

### 8.2 Engines 104, 119 LH-SFI in Model 140

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## Diagnosis - Diagnostic Trouble Code (DTC) Memory

### Preparation for recalling diagnostic trouble code memory

1. Connect impulse counter and adaptor for impulse counter scan tool to diagnostic connector (X11/4) according to connection diagram (see section 0).

**Note:**

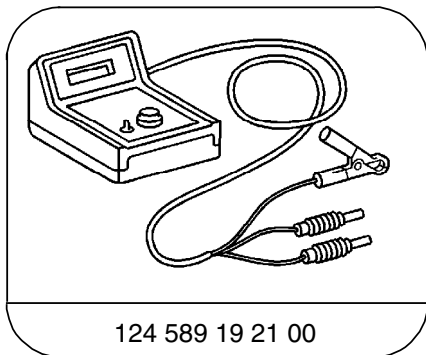
Connect impulse counter scan tool as follows:  
 red wire to socket 3,  
 black wire to socket 1 and  
 yellow wire to:

Diagnostic module	socket 19
Base module	socket 8

LH-SFI control module	socket 4
Ignition control module	socket 17
EA/CC/ISC control module	socket 7

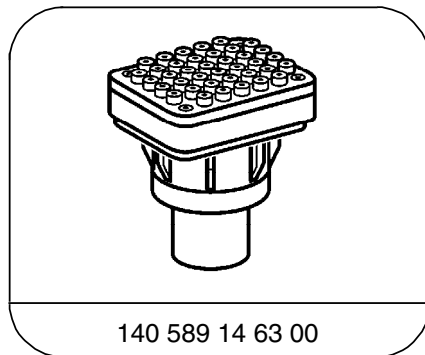
2. Recall control module diagnostic trouble code memory and clear stored diagnostic trouble codes (see section 0).

### Special Tools



124 589 19 21 00

Pulse counter



140 589 14 63 00

Adapter

## Diagnosis - Diagnostic Trouble Code (DTC) Memory

## Diagnostic Trouble Code (DTC) Readout, Diagnostic Module

Diagnostic Trouble Code (DTC)	Possible Cause	Remedy/Test Step <sup>1)</sup>
1	No malfunction in systems monitored	–
2	Heated oxygen sensor inoperative	Test LH-SFI, section 3.1.
3	Lambda control inoperative	Test LH-SFI, section 3.1.
4	Air injection inoperative	Test LH-SFI, section 3.1.
5	Exhaust gas recirculation inoperative	Test LH-SFI, section 3.1.
6	Idle speed control inoperative	Test electronic accelerator, section 6.2.
7	Ignition system defective	Test distributor ignition system, section 5.2.
8	Engine coolant temperature sensor, open/short circuit	Test LH-SFI, section 3.1.
9	Intake air temperature sensor, open/short circuit	Test LH-SFI, section 3.1.
10	Voltage at mass air flow sensor too high/low	Test LH-SFI, section 3.1.
11	TN-signal (rpm) at LH-SFI control module (N3/1) defective	Test LH-SFI, section 3.1.
12	Heated oxygen sensor heater, open/short circuit	Test LH-SFI, section 3.1.
13	Camshaft position sensor signal of ignition control module defective.	Test LH-SFI, section 3.1.
14	Intake manifold pressure at start (in ignition control module - N1/3) too low/high	Vacuum supply to N1/3, test distributor ignition system, section 5.2.
15	Wide open throttle information defective	Test electronic accelerator, section 6.2.

1) Observe Preparation for Test, see 22.

## Diagnosis - Diagnostic Trouble Code (DTC) Memory

Diagnostic Trouble Code (DTC)	Possible Cause	Remedy/Test Step <sup>1)</sup>
16	Closed throttle position information defective	Test electronic accelerator, section 6.2.
17	Data exchange malfunction between individual control modules	23 ⇒ 7.0.
18	Adjustable camshaft timing solenoid, open/short circuit	Test LH-SFI, section 3.1.
19	Fuel injectors open/short circuit or self-adaptation in LH-SFI control module (N3/1) at limit	Test LH-SFI and reset LH-SFI control module adaptation to mean value, section 3.1.
20	Speed signal not present	Test electronic accelerator, section 6.2.
21	Purge switchover valve, open/short circuit	Test LH-SFI, section 3.1.
22	Camshaft position sensor signal defective	Test distributor ignition system, section 5.2.
23	Intake manifold pressure (in ignition control module - N1/3) with engine running too low/high	Vacuum supply to N1/3, test distributor ignition system, section 5.2.
24	Starter ring gear segments and/or crankshaft position sensor defective	Test distributor ignition system, section 5.2.
25	Knock sensors or ignition control module defective	Test distributor ignition system, section 5.2.
26	Upshift delay 1→2 (model 124.034 only), 2 → 3 (all models)	Test LH-SFI, section 3.1.
27	Engine coolant temperature sensor deviation between sensor circuit 1 and sensor circuit 2	Test LH-SFI, section 3.1.
28	Engine coolant temperature sensor (coolant temperature change monitor)	Test LH-SFI, section 3.1.

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

## Electrical Test Program - Component Locations

### Model 124

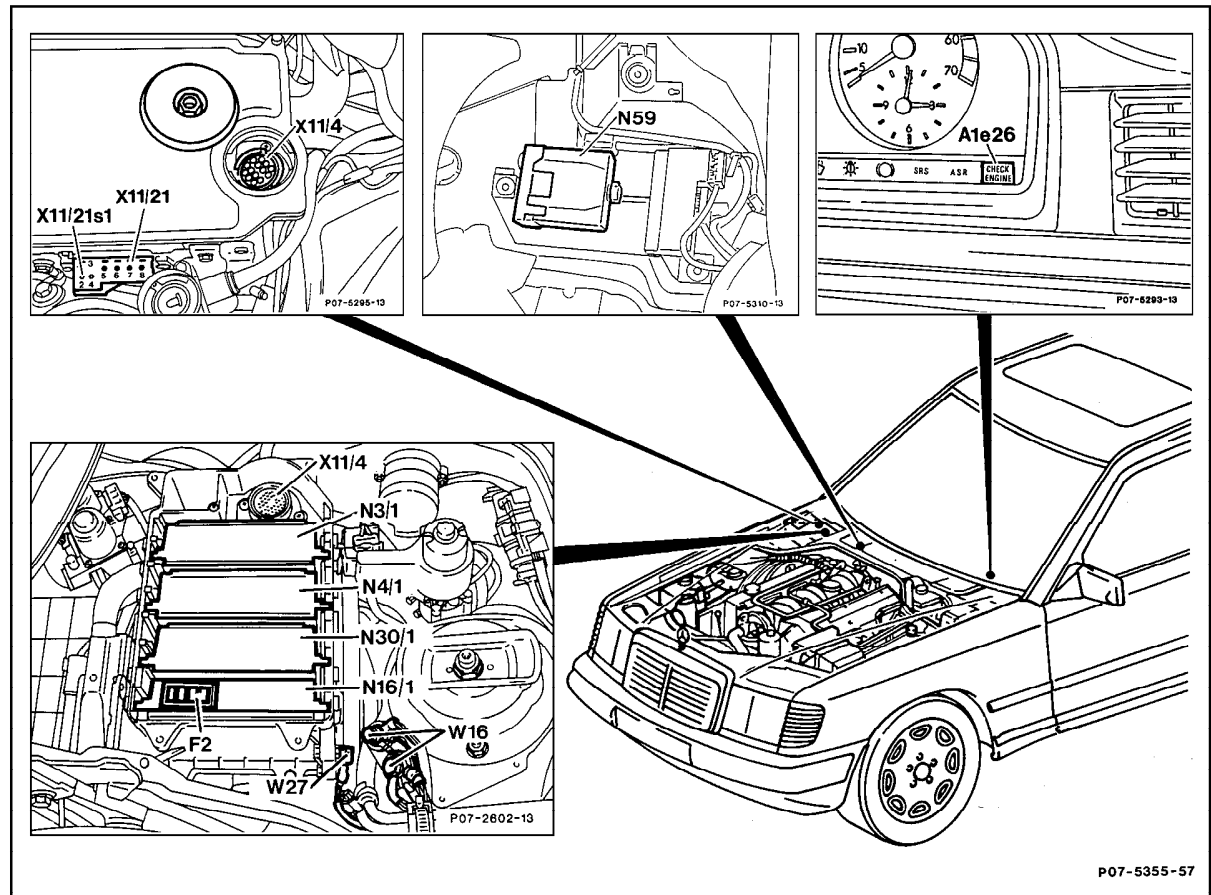


Figure 1

- A1e26 "CHECK ENGINE" malfunction indicator lamp
- F2 Fuse, LH-SFI control module voltage supply
- N3/1 LH-SFI control module
- N4/1 Electronic accelerator/cruise control/idle speed control module
- N16/1 Base module
- N30/1 ABS/ASR control module
- N59 Diagnostic module
- X11/4 Diagnostic connector (diagnostic trouble code, 38-pole)
- X11/21 Diagnostic module test connection
- X11/21s1 Pushbutton with LED

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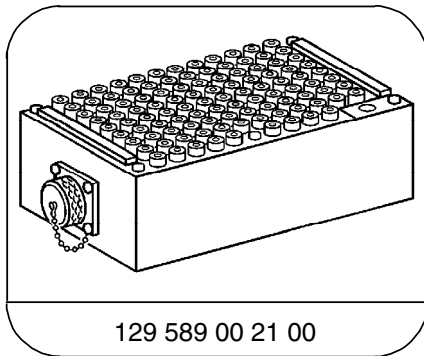
### Electrical Test Program - Preparation for Test

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

1. Ignition: **OFF**
2. Remove diagnostic module (N59).
3. Connect socket box with test cable (according to connection diagram on next page).
4. **Test steps 1.2 – 1.3 and 2.1 – 2.2 only:** Ignition: **OFF**, remove base module (N16/1) and connect socket box with contact module 1 and contact box (see Diagnostic Manual, Chassis and Drivetrain, Volume 1, section 1 22).

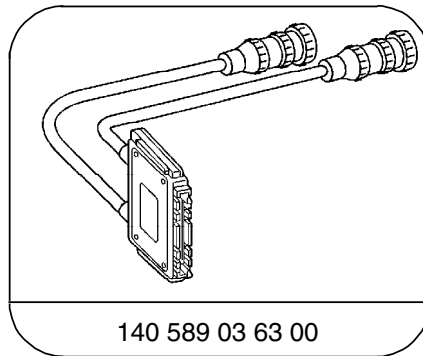
Electrical wiring diagrams, see Electrical Troubleshooting Manual.

#### Special Tools



129 589 00 21 00

126-pin socket box



140 589 03 63 00

Contacting module 3

#### Equipment

Digital multimeter <sup>1)</sup>

Sun DMM-5  
Fluke models 23, 83, 85, 87

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

Electrical Test Program - Preparation for Test

Connection Diagram – Socket Box Model 124

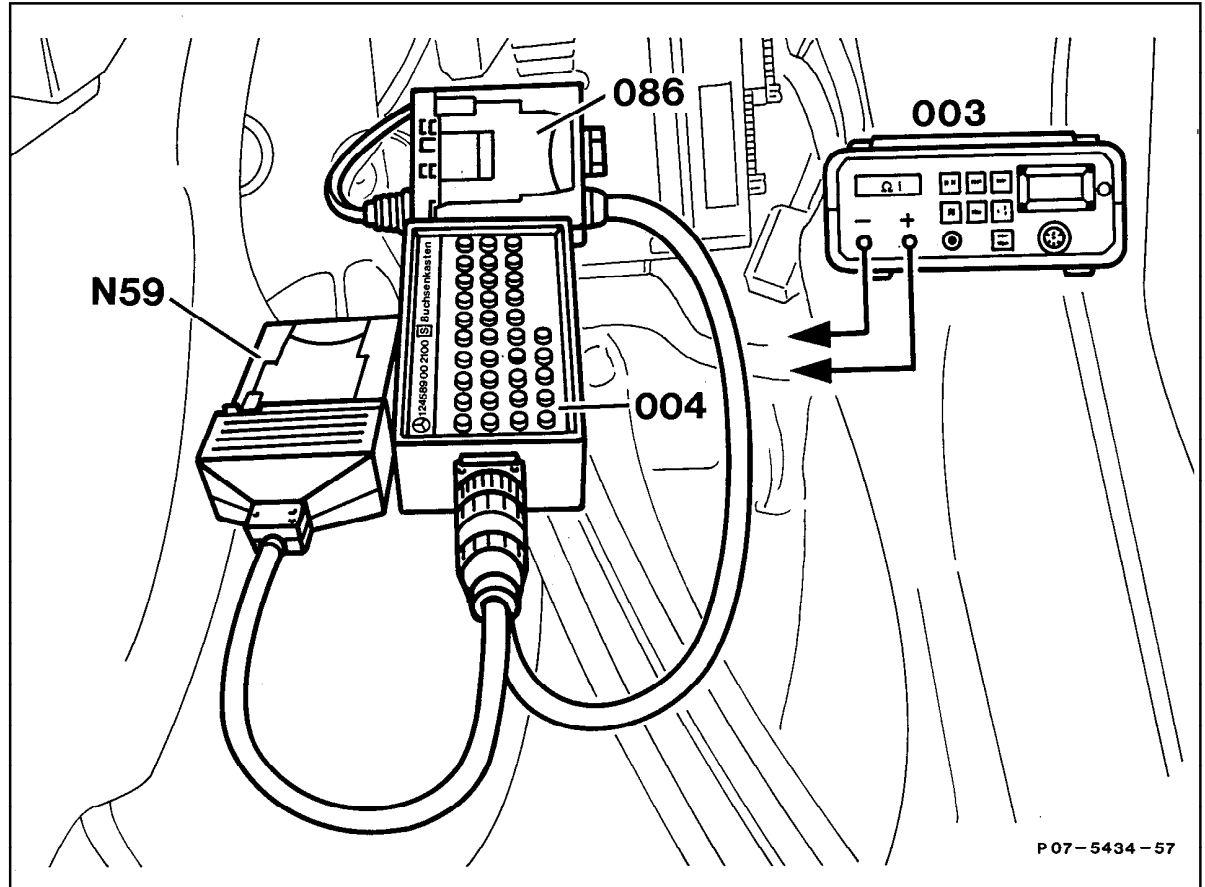


Figure 1

- 003 Multimeter
- 004 Socket box (35-pole)
- 086 Test cable
- N59 Diagnostic module

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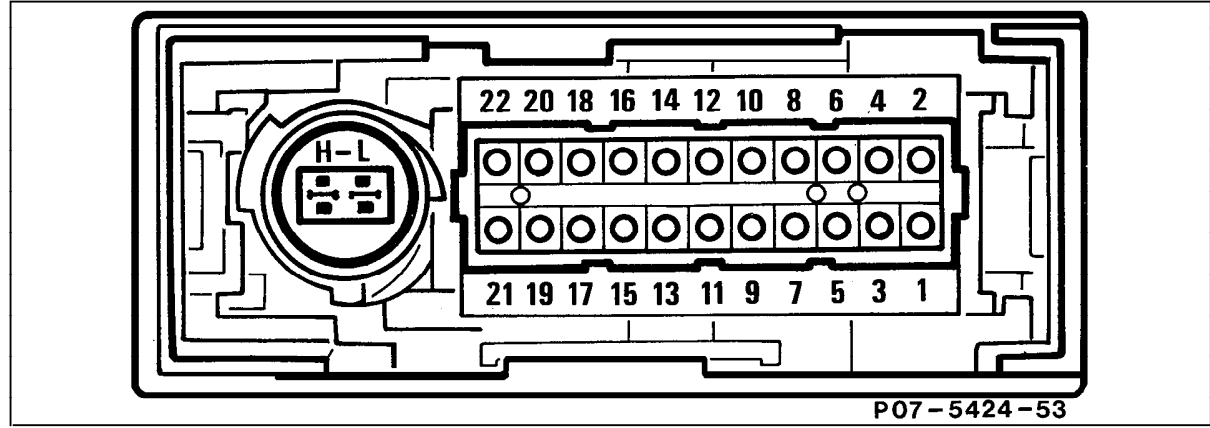
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## Electrical Test Program - Preparation for Test

### Terminal Layout of Diagnostic Module Model 124

Figure 2

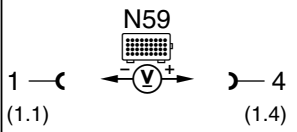
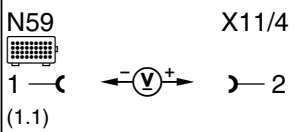
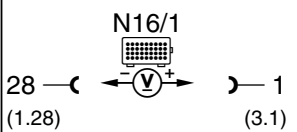

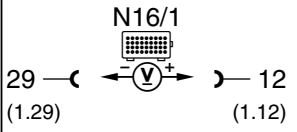
- 1 Ground, module box bracket
- 2 Ground bridge, coding
- 3 Voltage supply, circuit 87
- 4 Voltage supply, circuit 30
- 5 Diagnostic wire at diagnostic connector X11/21
- 6 Diagnostic wire at diagnostic connector X11/4
- 7 Ground, coding (model 124.034)
- 8 Ground, coding (model 124.036)
- 9 "CHECK ENGINE" malfunction indicator lamp
- L Data line (-)  
Controller Area Network  
(LH-SFI control module, ignition control module, electronic accelerator/cruise control/idle speed control module, ABS/ASR control module)
- H Data line (+)  
Controller Area Network  
(LH-SFI control module, ignition control module, electronic accelerator/cruise control/idle speed control module, ABS/ASR control module)



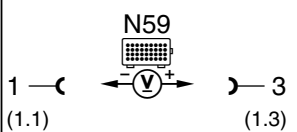
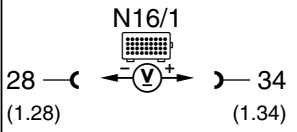

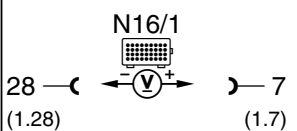
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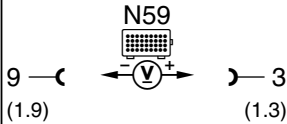
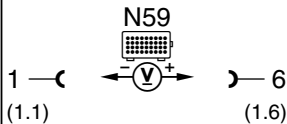
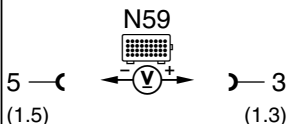
## Electrical Test Program - Test

Test step <b>DTC</b>	Scope of test	Test connection	Test condition	Nominal value	Possible cause/remedy
⇒ 1.0	<b>Diagnostic module (N59)</b> Voltage supply Circuit 30		Ignition: <b>ON</b>	11 – 14 V	⇒ 1.1 – 1.3.
⇒ 1.1	Ground, module box bracket (W27)		Ignition: <b>ON</b>	11 – 14 V	Ground wire at W27.
⇒ 1.2	Base module (N16/1) Voltage supply Circuit 30		<b>Connect socket box to N16/1.</b> Ignition: <b>ON</b>	11 – 14 V	Wire to terminal block (X4/10).
⇒ 1.3	9  DTC readout from base module (N16/1) Voltage supply from N16/1 to diagnostic module (N59) Circuit 30		Ignition: <b>ON</b>	11 – 14 V	N16/1.

## Electrical Test Program - Test

Test step <b>DTC</b>	Scope of test	Test connection	Test condition	Nominal value	Possible cause/remedy
⇒ 2.0	<b>Diagnostic module (N59)</b> Voltage supply Circuit 87L		Ignition: <b>ON</b>	11 – 14 V	⇒ 2.1 – 2.2.
⇒ 2.1	Base module (N16/1) Voltage supply Circuit 15, unfused		<b>Connect socket box to N16/1.</b> Ignition: <b>ON</b>  Ignition: <b>OFF</b>	11 – 14 V  <1 V	Open circuit, Ignition/starter switch (S2/1).  Open circuit, S2/1.
⇒ 2.2    10	 Impulse readout from base module (N16/1) Voltage supply (fused) for LH-SFI control module (N3/1)		Ignition: <b>ON</b>  Ignition: <b>OFF</b>	11 – 14 V  <1 V	Fuse (F2) at N16/1, N16/1.

## Electrical Test Program - Test

Test step DTC	Scope of test	Test connection	Test condition	Nominal value	Possible cause/remedy
⇒ 3.0	<b>Control of "CHECK ENGINE" malfunction indicator lamp</b>		Ignition: <b>ON</b>	11 – 14 V	N59.
⇒ 4.0	<b>Control of diagnostic wire</b>		Ignition: <b>ON</b>	11 – 14 V	Open circuit, N59.
⇒ 5.0	<b>Control of pushbutton (X11/21)</b>		Ignition: <b>ON</b> Press pushbutton (X11/21).	11 – 14 V	Open circuit, Pushbutton (X11/21), N59.

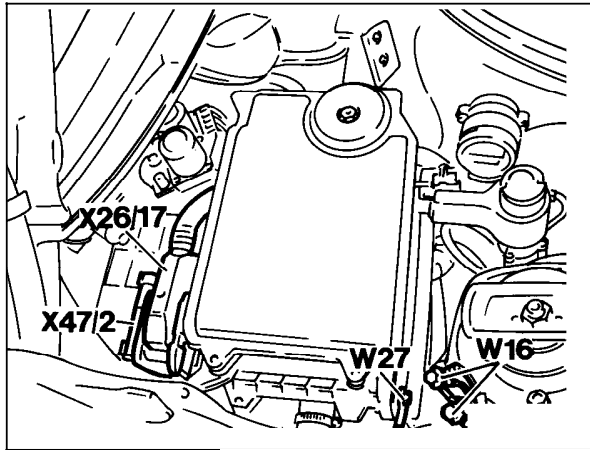
## Electrical Test Program - Test

Test step <b>DTC</b>	Scope of test	Test connection	Test condition	Nominal value	Possible cause/remedy
⇒ 6.0	<b>Diagnostic module coding</b>  Engine 119 (4.2 liter)		Ignition: <b>ON</b>	11 – 14 V	Open circuit.
	Engine 119 (5.0 liter)		Ignition: <b>ON</b>	11 – 14 V	Open circuit.

## Electrical Test Program - Test

Test step <b>DTC</b>	Scope of test	Test connection	Test condition	Nominal value	Possible cause/remedy
⇒ 7.0	<b>CAN data bus</b>		Ignition: <b>OFF</b> Unplug test cable or diagnostic module. Test with ohmmeter directly at the the two wide connections of the diagnostic module connector (see Figure 2).	55 – 65 Ω	Data line, ⇒ 8.1, ⇒ 8.2.
⇒ 7.1	CAN interface in LH-SFI control module (N3/1) Resistance		Pull out LH-SFI control module (N3/1) and test directly at LH-SFI control module (see Figure 3).	115 – 125 Ω	N3/1.
⇒ 7.2	CAN interface in ignition control module (N1/3) Resistance		Unplug connector “B” at ignition control module and test directly at control module (see Figure 4).	115 – 125 Ω	Ignition control module.

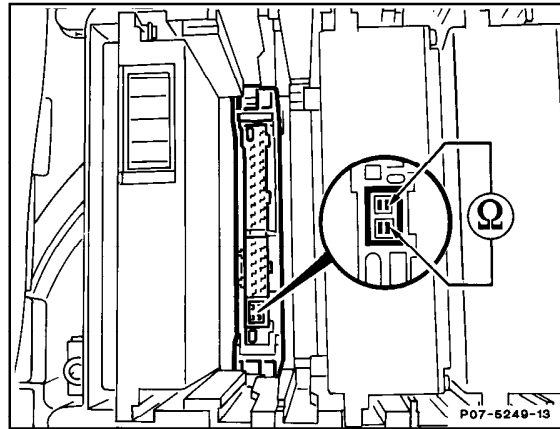
## Electrical Test Program - Test



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Figure 1

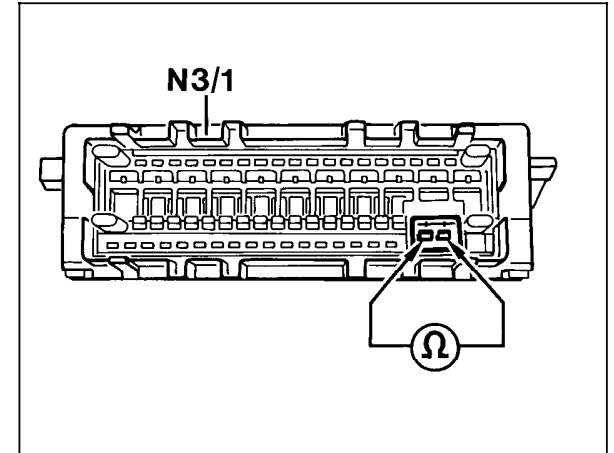
- W16 Ground, component compartment
- W27 Ground, module box bracket
- X26/17 Engine plug connection (36-pole)
- X47/2 Camshaft position sensor connector



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Figure 2

- N59x Diagnostic module connector



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Figure 3

- N3/1 LH-SFI control module

### Electrical Test Program - Test

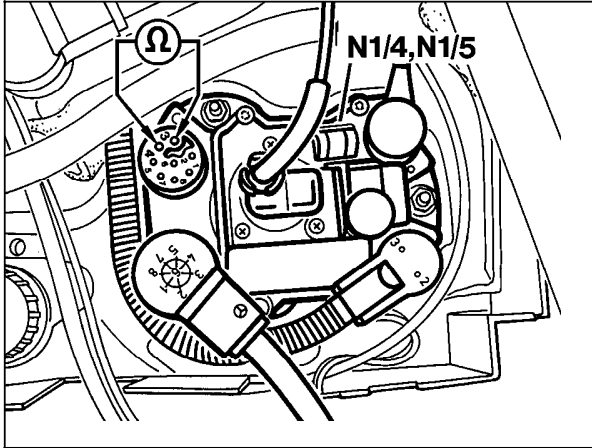


Figure 4

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N1/3 Ignition control module