

## High-fidelity Amplifier with No Phase Distortion up to 30,000 Cycles

ELIMINATION of cathode and screen bypass capacitors, decoupling capacitors, and the filter output capacitor result here in an amplifier that can cover all frequencies between 10 and 30,000 cycles with no phase distortion that is perceptible on a cathode-ray oscilloscope.

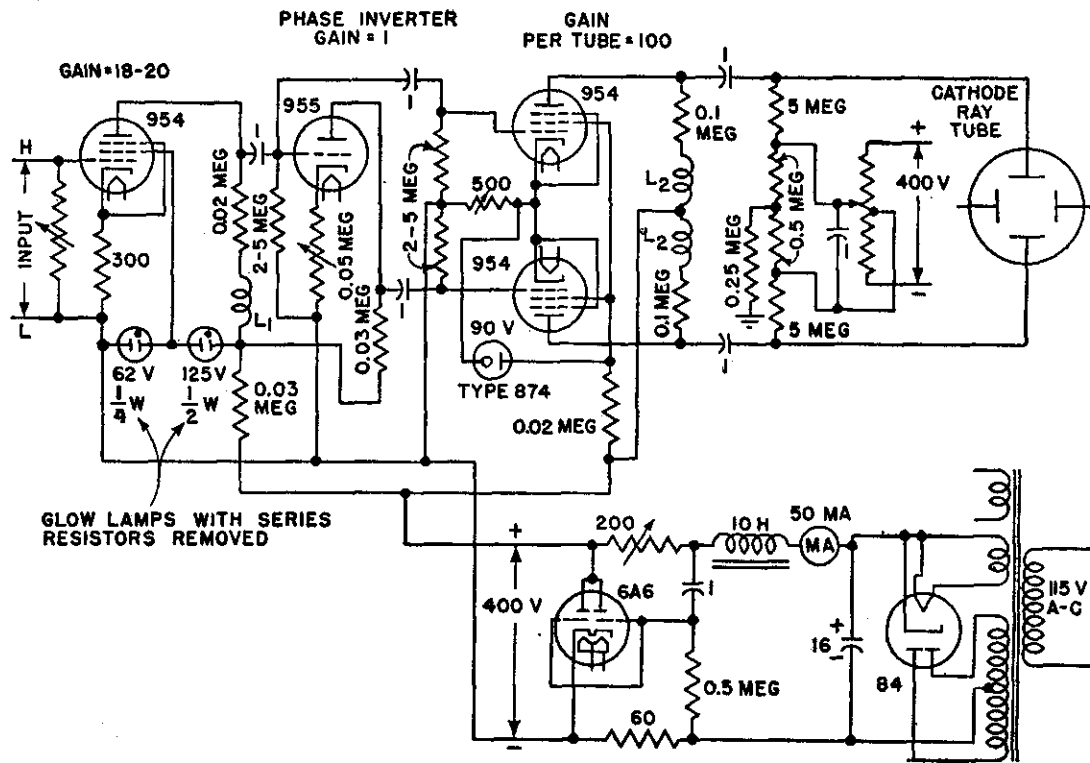
Use of a filter output capacitor is avoided by means of a type 6A6 connected as a filter. A positive pulse of ripple voltage coming in through the 10-henry choke is applied to the grid of the 6A6 through the  $1\text{-}\mu\text{f}$  capacitor. As a result, plate current through the 6A6 increases and the  $IR$  drops across the 200-ohm plate resistor and the 60-ohm cathode resistor increase. The increase in these  $IR$  drops is just equal to the pulse of ripple voltage; hence the ripple voltage is canceled at the output terminals of the power supply. In this way, the 6A6 smooths out ripple or voltage surges from the line but does not introduce phase distortion as a filter capacitor would.

The use of screen bypass and decoupling capacitors is avoided by the use of neon tubes and an 874 tube. These tubes act as voltage regulators and therefore perform, with negligible phase distortion, the same function as bypass capacitors.

The use of cathode bypass capacitors is avoided by designing the amplifier stages so these can be omitted without much loss of gain. In the first and third stages, the cathode bias resistors are

small resistances, and there is not much degeneration. The second stage, a phase inverter, is operated at unity gain; degenerative loss of gain in this stage is therefore not a disadvantage.

tance of these tubes is made still smaller by using chokes in series with the plate resistors to cause a phase shift in the opposite direction to the shift caused by the output capacitance of the tubes.



The acorn tubes used combine large mutual conductance with small inter-electrode capacitances. They therefore can provide high gain with little phase distortion. The little phase distortion that is produced by the output capaci-

Large capacitance values,  $1\text{ }\mu\text{f}$ , for the coupling capacitors, also contribute to the low phase distortion.