

Paul E. Grove

★ UNCLASSIFIED

TECHNICAL MANUAL

for

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



THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N.Y. OTTAWA, ONTARIO

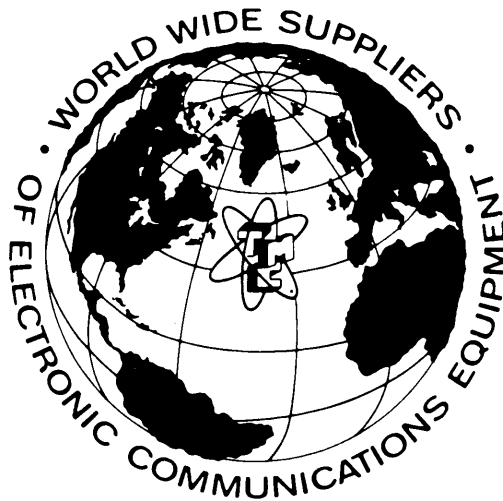


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★
IN 10016A

Issue Date: 20 August 1962

WARNING

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



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.

W a r r a n t y

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

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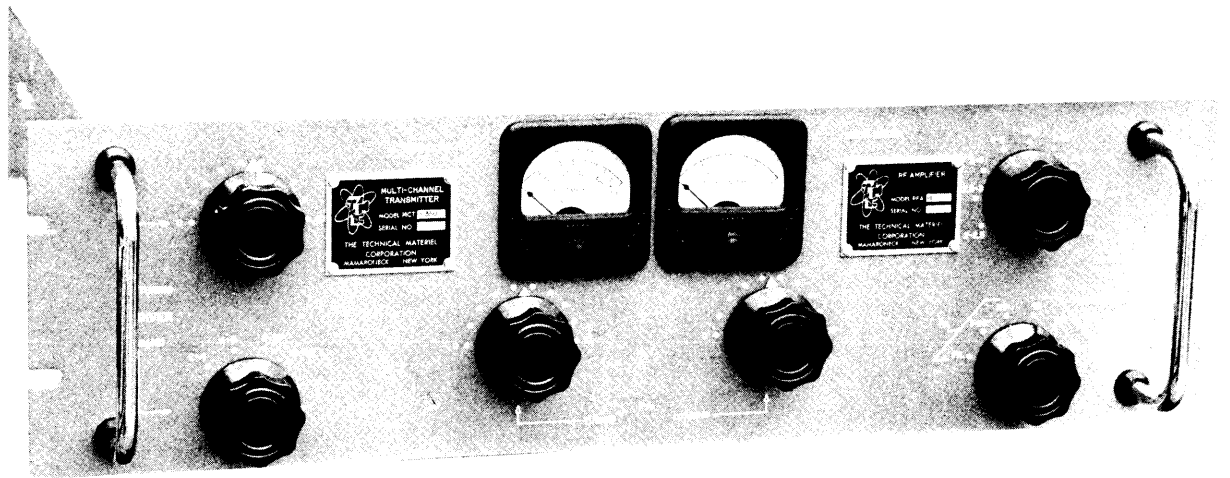
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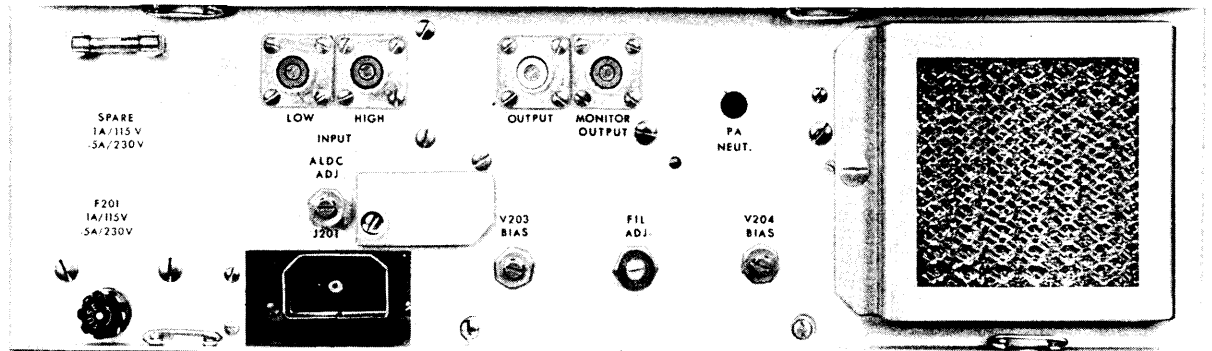
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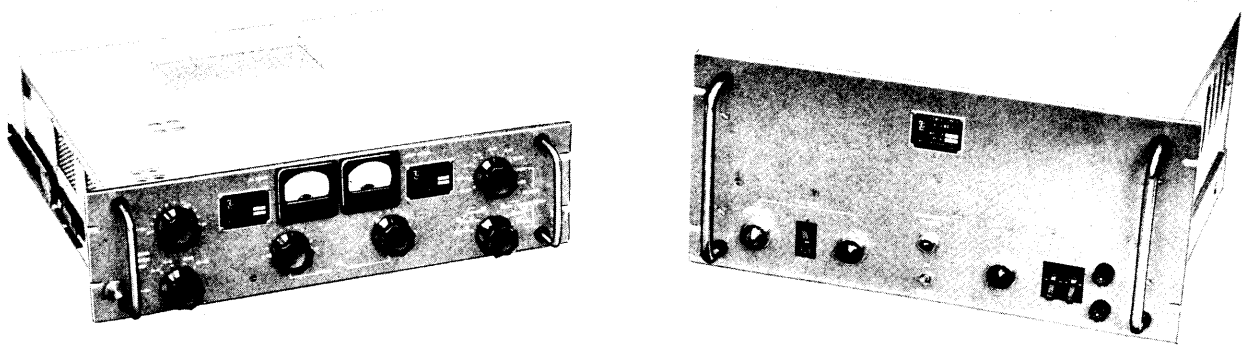
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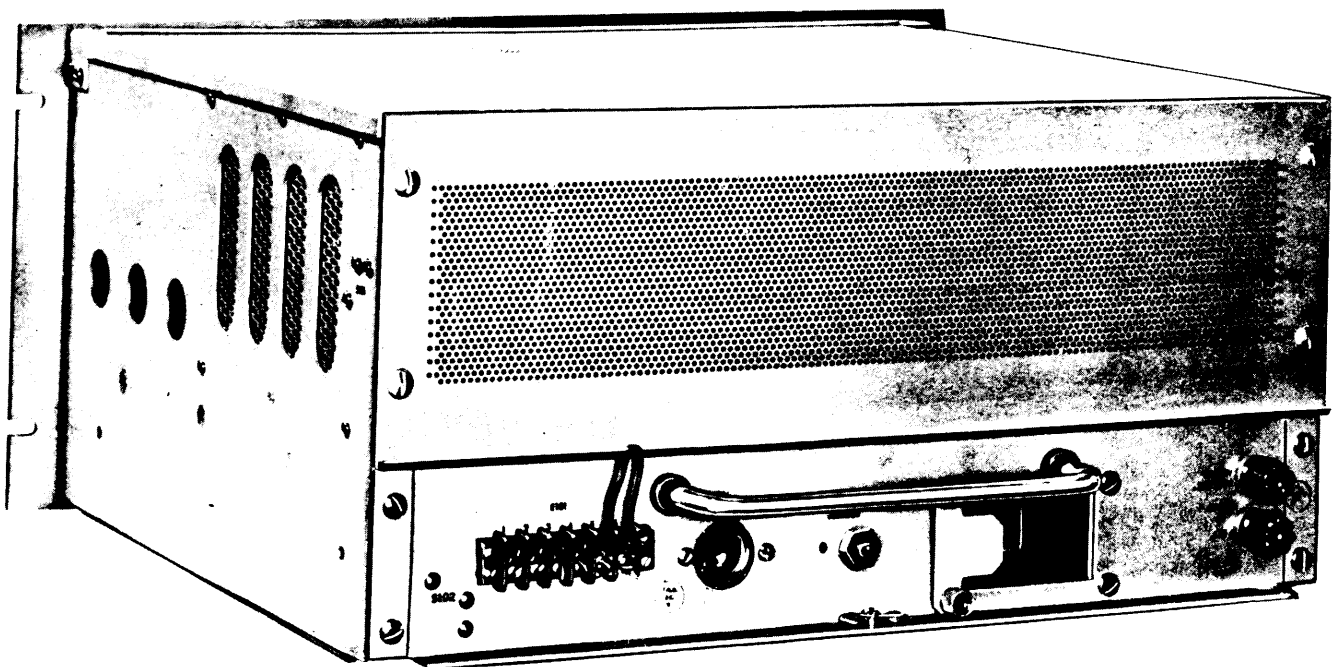
Front Angle View RFA-1 Linear Amplifier



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, Mode 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.</p> <p>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</p> <p>1 ea. 6CL6 Controlled Amplifier</p> <p>1 ea. 6146 Driver</p> <p>PSP-350 Power Supply</p> <p>2 ea. 866A Rectifiers</p> <p>2 ea. OA2 Voltage Regulators</p> <p>2 ea. OB2 Voltage Regulators</p> <p>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.</p> <p>19" wide x 8-3/4" high x 13" deep.</p>
WEIGHT: RFA-1 PSP-350	<p>30 lbs.</p> <p>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.

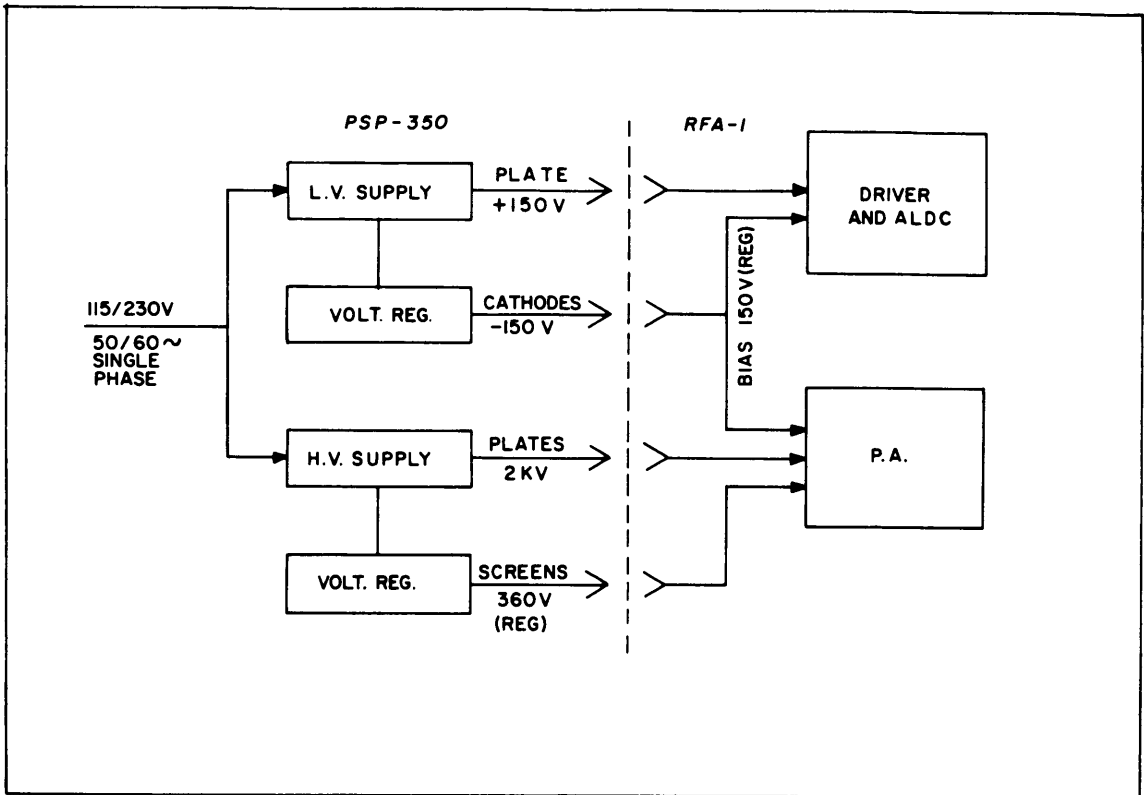


Figure 2-1 Simplified Block Diagram (CK10433)

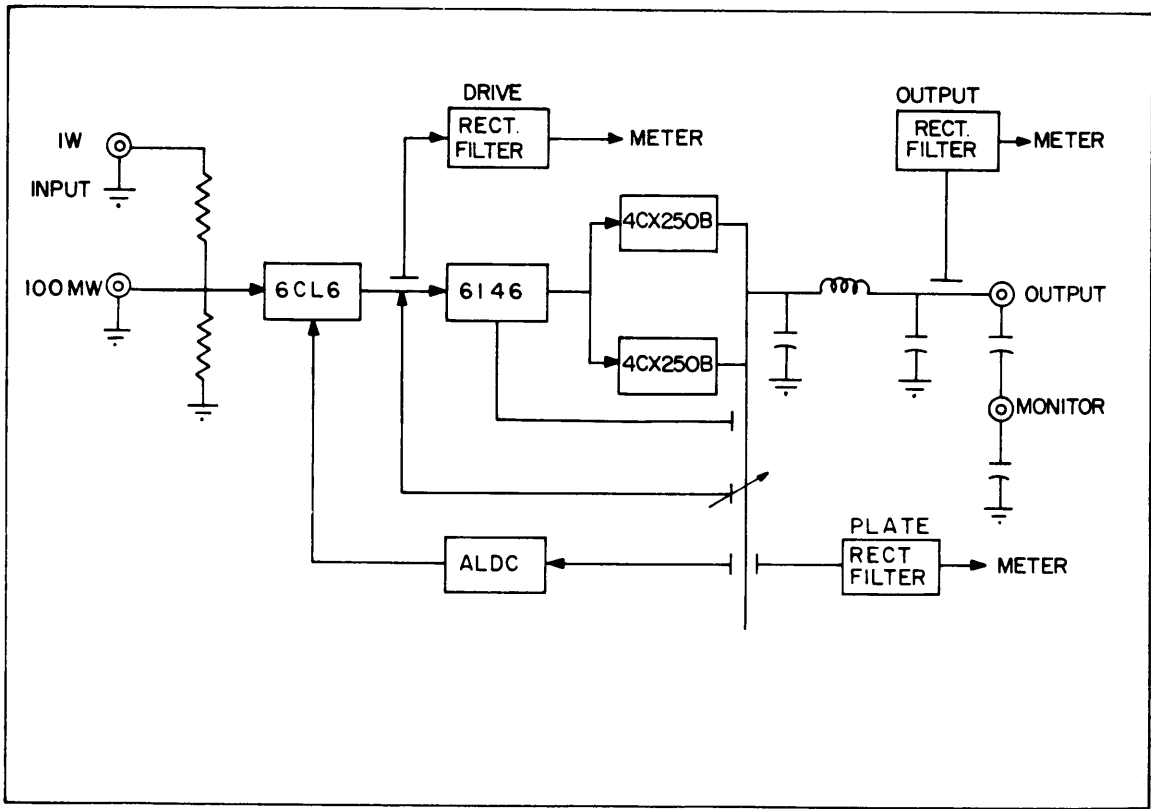


Figure 2-2 Simplified Schematic Diagram (CK10434)

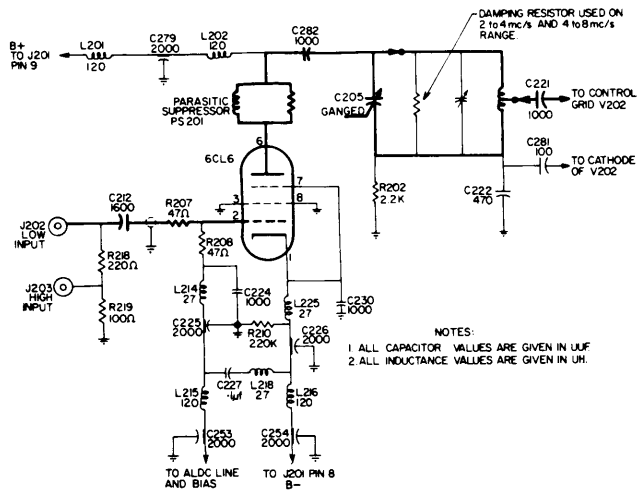


Figure 2-3 Simplified Schematic V201 Amplifier (CK10430)

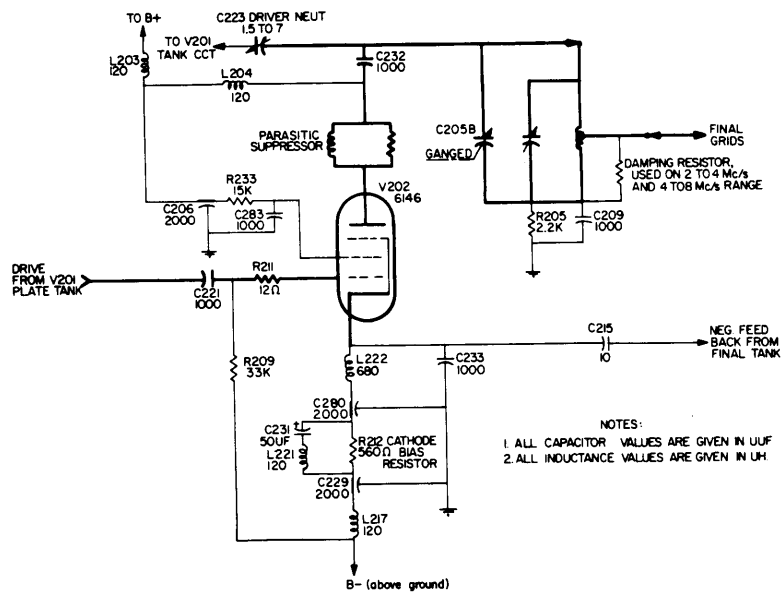


Figure 2-4 Simplified Schematic V202 2nd Amplifier (CK10428)

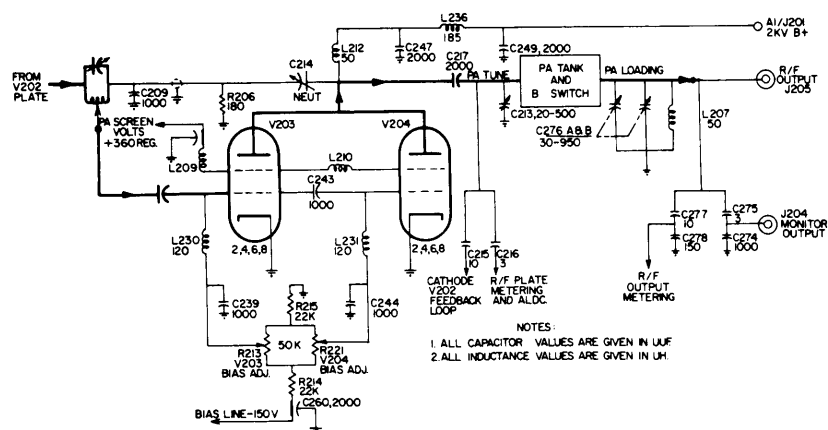


Figure 2-5 Simplified PA Schematic (CK10432)

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.

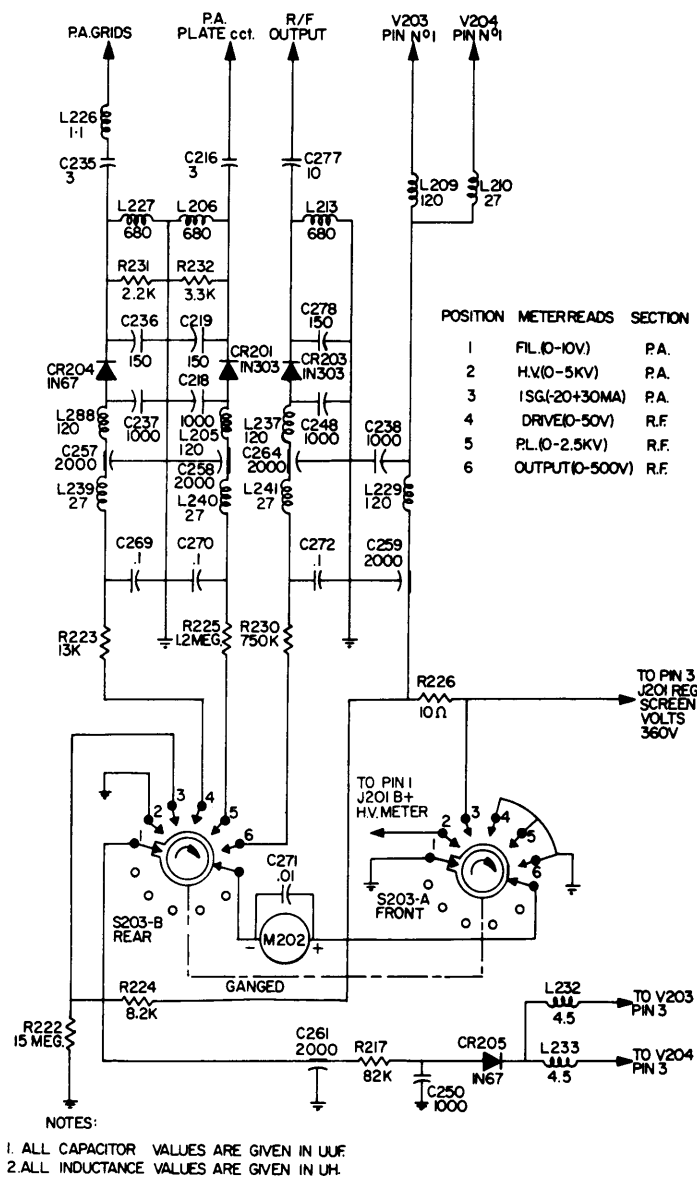


Figure 2-6 Simplified Metering Circuits (CK10429)

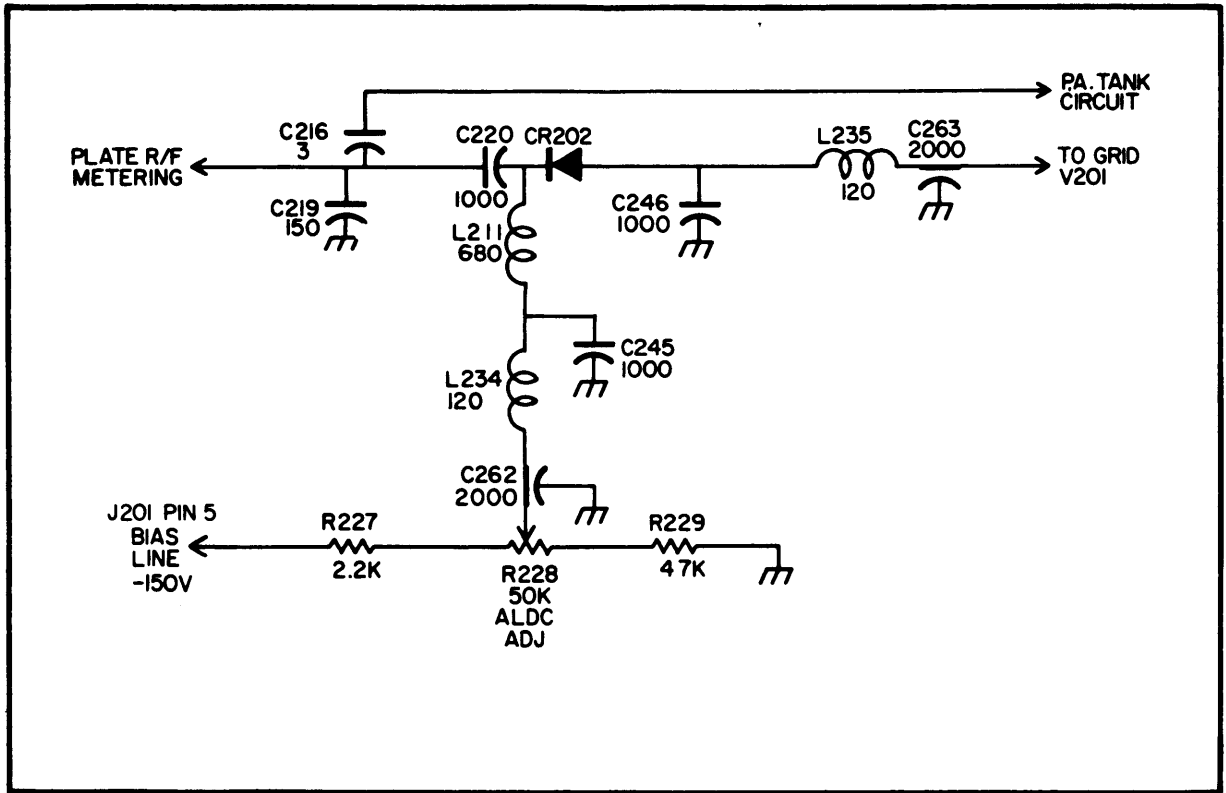


Figure 2-7 Simplified ALDC Circuit (CK10427)

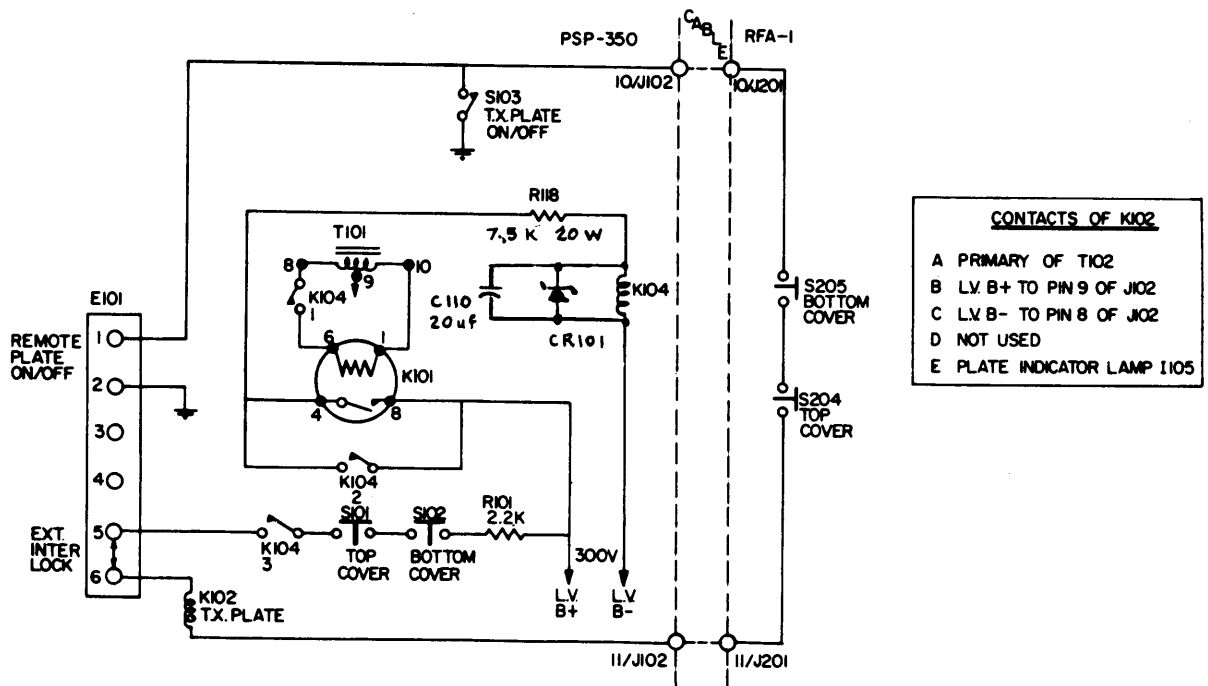


Figure 2-8 Simplified Interlock and Relay Circuit (CK10431)

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.

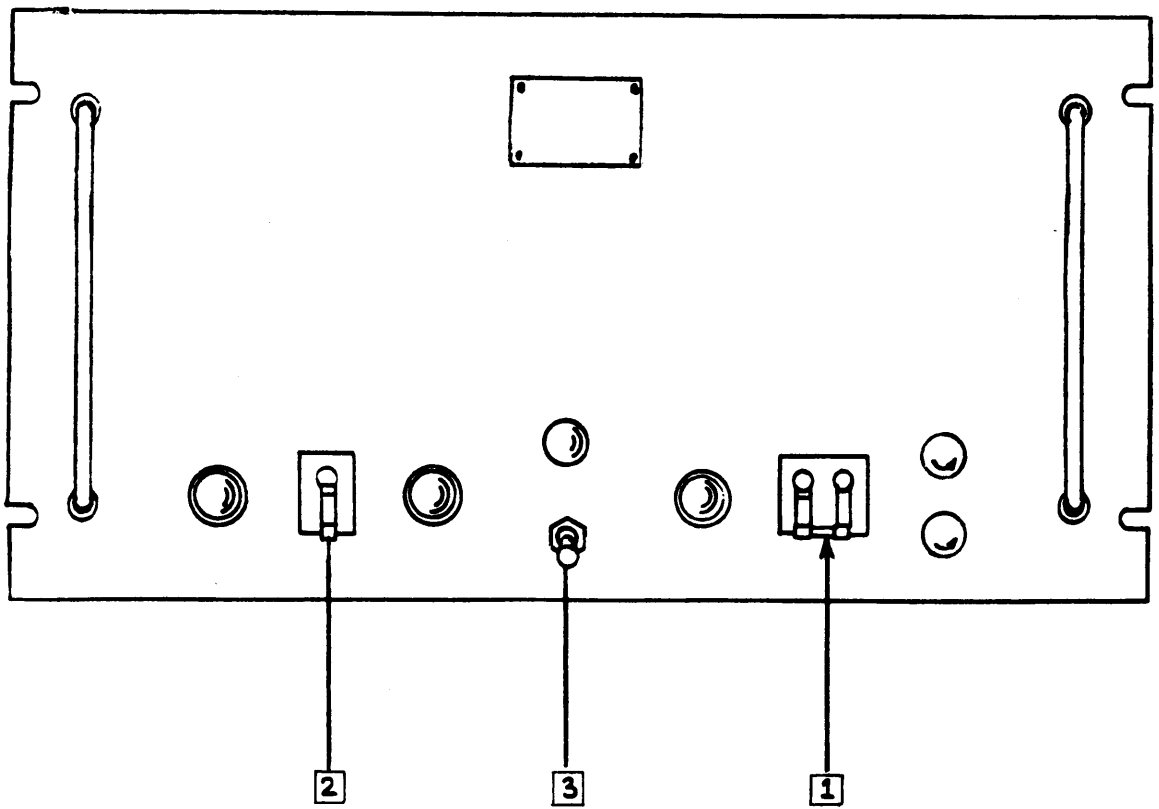
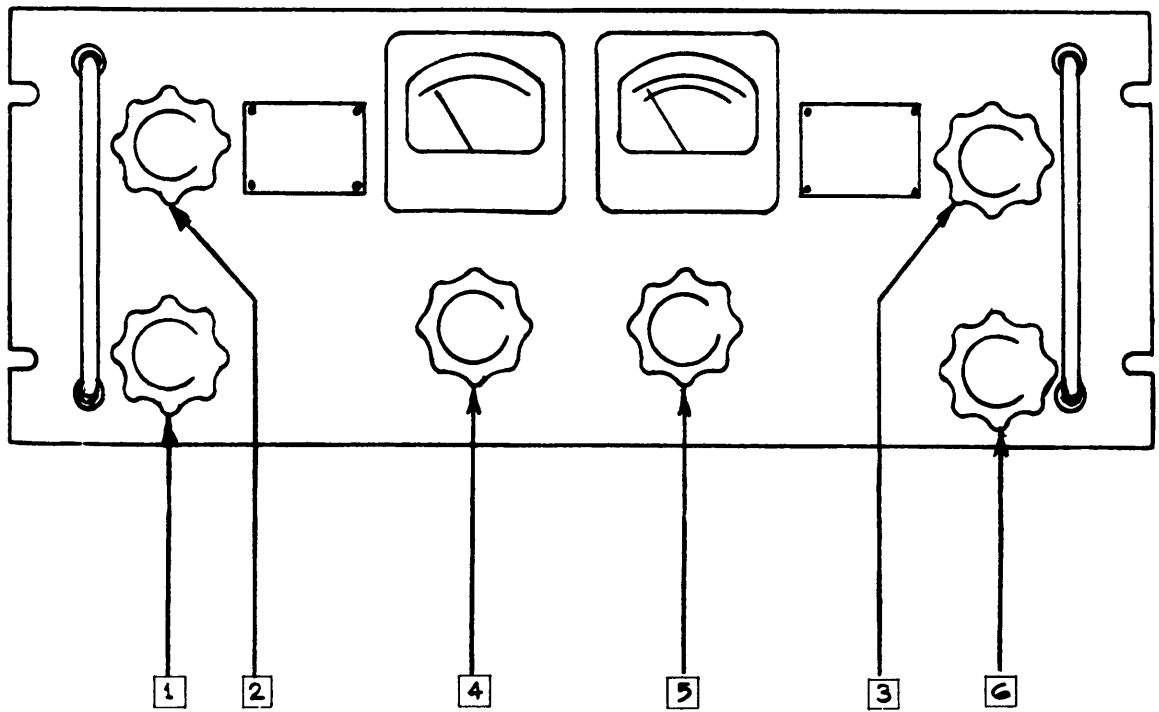
METER FUNCTIONS

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 Pan I 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	*

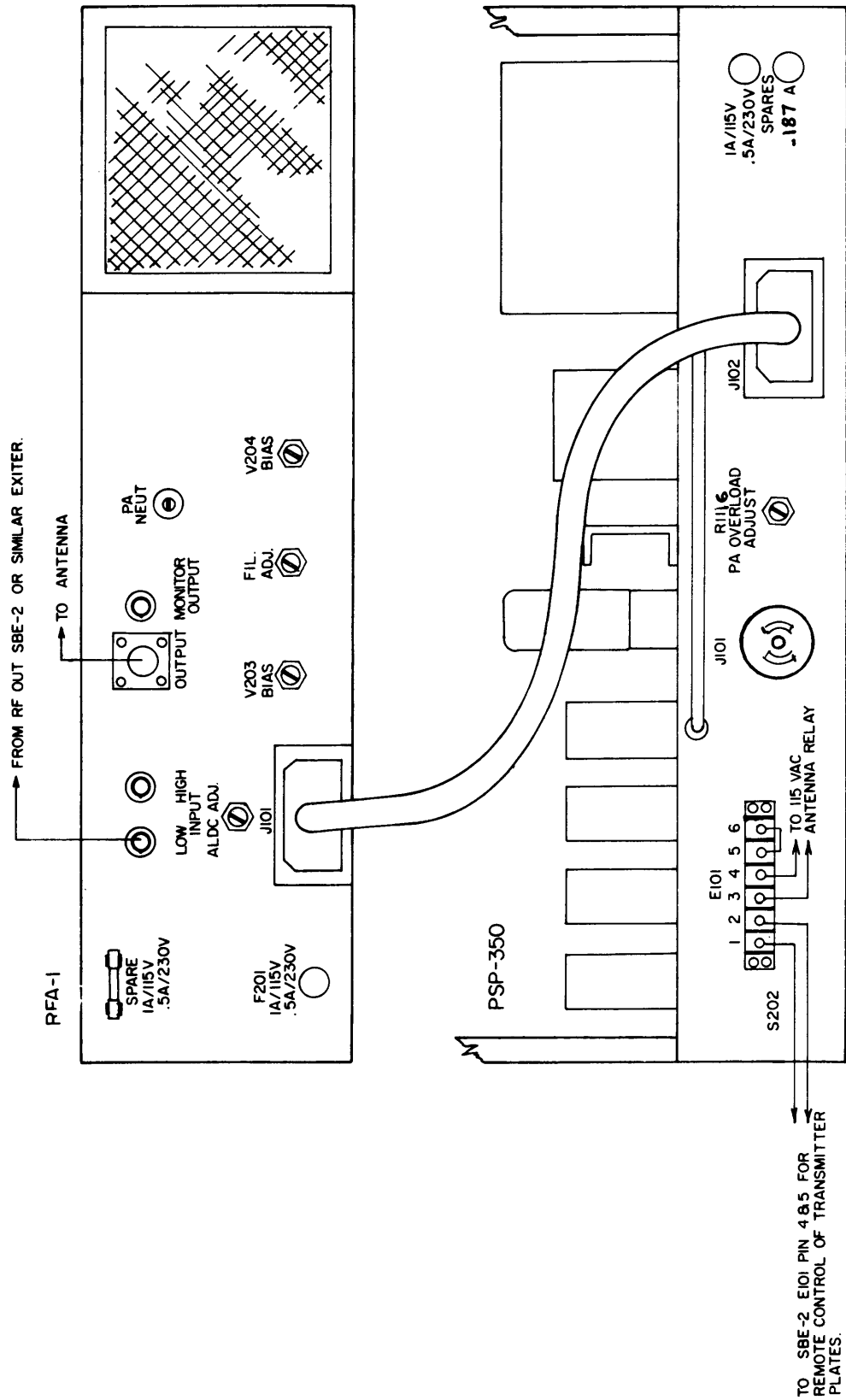


Figure 4-1 Rear Panel Connections & Adjustment (ID10265)

REAR PANEL CONNECTIONS & ADJUSTMENT

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 terminals 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.

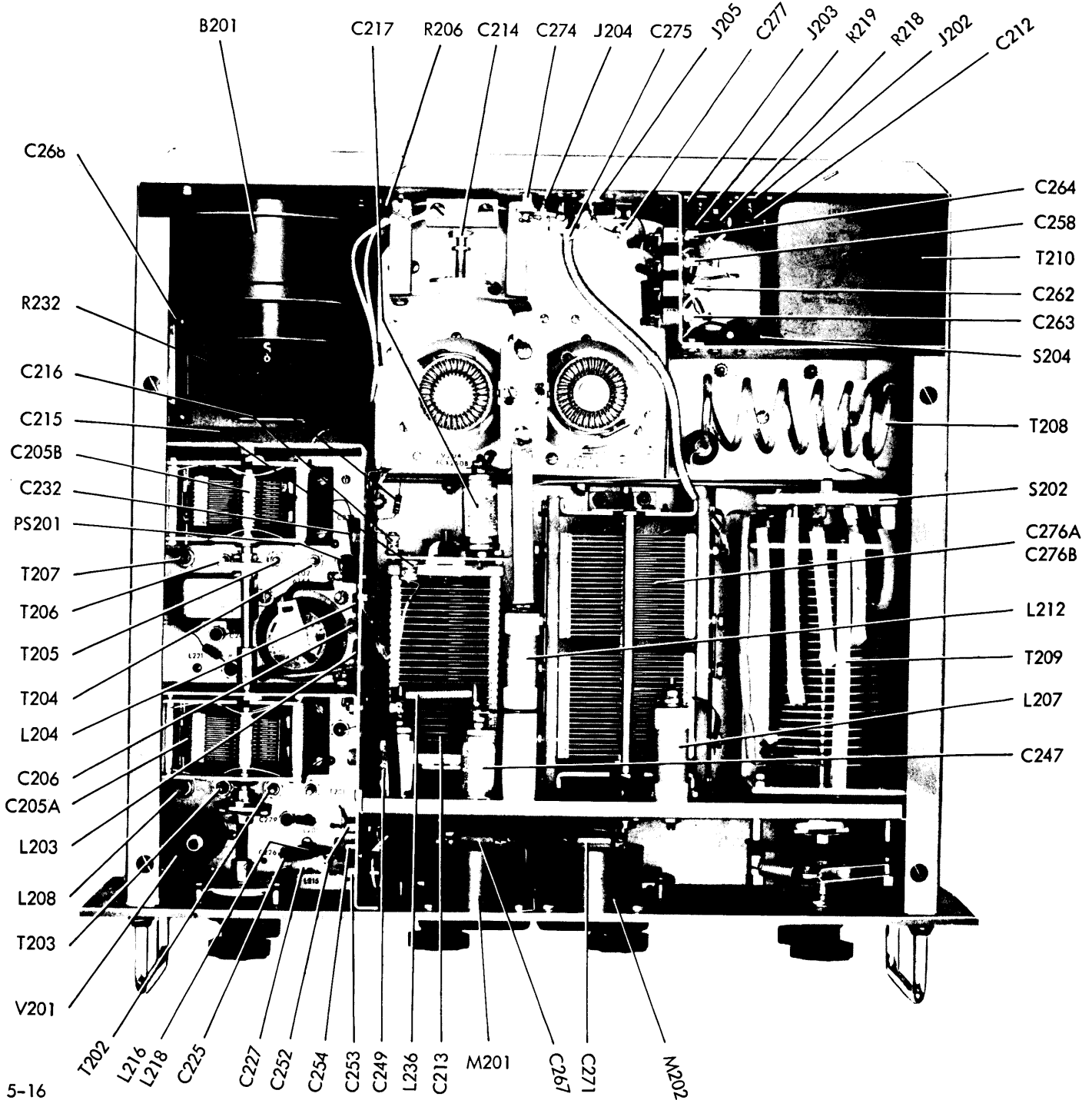


Figure 5-1 Location Diagram of Major Electronic Components
Top View RFA-1

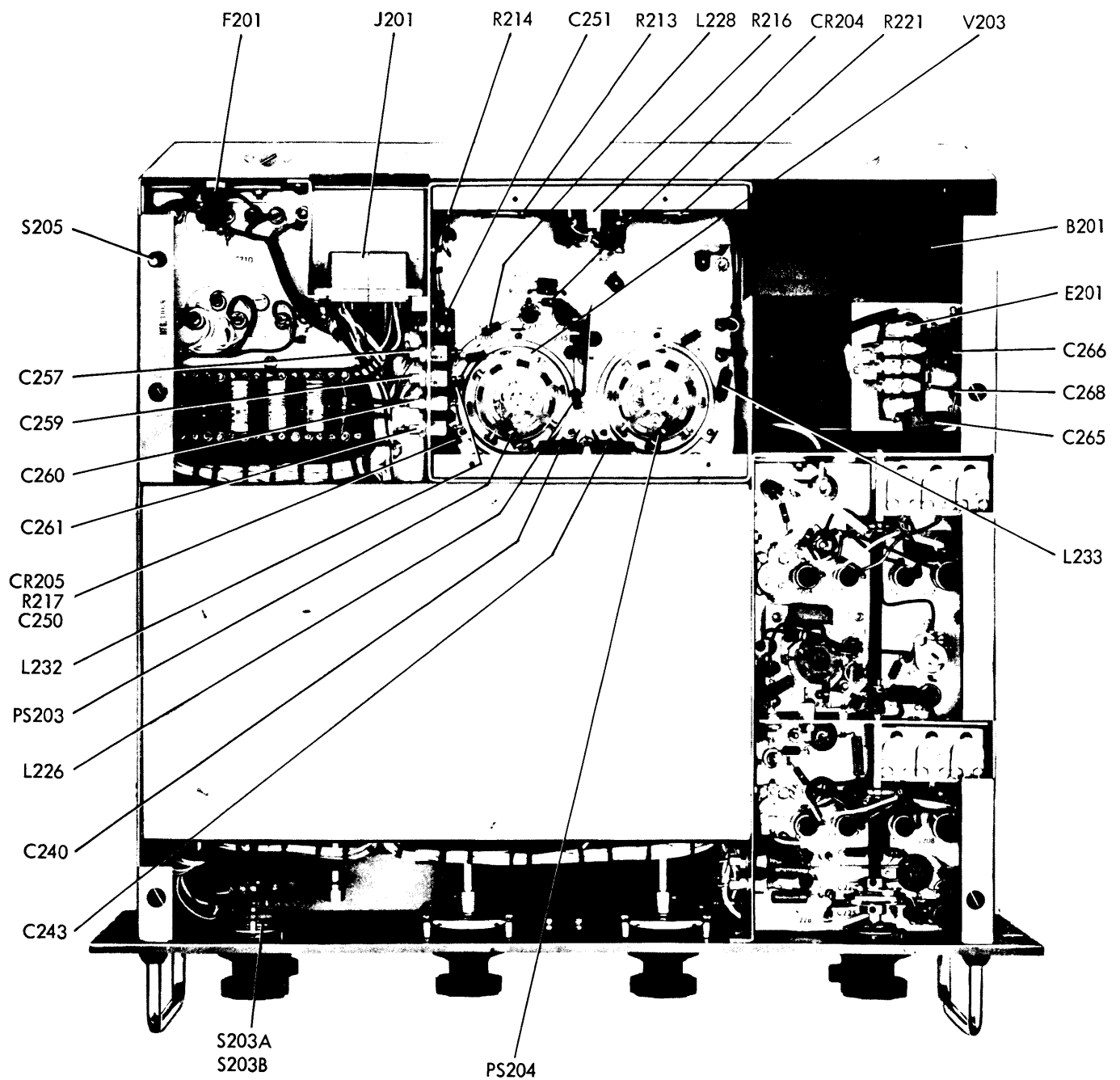


Figure 5-2 Location Diagram of Major Electronic Components
Bottom View RFA-1

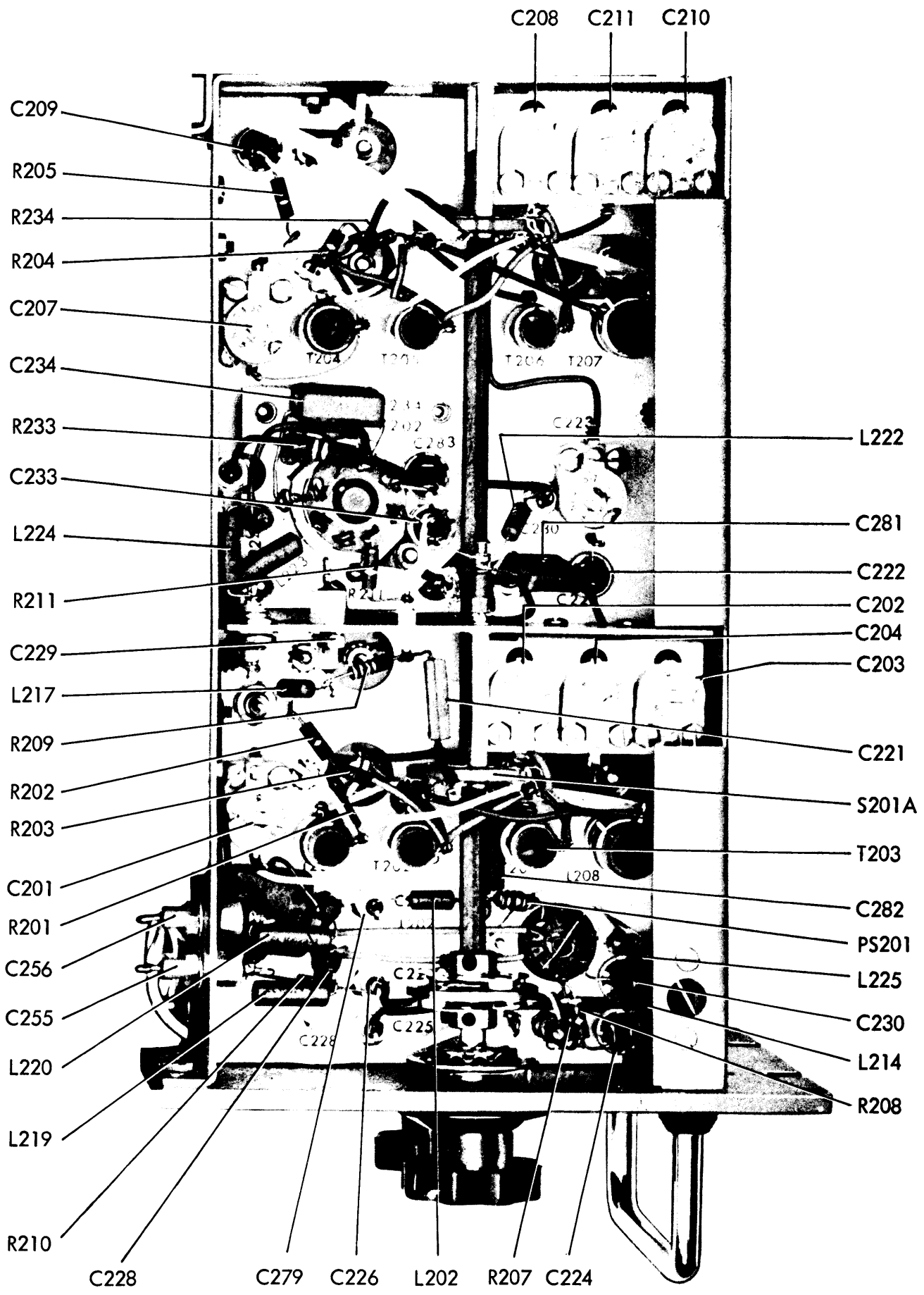
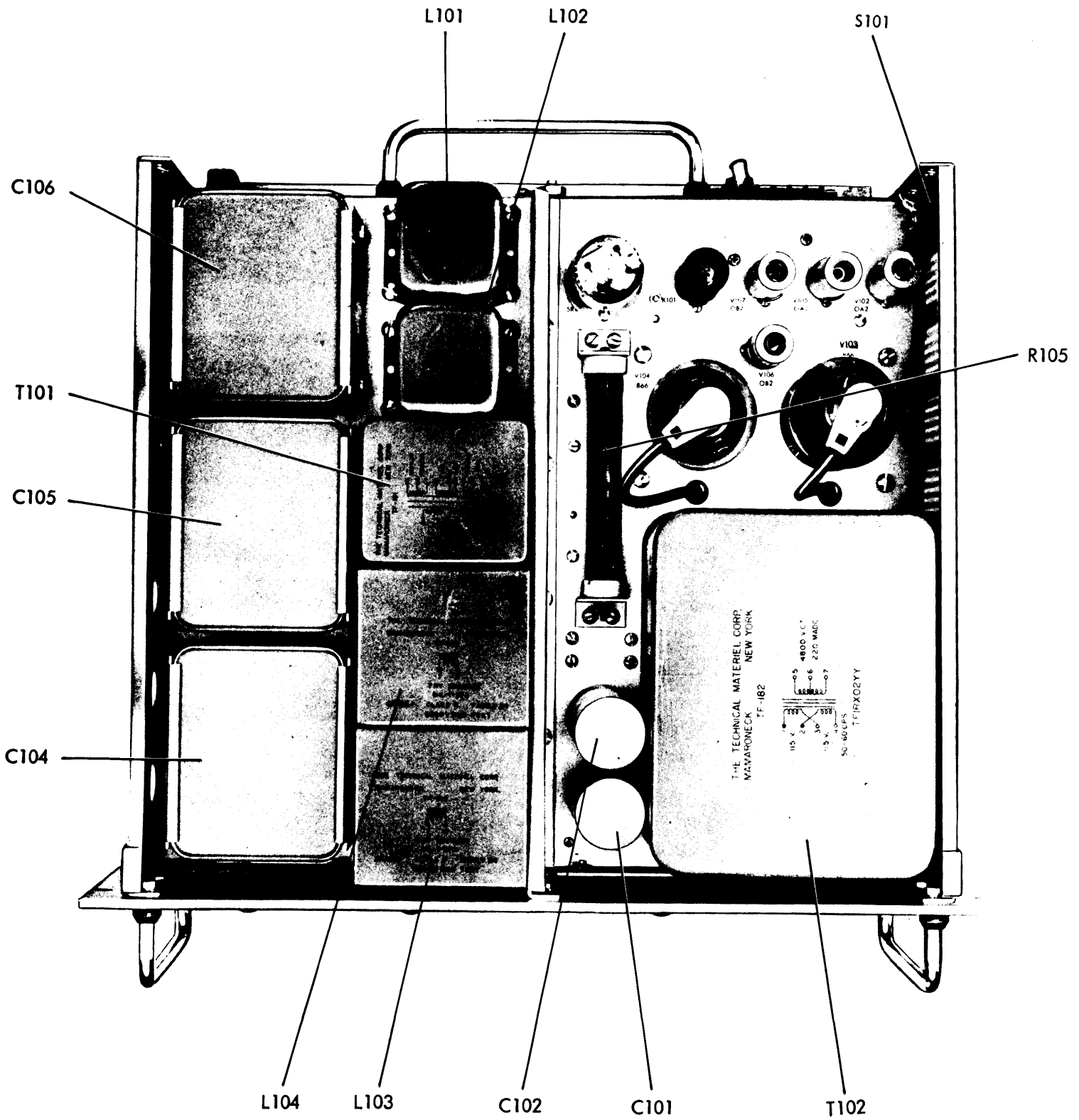
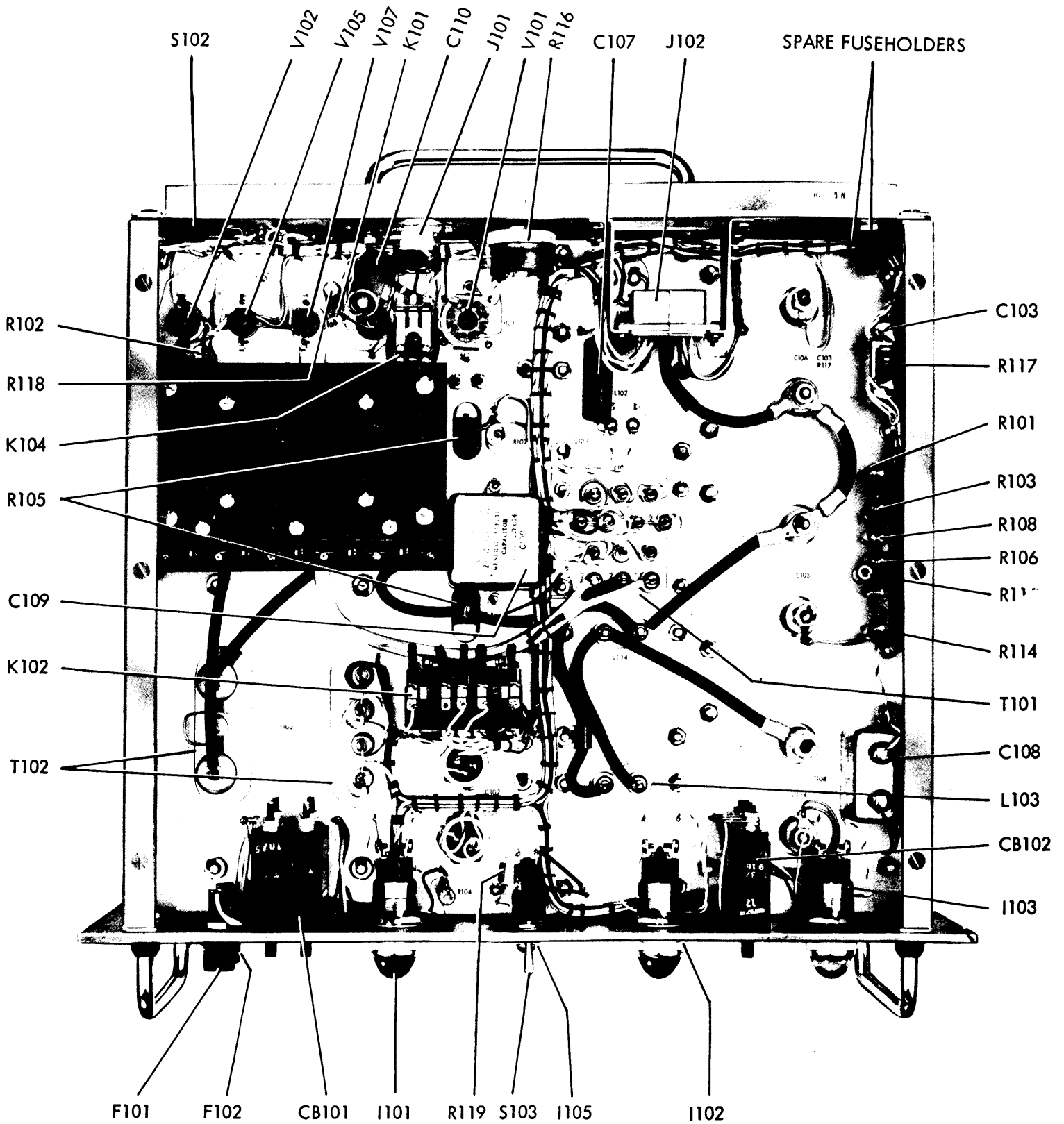


Figure 5-3 Location Diagram of Major Electronic Components
Bottom View RFA-1 (Driver Section only)



Figur 5-4 Location Diagram of Major Electronic Components
Top View PSP-350



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

SECTION VI
PARTS LIST MODEL RFA-1

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
B201	BLOWER: air		BL-100
C201	CAPACITOR: trimmer 4-30 uuf	2-4 mc Trimmer	CV-11C300
C202	CAPACITOR: trimmer 4-30 uuf	4-8 mc Trimmer	CV-11C300
C203	CAPACITOR: trimmer 4-30 uuf	16-32 mc Trimmer	CV-11C300
C204	CAPACITOR: trimmer 4-30 uuf	8-16 mc Trimmer	CV-11C300
C205A	CAPACITOR: variable, air, 12.5 - 270 uuf	1st Stage Tuning	CB-139-1
C205B	CAPACITOR: variable, air, 12.5 - 270 uuf	2nd Stage Tuning	CB-139-2
C206	CAPACITOR: fixed, feed thru, 2000 mmf.	R. F. Decoupling	CK70A202M
C207	CAPACITOR: trimmer 4-30 uuf	2-4 mc Trimmer	CV-11C300
C208	CAPACITOR: trimmer 4-30 uuf	4-8 mc Trimmer	CV-11C300
C209	CAPACITOR: button mica, 1000 mmf.	Decoupling	CB21QW102K
C210	CAPACITOR: trimmer 4-30 uuf	16-32 mc Trimmer	CV-11C300
C211	CAPACITOR: trimmer 4-30 uuf	8-16 mc Trimmer	CV-11C300
C212	CAPACITOR: mica, 1600 mmf.	R. F. Inp. Coupling	CM20D162G
C213	CAPACITOR: variable air, 19-488 uuf.	Output Tune	CB-138-3AN
C215	CAPACITOR: fixed, ceramic HV, 10mmf	NEG Feedback Coupling	CC-109-6
C216	CAPACITOR: fixed, ceramic HV, 3 mmf	ALDC Coupling	CC-109-2
C217	CAPACITOR: trylar, 2000 mmf	D. C. Blocking	CX102J202M
C218	CAPACITOR: button mica, 1000 mmf	R. F. Decoupling	CB21QW102K
C219	CAPACITOR: button mica, 150 mmf	R. F. V/Divider	CB21QW151K
C220	CAPACITOR: mica, 1000 mmf	ALDC Coupling	CM20C102J
C221	CAPACITOR: mica, 1000 mmf	R. F. Coupling V202 grid	CM20C102J
C222	CAPACITOR: button mica, 470 mmf	V202 Neut. Circuit	CB21QW471K

PARTS LIST MODEL RFA-1

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
C223	CAPACITOR: trimmer 1.5 - 7 uuf	Driver Neutralize	CV-11A070
C224	CAPACITOR: button mica, 1000 mmf	Bias V201 Decouple	CB21QW102K
C225	CAPACITOR: fixed, feed thru, 2000 mmf	R/F Decoupling	CK70A202M
C226	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C227	CAPACITOR: mylar, .1 mfd.		CN108C1003J
C228	CAPACITOR: mica, .01 mfd.	Heater V201 Decoupling	CM35C103J
C229	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C230	CAPACITOR: button mica, 1000 mmf	V201 Cathode Decoupling	CB21QW102K
C231	CAPACITOR: fixed, electrolytic, 50 mfd		CE63C500G
C232	CAPACITOR: mica, 1000 mmf	V202 Plate Coupling	CM20C102J
C233	CAPACITOR: button mica, 1000 mmf	V202 Cathode Decoupling	CB21QW102K
C234	CAPACITOR: mica, .01 mfd.	V202 Heater Decoupling	CM35C103J
C235	CAPACITOR: fixed, ceramic, 3 mmf	Meter Coupling	CC21SL030C
C236	CAPACITOR: button mica, 150 mmf	R. F. Voltage Div. <u>Grid Metering</u>	CB21QW151K
C237	CAPACITOR: button mica, 1000 mmf	R. F. Decoupling <u>Grid Metering</u>	CB21QW102K
C238	CAPACITOR: button mica, 1000 mmf	R. F. Decoupling <u>Screen Grid PA Metering</u>	CB21QW102K
C239	CAPACITOR: button mica, 1000 mmf	R. F. Decoupling <u>V203 Bias Line</u>	CB21QW102K
C240	CAPACITOR: mica, 1000 mmf	R. F. Coupling Grid V203	CM20C102J
C243	CAPACITOR: mica, 1000 mmf	R. F. Coupling Grid V203	CM20C102J
C244	CAPACITOR: button mica, 1000 mmf	R. F. Decoupling <u>V204 Bias Line</u>	CB21QW102K
C245	CAPACITOR: button mica, 1000 mmf	ALDC Decoupling	CB21QW102K
C246	CAPACITOR: button mica, 1000 mmf	ALDC Decoupling	CB21QW102K
C247	CAPACITOR: trylar, 2000 mmf	P.A. B+ Decoupling	CX102J202M
C248	CAPACITOR: button mica, 1000 mmf	R. F. output Meter Decoupling	CB21QW102K

PARTS LIST MODEL RFA-1

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
C249	CAPACITOR: trylar, 2000 mmf	P.A. B + Decoupling	CX102J202M
C250	CAPACITOR: button mica, 1000 mmf	CR205 Filter	CB21QW102K
C251	CAPACITOR: mica, .01 mfd	PA Fils Decoupling	CM35C103J
C252	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C253	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C254	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CX70A202M
C255	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C256	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C257	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C258	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C259	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C260	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C261	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C262	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C263	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C264	CAPACITOR: fixed, feed thru, 2000 mmf	R. F. Decoupling	CK70A202M
C267	CAPACITOR: mica, .01 mfd.	PA Plate Meter Decoupling	CM35C103J
C268	CAPACITOR: paper, 1 mfd.	Blower Starting	CP69B1EF105K
C269	CAPACITOR: mylar, .1 mfd.	Multimeter Circ. Decoupling	CN108C1003J
C270	CAPACITOR: mylar, .1 mfd.	Multimeter Circ. Decoupling	CN108C1003J
C271	CAPACITOR: mica, .01 mfd.	Multimeter, R. F. Bypass	CM35C103J
C272	CAPACITOR: mylar, .1 mfd.	Multimeter Circ. Decoupling	CN108C1003J
C273	CAPACITOR: fixed, ceramic HV	p/o PA Tank Cct.	CC-109-28
C274	CAPACITOR: button mica, 1000 mmf.	R. F. Monitor Cct.	CB21QW102K
C275	CAPACITOR: fixed, ceramic HV, 3 mmf	R. F. Monitor Coupling	CC-109-1

PARTS LIST MODEL RFA-1

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
C276A-B	CAPACITOR: variable air, 30-950 uuf	Output Loading	CB-125-A-950X
C277	CAPACITOR: fixed, ceramic HV, 10 mmf	R. F. Outp. Meter Coupling	CC-109-5
C278	CAPACITOR: button mica, 150 mmf.	R. F. Outp. Meter Circuit	CB21QW151K
C279	CAPACITOR: fixed, feed thru, 2000 mmf.	R. F. Decoupling	CK70A202M
C280	CAPACITOR: fixed, feed thru, 2000 mmf.	R. F. Decoupling	CK70A202M
C281	CAPACITOR: mica, 100 mmf.	R. F. Feedback Coupling	CM20D101G
C282	CAPACITOR: mica, 1000 mmf.	V201 Plate Coupling	CM20C102J
C283	CAPACITOR: button mica, 1000 mmf.	V202 Screen Decouple	CB21QW102K
CR-201	DIODE: silicon, 1N303	R/F Plate Volts Meter Rectifier	IN-303
CR-202	DIODE: silicon, IN303	ALDC Rectifier	IN-303
CR-203	DIODE: silicon, IN303	R/F Outp. Volts Rectifier	IN-303
CR-204	DIODE: germanium, IN67	R/F Grid Volts Meter Rectifier	IN-67
CR-205	DIODE: germanium, IN67	PA Fil. Volts Rectifier	IN-67
F201	FUSE: 1 amp (110V.)	Fuse	FU-102-1
F201	FUSE: 1/2 amp. (230V.)	Fuse	FU-102-.5
J201	CONNECTOR: receptacle male	Power Cable Interunit	JJ-158-P
J202	CONNECTOR: R. F. , BNC	R/F Input Connection Low	UG625/U
J203	CONNECTOR: R. F. , BNC	R/F Input Connector High	UG625/U
J204	CONNECTOR: R. F. , BNC	R/F Monitor Output	UG625/U
J205	CONNECTOR: R. F. teflon	R/F Output	SO-239-A
L201	INDUCTOR: RF, encapsulated, 120 uh	R/F Filtering	CL-10006-6
L202	INDUCTOR: RF, encapsulated, 120 uh	R/F Filtering	CL-10006-6
L203	INDUCTOR: RF, encapsulated, 120 uh	R/F Filtering	CL-10006-6
L204	INDUCTOR: RF, encapsulated, 120 uh	R/F Filtering	CL-10006-6
L205	INDUCTOR: RF, encapsulated, 120 uh	R/F Filtering	CL-10006-6

PARTS LIST MODEL RFA-1

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
L206	INDUCTOR: RF, encapsulated, 680 uh	R/F Filtering	CL-10006-7
L207	COIL: RF, 50 uh		CL-10013
L208	COIL: tunable, 16-32 Mc/s driver	16-32 Driver Coil	CL-10011-1
L209	INDUCTOR: RF, encapsulated, 120 uh	R/F Filtering	CL-10006-6
L210	INDUCTOR: RF, encapsulated, 27 uh	R/F Filtering	CL-10006-2
L211	INDUCTOR: RF, encapsulated, 680 uh	R/F Filtering	CL-10006-7
L212	COIL: RF, 50 uh	PA Plate Load	CL-10012
L213	INDUCTOR: RF, encapsulated, 680 uh	R/F Filtering	CL-10006-7
L214	INDUCTOR: RF, encapsulated, 27 uh	R/F Filtering	CL-10006-2
L215	INDUCTOR: RF, encapsulated, 120 uh	R/F Filtering	CL-10006-6
L216	INDUCTOR: RF, encapsulated, 120 uh	R/F Filtering	CL-10006-6
L217	INDUCTOR: RF, encapsulated, 120 uh	R/F Filtering	CL-10006-6
L218	INDUCTOR: RF, encapsulated, 27 uh	R/F Filtering	CL-10006-2
L219	INDUCTOR: RF, encapsulated, 8.5 uh		CL-10023-2
L220	INDUCTOR: RF, encapsulated, 8.5 uh	R. F. Filtering	CL-10023-2
L221	INDUCTOR: RF, encapsulated, 27 uh	R. F. Filtering	CL-10006-2
L222	INDUCTOR: RF, encapsulated, 680 uh	R. F. Filtering	CL-10006-7
L223	INDUCTOR: RF, encapsulated, 8.5 uh	R. F. Filtering	CL-10023-2
L224	INDUCTOR: RF, encapsulated, 8.5 uh	R. F. Filtering	CL-10023-2
L225	INDUCTOR: RF, encapsulated, 27 uh	R. F. Filtering	CL-10006-2
L226	INDUCTOR: RF, encapsulated, 1.0 uh	R. F. Filtering	CL-10006-3
L227	INDUCTOR: RF, encapsulated, 680 uh	R. F. Filtering	CL-10006-7
L228	INDUCTOR: RF, encapsulated, 120 uh	R. F. Filtering	CL10006-6
L229	INDUCTOR: RF, encapsulated, 120 uh	R. F. Filtering	CL-10006-6
L230	INDUCTOR: RF, encapsulated, 120 uh	R. F. Filtering	CL-10006-6
L231	INDUCTOR: RF, encapsulated, 120 uh	R. F. Filtering	CL-10006-6
L232	INDUCTOR: RF, encapsulated, 4.5 uh	R. F. Filtering	CL-10023-1

PARTS LIST MODEL RFA-1

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
L233	INDUCTOR: RF, encapsulated, 4.5 uh	R. F. Filtering	CL-10023-1
L234	INDUCTOR: RF, encapsulated, 120 uh	R. F. Filtering	CL-10006-6
L235	INDUCTOR: RF, encapsulated, 120 uh	R. F. Filtering	CL-10006-6
L236	COIL: RF, 185 uh	R. F. Filtering	A-1126
L237	INDUCTOR: RF, encapsulated, 120 uh	R. F. Filtering	CL-10006-6
L239	INDUCTOR: RF, encapsulated, 27 uh	R. F. Filtering	CL-10006-2
L240	INDUCTOR: RF, encapsulated, 27 uh	R/F Filtering	CL-10006-2
L241	INDUCTOR: RF, encapsulated, 27 uh	R/F Filtering	CL-10006-2
M202	MULTIMETER	Multimeter	MR-10002
M201	METER: 500 ma	PA Plate Current Meter	MR-10003
PS-201	SUPPRESSOR: parasitic		A-1543-2
PS-202	SUPPRESSOR: parasitic		A-1453
PS-203	SUPPRESSOR: parasitic		A-1546-1
PS-204	SUPPRESSOR: parasitic		A-1546-1
R201	RESISTOR: fixed, composition, 5600 ohm, $\pm 10\%$, 1/2 w.		RC20GF562K
R202	RESISTOR: fixed, composition, 2200 ohm, $\pm 10\%$, 1/2 w.		RC20GF222K
R203	RESISTOR: fixed, composition, 8200 ohm, $\pm 10\%$, 1/2 w.		RC20GF822K
R204	RESISTOR: fixed, composition, 2700 ohm, $\pm 10\%$, 1/2 w.		RC20GF272K
R205	RESISTOR: fixed, composition, 2200 ohm, $\pm 10\%$, 1/2 w.		RC20GF222K
R206	RESISTOR: fixed, composition, 180 ohm, $\pm 10\%$, 2 w.		RC42GF181K
R207	RESISTOR: fixed, composition, 47 ohm, $\pm 10\%$, 1/2 w.		RC20GF47OK
R208	RESISTOR: fixed, composition, 47 ohm, $\pm 10\%$, 1/2 w.		RC20GF470K
R209	RESISTOR: fixed, composition, 33000 ohm, $\pm 10\%$, 1/2 w.		RC20GF333K

PARTS LIST MODEL RFA-1

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
R210	RESISTOR: fixed, composition, 220.000 ohm, $\pm 10\%$, 1/2 w.		RC20GF224K
R211	RESISTOR: fixed, composition, 12 ohm, $\pm 10\%$, 1/2 w.		RC20GF120K
R212	RESISTOR: fixed, composition, 560 ohm, $\pm 10\%$, 2 w.		RC42GF561K
R213	RESISTOR: variable, 50,000 ohms	V203 Bias Adj.	RV4LAYS503A
R214	RESISTOR: fixed, composition, 22, 000 ohm, $\pm 10\%$, 1w.		RC30GF223K
R215	RESISTOR: fixed, composition, 22, 000 ohm, $\pm 10\%$, 1w.		RC30GF223K
R216	RESISTOR: variable, wirewound	(fil. adjust)	RA75XAOR5AK25
R217	RESISTOR: fixed, composition, 82, 000 ohm, $\pm 10\%$, 1w.		RC30GF823K
R218	RESISTOR: fixed, composition, 220 ohm, $\pm 10\%$, 2 w.		RC42GF221K
R219	RESISTOR: fixed, composition, 100 ohm, $\pm 10\%$, 2 w.		RC42GF101K
R220	RESISTOR: fixed, composition, 100,000 ohm, $\pm 10\%$, 1/2 w.		RC20GF104K
R221	RESISTOR: variable, 50,000 ohms	V204 Bias Adjust	RV4LAYS503A
R222	RESISTOR: fixed, composition, 15 meg ohm, $\pm 5\%$, 1/2 w.		RC20GF156J
R223	RESISTOR: fixed, composition, 13000 ohm, $\pm 5\%$, 1/2 w.		RC20GF133J
R224	RESISTOR: fixed, composition, 8200 ohm, $\pm 5\%$, 1/2 w.		RC20GF822J
R225	RESISTOR: fixed, composition, 1.2 meg ohm, $\pm 5\%$, 1/2 w.		RC20GF125J
R226	RESISTOR: fixed, composition, 10 ohm, $\pm 10\%$, 1/2 watt		RC20GF100K
R227	RESISTOR: fixed, composition, 2200 ohm, $\pm 10\%$, 1/2 watt		RC20GF222K

PARTS LIST MODEL RFA-1

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
R228	RESISTOR: variable		RV4LAYS5A503A
R229	RESISTOR: fixed, composition, 47000 ohm, $\pm 10\%$, 1/2 w.		RC20GF473K
R230	RESISTOR: fixed, composition, 750.000 ohm, $\pm 5\%$, 1/2 w.		RC20GF754J
R231	RESISTOR: fixed, composition, 2200 ohm, $\pm 10\%$, 1/2 watt		RC20GF222K
R232	RESISTOR: fixed, composition, 3300 ohm, $\pm 10\%$, 1/2 w.		RC20GF332K
R233	RESISTOR: fixed, composition, 15000 ohm, $\pm 10\%$, 1 w.		RC30GF153K
R234	RESISTOR: fixed, composition, 8200 ohm, $\pm 10\%$, 1/2 watt	Damping	RC20GF822K
S201A	WAFER: rotary switch, 2 Pole 4 Pos.	Drive Band Sw.	WS-101
S201B	WAFER: rotary switch, 2 Pole 4 Pos.	Drive Band Sw.	WS-101
S202	SWITCH	PA Bandswitch	SW-218
S203A-B	SWITCH: meter, 2 Pole, 6 Position	Multimeter	SW-217
S204	SWITCH: micro	Interlock	SW-219
S205	SWITCH: micro	Interlock	SW-219
T201	COIL: tunable	2-4 mc Driver	CL-10020
T202	COIL: tunable	4-8 mc Driver	CL-10021
T203	COIL: tunable	8-16 mc Driver	CL-10022
T204	COIL: tunable	2-4 mc Driver	CL-10020
T205	COIL: tunable	4-8 mc Driver	CL-10021
T206	COIL: tunable	8-16 mc Driver	CL-10022
T207	COIL: tunable tapped	16-32 mc Driver	CL-10011-2
T208	TRANSFORMER: RF, fixed, 16-32 Mc/s	PA Output	TF-10020
T209	TRANSFORMER: RF, (Part of A-10298)	PA Output	TF-10019
T210	TRANSFORMER: power (filament)	Power Transformer	TF-180

PARTS LIST MODEL RFA-1

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
V201	TUBE 6CL6	1st Amplifier	6CL6
V202	TUBE: driver, 6146	Driver	6146
V203	TUBE: PA, 4CX250B	Output Tube	4CX250B
V204	TUBE: PA, 4CX250B	Output Tube	4CX250B
XV201	SOCKET: tube, 9 pin	V201 Socket	TS-103-P01
XV202	SOCKET: tube, octal	V202 Socket	TS-101-P01
XV203	SOCKET: tube, Air System	V203 Socket	TS-132
XV204	SOCKET: tube, Air System	V204 Socket	TS-132

PARTS LIST MODEL PSP-350

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
C101	CAPACITOR: fixed, paper, round case, 4 mfd, 600 VDCW	L. V. Filter	CP41B1FF405K
C102	CAPACITOR: fixed, paper, round case, 4 mfd, 600 VDCW	L. V. Filter	CP41B1FF405K
C103	CAPACITOR: fixed, electrolytic	Bias Filter	CE63C500G
C104	CAPACITOR: fixed, paper	HV B+ Filter	CP70E1F1405K
C105	CAPACITOR: fixed, paper	HV B+ Filter	CP70E1F1405K
C106	CAPACITOR: fixed, paper	HV B+ Filter	CP70E1F1405K
C107	CAPACITOR: fixed	L. V. Decoupling	CN-100-22
C108	CAPACITOR: fixed bathtub	L. V. Decoupling	CP53B1EF205K
C109	CAPACITOR: fixed bathtub	Screen Supply Decoupling	CP53B1EF205K
C110	CAPACITOR: fixed, Electrolytic		CE-103-5
CB101	CIRCUIT BREAKER:	A. C. Main Power	SW- 298
CB102	CIRCUIT BREAKER: Overload H. V.	HV Overload	SW-215
CR101	DIODE: zener	Voltage Regulator	1N3006 RB
F101	FUSE: time lag, 1/2 amp., 230 V.	L. V. Fuse, A. C.	FU-102-.5
F101	FUSE: time lag , 1/2 amp., 230 V.	(Spare)	FU-102-.5
F101	FUSE: time lag, 1 amp. 110V.	L. V. Fuse, AC	FU-102-1
F101	FUSE: time lag, 1 amp. 110 V.	(Spare)	FU-102-1
F102	FUSE: cartridge 3/16 amp.	L. V. Fuse DC	FU-102- .187
F102	FUSE: cartridge 3/16 amp.	Spare	FU-102- .187
I101	LAMP: incandescent, 3 W. 120 V.	Main Line Ind.	BI-102-3
I102	LAMP: incandescent, 2 W. 120 V.	H. V. Inductor	BI-102-3
I103	LAMP: incandescent, 2 W. 120 V.	Overload Ind.	BI-102-3
I105	LAMP: Neon	TX on Inductor	BI-100-51
J101	RECEPTACLE: power	A. C. Power Inp.	JJ- 100
J102	CONNECTOR: receptacle, female	Interunit Power	JJ-158-S
K101	RELAY: thermostatic delay 9 pin miniature	Delay Relay	RL-111-6N060T
K102	RELAY: plate	Plate Relay	RL-114

PARTS LIST MODEL PSP-350

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
K104	RELAY: Interlock	Delay Circuit	RL-116-DC-3C-120
L101	REACTOR: filter, 15 henries	L. V. B+ Filter	TF-5000
L102	REACTOR: filter, 15 henries	L. V. B+ Filter	TF-5000
L103	REACTOR: filter, 7 henries	HV Filter Choke	TF-190
L104	REACTOR: filter, 7 henries	HV Filter Choke	TF-190
P102	CONNECTOR: plug, male		PL-160-P
P103	CONNECTOR: plug, female		PL-160-S
R101	RESISTOR: fixed, comp. 2200 ohm, 2w.		RC42GF222K
R102	RESISTOR: fixed, ww., 10K ohms, 10 watt		RW-109-34
R103	RESISTOR: fixed, composition, 100.000 ohm, +10%, 2W.		RC42GF104K
R104	RESISTOR: fixed, w.w., 45K ohm, 10 watt		RW-109-42
R105	RESISTOR: fixed, w.w., 80K ohm, 50 watt		RW-105-48
R106	RESISTOR: fixed, composition, 56 ohm, $\pm 10\%$, 2 watt.		RC42GF560K
R107	RESISTOR: fixed, w.w., 100K ohm, 20 watt		RW-110-43
R108	RESISTOR: fixed, composition, 470.000 ohm, $\pm 10\%$, 2 W.		RC42GF474K
R109	RESISTOR: fixed, composition, 20 Meg ohm, $\pm 5\%$, 2 W.		RC42GF206J
R110	RESISTOR: fixed, composition, 20 Meg ohm, $\pm 5\%$, 2 W.		RC42GF206J
R111	RESISTOR: fixed, composition, 20 Meg ohm, $\pm 5\%$, 2 W.		RC42GF206J
R112	RESISTOR: fixed, composition, 20 Meg ohm, $\pm 5\%$, 2 W.		RC42GF206J
R113	RESISTOR: fixed, composition, 20 Meg ohm, $\pm 5\%$, 2 W.		RC42GF206J
R114	RESISTOR: fixed, composition, 220.000 ohm, $\pm 10\%$, 2 W.		RC42GF224K

PARTS LIST MODEL PSP-350

SYMBOL	DESCRIPTION	FUNCTION	TMC PART NO.
R115	RESISTOR: fixed, w.w., 20 ohm, 5w.	Overload Circuit	RW-107-11
R116	RESISTOR: variable, wirewound, 25 watt, 100 ohms	Overload Adjust	RA75AXA101AK25
R117	RESISTOR: fixed, composition, 43 ohm, $\pm 5\%$, 2 watt	Biasing	RC42GF430J
R118	RESISTOR: 75 00 ohms, 20 watt, w.w.	Drupping	RW-10-32
R119	RESISTOR: Carbon, Fixed, 180K, 1/2 watt, $\pm 10\%$	I105 Limiter	RC20GF184K
S101	SWITCH:	Interlock	SW-219
S102	SWITCH:	Interlock	SW-219
S103	SWITCH: toggle	S/BI/Trans on Switch	ST-12A
T101	TRANSFORMER: power	L. V. Power Tr.	TF-181
T102	TRANSFORMER: power	H. V. Transformer	TF-189
V101	TUBE:	Rectifier	5R4GY
V102	TUBE:	Voltage Regulat.	OA2
V103	TUBE:	Rectifier	866
V104	TUBE:	Rectifier	866
V105	TUBE:	Voltage Reg.	OA2
V106	TUBE:	Voltage Reg.	OB2
V107	TUBE:	Voltage Reg.	OB2

DRIVER BAND SWITCH
S201-A, B

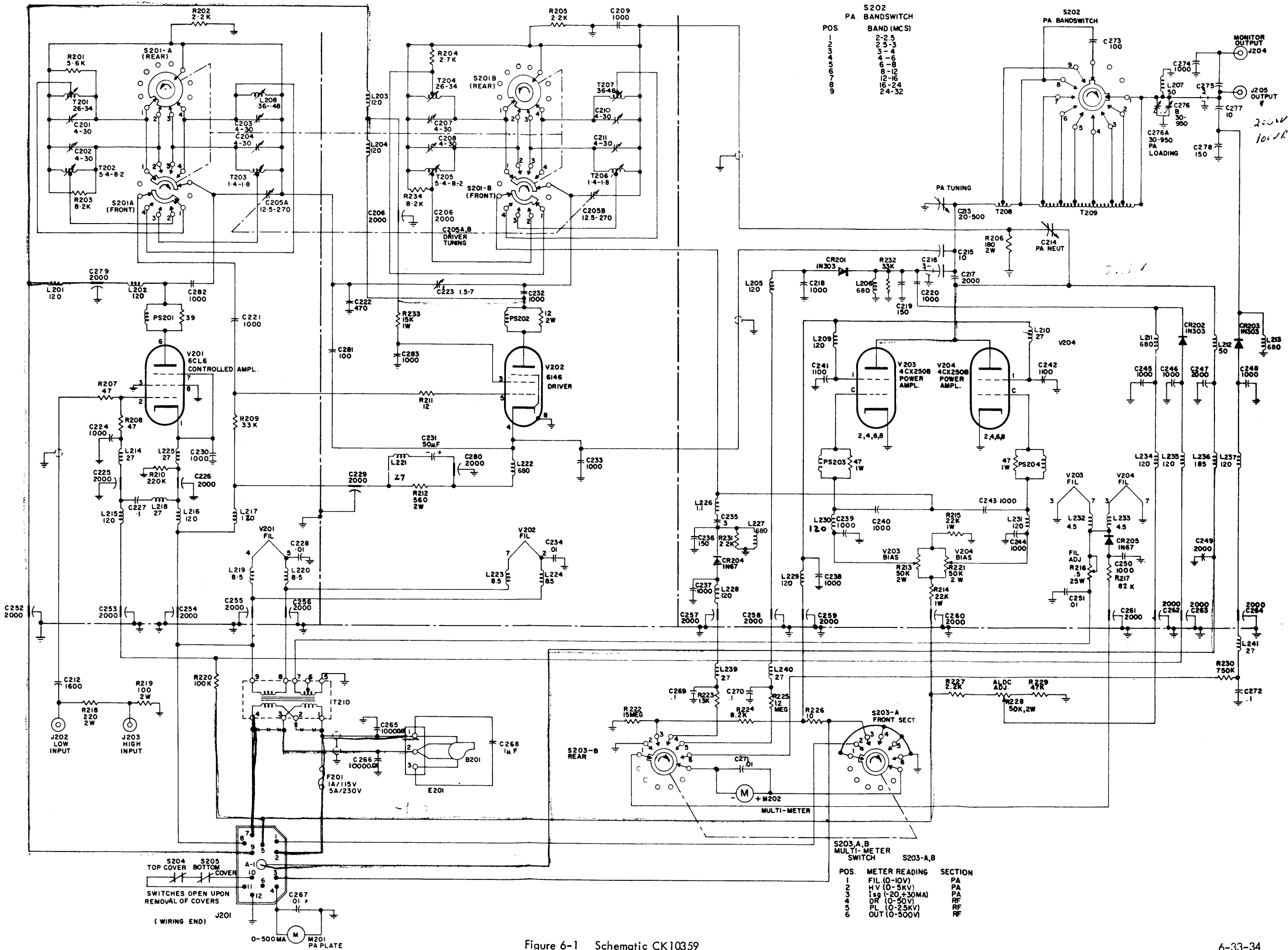
POS.	BAND (MCS)
1	2-4
2	4-8
3	8-16
4	16-32

S202 BANDSWITCH
PA BANDSWITCH

POS.	BAND (MCS)
1	2-2.5
2	2.5-3
3	3-4
4	4-6
5	6-8
6	8-12
7	12-16
8	16-24
9	24-32

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.
T201-REMOVE JUMPERS MARKED X-X-X
& CONNECT A JUMPER BETWEEN
TERMINALS 2&3.



S203, A, B
MULTI-METER
SWITCH

POS.	METER READING	SECTION
1	FIL (0-10V)	PA
2	HV (0-5KV)	PA
3	I _g (-20,+30MA)	PA
4	DR (0-50V)	RF
5	PL (0-2.5KV)	RF
6	OUT (0-500V)	RF

Figure 6-1 Schematic CK10359

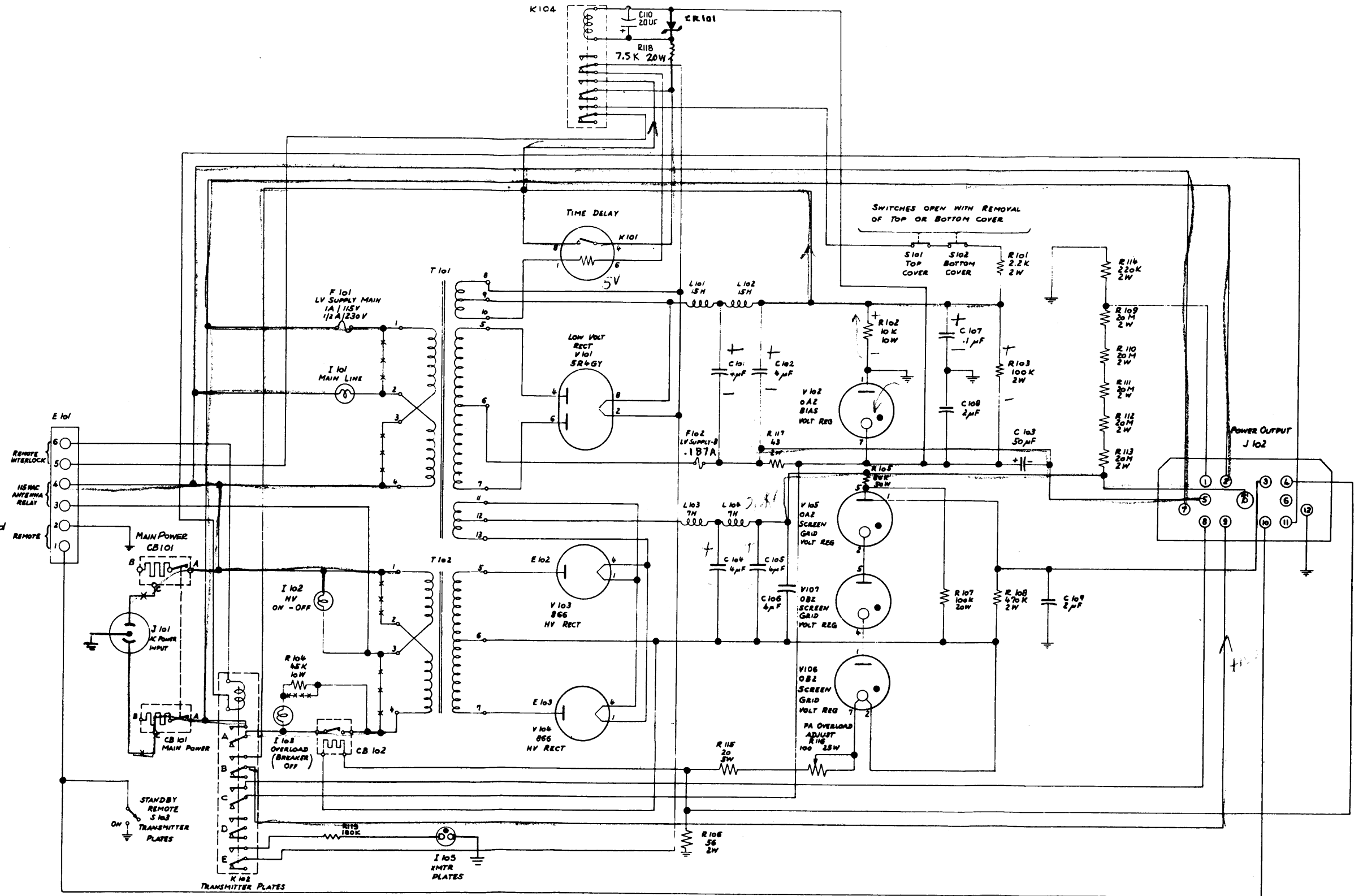
LAST SYMBOLS	MISSING SYMBOLS
CI10	I104
CB102	K103
E103	
F102	
I105	
J102	
K104	
R119	
T101	
V107	
S103	

CHANGES NECESSARY TO CONVERT TO
230 V OPERATION

- T101 Remove jumpers marked ~~XXXX~~ and connect jumper between terminals 2 and 3.
- T102 Same as T101.
- CB101 Remove lead from terminal "C" and connect it to terminal "B".
- R104 Remove and discard jumper marked ~~XXXX~~
- F101 Change from 1 amp. to 1/2 amp.
- F103 Change from 10 amp. to 5 amp.

Note:
1. All fuses are slow blow except F102
2. E101 #5 and 6 normally jumpered unless remote interlocking is required.

CK-697



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