

A COMPACT 3-400Z GROUNDED-GRID AMPLIFIER

The amplifier shown in Figs. 6-60 through 6-64 easily handles a kilowatt p.e.p. input at 3000 volts. It has been designed with ease of construction and operation in mind, and to this end as few special parts and machine operations as possible are required. Probably the major operation is adding an arm to the band switch, to ground a plate padding capacitor in the 3.5-Mc. position. This enables a smaller plate tuning capacitor to be used than would be the case if the variable were required to furnish all of the capacitance on this lowest-frequency band.

Referring to the wiring diagram in Fig. 6-61, the circuit is about as simple as it could be made. No tuned input circuit is used, since it was found that any of the s.s.b. units in the 75- to 100-watts output class could drive it without any trouble. If drive were marginal, as when only 35 watts peak were available, a coupling network might offer a slight advantage. Two r.f. chokes and a 1000-pf. bypass are used in the high-voltage lead because a high-impedance circuit like this is harder to filter than one where the current is higher and the voltage is lower. The plate coil is a standard 500-watt unit that runs cold at a kilowatt c.w. or s.s.b.

The 50,000-ohm resistor in the center tap of the filament transformer biases the tube to cut-off during "stand-by" periods and eliminates the "diode noise" caused by the static plate current. Leads to J_4 and J_5 from the VOX or other control short the resistor during transmit periods.

The connections on J_6 are similar to those on the 3-1000Z amplifier shown later in this chapter, with the exception of the lead marked "vm". This variation permits mounting the voltmeter on

the transmitter panel instead of in the power supply. The power supply design is similar to that for the larger amplifier, with the exception of the power transformer (600 va.), more filter capacitance and more compact rectifiers. The smaller transformer costs 60 per cent of the larger; it is highly recommended unless one plans some day to move up to the 3-1000Z amplifier.

Front and back panels and base plate are all standard unfinished $\frac{1}{8}$ -inch thick aluminum rack panels. They are trimmed to 15 inches. The angle stock holding the pieces together, and furnishing the faces for support of the cover, are $\frac{3}{4} \times \frac{3}{4} \times 1/16$ -inch Reynolds stock. A short piece is also used for supporting the fan, cut away as shown in Fig. 6-71.

The tube socket (Eimac SK-410) is held to the tapped base plate by long 6-32 screws. Prior to installation, one-half of the skirt is removed, so that the fan can move air under the socket and cool the pins (see Fig. 6-64). The three grid pins are grounded to individual soldering lugs.

To conserve space, the filament transformer must be modified so that the leads come out the side. This is done by removing the end bells and drilling a hole in the side through which the leads can be threaded.

To modify switch S_1 , first remove the rear shaft bearing and replace the ceramic insulators with shorter ($\frac{1}{2}$ -inch) ones. Two pairs of $\frac{1}{8}$ -inch polystyrene washers (Millen 38601) can be used to expose the end of the switch shaft. A brass shaft coupling, cut to a length of $7/16$ inch, is drilled and tapped 6-32 at right angles to the normal set-screw hole. The spring stock (0.20 x $\frac{3}{8}$ silver solder) is wrapped half around the

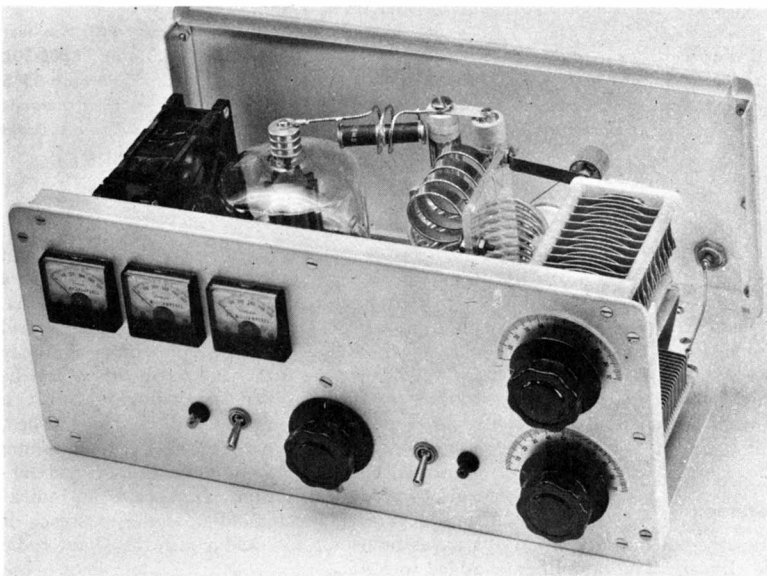


Fig. 6-60—The compact kilowatt amplifier with its perforated-metal cover removed. Using a 3-400Z in a grounded-grid circuit, it handles a kilowatt p.e.p. input at 3000 volts with ease. The (2-inch) meters monitor plate voltage, grid current and plate current. Panel is 7 X 15 inches; the bottom plate is $8\frac{3}{4}$ inches wide. (Built by Robert Smith, WILLF, Simsbury, Conn.)

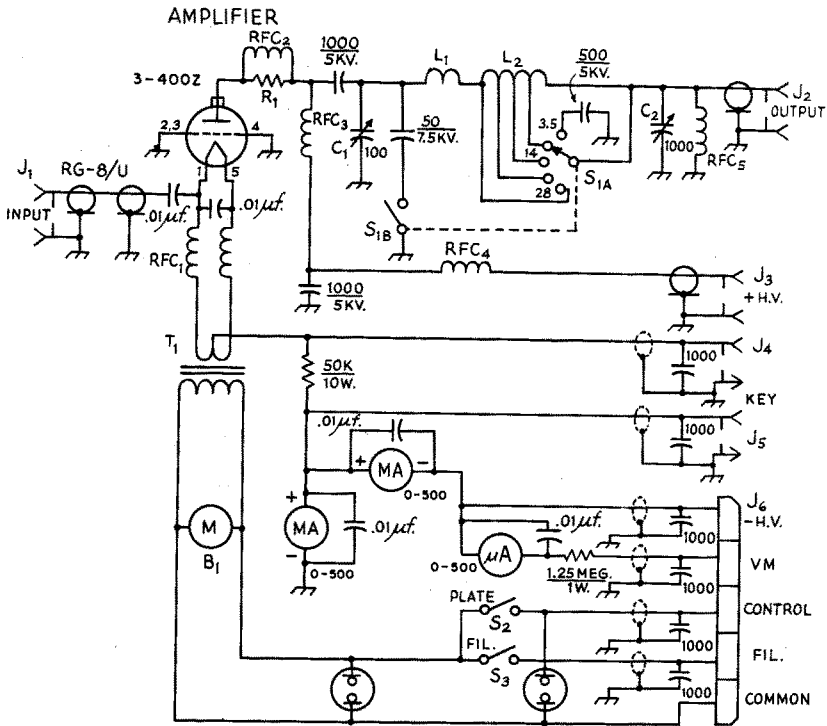


Fig. 6-61—Circuit diagram of the kilowatt grounded-grid amplifier.
Unless specified otherwise, capacitances are in picofarads.

B₁—65 c.f.m. fan (Rotron Whisper, with Rotron 16415 plug-in cord assembly).

C₁—100-pf. variable, 0.125-inch spacing (Johnson 154-14).

C₂—1000-pf. variable, 0.045-inch spacing (Johnson 154-30, available direct from manufacturer).

J₁, J₂—Coaxial receptacle (Dow-Key DK-60P).

J₃—Coaxial receptacle UG-560/U (Amphenol 82-805).

J₄, J₅—Phono jack.

J₆—Octal male connector (Amphenol 86-CP8 in 61-61 shell).

L₁—4 turns 3/8-inch strap, 1 1/2 diam.

L₂—20 turns No. 10, 3-inch diam. 11 turns at L₁ end, 4 t.p.i.; remainder 6 t.p.i. Tapped 1, 3, 5 and 11 turns from L₁ end. (L₁ and L₂: Illumitronics 195-1).

R₁—Two 43-ohm thermistors in series (CG 25-926).

RFC₁—24 double turns No. 14 Formvar or Nyclad, closewound on 5 3/4-inch length of 1/2-inch diam. ferrite rod (Lafayette Radio 32 R 6103).

RFC₂—2 turns No. 14, 1 1/4 inch diam., 2 t.p.i., on L₁.

RFC₃—90-μh. 500-ma. r.f. choke (B & W 800).

RFC₄, RFC₅—2.5-mh. 300-ma. (National R-300U).

S₁—2-pole 6-position (5 used) heavy-duty ceramic switch (Radio Switch Corp. type 86-B, Marlboro, N.J.) See text.

S₂, S₃—Heavy-duty toggle switch.

T₁—5-v. 13-ampere transformer (Triad F-9A). See text.

50-pf. 7 1/2-kv. capacitor is Centralab 850S-50Z.

500- and 1000-pf. 5-kv. capacitors are disc ceramic.

1000-pf. and 0.01-μf. capacitors are disc ceramic.

Meters are Simpson Model 1212. Dial lights are Drake Econoglow 117 with 100K resistor.

coupling and fastened at two points with short 6-32 screws through the new hole. The original set screw is left exposed. (Silver solder is available at welding supply houses; the type used here is called "Handy Harmon Easy Flow"). The fixed contact is supported by a ceramic insulator mounted on the base plate. "Time" the switch so that it engages as the switch is rotated from the 7- to the 3.5-Mc. position.

Adjustment

An output indicator is a useful adjunct when tuning a grounded-grid linear. The amplifier

should be tested with a dummy load, to acquaint the builder with the tuning. If the drive is a steady carrier, adjust the amplifier for 330 ma. plate current (at 3000 volts) and 100 ma. grid current. If sufficient test equipment is available for the "two-tone test", this adjustment can be confirmed or modified accordingly. With a dummy load connected and with C₂ half meshed, switching to 28 Mc. and setting C₁ at minimum capacitance should give no indication of grid current (with no excitation). If there is an indication of grid current, it indicates the existence of a parasitic oscillation, and a turn may have to be added to RFC₂.

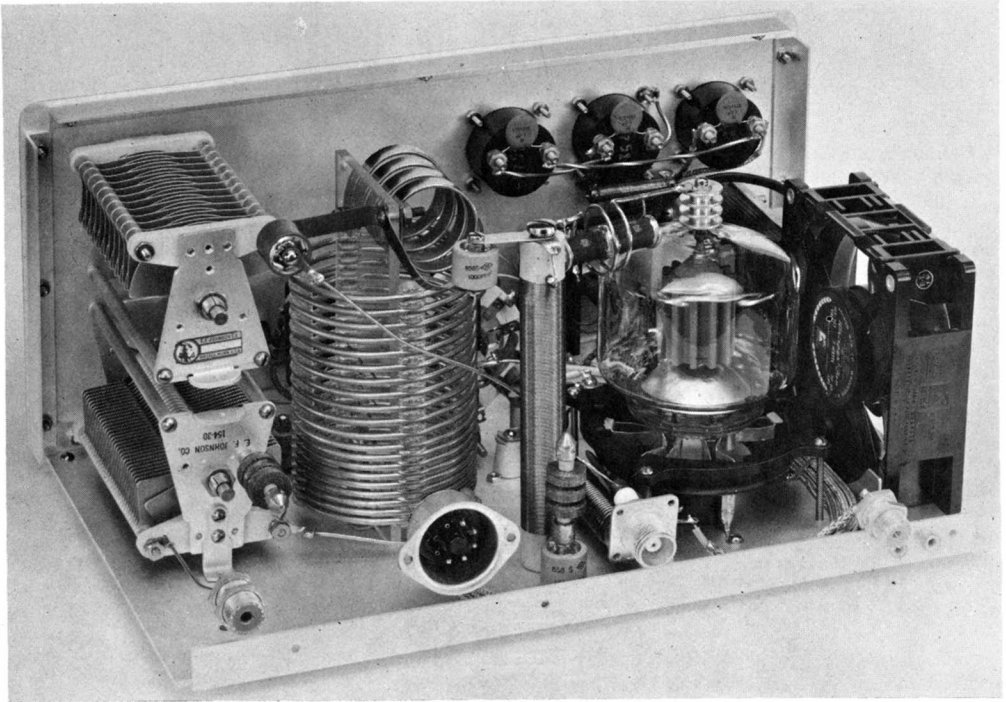
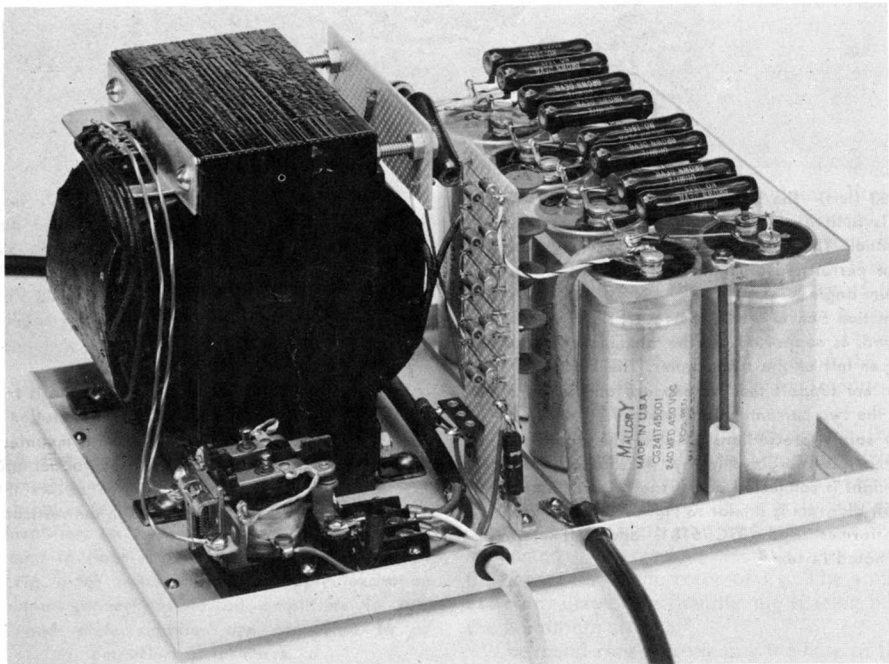


Fig. 6-62—The rear wall of the compact kilowatt has been removed to reveal the "works." Coaxial receptacles at left are output and input jacks; receptacle at center (near tube) is high-voltage connector. A 50-pf. 3.5-Mc. plate loading capacitor can be seen mounted on the plate tuning capacitor (upper left); the 500-pf. 3.5-Mc. output loading capacitor is mounted on the base behind the coil (just visible to right of variable loading capacitor).



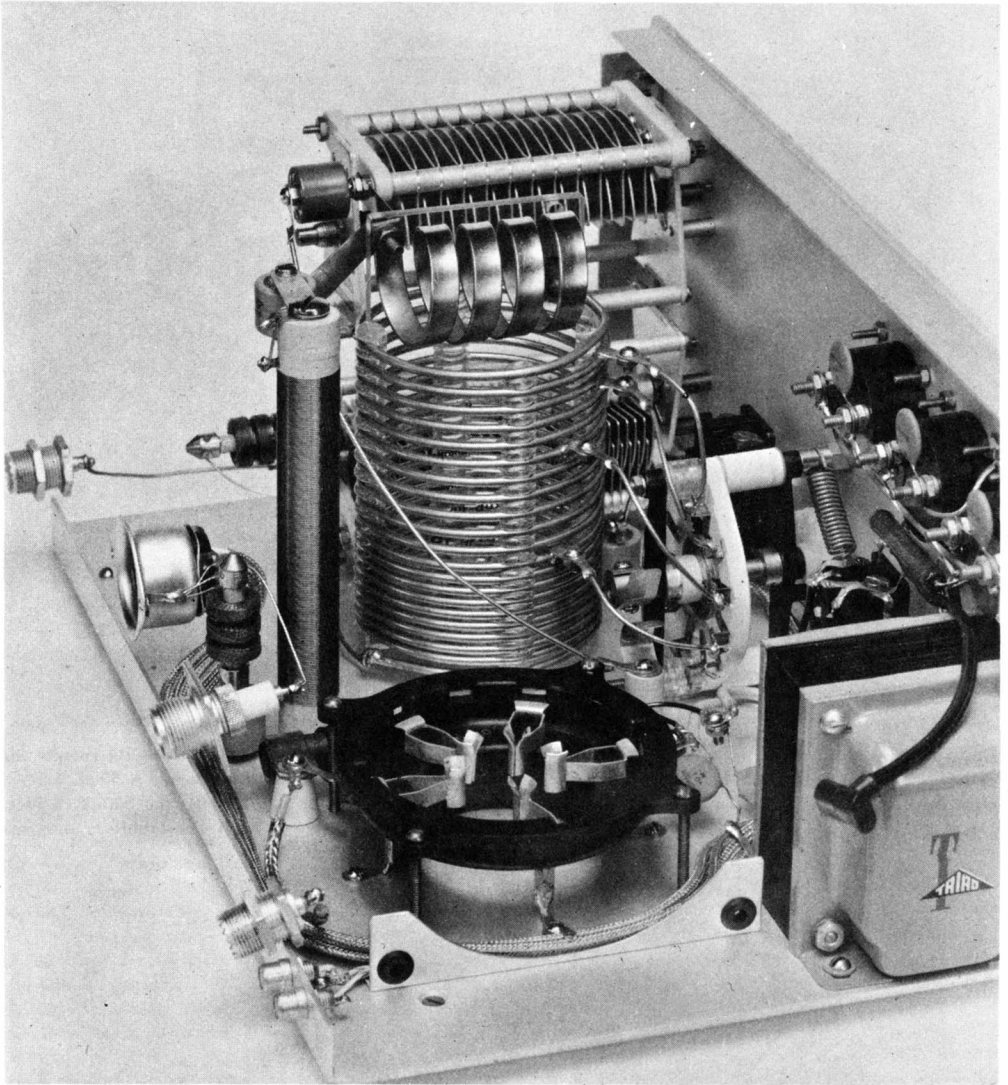


Fig. 6-63 (left)—The power supply for the 3-400Z amplifier is built on a 12-inch length of 8 $\frac{3}{4}$ -inches high rack panel. The four sides, which take a protective cover of perforated aluminum, are made from $\frac{3}{4}$ x $\frac{3}{4}$ aluminum angle.

A junction box to which the four primary leads are connected, is supported by the aluminum bracket on the upper left of the transformer. The bolts that hold this bracket support the Vectorboard on the right that carries the two current-limiting resistors.

As a safety precaution, to alert the operator that the primary is energized (relays do stick on occasion), a pilot light is connected across the primary leads.

Circuit diagram is similar to Fig. 6-90, with exception of transformer used (BTC 6181) and voltmeter connected noted in text.

Fig. 6-64 (above)—Close-up view with the tube and fan removed discloses details of switch S_{1B} . It is made from a brass shaft coupling and a length of silver solder; in the 3.5-Mc. position it contacts a fixed arm and grounds the 50-pf. fixed capacitor (upper left).

Mounting plate for fan is trimmed away for maximum ventilation under tube socket. The fan is mounted on a piece of $\frac{1}{4}$ -inch foam rubber and held in position by two screws through rubber grommets in the vertical plate.