

Table Top Transmitter

A compact 35 watt COPA
constructed and described by

Gene Yap

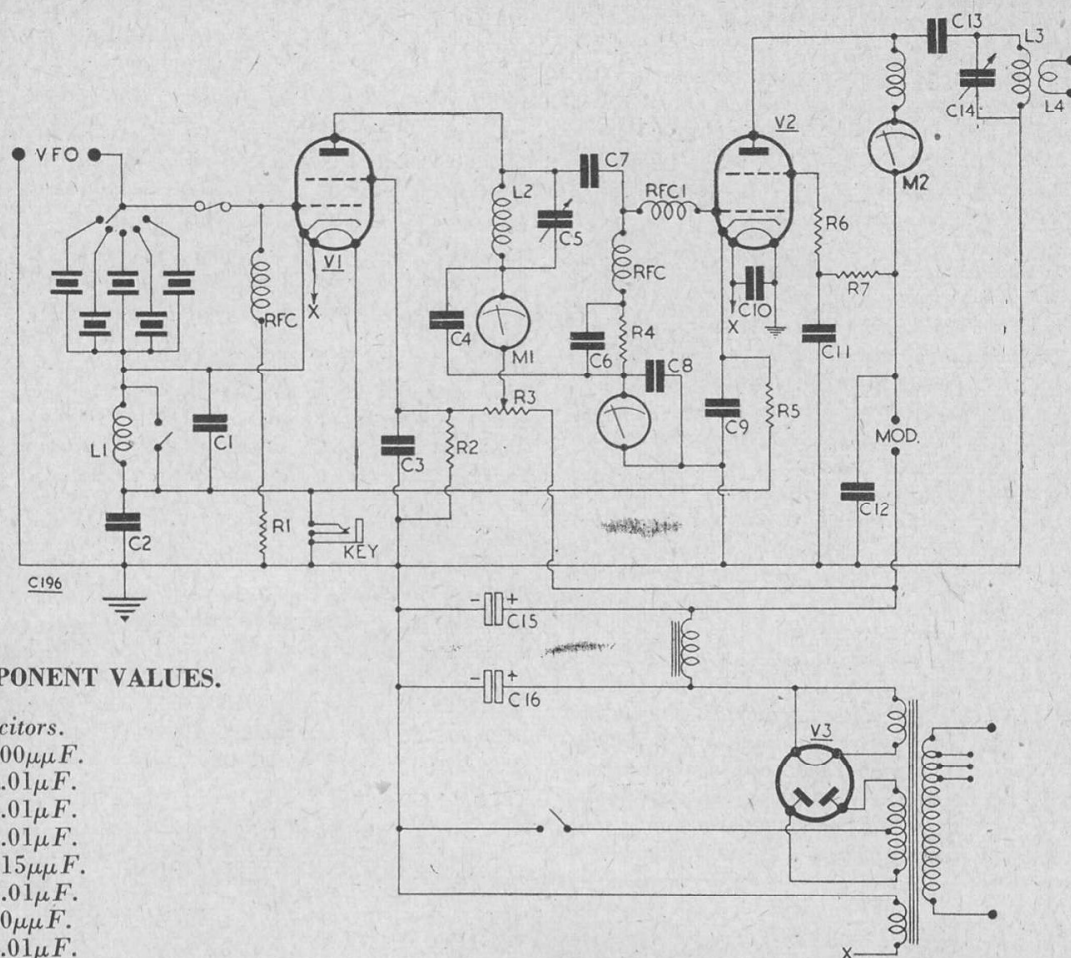
THIS self-contained CO-PA for AC mains operation has proved itself both as a very efficient 25—35 watt transmitter and as an exciter for a high powered RF stage which it is hoped to have an opportunity to describe at a later date. As will be seen in the photographs it is housed in a completely enclosed cabinet with ample ventilation and a hinged lid for easy band changing. A crystal selector switch is fitted to enable rapid change to various spots in the band or for switching in a VFO when required. This switching, of course, may be omitted and the crystal socket mounted on the front of the panel for quick change.

The simplicity in both construction and operation, no neutralising being necessary, makes it an eminently suitable design for the newly licenced amateur for whom it may well serve as an exciter for a more ambitious rig later or as a permanent stand-by. A stand-by transmitter is an essential piece of equipment in every Shack, helping as it does to avoid the temptation to rush a job when re-building in order to get back on the air quickly.

The circuit, a conventional and popular 6V6 crystal oscillator and 807 power amplifier, is quite straightforward and some amateurs will no doubt prefer to build it in a form which lends itself readily to the more general rack and panel construction. The writer prefers the growing tendency to use separate cabinets as this system makes for easy re-arrangement for changing to QRP, medium or QRO working, avoids straggling connections from separate power supplies and provides better screening. In any case rack and panel formation can easily be simulated by merely stacking the cabinets one upon the other.

Metering.

Permanent metering is fitted to both CO and PA tanks but economy can be effected by using one meter provided either with switching or by metering jack with suitable shunts. As an additional refinement a separate meter can be added to read the grid current to the 807, or as in the original the CO anode meter can serve this dual purpose. Separate meters are shown in the circuit diagram.



COMPONENT VALUES.

Capacitors.

C1, 100 μ F.
C2, 0.01 μ F.
C3, 0.01 μ F.
C4, 0.01 μ F.
C5, 115 μ F.
C6, 0.01 μ F.
C7, 40 μ F.
C8, 0.01 μ F.
C9, 0.01 μ F.
C10, 0.005 μ F.
C11, 0.01 μ F.
C12, 0.002 μ F.
C13, 0.001 μ F.
C14, 115 μ F.
C15, 16.0 μ F.
C16, 8.0 μ F.
Fuse 60mA bulb.

Meters.

M1 50mA
M2 150mA
Grid current meter 15mA

Resistors.

R1, 47,000 Ω (2)
R2, 15,000 Ω (15).
R3, 7,500 Ω (25).

R4, 27,000 Ω (1).

R5, 250 Ω (5).

R6, 100 Ω (1).

R7, 50,000 Ω (10).

N.B.—Figures in brackets following resistor values represent wattage ratings.

Inductors.

L1, L2, L3: Tuning Coils (See chart on page 443).
RFC Short wave chokes.
RFC1 see text.

L4 Link.

Values.

V1, 6V6

V1, 807

V1, 5U4

One side of V1 heater should be taken to earth and not to other side of key as shown in circuit diagram.

The 6V6 is used either as a tritet (for doubling or quadrupling the crystal fundamental), or as a simple CO by shorting out the cathode coil by means of a switch. In the original model this switch is inside the cabinet as in any case the lid has to be opened for coil changing, etc., and it certainly precludes wrong or thoughtless use which might have fatal consequences for the crystal. The oscillator tank must on no account be tuned through the crystal fundamental without this switch being closed; even although it has the protection of a fuse.

With the oscillator used as a tritet and multiplying in the anode circuit, several possible outputs are available with the minimum number of crystals, but a reduction of efficiency will result if the 807 is used as a doubler rather than as a simple power amplifier. Operation is easily possible in the 28 Mcs band from 7 Mcs crystals

if the 807 is used as a power doubler but much higher efficiencies are obtained by quadrupling in the CO. Alternatively the experienced amateur might use a 6L6 in place of the 807 for multiplying, followed by the 807 as the PA. In this case only normal receiving type components need be used with reduced HT (as in the oscillator stage) with link coupling to the new PA where the heavier duty components would be transferred.

Coils.

Suitable coil sizes are to be found in the table and it is to be noted that the cathode and CO tank coils are each on standard 1 $\frac{1}{4}$ " ribbed plug in formers. The PA tank coils are self supporting 2" diameter plated copper tube for 10, 20 and 40 meters. The 80 and 160 meter tank coils are wound on 2" formers, ribbed for preference but plain paxolin may be used. The wiring throughout

should be kept as short and direct as possible particularly in the grid and crystal circuits.

The crystal selector switch and crystal holders must be mounted as close as possible to the CO valve holder in order to keep shunt capacitances at a minimum especially with harmonic cut crystals intended for operating on the higher frequencies.

Power.

The mains transformer should be capable of delivering an output of 500 volts at 200 mA and at this figure will comfortably run to 35 watts if needed. The bias is obtained by a combination of grid leak and cathode resistor and no biasing battery is needed; thus retaining the compact form which was the writer's original intention.

It will be seen that the 807 is screened by a can and is horizontally mounted—horizontal mounting is not detrimental to this valve. If for layout considerations vertical mounting is preferred, screening may be achieved by mounting "through" the chassis or more simply by using a can as in the original.

Both the capacitors C5 and C14 are of 115 μ F and C5 must be fully insulated from the chassis. C14 can well be of the normal good quality receiving type. The .001 μ fd. capacitor isolating the HT from the final tank coil and the 807 screen by-pass capacitor should be of 1,000 volts working type. The components throughout are all of standard design except the air spaced RF

choke in the grid of the 807, (RFC1). This consists of ten turns of 20 enamelled swg. wire formed round any suitable cylinder to give a finished size of $\frac{5}{16}$ " diameter.

The slider on the 7,500 Ω resistor in the oscillator circuit should be adjusted to give a voltage of 250 on the anode—the screen voltage will be rather less than half that figure.

Keying.

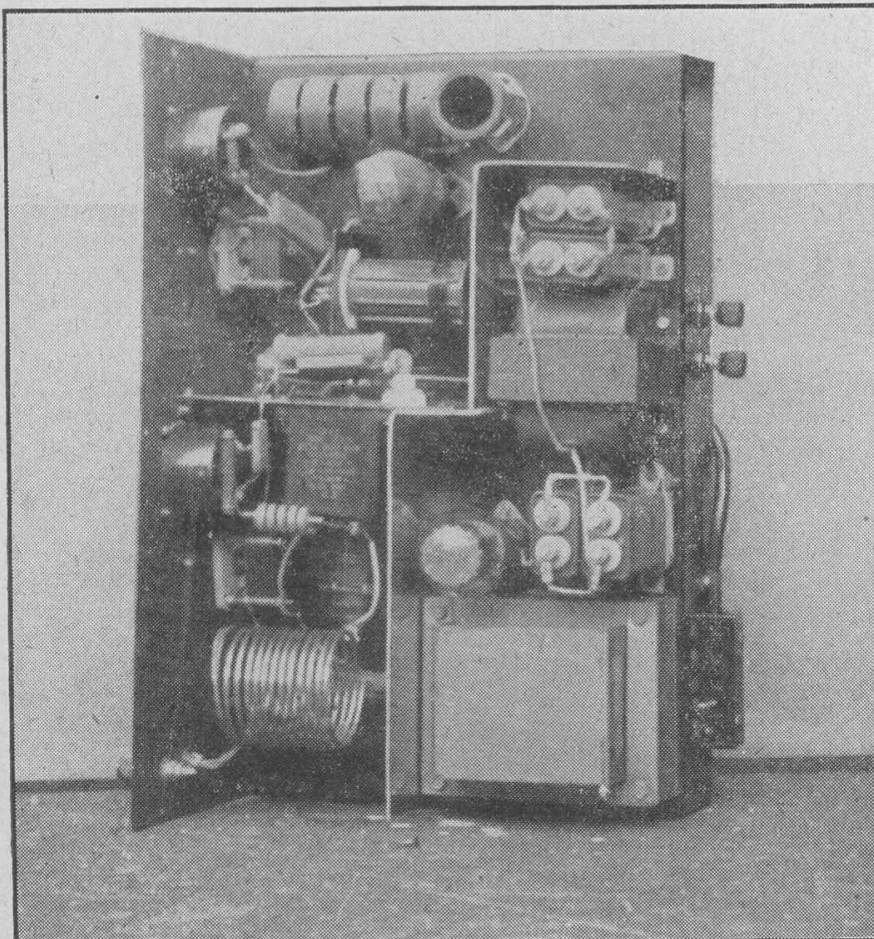
It will be noted that keying is effect in the common cathode return of both stages and with reasonably short leads there should be no trace of key clicks but if the constructor wishes any conventional click filter may be fitted. A filter may alternatively be fitted to the key itself. The key plug is of the self closing type to obviate further switching or shorting, when phone is used.

Modulation.

Terminals are provided at the rear of the chassis to provide for normal anode and screen modulation and any good audio equipment capable of giving up to 15 watts will be satisfactory for 100% modulation. The terminals can be shorted by a metal strip when the transmitter is used for CW operation, although this will not be necessary if the unit is used with the modulation transformer connected.

Operation.

The switch in the HT negative lead is used for



Top view of the transmitter showing the lay-out of the principal components. Care should be taken to ensure adequate screening between stages, as shown in the photograph. The power supply may be seen in the rear compartment, with the CO stage in the left-hand part (top in the photograph), and the PO stage in the right-hand compartment.

transmit/receive purposes, leaving as it does the valve heaters warmed ready for action the whole time. After switching on the mains a full half minute should be allowed before the HT circuit is made. It is essential to always make certain that the proper crystal and coils are in circuit and until one has become familiar with the capacitor settings both should be set to minimum capacity before switching on. If to be used for c.w. the "Modulation" terminals should be shorted (or connected through the modulation transformer secondary).

Make certain that you are operating on the fundamental (or the correct harmonic of the crystal) for the band intended. An absorption wavemeter is the simplest method of achieving this.

The oscillator is brought to resonance as

indicated by the dip in its associated meter and the appearance of a reading the PA grid current meter. The PA is then tuned for maximum output and any further adjustment of the CO stage that may be necessary. The crystal circuit should never be tuned to maximum output unless under load, i.e., the PA is correctly tuned. The RF voltage developed across the crystal (and the heat) is reduced when delivering power.

The 807's maximum grid current is 5 mA but a current of only 3 mA is ample for loading up to 25 watts.

The adjustable coupling coil, L4, is, of course, coupled to the "cold" end of the PA tank coil. It can well consist of 16 gauge systoflex covered wire. For newcomers to the transmitting side a half-wave dipole aerial is generally both the simplest and most certain of giving good results.

Coil Data

Freq.	Cathode Coil (L1)	Oscillator Tank Coil. (L2)	P.A. Tank Coil. (L3).
In Mcs.	Number of Turns.		
1.7	32	60	48
3.5	12	30	24
7	7	15	12
14	—	8	6
28	—	4	4

All cathode and Oscillator Coils and 1.7 and 3.5 P.A. coils wound 22 SWG enamelled.

PA coils for 7, 14, and 28 Mcs. are spaced 12 gauge plated copper tube.

"Facts about Philips"

This is the title of a new booklet produced by Philips Electrical Ltd., the purpose of which is to draw attention to the great variety of products manufactured by Philips.

This attractive little publication is bright in appearance and style, and is extremely readable. Profusely illustrated, and including photographs of the larger factories, "Facts about Philips" describes briefly the whole varied range of Philips products which includes radio, television, lamps, high frequency generators, industrial diamond dies, welding machines, medical equipment, etc.

"Facts about Philips" will serve as a general reminder that Philips activities extend over a much wider field than is usually realized by consumers of specific products.

Catalogues Received

Clydesdale: List Number 5 of ex-Government electronic and radio equipment is now available. This 48-page catalogue contains details of numerous receivers, oscillators, amplifiers, and other items of interest to radio enthusiasts. The list may be obtained on application to Clydesdale Supply Co., 2, Bridge Street, Glasgow, C.5.

Laskys Radio: A duplicated Bulletin of surplus gear is obtainable from Laskys Radio, 370, Harrow Road, Paddington, London, W.9.

Duke & Co. A comprehensive list of valves, equipment and miscellaneous components, including television EHT transformers, is contained in the list mailed by this firm. Copies may be obtained from Duke & Co., 219, Ilford Lane, Ilford, Essex.

NEW Denco TECHNICAL BULLETIN.

DTB3 has just been issued. It deals with Coil Turrets and is priced at 3/-. A review of this publication will appear in the next issue.