

## Chassis Heater Tube Replacement

Ok, after the deep despair of realising that at least one of the steel heater tubes in the central spine had rusted to the point of failure, I finally got around to the idea of replacing them.

Initially I'd expected to have to at least remove the engine/gearbox to get at them, but after talking it through on this forum I'd received plenty of ideas on how to go about the task. Are you sitting comfortably ? Then read on....

The first question was, what to replace them with ?

Initially I thought "stainless steel", then looked up the cost of stainless tube and puzzled how to get a neat 90deg bend at one end in my DIY workshop. It sounded hard work so instead I went for simple copper tube, 12mm OD, for which you can easily buy soldered fittings, the 90deg bend is solved. 2M of 12mm copper pipe, a few 90deg fittings and some 12mm olives, all bought from a plumber's merchant.

So how to remove the old pipes ?

Credit to the forum members for this one, apparently it's possible to twist the steel tubes and break the tack welds holding them in place. At first I tried with a self grip wrench from underneath the car after removing the rubber hoses & draining the coolant because I could grip it close to the tack welds.

Don't bother, it's an exercise in scraping knuckles.



Pic 1 : Access to remove the old tubes

Instead, go inside the cabin, remove the centre console and go in through the hole in the chassis spine where you adjust the handbrake cable. The tubes are at the top of the chassis spine so you can't see them, but you can feel them and with a suitably small crowbar (sometimes referred to as "a screwdriver") it's possible to bend the tube to such a position where you can see it and get a hacksaw blade on it.

Yes, we're in sacrificial mode now, these things are coming out one way or another.

Once the tube has been cut through you have much better leverage and it's now very easy to twist, break the tack welds and pull out two very rusty tubes into the cabin.



Pic 2: both heater tubes as removed.

That's a 1m ruler so they would have been roughly 38"/95cm when new. I'm sure that's a very arbitrary measurement and could easily imagine +/- 5cm on that. The OD came in at 12.5mm, so 1/2" in sensible units.

I had decided to use 12mm copper tube for the replacements for improved corrosion resistance even though simply replacing in steel would have been fine given the lifetime of these. But the main reason was fabrication, copper is standard plumbing supply, easy to bend if required to get them into the tunnel and with soldered fittings available to make the job even easier.



Pic 3: Old & New tubes.

The new copper tubes were made fractionally shorter than the originals. I've always found that the short return hose to the water pump pipe is a tight fit, so a bit more room to flex the tube might be helpful.

Instead of swept bends at the heater end, I used 90deg copper fittings to turn that corner. To replicate the swaged ends (which had all but rusted away) I soldered the 12mm olives in place, simple & effective.

The next job is to clean up the holes in the chassis and make sure there's no sharp edges hanging around to cut into the new copper replacements. If only we could get a step drill in there it would be so much easier..... but I couldn't, so it was boring work with a round file to remove the old tack welds and smooth everything out.

And on to the elephant in the room, how on earth am I going to get roughly 1m of tube inside that tunnel ?

It can't go in from the engine bay because of the 90deg bend and even if I'd made a swept bend there's not going to be enough space to manoeuvre a 1m length with the engine and all that plumbing/gear linkage in place. With no body or mechanicals in the way I'd guess that's how the originals were installed but for me it's not an option.

So it's got to be from inside the car and although it took me a while to figure out, in the end it was remarkably simple. The first tube probably took half an hour of different methods but once the problem was cracked the second one was sorted in less than a minute.



Pic 4: Tube replacement.

With both doors open there's enough room to angle the replacement and get the heater connection inside the tunnel. Then gradually feed the tube in, swinging it around as you go. No need to bend the tube and there's enough room in the central spine to push the complete length in and then feed it backwards to go through the holes in the rear closing plate on the chassis spine.

Once you're located in the closing plate it's a case of trial and error to get the heater connection through the front hole. After several minutes of blind fiddling about I realised it might be a good idea to mark the length from the access hole to the heater holes and after that stroke of genius (or maybe just "doh" ?) the tubes went in easily.

Going back one step, another problem is what to do about the tubes rubbing on the sharp metal of the chassis. The obvious one is a rubber grommet but looking through my stock it became clear that the holes would need to be much larger. Because they were

previously welded in place the holes only needed to be large enough to clear the swaged ends so to fit a rubber grommet I would have had to enlarge those holes quite significantly.

I'd already cleaned off the tack welds and collected several bruises & scratches along the way so I decided that was a job best left to the next owner. But we still need something to stop vibration cutting the soft copper, so along came a split collar, courtesy of the 3D printer. (that is a toy everyone should have !)



The ID is sized at 12.5mm diameter with a tapered outside so it's like sliding a cork in place. They worked remarkably well, just pushing them into place from the engine bay and inside the cabin, tapping with that universal tool (screwdriver) to get them nice & tight..

I used PLA+ which has a softening point of around 55C so they may distort in service, we'll just have to see how they go. If it looks like they're coming loose/distorting then I'll use a higher softening material for the next set and that should be good enough.

After that it's just a case of replacing the hose connections and topping up the coolant again.

So, with the benefit of 20/20 hindsight, is it a job you should be thinking about ?

The tubes on my chassis are pre 1980's vintage because I've records of the original owner ordering a new chassis in the late 70's, so over 40yrs old. Not a bad life and as most restorations will have a new chassis, that should reassure most of you folks.

Whilst there was internal corrosion and thinning, the main problems were at the ends, the swaged portions had either gone completely or started to pinhole. The initial failure was the inlet tube falling apart just after the swaged portion causing the hose to come loose. I'd take the condition of the swaged ends as a good early warning indicator of whether or not you should be considering replacements.

But if the chassis is on the floor right now, replace as a matter of course because it's cheap insurance.