

Fitting an Oil Cooler to the GT 86

This document continues on from where the oil temperature gauge document left off. It will cover completion of the gauge wiring and then the fitting of the HKS oil cooler kit. ***Reading through this might be a bit confusing without the kit and HKS photos!!!***

It was quite a big project for me as I am not a mechanic and only ever worked on cars as an enthusiast. I didn't really take enough pictures of the fitting, because I got right in to it and didn't want to stop. Therefore I have "borrowed" some pictures off the internet in certain places, so if the car suddenly changes colour then that is the reason why.

I would like to thank the owners of these "borrowed" pictures (whoever you are) and I hope they don't mind me using them. Since we are all enthusiasts at heart and just want to share our experiences, then I am sure it will be fine since there is no profit or gain in it for me.

Not everything is explained in detail, because this document is 19 pages as it is, so you will need to call upon your own skills and judgements.

Ok, here goes..... Installing the wiring.

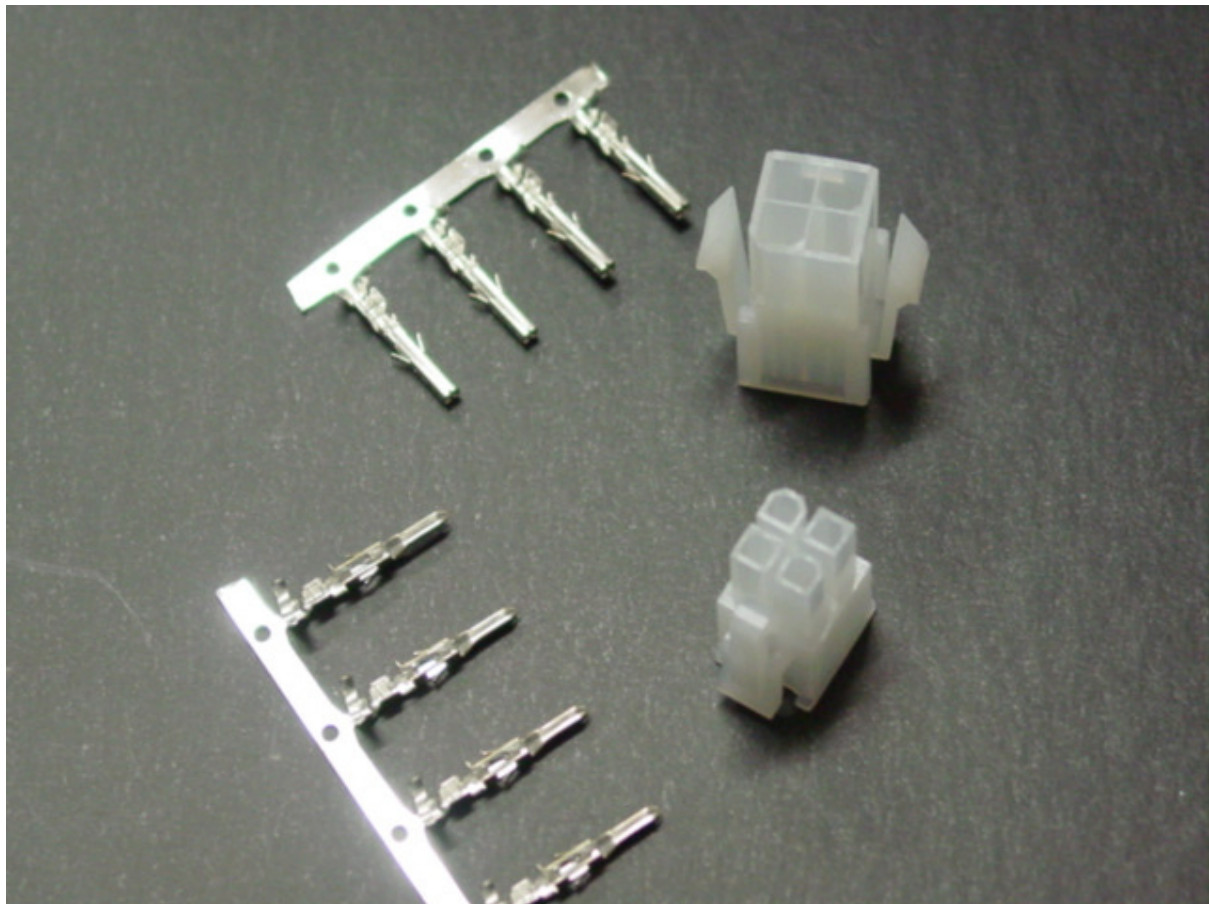


Figure 1

Above are the connectors I chose to connect the gauge to the wiring underneath the speaker grill. 1 x 4 way Molex for the gauge and a 2 way (not pictured) for the sensor.

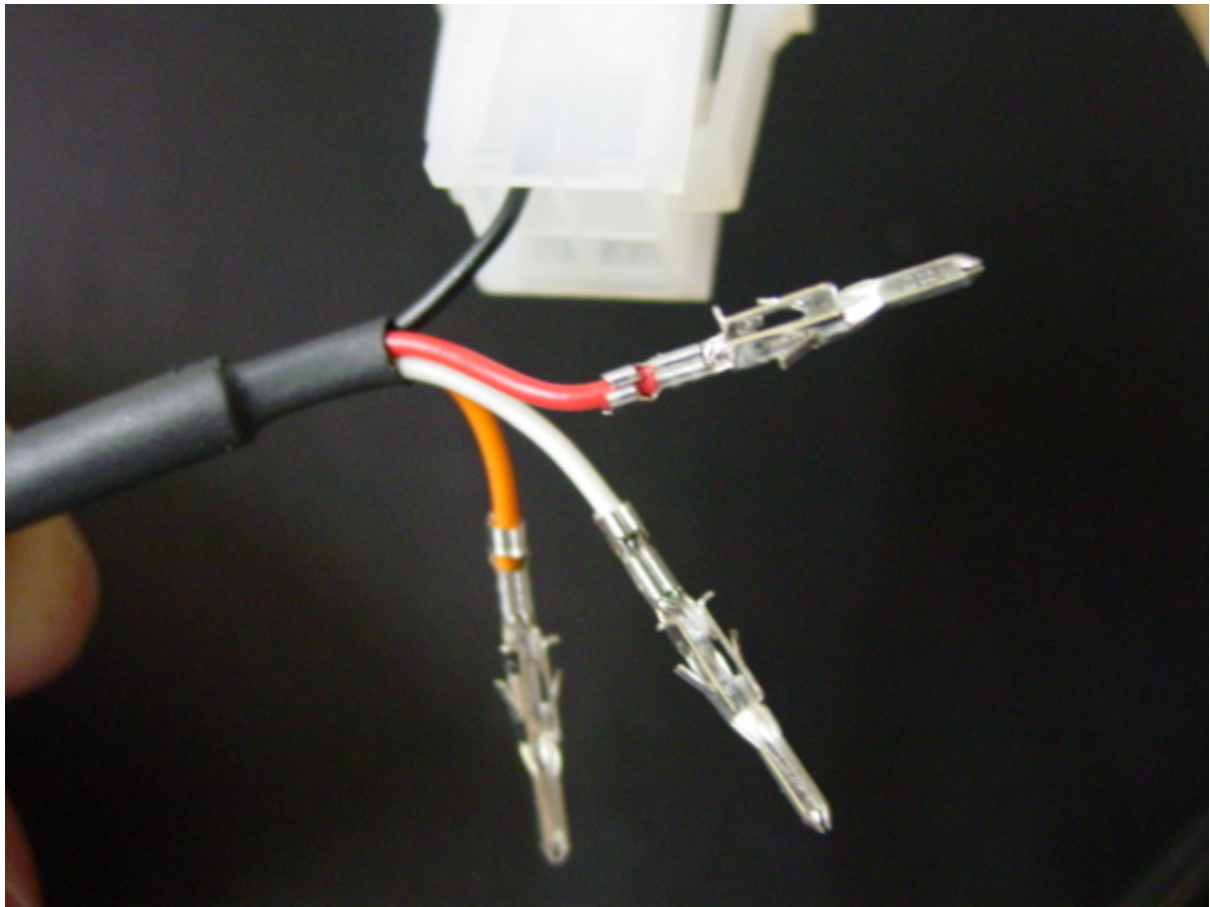


Figure 2

This is the wiring that comes out of the PROSPORT gauge. A male crimp terminal needs to be attached to each wire.

Black = GND

Red = 12V+ (Live all the time, un-switched)

White = Connected to +12 via the ignition. This also gives a white LED backlight.

Orange = This can be connected to +12V which is live when the headlights are on to change the backlight to red at night, or it could be connected to +12V via the ignition instead of, (or in addition to) the white wire, which will make the display backlight red permanently.

This actually looks quite nice and matches the 86 red instruments, but not as easy to read during the day.

Push the pins into the housing in any order you like. Just make sure when you come to wire up the female side that the colours match the same positions.

When complete, we will have a 4 way and a 2 way connector sitting in the speaker grill area to connect to these plugs.



Figure 3

4 way and 2 way connectors.

Here is the completed gauge connections including the sensor connection. Remember to use the "male" pin side of each connector on the gauge wiring.



Next we need to run a 2 core lead from where the oil filter is located, because that is where the sensor will be. We will connect this end later once the sensor is in.

There are several wiring looms located in the engine bay. Lay the new wire following the same path. There are many places where one or more looms are taped together. You can slip this wire in under the tape without undoing it. If you follow the stock loom layout, you will avoid it coming in to contact with any hot surfaces.



Figure 4

Once you head towards the drivers side, follow the brake lines and keep the wire close to the bulkhead until you get to the main loom entry point. There is a hollow rubber tube poking out. Pierce the end with a sharp object like a screw driver and feed the wire in. The rubber will seal itself around the wire and emerge inside just above the pedals.

Then, it is an easy task to guide the wire up towards the speaker grill area which should already been removed. Pull the wire out about 200mm.

Connect the 2 way female end of the connector that you still have to the wires.

We now need to run a power wire to the gauge which gets plugged into the 4 way connector.

The problem is that the 86 wiring is very tidy! Gone are the days of old when you would see numerous spare wires and connectors hanging out of looms under the dashboard. So I took what I thought was a novel and very tidy approach to the problem.



Figure 5

Under the dash, just above the bonnet release catch, there is a fuse box that feeds the instruments. Just pop off the cover to expose the fuses.

Note, this is a secondary or sub system fuse box mainly for the instruments and accessories.

I used a 2 core cable and a single black wire taped at various points to the 2 core.

Feed this arrangement down the speaker area until it appears at the pedals.

The colours in Fig 6 are as follows:

RED	+12V live all the time.
BLACK	Only live with ignition on (not accessories).
Thin Black	Connected to any body ground point.



Figure 6

I needed to find a point where there was +12V live all the time and another point that was only live when the ignition was on. Using a multimeter, I was able to locate 2 such points conveniently close together, that did not have any fuses in the holders. So they appear to be unused circuits.

I purchased a small pack of 5A mini blade fuses (orange).

When you think of how a fuse works, one side of the fuse is connected to the power source and the fuse bridges that source and feeds it to the circuit it protects. In the event of a problem, the fuse blows and isolates the circuit from the source.

Now, my multimeter tells me that I have power on one side of the fuse holder, but I have no idea if the other side of the fuse holder has any wiring connected to it underneath. So to be on the safe side, I decided to blow the fuses I fit before I insert them. Easily done by flicking them quickly across an old car battery or DC power supply.

I then soldered my wires onto one of the fuse pins and inserted the fuse with this pin on the live side of the fuse holder. Since the fuse is blown, there is no way any voltage can get to the other side. This is a neat and tidy way to get power to the gauge.

Lastly I just cut a small slot out of the side of the fuse cover so the cover would fit back on. (fig 5) The single black wire at the bottom is taped along the length of the other wire and then connected to a nearby earth point on the body.

Fitting the Cooler



Figure 7

So this is what's in the HKS box. Really it is just the main components. Apart from a bag of nuts bolts washers and cable ties, there is no real mounting hardware. It is left up to the individual to mount it. This is disappointing considering it is supposed to be a vehicle specific kit.

Don't get me wrong, this is nice gear, but I expected more from someone like HKS. That stainless steel braided hose looks expensive and there is only just enough to do the job. No room for error and you have to measure and cut the hose and fit the couplings.

The instructions have lots of pictures, but all the useful text is in Japanese. There is a separate booklet of the usual safety warnings which are in English, but you have seen it all before, such as:

Disconnect the battery, don't work on a hot engine, use jack stands, blah blah blah...
At the end there is a HKS disclaimer that you are on your own!

Oh and the oil filter shown does not come with it. The supplier chucked it in the box as a gift to me.

I will say it one last time though. Overall, The kit is still a nice collection of high quality parts!



Figure 8

I removed both wheels. Not absolutely necessary, but just makes it easier to work on.



Figure 9

Remove the 3 clip rivets (TRD body kit has 2 screws and 1 clip)

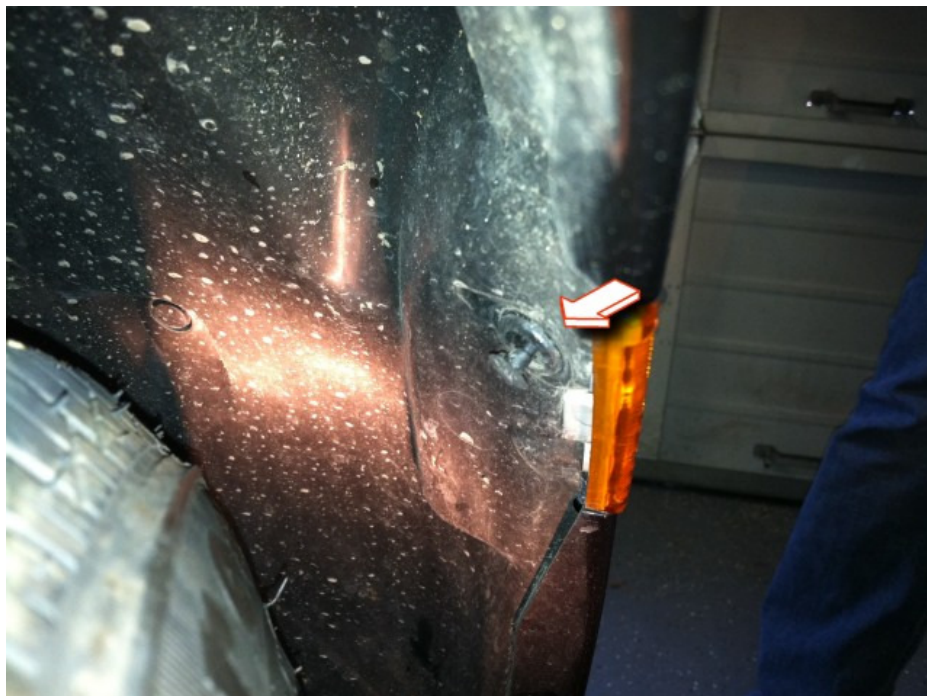


Figure 10

Another rivet higher up, just by the side marker.

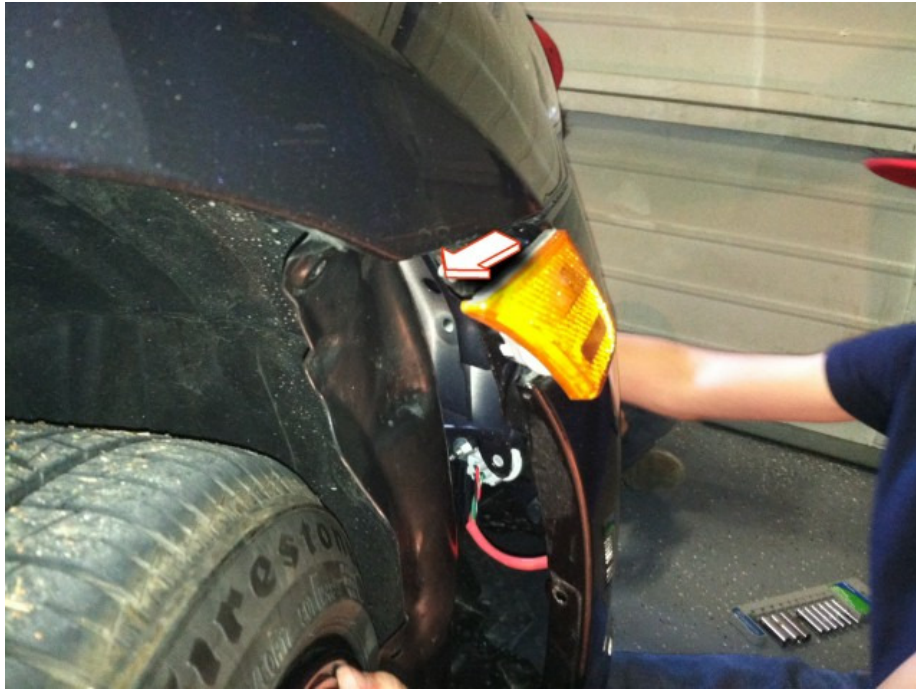


Figure 11

Peel back the super soft wheel arch cover and pop out the side marker slightly. Hard to describe, but this is tricky! There is another rivet that needs to be released. (shown by the arrow) All I can say is take your time with this!!



Figure 12

Under the front lip, remove the 3 rivets shown (more if you have TRD Body kit), there are still a couple of small ones located close to the front wheels that also need to be removed.



Figure 13

Remove the 10mm screw each side. (2)



Figure 14

There are 5 x 10mm bolts and 2 more rivets to come out along that top bar with the rubber strip. Once these are removed the bar just lifts off.

On the GT86 we have headlight washers. The protective caps have to be removed

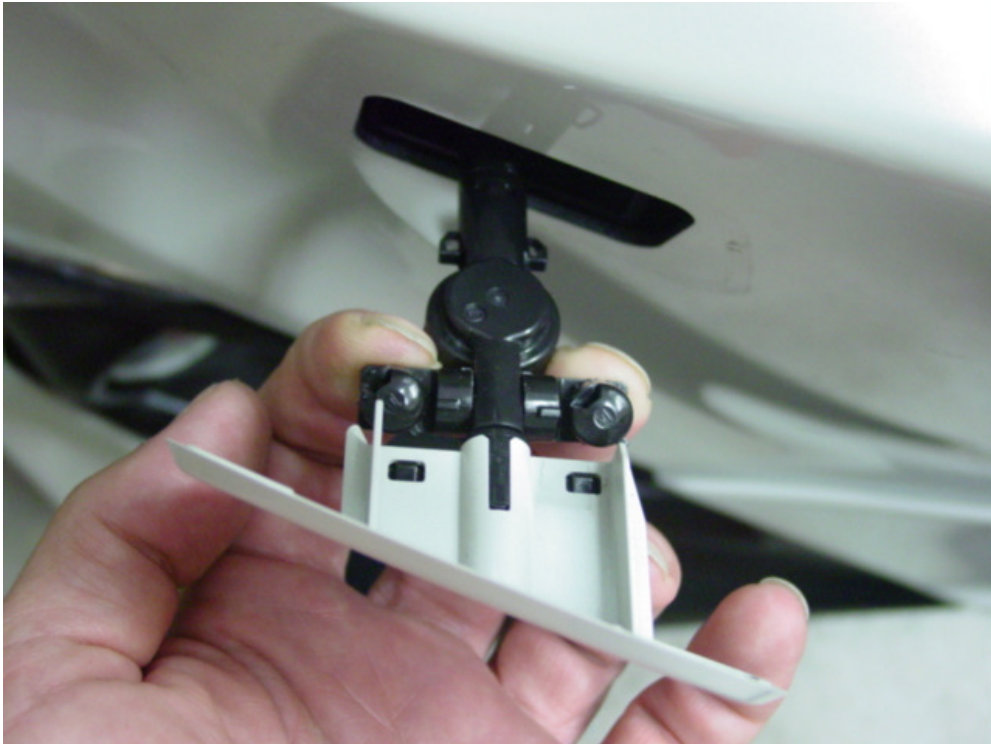


Figure 15

These are spring loaded, just pull them out by hand and remove the cover. Retract the washer jet assembly slowly.



Start at the side marker and pull outwards and work your way around. It is best to have a helper to support the side that has been released so it does not come crashing down when it goes. Again, take your time here. Be firm, but not aggressive!

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Disconnect lighting and side marker wiring plugs (4 in total) and this is what you end up with.

Pull off the white polystyrene packer. Pull out the air intake pipe and then under that is another large plastic cover held in with 4 rivets and 2 screws. Remove it. You will now have complete top access to the radiator and the space in front of it.

I also chose to remove the bottom lip as well. This is easy. It consists of 2 large plastic components. The lip itself and the bottom cover. Remove the bottom cover first (clips screws etc...) and then the lip. Piece of cake!

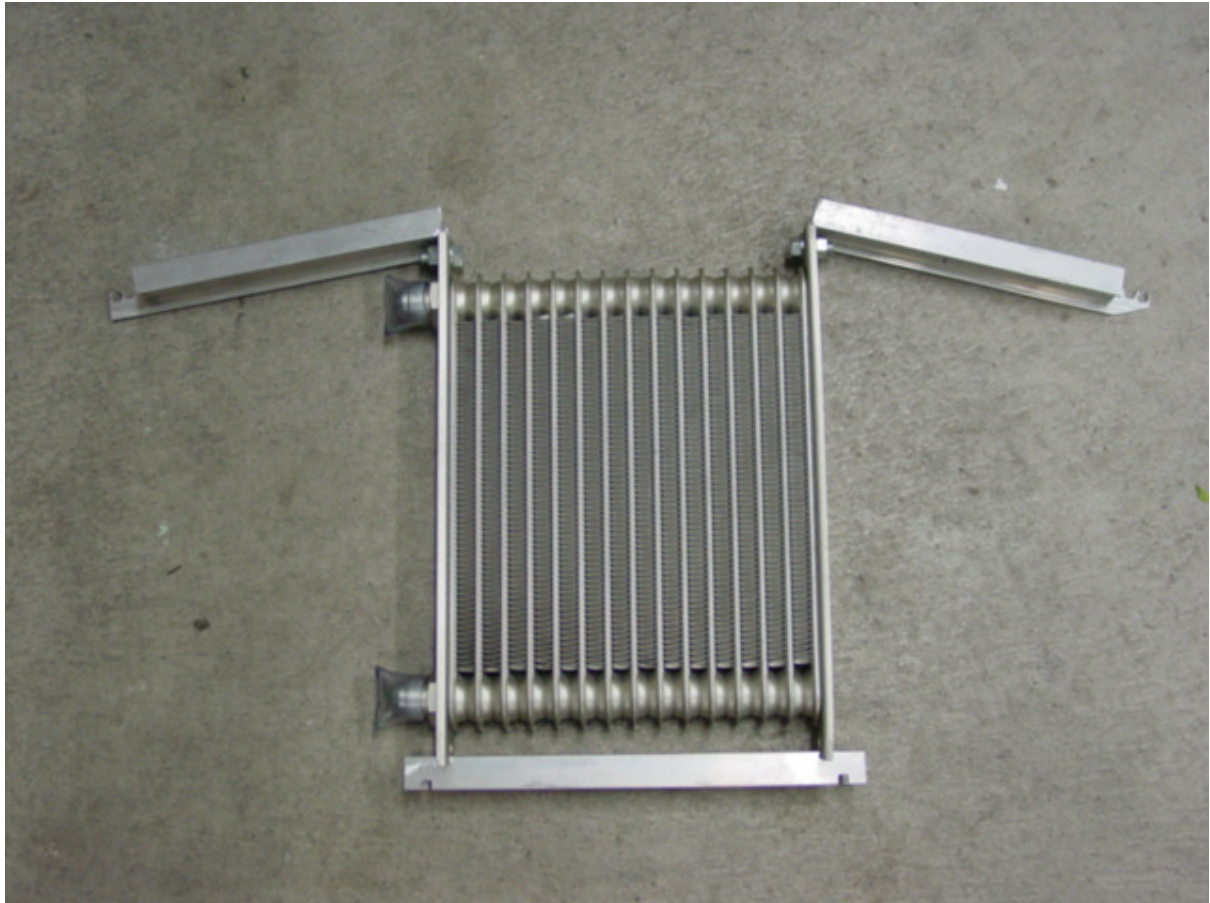


As you can see in this shot, you now have all the room in the world to play with.

I chose to mount the cooler core in front of the radiator, because I didn't like the location suggested by HKS (in front of the right wheel) and was not keen on cutting a thumping great hole in my wheel well cover and then covering it with mesh (which they don't supply). Yep that's what the instructions show.

Because we have fog lights on our models, I just don't get where the airflow comes from. It is too far away from the front grill and there are no holes around our lighting areas. Any airflow getting to the core would have to be minimal! I don't think the USA models have fog lights and they have a small grill in place of them, but even so they are expecting a lot of air to flow through such a small hole. The underside of the car is all sealed off with solid covers too so makes no sense to me, unless I am missing an important point.

Anyway, on with our build.....

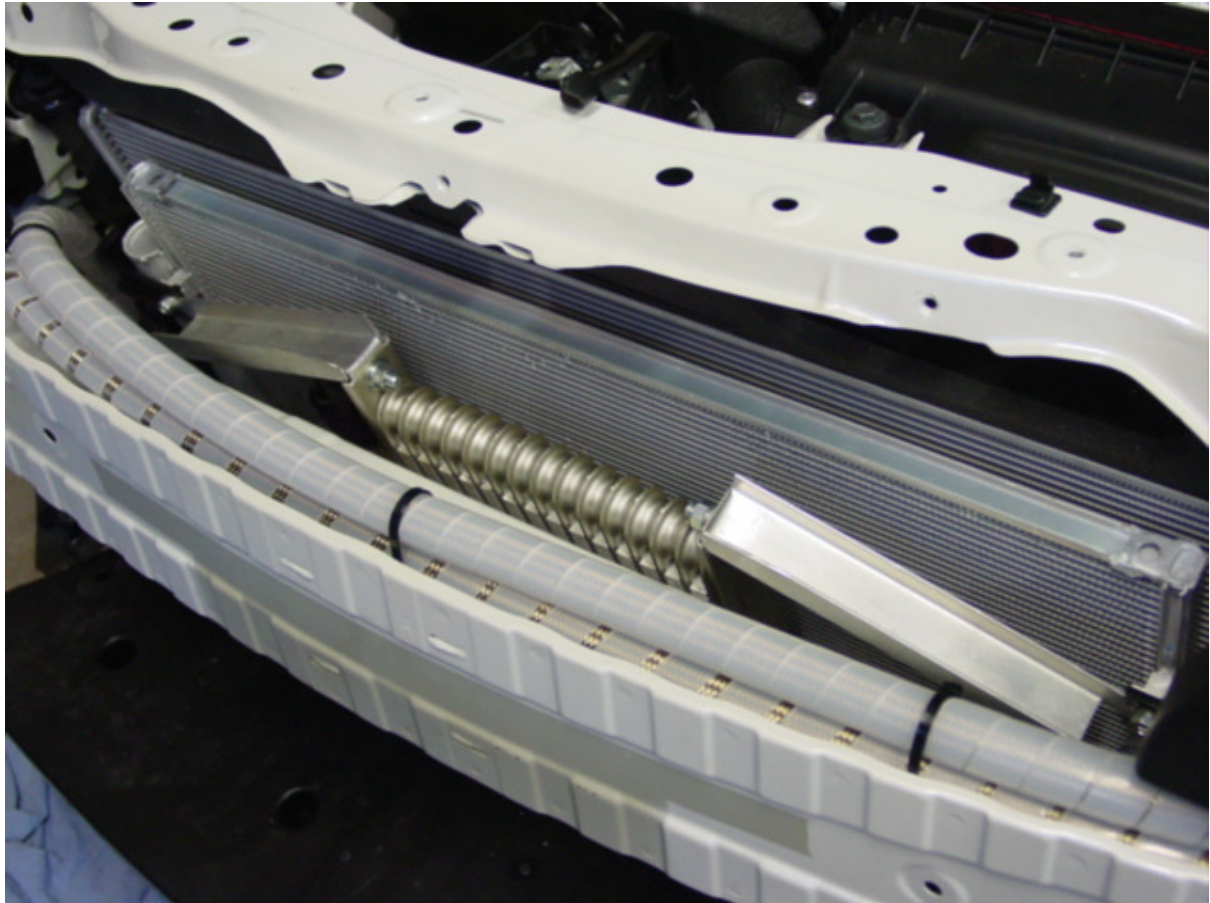


Unfortunately, this is where the photos start dropping off, but hopefully there will be enough for you to get the general idea.

I made some brackets out of Aluminium "U" channel The "U" shape gives it strength in all directions. It is light, easy to drill and it won't rust. The top 2 brackets are secured to the core by 2 x M8 bolts, nuts, washers and lock washers. There are 2 x 6mm holes drilled in the end of the bracket which attach to the stock radiator mounts. Sorry no photos.

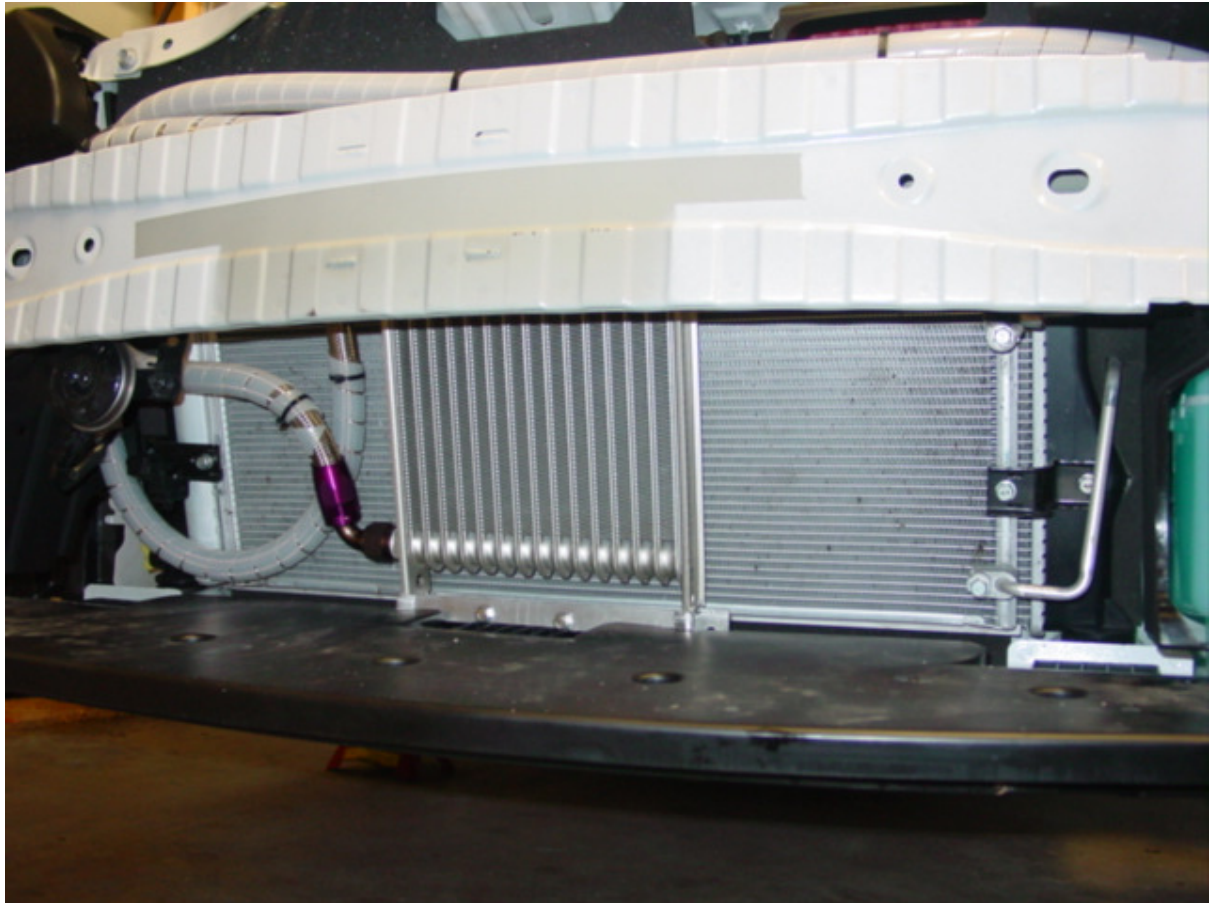
The bottom bracket just has 2 notches cut into it to support the core. This bracket will get some 6mm holes drilled in it later.

The "U" channel has been modified to allow the excess at the ends on the bottom bracket to be folded over on itself to help lock in the core. *The picture shown is before this is done.*



This is the view of the core installed. There is an even gap between the stock radiator and the front bodywork. You can also see in this shot that I had already cut and installed the hoses (a lack of intermediate photos, I know).

As I mentioned earlier you need cut the hoses to length using a hacksaw to get through the braid and then fit the hose fitting. Not difficult just need to double check before you make that cut! There are 3 x 90deg fittings and 1 x 45deg fitting.



Ideally, I really needed a straight hose fitting at the bottom connection. It would have flowed inline with the other hose instead of crossing over it, but I had to work with what was supplied. It doesn't make it any less functional, just not as tidy. This could be changed at some later stage by just removing the bottom lip and fitting a straight one.

You can now see the 2 x M6 bolts fitted in the bottom bracket. These bolts also go through some very sturdy metalwork that the bottom lip is secured to.

This core isn't going anywhere!

Now we can work on fitting the parts between the engine and oil filter.

As you read through this next section, you might find it hard to follow without the HKS pictures and seeing the parts inside the HKS kit. However, once you have these it should all make perfect sense.

At this point you should fit the oil temp sensor that comes with the gauge into the sandwich plate. There are 3 holes in this plate. The one we need has an allen key grub screw in it. Remove it. Place some thread tape around the sensor thread or some gasket sealant and screw in the sensor. The sensor has a tapered thread so it will not go in all the way. It just needs to go in a few turns until it is tight enough to seal. Clean all the surfaces ready for the install.

Next we need to remove the oil filter. Since Toyota have put the filter in the most sensible place possible, there is no need to drain the oil. Excellent!!!

I plan on changing the oil and filter after I have fully tested this install, so for now just use the oil you have and I even put back the OEM filter.

With the filter gone, you need to remove the OEM centre bolt that the filter was screwed onto. For this you will need a 24mm long reach socket.

Once this is out, go around and wipe all the surfaces clean. Fit the "O" ring gasket to the bottom of the HKS spacer block. Apply a thin film of oil to the ring and place the spacer on the original filter seat. Next fit the other "O" ring to the bottom of the sandwich plate. Place this on top of the spacer and position it so that it does not interfere with the oil filler cap and there is enough clearance for the sensor.

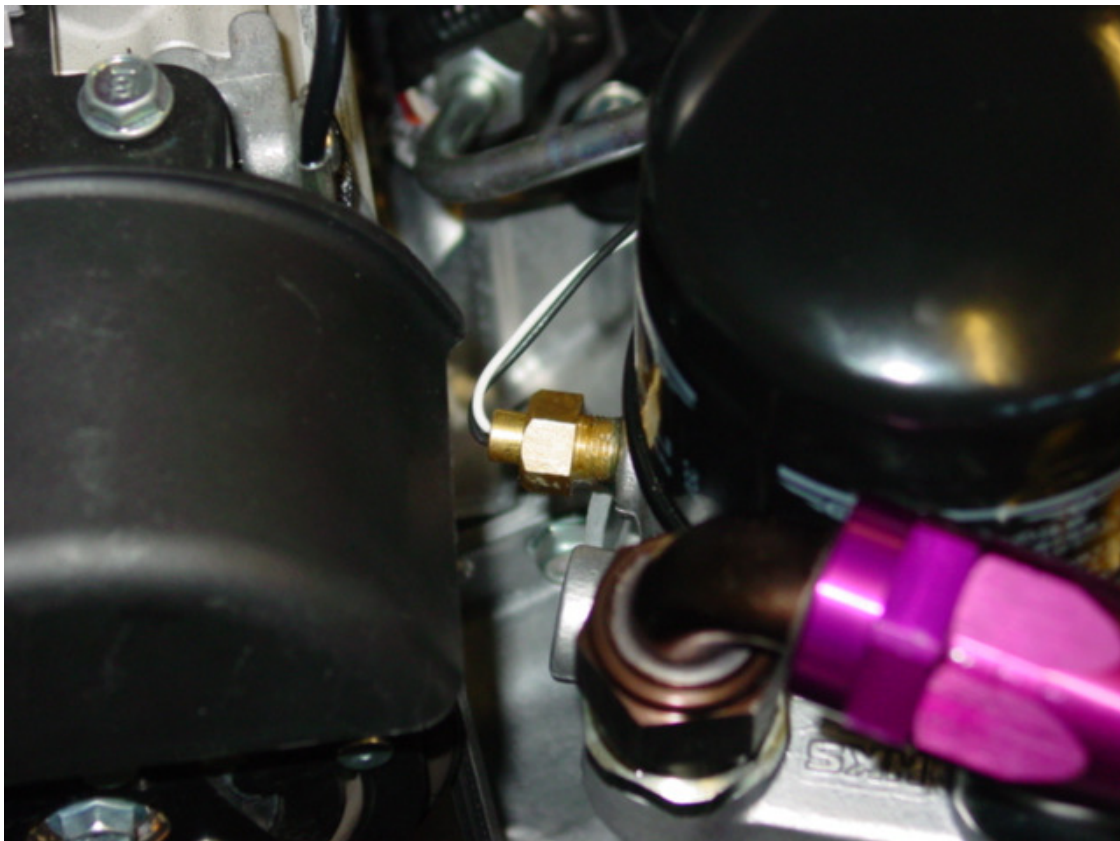
Fit the new, longer centre bolt from the kit and screw this down tightly, since it has to compress two "O" rings.

You will need a 30mm socket to get this in. Connect the sensor wires to our new lead.

Next install the banjo bolt and inlet pipe fitting. Make sure you fit the two copper washers supplied (one either side of the inlet pipe fitting) The inlet pipe swivels on this bolt, so attach the inlet hose to the inlet pipe and position it so the hose is not stressed in any way. Tighten the banjo bolt down and it will stay in that position.

Attach the outlet hose to the outlet pipe.

Refit the oil filter and double check everything.





Once you are happy that everything is tight and secure, start the engine. The oil light should go out straight away indicating you have pressure. Do not rev the engine yet!

Go straight to the oil filter assembly and check for leaks. Watch this area for a couple of minutes to see if any oil gathers in the oil filter drip tray. Don't worry too much about the core or hoses because the core will be empty of oil. Nothing is going to happen until the oil warms up and thermostat opens to let oil into the cooler core.

If all is well around the filter area, then increase the revs to about 2,000 for a minute or so. If you have hooked up the oil temp gauge then when it reads 70deg the thermostat will be starting to open and oil will slowly enter the cooler core. At this point you should have a good look around everything. Since the car is still in bits, all the hoses and connections are in plain sight.

If all is well, reassemble the bodywork, fit the wheels and go for a short test drive. Keep an eye on water and oil temp gauges.

Come back and check for any leaks or problems. Check the oil level as you will most likely need to add some to compensate for the oil that now resides in the cooler core.

Peter S.