

## Mercedes Diesel Glow Plugs

Mercedes diesel engines have used one of two basic glow plug system types over the years: Serial and Parallel.

- Most models from 1958 to 1976 used a pull start/preheating switch mounted on the dashboard. This system was very simple. It didn't even have a relay. Current draw from this early system was very high.
- The 1975-76 300D deleted the pull switch, and added a relay and thermo time switch which controlled how long the glow plugs stayed on. All 1977-79 models added a 50 amp fuse and a modified wiring harness.
- In 1978 Benz turbo diesels were changed over to a parallel quick glow system. This greatly improved system has been used with minor changes on all Benz diesels since 1980. Parallel systems are protected by an 80 amp fuse.

The parallel system eliminated problems caused by any series circuit which experiences an open circuit. Old Christmas tree lights wired in series are a good example. When one bulb burned out, they all went out.

The same thing happened with the series glow plug system. Any open circuit in the system meant that the entire system failed to work. That meant no-starts, even in warm weather. Parallel systems eliminated that problem.

The other advantage to the parallel system was reduced maintenance. So in terms of improved reliability and reduced maintenance cost, the parallel system was a cheap, relatively trouble-free improvement.

### System Operation

As with any electrical system, the Benz glow plug system needed the following minimum components:

- A power source (the battery)
- A switch (pull switch or key tumbler)
- A circuit protector (either a 50 or an 80 amp fuse was used)
- And Loads (the glow plugs themselves)

Later systems added:

- A relay (mounted either under the dash near the steering column or under the hood on the left inner fender)
- And a thermo time switch or temp sensor on the cylinder head

As we proceed, remember that all glow plug systems have a big appetite for electrical current. A good battery of the correct size, and a properly operating charging system are very important parts of any glow plug system.

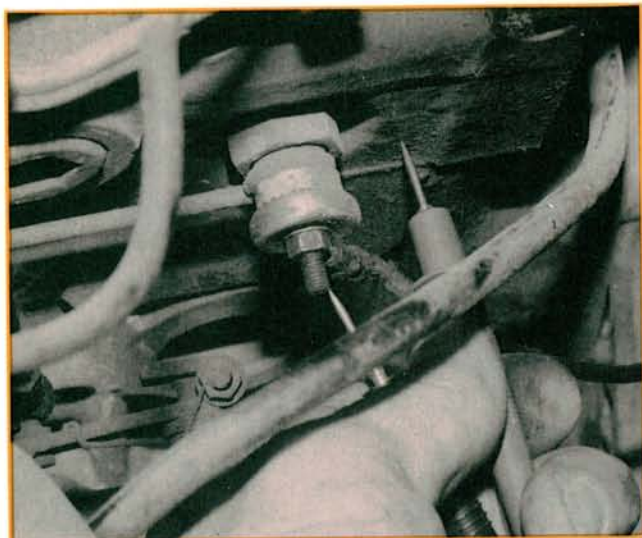
### Diagnostics

Let's get something straight before we start. Glow plugs are not like spark plugs. The glow plugs operate only during start up to warm the prechamber. This assists initial fuel ignition. After start up, the high (22 to 1) compression ratio of the diesel engine takes over as the ignition source. Now that we have that part straight, let's move on.

We'll start with series systems, since they were the first ones used, and require the most maintenance.

All Benz series systems should be serviced at least once a year. Doing the maintenance in the fall, just before the onset of cold weather makes sense. We'll show you all the steps to keeping the series system healthy.

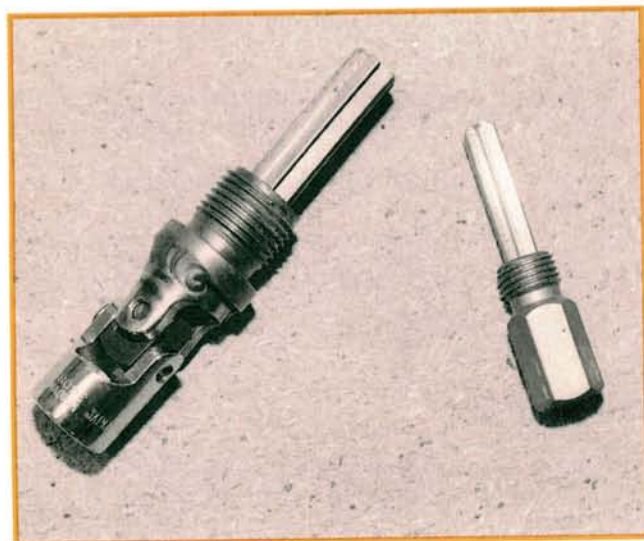
# DRIVEABILITY CLINIC



**1** Start checking the series system with this simple test. All you need is an 8 mm wrench and an ohmmeter. Disconnect the glow plug power source and ground connections. These attachments will be at glow plugs one and four, or one and five, depending on how many cylinders there are. Now check for continuity between the threaded terminal of any glow plug and the engine ground. If there's any continuity, there's a short in the system.



**2** Using the same 8 mm wrench, begin removing the resistor loops from the plugs. Pay special attention to how they come off and also note their positions on the insulators. They must go back the same way they came off. Lay them aside in the order in which they're removed. Now remove all the glow plugs. Carbon build up in the head may make the glow plugs tough to remove, so don't be surprised if it takes some effort to unscrew them.

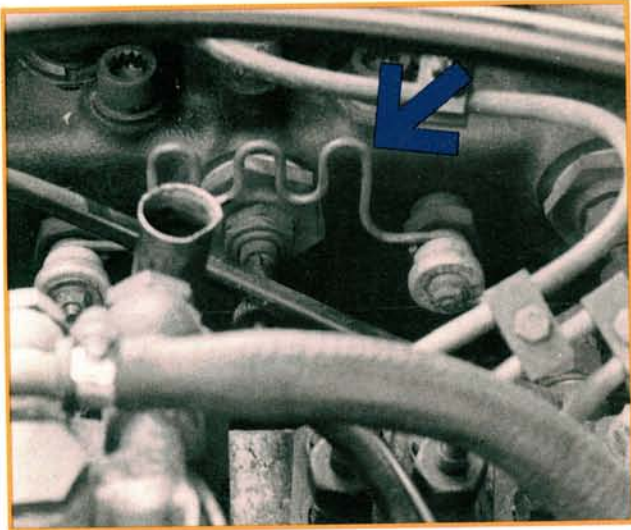


**3** The carbon build up in the plug holes can cause another problem. Carbon is a conductor. When enough carbon builds up, it can short out the system. Special reamers for both types of glow plugs are available from Baum Tools, Circle No. 220. In a pinch, use a sharp  $7/16$  inch drill bit cut down to a 3 inch length and turned by hand to remove the carbon. No power drills here. One slip and you may damage the prechamber. Then protect your eyes, and blow out the loose carbon with a blast of compressed air.



**4** Next, clean all of the components with a wire wheel. That includes all resistor connectors, insulators, and the glow plug ends themselves. Then bench test every plug with an ohmmeter. At this point we're looking for shorts. Connect the ohmmeter leads between the body of the plug and the threaded contact as shown. If there's any continuity at all, replace the plug. Replace only those plugs that test bad.

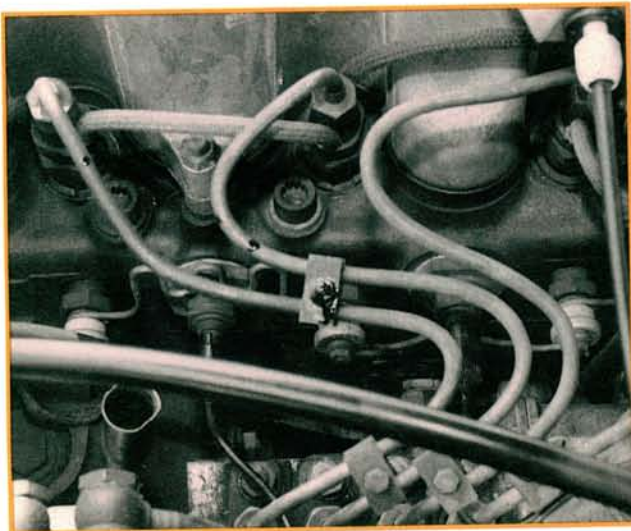
# DRIVEABILITY CLINIC



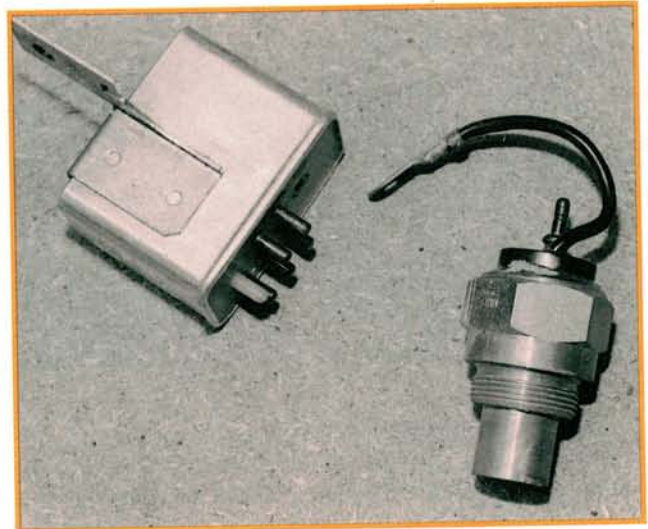
**5** All series systems have resistor coils connecting the glow plugs. The reason we had you lay the coils out in order, is that they are shaped differently, and are installed a certain way. The coils must be reinstalled in the same order and position of their removal. And they must be reinstalled on the proper side of the insulators. Failure to do this part of the job properly can result in an immediate dead short, or a short caused when a linkage contacts one of the resistors.



**6** We want the resistance in the circuit limited to the glow plugs themselves. High resistance at other connections in the circuit reduces the system's efficiency. Use a piece of emery to clean the hot and ground eyelets attached to the glow plug string. And always clean the fuse eyelets (if the system has a fuse). Corrosion causes high resistance at the fuse connections. The fuses corrode in a hurry. A blown fuse usually indicates a shorted plug. Remember, glow plugs have a big appetite for current.

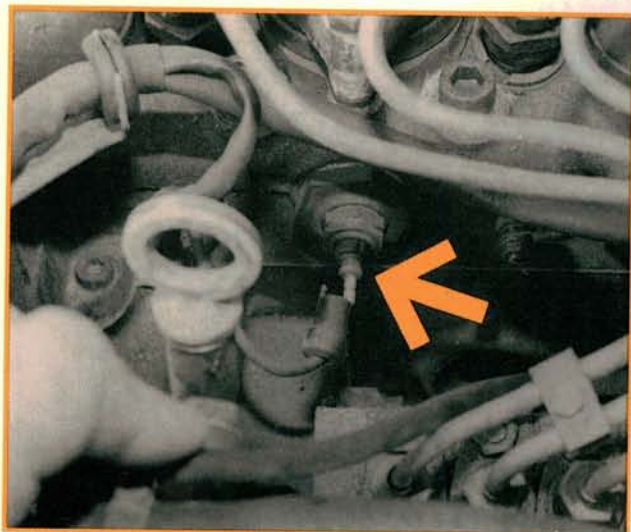


**7** Reinstall (hand tighten only) the glow plugs. They should thread in easily now if you removed all the carbon. Attach the insulators and resistor loops. Double check for any continuity to ground one more time before attaching the power and ground leads. It may seem like double work, but it sure beats powering up a system with a short, and damaging expensive components. If everything checks out okay go ahead and power up the system.

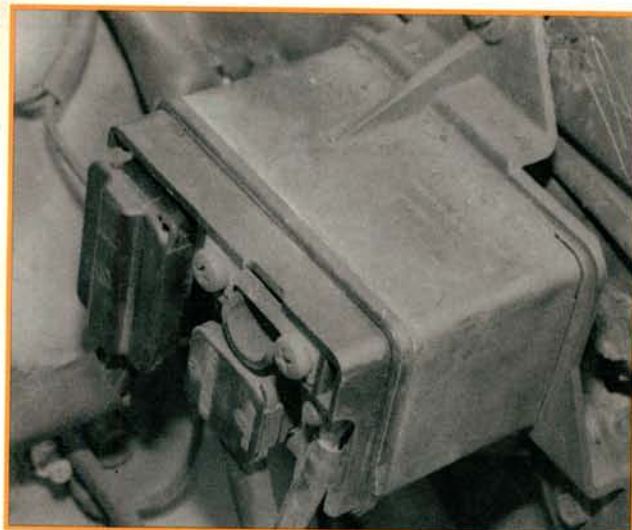


**8** Here are a few final notes. The series preglow relays do occasionally suffer heart failure. And temp sensors are usually bullet proof. If the car starts properly, but the dash light won't come on, unplug the wire at the sensor and touch it to ground with the key on. If the preglow light comes on, the sensor is bad. The indicator light bulbs in the dash can burn out too. Checking the bulb itself is a logical place to start if the dashboard indicator doesn't illuminate, even with the wire grounded.

# DRIVEABILITY CLINIC



**9** As we've already mentioned, the parallel glow plug system is not only more reliable than the series system, it also requires a lot less maintenance. But that doesn't mean we should ignore them. Unlike the series system, one or more of the glow plugs in a parallel system can fail without affecting the entire system. In warm weather, the customer may not notice any serious problem starting his car. In cold weather that will change. The good news is that all tests of the parallel system can be performed at the glow relay.

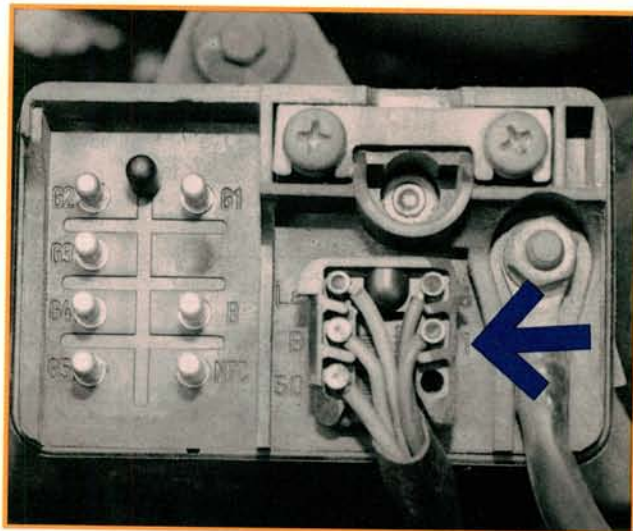


**10** The glow relay is under the hood, on the left inner fender well. Remove the multipoint connector for the glow plug feeds, and test with an ohmmeter between each plug socket and engine ground. There is a numbering glitch on 1978-80 vehicles. The numbers on the relay terminal don't correspond to the respective glow plug number. We don't know why. Here are the match ups:

Relay Terminal	1	2	3	5	7
Glow Plug	↓ 2	↓ 1	↓ 3	↓ 4	↓ 5



**11** On later systems things make a lot more sense. The numbers on the relay terminals correspond to the respective glow plugs, and are numbered 1 through 5. On all systems, the results are the same. Infinity indicates an open circuit (usually the glow plug itself). A reading of one ohm or less probably means a short (again, usually the glow plug). The advantage here is that you can isolate and repair individual glow plugs and their subcircuits without disassembling the entire glow plug system.

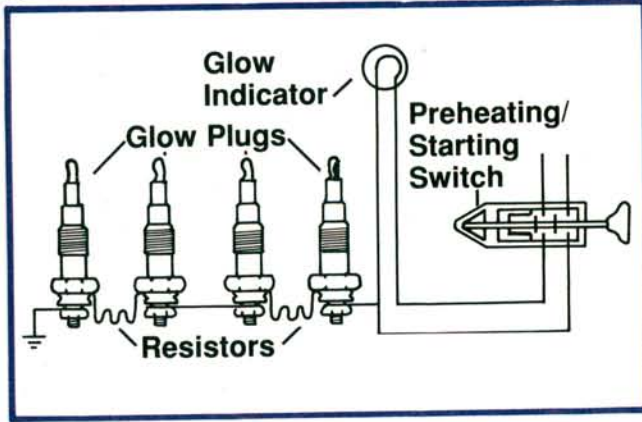


**12** At the smaller connector of the glow plug relay, you can check the dashboard indicator light. On early versions of the relay, use an ohmmeter to measure between ground and relay terminal number 1. A reading of infinity indicates an open circuit (usually the bulb). A reading of 100 ohms or less should lead you to a bad relay. Use this same procedure to check later style relays, but test between terminal 3 and ground. Finally, check for battery voltage both at the 6 mm lug on the relay, and at the fuse as well.

# DRIVEABILITY CLINIC

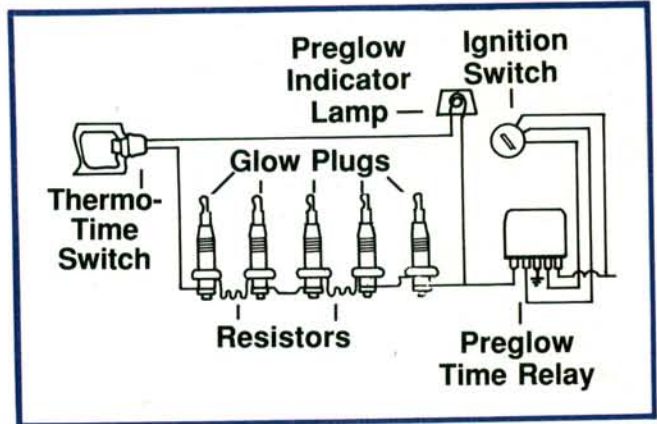
## Series -- Preheating/Starting Switch

YEAR	MODEL	ENGINE
1958-1966	190D	621
1966-1968	200D	621
1968-1973	220D	615
1974-1976	240D	616



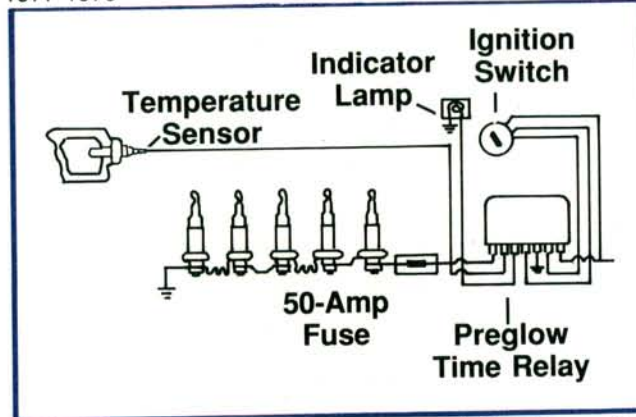
## Series -- Key Operated (1st Version)\*

YEAR	MODEL	ENGINE
1975-1976	300D	617.910



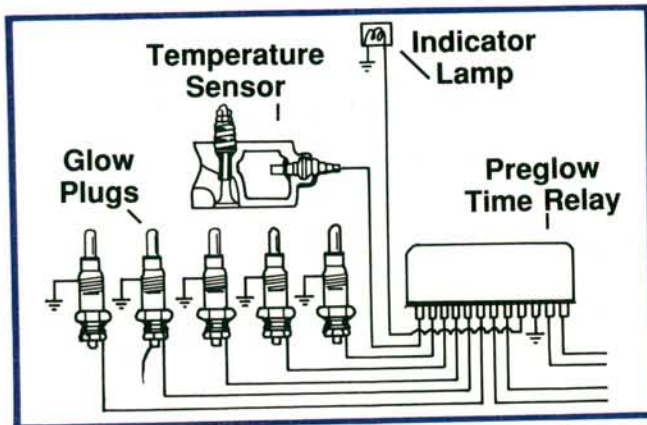
## Series -- Key Operated (2nd Version)\*

YEAR	MODEL	ENGINE
1977-1979	240D	616.912
1977-1979	300D/CD/TD	617.912



## Parallel (1978-1980)

YEAR	MODEL	ENGINE
1978-1980	300SD	617.950
1980	240D	616.912
1980	300D/CD/TD/SD	617.912



## Parallel (Since 1981)

YEAR	MODEL	ENGINE
1981-1982	240D	616
1981-1982	300D/CD/TD/SD	617

