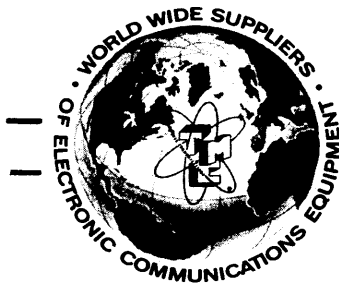


NOTICE

THE CONTENTS AND INFORMATION CONTAINED IN THIS INSTRUCTION MANUAL IS PROPRIETARY TO THE TECHNICAL MATERIEL CORPORATION TO BE USED AS A GUIDE TO THE OPERATION AND MAINTENANCE OF THE EQUIPMENT FOR WHICH THE MANUAL IS ISSUED AND MAY NOT BE DUPLICATED EITHER IN WHOLE OR IN PART BY ANY MEANS WHATSOEVER WITHOUT THE WRITTEN CONSENT OF THE TECHNICAL MATERIEL CORPORATION.



THE TECHNICAL MATERIEL CORPORATION

C O M M U N I C A T I O N S E N G I N E E R S

700 FENIMORE ROAD

MAMARONECK, N. Y.

Warranty

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment (except electron tubes,* fuses, lamps, batteries and articles made of glass or other fragile or other expendable materials) purchased hereunder to be free from defect in materials and workmanship under normal use and service, when used for the purposes for which the same is designed, for a period of one year from the date of delivery F.O.B. factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, F.O.B. factory, which may fail within the stated warranty period, PROVIDED:

1. That any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction.
2. That the defect is not the result of damage incurred in shipment from or to the factory.
3. That the equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise.
4. That any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

Electron tubes* furnished by TMC, but manufactured by others, bear only the warranty given by such other manufacturers. Electron tube warranty claims should be made directly to the manufacturer of such tubes.

TMC's obligation under this warranty is limited to the repair or replacement of defective parts with the exceptions noted above.

At TMC's option any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid. No parts or equipment shall be returned to TMC, unless a return authorization is issued by TMC.

No warranties, express or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the Buyers sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of TMC Products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

*Electron tubes also include semi-conductor devices.

PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT

Should it be necessary to return equipment or material for repair or replacement, whether within warranty or otherwise, a return authorization must be obtained from TMC prior to shipment. The request for return authorization should include the following information:

1. Model Number of Equipment.
2. Serial Number of Equipment.
3. TMC Part Number.
4. Nature of defect or cause of failure.
5. The contract or purchase order under which equipment was delivered.

PROCEDURE FOR ORDERING REPLACEMENT PARTS

When ordering replacement parts, the following information must be included in the order as applicable:

1. Quantity Required.
2. TMC Part Number.
3. Equipment in which used by TMC or Military Model Number.
4. Brief Description of the Item.
5. The *Crystal Frequency* if the order includes crystals.

PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT

TMC's Warranty specifically excludes damage incurred in shipment to or from the factory. In the event equipment is received in damaged condition, the carrier should be notified immediately. Claims for such damage should be filed with the carrier involved and not with TMC.

All correspondence pertaining to Warranty Claims, return, repair, or replacement and all material or equipment returned for repair or replacement, within Warranty or otherwise, should be addressed as follows:

THE TECHNICAL MATERIEL CORPORATION
Engineering Services Department
700 Fenimore Road
Mamaroneck, New York

LINEAR POWER AMPLIFIER

MODEL PAL-350(B)

The Model PAL-350(B), which consists of Power Supply PSP-350 and Linear Power Amplifier RFA-1, is similar to the PAL-350(A) with the following exceptions:

(1) The PSP-350 Power Supply has been converted from standard 866-A Mercury Vapor Rectifiers and 5R4GY High Vacuum Rectifiers to solid-state rectifiers (refer to figures 1 and 2).

(2) Linear Power Amplifier RFA has been converted to operate Class "C" for CW signals when Switch S206 is set at CW (refer to figure 3).

(3) Components added to the PSP-350 Power Supply are listed below:

REFERENCE SYMBOL

R120
R121
CR102
CR103
CR104

(4) Components added to RFA-1 Linear Power Amplifier are listed below:

REFERENCE SYMBOL

S206*
R235
R223

*The rear panel location of S206 is shown in figure 4.

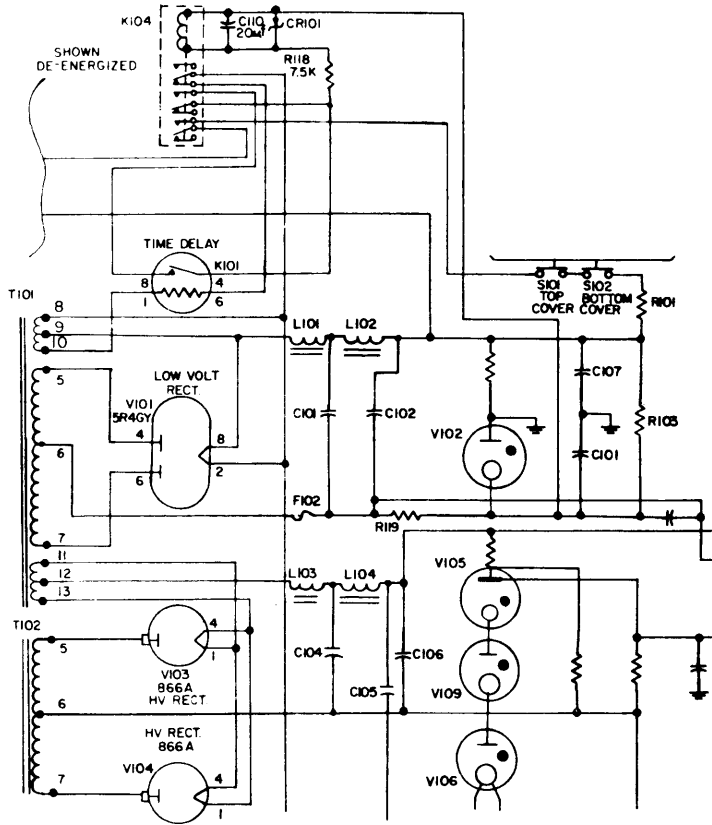


Figure 1. PSP-350
Before Modification,
Partial Schematic
Diagram

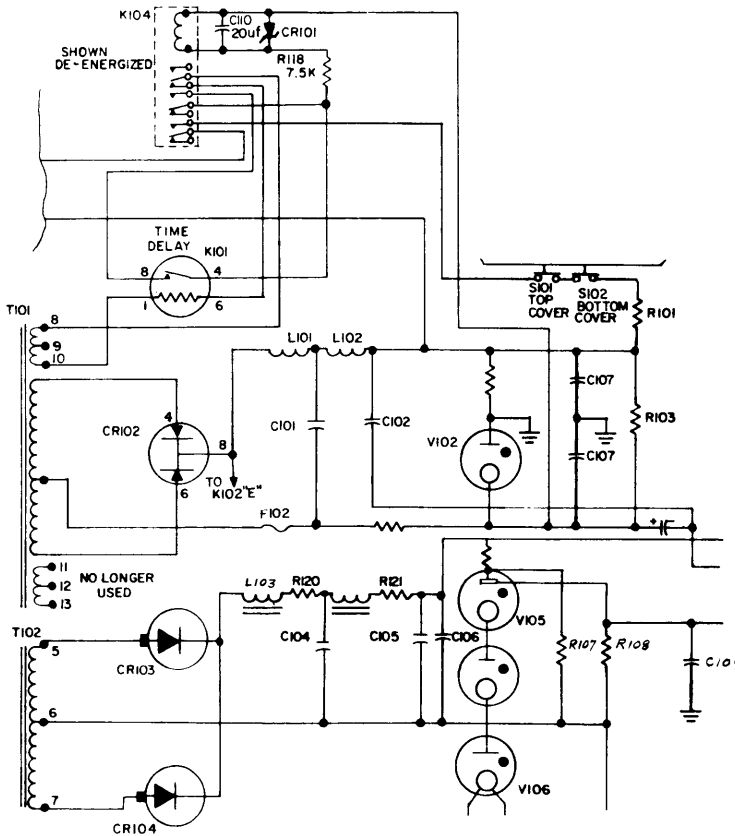


Figure 2. PSP-350
After Modification,
Partial Schematic
Diagram

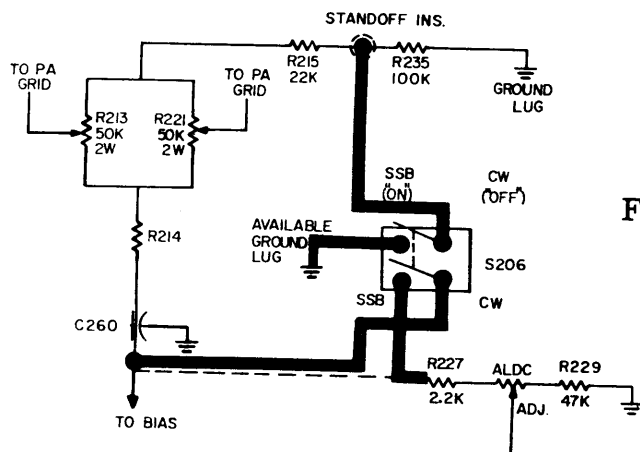


Figure 3. RFA-1 Modification,
Schematic Diagram

DOTTED LINES INDICATE UNMODIFIED UNIT. HEAVY SOLID LINES INDICATE MODIFICATION.

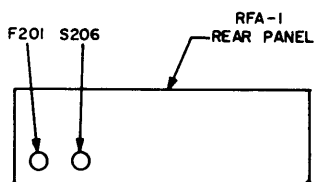


Figure 4. Rear Panel Location
of Switch S206



WARNING

Extremely high voltages (up to 3000V) exist in this equipment. Observe all standard safety procedures and safety procedures noted in this manual.

TABLE OF CONTENTS

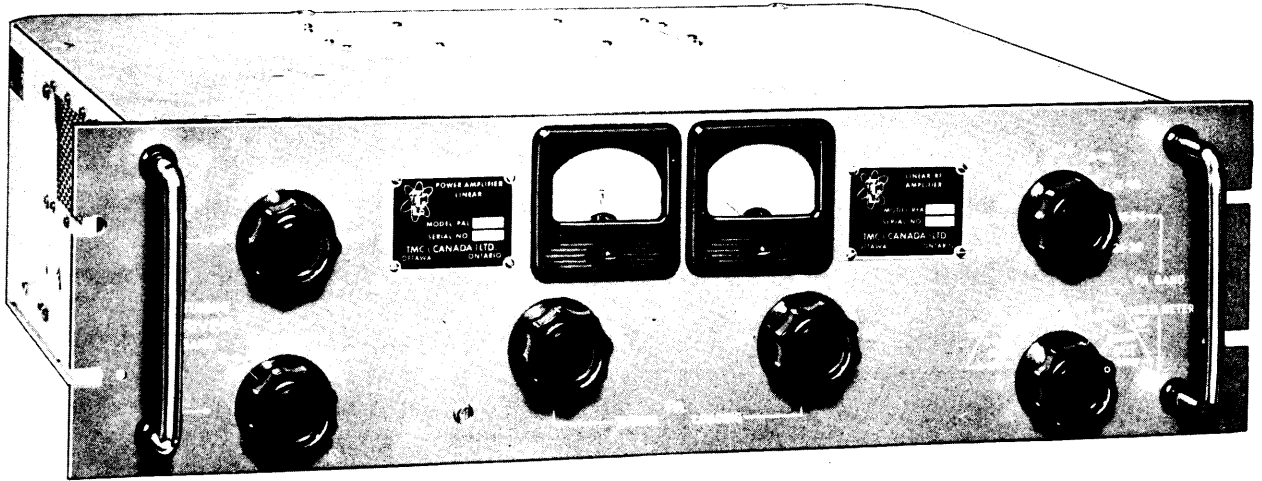
	<u>PAGE</u>
SECTION I GENERAL DESCRIPTION _____	1-1
SECTION II GENERAL DESCRIPTION OF CIRCUITS _____	2-3
Linear Power Amplifier Model RFA-1 _____	2-3
Power Supply Model PSP-350 _____	2-3
SECTION III CONTROL FUNCTIONS _____	3-8
Power Supply Model PSP-350 _____	3-8
Linear Power Amplifier Model RFA-1 _____	3-8
Meter Functions _____	3-8
SECTION IV INSTALLATION & OPERATION _____	4-10
Tuning Procedure _____	4-10
SECTION V MAINTENANCE _____	5-13
General _____	5-13
Operators Maintenance _____	5-13
Preventive Maintenance _____	5-13
Corrective Maintenance _____	5-14
Initial Power Checks _____	5-14
Driver Section Alignment _____	5-14
Neutralization of P.A. _____	5-15
SECTION VI PARTS LIST _____	6-21

LIST OF ILLUSTRATIONS

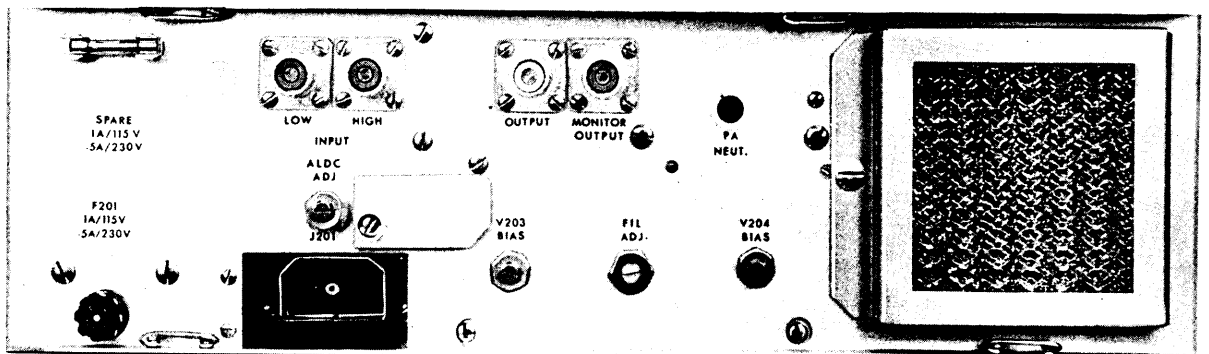
FIGURE		PAGE
Fig. 1-1	Front Angle View RFA-1 Linear Amplifier _____	iii
Fig. 1-2	Rear Angle View RFA-1 Linear Amplifier _____	iii
Fig. 1-3	Front Angle View PSP-350 Power Supply _____	iv
Fig. 1-4	Rear Angle View PSP-350 Power Supply _____	iv
Fig. 2-1	Simplified Block Diagram (CK 10433) _____	2-4
Fig. 2-2	Simplified Schematic Diagram (CK 10434) _____	2-4
Fig. 2-3	Simplified Schematic V201 Amplifier (CK 10430) _____	2-5
Fig. 2-4	Simplified Schematic V202 2nd Amplifier (CK 10428) _____	2-5
Fig. 2-5	Simplified PA Schematic (CK 10432) _____	2-5
Fig. 2-6	Simplified Metering Circuits (CK 10429) _____	2-6
Fig. 2-7	Simplified ALDC Circuit (CK 10427) _____	2-7
Fig. 2-8	Simplified Interlock and Relay Circuit (CK 10431) _____	2-7
Fig. 3-1	Panel Controls _____	3-9
Fig. 4-1	Rear Panel Connections and Adjustment (ID 10265) _____	4-11
Fig. 5-1	Location Diagram of Major Electronic Components Top View RFA-1 _____	5-16
Fig. 5-2	Location Diagram of Major Electronic Components Bottom View RFA-1 _____	5-17
Fig. 5-3	Location Diagram of Major Electrical Components Bottom View RFA-1 (Driver Section Only) _____	5-18
Fig. 5-4	Location Diagram of Major Electric Components Top View PSP-350 _____	5-19
Fig. 5-5	Location Diagram of Major Electronic Components Bottom View PSP-350 _____	5-20
Fig. 6-1	Schematic CK10359 _____	6-35
Fig. 6-2	Schematic CK10360 _____	6-37

LIST OF TABLES

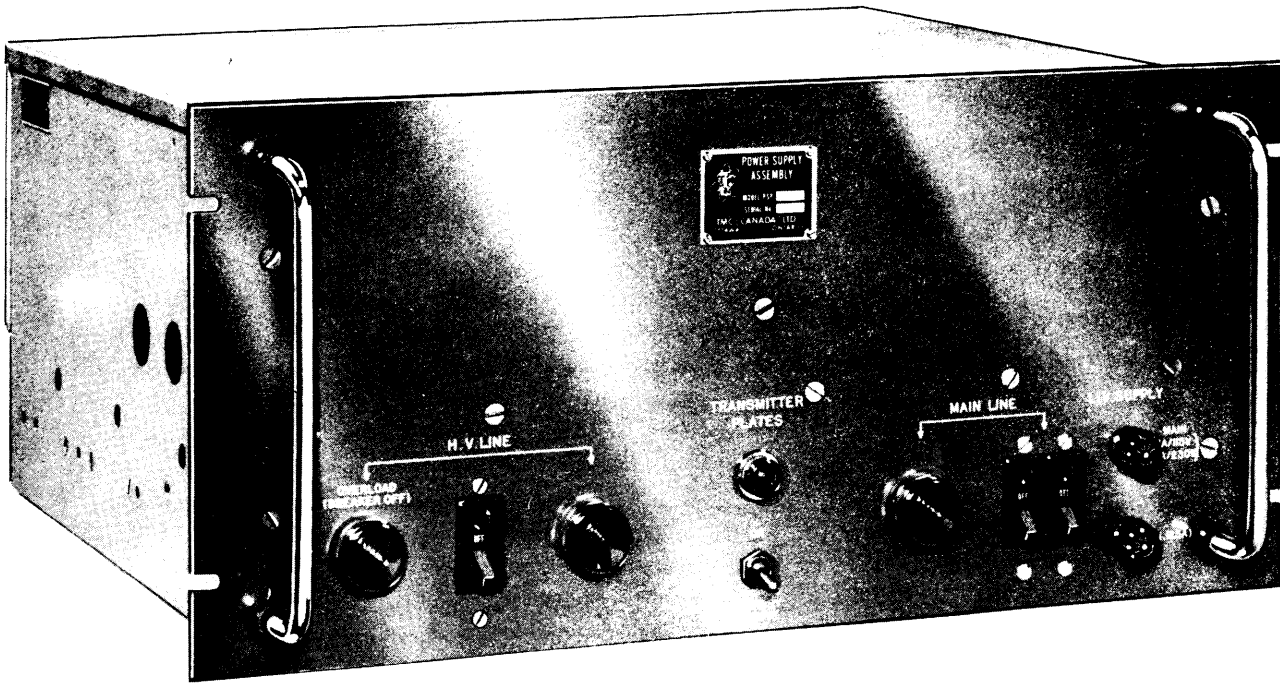
TABLE		PAGE
Table 1-1	Electrical Characteristics, PAL-350 _____	1-1
Table 4-1	Driver Tuning _____	4-11
Table 4-2	Single Tone Input _____	4-12
Table 4-3	Two Tone Input _____	4-12



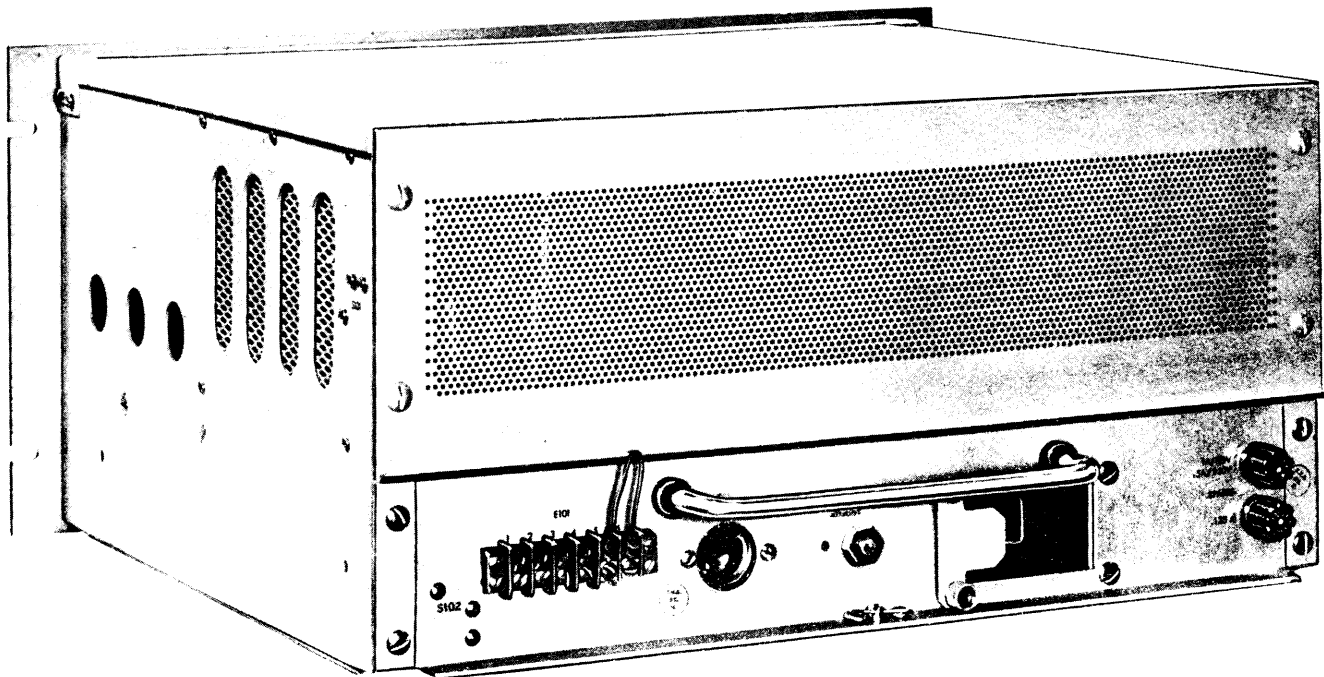
Front Angle View RFA-1 Linear Amplifier



Rear Angle View RFA-1 Linear Amplifier



Front Angle View PSP-350 Power Supply



Rear Angle View PSP-350 Power Supply

SECTION I

GENERAL DESCRIPTION

POWER AMPLIFIER, LINEAR, MODEL PAL-350(A)

The TMC Model PAL-350, Power Amplifier, Linear, is a conservatively rated general purpose amplifier which provides 350 watts PEP output over the frequency range 2 to 32 megacycles.

The Model PAL-350 is composed of two small and compact units; the Linear Power Amplifier, Model RFA-1 (5-1/4 inch panel) and the Power Supply, Model PSP-350 (8-3/4 inch panel). The entire unit occupies only 14 inches of panel space for standard rack mounting which makes it ideal for console, table top, mobile, and shipboard installations. A pair of 4X250B Beam Power Amplifier tubes in parallel with a pi network provide unbalanced output of from 50 to better than 600 ohms.

The combination of the TMC Model SBE, Mod Selector, Transmitting, and the PAL-350 provides a compact transmitting system capable of producing single, double or independent sideband signals with any degree of carrier insertion.

The PAL-350 has been carefully designed with no compromise in workmanship or component quality. Particular attention has been given to suppression of distortion products, amplifier stability, power supply hum content and dynamic impedance. Full interlock, overload and fuse protection have been provided for the safety of the operating personnel and protection of the equipment. A filtered, forced blower system is included as an integral part of the equipment. An effective ALDC (Automatic Load and Drive Control) system has been included to limit the distortion produced when high drive peaks occur.

TABLE 1-1. ELECTRICAL CHARACTERISTICS, PAL-350(A)

ITEM	CHARACTERISTICS
FREQUENCY RANGE:	2 to 32 megacycles continuous, bandswitched.
OUTPUT POWER:	350 watts 2 tone PEP. 200 watts key down CW or FS.
OPERATING MODES:	With appropriate exciter; CW, MCW, SSB, ISB, DSB, FS or pulse operation.
TUNING:	All tuning and bandswitching controls on front panel. (No plug-in components).
OUTPUT IMPEDANCE:	Will match any unbalanced load from 70 to 150 ohms at ± 20 degrees in the range 2 to 4 megacycles. Will match any unbalanced load from 50 to 600 ohms at ± 45 degrees in the range 4 to 32 megacycles.
OUTPUT CONNECTION:	Type C. coaxial.
INPUT IMPEDANCE:	70 ohms coaxial.
INPUT REQUIREMENTS:	100 milliwatts will produce full output.
INPUT CONNECTION:	Type BNC coaxial (RG-59/U).
DISTORTION PRODUCTS:	At full PEP output, 3rd order distortion products are at least 40 db below either tone of a standard two tone test.

TABLE 1-1. ELECTRICAL CHARACTERISTICS, PAL-350 (Continued)

ITEM	CHARACTERISTICS
HARMONIC SUPPRESSION:	<p>Second - at least 40 db from PEP output. Third - at least 50 db from PEP output.</p>
ALDC:	<p>An Automatic Load and Drive Control is provided to limit distortion during high drive peaks.</p>
PRIMARY POWER REQUIREMENTS:	<p>115/230 volts, 50/60 cycle, single phase, 550 watts under 350 watts PEP output conditions.</p>
SAFETY:	<p>Full interlock protection. Full overload and fuse protection.</p>
COOLING:	<p>Filtered, forced air blower system.</p>
TEMPERATURE, HUMIDITY:	<p>Designed to operate in any ambient temperature between 0 degrees and 50 degrees C for any value of relative humidity up to 90%.</p>
RUGGEDNESS:	<p>The unit is designed for mobile application with the addition of shock mounts.</p>
TUBE COMPLEMENT:	<p>RFA-1 Linear RF Amplifier</p> <p>2 ea. 4X250B RF Amplifiers 1 ea. 6CL6 Controlled Amplifier 1 ea. 6146 Driver PSP-350 Power Supply 2 ea. 866A Rectifiers 2 ea. OA2 Voltage Regulators 2 ea. OB2 Voltage Regulators 1 ea. 5R4 Rectifier</p>
MOUNTING:	<p>Standard WE relay rack.</p>
SIZE: RFA-1 PSP-350	<p>19" wide x 5-1/4" high x 17" deep. 19" wide x 8-3/4" high x 13" deep.</p>
WEIGHT: RFA-1 PSP-350	<p>30 lbs. 60 lbs.</p>
SHIPPING WEIGHT:	<p>140 lbs. gross.</p>
COMPONENTS AND CONSTRUCTION:	<p>Equipment is manufactured in accordance with JAN/MIL specifications wherever practicable.</p>

SECTION II

GENERAL DESCRIPTION OF CIRCUITS

LINEAR POWER AMPLIFIER MODEL RFA-1

The RFA-1, which operates as a class AB1 linear amplifier, uses a pair of 4CX250B beam power amplifiers in parallel to a pi network to provide an unbalanced output of 50 or 70 ohms. The final amplifiers are driven by a pentode driver stage which employs R. F. feedback to improve the linearity. The driver stage is preceded by an automatic load and drive control (ALDC) to limit the distortion produced when high peaks or load changes occur.

The RFA-1 requires a maximum of 100 milliwatts excitation to produce full output. A choice of input connections is provided to accommodate inputs between 100 milliwatts and 1 watt. The output connections on the RFA-1 consist of 2 type C coaxial connectors, one of which provides full R. F. output, the other provides 1/300 th of the R. F. output for monitoring purposes. The monitoring output may be terminated in any resistive load of 70 ohms or higher.

The unit covers a frequency range of 2 to 32 megacycles, and is band-switched. All tuning and operating adjustments are accomplished from the front of the unit. Complete metering facilities are provided by a MULTIMETER and a PA PLATE meter, the functions of which are explained under METER FUNCTIONS.

Referring to RFA Schematic CK-10359 contained at the rear of this manual, it will be seen the drive can be applied to either J202 or J203, depending upon the level of excitation available. The signal is coupled via C212 to the grid of the control amplifier V201, 6CL6. The screen grid of this amplifier is directly grounded. However, since the cathode is -150 V, with respect to the chassis, and the plate 150 Volts positive, the screen grid is 150 Volts positive with respect to the cathode and 150 Volts negative with respect to the plate. The plate circuit has a parasitic suppressor, PS201, the signal being coupled via C282 to the appropriate tuned circuit selected by S201 A and B for the frequency of operation. Plate voltage for V201 is applied via network L201, L202 and feed-through decoupling capacitor C279. ALDC is applied to this first stage in the form of bias derived from the ALDC rectifier CR202 (See simplified schematic ALDC circuit).

Coupling of the driver stage V202 is via C221 to grid of V202. A grid stopper resistor in this grid helps to stabilize the stage. The driver stage plate circuitry is almost identical to the previous stage with the signal being coupled to the final amplifier tubes V203 and V204 grids via C240 and C243. Neutralization of the driver stage is achieved by feeding back a small amount of signal voltage from the plate of the driver tube V202 via driver neutralizing capacitor C223 to the grid circuit.

The final amplifier is a pair of parallel connected 4CX250B beam tetrodes V203 and V204. The screen grids are operated at a potential of regulated 360 Volts positive. The plates having 2000 Volts positive applied. Bias for each of the two tubes is adjustable by means of R213, R221, from the rear of the unit. The grid leads having parasitic suppressors PS203, PS204 directly at the grid pin of each tube. The plate is tuned by a "PI" Network tank circuit. The output of the unit is brought out through J205. A small portion of the output (1/300th) appears at the monitor output jack J204. This is derived from the capacitive divider C274 and C275. Another capacitive divider across the output comprising C277 and C278 is used for the RF output metering circuit. Other metering of this stage includes metering of RF drive voltage, RF plate voltage, B+ and filament voltages, screen and plate current metering (See simplified metering circuit schematic).

The final tubes are forced air cooled by blower B201, through the air system sockets of V203, V204. It is essential to have the R/F section bottom cover in place at all times whilst the unit is operating.

Neutralization of the final amplifier stage is effected by C214 (adjustable from rear of unit).

POWER SUPPLY MODEL PSP-350

HIGH VOLTAGE:

This supply is of a conservative design containing mercury vapour high voltage rectifiers (type 866A). Rectification is full wave and is followed by a choke input filter network providing a plate voltage of 2000 volts to the final RF stage. Excellent regulation of the power supply is maintained due to the low internal impedance of the mercury vapour rectifiers.

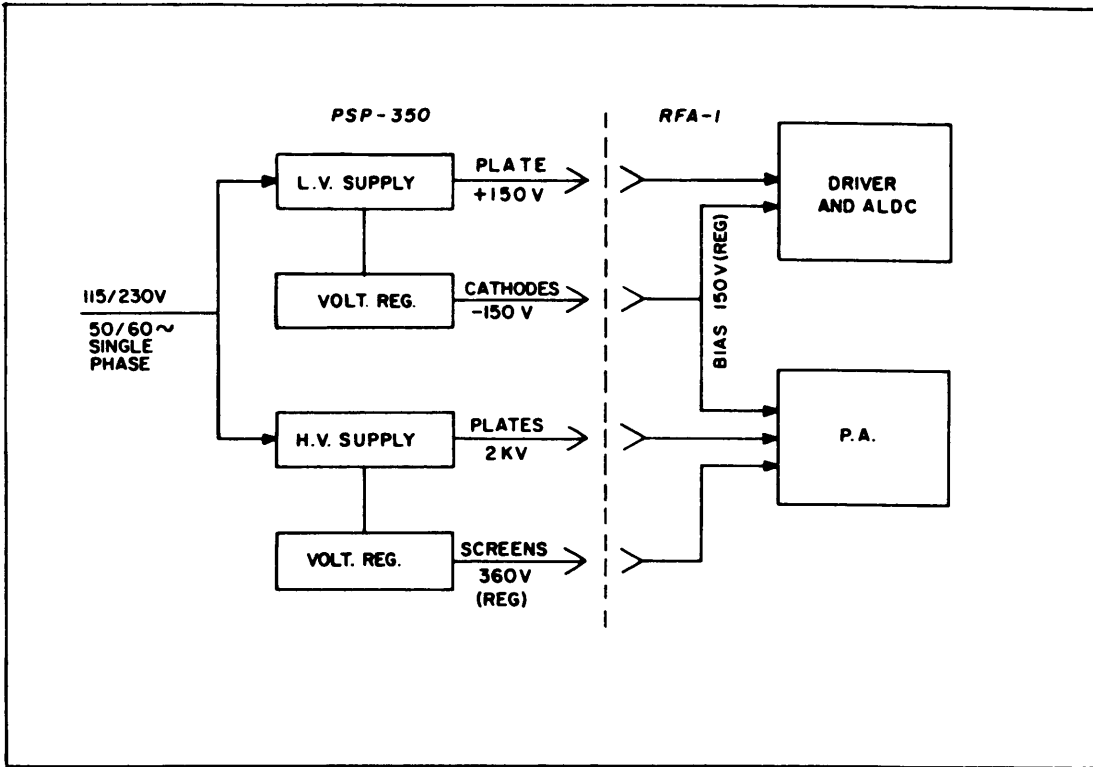


Figure 2-1 Simplified Block Diagram (CK10433)

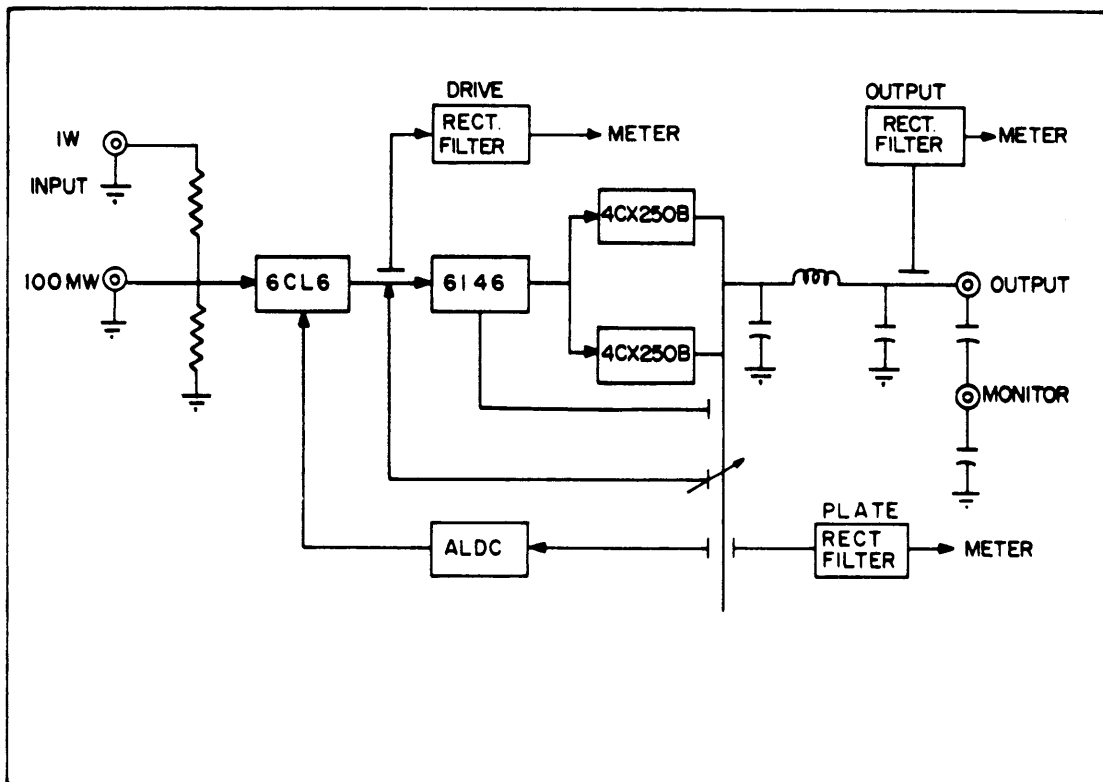


Figure 2-2 Simplified Schematic Diagram (CK10434)

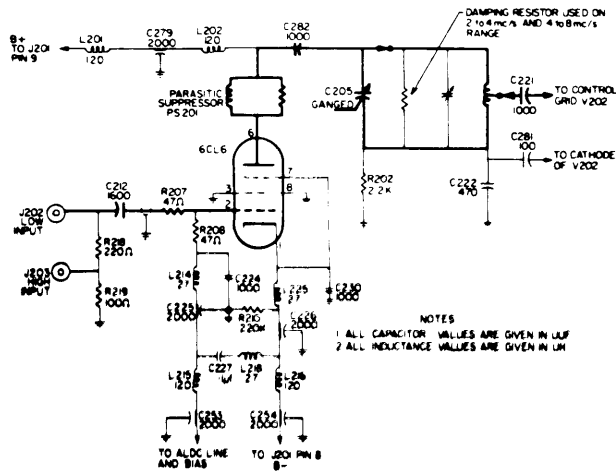


Figure 2-3 Simplified Schematic V201 Amplifier (CK10430)

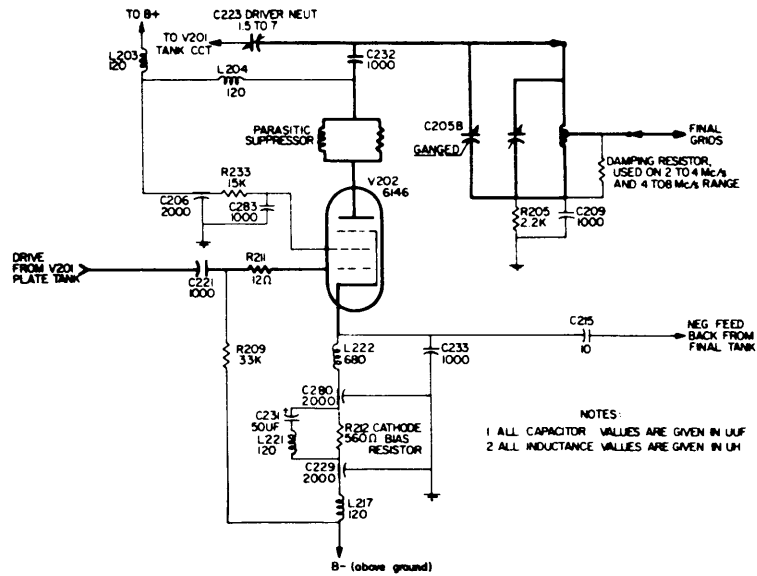


Figure 2-4 Simplified Schematic V202 2nd Amplifier (CK10428)

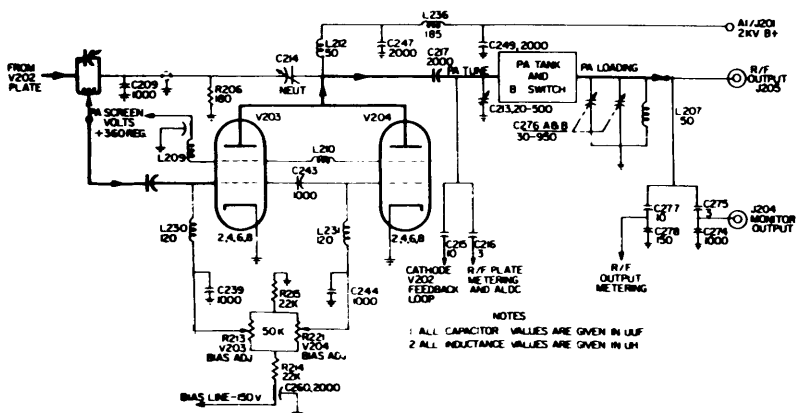


Figure 2-5 Simplified PA Schematic (CK10432)

LOW VOLTAGE:

The lower voltage power supply contains a high vacuum, full wave rectifier. This supply provides a voltage of 150 volts to the plates of the ALDC and driver stages, a voltage of -150 volts (regulated) bias voltage for the final amplifier, and screen voltage to the driver stage.

INPUT VOLTAGE:

The equipment is wired for operation on 115 V, 50/60 cycle power line supply. 230 volt, 50/60 cycle operation may be had on special order or by following

the instructions provided on the RFA-1 and PSP-350 schematic diagrams.

CONTROL OVERLOAD CIRCUIT:

The time delay relay prevents the application of high voltage to the mercury vapour rectifiers until their filaments have been allowed to warm up sufficiently for operation.

The plate overload breaker removes all B+ voltages when the current drawn from the high voltage supply becomes excessive, thus protecting the final amplifier tubes.

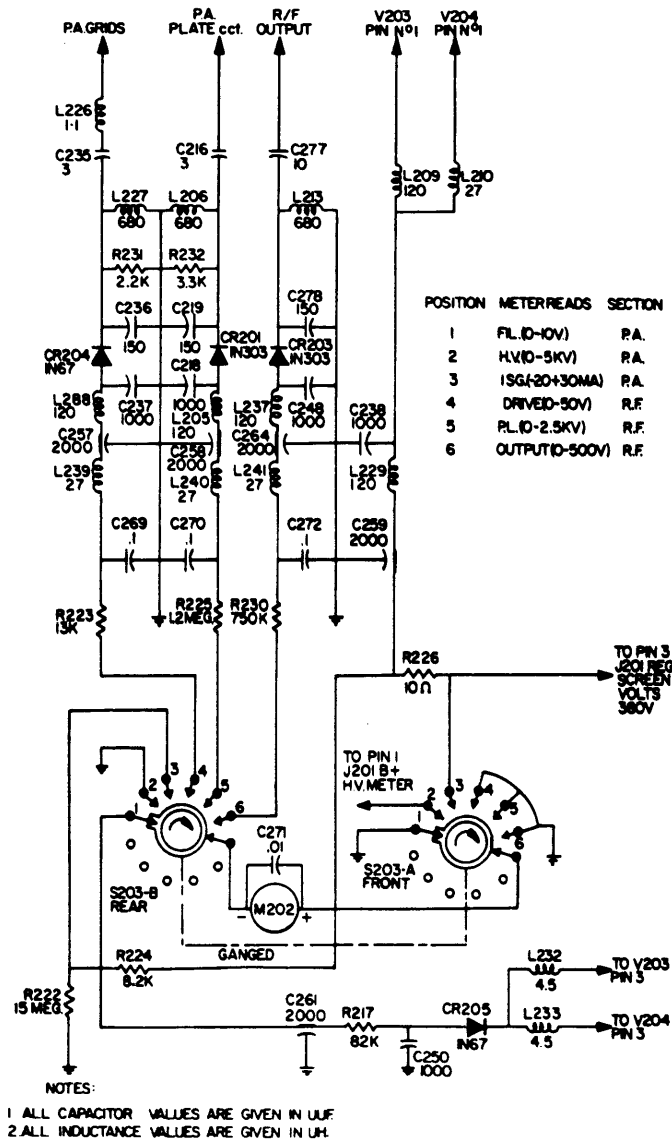


Figure 2-6 Simplified Metering Circuits (CK10429)

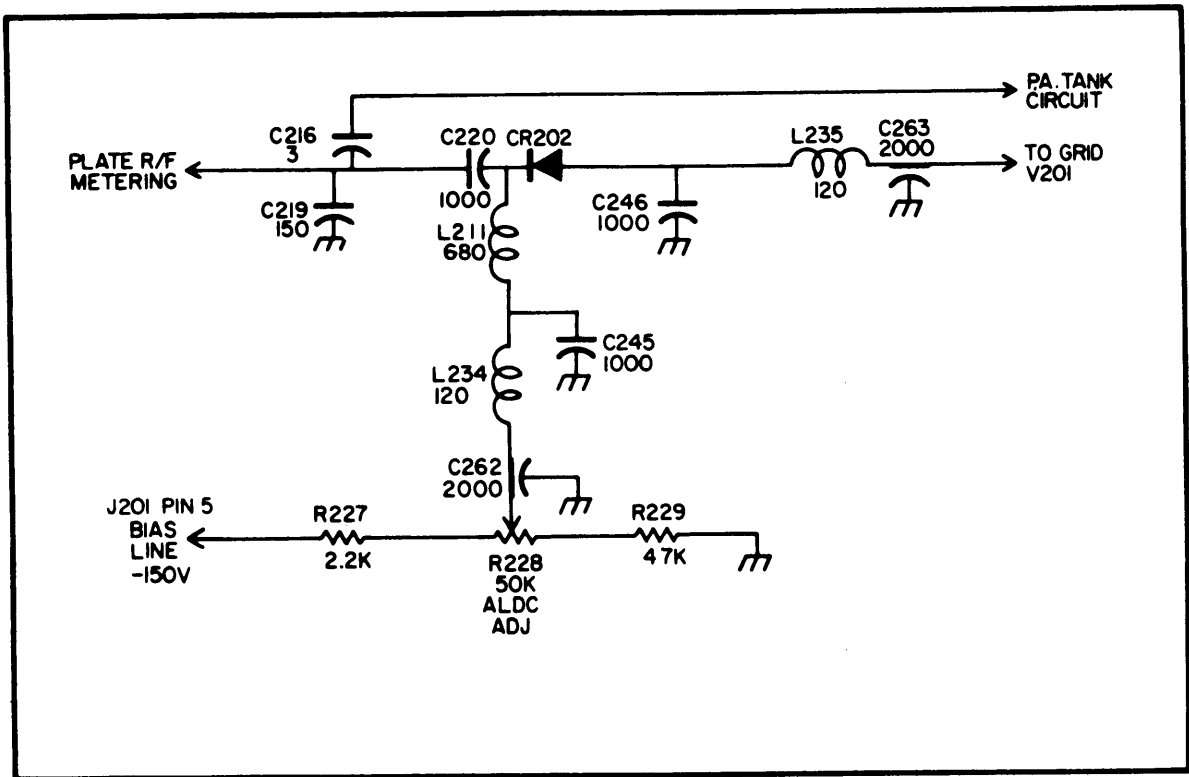
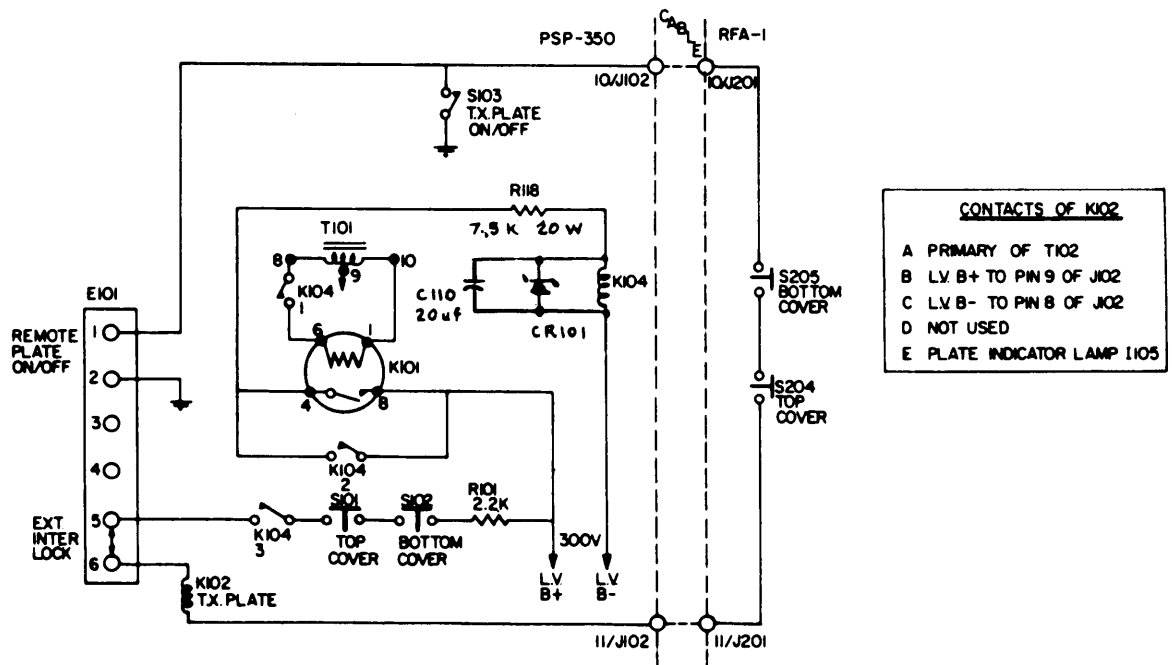


Figure 2-7 Simplified ALDC Circuit (CK10427)



- CONTACTS OF K102**
- A PRIMARY OF T102
 - B LV B+ TO PIN 9 OF J102
 - C LV B- TO PIN 8 OF J102
 - D NOT USED
 - E PLATE INDICATOR LAMP I105

Figure 2-8 Simplified Interlock and Relay Circuit (CK10431)

SECTION III

CONTROL FUNCTIONS

POWER SUPPLY MODEL PSP-350

1. MAIN LINE ON/OFF switch and circuit breaker:

In the ON position this switch applies AC power to the transmitter and provides line overload protection.

2. H.V. LINE ON/OFF switch and circuit breaker:

When the TRANSMITTER PLATE switch is in the ON position, and the H.V. LINE switch (ON position), voltage is applied to the final plates. It also provides overload protection when tripped by excessive PA plate or screen grid currents.

3. TRANSMITTER PLATES ON/STANDBY-REMOTE switch:

In the ON position this switch applies plate and screen voltages to the driver tubes, ALDC and final plates. (H.V. LINE switch in ON position). When the H.V. LINE switch is in the OFF position, this switch applies plate and screen voltages to the ALDC and driver stages only. The STANDBY-REMOTE position permits remote control of these functions.

LINEAR POWER AMPLIFIER MODEL RFA-1

1. DRIVER BAND bandchange switch:

Switches in and out various coils to change the frequency of the driver plate tank.

2. DRIVER TUNING control:

Varies the driver tuning capacitors to resonate the circuit to the desired frequency.

3. PA BAND bandchange switch:

Sets the PA tank to the proper band by selecting the appropriate tap on the PA tank coil.

4. PA TUNING control:

Varies the main PA tuning capacitor to resonate the circuit to the desired frequency.

5. PA LOADING control:

Adjusts the amount of coupling to the load.

6. MULTIMETER switch:

Permits selective indication of the PA filament voltage, the PA screen grid current, and the PA high voltage. Also, the RF voltage at the output of the driver, and RF voltage at the plate and output of the power amplifier.

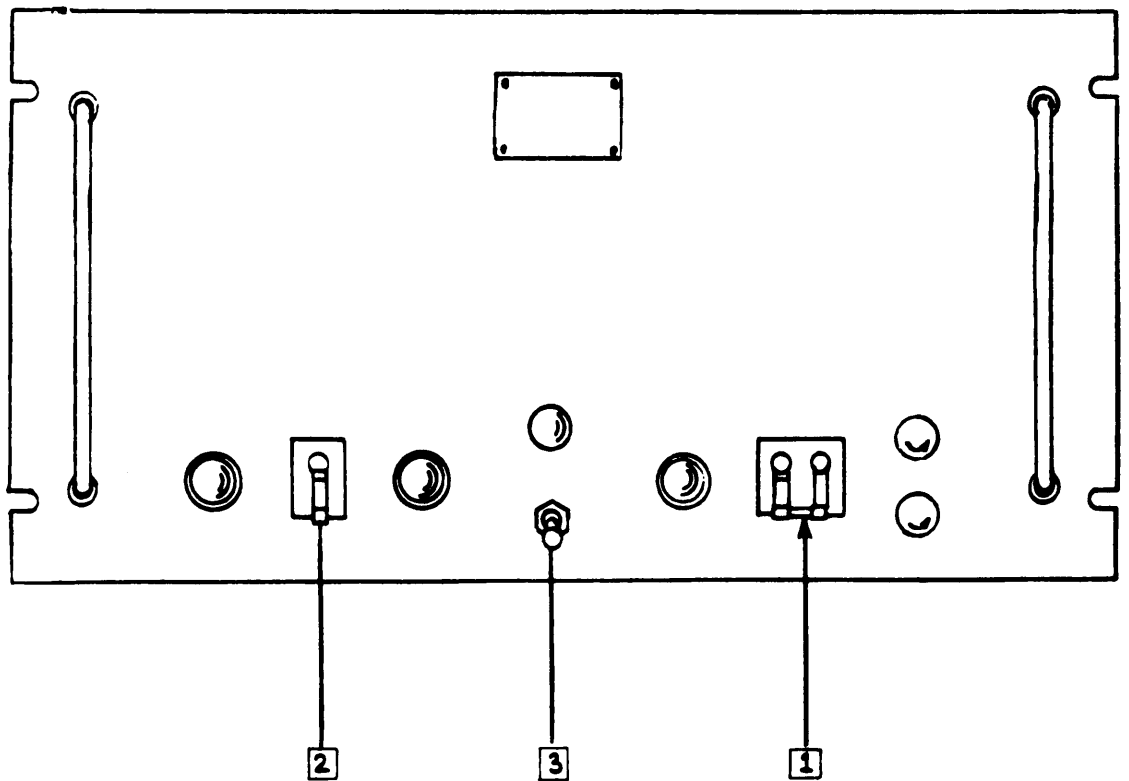
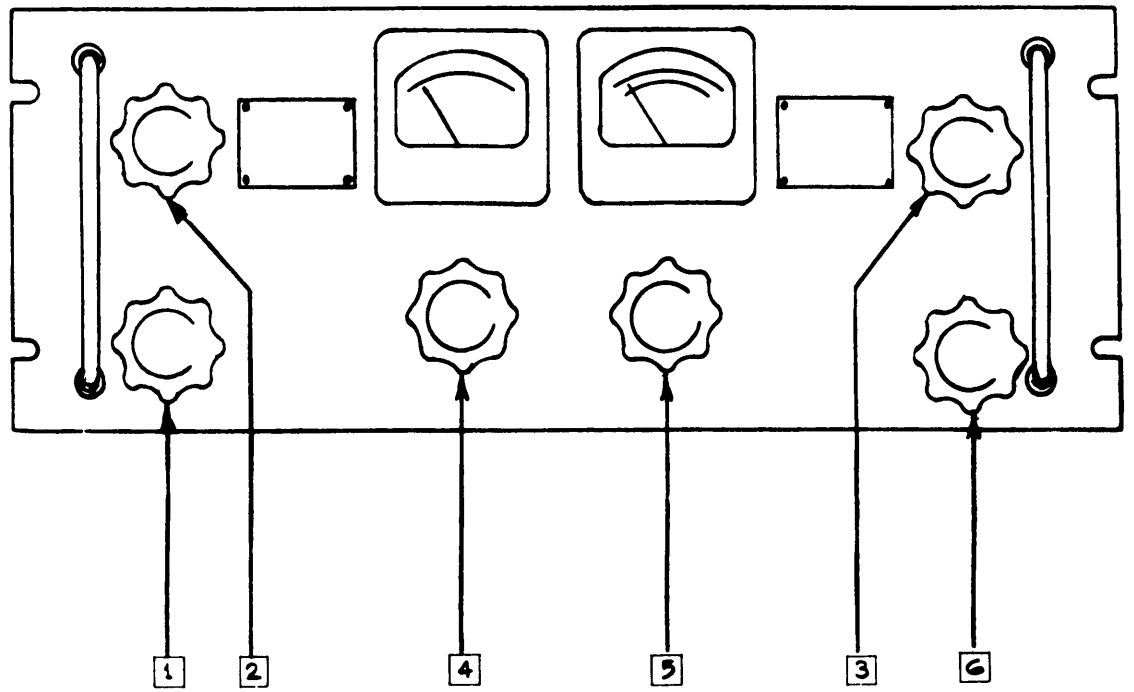
METER FUNCTIONS

1. PA PLATE meter:

This meter indicates PA plate current.

2. MULTIMETER indications:

ISG	-	PA screen grid current
PA HV	-	PA high voltage
FIL	-	PA filament voltage
DR	-	RF drive to PA stage
RF PL	-	PA RF plate voltage
OUT	-	RF output voltage



Figur 3-1 Panel Controls

SECTION IV

INSTALLATION & OPERATION

A) Carefully unpack the equipment and give a visual check for damage in shipment. Check all tubes for damage and correct seating in tube sockets. Insert the two 866A rectifier tubes in their appropriate sockets in the PSP-350. Replace all covers.

B) The PAL-350 can be mounted in any standard 19 inch relay rack. The front panels of the RFA-1 and the PSP-350 of which the PAL-350 is comprised are 5-1/4 inch and 8-3/4 inches high respectively. It is recommended that a minimum of 1-3/4 inches of free space be allowed above the PSP-350 unit.

C) Make cable connections as shown in the accompanying diagram.

D) Before operation of the equipment in any NEW installation it is necessary to allow a twenty minute warm-up period to vapourize any liquid mercury which might have gathered on the rectifier tube elements. Proceed as follows:

1. Turn "H. V. LINE SWITCH" off.
2. Turn "TRANSMITTER PLATES" switch to "STANDBY".
3. Turn multimeter switch to "PA FIL."
4. Turn "MAIN LINE" switch "ON". (Wait 20 minutes)
5. Multimeter should indicate 30 (equivalent to 6 volts), if not adjust "FIL. ADJ." control on rear.

E) Rotate bias potentiometers R213 and R221 and the ALDC potentiometer R228 to the fully anticlockwise position. All these controls being located on the rear of the RFA-1 unit.

TUNING PROCEDURE

NOTE

ITEMS 13 & 14 APPLY ONLY ON INITIAL TUNE UP AFTER INSTALLATION. (UNLESS BIAS SETTINGS NEED RE-ADJUSTMENT).

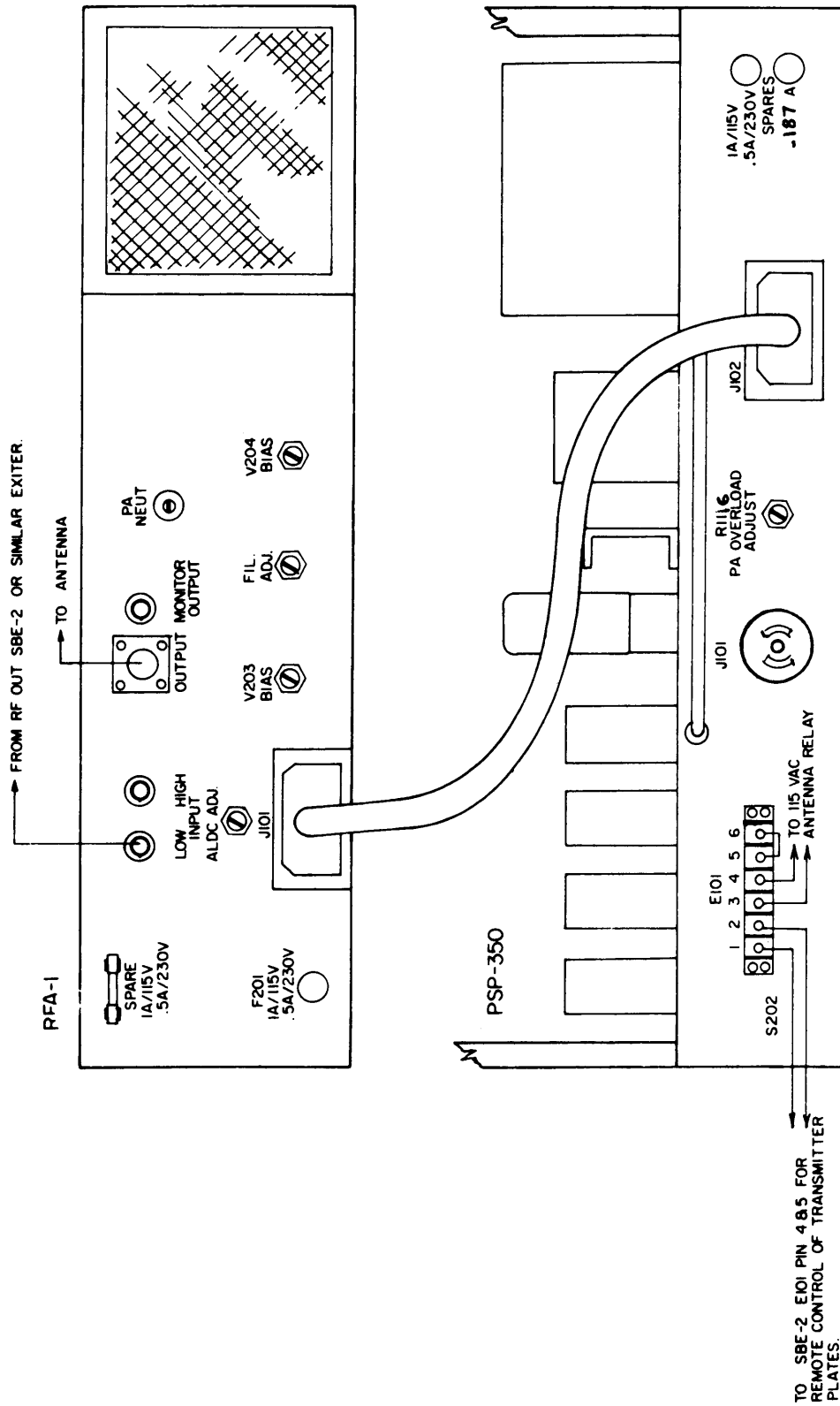
1. Temporarily set the following controls in the positions indicated:

H. V. LINE	- OFF
TRANSMITTER PLATES	- OFF
PA TUNING	- O
PA LOADING	- O

2. Turn MAIN LINE switch ON.
3. Turn MULTIMETER switch to PA FIL. Meter should read 30 (equivalent to 6 volts). If it does not, adjust FIL. ADJ. on rear of RFA-1 chassis.
4. Set the DRIVER BAND switch to the range covering the desired output frequency.
5. Set the PA BAND switch to cover the same frequency as above.
6. Set the MULTIMETER switch to RF DR.
7. Turn the associated exciter on and tune to the desired output frequency and mode of operation. Adjust for very low output level. In cases where the Model SBE is to be used consult its accompanying instruction manual.
8. Approximate the DRIVER TUNING control position by use of the following table:

TABLE 4-1, DRIVER TUNING

DRIVER BAND	0	1	2	3	4	5	6	7	8	9	10
2-4	*	2	2.25	2.5	2.75	3	3.25	3.5	3.75	4	*
4-8	*	4	4.5	5	5.5	6	6.5	7	7.5	8	*
8-16	*	8	9	10	11	12	13	14	15	16	*
16-32	*	16	18	20	22	24	26	28	30	32	*



REAR PANEL CONNECTIONS & ADJUSTMENT

Figure 4-1 Rear Panel Connections & Adjustment (ID10265)

9. Turn the TRANSMITTER PLATES switch ON.
10. Adjust the DRIVER TUNING until a peak reading is obtained on the MULTIMETER. Peaks should be kept below a reading of 30 on the meter to assure a full range of meter movement. Use the exciter's output control to keep the meter reading within range as the peak tuning is approached.

NOTE

The Driver Tuning is completed. It is essential that these controls are not readjusted unless another frequency is to be tuned.

11. Reduce the exciter output to zero; check to make sure load or antenna is connected to J205.
12. Turn the high voltage switch on.
13. Switch multimeter to read high voltage. Reading at this point will be 3000 volts approximately.
14. Slowly adjust potentiometer R213 until V203 is drawing 90m/a plate current, using the plate current meter as the indicator. Adjust R221 until total plate current V203 and V204 is 160 m/a.
15. Apply drive slowly from the exciter while observing the PA PLATE meter. The drive level will be correct when the meter indicates 200 ma of PA plate current.

16. Adjust the PA TUNING control until a dip in the R. F. drive (RFDR) is observed on the MULTIMETER.

NOTE

This does not necessarily coincide with a dip in the PA plate current. Both readings will not dip at the same time until the final stage is properly loaded.

17. Use the PA LOADING control in the following manner: Observe the RFDR on the MULTIMETER as the PA LOADING is increased. As the meter reading increases readjust the PA TUNING for a dip as before. Continue this loading procedure until the values indicated in the chart below are observed. Refer to table #2 if a single tone is applied to the exciter input, table #3 if two tones of equal levels are applied.
18. Before actual operation of the transmitter begins adjust the PA TUNING once again for a dip on the "RF DR".
19. Use the OUTPUT CONTROL of the exciter to keep the "RF PL" reading on the MULTIMETER from ever exceeding 800 volts. This must be done regardless of the various input combinations that may be applied ie: speech and/or tones etc.
20. If at any time during the tuning procedure and amplifier shows signs of instability or self oscillation, it should be neutralized as described in the maintenance section of this handbook.

TABLE 4-2, SINGLE TONE INPUT

<u>MULTIMETER:</u>		
<u>SWITCH POSITION</u>	<u>READING</u>	<u>VALUE</u>
ISG	15	-5 ma
RF DR	18	18 V
RF PL	10	500 V
RF OUT*	7	70 V

PA PLATE METER 240 m/a

TABLE 4-3, TWO TONE INPUT

<u>MULTIMETER:</u>		
<u>SWITCH POSITION</u>	<u>READING</u>	<u>VALUE</u>
ISG	12 to 10	-8 to -10 ma
RF DR	25 to 30	25 to 30 V
RF PL	18	800 V
RF OUT*	14	140 V

PA PLATE METER 300 m/a

* RF output measurements can indicate a wide range of voltages since the actual loading of an antenna may involve a great variety of impedances and reactances.

SECTION V

MAINTENANCE

GENERAL

The Model PAL-350 (PSP-350 and RFA-1) is designed to provide trouble free operation under continuous duty conditions. It is recommended that any necessary maintenance be undertaken by competent technicians familiar with linear RF amplifier-transmitter techniques.

OPERATOR'S MAINTENANCE

NOTE

NEVER REPLACE A FUSE WITH ONE OF A HIGHER RATING UNLESS BRIEF CONTINUED OPERATION IS MORE IMPORTANT THAN PROBABLE DAMAGE TO THE EQUIPMENT. IF A FUSE BURNS OUT IMMEDIATELY AFTER REPLACEMENT, DO NOT REPLACE IT A SECOND TIME UNTIL THE CAUSE HAS BEEN LOCATED AND CORRECTED.

The PSP-350 Power Supply contains 7 protective devices.

The action of one or more of them will disable all or part of the PAL-350 system. They are as follows:

<u>SYM.</u>	<u>FUNCTION</u>	<u>IND.</u>
F101	LV MAIN FUSE	I101
F102	LV SUPPLY FUSE	I104
CB101	MAIN POWER SWITCH (CIRCUIT BREAKER)	I101-5
CB102	HV SWITCH (CIRCUIT BREAKER)	I103
S101	TOP COVER (INTERLOCK)	I102-3
S102	BOTTOM COVER (INTERLOCK)	I102-3

The RFA-1 contains three protective devices:

<u>SYM.</u>	<u>FUNCTION</u>	<u>IND.</u>
S204	TOP COVER INTERLOCK	I102-3
S205	BOTTOM COVER INTERLOCK	I102-3
F201	FILAMENT FUSE	all heaters

In the event that any of the indicator lamps marked IND above should fail to light, check the protective device listed on the corresponding line or lines. If such action does not lead to the source of failure, check the lamp itself.

In most instances where a failure is experienced but not accompanied by a blown fuse or open switch, a faulty tube will be responsible. Troublesome tubes are best found by the substitution method. Do not leave replacement tubes in the equipment unless the originals are proven defective.

WARNING

THE VOLTAGES USED IN THIS EQUIPMENT ARE SUFFICIENTLY HIGH TO ENDANGER LIFE. ALL PERSONNEL ARE ADVISED TO BE THOROUGHLY FAMILIAR WITH THESE UNITS BEFORE TROUBLESHOOTING THEM IN A POWER-ON CONDITION. ALWAYS USE CAUTION.

PREVENTIVE MAINTENANCE

1. In order to prevent failure of the equipment due to corrosion, dust, or other destructive elements, it is recommended that a schedule of preventive maintenance be established and adhered to.

2. At periodic intervals (at least every six months) the equipment should be removed from the rack or enclosure for cleaning and inspection. All accessible covers should be removed and all terminal boards, wiring harnesses, tube sockets, etc. should be inspected for dirt, corrosion, charring, or grease. Dust can be removed with a soft brush or vacuum cleaner if one is available. Remove dirt or grease from electrical parts with carbon tetrachloride.

WARNING

CARBON TETRACHLORIDE (CCl₄) IS A TOXIC SUBSTANCE. DO NOT INHALE ITS FUMES. AVOID CONTACT WITH SKIN.

3. Carefully inspect soldered connections and machine screw fastenings for looseness and corrosion. Inspect ceramic insulators for cracks and dirt. Never use an acid core solder when making repairs.

CORRECTIVE MAINTENANCE

GENERAL

Before any alignment or internal adjustment of the equipment is attempted it should be established that all tubes and fuses are in working order. See OPERATOR'S MAINTENANCE, paragraph B, this section, for instructions.

INITIAL POWER CHECKS

- a) Replace covers on the PSP-350 power supply.
- b) Reconnect cable from PSP-350 to RFA-1.
- c) Close the interlocks, S204 and S205, of the RFA-1 by pulling their shafts outward.
- d) Be sure that HV LINE and TRANSMITTER PLATES switches are off.
- e) Turn MAIN LINE breaker ON. See that tube filaments light.
- f) Rotate the MULTIMETER switch through all its positions. The pointer should deflect only when switch is in the FIL position.
- g) Adjust R216, FIL ADJ. pot on the rear skirt of the RFA-1 chassis, if necessary, so that multimeter reading is 6 V.
- h) Bias controls R213 and R221 must be turned fully counter clockwise.
- i) Measure the voltage from pin C of V203 to ground. 90 to 115 V DC should be indicated.
- j) Voltage measured from pin 2 of V201 to ground must be 147 to 163 VDC.
- k) Use a reliable VTVM to see that the following voltages are as indicated:

FROM	TO	DC VOLTAGE
Plate Cap. V202	Ground	90 to 150
Pin 6 of V201	Ground	90 to 150
Pin 3 of V202	Ground	40 to 70
Pin 4 of V202	Ground	-120 to -130
Pin 5 of V202	Ground	-140 to -150
Pin 2 of V201	Ground	-145 to -155
Pin 1 of V201	Ground	-140 to -150

- l) Turn power off and replace cover on the RFA-1 RF deck.

DRIVER SECTION ALIGNMENT

1. Any of the following capacitors which have been replaced or accidentally misadjusted should be set to their center values (approximate): C201, C202, C203, C204, C207, C208, C210, C211 or C223.
2. See that TRANSMITTER PLATES and HV LINE switches are OFF. Turn the MAIN LINE switch ON.
3. After a 60 second delay turn the TRANSMITTER PLATES switch ON.
4. Turn the MULTIMETER selector switch to the FIL position; if 6V is not read on the meter adjust R216.
5. Set the MULTIMETER switch to the RF DR position.
6. Turn the DRIVER BAND switch to the 2-4 MC/s range.
7. Turn the DRIVER TUNING control to position 1.
8. Adjust associated exciter to apply low level drive at 2 Mc/s.
9. Tune T201 and T204 of the RFA-1 for a peak reading on the MULTIMETER while adjusting the drive to keep meter readings below 30 V.
10. Set the DRIVER TUNING control to position 9.
11. Tune trimmers C201 and C207 for peak indication on the MULTIMETER; again maintain a meter reading of less than 30 V by use of the exciter output drive control.
12. Remove drive. If the MULTIMETER continues to read, readjust C223 and repeat the last steps beginning with number 7 (above) until there is no sustained reading when drive is removed. This must be repeated until the desired results are achieved.
13. Reduce the exciter output level temporarily to minimum.
14. Set the DRIVER BAND switch of the RFA-1 to the 4-8 Mc/s range.
15. Set DRIVER TUNING to position 1.
16. Adjust the exciter to apply low level drive at 4.0 Mc/s.

17. Tune T202 and T205 for peak indication on the MULTIMETER while controlling the exciter output to keep meter readings below 30 V as before.
18. Set the DRIVER TUNING control to position 9.
19. Tune trimmers C202 and C208 for peak indication on the MULTIMETER; maintain less than 30 V on the meter by use of the exciter output drive control.
20. Remove drive. If the multimeter continues to read readjust C223 as before and repeat procedure starting with step 7.
21. Repeat steps 15 through 19 until no further adjustments are necessary.
22. Set the DRIVER BAND switch to the 8-16 Mc/s range.
23. Turn the DRIVER TUNING control to point number 1.
24. Adjust associated exciter to apply low level drive at 8 Mc/s.
25. Tune T203 and T206 of the RFA-1 for a peak reading on the MULTIMETER while adjusting the drive to keep meter readings below 30 V.
26. Turn the DRIVER TUNING control to point number 9.
27. Tune trimmers C204 and C211 for peak indication on the MULTIMETER; maintain a meter reading of less than 30 V by use of the exciter output drive control.
28. Remove drive. If the MULTIMETER continues to read, readjust C223 and repeat procedure beginning with step number 7 (above) until there is no sustained reading when drive is removed.
29. Repeat steps 22 through 28 several times until no further adjustment is necessary.
30. Set the DRIVER BAND switch to the 16 to 32 Mc/s position.
31. Turn the DRIVER TUNING control to point number 1.
32. Adjust the associated exciter to apply low level drive at 16 Mc/s.
33. Tune L208 and T207 for peak indication on the MULTIMETER while controlling the exciter output drive to keep the meter readings below 30 V.
34. Set the DRIVER TUNING control to point number 9.
35. Tune trimmers C203 and C210 for a peak indication on the MULTIMETER while again keeping the reading below 30 V by use of the exciter output drive control.
36. Remove drive. If MULTIMETER continues to read, readjust C223 and repeat procedure beginning with step number 7 (above) until there is no sustained reading when drive is removed.
37. Repeat steps 30 through 36 several times until no further adjustments are necessary.

NEUTRALIZATION

The neutralization procedures for this transmitter are carried out before shipping, and it should not normally be necessary to readjust in the field. Should it be found necessary for example in the event of a tube change, then the following procedure should be adopted.

It should be noted at this point that there are two stages in the PAL-350 which require neutralizing. I. E. The driver stage V202 and the final stage V203 and V204. The driver stage neutralizing is described fully in the section on driver alignment.

NEUTRALIZATION OF P. A.

WARNING

BE CERTAIN, THAT THE HIGH VOLTAGE OVERLOAD BREAKER STAYS IN OFF POSITION THROUGHOUT THE NEUTRALIZATION PROCESS.

- a) Turn ALDC ADJ. to extreme counter clockwise position.
- b) Connect VTVM to the plates of power amplifiers.
- c) Set P. A. loading at point No. 0.
- d) Disconnect lead from C215. (Feed back loop).
- e) Turn on transmitter plates switch.
- f) Apply drive at 32 Mc/s. (Single tone), tuning the driver stages to the peak meter indication in RF DR position. Adjust the drive control to 30 V on multimeter.
- g) Set PA bandswitch to 24-32 Mc/s. position.
- h) Tune P. A. tuning to peak indication on RF VTVM.

i) Adjust P.A. neutralizing capacitor C214 each time retuning P.A. tuning to the peak until the reading on VTVM is approximately 0.9 volts RMS.

j) Apply drive at 16 Mc/s and tune the driver stages to the peak indication in RF DR position. Adjust the drive control till 30 V on multimeter is obtained.

k) Set the P.A. band switch to 16-24 Mc/s. position.

l) Tune P.A. tuning to the peak indication on RF VTVM; the reading must not exceed 1 V RMS.

m) Set up the unit at 2 Mc/s. The reading on VTVM must not exceed 1 V RMS. If more than 1 V RMS, readjust the neutralizing capacitor C214 and recheck at 32 Mc/s.

n) Disconnect VTVM and remove drive

o) Turn off the transmitter plates switch.

p) Connect the feedback cable to C215.

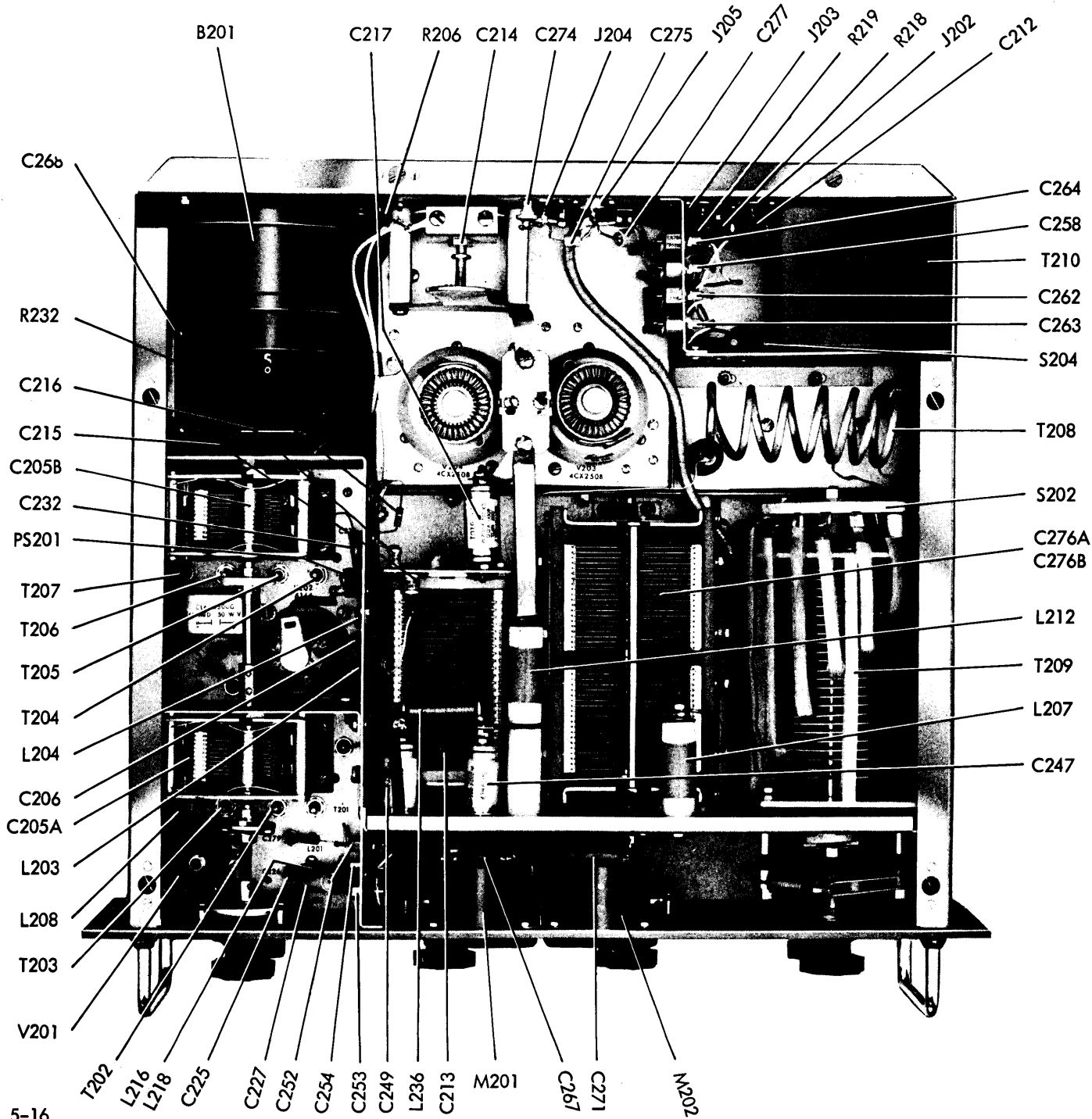


Figure 5-1 Location Diagram of Major Electronic Components
Top View RFA-1

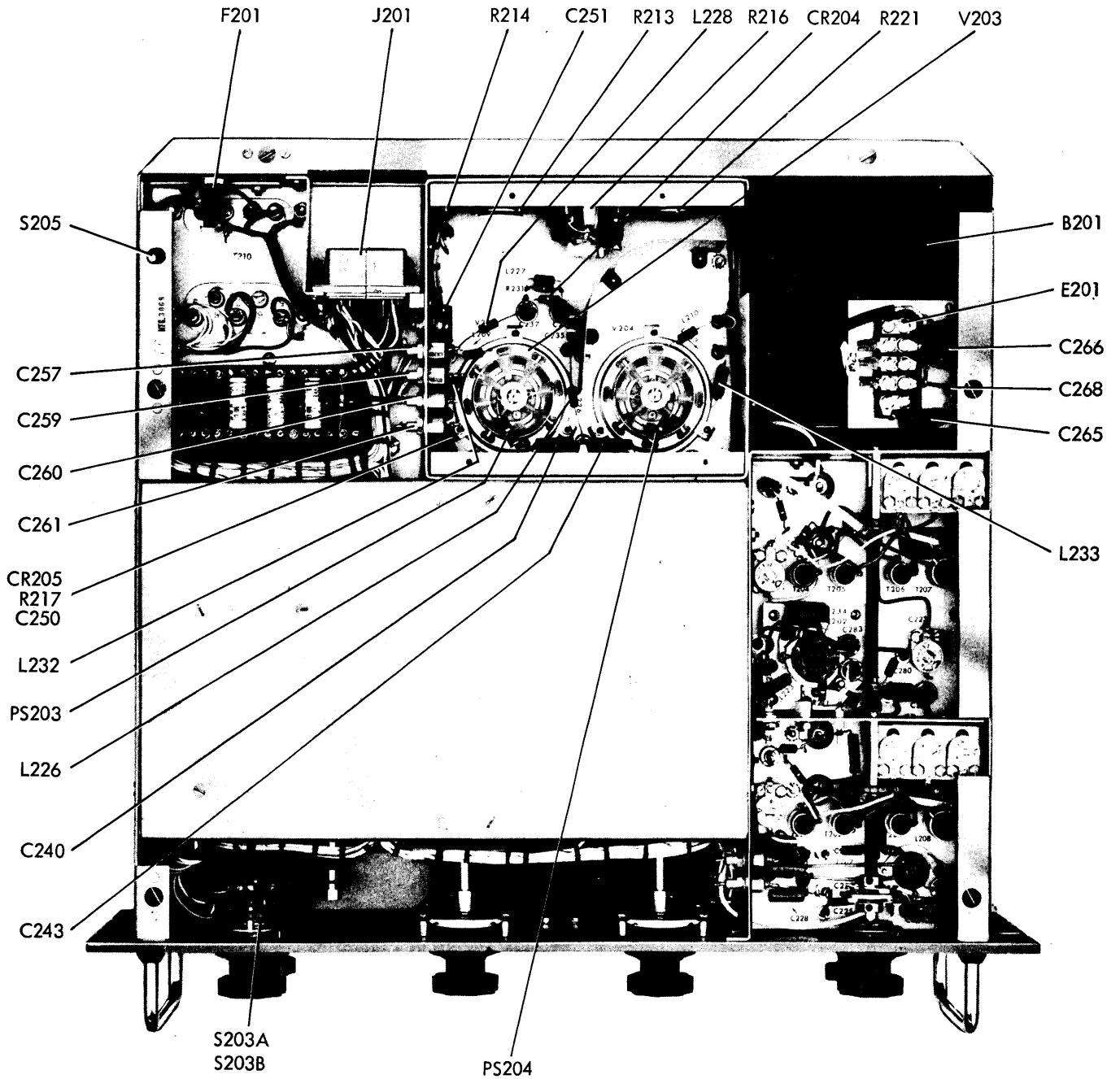


Figure 5-2 Location Diagram of Major Electronic Components
Bottom View RFA-1

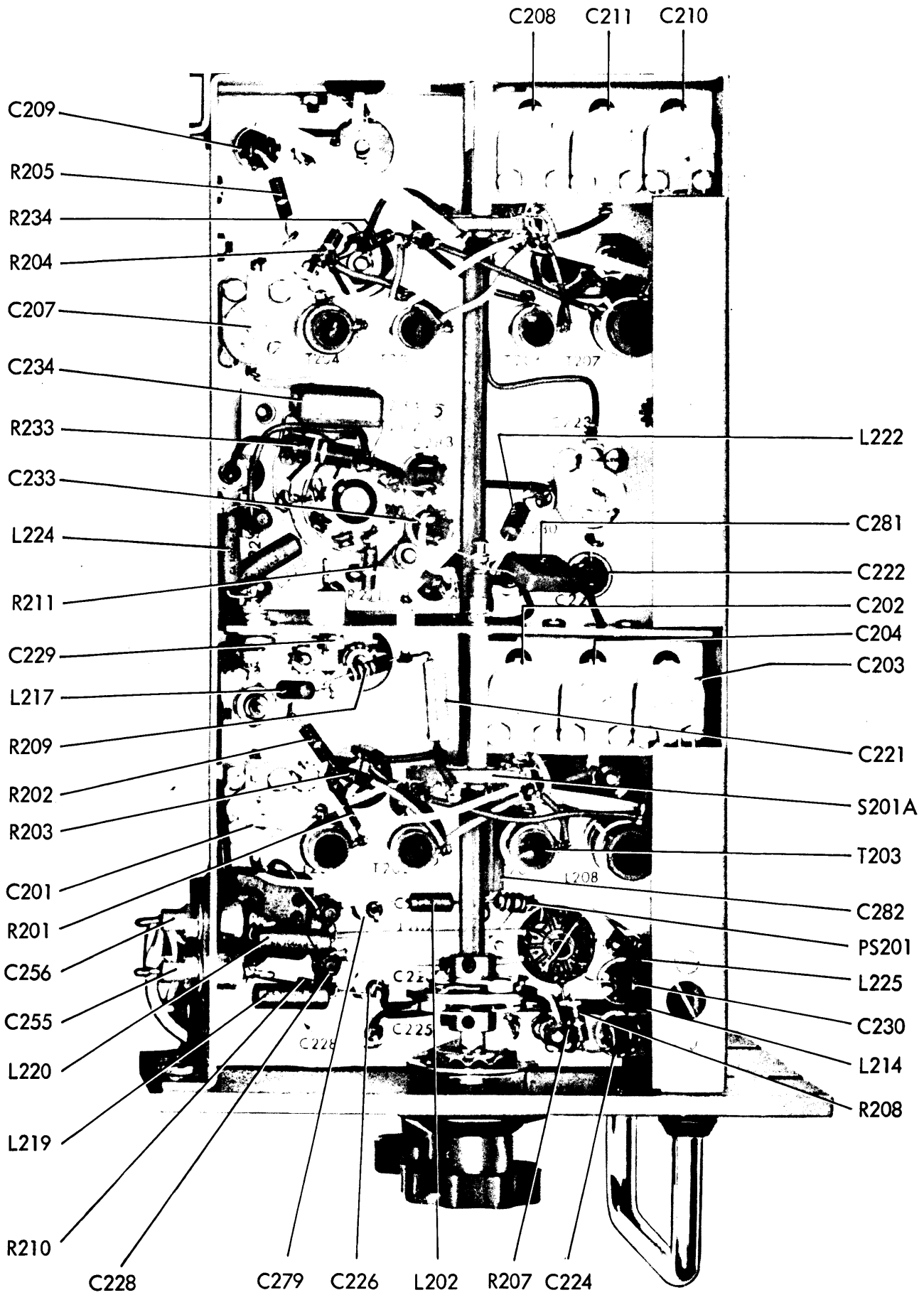


Figure 5-3 Location Diagram of Major Electronic Components
Bottom View RFA-1 (Driver Section only)

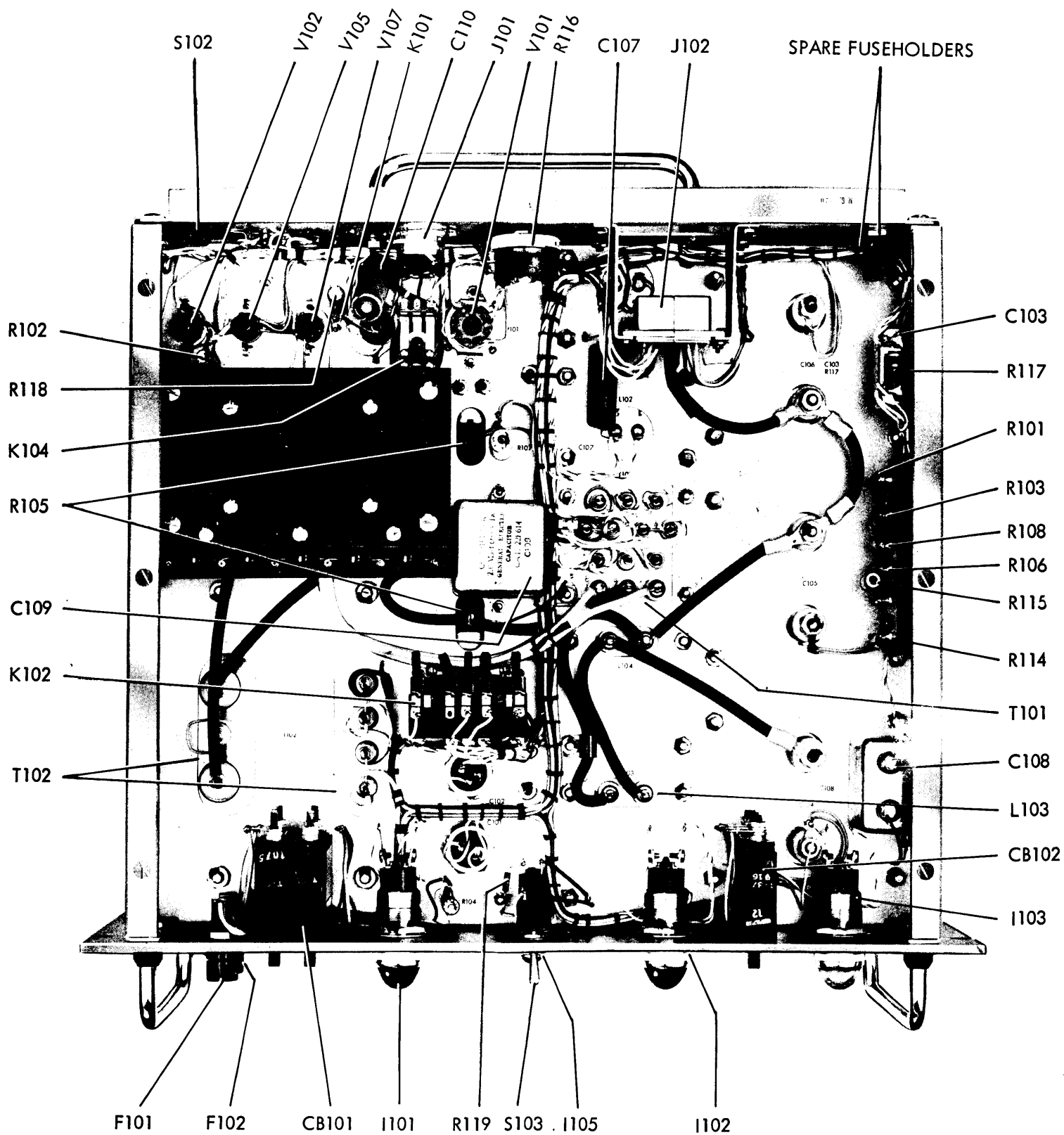


Figure 5-5 Location Diagram of Major Electronic Components Bottom View PSP-350

SECTION VI PARTS LIST

6-1. INTRODUCTION

The parts list presented in this section is a cross-reference list of parts identified by a reference designation and TMC part number. In most cases, parts appearing on schematic diagrams are assigned reference designations in accordance with MIL-STD-16. Wherever practicable, the reference designation is marked on the equipment, close to the part it identifies. In most cases, mechanical and electro-mechanical parts have TMC part numbers stamped on them.

To expedite delivery when ordering any part, specify the following:

- a. Reference symbol.
- b. Description as indicated in parts list.
- c. TMC part number.
- d. Model and serial numbers of the equipment containing the part being replaced; this can be obtained from the equipment nameplate.

For replacement parts not covered by warranty (refer to warranty sheet in front of manual), address all purchase orders to:

The Technical Materiel Corporation
Attention: Sales Department
700 Fenimore Road
Mamaroneck, New York

<u>Assembly or Subassembly</u>	<u>Page</u>
Linear Power Amplifier, Model RFA-1B	6-22
Power Supply, Model PSP-350B	6-32

PARTS LIST MODEL RFA-1B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
A201	COIL AND SWITCH ASSEMBLY: consists of, one capacitor, symbol no. C273; one switch, symbol no. S202; one transformer, symbol no. T209.	A10298
B201	FAN, CENTRIFICAL: 0.2 hp., 115 VAC; 50/60 cps, single phase, 3,400 rpm; 53 cfm.	BL100
C201	CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 4.0 to 30.0 uuf; 500 WVDC.	CV11C300
C202	Same as C201.	
C203	Same as C201.	
C204	Same as C201.	
C205A	CAPACITOR, VARIABLE, AIR DIELECTRIC: 12.5 uuf to 270 uuf; 700 volts AC peak; 3/8" shaft length, both sides.	CB139-1
C205B	CAPACITOR, VARIABLE, AIR DIELECTRIC: 12.5 uuf to 270 uuf; 700 volts AC peak; 3/8" shaft length, one side.	CB139-2
C206	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2,000 uuf, \pm 20%; 500 WVDC; feed thru type.	CK70AW202M
C207	Same as C201.	
C208	Same as C201.	
C209	CAPACITOR, FIXED, MICA DIELECTRIC: 1,000 uuf, \pm 10%; 300 WVDC; button type.	CB21QW102K
C210	Same as C201.	
C211	Same as C201.	
C212	CAPACITOR, FIXED, MICA DIELECTRIC: 1,600 uuf, \pm 2%; 500 WVDC.	CM20D162G
C213	CAPACITOR, VARIABLE, AIR DIELECTRIC: 20 uuf to 500 uuf; 2,000 AC peak voltage.	CB138-3AN
C214	CAPACITOR, VARIABLE, AIR DIELECTRIC: 0.4 uuf to 4.2 uuf.	AC172
C215	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10 uuf, \pm 10%; 5,000 WVDC.	CC109-6

PARTS LIST MODEL RFA-1B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C216	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 3 uuf, $\pm 10\%$; 5,000 WVDC.	CC109-2
C217	CAPACITOR, FIXED, PLASTIC DIELECTRIC: 2,000 uuf, $\pm 5\%$; 4,000 WVDC.	CX102J202M
C218	Same as C209.	
C219	CAPACITOR, FIXED, MICA DIELECTRIC: 150 uuf, $\pm 10\%$; 300 WVDC; button type.	CB21QW151K
C220	CAPACITOR, FIXED, MICA DIELECTRIC: 1,000 uuf, $\pm 5\%$; 500 WVDC.	CM20F102J
C221	Same as C220.	
C222	CAPACITOR, FIXED, MICA DIELECTRIC: 470 uuf, $\pm 10\%$; 300 WVDC; button type.	CB21QW471K
C223	CAPACITOR, VARIABLE, CERAMIC DIELECTRIC: 1.5 uuf to 7.0 uuf; 500 WVDC.	CV11A070
C224	Same as C209.	
C225	Same as C206.	
C226	Same as C206.	
C227	CAPACITOR, FIXED, PLASTIC DIELECTRIC: .1 uuf, $\pm 5\%$; 200 WVDC.	CN108C1003J
C228	CAPACITOR, FIXED, MICA DIELECTRIC: 10,000 uuf, $\pm 5\%$; 300 WVDC.	CM35C103J03
C229	Same as C206.	
C230	Same as C209.	
C231	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf; 50 WVDC; polarized; bathtub case.	CE63C500G
C232	Same as C220.	
C233	Same as C209.	
C234	Same as C228.	

PARTS LIST MODEL RFA-1B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C235	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 3 uuf, ± 0.25 uuf; 500 WVDC.	CC21SL030C
C236	Same as C219.	
C237	Same as C209.	
C238	Same as C209.	
C239	Same as C209.	
C240	Same as C220.	
C241	Non-replaceable item. Part of XV203.	
C242	Non-replaceable item. Part of XV204.	
C243	Same as C220.	
C244	Same as C209.	
C245	Same as C209.	
C246	Same as C209.	
C247	Same as C217.	
C248	Same as C209.	
C249	Same as C217.	
C250	Same as C209.	
C251	Same as C228.	
C252	Same as C206.	
C253	Same as C206.	
C254	Same as C206.	
C255	Same as C206.	
C256	Same as C206.	
C257	Same as C206.	
C258	Same as C206.	

PARTS LIST MODEL RFA-1B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C259	Same as C206.	
C260	Same as C206.	
C261	Same as C206.	
C262	Same as C206.	
C263	Same as C206.	
C264	Same as C206.	
C265	Same as C228.	
C266	Same as C228.	
C267	Same as C228.	
C268	CAPACITOR, FIXED, PAPER DIELECTRIC: 1 uf, $\pm 10\%$; 600 WVDC; hermetically sealed metal case.	CP69B1EF105K
C269	Same as C227.	
C270	Same as C227.	
C271	Same as C228.	
C272	Same as C227.	
C273	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 100 uuf, $\pm 10\%$; 5,000 WVDC. Part of symbol no. A201.	CC109-28
C274	Same as C209.	
C275	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 3 uuf, $\pm 10\%$; 5,000 WVDC.	CC109-1
C276A,B	CAPACITOR, VARIABLE, AIR DIELECTRIC: 30 uuf to 950 uuf; no peak voltage rating; .125" shaft length.	CB125A-950X
C277	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10 uuf, $\pm 10\%$; 5,000 WVDC.	CC109-5
C278	Same as C219.	
C279	Same as C206.	
C280	Same as C206.	

PARTS LIST MODEL RFA-1B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C281	CAPACITOR, FIXED, MICA DIELECTRIC: 75 uuf, $\pm 2\%$; 500 WVDC.	CM15C750G03
C282	Same as C220.	
C283	Same as C209.	
C284	CAPACITOR, FIXED, MICA DIELECTRIC: 10 uuf, $\pm 10\%$; 500 WVDC.	CM15B100K03
CR201	SEMICONDUCTOR DEVICE, DIODE: silicon; 100 V max. reverse voltage; 40 ma at 25°C; 10 ma at 150°C; hermetically sealed metal case.	1N303
CR202	Same as CR201.	
CR203	Same as CR201.	
CR204	SEMICONDUCTOR DEVICE, DIODE: silicon.	1N645A
CR205	Same as CR204.	
E201	TERMINAL BOARD: barrier type; 3 double screw terminals, 6-32 thd.; phenolic body.	TM102-3
EV201	SHIELD, ELECTRON TUBE: heat dissipating; 2-1/2" high x 1" diameter.	TS128-6
F201	FUSE, CARTRIDGE: 1 amp; time lag. (FOR 115 VOLT OPERATION)	FU102-1
F201	FUSE, CARTRIDGE: 1/2 amp; time lag. (FOR 230 VOLT OPERATION)	FU102-.5
J201	CONNECTOR, RECEPTACLE, ELECTRICAL: 12 male, 5 amp contacts; 1 female, HV, 5 amp contacts.	JJ158-P
J202	CONNECTOR, RECEPTACLE, ELECTRICAL: RF type; 1 round female contact, straight type; series BNC to BNC.	UG625*/U
J203	Same as J202.	
J204	Same as J202.	
J205	CONNECTOR, RECEPTACLE, ELECTRICAL: RF type; 1 round female coaxial contact, straight type; series UHF; teflon dielectric.	S0239A

PARTS LIST MODEL RFA-1B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L201	COIL, RADIO FREQUENCY: fixed; 120 uh, 4.65 ohms DC resistance; 250 ma current rating.	CL10006-6
L202	Same as L201.	
L203	Same as L201.	
L204	Same as L201.	
L205	Same as L201.	
L206	COIL, RADIO FREQUENCY: fixed; 680 uh, 13 ohms DC resistance; 155 ma current rating.	CL10006-7
L207	COIL, RADIO FREQUENCY: fixed; 50 uh; no resistance or current rating.	CL10013
*L208	COIL, RADIO FREQUENCY: variable; 36-48 mc; 42 uh.	
L209	Same as L201.	
L210	COIL, RADIO FREQUENCY: fixed; 27 uh, 2.8 ohms DC resistance; 300 ma current rating.	CL10006-2
L211	Same as L206.	
L212	COIL, RADIO FREQUENCY: fixed; 50 uh; no resistance or current rating.	CL10012
L213	Same as L206.	
L214	Same as L210.	
L215	Same as L201.	
L216	Same as L201.	
L217	Same as L201.	
L218	Same as L210.	
L219	COIL, RADIO FREQUENCY: fixed; 8.5 uh, +10%; 1,000 ma current rating.	CL10023-2
L220	Same as L219.	
L221	Same as L210.	

* Part number to be supplied at a later date.

PARTS LIST MODEL RFA-1B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L222	Same as L206.	
L223	Same as L219.	
L224	Same as L219.	
L225	Same as L210.	
L226	COIL, RADIO FREQUENCY: fixed; 1.0 uh; 0.3 ohms DC resistance; 1,050 ma current rating.	CL10006-3
L227	Same as L206.	
L228	Same as L201.	
L229	Same as L201.	
L230	Same as L201.	
L231	Same as L201.	
L232	COIL, RADIO FREQUENCY: fixed; 4.5 uh, $\pm 10\%$; 3,000 ma current rating.	CL10023-1
L233	Same as L232.	
L234	Same as L201.	
L235	Same as L201.	
L236	COIL, RADIO FREQUENCY: fixed; 185 uh inductance; 790 KC operating frequency.	CL178
L237	Same as L201.	
L238	NOT USED	
L239	Same as L210.	
L240	Same as L210.	
L241	Same as L210.	
M201	AMMETER: 0-500 ma; linear scale, black scale white background; RF type.	MR10003
M202	MULTIMETER: 0-2.5 amps; 0-5 volts; -2 ⁺ to +30 volt scale; 0-50 ua.	MR10002

PARTS LIST MODEL RFA-1B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
PS201	SUPPRESSOR, PARASITIC: consists of one, 1/2 watt, 39 ohm resistor; 4 turns of #22 wire.	AX161
PS202	SUPPRESSOR, PARASITIC: consists of one, 2 watt, 12 ohm resistor; 2 turns of #18 wire.	AX164
PS203	SUPPRESSOR, PARASITIC: consists of one, 1 watt, 47 ohm resistor; 2 turns of #22 wire.	AX162
PS204	Same as PS203.	
R201	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF103J
R202	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 5\%$; 1/2 watt.	RC20GF222J
R203	Same as R201.	
R204	RESISTOR, FIXED, COMPOSITION: 2,700 ohms, $\pm 5\%$; 1/2 watt.	RC20GF272J
R205	Same as R202.	
R206	RESISTOR, FIXED, COMPOSITION: 180 ohms, $\pm 5\%$; 2 watts.	RC42GF181J
R207	RESISTOR, FIXED, COMPOSITION: 22 ohms, $\pm 5\%$; 1/2 watt.	RC20GF220J
R208	RESISTOR, FIXED, COMPOSITION: 47 ohms, $\pm 5\%$; 1/2 watt.	RC20GF470J
R209	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF333J
R210	RESISTOR, FIXED, COMPOSITION: 220,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF224J
R211	RESISTOR, FIXED, COMPOSITION: 12 ohms, $\pm 5\%$; 1/2 watt.	RC20GF120J
R212	RESISTOR, FIXED, COMPOSITION: 560 ohms, $\pm 10\%$; 2 watts.	RC42GF561K
R213	RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms, $\pm 10\%$; 2 watts.	RV4LAYS A503A

PARTS LIST MODEL RFA-1B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R214	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, $\pm 5\%$; 1 watt.	RC32GF223J
R215	Same as R214.	
R216	RESISTOR, VARIABLE, WIREWOUND: 0.5 ohms, $\pm 10\%$; 25 watts.	RA75AXA0R5AK-25
R217	RESISTOR, FIXED, COMPOSITION: 91,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF913J
R218	RESISTOR, FIXED, COMPOSITION: 220 ohms, $\pm 5\%$; 2 watts.	RC42GF221J
R219	RESISTOR, FIXED, COMPOSITION: 100 ohms, $\pm 5\%$; 2 watts.	RC42GF101J
R220	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF104J
R221	Same as R213.	
R222	RESISTOR, FIXED, COMPOSITION: 15 megohms, $\pm 5\%$; 1/2 watt.	RC20GF156J
R223	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF223J
R224	RESISTOR, FIXED, COMPOSITION: 8,200 ohms, $\pm 5\%$; 1/2 watt.	RC20GF822J
R225	RESISTOR, FIXED, COMPOSITION: 1.2 megohms, $\pm 5\%$; 1/2 watt.	RC20GF125J
R226	RESISTOR, FIXED, COMPOSITION: 10 ohms, $\pm 5\%$; 1/2 watt.	RC20GF100J
R227	Same as R202.	
R228	Same as R213.	
R229	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF473J
R230	RESISTOR, FIXED, COMPOSITION: 750,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF754J
R231	Same as R202.	

PARTS LIST MODEL RFA-1B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R232	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, $\pm 5\%$; 1/2 watt.	RC20GF332J
R233	RESISTOR, FIXED, COMPOSITION: 15,000 ohms, $\pm 5\%$; 1 watt.	RC32GF153J
R234	Same as R224.	
R235	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, $\pm 5\%$; 1 watt.	RC32GF333J
R236	NOT USED	
R237	RESISTOR, FIXED, COMPOSITION: 20,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF203J
R238	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, $\pm 5\%$; 1 watt.	RC32GF392J
S201A,B	WAFER: rotary switch; 2 sections, 4 positions; contacts rated for 1 amp, 28 VDC or 5 amps at 110 VAC.	WS101
S202	SWITCH, ROTARY: 1 section, 2 pole, 4 positions; silver plated brass contacts, rated for 0.5 amp at 115 VAC, 1 amp at 28 VDC. Part of symbol no. A201.	SW218
S203A,B	SWITCH, ROTARY: 2 sections, 6 positions; silver plated brass contacts, rated for 0.5 amp at 115 VAC, 1 amp at 28 VDC.	SW217
S204	SWITCH, PUSH-PULL: SPDT; 250 VAC, 5 amps.	SW219
S205	Same as S204.	
T201	TRANSFORMER, RADIO FREQUENCY: tuned; operating frequency 2-4 mc; 26-34 uh inductance.	CL10020
T202	TRANSFORMER, RADIO FREQUENCY: tuned; operating frequency 4-8 mc; 5.4-8.2 uh inductance.	CL10021
T203	TRANSFORMER, RADIO FREQUENCY: tuned; operating frequency 8-16 mc; 1.4-1.8 uh inductance.	CL10022
T204	Same as T201.	
T205	Same as T202.	
T206	Same as T203.	

PARTS LIST MODEL RFA-1B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
T207	TRANSFORMER, RADIO FREQUENCY: tuned; operating frequency 16-32 mc; 36-48 uh nominal inductance, tapped.	CL414
T208	TRANSFORMER, RADIO FREQUENCY: fixed; operating frequency 16-32 mc; tapped.	TF10020
T209	TRANSFORMER, RADIO FREQUENCY: with silver solder 1/4" straps. Part of symbol no. A201.	TF10019
T210	TRANSFORMER, POWER, STEP-DOWN: primary- 115 VAC, 50/60 cps (Hz), single phase; secondary- 6.3 V at 2 amps and 6.9 V at 6 amps, center tap; insulated for 1,500 volts; hermetically sealed steel case.	TF180
V201	TUBE, ELECTRON: power pentode, 9 pin miniature.	6CL6
V202	TUBE, ELECTRON: beam power, octal.	6146
V203	TUBE, ELECTRON: beam power, 9 pin contact.	4CX250B
V204	Same as V203.	
W101	FOR REFERENCE SEE PSP-350B PARTS LIST	
XF201	FUSEHOLDER: extractor post type; accommodates cartridge fuse; overall length 1-3/4"; bushing mounted.	FH103
XV201	SOCKET, ELECTRON TUBE: 9 pin miniature.	TS103P01
XV202	SOCKET, ELECTRON TUBE: octal; low crown, 3/32" high.	TS101P01
XV203	SOCKET, ELECTRON TUBE: air system; grounded cathode; 9 pin contact; consists of one, 1,100 uuf silver mica capacitor, symbol no. C241.	TS132
XV204	Same as XV203. Consists of capacitor, symbol no. C242.	

PARTS LIST MODEL PSP-350B

C101	CAPACITOR, FIXED, PAPER DIELECTRIC: 4 uf, +10%; 600 WVDC; hermetically sealed cylindrical metal case.	CP41B1FF405K
C102	Same as C101.	
C103	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf; 50 WVDC; polarized; bathtub case.	CE63C500G

PARTS LIST MODEL PSP-350B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
C104	CAPACITOR, FIXED, PAPER DIELECTRIC: 4.0 uf, $\pm 10\%$; 3,000 WVDC; hermetically sealed metal case.	CP70E1FL405K
C105	Same as C104.	
C106	Same as C104.	
C107	CAPACITOR, FIXED, MYLAR DIELECTRIC: 0.1 uf, $\pm 10\%$; 600 WVDC.	CN100-22
C108	CAPACITOR, FIXED, PAPER DIELECTRIC: 2.0 uf, $\pm 10\%$; 100 WVDC; hermetically sealed metal case.	CP53B1EF205K
C109	Same as C108.	
C110	CAPACITOR, FIXED, ELECTROLYTIC: 20 uf, 250 WVDC; polarized.	CE116-4VS
CB101	CIRCUIT BREAKER: dual; double pole, single throw; contacts rated for 7.5 amps at 230 VAC, 15 amps at 115 VAC; 60 cps; toggle lever type; manual reset.	SW298
CB102	CIRCUIT BREAKER: magnetic and hydraulic combination blowout; single pole, single throw; contacts rated for 15 amps at 250 VAC, 50/60 cps; coil rated at 0.1 amps DC; insulated for 1,500 volts; shunt trip release; instantaneous toggle lever type; overload protection; manual reset.	SW215
CR101	SEMICONDUCTOR DEVICE, DIODE: Zener; silicon; 105 volts, 10 watts, non-inductive; cathode grounded to case.	1N3006RB
CR102	SEMICONDUCTOR DEVICE, DIODE	1N1239
CR103	SEMICONDUCTOR DEVICE, DIODE	DD127
CR104	Same as CR103.	
DS101	LAMP, INCANDESCENT: rated at 120 volts, 3 watts; S6 double contact bayonet base.	BI102-3
DS102	Same as DS101.	
DS103	Same as DS101.	

PARTS LIST MODEL PSP-350B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
DS104	LAMP, GLOW: 110/125 V, 1/25 watt; bayonet base; T-3-1/4 bulb.	BI100-51
EK101	SHIELD, ELECTRON TUBE: 9 pin miniature; 2-3/8" high x 1.065" base dia.	TS103U03
EV101	NOT USED	
EV102	SHIELD, ELECTRON TUBE: 7 pin miniature socket.	TS102U03
EV103	NOT USED	
EV104	NOT USED	
EV105	Same as EV102.	
EV106	Same as EV102.	
EV107	Same as EV102.	
F101	FUSE, CARTRIDGE: 110 volt, 1 amp; 1-1/4" long x 1/4" dia.; slow blow. (FOR 115 VOLT OPERATION)	FU102-1
F101	FUSE, CARTRIDGE: 230 volt, 1/2 amp; 1-1/4" long x 1/4" dia.; slow blow. (FOR 230 VOLT OPERATION)	FU102-.5
F102	FUSE, CARTRIDGE: 3/16 amp; 1-1/4" long x 1/4" dia.; quick acting; slow blow. (FOR DC OPERATION)	FU102-.187
J101	CONNECTOR, RECEPTACLE, ELECTRICAL: twist lock type; two half round male contacts; straight type.	JJ175
J102	CONNECTOR, RECEPTACLE, ELECTRICAL: 12 five amp female contacts; 1 HV 5 amp male contact.	JJ158-S
K101	RELAY, THERMAL: delay type; 60 sec., \pm 12 sec.; SPST, normally open; 6.3 VAC heater voltage; contact rating 115 volts, 2 amps or 220 volts, 1 amp; non-inductive; 1,000 V contact to contact breakdown; temperature range -55°C to +70°C; glass case; 9 pin miniature base.	RL1116N060T
K102	RELAY, PLATE: normally open; 115 VDC; 500 ohms, .015 operating amps; contact rating 25 amps; 5 pole, single throw.	RL114
K103	RELAY, ARMATURE: 10,000 ohms coil resistance; 120 volts DC; contacts rated at 5 amps, 150 V; non-inductive.	RL116DC3C120

PARTS LIST MODEL PSP-350B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
L101	REACTOR: 15 h; 285 ohms DC resistance; 85 ma DC; insulated for 2,500 volts RMS; hermetically sealed metal case.	TF5000
L102	Same as L101.	
L103	REACTOR: 7 h; 80 ohms DC resistance; 300 ma DC; insulated for 5,000 volts RMS; hermetically sealed metal case.	TF190
L104	Same as L103.	
P101	CONNECTOR, PLUG, ELECTRICAL: 12 five amp female contacts; 1 HV five amp male contact. Part of symbol no. W101.	PL160-S
P102	CONNECTOR, PLUG, ELECTRICAL: 12 five amp male contacts; 1 HV five amp female contact. Part of symbol no. W101.	PL160-P
P103	CONNECTOR, PLUG, ELECTRICAL: twist lock type; polarized; two female contacts; midget size; brown bakelite; 10 amps at 250 volts; straight type. Part of symbol no. W102.	PL176
P104	CONNECTOR, PLUG, ELECTRICAL: AC power; 3 prong male contacts; polarized; with removeable ground connection. Part of symbol no. W102.	PL218
R101	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, $\pm 5\%$; 2 watts.	RC42GF222J
R102	RESISTOR, FIXED, WIREWOUND: 10,000 ohms, $\pm 5\%$; 10 watts.	RW109-34
R103	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, $\pm 5\%$; 2 watts.	RC42GF104J
R104	RESISTOR, FIXED, WIREWOUND: 5,000 ohms, $\pm 5\%$; 10 watts.	RW109-32
R105	RESISTOR, FIXED, WIREWOUND: 40,000 ohms, $\pm 5\%$; 50 watts.	RW105-37
R106	RESISTOR, FIXED, COMPOSITION: 56 ohms, $\pm 5\%$; 2 watts.	RC42GF560J
R107	RESISTOR, FIXED, WIREWOUND: 100,000 ohms, $\pm 5\%$; 20 watts.	RW110-43

PARTS LIST MODEL PSP-350B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
R108	RESISTOR, FIXED, COMPOSITION: 470,000 ohms, $\pm 5\%$; 2 watts.	RC42GF474J
R109	RESISTOR, FIXED, COMPOSITION: 20 megohms, $\pm 5\%$; 2 watts.	RC42GF206J
R110 thru R113	Same as R109.	
R114	RESISTOR, FIXED, COMPOSITION: 220,000 ohms, $\pm 5\%$; 2 watts.	RC42GF224J
R115	RESISTOR, FIXED, WIREWOUND: 20 ohms, $\pm 5\%$; 5 watts.	RW107-11
R116	RESISTOR, VARIABLE, COMPOSITION: 100 ohms, $\pm 10\%$; 25 watts.	RA75AXA101AK-25
R117	RESISTOR, FIXED, COMPOSITION: 43 ohms, $\pm 5\%$; 2 watts.	RC42GF430J
R118	RESISTOR, FIXED, WIREWOUND: 7,500 ohms, $\pm 5\%$; 20 watts.	RW110-32
R119	RESISTOR, FIXED, COMPOSITION: 180,000 ohms, $\pm 5\%$; 1/2 watt.	RC20GF184J
R120	RESISTOR, FIXED, WIREWOUND: 50 ohms; current rating 710 ma; 25 watts.	RW111-7
R121	Same as R120.	
R122	Same as R105.	
S101	SWITCH, INTERLOCK: single pole, double throw; 250 VAC, 5 amps.	SW219
S102	Same as S101.	
S103	SWITCH, TOGGLE: SPST; 28° angle of throw; bat type handle.	ST12A
T101	TRANSFORMER, POWER, STEP-DOWN AND STEP-UP: primary- 115/230 VAC, 50/60 cps, single phase; secondary- #1, terminals (5,6,7) 811 volts at 100 ma; #2, terminals (8,9) 5 volts at 2 amps; terminals (8,10) 6.3 volts at 2 amps; #3, terminals (11,12,13) 2.5 volts at 10 amps, CT; hermetically sealed steel case.	TF181
T102	TRANSFORMER, POWER, STEP-UP: primary- 115/230 VAC, 50/60 cps, single phase; secondary- 4,800 V, CT/300 ma DC; hermetically sealed steel case.	TF189

PARTS LIST MODEL PSP-350B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
TB101	TERMINAL BOARD: barrier type; six single screw terminals and feed-thru solder lugs; 6-32 thd.; phenolic body.	TM100-6
V101	NOT USED	
V102	TUBE, ELECTRON: voltage regulator, 7 pin miniature.	OA2
V103	NOT USED	
V104	NOT USED	
V105	Same as V102.	
V106	TUBE, ELECTRON: voltage regulator, miniature glow, discharge type, 7 pin miniature.	OB2
V107	Same as V106.	
W101	CABLE ASSEMBLY, POWER, ELECTRICAL: consists of 110" lengths of various colors of MIL type MWC cable; 2 connectors, symbol nos. P101, P102. (SUPPLIED AS A LOOSE ITEM)	CA10136-110
W102	CABLE ASSEMBLY, POWER, ELECTRICAL: consists of 7" length of 2 conductor rubber covered, WI134-6-7 wire and two connectors, symbol nos. P103, P104. (SUPPLIED AS A LOOSE ITEM)	CA555-3
XCR101	NOT USED	
XCR102	SOCKET, ELECTRON TUBE: octal; low crown, 3/32" high.	TS101P01
XCR103	SOCKET, ELECTRON TUBE: 4 pin medium bayonet.	TS123-210-1
XCR104	Same as XCR103.	
XDS101	LIGHT, INDICATOR: with green frosted lens; bayonet base.	TS124-2
XDS102	LIGHT, INDICATOR: with red frosted lens; bayonet base.	TS124-1
XDS103	LIGHT, INDICATOR: with yellow frosted lens; bayonet base.	TS124-6
XDS104	LIGHT, INDICATOR: with red frosted lens for miniature bayonet base T-3-1/4 bulb.	TS106-1

PARTS LIST MODEL PSP-350B

REF SYMBOL	DESCRIPTION	TMC PART NUMBER
XF101	FUSEHOLDER: extractor post type; accommodates cartridge fuse 1-1/4" long x 1/4" dia.; rated for 15 amps, 250 V max.; o/a length 1-3/4"; bushing mounted.	FH103
XF102	Same as XF101.	
XK101	SOCKET, ELECTRON TUBE: 9 pin miniature.	TS103P01
XV101	NOT USED	
XV102	SOCKET, ELECTRON TUBE: 7 pin miniature.	TS102P01
XV103	NOT USED	
XV104	NOT USED	
XV105 thru XV107	Same as XV102.	

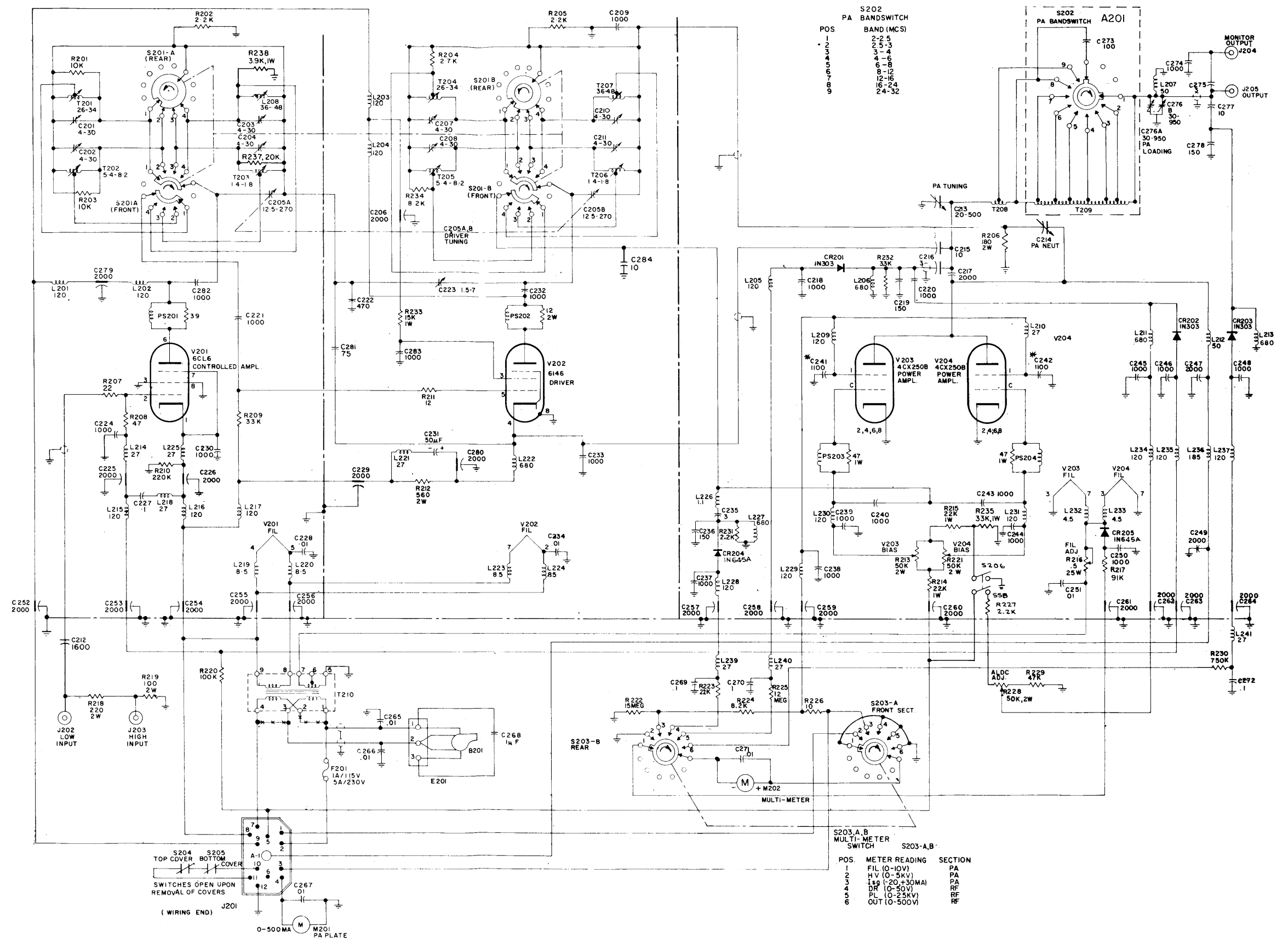
DRIVER BAND SWITCH
S201-A,B

POS	BAND (MCS)
1	2-4
2	4-8
3	8-16
4	16-32

UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS ARE IN OHMS, 1/2 WATT
ALL CAPACITORS ARE IN μ F
ALL COILS & TRANSFORMERS ARE IN μ H.

CHANGES NECESSARY TO CONVERT
230V OPERATION.
F201 CHANGED FROM 1AMP TO 5AMP.
T210 REMOVE JUMPERS MARKED ***
& CONNECT A JUMPER BETWEEN
TERMINALS 2&3.

* C241 AND C242 ARE INTEGRAL PARTS
OF V203 AND V204 SOCKETS



S202
PA BANDSWITCH

POS	BAND (MCS)
1	2-5
2	5-9
3	9-16
4	16-24
5	24-32

S203-A,B
MULTI-METER
SWITCH

POS.	METER READING	SECTION
1	FIL (0-10V)	PA
2	HV (0-5KV)	PA
3	15 μ (0-30MA)	PA
4	DR (0-50V)	RF
5	PL (0-25KV)	RF
6	OUT (0-500V)	RF

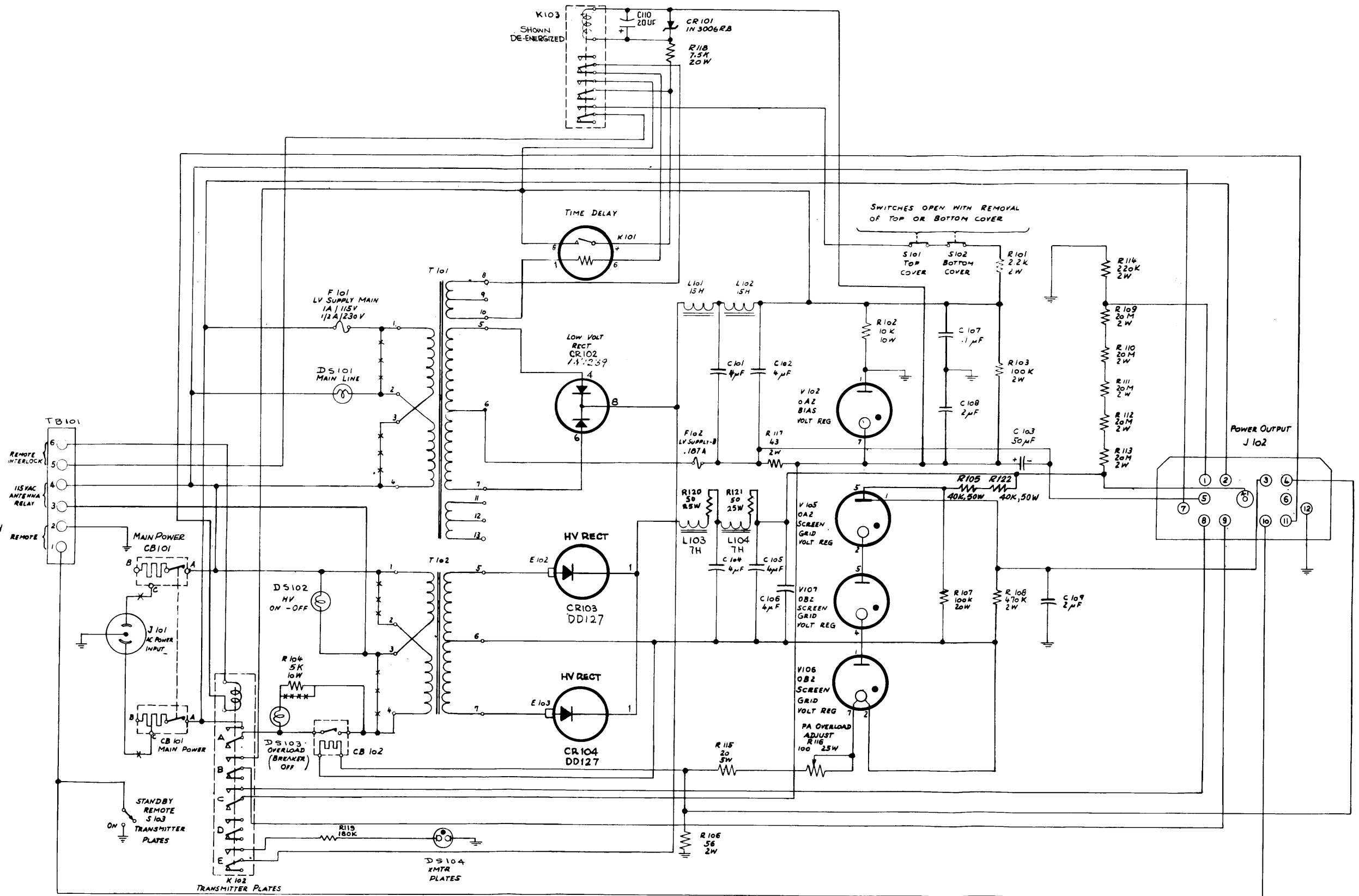
CK1002G

Figure 6-1. Schematic Diagram, Power Amplifier PAL-350B

CHANGES NECESSARY TO CONVERT TO 230 V OPERATION

- T 101 Remove jumpers marked * * * * and connect jumper between terminals # 2 and 3.
- T 102 Same as T 101.
- CB 101 Remove lead from terminals "C" and connect it to terminals "B".
- R 104 Remove and discard jumper marked * * * *
- F 101 Change from 1 amp. to 1/2 amp.

- Note:**
1. All fuses are slow blow.
 2. TB101 5 and 6 normally jumpered unless remote interlocking is required.



WARNING : Do NOT OPERATE THIS UNIT WITH V 102 and/or V 105 and/or V 106 REMOVED!

Figure 6-2. Schematic Diagram, Power Supply PSP-350B