

A Simple Grid Modulator

The modulator circuit shown in Fig. 9-14 is capable of modulating any transmitter, up to the maximum power limit, to about 80 per cent with low distortion. It requires no power supply other than heater power for the tubes, since it gets plate power from the cathode circuit of the r.f. amplifier with which it is used. Although the modulator output is connected in series with the r.f. amplifier cathode, the modulation is essentially of the grid-bias type (see chapter on ampli-

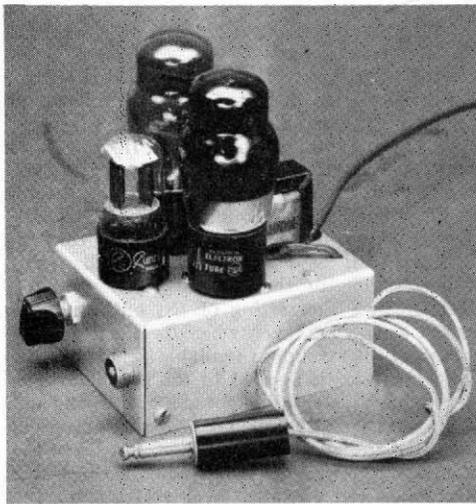


Fig. 9-13 — A simple modulator of the grid-bias type, usable with transmitters having c.w. plate inputs up to a kilowatt. Plate power for the unit is obtained automatically from the r.f. amplifier supply.

tude modulation). A useful characteristic of the system is that it does not require a fixed source of grid bias for the amplifier.

The speech amplifier uses a high- μ double triode to give two stages of resistance-coupled amplification. This gives sufficient gain for a crystal microphone. Resistors R_3 , R_7 and R_{10} ,

together with C_1 and C_3 , provide decoupling and additional filtering of the d.c. obtained from the r.f. amplifier cathode circuit.

The output stage uses one or more 6Y6Gs in parallel; in determining the number of tubes required to modulate a particular amplifier, use one 6Y6G for each 200 ma. of amplifier plate current based on the operating conditions for c.w. work. The audio output voltage is developed across L_1 and R_{11} in series; R_{11} may be omitted if the d.c. voltage between the screen and cathode of the 6Y6G does not exceed the rated value of 135 volts.

No special constructional precautions need be observed in laying out the amplifier. The unit shown in Fig. 9-13 is built on a homemade chassis folded from a sheet of aluminum, but a small standard chassis may be used instead. A filament transformer may be included in the unit in case the heater power cannot conveniently be obtained from the transmitter itself.

To use the modulator, first tune up the transmitter for ordinary c.w. operation with the modulator disconnected. Then connect the modulator output terminals in series with the amplifier cathode as indicated in Fig. 9-14. (Make certain that the modulator cathodes are up to operating temperature before applying plate voltage to the r.f. amplifier.) The amplifier plate current should drop to approximately one-half the c.w. value. If the plate current is too high, increase the value of R_9 until it is in the proper region; if too low, decrease the resistance at R_9 . Once this adjustment is made the system is ready for 'phone operation. The r.f. amplifier plate current should show no change with speech input, except for a slight upward kick on voice peaks.

The carrier power output with this system is somewhat less than would be obtained with conventional grid modulation because the d.c. voltage drop in the 6Y6G modulators subtracts from the amplifier plate voltage. The difference is small with r.f. tubes operating at 1000 volts or more.

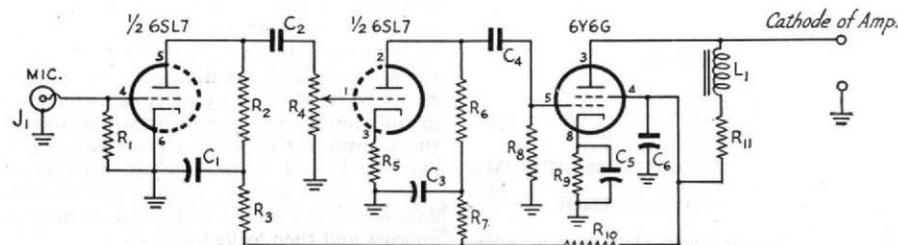


Fig. 9-14 — Circuit diagram of the speech amplifier and modulator.

C_1 , C_3 , C_6 — 8- μ fd. electrolytic, 450 volts.

C_2 — 0.005 μ fd. 400 volts.

C_4 — 0.01 μ fd. 400 volts.

C_5 — 50- μ fd. electrolytic, 50 volts.

R_1 — 2.2 megohms, $\frac{1}{2}$ watt.

R_2 — 0.22 megohm, $\frac{1}{2}$ watt.

R_3 , R_7 , R_{10} — 22,000 ohms, $\frac{1}{2}$ watt.

R_4 — 0.5-megohm volume control.

R_5 — 2200 ohms, $\frac{1}{2}$ watt.

R_6 , R_8 — 0.1 megohm, $\frac{1}{2}$ watt.

R_9 — 50 ohms, 2 watts (see text).

R_{11} — 2000 ohms, 2 watts (see text).

L_1 — Small filter choke, "a.c.-d.c." type satisfactory.