

Recent Equipment

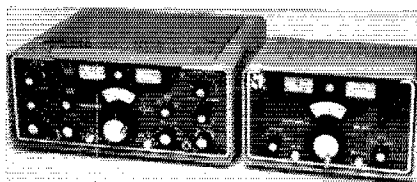


To acquaint you with the technical features of current amateur gear.

Hallicrafters SR-400

Transceiver and

HA-20 Adapter



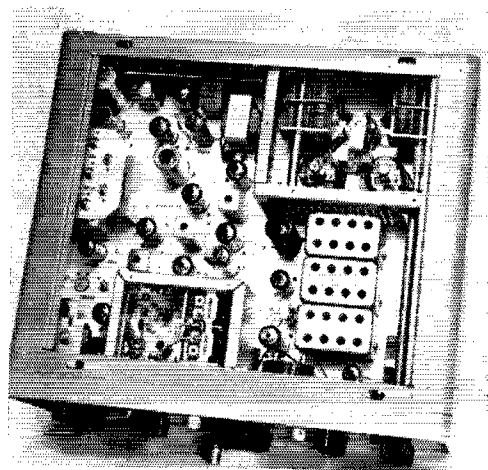
It would be easy to call the SR-400 transceiver a "baby brother" of the SR-2000¹ because in many ways it is identical with the latter. Aside from the final amplifier and power supply, the transmitting sections of the transceivers are the same. In the receiver line-up, the similarity is there but in the SR-400 additional selectivity for c.w. operation has been added, plus a "notch"-type filter. All in all, the SR-400 is designed with both the side-band and c.w. man in mind.

Frequency coverage of the transceiver takes in all of the 3.5-Mc. through 28.0-Mc. amateur bands in 500-ke. segments. The 28-Mc. band is covered in four sections of 500 ke. each. One

rotation of the tuning knob covers 25 kilocycles and the tuning dial is calibrated in 1-ke. divisions with a total of 100 ke. for the dial. The 1-ke. divisions are $\frac{1}{4}$ inch wide. This dial drives a second dial which is calibrated in 50-ke. steps starting either from 0 or 500. For a band starting at a multiple of 1000 ke. the 0 is used, and for ones beginning at a 500-ke. point the dial starting at 500 would be used. A 100-ke. standard is supplied and a variable panel-mounted control is provided in order to set the band edges precisely. Fig. 1 is the block diagram of the transceiver as given in the SR-400 instruction manual.

The receiver is a dual-conversion unit, with the first i.f. tunable over 6.0 to 6.5 Mc. Incoming signals are amplified and then converted to the first-i.f. range using a crystal-controlled high-frequency oscillator. The signals are then converted down to 1650 ke. after being mixed with the v.f.o. output. The v.f.o. range is 4350 to 4850 ke.

Preceding the high-selectivity section of the i.f. there is a noise blanker to remove interfering noise of the "ignition" type. The first i.f. tube at 1650 ke., a 6GX6, is a combination noise blanker and i.f. amplifier stage. The signal is applied to grid No. 1 and the noise blanking pulses to grid No. 3. These pulses are formed by amplifying noise "spikes" in a 7059 pentode stage at the 6.0-Mc. i.f. The noise output from this stage is rectified and then applied to another 7059 for additional amplification before being fed to the noise blanker at 1650 ke. The noise blanker should prove of great value to any amateur using the SR-400 in a mobile installation or in a noisy location. In one test we tuned in a weak c.w. signal, about an S3, and then fed the hashy noise from the brush sparking of an electric drill into the receiver at an S9 noise level. When the noise blanker control was then adjusted, the noise was reduced to a point where the c.w. signal was 100 percent copy. Without the blanker it was impossible to copy part of the c.w. signal.



Covers for the v.f.o., lower left, and amplifier compartment, upper right, have been removed in this top view of the SR-400. The two dual variables in the amplifier compartment are the plate tuning and loading units. A screw-down perforated cover for the amplifier provides tight shielding of the circuit for TVI suppression.

The large shield cans contain the r.f., mixer and driver tuned coils. The ganged tuning capacitor for these circuits is mounted below deck, along with the band switch.

¹ "Recent Equipment," QST, May 1967.

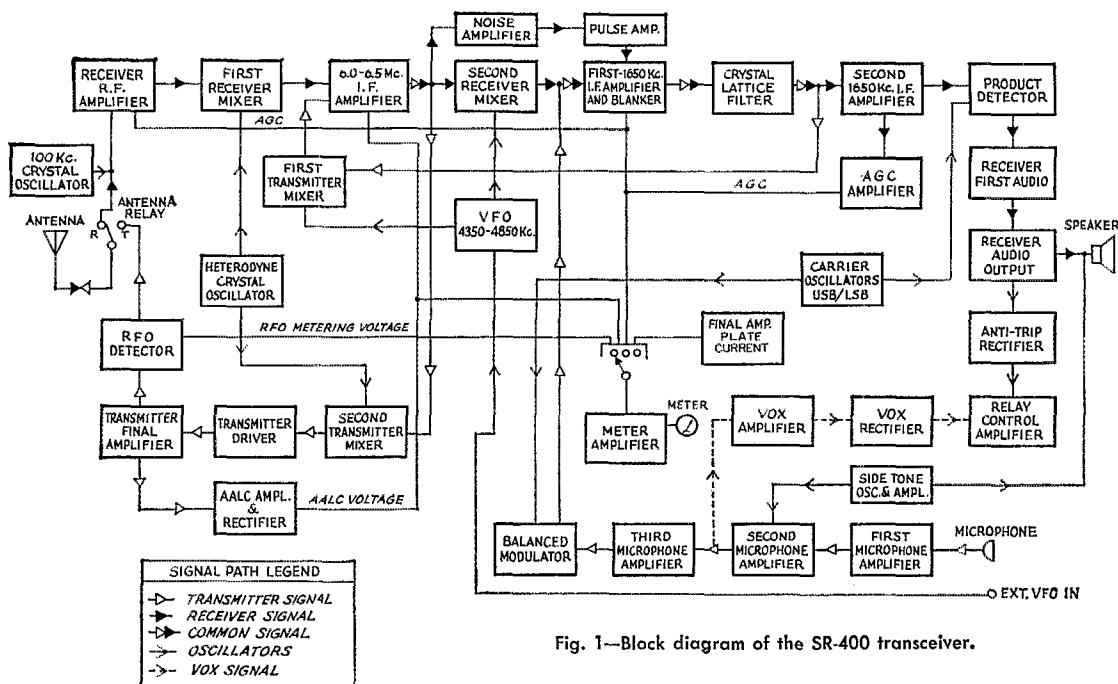
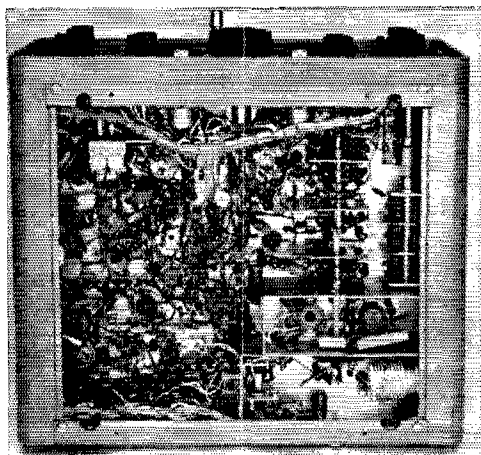


Fig. 1—Block diagram of the SR-400 transceiver.

After the noise blander, the signal goes through a set of crystal filters as shown in Fig. 2. There are two degrees of selectivity available, one using a six-crystal lattice filter for s.s.b. reception. The second is a sharp c.w. position in which the signal goes through a single crystal at 1652.2 kc. The manufacturer rates the sharp selectivity at 200 cycles at the 6-db. points, and the s.s.b. position at 2.1 kc. 3-db. bandwidth.



As evidenced by this view, it takes a lot of parts to put together a transceiver! The amplifier bottom compartment consists of two sections, visible at the lower right-hand corner. The upper section contains the bases of the 6HF5 amplifier tubes and the lower section the pi-network tank coil and the antenna changeover relay.

After the signal passes through the lattice network it is fed to the grid of the second i.f. amplifier. Connected in series from this grid to ground is a 1651-kc. crystal and a Varicap. Changing the bias on the Varicap changes the series-resonance frequency of the crystal, permitting the frequency to be moved across the i.f. passband. This provides a "notch" for reducing undesired heterodyne interference.

After the filter network, the signal is fed to a product detector and then into two audio amplifier stages. The audio output transformer has two output impedances available, 500 ohms for headphones and 3 ohms for a speaker.

In addition to the features outlined above, the SR-400 also has RIT, "receiver incremental tuning," which has been available on earlier Hallierafter transceivers. RIT permits you to tune about 3 kc. either side of the transmitting frequency, a very handy feature if you are working c.w., or if a received signal tends to drift off the transceive frequency. When the RIT control is switched on, a red panel indicator light comes on, a reminder that you are operating RIT. The RIT only works on receiving, as the transmitting frequency is controlled by the setting of the main tuning knob.

Transmitting Line-Up

Fig. 1 shows the line-up on transmitting. For voice operation, the microphone signal is amplified in three audio stages, the output being fed to the balanced modulator. Also coming into the balanced modulator is a carrier from

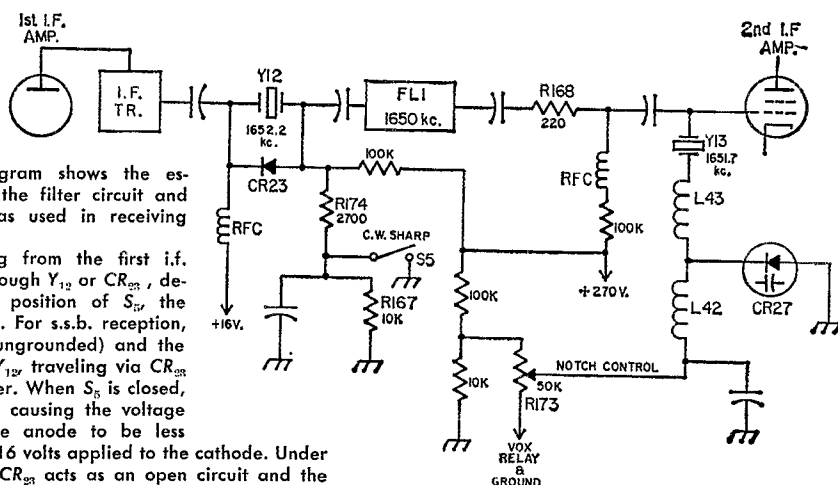


Fig. 2—This diagram shows the essential parts of the filter circuit and rejection notch as used in receiving with the SR-400.

Signals coming from the first i.f. stage are fed through Y_{12} or CR_{23} , depending on the position of S_{12} , the c.w. sharp switch. For s.s.b. reception, S_8 is left open (ungrounded) and the signal bypasses Y_{12} , traveling via CR_{23} to the 2.1-kc. filter. When S_8 is closed, R_{174} is grounded, causing the voltage appearing at the anode to be less positive than the 16 volts applied to the cathode. Under these conditions, CR_{23} acts as an open circuit and the signals are routed through Y_{12} .

Connected in series from the grid lead of the second i.f. to ground is the notch circuit, Y_{13} and the Varicap, CR_{27} . When the notch control R_{178} is adjusted, the bias voltage on CR_{27} is varied. This changes the capacitance of the unit sufficiently to change the series resonance of Y_{13} , moving the resonance across the i.f. passband. The circuit is capable of up to 30-db. notch rejection.

the carrier-oscillator stage, carrier frequencies being provided for either upper or lower sideband, as desired. Output from the balanced modulator is directed to the 1650-ke. first i.f. amplifier and then through the 2.1-ke. lattice filter. From there, the signal is fed to the first transmitter mixer, a 7059 pentode section, along with a signal from the v.f.o. The signal is mixed with the v.f.o. frequency and converted to the 6-Mc. range. It is next amplified, and then in the second transmitter mixer it is combined with the output of one h.f. crystal oscillator for conversion to the desired amateur band. From there the signal is fed to the driver stage, a 12BY7A, amplified, and then to the final amplifier, a pair of 6HP5s.

The tank circuit for the 6HF5s is a conventional pi-network arrangement designed to work into a 50-ohm load. The manufacturer specifies that the tank circuit will handle non-reactive loads in the 40- to 70-ohm range.

For c.w., the transmitter second mixer and driver stages are keyed. Grid-block keying is used. Also keyed is a neon side-tone oscillator and amplifier. The side-tone signal is fed to the receiver audio stages and the speaker or headphones for monitoring purposes, and also to the second microphone-amplifier stage, the output of which operates the VOX circuits and antenna relay. The VOX circuit can be adjusted for hold-in periods for either phone or c.w. operation.

The rated power input of the transmitter is 400 watts p.e.p. for s.s.b. and 360 watts for c.w. In the metering setup, a single meter is used. When receiving, it is an S meter. On transmit, it can be used either to read relative r.f. out-

put, a.a.l.c. (amplified automatic level control)
voltage, or amplifier plate current.

Power Supplies

If you could obtain the transformers, it would be possible to build your own power supplies for the SR-400, since the power supply is a separate unit. The transceiver requires 750 volts d.c. at 500 ma., 280 volts d.c. at 100 ma., 12.6 volts a.c. at 5.0 amp., and a bias voltage of -80 to -135 volts. The PS-500A-AC supply designed for the SR-400 also includes a speaker.

The d.c.-to-d.c. converter for mobile operation (12.6 volts d.c. input) is designated the PS-500-DC. Output voltages and currents are

(Continued on page 156)

Hallicrafters SR-400 Transceiver

Height: 6½ inches.
Width: 15 inches.
Depth: 13 inches.
Weight: 18 pounds.
Price Class: \$799.

PS-500A-AC Power Supply

Price Class: \$119.

PS-500-DC Power Supply

Price Class: \$149.

HA-20 V.F.O. and S.W.R. Bridge

Height: 7 inches.
Width: 10 inches.
Depth: 7 inches.

**Manufacturer: The Hallcrafters Co.,
600 Hicks Road, Rolling Meadows,
Illinois 60008.**