

# Customer Repairs

## Two difficult Marconi repairs

I bought a faulty model 2432A Marconi Frequency Counter some time ago. It was fairly cheap, being described as faulty; and as I'd also picked up a manual for it, I thought it would be a good repair proposition.



[See the Service Manual](#)

I'd tackled it twice previously before settling down to get to grips with it for this (third) time.

On the first occasion I'd discovered I hadn't been the first to try and fix it.

Also, the thing was without its outer case and it had obviously been stored somewhere damp allowing the circuit board to become tatty-looking and the soldering to take on a cloudy look.

The power supply seemed to be faulty. This used a couple of 741 op amps, the connections to which had been really badly damaged, by the last repairer, with missing pads and scruffy bits of wire added.

After a couple of fruitless hours I'd given up.

The second time I'd looked at it I'd replaced the two op amps and tidied up the soldering. I'd also fitted a couple of replacement regulator transistors as these were short-circuit.

I remembered that powering up produced nothing. The two main power rails, 12 volt and 5 volt were very low, in fact close to zero volts. Back it went to the pending pile as a large TV appeared at the door gripped by a pair of white knuckles.

This third time... I was determined to make progress.

Powering up produced what I'd remembered 6 months previously. I looked at the circuit diagram and discovered that the 12 and 5 volt power supplies were interdependent. With no 5 volts the 12 supply wasn't regulated. I didn't think too much of the implications of that at that moment.

I decided to check the 12 volt rail for resistance to ground. It was around half an ohm. Too low... no wonder the regulator transistor voltages were odd.

The circuit board is unusual. It pre-dates plated-through hole technology and instead relies on metal rivets to connect front and back circuit tracks. The power tracks were all over the place, ducking and diving through the board, first one way then the other, then back again and so on. Each time using a soldered through-link.

As the 12 volt rail had countless tracks going different ways to feed different parts of the circuit I decided to cut the tracks at specific points to isolate the short.

After half a dozen cuts I eventually found a small red tantalum capacitor that measured 0.7 ohm. I removed it and after fitting a modern equivalent, and soldering across the cut tracks, powered up and saw some red displays illuminated.

A meter across the 12 volt rail said 13 volts and a measurement across the 5 volt rail showed 4.9 volts. I tweaked the pot and got exactly the 5.1 volts stipulated in the manual. No separate adjustment for the 12 volt rail is provided as this seemed to follow the regulation of the 5-volt rail. This is a serious design fault and I'd like to give the recalcitrant Marconi engineer a piece of my mind! What was Marconi QA thinking about when the circuit had been released as being sound! More later!!

I applied a signal to the low frequency input socket expecting to see a series of digits appear on the display... but no.

I switched on my Marconi TF2008 intending to feed a couple of hundred megs into the HF socket. It wouldn't switch on. I checked its fuse. Open-circuit. I fitted a new fuse but that didn't help. I groaned and set it to one side then reverted to the low frequency audio signal and there was the row of zeros again.

Above: The innards of a TF2008 revealed

I scratched my head and at that moment the display of zeros disappeared to be followed by a whisp of smoke from somewhere on the main circuit board. I waited a moment for whatever it was to roast a little then switched off and felt around the components. A second red tantalum capacitor had clearly failed as a bead of solder had appeared on its outer surface and its jolly red colour was now a dirty-looking brown.

Why had it failed?

To cut a long story short. The metal through-links had developed dry joints. One of the links in the 5-volt feed was clearly worse than others and was now open circuit. A quick measurement of the 12-volt rail revealed the reason for the capacitor failure. The 12-volt rail, without the aid of the 5 volt rail, was sitting close to the full 16 volts of the regulator input. The idea of setting the 5.1 volts and the 12 volts via a single

potentiometer was not a good idea as the lower the voltage on the 5-volt rail, the higher that on the 12-volt rail. Minimum on one and the maximum on the other! Tantalum capacitors are pretty fickle things and if rated at 16 volts maximum, that's the maximum... 16.5 volts and failing capacitors! I resoldered all the through-links in sight, replaced the second faulty tantalum capacitor and switched on again. I was rewarded by a good 5 volt rail and a good 12 volt rail. Unfortunately I was still reading either zeros or just a decimal point. I set the counter on one side and pulled down the Marconi signal generator.

The TF2008 is an interesting beast. Inside there are maybe 50 or 60 metal boxes carrying bits of circuitry. Some of the boxes are fitted inside other boxes and carried on large hinged metal structures to allow servicing. A quick check revealed a short on the 12 volt power supply rail. Funny I thought... I've just been here. The power supply and some of the DC control equipment is fitted on open circuit boards, but of course these proved blameless.

A couple of hours later, and after opening and testing countless boxes I'd got to the box with the faulty component. Yes... you've probably guessed... a small tantalum capacitor.

This time the rail was sound. It hadn't risen to a voltage higher than the capacitor rating. In fact the latter was 35 volts so plenty in hand here. Just an end-of-life failure I suppose? I fitted a modern electrolytic and reassembled everything. A couple more hours and I'd discovered I'd forgotten to resolder a wire in the heart of the thing! Another 30 minutes this was remedied and all was well.

I applied a hundred megs or so to the counter but was rewarded by nothing other than a decimal point.

There ends the story until another period of slackness arrives....