

Setting Up

The heaters should be allowed to reach operating temperature and the microphone gain reduced to zero. At the same time the residual carrier level control should be turned anti-clockwise so that the DC input to the power amplifier is at minimum.

Tune all stages for correct RF functioning with a dummy load on the power amplifier. Using an absorption wavemeter, check that the frequency multiplier stages are on the right channels. It should be possible to produce 6 mA of drive into the QV06-40A; if this figure cannot be obtained, it will be necessary to alter the position of the centre-tap on the coil in the anode of the last driver stage.

At this point, with the transmitter tuned to 145 mc on a dummy load, the DC input to the power amplifier should be about 30 watts. The microphone gain can now be increased, and when it is at about the half-way position, a whistle into the microphone should increase the DC input to 150 watts.

This indicates that the modulator is working. The residual carrier level can now be varied at will, and the

DC input to the power amplifier is controlled by adjustment of the *audio* gain.

Results

In practice it has been found that best results were obtained when the resting carrier level was set to 100 watts and the system then talked-up to 150 watts. This gave distant stations a strong carrier to tune and hold. TVI was much less troublesome when the resting carrier was brought down to 20 watts and talked up to high power on speech peaks.

This form of modulation is capable of very good results provided that the audio from the microphone amplifier is clean. On-the-air-reports are the best guide. If a reflectometer is available with a headphone socket, this will give a very good indication of the audio quality as transmitted.

When this new transmitter was put into service, very good results were obtained straight away and a consistently strong signal was radiated into the Continent. In two months the SHORT WAVE MAGAZINE VHFCC award was obtained.

VERSATILE ATU FOR TOP BAND

MULTI-MATCH DEVICE FOR ANY TYPE OF AERIAL

P. R. CRAGG (G3UGK)

LONG wires, short wires, medium-length wires, high wires, low wires, end-fed wires, centre-fed wires—at one time or another most Top Band operators will have tried one or more of these, or their variants, in the never-ending search for a Better Signal. Having got the aerial up, the problem of feeding power into it is the next consideration—and always a problem because there are very few transmitters capable of coping with much outside the usual 50-75 ohms of input impedance. And how many 160-metre aerials present this magic figure to the Tx? Virtually none.

Many and varied are the configurations of ATU to be found in the literature—but none of them can cope with impedances that depart very much from the design figures.

The ATU described here is a combination of the three most commonly-needed configurations, selectable at the turn of a switch, to enable high or low impedances, balanced or unbalanced, to be transformed into a suitable match for the transmitter.

Design Considerations

No matter what the height or length of your aerial, or its feed point, it will look like one of the following to the transmitter: (1) *Low impedance, unbalanced*; (2) *High impedance, unbalanced*; (3) *Low impedance, balanced*; and (4) *High impedance, balanced*.

To deal with *Case* (4) first, the reader will realise that it would be unrealistic to cater for this, because a high-impedance balanced feed necessitates the use of a folded dipole at a height of not less than one half wavelength, say, 265ft. for Top Band. Anyone able to put up such an aerial would not need a multi-match ATU to couple it to the Tx.

Thus, we are left with the more usual types of long wires and dipoles. End-fed quarter-waves and the like need the series-tuned circuit of Fig. 2A to match the Tx into the low-impedance unbalanced feed. A half-wave dipole (by definition, centre-fed) presents a balanced, low impedance feed point and would need an ATU to the circuit of Fig. 2B. On the other hand, the end-fed wire, of up to half a wavelength or so, will offer a high-impedance unbalanced feed point, and will call for the circuit of Fig. 2C. There are variations on Fig. 2B, but the arrangement shown here has been used successfully for years.

Circuit Description

By the circuit of Fig. 1, any of the three required configurations can be selected by Sw1, a rotary switch of the low-loss type. Posn. 1 gives the Fig. 2A arrangement; posn. 2, Fig. 2B; and posn. 3, Fig. 2C.

When on posns. 1 or 3, transmitter loading is adjusted by selecting any one of the 12 tapping points on the coil, by Sw2, and on posn. 2 by the number of turns and the degree of coupling of the link (centre winding). In the writer's case, the link coil was found by experiment to enable a dipole anywhere between 25 and 60 feet to be loaded, this being considered a sufficient range for normal use. This link coil is open-circuited on posns. 1 and 3, when it has a negligible effect on the operation of the ATU. On posns. 1 and 3, the main windings are connected in series by the action of switch Sw1B, and act as a single inductance.

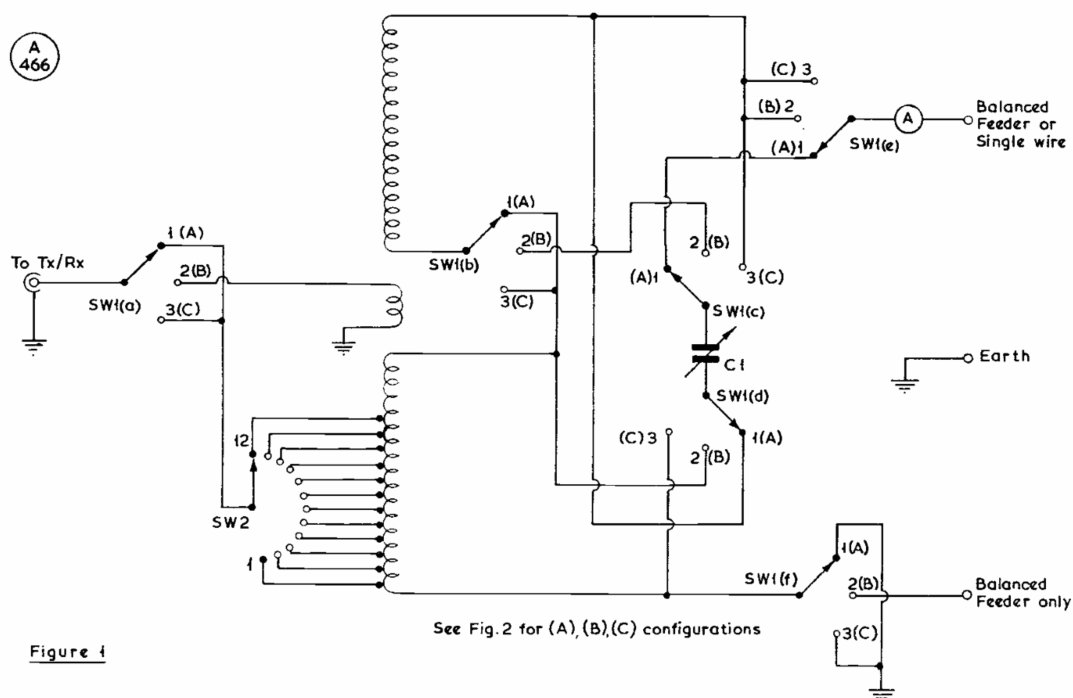


Figure 1

Fig. 1. Circuit of the Tuner, and see Fig. 2. Values can be: C1, 500 $\mu\mu\text{F}$, Rx type variable; SW1, 6-pole 3-way rotary switch; SW2, single-pole 12-way rotary; Coil, see text and Fig. 3; meter, 0-1 amp. RF.

Construction

First, the coil. Close-wind 50 turns of 22g. enam. copper wire on a 1 $\frac{1}{4}$ in. dia. former. Cut the centre turn and solder leads on to each end of the severed turn, ensuring that they are long enough to reach the tags on SW1. Close-wind six turns of p.v.c. insulated wire over the centre of the main winding, making sure to get three turns each side of the two centre leads. (Be careful to

wind the link coil in the same direction as the main winding). Tape the link in place. Scrape away the enamel from one point of each the first 12 turns of the main coil, and solder suitable leads at these points, being very careful not to short turns; it is advisable to offset each tapping point alternately by about a quarter-inch.

The capacitor C1 must be insulated from ground,

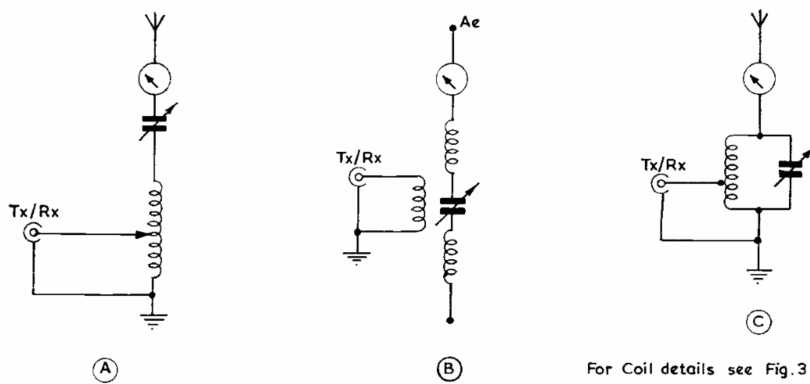


Fig. 2

Fig. 2. Configurations evolved from circuitry of Fig. 1.

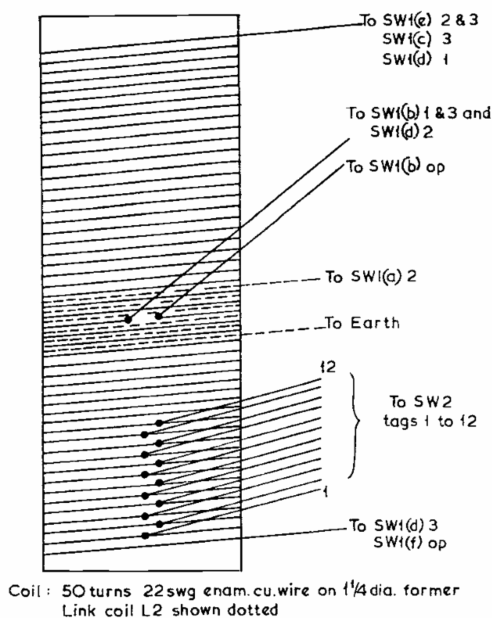


Fig.3

A
468

Fig. 3. Details of the coil tapping.

and mounted on a piece of paxolin or similar material, control being by an insulated drive shaft. Alternatively, run the shaft through a rubber grommet on the front panel. The coil assembly should be mounted as far as possible from the sides of any metal cabinet housing the ATU, to avoid damping effects by any large area of metal in close proximity. Keep all leads as short as possible.

Operating the ATU

If an SWR meter is available, connect it in the line between the Tx and the ATU, feed in power, adjust the capacitor for minimum reflected current and then, starting from posn. 1 of Sw2, increase loading until the Tx is delivering full power. The Tx PA loading condenser should be pre-set at about the middle of its range, and only re-adjusted if not enough loading can be given by Sw2 (a most unlikely occurrence). It may be necessary slightly to alter the setting of C1 to maintain minimum reflected current under full-power conditions.

Without an SWR meter, adjust C1 for maximum signal or noise with the receiver, tuned to the desired frequency, and load up the Tx as already described.

Concluding Notes

The prototype as discussed here has performed every bit as well as expected, and has proved extremely useful over the last few months. It has had to cope with half-waves, end-fed wires, quarter-waves, an inverted-Vee, and a "5RV" with feeders strapped, in locations as varied as a field in Huntingdonshire, Dartford Heath,

the West London Air Terminal, a hotel in Guernsey, various local stations, and the home QTH. It has tasted AM/CW/SSB using a Codar, a Vanguard, Vespa and KW-2000A—in other words, "I don't know what I'd do without it." The writer acknowledges help and advice from G3XTJ, G3XPE and G3RVV.

SUBSCRIPTION NOTE

A direct subscription to SHORT WAVE MAGAZINE costs 45s. (or 48s. "1st class mail") post free for a year of 12 twelve issues, starting any month. Despatch is guaranteed on the day before the last Friday in the month (which is publication day). Orders, with remittance, to: Subscription Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

In the ordinary way, the *Magazine* should be available, to order, through any local newsagent, price 4s. Except in the case of large newsagents in cities and big towns, SHORT WAVE MAGAZINE (like other specialist periodicals) is most unlikely to be available for casual purchase. In other words, order your copy.

THE "NEW QTH" PAGE

Periodically, as this month, we take some extra space to reduce the back-log of QTH's for publication, mainly changes-of-address—see pp.708-709 this issue. As explained on previous occasions, it behoves all interested in having their call sign/address published in the *Magazine* and the international *Radio Amateur Call Book* to let us know as soon as possible. It is a fact that new QTH's and changes-of-address come in literally daily, and so have to be taken strictly in rotation. And if you are notifying a change of address, please do not fail to say whether you are, or are not, a direct subscriber.

ALWAYS WANTED

Photographs of Amateur Radio interest, suitable for publication in SHORT WAVE MAGAZINE—either of equipment, stations, personalities or Club groups. They should be good quality prints, clear and sharp, and can be of any reasonable size, though post-card is preferred. Details should be on a *separate* sheet accompanying the picture and attached lightly to it—not written on the back of the photograph itself. All that we can use are paid for immediately on publication, and they should be addressed: Editor, SHORT WAVE MAGAZINE, BUCKINGHAM.

GETTING THAT BOOK—MAKE A NOTE

We can obtain for you any technical or scientific book, on any subject, in the English language, provided you can indicate (a) Its correct title, (b) The publisher, and (c) If possible the name of the author. This sort of enquiry usually demands a good deal of research, so all possible details should be given with any enquiry. There are tens of 1,000's of technical books published in English every year and, though we do not claim to be able to trace them all to source, we will certainly do our best for anyone with a firm enquiry in the radio-electronics field.