



## Harry Leeming G3LLL's In the Shop

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# The Yaesu FT-747 – a mystery rig?

**Harry Leeming G3LLL remembers his time running Holdings, a well known north west of England Amateur Radio dealers. This time he discusses the Yaesu FT-747.**

**Welcome to *In The Shop (ITS)* where I look back to my days in the Amateur Radio trade and the Yaesu FT-747 comes into focus this time. A few readers have asked questions about the origins of this unit and I wonder – does anyone have any more information?**

The FT-747 economy rig is a bit of a mystery, as to my eyes it does not look internally or externally like it was made by Yaesu, especially as it has a plastic cabinet. An almost identical rig was marketed in the USA as the 'Heathkit SB-1400' and I'm advised that there was also a professional version, the FT-80C h.f. land mobile transceiver.

I was reminded of this question when one of my old customers from Blackburn, dropped his FT-747 with

an intermittent fault. He had a problem with the rig jumping in frequency by a few hundred Hertz for no apparent reason. It only did this in the upper sideband (u.s.b.) and c.w. (Morse) modes, but like many intermittent faults it wouldn't do it to order!

As the same crystal is used on c.w. as on s.s.b. in the '747, this seemed the obvious culprit, but warming the crystal with a soldering iron had no effect. I soldered every joint in sight around the u.s.b./l.s.b. circuitry, and left it running for a few days, when it seemed okay he took it back. The rig behaved itself for a for a while and then once again it was up to its old tricks, so he brought it to me again, could the u.s.b. crystal be faulty after all?

To test this I swapped over the u.s.b.

and l.s.b. crystals as this being a very good way to test sideband crystals. When the rig was switched to indicate l.s.b. it was then using the u.s.b. crystal but with the l.s.b. components. (Also of course when switched to u.s.b. it was receiving l.s.b.).

After some considerable time switched to indicate u.s.b., it at last started to waver, but as it was then using the lower sideband crystal, this proved that the crystal was okay. I then refitted the crystals in their correct positions; but what was the trouble?

Attempts to trace the fault got me nowhere – even warming up parts with a soldering iron produced no conclusive results. Rather than waste more time on the job I decided to swap most of the parts around the u.s.b. circuit including the trimmer capacitors, the fixed capacitors and Q06. As I type this the rig is running tuned to my crystal frequency standard, emitting a steady beat note; by the time I am ready to send this completed column to *PW*, I hope it will still be on frequency (see later!).

### Removing Components

Having got rid of the shop and much of its test gear, I'm now restricted to using the equipment of a normal Amateur workshop. When I want to remove a component such as a transistor from a circuit board, I normally use a 'solder sucker' or 'solder wick', to get rid of the old solder. This is easier said than done – but once it has been achieved, there remains the problem of clearing the holes in the printed circuit board (p.c.b.), to enable a new part to be fitted.

The easy way to fit the new part is to use a very fine drill – but here lurks a hidden danger. Some of the solder holes into which parts have been fitted, are 'plated through', in other words the surround of the hole is conductive and so connects the p.c.b. track on one side of the board to the circuit track to the other.

If the drill is a fraction on the large side this removes the connection and leaves the two sides of the p.c.b. disconnected from each other. In the case of any mysterious faults you have after doing such work, do check that you have not fallen into this trap, and if you have, solder the component to the remaining track on both sides of the board.



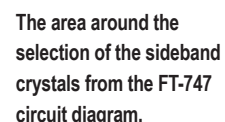
Although labelled as an FT-747 by Yaesu, Harry feels that this rig may share some ancestry with the Heathkit SB-1400. Does anyone know any more details or information?

I have discussed radio frequency (r.f.) clipping in the last two issues and how this can be accomplished. So, let's now have a look as to how this works out in practice on a few popular Yaesu rigs. The FT-101E was the first transceiver into which Yaesu built this feature – and on the initial batch how they got it wrong.

The output from the clipping diodes or integrated circuit (i.c.), is then at a fixed level, whether you speak normally or get excited and shout. So, because of this it is essential that the output of the processing unit is adjustable to allow for the rig's different gain on different bands.

The owner could, of course, open the lid and re-set the potentiometer but this was hardly convenient. So the FT Club in the USA brought out a modification kit, which included a processor output level control that could be mounted on the front panel. Yaesu weren't slow to catch on, and so later versions of the FT-101E have a dual gang potentiometer fitted in the clarifier position, the rear section of which controls the output of the processor.

- 1: Tune up the rig as normal with the processor switched off, and then adjust the 'Mic Gain' control until the **ALC** (automatic level control) meter is kicking back about half way within the green band when you speak.
- 2: Next, switch on the processor, leave



3: Then adjust the **'Mic Gain'** control so that the average r.f. power output indicated on your antenna tuner unit's (a.t.u.) power meter is a little larger than in operation 1.

The FT-101ZD, FT-107, FT-102 and most later models fitted with r.f. speech processing have rather more controls. In these the processor output level control is labelled '**Drive**' and also serves as the c.w. drive control. **Note:** If, out of years of habit, you tune up in the c.w. or '**Tune**' position, and then turn this control to zero, the rig will not transmit in the s.s.b. mode, if you switch the processor on.

- 1: Tune up the rig as normal with the processor switched off, and then adjust the '**Mic Gain**' until the meter is kicking about half way within the ALC markings when you speak.
- 2: Set the processor's input control '**Comp**' or '**Comp Level**' about half way, switch the compressor on, and advance the '**Drive**' control until the ALC meter is just moving when you speak.

- And that's it – the processor will then be (approximately) set. Try it on the air, experiment with the '**Mic Gain**' or '**Comp**' control to adjust the amount

Note that with the processor in, you can easily run QRP, or reduce the drive to a linear. Whistle loudly into the microphone, and set the compressor's output control ('**Level**' on the FT-101E and FT-901/2, '**Drive**' on the other rigs) to give the output you want, this level of power will now not be exceeded – however loud you speak.

When we had the shop we had quite an impressive looking line up of test equipment such as audio frequency (a.f.) and r.f. signal generators, oscilloscopes and a spectrum analyser. Most of the items had been obtained second hand and cost me very little – but they looked impressive. Customers used to make comments such as, “I can’t do my own repairs, I like to bring my equipment to someone who is really well equipped!”

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This is an early version of the FT-101. How can we tell? In later models, the Clarifier control (bottom right) has become a dual-concentric control with the speech compressor control on the rearward portion.

equipment being serviced. For example, if you want to peak up the receiver the built-in crystal calibrator is extremely useful and nearly all the tuned circuits will be 'spot on' if peaked by using the crystal calibrator.

On transmit most of the alignment adjustments can be done using a power or standing wave ratio (s.w.r.) meter, whilst transmitting c.w. at very low power into a dummy load. However, there may be some circuits, such as those in the speech processor, or in the s.s.b. generator stages, through which the c.w. signal does not pass. Additionally, with rigs like the FT-290, on which the c.w. drive can't be turned down.

In these cases you can of course find a microphone plug, and wire this up to an audio generator – but this is making hard work of it. One crude way to trim these circuits is to place the microphone near to something that makes a steady noise.

In fact, I must confess that when I've needed to trim just one circuit in a hurry, I have on occasions used the fan on an FT-101 for the noise source – but this isn't really satisfactory. The best way I find is to slightly offset the carrier balance potentiometer, so that just a couple of watts appears on the power meter and then to align the circuits using this signal. (But don't forget to re-set it afterwards though!).

A spectrum analyser makes a very nice toy, but I think it's seldom really needed. However, if you're in doubt

about the purity of your transmission, feed the signal into a dummy load and speak into the microphone. Poke just enough wire into the antenna socket of a good quality receiver to give you a signal of about S9+10 and have a listen to yourself on headphones.

If the transmission sounds okay and it's not splattering – get a fairly local Amateur to have a listen over the air – but make sure that he isn't too near or using an efficient antenna. Normally, under these conditions you would expect that your carrier and any other unwanted emissions such as key clicks or 'splatter' should be 40dB or more weaker than your main signal. But be aware that if your signal is '40 over nine' the splatter and 'noises off' could then be S9 – without there being anything wrong with your transmission.

### Radio Blackburn

Radio Blackburn (now Radio Lancashire) went on the air for the first time just over 40 years ago, and the recent celebration of its 'birthday' started me reminiscing. Prior to the station opening, members of the photographic side of our business, together with one of our engineers, took a load of photographs and made a slide show. This was shown at the 'Windsor Hall' Blackburn, at the station's promotional event.

I got to know the station's chief engineer **Bernard Shields** and his assistant engineer **James Rose** quite well and they would often drop in the

shop for a chat. As the station was established and run very much on a limited budget, the equipment wasn't all brand new and Bernard and James were expected to 'make do and mend'.

If at first they needed any specialised test gear such as a frequency counter, their only official way of obtaining it was to arrange to book it out from the IBA and BBC TV transmitter on the top of Winter Hill, which to say the least, wasn't very convenient, so on the odd occasion they borrowed ours.

Bernard then decided that Radio Blackburn should run an occasional technical program and several local people who were involved with electronics were asked to appear, including the local Post Office Interference Service Inspector and myself. Thinking about the trace on an oscilloscope and the breadth of subjects covered by the program Bernard called it 'Sweep', but this name rather backfired. Someone with a sense of humour at the station started to refer to Bernard and James as 'Sooty and Sweep' and these names rather stuck!

### That's It!

That's it this month! And, as I typing this the FT-747 is still on frequency after a week – so back it goes to its owner and I will hope for the best. Finally, try to remember not to fill in your log with a broken pencil – it's pointless! I've also got a sense of humour!

PW

### Problems

I like to hear about problems with older equipment, particularly pre-1990 Yaesu rigs. Please email me, (add some radio related term in the subject heading, to differentiate against spam), or write and enclose a stamped addressed envelope. Remember that electricity is dangerous, if you are not familiar with safety precautions you must never work on your equipment whilst it is plugged into the mains. (Switching off at the wall socket does not necessarily make equipment safe)