

**Top View:** In this illustration the blower and filament transformer locations are seen to be in the left hand shielded compartment at the rear of the chassis. In the same compartment, from left to right, are the 0A2 regulator, 6AG7 oscillator and 6V6 doubler. The 4CX300A amplifier is in the right-hand compartment, along with the plate circuit components.

## Compact, Powerful 6-METER RIG

Uses Eimac Ceramic 4CX300A



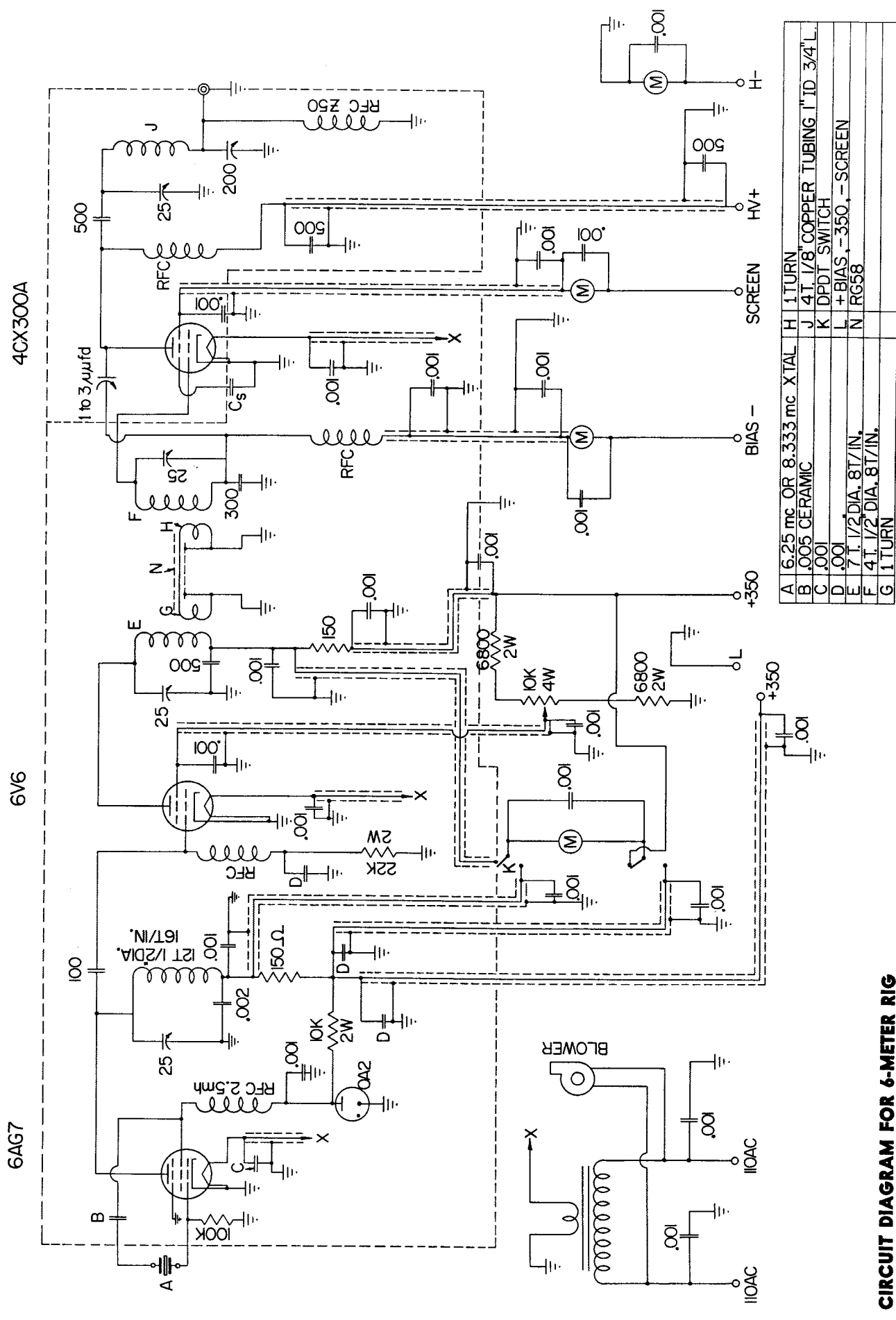
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The transmitter shown in the photographs is a three stage crystal controlled RF unit capable of running 625 watts input CW or 300 watts AM phone on 50 mc. The tube line-up is a 6AG7 oscillator-multiplier, 6V6 doubler, and a 4CX300A amplifier.

The 6AG7 crystal oscillator is used in a modified Pierce circuit with the plate circuit tuned to 25 mc. Crystals in either the 6 or 8 mc range work satisfactorily without circuit changes. The screen voltage is regulated at 150 volts by means of a 0A2. The 25 mc output is capacity coupled to the following doubler.

The doubler stage uses a 6V6GT in a conventional circuit. The screen voltage is adjustable from

*(Continued on page 4)*



A	6.25 mc OR 8.333 mc	X TAL	H	1 TURN
B	.005 CERAMIC		J	4T 1/8" COPPER TUBING 1" ID 3/4" L.
C	.001		K	DPDT SWITCH
D	.001		L	+BIAS, -350, -SCREEN
E	7T 1/2 DIA. 8T/IN.		N	RG58
F	4T 1/2 DIA. 8T/IN.			
G	1 TURN			

CIRCUIT DIAGRAM FOR 6-METER RIG

the front of the panel by a potentiometer; by this means the drive to the final amplifier is controlled. The output from the plate circuit is transferred to the grid circuit of the final amplifier by link coupling through a short length of RG-58U. Inductive coupling through two tuned circuits is necessary in order to minimize the coupling of 25 mc, 75 mc and higher harmonics to the final amplifier grid.

The 4CX300A final amplifier stage uses a pi network plate circuit. The tube is neutralized by means of a bridge circuit which is completed to ground by the 200 mmfd tuned grid circuit "by-pass" condenser. The neutralizing capacity is obtained by presenting a  $\frac{1}{2}$  inch by  $\frac{1}{2}$  inch surface adjacent to the anode of the tube, the separation being about  $\frac{3}{8}$  inch. This condenser can be seen in the top view of the transmitter, appearing as a small bracket next to the 4CX300A and toward the front panel. The 4CX300A is mounted in an Eimac SK-710 socket, a socket which has a built-in screen by-pass condenser and is designed for the tube.

The entire RF unit is enclosed in an aluminum box measuring 14 inches wide by 10 inches deep by  $6\frac{1}{2}$  inches high. It is supported from a standard 7 by 19 inch panel with four 2-inch long pillars, thus allowing the mounting of meters outside of the RF fields. The top of the box and the small portion of the bottom directly below the final amplifier plate tuning condensers are covered by perforated aluminum sheet. The chassis portion has a solid aluminum sheet bottom cover making possible pressurization by the blower, the air escaping through the SK-710 socket and the Eimac SK-606 chimney and cooling the 4CX300A anode. A small shield has been placed in one corner of the enclosure in order to prevent the radiation of harmonics via the terminal strip connections; a close-up view of the under side of the chassis with the corner shield removed shows the details of the bypassing of the terminal strip leads.

The blower used for cooling is a home brew device. An L-R No. 2 squirrel cage blower is driven by a phonograph motor which turns at about 3300 RPM. The unit moves enough air to adequately cool the tube up to about 150 watts plate dissipation, but would be inadequate for the full 300 watt rating. However in neither the keyed CW mode (625 watts input) or the AM mode (300 watts input) does the average plate dissipation exceed 100 watts.

For AM phone the final amplifier is plate modulated. As with other tetrodes it is necessary to provide modulating voltage to the screen. A choke of 10

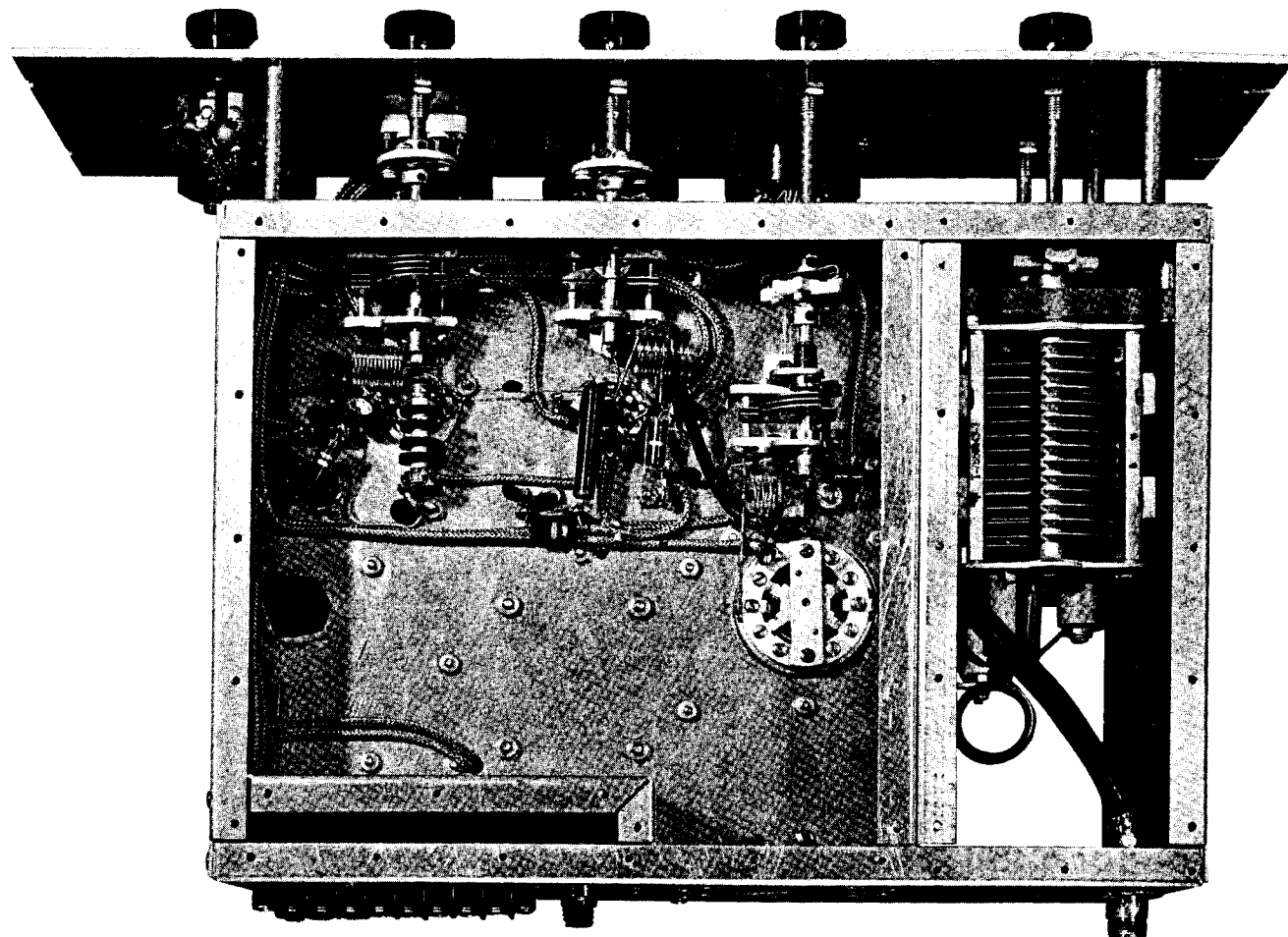
henrys or more in series with the screen supply circuit does give adequate modulation but the maximum is somewhat less than 100 percent. Correct operation can be achieved only by applying audio voltage directly to the screen from a tap on the modulation transformer or from a separate low power modulator capable of up to 5 watts output. A single 6V6 will supply more than enough power. It is important that the screen and plate modulation be correctly phased! A simple reversal of the leads from the screen or plate modulator (but not both) will indicate the proper phasing.

Four meters are used to indicate the currents drawn by the various stages. One measures the plate current of either the oscillator or the doubler: a double pole double throw switch connects the meter to the desired circuit. Individual meters are used in the grid, screen and plate circuits of the final amplifier. It will be noticed that plate current is measured in the negative lead from the high voltage supply. This requires that the negative lead of the high voltage supply not be connected to ground at any point in the power supply.

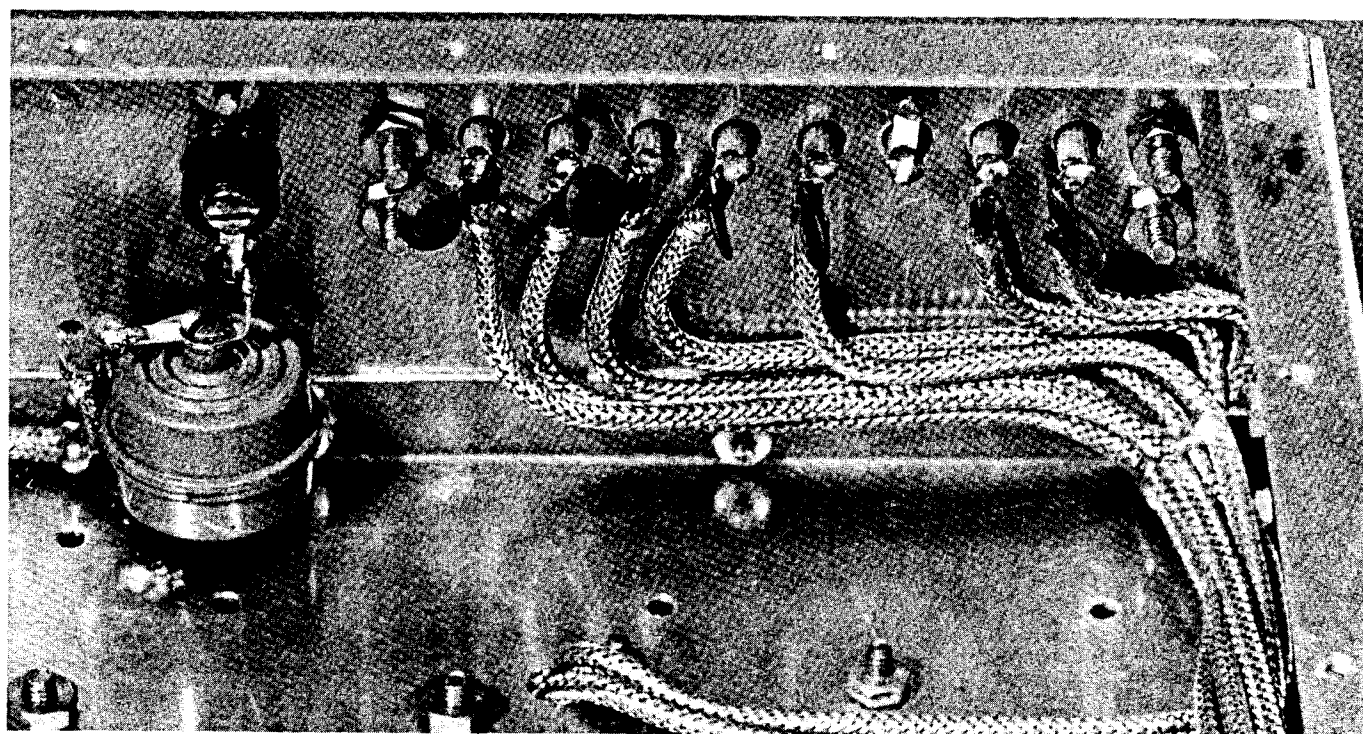
Although the oscillator and the doubler stages operate at the same plate voltage, separate terminal strip power connections are provided. This is done so that a suitable keying point is available for CW operation. Keying is done by breaking the plate and screen voltage to the doubler, allowing the oscillator to run continuously; breaking the circuit must be done using a suitable filter in order to suppress key clicks.

Three power supplies are needed. A 350V supply capable of 125 ma will power the oscillator, doubler and the amplifier screen—the correct screen voltage being obtained through a series dropping resistor. The amplifier plate supply can be at any voltage up to 1500 for phone and up to 2500 for CW at a current of 250 ma. The amplifier grid bias supply should apply -90 volts to the grid, and should be capable of withstanding 30 ma of grid current without serious loss of voltage regulation.

It is important that screen voltage never be applied to the amplifier unless plate and grid bias voltages are also on the tube. It is permissible to apply or remove all voltages simultaneously. Similarly the amplifier should never be operated lightly loaded unless the drive power is also reduced. The above applies to all tetrodes and pentodes and failure to observe these precautions will cause excessive screen dissipation, resulting in very short tube life.



**Bottom View:** The tuning condensers visible in this view, from left to right, are oscillator plate circuit, doubler plate circuit, final amplifier grid circuit and the final amplifier plate loading condenser. The tube sockets are for the 0A2, 6AG7, 6V6 and the 4CX300A. The blower exhaust into the chassis is at the extreme left. The small shield in the lower left hand corner of the chassis encloses the terminal strip connections.



**Bottom View—Terminal Strip:** By-passing details of power input terminal strip. The high voltage terminal and associated by-pass condenser are shown at left.