AERIAL TUNER

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This tuner can be used with end-fed or balanced feeder systems, either for reception or transmission. When used with a receiver, a substantial improvement in signal strength is obtainable. For transmission, it allows the usual pi-tank to be matched to end-fed, Zepp, and other aerials.

Construction

L1 is wound with 20 s.w.g. tinned copper wire, and L2 is of well-insulated wire, on top of L1, as in Fig. 2. The former is 89mm x 44mm and 34 turns are used in all. Taps are equally spaced at six turns, two turns, four turns, and five turns from the centre tap. They are made by passing short lengths of 16 s.w.g. wire into holes in the former, and securely

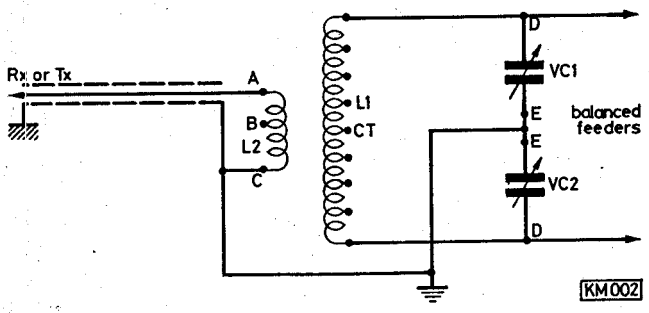


Fig. 1: The circuit diagram of the aerial tuner

soldering these to the winding turns as required. Nine 6BA bolts with tags, mounted on a piece of paxolin about 102mm x 102mm (as in Fig. 2), support the coil. Below these taps fit three bolts for A, B and C. A to B is three turns, and B to C has four turns, so that three, four, or seven turns may be selected. Two further bolts are for E, E, Fig. 2.

Provided plenty of taps are available, other coils may be suitable.

Methods of Coupling

It is possible to find a suitable coupling method by trial only, especially for reception alone. **Fig. 3** will help clarify some of the more usual configurations.

"A" is a pi-coupler, and adjustment of the capacitors allows a wide range of impedances to be matched, either to load the transmitter correctly, or to give best reception.

"B" is a popular method for high impedance aerials. With a transmitter, a co-axial lead is generally used, with outer conductor to the chassis. This, shown at "B" may be fitted for any circuit.

"C" employs the link for coupling. For low frequencies, the two capacitors may be put in parallel as shown, and this is useful if they are not of very large value.

"D" is a somewhat similar arrangement to using a centre-tapped coil and having the capacitors in series in this way is most appropriate for a high frequency band.

"E" shows the aerial tapped down, which is useful with parallel tuning when aerial loading prevents proper tuning with "B".

"B", "C" and "D" are appropriate for high impedance. "E" suits many intermediate lengths. "F" is for low impedance (quarter wave) with one capacitor used for series tuning.

Parallel tuning of balanced feeders is shown in Fig. 1. This is satisfactory when the feeder termination is high impedance. For low impedance feeders, "G" in Fig. 3 is necessary. The best balanced system is a tuned doublet. The top is divided into equal lengths, and the twin feeders are spaced about 102mm by spreaders. High impedance feed is expected if one-half the top, plus the feeder, equals a half-wave or multiple of half-waves. Should one-half the top plus feeder be a quarter wave or odd multiple, low-impedance coupling "G" is anticipated.

★ components

VC1 and VC2 350pF Jackson 5021/2 or similar. Ceramic or paxolin former, 100 × 100mm. Aluminium base 165 × 100 × 9mm, aluminium panel 203 × 152mm. Case 203 × 152 × 152mm. Tinned copper and insulated wire.

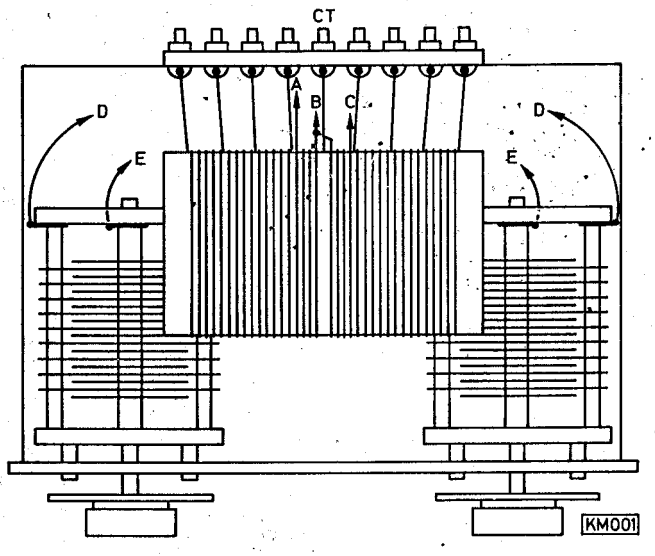
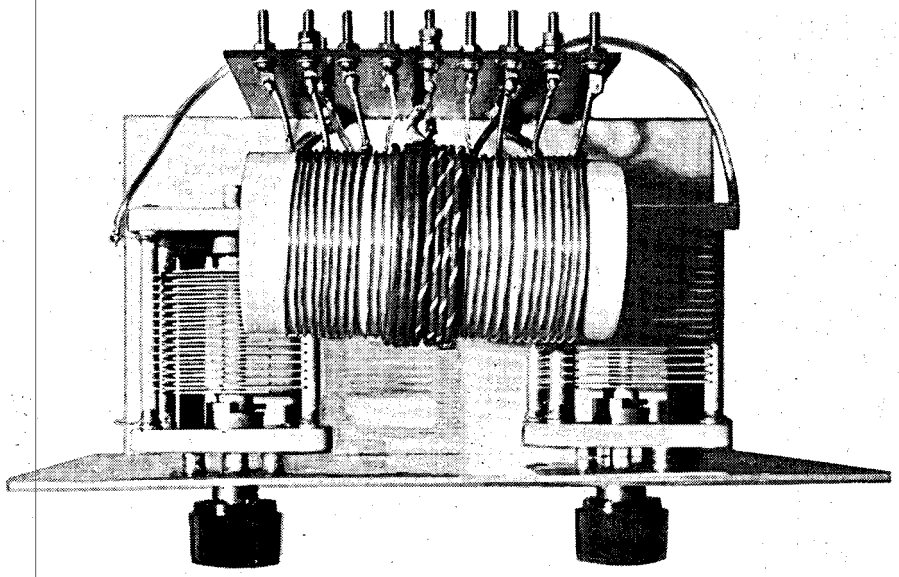


Fig. 2: General layout, showing connections to screw terminals



A view of the unit showing L2 (p.v.c. covered wire) wound *over* L1

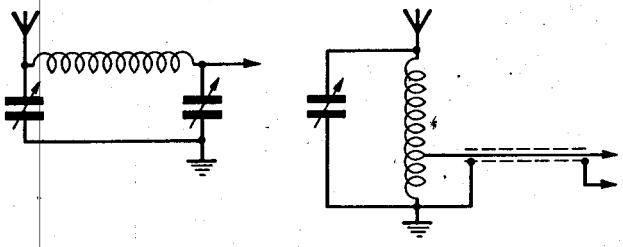


Fig. 3: Coupling circuits A and B

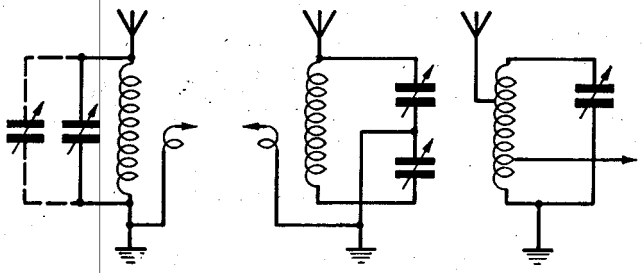


Fig. 4: Coupling circuits C to E

Frequency

Circuits showing the whole of L1 in use, above, are for the 80m band. For higher frequencies, fewer turns are used. With "A" short out unwanted turns. Circuits such as "B", "C", "E" and "F" are used at higher frequencies by moving the aerial and capacitor connections down the coil.

With balanced circuits, Fig. 1, "D" and "G" in Fig. 3, move taps in equally from each end.

There is sufficient latitude to allow tuning up for reception on 25m, 31m and other broadcast bands, if required.

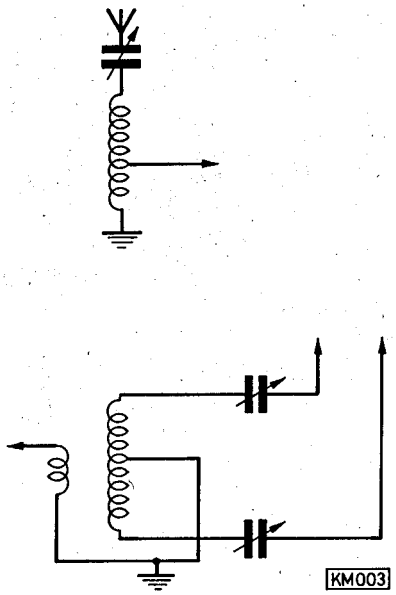


Fig. 5: Coupling circuits F (upper) and G (lower); details of all coupling circuits are given in the text

Reception

For reception purposes only, it is an easy matter to try various tappings or circuits, to find which peaks up signals best. This can be done with the aid of the S-meter, selecting a signal not subjected to fading. "B", "E" and "F" will cover most conditions likely to be met with a single wire aerial. The improvement is greatest when the original match with no tuner was poor.

Fig. 1 or "G" will be used with twin tuned feeders (doublet or Zepp) or Fig. 1 with feeders tapped in equally from each end of L1.

Transmission

The points already mentioned apply, plus the fact that for correct operation and loading, suitable matching is essential. Mis-matching may in fact cause damage to the transmitter output stage.

An excellent method of matching is to place a standing wave indicator in the co-axial lead from tuner to transmitter, and adjust the tuner for minimum SWR, with reduced power. An indication of 1·5:1 or lower is normally satisfactory. Adjustment to a very low SWR (virtually 1:1) is generally simplified by placing a variable capacitor in series with the link or tap—e.g., between A and the co-axial inner conductor in Fig. 1. A 500pF component is suitable for h.f. bands, and 2×500pF for 80m, receiver type capacitors having adequate spacing. "A" Fig. 3 does not require this item, and can generally provide virtually 1:1 SWR.

Capacitor settings and tappings used for each band should be noted so that re-tuning is possible with a minimum of trouble. ●