How-To Convert a W8 Cluster for Use in a MKIV TDI

By Greg Menounos

I didn't discover much of this information myself. Most of it is scattered across various threads on TDIClub and VWVortex. I just pulled it all together and took some pictures.

Genuine MKIV TDI FIS clusters are still pretty rare and expensive but the cluster used in the Passat W8 is a full-FIS Immo3 cluster that can be converted pretty easily and cheaply to work in a MKIV Golf or Jetta TDI. To perform the conversion, you will need:

1. A Passat W8 cluster
2. The transparent plastic faceplate from a MKIV Golf/Jetta donor cluster
3. A resistor and yellow LED from a donor cluster (more parts are needed for a '99.5 car)
4. Cluster faces from an Immo3 TDI cluster
5. Software to flash the cluster's EEPROM and get your existing cluster's SKC
6. VCDS to adapt keys and set the cluster's coding and mileage

You will also need to install a control stalk and outside temperature sensor. Instructions for those can be found here: http://forums.tdiclub.com/showthread.php?t=48366

Gather the materials

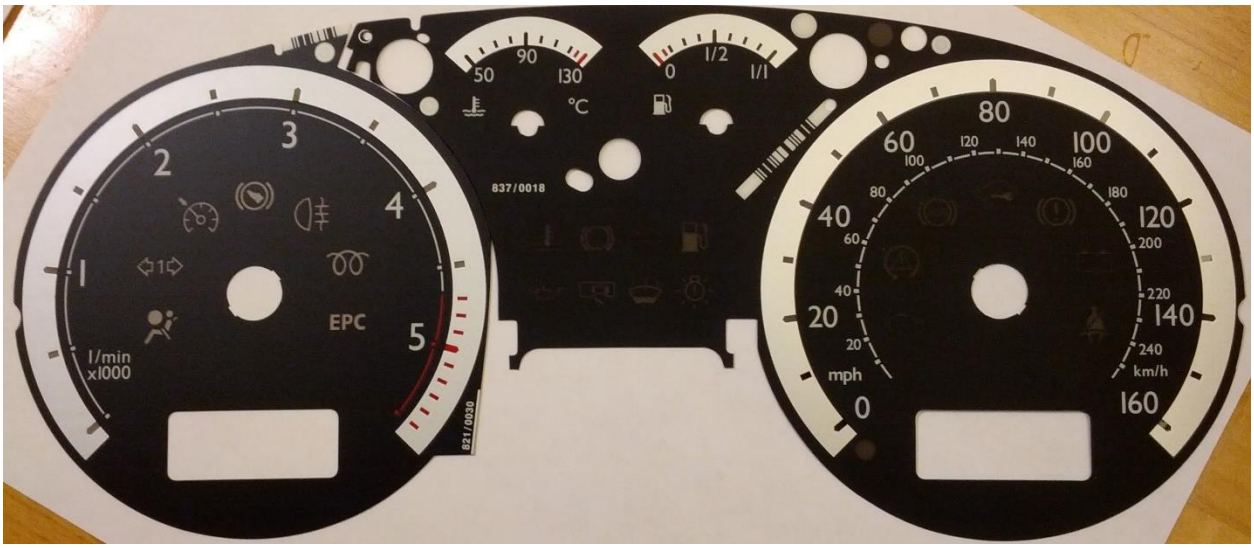
The part number of the Passat W8 cluster is 3B7 920 946E or 3B7 920 946EX. Try searching for that on eBay as well as "Passat 180mph" and "W8 cluster". I've found fully working ones for as little as $50 shipped. I'm not sure why they're so cheap but I'm not going to complain about it. Some W8 clusters may have an issue with the LCD display fading during hot weather. This is a common issue with both half and full height MKIV clusters. You can find out more, including where to order a replacement LCD, here: http://forums.tdiclub.com/showthread.php?t=318799

Next you'll need a MKIV cluster that you can steal some parts from. If you can afford for your car to be down for a while, you could use your old cluster. Or buy the cheapest MKIV cluster you can find – working or not. Just try to find one where the transparent plastic faceplate is not all scratched up as you'll be using it.

The reason you need the transparent plastic faceplate is because that part of the W8 cluster is a different shape and won't fit in your dashboard. The photo below shows a Golf/Jetta faceplate on the top and a W8 cluster on the bottom:

Since the tachometer red-line and speedometer don't match what's typically found in a TDI cluster, you'll need to replace the faces. You could probably use the faces from any Immo3 TDI cluster but the speedo will be wrong (top speed of 140mph vs. 160mph for the software you'll be flashing).

To keep the sporty look of the W8 cluster, I bought some TDI sport faces from eBay seller creationsmotorsport_com. Search for "VW MK4 BORA SPORT TDI CLOCK OVERLAY INSTRUMENT CLUSTER" or something similar. They're shipped from the UK so it takes a little while to get them but they're high quality and were packed very well. The cost was around $58. Just make sure you order the Immo3 faces and not the Immo2 ones. Out of the box they are meant for a MFA cluster but with a little trimming will work fine in a FIS cluster. Here's what they look like:

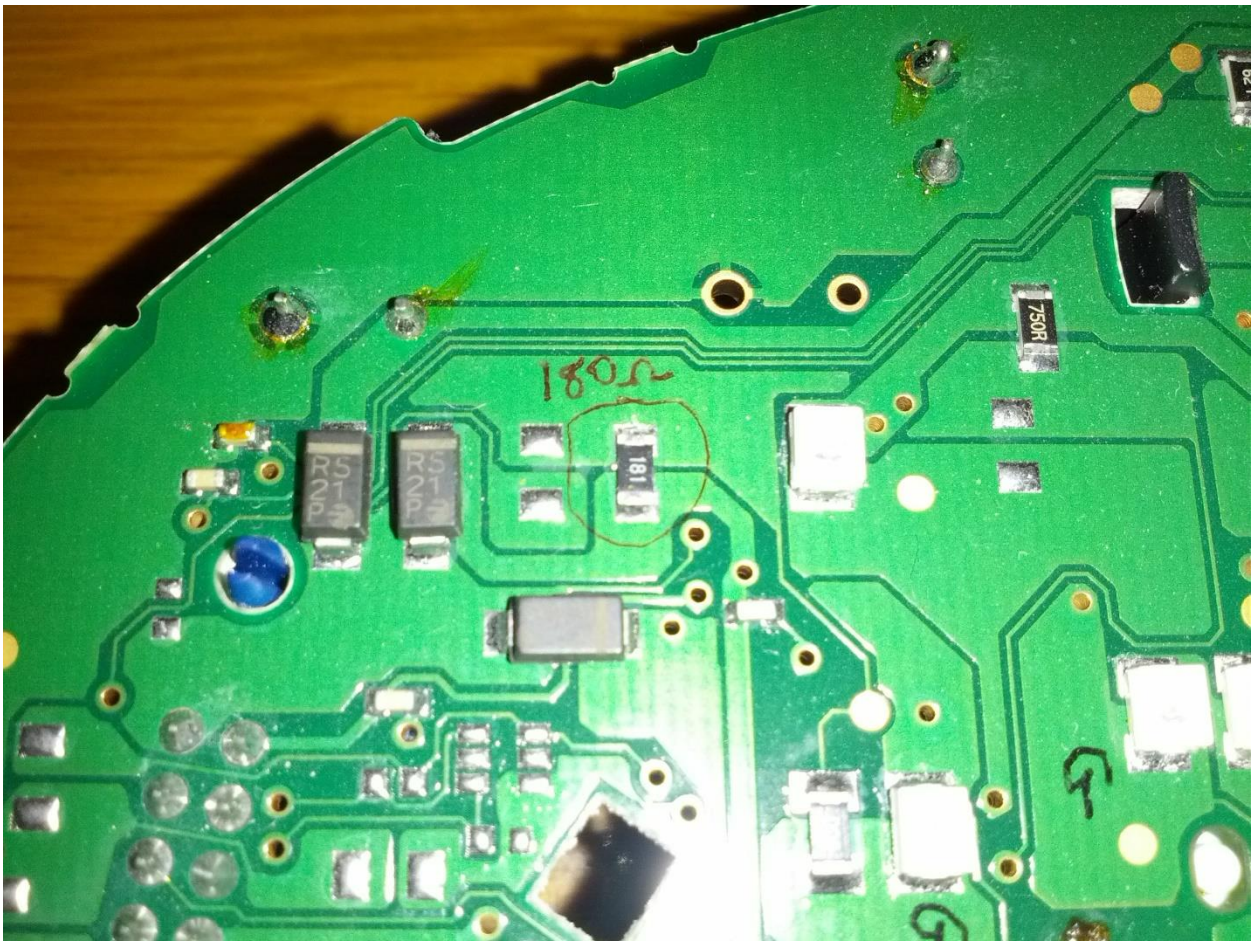


You'll need 2 electronic components from a donor cluster in order to add the glow plug light as the W8 cluster does not include one. **If using your existing cluster as a donor, you should pull the SKC from it (see below) and record the mileage and coding before you start harvesting it for parts.**

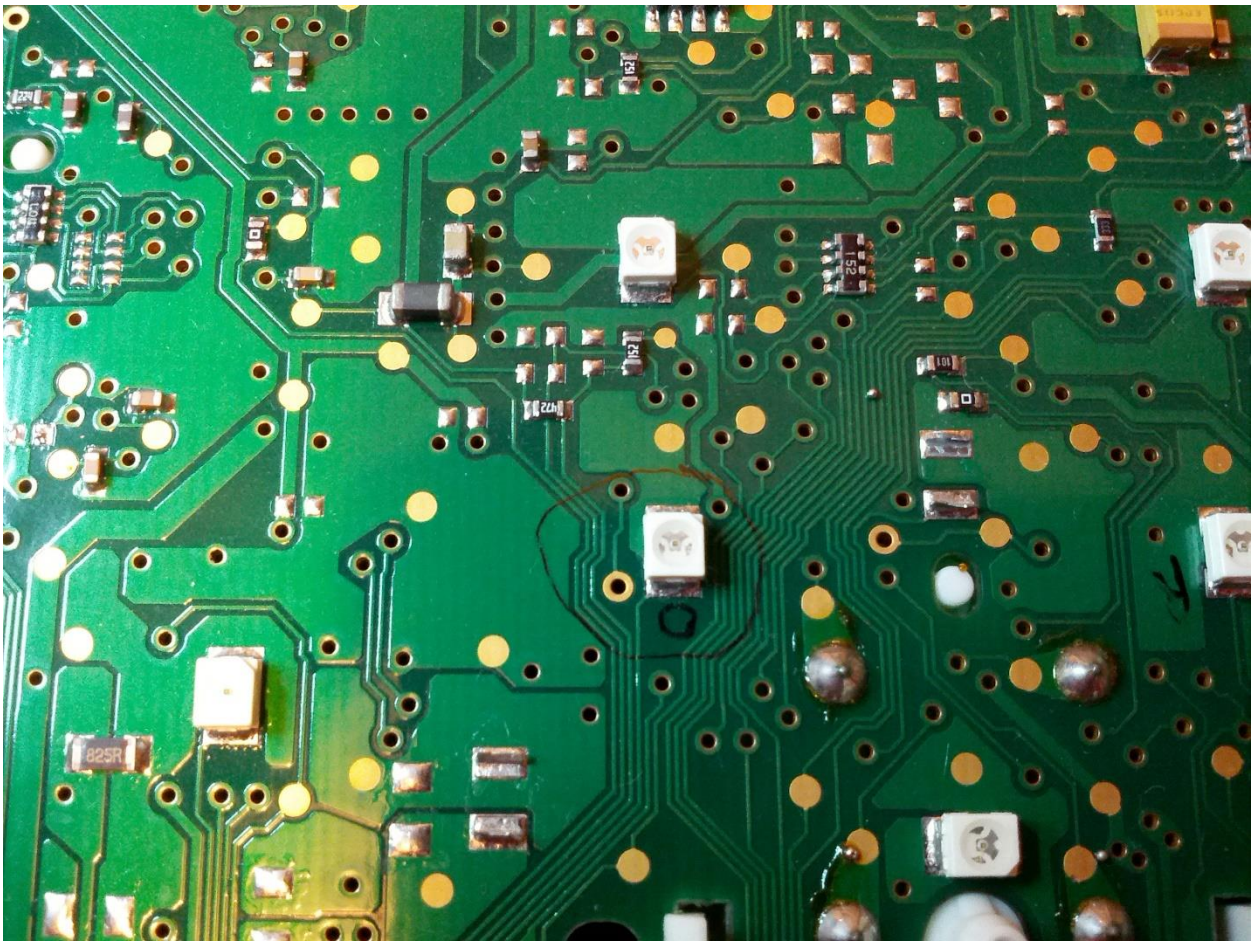
If you have a '99.5 car, you'll need additional parts, which are described here:

http://forums.tdiclub.com/showthread.php?t=308735

The first component you need is a 180 ohm resistor. It's a tiny surface-mount component marked "181". Here's where I found one in my donor cluster:

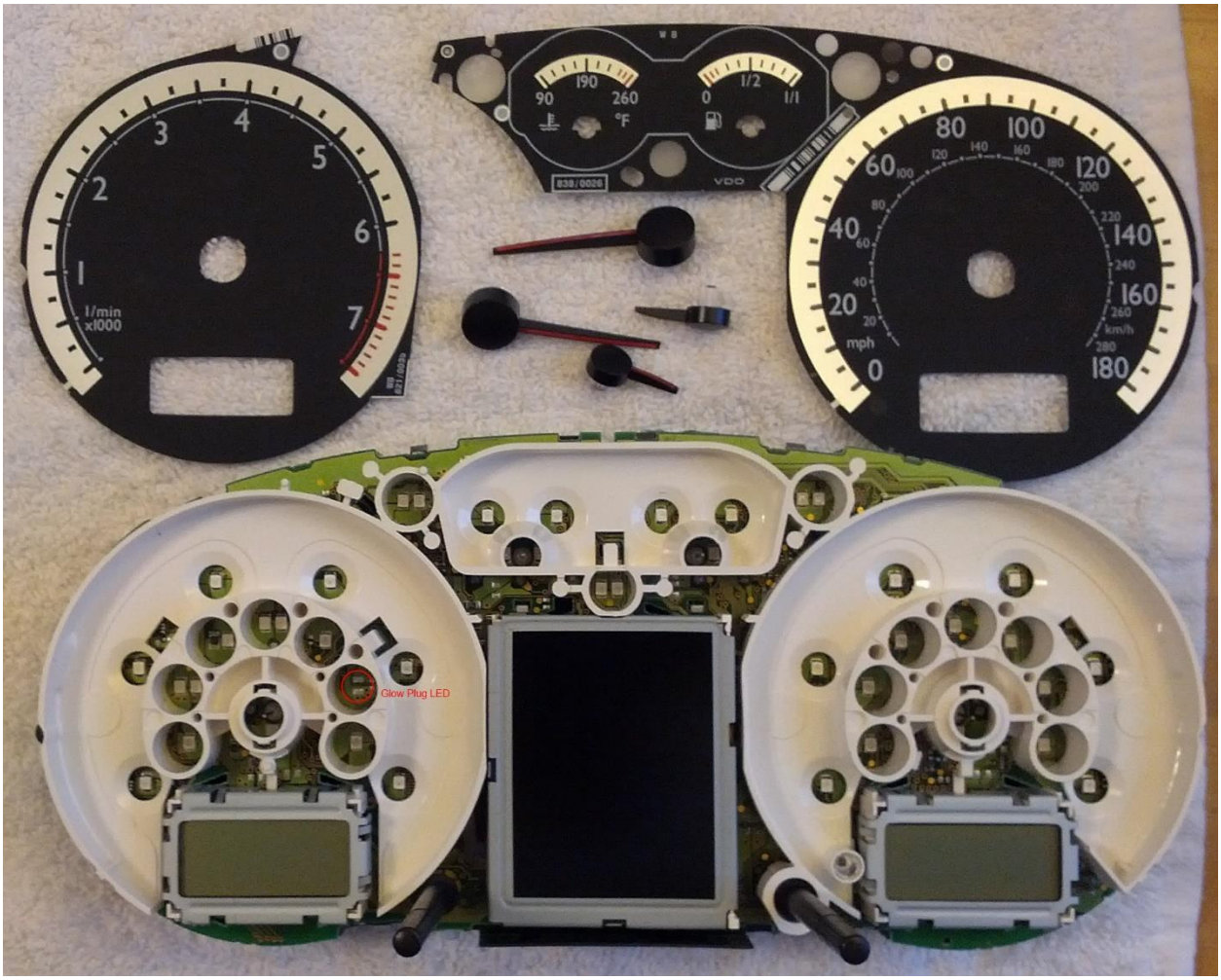


You'll also need a yellow surface mount LED. There are various color LEDs in the VW clusters so make sure you get one that's the proper color. If your donor cluster is a TDI cluster, just take the existing glow plug LED. Otherwise you'll need to test each LED until you find a yellow one. You could attach a couple of wires to a 1.5v battery and test with that (just make sure to reverse the wires if the LED doesn't light – it's polarized and will only work in one direction). Here's the LED that I used:

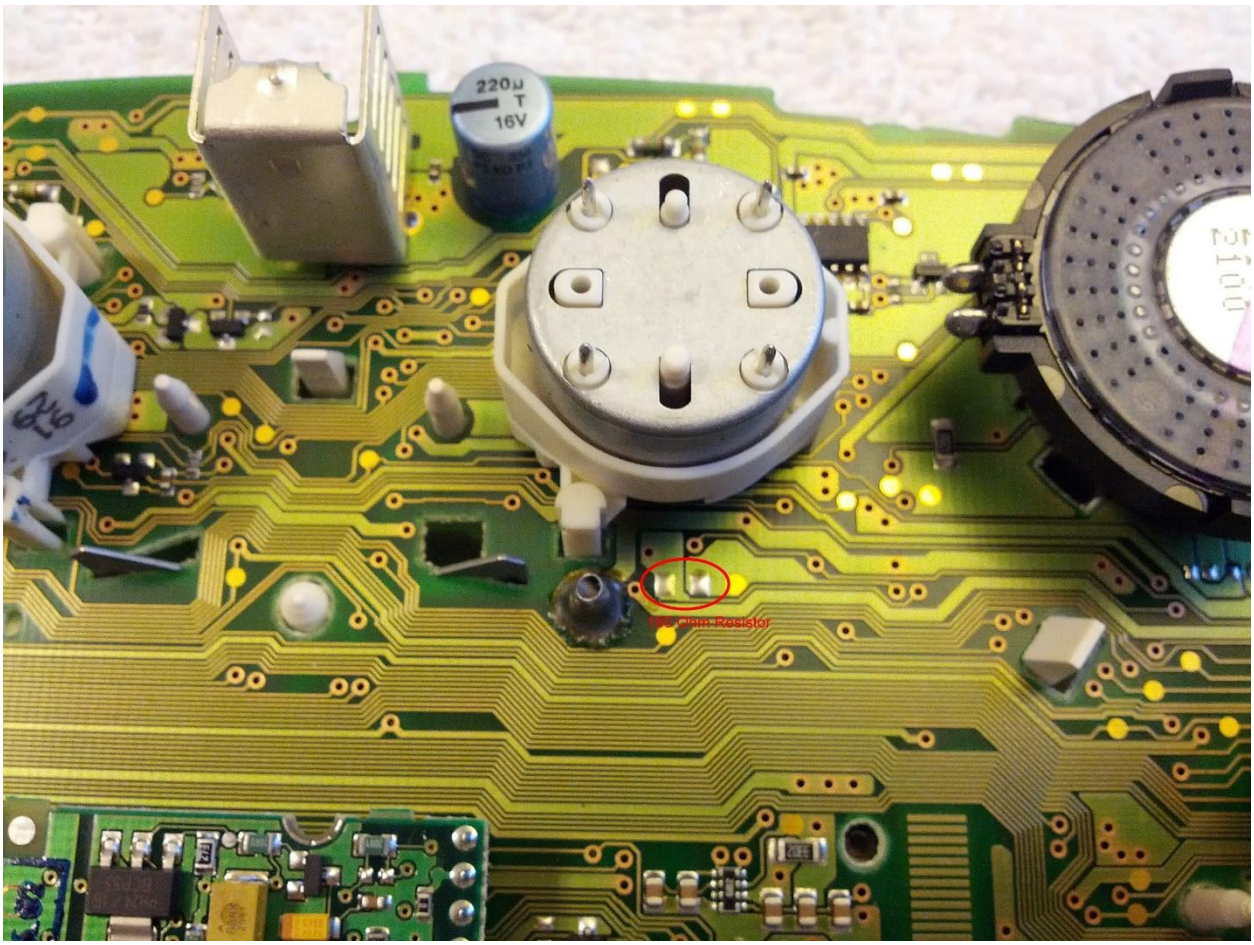


Disassemble the W8 Cluster

The cluster comes apart with 2 T-10 Torx screws. Make note of the gap between the needles and the faces as well as the resting position of each needle. You'll need to place the needles back in the proper position later. The thickest ID card in my wallet filled the needle-face gap pretty well so I used that as a guide. Remove the needles by "unscrewing" them counterclockwise while pulling them away from the gauge face. They're not threaded but they will come off their posts after a few turns. Here's what my cluster looked like with the faces and needles removed. Note that there's no glow plug LED:



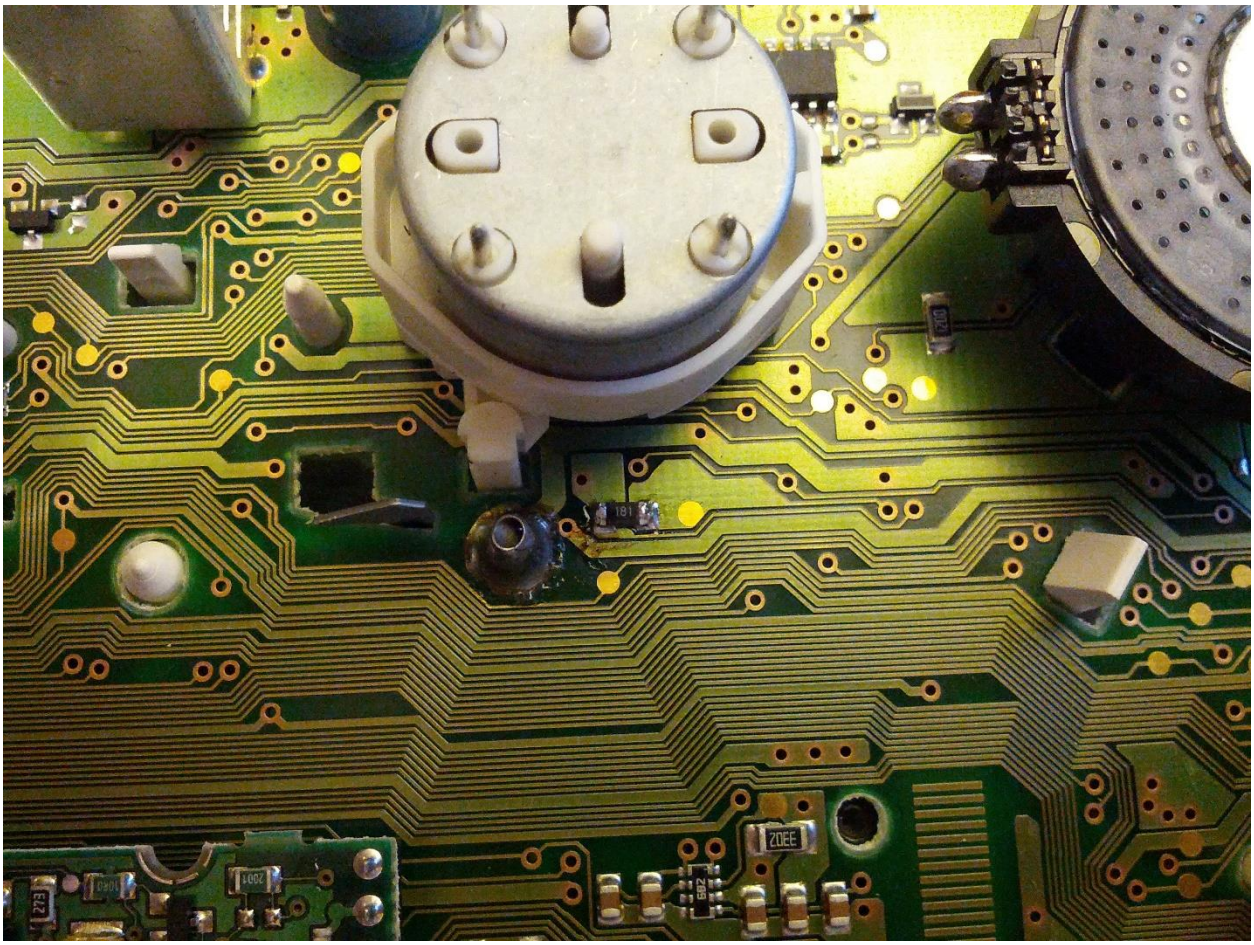
Now turn the cluster over as you'll need to solder your 180 ohm resistor. It goes here:



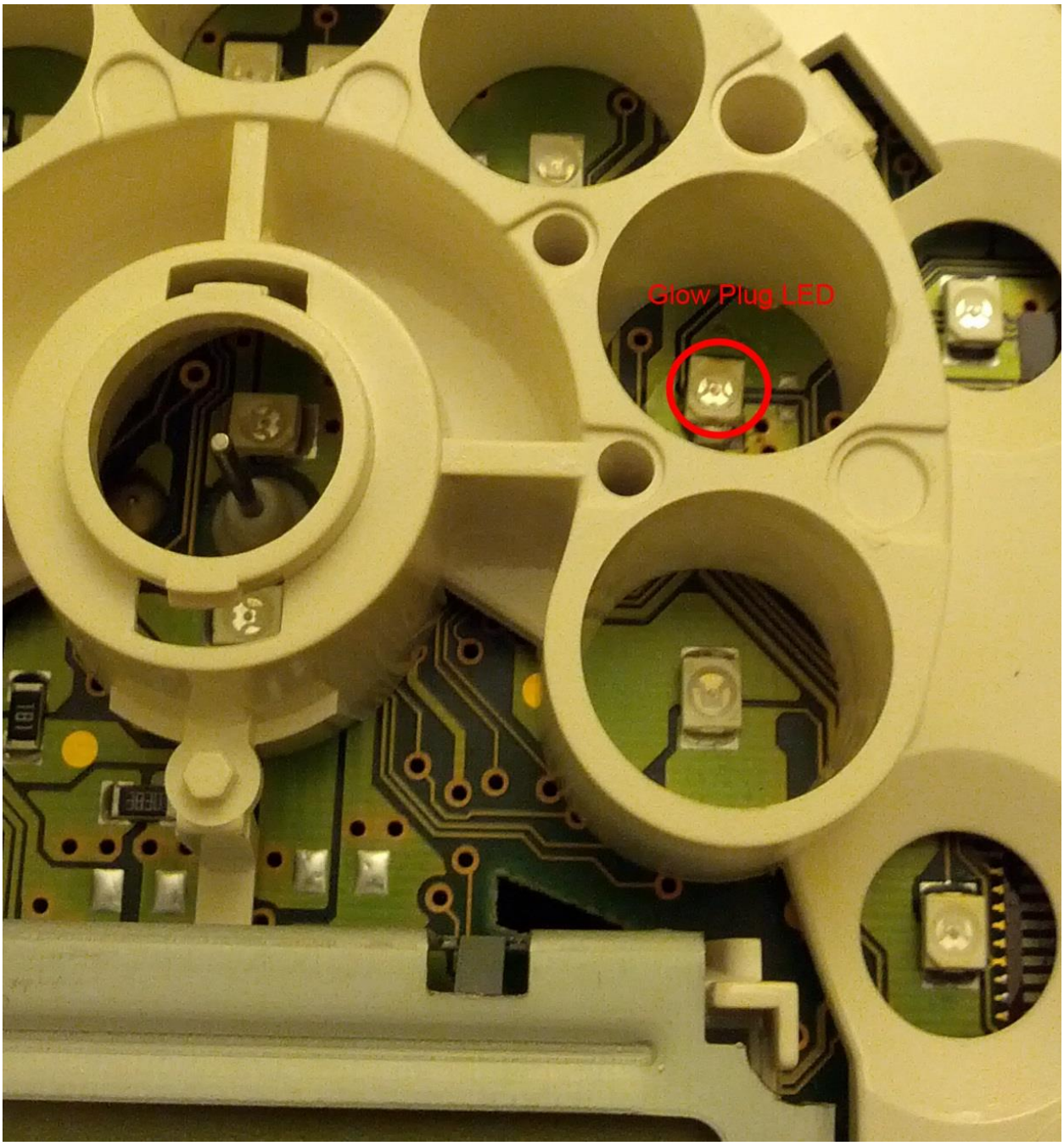
Here's a page that describes how to solder a surface mount resistor:

http://store.curiousinventor.com/guides/Surface_Mount_Soldering/Resistor/

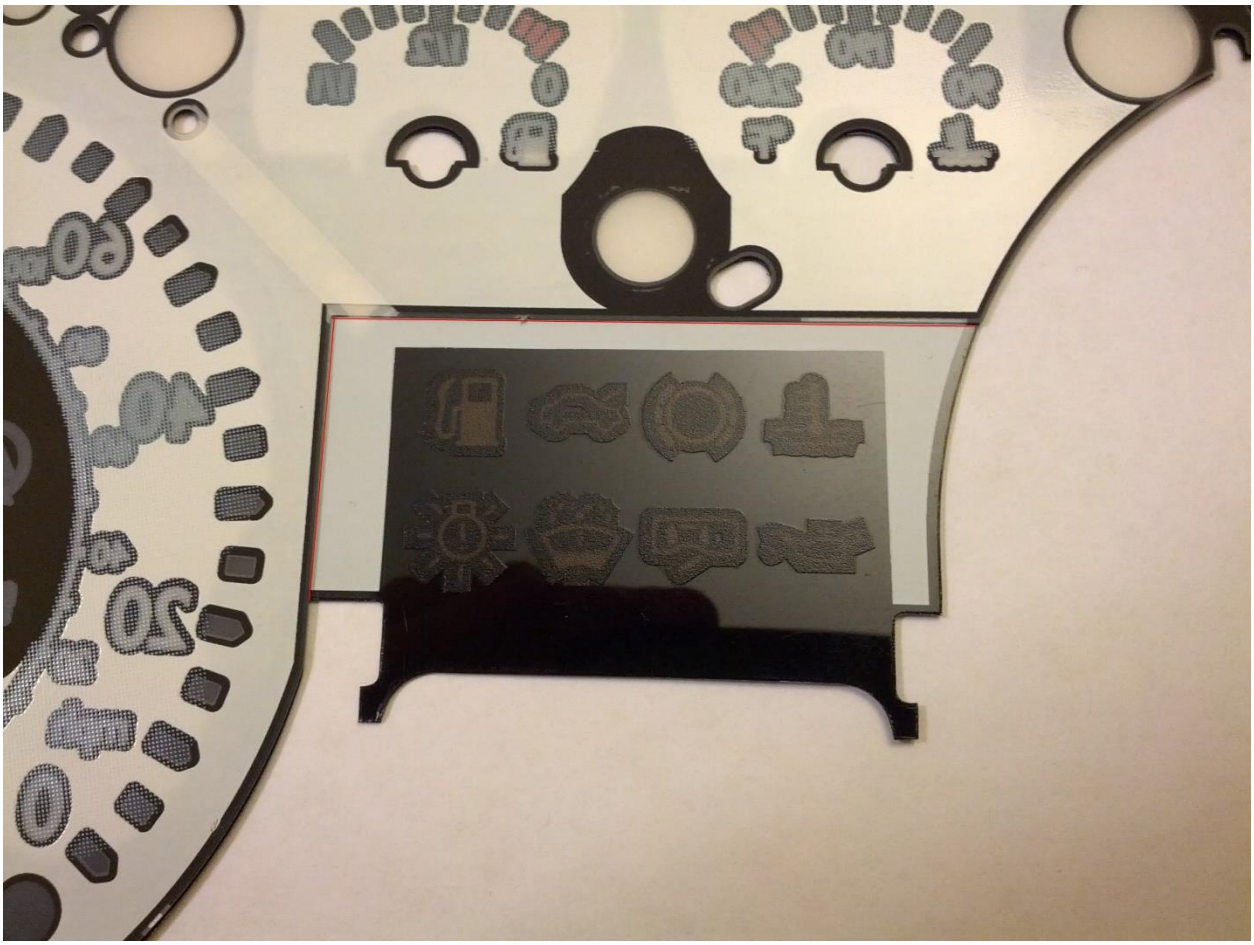
Here's what it looks like installed:



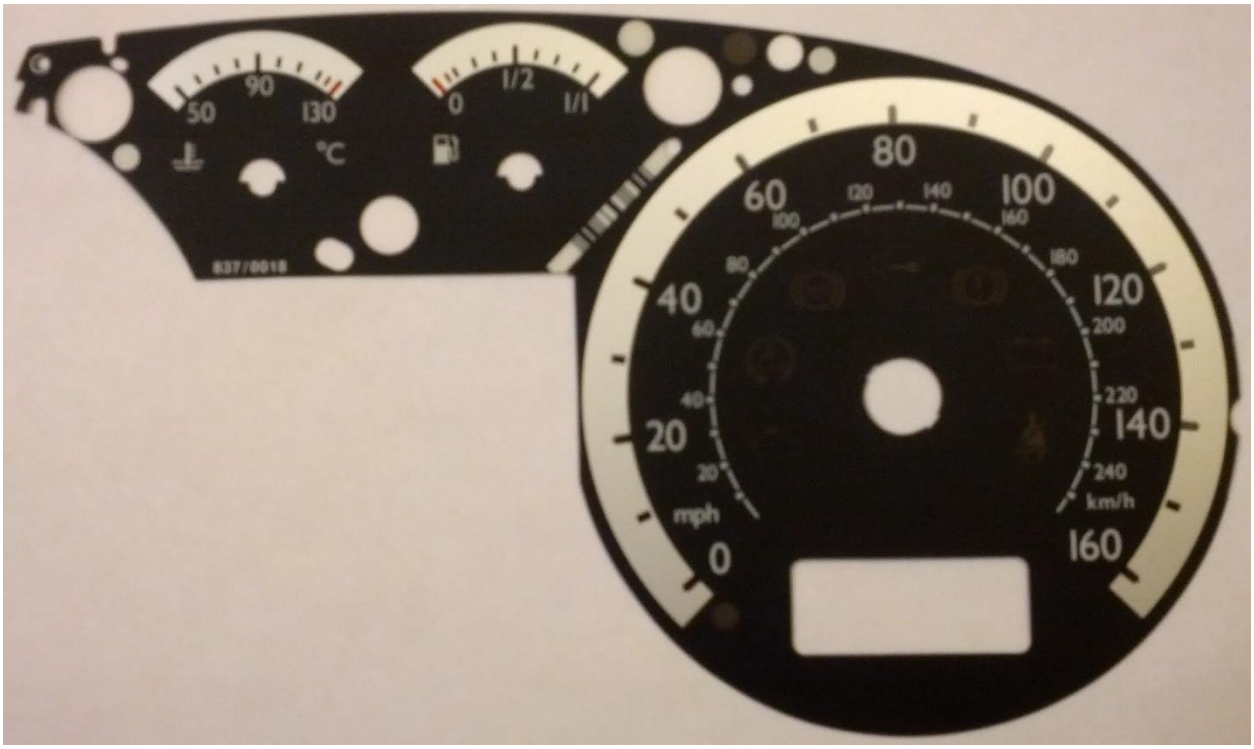
Turn the cluster back so the gauges are up. Now it's time to add the glow plug LED. The following photo shows the correct orientation of the LED. It will only work when installed in the correct direction. I didn't feel like removing all the white plastic framing but I was able to insert a small soldering iron straight down the hole and get it soldered into place.



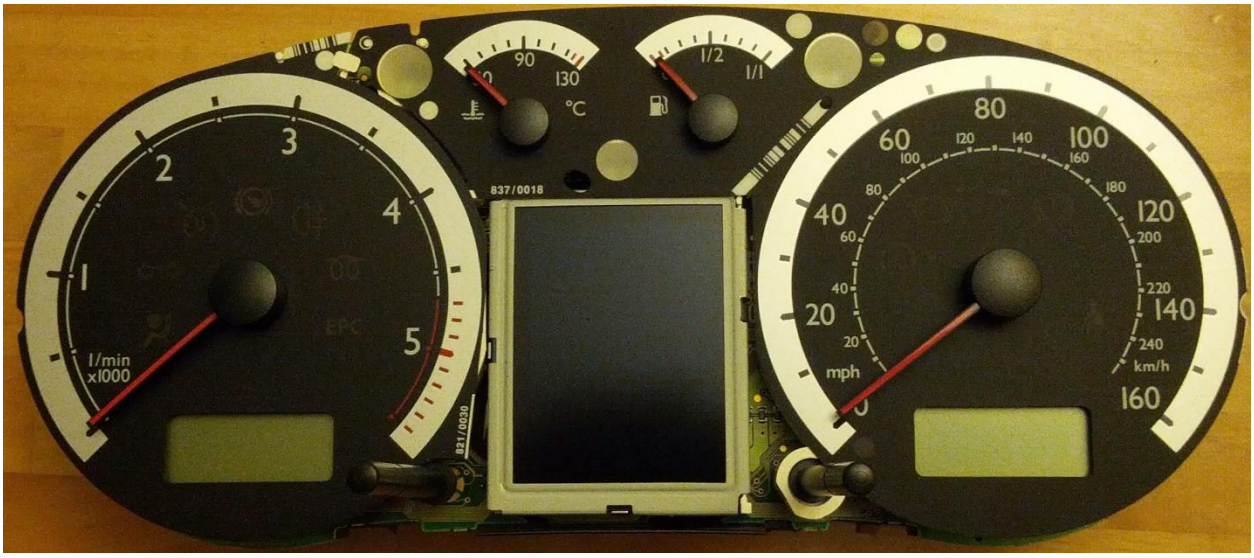
Next you need to modify the replacement MFA faces so they fit an FIS cluster. This only requires trimming the larger of the two faces. Place the larger replacement face, face-down. Then take the larger W8 face, face-down on top of it and line up all the edges. Then with a marker, trace the outline where the W8 face overlaps the new face. This is where the 8 warning icons are that would obscure the top half of the FIS display. Here's a picture of the 2 faces stacked (the 2 lines you should mark are highlighted red):



Separate the faces and cut along the lines you drew, removing the rectangular cutout. You should end up with something that looks like this:



Place the faces on the cluster and screw the needles back in – again **counter**clockwise. Stop turning when they're simultaneously in the right position and the have the right gap between the face and needle. You should end up with something that looks like this:



If you want to jazz up the cluster further, you could try adding chrome or aluminum rings around the gauges. The easiest way to do this is to use the faceplate from a GLI cluster. This also takes care of the high-beam indicator issue as the icon is built into the GLI faceplate. Probably the least expensive GLI cluster you can find on eBay is part number 1J5920906K.

If you don't go the GLI faceplate route, you'll need to do something about the headlight high beam indicator. On the W8 and GLI clusters, the high beam icon is part of the transparent plastic faceplate. It's

removable and looks like it'd be possible to trim it and glue it into the right spot on your new faceplate. Here's what it looks like on the W8 faceplate:

Even though it looks like you can put the cluster back together now, don't do it yet. You will need to flash the cluster with new software and then make sure the needles are lined up correctly by performing an output test with VCDS.

Flashing the cluster with TDI software

Next you'll need to write new software to the cluster so that it thinks it's a 1J5 920 946C. You should be able to find the new software by searching for the following using your favorite Internet search engine:

1J5920946C__KOMBI_WEGFAHRSP_VDO_V20_XXXXXXXXXXXXXXXXX_____VWZ7Z0B6235392

It's a 2048 byte long file. You'll then need to use a hex editor to make some changes:

Change the byte at location 0x65 from 0x80 to 0x82. This tells the cluster to use data from the CAN bus to control the temperature gauge and is necessary on unmodified W8 clusters. If you don't change this byte, you'll need to solder additional components onto the cluster to make the temp gauge work as described here:

http://www.gti-tdi.de/board2/index.php?page=Thread&postID=13177#post13177

I'm not sure if there's any disadvantage to receiving the coolant temperature over the CAN bus instead of directly from the coolant temp sensor.

You can also perform various other modifications to the cluster software such as enabling the Welcome message or always lighted needles as described here:

www.fitzski.com/jetta/images/cluster.pdf

Distance-to-empty is already enabled in the 1J5920946C dump file so you shouldn't need to do anything to enable that feature.

Once you've gotten the dump edited to your satisfaction, upload it to the cluster via VagTacho, VAGdashCOM, or VAG Commander. At the same time, use the software to retrieve the SKC from your existing cluster and your new cluster (though I think the SKC of the above dump file is 9430). VCDS can't do either of these tasks.

Run the Cluster Output Tests

You'll need VCDS for this step. Install the cluster in your car, run VCDS, select 17 (instruments) and click on "Output Test". It will lead you through a bunch of tests which include lighting all the indicators, testing the LCD display and running the gauges through their full ranges of motion. After each gauge is tested, the needle will stop at a calibration point near the middle of that gauge. This will tell you if you have set the needle position properly. The calibration points are as follows:

- Tachometer – 3000 rpm
- Temperature – 90° C.
- Fuel level – ½ full (or ½ empty for you pessimists)
- Speedometer – 100 km/h

If the position of any of the needles are wrong, remove the cluster, rotate the needle counterclockwise until it's at a better position and re-run the output test. This step is a lot easier if you set up a bench rig, which is described here: http://forums.tdiclub.com/showthread.php?t=309672

Once the needles are calibrated, you can put the cluster back together.

Here's the fully assembled converted W8->TDI cluster:

Here's what it looks like with a GLI faceplate:

Pair the New Cluster with your ECU

Immo3 ECU

Perform the steps detailed on the following page:

http://wiki.ross-tech.com/wiki/index.php/Immobilizer_III_Immobilizer_Swapping_(Instrument_Cluster)

This copies the Immobilizer ID, VIN and SKC from your ECU to your new cluster. After this step your new cluster will have the same SKC as your ECU and old cluster.

Make sure to also perform key matching and set the correct mileage. Follow the links at the end of the above page to learn how to perform each of those steps.

Immo2 ECU

Perform the steps detailed on the following page:

http://forums.tdiclub.com/showpost.php?p=3468471&postcount=5

Then make sure to set the correct mileage that was on your old cluster.

Non-Immo ECU ('99.5 Cars)

If you have a '99.5 car, you have more work to do. Instructions are on the following page:

http://forums.tdiclub.com/showthread.php?t=308735