

Chances are that they would work at least 75 per cent of the stations they could raise with 100 watts or more.

For mountain-topping a dry-battery transceiver is a pure joy. Take along a portable beam such as the one described in January, 1966, *QST*, page 32. Drive as far as you can up your favorite mountain. Then get out and walk to the top, if there's no road, and get up to where signals are strong, the air is clear, and ignition noise is nil. QSOs over 100 miles and more are routine in such circumstances. If you haven't tried it, you're missing one of ham radio's greatest thrills. — *W1HDQ*

### Lafayette HA-650 Transceiver

Height: 5½ inches.

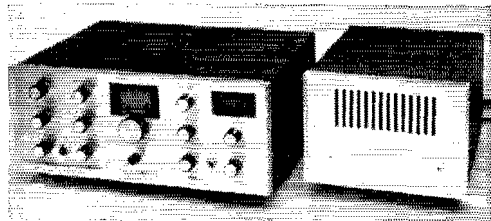
Width: 9½ inches.

Depth: 2¼ inches.

Power Requirements: 11.5 to 11.5 volts d.c., 400 ma. max. 117 volts a.c., with optional Model HB-501 power supply.

Price Class: \$120, with 10 "D" cells and cable for 12-volt service.

Manufacturer: Lafayette Radio Electronics, P.O. Box 10, Syosset, N. Y. 11791



### Eico 753 S.S.B. Transceiver

A NEW contender in the s.s.b. kit market, the Eico Model 753 S.S.B. Transceiver, transmits and receives a.m., c.w., and s.s.b. on three amateur bands. The transmitter p.e.p. input level is 200 watts on s.s.b. and c.w. On a.m., a p.e.p. input of up to 100 watts is available.

The transceiver operates on 80, 40 and 20 meters, transmitting and receiving upper sideband on 20 and lower sideband on 80 and 40. It is available either in kit form or as a factory-wired unit at the option of the consumer. Similarly, two power supplies — Model 752 for mobile operation, or the Model 751 for a.c. use — can be secured either in kit form or as prewired equipment.

#### About the Circuit

The original design of the 753 resulted in nearly 100 per cent use of vacuum tubes throughout. The only exception was the use of germanium diodes in the a.l.c. and a.g.c. circuits. Later, in an effort to improve the frequency stability, a solid-state v.f.o. was made available as a circuit-modification item to those who desired to update their transceivers. The new v.f.o. circuit board is prewired and can be installed in place of the vacuum-tube oscillator in less than an hour's time. The model discussed here is the one that has the revised v.f.o. circuitry.

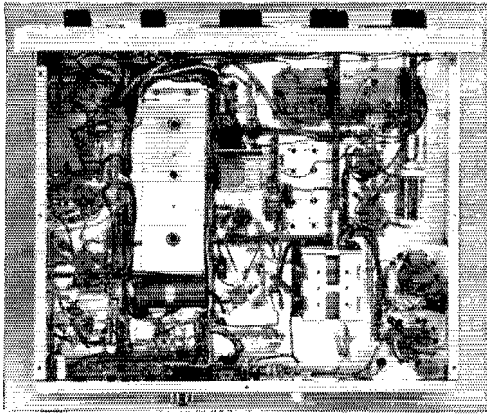
In the transmit mode, during s.s.b. operation, the microphone output voltage is amplified by  $V_{1A}$  and  $V_{1B}$  (see Fig. 1) and passed along to the 7360 balanced modulator stage,  $V_2$ . Amplified audio is also supplied to the VOX amplifier,  $V_{3A}$ , where it is stepped up in level and fed to the relay amplifier tube,  $V_{3B}$ , for use in voice-controlled operation. Push-to-talk can be used instead of VOX, if desired, by using the microphone switch to control the changeover relay directly. There is

a front-panel switch for selecting either method.

A 5.2-Mc. carrier generated by  $V_{4A}$  is combined with the amplified microphone voltage in  $V_2$ , the balanced modulator. The double-sideband suppressed-carrier signal from  $V_2$  is then fed through a 2.7-ke.-bandwidth crystal filter to a common i.f. amplifier,  $V_5$ . The crystal filter removes the unwanted sideband and contributes further to the carrier suppression. After amplification by  $V_5$ , the s.s.b. signal goes to  $V_{12}$ , the transmitting mixer, where it is heterodyned by the v.f.o. signal to produce the desired transmitter output frequency. After further amplification by driver stage  $V_{13}$ , the signal is fed to the parallel-connected 6DQ6Bs,  $V_{14}$  and  $V_{15}$ , in the final stage. This stage operates as a Class AB<sub>1</sub> amplifier.

For a.l.c., a little r.f. from the final-amplifier stage is rectified by a diode, and the resultant negative d.c. voltage is applied to the grid of i.f. amplifier  $V_5$ . As the input signal to the grids of the p.a. stage increases, the a.l.c. voltage becomes greater, lowering the output level of i.f. amplifier  $V_5$  and reducing the amount of drive to the p.a. grids. The a.l.c. action tends to prevent the p.a. stage from "flat-topping" during peak signal periods.

For c.w., the modulator is unbalanced and B-plus voltage is removed from the microphone amplifier stage,  $V_{1A}$ . These changes are made when the mode switch is placed in the c.w. position. When  $V_2$  is unbalanced, carrier is supplied to the transmitting mixer, which in turn permits the buffer stage,  $V_{13}$ , to produce output to drive the p.a. stage. The drive is adjusted by means of the exciter control, which tunes the mixer and buffer plates. Grid-block keying is employed at  $V_{12}$ , the transmitting-mixer. A grid bias of -50 volts cuts off  $V_{12}$  during the key-up period, but when the key is closed the blocking voltage is



Bottom view of the Eico 753 transceiver. The metal enclosure at the left center of the photo contains the prewired crystal-filter assembly. At the upper right the underside of the v.f.o. printed-circuit board is visible.

removed, enabling  $V_{12}$  to drive the buffer stage.

The circuit conditions for a.m. operation are similar to those for c.w. with the exception that the microphone amplifier,  $V_{1A}$ , is switched back into the circuit in the a.m. position of the mode switch. Carrier output on a.m. is on the order of 30 watts.

### Receiver Section

In receiving, the pi-section tank of the transmitter doubles in duty and serves as the antenna tuned circuit for  $V_{16}$ , the receiving r.f. amplifier. Similarly, the plate coils for  $V_{13}$ , the transmitter's buffer amplifier, are used in the tuned circuits

for the plate of  $V_{16}$ , the receiving r.f. amplifier. When the transmitter is adjusted for operation at a given frequency, the receiver is automatically tuned for peak response at the same frequency because of the common tank circuits. Conversely, if the receiver is tuned for peak sensitivity by adjusting the transmitter's exciter and p.a. tank controls, the transmitter tuning will require only slight touching up when moving from one part of the band to another.

The solid-state v.f.o. controls both the receiver and transmitter frequency and stabilizes after a warm-up period of about 15 minutes. During an investigation of the transceiver's frequency stability, a Variac was placed in the primary circuit of the 753's a.c. power supply and the line voltage was varied from 100 to 120 volts. The receiver frequency shifted 5 c.p.s. during this excursion when checked against a crystal-controlled signal source. The v.f.o. exhibited comparable stability in the transmit mode.

Output is taken from the receiving mixer,  $V_{17}$ , and fed through the crystal filter,  $FL_1$ . The signal is amplified next by the common i.f. stage,  $V_6$ , and passed along to  $V_7$  for additional i.f. amplification. One half of  $V_8$ , a 12AX7, functions as a product detector, combining the i.f. signal from  $V_7$  and the 5.2-Mc. carrier (b.f.o.) from  $V_{4A}$ . The resultant audio signal is amplified by the second half of  $V_8$  and is applied to audio-output stage  $V_9$ . The changeover from transmit to receive is effected by switching the mode relay with the push-to-talk switch, or with the VOX circuit.

Careful checks were made while listening to all three bands and the image rejection seemed to be

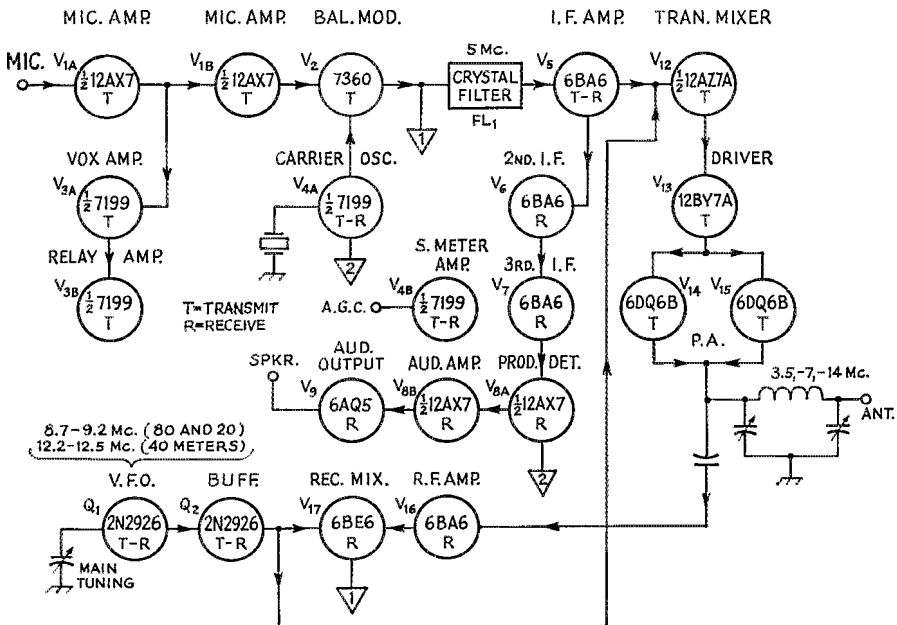
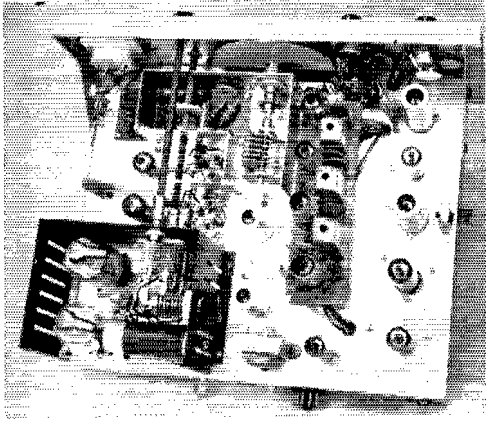


Fig. 1—Block diagram of the Eico 753 transceiver. Stages marked "T" are used in transmitting; those marked "R" are used in receiving.



Top-chassis layout of the Eico transceiver. The shield covers have been removed from the p.a. section (lower left) and from the v.f.o. compartment (upper center) to show the arrangement of the components. The i.f. printed circuit board is visible at the right-center of the chassis.

entirely satisfactory. The sensitivity of the receiver was good and the audio quality of the s.s.b. signals was sharp and natural sounding. The two-ratio dial drive took a little "gettin' used to" but proved to be very helpful when rapid excursions from one end of the band to the other were necessary. The bandspread action of the dial is desirable when one wishes to "fine-tune" a 50-ke. segment of the tuning range.

The main tuning dial is calibrated in 10-ke. increments and is supplemented, while receiving, by a panel-mounted "receiver-offset" tuning control. This control varies the v.f.o. frequency approximately 20 ke. by changing the voltage on a varicap diode which in turn varies the capacitance in the v.f.o. tank. When the offset control is in its center position the receiver is tuned to the transmitting frequency. The offset-tuning feature is especially useful to the c.w. operator who desires to shift the receiver frequency while maintaining an exact transmitter frequency. It also enables the operator to listen to portions of the foreign phone bands while keeping the transmitter frequency in the U.S. part of the band.

#### Additional Comments

The VOX circuit in the 753 is one of the easiest to adjust that this writer has encountered. In a matter of seconds, all controls were set according to the instruction manual and the "critter" did just what the book said it would. The anti-VOX circuit permitted high levels of audio from the speaker without any tripping of the relay—a most rewarding feature, indeed.

The circuit layout is orderly and in logical sequence. A printed-circuit board is used for the i.f. section of the transceiver. Circuit boards are employed, also, for the v.f.o. and the crystal-filter assemblies. The latter unit is prewired and factory aligned, reducing the complexity of final alignment of the equipment.

Approximately 35 hours were required to as-

semble and test the transceiver and its a.c. power supply. The less-experienced kit builder should expect to devote about 55 hours to the project. However, the assembly steps are straightforward and easy to understand, so even the less-seasoned radio amateur should have little difficulty in putting the kit together. The component parts are plainly marked and are packaged in individual envelopes for rapid identification.

The mobile power supply, a solid-state type, was supplied to us as a factory-wired unit. It performed well and permitted the transceiver to deliver performance that was comparable to a.c. operation. The early-production mobile supplies were reluctant to "start" in cold weather because the feedback ratio was a bit marginal in the transistor switching circuit. Eico has since offered a substitute resistor for that part of the circuit, which cured all traces of the trouble.

On-the-air signals during c.w. operation resulted in reports of 599X. The s.s.b. and a.m. signals were reported to be clean, effective, and natural sounding, even when the transceiver was used to excite a 1-kilowatt linear amplifier.

The equipment is housed in an attractive cabinet whose dark-blue wrinkle finish presents an appealing contrast to the chrome-satin finish of the panel. All controls are easily accessible and are situated in such a way as to provide ample finger room when adjusting the knobs. The a.c. power supply, which contains the speaker for the 753, is finished in a matching decor. — WTC'ER

#### Eico 753 Tri-Band Transceiver Kit

Height: 5 $\frac{1}{8}$  inches.

Width: 11 $\frac{1}{4}$  inches.

Depth: 11 $\frac{1}{4}$  inches.

Power Requirements: 700 volts d.c. at 300 ma.; 250 volts d.c. at 170 ma.; -100 volts d.c. at 5 ma.; 12.6 volts a.c. at 3.8 amp.

Price Class: \$190 (less power supply).

Manufacturer: Eico Electronic Instrument Co., 131-01 39th Avenue, Flushing, New York 11352

## Strays

James Grubs, WSGRT, 7817 Maplewood Ave., Sylvania, Ohio, would like to hear from hams who are Boy Scout radio and electronics merit badge counsellors. WSGRT is interested in exchanging ideas on techniques and in the possibility of starting a radio and electronics merit badge newsletter.

The caption under the canoe-mobile photograph in QST, January 1966, page 56 should read K9EQY, WA91WK and K9KLT. . . .

W4JLE/PJ on board the USS *Observation Island* (EAG-154) at (Suracao, Netherlands Antilles, completed his WAS in three days! During the same three-day period, Jerry also worked about 1000 stations which represented 38 different countries.