



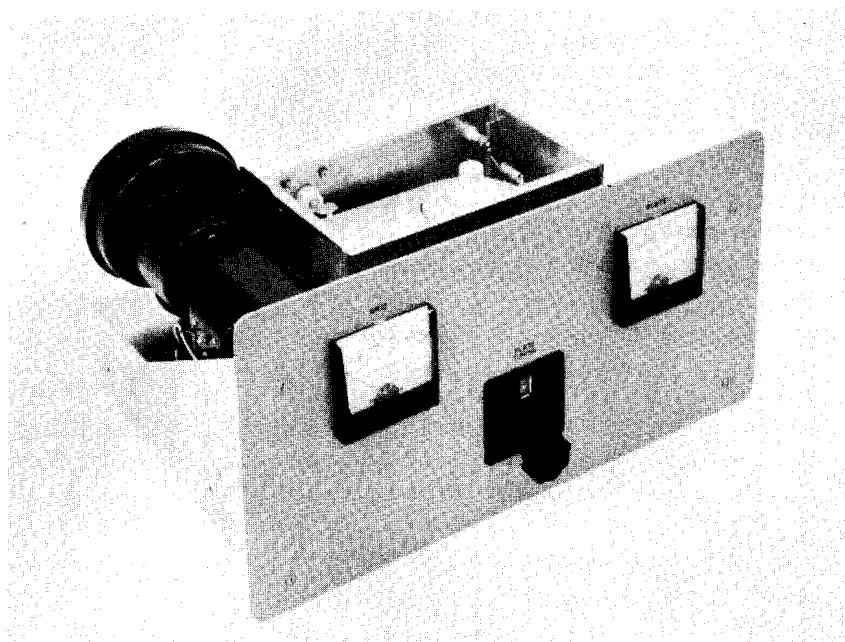
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TWO KILOWATT 432 MC AMPLIFIER USES EIMAC 3CX1000A7

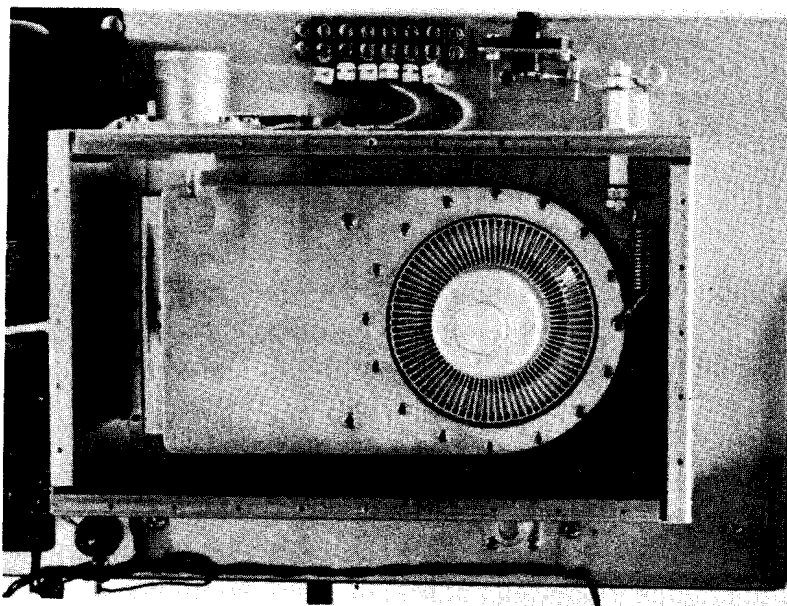
The 3CX1000A7 ceramic zero bias triode runs two kilowatts (PEP or continuous service) in this compact 432 Mc linear amplifier. The 3CX1000A7 is an external anode, ceramic version of the popular 3-1000Z. This experimental circuit uses a half wavelength strip line plate circuit and a tuned input configuration for efficient cathode driven (grounded grid) operation. Power gain of this amplifier is about 8 decibels and overall plate efficiency is approximately 50 percent.

The strip line plate inductor is an 1/8-inch thick copper rectangle 4-3/8" wide and 7-3/4" long. The rounded end of the plate encircles the anode of the 3CX1000A7 and is fastened to it by a matching copper collar having flexible finger stock silver-soldered to its inner circumference. The collar is bolted to the strip line which, in turn, is supported at the center by two 2" high ceramic insulators. The end of the plate opposite the tube is tuned by means of a copper flipper hinged to the chassis and moved to and fro by an arm and worm gear arrangement shown in the illustration. The antenna circuit is capacitively coupled at this end of the strip line.

The EIMAC SK-870 Air Socket and Chimney grounds the multiple grid terminals of the 3CX1000A7. Four of the filament terminals are bypassed to the ground ring of the socket with 220 $\mu\mu\text{f}$ silver mica capacitors. The filament terminal to which drive is applied is bypassed to the socket ground bolts by a 3 $\mu\mu\text{f}$, 5 KV ceramic capacitor to neutralize the inductance of the internal filament leads of the tube, thereby reducing the s.w.r. on the coaxial line to the driver.



Zero bias triode 3CX1000A7 runs two kilowatts in 432 Mc strip line amplifier. Blower and filament transformer are mounted at end of chassis, with tube and plate circuit enclosed in box atop the chassis. Plate tuning capacitor is worm driven by counter dial centered on panel.



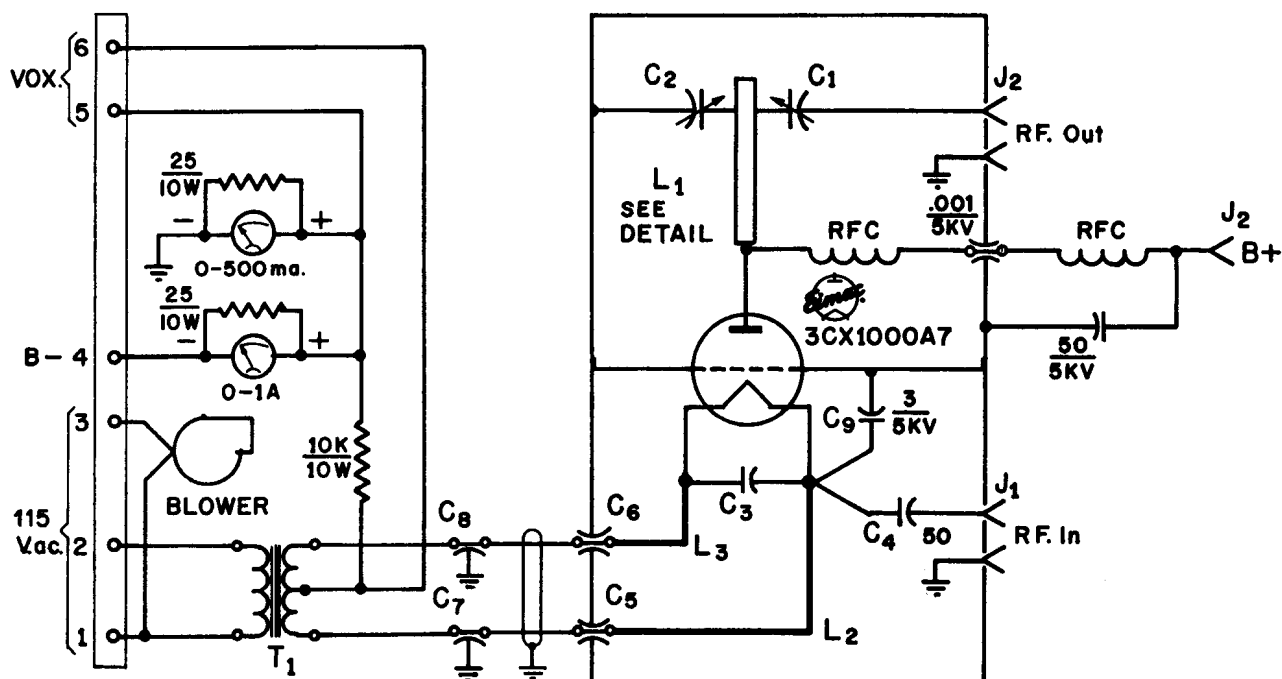
View of strip line circuit. The half wavelength line is supported by two ceramic insulators (see bolt heads near center of plate). Anode of 3CX1000A7 is encircled by copper collar bolted to strip line. Inner circumference of collar is lined with flexible finger stock. Plate r.f. choke is at left, and antenna capacitor plate is mounted to the coaxial plug at right. Edge of plate tuning capacitor is visible below strip line. Grid coaxial receptacle is behind enclosure, on chassis.

The resonant filament lines run from the socket terminals to feedthrough capacitors mounted on a nearby aluminum bracket. From this point, the leads run in shielded braid to the feedthrough capacitors mounted on the chassis deck.

The top plate of the above-chassis enclosure is made of perforated aluminum for proper ventilation. Air is blown into the pressurized under-chassis area and escapes via the tube socket, passing over the anode of the 3CX1000A7 and out the perforated top of the enclosure.

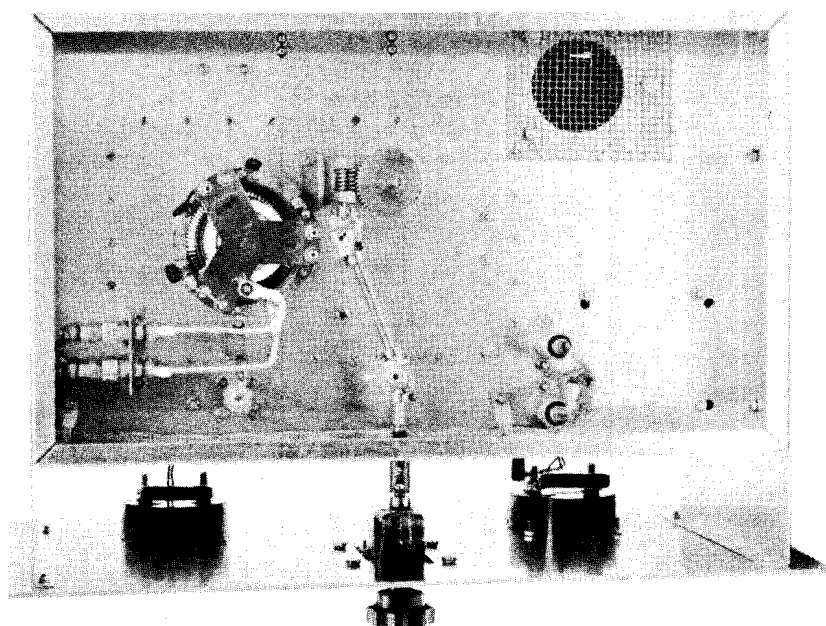
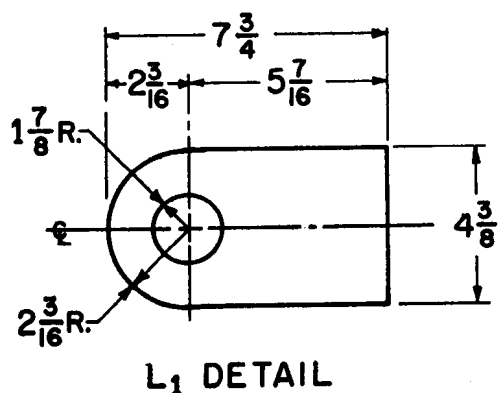
Amplifier Adjustment. The filament lines and plate line may be grid-dipped to 432 Mc with the 3CX1000A7 in the socket and no voltages applied. For initial adjustment a dummy load and power output meter are required, as plate current dip is not a true indicator of performance. Reduced plate voltage and grid drive are applied to the amplifier. The plate circuit is resonated and the coupling capacitor C-1 adjusted for maximum power output. The plate of capacitor C-1 is silver-soldered to the center pin of the coaxial receptacle and the mounting holes of the receptacle are slotted. The receptacle is mounted in an oversize hole and coupling is adjusted by loosening the bolts and moving the receptacle about in the mounting hole. Capacitors C-1 and C-2 are adjusted for maximum power output. Coupling exists between input and output circuits and, while the amplifier remains stable, the grid current varies abruptly depending upon plate circuit tuning and loading. Grid current should be about 40 percent of the plate current. It may be necessary to experiment with the value of the neutralizing capacitor to obtain optimum grid drive. Either a 3 μf or a 5 μf capacitor may be used. A variable capacitor is not recommended at this point as the internal inductance of such a unit is too high.

Once the amplifier is properly tuned and loaded, the filament voltage should be reduced to the minimum value that will provide full output (about 4.7 volts or so), as VHF backheating tends to raise cathode temperature above normal. Standby bias is incorporated in the amplifier and is removed for proper operation by shortening terminals 5 and 6 on the power strip.



SCHEMATIC, 3CX1000A7 AMPLIFIER FOR 432 MC

- C-1: Coupling capacitor. Copper tab 1" x 5/8" spaced approximately 1/2" from plate line. Tab is supported by copper rod 0.188" diameter, soldered in center pin of coaxial receptacle J-2 (rod may be center conductor taken from RG-17/U coaxial line).
- C-2: Tuning capacitor. Copper tab 1" x 4" spaced about 1/4" to 3/8" from plate line. Tab is portion of longer strip bent in an inverted "L" with brass hinge at bottom. Hinge is jumpered with copper shim to provide low impedance ground path. Tab is moved by an excentric arm and 3/8" diameter teflon drive rod driven by worm gear (see drawing).
- C-3: 220 μ f dipped silver mica (4 required) mounted from heater terminals to socket ground ring.
- C-4: 50 μ f. Centralab 850S-50Z.
- C-5, C-6: 200 μ f, 30 amp. capacity. Erie 482-463-10.
- C-7, C-8: 0.01 μ f, 30 amp. capacity. Sprague 80-P3.
- C-9: 3 μ f. Centalab 855-3Z. Grounded to two thru-bolts of the socket assembly. Connect bolts in parallel and to one side of capacitor.
- RFC: 15 turns #16, 1/4" diam., 1-1/8" long. Socket: Eimac SK-870.
- J-1: UG-58/A. J-2: UG-352/U. T-1: 5 volts at 30 amp. Stancor P-6468.
- B: Blower. 80 cubic ft./min. Dayton 1C-180. Box: 6" x 4" x 10".



Filament lines and feedthrough capacitors are at lower left, with grid coupling capacitor below the lines. Filament bypass capacitors are soldered between ground ring of socket and filament terminals. Neutralizing capacitor is soldered between filament terminal (lower left of socket) and the two ground bolts atop socket flange. Plate circuit worm drive is to the side of the socket, and filament feedthrough capacitors are at right.

When antenna coupling is too heavy, resonance indication will be very broad and output will be low. When coupling is too light, a sharp resonance will be noted, combined with severe fluctuations in grid current as the plate circuit is tuned. When properly loaded, maximum power output will be achieved with the plate circuit slightly detuned from resonance point.

The output circuit of the amplifier is designed for RG-17/U coaxial line. Teflon dielectric RG-225/U is recommended for the drive line. At 2 KW input (3000 volts at 667 ma) power output is nearly 1000 watts measured at the load. Drive power is approximately 170 watts. Maximum test power was 3.2 KW (4000 volts at 800 ma) and power output was 1.5 KW. Plate dissipation was 1.7 KW, considerably over rated continuous value.

