Modifying the W.S. No. 18 for Top Band

By DAVID NOBLE (G3MAW)*
and DAVID M. PRATT (G3KEP)†

THE No. 18 set walkie-talkie admirably fulfills the requirements of a portable station for R.A.E.N. use apart from the frequency range. Top Band is preferable for this purpose due to the reduced amount of interference. The 68P set is a 160 metre equivalent to the 18 set, but as it is not readily obtainable on the surplus market, the writers decided to carry out modifications to the 18 set Mk III which is at present available at a reasonable price. Action was also taken to improve the quality of modulation in so far as this can be effected with a carbon microphone.

An 18 set acquired for modification should first be tested on the original frequency coverage to ensure that any failure to function after modification is due to some fault in the alterations. The original circuit diagram of the transmitter is shown in Fig. 1 and the modified circuit in Fig. 2.

The modifications suggested can be divided into the following stages:

(i) The transmitter is modified first, as the p.a. coil is also the grid coil of the receiver r.f. stage.
   (*a*) V.f.o. coil assembly;
   (*b*) P.a. coil assembly;
   (*c*) Aerial current indication;
   (*d*) Modulation and grid drive.

(ii) The receiver, only two modifications are required to the receiver; these being to the r.f. anode and oscillator tuned circuits.

Transmitter

The v.f.o. coils, L6, L7, are removed and inspected, a note being made of the connections. First, it is necessary to remove the v.f.o. screening box and under-chassis cover. The coils are rewound as specified in Table I ensuring that the windings are wound in the same direction.

It will also be necessary to alter the values of the following components:

Coupling condenser C31 from 30 pF to 47 pF;
Padding condenser C36 from 10 pF to 56 pF;
V.f.o. trimmer C35 from 15 pF to 50 pF.

The p.a. tank coil, L8, is also removed and rewound according to Table I. The neutralization winding is omitted as this was not found necessary on the lower frequency band. The neutralization components C44 and R26 are also removed as these are no longer required. The aerial coupling condenser C47 is increased to 2000 pF.

With the normal aerial current indicator, it was found that only a very small reading of r.f. was shown on the meter; a simpler and more effective arrangement was therefore installed. The original aerial metering components are removed as also is the metal tube through which the aerial lead originally passed. The negative meter lead is shortened and the positive one replaced by a length of co-axial cable. Another short length of co-axial is fed from the meter to a coupling lead within the r.f. indication box. The braiding of these co-axial leads is of course connected to chassis. A germanium diode is connected from the switch end of the latter lead to a solder-tag mounted on the front panel. With this arrangement, it will be found that too much current passes through the meter. The preferred way of adjusting this is, doubtless, to alter the coupling by moving the coupling lead; but this is very tedious, as the box has to be removed, and replaced each time an adjustment is made until the correct position is achieved. It will be found simpler to shunt the r.f. by placing a condenser across the meter terminals. This is approximately 300 pF but, by experiment, the exact value can be chosen to give full scale deflection under maximum r.f. conditions.

Modulation and Drive

Modulation of much better quality can be obtained by substituting an r.f. choke for R23 (Fig. 1). On c.w., the junction of R23 and C42 is connected to earth by the key jack, and with the r.f. choke in this position, gives a virtually shorted d.c. path from grid to earth resulting in the absence of bias. The wire from the key jack is, therefore, connected to the junction of R22 and R21. As can be seen from Fig. 1, an emergency bias supply is normally obtained from V5. Should the 12 volt battery bias supply at any time fail, C37 extracts a small amount of r.f. from the oscillator which is rectified by a diode of V5, thus providing a small negative voltage at the junction of R21 and R22, so preventing V6 from drawing excessive current. This, however, reduces the p.a. efficiency slightly, and it was accordingly decided to omit this arrangement. C37 is, therefore, removed. As the diode pin of V5 is used as an anchoring point for R21 and R22, the rest of the circuit should be untouched as this diode will not conduct with the negative voltage on its anode. C41 is increased to 47 pF as it was found that grid drive was slightly greater with this value and better efficiency was obtained. The modifications to the transmitter are now complete and it may be tested on its new coverage.

Receiver

Attention may now be turned to the modification of the receiver (Fig. 3). The r.f. anode coil L1 is rewound (see Table I) and its padding condenser replaced by a 100 pF shunted by a 50 pF trimmer. All other components of this stage are unaltered.

The oscillator coil is rewound and C14 and C15 are replaced by 680 pF and 56 pF silvered mica condensers respectively. No further modifications were found necessary.

Alignment

The actual modifications now being complete, the 18 set is ready for alignment. First, the receiver oscillator is adjusted to operate on 2265 kc/s with C17 at maximum capacity. This can be done by injecting a signal of 1800 kc/s at the aerial socket and adjusting C16 until the signal is heard. The output from the signal generator is then injected at 1900 kc/s, and the trimmer C6 adjusted for maximum output.

The transmitter should next be switched on with the aerial disconnected. With the v.f.o. tuning condenser C34 at maximum capacity, C35 is adjusted so that output on 1800 kc/s is obtained. The netting compensation trimmer C33 is adjusted so that with the netting button depressed, the radiated frequency corresponds to the actual received frequency.

It will be found that both the transmitter and the receiver frequency range is from 1800 to about 2300 kc/s, and calibration graphs may be plotted using a 100 kc/s sub-standard crystal.

Results

With a half-wave end fed aerial on c.w. the best DX is about 300 miles, while on telephony a good report has been received from a station 70 miles away. Using a 12 ft. whip aerial consistent reports of about RS58 are received over a 20 mile radius of the writers' location.

* "*Heather Bank*," *Menston, Yorkshire.*
† "*Glenluce*," *Lyndale Road, Eldwick, Bingley, Yorkshire.*

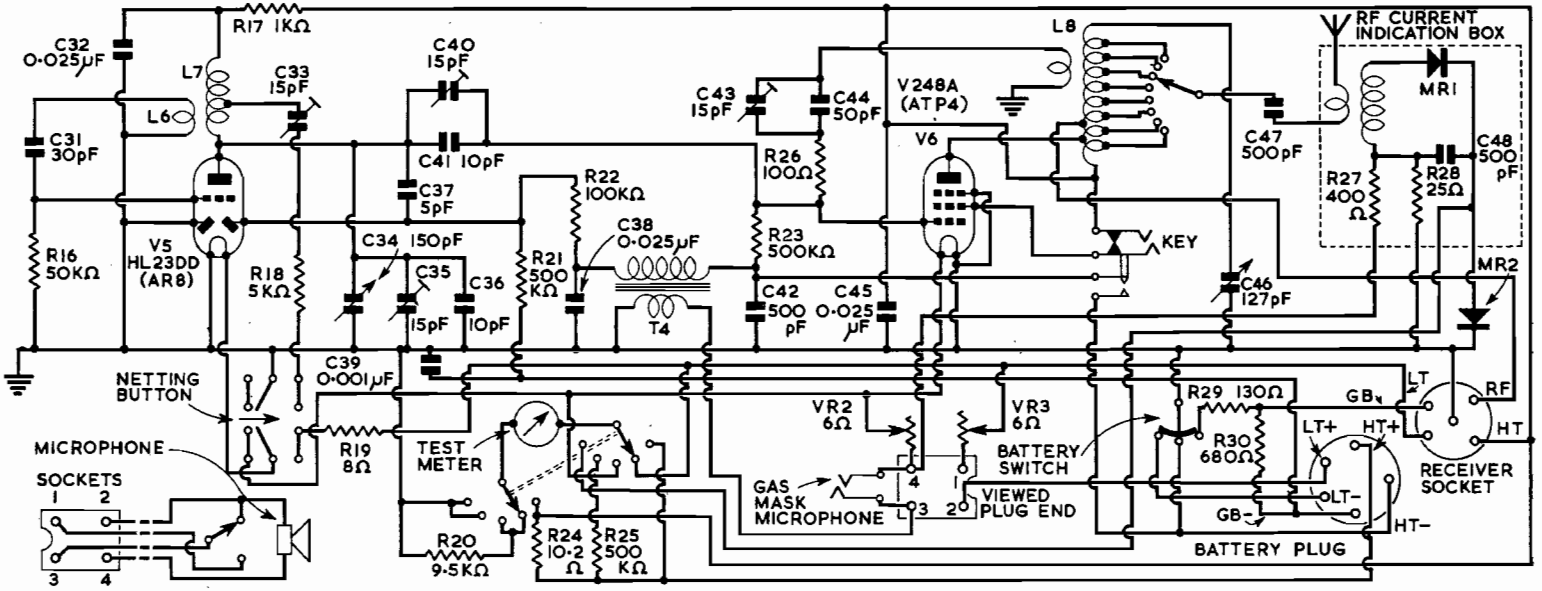

Fig. 1. Circuit diagram of the transmitter section of the W.S.18 before modification.

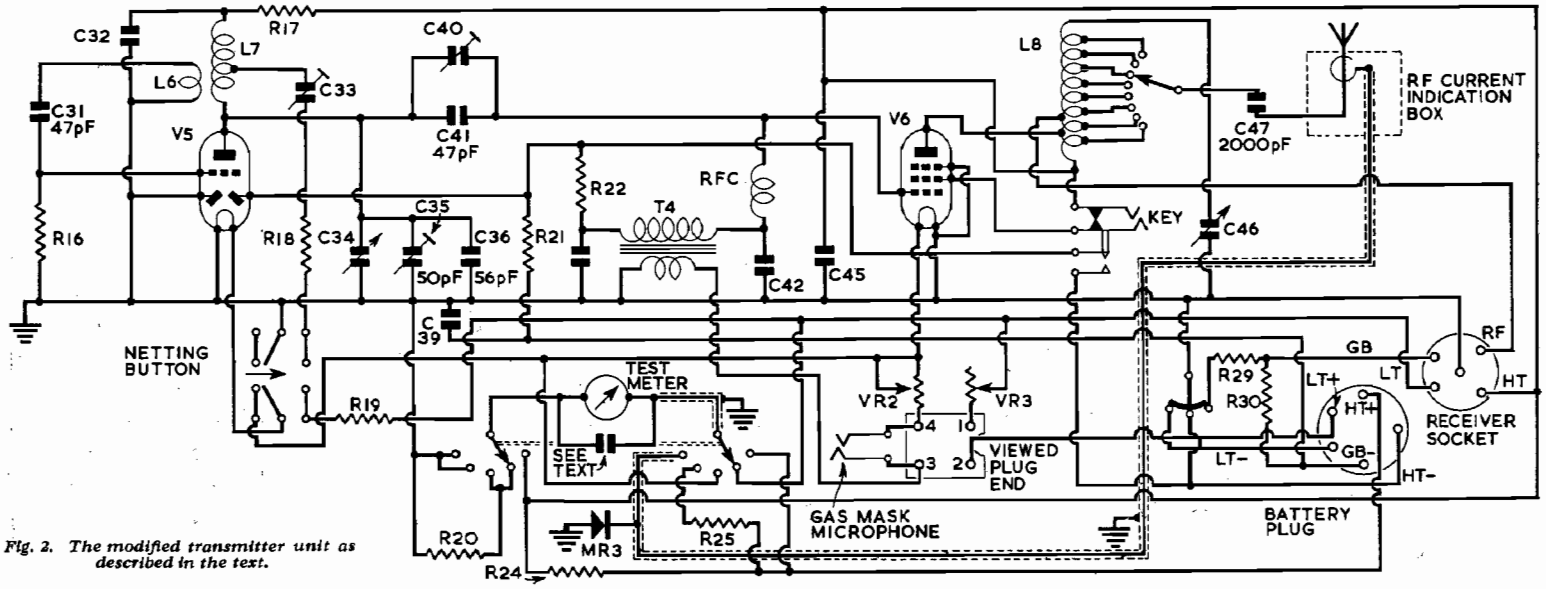

Fig. 2. The modified transmitter unit as described in the text.

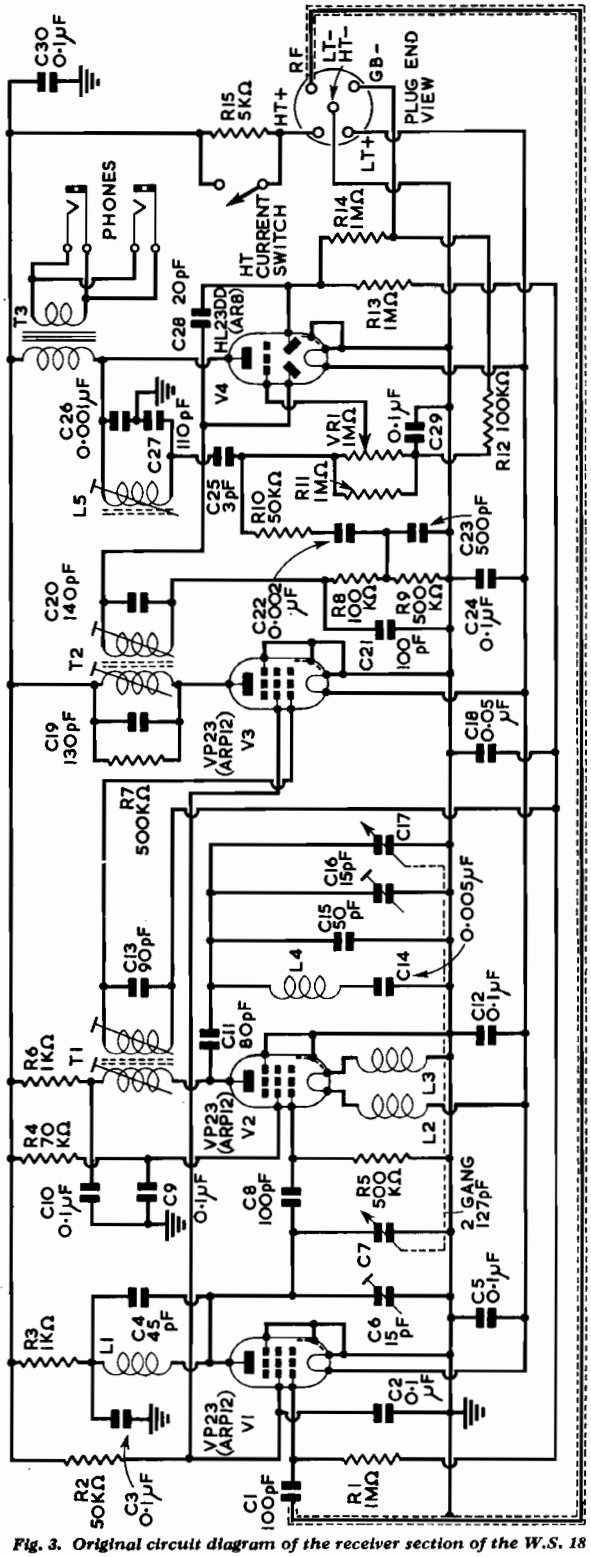

Fig. 3. Original circuit diagram of the receiver section of the W.S. 18

TABLE I — COIL DATA

L1, 52 turns 24 s.w.g. enam. copper, close-wound on original former.
L2, L3, 16 turns 36 s.w.g. enam. copper, bi-filar wound over centre of L4.
L4, 74 turns 30 s.w.g. enam. copper, close-wound on original former.
L6, 31 turns 36 s.w.g. enam. copper, close-wound over h.t. end of L7.
L7, 43 turns 24 s.w.g. enam. copper, close-wound on original former tapped at 19 turns from h.t. end.
L8, 60 turns 24 s.w.g. enam. copper, close-wound on original former tapped at 4, 9, 15, 21, 27, 35, and 44 turns from h.t. end.

Ferrite Beads for Suppressing Feedback

FERRITE beads are a convenient method of suppressing parasitics in radio and television equipment caused by feedback along supply and control lines. Such parasitics are normally prevented, with varying degrees of success, by conventional decoupling methods or by the introduction of inductive components in to the leads concerned. However, the use of ferrite beads is rather simpler.

With Ferroxcube, for example, the losses normally associated with magnetic materials are extremely low over the frequency range for which it is designed, but outside this range the residual losses increase rapidly. A piece of Ferroxcube threaded on to a lead acts as a highly inductive toroid and thereby considerably increases the impedance of the lead to high frequencies.

The method of use is to thread the ferrite beads on to the leads in positions where they are found to be most effective. Because of their small size and weight the beads need no support and they can therefore be used even in congested wiring. No soldered joints are involved and there is no low frequency loss or d.c. voltage drop in the lead. If one bead is insufficient to eliminate the feedback, the impedance of the lead can be further increased by adding additional beads.

It is seldom possible to decide in advance exactly where beads will be required and it is therefore usual practice to experiment with beads in various parts of the circuit and at various positions on the leads until unwanted feedback is eliminated.

Two types of Ferroxcube beads are at present available: type FX1115 for use at frequencies between 2 and 15 Mc/s and type FX1242 for frequencies between 15 and 100 Mc/s. Ferroxcube is made by Mullard Ltd.

Can You Help?

● L. Deavin (B.R.S.19831), 94 Northampton Road, Roade, Northants., who wishes to obtain information on the construction of a transistorized electronic key?

● H. E. Horton, Box 25, Mount Hope, Ontario, Canada, who wishes to obtain the circuit diagram and operating manual for the ex-Admiralty Tuner Amplifier B21B?

Silent Key

JACK K. WRIGHT (G3KUH)

It is with deep regret that we record the death of Mr. J. K. Wright (G3KUH) of Parkgate, near Rotherham. Jack was well-known on the v.h.f. bands and was chairman of the Rotherham Radio Club, of which he was also a founder member. He was a keen constructor and experimenter and in every sense a true "ham."

On behalf of his many friends, we express our deepest sympathy to his widow in her great loss.—R.R.P.