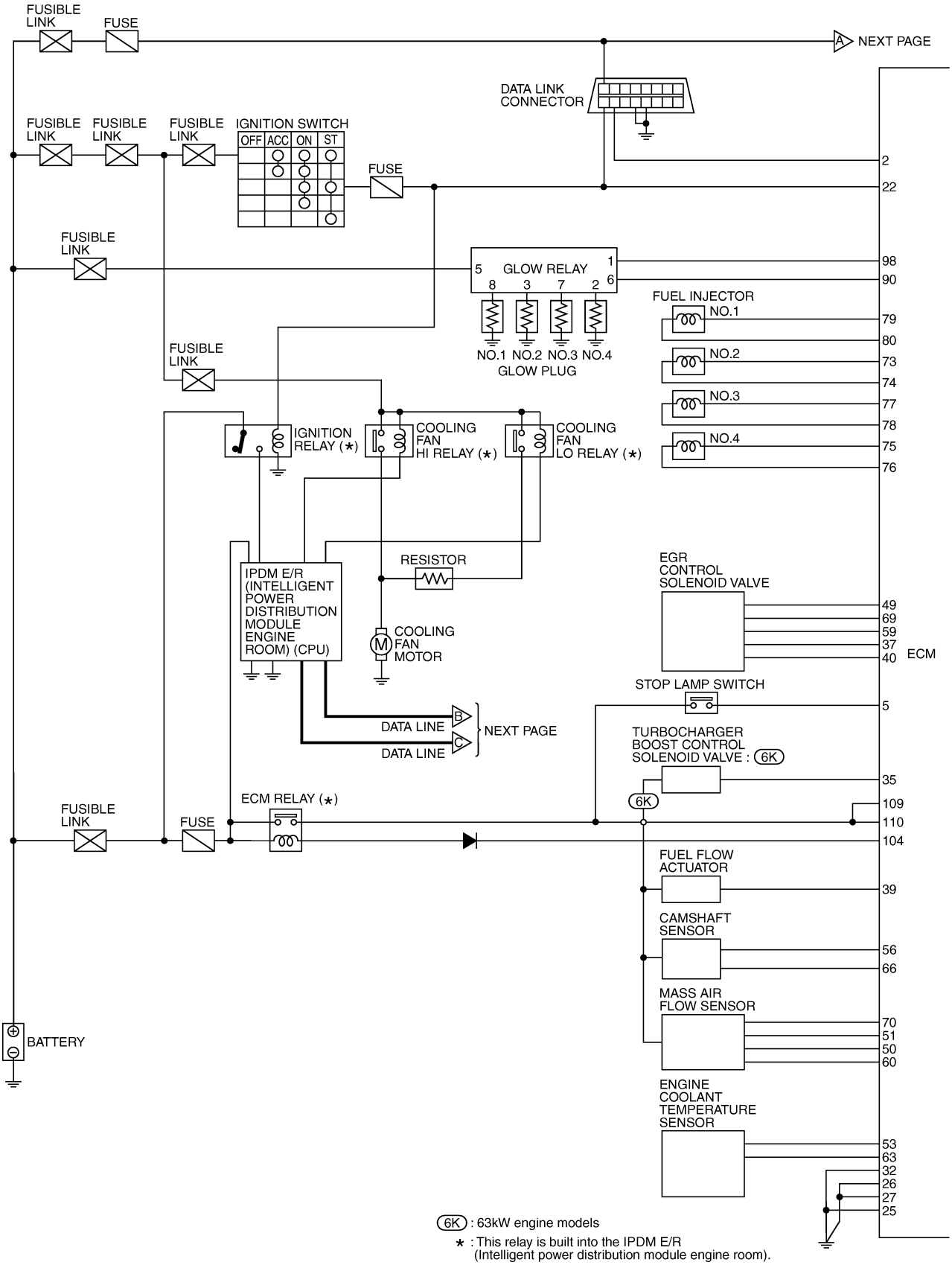
MBWA1426E


PRECEDING PAGE
A
B
C
FUSE
IGNITION SWITCH ON or START
GLOW
MALFUNCTION INDICATOR (YELLOW)
MALFUNCTION INDICATOR (RED)
COMBINATION METER
UNIFIED METER CONTROL UNIT
1
DATA LINE
7
DATA LINE
STOP LAMP SWITCH
5
FUSE
BATTERY
ECM
29
30
28
34
18
12
6
SENSOR 1
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
47
67
57
COMMON RAIL FUEL PRESSURE SENSOR
48
58
68
TURBOCHARGER BOOST PRESSURE SENSOR
55
65
CRANKSHAFT POSITION SENSOR (POS)
51
61
INTAKE AIR TEMPERATURE SENSOR
54
64
FUEL TEMPERATURE SENSOR
6K
4K
62
52
TURBOCHARGER AIR TEMPERATURE SENSOR
44
45
41
KNOCK SENSOR (ACCELOMETER)
83
89
107
REFRIGERANT PRESSURE SENSOR
4K : 48kW engine models
6K : 60kW engine models
PA : With PTC heater and with A/C
PO : With PTC heater and without A/C

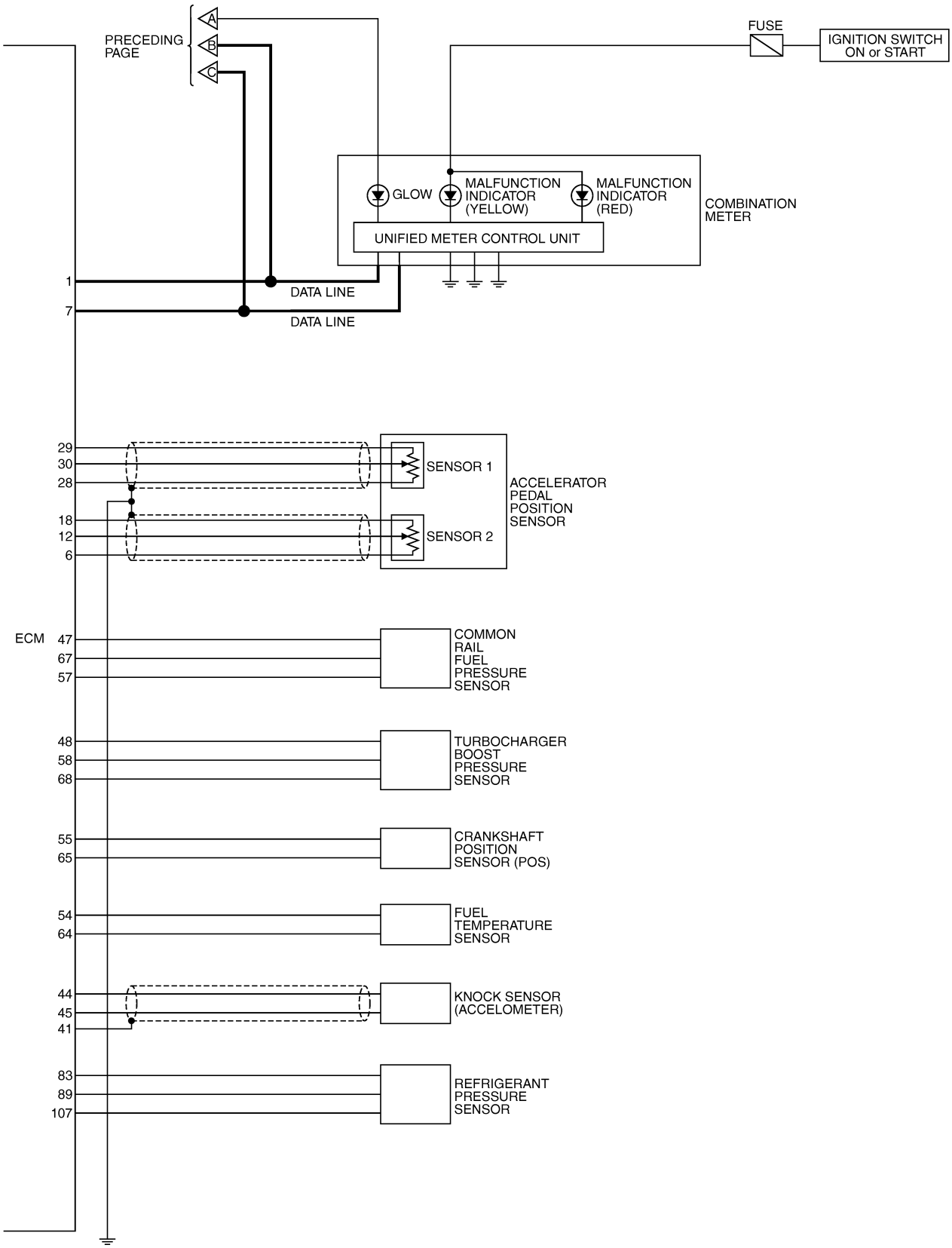
MBWA1427E

Euro 4 50 kW and 63 kW engine models

(Refer to EC-K9K-5 to confirm engine type.)



MBWA1428E

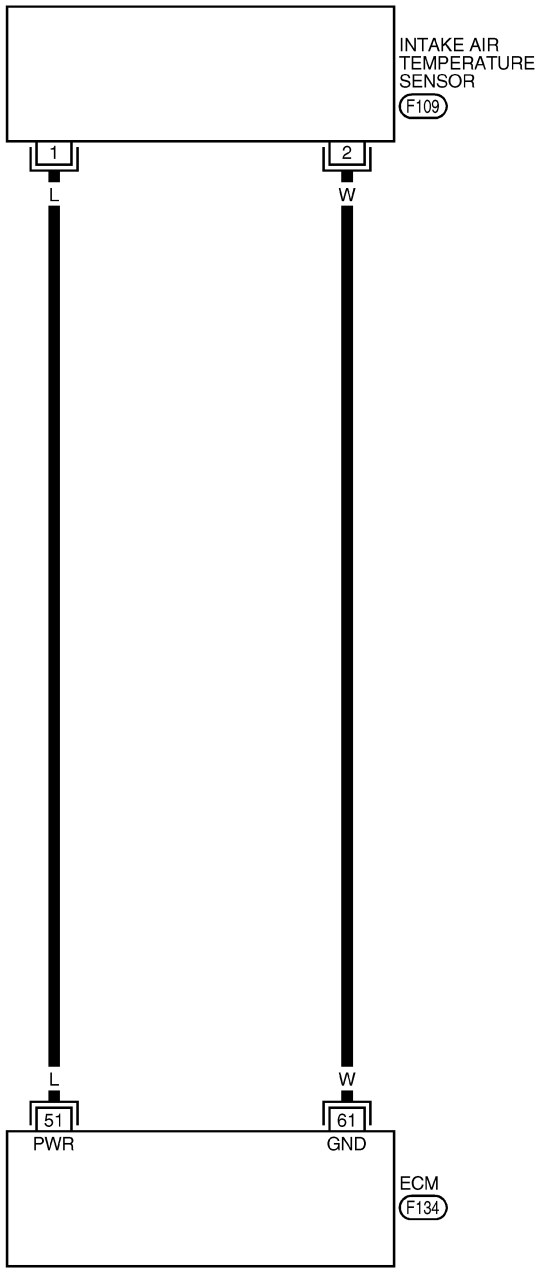

PRECEDING PAGE
A
B
C
FUSE
IGNITION SWITCH ON or START
GLOW
MALFUNCTION INDICATOR (YELLOW)
MALFUNCTION INDICATOR (RED)
COMBINATION METER
UNIFIED METER CONTROL UNIT
1
DATA LINE
7
DATA LINE
29
30
28
SENSOR 1
18
12
6
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
ECM
47
67
57
COMMON RAIL FUEL PRESSURE SENSOR
48
58
68
TURBOCHARGER BOOST PRESSURE SENSOR
55
65
CRANKSHAFT POSITION SENSOR (POS)
54
64
FUEL TEMPERATURE SENSOR
44
45
41
KNOCK SENSOR (ACCELOMETER)
83
89
107
REFRIGERANT PRESSURE SENSOR

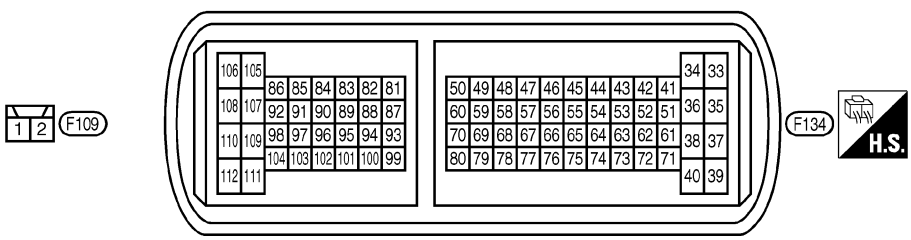
MBWA1429E

Euro 3 48 kW and 60 kW engine models

(Refer to EC-K9K-5 to confirm engine type.)

EC-IATS-01



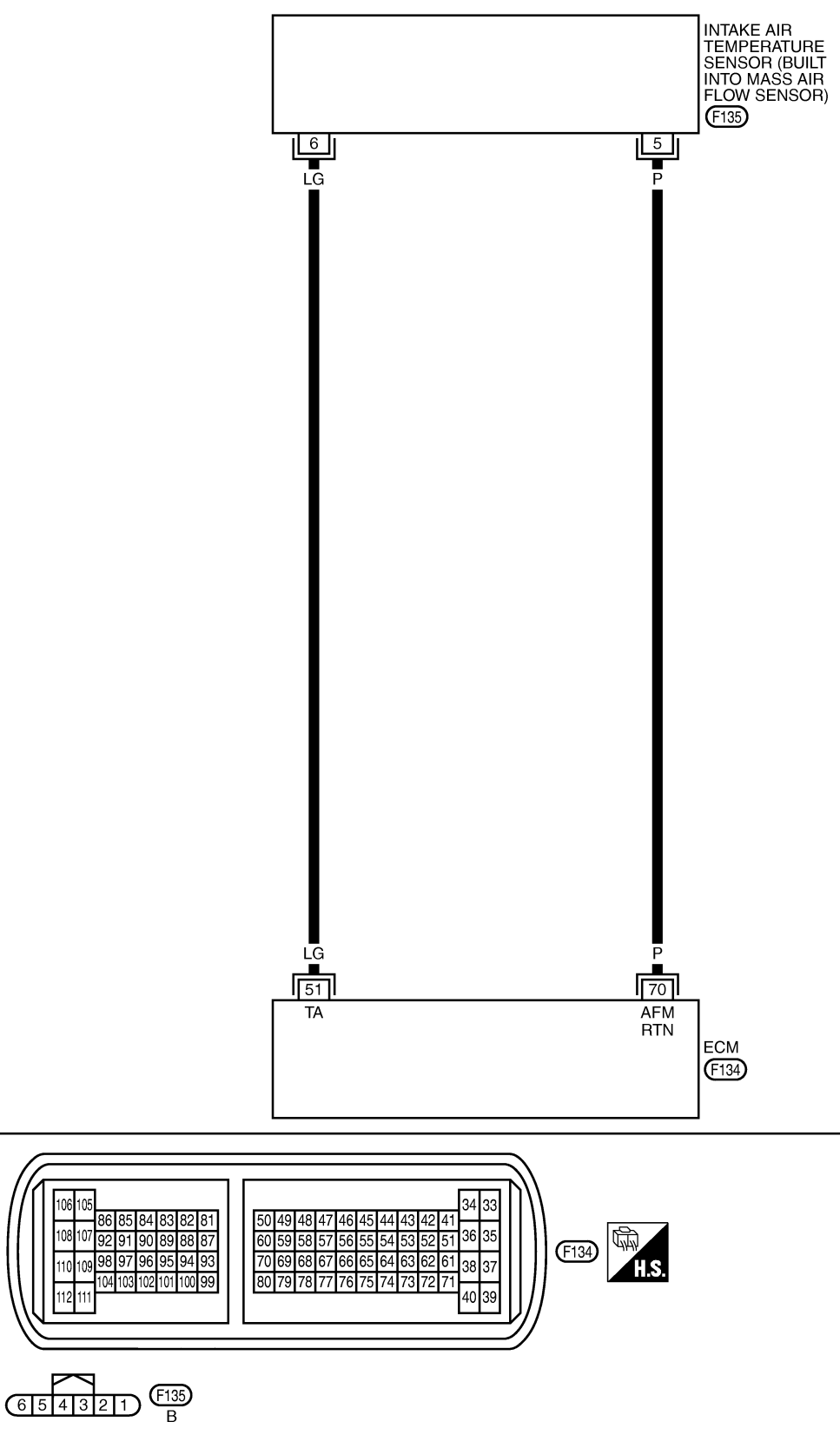


MBWA0595E

Euro 4 50 kW and 63 kW engine models

(Refer to EC-K9K-5 to confirm engine type.)

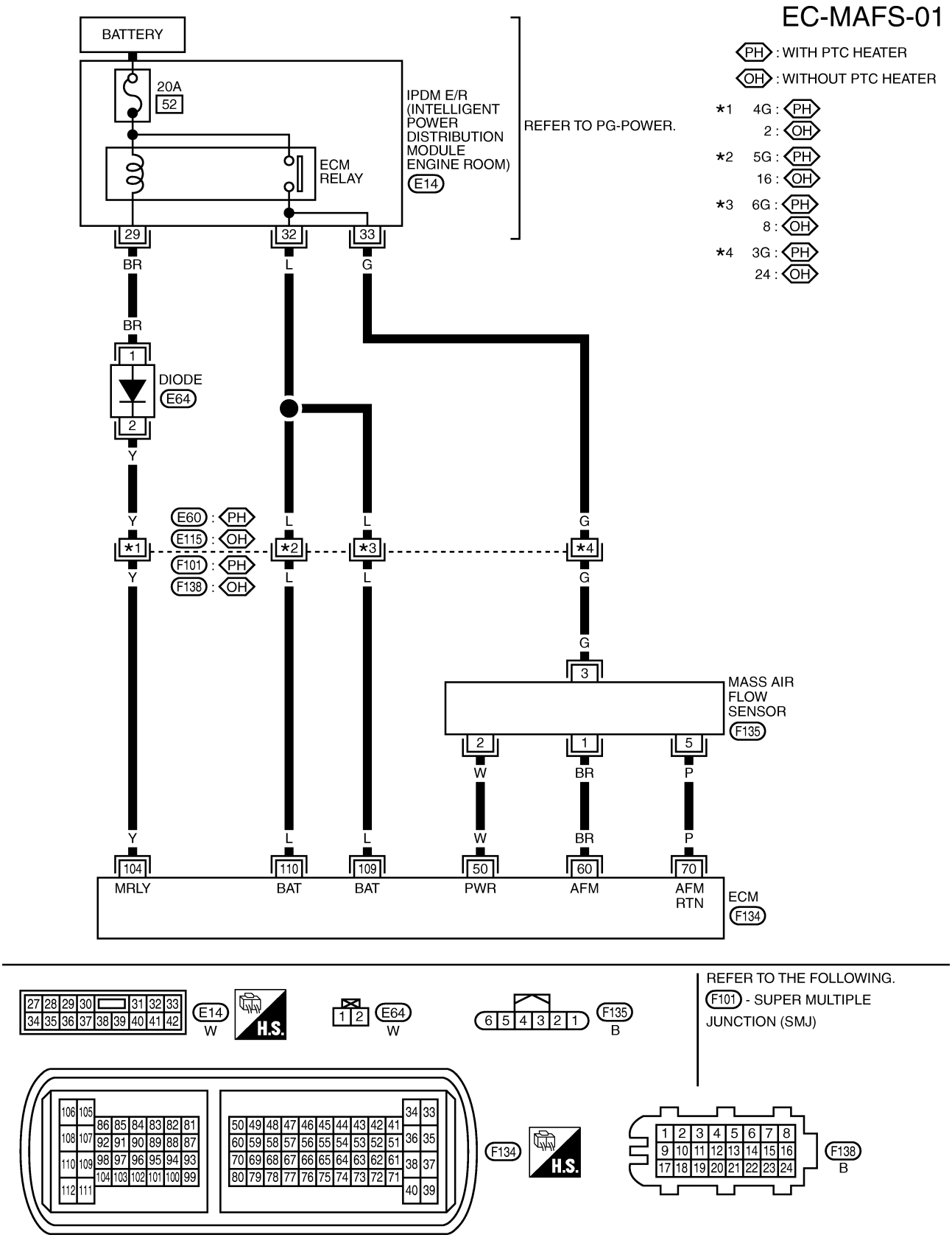
EC-IATS-02



MBWA1430E

Euro 4 50 kW and 63 kW engine models

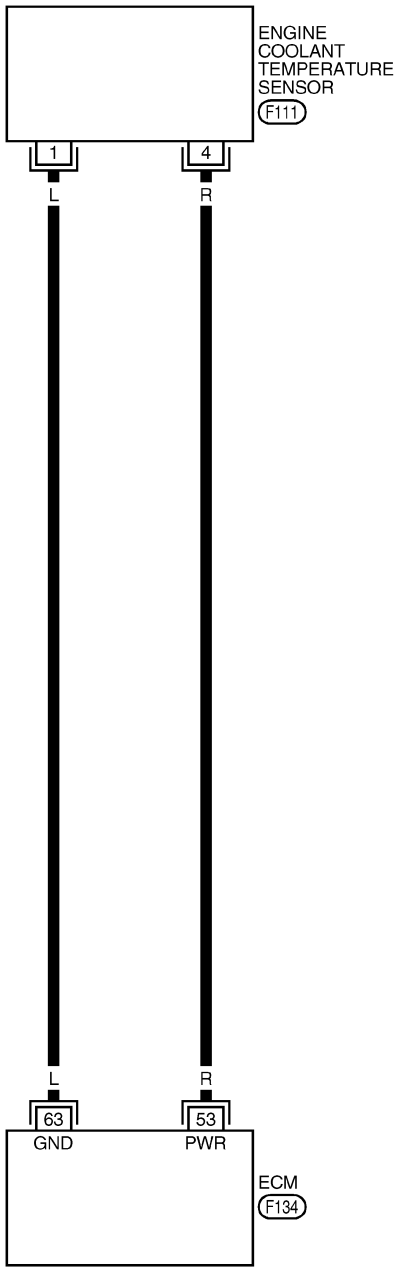
(Refer to EC-K9K-5 to confirm engine type.)

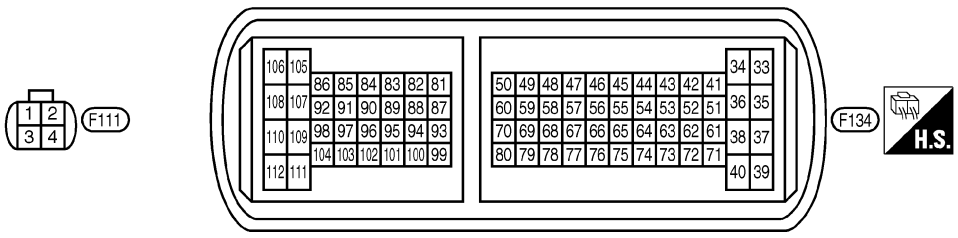


MBWA1431E

All K9K engine models

EC-ECTS-01

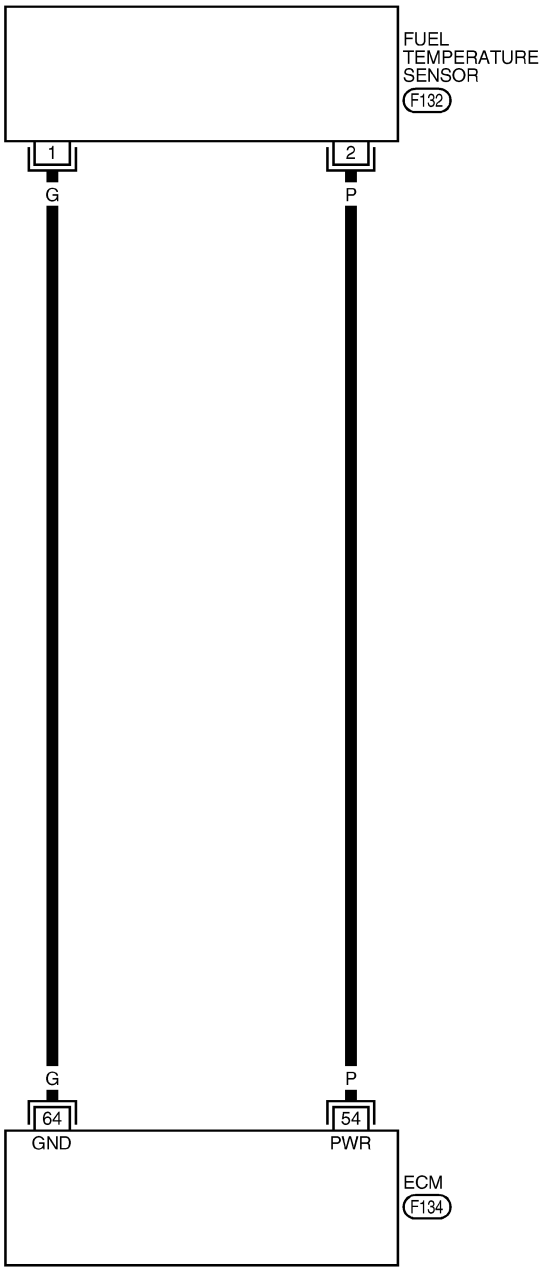


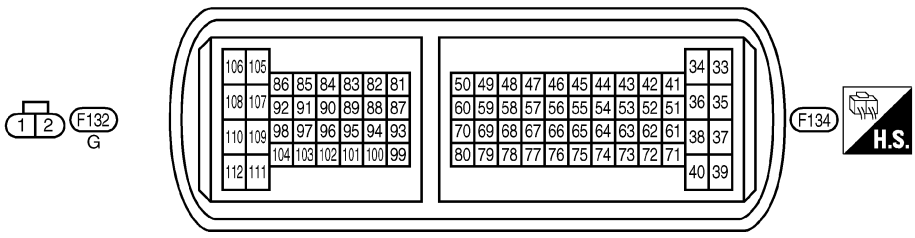


MBWA0596E

All K9K engine models

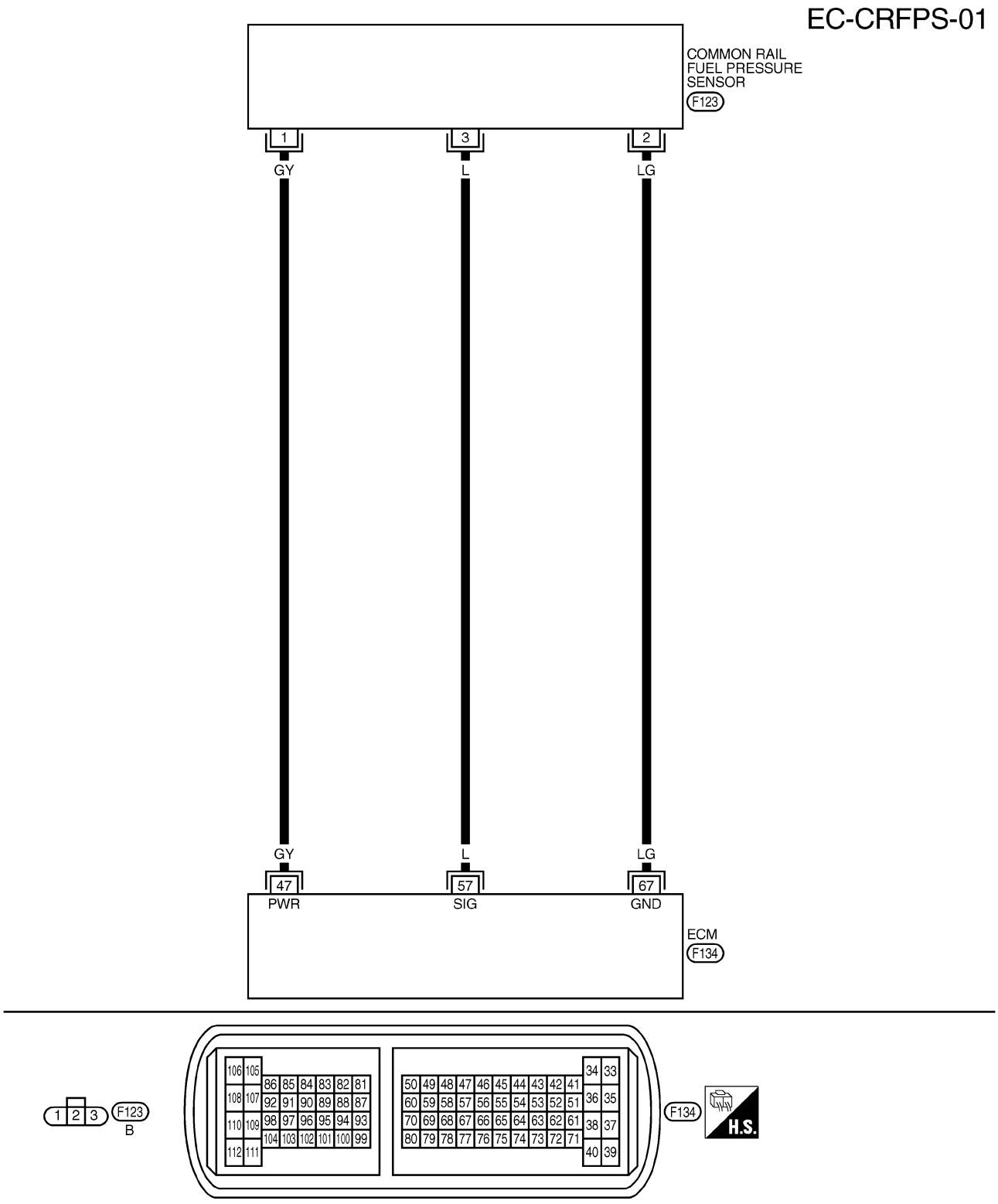
EC-FTS-01





MBWA0597E

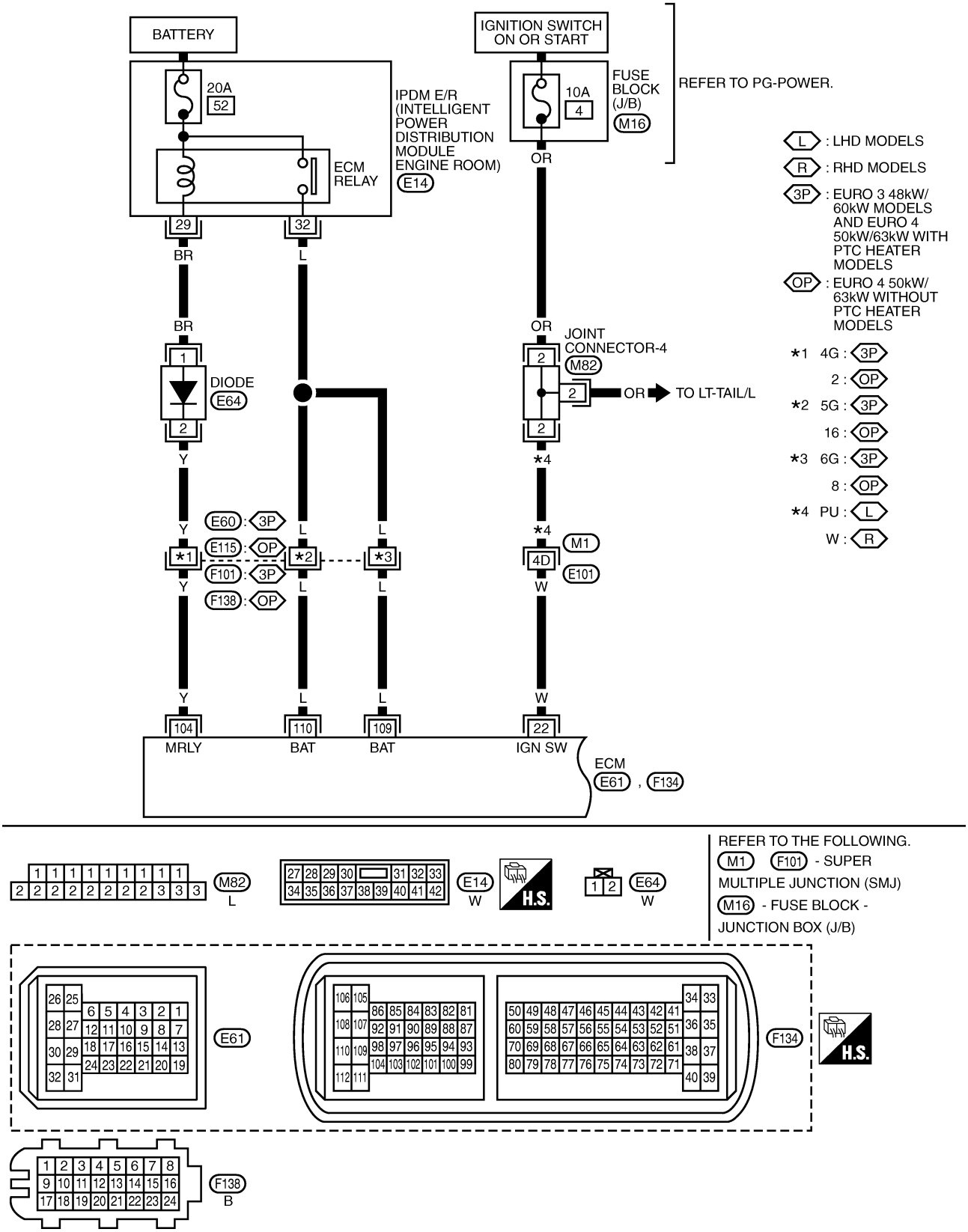
All K9K engine models



MBWA0598E

All K9K engine models

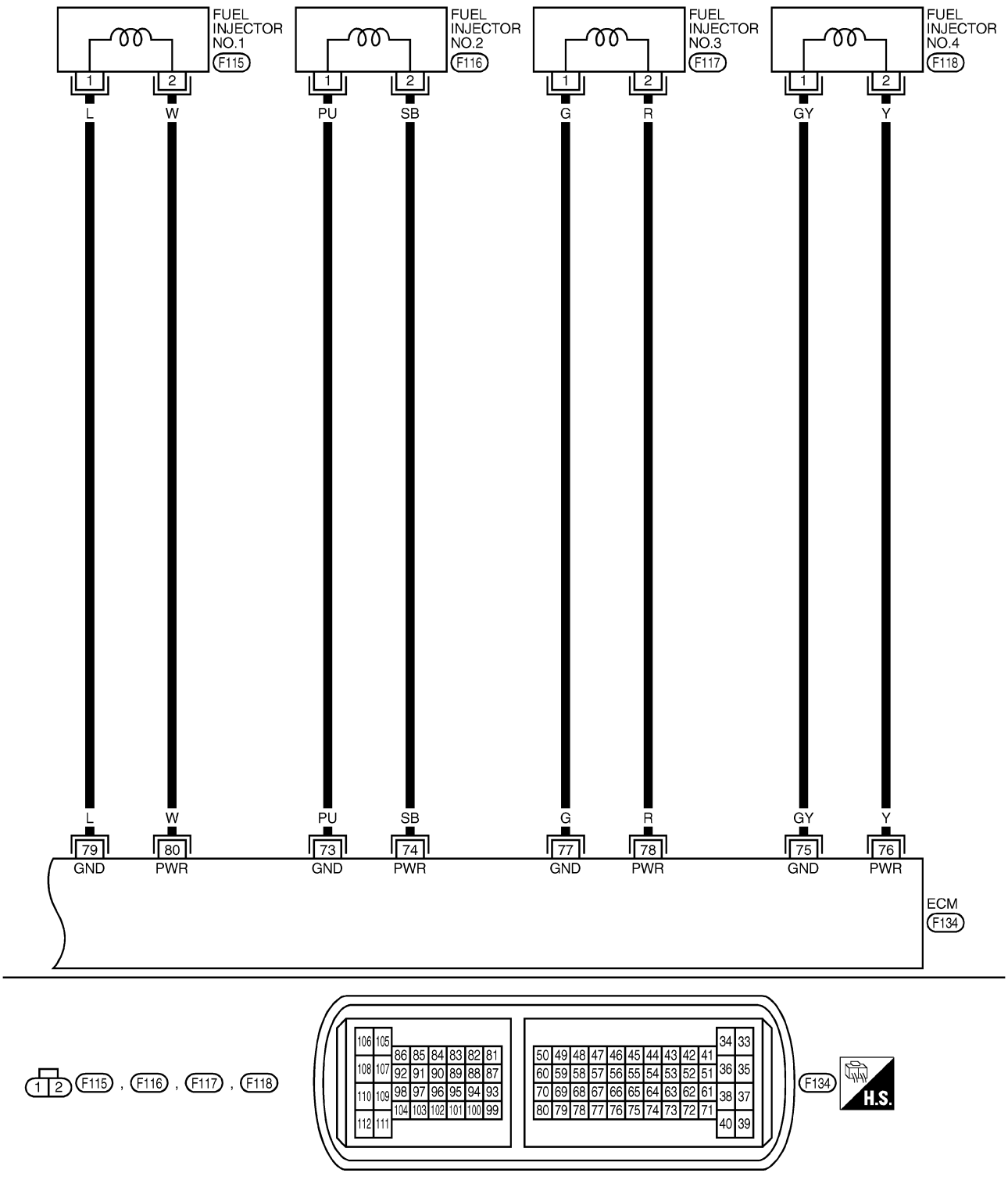
EC-INJECT-01



MBWA1344E

All K9K engine models

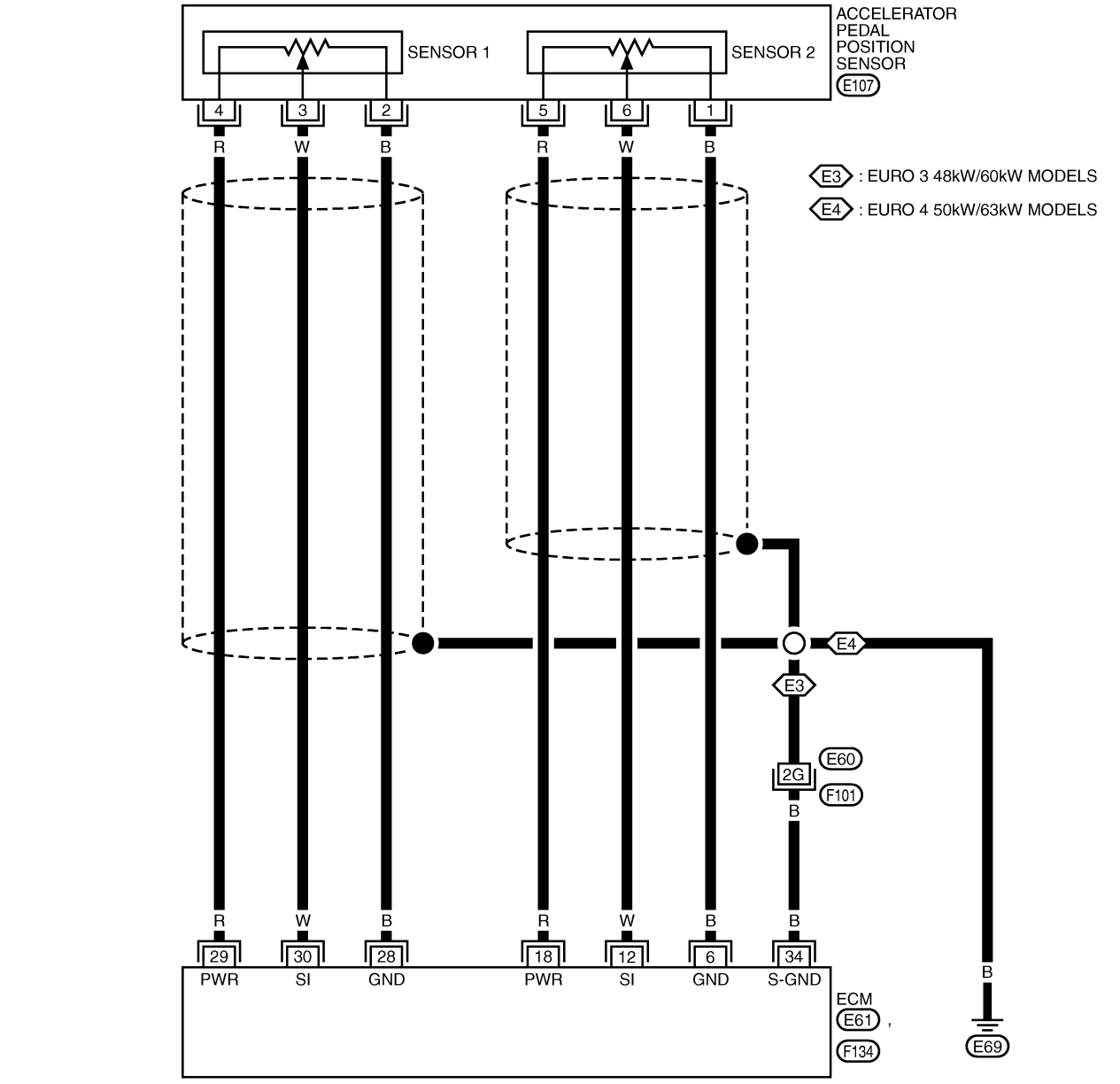
EC-INJECT-02

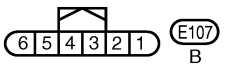


MBWA0599E

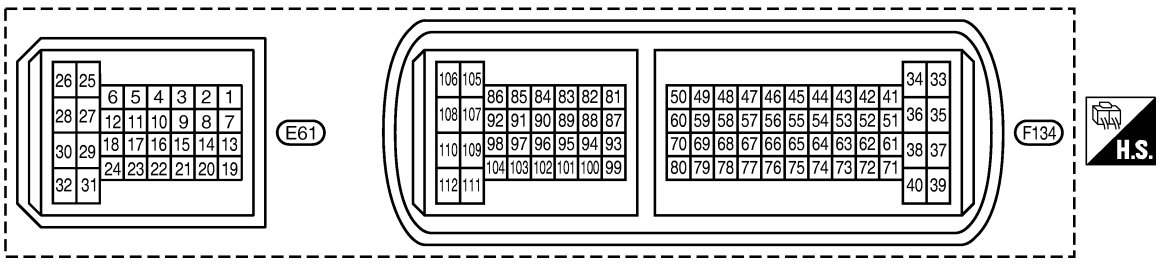
LHD models with all K9K engine models

EC-APPS-01



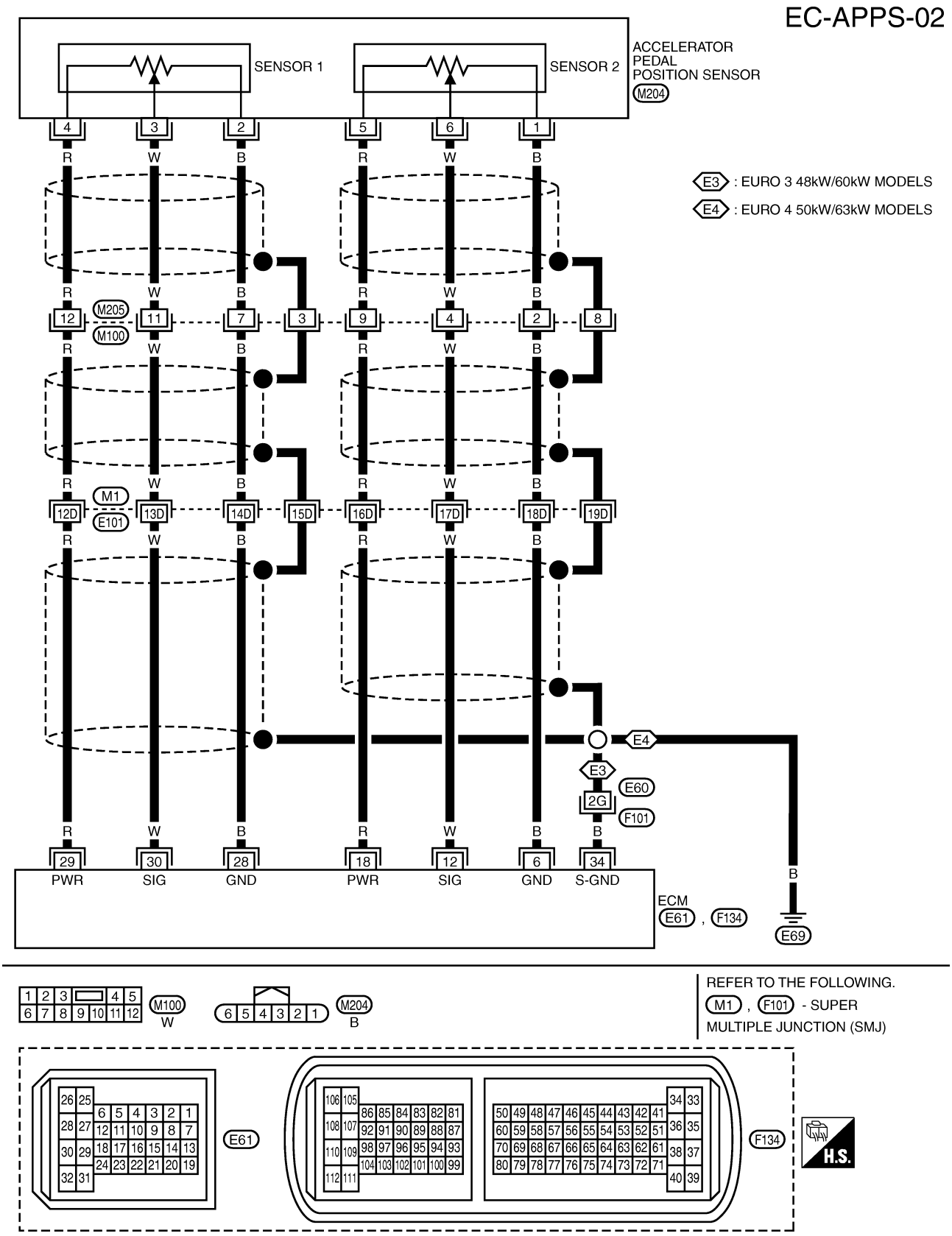


REFER TO THE FOLLOWING.
F101 - SUPER MULTIPLE JUNCTION (SMJ)



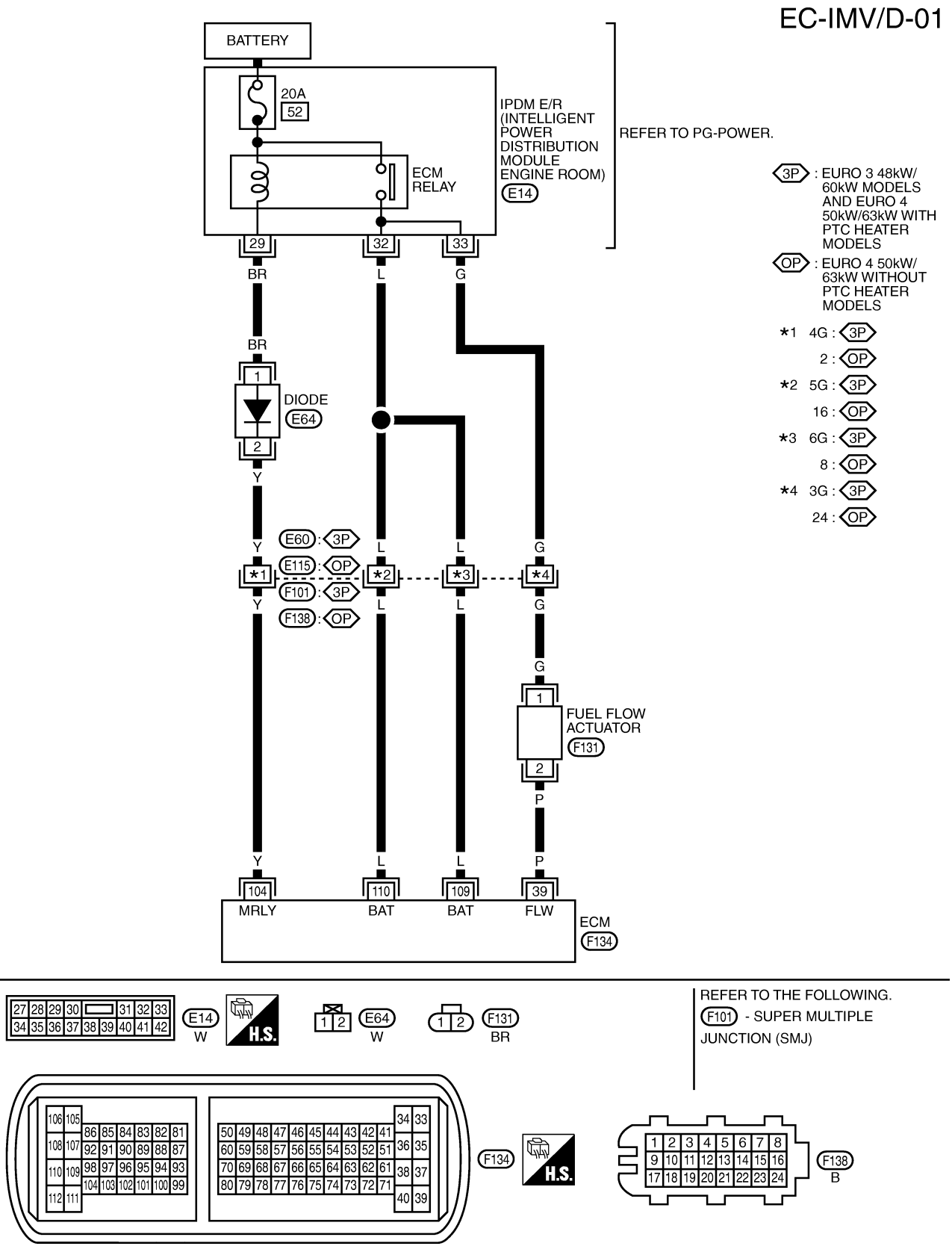
MBWA1345E

RHD models with all K9K engine models



MBWA1432E

All K9K engine models

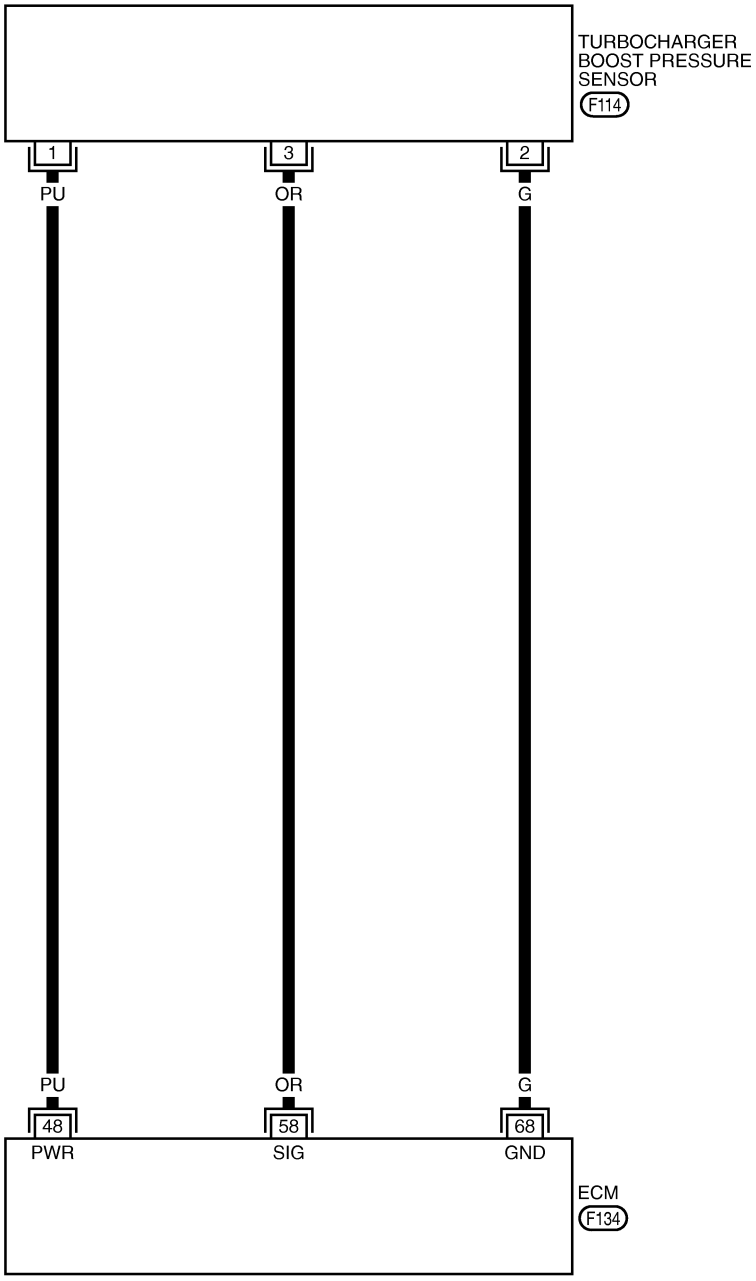


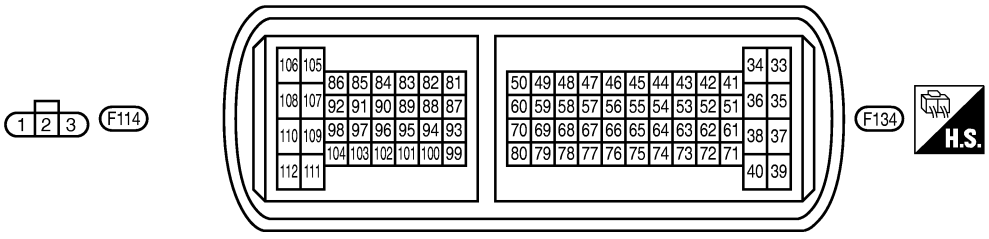
MBWA1347E

Euro 3 48 kW and Euro 4 50 kW and 63 kW engine models

(Refer to EC-K9K-5 to confirm engine type.)

EC-TCBST-01



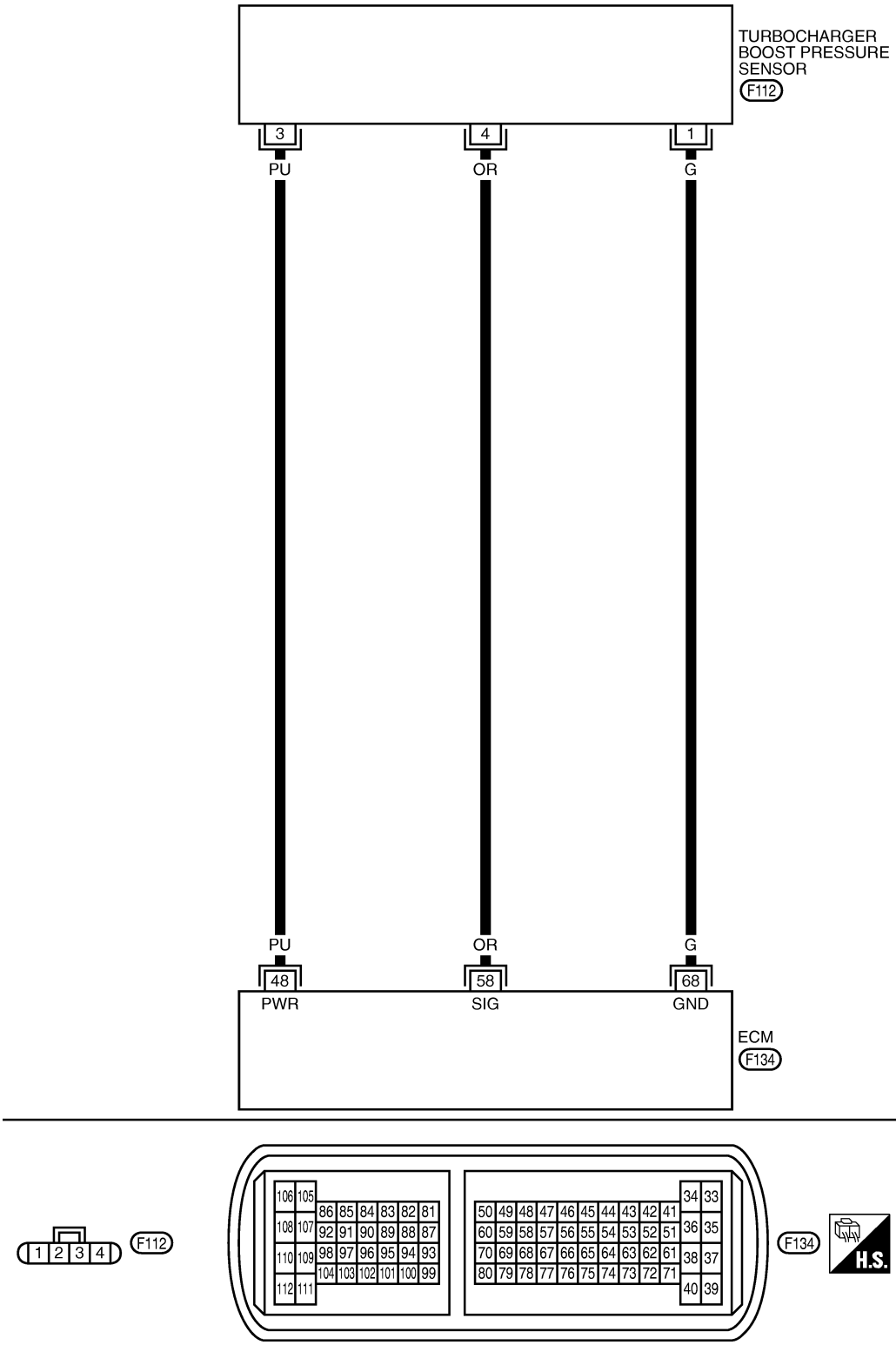


MBWA1373E

Euro 3 60 kW engine models

(Refer to EC-K9K-5 to confirm engine type.)

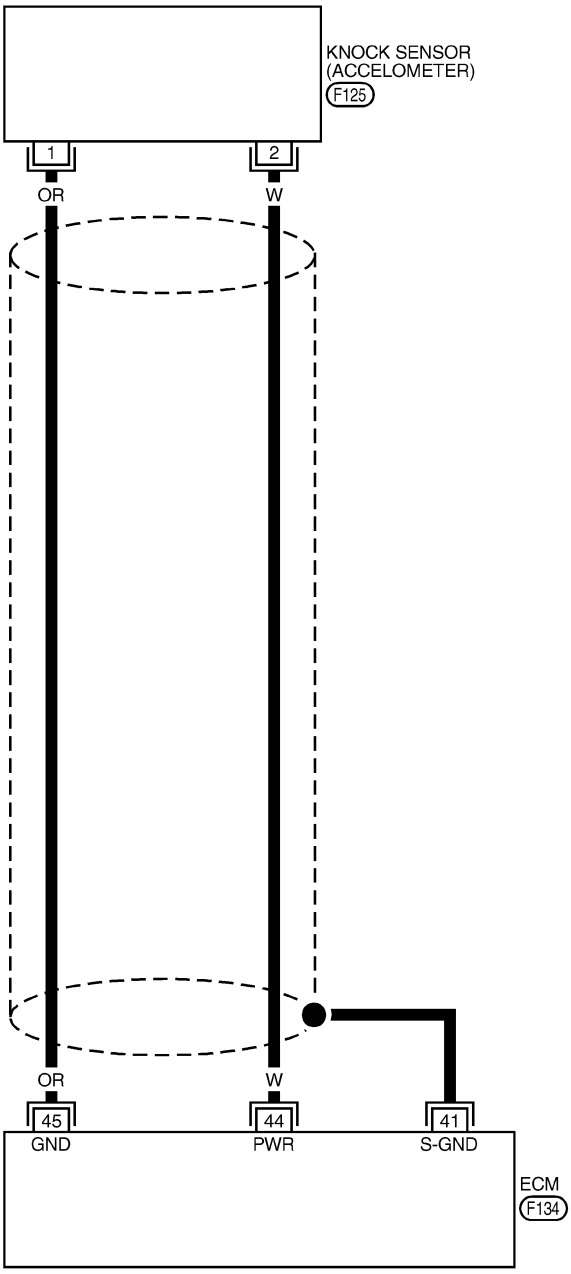
EC-TCBST-02

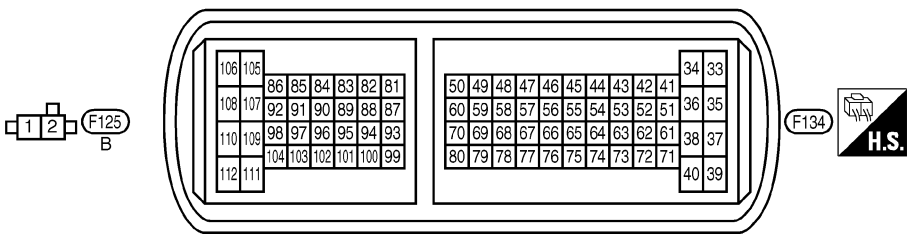


MBWA1374E

All K9K engine models

EC-KS-01

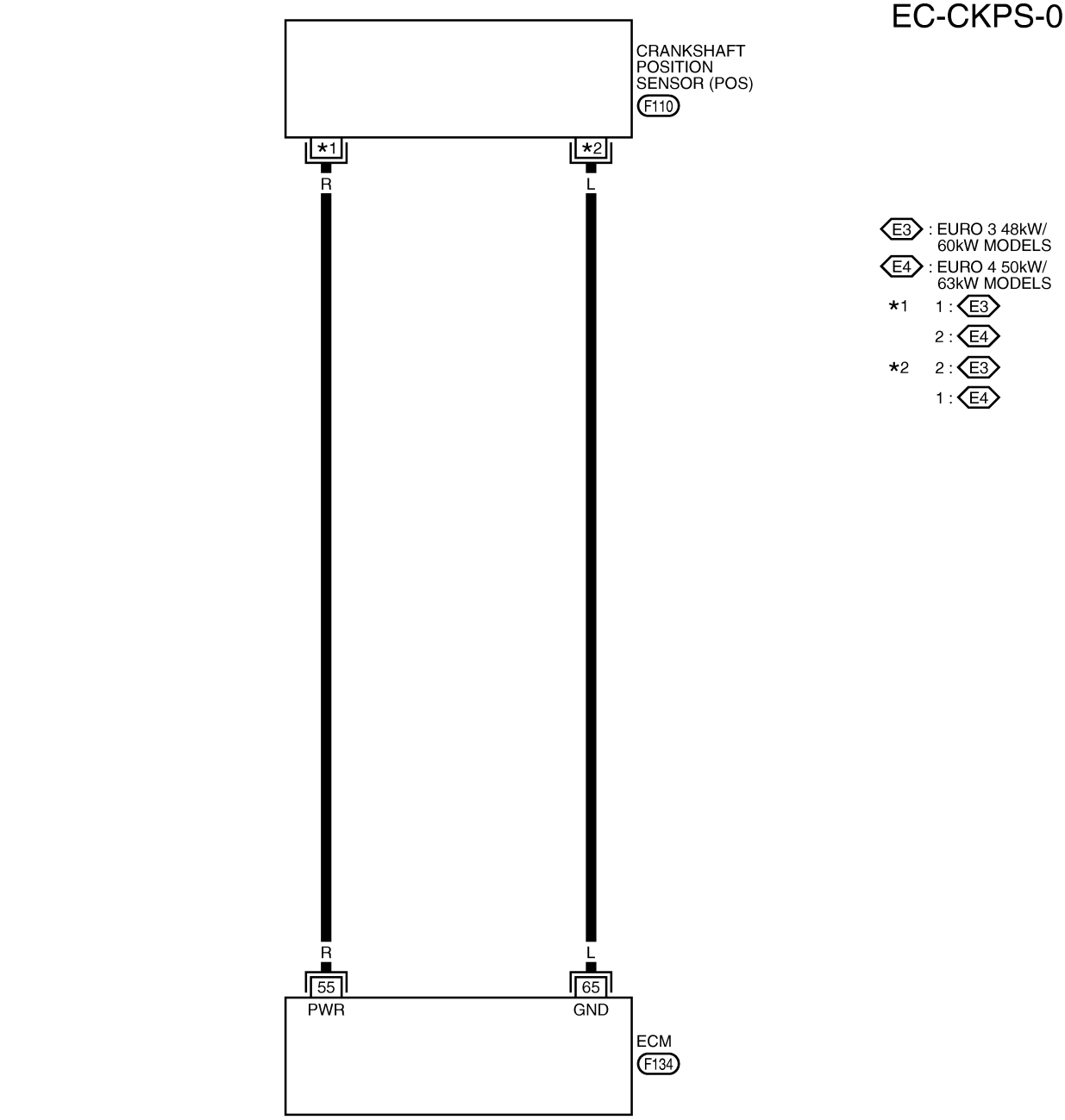




MBWA0602E

All K9K engine models

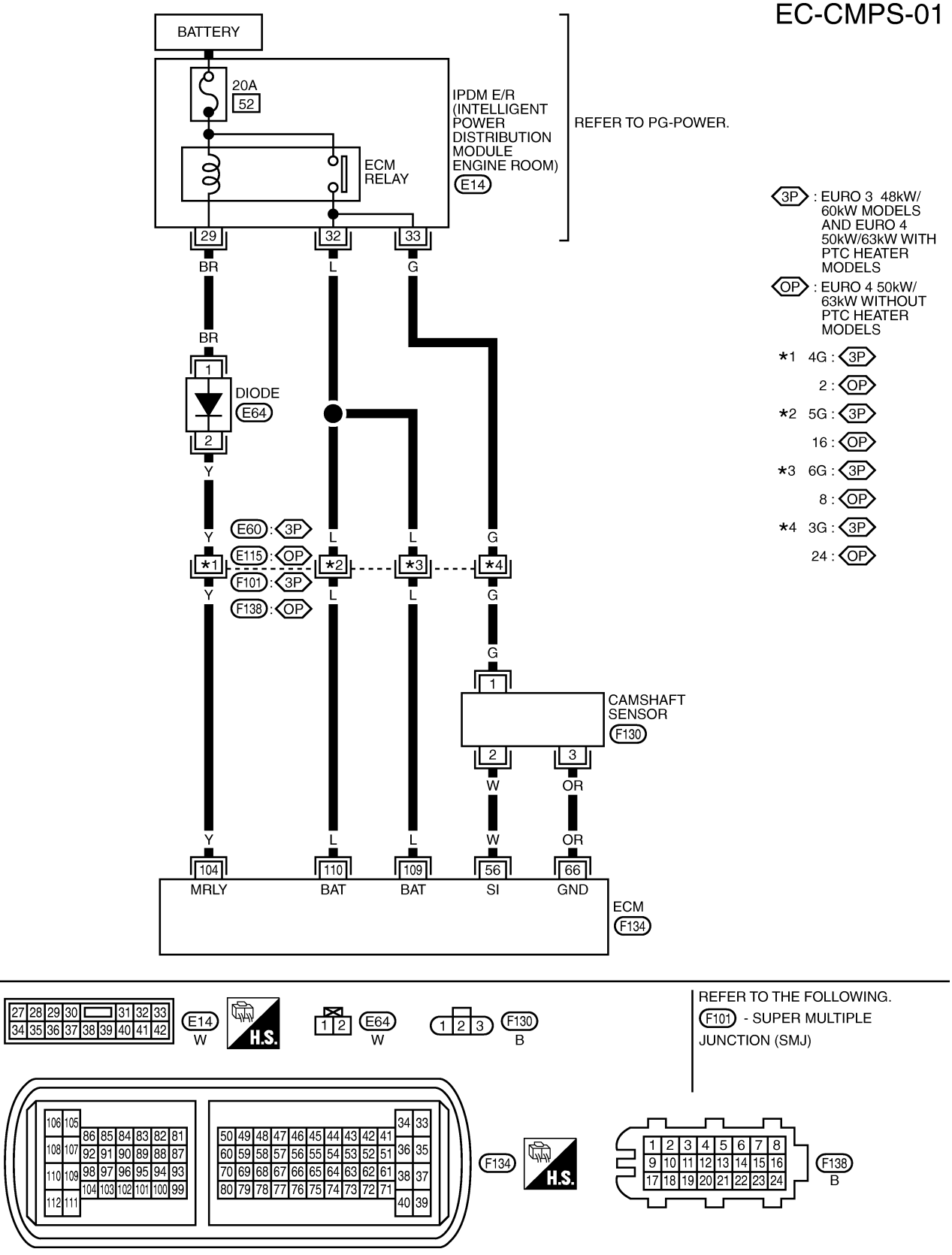
EC-CKPS-01



MBWA1349E

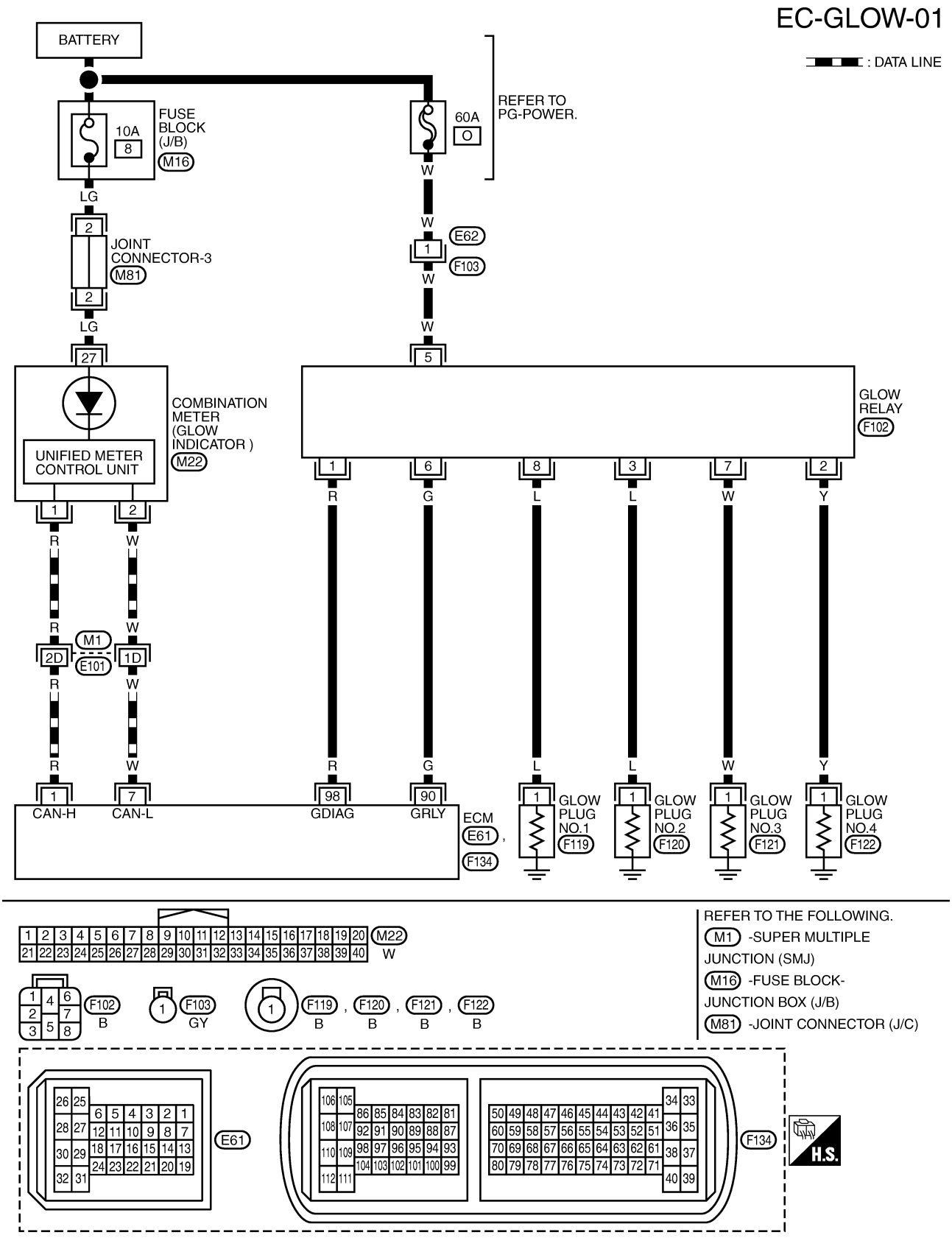
All K9K engine models

EC-CMPS-01



MBWA1350E

All K9K engine models

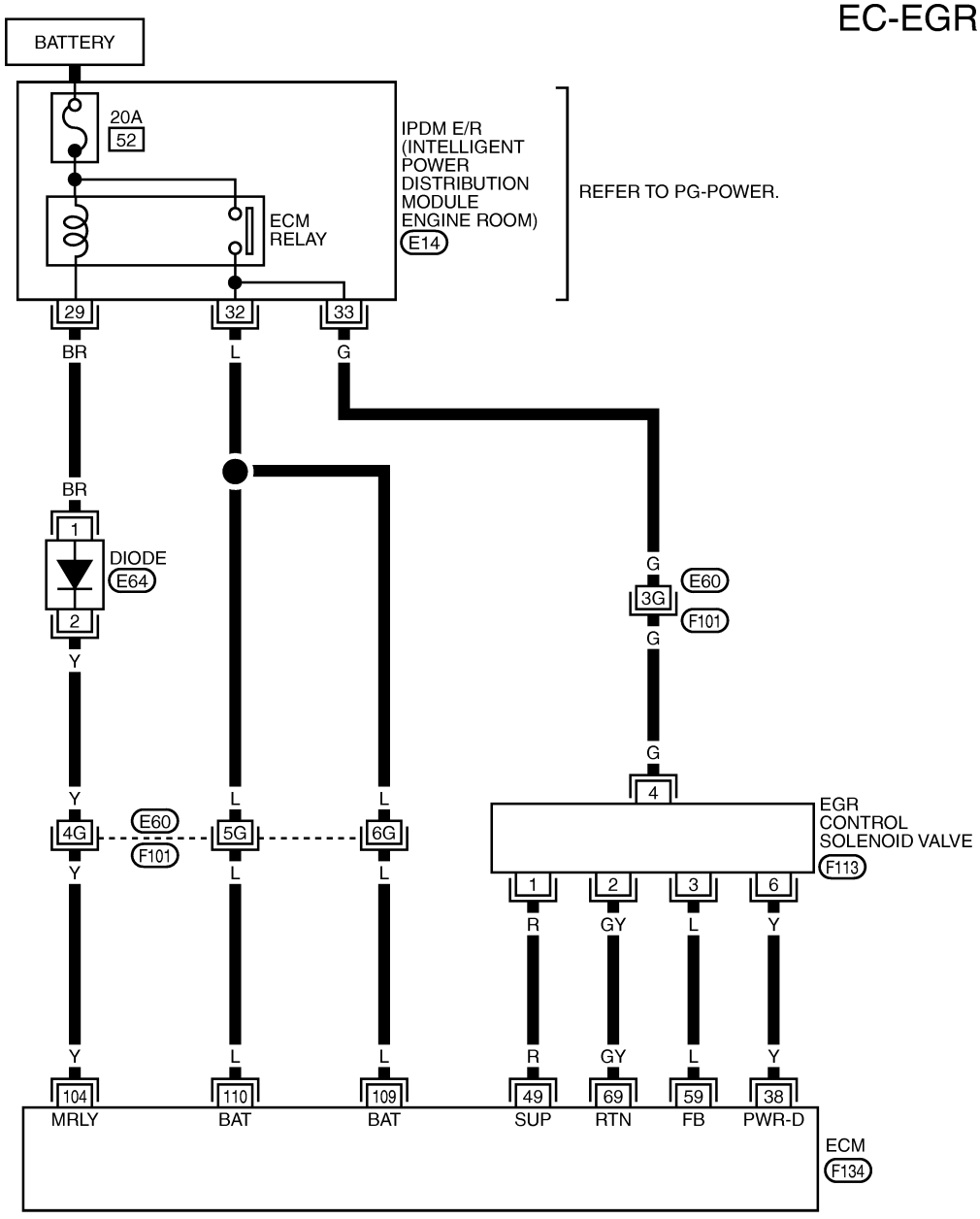


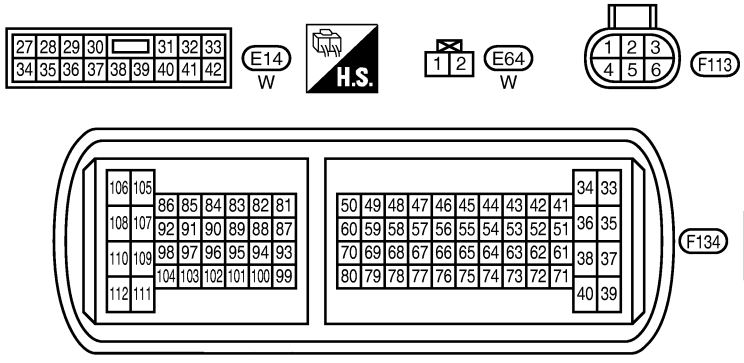
MBWA1351E

Euro 3 48 kW and 60 kW engine models

(Refer to EC-K9K-5 to confirm engine type.)

EC-EGRC/V-01



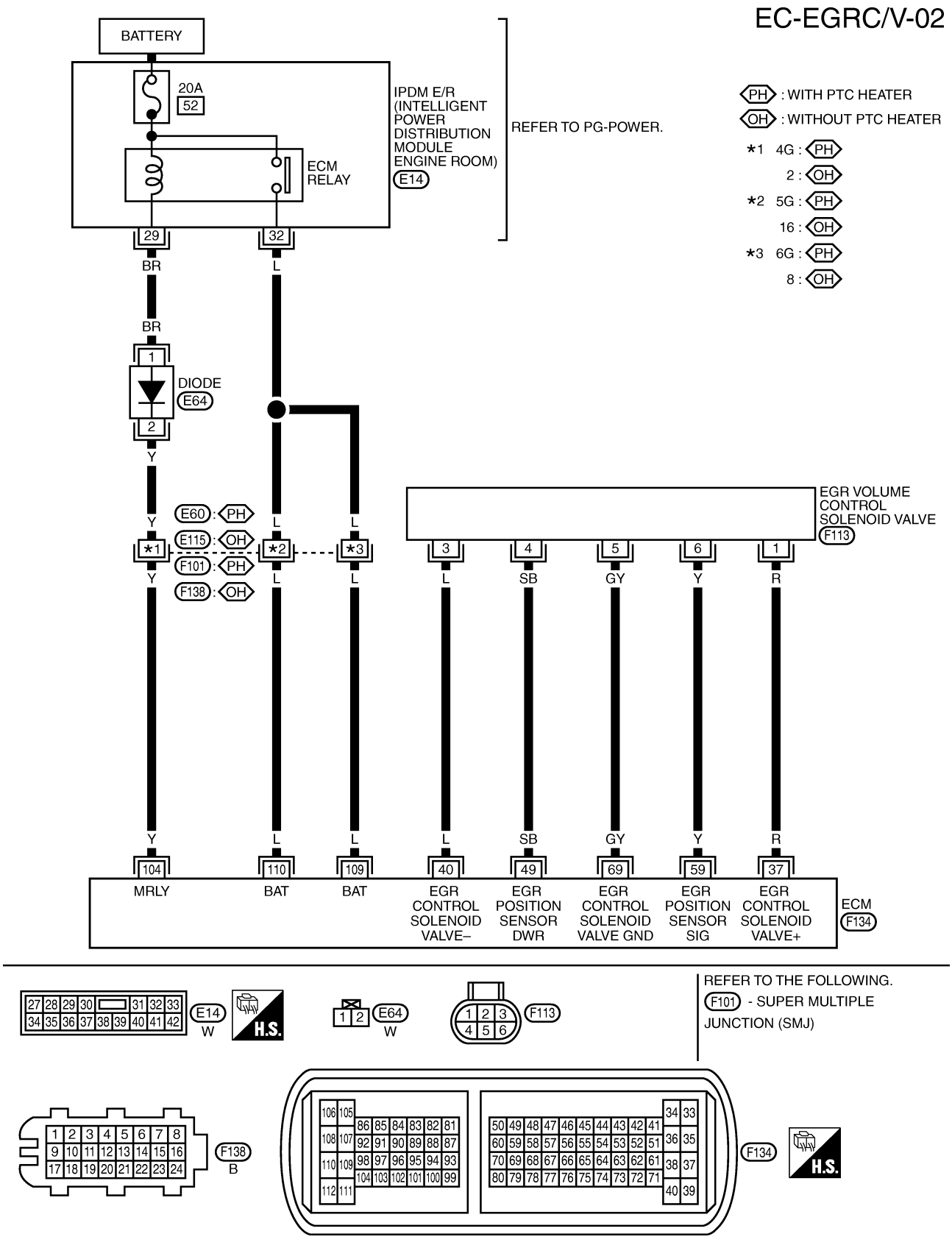


REFER TO THE FOLLOWING.
F101 - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1433E

Euro 4 50 kW and 63 kW engine models

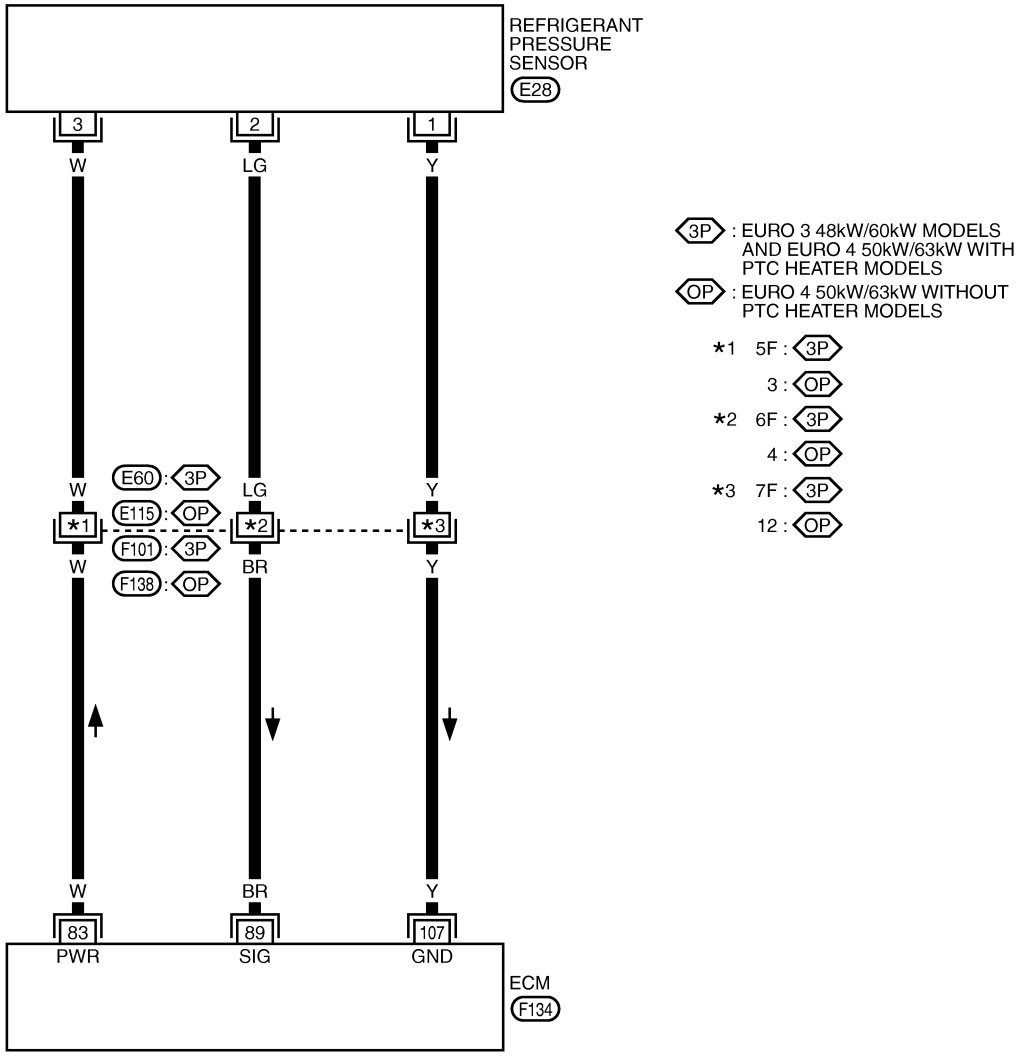
(Refer to EC-K9K-5 to confirm engine type.)

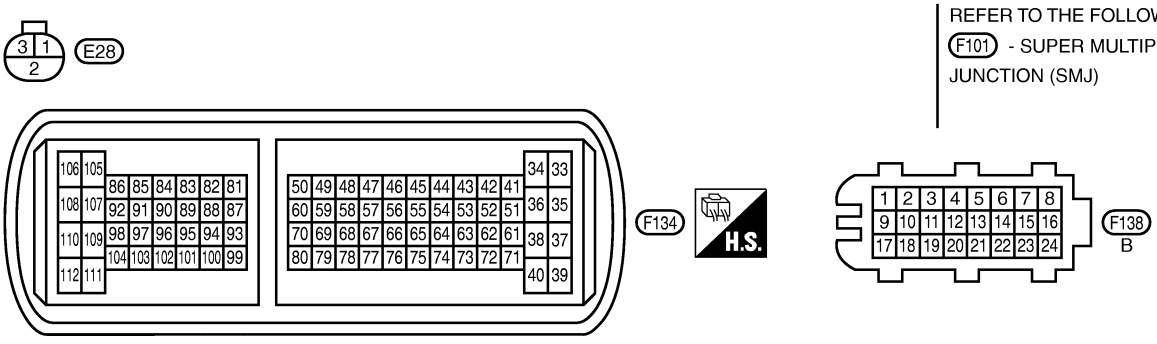


MBWA1352E

All K9K engine models

EC-RP/SEN-01

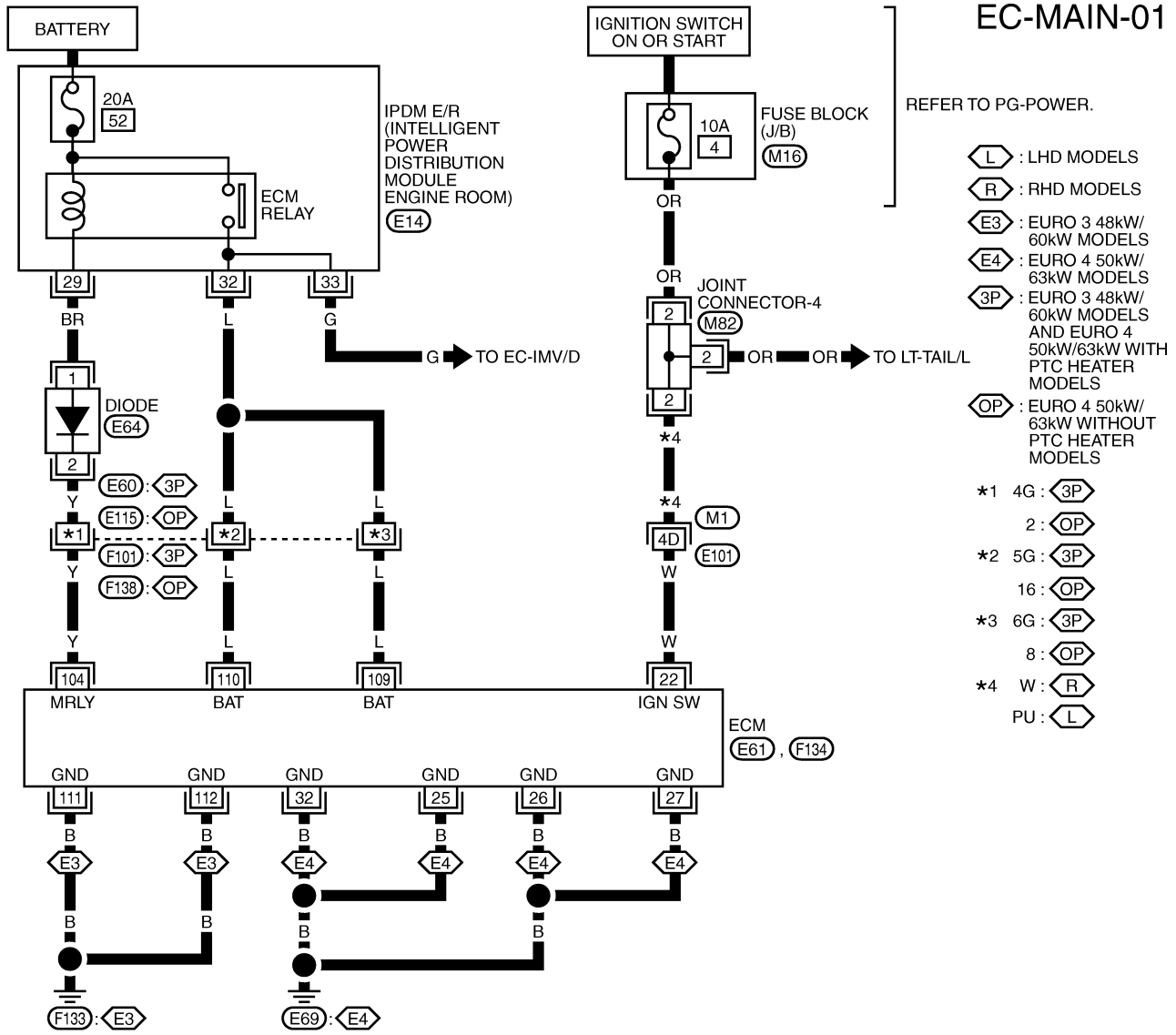


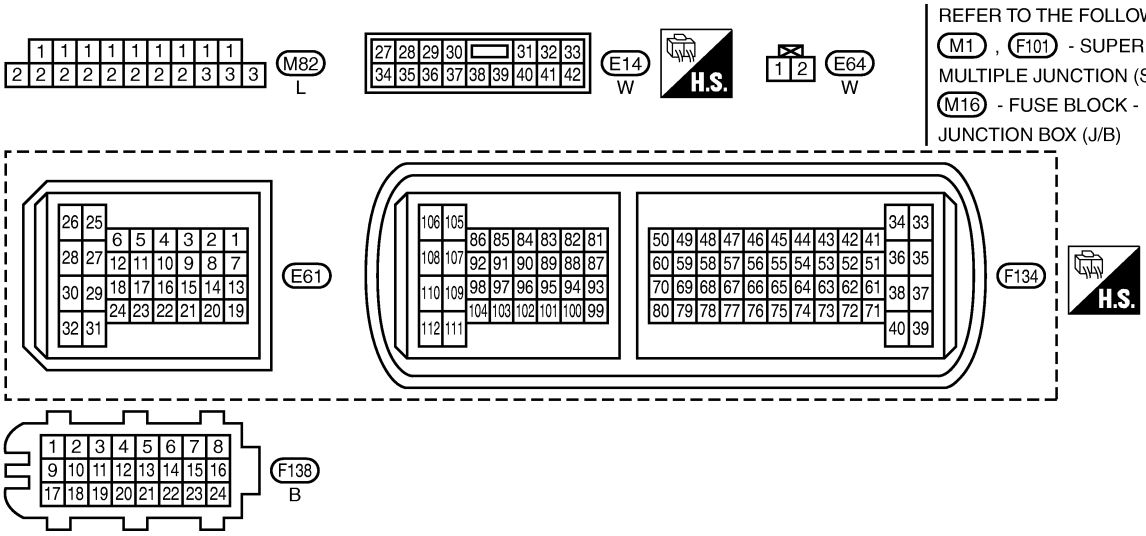


REFER TO THE FOLLOWING.
F101 - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1353E

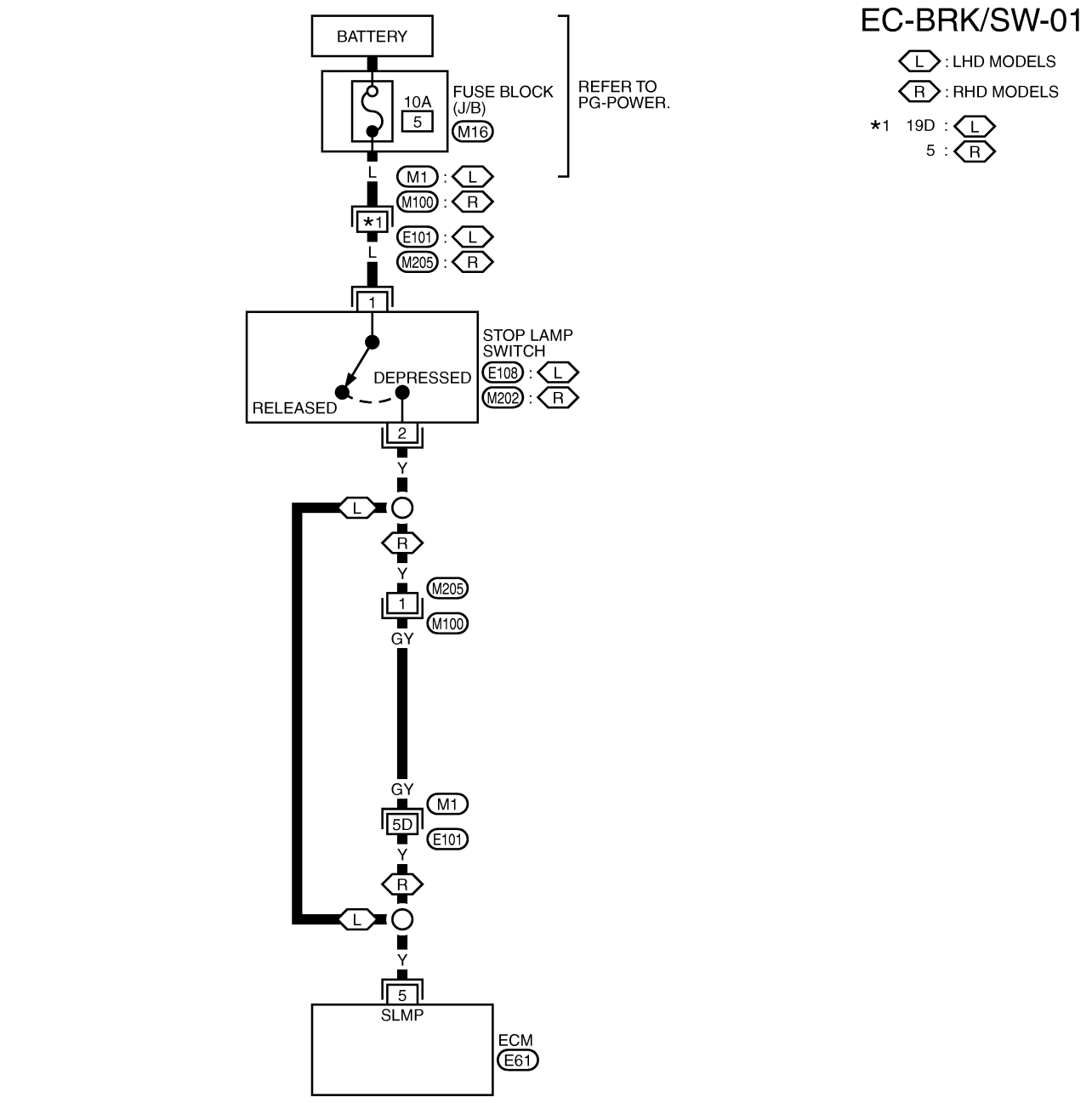
All K9K engine models





MBWA1354E

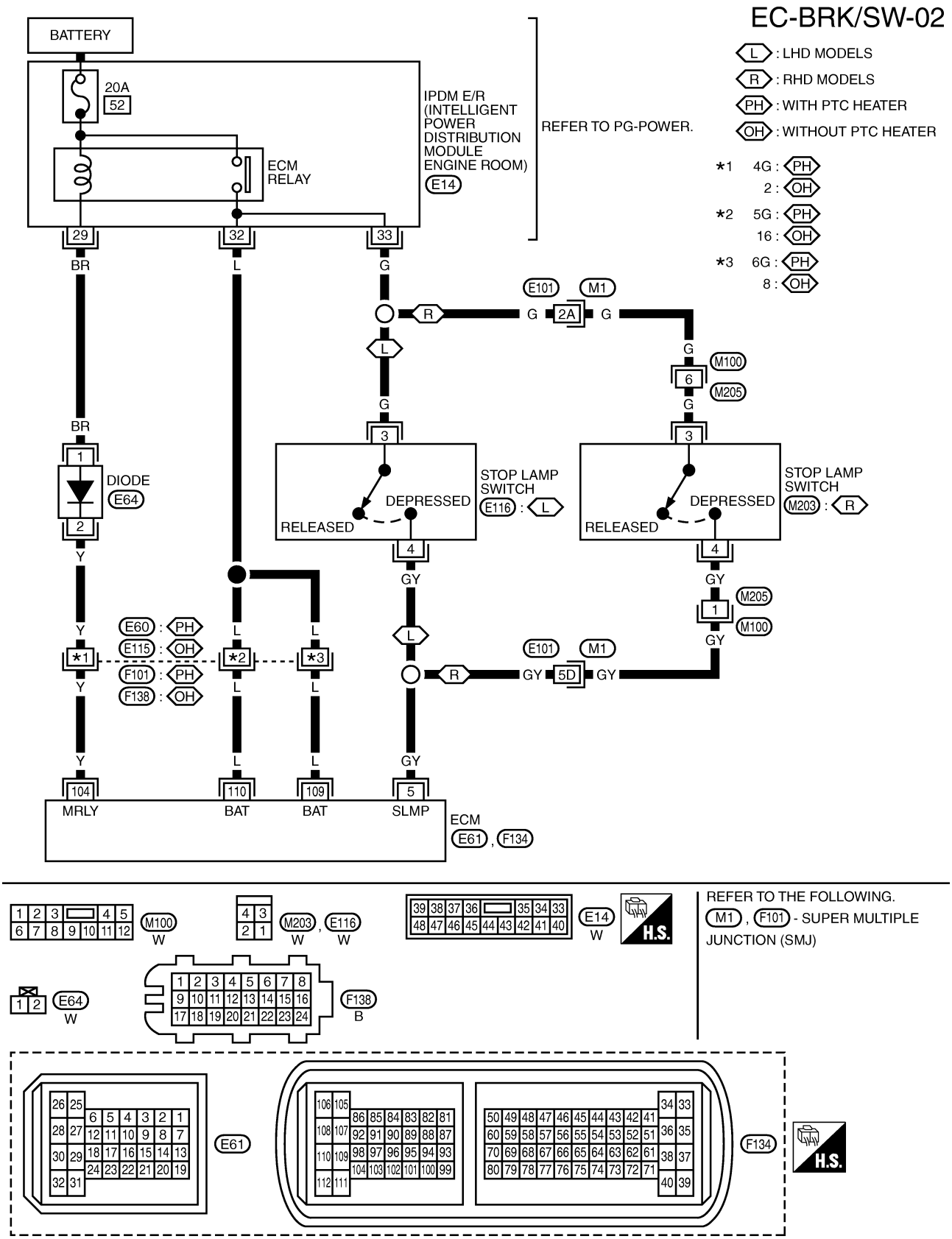
Euro 3 48 kW and 60 kW engine models



REFER TO THE FOLLOWING.
M1 - SUPER MULTIPLE JUNCTION (SMJ)
M16 - FUSE BLOCK - JUNCTION BOX (J/B)

MBWA1434E

Euro 4 50 kW and 63 kW engine models

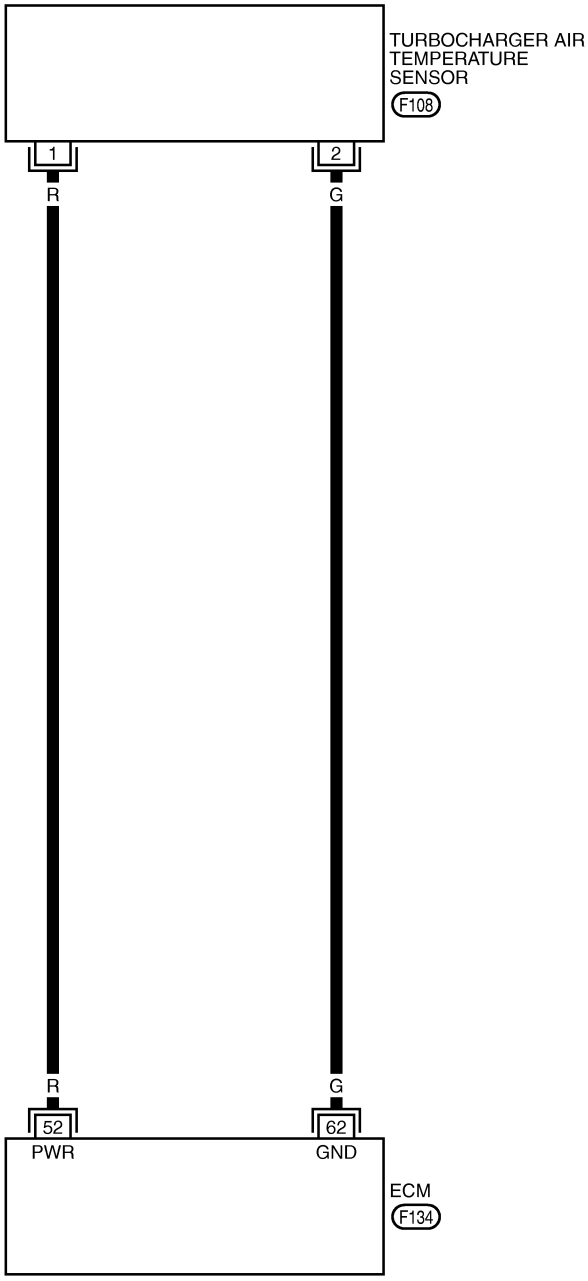


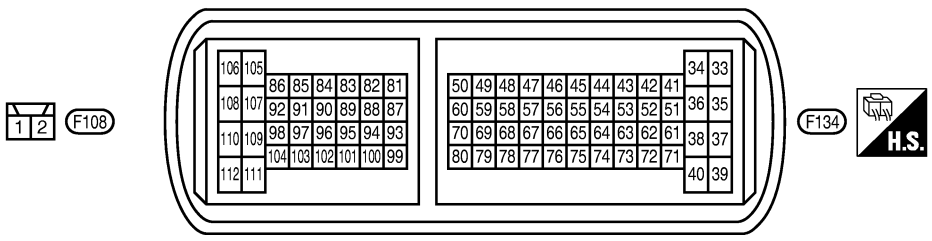
MBWA1439E

Euro 3 48 kW engine models

(Refer to EC-K9K-5 to confirm engine type.)

EC-BTS-01



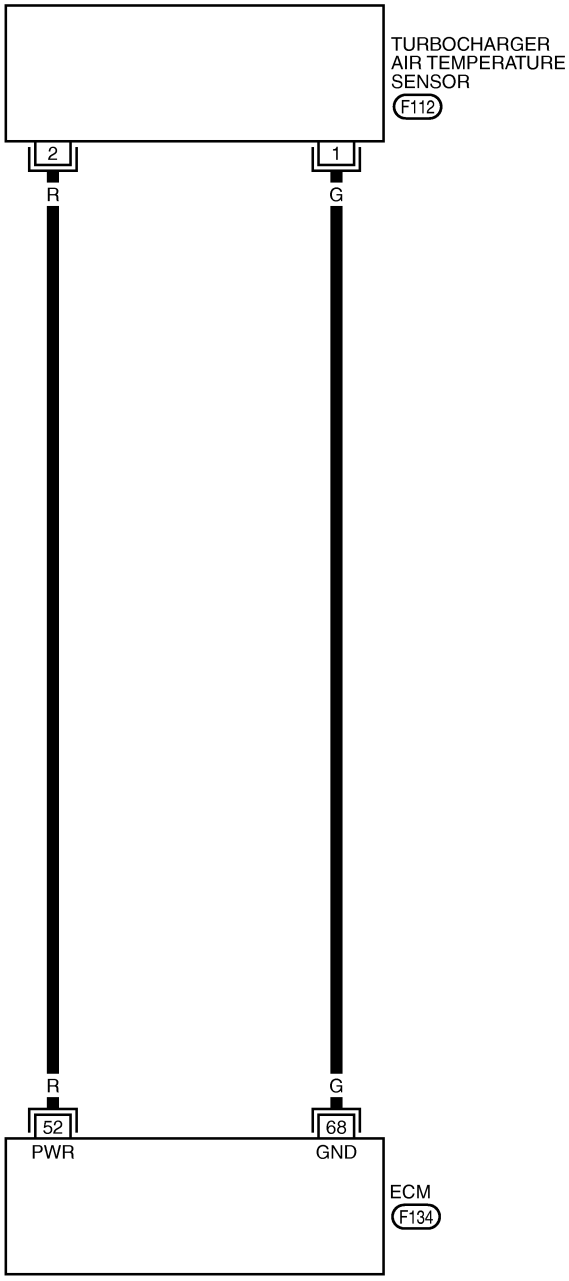


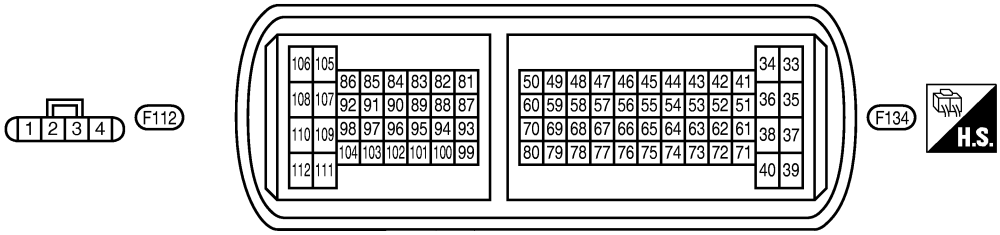
MBWA1375E

Euro 3 60 kW engine models

(Refer to EC-K9K-5 to confirm engine type.)

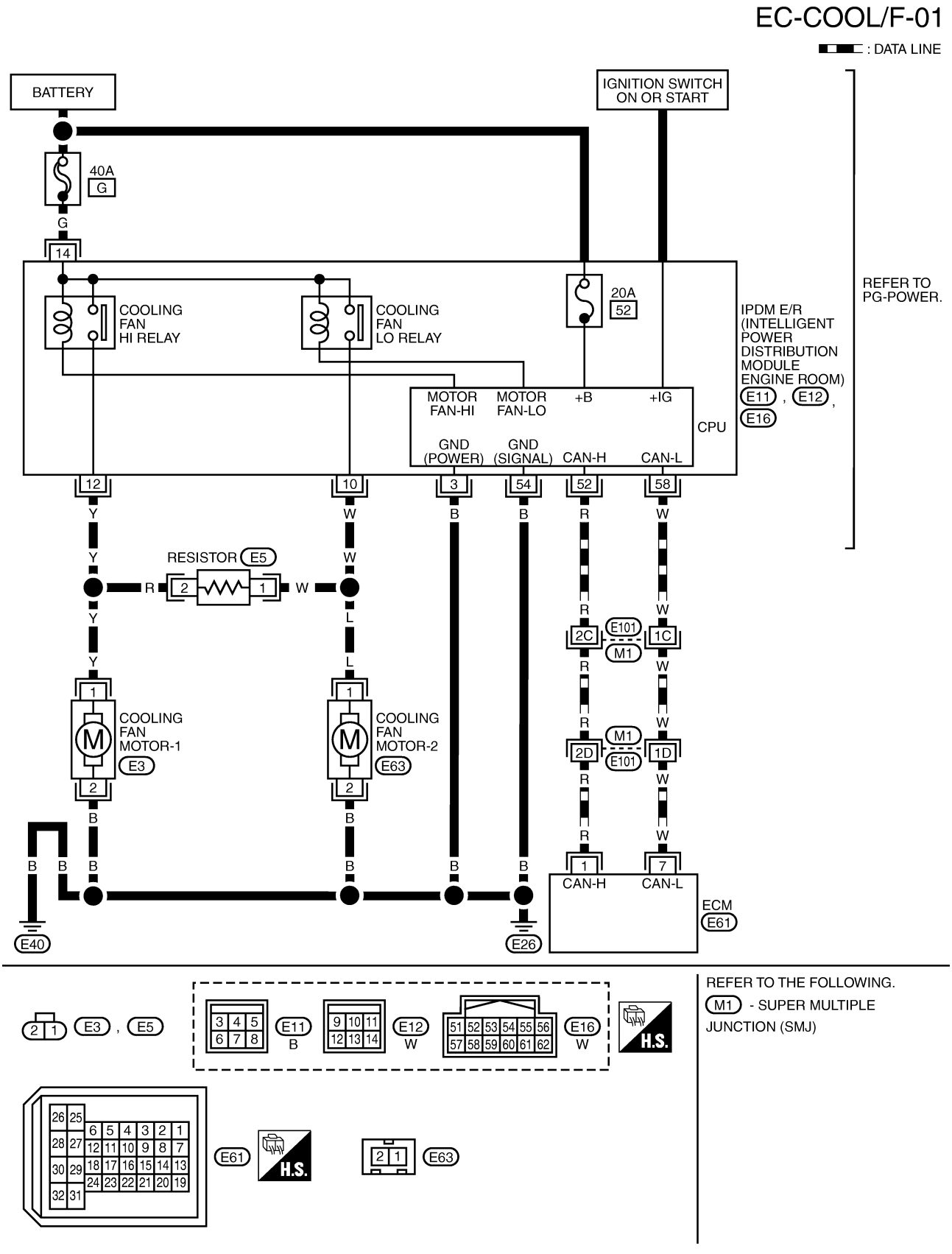
EC-BTS-02





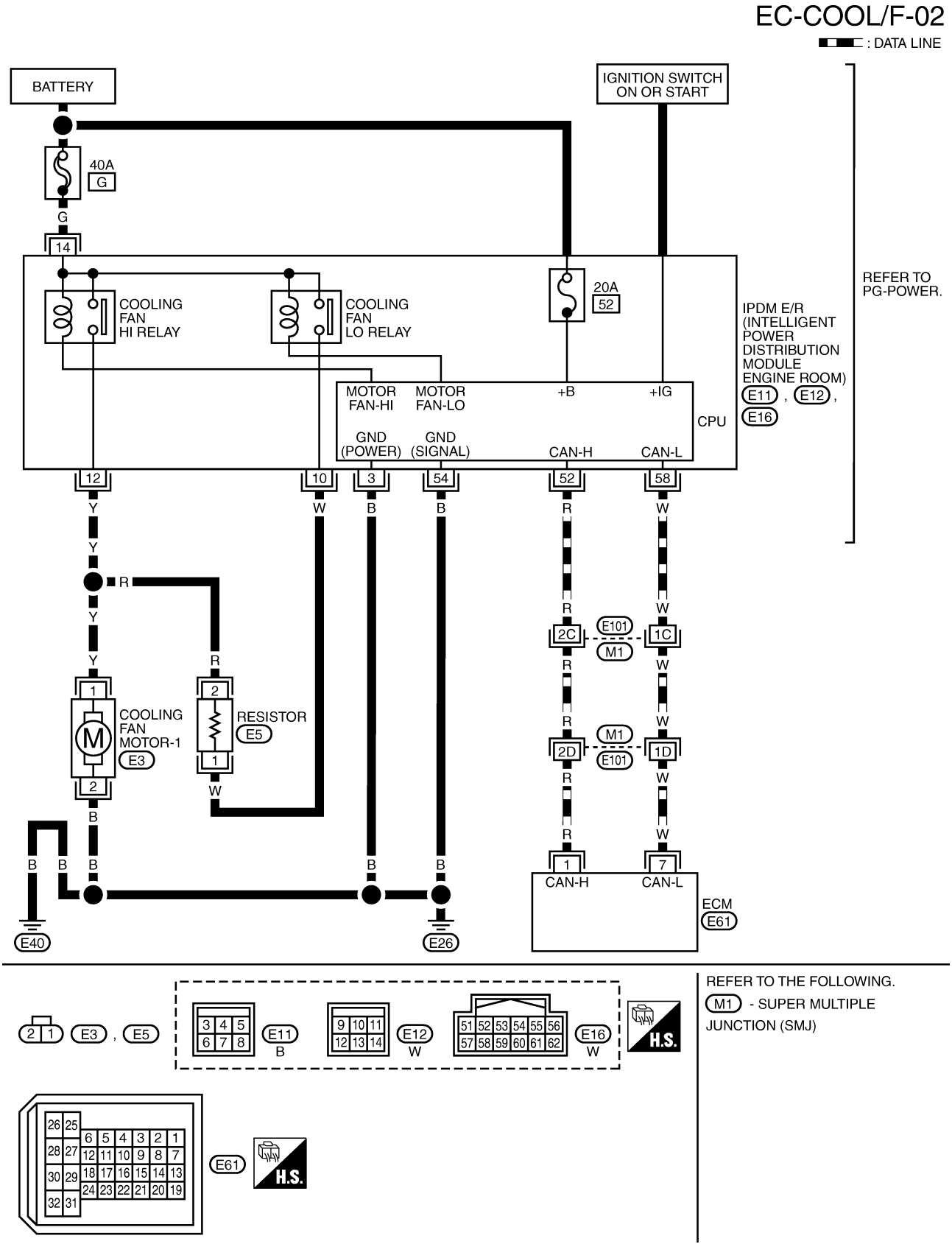
MBWA1376E

Euro 3 48 kW and 60 kW engine models with PTC heater



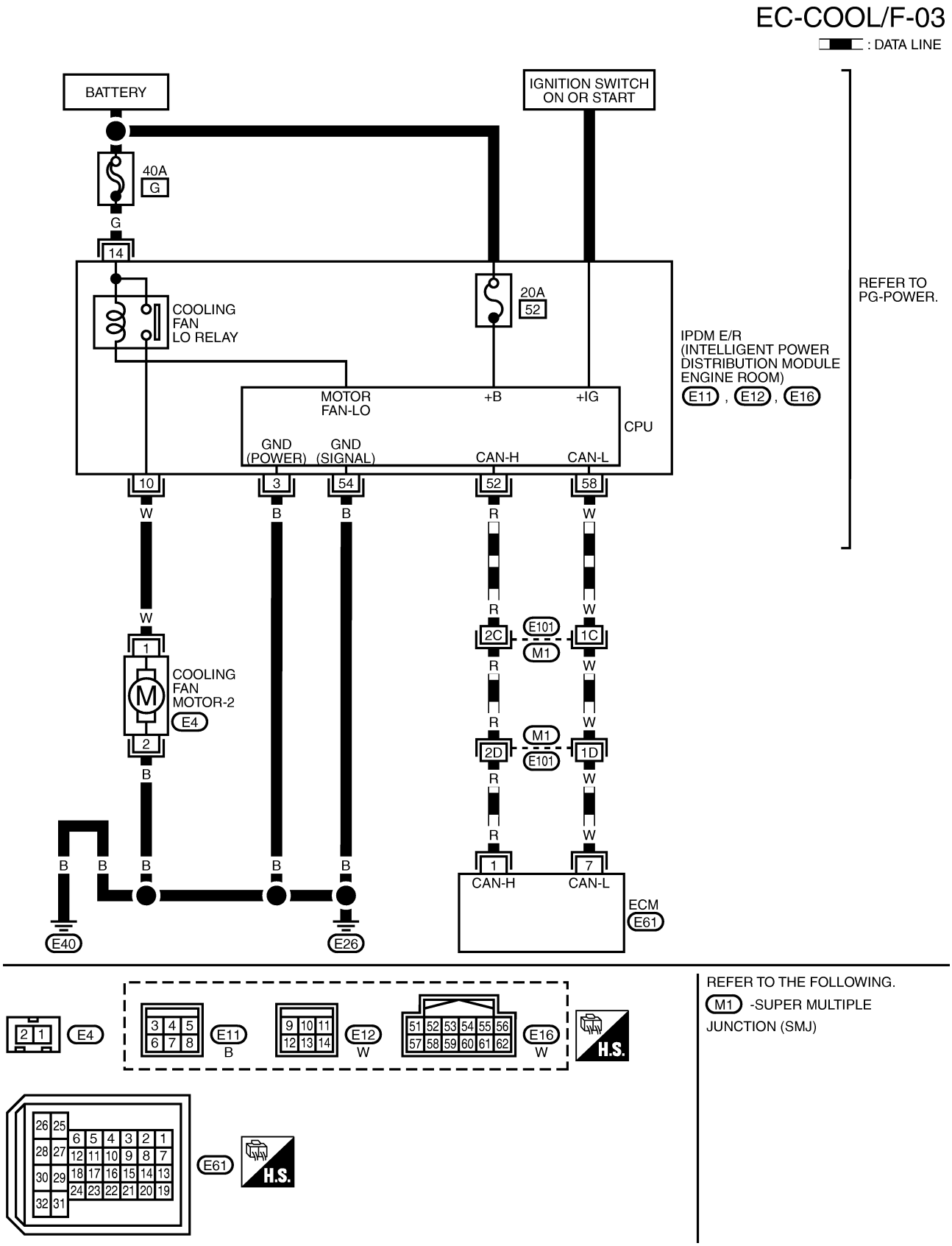
MBWA1435E

Euro 3 48 kW and 60 kW engine models with air conditioner and Euro 4 50 kW and 63 kW engine models



MBWA1436E

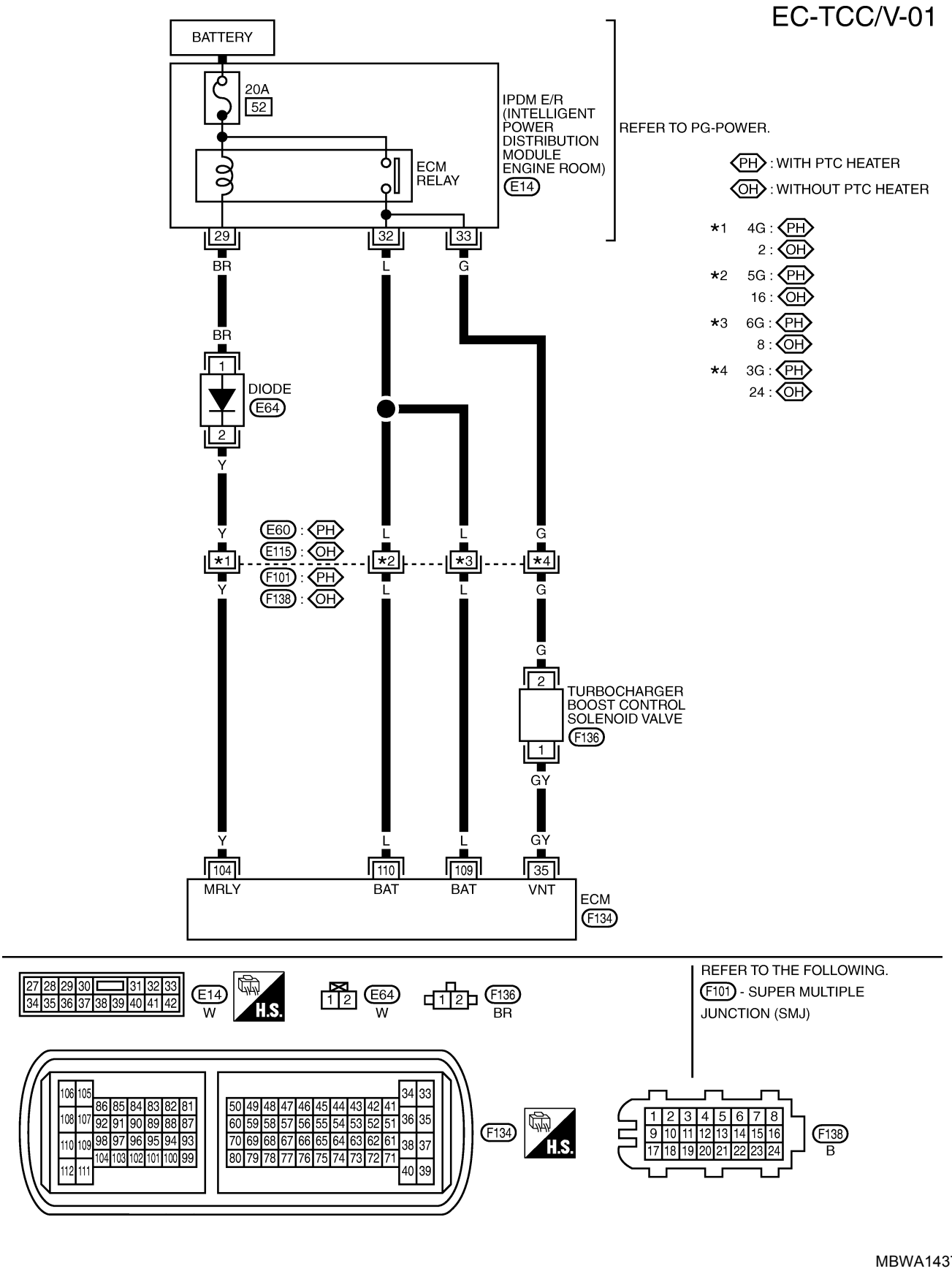
Euro 3 48 kW and 60 kW engine models without air conditioner



MBWA0511E

Euro 4 63 kW engine models

(Refer to EC-K9K-5 to confirm engine type.)

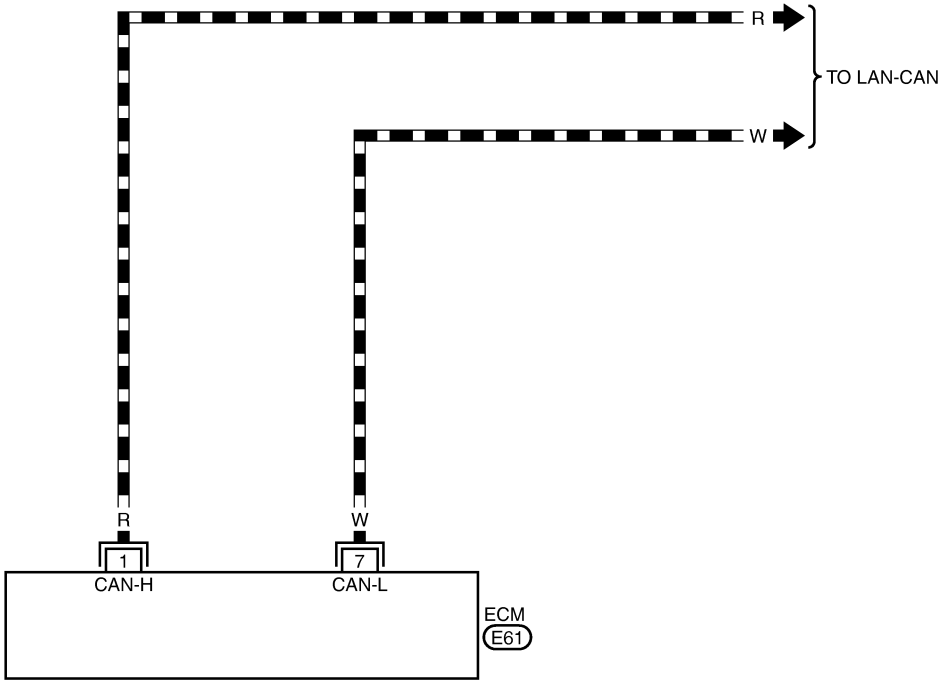


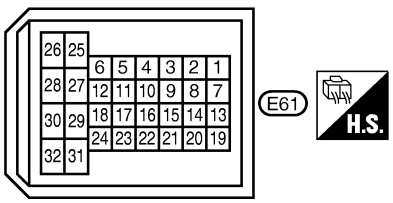
MBWA1437E

All K9K engine models

EC-CAN-01

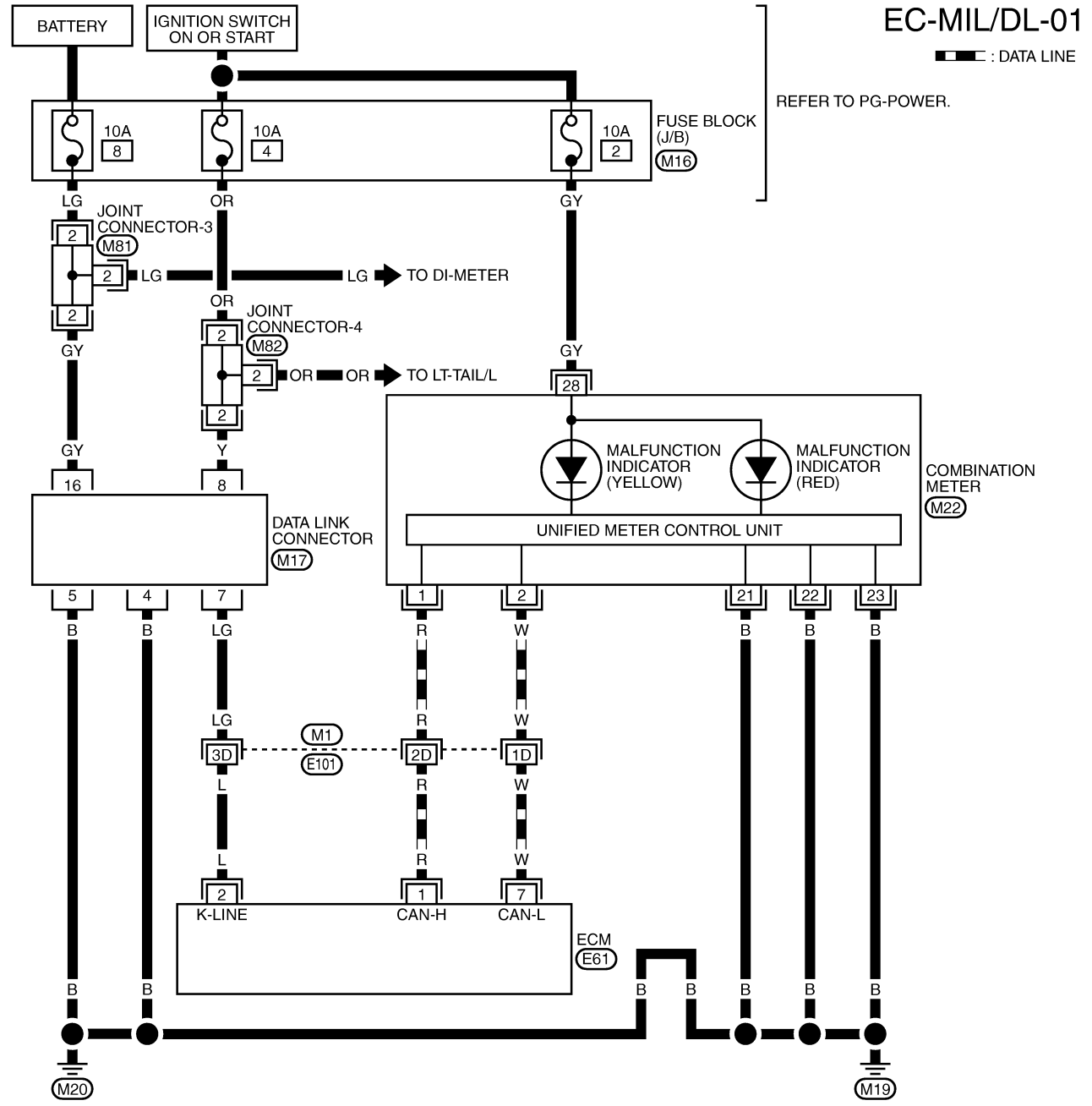
: DATA LINE

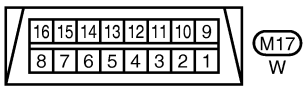


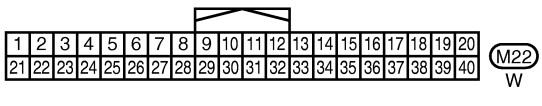


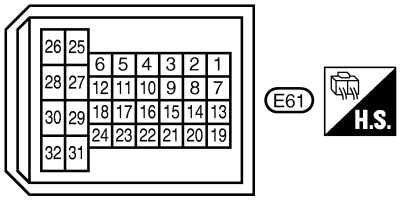
MBWA0592E

LHD models with all K9K engines





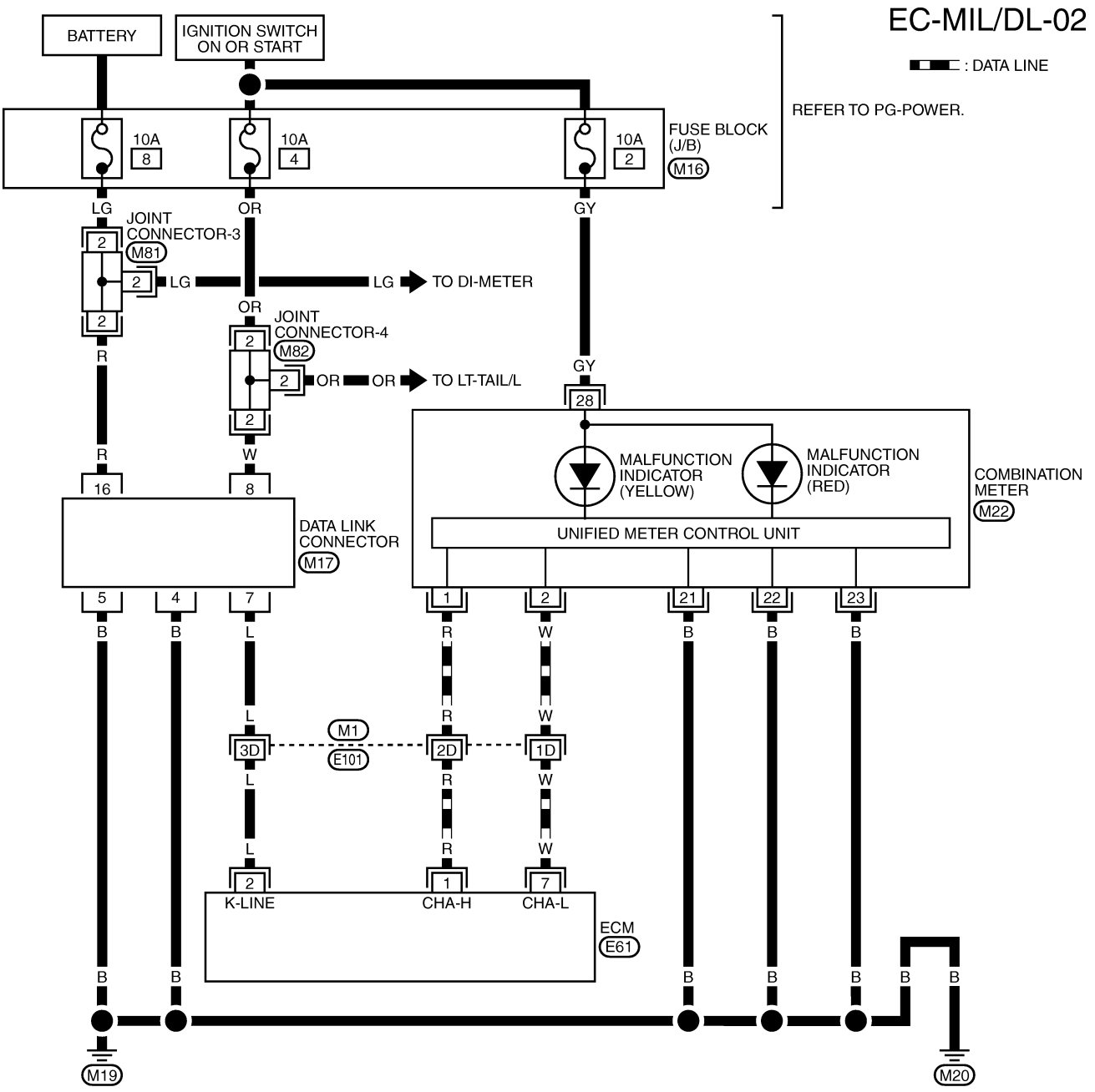




REFER TO THE FOLLOWING.
M1 - SUPER MULTIPLE JUNCTION (SMJ)
M16 - FUSE BLOCK - JUNCTION BOX (J/B)
M81 , M82 - JOINT CONNECTOR (J/C)

MBWA1438E

RHD models with all K9K engines



MBWA1440E