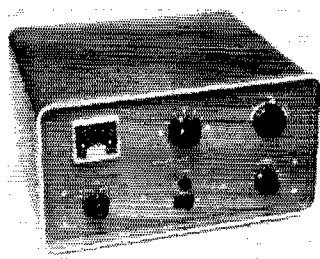


• Recent Equipment —

The Hammarlund

HXL-1 Linear Amplifier



THE recent popularity of transceivers has led logically to an increased interest in linear amplifiers to go with them. Hammarlund has obliged with the HXL-1, a linear amplifier that includes its own built-in kilowatt power supply. It is bandswitching and covers the amateur bands 80 through 10 meters.

Two fan-cooled 572A zero-bias power triodes¹ are used as r.f. amplifiers; these are the United Electronics graphite-anode type which can be used as direct replacements for the 811A. However, the tube manufacturer rates them with an ICAS plate dissipation of 225 watts each. Hammarlund runs the pair of these tubes at 1000 watts d.c. input on c.w. and RTTY. On s.s.b., the amplifier is rated at 1500 watts p.e.p. input. About 60 to 70 watts of drive are necessary to push the amplifier to full output. The manufacturer's confidence in the amplifier and its power supply is such that the key-down time may be as much as $\frac{1}{2}$ hour when running 1000 watts d.c. input!

A grounded-grid circuit is used with drive fed to the 572A cathodes, which are isolated from the rest of the circuit by a bifilar choke in the filament leads. The choke is tapped and drive is introduced to the proper tap by the panel-controlled BAND SELECTOR switch. This input circuit presents an almost constant 50-ohm impedance on all bands.

A pi network in the amplifier plate circuit is designed to match loads over the range of 40

to 80 ohms. Ganged to the before-mentioned band selector is a switch section that chooses the correct taps on the pi-network inductor. On the 40- and 80-meter bands, fixed values of capacitance are also selected by the switch to supplement the 1150-pf. loading capacitor.

The dominant section of the HXL-1 is the power supply, which is quite evident when one goes to lift the unit. A husky transformer, which has a dual primary for use either on 120 or 240 volts, supplies the high voltage for the amplifier. A full-wave voltage doubling circuit using semiconductor rectifiers provides the high-voltage d.c. A bank of electrolytic capacitors in series has an effective filtering capacitance of 33 μ f.

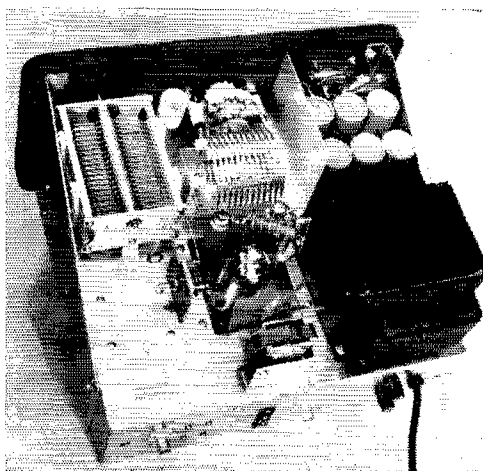
Both the voltage and amplifier plate current can be monitored by a panel meter on the HXL-1. A panel METER switch allows for switching between plate current (0-1000 ma.), plate voltage (0-2500 volts), r.f. volts (2-250 volts — roughly accurate when working into a 50-ohm load), and linearity. R.f. volts are measured by sampling r.f. through a resistive divider at the output of the pi network. The meter scale calibration is accurate to about 20 per cent.

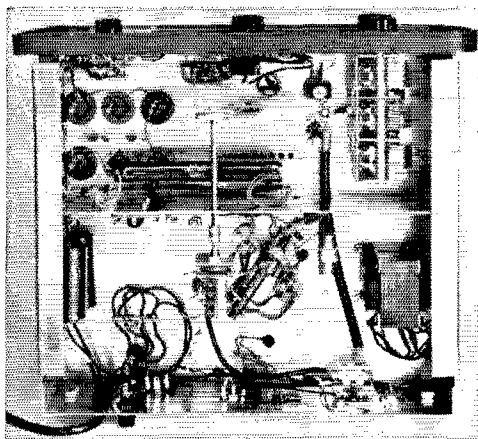
The LINEARITY meter position allows the operator to tell at a glance if there is a proper relationship between the input and output r.f. voltages. Fig. 1 is the circuit used for linearity checks.² The indicating meter is a basic 0 to 1.2 ma., with zero about two tenths upscale. When the amplifier's plate circuit tuning and loading are adjusted properly to show the correct

¹ Wolfe, "UE572s in Grounded Grid", *QST*, May 1961, page 16.

² Recent Equipment, *QST*, November 1961, p. 67.

The complete HXL-1 kilowatt linear amplifier with its cabinet removed. At the right in the photograph are the plate power transformer and filter capacitors for the power supply section. The two 572A triode amplifiers with cooling fan are in the foreground and the r.f. amplifier tank circuit and band switch are at the center top. The large variable capacitor is the 330-pf. plate tuning capacitor. Just to the left of the tubes is the 1-pf. neutralizing capacitor. Rear apron components visible are, from left to right, antenna output connector (SO-239), external relay terminals, r.f. input connector (SO-239), fuses, and line cord.





Bottom view of HXL-1 linear amplifier. That's a brute-force line filter at the lower left of the photograph.

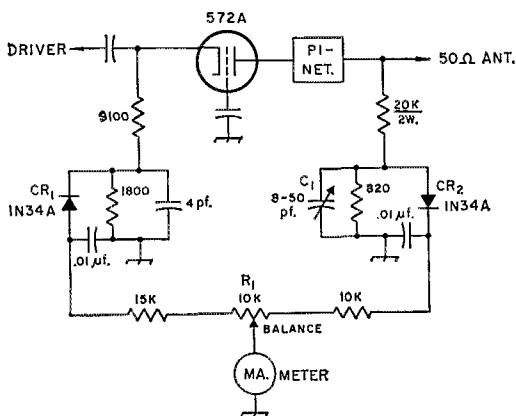


Fig. 1—Circuit of the linearity bridge used in the HXL-1 amplifier. Input and output r.f. voltages are compared and if they show the correct relationship, and thus good linearity, will give a zero indication on the meter. The BALANCE potentiometer, R_1 , is a panel control.

load impedance to the power amplifier plates, the input and output r.f. voltages through the resistive voltage dividers in Fig. 1 will be the same. With equal and opposite voltages appearing at the meter, it indicates zero, and thus good linearity. Diodes CR_1 and CR_2 rectify the r.f. voltage for use in the d.c. meter circuit. Capacitor

Hammarlund HXL-1 Linear Amplifier

Height: 9 1/8 inches.

Width: 17 1/2 inches.

Depth: 15 inches.

Weight: 66 pounds.

Power requirements: 110/120 volts 50/60 cycles, 220/230 volts 50/60 cycles.

Price class: Under \$400.

Manufacturer: Hammarlund Mfg. Co., 53 West 23rd St., New York 10, New York.

C_1 is for calibration and is factory set. The BALANCE potentiometer, R_1 , is a panel control and is provided to compensate for slight unbalances due to the frequency sensitivity of the bridge. The meter is adjusted for zero with the BALANCE control when the amplifier is being driven by an unmodulated carrier.

A relay built in the HXL-1 amplifier allows for exciter-only use for crosstown contacts or other low-power applications. Relay contacts are d.p.d.t. and connect the exciter output directly to the antenna or to the linear amplifier input. In the latter case, the amplifier's output is connected to the antenna. In straight-through operation, the d.c. ground return for the amplifier grids is open, making the amplifier inoperative. Two terminals at the rear of the HXL-1 are for control of the relay. When the amplifier switch is on and the terminals are shorted, the relay closes and the amplifier is in the circuit. The exciter is automatically switched directly to the antenna when the amplifier's power switch is turned off.

In trying out the HXL-1 here at the ARRL lab we found the amplifier easy to hook up, tune, and use. There were no indications of instability and the amplifier showed a gain of about 10 db. over the design frequency range.

The HXL is housed in a grey perforated wrap-around cabinet. The panel is also grey and contains the meter, BAND-SELECTOR, TUNING knob, LOADING knob, METER switch and "rocker" type ON-OFF switch. Physical dimensions and styling of the HXL-1 are similar to that of the Hammarlund HX-50.³

— E. L. C.

³ Recent Equipment, QST, March 1963, p. 50.

Brelonix MP-40 Modulator Kit

THE Brelonix modulator kit, MP-40, is a good example of the logical application of transistors to amateur radio equipment. The kit is a transistorized modulator capable of outputs in excess of 40 watts (50% duty cycle), which means it can modulate transmitters in the 75-to-100-watt r.f. class.

