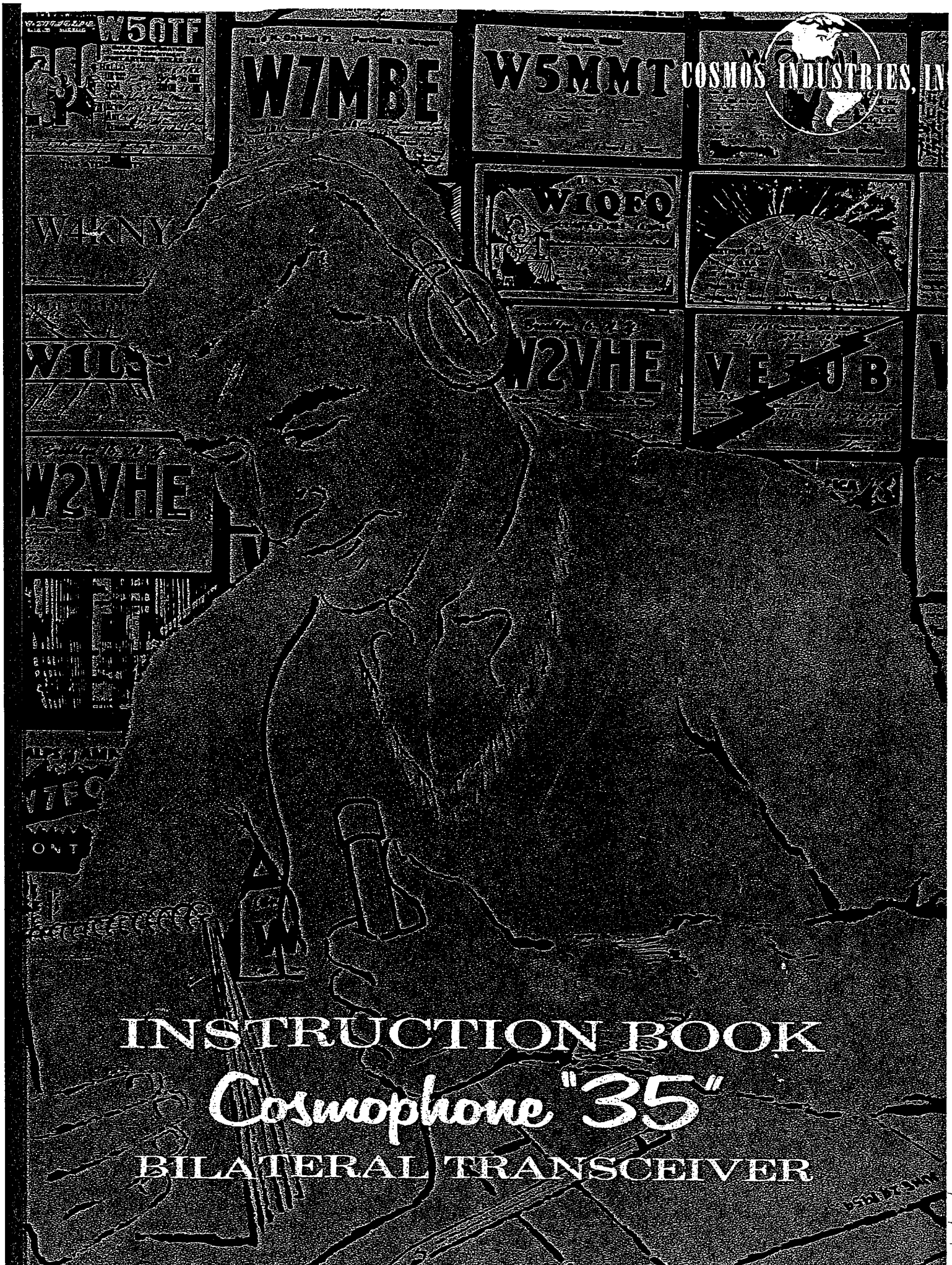

INSTRUCTION BOOK

Cosmophone "35"

BILATERAL TRANSCEIVER

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BILATERAL TRANSCEIVER

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SECTION I
DESCRIPTION

1.1 GENERAL

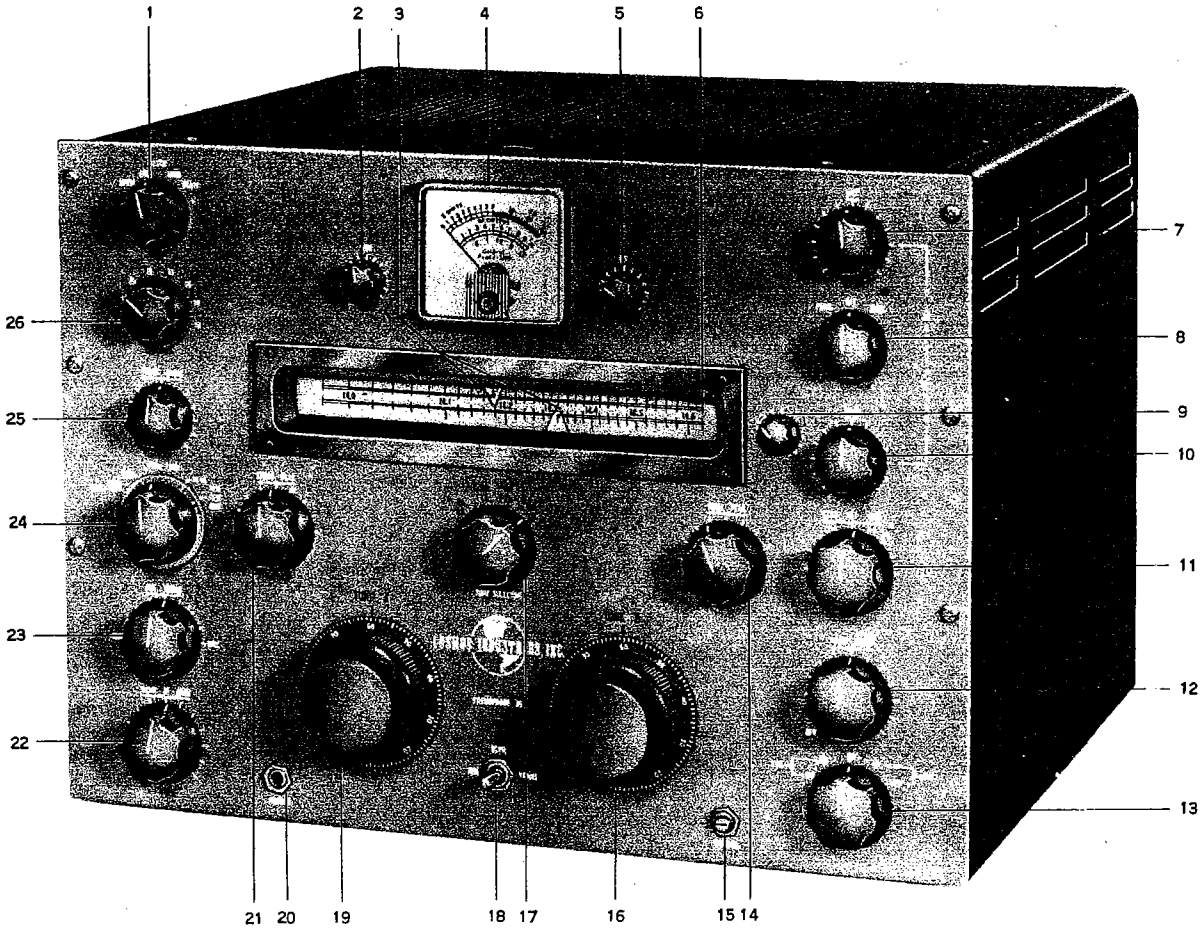

FIGURE 1. COSMOPHONE "35" – OPERATING CONTROLS

The Cosmophone "35" (*figure 1*) is a 35 stage bilateral receiver-transmitter, capable of transmitting or receiving SSB (single sideband), CW, and AM signals on the 10,11,15,20,40 and 80 meter bands. Dual tuning controls, TUNE A and TUNE B, (19 and 16), provide the convenience of transceiver operation plus the flexibility of being able to receive and transmit on separate frequencies. Furthermore, the transmit and receive frequencies can be instantaneously interchanged by rotating a TUNE SELECTOR control (17). Bands are selected by a bandswitch (26) on the front panel. For each position of the bandswitch, a drum type frequency indicating dial (6) is rotated so that it will present the proper scales. Two identically calibrated scales are presented for each band. Each scale has its own frequency indicating pointer (3) that is moved by a corresponding tuning control. The related scale, scale pointer, and tuning control are readily identified by means of matched colored markings. The positions of the TUNE SELECTOR control are also coordinated with the same set of matching colors. Movement of the dial drum, in the horizontal plane, for purposes of calibration, is accomplished by means of a dial calibration knob (9). The type of emission is selected by an emission switch (13). Either upper (UP) or lower (LOW) sideband can be selected in the SSB or AM positions of the emission switch. AM transmission is SSB with carrier inserted. The carrier level is regulated by a front panel CARRIER control (15).

The unit is highly selective, employing a narrowband mechanical filter as well as a peak-null Q-multiplier circuit that has manually operated amplitude (AMP) and frequency (FREQ) controls (7 and 10). The PEAK, NULL, or OFF positions of the multiplier are selected by a switch (8). AVC as well as manual gain has been applied to the RF and IF receiver amplifier stages. A RCVR RF GAIN control (22) is located on the front panel. A single meter (4) presents rf-volts, grid and plate currents, as well as S-meter indications. A METER SWITCH (1), selects the desired meter function.

Vox and antitrip circuitry provide as smooth an

operation as is possible. The vox and antitrip levels are regulated by VOX and QT front panel controls (2 and 5). Switching from receive to transmit or vox operation is readily achieved by means of a three-position toggle switch (18).

Other front panel controls include receive and transmit audio (12 and 25), receive and transmit peaking (14 and 21), receiver antenna trimming (11), transmitter antenna tuning (23), and a FINAL TANK control (24). A phone jack (10), designated PHONES, is located at a convenient place on the panel.

1.2 EXTERNAL CONNECTIONS

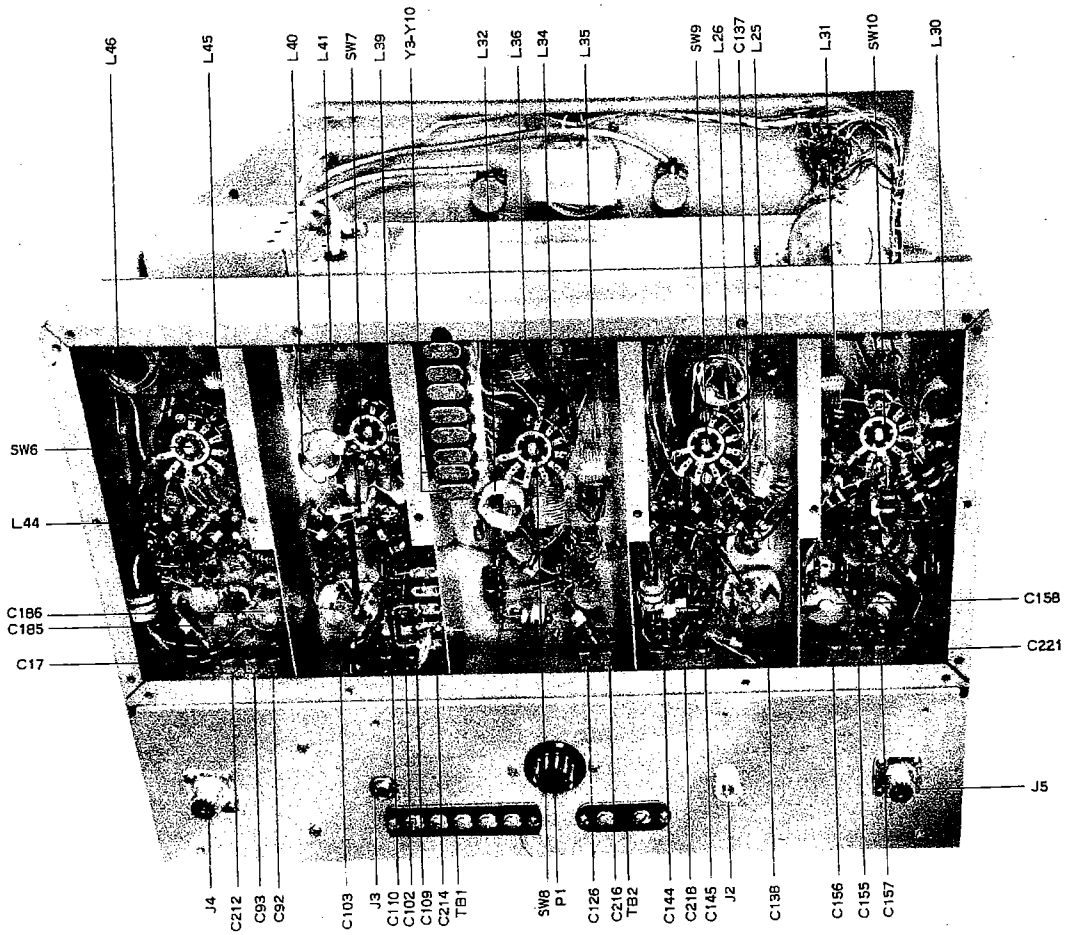

FIGURE 2. COSMOPHONE "35" – REAR VIEW

All external connections except phones, are made at the rear of the unit *(refer to figure 2)*. A cover over the rear apron has been marked so that the connections are easily identified. Receiving and transmitting antennas are to be connected to the two connectors (J-4 and J-5) labeled RECEIVE ANTENNA and TRANSMIT ANTENNA. A key jack (J-3), designated KEY, and a connector (J-2), designated MICROPHONE, are the connection points for a key and microphone. Power is brought into the unit through a power plug receptacle (P-1). A terminal board, TB-1, having five terminals, serves as the point for speaker attachment. Another terminal board, TB-2, having two terminals, has been provided for the attachment of an antenna relay. The correct method of attaching an antenna relay to the terminal board is shown schematically in *figure 3*.

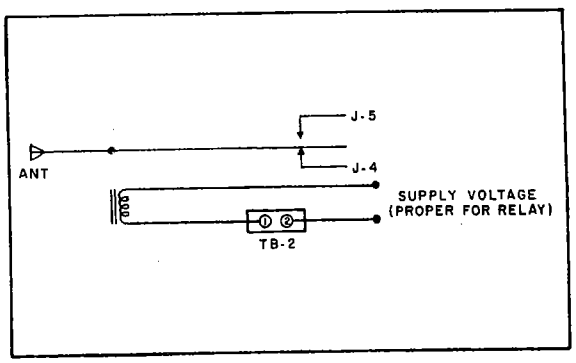

FIGURE 3. CONNECTING ANTENNA RELAY

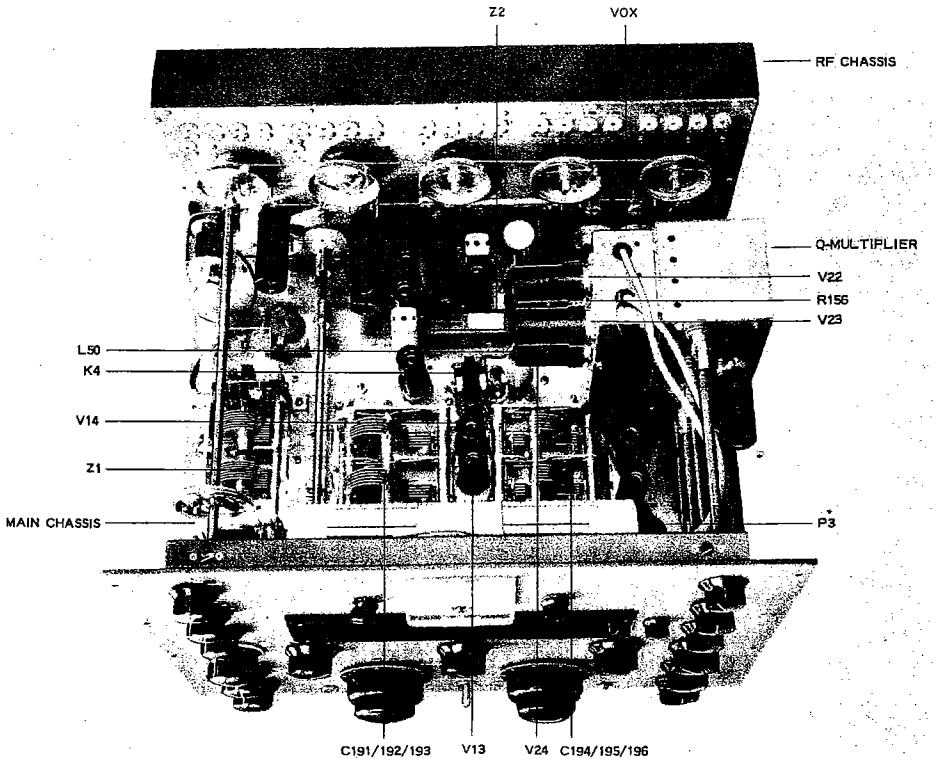

FIGURE 4. COSMOPHONE "35" – TOP VIEW

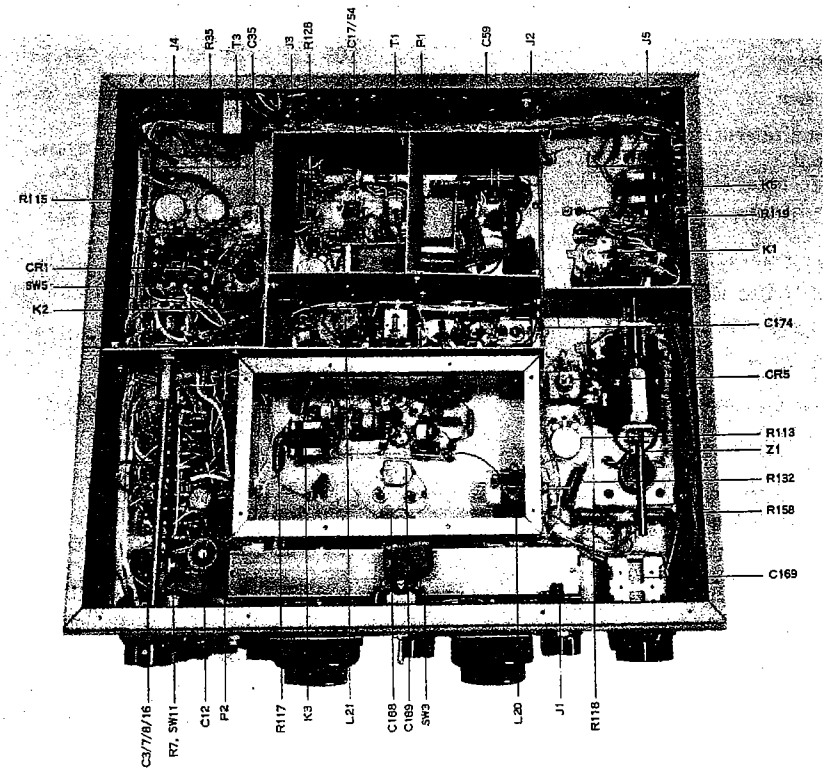

FIGURE 5. COSMOPHONE "35" – BOTTOM VIEW

1.3 INTERNAL ARRANGEMENT

When viewed from the top, with the VFO cover and variable IF shield removed *(figure 4)*, it will be seen that the unit is made up of a main chassis and three subchassis. The RF-chassis is at the rear of, and extends upward from the main chassis. This strip has the receive and transmit RF circuitry mounted upon it as well as five bandswitch pulleys. Another, much smaller chassis, extends upward from the right side of the main chassis near the center. This is the Q-multiplier chassis. It has the components of the Q-multiplier circuitry mounted on it. The third subchassis, the vox subchassis, is mounted on the Q-multiplier chassis. It serves to mount the components of the vox and antitrip circuits. A cord, extends from the bottom of the vox chassis and plugs into a receptacle on the main chassis. By unplugging the cord and removing the hardware that attaches the vox chassis to the Q-multiplier chassis, the vox chassis can readily be removed from the unit. The portions of a variable frequency oscillator that are located on the top of the main chassis are covered by two shields (*not shown on figure 4*). When the shields are removed, the variable condensers associated with the TUNE A and TUNE B controls are visible. The components mounted on top of the chassis are identified by their reference symbols that are silkscreened on the chassis. Some of the major components are further identified in *figure 4*. *Figure 5* is a bottom view of the unit. Some of the major components seen from this aspect are also identified on this figure.

1.4 PERFORMANCE AND CHARACTERISTICS

Table I lists, in tabular form, the pertinent information relative to the performance and characteristics of the Cosmophone "35".

TABLE I
PERFORMANCE AND CHARACTERISTICS

Item	Description	
Frequency Range	Band (meters)	Range (MC)
	10	28.0 – 28.6
	10	28.5 – 29.1
	10	29.1 – 29.7
	11	26.9 – 27.5
	15	21.0 – 21.6
	20	14.0 – 14.6
	40	6.9 – 7.5
	80	3.5 – 4.1
Emission	SSB, CW, AM	
Line Input	105-120 volts AC, 50-60 cps, 330 watts	
Power Output	35 watts	
Power Requirements		
Filament	6.3 volts AC or DC at 13 amps.	
Low Voltage, Plate	300 volts DC	160 ma
Low Voltage, Plate (regulated)	210 volts DC	45 ma
High Voltage, Plate	600 volts DC	100 ma
Bias (regulated)	–150 volts DC	25 ma
Number of Tubes Used	24	
Impedances		
RF		
Receiver Input	nominally 35 to 100 ohms	
Transmitter Output	nominally 35 to 100 ohms	
AF		
Microphone Input	high impedance	
Speaker Output	3.2 ohms	
Frequency Stability, overall	500 cps	
Selectivity	3.1 KC/6 DB, 6.6 KC/60 DB	
Receiver Sensitivity	1 microvolt at 6 DB S/N ratio	
Dial Accuracy	±1 KC after calibration	
Tuning Knob Ratios	20:1 and 100:1	
Size	17" wide x 12" high x 15" deep	
Weight	Cosmophone "35" – 57¾ pounds, 66 pounds (pkgd.)	
	Power Supply "PS-35" – 35½ pounds, 41 pounds (pkgd.)	

SECTION II
THEORY OF OPERATION

2.1 TRANSMITTER BLOCK DIAGRAM

The transmitter *(refer to block diagram, figure 6)* takes audio signals from the microphone through speech amplifier and cathode follower stages to a balanced modulator where they are mixed with the injection from a 455 KC oscillator to produce a fixed IF signal. The oscillator output is brought to the balanced modulator through a phase inverter. From the balanced modulator the fixed IF signal is passed through a grounded grid stage to a mechanical filter where one sideband is removed. The now, SSB IF signal, is amplified and then mixed with the injection from a variable frequency oscillator (VFO) in an intermediate mixer to produce a variable IF. The VFO output is brought to the intermediate mixer through a cathode follower stage. The SSB variable IF signal is then brought to a set of balanced mixers where it is heterodyned with the output of a high frequency oscillator to produce the desired RF signal. The RF signal is passed to the antenna through a driver, an output amplifier, and a final tank.

A portion of the AF signal is passed from the output of the speech amplifier to a VOX amplifier, a VOX rectifier, and then to a relay amplifier.

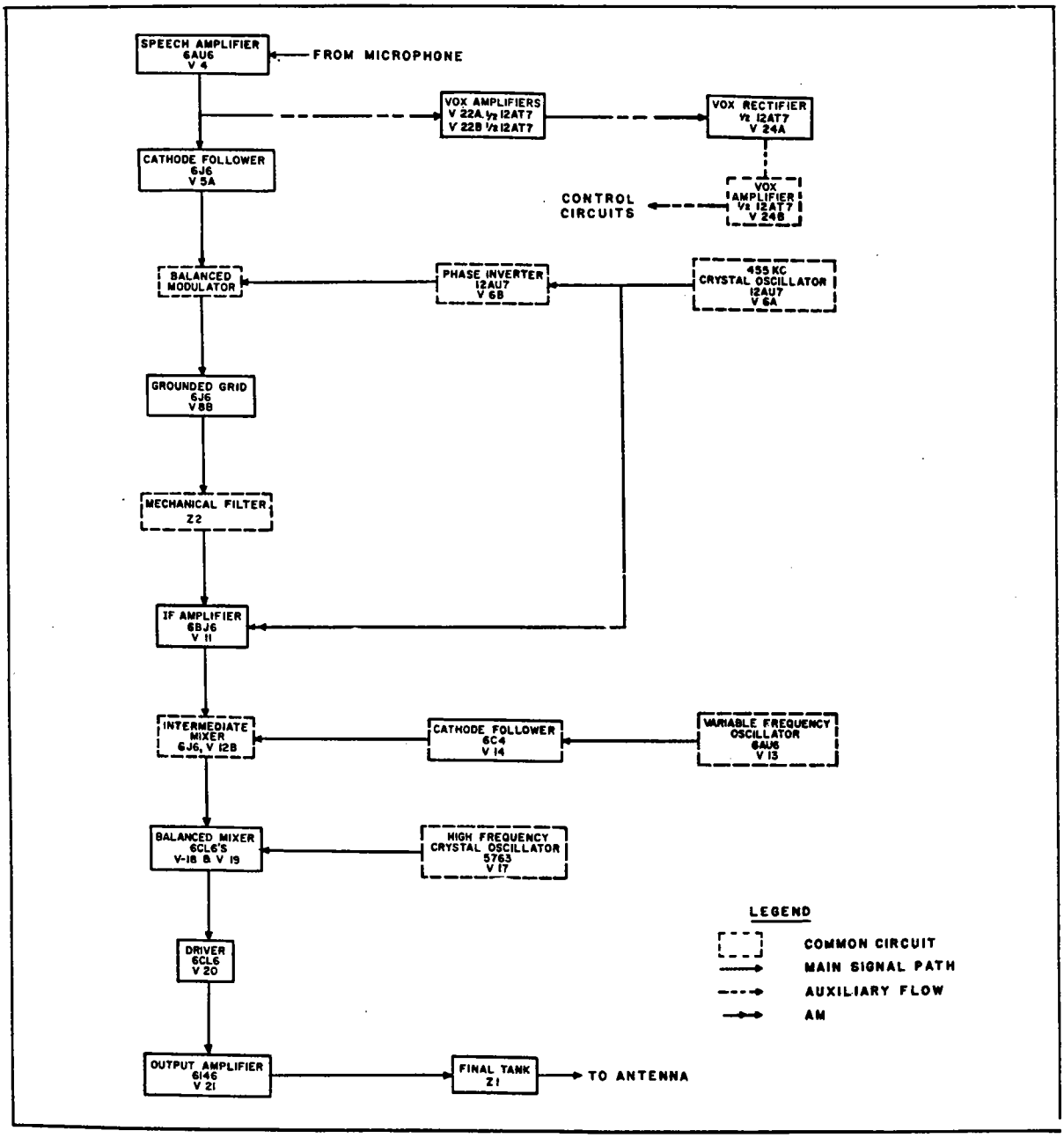

FIGURE 6. TRANSMITTER BLOCK DIAGRAM