1.15 Instrument Cluster (IC)

Contents

1.15 Model 163 (as of M.Y. 1998) with FSS

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Diagnosis – Function Test

Bulb test

- Turn the ignition key to position "2". All malfunction indicator/warning lamps must illuminate.
- Start engine. At engine RPM > 480 all indicator/warning lamps should go off, indicating that all systems monitored are O.K.
- Independent of engine running the following should go off: After 4 seconds, the SRS MIL.
 After 6 seconds, the safety belt warning indicator.



Should the malfunction indicator/warning lamps remain illuminated and/or come on while in operation, the corresponding system must be checked and/or the fluid level corrected as necessary.

Warning buzzer

- Exterior lamps and parking brake warning
- · Ignition key in ignition switch warning
- Safety belt warning for 6 seconds (the warning buzzer will cease if safety belt buckle is latched).
- Warning tone at engine oil levels below min. or above max.
 (in addition a red background warning displays, if oil level is at the min. level the display has yellow background and no warning tone sounds)
- Warning sound for 5 seconds when CAN Bus data signal inoperative



Indicator instruments

The indicator instruments must reflect the actual operating conditions.



Instrument cluster with multi-functional display

If the operational problem occurs (worn brake pads, insufficient engine coolant level, failed exterior lamp etc.) or the system (such as: ABS or SRS) fails a warning message will be displayed in place of the outside temperature, trip odometer, odometer and electronic clock. Based on the severity of the problem, the display will be red or yellow in color. Additionally, a warning tone will sound.

Flexible Service System (FSS)

- Remaining mileage or time until the next service due can be activated as follows:
 - Turn the ignition key to position 2. Press twice the trip odometer reset button within 1 sec. The tool symbol and the remaining mileage or time will be displayed for 10 sec.
- Oil level display (engines M112 and M113) can be activated as follows:
 Turn the ignition key to position 2. Wait 10 seconds until the oil can symbol and message "oil level?" comes up and then press the the trip odometer reset button twice within 1 second. If the oil level is too low the message will be displayed.



Function test, diagnosis and coding can be accomplished using the Hand Held Tester (HHT).

Diagnosis - Diagnostic Trouble Code (DTC) Memory

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Note regarding HHT:

The Instrument Cluster (IC) and the functions of the Flexible Service System (FSS) can be tested using the HHT, the following functions are available:

- 1. Control module version
- Diagnostic Trouble Code (DTC) Memory
- 3. Actual values
- 4. Activation
- 5. Version Coding

Additional information for the steps 2, 3 and 5 can be recalled by pressing the ENTER key.

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Note regarding version coding:

The following HHT options are available during version coding:

- 1. Read out of version coding and transfer IC and FSS information to a new instrument cluster.
- 2. Read out/change of version coding: Engine option

Country option (miles/kilometers) Fuel tank option

Optional equipment, etc.

2. Setting of:

- Clock 1.
- 2. Mileage forward
- Mileage backward 3.
- Oil changes (FSS) 4.
- Mistakenly deleted oil changes resetting (FSS) 5.
- Flexible Service System (FSS) 6.
- 7. Time setting with battery terminal removed
- 8 Setting warning for oil level at minimum



Note

Prior to the replacement of a defective instrument cluster, readout and store data in the HHT. After installing the instrument cluster download the previously stored values back into the instrument cluster.

If the readout of the stored version coding is not possible, the download must be performed manually (by utilizing the HHT menu).

If substituting a new instrument cluster for testing, do not set the mileage as it cannot be set back later.

Diagnosis – Complaint Related Diagnostic Chart

Complaint/Problem	Possible cause	Test step/Remedy 1)
Entire instrument cluster (A1) not functioning.	Power supply, Instrument cluster (A1)	23 ⇒ 1.0
Warning lamps/Indicator lamps are not functioning.	Power supply, Instrument cluster (A1)	23 ⇒ 1.0
Communication between HHT and instrument cluster not possible.	Wiring, Instrument cluster (A1)	23 ⇒ 2.0
Warning lamps/Indicator lamps (brake fluid level, parking brake, brake pad wear, ABS, ETS, ASR, ESP) illuminate simultaneously and speedometer needle rests at the bottom stop.	Traction system control module (N47)	Diagnostic information in WIS
Tachometer needle, ECT needle remain at rest on the bottom stop. Engine oil low level warning lamp illuminates.	Injection control module (N3)	Diagnostic information in WIS
Warning lamps/Indicator lamps (brake fluid level, parking brake, brake pad wear, oil level, ABS, ETS, ASR, ESP) illuminate simultaneously and tachometer, speedometer, ECT gauge needle rests at the bottom stop.	CAN Bus disruption	$23 \Rightarrow 3.0$ $23 \Rightarrow 4.0$
Steering lock warning lamp (A1e40) illuminates continuously or not functioning	Wiring, Steering lock switch (S97/1)	23 ⇒ 5.0
Engine coolant level (ECL) switch not functioning	Wiring, ECL switch (S41)	23 ⇒ 6.0

Observe Preparation for Test, see 22.

Diagnosis – Complaint Related Diagnostic Chart

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Note regarding diagnosis:

To narrow the search for the possible fault, the diagnostic chart indicates how the warning lamps or indicators are activated and controlled by a particular system.

If the warning lamps or indicators display malfunction of more systems simultaneously, it is almost always evidence of a faulty CAN Bus. $|\hat{\mathbf{i}}|$

Following warning lamps/indicators receive the information via CAN Bus from Traction systems control module (N47) (on vehicles with multifunctional Instrument Clusters additionally a message appears in the display field):

- Odometer, trip odometer
- Electronic speedometer
- · Low brake fluid level/parking brake indicator
- Warning lamp brake pad wear
- ABS indicator
- · ETS, ESP indicator
- Warning lamp ETS, ESP

i Note:

"Low-range" indicator receives information via CAN Data-bus from the Transfer case control module (N78).

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Following warning lamps/indicators receive the information via CAN Bus from Injection systems control module (N3) (on vehicles with multifunctional Instrument Clusters additionally a message appears in the display field):

- Tachometer
- Oil level warning lamp
- Coolant temperature
- Fuel reserve warning lamp (if a fuel system leak is detected or fuel filler cap is not tightly closed while engine is running the warning lamp [A1e4] will blink, not correcting the problem can cause the "check engine" lamp to illuminate)
- Flexible Service System (FSS)
 - Oil quality
 - Oil level
 - Oil temperature
 - Engine torque
 - Engine speed, coolant temperature

Diagnosis – Complaint Related Diagnostic Chart

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Instrument cluster receives direct information for the following warning lamps/indicators:

- Outside temperature display
- Fuel gauge
- Turn signal indicator left
- Turn signal indicator right
- High beam indicator
- Fuel reserve warning lamp
- SRS control and warning lamps
- Battery charging control/warning lamp
- Seat belt warning lamp
- Seat belt/rear seat back rest latch warning lamp
- Windshield washer fluid low level warning lamp
- Coolant low level warning lamp
- Turn signal audio device
- Seat belt warning buzzer
- Lights on warning buzzer
- Key in ignition warning buzzer
- Steering lock warning lamp

Electrical Test Program – Component Locations

Model 163

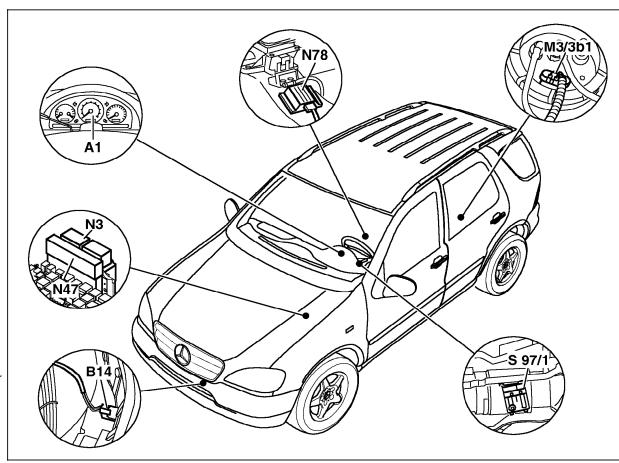


Figure 1

A1 Instrument Cluster (IC) view of multi-functional

Instrument Cluster

B14 Temperature sensor for outside temperature indicator

(one or the other version installed)

M3/3b1 Fuel level sensor
N3 Engine control module

N47 Traction systems control module

N78 Transfer case control module

S97/1 Steering lock switch

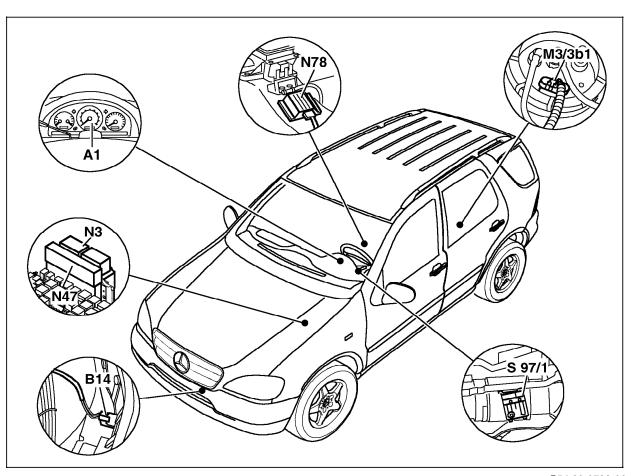
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Electrical Test Program – Component Locations

Model 163 as of 3.98

Figure 2

S41 Engine coolant level (ECL) switch



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Electric Test Program – Preparation for Test

- 1. Battery voltage 11 14 V.
- 2. Check fuses.
- 3. Systems and fluid levels in order.

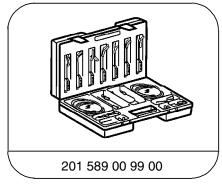
⚠ Caution:

To prevent damage to the control modules, the connectors on the control modules must only be removed or connected with the ignition **OFF**.

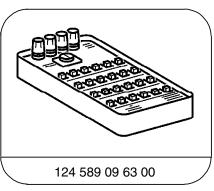
Electrical wiring diagrams:

Refer to Workshop Information System (WIS)

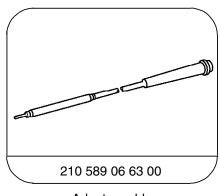
Special Tools



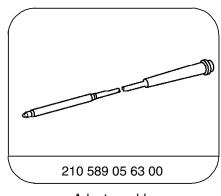
Electrical connecting set



Ohm decade



Adapter cable



Adapter cable

Conventional tools, test equipment

Description	Brand, model, etc.		
Multimeter	Fluke models 1) 23, 78, 87, 88, 98 II		

¹⁾ Available through the MBUSA Standard Service Equipment Program.

Electrical Test Program – Test Model

	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0	Instrument cluster (A1) Voltage supply Terminal 30		Ignition: OFF 11 Remove A1 Disconnect connector "A" (18-pin)	11 – 14 V	Fuse 13 in fuse and relay box (F1), Wiring, Values O.K.: ⇒ 1.1
1.1	Voltage supply Terminal15, fused		- 9 A.9)	11 – 14 V	Fuse 22 in fuse and relay box (F1), Wiring, Values O.K.: ⇒ 1.2
1.2	Voltage supply Terminal 15, fused		- 7 A.7)	11 – 14 V	Fuse 10 in fuse and relay box (F1), Wiring, Values O.K.:
2.0	HHT interface Connection between A1 and data link connector (X11/4)		A1 Ignition: OFF 11 Remove A1, Disconnect connector "B" (12-pin)	5 Ω	Wiring.

Electrical Test Program – Test

\Rightarrow	Test scope	Test conr	nection		Test condition	Nominal value	Possible cause/Remedy
3.0	CAN bus data lines Resistance	1 — c (B.9)	A1 -		Ignition: OFF Disconnect connector "B" (12-pole) (N3/10 engine control modules is connected to CAN)	around 120 Ω	CAN: -//-,
3.1	CAN bus data lines Voltage Low-data line		<u>~</u> <u>(</u> <u>V</u>) [±] ►	A1) — 10 (B.10)	Ignition: ON	around 2.3 V	N3/10 Values O.K.: ⇒ 3.2
3.2	CAN bus data lines Voltage High-data line		<u>~</u> <u>(</u> <u>V</u>)+	A1 > — 9 (B.9)	Ignition: ON	around 2.6 V	N3/10
4.0	Instrument cluster (A1) CAN bus data input resistance	9 — ఁ (B.9)	A1 → ② + →		Ignition: OFF Disconnect connector "B" (12-pole)	around 120 Ω	A1
5.0	Steering lock switch (S97/1)		A1 -		Ignition: OFF Disconnect connector "A" (18-pole) steering locked steering unlocked	$<$ 1 Ω $>$ 20 k Ω	Wiring (S97/1)

Electrical Test Program – Test

⇒	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
6.0	Engine coolant level (ECL) switch (S41)	S41 1 — (Ignition: OFF Disconnect connector on S41 and connect resistance substitution unit.		Values O.K.: ECL switch (S41) Values not O.K.:
			Set resistance to $70k\Omega$, Start engine, wait up to 1 minute.	ECL warning lamp (A1e11) comes on.	Wiring to A1, A1
	As of 3.98		Set resistance to $30k\Omega$, wait up to 1 minute.	ECL warning lamp (A1e11) goes off	