

3.3 Engine 606.962, Model 210,
as of production start-up 03/97 (Model year 1998)

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Diagnosis

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Diagnosis - Diagnostic Trouble Code (DTC) Memory

Note regarding diagnostic trouble code (DTC) readout:

- DTC memory: Fault display
 - Actual faults:** are on a **grey** background
 - Stored faults:** are on a **light** background

The signal plausibility is checked on all input and output connections during operation.

All malfunctions which occur for an extended period of 5 secs, are stored in the diagnostic trouble code memory of the engine control module (IFI) (N3/7) except; control deviations (boost pressure, EGR etc.), in which case the malfunction is stored after 5 - 10 seconds.

The DTC memory remains active even if the ignition is turned "OFF" or the vehicle's battery is disconnected.

With emission related faults the CHECK ENGINE MIL (A1e26) lights up and/or the multifunction indicator displays:

CHECK ENGINE
ENGINE ELECTRONICS

Such faults are identified with an OBD fault code, see: 13/1

- EGR lifting sender (B28/3) or hot film MAF sensor (B2/5)
- EGR valve pressure transducer (Y31/1)
- Boost pressure control/pressure control flap vacuum transducer (Y31/5)

Fault freeze frame data

Additionally, ambient conditions present at the time the fault occurs, can be displayed with the HHT. Only those freeze frame data are stored which were present when the fault first occurred. The freeze frame data may be indicated on several screen displays (up to 8 screen displays). The last two screen displays are for development purposes only.

Screen displays with the result √/F indicate the cause of the fault e.g.

- Voltage too high
- Voltage too low
- Signal too large
- Signal too small
- Value implausible

Limp mode for missing signals.

The engine control module (IFI) (N3/7) will go into limp mode operation if important input signals are not received or other serious malfunctions occur.

Limp mode operation may result in:

- Performance reduction/reduction of maximum engine rpm.
- Switching off anti-vibration control.
- EGR system malfunction.
- Cruise control malfunction.
- Boost control malfunction.

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Notes for HHT

- **Loose connections:**
Loose connections are stored if they occur several times in a certain time period. Therefore, they can appear only as stored DTC's and never as actual DTC's.
- **Nominal values:**
All nominal values relative to the actual values shown on the HHT are listed in the Diagnostic Manual, Diesel Engines, Volume 1.1, section A.
- **Actual values for engine coolant temperature (ECT):**
In case of an open or short circuit, the actual value is immediately replaced by a substitute value which is very close to the actual value. Therefore, a fault can not be recognized clearly. A readout of the fault is possible only via the diagnostic trouble code (DTC) memory.
- **Actual value for engine rpm:**
In case of the engine rpm, the HHT display indicates under menu selection 3/1 the closed throttle (idle) speed **nominal value** calculated by the control module on the **left** and the rpm **actual value** on the **right**.
- **Actual value for injection quantity:**
In case of the injection quantity, the HHT display indicates under menu selection 3/2 engine test the injection quantity **nominal value** calculated by the control module on the **left** and the injection quantity **actual value** on the **right**.
- **Actual value manifold pressure for "tuned", variable length runner intake manifold (non-turbo engine only):**
The manifold pressure in the "tuned" intake manifold is indicated on the HHT screen under menu selection 3/2, engine test.

The intake manifold pressure **nominal value**, calculated by the control module, is displayed on the **left** and the intake manifold pressure **actual value** is displayed on the **right** side of the HHT screen. The values should differ from each other only slightly. The permissible tolerances have not been established.

Notes regarding the Drive Authorization System (DAS) Stage 3.

- The activation of the drive authorization system stage 3 takes place only from the electronic ignition-starter switch (EIS) control module (N73) via the CAN data bus to the engine control module (IF1) (N3/7). After activation of the DAS, the engine control module renders the fuel injection system inoperable. This drive authorization system stage 3 can only be activated or de-activated using the ignition key. The engine control module (IF1) (N3/7) and the RCL or electronic ignition-starter switch (EIS) control module (N73) are permanently matched to one another via an identification code. This identification code can not be erased (see HHT actual value "drive authorization system" menu selection 3/7). Troubleshooting of an engine, RCL, or electronic ignition-starter switch control module by swapping control modules from another vehicle is no longer possible. Version coding must be performed on the engine control module with the HHT before the first engine start. The VIN number will be inputted into the engine control module when it is "married" to the RCL control module.



If an engine control module is swapped for testing purposes, a maximum of 40 starts can be undertaken before the engine and RCL control modules will be "married".

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Version coding with HHT

Version coding can be performed automatically and manually only with the Hand-Held Tester (see menu selection 5 "Version coding").

- **Automatic**

Before removing the engine control module (IFI) (N3/7), read existing version code with HHT. After installation of the new control module, enter the previously read version code (see menu program in HHT).

- **Manually**

If the code number can **not** be read, the vehicle equipment/version must be determined. The corresponding code number is obtained from the Spare Parts Microfiche, Group 54 and manually entered with the HHT.

The following vehicle version data must be observed for version coding:

- Vehicle model
- 5-speed automatic transmission with cruise control
- Country version

Upon the return of a control module back to the parts stock be certain to erase the code number first.

Trial installation of a control module from another vehicle is **not** possible.
Trial installation of a new control module from spare parts stock is possible.

Driving cycle:

A drive cycle is reached when the following conditions are met:

- Coolant temperature > 60° C
- Stop engine
- Wait 5 seconds
- Start engine
- Run engine at idle for 2 minutes
- Perform full load acceleration with gear selector level in "D" up to 55 mph and then:
- Allow vehicle to coast to 40 mph


Prerequisite for DTC memory readout:

1. Review 11, 12, 21, 22, 23, 31,
2. Fuse on passenger-side fuse and relay box (K40/4) in order,
3. Connect HHT to data link connector (X11/4, 38-pole) according to connection diagram (see section 0), yellow wire to socket 4.

Electrical wiring diagram:

Electrical Troubleshooting Manual, Model 210


Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	OBD	Possible cause	DTC Description	Test step/Remedy ¹⁾
		No malfunction in system		–
P0100	P0100	Hot film MAF sensor (B2/5)	13 ≧ 1	23 ⇒ 26.0
P0105	P0235	Pressure sensor (B28)	13 ≧ 2	23 ⇒ 7.0
P0110	P0110	IAT sensor (B17)	13 ≧ 3	23 ⇒ 6.0
P0115	P0115	ECT sensor (B11)	13 ≧ 4	23 ⇒ 5.0
P0180	P0180	Fuel temperature sensor (Y1/1b1)	13 ≧ 5	23 ⇒ 15.0
P0300	P0300	Compression ignition miss	13 ≧ 6	See DM, Diesel Engines, Section B9 and B11
P0500	P0500	VSS		N47-2, See DM, C&D, Vol. 3, Section 9.3, 23
P0600	P0600 ²⁾	CAN data bus	13 ≧ 7	23 ⇒ 16.0
P0700 P0702	P0700 P0715 P0720 P0730 P0740 P0702 P0743 P0748 P0753 P0763	Read out: DTC code ETC		N15/1, DM, C&D, Vol.1, Section 2.3, 13

1) Observe Preparation for Test, see 22.


2) The DTC P0600 can be displayed even if no malfunction is present

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	OBDDTC	Possible cause	DTC Description	Test step/Remedy ¹⁾
P0703		Stop lamp switch (S9/1)		DM, C& D, Vol. 3, Section 9.3, 23
P1105	P1105	Atmospheric pressure sensor in control module	13 ≥ 8	N3/7
P1220	P0200	Fuel quantity actuator (IFI) (Y23/1)	13 ≥ 9	23 ⇒ 9.0
P1221	P0600	CAN communication ASR/ESP/ETC interrupted		Readout DTC memory of ASR/ESP/ETC control modules.
P1222	P0220	IFI/DFI accelerator pedal position sensor (R25/2)	13 ≥ 10	23 ⇒ 11.0
P1223	P0200	Fuel rack position sensor (Y23/11)	13 ≥ 11	23 ⇒ 10.0
P1330		Starter activation		23 ⇒ 27.0
P1335	P0725	CKP sensor (IFI) (L5/6)	13 ≥ 12	23 ⇒ 8.0
P1401		EGR lifting sender (B28/3)		23 ⇒ 25.0
P1403 P1404	P0400	EGR valve pressure transducer (Y31/1)	13 ≥ 13	23 ⇒ 24.0
P1470	P0243	Boost pressure control/pressure control flap vacuum transducer (Y31/5)	13 ≥ 14	23 ⇒ 13.0
P1480	P0380	Preglow control	13 ≥ 15	23 ⇒ 19.0
P1481	P1365 P1367 P1369	Glow plug failure	13 ≥ 16	23 ⇒ 21.0

¹⁾ Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	OBDDTC	Possible cause	DTC Description	Test step/Remedy ¹⁾
P1482	P0380	Preglow control module (N14/2)	13 ≥ 17	23 ⇒ 20.0
P1520		CC switch (S40)		23 ⇒ 12.0
P1610	P0560	Passenger-side fuse and relay module (K40/4)	13 ≥ 18	23 ⇒ 4.0
P1611	P0200	Internal reference voltage (2.5 V)	13 ≥ 19	N3/7
P1612	P0560	Engine control module (IFI) (N3/7) voltage, circuit 15	13 ≥ 20	23 ⇒ 23.0
P1613	P0200	Engine control module (IFI) (N3/7)	13 ≥ 20	N3/7
P1614	P0200	Engine control module (IFI) (N3/7) microprocessor/fuel calculation	13 ≥ 22	N3/7
P1615	P0560	Engine control module (IFI) (N3/7) voltage supply		23 ⇒ 1.0
P1617	P0200	N3/7 EEPROM or incorrectly coded	13 ≥ 23	
P1622	P0215	IFI electrohydraulic shut-off actuator (Y1/1)	13 ≥ 24	23 ⇒ 14.0
P1630		Drive authorization signal		23 ⇒ 3.0
P1705		ETC control module (N15/3)		23 ⇒ 17.0

1) Observe Preparation for Test, see 22.

Diagnosis – Complaint Related Diagnostic Chart (Preglow System)

Prior to Testing:

1. Review 11, 12, 21, 22, 23, 31

Complaint/Problem	Possible cause	Test step/Remedy ¹⁾
Preglow indicator lamp does not illuminate with glow/starter switch ON, however engine can be started.	Preglow indicator lamp.	A1
Preglow indicator lamp does not illuminate, engine can not be started.	Voltage supply to preglow control module (N14/2) is faulty or preglow control module (N14/2) is defective.	23 ⇒ 3.0 23 ⇒ 27.0
Preglow indicator lamp illuminates for approx. 1 minute while driving.	Open circuit at glow plugs.	23 ⇒ 21.0
Preglow indicator lamp illuminates while driving or illuminates intermittantly.	Short circuit N14/2 Communication between N3/7 and N14/2 interrupted.	23 ⇒ 19.0 23 ⇒ 20.0

¹⁾ Observe Preparation for Test, see 22.

Note regarding preglow circuit:

A melt-down type fuse is installed in the preglow endstage circuit.

If a short circuit occurs within the glow plugs or a short circuit occurs within the wires to the glow plugs, the circuit within the glow plug endstage is interrupted.

After repair of the shortcircuit, N14/2 **must** be replaced.

A malfunction of a glow plug is **not** indicated by the preglow indicator lamp.

Diagnosis – Trouble Code Description

➤ 1		Hot film MAF sensor (B2/5)
1	System DTC code OBD trouble code	P0100 P0100
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately upon fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Hot film MAF sensor signal threshold values and plausibility (air flow after air cleaner element) Threshold values of voltage supply
5	Voltage supply Voltage supply Signal voltage Signal voltage Engine rpm	< 4.7 V longer than 2 seconds > 5.0 V longer than 2 seconds > 4.7 V longer than 2 seconds < 0.2 V longer than 2 seconds < 650 rpm and current airflow (mass) < 280mg/H or > 700mg/H longer than 10 seconds

Diagnosis – Trouble Code Description

≥ 2		Pressure sensor (B28)
1	System DTC code OBD trouble code	P0105 P0235
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately upon fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Intake manifold pressure is sensed by pressure sensor (B28) and is signalled to the engine control module (IFI) (N3/7)
5	Voltage supply Voltage supply Signal voltage Signal voltage Engine rpm	The engine control module (IFI) tests the voltage values < 4.7 V longer than 2 seconds > 5.0 V longer than 2 seconds > 4.6 V longer than 2 seconds < 0.4 V longer than 2 seconds < 650 rpm and the difference between the intake manifold pressure and atmospheric pressure > 150mbar longer than 6 seconds

Diagnosis – Trouble Code Description

≥ 3		IAT sensor (B17)
1	System DTC code OBD trouble code	P0110 P0110
2	Storage of DTC and activation of CHECK ENGINE MIL	After two consecutive trips with fault
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	The engine control module (IFI) (N3/7) checks the current voltage at the IAT sensor to the voltage threshold values. If the threshold values are exceeded, an alternate value is established.
5	Signal voltage Signal voltage	The engine control module (IFI) (N3/7) checks the voltage values. > 4.7 V longer than 2 seconds < 0.2 V longer than 60 seconds

Diagnosis – Trouble Code Description

≥ 4		ECT sensor (B11)
1	System DTC code OBD trouble code	P0115 P0115
2	Storage of DTC and activation of CHECK ENGINE MIL	After two consecutive trips with fault
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	<p>After ignition: "ON" an internal elapsed time span occurs within the engine control module (IFI) (N3/7) , this time span is at: Coolant temperature of: > 10 °C 2 minutes Coolant temperature of: < 9 °C > 5 minutes The internal time span within the engine control module (IFI) (N3/7) is interrupted if the engine rpm is: < 100 rpm or the injection pump injection stroke is < 15mg/ per stroke.</p> <p>If the internal time span has elapsed and the coolant temperature has not attained 5 °C or has not increased to 40 °C, the ECT sensor is then recognized as defective.</p>
5	Signal voltage Signal voltage	<p>The engine control module (IFI) (N3/7) checks the voltage values. < 0.2 V longer then 500milli-seconds > 4.7 V longer then 500milli-seconds With an engine rpm of > 1000 rpm and with an injection amount of > 15mg/stroke, the coolant temperature (after 2-5 minutes) must attain a value of 5 °C, or increase to > 40 °C (depending on coolant temperature with ignition: ON), other wise a fault will be stored in the DTC memory.</p>

Diagnosis – Trouble Code Description

≥ 5		Fuel temperature sensor (Y1/1b1)
1	System DTC code OBD trouble code	P0180 P0180
2	Storage of DTC and activation of CHECK ENGINE MIL	After two consecutive trips with fault
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	The engine control module (IFI) (N3/7) checks the current voltage value of the fuel temperature sensor to the threshold values. If the threshold values are exceeded, an alternate value is established.
5	Signal voltage Signal voltage	The engine control module (IFI) (N3/7) checks the voltage values. < 0.2 V longer than 2 seconds > 4.7 V longer than 2 seconds

≥ 6		Compression ignition miss
1	System DTC code OBD trouble code	P0300 P0300
2	Storage of DTC and activation of CHECK ENGINE MIL	After two consecutive trips with fault
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Uneven engine rpm
5	Engine rpm Injection amount ECT	450-1400 rpm/min 2-30mg/stroke > 20 °C

Diagnosis – Trouble Code Description

➤ 7		CAN data bus
1	System DTC code OBD trouble code	P0600 P0600
2	Storage of DTC and activation of CHECK ENGINE MIL	After two consecutive trips with fault
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	The combination instrument cluster sends to the engine control module (IFI) (N3/7) data within a time raster. If the data is not received within 1 second, a defective combination instrument cluster is recognized. During operation, the CAN connection resistance value is monitored via the IFI control module. At the same time, the CAN element within the IFI control module is checked as well.

➤ 8		Atmospheric pressure sensor in control module
1	System DTC code OBD trouble code	P1105 P1105
2	Storage of DTC and activation of CHECK ENGINE MIL	After two consecutive trips with fault
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	
5	Signal voltage Signal voltage	The engine control module (IFI) (N3/7) checks the voltage values > 4.7 V longer than 2 seconds < 2.2 V longer than 2 seconds

Diagnosis – Trouble Code Description

➤ 9		Fuel quantity actuator (Y23/1)
1	System DTC code OBD trouble code	P1220 P0200
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately upon fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Control deviation: fuel rack position sensor and fuel quantity actuator see nominal/actual value comparisons
5		The engine control module (IFI) (N3/7) checks the voltage values

➤ 10		IFI/DFI accelerator pedal position sensor (R25/2)
1	System DTC code OBD trouble code	P1222 P0220
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately upon fault
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Test for supply voltage If the IFI/DFI accelerator pedal position sensor is activated > 20%, then the idle speed contact must be at OFF, see HHT actual values. Beyond < 1%, the idle speed contact in the IFI/DFI accelerator pedal position sensor must be activated. If the the IFI/DFI accelerator pedal position sensor is not activated, then the display in the HHT must show 0%, see HHT actual values. Hint: When testing, observe that the EGR lifting sender (B28/3) and IFI/DFI accelerator pedal position sensor (R25/2) must both have the same voltage supply, therefore test both components.
5	Voltage supply Voltage supply Signal voltage	The engine control module (IFI) (N3/7) checks the voltage values. > 5 V longer then 2 seconds < 4.7 V longer than 2 seconds > 4.7 V longer than 240 milli-seconds

Diagnosis – Trouble Code Description

➤ 11		Fuel rack position sensor (Y23/111)
1	System DTC code OBD trouble code	P1223 P0200
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately upon fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	
5		The engine control module (IFI) (N3/7) checks the voltage values. Via control module delayed shut-off, verification if the Start and Stop contacts are achieved, are checked.

➤ 12		CKP sensor (L5/6)
1	System DTC code OBD trouble code	P1335 P0725
2	Storage of DTC and activation of CHECK ENGINE MIL	After two consecutive trips with fault
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Check of dynamic plausibility, therefore the time span from one impluse to the next impluse must not change over a defined time span
5		Engine is shut down

Diagnosis – Trouble Code Description

≥ 13		EGR valve pressure transducer (Y31/1)
1	System DTC code OBD trouble code	P1403 / P1404 P0400
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Negative control deviation The desired value from the control module (nominal value) was exceeded over a long time (5 seconds) and by more than 150mg/stroke as well Explanation of deviation: Nominal value minus actual value

Diagnosis – Trouble Code Description

≥ 14		Boost pressure control/pressure control flap vacuum transducer (Y31/5)
1	System DTC code OBD trouble code	P1470 P0243
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Nominal and actual values comparison The engine control module (IFI) (N3/7) checks the electrical wiring and the remaining control deviation Monitoring of both positive and negative control deviation Monitoring of endstage for short circuits and open circuits
5	Positive control deviation Negative control deviation	Positive or negative control deviation Positive control deviation: The desired value from the control module (nominal value) was not attained over a long time (10 seconds) and by more than 300mbar as well Negative control deviation: The desired value from the control module (nominal value) was exceeded over a long time (10 seconds) and by more than 300mbar as well Explanation of deviation: Nominal value minus actual value

Diagnosis – Trouble Code Description

≥ 15		Preglow control
1	System DTC code OBD trouble code	P1480 P0380
2	Storage of DTC and activation of CHECK ENGINE MIL	After two consecutive trips with fault
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Function of the preglow indicator lamp is checked
5	Ignition: ON	


Diagnosis – Trouble Code Description

➤ 16		Glow plug failure, cylinder 1-2 Glow plug failure, cylinder 3-4 Glow plug failure, cylinder 5-6
1	System DTC code OBD trouble code	P1481 P1365 P1367 P1369
2	Storage of DTC and activation of CHECK ENGINE MIL	After two consecutive trips with fault
3	Monitoring time and frequency of test	During preglow function
4	Fault indication	The preglow indicator lamp is activated in the combination instrument cluster for 1 minute after starting.
5	Ignition: ON	

➤ 17		Preglow control module end stage (N14/2)
1	System DTC code OBD trouble code	P1482 P0380
2	Storage of DTC and activation of CHECK ENGINE MIL	After two consecutive trips with fault
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Function, communication and wiring between engine control module (IFI) (N3/7) and preglow control module end stage
5	Ignition: ON	


Diagnosis – Trouble Code Description

➤ 18		Passenger-side fuse and relay module (K40/4) activation
1	System DTC code OBD trouble code	P1610 P0560
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after the next engine start
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Hold-relay in passenger-side fuse and relay module
5	Ignition: ON	


➤ 19		Internal reference voltage (engine control module) (IFI) (N3/7)
1	System DTC code OBD trouble code	P1611 P0200
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Internal check of engine control module (IFI) (N3/7) for over/under voltage
5		 Replace engine control module as necessary

Diagnosis – Trouble Code Description


➤ 20		Engine control module (IFI) (N3/7), Circuit 15
1	System DTC code OBD trouble code	P1612 P0560
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	If when ignition is switched ON, there is no voltage supply via circuit 15, a fault is present
5	Voltage supply	11 – 14 V
6		Replace engine control module (IFI) (N3/7)

➤ 20		Engine control module (IFI) (N3/7)
1	System DTC code OBD trouble code	P1613 P0200
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Internal check for delayed control module shut-off
5		 Replace engine control module as necessary

Diagnosis – Trouble Code Description

➤ 22		Engine control module (IFI) (N3/7), microprocessor/fuel calculation
1	System DTC code OBD trouble code	P1614 P0200
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	Internal check of engine control module during operation and delayed shut-off
5		 <p>Engine control module or injection pump fault (based on fault type), be certain to check supplied fault code data (HHT freeze frame) as well</p>

Diagnosis – Trouble Code Description

➤ 23		Engine control module (IFI) (N3/7), EEPROM or incorrectly coded
1	System DTC code OBD trouble code	P1617 P0200
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	With ignition ON and during delayed shut-off
5		 Check version coding and correct as necessary

Diagnosis – Trouble Code Description

➤ 24		IFI electrohydraulic shut-off actuator (Y1/1)
1	System DTC code OBD trouble code	P1622 P0215
2	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after fault recognition
3	Monitoring time and frequency of test	Continuously
4	Checked signal or condition	The end stage is checked for a short circuit. Additionally, a plausibility check is performed during the engine control module shut-off delay function. During the test, the engine control module is de-energized and the engine rpm is monitored. If the engine rpm does not fall below 500 rpm within 2 seconds, then a fault is recognized and the engine is shut-off via the fuel quantity actuator (IFI) (Y23/1)

Electrical Test Program – Component Locations

Engine 606.962
Electrical Components on vehicle

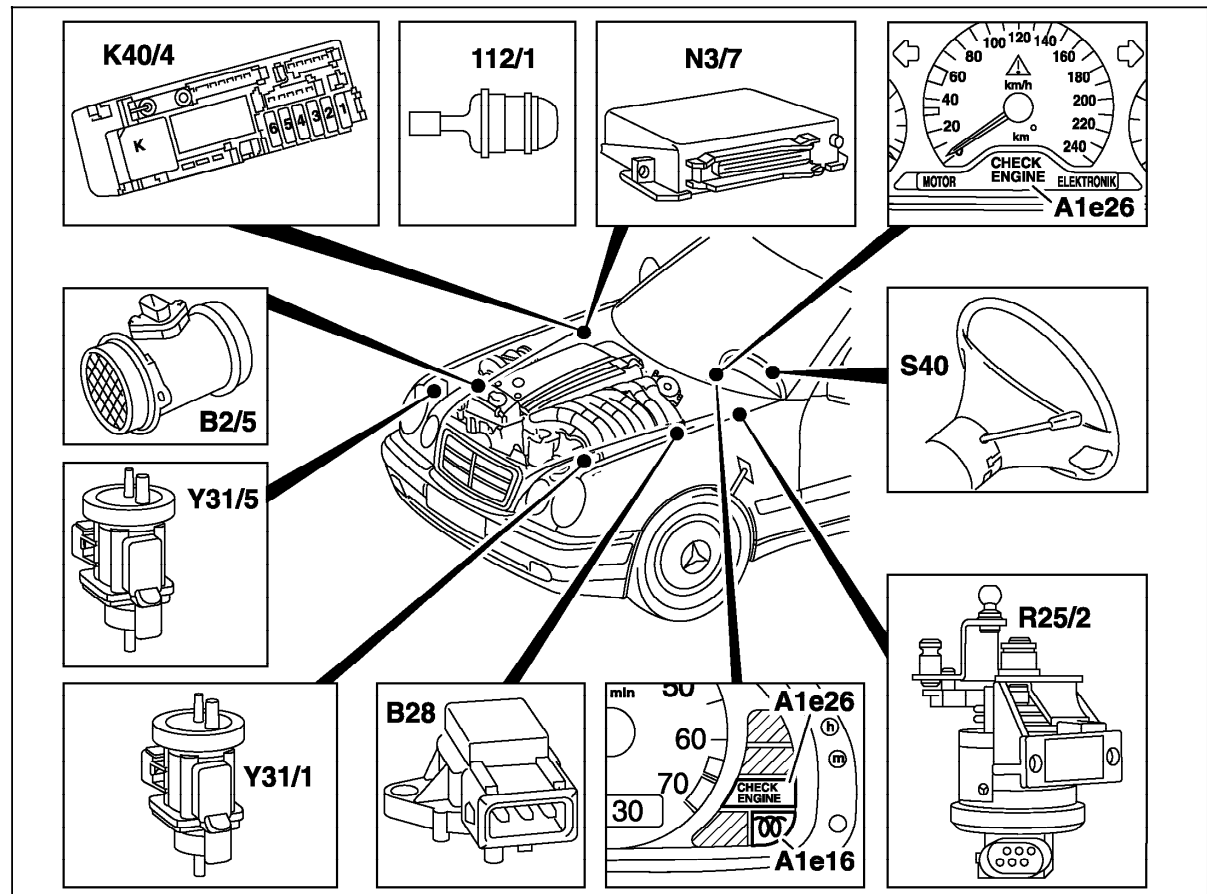


Figure 1

- 112/1 Ventilation filter for EGR valve vacuum transducer (Y31/1)
- A1e16 Preglow indicator lamp
- A1e26 "CHECK ENGINE" MIL
- B2/5 Hot film MAF sensor
- B28 Pressure sensor
- K40/4 Passenger-side fuse and relay module box
- N3/7 Engine control module (IFI)
- N14/2 Preglow control module
- R25/2 IFI/DFI accelerator pedal position sensor
- S40 CC switch
- Y31/1 EGR valve pressure transducer
- Y31/5 Boost pressure control/pressure control flap vacuum transducer

P07.12-0437-06

Electrical Test Program – Component Locations

Engine 606.962
Electrical Components in Engine
Compartment

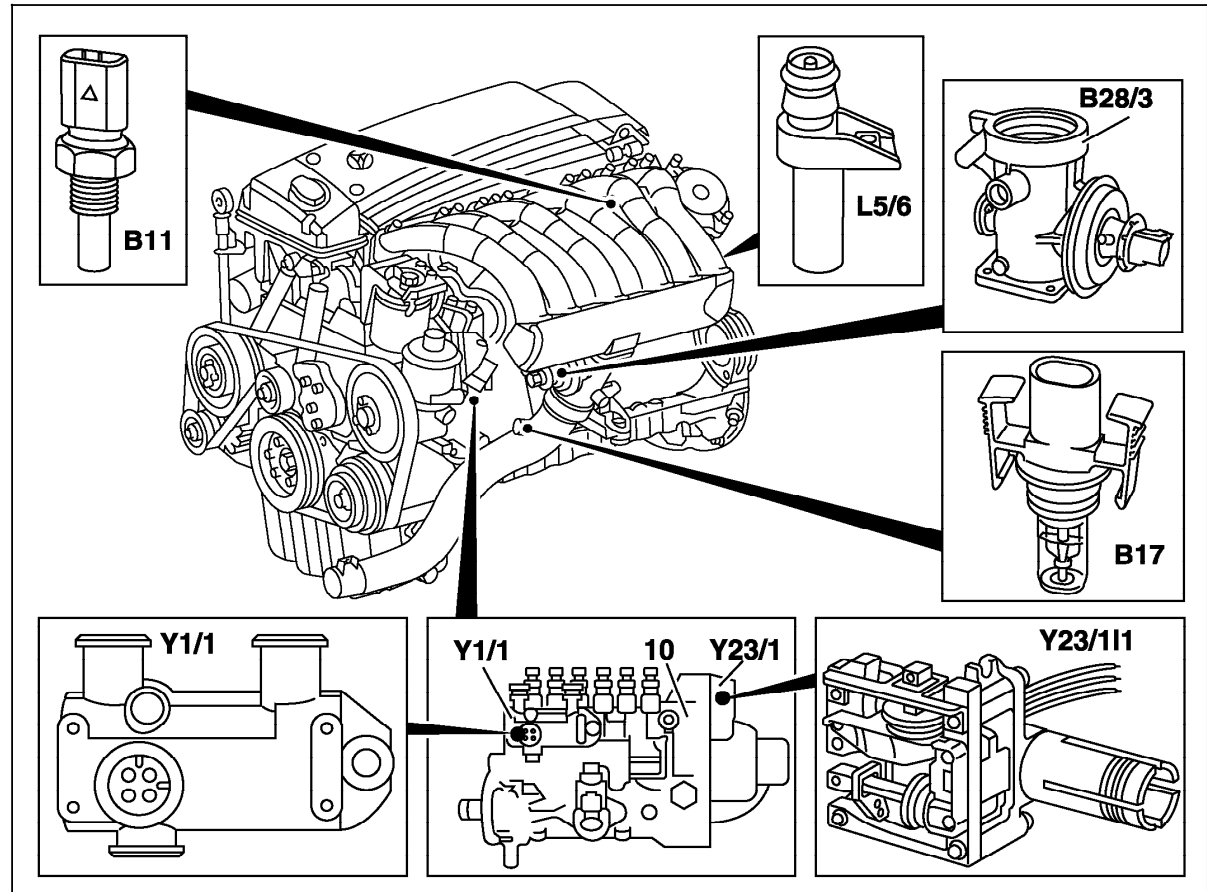


Figure 2

- | | |
|---------|--|
| B11 | ECT sensor |
| B17 | IAT sensor |
| B28/3 | EGR lifting sender |
| L5/6 | CKP sensor (IFI/DFI) |
| Y1/1 | IFI electrohydraulic shut-off actuator |
| Y23/1 | Fuel quantity actuator |
| Y23/111 | Fuel rack position sensor |
| 10 | In-line fuel injection pump |

P07.12-0326-06

Electrical Test Program – Component Locations

Electrical Components on Engine

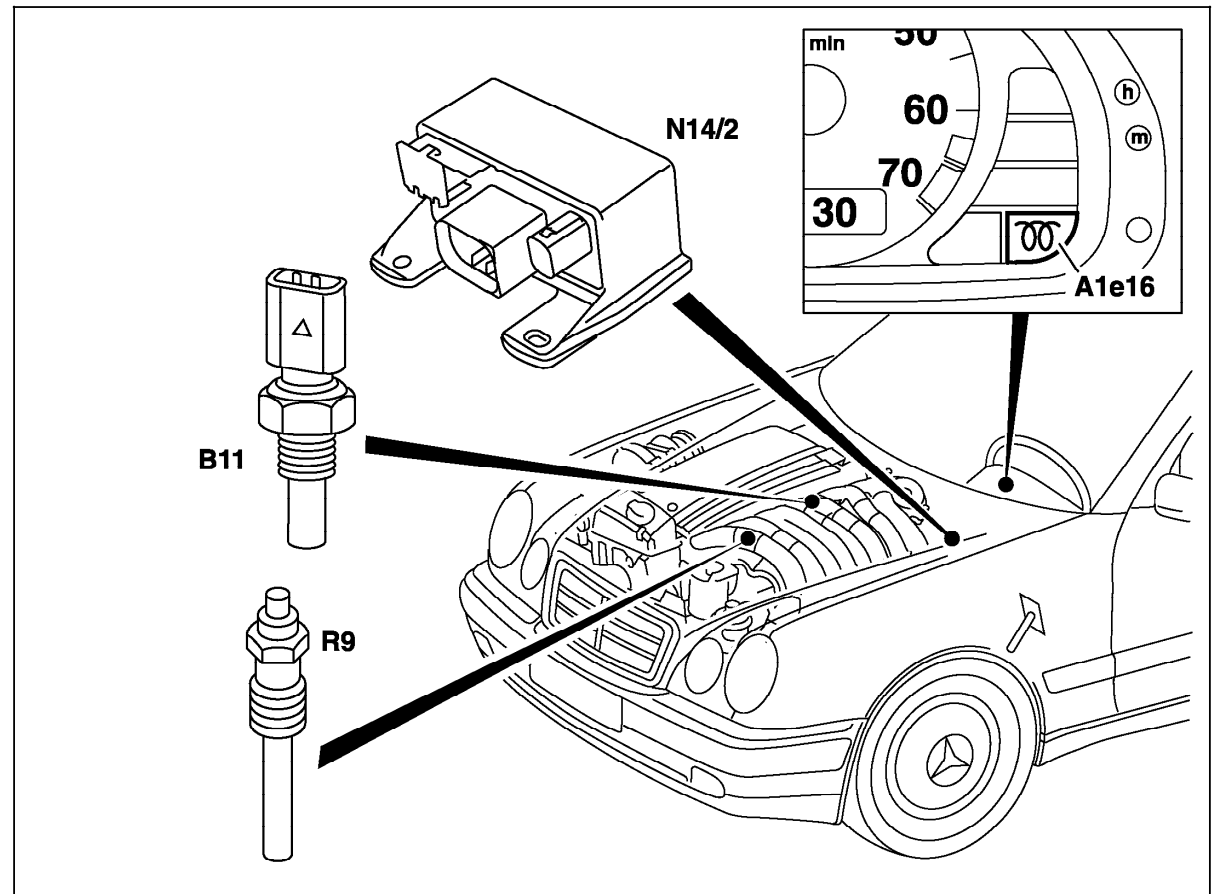


Figure 3

- A1e16 Preglow indicator lamp
- B11 ECT sensor
- N14/2 Preglow control module
- R9 Glow plugs

P07.12-0407-06

Electrical Test Program - Preparation for Test

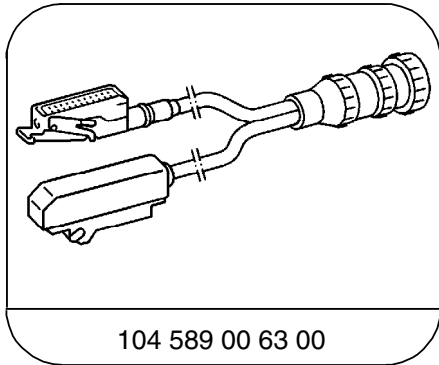
Preliminary work:

Diagnosis - Diagnostic Trouble Code (DTC) Memory 11

1. Review 11, 12, 22, 23, 31,
2. Ignition: **OFF**
3. Fuse on passenger-side fuse and relay module (K40/4) in order, Passenger-side fuse and relay module in order and connected.
4. Disconnect engine control module (IFI) (N3/7) connector.
5. Connect socket box with test cable to engine control module (IFI) (N3/7).

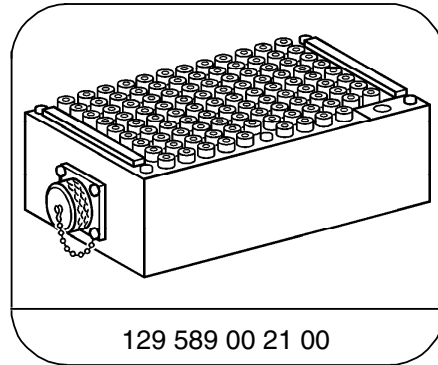
Electrical wiring diagrams :
Electrical Troubleshooting Manual, Model 210, Volume 1

Special Tools



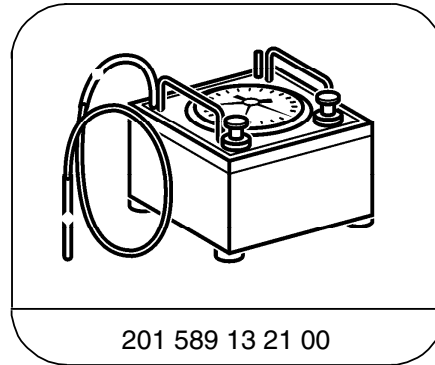
104 589 00 63 00

Test cable



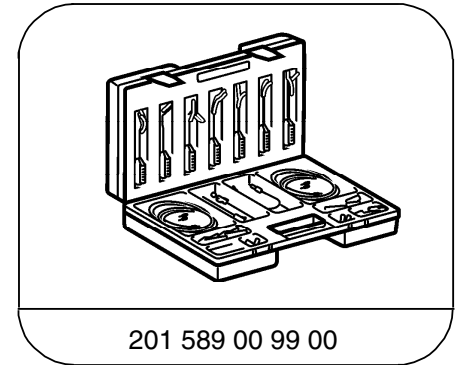
129 589 00 21 00

126-pin socket box



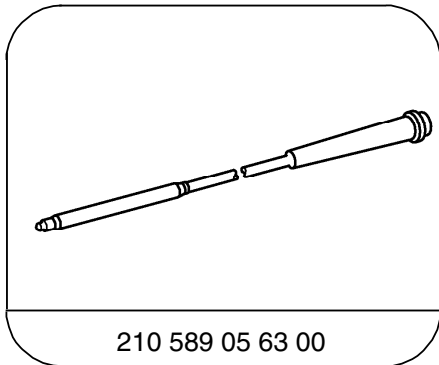
201 589 13 21 00

Tester



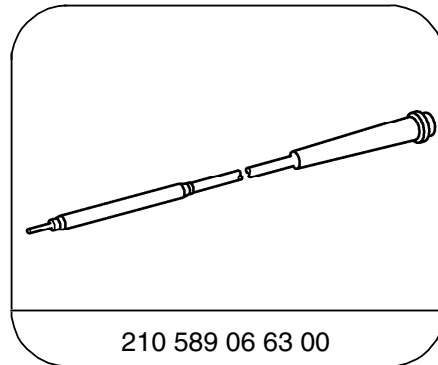
201 589 00 99 00

Electrical connecting set



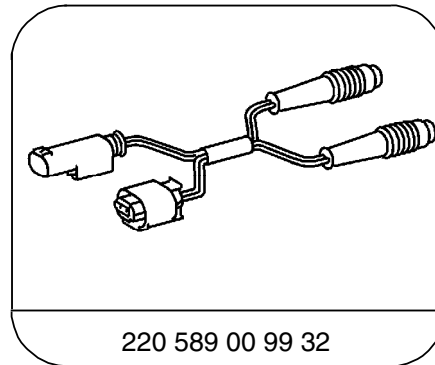
210 589 05 63 00

Adapter cable



210 589 06 63 00

Adapter cable



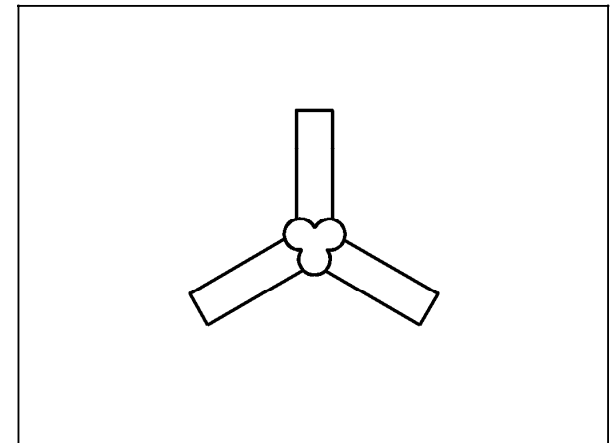
220 589 00 99 32

Adapter cable

Electrical Test Program - Preparation for Test

Test equipment; See MBUSA Standard Service Equipment Program

Description	Brand, model, etc.
Multimeter	Fluke models 23, 77 III, 83, 85, 87
Engine analyzer	Bear DACE Hermann Electronic
Y - fitting	117 078 01 45



P07.12-0438-01

Figure 1

Y - fitting

Electrical Test Program – Preparation for Test

Connection Diagram – Socket box

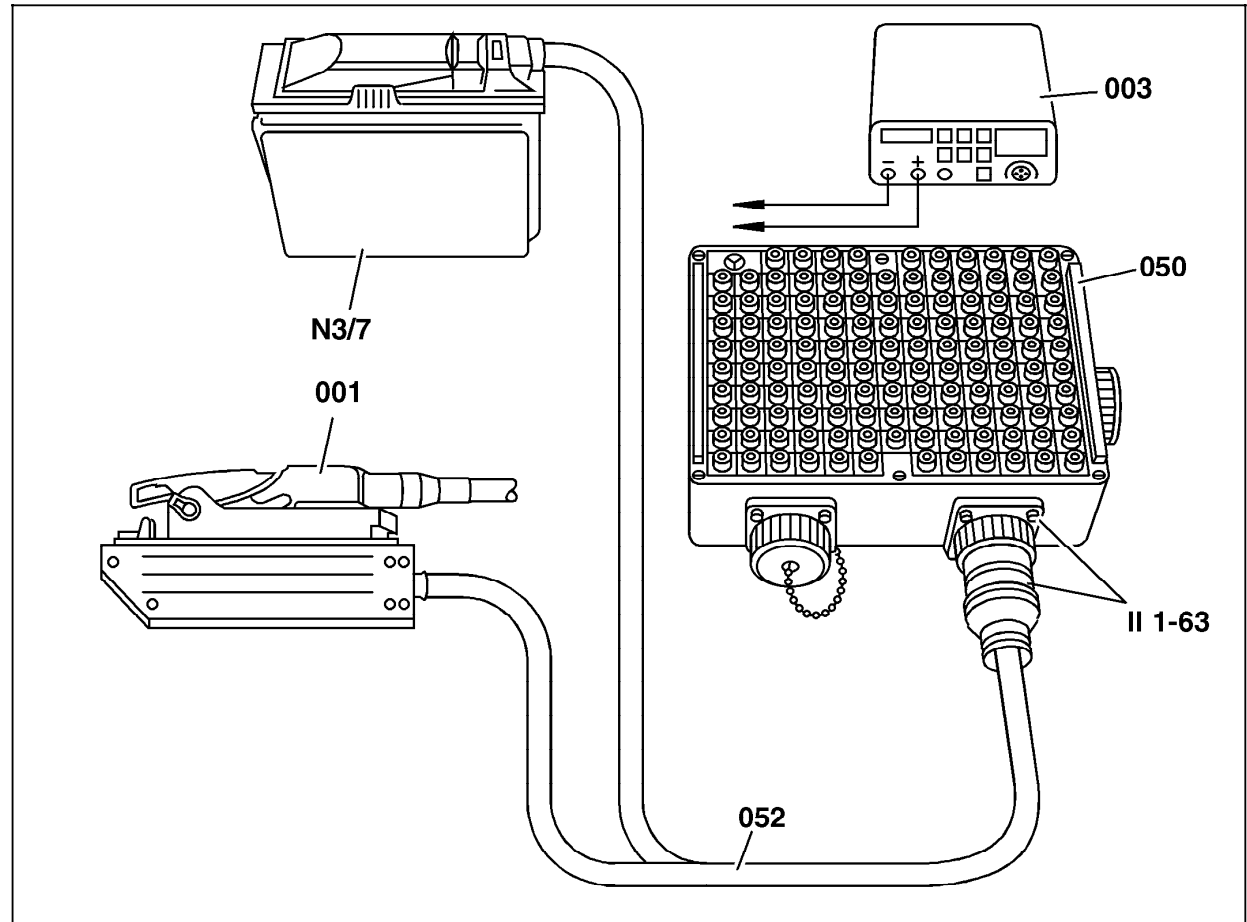


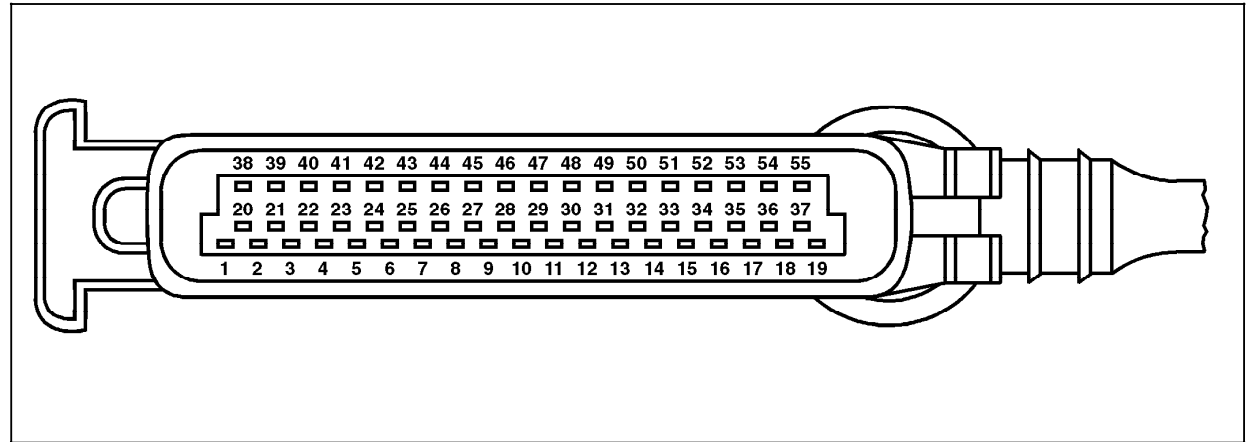
Figure 2

- 001 Engine control module (IF) (N3/7) connector
- 003 Multimeter
- 050 Socket box (126-pole)
- 052 Test cable
- N3/7 Engine control module (IF)
- II 1-63 Socket and plug of test cable

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Electrical Test Program – Preparation for Test

Connector Layout - Engine Control Module (IFI) (N3/7)



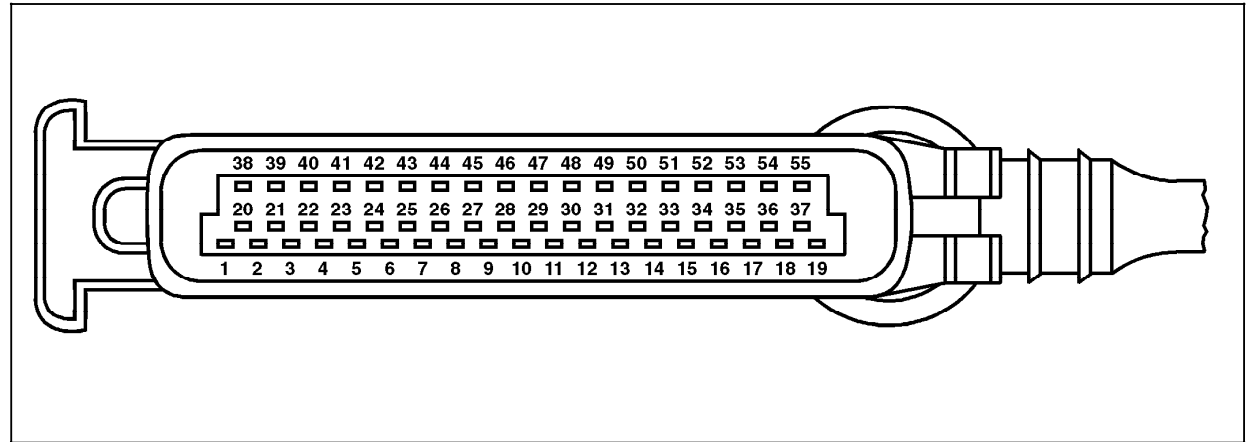
P07.12-0440-04

Figure 3

1	–	17	Starter relay (K40/4k2) (Model 210)
2	–	18	Ground W15 (electronics output ground - right footwell)
3	Fuel temperature sensor (Y1/1b1) in electrohydraulic shut off actuator, socket 4	19	Ground W15 (electronics output ground - right footwell)
4	Sensor ground GND	20	CKP sensor (L5/6)
5	CAN data bus (socket L)	21	Hot film MAF sensor ([B2/5] socket 5)
6	IFI/DFI accelerator pedal position sensor (R25/2) pressure sensor (socket 6), pressure sensor (B28) (socket 2)	22	Pressure sensor ([B28] socket 1)
7	Oil level switch (S43)	23	ECT sensor ([B11] socket 2)
8	CC switch (S40) (accelerate/set, socket 4)	24	IFI/DFI accelerator pedal position sensor ([R25/2] CTP switch, socket 3)
9	Fuel rack position sensor ([Y23/111] socket 7)	25	–
10	Fuel rack position sensor ([Y23/111] socket 1)	26	Terminal HRL from relay module K40 (connector E, socket 3)
11	–	27	P/N signal from transmission control module (N15/3)
12	–	28	CKP sensor (L5/6) ground
13	Terminal 50	29	IFI/DFI accelerator pedal position sensor ([R25/2] potentiometer socket 1)
14	TN-signal	30	CC switch ([S40s5] control contact, socket 6)
15	IFI/DFI accelerator pedal position sensor ([R25/2] CTP switch, socket 4)		
16	–		

Electrical Test Program – Preparation for Test

Connector Layout - IFI Control Module (N3/7)



P07.12-0440-04


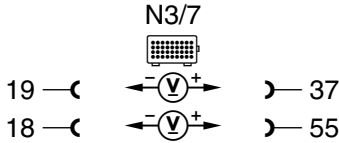
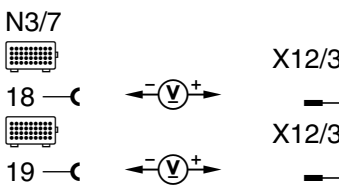

Figure 4

31	Cruise control switch (S40)	47	Circuit 15E
32	–	48	–
33	Preglow control module ([N14/2] connector 1, socket 2)	49	–
34	–	50	Diagnostic signal (to X11/4, socket 4)
35	EGR valve vacuum transducer ([Y31/1] socket 1)	51	–
36	Fuel quantity actuator ([Y23/1] socket 2)	52	Pressure control flap vacuum transducer ([Y31/2] socket 1)
37	Voltage supply, circuit 87UG, unfused (relay module K40 [base function], connector E, socket 5)	53	Boost pressure control/pressure control flap vacuum transducer ([Y31/5] socket 1)
38	CC switch ([S40s2] decelerate/set, socket 3)	54	IFI injection pump ([Y23/1] socket 2)
39	IFI/DFI accelerator pedal position sensor ([R25/2] potentiometer, socket 5)	55	Voltage supply, circuit 87UG, unfused (relay module K40 [base function], connector E, socket 7)
40	IAT sensor ([B17] socket 2)		
41	CAN data bus (socket H)		
42	CC switch ([S40s1] resume, socket 5)		
43	IFI electrohydraulic shut-off actuator ([Y1/1] socket 3)		
44	CC switch ([S40s4] off, socket 1)		
45	Pressure sensor ([B28] socket 3)		
46	Fuel rack position sensor ([Y23/111] socket 6)		


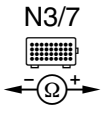
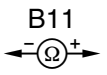
Electrical Test Program – Test

Prior to Testing:



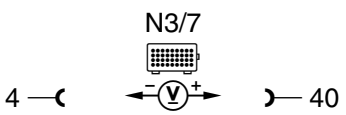

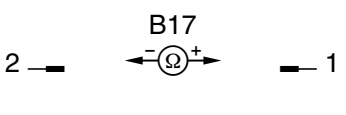
1. Review 22

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0	PIBIS	Engine control module (IFI) (N3/7) Voltage supply Circuit 87	<p>N3/7</p> 	Ignition: ON	11 – 14 V 11 – 14 V	⇒ 1.1, Wiring/connectors, Passenger side fuse and relay module box (K40/4), ⇒ 2.0, W16/5, W16/6
1.1		Power harness ground, electronic	<p>N3/7</p> 	Ignition: OFF X12/3 (Figure 2).	11 – 14 V 11 – 14 V	Power ground, electronic
2.0		Passenger side fuse and relay module box (K40/4) Voltage supply Terminal 30	<p>K40/4</p> 	Ignition: OFF Disconnect connector C from the passenger side fuse and relay module box (K40/4), (Figure 1 and 17).	11 – 14 V	Fuses, Wiring/connectors, Passenger side fuse and relay module box (K40/4).


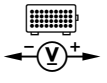
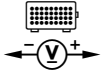
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy																				
5.1		Resistance		Ignition: OFF Disconnect connector on engine control module (IFI) (N3/7), (Figure 1).	<table border="0"> <tr> <td>°C</td> <td>Ω</td> </tr> <tr> <td>20</td> <td>2500</td> </tr> <tr> <td>30</td> <td>1700</td> </tr> <tr> <td>40</td> <td>2600</td> </tr> <tr> <td>50</td> <td>830</td> </tr> <tr> <td>60</td> <td>600</td> </tr> <tr> <td>70</td> <td>435</td> </tr> <tr> <td>80</td> <td>325</td> </tr> <tr> <td>90</td> <td>245</td> </tr> <tr> <td></td> <td>± 10%</td> </tr> </table>	°C	Ω	20	2500	30	1700	40	2600	50	830	60	600	70	435	80	325	90	245		± 10%	⇒ 5.2 Wiring/connectors.
°C	Ω																									
20	2500																									
30	1700																									
40	2600																									
50	830																									
60	600																									
70	435																									
80	325																									
90	245																									
	± 10%																									
5.2		B11		Ignition: OFF Disconnect connector on B11 (Figure 4).	Nominal values: see ⇒ 5.1	B11																				


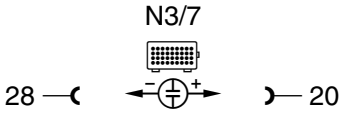
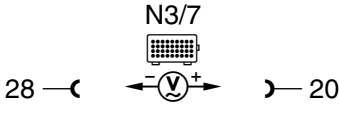


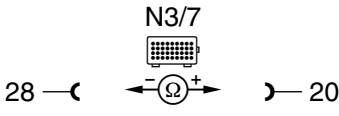
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy										
6.0		IAT sensor (B17) Voltage		Engine: at idle	<table border="1"> <tr> <td>°C</td> <td>V</td> </tr> <tr> <td>20</td> <td>3.8</td> </tr> <tr> <td>30</td> <td>3.3</td> </tr> <tr> <td>40</td> <td>2.9</td> </tr> <tr> <td colspan="2">± 5%</td> </tr> </table>	°C	V	20	3.8	30	3.3	40	2.9	± 5%		⇒ 6.1, Engine control module (IFI) (N3/7).
°C	V															
20	3.8															
30	3.3															
40	2.9															
± 5%																
6.1		Resistance		Ignition: OFF Disconnect plug on engine control module (IFI) (N3/7), (Figure 1).	<table border="1"> <tr> <td>°C</td> <td>Ω</td> </tr> <tr> <td>20</td> <td>6060</td> </tr> <tr> <td>30</td> <td>3900</td> </tr> <tr> <td>40</td> <td>2600</td> </tr> <tr> <td colspan="2">± 5%</td> </tr> </table>	°C	Ω	20	6060	30	3900	40	2600	± 5%		⇒ 6.2, Wiring/connectors.
°C	Ω															
20	6060															
30	3900															
40	2600															
± 5%																
6.2		B17		Ignition: OFF Disconnect plug on IAT sensor (B17), (Figure 5).	Nominal values see ⇒ 6.1	B17										


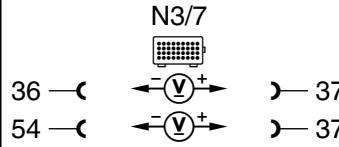
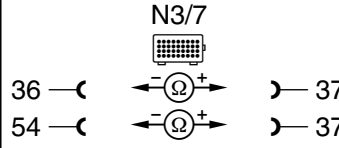
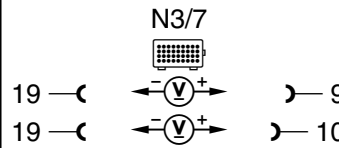
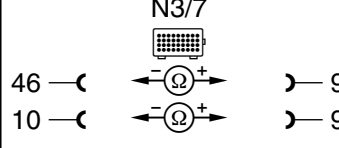
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.0	P0150	Pressure sensor (B28) Voltage	<p>N3/7</p>  <p>4 —()— 22</p>	Accelerate briefly to 2,500 rpm.	Voltage: Rises Pressure: Rises	⇒ 7.1, Pressure lines, B28 (Figure 6).
7.1		B28 Voltage supply	<p>N3/7</p>  <p>4 —()— 45</p>	Ignition: ON	4.8 – 5.2 V	Wiring/connectors, Engine control module (IFI) (N3/7).







Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
8.0	P1335	CKP sensor (L5/6)	 	<p>Engine: at idle</p> <p> Test via oscilloscope. Testing with Hermann Datascope is only possible during the start or shut-down phase. With DACE tester, testing is possible during idle, during which the time axis must be set to 25ms and the voltage to 40 V AC.</p> <p>Engine: at idle</p> <p> Test with multimeter only if oscilloscope is not available.</p> <p>Start rpm > 200rpm</p>	<p>Signal (Figure 7)</p> <p>> 0.8 V ~ rising rpm equals rising voltage</p> <p>> 0.3 V ~</p>	<p>Installation position of CKP sensor (L5/6), Dirt on L5/6 (metal chips), Segments on flywheel, ⇒ 8.1</p>
8.1		Resistance of sensor L5/6		<p>Ignition: OFF</p> <p>Remove connector on engine control module (IFI) (N3/7)</p>	610 – 1300 Ω	<p>Connector L5/6x1 (Figure 7), Wiring/connectors, CKP sensor (L5/6).</p>




Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.0	P1220	Fuel quantity actuator (Y23/1) Adjustment solenoid	<p>N3/7</p> 	Ignition: ON	> 4.0 V max. for 30 seconds with a clearly audible clicks	⇒ 9.1, Wiring/connectors, Engine control module (IFI) (N3/7).
9.1		Resistance	<p>N3/7</p> 	Ignition: OFF Remove connector on IFI control module (N3/7).	1.0 ± 1.4 Ω 1.0 ± 1.4 Ω	Wiring/connectors, Fuel quantity actuator connector (Y23/1x1) (Figure 13), Fuel quantity actuator (Y23/1).
10.0	P1223	Fuel rack position sensor (Y23/11)	<p>N3/7</p> 	Ignition: ON	2.2 – 2.7 V 2.2 – 2.7 V	⇒ 10.1, Wiring/connectors.
10.1		Resistance	<p>N3/7</p> 	Ignition: OFF Remove connector on engine control module (IFI) (N3/7)	20 – 25 Ω 40 – 50 Ω	Wiring/connectors, Connector Y23/1x1 (Figure 13), Fuel quantity actuator (Y23/1).


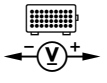

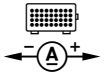

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
11.0	P1222	IFI/DFI accelerator pedal position sensor (R25/2) Nominal value potentiometer Actual value potentiometer	N3/7  6 —  — 39 18 —  — 15 15 —  — 24 15 —  — 29	Ignition: ON CTP (idle) position: Full load position: CTP (idle) position: Full load position: CTP (idle) position: Full load position: CTP (idle) position: Full load position:	 $0.2 \pm 0.5 \text{ V}$ $3.7 \pm 4.8 \text{ V}$ $> 4.5 \text{ V}$ $< 0.5 \text{ V}$ $< 0.5 \text{ V}$ $> 4.5 \text{ V}$ $< 0.5 \text{ V}$ $> 4.5 \text{ V}$	Wiring/connectors, IFI/DFI accelerator pedal position sensor (R25/2) (Figure 9), Engine control module (IFI) (N3/7).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
12.0	P1520	<p>CC switch (S40)</p> <p>CC switch (S40)</p> <p>Safety contact</p>	<p></p> <p></p>	<p>Ignition: ON Menu: Cruise control actual values</p> <p>Position: DECELERATE Position: ACCELERATE Position: RESUME Position: OFF Switch not actuated</p> <p>CC Switch not actuated:</p> <p>Position: DECELERATE, ACCELERATE, RESUME, OFF:</p>	<p>D A R O (No display)</p> <p>OFF</p> <p>ON</p>	<p>Wiring/connectors, Engine control module (IFI) (N3/7), CC switch (S40), Electronic ignition-starter switch (EIS) control module (N73).</p>

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
13.0	P1470	<p>Boost pressure control/pressure control flap vacuum transducer (Y31/5)</p> <p>Test connections: Connect vacum/pressure tester with Y- fitting, between Y31/5 "OUT" outlet and boost pressure control valve. Intake manifold pressure can be observed as well using the HHT.</p>	<p>53 —  — 37</p> <p style="text-align: center;">N3/7 </p>	<p>Check vacuum at Y31/5 "OUT" outlet (Figures 8 and 10) Engine: at CTP (idle)</p> <p>Accelerate briefly from 1,500 rpm to 3,500 rpm:</p>	<p>> 4.0 V >350 mbar</p> <p>< 3 V < 400 mbar Intake manifold pressure rises.</p>	<p>31/1, Vent filter dirty (Figure 12), Vacuum lines, Vacuum supply ⇒ 13.2, Wiring.</p>
13.1		Current draw	<p>18 —  — 53</p> <p style="text-align: center;">N3/7 </p>	Ignition: ON	0.8 - 1.2 A	Wiring/connectors, Y31/5 (Figure 2).
13.2		<p>Vacuum supply</p> <p>Test connections: Connect vacum/pressure tester with Y- fitting between vacuum supply lines.</p>		Engine: At CTP (idle)	>700 mbar	Vacuum lines, Vacuum pump.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy										
14.0	P1622	IFI electrohydraulic shut-off actuator (Y1/1) Activation		Engine: at CTP (idle)	11 – 14 V	⇒ 14.1, Wiring/connectors,										
14.1		Current draw		Ignition: OFF Disconnect connector at N3/7, X12/3 (Figure 2).	1.4 – 1.6 A Y1/1 clicks audibly.	Y31/1 (Figure 11).										
14.2		Resistance		Ignition: OFF Disconnect connector at Y1/1	7.6 – 8.6 Ω	Y1/1										
15.0	P0180	Fuel temperature sensor (Y1/1b1)		Ignition: ON	<table> <tr> <td>$^{\circ}\text{C}$</td> <td>V</td> </tr> <tr> <td>20</td> <td>3.9</td> </tr> <tr> <td>30</td> <td>3.5</td> </tr> <tr> <td>40</td> <td>3.0</td> </tr> <tr> <td>50</td> <td>2.6</td> </tr> </table>	$^{\circ}\text{C}$	V	20	3.9	30	3.5	40	3.0	50	2.6	⇒ 15.1, Engine control module (IFI) (N3/7).
$^{\circ}\text{C}$	V															
20	3.9															
30	3.5															
40	3.0															
50	2.6															
15.1		Resistance of Y1/1b1		Ignition: OFF Disconnect plug on engine control module (IFI) (N3/7), (Figure 1).	<table> <tr> <td>$^{\circ}\text{C}$</td> <td>Ω</td> </tr> <tr> <td>20</td> <td>2500</td> </tr> <tr> <td>30</td> <td>1700</td> </tr> <tr> <td>40</td> <td>1170</td> </tr> <tr> <td>50</td> <td>830</td> </tr> </table>	$^{\circ}\text{C}$	Ω	20	2500	30	1700	40	1170	50	830	⇒ 15.2, Wiring/connectors.
$^{\circ}\text{C}$	Ω															
20	2500															
30	1700															
40	1170															
50	830															










Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
15.2		Y1/1b1	<p>Y1/1b1 1 — (— Ω —) — 4</p>	Ignition: OFF Remove connector at fuel temperature sensor (Y1/1)	Actual values see ⇒ 15.1	Fuel temperature sensor (Y1/1b1), Replace IFI electrohydraulic shut-off actuator (Y1/1).
16.0	P0600	CAN-Data bus Wiring resistance	<p>N3/7 41 — (— Ω —) — 5</p>	Ignition: OFF	58 – 62 Ω	Wiring/connectors, X25/7, CAN-bus, DAS control module (N54/1), Engine control module (IFI) (N3/7).
17.0	P1705	P/N signal from ETC control module (N15/3)	<p>N3/7 18 — (— Ω —) — 27</p>	Ignition: ON Gear selector lever in position: P or N	YES <0.5 V NO > 9.0 V	Wirng, Ground, (electronics, right footwell) (W15/1), ETC control module (N15/3).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
18.0	P0703	Stop lamp switch (S9/1)		Ignition: ON Brake pedal position via CAN (Select actual values tests, engine tests, page 3): Brake pedal depressed : ON Brake pedal released : OFF		⇒ 18.1 Wiring, CAN-Bus
18.1		Resistance	<p>S9/1</p> <p>1 — Ω — 4</p>	Ignition: OFF Disconnect stop lamp switch connector (S9/1x1): Brake pedal depressed : Brake pedal released :	< 1 Ω >100 k Ω	Stop lamp switch (S9/1), (Figure 14).
19.0	P1480	Preglow control Communication wire between engine control module (IFI) (N3/7) and preglow control module (N14/2) Resistance	<p>N3/7</p> <p>33 — Ω — 2</p> <p>N14/2x1</p>	Ignition: OFF Remove connector (N14/2x1) from preglow control module (N14/2) (Figures 1, 2 and 3), Remove engine control module (IFI) (N3/7).	< 1 Ω	Wiring, Preglow control module (N14/2).
20.0	P1482	Preglow control module (N14/2) Voltage supply Circuit 30	<p>N14/2x3</p> <p>V</p>	Ignition: OFF	11 – 14 V	⇒ 20.1, Preglow control module (N14/2) (Figure 2).


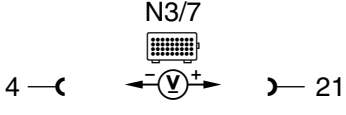
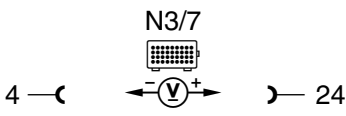

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
20.1		Ground, electronics output ground - right footwell (W15)	  N14/2x1 1	Ignition: OFF Remove connector (N14/2x1) from preglow control module (N14/2) (Figure 3).	< 1 Ω	Ground (electronics output ground - right footwell) (W15), Wiring/connectors.
21.0	P1481	Glow plug failure Glow plug and harness test	      N14/2x2 1 (2.1) 2 (2.2) 3 (2.3) 4 (2.4) 5 (2.5) 6 (2.6)	Measure with DC current pickup. Remove windshield washer reservoir, remove cable cover, loosen cable ties, pull back protective sleeve from cable, for each measurement turn ignition key again to position 2.	8 – 25 A The current draw is dependent on the coolant temperature.	Glow plugs, Wiring, Preglow output (N14/2).
22.0		Test step for NON-USA vehicles only				


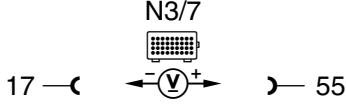

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
23.0	P1612	Circuit 15E		Ignition: ON	11 – 14 V	Voltage supply, see ⇒ 1.0, Wiring/connectors, Electronic ignition-starter switch (EIS) control module (N73), Passenger-side fuse and relay module box (K40/4) (Figure 1), Starter relay (K40/4k2), (Figure 17).
24.0	P1403	EGR valve pressure transducer (Y31/1)		Engine: at idle Pressure regulation (see Menu: Actual values, Engine test, page 3) >1000 rpm Accelerate briefly to 3,300 rpm:	ON OFF	⇒ 24.1, Vent filter dirty (Figure 12), Pressure lines, Pressure supply, see ⇒ 13.0, Wiring, EGR valve pressure transducer (Y31/1), ⇒ 24.2
24.1		Current draw		Ignition: ON	0.8 – 1.2 A	Wiring/connectors, EGR valve pressure transducer (Y31/1) (Figure 11).
24.2		EGR valve leak test		Ignition: OFF Remove vacuum line and connect pressure/vacuum tester, apply 400mbar to EGR valve	EGR valve closes audibly.	EGR valve

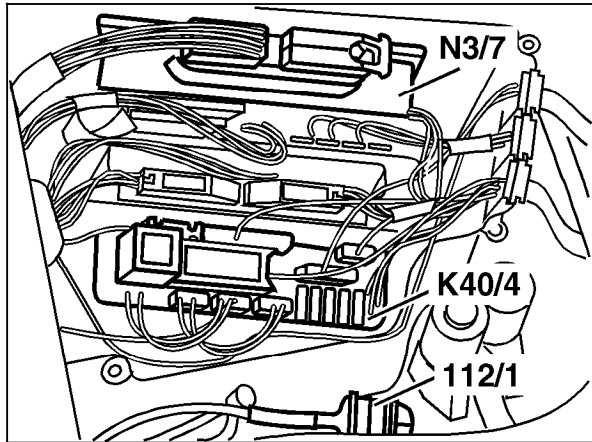
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
25.0	P1401	EGR lifting sender (B28/3)		Engine: at idle at 2000 rpm	< 1.5 V > 3.0 V	⇒ 25.1, see 31/1, (Figure 1).
25.1		EGR lifting sender (B28/3) Voltage supply			4.8 – 5.2 V	Separation point (X35/63), Wiring/connectors
26.0	P0100	Hot film MAF sensor (B2/5) Voltage from Hot Film		Run engine between 1,200 amd 2,500 rpm to check air mass (see Menu: Actual values, Engine test, page 5)	Actual/nominal values comparison	Unmetered air leak, Wiring/connectors, (B2/5), (see Figure 16).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
27.0	P1330	Starter control Activate starter relay (K40/4k2)		Engine: Start	> 9.0 V, During the start procedure.	⇒ 27.1, Wiring/connectors, Starter relay (K40/4k2) (Figure 17), Passenger-side fuse and relay module box (K40/4) (Figure 1), Engine control module (IFI) (N3/7).
27.1		Circuit 50 of Electronic ignition-starter switch (EIS) control module (N73)		Engine: Start	< 1.0 V, During the start procedure.	Wiring/connectors, Driver-side fuse and relay module box (K40/2), Electronic ignition-starter switch (EIS) control module (N73), Engine control module (IFI) (N3/7).

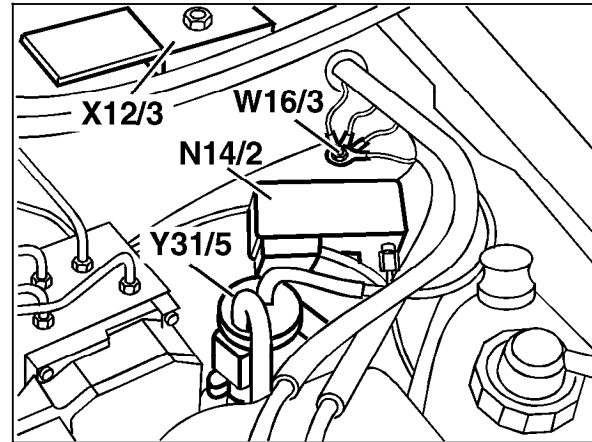
Electrical Test Program – Test



P07.12-0404-13

Figure 1

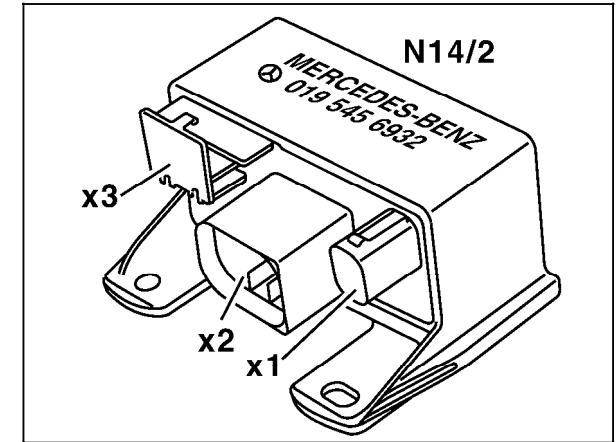
- 112/1 Ventillation filter for EGR valve pressure transducer (Y31/1)
- K40/4 Passenger-side fuse and relay module box
- N3/7 Engine control module (IFI)



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Figure 2

- N14/2 Preglow output stage module
- W16/3 Ground (output ground - left wheel housing)
- X12/3 Terminal block circuit 30
- Y31/5 Boost pressure control/pressure control flap vacuum transducer

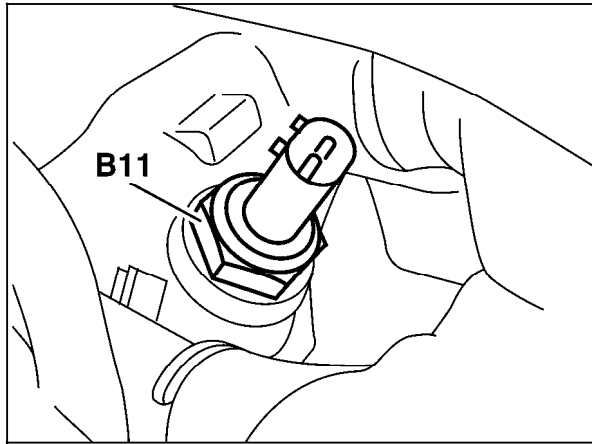


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Figure 3

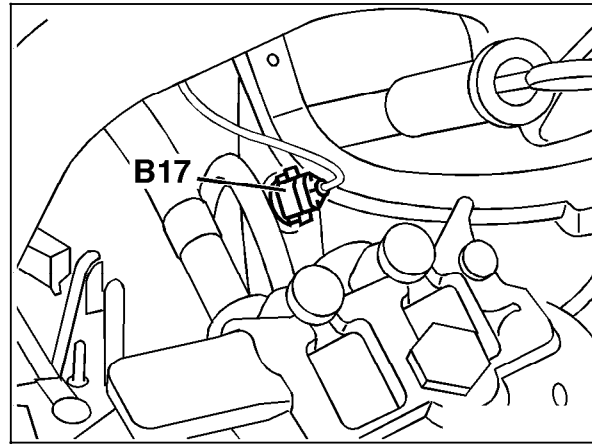
- N14/2 Preglow output
- N14/x1 Preglow output connector to control wire from engine control module (IFI) (N3/7)
- N14/2x2 Preglow output glow plug connector
- N14/2x3 Preglow output circuit 30 connector

Electrical Test Program – Test



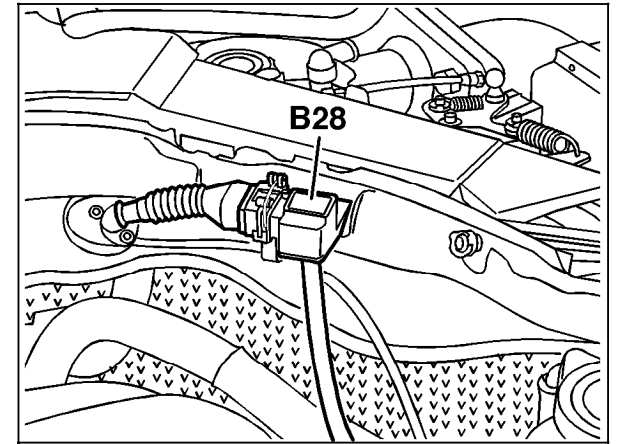
P07.13-0413-13

Figure 4
B11 ECT sensor



P07.12-0351-13

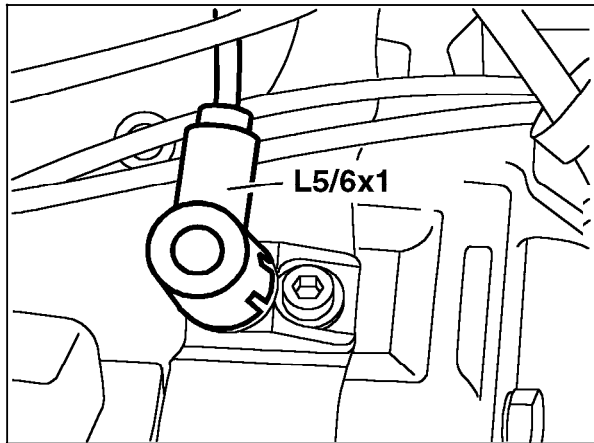
Figure 5
B17 IAT sensor



P07.12-0355-13

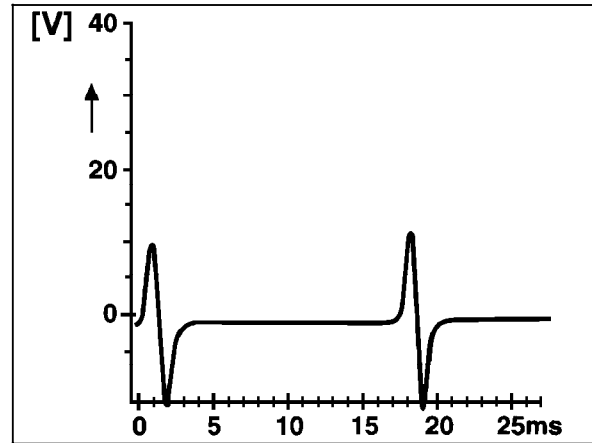
Figure 6
B28 Pressure sensor

Electrical Test Program – Test



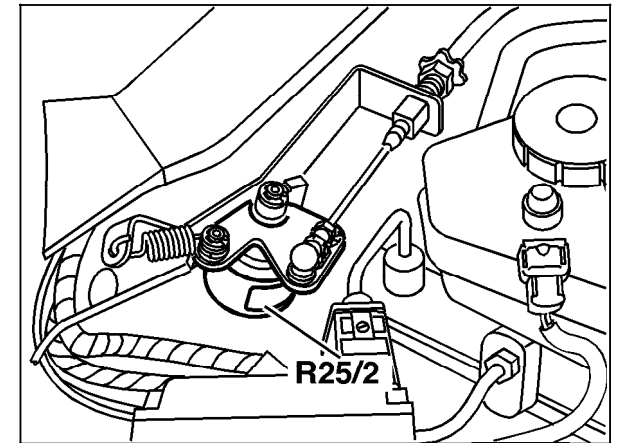
P07.12-0239-13

Figure 7
L5/6x1 CKP sensor connector (IFI/DFI)



P07-6154-13

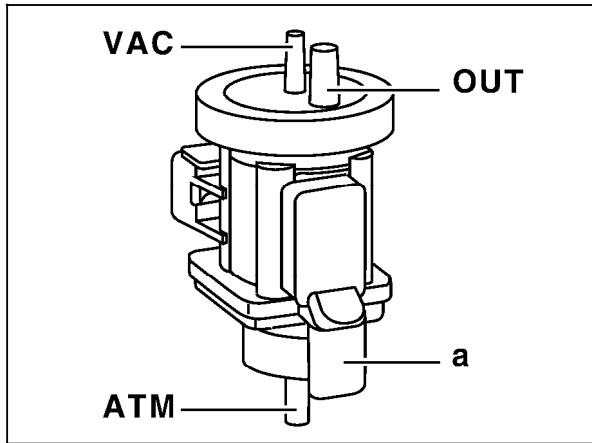
Figure 8
L5/6 CKP sensor (IFI/DFI) signal



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Figure 9
R25/2 IFI /DFI accelerator pedal position sensor

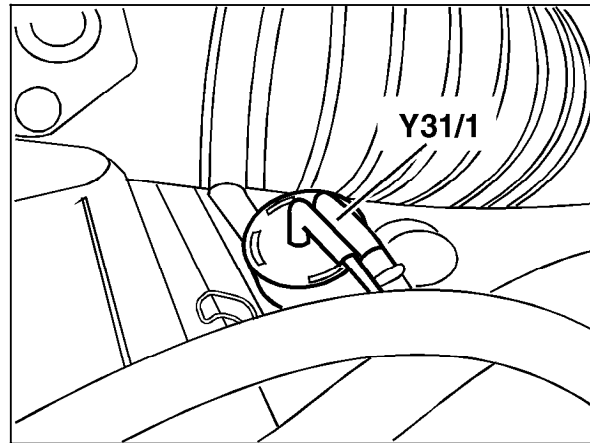
Electrical Test Program – Test



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Figure 10

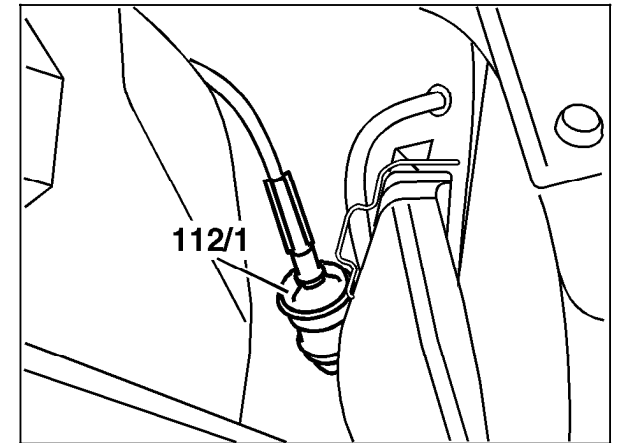
- ATM Vent
- OUT Vacuum outlet to consumer
- VAC Vacuum supply
- a Electrical connection



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Figure 11

- Y31/1 EGR valve pressure transducer

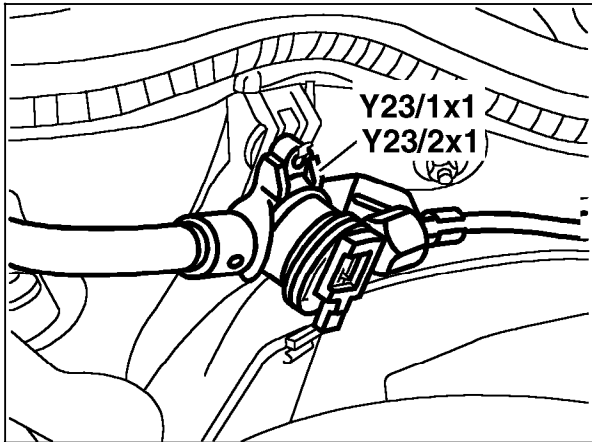


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Figure 12

- 112/1 Ventillation filter for EGR valve pressure transducer (Y31/1)

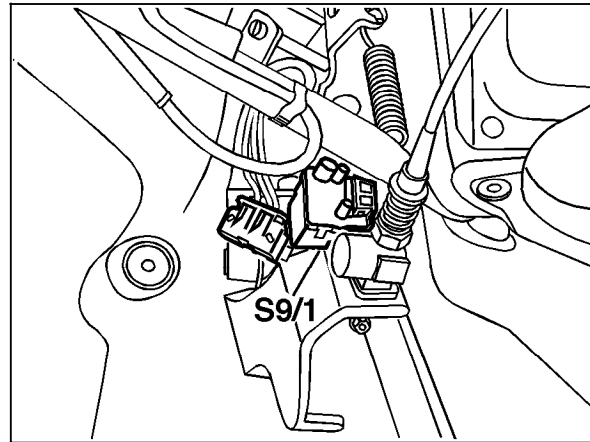
Electrical Test Program – Test



P07.12-0240-13

Figure 13

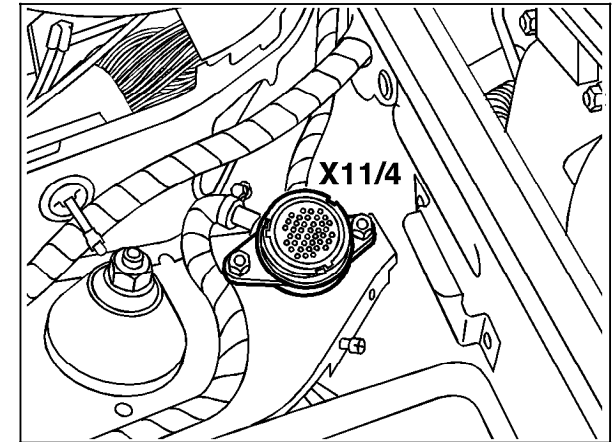
Y23/1x1 Fuel quantity actuator (IFI) connector



P07.12-0354-13

Figure 14

S9/1 Stop lamp switch



P07.12-0374-13

Figure 15

X11/4 Data link connector (DTC readout)

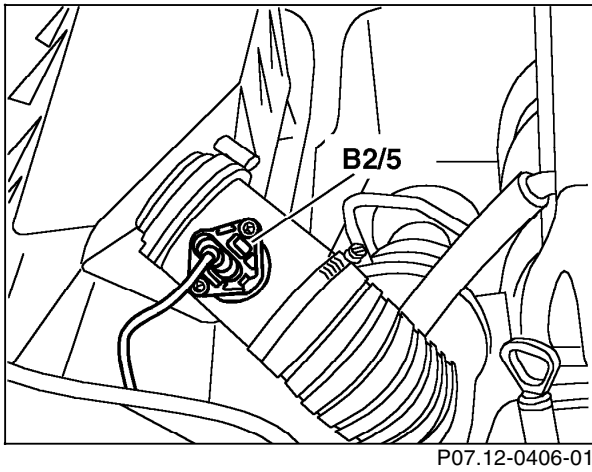


Figure 16

B2/5 Hot film MAF sensor

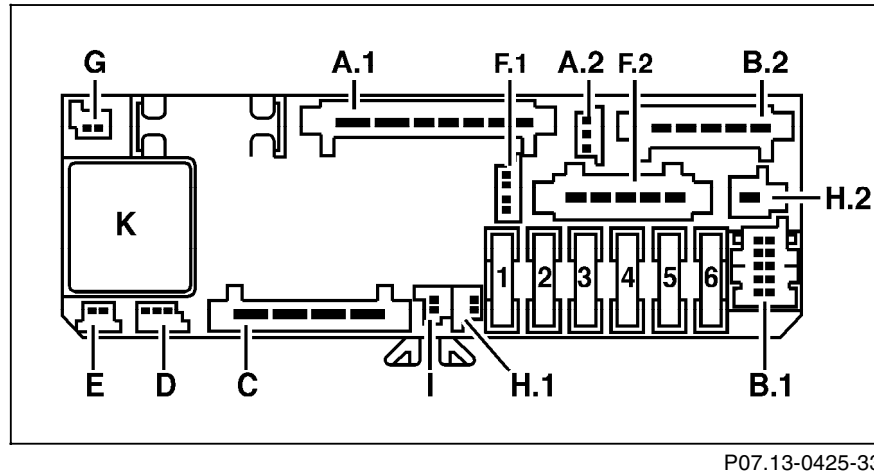


Figure 17

- K40/4 Passenger side fuse and relay module box
- K Starter relay (K40/4k2)
- A.1 Pin 6: Starter (M1) activation
- C Pln 3: Terminal 15U from Electronic ignition-starter switch (EIS) control module (N73)
- I Pin 1: Starter relay (K40/4k2) activation

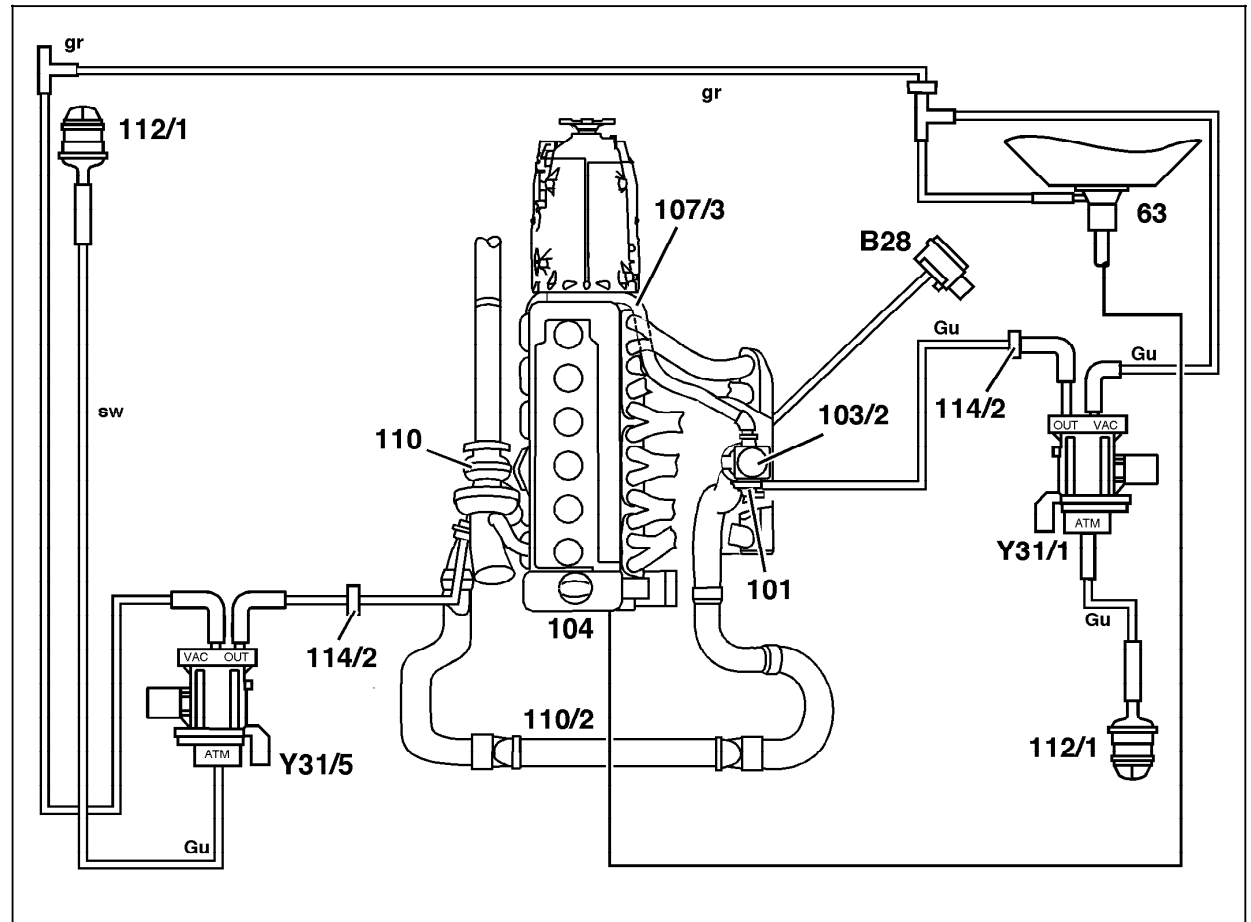
Vacuum Line Routing

Engine 606.962, Model 210

Figure 1

- 10 In-line fuel injection pump
- 63 Check valve with orifice 0.8 mm
- 101 EGR valve
- 103/2 Mixing housing
- 104 Vacuum pump
- 107/3 Corrugated pipe
- 110 Turbocharger
- 110/2 Inter-cooler
- 112/1 Ventillation filter for EGR valve vacuum transducer (Y31/1)
- 114/2 Connector 6mm/6mm
- B28 Pressure sensor
- Y31/1 EGR valve vacuum transducer
- Y31/5 Boost pressure control/pressure control flap vacuum transducer
- ATM Vent to component compartment
- OUT Outlet from vacuum transducer
- VAC Vacuum supply from vacuum pump

- gr grey
- sw black
- GU rubber hose



P07.12-0410-06