

9.1 Engine 104

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**Diagnosis - Diagnostic Trouble Code (DTC) Memory**

Preliminary work: ..... Engine Test, Adjustment, Engines (SMS, Job No. 07-1100)

**⚠ WARNING!**

**Risk of severe injury when touching ignition parts which produce high voltages. Do not touch ignition components.**

**Persons with heart pacemakers are not to perform repairs on this type of ignition system..**

Electronic ignition systems produce dangerous high voltages on both the primary circuit and the secondary (ignition) circuits. Due to the high voltages produced, contact with any of the voltage carrying components can be dangerous to your health (burns, heart palpitations, cardiac arrest etc).

- Ignition must be turned OFF prior to performing any repair work on the ignition system.
- Do not come in contact or remove with any of the ignition components while the engine is cranking or idling.
- Wear rubber soled shoes.
- Disconnect connectors for CKP sensor at sensor or control module.
- If repairs require that the ignition be turned on, then dangerous voltages will be present through out the entire ignition system.
- No exposed metal connectors or sending units may be installed in the ignition wires.

**⚠ WARNING!**

**Risk of fatal injury** from being pulled into rotating vehicle parts.

Do not reach into rotating parts.

Wear closed and tight-fitting work clothes.

Protect vicinity of rotating vehicle components from unauthorized access.

**⚠ WARNING!**

Risk of explosion from fuel igniting, risk of poisoning from inhaling and swallowing fuel as well as risk of injury to eyes and skin from contact with fuel.

No fire, sparks, exposed flames or smoking.

Pour fuels only into suitable and appropriately marked containers.

Wear protective clothing when handling fuel.

**Possible hazards**

Risk of explosion, poisoning and injury

Fuels are highly inflammable and toxic if inhaled. Fuel may cause skin damage. Contact with gasoline fuel, for example, removes the natural oils on the skin. Fuel vapors are explosive, invisible and spread out at floor level. They are toxic if inhaled and have a narcotic effect in high concentrations.

**Protective measures/guidelines**

- Pay attention to national safety regulations and provisions.
- No fire, sparks, exposed flames or smoking.
- Ensure that the place of work is adequately ventilated.
- Never drain or pour in fuels over assembly pits.
- Store drained fuel in suitable and sealed containers.
- Immediately eliminate any fuel spills which have been spilled out of the container.

Continued on next page:

## Diagnosis - Diagnostic Trouble Code (DTC) Memory

Preliminary work: ..... Engine Test, Adjustment, Engines (SMS, Job No. 07-1100)

### Conducting work on a vehicle with exposed flame

(e.g. welding etc.)

- Prior to commencing such work, remove appropriate parts of the fuel system and seal open fuel lines with plugs.


### First-aid measures

- Clean contaminated/exposed skin with water and soap.
- Change contaminated clothing as quickly as possible.
- If fuel gets into the eyes, rinse out eyes immediately with water, and contact a doctor, if necessary.

### To Avoid Damage to the Ignition System

- To avoid damage to the engine control module, connect/disconnect the control module connectors only with the ignition: **OFF**.
- Circuit 1 of the ignition coil may not be shorted to ground, e.g. theft deterrence.
- Only original equipment should be installed in the ignition system.
- Do not operate the ignition system at cranking speed unless the entire ignition harness is connected.
- Do not perform any tests (grounding of ignition cable 4 disconnecting a spark plug connector or pulling cable 4 out of the ignition coil) at cranking or idle speed.

- The high output side of the ignition system must carry at least 2 kΩ of load (spark plug connector).
- If assisting a disabled vehicle and it becomes necessary to perform an ignition spark test, perform this test only on one ignition/spark plug. Ensure a good ground connection to the spark plug.
- ME - SFI: the ignition system is to be turned OFF, when cranking engine to perform compression tests, additionally, it is necessary to disconnect connector 2 from the control module.

 Engine 120 has separate ignition and fuel injection system.



**Readout via the impulse counter scan tool is not possible.**

### Note:

Symbol for emission related malfunctions which lead to the activation of the CHECK ENGINE MIL when a certain test cycle was performed and a fault was recognized.

## Diagnosis - Diagnostic Trouble Code (DTC) Memory

Preliminary work: ..... Engine Test, Adjustment, Engines (SMS, Job No. 07-1100)

### Note regarding diagnostic trouble code (DTC) readout:

The engine control module (N3/10) for the ME-SFI system is equipped with diagnostic trouble code (DTC) memory. Malfunctions are recognized and stored as DTC's and are distinguished as follows:

- Malfunctions which are constantly present,
- Intermittent contact malfunctions which have occurred during a trip and have been stored.

The DTC memory is erased when the vehicle's battery is disconnected.

Malfunctions which are no longer present, are automatically erased as follows:

- After three trips the "CHECK ENGINE" MIL goes out.
- After an additional 40 warm-up periods the DTC is automatically erased.

A warm-up period or trip is defined as follows:

### Warm-up period

- Engine coolant temperature at start < 35° C,
- Engine coolant temperature increases to > 70° C.

### Trip

- Engine running for > 20 minutes,
- Engine oil temperature > - 7° C,
- Engine speed > 500 rpm,
- All emission related logic chain functions already there were checked during previous trips.

The stored DTC's can be read at the data link connector (X11/4) **using the HHT only**, with the ignition switched "ON" or with the "engine running".

Readout via an on-off ratio readout or impulse counter scan tool has been eliminated.

### Note regarding mixture preparation self-adaptation:

The Lambda control system determines the fuel injection duration so precisely that the fuel/air ratio is kept constant at Lambda level 1 (equals 14.7 kg air to 1 kg fuel) under all operating conditions.

Should malfunctions occur in the form of:

- Intake air leaks,
- Injector wear or carbon build-up,
- Engine wear,
- Transition resistance in MAF sensor,
- Defective diaphragm pressure regulator,
- Defective purge control valve,

the engine control module (ME-SFI, 2.1) automatically performs a mixture adjustment.

## Diagnosis - Diagnostic Trouble Code (DTC) Memory

The degree of correction is constantly calculated and permanently stored. The self-adaptation is performed additive at idle and multiplicative under partial load. The correction towards rich or lean is  $\pm 1.0$  milliseconds (injection duration) at idle and the factor 0.68 – 1.32 at partial load. After repair work is performed, the engine control module (ME2.1) will automatically adapt itself again.

### Note regarding version coding:

The engine control module is equipped with a version coding feature. The coding must be performed with the Hand-Held Tester (automatically or manually, see Notes for HHT “Version coding” 11/5) upon installation of a new control module.

The following vehicle version data must be determined for coding:

- Vehicle model,
- Engine,
- Manual/automatic transmission
- Non-catalytic converter (non-TWC),
- Country version,
- 30 km/h limitation

### Note regarding drive authorization system (DAS X):

**Model 129, 140, 210 as of 06/96**

**Model 202 as of 08/96**

Vehicles with ME-SFI are equipped with DAS X. DAS is activated from the DAS control module (N54/1) via the CAN data bus to the engine control module.

Upon activation of the DAS, the engine control module renders the fuel injection system inoperative. The activation or deactivation is accomplished with a transponder in the ignition key. As soon as the key is turned in the steering lock, the DAS control module receives a signal and activates the engine control via the CAN data bus.

As of M.Y. 1998, models 202, 208 and 210, **DAS 3** is used. DAS 3 can only be activated or deactivated using the electronic key. Upon inserting the electronic key into the ignition lock, the DAS control module activates the engine control via the CAN data bus.

The locking and unlocking of the vehicle, using the mechanical key has no effect on the DAS system.

The engine control module and the DAS control module are “married” to one another through identification codes. The identification codes can not be erased (see HHT nominal values “DAS”, menu selection 3/7).

**Therefore, swapping the engine or RCL control module from one vehicle to another is not possible!**



If an exchange engine control module is installed for test purposes, up to 40 start attempts can be performed before the engine and DAS control modules “marry” to one another. Prior to performing the first start, the engine control module must be version coded using the HHT. Additionally, the code number and VIN must be entered (see HHT nominal values “DAS”, menu selection 3/7).

## Diagnosis - Diagnostic Trouble Code (DTC) Memory

### Notes regarding automatic recognition of the mechanical end stop and wide open position of the throttle valve from the actuator:

The end stops of the throttle valve is determined by the actuator and stored in the engine control module.

After replacing the control module or actuator, the mechanical end stop and wide open position must again be determined and recorded (stored). Thereby allowing learned data to be erased with the HHT and new data to be learned. When the new engine control module is connected for the first time to circuit 30 (B+), the engine control module performs a self-adaptation of the actuator with the ignition "ON" (lower mechanical end stop of the throttle valve).

### Requirements for learning process:

- Selector lever in position P/N,
- Vehicle standing still,
- Engine off,
- Engine coolant temperature between 5° C and 100° C,
- Accelerator pedal not applied.

When all requirements are met, turn **ignition ON for at least 60 seconds**, then turn **ignition OFF for at least 10 seconds**.

The learned value is stored in memory, only after the first 10 start cycles, provided the voltage supply has not been interrupted. Should the battery be disconnected after the 9th start cycle, the re-learning process must be performed again.

### Notes regarding VSS sensor adaption for rough running engine test:

After the replacement of the ME-SFI control module, CKP sensor (L5), starter ring gear or motor mount, a sensor adaption must be performed:

- Engine coolant temperature approx. > 70 °C,
- Drive vehicle on road.
- With selector lever in position 4: Increase engine rpm to approx. 2,500 rpm and then coast until engine rpm is approx. < 1,500 rpm.
- With selector lever in position 2: Increase engine rpm to approx. 6,100 rpm and then coast until engine rpm is approx. < 4,100 rpm. Again increase engine rpm to approx. 6,100 rpm and then coast until engine rpm is approx. < 3,000 rpm.
- Using the HHT, determine if VSS sensor adaption has taken place.

### Notes regarding performance/speedometer test:

Disconnecting the ESP/ASR/ETS/ABS control modules is not allowed. The engine control module and transmission control module rely on these modules to supply the VSS data via the CAN bus.

To disable the brake and engine regulation function of the ESP/ASR/ETS/ABS control modules:

#### A. Working without HHT

- Ignition: **OFF**.
- Connect HHT adapter to data link connector (X11/4).
- Bridge sockets 1 and 6.
- Engine: **Start** (ESP/ASR/ETS/ABS MIL must illuminate!).

Continued:

**Diagnosis - Diagnostic Trouble Code (DTC) Memory**

**B. Working with HHT**

- Ignition: **OFF**.
- Disconnect front axle VSS sensor connector (ESP/ASR/ETS/ABS MIL must illuminate!).

**When work is completed, reconnect VSS sensor connector and erase DTC's with HHT!**

## Diagnosis - Diagnostic Trouble Code (DTC) Memory

### Notes for HHT

- **Fault search with HHT**

Diagnostic trouble code (DTC) memory: Select "Current DTC's". If the actual condition changes, e.g. when wiggling a connector, the change is reported optically and acoustically so that troubleshooting can be performed directly with the 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 "Current DTC's".

- **Nominal values**

All nominal values relative to the actual values shown on the HHT are listed in the Diagnostic Manual, Engines, Volume 1, section A.

- **Actual value for engine speed**

For engine speed, the HHT display indicates the closed throttle speed (CTP) nominal value calculated by the control module on the left, and the rpm actual value on the right. Both values should differ from each other only slightly. Permissible tolerances are not yet determined.

- **Version coding with HHT**

a) Before replacement of the engine control module, the existing code number must be read and stored with the HHT (menu selection 5 "Version coding"). After installation of the new control module, the previously read code number must be entered.

**Note:**

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

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

- **Drive authorization system (DAS) X**

Upon replacement the engine control module must be version coded using the HHT. Additionally, the code number and VIN must be entered (see HHT nominal values "DAS", menu selection 3/7).



Diagnosis - Diagnostic Trouble Code (DTC) Memory

Special Tools



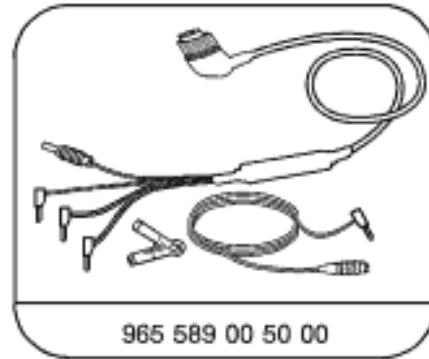
965 589 00 01 00

Hand-Held-Tester



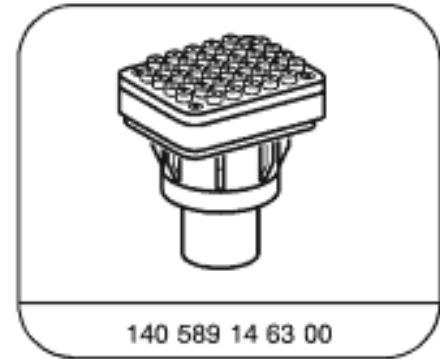
965 589 00 40 00

Test cable



965 589 00 50 00

Adapter cable



140 589 14 63 00

Adapter

Diagnosis - Diagnostic Trouble Code (DTC) Memory

Connection Diagram - Hand-Held Tester (HHT)

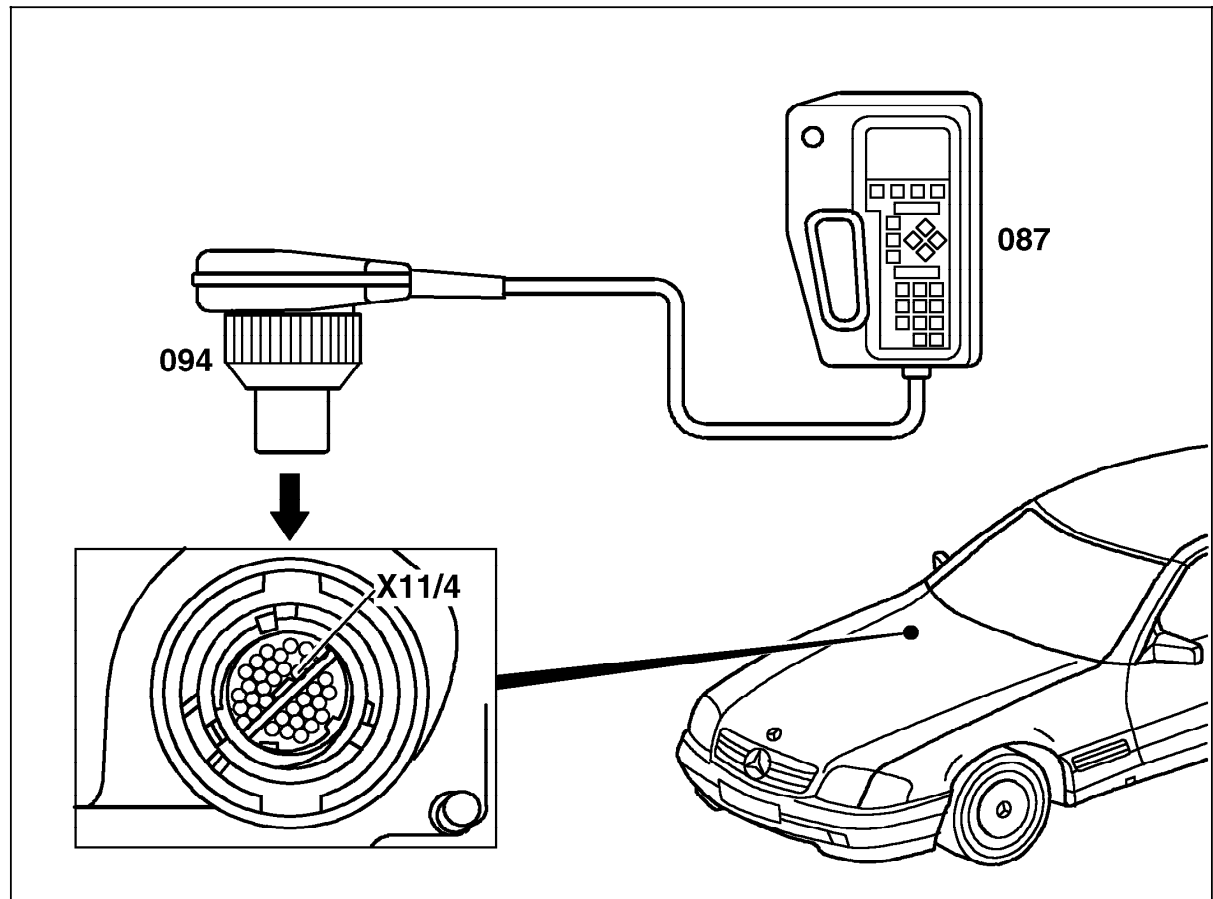
1. Connect HHT (087) with test cable (097) to data link connector (X11/4)
2. Ignition: **ON**
3. As per display in HHT:
  - a) read out/erase DTC memory
  - b) read out actual values
  - c) perform activations
  - d) program control modules
4. Disconnect HHT



Observe system specific notes, which are described in the beginning of each chapter. Erase all stored faults which come about when tests or simulations are performed, upon completion of the repairs.

Figure 1

- |       |   |
|-------|---|
| 087   | Hand-Held Tester                            |
| 094   | Multiplexer cable                           |
| X11/4 | Data link connector (DTC readout) (38-pole) |



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Diagnosis - Diagnostic Trouble Code (DTC) Memory

Connection Diagram - Hand-Held Tester (HHT)

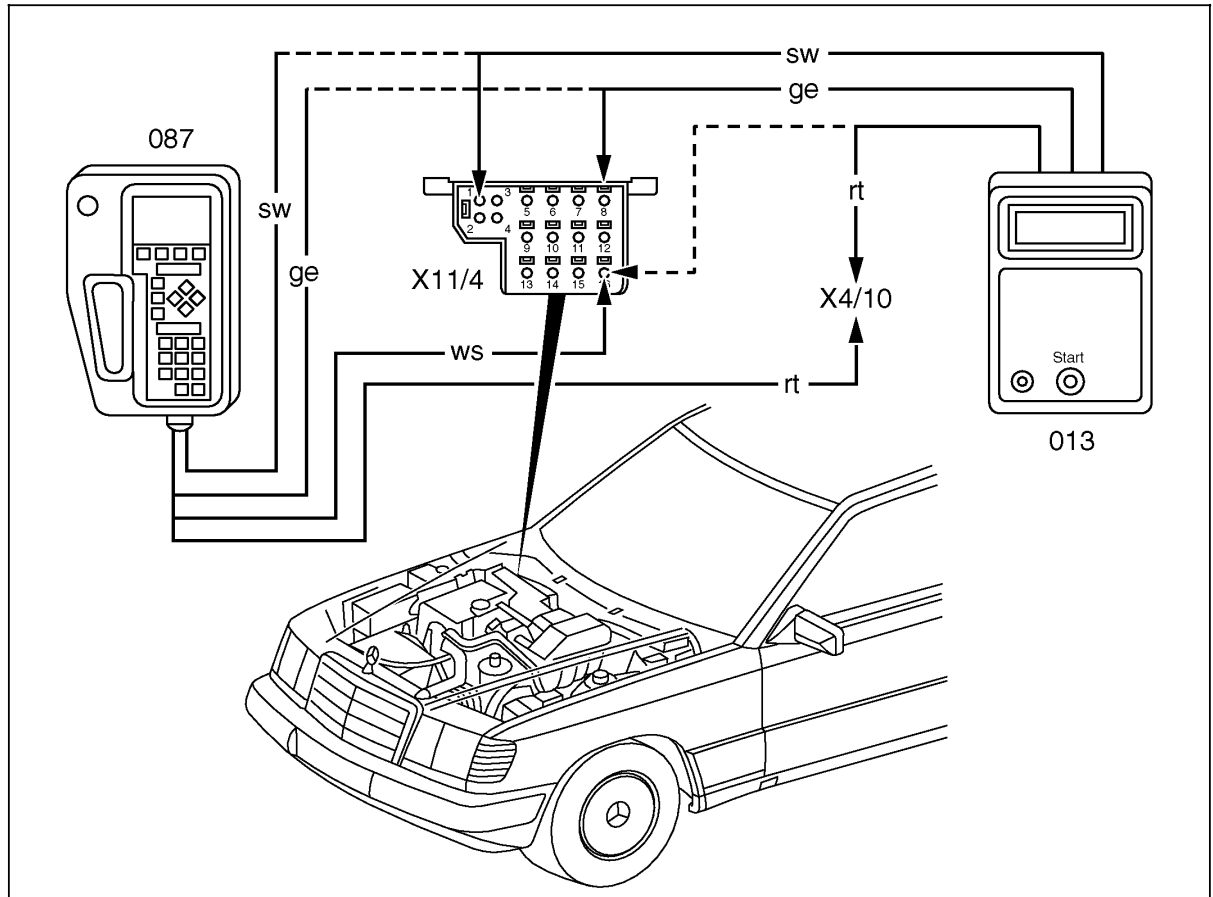
1. Connect HHT (087) with test cable (097) to data link connector (X11/4)
2. Ignition: **ON**
3. As per display in HHT:
  - a) read out/erase DTC memory
  - b) read out actual values
  - c) perform activations
  - d) program control modules
4. Disconnect HHT



Observe system specific notes, which are described in the beginning of each chapter. Erase all stored faults which come about when tests or simulations are performed, upon completion of the repairs.

Figure 1

- 087 Hand-Held Tester
- 094 Multiplexer cable
- X11/4 Data link connector (DTC readout) (38-pole)



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Diagnosis – Diagnostic Trouble Code (DTC) Memory

Prerequisites for readout of DTC memory




Readout via the impulse counter scan tool is not possible.

Note:



Symbol for emission related malfunctions which lead to the activation of the CHECK ENGINE MIL when a certain test cycle was performed and a fault was recognized.

1. Perform Test and adjustment of engine, see DM, Engines, Vol. 1, section B, if necessary.
2. Review 11, 21, 22, 23, 24, 31, 33,
3. Connect HHT (087) with test cable (097) to data link connector (X11/4). Readout DTC fault codes.
4. Ignition: **ON**

DTC 	Possible cause		Test step/Remedy <sup>1)</sup>
	SAE nomenclature	Explanation	
–	No malfunction in system		In case of complaint, perform 23, 24, 25 or 26 in its entirety
PO 100	MAF circuit malfunction	Hot film MAF sensor (B2/5)	23⇒ 5.0
PO 105	MAP circuit malfunction	Pressure sensor (B28) (only USA)	23⇒ 7.0
PO 110	IAT circuit malfunction	IAT sensor (in Hot film MAF sensor B2/5)	23⇒ 6.0
PO 115	ECT circuit malfunction	ECT sensor (B11/4)	23⇒ 9.0
PO 120	Throttle position circuit malfunction	Actual value potentiometer in EA/CC/ISC actuator (M16/1)	25⇒ 3.0
PO 130	O2S 1 circuit malfunction	A. O2S 1 (before TWC) (G3/2) B. O2S 1 (before TWC) (G3/2) Voltage increase insufficient	23⇒ 11.0


<sup>1)</sup> Observe Preparation for Test, see 22.

## Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	Possible cause		Test step/Remedy <sup>1)</sup>
	SAE nomenclature	Explanation	
PO 133	O2S 1 circuit slow response	A O2S 1 (before TWC) (G3/2), Ageing correction value exceeded. B O2S 1 (before TWC) (G3/2), Ageing time period too long.	23 ⇒ 11.0
PO 135	O2S 1 heater circuit malfunction	O2S 1 heater (before TWC) (G3/2)	23 ⇒ 12.0
PO 136	O2S 2 circuit malfunction	O2S 2 (after TWC) (G3/1) (only  )	23 ⇒ 13.0
PO 141	O2S 2 heater circuit malfunction	Right O2S 2 heater (after TWC) (G3/1)	23 ⇒ 14.0
PO 170	Fuel trim malfunction	A Self adaptation of fuel mixture “partial load“ at limit from engine control module (N3/10). B Self adaptation of fuel mixture “CTP“ at limit from engine control module (N3/10).	Intake air leak, injectors, diaphragm pressure regulator, engine wear.
PO 201	Injector circuit malfunction - cyl. 1	Injector (Y62y1) – cylinder 1	23 ⇒ 15.0
PO 202	Injector circuit malfunction - cyl. 2	Injector (Y62y2) – cylinder 2	23 ⇒ 16.0
PO 203	Injector circuit malfunction - cyl. 3	Injector (Y62y3) – cylinder 3	23 ⇒ 17.0
PO 204	Injector circuit malfunction - cyl. 4	Injector (Y62y4) – cylinder 4	23 ⇒ 18.0
PO 205	Injector circuit malfunction - cyl. 5	Injector (Y62y5) – cylinder 5	23 ⇒ 19.0
PO 206	Injector circuit malfunction - cyl. 6	Injector (Y62y6) – cylinder 6	23 ⇒ 20.0



1) Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	Possible cause		Test step/Remedy <sup>1)</sup>
	SAE nomenclature	Explanation	
P0 300	Random misfire detected	A Random misfire B Random misfire, TWC damaging	24 ⇒ 8.0 24 ⇒ 9.0 24 ⇒ 10.0 24 ⇒ 11.0 36 ⇒ 1.0, 2.0 Compression pressure
P0 301	Cylinder 1 misfire detected	A Cylinder 1 misfire B Cylinder 1 misfire, TWC damaging	24 ⇒ 10.0 24 ⇒ 11.0 36 ⇒ 1.0, 2.0 Compression pressure
P0 302	Cylinder 2 misfire detected	A Cylinder 2 misfire B Cylinder 2 misfire, TWC damaging	24 ⇒ 8.0 24 ⇒ 11.0 36 ⇒ 1.0, 2.0 Compression pressure
P0 303	Cylinder 3 misfire detected	A Cylinder 3 misfire B Cylinder 3 misfire, TWC damaging	24 ⇒ 9.0 24 ⇒ 11.0 36 ⇒ 1.0, 2.0 Compression pressure
P0 304	Cylinder 4 misfire detected	A Cylinder 4 misfire B Cylinder 4 misfire, TWC damaging	24 ⇒ 9.0 24 ⇒ 11.0 36 ⇒ 1.0, 2.0 Compression pressure





<sup>1)</sup> Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	Possible cause		Test step/Remedy <sup>1)</sup>
	SAE nomenclature	Explanation	
P0 305	Cylinder 5 misfire detected	A Cylinder 5 misfire B Cylinder 5 misfire, TWC damaging	24 ⇒ 8.0 24 ⇒ 11.0 36 ⇒ 1.0, 2.0 Compression pressure
P0 306	Cylinder 6 misfire detected	A Cylinder 6 misfire B Cylinder 6 misfire, TWC damaging	24 ⇒ 10.0 24 ⇒ 11.0 36 ⇒ 1.0, 2.0 Compression pressure
P0 325	KS 1 circuit malfunction	Front KS 1 (A16)	Wiring, connector, A16
P0 330	KS 2 circuit malfunction	Rear KS 2 (A16)	Wiring, connector, A16
P0 335	CKP sensor circuit malfunction	CKP sensor (L5)	24 ⇒ 6.0
P0 341	CMP sensor circuit range/performance	Camshaft Hall-effect sensor (B6/1)	24 ⇒ 7.0
P0 370	Angle deviation between camshaft and crankshaft	Angle deviation between camshaft and crankshaft	Check basic adjustment of camshaft.
P0 410	Only  Air injection system malfunction	AIR system malfunction (logic chain)	23 ⇒ 23.0
P0 422	TWC efficiency below threshold	TWC efficiency below threshold	Replace TWC.

<sup>1)</sup> Observe Preparation for Test, see 22.


Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	Possible cause		Test step/Remedy <sup>1)</sup>
	SAE nomenclature	Explanation	
P0440 Only  <b>Models 140/210</b> <b>Model 129 as of 09/97</b>	EVAP system malfunction	EVAP malfunction (logic chain)	23 ⇒ 27.0 – 29.0
P0441	EVAP system incorrect purge flow	EVAP not functioning	23 ⇒ 27.0 – 28.0
P0442 Only  <b>Mod. 140/210</b> <b>Mod. 129 as of 09/97</b>	EVAP system leak detected (small leak)	EVAP system, small leak	23 ⇒ 29.0
P0443	EVAP system purge control valve circuit malfunction	Purge control valve (Y58/1)	23 ⇒ 27.0
P0446 Only  <b>Mod. 140/210</b> <b>Mod. 129 as of 09/97</b>	EVAP system vent control malfunction	A. Activated charcoal canister shut-off valve (Y58/4) B. End stage activated charcoal canister shut-off valve (Y58/4)	23 ⇒ 28.0, 29.0, 31.0 23 ⇒ 30.0

<sup>1)</sup> Observe Preparation for Test, see 22.




Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	Possible cause		Test step/Remedy <sup>1)</sup>
	SAE nomenclature	Explanation	
P0 450 Only (USA) Mod. 140/210 Mod. 129 as of 09/97  Mod. 129 up to 08/97 Mod. 202	EVAP system pressure sensor malfunction	A. Fuel tank pressure sensor (B4/3) electrical fault B. Fuel tank pressure sensor (B4/3) electrical fluctuations  Purge monitoring pressure sensor (B4/4)	23 ⇒ 31.0 Charcoal canister plugged.  23 ⇒ 32.0
P0 455 Only (USA) Mod. 140/210 Mod. 129 as of 09/97	EVAP system leak detected (large leak)	EVAP system, large leak Fuel tank pressure sensor (B4/3)	23 ⇒ 29.0 23 ⇒ 31.0
P0 460	Fuel level sensor circuit		Read-out Instrument cluster memory
P0 500	VSS sensor malfunction	A VSS left front B VSS left rear	Test ASR, ETS see DM, Chassis and Drivetrain, Vol. 3, Section 9.3
P0 507	ISC rpm	Idle control system	25 ⇒ 1.0 – 3.0
P0 560	System voltage malfunction	Voltage supply to engine control module (N3/10)	23 ⇒ 1.0 – 2.0
P0 565	Cruise control switch	CC switch (S40)	26 ⇒ 1.0
P0 600	Serial communication link malfunction	CAN bus from ESP/SPS control module (N47-5)	Test ESP see DM, Chassis and Drivetrain, Vol. 3, Section 10.2


<sup>1)</sup> Observe Preparation for Test, see 22.

## Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	Possible cause		Test step/Remedy <sup>1)</sup>
	SAE nomenclature	Explanation	
P0 604	Internal control module random Access memory (RAM) error	A Engine control module (N3/10) B Engine control module (N3/10)	(N3/10)
P0 605	Internal control module read only memory (ROM) error	Engine control module (N3/10)	(N3/10)
P0 700	Transmission control system malfunction	Read DTC memory of transmission control module	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.
P0 702	Transmission control system electrical	Read DTC memory of transmission control module	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.
P0 715	Input/turbine speed sensor circuit malfunction	Read DTC memory of transmission control module	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.
P0 720	Output speed sensor circuit malfunction	Read DTC memory of transmission control module	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.
P0 730	Incorrect gear ratio	Read DTC memory of transmission control module	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.
P0 740	Torque converter clutch circuit malfunction	Read DTC memory of transmission control module	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.
P0 743	Torque converter clutch circuit electrical	Read DTC memory of transmission control module	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.
P0 748	Pressure control solenoid electrical	Read DTC memory of transmission control module	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.




<sup>1)</sup> Observe Preparation for Test, see 22.

## Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	Possible cause		Test step/Remedy <sup>1)</sup>
	SAE nomenclature	Explanation	
P0 753	Shift solenoid A electrical	Read DTC memory of transmission control module	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.
P0 758	Shift solenoid B electrical	Read DTC memory of transmission control module	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.
P0 763	Shift solenoid C electrical	Read DTC memory of transmission control module	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.
P0 802	Resonance intake manifold switchover valve	Resonance intake manifold switchover valve (Y22/6)	23 ⇒ 24.0
P0 809	Angle deviation between camshaft and crankshaft	Angle deviation between camshaft and crankshaft	Check basic adjustment of camshaft.
P0 811	CAN from electronic ignition lock	CAN from electronic ignition lock	23 ⇒ 33.0
P1 163	Oil level switch	Oil level switch (S43)	23 ⇒ 34.0
P1 182	<b>Model 202.028 only</b> Starter relay	Starter relay module in passenger-side fuse and relay module box (K40/4)	23 ⇒ 4.0
P1 186	Fuel safety shut-off recognized	EA/CC/ISC actuator (M16/1)	25 ⇒ 3.0 – 4.0, EA/CC/ISC actuator (M16/1) sticks or jammed, Check intake system for residue.
P1 225	Resonance intake manifold switchover valve	Resonance intake manifold switchover valve (Y22/6)	23 ⇒ 24.0


1) Observe Preparation for Test, see 22.

## Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	Possible cause		Test step/Remedy <sup>1)</sup>
	SAE nomenclature	Explanation	
P1 386	Knock sensor control from ECM (N3/10) at end stop	Knock sensor regulation from engine control module (N3/10) at end stop	1. Increased knock tendency due to bad fuel, carbon in combustion chamber or mechanical damage. 2. Engine control module (N3/10).
P1 420	Only  AIR pump switchover valve	AIR pump switchover valve (Y32)	23 ⇒ 22.0
P1 453	Only  AIR relay module	AIR relay module (K17), relay module (K40) or passenger-side fuse and relay module box (K40/4)	23 ⇒ 21.0
P1 491		Refrigerant pressure in A/C system too high	Check automatic A/C system.
P1 519	Adjustable camshaft timing solenoid	Adjustable camshaft timing solenoid (Y49) (logic chain)	23 ⇒ 26.0
P1 525	Adjustable camshaft timing solenoid	Adjustable camshaft timing solenoid (Y49)	23 ⇒ 25.0
P1 542	Pedal value sensor	Pedal value sensor (B37)	25 ⇒ 1.0, 2.0
P1 570	CAN signal from DAS control module to engine control module	A. Start attempted with "locked" DAS B. CAN signal from DAS control module (N54/1) to engine control module (N3/10) interrupted. C. Engine control module (ME-SFI) and DAS control module are not compatible.	User error, Check correct operation of DAS, see DM, Body and Accessories, Vol. 1, 23 ⇒ 33.0, Check control modules and control module part no.'s

1) Observe Preparation for Test, see 22.

## Diagnosis – Diagnostic Trouble Code (DTC) Memory

DTC 	Possible cause		Test step/Remedy <sup>1)</sup>
	SAE nomenclature	Explanation	
P1 580	EA/CC/ISC actuator	EA/CC/ISC actuator (M16/1)	25 ⇒ 3.0 – 4.0
P1 584	Stop lamp switch	Stop lamp switch (S9/1)	Test ETS, ASR, see DM, Chassis & Drivetrain, Vol. 3, Section 9.3
P1 603	CAN signal from EIS	CAN failure	23 ⇒ 33.0
P1 605		Poor road/traction condition recognition signal (via comparison of VSS rpm signals)	Test ASR/ESP, see DM, Chassis and Drivetrain, Vol. 3, Section 9.3, 10.2
P1 642		Engine control module incorrectly coded (coded for MT, vehicle has AT)	Check version coding and correct.
P1 643		Engine control module incorrectly coded (coded for MT, vehicle has AT) or No CAN transmission from transmission control module (N15/3)	Check version coding and correct.
P1 644		Transmission version can not be checked due to low voltage at transmission control module (N15/3)	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.
P1 747	CAN signal from ETC	A. CAN failure: Transmission protection malfunction from transmission control module (N15/3) B. CAN failure: Instrument cluster	Test ETC, see DM, Chassis & Drivetrain, Vol. 1, section 2.  Test instrument cluster (A1), see DM, Body & Accessories, Vol. 1

1) Observe Preparation for Test, see 22.

Diagnosis – Complaint Related Diagnostic Chart – Injection/Ignition




**WARNING!**

**Risk of severe injury when touching ignition parts which produce high voltages. Do not touch ignition components.**

**Persons with heart pacemakers are not to perform repairs on this type of ignition system.**


**Preparation for Test:**

1. Review **WARNING!** on pages 11/1 and 11/2,
2. Review 11, 21, 22, 23, 24, 31, 33,
3. Connect HHT with test cable) to data link connector (X11/4), readout DTC fault codes.

Complaint/Problem	Possible cause	Test step/Remedy <sup>1)</sup>	 Actual value Engine test Menu item
Engine starts and accelerates poorly when cold	Injector (Y62) activation and injection duration. Hot film MAF sensor (B2/5). ECT sensor (B11/4). Ignition voltage too low. Intake air leak.	23 ⇒ 15.0 – 20.0 23 ⇒ 5.0 23 ⇒ 9.0 24 ⇒ 11.0 Remedy air leak.	3/11 2/11 4/11 – –
Engine does not start	Voltage supply is missing. Malfunction of drive authorization system (DAS) . Fuel pumps defective. No compression, oil pressure too high.  Ignition voltage too low.	23 ⇒ 1.0 – 2.0 23 ⇒ 33.0 34 ⇒ 2.0 Check compression and oil pressure. 24 ⇒ 11.0	– DAS 1/1 – – –
Engine has uneven idle	Camshaft timing. Injector (Y62) activation and injection duration. Intake air leak.	23 ⇒ 25.0 – 26.0 23 ⇒ 15.0 – 20.0 Remedy air leak.	3/11 3/11 –


<sup>1)</sup> Observe Preparation for Test, see 22.

Diagnosis – Complaint Related Diagnostic Chart – Injection/Ignition

Complaint/Problem	Possible cause	Test step/Remedy <sup>1)</sup>	 Actual value Engine test Menu item
Engine has insufficient output	TWC flow restricted.  O2S 1 (G3/2) (before TWC). ECT sensor (B11/4). Hot film MAF sensor (B2/5). Camshaft timing.	Check exhaust back pressure, see DM, Engines, Vol. 1, section A, “Engine Output“ 23 ⇒ 11.0 – 12.0 23 ⇒ 9.0 23 ⇒ 5.0 23 ⇒ 25.0 – 26.0	– 8/11 4/11 2/11 3/11
Engine runs unevenly (shakes)	Injector (Y62) activation and injection duration. Injector leaking, spray pattern. O2S 1 (G3/2) (before TWC). Ignition voltage too low. Compression on one or more cylinders too low. Intake air leak. EGR valve leaks/stuck	23 ⇒ 15.0 – 20.0 36 ⇒ 1.0 23 ⇒ 11.0 – 12.0 24 ⇒ 11.0 Check compression. Remedy air leak. Check EGR valve.	3/11 – 8/11 – – –
Engine runs unevenly (misfiring)	Ignition voltage too low. Hot film MAF sensor (B2/5).	24 ⇒ 11.0 23 ⇒ 5.0	– 2/11
Engine surges after cold start	Intake air leak.	Remedy air leak.	–

<sup>1)</sup> Observe Preparation for Test, see 22.

Diagnosis – Complaint Related Diagnostic Chart – Injection/Ignition

Complaint/Problem	Possible cause	Test step/Remedy <sup>1)</sup>	 Actual value Engine test Menu item
Transition failure during warm-up	ECT sensor (B11/4). Hot film MAF sensor (B2/5). Intake air leak.	23 ⇒ 9.0 23 ⇒ 5.0 Remedy air leak.	4/11 2/11 –
Transition failure when warm or increased fuel consumption	O2S 1 (G3/2) (before TWC). Purge control valve (Y58/1) stuck in open position.	23 ⇒ 11.0 – 12.0 23 ⇒ 27.0 – 28.0	8/11 4/11
Engine vibrates	Hot film MAF sensor (B2/5). Ignition voltage too low. O2S 1 (G3/2) (before TWC).	23 ⇒ 5.0 24 ⇒ 11.0 23 ⇒ 11.0 – 12.0	2/11 – 8/11
EA is in “limp-home” mode	Nominal value potentiometer in pedal value sensor (B37). EA/CC/ISC actuator actual value potentiometer.	25 ⇒ 1.0, 2.0 25 ⇒ 3.0	5/11 5/11

<sup>1)</sup> Observe Preparation for Test, see 22.



Electrical Test Program – Component Locations

Components on engine  
Model 129

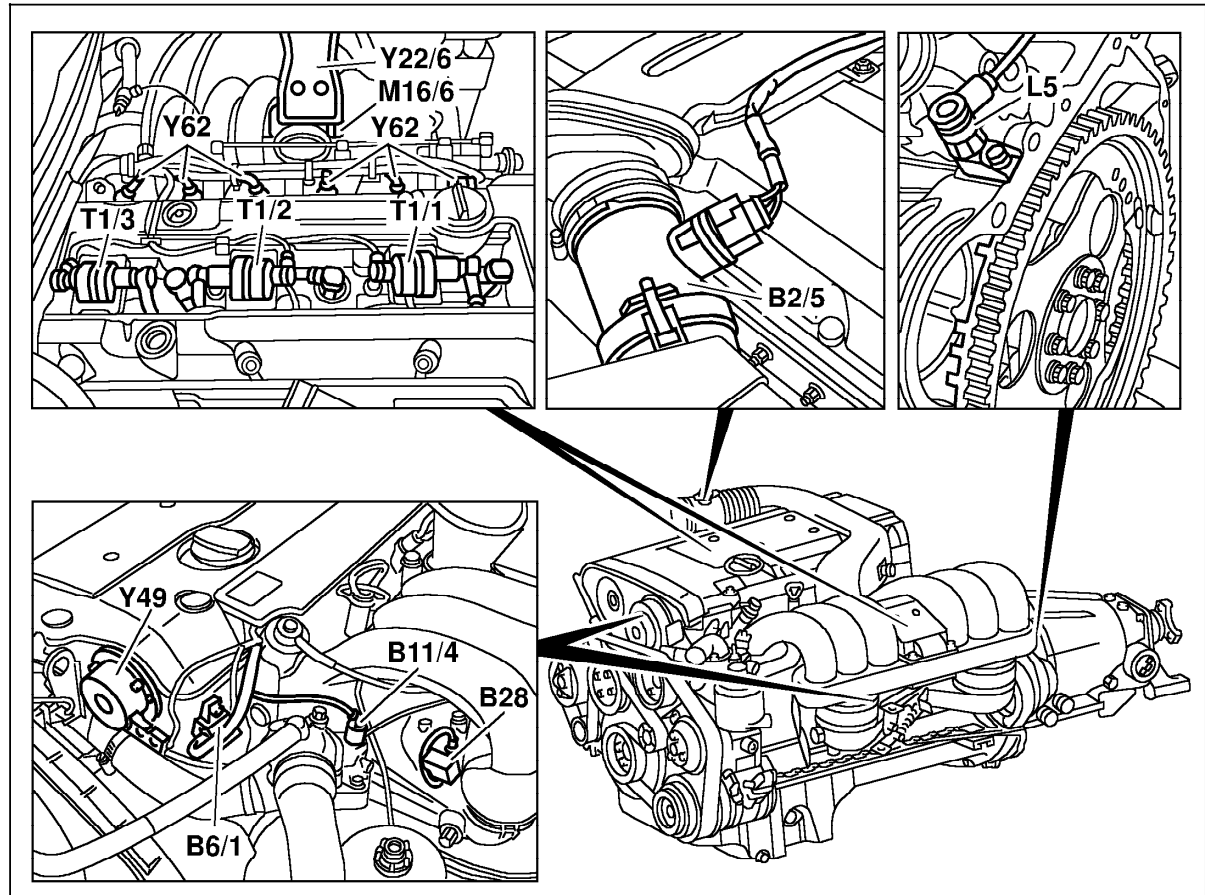


Figure 1

- B2/5 Hot film MAF sensor
- B6/1 Camshaft Hall-effect sensor
- B11/4 ECT sensor
- B28 Pressure sensor (only USA)
- L5 CKP sensor
- M16/1 EA/CC/ISC actuator
- T1/1 Ignition coil cylinders 2 and 5
- T1/2 Ignition coil cylinders 3 and 4
- T1/3 Ignition coil cylinders 1 and 6
- Y22/6 Resonance intake manifold switchover valve
- Y49 Adjustable camshaft timing solenoid
- Y62 Injectors

P07.61-0281-06

Electrical Test Program – Component Locations

Components on engine  
Model 129

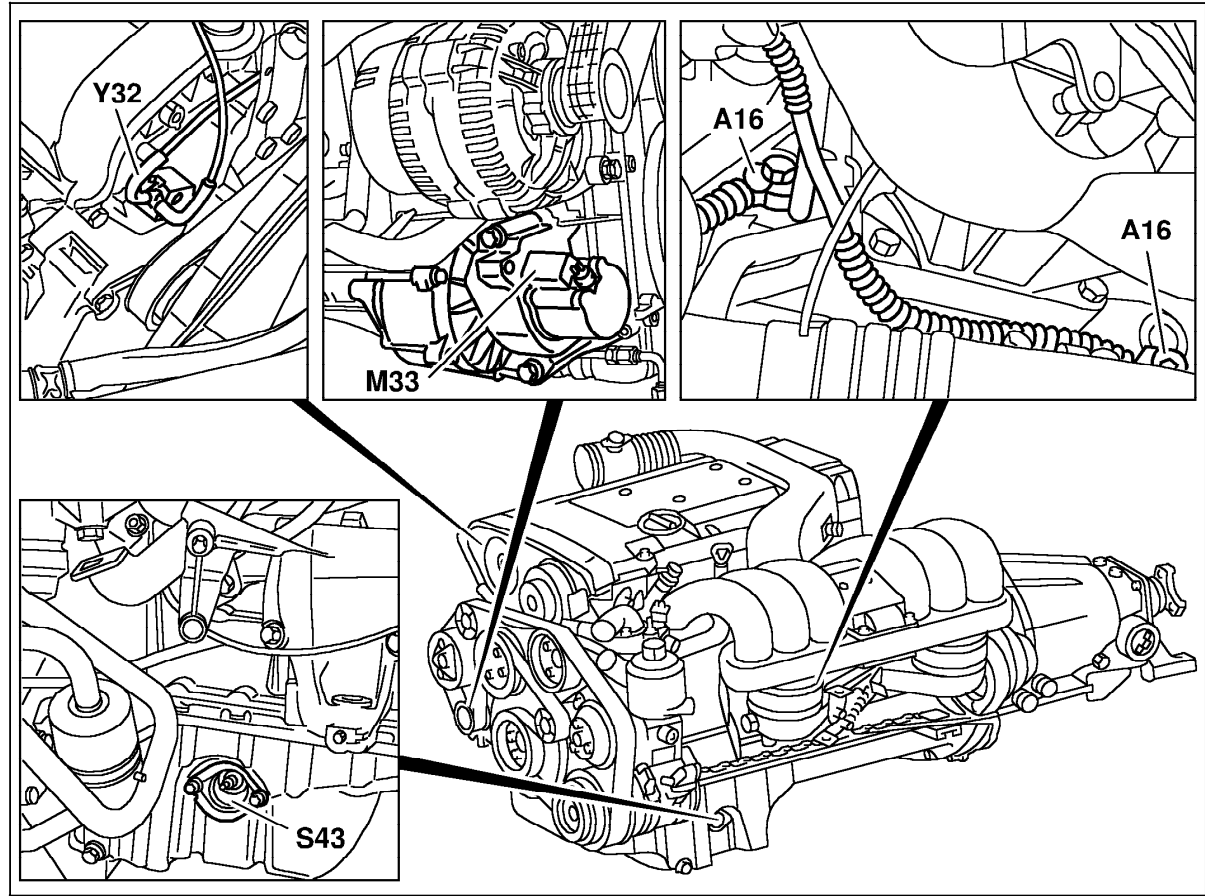


Figure 2

- A16 Knock sensors
- M33 AIR pump (only USA J TAW ROK)
- S43 Oil level switch
- Y32 AIR pump switchover valve (only USA J TAW ROK)

P07.61-0280-06

Electrical Test Program – Component Locations

Engine Compartment  
Model 129

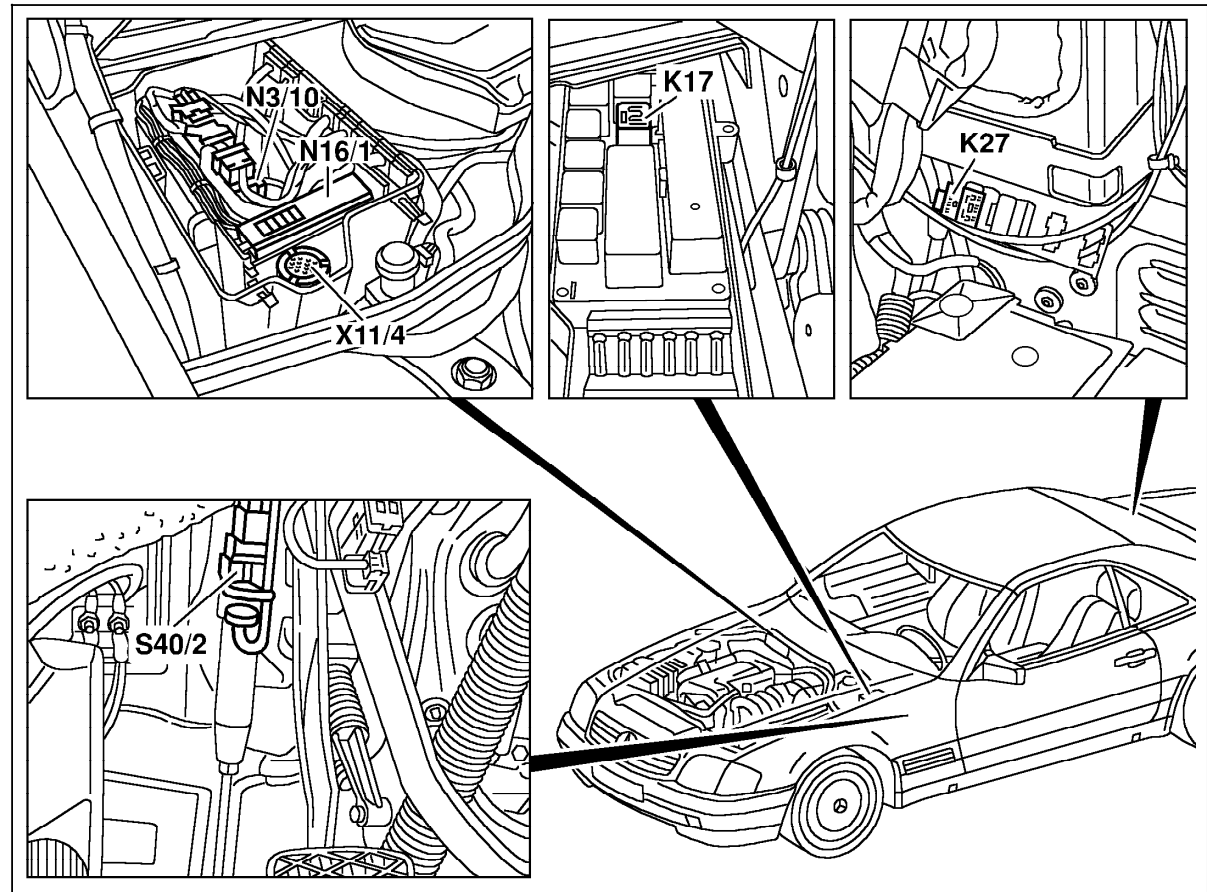


Figure 3

- K17 AIR relay module (only **USA** **J** **TAW** **ROK**)
- K27 FP relay module
- N3/10 Engine control module (ME-SFI)
- N16/1 Base module (BM)
- S40/2 Clutch pedal switch (not **USA**)
- X11/4 Data link connector (DTC readout) (38-pole)

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Electrical Test Program – Component Locations

Engine Compartment  
Model 129

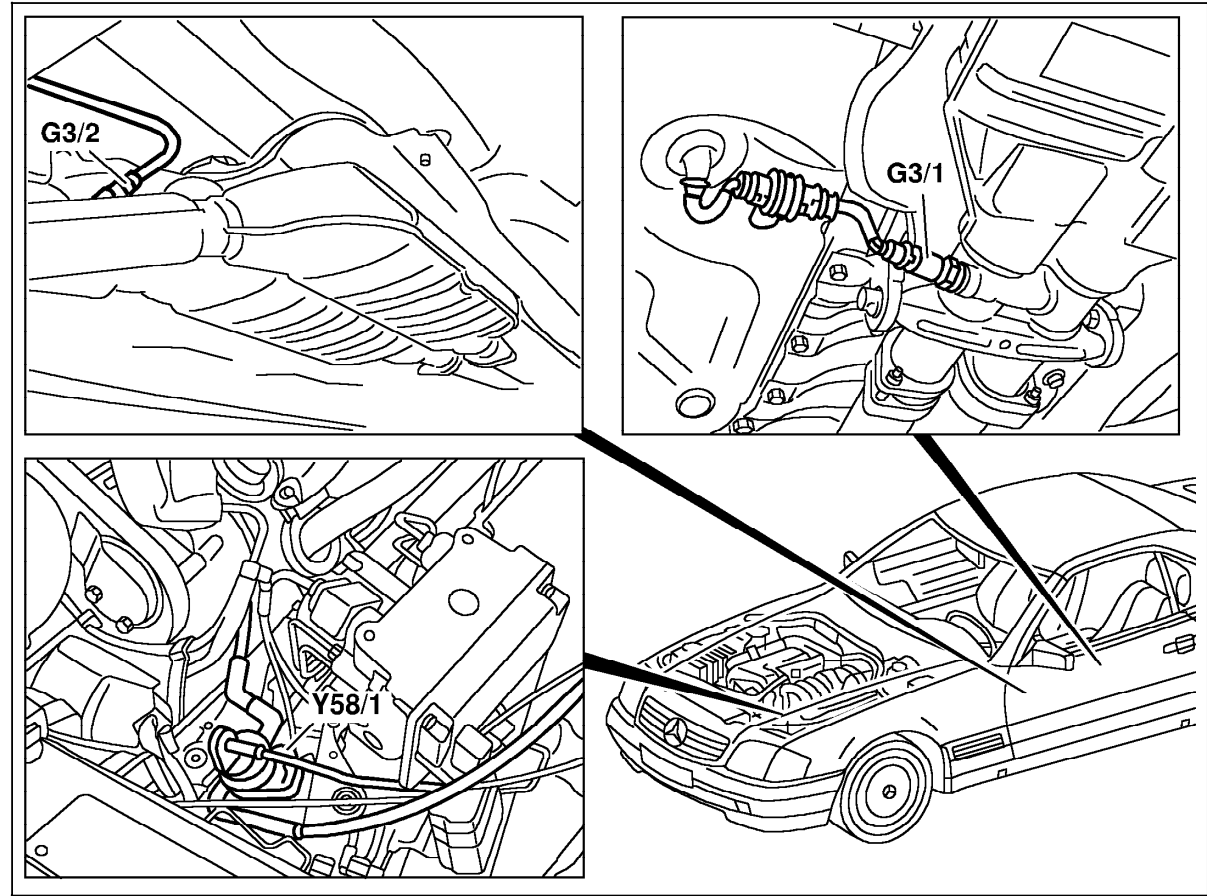


Figure 4

- G3/1 O2S 2 (after TWC) (only USA)
- G3/2 O2S 1 (before TWC)
- Y58/1 Purge control valve

P07.61-0286-06

Electrical Test Program – Component Locations

Engine Compartment  
Model 129

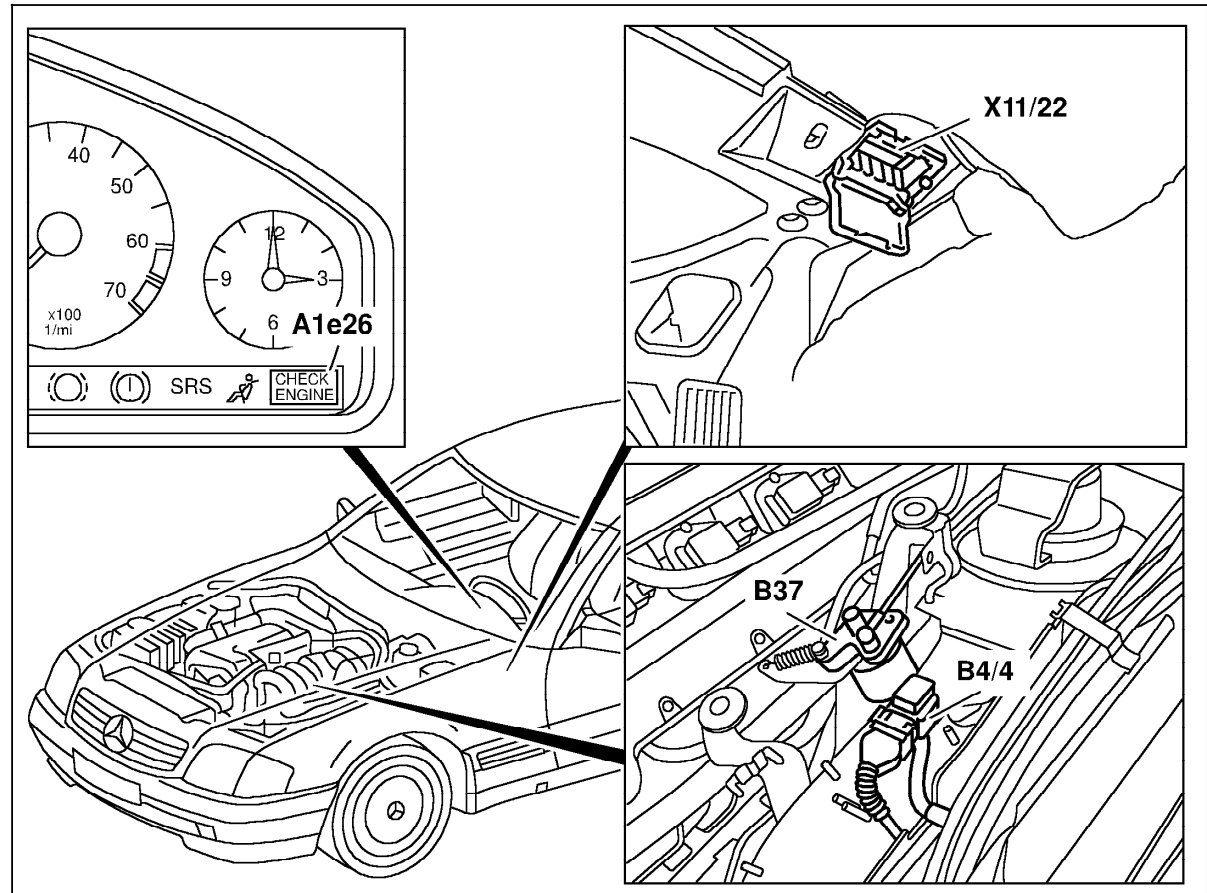


Figure 5

- A1e26 "CHECK ENGINE" MIL (only USA)
- B4/4 Purge monitoring pressure sensor (only USA, up to 08/97)
- B37 Pedal value sensor
- X11/22 Diagnostic module (OBD II) generic scan tool connector (only USA)

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Electrical Test Program – Component Locations

Trunk area  
Model 129

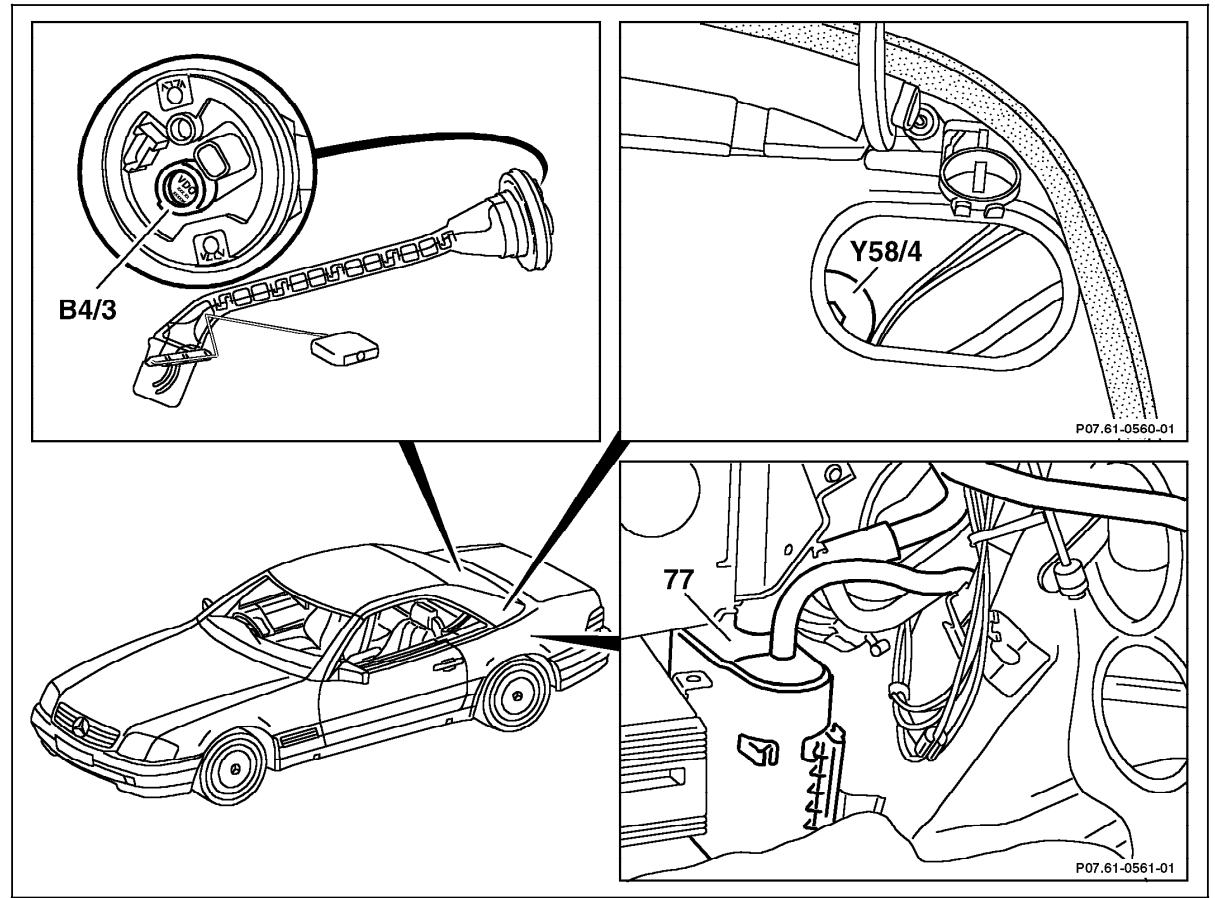


Figure 6

- B4/3 Fuel tank pressure sensor (only USA)
- Y58/4 Activated charcoal canister shut-off valve  
(only USA) (as of 09/97)
- 77 Active charcoal canister

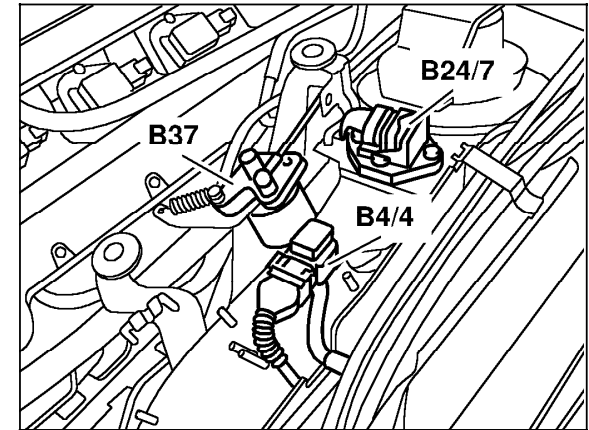
P07.61-0552-06

Electrical Test Program – Component Locations

Trunk area  
Model 129

Figure 7

- B4/4 Fuel tank emissions monitoring pressure sensor (only USA)
- B24/7 Body acceleration sensor (up to 05/96) (only USA)
- B37 Pedal value sensor (only USA)



P07.61-0576-01

Electrical Test Program – Component Locations

Components on engine  
Model 140

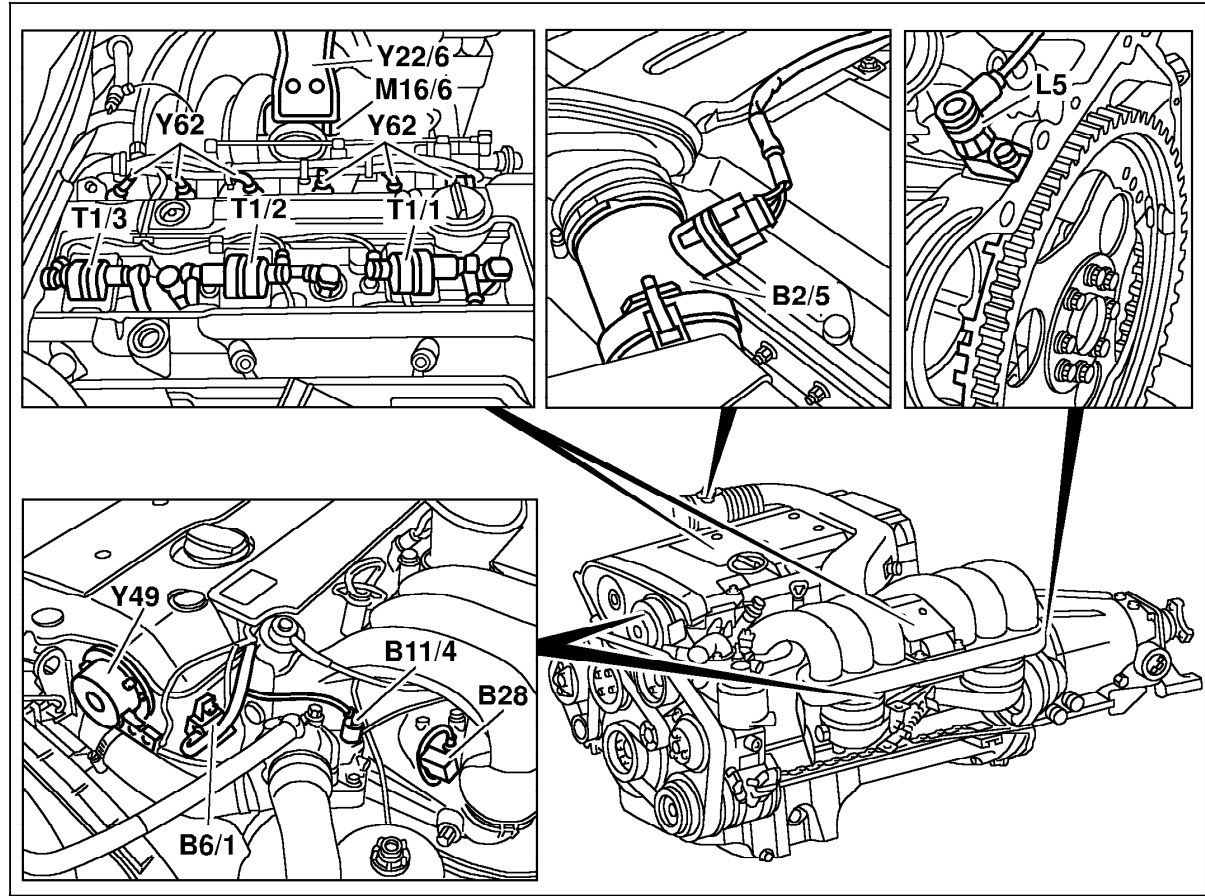


Figure 8

- B2/5 Hot film MAF sensor
- B6/1 Camshaft Hall-effect sensor
- B11/4 ECT sensor
- B28 Pressure sensor (only USA)
- L5 CKP sensor
- M16/1 EA/CC/ISC actuator
- T1/1 Ignition coil cylinders 2 and 5
- T1/2 Ignition coil cylinders 3 and 4
- T1/3 Ignition coil cylinders 1 and 6
- Y22/6 Resonance intake manifold switchover valve
- Y49 Adjustable camshaft timing solenoid
- Y62 Injectors

P07.61-0281-06



Electrical Test Program – Component Locations

Components on engine  
Model 140

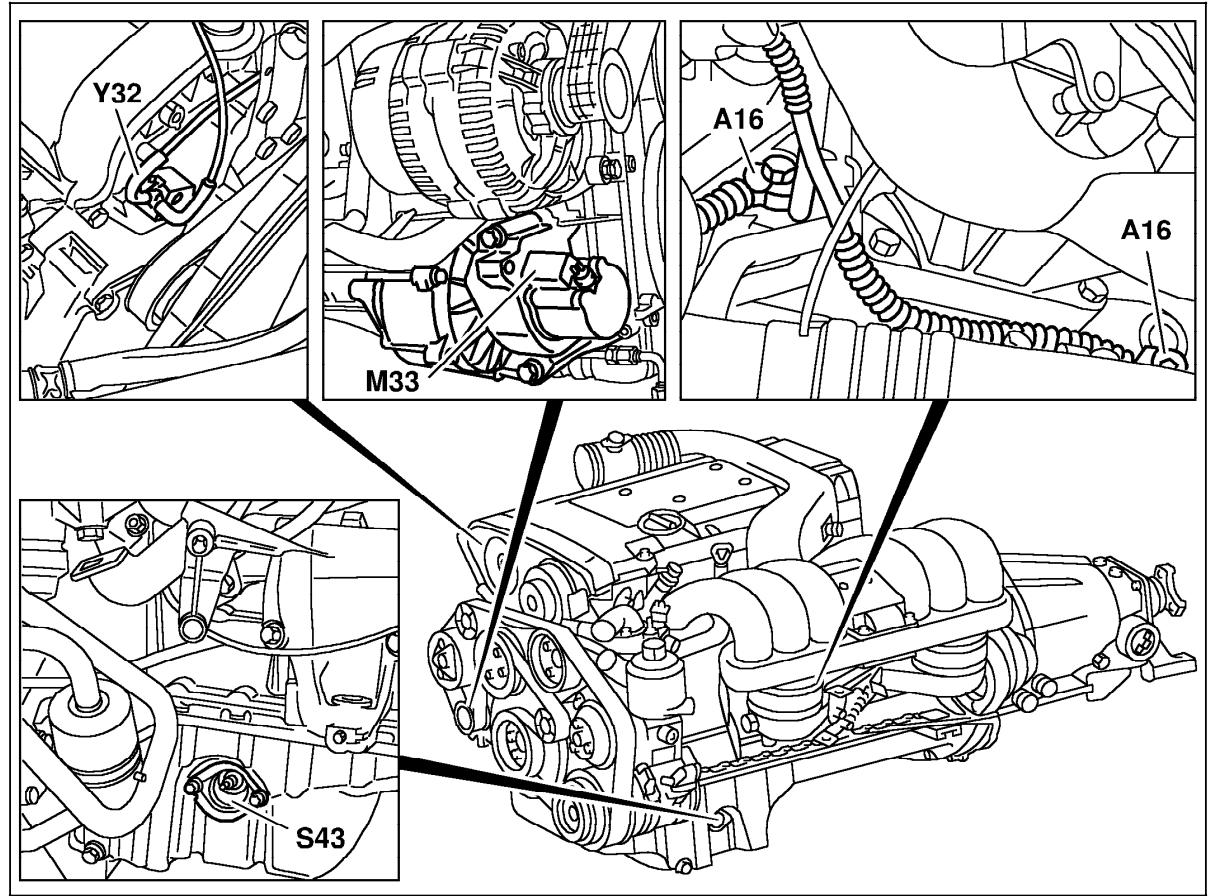


Figure 9

- A16 Knock sensors
- M33 AIR pump (only USA J TAW ROK)
- S43 Oil level switch
- Y32 AIR pump switchover valve (only USA J TAW ROK)

P07.61-0280-06

Electrical Test Program – Component Locations

Engine Compartment  
Model 140

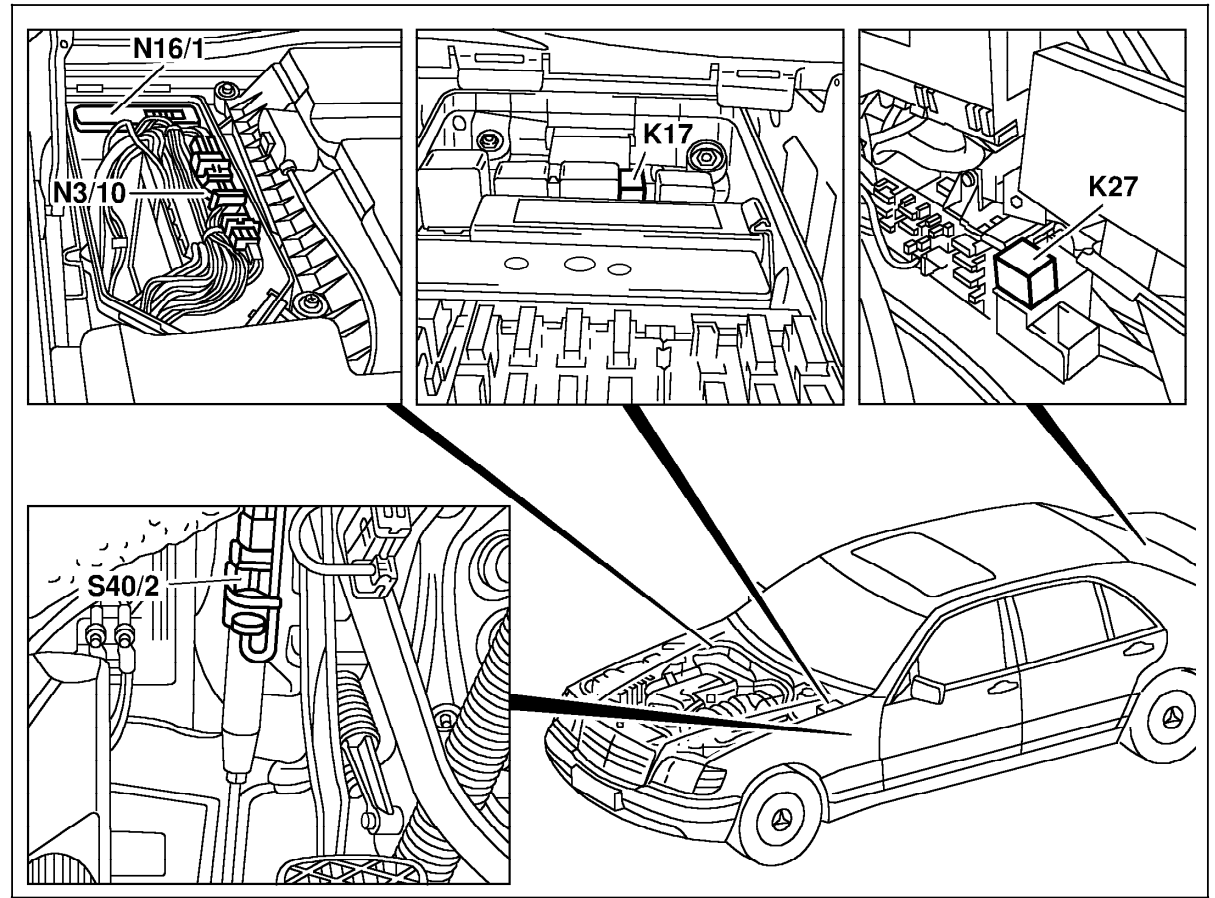


Figure 10

- K17 AIR relay module (only USA)
- K27 FP relay module
- N3/10 Engine control module (ME-SFI)
- N16/1 Base module (BM)
- S40/2 Clutch pedal switch (not USA)

P07.61-0282-06

Electrical Test Program – Component Locations

Engine Compartment  
Model 140

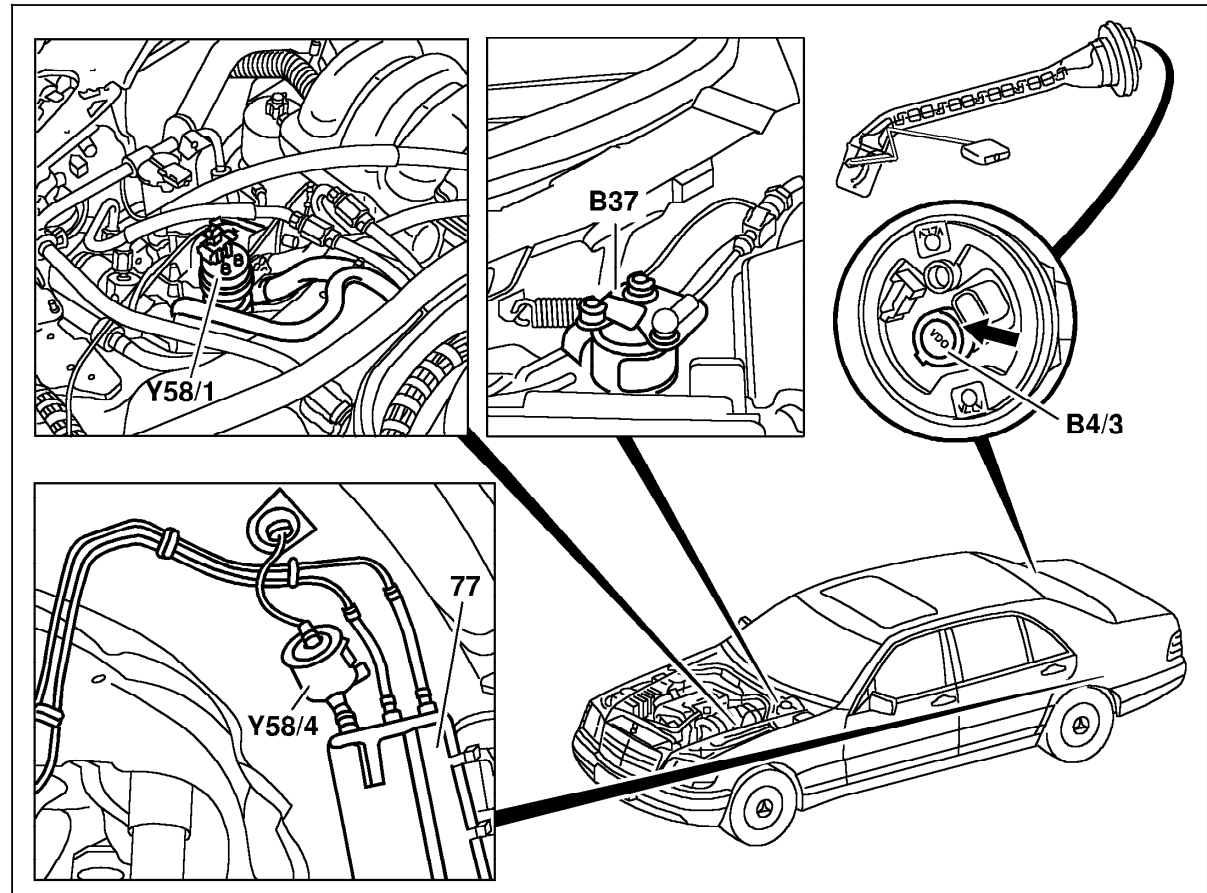


Figure 11

- B4/3 Fuel tank pressure sensor (only USA)
- B37 Pedal valve sensor
- Y58/1 Purge control valve
- Y58/4 Activated charcoal canister shut-off valve (only USA)
- 77 Active charcoal canister

P07.61-0283-06

Electrical Test Program – Component Locations

Engine Compartment  
Model 140

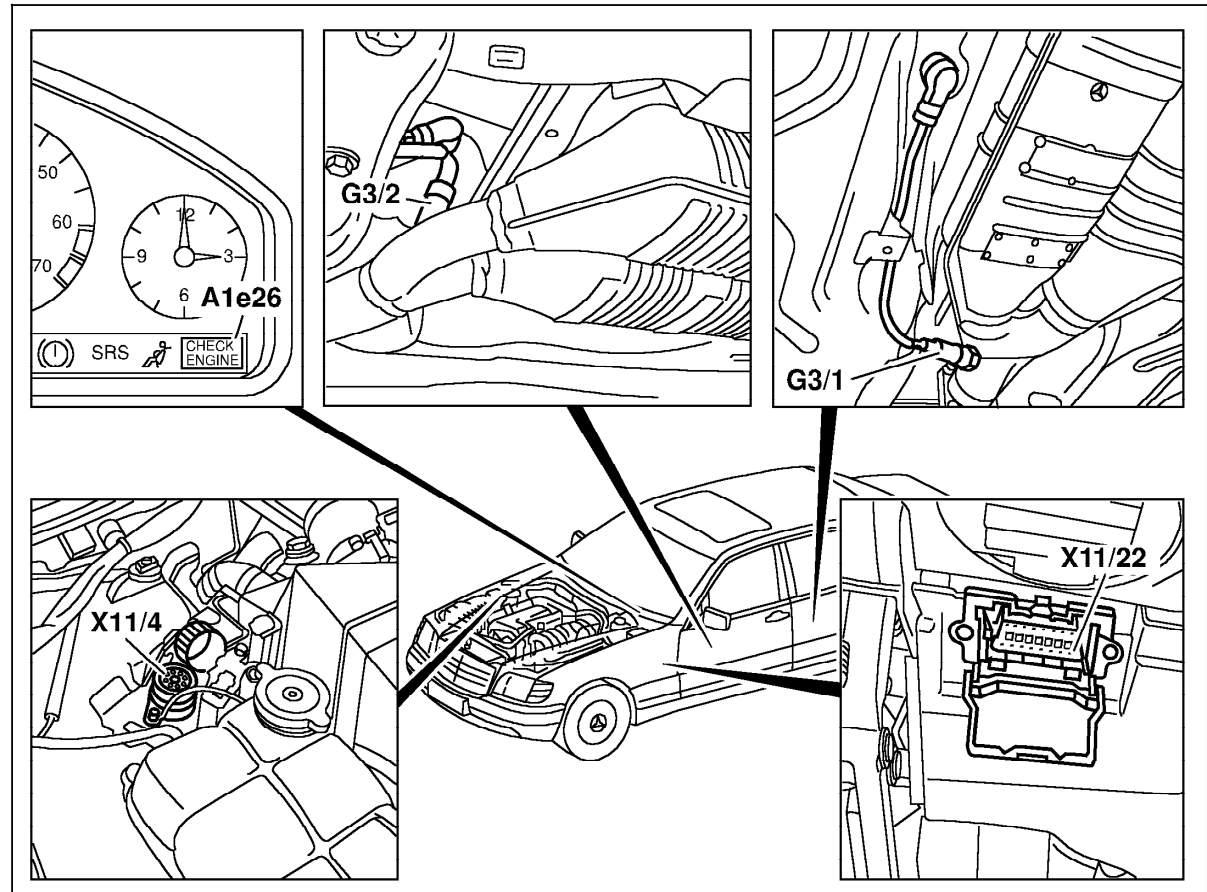


Figure 12

- A1e26 CHECK ENGINE MIL (only USA)
- G3/1 O2S 2 (after TWC) (only USA)
- G3/2 O2S 1 (before TWC)
- X11/4 Data link connector (DTC readout)
- X11/22 Diagnostic module (OBD II) generic scan tool connector (only USA)

P07.61-0284-06

Electrical Test Program – Component Locations

Trunk area  
Model 140

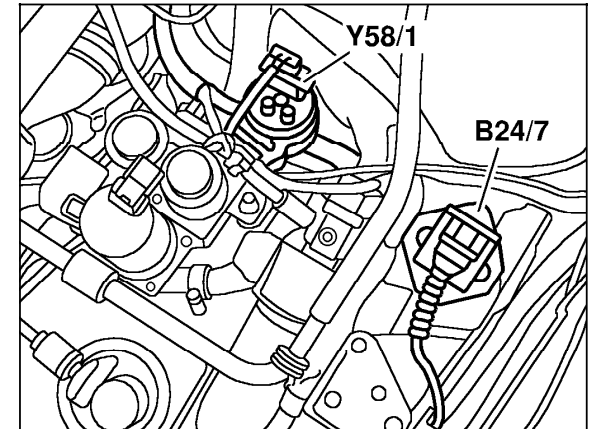


Figure 13

B24/7 Body acceleration sensor (up to 05/96)  
Y58/1 Purge control valve

P07.61-0577-01

Electrical Test Program – Component Locations

Components on engine  
Model 202

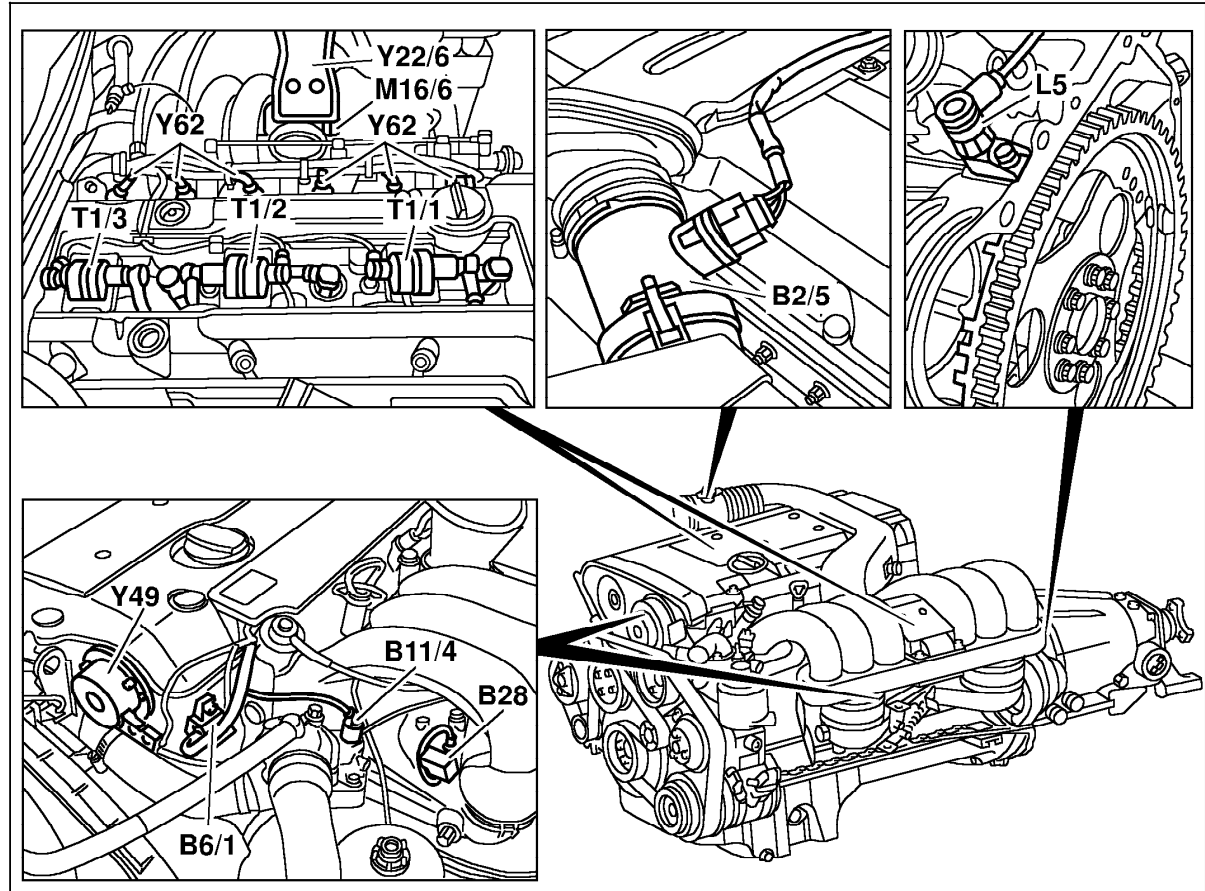


Figure 14

- B2/5 Hot film MAF sensor
- B6/1 Camshaft Hall-effect sensor
- B11/4 ECT sensor
- B28 Pressure sensor (only USA)
- L5 CKP sensor
- M16/1 EA/CC/ISC actuator
- T1/1 Ignition coil cylinders 2 and 5
- T1/2 Ignition coil cylinders 3 and 4
- T1/3 Ignition coil cylinders 1 and 6
- Y22/6 Resonance intake manifold switchover valve
- Y49 Adjustable camshaft timing solenoid
- Y62 Injectors

P07.61-0281-06

Electrical Test Program – Component Locations

Components on engine  
Model 202

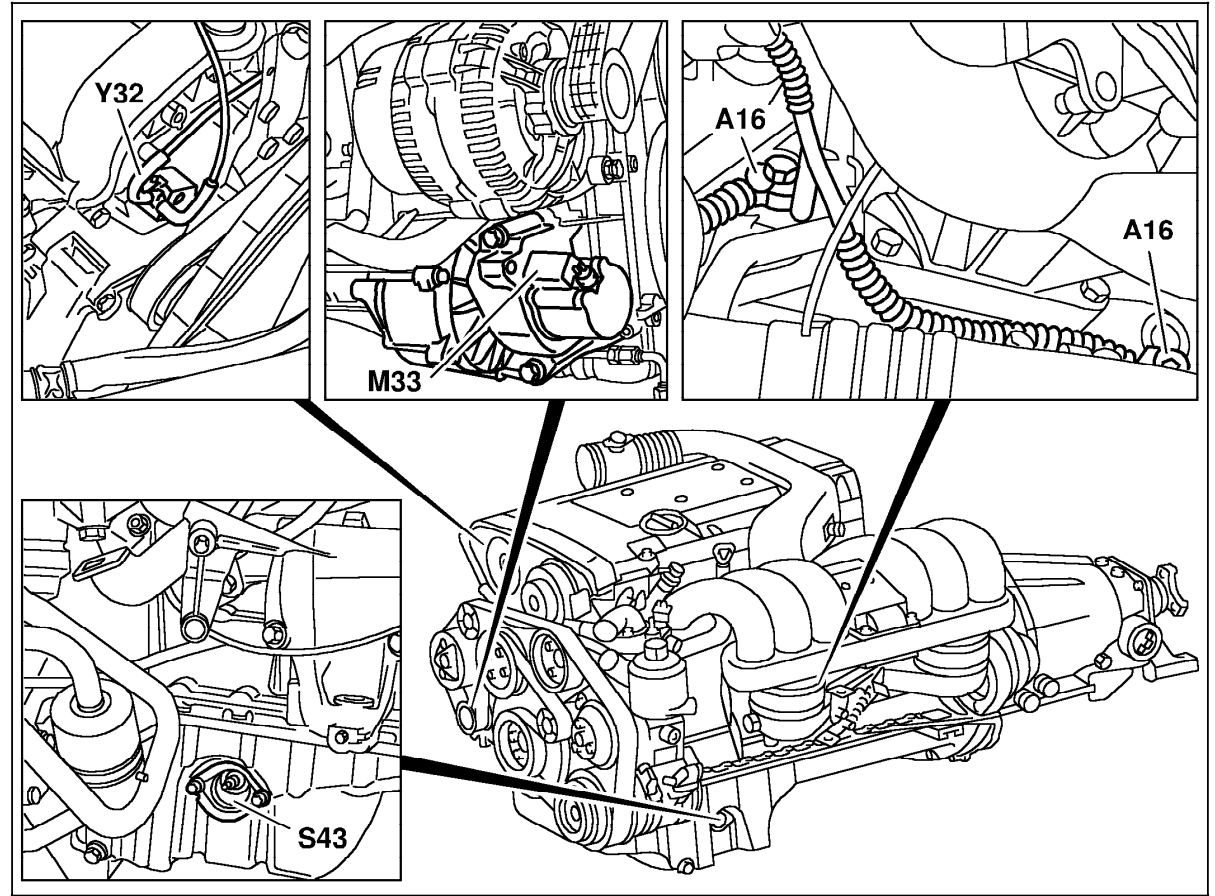


Figure 15

- A16 Knock sensors
- M33 AIR pump (only USA J TAW ROK)
- S43 Oil level switch
- Y32 AIR pump switchover valve (only USA J TAW ROK)

P07.61-0280-06

Electrical Test Program – Component Locations

Engine Compartment  
Model 202

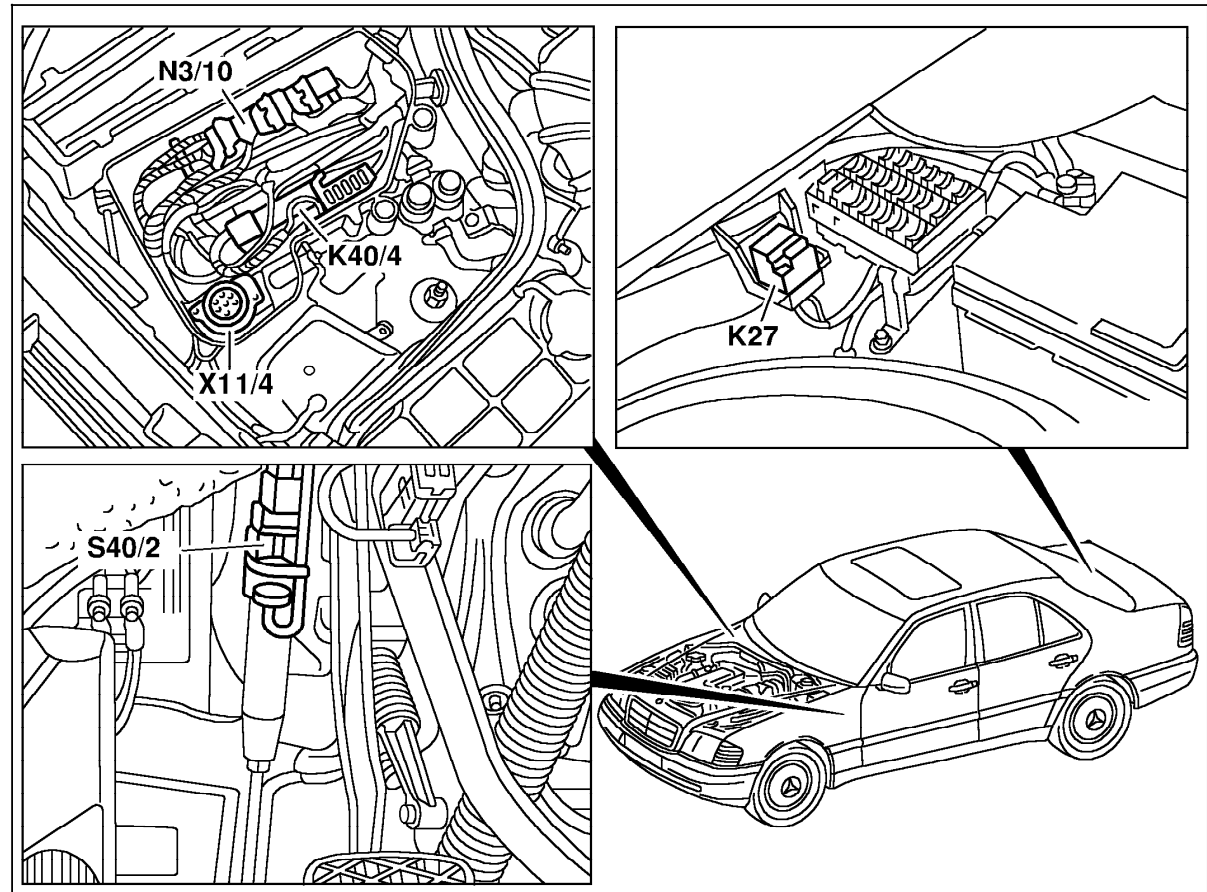


Figure 16

- K27 FP relay module
- K40/4 Passenger-side fuse and relay module box with:  
Starter relay  
Relay module, AIR pump (only USA)
- N3/10 Engine control module (ME-SFI)
- S40/2 Clutch pedal switch (MT only) (not USA)
- X11/4 Data link connector (DTC readout)

P07.61-0301-06



Electrical Test Program – Component Locations

Engine Compartment  
Model 202

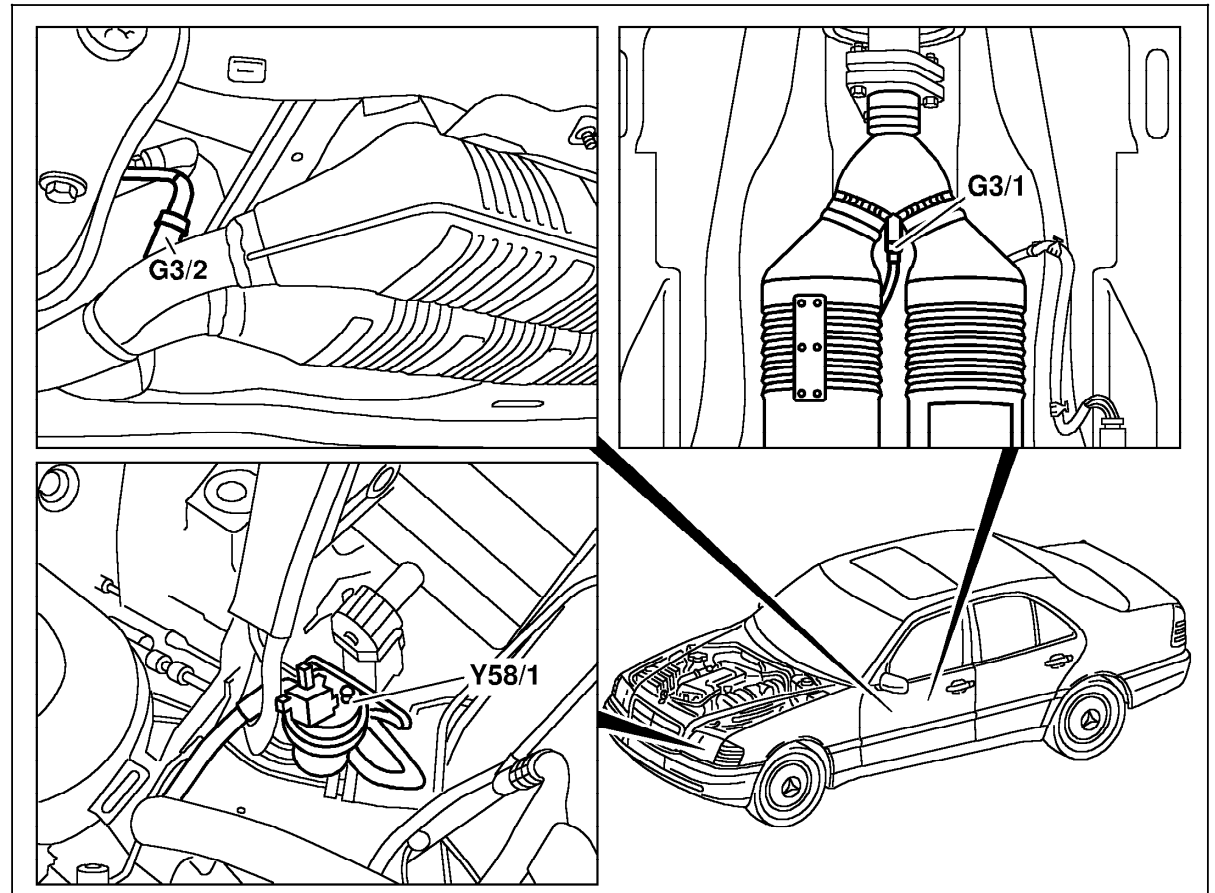


Figure 17

- G3/1 O2S 2 (after TWC) (only USA)
- G3/2 O2S 1 (before TWC)
- Y58/1 Purge control valve

P07.61-0302-06

Electrical Test Program – Component Locations

Engine Compartment  
Model 202

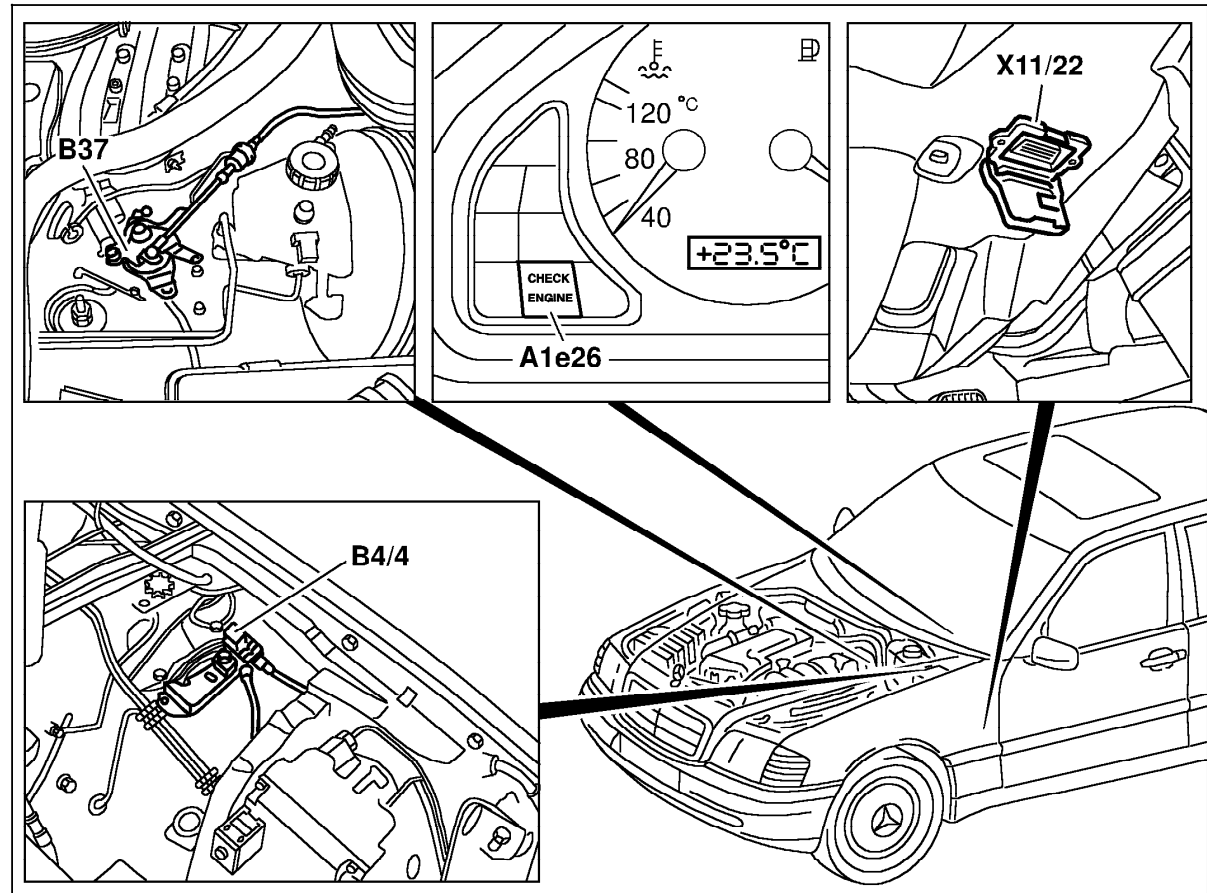


Figure 18

A1e26 "CHECK ENGINE" MIL (only USA)

B4/4 Fuel tank emissions monitoring pressure sensor (only USA)

B37 Pedal valve sensor

X11/22 Diagnostic module (OBD II) generic scan tool connector (only USA)

P07.61-0303-06

Electrical Test Program – Component Locations

Components on engine  
Model 210

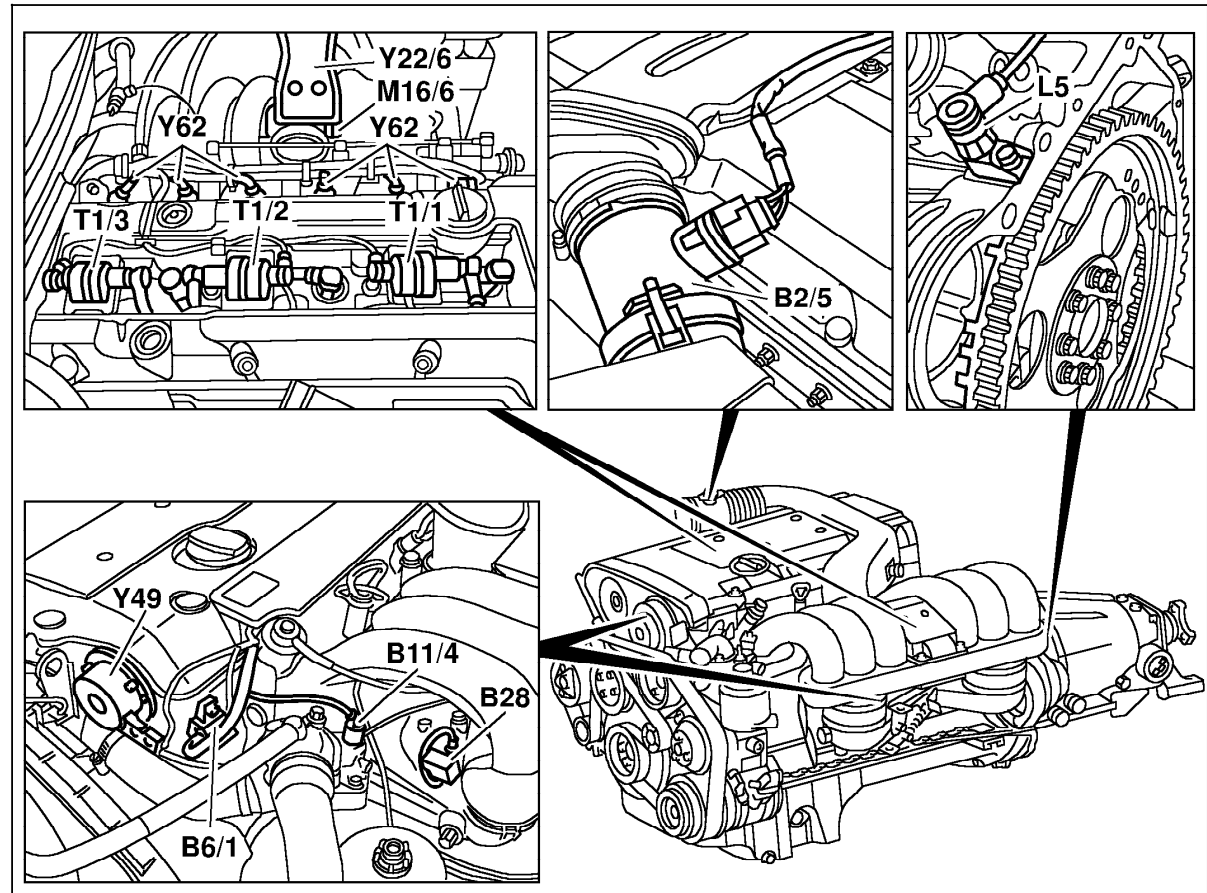


Figure 19

- B2/5 Hot film MAF sensor
- B6/1 Camshaft Hall-effect sensor
- B11/4 ECT sensor
- B28 Pressure sensor (only USA)
- L5 CKP sensor
- M16/1 EA/CC/ISC actuator
- T1/1 Ignition coil cylinders 2 and 5
- T1/2 Ignition coil cylinders 3 and 4
- T1/3 Ignition coil cylinders 1 and 6
- Y22/6 Resonance intake manifold switchover valve
- Y49 Adjustable camshaft timing solenoid
- Y62 Injectors

P07.61-0281-06

Electrical Test Program – Component Locations

Components on engine  
Model 210

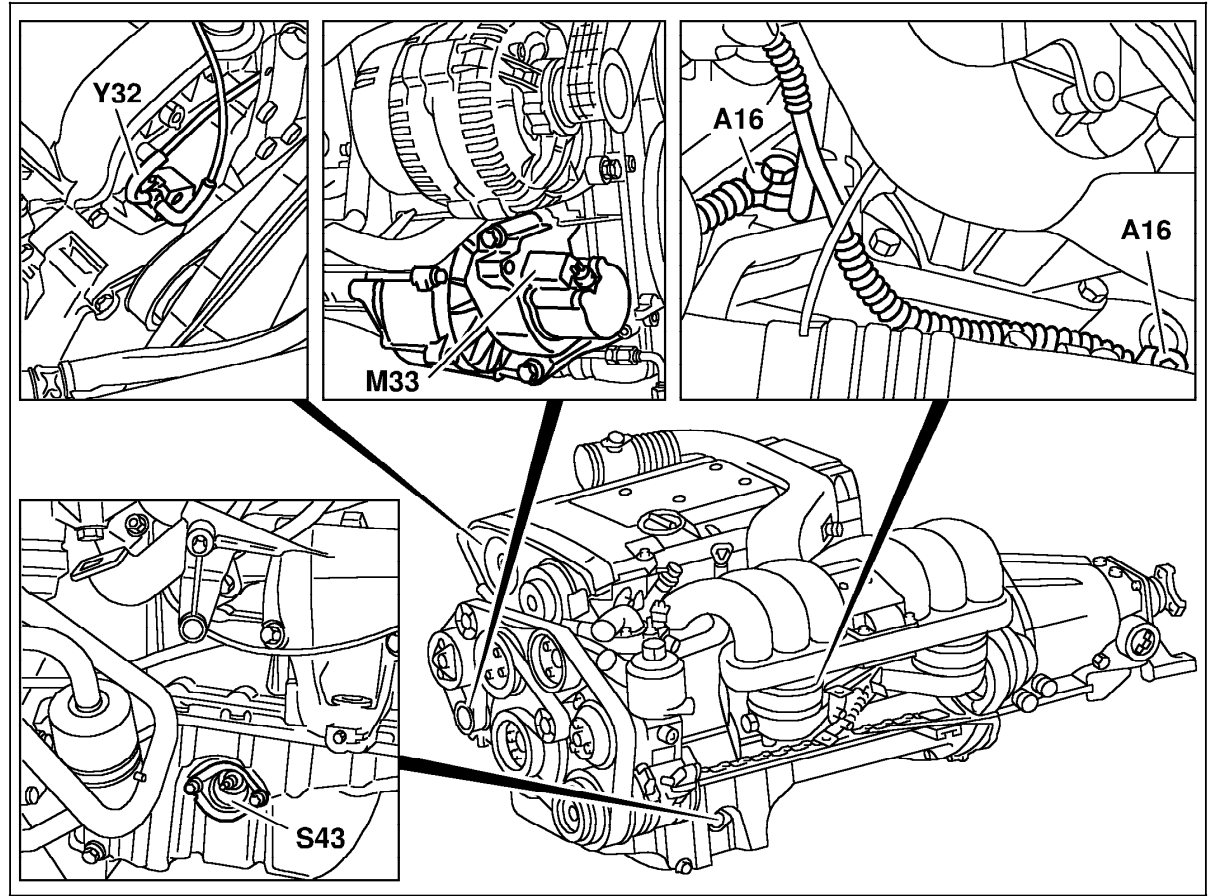


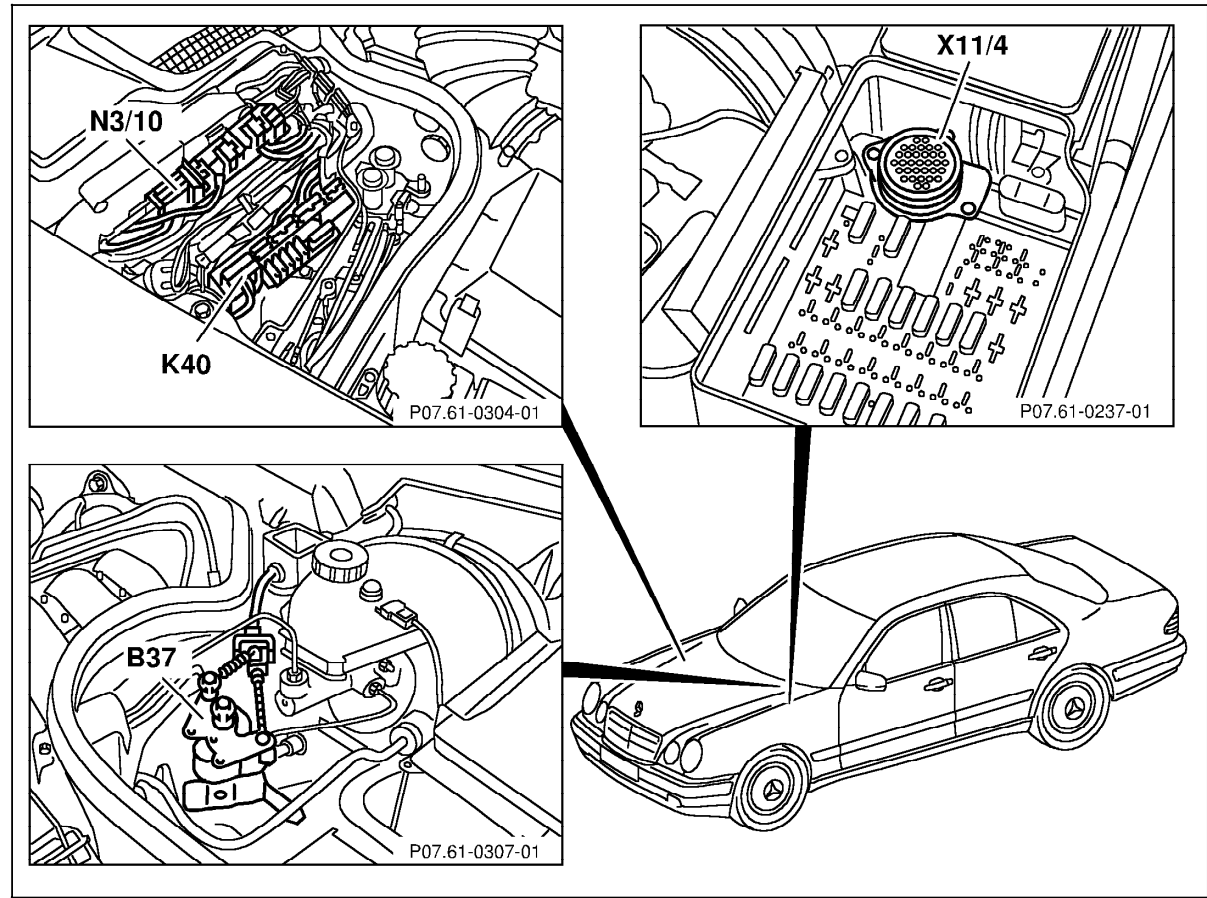
Figure 20

- A16 Knock sensors
- M33 AIR pump (only USA J TAW ROK)
- S43 Oil level switch
- Y32 AIR pump switchover valve (only USA J TAW ROK)

P07.61-0280-06

Electrical Test Program – Component Locations

Engine Compartment  
 Model 210 (USA only)



P07.61-0305-06

Figure 21

- B37 Pedal value sensor
- K40 Relay module with:  
 FP relay  
 AIR pump relay
- N3/10 Engine control module (ME-SFI)
- X11/4 Data link connector (DTC readout)

Electrical Test Program – Component Locations

Engine Compartment  
Model 210 (USA only)

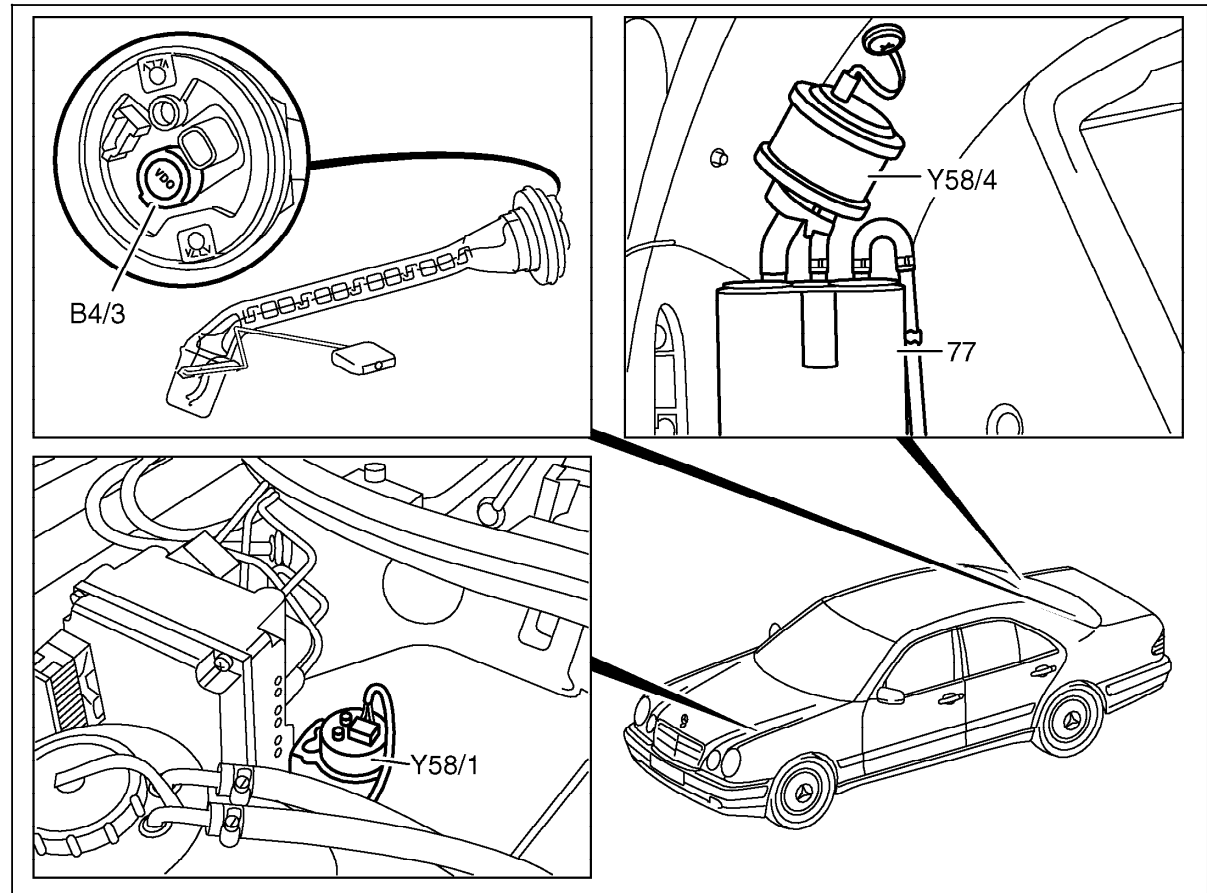


Figure 22

- B4/3 Fuel tank pressure sensor (only USA)
- Y58/1 Purge control valve
- Y58/4 Activated charcoal canister shut-off valve (only USA)
- 77 Activated charcoal canister

P07.61-0288-06

Electrical Test Program – Component Locations

Engine Compartment  
Model 210 (USA only)

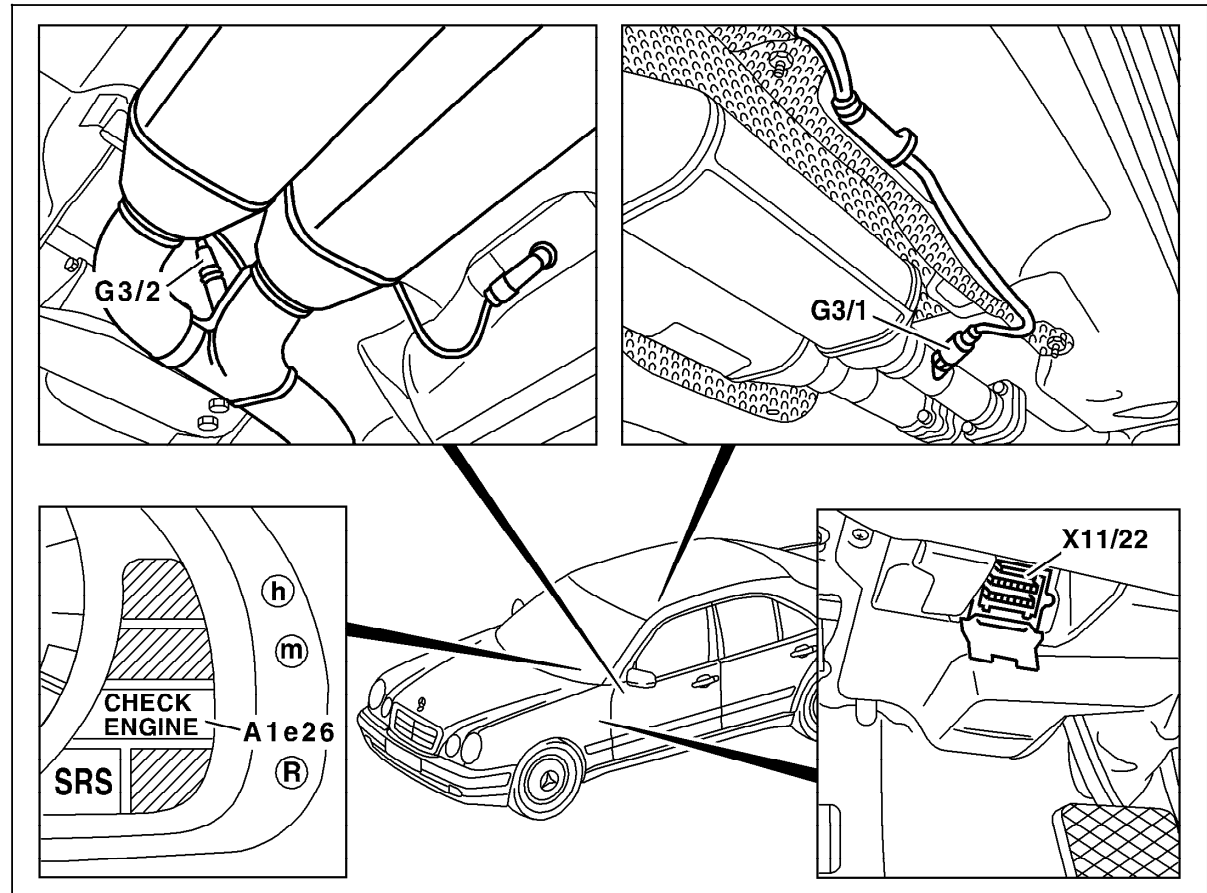


Figure 23

- A1e26 "CHECK ENGINE" MIL (only USA)
- G3/1 O2S 2 (after TWC) (only USA)
- G3/2 O2S 1 (before TWC)
- X11/22 Diagnostic module (OBD II) generic scan tool connector (only USA)

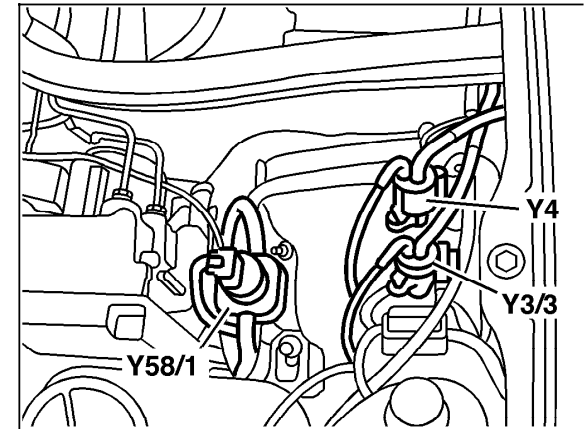
P07.61-0289-06

Electrical Test Program – Component Locations

Engine compartment  
Model 210

Figure 24

- Y3/3 Upshift delay switchover valve
- Y4 Transmission mode switchover valve
- Y58/1 Purge control valve



P07.51-0336-01



Electrical Test Program – Preparation for Test

Preliminary work:
Diagnosis - Malfunction Memory ..... 11

WARNING!

Risk of severe injury when touching ignition parts which produce high voltages. Do not touch ignition components. Persons with heart pacemakers are not to perform repairs on this type of ignition system.

- 1. Review WARNING! on pages 11/1 and 11/2,
2. Review 11, 21, 22, 23, 24, 31, 33,
3. Review section 0,
4. Connect HHT and readout DTC memory, see 11,
5. Ignition: OFF
6. Connect test cable with socket box as per "Connection Diagram - Socket Box", see 22/5.



Connector with red marking is not required at this time since the engine control module has presently no function installed for it. When disconnecting the connectors on the engine control module remove center connector (D) first, when reconnecting connectors install center connector (D) last.

Note:

The test program is divided into four sections:

- 23 SFI Test
24 Ignition System Test
25 EA System Test
26 CC System Test

Electrical wiring diagrams:

- Electrical Troubleshooting Manual, Model 129,
Electrical Troubleshooting Manual, Model 140,
Electrical Troubleshooting Manual, Model 202,
Electrical Troubleshooting Manual, Model 210.

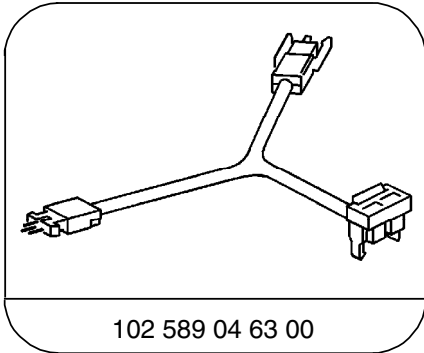
Note regarding "Test Connection" column:

The numbers indicated in parentheses, for example, => 1.0 (2A) signify:

- 2 = Socket 2 on wiring diagram.
A = Connector A on wiring diagram

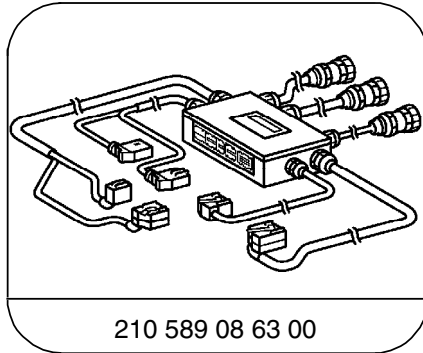
Electrical Test Program – Preparation for Test

Special Tools



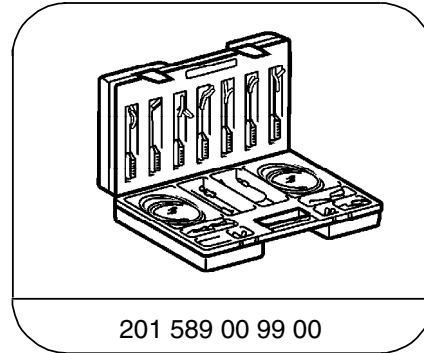
102 589 04 63 00

Test cable



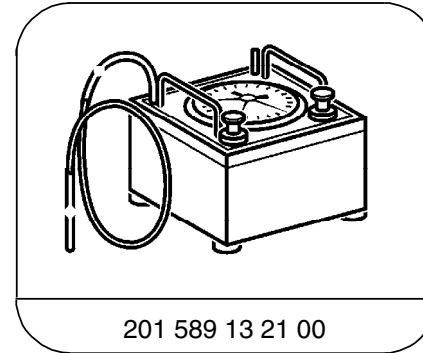
210 589 08 63 00

145-pin test cable



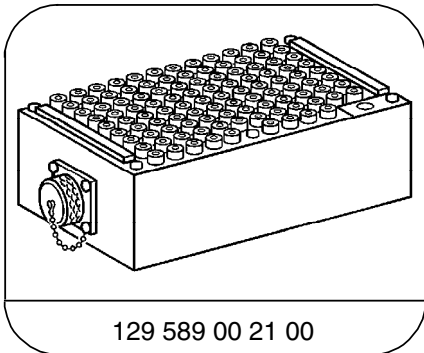
201 589 00 99 00

Electrical connecting set



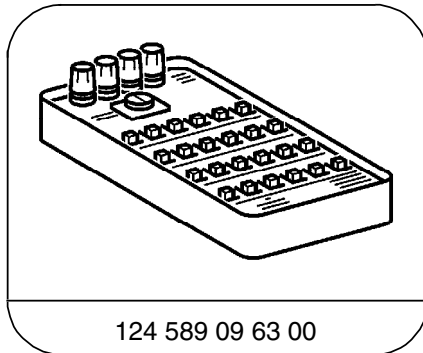
201 589 13 21 00

Tester



129 589 00 21 00

126-pin socket box



124 589 09 63 00

Ohm decade

Test equipment; See MBUSA Standard Service Equipment Program

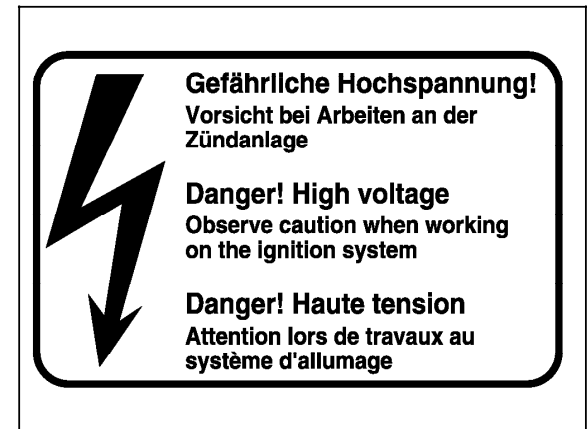
Description	Brand, model, etc.
Digital multimeter	Fluke models 23, 77 III, 83, 85, 87
Engine analyzer	Bear DACE Hermann Electronic

**Electrical Test Program – Preparation for Test****⚠ WARNING!**

**Risk of severe injury due to high voltage ignition components. Persons with heart pacemakers are not to perform repairs on this type of ignition system.**

Electronic ignition systems produce dangerous high voltages on both the primary circuit and the secondary (ignition) circuits. Due to the high voltages produced, contact with any of the voltage carrying components can be dangerous to your health (burns, heart palpitations, cardiac arrest etc).

- Persons with heart pacemakers are not to perform repairs on this type of ignition system.
- Ignition must be turned OFF prior to performing any repair work on the ignition system.
- Do not come in contact or remove with any of the ignition components while the engine is cranking or idling.
- Wear rubber soled shoes.
- Disconnect connectors for CKP sensor at sensor or control module.
- If repairs require that the ignition be turned on, then dangerous voltages will be present through out the entire ignition system.
- No exposed metal connectors or sending units may be installed in the ignition wires.



P15.11-0001-01

## Electrical Test Program – Preparation for Test

### To Avoid Damage to the Ignition System

- To avoid damage to the engine control module, connect/disconnect the control module connectors only with the ignition: **OFF**
- Circuit 1 of the ignition coil may not be shorted to ground, e.g. theft deterrence.
- Only original equipment should be installed in the ignition system.
- Do not operate the ignition system at cranking speed unless the entire ignition harness is connected.
- Do not perform any tests (grounding of ignition cable 4 disconnecting a spark plug connector or pulling cable 4 out of the ignition coil) at cranking or idle speed.
- The high output side of the ignition system must carry at least 2 kΩ of load (spark plug connector).
- If assisting a disabled vehicle and it becomes necessary to perform an ignition spark test, perform this test only on one ignition/spark plug. Ensure a good ground connection to the spark plug.
- ME - SFI: the ignition system is to be turned OFF, when cranking engine to perform compression tests, additionally, it is necessary to disconnect connector 2 from the control module.
- CFI/LH-SFI: disconnect connector(s) on DI control module for CKP sensor (L5).
- CFI/LH-SFI: The DI control module, which is mounted on the wheel arch, is coated with a heat absorbing paste to enhance the transfer of heat, therefore do not remove the foil strip, since this has no negative effect on the heat transfer.

**i** Engine 120 has two separate ignition and fuel injection system

### Using Test Equipment

- **Ensure that the engine and ignition are OFF when connecting/ disconnecting test equipment to a coil.**
- **Connect the secondary voltage measuring equipment on the corresponding secondary ignition lead only when engine is stopped and ignition is OFF.**
- **If the circuit breaker is activated (power balance test), and the engine stalls, then the test procedure with this tester cannot be performed.**
- **Do not connect a test lamp to circuit 1 or 15 of the ignition coil.**

Electrical Test Program – Preparation for Test

Connection Diagram - Socket Box

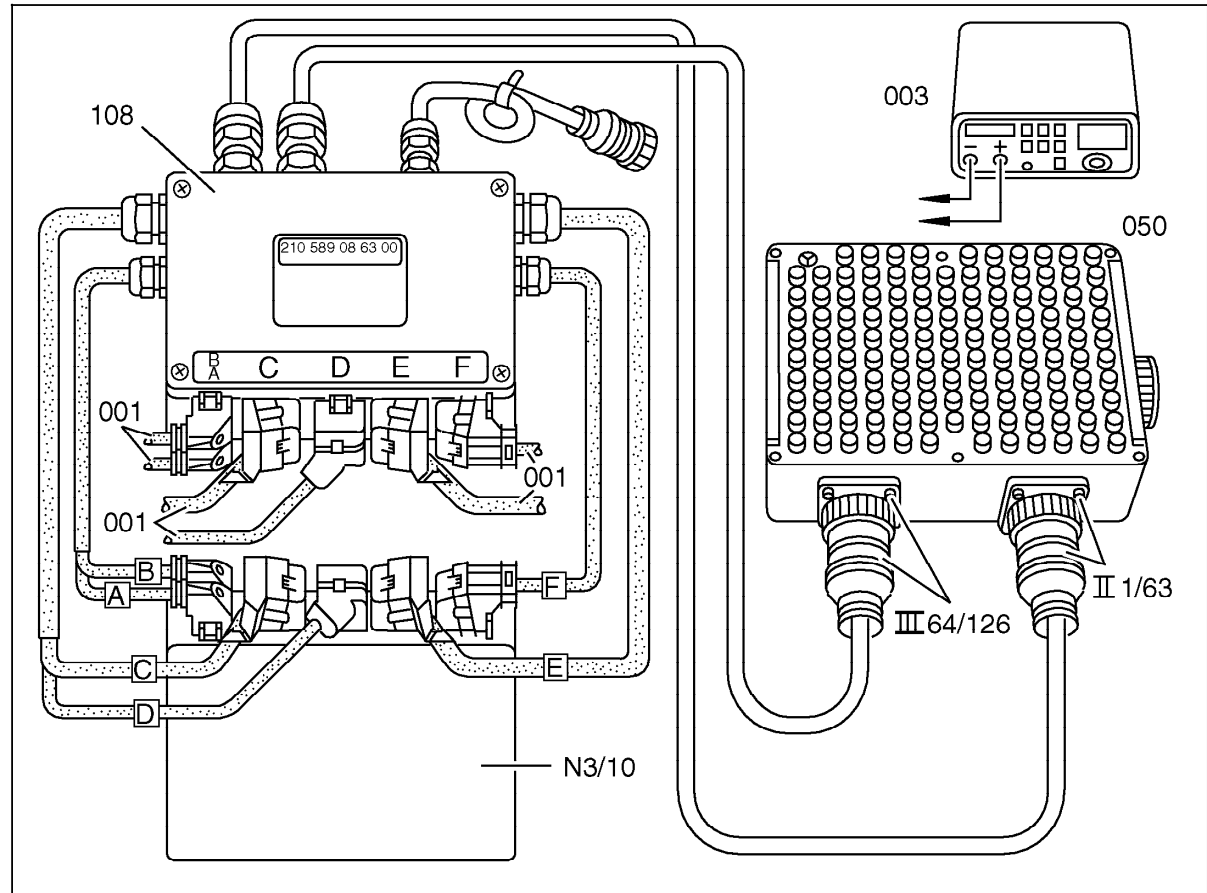
**Note:**  
When disconnecting the connectors on the engine control module remove center connector (D) first, when reconnecting connectors install center connector (D) last.



**Connector with red marking is not required at this time since the engine control module has presently no function installed for it.**

Figure 1

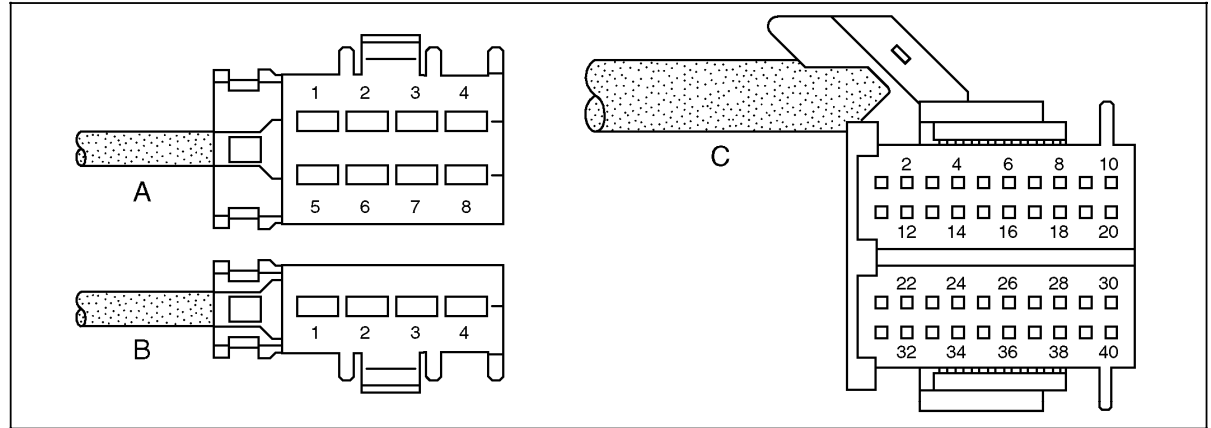
- 001 Engine control module connectors
- 003 Digital multimeter
- 050 Socket box (126-pole)
- 108 Test cable
- N3/10 Engine control module (ME-SFI)
- A-F Connectors
- III 64/126 and II 1/63: Connector description on socket box and test cable



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Electrical Test Program – Preparation for Test

Connector Layout - Engine Control Module



P07.61-0251-04

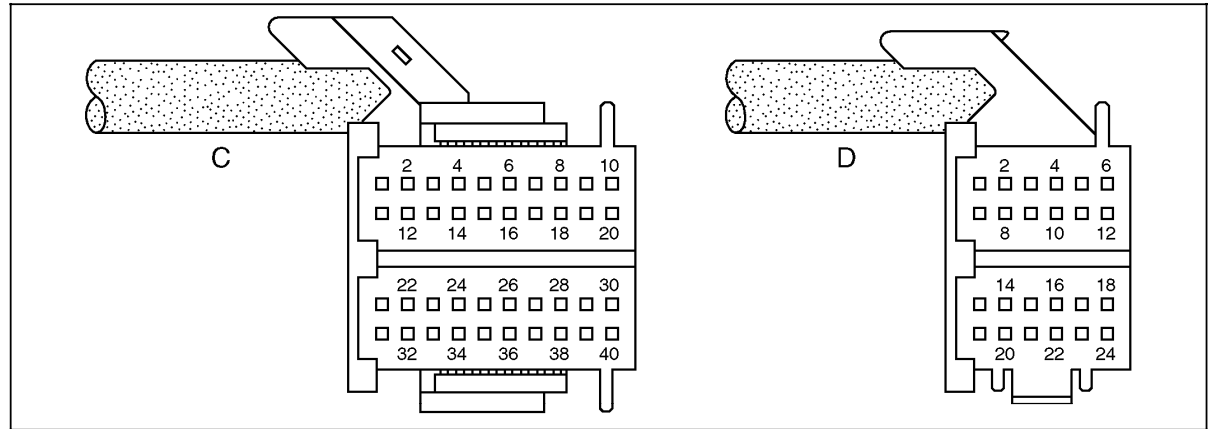
Figure 2

- 1A –
- 2A Voltage supply (circuit 87), Model 129/140 base module, Model 202 fuse and relay module box, Model 210 relay module
- 3A Ground, Model 129 module box bracket W27, Model 140 output ground right footwell W15, Model 202/210 right component compartment W16/6
- 4A –
- 5A O2S 1 heater (before TWC)
- 6A –
- 7A Ground, Model 129 module box bracket W27, Model 140 output ground right footwell W15, Model 202/210 right component compartment W16/6
- 8A Ground, Model 129 module box bracket W27, Model 140 output ground right footwell W15, Model 202/210 right component compartment W16/6
  
- 1B O2S 2 heater (after TWC)
- 2B –
- 3B Diagnosis connection (data link connector)
- 4B Voltage supply (circuit 30), Model 129/140 base module, Model 202 fuse and relay module box, Model 210 relay module

- 1C – 20C –
- 21C Purge control valve
- 22C Pedal value sensor (+ nominal value potentiometer 1)
- 23C Pedal value sensor (– nominal value potentiometer 1)
- 24C Pedal value sensor (nominal value potentiometer 1 wiper)
- 25C Pedal value sensor (nominal value potentiometer 2 wiper)
- 26C Pedal value sensor (– nominal value potentiometer 2)
- 27C Pedal value sensor (+ nominal value potentiometer 2)

Electrical Test Program – Preparation for Test

Connector Layout - Engine Control Module



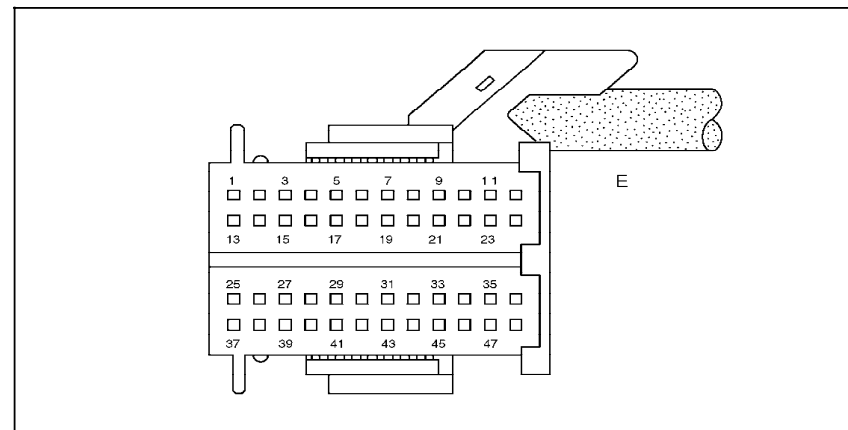
P07.61-0252-04

Figure 3

28C	AIR relay module (only <b>USA</b> )	34D	Ground, fuel tank pressure sensor	19D	P/N recognition
29C	FP relay module (on model 210 in relay module)	35D	(only Model 140/210) (model 129 as of 09/97)	20D	CC switch (accelerate/set)
30C	–	36D	(only <b>USA</b> )	21D	CC switch (decelerate/set)
31C	O2S 1 ground (before TWC)	37D	Signal, fuel tank pressure sensor	22D	CC switch (resume)
32C	O2S 1 signal (before TWC)	38D	(only Model 140/210) (model 129 as of 09/97)	23D	CC switch (control contact)
33C – 37C	–	39D	(only <b>USA</b> )	24D	CC switch (off)
38C	Datalink connector (engine rpm signal)	40D	Voltage supply 5 V for fuel tank pressure sensor		
39C	Data link connector (ME-SFI DTC's)		(only Model 140/210) (model 129 as of 09/97)		
40C	Signal (circuit 50)		(only <b>USA</b> )		
1D	–	7D	O2S 2 ground (after TWC) (only <b>USA</b> )		
2D	Activated charcoal canister shut-off valve	8D	O2S 2 signal (after TWC) (only <b>USA</b> )		
	(only Model 140/210) (model 129 as of 09/97)	9D – 10D	–		
	(only <b>USA</b> )	11D	CAN data bus "H"		
3D	Starter relay (only Model 202)	12D	CAN data bus "L"		
		13D – 18D	–		

Electrical Test Program – Preparation for Test

Connector Layout - Engine Control Module



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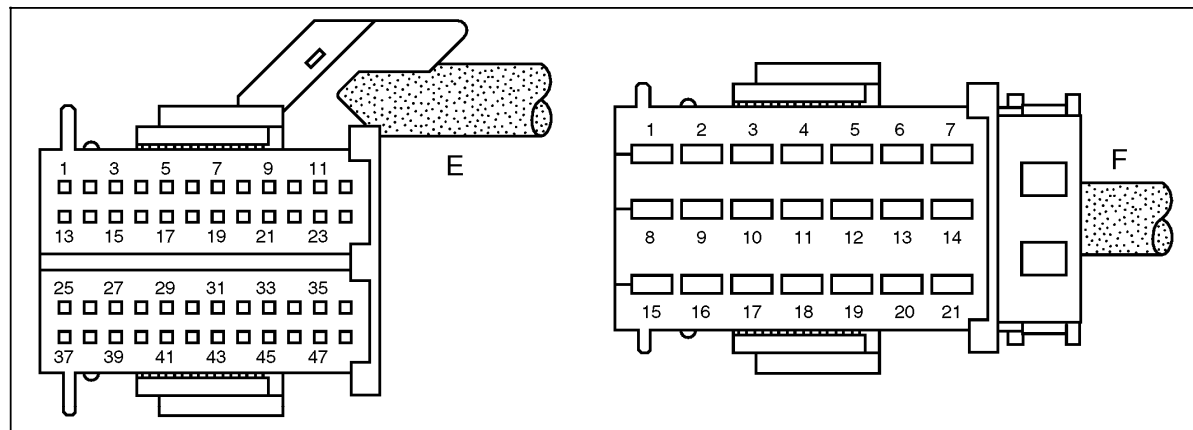
Figure 4

1E	Injector cyl. 2	25E	Injector cyl. 1
2E	Injector cyl. 4	26E	Injector cyl. 5
3E	–	27E	AIR pump relay in relay module (only Model 210)
4E	Adjustable camshaft timing solenoid	28E	ETC sensor ground
5E – 9E	–	29E	ECT sensor signal
10E	AIR pump switchover valve (only USA)	30E	–
11E	–	31E	EA/CC/ISC actuator (actual value potentiometer 1 wiper)
12E	Resonance intake manifold switchover valve	32E	EA/CC/ISC actuator (actual value potentiometer ground)
13E	Injector cyl. 3	33E	Actual value potentiometer voltage supply
14E	Injector cyl. 6	34E	EA/CC/ISC actuator (actual value potentiometer 2 wiper)
15E – 16E	–	35E – 36E	–
17E	Oil level switch		
18E – 21E	–		
22E	Voltage supply 5 V, pressure sensor (only USA)		
23E	Pressure sensor signal (only USA)		
24E	Pressure sensor ground (only USA)		



Electrical Test Program – Preparation for Test

Connector Layout - Engine Control Module


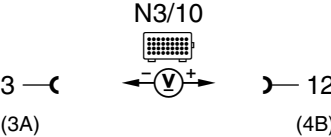
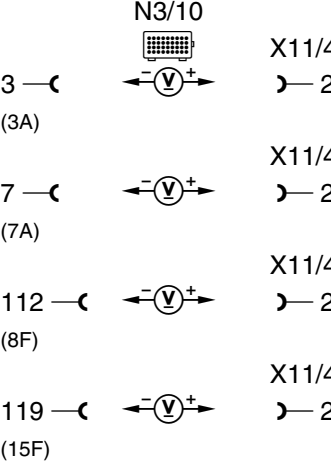


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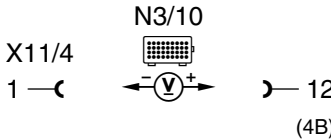
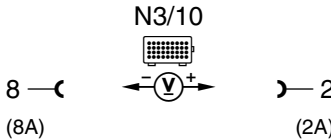
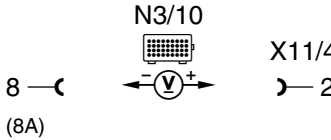
Figure 5

37E	CKP sensor ground	1F	EA/CC/ISC actuator (-)
38E	CKP sensor signal	2F	EA/CC/ISC actuator (+)
39E	Camshaft Hall-effect sensor ground	3F – 5F	–
40E	Camshaft Hall-effect sensor signal	6F	Ignition coil T1/2, cyl. 3 and 4
41E	KS 1 ground	7F	–
42E	KS 1 signal	8F	Output ground, Model 129 module box bracket W27, Model 140 output ground right footwell W15, Model 202/210 right component compartment W16/6
43E	KS 2 ground	9F – 12F	–
44E	KS 2 signal	13F	Ignition coil T1/1, cyl. 2 and 5
45E	IAT sensor (in hot film MAF sensor)	14F	–
46E	Hot film MAF sensor voltage supply 5 V	15F	Output ground, Model 129 module box bracket W27, Model 140 output ground right footwell W15, Model 202/210 right component compartment W16/6
47E	Hot film MAF sensor signal	16F – 19F	–
48E	Hot film MAF sensor ground	20F	Ignition coil T1/3, cyl. 1 and 6
		21F	–


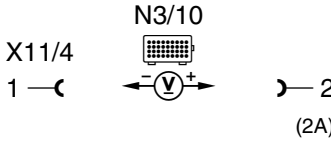
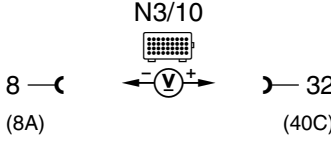
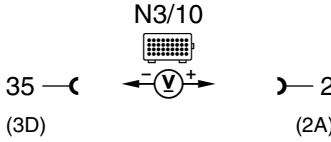
Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
1.0	P0 560	<b>Engine control module (ME-SFI) (N3/10)</b> Voltage supply Circuit 30		Ignition: <b>ON</b>	11 – 14 V	⇒ 1.1 – 1.2
1.1		Ground wire		Ignition: <b>ON</b>	11 – 14 V	Wiring, <b>Model 129:</b> Ground, module box bracket (W27). <b>Model 140:</b> Output ground (W15), right footwell. <b>Model 202, 210:</b> Output ground (W16/6), right component compartment.


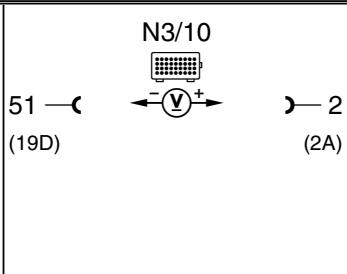


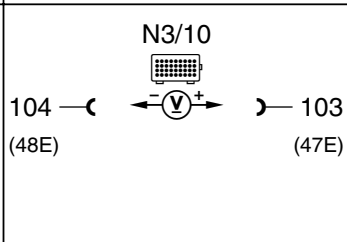
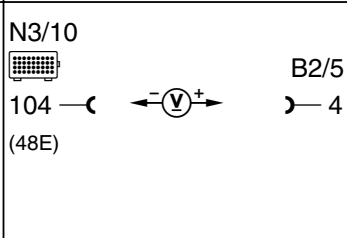
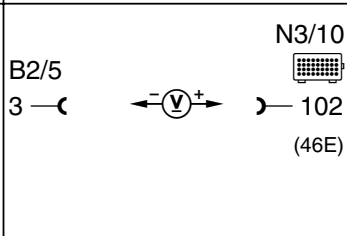
Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
1.2		Voltage supply Circuit 30		Ignition: <b>ON</b>	11 – 14 V	Wiring, <b>Model 129, 140:</b> Base modul (N16/1) or fuse on base module. <b>Model 202:</b> Passenger-side fuse and relay module box (K40/4). <b>Model 210:</b> Relay module (K40).
2.0	PO 560	<b>Engine control module (ME-SFI) (N3/10)</b> Voltage supply Circuit 87		Ignition: <b>ON</b>	11 – 14 V	⇒ 2.1 – 2.2
2.1		Electronics ground		Ignition: <b>ON</b>	11 – 14 V	Wiring, <b>Model 129:</b> Control module box bracket (W27). <b>Model 140:</b> Output ground (W15), right footwell. <b>Model 202 and 210:</b> Output ground (W16/6), right component compartment.

Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
2.2		Voltage supply Circuit 87		Ignition: <b>ON</b>  Ignition: <b>OFF</b>	11 – 14 V  < 1 V	Wiring, <b>Model 129, 140:</b> Base module (N16/1) or fuse on base module. <b>Model 202:</b> Passenger-side fuse and relay module box (K40/4). <b>Model 210:</b> Relay module (K40).
3.0		<b>Starter signal</b> Circuit 50		Engine: <b>Start</b>	11 – 14 V during the start procedure.	Wiring, Ignition/starter switch
4.0		<b>Starter relay in fuse and relay module box (K40/4)</b> <b>Model 202.028 with 722.4/6 A-transm.</b> Activation		Selector lever position: P/N Engine: <b>Start</b>  Selector lever position: R, D, 3, 2 Engine: <b>Start</b>	11 – 14 V          < 2 V	⇒ 4.1 Engine control module (N3/10).


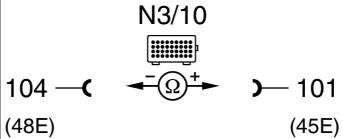
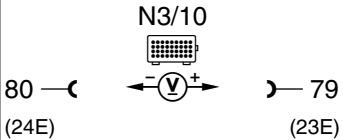
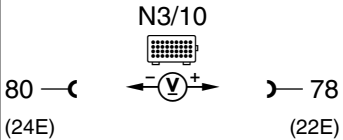
Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
4.1		P/N recognition		Ignition: <b>ON</b>  Selector lever position: P/N  R, D, 4, 3, 2, 1,	11 – 14 V  < 2 V	Wiring, See in WIS: AD27.19-P-1000AZ, and AD27.19-P-3000AB
5.0	 	<b>Hot film MAF sensor (B2/5)</b> Hot film signal		Ignition: <b>ON</b> Engine: <b>at Idle</b>  Engine coolant temperature >70°C	0.9 – 1.1 V 1.3 – 1.7 V Increasing rpm = increasing voltage.	⇒ 5.1 – 5.3, Wiring, Air intake system leak, B2/5
5.1		Hot film MAF sensor (B2/5) Voltage supply 5 V		Disconnect MAF sensor (B2/5) connector and measure directly on socket 4 (br/yl). Ignition: <b>ON</b>	4.7 – 5.2 V	Wiring, N3/10
5.2		Ground wire for hot film MAF sensor (B2/5)		Disconnect MAF sensor (B2/5) connector and measure directly on socket 3 (br). Ignition: <b>ON</b>	4.7 – 5.2 V	Wiring.


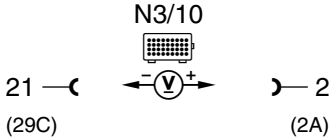
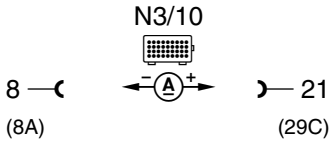
Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy																
5.3		Hot film MAF sensor (B2/5) Voltage supply 12 V		Disconnect MAF sensor (B2/5) connector and connect plus of voltmeter to socket 2 (rd/bu). Ignition: <b>ON</b>	11 – 14 V	Wiring, <b>Model 129, 140:</b> Base module (N16/1) or fuse on base module. <b>Model 202:</b> Passenger-side fuse and relay module box (K40/4). <b>Model 210:</b> Relay module (K40).																
6.0		IAT sensor in hot film MAF sensor (B2/5) Voltage		Ignition: <b>ON</b>	<table border="0"> <tr> <td>°C</td> <td>V</td> </tr> <tr> <td>10</td> <td>3.1</td> </tr> <tr> <td>20</td> <td>2.7</td> </tr> <tr> <td>30</td> <td>2.2</td> </tr> <tr> <td>40</td> <td>1.8</td> </tr> <tr> <td>50</td> <td>1.4</td> </tr> <tr> <td>60</td> <td>1.1</td> </tr> <tr> <td></td> <td>± 5%</td> </tr> </table>	°C	V	10	3.1	20	2.7	30	2.2	40	1.8	50	1.4	60	1.1		± 5%	⇒ 6.1 N3/10
°C	V																					
10	3.1																					
20	2.7																					
30	2.2																					
40	1.8																					
50	1.4																					
60	1.1																					
	± 5%																					

Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy																
6.1		IAT sensor Resistance		Ignition: <b>OFF</b> Disconnect connector <b>E</b> on engine control module (N3/10).	<table border="0"> <tr> <td>oC</td> <td>Ω</td> </tr> <tr> <td>10</td> <td>3600</td> </tr> <tr> <td>20</td> <td>2420</td> </tr> <tr> <td>30</td> <td>1660</td> </tr> <tr> <td>40</td> <td>1170</td> </tr> <tr> <td>50</td> <td>850</td> </tr> <tr> <td>60</td> <td>600</td> </tr> <tr> <td></td> <td>± 5%</td> </tr> </table>	oC	Ω	10	3600	20	2420	30	1660	40	1170	50	850	60	600		± 5%	Wiring, B2/5
oC	Ω																					
10	3600																					
20	2420																					
30	1660																					
40	1170																					
50	850																					
60	600																					
	± 5%																					
7.0	PO 105	<b>Pressure sensor (B28)</b> Sensor signal (only USA)		Connect vacuum tester to pressure sensor (B28) using Y-fitting, 23 (Figure 1). Ignition: <b>ON</b>  Engine: <b>at Idle</b>	<p>&gt; 3.5 V</p> <p>&lt; 2 V and pressure climbs to &gt; 500 mbar.</p>	⇒ 7.1, Vacuum line, Wiring, B28																
7.1		Pressure sensor (B28) Voltage supply		Ignition: <b>ON</b>	4.7 – 5.3 V	N3/10																

Electrical Test Program – Sequential Multiport Fuel Injection System Test


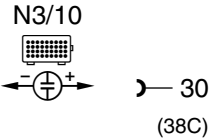
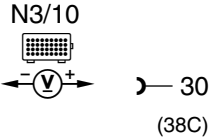
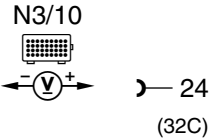
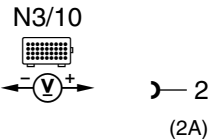
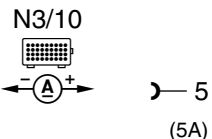
⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
8.0		<p><b>Model 129, 140, 202 FP relay module (K27)</b></p> <p><b>Model 210 Relay module (K40)</b> Activation</p>	 	<p><b>i</b> On Model 202, the activation of the fuel pump takes place via the passenger-side fuse and relay module box (K40/4).</p> <p>Ignition: <b>ON</b></p> <p><b>i</b> The activation of the FP occurs only once after ignition "ON". For the next activation, the engine must have run briefly.</p> <p>Engine: <b>Start</b></p> <p>Ignition: <b>ON</b></p>	<p>11 – 14 V for approx. 1 sec.</p> <p>11 – 14 V, during starting and while engine runs only.</p> <p>0.1 – 0.3 A</p>	<p>Wiring, K27 or K40, N3/10</p>



Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy																						
9.0	P0 115	ECT sensor (B11/4) Voltage		Ignition: <b>ON</b>	<table border="1"> <thead> <tr> <th>°C</th> <th>V</th> </tr> </thead> <tbody> <tr><td>20</td><td>3.4</td></tr> <tr><td>30</td><td>2.9</td></tr> <tr><td>40</td><td>2.4</td></tr> <tr><td>50</td><td>1.9</td></tr> <tr><td>60</td><td>1.5</td></tr> <tr><td>70</td><td>1.2</td></tr> <tr><td>80</td><td>0.9</td></tr> <tr><td>90</td><td>0.7</td></tr> <tr><td>100</td><td>0.5</td></tr> <tr><td></td><td>±5 %</td></tr> </tbody> </table>	°C	V	20	3.4	30	2.9	40	2.4	50	1.9	60	1.5	70	1.2	80	0.9	90	0.7	100	0.5		±5 %	⇒ 9.1, N3/10
°C	V																											
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9.1		Resistance (B11/4)		Ignition: <b>OFF</b> Disconnect connector <b>E</b> on engine control module (N3/10).	<table border="1"> <thead> <tr> <th>°C</th> <th>Ω</th> </tr> </thead> <tbody> <tr><td>20</td><td>3090</td></tr> <tr><td>30</td><td>2000</td></tr> <tr><td>40</td><td>1330</td></tr> <tr><td>50</td><td>900</td></tr> <tr><td>60</td><td>630</td></tr> <tr><td>70</td><td>440</td></tr> <tr><td>80</td><td>320</td></tr> <tr><td>90</td><td>230</td></tr> <tr><td>100</td><td>170</td></tr> <tr><td></td><td>±5 %</td></tr> </tbody> </table>	°C	Ω	20	3090	30	2000	40	1330	50	900	60	630	70	440	80	320	90	230	100	170		±5 %	Wiring, ⇒ 9.2
°C	Ω																											
20	3090																											
30	2000																											
40	1330																											
50	900																											
60	630																											
70	440																											
80	320																											
90	230																											
100	170																											
	±5 %																											
9.2		ECT sensor (B11/4) Resistance		Disconnect connector on ECT sensor (B11/4).	Nominal value, see ⇒ 9.1	B11/4																						


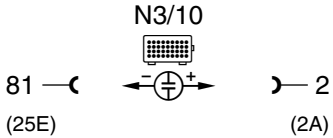
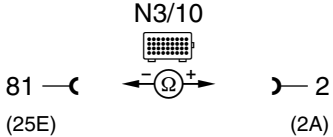
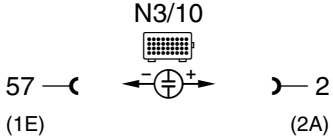
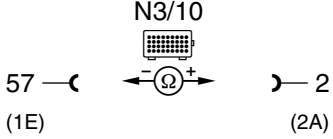
Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
10.0		<b>Engine control module (N3/10)</b> TN-signal output	 <p>8 — (8A)      30 — (38C)</p>	Test with oscilloscope: Engine: <b>Start</b> or Engine: <b>at Idle</b>	Signal, see Figure 2	Wiring, N3/10
			 <p>8 — (8A)      30 — (38C)</p>	Test with multimeter, only if test with oscilloscope is not possible.	7.5 – 9.0 V	
11.0	PO 130 PO 133	<b>O2S 1 (before TWC) (G3/2)</b> O2S signal	 <p>23 — (31C)      24 — (32C)</p>	If ECT > 80 ° C, run engine at idle for at least two minutes.	fluctuates from – 0.2 V to + 1.0 V, by more than 0.3 V	Wiring, ⇒ 12.0, G3/2
12.0	PO 135	<b>O2S 1 (before TWC) (G3/2)</b> O2S heater activation	 <p>5 — (5A)      2 — (2A)</p>	If ECT > 80 ° C, run engine at idle for at least two minutes.	11 – 14 V	Wiring, G3/2 N3/10
		O2S 1 (G3/2) Current draw	 <p>3 — (3A)      5 — (5A)</p>	Ignition: <b>ON</b>	0.6 – 3.4 A	

Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
13.0	PO 136	<b>O2S 2 (after TWC) (G3/1)</b> O2S signal (only USA)		If ECT > 80° C, Engine: <b>Start</b> Raise and hold engine speed at 2000 – 3000 rpm for approx. 2 minutes.  Engine: <b>at idle</b> Bridge sockets on socket box.	Within one minute, the value range of 450 mV to 500 mV must be either exceed or be below value range given.  > 550 mV AIR pump runs. Voltage changes to < 40 mV within 60 seconds.	Wiring, ⇒ 14.0, G3/1, N3/10
14.0	PO 141	<b>O2S 2 (after TWC) (G3/1)</b> O2S heater activation (only USA)  O2S 2 (G3/1) Current draw		Engine: <b>at Idle</b> If ECT > 80° C, run engine at idle for at least 2 minutes.  Ignition: <b>ON</b>	11 – 14 V or voltage fluctuates between 1 – 14 V  0.6 – 3.4 A	Wiring, G3/1, N3/10

Electrical Test Program – Sequential Multiport Fuel Injection System Test


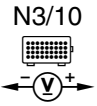
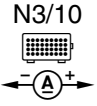
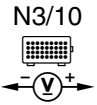

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
15.0	PO 201	<b>Injector (Y62y1)</b> Activation and injection time         Resistance (Y62y1)	  	<b>ECT approx. 20° C</b> at start:  <b>ECT approx. 80° C</b> at idle: accelerate briefly:     Ignition: <b>OFF</b>	Injection time: approx. 8 ms       approx. 3 – 5 ms approx. 14 ms (signal see Figures 3 and 4).   14 – 17 Ω	Wiring, Y62y1, N3/10, ECT sensor (B11/4), IAT sensor in hot film MAF sensor (B2/5), O2S 1 (G3/2).
16.0	PO 202	<b>Injector (Y62y2)</b> Activation and injection time         Resistance (Y62y2)	  	<b>ECT approx. 20° C</b> at start:  <b>ECT approx. 80° C</b> at idle: accelerate briefly:     Ignition: <b>OFF</b>	Injection time: approx. 8 ms       approx. 3 – 5 ms approx. 14 ms (signal see Figures 3 and 4).   14 – 17 Ω	Wiring, Y62y2, N3/10, ECT sensor (B11/4), IAT sensor in hot film MAF sensor (B2/5), O2S 1 (G3/2).

Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
17.0	PO 203	<b>Injector (Y62y3)</b> Activation and injection time        Resistance (Y62y3)	 	<b>ECT approx. 20° C</b> at start:  <b>ECT approx. 80° C</b> at idle: accelerate briefly:    Ignition: <b>OFF</b>	Injection time: approx. 8 ms      approx. 3 – 5 ms approx. 14 ms (signal see Figures 3 and 4).   14 – 17 Ω	Wiring, Y62y3, N3/10, ECT sensor (B11/4), IAT sensor in hot film MAF sensor (B2/5), O2S 1 (G3/2).
18.0	PO 204	<b>Injector (Y62y4)</b> Activation and injection time        Resistance (Y62y4)	 	<b>ECT approx. 20° C</b> at start:  <b>ECT approx. 80° C</b> at idle: accelerate briefl:    Ignition: <b>OFF</b>	Injection time: approx. 8 ms      approx. 3 – 5 ms approx. 14 ms (signal see Figures 3 and 4).   14 – 17 Ω	Wiring, Y62y4, N3/10, ECT sensor (B11/4), IAT sensor in hot film MAF sensor (B2/5), O2S 1 (G3/2).



Electrical Test Program – Sequential Multiport Fuel Injection System Test


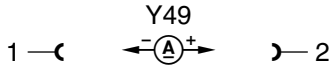

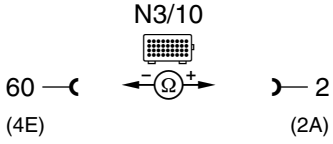
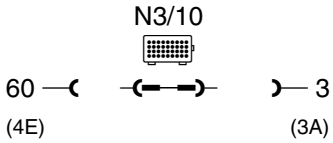
⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
21.0	PI 453	<p><b>Model 129, 140:</b>  <b>AIR relay module (K17),</b>  <b>Model 202: Passenger-side fuse and relay module box (K40/4),</b>  <b>Model 210:</b>  <b>Relay module (K40)</b>                      Activation</p> <p>(K17), (K40), (K40/4)                      Current draw</p>	<p>N3/10  </p> <p>N3/10  </p>	<p>Disconnect ECT sensor (B11/4) connector.                      Simulate 2.5 kΩ resistance at sockets 1 and 2 with resistance substitution unit.                      Engine: <b>at Idle</b></p> <p>Ignition: <b>ON</b></p>	<p>11 – 14 V for approx. two minutes <b>and</b> AIR pump runs.</p> <p>0.1 – 0.3 A</p>	<p>Wiring,                      AIR pump fuse,                      K17, K40 or K40/4,                      N3/10</p>
22.0	PI 420	<p><b>AIR pump switchover valve (Y32)</b>                      Activation</p> <p>Current draw (Y32)</p>	<p>N3/10  </p> <p>N3/10  </p>	<p>Disconnect ECT sensor (B11/4) connector.                      Simulate 2.5 kΩ resistance at sockets 1 and 2 with resistance substitution unit.                      Engine: <b>at Idle</b></p> <p>Ignition: <b>ON</b></p>	<p>11 – 14 V for approx. two minutes <b>and</b> AIR pump runs.</p> <p>0.4 – 0.6 A</p>	<p>Fuse,                      Wiring,                      Y32,                      N3/10</p>

Electrical Test Program – Sequential Multiport Fuel Injection System Test


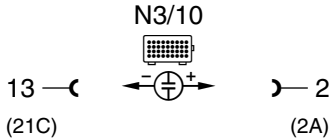
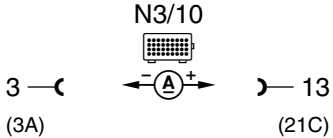
⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
23.0	PO 410	<p><b>AIR system</b> (logic chain)</p> <p> The O2S 1 signal before TWC is being measured.</p>	<p>N3/10</p> <p></p> <p>N3/10</p> <p></p> <p>N3/10</p> <p></p>	<p>If ETC &gt; 80°C run engine at idle for at least 2 minutes.</p> <p>Bridge sockets on socket box</p>	<p>The O2S voltage oscillates in the area of -0.2 V and +1.0 V</p> <p>AIR pump runs. Voltage changes to &lt; 100 mV within 20 seconds.</p>	<p>Y32 binding, AIR combi valve, AIR pump no output.</p>
24.0	PO 802 PI 225	<p><b>Resonance intake manifold switchover valve (Y22/6)</b> Activation</p> <p>Y22/6 Current draw</p>	<p>N3/10</p> <p></p> <p>N3/10</p> <p></p>	<p>Engine: <b>Start</b> Engine speed: &lt; approx. 3500 rpm</p> <p>Engine speed: &gt; approx. 3500 rpm</p> <p>Ignition: <b>ON</b></p>	<p>&lt; 1 V</p> <p>11 – 14 V</p> <p>0.4 – 0.6 A</p>	<p>Wiring, Y22/6, N3/10</p>




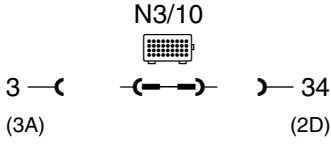
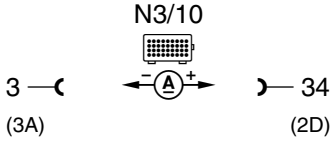
Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
25.0	P1 525	<b>Adjustable camshaft timing solenoid (Y49)</b>  Current draw		 Connect test cable (102 589 04 63 00) to solenoid.  Engine: <b>at idle</b> ECT > 70°C Increase engine speed to approx. 2000 rpm.	1.0 – 1.5 A	⇒ 25.1, ⇒ 26.0, N3/10
25.1		Resistance (Y49)		Ignition: <b>OFF</b>	7 – 12 Ω	Wiring, Y49
26.0	P1 519	<b>Adjustable camshaft timing solenoid (Y49)</b>  Mechanical function		Engine: <b>at Idle</b>  Bridge sockets on socket box for a maximum of 10 seconds.	Engine runs rough or stalls	Check function of camshaft adjuster (see SMS, Engine 104, Job No. 05-2160).





Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
27.0	PO 441 PO 443	<b>Purge control valve (Y58/1)</b> Activation         Current draw (Y58/1)	  	Engine: <b>at Idle</b> and at operating temperature.         Ignition: <b>ON</b>	After approx. 1 minute, purge control valve (Y58/1) must noticeably cycle (Fig. 5 to 7), Signal see (Figure 8).         0.3 – 0.5 A	Wiring, Y58/1, ⇒ 28.0, N3/10
28.0	PO 440 PO 441	<b>Purge control valve (Y58/1)</b> Vacuum control		Connect vacuum tester to purge control valve (Y58/1) between purge line to charcoal canister (Figure 5 to 7).       Engine at operating temperature and at idle.	After approx. 1 minute, > 50 mbar and needle oscillates, Y58/1 must cycle.	Vacuum line, Y58/1


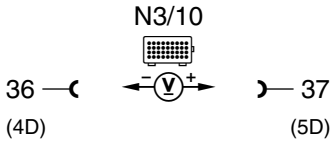
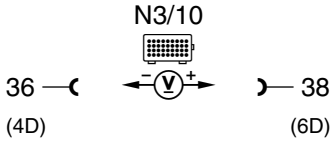
Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
29.0	PO 440 PO 442 PO 446 PO 455	Only (USA) <b>Model 140, 210 only,</b> <b>Model 129 as of 09/97</b> <b>Purge system</b> Leaks  Activated charcoal canister shut-off valve (Y58/4) Activate		Disconnect purge line (A) to charcoal canister on purge control valve (Y58/1). Connect vacuum tester to purge line (Figure 6 and 7).  Ignition: <b>ON</b>  Apply approx. 25 mbar of vacuum.	After approx. 1 minute, < 5 mbar vacuum loss.	Fuel tank cap, Purge line to charcoal canister, Purge line from charcoal canister to Y58/4, Charcoal canister, Y58/4  Charcoal canister, Y58/4, Purge control valve (Y58/1)
30.0	PO 446	Only (USA) <b>Model 140, 210 only,</b> <b>Model 129 as of 09/97</b> <b>Activated charcoal canister shut-off valve (Y58/4)</b> Current draw		Ignition: <b>ON</b>	0.5 – 0.9 A	Fuse, Wiring, Y58/4


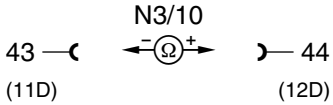
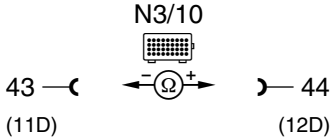
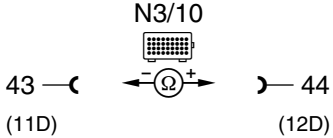
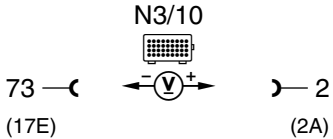
Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
31.0	PO 446 PO 450 PO 455	Only (USA) <b>Model 140, 210</b> <b>Model 129 as of 09/97</b> <b>Fuel tank pressure sensor (B4/3)</b> Sender signal  Activated charcoal canister shut-off valve (Y58/4) activated	<p style="text-align: center;">N3/10 </p> <p>36 —( (4D)   ←(V)+ → (5D) 37</p> <p style="text-align: center;">N3/10 </p> <p>3 —( (3A)   ←(V)+ → (2D) 34</p>	Disconnect purge line (A) to charcoal canister on purge control valve (Y58/1). Connect vacuum tester to purge line (Figure 6 and 7).  Ignition: <b>ON</b>  Apply approx. 25 mbar of vacuum.	> 2.9 V  < 2.3 V	⇒ 31.1, Wiring, Vacuum line, Charcoal canister plugged, B4/3
31.1		Only (USA) Fuel tank pressure sensor (B4/3) Voltage supply	<p style="text-align: center;">N3/10 </p> <p>36 —( (4D)   ←(V)+ → (6D) 38</p>	Ignition: <b>ON</b>	4.7 – 5.3 V	N3/10


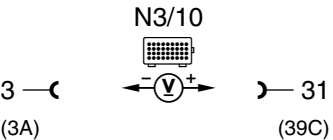
Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
32.0	P0 450	Only (USA) <b>Model 129, 202 up to 08/97</b> <b>Purge monitoring pressure sensor (B4/4)</b> Sender signal		Disconnect purge line (A) to charcoal canister on purge monitoring pressure sensor (B4/4). Connect vacuum tester to purge monitoring pressure sensor (Figure 9 and 10).  Ignition: <b>ON</b>  Apply approx. 300 mbar of vacuum.	> 3.5 V  < 3 V	Wiring, ⇒ 32.1, B4/4
32.1		Purge monitoring pressure sensor (B4/4) Voltage supply		Ignition: <b>ON</b>	4.7 – 5.3 V	N3/10

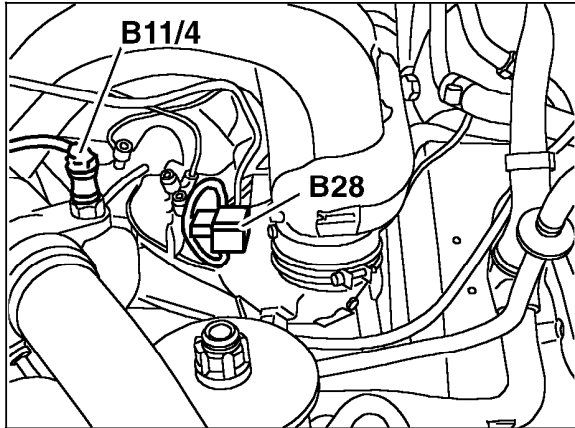
Electrical Test Program – Sequential Multiport Fuel Injection System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
33.0	PD 600 PD 811 PI 570 PI 603 PI 747	<b>CAN data bus</b>		Ignition: <b>OFF</b>	55 – 65 Ω	⇒ 33.1 – 33.2, Data line.
33.1		CAN element in DAS control module (N54/1) Resistance		Ignition: <b>OFF</b> Disconnect connector <b>D</b> from engine control module N3/10, (Figure 11).	115 – 125 Ω	Wiring, N54 or N54/1
33.2		CAN element in engine control module (N3/10) Resistance		Ignition: <b>OFF</b> Disconnect connector <b>D</b> from test cable.	115 – 125 Ω	N3/10
34.0	PI 163	<b>Oil level switch (S43)</b>		Ignition: <b>ON</b>  Oil level okay: Oil level low:	11 – 14 V < 1 V	Wiring, S43

Electrical Test Program – Sequential Multiport Fuel Injection System Test

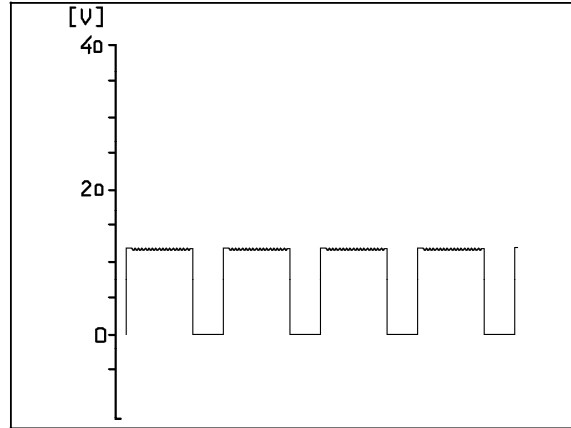
⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
35.0		<b>Diagnosis line</b> Activation	<p style="text-align: center;">N3/10</p> 	Ignition: <b>ON</b>	11 – 14 V	Wiring, N3/10

Electrical Test Program – Sequential Multiport Fuel Injection System Test



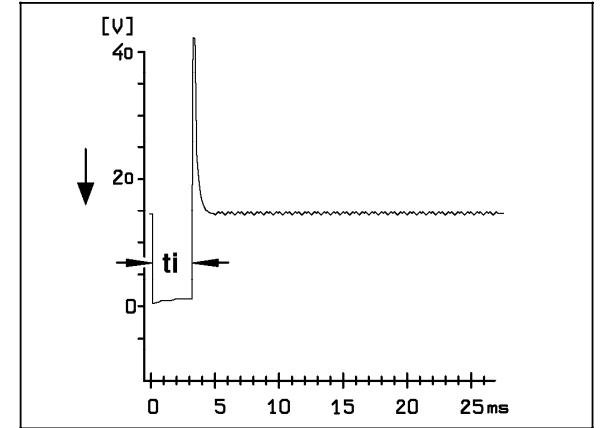
P07.61-0276-13

Figure 1  
B28 Pressure sensor



P07.61-0537-01

Figure 2  
TN signal



P07.61-0538-01

Figure 3  
Injection duration "ti" at CTP



Electrical Test Program – Sequential Multiport Fuel Injection System Test

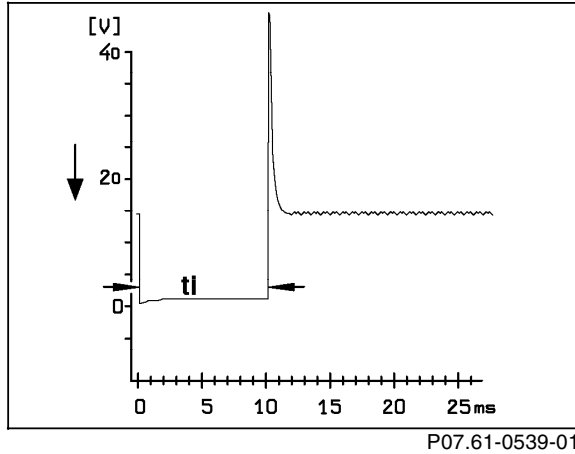


Figure 4  
Injection duration "ti" at WOT

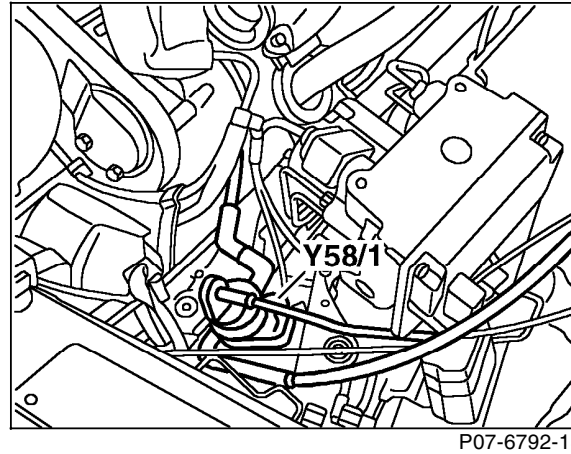


Figure 5  
Model 129  
Y58/1 Purge control valve

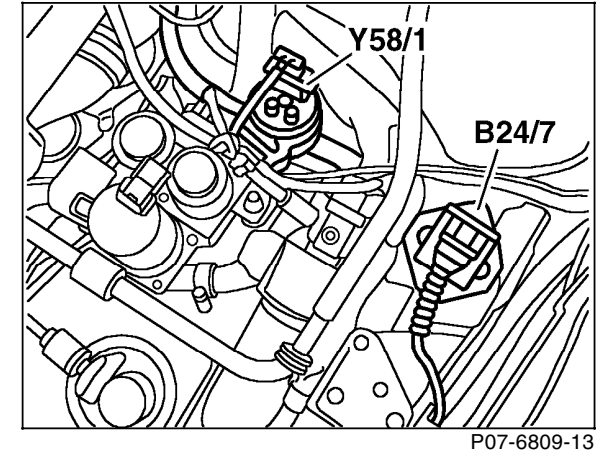
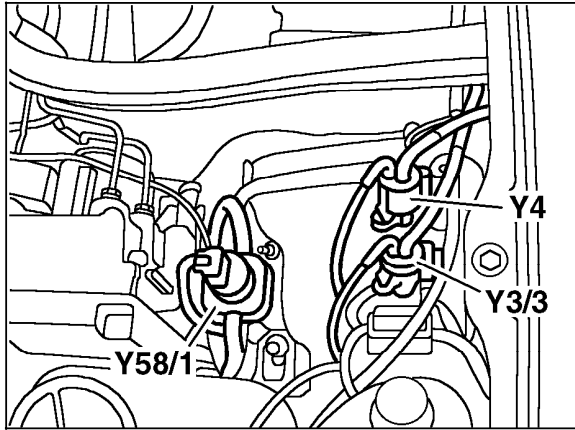
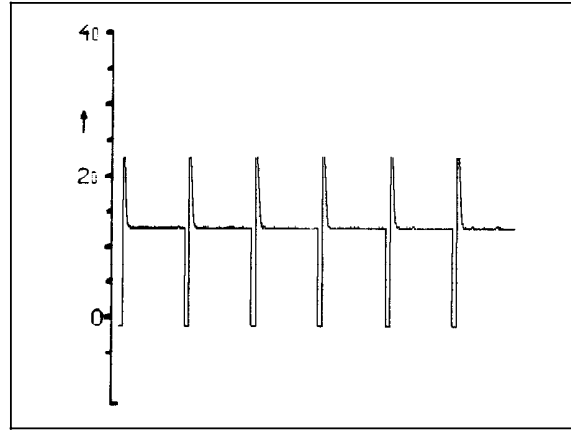


Figure 6  
Model 140  
Y58/1 Purge control valve

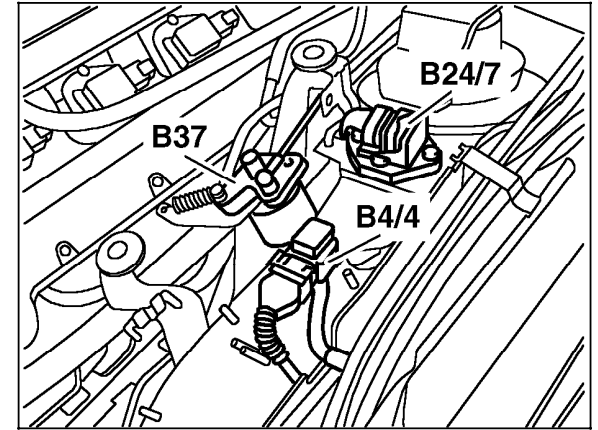
Electrical Test Program – Sequential Multiport Fuel Injection System Test



P07.51-0336-13



P07-5330-13



P07-6791-13

Figure 7  
Model 210

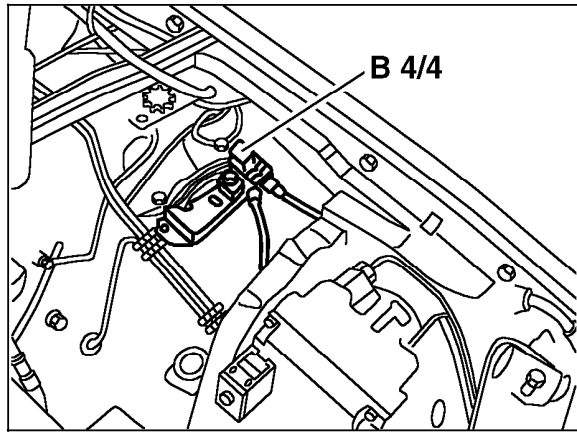
Y58/1 Purge control valve

Figure 8  
Purge control valve signal

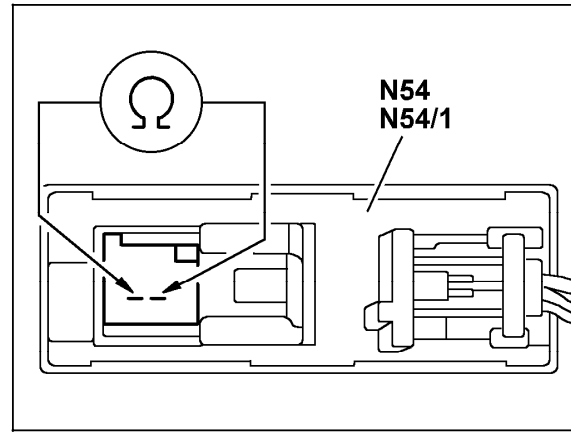
Figure 9  
Model 129 (USA)

B4/4 Fuel tank emissions monitoring pressure sensor

Electrical Test Program – Sequential Multiport Fuel Injection System Test



P07.61-0297-13



P07.51-0426-01

Figure 10  
Model 202 (USA)

B4/4 Fuel tank emissions monitoring pressure sensor

Figure 11  
N54/1 DAS control module

Electrical Test Program – Ignition System Test

**⚠ WARNING!**

Risk of severe injury when touching ignition parts which produce high voltages. Do not touch ignition components.

Persons with heart pacemakers are not to perform repairs on this type of ignition system.

1. Review **WARNING!** on pages 11/1 and 11/2,
2. Review 11, 21, 22, 23, 24, 31, 33,
3. Review section 0,
4. Connect HHT and readout DTC memory, see 11,
5. Ignition: **OFF**
6. Connect test cable with socket box as per "Connection Diagram - Socket Box", see 22/5.

**i**



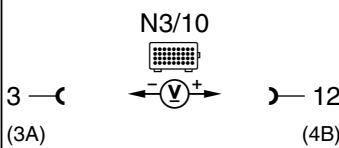
Connector with red marking is not required at this time since the engine control module has presently no function installed for it. When disconnecting the connectors on the engine control module remove center connector (D) first, when reconnecting connectors install center connector (D) last.

**Note regarding “Test Connection” column:**


The numbers indicated in parentheses, for example, ⇒ 1.0 (2A) signify:

2 = Socket 2 on wiring diagram.

A = Connector A on wiring diagram

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0		<b>Engine control module (N3/10)</b> Voltage supply circuit 30		Ignition: <b>ON</b>	11 – 14 V	⇒ 1.1 – 1.2


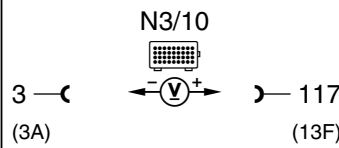
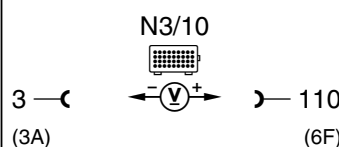
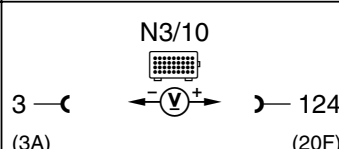
Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.1		Ground wire	<p>N3/10</p> <p>3 — (3A) ← V → 2</p> <p>X11/4</p> <p>7 — (7A) ← V → 2</p> <p>X11/4</p> <p>112 ← V → 2</p> <p>— (8F)</p> <p>X11/4</p> <p>119 ← V → 2</p> <p>— (15F)</p>	Ignition: <b>ON</b>	11 – 14 V	<p>Wiring,  <b>Model 129:</b>                      Ground (W27), module box bracket.  <b>Model 140:</b>                      Output ground (W15), right footwell.  <b>Model 202, 210:</b>                      Output ground (W16/6), right component compartment,</p>
1.2		Voltage supply circuit 30	<p>N3/10</p> <p>X11/4 1 — (4B) ← V → 12</p>	Ignition: <b>ON</b>	11 – 14 V	<p>Wiring,  <b>Model 129, 140:</b>                      Base module (N16/1) or fuse on base module,  <b>Model 202:</b>                      Passenger-side fuse and relay module box (K40/4),  <b>Model 210:</b>                      Relay module (K40).</p>

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
2.0	PO 560	<b>Engine control module (N3/10)</b> Voltage supply circuit 87	<p>N3/10 8 —( 8A)      (V)      —) 2 (2A)</p>	Ignition: <b>ON</b>	11 – 14 V	⇒ 2.1 – 2.2
2.1		Electronics ground	<p>N3/10 8 —( 8A)      (V)      —) 2 (2A) X11/4</p>	Ignition: <b>ON</b>	11 – 14 V	Wiring, <b>Model 129:</b> Ground (W27), module box bracket, <b>Model 140:</b> Output ground (W15), right footwell, <b>Model 202, 210:</b> Output ground (W16/6), right component compartment.
2.2		Voltage supply circuit 87	<p>N3/10 X11/4 1 —( 1A)      (V)      —) 2 (2A)</p>	Ignition: <b>ON</b>  Ignition: <b>OFF</b>	11 – 14 V  < 1 V	Wiring, <b>Model 129, 140:</b> Base module (N16/1) or fuse on base module, <b>Model 202:</b> Passenger-side fuse and relay module box (K40/4), <b>Model 210:</b> Relay module (K40).

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
3.0		<b>Ignition coil (T1/1)</b> Cylinder 2 and 5 Voltage supply		Ignition: <b>ON</b>  Starter: <b>Crank</b>	11 – 14 V  > 10 V	Wiring, Fuses: Model 129, fuse 34, Model 140, fuse 22, Model 202, fuse and relay module box fuse 6, Model 210, fuse 19 Ignition coil (T1/1).
4.0		<b>Ignition coil (T1/2)</b> Cylinder 3 and 4 Voltage supply		Ignition: <b>ON</b>  Starter: <b>Crank</b>	11 – 14 V  > 10 V	Wiring, Fuses: Model 129, fuse 34, Model 140, fuse 22, Model 202, fuse and relay module box fuse 6, Model 210, fuse 19, Ignition coil (T1/2).
5.0		<b>Ignition coil (T1/3)</b> Cylinder 1 and 6 Voltage supply		Ignition: <b>ON</b>  Starter: <b>Crank</b>	11 – 14 V  > 10 V	Wiring, Fuses: Model 129, fuse 34, Model 140, fuse 22, Model 202, fuse and relay module box fuse 6, Model 210, fuse 19, Ignition coil (T1/3).


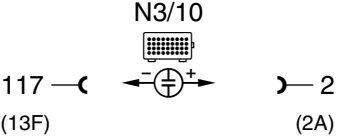
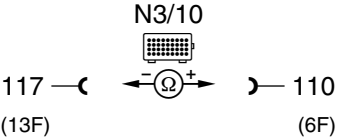
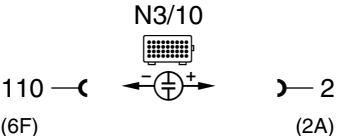




Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
7.0	P0 341	<p><b>Camshaft Hall-effect sensor (B6/1)</b> Hall-effect signal</p> <p>Voltage</p>	<p>N3/10</p> <p>95 —( (39E)      —) 96 (40E)</p> <p>N3/10</p> <p>96 —( (40E)      —) 2 (2A)</p>	<p>Test with oscilloscope. Engine: <b>at Idle</b></p> <p>Test with multimeter only if oscilloscope is unavailable. Engine: <b>at Idle</b></p>	<p>Signal, see Figure 2 and 3.</p> <p>1.2 – 1.7 V Value changes</p>	⇒ 7.1, Wiring, B6/1.
7.1		<p>Camshaft Hall-effect sensor (B6/1) Voltage supply</p>	<p>B6/1</p> <p>1 —(      —) 3</p>	<p>Ignition: <b>ON</b></p> <p>Disconnect connector from Hall-effect sensor (B6/1) and test directly on sockets 1 and 3 of connector.</p>	11 – 14 V	Wiring.




Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
8.0	PO 300 PO 302 PO 305	<b>Primary voltage</b> Ignition coil (T1/1), Cylinders 2 and 5		<b>Test connection Note:</b> Individual primary pattern: Range 400 V Duration 100%  Starter: <b>Crank</b>	200 – 350 V	⇒ 8.1
8.1		Primary winding of T1/1 and T1/2		Ignition: <b>OFF</b>	0.9 – 1.6 Ω The resistance of a single coil at 20°C is approx. 0.6 Ω.	Wiring, T1/1 or T1/2
9.0	PO 300 PO 303 PO 304	<b>Primary voltage</b> Ignition coil (T1/2) Cylinders 3 and 4		<b>Test connection Note:</b> Individual primary pattern: Range 400 V Duration 100%  Starter: <b>Crank</b>	200 – 350 V	⇒ 9.1

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
9.1		Primary winding of T1/2 and T1/1	<p>N3/10</p> <p>110 (6F) ← Ω → 117 (13F)</p>	Ignition: <b>OFF</b>	0.9 – 1.6 Ω The resistance of a single coil at 20°C is approx. 0.6 Ω .	Wiring, T1/2 or T1/1
10.0	<p>PO 300</p> <p>PO 301</p> <p>PO 306</p>	<p><b>Primary voltage</b></p> <p>Ignition coil (T1/3)</p> <p>Cylinders 1 and 6</p>	<p>N3/10</p> <p>124 (20F) ← Ω → 2 (2A)</p>	<p><b>Test connection Note:</b></p> <p>Individual primary pattern:</p> <p>Range 400 V</p> <p>Duration 100%</p> <p>Starter: <b>Crank</b></p>	200 – 350 V	⇒ 10.1
10.1		Primary winding of T1/3 and T1/2	<p>N3/10</p> <p>124 (20F) ← Ω → 110 (6F)</p>	Ignition: <b>OFF</b>	0.9 – 1.6 Ω, The resistance of a single coil at 20°C is approx. 0.6 Ω .	Wiring, T1/3 or T1/2

Electrical Test Program – Ignition System Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
11.0	PD 300 PD 301 PD 302 PD 303 PD 304 PD 305 PD 306	<b>Firing voltage</b> Ignition coil (T1/1) to (T1/3)	Engine analyzer 	<b>Test connection Note:</b> Individual secondary pattern: Range 20 kV Duration 100% Connect kV pick-ups successively to T1/1 through T1/3.  Starter: <b>Crank</b>	8 – 20 kV	⇒ 11.1, Spark plugs, N3/10.
11.1		Secondary winding of T1/1, T1/2 and T1/3	T1/1 T1/2 T1/3 cir. 4a  cir. 4b	Disconnect both ignition cables on T1/1, T1/2 or T1/3	6 – 8.5 kΩ	T1/1, T1/2 or T1/3

Electrical Test Program – Ignition System Test

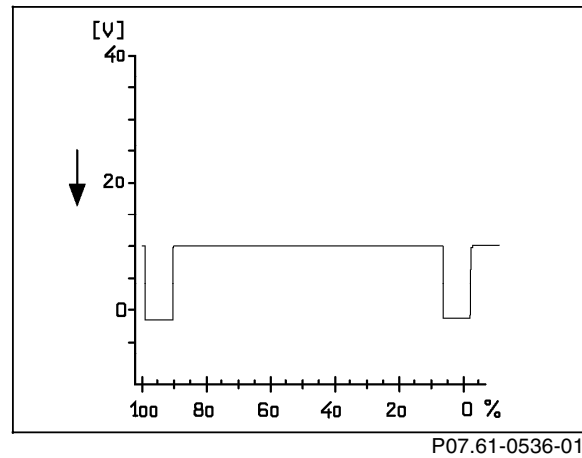
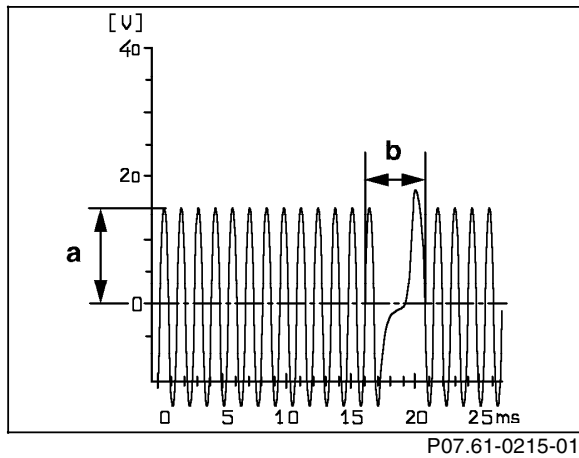


Figure 1  
 CKP sensor (L5) signal, shown at idle  
 b=2 missing teeth for cylinder 1 recognition

Figure 2  
 Camshaft Hall-effect sensor (B6/1) signal

Electrical Test Program – Ignition System Test

Signal survey

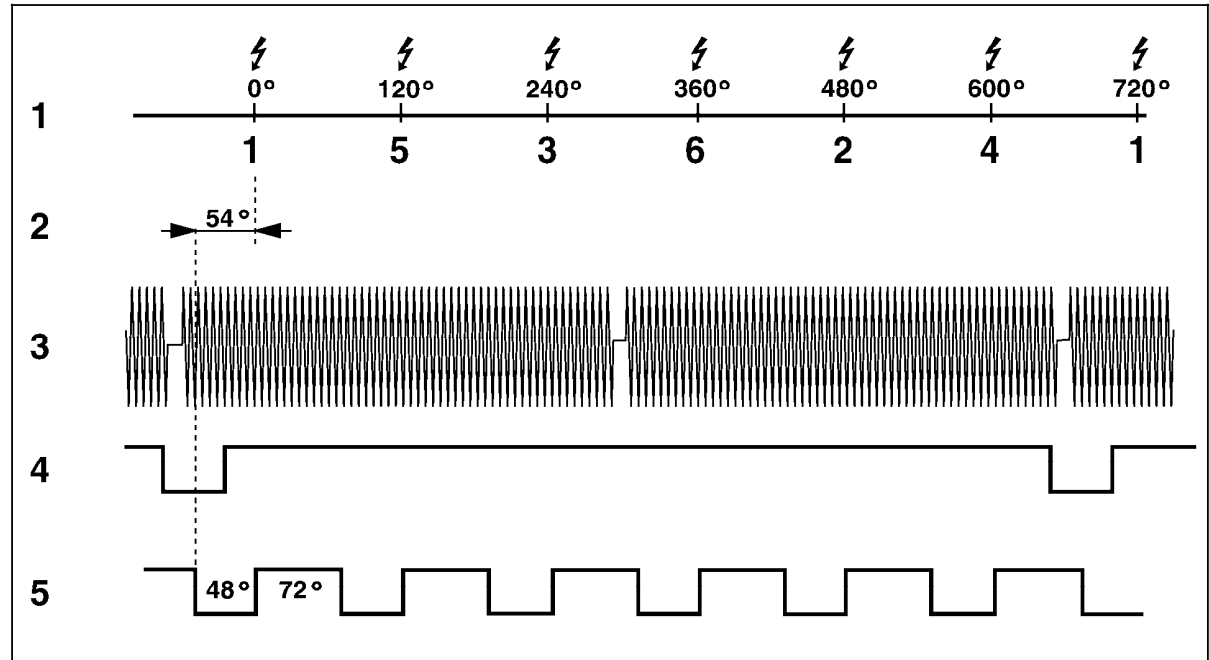


Figure 3

- a Voltage
- b Two missing teeth for identification of cylinder #1
- 1 Crank angle (CKA)
- 2 Cylinder
- 3 CKP sensor (L5) signal
- 4 Camshaft Hall-effect sensor (B6/1) signal
- 5 Engine rpm signal TNA

P07.61-0256-55

Electrical Test Program – Electronic Accelerator (EA) Test

**⚠ WARNING!**

Risk of severe injury when touching ignition parts which produce high voltages. Do not touch ignition components.

Persons with heart pacemakers are not to perform repairs on this type of ignition system.

1. Review **WARNING!** on pages 11/1 and 11/2,
2. Review 11, 21, 22, 23, 24, 31, 33,
3. Review section 0,
4. Connect HHT and readout DTC memory, see 11,
5. Ignition: **OFF**
6. Connect test cable with socket box as per "Connection Diagram - Socket Box", see 22/5.

**i**


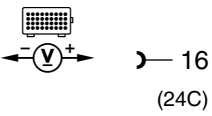
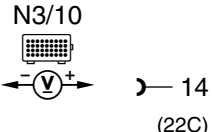
Connector with red marking is not required at this time since the engine control module has presently no function installed for it. When disconnecting the connectors on the engine control module remove center connector (D) first, when reconnecting connectors install center connector (D) last.

**Note regarding “Test Connection” column:**




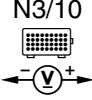
The numbers indicated in parentheses, for example, ⇒ 1.0 (2A) signify:

2 = Socket 2 on wiring diagram.

A = Connector A on wiring diagram


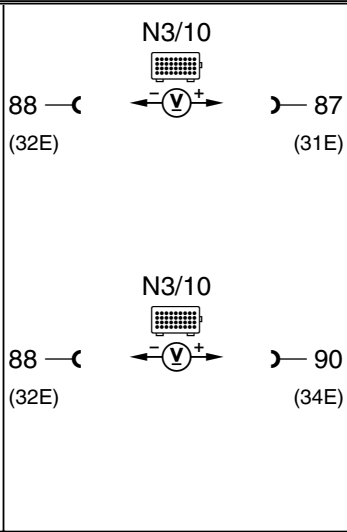
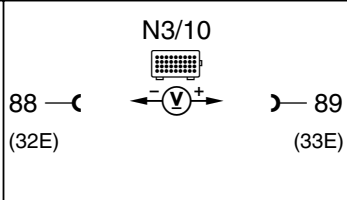
⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
1.0	P1 542 PO 507	<b>Pedal value sensor (B37)</b> Signal Nominal value potentiometer 1	N3/10 	Ignition: <b>ON</b> Accelerator pedal position: CTP WOT with kick-down	0.2 – 0.5 V 4.3 – 4.8 V	⇒ 1.1, Wiring, B37
1.1		<b>Pedal value sensor (B37)</b> Voltage supply	N3/10 	Ignition: <b>ON</b>	4.75 – 5.25 V	Wiring, N3/10

Electrical Test Program – Electronic Accelerator (EA) Test


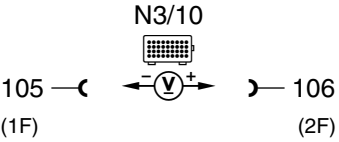
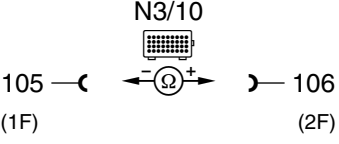
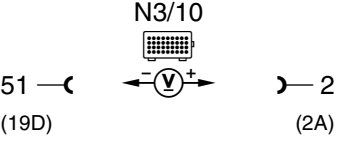
⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
2.0	P1 542 P0 507	<b>Pedal value sensor (B37)</b> Signal 2	N3/10  18 — (26C)      17 — (25C)	Ignition: <b>ON</b> Accelerator pedal position: CTP WOT with kick-down	0.1 – 0.4 V 2.1 – 2.5 V	⇒ 2.1, Wiring, B37
2.1		Voltage supply Nominal value Potentiometer 2   This test step not valid for Pedal value sensor using a hall-type sensor.	N3/10  18 — (26C)      19 — (27C)	Ignition: <b>ON</b>	2.25 – 2.75 V	Wiring, N3/10



Electrical Test Program – Electronic Accelerator (EA) Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
3.0	PD 507 PD 120 PD 186 PI 580	<b>EA/CC/ISC actuator (M16/6)</b> Signal Actual value potentiometer 1   Actual value potentiometer 2		Ignition: <b>ON</b>  Accelerator pedal position: CTP WOT or kick-down   Accelerator pedal position: CTP WOT or kick-down	   4.0 – 4.6 V < CTP value    0.3 – 0.9 V > CTP value	⇒ 3.1, Wiring, M16/6
3.1		Voltage supply Actual value Potentiometers 1 and 2		Ignition: <b>ON</b>	4.75 – 5.25 V	Wiring, N3/10

Electrical Test Program – Electronic Accelerator (EA) Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
4.0	PI 186 PI 580	<b>EA/CC/ISC actuator (M16/6)</b> Activation of actuator motor  Resistance of actuator motor	<p>N3/10</p>  <p>105 —( 1F) ← —(V)→ —( 106 (2F)</p> <p>N3/10</p>  <p>105 —( 1F) ← —(Ω)→ —( 106 (2F)</p>	<p>Ignition: <b>ON</b></p> <p>Engine: <b>at Idle</b> ECT &gt; 70 °C</p> <p>Ignition: <b>OFF</b></p>	<p>0.8 – 2.3 V</p> <p>1.0 – 2.5 V</p> <p>Value oscillates.</p> <p>&lt; 10 Ω</p>	<p>Wiring, M16/6, N3/10</p>
5.0		<b>P/N recognition</b> <b>Model 202 with</b> <b>A-Transmission</b>	<p>N3/10</p>  <p>51 —( 19D) ← —(V)→ —( 2 (2A)</p>	<p>Ignition: <b>ON</b></p> <p>Selector lever position: P/N</p> <p>R, D, 4, 3, 2, 1</p>	<p>11 – 14 V</p> <p>&lt; 2.0 V</p>	<p>Wiring, See in WIS: AD27.19-P-1000AZ and AD27.19-P-3000AB</p>

### Electrical Test Program – Cruise Control (CC) Test

 **WARNING!**

Risk of severe injury when touching ignition parts which produce high voltages. Do not touch ignition components.

Persons with heart pacemakers are not to perform repairs on this type of ignition system.

1. Review **WARNING!** on pages 11/1 and 11/2,
2. Review 11, 21, 22, 23, 24, 31, 33,
3. Review section 0,
4. Connect HHT and readout DTC memory, see 11,
5. Ignition: **OFF**
6. Connect test cable with socket box as per "Connection Diagram - Socket Box", see 22/5.



Connector with red marking is not required at this time since the engine control module has presently no function installed for it. When disconnecting the connectors on the engine control module remove center connector (D) first, when reconnecting connectors install center connector (D) last.

**Note regarding “Test Connection” column:**

The numbers indicated in parentheses, for example, ⇒ 1.0 (2A) signify:

2 = Socket 2 on wiring diagram.

A = Connector A on wiring diagram

Electrical Test Program – Cruise Control (CC) Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0	PO 565	<b>CC switch (S40)</b>				
		<b>V</b> Decelerate/set		Ignition: <b>ON</b> CC switch not activated. Decelerate activated.	< 1 V 11 – 14 V	Wiring, S40
		<b>SP</b> Memory recall		Memory activated.	11 – 14 V	
		<b>B</b> Accelerate/set		Accelerate activated.	11 – 14 V	



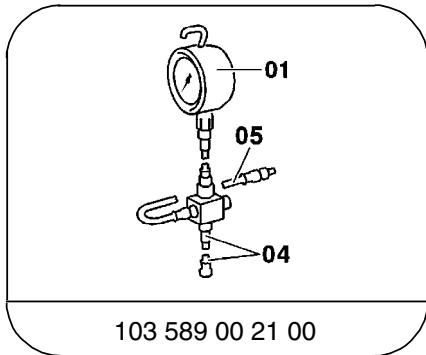
Hydraulic Test Program – Preparation for Test (Fuel System Pressure and Internal Leakage Test)

Operation No. of Text description and Time Allowance ..... 07-1402

**Preparation for Test**

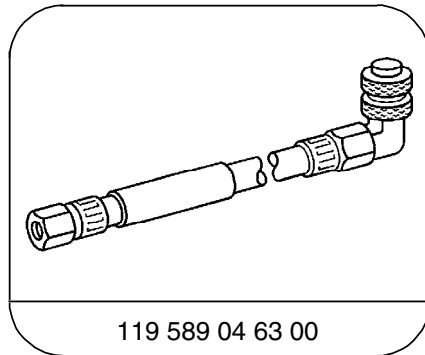
1. Review **WARNING!** on pages 11/1 and 11/2,
2. Review 11, 21, 22, 23, 24, 31, 33,
3. Review section 0,
4. Connect pressure gauge to test connection (see Figure 1),
5. After completing test, using measurement glass (055), release fuel pressure and allow residual fuel to drain into glass (see Figure 1).

**Special Tools**



103 589 00 21 00

Tester



119 589 04 63 00

Pressure hose

Hydraulic Test Program – Preparation for Test (Fuel System Pressure and Internal Leakage Test)

Connection Diagram

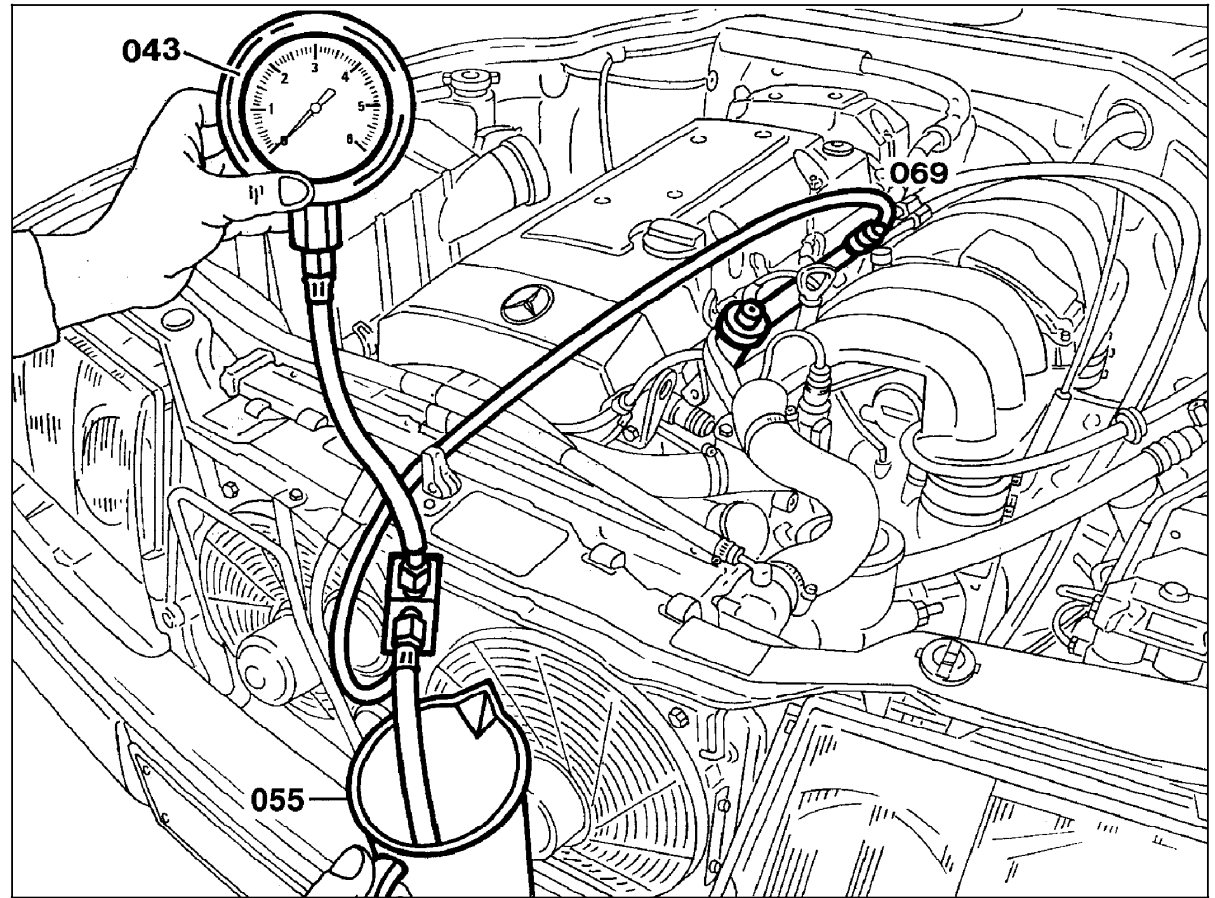



Figure 1

- 043 Pressure gauge, part no. 103 589 00 21 00
- 055 Measuring glass
- 069 Pressure hose, part no. 119 589 04 63 00

P07.61-0578-06

Hydraulic Test Program – Test (Fuel System Pressure and Internal Leakage Test)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy <sup>1)</sup>
1.0		<b>Fuel pressure at idle (with vacuum)</b>	Pressure gauge connected to test connection.	Engine: <b>at Idle</b> Valve on pressure gauge closed.	3.2 – 3.6 bar	Check fuel pumps 34, Diaphragm pressure regulator.
2.0		<b>Fuel pressure at idle (without vacuum)</b>	Pressure gauge connected to test connection.	Engine: <b>at Idle</b> Disconnect vacuum hose from diaphragm pressure regulator.	3.7 – 4.2 bar	Diaphragm pressure regulator.
3.0		<b>Fuel system leakage</b>	Pressure gauge connected to test connection.	Engine: <b>OFF</b>  After 30 minutes:	> 3.0 bar  > 2.5 bar	If the pressure drops quickly: replace check valve in fuel pumps.  If the pressure drops slowly, check injectors 36, Replace diaphragm pressure regulator or O-rings on diaphragm pressure regulator.

<sup>1)</sup> Observe Preparation for Test, see 31.



Hydraulic Test Program – Preparation for Test (Fuel Pump Test)

Connection Diagram – Delivery Test

1. Review **WARNING!** on pages 11/1 and 11/2,
2. Review section O,
3. Review 11, 21, 22, 23, 24, 31, 33,
4. Connect socket box tester to engine control module (N3/10).

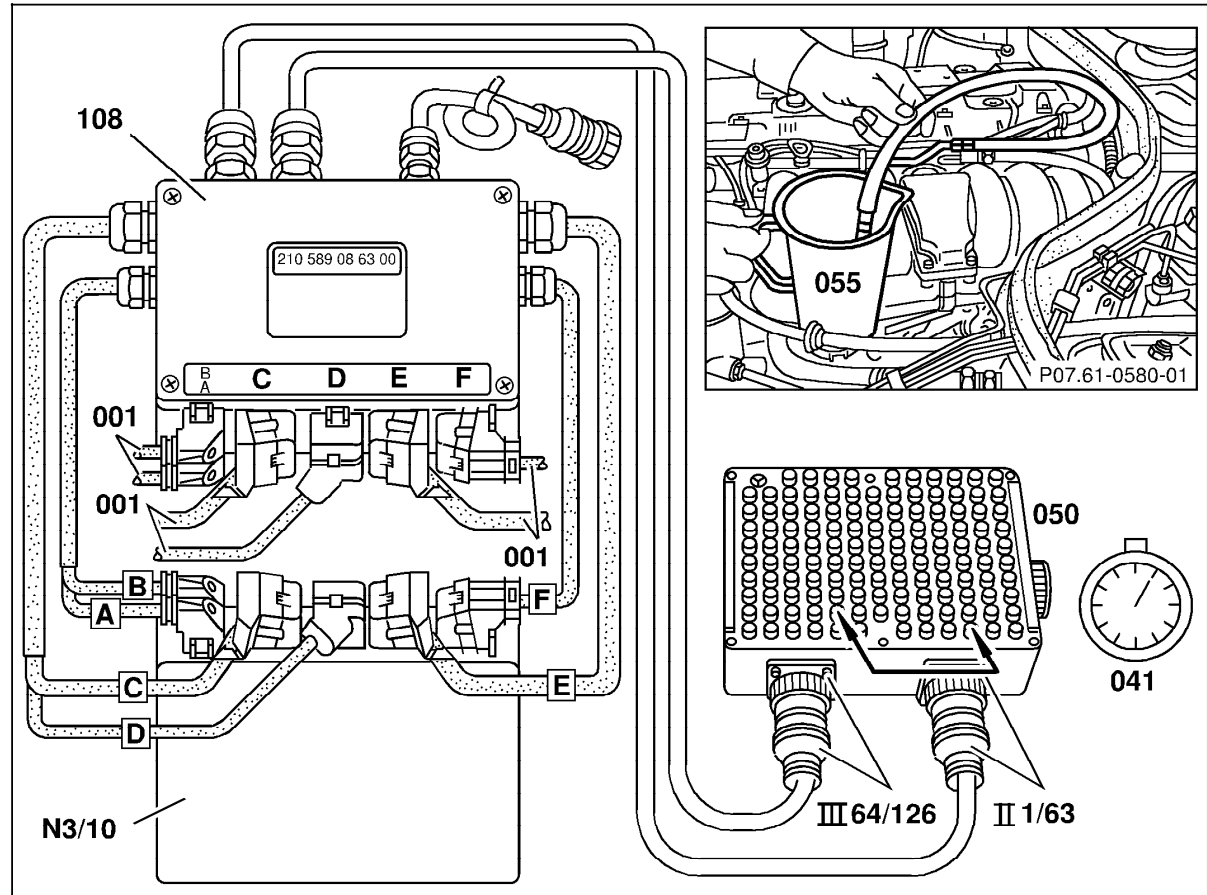


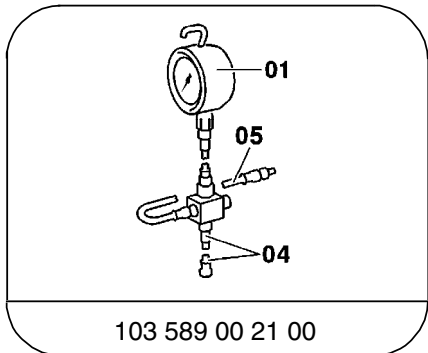
Figure 1

- 001 Engine control module connectors A–F
- 041 Stop watch
- 050 Socket box tester, 126 pole
- 055 Measuring glass
- 108 Test cable
- N3/10 Engine control module (ME-SFI)
- A-F Connectors
- III 64/126 and II 1/63:  
Connector description on socket box and test cable

P07.61-0268-06

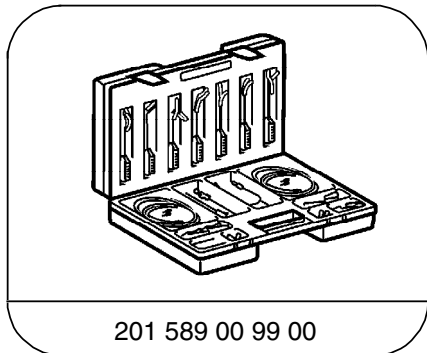
Hydraulic Test Program – Preparation for Test (Fuel Pump Test)

Special Tools



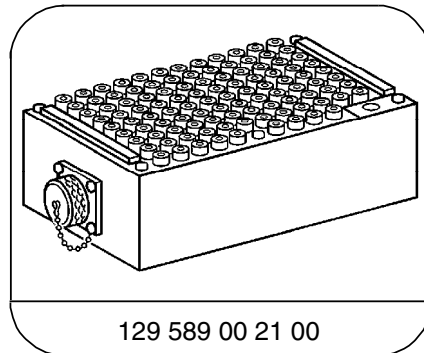
103 589 00 21 00

Tester



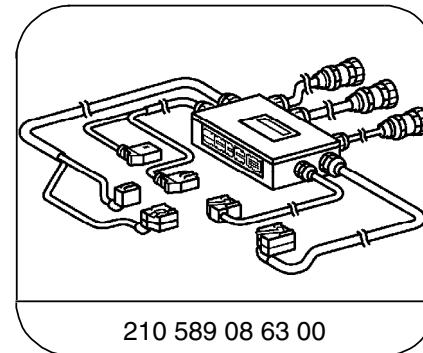
201 589 00 99 00

Electrical connecting set



129 589 00 21 00

126-pin socket box



210 589 08 63 00

145-pin test cable

Test equipment; See MBUSA Standard Service Equipment Program

Description	Brand, model, etc.
Digital multimeter	Fluke models 23, 77 III, 83, 85, 87
Stop watch	Local purchase
Measuring glass (1 liter minimum)	Local purchase

Multimeter Connection Diagram  
Model 140 shown

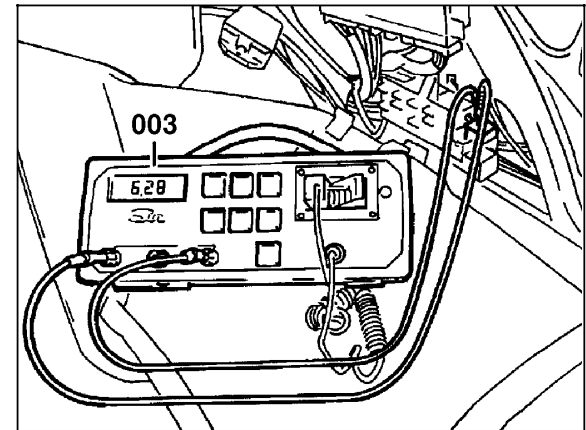


Figure 1




003 Multimeter

P07.61-0579-01

Hydraulic Test Program – Test (Fuel Pump Test)

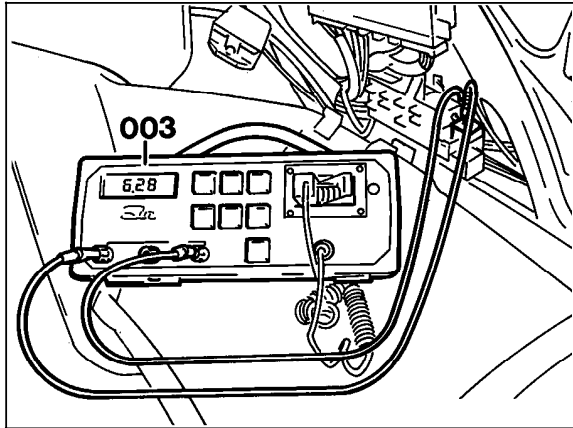
Preparation for Test:

1. Review **WARNING!** on pages 11/1 and 11/2,
2. Review 11, 21, 22, 23, 24, 31, 33,
3. Review section 0,
4. Connect socket box to engine control module (N3/10).

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy <sup>1)</sup>
1.0		<b>Fuel pump</b> Delivery capacity	N3/10  3 (3A) ← → 21 (29C)	Disconnect fuel return hose from fuel line and place end in measuring glass. Ignition: <b>ON</b>	1 liter of fuel within 35 seconds maximum.	Check fuel lines for restrictions (kinks and dents), Replace fuel filter, 34, ⇒ 2.0
1.1		<b>Fuel pumps</b> Current draw		On Models 129, 140 and 202: disconnect fuel pump relay module and connect multimeter to sockets 1 and 3 (Figure 1). On Model 210: disconnect connector B from FP relay module (K27) and connect multimeter to sockets 1 and 3. Ignition: <b>ON</b>	5 – 9 A	Fuel pump

<sup>1)</sup> Observe Preparation for Test, see 31.

Hydraulic Test Program – Test (Fuel Pump Test)



P07-2644-13

Figure 1  
Model 140 shown  
003 Multimeter

Hydraulic Test Program – Preparation for Test (Injector Test)

Preparation for Test

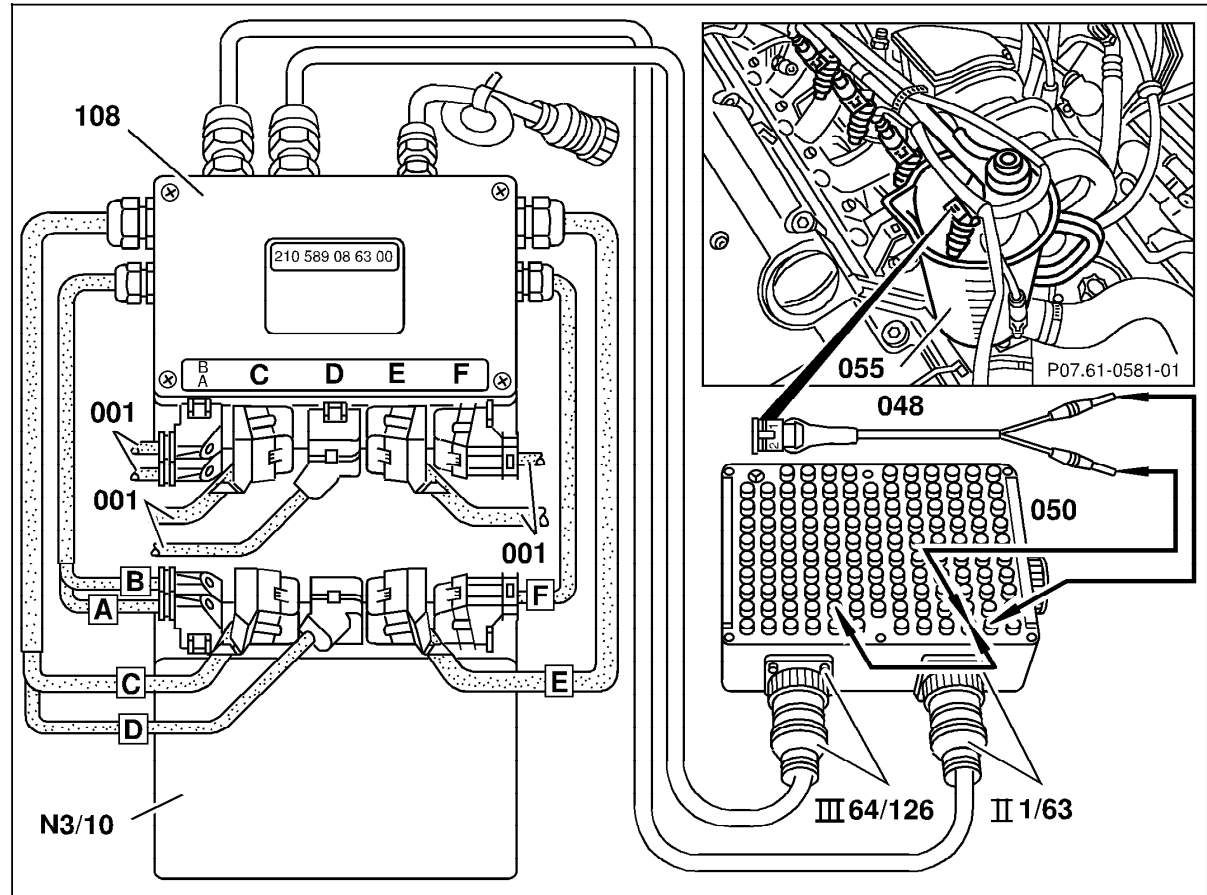
1. Review **WARNING!** on pages 11/1 and 11/2,
2. Review section 0,
2. Review 11,
3. Review WS58.50-P-0761-01A and fabricate test harness (048) (Figure 1), also see 35/2.
4. Connect socket box tester to engine control module (N3/10).
5. Disconnect 2-pole connectors on injectors.
6. Remove fuel rail with injectors, thereby **not** disconnecting the fuel feed and return lines.
7. Connect self-made harness (048) to each injector one after another.
8. Hold each injector in measuring glass one after another.

Note:

When disconnecting the connectors on the engine control module remove center connector (D) first, when reconnecting connectors install center connector (D) last.

Figure 1

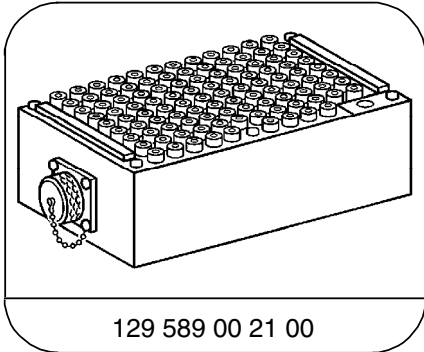
- 001 Engine control module connectors
- 048 Self made harness
- 050 Socket box tester, 126 pole
- 055 Measuring glass
- 108 Test cable
- N3/10 Engine control module (ME-SFI)
- A-F Connectors
- III64/126 and II1/63: Connector description on socket box and test cables



P07.61-0269-06

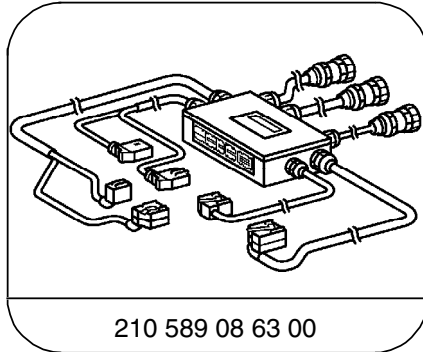
Hydraulic Test Program – Preparation for Test (Injector Test)

Special Tools



129 589 00 21 00

126-pin socket box



210 589 08 63 00

145-pin test cable

Test equipment; See MBUSA Standard Service Equipment Program

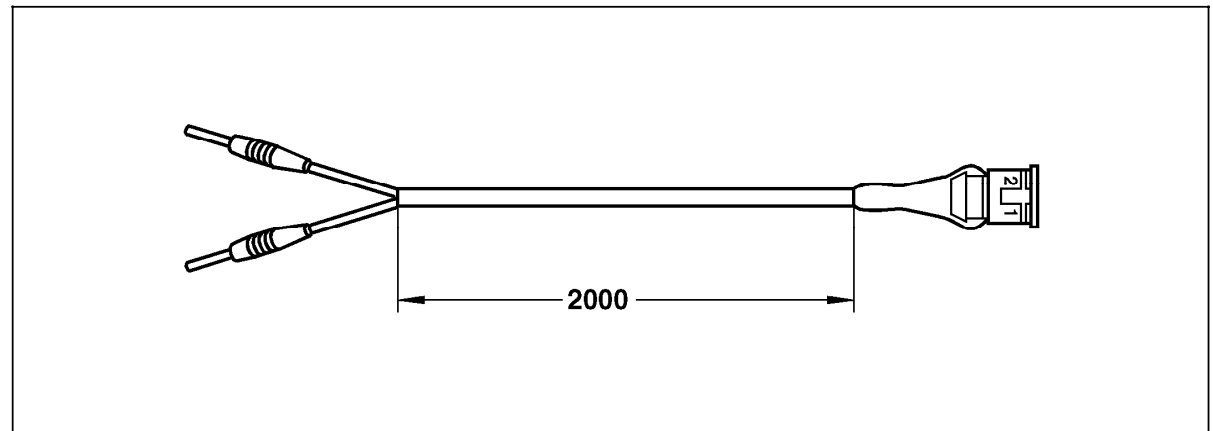
Description	Brand, model, etc.
Digital multimeter	Fluke models 23, 77 III, 83, 85, 87
Measuring glass (1 liter minimum)	Local purchase

Hydraulic Test Program – Preparation for Test (Injector Test)

Self made harness

Consists of:

- 1x Connector (140 545 35 28)
- 2x Contact spring (004 545 56 26)
- 1x Banana plug (red)
- 1x Banana plug (black)
- 2.2m Wire (red, 1.5 mm)
- 2.2m Wire (brown, 1.5 mm)
- 2.2m Harness tubing (6mm diameter)






Connector layout  
 1=red  
 2=brown

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Hydraulic Test Program – Test (Injector Test)

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0		<b>Injectors</b> Leakage test	N3/10  3 (3A) —(—) 21 (29C)	Fuel rail and fuel injectors removed. Ignition: <b>ON</b>	Injectors must not drip.	Replace dripping injectors, ⇒ 2.0
2.0		<b>Injectors</b> Operation and spray pattern test	N3/10  3 (3A) —(—) 21 (29C)	Ignition: <b>ON</b> Hold each injector (one after another) into a container and, using the self-made test harness, manually activate the injector by connecting harness banana plugs to socket box sockets 3 (–) and 2 (+).	Injectors must spray evenly (Figure 1).	Replace defective injectors.

Hydraulic Test Program – Test (Injector Test)

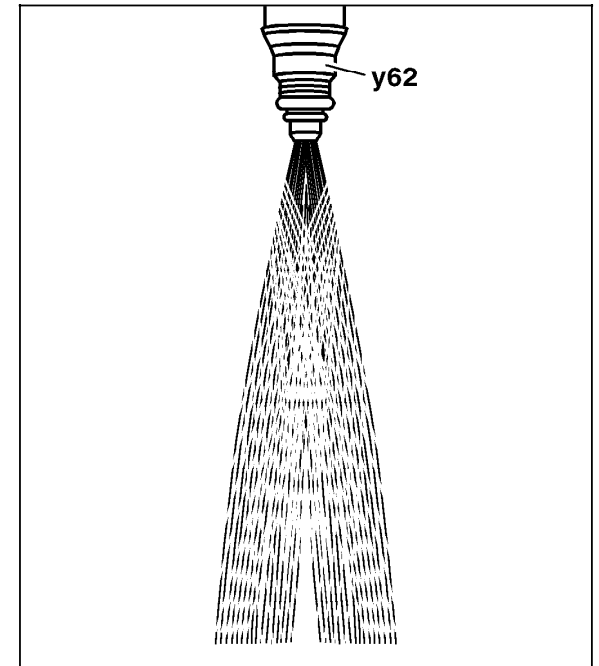


Figure 1

Y62 Injector  
Good spray pattern

P07.61-0542-02