The glow plug codes are a popular code to be thrown on our cars. Several versions of the DTC are

16764 / P0380 code (Glow plug/heater circuit electrical fault (Q6))
17055 / P0671 code (Cylinder 1 Glow plug circuit (Q10))
17056 / P0672 code (Cylinder 2 Glow plug circuit (Q11))
17057 / P0673 code (Cylinder 3 Glow plug circuit (Q12))
17058 / P0674 code (Cylinder 4 Glow plug circuit (Q13))

The first code is for 2001 and older cars. They have a 2 wire glow plug harness, so just throw a generic code for the glow plugs.

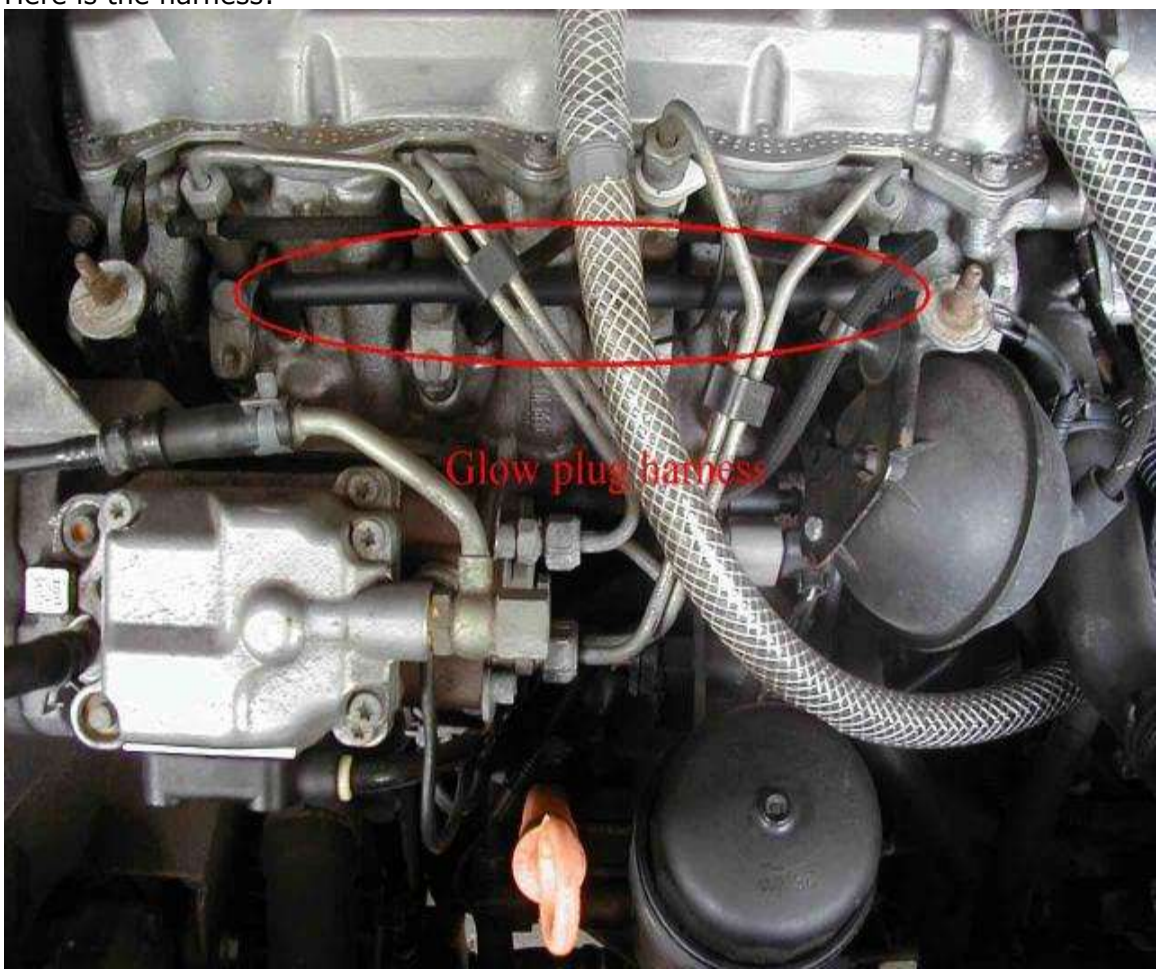
The other codes are just examples of codes you might find on a 2002 or newer car. They have a 4 wire harness, so the ECM can specify the problem plug.But the trouble shooting procedure is the same for all codes.

NOTE: I have tested a few 2002's recently for glow plug problems. I don't know if this is the case for all of them, but the ones I tested have the cylinder order backwards. For example, if the code specifies a bad plug at cylinder # 1, then cyl # 4 may be bad. The last car I tested had 2 bad plugs according to the codes. Cylinders 1 & 2 were indicated as being bad, but actually it was plugs 3 & 4 that were bad. So don't always trust the codes. Check for yourself with the multimeter before replacing any plugs.

Now why was a code thrown? The ECM measures the resistance accross the harness wires. If it finds an imbalance in the resistance between the wires, It thinks there is a bad plug since a bad plug will have high or infinate resistance. But the big problem is that there are other factors that can cause the resistance deviation other than a bad plug. A bad relay, corroded or oxidised harness, a bad ground or a blown fuse can all cause the code to appear. So I will go step by step through each of the possibilities so you can test and rule out or confirm the actual cause.

The first step I suggest is to check the plugs themselves. Afterall, they are the intended culprit that should light the MIL. What you need to do is remove the engine cover and locate the glow plug harness. You will need a 10mm socket & a digital multimeter for this step.

Here is the harness:



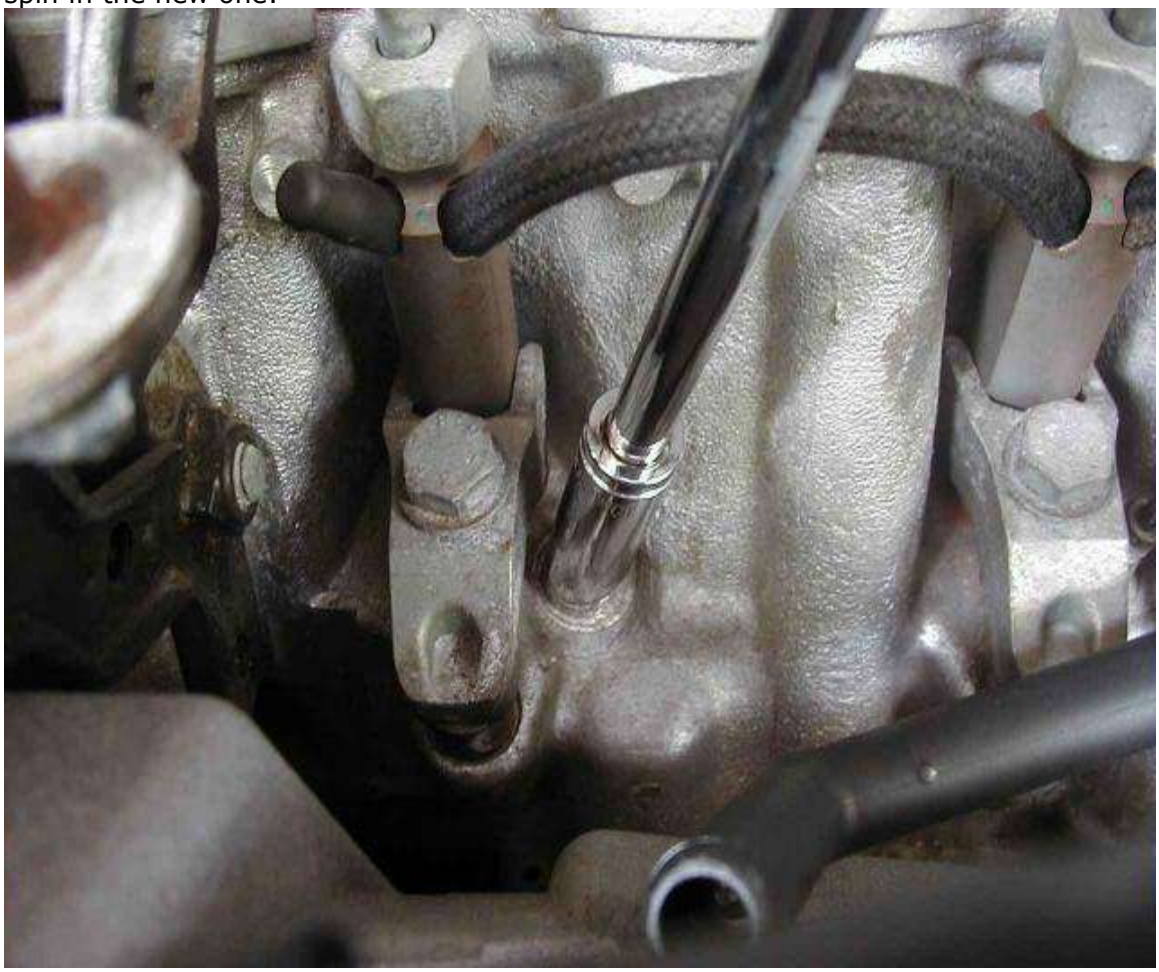
To remove it, just hook your finger under each terminal and pull. they snap on & off like spark plug boots. Once it is off, just rotate it out of the way so you can expose your plugs:

Then get your digital multimeter (available at any auto parts store or Wal-mart for less than $20) and set it to the lowest ohm setting possible (usually 200). Then place one probe to a good, clean ground and the other probe to the tip of the glow plug:

Do this for each plug and take note of the resistance value of each plug. They should all be between 0.5 and 1.5 ohms. It doesn't matter what the readings are, as long as they are close to eachother (within 0.2 - 0.3 ohms). If you have a plug that reads high or infinate, then you have found the bad plug and it needs to be replaced.

EDIT: I have measured sets of plugs that have had a 0.1 ohm difference with no code being thrown. But one member who contacted me had a code thrown with a resistance of 0.6 ohms on 3 plugs and 1.1 ohms on one plug. This was enough of a variation to throw the code. So even though we do not know the exact tollerance difference, its somewhere between 0.2 and 0.5 ohms.

Replacing plugs is very easy. Its like changing a spark plug. You need a 10mm deep socket and an extension. Many reccomend a 1/4" drive socket to allow the extension to get around the injector lines, but I have done them with 3/8" drive sockets too. Or, if you have a wobble head extension, even better. Just spin out the old one & spin in the new one:



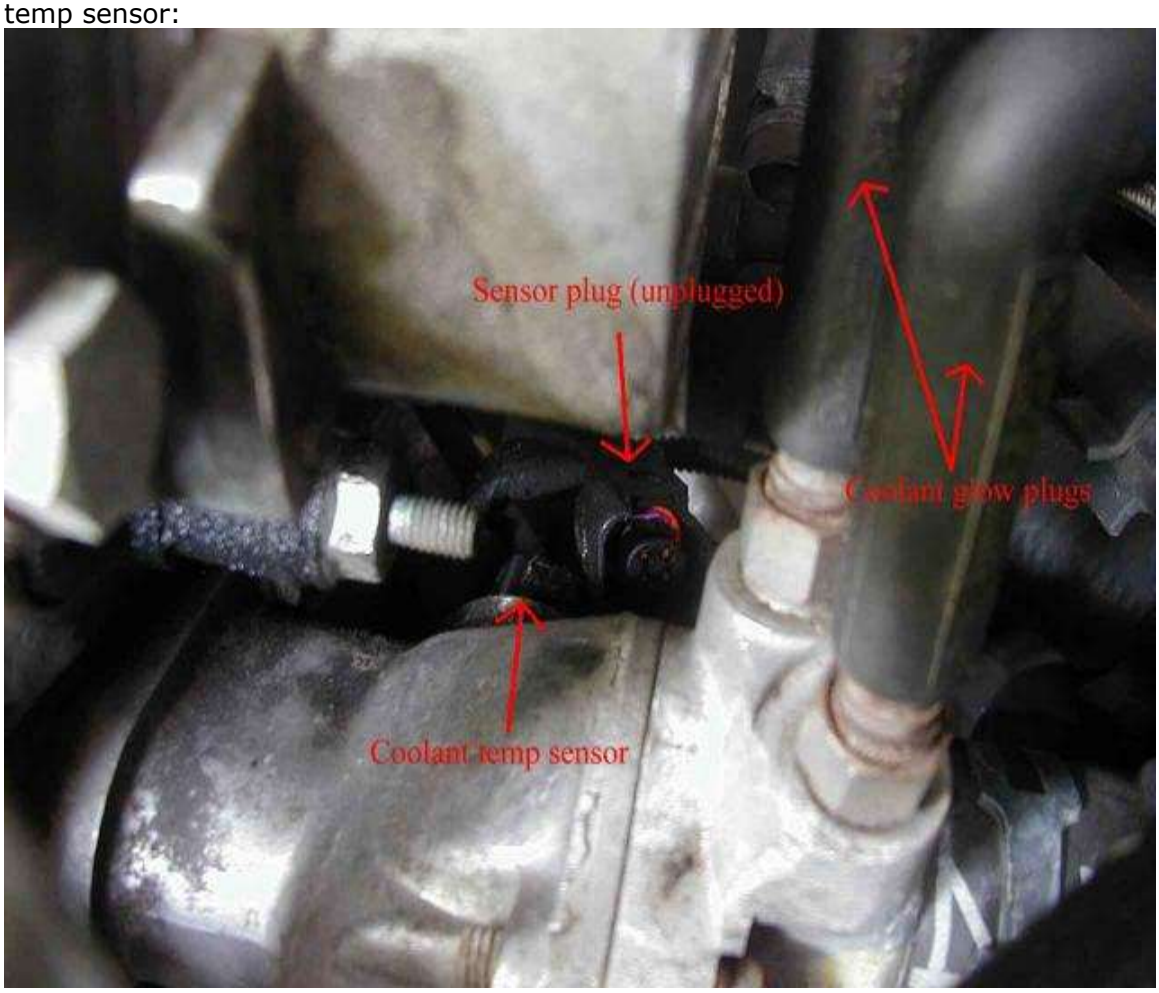
I strongly suggest putting in the new ones by hand. You want to make sure it spins freely before using the ratchet on it to make sure it is not cross threaded. start it by hand and spin it in at least 3 turns to make sure it doesn't bind and then finish withthe ratchet. Tighten to 11 ft/lb. If you don't have a tourque wrench, no problem. Just make them snug, but not tight. Grip the ratchet with the head in your palm so you can't use the leverage of the handle and tighten it that way. That should be close to the correct tourque without overtighteneing.

Now there is debate on whether the 3 coolant glow plugs are monitored by the ECM. I don't know if they are, but it certainly can't hurt to check them either. Just pull off each boot and perform the same test as the engine glow plugs. The resistance values should be the same (between 0.5-1.5 ohms). Since the coolant plugs do not get exposed to the same harsh environment as the engine glow plugs, I don't think they fail as easily as the engine plugs. Perhaps thats why there are not many reports of those plugs causing the code.

If your plugs all checked out OK, then you have another problem. It is likely your harness, but since there is no way to test the harness, we have to move on to other

steps to rule them out. If all other tests check out, then that only leaves the harness, so we will address that last.

The next thing to check is the relay. To check the relay, you need to see if your harness is getting battery voltage. In order to do this, you need to unplug the coolant temp sensor. This will trick the ECM into thinking its really cold out and activate the glow plugs for about 20 seconds. This will give you enough time to turn on the ignition, run to the front of the car and perform the test. Here is the coolant temp sensor:



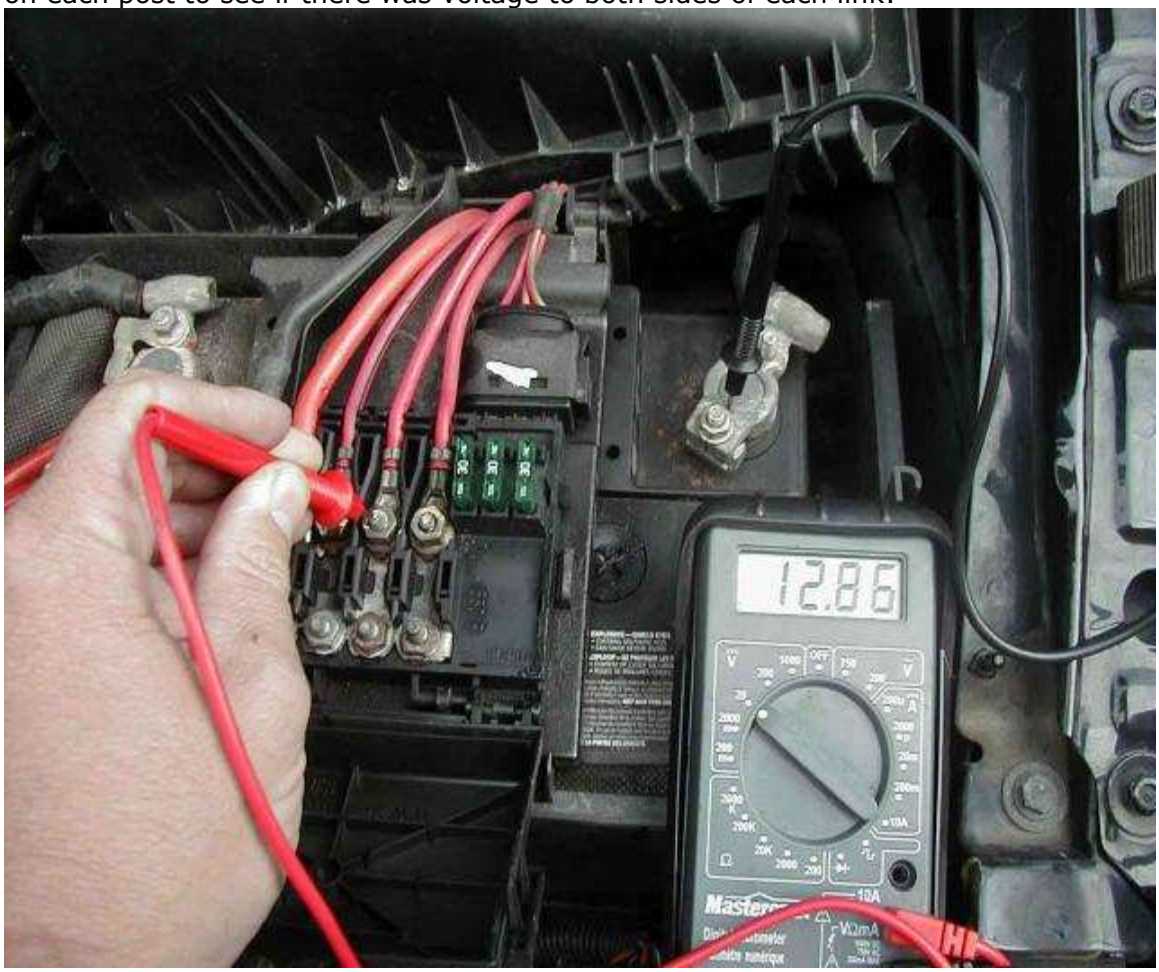
It is located in the housing below and behind the 3 coolant glow plugs(manual transmission cars). It is difficult to see, so you may have to feel for it. It unplugs in a similar way the MAF unplugs, just a smaller plug. You need to push on the tab with your thumb to release the clip while wiggling the plug off . Practice on the MAF if you want to get a hang of it.

Once it is unplugged, set up your multimeter to measure voltage. You need to set it to 20V on the DC side of the meter. Turn on the ignition (do not start). Then find a good ground and place the other probe into the end of the harness terminal like this:

You should get around 12V at each finger of the harness. The glow time is only about 20 seconds, so you may have to repeat the procedure to get all four if your not fast enough. Once the glow time is up, the voltage will drop, but it will still show a small votage at the harness terminals:

I'm not sure why there is still voltage, but it is normal. If you do not get 12V at any time, then your relay is not completing the circuit and needs to be replaced. The relay is an expensive part (around $125), but fortunately, it is not often the cause of the code. I have only tested one system out of dozens that I have tested that ended being a relay problem.

So if the relay checked out ok, then you need to check the fuse under the battery. This was why my MIL came on by the way. Until recently, I was driving around without a battery cover and the fuses on top of the battery were exposed to the elements. They became oxidised & corroded. Two of the big fuses were not conducting current between the two posts. I tested them by placing the multimeter on each post to see if there was voltage to both sides of each link:



In my case, I got no reading on the far side of 2 of the links. The glow plug fuse is the second from the right. I removed the fuses, cleaned them with sandpaper and reinstalled them. I also used some Deoxit D5 to help enhance the contact & remove the oxidation. If your fuses are clean looking, I wouldn't worry about it, but it can't hurt to check. Of course, if one is blown, then replace it.

So now you have checked everything you can check. If you haven't found any problems yet, then you likely have a bad harness. There is nothing wrong with the integrity of the harness, its just a bit of corrosion or oxidation in the terminals that is causing poor contact, resulting in the high resistance that is making the ECM think its a bad plug. Most of the time, replacement of the harness is not necessary. It can be treated with the product I mentioned earlier, Deoxit D5. I have used it on many cars with great success. Here is a link to a discussion on this product.

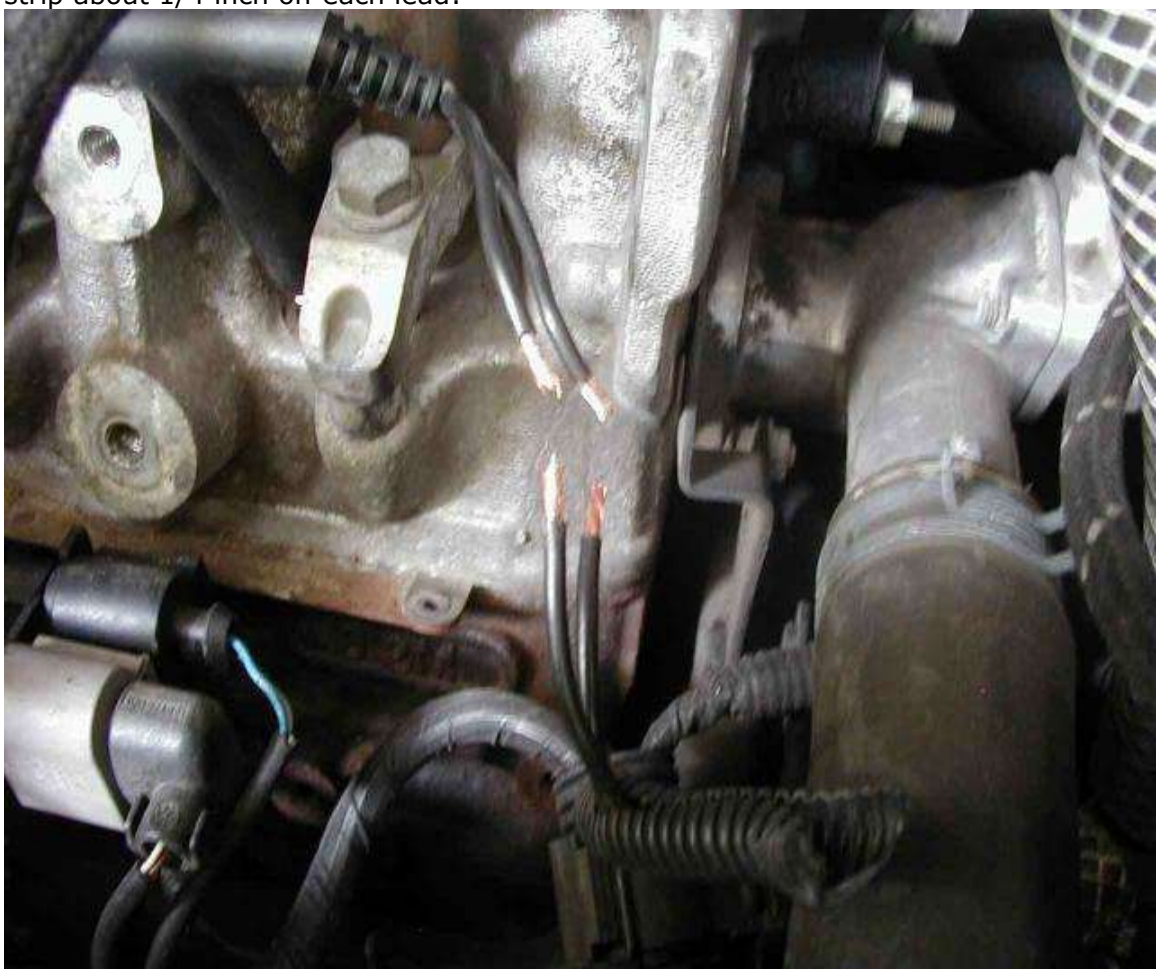
In some cases, the harness may be too badly damaged to be treated. This would only be the case if it was left untreated for any length of time. I had a realy bad harness when I bough my car, so I replaced mine. Here is what I found when I opened it up:

As you can see, the oxidation on the two center liners was quite evident. They are white in color instead of shiny like the outer ones. The poor contact created by the oxidation caused arcing when the voltage was trying to complete the circuit. The

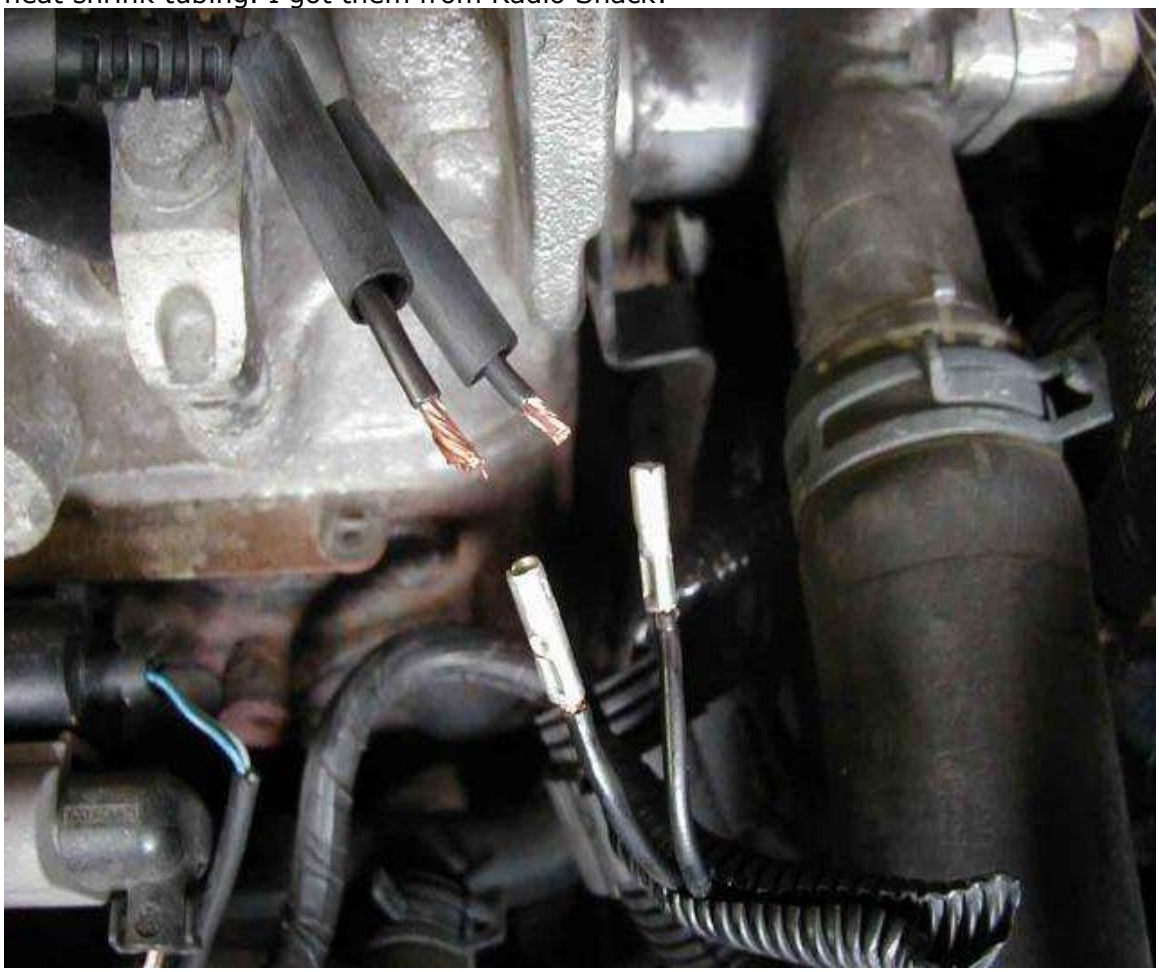
arcing caused those black scorch marks. This obviously caused a poor connection which resulted in the high resistance, causing the code to be thrown. This harness caused my CEL to come on many times. Once cleared, it would always return. Sometimes it would stay off for 100 km of driving and sometimes it would come back within minutes. After I changed the harness last December, I have not had a glow plug fault now for almost 18 months and 60k km. But as I said earlier, don't consider replacing it until you try to treat it. No point cutting out the original one and splicing in a new one if you don't have to. Treating it is cheaper, easier & less invasive that replacing it. But if you do feel you need to replace it, here is how I did mine:

First, cut the old harness off with wire cutters. To make it easier to splice in the new one, cut the wires as close to the harness as possible so you are left with longer pieces to work with. In my case, since I was redoing my connection just for the purpose of taking pictures, I cut mine at the old joint:

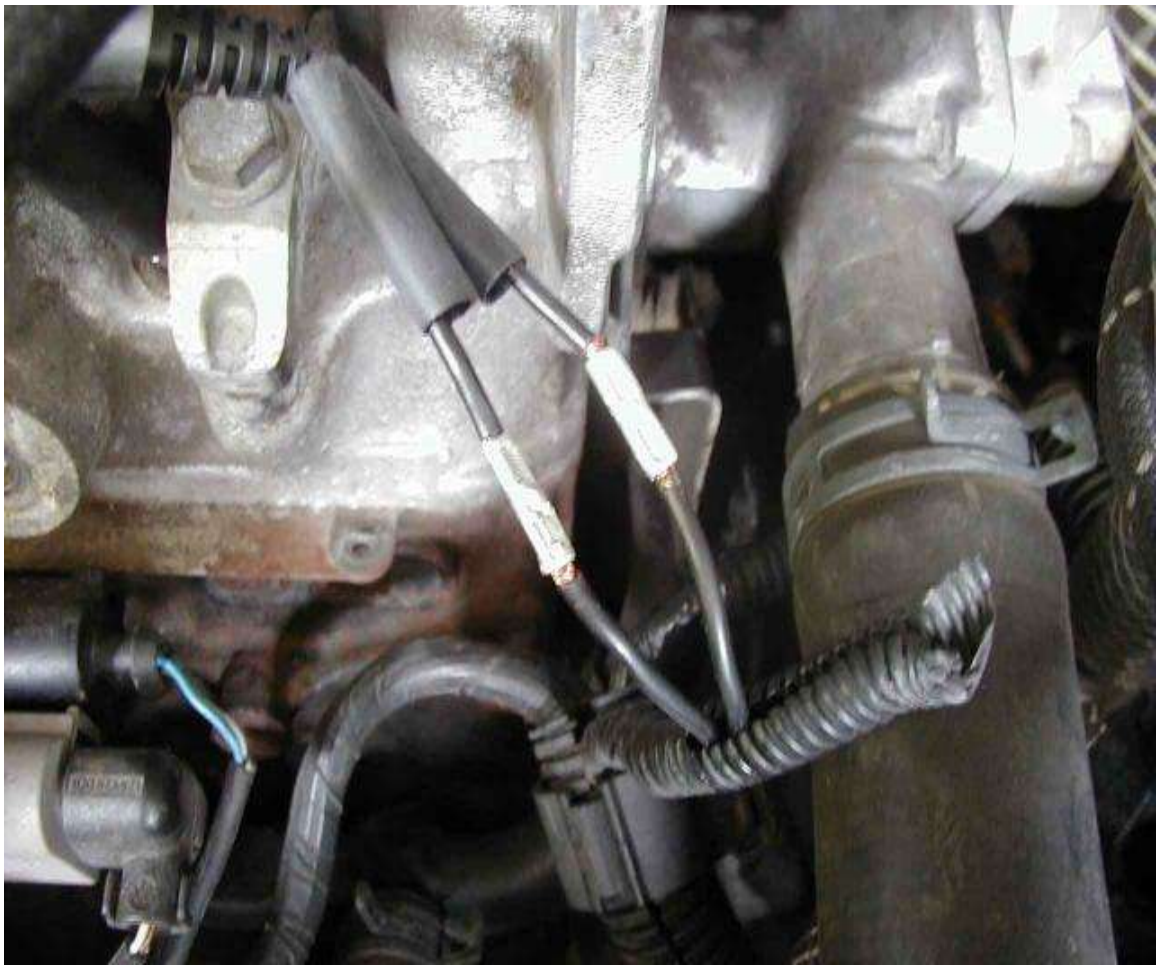
The new harness (two wire version) comes with spade connectors on the endes of the leads. Just cut them off since there is nothing to connect them to anyway. Then strip about 1/4 inch off each lead:



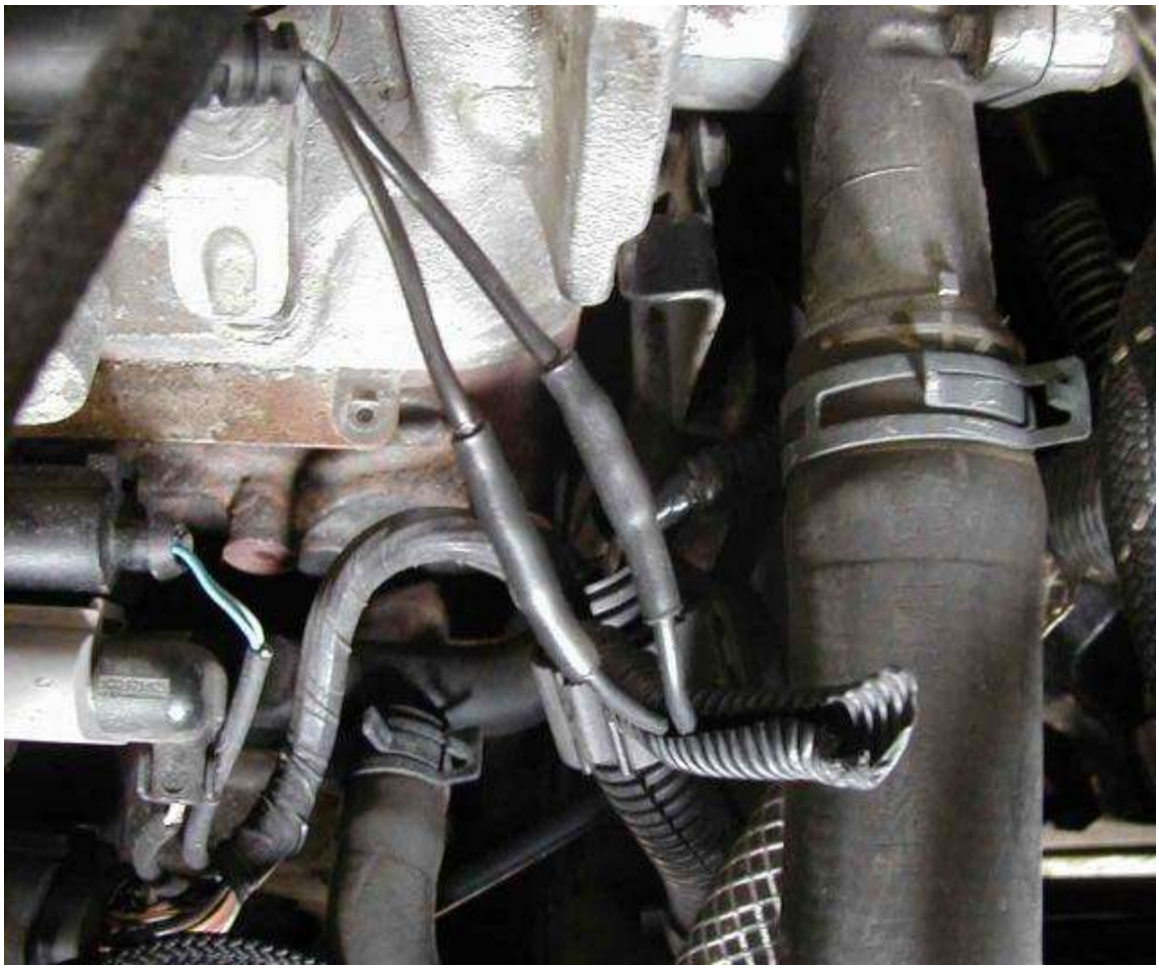
Then crimp on some butt connectors to one set of wires. I use uninsulated ones since I can get a better crimp with them. They will also look nicer (less bulky) under the heat shrink tubing. I got them from Radio Shack:



Then I slid on a couple of pieces of heat shrink tubing and crimped the other two wires to complete the splice:



I then used a heat gun to shrink the tubing to seal the joint:



I used heat shring tubing with a glue lining. When it shrinks, the heat melts the glue and it makes a water tight seal around the joint. I bought it at a tractor trailer repair shop. They use it for wiring trailers since the wires are exposed to the elemnts (rain, snow & salt). They are very good. You will also find it easier to do the crimping if you remove the vacuum ball and set it off to the side. There is more room to get the crimping pliers in there.

If you have a 2002 or newer car, then your harness has a long set of wires and can be plugged into the main harness. But it is somewhere in the main loom and removal of the air filter box and possibly the battery too to route the wires the same as the original harness. It can be quite a pain in the butt to replace. A good reason to try to treat it rather than replace it.

This will give you an idea of how to test & diagnose your glow plug fault and save yourself an expensive visit to the dealer. I have read of quotes between $500-700 to fix these codes. The plugs are available from http://www.tdiparts.com/ for $80 / set shipped and Deoxit D5 is available at lots of places online. Just do a google search for it. BTW, you need the 10mm plugs for the engine and the coolant plugs are 12mm.

Good luck and hope you can get rid of that pesky code for good with this procedure.