

### Electrical Test Program - Preparation for Test

Preliminary work: ..... Engine Test, Adjustment, Engines, Volume 1 B.

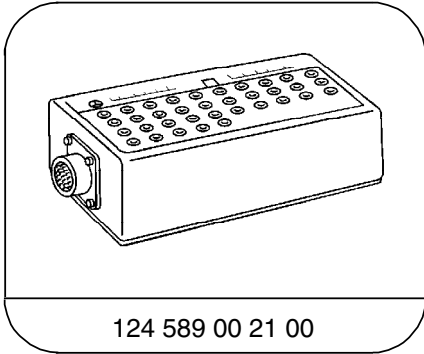
1. Ignition: **OFF**
2. Connect socket box to ignition control module (N1/3) with test cable set according to connection diagram.

**Electric wiring diagrams, see Electrical Troubleshooting Manual.**

## 5.1 Distributor Ignition System (DI)

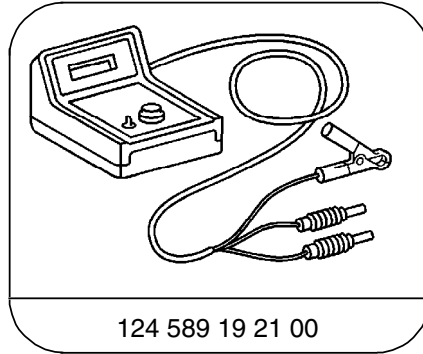
Engines 104, 119 CFI

### Electrical Test Program - Preparation for Test



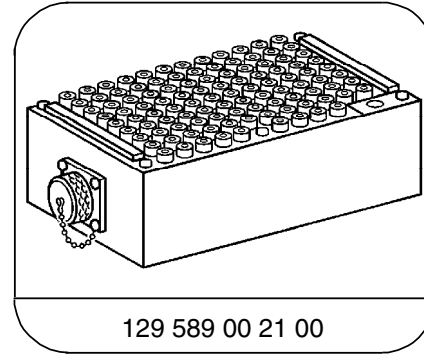
124 589 00 21 00

35-pin socket box



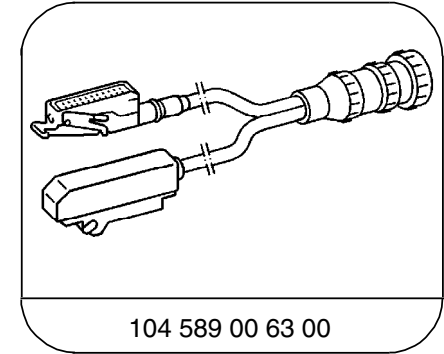
124 589 19 21 00

Pulse counter



129 589 00 21 00

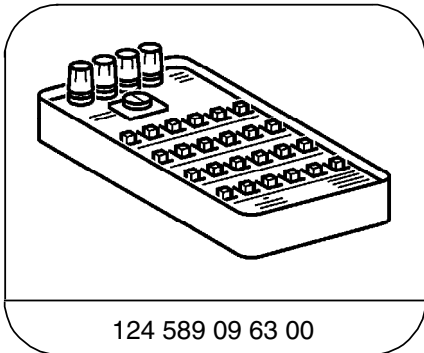
126-pin socket box



104 589 00 63 00

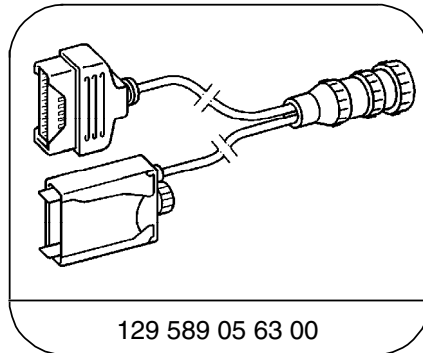
Test cable

### Special Tools



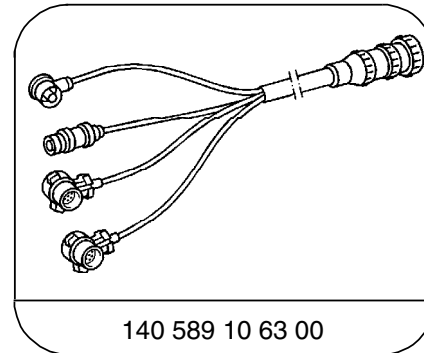
124 589 09 63 00

Ohm decade



129 589 05 63 00

22-pin test cable



140 589 10 63 00

Test cable

## 5.1 Distributor Ignition System (DI)

Engines 104, 119 CFI

### Equipment

Digital multimeter <sup>1)</sup>	Sun DMM-5 Fluke model 23 with 80i-410 current probe
Engine analyzer <sup>1)</sup>	Bear DACE (Model 40-960) Sun EMT-1019/Master 3 Sun MCM-2110 Sun MEA-1500MB
Diagnostic interface adaptor unit <sup>1)</sup>	SUN, Bear

<sup>1)</sup> Available through the MBUSA Standard Equipment Program.

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#### Safety Precautions

The increased demands on the ignition systems of modern engines and the desire for maintenance-free operation have led to the introduction of electronic ignition systems.

As a rule, the sparking power of an electronic system is higher than a conventional system; additional increases in performance are characteristic of this type of system.

**DANGER!** Contact with high-voltage components or connectors can be fatal.

#### **WARNING!**

Therefore, when working on the distributor ignition system (DI), the following safety precautions must be observed:

- Before performing work that requires cranking the engine (e. g. compression test) turn off ignition and disconnect connector 2 on the ignition control module (N1/3) or connect safety plug, part no. 102 589 02 21 00 to diagnostic connector.
- Persons with pacemakers should not work on this type of ignition system.
- At cranking or idle speed, do not touch or disconnect any components of the ignition system.
- Perform installation work on the ignition system or ignition wires only when the engine/ignition is turned off (as well as connecting/disconnecting sensors only with the ignition switched off).
- No exposed metal connectors or sending units may be installed in the ignition wires (e.g. ignition wire, cylinder 1).

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#### Note:

- The sequence and respective values for test conditions of the “Ignition Timing Test” and “Diagnostic Trouble Code (DTC) Readout” must be observed.
- Within a test step, if, for example, the value for point 1 is ok, then proceed to point 2. If the value is not ok, you must then proceed to point 1.1.

#### A. Ignition Timing Test

1. Engine at operating temperature (70 – 90 °C). To avoid a false reading, simulate 320 Ω (80 °C engine coolant temperature) with the resistance substitution unit. (Simulate at both sets of sockets of connector for engine coolant temperature sensor B11/2 to prevent CFI control module from reading a temperature deviation and storing this as a malfunction).
2. Run engine for at least 8 seconds at 3100 – 3600 rpm with vacuum line connected.
3. Disconnect vacuum line with engine at idle.
4. Run engine for at least 2 seconds above 3100 rpm.
5. Record firing point at idle without vacuum.
6. Reconnect vacuum line and record firing point.

#### Important Note!

- Do not turn the engine off during this test procedure.

#### Engine 119:

- During the entire test, the engine analyzer must be set to “4 cylinder”.
- During diagnosis, e.g. evaluation of oscilloscope screen, power balance test, etc., the diagnostic interface adaptor unit must be switched between the engine analyzer and diagnostic connector (see connection diagram), as otherwise false readouts may occur.
- The ignition timing test can be performed with or without the diagnostic interface adaptor unit, whereby the engine analyzer must be set to “4 cylinder”.

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#### B. To Avoid Damage to the Ignition System

- To avoid damage to the ignition control module (N1/3), connect/disconnect the control module connectors only when the ignition is turned off.
- Do not connect a test lamp to circuit 1 of the ignition coil.
- Circuits 1 and 15 of the ignition coil may not be shorted to ground, e. g. theft deterrence.
- To avoid reversing polarity, the threads on the ignition coil have different diameters (M5 and M6).
- Only original equipment components should be installed in the ignition system.
- Do not operate the ignition system at cranking speed unless the ignition harness is completely connected.
- To avoid damage to the ignition control module (N1/3), the high output side of the ignition system must carry at least 2 k $\Omega$  of load (distributor rotor 1 k $\Omega$ , each connection on the distributor cap 1 k $\Omega$ ). Do not install a 5 k $\Omega$  distributor rotor for noise suppression.
- Do not perform any tests (grounding ignition cable 4, disconnecting a spark plug connector or pulling cable 4 out of the ignition coil) at cranking or idle speed.

- To better dissipate heat, the ignition control module (N1/3) is installed with thermal paste on the wheel well. When exchanging the control module, do not remove the foil shield, it does not influence heat dissipation.
- If the circuit breaker is activated (power balance test), and the engine stalls, then the test procedure with this tester cannot be performed.
- When testing the ignition coil separately, do not load the coil with more than 28 kV in order to avoid damage to the coil.
- If assisting a disabled vehicle and it becomes necessary to perform an ignition spark test, perform this test only on one ignition cable/spark plug. Ensure good ground connection to the spark plug.

 **WARNING!**  
High Voltage!

#### C. Using Test Equipment

- Ensure that the engine and ignition are turned off when connecting/disconnecting equipment such as voltage signal pick-up on ignition cable 4 and trigger pick-up on cylinder 1.

## Electrical Test Program - Preparation for Test

### Connection of Engine Analyzer Engine 104 CFI

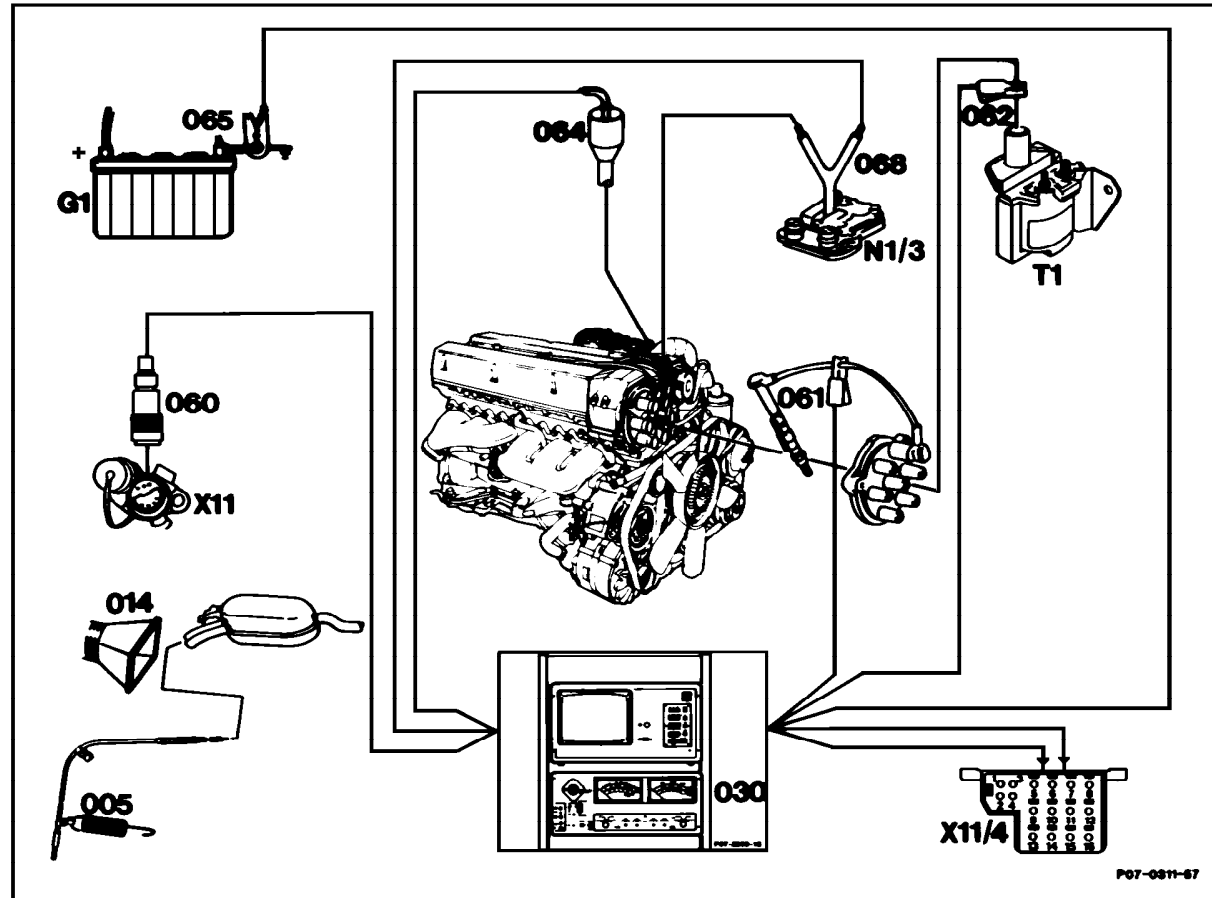


Figure 1

- G1 Battery
- N1/3 Ignition control module
- T1 Ignition coil
- X11 Diagnostic connector/terminal block (circuit TD)
- X11/4 Diagnostic connector, (DTC readout, 16-pole)
- 005 Oxygen sensor
- 014 Exhaust vent hose
- 030 Engine analyzer with oscilloscope
- 060 Diagnostic connector
- 061 Trigger clamp (cylinder 1)
- 062 Kilovolt clamp (on ignition coil)
- 064 Oil temperature gauge
- 065 DC inductive clamp
- 068 Y-adaptor (vacuum)

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## 5.1 Distributor Ignition System (DI)

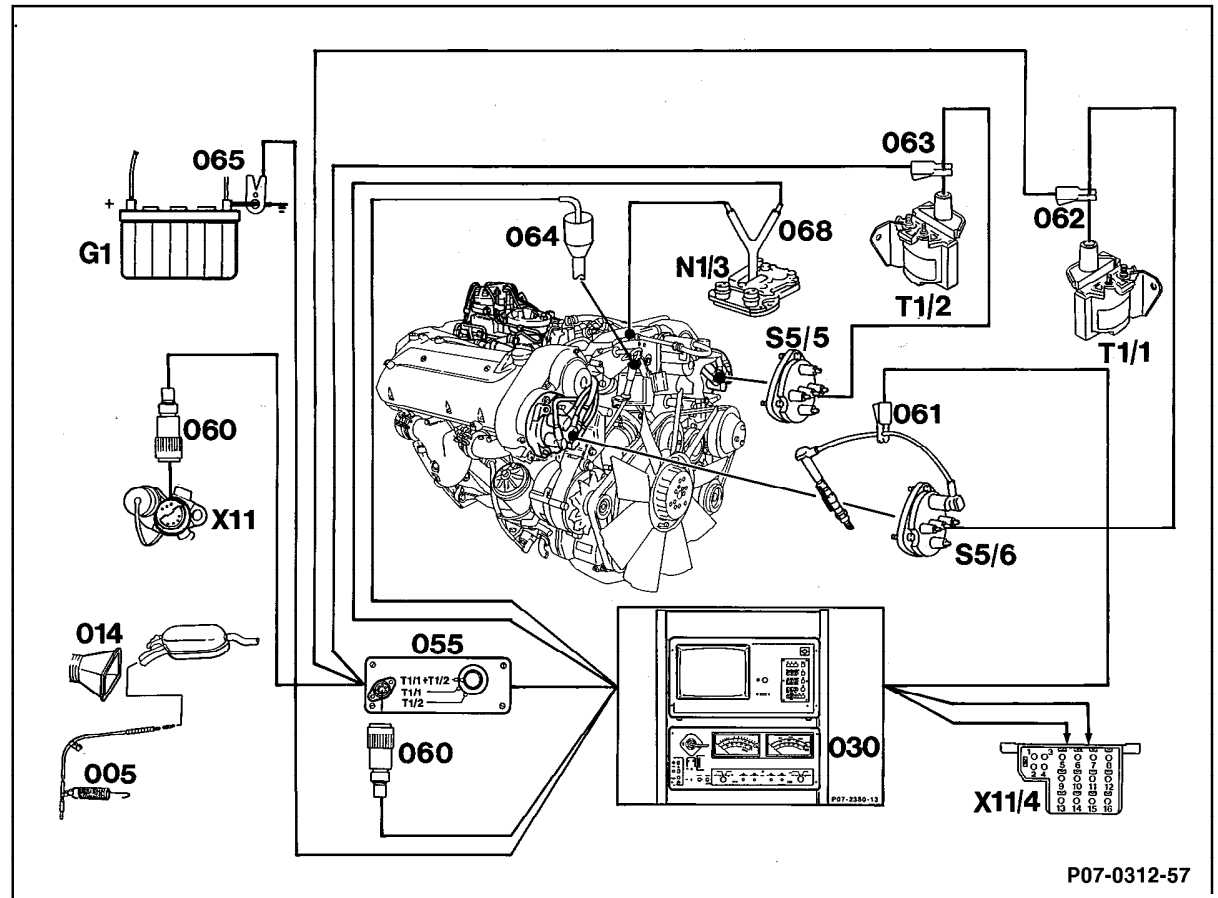
Engines 104, 119 CFI

### Electrical Test Program - Preparation for Test

#### Connection of Engine Analyzer Engine 119 CFI

Figure 2

- R4 Spark plugs
- N1/3 Ignition control module
- S5/5 Left high-voltage distributor
- S5/6 Right high-voltage distributor
- T1/1 Ignition coil 1 (right cylinder bank)
- T1/2 Ignition coil 2 (left cylinder bank)
- X11 Diagnostic connector/terminal block (circuit TD)
- X11/4 Diagnostic connector (DTC, 16-pole)
- 005 Oxygen sensor
- 014 Exhaust vent hose
- 030 Engine analyzer with oscilloscope
- 055 Diagnostic interface adaptor unit
- 060 Diagnostic connector
- 061 Trigger clamp (cylinder 1)
- 062 Right kilovolt clamp (on ignition coil)
- 063 Left kilovolt clamp (on ignition coil)
- 064 Engine oil temperature gauge
- 065 DC inductive clamp
- 068 Y-adaptor (vacuum)





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#### Connection Diagram – Socket Box, Ignition Control Module (N1/3)

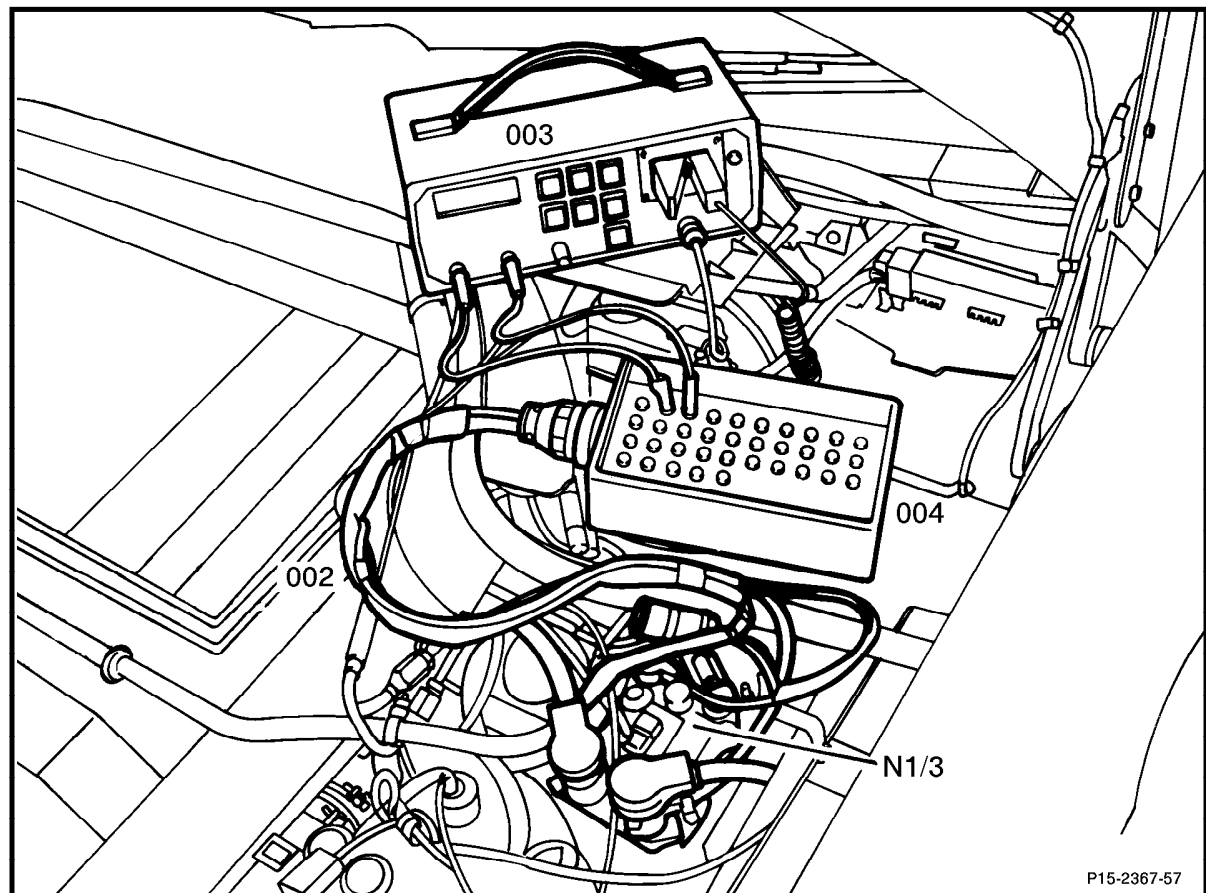


Figure 3

- 002 Test cable 140 589 10 63 00
- 003 Multimeter
- 004 Socket box (35-pole)
- N1/3 Ignition control module

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## 5.1 Distributor Ignition System (DI)

Engines 104, 119 CFI

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#### Connection Diagram - Socket Box, Engine Systems (MAS) and CFI Control Modules Engines 104, 119 CFI

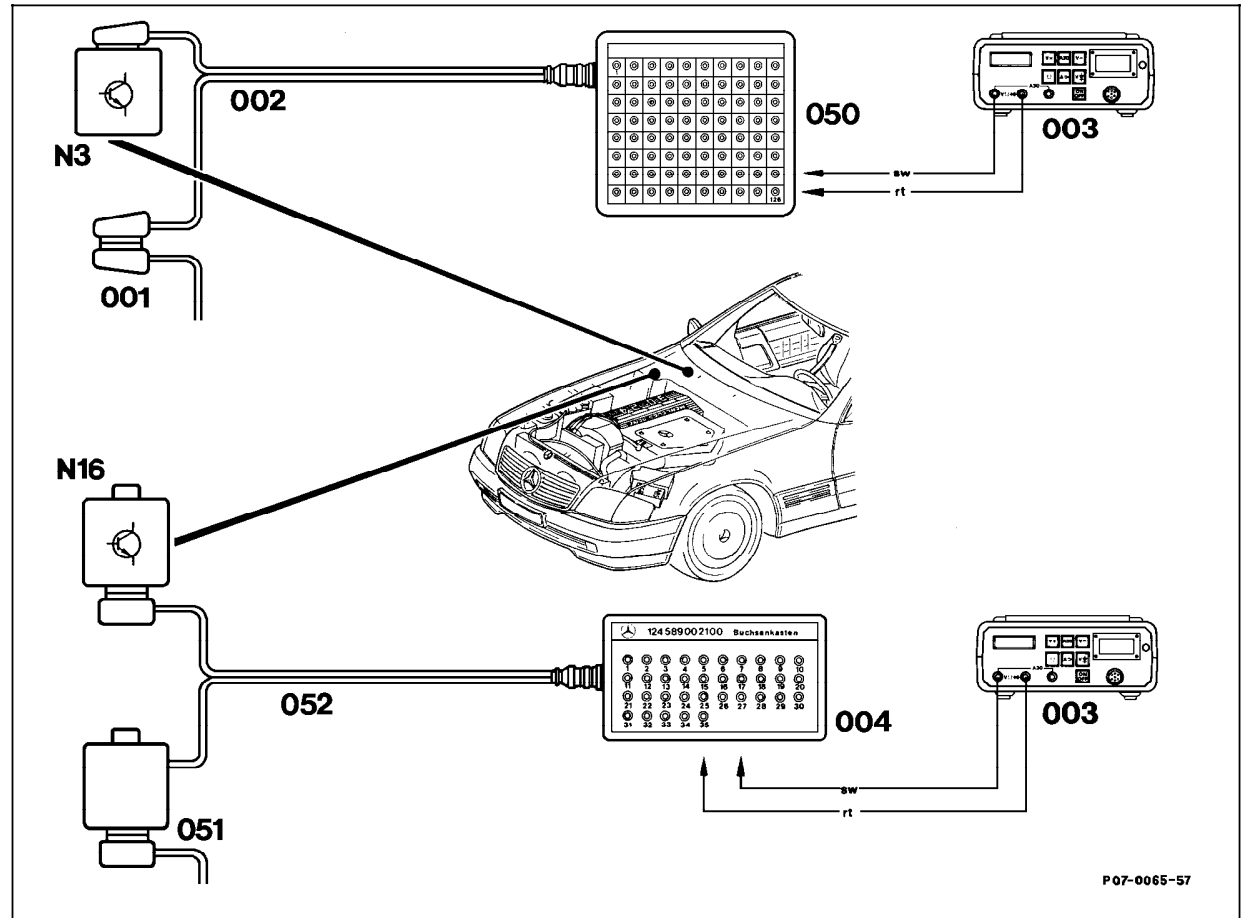


Figure 4

- 001 CFI control module connector
- 002 Test cable 104 589 00 63 00
- 003 Multimeter
- 004 Socket box (35-pole)
- 050 Socket box (126-pole)
- 051 Connector, engine systems control module (MAS)
- 052 Test cable 129 589 05 63 00
- N3 CFI control module
- N16 Engine systems control module (MAS)

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