3.2 Engine 606.912, Model 210 as of 06/96 up to 02/97

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 are stored in the diagnostic trouble code memory of the IFI control module (N3/7).
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 the multifunction indicator displays:

CHECK ENGINE
ENGINE ELECTRONICS

The faults are identified with an OBD failure code: See listing starting on page 5.
Such faults are for example:

– EGR lifting sender (B28/3)
– EGR valve pressure transducer (Y31/1)
– Pressure control flap vacuum transducer (Y31/2)

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

Substitution for missing signals.
The Engine control module (IFI) (N3/7) replaces missing input signals with substitute values based on other signals available in order to maintain system function.
The substitute values may result in:

– Performance reduction/reduction of maximum engine rpm.
– EGR system malfunction.
– Cruise control malfunction.
– Intake MAP 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 only rarely 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 value for engine coolant, air and fuel temperatures:**
  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‘s, 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 for intake manifold pressure:**
  In case of the intake manifold pressure, the HHT display indicates under menu selection 3/2 engine test the intake manifold pressure **nominal value** calculated by the control module on the **left** and the intake manifold pressure **actual value** on the **right**.

The values should differ from each other only slightly. The permissible tolerances are presently unknown.

Notes regarding the Drive Authorization System Stage X (DAS)

- The activation of the drive authorization system stage X takes place only from the DAS control module (N54/1) via the CAN data bus to the engine control module (IFI) (N3/7).
  After activation of the DAS stage X, the engine control module (IFI) (N3/7) renders the fuel injection system inoperable. The activation or deactivation is accomplished with transponder technology via the ignition key. As soon as the ignition key is turned to position "2" in the steering lock, the DAS control module (N54/1) receives a signal and the fuel injection system is made operative via the CAN data bus.
  The engine control module (IFI) (N3/7) and the DAS control module (N54/1) 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 control module (IFI) (N3/7) or the DAS control module (N54/1) by swapping control modules from another vehicle is no longer possible.
  If a new engine control module (IFI) (N3/7) is installed for test purposes only, a maximum of 40 engine starts can be performed before the control modules are permanently locked with each other.
  After 40 engine starts, the engine control module (IFI) (N3/7) can no longer be used in any other vehicle.
  Before the first engine start, version coding **must** be performed on the engine control module (IFI) (N3/7) with the HHT. After that, identification must be initiated.

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Version coding with HHT

a) 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 (menu program in HHT).
- **Manual**
  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 coding:
  - Vehicle model
  - 5-speed automatic transmission
  - With cruise control
  - Country version

  When returning a new control module to a PDC, the code number must be erased.

Trial installation of a control module from an other vehicle is **not** possible. Trial installation of a new control module from spare parts stock is possible, but only to a maximum of 40 engine starts. After 40 engine starts, the control module is permanently assigned to the vehicle.

Operating Cycle (USA) version only

One operating cycle is reached if:

- Engine coolant temperature > 60° C
- Turn off engine
- Wait 5 seconds (internal control module test)
- Start engine
- Run engine at idle speed for 20 seconds
- In selector lever position P/N raise engine speed to 2500 rpm and release accelerator pedal and allow engine to return to idle speed.
- Accelerate (full load acceleration) vehicle in transmission range D to approx. 53 mph (85 km/h) and then decelerate (coasting) to approx. 37 mph (60 km/h).

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Prerequisite for DTC memory readout

1. Review section 11, 12, 21, 22, 23,
2. Fuse on relay module (K40) 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.
4. Review electrical wiring diagram: PE07.00-P-1100A

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

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	OBD DTC	Possible cause	DTC Description	Test step/Remedy [1]
		No malfunction in system		–
P0105	P0105	Pressure sensor (B28)	13 ≫ **1**	23⇒ 5.0
P0110	P0111	IAT sensor (B17)	13 ≫ **2**	23⇒ 4.0
P0115	P0115	ECT sensor (B11)	13 ≫ **3**	23⇒ 3.0
P0180	P0181	Fuel temperature sensor (Y1/1b1)	13 ≫ **4**	23⇒ 12.0
P0600	P0600	CAN data bus	13 ≫ **5**	23⇒ 13.0
P0700	P0700 P0715 P0720 P0730 P0740	Transmission failure		see DM, Chassis and Drivetrain, Volume 1, section 2
P0702	P0702 P0743 P0748 P0753 P0758 P0763	Transmission failure		see DM, Chassis and Drivetrain, Volume 1, section 2

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC	OBD DTC	Possible cause		Test step/Remedy [1]
P1105	P0106	Atmospheric pressure sensor in control module	13 ≫ **6**	N3/7
P1220	P0200	Fuel quantity actuator (Y23/1)	13 ≫ **7**	23⇒ 7.0
P1221	P0600	CAN communication, ETC or ETS interrupted	13 ≫ **8**	23⇒ 13.0
P1222	P0220	IFI/DFI accelerator pedal position sensor (R25/2)	13 ≫ **9**	23⇒ 9.0
P1223	P0200	Fuel rack position sensor (Y23/1I1)	13 ≫ **10**	
P1335	P0725	CKP sensor (IFI/DFI) (L5/6)	13 ≫ **11**	23⇒ 6.0
P1401	P0403	EGR lifting sender (B28/3)	13 ≫ **12**	23⇒ 17.0
P1404	P0400	EGR control	13 ≫ **13**	23⇒ 27.0
P1470	P0120	Pressure control flap vacuum transducer (Y31/2)	13 ≫ **14**	23⇒ 20.0
P1475	P0200	Shifting induction pipe switchover valve (Y22/6)	13 ≫ **15**	23⇒ 21.0
P1476	P0200	Resonance intake line switchover valve (Y22/7)	13 ≫ **16**	23⇒ 23.0
P1480	P0380	Preglow control	13 ≫ **17**	23⇒ 14.0
P1481	P1365 P1367 P1369	Glow plug failure, cylinder 1 – 2 Glow plug failure, cylinder 3 – 4 Glow plug failure, cylinder 5 – 6	13 ≫ **18**	23⇒ 16.0
P1482	P0380	Preglow control module (N14/2)	13 ≫ **19**	23⇒ 15.0

[1] Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	OBD DTC	Possible cause		Test step/Remedy [1]
P1520		CC switch (S40)		23⇒ 10.0
P1610	P0560	Voltage supply missing or relay module (K40)	13 ≫ **20**	23⇒ 18.0
P1611 P1613	P0200	Engine control module (IFI) (N3/7)	13 ≫ **21**	N3/7
P1612	P0560	Engine control module (IFI) (N3/7) voltage, circuit 15	13 ≫ **22**	23⇒ 19.0
P1614	P0200	Engine control module (IFI) (N3/7) or fuel metering actuator (Y23/1k1) or fuel rack position sensor (Y23/1l1)	13 ≫ **23**	23⇒ 7.0 23⇒ 8.0
P1615		Engine control module (IFI) (N3/7), supply voltage		23⇒ 1.0 23⇒ 2.0
P1617	P0200	Engine control module (IFI) (N3/7) or not properly coded	13 ≫ **24**	see HHT “Version Coding“ menu selection 5
P1622	P0215	IFI/DFI electrohydraulic shut-off actuator (Y1/1)	13 ≫ **25**	23⇒ 11.0
P1630		Drive authorization signal (DAS)		see HHT actual values “Drive Authorization“ menu selection 3/7

[1] Observe Preparation for Test, see 22.

Diagnosis – Complaint Related Diagnostic Chart (Preglow System)

Prior to Diagnosis:

1. Review section 0, 11, 12, 21, 22, 23

Complaint/Problem	Possible cause	Test step/Remedy [1]
Preglow indicator lamp does not light with glow/starter switch ON, engine can be started.	Preglow indicator lamp.	Instrument cluster (A1)
Preglow indicator lamp does not light, engine can not be started.	Preglow control module (N14/2). Voltage supply to preglow control module (N14/2) is missing.	23 ⇒ 15.0
Preglow indicator lamp lights up while driving for approx. 1 minute.	Open circuit of glow plug	23 ⇒ 16.0
Preglow indicator lamp lights up while driving or lights intermittantly.	Short circuit in preglow control module (N14/2).	23 ⇒ 15.0
Preglow indicator lamp lights up while driving or lights intermittantly.	Communication fault between engine control module (IFI) (N3/7) and preglow control module (N14/2).	23 ⇒ 14.0

[1] Observe Preparation for Test, see 22.

Note regarding preglow current circuit:

A melt-down fuse is installed for each individual glow plug in the preglow control module (N14/2). With a short circuit in the glow plugs or the electrical wiring to the glow plugs, the current circuit is interrupted. The preglow control module (N14/2) must be replaced after the short circuit is eliminated.

Diagnosis – Table of Trouble Code Description

⩾1		**Pressure sensor (B28)**
	System trouble code OBD trouble code	P0105 P0105
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately upon fault recognition
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	The intake manifold absolute pressure is registered by the pressure sensor (B28) and transmitted to the engine control module (IFI) (N3/7)
	Supply voltage Supply voltage Signal voltage Signal voltage Engine rpm	The engine control module (IFI) checks 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 < 800 rpm and the difference between Intake manifold pressure – atmospheric pressure > 210 mbar longer than 6 seconds

Diagnosis – Table of Trouble Code Description

≫ 2		IAT sensor (B17)
	System trouble code OBD trouble code	P0110 P0111
	Storage of DTC and activation of CHECK ENGINE MIL	Two consecutive trips with fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	The engine control module (IFI) (N3/7) checks the voltage present at the IAT sensor for the threshold values. If the threshold is exceeded, the engine control module (IFI) replaces it with a substitude value.
	Signal voltage Signal voltage	The engine control module (IFI) checks the voltage values: > 4.7 V longer than 2 seconds < 0.2 V longer than 2 seconds

Diagnosis – Table of Trouble Code Description

≫ 3		**ECT sensor (B11)**
	System trouble code OBD trouble code	P0115 P0115
	Storage of DTC and activation of CHECK ENGINE MIL	Two consecutive trips with fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	After ignition: **ON,** a timing sequence starts in the engine control module. This time is at Engine coolant temperature > 10°C 2 minutes Engine coolant temperature –7°C 5 minutes The internal timing sequence in the engine control module is interrupted if the engine speed is < 1000 rpm and the injection quantity is < 15 mg/stroke. If the internal timing sequence is completed and the coolant temperature, since ignition **ON**, did not increase by at least 5°C or to 40°C, the ECT sensor (B11) is recognized as defective.
	Signal voltage Signal voltage	The engine control module (IFI) checks the voltage values: < 0.2 V longer than 500 ms >4.7 V longer than 500 ms As of an engine speed > 1000 rpm and an injection quantity > 15 mg/stroke the coolant temperature must have increased after 2 – 5 minutes (depending on the coolant temperature at ignition ON) by at least 5°C or risen to > 40°C or a fault is entered into the DTC memory.

Diagnosis – Table of Trouble Code Description

≫ 4		**Fuel temperature sensor (Y1/1b1)**
	System trouble code OBD trouble code	P0180 P0181
	Storage of DTC and activation of CHECK ENGINE MIL	Two consecutive trips with fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	The engine control module (IFI) (N3/7) checks the voltage present at the fuel temperature sensor for the threshold values. If the threshold is exceeded, the engine control module (IFI) replaces it with a substitude value.
	Signal voltage Signal voltage	The engine control module (IFI) checks the voltage values: < 0.2 V longer than 2 seconds > 4.7 V longer than 2 seconds

Diagnosis – Table of Trouble Code Description

⩾ 5		CAN data bus
	System trouble code OBD trouble code	P0600 P0600
	Storage of DTC and activation of CHECK ENGINE MIL	Two consecutive trips with fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	The instrument cluster (A1) transmits data to the engine control module(IFI) (N3/7) in a certain time cycle. The instrument cluster (A1) is recognized as defective, if these data are missing for longer than 1 second. The CAN internal resistance in the engine control module (IFI) is monitored during operation. Further more, the CAN element in the engine control module (IFI) is monitored.

Diagnosis – Table of Trouble Code Description

≫ 6		**Atmospheric pressure sensor in control module**
	System trouble code OBD trouble code	P1105 P0106
	Storage of DTC and activation of CHECK ENGINE MIL	Two consecutive trips with fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	
	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 – Table of Trouble Code Description

⩾ 7		**Fuel quantity actuator (Y23/1)**
	System trouble code OBD trouble code	P1220 P0200
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	Control deviation between fuel rack position sensor and fuel quantity actuator see nominal – actual value comparison
		The engine control module (IFI) (N3/7) checks the voltage values

Diagnosis – Table of Trouble Code Description

⩾ 8		**CAN communication, ETC or ETS interrupted**
	System trouble code OBD trouble code	P1221 P0600
	Storage of DTC and activation of CHECK ENGINE MIL	Two consecutive trips with fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	The CAN communication from the transmission control module and the ETS/SPS control module is checked for existance and plausibility.

Diagnosis – Table of Trouble Code Description

⩾ 9		**IFI/DFI accelerator pedal position sensor (R25/2)**
	System trouble code OBD trouble code	P1222 P0220
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	Checking the supply voltage. If the IFI/DFI accelerator pedal position sensor (R25/2) is activated > 20%, the idle speed contact display must be OFF, see HHT actual values. As of < 1% the idle speed contact in the IFI/DFI accelerator pedal position sensor must be actuated. If the IFI/DFI accelerator pedal position sensor is not actuated, the display on the HHT must be 0%, see HHT actual values. **Note:** During the test it should be observed, that the EGR lifting sender (B28/3) and the IFI/DFI accelerator pedal position sensor (R25/2) receive the same supply voltage. Therefore, both parts should be tested.
	Supply voltage Supply voltage Signal voltage	The engine control module(IFI) (N3/7) checks the voltage values: > 5 V longer than 2 seconds < 4.7 V longer than 2 seconds > 4.7 V longer than 240 ms

Diagnosis – Table of Trouble Code Description

⩾ 10		**Fuel rack position sensor (Y23/1I1)**
	System trouble code OBD trouble code	P1223 P0200
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	
	Checked signal or condition	The engine control module (IFI) (N3/7) monitors the signal voltage and also monitors if the start and stop rest "stops" are reached, while the control module is in the after run mode.

Diagnosis – Table of Trouble Code Description

⩾ 11		**CKP sensor (IFI/DFI) (L5/6)**
	System trouble code OBD trouble code	P1335 P0725
	Storage of DTC and activation of CHECK ENGINE MIL	Two consecutive trips with fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	Checking for dynamic plausibility, e.g. the time from one impulse to the next must not deviate by a specified time
		Engine is shut off

Diagnosis – Table of Trouble Code Description

≫ 12		**EGR lifting sender (B28/3)**
	System trouble code OBD trouble code	P1401 P0403
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	Monitoring of supply and signal voltage
	Signal voltage Supply voltage Supply voltage Signal voltage, ignition **ON**	The engine control module (IFI) (N3/7) checks the voltage values: > 4.7 V longer than 2 seconds > 5 V longer than 2 seconds <4.7 V longer than 2 seconds >1.3 V longer than 2 seconds

Diagnosis – Table of Trouble Code Description

⩾ 13		**EGR valve pressure tranducer (Y31/1)**
	System trouble code OBD trouble code	P1404 P0400
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	Positive or negative control deviation. **Positive control deviation** The desired value from the engine control module (IFI) (N3/7) (nominal value) was for an extended period of time (4 seconds) by more than 2.5 mm **below** specification. **Negative control deviation** The desired value from the engine control module (IFI) (N3/7) (nominal value) was for an extended period of time (4 seconds) was **exceeded** by more than 1.5 mm . Explanation for control deviation: Nominal value **minus** actual value. Short circuit or end stage idling. **Flow check** The following sequence is performed during the flow check: – EGR valve closed – Pressure control flap closed – With the pressure control flap and the EGR valve closed, the intake manifold pressure is measured. – EGR valve opened – With the pressure control flap closed and the EGR valve opened the intake manifold pressure is measured. – The difference between closed and opened EGR valve must be > 10 mbar otherwise a failure is set in the DTC memory.

Diagnosis – Table of Trouble Code Description

≫ 14		**Pressure control flap vacuum transducer (Y31/2)**
	System trouble code OBD trouble code	P1470 P0120
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	**Nominal – actual value comparison** The engine control module (IFI) (N3/7) checks the electrical wiring and for permanent control deviations. Monitoring for positive or negative control deviations. Monitoring the final stage for short and open circuit.
	Positive control deviation Negative control deviation	Positive or negative control deviation. **Positive control deviation** The desired value from the IFI control module (nominal value) was for an extended period of time (6 seconds) by more than 210 mbar **below** specification. **Negative control deviation** The desired value from the IFI control module (nominal value) was for an extended period of time (6 seconds) was **exceeded** by more than 75 mbar. Explanation for control deviation: Nominal value **minus** actual value.

Diagnosis – Table of Trouble Code Description

≫ 15		**Shifting induction pipe switchover valve (Y22/6)/resonance intake manifold flap**
	System trouble code OBD trouble code	P1475 P0200
	Storage of DTC and activation of CHECK ENGINE MIL	Two consecutive trips with fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	If the shifting induction pipe switchover valve Y22/6 **is energized**, then this means that: the resonance intake manifold flap 99/4 is **not supplied** with vacuum and the resonance intake line switch (S35/1) **is not actuated**. If the shifting induction pipe switchover valve Y22/6 **is not energized**, then this means that: the resonance intake manifold flap 99/4 **is supplied** with vacuum and the resonance intake line switch (S35/1) **is actuated**. The engine control module (IFI) (N3/7) checks the activation. The engine control module (IFI) (N3/7) recognizes a failure, if the problems exist longer than approx. 2 seconds. The monitoring of the switches takes place at an engine speed > 1000 rpm. Monitoring the final stage for short and open circuit.

Diagnosis – Table of Trouble Code Description

≫ 16		**Resonance intake line switchover valve (Y22/7)/resonance intake line flap**
	System trouble code OBD trouble code	P1476 P0200
	Storage of DTC and activation of CHECK ENGINE MIL	Two consecutive trips with fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	If the switchover valve Y22/7 **is energized**, then this means that: the resonance intake line flap 99/2 is **not supplied** with vacuum and the resonance intake line switch (S35/1) **is not actuated**. If the switchover valve Y22/7 **is not energized**, then this means that: the resonance intake line flap 99/2 **is supplied** with vacuum and the resonance intake line switch S35/1 **is actuated**. The engine control module (IFI) (N3/7) checks the activation. The engine control module (IFI) (N3/7) recognizes a failure if the problems exist longer than approx. 2 seconds. The monitoring of the switches takes place at an engine speed > 1000 rpm. Monitoring the final stage for short and open circuit.

Diagnosis – Table of Trouble Code Description

≫ 17		**Preglow control**
	System trouble code OBD trouble code	P1480 P0380
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	The function of the preglow indicator lamp is checked.
	Ignition: **ON**	

Diagnosis – Table of Trouble Code Description

≫ 18		**Glow plug failure, cylinder 1 – 2** **Glow plug failure, cylinder 3 – 4** **Glow plug failure, cylinder 5 – 6**
	System trouble code OBD trouble code	P1481 P1365 P1367 P1369
	Storage of DTC and activation of CHECK ENGINE MIL	Two consecutive trips with fault
	Monitoring time and frequency of test	During the preglow procedure
	Checked signal or condition	
	Ignition: **ON**	

Diagnosis – Table of Trouble Code Description

≫ 19		**Preglow control module (N14/2)**
	System trouble code OBD trouble code	P1482 P0380
	Storage of DTC and activation of CHECK ENGINE MIL	Two consecutive trips with fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	
	Ignition: **ON**	

Diagnosis – Table of Trouble Code Description

≫ 20		**Voltage supply missing or relay module (K40)**
	System trouble code OBD trouble code	P1610 P0560
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	
	Ignition: **ON**	

Diagnosis – Table of Trouble Code Description

≫ 21		**Engine control module (IFI) (N3/7)**
	System trouble code OBD trouble code	P1611 / P1613 P0200
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	With code: P1611: Internal check of engine control module (IFI) (N3/7) for under/over voltage With code: P1613: Internal check of engine control module (IFI) (N3/7) for after run
		i Control module fault: replace engine control module (IFI) (N3/7)

Diagnosis – Table of Trouble Code Description

≫ 22		**Engine control module (IFI) (N3/7), circuit 15**
	System trouble code OBD trouble code	P1612 P0560
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	If no voltage supply via circuit 15 is supplied to the engine control module (IFI (N3/7) with ignition **ON**, a fault is present.
	Supply voltage	11 – 14 V

Diagnosis – Table of Trouble Code Description

≫ 23		**Engine control module (IFI) (N3/7) fuel metering actuator or fuel rack position sensor**
	System trouble code OBD trouble code	P1614 P0200
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	Internal check in control module during operation and after engine shut-off
		i Engine control module or injection pump fault (based on fault type), be certain to check supplied fault code data (HHT freeze frame) as well

Diagnosis – Table of Trouble Code Description

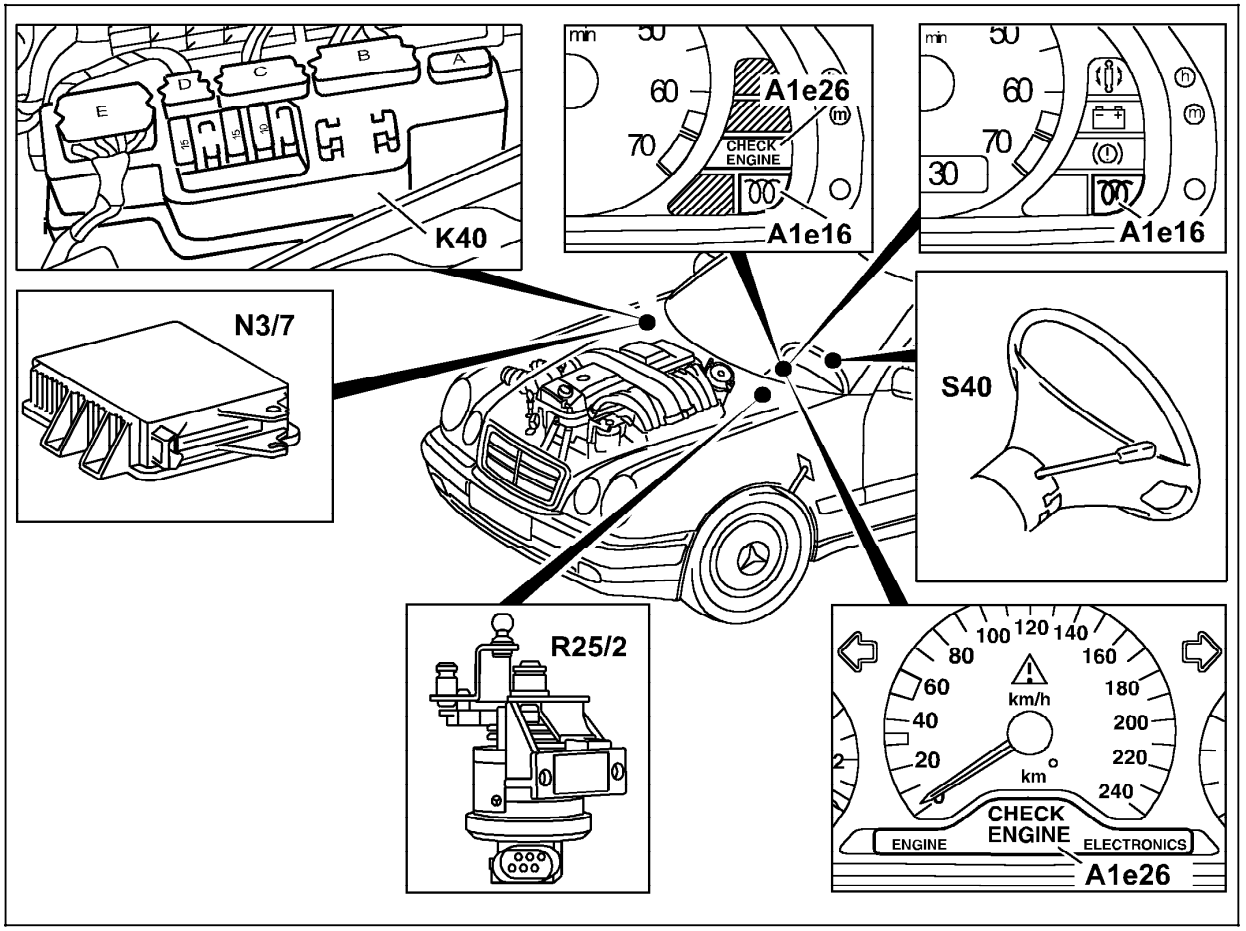
≫ 24		**Engine control module (IFI) (N3/7) or not properly version coded**
	System trouble code OBD trouble code	P1617 P0200
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	With ignition **ON** and during after running
		i Check version coding and correct

Diagnosis – Table of Trouble Code Description

≫ 25		**IFI electrohydraulic shut-off actuator (Y1/1)**
	System trouble code OBD trouble code	P1622 P0215
	Storage of DTC and activation of CHECK ENGINE MIL	Immediately after occurrence of fault
	Monitoring time and frequency of test	Continuously
	Checked signal or condition	The final stage of the electrohydraulic shut-off actuator is checked for short circuit. In addition, a plausibility check is performed during engine control module after run: Prerequisite Engine speed < 800 rpm Vehicle speed < 3 km/h During the electrohydraulic shut-off actuator test, the actuator is deenergized and the engine speed is monitored. If the engine speed does not drop below 500 rpm within 2 seconds a IFI electrohydraulic shut-off actuator (Y1/1) failure is recognized and the engine is turned off via the fuel metering actuator (Y23/1k1). Increases the engine speed to > 1300 rpm or by more than 740 rpm during the electrohydraulic shut-off actuator test, a shut-off actuator failure (Y1/1) is recognized also and the engine is turned off via the fuel metering actuator.(Y23/1k1).
	Signal voltage Signal voltage	ⓘ The engine speed must drop within 2 seconds < 500 rpm after turning off engine. Short circuit of electrohydraulic actuator against battery +

Electrical Test Program – Component Locations

Engine 606.912
Electrical Components in Engine Compartment



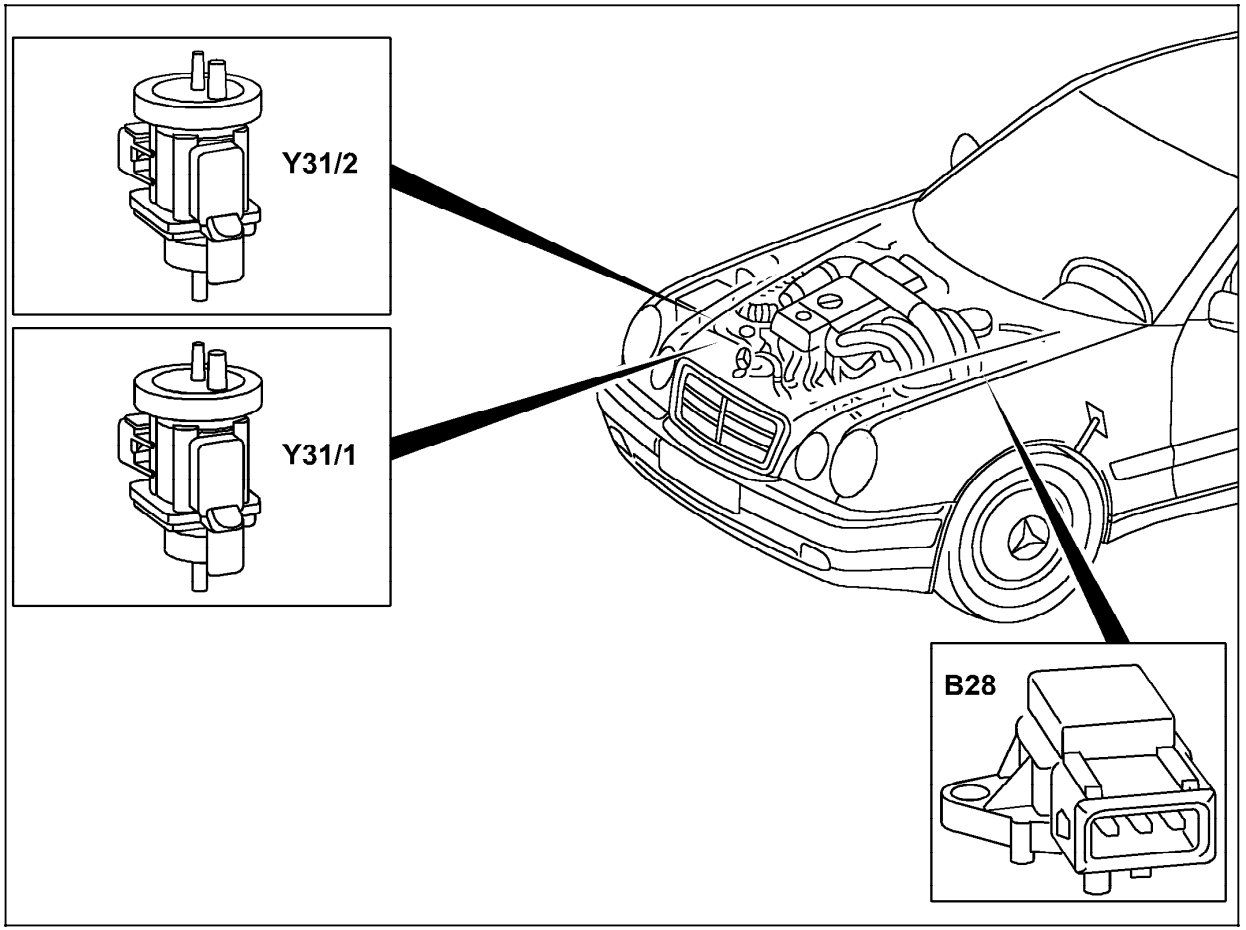
P07.12-0347-06

Figure 1

A1e16	Preglow indicator lamp
A1e26	CHECK ENGINE MIL
K40	Relay module (IFI, base function)
N3/7	IFI control module
R25/2	IFI accelerator pedal position sensor
S40	CC switch

Electrical Test Program – Component Locations

Engine 606.912
Electrical Components in Engine Compartment



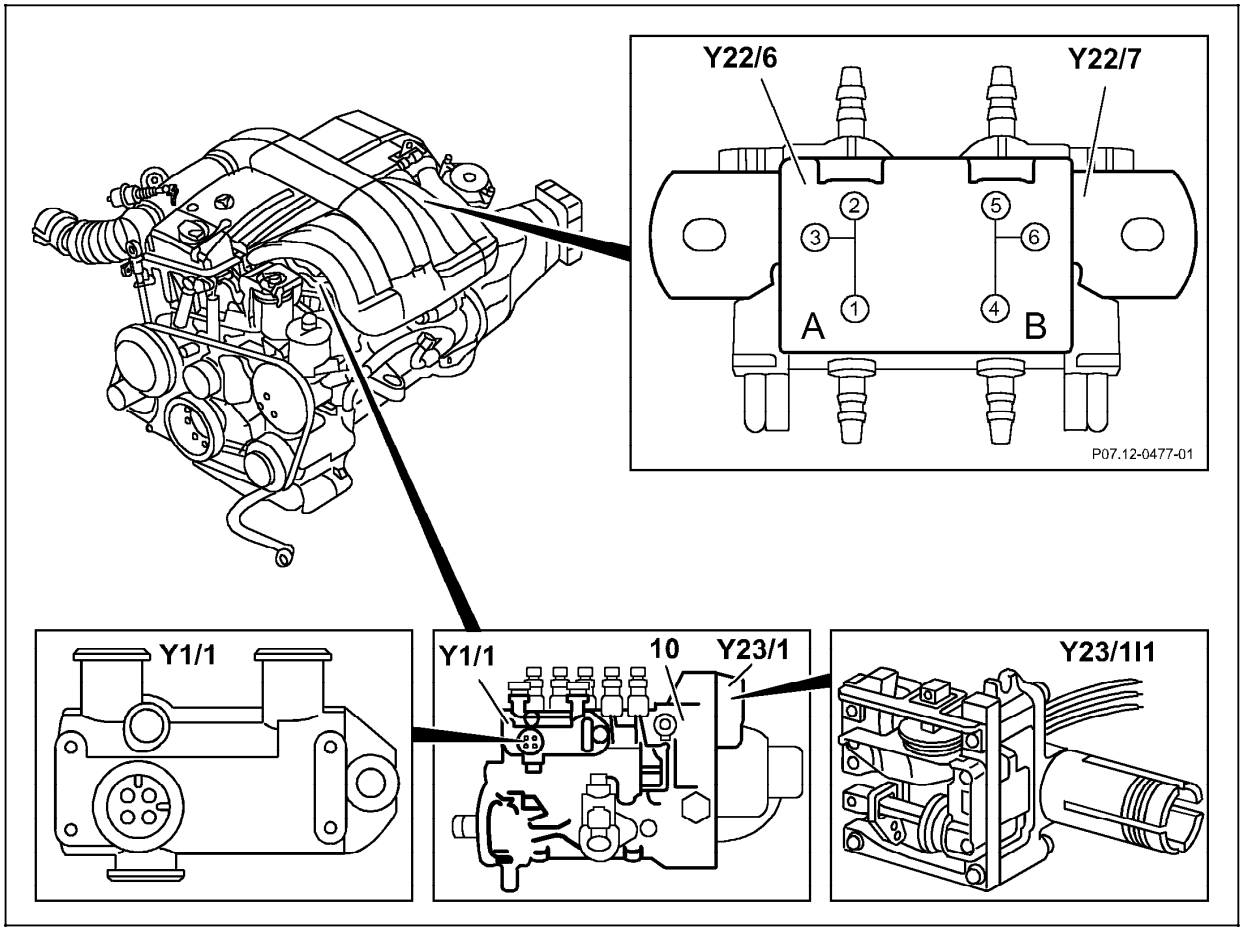
P07.13-0346-06

Figure 2

B28	Pressure sensor
Y31/1	EGR valve pressure transducer
Y31/2	Pressure control flap vacuum transducer

Electrical Test Program – Component Locations

Electrical Components on Engine



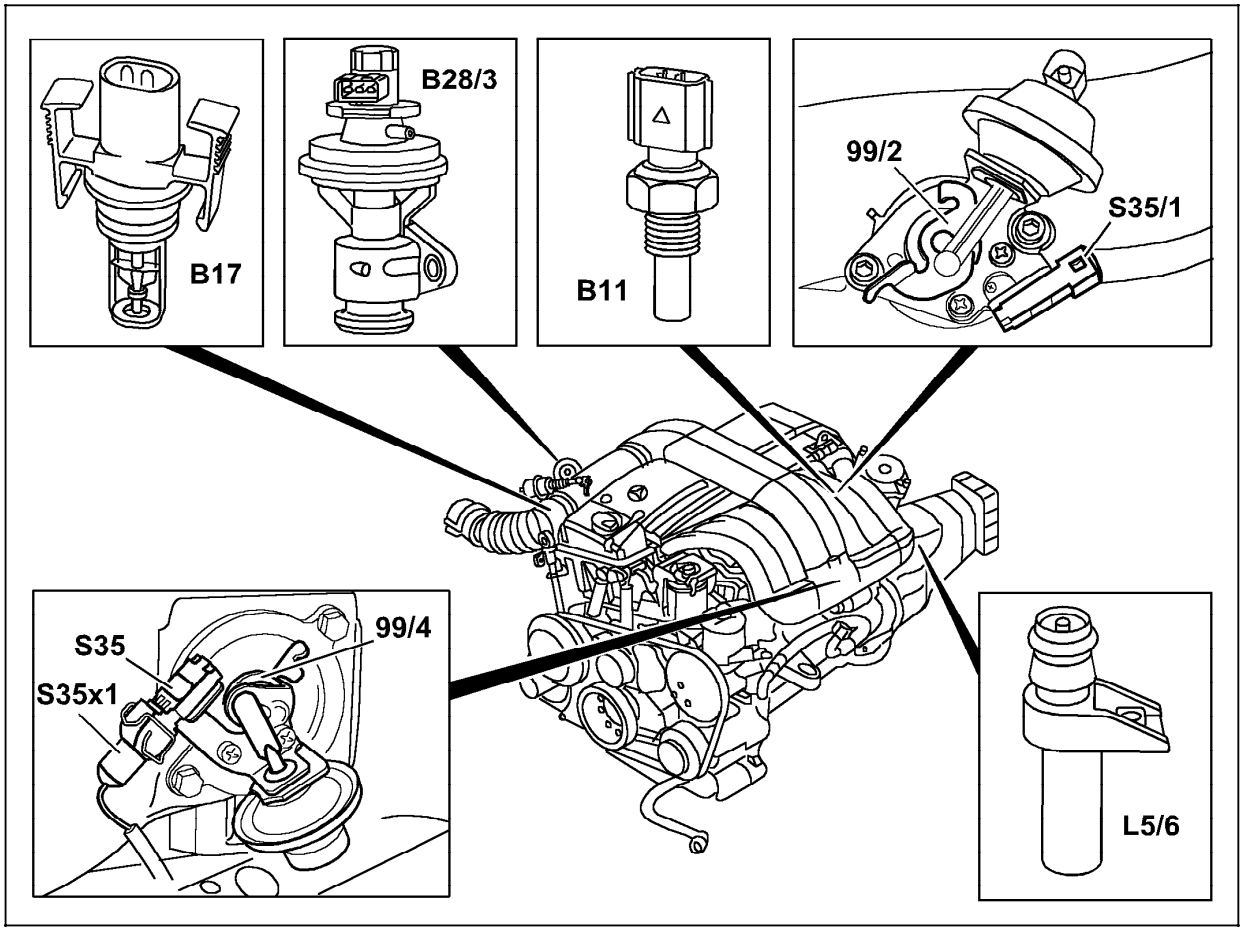
P07.12-0267-06

Figure 3

10	In-line fuel injection pump
Y1/1	IFI electrohydraulic shut-off actuator
Y22/6	Resonance intake manifold switchover valve
Y22/7	Resonance intake line switchover valve
Y23/1	Fuel quantity actuator
Y23/1I1	Fuel rack position sensor

Electrical Test Program – Component Locations

Electrical Components on Engine



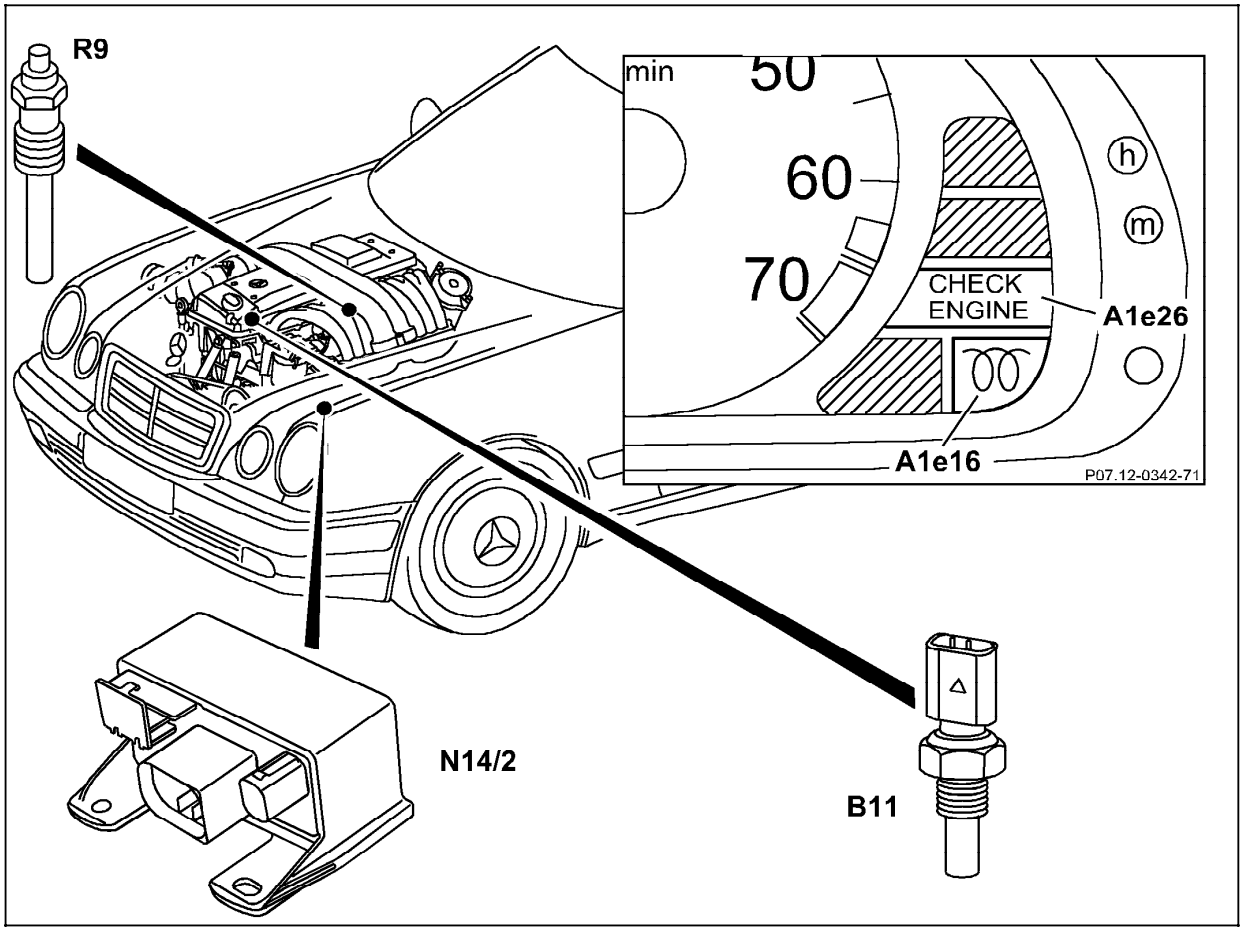
P07.12-0345-06

Figure 4

B11	ECT sensor
B17	IAT sensor
B28/3	EGR lifting sender
L5/6	CKP sensor
S35	Resonance intake manifold switch
S35x1	Resonance intake manifold switch connector
S35/1	Resonance intake line switch
99/2	Resonance intake line flap
99/4	Resonance intake manifold flap

Electrical Test Program – Component Locations

Engine 606.912
Preglow System Components



P15.20-0224-06

Figure 5

A1e16	Preglow indicator lamp
A1e26	"CHECK ENGINE" MIL
B11	ECT sensor
N14/2	Preglow control module
R9	Glow plugs

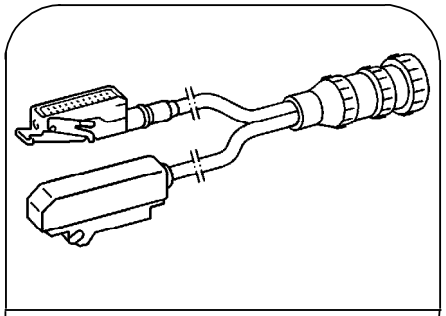
Electrical Test Program - Preparation for Test

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

1. Review section 11, 12, 21, 22, 23, 31,
2. Ignition: **OFF**
3. Fuse on relay module (K40) in order.
   Relay module in order.
   Relay module plugs connected.
4. Disconnect engine control module (IFI) (N3/7) connector.
5. Connect socket box with test cable to engine control module (IFI) (N3/7).

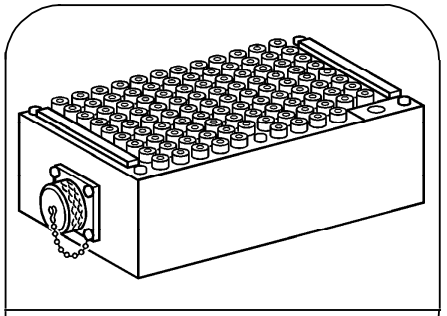
Electrical wiring diagrams:
Electrical Troubleshooting Manual, Model 210, Volume 1

Special Tools



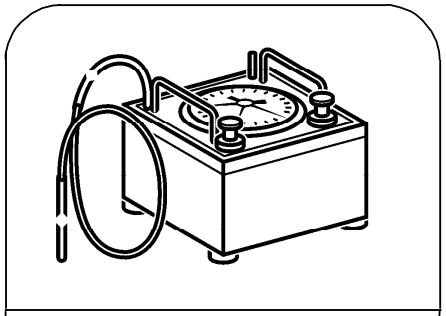
104 589 00 63 00

Test cable



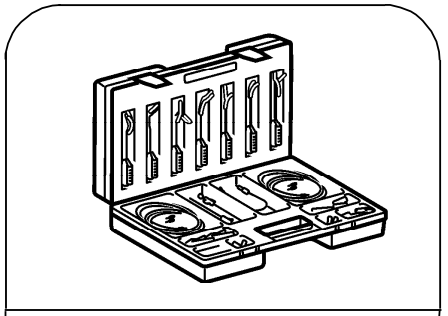
129 589 00 21 00

126-pin socket box



201 589 13 21 00

Tester



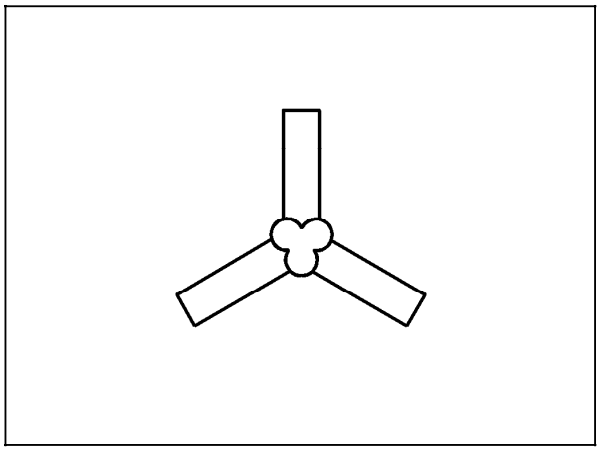
201 589 00 99 00

Electrical connecting set

Electrical Test Program - Preparation for Test

Test equipment; See MBUSA Standard Service Equipment Program

Description	Brand, model, etc.
Digital multimeter	Fluke models 23, 77 III, 83, 85, 87
Y - fitting	117 078 01 45

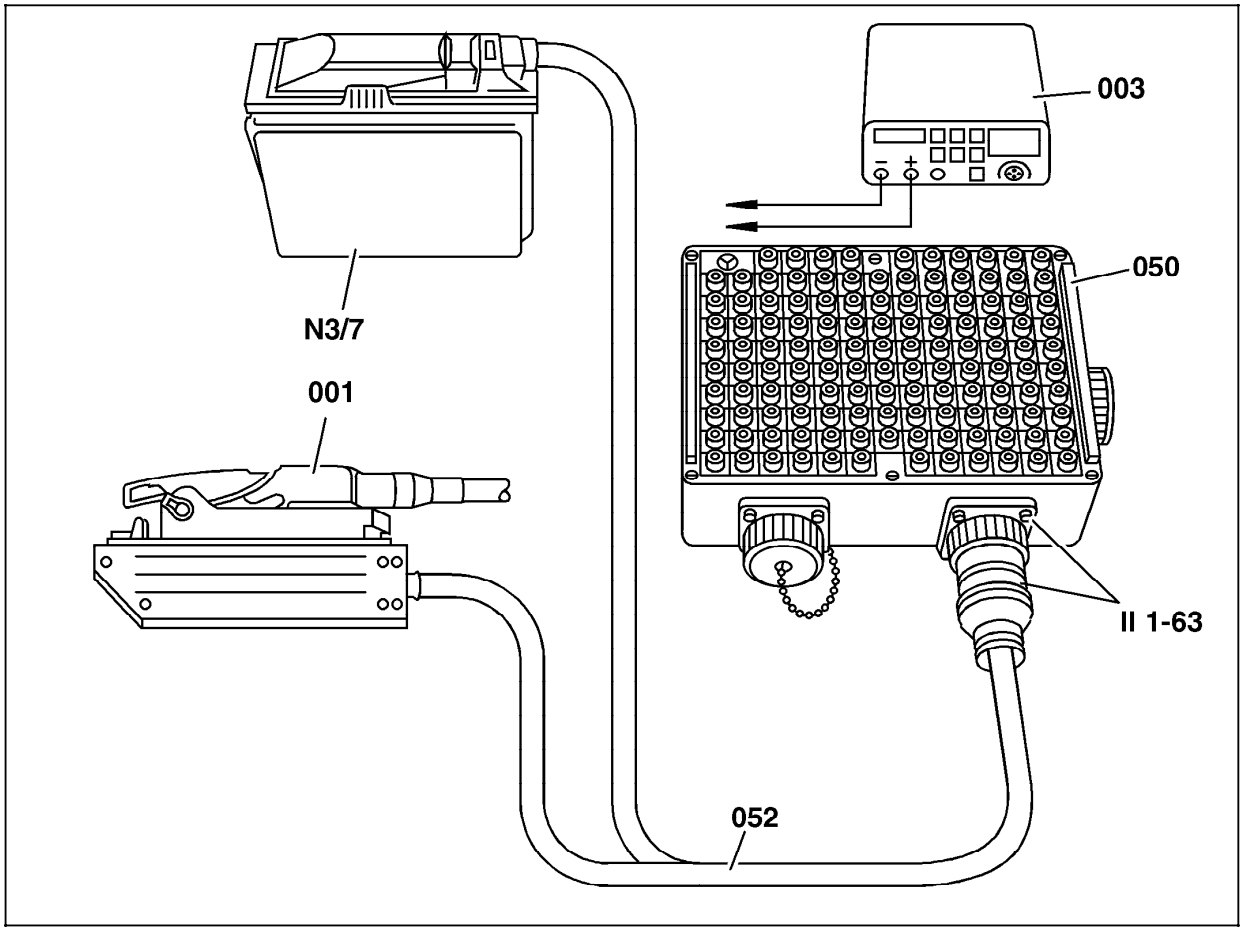


P07.12-0438-01

Figure 1
Y - fitting

Electrical Test Program – Preparation for Test

Connection Diagram – Socket box



P07.12-0439-06

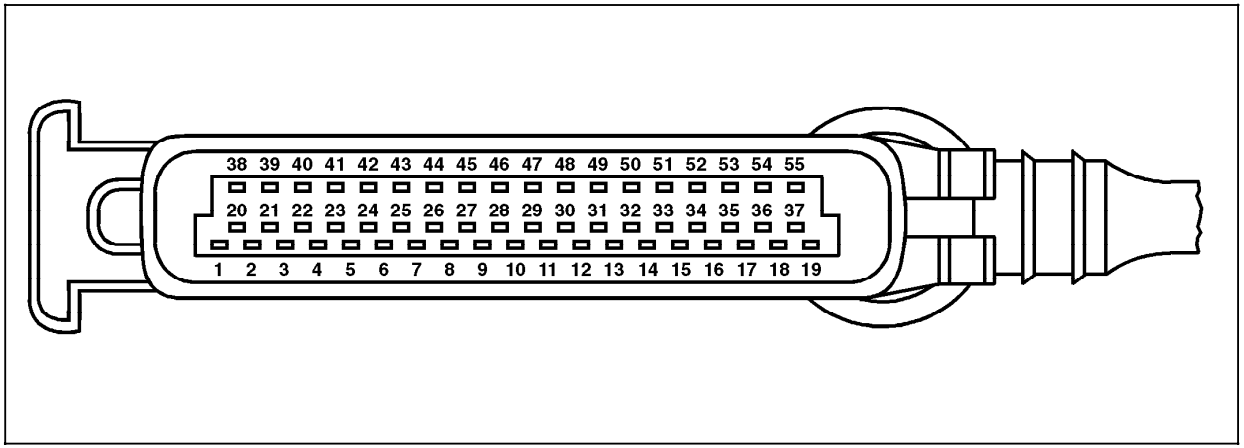
Figure 2

001 Engine control module (IFI) (N3/7) connector
003 Multimeter
050 Socket box (126-pole)
052 Test cable

N3/7 Engine control module (IFI) (N3/7)
II 1-63 Socket and plug of test cable

Electrical Test Program – Preparation for Test

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



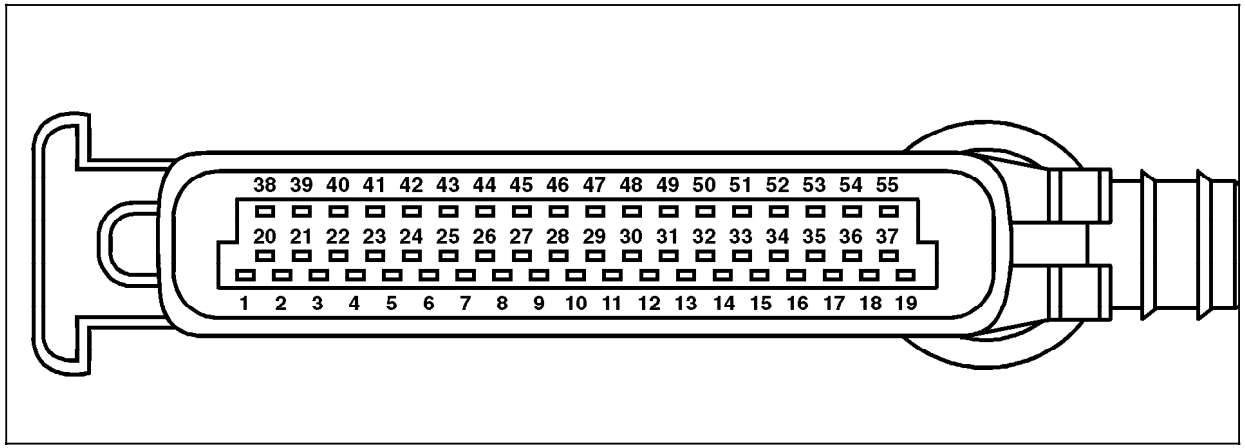
P07.12-0440-04

Figure 3

1	–
2	–
3	Fuel temperature sensor in electrohydraulic shut-off actuator, socket 4
4	Sensor ground GND
5	CAN data bus (socket L)
6	IFI/DFI accelerator pedal position sensor (potentiometer, socket 6)
7	Oil level switch (S43)
8	CC switch (accelerate/set, socket 4)
9	Fuel rack position sensor (socket 7)
10	Fuel rack position sensor (socket 1)
11	Resonance intake manifold switchover valve
12	Resonance intake line switch
13	Circuit 50 (glow/starter switch)
14	TN-signal (data link connector, pin 13)
15	IFI/DFI accelerator pedal position sensor (CTP switch, socket 4)
16	–
17	–
18	Ground W16/5 – W16/6 (electronics)
19	Ground W16/5 – W16/6 (electronics)
20	CKP sensor (socket 1)
21	EGR lifting sender (B28/3) (socket 3)
22	Pressure sensor (socket 1)
23	ECT sensor (socket 2)
24	IFI/DFI accelerator pedal position sensor (CTP switch, socket 3)
25	–
26	Terminal HRL from relay module K40 (connector E, socket 3)
27	P/N signal from transmission control module (N15/3)
28	Sensor ground (B28/3, L5/6)
29	IFI/DFI accelerator pedal position sensor (potentiometer socket 1)
30	CC switch (control contact, socket 6)

Electrical Test Program – Preparation for Test

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



P07.12-0440-04

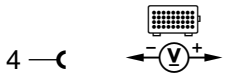
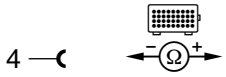
Figure 4

31	–
32	Resonance intake manifold switch
33	Preglow control module (N14/2)
34	–
35	EGR valve vacuum transducer (Y31/1)
36	Fuel quantity actuator (socket 2)
37	Voltage supply, circuit 87U, unfused (relay module K40, connector E, socket 7)
38	CC switch (decelerate/set, socket 3)
39	IFI accelerator pedal position sensor (potentiometer, socket 5)
40	IAT sensor (socket 2)
41	CAN data bus (socket H)
42	CC switch (resume, socket 5)
43	IFI electrohydraulic shut-off actuator (socket 3)
44	CC switch (off, socket 1)
45	Pressure sensor (socket 3)
46	Fuel rack position sensor (socket 6)
47	Circuit 15E
48	–
49	–
50	Diagnostic signal (to X11/4, socket 4)
51	Resonance intake line switchover valve (socket 1)
52	–
53	Pressure control flap vacuum transducer (socket 1)
54	Fuel quantity actuator (socket 2)
55	Voltage supply, circuit 87U, unfused (relay module K40, connector E, socket 7)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0	P1610	**Engine control module (IFI) (N3/7)** Voltage supply Circuit 87 unfused	N3/7 19 — V — 37 18 — V — 55	Ignition: **ON**	11 – 14 V	Wiring, Relay module (K40) (see Figure 1), ⇒ 1.1
1.1		Ground, component compartment – right (W16/6)	N3/7 18 — V — X12/3 19 — V — X12/3	Ignition: **OFF**	11 – 14 V	Ground W16/6, Activation of holding relay, see ⇒ 2.0
2.0		**Holding relay activation** Terminal HRL	N3/7 26 — V — X12/3	Ignition: **ON** **Engine at: CTP (idle)** **Engine**: Shut off	11 – 14 V 11 – 14 V for approx. 4 sec. then < 1 V	Wiring, Relay module (K40), Engine control module (IFI) (N3/7)

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
3.0	P0115	**ECT sensor (B11)** Voltage	N3/7  4 — 23	Ignition: **ON**	°C V 20 3.7 30 3.4 40 3.0 50 2.6 60 2.1 70 1.8 80 1.5 90 1.2 ± 10%	Engine control module (IFI) (N3/7) ⇒ 3.1
3.1		Resistance	N3/7  4 — 23	Ignition: **OFF** Disconnect connector on engine control module (IFI) (N3/7)	°C Ω 20 2500 30 1700 40 1170 50 830 60 600 70 435 80 325 90 245 ± 10%	Wiring, ⇒ 3.2

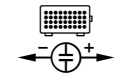
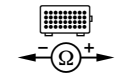
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
3.2		B11	B11 1 — Ω — 2	Ignition: **OFF** Disconnect connector on ECT sensor (B11)	°C Ω 20 2500 30 1700 40 1170 50 830 60 600 70 435 80 325 90 245 ± 10%	B11 (Figure 2)
4.0	P0110	**IAT sensor (B17)** Voltage	N3/7 4 — V — 40	Engine: **At CTP (idle)**	°C V 20 3.8 30 3.3 40 2.9 ±5%	Engine control module (IFI) (N3/7), ⇒ 4.1
4.1		Resistance	N3/7 4 — Ω — 40	Ignition: **OFF** Remove connector on engine control module (IFI) (N3/7)	°C Ω 20 6060 30 3900 40 2600 ±5%	Wiring, ⇒ 4.2

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
4.2		B17	B17 2 — Ω — 1	Ignition: **OFF** Remove connector on sensor B17 (Figure 3)	°C Ω 20 6060 30 3900 40 2600 ±5%	B17
5.0	P0105	**Pressure sensor (B28)** i Connect pressure tester with Y-fitting to pressure sensor	N3/7 4 — V — 22	Engine: **At CTP** Slowly increase engine speed to 2500 rpm	Voltage: **Drops** Vacuum: **Rises**	Pressure line, B28 (Figure 4), ⇒ 6.1
5.1		Voltage supply	N3/7 4 — V — 45	Ignition: **ON**	4.8 – 5.2 V	Engine control module (IFI) (N3/7), Wiring.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
6.0	P1335	**CKP sensor (L5/6)**	N3/7  28 — 20	Engine: **At CTP** i 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**.	Signal: see document: AD07.12-P-2000-07B	Installation position of sensor, Dirt on sensor (metal chips), Segments on flywheel, ⇒ 6.1
			N3/7  28 — 20	Engine: **At CTP** i Test with multimeter only if oscilloscope is not available. Cranking rpm: > 200 rpm	> 0.8 V increasing rpm = increasing voltage > 0.3 V	
6.1		Resistance of sensor L5/6	N3/7  28 — 20	Ignition: **OFF** Remove connector on engine control module (N3/7)	680 – 1300 Ω	Connector L5/6x1 (see Figure 5), Wiring.

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.0	P1220 P1614	**Fuel quantity actuator (Y23/1)** Adjustment solenoid	N3/7 36 — V — 37 54 — V — 37	Ignition: **ON**	> 4.0 V max. for 30 seconds	⇒ 7.1, N3/7
7.1		Resistance	N3/7 36 — Ω — 37 54 — Ω — 37	Ignition: **OFF** Remove connector on engine control module (IFI) (N3/7)	1.0 – 1.4 Ω	Connector (Y23/1x1) (Figure 6), Wiring, Y23/1
8.0	P1223 P1614	**Fuel rack position sensor (Y23/1I1)**	N3/7 19 — V — 9 N3/7 19 — V — 10	Ignition: **ON** Ignition: **ON**	2.2 – 2.7 V 2.2 – 2.7 V	N3/7, ⇒ 8.1
8.1		Resistance	N3/7 46 — Ω — 9 10 — Ω — 9	Ignition: **OFF** Remove connector on engine control module (IFI) (N3/7)	21 – 25 Ω 43 – 47 Ω	Connector (Y23/1x1) Wiring, Y23/1

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.0	P1222	**IFI/DFI accelerator pedal position sensor (R25/2)**	N3/7 6 — V — 39	Ignition: **ON** CTP position: Full load position:	 0.3 ± 0.5 V 3.75 ± 4.75 V	Wiring, R25/2 (Figure 7), Engine control module (IFI) (N3/7)
9.1		CTP contact switch (R25/2s1)	N3/7 18 — V — 15 15 — V — 24 15 — V — 29	Ignition: **ON** CTP position: Full load position: CTP position: Full load position: CTP position: Full load position:	 > 4.5 V <0.5 V <0.5 V > 4.5 V <0.5 V > 4.5 V	Wiring, R25/2 (Figure 7), Engine control module (IFI) (N3/7)

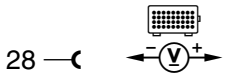
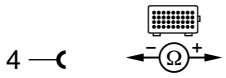
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
10.0	P1520	**CC switch (S40)**	N3/7	Ignition: **ON**		Wiring,
				Switch S40s1 not actuated	< 1 V	CC switch (S40).
		SP Resume	18 — ◄ (V) ► — 42	Position: **RESUME**	11 – 14 V	
			N3/7	S40s2		
		V Decelerate/set	18 — ◄ (V) ► — 38	Position: **DECELERATE**	11 – 14 V	
			N3/7	S40s3		
		B Accelerate/set	18 — ◄ (V) ► — 8	Position: **ACCELERATE**	11 – 14 V	
			N3/7			
		A Off	18 — ◄ (V) ► — 44	Switch S40s4 not actuated	11 – 14 V	
				Position: **OFF**	< 1 V	
			N3/7	Switch S40s5not actuated	< 1 V	
		Safety contact	18 — ◄ (V) ► — 30	Position: **DECELERATE, ACCELERATE, RESUME, OFF**	11 – 14 V	

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
11.0	P1622	**Electrohydraulic shut-off actuator (Y1/1)** Activation	N3/7 18 — (V) — 43	Engine: **At CTP (idle)**	11 – 14 V	Engine control module (IFI) (N3/7), ⇒ 11.1
11.1		Current draw	N3/7 X12/3 43 — (A) —	Ignition: **OFF** Control module removed	1.46 A Electro-hydraulic shut-off actuator clicks audibly.	Wiring, Connector, ⇒ 11.2
11.2		Resistance	N3/7 18 — (Ω) — 43	Ignition: **OFF** Remove connector from engine control module (IFI) (N3/7)	7.6 ± 8.6 Ω	Y1/1 (Figure 10).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
12.0	P0180	**Fuel temperature sensor (Y1/1b1)**	N3/7  28 — 3	Engine: **At CTP (idle)**	°C V 20 3.9 30 3.5 40 3.0 50 2.6	Engine control module (IFI) (N3/7), ⇒ 12.1
12.1		Resistance	N3/7  4 — 3	Ignition: **OFF** Remove connector on engine control module (IFI) (N3/7)	°C Ω 20 2500 30 1700 40 1170 50 830	Wiring, ⇒ 12.2
12.2		Y1/1b1	Y1/1b1  1 — 4	Ignition: **OFF** Remove connector on electrohydraulic shut-off actuator (Y1/1) (Figure 10)	°C Ω 20 2500 30 1700 40 1170 50 830	Replace: Electrohydraulic shut-off actuator (Y1/1).

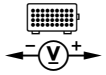
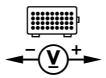
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
13.0	P0600	**CAN data bus**	N3/7 41 — Ω — 5	Ignition: **OFF**	58 – 62 Ω	Engine control module (IFI) (N3/7), Data line, ⇒ 13.1
13.1		CAN element in DAS control module (N54/1) Resistance	N3/7 41 — Ω — 5	Ignition: **OFF** Remove connector on engine control module (IFI) (N3/7).	115 – 125 Ω	Data line, DAS control module (N54/1).
14.0	P1480	**Preglow control** Communication wire between engine control module (IFI) (N3/7) and preglow control module (N14/2) Resistance	N3/7 33 — Ω — N14/2x1 2 (1.2)	Ignition: **OFF** Remove connector N14/2x1 from preglow control module (N14/2) (Figure 15).	< 1 Ω	Wiring, N14/2, N3/7

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
15.0	P1482	**Preglow control module (N14/2)** Voltage supply Circuit 30	W16/3 ⊥ (V) N14/2x3 (3)	Ignition: **OFF**	11 – 14 V	Wiring, ⇒ 15.1
15.1		Ground, left component compartment (W16/3)	W16/3 ⊥ (Ω) N14/2x1 1 (1.1)	Ignition: **OFF** Remove connector on preglow control module (N14/2) (Figure 13)	< 1 Ω	Wiring, Preglow control module (N14/2) (Figure 14).
16.0	P1481	**Glow plug failure** Glow plug and harness test	N14/2x2 ⊥ (A) 1 (2.1) ⊥ (A) 2 (2.2) ⊥ (A) 3 (2.3) ⊥ (A) 4 (2.4) ⊥ (A) 5 (2.5) ⊥ (A) 6 (2.6)	Measure with DC current pickup. Pull back protective sleeve. For each measurement, turn ignition key back to position 2 again.	7 – 25 A The current draw is dependent on the coolant temperature.	Glow plugs, Wiring, Preglow output (N14/2) (Figure 14), Engine control module (IFI) (N3/7).

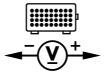
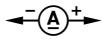
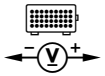
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
17.0	P1401	**EGR lifting sender (B28/3)**	N3/7  20 — 21	Engine: **at CTP (idle)** i If EGR was recirculated previously, a waiting time of 50 seconds must be observed, after that, the values can be checked. Accelerate briefly, then Engine: **at CTP** (idle) for approx. 50 seconds	< 1.5 V < 100 mbar > 1.5 V > 150 mbar	B28/3, (Figure 12).
17.1			N3/7  20 — 24	Ignition: **ON**	4.8 – 5.2 V	Wiring N3/7

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
18.0	P1615	**Relay module (K40)** Voltage supply	Plug **B** 5 — K40 — Plug **B** 4	Ignition: **OFF** Disconnect connector **B**	11 – 14 V	Check voltage supply, Wiring, Output ground, component compartment – right (W15/1), Relay module (K40).
19.0	P1612	**Control module Circuit 15E**	N3/7 18 — 47	Ignition: **ON**	11 – 14 V	Check voltage supply, Wiring, X12/5
20.0	P1470	**Pressure control flap vacuum transducer (Y31/2)** Vacuum at outlet “OUT” of vacuum transducer (Y31/2)	N3/7 53 — 37	Engine: **at CTP (idle)** 1500 rpm Accelerate briefly, vacuum and voltages drop. The test values are reference values.	< 1.5 V < 150 mbar > 3 V >300 mbar < 1 V < 100 mbar	Vent filter dirty, Vacuum lines, Wiring, Y31/2 (see 21/2), Engine control module (IFI) (N3/7)

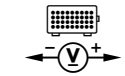
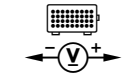
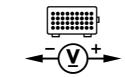
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
21.0	P1475	**Resonance intake manifold switchover valve (Y22/6)/resonance intake manifold flap** Voltage	N3/7  11 — 37	Engine: **at CTP (idle)** 1300 – 2800 rpm	11 – 14 V < 1 V	Engine control module (IFI) (N3/7), ⇒ 21.1.
21.1		Current draw	 11 — 18	Ignition: **ON**	0.36 A	Wiring, Resonance intake manifold witchover valve (Y22/6) (Figure 11).
22.0		**Resonance intake manifold switch (S35)** Voltage	N3/7  18 — 32	Engine: **at CTP (idle)** 1400 – 1600 rpm	11 – 14 V < 1 V	N3/7, ⇒ 22.1
22.1		Resistance	 18 — 32	Remove connector on engine control module (IFI) (N3/7)	> 20 kΩ	Wiring, Resonance intake manifold switch (S35) (Figure 13).

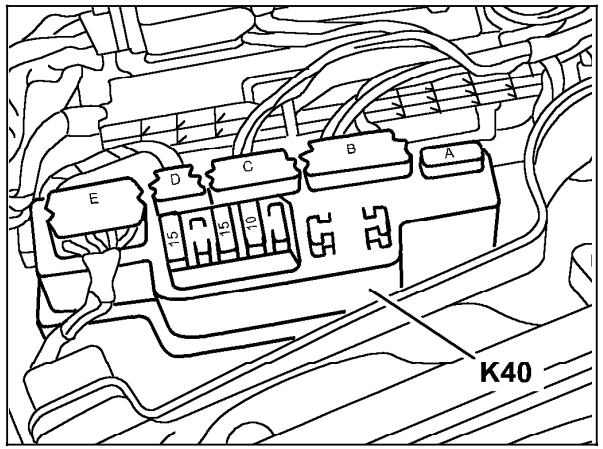
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
23.0	P1476	**Resonance intake line switchover valve (Y22/7) /resonance intake line flap** Voltage	N3/7 51 — (V) — 37	Engine: **at CTP (idle)** 3600 – 3800 rpm	11 – 14 V < 1 V	Engine control module (IFI) (N3/7), ⇒ 23.1
23.1		Current draw	N3/7 51 — (A) — 18	Ignition: **ON**	0.36 A	Resonance intake line switchover valve (Y22/7) (Figure 11), Wiring.
24.0		**Resonance intake line switch (S35/1)** Voltage	N3/7 18 — (V) — 12	Engine: **at CTP (idle)** 3600 – 3800 rpm	11 14 V < 1 V	N3/7, ⇒ 24.1
24.1		Resistance	18 — (Ω) — 12	Remove connector on engine control module (IFI) (N3/7)	> 20 kΩ	Wiring, S35/1 (Figure 8).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
25.0		**Oil level switch (S43)**	N3/7  7 — 37	Ignition: **ON** **Note:** Engine oil level above minimum	11 – 14 V	Wiring, S43
26.0		**Circuit 50**	N3/7  13 — 18	Start engine.	> 6 V	Wiring, X26, S2/2
27.0	P1404	**EGR valve vacuum transducer (Y31/1)** Vacuum at outlet “OUT” of vacuum transducer	N3/7  35 — 37	Engine: **at CTP (idle)** 660 ± 50 rpm i If EGR was recirculated previously, a waiting time of 50 seconds must be observed, after that, the values can be checked. 2000 ± 100 rpm Accelerate briefly, vacuum and voltages drop. The test values are reference values.	< 1.0 V < 150 mbar > 2 V > 200 mbar < 1.0 V < 150 mbar	Vent filter dirty, Vacuum lines, Vacuum supply, Wiring, Vacuum transducer (Y31/1) (Figure 10), Engine control module) (IFI) (N3/7).

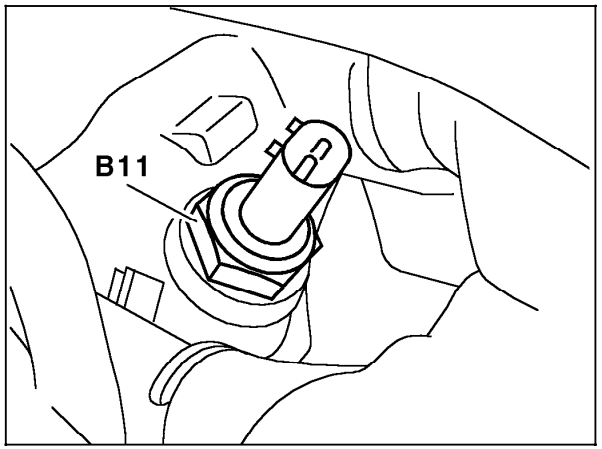
Electrical Test Program – Test



P07.12-0457-01

Figure 1

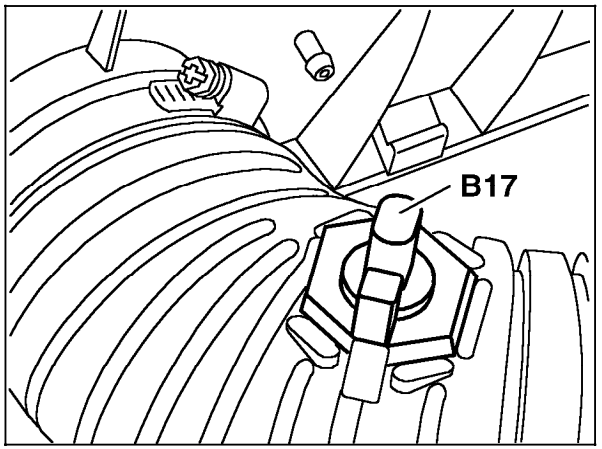
K40 Relay module



P07.13-0413-01

Figure 2

B11 ECT sensor (IFI)

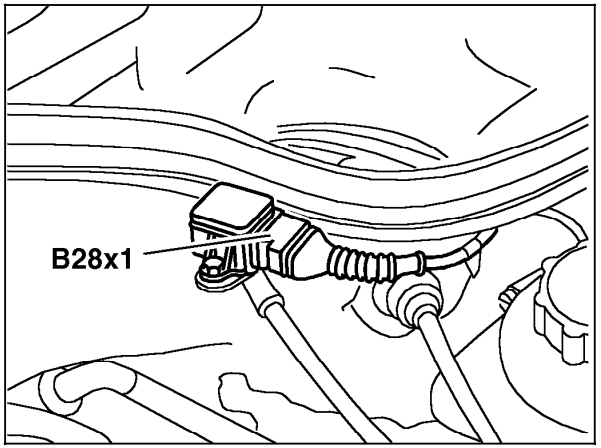


P07-6802-13

Figure 3

B17 IAT sensor

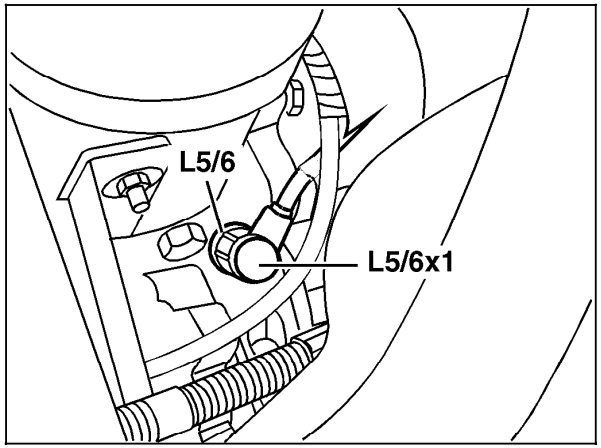
Electrical Test Program – Test



P07.12-0445-01

Figure 4

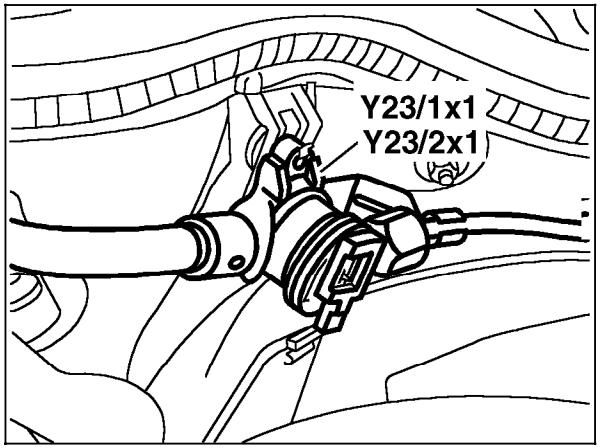
B28x1 Pressure sensor connector



P07.13-0355-01

Figure 5

L5/6x1 CKP sensor connector (IFI)

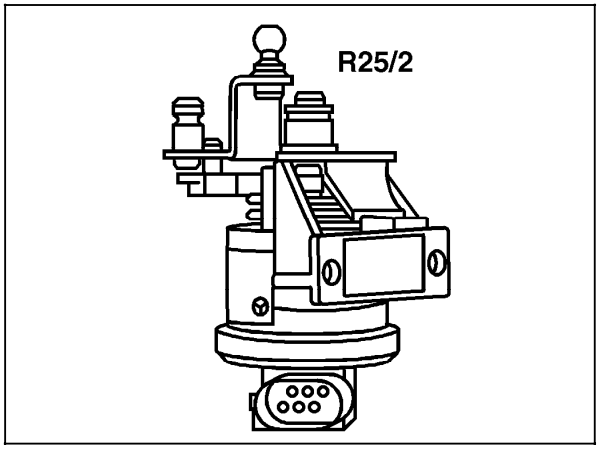


P07.12-0240-13

Figure 6

Y23/1x1 Fuel metering actuator (IFI) connector

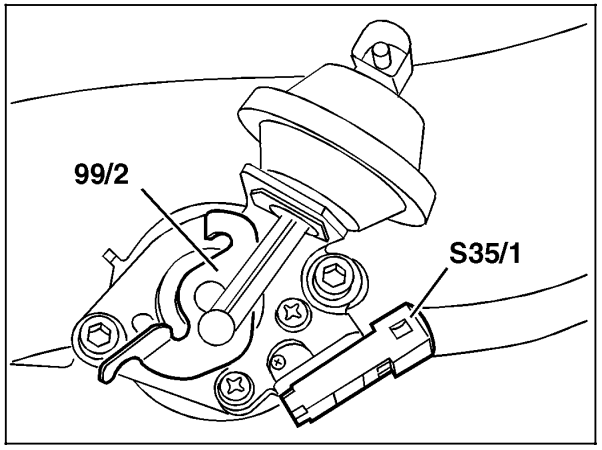
Electrical Test Program – Test



P07.12-0447-01

Figure 7

R25/2 IFI/DFI accelerator pedal position sensor (connector located on sensor)

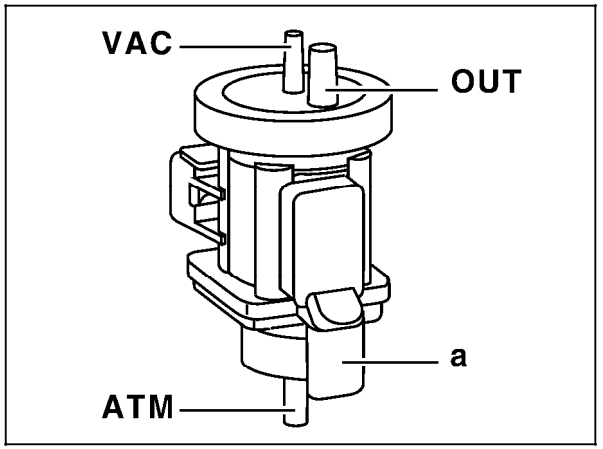


P07.12-0360-01

Figure 8

S35/1 Resonance intake line switch

99/2 Resonance intake manifold flap

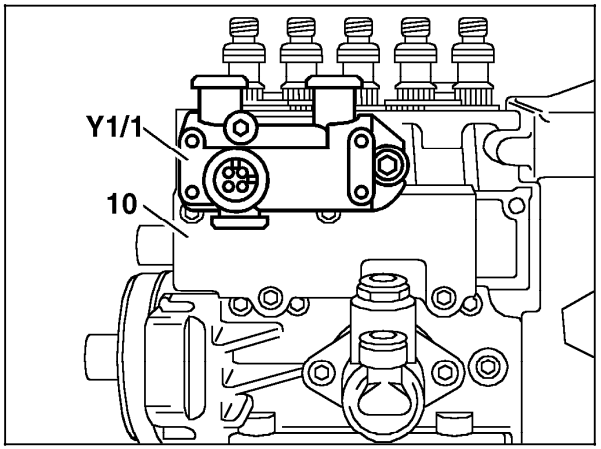


P07.13-0374-13

Figure 9

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

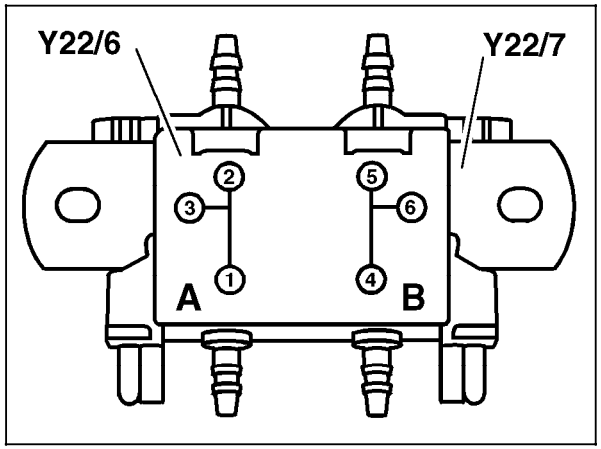
Electrical Test Program – Test



P07.12-0448-01

Figure 10

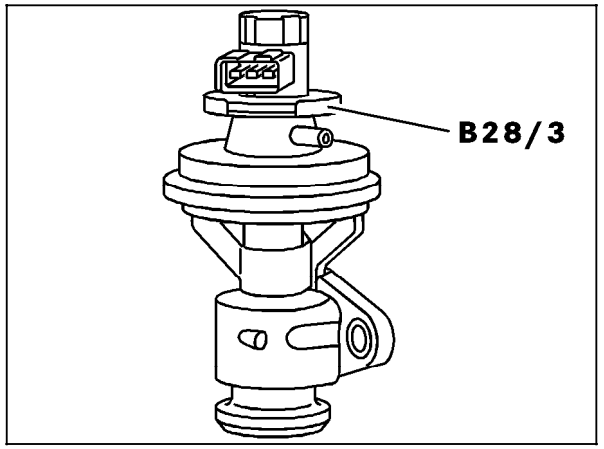
10 In-line fuel injection pump
Y1/1 IFI/DFI electrohydraulic shut-off valve



P07-6090-13

Figure 11

Y22/6 Resonance intake manifold switchover valve
Y22/7 Resonance intake line switchover valve
Note: The resonance intake line switchover valve (Y22/7) is installed towards the engine.

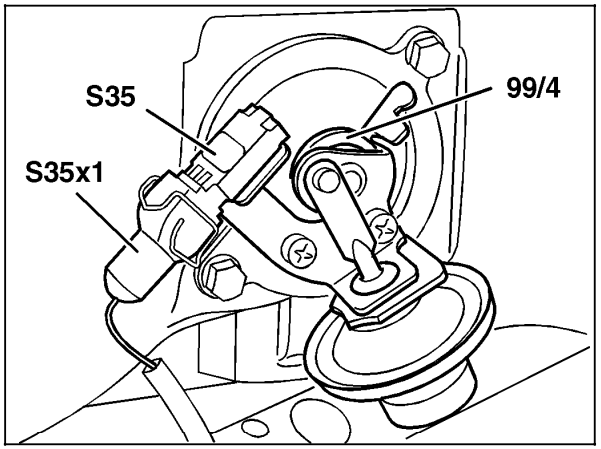


P07.12-0255-13

Figure 12

B28/3 EGR lifting sender

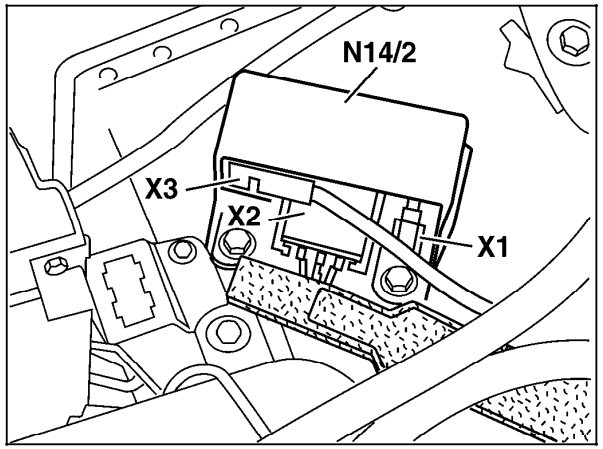
Electrical Test Program – Test



P07.12-0359-01

Figure 13

S35 Resonance intake manifold switch
S35x1 Resonance intake manifold switch connector
99/4 Resonance intake manifold flap



P15.20-0226-01

Figure 14

N14/2 Preglow output
N14/2x1 Preglow output connector
a) Connection for control wire from engine control module (IFI) (N3/7)
b) Connection for vehicle ground

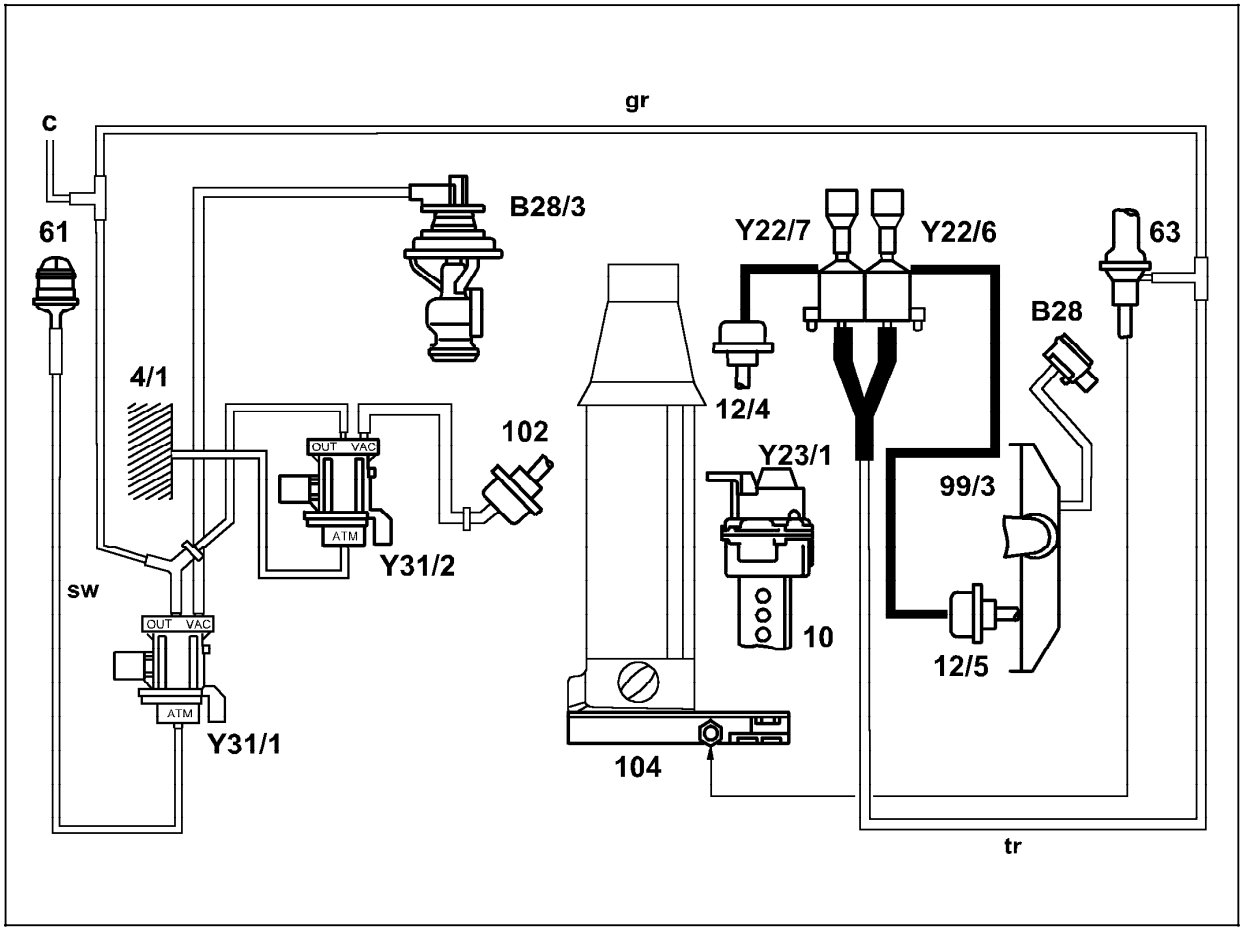
N14/2x2 Preglow output glow connector
N14/2x3 Preglow output circuit 30 connector

Vacuum Line Routing

Engine 606.912, Model 210 (USA)

Figure 1

4/1	Air filter upper housing
10	In-line fuel injection pump
12/4	Resonace intake line vacuum element
12/5	Resonance intake manifold vacuum element
61	Filter
63	Check valve with orifice 0.8 mm
99/3	Resonance intake manifold
102	Pressure control flap vacuum element
104	Vacuum pump
ATM	Vent to component compartment
OUT	Outlet from vacuum transducer (Y31/2)
VAC	Vacuum supply from vacuum pump
B28	Pressure sensor
B28/3	EGR lifting sender
Y22/6	Resonance intake manifold switchover valve
Y22/7	Resonance intake line switchover valve
Y23/1	Fuel quantity actuator
Y31/1	EGR valve pressure transducer
Y31/2	Pressure control flap vacuum transducer
gr	grey
tr	transparent
sw	black
c	Remaining consumers



P07.12-0344-06