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Portable 10 Watts 7 Mc/s Radio Telephone Transmitter

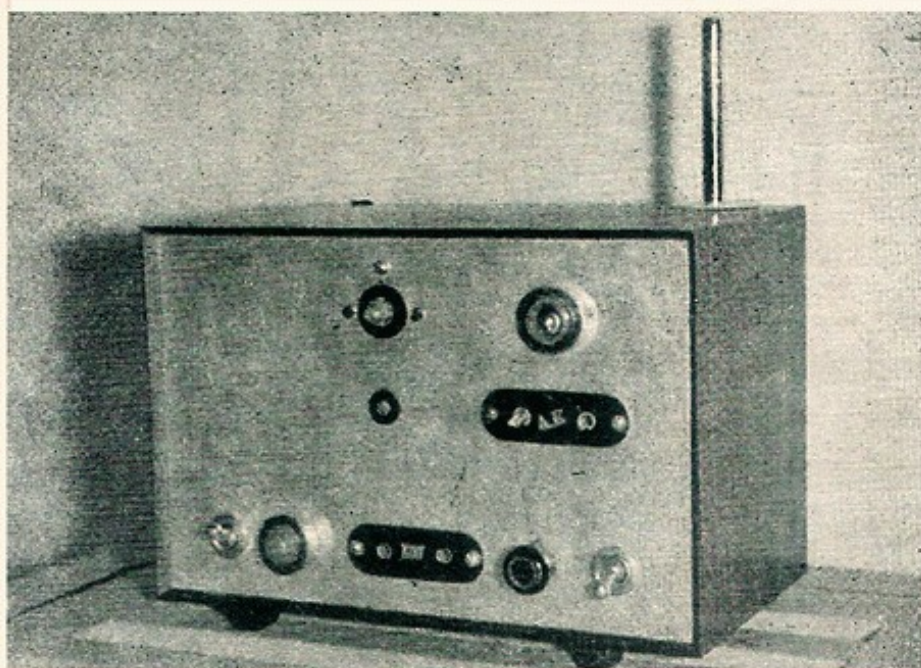


Fig. 2 : Front View

A low cost, compact, portable HF Transmitter easily built at home with indigenous parts.

(Turn to page 6 for description)

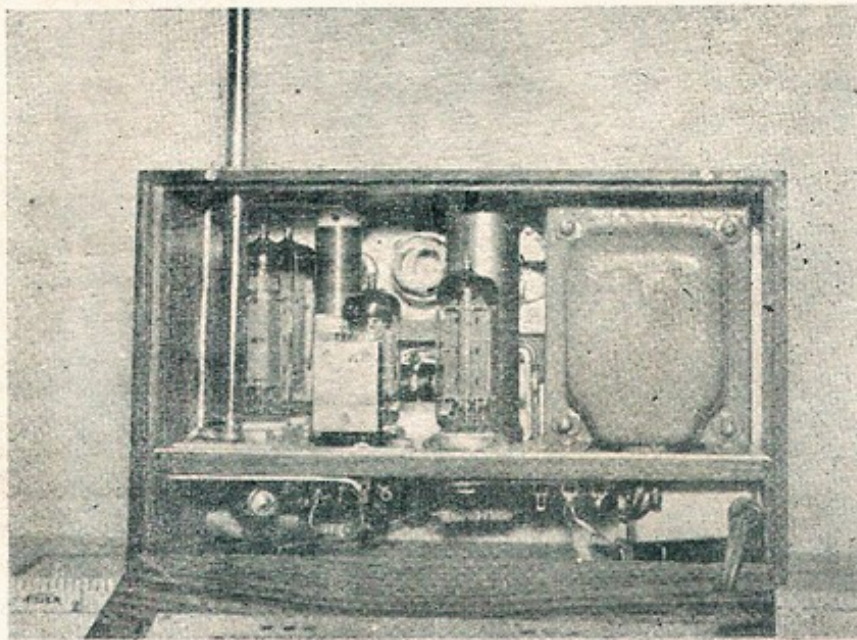


Fig. 3 : Rear View

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"THE MIGHTY MIDGET"

(A portable 10 Watt Transmitter)

This midget transmitter is designed specifically for the ragchewer on 7 mcs. who wishes to have a portable phone transmitter that can easily be carried around. The complete transmitter is small enough to be carried in a suitcase and may be used in conjunction with a good transistor radio receiver.

The Circuit:

It was decided that 10 watts, which represented the minimum transmitter power, would ensure moderately comfortable QSO's upto a few hundred miles on 7 mcs with a not-too-good antenna. This transmitter utilises an EL84 crystal-controlled oscillator, plate and screen modulated by another EL84.

The oscillator circuit is of the Colpitts type with a tuned plate tank circuit (fig. 1). The cathode RF choke is simply a small MW antenna coil with the primary and secondary joined in series in the proper phase. It may sometimes be necessary to modify the 200 pf cathode capacitor if oscillation stops when loading up a 7 mcs dipole antenna — the value of the capacitor has to be reduced. If however the crystal gets hot when operating with the telescopic antenna (due to excessive excitation) the value of the capacitor has to be increased.

The output circuit utilises a pi-network using a 6 μ H tank coil, a 150 pf air trimmer as the tuning capacitor and a 600 pf mica padder (with a 100 pf ceramic capacitor in parallel) as the loading capacitor. A NE48 neon bulb coupled to the pi-network by means of a twisted wire gimmick-capacitor, is used as the RF output and modulation indicator.

A 1-metre telescopic antenna, together with a 32 μ H loading coil in series, is also provided for short-range operation and for experimental purposes.

Choke modulation of the oscillator by a class-A modulator obviates the need for a modulation transformer and at the same time gives excellent audio quality. Contrary to



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popular notion, tests showed that, even with deep modulation to the extent of 75%, frequency modulation of the crystal oscillator is totally negligible. The output of the EL84 modulator is more than enough for fully modulating the carrier, but with choke modulation of an oscillator, the depth of modulation should be limited to about 75% in order to avoid distortion and frequency modulation. In this rig, however, this is no problem since the two stage modulator has just enough gain to give about 70% modulation with a high impedance dynamic microphone!

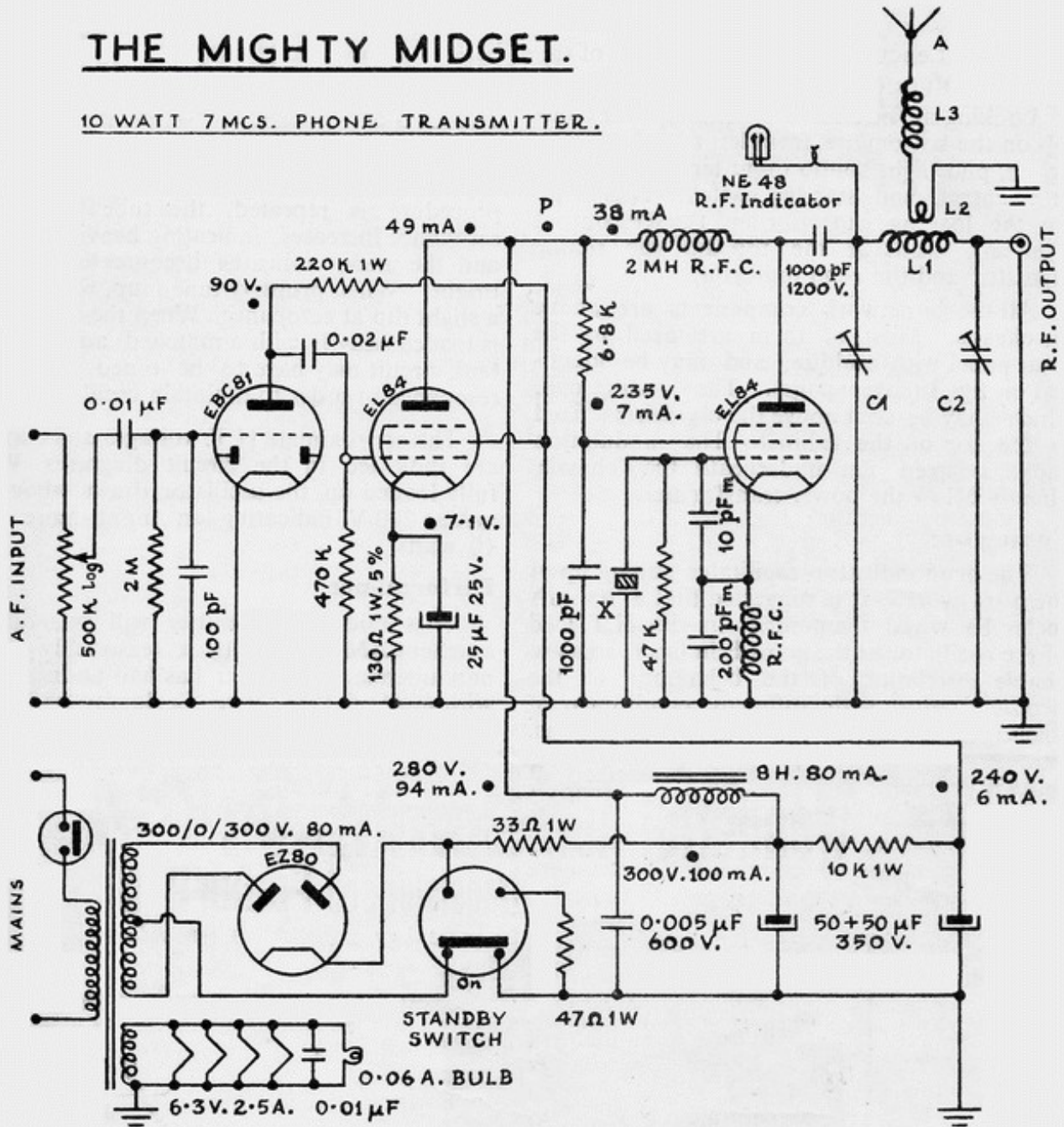
Construction:

The prime consideration in the construction has been miniaturisation. Handling 1/20 watt per cubic inch of space, the transmitter represents a very compact layout. The complete transmitter, including power supply, is built inside a 8" x 4½" x 5½" high rose wood cabinet, with a 7½" x 5" aluminium panel (fig. 2 on cover page). The cabinet has a hinged rear door which has a rectangular window covered with a perforated aluminium sheet. The bottom of the cabinet is open so as to provide easy access to the wiring. A number of ¼" diameter holes are drilled in the top and right sides of the cabinet so as to ensure good ventilation (these holes were drilled after the photographs were taken).

The 'chassis' is merely a 1/16 in. aluminium sheet firmly fixed to the sides of the cabinet. The height available over the chassis is 3¼ in.,

THE MIGHTY MIDGET.

10 WATT 7 MCS. PHONE TRANSMITTER.



LEGEND.

- A : 1 METRE TELESCOPIC ANTENNA.
- X : 7 MCS. CRYSTAL.
- L1 : 6 μ H. 22 TURNS 22 # CLOSEWOUND ON $\frac{3}{4}$ " DIA. COIL-FORM.
- L2 : 3 TURNS HOOK-UP WIRE LINK ON L1.
- L3 : 32 μ H LOADING COIL. 72 TURNS 28 # ON $\frac{5}{8}$ " D. FORM.
- C1 : TUNING. 150 pF AIR-TRIMMER.
- C2 : LOADING. 600 pF MICA PADDER.

FIG. 1.

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which is just enough to clear the height of the power transformer!

Looking at the front view (fig. 2), the controls on the bottom are, from left to right: mains switch, pilot light, audio input terminals, audio gain control, and standby switch. Higher up are the loading capacitor and the RF output terminals, while at the top are the tuning capacitor and the neon indicator.

All the pi-network components are above the chassis. Most of them are fixed to the front panel with araldite, and may be identified in fig. 3 (cover page). The loading coil, which may be seen above the crystal, is fixed to the top of the cabinet. The modulation choke is fixed flat underneath the chassis, directly below the power transformer.

Tuning up:

The neon indicator facilitates tuning up of the pi-network. It is suggested that a 100 mA meter be wired temporarily in the H.T. lead of the oscillator at the point P in fig. 1, so as to enable correlation of the behaviour of the neon indicator with different conditions of loading and with different types of antennas.

First the loading capacitor is kept at the maximum capacitance and the tuning capacitor quickly adjusted for resonance, as indicated by a sharp dip in the meter. The loading capacitance is then reduced a little and the tuning capacitor again adjusted for a dip. As this procedure is repeated, the tube current at resonance increases, indicating heavier loading, and the neon indicator becomes less and less bright. When properly tuned up, there is only a slight dip at resonance. When the transmitter is loaded heavily with a matched antenna, the tank circuit may have to be tuned slightly off resonance in order to maintain oscillation.

The approximate H.T. voltages and currents are indicated in the circuit diagram. When fully loaded up, the oscillator draws about 38 mA at 280 V, indicating an input more than 10 watts.

Performance :

This midget transmitter will put out an excellent AM signal with a reasonably good 7 mcs antenna. The writer has had phone QSO's with most of the active Ceylonese and South Indian amateur stations, using this small rig.

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