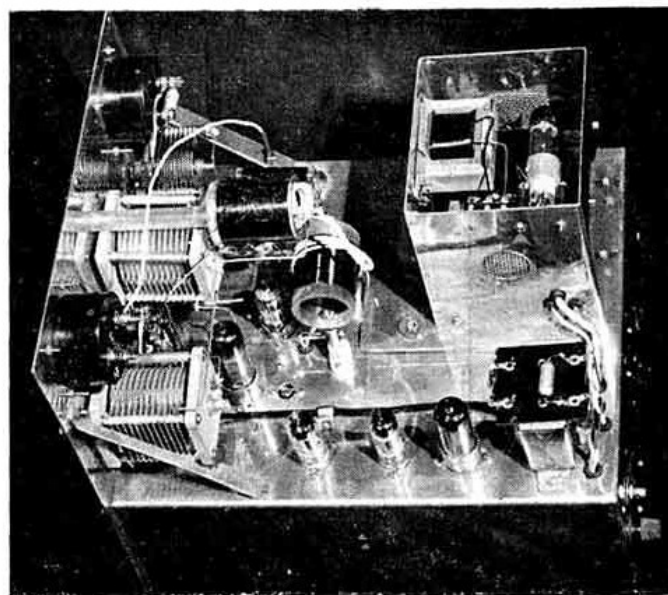


A Desk-top 160 Metre Transmitter

*Compact Modern Design with built-in
Power Supplies and Modulator*

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(G8TL)*



A side view of the transmitter.

THE transmitter to be described was designed to meet the requirements of the writer—a Top Band addict of long standing—for a thoroughly reliable, compact and self-contained unit for the lowest frequency amateur allocation. With the prospect of good conditions on 1.8 Mc/s during the coming winter, it is believed that other members will be interested in the design which has proved itself over an extended period of successful operation.

Owing to the 10 watt limitation on power input, it was decided to make the transmitter for single band operation only. Other desirable features were considered to be excellent stability, freedom from TVI and good phone quality. To this end, lightly loaded circuits, high quality components and generous screening are employed.

The Circuit

It will be seen from the complete circuit diagram in Fig. 1 that the oscillator V1a (one half of a 12AT7) is of the Clapp type, experience having shown that this arrangement is stable and free from drift. A cathode follower (V1b) isolates the oscillator from the buffer stage V2 (type 6AM6). Drive to the buffer stage is via a 50pF variable air-spaced capacitor (C9) which permits adjustment for the minimum amount required. Either the oscillator or buffer stage may be keyed for c.w. transmission by inserting a key into J1 or J2.

To provide a low impedance path to earth at high frequencies for the control grids and screen grids of the buffer and p.a. valves (V2 and V3 respectively) 10pF bypass capacitors (C11, C13, C18, C19) and 50 ohm grid stoppers (R9 and R11) are used. The additional capacitance introduced by these capacitors can be ignored at the frequency concerned. An anti-parasitic choke comprising a 100 ohm resistor (R14) overwound with eight turns of 20 s.w.g. enamelled copper wire is connected to the anode of the p.a. valve as a further aid to stable operation. To help reduce harmonic radiation to a minimum, link coupling is used between the p.a. tank (L3) and aerial (L6) coils. Both buffer and p.a. coils plug into sockets mounted on porcelain stand-off insulators, thus making it a simple matter to modify the transmitter for 80m if desired.

The modulator and speech amplifier, designed for use with a crystal microphone, comprises two triode voltage

amplifiers, V5 and V6 (both type 6AT6), driving a pentode power amplifier, V7 (type 6BW6), coupled to the anode and screen of the p.a. (V3) by means of the modulation transformer, T3.

Separate power supplies are employed for the r.f. section and the modulator, the former being carried under the chassis and the latter above, both in their own screening compartments. Bias for the p.a. is obtained from the secondary of the r.f. section power supply transformer with a small metal rectifier (MR1) and a bleeder network (R26, R27, R28) to earth.

Construction

The complete unit is built on an aluminium chassis measuring 10½ in. × 12 in. × 4 in. deep with the controls and meters mounted on a 10½ in. × 10½ in. front panel. The v.f.o. section is fitted underneath the chassis, the coil and capacitors being separately boxed. The oscillator coil L1 is wound on a paxolin former and mounted in a metal screening box together with its associated capacitors. The values of C4 and C5 shown in Fig. 1 were found to give the most output consistent with good stability.

Next to the oscillator are the buffer and p.a. stages, which are carefully screened from the modulator and power supplies. Lids are fitted to all of the sections before the chassis is fitted into the metal case.

The transmitter power supply and bias pack are mounted in a separate compartment at the rear of the chassis to which it is secured by two screws. Connections are made by plugs and sockets so that the unit can be removed completely for inspection and servicing if required.

The modulator and speech amplifier run along one edge of the chassis in another screened compartment. The power supply for this section is built into a ventilated aluminium box mounted on top of the chassis. Provision is made to switch off the mains transformer (T2) when using c.w. while a further single pole switch (S5) short-circuits the secondary of the modulation transformer (T3).

In order to eliminate any traces of hum the centre-taps of the heater supplies in both the r.f. section and the modulator are connected to earth via 50 ohm wire wound potentiometers, with 0.01 µF decoupling capacitors connected to each side.

All wiring, other than that for the heaters, is carried out

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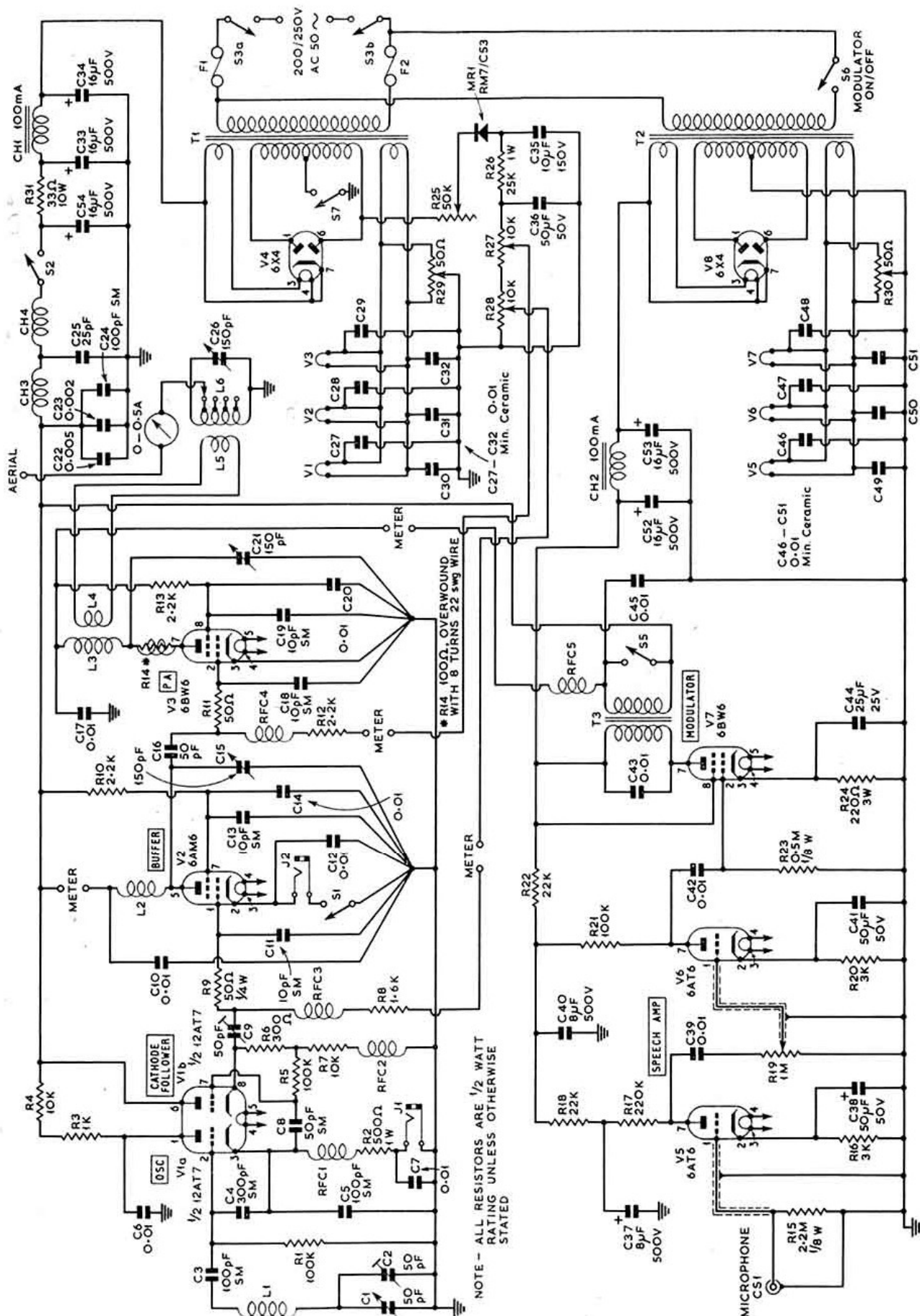


Fig. 1. Circuit of the complete Top Band transmitter and modulator with internal power supplies described by G8TL. Meters of suitable type and range should be connected across the points marked "METER". Alternatively the appropriate meters may be selected by means of switches as in the prototype. If this is done low value resistors should be wired permanently across the metering points.

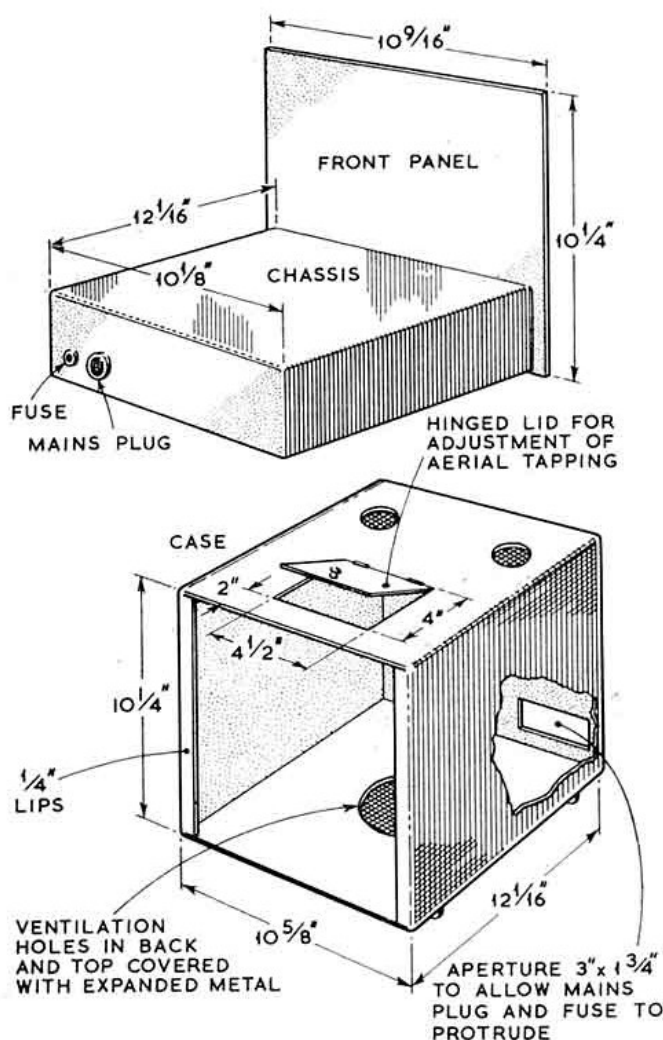


Fig 2. Construction of the metalwork for the transmitter.

in bare 18 s.w.g. tinned copper wire, sleeved only at crossover points or where leads pass through the chassis. Heater wiring is in twisted pair throughout. The a.c. mains input is via a Bulgin three pin connector mounted on the rear drop of the chassis with a fuse fitted adjacent to it.

The complete unit fits into a cabinet measuring 10½ in. × 10½ in. × 12½ in. Provision is made for adjusting the tappings on the aerial coil through a door in the top. The cabinet stands on short Perspex insulators thus allowing air to pass underneath and through large ventilation holes into the box, helping to maintain an even temperature throughout. Constant temperature in the cabinet after the initial warm-up period is an aid to good frequency stability.

Operation

The range 1.8 to 2 Mc/s is spread over 10° to 90° of the v.f.o. slow motion dial which was calibrated with the aid of a BC221 frequency meter. A check on the calibration after some weeks of operation showed the accuracy to be most satisfactory. In operation the v.f.o. was found to be very stable when left running for long periods, so much so that a QS150/15 stabilizer tube originally installed was discarded as unnecessary.

The buffer coupling capacitor C9 was reduced in capacity

until just sufficient drive was obtained and then locked. Correct bias for the various stages was set by means of the 10K ohms potentiometers R27 and R28.

On c.w. the note is reported to be a good clean T9 with no chirp whatsoever. Used with a crystal microphone, excellent reports on the phone quality have been received. No TVI has been caused although the rig is frequently used during television hours in area in which there are many TV receivers.

COMPONENTS LIST

- C1, 50pF air-spaced variable (Jackson Bros.).
- C2, 9, 50pF air-spaced trimmer (Jackson Bros.).
- C3, 5, 24, 100pF silver mica (Dubilier).
- C4, 300pF silver mica (Dubilier).
- C6, 7, 10, 12, 14, 17, 20, 0.01μF tubular (Dubilier).
- C8, 50pF silver mica (Dubilier).
- C11, 13, 18, 19, 10pF silver mica (Dubilier).
- C15, 21, 26, 150pF air-spaced variable (Jackson Bros. type 5070/7).
- C22, 0.005μF 350V mica (Dubilier).
- C23, 0.002μF 350V mica (Dubilier).
- C25, 25pF 350V silver mica (Dubilier).
- C27, 28, 29, 30, 31, 32, 0.01μF miniature ceramic (Dubilier).
- C33, 34, 52, 53, 54, 16μF 500V wkg. electrolytic (Dubilier).
- C35, 10μF 150V electrolytic (Dubilier).
- C36, 38, 41, 50μF 50V electrolytic (Dubilier).
- C37, 40, 8μF 500V wkg. electrolytic (Dubilier).
- C39, 42, 43, 45, 0.01μF mica (Dubilier).
- CH1, CH2, 100mA smoothing choke.
- CH3, CH4, Eddystone type 1066.
- L1, 90 turns 30 s.w.g. enam. close wound on 1½ in. dia. paxolin former.
- L2, 28 s.w.g. enam. close wound for 1½ in. on 1½ in. dia. paxolin former.
- L3, 26 s.w.g. enam. close wound for 1½ in. on 1½ in. dia. paxolin former.
- L4, L5, 4 turn insulated link coils.
- L6, 28 s.w.g. enam. close wound for ½ in. on 1½ in. dia. paxolin former.
- R1, 5, 21, 100 K ohms ½ watt (Dubilier).
- R2, 500 ohms 1 watt (Dubilier).
- R3, 1K ohms ½ watt (Dubilier).
- R4, 7, 10K ohms ½ watt (Dubilier).
- R6, 300 ohms ½ watt (Dubilier).
- R8, 1.6K ohms ½ watt (Dubilier).
- R9, 11, 50 ohms ½ watt (Dubilier).
- R10, 12, 13, 2.2K ohms ½ watt (Dubilier).
- R14, 100 ohms ½ watt resistor overwound with 8 turns 22 s.w.g. enam.
- R15, 2.2 Megohms ½ watt (Dubilier).
- R16, 20, 3K ohms ½ watt (Dubilier).
- R17, 220K ohms ½ watt (Dubilier).
- R18, 22, 22K ohms ½ watt (Dubilier).
- R19, 1 Megohm potentiometer with s.p. switch (Dubilier).
- R23, 0.5 Megohm ½ watt (Dubilier).
- R24, 220 ohms 3 watts (Dubilier).
- R25, 50K ohms wire wound potentiometer (Dubilier).
- R26, 25K ohms 1 watt (Dubilier).
- R27, 28, 10K ohms wire wound potentiometer (Dubilier).
- R29, 30, 50 ohms wire wound potentiometer (Bulgin type I.V.C.5).
- R31, 33 ohms 10 watt wire wound (Dubilier).
- RFCL, 2, 3, 4, 5, Bulgin type S.W. 88.
- S1, 2, 5, 7, single pole toggle switch (Bulgin type S.259 P/D).
- S3, double pole toggle switch (Bulgin type S.277).
- S4—not used.
- S6, modulator on/off switch (part of R19).
- T1, 2, 300-0-300 volts 80 mA., 6.3 volts 3 amps., 6.3 volts 1.5 amps.
- T3, modulation transformer (G. & B. Electric Co. Ltd.).
- V1, 12AT7 (Brimar).
- V2, 6AM6 (Brimar).
- V3, V7, 6BV6 (Brimar).
- V4, V8, 6X4 (Brimar).
- V5, V6, 6AT6 (Brimar).

Other Components

- Bulgin dial lights, jacks, knobs, fuseholders, couplers, tagboards, etc.
- Eddystone slow motion dial (for the v.f.o.).
- Clix plugs and sockets for the coils.
- McMurdo valve bases.
- 0.0-5 amp. r.f. meter.
- 0.50 mA. m.c. meter (for anode currents).
- 0.5 mA. m.c. meter (for grid currents).