A Single 6146 Amplifier

The photographs of Figs. 6-64, 6-67, and 6-68, show views of an amplifier using a single 6146. With the built-in supply shown, it can be operated at an imput of about 70 watts, or up to 90 watts with a 750-volt supply. The circuit is shown in Fig. 6-65. The input circuit is a conventional parallel-tuned tank with link coupling. However, the inductor is made up in two sections to avoid the inefficiencies of shorting turns on a single large coil in switching to the higher frequencies. A separate link coil is used with each of the two grid coils.

A pi-section tank circuit is used in the output. The amplifier is keyed in the cathode circuit. The single milliammeter may be switched to read either grid current or cathode current. The 150-ohm series resistor and the 22-ohm parallel resistor form a meter shunt that increases the full-scale reading to 250 ma. when checking cathode current.

Construction

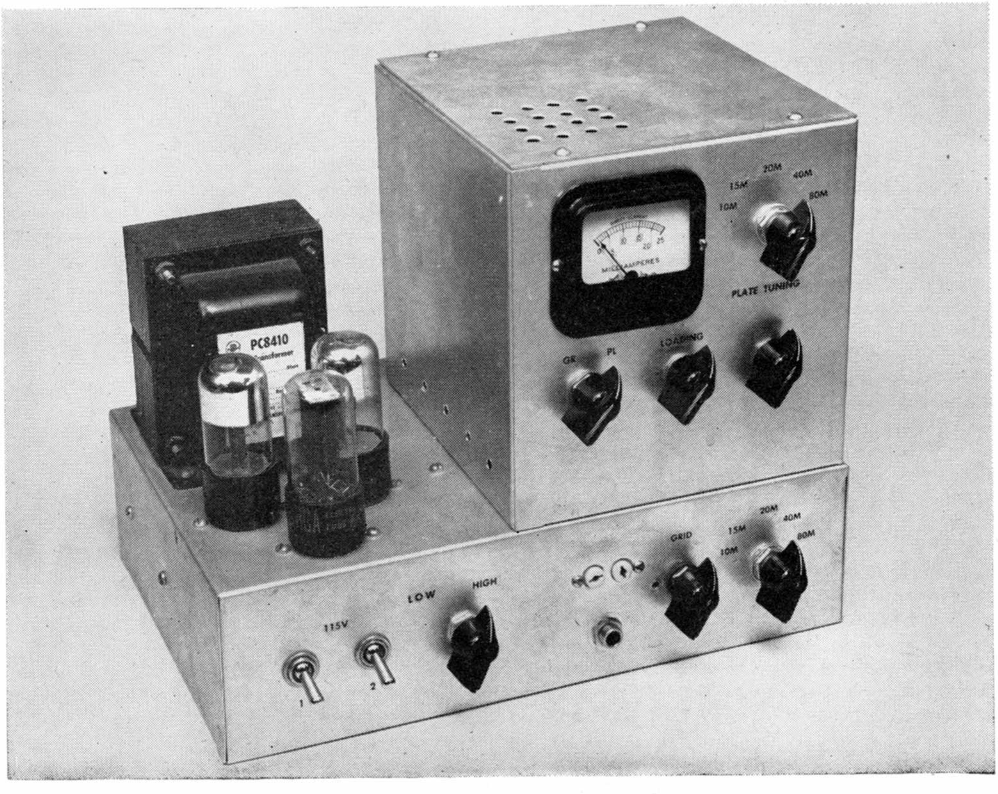
The layout of components is shown in the photographs. In the box, the tube socket should be placed far enough back on the chassis so that the tube will clear the meter. C_7 is placed to the rear to space it about an inch from the tube. It is mounted on an aluminum bracket so as to bring its shaft up to the proper level. A panel bearing is coupled to the shaft.

RFC_3, C_8 and C_9 are mounted on an insulated terminal strip to the left of the tube socket. The flexible plate lead to the 6146 is connected to RFC_3 and C_8 at this strip. The v.h.f. parasitic suppressor L_5 is connected between this lead and the plate connector.

To the rear of the tube socket is another strip with two insulated terminals. A piece of No. 16 wire about 2 inches long is soldered vertically to each of the insulated terminals. Then a piece of "spaghetti" is slid over each of the wires. The capacitance between these wires provides the capacitance shown in Fig. 6-65 as C_3. This capacitor is the neutralizing capacitor to stabilize the amplifier.

A crystal socket is used as the input connector J_1, as shown in Fig. 6-66. If preferred, a coaxial

Fig. 6-64—The base for the 6146 amplifier is a 11 × 7 × 3-inch aluminum chassis. A 6 × 6 × 6-inch aluminum box encloses the amplifier tube and its output circuit. S_2 is to the right of the meter. Below, from left to right, are controls for S_3, C_7 and C_4. On the chassis, from left to right, are the power-supply switches (see Fig. 6-66), J_1 (see text) and J_3, and controls for C_1 and S_1. Ventilation holes are drilled in the cover in the area above the tube, and along the sides of the box, near the bottom. The power-supply diagram is shown in Fig. 6-66.



A 6146 Amplifier

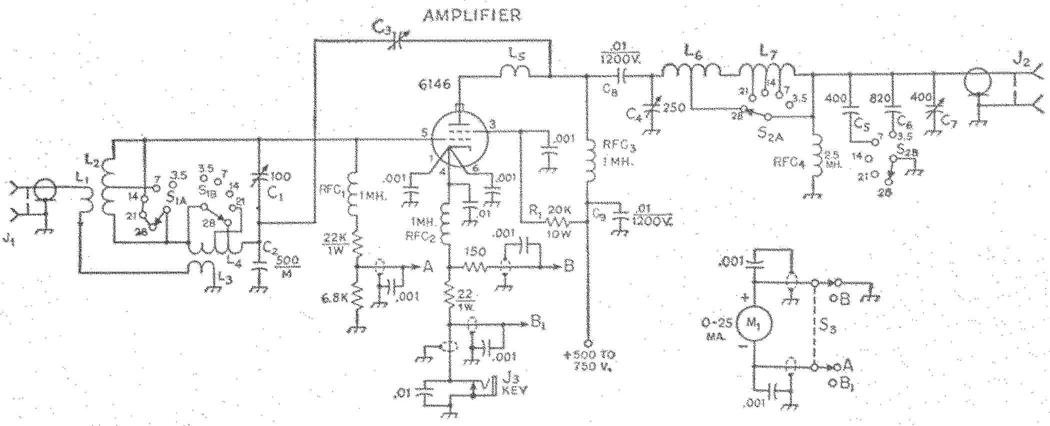


Fig. 6-65—Circuit of the 6146 band-switching amplifier. All capacitances less than 0.001 μf. are in μμf. All unmarked bypasses are disk ceramic. All resistors are ½ watt unless otherwise specified. Filament and meter wiring should be shielded as indicated.

C_1—100-μμf. variable (Hammarlund MC-100-S).
C_2—470-μμf. mica.
C_3—Neutralizing capacitor (see text).
C_4—250-μμf. variable (Hammarlund MC-250-S).
C_5—400-μμf. tub. ceramic (Centralab DC-401).
D_6—820-μμf. tub. ceramic (Centralab D6-821).
C_7—400-μμf. variable capacitor (broadcast replacement type).
C_8—C_9—Disk ceramic.
J_1—See text.
J_2—Coaxial receptacle (SO-239).
J_3—Close-circuit key jack.
L_1-L_7—See coil data opposite.
M_1—0-25-ma. d.c. milliammeter, 2½-inch square (Shurite).
RFC_1, RFC_4—1- or 2.5-mh. (National R-50).
RFC_2, RFC_3—1- or 2.5-mh. (National R-100).
S_1, S_2—Double-pole 6-position rotary switch (Centralab PA-2003).

COIL DATA

The coils L_1L_2 are made from a single length of B & W Miniductor stock. Unwind 8 turns from the support bars and using side cutters, snip off the projecting bars. Snip the unwound piece of wire off about one inch from the coil stock. Next count off 13 turns and bend the 13th turn in toward the axis of the coil and cut the wire at this point. At the cut, unwind ½ turn from each coil. This leaves two coils on the same support bars. Unwind ½ turn at the end of the large coil. The 12-turn coil is L_1 and the 42-turn coil is L_2. Similar procedure is followed in making L_3L_4.

L_1 — 12 turns of No. 24, 1-inch diam, 32 turns per inch (B & W 3016).
L_2 — 42 turns of No. 24, 1-inch diam., 32 turns per inch (B & W 3016).
40-meter tap is made at 25th turn counting from junction of L_2L_4.
L_3 — 4 turns of No. 20, ⅝-inch diam., 16 turns per inch (B & W 3007).
L_4 — 13 turns of No. 20, ⅝-inch diam., 16 turns per inch (B & W 3007).
20-meter tap is made at junction of L_2L_4.
15-meter tap is made 4½ turns from junction of L_2L_4.
10-meter tap is made 7½ turns from junction of L_2L_4.
L_5 — 4 turns of No. 14, ¼-inch diam., turns spaced wire diam.
L_6 — 5½ turns of No. 12, 1-inch diam., turns spaced so that coil is 1-inch long.
10-meter tap is made 1½ turns from junction of L_6L_7.
L_7 — 17½ turns of No. 16, 2-inch diam., 10 turns per inch (B & W 3907-1).
15-meter tap is made 2 turns from junction of L_6L_7.
20-meter tap is made 5 turns from junction of L_6L_7.
40-meter tap is made 9 turns from junction of L_6L_7.

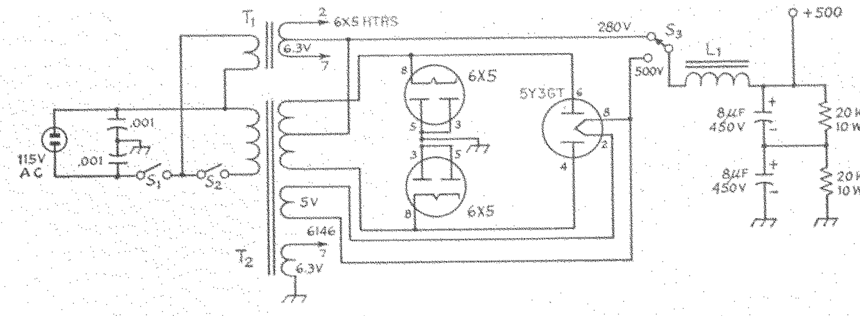


Fig. 6-66—Economy power supply for 6146 amplifier.

L_1—10.5 henrys, 110 ma., 225 ohms.
S_3—1-pole 6-position (2 used) wafer switch, non-shorting (Centralab 1401).
S_4—1-pole 6-position (2 used) steatite wafer switch, nonshorting (Centralab 2501).
T_1—Filament transformer, 6.3 volt, 1.2 amperes.
T_2—Power transformer, 360-0-360 volts, 120 ma., 6.3 volts 3.5 amperes, 5 volts 3 amperes (Stancor PC8410).

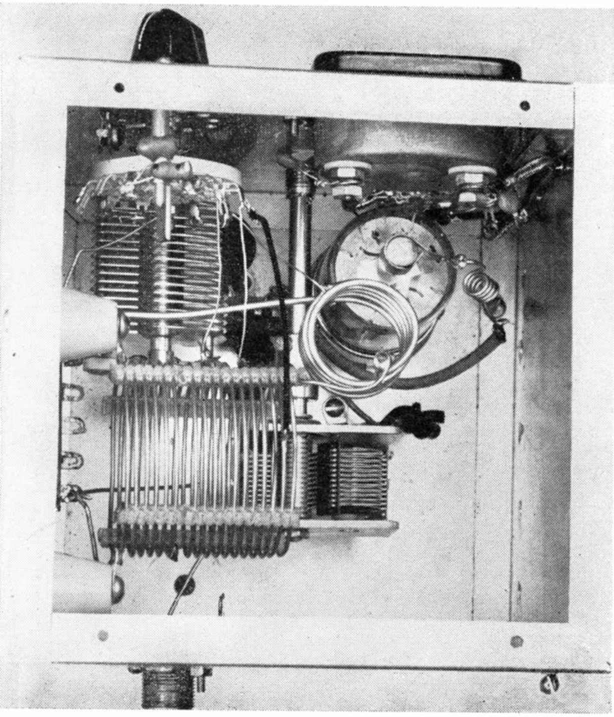


Fig. 6-67—This view shows the arrangement of components in the box. L_7 is supported by two lugs soldered to the end turn and fastened to 1-inch cone insulators centered 1¾ inches down from the top of the box. L_6 is supported at right angles to L_7 by soldering its top end to the inner end of L_7. The twisted insulated wires forming C_3 appear immediately in front of C_7 near the center.

receptacle similar to J_2 may be mounted at the rear.

Adjustment

The amplifier requires a driver delivering at least 2 watts. The usual v.f.o. will not drive it without an intermediate amplifier, such as a 6AQ5. However, most crystal oscillators operating at 300 volts should be adequate.

The first step in the adjustment is to neutralize the amplifier. The high-voltage line to the plate and screen should be disconnected temporarily at the high voltage terminal in Fig. 6-65. The exciter should be tuned up on the highest-frequency band available.

With the heater voltage only applied to the 6146, excitation should be applied, and C_1 adjusted to give maximum grid current. Then, with S_2 set to the same band as the grid circuit, and C_7 set at maximum capacitance, C_4 should be turned through its range. Unless the amplifier is neutralized, there should be a kick in the grid current at some point within the range of C_4. When this point has been found, the two insulated wires representing C_3 should be twisted together a bit at a time until the grid-current kick is brought to a minimum.

The high-voltage connection to the plate and screen may now be replaced. A 60-watt lamp may be connected across J_2 to serve as a dummy load during testing. With power and excitation applied, and C_7 at maximum capacitance, adjust C_4 for a dip in cathode current. Then reduce C_7 a little at a time, each time readjusting C_4 for the dip in cathode current. As C_7 is reduced, the dip in cathode current should become less pronounced and the load lamp should increase in brilliance. Continue these alternate adjustments until the cathode current at the point of dip is maximum, but do not allow it to exceed 150 ma.

The output circuit is designed to feed 50- or 70-ohm matched antenna systems. For other antenna systems, an antenna tuner should be used between the amplifier and the antenna. With an antenna replacing the dummy load, the adjustment procedure should be similar.

(Originally described in *QST*, August, 1956.)

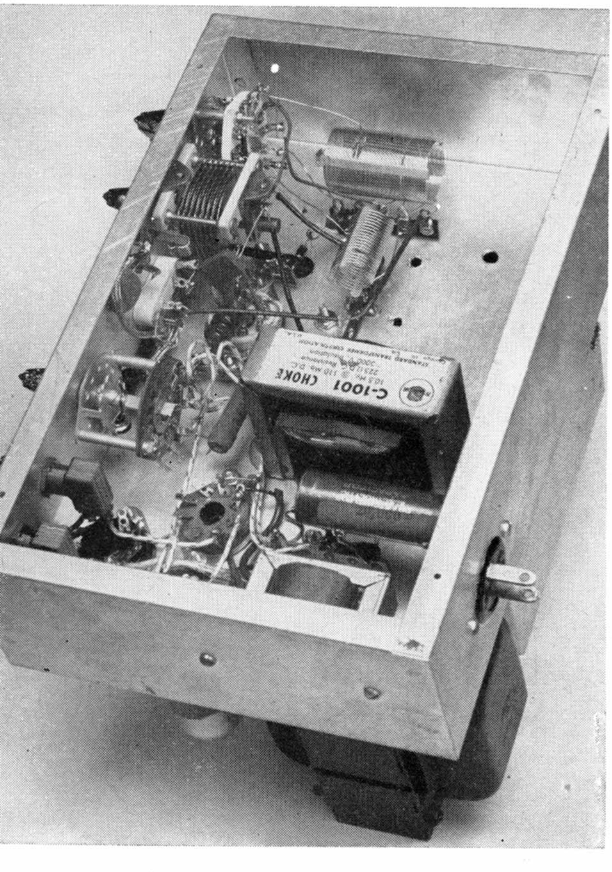


Fig. 6-68—The grid tank coils L_2 and L_4 are supported on soldering-lug strips to the rear of S_1 and C_1. Power-supply filter components are grouped in the lower right-hand corner.