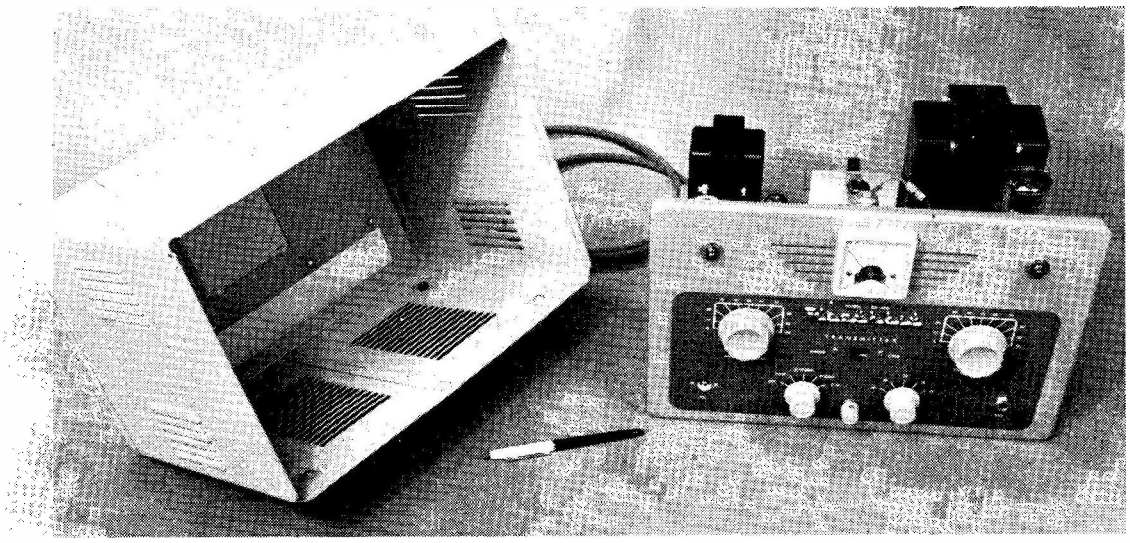


General appearance of the Heathkit DX-40U five-band transmitter before installation in its matching cabinet, with a size comparison. It runs 75 watts input on CW, and the controlled-carrier system of modulation drives the PA to 60 watts on phone. The kit of parts supplied is complete to produce the transmitter as illustrated.

HEATHKIT DX-40U

COMPACT, EASY-TO-BUILD CW/PHONE TRANSMITTER

THE Heathkit range of equipment — conceived and born in the U.S.A.— is becoming well known in this country. Here we illustrate the DX-40U, an attractive proposition for the medium-power operator, as a stand-by or second transmitter for the fully-equipped station, or for the beginner who wants something from the book which he is sure will work.

Rated at 75w. input for CW operation on the five bands 80-10 metres, and at 60w. for phone working, the DX-40U is self-powered, and the general design, circuitry, parts supplied and finished appearance are essentially modern and up-to-date. With the kit as provided—complete to the last detail—operation can be on crystal-control only, but there is an additional socket on the rear chassis drop for drive from a suitable external VFO tuning the 3·5 mc band, for which HT/LT can be taken from the accessory-socket, also on the back. Crystals in the range 3·5 or 7 mc may be used, depending on the output frequency required.

Though the PA stage can be matched into a wide range of impedances, for best results the RF output should be taken through a low-impedance (50-300 ohm) feed line, either direct to a current-fed aerial system or to an external ATU. For a beginner, an ideal arrangement would be a doublet cut for 7,050 kc, the feeder line being 75-ohm coax directly coupled from the transmitter into the aerial, no aerial tuning unit then being required—as this system would also give 3rd harmonic operation, the 21 mc band could be covered without any change in the aerial or its feeder layout being necessary. For more sophisticated (but not necessarily more efficient) aerial systems, an external aerial tuning unit should be used for

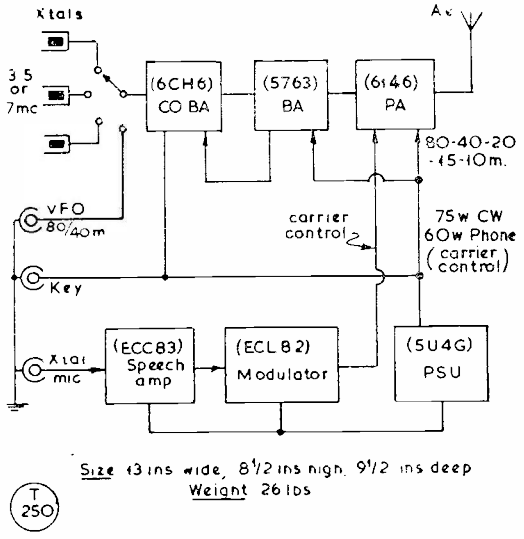


Fig. 1. Block schematic of the DX-40U CW/Phone Transmitter described and illustrated in the accompanying article.

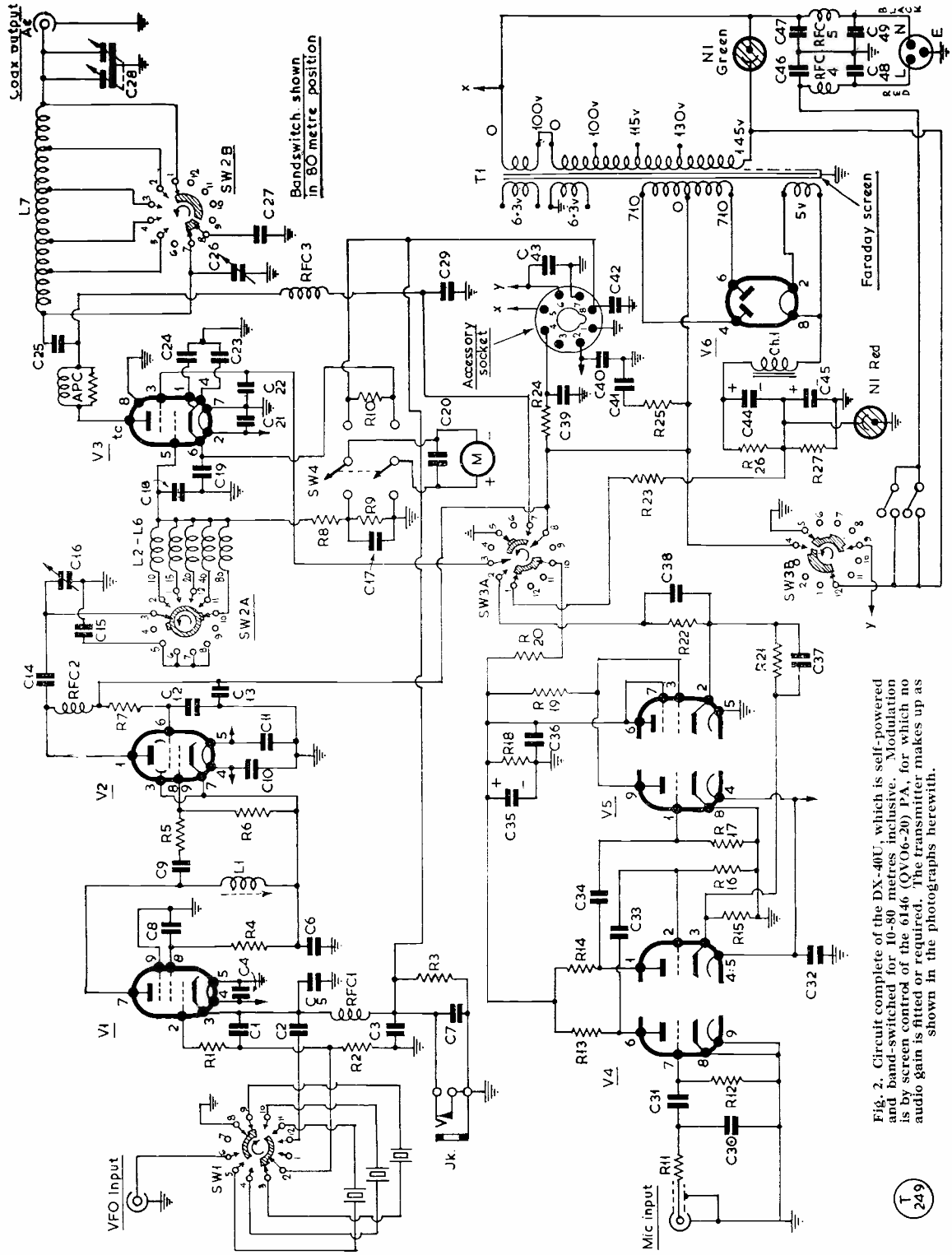


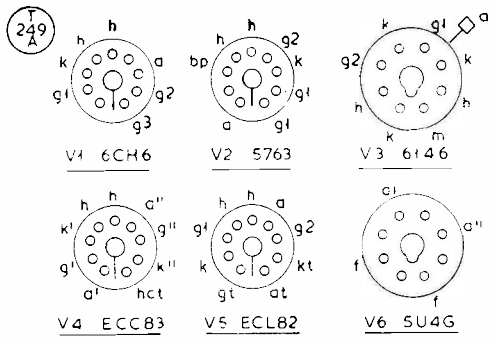
Fig. 2. Circuit complete of the DX-40U, which is self-powered and band-switched for 10-80 metres inclusive. Modulation is by screen control of the 6146 (QVO6-20) PA, for which no audio gain is fitted or required. The transmitter makes up as shown in the photographs herewith.

(T 249)

Table of Values

Fig. 2. Circuit of the Heathkit DX-40U

C1	= 22 $\mu\mu$F	C28 = 446...446 $\mu\mu$F, var.	R20, R24, R26, R27 = 20,000 ohms, 10-w.
C2, C4, C6, C7, C8, C10, C11, C17, C19, C20, C21, C23, C24, C40, C42, C43, C46, C47, C48, C49	= .002 μF	C30, C37 = 100 $\mu\mu$F	R22 = 12,000 ohms, 2-w.
		C33 = 500 $\mu\mu$F	R23 = 6,800 ohms, 2-w.
		C35 = 20 μF, 450v., elect.	R25 = 1,000 ohms
		C38 = 2 μF	L1 = 20-metre coil
		C41 = .005 μF	L2 = 10-metre coil
		C44, C45 = 40 μF, 450v., elect.	L3 = 15-metre coil
		R1, R5 = 47 ohms	L4 = 20-metre coil
		R2, R6 = 100,000 ohms	L5 = 40-metre coil
		R3 = 47,000 ohms	L6 = 80-metre coil
		R4, R7, R8 = 27,000 ohms, 1-w.	L7 = Tapped PA coil assembly
C3, C32	= .01 μF	R9 = 20 ohms	APC = APC (anti-parasitic choke)
C5	= 220 $\mu\mu$F	R10 = 0.67 ohm	RFC1, RFC2 = 1.1 mH
C9, C18	= 47 $\mu\mu$F	R11 = 4,700 ohms	
C12, C13, C29, C36, C39	= .002 μF, 1,000v.	R12 = 2.2 megohms	RFC3 = 2.5 mH
C14, C22, C31, C34	= .001 μF, 1,000v.	R13, R14, R21 = 470,000 ohms	V1 = 6CH6
C15	= 27 $\mu\mu$F		V2 = 5763
C16	= 20 $\mu\mu$F	R15 = 2,700 ohms	V3 = 6146
C25	= .001 μF, 1,500v.	R16, R19 = 1 megohm	V4 = ECC83
C26	= 140 $\mu\mu$F, var.	R17 = 10 megohms	V5 = ECL82
C27	= 68 $\mu\mu$F, 3,500v.	R18 = 50,000 ohms, 10-w.	V6 = 5U4G



Base connections for the valves used in the DX-40U.

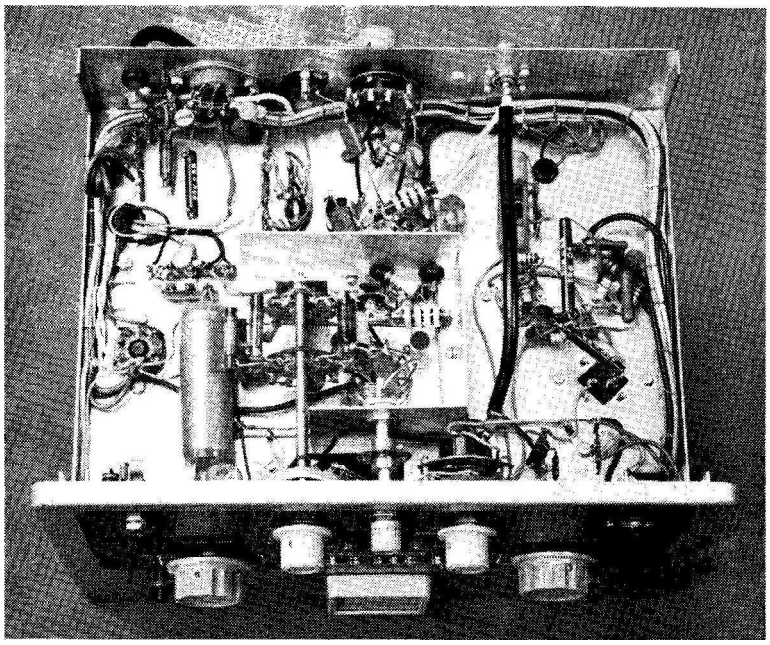
proper matching and loading.

Performance and Results

A single meter is switched to read either PA grid or plate current, and there are miniature neon indicators for " power on " and " transmit." The controls are smooth and positive, and the operating switch gives off, tune, stand-by, phone and CW positions.

Results with the model as illustrated here have been very satisfactory both on CW and (within its limitations) on telephony. The keyed note is clean and sharp, and the CO will go off with certainty with any crystal capable of oscillation in either the 3·5 or 7 mc bands. The CW output using VFO is, of course, dependent on the stability and quality of note given by the VFO itself — there is a Heathkit unit, the VF-1, which will match this transmitter, but for our tests a "modified TU7B " type of external VFO, much attenuated, was used.

For phone working, the system of modulation is a form of PA screen grid control—called controlled carrier—which, from a low " resting " (or non-modulated) level of carrier output, produces modulated DC on the screen of the 6146, so that the carrier varies upwards to the maximum for full CW output. This system is self-adjusting, in that over-modulation is not possible, and since the speech amplifier circuit values ensure full gain from any standard type of crystal microphone, no audio

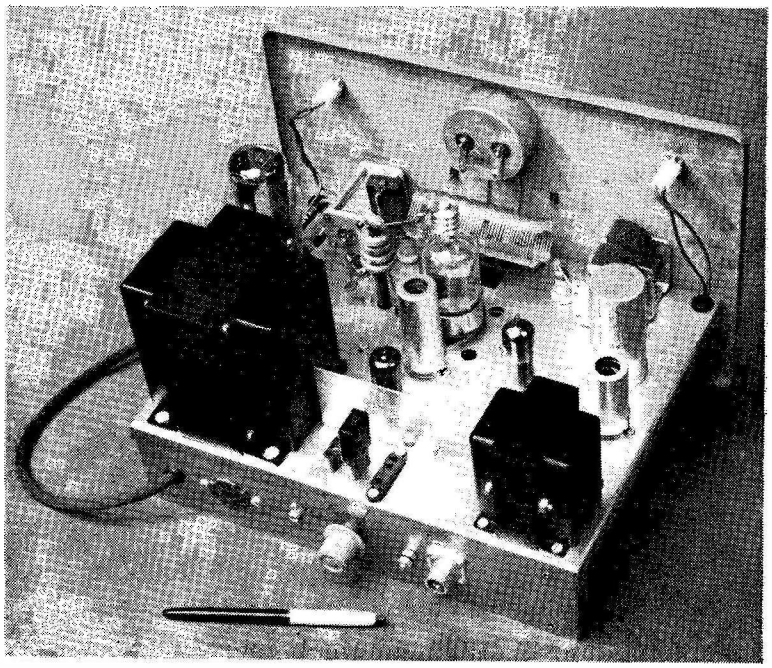


Layout and wiring below chassis for the DX-40U, as built to the instructions and with the parts supplied. The exciter/PA section is in the central screened compartment, with the CO stage immediately behind.

gain control is fitted — nor, indeed, is it necessary.

While the telephony output is very good, the transmission cannot "sound as loud" as a conventional amplitude-modulated signal of comparable power rating; within limits, the stronger the speech input to the microphone the deeper the modulation (though this is not an exact measure of modulation control!), while from the point of view of the receiving operator, the carrier seems to disappear during pauses in transmission, or when the speech is low-toned. However, the fact is that as a system of efficiency modulation, the DX-40U arrangement works very well and gives entirely satisfactory results within its limitations.

Full RF output can easily be obtained on all bands, and there is ample drive available for the PA on 10 metres using a 7 mc crystal or 3·5 mc VFO. Though the power transformer is generously rated, it tends to run rather warm during sustained operating sessions. However, after a two-hour "soak test" at an adjusted input of 75 watts on 10 metres, which was found to give 52 watts into a calibrated RF load, there were no signs of stress anywhere.



Inside the DX-40U Transmitter, showing general layout above chassis, which is punched ready for the acceptance of all parts. The power supply section is on the left, with the smoothing choke at lower right. The PA is a 6146 (Mullard QVO6-20) and its tank assembly can be seen immediately beneath the meter, between the tuning condensers. The switch on the rear chassis drop (foreground) is for VFO-crystal selection, with the aerial socket to the right and the accessory connector at left.

Some General Comments

The time taken to build the DX-40U Transmitter as shown here, from the kit of parts supplied by Daystrom, Ltd., was 14 working hours. Tools used were a soldering iron, BA box spanners, screwdriver, long-nose pliers, side cutters and a wire stripper.

With the DX-40U kit comes a manual which is one of the best of its kind we have yet seen. It is an outstanding example of clear, patient and meticulously accurate explanation on the "do-it-yourself" theme. Well printed and illustrated, covering every detail and containing much incidental information—such as hints on soldering and notes on suitable aerial systems—the DX-40U Manual also gives complete fault-finding and maintenance procedures. As a technical handbook, it is a model of what such manuals should be.

T. E. GOLDUP, C.B.E., M.I.E.E.

It is with great regret that we have to record the sudden death of Thomas Edward Goldup, aged 65, a member of the board of Mullard Ltd. Educated at the R.N.C., Greenwich, he served in the Royal Navy as a signals officer during the First War and then became senior experimental officer at the Signal School, Portsmouth, in the early days of valve development. This led him to the Mullard valve factory, and in 1928 he started the well-known Mullard technical service department, which made him widely known throughout the industry. By 1938, he had become a director of a Mullard subsidiary and by 1951 was on the board of the parent company.

Having been in on radio development in the pioneering days, and being of an experimental turn of mind himself, Thomas Goldup had a great respect for the amateur contribution to radio research and discovery. However, he also recognised the importance of sound basic training for those aspiring to make a career in radionics, and so was much interested in technical education. He made a very considerable impact on the College of Electronics at Malvern, of which he was chairman, and his interest in its affairs was always practical. Made C.B.E. in 1954, he became President of the Institution of Electrical Engineers for the 1957-58 session.