

remainder of the receiver is operative. There are separate a.g.c. and b.f.o. switches; the former also cuts in the S meter when thrown to the "on" position. The S meter is one arm of a d.c. bridge in the plate circuit of the last i.f. stage.

We are unable to comment on any aspect of assembling the kit, as the set was received completely wired. The preassembled r.f. section should save considerable time. So should the wiring harness which is part of the kit. The under-chassis space is not crowded, so assembly and wiring here should offer few mechanical problems. On a "general principles" guess, the only point that might tax the constructor would be the ever-cantankerous dial cord.

The assembly instructions appear to be done

with the usual Heathkit thoroughness, but the book is a little on the sketchy side in explaining the circuit features and in operating instructions.

— G. G.

Heathkit HR-10 Receiver

Height: 6½ inches.

Width: 13¾ inches.

Depth: 11½ inches.

Weight: 18 pounds.

Power requirements: 117 volts, 50/60 cycles, 50 watts.

Price class: \$80.

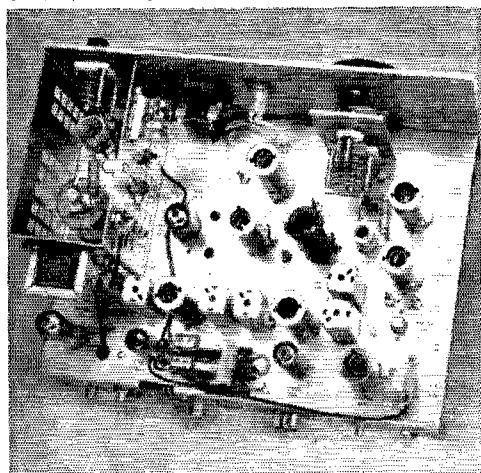
Manufacturer: Heath Company, Benton Harbor, Mich.

The Clegg "Thor" 50-Mc. Transceiver

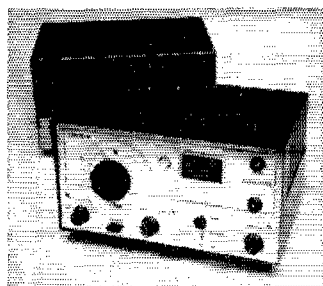
LIKE its Greek deity predecessor,¹ the Clegg Laboratories Thor is packed with novel but practical ideas. Obviously it was designed with the special needs of the v.h.f. operator in mind, and it has a number of features that have not been available to the purchaser of v.h.f. gear heretofore.

The Thor is the first v.h.f. transceiver wherein the transmitter frequency can be made to follow the receiving frequency automatically, for example. Separate-frequency operation is also possible. By use of a variable oscillator common to both

¹ Recent Equipment: The Clegg Zeus V.H.F. Transmitter, QST, Sept. 1961, p. 55.



Interior of the Thor r.f. unit. The transmitter final amplifier assembly is at the left, v.f.o. tuning at the right.



transmitting and receiving, and eliminating frequency multiplication with v.f.o. control, highly stable signals are produced, coming and going. Transmitter output is over 40 watts, a.m. or c.w. The receiver does an excellent job on all modes, including s.s.b.

How It Works

In receiving, the signal is first amplified in a 6CW4 stage, V_1 . This r.f. amplifier has three tuned circuits, adjusted for essentially flat response across the desired range, 50 to 52 Mc., with good attenuation of signals above and below. A tunable oscillator and cathode follower, V_6 , covers 39.3 to 41.3 Mc., its output beating with the signal in the first mixer, V_2 , a 6EH7, to give output at 10.7 Mc. The tunable oscillator is also used as the v.f.o. in transmitting.

The mixer plate circuit has a 10.7-Mc. crystal-lattice filter, for selectivity where it does the most good: up near the front end of the receiver.

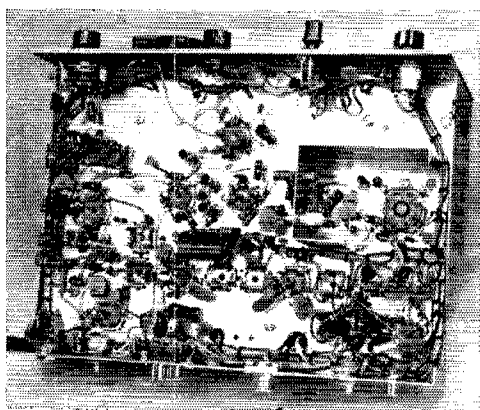
A triode-pentode 6B18, V_3 , combines the functions of second mixer and crystal oscillator, the latter on 11.156 Mc. Mixer output is on 455 kc. Two transformers designed for the flat-topped steep-sided response desirable in v.h.f. work are used between the second mixer and a 455-ke. amplifier, V_4 , another 6EH7. A 6AL5, V_{14} , and two audio stages in a 6BMS, V_5 , complete the receiving lineup.

Receiver selectivity quoted by the manufacturer is 5 kc. at 6 db. down and 12 kc. at 50 db. down. This is not razor-sharp, as c.w. or even sideband operators think of selectivity, but it chops off signals in the 50-Mc. band in a way that will be a revelation to hams accustomed to

the response of the usual v.h.f. transceiver. More important, the selectivity "up front" helps markedly to cut down blocking and cross-modulation by strong signals close to the fellow you're trying to hear, and interference from out-of-band signals is below levels normally encountered in 50-Mc. receivers and converters.

In transmitting, output from the tunable oscillator V_{6A} , is fed to a 12BA7, V_8 , which serves as either a mixer or doubler. The 39.3-Mc. energy is mixed with the output of a 10.7-Mc. crystal oscillator, a 6U8 triode, V_{7A} , to give a 50-Mc. signal. V_{7A} is also the b.f.o. for receiving c.w. and s.s.b. signals. For crystal control, the 6U8 pentode section, V_{7B} , works with either 8- or 12-Mc. crystals, doubling to 25 Mc. in its plate circuit. We run into the limitations of block-diagram presentation in showing how this is done, but the crystal-controlled excitation is fed to a different grid of the 12BA7, and the stage then operates as a doubler to 50 Mc.

Next comes a novelty in transmitting circuitry, a 6DJ8 cascode amplifier, V_9 . This type of circuit is well-known to v.h.f. men as a receiving amplifier, but it has virtues in this transmitter application also. It is stable, requiring no neutralization, and broad enough so that it need not be gang-tuned to the other transmitting circuits. The 6DJ8 builds up the output sufficiently to



Bottom of the 50-Mc. transceiver. Clean, open layout, even in a small-sized assembly, is made possible by putting only the r.f. and control circuits in the package that will be at the operating position.

drive a 7558 50-Mc. amplifier, V_{10} , which drives the final 6883 (12-volt version of the 6146), V_{11} . Output with the unit tested is approximately 45 watts. The transmitter output circuit is a pi network.

Layout

Like the Zeus, the Thor is a two-package

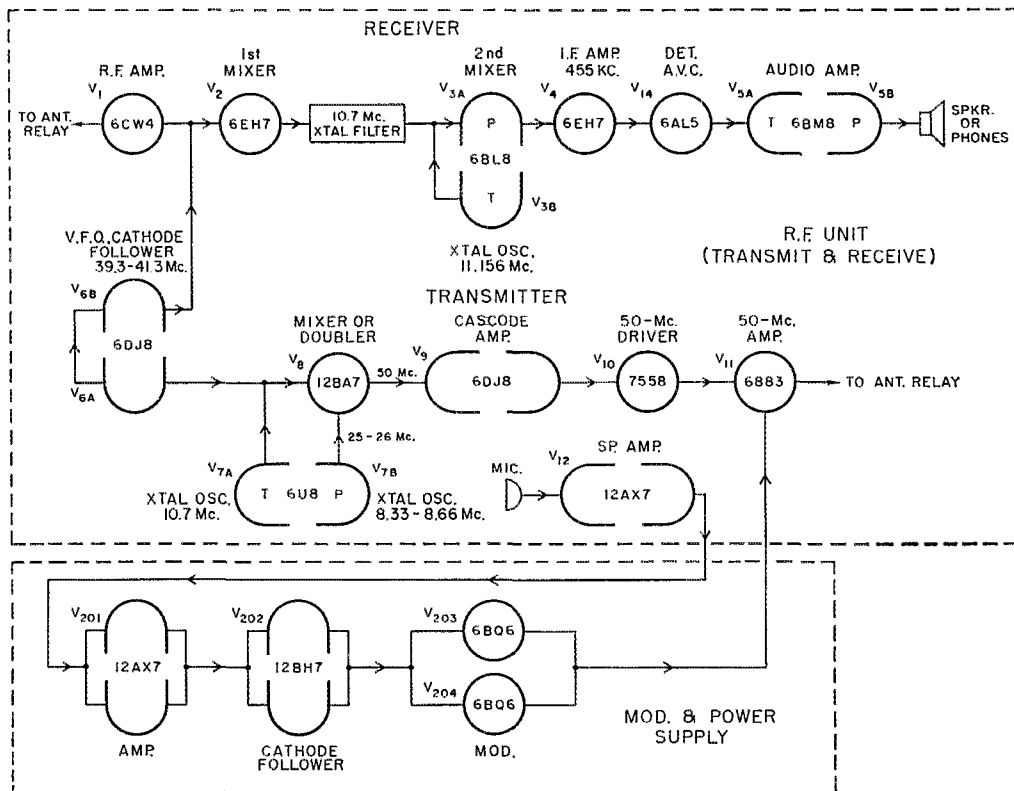
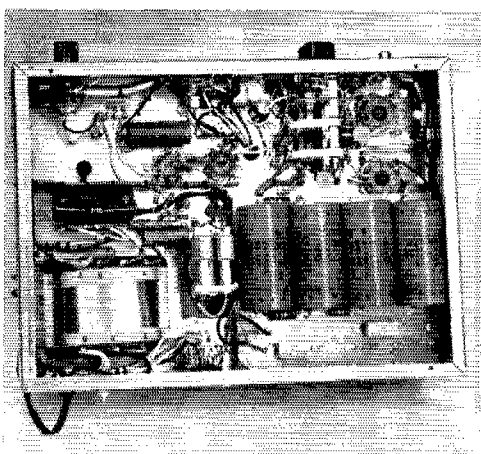


Fig. 1—Block diagram of the Clegg Thor 50-Mc. Transceiver. A single tunable oscillator is used for both transmitter frequency control and receiver tuning. A crystal oscillator is also provided for operating on frequencies other than that of the station being received.



Bottom of the Thor power supply and modulator. The power supply uses four small diode rectifiers, two of which are just visible in the lower right corner of the picture.

Electrostatically shielded power transformer is at the lower left.

design. All portions of the equipment that require adjustment in normal use are in the r.f. package, a small lightweight assembly that takes up little room at the operating position. This includes the first speech amplifier, V_{12} . A larger and heavier assembly, shown at the bottom of our block diagram, contains the power supply and speech stages, V_{201} , V_{202} , V_{203} , and V_{204} . The modulator stage uses two 6BQ6s in push-pull. Speech clipping and filtering give this audio system the characteristic Clegg punch.

The power supply is tubeless, using four small diodes. The power transformer is electrostatically shielded. A separate power supply for 12-volt d.c. input is available, for those who would like a real "power-house" 50-Mc. mobile installation. The cable for interconnecting the a.c. supply and the r.f. unit is 10 feet long, permitting installation in a variety of ways. No external send-receive relay is needed, since this function is built into the Thor.

Operation

The tuning range of the Thor is limited to 50 to 52 Mc. This recognizes the practical fact that nearly all use of the band is in the lower portion. With the selectivity of the Thor receiver, you wouldn't want to tune more with one sweep of a vernier dial. The planetary mechanism employed covers the calibrated part of the dial in slightly over $2\frac{1}{2}$ turns of the knob.

Operation higher in the band than 52 Mc. is possible with crystal control. With v.f.o. control, the transmitter frequency is always within a few

cycles of the receiving frequency. For transmitting on a separate frequency it is recommended that crystal control be used.

An interesting receiving feature is provided with the receiving mode switch. At the far left position reception is a.m. The next three positions to the right are for c.w. or sideband, with different levels of b.f.o. injection. This is necessary in obtaining the best reception of both c.w. and sideband signals of different strengths, as the b.f.o. level determines the gain through a.g.c. action and the a.g.c. cannot be turned off. C.w. signals that are really 'T9 have a beautiful clear quality with this receiver. Sideband sounds fine and is quite easily tuned in, considering the wide tuning range of the receiver. (Two megacycles is wide, when you have fairly high selectivity.) Stability is adequate for both these critical modes.

The heterodyning system of the Thor has two unwanted by-products: there is no beat-oscillator effect when using crystal control (because V_{7A} is turned off when crystal control is used) except within heterodyning range of your crystal frequency, and you cannot transmit conveniently with v.f.o. except on the frequency of the station you are working. There are ways around these limitations, but they are neither convenient nor very safe. The first is no great problem, as presumably most work with crystal control would be close to a band edge, and the station being worked would usually be there, too. The important point to keep in mind when using v.f.o. is to be sure that the station you call on voice is in the band — and that means above 50.1 Mc. for U.S. phone operation. (Remember those over-eager beavers who piled onto VP7CX on 50.05?) To call him legally with the Thor, you either *have* to use crystal control, or move the tuning dial back above 50.1 Mc. each time you transmit.

Looking at the front panel, the receiving mode switch is in the lower left corner. The crystal socket is directly below the tuning dial. Next is the v.f.o.-crystal switch. The main control switch is lever-operated, with the SEND position at the top, RECEIVE in the middle, and ANL at the bottom. The volume control and a.c. switch knob is at the bottom right corner. Above it are the amplifier tuning and loading controls. To their left is the S-meter, and a translucent white pilot light is between the meter and the tuning dial.

The rear apron of the r.f. unit carries the microphone jack, speech gain control, S-meter adjustment, antenna and power connectors, and phone and speaker jacks. The modulator front apron has the fuse receptacle, keying jack, phone-c.w. switch, and modulator-current meter jack.

— E. P. T.

Strays

An authentic Tibetan Prayer Wheel ritual defines "OM" as "a magic word in Hinduism which symbolizes much in little space and stands for infinity."

OK100 again reminds W/K amateurs to send QSLs and SWLs only via the Central Radio Club in Prague. It is against Czech regulations to QSL direct.