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 input 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. C7 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.

RFC2, C8 and C9 are mounted on an insulated terminal strip to the left of the tube socket. The flexible plate lead to the 6146 is connected to RFC2 and C8 at this strip. The v.h.f. parasitic suppressor L6 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 C3. This capacitor is the neutralizing capacitor to stabilize the amplifier.

A crystal socket is used as the input connector J1, as shown in Fig. 6-66. If preferred, a coaxial
A 6146 Amplifier

Fig. 6-65—Circuit of the 6146 band-switching amplifier. All capacitances less than 0.001 µf. are in µuf. All unmarked bypasses are disk ceramic. All resistors are 1/2 watt unless otherwise specified. Filament and meter wiring should be shielded as indicated.

C1—100-µf, variable (Hammarlund MC-100-S).
C2—470-µf, mica.
C3—Neutralizing capacitor (see text).
C4—250-µf, variable (Hammarlund MC-250-S).
C5—400-µf, tub. ceramic (Centralab DC-401).
C6—820-µf, tub. ceramic (Centralab D6-821).
C7—400-µf, variable capacitor (broadcast replacement type).
C8—C9—Disk ceramic.

J1—See text.
J2—Coaxial receptacle (SO-239).
J3—Close-circuit key jack.
L1-L7—See coil data opposite.
M1—0-25-ma. d.c. milliammeter, 2½-inch square (Shurite).
RFC1, RFC2—1- or 2.5-mh, (National R-50).
RFC3, RFC4—1- or 2.5-mh, (National R-100).
S1, S2—Double-pole 6-position rotary switch (Centralab PA-2003).

COIL DATA

The coils L2-L5 are made from a single length of B & W Minitorque 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 1½ turns from each coil. This leaves two coils on the same support bars. Unwind 1½ turn at the end of the large coil. The 12-turn coil is L1 and the 42-turn coil is L2. Similar procedure is followed in making L3-L4.

L1—12 turns of No. 24, 1-inch diam., 32 turns per inch (B & W 3016).
L2—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 L3-L4.

L3—4 turns of No. 20, 3/8-inch diam., 16 turns per inch (B & W 3007).
L4—13 turns of No. 20, 3/8-inch diam., 10 turns per inch (B & W 3007).
20-meter tap is made at junction of L3-L4.
15-meter tap is made 1½ turns from junction of L3-L4.
10-meter tap is made 7½ turns from junction of L3-L4.
L6—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 L6-L7.
L7—17½ turns of No. 10, 2-inch diam., 10 turns per inch (B & W 3007-1).
15-meter tap is made 2½ turns from junction of L6-L7.
20-meter tap is made 5 turns from junction of L6-L7.
40-meter tap is made 9 turns from junction of L6-L7.

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

L1—10.5 henrys, 110 ma., 225 ohms.
S1—1-pole 6-position (2 used) wafer switch, nonshorting (Centralab 1401).
S2—1-pole 6-position (2 used) slewing wafer switch, nonshorting (Centralab 2501).

T1—Filament transformer, 6.3 volt, 1.2 amperes.
T2—Power transformer, 360-0-360 volts, 120 ma., 6.3 volts 3.5 amperes, 5 volts 3 amperes (Stancor PCE410).
Fig. 6-67—This view shows the arrangement of components in the box. L₃ is supported by two lugs soldered to the end turn and fastened to 1-inch cone insulators centered 1½ inches down from the top of the box. L₄ is supported at right angles to L₃ by soldering its top end to the inner end of L₃. The twisted insulated wires forming C₃ appear immediately in front of C₃ near the center.

receptacle similar to J₂ 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 C₁ adjusted to give maximum grid current. Then, with S₂ set to the same band as the grid circuit, and C₇ set at maximum capacitance, C₄ 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 C₄. When this point has been found, the two insulated wires representing C₃ 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 J₂ to serve as a dummy load during testing. With power and excitation applied, and C₇ at maximum capacitance, adjust C₄ for a dip in cathode current. Then reduce C₇ a little at a time, each time readjusting C₄ for the dip in cathode current. As C₇ 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.

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Fig. 6-68—The grid tank coils L₃ and L₄ are supported on soldering-lug strips to the rear of S₁ and C₁. Power-supply filter components are grouped in the lower right-hand corner.