

8.4 Engine 104 HFM-SFI in Model 124

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Diagnosis - Diagnostic Trouble Code (DTC) Memory

Preparation for recalling diagnostic trouble code (DTC) memory

1. Connect impulse counter scan tool and adaptor for impulse counter to test connection for diagnosis (X11/4) according to connection diagram (see section 0).

Note:

Connect impulse counter scan tool as follows:

red wire to socket 16,
black wire to socket 1 and
yellow wire to:

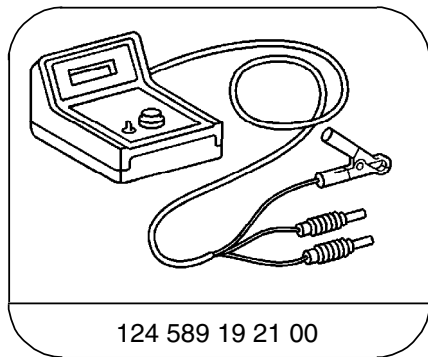
| | | |
|--------------------------|--------|----|
| Diagnostic module | socket | 3 |
| Engine control module | socket | 8 |
| EA/CC/ISC control module | socket | 14 |

2. Recall control modules' diagnostic trouble code memory and clear stored trouble codes (see section 0).

Note

The retained diagnostic trouble code (DTC) memory feature of the diagnostic module has been replaced with DTC memory which is cleared after disconnecting the vehicle's battery (DM voltage supply). In addition, the DTC readout "1" (no malfunction in system) **does not** appear after clearing the DTC memory (disconnecting the vehicle's battery). DTC readout "1" only reappears during the vehicle's subsequent trip after the diagnostic module has confirmed that all monitored systems and their respective components are ok (no malfunctions).

Special Tools



124 589 19 21 00

Pulse counter

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Diagnostic Trouble Code (DTC) Readout, Diagnostic Module

| Diagnostic Trouble Code (DTC) | Possible Cause | Remedy/Test Step ¹⁾ |
|-------------------------------|---|---|
| 1 | No malfunction in systems monitored | – |
| 2 | Heated oxygen sensor inoperative | Test HFM-SFI, Engines Vol.2, section 1. |
| 3 | Lambda control inoperative | Test HFM-SFI, Engines Vol.2, section 1. |
| 4 | Air injection inoperative | Test HFM-SFI, Engines Vol.2, section 1. |
| 5 | Exhaust gas recirculation inoperative | Test HFM-SFI, Engines Vol.2, section 1. |
| 6 | Idle speed control inoperative | Test EA/CC/ISC, sections 6/7. |
| 7 | Ignition system defective | Test HFM-SFI, Engines Vol.2, section 1. |
| 8 | Engine coolant temperature sensor, open/short circuit | Test HFM-SFI, Engines Vol.2, section 1. |
| 9 | Intake air temperature sensor, open/short circuit | Test HFM-SFI, Engines Vol.2, section 1. |
| 10 | Voltage at hot wire mass air flow sensor too high/low | Test HFM-SFI, Engines Vol.2, section 1. |
| 11 | TN-signal (rpm) at engine control module (N3/4) defective | Test HFM-SFI, Engines Vol.2, section 1. |
| 12 | Heated oxygen sensor heater, open/short circuit | Test HFM-SFI, Engines Vol.2, section 1. |
| 15 | Wide open throttle information defective | Test EA/CC/ISC, sections 6/7. |

1) Observe Preparation for Test, see 22.

Diagnosis - Diagnostic Trouble Code (DTC) Memory

| Diagnostic Trouble Code (DTC) | Possible Cause | Remedy/Test Step ¹⁾ |
|-------------------------------|--|---|
| 16 | Closed throttle position information defective | Test EA/CC/ISC, section 6/7. |
| 17 | Data exchange malfunction between individual control modules | 23 ⇒ 6.0. |
| 18 | Adjustable camshaft timing solenoid, open/short circuit | Test HFM-SFI, Engines, Vol. 2, section 1 |
| 19 | Fuel injectors open/short circuit or self-adaptation in engine control module (N3/4) at limit | Test HFM-SFI and reset engine control module adaptation to mean value, Engines, Vol. 2, section 1 |
| 20 | Speed signal not present | Test HFM-SFI, Engines, Vol. 2, section 1 |
| 21 | Purge switchover valve, open/short circuit | Test HFM-SFI, Engines, Vol. 2, section 1 |
| 22 | Camshaft position sensor signal defective | Test HFM-SFI, Engines, Vol. 2, section 1 |
| 23 | Intake manifold pressure (in base module pressure sensor- B5/2) with engine running too low/high | 23 ⇒ 7.0. |
| 24 | Starter ring gear segments and/or crankshaft position sensor defective | Test HFM-SFI, Engines, Vol. 2, section 1 |
| 25 | Knock sensors or engine control module defective | Test HFM-SFI, Engines, Vol. 2, section 1 |
| 26 | Upshift delay defective | Test HFM-SFI, Engines, Vol. 2, section 1 |
| 27 | Not used | – |
| 28 | Engine coolant temperature sensor (coolant temperature change monitor) | Test HFM-SFI, Engines, Vol. 2, section 1 |

¹⁾ Observe Preparation for Test, see 22.

Electrical Test Program - Component Locations

Model 124

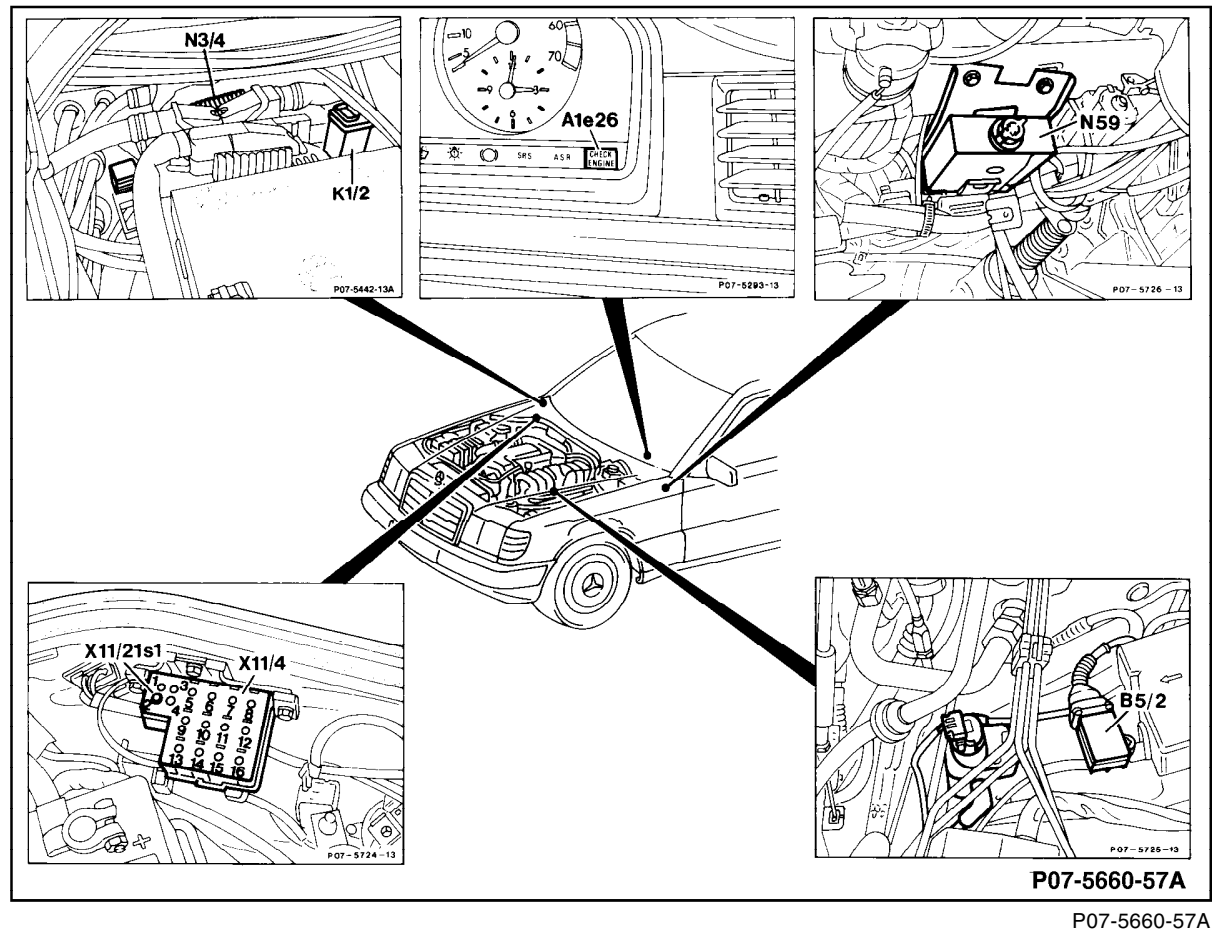


Figure 1

- A1e26 "CHECK ENGINE" malfunction indicator lamp
- B5/2 Pressure sensor (DM)
- K1/2 Overvoltage protection relay module
87E/87L/30a, 9-pole
- N3/4 Engine control module (HFM-SFI)
- N59 Diagnostic module - California version
- X11/4 Diagnostic connector
(diagnostic trouble code 16-pole)
- X11/21s1 Pushbutton (with LED)

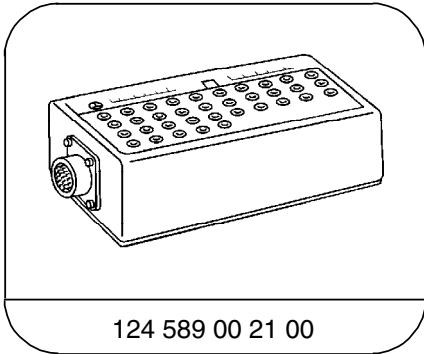
Electrical Test Program - Preparation for Test

Preliminary work: Diagnosis – Diagnostic Trouble Code (DTC) Memory 11

1. Ignition: **OFF**
2. Remove covering from left instrument panel.
3. Remove diagnostic module (N59).
3. Connect socket box with test cable
(according to connection diagram on next page).

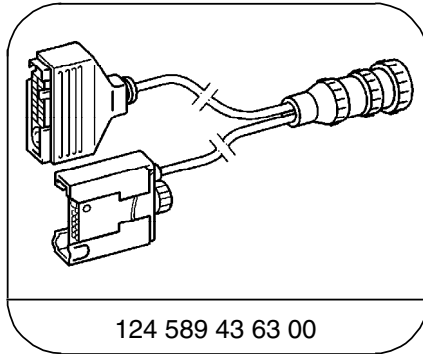
Electrical wiring diagrams, see Electrical Troubleshooting Manual.

Special Tools



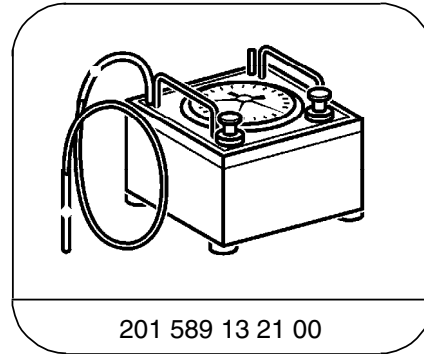
124 589 00 21 00

35-pin socket box



124 589 43 63 00

22-pin test cable



201 589 13 21 00

Tester

Equipment

Digital multimeter ¹⁾

Sun DMM-5
Fluke models 23, 83, 85, 87

¹⁾ Available through the MBUSA Standard Equipment Program.

Electrical Test Program - Preparation for Test

Connection Diagram – Socket Box Model 124

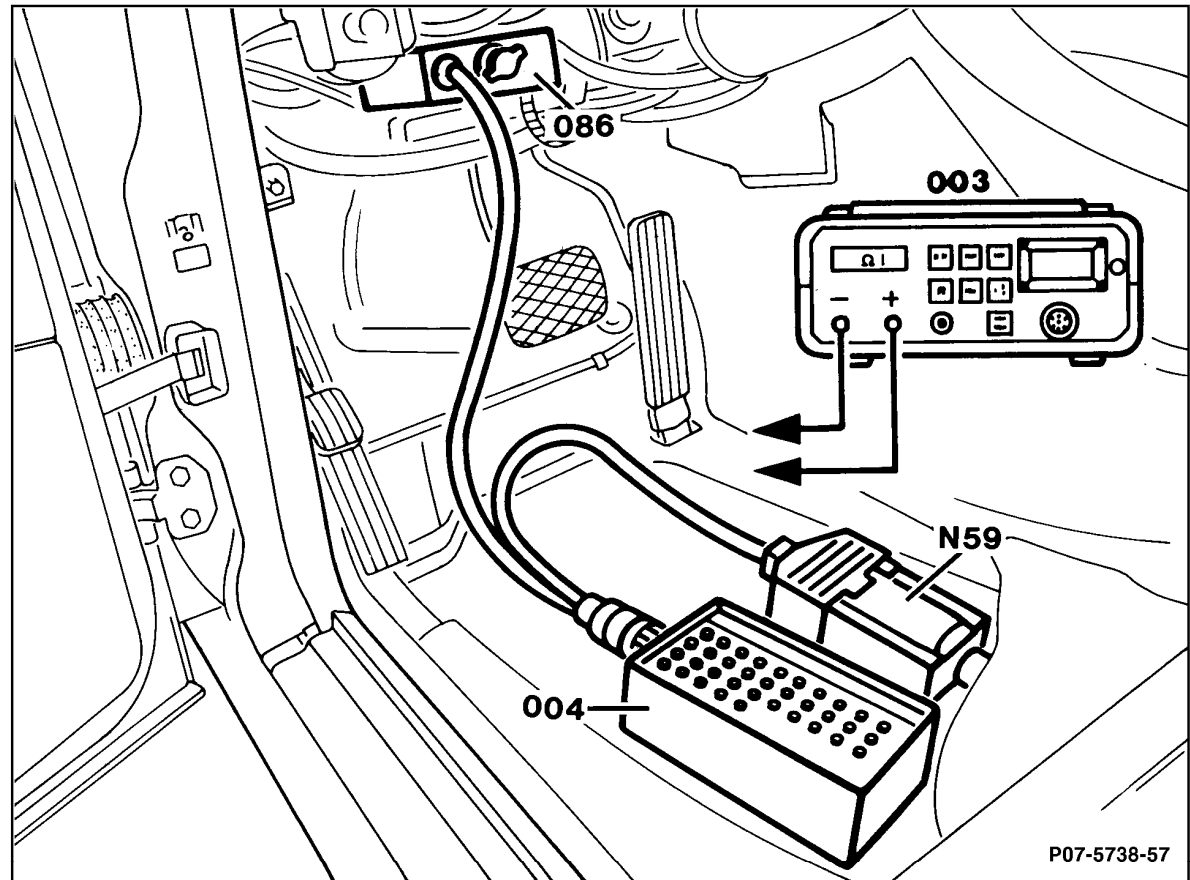


Figure 1

- 003 Multimeter
- 004 Socket box (35-pole)
- 086 Test cable
- N59 Diagnostic module

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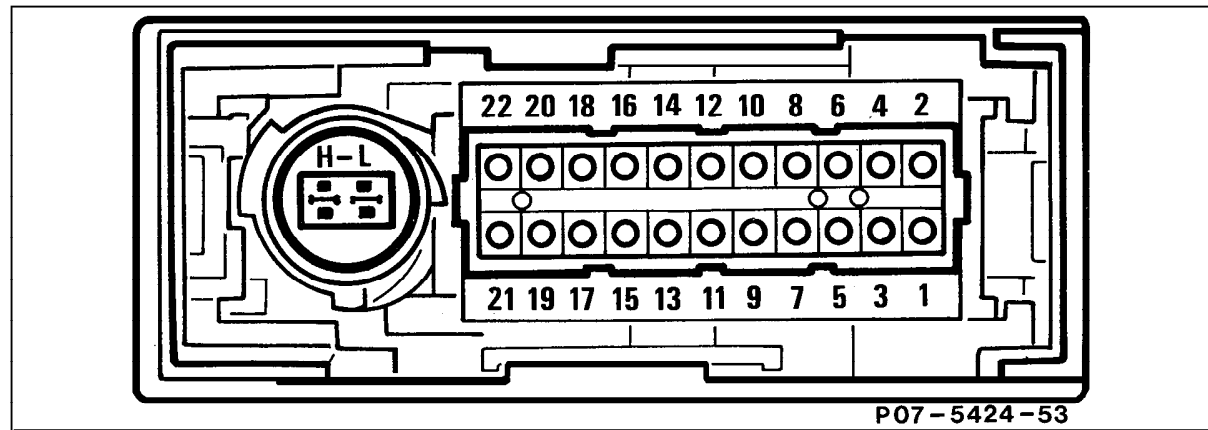
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Electrical Test Program - Preparation for Test

Terminal Layout of Diagnostic Module Model 124

Figure 2

- | | |
|---------|--|
| 1 | Main ground (behind instrument cluster, W1) |
| 2 | Ground bridge, coding |
| 3 | Voltage supply, circuit 87 |
| 4 | Voltage supply, circuit 30 (fuse 9) |
| 5 | Not used |
| 6 | Diagnostic wire at diagnostic connector X11/21 |
| 7 | Not used |
| 8 | Not used |
| 9 | "CHECK ENGINE" malfunction indicator lamp |
| 10 | Main ground (behind instrument cluster, W1) |
| 11 – 17 | Not used |
| 18 | Diagnostic module pressure sensor |
| 19 – 21 | Not used |
| 22 | Diagnostic module pressure sensor |
| H | Data line (+) Controller Area Network (Engine control module, electronic accelerator/cruise control/idle speed control module) |
| L | Data line (-) Controller Area Network (Engine control module, electronic accelerator/cruise control/idle speed control module) |

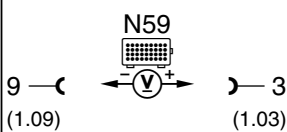
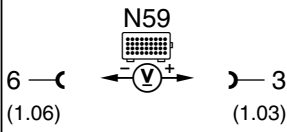
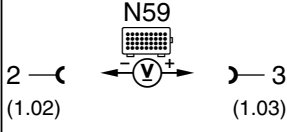
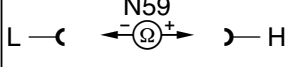


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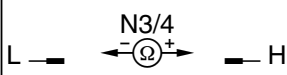
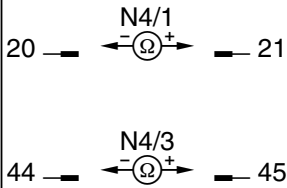
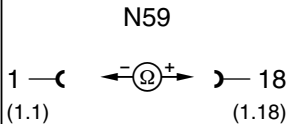
Electrical Test Program - Test

| Test step DTC | Scope of test | Test connection | Test condition | Nominal value | Possible cause/remedy |
|-------------------------|---|--|---------------------|---------------|---|
| ⇒ 1.0 | Diagnostic module (N59) Voltage supply Circuit 30 | <p>N59</p> <p>1 — (1.01) ← V → — 4 (1.04)</p> | Ignition: ON | 11 – 14 V | Fuse 9, open circuit, ⇒ 1.1. |
| ⇒ 1.1 | Main ground (behind instrument cluster, W1) | <p>N59</p> <p>1 — (1.01) ← V → — 16</p> <p>X11/4</p> | Ignition: ON | 11 – 14 V | Main ground (W1) |
| ⇒ 2.0 | Diagnostic module (N59) Voltage supply Circuit 87E | <p>N59</p> <p>1 — (1.01) ← V → — 3 (1.03)</p> | Ignition: ON | 11 – 14 V | Overvoltage protection relay module (K1/2), open circuit. |

Electrical Test Program - Test

| Test step DTC | Scope of test | Test connection | Test condition | Nominal value | Possible cause/remedy |
|------------------|---|---|--|---------------|---|
| ⇒ 3.0 | Control of "CHECK ENGINE" malfunction indicator lamp |  | Ignition: ON | 11 – 14 V | N59. |
| ⇒ 4.0 | Control of pushbutton (X11/21) |  | Ignition: ON Press pushbutton (X11/21). | 11 – 14 V | Open circuit, Pushbutton (X11/21), N59. |
| ⇒ 5.0 | Diagnostic module coding |  | Ignition: ON | 11 – 14 V | Open circuit. |
| ⇒ 6.0 17 | CAN data bus |  | Ignition: OFF Unplug test cable or diagnostic module. Test with ohmmeter directly at the the two wide connections of the diagnostic module connector (see Figure 2). | 55 – 65 Ω | Data line, ⇒ 6.1, ⇒ 6.2. |

Electrical Test Program - Test

| Test step DTC | Scope of test | Test connection | Test condition | Nominal value | Possible cause/remedy |
|-------------------------|---|---|--|---|----------------------------------|
| ⇒ 6.1 17 | CAN element in engine control module (N3/4) Resistance |  <p>N3/4 L — Ω — H</p> | Unplug connector 1 at N3/4 and test directly with an ohmmeter at N3/4 (see Figure 3). | 115 – 125 Ω | N3/4. |
| ⇒ 6.2 17 | CAN element in EA/CC/ISC (N4/1) or CC control module (N4/3) Resistance |  <p>N4/1 20 — Ω — 21</p> <p>N4/3 44 — Ω — 45</p> | Remove N4/1 or N4/3 in the passenger side footwell. Test directly at N4/1 or N4/3 connector 1 pin 20 and 21 (see Figures 4 and 5). | 115 – 125 Ω | N4/1 or N4/3. |
| ⇒ 7.0 23 | Diagnostic module pressure sensor (B5/2) Voltage |  <p>N59 1 — Ω — 18 (1.1) (1.18)</p> | Connect pressure gauge to B5/2 with Y-distributor (see Figure 6) Ignition: ON Engine: at Idle | > 3.5 V < 2 V and pressure rises to > 500 mbar | Vacuum line, open circuit, B5/2. |

Electrical Test Program - Test

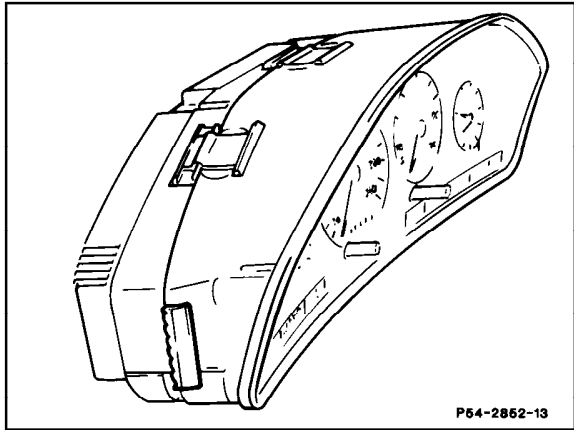


Figure 1

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W1 Main ground (behind instrument cluster)

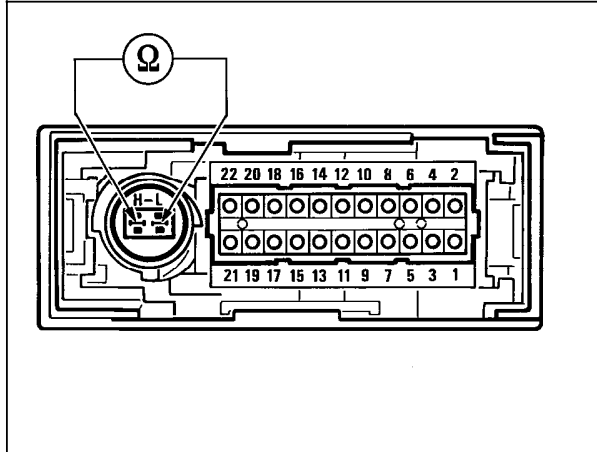


Figure 2

P07-5787-13

N59 Diagnostic module connector

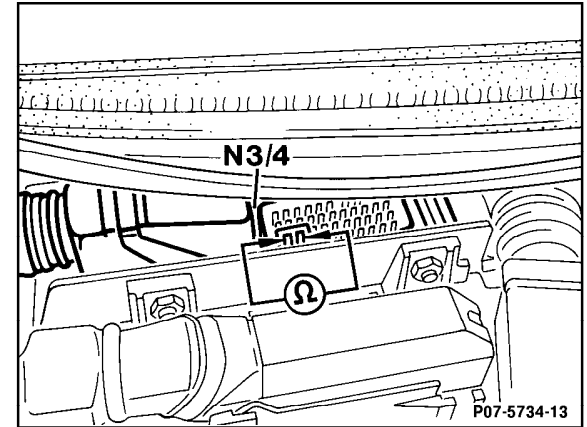


Figure 3

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N3/4 Engine control module (for HFM-SFI vehicles)

Electrical Test Program - Test

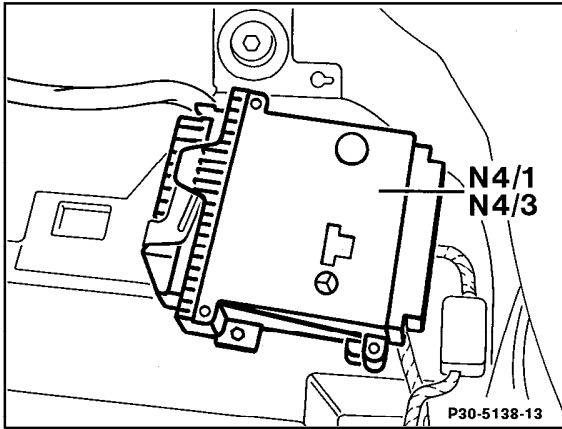


Figure 4 P30-5138-13

N4/1 Electronic accelerator/cruise control/idle speed control module
 or
 N4/3 Cruise control/idle speed control module

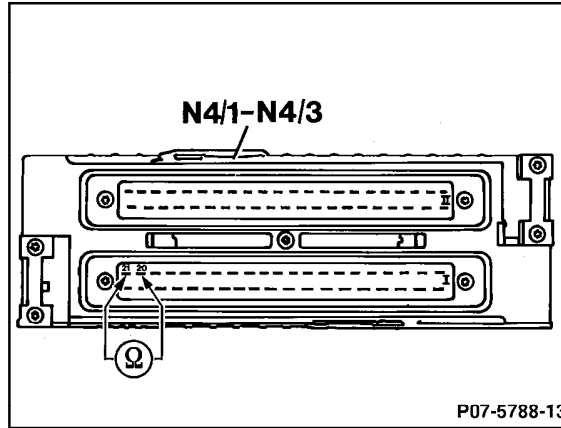


Figure 5 P07-5788-13

N4/1 Electronic accelerator/cruise control/idle speed control module
 or
 N4/3 Cruise control/idle speed control module

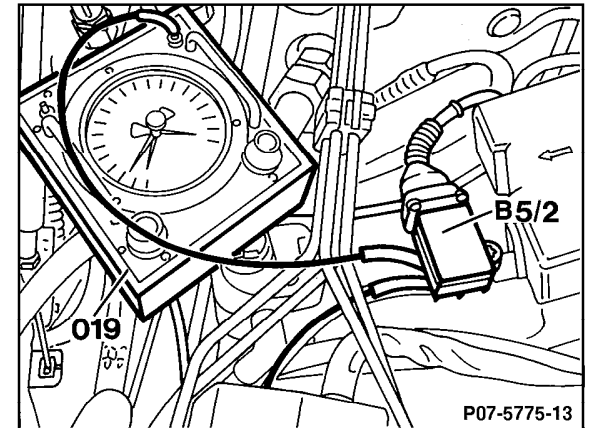


Figure 6 P07-5775-13

B5/2 Diagnostic module pressure sensor
 019 Pressure gauge