

In the Shop

with Harry Leeming G3LLL

Harry G3LLL rounds-off his chat on speech processing, before moving onto a sticky problem with the FT-101ZD and replacing relays.

Following on from the October issue, where I covered speech processing, I would like to point out that even without going to the expense of special microphones, the clarity of the audio response can often be much improved by the simple expedient of attenuating the lower frequencies. The diagram, **Fig. 1**, shows a simple local/DX switch that can be fitted to almost any microphone.

For instance, with a Shure 444 microphone, disconnecting the existing leads from the VOX switch, which is not needed with most rigs and shorting them together can easily achieve good results. You can then use this switch to either short-out, or bring into circuit a capacitor wired as shown in **Fig. 1**, into the live audio lead. The value of the capacitor should be chosen so that its reactance is about equal to the rig's

microphone input impedance at the higher audio frequencies. This will reduce your audio gain but once the microphone gain control is advanced to compensate, you will have a rising response. This emphasises the frequency range that's required to get clear speech across.

The best value for the capacitor is subject to trial and error. This will depend on the characteristics of your voice, rig and microphone. To start, on a rig with an input impedance of $1K\Omega$, try $5nF$, or for the older $50K\Omega$ rigs, such as the Yaesu FT-101E, try $2nF$ ($2.2nF$). Too low a value will give a very thin sound with insufficient microphone gain. However, a little experimenting can make the difference between being read at '5&3' and 'sorry old man I can hear you there but I can't read you'. Next time, I will look at amplitude processing and limiting but for now let's move onto other matters.

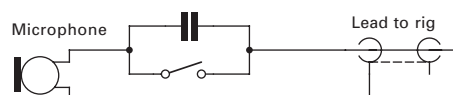


Fig.1: A simple local/DX switch that can be fitted to almost any microphone.

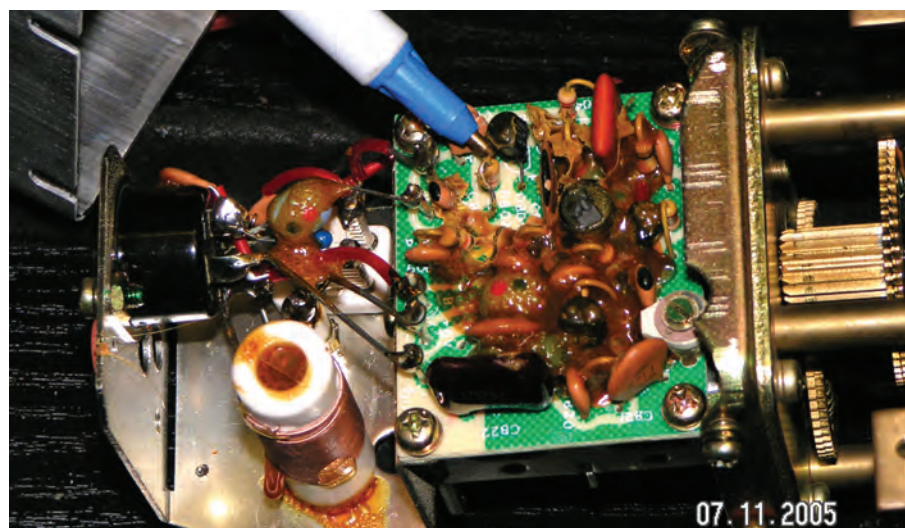


Fig. 2: Carefully picking the glue off from around the oscillator transistor, often results in problems being solved.

Faulty Glue?

I had a query from George who had a Yaesu FT-101ZD that was jumping in frequency. He seemed to know what he was doing and had tried the usual suggestions. These included cleaning the clarifier and v.f.o. push buttons, poking around to see if anything was loose, had checked that the voltages were stable and so on but all to no avail. He stated that it was difficult to check most of the v.f.o. components as they seemed to be encapsulated and asked if I had any suggestions?

To help George, I told him that a number of pieces of equipment, such as the Yaesu v.f.o.s and FDK's phase locked loop stages are covered with a rubbery glue like substance. This appears to be used to stop engine vibration modulating the frequency when they are used in mobile operation. (Yes, believe it or not the FT-101 series were designed as mobile rigs!).

The adhesive covers many components, and is extremely difficult to remove when trying to service equipment. There are various ways of tackling it and I normally try alternatively heating it with a hair dryer, then freezing it whilst attempting to pick it off with long nosed pliers. (If any readers have a better method I would like to hear from them!).

The strange thing about this glue-like substance is that once I've removed it, I have often found that the fault that I've been trying to locate has disappeared. The faults have varied from p.l.l. oscillators that would not lock, FT-290 a.g.c. systems that turned the gain down until the rig had been on for half an hour, and v.f.o.s that have drifted and jumped around in frequency.

In some cases, I might (possibly) have cured an intermittent connection in my efforts to remove the messy substance but it has happened too often for this to be always the answer. I can only presume that over many years something happens to the 'glue' to make it become conductive, or attack components but I've never been able to measure any such leak.

I suggested to George that while there was absolutely no guarantee of success, that he should carefully try to pick the glue off in the vicinity of the oscillator transistor, (as shown in **Fig. 2**). Later (Lo and Behold) he E-mailed me back and reported that a cure had been achieved and that his rig was more stable than it had been for years.

What Do I Think About the FT-102?

Bert E-mailed me to say that he had the opportunity to pick-up a Yaesu FT-102 'that needed slight attention' for only £100. What did I think? I told him that if he was capable of sorting out his own problems, then a nice clean FT-102 with a few repairable faults

could be a bargain. If, however, he would have to pay someone else to repair it my opinion was that he would be better off with an FT-101Z or ZD.

An FT-102 in good working order is superb and when they first arrived in the country I was most impressed but after years of experience with them I have had to revise my thinking. Nowadays, when I see an FT-102 I think of the little girl referred to in the poem by **H.W. Longfellow** "*When she was good she was very very good, but when she was bad she was horrid.*" This fits the FT-102 (and to be politically correct, little boys like my four year old grandson) perfectly. There are quite a few potential problem areas with the FT-102, in that the relays, the band change switch, and the p.a. stage are the most troublesome. This time, I will concentrate on the relays.

On the FT-102's r.f. board are five small relays. Of course, all rigs have relays although most other h.f. rigs, however, have no more than one on the r.f. board. Relays tend to be unreliable devices and if you fit five times as many you tend to get five times as much trouble! Add to this the fact that many of the contacts on the FT-102 relays switch only very small signal voltages (which unlike steady d.c. voltages, are not strong enough to breakdown even the slightest layer of dirt or oxide) you have a recipe for trouble.

The relays are also small and cannot be cleaned easily, which makes things even more difficult. I find that if the user does not smoke, a new set of relays in the FT-102 tends to last about three or four years. However, if the owner is a heavy smoker, the relays can start to become intermittent within a year. With the FT-102 therefore you either give up smoking, or it gives up.

Some users claim to have improved the reliability of the relays by introducing what is known as 'd.c. wetting'. This involves passing a d.c. current from a source of a few volts through the contacts. The idea is that the voltage will breakdown any thin layer of dirt or oxide that forms and make the relays last longer. This idea sounds good but without extensive trials its effectiveness is hard to prove. Perhaps any reader who has more details and full instructions would like to drop me a line?

Replacing The Relays

Of course, before you start work, completely disconnect the rig from the mains. You should note that the FT-102 has a 900V h.t. line. This appears on un-insulated terminals near to the r.f. board underneath the rig and is **extremely dangerous**. The 900V supply can hold its charge even when the rig has been switched off for days (I found out the hard way!). So, make sure that you discharge this before poking your fingers in. Removing the r.f. board to replace the relays is rather

too much like hard work and can easily result in a damaged band change switch, fortunately this is not necessary and I find it best to proceed as follows.

Remove the covers from the rig and then undo the screws from the audio panel underneath. Fold the audio panel back, fasten it out of the way with a rubber band and then remove the metal 'window' in the chassis, which you will find underneath it. It's now possible to get at the underside of the r.f. board, without removing it.

Before unsoldering the relays, make a drawing of any connections or modifications that are 'tacked on', as quite a few alterations were made to the printed circuit board (p.c.b.) during the production run and the circuit may be different from that in your manual. If you forget where an undocumented capacitor goes, you will be in deep trouble when you try and fit the new relays. Note that the relay at the front underneath the spindle (RL1005) is a very tight fit, it is, however, just possible to remove it if you break-off the cover and cut the pins short before unsoldering them.

Fitting the four relays towards the back of the r.f. board is no problem, as long as you have noted which are 24V, and which are 12. But RL1005 at the front is a challenge! First, temporarily insert this relay on the wrong side of the board to check that all the pins line-up and that the holes are free, drill out the holes very slightly if necessary, so as to ensure an easy fit. When you have done this remove the relay, cut away the pin that goes to an unconnected tab on the p.c.b. and then trim the rest of the pins as short as you dare. With the aid of a little sticky tape and loads of patience it's then just possible to guide it into place under the spindle and then to solder it. Please note that as I'm no longer in the trade I cannot supply these relays. Has anyone a suggestion for a UK supplier?

Now't Funnier Than Folk!

You don't find an Amateur Radio shop on every street corner and to the local population around Johnston Street Blackburn, what we did in our shop was somewhat of a mystery. When we originally moved in we tried to increase our takings by serving the local population. We soon found that the time taken trying to explain as to why we did not repair £5 radios or giving advice about televisions, hi-fi and electronics in general, was totally unproductive.

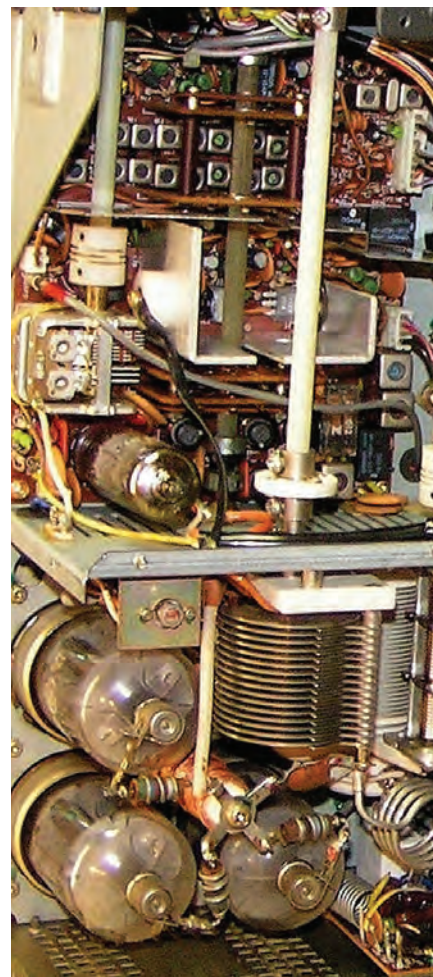


Fig. 3: The r.f. board from a Yaesu FT-102.

A real classic of a request was the customer who came in and explained that he had just moved into the area. He said that he would like to borrow an ammeter. When I queried why, he explained that the house he had moved into had a large assortment of two and three pin mains sockets. "I am not sure whether they are 2, 3, 5, 13 or 15A sockets", he said "I would like to borrow an ammeter so that I can check their ratings." How do you explain that one? **PW**

Harry's waiting to hear from You!

As I am now retired, I like to hear about problems with older equipment, particularly pre-1990 Yaesu rigs. If you want a direct reply send remember to send me your E-mail address or enclose a stamped addressed envelope. Send your letters to: **Harry Leeming G3LLL, 'The Cedars' 3A Wilson Grove, Heysham, Morecambe LA3 2PQ. Tel: (07901) 932763 E-mail: harryleeming@tiscali.co.uk**

Remember the mains supply is potentially lethal. Unless you really know what you are doing, always pull the mains plug out, **do not just switch off at the wall socket**, when working on equipment.