MEF-1

Mini QRP tuner for monoband “End-Fed” antennas

Assembly manual

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Thank you for constructing the **MEF-1** QRP tuner for monoband "End-Fed" antennas

Have fun assembling it and enjoy QRP! 73, Javier Solans, ea3gcy

SPECIFICATIONS

- Maximum power: 10W-12W pep
- Transmitter impedance: 50Ω
- End-Fed antenna impedance: 3-5KΩ
- Dimensions: board: 35 x 70 mm. box: 35 x 50 x 18 mm.

PARTS LIST

1 Box 35 x 50 mm
1 T50-6 toroid
1 55pF ceramic trimmer capacitor - C1
1 BNC panel-mount connector
1 PCB printed circuit board MEF-1
60 cm of 0.5mm enameled wire
1 Capacitor - C2 - 150p or 47p (if used)

TIPS FOR FIRST TIME BUILDERS

Tools required:
- A 30W soldering iron, good-quality electronic-type solder, small diagonal wire cutters, needle-nose pliers, tweezers, screwdriver and a wrench for the nut of the BNC connector.
- You will need good lighting and a magnifying glass to see the fine print on the components and other assembly details.

Soldering:
There are two important things which need to be done to insure successful operation of a kit. The first is to put the component into the proper place on the circuit board; the second is good soldering.
To solder properly, you must use an electronic-type solder of the highest quality possible and the correct type of iron. Use a quality-brand soldering iron with a short, fine-pointed tip. For this kit, the soldering iron should be about 30-35 Watts (if it is not thermostatically controlled). Use only high-quality electronic-type solder. NEVER use any extra flux. You should hold the hot soldering iron in contact with both the circuit board and the component lead for about two seconds to heat them up. Then, keeping the soldering iron in place, touch the solder at the junction of the lead and trace and wait about two seconds or so until the solder flows between the lead and the trace to form a good joint. Now remove the soldering iron. The soldering iron should have been in contact with the work piece for a total time of about 4 seconds. When soldering leads that connect to large trace surfaces, you will need to preheat the junction for a little longer so that the solder flows correctly.
You should clean the soldering tip before soldering each joint. This prevents accumulating solder on the tip and mixing in residues from previous soldering operations with the next one.

RECOMMENDED ASSEMBLY SEQUENCE

Be careful not to scratch the front panel while installing the parts.
It is recommended to assemble the kit in the following order:

1.- Wind the T50-6 toroid according to the band of your choice and solder it in place.
2.- Place and solder C1, the 50pF trimmer, as shown in the photos. The trimmer C1 is the same for all bands.

3. - Place and solder the polystyrene capacitor C2 in its place as shown in the photos. This capacitor is only used for the 40M band. See the table.
4.- Position and strongly twist the BNC connector into place. The washer should be placed on the reverse side along with the nut. Be careful not to scratch the front panel. Use a piece of wire or a leftover component lead clipping to connect the BNC connector's center conductor to point "A" on the circuit board. See the photos.

TABLE FOR T50-6 and C2 BY BAND

	T50-6		
BAND	**B - B1**	**A - A1**	**C2**
40M	28 turns (52 cm)	4 turns (11 cm)	150pf
30M	28 turns (52 cm)	4 turns (11 cm)	47pf
20M	25 turns (49 cm)	3 turns (10 cm)	not used
17M	24 turns (46 cm)	3 turns (10 cm)	not used
15M	22 turns (42 cm)	3 turns (10 cm)	not used
12M	18 turns (35 cm)	2 turns (9 cm)	not used
10M	18 turns (35 cm)	2 turns (9 cm)	not used

T50-6 TOROID

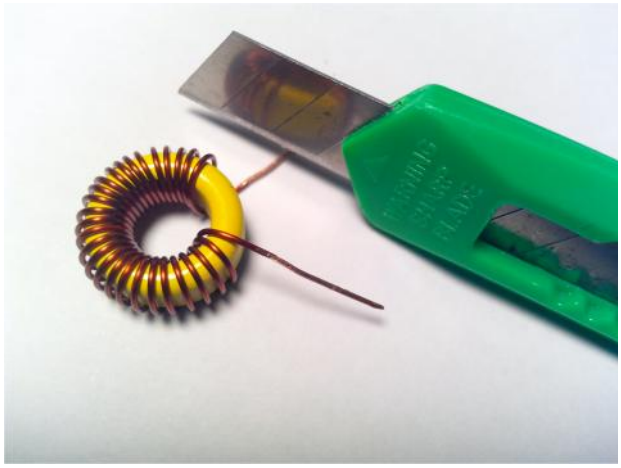
The transformer T1 is what transforms the "End-Fed" antenna's high feed impedance to the transmitter's 50-ohm impedance. It is wound on the yellow, 12.5mm diameter T50-6 toroid. Consult the table to know how many turns to put on the toroid and the length of enameled wire needed according to the band for which you are constructing the MEF-1

In the following paragraph the toroid windings for the 40M band are described.

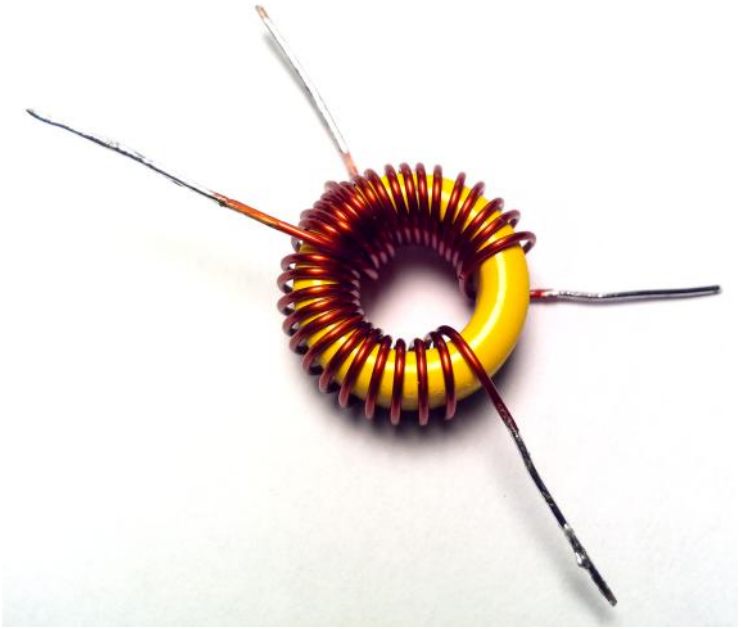
For the 40M band the transformer is made up of a secondary winding of 28 returns and a primary winding of 4 returns. Both windings use the 0.5mm enameled wire included in kit.

Cut about 52 cm of enameled wire and wind twenty-eight (28) turn in the direction shown in the pictures. This will be the secondary winding ("solder points" on the board silkscreen-labeled "B" – "B1").

Wind the turns tightly so that they conform to the contour of the toroid and are as tight as possible. The turns should be evenly distributed around the circumference of the toroid. Leave pigtails of about 10 mm. Scrape the enamel off the ends of the wire with a knife so that they can be soldered to the board.
Counting the turns: ***Count one turn for every time the wire passes through the center of the toroid.***
IMPORTANT: Wind the toroid exactly as shown in the pictures. The direction of the windings of the secondary as well as of the primary is crucial.



Next, cut about 10-11 cm of 0.5mm enameled wire and wind four (4) turns on the side opposite that of the ends of the previous winding (see the photo); this is the primary winding (soldering points “A” – “A1”). Leave pigtails of about 10 mm or a little more. Scrape the enamel off the ends of the wire with a knife so that they can be soldered to the board.



ANTENNA:

With the suitable length of antenna wire, the MEF-1 can be used for the 40M to 10M bands. This type of tuner can work without a counterpoise, therefore connecting something to the terminal labeled “Count” is not required, and it is sufficient to connect a ½ wavelength wire to the terminal labeled “Ant”; in this case the coaxial cable going to the equipment and the microphone cable or CW key cable act as a "counterpoise."

The best results will be obtained by using a half-wavelength antenna for the band chosen for the tuner. You can use the formula 142.5 / Freq(MHz)
See the following table:

Band	40 m	30 m	20 m	17 m	15 m	10 m
length	20.35 m	14.25 m	10.2 m	7.90 m	6.8 m	5.10 m

Although not required, many authors recommend using a certain length of wire as a counterpoise. If you prefer to use a counterpoise, you can use the following table:

Band	40 m	30 m	20 m	17 m	15 m	10 m
Antenna	19.2 m	13.4 m	9.6 m	7.47 m	6.4 m	4.9 m
Count.	10.67 m	7.31 m	5.33 m	4.12 m	3.5 m	2.5 m

Like all antennas, to obtain maximum efficiency, it is very important to locate it in highest and clearest location possible. Placing an antenna in a poor location, such as very close to the ground, near other conductors such as power lines or concrete structures, etc., can degrade the antenna’s efficiency and even prevent it from tuning correctly in some of the bands

FRONT PANEL FINISH

The front panel of the MEF-1 is also the printed circuit board to which the components are soldered.
It would be a good idea to apply a protective varnish to the surface of the front panel. The paint on the board is not very durable; however, a suitable varnish will help to protect it for a long time (there are spray-on lacquers for this purpose).

ADJUSTMENT OF TRIMMER C1

Important: Use a tool suitable for adjusting this type of trimmer.

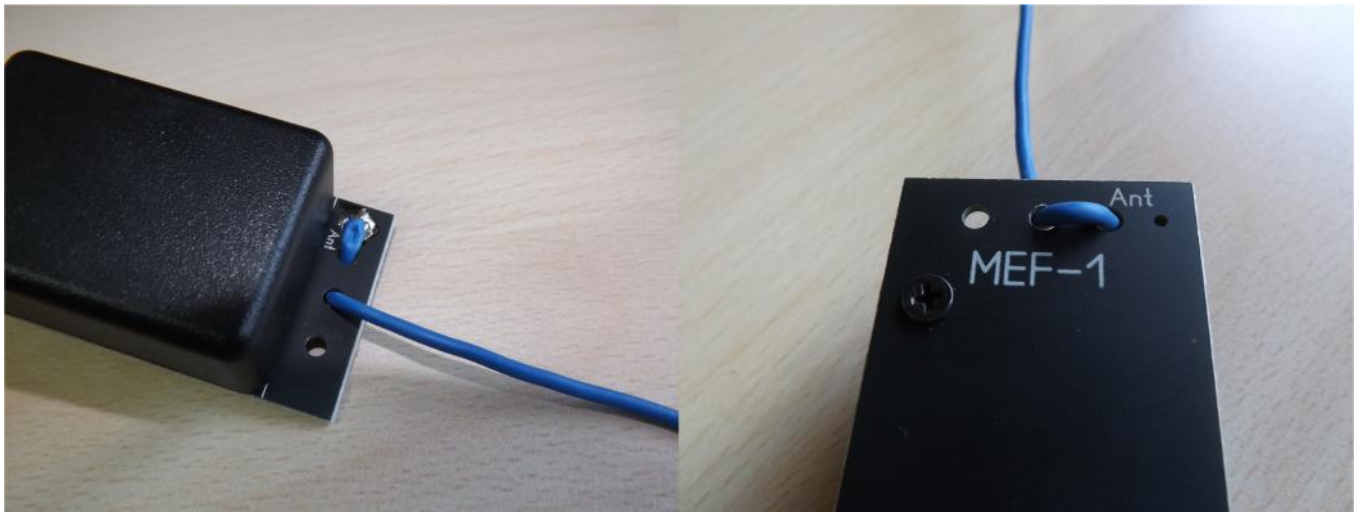
Adjustment with antenna:

The adjustment of C1 is very easy. Solder onto the pad labeled “Ant” the appropriate length of wire for the chosen band. The wire can pass through the two holes in the board to serve as a strain relief to prevent pulling on the solder joint (to see photos). If needed, the third hole can be used to hold the MEF-1 with an insulating cord to suspend it.
If you will be using a counterpoise, solder the correct length of wire to the pad labeled "Count."

Install the antenna in a suitable place and transmit with the lowest power possible, while slowly adjusting the trimmer until obtaining the lowest possible SWR. In order to measure the SWR, you will need to connect an SWR meter between the transmitter and the MEF-1.
Note: If you cannot obtain a reasonably low SWR, it could be because you are not using the correct length of wire.

Adjustment with resistive load:

Solder a 4.7K resistor between the pad labeled “Ant” and GND (you can solder it across the connection points of one of the capacitors.
Adjust trimmer C1 to its center position. Transmit with the lowest power possible, while slowly adjusting the trimmer until obtaining the lowest possible SWR. In order to measure the SWR, you will need to connect an SWR meter between the transmitter and the MEF-1.



Notes:

- You can drill out the holes in the pads on the board labeled “Ant” and “Count” with a 3mm drill bit. This will allow you to place an M3 screw to connect the antenna wire using a fork or ring terminal instead of soldering it directly.
- If you always use the antenna in the same place or in similar places, you will probably not have to readjust C1. If you install the antenna in a place very different from normal, it is possible that you will have to readjust C1 or change the length of the antenna slightly.

LIMITED WARRANTY

Please read carefully BEFORE building your kit

All electronic components and hardware supplied with the kit are under warranty in case of any manufacturing defect for the period of one year after purchase. The warranty does not include the transmitter final amplifier transistor.

The original purchaser has the option of examining the kit and manual for 10 days. If, within this period, the buyer decides not to build the kit, he/she may return the entire unassembled kit at their own expense for the shipping expenses. The shipping expenses and sales commissions (i.e. bank, Ebay, and Paypal commissions) included in the purchase price will not be returned.
Please, BEFORE returning a product, request instructions by email at: ea3gcy@gmail.com

Javier Solans, EA3GCY, warrants this device to function according to the specifications, provided that it is assembled and adjusted as described in this documentation, and used correctly according to all provided instructions.
It is your responsibility to follow all the instructions in the manual, to identify all the components correctly, and to use good workmanship and proper tools and instruments in the construction and adjustment of this kit.
REMEMBER: This kit will not work as a commercially manufactured product; however, if can often give similar results. Do not expect great performance, BUT YOU ARE SURE TO HAVE LOTS OF FUN!

If you believe that there is a missing component for the kit, please do a thorough inventory of all parts using the parts list in the manual. Check all bags, envelopes and boxes carefully. If needed, you may email me and I will replace any component that you are missing. Even if you can find the exact part locally, please let me know so that we are aware of the problem to help other customers.
I can also supply any part that you have lost, damaged or broken accidently.
If you find any errors in this manual or would like to make a comment, please do not hesitate to contact me at: ea3gcy@gmail.com

THANK YOU for building the MEF-1 kit.
Enjoy QRP!
73 Javier Solans, EA3GCY

SCHEMATIC