

HOW-TO: Troubleshoot Your Glow-Plugs

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HOW-TO: Troubleshoot your glowplugs

On a cold mornings the heat of compression alone is not enough to get our beloved diesels going; they need some additional heat that is generated by 4 glowplugs.

Glowplugs are small sparkplug-looking devices mounted in each cylinder that glow red hot. The additional heat they generate is critical for reliable starts when the engine is cold, and when the system is not working properly hard starting results.

System Components:

The glow plug system consists of 4 main parts:

1. a glow
plug relay that controls the flow of power to the glow plugs

On MK2 chassis the relay is a tall
rectangular black box that lives on the left-hand side of the fuse/relay plate

(c)2009 Gord McFarling

On MK3 chassis the relay is a small square silver box that lives on the right-hand side of the relay plate. It's controlled by the Engine Control Module, a big black relay found on the left hand side of the relay plate.

2. a glow
plug fuse

On MK2s the glow plug fuse is mounted on the firewall in the engine compartment, above and to the left of the brake booster.

On MK3s the fuse can be mounted on the firewall as well:

And it can also sometimes be found on the fuse block, as per the picture of the MK3 fuse block above

3. a
coolant temperature sensor that tells the glow plug system how long to run the glowplugs

MK1s and early MK2s use a brass
temperature sensor mounted on the driver-side head coolant flange:

(c) 2009 Bobby LeClaire

Note that there are two identical coolant sensors, one for the glow plug relay and one for the temperature gauge. The glowplug sensor usually has an XXXX wire.

Later MK2s use a plastic-encased coolant sensor usually mounted on the central head coolant flange and has two green wires:

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4.the
actual glow plugs themselves

Small sparkplug-looking devices
mounted below each injector and connected together with a copper buss bar:

(picture)

Operation:

As mentioned, the glow plugs are controlled by a relay system. The system looks at coolant temperature to decide if the glow plugs are needed, and for how long. On MK3 chassis the system also notices when the drivers door is opened.

A yellow light on the dashboard tells you when the glowplugs are needed and how long to wait before starting the engine. The yellow light is NOT related to whether the plugs are actually getting power, an unfortunate nuance that often confuses folks trying to troubleshoot the system..

The relay supplies power to the glowplugs thru heavy duty wiring and a large fuse (usually 50 amps).

On MK1 and MK2 chassis the relay

shuts off power to the glowplugs as soon as the engine's starter is engaged. On MK3s the system continues to power the glowplugs for several minutes after the engine starts; this "afterglow" is designed to reduce emissions and improve cold engine driveability.

Troubleshooting:

Troubleshooting the system consists of systematically tracing the flow of current to the glowplugs and then checking operation of the glowplugs themselves.

Tools needed:

-
test light or multimeter

picture

-
(optional) 50A ammeter...a cheap dash-mounted unit from NAPA or the like works fine

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I've put mine in a plastic box and added alligator clips since the meter seems to get loaned out often.

Step 1: Check for power at the glowplugs themselves

Using the multimeter or test light, turn the key to "on" and then check to see if power getting to the glowplug buss. Power should appear for 3-20 seconds, depending on coolant temperature.

If power is getting to the glowplugs proceed all the way to step 5

Step 2: check the glowplug fuse

Using the multimeter or testlight, turn the key to "on" and then check to see if there is power on both sides of the glow plug fuse.

The fuse is known to often generate hairline fractures that are hard to see; pulling the fuse out will sometimes reveal a crack.

Step 3: check coolant sensor operation

Find the connector on the end of the coolant sensor and disconnect it. Turn the key to on and then check for power at the glowplug fuse… the relay should now stay on for approximately 20 seconds. If it does the glowplug relay is probably fine... to confirm the problem is the coolant sensor a multimeter is required:.

(text about checking resistance of coolant sensor here)

Step 4: glow plug relay

If all of your tests have still not identified a fault the

next logical suspect is the glow plug relay itself. Unfortunately it's a bit tricky to access and has quite a few connections; the easiest way to check its operation is to install a known good relay.

If you do want to troubleshoot the actual signals at the MK2 relay itself the pinout looks like this:

Step 5: check operation of the glow plugs themselves

The glowplugs are wired in parallel via the glow plug buss and have a very small resistance; this makes them difficult to test using a multimeter. There are a couple of options:

- 1) connect an ammeter capable of measuring at least 60 amps between the positive terminal of the battery and the glow plug buss. The meter should register over 60A and then

settle down to somewhere between 40 and 50 amps. Each glow plug will draw 10-12 amps, so if you get a reading of less than 40 amps one or more glow plugs are defective.

2)

Disconnect the glowplugs from the buss bar and then use a multimeter or test light to check for continuity to ground. Disconnecting the glow plugs from the buss bar is a pain, particularly the two plugs behind the injection pump, but the plugs can not be tested when they are all connected in parallel.

3)

Remove the injectors and check that the plugs glow red hot by peering down the injector holes.

Common problems and causes:

Symptom: no power to the glowplugs at all

Probable causes: glow plug fuse, glow plug relay

Symptom: yellow glow plug LED stays on for a long time, regardless of engine temperature

Probable causes: defective coolant sensor, broken wire to coolant sensor, glow plug relay

Symptom: glow plug light flashes

Probable causes: on cars equipped with a water separator a flashing glow plug light indicates that the water separator is full or defective

Symptom: glow plug glows brightly at first, and then dimly

Probable causes: water has dripped down into the fuseblock and corroded the glow plug relay contacts or socket. This is particularly common in older MK1s and MK2s with rust around the windshield and/pr radio antenna mount.

Other random thoughts:

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Because the glow plugs draw a lot of current good ground connections are important, so it's a good idea to check the various ground cables, particularly the battery ground connections and the connection between the chassis and the transmission

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The glowplugs are also very demanding of the battery, particularly during cold weather. A good battery and charging system is an important part of cold-weather starting.

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Bosch Duraterms are generally thought to be the most reliable glowplugs available on the market. They incorporate many 3rd generation technology features and are compatible with all glowplug systems. On the other hand, Autolite glowplugs have a terrible reputation.

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Whenever I find a defective glowplug I tend to replace all four. It's such a pain to remove the buss bar to find the problem that I try to do it as little as possible, and it seems that when one plug goes others are generally not far behind; it kinda makes sense that they have a similar lifespan.

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I'm a big fan of a light on the dashboard that shows actual power is being delivered to the glow plug buss. Unlike the stock yellow dashboard light it will show you when a fuse is blown or the relay is misbehaving.