

CENTRAL LOCKING

MERCEDES-BENZ STYLE

POWER DOOR LOCKS
ARE A CONVENIENCE BOON —
WHEN THEY'RE WORKING.
HERE'S HOW TO
DIAGNOSE M-B'S UNIQUE
ELECTRO-PNEUMATIC SYSTEM



The pump may be found in the spare tire well, as in this specimen, under the back seat, or in the engine compartment. Note the single yellow vacuum/pressure line and the insulating foam casing.

When central locking was first introduced it was one of those, "Why didn't I think of that?" moments. It sure beats walking around the car key in hand, or stretching awkwardly from the driver's seat to push all those buttons down. So, this feature has been standard equipment on all Mercedes-Benz models sold in the U.S. for decades.

M-B, as you should know by now, took a different tack from other automakers for this system early on. Instead of using solenoids or electric motors to snap those locks, the company's engineers decided it was better to do the job pneumatically – more force, no unpleasant noise, great durability. That, however, presents us in the independent auto repair business with a new set of diagnostic issues, and if we're going to be a one-stop car-care center for our patrons who own Mercedes-Benz vehicles, we need to understand how these systems work and how to diagnose and fix them.

Since about 1986, most M-B cars have had what's called the "multi-point" system. If you're not sure what you're dealing with, go to

the passenger's door and unlock. If all the other doors do the same, you've got multi-point. If not, either you're working on a car with the older single-point system (which unlocks only from the driver's door), or there's a problem. But since you've been presented with a complaint about this feature, you may be unable to get any action out of it whatsoever. That means you've got to dig deeper.

Componentry

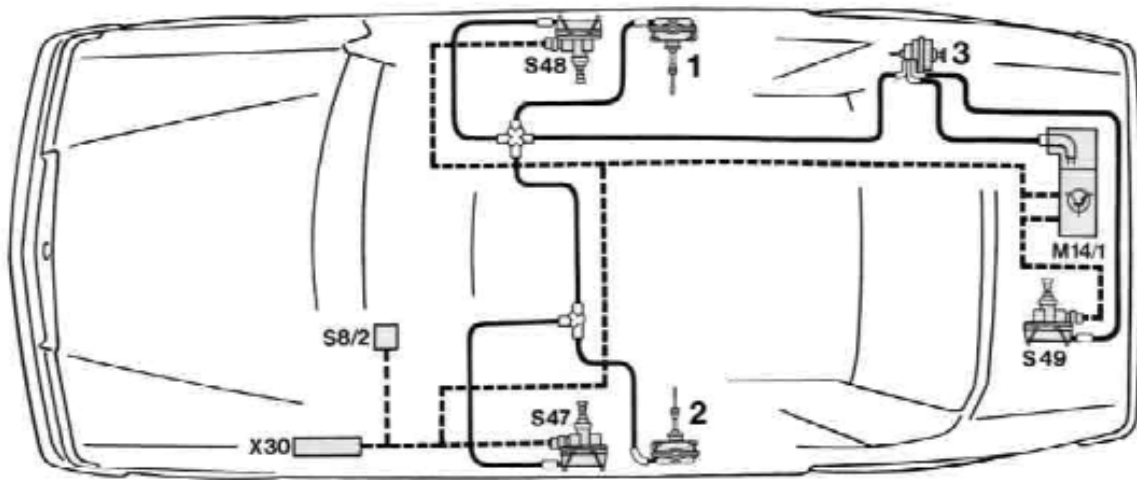
You need to understand the components and operation of a typical system before you can proceed (reading the owner's manual will give you an idea of how it's supposed to work from the customer's point of view). First, there's the pump, which supplies both the vacuum (for locking) and pressure (for unlocking) the system depends upon. This may be located in the spare tire well, under the back seat, or perhaps in the engine compartment on older models. If it's not in the engine compartment, it'll be encapsulated in foam. It has two electrical connectors, one round and the other flat.

The pump should produce .5 Bar (7 psi) within two or three seconds. Pressure in the system is relieved in 15 to 20 seconds after the pump stops. If there's a heavy leak, the electronics that control it switch it off in 25 to 60 seconds. From about 1983 onward, the change from vacuum to pressure is accomplished by electrically reversing the rotation of the motor – negative control voltage for vacuum, positive for pressure. Previously, this had been done by means of a switching valve.

Next, actuation units (which M-B calls "operating elements") are present at all the doors, the trunk lid and the gas cap flap. These are simple diaphragm-type pneumatic devices with linkage rods. All are very similar, but the ones for the doors are all black, while those for the trunk and filler flap are painted different colors on their upper portions. One yellow plastic line connects them to the pump.

There's an electrical switch in the driver's door that controls the action of the pump, and one of the functions of the ignition switch is to assure that the doors can't be locked while the key is in place. In the multi-point system, the passenger's door and trunk elements also have switches.

Typical Mercedes-Benz Central Locking Schematic



- | | | | |
|-------|--|-----|---|
| 1 | Element, rear door right (sedan only) | S47 | Control and working element, front door left |
| 2 | Element, rear door left (sedan only) | S48 | Control and working element, front door right |
| 3 | Element, tank flap | S49 | Control and working element, trunk lid lock |
| M14/1 | Supply pump central locking system | X30 | Connector block for optional electrical equipment |
| S8/2 | Warning buzzer contact lighting/central locking system | — | Electrical cable |
| | | --- | Pneumatic pipe |

The interaction between central locking and the alarm system is quite complex and would fit better into an article on the latter. All we'll say here is that if the vehicle has an EDW Alarm system, you can disconnect the intermediate plug of the EDW cable harness from the connector (M14/1x2, or M14/2x2) and connect the central locking cable harness directly to the supply pump. If central locking works okay now, it's time to delve into the EDW.

Leaker?

There are three types of possible problems: Pneumatic, mechanical, and electrical. Where the first is concerned, the most probable malfunction is, you guessed it, a leak, which is probably in the diaphragm of an operating element, or at a line connection. Those plastic lines themselves are pretty tough, but still a possibility.

To find out whether or not a leak is indeed present, disconnect a line and use a manually-operated test pump, such as a Mighty Vac, to draw a vacuum and see if it holds. At 300 mbars (9 in. Hg), you should see less than a 30 mbar drop in the gauge in one minute.



The operating elements are all pretty much the same. You screw the rod in or out to achieve the proper length.

But vacuum doesn't necessarily tell the whole story. Sometimes a circuit that holds vacuum won't hold pressure. So, pump it up to 600 mbars (9 psi) and make sure it doesn't lose more than 30 mbars in a minute.

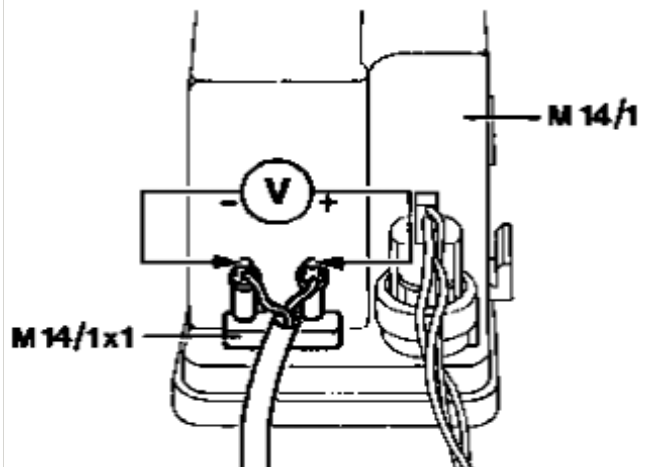


Watch the gauge for a minute to determine if there's a leak. Finding it is the big problem.



With the key out of the ignition, look and listen while you slowly push the driver's lock button down.

Okay, suppose there's leakage. How do you find out where it is exactly? The logical first step is a visual exam of all the lines and connections you can see. If nothing's obvious so far, start disconnecting lines at the pump and doing your vacuum/pressure tests, and work your way toward the doors, trunk and gas cap flap. Nobody wants to remove a door panel unnecessarily, but you may need to do so. Plug the element end of the line. If vacuum and pressure hold now, the diaphragm in the operating element is the culprit. Connect your test pump to it directly to make absolutely sure.



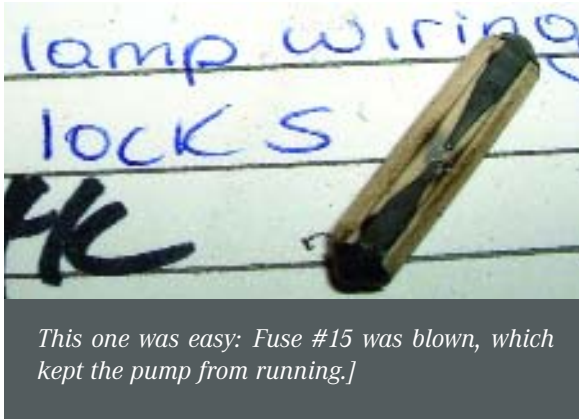
1. Check voltage supply of the supply pump.
2. Connect digital multimeter.
3. Lock and unlock central locking system with key.
4. Then reinstall coupling housing.
Nominal value: battery voltage > 10V

Mechanical problems come down to maladjustment of the length of the rods, perhaps due to a faulty previous repair, and to binding. In the former case, follow the factory recommendations for rod length. In the latter, bend the rod and lubricate the joints according to common sense. Remember to re-adjust the rod length when you've got everything moving unhindered.

Flow of electrons

If you suspect an electrical glitch, the first thing to do is to listen for the pump to run (come to think of it, using your sense of hearing will help you locate the pump in the first place in cases where you're not sure where to look). With the key out of the ignition switch, slowly press the driver's door lock and you should hear the pump. No? Then examine the fuse (typically #15, but check the fuse box chart).

If that's okay, unplug the pump's flat connector (M14/1x1), remove the connector housing, push the terminals back on the pump pins and check for voltage between the terminals (the brown wire is ground) while you lock and unlock the system. If you don't get at least 10V, go to the wiring diagram to track down the impediment to electron flow. If you've found sufficient voltage, but the pump still doesn't

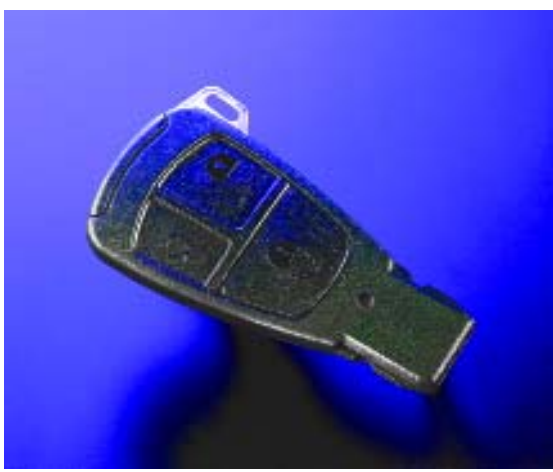


run, it's probably worn out. By the way, pumps with a black cover are not interchangeable with those that have a white cover.

If M14/x1 has a third pin, the car is probably equipped with orthopedic seats. The third pin is Circuit 15 to control that function.

Finally, the round connector carries the switch signals from the three controlling elements (front doors and trunk) to the pump. Look for a change from ground to 12V as you move the actuator from unlocked to locked for each of the three pins.

Keyless Go System and Infrared “SmartKey”



You walk up to your locked car, pull the door handle, and the car unlocks. Key still in a pocket or purse, you sit down in the driver's seat, press the brake pedal, touch the top of the shift lever, and the engine starts! Science fiction? It might seem so, but it's a real-life option on some Mercedes-Benz models. Starting in 2004, Keyless Go is available on S-Class, CL-Class, SL-Class, E-Class, and CLK-Class.

Low-power radio transceivers in the doors sense the presence of the SmartKey in the driver's pocket or purse and allow the doors to unlock when a button on the door handle is touched. Without a key of any sort in the ignition slot, the engine burbles to life whenever a button on top of the shift lever is pushed. For safety reasons, the brake pedal must be depressed with the shift lever in Park for the engine to start.

Most other Mercedes-Benz cars get the

standard-issue SmartKey – the industry's first fully electronic key system. Gone is the conventional mechanical ignition key, in favor of a fully electronic key that is integrated into the remote locking unit. There's no metal key which could be illegally copied and, as a result, no way to unlock the steering column or start the engine without the owner's remote unit. Since a family can make use of multiple keys for the same car, SmartKey even memorizes the last seat position, climate control and mirror settings selected.

The driver operates SmartKey in exactly the same fashion as a conventional system. The unlock button on the remote unit unlocks the door, and the Smartkey fits into the ignition switch and is twisted. As the driver turns the key, infrared data is exchanged. If the correct code is sent back, the steering column is unlocked, the ignition circuit is switched on and the starter operates. As a double security measure, the system changes codes each time the car is started. Also, the driver need only “bump” the key to the start position. The starter is disengaged at the precise moment the engine fires, preventing the ring starter gears from potentially gnashing.

Hidden inside the SmartKey unit is a small conventional key that can be detached to lock the glove box and trunk securely, then pocketed before handing the remote to a valet. The metal key also unlocks the door if the battery in the remote fails, and since data exchange from the car works even when the SmartKey battery is dead, the car can still be started with the remote unit.