



The Yaesu FT-290R

This month Chris Lorek G4HCL revisits the hugely popular Yaesu FT-290R Mk1 2m multimode transceiver.



Fig. 1: The Yaesu FT-290 Mk1.

Back in 1981, Yaesu launched what must have been one of their most popular transceivers of all time, the FT-290R

Mk1 self-contained 2m multimode, Fig. 1. It proved to be an ideal starter rig for numerous new 'Class B' amateurs, many whom had started out by operating on the 27MHz Citizens Band and had progressed to licensed amateur radio. A typical second-hand price at this time is in the region of £80, a significant saving compared with current multimodes.

I fondly remember each working day in the early morning in the early 1980s, being in my kitchen with the kettle boiling and having a regular morning contact on 2m FM simplex with a lady amateur in the same East Anglian village, who was also making a cuppa for herself and her husband while using her FT-290R Mk1 on the kitchen work surface. She also came into the hobby from Citizens Band.

The rig was available with a leatherette carrying case and shoulder strap and, as such, was often called the 'Electric Handbag' by some of its users! It measures 150x58x195mm and weighs around 1.3kg plus the weight of any internal batteries that you may fit. Due to its portability, many of these transceivers were and still are used as self-contained 'hilltop' radios by amateurs, and they are an ideal rig for use in the annual summer *PW* 144MHz QRP contest.

I detailed the FT-290 series in general a few years ago in this *PW* column and received an extremely good response from readers. However, many readers asked for more information on the FT-290R Mk1, particularly on how to add a CTCSS encoder because several amateurs who contacted me said that, in this day and age, for 2m FM operation through repeaters, it was virtually an essential. Also, details of the DC connector, which has caught many out in the past. So here's

an updated feature on this transceiver by popular request, which I hope will also be of interest to newer readers.

Features

The FT-290R Mk1 is a tough and rugged transportable 2m CW/SSB/AM/FM transceiver, with a power output of 2.5W and with a switchable low power of 0.8W across 144-146MHz. It can be run from a set of eight internal alkaline or rechargeable C-sized cells or from an external 8.5-15.2V DC power supply via the small coaxial DC socket on the side of the transceiver. There's a severe word of warning here, even at this early stage of this feature. The DC connector uses the outer sleeve of the mating plug as positive DC, and the inner as negative DC, unlike the vast majority of DC leads nowadays. Be sure you don't make a potentially very expensive mistake! Also, if you have a disconnected DC power lead, that the connector outer doesn't touch the chassis of any other equipment that you're using from the same shack or mobile DC power supply.

As well as selectable 12.5kHz and 25kHz FM channel steps, the radio offers 100Hz and 1kHz steps on CW and SSB, ten memory channels plus a priority channel, two VFOs, a backlit digital display, an analogue S-meter and RF power output meter and a built-in telescopic antenna on the front panel. The VFOs and memory channels can be scanned for activity. There's a noise blanker selectable from the front panel to help reduce electrical car ignition noise. If you're buying from 'across the pond' (the USA), check the FM channel steps because they are 5kHz and 10kHz in models sold there. However, if you're handy with a soldering iron or know someone who is, these can easily be changed to UK steps by resoldering a few internal PCB links. There's now plenty of information on the internet for this. As well as the telescopic whip, there's also an SO-239 socket on the rear panel to allow you to plug in an external antenna. For CW operation, a rear panel socket is provided for connecting a Morse key.

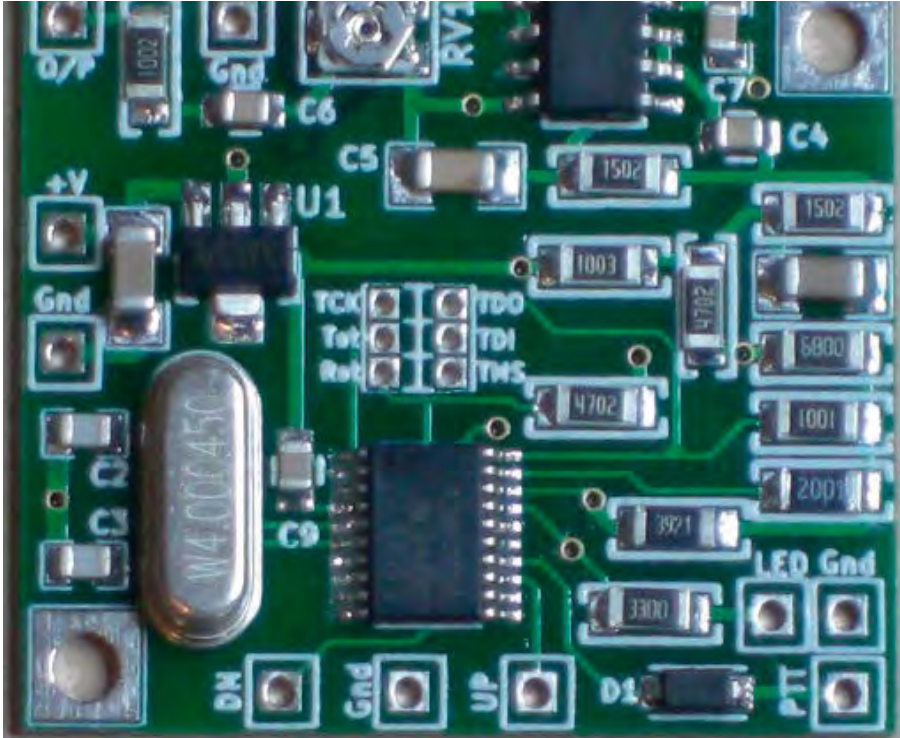


Fig. 2: The G8TMV CTCSS PCB.



Fig. 3: The Microset 2m 30W in-line linear amplifier and receive preamplifier.

Other Bands and Models

As well as the 2m model, you may come across the FT-790R Mk1, which, as you may have guessed, is the 70cm (430-440MHz) version. Another rarer find, most likely because 6m wasn't available in the UK at the time of launch, is the FT-690R

Mk1, which covers the 6m band of 50-54MHz. Later models included a Mk2 version.

Indeed, I have an FT-290R Mk2 here in my shack and I plan for this to be the subject of a further column in its own right in the near future. However, here I'll just be

concentrating on expanded details on the FT-290R Mk1.

Add-on CTCSS FM Encoder

To the best of my knowledge Yaesu didn't offer an optional internal CTCSS (sub-tone) encoder for repeater access in European models for this transceiver. Instead, a built-in 1750Hz toneburst is included because this was the standard method of FM repeater access at the time. Because it's a discontinued transceiver, you may well find it hard to obtain a Yaesu CTCSS module over here, although if you buy an FT-290 from the US, do check whether one is fitted (but see my note above regarding FM channel spacing). However, a number of add-on CTCSS encoders are available. One compact unit from the UK that will fit nicely into the FT-290R Mk1 comes from **G8TMV**, Fig. 2:

www.tuckley.org/ctcss

The tone encoder will generate any of the standard CTCSS tones used by the UK repeater system and many of the ones used in Europe. Each time the 'Up' push-button is pressed the encoder moves to the next tone in the sequence. The 'Down' button steps in the opposite direction. Each time a new tone is selected, and at power up, the LED annunciates the code letter for the tone in Morse code. A particular tone can be made the default by pressing and holding the 'Up' push-button until the LED flashes once, useful for your 'home' area. This stores the currently selected value in the microcontroller non-volatile memory so that it will be used the next time the encoder is powered up.

Note that this isn't a simple plug-in. You'll need to fit it using some electronic wiring skills but there's a useful guide; <https://billingtonrepairs.wordpress.com/modifications/ctcss-for-the-yaesu-ft290r-mk1>

Expansion to 144-148MHz

Given that our 2m band now goes up to 147MHz for suitably licensed UK amateurs, here's a simple method of expanding the tuning range to 144-148MHz. Remove the battery compartment and slide out the power board to allow access to the microprocessor board. Two tinned copper wire jumpers are visible on this board, next to the microprocessor. One is easy to see and the other is not because it is next to the main board. Cut the jumper that is difficult to see. If the wrong jumper is cut, then the frequency display will not be correct when the unit is powered up.

Receive Preamplifier

One of the most common, and useful, modifications by previous owners is the fitting of a receive preamplifier. The UK firm of muTek manufactured a compact preamplifier specifically designed for fitment into the FT-290R Mk1, and this is sometimes, arguably incorrectly, described as a 'muTek front end'. Yet it's very worthwhile having.

External Transmit Amplifier

To boost the 2.5W transceiver output power for base or mobile use, many amateurs use an in-line RF-switched linear amplifier, typically a 25-30W type, and this can be a useful extra if your seller has one of these included in the sale. Some of them also have a switchable receive preamplifier built in, which could obviate the need for an internal muTek receiver preamplifier if you'll only use the transceiver for base and mobile work rather than out portable. The accompanying photo, **Fig. 3**, shows the 30W amplifier I use with my own FT-290R. This also includes a switchable low-noise GaAsFET preamplifier.

Microphone Connections

If you find your transceiver doesn't come with a microphone, or yours is damaged, here are the connections for the 7-pin microphone connector: Pin 1 – ground and mic screen, Pin 2 – Transmit audio, Pin 3 – PTT, Pin 4 – 5V output (note that this can only provide up to a few milliamps, for an electret microphone, for example), Pin 5 – Speaker, Pin 6 – Up scan, and Pin 7 – Down scan. The pin numbers are given on the in-line socket.

Common Faults

Here are a few things to look out for, and their possible cures, if you're buying a second-hand FT-290R Mk1:

Broken Telescopic Whip: The telescopic whip is easily broken but can easily be replaced. Just check prior to purchase. Note that if you're using an external antenna via the rear panel coaxial connector, this whip should be fully pushed in because it forms part of the PA tuning network.

Front Panel Display Bulb: The digital frequency incandescent display bulb is the most common failure in these transceivers. If you're not going to use it in adverse lighting conditions, there's no need to worry about this and the replacement is rather a complex bit of work. Instead of trying to replace the bulb, I'd advise carrying a small LED torch if you'll be using the radio out portable at night!

Battery Overcharging: If you fit internal rechargeable batteries and you plug in an external unregulated current DC supply, the internal batteries can sometimes become overcharged and, in some cases, these could get extremely hot or even destroy themselves, along with possible damage to the transceiver circuitry. This can happen if you're using a non-Yaesu supplied DC input plug that isn't the right length or diameter. A correct DC plug into the FT-290R socket will disconnect this external connection to the internal batteries when it's plugged in. With an incorrect plug, though, the batteries may not be disconnected when the external DC supply is plugged in. The cure is to use the correct size of plug!

Intermittent Tuning: Intermittent tuning is usually caused by the 'Step' switch. A burst of electrical switch cleaner on this (please, not WD40 or similar!) will usually provide a cure. Likewise, for tuning 'jumps'.

No Transmit Power Output: If it is not the power amplifier (which is the most likely cause), then with a lack of power output, check diode D24 in the antenna switching circuit. Check for coil L2012


physically shorting to the copper screen and also check the driver transistor Q2021 and associated resistor R69.

Receive and Transmit Off-Frequency: If this is just a small amount such as one or two kilohertz, then you can realign the PLL local oscillator. However, if the radio is several kilohertz off frequency, such as 10kHz or more, then check the PLL local oscillator crystal X02 which is 18.7414MHz.

FM Transmit off frequency: If it's only on FM transmit that the radio is off frequency, then realign the FM TX oscillator coil L1002. However, if the frequency error is significant, then check crystal X1001.

User Manual and Circuit Diagrams

You'll find that the manual and circuit diagrams are available for download from the internet, as with most radios nowadays. However, if you'd like a PDF copy by e-mail, just get in touch and I'll be pleased to oblige and include user operating instructions, circuit details and diagrams, alignment details and component layouts: chris@lorek.co.uk

I hope the above proves useful to readers who are looking for an economic but well-performing 2m multimode. The Mk1 was superseded by the FT290R Mk2 some years later. That one is almost a completely different rig, albeit the same size and with the same general specifications. (It uses a set-top BNC for a portable antenna rather than a telescopic whip. So don't be misled when purchasing. The Mk2 is a newer radio but somewhat more expensive than the Mk1.). I'll see you in next month's *PW* with a further *Emerging Technology* feature. 



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