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Mod's , information and glitch fixes for the Yaesu FT - 290 MK I

I have scanned the circuit diagram and schematic from the manual. I put them on my site and was very shortly afterwards contacted by Yaesu GB telling me that I was in breach of copyright!

I still have the scans which I can email you if you contact me, - use the icon at bottom of home page.....

Please note, I am not the author of any of these suggestions.

I can not take any responsibility of the consequences of any of your actions upon using any of these hints.

The information below I have collected from various sources via packet in the early 1990's.

Good luck anyway, have fun in the hobby.

[AUDIO DECOUPLING](#)

It seems important to fit a 0.1uF cap into the receive audio line to the TNC. Fit it inside the five pin plug. The FT290R has no decoupling capacitor in the audio output (See wiring Diag. IC No.Q1027 (uPC575C2) off pin 7.

[CAP CRUNCH](#)

Many people have problems getting the Mk1 working on packet. This is due to the receiver filtering attenuating frequencies above 2kHz, thus the 2.2kHz tone is attenuated by 10-15dB. The standard capacitor crunch mod, originally designed to give more "sparkle" to the audio cures this. To do the mod, remove the case and turn the rig so the control knobs face away and the SO239 antenna socket is nearest you. At the back of the PCB is a relay (a box shaped component made of semi-clear plastic). Just above the relay are two green capacitors. Using small pliers, grip the capacitor nearest the relay (C110) and crush it, removing all the debris.

[DE-EMPHASIS - 1](#)

There is a very "hard" de-emphasis in FT290R. This can cause serious problems copying packet signals

with some demodulator chips, e.g. like the XR2211. This modification increases the intelligibility in noisy environments, and is also useful in FM voice communications. Add a serial RC unit, $R = 4.7k$, $C = 1\mu F$ tantalum capacitor between pin 9 of IC Q1019 and the collector of transistor Q1021. The positive leg of the capacitor goes to the transistor collector. These can be found as test points near to IC Q1019. Solder the components together, insulate them, then solder to the test points mentioned. With this modification, FM reception will sound somewhat noisy, but louder.

DE-EMPHASIS - 2

Yaesu seem to have goofed on both the FM de-emphasis and the audio filter. A computer analysis of the audio circuit suggests:

1. Reduce C125 from 10n to 4.7n in filter
2. Reduce C124 from 2.2n to 1.5n (near Q1026) This isn't perfect but it a lot better - the tones now seem nearly equal. There appears to be plain FM (cf phase) with no pre-emphasis on Tx!

RESET TO 145MHz

This mod resets the CPU to 145MHz and sounds a bleep to tell you it's been done. Remove top and bottom covers, locate the hole in the case near the SO239 socket covered by a stick-on aluminium label. Make a hole in the label and install a push to make, non-latching switch. Connect one side of the switch to ground and the other to pin 4 of J5003 which connects the keyboard and control units. A 1nF capacitor should also be connected from pin 4 to ground for decoupling. Replace the covers, dial up any frequency, press the button and the set should reset to 145MHz and bleep.

LISTEN ON INPUT

Place the set with controls towards you, remove the bottom cover and locate the black/white wire on SK1. It's the tenth one from the left. Cut this wire at the socket and insulate the free end. Locate the green/white wire on SK1 and solder the anode of a 1N4148 diode to it. Connect the cathode of the diode to the red/white wire on the PCB adjacent to the mic. socket. Insulate the diode leads to prevent shorts. When the call button is pressed, it allows listen on input on both +shift and -shift. When you want the rig to transmit a tone burst you must close the PTT at the same time as pressing the call button.

CURING SYNTHESISER WHINE

Early 290s suffered from a high level of whine. Try moving the wiring harnesses around inside the rig whilst monitoring the whine on another rig. The real cure, if you have a delicate hand for soldering, is locate LO6 in the synthesiser and solder a 15pF capacitor in parallel with it. This can usually be soldered between the hot ends of C24 & C25 which are at the rear of the IC in the synthesiser unit.

MODIFIED SQUELCH

This mod reduces the difference in level between the opening and closing points and speeds up the operation of the squelch enabling the scanner to work better. Reduce C94 from 4.7uF to 1uF, increase R79 from 270K to 330K and add a 10uF tantalum or subminiature electrolytic between the leg of R78 (4.7K) and the body of the transistor T1007.

OPENING UP TO 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 which is difficult to see. If the wrong jumper is cut then the frequency display will not be correct when the unit is powered up.

Mod for 1kc and 100hz steps on FM for satellite working

I asked around for details of this Mod but no-one had attempted it. I decided to take the bit between my teeth and sort it out. Here goes: -

1. Remove the covers of the rig and locate the mode select switch on the front panel. (you only need remove the covers...nothing else)
2. Locate the wafer of the switch nearest to the front of the rig and identify the green and yellow wires. Arrange a suitable method of switching the wires around. With the wires transposed the rig will now step 1kc and 100hz on FM. Note though that SSB will be 25/12kc, simply flick the switch to tune SSB normally. (I used an external switch, but I am sure that the noise blanker switch could be used or replaced with a suitable DPDT switch). You will find that the rig will tune on TX making it much more suitable for satellite working.

Modification of tuning range

There are 4 possible jumpers in the FT-290R close to the CPU on the second small board from the rear. Numbers are 1 - 4 from the bottom (the most hidden one). The indicated combination is perhaps the most usable in Europe because the repeater shift is +/- 600 kHz, the steps on FM tunes to X00, X25, X50 and X75 standard frequencies and at the same time it gives a larger tuning range.

But please note that it is not legal to transmit on frequencies outside the amateur bands, Even by mistake. In some countries it is not legal to have a receiver that can be tuned outside the amateur bands. Please check local regulations.

Frequency Repeater Step 1 2 3 4 Not usable 0 0 0 0 144 - 148 600 25 + 12.5 0 0 0 1 140 - 150 1.600
100 + 250 0 1 0 144 - 146 600 10 + 10 0 0 1 1 Not usable 0 1 0 0 144 - 148 600 10 + 5 0 1 0 1 140 -

150 8.000 100 + 100 1 1 0 144 - 148 600 10 + 5 0 1 1 1 Not usable 1 0 0 0 144 - 146 600 25 + 12.51 0
0 1 Standard in Europe 140 - 150 5.000 100 + 251 0 1 0 143.5 - 148.5 600 10 + 5 1 0 1 1 140 - 150
7.600 100 + 251 1 0 0 140 - 150 600 20 + 10 1 1 0 1 140 - 144 1.000 20 + 10 1 1 1 1

COMMON FAULTS

NO RF O/P : PA

If it is not PA (the most likely cause) then check diode D24 in aerial switching, check for L2012 physically shorting to copper screen, and check driver Q2021 and R69.

OFF FREQUENCY RX + TX

If this is just a couple of KHz then realign PLL local osc. If it is several KHz (possibly 10-12) off frequency then suspect PLL local osc xtal X02 (18.7414MHz).

OFF FREQUENCY FM TX

Realign L1002 (FM TX osc coil). If frequency error is significant then suspect xtal X1001.

ERRATIC FREQUENCY JUMPS

Check X02 as above.

DRIFTING

Check -6.8v. rail, and check Q05 on REG unit if this is missing.

POOR SQUELCH OPERATION

Check Q1019 (MC3357P) and D32 in squelch circuitry.

POOR QUALITY FM RX

Xtal X1003 (11.265MHz).

ERRATIC TUNING

The tuning step switch.

TUNING JUMPS

The tuning step switch.

INTERMITTENT TX+RX

Check TX/RX relay. Check alignment of VCO in PLL.

NO AUDIO O/P

Check audio IC Q1027. Also check to see if the reverse polarity diode is blown, as reverse polarity causes failure of this IC.

CONTINUOUS CW OR NO CW TX

Check Q2010 (MC14001B). Also check the wire to the key socket is not s/c or broken, as this can happen when the battery compartment is taken in and out.

LOW SENSITIVITY RX

Check T1001 Ae. i/p coil, D25 in aerial switching and RF amp.

LOW SENSITIVITY ON A UNIT WITH A MUTEK BOARD

Check for loose strands from the braid of the Mutek board's coax shorting out the connecting pins on the Mutek board. Then check BF980 in Mutek board.

FADING LCD DISPLAY

Dismantle LCD display unit and clean the rubber connecting strip and the PCB it makes contact to.

CRACKLING NOISE ON TX AUDIO (FM ONLY)

Q2004 mic amp IC.

CRACKLING NOISE ON TX+RX

Check X3001 (5.76MHz) in PLL.

MELTED NICADS

Replace DC i/p socket (and nicads). This fault can also occur as a result of using a DC input plug which is not quite the correct diameter or length, because the batteries are then not disconnected when DC is plugged in.

POOR SSB TX (NON-LINEAR)

If the PA has gone non-linear, then replace the PA and change R70 from 390R to 270R.

MICROPHONE CONNECTIONS

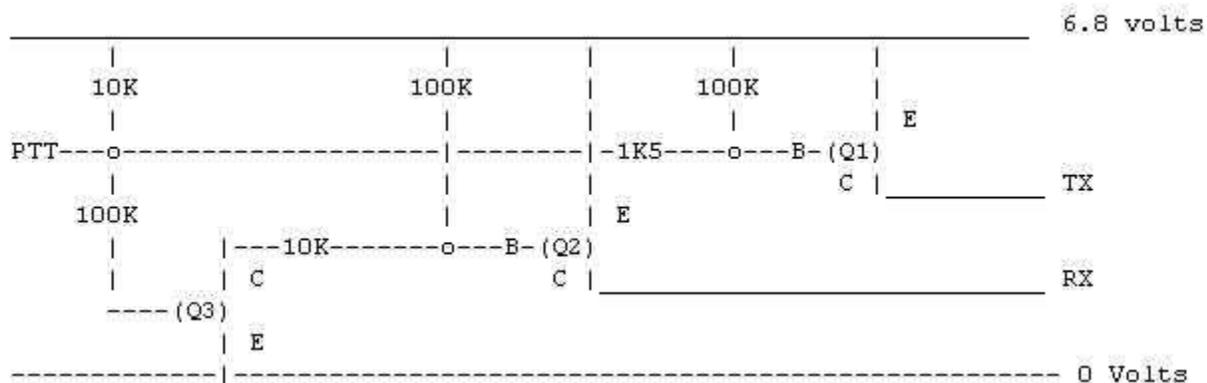
The pin connections for the FT290 Mk1 are:- Pin 1 = Ground & Mike screen Pin 2 = Audio from mike Pin 3 = PTT Pin 4 = 5 Volts, this is only good for a few milliamps!! Pin 5 = Speaker Pin 6 = Up scan Pin 7 = Down scan You'll find the pin numbers on the inside of the line socket.

TX/RX CHANGEOVER RELAY SUBSTITUTE

This is a circuit I was given to substitute for the relay in Yeasu's FT series.

I made it but never fitted it, though I am assured it does work.

I have also managed to fit it onto a piece of Vero board, 6 holes X 4 strips ! That's close to the size of the relay.

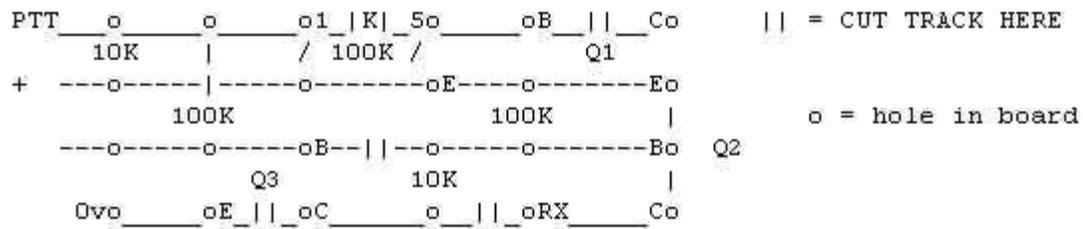


Q1 = BC178, a PNP general purpose transistor

Q2 = BC179, a PNP general purpose transistor

Q3 = BC107, a NPN general purpose transistor

All the transistor pinouts are the same, looking from the bottom, next to the tag is E, B and C follow



clockwise.

If you can't understand the schematic diagram, I'm now going to try to describe how it's done.

Take the piece of board, turn it over so that the tracks are facing you, on the top track, cut between holes 1&2, and 3&4, leave the 2nd track uncut, cut track 3 between holes 3&4, and cut track 4 between holes 2&3 and 4&5.

Turn the board over, length ways, then insert components as follows, I shall number the holes from top left to bottom right. A1-A6, to D1-D6.

A1-B1, 10K. A2-C2, 100K. A3-A4, 1K5. Insert the BC178, A5,B A6,C & B4,E put one end of the 100K in B3, and solder the other end to the top bend of the 1K5. B5-C5, 100K. BC179, B6,E C6,B D6,C. C4-D4, 10K. And finally, the BC107, C3,B D2,E D3,C

When complete, turn it over, and solder wires to A1, A6, B2, D1, & D5.

According to a few replies I've had, it works a treat.

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Hope these are of some interest?

G7COC