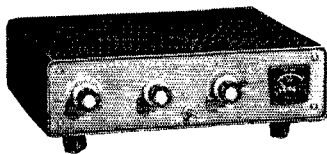


• Recent Equipment —

The Heathkit HW-14

Sideband Linear

Amplifier Kit



WOULD you believe it? A kilowatt amplifier less than $\frac{1}{4}$ of a cubic foot in volume! This is an amplifier that covers the five amateur bands, 80 through 10 meters, with 1000 watts p.e.p. input (with rated third-order distortion —30 db. or better), a.l.c. provisions, tuned-input circuit, built-in antenna changeover relay, built-in s.w.r. circuit and indicator, and accessory power supplies that operate from either the a.c. mains or 12 volts d.c. All of this doesn't describe a fictional amplifier; it's the Heathkit "KW Kompact," the model HA-14 sideband linear amplifier. Although designed primarily for sideband mobile operation, the amplifier can be used with any exciter or transmitter capable of delivering 100 watts or more.

One secret to the small size of the amplifier is the use of parallel-connected carbon anode zero-bias 572-B triode tubes¹ which are operated Class B grounded grid. The "bottles" are mounted horizontally in a manner similar to that used in the Kompact's big brother, the Heathkit SB-200 linear amplifier.² A glance at the photograph shows the relative positions of the tubes, the input circuit, and the plate tank circuit.

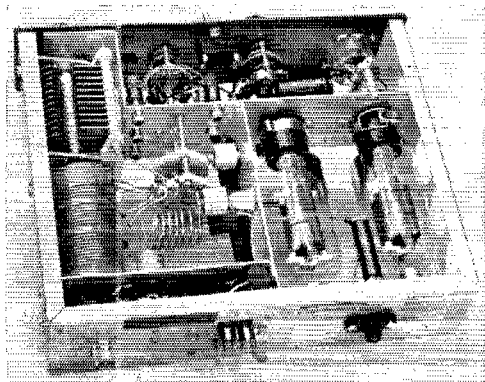
Power from the exciter is coupled to the tubes, which are cathode driven, by a broad-band network (52 ohms unbalanced input) and a bifilar-wound filament choke. The input network does not require any tuning by the operator when

band switching: the correct constants for the input network (as well as for the output tank circuit taps) are selected by a panel BAND switch.

A pi network couples the tube output to the load, which can be anything between 50 and 75 ohms unbalanced, s.w.r. not to exceed 2:1. There is a panel TUNE control for resonating the output tank.

An a.l.c. circuit in the HA-14 provides a control voltage for application back to the exciter. A capacitive voltage divider in the grid circuit of the amplifier tubes samples the audio voltage. The voltage is rectified by a semiconductor diode, which is reverse biased by a fixed threshold voltage, and the negative control voltage is made available at a connector at the rear apron for use back at the a.l.c. input of the exciter/transmitter. This system has a definite advantage over the conventional a.l.c. circuits used in AB₁ amplifiers that work only when the tubes go into grid current, since the threshold can be selected without depending on abrupt changes in tube operating conditions.

As mentioned earlier, the HA-14 contains its own built-in antenna change-over relay and s.w.r. bridge. Designed to be actuated by the VOX relay contacts in the exciter, the antenna relay closes during transmission and connects the exciter's output to the amplifier's input circuit and the amplifier output to the antenna connector. In addition, cutoff bias is removed from



This bottom view of the HA-14 was taken with the perforated steel cabinet removed. At the right are the two carbon-anode 572B amplifier tubes. Just visible in the compartment at the top of the photograph are the bifilar-wound filament choke (right) and the input-circuit coils and band switch. Final-amplifier tank-circuit components and band switch are in the lower front area of the photograph. Rear apron connectors shown are (l. to r.): r.f. output (SO-239), r.f. input (phono connector), power and control plug, and high-voltage connector.

the amplifier tubes (resting current is approximately 90 ma.). During reception, or when the amplifier's power ON-OFF switch is placed in OFF, the antenna relay connects the exciter output directly to the antenna for "barefoot" operation. Cutoff bias is applied to the amplifier tubes in this condition. Since the 572-B tubes have directly-heated filaments, there is no waiting when going from low power to high power. Just flip the amplifier switch to ON and the amplifier is immediately and automatically ready for use.

The s.w.r. circuit is a kind of Monimatch³ and, with its panel indicator, measures relative power output and s.w.r. (0-6 relative power, 1:1 to 3:1 s.w.r.). A concentric control on the front panel allows for switching between forward and reverse power (outer large knob) and for controlling meter sensitivity (inner small knob). Since the s.w.r. bridge is connected in series with the antenna output connector, the circuit also can be used for relative power and s.w.r. measurements when only the exciter is in operation.

The HA-14 is called a kilowatt *sideband* linear amplifier and the manufacturer does not give any c.w. ratings for it. However, the tubes are husky enough for a c.w. kilowatt, and the a.c. power supply (HP-24) is rated for 500 ma. on c.w. with a 30-percent duty cycle.

Since the amplifier was designed primarily for mobile operation and as a companion for the HW series of exciters,⁴ suggestions are included in the instruction manual for mounting and connecting the amplifier to this equipment in the mobile or fixed station. Because of its top-to-bottom measurement of slightly over three inches, it can be neatly tucked in almost anywhere.

The HA-14 amplifier described here was supplied to us by Heath already wired. However, a skim through the instruction manual and a glance at the finished product indicates that the entirely assembly would probably be no more than a week-end project.

Our amplifier performed well, too. A few checks in the ARRL lab confirmed that the little amplifier handles its advertised power, although it was difficult to maintain a nominal 13 volts d.c. at close to 50 amps. maximum during the d.c. power-supply test!

³ McCov, "Monimatch, Mark II," *QST*, February 1957.

⁴ "Recent Equipment," *QST*, January 1964.

Heathkit HA-14 Linear Amplifier

Height: 3 $\frac{3}{16}$ inches.

Width: 12 $\frac{1}{16}$ inches.

Depth: 10 inches.

Weight: 7 pounds.

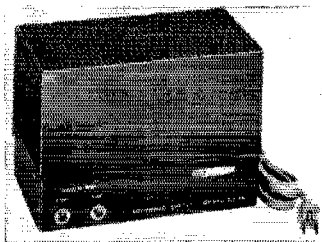
Power Requirements: 2,000 v.d.c., 500 ma. peak; -120 v.d.c. at 60 ma.; and 12.6 a.c. or v.d.c. at about 4 amps.

Price Class: \$100

Manufacturer: Heath Company, Benton Harbor, Michigan.

Model HP-24 A.C. Power Supply

The a.c. power supply for the HA-14 is almost as much of a surprise as the amplifier. This kilowatt supply isn't much larger than a shoe box! A voltage doubler circuit, it has a string of semiconductor rectifiers and series-connected electrolytic capacitors, and develops about 2500 volts d.c. with no load. It has an effective output ca-



pacitance of about 20 μ f. and the supply has a rated ripple of less than 1 per cent at 500 ma.

There are other windings on the transformer for providing bias voltage (-180 volts no load), a.l.c. threshold voltage (about 6 volts d.c.) and filament voltage (12.6 volts a.c. at 4 amps.).

The primary of the power transformer is actually two windings which may be connected in series for 230 volts or in parallel for 115 volts. Although designed for 60-cycle operation, we have had reports from foreign operators who have successfully used the supply and amplifier with 50-cycle current. The primary windings are protected by two push-to-reset circuit breakers. On-off control of the power supply is accomplished remotely from the panel-power ON-OFF switch on the HA-14 amplifier.

Heathkit HP-24 Power Supply

Height: 6 $\frac{3}{4}$ inches.

Width: 9 inches.

Depth: 14 $\frac{1}{4}$ inches.

Weight: 18 $\frac{1}{2}$ pounds.

Power Requirements: 120 v.a.c., 60 cycles, 16 amps. max.; 210 v.a.c., 60 cycles, 8 amps. max.

Price Class: \$50

Manufacturer: Heath Company, Benton Harbor, Michigan.

Model HP-14 Transistorized Mobile Power Supply

This d.c. power supply will operate only from negative-ground systems. Four transistors in a

