2.3L 4-CYL
Article Text
1998 Mercedes-Benz SLK230
For 1

Monday, March 19, 2012 08:45PM

ARTICLE BEGINNING

1997-98 ENGINES
Mercedes-Benz 2.3L 4-Cylinder

1997-98: C230
1998: SLK230

*** PLEASE READ THIS FIRST ***

NOTE: For engine repair procedures not covered in this article, see ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION article in the GENERAL INFORMATION section.

ENGINE IDENTIFICATION

The engine family designation is shown on the emission control information plate (attached to radiator crossmember). The first character identifies the model year ("U" for 1997; "W" for 1998), while the fourth and fifth characters identify the engine displacement.

ENGINE IDENTIFICATION CODE

Application	(1) Engine ID	Engine Code
C230	111.974	(2)
SLK230	111.973	WMBXV02.3GSU

(1) - Use engine identification number when ordering replacement parts.
(2) - Information is not available.

ADJUSTMENTS

HYDRAULIC LASH ADJUSTMENT

NOTE: Engine is equipped with hydraulic valve lifters; valve clearance adjustment is not necessary.

REMOVAL & INSTALLATION

* PLEASE READ THIS FIRST *

NOTE: For reassembly reference, label all electrical connectors, vacuum hoses and fuel lines before removal.

FUEL PRESSURE RELEASE

Valve Guides

1) Remove intake and exhaust valve guides. Using Drift (111 589 02 15 00), drive valve guides out from combustion chamber side of cylinder head. Outside diameter of Drift (111 589 02 15 00) is .27" (7 mm).

2) Standard size 1 color coding is Grey. Repair size 1 color coding is Red. Heat cylinder head in water to 176°F (80°C). Using insertion Drift (606 589 02 15 00), install intake and exhaust valve guides. Install valve guide until drift contacts cylinder head. Insertion depth is set by drift. See Fig. 8.

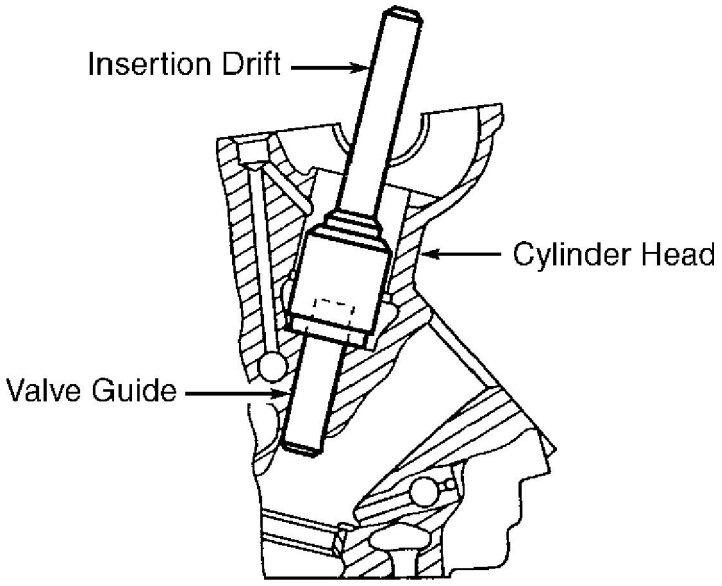


Fig. 8: Installing Valve Guide
Courtesy of Mercedes-Benz of North America.

NOTE: Removal and installation procedure for valve seat is not available.

Valve Seat

Standard valve seat angle is 45 degrees. For valve seat correction angles, see CYLINDER HEAD table under ENGINE SPECIFICATIONS. See Fig. 9.

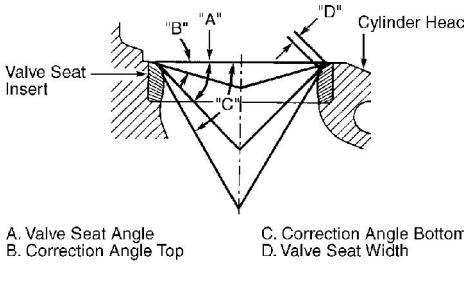


Fig. 9: Checking Valve Seat Correction Angles
Courtesy of Mercedes-Benz of North America.

* Belt adjustment.
* Engine Compression.
* Valve clearance.
* Valve Arrangement.
* Ignition coil specifications.
* High tension wire resistance.
* Spark plug type and gap.
* Firing order.
* Ignition timing.
* Fuel pump performance and injector resistance specifications
* Slow and fast idle speed and mixture specifications.
* Carbon monoxide (CO) level specifications.
* Throttle position sensor/switch specifications.

C - SPECIFICATIONS

This is a collection of quick-reference type specifications. This article is helpful when you are familiar with proper adjustment procedures and only need specifications. Included in this section are:

* Battery specifications.
* Fluid capacities.
* Replacement intervals.
* Belt adjustment.
* Engine Compression.
* Valve clearance.
* Valve Arrangement.
* Ignition coil specifications.
* High tension wire resistance.
* Spark plug type and gap.
* Firing order.
* Ignition timing.
* Fuel pump performance and injector resistance specifications
* Slow and fast idle speed and mixture specifications.
* Carbon monoxide (CO) level specifications.
* Throttle position sensor/switch specifications.

D - ADJUSTMENTS

This article contains the information that use to be included in the TUNE-UP section. Checking and adjusting valves, spark plugs, spark plug wires, base ignition timing and idle speed are found in this section. Use this article for routine maintenance. Also, if you have a driveability problem, ensure all on-vehicle adjustments are correct before proceeding with any diagnosis.

E - THEORY/OPERATION

This article covers basic theory and operation of engine performance-related systems and components. Before diagnosing vehicles or systems with which you are not completely familiar, read this

Reasons to Require Repair or Replacement

A - Part no longer performs intended purpose
B - Part does not meet a design specification (regardless of performance)
C - Part is missing

NOTE: When a repair is required, the shop must refuse partial service to the system in question, if the repair creates or continues an unsafe condition.

Reasons to Suggest Repair or Replacement

1 - Part is close to the end of its useful life (just above discard specifications, or weak; failure likely to occur soon, etc.)
2 - To address a customer need, convenience, or request (to stiffen ride, enhance performance, eliminate noise, etc.)
3 - To comply with maintenance recommended by the vehicle's Original Equipment Manufacturer (OEM)
4 - Technician's recommendation based on substantial and informed experience

NOTE: Suggested services are always optional. When presenting suggested repairs to the customer, you must present the facts, allowing the customer to draw their own conclusions and make an informed decision about how to proceed.

HEATING, VENTILATION, AND AIR CONDITIONING

SERVICE PROCEDURES REQUIRED AND SUGGESTED FOR PROPER VEHICLE OPERATION

CAUTION: Before working on any air conditioning system, be sure to review current local, state, federal, and EPA regulations regarding charging, recycling, and disposal of refrigerant.

ACCUMULATORS

ACCUMULATOR INSPECTION

Condition	Code	Procedure
Attaching hardware broken	A	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.

*** A/C-HEATER SYSTEM UNIFORM INSPECTION**

required.

Bracket corroded, affecting performance .. A .. Require repair or replacement.
Bracket corroded, not affecting performance .. 2 .. Suggest repair or replacement.
Bracket cracked, affecting performance ..... A .. Require repair or replacement.
Bracket cracked, not affecting performance .. 1 .. Suggest repair or replacement.
Bracket holes elongated, affecting performance .. A .. Require repair or replacement.
Bracket holes elongated, not affecting performance .... No service suggested or required.
Bracket loose, affecting performance ..... A .. Require repair or replacement.
Bracket loose, not affecting performance .. 1 .. Suggest repair or replacement.
Bracket missing ..... C ..... Require replacement.
Corroded, affecting structural integrity ... A ..... Require replacement.
Corroded, not affecting structural integrity ... . No service suggested or required.
Fitting type incorrect (such as compression fitting) ..... B ..... Require replacement.
Flange leaking ..... A .. Require repair or replacement.
Leaking ..... A .. Require repair or replacement.
Restricted internally ... A .. Require repair or replacement.
Threads damaged ..... A .. Require repair or replacement.
Threads stripped (threads missing) ..... A ..... Require replacement.

CONNECTORS

See WIRING HARNESSES AND CONNECTORS.

CONTROL CABLES

CONTROL CABLE INSPECTION

Condition	Code	Procedure
Attaching hardware broken	A	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.

broken ..... A ... Require repair or replacement of hardware.
Attaching hardware missing ..... C ..... Require replacement of hardware.
Attaching hardware not functioning ..... A .. Require repair or replacement of hardware.
Connection leaking ..... A .. Require repair or replacement.
Corroded ..... 1 .. Suggest repair or replacement.
Disconnected ..... A .. Require repair or replacement.
Fins damaged, affecting performance ..... A .. Require repair or replacement.
Fins damaged, not affecting performance .. .. No service suggested or required.
Internal restrictions, affecting performance .. A .. Require repair or replacement.
Leaking ..... A .. Require repair or replacement.
Missing ..... C ..... Require replacement.

HEATER HOSES

HEATER HOSE INSPECTION

Condition	Code	Procedure
Application incorrect	B	Require replacement.
Connected incorrectly	A	Require repair.
Corroded, not reusable	1	Suggest replacement.
Cracked	A	Require repair or replacement.
Hard (brittle)	1	Suggest repair or replacement.
Inner fabric (webbing) damaged	A	Require replacement.
Insufficient clamping force, allowing hose to leak	A	Require repair or replacement.
Leaking	A	Require repair or replacement.
Maintenance intervals	3	Suggest replacement.
Melted	1	Suggest repair or replacement.
Missing	C	Require replacement.
Outer covering damaged	1	Suggest replacement.
Outer covering damaged to the extent that the inner fabric is visible	A	Require replacement.
Protective sleeves damaged	2	Suggest replacement of sleeves.
Protective sleeves missing	2	Suggest replacement of sleeves.
Restricted, affecting performance	A	Require repair or replacement.

VACUUM RESERVOIR INSPECTION

Condition	Code	Procedure
Attaching hardware broken	A ...	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware not functioning	A ...	Require repair or replacement of hardware.
Check valve leaking internally	A	Require replacement.
Leaking	A ..	Require repair or replacement.
Missing	C	Require replacement.
Restricted	A ..	Require repair or replacement.

VACUUM TUBES

See VACUUM HOSES AND TUBES.

VALVES IN RECEIVER (VIRS)

VALVE IN RECEIVER (VIR) INSPECTION

Condition	Code	Procedure
Application incorrect ...	B	Require replacement.
Attaching hardware broken	A ...	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware not functioning	A ...	Require repair or replacement of hardware.
Bracket bent, affecting performance	A ..	Require repair or replacement.
Bracket bent, not affecting performance ..	.. ..	No service suggested or required.
Bracket broken, affecting performance	A	Require replacement.
Bracket broken, not affecting performance ..	.. ..	No service suggested or required.
Bracket corroded, affecting performance ...	A ..	Require repair or replacement.

Disconnect A/C push-button control unit connectors. Connect socket box to A/C push-button control unit connector. Connect DVOM negative lead to socket box terminal No. 12 and positive lead to terminal No. 18. Start engine and allow to idle. DVOM should indicate greater than 1.5 volts. If reading is not as specified, check serial interface circuit. See WIRING DIAGRAMS.

DTC B1454: FRESH/RECIRCULATION SWITCHOVER VALVE

Disconnect A/C push-button control unit connectors. Connect socket box to A/C push-button control unit connector (harness side only). Connect DVOM negative lead to socket box terminal No. 16 and positive lead to terminal No. 21. DVOM should indicate 40-55 ohms. If reading is not as specified, check switchover valve block circuit. See WIRING DIAGRAMS.

DTC B1459: SERIAL INTERFACE (K2)

Disconnect A/C push-button control unit connectors. Connect socket box to A/C push-button control unit connector. See Fig. 3. Connect DVOM negative lead to socket box terminal No. 12 and positive lead to terminal No. 5. Start engine and allow to idle. DVOM should indicate greater than 0.2 volts. If reading is not as specified, check serial interface circuit. See WIRING DIAGRAMS.

TESTING

WARNING: To avoid injury from Accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in AIR BAG SYSTEM SAFETY article in GENERAL SERVICING.

FUNCTIONAL TEST

Preparation For Functional Test

1) Check condition of fuses F1-33, F1-36, F1-37, and F1-M4. See WIRING DIAGRAMS.
2) Put shift lever in "P" and engage parking brake. Run engine until it reaches normal operating temperature.
3) Ensure ambient (outside) temperature is greater than 58°F (15°C).
4) Ensure EC button indicator is NOT on.
5) Manually open center and side air outlets.
6) Ensure recirculation button is not depressed.
7) Set blower speed knob to position No. 3.

Functional Test

1) To check operation in defrost mode, set temperature selector wheel to White range. Set mode control knob to the 12 o'clock position (pointing straight up). Ensure EC button indicator is NOT on. If operation is correct, air will vent from defrost and center outlets.

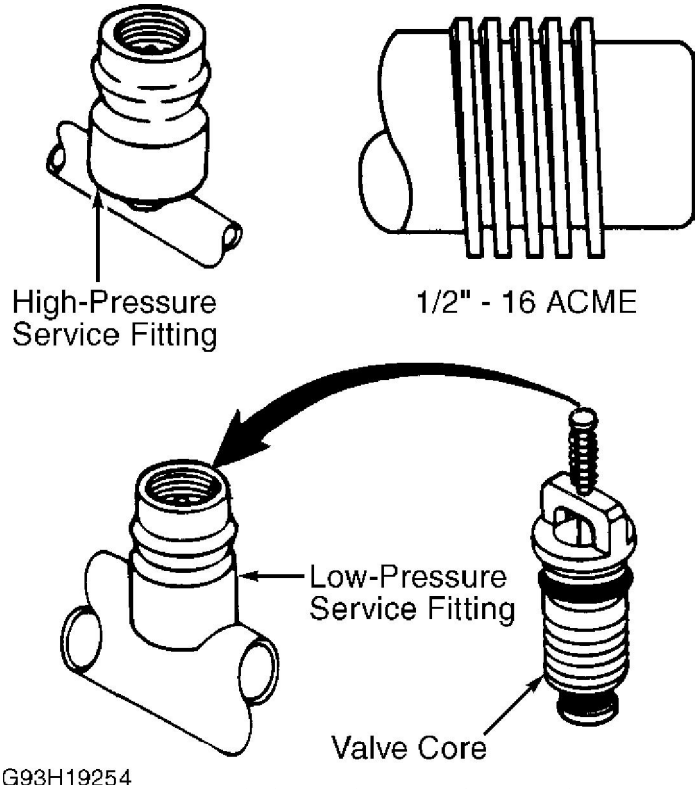


Fig. 1: Identifying R-134a Fittings & Quick-Connect Service Couplings
Courtesy of Audi of America, Inc.

Underhood A/C Specification Labels

Most R-134a based systems will be identified through the use of underhood labels, or with R-134a refrigerant clearly printed on labels. See Figs. 2 and 3. Labels may be located on underside of hood, compressor, firewall and/or strut supports. Before servicing an A/C system, always determine which refrigerant is being used.

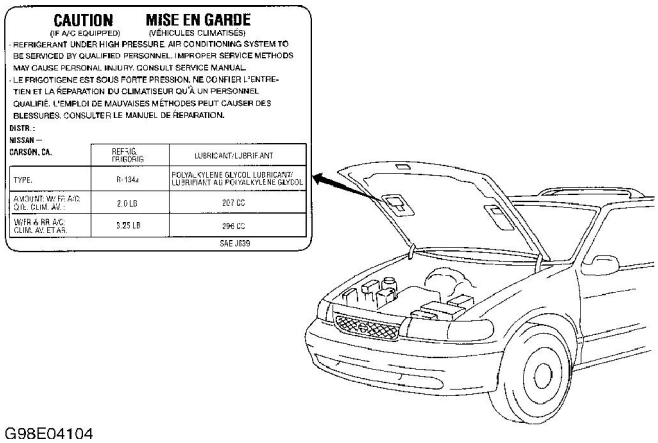


Fig. 2: Underhood A/C Specification Label (Typical)
Courtesy of Nissan Motor Co., U.S.A.

DISABLING & ACTIVATING AIR BAG SYSTEM.

* Before straightening any damage to body, or before performing electrical arc-welding, disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.
* Always wear safety glasses and gloves when handling a deployed air bag module. Air bag module may contain sodium hydroxide deposits which are irritating to the skin.
* DO NOT repair any portion of SRS wiring harness.
* Always handle air bag module with trim cover away from your body. Always place air bag module on workbench with trim cover up, away from loose objects.
* DO NOT expose any SRS component to temperatures in excess of 212°F (100°C).
* DO NOT expose any SRS component to cleaning agents such as solvents, gasoline, lye, etc.
* DO NOT connect Hand-Held Tester (6511 0001 99) to Data Link Connector (DLC) with ignition on. Damage to HHT may result.
* DO NOT connect HHT (6511 0001 99) to vehicle if a battery charger is connected to vehicle battery. Damage to HHT may result.

DISABLING & ACTIVATING AIR BAG SYSTEM

Disabling System

Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Turn ignition off. Disconnect and shield negative battery cable. Remove passenger foot mat. Remove passenger footrest. Disconnect SRS system connector (X29/9) located at passenger footwell area. See Fig. 2. System is now disabled.

Activating System

Turn ignition off. Reconnect SRS system connector. Reconnect negative battery cable. System is now activated. Perform SYSTEM OPERATION CHECK.

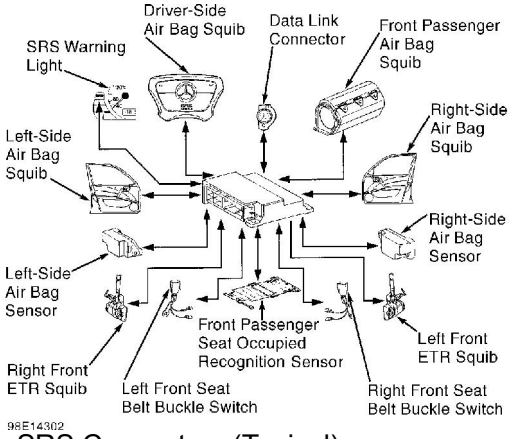


Fig. 2: Locating SRS Connectors (Typical)
Courtesy of Mercedes-Benz of North America

AIR BAG RESTRAINT SYSTEM Article Text (p. 3

are self-explanatory.

Using SRS & ETR Diagnosis Chart

For reading and understanding fault code diagnosis chart, use the following example: Read test step 3.0 (first column), HHT fault Code 002, 004 (second column). See Fig. 7. Read TEST SCOPE/HHT ACTUAL VALUE NO./TEXT column (third column). Driver-side air bag squib connector R12/3 is being tested. HHT will identify if problem is with too much resistance or not enough resistance in driver-side air bag squib circuit. Read TEST CONDITION column (fifth column). Test circuit with HHT connected to DLC, with ignition in position "2". Read NOMINAL VALUE/HHT DISPLAY column (sixth column). HHT will display a check or an "F". If HHT displays a check, circuit is okay. If HHT displays an "F", go to step 3.1.

Read TEST CONNECTION (NOT FOR HHT) column (forth column). Driver-Side air bag squib connector R12/3, terminals No. 1 and 2 are identified. Read TEST CONDITION column. Test circuit with HHT connected to DLC and ignition key removed. Remove driver-side air bag module. Disconnect driver-side air bag module squib connector R12/3. Connect Resistance Substitution Unit (124 589 09 63) to driver-side air bag module squib connector (harness side). Set resistance substitution unit to 2 ohms. Turn ignition key to position "2". Read NOMINAL VALUE/HHT DISPLAY column. If HHT displays a check, replace driver-side air bag module. If HHT displays an "F", go to step 3.2.

Read TEST CONNECTION (NOT FOR HHT) column. Horn/air bag clockspring connector A45x1, terminals No. 1 and 2 are identified. Read TEST CONDITION column. Test circuit with HHT connected to DLC. Remove ignition key. Connect Resistance Substitution Unit (124 589 09 63 00) to horn/air bag clockspring connector A45x1. Set resistance substitution unit to 2 ohms. Read NOMINAL VALUE/HHT DISPLAY column. If HHT displays a check, check horn/air bag clockspring for continuity. Replace horn/air bag clockspring as necessary. If HHT displays an "F", go to step 3.4.

NOTE: Some testing is identified by model number. To identify models by model number see MODEL IDENTIFICATION table.

MODEL IDENTIFICATION

Model Number	Model
129	SL Class
140	S Class
170	SLK 230
202	C Class
208	CLK 320
210	E Class

COMPONENT IDENTIFICATION

Component	Manufacturer's Designation

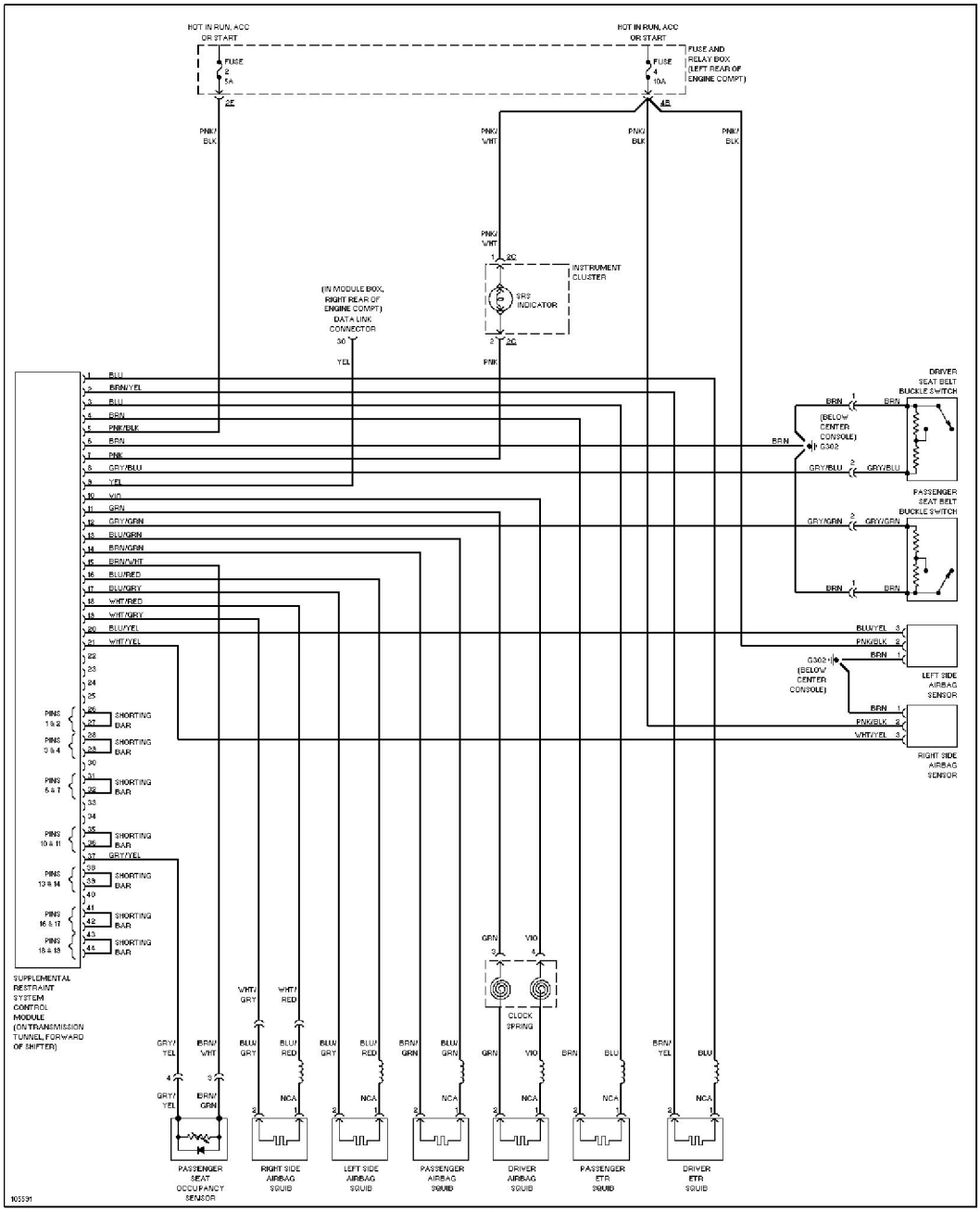
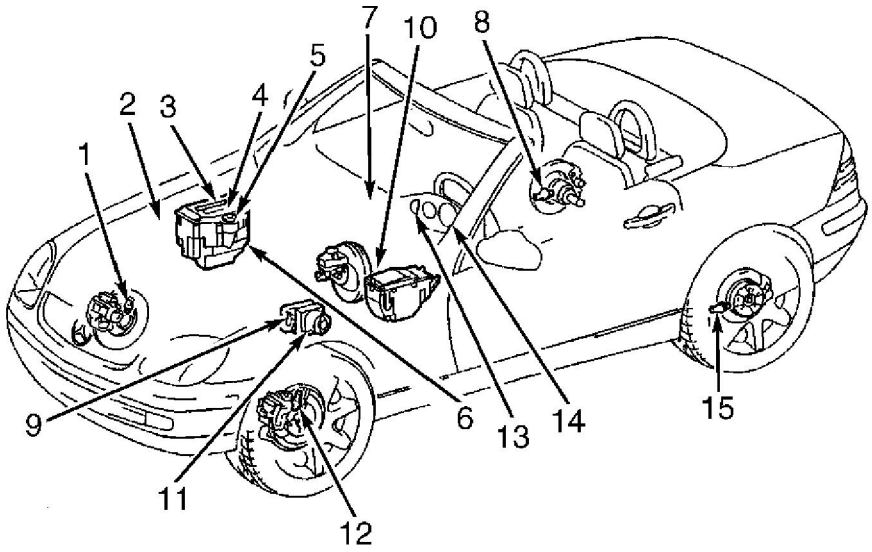


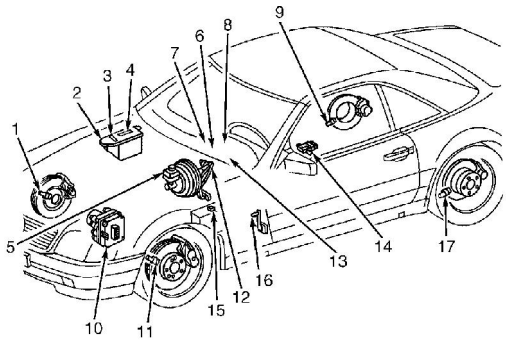
Fig. 30: Air Bag System Wiring Diagram (C230, C280 & CLK320)



1. Right Front Axle VSS Sensor
2. Crash Separation Relay
3. ASR/SPS Or ETS/SPS Control Module
4. Relay Module (ME-SFI Base Function)
5. Data Link Connector
6. Control Module Box
7. ASR Off Switch
8. Right Rear Axle VSS Sensor
9. Cycling Module High Pressure/Return Pump
10. Brakelight Switch
11. ASR/ETS/ESP Hydraulic Uni
12. Left Front Axle VSS Sensor
13. ABS, ASR Or ETS MIL
14. ASR Or ETS Warning Light
15. Left Rear Axle VSS Sensor

98J07505

Fig. 7: Identifying & Locating ASR V/ETS Components (SLK230)
Courtesy of Mercedes-Benz of North America.



1. Right Front Axle VSS Sensor
2. Data Link Connector
3. Base Module
4. ASR/SPS Or ETS/SPS Control Module
5. Master Brake Cylinder Switchover Valve
6. ABS MIL
7. ASR Off Switch
8. ASR Or ETS Warning Light
9. Right Rear Axle VSS Sensor
10. ASR/ETS/ESP Hydraulic Unit
11. Left Front Axle VSS Sensor
12. Brakelight Switch
13. BAS/ASR, ASR Or ETS MIL
14. ABS Lateral Acceleration Sensor
15. High Pressure/Return Pump Relay
16. Parking Brake Switch
17. Left Rear Axle VSS Sensor

98D07507

Fig. 8: Identifying & Locating ASR V/ETS Components (SL320 & SL500)
Courtesy of Mercedes-Benz of North America.

OPERATION

also cleared from other modules.

Using Adapter Harness (965 589 00 40 00), connect Hand-Held Tester (965 589 00 01 00) to data link connector. Clear codes from combination control module using manufacturer's instructions.

SYSTEM TESTS

* PLEASE READ FIRST *

NOTE: Identify terminal numbers by wire color. See WIRING DIAGRAMS.

NOTE: Ensure fuses in engine compartment fuse box is not blown. Also ensure fuses in rear fuse box (in trunk) are not blown.

NOTE: The general term, traction control module will be used for all traction control modules (ABS, ETS & ASR V). Use fig. 12, 13 or 14 to install breakout box and adaptor and identify traction control module connectors.

TEST 1: TRACTION SYSTEMS CONTROL MODULE VOLTAGE SUPPLY (CIRCUIT 87)

1) Using Adapter (140 589 45 63 00), connect Breakout Box (129 589 00 21 00) to traction control module. See Fig. 12, 13 or 14. Turn ignition switch to RUN position. Check voltage at terminals No. 10 and 57 at breakout box. If battery voltage exists, go to next step. If battery voltage does not exist, go to step 3).

2) Check voltage at terminals No. 10 and 81 at breakout box. if battery voltage exists, system is okay at this time. If battery voltage does not exist, go to step 4).

3) Check voltage between ground and terminal No. 10 at breakout box. If battery voltage exists, system is okay at this time. If battery voltage does not exist, check the following:

* C230 and C280 models without control module box, check overvoltage protection relay module fuse. If overvoltage protection relay module fuse is okay, replace overvoltage protection relay module.
* SLK230, E300D, E320, E420 and E430 models, check relay module fuse. If relay module fuse is okay, replace relay module.
* C230 and C280 models with control module box, check passenger side fuse and relay module box. Replace as necessary.
* SL320, SL500 models, check base module fuse. If base module fuse is okay, replace base module.

4) Turn ignition switch to OFF position. Disconnect traction control module, leaving wiring harness connected to breakout box. Check resistance between appropriate ground and terminal No. 57 at breakout box and between appropriate ground and terminal No. 81 at breakout box. Resistance should be less than one ohm. If resistance is

from grommet in wheelhousing.

2) Remove windshield washer reservoir before removing right speed sensor (if necessary). Loosen partition in engine compartment near coaxial cable. Lift partition slightly and pull out cable.

3) Speed sensors have different protective tubes at left and right, identified in holder by "L" or "R". Before installing, ensure NO metal is on sensor magnetic edges. Coat sensor and steering knuckle bore with Molykote Long-Term 2 lubricant.

4) Remove cover plate protective tube. Remove and discard speed sensor attaching bolt. Pull speed sensor from steering knuckle bore.

Installation

1) Check wheel hub rotor for damage. On C230 and C280, replace centering sleeve. On all models, light lightly grease bore in steering knuckle, replace sensor "O" ring, and mount unit on steering knuckle without damaging "O" ring. DO NOT force. Tighten NEW self-locking speed sensor attaching bolt to specification. See TORQUE SPECIFICATIONS.

2) Attach cover plate protective tube. Clip cable to holder. Pull through grommet into engine compartment. Replace "O" ring. Connect coaxial cable. Mount front wheel.

REAR AXLE SPEED SENSOR

Removal (Differential)

Remove rear seat and backrest. With ignition off, remove cable at connector. See Fig. 15. Remove cable-to-sensor clips. Pull cable through grommets in frame floor and axle carrier. Remove speed sensor attaching bolt and discard. Remove sensor from rear axle housing.

Installation

To install, reverse removal procedure. Ensure magnetic tip is clean and free of any foreign material. Replace "O" ring on sensor. DO NOT damage "O" ring. Insert sensor into rear axle housing. Using NEW self-locking bolt, attach sensor to rear axle housing and tighten to specification. See TORQUE SPECIFICATIONS.

Removal & Installation (Wheel Carrier)

Remove self-locking bolts and discard. Remove rear axle speed sensor. Disconnect electrical connector. To install, reverse removal procedure. Check wheel hub rotor for damage. Ensure speed sensor magnetic tip is clean and free of foreign material. Lightly lubricate bore in wheel carrier. Install NEW bolts and tighten to specification. See TORQUE SPECIFICATIONS.

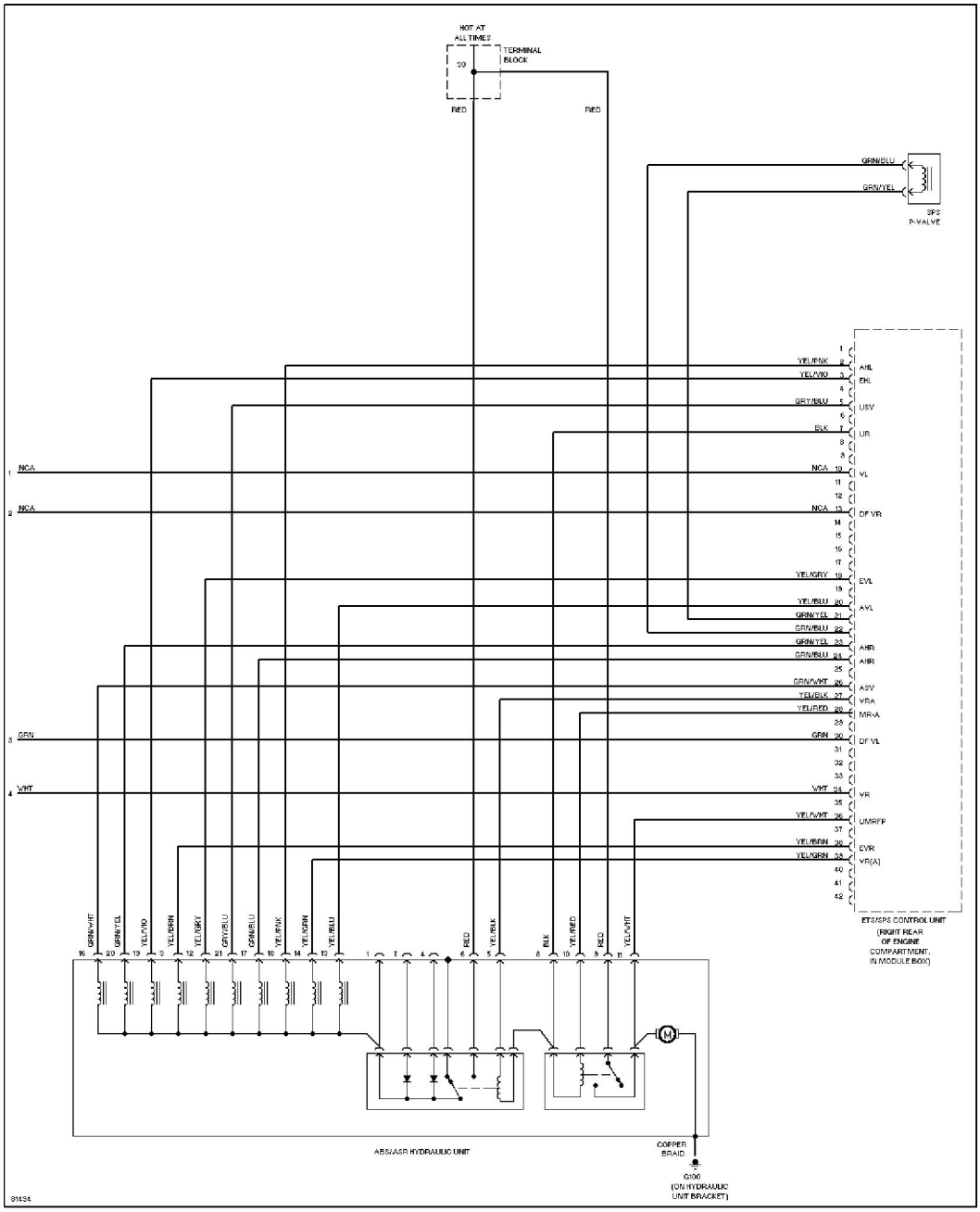


Fig. 27: Anti-Lock Brake System Wiring Diagram (1996 S320 - With Traction Control - 2 Of 2)

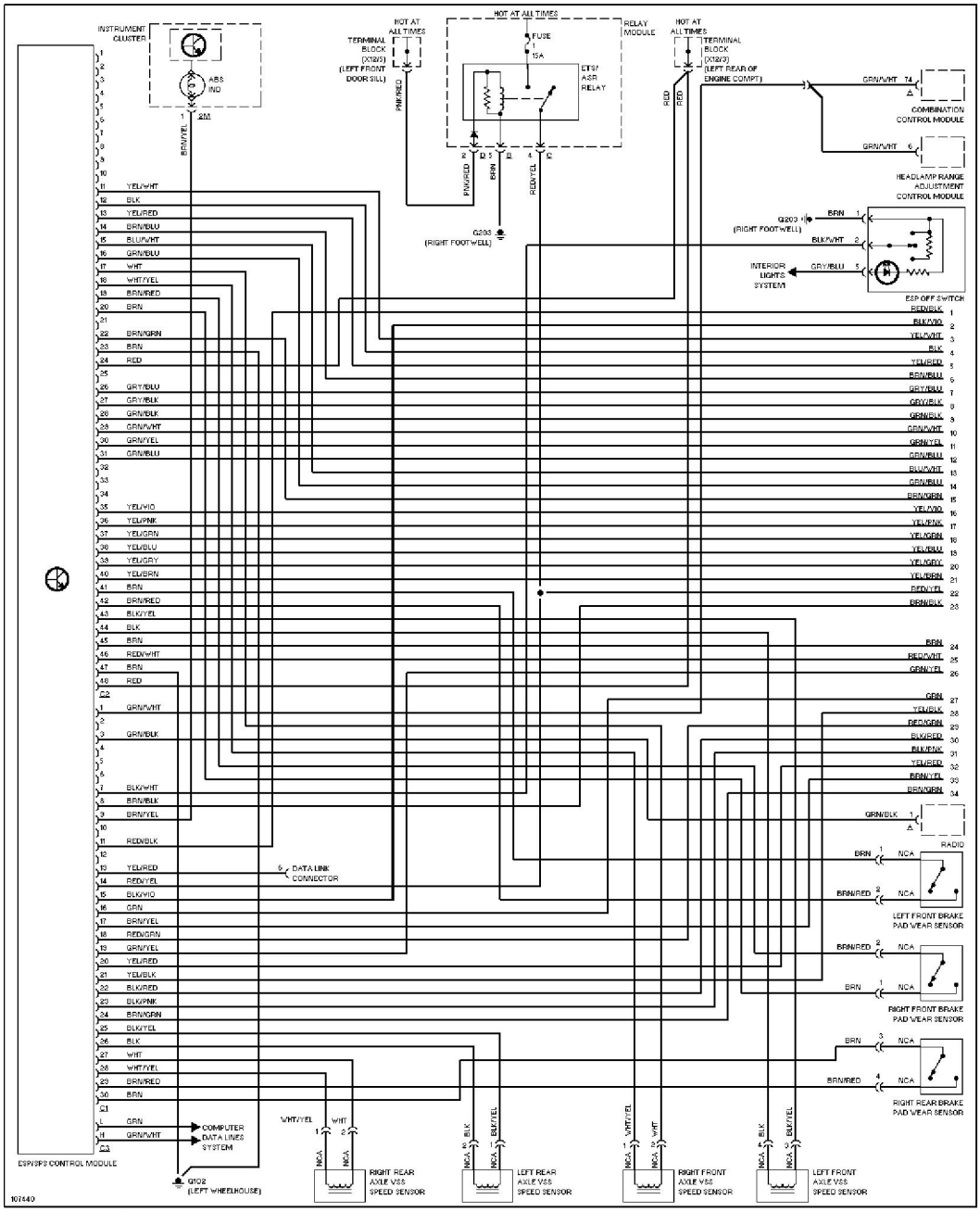


Fig. 40: Anti-Lock Brake System Wiring Diagram (1997 E420 - With Electronic Stability Program - 1 Of 2)

ANTI-LOCK BRAKE SYSTEM Article Text (p. 59)1998 Mercedes-Benz SLK230For 1

performing system tests, connect Harness Adapters (129 589 04 63 00 or 202 589 06 63 00) and Breakout Box (124 589 00 21 00) to anti-theft control module and connector.

TEST 1: PNEUMATIC SYSTEM EQUIPMENT CONTROL MODULE

Connect harness adapter and breakout box to Pneumatic System Equipment (PSE) control module. Measure voltage between terminals No. 3 and 4, and between terminals No. 2 and 3 at breakout box. Battery voltage should exist. If battery voltage is as specified, go to next step. If battery voltage does not exist, check wiring. See WIRING DIAGRAMS.

TEST 2: LEFT FRONT DOOR SWITCH

Connect breakout box to Pneumatic System Equipment (PSE) control module. Measure voltage between breakout box terminal No. 60 and PSE control module connector No. 2 terminal No. 4. Close left door. Voltage should be less than one volt with door closed. Open door. Battery voltage should exist with door open. If voltage is as specified, go to next step. If voltage is not as specified, check wiring. See WIRING DIAGRAMS. If wiring is okay, replace left front door switch.

TEST 3: RIGHT FRONT DOOR SWITCH

Connect breakout box to Pneumatic System Equipment (PSE) control module. Measure voltage between breakout box terminal No. 60 and PSE control module connector No. 2 terminal No. 4. Close left door. Voltage should be less than one volt with door closed. Open door. Battery voltage should exist with door open. If voltage is as specified, go to next step. If voltage is not as specified, check wiring. See WIRING DIAGRAMS. If wiring is okay, replace right front door switch.

TEST 4: TRUNK LID SWITCH

NOTE: Trunk lid switch may also be referred to as Trunk Lock/Trunk Illumination Rotary Latch Selector Switch.

Connect breakout box to Pneumatic System Equipment (PSE) control module. Measure voltage between breakout box terminal No. 59 and PSE control module connector No. 2 terminal No. 4. Close trunk lid. Voltage should be less than one volt with trunk closed. Open trunk lid. Battery voltage should exist with trunk open. If voltage is as specified, go to next step. If voltage is not as specified, check wiring. See WIRING DIAGRAMS. If wiring is okay, replace trunk lid switch.

TEST 5: ENGINE HOOD SWITCH

Connect breakout box to Pneumatic System Equipment (PSE)

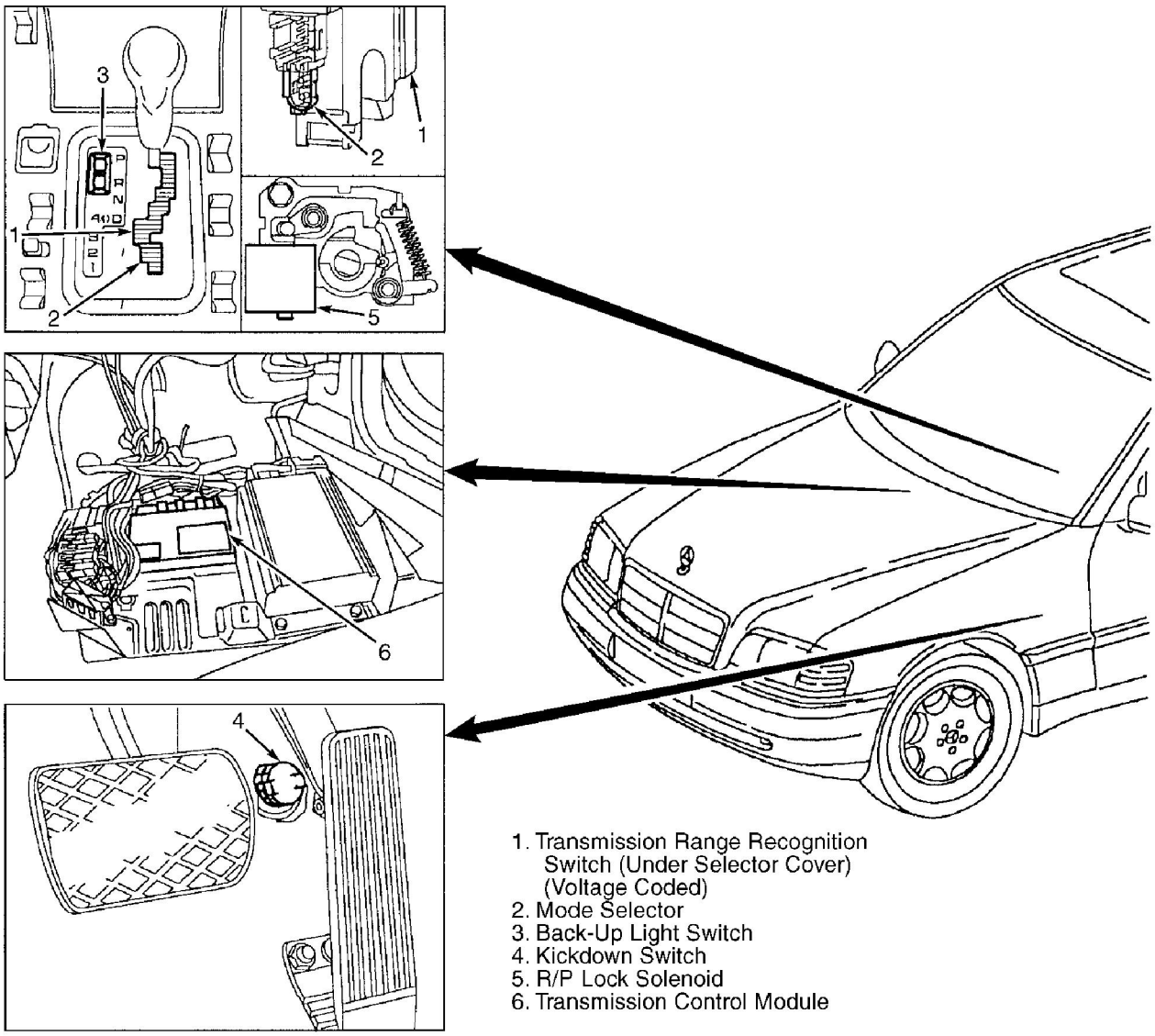


Fig. 5: Component Locations (1997-98 C230 & C280)
Courtesy of mercedes of north america

No. 38 and transmission harness connector terminal No. 6. Continuity should be present. If continuity is present, go to next step. If continuity is not present, repair open in affected circuit.

4) Measure resistance between transmission harness connector terminals No. 2 and No. 6. Resistance should be 4-8 ohms. If resistance is not within specification, go to next step. If resistance is within specification, repeat step 1).

5) Remove transmission oil pan and filter. Remove modulator pressure regulating solenoid valve. See Fig. 10 for solenoid location. Measure resistance between modulator pressure regulating solenoid terminals. Resistance should be 4-8 ohms. If resistance is not within specification, replace modulator pressure regulating solenoid. If resistance is within specification, replace Electronic Control Module (ECM).

TEST: F

1) Check shift pressure regulating solenoid circuit. Turn ignition switch to OFF position. Disconnect Transmission Control Module (TCM) 14-pin connector. Measure resistance between terminals No. 37 and No. 38. Resistance should be 4-8 ohms. If resistance is not within specification, go to next step. If resistance is within specification, substitute TCM with known good unit and retest.

2) Disconnect transmission 13-pin connector. Measure resistance between TCM harness connector terminal No. 37 and transmission harness connector terminal No. 10. Continuity should be present. If continuity is present, go to next step. If continuity is not present, repair open in affected circuit.

3) Measure resistance between TCM harness connector terminal No. 38 and transmission harness connector terminal No. 6. Continuity should be present. If continuity is present, go to next step. If continuity is not present, repair open in affected circuit.

4) Measure resistance between transmission harness connector terminals No. 10 and No. 6. Resistance should be 4-8 ohms. If resistance is not within specification, go to next step. If resistance is within specification, repeat step 1).

5) Remove transmission oil pan and filter. Remove shift pressure regulating solenoid valve. See Fig. 10 for solenoid location. Measure resistance between shift pressure regulating solenoid terminals. Resistance should be 4-8 ohms. If resistance is not within specification, replace shift pressure regulating solenoid. If resistance is within specification, replace Electronic Control Module (ECM).

TEST: G

1) Check R/P lock solenoid circuit. Disconnect R/P lock solenoid 2-pin connector located on shift selector lever assembly and inspect for damage. Measure resistance between R/P lock solenoid connector terminals No. 1 and No. 2. Resistance should be 20-35 ohms. If resistance is within specification, go to next step. If resistance is not within specification, replace R/P lock solenoid.

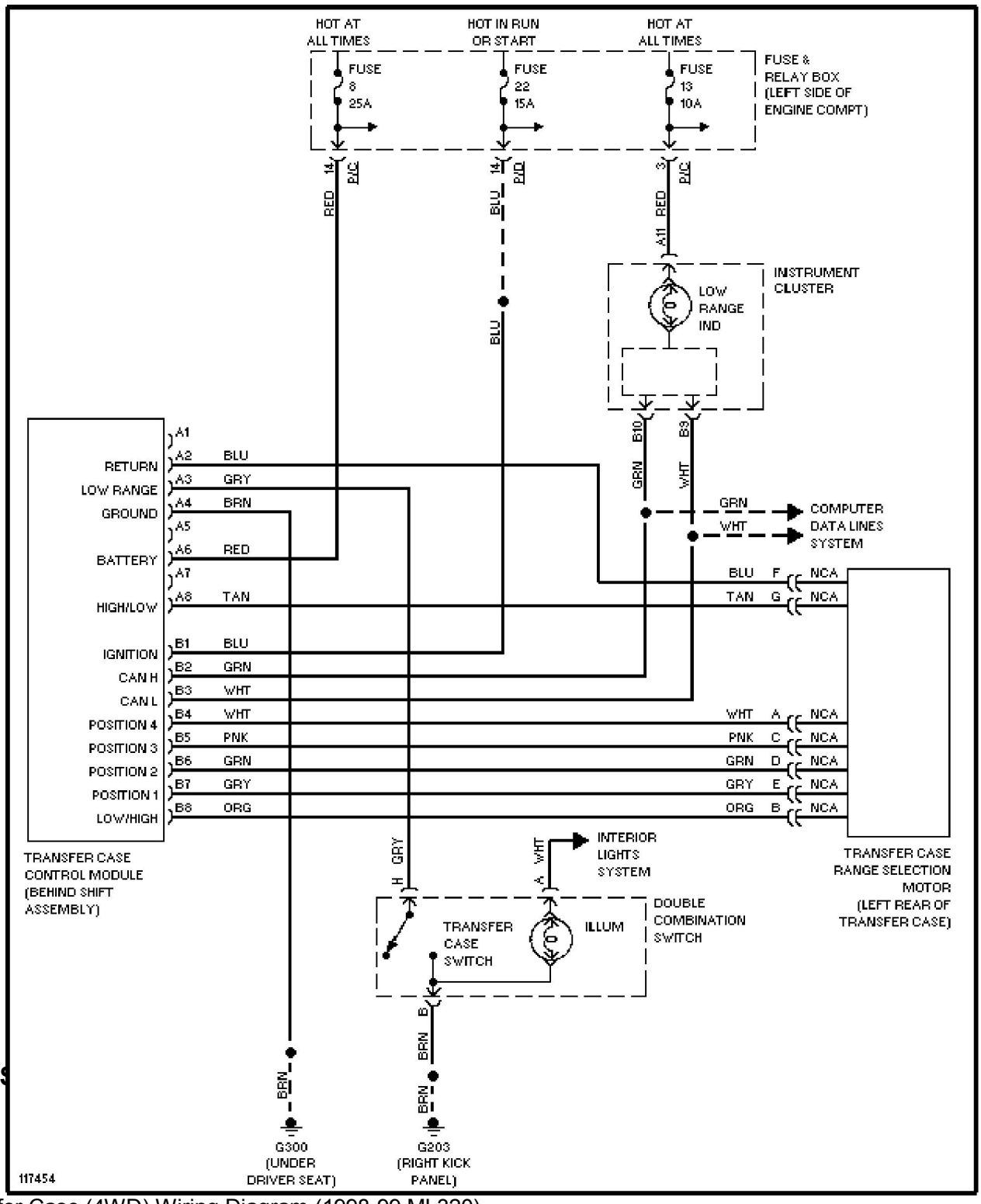


Fig. 21: Transfer Case (4WD) Wiring Diagram (1998-99 ML320)
Courtesy of Mercedes-Benz of North America.

END OF ARTICLE

Reasons to Require Repair or Replacement
A - Part no longer performs intended purpose
B - Part does not meet a design specification (regardless of performance)
C - Part is missing

NOTE: When a repair is required, the shop must refuse partial service to the system in question, if the repair creates or continues an unsafe condition.

Reasons to Suggest Repair or Replacement
1 - Part is close to the end of its useful life (just above discard specifications, or weak; failure likely to occur soon, etc.)
2 - To address a customer need, convenience, or request (to stiffen ride, enhance performance, eliminate noise, etc.)
3 - To comply with maintenance recommended by the vehicle's Original Equipment Manufacturer (OEM)
4 - Technician's recommendation based on substantial and informed experience

NOTE: Suggested services are always optional. When presenting suggested repairs to the customer, you must present the facts, allowing the customer to draw their own conclusions and make an informed decision about how to proceed.

BRAKES

SERVICE PROCEDURES REQUIRED & SUGGESTED FOR PROPER VEHICLE OPERATION

Some states may have specifications that differ from OEM. Check your local/state regulations. Where state or local laws are stricter, they take precedence over these guidelines.

ACCELEROMETERS (G SENSOR OR LATERAL)

ACCELEROMETER INSPECTION

Condition	Code	Procedure
Broken	A	Require replacement.
Connector loose	A	Require repair or replacement.
Loose	B	Require repair or replacement.
Missing	C	Require replacement.
Out of position	B	Require re-positioning to vehicle manufacturer's specifications.
Output signal incorrect	B	Require replacement.

performance ..... A ..... (2) Require repair or replacement.
Terminal burned, not affecting performance .. 2 .. Suggest repair or replacement.
Terminal corroded, affecting performance .. A .. Require repair or replacement.
Terminal corroded, not affecting performance .. 2 .. Suggest repair or replacement.
Terminal loose, affecting performance ..... B .. Require repair or replacement.
Terminal loose, not affecting performance .. 1 .. Suggest repair or replacement.
Threads damaged ..... A .. Require repair or replacement.
Threads stripped (threads missing) ..... A ..... Require replacement.
Wire lead conductors exposed ..... B .. Require repair or replacement.
Wire lead corroded ..... A .. Require repair or replacement.
Wire lead open ..... A .. Require repair or replacement.
Wire lead shorted ..... A .. Require repair or replacement.

(1) - Refer to manufacturer's diagnostic trouble code procedure and require repair or replacement of affected component(s).
(2) - Determine cause and correct prior to repair or replacement of part.
(3) - Inoperative includes intermittent operation or out of OEM specification. Some components may be serviceable. Check for accepted cleaning procedure.

FLUID

See BRAKE FLUID.

FLUID LEVEL SENSOR SWITCHES

See SWITCHES.

FOUR WHEEL DRIVE SWITCHES

See SWITCHES.

FRICTION MATERIAL

NOTE: Original Equipment Manufacturer (OEM) specifications designate replacement at different thicknesses.

CAUTION: It is required that friction material be matched in axle sets for consistent braking characteristics.

FRICTION MATERIAL INSPECTION

(4) - Inoperative includes intermittent operation or out of OEM specification. Some components may be serviceable; check for accepted cleaning procedure.

STEEL BRAKE LINES

STEEL BRAKE LINE INSPECTION

Condition	Code	Procedure
Attaching hardware broken	A	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware not functioning	A	Require repair or replacement of hardware.
Corroded, affecting structural integrity	A	Require replacement.
Fitting incorrect (for example, compression fitting)	B	Require replacement.
Flare type incorrect	B	Require repair or replacement.
Leaking	A	Require repair or replacement.
Line material incorrect (copper, etc.)	B	Require replacement.
Restricted	A	Require replacement.
Routed incorrectly	B	Require routing correction.
Rust-pitted	1	Suggest replacement.
Threads damaged	A	Require repair or replacement.
Threads stripped (threads missing)	A	Require replacement.

STOPLIGHT SWITCHES

See BRAKE STOPLIGHT SWITCHES.

SWITCHES

NOTE: Copied from Electrical UIGs & added "float saturated" from old fluid level sensor switches.

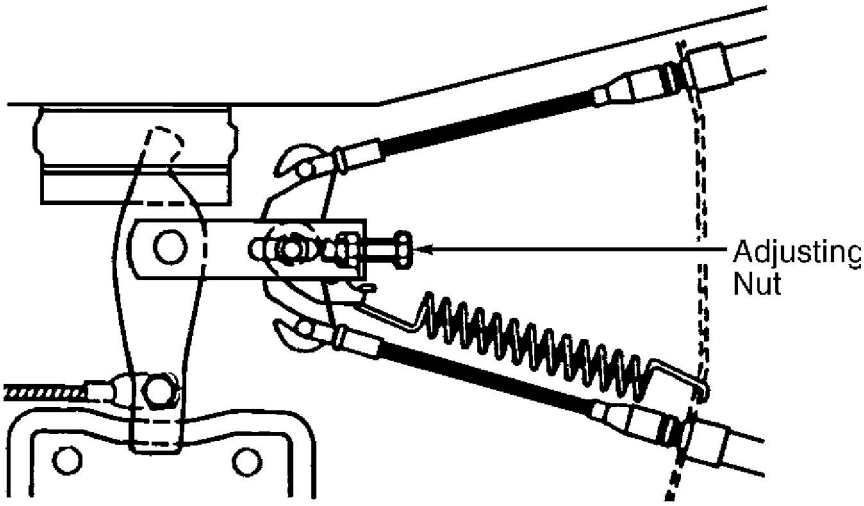
STEEL BRAKE LINE INSPECTION

Condition	Code	Procedure
Attaching hardware broken	A	Require repair or replacement

Procedure A

1) On SL500, remove exhaust head shield to access parking brake cable adjusting nut. On all models, loosen parking brake adjusting nut at parking brake pedal (SL500) or lever (SLK230). Loosen adjusting nut until parking brake cables sag. See Fig. 1. Raise and support vehicle. Remove rear wheels. Align wheel bolt hole with parking brake adjuster. Using a screwdriver, turn adjusting wheel up on right rear side of vehicle. Turn adjusting wheel down on left side of vehicle. Turn both adjusting wheels until rear brake disc can't be rotated (tight).

2) Turn adjusting wheels 5-6 teeth (down on right) and (up on left) until rear brake disc can be turned freely. Turn adjusting wheel an equal number of turns at each wheel. Tighten parking adjusting nut at parking brake pedal (SL500) or lever (SLK230) until parking brake cables no longer sag. Forcefully operate parking brake several times. Adjust parking brake adjusting nut until parking brake starts to apply moving pedal (SL500) or lever (SLK230) one notch.



G97J08779

Fig. 1: Identifying Parking Brake Cable Adjusting Nut
Courtesy of Mercedes-Benz of North America.

Procedure B

1) Preload automatic cable length adjuster. See PRELOADING AUTOMATIC PARKING BRAKE CABLE ADJUSTER. Raise and support vehicle. Remove rear wheels. Align wheel bolt hole with parking brake adjuster. Using a screwdriver, turn adjusting wheel up on right rear side of vehicle. Turn adjusting wheel down on left side of vehicle. Turn both adjusting wheels until rear brake disc can't be rotated (tight).

2) On C-Class, CLK and E-Class models, turn adjusting wheels 12-15 teeth (down on right) and (up on left) until rear brake disc can be turned freely. On S-Class models, turn adjusting wheels 5-6 teeth (down on right) and (up on left) until rear brake disc can be turned freely.

Rear
C220, C230 & C280 ..... .35 (9.0)
CL500 ..... .9 (23.0)
CLK320 & CLK430 ..... .4 (10.0)
E300 ..... .35 (9.0)
E320 & E430 ..... .39 (10.0)
C43 & E55 ..... .87 (22.0)
ML320 ..... .5 (13.0)
ML430 & ML55 ..... .55 (14.0)
S320, S420 & S500 ..... .87 (22.0)
S430 & S500 ..... .87 (22.0)
SL500 & SLK230 ..... .35 (9.0)

(1) - Specifications for models not listed are not available.
(2) - 2000 model year.

END OF ARTICLE

under SYSTEM TESTS.
* Voltage supply to circuit 31. Perform TEST 8: CIRCUIT 31 under SYSTEM TESTS.
* Check wiper switch portion of combination switch. Perform TEST 9: WIPER SWITCH under SYSTEM TESTS.
* Check combination control module wiper switch intermittent circuit. Perform TEST 11: WIPER SWITCH INTERMITTENT CIRCUIT under SYSTEM TESTS.
* Check wiper motor circuit 31. Perform TEST 14: WIPER MOTOR CIRCUIT 31 under SYSTEM TESTS.

WINDSHIELD WIPER WASH FUNCTION INOPERATIVE

If windshield wiper wash function is inoperative, check wiper switch wash circuit. Perform TEST 10: WIPER SWITCH WASH CIRCUIT under SYSTEM TESTS.

WINDSHIELD WIPER INTERVAL WIPE FUNCTION INOPERATIVE

If windshield wiper interval wipe function is inoperative, check the following as possible cause and repair as necessary:

* Check wiper switch portion of combination switch. Perform TEST 9: WIPER SWITCH under SYSTEM TESTS.
* Check combination control module wiper switch intermittent circuit. Perform TEST 11: WIPER SWITCH INTERMITTENT CIRCUIT under SYSTEM TESTS.

WINDSHIELD WIPER LOW SPEED FUNCTION INOPERATIVE

If windshield wiper low speed function is inoperative, check the following as possible cause and repair as necessary:

* Check wiper switch portion of combination switch. Perform TEST 9: WIPER SWITCH under SYSTEM TESTS.
* Check combination control module wiper switch low speed circuit. Perform TEST 12: WIPER SWITCH LOW SPEED CIRCUIT under SYSTEM TESTS.

WINDSHIELD WIPER HIGH SPEED FUNCTION INOPERATIVE

If windshield wiper high speed function is inoperative, check the following as possible cause and repair as necessary:

* Check wiper switch portion of combination switch. Perform TEST 9: WIPER SWITCH under SYSTEM TESTS.
* Check combination control module wiper switch high speed circuit. Perform TEST 13: WIPER SWITCH HIGH SPEED CIRCUIT under SYSTEM TESTS.

WINDSHIELD WIPERS WILL NOT TURN OFF (IGNITION ON)

COMPRESSED NATURAL GAS SAFETY PRECAUTIONS
Article Text

1998 Mercedes-Benz SLK230
For 1

Monday, March 19, 2012 08:50PM

ARTICLE BEGINNING

GENERAL INFORMATION
Compressed Natural Gas Safety Precautions

All Models With CNG Engines

WARNING: The following safety precautions are to be strictly followed whenever working around vehicles powered by Compressed Natural Gas. Failure to follow these procedures could result in injury.

Compressed Natural Gas Safety Precautions

* DO NOT smoke or create sparks while servicing Compressed Natural Gas (CNG) fuel systems.
* Natural gas vapors at atmospheric pressure are lighter than air and will rise and disperse in open areas. In enclosed areas, natural gas vapor may collect and form a combustible mixture. If the vehicle is routinely placed in an enclosed area or if the facility is heated by open flame heaters, the area should be provided with adequate ventilation and/or a natural gas detection system. For long term storage, the manual shut-off valve and individual cylinder valves should be closed.
* Natural gas contains an odorant additive. If persistent natural gas odor is detected, a leak is indicated and should be located and repaired immediately.
* DO NOT return any vehicle to service that has been in an accident which may have damaged or dislocated any fuel system component until a thorough inspection and leak test has been made.
* DO NOT attempt to weld CNG fuel cylinders or any other part of fuel system.
* Any fuel system component, including the cylinders, that have been subjected to fire may not be returned to service due to reduced pressure capability.
* DO NOT use paint oven to cure paint repairs.
* DO NOT paint or undercoat any CNG fuel system component.
* Chrysler CNG fuel systems have a maximum capacity of 3000 psi compensated to a temperature of 70°F (21°C). Vehicles SHOULD ONLY be refueled using equipment incorporating temperature compensation to 70°F (21°C). Exceeding fuel system capacity will result in fuel system damage or personal injury.
* The fuel pressure regulator is under cooling system pressure. DO NOT attempt to remove hoses from regulator without relieving cooling system pressure.
* DO NOT park vehicle near a source of excessive heat or open flame.
* DO NOT attempt to force open fuel filler valve; a sudden release of natural gas will occur, possibly causing an explosion.

Designation				Engine 111.920/921/941/944/945/961/974/975 in model 202, 111.940/960 in model 124, 111.942/947/970 in model 210, 111.944/945/975 in model 208, 111.946 in model 170	Engine 111.943/958/973/983 in model 170
Cooling system	Total capacity	without AC	liter	8.0	8.5
		with AC	liter	8.5	9.0
	Capacity of anticorrosion/ antifreeze agent down to -37 °C	without AC	liter	4.0	4.25
		with AC	liter	4.25	4.5
	Capacity of anticorrosion/ antifreeze agent down to -45 °C	without AC	liter	4.5	4.7
		with AC	liter	4.75	5.0

G00040214

Fig. 4: Engine 111 In Models 202, 124, 210, 208 & 170 - Specifications
Courtesy of Mercedes-Benz of North America.

Models 203 & 163

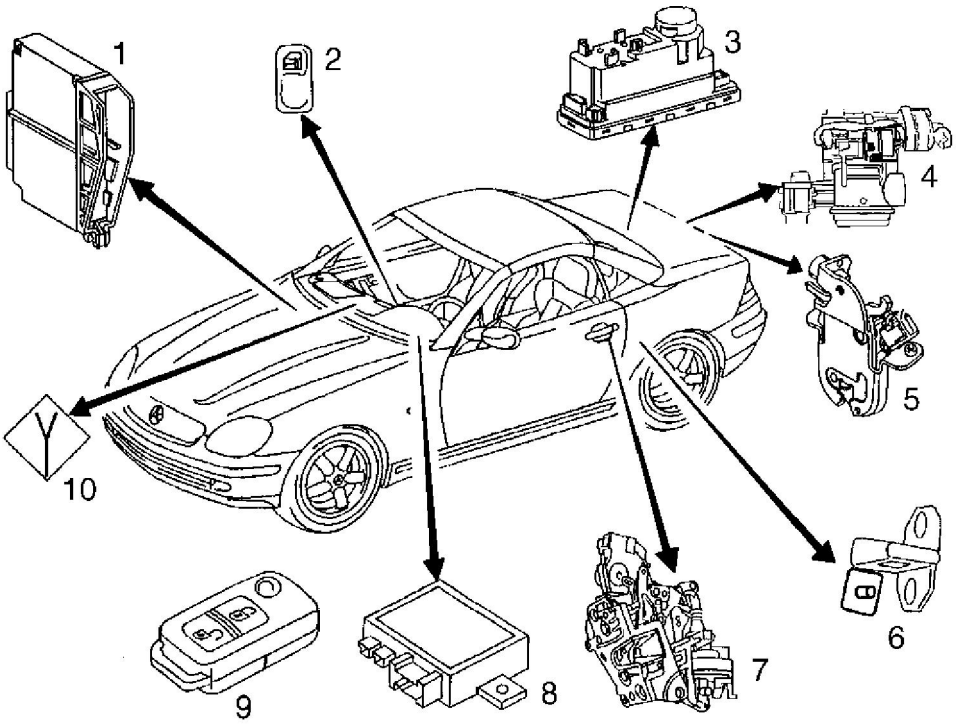
Designation				Engine 111.951/955/981 in model 203	Engine 111.977 in model 163
Cooling system	Total capacity	without AC	liter	≈8.5	≈10.5
		with AC	liter	≈8.5	≈10.5
	Capacity of anticorrosion/ antifreeze agent down to -37 °C	without AC	liter	≈4.25	≈5.25
		with AC	liter	≈4.25	≈5.25
	Capacity of anticorrosion/ antifreeze agent down to -45 °C	without AC	liter	≈4.75	≈5.75
		with AC	liter	≈4.75	≈5.75

G00040215

Fig. 5: Engine 111 In Models 203 & 163 - Specifications
Courtesy of Mercedes-Benz of North America.

ENGINE SERIES 112 & 113

Models 170, 202, 208, & 210



1. Combination Control Module
2. Interior Central Locking Switch
3. PSE Control Module
4. Trunk Lid Lock Actuator
5. Trunk Lid Microswitch
6. Front Door Pin Switch
7. Front Door Lock Actuator
8. Drive Activation System (DAS) Control Module
9. Remote Transmitter
10. Antenna

98G03978

Fig. 3: Location Pneumatic System Electrical Components (SLK230)
Courtesy of Mercedes-Benz of North America

TROUBLE SHOOTING

PNEUMATIC SYSTEM EQUIPMENT (PSE)

NOTE: Ensure fuses for PSE control module are not blown, voltage supply to all related control module is okay and CAN data lines are not damaged. See WIRING DIAGRAMS.

Using Adapter Harness (965 589 00 40 00), connect Hand Held Tester (965 589 00 01 00) to data link connector. Unlock vehicle using remote transmitter. Turn ignition switch to RUN position. Enter function tests mode. Enter function test that is to be performed. After entering appropriate function test, perform appropriate test condition, observe tester value. If tester value is not as specified, go to appropriate system tests. See FUNCTION TEST (PNEUMATIC SYSTEM EQUIPMENT CONTROL MODULE) table. See SYSTEM TESTS.

FUNCTION TEST (PNEUMATIC SYSTEM EQUIPMENT CONTROL MODULE) TABLE

* Perform remote trunk release vacuum TEST 1: REMOTE TRUNK RELEASE SYSTEM PRESSURE TEST. See REMOTE TRUNK RELEASE under VACUUM SYSTEM TESTS.
* Perform pneumatic system vacuum TEST 12: REMOTE TRUNK RELEASE PRESSURE SUPPLY. See PNEUMATIC SYSTEM EQUIPMENT under VACUUM SYSTEM TESTS.
* Repair mechanical fault.

RETRACTABLE TRUNK LID GRIP

Trunk Lid Grip Extension Inoperative

Open trunk lid. If retractable trunk lid grip does not extend and pump in PSE control module does not run, check the following as possible cause and repair as necessary:

* Perform retractable trunk lid grip TEST 1: TRUNK LID ROTARY TUMBLER SWITCH. See RETRACTABLE TRUNK LID GRIP under SYSTEM TESTS.
* Perform pneumatic system equipment TEST 1: PSE CONTROL MODULE POWER SUPPLY. See PNEUMATIC SYSTEM EQUIPMENT under SYSTEM TESTS.

If retractable trunk lid grip does not extend and pump in PSE control module runs, check the following as possible cause and repair as necessary:

* Perform retractable trunk lid grip vacuum TEST 1: RETRACTABLE TRUNK LID GRIP SYSTEM PRESSURE CHECK. See RETRACTABLE TRUNK LID GRIP under VACUUM SYSTEM TESTS.
* Perform pneumatic system vacuum TEST 5: RETRACTABLE TRUNK LID GRIP PRESSURE SUPPLY. See PNEUMATIC SYSTEM EQUIPMENT under VACUUM SYSTEM TESTS.

Trunk Lid Grip Retraction Inoperative

Close trunk lid. If retractable trunk lid grip does not retract and pump in PSE control module does not run, check the following as possible cause and repair as necessary:

* Perform retractable trunk lid grip TEST 1: TRUNK LID ROTARY TUMBLER SWITCH. See RETRACTABLE TRUNK LID GRIP under SYSTEM TESTS.
* Perform pneumatic system equipment TEST 1: PSE CONTROL MODULE POWER SUPPLY. See PNEUMATIC SYSTEM EQUIPMENT under SYSTEM TESTS.

If retractable trunk lid grip does not retract and pump in PSE control module runs, check the following as possible cause and repair as necessary:

* Perform retractable trunk lid grip vacuum TEST 2: RETRACTABLE TRUNK LID GRIP SYSTEM VACUUM CHECK. See RETRACTABLE TRUNK LID GRIP under VACUUM SYSTEM TESTS.

Sedan)

Unlock vehicle using remote transmitter. Remove key from ignition. Close all door and lock vehicle using remote transmitter. Open right rear door using inside door handle within 30 seconds. If all doors, fuel door and trunk unlock, right rear door switch is okay at this time. If all doors, fuel door and trunk do not unlock, check wiring. See WIRING DIAGRAMS. If wiring is okay, perform pneumatic system TEST 6: REAR DOOR SWITCH CIRCUIT (CL500, S320, S420, S500). See PNEUMATIC SYSTEM EQUIPMENT under SYSTEM TESTS.

Test 12: Vehicle Speed Activation Signal

1) On SL500, go to next step. On CL500, S320, S420, S500, go to step 3).

2) Using Harness Adapter (202 589 16 63 00), connect Breakout Box (129 589 00 21 00) to Pneumatic System Equipment (PSE) control module. Measure voltage between ground and terminal No. 64 at breakout box. Turn ignition switch to RUN position. Raise and support vehicle so drive wheels can be turned. Rotate left front wheel. If approximately 5 volts exists, vehicle speed activation signal is okay at this time. If approximately 5 volts does not exist, check the following as possible cause and repair as necessary:

* Check wiring. See WIRING DIAGRAMS.
* Check traction control system.

3) Using Harness Adapter (140 589 13 63 00), connect Breakout Box (129 589 00 21 00) to Pneumatic System Equipment (PSE) control module. Measure voltage between ground and terminal No. 10 at breakout box. Turn ignition switch to RUN position. Raise and support vehicle so drive wheels can be turned. Rotate left front wheel. If approximately 5 volts exists, vehicle speed activation signal is okay at this time. If approximately 5 volts does not exist, check the following as possible cause and repair as necessary:

* Check wiring. See WIRING DIAGRAMS.
* Check traction control system.

RETRACTABLE REAR HEADREST

NOTE: Retractable rear headrest is only available on S320, S420 and S500 models.

NOTE: For connector and terminal identification refer to wiring diagrams. See WIRING DIAGRAMS.

NOTE: Ensure related fuses are not blown and voltage to all control modules is okay. See WIRING DIAGRAMS.

Test 1: Retractable Rear Headrest Unlocking Circuit

1) With rear headrests extended, turn ignition switch to RUN position. When rear headrest switch is pressed, rear headrests should retract. If rear headrests retract, retractable rear headrest system

VACUUM DIAGRAMS. Connect Yellow connector on Vacuum/Pressure Tester (201 589 13 21 00) to malfunctioning actuator. Apply 8.7 psi (600 mbar) of pressure to actuator. If pressure loss is not substantial in one minute, check and repair pneumatic lines as necessary. See VACUUM DIAGRAMS. If pressure loss is substantial in one minute, replace actuator as necessary.

Test 4: Individual Component Vacuum Tests

Disconnect suspected pneumatic line from malfunctioning actuator. See VACUUM DIAGRAMS. Connect Black connector on Vacuum/Pressure Tester (201 589 13 21 00) to malfunctioning actuator. Apply 8.1 In. Hg (300 mbar) of vacuum to actuator. If vacuum loss is not substantial in one minute, check and repair pneumatic lines as necessary. See VACUUM DIAGRAMS. If vacuum loss is substantial in one minute, replace actuator as necessary.

ORTHOPEDIC SEAT

NOTE: Orthopedic seats are only available on CL500, S320, S420, S500 and SL500 models.

NOTE: Ensure related fuses are not blown and voltage to all control modules is okay. See WIRING DIAGRAMS.

Test 1: Lower Center Back Rest Insert Test

Disconnect pneumatic line from OBS port at Pneumatic System Equipment (PSE) control module. See Fig. 4, 5 or 6. Connect disconnected pneumatic line to Yellow connector on Vacuum/Pressure Tester (201 589 13 21 00). Set lower center support adjuster to maximum setting and all other inserts adjustments to minimum setting. Apply 8.7 psi (600 mbar) of pressure to system in each of the 3 height settings. If pressure loss is not substantial in one minute, check and repair pneumatic lines as necessary. See VACUUM DIAGRAMS. If pressure loss is substantial in one minute, perform TEST 5: LINE & RESERVOIR TEST.

Test 2: Upper Center Back Rest Insert Test

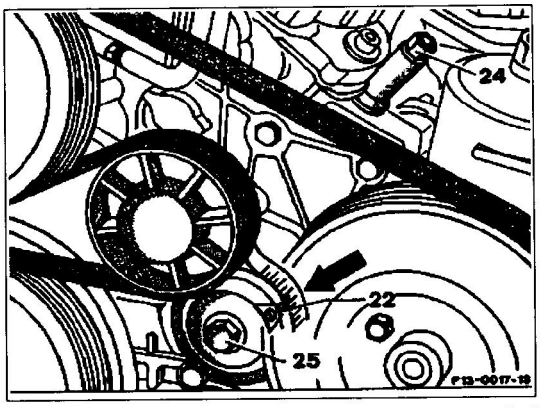
Disconnect pneumatic line from OBS port at Pneumatic System Equipment (PSE) control module. See Fig. 4, 5 or 6. Connect disconnected pneumatic line to Yellow connector on Vacuum/Pressure Tester (201 589 13 21 00). Set upper center support adjuster to maximum setting and all other inserts adjustments to minimum setting. Apply 8.7 psi (600 mbar) of pressure to system in each of the 3 height settings. If pressure loss is not substantial in one minute, check and repair pneumatic lines as necessary. See VACUUM DIAGRAMS. If pressure loss is substantial in one minute, perform TEST 5: LINE & RESERVOIR TEST.

Test 3: Side Back Rest Insert Test

Disconnect pneumatic line from OBS port at Pneumatic System Equipment (PSE) control module. See Fig. 4, 5 or 6. Connect disconnected pneumatic line to Yellow connector on Vacuum/Pressure

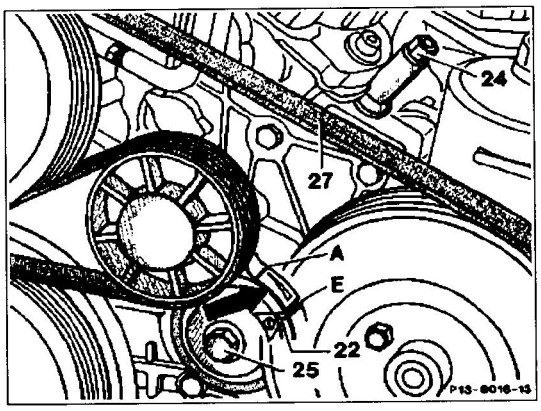
Removal & Installation

- Loosen screw (25) by 1/4-1/2 turn.
- Loosen tensioning device with tensioning nut (24) (turn counterclockwise) until poly-V-belt (27) can be removed.
- Check the pulley profiles and the tensioning device for damage and dirt and replace if required (e.g. worn out tensioning device bearing bushing, dents in the pulleys, etc.).



P13-0017-13

- On vehicles produced up to the middle of October 1986, slide adjusting pointer (22) to the left until the tip of the pointer is above the first dividing line of the adjusting scale (arrow).
- On vehicles produced as of the middle of October 1986, slide adjusting pointer to the left until the tip of the pointer is above the thin line (A) of the adjusting scale.



Installing poly-V-belt:

- Start in numerical sequence of belt routing diagrams at tensioning pulley (1) (for illustrations, refer to following pages).

Note:
Do not use belt wax or similar products.

- Check the seating of the poly-V-belt on the belt pulleys.
- On vehicles produced up to the middle of October 1986, turn the tensioning nut (24) to the right until the tip of the adjusting pointer (22) is positioned between the 8th and 9th index mark.
- On vehicles produced as of the middle of October 1986, keep turning tensioning nut to the right until the tip of the adjusting pointer is centered above the thick line (E) of the adjusting scale.
- Tighten bolt (25) as follows:

Width between flats 19 mm	75 Nm
Width between flats 17 mm (shouldered bolt)	80 Nm

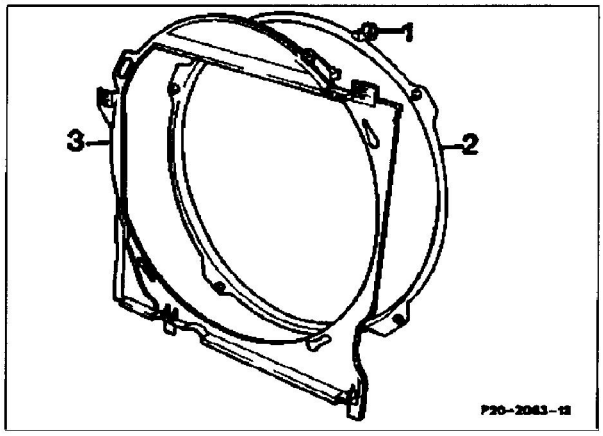
G00040183

Fig. 2: Removal & Installation - Engine 102 Poly-V-Belt
Courtesy of Mercedes-Benz of North America.

On engine 601, loosen fan cover and place on fan. Unscrew fan and remove with fan cover.

On engine 602.911 in model 201 with one piece fan cover, remove radiator.

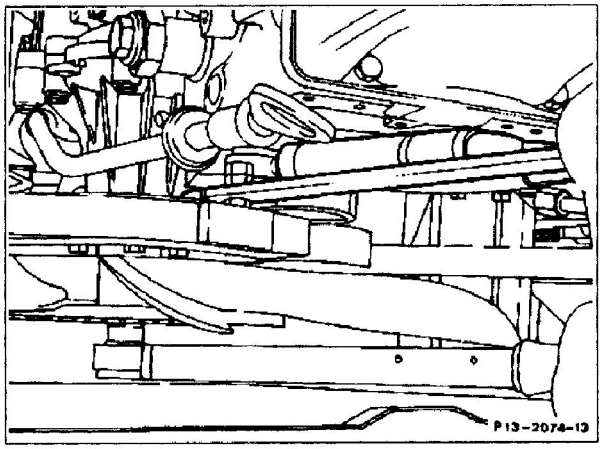
On engine 602 in model 201 with two piece fan shroud, pull locking pin (1) and turn ring (2) to the left. to open shroud and remove. Place ring on fan. Pull out shroud body (3) and remove ring.



On engine 602 in model 124, loosen fan cover and place on fan. Unscrew viscofan clutch with fan and remove with fan cover.
To loosen and tighten hex. socket screw of viscofan clutch, use screwdriver insert 103 589 01 09 00 and counterhold 603 589 00 40 00.

DRIVE BELT

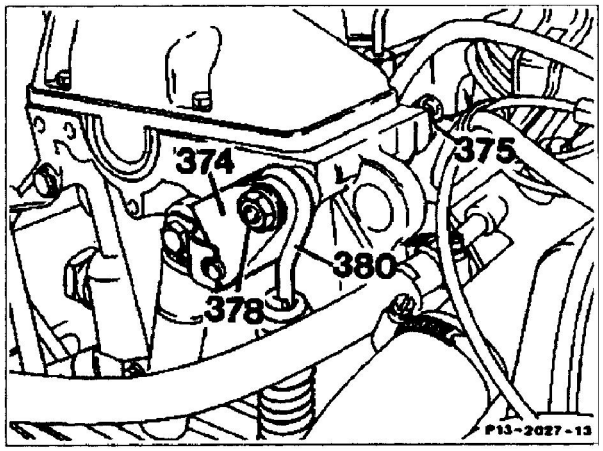
On engine 603.96 (TURBO), the viscofan clutch cannot be removed without removing the radiator.



P13-2074-13

- Loosen tensioning device (vehicle tool or conventional tool):

- Unscrew nut (378).
- Insert a lever (12 - 13 mm dia., approx. 300 mm long) or wheel nut wrench from vehicle tool set into hole on spring tensioning lever (374). Push lever slightly to the left until screw (375) can be pushed back in direction of intake manifold.
- Loosen draw spring (380) by swiveling lever to the right.
- Push back tensioning pulley and remove poly-V-belt.
- Check belt pulley profiles and tensioning device for damage (such as worn out pivot points of tensioning device, dents in pulleys, etc.) and contamination and replace, if necessary.



P13-2027-13

G00040197

Fig. 16: Removal & Installation - Engines 601, 602 & 603 Poly-V-Belt (1 Of 2)
Courtesy of Mercedes-Benz of North America.

		bushing.
Attaching hardware threads stripped (threads missing)	A	Require replacement of part with stripped threads if available; otherwise, replace bushing.
Binding	A	Require repair or replacement.
Contaminated	1	Suggest replacement.
Deteriorated, affecting performance	A	Require repair or replacement.
Distorted, affecting performance	A	Require repair or replacement.
Missing	C	Require replacement.
Noisy	2	(1) Further inspection required.
Rubber separating from internal metal sleeve on bonded bushing	A	Require replacement.
Seized	A	Require replacement.
Shifted (out of position)	B	Require repair or replacement.
Split	A	Require replacement.
Surface cracking (weather-checked)	4	No service suggested or required.
Worn, affecting performance	A	Require repair or replacement.
Worn close to the end of its useful life	1	Suggest replacement.

(1) - If noise isolated to bushing, suggest repair or replacement.

CAUTION: Use only approved lubricant on rubber bushings. Petroleum-based lubricants may damage rubber bushings.

CABLES (SPEEDOMETER)

CABLE (SPEEDOMETER) INSPECTION

Condition	Code	Procedure
Attaching hardware broken	A	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware not functioning	A	Require repair or replacement.

nylon screen type) ..... A .. Require repair or replacement.

(1) - Further inspection may be required to determine the source of restriction or contamination.

FLANGES

See COMPANION FLANGES.

FLEX PLATES

FLEX PLATE INSPECTION

Condition	Code	Procedure
Bent, affecting performance	A	Require replacement.
Bent, not affecting performance	..	No service suggested or required.
Bolt or stud holes elongated	B	Require replacement.
Broken	A	Require replacement.
Cracked	A	Require replacement.
Ring gear worn close to the end of its useful life	1	Suggest replacement.
Ring gear worn to the extent that it no longer performs its intended function	A	Require replacement.
Weights missing	A ..	Require repair or replacement.

FLUID LEVEL INDICATORS

See DIP STICKS (FLUID LEVEL INDICATORS).

FLUIDS AND LUBRICANTS

FLUID AND LUBRICANT INSPECTION

Condition	Code	Procedure
Application incorrect	B	(1) Require replacement.
At service interval	3	Suggest replacement.
Beyond service interval	3	Suggest replacement.
Burned	..	(2) Further inspection required.
Contaminated, for example, fluid other than specified		

Wire lead misrouted ..... B .... Require re-routing according to vehicle manufacturer's specifications.
Wire lead open ..... A .. Require repair or replacement.
Wire lead shorted ..... A .. Require repair or replacement.

(1) - If a sensor is not adjustable, further inspection is required to identify and correct cause.
(2) - Determine cause and correct prior to repair or replacement of part.
(3) - Determine source of contamination, such as metal particles or water. Require repair or replacement.
(4) - Inoperative includes intermittent operation or out of OEM specification. Some components may be serviceable; check for accepted cleaning procedure.

SPEEDOMETER-DRIVEN GEAR HOUSINGS

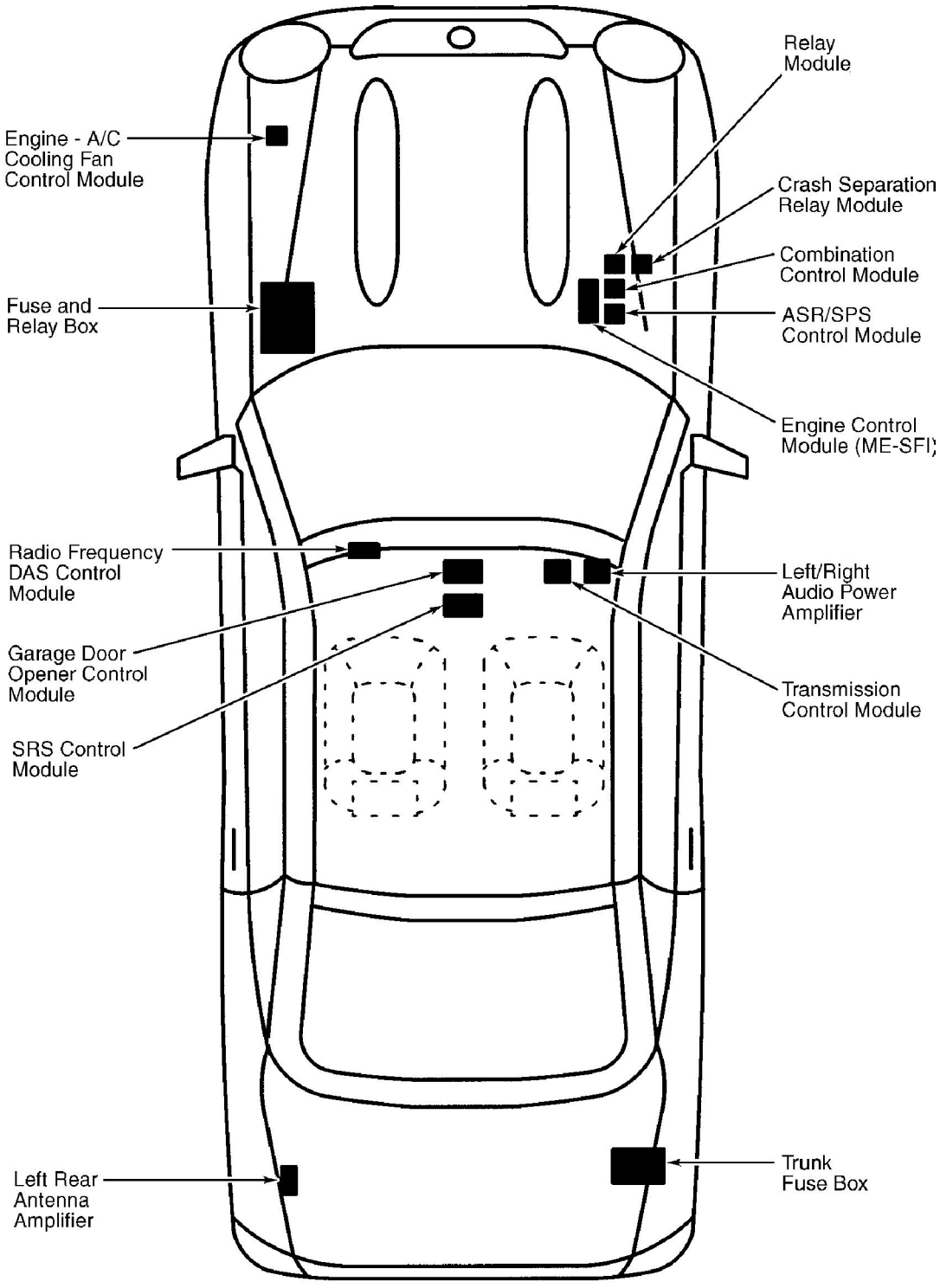
See SPEEDOMETER/ODOMETER DRIVES (MECHANICAL).

SPEEDOMETER/ODOMETER DRIVES (MECHANICAL)

SPEEDOMETER/ODOMETER DRIVE (MECHANICAL) INSPECTION

Condition	Code	Procedure
Application incorrect	B	Require replacement.
Attaching hardware broken	A	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware not functioning	A	Require repair or replacement of hardware.
Inoperative	A	(1) Require replacement.
Leaking	A	Require repair or replacement.
Missing	C	Require replacement.
Teeth broken	A	Require repair or replacement.
Threads damaged	A	Require repair or replacement.
Threads stripped (threads missing)	A	Require replacement.
Worn close to the end of its useful life	1	Suggest replacement.
Worn, affecting performance	A	Require replacement.

(1) - Inoperative includes intermittent operation.



98D02703

Fuse & Relay Box — In left rear corner of engine compartment.

ELECTRIC

Heater Core Temperature Sensor	Beneath center console, near shifter lever.
Hot Film MAF Sensor	On left front of engine, in air intake duct.
Knock Sensor	On left side of engine block, beneath intake manifold, between cylinders 2 & 3.
Left Side Air Bag Sensor	Beneath driver's seat, on lateral crossmember.
O2 Sensor 1 (Before TWC)	Beneath vehicle, in exhaust pipe at rear of engine.
O2 Sensor 2 (After TWC)	Beneath vehicle, rear of catalytic converter.
Outside Temperature Indicator Sensor	On left front of vehicle, behind front bumper.
Passenger/Child Seat Recognition Sensor	In passenger's seat cushion.
Pedal Value Sensor	On left inner fender panel.
Pressure Sensor	On left side of engine.
Refrigerant Pressure Sensor	In left front of engine compartment, behind headlight.
Right Side Air Bag Sensor	Beneath passenger's seat, on lateral crossmember.
VSS Sensors	At respective wheel hub.

SOLENOIDS & SOLENOID VALVES

Component	Component Location
Activated Charcoal Canister Shutoff Valve	Beneath vehicle, forward of right rear axle.
Adjustable Camshaft Timing Solenoid	On front center of engine.
Air Pump Switchover Valve	On front center of engine.

Binding ..... 2 .. Suggest repair or replacement.
Connector broken ..... A .. Require repair or replacement.
Connector melted ..... A ..... (1) Require repair or replacement.
Connector missing ..... C ..... Require replacement.
Inoperative ..... A ..... (2) Require replacement.
Insulation damaged, conductors exposed ..... A .. Require repair or replacement.
Insulation damaged, conductors not exposed . 1 ..... Suggest replacement.
Missing ..... C ..... Require replacement.
Motor runs continuously . A ..... Require or replacement.
Power antenna noisy ..... 2 .. Suggest repair or replacement.
Sticking ..... 2 .. Suggest repair or replacement.
Terminal broken ..... A .. Require repair or replacement.
Terminal burned, affecting performance ..... A ..... (1) Require repair or replacement.
Terminal burned, not affecting performance .. 2 .. Suggest repair or replacement.
Terminal corroded, affecting performance .. A .. Require repair or replacement.
Terminal corroded, not affecting performance .. 2 .. Suggest repair or replacement.
Terminal loose, affecting performance ..... B .. Require repair or replacement.
Terminal loose, not affecting performance .. 1 .. Suggest repair or replacement.

(1) - Determine cause and correct prior to repair or replacement of part.
(2) - Inoperative includes intermittent operation or out of specification.

BATTERIES

Proper operation of any electrical system or component can be affected by battery condition. The battery(ies) must meet or exceed minimum specification for vehicle as equipped and test to that specific battery's CCA.

Definition of Terms

* Battery Performance Testing
  Testing that determines whether or not a battery meets both vehicle OEM and battery manufacturer's specifications.

* Cold Cranking Amp (CCA) Rating
  The number of amperes a new, fully charged battery at 0° F (-17.8° C) can deliver for 30 seconds and maintain at least a voltage of 1.2 volts per cell (7.2 volts for a

Oil-soaked (spongy) ..... 1 ..... Suggest replacement.
Restricted ..... A .. Require repair or replacement.
Surface cracks (dry-
rotted) ..... 1 ..... Suggest replacement.

CRUISE CONTROL VEHICLE SPEED SENSORS

CRUISE CONTROL VEHICLE SPEED SENSOR INSPECTION

Condition Code Procedure

Air gap incorrect ..... B ..... (1) Require adjustment to vehicle manufacturer's specifications.
Attaching hardware
broken ..... A ... Require repair or replacement of hardware.
Attaching hardware
missing ..... C ..... Require replacement of hardware.
Attaching hardware not
functioning ..... A ... Require repair or replacement of hardware.
Broken ..... A ..... Require replacement.
Housing cracked ..... A ..... Require replacement.
Internal resistance
does not meet
specifications ..... B ..... (2) Require replacement.
Lead routing incorrect .. B .. Require rerouting according to vehicle manufacturer's specifications.
Loose ..... B ..... (3) Require adjustment to vehicle manufacturer's specifications.
Missing ..... C ..... Require replacement.
Output signal incorrect . B ..... (2) Require repair or replacement.
Surface contaminated .... 2 .. Suggest cleaning; identify and correct source.
Tip bent ..... B ..... Require replacement.
Tip broken ..... B ..... Require replacement.
Tip missing ..... B ..... Require replacement.
Wire lead burned ..... A ..... Require replacement.
Wire lead conductors
exposed ..... B ..... Require replacement.
Wire lead corroded ..... A ..... Require replacement.
Wire lead open ..... A ..... Require replacement.
Wire lead shorted ..... A ..... Require replacement.

(1) - If a sensor is not adjustable, further inspection is required to identify and correct cause.

Cracked ..... A ..... Require replacement.
Inoperative ..... A ..... (2) Require replacement.
Missing ..... C ..... Require replacement.
Terminal broken ..... A .. Require repair or replacement.
Terminal burned, affecting
performance ..... A ..... (1) Require repair or
replacement.
Terminal burned, not
affecting performance .. 2 .. Suggest repair or replacement.
Terminal corroded,
affecting performance .. A .. Require repair or replacement.
Terminal corroded, not
affecting performance .. 2 .. Suggest repair or replacement.
Terminal loose, affecting
performance ..... B .. Require repair or replacement.
Terminal loose, not
affecting performance .. 1 .. Suggest repair or replacement.
Wire lead burned ..... A .. Require repair or replacement.
Wire lead conductors
exposed ..... B .. Require repair or replacement.
Wire lead open ..... A .. Require repair or replacement.
Wire lead shorted ..... A .. Require repair or replacement.

(1) - Determine cause and correct prior to repair or
replacement of part.
(2) - Inoperative includes intermittent operation.

MOTORS

MOTOR INSPECTION

Condition Code Procedure

Amperage draw out of
specification ..... A .. Require repair or replacement.
Attaching hardware
broken ..... A ... Require repair or replacement
of hardware.
Attaching hardware
missing ..... C ..... Require replacement of
hardware.
Attaching hardware not
functioning ..... A ... Require repair or replacement
of hardware.
Bracket bent ..... A .. Require repair or replacement.
Bracket broken ..... A .. Require repair or replacement.
Bracket cracked ..... A .. Require repair or replacement.
Bracket holes elongated,
affecting performance .. A .. Require repair or replacement.
Bracket holes elongated,
not affecting

SUB-WOOFER VOLUME CONTROLS

See
RECEIVERS, AMPLIFIERS, EQUALIZERS AND SUB-WOOFER VOLUME CONTROLS.

SWITCHES

SWITCH INSPECTION

Condition	Code	Procedure
Attaching hardware broken	A	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware not functioning	A	Require repair or replacement of hardware.
Binding, affecting performance	A	Require repair or replacement.
Binding, not affecting performance	2	Suggest repair or replacement.
Broken	A	Require repair or replacement.
Burned, affecting performance	A	(1) Require repair or replacement.
Burned, not affecting performance	2	(1) Suggest repair or replacement.
Cracked, affecting performance	A	Require repair or replacement.
Cracked, not affecting performance	1	Suggest repair or replacement.
Leaking	A	Require repair or replacement.
Malfunctioning	A	(2) Require repair or replacement.
Melted, affecting performance	A	(1) Require repair or replacement.
Melted, not affecting performance	2	(1) Suggest repair or replacement.
Missing	C	Require replacement.
Out of adjustment	B	Require repair or replacement.
Terminal broken	A	Require repair or replacement.
Terminal burned, affecting performance	A	(1) Require repair or replacement.

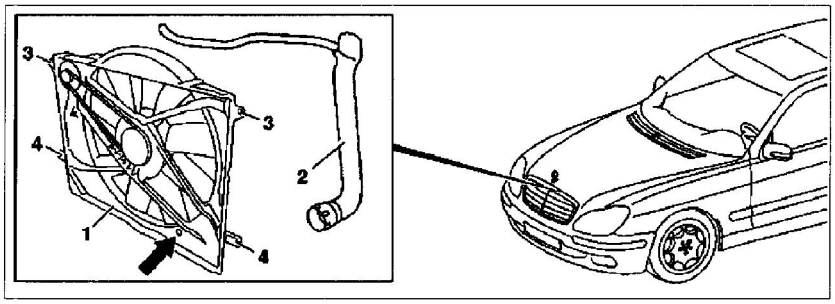
Insulation damaged,
conductors not exposed . 1 ..... Suggest replacement.
Open ..... A .. Require repair or replacement.
Protective shield
(conduit) melted ..... 2 ..... (1) Suggest repair or replacement.
Protective shield
(conduit) missing ..... 2 .. Suggest repair or replacement.
Resistance (voltage drop)
out of specification ... A .. Require repair or replacement.
Routed incorrectly ..... B ..... Require repair.
Secured incorrectly ..... B ..... Require repair.
Shorted ..... A .. Require repair or replacement.
Terminal broken ..... A .. Require repair or replacement.
Terminal burned, affecting
performance ..... A ..... (1) Require repair or replacement.
Terminal burned, not
affecting performance .. 2 .. Suggest repair or replacement.
Terminal corroded,
affecting performance .. A .. Require repair or replacement.
Terminal corroded, not
affecting performance .. 2 .. Suggest repair or replacement.
Terminal loose, affecting
performance ..... B .. Require repair or replacement.
Terminal loose, not
affecting performance .. 1 .. Suggest repair or replacement.
Voltage drop out of
specification ..... A .. Require repair or replacement.

(1) - Determine cause and correct prior to repair or replacement of part.

END OF ARTICLE

Shown on model 220 with M112

1 Fan shroud
2 Coolant line
3 Mounting plate
4 Retaining lugs



P20.40-2001-04

Operation no. of operation texts or standard texts and flat rates

Sector	Op. no.	Operation text
P	206800	REPLACE FAN SHROUD

	Removing, installing	
⚠ **Danger!**	**Risk of injury** to skin and eyes from scalding with hot coolant which splashes out. **Risk of poisoning** from swallowing coolant.	Do not open cooling system unless coolant temperature is below 90 °C. Open cap slowly and release the pressure. Do not pour coolant into beverage bottles. Wear protective gloves, protective clothing and eye protection.
1	Drain coolant	ⓘ At radiator
2	Remove air intake pipes at air cleaner	
3	Unscrew bolts of mounting plates (3) at fan shroud (1)	
4	Separate electric plug connections of suction fan	
6	Disconnect coolant line (2)	ⓘ Detach only at radiator.
7	Unscrew plate attaching ATF line	ⓘ At bottom at fan shroud (arrow).
8	Remove fan shroud (1)	ⓘ Lift fan shroud together with retaining plates (4) up and out of lugs at radiator.
9	Install in the reverse order	
10	Inspect coolant level and cooling system for leaks	

G00024509

Fig. 11: Removal & Installation - Fan Shroud Assembly - Engine 112
Courtesy of Mercedes-Benz of North America.

Engine 120 In Model 129 & 140

VALVES & VALVE SEATS

Valve Grinding

Valve stem O.D. should be measured in several areas to indicate amount of wear. Replace valve if not within specification. Valve margin area should be measured to ensure that valve can be grounded. See Fig. 9.

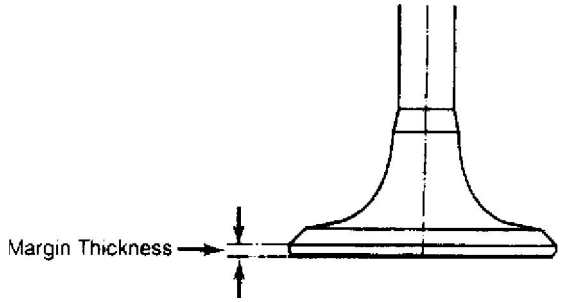


Fig. 9: Measuring Valve Head Margin - Typical
This Graphic For General Information Only

If valve margin is less than specification, this will burn the valves. Valve must be replaced. Due to minimum margin dimensions during manufacture, some new type valves cannot be reground.

Resurface valve on proper angle specification using valve grinding machine. Follow manufacturer's instructions for valve grinding machine. Specifications may indicate a different valve face angle than seat angle.

Measure valve margin after grinding. Replace valve if not within specification. Valve stem tip can be refinished using valve grinding machine.

Valve Lapping

During valve lapping of recent designed valves, be sure to follow manufacturers recommendations. Surface hardening and materials used with some valves do not permit lapping. Lapping process will remove excessive amounts of the hardened surface.

Valve lapping is done to ensure adequate sealing between valve face and seat. Use either a hand drill or lapping stick with suction cup attached.

Moisten and attach suction cup to valve. Lubricate valve stem and guide. Apply a thin coat of fine valve grinding compound between valve and seat. Rotate lapping tool between the palms or with hand drill.

Lift valve upward off the seat and change position often. This is done to prevent grooving of valve seat. Lap valve until a smooth polished seat is obtained. Thoroughly clean grinding compound from components. Valve to valve seat concentricity should be checked. See VALVE SEAT CONCENTRICITY.

CAUTION: Valve guides must be in good condition and free of carbon deposits prior to valve seat grinding. Some engines contain

INSTALLATION

Install upper main bearing in cylinder block. Ensure lock tab is properly located in cylinder block. Install bearings in main bearing caps. Ensure all oil passages are aligned. Install rear seal (if removed).

Ensure crankshaft journals are clean. Lubricate upper main bearings with clean engine oil. Carefully install crankshaft. Check each main bearing clearance using Plastigage method. See MAIN & CONNECTING ROD BEARING CLEARANCE in this article.

Once clearance is checked, lubricate lower main bearing and journals. Install main bearing caps in original location. Install rear seal in rear main bearing cap (if removed). Some rear main bearing caps require sealant to be applied in corners to prevent oil leakage.

Install and tighten all bolts except thrust bearing cap to specification. Tighten thrust bearing cap bolts finger tight only. Thrust bearing must be aligned. On most applications, crankshaft must be moved rearward then forward. Procedure may vary with manufacturer. Thrust bearing cap is then tighten to specification. Ensure crankshaft rotates freely. Crankshaft end play should be checked. See CRANKSHAFT END PLAY in this article.

CRANKSHAFT END PLAY

Dial Indicator Method

Crankshaft end play can be checked using dial indicator. Mount dial indicator on rear of cylinder block. Position dial indicator tip against rear of crankshaft. Ensure tip is resting against flat surface.

Pry crankshaft rearward. Adjust dial indicator to zero. Pry crankshaft forward and note reading. Crankshaft end play must be within specification. If end play is not within specification, check for faulty thrust bearing installation or worn crankshaft. Some applications offer oversized thrust bearings.

Feeler Gauge Method

Crankshaft end play can be checked using feeler gauge. Pry crankshaft rearward. Pry crankshaft forward. Using feeler gauge, measure clearance between crankshaft and thrust bearing surface. See Fig. 22.

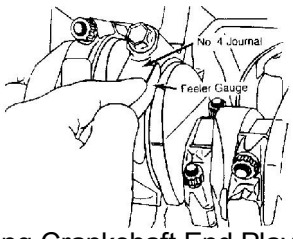


Fig. 22: Checking Crankshaft End Play - Typical
This Graphic For General Information Only

Crankshaft end play must be within specification. If end play is not within specification, check for faulty thrust bearing

To assure auto repair customers recourse if they were not satisfied with a repair transaction, the Motorist Assurance Program offers mediation and arbitration through MAP/BBB-CARE and other non-profit organizations. MAP conducted pilot programs in twelve states before announcing the program nationally in October, 1998. During the pilots, participating repair shops demonstrated their adherence to the Pledge and Standards and agreed to follow the UICS in communicating the results of their inspection to their customers. To put some "teeth" in the program, an accreditation requirement for shops was initiated. The requirements are stringent, and a self-policing method has been incorporated which includes the "mystery shopping" of outlets.

We welcome you to join us as we continue our outreach... with your support, both the automotive repair industry and your customers will reap the benefits. Please visit MAP at our Internet site www.motorist.org or contact us at:

7101 Wisconsin Avenue
Bethesda, MD 20814

Phone: (301) 634-4955
Fax: (202) 318-3078
E-mail: map@motorist.org

January 2002

OVERVIEW OF SERVICE REQUIREMENTS AND SUGGESTIONS

It is MAP policy that all exhaust, brake, steering, suspension, wheel alignment, drive-line, engine performance and maintenance, and heating, ventilation and air conditioning, and electrical services be offered and performed under the standards and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be "Required" or "Suggested." In addition, suggestions may be made to satisfy the requests expressed by the customer.

When a component is suggested or required to be repaired or replaced, the decision to repair or replace must be made in the customer's best interest, and at his or her choice given the options available.

This section lists the various parts and the conditions that indicate a required or suggested service or part replacement. Although this list is extensive, it is not fully inclusive. In addition to this list, a technician may make a suggestion. However, any suggestions must be based on substantial and informed experience, or the vehicle manufacturer's recommended service interval and must be documented.

Some conditions indicate that service or part replacement is

Wire lead shorted ..... A . Require repair or replacement.

(1) - Determine cause and correct prior to repair or replacement of part.
(2) - Inoperative includes intermittent operation or out of OEM specification. Some components may be serviceable; check for accepted cleaning procedure.

AIR PLENUMS

AIR PLENUM INSPECTION

Condition	Code	Procedure
Integrated air or fuel control components inoperative	A	(1) Require repair or replacement.
Internal air or fuel components damaged, affecting performance	A	Require repair or replacement of component.
Internal air or fuel components damaged, not affecting performance		No service suggested or required.
Internal air or fuel components missing	C	Require replacement of component.
Leaking	A	Require repair or replacement.
Restricted	A	Require repair or replacement.
Threads damaged	A	Require repair or replacement.
Threads stripped (threads missing)	A	Require repair or replacement.

(1) - Inoperative includes intermittent operation or out of OEM specification.

AIR PUMP BELTS

AIR PUMP BELT INSPECTION

Condition	Code	Procedure
Alignment incorrect	B	(1) Further inspection required.
Cracked	1	Suggest replacement.
Frayed	1	Suggest replacement.
Maintenance intervals	3	Suggest replacement to comply with vehicle OEM recommended

CASTING CORE PLUGS AND EXPANSION PLUGS

CASTING CORE PLUG AND EXPANSION PLUG INSPECTION

Condition	Code	Procedure
Leaking	A	Require replacement.
Material type incorrect	2	Suggest replacement.

CHARGE AIR COOLERS "INTERCOOLERS" (CAC)

CHARGE AIR COOLER "INTERCOOLER" (CAC) INSPECTION

Condition	Code	Procedure
Air-to-air intercooler leaking, affecting boost performance	A	Require repair or replacement.
Attaching hardware broken	A	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware not functioning	A	Require repair or replacement of hardware.
Leaking coolant	A	Require repair or replacement.
Missing	C	Require replacement.
Restricted, affecting performance	A	Require repair or replacement.

CHECK VALVES

See ASPIRATOR, CHECK AND DECEL VALVES.

CHOKES

See CARBURETORS AND CHOKES.

CLUTCH PEDAL POSITION SWITCHES

CLUTCH PEDAL POSITION SWITCH INSPECTION

Condition	Code	Procedure
Attaching hardware		

		spring(s).
Spring inoperative	A	(2) Require replacement of spring(s).

(1) - Inoperative includes intermittent operation or out of OEM specification. If the inoperative diaphragm is separate from the heat riser, then require replacement of the inoperative diaphragm. If the inoperative diaphragm is part of the heat riser, then replace the heat riser.
(2) - Inoperative includes intermittent operation or out of OEM specification.

EGR COOLERS

See EGR PLATES AND COOLERS.

EGR EXHAUST MANIFOLD PASSAGES

See EGR INTAKE AND EXHAUST MANIFOLD PASSAGES.

EGR INTAKE AND EXHAUST MANIFOLD PASSAGES

EGR INTAKE AND EXHAUST MANIFOLD PASSAGE INSPECTION

Condition	Code	Procedure
Leaking	A ..	Require repair or replacement.
Restricted, affecting performance	A ..	Require repair or replacement.

EGR PLATES AND COOLERS

EGR PLATE AND COOLER INSPECTION

Condition	Code	Procedure
Leaking	A ..	Require repair or replacement.
Missing	C	Require replacement.
Restricted, affecting performance	A ..	Require repair or replacement.

ELECTRONIC SPARK CONTROL MODULES

ELECTRONIC SPARK CONTROL MODULE INSPECTION

Condition	Code	Procedure
Application incorrect ...	B	Require replacement*

Missing ..... C ..... Require replacement.
Resistance out of
specification ..... B .. Require repair or replacement.
Restricted, affecting
performance ..... A .. Require repair or replacement.
Restricted, not affecting
performance ..... 1 .. Suggest repair or replacement.
Terminal broken ..... A .. Require repair or replacement.
Terminal burned, affecting
performance ..... A ..... (1) Require repair or
replacement.
Terminal burned, not
affecting performance .. 2 .. Suggest repair or replacement.
Terminal corroded,
affecting performance .. A .. Require repair or replacement.
Terminal corroded, not
affecting performance .. 2 .. Suggest repair or replacement.
Terminal loose, affecting
performance ..... B .. Require repair or replacement.
Terminal loose, not
affecting performance .. 1 .. Suggest repair or replacement.
Threads damaged ..... A .. Require repair or replacement.
Threads stripped (threads
missing) ..... A ..... Require replacement.
Wire lead conductors
exposed ..... B .. Require repair or replacement.
Wire lead corroded ..... A .. Require repair or replacement.
Wire lead open ..... A .. Require repair or replacement.
Wire lead shorted ..... A .. Require repair or replacement.

(1) - Determine cause and correct prior to repair or replacement of part.
(2) - Determine source of contamination, such as engine coolant, fuel, metal particles, or water. Require repair or replacement.
(3) - Inoperative includes intermittent operation or out of OEM specification. Some components may be serviceable; check for accepted cleaning procedure.

EXHAUST GAS RECIRCULATION FEEDBACK DEVICES

EXHAUST GAS RECIRCULATION FEEDBACK DEVICE INSPECTION

Condition Code Procedure

Attaching hardware
missing ..... C ..... Require replacement of
hardware.
Attaching hardware
threads damaged ..... A ... Require repair or replacement
of hardware.

		of hardware.
Cracked	A	Require replacement.
Dented (fluid type only)	A	Require replacement.
Keyway distorted	A .	Require repair or replacement.
Leaking (Fluid damper only)	A	Require replacement.
Loose	A	Require replacement.
Noisy	A	Require replacement.
Outer ring slipped out of position	A	Require replacement.
Positioned incorrectly ..	A .	Require repair or replacement.
Rubber damping material deteriorated	1	Suggest replacement.
Seal surface worn, causing a leak	A .	Require repair or replacement.
Threads damaged	A .	Require repair or replacement.
Threads stripped (threads missing)	A	Require replacement.

HEATER CONTROL VALVES

HEATER CONTROL VALVE INSPECTION

Condition	Code	Procedure
Attaching hardware broken	A ...	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware not functioning	A ...	Require repair or replacement of hardware.
Bypassed	A	Require replacement.
Coolant leak	A ..	Require repair or replacement.
Malfunctioning	A	(1) Require repair or replacement.
Missing	C	Require replacement.
Restricted	A ..	Require repair or replacement.
Vacuum leak	A ..	Require repair or replacement.

(1) - Includes inoperative, intermittent operation, or failure to perform all functions.

HEATER CORES

HEATER CORE INSPECTION

Connector missing ..... C ..... Require replacement.
Inoperative ..... B ..... (2) Require repair or replacement. Further inspection required.
Leaking ..... A .. Require repair or replacement.
Missing ..... C ..... Require replacement.
Resistance out of specification ..... B .. Require repair or replacement.
Terminal broken ..... A .. Require repair or replacement.
Terminal burned, affecting performance ..... A ..... (1) Require repair or replacement.
Terminal burned, not affecting performance .. 2 .. Suggest repair or replacement.
Terminal corroded, affecting performance .. A .. Require repair or replacement.
Terminal corroded, not affecting performance .. 2 .. Suggest repair or replacement.
Terminal loose, affecting performance ..... B .. Require repair or replacement.
Terminal loose, not affecting performance .. 1 .. Suggest repair or replacement.
Threads damaged ..... A .. Require repair or replacement.
Threads stripped (threads missing) ..... A ..... Require replacement.
Wire lead conductors exposed ..... B .. Require repair or replacement.
Wire lead corroded ..... A .. Require repair or replacement.
Wire lead open ..... A .. Require repair or replacement.
Wire lead shorted ..... A .. Require repair or replacement.

(1) - Determine cause and correct prior to repair or replacement of part.
(2) - Inoperative includes intermittent operation or out of OEM specification. Some components may be serviceable; check for accepted cleaning procedure.

LIQUID VAPOR SEPARATORS

LIQUID VAPOR SEPARATOR INSPECTION

Condition	Code	Procedure
Inoperative	A	(1) Require repair or replacement.
Leaking	A	Require replacement.
Missing	C	Require replacement.
Restricted	A	Require repair or replacement.

(1) - Inoperative includes intermittent operation or out of OEM specification.

Terminal loose, affecting performance ..... B .. Require repair or replacement.
Terminal loose, not affecting performance .. 1 .. Suggest repair or replacement.
Wire lead conductors exposed ..... B .. Require repair or replacement.
Wire lead corroded ..... A .. Require repair or replacement.
Wire lead open ..... A .. Require repair or replacement.
Wire lead shorted ..... A .. Require repair or replacement.

(1) - Determine cause and correct prior to repair or replacement of part.
(2) - Inoperative includes intermittent operation or out of OEM specification. Refer to OEM recommended service' procedures.

POWER STEERING PRESSURE SENSORS

POWER STEERING PRESSURE SENSOR INSPECTION

Condition	Code	Procedure
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware threads damaged	A	Require repair or replacement of hardware.
Attaching hardware threads stripped (threads missing)	A	Require repair or replacement of hardware.
Connector broken	A	Require repair or replacement.
Connector (Weatherpack type) leaking	A	Require repair or replacement.
Connector melted	A	(1) Require repair or replacement.
Connector missing	C	Require replacement.
Contaminated	A	(2) Require repair or replacement.
Inoperative	B	(3) Require repair or replacement. Further inspection required.
Leaking	A	Require repair or replacement.
Missing	C	Require replacement.
Resistance out of specification	B	Require repair or replacement.
Restricted, affecting performance	A	Require repair or replacement.
Terminal broken	A	Require repair or replacement.
Terminal burned, affecting		

Binding ..... A .. Require repair or replacement.
Leaking ..... A .. Require repair or replacement.
Missing ..... C ..... Require replacement.
Seized ..... A .. Require repair or replacement.

THERMOSTATS AND HOUSINGS

THERMOSTAT AND HOUSING INSPECTION

Condition Code Procedure

Application incorrect ... B ..... Require replacement.
Attaching hardware broken ..... A ... Require repair or replacement of hardware.
Attaching hardware corroded ..... A ... Require repair or replacement of hardware.
Attaching hardware missing ..... C ..... Require replacement of hardware.
Attaching hardware not functioning ..... A ... Require repair or replacement of hardware.
Housing corroded ..... 1 .. Suggest replacement of housing.
Inoperative ..... A ..... (1) Require replacement.
Installation incorrect .. B .. Require repair or replacement.
Leaking ..... A .. Require repair or replacement.
Thermostat missing ..... C ..... Require replacement of thermostat.
Threads damaged ..... A .. Require repair or replacement.
Threads stripped (threads missing) ..... A .. Require repair or replacement.

(1) - Inoperative includes intermittent operation or out of OEM specification.

THROTTLE BODIES

THROTTLE BODY INSPECTION

Condition Code Procedure

Connector broken ..... A .. Require repair or replacement.
Connector (Weatherpack type) leaking ..... A .. Require repair or replacement.
Connector melted ..... A ..... (1) Require repair or replacement.
Connector missing ..... C ..... Require replacement.
Contaminated ..... A ..... (2) Require repair

Attaching hardware missing ..... C ..... Require replacement of hardware.
Attaching hardware threads damaged ..... A ... Require repair or replacement of hardware.
Attaching hardware threads stripped (threads missing) ..... A ... Require repair or replacement of hardware.
Connector broken ..... A .. Require repair or replacement.
Connector (Weatherpack type) leaking ..... A .. Require repair or replacement.
Connector melted ..... A ..... (1) Require repair or replacement.
Connector missing ..... C ..... Require replacement.
Contaminated ..... A ..... (2) Require repair or replacement.
Inoperative ..... B ..... (3) Require repair or replacement. Further inspection required.
Leaking ..... A .. Require repair or replacement.
Missing ..... C ..... Require replacement.
Resistance out of specification ..... B .. Require repair or replacement.
Restricted, affecting performance ..... A .. Require repair or replacement.
Terminal broken ..... A .. Require repair or replacement.
Terminal burned, affecting performance ..... A ..... (1) Require repair or replacement.
Terminal burned, not affecting performance .. 2 .. Suggest repair or replacement.
Terminal corroded, affecting performance .. A .. Require repair or replacement.
Terminal corroded, not affecting performance .. 2 .. Suggest repair or replacement.
Terminal loose, affecting performance ..... B .. Require repair or replacement.
Terminal loose, not affecting performance .. 1 .. Suggest repair or replacement.
Threads damaged ..... A .. Require repair or replacement.
Threads stripped (threads missing) ..... A ..... Require replacement.
Wire lead conductors exposed ..... B .. Require repair or replacement.
Wire lead corroded ..... A .. Require repair or replacement.
Wire lead open ..... A .. Require repair or replacement.
Wire lead shorted ..... A .. Require repair or replacement.

(1) - Determine cause and correct prior to repair or

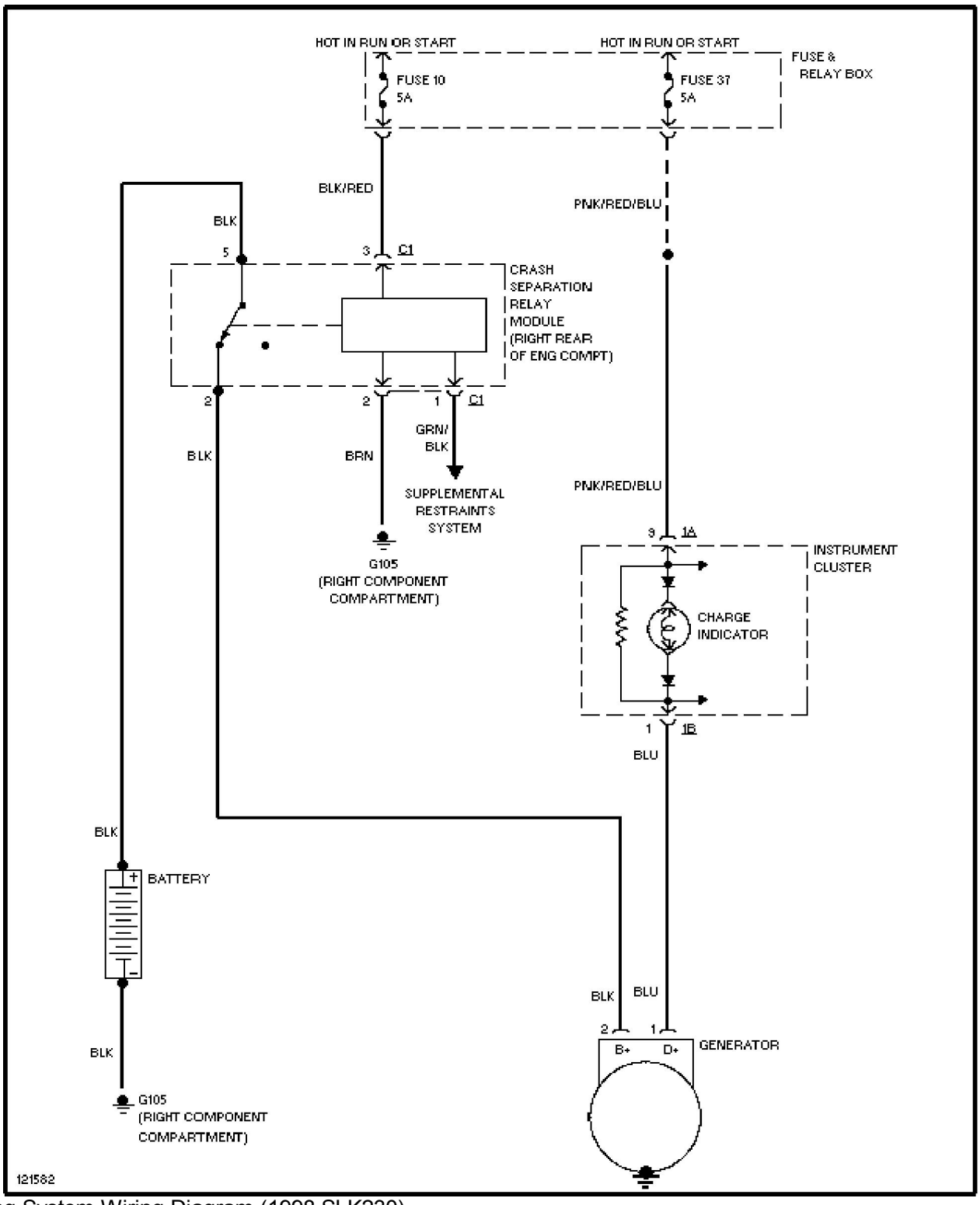


Fig. 5: Charging System Wiring Diagram (1998 SLK230)

RECEIVER (CL500, S320, S420, S500 & SL500)

Close side windows. Point remote transmitter toward left front door receiver. Unlock vehicle by pressing unlock button on remote transmitter for more than one second and hold. Vehicle should unlock, turn signal lights should blink once and side windows should open. If any of these conditions are not met, perform TESTS 1, 2, 6, 7, 11, 17, 18 and 19 under SYSTEM TESTS. Check for incorrect programming (version coding).

LOCKING VEHICLE WITH REMOTE TRANSMITTER AT RIGHT FRONT DOOR RECEIVER (CL500, S320, S420, S500 & SL500)

Open side windows. Point remote transmitter toward right front door receiver. Lock vehicle by pressing lock button on remote transmitter for more than one second and hold. Vehicle should lock, turn signal lights should blink 3 times and side windows should close. If any of these conditions are not met, perform TESTS 1, 2, 8, 9, 10, 16, 20 and 21 under SYSTEM TESTS. Check for incorrect programming (version coding).

UNLOCKING VEHICLE WITH REMOTE TRANSMITTER AT RIGHT FRONT DOOR RECEIVER (CL500, S320, S420, S500 & SL500)

Close side windows. Point remote transmitter toward right front door receiver. Unlock vehicle by pressing unlock button on remote transmitter for more than one second and hold. Vehicle should unlock, turn signal lights should blink once and side windows should open. If any of these conditions are not met, perform TESTS 1, 2, 8, 9, 11, 17, 18, and 19 under SYSTEM TESTS. Check for incorrect programming (version coding).

LOCKING VEHICLE USING MECHANICAL LOCK CYLINDER

Insert key into lock cylinder and attempt to lock vehicle. Ensure vehicle locks. If vehicle does not lock, perform TESTS 1, 2, 14, 16, 20 and 21 under SYSTEM TESTS. Check for incorrect programming (version coding).

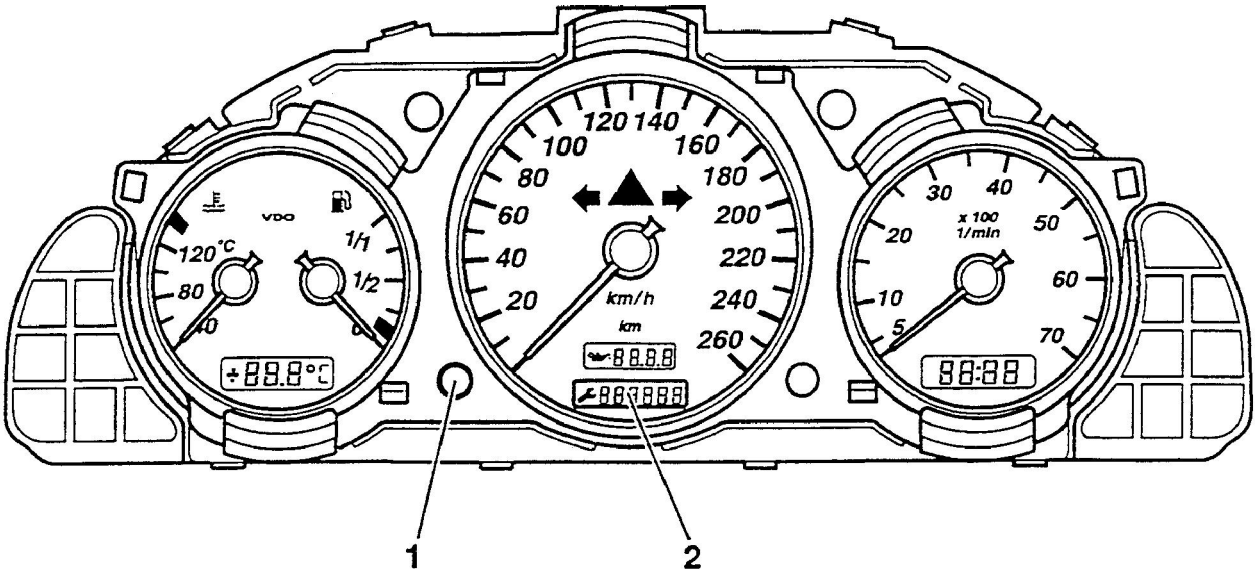
UNLOCKING VEHICLE USING MECHANICAL LOCK CYLINDER

Insert key into door lock cylinder and attempt to unlock vehicle. Ensure vehicle unlocks. If vehicle does not unlock, perform TESTS 1, 2, 6, 15, 17, 18, and 19 under SYSTEM TESTS. Check for incorrect programming (version coding).

OPEN TRUNK LID WITH REMOTE TRANSMITTER (CL500, S320, S420, S500 & SL500)

Ensure trunk lid lock key slot is not in 90 degree position (key can be removed). Press unlock trunk lid button on remote transmitter. Ensure trunk lid opens. On CL500 models, ensure

The maintenance service reminder is integrated into the digital display field for the odometer and comes on 2000 miles or 30 days before the next maintenance service is due. See Fig. 2. The remaining available mileage can be accessed manually.



50H13240

Fig. 2: Instrument Cluster, Maintenance Service Reminder
Courtesy Of Mercedes-Benz

Accessing The Remaining Mileage

1) With ignition switch in position 2 or with engine running, momentarily press button 1 twice. See Fig. 2.

2) The display is canceled after approx. 10 seconds or when button 1 is pressed again.

Reset Procedure

Turn ignition switch to position 1. Press button 1 and hold. See Fig. 2. Turn ignition switch to position 2. After 10 seconds a signal sounds and the display shows 7500 miles (12,000 km). Release button 1.

NOTE: If maintenance service reminder is reset unintentionally, it can be set back to the current reading using the HHT.

FLEXIBLE SERVICE SYSTEM (FSS) LIGHT (1998-2001)

FSS calculates next oil change and maintenance based on time, mileage, and operating conditions. Before the next service interval is due, a wrench or double wrench symbol displays in the odometer field. The suggested mileage and/or time (in days) to service also displays. See Fig. 3.

This message will display for about 10 seconds when ignition key is turned on. On some models, the message will also display while

* Perform TEST 3: PASSENGER'S SIDE MIRROR VOLTAGE SUPPLY under SYSTEM TESTS.
* Perform TEST 6: PASSENGER'S SIDE VERTICAL ADJUSTMENT MOTOR TEST under SYSTEM TESTS.
* Perform TEST 7: PASSENGER'S SIDE HORIZONTAL ADJUSTMENT MOTOR TEST under SYSTEM TESTS.

DRIVER'S SIDE MIRROR HEATER INOPERATIVE

If driver's side mirror heater is inoperative, perform TEST 8: DRIVER'S SIDE HEATER VOLTAGE SUPPLY under SYSTEM TESTS.

PASSENGER'S SIDE MIRROR HEATER INOPERATIVE

If passenger's side mirror heater is inoperative, perform TEST 9: PASSENGER'S SIDE HEATER VOLTAGE SUPPLY under SYSTEM TESTS.

MIRROR CONTROL SWITCH ILLUMINATION INOPERATIVE

If mirror control switch illumination is inoperative, perform TEST 10: MIRROR CONTROL SWITCH ILLUMINATION VOLTAGE SUPPLY under SYSTEM TESTS.

SYSTEM TESTS

TEST 1: MIRROR CONTROL SWITCH VOLTAGE SUPPLY

1) Disconnect mirror control switch harness connector. Turn ignition switch to RUN position. Measure voltage between ground and harness connector terminal No. 6. If battery voltage exists, go to next step. If battery voltage does not exist, repair wiring. See WIRING DIAGRAMS.
2) Measure voltage between harness connector terminals No. 1 and 6. If battery voltage exists, mirror control switch voltage supply is okay at this time. If battery voltage does not exist, repair wiring. See WIRING DIAGRAMS.

TEST 2: DRIVER'S SIDE MIRROR VOLTAGE SUPPLY

1) Disconnect driver's side mirror harness connector. Turn ignition switch to RUN position. Measure voltage between harness connector terminals No. 4 and 5. When driver's side mirror switch is in upward position, battery voltage should exist. In downward position, battery voltage should exist with opposite polarity. If voltage is as specified, go to next step. If voltage is not as specified, check wiring. See WIRING DIAGRAMS. If wiring is okay, replace mirror control switch.
2) Measure voltage between terminals No. 3 and 4 at driver's side mirror harness connector. When driver's side mirror switch is in outward position, battery voltage should exist. In inward position, battery voltage should exist with opposite polarity. If voltage is as specified, driver's side mirror voltage supply is okay at this time.

Range Rover ..... 1999-01 .... D/P, SI .... LAND ROVER-1
1995-98 ..... D/P ..... LAND ROVER-1

D/P - Driver's & Passenger's Side.
D/P2 - Driver's & Passenger's Side (Dual-Stage).
DS - Driver's Side.
HI - Head Impact.
KI - Knee Impact.
SI - Side Impact.
PS2 - Passenger's Side (Dual-Stage).

INSPECTION PROCEDURES

LAND ROVER-1

Action	Component or System
Replace After Deployment	* All air bag modules * Air bag diagnostic control unit * Air bag wiring harness * Rotary coupler * Front crash sensors (1) * Seat belt pretensioners (2)
Inspect & If Damaged Replace Component (Even If Air Bag Did Not Deploy)	* Air bag module & mounting surfaces * Crash sensors & mounting brackets * Steering column & wheel * Wiring harness & connectors * Front seat frames (side impact air bag modules) * Seat belts & mounting points
Comments	After vehicle is repaired, ensure AIR BAG warning light is functioning properly. If side impact air bags have deployed, replace seat foam and air bag cover.
(1) - Applicable to some 1999 & 2000 models only. (2) - If equipped.	

MERCEDES-BENZ (1986-01)

AIR BAG APPLICATION

APPLICATION - MERCEDES-BENZ

Make/Model Year Location Table

C Class ..... 1998-00 ..... D/P, SI MERCEDES-1
1994-97 ..... D/P MERCEDES-1

sealing frame of retractable roof with a slight pretension. If rear side glass contact is still not satisfactory, loosen 2 bolts on bottom of retaining bracket and adjust window lift mechanism as necessary.

4) Retractable roof should still be in closed position. Check rear side glass gap in relation to door glass and adjust rear side glass or door glass as necessary to maintain a .236-.314" (6-8 mm) parallel gap. If necessary to adjust door glass, make adjustment at rear guide rail for door glass. Parallel gap between door glass and rear side glass is different with retractable roof closed. Allowable gap changes from .196" (5 mm) to .236-.314" (6-8 mm).

SYSTEM TESTS

NOTE: System tests for the power window and sun roof system can only carried out using Mercedes-Benz Hand-Held Tester (6511 0001 99). Follow HHT screen prompts and HHT instruction manual.

REMOVAL & INSTALLATION

DOOR PANEL

Removal & Installation

1) Remove appropriate door panel speaker cover. Remove door speaker. Remove angled cover under door armrest. Remove screw under angled cover under door armrest. Remove small cover located on door panel located near door lock. Remove screw located behind small cover. Remove screw and small cover located at end of door (door jamb) just below door lock.

2) Pry door panel off door beginning at bottom of panel. Lift door panel at top along sealing rail upward out of clips. Ensure all electrical connections are disconnected before completely removing door panel. Remove door panel. To install, reverse removal procedure.

DOOR WINDOW MOTOR

Removal & Installation

Remove door panel. See DOOR PANEL . Partially remove door liner foil. Disconnect power window motor electrical connector. Remove 3 power window motor Torx bolts. Remove power window motor. To install, reverse removal procedure.

REAR SIDE GLASS

NOTE: Removing rear side glass involves removing rear side glass with window lift mechanism and window motor.

Removal & Installation

1) Open retractable roof. Move front seats forward for access to rear side glass. Remove door seal molding. Remove 3 screws securing small cover located at top of door jamb. Remove small cover. Remove screws securing cover located at top of seat belt. DO NOT remove seat

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0		**Front HS control module (N25/5)** Voltage supply Circuit 30 Circuit 15R	⊥ N25/5 (V) ≻— 4 ⊥ N25/5 (V) ≻— 2	Ignition: **OFF** Ignition: **Position 1**	11 - 14 V	Wiring.
2.0		**Front HS control module (N25/5)** Voltage supply for circuit 58d from cockpit switch group (S6/1)	4 —≺ S6/1 (V) ≻— 9	Adjust cockpit illumination to HI, Parking lamps: ON	11 - 14 V	Wiring.
3.0		**Cockpit switch group (S6/1)** Circuit 58d internal connection	9 — S6/1 (Ω) ≻— 58d	Ignition: **OFF**	< 1 Ω	S6/1
4.0		**Cockpit switch group (S6/1)** Circuit 31 internal connection	4 — S6/1 (Ω) ≻— 31	Ignition: **OFF**	< 1 Ω	S6/1
5.0		**Left front seat cushion heater element (R13/1) and left front backrest heater element (R13/2)** Voltage supply Models 170, 208, 210 Model 202	⊥ X55/3 (V) ≻— 4 (C) ⊥ X55/3 (V) ≻— 2 (C)	Ignition: **ON** Left front HS switch (N25/5s1) set to heating stage II. N25/5s1 set to heating stage I	0 - 1 V 9 - 14 V Proper interval indicated on multimeter.	Wiring, ⇒ 1.0, Front HS control module (N25/5) ⇒ 5.1
5.1		**R13/1 and R13/2** Voltage supply Ground Models 170, 208, 210 Model 202	1 —≺ (C) X55/3 (V) ≻— 4 (C) 1 —≺ (C) X55/3 (V) ≻— 2 (C)	Ignition: **ON** Left front HS switch (N25/5s1) set to heating stage II.	11 - 14 V	Wiring.
6.0		**Left front seat cushion heater element (R13/1)** Resistance Model 210 Model 202 Model 170, 208	1 — (C) X55/3 (Ω) — 4 (C) 3 — (C) X55/3 (Ω) — 4 (C) 1 — (C) X55/3 (Ω) — 4 (C)	Disconnect connector C at X55/3. MB tex seats Leather seats Cloth and MB tex seats	 2.6 - 3.4 Ω 3.9 - 4.7 Ω 2.5 - 3.0 Ω Model 170 2.0 - 2.5 Ω Model 208 2.4 - 2.9 Ω	R13/1

G00041860

Fig. 14: System Tests - Steps 1-6 (1 Of 3)
Courtesy of DaimlerChrysler Corp.

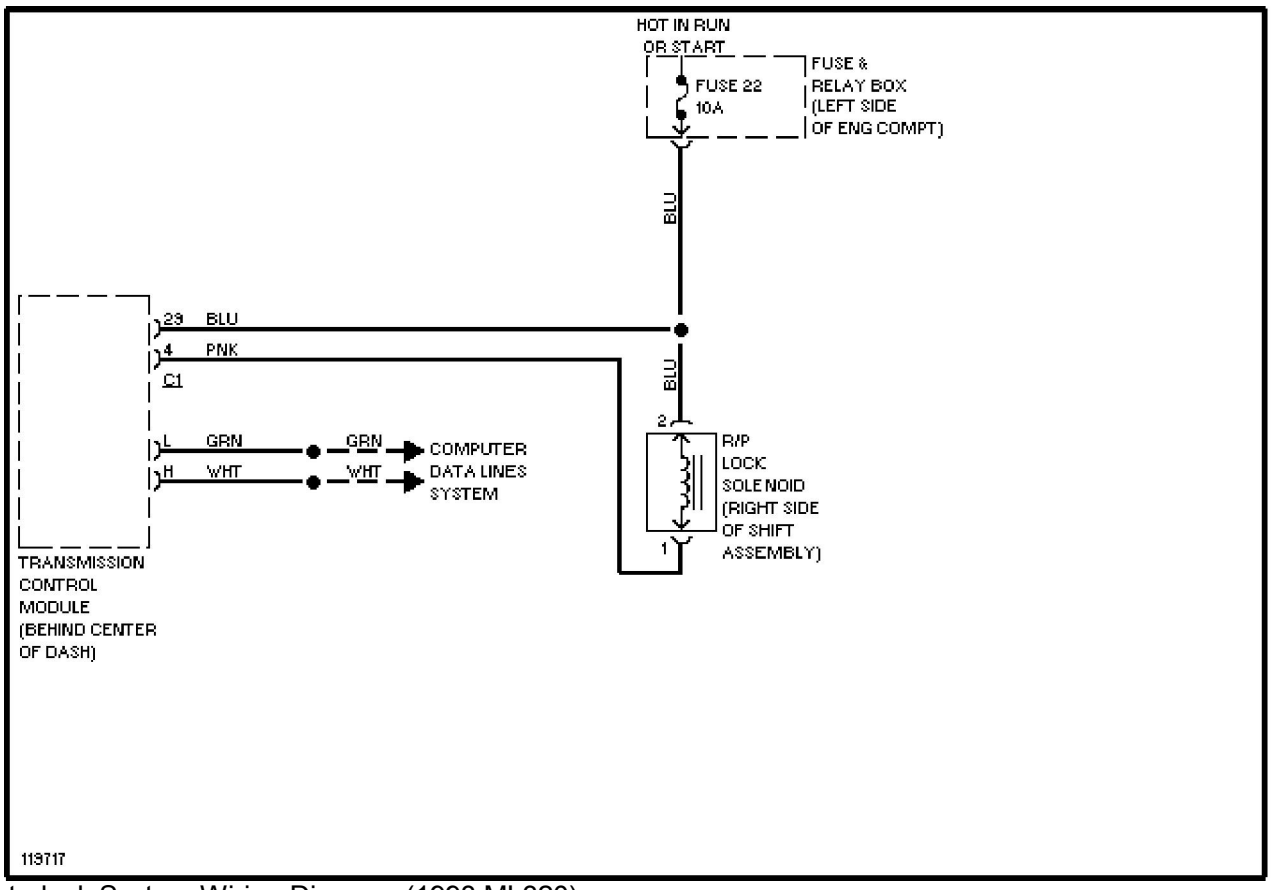


Fig. 11: Shift Interlock System Wiring Diagram (1998 ML320)

SHIFT INTER

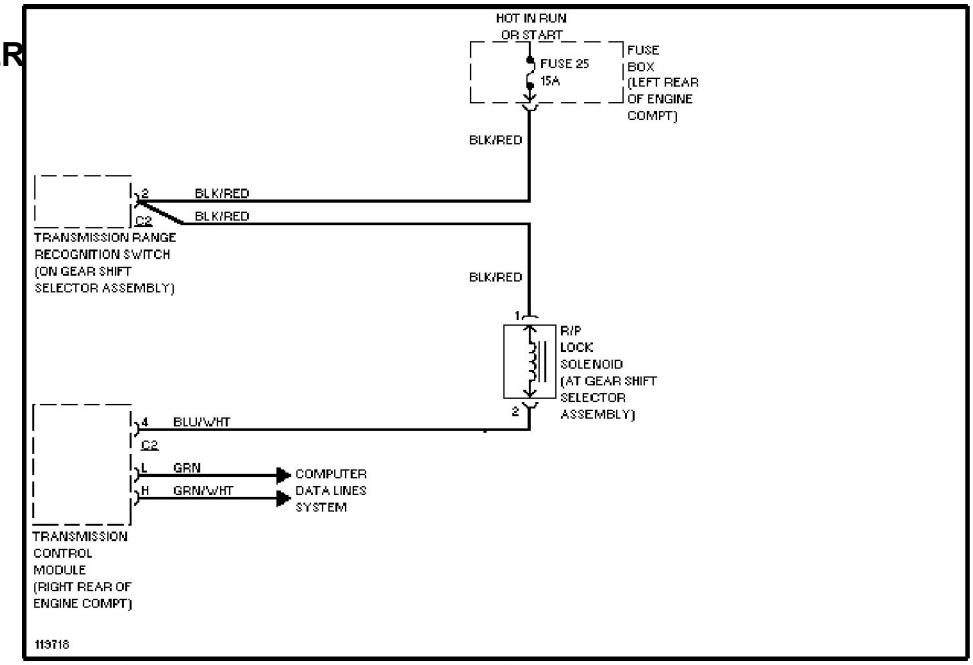


Fig. 12: Shift Interlock System Wiring Diagram (1998 S320, S420 & 1999 S500)

(2) - Replace at specified mileage or every 4 years.

MECHANICAL CHECKS

ENGINE COMPRESSION

COMPRESSION SPECIFICATIONS

Application	Specification
Compression Ratio (1)	
C230	
1998	10.4:1
1999	8.8:1
C280, C43, CLK320, CLK430, E320, E430, ML320, ML430, S320 & SL500	10.0:1
E300 Turbo Diesel	22.0:1
S420 & S500	11.0:1
SLK230	8.8:1
Compression Pressure	
Gasoline Engine	
Normal	
2.3L	160-218 psi (11-15 bar)
2.3L Supercharged	109-153 psi (7.5-10.5 bar)
2.8L V6	174-203 psi (12-14 bar)
3.2L V6	
CLK320 & E320	174-203 psi (12-14 bar)
ML320	145-174 psi (10-12 bar)
3.2L Inline 6-Cyl.	145-203 psi (10-14 bar)
4.2L V8	145-203 psi (10-14 bar)
4.3L V8	
C43 & CLK430	160-189 psi (11-13 bar)
E430	174-203 psi (12-14 bar)
ML430	145-174 psi (10-12 bar)
5.0L V8	
CL500, S500 & SL500 (1998)	145-203 psi (10-14 bar)
SL500 (1999)	174-203 psi (12-14 bar)
Minimum	
2.3L	(2)
2.8L & 5.0L (Eng. 113.961)	131 psi (9 bar)
3.2L (V6)	
CLK320 & E320	131 psi (9 bar)
ML320	116 psi (8 bar)
3.2L (I6), 4.2L, 4.3L & 5.0L (Eng. 119.98)	145 psi (10 bar)
3.2L (I6), 4.2L, 4.3L & 5.0L (Eng. 119.98)	145 psi (10 bar)
Maximum Difference Between Cylinders	
2.3L, 2.8L, 3.2L, 4.2L, 4.3L & 5.0L	22 psi (1.5 bar)
Diesel Engine (3.0L)	
Normal	421-508 psi (29-35 bar)
Minimum	261 psi (18 bar)
Maximum Difference Between Cylinders	44 psi (3 bar)

INSTALLATION. Insert retaining screws into clockspring assembly. Turn contact spiral counterclockwise until slight resistance is felt. Turn contact spiral back 2-2.5 turns until retaining screws can be removed.

REMOVAL & INSTALLATION

CLOCKSPRING

Removal & Installation

1) Remove steering wheel. See STEERING WHEEL. Remove lower instrument panel cover. Disconnect 2 clockspring electrical connectors. See Fig. 1. Loosen, but do not remove clockspring retaining screws. Gently remove clockspring from steering column.

2) Vehicles with Adaptive Damping System (ADS) or Electronic Stability Program (ESP) will have a steering angle sensor clipped to back of clockspring. After reassembly, sensor will need to be activated. See STEERING ANGLE SENSOR under ADJUSTMENTS. If clockspring was twisted during removal, it will need to be reset before reassembling. See CLOCKSPRING under ADJUSTMENTS. To install, reverse removal procedure.

COMBINATION SWITCH

Removal & Installation

Disconnect battery ground cable. Remove steering wheel. See STEERING WHEEL. Remove clockspring. See CLOCKSPRING. On S Class models, remove lower instrument panel cover. On all others, remove lower cover and lower section of driver's side instrument panel. On SL and ML Class vehicles, remove switch cover plate. On all models, remove 3 combination switch retaining screws. See Fig. 1. Depress connector lock on combination switch harness connector. Unplug electrical connectors. On S Class models, carefully remove combination switch and cruise control switch from steering column casing. On all others, remove steering column casing with switches, if necessary.

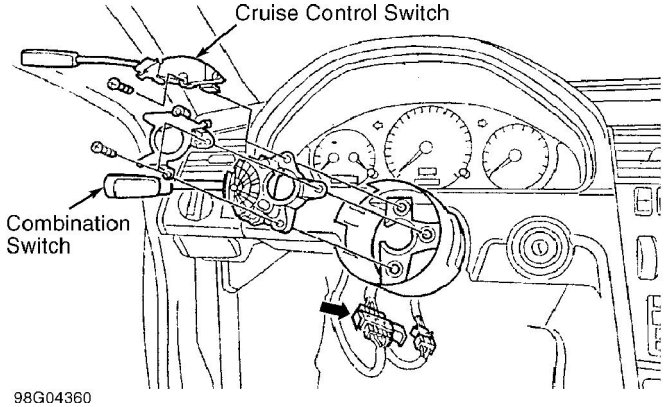


Fig. 1: Identifying Combination Switch & Steering Components (Typical)
Courtesy of Mercedes-Benz of North America.

STEERING WHEEL

Removal

1) Before proceeding, follow air bag precautions and disable SRS. See SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM. Remove air bag module. See AIR BAG MODULE. Disconnect horn electrical connectors from steering wheel.

2) Ensure front wheels are in straight-ahead position. Remove steering wheel hub nut. Mark steering wheel-to-shaft position for installation reference. Pull steering wheel off with hands or use steering wheel puller.

Installation

1) Position steering wheel onto shaft splines, aligning index marks made during removal, and aligning turn signal canceling cam on steering shaft with combination switch tang. Install steering wheel.

2) Install a NEW counter sunk screw and tighten to 60 ft. lbs. (80 N.m). Connect horn electrical connectors. Install air bag module. See AIR BAG MODULE. Connect horn wiring. Activate SRS and perform system operation check to ensure system is functioning properly. See DISABLING & ACTIVATING AIR BAG SYSTEM.

3) On vehicles equipped with Adaptive Damping System (ADS), steering wheel angle sensor MUST BE reactivated by starting engine then turning steering wheel lock to lock.

COMBINATION SWITCH

Removal

1) Remove air bag module and steering wheel. See AIR BAG MODULE and STEERING WHEEL under REMOVAL & INSTALLATION. Remove cover plate, containing SRS carbon brushes for air bag module deployment, from steering column and allow cover plate to hang loose. See Fig. 5.

2) Some models are equipped with Adaptive Damping System (ADS). These models will have a Hall Effect sensor cover plate that also must be carefully removed to access combination switch.

3) Remove lower instrument panel cover below steering wheel. Unplug combination switch harness connector mounted to instrument panel, left of steering column. Remove combination switch attaching screws. Remove combination switch from column, using care to guide wiring through column housing cover.

Installation

To install, reverse removal procedure. Ensure all electrical connections are tight. Ensure canceling operation of turn signal switch. Install steering wheel and air bag module. See AIR BAG MODULE and STEERING WHEEL under REMOVAL & INSTALLATION.

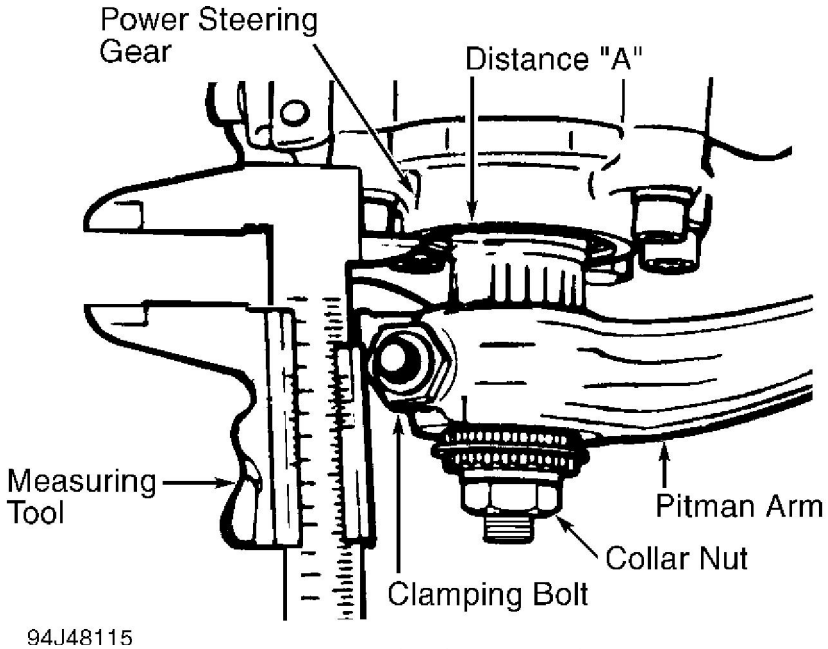


Fig. 6: Measuring Pitman Arm-To-Pitman Arm Shaft Bearing Cover
Courtesy of Mercedes-Benz of North America.

CAUTION: To prevent damage to contact spiral, remove ignition key. Allow steering wheel to lock. Steering wheel must NOT be allowed to turned when steering gear is removed. Electronic key must be kept separate.

Removal & Installation (C230, C280, CLK320, SL320, SL500 & SLK230)

1) Move adjustable steering column out fully (if equipped). Drain fluid from power steering pump reservoir. Remove under cover molding as necessary.

2) Disconnect steering linkage from pitman arm. DO NOT disconnect pitman arm from power steering gear splined shaft. Remove exhaust connecting pipe. Remove heat shield.

3) Disconnect hydraulic lines from power steering gear. Plug all openings to prevent contamination. Remove ignition key and allow steering lock to engage or remove electronic ignition key. Disconnect steering shaft from steering coupler. See Fig. 7.

4) On SLK230 models, disconnect ground strap from frame. Remove left and right engine mounts. Raise engine about 1.6" (40 mm) and push to right. On all models, remove steering gear mounting bolts. Move steering shaft from steering gear. Remove steering gear.

5) To install, turn steering gear into center position. Install steering gear, into steering coupler. Do NOT force steering coupling into steering shaft to prevent damage to lower steering shaft (collapsible tubing). Using NEW bolts, install steering gear to engine block. Tighten bolts to specifications. See TORQUE SPECIFICATIONS. On SLK230 models, lower engine and install engine mounts. Connect ground strap to frame.

Connector broken ..... A ..... Require repair or replacement.
Connector (Weatherpack type) leaking ..... A ..... Require repair or replacement.
Connector melted ..... A ..... (1) Require replacement.
Connector missing ..... C ..... Require replacement.
Leaking ..... B ..... Require repair or replacement.
Output incorrect ..... B ..... Require replacement.
Terminal burned, affecting performance ..... A ..... (1) Require repair or replacement.
Terminal burned, not affecting performance ..... 2 ..... Suggest repair or replacement.
Terminal corroded, affecting performance ..... A ..... Require repair or replacement.
Terminal corroded, not affecting performance ..... 2 ..... Suggest repair or replacement.
Terminal loose, affecting performance ..... B ..... Require repair or replacement.
Terminal loose, not affecting performance ..... 1 ..... Suggest repair or replacement.
Threads damaged ..... A ..... Require repair or replacement.
Threads stripped (threads missing) ..... A ..... Require replacement.
Wire lead burned ..... A ..... Require repair or replacement.
Wire lead conductors exposed ..... B ..... Require repair or replacement.
Wire lead open ..... A ..... Require repair or replacement.
Wire lead shorted ..... A ..... Require repair or replacement.

(1) - Determine cause and correct prior to repair or replacement of part.

AIR SUSPENSION DRIERS

AIR SUSPENSION DRIERS

Condition Code Procedure

Attaching hardware not functioning	A	.....	Require repair or replacement of hardware.
Attaching hardware threads damaged	A	.....	Require repair or replacement of hardware.
Attaching hardware threads stripped (threads missing)	A	.....	Require replacement of hardware.
Connector bent	A	.....	Require repair or replacement.
Connector broken	A	.....	Require repair or replacement.
Connector loose	A	.....	Require repair or replacement.
Electronic valve control inoperative	A	.....	(1) Require replacement.
Terminal bent	A	.....	Require repair or replacement.
Terminal broken	A	.....	Require repair or replacement.
Terminal corroded	A	.....	Require repair or replacement.
Terminal loose	A	.....	Require repair or replacement.

(1) - It is acceptable to replace with a non-electronically controlled unit, where available.

FLEX COUPLERS

See STEERING COUPLERS.

HEIGHT SENSORS

HEIGHT SENSORS

Condition	Code		Procedure
Attaching hardware broken	A	.....	Require repair or replacement of hardware.
Attaching hardware corroded, affecting structural integrity	A	.....	Require replacement of hardware.
Attaching hardware missing	C	.....	Require replacement of hardware.
Attaching hardware not functioning	A	.....	Require repair or replacement of hardware.

replacement.
Wire lead conductors exposed ..... B ..... Require repair or replacement.
Wire lead open ..... A ..... Require repair or replacement.
Wire lead shorted ..... A ..... Require repair or replacement.

(1) - Determine cause and correct prior to replacement of part.
(2) - Determine cause and correct prior to repair or replacement of part.

RADIUS ARMS

RADIUS ARMS

Condition	Code	Procedure
Attaching hardware broken	A	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware not functioning	A	Require repair or replacement of hardware.
Attaching hardware threads damaged	A	Require repair or replacement of hardware.
Attaching hardware threads stripped (threads missing)	A	Require replacement of hardware.
Bent	B	Require replacement.
Corroded, affecting structural integrity	A	Require replacement.
Holes distorted	A	Require replacement.
Threads damaged	A	Require repair or replacement.
Threads stripped (threads missing)	A	Require replacement.

RELAY RODS

RELAY RODS

Condition	Code	Procedure
Attaching hardware broken	A	Require repair or replacement of hardware.

hardware.

Binding ..... A ..... Require repair or replacement

Connector broken ..... A ..... Require repair or replacement.

Connector (Weatherpack type) leaking ..... A ..... Require repair or replacement.

Connector melted ..... A ..... Require replacement. See note below.

NOTE: Determine cause and correct prior to replacement of part.

Connector missing ..... C ..... Require replacement.

Fluid contaminated ..... B ..... (1) Require flushing and refilling of the system.

Gasket leaking ..... A ..... Require repair or replacement of gasket.

Housing leaking ..... A ..... Require replacement.

Hydraulic fittings leaking ..... A ..... Require repair or replacement of fittings.

Inadequate power assist ..... A ..... (2) Further inspection required.

Lash exceeds manufacturer's specifications ..... B ..... Require repair or replacement.

Malfunctioning ..... A ..... (3) Require repair or replacement.

Seal leaking ..... A ..... Require repair or replacement of seal and/or mating part.

Splines damaged ..... A ..... Require repair or replacement of splines.

Splines stripped ..... A ..... Require replacement of splines.

Steering coupler shield cracked ..... 2 ..... Suggest replacement.

Steering coupler shield missing ..... C ..... Require replacement.

Terminal burned, affecting performance ..... A ..... (4) Require repair or replacement.

Terminal burned, not affecting performance ..... 2 ..... Suggest repair or replacement.

Terminal corroded, affecting performance ..... A ..... Require repair or replacement.

Terminal corroded, not affecting performance ..... 2 ..... Suggest repair or replacement.

*** STEERING UNIFORM INSPECTION GUIDELINES**

Adjusting sleeve seized ..... A ..... (1) Require repair or replacement.
Adjusting sleeve threads damaged ..... A ..... Require repair or replacement of sleeve.
Adjusting sleeve threads stripped (threads missing) ..... A ..... Require replacement of sleeve.
Attaching hardware broken ..... A ..... Require repair or replacement of hardware.
Attaching hardware missing ..... C ..... Require replacement of hardware.
Attaching hardware not functioning ..... A ..... Require repair or replacement of hardware.
Attaching hardware threads damaged ..... A ..... Require repair or replacement of hardware.
Attaching hardware threads stripped (threads missing) ..... A ..... Require replacement of hardware.
Bent ..... A ..... Require replacement.
Binding ..... A ..... (2) Further inspection required.
Grease boot cracked ..... 2 .... (3) Suggest replacement of boot.
Grease boot missing ..... C .... (4) Require replacement of boot.
Grease boot torn ..... A .... (5) Require replacement of boot.
Grease fitting broken ..... A ..... Require replacement of grease fitting.
Grease fitting missing ..... C ..... Require replacement of grease fitting.
Grease fitting won't seal ..... A ..... Require replacement of grease fitting.
Grease seal missing ..... C .... (6) Require replacement of seal.
Grease seal torn ..... A ... (7) Required replacement of seal.
Greaseable tie rod end won't take grease ..... 2 .... (8) Suggest replacement of grease fitting.
Looseness (perceptible horizontal movement) ..... 1 ..... (9) Suggest replacement.
Looseness exceeds manufacturer's specifications ..... B ..... Require replacement.
Looseness that is excessive .... B ..... (10) Require replacement.
Noisy ..... 2 ..... (11) Further inspection

WHEELS (RIMS)

WARNING: Mounting a regular tire on a high-pressure compact spare wheel is not permitted. Attempting to mount a tire of one diameter on a wheel of a different diameter or flange type may result in serious injury or death. If the wheel identification stamp is not legible, or cannot be found, do not use the wheel until the size and type have been properly identified. Wheels of different diameter, offset, or width cannot be mixed on the same axle. Bead seat tapers cannot be interchanged.

WHEELS (RIMS)

Condition	Code	Procedure
Bead leaking, caused by wheel	A	(1) Require repair or replacement.
Bent hub mounting surface	A	Require replacement.
Bent rim, causing vibration	2	(1) Suggest replacement.
Broken	A	Require replacement.
Cast wheel porous, causing a leak	A	Require repair or replacement.
Clip-on balance weight is incorrect type for rim flange	2	Suggest replacement of weight.
Corrosion, affecting structural integrity	A	Require replacement.
Corrosion build-up on wheel mounting surface	A	Require repair.
Cracked	A	Require replacement.
Directional/asymmetrical wheels mounted incorrectly	B	Require remounting and/or repositioning.
Load capacity less than OEM specifications	B	Require replacement.
Mating surface distorted	A	Require replacement.
Offset mismatched on same axle	B	Require replacement.
Rivets leaking	A	Require replacement.
Run-out beyond OEM specs	B	(2) Require replacement.
Stud holes elongated	A	(3) Require replacement.
Welded or brazed repair	2	Suggest replacement.
Welds leaking	A	Require replacement.
Wheel centering (pilot) hole incorrect	B	Require replacement.

(1) - CAUTION: Do not attempt to correct a bent rim.
(2) - Some wire spoke wheels may be repaired.

consumer protection, are conducted. Feedback from these sessions is brought back to the association, and the program adjusted as needed.

To assure auto repair customers recourse if they were not satisfied with a repair transaction, the Motorist Assurance Program offers mediation and arbitration through the Better Business Bureau and other non-profit organizations. MAP conducted pilot programs in twelve states before announcing the program nationally in October 1998. During the pilots, participating repair shops demonstrated their adherence to the Pledge and Standards and agreed to follow the UICS in communicating the results of their inspection to their customers.

To put some "teeth" in the program, an accreditation requirement for shops was initiated. The requirements are stringent, and a self-policing method has been incorporated which includes the "mystery shopping" of outlets.

We welcome you to join us as we continue our outreach with your support, both the automotive repair industry and your customers will reap the benefits. Please visit MAP at our Internet site www.motorist.org or contact us at:

7101 Wisconsin Avenue
Bethesda, MD 20814
Phone (301) 634-4955 - Fax (202) 318-0378
January 2002
Map@motorist.org

OVERVIEW OF SERVICE REQUIREMENTS AND SUGGESTIONS

It is MAP policy that all exhaust, brake, steering, suspension, wheel alignment, drive-line, engine performance and maintenance, and heating, ventilation and air conditioning, and electrical services be offered and performed under the standards and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be "Required" or "Suggested". In addition, suggestions may be made to satisfy the requests expressed by the customer.

When a component is suggested or required to be repaired or replaced, the decision to repair or replace must be made in the customer's best interest, and at his or her choice given the options available.

This section lists the various parts and conditions that indicate a required or suggestedservice or part replacement. Although this list is extensive, it is not fully inclusive. In addition to this

replacing the grease fitting, suggest replacement of center link.

(8) - If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.

CAUTION: Do not use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

(9) - Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity. If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.

CAUTION: Do not use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

(10) - Check for damaged taper hole.
(11) - Check for damaged stud.

COMPRESSORS

COMPRESSORS

Condition	Code	Procedure
Attaching hardware broken	A	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware not functioning	A	Require repair or replacement of hardware.
Attaching hardware threads damaged	A	Require repair or replacement of hardware.
Attaching hardware threads stripped (threads missing)	A	Require replacement of hardware.
Connector bent	A	Require repair or replacement.
Connector broken	A	Require replacement.
Connector loose	A	Require repair or replacement.
Does not build pressure	A	Require replacement.
Excessive run time	B	Require replacement.
Inoperative	A	(1) Require replacement.
Leaking	A	Require repair or replacement.

		seal if available separately or bearing and seal together.
Binding	A	Require repair or replacement of affected parts.
End caps missing	C	Require replacement of missing part, if available; otherwise, replace king pin.
End play exceeds specifications	B	Require repair.
Grease fitting broken	A	Require replacement of grease fitting.
Grease fitting missing	C	Require replacement of grease fitting.
Grease fitting will not seal	A	Require replacement of grease fitting.
Locating pins missing	C	Require replacement of missing part, if available; otherwise, replace king pin.
Looseness exceeds manufacturer's specifications	B	Require replacement of worn parts.
Seized	A	Require replacement.
Threads damaged	A	Require repair or replacement.
Threads stripped (threads missing)	A	Require replacement.
Will not take grease	2	(1) Suggest replacement of grease fitting.

(1) - If king pin will not take grease after replacement of grease fitting, suggest replacement of king pin.

MODULES

See CONTROL MODULES.

PITMAN ARMS

PITMAN ARMS

Condition	Code	Procedure
Attaching hardware broken	A	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of

Attaching hardware corroded, affecting structural integrity ..... A ..... Require replacement of hardware.

Attaching hardware missing ..... C ..... Require replacement of hardware.

Attaching hardware not functioning ..... A ..... Require repair or replacement of hardware.

Attaching hardware threads damaged ..... A ..... Require repair or replacement of hardware.

Attaching hardware threads stripped (threads missing) ..... A ..... Require replacement of hardware.

Binding ..... A ..... Require replacement.

Body dented ..... A ..... (1) Further inspection required.

Body punctured ..... A ..... Require replacement.

Brake hose bracket bent ..... B ..... Require repair or replacement.

Brake hose bracket missing ..... C ..... Require replacement.

Brake hose bracket threads damaged ..... A ..... Require repair or replacement.

Brake hose bracket threads stripped (threads missing) ..... C ..... Require replacement.

Compression bumper missing ..... C ..... Require replacement of compression bumper.

Compression bumper split ..... 1 ..... Suggest replacement of compression bumper.

Damping (none) ..... A ..... Require replacement.

Dust boot (bellows) split ..... A .... (2) Require replacement of boot.

Dust boot (bellows) missing .... C .... (2) Require replacement of boot.

Dust boot (bellows) torn ..... A .... (2) Require replacement of boot.

Dust shield broken ..... 2 ..... (3) Suggest replacement.

Dust shield missing ..... 2 ..... (3) Suggest replacement.

Gland nut (strut housing cap) is not removable using appropriate tool ..... A .... (4) Require replacement of nut and/or housing.

Gland nut (strut housing cap) threads damaged ..... A ..... Require repair or replacement of nut.

Gland nut (strut housing cap) threads stripped (threads missing) ..... A ..... Require replacement of

hardware.

Attaching hardware not functioning ..... A ..... Require repair or replacement of hardware.

Attaching hardware threads damaged ..... A ..... Require repair or replacement of hardware.

Attaching hardware threads stripped (threads missing) ..... A ..... Require replacement of hardware.

Axial or radial movement exceeds vehicle manufacturer's specifications ..... B ..... Require replacement.

Bearing binding ..... A ..... Require replacement of bearing.

Bearing missing ..... C ..... Require replacement of bearing.

Bearing seized ..... A ..... Require replacement of bearing.

Bent ..... B ..... Require replacement.

Corroded, affecting structural integrity ..... A ..... Require replacement.

Holes distorted ..... A ..... Require replacement.

Missing ..... C ..... Require replacement.

Threads damaged ..... A ..... Require repair or replacement.

Threads stripped (threads missing) ..... A ..... Require replacement.

STRUT RODS

STRUT RODS

Condition	Code	Procedure
Adjusting nut seized	A	(1) Require repair or replacement.
Attaching hardware broken	A	Require repair or replacement of hardware.
Attaching hardware missing	C	Require replacement of hardware.
Attaching hardware not functioning	A	Require repair or replacement of hardware.
Attaching hardware threads damaged	A	Require repair or replacement of hardware.
Attaching hardware threads stripped (threads		

replacement.

Attaching hardware broken ..... A ..... Require repair or replacement of hardware.

Attaching hardware missing ..... C ..... Require replacement of hardware.

Attaching hardware not functioning ..... A ..... Require repair or replacement of hardware.

Attaching hardware threads damaged ..... A ..... Require repair or replacement of hardware.

Attaching hardware threads stripped (threads missing) ..... A ..... Require replacement of hardware.

Connector broken ..... A ..... Require repair or replacement.

Connector (Weatherpack type) leaking ..... A ..... Require repair or replacement.

Connector melted ..... A ..... (1) Require repair or replacement.

Connector missing ..... C ..... Require replacement.

Insulation damaged, conductors exposed ..... A ..... Require repair or replacement.

Insulation damaged, conductors not exposed ..... 1 ..... Suggest repair or replacement.

Open ..... A ..... Require repair or replacement.

Protective shield (conduit) melted ..... 2 ..... (1) Suggest repair or replacement.

Protective shield (conduit) missing ..... C ..... Require repair or replacement.

Resistance (voltage drop) out of specification ..... A ..... Require repair or replacement.

Routed incorrectly ..... B ..... Require repair.

Secured incorrectly ..... B ..... Require repair.

Shorted ..... A ..... Require repair or replacement.

Terminal broken ..... A ..... Require repair or replacement.

Terminal burned, affecting performance ..... A ..... (1) Require repair or replacement.

Terminal burned, not affecting performance ..... 2 ..... Suggest repair or replacement.

Application	Ohms
Fuel Injector	14-17

FUEL INJECTOR RESISTANCE (2.8L, 3.2L V6, 5.0L ENG. 113)

Application	Ohms
Fuel Injector	14-18

IGNITION SYSTEM

IGNITION COIL RESISTANCE SPECIFICATIONS (2.3L, 2.8L, 3.2L, 4.3L, 5.0L ENG. 113)

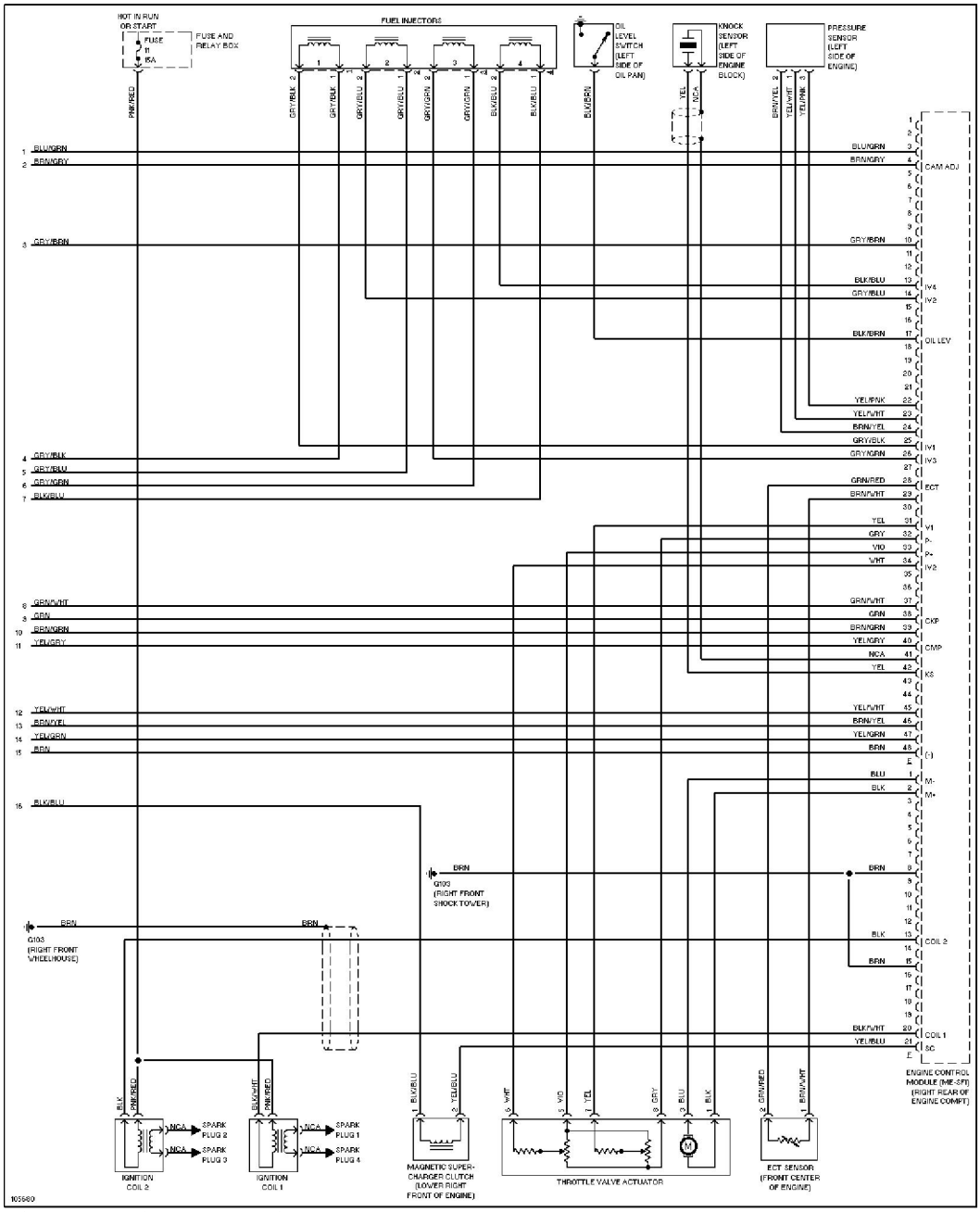
Application	Ohms @ 68°F (20°C)
Primary	
Single Coil	.6
Both Coils	0.9-1.6
Secondary	6000-8500

IGNITION COIL RESISTANCE SPECIFICATIONS (4.2L & 5.0L ENG. 119)

Application	Ohms @ 68°F (20°C)
Primary	0.9-1.4
Secondary	(1)

(1) - Specification is not available.

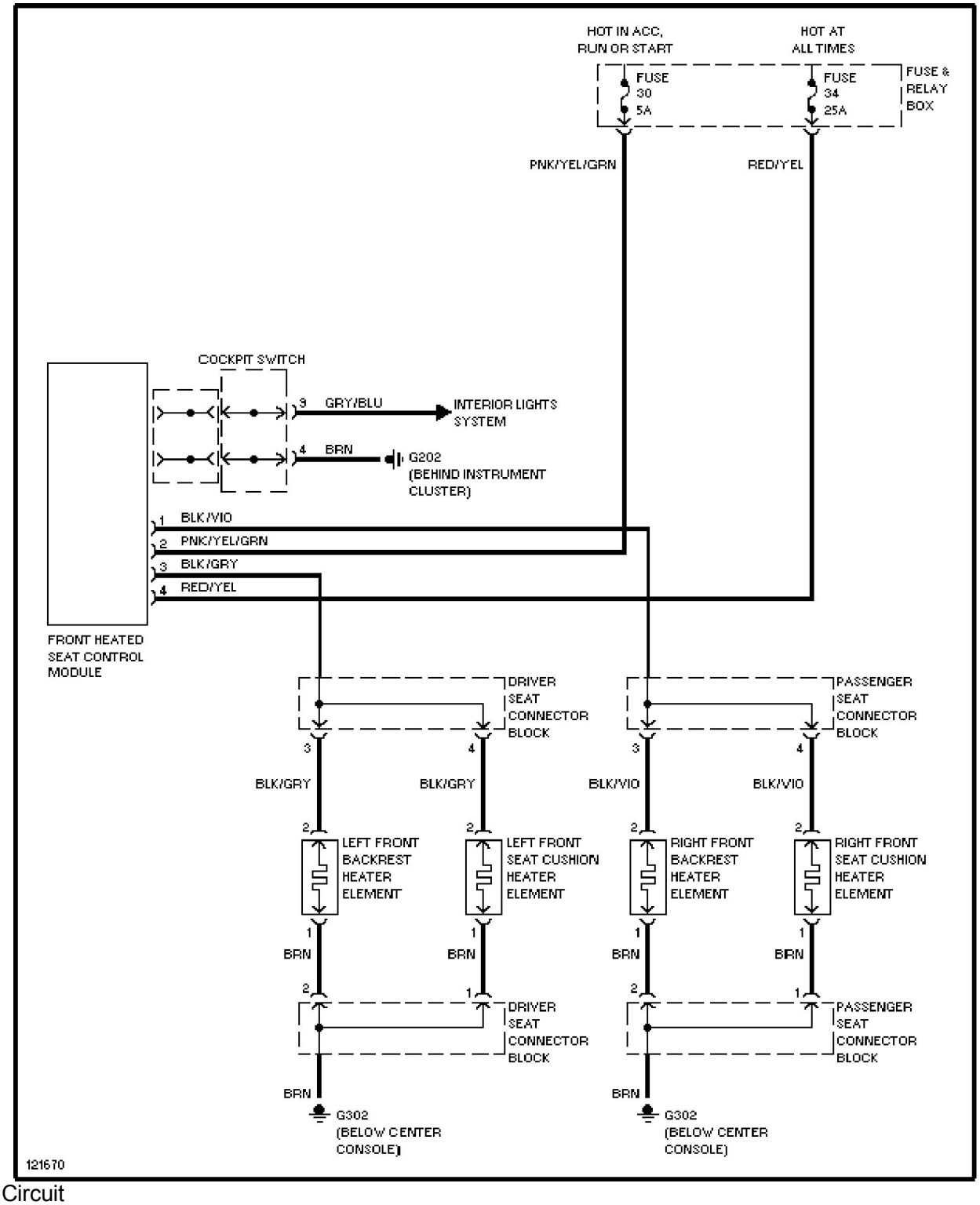
END OF ARTICLE



2.3L, Engine Performance Circuits (3 of 3)

SYSTEM WIRING DIAGRAMS Article Text (p. 13) 1998 Mercedes-Benz SLK230 For 1

EXTERIOR LIGHTS



Heated Seats Circuit

ignition is first turned on.

The following requirements must be present for ECM to self-adapt to lower mechanical end stop:

* Transmission in Park or Neutral
* Vehicle not moving
* Engine off
* Engine coolant temperature 41-212°F (5-100°C)
* Accelerator pedal not depressed

When all conditions are met, turn ignition on for at least 60 seconds, then turn ignition off for at least 10 seconds. The learned value is stored in memory only after the first 10 start cycles. If battery voltage is disconnected after the 9th start cycle, the re-learn process must be performed again.

Vehicle Speed Sensor (VSS) Adaption

After replacing an Engine Control Module (ECM), Crankshaft Position (CKP) sensor, starter ring gear or motor mount, sensor adaptation must be performed. Run engine until coolant temperature is more than 158°F (70°C). Drive vehicle. With gear selector in position 4, increase engine speed to approximately 2500 RPM, then coast until engine speed is less than 1500 RPM. Change gear selector to position 2. Increase engine speed to approximately 6100 RPM, then coast until engine speed is less than 4100 RPM. Again increase engine speed to approximately 6100 RPM, then coast until engine speed is less than 3000 RPM. Using scan tool, verify VSS adaptation has occurred.

Performance/Speedometer Test

Disconnecting Electronic Stability Program (ESP), Acceleration Slip Regulation (ASR), Electronic Traction Stability (ETS), Anti-lock Brake System (ABS) control modules is not allowed. The Engine Control Module (ECM) and Transmission Control Module (TCM) rely on these modules for Vehicle Speed Sensor (VSS) data through the Controller Area Network (CAN) bus. To disable brake and engine regulation functions of the ESP, ASR, ETS, ABS control modules, perform one of the following procedures:

* Working without scan tool - Turn ignition off, connect Adapter (140 589 14 63 00) to underhood Data Link Connector (DLC), jumper adapter sockets No. 1 and 6, start engine, BAS/ESP or BAS/ASR lights must illuminate. Erase DTCs after completing work.
* Using scan tool - Turn ignition off, disconnect front axle Vehicle Speed Sensor (VSS) connector, ESP/ASR light must illuminate. When diagnostic/repair work is completed, reconnect VSS connector. Erase DTCs after completing work.

CHECK ENGINE LIGHT

The ECM is equipped with Diagnostic Trouble Code (DTC)

CAUSE column. Proceed to test identified in TEST STEP/REMEDY column.

Complaint/Problem	Possible cause	Test step/Remedy
Engine starts and accelerates poorly when cold	Injector (Y62) activation and injection duration.	See FUEL INJECTION SYSTEM TESTS, steps 14-17.
	Hot film MAF sensor (B2/5).	See FUEL INJECTION SYSTEM TESTS, step 4.
	ECT sensor (B11/4).	See FUEL INJECTION SYSTEM TESTS, step 8.
	Ignition voltage too low.	See FUEL INJECTION SYSTEM TESTS, step 9.
	Intake air leak.	Remedy air leak.
Engine does not start	Voltage supply is missing.	See FUEL INJECTION SYSTEM TESTS, steps 1 and 2.
	Malfunction of drive authorization system (DAS) .	See FUEL INJECTION SYSTEM TESTS, step 32.
	Fuel pumps defective.	See FUEL PUMP TESTS.
	No compression, oil pressure too high.	Check compression and oil pressure.
	Ignition voltage too low.	See IGNITION SYSTEM TESTS, step 9.
Engine has uneven idle	Camshaft timing.	See FUEL INJECTION SYSTEM TESTS, steps 24 and 25.
	Injector (Y62) activation and injection duration.	See FUEL INJECTION SYSTEM TESTS, steps 14-17.
	Intake air leak.	Remedy air leak.

G99A08553

Fig. 15: Symptom Diagnostics (1 Of 3)
Courtesy of Mercedes-Benz of North America.

Complaint/Problem	Possible cause	Test step/Remedy
Engine has insufficient output	TWC flow restricted.	Check exhaust back pressure,
	O2S 1 (G3/2) (before TWC).	See FUEL INJECTION SYSTEM TESTS, steps 10 and 11.
	ECT sensor (B11/4).	See FUEL INJECTION SYSTEM TESTS, step 8.
	Hot film MAF sensor (B2/5).	See FUEL INJECTION SYSTEM TESTS, step 4.
	Camshaft timing.	See FUEL INJECTION SYSTEM TESTS, steps 24 and 25.
Engine runs unevenly (shakes)	Injector (Y62) activation and injection duration.	See FUEL INJECTION SYSTEM TESTS, steps 14 and 15.
	Injector leaking, spray pattern.	See FUEL INJECTOR TESTS, step 1.
	O2S 1 (G3/2) (before TWC).	See FUEL INJECTION SYSTEM TESTS, steps 10 and 11.
	Ignition voltage too low.	See FUEL INJECTION SYSTEM TESTS, step 9.
	Compression on one or more cylinders too low.	Check compression.
	Intake air leak.	Remedy air leak.
Engine runs unevenly (misfiring)	Ignition voltage too low.	See FUEL INJECTION SYSTEM TESTS, step 9.
	Hot film MAF sensor (B2/5).	See FUEL INJECTION SYSTEM TESTS, step 4.
Engine surges after cold start	Intake air leak.	Remedy air leak.

G99C08554

Fig. 16: Symptom Diagnostics (2 Of 3)
Courtesy of Mercedes-Benz of North America.

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
35.0	P0 805 P1 235	**Supercharger function**		Connect pressure tester to intake manifold. Drive vehicle on dynometer or road in transm. selector lever in range 3 or 3rd gear if manual trans. with full load at approx. 3500 rpm.	> 280 mbar pressure	⇒ 36.0 – 37.0 Air flap/air filter actuator (M16/7) binding, Charge air line plugged, Supercharger defective.
36.0	P0 806 P1 236	**Magnetic supercharger clutch (Y2/1)** Activation **Supercharger only**	N3/10 125 (21F) — (V) — 2 (2A)	Engine: **At Idle;** **Rapidly depress accelerator pedal (WOT):**	11 – 14 V, as long as the supercharger is engaged.	Wiring, Y2/1, N3/10
37.0	P0 803 P0 243	**Air flap/air filter actuator (M16/7)** Activation **Supercharger only**	N3/10 59 (3E) — (V) — 3 (3A)	Ignition: **ON** Engine: **At Idle;** **Rapidly depress accelerator pedal (WOT):**	1.0 – 1.4 V 2.0 – 12.0 V	Wiring, M16/7, N3/10

G99D05462

Fig. 44: Fuel Injection System Tests (Step 35.0-37.0)
Courtesy of Mercedes-Benz of North America.

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/remedy
38.0	P0 801 P1 181	**Engine/climate control electric cooling fan control module (N76)** Activation	N3/10 6 (6A) — (V) — 2 (2A)	Engine: **at Idle** ECT < 70 °C A/C system: **ON** ECT > 85 °C	1 – 1.9 V and fan is stopped. 2 – 4 V and fan runs. Between 2.5 – 12.5 V and fan runs according to activation.	Wiring, N76, N3/10

G99F05463

Fig. 45: Fuel Injection System Tests (Step 38.0)
Courtesy of Mercedes-Benz of North America.

E - THEORY/OPERATION - GASOLINE
Article Text
1998 Mercedes-Benz SLK230
For 1

Monday, March 19, 2012 08:52PM

ARTICLE BEGINNING

1998-2000 ENGINE PERFORMANCE
Theory & Operation - Gasoline

1998-2000: C230, C280, C43, CL500, CLK320, E320, E430, ML320, S320, S420, S500, SL500, SLK230
1999-2000: CLK430, ML430
2000: ML55

INTRODUCTION

This article covers basic description and operation of engine performance-related systems and components. Read this article before diagnosing vehicles or systems with which you are not completely familiar.

SYSTEM APPLICATION

SYSTEM APPLICATION

Year/Model	Fuel System	Ignition System
1998		
C230, S320 & SLK230	(1) ME-SFI	(2) EI
C280, C43, CLK320, E320, E430, ML320, S420, S500 & SL500	(3) ME-SFI	(2) EI
CL500	(4) ME-SFI	(2) EI
1999		
C230, S320 & SLK230	(1) ME-SFI	(2) EI
C280, C43, CLK320, CLK430, E320, E430, ML320, ML430 & SL500	(3) ME-SFI	(2) EI
CL500, S420 & S500	(4) ME-SFI	(2) EI
2000		
C230 & SLK230	(1) ME-SFI	(2) EI
C280, C43, CLK320, CLK430, CL500, E320, E430, E55, ML320, ML430, S430, S500 & SL500	(3) ME-SFI	(2) EI

(1) - Motor Electronics Sequential Fuel Injection ME-SFI (version 2.1).
(2) - Distributorless ignition system (EI).
(3) - Motor Electronics Sequential Fuel Injection ME-SFI (version 2.0).
(4) - Motor Electronics Sequential Fuel Injection ME-SFI (version 1.0).

NOTE: Malfunction Indicator Light (MIL) may also be referred to as CHECK ENGINE light.

REMOVAL & INSTALLATION

* PLEASE READ THIS FIRST *

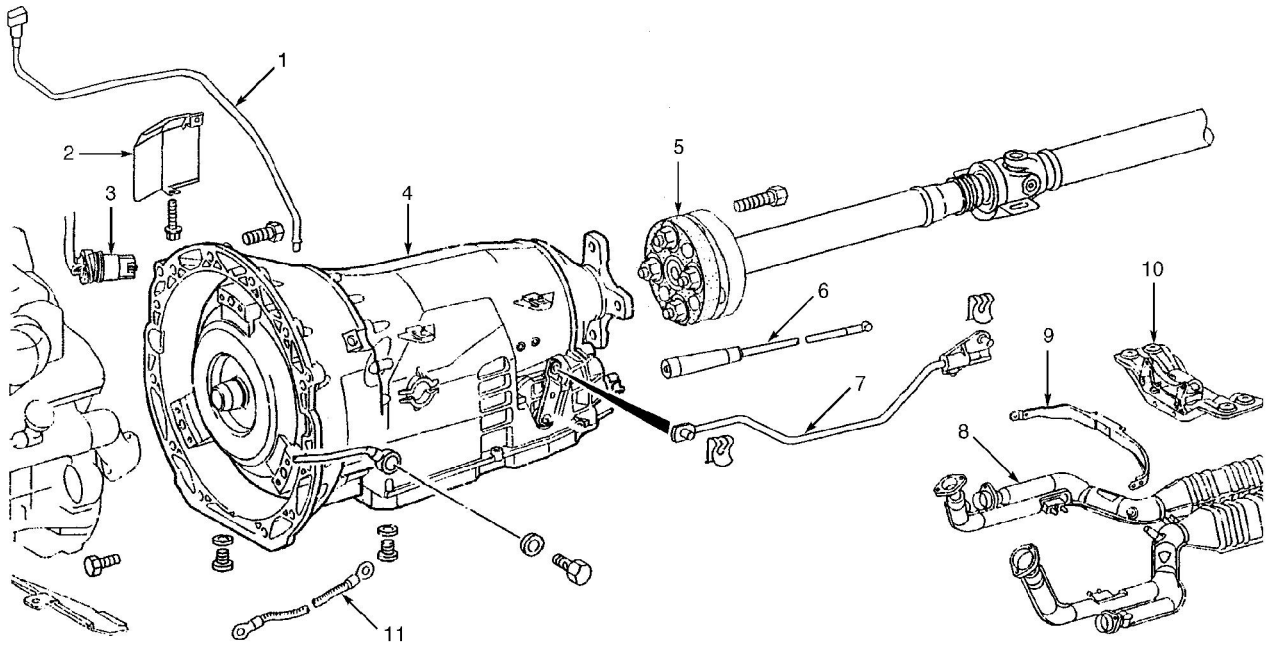
CAUTION: If metal chips are present in transmission oil pan, torque converter must be replaced. Flushing will not remove all metal chips from a torque converter. Failure to replace torque converter may result in future transmission failure.

TRANSMISSION (ALL MODELS)

WARNING: When removing transmission from engine, ensure torque converter does not fall out.

Removal

1) Disconnect negative battery cable. On S420, S500 and SL500, disconnect transmission oil filler pipe from engine. See Fig. 1 .



1. Transmission Oil Filler Pipe
2. Shield
3. 13-Pin Electrical Connector
4. Transmission
5. Drive Shaft Flange
6. Parking Lock Interlock
7. Shift Rod
8. Exhaust System
9. Exhaust Bracket
10. Crossmember With Mount
11. Ground Strap

Fig. 1: Removing & Installing Transmission (Typical)
Courtesy of Mercedes-Benz of North America.

2) On all models, rotate engine until torque converter drain plug is accessible. Remove torque converter drain plug, and drain fluid. Remove transmission oil pan drain plug and drain fluid.

3) Remove shield on right side of transmission. Disconnect

	defective	article
	Open solenoid pull-in wire	See Testing in STARTER article
Starter Does Not Operate and Headlights Dim	Weak battery or dead cell	Charge or replace battery as necessary
	Loose or corroded battery connections	Check that battery connections are clean and tight
	Internal ground in starter windings	See Testing in STARTER article
	Grounded starter fields	See Testing in STARTERS
	Armature rubbing on pole shoes	See STARTER article
Starter Turns but Engine Does Not Rotate	Starter clutch slipping	See STARTER article
	Broken clutch housing	See STARTER article
	Pinion shaft rusted or dry	See STARTER article
	Engine basic timing incorrect	See Ignition Timing in TUNE-UP article
	Broken teeth on engine flywheel	Replace flywheel and check for starter pinion gear damage
Starter Will Not Crank Engine	Faulty overrunning clutch	See STARTER article
	Broken clutch housing	See STARTER article
	Broken flywheel teeth	Replace flywheel and check for starter pinion gear damage
	Armature shaft sheared or reduction gear teeth stripped	See STARTER article
	Weak battery	Charge or replace battery as necessary
	Faulty solenoid	See On-Vehicle Tests in **TROUBLE SHOOTING - BASIC PROCEDURES A**

External Oil Leakage	Fuel pump improperly seated or worn gasket	Remove pump, replace gasket and seat properly
	Oil pan gasket broken or pan bent	Straighten pan and replace gasket
	Timing chain cover gasket broken	Replace timing chain cover gasket
	Rear main oil seal worn	Replace rear main oil seal
	Oil pan drain plug not seated properly	Remove and reinstall drain plug
	Camshaft bearing drain hole blocked	Remove restriction
	Oil pressure sending switch leaking	Remove and reinstall sending switch
Excessive Oil Consumption	Worn valve stems or guides	Replace stems or guides, See ENGINES
	Valve "O" ring seals damaged	Replace "O" ring seals, See ENGINES
	Plugged oil drain back holes	Remove restrictions
	Improper PCV valve operation	Replace PCV valve
	Engine oil level too high	Remove excess oil
	Engine oil too thin	Replace thicker oil
	Valve stem oil deflectors damaged	Replace oil deflectors
	Incorrect piston rings	Replace piston rings, See ENGINES
	Piston ring gaps not staggered	Reinstall piston rings, See ENGINES
	Insufficient piston ring tension	Replace rings, See ENGINES
	Piston ring grooves or oil return slots clogged	Replace piston rings, See ENGINES
	Piston rings sticking in grooves	Replace piston rings, See ENGINES
	Piston ring grooves excessively worn	Replace piston and rings, See ENGINES
	Compression rings installed upside down	Replace compression rings correctly, See ENGINES
	Worn or scored cylinder walls	Rebore cylinders or replace block
	Mismatched oil ring expander and rail	Replace oil ring expander and rail, See ENGINES
	Intake gasket dowels too long	Replace intake gasket dowels
	Excessive main or connecting rod bearing clearance	Replace main or connecting rod bearings, See ENGINES

	CONTROL LABEL (where applicable)
Check for engine overheating problems	Low coolant, loose belts or electric cooling fan inoperative

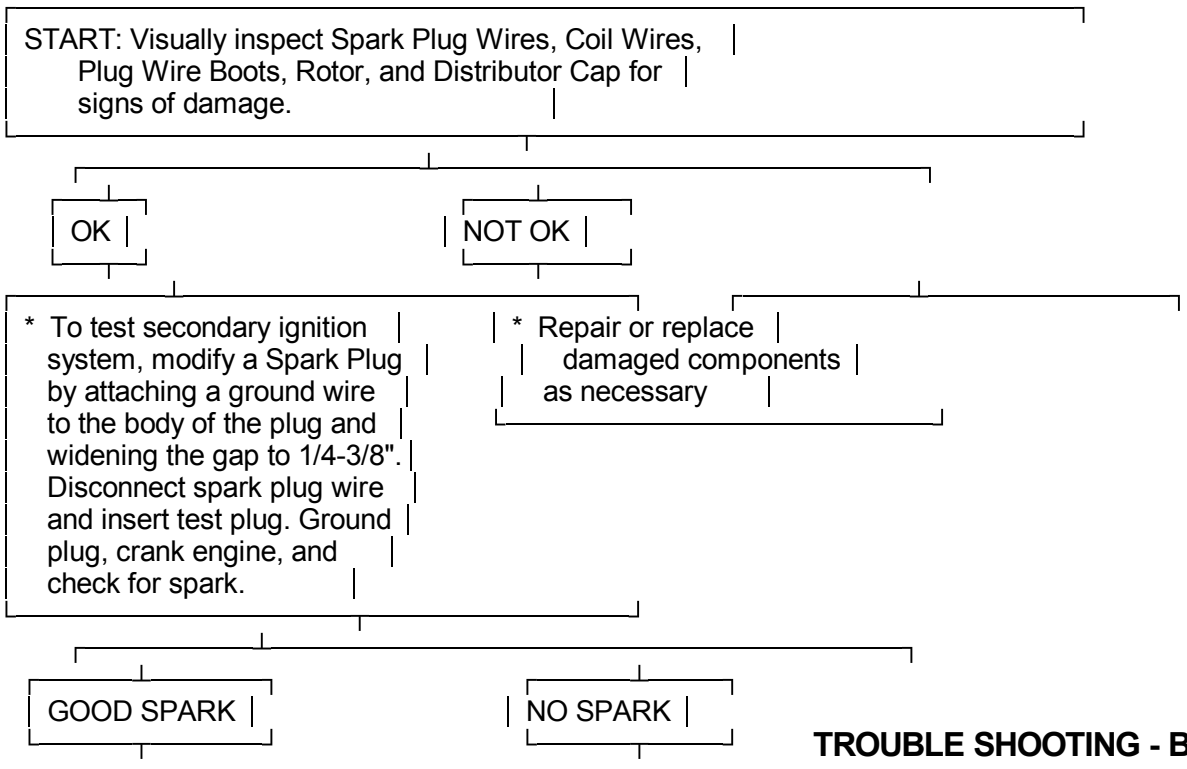
---

NOTE: For additional electronic fuel injection trouble shooting information, see the appropriate article in the ENGINE PERFORMANCE section (not all vehicles have Computer Engine Control articles). Information is provided there for diagnosing fuel system problems on vehicles with electronic fuel injection.

IGNITION SYSTEM TROUBLE SHOOTING

NOTE: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

Ignition Secondary Trouble Shooting Chart



	Clogged air cleaner	Replace air filter
	Defective spark plugs	Replace spark plugs
	Defective ignition wires	Replace ignition wire see ENGINE PERFORMANCE
	Defective distributor cap	Replace distributor cap
Faulty High Speed Operation	Incorrect ignition timing	Reset ignition timing see ENGINE PERFORMANCE
	Defective distributor centrifugal advance	Replace advance mechanism
	Defective distributor vacuum advance	Replace advance unit
	Incorrect spark plugs or plug gap	Check gap and/or replace spark plugs
	Faulty choke operation	Check choke and repair as required
	Clogged vacuum passages	Remove restrictions
	Improper size or clogged main jet	Check jet size and clean, see FUEL
	Restricted air cleaner	Check filter and replace as necessary
	Defective distributor cap, rotor or coil	Replace cap, rotor or coil
Misfire at All Speeds	Defective spark plugs	Replace spark plugs
	Defective spark plug wires	Replace spark plug wires
	Defective distributor cap, rotor, or coil	Replace cap, rotor, or coil
	Cracked or broken vacuum hoses	Replace vacuum hoses
	Vacuum leaks	Repair vacuum leaks
	Fuel lines clogged	Remove restriction

CONDITION	POSSIBLE CAUSE	CORRECTION
Knocking or Clunking		
	Differential Side Gear Clearance	Check Clearance
	Worn Pinion Shaft	Replace Pinion Shaft
	Axle Shaft End Play	Check End Play
	Missing Gear Teeth	Check Differential/ Replace Gear
	Wrong Axle Backlash	Check Backlash
	Misaligned Driveline	Realign Driveline
Clinking During Engagement		
	Side Gear Clearance	Check Clearance
	Ring and Pinion Backlash	Check Backlash
	Worn/Loose Pinion Shaft	Replace Shaft/Bearing
	Bad "U" Joint	Replace "U" Joint
	Sticking Slip Yoke	Lube Slip Yoke
	Broken Rear Axle Mount	Replace Mount
	Loose Drive Shaft Flange	Check Flange
Click/Chatter On Turns		
	Differential Side Gear Clearance	Check Clearance
	Wrong Turn On Plates (1)	Replace Clutch Plates
	Wrong Differential Lubricant (1)	Change Lubricant
Knock Or Click	Flat Spot on Rear Wheel Bearing	Replace Wheel Bearing
Low Vibration At All Speeds		
	Faulty Wheel Bearing	Replace Wheel Bearing
	Faulty "U" Joint	Replace "U" Joint
	Faulty Drive Shaft	Balance Drive Shaft
	Faulty Companion Flange	Replace Flange

	Loose steering gear-to-frame bolts	See STEERING
	Worn control arm bushings	See SUSPENSION
	Ball joints not lubricated	Lubricate ball joints & see Ball Joint Checking in SUSPENSION
Front Wheel Shake, Shimmy, or Vibration	Tires or wheels out of balance	Check tire balance
	Incorrect wheel alignment	See WHEEL ALIGNMENT
	Drive shaft unbalanced	Check drive shaft balance
	Loose or worn wheel bearings	See WHEEL ALIGNMENT
	Loose or worn tie rod ends	See SUSPENSION
	Worn upper ball joints	See Ball Joint Checking in SUSPENSION
	Worn shock absorbers	Replace shock absorbers
	Worn strut bushings	Replace strut bushings
Car Pulls to One Side	Mismatched or uneven tires	Check tire condition
	Broken or sagging springs	See SUSPENSION
	Loose or worn strut bushings	See SUSPENSION
	Improper wheel alignment	See WHEEL ALIGNMENT
	Improper rear axle alignment	Check rear axle alignment
	Power steering gear unbalanced	See STEERING
	Front brakes dragging	See BRAKES
Abnormal Tire Wear	Unbalanced tires	Check tire balance & rotation
	Sagging or broken springs	See SUSPENSION

CHECKING RIDING HEIGHT

NOTE: This procedure is to be used only if Measuring Device (201 589 00 21 00) is available. It is necessary to check vehicle riding height using a servicing pit or alignment rack. Vehicle weight must be on wheels.

NOTE: On vehicles with Adaptive Damping System (ADS), ensure oil level in level control system is full and system is functioning properly. If vehicle with ADS is too low, level must NOT be corrected by modifying connecting rod of the level control. Check level control system functions. Adjust vehicle level by changing springs or spring rubber mounts. See ADJUSTING RIDING HEIGHT.

Front Axle (C230, C280, CL500, S320, S420, S500, SL320, SLK230, E300D, E320, E420 & E430

1) Lift and support vehicle. Remove engine splash-shield. Lower vehicle. Bounce vehicle several times to settle suspension. Position Measuring Device (201 589 00 21 00 except SLK230 & SL500; 201 589 01 21 00 on SLK230 & SL500) between front and rear eccentric bolts on wishbone mounts. See Fig. 1.

2) Ensure measuring device is positioned so scale can be read from center of vehicle. When measuring right side of vehicle, use "+" and "-" signs on upper section of scale. When measuring left side of vehicle, use "-" and "+" signs on lower section of scale. See RIDING HEIGHT SPECIFICATIONS table. If riding height is not within specification, repair or replace suspension components as necessary. See ADJUSTING RIDING HEIGHT.

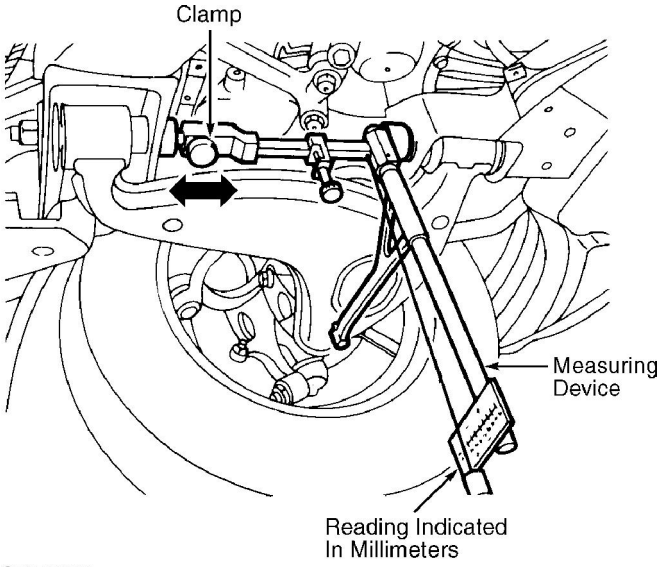


Fig. 1: Measuring Front Riding Height
Courtesy of Mercedes-Benz of North America.

NOTE: Vehicles with Acceleration Slip Regulation (ASR) are equipped with a wear indicator for both front and rear axle.

WHEEL ALIGNMENT THEORY/OPERATION
Article Text
1998 Mercedes-Benz SLK230
For 1

Monday, March 19, 2012 09:02PM

ARTICLE BEGINNING

GENERAL INFORMATION
Wheel Alignment Theory & Operation

All Models

ADJUSTMENTS

* PLEASE READ THIS FIRST *

NOTE: This article is intended for general information purposes only. This information may not apply to all makes and models.

PRE-ALIGNMENT INSTRUCTIONS

GENERAL ALIGNMENT CHECKS

Before adjusting wheel alignment, check the following:

* Each axle uses tires of same construction and tread style, equal in tread wear and overall diameter. Verify that radial and axial runout is not excessive. Inflation should be at manufacturer's specifications.
* Steering linkage and suspension must not have excessive play. Check for wear in tie rod ends and ball joints. Springs must not be sagging. Control arm and strut rod bushings must not have excessive play. See Fig. 1.

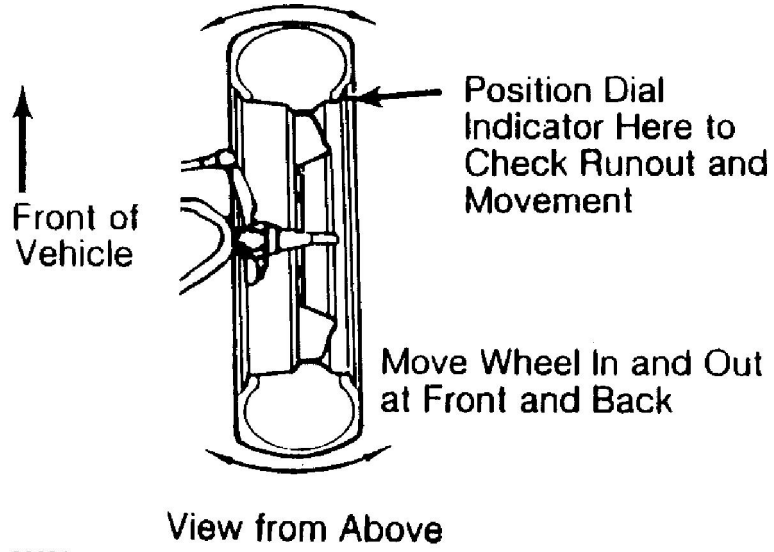
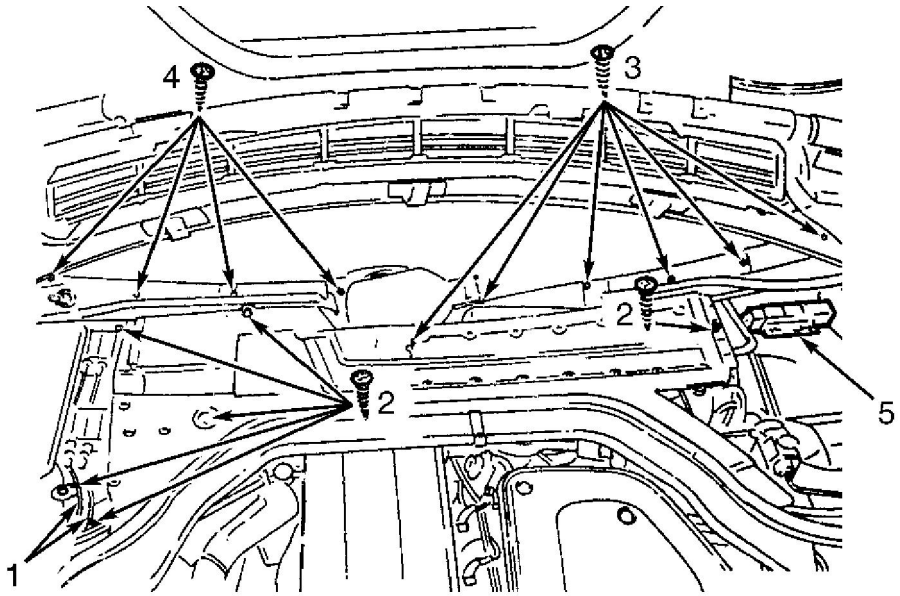


Fig. 1: Checking Steering Linkage

* Vehicle must be on level floor with full fuel tank, no passenger load, spare tire in place and no load in trunk. Bounce front and rear end of vehicle several times. Confirm



1. Vacuum Lines
2. Air Box Screws
3. Left Cover Screws
4. Right Cover Screws
5. Wiper Relay

99A51060

Fig. 11: Removing Wiper System Components (CL500 & S Class)
Courtesy of Mercedes-Benz of North America.

Removal (SL500)

Remove 3 wiper motor nuts and 2 lower wiper motor screws. See Fig. 12. Open cable strap holding wiper motor harness. See Fig. 13. Disconnect wiper motor harness connector from wiper relay. Push connector and grommet through firewall and remove wiper motor with gearbox. Remove crank arm nut from wiper motor shaft. Press off crank arm. Unbolt 3 wiper motor screws and remove motor.

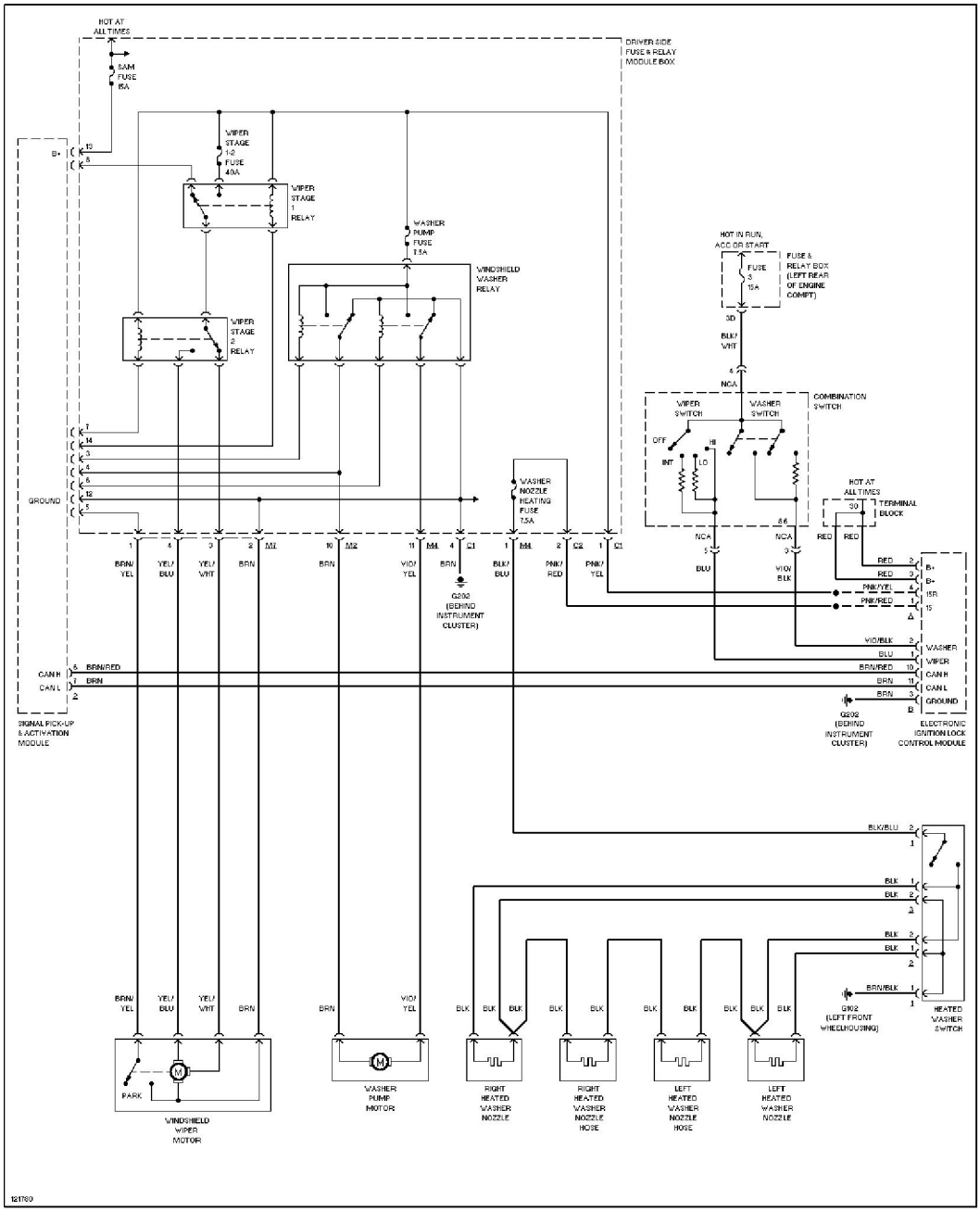


Fig. 25: Windshield Wiper/Washer System Wiring Diagram (1998 E300, E320 & E420)

