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INSTRUCTION BOOK

FOR

TRANSMITTER, MODEL RT-1-B

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INSTRUCTION BOOK
FOR
TRANSMITTER, MODEL RT-1-B

Warning!

HIGH VOLTAGE IS USED IN THE OPERATION OF THIS EQUIPMENT.

DEATH ON CONTACT MAY RESULT IF OPERATING PERSONNEL FAIL TO OBSERVE SAFETY PRECAUTIONS.

RESTRICTED

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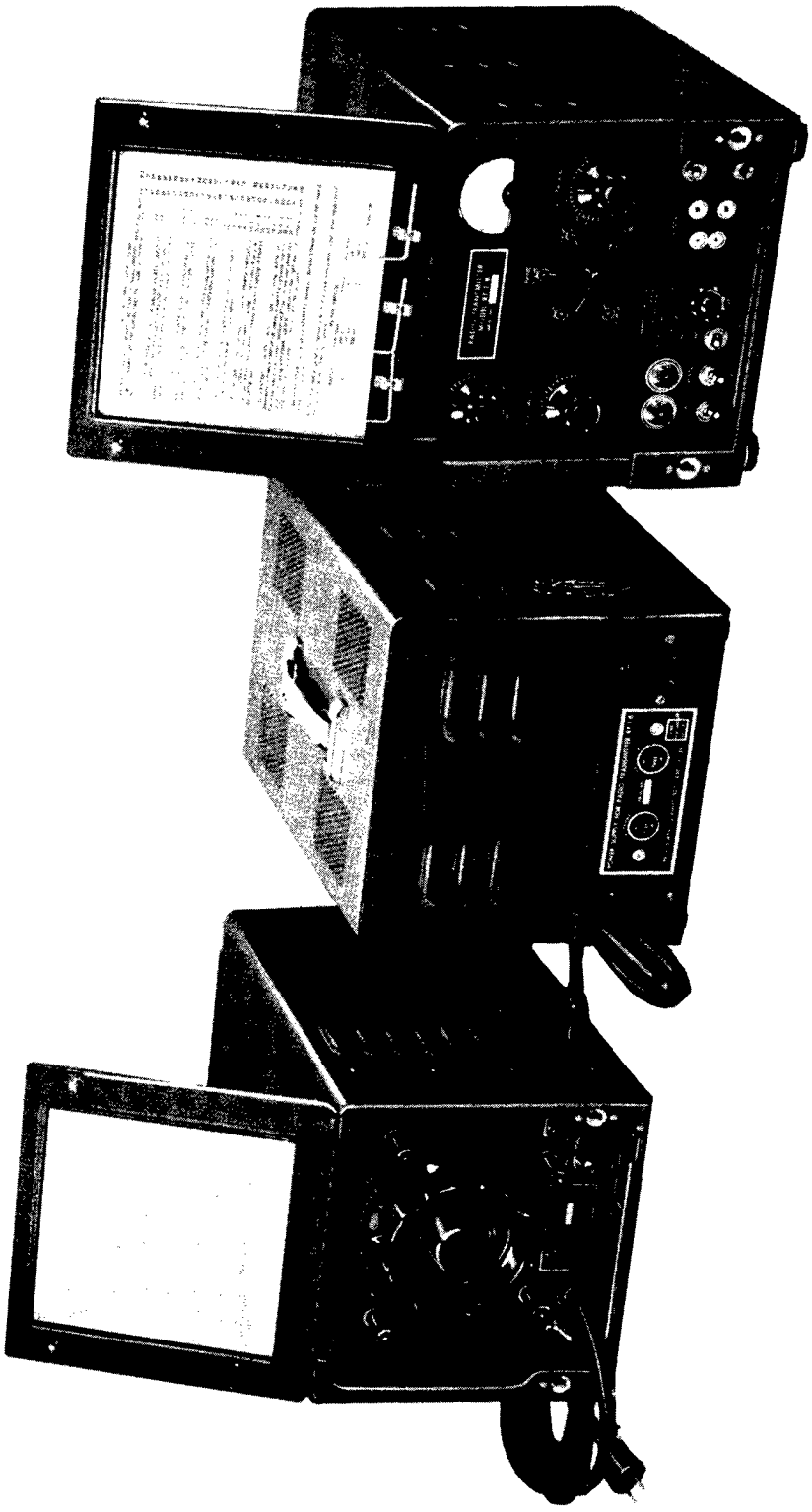


RADIO TRANSMITTER RT-1-B

FIGURE 1 COMPLETE STATION

GENERAL DESCRIPTION.

(a) The Model RT-1-B equipment described in this instruction book is a C.W. transmitter, in three units, rated at 100 watts output, and covering the frequency range of 3 to 30 megacycles in 5 bands. The three units are:

(1) Transmitter.

(2) Power Supply.

(3) Accessory Unit (For line voltage control and housing spare parts and accessories).

(b) All controls except the main "ON-OFF" switch and those used to adjust the equipment to match the available line voltage are located on the front panel of the transmitter unit.

(c) All units are interconnected by self-contained attached cables.

(d) The transmitter can be adjusted to match any single wire unbalanced antenna of from 50 to 1500 ohms impedance or a balanced antenna of 72 ohms impedance.

(e) The overall weight of the equipment ready for use is approximately 130 pounds. (In carrying cases, approximately 190 pounds).

(f) Carrying cases are provided for each unit.

TRANSMITTER RT-1-B

A. SPECIFICATIONS

A-1. Transmitter

Power Input: 1350 volts D.C. at 200 ma.
500 volts D.C. at 100 ma.
115 volts A.C., 50 to 400 cycles

Frequency Range: 3 to 30 megacycles, in 5 bands

Frequency Control: Crystal or Variable Oscillator (external unit)

Available Inputs:
(a) Jack for telegraph type key (Identified as "Key")

(b) Connector for Variable Frequency Oscillator and Radioteletype. (Identified as "V.F.O. Input")

Available Outputs: Terminals from keying relay to key a Variable Frequency Oscillator simultaneously with the transmitter oscillator and intermediate amplifier stages.
Jacks for single wire, unbalanced, antennas.
Jacks for balanced 72 ohms antenna.

Power Output: 100 watts, 3 to 21 megacycles.
75 watts, 21 to 30 megacycles.

Tube Complement:

1 - JAN 6AC7	Oscillator-Multiplier
1 - 2 E26	Intermediate Amplifier
1 - 4-65A	Power Amplifier
1 - JAN 6Y6G	Screen Voltage Regulator
1 - JAN VR-150	Voltage Regulator

Physical Dimensions: 14" x 10" x 9" (exclusive of carrying-handle)

Weight: 30 1/2 pounds
50 1/2 pounds in carrying case

A-2. Power Supply.

Power Input: 115 volts, A.C., 50 to 400 cycles;
430 watts at 60 cycles with a power factor of 95%
425 watts at 400 cycles with a power factor of 97%

Power Output: 1350 volts D.C. at 200 ma. } Through
500 volts D.C. at 100 ma. } Power cable
115 volts A.C., 50 to 400 cycles
115 volts A.C., 50 to 400 cycles at
200 watts (service outlet)

Tube Complement:

1 - JAN 5R4GY	Low voltage rectifier
2 - JAN 816	High voltage rectifiers

Physical Dimensions: 14" x 10" x 9" (exclusive of carrying handle)

Weight: 60 1/2 pounds
80 1/2 pounds in carrying case

A-3. Accessory Unit.

Power Input: Two ranges:
90 to 140 volts A.C., 50 to 400 cycles
or, 180 to 280 volts, A.C., 50 to 400 cycles

Power Output: 115 volts A.C., 50 to 400 cycles, at 500 watts. ("Transmitter Only" outlet)
and, 115 volts A.C., 50 to 400 cycles, at 300 watts. (Duplex "Service" outlet)

Physical Dimensions: 14" x 10" x 9" (exclusive of carrying handle)

Weight: 39 pounds
59 pounds in carrying case

Direct Equipment Spare Parts:

1 JAN 6AC7 Tube	4 Pilot bulbs, 6V
1 2E26 Tube	4 Pilot bulbs, 115V
1 4-65A Tube	10 Fuses, 5 amperes
1 JAN VR-150 Tube	10 Fuses, 2 amperes
1 JAN 6Y6G Tube	10 Fuses, 10 amperes
1 JAN 5R4GY Tube	10 Fuses, 3 amperes
2 JAN 816 Tube	1 Knob, 1" with pointer
1 Keying Relay	1 Knob, 1 1/2"
4 Banana plugs (double, insulated)	1 Knob, Band Switch
	1 Connector, Coax.
	1 Adapter, Coax.

B. OPERATING INSTRUCTIONS.

B-1. Operating Conditions:

Ambient temperature range: -5°C to +55°C. (-40°C for storage)

Ambient humidity range; up to 90%

Duty:

The ratings are for continuous duty. In the case of On-Off Keying, a 50% duty cycle is assumed. In the case of frequency shift (Radiotele-type, Paragraph B-8) additional ventilation is recommended.

Line voltage and frequency ranges: 90 to 140 and 180 to 280 volts A.C. at 50 to 400 cycles per second.

B-2. Installation (see figure 1)

Placement of units:

The transmitter is designed for operation on the operator's desk or table. (For remote keying see paragraph B-6 "Keying"). Interconnecting leads between the three units are six feet long, permitting placement of the Power Supply and Accessory Unit either on or under the table, the Accessory Unit to be within six feet of a power outlet.

All units must have good ventilation to prevent overheating. Caution must be exercised to insure that none of the ventilation screens in the units are obstructed.

The transmitter must be located as close as possible to the antenna lead-in to the room, and to an adequate "ground". (See paragraph B-4, "Antennas").

When connecting the three units together and connecting the Accessory Unit to the power line, it is very important to comply with the instructions located inside the front cover of the Accessory Unit. (figure 2)

B-3. Crystals

Any crystal which is equal in frequency to the output frequency or which is equal to exactly 1/2, 1/3 or 1/4 of the desired output frequency may be used. Cleaner keying is generally obtained when using crystals cut to a sub-multiple of the desired output frequency than with those cut to the fundamental frequency. Do not attempt to use crystals which are intended for "over tone" operation. Generally "overtone" crystals bear name plate frequencies above 10 megacycles.

B-4. Antennas.

For single frequency operation a half-wave doublet antenna with a transmission line of 72 ohms impedance, twin-lead or twisted pair, is recommended. This lead-in would be connected to the transmitter antenna jacks marked "Link".

For coverage of several random frequencies a single wire of any length greater than 5/8 of a wavelength at the lowest operating frequency may be used; however, an electrical length of an integal number of exact half-wave lengths may render proper loading impossible. If loading trouble is encountered at some particular frequency, add to the antenna length approximately 1/8 to 1/4 wavelength of wire at that frequency. If such treatment results in loading trouble at another frequency, a second antenna will be required.

A good ground connection, with the lead to the ground as short as possible, is required to complete the antenna installation.

A "good ground" may consist of a metal spike or post driven approximately 6 feet into moist earth or of a connection to existing buried pipes, such as water supply pipes. Where the conditions are not suitable for this type of ground, such as in a desert area or on very rocky soil, a counterpoise may be used. The counterpoise should consist of at least one but preferably several equal length wires 1/4 wave length or longer at the lowest used frequencies, installed close to and insulated from the ground, directly under the antenna, and spread out fanlike in several directions, each at equal height from the ground.

Note: Double banana-type plugs are supplied with the Transmitter spare parts for antenna and ground connections.

B-5 Tuning.

The operator should be thoroughly familar with the "Tuning instructions" and chart located on the inside surface of the front cover of the Transmitter, before attempting to operate the Transmitter. (See figures 3 and 4).

After completing the tuning as outlined by these instructions, a more efficient adjustment of the excitation control sometimes can be obtained by retuning the excitation control slightly to obtain a slight increase in power amplifier plate current. This is possible when the power amplifier grid current exceeds 12-15 milliamperes. The reduction in grid drive to the optimum value actually results in higher power amplifier output and improved efficiency.

B-6 Keying.

A keying relay is incorporated in the transmitter to provide for more positive keying and also to allow for remote position keying. The mimi-

mum necessary keying line current is 5.5 milliamperes. An extra set of contacts provided in the relay may be used to key an external Variable Frequency Oscillator simultaneously with the Transmitter. Connections to these contacts are terminals available on the left side of the chassis, identified as "KEY-GND-MUTE". The "Key" contacts are normally open and the "Mute" contacts are normally closed. (See figure 8). A jack is provided on the front panel identified as "Key" for insertion of the key plug.

Break-in operation is possible since the crystal oscillator is keyed. The "Mute" contacts may be used to reduce the sensitivity of the receiver during transmitting as follows: A resistance high enough in value to reduce the sensitivity of the receiver to a low level for monitoring the transmitter signals is installed in series between the receiver sensitivity control and chassis ground. The "Mute" and "Gnd" terminals are wired to connect across this resistor. The "Gnd" lead must be connected to the receiver chassis ground. Under "keyup" ("receive") conditions, the "Mute" contacts are closed, thus shorting out the resistor and returning the receiver sensitivity to normal.

It is recommended that the transmitter and receiver antennas be separated as much as possible to reduce the possibility of damaging the receiver by the high power output of the transmitter.

B-7. Variable Frequency Oscillator Operation.

To operate using an external Variable Frequency Oscillator for frequency control, set up the Transmitter and Variable Frequency Oscillator as follows:

1. Connect the output of the Variable Frequency Oscillator through a coaxial cable to the "V.F.O. Input" receptacle on the right side of the Transmitter. (See figure 7).

2. If it is desired to key the Variable Frequency Oscillator simultaneously with the Transmitter, connect the keying leads or terminals of the Variable Frequency Oscillator to the "Key" and "Gnd" terminals located on the left side of the Transmitter.

3. Connect the key to the Transmitter front panel "Key" jack and set the "Xtal-V.F.O." switch to the "V.F.O." position.

4. Tune the Variable Frequency Oscillator to a sub-multiple (1/2 or 1/3) of the desired Transmitter output frequency. Do not attempt to operate the Transmitter on the fundamental frequency of the Variable Frequency Oscillator. Approximately .1 watt of signal power is required.

5. With the key "closed", tune up the Transmitter as described in the "Transmitter Tuning Instructions".

B-8. Radioteletype Operation.

For Radioteletype operation, set up the Transmitter and Radioteletype Exciter (frequency shift oscillator or other type) as follows:

1. Connect the output of the Radioteletype Exciter through a coxial cable to the "V.F.O. Input" receptacle located on the right side of the Transmitter chassis.

2. Set the "Xtal-V.F.O." switch to the "V.F.O." position. The key jack must be in the closed position (no plug inserted in the jack).

3. Tune the Radioteletype Exciter to a sub-multiple (1/2 or 1/3) of the desired Transmitter output frequency. Do not attempt to operate the Transmitter on the fundamental frequency of the Exciter. Approximately .1 watt of signal power is required.

4. With the Exciter emitting a constant signal, tune up the Transmitter as described in the "Transmitter Tuning Instructions".

5. Additional ventilation should be provided by locating equipment in the path of free flowing air, i.e. a natural draft or the air from a fan.

C. MAINTENANCE.

C-1. Circuit Description.

C-1a. General

The Model RT-1-B Transmitter and accessories have been designed to operate from a very wide range of alternating current power line voltages and frequencies, covering practically every common alternating current power line condition found anywhere in the world. The wide range of carrier output frequencies is easily and quickly covered through a system of ganged tuning and band switching. All tuned circuits operate at the same frequency, that is, the output frequency. All frequency multiplying is accomplished in the oscillator stage. The antenna matching network has been designed to match a wide range of antenna impedances.

C-1b. Oscillator.

The crystal oscillator-frequency multiplier stage is of the Pierce circuit type, wherein the screen grid of the 6AC7 tube acts as the anode of the triode crystal oscillator section and the plate is coupled to the oscillator section by only the electron stream. The crystal is connected electrically between the control grid and the screen grid.

The tuned circuits are in the plate circuit and are resonated to select either the fundamental crystal frequency or a harmonic of that frequency (2nd, 3rd, or 4th). The variable capacitor and the inductances of this plate circuit are ganged tuned and switched with the capacitor and inductances of the intermediate amplifier stage, and the inductances of the power amplifier stage.

When an external Variable Frequency Oscillator is used for frequency control, the 6AC7 oscillator stage is used as a class C multiplyer stage. Since the tuned circuits of all three stages are always tuned to the same frequency it is necessary to use the external Variable Frequency Oscillator tuned to a sub-multiple of the desired output frequency to avoid the possibility of self-excited oscillation.

Capacitor C2, which couples the screen grid of the 6AC7 to the crystal when the 6AC7 is used as a crystal oscillator, is connected to chassis ground when the "Xtal-V.F.O." switch is set to "V.F.O.", thereby effectively grounding the screen grid to R.F. voltages and enabling the stage to be used as a class C multiplier.

C-1c. Power Amplifier.

A single type 4-65A tetrode is used as a power amplifier, operating in class C. This stage is capacity coupled to the preceding intermediate amplifier stage. The associated tuned circuits are located in the plate circuit and are coupled to the antenna through link coupling or through a pi network. Grid bias is obtained through a combination of grid leak resistance and fixed bias.

Double protection against damage due to loss of excitation is provided for this stage; first, the fixed grid bias, and second, screen voltage regulation, accomplished through the use of a type 6Y6G tube whose plate is connected directly to the 4-65A screen grid. The action is described as follows:

When the Transmitter is not keyed (excitation off), the power amplifier tube is biased by the fixed bias supply of approximately -60 volts. The keying relay contacts which connect the excitation to the 6Y6G grid are open, and the voltage at this grid is zero, causing the tube to draw sufficient plate current through the 4-65A screen voltage dropping resistors to drop the screen voltage to approximately 50 volts. This limits the plate power dissipation of the 4-65A tube to less than its rated maximum of 65 watts. When the keying circuit is closed and excitation if applied to the 4-65A grid, the fixed bias source is grounded at the relay by the key, and the 6Y6G grid is connected to the 4-65A grid circuit through the relay contacts. The grid bias voltage developed by the excitation across the 4-65A grid leak resistor, R21, is applied through the relay contacts to the 6Y6G grid, biasing this tube beyond plate current cutoff. This restores the 4-65A screen grid voltage to normal and allows the power amplifier to operate in a normal class C manner.

If the excitation were to fail when the relay circuit is closed, thus shorting out the fixed bias source, the voltage at the 4-65A and 6Y6G control grids would be zero and the 6Y6G screen voltage regulation feature would operate and protect the power amplifier tube against excessive plate current.

The "Tune-Operate" switch shorts the control grid of the 6Y6G tube to ground in the "Tune" position. In this condition the grid bias voltage of the 4-65A tube that is developed by excitation is not applied to the 6Y6G grid, and, also, is reduced in value because the grid leak resistor of the 4-65A tube, R21, is also shorted, leaving only the bias voltage developed across the grid radio frequency choke, RFC-5. Since the 6Y6G grid voltage is zero, the tube passes a large plate current, thus reducing the 4-65A screen grid voltage. The power amplifier stage then operates at low plate current dissipation and low power output making conditions safe for the Transmitter tuning procedure.

C-1d. Antenna Matching.

A dual range pi network is incorporated in the Transmitter and is used to match into unbalanced antenna loads of from 50 to 1500 ohms impedance. The two ranges are referred to as "High Z" and "Low Z" on the Transmitter front panel loading control. There is no sharp point of demarkation between high and low antenna impedance ranges on this loading control because the output frequency also affects the control setting.

Switching between high and low antenna load ranges is accomplished by a cam on the loading capacitor which operates a switch to include or exclude an additional capacitor into the pi-network cir-

cuit. This capacitor is added into the circuit for "Lo Z" range and is omitted for the "Hi Z" range.

There is also available a low impedance balanced output circuit termed the "Link" output to match a balanced antenna load of 72 ohms impedance. If a balanced output circuit of up to 300 ohms impedance is required, it will be necessary to shunt the "Link" output with a small variable capacitor, (not supplied) having a maximum capacity of 150 micro-microfarads. For balanced antenna loads exceeding 300 ohms, an external antenna coupler will be required. The antenna loading control should be in the "Tune" position at all times when operating into a balanced load.

C-1e. Keying Relay and Bias Circuit.

The Transmitter contains its own filament transformer which has, in addition to the filament winding, a winding to supply power to a combination bias and keying relay circuit.

With key up, (open) the relay is not energized and the connection between the 4-65A control grid and the 6Y6G control grid is open. Under these conditions the fixed bias voltage is applied to the 4-65A control grid and the 6Y6G plate current is large causing the 4-65A screen-grid voltage to be low in value. (See Paragraph C-1c).

When the key is closed, the keying relay is energized and the fixed bias voltage is cut off from the 4-65A grid circuit. One set of the relay contacts closes the oscillator and intermediate cathode circuits to start the excitation voltage to the power amplifier grid, and the other set of contacts closes the circuit to apply the 4-65A grid resistor voltage to the 6Y6G control grid to restore the 4-65A screen grid voltage to normal. The circuit then operates as described in paragraph 1-c.

C-1f. Metering Circuits.

The meter has a one milliampere direct current movement with external multipliers and shunts to read various voltages and currents in the Transmitter. Selection of the circuit to be metered in accomplished by a double pole six-position switch operated from the Transmitter front panel. Each metered circuit is indicated at the corresponding switch position on the front panel.

C-1g. Band Switching.

The inductances in all stages are switched by one multiple pole five-position ganged band switch. Two snap-action switches actuated by a cam on the band switch shaft open the primary circuit of the high voltage power transformer and the high voltage indicating panel light when switching from one range to another. These switches close the associated circuits only when the band switch is set exactly correct for each band. This latter feature prevents the arcing and burning of the band switch contacts during switching.

C-1h. Power Supply.

The Power Supply requires an alternating current input of 115 volts at between 50 and 400 cycles per second.

With the key down, the power factor is 95% and the power required is 430 watts when the Transmitter is adjusted for 100 watts power output. Overload protection is provided by a 5-ampere power line input fuse. Do not use a higher value!

The Power Supply contains all the transformers, filter chokes, and filter capacitors of the equipment with the exception of the filament-bias transformer, which is included in the Transmitter unit.

A pair of type 816 mercury vapor rectifier tubes are used for the high voltage rectification, and a single type 5R4GY tube is used for the lower "B" voltage rectification. Both circuits are full-wave. These two direct current sources are 1350 volts at 200 milliamperes for the power amplifier stage, and 500 volts at 100 milliamperes for the oscillator and intermediate amplifier stages. The plate transformer supplies alternating current power, from a center-tapped and low "B" voltage tapped secondary winding to both rectifier circuits. A separate dual secondary winding transformer supplies power for the rectifier filaments.

Filters for the two rectifier circuits consist of separate single section inductance-capacitance filters, with choke input.

A time delay circuit is incorporated in the Power Supply to prevent the application of the high plate voltages to the rectifier tubes before the rectifier filaments have heated to operating temperature. A time delay of one minute begins when the Transmitter filament switch is turned on.

The time delay circuit consists of a temperature compensated thermal time delay switch, a double pole direct current relay, and a bridge type rectifier. The thermal switch contacts complete the relay circuit after the one minute time delay. When the relay closes its contacts, it opens the thermal switch heater circuit and holds itself closed by means of its contact circuit arrangement. This release of the thermal switch allows the switch to cool and reset itself. One pair of the relay contacts completes the primary circuit of the plate power transformer.

An interruption of the filament transformer primary circuit will cause the relay to release. The time delay cycle will begin again upon closing the filament primary circuit. An interruption of the plate power transformer primary circuit, such as caused by operating the "Plate" on-off switch or the band switch interlock switches, will not cause the relay to release and recycle.

The input power line cord and the output power cable which carries power to the Transmitter are permanently attached to the Power Supply and are provided with an internal rack for storage when not in use.

A service receptacle, separately fused for 2 amperes, is provided on the front of the Power Supply

The Primary circuit of the plate power transformer is interlocked to prevent flashover arcs across the band switch contacts by means of a snap action switch actuated by a cam on the band switch as described in paragraph C-1g.

C-1i. Line Voltage Control Unit.

This unit is built into one end of the Accessory Unit and consists of a 2000 volt-ampere Variac, switches, panel light, and outlet receptacles. When the input line voltage is within the ranges of 90 to 140 volts or 180 to 280 volts, the Variac can be adjusted to give an output voltage of 115 volts. A panel switch marked 115-230 selects the proper operating range. Another switch turns the power input on or off when operated. A panel light indicates when the input switch is on.

A single receptacle is provided at the side of the cabinet for power connection to the Power Supply unit, at 115 volts. A duplex service receptacle, also at 115 volts, is provided at the side of the cabinet for powering auxiliary equipment such as lights, etc., and is fused for 3 amperes. The input circuit to the Variac is fused for 10 amperes.

The Variac is calibrated 0 to 25 volts (output) each side of the center position on the front panel, with the notation "increase voltage" and "decrease voltage" in the proper directions. The Variac calibration is given only as an aid to setting the proper voltage. The exact setting should be determined by referring to the meter on the front panel of the Transmitter. Mechanical stops on the Variac prevent its rotation beyond the plus or minus 25 volts limits.

D. Trouble Shooting.

D-1. General.

Schematic diagrams, parts lists, and photographs included in this Instruction Book may be used as an aid in trouble shooting in this equipment. Before attempting to service this equipment the preceding information concerning circuit description should be studied thoroughly to learn how each stage operates. This knowledge is essential before efficient servicing can be accomplished.

D-2. The tables of typical operating voltages and resistances, (Charts 1 and 2) may be used to localize the stage in which trouble occurs. It

should be noted that Transmitter metering circuits can be used for all measurements marked with an asterisk (*) on the charts. These readings should be checked first when trouble shooting.

D-3. Repeated Fuse-Blowing

This trouble will normally be caused by defects such as shorted filter or by-pass capacttors, shorted wiring, or a short circuited interconnecting cable. If, however, the 6Y6G tube becomes defective or begins to lose emission, less screen grid voltage regulation protection is offered to the power amplifier tube and the high current drawn will burn out the 5-ampere fuse in the Power Supply. Failure to remedy this trouble will eventually damage the 4-65A tube. The condition of the 6Y6G tube may easily be checked by reading the power amplifier screen grid voltage which should not be greater than 50 volts in the key-up condition. Do not replace the 5-ampere fuse with one of higher current rating.

D-4. Poor Keying Characteristics.

These may be caused by a number of factors. In the event of sluggish keying, check for a crystal of low activity by substituting another crystal and/or by replacing the 6AC7 crystal oscillator tube. In the case of the presence of a backwave, check for high resistance continuity of the keying relay contacts. If these are in good condition, the trouble will probably be in the key thump electrolytic capacitor C 14 which may have become leaky.

Poor regulation of the 6AC7 screen grid voltage caused by failure of the VR-150 regulator tube may cause a fault in the transmitted signal which will cause it to sound "chirpy" when received.

D-5. Exciter Tracking.

The Transmitter has been adjusted at the factory for proper tracking of the tuned circuits in the oscillator and intermediate amplifier stages. This adjustment is not particularly critical and normally will not get out of adjustment. If, after routine inspection and checking of tubes and voltages, insufficient drive is experienced, the trouble may be tracking, which can be adjusted as follows:

With the Transmitter "Tune-Operate" switch in the "Tune" position, adjust the tracking capacttor C6 for maximum indication of power amplifier grid current at approximately 28 megacycles (7 megacycles crystal). "Rock" the tuning capacitor while adjusting the tracking capacitor. This adjustment should provide ample excitation throughout the frequency range of the Transmitter, but there may be cases where it is desirable to affect a compromise in tracking between approximately 23 and 28 megacycles.

RT-1-B PARTS LIST

TRANSMITTER UNIT

SYMBOL NUMBER		DESCRIPTION
C1, C10	Capacitor, Mica	33mmf. ± 10% 500 W.V.
C2, C3, C11, C18, C20, C21	Capacitor, Mica	.01 mf. ± 20% 300 W.V.
C4	Capacitor, Mica	22mmf. ± 10% 500 W.V.
C5, C13	Capacitor, Variable	140 mmf.
C6	Capacitor, Variable	15 mmf.
C7, C9, C12, C19, C22	Capacitor, Mica	.01 mf. ± 20% 500 W.V.
C8	Capacitor, Mica	15 mmf. ± 10% 500 W.V.
C14	Capacitor, Electrolytic	5. mf. - 10% +150% 50 W.V.
C15, C17, C24	Capacitor, Mica	.005 ± 20% 1000 W.V.
C16	Capacitor, Mica	27 mmf. ± 10% 1000 W.V.
C23	Capacitor, Variable	150 mmf.
C25	Capacitor, Electrolytic	5. mfd. -10% +150% 150 W.V.
C26	Capacitor, Paper	.04 mf. -10% +20% 200 W.V.
C27	Capacitor, Mica	.01 mf. ±10% 2500 W.V.
C28	Capacitor, Variable	500 mmf.
C29	Capacitor, Mica	.0004 mf. ±10% 2500 W.V.
C33	Capacitor, Mica	.001 mf. ±10% 500 W.V.
C34	Capacitor, Mica	.01 mf. ± 20% 300 W.V.
R1, R7, R22	Resistor, Carbon	47K ohms, ±10%, 1 Watt
R2	Resistor, Carbon	300 ohms, ± 5%, 1 Watt
R3	Resistor, Carbon	4.7 ohms, ±10%, 1 Watt
R4	Resistor, Wire Wound	15K ohms, ±10%, 38 Watts
R5, R9	Resistor, Carbon	15K ohms, ±10%, 1 Watt
R6	Resistor, Carbon	510 ohms, ± 5%, 2 Watts
R8	Resistor, Carbon	22 ohms, ±10%, 1 Watt
R10	Resistor, Wire Wound	10K ohms, ±10%, 30 Watts
R11	Resistor, Carbon	100K ohms, ±10%, 2 Watts
R12	Resistor, Carbon	250K ohms, ± 5%, 1/2 Watt
R13	Resistor, Carbon	5100 ohms, ± 5%, 1/2 Watt
R14	Resistor, C arbon	510K ohms, ± 5%, 1/2 Watt
R15	Resistor, Carbon	15K ohms, ± 5%, 1/2 Watt
R16	Resistor, Carbon	100K ohms, ± 5%, 1/2 Watt
R17	Resistor, Carbon	51K ohms, ± 5%, 1/2 Watt
R18	Resistor, Carbon	470K ohms, ±10%, 1 Watt
R19	Resistor, Carbon	820K ohms, ±10%, 1 Watt
R20	Resistor, Carbon	11 ohms, ± 5%, 1 Watt
R21	Resistor, Carbon	1 Meg. ohms. ±10%, 1 Watt
R23	Resistor, Wire Wound	5K ohms, ±10%, 18 Watts
R24	Resistor, Carbon	100K ohms, ±10%, 1 Watt
R25, R26	Resistor, Wire Wound	50K ohms, ±10%, 50 Watts
R30	Resistor, Carbon	1000 ohms, ±10%, 1 Watt
R31	Resistor, Carbon	1000 ohms, ± 5%, 1/2 Watt
R32	Resistor, Carbon	10 ohms, ±10%, 1/2 Watt

SYMBOL NUMBER	DESCRIPTION
J1	Jack, Key
L1	Coil Assembly, Oscillator
L2	Coil Assembly, Intermediate Amplifier
L3	Coil Assembly, Power Amplifier
LMP-1	Light, Panel, Green (#47 Bulb)
LMP-2	Light, Panel, Red (#47 Bulb)
M-1	Meter, O-1 Milliampere
RE-1	Rectifier, Meter, (Conant Type BHS-C)
RE-2	Rectifier, Selenium, (Federal 403D2787)
RFC-1, -2, -4	Choke, R.F., 2.5 mh., 100 ma.
RFC-3	Choke, Parasitic Suppressor
RFC-5	Choke, R.F., 1.0 mh., 150 ma.
RFC-6	Choke, R.F., 1.0 mh., 400 ma.
RLY-1	Relay, Keying, D.P.D.T. 6300 ohms D.C.
SO-1	Socket, Coax. Connector, (V.F.O. Input)
SO-2,-3	Sockets, Crystal
SO-4	Socket, Male, 6 contact
SO-5	Socket, Banana Jacks (Ant. Terminals)
SO-6	Socket, High Voltage Connector
SW-1	Switch, Toggle, D.P.D.T. (Xtal-V.F.O.)
SW-2	Switch, Toggle, D.P.S.T. (Plate)
SW-3A	Switch, Snap Action, S.P.S.T. (Plate Interlock)
SW-3B	Switch, Snap Action, S.P.S.T. (Panel Light Interlock)
SW-4	Switch, Toggle, S.P.S.T. (Filament)
SW-5A,-5B	Switch, Wafer, 2P.6T. (Meter)
SW-6A	Switch, Wafer, 1P.5T. (Oscillator)
SW-6B	Switch, Wafer, 1P.5T. (Intermediate Amplifier)
SW-6C	Switch, Wafer, 1P.5T. (Screen Bleeder)
SW-6D---G	Switch, Wafer, 4P.5T. (Power Amplifier)
SW-7	Switch, Cam Operated, S.P.S.T. (Ant. Load)
SW-8	Switch, Toggle, S.P.S.T. (Tune Operate)
T-1	Transformer, Filament and Bias
TS-1	Terminal Strip, (Keying)
V-1	Tube, JAN-6AC7
V-2	Tube, 2E26
V-3	Tube, 4-65A
V-4	Tube, JAN-VR-150
V-5	Tube, JAN-6Y6G

POWER SUPPLY UNIT

SYMBOL NUMBER	DESCRIPTION
C-30A, C-30B	Capacitor, Paper, .1-.1 mf. -10% +20%, 600 W.V.
C-31	Capacitor, Oil Filled, 2 mf. 2500 W.V.
C-32	Capacitor, Oil Filled, 4 mf. 1000 W.V.
F-1	Fuse, 2 Amperes
F-2	Fuse, 5 Amperes
L4	Choke, Filter, 10 Henries, 100 ma.
L5	Choke, Filter, 10 Henries, 200 ma.
PL-1	Plug A.C. Standard
PL-2	Plug, Female, 6 contact
PL-3	Plug, High Voltage Connector
R-27	Resistor, Wire Wound, 40K ohms, ±10% 110 Watts
R-28, R-29	Resistor, Wire Wound, 50K ohms, ±10% 110 Watts
RE-3	Rectifier, Full Wave Bridge
RLY-2	Relay, 95 V.D.C., D.P.D.T. (H.V. Primary)
RLY-3	Relay, Time Delay Switch (60 Seconds)
SO-7	Socket, (A.C. Service Receptacle)
T-2	Transformer, High Voltage
T-3	Transformer, Filament
V-6	Tube, JAN-5R4GY
V-7, V-8	Tube, JAN-816

ACCESSORY UNIT

F-3	Fuse, 10 Amperes
F-4	Fuse, 3 Amperes
LMP-3	Light, Panel, Amber, (115 Volt Bulb, Mazda #6S6)
PL-3	Plug, A.C. Input
SO-8	Receptacle, A.C., Single
SO-9	Receptacle, A.C., Dual
SW-9	Switch, Toggle, D.P.S.T. (On-Off)
SW-10	Switch, Toggle, S.P.D.T. (115-230)
T-4	Variac, (General Radio #V-20 Ohm)

TYPICAL RESISTANCE MEASUREMENTS SOCKET TERMINALS TO CHASSIS				
TUBE	PIN	RESISTANCE IN OHMS BAND 1 - 2	BAND 3	BANDS 4 - 5
6AC7	1	0	0	0
	2-7	11	11	11
	3-5	5K	5K	5K
	4	47K	47K	47K
	6	42.7K	44K	65K
	8	27.7K	29K	50K
2E26	1-4-6	5.2K	5.2K	5.2K
	2-7	11	11	11
	3	13K	17.9K	97K
	5	15K	15K	15K
	8	0	0	0
	Plate Cap	25.7K	26.6K	40K
6Y6G	1-6	∞	∞	∞
	2-7	11	11	11
	3-4	125K	125K	125K
	5	(On Operate) 105K	105K	105K
	5	(On Tune) 0	0	0
	8		0	0
VR-150	2	0	0	0
	3	∞	∞	∞
	5	42.7K	44K	65K
	7	∞	∞	∞
4-65A	1-7	11	11	11
	2-6	125K	125K	125K
	4	1M	1M	1M
	Plate Cap	100K	100K	100K

CHART 1

TYPICAL OPERATING VOLTAGES AND CURRENTS

STAGE	MEASUREMENTS	KEY DOWN		KEY UP	
		BANDS 1-2-3	BANDS 4-5	BANDS 1-2 -3	BANDS 4-5
6AC7 Oscillator-Frequency Multiplier	Plate Volts	300	300	350	380
	Screen Grid Volts	150	150	150	150
	Filament Volts	6.3	6.3	6.3	6.3
	Cathode Volts	2.5	2.5	12	47
	* Cathode Current	7.5	7.5	0	0
2E26 Intermediate Amplifier	Plate Volts	500	500	550	550
	Screen Grid Volts	60	180	80	370
	Filament Volts	6.3	6.3	6.3	6.3
	Cathode Volts	12	25	12	50
	* Cathode Current	20	47	3	10
4-65A Power Amplifier	Plate Volts	1350	1350	1450	1450
	* Screen Grid Volts	275	235	45	50
	Filament Volts	6.3	6.3	6.3	6.3
	* Plate & Screen Cu.	175	175	0	0
	* Grid Current	15	18	0	0
6Y6G Screen Voltage Regulator	Plate Volts	275	235	45	50
	Filament Volts	6.3	6.3	6.3	6.3

NOTES:

1. All of the above measurements were taken with a Power Line voltage of 115V, and a Frequency of 60 cycles per second with a 20,000 ohms per volt meter.
2. Measurements marked with an asterisk (*) indicated by Front Panel Meter.

CHART 2.

ACCESSORY UNIT OPERATING INSTRUCTIONS

The Accessory Unit is designed to supply to the Transmitter and Power Supply an output of 115 volts (AC) when operating from a line voltage between 90 and 140 volts or between 180 and 280 volts, for any line frequency between 50 and 400 cycles per second.

1. Before connecting the Accessory Unit to the power line, do the following:
   (a) Connect the Power Supply to the Accessory Unit and to the Transmitter.
   (b) Set the Transmitter FILAMENT and PLATE switches to the OFF position, and the METER switch to position 1.
   (c) Set the Accessory Unit ON-OFF switch to OFF, the 115-230 switch to 230, and the Variac knob to the center position.
2. Connect the Accessory Unit to the power line.
3. Turn ON the Accessory Unit ON-OFF switch, and read the line voltage on the Transmitter meter.
4. If the Transmitter meter indicates between 90 and 140 volts, then the power line voltage is in the 180 to 280 volt range and the Accessory Unit 115-230 switch is in the correct position. Rotate the Variac knob until the Transmitter meter reads 115 volts.
5. If the Transmitter meter indicates less than 90 volts after operation 3, above, then the power line voltage is in the range between 90 and 140 volts, and the 115-230 switch must be set in the 115 position. Rotate the Variac knob until the Transmitter meter indicates 115 volts.
6. The Transmitter may now be set up for operation.

WARNING: FAILURE TO OBSERVE THE ABOVE INSTRUCTIONS IN THE EXACT SEQUENCE GIVEN, MAY RESULT IN SERIOUS DAMAGE TO THIS EQUIPMENT.

Figure 2

RT-1-B TUNING INSTRUCTIONS

WARNING: BEFORE TURNING THIS UNIT ON, READ INSTRUCTIONS FOR ACCESSORY UNIT AND ADJUST THAT UNIT FOR 115 VOLTS OUTPUT.

1. Set TUNE-OPERATE switch in TUNE position; set XTAL INPUT-VFO switch to XTAL INPUT position; set METER switch to position 2; set BAND switch in accordance with tuning chart; plug crystal into XTAL socket.

2. Turn on FILAMENT and PLATE switches. A time delay relay in Power Supply keeps high voltage off for one minute after FILAMENT switch has been turned on.

3. Set EXCITATION and POWER AMPLIFIER tuning controls to dial readings indicated in tuning chart, and set ANTENNA LOADING control to TUNE position.

4. Retune EXCITATION control slightly if necessary for maximum meter reading; current should be over 12 milliamperes.

5. Turn METER switch to position 3 and retune POWER AMPLIFIER control slightly for minimum meter reading. There should be a definitely perceptible dip in meter reading at correct setting of POWER AMPLIFIER control.

6. Turn ANTENNA LOADING control to right, increasing loading simultaneously as POWER AMPLIFIER control is tuned for minimum current. For initial adjustment, meter should read 60 ma. Do not load above this current. If turning ANTENNA LOADING control to the right does not increase current sufficiently, then turn this control to the left of TUNE position.

7. Set TUNE-OPERATE switch to OPERATE position. Retune POWER AMPLIFIER control for minimum current.

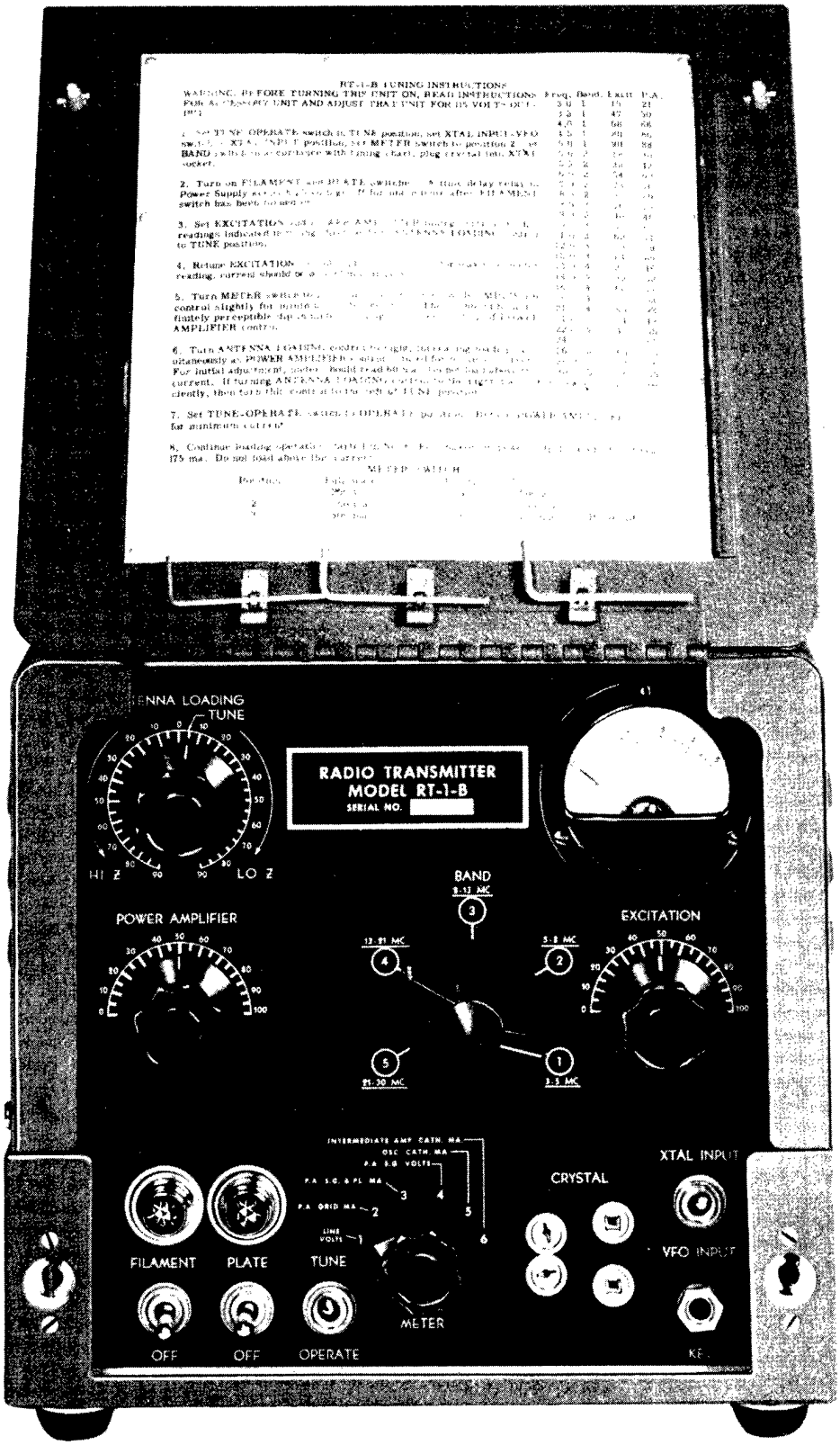
8. Continue loading operation started in No. 6 For maximum power output meter should read 175 ma. Do not load above this current.

Freq.	Band.	Excit.	P.A.
3.0	1	12	22
3.5	1	44	50
4.0	1	65	68
4.5	1	79	80
5.0	1	89	89
5.0	2	16	32
5.5	2	36	49
6.0	2	52	61
7.0	2	72	76
8.0	2	85	88
8.0	3	14	27
9.0	3	37	48
10.0	3	56	61
11.0	3	67	71
12.0	3	76	79
13.0	3	83	85
13.0	4	25	48
14.0	4	39	57
16.0	4	57	73
18.0	4	71	83
21.0	4	85	93
21.0	5	33	49
22.0	5	41	55
24.0	5	55	66
26.0	5	65	74
28.0	5	72	80
30.0	5	79	86

METER SWITCH

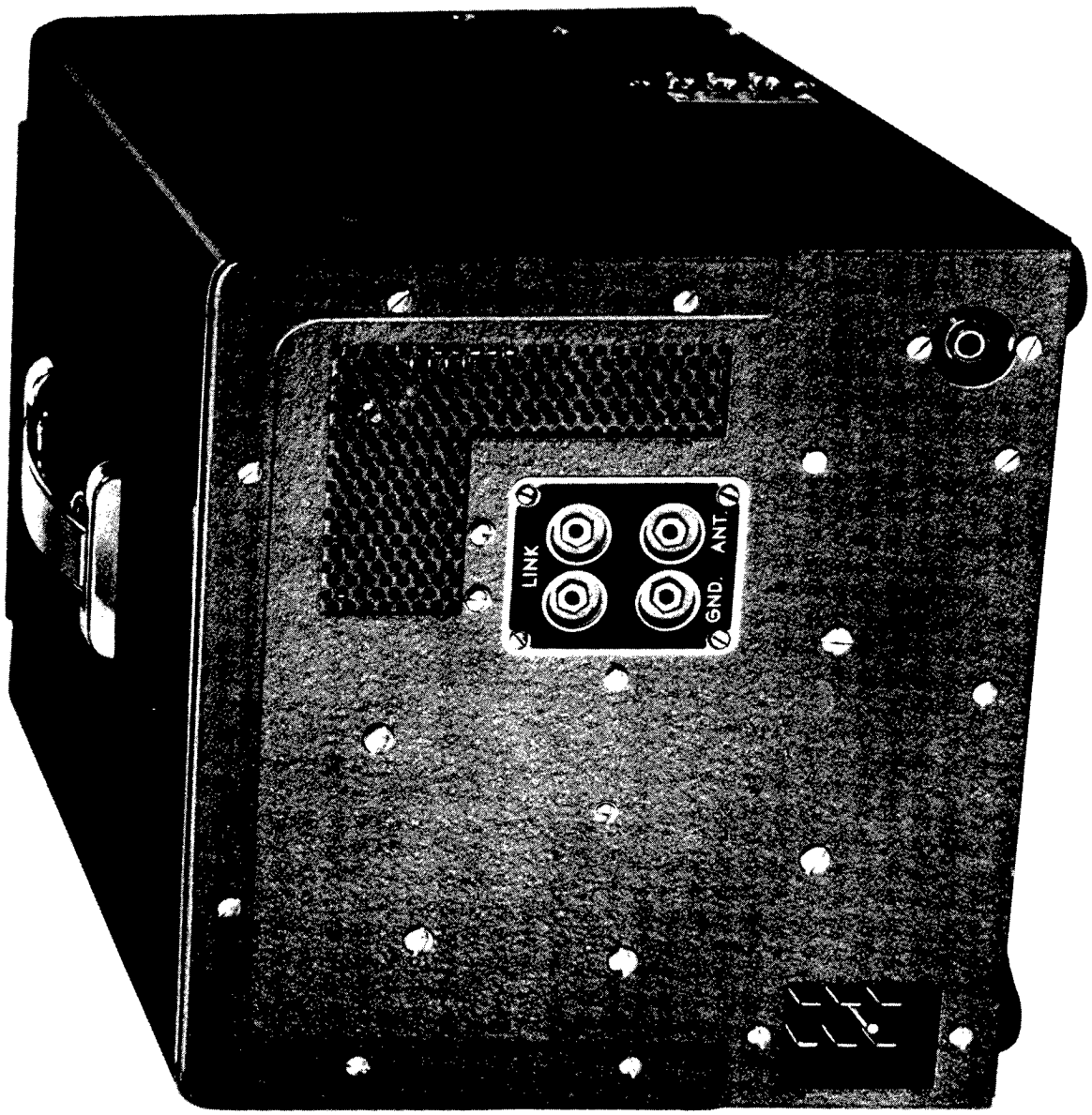
Position	Full Scale	Position	Full Scale
1	250 v	4	500 v
2	50 ma	5	50 ma
3	500 ma	6	100 ma

Figure 3



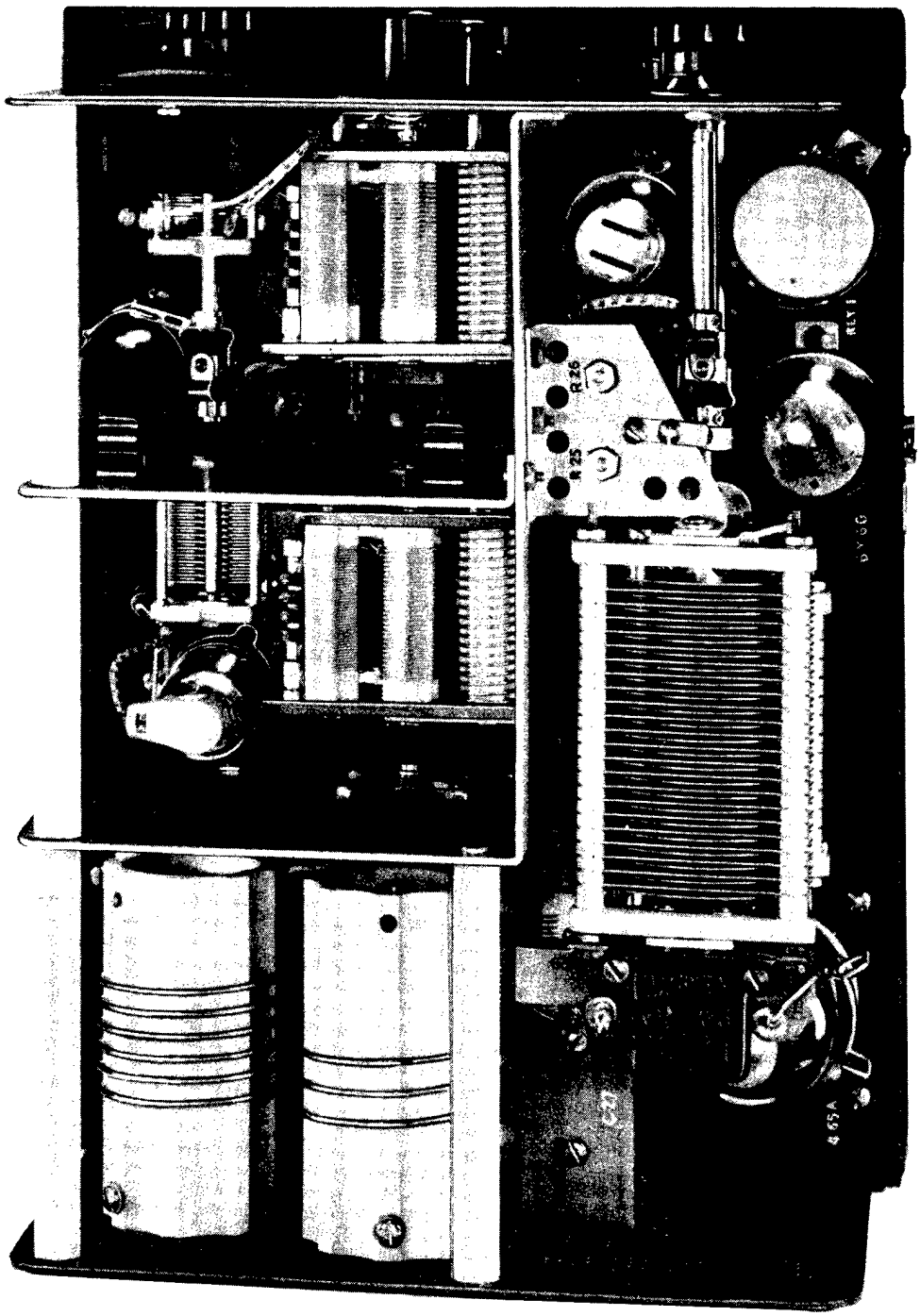
RADIO TRANSMITTER RT-1-B

FIGURE 4 FRONT VIEW



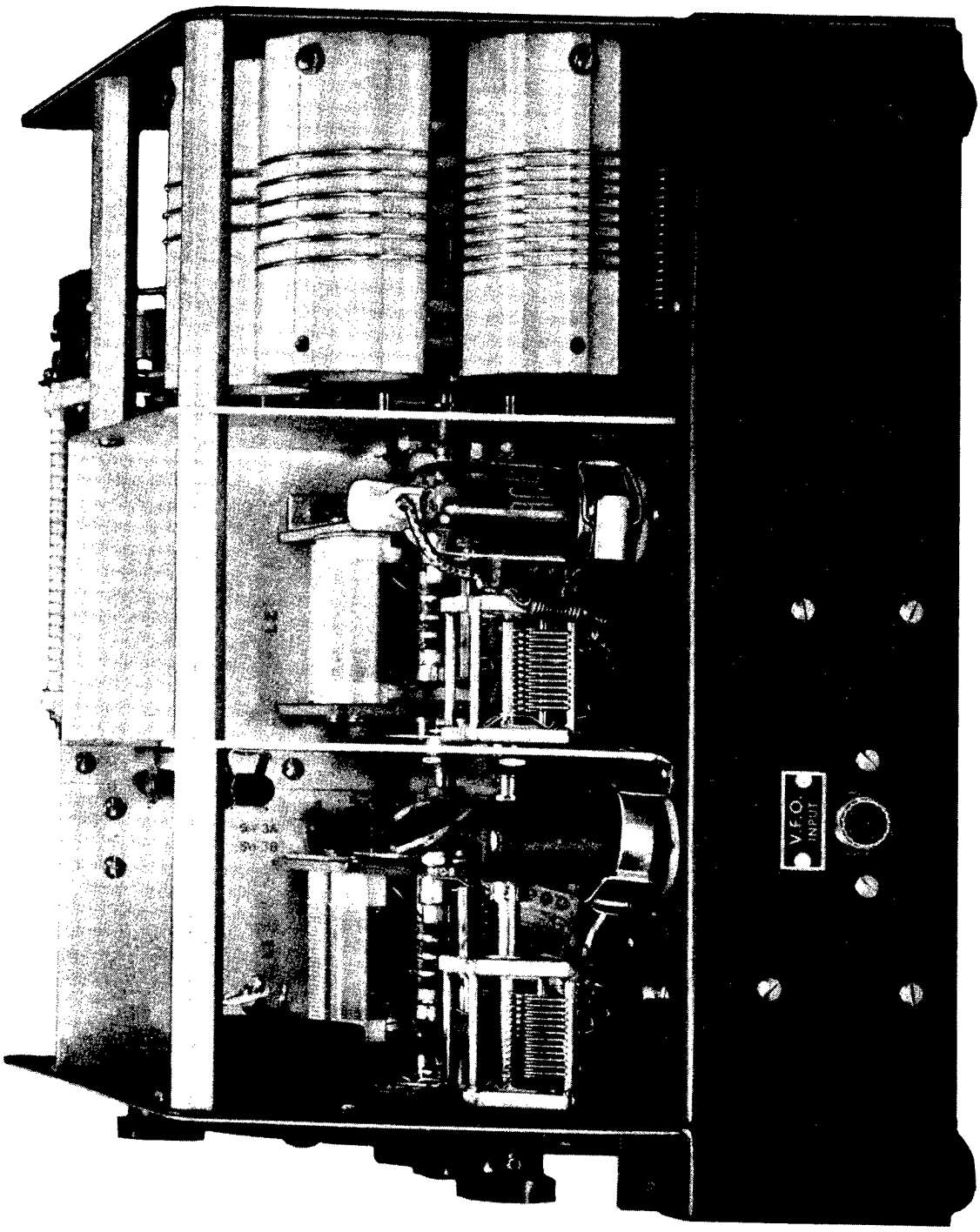
RADIO TRANSMITTER RT-1-B

FIGURE 5 REAR VIEW



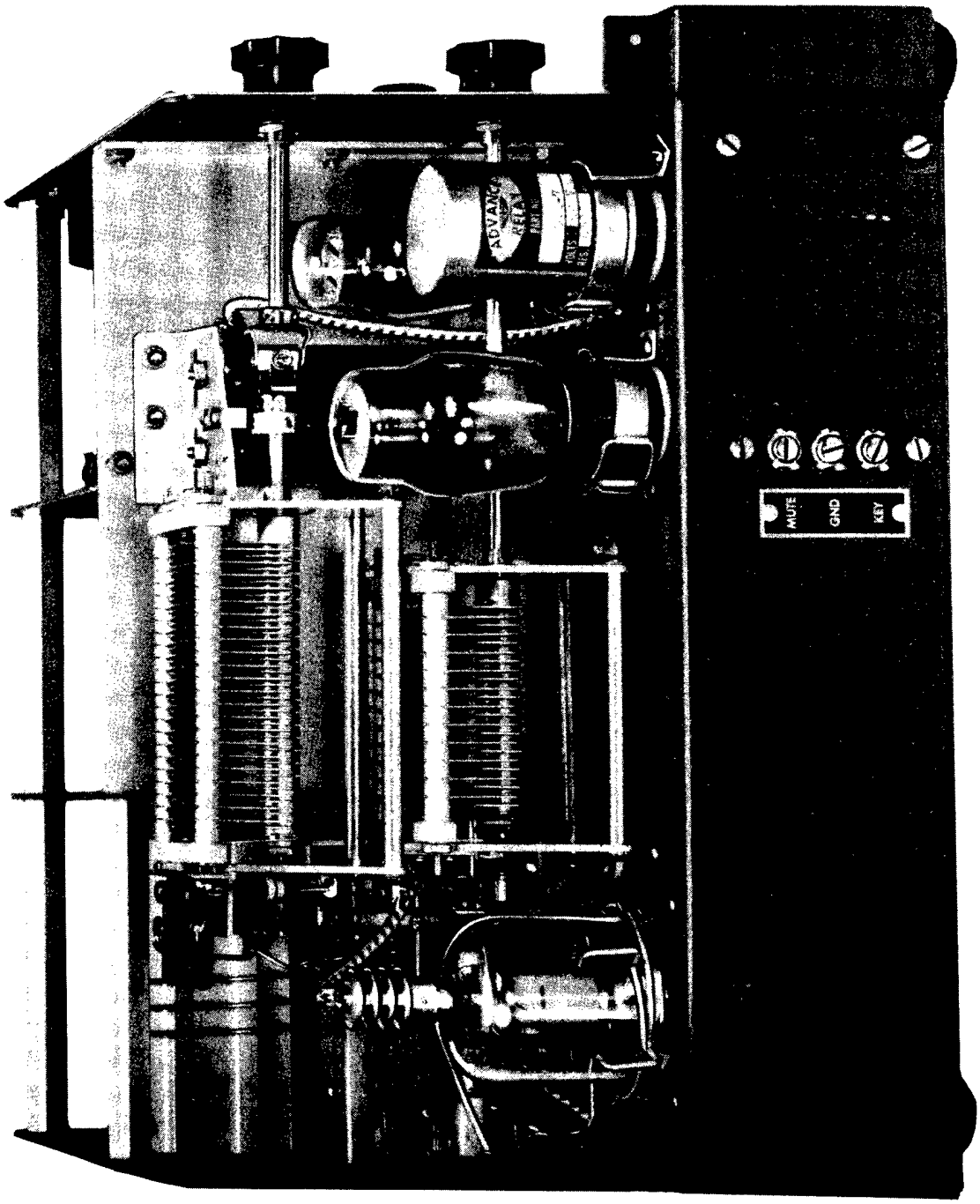
RADIO TRANSMITTER RT-1-B

FIGURE 6 TOP VIEW



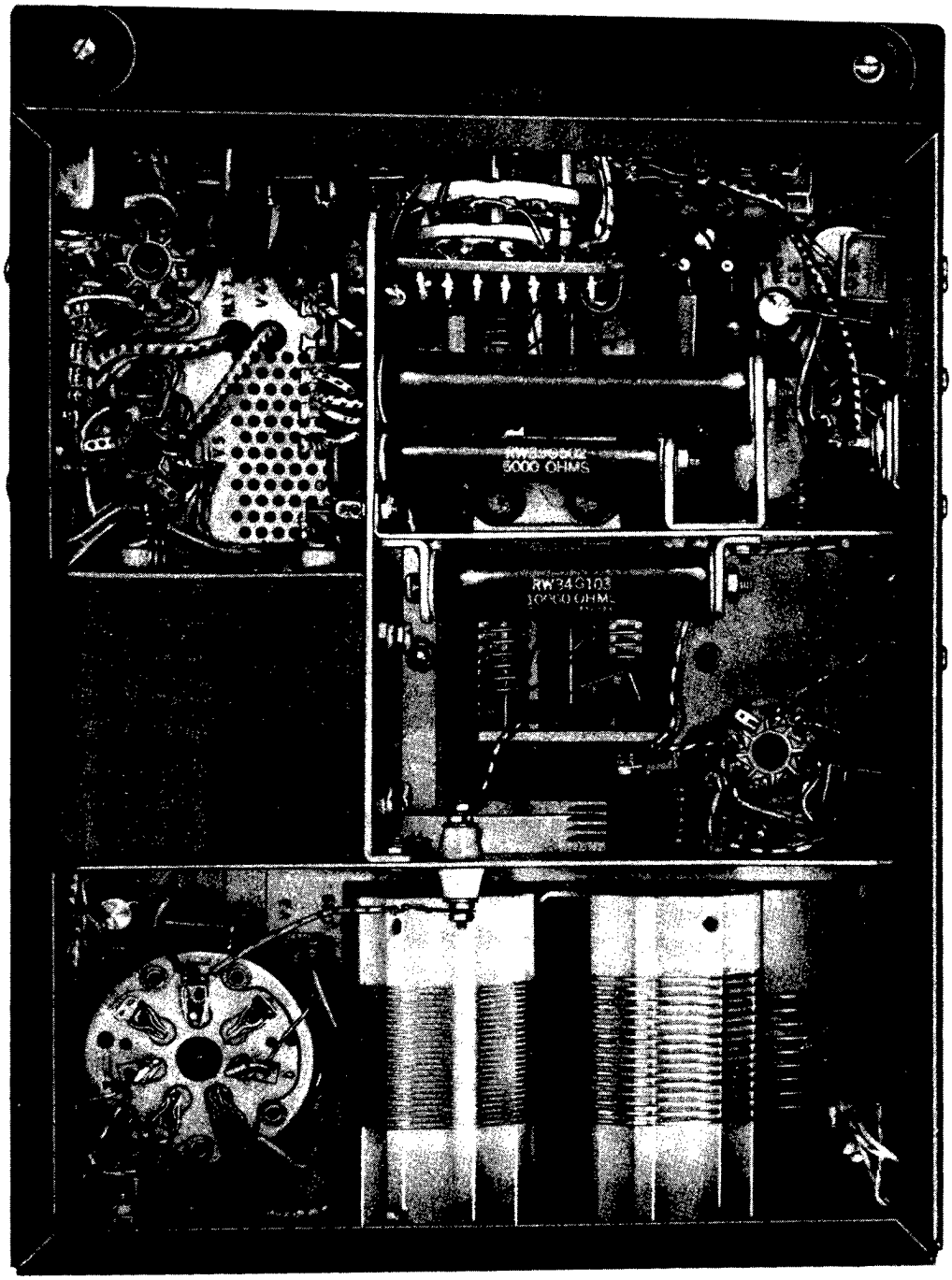
RADIO TRANSMITTER RT-1-B

FIGURE 7 RIGHT SIDE VIEW



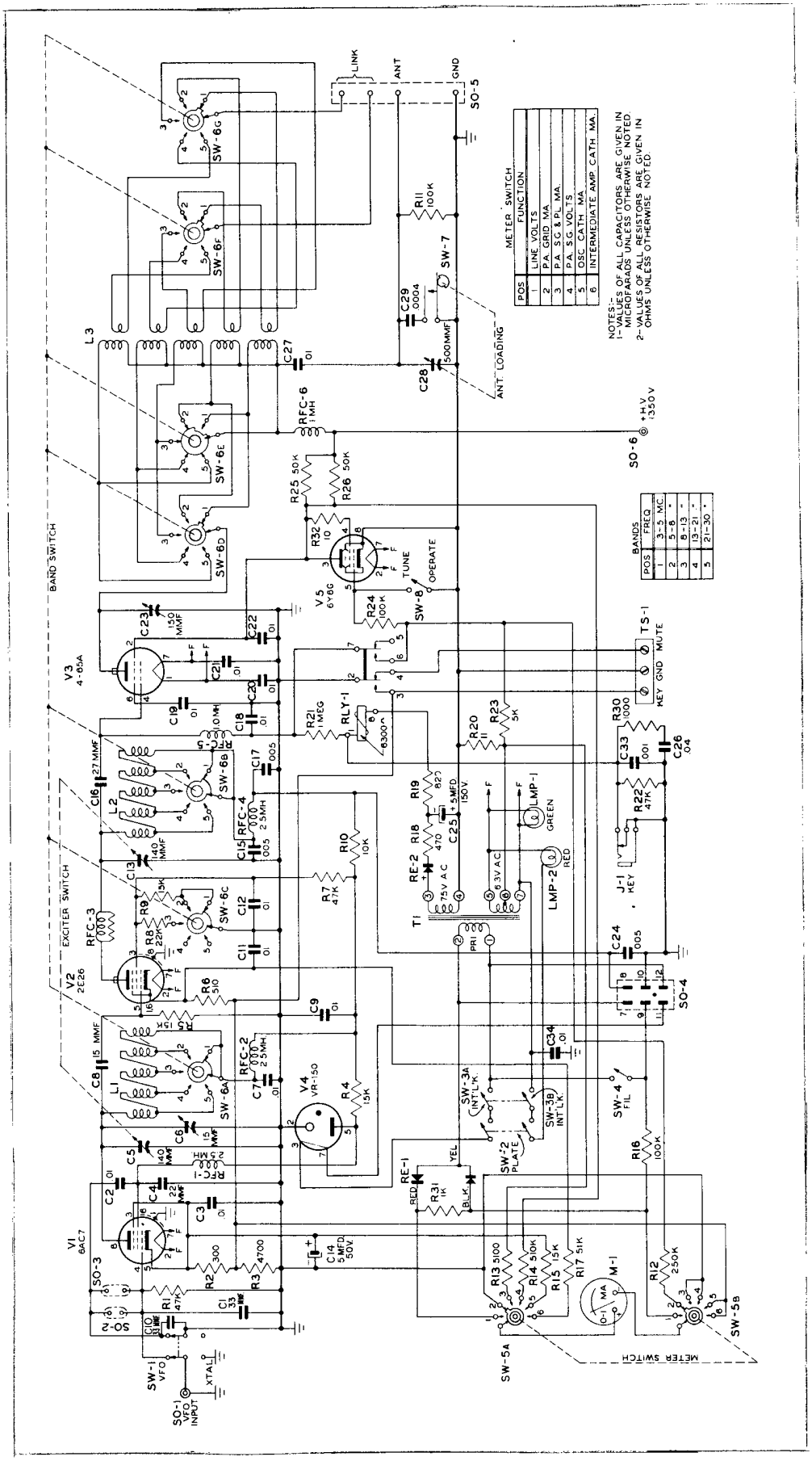
RADIO TRANSMITTER RT-1-B

FIGURE 8 LEFT SIDE VIEW



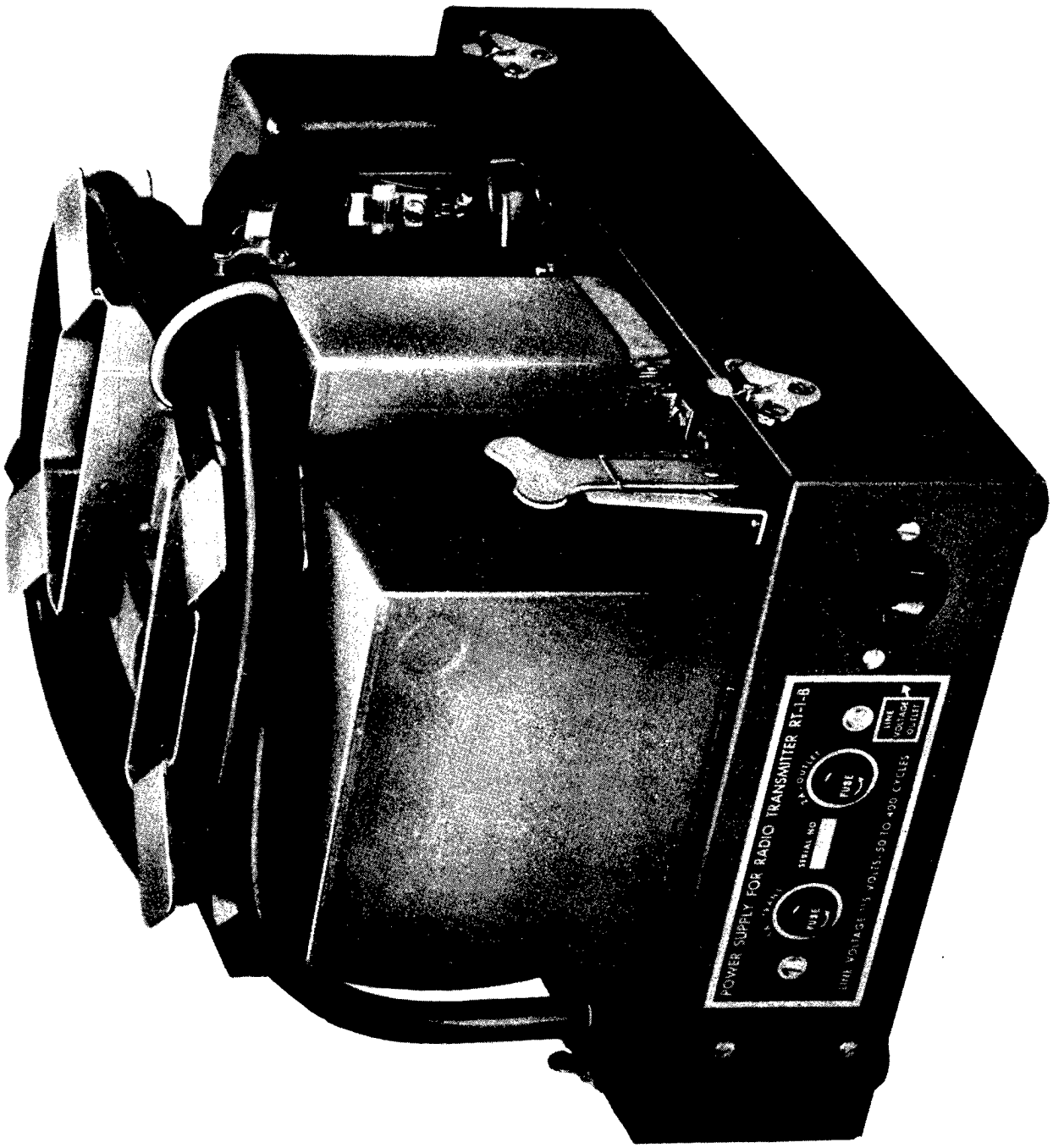
RADIO TRANSMITTER RT-1-B

FIGURE 9 BOTTOM VIEW



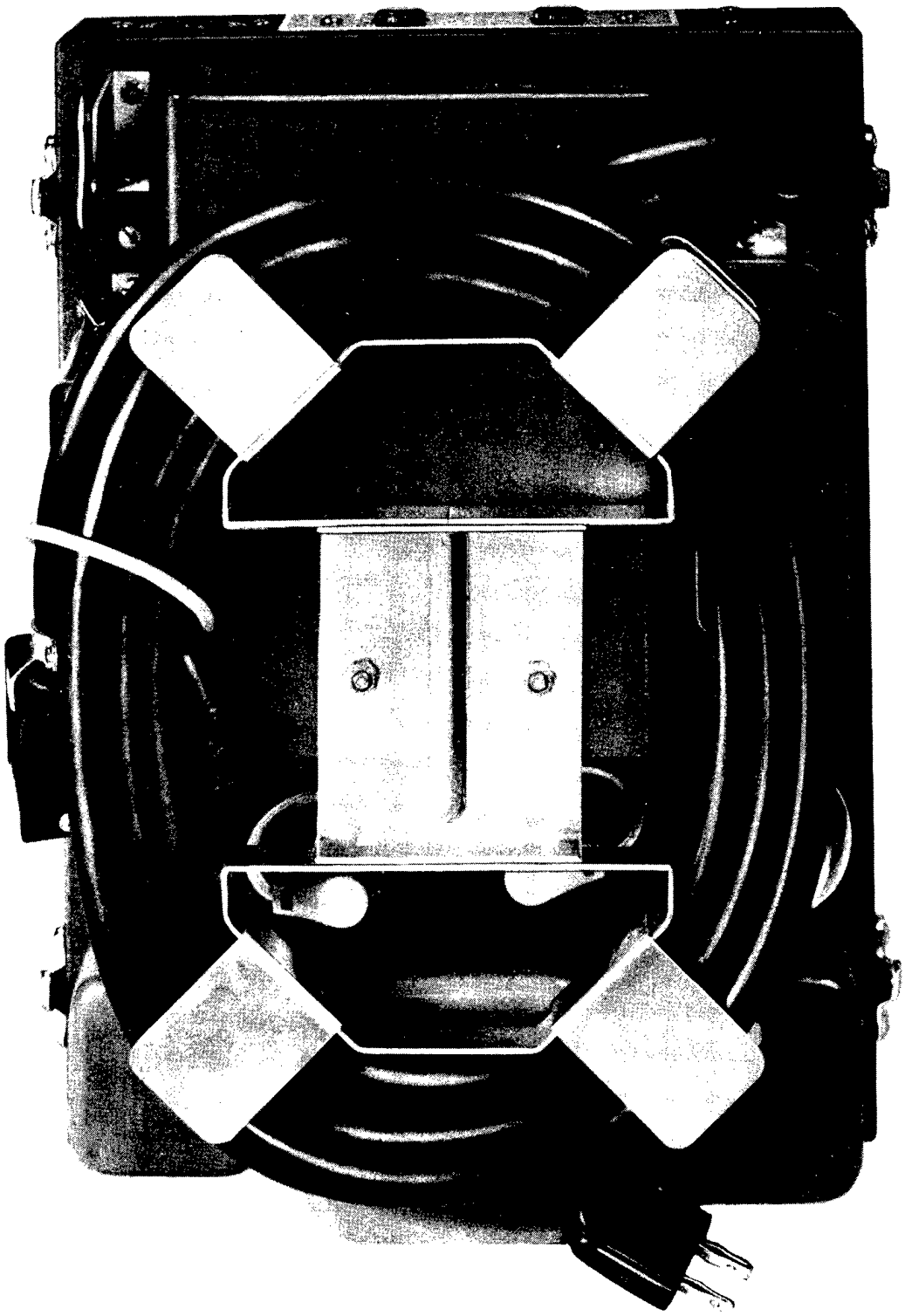
RADIO TRANSMITTER RT - 1 - B

FIGURE 10 SCHEMATIC DIAGRAM



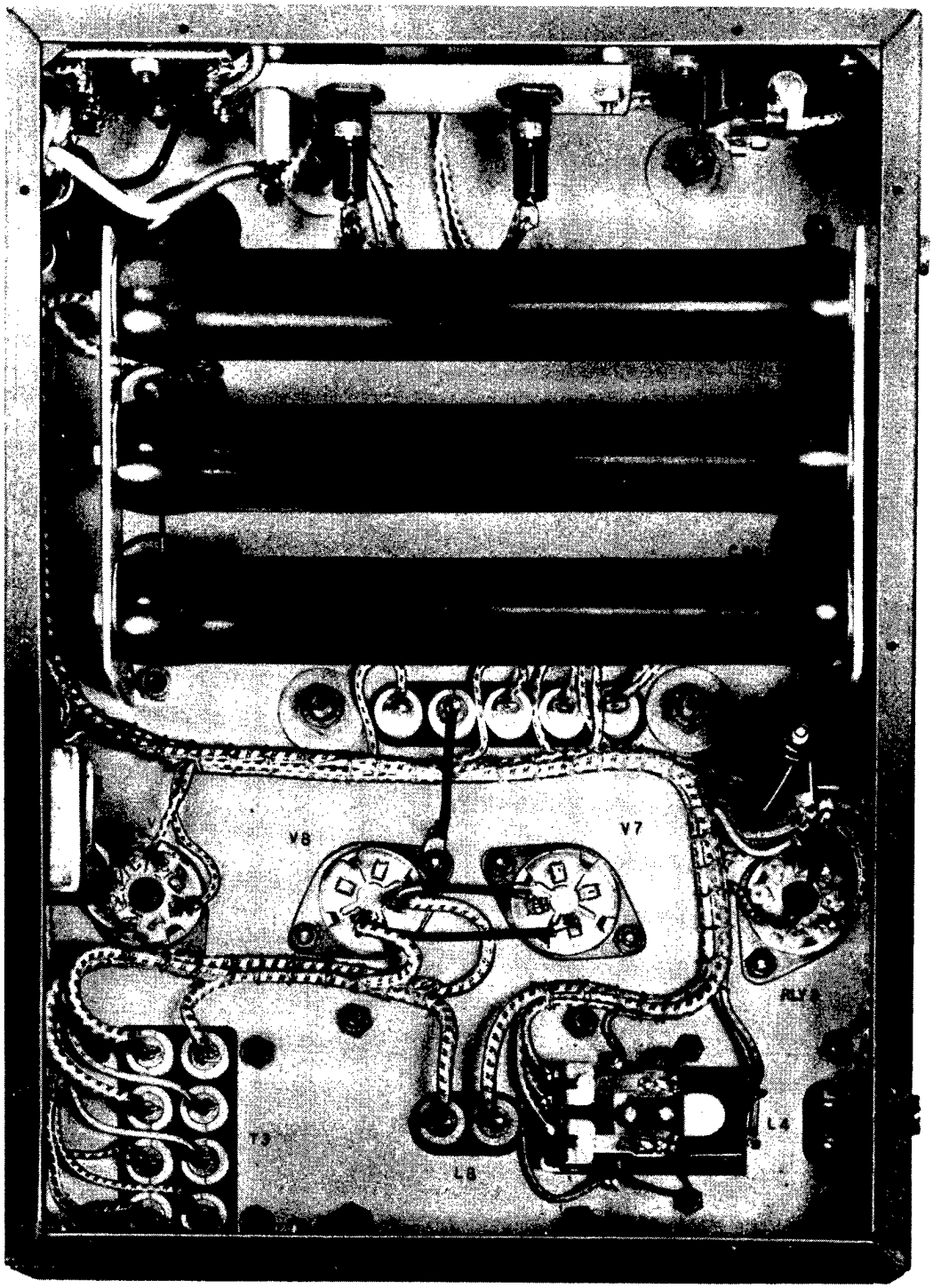
POWER SUPPLY FOR RADIO TRANSMITTER RT-1-B

FIGURE 11 FRONT VIEW



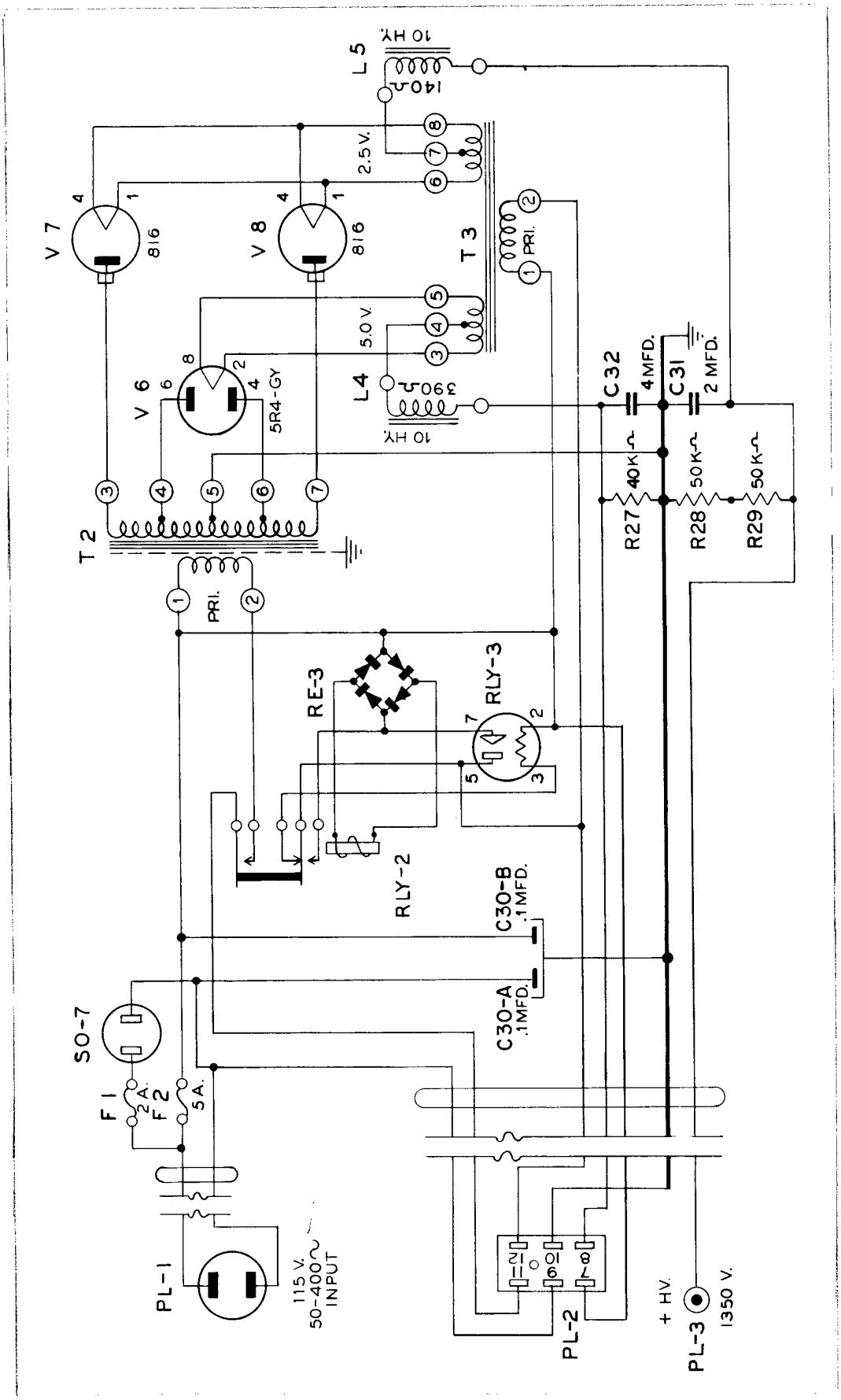
POWER SUPPLY FOR RADIO TRANSMITTER RT-1-B

FIGURE 12 TOP VIEW



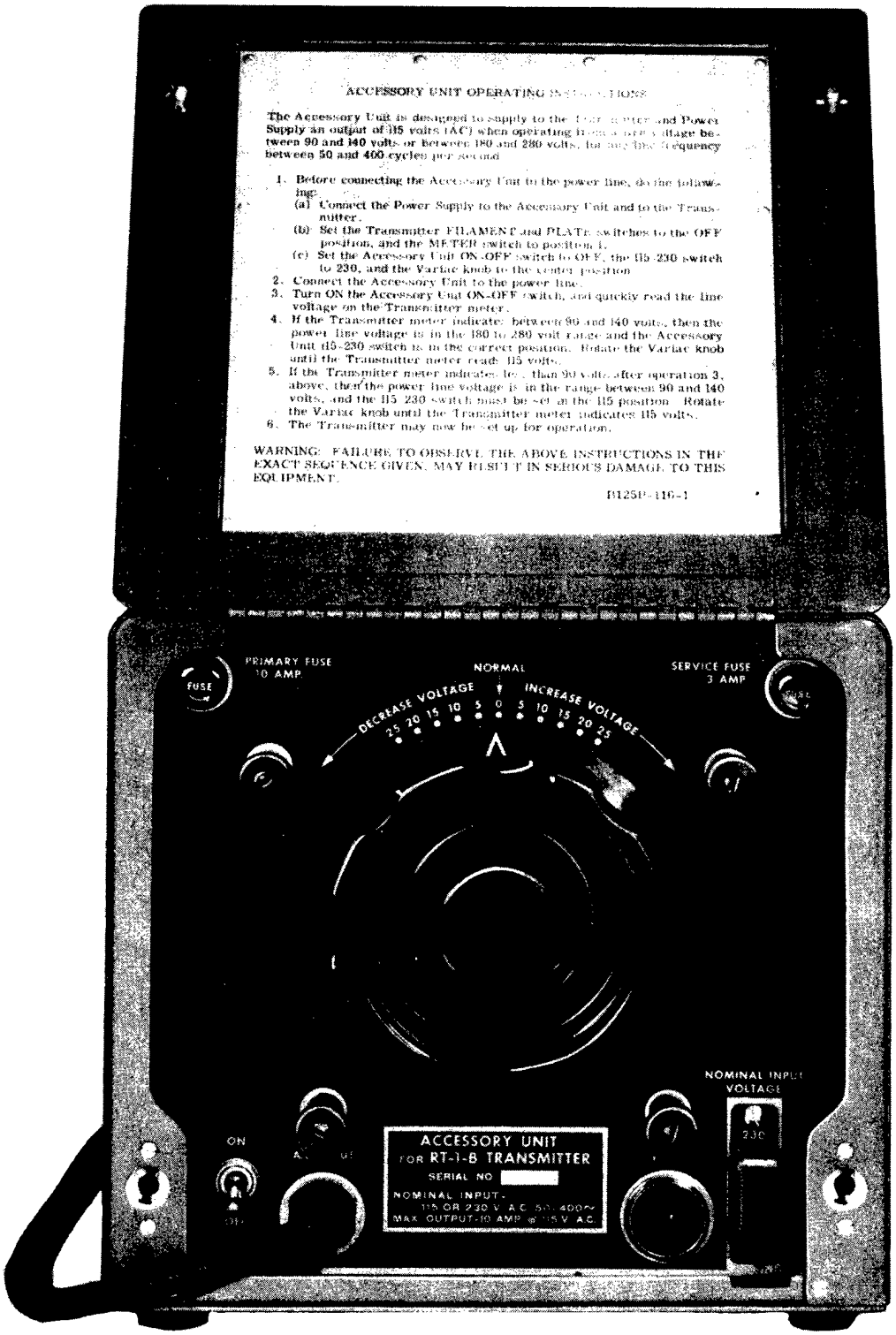
POWER SUPPLY FOR RADIO TRANSMITTER RT-1-B

FIGURE 13 BOTTOM VIEW



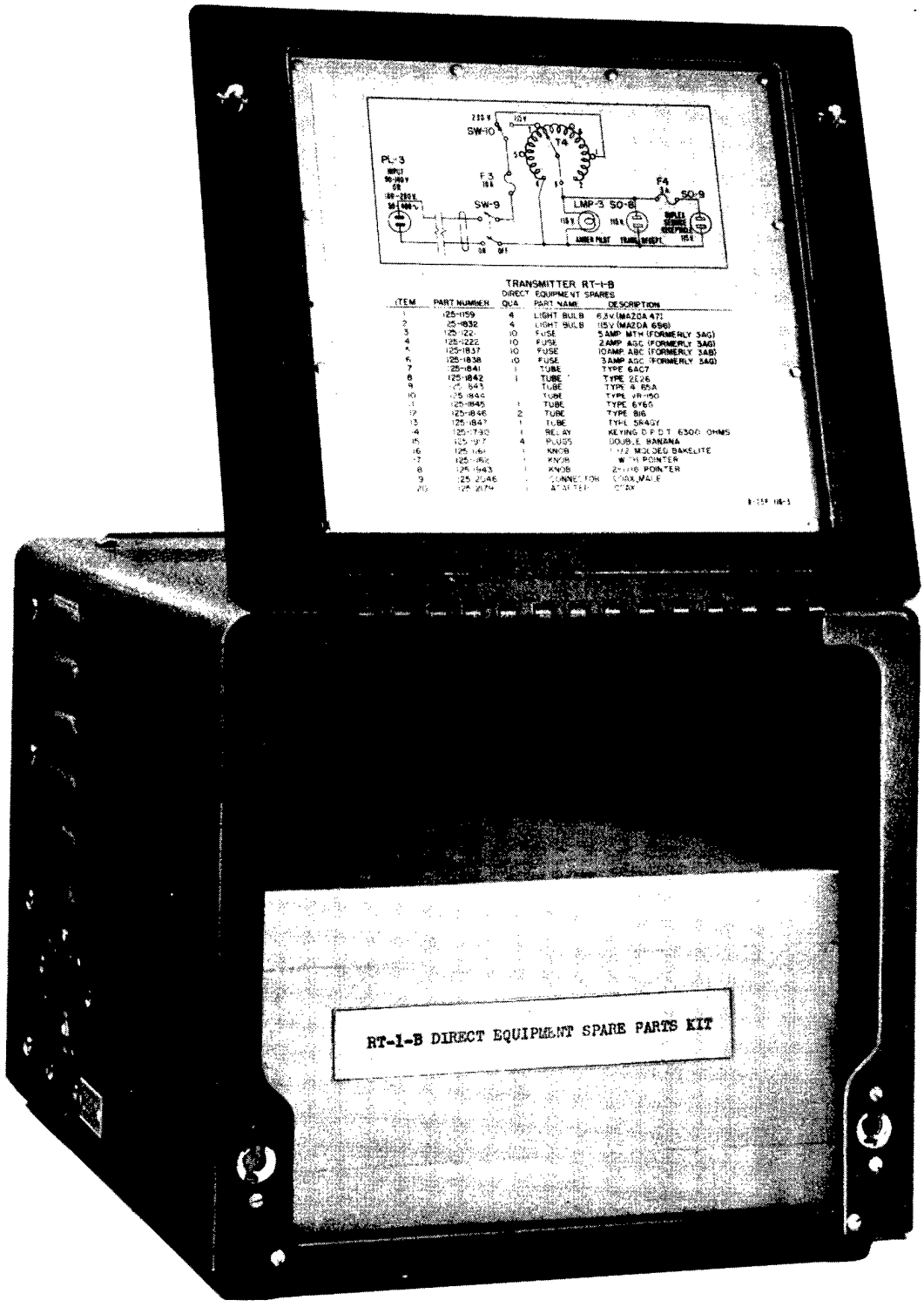
POWER SUPPLY FOR RADIO TRANSMITTER RT-1-B

FIGURE 14 SCHEMATIC DIAGRAM



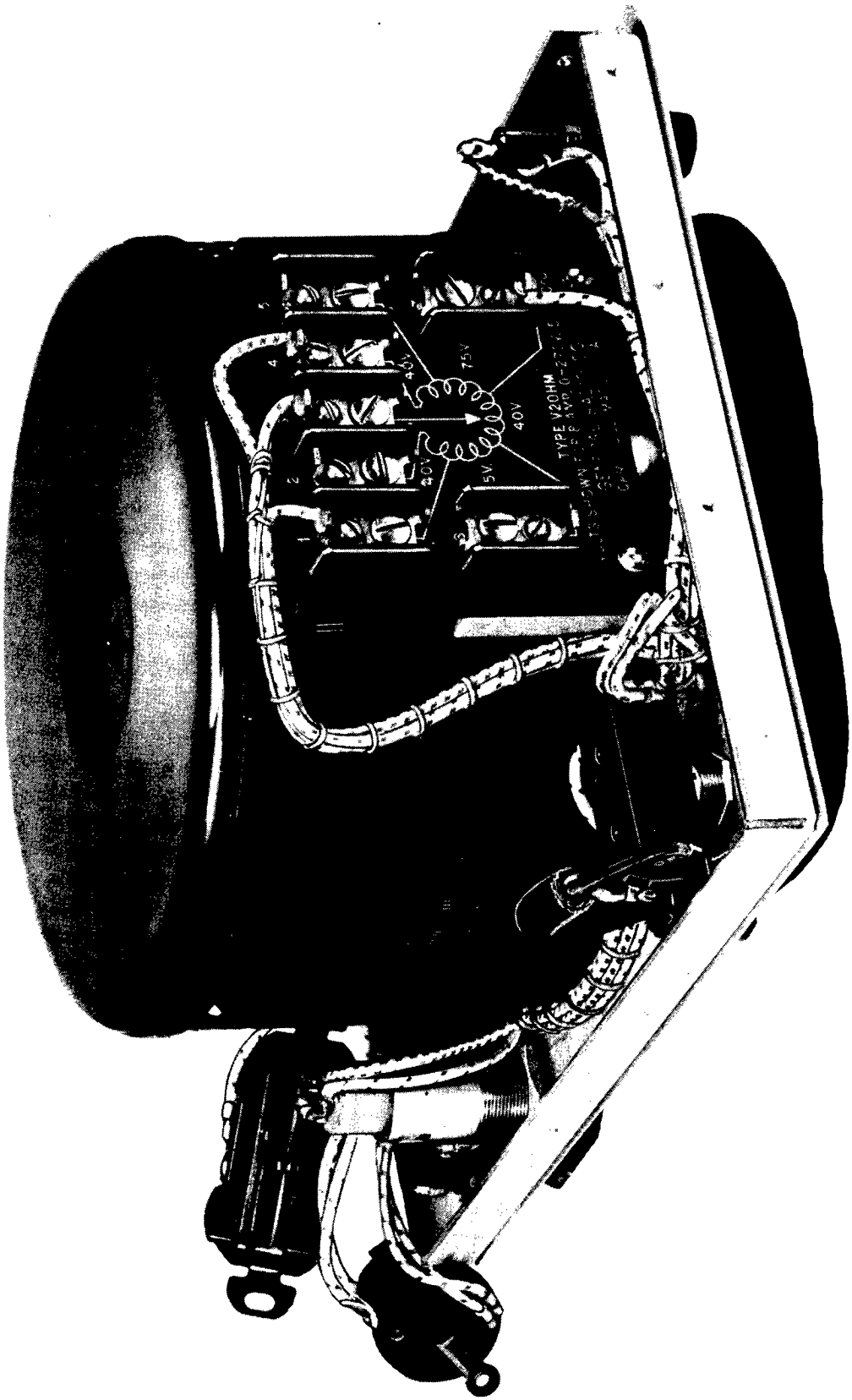
ACCESSORY UNIT FOR RADIO TRANSMITTER RT-1-B

FIGURE 15 FRONT VIEW



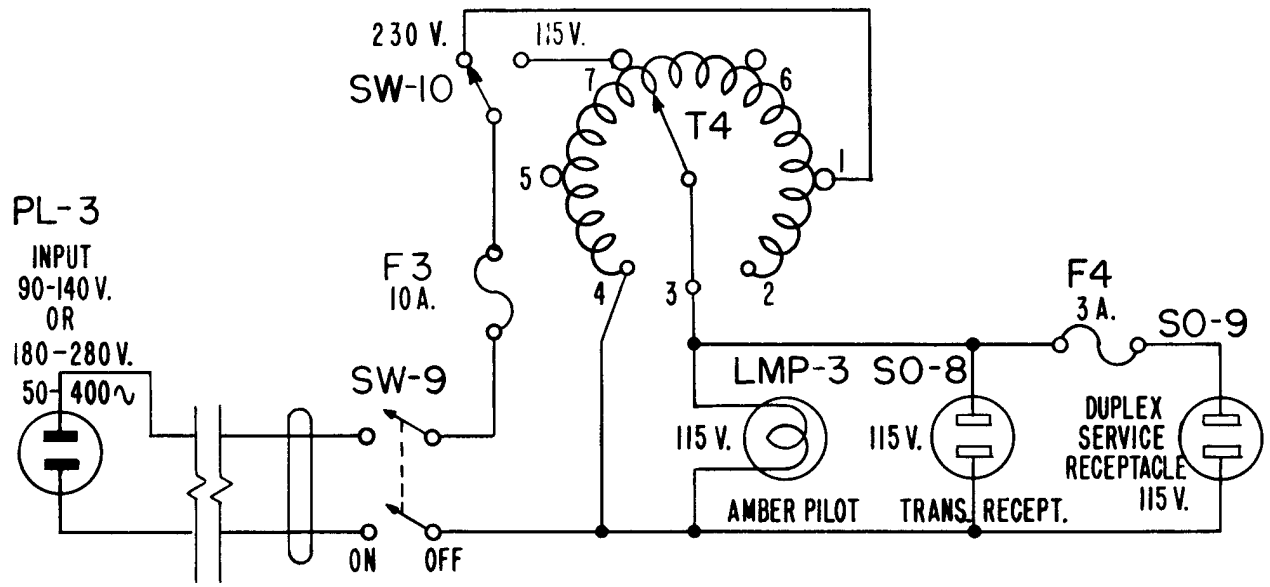
ACCESSORY UNIT FOR RADIO TRANSMITTER RT-1-B

FIGURE 16 REAR VIEW



ACCESSORY UNIT FOR RADIO TRANSMITTER RT-1-B

FIGURE 17 VIEW OF VARIAC



TRANSMITTER RT-1-B

DIRECT EQUIPMENT SPARES

ITEM	PART NUMBER	QUA.	PART NAME	DESCRIPTION
1	125-1159	4	LIGHT BULB	6.3V. (MAZDA 47)
2	125-1832	4	LIGHT BULB	115 V. (MAZDA 6S6)
3	125-1221	10	FUSE	5 AMP. MTH (FORMERLY 3AG)
4	125-1222	10	FUSE	2 AMP. AGC (FORMERLY 3AG)
5	125-1837	10	FUSE	10AMP. ABC (FORMERLY 3AB)
6	125-1838	10	FUSE	3 AMP AGC (FORMERLY 3AG)
7	125-1841	1	TUBE	TYPE 6AC7
8	125-1842	1	TUBE	TYPE 2E26
9	125-1843	1	TUBE	TYPE 4-65A
10	125-1844	1	TUBE	TYPE VR-150
11	125-1845	1	TUBE	TYPE 6Y6G
12	125-1846	2	TUBE	TYPE 816
13	125-1847	1	TUBE	TYPE 5R4GY
14	125-1790	1	RELAY	KEYING D.P.D.T. 6300 OHMS.
15	125-1917	4	PLUGS	DOUBLE BANANA
16	125-1161	1	KNOB	1-1/2" MOLDED BAKELITE
17	125-1162	1	KNOB	1" WITH POINTER
18	125-1943	1	KNOB	2-1/16" POINTER
19	125-2046	1	CONNECTOR	COAX, MALE
20	125-2179	1	ADAPTER	COAX

ACCESSORY UNIT FOR RADIO TRANSMITTER RT-1-B

FIGURE 18 SCHEMATIC DIAGRAM

NOTES

NOTES