Mercedes-Benz

Service

Diagnostic Trouble Code (DTC) Reference Guide

Edition B

Mercedes-Benz of North America, Inc.

07.1 Diesel injection system
ELR Electronic idle speed control
EDS Electronic diesel system

07.3 CFI Continuous fuel injection system
ESCM Engine systems control module (MAS)

07.4 LH-SFI LH sequential multiport fuel injection system
BM Base module
DM Diagnostic module

07.5 HFM-SFI HFM sequential multiport fuel injection/ignition system
DM Diagnostic module

15 DI Distributor ignition

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82 ATA Anti-theft alarm system
CT Cellular telephone
CF Convenience feature
Radio

83 A/C Air conditioning

[1] except 124.034/036

91 SRS Supplemental restraint system

Special tools

This reference guide is the product of existing technical publications. Special care has been taken to provide accurate information on test procedures, together with the necessary technical data for the particular job.

Mercedes-Benz of North America, Inc. recommends that repairs to, and maintenance of Mercedes-Benz automobiles be performed by **trained Mercedes-Benz personnel** at authorized Mercedes-Benz dealerships.

The information contained in this special publication is ordinarily issued by Mercedes-Benz of North America, Inc., in conjunction with supplementary service literature and special tools supplied **only** to its authorized dealers. The repair and maintenance procedures outlined herein are intended for use by **trained Mercedes-Benz service and dealership personnel**. Supplementary service literature will not be provided with this publication, but may be contained in reprints of this reference guide. The material in this reference guide is divided according to the Mercedes-Benz Component Group System.

Special tools required in performing certain service jobs are identified in the reference guide and are recommended for use. Any part numbers given are only used for identification and easier differentiation between individual components, and are not intended for ordering purposes.

All procedures, illustrations and specifications contained in this reference guide were based on the latest information available at the time of publication. All rights are reserved to make production, design and specification changes at any time, without notice and without obligation to give notice. Any such changes will not be contained in this reference guide.

⚠ CAUTION!

The proper performance of service and repair procedures is essential for both the safety of the mechanic and the safe and efficient operation of the vehicle. The use of incorrect service procedures and tools may greatly increase the risk of personal injury and render the vehicle unsafe. The procedures in this reference guide are described in such a manner that the service may be performed safely and accurately.

MERCEDES-BENZ OF NORTH AMERICA, INC.
Service and Parts Literature

DTC readout (ELR)

Model Year 1989

Model 201.126

Testing with impulse counter:

The number range for the impulse counter is 1 to 6.
The number 1 indicates no malfunctions in the system. All other numbers refer to a particular malfunction source.

1. Connect impulse counter according to connection diagram.

Note:
LED "U Batt" in display must light up,if not, refer to *Specific Literature Recommendation* listed below.

2. **Engine at idle**

3. Press start button for 2 to 4 seconds.

4. Read and note displayed impulse readout.
   Display "1" = no malfunction stored,
   Greater than "1" = malfunction in system.

5. Press start button again for 2 to 4 seconds. If there are no further malfunctions in the system, the previously displayed number will reappear. If additional malfunctions exist, then the respective malfunction code will be displayed

6. Repeat step 5 until the first number displayed is repeated.

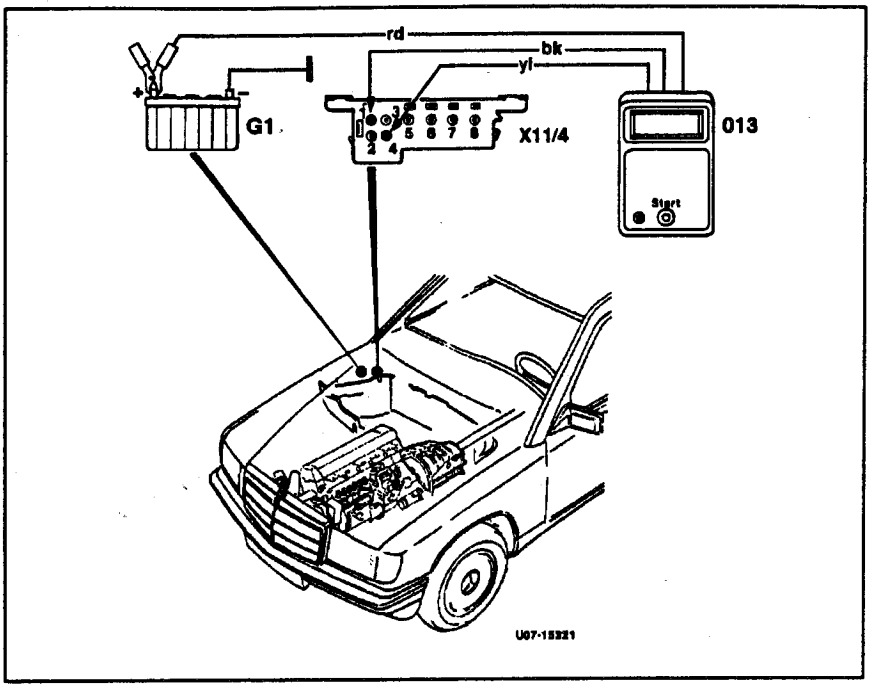
7. Note any additional malfunctions from impulse readout.

8. Eliminate all noted malfunctions (impulse readout) according to troubleshooting chart and diagnostic tests.

Erasing malfunction memory
Malfunctions are not stored in memory.
Erasing procedures are not required.

Specific Literature Recommendation: Model Year 1989 Introduction Manual, Models 107, 124, 126 and 201, Group 07.1, ELR testing, and: Service Microfiche, Engines 601, 602.91, 603.91 Combustion I, Group 07.1, Job 07.1-105.

Connection diagram



Socket 4	ELR Diagnostic Connection
013	Impulse counter
G1	Battery
X 11/4	Data link connector

Malfunction table, impulse readout, ELR control unit

Impulse readout	Possible cause
1	No malfunctions in system
2	Ring gear speed sensor (L3)
3	Coolant temperature sensor (B11/1)
6	ELR control unit (N8) or idle speed control system

DTC readout (EDS)

Model Years 1990 – 1991

Model 124.128

Test conditions:

- Coolant temperature 60-80 °C
- Automatic Climate Control OFF
- Selector lever in Park

Testing with impulse counter:

1. Connect impulse counter according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to *Specific Literature Recommendation* listed below for location of detailed test.

2. **Engine at idle.**

3. Press start button for 2 to 4 seconds.

4. Read and note impulse readout displayed.
   Display "1" = no malfunction stored,
   Greater than "1" = malfunction in system.

5. Press start button again for 2 to 4 seconds. If there are no further malfunctions in the system, the previously displayed number will reappear. If additional malfunctions exist, then the respective malfunction code will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Increase engine speed to 900 rpm for at least 5 seconds. Press start button again for 2 to 4 seconds while maintaining engine speed of 900 rpm.

8. Eliminate noted malfunctions (impulse readout) according to troubleshooting chart.

9. Perform tests of individual components.

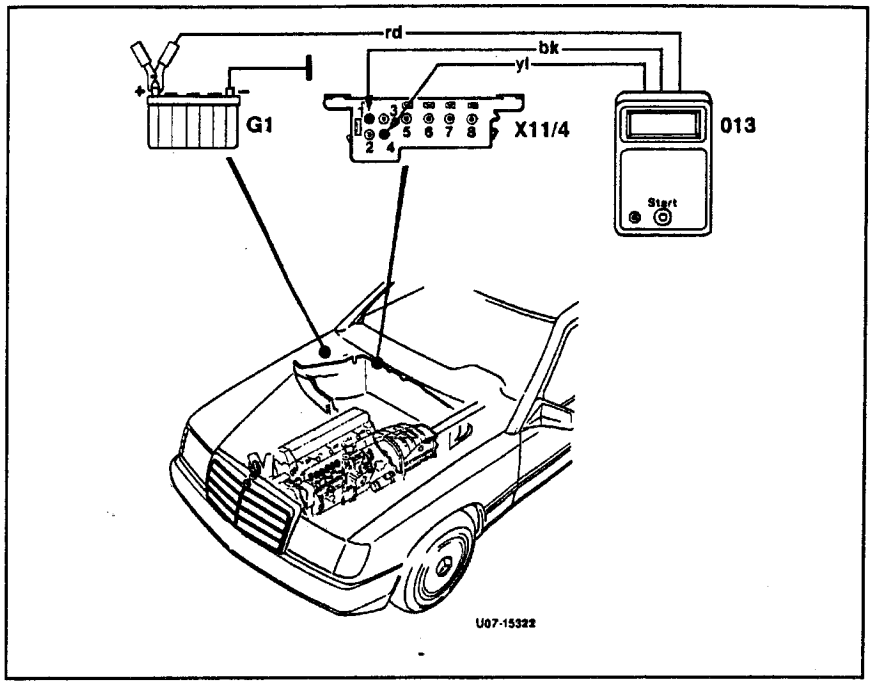
Erasing malfunction memory:
After eliminating a malfunction, the respective impulse readout must be cleared as follows:

10. Press start button and read out the malfunction.Then press the start button for 6 to 8 seconds.

Note:
Each malfunction displayed must be **erased individually**.

Specific Literature Recommendation: *Model Year 1990/91 Introduction Manual, Models 124.1 and 126.1 Turbodiesels, Group 07.1, EDS testing, and: Service Microfiche, Engine 602.96, 603.96/97 TURBO, Combustion II, Group 07.1, Job 07.1-190 "F"*

Connection diagram



Socket 4	EDS diagnostic readout
013	Impulse counter
X11/4	Data link connector

Malfunction table, impulse readout, EDS control unit

Impulse readout	Possible cause
1 [1]	No malfunctions in system
2	Fuel rack position sensor (L7)
3	Air flow sensor (B2/1)
4	EDS control unit (N39), atmospheric pressure sensor
5 [2]	EGR valve vacuum transducer (Y31/1) or malfunction in EGR control circuit
6	EDS control unit (N39), internal voltage supply
7	Starter ring gear speed sensor (L3)
8	Coolant temperature sensor (B11/4)
9	Intake air temperature sensor (B2/1a)
10	Not used
11 [3]	Electronic idle speed control actuator (Y22) or EGR valve vacuum transducer (Y31/1)
12	Not used
13	EDS control unit (N39) defective (internal malfunction memory)
14	EDS pressure sensor (B5/1) defective
15	Intake manifold air pressure control valve vacuum transducer (Y31/2), wastegate vacuum transducer (Y31/3), or malfunction in the intake manifold air pressure circuit.

1) If there are complaints nonetheless, perform function tests for electronic idle speed control, EGR and P2-control.
2) Displayed only after 900 rpm for at least 5 seconds.
3) Displayed only if there is a short circuit.

DTC readout (EDS)

Model Year 1992 - 1993

Model 124.128

Test conditions:

- Engine coolant temperature 60-80 °C
- A/C OFF
- Selector lever in "P" park position
- Overvoltage protection relay fuse intact

Testing with impise counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not refer to *Specific Literature Recommendation* listed below for location of detailed test.

2. **Engine at idle.**

3. Press start button for 2 to 4 seconds.

4. Read and note readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed number will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Eliminate noted faults (DTC readout) according to troubleshooting chart.

8. Perform tests of individual components.

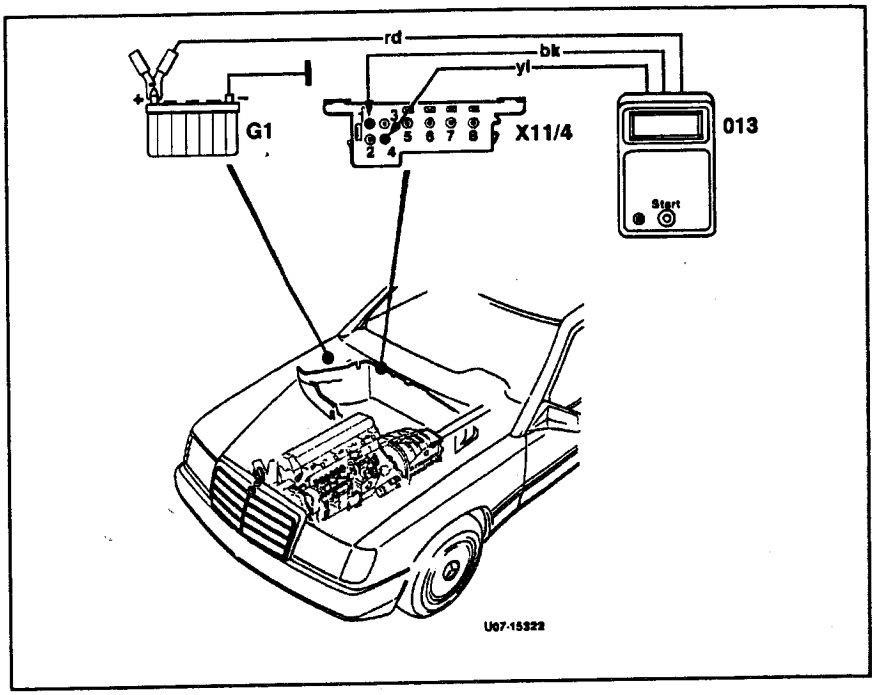
Erasing DTC memory:
After eliminating a fault, the respective DTC readout must be cleared as follows:

9. Press start button and read out the eliminated fault. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

Specific Literature Recommendation: *Model Year 1992 Introduction Manual, Models 124, 129 and 201, Group 07.1, EDS testing, and Service Microfiche, Engine 602.96, 603.96/97 TURBO, Combustion II, Group 07.1, Job*

Connection diagram



Socket 4	EDS DTC read out
013	Impulse counter scan tool
G1	Battery
X11/4	Data link connector

Fault table, readout, EDS control module,

DTC readout	Possible cause
1 [1]	No faults in system
2	Fuel rack position sensor (L7)
3	Volume air flow sensor (B2/1)
4	EDS control module (N39), barometric pressure sensor
5	EGR valve vacuum transducer (Y31/1) or fault in EGR control circuit
6	EDS control module (N39), internal voltage supply
7	Starter ring gear speed sensor (L3)
8	Engine coolant temperature sensor (B11/4)
9	Intake air temperature sensor (B2/1a)
10	Voltage supply
11 [2]	Idle speed control actuator (Y22) or EGR valve vacuum transducer (Y31/1)
12	Not used
13	EDS control module (N39) defective (internal memory)
14	EDS pressure sensor (B5/1) defective
15	Boost pressure control/pressure control flap vacuum transducer (Y31/5) or defect in boost pressure control circuit.

1) If there are complaints nonetheless, perform function tests for idle speed control, EGR and P2-control.
2) Displayed only if there a short circuit.

DTC readout (EDS)

Model Years 1986 – 1987

Models 124.133 126.125 124.193

Test conditions:

- Coolant temperature 60-80 °C
- Automatic Climate Control OFF
- Selector lever in Park
- Overvoltage protection relay fuse intact

Testing with On-off ratio tester.

Note: When performing this test the air intake hose between the air flow sensor (B2/1) and the turbocharger must be connected, otherwise no signal will be sent to the EDS control unit (N39) for exhaust gas recirculation (EGR) and air recirculation.

1. Connect On-off ratio tester according to connection diagram, press button IR 100%.

2. **Engine at idle.**

Note:
Check tester function by connecting plug (a) to vehicle ground for approx. 1 sec. The needle should oscillate to 100% and then back to 0%.

No fault in system = reading approx. 0%

Fault in system = reading approx. 100%

3. Trigger signal for system diagnosis: Connect plug (a) for approx. 1 sec. to vehicle ground. After plug (a) is removed from ground, the On-off ratio tester needle goes to 0% and starts to oscillate in regular intervals. Each oscillation has to be counted. **If a fault exists in the system, the needle will again go to the 100% reading.**

Note:
One oscillation = 0% - 100% - 0%.

4. Increase engine speed above 1200 rpm for at least 5 seconds. While maintaining this engine speed, once again connect plug (a) for approx. 1 sec. to vehicle ground. Record number of tester oscillations.

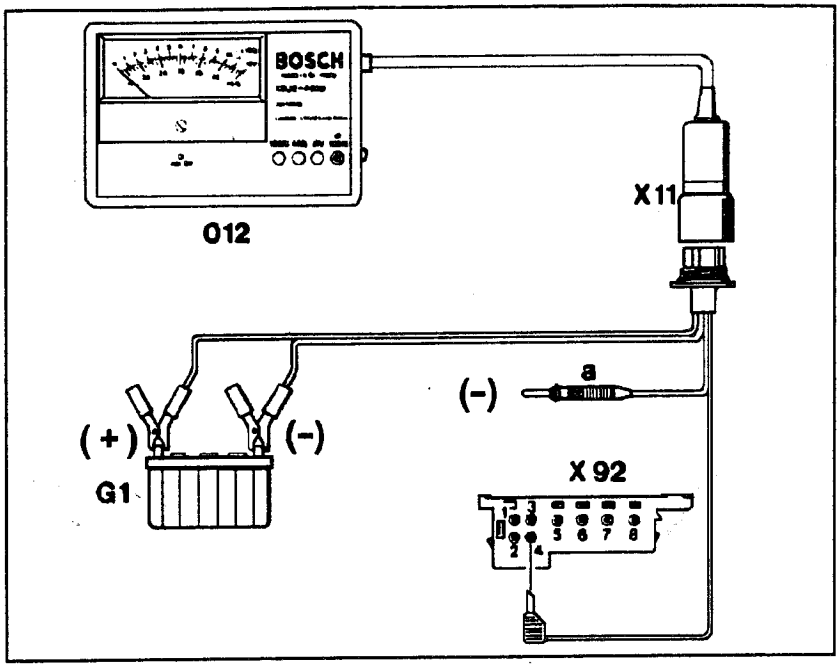
5. The number of oscillations indicates which electrical component is faulty, note all malfunctions from on- off ratio test.

6. Eliminate all noted malfunctions according to troubleshooting chart and diagnostic tests.

7. After eliminating all malfunctions, repeat steps 2, 3 and 4 to verify that no other system malfunctions exist.

Specific Literature Recommendation: *Model Year 1986 Introduction Manual, Engine 603.961 in Model 126.125, Group 07.1, EDS testing, and: Model Year 1987 Introduction Manual, Models 124.133 and 124.193, Group 07.1, EDS testing, and: Service Microfiche, Engine 602.96, 603.96/97 TURBO,Combustion II, Group 07.1, Job 07.1-190*

Connection diagram



Socket 4	EDS diagnostic readout
G1	Battery
012	On-off ratio tester
X11/4	Data link connector
X11	Diagnostic Socket

Malfunction table, EDS diagnostics using On-off ratio tester

Number of oscillations	Possible cause
1x	Rpm sensor (L3)
2x	Fuel rack position sensor (L7)
3x	Air flow sensor (B2/1), electric fault
4x	Altitude correction capsule (B18)
5x [1]	EGR circuit – electrical and mechanical faults a. EGR valve (60) b. Vacuum transducer (Y31/1) c. Air flow sensor (B2/1) d. Air recirculating valve (137b) e. Vacuum transducer (Y31) or clogged filter of vent line (62a)
8x	Coolant temperature sensor (B11/4)
9x	Intake air temperature sensor (B2/1a) in air flow sensor
10x	Reference resistor (R18/2), EGR
11x	Trimming plug (R18/1), electronic idle speed control

[1] Reading only at 1200 for at least 5 sec, otherwise no readout.

DTC readout (EDS)

Model Years 1990 – 1991

Models 126.134
126.135

Test conditions:

- Coolant temperature 60-80 °C
- Automatic Climate Control OFF
- Selector lever in Park
- Overvoltage protection relay fuse intact

Testing with impulse counter:

Caution:
Do not disconnect battery, overvoltage protection relay or EDS control unit (N39) before or while using the impulse counter, otherwise any stored malfunctions will be erased from memory.

1. Connect impulse counter according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for location of detailed test.

2. **Engine at idle.**

3. Press start button for 2 to 4 seconds.

4. Read and note impulse readout displayed.
   Display "1" = no malfunction stored,
   Greater than "1" = malfunction in system.

5. Press start button again for 2 to 4 seconds. If there are no further malfunctions in the system, the previously displayed number will reappear. If additional malfunctions exist, then the respective malfunction code will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Run engine at 900 rpm for at least 5 seconds. While maintaining engine speed of 900 rpm push start button again for 2 to 4 seconds .

8. Note any additional malfunctions from impulse readout.

9. Eliminate all noted malfunctions according to troubleshooting chart and diagnostic tests.

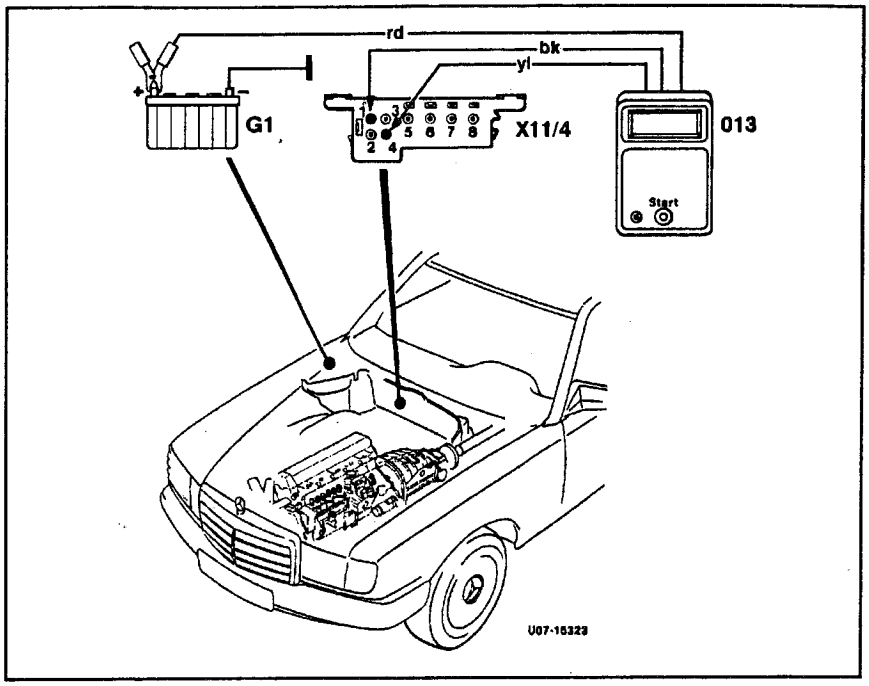
Erasing malfunction memory:
After eliminating a malfunction, the respective impulse readout must be cleared as follows:

10. Press start button and read out the eliminated malfunction. Then press the start button for 6 to 8 seconds.

Note:
Each malfunction displayed must be **erased individually**.

Specific Literature Recommendation: *Model Year 1990/91 Introduction Manual, Models 124.1 and 126.1 Turbodiesels, Group 07.1, EDS testing, and Service Microfiche, Engine 602.96, 603.96/97 TURBO, Combustion II,*

Connection diagram



Socket 4	EDS diagnostic readout
013	Impulse counter
X11/4	Data link connector

Malfunction table, impulse readout, EDS control unit

Impulse readout	Possible cause
1 [1]	No malfunctions in system
2	Fuel rack position sensor (L7)
3	Air flow sensor (B2/1)
4	EDS control unit (N39), atmospheric pressure sensor
5 [2]	EGR valve vacuum transducer (Y31/1) or malfunction in EGR control circuit
6	EDS control unit (N39), internal voltage supply
7	Starter ring gear speed sensor (L3)
8	Coolant temperature sensor (B11/4)
9	Intake air temperature sensor (B2/1a)
10	Voltage supply
11 [3]	Electronic idle speed control actuator or EGR valve vacuum transducer (Y31/1)
12	Not used
13	EDS control unit (N39) defective (internal memory)
14	EDS Air pressure sensor (B5/1) defective
15	Intake manifold air pressure control valve vacuum transducer (Y31/2), wastegate vacuum transducer (Y31/3) or malfunction in intake manifold air pressure control circuit

1) If there are complaints nonetheless, perform function tests for electronic idle speed control, EGR and P2-control.
2) Displayed only after 900 rpm for at least 5 seconds. This malfunction is not stored.
3) Displayed only if there is a short circuit.

DTC readout (EDS)

Model Year 1992 - 1993

Model 140.134

Test conditions:

- Engine coolant temperature 60-80 °C
- A/C OFF
- Selector lever in "P" park position

Testing with impulse counter scan tool:

Caution:
Do not disconnect battery, unplug Base module (N16/1) or EDS control module (N39) before or while using the impulse counter scan tool, otherwise any stored DTCs will be erased from memory.

1. Connect the impulse counter scan tool according to the connection diagram.

Note:
LED "U-Batt" must light up, if not refer to *Specific Literature Recommendation* listed below for location of detailed test.

2. **Engine at Idle.** [1]

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed number will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Eliminate noted faults (DTC readout) according to troubleshooting chart.

8. Note any additional system faults.

9. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault, the respective DTC readout must be cleared as follows:

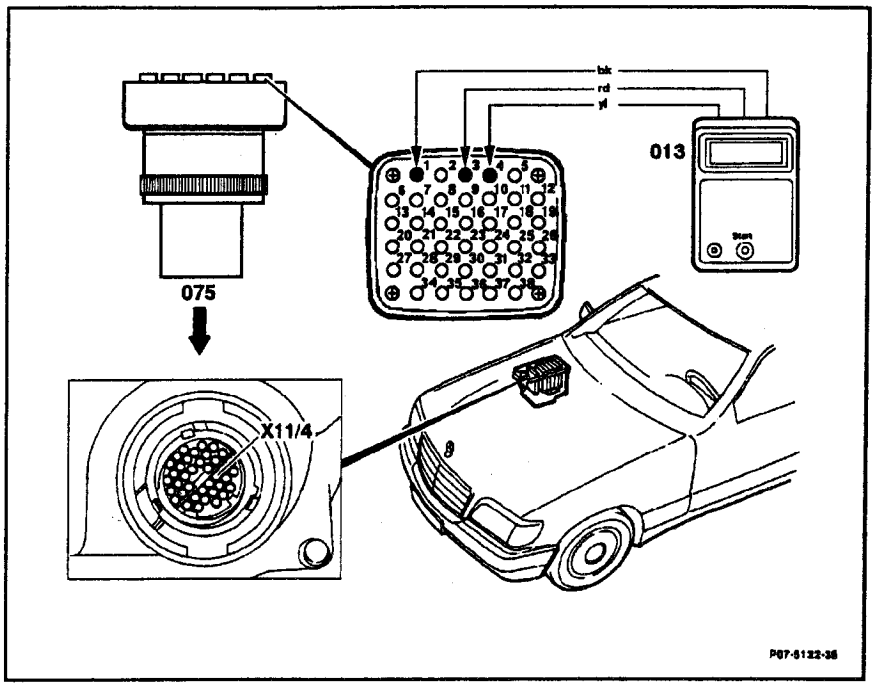
10. Press start button for 2 to 4 seconds and read out the eliminated fault. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

1) If the DTC memory is read using the impulse counter scan tool with the ignition ON and the engine not running, DTC readout "7" (starter ring gear speed or RPM sensor - L3) will appear.

Specific Literature Recommendation: Model Year 1992 Introduction Manual, Model 140, Group 07.1,

Connection diagram



Socket 4	EDS DTC readout
013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Fault table, DTC readout ,EDS control module

DTC readout	Component/fault circuit
1 [1]	No faults in system
2	Fuel rack position sensor (L7)
3	Volume air flow sensor (B2/1)
4	EDS control module (N39), atmospheric pressure sensor
5	EGR valve vacuum transducer (Y31/1) or fault in EGR control circuit
6	EDS control module (N39), internal voltage supply
7	Starter ring gear speed, sensor (L3)
8	Engine coolant temperature sensor (B11/4)
9	Intake air temperature sensor (B2/1a)
10	Voltage supply
11 [2]	Electronic idle speed control actuator (Y22), boost pressure cut-out switchover valve (Y31/6) or EGR valve vacuum transducer (Y31/1)
12	Not used
13	EDS control module (N39) defective (internal memory)
14	EDS pressure sensor (B5/1) defective
15	Boost pressure control vacuum transducer (Y31/4) defective or defect in boost pressure control circuit

1) If there are complaints nonetheless, perform function tests for electronic idle speed control and EGR control.
2) Displayed only if there is a short circuit.

On-off ratio test (CIS-E)

Model Year 1987

Model 201.028

Testing with On-off ratio tester:

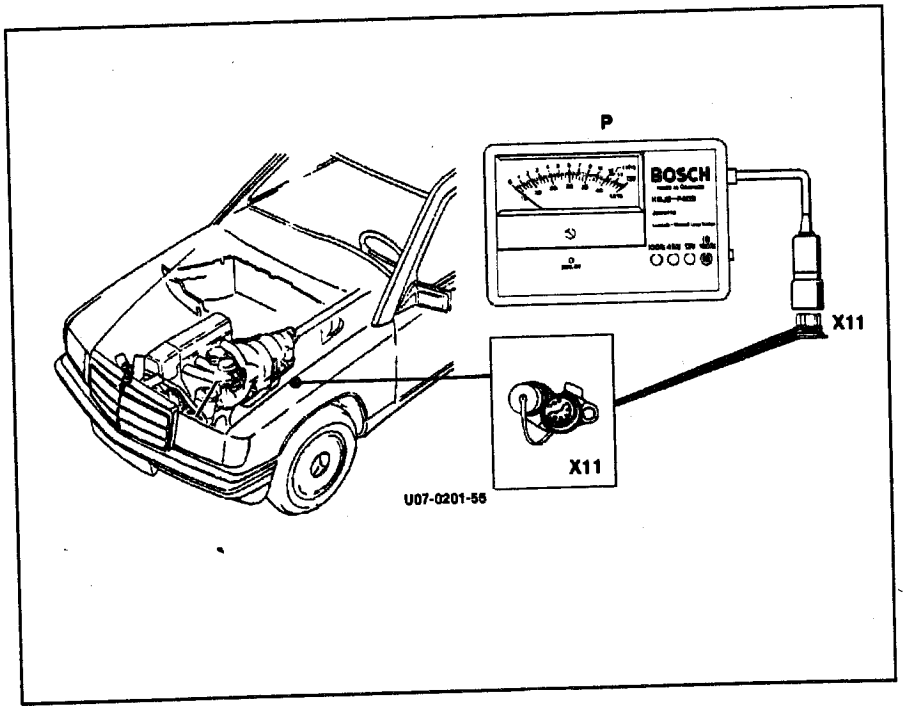
Various components of the CIS-E injection system are checked via the microprocessor in the CIS-E control unit. The failure codes are transmitted via the lambda measuring circuit of the diagnostic socket and are shown on the On-off ratio tester. The fixed On-off ratio indicates possible malfunctions. The following table lists the relationship between the fixed On-off ratio, the cause of the failure and the respective tests to be performed.

Test conditions:

- Engine at idle
- Coolant temperature 60-80 °C
- Tempmatic Climate Control OFF
- Selector lever in Park
- Overvoltage protection relay fuse intact

Connect On-off ratio tester to diagnostic socket (X11) according to connection diagram.

Connection diagram



P	On-off ratio tester
X11	Diagnostic

Specific Literature Recommendation: *Service Microfiche, Engine 102, Combustion IIIb, Group 07.3, Job 07.3-121 "F" section "g)",and: Diagnostic Manual Volume 2, Gasoline Engines, Engine 102, Test GE-04.00 and: Model Year 1987 Introduction Manual, Models 107, 124, 126 and 201,*

Malfunction table, On-off ratio, CIS-E

On-off ratio	Possible cause of failure	Tests to be performed
0%	• CIS-E control unit (N3) receives no voltage or is defective, • circuit to diagnostic socket (X11), terminal 3, open or On-off ratio tester (012) defective, • air/fuel mixture too rich. O_2-sensor signal voltage is + 12 volts.	Check voltage supply, ground connection and wires to diagnostic socket. Check On-off ratio tester (012). Check O_2 sensor signal.
10%	• Air flow sensor position indicator (B2) defective or polarity reversed, • idle speed approx. 2000 rpm, Wires in plug of throttle valve switch (S29/2) incorrectly connected or short circuit (full load contact closed before engine reaches full load).	Check (B2) signal and routing of wires. Check (S29/2) and wire connections according to wiring diagram (Defective idle contact, ignition timing advanced approx. 10°).
20%	• Full load contact polarity reversed or defective, reading at 20% only with microswitch activated .	Check full load contact (S29/2).
30%	• Short or open circuit between CIS-E control unit (N3) and coolant temperature sensor (B11/2), coolant temperature sensor defective.	Check (B11/2).
40%	• Short or open circuit to air flow sensor position indicator (B2) or air flow sensor position indicator defective, increased idle speed.	Check (B2).
50%	• O_2-sensor (G3/2) not at operating temperature, open circuit or defective.	Check engine operating temperature. Check (G3/2).
60%	Not used	-
70%	• No TD signal (open circuit) at CIS-E unit.	Check TD signal.
80%	• Short or open circuit to altitude correction capsule (B18) or capsule defective.	Check (B18).
90%	Not used	-
100%	• Air fuel mixture too lean, • O_2 sensor defective (short circuit to ground), • CIS-E control unit (N3) or On-off ratio tester defective, • defective overvoltage protection relay (K1/1), no voltage supply, increased idle speed.	Check adjustment of Lambda control and O_2 sensor signal. Check power supply.
Oscill-ations	No malfunction within the circuit of the monitored signals. On-off ratio reading indicated.	-

DTC readout (CIS-E)

Model Year 1988 (California version only)

Model 201.028

On-board diagnostic system (California version only)

The CIS-E control unit monitors emission control components that either provide input signals to or receive output signals from the control unit. Malfunctions resulting from open circuits or failure of any of these components are indicated by the CHECK ENGINE indicator light in the instrument cluster and are simultaneously stored in the CIS-E control unit memory.

Testing with on-board diagnostic system:

An on-board test connection (X92) with a pushbutton (2) and light emitting diode (LED) is located on the engine compartment firewall.

Note:
Do not disconnect battery, overvoltage protection relay or CIS-E control unit, otherwise any stored malfunctions will be erased from malfunction memory.

1. If preferred, connect impulse counter according to connection diagram.
2. **Ignition: ON**
3. Press LED pushbutton or impulse counter pushbutton for 2 to 4 seconds.
4. Count and note the number of LED blink impulses or impulse display.
5. Press LED pushbutton or impulse counter pushbutton again for 2 to 4 seconds. If no further malfunctions are detected, the CIS-E control unit (N3) will switch over to the Lambda on-off ratio readout mode.
6. Eliminate any noted malfunctions (blink codes) according to the troubleshooting chart and diagnostic tests.

Erasing malfunction memory:
If a malfunction is corrected without disconnecting the CIS-E control unit in the process, the malfunction memory must be erased as follows:

7. After an impulse readout, wait 2 seconds then press the pushbutton for at least 6 seconds.

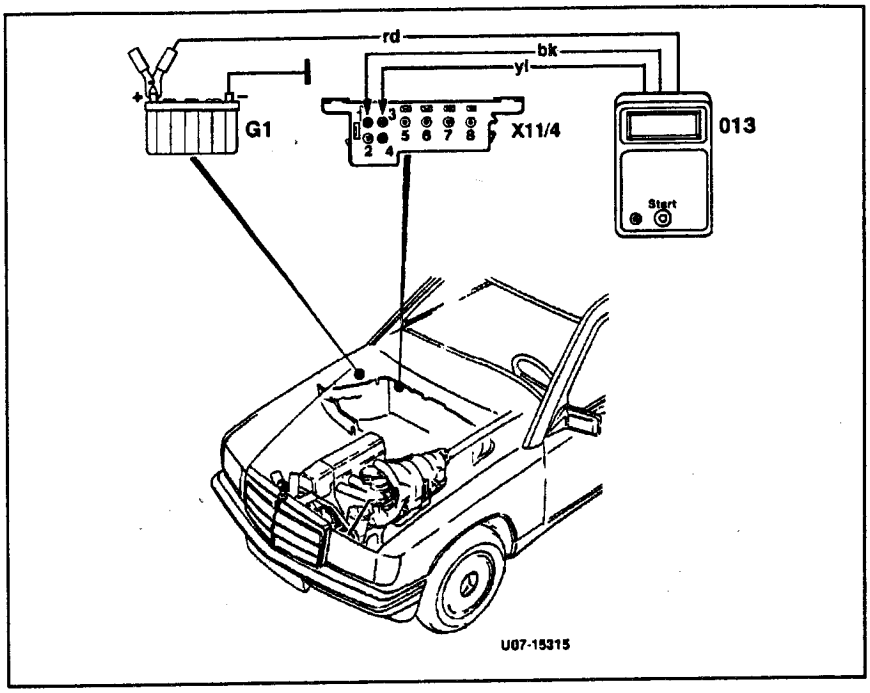
Note:
Each malfunction stored in memory must be **erased individually**.

8. If the LED blinks once or impulse display is "1", all stored malfunctions are erased.

Note:
In order to test the Lambda control system on-off ratio, the CIS-E control unit (N3) must be switched over to the Lambda readout mode by first pressing the pushbutton to read out any malfunction impulse readouts, then pressing the pushbutton again for 2 to 4 seconds. If no further malfunctions are detected, the CIS-E control unit (N3) will switch over to the Lambda on-off ratio readout mode.
Afterwards, the ignition key must then be turned **OFF and ON** for CIS-E to resume normal operation.

Specific Literature Recommendation: Model Year 1988 Introduction Manual, Models 107, 124, 126, 201, Engine 102.985, Group 07.3, CIS-E testing, and: Service Microfiche, Engine 102, Combustion IIIb, Group 07.3, Job 07.3-121 "F" section "m".

Connection diagram



Socket 3	CIS-E Diagnostic readout
013	Impulse counter
G1	Battery
X11/4	Data link connector

Malfunction table, Impulse readout, CIS-E (California version only)

Impulse readout	Possible cause
1	No malfunctions in system
2	Full load contact, throttle valve switch (S29/2)
3	Coolant temperature sensor (B11/2)
4	Air flow sensor position indicator (B2)
5	O_2-sensor (G3/2)
6	Not used
7	TD-signal
8	Altitude correction capsule (B18)
9	Electrohydraulic actuator (EHA) (Y1)
10	Idle contact, throttle valve switch (S29/2)

DTC readout (CFI)

Model Years 1991 – 1993

Model 201.028

Testing with impulse counter scan tool:

Caution:
Do not disconnect battery, overvoltage protection relay or CFI control module (N3) before or during impulse counter scan tool use, otherwise the stored DTC will be erased from memory. In comparison to California version vehicles, the Federal version test connection for diagnosis (X11/4) has **no pushbutton with LED.**

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" in display must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout.
   Display "1" = no fault stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault, the respective DTC readout must be cleared as follows:

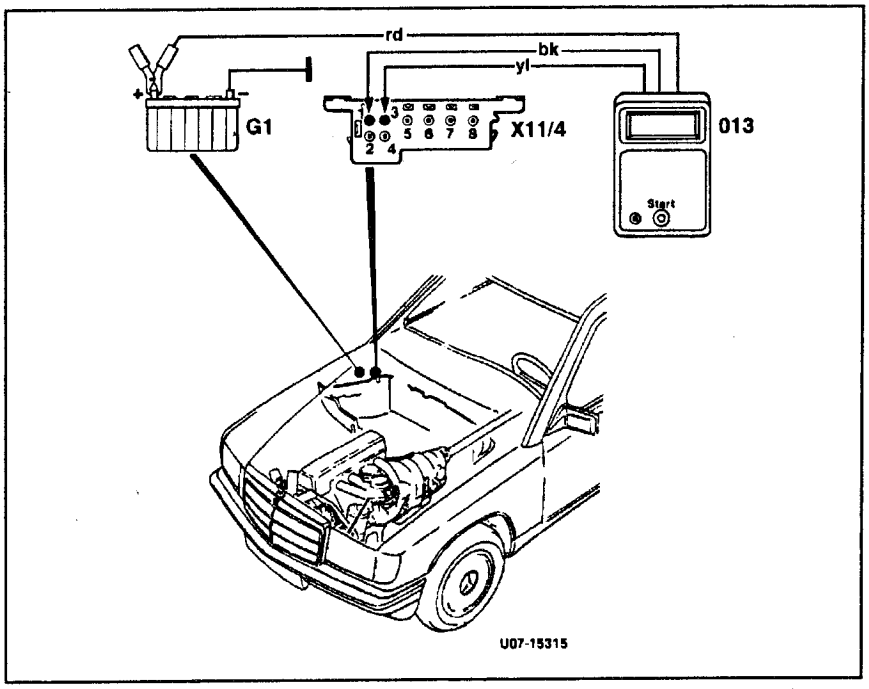
9. Press start button for 2 to 4 seconds and read out the fault. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually.**

If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Model Year 1991 Introduction Manual Model 201.028, Group 07.3, and: Diagnostic Manual, Volume 2, Engine 102, Test GF-04.00, Section "B", and: Service Microfiche, Engine 102

Connection diagram



Socket 3	CFI DTC readout
013	Impulse counter scan tool
G1	Battery
X11/4	Data link connector (DTC readout, 8-pole)

Fault table, DTC readout, CFI

DTC readout	Possible cause
1	No faults in system
2	Wide open throttle/closed throttle position throttle position switch (S29/2)
3	Engine coolant temperature sensor (B11/2)
4	Volume air flow sensor position indicator (B2)
5	Oxygen sensor (G3/2)
6	Not used
7	TD (RPM signal)
8	Altitude correction capsule (B18)
9	Electrohydraulic actuator (EHA) (Y1)
10	Wide open throttle/closed throttle position throttle positionswitch (S29/2)
12 [1)]	EGR temperature sensor (B21)

1) Only on California version vehicles

On-off ratio test (CIS-E)

Model Year 1987

Models 124.026 201.029
124.030

Testing with On-off ratio tester:

Various components of the CIS-E injection system are checked via the microprocessor in the CIS-E control unit. The failure codes are transmitted via the lambda measuring circuit of the diagnostic socket and are shown on the On-off ratio tester. The fixed On-off ratio indicates possible malfunctions. The following table lists the relationship between the fixed On-off ratio, the cause of the failure and the respective tests to be performed.

Test conditions:

- Engine at idle
- Coolant temperature 60-80 °C
- Automatic Climate Control OFF
- Selector lever in Park
- Overvoltage protection relay fuse intact

1. Connect On-off ratio tester to diagnostic socket (X11) according to connection diagram below.

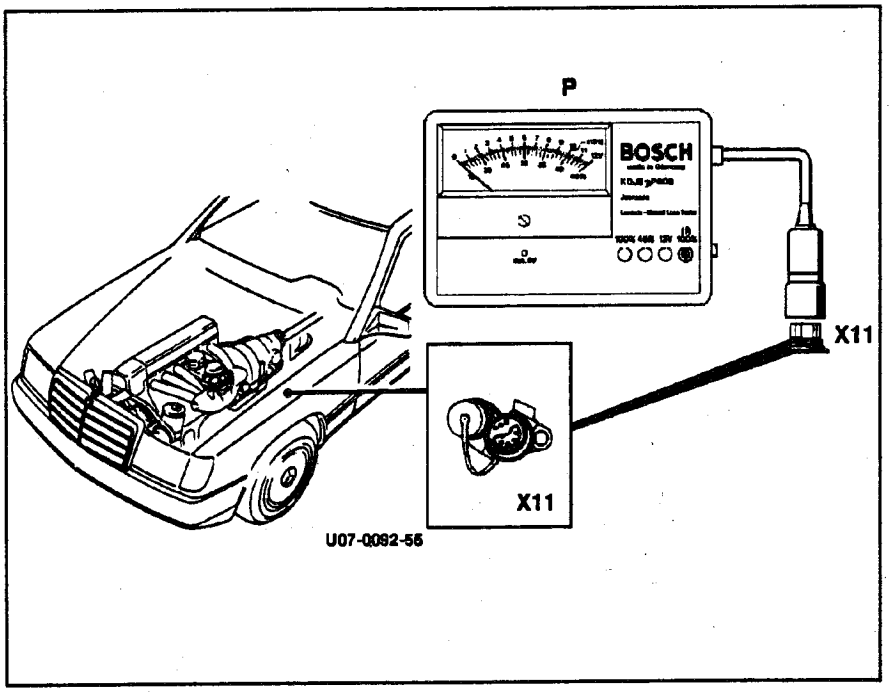
2. **Engine: at IDLE.**

3. If needle of On-off ratio tester does not oscillate, refer to malfunction table.

Note:
Oscillating On-off ratio tester needle indicates no malfunctions in system.

Note:
Refer to *Specific Literature Recommendation* listed below for location of detailed test.

Connection diagram



P On-off ratio tester
X11 Diagnostic socket

Specific Literature Recommendation: *Model Year 1987 Introduction Manual, Models 107, 124, 126 and, Group 07.3, CIS-E testing, Diagnostic Manual Vol. 2, Gasoline Engines, Engine 103, Test GE-07.00, Lambda control system quick test and: Service Microfiche, Engine 103, Combustion I, Group 07.3, Job 07.3-121, section "B".*

Malfunction table, CIS-E, On-off ratio

On-off ratio	Possible cause of failure	Tests to be performed
0%	• CIS-E control unit (N3) receives no voltage or is defective, • circuit to diagnostic socket (X11), terminal 3, open or On-off ratio tester (012) defective, • air/fuel mixture too rich. O_2-sensor signal voltage is +12 volts.	Check voltage supply, ground connection and wires to diagnostic socket. Check On-off ratio tester. Check O_2 sensor signal.
10%	• Air flow sensor position indicator (B2) defective or polarity reversed. Idle speed approx. 2000 rpm, • wires in plug of throttle valve switch (S29/2) incorrectly connected or short circuit (full load contact closed before engine reaches full load).	Check air flow sensor position indicator signal and routing of wires. Check (S29/2) and wire connections according to wiring diagram. (Defective idle contact, ignition timing advanced approx. 10°).
20%	• Full load contact polarity reversed or defective. Reading at 20% only with activated microswitch.	Check (S29/2).
30%	• Short or open circuit between CIS-E control unit (N3) and coolant temperature sensor (B11/2), coolant temperature sensor defective.	Check (B11/2).
40%	• Short or open circuit to air flow sensor position indicator (B2) or air flow sensor position indicator defective. Increased idle speed.	Check (B2).
50%	• O_2-sensor (G3/2) not at operating temperature, open circuit or defective.	Check engine operating temperature. Check (G3/2).
60%	Not used	-
70%	• No TD signal (circuit open) at CIS-E unit.	Check TD signal.
80%	• Short or open circuit to altitude correction capsule (B18) or capsule defective.	Check (B18).
90%	Not used	-
100%	• Air fuel mixture too lean, • O_2 sensor (G3/2) defective (short circuit to ground), • CIS-E control unit (N3) or on off ratio tester (012) defective, • defective overvoltage protection relay (K1), no voltage supply. Increased idle speed.	Check adjustment of lambda control and O_2 sensor signal. Check power supply.

DTC readout (CIS-E)

Model Year 1988 – 1989 (California version only)

Models 124.026 126.024 201.029
124.030 126.025
124.050
124.090

Testing with impulse counter:

Caution:
Do not disconnect battery, overvoltage protection relay or CIS-E control unit (N3) before or during impulse counter use, otherwise any stored malfunction will be erased from memory.

1. Connect impulse counter according to connection diagram.

Note:
LED "U-Batt" must light up, if not refer to *Specific Literature Recommendation* listed below for location of detailed test.

2. **Ignition ON.**

3. Press start button for 2 to 4 seconds.

   Read and note impulse readout displayed.
   Display "1" = no malfunction stored,
   Greater than "1" = malfunction in system.

5. Press start button again for 2 to 4 seconds. If there are no further malfunctions in the system, the previously displayed number will reappear. If additional malfunctions exist, then the respective malfunction code will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Note any additional malfunctions from impulse readout.

8. Eliminate all noted malfunctions (impulse readout) according to troubleshooting chart and diagnostic tests.

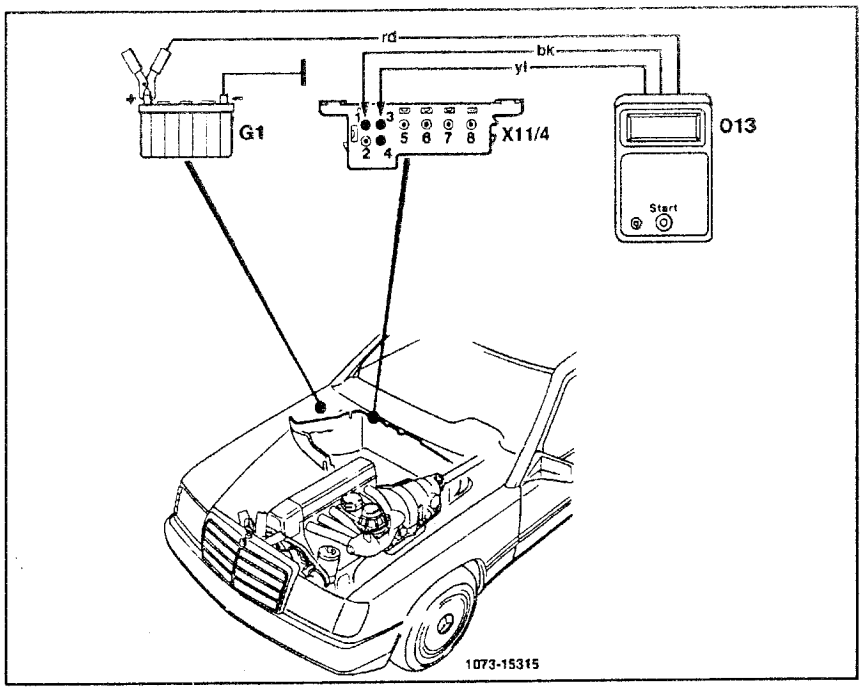
Erasing malfunction memory:
After eliminating a malfunction, the respective impulse readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the malfunction. Then press the start button for 6 to 10 seconds.

Note:
Each malfunction displayed must be **erased individually**.

Specific Literature Recommendation: *Model Year 1988 Introduction Manual, Models 107, 124, 126, Group 07.3, CIS-E testing, and: Diagnostic Manual Vol.2, Gasoline Engines, Engine 103, Test GE-07.00, Lambda control system quick test,*

Connection diagram



Socket 3	CIS-E diagnostic readout
013	Impulse counter
G1	Battery
X11/4	DLC (8-pole)

Malfunction table, impulse readout, CIS-E

Impulse readout	Possible cause
1	No malfunctions in system
2	Full load contact, throttle valve switch (S29/2)
3	Coolant temperature sensor (B11/2)
4	Air flow sensor position indicator (B2)
5	O_2-sensor (G3/2)
6	Not used
7	TD-signal
8	Altitude correction capsule (B18)
9	Electrohydraulic actuator (EHA) (Y1)
10	Idle contact, throttle valve switch (S29/2)

On-off ratio test (CIS-E)

Model Years 1988 - 1989

Models 124.026 126.024 201.029
124.030 126.025
124.050
124.090

Testing with On-off ratio tester:

Various components of the CIS-E injection system are checked via the microprocessor in the CIS-E control unit. The failure codes are transmitted via the lambda measuring circuit of the diagnostic socket and are shown on the On-off ratio tester. The fixed On-off ratio indicates possible malfunctions. The following table lists the relationship between the fixed On-off ratio, the cause of the failure and the respective tests to be performed.

Test conditions:

- Engine at idle
- Coolant temperature 60-80°C
- Automatic Climate Control OFF
- Selector lever in Park
- Overvoltage protection relay fuse intact

1. Connect On-off ratio tester to diagnostic socket (X11) according to connection diagram below.

2. **Ignition ON**
   70% Federal version control unit
   85% California version control unit

3. **Engine: at IDLE.**

4. If needle of On-off ratio tester does not oscillate, refer to malfunction table.

Note:
Oscillating On-off ratio tester needle indicates no malfunctions in system.

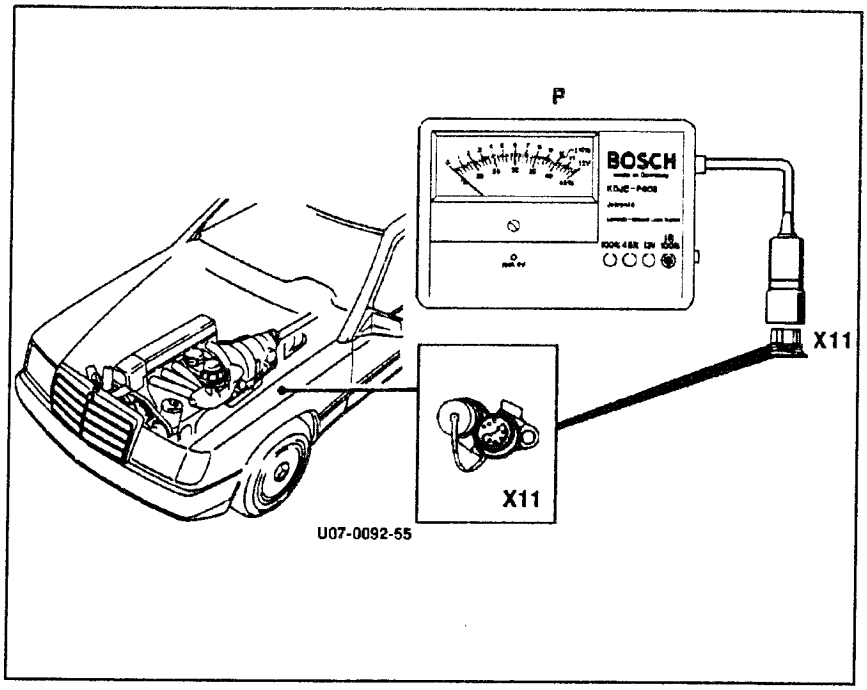
Note:
Refer to *Specific Literature Recommendation* listed below for location of detailed test.

Specific Literature Recommendation: *Model Year 1988 Introduction Manual, Models 107, 124, 126, Group 07.3, CIS-E testing, and: Diagnostic Manual Vol. 2, Gasoline Engines, Engine 103, Test GE-07.00, Lambda control system quick test,*

Connection diagram

Model 124

(Model 126, 201 similar)



P On-off ratio tester
X11 Diagnostic socket

Malfunction table, On-off ratio, CIS-E

On-off ratio %	Possible cause
0%	CIS-E control unit (N3) receives no voltage or is defective
10%	Idle speed contact (S29/2)
20%	Full load contact (S29/2)
30%	Coolant temperature sensor (B11/2)
40%	Air flow sensor position indicator (B2)
50%	O_2-sensor (G3/2)
60%	Not used
70%	TD signal
80%	Altitude correction capsule (B18)

On-off ratio test (CFI)

Model Years 1990 - 1993

Models 124.026 126.024 201.029
124.030 126.025
124.090
124.230
124.290

Fault memory
Faults which occur with the engine running are recorded into memory only if they have occurred after 4 sequential engine starts. This prevents a fault from being recorded if it occurred only once. If, for example, a fault occurred only 3 times, then the fault counter will be cleared again after a certain number of engine starts.

Only faults which prevent starting of the engine or severely influence engine operation are immediately stored in memory. The fault memory is not erased if the battery is disconnected.

Recalling fault memory with On-off ratio tester
Stored fault's can be recalled with the On-off ratio tester at the diagnostic test connection (X11)

On-off ratio test: Ignition ON

Test conditions:
- Engine coolant temperature approx. 80 °C
- A/C OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram

2. **Engine: OFF**

3. **Ignition: ON**

Testing Lambda control system with On-off ratio tester.
The operation of the Lambda control system can be checked with the On-off ratio test. The On-off ratio test can also be used to identify momentary faults not stored in fault memory. Faults are distinguished between those that occur with the ignition on and those that occur with the engine at idle. The On-off ratio can be checked with the On-off ratio tester or with the diagnostic test unit. A readout of 50% or an oscillating needle indicates that all input signals and the Lambda control unit are ok. Readouts of 10% to 90% refer to a particular fault source (see Fault Tables). In addition, after testing the On-off ratio, an DTC readout **must be performed** using the impulse counter scan tool.

On-off ratio test: Engine at idle

Test conditions:
- Engine coolant temperature approx. 80 °C
- A/C OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram

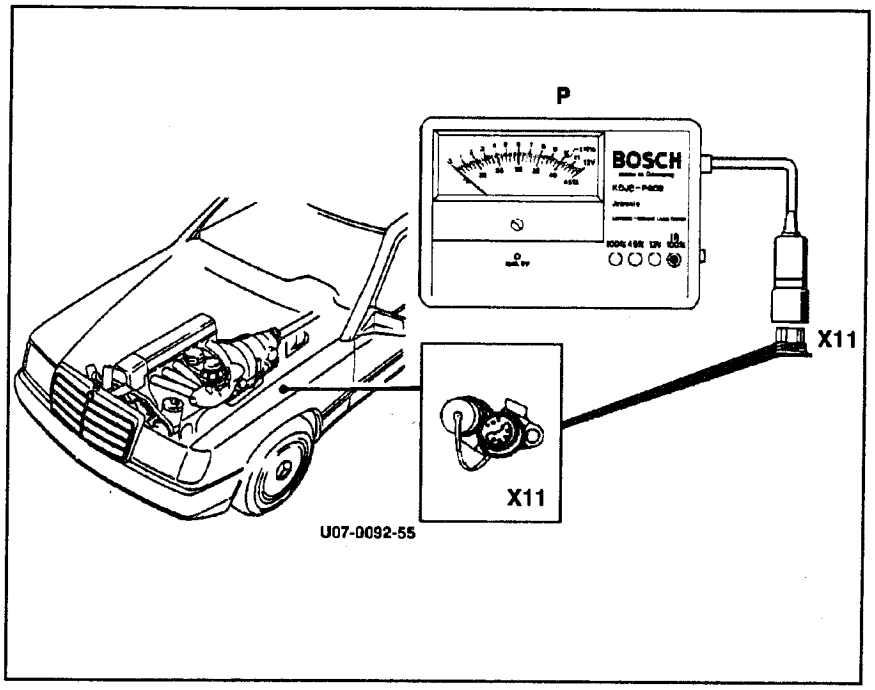
2. **Ignition: ON**

3. **Engine: At idle**

Specific Literature Recommendation: Model Year 1990 Introduction Manual, Models 124.0, 126.0, 201, Group 07.3, CIS-E testing, sections "D" and "E"

Connection diagram

(Model 124 shown)



P On-off ratio
X11 Diagnostic socket

Fault table, On-off ratio test, Ignition: ON

On-off ratio %	Possible cause
0%	Not used
10%	Wide open throttle/closed throttle position throttle position switch (S29/2) closed throttle position contact open
20%	Wide open throttle/closed throttle position throttle position switch (S29/2) wide open throttle contact closed
30%	Engine coolant temperature < 70 °C or > 100 °C
40%	Volume air flow sensor plate (B2) deflected
50%	Input signals ok
60%	Speed signal recognized
70%	Starter signal (circuit 50) recognized
80%	Transmission range
90%	Current at EHA (Y1) implausible
100%	Not used

Malfunction table, On-off ratio test, engine: at idle

On-off ratio %	Possible cause
0%	Ground at diagnostic connector (X11) socket 2 open. Open circuit in wire to socket 3 or 6 of diagnostic socket (X11) or On-off ratio defective. Mixture adjustment too rich.
10%	Volume air flow sensor position indicator (B2) polarity reversed or defective. Terminals of wide open throttle/closed throttle position throttle position switch (S29/2) connector (CTP and WOT) reversed or CTP open with microswitch closed
20%	WOT contact defective or wide open throttle/closed throttle position throttle position switch (S29/2) polarity reversed. 20% displayed only with activated microswitch (S27/2).
30%	Short or open circuit between CFI control module (N3) and engine coolant temperature sensor (B11/2), or defective engine coolant temperature sensor (B11/2), or excessive deviation in temperature values in comparison with ignition control module (N1/2)
40%	Open or short circuit in volume air flow sensor position indicator (B2) wiring or defective volume air flow sensor position indicator (B2)
50%	Oxygen sensor (G3/2) not operational or defective, open circuit
60%	Implausible vehicle speed signal at CFI control module (N3)
70%	Implausible TNA-signal (rpm) at CFI control module (N3)
80%	Interrupted data exchange between ignition control module (N1/2) and CFI control module (N3)
90%	Implausible current reading at EHA (Y1)
95%	Deceleration fuel shut-off is currently in operation
100%	No voltage or ground at CFI control module (N3) or CFI control module defective. On-off ratio defective. Lambda adjustment too lean Oxygen sensor defective (short circuit to ground).
Needle oscillates	No faults

On-off ratio test (CFI)

Model Years 1990 – 1993

Models 124.026 126.024 201.029
124.030 126.025
124.090
124.230
124.290

Fault memory
Faults which occur with the engine running are recorded into memory only if they have occurred after 4 sequential engine starts. This prevents a fault from being recorded if it occurred only once. If, for example, a fault occurred only 3 times, then the fault counter will be cleared again after a certain number of engine starts.

Only faults which prevent starting of the engine or severely influence engine operation are immediately stored in memory. The fault memory is not erased if the battery is disconnected.

Recalling fault memory with On-off ratio tester
Stored fault's can be recalled with the On-off ratio tester at the diagnostic test connection (X11)

On-off ratio test: Ignition ON

Test conditions:
- Engine coolant temperature approx. 80 °C
- A/C OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram

2. **Engine: OFF**

3. **Ignition: ON**

Testing Lambda control system with On-off ratio tester.
The operation of the Lambda control system can be checked with the On-off ratio test. The On-off ratio test can also be used to identify momentary faults not stored in fault memory. Faults are distinguished between those that occur with the ignition on and those that occur with the engine at idle. The On-off ratio can be checked with the On-off ratio tester or with the diagnostic test unit. A readout of 50% or an oscillating needle indicates that all input signals and the Lambda control unit are ok. Readouts of 10% to 90% refer to a particular fault source (see Fault Tables). In addition, after testing the On-off ratio, an DTC readout **must be performed** using the impulse counter scan tool.

On-off ratio test: Engine at idle

Test conditions:
- Engine coolant temperature approx. 80 °C
- A/C OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram

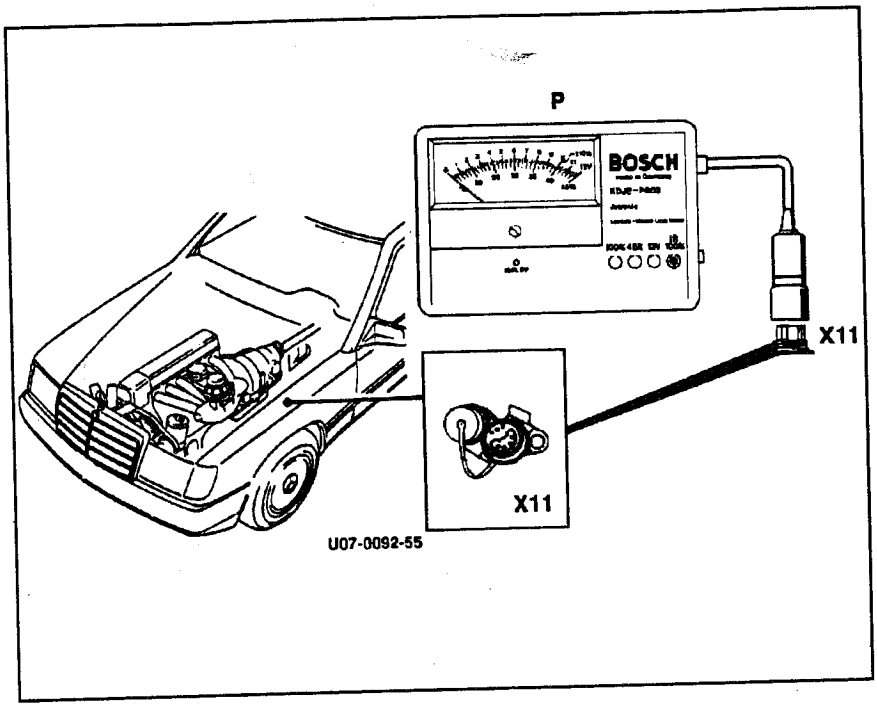
2. **Ignition: ON**

3. **Engine: At idle**

Specific Literature Recommendation: Model Year 1990 Introduction Manual, Models 124.0, 126.0, 201, Group 07.3, CIS-E testing, sections "D"and "E"

Connection diagram

(Model 124 shown)



P On-off ratio
X11 Diagnostic socket

Fault table, On-off ratio test, Ignition: ON

On-off ratio %	Possible cause
0%	Not used
10%	Wide open throttle/closed throttle position throttle position switch (S29/2) closed throttle position contact open
20%	Wide open throttle/closed throttle position throttle position switch (S29/2) wide open throttle contact closed
30%	Engine coolant temperature < 70 °C or > 100 °C
40%	Volume air flow sensor plate (B2) deflected
50%	Input signals ok
60%	Speed signal recognized
70%	Starter signal (circuit 50) recognized
80%	Transmission range
90%	Current at EHA (Y1) implausible
100%	Not used

Malfunction table, On-off ratio test, engine: at idle

On-off ratio %	Possible cause
0%	Ground at diagnostic connector (X11) socket 2 open. Open circuit in wire to socket 3 or 6 of diagnostic socket (X11) or On-off ratio defective. Mixture adjustment too rich.
10%	Volume air flow sensor position indicator (B2) polarity reversed or defective. Terminals of wide open throttle/closed throttle position throttle position switch (S29/2) connector (CTP and WOT) reversed or CTP open with microswitch closed
20%	WOT contact defective or wide open throttle/closed throttle position throttle position switch (S29/2) polarity reversed. 20% displayed only with activated microswitch (S27/2).
30%	Short or open circuit between CFI control module (N3) and engine coolant temperature sensor (B11/2), or defective engine coolant temperature sensor (B11/2), or excessive deviation in temperature values in comparison with ignition control module (N1/2)
40%	Open or short circuit in volume air flow sensor position indicator (B2) wiring or defective volume air flow sensor position indicator (B2)
50%	Oxygen sensor (G3/2) not operational or defective, open circuit
60%	Implausible vehicle speed signal at CFI control module (N3)
70%	Implausible TNA-signal (rpm) at CFI control module (N3)
80%	Interrupted data exchange between ignition control module (N1/2) and CFI control module (N3)
90%	Implausible current reading at EHA (Y1)
95%	Deceleration fuel shut-off is currently in operation
100%	No voltage or ground at CFI control module (N3) or CFI control module defective. On-off ratio defective. Lambda adjustment too lean Oxygen sensor defective (short circuit to ground).
Needle oscillates	No faults

DTC readout (CFI)

Model Years 1990 - 1993

Models 124.026 126.024 201.029
124.030 126.025
124.090
124.230
124.290

Testing with impulse counter scan tool:

Caution:
Do not disconnect battery, overvoltage protection relay or CFI control module (N3) before or during the impulse counter scan tool use, otherwise any stored faults will be erased from memory.

1. Connect impulse counter scan tool according to connection diagram.

Note:
Led "U-Batt" must light up. if not, refer to *specific literature recommendation* listed below for location of detailed test.

2. **Engine at idle.**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout.
display "1" = no faults stored,
greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault, the respective DTC readout must be cleared as follows:

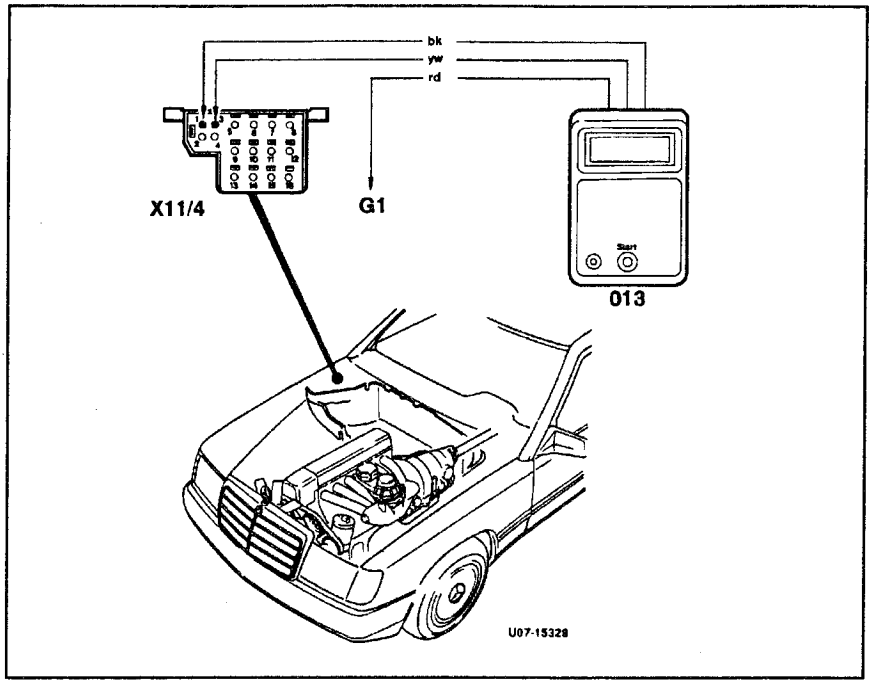
9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

Specific Literature Recommendation: *Model Year 1990 Introduction Manual, Models 124.0, 126.0, 201, Engine 103, Group 07.3, Checking electrical components, section "C".*

Connection diagram

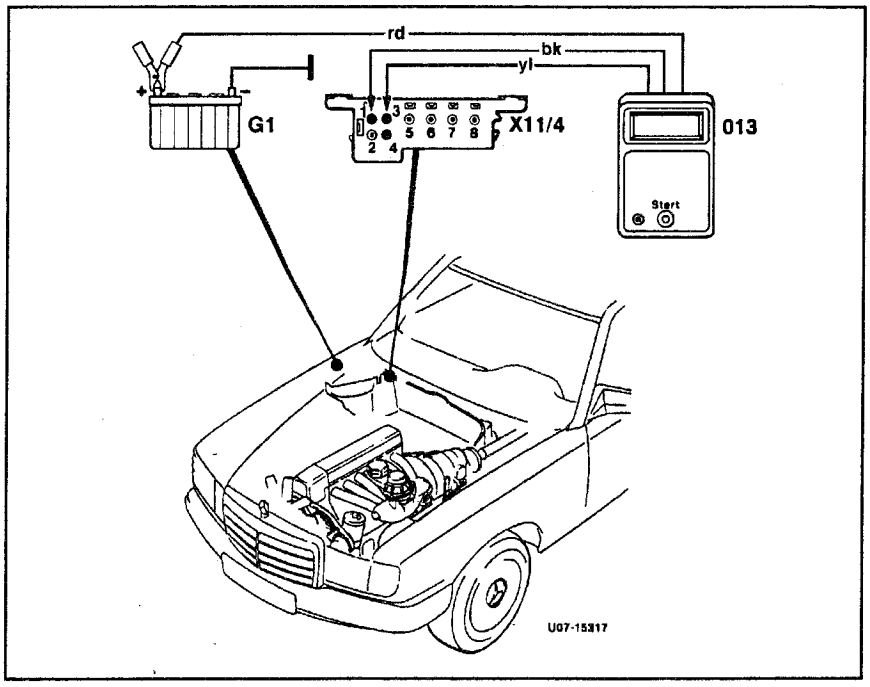
Models 124, 201



Socket 3	CFI DTC readout
013	Impulse counter scan tool
G1	Battery
X11/4	Data link connector

Connection diagram

Model 126



Socket 3	CFI DTC readout
013	Impulse counter scan tool
G1	Battery
X11/4	Data link connector (8-pole)

Fault table, DTC readout, CFI

DTC readout	Possible cause
1	No fault in system
2	Wide open throttle contact, wide open throttle/closed throttle position throttle position switch (S29/2) implausible
3	Engine coolant temperature signal read by CFI control module (N3)
4	Potentiometer voltage (B2) implausible
5	Oxygen sensor signal (G3/2) implausible
6	Not used
7	TNA-signal (rpm signal) read by CFI control module (N3)
8	Altitude pressure signal from ignition control module (N1/2) implausible
9	Current to EHA (Y1) is implausible
10	Closed throttle contact, wide open throttle/closed throttle position throttle position switch (S29/2) implausible
11	Air injection system
12	Absolute pressure values from EZL ignition control module (N1/2) are implausible
13	Intake air temperature reading (B17/2) is implausible
14	Vehicle speed signal read by CFI control module (N3) is implausible
15	Not used
16	EGR
17	Oxygen sensor (G3/2) is shorted to positive or ground
18	Current to idle air control valve (Y6) is implausible

Fault table, DTC readout, CFI (continued)

19	Not used
20	Not used
21	Not used
22	Oxygen-sensor (G3/2) heating current implausible
23	Short circuit to positive in purge switchover valve circuit (Y58/1)
24	Not used
25	Short circuit to positive in start valve (Y8) circuit
26	Short circuit to positive in upshift delay solenoid valve (Y3/2) circuit
27	Data exchange between CFI control module (N3) and ignition control module (N1/2) interrupted
28	Intermittent contact in engine coolant temperature sensor (B11/2) circuit
29	CFI (N3) and ignition control (N1/2) modules reading different engine coolant temperatures
30	Not used
31	Intermittent contact in intake air temperature sensor (B17/2)
32	Not used
33	Not used
34	Engine coolant temperature reading from ignition control module (N1/2) implausible

DTC readout (MAS)

Model Years 1990 – 1993

Models 124.026 126.024 201.029
124.030 126.025
124.090
124.230
124.290

Testing with Impulse counter scan tool:

Note: The engine systems (MAS) control module (N16) retains memory even with the battery disconnected or the control module unplugged.

1. Connect impulse counter scan tool according to connection diagrams.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Engine at idle.**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first displayed DTC is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readouts) according to troubleshooting chart and diagnostic tests.

Erasing DTC's from memory
After eliminating a fault the respective DTC readout must be cleared as follows:

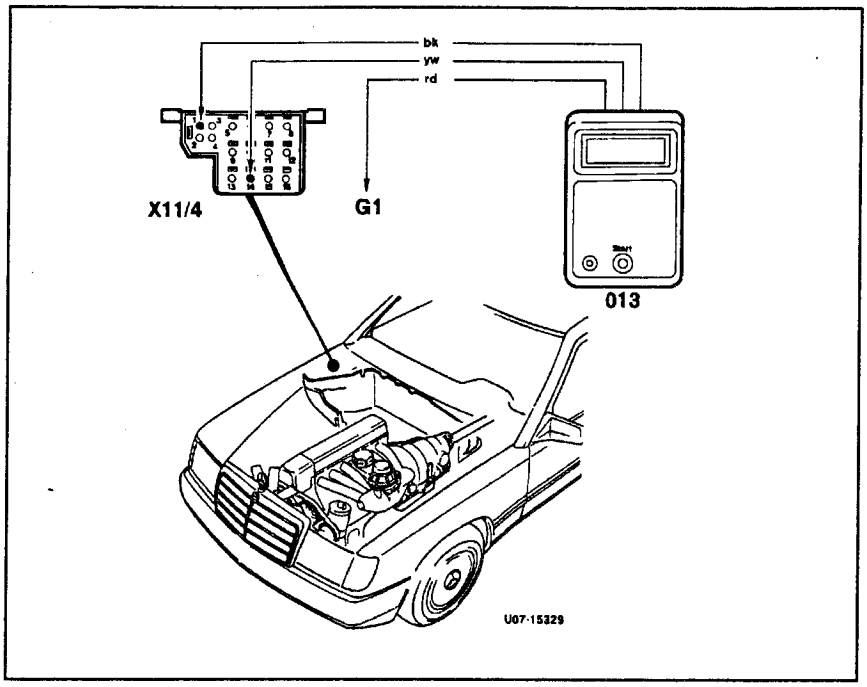
9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually.**

Specific Literature Recommendation: Model Year 1990 Introduction Manual, Models 124.0, 126.0, 201, Group 15, testing MAS with impulse counter.

Connection diagram

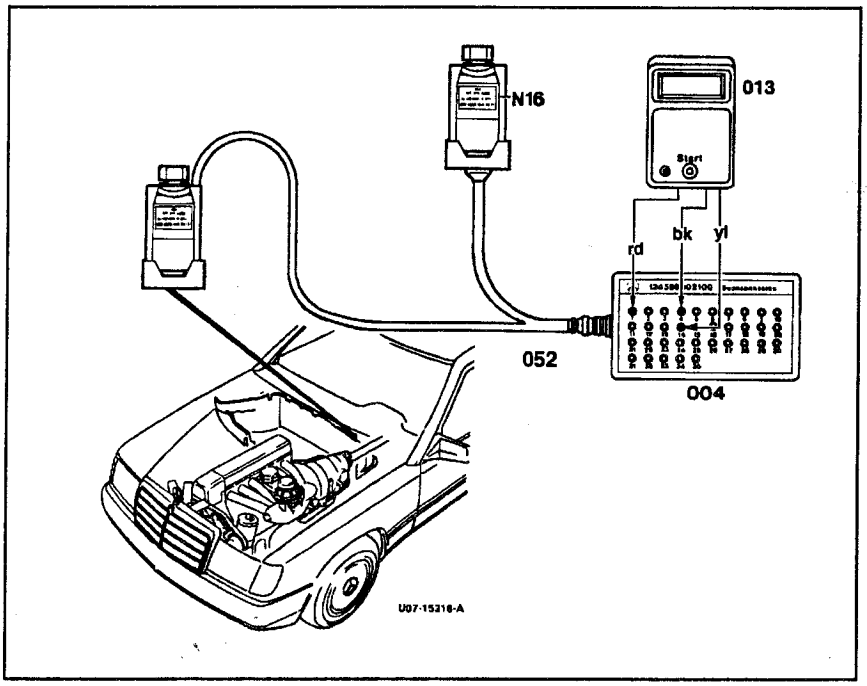
Models 124, 201



Socket 14	ESCM diagnostic readout
013	Impulse counter scan tool
X11/4	Data link connector

Connection diagram

Models 126.024/025



Socket 14	ESCM diagnostic readout
052	Test cable (Part no. 129 589 05 63 00)
004	Socket box tester, (35 pole)
013	Impulse counter scan tool
N16	Engine systems control module

Fault table, DTC readout, Engine systems (ESCM) control module (N16)

DTC readout	Possible cause
1	No fault in system
2	Fuel pump relay (circuit 87) not functioning
3	TD/TN signal (RPM signal) interrupted
4	Output for oxygen sensor heater (circuit SH) control defective
5	Output for air injection pump control (circuit LP) defective
6	Output for [illegible]down switch control (circuit 87k) defective
7	Not used
8	Engine coolant temperature outside of tolerance range
9	Circuit 50 failure
10	Output failure start valve
11	A/C compressor engagement signal missing (circuit 87Z)
12	Output for A/C compressor control defective
13	Excessive A/C compressor belt/clutch slippage
14	Not used
15	Short circuit detected in fuel pump circuit

On-off ratio test (CFI)

Model years 1990 - 1993

Models 124.051 129.061

Fault memory:
Faults which occur with the engine running are counted by a fault counter. The fault is recorded into memory only if it has occurred after 4 sequential engine starts. This prevents a fault from being recorded if, for example, it occurred only once. If, for example, a fault occurred only 3 times, then the fault counter will be cleared again after a certain number of engine starts.
Only faults which prevent starting of the engine or severely influence engine operation are immediately stored in memory. The fault memory is not erased if the battery is disconnected.

Recalling fault memory with On-off ratio tester
Stored fault's can be recalled with the On-off ratio tester at the diagnostic test connection (X11).

On-off ratio test: Ignition ON
Test conditions:
- Coolant temperature approx. 80°C
- A/C control OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram

2. **Engine: OFF**

3. **Ignition: ON**

Note:
A fixed fault on-off ratio of 50% indicates that all input signals are OK. If any other on-off ratio is displayed, refer to Fault table.

Testing Lambda control system with On-off ratio tester :

The operation of the Lambda control system can be checked with the On-off ratio test. The On-off ratio test can also be used to identify momentary faults not stored in fault memory. Faults are distinguished between those that occur with the ignition on and those that occur with the engine at idle. The On-off ratio can be checked with the On-off ratio tester or with the Impulse counter scan tool. A readout of 50% or an oscillating needle indicates that all input signals and the Lambda control module are ok. Readouts of 10% to 95% refer to a particular fault source (see fault tables). In addition, after testing the on-off ratio, a DTC readout **must be performed** using the impulse counter scan tool.

On-off ratio test: Engine at idle

Test conditions:
- Coolant temperature approx. 80 °C
- A/C OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram

2. **Ignition: ON**

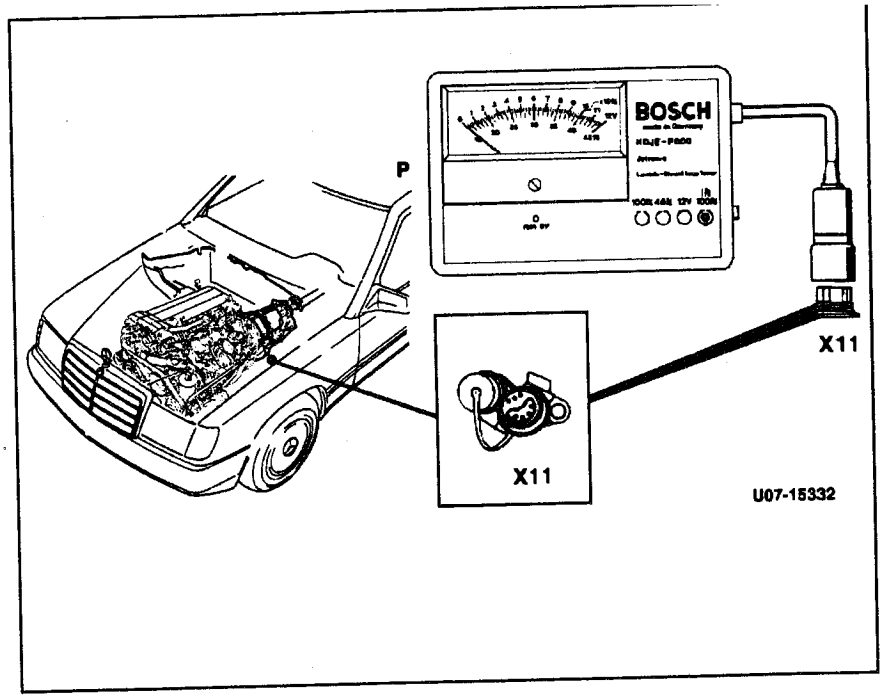
3. **Engine: AT IDLE**

Note:
An oscillating needle indicates that all input signals are OK. If any other ratio is displayed, refer to fault table.

Specific Literature Recommendation: Diagnostic Manual, Models, Engines Vol. 2, Engine104, 119 CIS-E injection, Section 2.1, Diagnosis - Malfunction Memory

Connection diagram

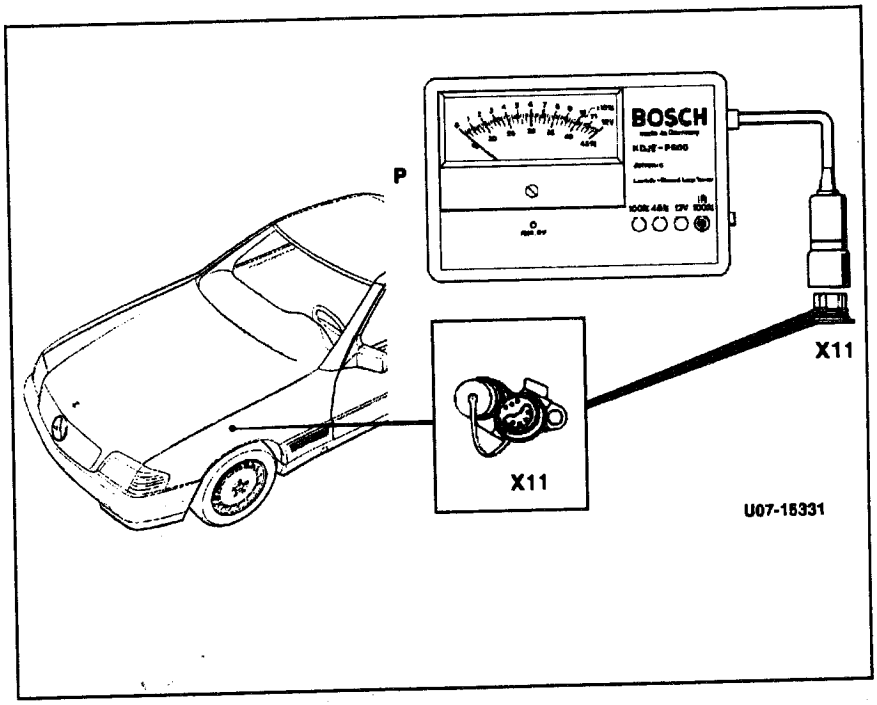
Model 124.051



P On-off ratio tester
X11 Diagnostic connector

Connection diagram

Model 129.061



P On-off ratio tester
X11 Diagnostic connector

Fault table, On-off ratio test, ignition: ON

Fault On-off ratio %	Possible cause
0%	Not used
10%	Closed throttle position (S29/2) open
20%	Wide open throttle (S29/2) closed
30%	Coolant temperature < 70 °C or > 100 °C
40%	Sensor plate of volume air flow sensor position indicator (B2) deflected
50%	Input signals ok
60%	Recognition of speed signal from electronic speedometer with top speed limiter (A1p8)
70%	Starter signal (circuit 50) recognized
80%	Transmission range engaged
90%	Electrohydraulic actuator current (Y1) implausible
100%	Not used

Malfunction table, On-off ratio test, engine at idle

Malfunction On-off ratio %	Possible cause
0%	Open circuit at socket 2 and 9-pole diagnostic socket (X11). Open circuit in wire to socket 3 or 6 of 9-pole diagnostic socket (X11) or On-off ratio tester defective. Mixture adjustment too rich
10%	Volume air flow sensor position indicator (B2) polarity reversed or defective Terminals of throttle position switch (S29/2) connector (closed throttle position/wide open throttle) reversed or short circuit, wide open throttle contact closed with insufficient air flow
20%	Full load contact defective or throttle valve switch (S29/2) polarity reversed. 20 % only indicated if throttle valve switch (S29/2) is activated
30%	Short circuit or open circuit between CFI control module (N3) and 4-pole engine coolant temperature sensor (B11/2), or 4-pole engine coolant temperature sensor (B11/2) defective or greater deviation of temperature values as compared with ignition control module (N1/3).
40%	Wire to volume air flow sensor position indicator (B2) has open circuit or short, or sensor (B2) defective.
50%	Oxygen sensor (G3/2) not operational or defective, open circuit
60%	Speed signal at CFI control module (N3) implausible
70%	TNA-signal (rpm signal) at CFI control module (N3) implausible
80%	Data exchange between EZL/AKR ignition control module (N1/3) and CFI control module (N3) defective
90%	Current to electrohydraulic actuator (Y1) implausible
95%	Deceleration shut-off active
100%	Current or ground at CFI control module (N3) not present or CFI control module (N3) defective On-off ratio tester defective Lambda adjustment too lean Oxygen-sensor (G3/2) defective (short to circuit 31 (ground))
Needle oscillates	No faults of signals monitored

DTC readout (CFI)

Model years 1990 - 1993

Models 124.051 129.061

Test conditions:
- Coolant temperature approx. 80 °C
- A/C OFF
- Selector lever in park "P" position

Note:
The On-off ratio test must be performed prior to reading the DTC readout.

The DTC memory readout must be performed with the engine OFF and the ignition ON.

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault's in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Note any additional faults from the DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory
After eliminating a fault, the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

10. **Ignition: OFF** and wait 30 seconds.

If the DTC has been eliminated and its respective readout erased, then the DTC will no longer be displayed when performing the DTC readout.
If the number displayed is greater than 1, then there are further faults in the system.
In case of complaints, the fault memory must be read and the fault eliminated before proceeding with any additional repairs.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 2, Engines 104, 119 CIS-E injection Section 2.1, Diagnosis - Malfunction Memory.

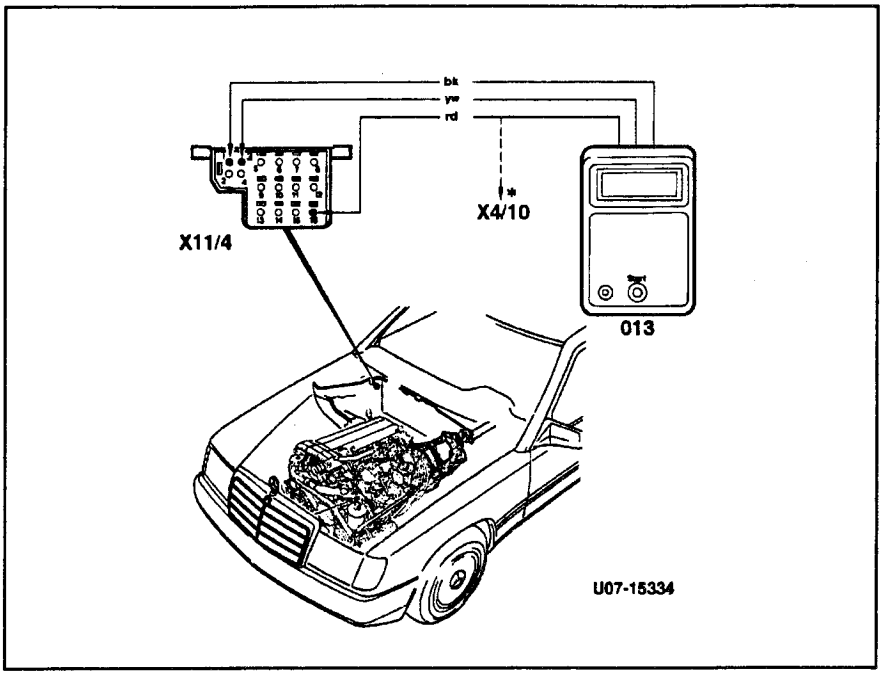
Connection diagram

Model 124.051

013 Impulse counter scan tool
X11/4 Data link connector (DTC readout, 16-pole)
*X4/10 Red wire may be alternately connected to terminal block X4/10

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 16 Red
Socket 3 Yellow



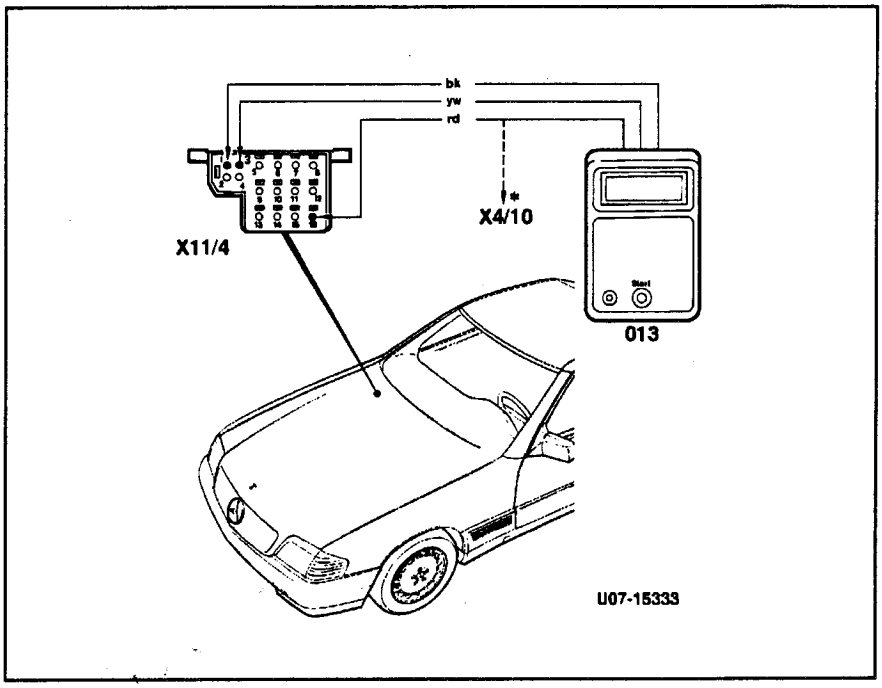
Connection diagram

Model 129.061

013 Impulse counter scan tool
X11/4 Data link connector (DTC readout, 16-pole)
*X4/10 Red wire may be alternately connected to terminal block X4/10

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 16 Red
Socket 3 Yellow



Fault table, DTC readout, Control module (N3)

DTC readout	Possible cause
1	No fault in system
2	Wide open throttle, wide open throttle/closed throttle position throttle position switch (S29/2) implausible
3	Engine coolant temperature in CFI control module (N3) implausible
4	Volume air flow sensor position indicator potentiometer (B2) current implausible
5	Oxygen sensor (G3/2) signal implausible
6	Not used
7	TN-signal (rpm signal) at CFI control module (N3) implausible
8	Altitude correction signal from ignition control module (N1/3)
9	Current to electrohydraulic actuator (Y1) implausible
10	Closed throttle position, wide open throttle/closed throttle position throttle position switch (S29/2) implausible
11	Air injection system, open/short circuit
12	Absolute pressure values from ignition control module (N1/3) implausible
13	Intake air temperature implausible
14	Speed signal at CFI control module (N3) implausible
15	Not used
16	EGR switchover valve (Y27), open/short circuit
17	Oxygen sensor signal wire shorted to positive or ground
18	Current to idle air control valve (Y6) implausible
19	Not used
20	Not used
21	Not used
22	Oxygen sensor heater voltage implausible
23	Short to positive in purge switchover valve (Y58/1) circuit
24	Not used
25	Short to positive in start valve (Y8) circuit
26	Short to positive in upshift delay solenoid valve (Y3/2) circuit
27	Data exchange between CFI control module (N3) and ignition control module (N1/3)
28	Intermittent contact in engine coolant temperature sensor (B17/2) circuit

Fault table, DTC readout, CFI Control module (N3)

DTC readout	Possible cause
29	Difference in engine coolant temperatures between CFI control module (N3) and ignition control module (N1/3) defective
30	Not used
31	Intermittent contact in intake air temperature sensor (B17/2) circuit
32	Not used
33	Not used
34	Engine coolant temperature from ignition control module (N1/3) implausible

DTC readout (MAS)

Model Year 1990 - 1993

Models 124.051 129.061

Testing with impulse counter scan tool:

Note: The engine systems (MAS) control module (N16) will retain its memory even with the battery disconnected or the control module unplugged.

1. Connect impulse counter scan tool scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Engine at idle.**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = fault in system

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first displayed DTCis repeated.

7. Note any additional faults from DTC readout

Eliminate all noted noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTCs from memory
After eliminating a fault, the respective DTC readout must be cleared as follows:

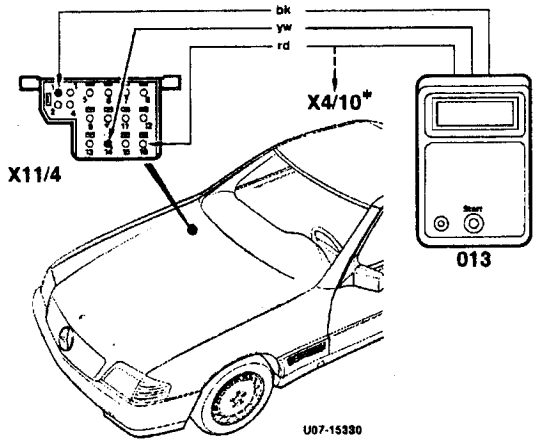
9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually.**

Specific Literature Recommendation: *Diagnostic Manual, Engines, Vol. 2 section 2.1, Gasoline injecton system CIS-E Diagnosis - System Memory and: Model Year 1990 Model 129 Introduction Manual, Group 15, testing MAS with impulse counter scan tool.*

Connection diagram

Model 129.061



Socket 14	ESCM diagnostic readout
013	Impulse counter scan tool
X11/4	Data link connector

Fault table, DTC readout, Engine systems (MAS) control module (N16)

DTC readout	Possible cause
1	No fault in system
2	Fuel pump relay (circuit 87) not functioning
3	TN (RPM signal) interrupted
4	Output for oygen sensor heater (circuit SH) control defective
5	Output for air injection pump control (circuit LP) defective
6	Output for kickdown switch control (circuit 87k) defective
7	Not used
8	Not used
9	Not used
10	Not used
11	A/C compressor engagement signal missing (circuit 87Z)
12	Output for A/C compressor control defective
13	Excessive A/C compressor belt slippage
14	Vehicle speed signal implausible
15	Short circuit detected in fuel pump circuit

On-off ratio test (CIS-E)

Model Years 1988 – 1989 (California)

Models 107.048 126.035
126.039
126.045

On-board diagnostic system via On-off ratio tester

Various components of the CIS-E injection system are checked via the microprocessor in the CIS-E control unit. The failure codes are transmitted via the lambda measuring circuit of the diagnostic socket and are shown on the On-off ratio tester. The On-off ratio indicates possible malfunctions. The following table lists the relationship between the fixed On-off ratio, the cause of the failure and the respective tests to be performed.

Test conditions:

- Coolant temperature 60-80°C
- Automatic Climate Control OFF
- Selector lever in Park
- Overvoltage protection relay fuse intact

1. Connect On-off ratio tester to diagnostic socket (X11).

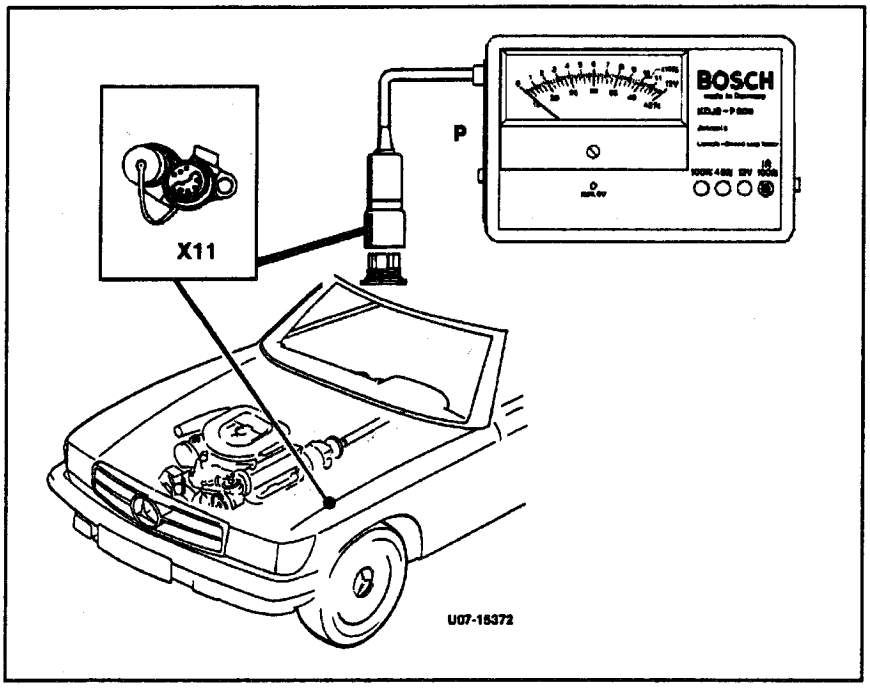
2. **Ignition: ON**

3.

On-off ratio readout	Control unit
70 %	Malfunctions present
100 %	No malfunctions
85%	(USA) California

Connection diagram

Model 107

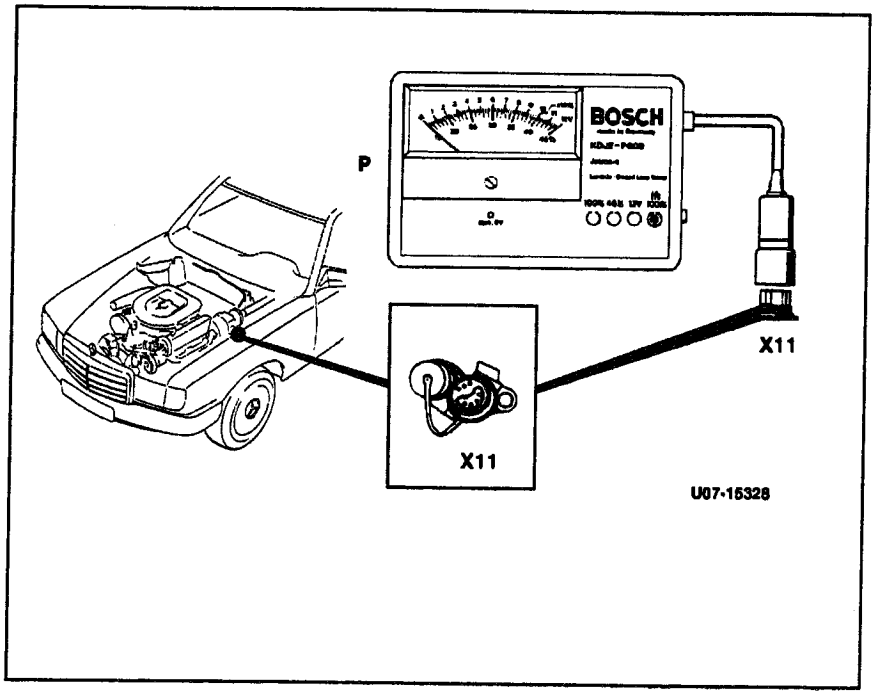


P On-off ratio tester
X11 Diagnostic socket

Specific Literature Recommendation: Model Year 1988 Introduction Manual, Models 107, 124, 126 and 201, Group 07.3, CIS-E testing, and Diagnostic Manual Vol. 2, Gasoline Engines, Engine 116, 117, Test GE-08.01, Lambda control system quick test. Service Microfiche, Engines 116.96, 117.96, Combustion I, Group 07.3, Job 07.3-121, "B" Section "d"

Connection diagram

Model 126



P On-off ratio tester
X11 Diagnostic socket

Malfunction table, On-off ratio , CIS-E (California version only)

On-off ratio %	Possible cause
0%	Open connection between CIS-E control unit (N3) and connection (X11)
10%	Polarity of air flow sensor position indicator (B2) reversed
20%	Full load contact, throttle valve switch (S29/2)
30%	Coolant temperature sensor (B11/2)
40%	Air flow sensor position indicator (B2)
50%	O_2-sensor (G3/2)
60%	Not used
70%	TD-signal (ignition control module wiring/open circuit)
80%	Altitude correction capsule (B18)
90%	Not used.
100%	Exhaust gas recirculation

On-off ratio test (CIS-E)

Model Years 1990 – 1991

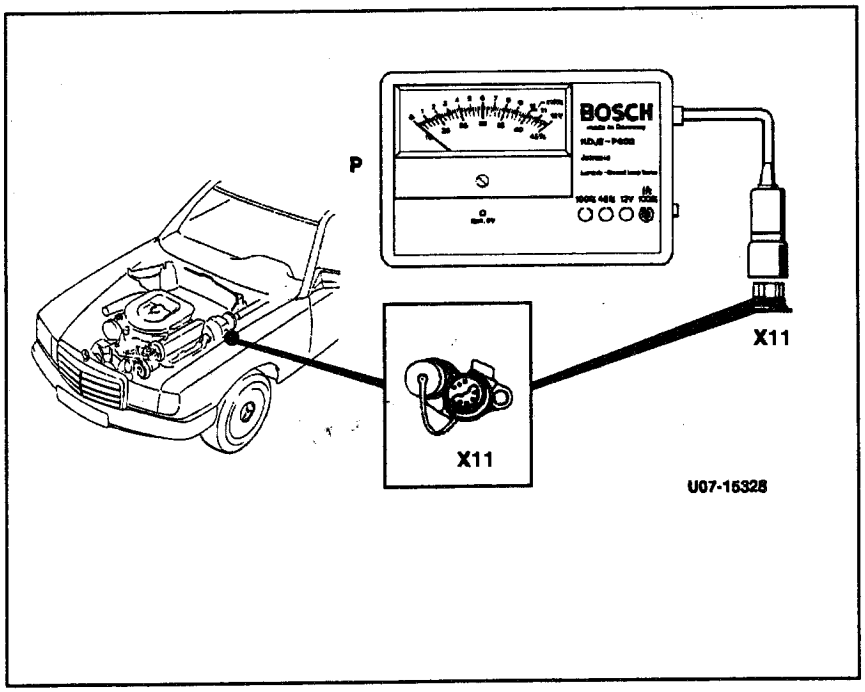
Models 126.035
126.039
126.045

Recalling malfunction memory with On-off ratio tester
Stored malfunctions can be recalled with the On-off ratio tester at the diagnostic test connection (X11)

Test conditions:
- Coolant temperature approx. 80°C
- Automatic Climate Control OFF
- Selector lever in Park

1. Connect On-off ratio tester according to connection diagram
2. **Engine: OFF**
3. **Ignition: ON**

Connection diagram



P On-off ratio tester
X11 Test connection for diagnosis

Specific Literature Recommendation: *Model Year 1990 Introduction Manual, Models 124.0, 126.0, 201, Engines 116, 117, Group 07.3, Testing with On-off ratio tester*

Malfunction table, On-off ratio test

On-off ratio %	Possible cause
0%	Defective On-off ratio tester Wiring from CIS-E control unit (N3) to diagnostic socket (X11) open circuit
10%	Air flow sensor position indicator (B2), wiring
20%	Polarity of connector (S29/2) reversed, full load contact, wiring
30%	Coolant temperature sensor (B11/2), open circuit, wiring
40%	Air flow sensor position indicator (B2), wiring, open circuit
50%	O_2-sensor (G3/2), wiring, open circuit
60%	Not used
70%	Engine rpm (TD) signal (ignition control module wiring/open circuit)
80%	Altitude correction capsule (B18)
90%	Not used
100%	Test the On-off ratio for the following: • Ground connections (W11), (W10) • Fuse in overvoltage protection relay (K1/1) defective, disconnected • Voltage supply to the CIS-E control unit (N3) • Current to electrohydraulic actuator (Y1) • O_2-sensor (G3/2)

DTC readout (CIS-E)

Model Year 1988 – 1991 (California/Federal versions)

Models 107.048 126.035
126.039
126.045

On-board diagnostic system (California version)

The CIS-E control unit monitors emission control components that either provide input signals to or receive output signals from the control unit. Malfunctions resulting from interruptions or failure of any of these these components are indicated by the CHECK ENGINE indicator light in the instrument cluster and are simultaneously stored in the CIS-E control unit memory.

Testing with on-board diagnostic system:

An on-board test connection (X92) with a pushbutton (2) and light emitting diode (LED) is located on the engine compartment firewall.

Note:
Do not disconnect battery, overvoltage protection relay or CIS-E control unit, otherwise any stored malfunctions will be erased from memory.

1. If preferred, connect impulse counter according to connection diagram.

2. **Ignition: ON**

3. Press LED pushbutton or impulse counter pushbutton for 2 to 4 seconds.

4. Count and note the number of LED blink impulses or impulse display.

5. Press LED pushbutton or impulse counter pushbutton again for 2 to 4 seconds. If no further malfunctions are detected, the CIS-E control unit (N3) will switch over to the Lambda on-off ratio readout mode.

6 . Eliminate any noted malfunctions (blink codes) according to the troubleshooting chart and diagnostic tests.

Erasing malfunction memory:
If a malfunction is corrected without disconnecting the CIS-E control unit in the process, the malfunction memory must be erased as follows:

7. After an impulse readout, wait 2 seconds then press the pushbutton for at least 6 seconds.

Note:
Each malfunction stored in memory must be **erased individually**.

8. If the LED blinks once or impulse display is "1", all stored malfunctions are erased.

Note:
In order to test the Lambda control system on-off ratio, the CIS-E control unit (N3) must be switched over to the Lambda readout mode by first pressing the pushbutton to read out any malfunction impulse readouts, then pressing the pushbutton again for 2 to 4 seconds. If no further malfunctions are detected, the CIS-E control unit (N3) will switch over to the Lambda on-off ratio readout mode.
Afterwards, the ignition key must then be turned **OFF and ON** for CIS-E to resume normal operation.

Specific Literature Recommendation: Model 1988 Introduction Manual, Models 107, 124, 126 and 201, Group 07.1, CIS-E testing, and Diagnostic Manual Vol.2, Gasoline Engines, Engine 116, 117, Test GE-08.01, Lambda control system quick test. Service Microfiche, Engines 116.96, 117.96, Combustion I, Group 07.3, Job 07.3-121, "B" Section "d"

On-board diagnostic system (Federal version)

The CIS-E control unit monitors emission control components that either provide input signals to or receive output signals from the control unit. Malfunctions resulting from interruptions or failure of any of these these components are simultaneously stored in the CIS-E control unit memory.

Testing with on-board diagnostic system:

An on-board test connection (X92) is located on the engine compartment firewall.

Note:
Do not disconnect battery, overvoltage protection relay or CIS-E control unit, otherwise any stored malfunctions will be erased from memory.

1. Connect impulse counter according to connection diagram.

2. **Ignition: ON**

3. Press impulse counter pushbutton for 2 to 4 seconds.

4. Read and note impulse readout displayed. Display "1" = no malfunction stored, greater than "1" = malfunction in system.

5. Press impulse counter pushbutton again for 2 to 4 seconds. If no further malfunctions are detected, the CIS-E control unit (N3) will switch over to the Lambda on-off ratio readout mode.

6 . Eliminate any noted malfunctions (blink codes) according to the troubleshooting chart and diagnostic tests.

Erasing malfunction memory:
If a malfunction is corrected without disconnecting the CIS-E control unit in the process, the malfunction memory must be erased as follows:

7. After an impulse readout, wait 2 seconds then press the pushbutton for at least 6 seconds.

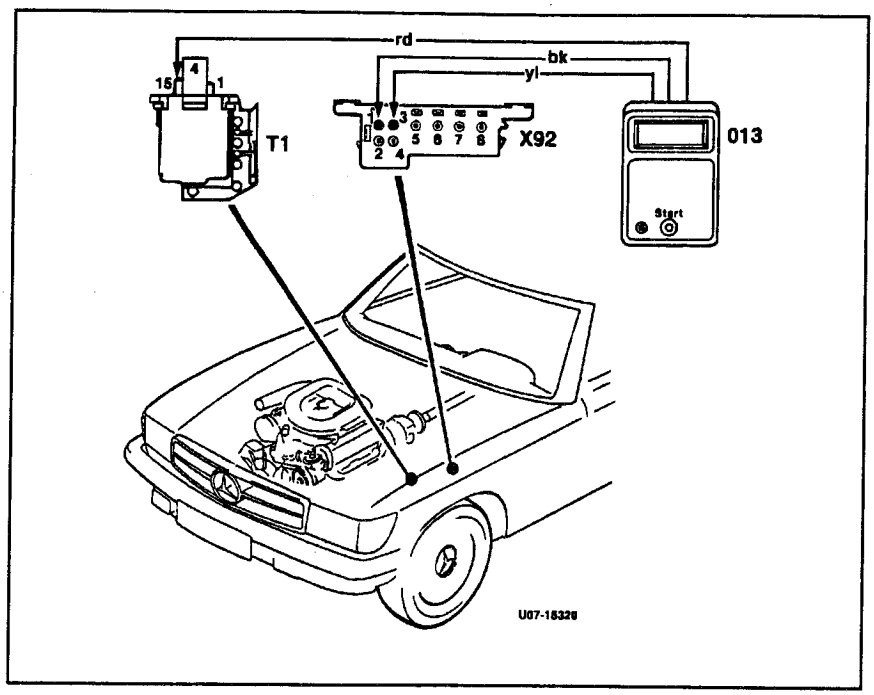
Note:
Each malfunction stored in memory must be **erased individually**.

8. If the impulse display is "1", all stored malfunctions are erased.

Note:
In order to test the Lambda control system on-off ratio, the CIS-E control unit (N3) must be switched over to the Lambda readout mode by first pressing the pushbutton to read out any malfunction impulse readouts, then pressing the pushbutton again for 2 to 4 seconds. If no further malfunctions are detected, the CIS-E control unit (N3) will switch over to the Lambda on-off ratio readout mode.
Afterwards, the ignition key must then be turned **OFF and ON** for CIS-E to resume normal operation.

Connection diagram

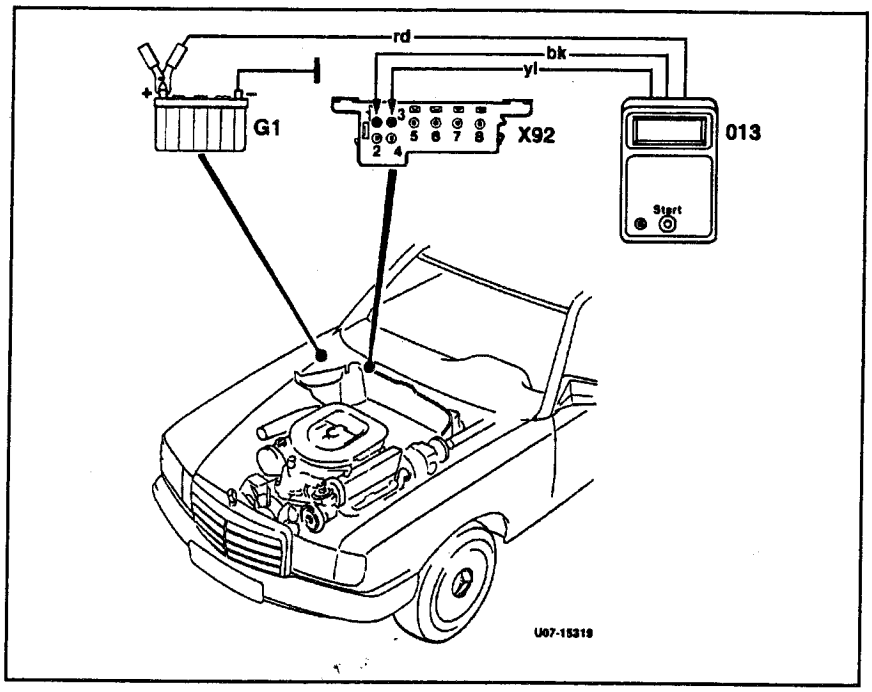
Model 107



Socket 3 CIS-E diagnostic connection
013 Impulse counter
T1 Ignition coil
X11/4 Data link connector (8-pole, impulse readout)

Connection diagram

Model 126



Socket 3 CIS-E diagnostic connection
013 Impulse counter
G1 Battery
X11/4 Data link connector (8-pole, impulse readout)

Malfunction table, Impulse readout, CIS-E

Impulse readout	Possible cause
1	No malfunctions in system
2	Full load contact, throttle valve switch (S29/2)
3	Coolant temperature sensor (B11/2)
4	Air flow sensor position indicator (B2)
5	O_2-sensor (G3/2)
6	Not used
7	TD-signal
8	Altitude correction capsule (B18)
9	Electrohydraulic actuator (EHA) (Y1)
10	Idle contact, throttle valve switch (S29/2)
11	Not used
12	Exhaust gas recirculation

DTC readout (CIS-E)

Model Years 1990 - 1992

Model 129.066

Diagnostics with malfunction memory
Malfunctions which occur with the engine running are counted by a malfunction counter. The malfunction is recorded into memory only if it has occurred after 4 sequential engine starts. This prevents a malfunction from being recorded if, for example, it occurred only once. If, for example, a malfunction occurred only 3 times, then the malfunction counter will be cleared again after a certain number of engine starts.

Only malfunctions which prevent starting of the engine or severely influence engine operation are immediately stored in memory. The malfunction memory is not erased if the battery is disconnected.

Recalling malfunction memory with On-off ratio tester
Stored malfunctions can be recalled with the On-off ratio tester at the diagnostic test connection (X11).

On-off ratio test: Ignition ON
Test conditions:
- Coolant temperature approx. 80 °C
- Automatic Climate Control OFF
- Selector lever in Park

1. Connect On-off ratio tester according to connection diagram
2. **Engine: OFF**
3. **Ignition: ON**
4. A fixed On-off ratio of 50% indicates that all input signals are OK. If a different ratio is displayed, refer to malfunction table.

Testing Lambda control system with On-off ratio tester.
The operation of the Lambda control system can be checked with the On-off ratio test. The On-off ratio test can also be used to identify momentary malfunctions not stored in malfunction memory. Malfunctions are distinguished between those that occur with the ignition on and those that occur with the engine at idle. The On-off ratio can be checked with the On-off ratio tester. A readout of 50% or an oscillating needle indicates that all input signals and the Lambda control unit are ok. Readouts of 10% to 95% refer to a particular malfunction source (see Malfunction Tables). In addition, after testing the On-off ratio, an impulse readout **must be performed** using the impulse counter

On-off ratio test: Engine at idle

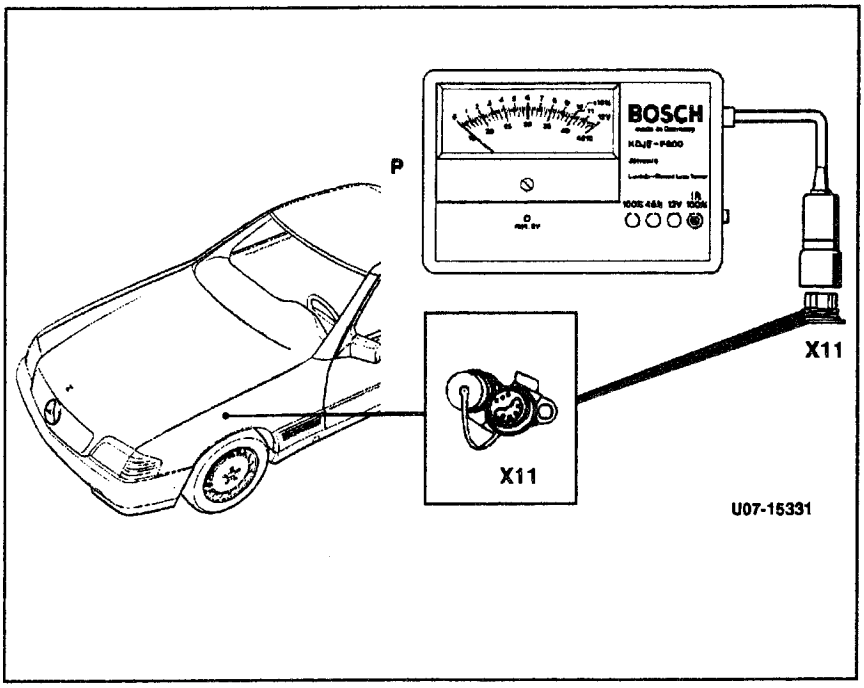
Test conditions:
- Coolant temperature approx. 80°C
- Automatic Climate Control OFF
- Selector lever in Park

1. Connect On-off ratio tester according to connection diagram
2. **Ignition: ON**
3. **Engine: AT IDLE**
4. If needle of On-off ratio tester does not oscillate, refer to malfunction table.

Note:
Oscillating On-off ratio tester needle indicates no malfunctions in system.

Specific Literature Recommendation: Diagnostic Manual, Models, Engines Vol. 2, Engine 104, 119 CIS-E injection, Section 2.1, Diagnosis - Malfunction Memory

Connection diagram



P On-off ratio tester
X11 Test connection for diagnosic connector

Malfunction table, On-off ratio test, ignition: ON

On-off ratio %	Possible cause
0%	Not used
10%	Idle speed contact, throttle valve switch (S29/2) open
20%	Full load contact, throttle valve switch (S29/2) closed
30%	Coolant temperature < 70° C or > 100° C
40%	Sensor plate of air flow sensor position indicator (B2) deflected
50%	Input signals ok
60%	Recognition of speed signal from electronic speedometer with top speed limiter (A1p8)
70%	Starter signal (circuit 50) recognized
80%	Transmission engaged in gear
90%	Electrohydraulic actuator current (Y1) implausible
100%	Not used

Malfunction table, On-off ratio test, engine at idle

On-off ratio %	Possible cause
0%	Open circuit at socket 2 and 9-pole diagnostic socket (X11). Open circuit in wire to socket 3 or 6 of 9-pole diagnostic socket (X11) or On-off ratio tester defective. Mixture adjustment too rich.
10%	Air flow sensor position indicator (B2) polarity reversed or defective Terminals of throttle valve switch (S29/2) connector (idle/full load) reversed or short circuit, full load contact closed with insufficient air flow
20%	Full load contact defective or throttle valve switch (S29/2) polarity reversed. 20 % only indicated if throttle valve switch (S29/2) is activated
30%	Short circuit or open circuit between CIS-E control unit (N3) and 4-pole engine coolant temperature sensor (B11/2), or 4-pole engine temperature sensor (B11/2) defective or greater deviation of temperature values as compared with EZL/AKR ignition control unit (N1/3).
40%	Wire to air flow sensor position indicator (B2) has open circuit or short, or sensor (B2) defective.
50%	O_2-sensor (G3/2) not operational or defective, open circuit
60%	Speed signal at CIS-E control unit (N3) implausible
70%	TNA-signal (rpm signal) at CIS-E control unit (N3) implausible
80%	Data exchange between EZL/AKR ignition control unit (N1/3) and control unit (N3) defective
90%	Current to electrohydraulic actuator (Y1) implausible
95%	Deceleration shut-off active
100%	Current or ground at CIS-E control unit (N3) not present or CIS-E control unit (N3) defective. On-off ratio tester defective. Lambda adjustment too lean. Oxygen sensor (G3/2) defective (short to circuit 31 (ground)).
Needle oscillates	No malfunction of signals monitored.

DTC readout (CIS-E)

Model Year 1990 - 1992

Models 129.066

Test conditions:

- Coolant temperature approx. 80 °C
- Automatic Climate Control
- Selector lever in Park

Note:
The On-off ratio test must be performed prior to reading the Impulse readout .

The malfunction memory readout must be performed with the engine OFF and the ignition ON.

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC read out displayed. Display "1" = no malfunction stored, Greater than "1" = malfunction in system.

5. Press start button again for 2 to 4 seconds. If there are no further malfunctions in the system, the previously displayed number will reappear. If additional malfunctions exist, then the respective malfunction code will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Note any additional malfunctions from the impulse read out.

8. Eliminate all noted malfunctions (impulse readout) according to troubleshooting chart and diagnostic tests.

Erasing malfunction memory
After eliminating a malfunction, the respective impulse read out must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the malfunction. then press the start button for 6 to 8 seconds.

Note:
Each malfunction displayed must be **erased individually.**

10. **Ignition: OFF** and wait 30 seconds.

If the malfunction has been eliminated and its respective readout erased, then the malfunction code will no longer be displayed when performing the impulse read out.
If the number displayed is greater than 1, then there are further malfunctions in the system.
In case of complaints, the malfunction memory must be read and the malfunction eliminated before proceeding with any additional repairs.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 2, Engines 104, 119 CIS-E injection, Section 2.1, Diagnosis - Malfunction Memory.

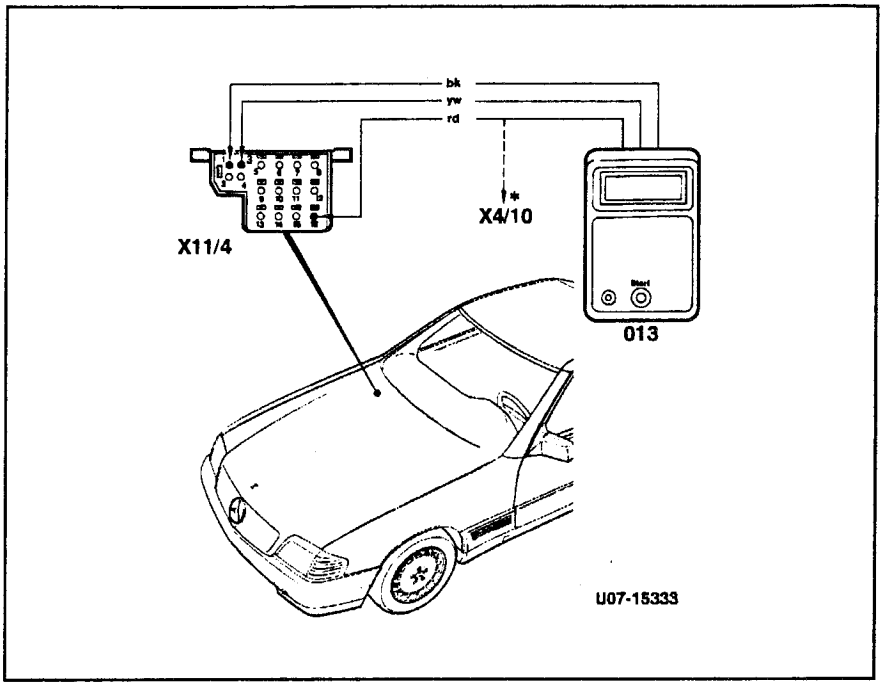
Connection diagram

Model 129.066

013 Impulse counter
X11/4 Data link connector (impulse read out, 38-pole)
*X4/10 Red wire may be alternately connected to terminal block X4/10

Note:
Connect wires of impulse counter as follows:

Socket 1 Black
Socket 16 Red
Socket 3 Yellow



Malfunction table, impulse readout, CIS-E Control Unit (N3)

Impulse read out	Possible cause
1	No malfunctions in system
2	Full load contact, throttle valve switch (S29/2) implausible
3	Coolant temperature in CIS-E control module (N3) implausible
4	Air flow sensor position indicator potentiometer current (B2) implausible
5	O_2-sensor signal implausible
6	Not used
7	TNA-signal (rpm signal) at CIS-E control module (N3) implausible
8	Altitude correction signal from EZL/AKR ignitioncontrol module (N1/3) implausible
9	Current to electrohydraulic actuator (Y1) implausible
10	Idle speed contact, throttle valve switch (S29/2) implausible
11	Air injection system, open/short circuit
12	Absolute pressure values from EZL/AKR ignitioncontrol module (N1/3) implausible

Malfunction table, impulse readout, CIS-E Control Unit (N3) (continued)

Impulse read out	Possible cause
13	Intake air temperature implausible
14	Speed signal at CIS-E control unit (N3) implausible
15	Not used
16	EGR switchover valve (Y27), open/short circuit
17	O_2-sensor signal wire shorted to positive or ground
18	Current to idle speed air valve (Y6) implausible
19	Not used
20	Not used
21	Not used
22	O_2-sensor heater voltage implausible
23	Short to positive in purge switchover valve (Y58/1) circuit
24	Not used
25	Short to positive in start valve (Y8) circuit
26	Short to positive in upshift delay solenoid/switchover valve (Y3/2) circuit
27	Data exchange between CIS-E control unit (N3) and EZL/AKR ignition control unit (N1/3) defective
28	Intermittent contact in coolant temperature sensor (B11/2) circuit
29	Difference in coolant temperatures between CIS-E control unit (N3) and EZL/AKR ignitioncontrol unit (N1/3)
30	Not used
31	Intermittent contact in intake air temperature sensor (B17/2) circuit
32	Not used
33	Not used
34	Coolant temperature from EZL/AKR ignition control unit (N1/3) implausible

DTC readout (MAS)

Model Year 1990 – 1992

Model 129.066

Testing with impulse counter :

Note: The engine systems (MAS) control module (N16) will retain its memory even if the battery is disconnected or the control unit is unplugged.

1. Connect impulse counter according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Engine at idle.**

3. Press start button for 2 to 4 seconds.

4. Read and note impulse readout displayed.
   Display "1" = no malfunction stored,
   Greater than "1" = malfunction in system

5. Press start button again for 2 to 4 seconds. If there are no further malfunctions in the system, the previously displayed number will reappear. If additional malfunctions exist, then the respective malfunction code will be displayed.

6. Repeat step 5 until the first displayed number is repeated.

7. Note any additional malfunctions from impulse readout.

8. Eliminate all noted malfunctions (impulse readout) according to troubleshooting chart and diagnostic tests.

Erasing malfunctions from memory
After eliminating a malfunction, the respective impulse code must be cleared as follows:

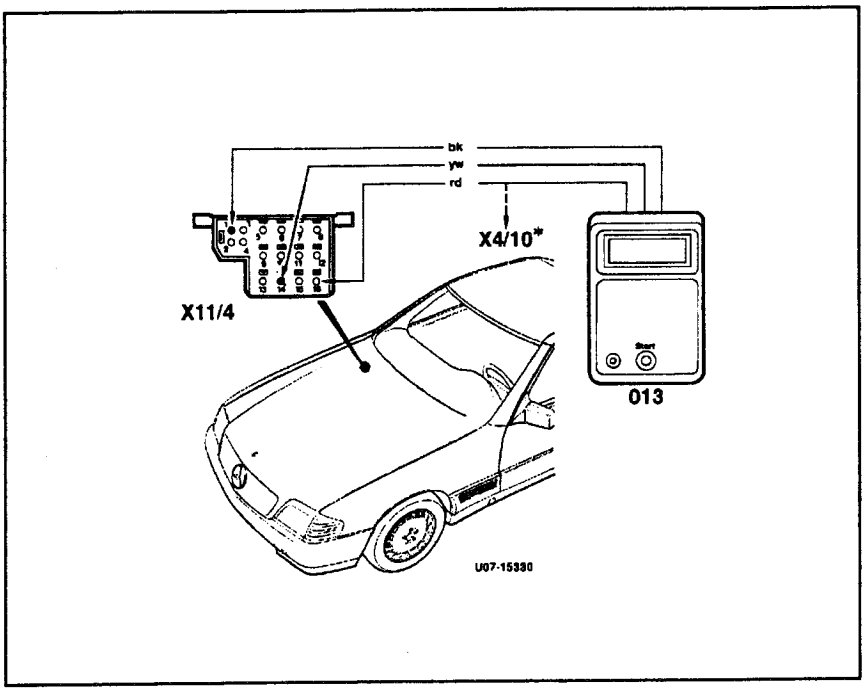
9. Press start button for 2 to 4 seconds and read out the malfunction. Then press the start button for 6 to 8 seconds.

Note:
Each malfunction displayed **must be erased individually.**

If the malfunction has been eliminated and its respective readout erased, then the malfunction code will no longer be displayed when performing the impulse readout.
If the number displayed is greater than 1, then there are further malfunctions in the system.

Specific Literature Recommendation: *Diagnostic Manual, Engines Volume 2, Engines 104, 119 CIS-E injection, Section 2.1, impulse Readout, Engine Systems (MAS) Control unit (N16) and: Model Year 1990 Model 129 Introduction Manual, Group 07.3, testing MAS with impulse counter.*

Connection diagram



Socket 14 MAS diagnostic readout
013 Impulse counter
X11/4 Data link connector

Malfunction table, impulse readout, Engine systems (MAS) control unit (N16)

Impulse readout	Possible cause
1	No malfunctions in system
2	Fuel pump relay (circuit 87) not functioning
3	TN (RPM signal) interrupted
4	Output for oxygen sensor heater control defective
5	Output for air injection pump control defective
6	Output for kickdown switch control defective
7	Not used
8	Not used
9	Not used
10	Not used
11	A/C compressor engagement signal missing
12	Output for A/C compressor control defective
13	Excessive A/C compressor clutch slippage
14	Speed signal implausible
15	Short circuit detected in fuel pump circuit

On-off ratio test (LH-SFI)

Model Year 1992 - 1993

Model 140.032

Fault memory
Faults which occur with the engine running are counted by a fault counter. The fault is recorded into memory only if it has occurred after 4 sequential engine starts. This prevents a fault from being recorded if, for example, it occurred only once. If, for example, a fault occurred only 3 times, then the fault counter will be cleared again after a certain number of engine starts.

Only faults which prevent starting of the engine or severely influence engine operation are immediately stored in memory. The fault memory is not erased if the battery is disconnected.

Recalling fault memory with On-off ratio tester
Stored faults can be recalled with the On-off ratio tester at the diagnostic test connection (X11)

On-off ratio test: Ignition ON

Test conditions:
- Coolant temperature approx. 80 °C
- A/C control OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram
2. **Engine: OFF**
3. **Ignition: ON**
4. If the On-off ratio is any value other than 50%, refer to fault table for possible cause.

Testing Lambda control system with On-off ratio tester.
The operation of the Lambda control system can be checked with the On-off ratio test. The On-off ratio test can also be used to identify momentary faults not stored in fault memory. Faults are distinguished between those that occur with the ignition on and those that occur with the engine at idle. A readout of 50% or an oscillating needle indicates that all input signals and the Lambda control module are ok. Readouts of 10% to 95% refer to a particular fault source (see Fault Tables). In addition, after testing the On-off ratio, an DTC readout **must be performed** using the impulse counter scan tool.

On-off ratio test: Engine at idle

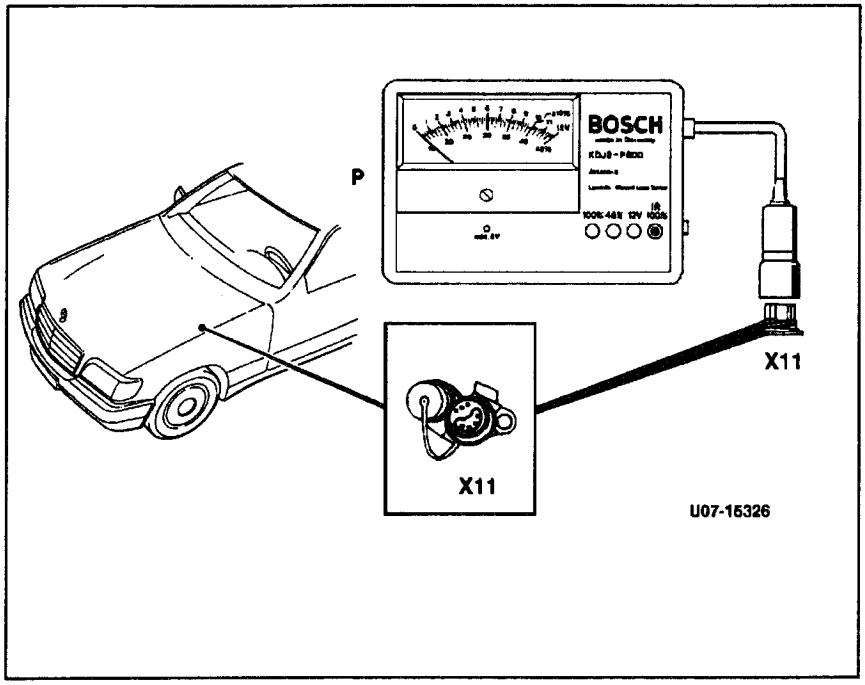
Test conditions:
- Coolant temperature approx. 80 °C
- A/C control OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram
2. **Ignition: ON**
3. **Engine: AT IDLE**
3. If the On-off ratio is any value other than 50% or oscillating, refer to fault table for possible cause.

Specific Literature Recommendation: Diagnostic Manual, Engines Vol. 2, Engine 104, 119 LH injection, Section 3.1, Diagnosis - Malfunction Memory

Connection diagram

Model 140.032



P On-off ratio tester
X11 Data link connector

Fault, On-off ratio test, ignition: ON

On-off ratio	Possible cause
10%	Closed throttle position recognition inactive
20%	Wide open throttle recognition inactive
30%	Engine coolant temperature < 70° C or > 110° C
40%	Not used
50%	Input signals ok
60%	TN-signal (rpm signal) or camshaft position sensor signal not present while starting engine
70%	Starter engaged
80%	CAN-data exchange defective
90%	Fuel safety shut-off active

Fault table, On-off ratio test, engine at Idle

On-off ratio %	Possible cause
10%	CTP recognition applied constantly
20%	Output of injectors or one or more injectors have open circuit
30%	Engine coolant temperature sensor (B11/2)
40%	Volume air flow sensor with hot wire
50% [1]	Oxygen sensor (G3/2) not operational or defective, open circuit
60%	Camshaft position sensor (L5/1)
70%	TN-signal (rpm signal)
80%	CAN-data exchange defective
90%	Vehicle speed signal
95%	Deceleration shut-off active

[1] Needle oscillates if all monitored signals are ok.

DTC readout (LH-SFI)

Model Year 1992 - 1993

Model 140.032

Testing with impulse counter scan tool:

Note:
The On-off ratio test must be performed prior to testing the DTC readout.

The DTC memory readout must be performed with the engine OFF and the ignition ON.

1. Connect impulse counter scan tool according to connection diagram

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

8. Note any additional faults from the DTC readout.

9. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory
After eliminating a fault, the respective DTC must be cleared as follows:

10. Press start button for 2 to 4 seconds and read out the DTC. then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

11. **Ignition: OFF** and wait 30 seconds.

If the fault has been eliminated and its respective DTC readout erased, then the DTC will no longer be displayed when performing the DTC readout.
If the number displayed is greater than 1, then there are further faults in the system.
In case of complaints, the DTCmemory must be read and the fault eliminated before proceeding with any additional repairs.
The On-off ratio test must be performed prior to performing the DTC test.

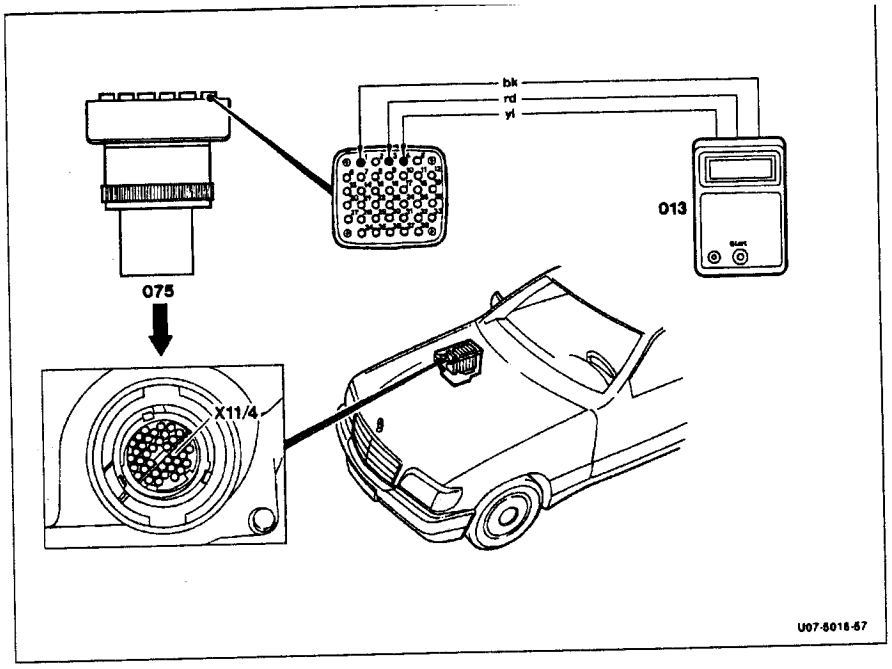
Specific Literature Recommendation: Diagnostic Manual, Engines Volume 2, Engines 104, 119 LH injection, Section 3.1, Diagnosis - Malfunction Memory.

Connection diagram

013 Impulse counter scan tool
075 Impulse counter scan tool adaptor
X11/4 Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 3 Red
Socket 4 Yellow



Fault table, DTC readout, SFI Control module (N3/1)

DTC readout	Possible cause
1	No faults in system
2	Engine coolant temperature sensor (B11/2) circuit 1, open/short circuit
3	Engine coolant temperature sensor (B11/2) circuit 2, open/short circuit
4	Voltage at mass air flow sensor with hot wire (B2/2) insufficient or too high
5	Not used
6	Not used
7	TN signal (RPM signal) incorrect or open/short circuit
8	Camshaft position sensor (L5/1) signal, open/short circuit
9	Starter signal (circuit 50) missing, open/short circuit
10	Closed throttle position recognition from electronic accelerator control module, short circuit
11	Air injection system, open/short circuit

Fault table, (continued)

DTC readout	Possible cause
12	Burn-off control for mass air flow sensor with hot-wire, open/short circuit
13	Intake air temperature sensor (B17/7), open/short circuit
14	Not used
15	Not used
16	EGR switchover valve (Y27), open/short circuit
17	No data transmission from electronic accelerator control module (N4/1)
18	No data transmission from EZL/AKR ignition control module (N1/3)
19	Not used
20	No data transmission from LH-SFI control module (N3/1)
21	Oxygen sensor (G3/2), open circuit
22	Oxygen sensor heater, open/short circuit
23	Purge switchover valve (Y58/1), open/short circuit
24	Not used
25	Adjustable camshaft timing solenoid (Y49, Y49/2), open/short circuit
27	Injector (Y62) open/short circuit
28	Not used
32	Not used

DTC readout (BM)

Model Year 1992 - 1993

Model 140.032

Test conditions:

- Coolant temperature approx. 80 °C
- A/C OFF
- Selector lever in park "P" position

Note:
The On-off ratio test must be performed prior to testing DTC Readout.

The base module (N16/1) DTC memory remains active even if the overvoltage protection relay or vehicle battery are disconnected.

1. Connect impulse counter scan tool according to connection diagram.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC Readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC Readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC Readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually.**

If the fault has been eliminated and its respective DTC readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the number displayed is greater than 1, then there are further faults in the system.
In case of complaints the DTC memory must be read and the fault must be eliminated before proceeding with any additional repairs.
The On-off ratio test must be performed prior to performing the DTC test.

Specific Literature Recommendation: Diagnostic Manual, Engines, Volume 2, Engine 104, 119 LH injection, Section 3.1, Diagnosis - Malfunction Memory.

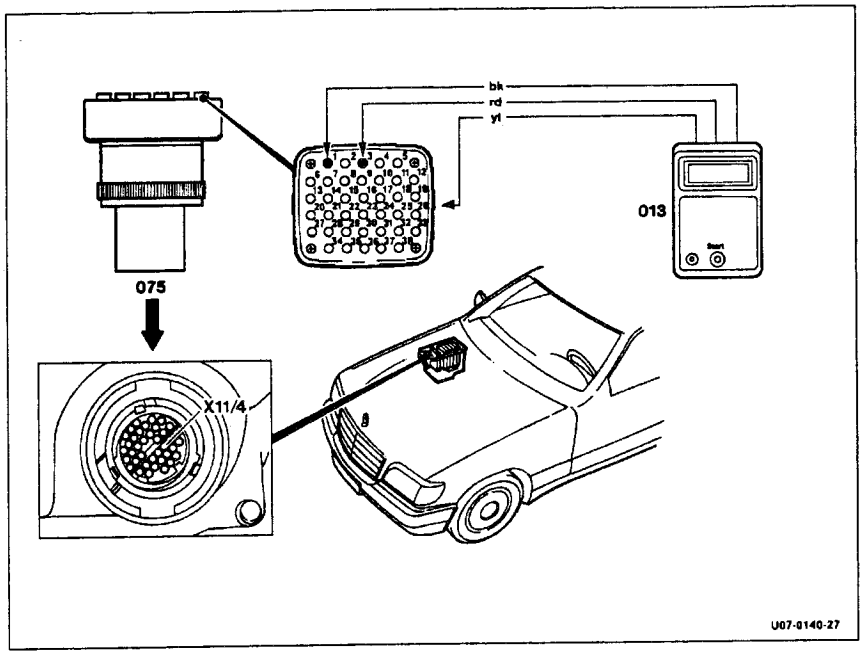
Connection diagram

Model 140.032

013	Impulse counter scan tool scan tool
075	Impulse counter scan tool scan tool adaptor
X11/4	Data link connector (DTC Readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 3 Red
Socket 8 Base module



Fault table, DTC Readout, Base module (N16/1)

DTC Readout	Possible cause
1	No faults in system
2	Not used
3	Not used
4	Not used
5	Maximum permissible temperature in module box exceeded
6	Electromagnetic A/C compressor clutch blocked
7	Poly V-belt slipping
8	Not used
9	Voltage supply for LH-SFI control module (N3/1) interrupted
10	Voltage supply for LH-SFI control module (N3/1) interrupted Voltage supply for fuel injectos interrupted
11	Voltage supply for accessory equipment control module interrupted
12	Voltage supply for ABS control module (N30) or ABS/ASR control module (N30/1), or ASD control module (N30/2) interrupted
13	Not used
14	Not used
15	Voltage supply for kickdown valve (Y3) interrupted
16	Voltage supply for electromagnetic A/C Compressor clutch (A9k1) interrupted
17	Voltage supply for module box blower motor (M2/2) interrupted

DTC readout, Diagnostic module (DM)

Model Year 1992 -1993

Model 140.032

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective DTC readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Engines, Volume 2, Section 8.1, Diagnostic Module, Diagnosis - Malfunction Memory

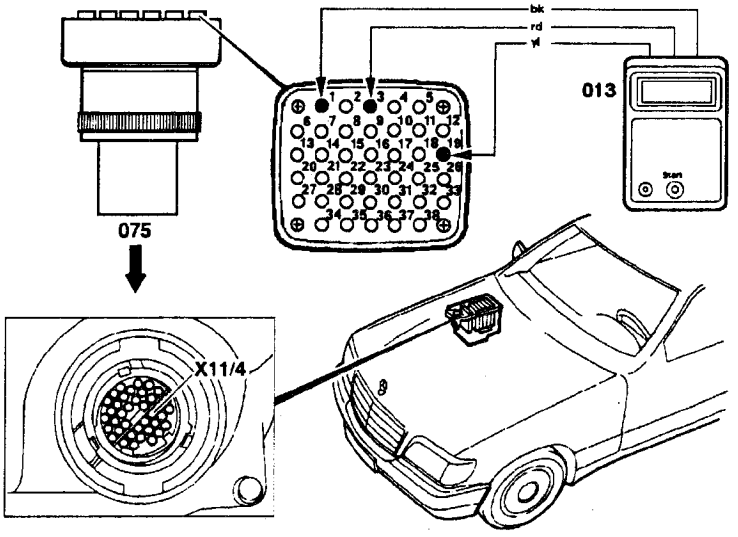
Connection diagram

Model 140.032

Socket 19	Diagnostic module readout
013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 19	Yellow



DTC table, Impulse counter scan tool, Diagnostic module (N59)

DTC readout	Possible Cause
1	No faults in system
2	Oxygen sensor inoperative
3	Lambda control inoperative
4	Air injection system inoperative
5	Exhaust gas recirculation inoperative
6	Idle speed control inoperative
7	Ignition system defective
8	Engine coolant temperature sensor, open/short circuit
9	Intake air temperature sensor, open/short circuit
10	Voltage at mass air sensor too high/low
11	TN-signal (rpm) defective
12	Oxygen sensor heater, open/short circuit
13	Camshaft position sensor signal from ignition control module defective
14	Intake manifold pressure too low when starting

Fault table, DTC readout, Diagnostic module (N59) continued

DTC readout	Possible Cause
15	Wide open throttle information defective
16	Closed throttle position information defective
17	Data exchange fault between individual control modules
18	Adjustable camshaft timing solenoid, open/short circuit
19	Injectors open/short circuit or emission control system adaptation at limit
20	Vehicle speed signal missing
21	Purge switchover valve, open/short circuit
22	Camshaft position sensor signal defective
23	Intake manifold pressure with engine running too low
24	Starter ring gear segments defective
25	Knock sensors defective
26	Upshift delay switchover valve, open/short circuit
27	Engine coolant temperature sensor deviation between sensor circuit 1 and sensor circuit 2
28	Engine coolant temperature sensor (engine coolant temperature change monitor)

On-off ratio test (LH-SFI)

Model Year 1992 - 1993

Models 124.034 129.067 140.042 140.051
124.036 140.043 140.070

Fault memory
Faults which occur with the engine running are counted by a fault counter. The fault is recorded into memory only if it has occurred after 4 sequential engine starts. This prevents a fault from being recorded if, for example, it occurred only once. If, for example, a fault occurred only 3 times, then the fault counter will be cleared again after a certain number of engine starts.

Only faults which prevent starting of the engine or severely influence engine operation are immediately stored in memory. The fault memory is not erased if the battery is disconnected.

Recalling fault memory with On-off ratio tester
Stored faults can be recalled with the On-off ratio tester at the diagnostic test connection (X11).

On-off ratio test: Ignition ON

Test conditions:
- Coolant temperature approx. 80 °C
- A/C OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram
2. **Engine: OFF**
3. **Ignition: ON**
4. If any value other than 50% appears, refer to fault table for possible cause.

Testing Lambda control system with On-off ratio tester.
The operation of the Lambda control system can be checked with the On-off ratio test. The On-off ratio test can also be used to identify momentary faults not stored in fault memory. Faults are distinguished between those that occur with the ignition on and those that occur with the engine at idle. The On-off ratio can be checked with the On-off ratio tester or with the diagnostic test unit. A readout of 50% or an oscillating needle indicates that all input signals and the Lambda control module are ok. Readouts of 10% to 95% refer to a particular fault source (see Fault Tables). In addition, after testing the On-off ratio, an DTC readout **must be performed** using the impulse counter scan tool.

On-off ratio test: Engine at idle

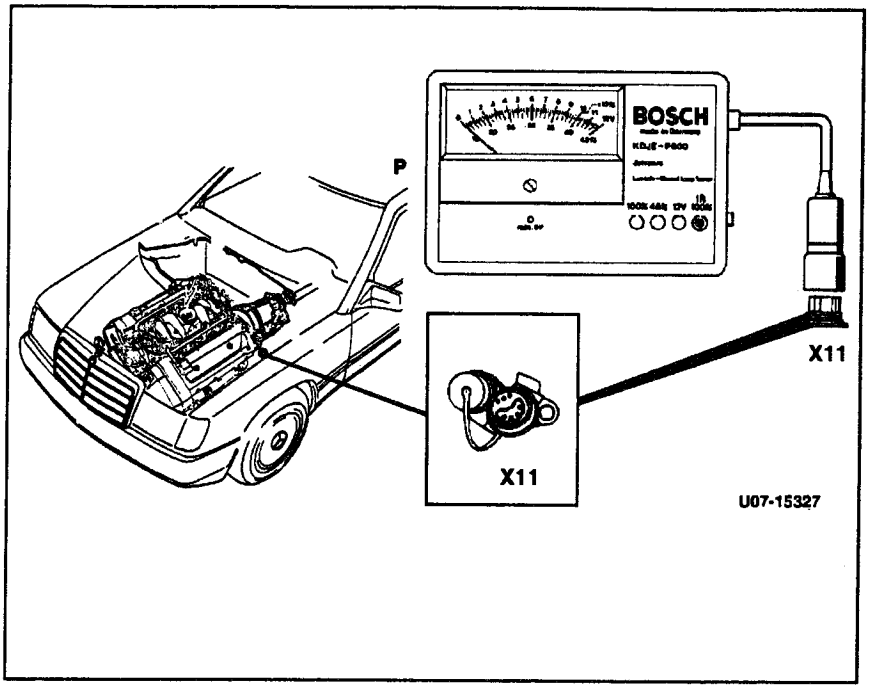
Test conditions:
- Coolant temperature approx. 80 °C
- A/C OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram
2. **Ignition: ON**
3. **Engine: AT IDLE**
4. If any value other than 50% or oscillations appear, refer to fault table for possible cause.

Specific Literature Recommendation: Diagnostic Manual, Engines Vol. 2, Engine 104, 119 LH injection, Section 3.1, Diagnosis - Malfunction Memory

Connection diagram

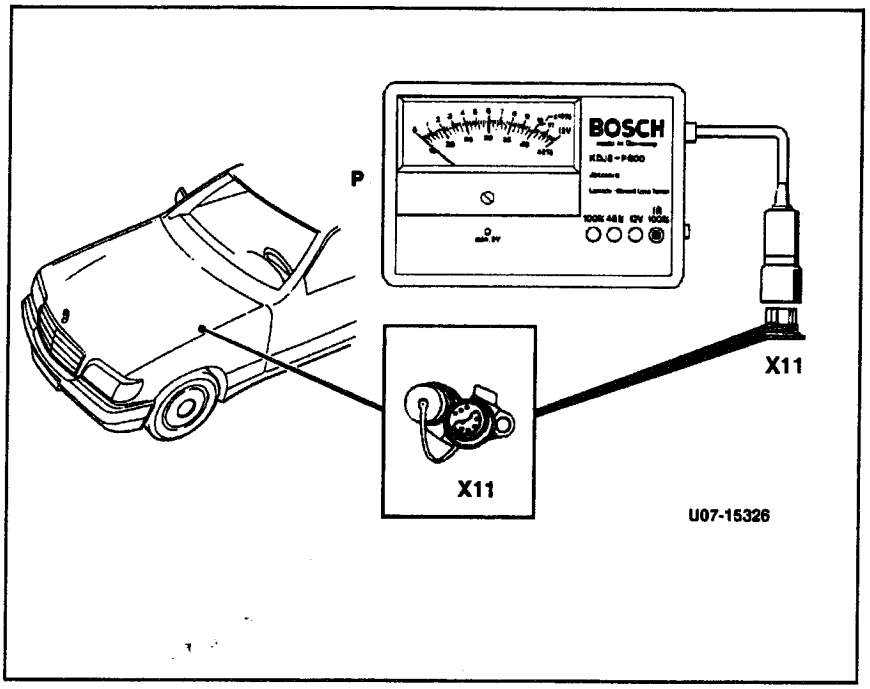
Models 124.034/036



P On-off ratio tester
X11 Diagnostic connector

Connection diagram

Models 140.042/057
140.070



P On-off ratio tester
X11 Diagnostic connector

Fault table, On-off ratio test, ignition: ON

On-off ratio %	Possible cause
10%	Closed throttle position recognition inactive
20%	Wide open throttle recognition inactive
30%	Engine coolant temperature < 70° C or > 110° C
40%	Not used
50%	Input signals ok
60%	TN-signal (rpm signal) or camshaft position sensor signal not present while starting engine
70%	Starter engaged
80%	CAN-data exchange defective
90%	Fuel safety shut-off active

Fault table, On-off ratio test, engine at idle

On-off ratio %	Possible cause
10%	Closed throttle position recognition applied constantly
20%	Output of injectors or one or more fuel injectors have open circuit
30%	Engine coolant temperature sensor (B11/2)
40%	Mass air sensor with hot wire
50% [1]	Oxygen sensor (G3/2) not operational or defective, open circuit
60%	Camshaft position sensor (L5/1)
70%	TN-signal (rpm signal)
80%	CAN-data exchange defective
90%	Vehicle speed signal
95%	Deceleration shut-off active

[1] Needle oscillates if all monitored signals are ok.

DTC readout (LH-SFI)

Model Year 1992

Models 124.034 140.042
124.036 140.043
129.067 140.051

Testing with impulse counter scan tool:

Note:
The On-off ratio test must be performed prior to reading the DTC readout.

The fault memory readout must be performed with the engine OFF and the ignition ON.

1. Connect impulse counter scan tool according to connection diagram

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note fault readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

8. Note any additional faults from the DTC readout.

9. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory
After eliminating a fault, the respective DTC readout must be cleared as follows:

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

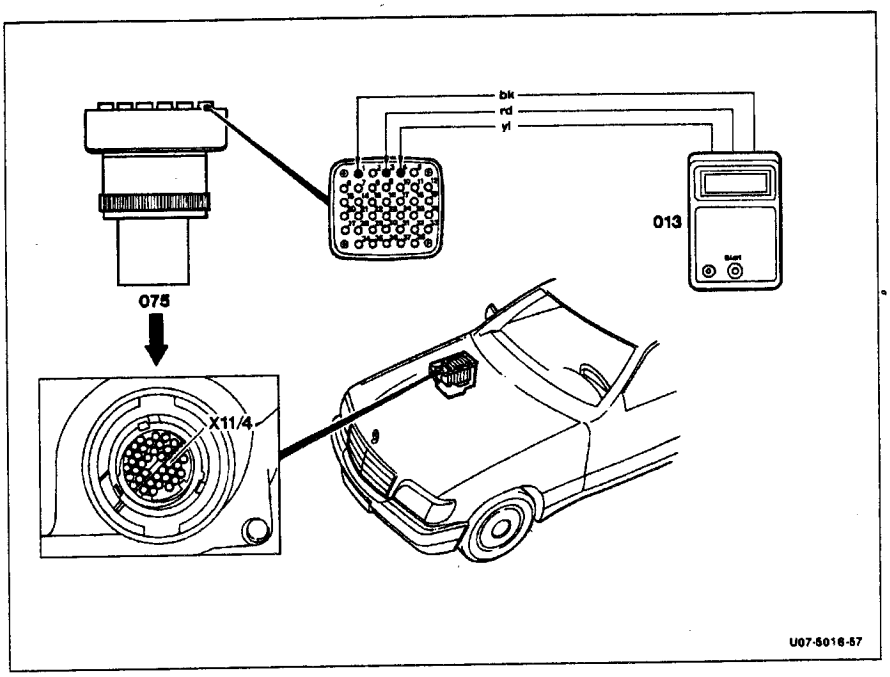
11. **Ignition: OFF** and wait 30 seconds.

If the fault has been eliminated and its respective DTC readout erased, then the DTC will no longer be displayed when performing the DTC readout.
If the number displayed is greater than 1, then there are further faults in the system.
In case of complaints, the DTC memory must be read and the fault eliminated before proceeding with any additional repairs.
The On-off ratio test must be performed prior to performing the impulse counter scan tool test.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 2, Engines 104, 119 LH injection, Section 3.1, Diagnosis - Malfunction Memory.

Connection diagram

013 Impulse counter scan tool
075 Impulse counter scan tool adaptor
X11/4 Data link connector (DTC readout, 38-pole)



Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 3 Red
Socket 4 Yellow

Fault table, DTC readout, SFI Control module (N3/1)

DTC readout	Possible cause
1	No faults in system
2	Engine Coolant temperature sensor (B11/2) circuit 1, open/short circuit
3	Engine coolant temperature sensor (B11/2) circuit 2, open/short circuit
4	Voltage at mass air sensor with hot wire (B2/2) insufficient or too high
5	Not used
6	Not used
7	TN-signal (rpm signal) incorrect or open/short circuit
8	Camshaft position sensor (L5/1) signal, open/short circuit
9	Starter signal (circuit 50) missing, open/short circuit
10	Closed throttle position recognition from electronic accelerator control module, short circuit
11	Air injection system, open/short circuit

Fault table, DTC readout, LH control module (N3/1) (continued)

DTC readout	Possible cause
12	Burn-off control for mass air sensor with hot-wire, open/short circuit
13	Intake air temperature sensor (B17/7), open/short circuit
14	Not used
15	Not used
16	EGR switchover valve (Y27), open/short circuit
17	No data transmission from electronic accelerator control module (N4/1)
18	No data transmission from ignition control module (N1/3)
19	Not used
20	No data transmission from SFI control module (N3/1)
21	Oxygen sensor (G3/2), open circuit
22	Oxygen sensor heater, open/short circuit
23	Purge switchover valve (Y58/1), open/short circuit
24	Left adjustable camshaft timing solenoid (Y49/1), open/short circuit
25	Right adjustable camshaft timing solenoid (Y49, Y49/2), open/short circuit
27	Injectors (Y62) open/short circuit
28	Not used
32	Not used

Base module (BM)

Model Year 1992 - 1993

Models 124.034 140.042
124.036 140.043
129.067 140.051

Testing with impulse counter scan tool:

Note:
The On-off ratio test must be performed prior to testing the DTC readout.

The base module (N16/1) DTC memory remains active even if the overvoltage protection relay or vehicle battery are disconnected.

1. Connect impulse counter scan tool according to connection diagram.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.
If the fault has been eliminated and its respective DTC readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.
In case of complaints the DTC memory must be read and the fault must be eliminated before proceeding with any additional repairs.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 2, Engine 104, 119 LH injection, Section 3.1, Diagnosis - Malfunction Memory.

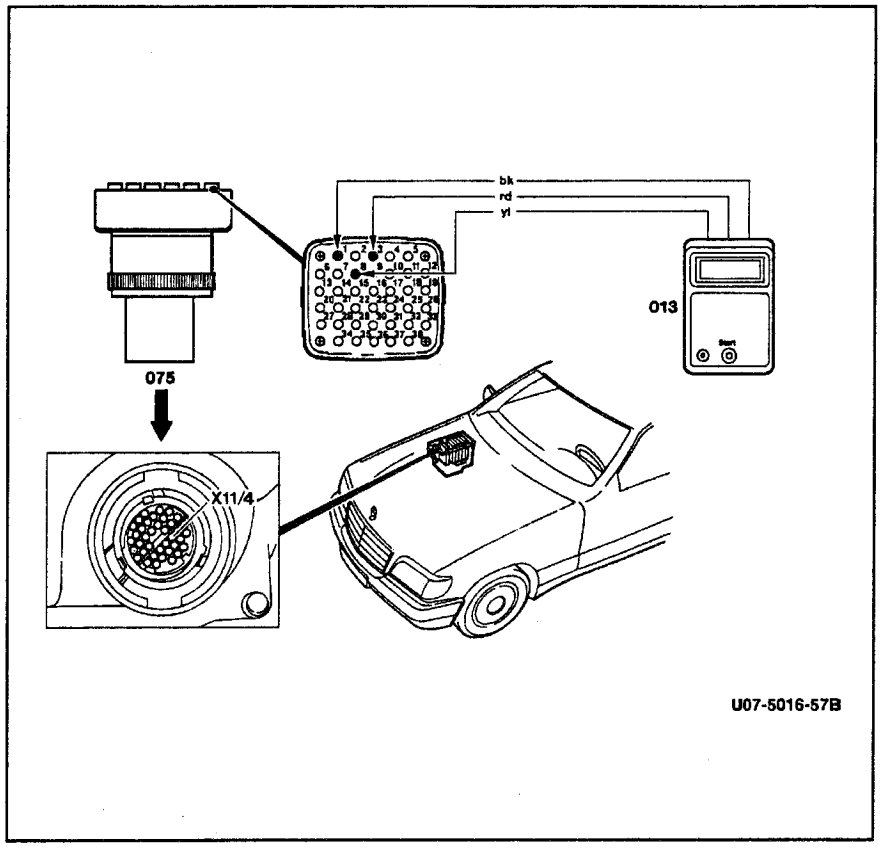
Connection diagram

Models 124.034/036
129.067
140.042
140.043
140.051

013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Diagnostic link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 3 Red
Socket 8 Yellow



Fault table, DTC readout, Base module (N16/1)

DTC readout	Possible cause
1	No faults in system
5	Maximum permissible temperature in module box exceeded
6	Electromagnetic A/C compressor clutch blocked
7	Poly V-belt slipping
9	Voltage supply for LH-SFI control module (N3/1) interrupted
10	Voltage supply for LH-SFI control module (N3/1) interrupted Voltage supply for injector valves interrupted
11	Voltage supply for accessory equipment control modules interrupted
12	Voltage supply for ABS control module (N30) or ABS/ASR control module (N30/1), or ASD control module (N30/2) interrupted
15	Voltage supply for kickdown valve (Y3) interrupted
16	Voltage supply for electromagnetic A/C Compressor clutch (A9k1) interrupted
17	Voltage supply for module box blower motor (M2/2) interrupted

Diagnostic module (DM)

Model Year 1992 - 1993

Models 124.034 140.042
124.036 140.043
119.067 140.051

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
Display "1" = no faults stored,
Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
If there are no further faults in the system, the previously displayed DTC will reappear.
If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing fault memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

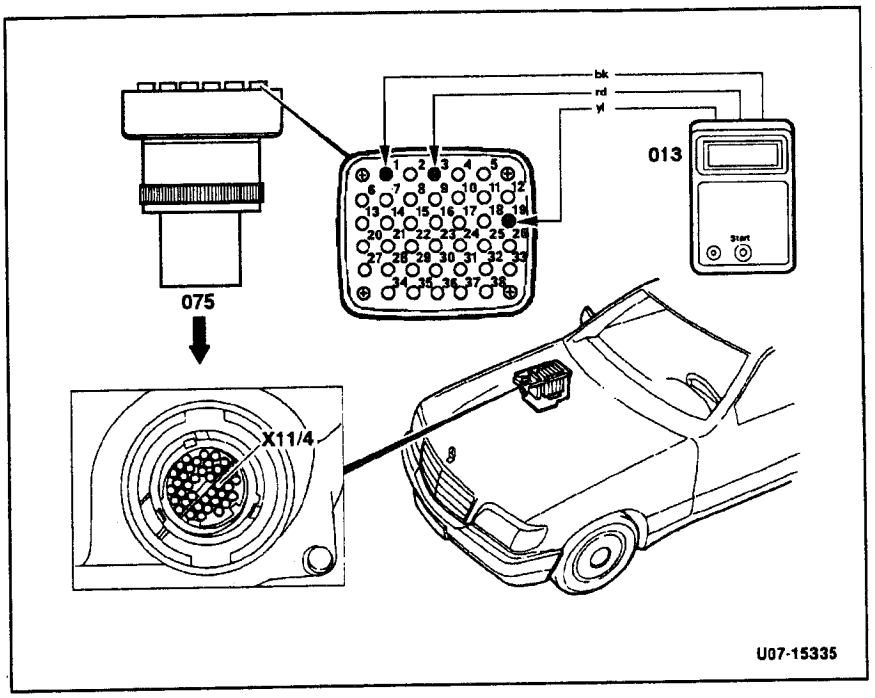
9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective DTC readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 2, Section 8.1, Diagnostic Module, Diagnosis - Malfunction Memory

Connection diagram



013	Impulse counter scan tool
075	Impulse counter scan tool scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 19	Yellow

Fault table, DTC readout, Diagnostic module (N59)

DTC readout	Possible Cause
1	No faults in system
2	Oxygen sensor inoperative
3	Lambda control inoperative
4	Air injection system inoperative
5	Exhaust gas recirculation inoperative
6	Idle speed control inoperative
7	Ignition system defective
8	Engine coolant temperature sensor, open/short circuit
9	Intake air temperature sensor, open/short circuit
10	Voltage at mass air sensor too high/low
11	TN-signal (rpm) defective
12	Oxygen sensor heater, open/short circuit
13	Camshaft position sensor signal from ignition control module defective.
14	Intake manifold pressure too low when starting

Fault table, DTC readout, Diagnostic module (N59)

DTC readout	Possible Cause
15	Wide open throttle information defective
16	Closed throttle position information defective
17	Data exchange fault between individual control modules
18	Adjustable camshaft timing solenoid, open/short circuit
19	Injectors open/short circuit or emission control system adaptation at limit
20	Vehicle speed signal missing
21	Purge switchover valve, open/short circuit
22	Camshaft position sensor signal defective
23	Intake manifold pressure with engine running too low
24	Starter ring gear segments defective
25	Knock sensors defective
26	Upshift delay switchover valve, open/short circuit
27	Engine coolant temperature sensor deviation between sensor circuit 1 and sensor circuit 2
28	Engine coolant temperature sensor (engine coolant temperature change monitor)

On-off ratio test (LH-SFI)

Model Year 1992 - 1993

Model 140.057 140.076

Diagnostics with fault memory
Faults which occur during starting or with the engine running are recorded by a fault counter. Faults are assigned a specific value according to fault severity (e.g. mass air sensor 128,engine coolant temperature sensor 32). The fault counter counts in stages up to a threshold value of 128, brief faults are stored into memory after switching off the ignition. For example, a fault of the engine coolant temperature sensor, which is assigned a value of 32, would have to occur 4 times to reach the threshold value of 128. Only then would the fault counter record the fault into memory. Faults which affect engine operation (i.e. faults assigned a value ≥ 128) are immediately stored into fault memory by the fault counter after switching off the ignition. If a fault is no longer present during a subsequent engine start or engine operation, the total value recorded by the fault counter is reduced by 1 every time the engine is switched off. This procedure repeats itself until the fault counter is cleared.

Only faults which prevent starting of the engine or severely influence engine operation are immediately stored in memory. The fault memory is not erased if the battery is disconnected.

Test conditions:
- Coolant temperature approx. 80 °C
- A/C OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram.

2. **Engine: OFF**

3. **Ignition: ON**

4. If any value other than 50% appears, refer to fault table for possible cause.

The operation of the Lambda control system can be checked with the On-off ratio test. The On-off ratio test can also be used to identify momentary faults not stored in fault memory. Faults are distinguished between those that occur with the ignition on and those that occur with the engine: at idle. The On-off ratio can be checked with the On-off ratio tester or with the diagnostic test unit. A readout of 50% or an oscillating needle indicates that all input signals and the Lambda control module are ok. Readouts of 10% to 95% refer to a particular fault source (see Fault Tables). In addition, after testing the On-off ratio, an DTC readout **must be performed** using the impulse counter.

On-off ratio test: Engine at idle

Test conditions:
- Coolant temperature approx. 80 °C
- A/C OFF
- Selector lever in park "P" position

1. Connect On-off ratio tester according to connection diagram.

2. **Engine: AT IDLE**

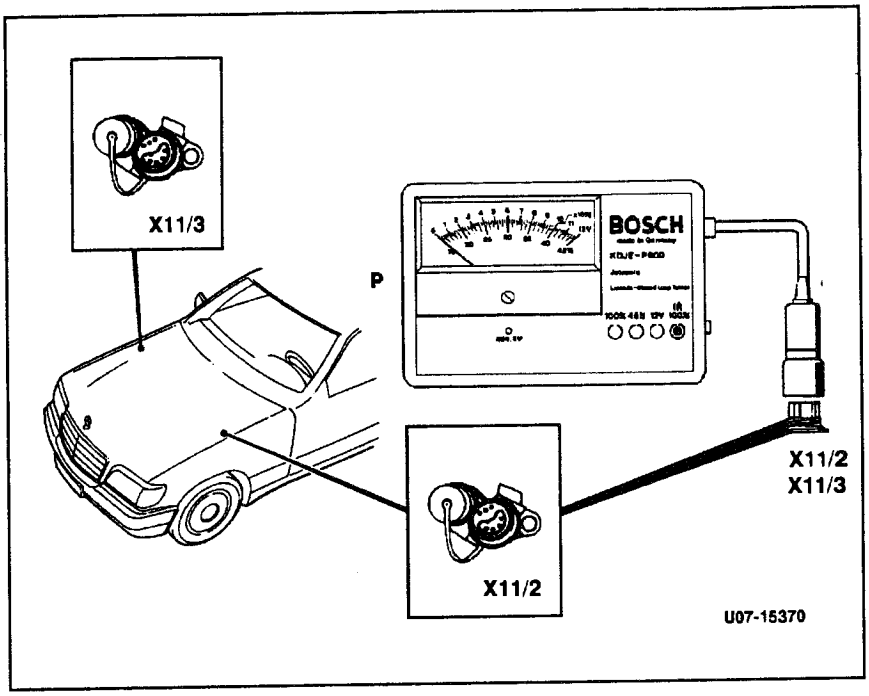
3. If any value other than 50% or oscillations appears, refer to fault table for possible cause.

Note: The fault memories of each cylinder bank must be read through diagnostic sockets X11/2 and X11/3.

Specific Literature Recommendation: Diagnostic Manual, Engines Vol. 2, Engine 120 LH injection, Section 3.2, Diagnosis - Malfunction Memory

Connection diagram

Model 140.057



P On-off ratio tester
X11/2 Left diagnostic connector
X11/3 Right diagnostic connector

Fault table, On-off ratio test, ignition: ON

On-off ratio %	Possible cause
10%	Closed throttle position throttle recognition inactive
20%	Wide open throttle recognition inactive
30%	Engine coolant temperature < 70° C or > 110° C
40%	Not used
50%	Input signals ok
60%	TN-signal (rpm signal) or camshaft position sensor signal not present while starting engine
70%	Starter engaged
80%	CAN-data exchange defective
90%	Fuel safety shut-off active

Fault table, On-off ratio test, engine at idle

On-off ratio %	Possible cause
10%	Closed throttle position recognition applied constantly
20%	Output of injectors or one or more injectors have open circuit
30%	Engine coolant temperature sensor (B11/9) or (B11/10)
40%	Air mass sensor with hot wire (B2/3) or (B2/4)
50% [1]	Oxygen sensor (G3/2) or (G3/3) not operational or defective, open circuit
60%	Camshaft position sensor (L5/2) or (L5/3)
70%	TN-signal (rpm signal)
80%	CAN-data exchange defective
90%	Vehicle speed signal
95%	Deceleration shut-off active

[1] Needle oscillates if all monitored signals are ok.

DTC readout (LH-SFI)

Model Year 1992 - 1993

Model 140.057
140.076

Testing with impulse counter scan tool:

Note:
The On-off ratio test must be performed prior to reading the DTC readout.

The DTC memory readout must be performed with the engine OFF and the ignition ON.

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1", = no fault stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

8. Note any additional faults from the DTC readout.

9. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory
After eliminating a fault, the respective DTC readout must be cleared as follows:

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually.**

11. **Ignition: OFF** and wait 30 seconds.

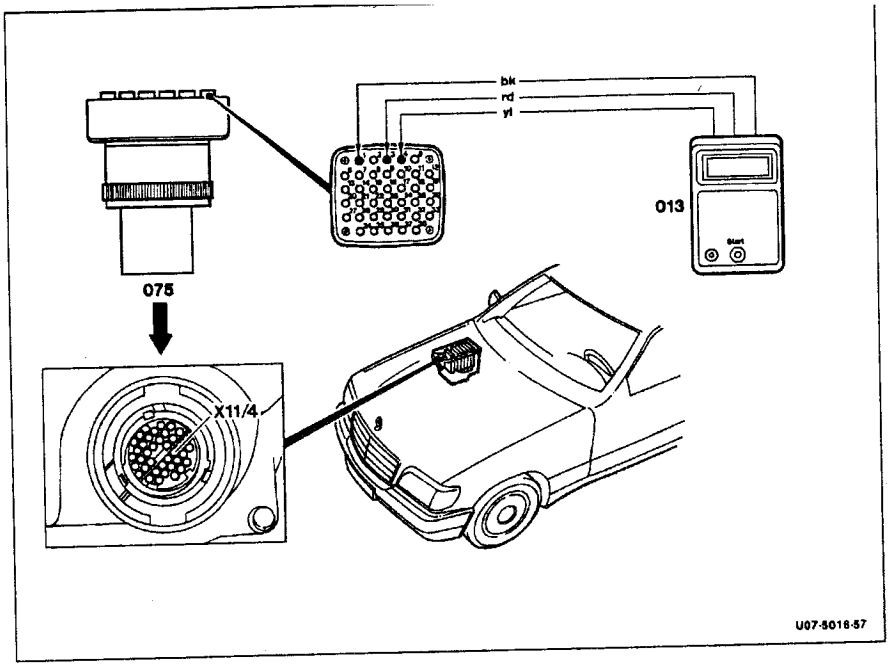
If the fault has been eliminated and its respective readout erased, then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.
In case of complaints, the fault memory must be read and the fault eliminated before proceeding with any additional repairs.

Note:
The DTC memories of both control modules (N3/2 and N3/3) must be read.

Specific Literature Recommendation: Diagnostic Manual, Models 129 and 140, Engines Volume 2, Engine 120 LH injection, Section 3.2, Diagnosis - Malfunction Memory.

Connection diagram

013 Impulse counter scan tool
075 Impulse counter scan tool adaptor
X11/4 Data link connector (DTC readout, 38-pole)



Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 3 Red
Socket 4 Yellow (N3/3)
Socket 5 Yellow (N3/2)

Fault table, DTC readout, SFI control module (N3/2) or (N3/3)

DTC readout	Possible cause
1	No faults in system
2	Engine coolant temperature sensor (B11/9) or (B11/10) circuit 1, open/short circuit
3	Engine coolant temperature sensor (B11/9) or (B11/10) circuit 2, open/short circuit
4	Voltage at mass air sensor with hot wire (B2/3) or (B2/4) insufficient or too high
5	Not used
6	Not used
7	TN-signal (rpm signal) incorrect or open/short circuit
8	Camshaft position sensor (L5/2) or (L5/3) signal, open/short circuit
9	Starter signal (circuit 50) missing, open/short circuit
10	Closed throttle position recognition from electronic accelerator control unit, short circuit
11	Air injection system, open/short circuit

Fault table, DTC readout, LH control modules (N3/2, N3/3) (continued)

DTC readout	Possible cause
12	Burn-off control for mass air sensor with hot-wire, open/short circuit
13	Intake air temperature sensor (B17/5) or (B17/6), open/short circuit
14	Not used
15	Not used
16	EGR switchover valve (Y27/2) or (Y27/3), open/short circuit
17	No data transmission from electronic accelerator control module (N4/1)
18	No data transmission from ignition control module (N1/4) or (N1/5)
19	No data transmission from left LH-SFI control module (N3/2), to right LH-SFI control module (N3/3)
20	No data transmitted from LH-SFI control module (N3/2) or (N3/3)
21	Oxygen sensor (G3/3) or (G3/4), open circuit
22	Oxygen sensor heater, open/short circuit
23	Purge switchover valve (Y58/2) or (Y58/3), open/short circuit
24	Not used
25	Adjustable camshaft timing solenoid (Y49/1) or (Y49/2), open/short circuit
27	Injectors (Y63) or (Y64) open/short circuit
28	Not used
32	Not used

DTC readout (BM)

Model Year 1992 - 1993

Model 140.057
140.076

Testing with impulse counter scan tool:

Note:
The On-off ratio test must be performed prior to reading the DTC readout.

The base module (N16/1) DTC memory remains active even if the overvoltage protection relay or vehicle battery is disconnected.

1. Connect impulse counter scan tool according to connection diagram.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds

4. Read and note DTC readout displayed.
   Display "1" = faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually.**

11. **Ignition: OFF** and wait 30 seconds.

If the fault has been eliminated and its respective DTC readout erased, the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.
In case of complaints, the DTC memory must be read and the fault eliminated before proceeding with any additional repairs.

Specific Literature Recommendation: Diagnostic Manual, Engines, Volume 2, Engine 120 LH injection, Section 3.2, Diagnosis - Malfunction Memory.

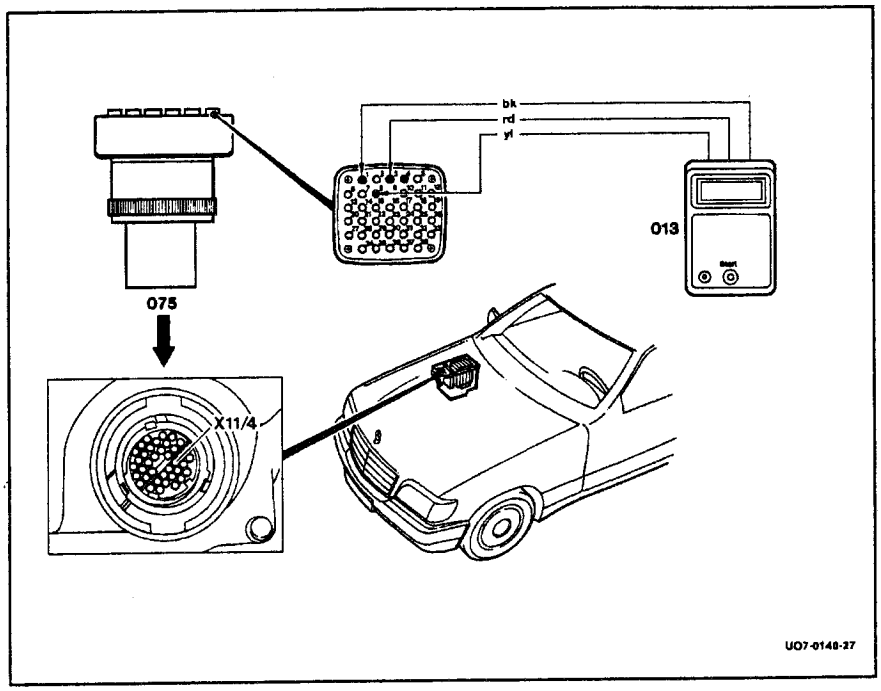
Connection diagram

Model 140.057/076

013 Impulse counter scan tool
075 Impulse counter adaptor
X11/4 Data link connector

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 3 Red
Socket 8 Yellow



Fault table, DTC, Base module (N16/1)

DTC readout	Possible cause
1	No fault in system
5	Maximum permissible temperature in module box exceeded
6	Electromagnetic A/C compressor clutch blocked
7	Poly V-belt slipping
8	Voltage supply for LH-SFI control module (N3/2) interrupted
9	Voltage supply for LH-SFI control module (N3/3) interrupted
10	Voltage supply for LH-SFI control module (N3/3) interrupted Voltage supply for injectors (Y64) interrupted
11	Voltage supply for accessory equipment control modules interrupted
12	Voltage supply for ABS control module (N30) interrupted
13	Voltage supply for LH-SFI control module N3/2 interrupted Voltage supply for injectors (Y63) interrupted
15	Voltage supply for kickdown valve (Y3) interrupted
16	Voltage supply for electromagnetic A/C Compressor clutch (A9k1) interrupted
17	Voltage supply for module box blower motor (M2/2) interrupted

DTC readout (DM)

Model Year 1992 - 1993

Models 140.057
140.076

Testing with Impulse counter scan tool scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing fault memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.
If the DTC has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 2, Section 8.1, Diagnostic Module, Diagnosis - Malfunction Memory

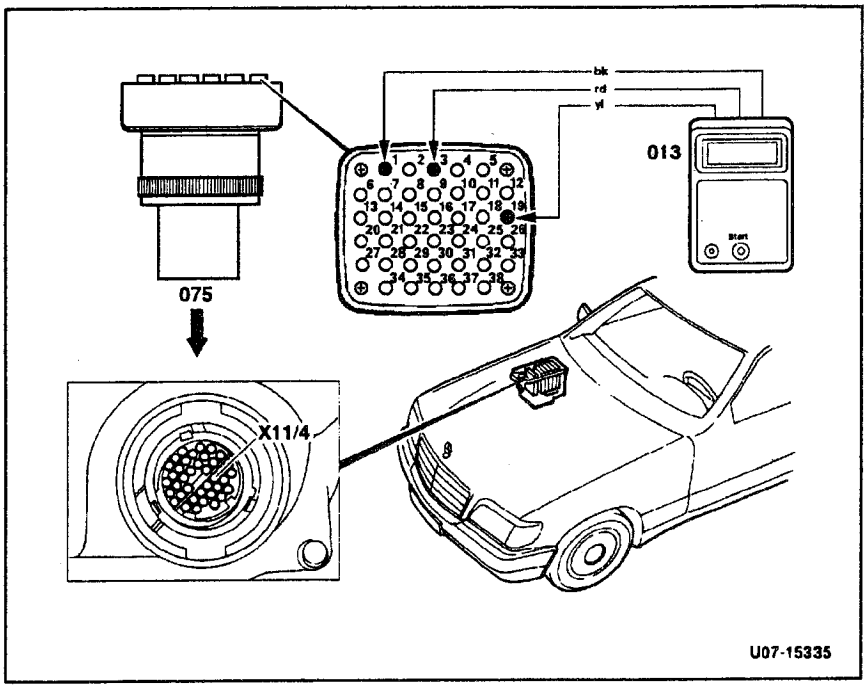
Connection diagram

Model 140.057/067

013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 19	Yellow



Fault table, DTC readout, Diagnostic module (N59)

DTC readout	Possible Cause
1	No fault in system
2	Right oxygen sensor (G3/4) inoperative
3	Lambda control of right LH-SFI control module (N3/3) inoperative
4	Air injection at right cylinder bank inoperative inoperative
5	Exhaust gas recirculation of right LH-SFI control module (N3/3) inoperative
6	Idle speed control inoperative
7	Ignition system for right cylinder bank defective
8	Right engine coolant temperature sensor (B11/10), open/short circuit
9	Right intake air temperature sensor (B17/6), open/short circuit
10	Voltage at right mass air flow sensor (B2/4) too high/low
11	TN-signal (rpm) at right LH-SFI control module (N3/3) defective
12	Oxygen sensor heater of right oxygen sensor (G3/2), open/short circuit
13	Camshaft position sensor signal of right ignition control module (N1/5) defective.
14	Intake manifold pressure at start (in right ignition control module N1/5) too low/high

Fault table, DTC readout, Diagnostic module (N59) continued

DTC readout	Possible Cause
15	Wide open throttle information defective
16	Closed throttle position information defective
17	Data exchange fault between right-hand control modules LH-SFI (N3/3), ignition control module (N1/5) and electronic accelerator (N4/1)
18	Right adjustable camshaft timing solenoid (Y49/2), open/short circuit
19	Right injectors (Y64) open/short circuit or emission control system adaptation in right LH-SFI control module (N3/3) at limit
20	Vehicle speed signal missing
21	Right purge switchover valve (Y58/3), open/short circuit
22	Right camshaft position sensor (L 5/3) signal defective
23	Intake manifold pressure (in right ignition control module N1/5) with engine running too low/high
24	Starter ring gear segments defective
25	Knock sensors or right ignition control module (N1/5) defective
26	Upshift delay switchover valve (Y3/3), open/short circuit open/short circuit
27	Right engine coolant temperature sensor (B11/10) deviation between circuit 1 and circuit 2
28	Right engine coolant temperature sensor (B11/10) (engine coolant temperature change monitor)
34	Left oxygen sensor (G3/3) inoperative
35	Lambda control of left LH-SFI control module (N3/2) inoperative
36	Air injection at left cylinder bank inoperative
37	Exhaust gas recirculation of left LH-SFI control module (N3/2) inoperative
38	Not used
39	Ignition system for left cylinder bank defective
40	Left engine coolant temperature sensor (B11/9), open/short
41	Left intake air temperature sensor (B17/5) open/short
42	Voltage at left mass air flow sensor (B2/3) too high/low
43	TN-signal (rpm) at left LH-SFI control module (N3/2) defective
44	Oxygen sensor heater of left oxygen sensor (G3/3), open/short
45	Camshaft position sensor signal of left ignition control module (N1/4) defective.
46	Intake manifold pressure at start (in left ignition control module) (N1/4) defective.
47	Not used
48	Not used
49	Data exchange fault between left LH-SFI control module (N3/2) and igntion control module (N1/4)
50	Left adjustable camshaft timing solenoid (Y49/1), open/short

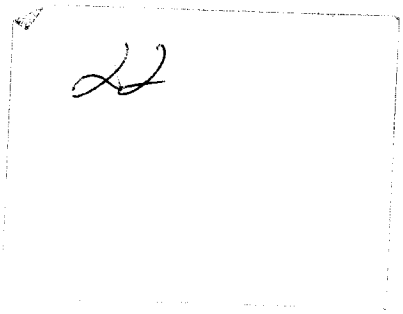
Fault table, DTC readout, Diagnostic module (N59)

DTC readout	Possible Cause
51	Left injectors (Y63) open/short circuit or emission control system adaptation in left LH-SFI control module (N3/2) at limit
52	Not used
53	Left purge switchover valve (Y58/2), open/short
54	Left camshaft position sensor (L5/2) signal defective
55	Intake manifold pressure (in left ignition control module (N1/4) with engine running too low/high
56	Starter ring gear segments and/or left crankshaft position sensor (L5/4) defective
57	Knock sensors or left igntion control module (N1/4) defective
58	Not used
59	Left engine coolant temperature sensor (B11/9) deviation between circuit 1 and circuit 2
60	Left engine coolant temperature sensor (B11/9) (engine coolant temperature change monitor)

DTC readout (HFM-SFI)

Model Year 1993

Models 124.028
124.032
124.052
124.092



Testing with impulse counter scan tool:

Note regarding DTC readout:
The engine control module (3/4) for the HFM-SFI system is equipped with DTC memory. Faults are recognized and stored as trouble codes and are distinguished as follows:

- Faults which are constantly present,
- Faults which occur longer than 3 seconds,
- Intermittent contact faults which have occurred 5 times during a trip

The DTC memory remains active even if the vehicle's battery is disconnected.

Faults which are no longer present, are automatically erased again after a maximum of 19 trips. A Trip occurred if:

- Vehicle speed > 2.5mph,
- Engine speed > 700 rpm,
- Engine shut off for 30 seconds.

The stored DTC's can be read at the diagnostic connector (X11/4) with the ignition switched ON or with the engine running.

Preparation for test with impulse counter scan tool
Connect impulse counter scan tool to diagnostic link connector (X11/4) according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

Reading DTC memory
1. Ignition: **ON**
2. Press start button for 2 to 4 seconds.
3. Read and record DTC.
4. Press start button again for 2 to 4 seconds
5. Read and record DTC.
6 Repeat steps 4 and 5 until the first DTC reappears

Clearing DTC memory
1. Press start button for 2 to 4 seconds (DTC reappears).
2. Wait 3 seconds, press start button for 5 to 6 seconds, thereby clearing the previously displayed DTC from memory.
3. Repeat steps 1 and 2 until the DTC "1" appears (no faults stored).

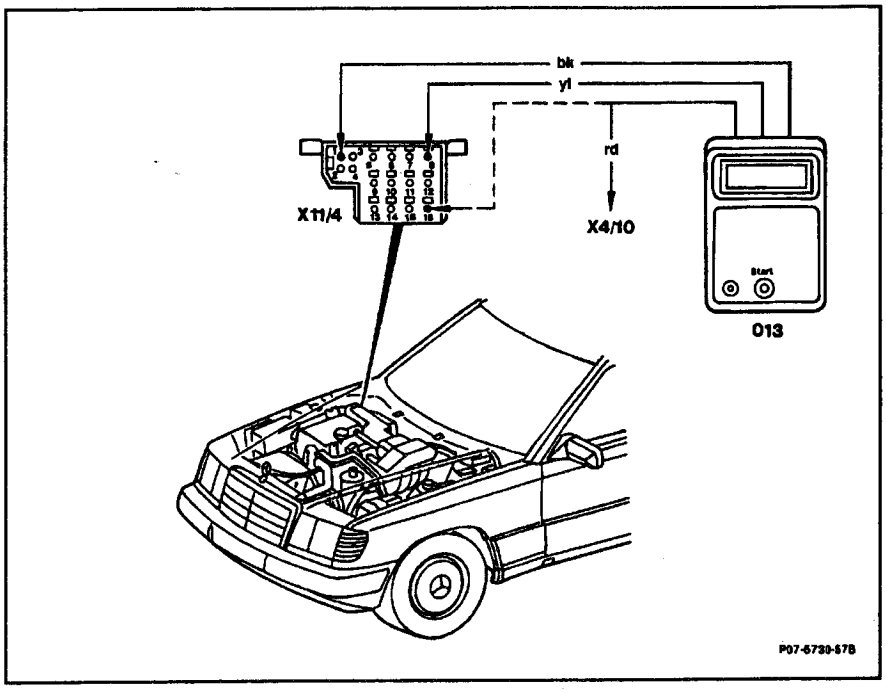
Resetting and reactivating engine control module memory
1. Clear DTC memory.
2. After the DTC "1" appears, press start button for 8 to 9 seconds.
3. Switch ignition OFF and wait a minimum of 2 seconds.
4. Turn ignition ON, wait a minimum of 10 seconds and then start engine.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 2, Engines 104, HFM-SFI, Section 1, Diagnosis - DTC Memory.

Connection diagram

013 Impulse counter scan tool

X11/4 Data link connector (DTC readout, 16-pole)



Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 16 Red
Socket 8 Yellow

Fault table, DTC readout, Engine control module (HFM-SFI) (N3/4)

DTC readout	Possible cause
1	No fault in system
2	Engine coolant temperature sensor (B11/3)
3	Intake air temperature sensor (B17)
4	Hot film mass air flow sensor with hot wire (B2/5)
5	Closed throttle position switch (M16/1s1 or M16/ 2r2) of electronic accelerator actuator (M16/1) or cruise control/idle speed control actuator (M16/2)
6	Throttle body actual value potentiometer (M16/1r2 or M16/2r2) of electronic accelerator actuator (M16/1) or cruise control/idle speed control actuator (16/2)
7	Actuator reference potentiometer (M16/1r1 or M 16/2r1) of electronic accelerator actuator (M16/1) or cruise control/idle speed control actuator (M16/2)
8	Fault in idle speed control (ISC) system
9	Heated oxygen sensor (G3/2), open circuit
10	Not used
11	Oxygen sensor heater of oxygen sensor (G3/2)
12	Not used
13	Lambda control system operating rich or lean limit
14	Injector (Y62y1), cylinder 1

Fault table, (continued)

DTC readout	Possible cause
15	Injector (Y62y2), cylinder 2
16	Injector (Y62y3), cylinder 3
17	Injector (Y62y4), cylinder 4
18	Injector (Y62y5), cylinder 5
19	Injector (Y62y6), cylinder 6
20	Self-adaptation at rich or lean limit
21	Ignition output 1 or ignition coil (T1/1) for cylinders 2 and 5
22	Ignition output 2 or ignition coil (T1/2) for cylinders 3 and 4
23	Ignition output 3 or ignition coil (T1/3) for cylinders 1 and 6
24	Crankshaft position sensor (L5) or magnet for position sensor not recognized
25	Crankshaft position sensor (L5/1)
26	Not used
27	TN-signal (rpm signal), short circuit
28	Not used
29	Not used
30	Fuel pumps relay module (K27)
31	Not used
32	Knock sensors 1 and/or 2 (A16)
33	Maximum retard setting on at least one cylinder has been reached or the ignition angle deviation between the individual cylinders is > 6° crankshaft angle.
34	Knock control-output switch in engine control module (3/4) defective
35	Secondary air injection pump air switchover valve (Y32) and/or electromagnetic secondary air injection pump clutch (Y33)
36	Purge switchover valve (Y58/1)
37	Upshift delay switchover valve (Y3/3)
38	Adjustable camshaft timing solenoid (Y49)
39	EGR switchover valve (Y27)
40	Transmission overload protection switch (S65)
41	CAN communication from engine control module (3/4)
42	CAN communication from electronic accelerator/cruise control/idle speed control module (N4/1), cruise control/idle speed control module (4/3) or diagnostic module (N59) defective
43	Starter signal (circuit 50) not present

Fault table, (continued)

DTC readout	Possible cause
44	Not used
45	Fuel safety shut-off electronic accelerator or cruise control active
46	Resonance intake manifold switchover valve (Y22/6)
47	Not used
48	Not used
49	Voltage supply at engine control module (N3/4) < 8V
50	Engine control module (N3/4)

DTC readout (HFM-SFI)

Model Year 1993

Models 124.028
124.032
124.052
124.092

Testing with impulse counter scan tool:

Preparation for test with impulse counter scan tool

1. Connect impulse counter scan tool and adapter to (X11/4) according to data linkconnection diagram. LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.
2. Recall control module's DTC memory and clear stored DTC's.

Reading DTC memory

1. Ignition **ON**
2. Press start button for 2 to 4 seconds.
3. Read and record DTC.
4. Press start button again for 2 to 4 seconds
5. Read and record DTC.
6 Repeat steps 4 and 5 until the first DTC reappears

Clearing DTC memory

Note:

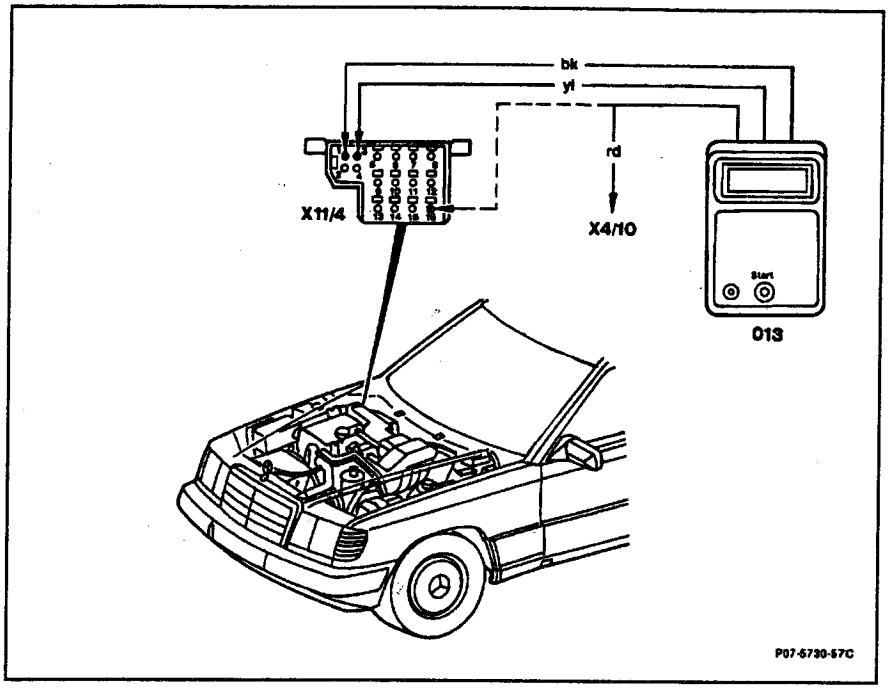
The retained DTC memory feature of the diagnostic module has been replaced with DTC memory which is cleared after disconnecting the vehicle's battery (DM voltage supply). In addition, the DTC readout "1" (no faults in system) does not appear after clearing the DTC memory (disconnecting the vehicle's battery). DTC readout "1" only reappears during the vehicles' subsequent trip after the diagnostic module has confirmed that all monitored systems and their respective components are functioning properly (no faults).

Specific Literature Recommendation: Diagnostic Manual, Models 129 and 140, Engines Volume 3, Engines 104, HFM-SFI, Section 8.4, Diagnosis - DM

Connection diagram

013 Impulse counter scan tool

X11/4 Data link connector (DTC readout, 16-pole)



Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 16 Red
Socket 3 Yellow

DTC table, DTC readout, Diagnostic module (N59)

DTC readout	Possible cause
1	No fault in system
2	Heated oxygen sensor inoperative
3	Lambda control inoperative
4	Air injection system inoperative
5	Exhaust gas recirculation inoperative
6	Idle speed control inoperative
7	Ignition system defective
8	Engine coolant temperature sensor, open/short
9	Intake air temperature sensor, open/short circuit
10	Voltage at hot wire mass air flow sensor too high/low
11	TN-signal (rpm) at engine control module defective
12	Heated oxygen sensor heater, open/short circuit
15	Wide open throttle information defective
16	Closed throttle position information defective

DTC table, (continued)

DTC readout	Possible cause
17	Data exchange malfunction between individual control modules
18	Adjustable camshaft timing solenoid, open/short circuit
19	Injectors open/short circuit emission control system adaptation in engine control module (3/4) at limit
20	Vehicle speed signal not present
21	Purge switchover valve, open/short circuit
22	Camshaft position sensor signal defective
23	Intake manifold pressure (in base module pressure sensor-B5/2) with engine running too low/high
24	Starter ring gear segments and/or crankshaft position sensor defective
25	Knock sensors or engine control module defective
26	Upshift delay defective
27	Not used
28	Engine coolant temperature sensor (engine coolant temperature change monitor)
44	Not used
45	Fuel safety shut-off electronic accelerator or cruise control active
46	Resonance intake manifold switchover valve (Y22/6)
47	Not used
48	Not used
49	Voltage supply at engine control module (N3/4) < 8V
50	Engine control module (N3/4)

DTC readout (DI)

Model Years 1990 - 1993

Models 124.051 129.061

DTC readout with impulse counter scan tool:

- The ignition control module (N1/3) is equipped with diagnostics **without** DTC memory. The control module (N1/3) cannot store faults for recall at a later date.
- The DTC readout can only be performed with the engine at idle.
- If there are multiple system faults, the fault assigned the lowest DTC will be displayed first.
- The DTC memory is cleared by switching off the ignition.
- With the engine running a displayed DTC can be cleared by pressing the start button for 6 to 8 seconds.

Preparation for test with impulse counter scan tool

1. Connect impulse counter scan tool according to connection diagram.

2. Start engine and run a for at least 8 seconds at 3100-3600 rpm with vacuum hose connected to EZL/AKR ignition control module.

3. Pull off vacuum hose with engine at idle.

4. With engine at idle, move transmission selector lever from P/N to trans. range "D" and back again.

5. Run engine for at least 2 seconds above 5000 rpm.

6. Engine at idle, reconnect vacuum hose.

7. Raise engine idle speed to approxmately 2300 rpm and then briefly apply full throttle (wide open throttle contact must close briefly).

8. **Engine at idle.**

Note: If the ignition is turned off, the entire procedure must be repeated (steps 1 through 8).

Testing with impulse counter scan tool:

9. Press impulse counter scan tool start button for 2 to 4 seconds.

10. Read and note displayed DTC readout.
    Display "1" = no faults stored,
    Greater than "1" = fault in system.

11. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed will reappear. If additional faults exist, the respective DTC will be displayed.

12. Repeat step 10 until the first DTC displayed is repeated.

13. Note any additional faults from DTC readout.

14. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Specific Literature Recommendation Diagnostic: *Manual, Engines Volume 2, Engines 104, 119 CIS-E injection, Section 5.1, Diagnosis - Malfunction Memory.*

Erasing fault memory:
After eliminating a fault, the respective DTC may be cleared as follows:

15. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 10 seconds

Note:
Each DTC displayed must be **erased individually**

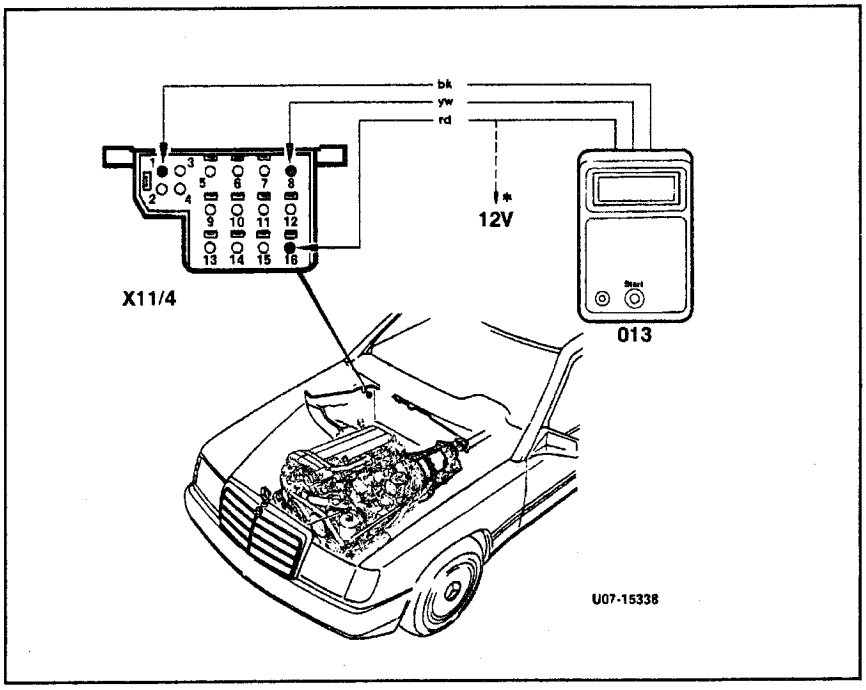
Connection diagram

Model 124.051

013 Impulse counter scan tool
X11/4 Data link connector (DTC readout, 16-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 16 Red
Socket 8 Yellow



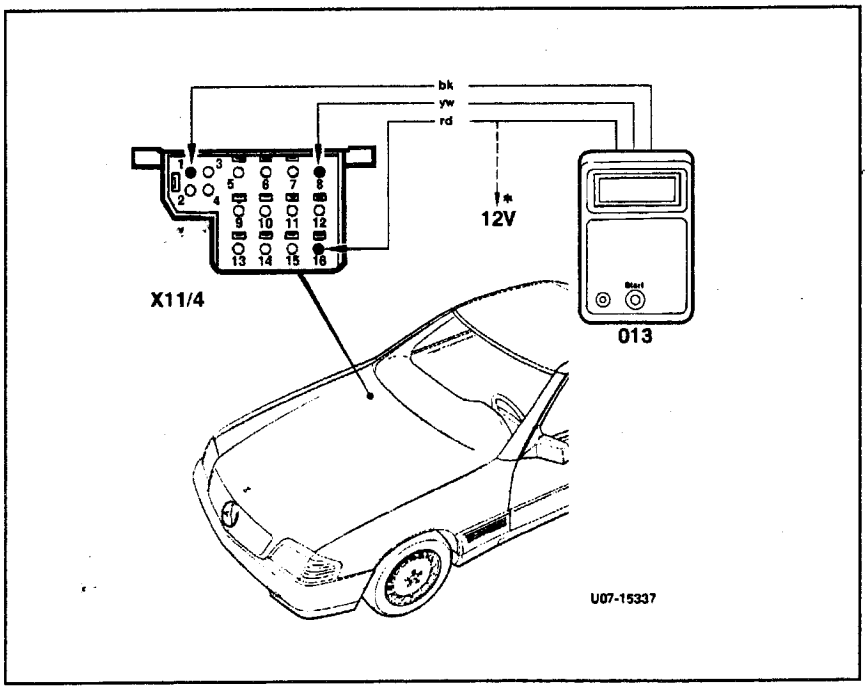
Connection diagram

Model 129.061

013 Impulse counter scan tool
X11/4 Data link connector (DTC readout, 16-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 16 Red
Socket 8 Yellow



Fault table, DTC readout, Ignition control module (N1/3)

DTC readout	Possible cause
1	No faults in system
2	Maximum retard setting on at least one cylinder has been reached
3	Engine coolant temperature sensor (B11/2) defective
4	Load sensor in ignition control module (N1/3) defective
5	Knock sensors (A16) 1 and/or 2 defective
6	Camshaft position sensor (L5/1) defective
7	Knock control-output switch in ignition control module (N1/3) defective
8	Transmission overload switch (S65) does not close
9	Transmission overload switch (S65) does not open
10	Data exchange from ignition control module (N1/3) to CFI control module defective
11	Reference resistor (R16/2) defective
12	TN signal is outside the tolerance range
13	Wide open throttle contact does not open
14	Closed throttle position contact does not open
15	Ignition coil 1 output from ignition control module (N1/3) defective
16	Not used
17	Crankshaft position sensor (L5) defective

DTC readout (DI)

Model Year 1992 - 1993

Model 140.032

DTC readout with impulse counter scan tool:

The ignition control module (N1/3) is equipped with diagnostics, **including** DTC memory. A DTC is recorded into memory only if the same fault has occured after 8 sequential engine starts. This prevents a DTC from being recorded if, for example, it occured only once. If, for example, a fault occured only 7 times, then the fault counter will be cleared again after a certain number of engine starts.

Note: The DTC memory remains active even if the vehicle battery is disconnected.

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

Erasing DTC memory:
After eliminating a fault, the respective DTC readout must be cleared as follows:

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective readout erased, then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Engines Vol. 2, Engine 104, 119 LH injection, Section 5.2, Diagnosis - Malfunction memory

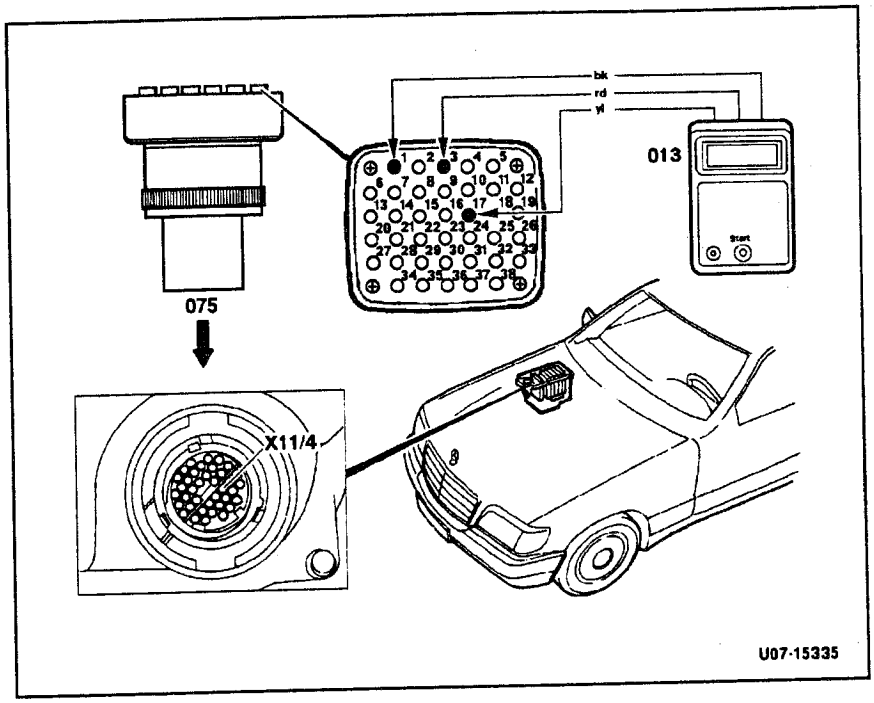
Connection diagram

Model 140.032

013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 17	Yellow



Fault table, DTC readout, Ignition control module (N1/3)

DTC readout	Possible cause
1	No faults in system
2	Maximum retard setting on at least one cylinder has been reached
3	Not used
4	Load sensor in ignition control module (N1/3) defective
5	Knock sensors (A16) 1 and/or 2 defective
6	Camshaft position sensor (L5/1) defective
7	Knock control-output switch in ignition control module (N1/3) defective
8	Transmission overload switch (S65) does not close
9	Transmission overload switch (S65) does not open
10	Not used
11	Reference resistor (R16/2) defective
12	TN signal is outside of tolerance range
13	Not used
14	Not used
15	Ignition coil output from ignition control module (N1/3) defective
16	Not used
17	Crankshaft position sensor (L5) defective

Fault table, DTC readout, Ignition control module (N1/3) continued

DTC readout	Possible cause
18	Not used
19	Not used
20	Ignition control module (N1/3) DTC memory defective
21	Load sensor in ignition control module (N1/3) defective (recognized with engine running)
22	Not used
23	Not used
24	Not used
25	Not used
26	Ignition control module (N1/3) data exchange fault
27	LH-SFI control module (N1/3) data exchange fault
28	Electronic accelerator control module/idle speed control data exchange fault

DTC readout (DI)

Model Years 1990 – 1992

Model 129.066

Impulse readout with impulse counter

- The EZL/AKR ignition control unit (N1/3) is equipped with diagnostics, however **without** malfunction memory. The control unit (N1/3) cannot store malfunctions for recall at a later date.
- The impulse readout can only be performed with the engine at idle.
- If there are multiple system malfunctions, the malfunction assigned the lowest number will be displayed first.
- The malfunction memory is cleared by switching off the ignition.
- With the engine running a displayed malfunction can be cleared by pressing the start button for 6 to 8 seconds.

Preparation for test with impulse counter

1. Connect impulse counter according to connection diagram.
2. Start engine and run a for at least 8 seconds at 3100-3600 rpm with vacuum hose connected to EZL/AKR ignition control unit.
3. Pull off vacuum hose with engine at idle.
4. With engine at idle, move transmission selector lever from "P" or "N" to "D" and back again.
5. Run engine for at least 2 seconds above 5000 rpm.
6. Engine at idle, reconnect vacuum hose.
7. Raise engine idle speed to approx. 2300 rpm and then briefly apply full throttle (full load contact must close briefly).
8. Engine **at idle**.

Note: If the ignition is turned off, the entire procedure must be repeated (steps 1 through 8).

Testing with impulse counter:

9. Press impulse counter start button for 2 to 4 seconds.
10. Read and note displayed impulse readout. Display "1" = no malfunction stored. Greater than "1" = malfunction in system.
11. Press start button again for 2 to 4 seconds. If there are no further malfunctions in system, the previously displayed number will reappear. If additional malfunctions exist, the respective malfunction code will be displayed.
12. Repeat step 10 until the first number displayed is repeated.
13. Note any additional malfunctions from impulse readout.
14. Eliminate all noted malfunctions (impulse readout) according to troubleshooting chart and diagnostic tests.

Erasing malfunction memory:

After eliminating a malfunction, the respective impulse readout may be cleared as follows:

15. Press start button for 2 to 4 seconds and read out the malfunction. Then press the start button for 6 to 10 seconds.

Note:

Each malfunction displayed must be **erased individually**.

Specific Literature Recommendation: Diagnostic Manual, Models 129 and 140, Engines Volume 2, Engines 104, 119 CIS-E injection, Section 5.1, Diagnosis - Malfunction Memory.

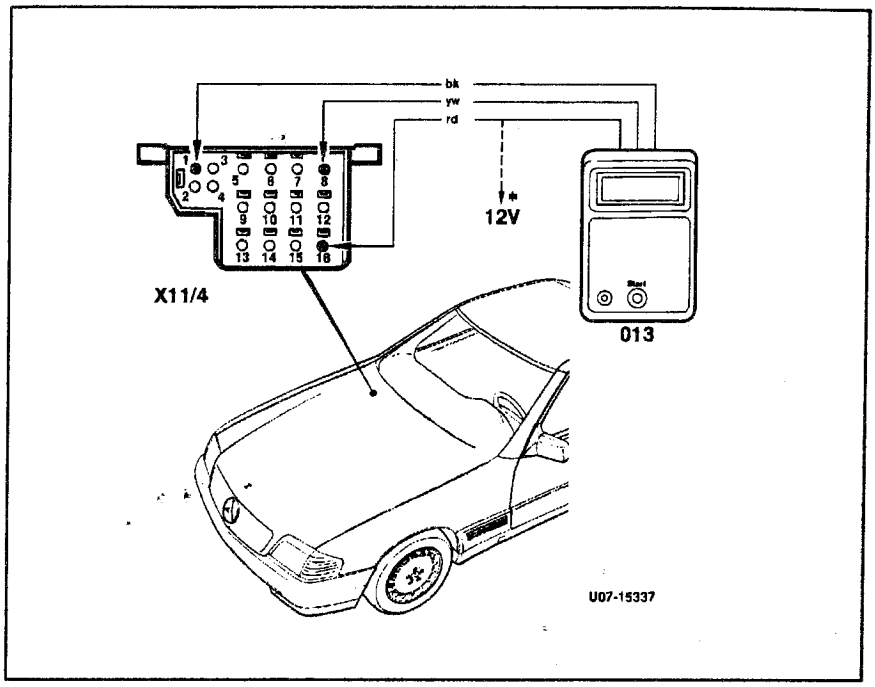
Connection diagram

Model 129.066

013 Impulse counter
X11/4 Test connection for diagnosis (impulse readout, 16-pole)

Note:
Connect wires of impulse counter as follows:

Socket 1 Black
Socket 16 Red
Socket 8 Yellow



Malfunction table, impulse readout, EZL/AKR control unit (N1/3)

Impulse readout	Possible cause
1	No malfunctions in system
2	Maximum retard setting on at least one cylinder has been reached
3	Coolant temperature sensor (B11/2) defective
4	Load sensor in EZL/AKR ignition control unit (N1/3) defective
5	Knock sensors (A16) 1 and/or 2 defective
6	Camshaft position sensor (L5/1) defective
7	Knock control-output switch in EZL/AKR ignition control unit (N1/3) defective
8	Transmission overload switch (S65) does not close
9	Transmission overload switch (S65) does not open
10	Data exchange from EZL/AKR ignition control unit (N1/3) to CIS-E control unit defective
11	Reference resistor (EZL/AKR) (R16/2) defective
12	TN engine speed signal is outside the tolerance range
13	Full load contact does not open
14	Idle speed contact does not open
15	Ignition coil 1 output from EZL/AKR ignition control unit (N1/3) defective
16	Ignition coil 2 output from EZL/AKR ignition control unit (N1/3) defective
17	Crankshaft position sensor (L5) defective

DTC readout (DI)

Model Year 1992 - 1993

Models 124.034 140.042
124.036 140.043
140.051
129.067 140.070

DTC readout with impulse counter scan tool:

The ignition control module (N1/3) is equipped with diagnostics, **including** DTC memory. A DTC is recorded into memory only if the same fault has occured after 8 sequential engine starts. This prevents a DTC from being recorded if, for example, it occured only once. If, for example, a fault occured only 7 times, then the fault counter will be cleared again after a certain number of engine starts.

Note: The DTC memory remains active even if the vehicle battery is disconnected.

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
Display "1" = no faults stored,
Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
If there are no further faults in the system, the previously displayed DTC will reappear.
If additional faults exist, the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

Erasing DTC memory:
After eliminating a fault, the respective DTC readout must be cleared as follows:

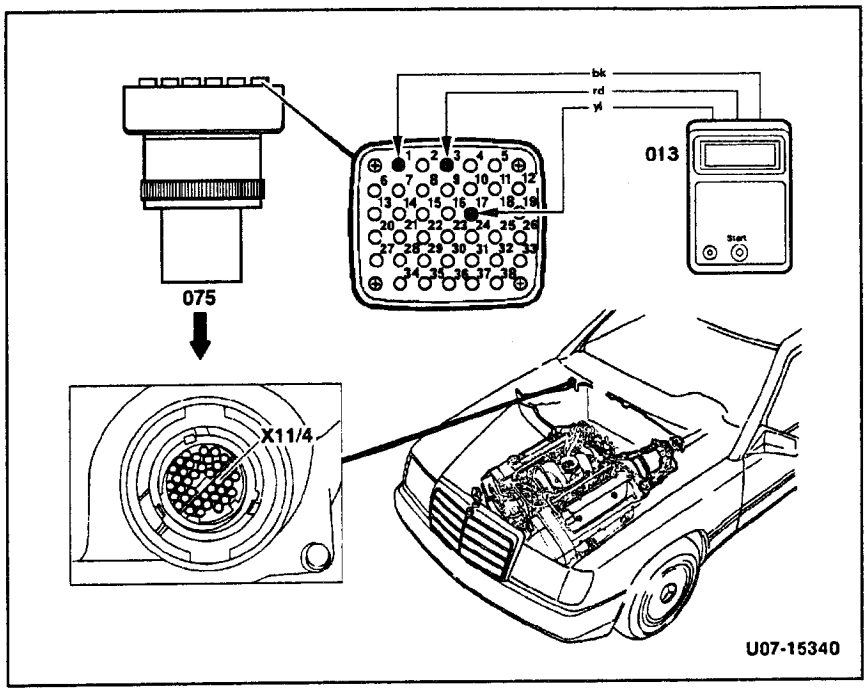
8. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective readout erased, then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Engines Vol. 2, Engine 104, 119 LH injection, Section 5.2, Diagnosis - Malfunction memory

Connection diagram



013 Impulse counter scan tool
075 Impulse counter scan tool adaptor
X11/4 Data link connector

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 3 Red
Socket 17 Yellow

Fault table, DTC readout, Ignition control module (N1/3)

DTC readout	Possible cause
1	No faults in system
2	Maximum retard setting on at least one cylinder has been reached
3	Not used
4	Load sensor in ignition control module (N1/3) defective
5	Knock sensor (A16) 1 and/or 2 defective
6	Camshaft position sensor (L5/1) defective
7	Knock control output switch in ignition control module (N1/3 defective
8	Transmission overload switch (S65) does not close
9	Transmission overload switch (S65) does not open
10	Not used
11	Reference resistor (ignition control module) (R16/2) defective
12	TN-Signal (engine RPM) is outside of tolerance range
13	Not used
14	Not used

Fault table, DTC readout, Ignition control module (N1/3)

DTC readout	Possible cause
15	Ignition coil 1 output from ignition control module (N1/3) defective or primary winding of ignition coil has open circuit
16	Ignition coil 2 output from ignition control module (N1/3) defective or primary winding of ignition coil has open circuit
17	Crankshaft position sensor defective (L5)
18	Magnets for crankshaft position sensor (L5) not recognized
19	Not used
20	Ignition control module (N1/3) DTC memory defective
21	Load sensor in ignition control module (N1/3) defective (recognized with engine running)
22	Not used
23	Not used
24	Not used
25	Not used
26	Ignition controlmodule (N1/3) data exchange fault
27	Control module (N1/3) data exchange fault
28	Electronic accelerator controlmodule/idle speed control data exchange fault

DTC readout (DI)

Model Year 1992 - 1993

Model 129.076
140.057
140.076

DTC readout with impulse counter scan tool:

The ignition control unit (N1/3) is equipped with diagnostics, **including** DTC memory. A DTC is recorded into memory only if the same fault has occured after 8 sequential engine starts. This prevents a DTC from being recorded if, for example, it occured only once. If, for example, a fault occured only 7 times, then the fault counter will be cleared again after a certain number of engine starts.

Note: The DTC memory remains active even if the vehicle battery is disconnected.

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed. Display "1" = no faults stored, greater than "1" = fault in system.utton for 2 to 4 seconds.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

Erasing DTC memory:
After eliminating a fault, the respective DTC readout must be cleared as follows:

8. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective readout erased, then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 2, Engine 120 LH, Section 5.3, Diagnosis-Malfunction Memory

Connection diagram

Model 140.057

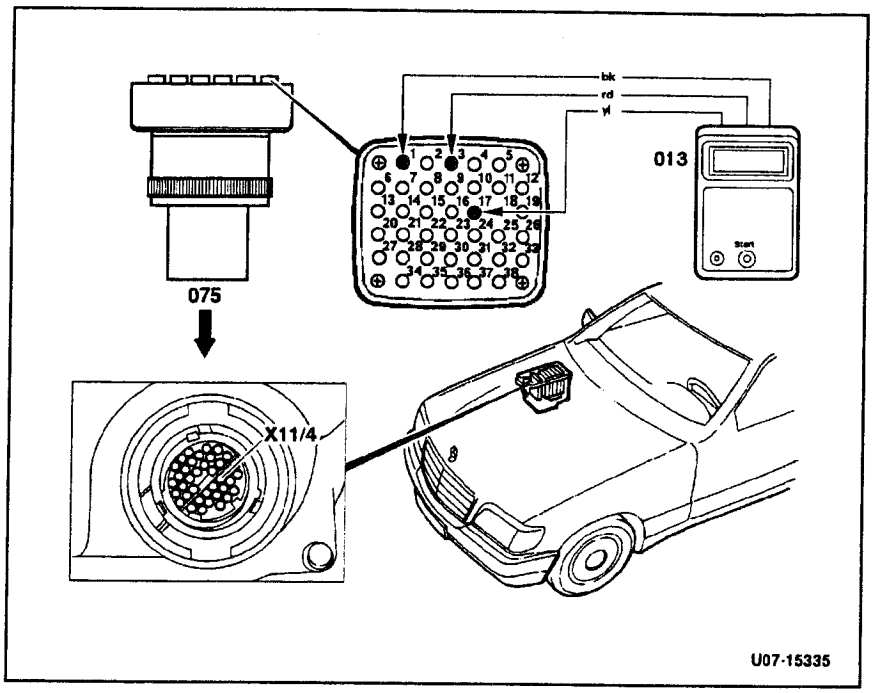
013 Impulse counter scan tool

075 Impulse counter scan tool adaptor

X11/4 Data link connector

Note:
Connect wires of impulse counter scan toll as follows:

Socket 1 Black
Socket 3 Red
Socket 17 Yellow (N1/4)
Socket 18 Yellow (N1/5)



Fault table, DTC readout, Ignition control module (N1/4, N1/5)

DTC readout	Possible Cause
1	No faults in system
2	Maximum retard setting on at least one cylinder has been reached
3	Not used
4	Load sensor in ignition control module (N1/4 or N1/5) defective
5	Knock sensor 1 and/or 2 defective
6	Camshaft position sensor (L5/2 or L5/3) defective
7	Knock control–output switch in ignition control module (N1/4 or N1/5) defective
8	Transmission overload protection switch, brake band B1 (S65) and/or B2 (S65/1) does not close
9	Transmission overload protection switch, brake band B1 (S65) and/or B2 (S65/1) does not open
10	Not used
11	Left or right reference resistor (ignition control module) (R16/3 or R16/4) defective
12	TN-signal (engine rpm output) is outside of tolerance range
13	Not used

Fault table, DTC readout, ignition control module (continued)

DTC readout	Possible Cause
14	Not used
15	Ignition coil 1 output from left or right ignition control module (N1/4 or N1/5) defective or primary winding of ignition coil has open circuit
16	Not used
17	Left or right crankshaft position sensor defective (L5/4 or L5/5)
18	Not used
19	Ground, coding from left EZL/AKR ignition control module (N1/4) not present
20	Left or right ignition control module (N1/4 or N1/5) DTC memory defective
21	Load sensor in left or right ignition control module (N1/4 or N1/5) defective (recognized with engine running)
22	Not used
23	Not used
24	Not used
25	Not used
26	Left or right ignition control module (N1/4 or N1/5) data exchange fault
27	Left or right LH-SFI control module (N3/2 or N3/3) data exchange fault
28	Electronic accelerator control module/idle speed control data exchange fault

DTC readout (ETC)

Model Years 1990 – 1993

Model 129.061

Testing with impulse counter scan tool

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC read out) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC, readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

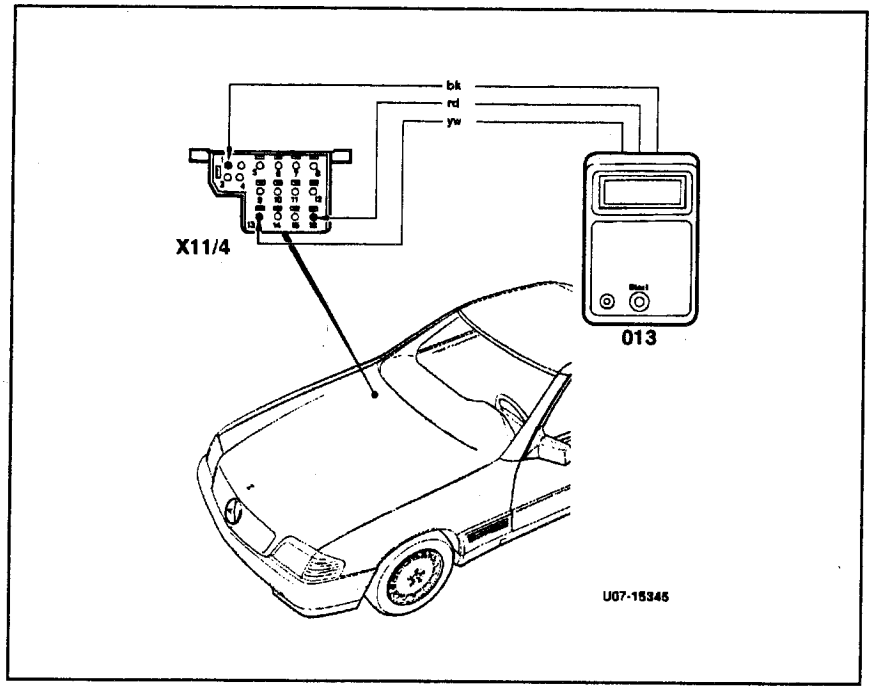
Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Chassis and Drivetrain, Volume 1, Electronic Automatic Transmission Control, Section 2.1, Diagnosis - Fault Code Readout

Connection diagram

Model 129.061



013 Impulse counter scan tool
X11/4 Test connection for diagnosis

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 16 Red
Socket 13 Yellow

Fault table, DTC readout, Transmission control module (N15/1)

DTC readout	Possible cause
1	No faults in system
2	Not used
3	Load signal interrupted
4	Throttle valve switch (potentiometer) interrupted
5	Engine speed (RPM) signal interrupted
6	Vehicle speed signal interrupted
7	Output fault in 5-speed automatic transmission control module (N15/1) or fault in control valve circuit (Y3/1y2)
8	5-speed automatic transmission control module (N15/1)
9 1)	Control valve (Y3/1y2)
10	Control valve (Y3/1y2), short circuit

DTC readout (ETC)

Model Years 1990 – 1993

Model 140.032

Testing with impulse counter scan tool

Read DTC memory for transmission control module (N15/1).
Ignition control module (N1/3) or base module (N16/1) must also be tested for DTC's.
Refer to *specific literature recommendation* below if there are any faults in the system.

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC read out) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC, readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Chassis and Drivetrain, Volume 1, Electronic Automatic Transmission Control, Section 2.2, Diagnosis - Fault Code Readout Diagnostic Manual

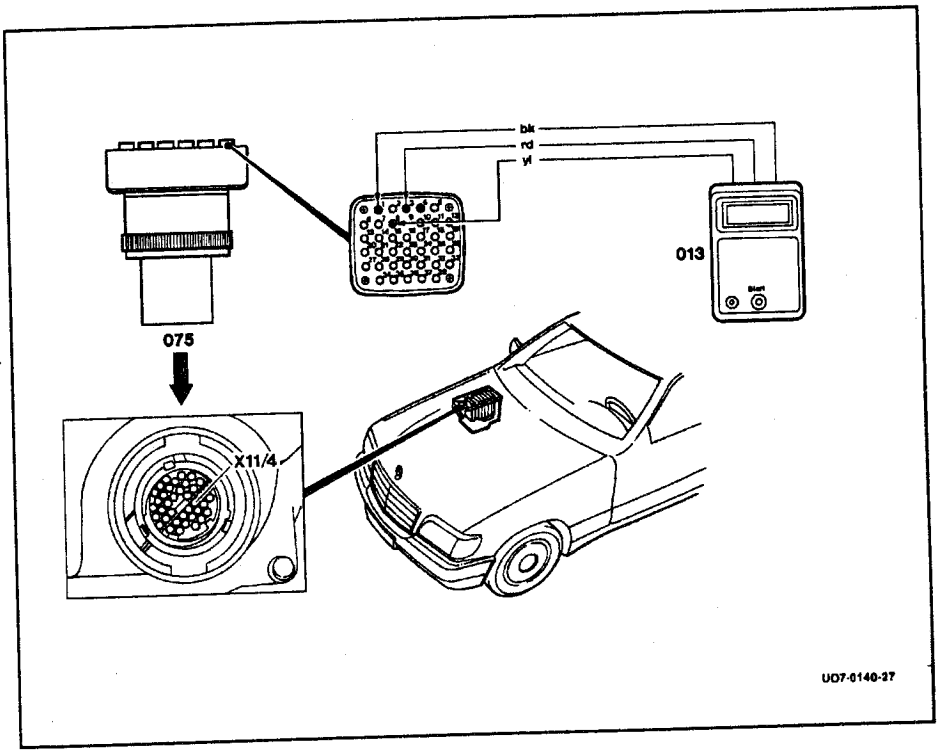
Connection diagram

Model 140.032

013	Impulse counter scan tool
X11/4	Data link connector

Note:
Connect wires of impulse counter as follows:

Socket 1	Black
Socket 3	Red
Socket 10	Yellow (N15/1)
Socket 17	Yellow (N1/3)
Socket 8	Yellow (N16/1)



Fault table, DTC readout, Transmission control module (N15/1)

DTC readout	Possible cause
1	No fault in system
2	Not used
3	Transmission overload protection switch 4GR/5GR gear defective
4	CAN data line to electronic accelerator/cruise control module (N4/1)
5	CAN data line to ignition control module (knock sensor) (N1/3)
6	CAN data line, short/open circuit
7	Open circuit at control valve (Y3/1y2) or transmission control module (5 speed automatic) (N15/1)
8	5-speed automatic transmission control module (N15/1)
9	Control valve (Y3/1y2)
10	Control valve (Y3/1y2), short circuit

DTC readout (4MATIC)

Model Year 1990 - 1993

Models 124.230
124.290

Notes regarding DTC readout
If no DTC readout is possible and the 4MATIC indicator lamp stays on continuously, a fault is indicated in the hydraulic system or an open circuit between the 4MATIC control module N30/3 and X11/4, socket 5.

Caution:
Do not disconnect battery, overvoltage protection relay or 4MATIC control module (N30/3) before or during impulse counter scan tool use, otherwise the stored DTC will be erased from memory.

Note:
4MATC function/test selection switch (S7/3) must be in the function position (not in test position) for DTC readout to be operational.

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Engine at idle.**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

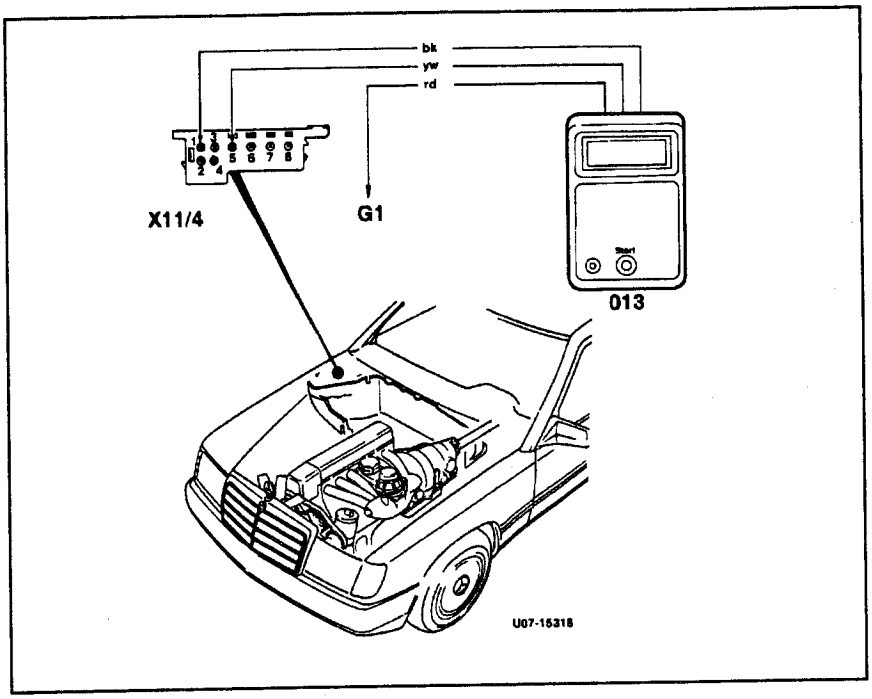
Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: *Diagnostic Manual, Volume 3, 4MATIC section, 4M-01.01, Model Year 1990 Introduction Manual, Models 124.230/290 4MATIC Automatically Engaging Four Wheel Drive, Group 28, Section "A", Electrical system test with impulse counter*

Connection diagram

Models 124.230/290



Socket 5	4MATIC diagnostic readout
013	Impulse counter scan tool
X11/4	Data link connector (yellow)

Fault table, DTC readout, 4MATIC control module (N30/3)

DTC readout	Possible cause
1	No faults in system
2	4MATIC control module (N30/3)
3	Brake light switch (S9/7)
4	Left front axle vehicle speed sensor (L6/1)
5	Right front axle vehicle speed sensor (L6/2)
6	Rear speed sensor (L6)
7	All 3 vehicle speed sensors
8	Overvoltage protection relay (K1/2), front axle drive train valve (A7/2y1)
9	Overvoltage protection relay (K1/2), central differential lock valve (A7/2y2)
10	Overvoltage protection relay (K1/2), stop lamp switch (S9/1), rear axle differential lock valve (A7/2y3)
11	Steering angle sensor (N49)

DTC readout (CC/ISC) (w/o ASR)

Model Year 1992 - 1993

Model 140.032

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = DTC in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the fault. Then press the start button for 6 to 8 seconds.

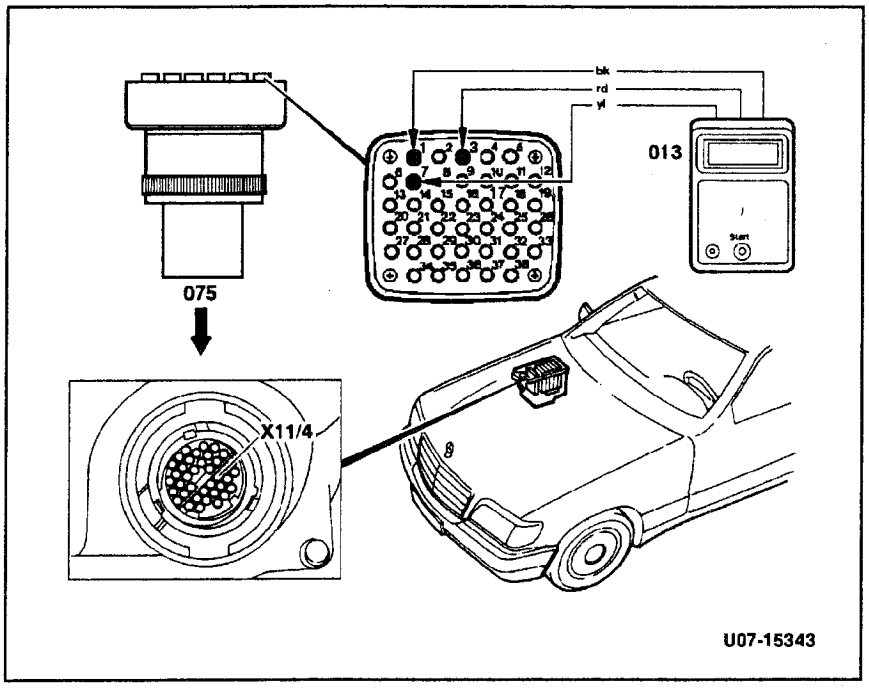
Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 3, Engine 104 LH injection, Section 7.1, Diagnosis - Malfunction Memory.

Connection diagram

Model 140.032



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 7	Yellow

Fault table, DTC, Cruise control/idle speed control module (N4/3)

DTC readout	Possible Cause
1	No faults in system
2	Cruise control/idle speedcontrol module (N4/3)
3	Cruise control/idle speed control actuator (M16/2)
4	Cruise control switch (S40)
5	Brake light switch (S9/1)
6	Starter lock-out/backup lamp switch (S16/3)
7	Data bus (CAN)
8	Left front axle vehicle speed sensor (L6/1)
9	Left rear axle vehicle speed sensor (L6/3)
10	Engine speed (RPM) signal (TNA)
11	Fuel safety shut-off to LH-SFI control module
12	Cruise control/idle speed control module voltage supply

DTC readout (EA/CC/ISC) (w/ASR)

Model Year 1992-1993

Model 140.032

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

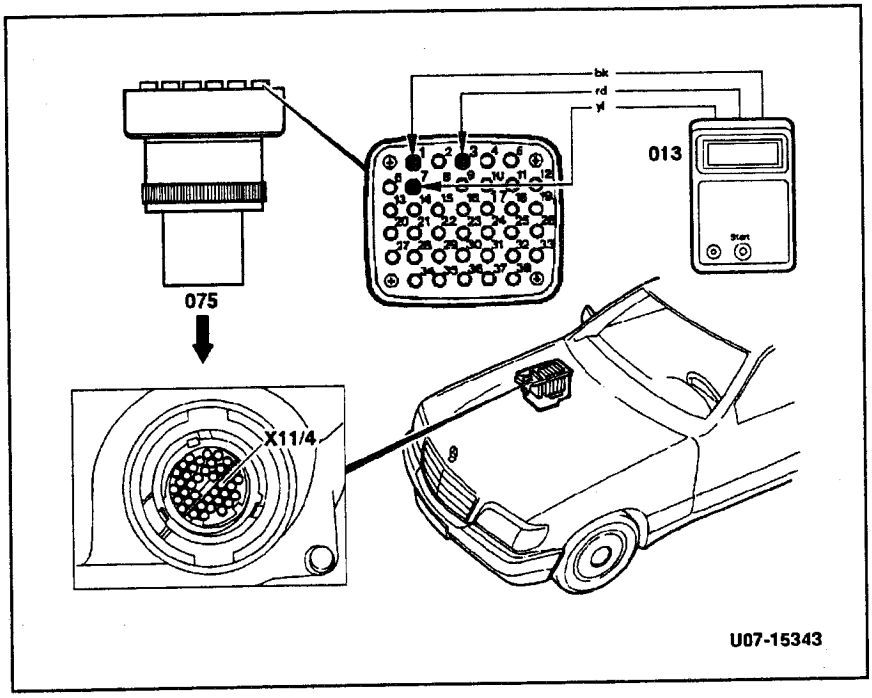
Note:
Each DTC displayed must be **erased individually.**

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 3, Engine 104 LH injection, Section 6.2, Diagnosis - Malfunction Memory.

Connection diagram

Model 140.032



Socket 7 Diagnostic readout
013 Impulse counter scan tool
075 Impulse counter scan tool adaptor

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 3 Red
Socket 7 Yellow

Fault table, DTC readout, Electronic accelerator/cruise control/idle speed module (N4/1)

DTC readout	Possible Cause
1	No fault in system
2	Electronic accelerator/cruise control/ idle speed module (N4/1)
3	Electronic accelerator actuator (M16/1)
4	Cruise control switch (S40)
5	Stop lamp switch (S9/1)
6	Starter lock-out/backup lamp switch (S16/3)
7	Data bus (CAN)
8	Left front axle vehicle speed sensor (L6/1)
9	Left rear axle vehicle speed sensor (L6/3)
10	Engine speed signal (TNA)
11	Fuel safety shut-off to LH-SFI control module
12	EA/CC/ISC control module voltage supply
13	Not used
14	Closed throttle position switch (S29/3)

DTC readout (CC/ISC) (w/o ASR)

Model Year 1993

Models 124.028
124.032
124.052
124.092

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool to diagnostic connector (X11/4) according to connection diagram.
   Note:
   LED "U-Batt" must li[illegible] up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. Reading DTC memory:
   a) Ignition ON
   b) Press start button for 2 to 4 seconds.
   c) Read and record DTC.
   d) Press start button again for 2 to 4 seconds
   e) Read and record DTC.
   f) Repeat steps 4 and 5 until the first DTC reappears

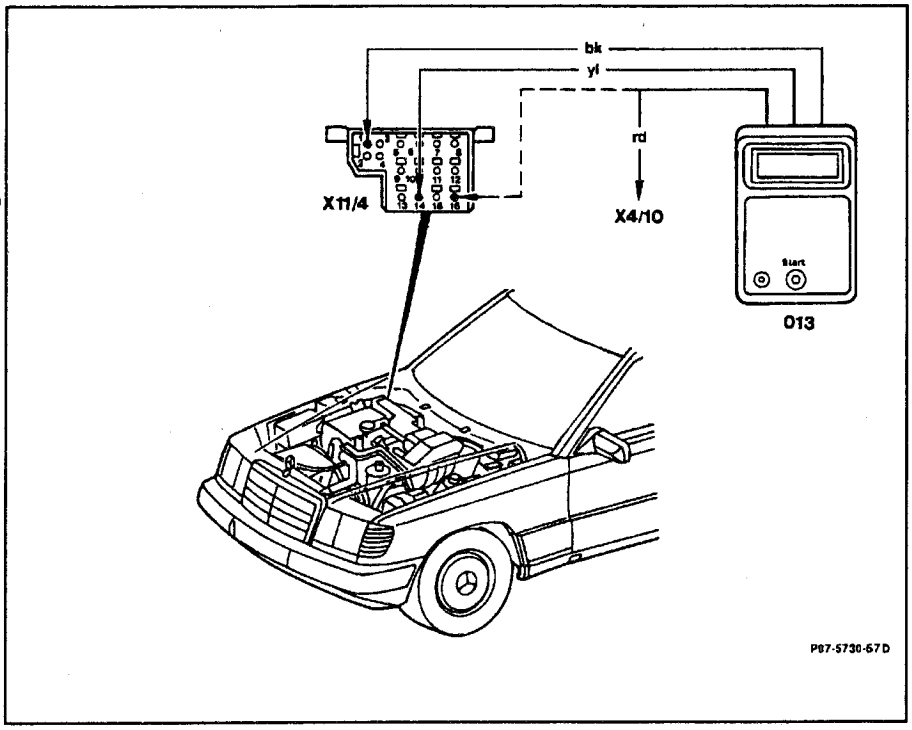
3. Clear DTC memory:
   Note:
   Clearing of stored DTC 's must begin within 20 seconds of reading the DTC. After 20 seconds, the DTC can no longer be erased.
   a) Press start button for 2 to 4 seconds (DTC appears).
   b) Wait 3 seconds, then press start button for 6 to 8 seconds, thereby clearing the previously displayed trouble code form memory.
   c) Each stored DTC must be cleared individually.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 3, Engines 104, HFM-SFI, Section 7.3, Diagnosis - CC/ISC, Engines Volume 2 Section 0

Connection diagram

013 Impulse counter scan tool

X11/4 Data link connector (DTC readout, 16-pole)



Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 16 Red
Socket 14 Yellow

Fault table, DTC readout, Cruise control/idle speed control module (N4/3)

DTC readout	Possible cause
1	No fault in system
2	Cruise control/idle speed control module (N4/3)
3	Cruise control/idle speed control actuator (M16/2)
4	Cruise control switch (S40)
5	Stop lamp switch (S9/1)
6	Starter lock-out/backup lamp switch (S16/2)
7	Data bus (CAN)
8	Left front axle vehicle speed sensor (L6/1)
9	Rear axle vehicle speed sensor (L6)
10	Engine speed signal (TNA)
11	Fuel safety shut-off to engine control module (N3/4)
12	Cruise control/idle speed control module voltage supply

DTC readout (EA/CC/ISC) (w/ ASR)

Model Year 1993

Models 124.028
124.032
124.052
124.092

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.
   Note:
   LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Reading DTC memory:**
   a) Ignition ON
   b) Press start button for 2 to 4 seconds.
   c) Read and record DTC.
   d) Press start button again for 2 to 4 seconds
   e) Read and record DTC.
   f) Repeat steps 4 and 5 until the first DTC reappears

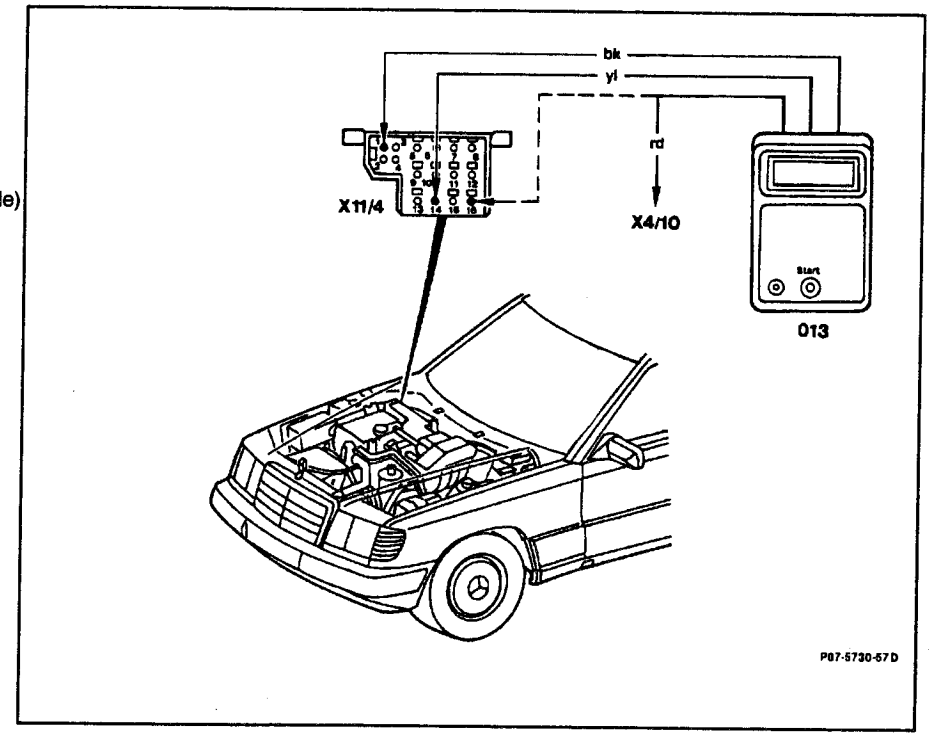
3. **Clear DTC memory:**
   Note:
   Clearing of stored DTCs must begin within 20 seconds of reading the DTC. After 20 seconds, the DTC can no longer be erased.
   a) Press start button for 2 to 4 seconds (DTC appears).
   b) Wait 3 seconds, then press start button for 6 to 8 seconds, thereby clearing the previously displayed trouble code form memory.
   c) Each stored DTC must be cleared individually.

Specific Literature Recommendation: *Diagnostic Manual, Engines Volume 3, Engines 104, HFM-SFI, Section 6.4, Diagnosis - EA Engines Volume 2 Section 0*

Connection diagram

013 Impulse counter scan tool

X11/4 Data link connector (DTC readout, 16-pole)



Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 16 Red
Socket 14 Yellow

Fault table, DTC readout, Electronic accelerator/cruise control/idle speed control module (N/4)

DTC readout	Possible cause
1	No fault in system
2	Electronic accelerator/cruise control/idle speed control module (N4/1)
3	EA/CC/ISC actuator (M16/1)
4	Cruise control switch (S40)
5	Stop lamp switch (S9/1)
6	Starter lock-out/backup lamp switch (S16/1)
7	Data bus (CAN)
8	Left front axle vehicle speed sensor (L6/1)
9	Hall-effect speed sensor (B6)
10	Engine speed signal (TNA)
11	Fuel safety shut-off to engine control module (N3/4)
12	Electronic accelerator/cruise control/idle speed control module voltage supply, circuit 87
14	Closed throttle position switch (S29/3)

DTC readout (CC/ISC) (w/o ASR)

Model Year 1992 - 1993

Model 124.034 140.042
140.043

Testing with impulse counter scan tool :

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Engines Volume 3, Engine 119 LH injection, Section 7.1, Cruise Control/Idle Speed Control, Diagnosis - Malfunction Memory

Connection diagram

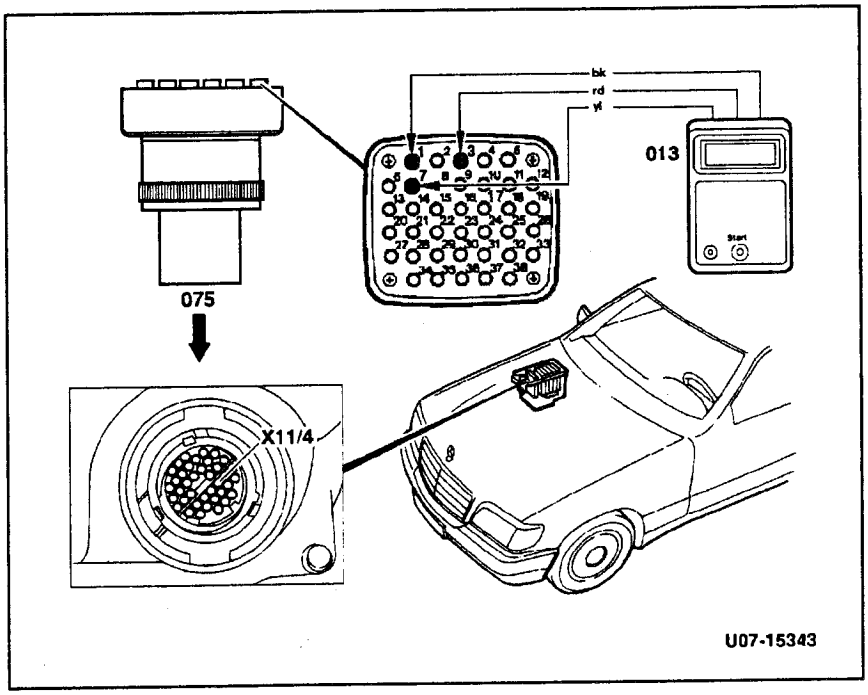
Model 140.042 shown

Socket

013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 7	Yellow



Fault table, DTC readout, Cruise control/idle speed control module (N4/3)

DTC readout	Possible Cause
1	No faults in system
2	Cruise control/idle speed control module (N4/3)
3	Cruise control/idle speed control actuator (M16/2)
4	Cruise control switch (S40)
5	Stop lamp switch (S9/1)
6	Starter lock-out/backup light switch (S16/3)
7	Data bus (CAN)
8	Left front speed sensor (L6/1)
9	Left rear speed sensor (L6/3)
10	Engine speed signal (TNA)
11	Fuel safety shut-off to LH- SFI control module
12	Cruise control/idle speed control module voltage supply

DTC readout (EA/CC/ISC) (w/ ASR)

Model Year 1992 - 1993

Models 124.034 140.042
124.036 140.043
140.051
140.070

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
Display "1" = no faults stored,
Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
If there are no further faults in the system, the previously displayed DTC will reappear.
If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the fault. Then press the start button for 6 to 8 seconds.

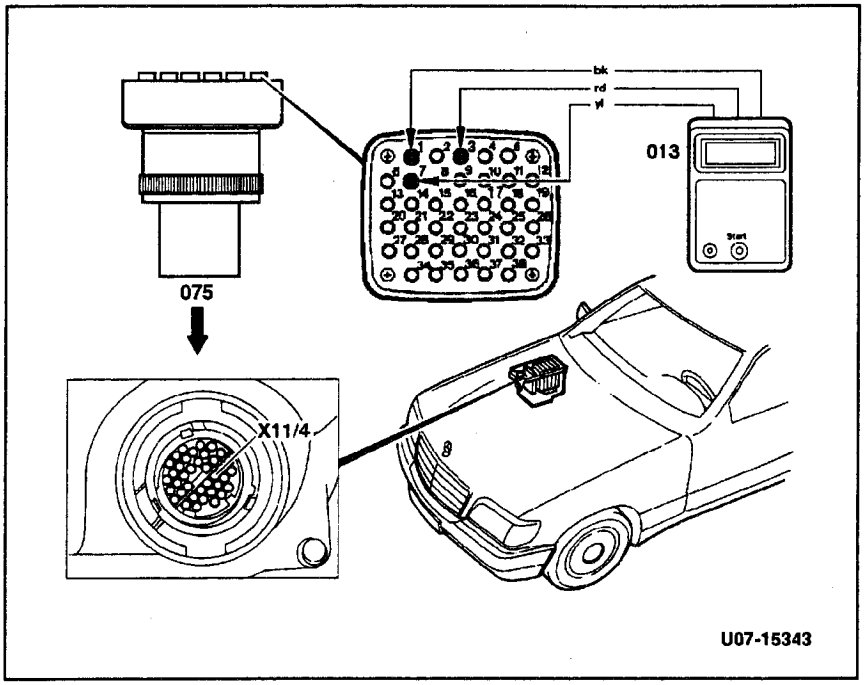
Note:
Each fault displayed must be **erased individually**.

If the DTC has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: *Diagnostic Manual, Models 129 and 140, Engines Volume 3, Engine 119 LH injection, Section 6.2, Diagnosis - Malfunction Memory.*

Connection diagram

Model 140 shown



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 7	Yellow

Fault table, DTC readout, Electronic accelerator/cruise control/idle speed control module (N4/1)

DTC readout	Possible Cause
1	No fault in system
2	EA/CC/ISC control module (N4/1)
3	EA/CC/ISC actuator (M16/1)
4	Cruise control switch (S40)
5	Stop lamp switch (S9/1)
6	Starter lock-out/backup lamp switch (S16/3)
7	Data bus (CAN)
8	Left front axle vehicle speed sensor (L6/1)
9	Left rear axle vehicle speed sensor (L6/3)
10	Engine speed signal (TNA)
11	Fuel safety shut-off to LH-SFI control module
12	EA/CC/ISC module voltage supply
13	Not used
14	Closed throttle position contact switch (S29/3)

DTC readout (EA/CC/ISC) (w/ASR)

Model Year 1992 -1993

Model 140.057
140.076

Testing with impulse counter scan tool:

1. Connect impulse counter scan according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to *Specific Literature Recommendation* listed below for location of detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respectiveDTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing theDTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: *Diagnostic Manual, Engines Volume 3, Engine 120 LH injection, Section 6.3, Electronic Accelerator - LH Diagnosis - Malfunction Memory*

Connection diagram

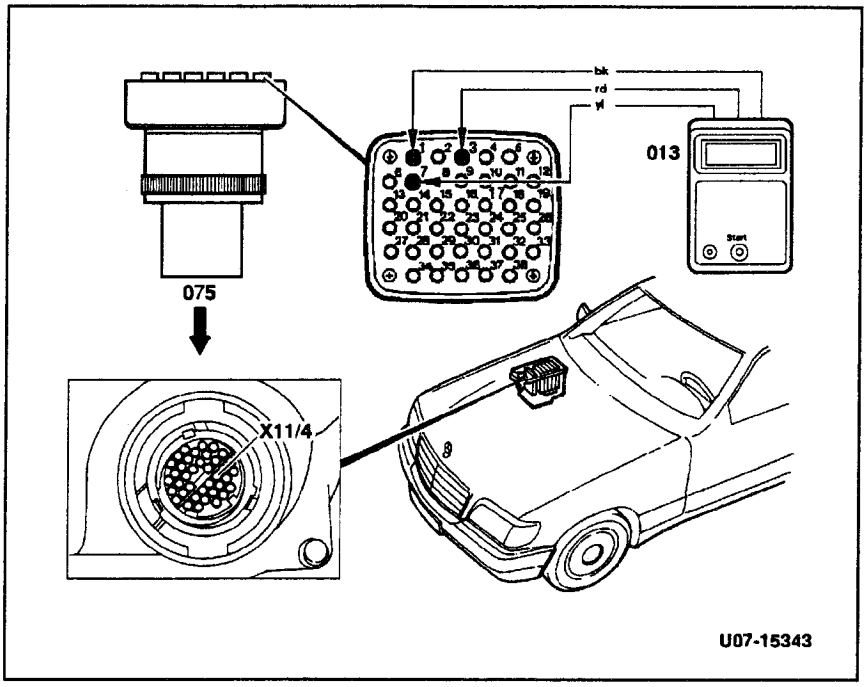
Model 140.057

Socket 7 diagnostic readout
013 Impulse counter scan tool

075 Impulse counter scan tool adaptor
X11/4 Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter as follows:

Socket 1 Black
Socket 3 Red
Socket 7 Yellow



Fault table, DTC readout, Electronic accelerator/cruise control/idle speed control module (N4/1)

DTC readout	Possible Cause
1	No faults in system
2	EA/CC/ISC control module (N4/1)
3	Right EA/CC/ISC actuator, (left cylinder bank) (M16/3)
4	Cruise control switch (S40)
5	Stop lamp switch (S9/1)
6	Starter lock-out/backup lamp switch
7	Data bus (CAN)
8	Left front axle vehicle speed sensor (L6/1)
9	Left rear axle vehicle speed sensor (L6/3)
10	Engine speed signal (TNA)
11	Fuel safety shut-off to LH-SFI control module
12	Electronic accelerator control module voltage supply
13	Left EA/CC/ISC actuator, (right cylinder bank) (M16/4)
14	Closed throttle position contact switch

DTC readout (ADS)

Model Years 1991 – 1993

Models 129.061
129.066
129.067
129.076

Testing with impulse counter scan tool scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
Any faults stored in the ADS control module (N51) will remain intact even if the vehicle battery, overvoltage protection relay or ADS control module (N51) are disconnected.

LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for location of detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
If DTC's "3", "4", and "5" are stored as a result of faults in other systems, they will be automatically cleared after successful repair.

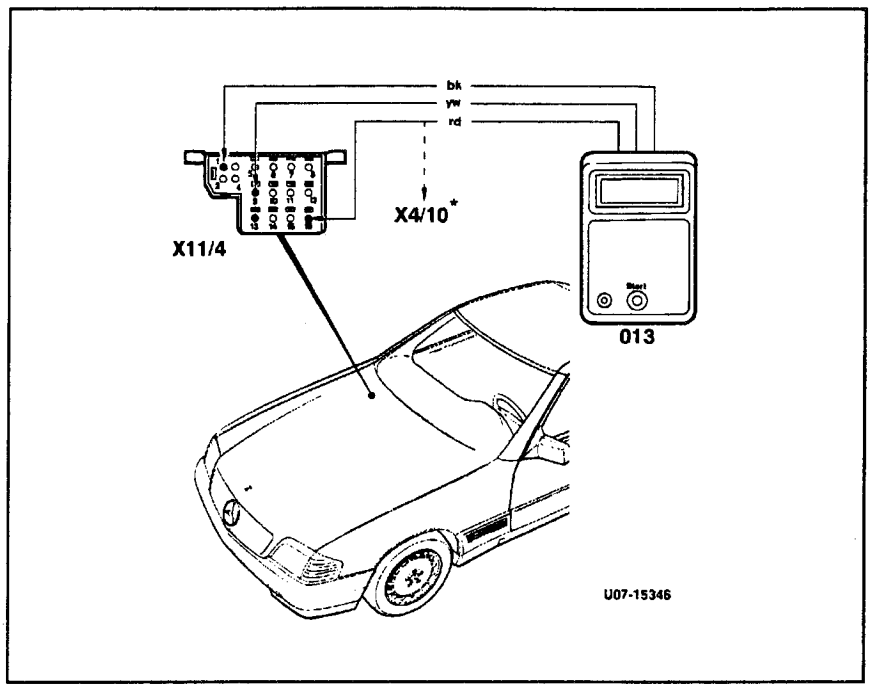
All other displayed faults must be **erased individually**.

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing theDTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual Chassis and Drivetrain, Volume 1, Section 3.1 and/or 3.1, Diagnosis Fault Code Readout

Connection diagram

Models 129.061/066



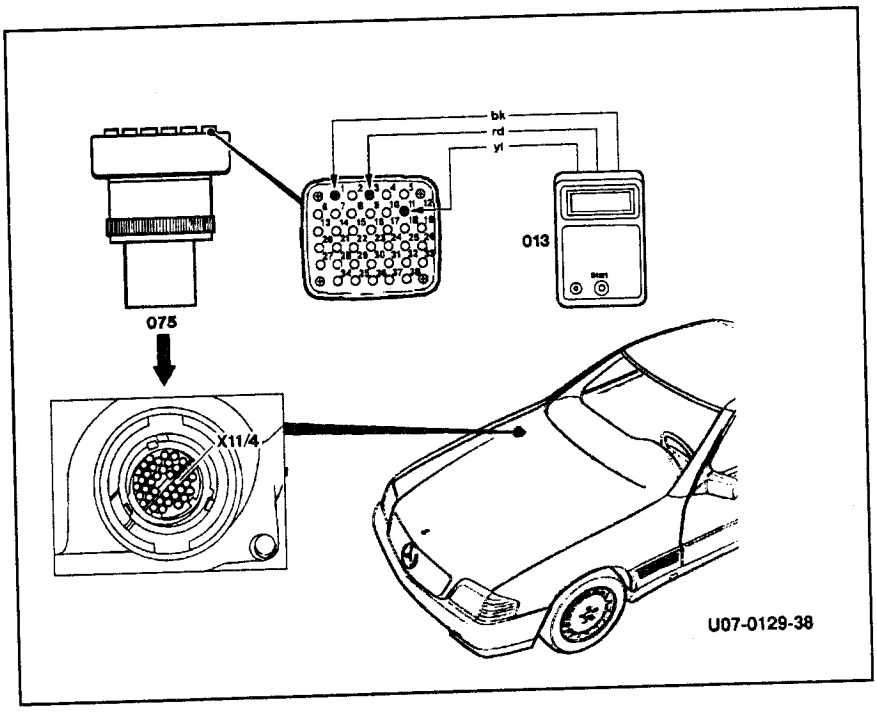
Socket 9	ADS diagnostic readout
013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X4/10	12V terminal block,
X11/4	Data link connector

Fault table, DTC readout, ADS control module (N51)

DTC Readout	Possible cause
1	No faults in system
2	ADS control module (N51)
3	Body acceleration sensor (B24)
4	Wheel acceleration sensor (B24/1)
5	Steering angle sensor (N49)
6	Front axle solenoid valves 1 (Y51y1, Y52y1)
7	Front axle solenoid valves 2 (Y51y2, Y52y2)
8	Rear axle solenoid valves 1 (Y53y1, Y54y1)
9	Rear axle solenoid valves 2 (Y53y2, Y54y2)
10	Not used
11	Not used
12	ABS signal
13	Oil level switch (ADS) (S44)
14	Steering angle sensor (N49) not activated

Connection diagram

Models 129.067/076



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 11	Yellow

Fault table, DTC readout, ADS control module (N51)

DTC readout	Possible cause
1	No faults in system
2	ADS control module (N51)
3	Body acceleration sensor (B24)
4	Wheel acceleration sensor (B24/1)
5	Steering angle sensor (N49)
6	Front axle solenoid valves 1 (Y51y1, Y52y1)
7	Front axle solenoid valves 2 (Y51y2, Y52y2)
8	Rear axle solenoid valves 1 (Y53y1, Y54y1)
9	Rear axle solenoid valves 2 (Y53y2, Y54y2)
12	Right front axle vehicle speed signal
14	Steering angle sensor (N49) not activated
15	Comfort/sport switch (ADS) (S45/1)
17	Vehicle load sensor (N51/1)
18	ADS warning lamp (A1e27)
19	Voltage supply too low
20	Steering angle sensor (N49)
21	Voltage supply too high
22	Comfort/sport switch (ADS) (S45/1)

DTC readout (ADS)

Model Year 1992 - 1993

Models 140.032
140.042 140.070
140.051 140.076
140.057 140.134

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
Any faults stored in the ADS control module (N51) will remain intact even if the vehicle battery, overvoltage protection relay or ADS control module (N51) are disconnected.

LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for location of detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
Display "1" = no faults stored,
Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
If there are no further faults in the system, the previously displayed DTC will reappear.
If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

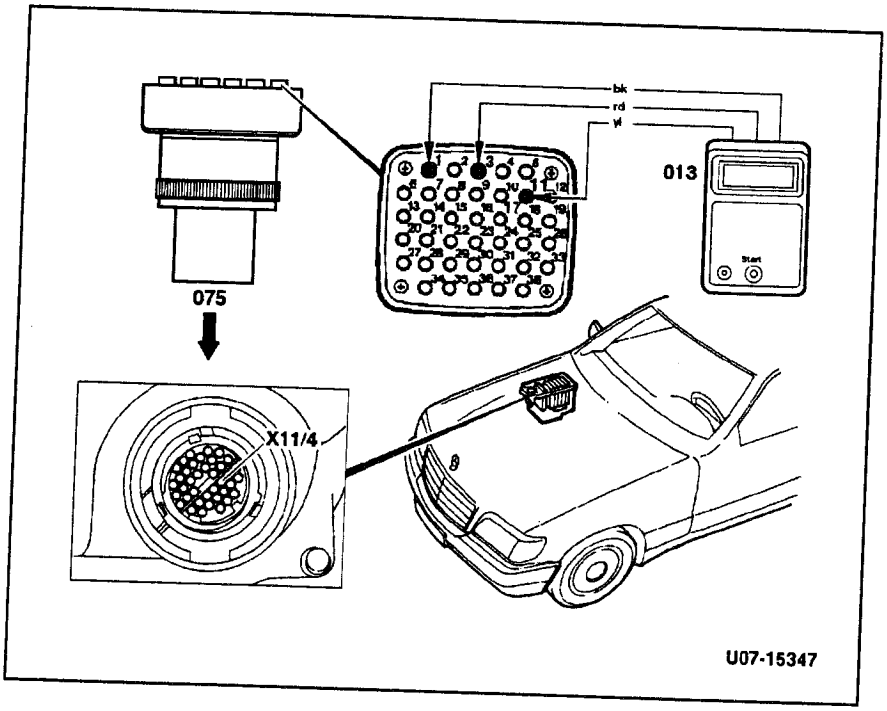
8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Connection diagram



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 11	Yellow

Fault table, DTC readout, ADS control module (N51)

DTC readout	Possible cause
1	No fault in system
2	ADS control module (N51)
3	Body acceleration sensor (B24)
4	Wheel acceleration sensor (B24/1)
5	Steering angle sensor (N49)
6	Front axle solenoid valves 1 (Y51y1, Y52y1)
7	Front axle solenoid valves 2 (Y51y2, Y52y2)
8	Rear axle solenoid valves 1 (Y53y1, Y54y1)
9	Rear axle solenoid valves 2 (Y53y2, Y54y2)
12	Right front axle vehicle speed signal
14	Steering angle sensor (N49) not activated
15	Comfort/sport switch (ADS) (S45/1)
17	Vehicle load sensor (N51/1)
18	ADS warning lamp (A1e27)
19	Voltage supply too low
20	Steering angle sensor (N49)
21	Voltage supply too high
22	Comfort/sport switch (ADS) (S45/1)

DTC readout (ASD)

Model Years 1991 – 1993

Models	**124.128**	**129.061**
	126.134	**140.134**
	126.135	**201.028**

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Engine: at idle**

3. Press start button for approx. 1 second.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Repeat step 4 until the first DTC displayed is repeated.

6. Note any additional faults from DTC readout.

7. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

8. **Engine: at idle**

9. With DTC readout displayed, wait 2 seconds, then press the start button for at least 10 seconds.

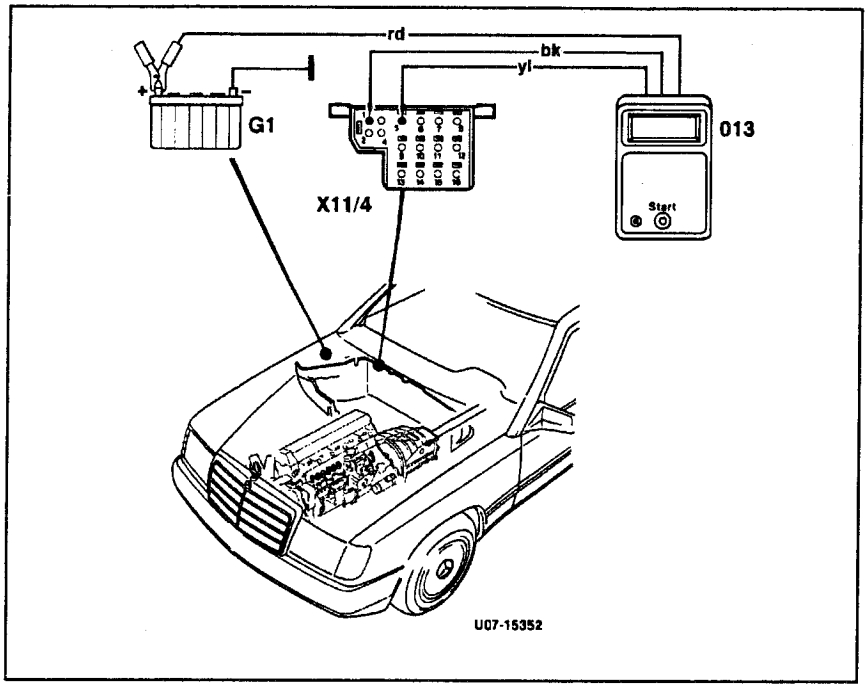
10. Press start button for approx. 1 second.

Specific Literature Recommendation: *Diagnostic Manual, Chassis and Drivetrain, Volume 1, Sections 4.1, 4.2, ASD, Diagnosis - Malfunction Memory, Diagnostic Manual, Volume 3, Drivetrain, Body & Accessories, Section ASD, Service Microfiche Rear Axle I - wheel location, Models 107, 126 09/85 →, Model Year 1991 Introduction Manual, Models 124, 126, 129, 201, Group 35, ASD Malfunction Diagnostics Table*

Connection diagram

Models 124, 201

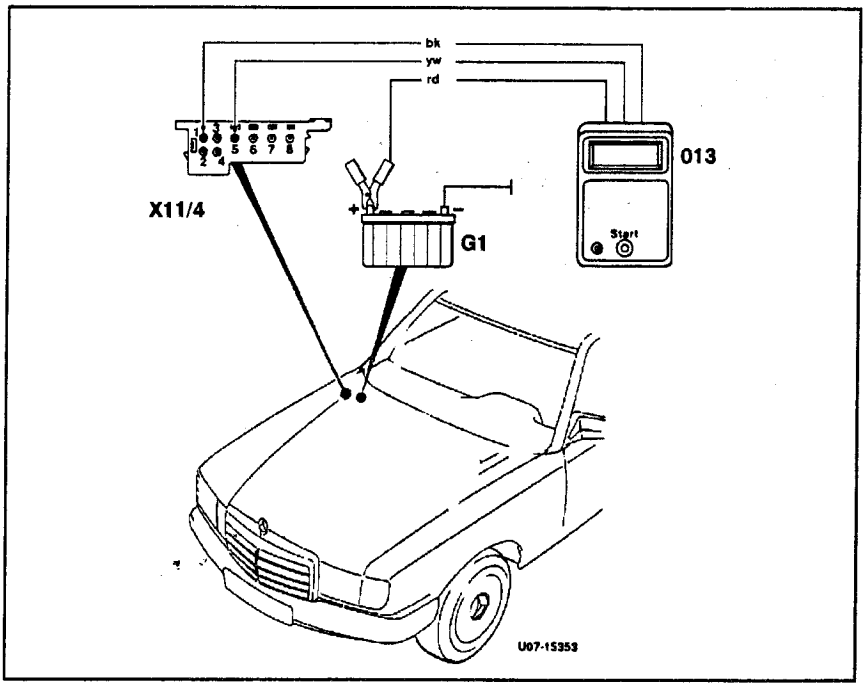
(Model 124 shown)



Socket 5	ASD diagnostic readout
013	Impulse counter scan tool
X11/4	Data link connector

Connection diagram

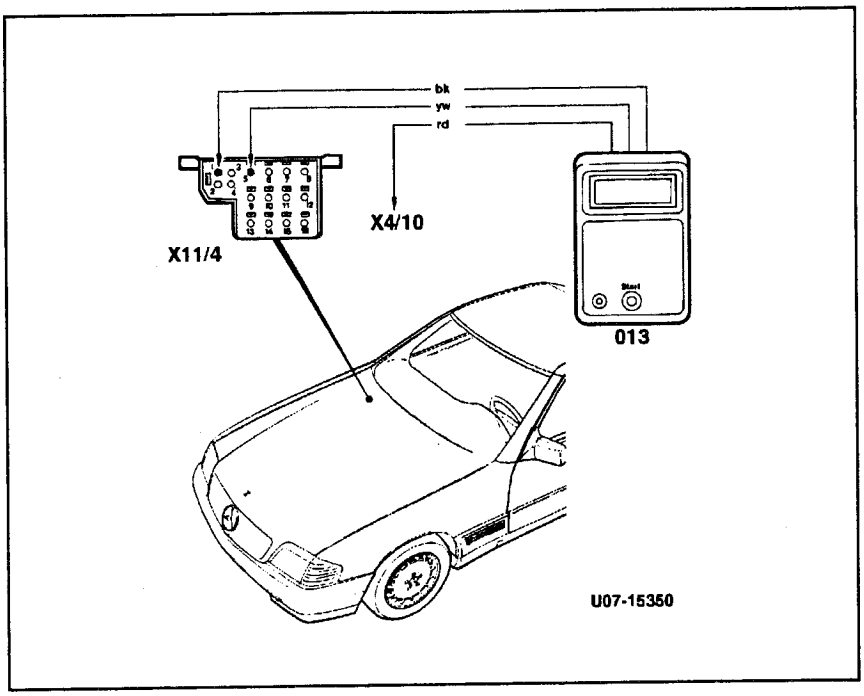
Model 126



Socket 5	ASD diagnostic readout
013	Impulse counter scan tool
X11/4	Data link connector

Connection diagram

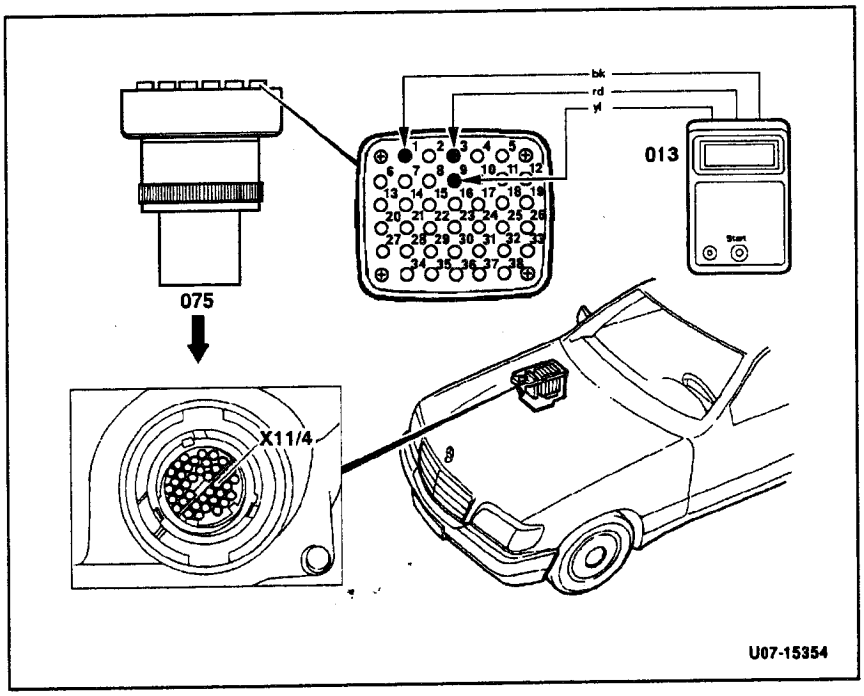
Model 129.061



Socket 5	ASD diagnostic readout
013	Impulse counter scan tool
X4/10	Terminal block
X11/4	Data link connector

Connection diagram

Models 140.134



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector

Note:
Connect wires of impulse counter scan tool as follows:

Socket	1	Black
Socket	3	Red
Socket	9	Yellow

Fault table, DTC readout, ASD control module (N30/2)

DTC readout	Possible cause
1	No fault in system
2	ASD control module (N30/2)
3	Stop lamp switch (S9/1)
4	Left front axle vehicle speed sensor (L6/1)
5	Right front axle vehicle speed sensor (L6/2)
6	Rear axle speed sensor (L6)
7	No speed signal from any sensor (L6, L6/1, L6/2), missing ground
8	ASD valve (Y38) or stop lamp switch (S9/1)

DTC readout (ABS)[1)]

Model Year 1992 - 1993

Models 140.032
140.042
140.043
140.134

Testing with impulse counter scan tool:

Note:
Observe all system specific **WARNINGS** listed in the "test conditions" section of each Test Procedure.

1. Connect impulse counter scan tool according to connection diagram.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

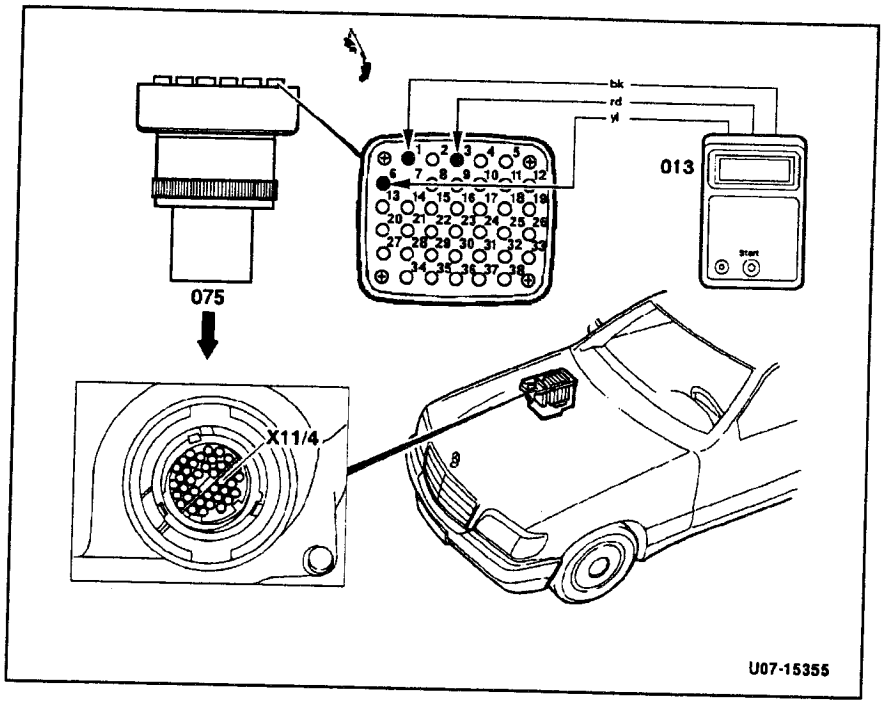
Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

1) For vehicles equipped with ABS/ASR, please refer to Group 42 ABS/ASR, Model Year 1992

Specific Literature Recommendation: Diagnostic Manual, Chassis and Drivetrain, Volume 1 Section 6.2 Anti-lock Brake System (ABS) Diagnosis - Malfunction Memory

Connection diagram



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 6	Yellow

Fault table, DTC readout, ABS control module (N30)

DTC readout	Possible Cause
1	No faults in system
2	Left front axle vehicle speed sensor (L6/1)
3	Right front axle vehicle speed sensor (L6/2)
4	Rear axle speed sensor (L6)
6	Left front axle solenoid valve (A7y1)
7	Right front axle solenoid valve (A7y2)
8	Rear axle solenoid valve (A7y3)
10	Return/pressure pump motor (A7m1) or return/pressure pump relay (A7k2)
11	Solenoid valve relay (A7k1)
12	Master cylinder switchover valve (Y61)
13	Stop lamp switch (S9/1)
14	ABS lateral acceleration sensor (B24/2)
15	ABS control module (N30)
16	Vehicle speed sensors (L6/1, L6/2, L6) - wrong, dirty or damaged toothed rotor
17	Low voltage at solenoid valve relay (A7k1)

DTC readout (ABS/ASR)

Model Year 1992 - 1993

Models 124.034 140.032
124.036 140.042
140.051
140.057
140.070
140.076

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
Display "1" = no faults stored,
Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
If there are no further faults in the system, the previously displayed DTC will reappear.
If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually.**

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: *Diagnostic Manual, Chassis and Drivetrain, Volume 1, Section 5.2 Acceleration Slip Control (ASR), Diagnosis - Malfunction Memory.*

Connection diagram

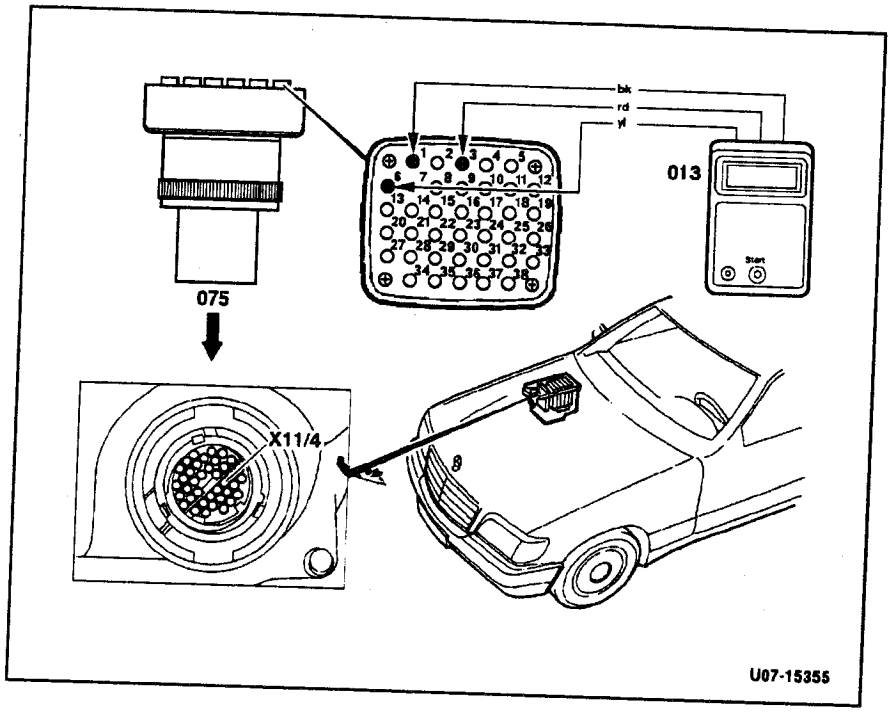
Model 140

(Model 124 similar)

013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 6	Yellow



Fault table, DTC readout, ABS/ASR control module (N30/1)

DTC readout	Possible Cause
1	No fault in system
2	Left front axle vehicle speed sensor (L6/1)
3	Right front axle vehicle speed sensor (L6/2)
4	Left rear axle vehicle speed sensor (L6/3)
5	Right rear axle vehicle speed sensor (L6/4)
6	Left front axle solenoid valve (A7/3y1)
7	Right front axle solenoid valve (A7/3y2)
8	Left rear axle solenoid valve (A7/3y3)
9	Right rear axle solenoid valve (A7/3y4)
10	Return/pressure pump relay (A7/3k2), Return/pressure pump motor (A7/3m1)
11	Solenoid valve relay (A7/3k1)
12	**Models 140.04/05:** Master cylinder switchover valve (Y61)
13	Stop lamp switch (ASD/ASR)
14	**Models 140.04/05:** ABS lateral acceleration sensor (B24/2)

Fault table, DTC readout, ABS/ASR control module (N30/1)

DTC readout	Possible Cause
15	ABS/ASR control module (N30/1)
16	Vehicle speed sensors (L6/1, L6/2, L6/3, L6/4), wrong, dirty or damaged toothed rotor
17	Low voltage at solenoid valve relay (A7/3k1)
20	Switchover/solenoid valve (A7/3y5)
21	Pressure switch (A7/3s1) charge
22	Pressure switch (A7/3s1) leakage
23	Pressure switch (A7/3s1) hydraulic system
24	ASR charging pump (M15)
30	CAN data line to electronic accelerator/cruise control/idle speed control module (N4/1)
31	CAN data line to LH-SFI control module (N3/1) left LH-SFI control module (N3/2) right LH-SFI control module (N3/3)
32	CAN data line to left ignition control module (N1/4) right ignition control module (N1/5) ignition control module, LH-SFI (N1/3)
33	CAN data line, short/open circuit

DTC readout (SPS)

Model Year 1992 - 1993

Models 140.032
140.042 140.070
140.051 140.076
140.057 140.134

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the DTC Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Chassis and Drivetrain Volume 1 Section 7.1 Speed sensitive power steering, Diagnosis - Malfunction memory

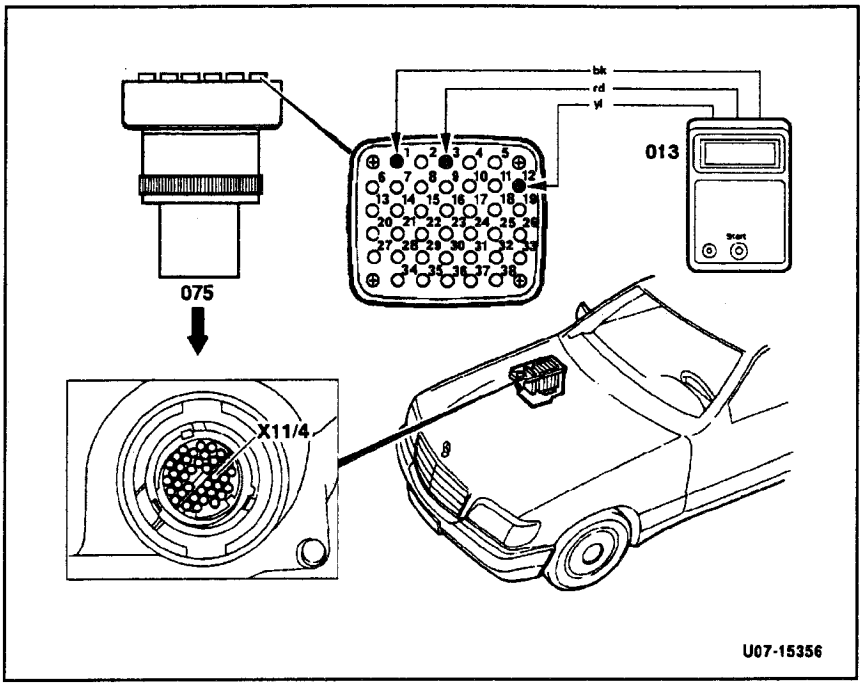
Connection diagram

Model 140

013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 12	Yellow

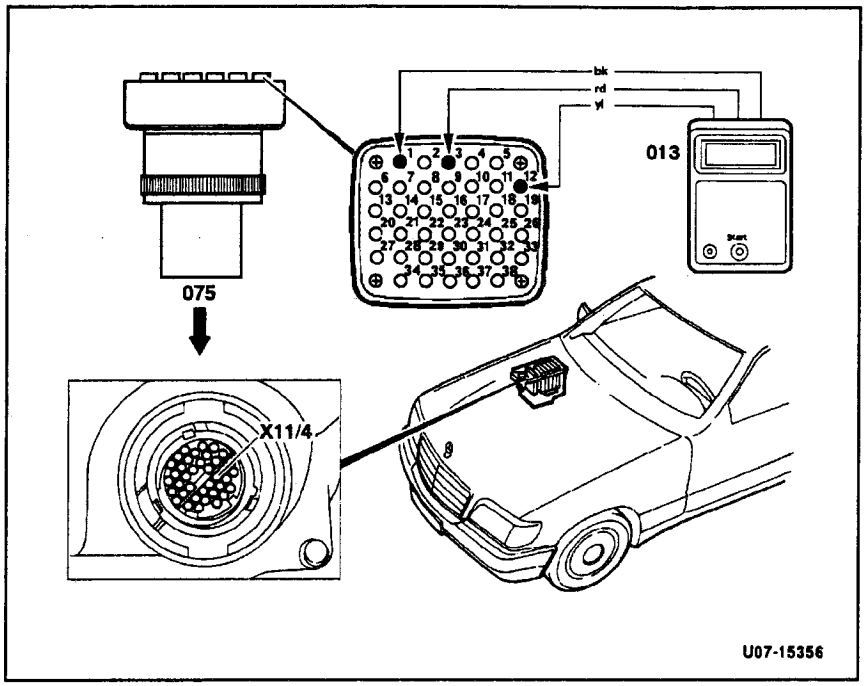


Fault table, DTC readout, SPS control module (N49/1)

DTC readout	Possible Cause
1	No faults in system
2	Speed sensitive power steering control module (N49/1)
3	Left/center rear axle speed sensor (L6/3)
4	Right rear axle vehicle vehicle speed sensor (L6/4)
5	Different vehicle speeds signals from right and left rear axle sensors (L6/3-6/4)
6	No vehicle speed sensor signal
7	Inductive speed sensor, transmission (L2) defective
8	Short circuit between positive connection of speed sensitive power steering valve (Y10) and U_{BATT}
9	Short circuit at speed sensitive power steering valve (Y10)
10	Open circuit at speed sensitive power steering valve (Y10)
11	Voltage supply at speed sensitive power steering control module (N49/1)

Connection diagram

Model 140



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 12	Yellow

Fault table, DTC readout, SPS control module (N49/1)

DTC readout	Possible Cause
1	No faults in system
2	Speed sensitive power steering control module (N49/1)
3	Left/center rear axle speed sensor (L6/3)
4	Right rear axle vehicle vehicle speed sensor (L6/4)
5	Different vehicle speeds signals from right and left rear axle sensors (L6/3-6/4)
6	No vehicle speed sensor signal
7	Inductive speed sensor, transmission (L2) defective
8	Short circuit between positive connection of speed sensitive power steering valve (Y10) and U_{BATT}
9	Short circuit at speed sensitive power steering valve (Y10)
10	Open circuit at speed sensitive power steering valve (Y10)
11	Voltage supply at speed sensitive power steering control module (N49/1)

DTC readout (RB)

Model Years 1993

Model 124.066

Testing with impulse counter scan tool:

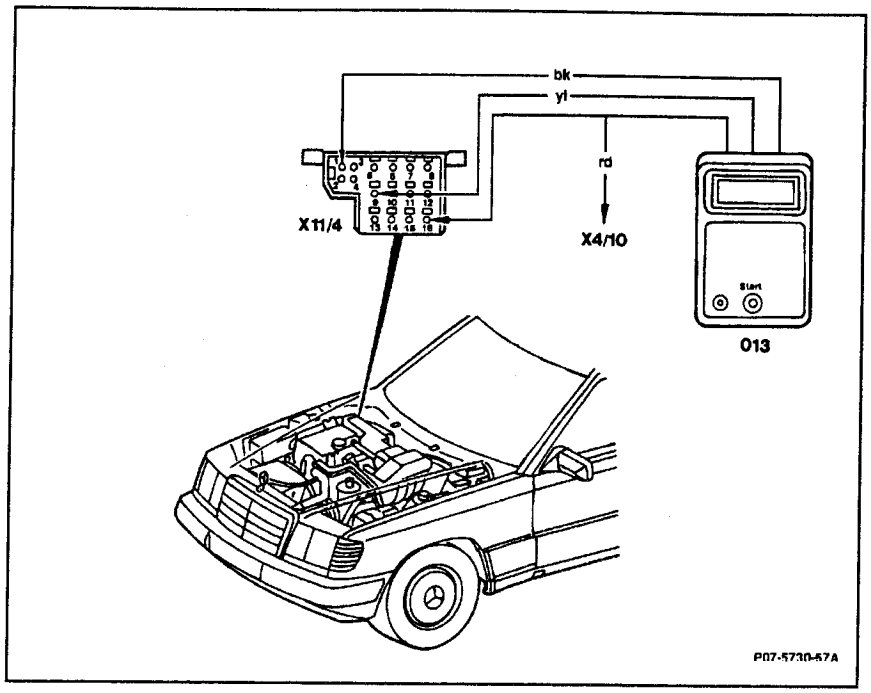
1. Connect impulse counter scan tool to diagnostic connector (X11/4) according to connection diagram.
   Note:
   LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Reading DTC memory:**
   a) Ignition: **ON**
   b) Press start button for 2 to 4 seconds.
   c) Read and record DTC.
   d) Press start button again for 2 to 4 seconds
   e) Read and record DTC.
   f) Repeat steps 4 and 5 until the first DTC reappears

3. **Clear DTC memory:**
   Note:
   Clearing of stored DTC's must begin within 20 seconds of reading the DTC. After 20 seconds, the DTC can no longer be erased.
   a) Press start button for 2 to 4 seconds (DTC appears).
   b) Wait 3 seconds, then press start button for 6 to 8 seconds, thereby clearing the previously displayed trouble code form memory.
   c) Each stored DTC must be cleared individually.

Specific Literature Recommendation: Diagnostic Manual Body and Accessories, Volume 3, Section 19.1. Roll bar (Crash Deployment), Diagnostics - Malfunction Memory

Connection diagram



013 Impulse counter scan tool
X4/10 Terminal Block, terminal 30
X11/4 Data link connector (DTC readout, 16-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1 Black
Socket 16 Red
Socket 9 Yellow

Fault table, DTC readout, Roll bar (Crash deployment) control module (N53)

DTC readout	Possible cause
1	No fault in system
2	Roll bar control module (N53)
3	Roll bar control module (N53) voltage supply
6	Roll bar deployment solenoid (Y57/1), open circuit, short circuit to 30 or 31
7	Rear axle switch (S83/2or S83/3), short to circuit 30 or 31
8	Roll bar malfunction indicator lamp (E30)

DTC readout (CST)

Model Years 1993

Model 124.066

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool to diagnostic connector (x11/4) according to connection diagram.
   Note:
   LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Reading DTC memory:**
   a) Ignition: **ON**
   b) Press start button for 2 to 4 seconds.
   c) Read and record DTC.
   d) Press start button again for 2 to 4 seconds
   e) Read and record DTC.
   f) Repeat steps 4 and 5 until the first DTC reappears

3. **Clear DTC memory:**
   Note:
   Clearing of stored DTC 's must begin within 20 seconds of reading the DTC. After 20 seconds, the DTC can no longer be erased.
   a) Press start button for 2 to 4 seconds (DTC appears).
   b) Wait 3 seconds, then press start button for 6 to 8 seconds, thereby clearing the previously displayed trouble code form memory.
   c) Each stored DTC must be cleared individually.

DTC memory

DTC's are only stored in memory if the fault occurs during operation of the convertible top (soft top becomes inoperative) and the power top switch is pushed long enough (up to 80 seconds) and the warning lamp in the switch starts to blink. DTC's 5 to 16 are so-called limit switches, but that does not necessarily denote that the affected limit switch is defective. These DTC readouts indicate which limit switch signal has malfunctioned for continued convertible top operation.

The basis of the fault can be:

- Electrical faults (the last-requested operation was ended).
- Hydraulic faults (the last-requested operation had not begun).

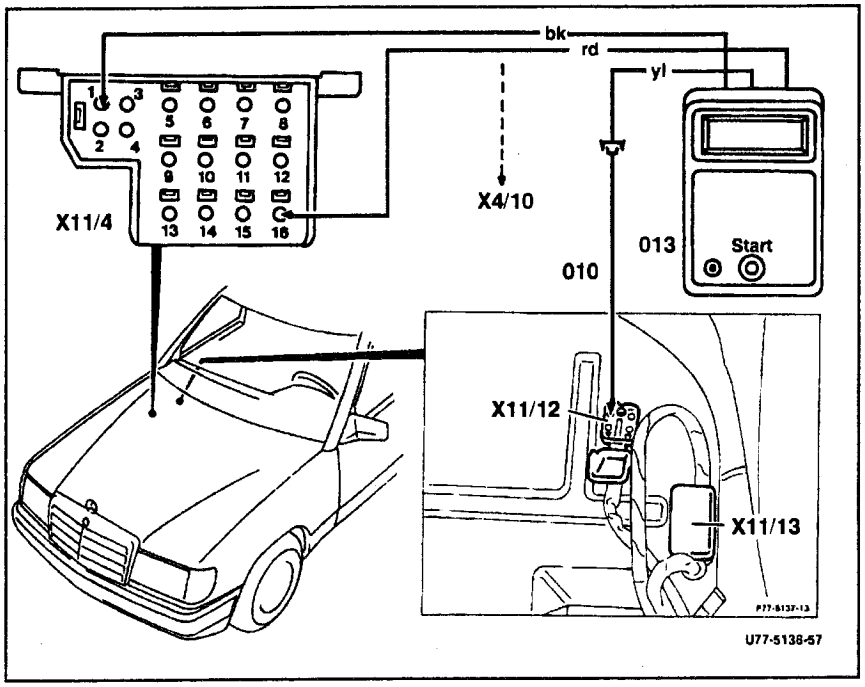
Specific Literature Recommendation: Diagnostic Manual Body and Accessories, Volume 2, Section 11.1, Cabriolet Soft Top, Roll Bar Manual Operation. Diagnostics - Malfunction Memory

Connection Diagram

Connect yellow wire of Impulse counter scan tool to socket no. 2 of X11/12 located in right front passenger footwell. To avoid need for extension cable (010), connect black lead of impulse counter scan tool to good ground and red lead to X4/10 inside vehicle interior.

010 Extension cable
013 Impulse counter scan tool
X4/10 Terminal block, (term. 30/term. 61 battery)
X11/4 Data link connector (DTC readout, 16-pole)
X11/12 Power Soft top test connection (4 pole)
X11/13 SRS test connection (10 pole)

Note:
Connect wires of impulse counter scan tool as follows:
Socket 1 Black
Socket 16 Red



Fault table, DTC readout, Cabriolet soft top

DTC readout	Possible cause
1	No fault in system
2	Low voltage
3	Normal operating time exceeded
4	Illogical limit switch signals
5	Limit switch (A25/1s2), soft top compartment cover "locked"
6	Limit switch (A25/1s1), soft top compartment cover "closed"
7	Limit switch (S84/5), soft top storage compartment "open"
8	Limit switch (S84/8), soft top fabric bow "locked"
9	Limit switch (S84/7), soft top fabric bow "down"
10	Limit switch (S84/6), soft top fabric bow "raised"
11	Limit switch (S84/1), left front soft top "locked"
12	Limit switch (S84/2), right front soft top "locked"
13	Limit switch (S84/3), soft top "open" switch (soft top in storage compartment)
14	Limit switch (S84/4), soft top "overhead"
15	Limit switch (S84/4), soft top "retracted"

Fault table, DTC readout, Cabriolet soft top

DTC readout	Possible cause
16	Limit switch (S83/6), roll bar "extended"
17	Automatic deployment of roll bar has occurred
18	Power soft top switch (S84)
19	Vehicle speed signal
20	Circuit in power soft top control module (N52), solenoid valve, roll bar retracted
21	Circuit in hydraulic unit (A7/5), circuit solenoid valve, roll bar retracted (Y57y10)
22	Circuit in power soft top control module (N52), solenoid valve, roll bar extended
23	Circuit solenoid valve, roll bar extended (Y57y11)
24	Circuit in power soft top control module (N52), power windows

DTC readout (RB)

Model Years 1990 - 1993

Models 129.061
129.066
129.067
129.076

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for location of detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

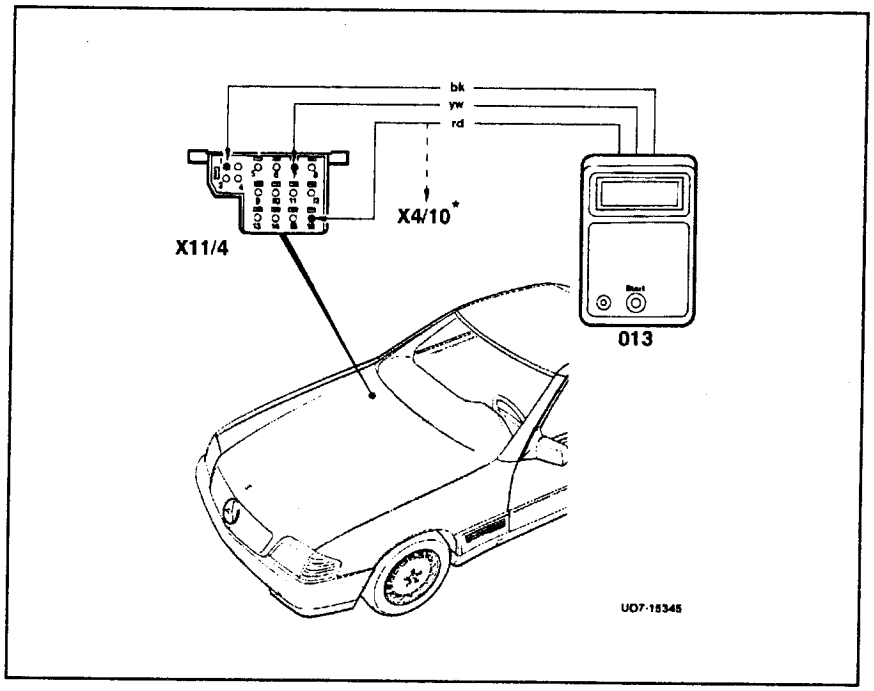
Note:
Each fault displayed must be **erased individually.**

If the fault has been eliminated and its respective readout erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual Body and Accessories, Volume 3 Section 19.2. Roll bar (Crash Deployment), Diagnostics - Malfunction Memory

Connection diagram

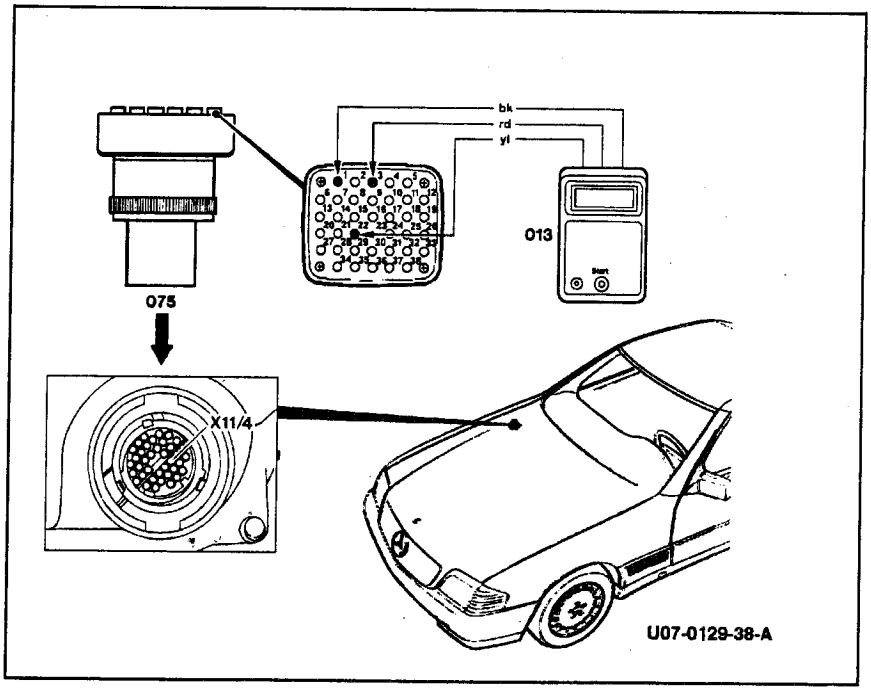
Models 129.061/066



Socket 7	Roll bar diagnostic readout
013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X4/10	Black
X11/4	Data link connector

Connection diagram

Models 129.067/077



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 22	Yellow

Fault table, DTC readout, Roll bar (crash deployment) control module (N53)

DTC readout	Possible cause
1	No fault in system
2	Roll bar control module (N53)
3	Voltage supply
4	Driver seat belt lock relay (K18/2), open circuit, short circuit to terminal 30 and/or 31
5	Passenger seat belt lock relay (K18/3), open circuit, short circuit to terminal 30 and/or 31
6	Roll bar deployment solenoid (Y57/1), open circuit, short circuit to terminal 30 and/or 31
7	Left and/or right rear axle switch, roll bar (S83/2, S83/3), short circuit to terminal 30 and/or 31
8	Roll bar malfunction lamp lamp (A1e29)

DTC readout manual (RST)

Model Years 1990 – 1993

Model 129.061
129.066
129.067
129.076

DTC memory:

DTC's are only stored in memory if the fault occurs during operation of the convertible top (soft top becomes inoperative) and the power top switch is pushed long enough (up to 80 seconds) and the warning lamp in the switch starts to blink. DTC's 2 to 18 are so-called limit switches, but that does not necessarily denote that the affected limit switch is defective. These DTC readouts indicate which limit switch signal has malfunctioned for continued convertible top operation.

The basis of the fault can be:

- Electrical faults (the last-requested operation was ended).
- Hydraulic faults (the last-requested operation had not begun).

Testing with impulse counter scan tool:

1. Connect the impulse counter scan tool according to the connection diagram.
2. Ignition: **ON**
3. Press the Start button 2 to 4 seconds (DTC readout appears).
4. Number 1 means there are no DTCs stored in the system (hard top removed).
5. Number 20 means there are no DTCs stored in the system (hard top installed).
6. All additional DTC's correspond to a specific fault circuit.
7. If there are additional faults in the system, the fault with the lowest DTC will be the first DTC readout.
8. DTC's from 1 to 30 can appear in the display of the impulse counter scan tool.
9. If the first DTC reappears after one or more additional DTC readouts (DTC's), no additional DTC's are stored.

Erasing DTC memory:
After eliminating a fault, the respective DTC readout must be cleared as follows:

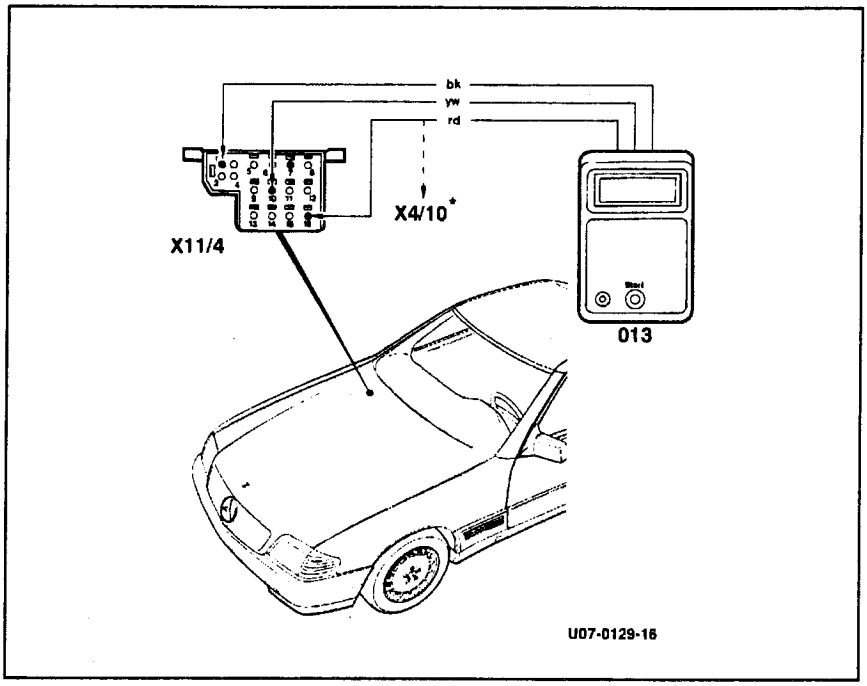
10. Ignition: ON
11. Read out the DTC memory.
12. After waiting three seconds, push the start button 6 to 8 seconds. (On vehicles up to control module version 7.6, DTC's can be erased only after the second time they are read out and DTC's > 20 can only be erased once the hard top is removed).
13. DTC readout 1 (20), indicates that the stored DTC is erased.
14. A DTC readout > 1 means additional faults are in the system.

Note:
Each DTC displayed must be **erased individually.**

Specific Literature Recommendation: Diagnostic Manual Body and Accessories, Volume 2, Section 11.2, Soft top/Roll bar (Manual Operation) Model 129, Diagnosis- Malfunction memory

Connection diagram

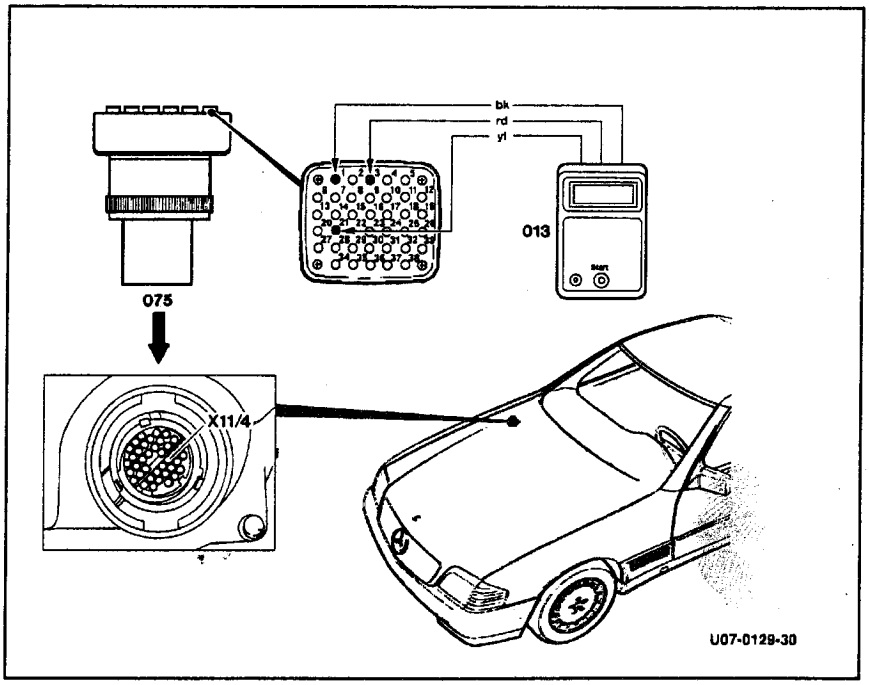
Models 129.061/066



Socket 10	Power soft top control module DTC readout
013	Impulse counter scan tool
X4/10	12V terminal
X11/4	Data link connector

Connection diagram

Models 129.067/077



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connectors (38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 21	Yellow

Fault table, DTC readout, Roadster soft top

DTC readout	Possible cause
1	No faults stored
2	Limit switch (A24s2) soft top storage compartment cover (left) locked
3	Limit switch (A25s2) soft top storage compartment cover (right) locked
4	Limit switch (A24s1) soft top storage compartment cover (left) closed
5	Limit switch (A25s1) soft top storage compartment cover (right) closed
6	Limit switch (A22s2) soft top fabric bow (left) locked
7	Limit switch (A23s2) soft top fabric bow (right) locked
8	Limit switch (A22s1) soft top fabric bow (left) closed
9	Limit switch (A23s1) soft top fabric bow (right) closed
10	Limit switch (S84/1) soft top (left front) locked
11	Limit switch (S84/2) soft top (right front) locked
12	Limit switch (S84/5) soft top storage compartment cover open
13	Limit switch (S84/6) soft top fabric bow raised
14	Limit switch (S84/3) soft top down (in storage compartment)
15	Limit switch (S84/4) soft top up (secondary closing speed)
16	Limit switch (S83/1) roll bar retracted
17	Limit switch (S21/9) left side window down
18	Limit switch (S21/8) right side window down
19	Axle vehicle speed signal illogical
20	Hardtop installed recognition
21	Power soft top switch (S84)
22	Roll bar switch (S83)
23	Roll bar control module (N53)
24	Roll bar crash deployment
25	Limit switch signals illogical
26	Operation time exceeded
27	Insufficient voltage
28	No speedometer signal
29	No axle vehicle wheel speed sensor signal
30	Soft top operation blocked

DTC readout (IRCL)

Model Years 1990 – 1993

Models 129.061
129.066
129.067
129.076

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually.**

If the fault has been eliminated and its respective DTC erased then the DTC will no longer be displayed when performing the DTC readout.

Verification: (if all DTC's are erased)

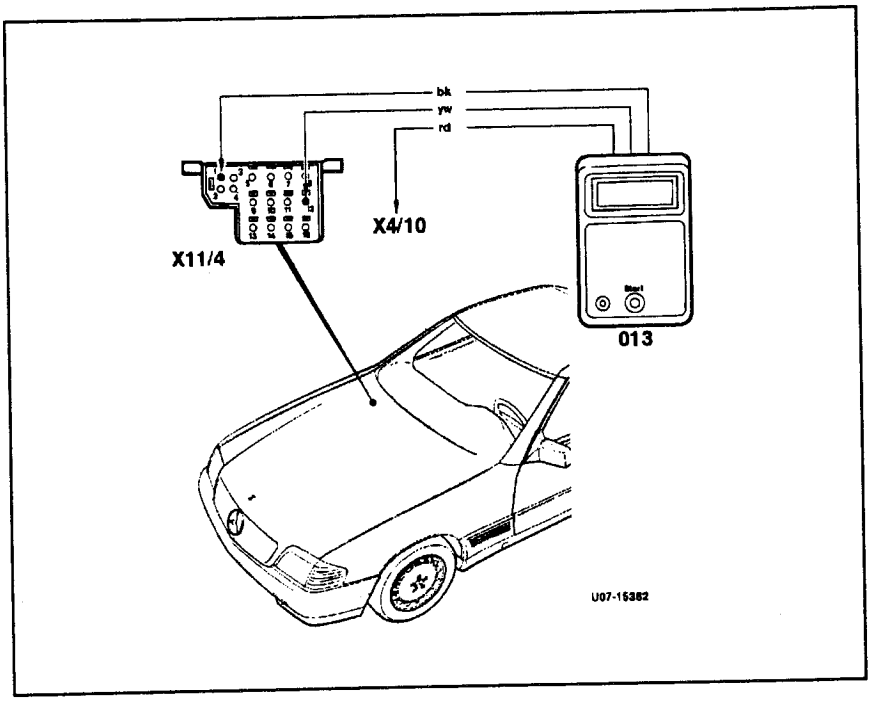
10. Actuate the infrared remote controlled central locking system with the infrared transmitter for 5 lock - unlock cycles at any of the infrared receivers and then wait 3 minutes.

11. Repeat step 5. The DTC 1 (no DTC) must appear. If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature recommendation: *Diagnostic Manual Body and Accessories, Volume 1, Section 4.1, Infrared Remote Control for Central Locking, Diagnosis - Malfunction memory*

Connection diagram

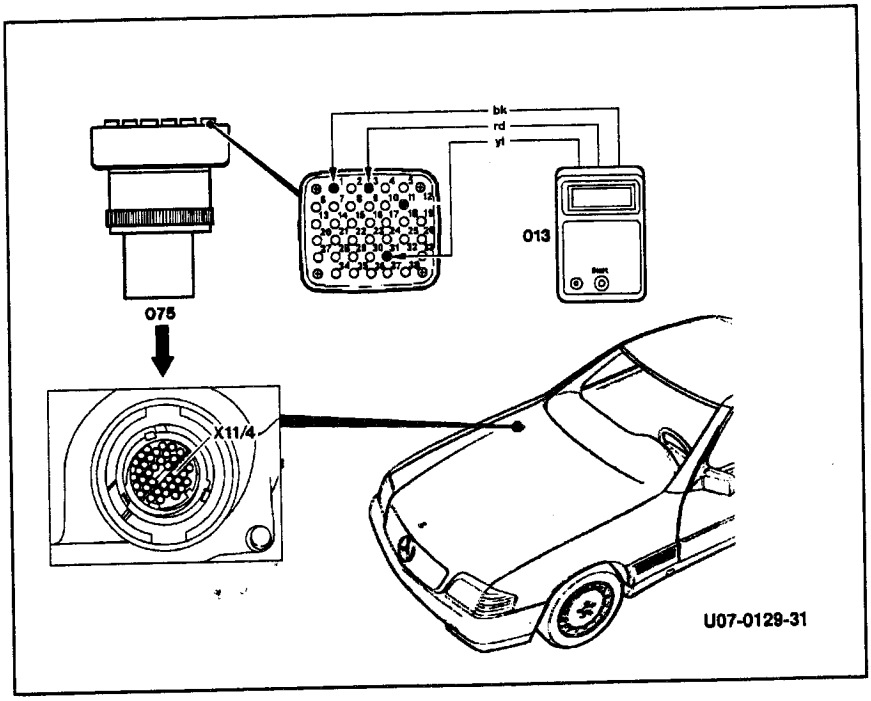
Models 129.061/066



Socket 12	infrared central locking diagnostic readout
013	Impulse counter scan tool
X4/10	Terminal blocks,
X11/4	Data link connector

Connection diagram

Models 129.067/076



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 31	Yellow

Fault table, DTC readout Infrared remote control module (N54)

DTC readout	Possible cause
1	No faults in system
2	Infrared remote control module (N54)
3	Supply pump, central locking system (M14/1 or M14/2), short to circuit 31 (ground)
4	Left front door infrared remote control receiver (A26/1) Right front door infrared remote control receiver (A26/2) Trunk lid infrared remote control receiver (A26/3) Red indicator lamps, short to circuit 31 (ground)
5	Left front door infrared remote control receiver (A26/1) Right front door infrared remote control receiver (A26/2) Trunk lid infrared remote control receiver (A26/3) Green indicator lamps, short to circuit 31 (ground)
6	Supply pump, central locking system (M14/1), short to circuit 30
7	Left front door infrared remote control receiver (A26/1) Right front door infrared remote control receiver (A26/2) Trunk lid infrared remote control receiver (A26/3) Red indicator lamps, short to circuit 30 or open circuit
8	Left front door infrared remote control receiver (A26/1) Right front door infrared remote control receiver (A26/2) Trunk lid infrared remote control receiver (A26/3) Green indicator lamps, in receiver have short to circuit 30 or open circuit
9	Driver door switch group (S86) wiring, short to circuit 30 ATA/convenience microswitch (S87s1) wiring, short to circuit 30 ATA/convenience microswitch (S88s1) wiring, short to circuit 30
10	Ignition/starter switch – position recognition switch (S2/1s2), open circuit
11	Ignition/starter switch–position recognition switch (S2/1s2), short to circuit 31
12	Left front door actuator (S47), open circuit
13	Right front door actuator (S48), open circuit
14	Trunk lid lock actuator (S49), open circuit

DTC readout (IRCL)

Model Year 1992 - 1993

Models 140.032
140.042 140.070
140.051 140.076
140.057 140.134

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
Display "1" = no fault stored,
Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective DTC erased then the DTC will no longer be displayed when performing the DTC readout.

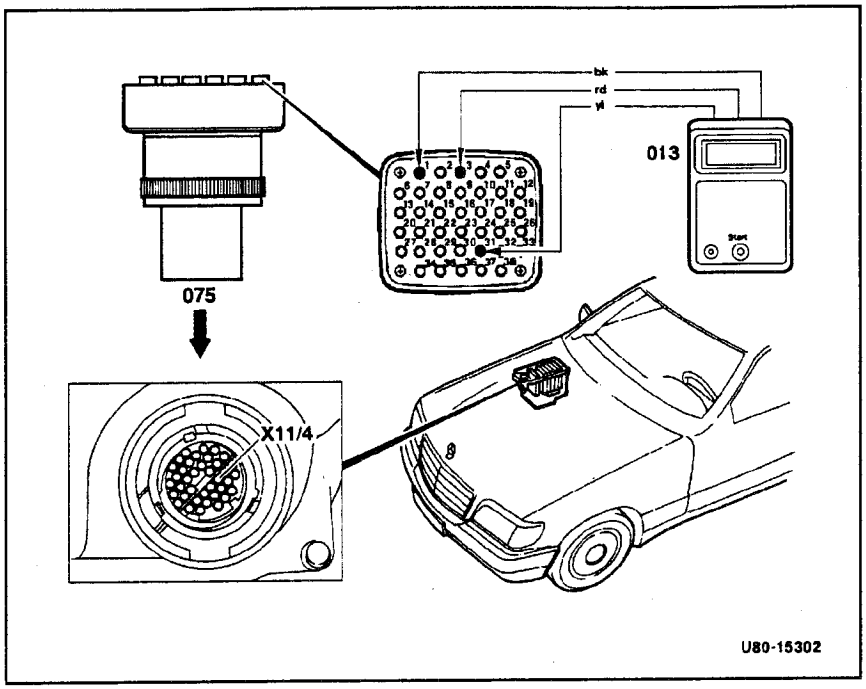
Verification: (if all readouts are erased)

10. Actuate the infrared remote controlled central locking system with the infrared transmitter for 5 lock - unlock cycles at any of the infrared receivers and then wait 3 minutes.

11. Repeat step 5. The DTC 1 (no faults) must appear. If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual Body and Accessories, Volume 1, Section 4.2, Infrared Remote Control for Central Locking System, Diagnosis - Malfunction Memory

Connection diagram



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 31	Yellow

Fault table, DTC readout, Infrared remote control module (N54)

DTC readout	Possible cause
1	No faults in system
2	Open circuit - left front door actuator (S47)
3	Warning buzzer - open circuit
4	Warning buzzer - short circuit to ground
5	Red indicator lamps - short to ground
6	Green indicator lamps - short to ground
7	Short to positive, Lock circuit 1
8	Short to positive, Lock circuit 2
9	Red indicator lamps - short to positive
10	Green indicator lamps - short to positive
11	Defective infrared remote control module (N54)

DTC readout (PSE)

Model Year 1992 - 1993

Models 140.032
140.042 140.070
140.051 140.076
140.057 140.134

Testing with impulse counter scan tool:

The DTC memory readout must be performed with the engine OFF and the ignition ON.

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
Display "1" = no DTC stored,
Greater than "1" = DTC in system.

5. Press start button again for 2 to 4 seconds.
If there are no further faults in the system, the previously displayed DTC will reappear.
If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from the DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory
After eliminating a fault, the respective DTC readout must be cleared as follows:

9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually.**

10. **Ignition: OFF** and wait 30 seconds.

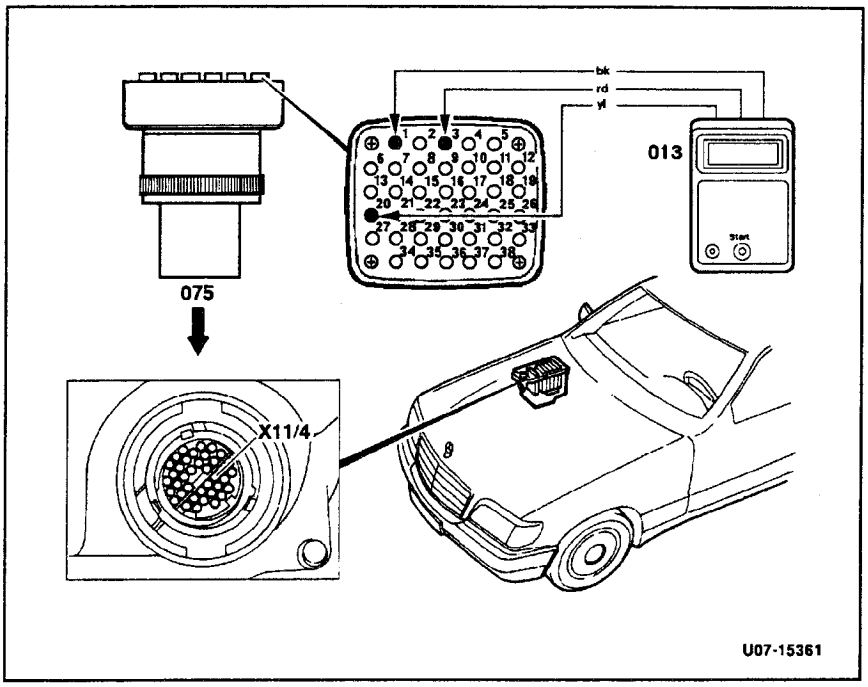
Note:
If the central locking system malfunctions after erasing and correcting noted DTC, it is possible that the fault detection safety circuit of Pneumatic control module (A37) has been activated. To clear fault detection safety circuit, disconnect power connector from Pneumatic control module (A37) for approximately. 3 seconds.

Specific Literature Recommendation: Diagnostic Manual Body and Accessories, Volume 1, Section 3.1a, Pneumatic Control module, Diagnosis - Malfunction memory

013	Impulse counter scan tool
075	Adapter for impulse counter scan tool
X11/4	Data link connector (38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 20	Yellow



Fault table, DTC readout, Pneumatic control module (A37)

DTC readout	Possible cause
1	No fault in system
2	Central locking system, air demand too high (leakage)
3	Retractable trunk lid grip, air demand too high (leakage)
4	Backup assist, air demand too high (leakage)
5	Orthopedic backrest pressure, air demand too high (leakage)
6	Manifold vacuum assist, air demand too high (leakage)
7	Short to positive, Lock circuit 1
8	Short to positive, Lock circuit 2
9	Not used
10	Central locking interior control switch (S85) signal defective
11	Front door signal (S17/3, S17/4) defective
12	Signal from lock circuit 1 is present for longer than 2 minutes
13	Signal from lock circuit 2 is present for longer than 2 minutes
14	Central locking interior control switch (S85) signal is present for longer than 2 minutes
15	Not used
16	Not used
17	Defective pneumatic control module (A37)

DTC readout (ATA)

Model Year 1990 - 1993

Models 129.061
129.066
129.067
129.076

Testing with impulse counter scan tool:

Note:
The DTC readout will only show which sensor(s) activated the alarm. It cannot detect faults except in cases where the alarm was activated for no apparent reason (in which case the respective sensor is identified). Problems arising while arming or disarming the alarm system cannot be detected by the DTC readout. In this case, the socket box test must be performed.

1. Connect impulse counter scan tool according to connection diagram.
2. **Ignition: ON**
3. Press start button for 2 to for 4 seconds.
4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.
5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.
6. Repeat step 5 until the first DTC displayed is repeated.
7. Note any additional faults from DTC readout.
8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. **Ignition: ON**
10. Press start button for 2 to 4 seconds and read out the DTC . Then press the start button for 6 to 8 seconds.

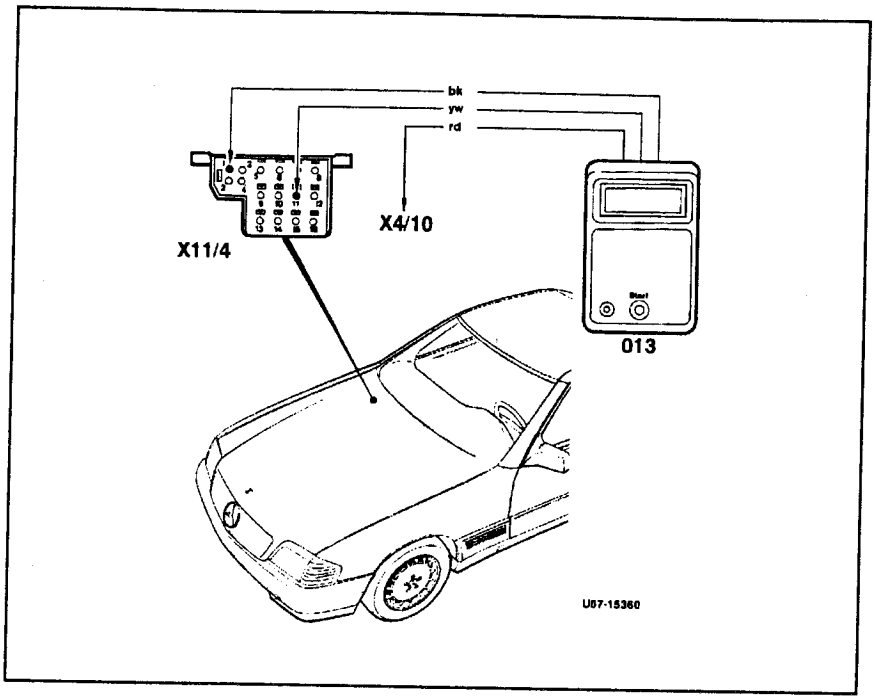
Note:
Each DTC displayed must be **erased individually.**

If the fault has been eliminated and its respective DTC erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Body and Accessories, Volume 2 Section 13.1 Anti-Theft Alarm (ATA), Diagnostics - Malfunction Memory

Connection diagram

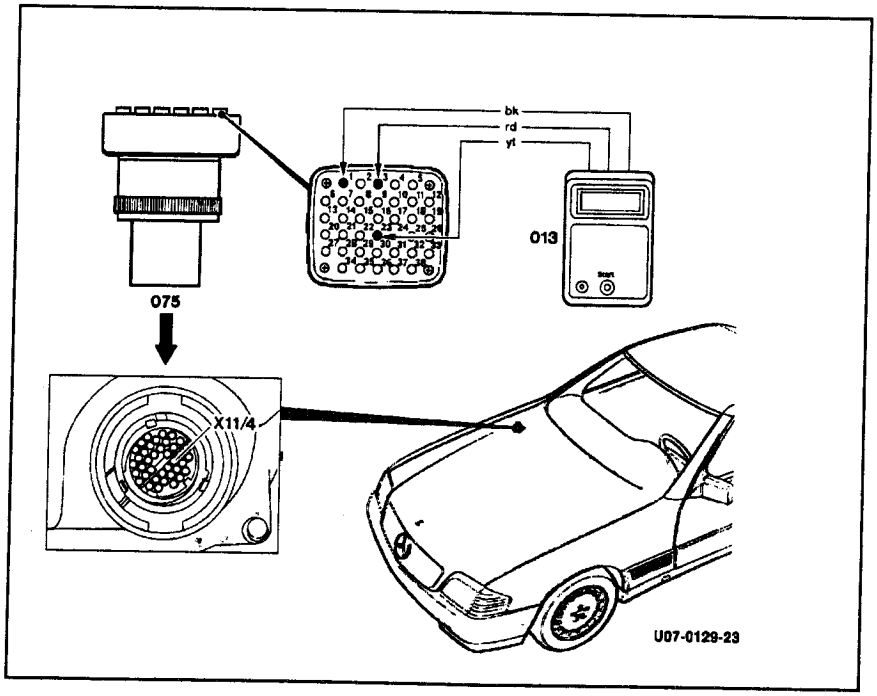
Modesls 129.061/066



Socket 11	ATA diagnostic readout
013	Impulse counter scan tool
X4/10	Terminal block
X11/4	Data link connector

Connection diagram

Models 129.067/076



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 23	Yellow

Fault table, DTC readout, ATA control module (N26)

DTC readout	Possible cause
1	No faults in system
2	Alarm activated by trunk sensor circuit
3	Alarm activated by engine hood circuit
5	Alarm activated by center console compartment
6	Alarm activated by left or right door
10	Alarm activated by radio circuit
12	Alarm activated by ignition circuit
14	Alarm activated by brake circuit

DTC readout (ATA)

Model Year 1992 - 1993

Models 140.032
140.042 140.070
140.051 140.076
140.057 140.134

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = faults in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

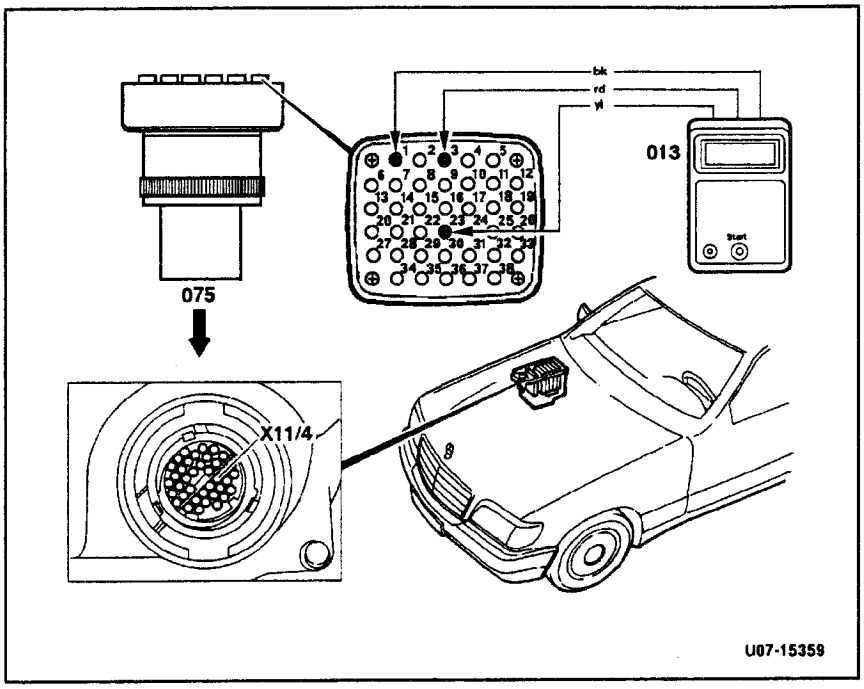
9. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually.**

If the fault has been eliminated and its respective DTC erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature recommendation: Diagnostic Manual, Body and Accessories, Volume 2, Section 13.2 Anti-Theft Alarm (ATA), Diagnostics - Malfunction memory

Connection diagram



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (38 pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 23	Yellow

Fault table, DTC readout, ATA control module (N26)

DTC readout	Possible cause
1	No fault in system
2	Alarm activated by trunk sensor circuit
3	Alarm activated by engine hood circuit
5	Alarm activated by rear door circuit
6	Alarm activated by front door circuit
10	Alarm activated by radio circuit
12	Alarm activated by ignition circuit
14	Alarm activated by brake circuit
19	ATA Control module defective
20	No ground connection, left front door actuator

DTC readout (CT)

Model Year 1992 - 1993

Models

129.061	140.032
129.066	140.042
129.067	140.051
129.076	140.057
	140.070
	140.076
	140.134

Test conditions:

- Ignition: **ON**
- Telephone: **ON**
- Good cellular telephone reception area. (no static, etc.).

Note:
The cellular telephone transmitter/receiver unit (TR) is equipped with a self diagnosis feature. If a system fault is detected, it will be displayed in the In-Dash Control Module (IDCM) LCD display and the telephone system will become inoperative. Each fault is assigned a DTC number, ranging from 1 to 8. By matching up the displayed DTC to the possible cause in the DTC table, the proper remedy/test can then be performed.

Testing cellular telephone system:

1. Ignition: **ON**
2. Telephone: **ON**
3. Check IDCM display for DTC's.
4. Eliminate any faults according to troubleshooting chart and Diagnostic Manual.

Note:
If the vehicle battery has been disconnected, it is not necessary to reprogram the telephone.

5. After eliminating all faults, check telephone system functions and verify proper telephone operation.

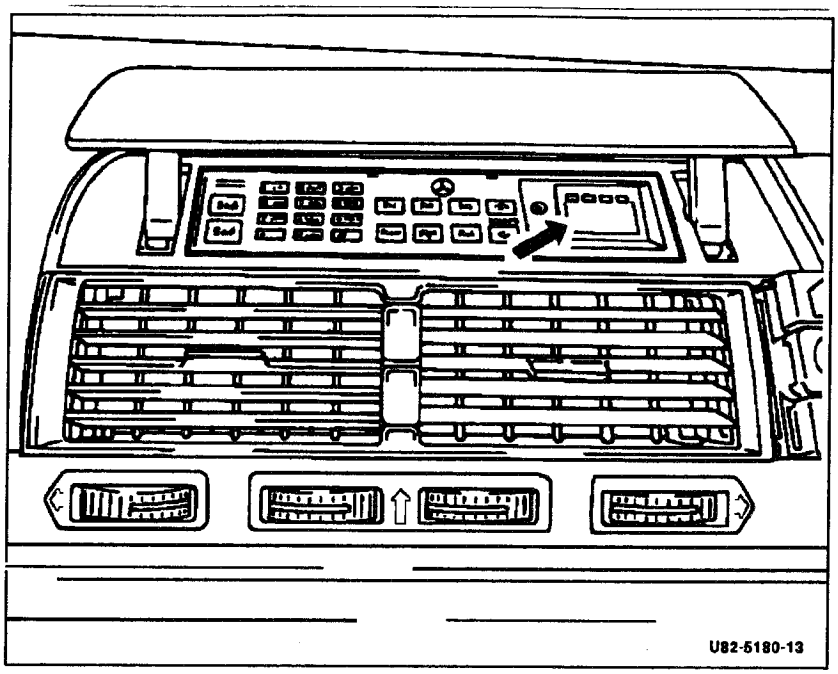
Cellular telephone system abbreviations:

TR	Transmitter /Receiver
NAM	Number Assignment Module
ESN	Electronic Serial Number
IDCM	In Dash Control Module
RAM	Random Access Memory
ROM	Read Only Memory
EEPROM	Electrically Erasable Programmable Read Only Memory
LCD	Liquid Crystal Display

Specific Literature Recommendation: Diagnostic Manual Body and Accessories, Volume 3, Section 23.2, Cellular Telephone System, Diagnosis - Error codes

Models 129, 140

In-dash control module LCD display



Fault table, DTC readout, Cellular telephone system

DTC	Possible cause
1	TR memory fault (ROM)
2	TR memory fault (RAM)
3	NAM fault
4	ESN fault
5	TR memory fault (EE PROM)
6	TR output power fault
7	IDCM fault
8	TR output power control fault

DTC readout (CF)

Model Year 1992 - 1993

Models 140.032
140.042
140.051
140.057
140.070
140.076
140.134

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up, if not, refer to detailed tests located in *Specific Literature Recommendation* listed below.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = faults in system.

5. Press start button again for 2 to 4 seconds.
   If there are no further faults in the system, the previously displayed DTC will reappear.
   If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from the DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Erasing DTC memory:
After eliminating a fault, the respective DTC readout must be cleared as follows:

9 Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

10. **Ignition: OFF** and wait 30 seconds.

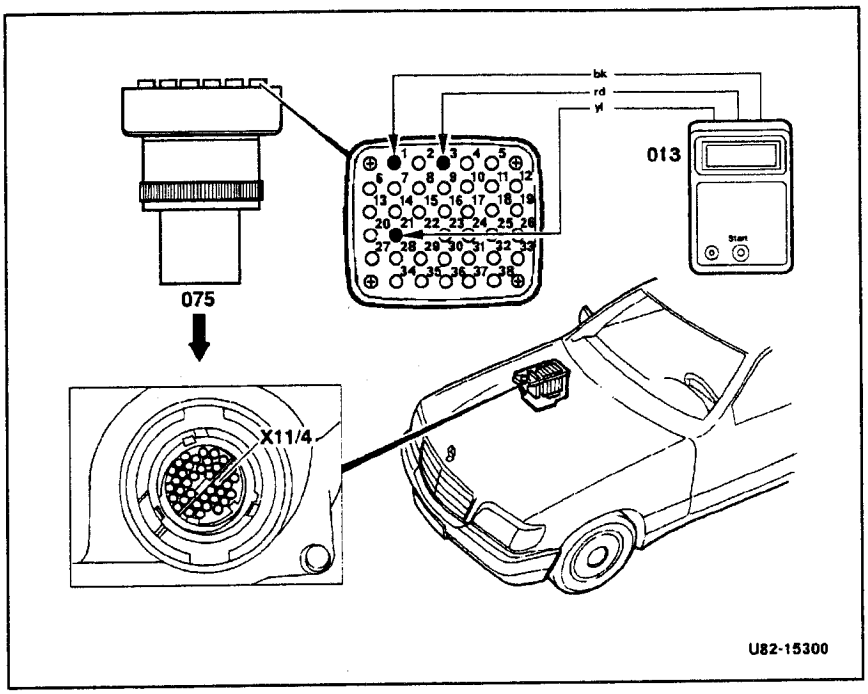
If the fault has been eliminated and its respective DTC erased, then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further DTC's in the system.

Specific Literature Recommendation: Diagnostic Manual Body and Accessories, Volume 1, Section 5.1, Convenience System, Diagnosis - Malfunction memory

013	Impulse counter scan tool
075	Impulse counter scan tool adapter
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 21	Yellow



Fault table, DTC readout, Convenience control module (N57)

DTC readout	Possible cause
1	No fault in system
2	Closing circuit for left front power window motor (M10/3), control module
3	Opening circuit for left front power window motor (M10/3), control module
4	Closing circuit for right front power window motor (M10/4),control module
5	Opening circuit for right front power window motor (M10/4), control module
6	Closing circuit for left rear power window motor (M10/5), control module
7	Opening circuit for left rear power window motor (M10/5), control module
8	Closing circuit for right rear power window motor (M10/6),control module
9	Opening circuit for right rear power window motor (M10/6), control module
10	Switch for left front power window (S21/1): Closing time exceeded
11	Switch for left front power window (S21/1): Opening time exceeded
12	Switch for right front power window (S21/2): Closing time exceeded
13	Switch for right front power window (S21/2): Opening time exceeded
14	Left rear power window circuit (S21/3) and left rear power window switch, front console (S21/5): closing time exceeded
15	Left rear power window circuit (S21/3) and left rear power window switch, front console (S21/5): opening time exceeded
16	Right rear window circuit (S21/4) and right rear power window switch, front console (S21/6): closing time exceeded
17	Right rear window circuit (S21/4) and right rear power window switch, front console (S21/6): opening time exceeded
18	Circuit for left front lock switch (S86/1), right front (S87/1), trunk lid lock switch (S88/2): closing time exceeded

Fault table, DTC readout, Convenience control module (N57) continued

DTC readout	Possible cause
19	Circuit for left front lock switch (S86/1), right front (S87/1), trunk lid lock switch (S88/2): opening time exceeded
20	Left front power window switch (S21/1): short to ground or wires reversed
21	Right front power window switch (S21/2): short to ground or wires reversed
22	Left rear window circuit (S21/3) and left rear power window switch (front console S21/5): short to ground or wires reversed
23	Right rear window circuit (S21/4) and right rear power window switch (front console S21/6): short to ground or wires reversed
24	Left front power window motor circuit (M10/3): Wiring or speed sensor
25	Right front power window motor circuit (M10/4): Wiring or speed sensor
26	Left rear power window motor circuit (M10/5): Wiring or speed sensor
27	Right rear power window motor circuit (M10/6): Wiring or speed sensor
28	Left front power window motor circuit (M10/3): Sensor wiring reversed
29	Right front power window motor circuit (M10/4): Sensor wiring reversed
30	Left rear power window motor circuit (M10/5): Sensor wiring reversed
31	Right rear power window motor circuit (M10/6): Sensor wiring reversed
32	Left front power window motor circuit (M10/3): Speed sensor signal defective
33	Right front power window motor circuit (M10/4): Speed sensor signal defective
34	Left rear power window motor circuit (M10/5): Speed sensor signal defective
35	Right rear power window motor circuit (M10/6): Speed sensor signal defective
36	Convenience control module (N57) defective
37	Voltage too low (< 9 V)
38	Sliding/pop-up roof switch circuit (S13/2): Short, check wiring harness
39	Voltage supply circuit 30 A,control module
40	Voltage supply circuit 30 B,control module

DTC readout Radio (Becker two piece)

Model Years 1991 - 1993

Models 124 126 129

The Becker two-piece radio has a self-diagnostic system. The system verifies data exchange via the BUS cable between the dash mounted radio control module (A2/4), CD changer (A2/6) and trunk mounted tuner/amplifier (A2/3). If a fault is detected, a DTC *E1* through *E5* will appear in the radio display.

No procedure is required to access radio DTC's.The diagnostic chart below cross references DTC's - possible cause - remedy.

Note:
If more than one remedy is listed, they are to be performed in the sequence listed.

Fault table, DTC readout Radio control module (A2/4)

DTC	Possible cause	Remedy
E1	• EE PROM in radiocontrol module defective	Replace radio control module (A2/4)
E2	• Radio control module, CD changer and tuner/amplifier will not turn on due to open circuit or poor BUS connection • No voltage	Check BUS cable connections on radio control module (A2/4) and CD changer (A2/6). Check for continuity between pins on BUS cables. Check condition of fuse on rear of CD changer and tuner/amplifier (A2/3). Check for circuits 15, 30 and 31 at the radio control module, CD changer and tuner/amplifier. Replace tuner/amplifier (A2/3).
E3	• Tuner/amplifier will not turn on due to open circuit or poor/no BUS connection between CD changer and tuner/amplifier. • No voltage to tuner/amplifier (A2/3).	Check BUS cable connections on CD changer (A2/6) and tuner/amplifier (A2/3). Check for continuity between pins of BUS cable from CD changer to tuner/amplifier. Check condition of fuse on rear of tuner/amplifier. Check for circuits 30 and 31 at tuner/amplifier. Replace tuner/amplifier (A2/3).
E4	• Tuner/amplifier and/or CD changer will not turn ON. BUS communication OK.	Replace tuner/amplifier (A2/3) and/or CD changer (A2/6).
E5	• Tuner/amplifier will not turn ON. BUS communication OK	Replace tuner/amplifier (A2/3).

Specific Literature Recommendation: Service Information, Ref. No. MBNA 82/58, February 1992,BECKER TWO - PIECE RADIO, ERROR CODES

DTC readout (Tempmatic A/C)

Model Year 1987

Models 201.028
201.029
201.034
201.126
201.128

Testing procedure using LED blink code:

1. Remove TCC pushbutton assembly.

Note:
Check the 2 amp. fuse in the back of the pushbutton assembly.

2. Connect socket box wiring harness adapter to pushbutton assembly and to wiring harness.

3. Connect socket box tester to wiring harness adapter.

4. Connect red wire of LED blink tester to socket 10 and brown wire of LED blink tester to socket 9 of the socket box tester.

5. **Ignition: ON**

6. Set temperature wheel to 22 °C, pushbuttons may be in any position.

7. Count the number of blink impulses emitted by the LED blink tester.

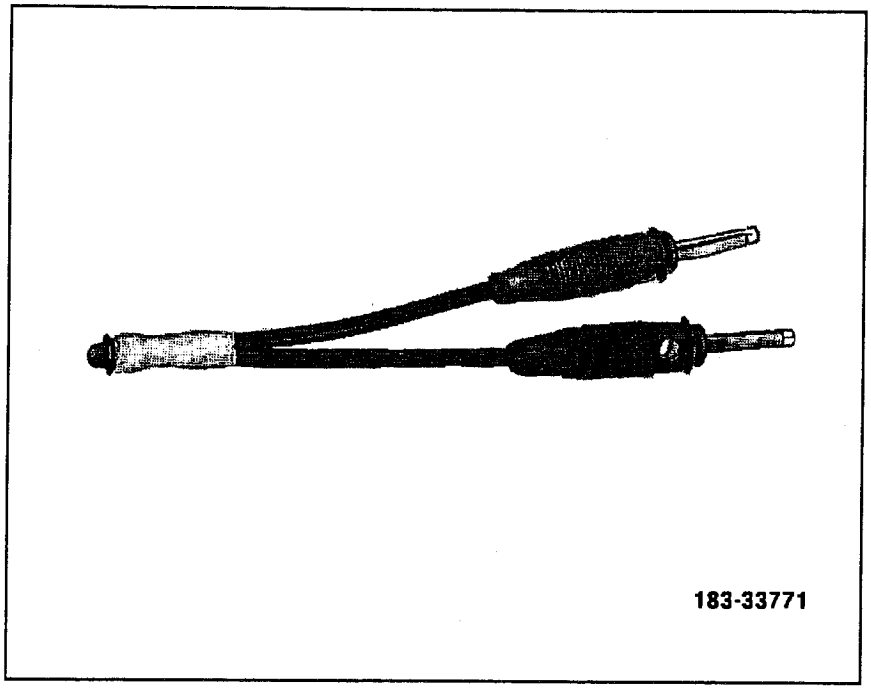
8. Replace and/or repair defective part or check respective wiring.

9. Repeat step 7 until no further blink impulses are emitted by the LED blink impulse tester.

The malfunction indicates repeats until the defect is no longer detected. There is a pause of four seconds between each sequence of impulses, at which point the opening and closing of the relay in the blower switch is audible (clicking noise), momentarily switching the blower off. This provides an additional method for diagnosing the defective component by listening to the relay and timing the impulse sequences.

Specific Literature Recommendation: Model Year 1987 Introduction Manual, Models 107, 124, 126, 201, Group 83, Model 201, TCC Diagnosis using LED blink code

LED for blink code



LED blink code tester

Malfunction table, blink impulse codes, TCC

Blink impulses	Possible cause
5	In car temperature sensor (B10/4)
10	Outside temperature sensor (B10/5)
15	Feedback potentiometer (R23)
20	Evaporator temperature sensor (B10/6)
25	Coolant temperature gauge sensor (B13)

DTC readout (Tempmatic A/C)

Model Years 1988 – 1993

Models 201.028
201.029
201.126

Test conditions:

- Coolant temperature 60-80 °C
- A/C OFF
- Selector lever in park "P" position
- Overvoltage protection relay fuse intact

Note:
The DTC readout displays only those faults present at the time of diagnosis. It cannot store previous DTC's in memory.
If the DTC readout indicates no fault, but a complaint still exists, a component tolerance deviation may exist, i.e. low ohm value at a sensor. Since such a deviation cannot be detected via the DTC readout, the system must be checked thoroughly according to the test card using the socket box tester and multimeter.

1. Connect impulse counter scan tool according to connection diagram.

2. **Ignition: ON**

Note:
LED "U-Batt" must light up. If not, please refer to *Specific Literature Recommendation* listed below for location of detailed test.

3. Press start button for 2 to 4 seconds

4. Read and note DTC readout displayed.
Display "1" = no faults stored,
Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds.
If there are no further faults in the system, the previously displayed DTC will reappear.
If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

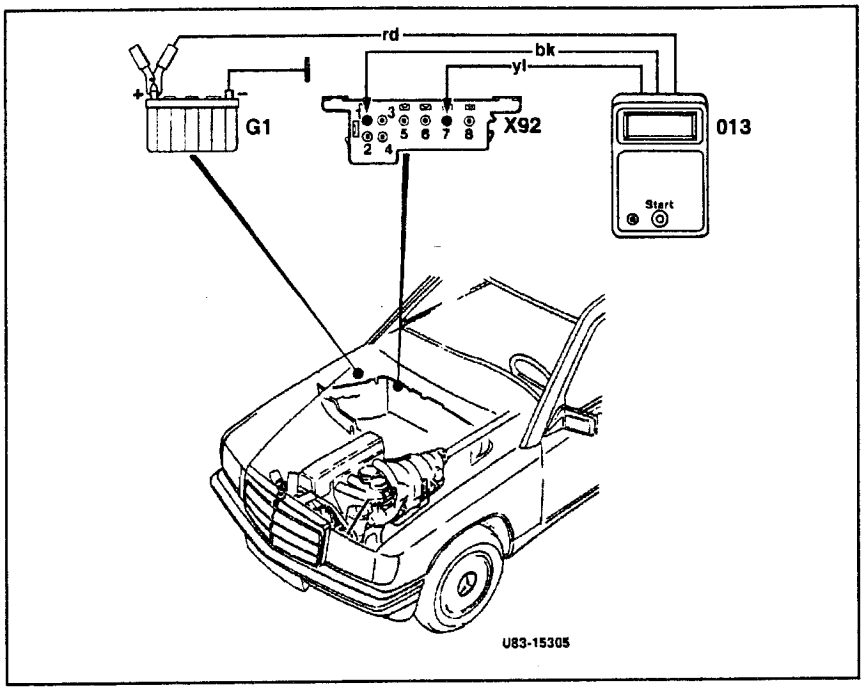
7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Specific Literature Recommendation: Model Year 1988 Introduction Manual, Models 107, 124, 126 and 201, Group 83, Checking ACC/TCC with impulse counter, Impulse readout Model 201

Connection diagram

Model 201



Socket 7	TCC diagnostic readout
013	Impulse counter scan tool
X11/4	Data link connector
G1	Battery

Fault table, DTC readout, A/C pushbutton control module (N19/1)

DTC readout	Possible cause
1	No fault in system
2	In-car temperature sensor (B10/4), short circuit
3	In-car temperature sensor (B10/4), open circuit
4	Outside temperature sensor (B10/5), short circuit
5	Outside temperature sensor (B10/5), open circuit
6	Evaporator temperature sensor (B10/6) short circuit
7	Evaporator temperature sensor (B10/6) open circuit
12	Coolant temperature sensor (B11/7), short circuit
13	Coolant temperature sensor (B11/7), open circuit
14	Feedback potentiometer (R23) short circuit
15	Feedback potentiometer (R23) , open circuit

Fault table, DTC readout, A/C pushbutton control module (N19/1)

DTC readout	Possible cause
30	Coolant pump (M13) short circuit
33	A/C compressor control module (N6) short circuit
34	Auxiliary fan relay (K9) short circuit
50	Switchover valve unit ((5 connections) defective between pins 5 and 4
51	Switchover valve unit (5 connections) defective between pins 5 and 6
52	Switchover valve unit (5 connections) defective between pins 5 and 2
54	Switchover valve unit (5 connections) defective between pins 5 and 3
55	Switchover valve unit (4 connections) defective between pins 5 and 1
56	Switchover valve unit (4 connections) defective between pins 5 and 2
57	Switchover valve unit (4 connections) defective between pins 5 and 1
58	Switchover valve blend air flaps (warm) (Y25/3) short circuit
59	Switchover valve blend air flaps (cold) (Y25/4), short circuit
60	Switchover valve heater valve (closes) (Y25/5) short circuit
61	Blower switch (S3/1) defective, low speed
62	Blower switch (S3/1) defective, high speed

DTC readout (A/C)

Model Years 1992 – 1993

Models 124.034
124.036

Testing with impulse counter scan tool:
Note:
The DTC readout displays only those faults present at the time of diagnosis. It cannot store previous DTC's in memory.

If one or more faults are displayed by the DTC readout, then these are to be eliminated and the DTC test repeated. This ensures that all DTCs which are recorded by the impulse counter scan tool have been eliminated.

If the DTC readout indicates no fault, but a complaint still exists, a component tolerance deviation may exist, i.e. low ohm value at a sensor. Since such a deviation cannot be detected via the DTC readout, the system must be checked thoroughly using the socket box and multimeter.

Testing

1. Connect impulse counter scan tool according to connection diagram

2. Ignition on "U Batt" light emitting diode must light up.If not, refer to *Specific Literature Recommendation* listed below for detailed test.

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = fault in system.

5. Press start button for 2 to 4 seconds. If there are no further faults in the system, the previously displayed number will reappear.

6. Eliminate all noted faults (DTC readouts) and switch the ignition on and off.

Note
During the DTC test the light emitting diode in the fresh air/recirculated air switch flashes.

Specific Literature Recommendation: SMS Job no. 83-503, sections C and D

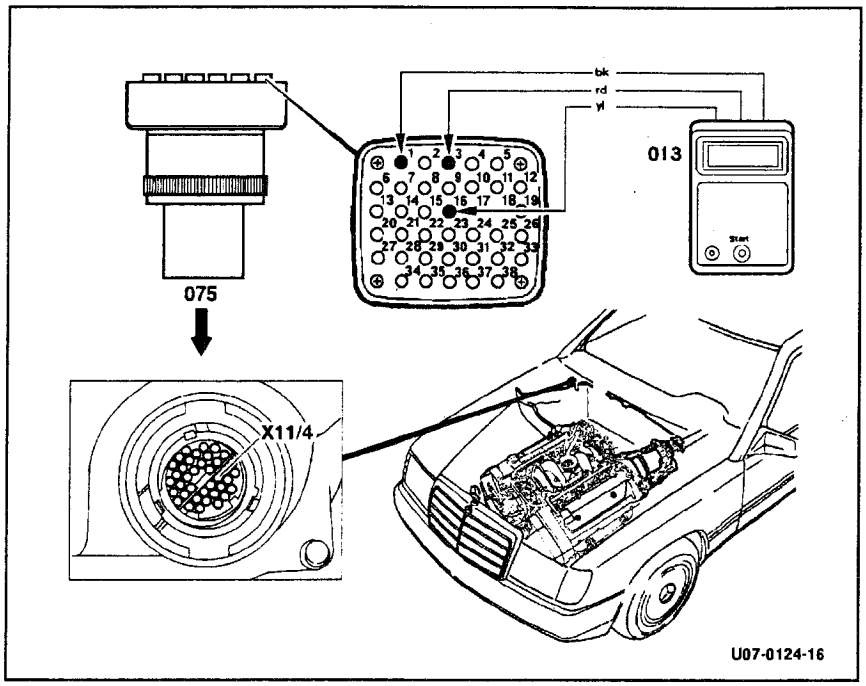
Connection diagram

Models 124.034
124.036

013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 16	Yellow



Fault table, DTC readout, A/C pushbutton control module (N22) (Up to prod. date 7/91)

DTC readout	Possible cause
1	No fault in system
2	In-car temperature sensor, short-circuit
3	In-car temperature sensor, open
4	Outside air temperature sensor, short-circuit
5	Outside air temperature sensor, open
6	Evaporator temperature sensor, short-circuit
7	Evaporator temperature sensor, open
8	Left heat exchanger temperature sensor, short-circuit
9	Left heat exchanger sensor, open
10	Right heat exchanger temperature sensor, short-circuit
11	Right heat exchanger temperature sensor, open
12	Engine coolant temperature sensor, short-circuit
13	Engine coolant temperature sensor, open
30	Circulation pump, short circuit/open
31/32	Duo valve, short-circuit/open
33	Compressor cut-out control module, short-circuit/open
34	Auxiliary fan 2nd stage (actuation), short-circuit
56	Switchover valve fresh air/recirculated air flap (long stroke), short-circuit
57	Switchover valve fresh air/recirculated air flap (short stroke), short circuit

Fault table, DTC readout, A/C pushbutton control module (N22) (as of prod. date 8/91)

DTC readout	Possible cause
11	No faults in system
2	In-car temperature sensor (B10/4), short-circuit
3	In-car temperature sensor, open
4	Outside air temperature sensor (B10/5) , short-circuit
5	Outside air temperature sensor, open
6	Evaporator temperature sensor (B10/6), short-circuit
7	Evaporator temperature sensor, open
8	Left heat exchanger temperature sensor, short-circuit
9	Left heat exchanger sensor, open
10	Right heat exchanger temperature sensor, short-circuit
11	Right heat exchanger temperature sensor, open
12	Engine coolant temperature sensor (B11/7) short-circuit
13	Engine coolant temperature sensor, open
30	Circulation pump, short circuit/open
31/32	Duo valve, short-circuit/open
33	Compressor cut-out control module, short-circuit/open
34	Auxiliary fan 2nd stage (actuation), short-circuit
56	Valve block (4 connections) (Y11), short-circuit or open
57	Valve block (4 connections) (Y11), short-circuit or open
58	Valve block (4 connections) (Y11), short-circuit or open

DTC readout (Automatic A/C)

Model Year 1988 – 1993[1)]

Models 124.026 126.024
124.030 126.025
124.050 126.035
124.090 126.045
124.051 126.039
124.230 126.134
124.290 126.135

Testing with impulse counter scan tool:
Note:
The DTC readout displays only those DTC's present at the time of diagnosis. It cannot store previous DTCs in memory.
If the DTC readout indicates no fault, but a complaint still exists, a component tolerance deviation may exist, i.e. low ohm value at a sensor. Since such a deviation cannot be detected via the DTC readout, the system must be checked thoroughly according to the test card using the socket box and multimeter.

1. Connect impulse counter scan tool according to connection diagram.
2. **Ignition: ON**

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for location of detailed test.

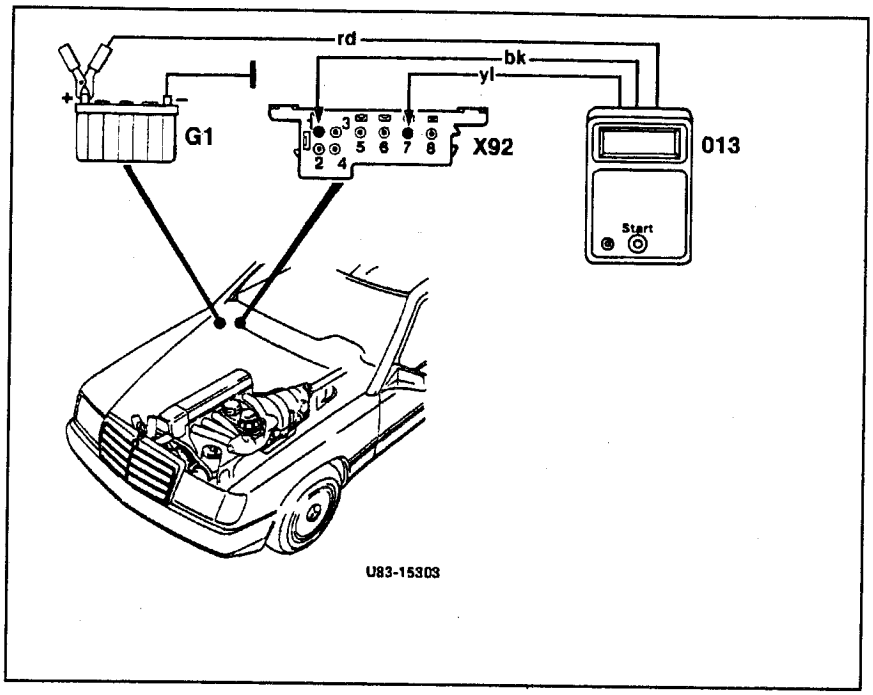
3. Press start button for 2 to 4 seconds.
4. Read and note DTC readout displayed.
   Display "1" = no fault stored,
   Greater than "1" = fault in system.
5. Press start button for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will reappear.
6. Repeat step 5 until the first displayed DTC repeated.
7. Note any additional faults from DTC readout.
8. Eliminate all noted faults (DTC readouts) according to troubleshooting chart and diagnostic tests.

1) Model 126 until model year 1991.

Specific Literature Recommendation: Model Year 1988 Introduction Manual, Models 107, 124, 126 and 201, Group 83, Checking ACC/TCC with impulse counter, Service Microfiche, Air conditioning system II, Automatic Climate Control, Model 124, Job 83-603.

Connection diagram

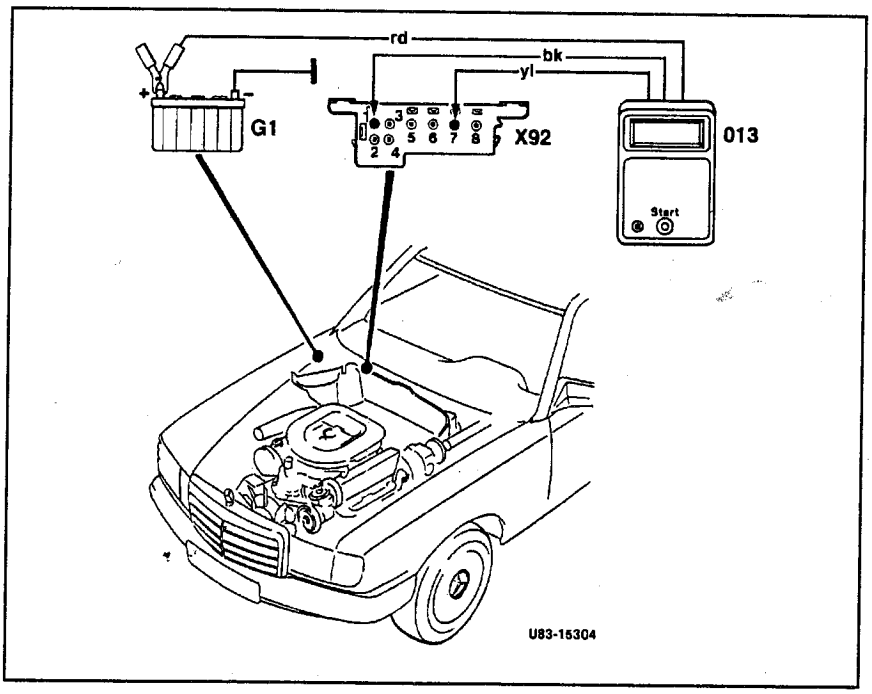
Model 124



Socket 7	A/C diagnostic readout
013	Impulse counter scan tool
X11/4	Data link connector
G1	Battery

Connection diagram

Model 126



Socket 7	A/C diagnostic readout
013	Impulse counter scan tool
X92	Data link connector
G1	Battery

Fault table, DTC readout, A/C pushbutton control module (N22)

DTC Readout	Possible cause
1	No fault in system
2	In-car temperature sensor (B10/4) short circuit
3	In car temperature sensor (B10/4) open circuit
4	Outside temperature sensor (B10/5) short circuit
5	Outside temperature sensor (B10/5) open circuit
6	Evaporator temperature sensor (B10/6) short circuit
7	Evaporator temperature sensor (B10/6) open circuit
8	Heater core temperature sensor (B10/1) short circuit
9	Heater core temperature sensor (B10/1) open circuit
12	Engine coolant temperature sensor (B11/8) short circuit
13	Engine coolant temperature sensor (B11/8) open circuit
30	Coolant pump (M13) short circuit
31	Mono valve (Y19) short circuit
33	A/C compressor control module (N6) short circuit
34	Auxiliary fan relay (K9) defective
50	Switchover valve unit (Y7) (7 connections defective between pins 5 and 8)
51	Switchover valve unit (Y7) (7 connections defective between pins 8 and 7)
52	Switchover valve unit (Y7) (7 connections defective between pins 8 and 3)
54	Switchover valve unit (Y7) (7 connections defective between pins 8 and 4)
55	Switchover valve unit (Y7) (7 connections defective between pins 8 and 6)
56	Switchover valve unit (Y7) (7 connections defective between pins 8 and 2)
57	Switchover valve unit (Y7) (7 connections defective between pins 8 and 1)

DTC readout (Automatic A/C)

Model Years 1990 – 1993

Models 129.061 129.067 129.066 129.076

Testing with DTC display:
This test is divided into the following test modes:

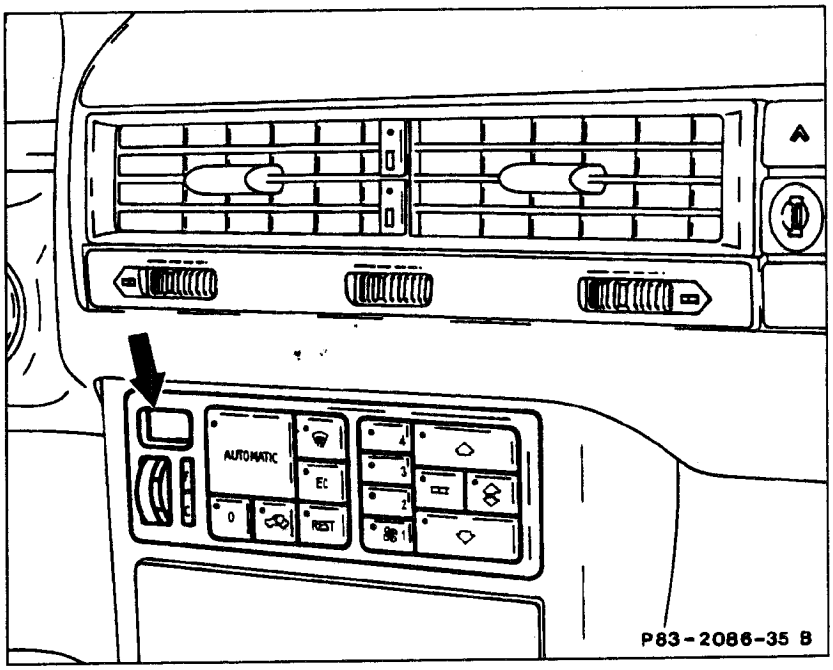
A. Continuous display, instantaneous display of actual temperature sensor readings, temperature selector wheel setting, vehicle speed, system voltage and soft top position.

B. Display of permanent and intermittent DTC's stored in memory.

C. Testing the temperature sensors, potentiometer and feedback potentiometer.

Note:
If no DTC can be found when testing with DTC display and testing with socket box tester, (for example, the footwell flap does not open) it is possible there is a leak in the vacuum system. Check vacuum system pneumatic elements for leaks.

The A/C pushbutton control module (N22) has DTC memory and the capability to display DTC's via the temperature display window (arrow) on the A/C pushbutton control panel. The stored DTC will remain in memory even with the vehicle battery disconnected.



Specific Literature Recommendation: *Diagnostic Manual Automatic Climate Control, Volume 1, Section 3.1 Automatic Climate Control, Model 129, Diagnosis - Fault Code Readout.*

Test mode A.
Preparations for test A:

1. Ignition: **ON.**

2. Press REST, and within one second press blower speed button **4.** The temperature window will alternately display the number "02" with the in-car temperature sensor value *or* "OP E" if there is an open circuit *or* "CL 0" if there is a short circuit.

3. Press F to go to next step and Press C to go to previous steps.

4. To exit this test mode, turn ignition **"OFF"** and wait five seconds.

Fault table A, DTC readout, A/C pushbutton control module (N22)

DTC	Possible cause
02	In–car temperature sensor (B10/4)
04	Outside temperature sensor (B10/5)
06	Evaporator temperature sensor (B10/6)
08	Heater core temperature sensor (B10/1)
12	Engine coolant temperature sensor (B10/8)
14	Temperature selector wheel (° C) setting
18	Vehicle speed (km/h)
20	Soft top open U, soft top closed O
22	System voltage
83	OFF/ON (not used)
84 1)	Blower voltage 050 (0.5 V) - 600 (6.0 V)

1) As of approximately 11/91.

Test modes B and C.

Preparation for tests B and C:

1. Turn temperature wheel to white field.

Test mode B.

2. Turn ignition **ON** and within 10 seconds press F, and REST **simultaneously** for 2 to 4 seconds.

3. Read and record the DTCs displayed on the temperature display window.

4. The display will show permanent DTCs stored in memory. After each DTC is displayed and recorded, press again until the display reads "End".

5. Press once again. Now the stored intermittent DTC's will be displayed. The symbol □ will appear after each DTC to indicate an intermittent DTC.After each DTC is displayed (see Diagnostic Chart A for corresponding DTC source) and recorded, press again until the display reads "En □d".

Test mode C.

6. Press once again. The display will alternately blink the number "2" and the in – car temperature in °C. Press until all temperature sensor display numbers from 02–12 are shown

7. Press once again and the display will alternately blink the number "16"and the voltage of the potentiometer for the center air outlet flap depending on the setting (open or closed) of the center air outlet flap. The voltage, for example, for 3.5 V is displayed as "35U". Press until all potentiometer and feedback potentiometer display numbers from 16–26 are shown. Press until the display reads "End" and the symbol □ blinks.

8. Turn ignition off and repair recorded DTCs according to the respective diagnostic chart.

Fault table B and C, DTC readout, A/C pushbutton control module (N22)

DTC	Possible cause
01	No stored faults in system memory
02	In – car temperature sensor (B10/4), short circuit
03	In – car temperature sensor (B10/4), open circuit
04	Outside temperature sensor (B10/5), short circuit
05	Outside temperature sensor (B10/5), open circuit
06	Evaporator temperature sensor (B10/6), short circuit
07	Evaporator temperature sensor (B10/6), open circuit
08	Heater core temperature sensor (B10/1), short circuit

Fault table B and C, DTC readout, A/C pushbutton control module (N22)

DTC	Possible cause
09	Heater core temperature sensor (B10/1), open circuit
12	Engine coolant temperature sensor (B10/8), short circuit
13	Engine coolant temperature sensor (B10/8), open circuit
16	Center air outlet flap control module potentiometer, short circuit
17	Center air outlet flap control module potentiometer, open circuit
18	Center air outlet feedback potentiometer, short circuit
19	Center air outlet feedback potentiometer, open circuit
20	Left air outlet flap control module potentiometer, short circuit
21	Left air outlet flap control module potentiometer, open circuit
22	Left air outlet feedback potentiometer, short circuit
23	Left air outlet feedback potentiometer, open circuit
24	Right air outlet flap control module potentiometer, short circuit
25	Right air outlet flap control module potentiometer, open circuit
26	Right air outlet feedback potentiometer, short circuit
27	Right air outlet feedback potentiometer, open circuit
30	Auxiliary coolant pump (M13), short circuit
31	Mono valve (Y19), short circuit
33	A/C compressor signal, short circuit
34	Auxiliary fan signal, 2nd stage short circuit
35	Auxiliary fan signal, 1st stage short circuit
50	Valve block signal, short circuit
70	Auxiliary coolant pump (M13), open circuit
71	Mono valve (Y19), open circuit
73	A/C compressor signal, open circuit
74	Auxiliary fan signal, 2nd stage open circuit
75	Auxiliary fan signal, 1st stage open circuit

DTC readout (A/C)

Model Year 1992 - 1993

Models 140.032
140.042
140.043
140.051
140.057
140.070
140.076
140.134

Diagnostic testing:

These tests are divided into the following test modes:

A. Reading sensor values

B. DTC readout

Note:

If no DTC can be found when testing with DTC display and testing with socket box tester, (for example, the footwell flap does not open), it is possible there is a leak in the vacuum system. Then refer to "individual flap test," diagnostic manual climate control, section 3.2.

Reading sensor values

Preparations for test

1. Set temperature selector wheels to white area.
2. Ignition **ON**
3. Press left and right AUTO button.
4. Wait at least 20 seconds then press REST for more than 5 seconds until display changes
5. The DTC "1" will appear in left display window, in the right window the instantaneous in-car temperature will appear, or, HI if there is a short circuit, LO if there is an open circuit.
6. By pressing the left AUTO button the next value will be displayed in the right window (see table below).
7. Press REST button to end test program.

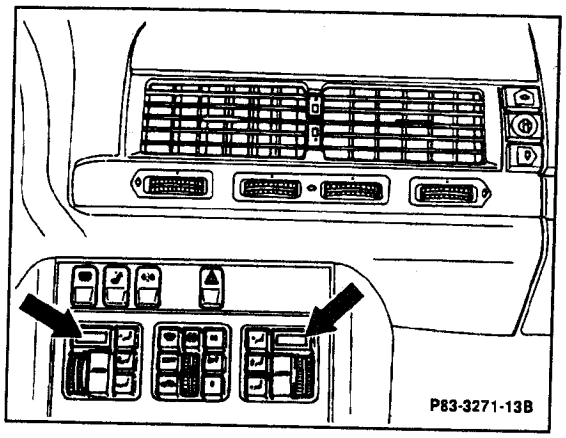
Specific Literature Recommendation: Diagnostic Manual, Climate Control Volume 1, Section 3.2, Automatic Climate Control, Diagnosis - Fault code readout

Reading sensor values

Notes:

1. The display windows (arrows) will show in sequence the actual temperature sensor readings, refrigerant pressure, blower control voltage, software status and control module version. Thereby allowing the tolerance range of the temperature sensors and the refrigerant pressure to be checked.

2. The temperature control is maintained during the duration of the test.



Diagnosis - Reading sensor values
Sensor value readout table, A/C pushbutton control module (N22)

Test step display	Sensor value display
1	In-car temperature sensor with aspirator blower (B10/4)
2	Outside temperature sensor (B10/5)
3	Left heater core temperature sensor (B10/2) 1)
4	Right heater core temperature sensor (B10/3)
5	Evaporator temperature sensor (B10/6)
6	Coolant temperature sensor (climate control) (B10/8) 1)
7	Refrigerant pressure in bar (06 = 6 bar)
8	Blower control voltage from 8(MIN) - 60 (MAX)
9	Software status, A/C pushbutton control module, manufacturer Bosch: 57, 58, etc manufacturer Kammer: 02 03 etc.
10	Left heater core temperature sensor (B10/9) (rear climate control)
11	Right heater core temperature sensor (B10/10) (rear climate control)
12	Evaporator temperature sensor (B10/11) (rear climate control)
13	Software status, rear A/C control unit, manufacturer Bosch: 42 2)
16	Active charcoal filter; A = equipped. 0 = not equipped

1) Display will read only two digits (ex. temperature of 104 °F will read 04 °F

2) As of 2/92

Diagnosis - DTC Readout

Test preparations:

1. Turn left temperature wheel to red field (detent).

2. Turn right temperature wheel to blue field (detent).

3. Turn **ignition ON.**

4. Press AUTO

5. Within 20 seconds simultaneously press REST and 0 for more than 2 seconds.

6. The display will show permanent DTCs stored in memory (see table on following page). Press AUTO until all stored DTCs are displayed (record each DTC as it is displayed).

7. Each fault (short circuit, open circuit, etc.) has a specific DTC. The letter "E" (Error) along with the hundredth digit of the display code will display in the left window. The tenth and single digit of the code will display in the right window. By pressing the right AUTO the next DTC stored in memory will be displayed

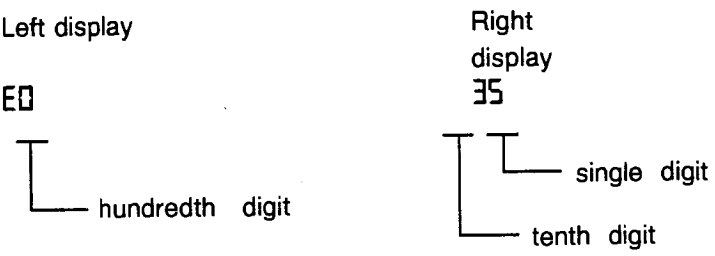
8 Turn ignition **OFF** and repair recorded DTCs according to the respective diagnostic chart.

9. To delete stored DTC's repeat steps 1 - 5,then press the left AUTO for the letter "d" (delete) to appear in the window.

   By pressing the right AUTO the display code will be deleted from memory. Continue to press the left and right AUTO buttons until all codes are deleted from memory (display will show "E0 00").

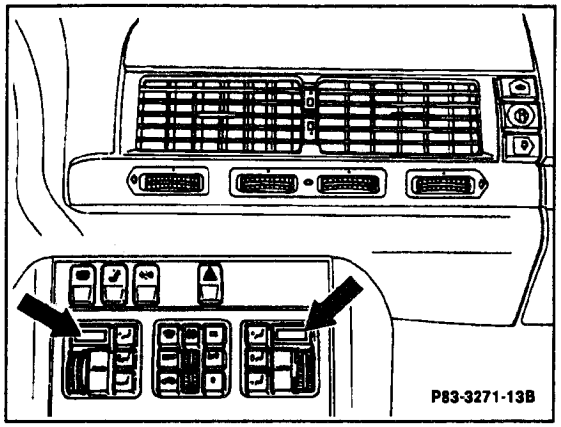
10. Return temperature selector to normal setting.

Note: If the vehicle is equipped with rear A/C the red diode in the recirculation switch will blink during the test (as of software status 6.2 [Bosch] or 06 [Kammerer]).



The A/C pushbutton control module (N22) has DTC memory with the capability to display the codes via the temperature display windows (arrows) on the A/C pushbutton control panel. The stored DTC's will remain in memory even with the vehicle battery disconnected.

The DTC readout displays permanent as well as intermittent malfunctions.



Fault table, DTC readout, A/C Pushbutton control module (N22)

Display code	Possible cause
E0 01	No faults in system
E0 02	A/C pushbutton control module (N22)
E0 03	rear climate control module
E0 06	connection to Switchover valve block (Y11)
E0 07	data exchange (CAN B), short circuit
E0 08	data exchange (CAN A), short circuit
E0 09	data exchange (CAN A and B), open circuit
E0 10	repeat displaying of malfunction readout
E0 11	data exchange (CAN B), open circuit
E0 12	data exchange (CAN A), open circuit
E0 13	connection to rear climate control module
E0 14	data exchange (CAN B), open circuit (rear climate control)
E0 15	data exchange (CAN A), open circuit (rear climate control)

Fault table, DTC readout, A/C Pushbutton control module (N22) (continued)

DTC	Possible cause
E0 16	In-car temperature sensor with aspirator blower (B10/4), short circuit 1)
E0 17	In-car temperature sensor with aspirator blower (B10/4), short circuit 2)
E0 18	In-car temperature sensor with aspirator blower (B10/4), open circuit 1)
E0 19	In-car temperature sensor with aspirator blower (B10/4), open circuit 2)
E0 24	Left heater core temperature sensor (B10/2), short circuit 1)
E0 25	Left heater core temperature sensor (B10/2), short circuit 2)
E0 26	Left heater core temperature sensor (B10/2), open or short circuit 1)
E0 27	Left heater core temperature sensor (B10/2), open or short circuit 2)
E0 28	Right heater core temperature sensor (B10/3), short circuit 1)
E0 29	Right heater core temperature sensor (B10/3), short circuit 2)
E0 30	Right heater core temperature sensor (B10/3), open or short circuit 1)
E0 31	Right heater core temperature sensor (B10/3), open or short circuit 2)
E0 32	Outside temperature sensor (B10/5), short circuit 1)
E0 33	Outside temperature sensor (B10/5), short circuit 2)
E0 34	Outside temperature sensor (B10/5), open or short circuit 1)
E0 35	Outside temperature sensor (B10/5), open or short circuit 2)
E0 36	Evaporator temperature sensor (B10/6), short circuit 1)
E0 37	Evaporator temperature sensor (B10/6), short circuit 2)
E0 38	Evaporator temperature sensor (B10/6), open or short circuit 1)
E0 39	Evaporator temperature sensor (B10/6), open or short circuit 2)
E0 40	Coolant temperature sensor (B10/8), short circuit 1)
E0 41	A/C system coolant temperature sensor (B10/8), short circuit 2)
E0 42	A/C system coolant temperature sensor (B10/8), open or short circuit 1)
E0 43	A/C system coolant temperature sensor (B10/8), open or short circuit 2)
E0 44	Refrigerant pressure sensor (B12), short circuit 1)
E0 45	Refrigerant pressure sensor (B12), short circuit 2)
E0 46	Refrigerant pressure sensor (B12), open or short circuit 1)
E0 47	Refrigerant pressure sensor (B12), open or short circuit 2)

1) Permanent failure
2) Intermittent failure

Fault table, DTC readout, A/C Pushbutton control module (N22) (continued)

DTC	Possible cause
E0 48	Left temperature selector wheel, short circuit 1)
E0 49	Left temperature selector wheel, short circuit 2)
E0 50	Left temperature selector wheel, open or short circuit 1)
E0 51	Left temperature selector wheel, open or short circuit 2)
E0 52	Right temperature selector wheel, short circuit 1)
E0 53	Right temperature selector wheel, short circuit 2)
E0 54	Right temperature selector wheel, open or short circuit 1)
E0 55	Right temperature selector wheel, open or short circuit 2)
E0 72	Heater supply unit circulation pump (A31m1), short circuit 1)
E0 73	Heater supply unit circulation pump (A31m1), short circuit 2)
E0 74	Heater supply unit circulation pump (A31m1), open or short circuit 1)
E0 75	Heater supply unit circulation pump (A31m1), open or short circuit 2)
E0 76	Heater supply unit circulation pump (A31m1), over load 1)
E0 77	Heater supply unit circulation pump (A31m1), over load 2)
E0 80	Heater supply unit left duovalve (A31y1), short circuit 1)
E0 81	Heater supply unit left duovalve (A31y1), short circuit 2)
E0 82	Heater supply unit left duovalve (A31y1), open or short circuit 1)
E0 83	Heater supply unit left duovalve (A31y1), open or short circuit 2)
E0 84	Heater supply unit right duovalve (A31y2), short circuit 1)
E0 85	Heater supply unit right duovalve (A31y2), short circuit 2)
E0 86	Heater supply unit right duovalve (A31y2), open or short circuit 1)
E0 87	Heater supply unit right duovalve (A31y2), open or short circuit 2)
E0 88	A/C compressor ground activation 1)
E0 89	A/C compressor ground activation 2)
E0 90	A/C compressor ground activation, open or short circuit 1)
E0 91	A/C compressor ground activation, open or short circuit 2)
E0 96	Auxiliary fan, 1st stage activation, short circuit 1)
E0 97	Auxiliary fan, 1st stage activation, short circuit 2)
E0 98	Auxiliary fan, 1st stage activation, open or short circuit 1)
E0 99	Auxiliary fan, 1st stage activation, open or short circuit 2)

1) Permanent failure
2) Intermittent failure

Fault table, DTC readout, A/C Pushbutton control module (N22) (continued)

DTC	Possible cause
E1 00	Auxiliary fan, 2nd stage activation, short circuit 1)
E1 01	Auxiliary fan, 2nd stage activation, short circuit 2)
E1 02	Auxiliary fan, 2nd stage activation, open or short circuit 1)
E1 03	Auxiliary fan, 2nd stage activation, open or short circuit 2)
E1 04	Auxiliary fan, 3rd stage activation, short circuit 1)
E1 05	Auxiliary fan, 3rd stage activation, short circuit 2)
E1 06	Auxiliary fan, 3rd stage activation, open or short circuit 1)
E1 07	Auxiliary fan, 3rd stage activation, open or short circuit 2)
E1 08	After-run pump relay (K30), power supply, short circuit 1) 3)
E1 09	After-run pump relay (K30), power supply, short circuit 2) 3)
E1 10	After-run pump relay (K30), power supply, open or short circuit 1) 3)
E1 11	After-run pump relay (K30), power supply, open or short circuit 2) 3)
E1 12	Engine rpm increase diode matrix (V2), short circuit 1)
E1 13	Engine rpm increase diode matrix (V2), short circuit 2)
E1 14	Engine rpm increase diode matrix (V2), open or short circuit 1)
E1 15	Engine rpm increase diode matrix (V2), open or short circuit 2)
E1 16	Charcoal filter actuator (A32m2) (OPEN), short circuit 1)
E1 17	Charcoal filter actuator (A32m2) (OPEN), short circuit 2)
E1 18	Charcoal filter actuator (A32m2) (OPEN), open or short circuit 1)
E1 19	Charcoal filter actuator (A32m2) (OPEN), open or short circuit 2)
E1 20	Charcoal filter actuator (A32m2) (CLOSED), short circuit 1)
E1 21	Charcoal filter actuator (A32m2) (CLOSED), short circuit 2)
E1 22	Charcoal filter actuator (A32m2) (CLOSED), open or short circuit 1)
E1 23	Charcoal filter actuator (A32m2) (CLOSED), open or short circuit 2)

1) Permanent failure
2) Intermittent failure
3) Possible sequential failures 75, 83, 87, 99, 103

Note: The following DTC's are only applicable to the rear A/C 3).

DTC	Possible cause
E1 28	Left rear heater core temperature sensor (B10/9), short circuit 1)
E1 29	Left rear heater core temperature sensor (B10/9), short circuit 2)
E1 30	Left rear heater core temperature sensor (B10/9), open or short circuit 1)
E1 31	Left rear heater core temperature sensor (B10/9), open or short circuit 2)
E1 32	Right rear heater core temperature sensor (B10/10), short circuit 1)
E1 33	Right rear heater core temperature sensor (B10/10), short circuit 2)
E1 34	Right rear heater core temperature sensor (B10/10), open or short circuit 1)
E1 35	Right rear heater core temperature sensor (B10/10), open or short circuit 2)
E1 36	Left temperature selector wheel, short circuit 1)
E1 37	Left temperature selector wheel, short circuit 2)
E1 38	Left temperature selector wheel, open or short circuit 1)
E1 39	Left temperature selector wheel, open or short circuit 2)
E1 40	Right temperature selector wheel, short circuit 1)
E1 41	Right temperature selector wheel, short circuit 2)
E1 42	Right temperature selector wheel, open or short circuit 1)
E1 43	Right temperature selector wheel, open or short circuit 2)
E1 44	Rear evaporator temperature sensor (B10/11), short circuit 1)
E1 45	Rear evaporator temperature sensor (B10/11), short circuit 1)
E1 46	Rear evaporator temperature sensor (B10/11), open or short circuit 1)
E1 47	Rear evaporator temperature sensor (B10/11), open or short circuit 2)
E1 48	Heater supply unit circulation pump (A31/1m1), short circuit 1)
E1 49	Heater supply unit circulation pump (A31/1m1), short circuit 2)
E1 50	Heater supply unit circulation pump (A31/1m1), open or short circuit 1)
E1 51	Heater supply unit circulation pump (A31/1m1), open or short circuit 2)
E1 52	Heater supply unit circulation pump (A31/1m1), overloaded 1)
E1 53	Heater supply unit circulation pump (A31/1m1), overloaded 2)

1) Permanent failure
2) Intermittent failure
3) Test procedure will be released in future supplement

Note: The following DTC's are only applicable to the rear climate control 3).

DTC	Possible cause
E1 56	Heater supply unit left duovalve (A31/1y1), short circuit 1)
E1 57	Heater supply unit left duovalve (A31/1y1), short circuit 2)
E1 58	Heater supply unit left duovalve (A31/1y1), open or short circuit 3)
E1 59	Heater supply unit left duovalve (A31/1y1), open or short circuit 2)
E1 60	Heater supply unit right duovalve (A31/1y2), short circuit 1)
E1 61	Heater supply unit right duovalve (A31/1y2), short circuit 2)
E1 62	Heater supply unit right duovalve (A31/1y2), open or short circuit 1)
E1 63	Heater supply unit right duovalve (A31/1y2), open or short circuit 2)
E1 64	Rear refrigerant shut-off valve (Y67), short circuit 1)
E1 65	Rear refrigerant shut-off valve (Y67), short circuit 2)
E1 66	Rear refrigerant shut-off valve (Y67), open or short circuit 1)
E1 67	Rear refrigerant shut-off valve (Y67), open or short circuit 2)
E1 68	Rear tunnel flap vacuum valve (Y67/1), short circuit 1)
E1 69	Rear tunnel flap vacuum valve (Y67/1), short circuit 2)
E1 70	Rear tunnel flap vacuum valve (Y67/1), open or short circuit 1)
E1 71	Rear tunnel flap vacuum valve (Y67/1), open or short circuit 2)

1) Permanent failure
2) Intermittent failure
3) Test procedure will be released in future supplement

DTC readout (SRS)

Model Years 1988 – 1989

Model 107.048

Testing with impulse counter:

1. Connect impulse counter according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note impulse readout displayed.
   Display "1" = no malfunction stored,
   Greater than "1" = malfunction in system.

5. Press start button again for 2 to 4 seconds. If there are no further malfunctions in the system, the previously displayed number will reappear. If additional malfunctions exist, then the respective malfunction code will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Note any additional malfunctions from impulse readout.

8. Eliminate all noted malfunctions (impulse readout) according to troubleshooting chart and diagnostic tests.

Caution:
Before performing any SRS system repairs, the negative battery terminal must first be disconnected and covered before disconnecting the red, 10 pole SRS plug connector (X29/9).

Erasing malfunction memory:
After eliminating a malfunction the respective impulse readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the malfunction. Then press the start button for 6 to 8 seconds.

Note:
Each malfunction displayed must be **erased individually.**

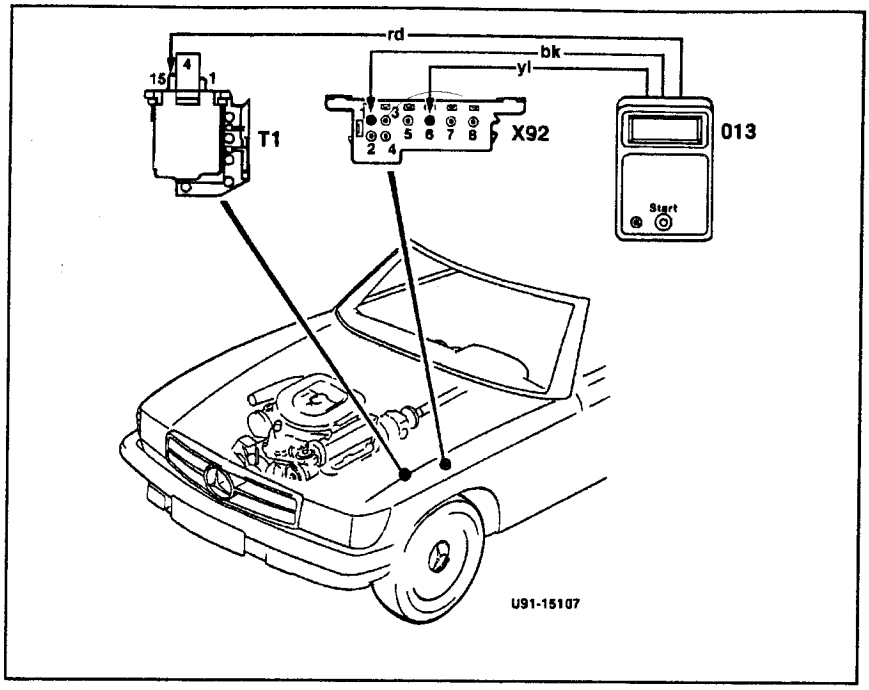
If the malfunction has been eliminated and its respective readout erased then the malfunction code will no longer be displayed when performing the impulse readout.

If the number displayed is greater than 1, then there are further malfunctions in the system.

Specific Literature Recommendation: *Model Year 1988 Introduction Manual, Models 107, 124, 126 and 201, Group 91, Checking SRS with impulse counter, and: Service Microfiche, Airbag and seat belt tensioner Model 107, 123, Group 91, Job 91-710 "B".*

Connection diagram

Model 107.048



Socket 6	SRS diagnostic readout
013	Impulse counter
T1	Ignition coil (12V supply)
X11/4	Data link connector (8-pole, impulse readout)

Malfunction table, impulse readout, SRS control module (N2/2)

Impulse display	Possible cause
1	No malfunctions in system
2	Control unit (N2/2)
3	SRS - Driver air bag
5	Driver seat belt buckle
6	Front passenger seat belt buckle
8	Voltage supply (Circuit 15R)
9	Warning lamp (A1e15) defective[1)]
10	Control unit (N2/2) was activated

1) If impulse counter button is held too long (>8 seconds), it is possible to have impulse display 9 with no warning lamp malfunction. If warning lamp illuminates, disregard impulse display 9 and erase from malfunction memory.

DTC readout (SRS)

Model Year 1988

Models 124.026 126.024
124.030 126.025
124.050 126.035
124.090 126.039
126.045

Testing with impulse counter:

1. Connect impulse counter according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note impulse readout displayed.
   Display "1" = no malfunction stored,
   Greater than "1" = malfunction in system.

5. Press start button again for 2 to 4 seconds. If there are no further malfunctions in the system, the previously displayed number will reappear. If additional malfunctions exist, then the respective malfunction code will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Note any additional malfunctions from impulse readout.

8. Eliminate all noted malfunctions (impulse readout) according to troubleshooting chart and diagnostic tests.

Caution:
Before performing any SRS system repairs, the negative battery terminal must first be disconnected and covered before disconnecting the red, 10 pole SRS plug connector (X29/9).

Erasing malfunction memory:
After eliminating a malfunction the respective impulse readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the malfunction. Then press the start button for 6 to 8 seconds.

Note:
Each malfunction displayed must be **erased individually**.

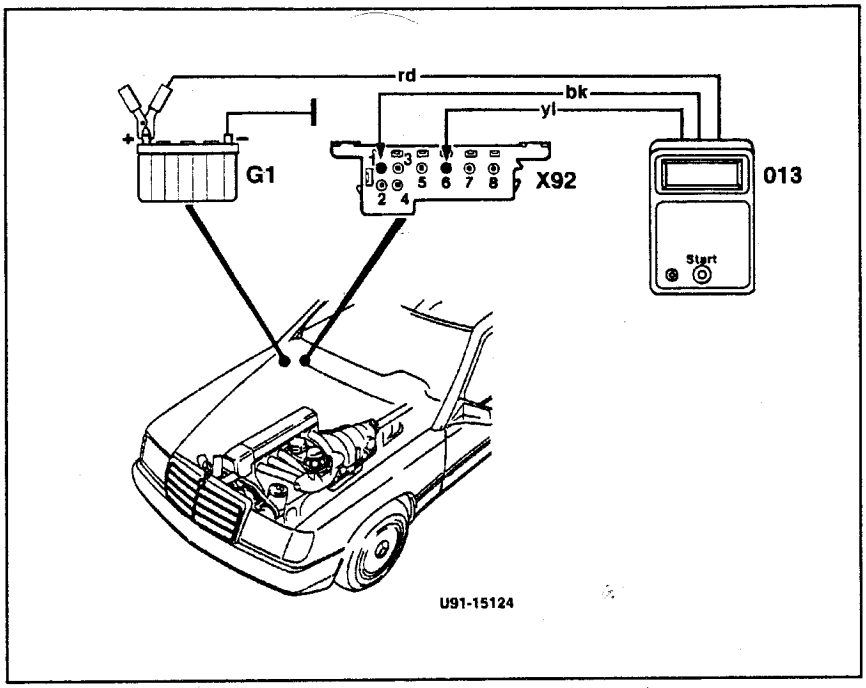
If the malfunction has been eliminated and its respective readout erased then the malfunction code will no longer be displayed when performing the impulse readout.

If the number displayed is greater than 1, then there are further malfunctions in the system.

Specific Literature Recommendation: *Model Year 1988 Introduction Manual, Models 107, 124, 126 and 201, Group 91, Checking SRS with impulse counter, and: Service Microfiche, Airbag and seat belt tensioner Models 124 or 126, Group 91, Job 91-710 "B"*

Connection diagram

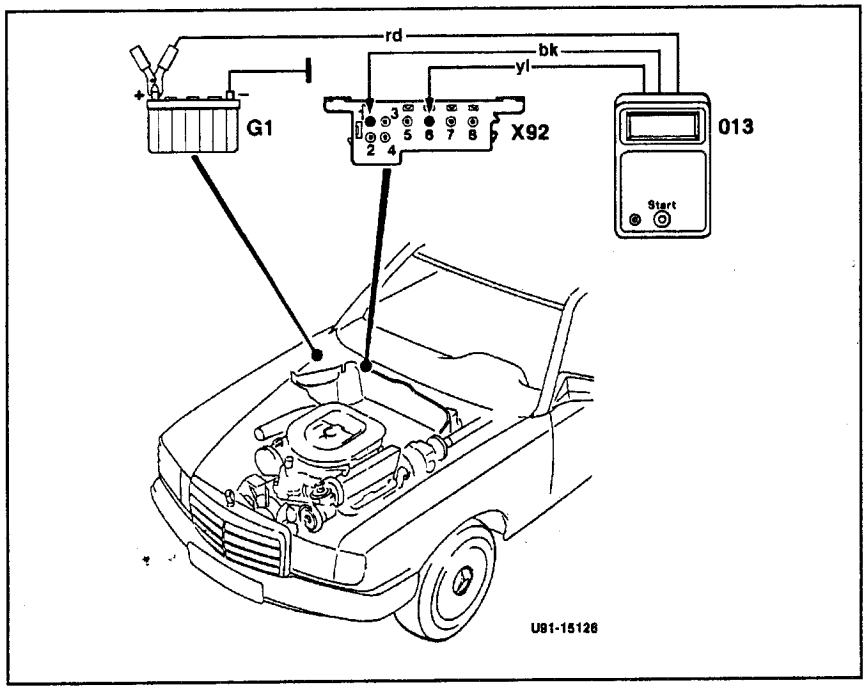
Model 124



Socket 6	SRS diagnostic readout
G1	Battery
013	Impulse counter
X92	Data link connector (8-pole, impulse readout)

Connection diagram

Model 126



Socket 6	SRS diagnostic readout
013	Impulse counter
G1	Battery
X11/4	Data link connector (8-pole, impulse readout)

Malfunction table, impulse readout, SRS control unit (N2/2)

Impulse display	Possible cause
1	No malfunctions in system
2	Control unit (N2/2)
3	Driver air bag
5	Driver seat belt buckle
6	Front passenger seat belt buckle
8	Voltage supply (Circuit 15R)
9	Warning lamp (A1e15) defective[1)]
10	Control unit (N2/2) was activated

1) If impulse counter button is held too long (>8 seconds), it is possible to have impulse display 9 with no warning lamp malfunction. If warning lamp illuminates, disregard impulse display 9 and erase from malfunction memory

DTC readout (SRS)

Model Years 1988 - 1993

Models 201.028
201.029
201.126

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
Display "1" = no faults stored,
Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Caution:
Before performing any SRS system repairs, the negative battery terminal must first be disconnected and covered before disconnecting the red, 10 pole SRS plug connector (X29/9).

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

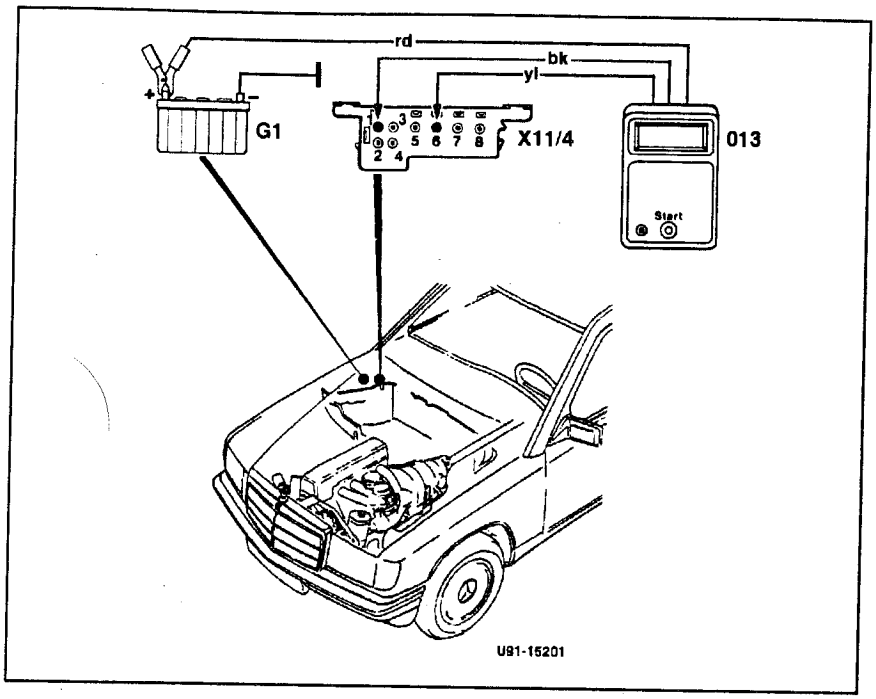
If the fault has been eliminated and its respective DTC erased then the DTC will no longer be displayed when performing the DTC readout.

If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: *Model Year 1988 Introduction Manual, Models 107, 124, 126 and 201, Group 91, Checking SRS with impulse counter, Service Microfiche, Airbag and seat belt tensioner Model 201, Group 91, Job 91-710 "B".*

Connection diagram

Model 201



Socket 6	SRS DTC readout
G1	Battery
013	Impulse counter scan tool
X11/4	Data link connector (8-pole, DTC readout)

Fault table, DTC readout, SRS control module (N2/2)

DTC display	Possible cause
1	No fault in system
2	SRS - Control module (N2/2)
3	Driver air bag
5	Driver seat belt buckle
6	Front passenger seat belt buckle
8	Voltage supply (Circuit 15R)
9	Warning lamp (A1e15) defective[1)]
10	SRS - Control module (N2/2) was activated

1) If impulse counter scan tool button is held too long (>8 seconds), it is possible to have DTC display 9 with no warning lamp fault. If warning lamp illuminates, disregard DTC display 9 and erase from DTC memory.

DTC readout (SRS)

Model Year 1989 – 1993

Models 124.026 124.051
124.032 124.052
124.034[1] 124.090
124.036[1] 124.128
124.050 124.230
124.290

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
Display "1" = no faults stored,
Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Caution:
Before performing any SRS system repairs, the negative battery terminal must first be disconnected and covered before disconnecting the red, 10 pole SRS plug connector (X29/9).

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

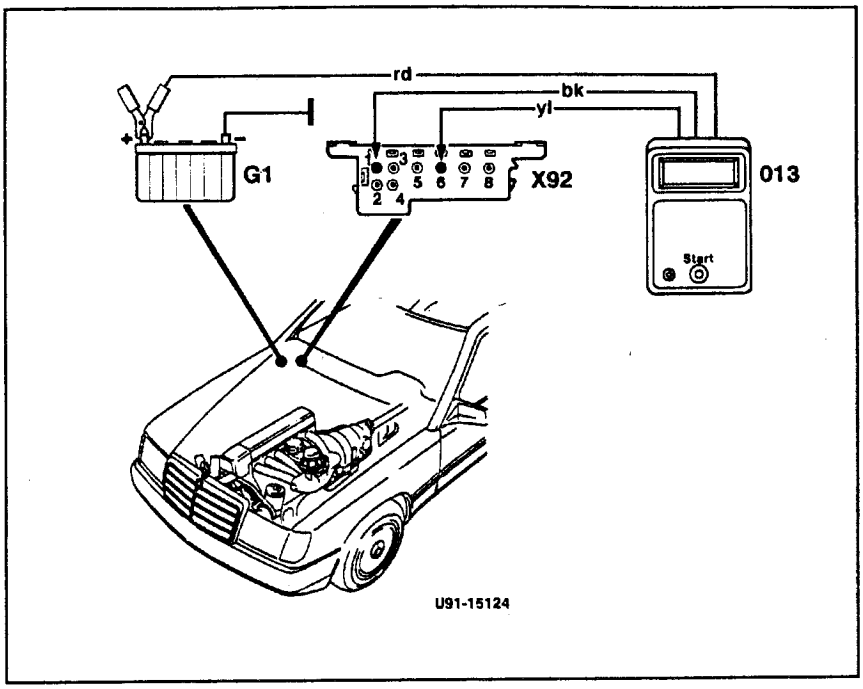
If the fault has been eliminated and its respective DTC erased then the DTC will no longer be displayed when performing the DTC readout.

If the DTC displayed is greater than 1, thenthe there are further faults in the system.

Specific Literature Recommendation: *Model Year 1989 Introduction Manual, Models 107, 124, 126, 201, Group 91, "G" Checking SRS with impulse counter, Service Microfiche, Airbag with seat belt tensioner, Model 124, Group 91, Job 91-710 "B"[1] Diagnostic Manual, Body and Accessories, Volume 3, Section 16.2, Airbag, Model 140, Diagnostics - Malfunction memory.*

Connection diagram

Model: 124[1)]

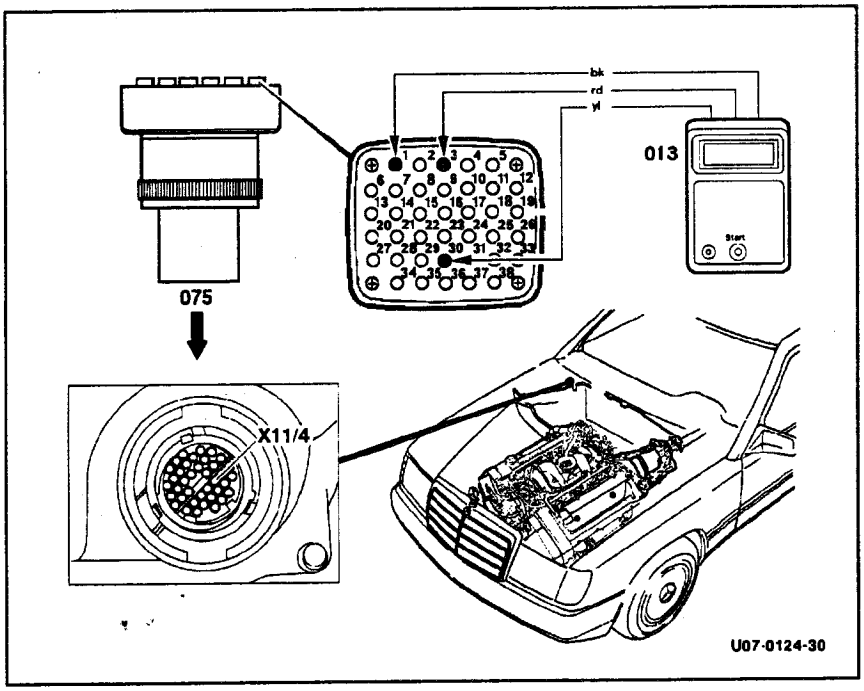


Socket 6	SRS diagnostic readout
013	Impulse counter scan tool
G1	Battery
X11/4	Data link connector (8-pole, DTC readout)

[1)] Except: 124.034/036

Connection diagram

Models: 124.036
124.034



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 30	Yellow

Fault table, DTC readout, SRS control module (N2/2)

DTC display	Possible cause
1	No fault in system
2	SRS control module (N2/2)
3	Driver air bag
4	Front passenger airbag
5	Driver seat belt buckle
6	Front passenger seat belt buckle
7	Front passenger airbag resistor
8	Voltage supply
9	Warning lamp (A1e15) defective[1)]
10	SRS control module (N2/2) was activated

1) If impulse counter scan tool button is held too long (>8 seconds), it is possible to have DTC display 9 with no warning lamp fault. If warning lamp illuminates, disregard DTC display 9 and erase from DTC memory.

DTC readout (SRS)

Model Year 1989 – 1991

Models 126.024
126.025
126.035
126.039
126.048

Testing with impulse counter:

1. Connect impulse counter according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note impulse readout displayed. Display "1" = no malfunction stored, Greater than "1" = malfunction in system.

5. Press start button again for 2 to 4 seconds. If there are no further malfunctions in the system, the previously displayed number will reappear. If additional malfunctions exist, then the respective malfunction code will be displayed.

6. Repeat step 5 until the first number displayed is repeated.

7. Note any additional malfunctions from impulse readout.

8. Eliminate all noted malfunctions (impulse readout) according to troubleshooting chart and diagnostic tests.

Caution:
Before performing any SRS system repairs, the negative battery terminal must first be disconnected and covered before disconnecting the red, 10 pole SRS plug connector (X29/9).

Erasing malfunction memory:
After eliminating a malfunction the respective impulse readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the malfunction. Then press the start button for 6 to 8 seconds.

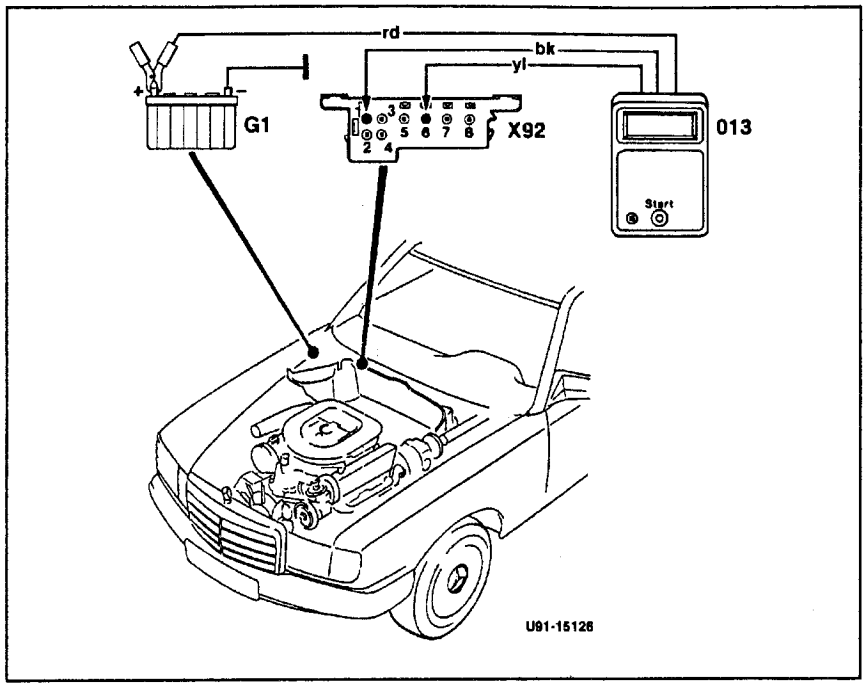
Note:
Each malfunction displayed must be **erased individually**.

If the malfunction has been eliminated and its respective readout erased then the malfunction code will no longer be displayed when performing the impulse readout.
If the number displayed is greater than 1, then there are further malfunctions in the system.

Specific Literature Recommendation: *Model Year 1989 Introduction Manual, Models 107, 124, 126, 201, Group 91, "G" Checking SRS with impulse counter, Service Microfiche, Airbag with seat belt tensioner, Model 126, Group 91, Job 91-710 "B".*

Connection diagram

Model 126



Socket 6	SRS diagnostic readout
013	Impulse counter
G1	Battery
X11/4	Data link connector (8-pole, impulse readout)

Malfunction table, impulse readout, SRS control unit (N2/2)

Impulse display	Possible cause
1	No malfunctions in system
2	SRS control unit (N2/2)
3	Driver airbag
4	Front passenger airbag
5	Driver seat belt buckle
6	Front passenger seat belt buckle
7	Front passenger airbag resistor
8	Voltage supply
9	Warning lamp (A1e15) defective[1)]
10	SRS Control unit (N2/2) was activated

1) If impulse counter button is held too long (>8 seconds), it is possible to have impulse display 9 with no warning lamp malfunction. If warning lamp illuminates, disregard impulse display 9 and erase from malfunction memory.

DTC readout (SRS)

Model Years 1990 – 1993

Models 129.061 129.067[1)]
129.066 129.076[1)]

Testing with impulse counter scan tool:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

8. Eliminate all noted faults (DTC readout) according to troubleshooting chart and diagnostic tests.

Caution:
Before performing any SRS system repairs, the negative battery terminal must first be disconnected and covered before disconnecting the red, 10 pole SRS plug connector (X29/9).

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. **Ignition: ON**

10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

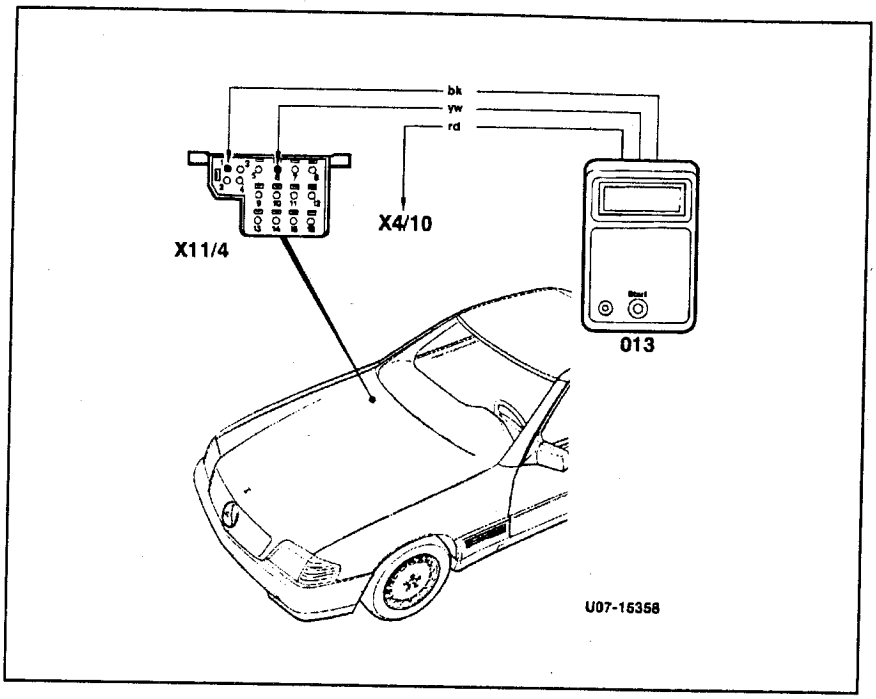
Note:
Each DTC displayed must be **erased individually.**

If the fault has been eliminated and its respective DTC erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Body and Accessories, Volume 3, Section 16.1 Airbag Model 129, Diagnostics - Malfunction memory.
[1)] Diagnostic Body and Accessories, Volume 3, Section 16.2, Airbag, Model 140, Diagnostics - Malfunction memory.

Connection diagram 1990-1993

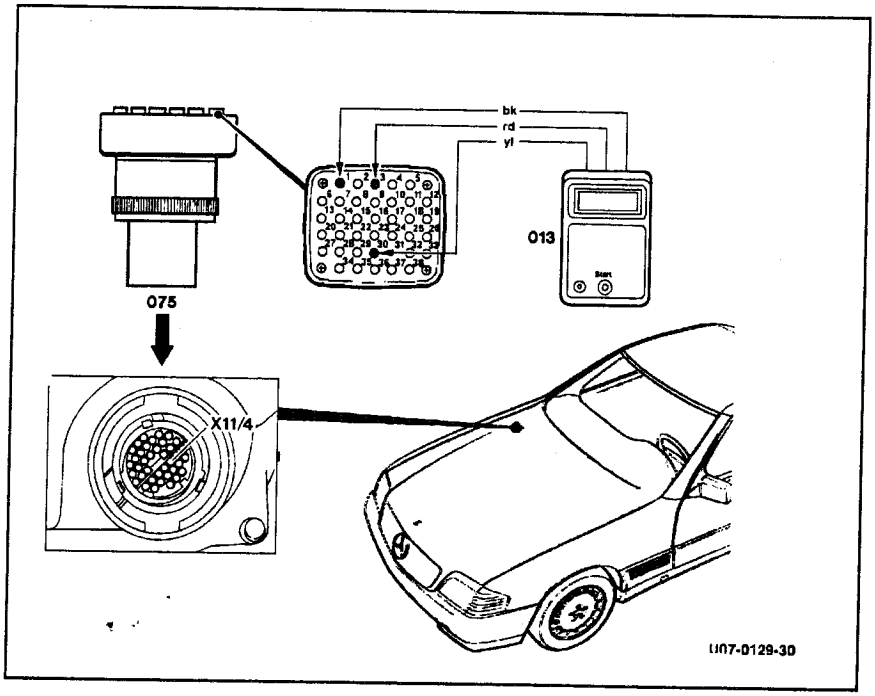
Models 129.061
129.066



Socket 6	SRS diagnostic readout
013	Impulse counter scan tool
X4/10	Terminal block
X11/4	Data link connector

Connection diagram 1993

Models 129.067
129.076



013	Impulse counter scan tool
075	Impulse counter scan tool adaptor
X11/4	Data link connector (DTC readout, 38-pole)

Note:
Connect wires of impulse counter scan tool as follows:

Socket 1	Black
Socket 3	Red
Socket 30	Yellow

Fault table, DTC readout, SRS control module (N2/2)

DTC readout	Possible cause
1	No fault in system
2	SRS control module (N2/2)
3	Driver airbag squib (R12/3)
4	Front passenger airbag squib
5	Driver seat belt buckle switch (airbag/ETR) (S68/3)
6	Front passenger seat belt buckle switch (ETR) (S68/4)
7	Front passenger airbag resistor
8	Voltage supply
9 [1)]	(With flashing SRS warning lamp, A1e15) Impulse counter scan tool button held too little time to read out the DTC memory or too long to erase DTC codes.
10 [2)]	SRS control module (N2/2)

1) If impulse counter button is held too long (>8 seconds), it is possible to have impulse display 9 with no warning lamp malfunction. If warning lamp illuminates, disregard impulse display 9 and erase from malfunction memory.

2) Impulse readout 10 indicates that the airbag output drivers in the control unit were activated. This impulse readout cannot be erased. **The control unit must be replaced.**

DTC readout (SRS)

Model Year 1992 - 1993

Models 140.032
140.042
140.043
140.051
140.057
140.070
140.076
140.134

Testing with impulse counter:

1. Connect impulse counter scan tool according to connection diagram.

Note:
LED "U-Batt" must light up. If not, refer to *Specific Literature Recommendation* listed below for detailed test.

2. **Ignition: ON**

3. Press start button for 2 to 4 seconds.

4. Read and note DTC readout displayed.
   Display "1" = no faults stored,
   Greater than "1" = fault in system.

5. Press start button again for 2 to 4 seconds. If there are no further faults in the system, the previously displayed DTC will reappear. If additional faults exist, then the respective DTC will be displayed.

6. Repeat step 5 until the first DTC displayed is repeated.

7. Note any additional faults from DTC readout.

Caution:
Before performing any SRS system repairs, the negative battery terminal must first be disconnected and covered before disconnecting the red, 10 pole SRS plug connector (X29/9).

Erasing DTC memory:
After eliminating a fault the respective DTC readout must be cleared as follows:

9. **Ignition: ON**

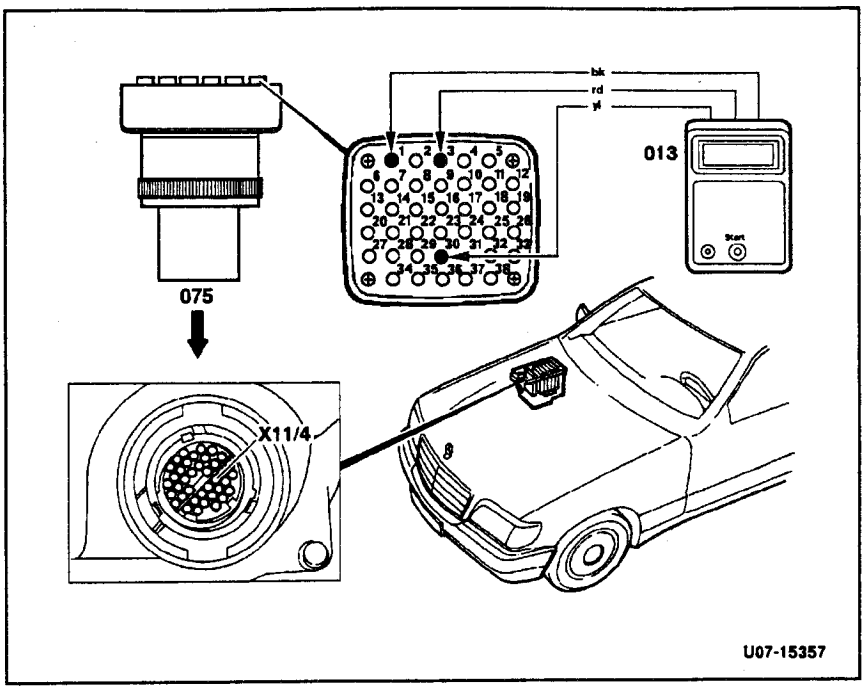
10. Press start button for 2 to 4 seconds and read out the DTC. Then press the start button for 6 to 8 seconds.

Note:
Each DTC displayed must be **erased individually**.

If the fault has been eliminated and its respective DTC erased then the DTC will no longer be displayed when performing the DTC readout.
If the DTC displayed is greater than 1, then there are further faults in the system.

Specific Literature Recommendation: Diagnostic Manual, Body and Accessories, Volume 3, Section 16.2, Airbag, Model 140, Diagnostics - Malfunction memory

Connection diagram



013 Impulse counter scan tool
075 Impulse counter scan tool adaptor
X11/4 Test connection for diagnosis (DTC readout, 38-pole)

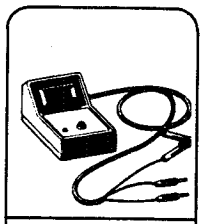
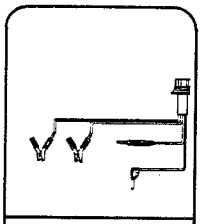
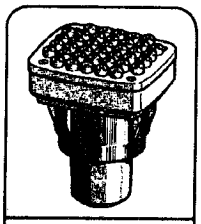
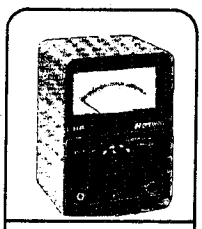
Note:
Connect wires of impulse counter scan tool as follows:

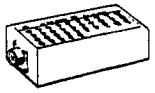
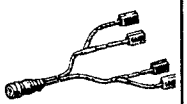
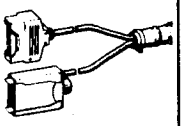
Socket 1 Black
Socket 3 Red
Socket 30 Yellow

Fault table, DTC readout, SRS control module (N2/2)

DTC readout	Possible cause
1	No fault in system
2	SRS ccontrol module (N2/2)
3	Driver airbag squib (R12/3)
4	Front passenger airbag squib (R12/8).
5	Driver seat belt buckle switch (S68/3)
6	Front passenger seat belt buckle switch (S68/4)
7	Front passenger airbag resistor
8	Voltage supply
9	SRS warning lamp (A1e15) or insufficient time to read out the DTC memory or erase DTC's
10 [1]	SRS control module (N2/2)

1) DTC readout 10 means that the airbag deployment circuits in the control module have been activated. The DTC readout cannot be erased. **The control module must be replaced.**

Part Number Designation	Set	Group	
124 589 19 21 00 **Impulse counter** for on-board diagnostic system (i.e.,CFI, A/C, SRS, etc.)	B	03	 119 589 01 14 00
903 589 01 63 00 **EDS adapter cable** For testing EDS with On-off ratio tester	B	07	 903 589 01 63 00
140 589 14 63 00 **Adapter for diagnostic test connection** for connecting impulse counter scan tool 124 589 19 21 00 to data link connector	B	54	 140 589 14 63 00
909 589 09 21 00 **Lambda tester** (On-off ratio tester)	A	07	 909 589 09 2100

Part Number Designation	Set	Group	
124 589 00 21 00 **Socket box tester** For A/C testing. Used in conjunction with test cables	B	83	 124 589 00 21 00
201 589 09 63 00 **Socket box tester cable** For socket box 124 589 00 21 00	B	83	 201 589 09 63 00
900 589 00 21 00 **LED blink code tester** for 1987 TCC system	B	07	LED blink code tester (see Figure, page 181) 900 589 00 21 00
129 589 05 63 00 **Test cable**	B	07	 129 589 05 63 00

Notes