Installing the Flyinmiata Link Intake Air Temperature sensor into a supercharged MX5

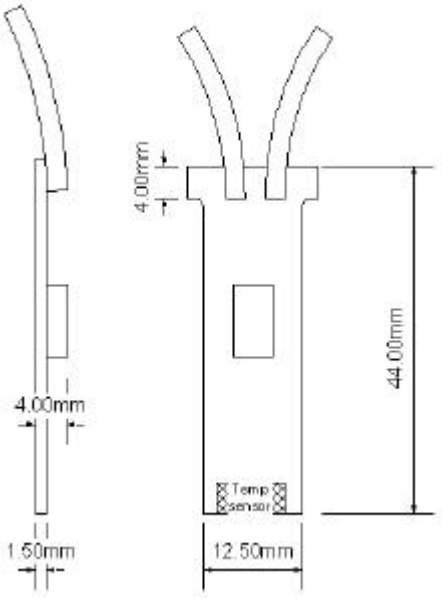
Jeremy Hendy, 11th August 2001

The Link air intake temperature sensor

The air intake temperature sensor is a small printed circuit board, around 44mm x 12.5mm, which is designed to be mounted inside the idle air hose stub pipe of the FlyinMiata turbos – see the picture on the right & the installation instructions at http://www.dlralt.com/intakeairtemp.pdf for more details.

It has two wires; a ground and the signal, which is connected to the ECU via the wire formerly used for the power steering pump pressure sensor.

The sensor looks like this (photos from flyinmiata, dimensions from my (rough) measurements):



Unfortunately, on the supercharger installations, there isn't an idle air hose pipe in the metalwork, so another method has to be found. I decided to tee a short length of pipe into the supercharger crossover pipe.

As the sensor PCB was designed to fit into the ½" inside diameter pipe of the FM turbo intercooler exit, I used a short piece (about 35 mm) of ½" ID brass tubing.

I cut a few M16 threads on the pipe, which helped to give it some mechanical stability when mounted into the thin steel of the crossover tube, and used a Dremel tool to cut some grooves in the other end of the pipe to take the "lugs" of the temperature sensor PCB.

These were then deepened until the business end of the temperature sensor protruded about 10mm out of the other end of the pipe into the airflow. Building a "dummy" temp sensor cut out of thick cardboard for trial fitting helped a lot when prototyping.

Fixing the tube to the crossover pipe

The next step was to cut a 16mm hole in the crossover pipe. The hole was positioned so that the temperature sensor would protude from the bottom of the pipe just before the 90 degree bend going into the dummy throttle body.

I'd decided to use "Super Steel" epoxy weld to fix the pipe to the crossover, rather than try brazing or welding it in – again, a bit of prototyping with some sheet steel established that the epoxy held pretty solidly providing that the surfaces were clean, and roughened up to provide a key for the epoxy.

As you can see in the picture, I used the Dremel with a grinding attachment to take off the powder coating from the crossover tube for about 1cm around the hole.

I found that a conical (variable diameter) hole-cutting drill was ideal, as it let me cut the hole just big enough to thread the brass tube in. The threads then held the tube firm while the epoxy set and acted as a sealant & additional mechanical support. Remember to thoroughly clean all the swarf from the inside of the crossover pipe!

The slots in the pipe were aligned to ensure that the temperature sensor was "in line" with the airflow along the tube, rather than causing turbulence.

To minimise the possibility of the epoxy dribbling through into the crossover tube, a piece of rag was stuffed in behind the tube.

The epoxy was then applied, and left for 24 hours for it to thoroughly set.

Sealing the open end of the pipe

With the temperature sensor fitted, the next challenge is providing an airtight (& boost-tight!) seal on the open end of the pipe, whilst still getting the two wires to the outside world. In the FM turbo installation, the wires exit through the sidewall of the idle air hose, with a little silicone sealant used to provide an airtight seal.

I managed to find a suitable rubber cap in the local DIY shop – a 16mm walking stick end, which fitted the tube perfectly.

My first attempt routed the two wires back down the side of the tube to avoid piercing the cap. A tie-wrap was then used to stop the cap flying off under boost. In the photo, you can also see the 2-way connector that I used to connect the sensor to the wiring harness – as the crossover tube seems to get regularly removed, I wanted to be able to easily connect and disconnect the temperature sensor.

Having fitted the pipe, I found it difficult to get a stable idle (although the idle MAP readings were pretty much the same as before, the IAC% was close to zero. Interestingly enough, boost wasn't significantly affected. I suspected an air leak down the side of the pipe, where the wires exited the cap.

For leak-testing the pipe, I re-fitted the silicone hoses at either end of the pipe, clamped the cap from a large aerosol in one end to provide a seal, and in the other end I clamped a round plastic water bottle with a hole drilled in the bottom of it. Squeezing the bottle then pressurised the crossover pipe – sure enough, you could hear the hiss as the air escaped past the wires.

I subsequently pierced the end of the rubber cap, pushed the wires through (having previously tied a knot in them, as per the FM instructions), and (messily!) sealed the hole with silicone sealant – this worked fine.