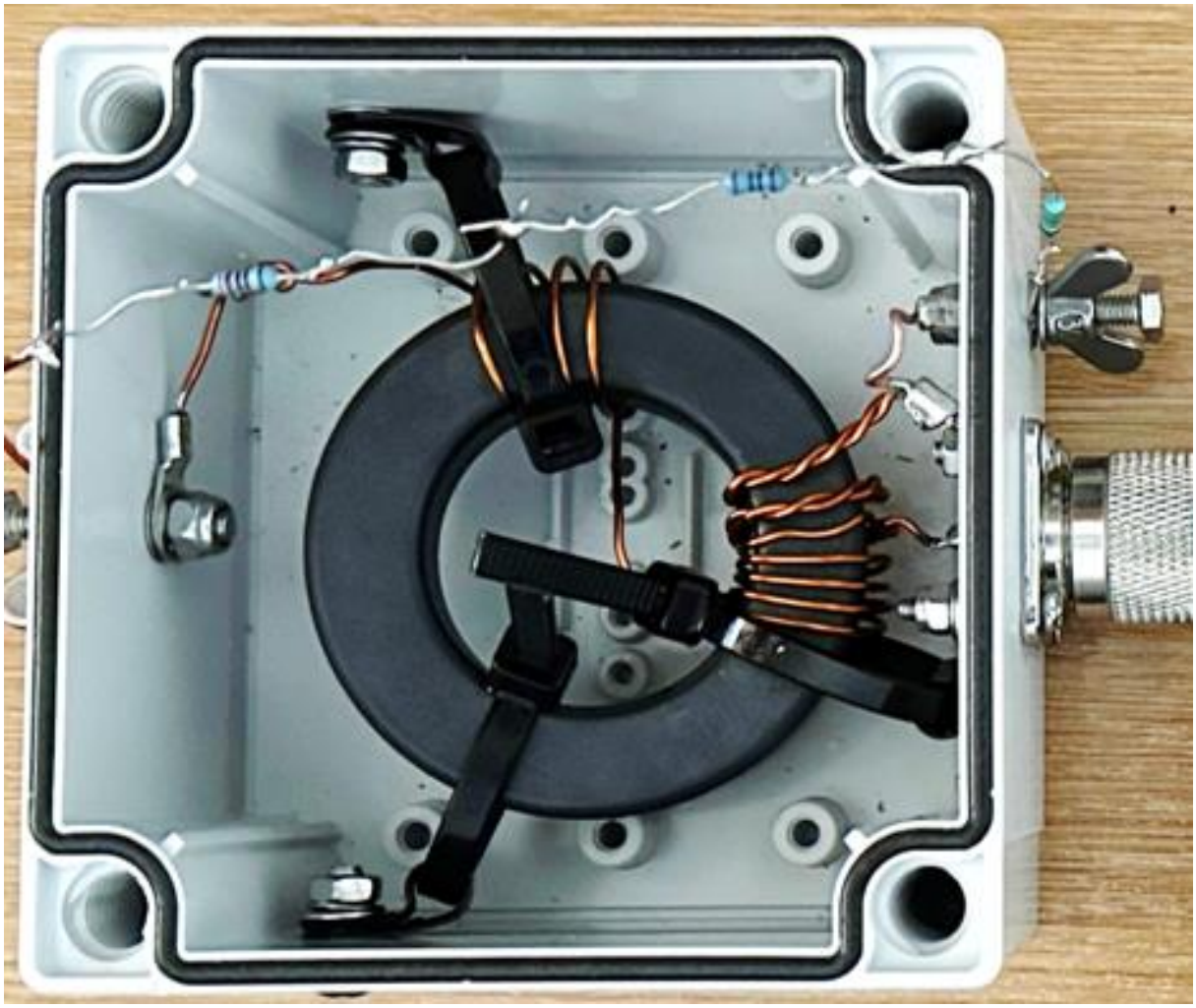
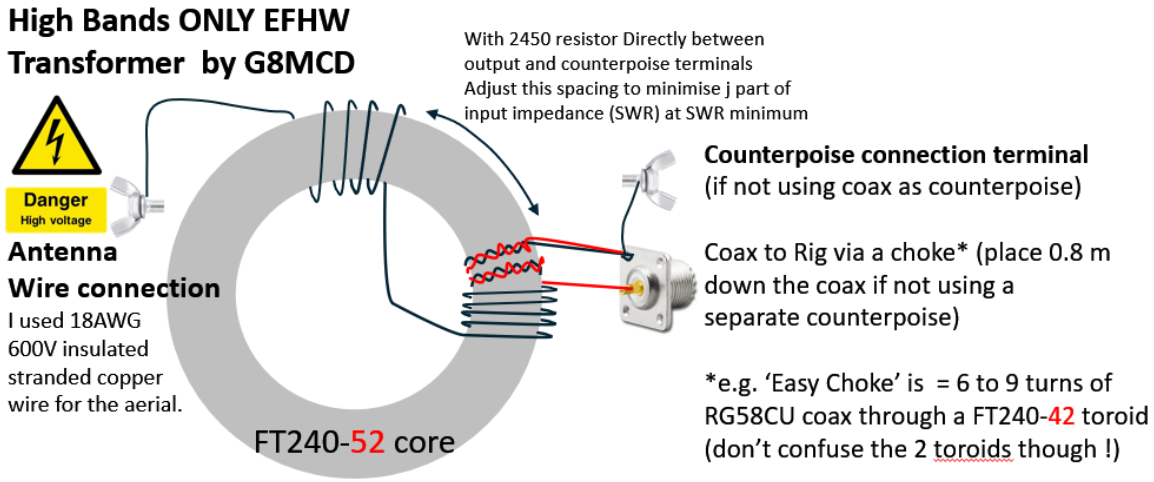
A Novel High Bands EFHW Special for 18 – 30 MHz by G8MCD 9 – 12 April 2024 V1.0

Uses a FT240-52 core (fair-rite @mouser) and an unusual 2:11 turns ratio, see later **
1.0/1.1mm dia Enamelled Copper Motor winding wire (5KV insulation @ Brocock.co.uk)
No input capacitor needed. RS 498-4003 ABS box, SO239 socket, Misc Stainless steel hardware
Rated 15W (Max) continuous, 60W SSB for 18 – 30 MHz tbc (Box may require more ventilation/drain holes !)
Caution: High Voltage in transformer box and antenna /output terminals





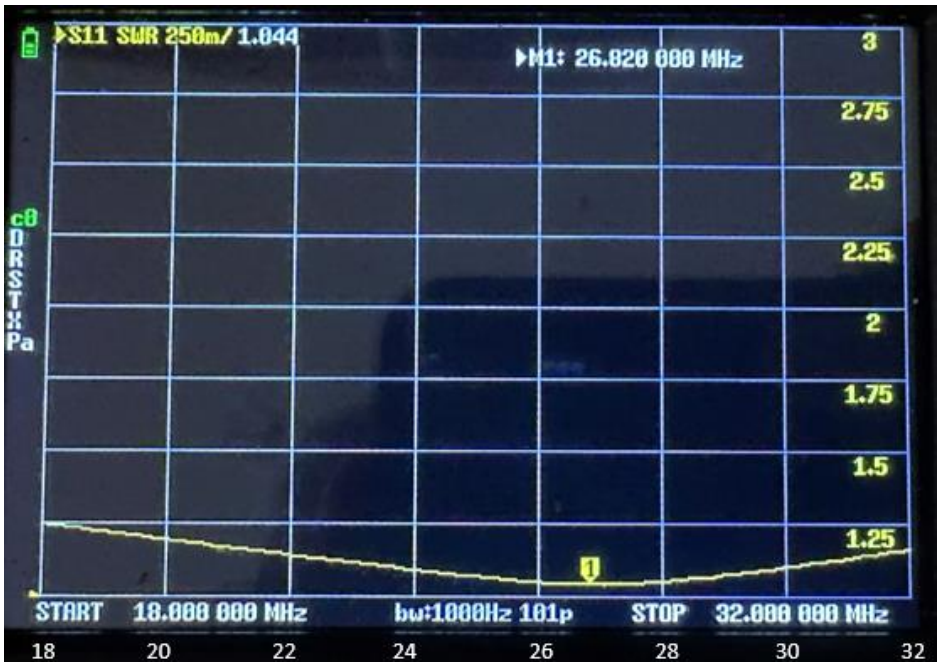
Fair-Rite FT240-52 ferrite core - please try to get a genuine one !
2 primary turns are twisted with the secondary wire. **11 secondary turns** (first 2 twisted with Primary wire)

Both use **1mm dia 'enamelled' copper 'motor wire' with 5KV + insulation** File or scrape the enamelled wire ends down to copper before soldering ! This insulation will not melt easily ! **Secondary turns can be varied if 11 isn't working (14 didn't work for me).**

This project requires appropriate skills and knowledge. **High voltages are present** in the transformer, Antenna Wire Connections etc.
Presented as a work in progress and for competent engineers / home constructors only

Measurements:

SWR vs frequency for Transformer and the traditional EFHW 2450 ohm resistor load



Input side appears Very close to 50 Ohms resistive with a 2450 ohm test load (typical EFHW) on the output

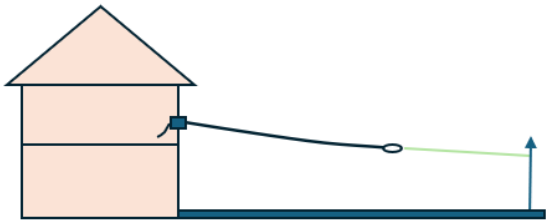
18 – 30 MHz transformer bandwidth easily achieved

The transformer loss is around 1dB across the above bandwidth (and probably contributes to the wide SWR bandwidth in tests and real-world usage.

** I'm working to a theory that the primary impedance includes some of the loss component 'in parallel' with the transformed impedance which may explain the unusual ratio needed to hit 50 ohms at the SO239 socket.

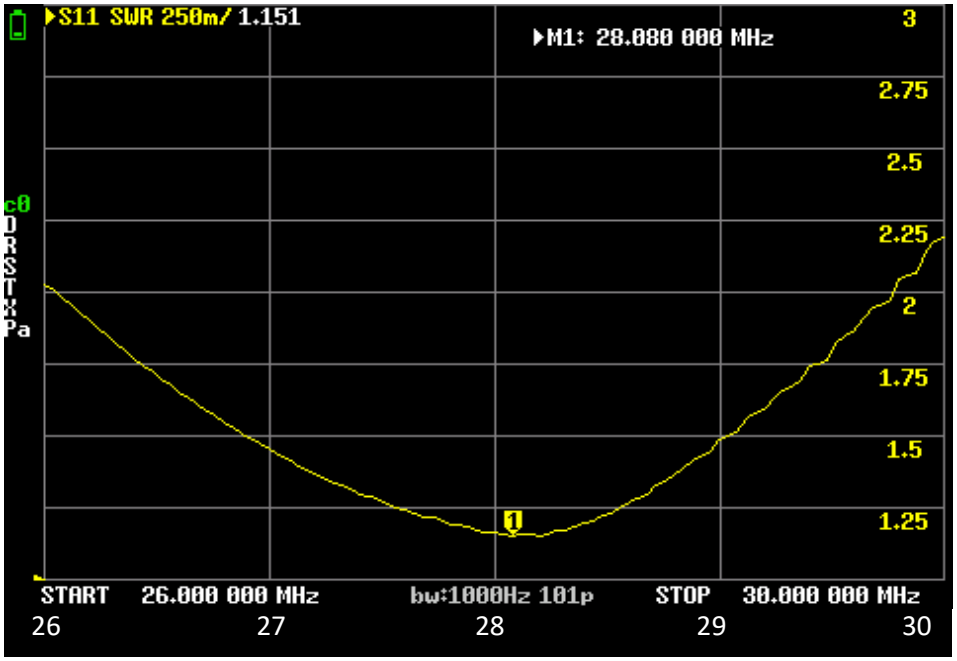
With a <u>real world</u> use into antenna wire.

Over garden, under tree branches, from a 4 m high window opening; sloping down to 2.5m etc. ***KEEP the Antenna wire away from any solid objects or tune will be lost***
0.8m Counterpoise wire attached at transformer,
c 4.6 – 5.6 m antenna wire According to centre frequency and subject to on-site tests and trimming to size.



Also suitable for field day/ emergency / rapid deployment

SWR vs frequency: At Transformer box with VNA attached, antenna wire and counterpoise

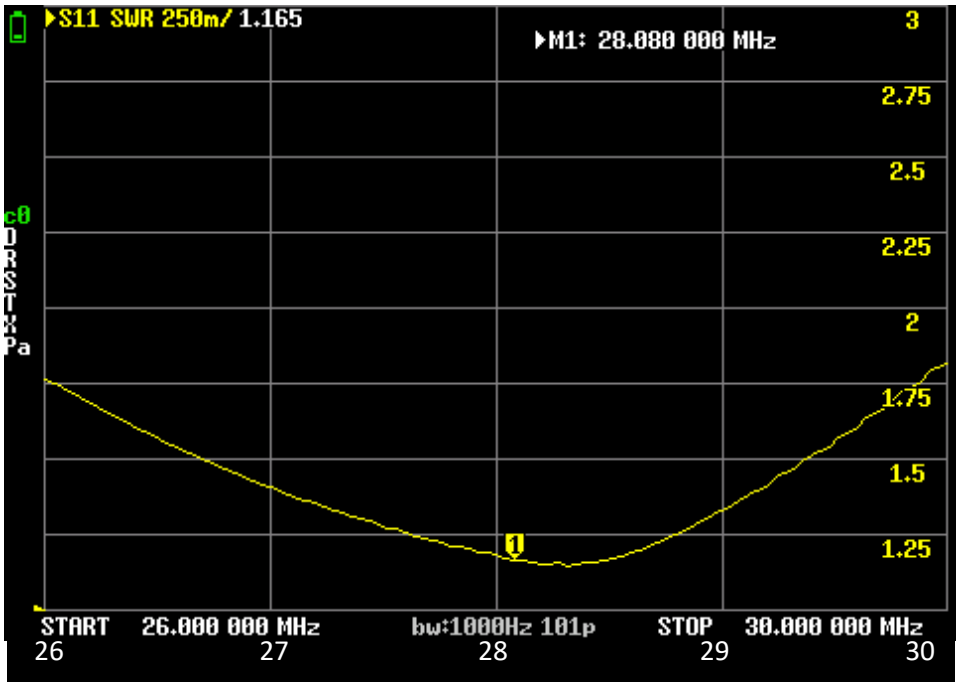


2 MHz 1.5:1 bandwidth (8%) e.g. 26.9 – 29 MHz

46R -j 5.6 at centre
1.15 :1 at box

NO coax feeder used at all in this test. The VNA is literally plugged into the transformer box so this is as 'raw' as you can get.

Real world : At the end of 12 m of good quality RG58CU cable (1db attenuation at 30 MHz)
7 turns of the RG58CU feeder on a FT240-43 toroid form a CMC choke 0.8m from the transformer box



2.5 MHz 1.5:1 bandwidth (9%)
e.g. 26.7 – 29.4 MHz

46R -j 6.6 at centre
1.16 :1 SWR at transmitter

Total system loss is c 2 dB (transformer + cable) i.e. Less than one S-Point at the receive end.

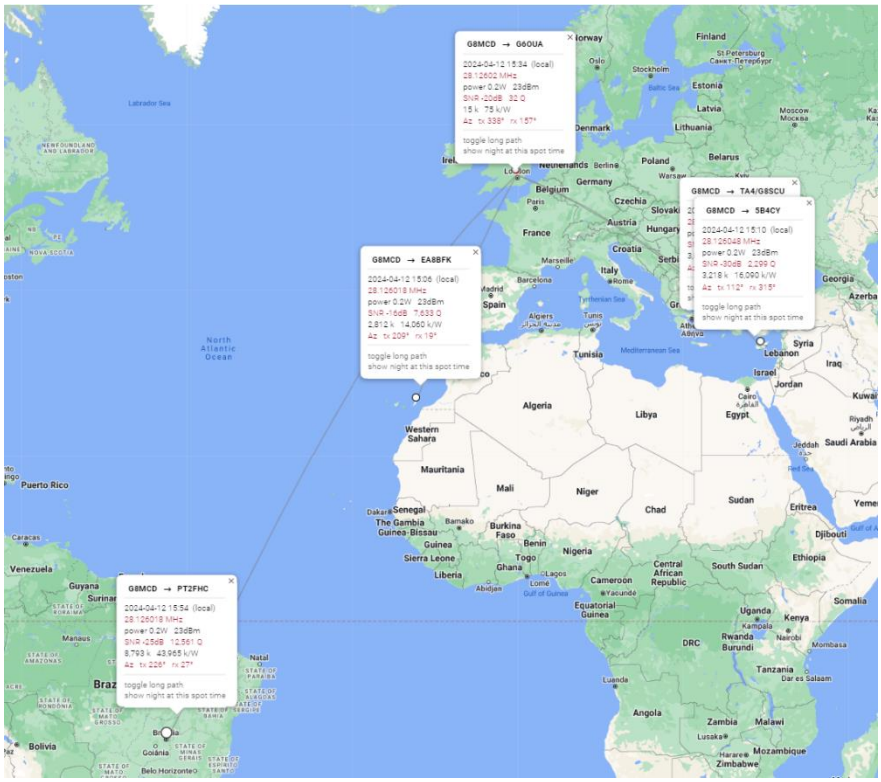
Typical gain of a EFHW means ERP = much the same as the transmitter's output power.

Conclusion

Not the best antenna in the world and NOT loss-free. **BUT** it offers great usability, a good match over a wide bandwidth, (especially via a 12m+ coax feeder,) and is easy to carry, set up and 'tune'.

Most rigs won't require an ATU or re-tuning within a band once the wire is trimmed correctly.

Power is limited by the heating of the single ferrite core but this looks manageable up to 15 or so Watts FM, and 4x more on SSB. This has not been fully tested in practice so I welcome feedback.



Contacts reported in the first 24 hours for a 28.1 MHz WSPR Digital Beacon transmitter using an output power of just 0.2W (=100W+ of SSB) into the antenna system described here.
(My 'wooded valley' back garden, normal conditions, daylight hours, no hill, no tower, no ATU, just a short counterpoise and fed via 12m of RG58CU coax)

From 15Km to 8,793 Km to Brazil : Not bad for 10m on a quiet afternoon !

Have fun experimenting
73 G8MCD