

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.

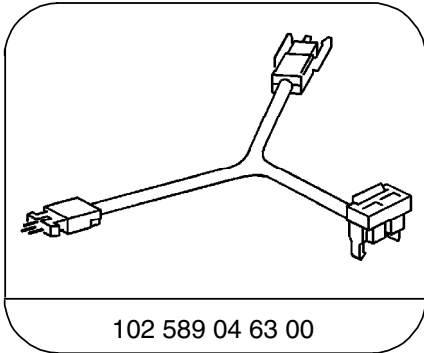
Note regarding “Test Connection” column:

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

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

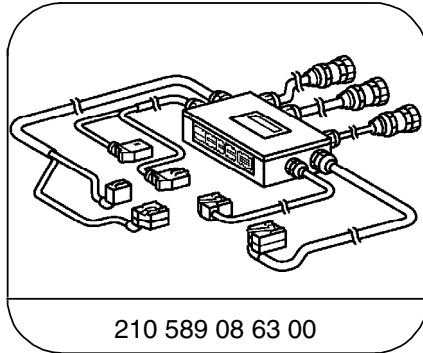
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Special Tools



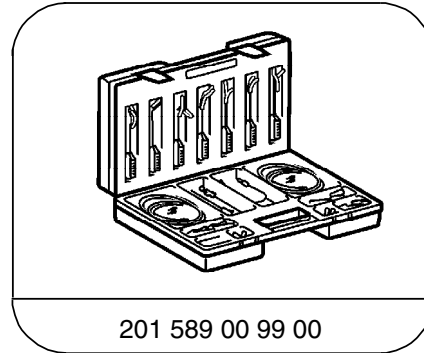
102 589 04 63 00

Test cable



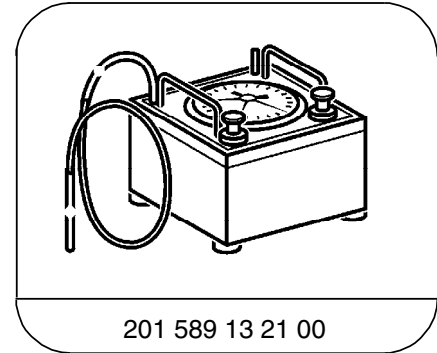
210 589 08 63 00

145-pin test cable



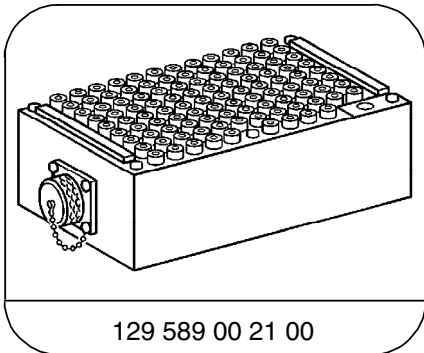
201 589 00 99 00

Electrical connecting set



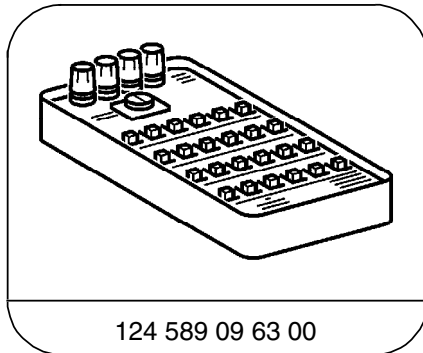
201 589 13 21 00

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

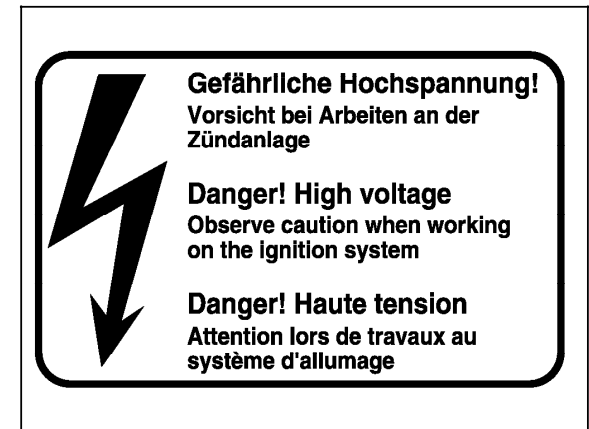
Description	Brand, model, etc.
Digital multimeter	Fluke models 23, 77 III, 83, 85, 87
Engine analyzer	Bear DACE Hermann Electronic

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.



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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

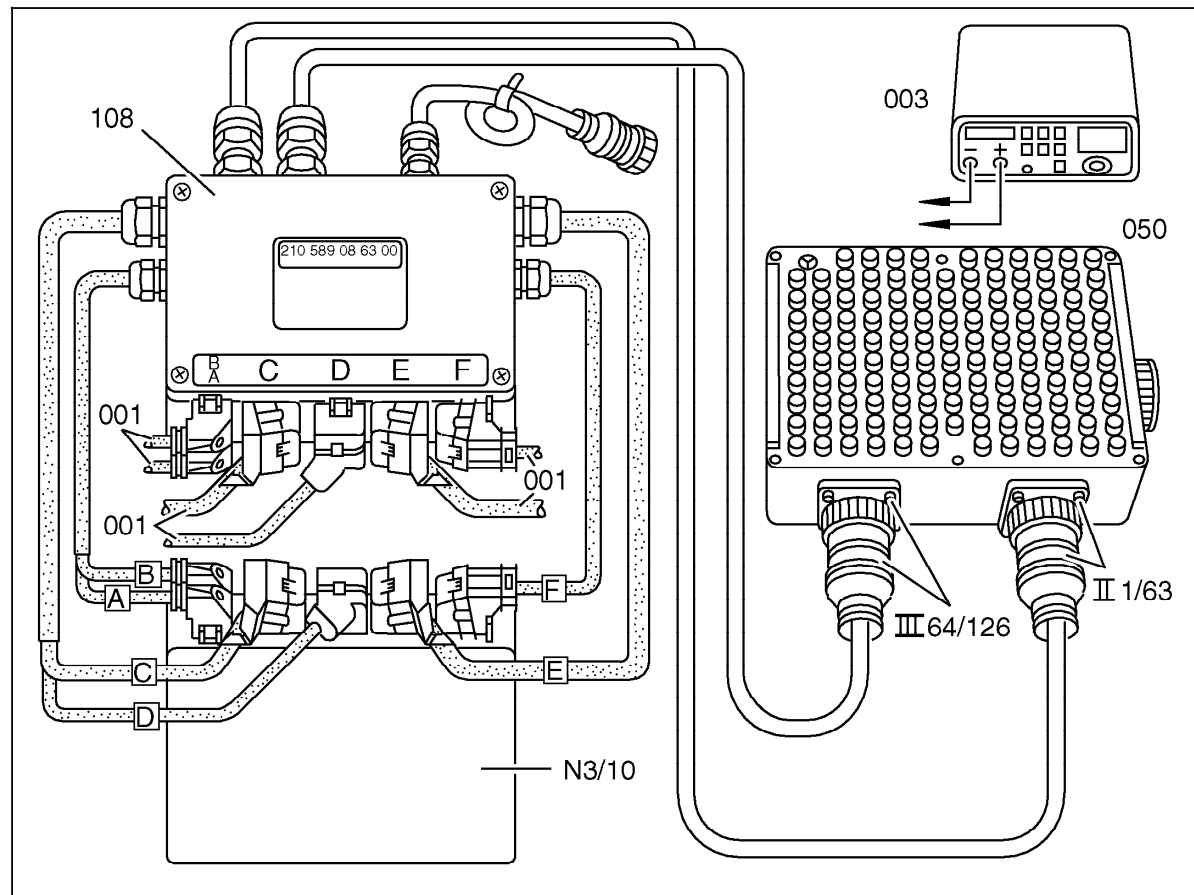
Note:
When disconnecting the connectors on the engine control module remove center connector (D) first, when reconnecting connectors install center connector (D) last.



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

Figure 1

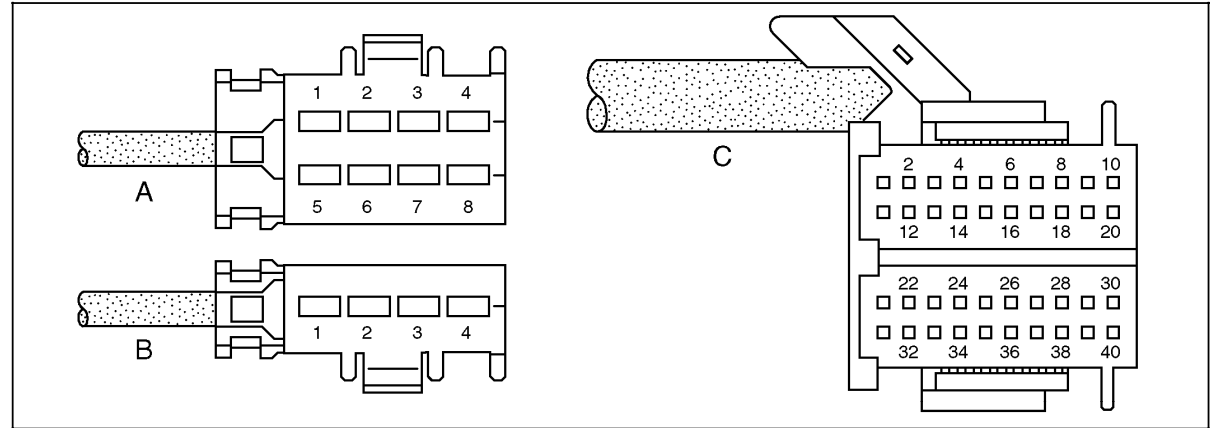
- 001 Engine control module connectors
- 003 Digital multimeter
- 050 Socket box (126-pole)
- 108 Test cable
- N3/10 Engine control module (ME-SFI)
- A-F Connectors
- III 64/126 and II 1/63: Connector description on socket box and test cable



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Electrical Test Program – Preparation for Test

Connector Layout - Engine Control Module



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Figure 2

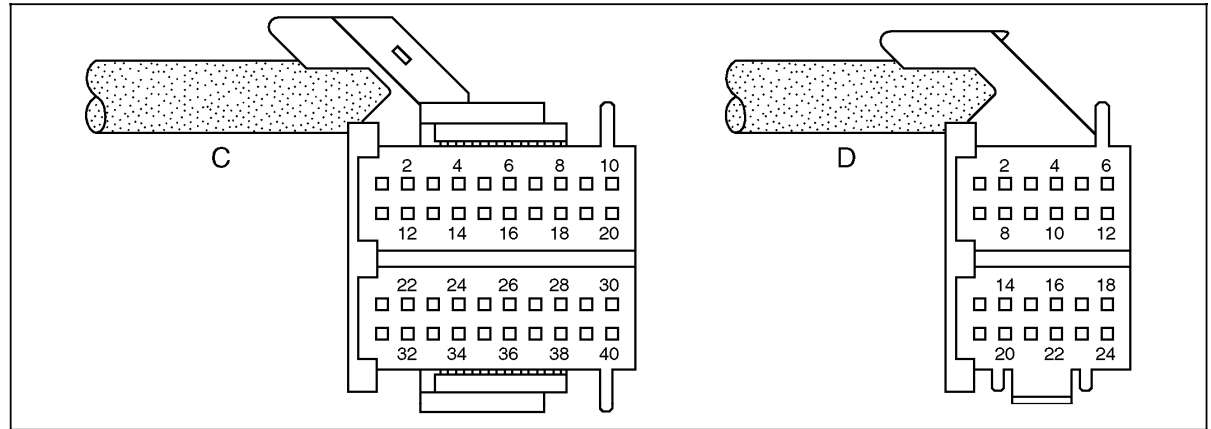
- 1A –
- 2A Voltage supply (circuit 87), Model 129/140 base module, Model 202 fuse and relay module box, Model 210 relay module
- 3A Ground, Model 129 module box bracket W27, Model 140 output ground right footwell W15, Model 202/210 right component compartment W16/6
- 4A –
- 5A O2S 1 heater (before TWC)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



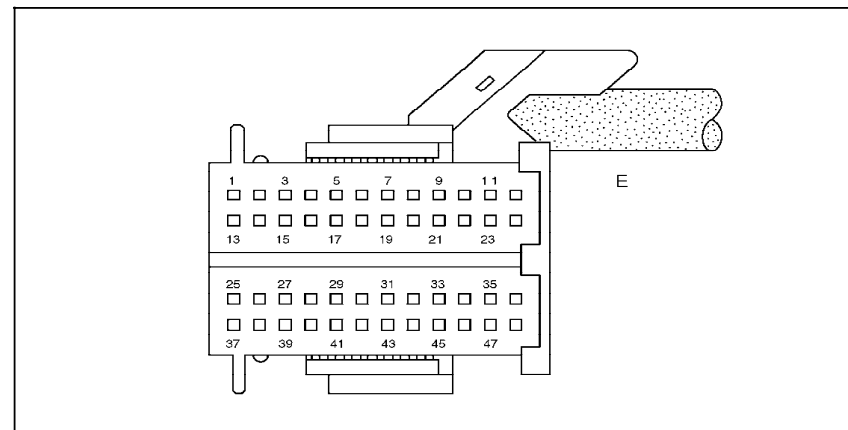
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Figure 3

28C	AIR relay module (only USA)	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 USA)	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 USA)	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)	1D	(only Model 140/210) (model 129 as of 09/97)		
40C	Signal (circuit 50)	2D	(only USA)		
1D	–	3D	O2S 2 ground (after TWC) (only USA)		
2D	Activated charcoal canister shut-off valve	4D	O2S 2 signal (after TWC) (only USA)		
	(only Model 140/210) (model 129 as of 09/97)	5D – 10D	–		
	(only USA)	11D	CAN data bus "H"		
3D	Starter relay (only Model 202)	12D	CAN data bus "L"		
		13D – 18D	–		

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Connector Layout - Engine Control Module



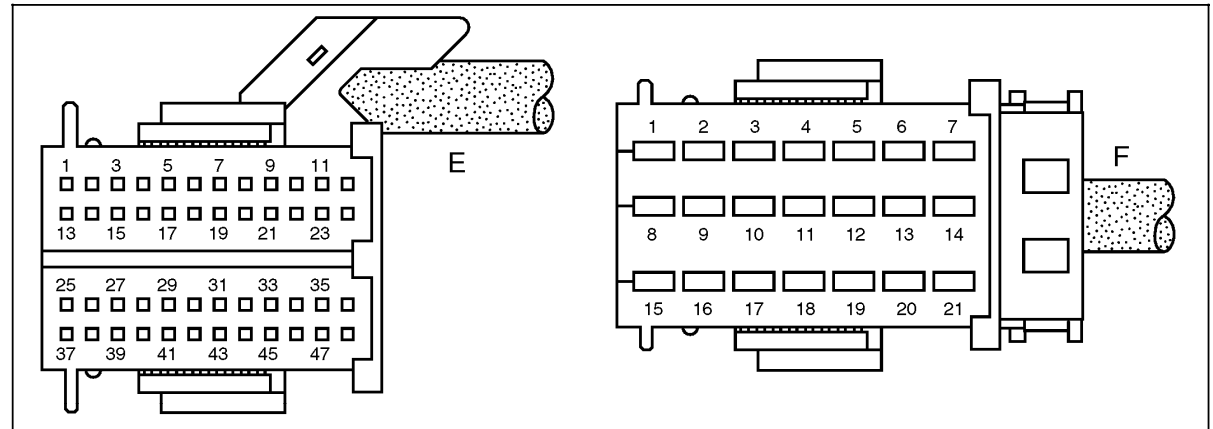
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Figure 4

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)		

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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	–