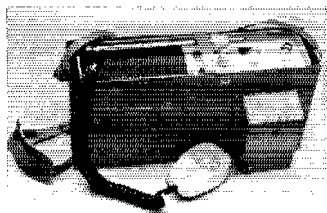


• Recent Equipment —



The Lafayette HA-650

50-Mc. Transceiver

HERE is a lightweight, compact all-transistor 50-Mc. station with enough output to be useful in ordinary communication, yet with power drain held down to the point where operation from self-contained flashlight cells becomes practical. As such, the HA-650 should be very popular with 6-meter men who like to "mountain-top" beyond the range of automotive transportation. It is ideal for short-range emergency communication, either on its own batteries or hooked up to the 12-volt system in a car. A cable for 12-volt connection is supplied, and a power supply giving 12-volt d.c. output from 115-volt a.c. input (HB-501) is available.

The transceiver is designed for pedestrian-mobile use. A leatherette case with shoulder sling is supplied, and the rig can be operated while in the case. A telescoping whip only 8 inches minimum length is mounted on a swivel joint at the left end of the panel. It opens up to a maximum of 55 inches and it may be used in any position, permitting horizontal, vertical or any polarization in between. A socket is provided for connecting an external antenna of the 50-ohm variety. A small slide switch selects either antenna.

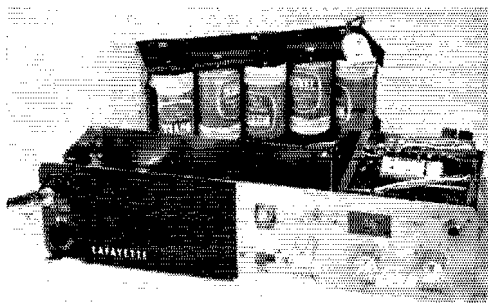
The Receiver

Receiver sensitivity is well above the minimum necessary for adequate performance with its companion transmitter. An r.f. amplifier, mixer, tunable oscillator and three 1620-kc. i.f. stages precede a diode detector and three audio stages. The last audio stage is a push-pull Class-B amplifier that also serves as the modulator. It has thermistor bias stabilization. The i.f. stages are neutralized. A.g.c. voltage developed in the audio detector is applied to the bases of the r.f. and i.f. amplifier transistors. The a.g.c. characteristics are peculiar; the receiver makes almost no noise in the absence of any signal, but when you tune across the band signals pop out at you with tremendous audio volume. A comparison with a good converter, signal-for-signal on the same antenna for both receivers, will show that the transceiver does right well.

Selectivity is all you'll want to handle in portable work. Specifications say 3 kc. at 6 db. down and 8 kc. at 40 db. down. This is sharp slicing for a 1600-kc. i.f. system, and we found little trouble with interference between stations separated by more than heterodyning distance. The oscillator collector voltage and base bias are Zener regulated, and stability is quite good. There is a protective diode across the receiver input, to guard against r.f. burnout of the first transistor.

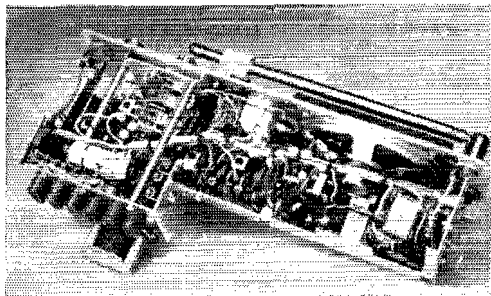
Receiver tuning range is 50 to 52 Mc., recognizing the basic fact of receiver design that it is extremely difficult to provide four megacycles of tuning and at the same time have ease of control. By covering only the first half of the band a reasonably good tuning rate is obtained with a low-cost planetary-drive dial. The small knob and dial assembly do not help in this, but they undoubtedly were a concession to the need for compactness and simplicity in a hand-carried portable.

If the receiver has a real weakness it is the small dynamic range of the a.g.c. system. Strong



The Lafayette HA-650 transceiver, with its metal case and leather carrying sling removed. The telescoping whip is swivelled out to show the panel and operating controls. Next to the speaker grill are the S-meter and spotting switch. Knobs are volume control and power switch, tuning dial, and 6-position crystal switch. Molded plastic housing for 10 D-size flashlight cells fits into niche at the left rear.

signals just about blow your ears off if you tune across the band with the gain up high enough to hear the weak ones. We know of no simple cure for this, having encountered the same problem in using a small pocket broadcast receiver as the i.f. for a 50-Mc. portable transceiver. You just have to be ready with a finger on the gain control. The a.g.c. cannot be turned off, and the receiver is definitely for a.m. phone only, there being no b.f.o. Sideband and c.w. are out.



Interior of the 50-Mc. transceiver. The two-gang receiver tuning capacitor and most other receiver components are at the left, with the crystal sockets and modulation transformer at the front of the picture. Most transmitter components are on the circuit board that occupies the righthand two-thirds of this view. The whip is shown in its carrying position.

Transmitter

Four transistors are used in the r.f. portion of the transmitter. The oscillator takes 8-Mc. crystals, and there are sockets and switch positions for 6 of them. Surplus 1T-243 types work well. The circuit is a Pierce, with the tuned output on a harmonic. (The schematic doesn't say which harmonic, and we couldn't get to the coil to find out with a wavemeter.) The second transistor multiplies to 50 Mc., and it has three tuned circuits between it and the first amplifier, to filter out unwanted multiples of the crystal frequency. Two amplifier stages on 50 Mc. follow, and both are modulated.

Modulation is adequate, and of good quality. Some audio is applied to the driver through a 68-ohm resistor shunted across an audio choke. The output stage uses the grounded-base circuit and the output (collector) circuit is series-tuned. The microphone is a high-impedance dynamic, supplied with the transceiver. Its push-to-talk switch is the only operating control.

The transmitter frequency range is intended to match that of the receiver, but we found that retuning of the driver and output tuned circuits is necessary for maximum output, if the frequency is shifted more than 200 to 300 kc. This is no great handicap, as most 50-Mc. operation is in the first 500 kc. of the band, ordinarily.

Assembly

With the exception of the crystals, sockets and selector switch, the entire r.f. assembly is a single circuit board, in a form that will be familiar to

anyone who has examined the innards of small Japanese transistor radios. Innumerable beautiful little components are employed, and the whole arrangement is deceptively simple in appearance. Most part numbers are marked on the circuit board in black ink, adjacent to the components in question, but they are not easy to see. This combined with the Japanese symbols and general lack of information on the schematic diagram makes checking out the circuits no simple task.

The case and battery housing are marvels of simple metalwork, and the whole thing comes apart in a few seconds. Self-contained power is provided by 10 large-size "D" flashlight cells, in a molded-bakelite housing that keeps them together neatly and makes battery changing a breeze. External power from a 12-volt battery may be connected by removing the plug and cable that go to the D cells and substituting the cable supplied for this purpose. It has its own 1-amp. fuse. Small dial and meter lamps glow when the external power is used, and do not work on the flashlight cells. The transceiver should be used with negative-ground cars only, unless the circuit is rewired for positive ground. Current drain is 80 ma. maximum on receive, 400 ma. maximum on transmit.

The whip antenna is especially neat. It is fitted with a dual-purpose soft plastic clip that holds it in place against the front panel, for carrying, or slips down over the swivel joint to keep the antenna erect when the transceiver is used on the whip. One drawback with this arrangement: the folded-down whip lies directly over the S-meter, and comes close enough to other controls to be somewhat inconvenient when the rig is used with an external antenna. You can't have everything, as anyone who has tried to design really small radio gear quickly learns.

The instructions supplied with the HA-650 leave much to be desired. Almost nothing is said about the equipment's design features, and the made-in-Japan circuit diagram requires extensive study before the owner will know much about what he has bought. Most of the transistors have Japanese numbers, and American equivalents are not given.

Results

Coverage with the transceiver operating on its whip is essentially local, unless you take it to some high spot that has a distant horizon. But when you put the HA-650 on a good beam you may be surprised to discover that a watt or so is enough to provide plenty of contacts. This is not exactly earth-shaking, though in these days of kilowatts in every lunchbox the tendency is to think that high power is a must. Not so, in v.h.f. work, at least. Much of our 6-meter communication is over easy paths, where very strong signals ordinarily prevail. On such circuits one watt works exactly as well as 1000 — a fact of life that will bear emphasis when you hear wailing about 50-Mc. TVI. This little package would make it possible for many would-be 6-meter men to use the band without annoying their neighbors.

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.

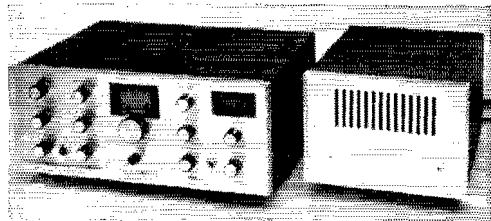
Width: 9½ inches.

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 AB₁ 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