

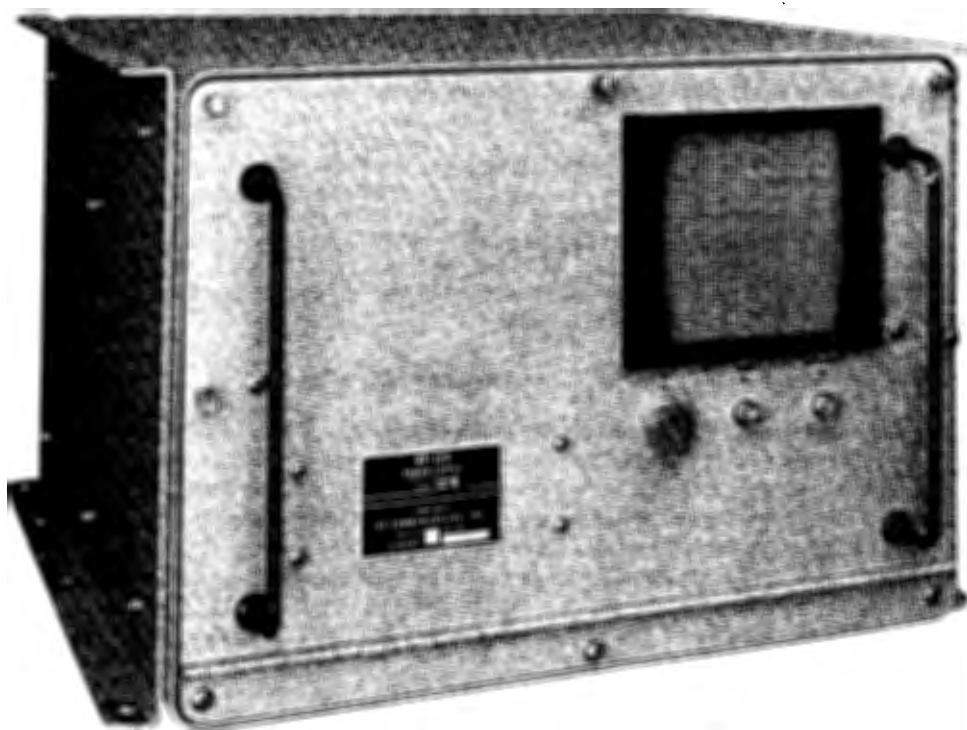
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**HARRIS**  
RF COMMUNICATIONS

# RF-124 POWER SUPPLY

## INSTRUCTION MANUAL





**LIMITED ONE YEAR WARRANTY  
HARRIS CORPORATION (RF COMMUNICATIONS GROUP)**

**FROM HARRIS TO YOU** – This warranty is extended to the original buyer and applies to all Harris Corporation, RF Communications Group equipment purchased and employed for the service normally intended, except those products specifically excluded.

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- Customers with equipment purchased for use outside the United States will be supplied with information for the return of the defective equipment or part to our factory in Rochester, NY, U.S.A., for repair or replacement. You must prepay all transportation, insurance, duty and customs charges. We will pay for return to you of the repaired/replaced equipment or part, C.I.F. destination; you must pay any duty, taxes or customs charges.
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Harris Corporation  
RF Communications Group  
Customer Service  
1680 University Avenue  
Rochester, NY 14610, U.S.A.

Telephone: (716) 244-5830  
Telex: 240313  
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**WHAT IS NOT COVERED** – We regret that we cannot be responsible for:

- Defects or failures caused by buyer or user abuse or misuse.
- Defects or failures caused by unauthorized attempts to repair or alter the equipment in any way.
- Consequential damages incurred by a buyer or user from any cause whatsoever, including, but not limited to transportation, non-Harris repair or service costs, downtime costs, costs for substituting equipment or loss of anticipated profits or revenue.
- The performance of the equipment when used in combination with equipment not purchased from Harris.
- **HARRIS MAKES NO OTHER WARRANTIES BEYOND THE EXPRESS WARRANTY AS CONTAINED HEREIN. ALL EXPRESS OR IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY ARE EXCLUDED.**

**SERVICE WARRANTY** – Any repair service performed by Harris under this limited warranty is warranted to be free from defects in material or workmanship for sixty days from date of repair. All terms and exclusions of this limited warranty apply to the service warranty.

**IMPORTANT** – Customers who purchased equipment for use in the United States must obtain a Return Authorization Number before shipping the defective equipment to us. Failure to obtain a Return Authorization Number before shipment may result in a delay in the repair/replacement and return of your equipment.

**IF YOU HAVE ANY QUESTIONS** – Concerning this warranty or equipment sales or services, please contact our Customer Service Department.

# RF-124 POWER SUPPLY

# INSTRUCTION MANUAL

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Equipment manufactured by Harris Corporation, RF Communications Group meets stringent quality and safety standards. However, high voltages are present in many radio products, and only a skilled technician should attempt to remove outer covers and make adjustments or repairs. All personnel who operate and maintain the equipment should be familiar with this page as a safety preparedness measure. Although this procedure is reproduced as a service to the personnel involved with this equipment, Harris Corporation assumes no liability regarding any injuries incurred during the operation and repair of such equipment, or the administration of this suggested procedure.

**ELECTRICAL SHOCK: EMERGENCY PROCEDURE**

The victim will appear unconscious and may not be breathing. If the victim is still in contact with the voltage source, disconnect the power source in a manner safe to you, or remove the victim from the source with an insulated aid (wooden pole or rope). Next, determine if the victim is breathing and has a pulse. If there is a pulse but no breathing, administer artificial respiration. If there is no pulse and no breathing, perform CPR (if you have been trained to do so). If you have not been trained to perform CPR, administer artificial respiration anyway. Never give fluids to an unconscious person.

**WHEN BREATHING STOPS**



**FIRST**, send someone to get a **DOCTOR**.  
**THEN**, administer first aid to restore breathing (artificial respiration):

**1 IF A VICTIM APPEARS TO BE UNCONSCIOUS**  
TAP VICTIM ON THE SHOULDER AND SHOUT, "ARE YOU OKAY?"



**2 IF THERE IS NO RESPONSE**  
TILT THE VICTIM'S HEAD, CHIN POINTING UP. Place one hand under the victim's neck and gently lift. At the same time, push with the other hand on the victim's forehead. This will move the tongue away from the back of the throat to open the airway.  
**IMMEDIATELY LOOK, LISTEN, AND FEEL FOR AIR.**  
While maintaining the backward head tilt position, place your cheek and ear close to the victim's mouth and nose. Look for the chest to rise and fall while you listen and feel for the return of air. Check for about five seconds.



**3 IF THE VICTIM IS NOT BREATHING**  
GIVE FOUR QUICK BREATHS.  
Maintain the backward head tilt, pinch the victim's nose with the hand that is on the victim's forehead to prevent leakage of air, open your mouth wide, take a deep breath, seal your mouth around the victim's mouth, and blow into the victim's mouth with four quick but full breaths just as fast as you can. When blowing, use only enough time between breaths to lift your head slightly for better inhalation.  
If you do not get an air exchange when you blow, it may help to reposition the head and try again.  
**AGAIN, LOOK, LISTEN, AND FEEL FOR AIR EXCHANGE.**



**4 IF THERE IS STILL NO BREATHING**  
CHANGE RATE TO ONE BREATH EVERY FIVE SECONDS.

For more information about these and other life-saving techniques, contact your Red Cross chapter for training  
"When Breathing Stops" reproduced with permission from an American Red Cross Poster

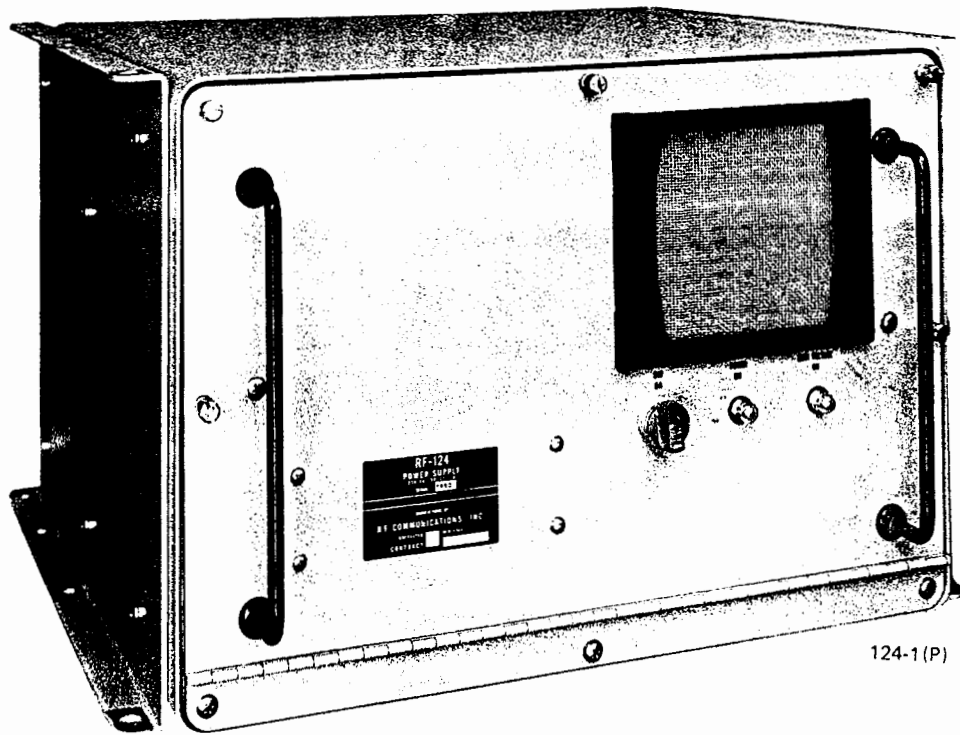
# RF-124

## POWER SUPPLY

# INSTRUCTION MANUAL

**WARNING**

LETHAL VOLTAGES ARE PRESENT WITHIN THE RF-124 DURING OPERATION. WHEN PERFORMING ANY MAINTENANCE OF THE EQUIPMENT, ENSURE THAT PRIMARY POWER IS TURNED OFF AND SECURED AT THE SOURCE.



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RF-124 Power Supply

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SPECIFICATIONS

Input Power	242 Vac ( $\pm 10\%$ ), 4500 W, 50/60 Hz ( $\pm 5\%$ ), single-phase, 18.6 A or 230 Vac ( $\pm 10\%$ ), 4500 W, 50/60 Hz ( $\pm 5\%$ ), single-phase, 19.5 A or 218 Vac, ( $\pm 10\%$ ), 4500 W, 50/60 Hz ( $\pm 5\%$ ), single-phase, 20.6 A or 208 Vac ( $\pm 10\%$ ), 4500 W, 50/60 Hz ( $\pm 5\%$ ), single-phase, 21.6 A
Output Power	115 Vac, 400 Hz, single-phase, square wave, 70 watts 115 Vac, 60 Hz, single-phase, 185 A +500 Vdc at 0.9 A +2250 Vdc at 1.2 A or +1600 Vdc at 0.85 A
Size	17-3/8 in (44.13 cm) W x 19 in (48.26 cm) D x 12-1/4 in (31.12 cm) H
Weight	200 pounds (90.72 kg); shipping weight is approximately 250 lbs (113.4 kg)
Temperature Range	0°C to 50°C (32 to 122°F)
Shock	10g's maximum for 1 ms

## ABOUT THIS MANUAL

This manual provides comprehensive user information for the RF-124 Power Supply and includes detailed installation and interface information. The manual is divided into four sections. Section 1, General Information, provides general unit level descriptive information. Section 2, Installation, shows all mounting options and primary power setup details for the unit. Section 3, Functional Description, discusses all significant operating and control features. These discussions permit logical analysis of each feature. Section 4, Maintenance, addresses all routine maintenance requirements and features. Parts lists, component location diagrams, and complete schematic information are included at the end of the manual.

SECTION 1

GENERAL INFORMATION

1.1 GENERAL DESCRIPTION

This manual provides complete user information for the RF-124 Power Supply, figure 1-1. The RF-124 was designed and manufactured by Harris Corporation, RF Communications Group, 1680 University Avenue, Rochester, New York, 14610, USA.

Primary power to the RF-124 is controlled through the RF-110A Power Amplifier. The RF-124 Power Supply provides the following output voltages:

- +2250 Vdc @ 1.2 A or +1600 Vdc @ 0.85 A (for final amplifier plates)
- +500 Vdc @ 0.9 A (for final amplifier screens, driver plates, and screens)
- 115 Vac, 50/60 Hz, 185 W (for band change motor and external requirements)
- 115 Vac, 400 Hz, 70 W (for blower and time meter motors)

The RF-124 produces these output voltages to satisfy the power requirements of the RF-110A. The RF-124 is rated for continuous duty operation.

All general unit level details are given in the table of specifications in the front of this manual. The unit can be rack or stack mounted. The RF-124 is normally configured for its intended application when shipped from the factory.

1.2 EQUIPMENT SUPPLIED

Table 1-1 lists the equipment supplied with the RF-124. Table 1-2 lists the contents of the RF-124 Ancillary Kit.

Table 1-1. Equipment Supplied

Item	Part Number
Power Supply RF-124	825-0124 (230 Vac Unit)
Power Supply Assembly	8913-0001
RF-124 Instruction Manual	8913-0003
Stack Mounting Kit	825-1124
Interconnect Cable (W3)	399-0027
Ancillary Kit	825-6224

Table 1-2. RF-124 Power Supply Ancillary Kit, Part No. 825-6224 (Contents)

Qty.	Description	Part Number
5	Fuse, 32 V, 8 A, Slow-Blow	F02B32V8AS
5	Fuse, 1.5 A, 2500 V	10075-0016
1	Connector, Male	10043-0074
1	Cable Clamp	J08-0002-243
1	Ground Strap (13 in/33 cm)	391-0021-3
-	Ground Strap Hardware	----
1	Screw, Pan Head, No. 10	MS51958-63
1	Flat Washer, No. 10	MS15795-808
1	Split Washer, No. 10	MS35338-138

### 1.3 ANCILLARY AND OPTIONAL EQUIPMENT

Table 1-3 lists the ancillary and optional equipment available for use with the RF-124.

Table 1-3. Ancillary and Optional Equipment Available for use with the RF-124

Equipment	Description
RF-115 Shock Mount Kit	The RF-115 is designed to provide vibration and shock isolation for the RF-130 system, or for any of its individual components in a stack mount configuration.
Running Spares Kit (RSK)	Contains operator-replaceable items. Refer to paragraph 1.4.1.
Site Spares Kit (SSK)	Contains comprehensive maintenance repair parts. Refer to paragraph 1.4.2.

### 1.4 SPARE PARTS KITS

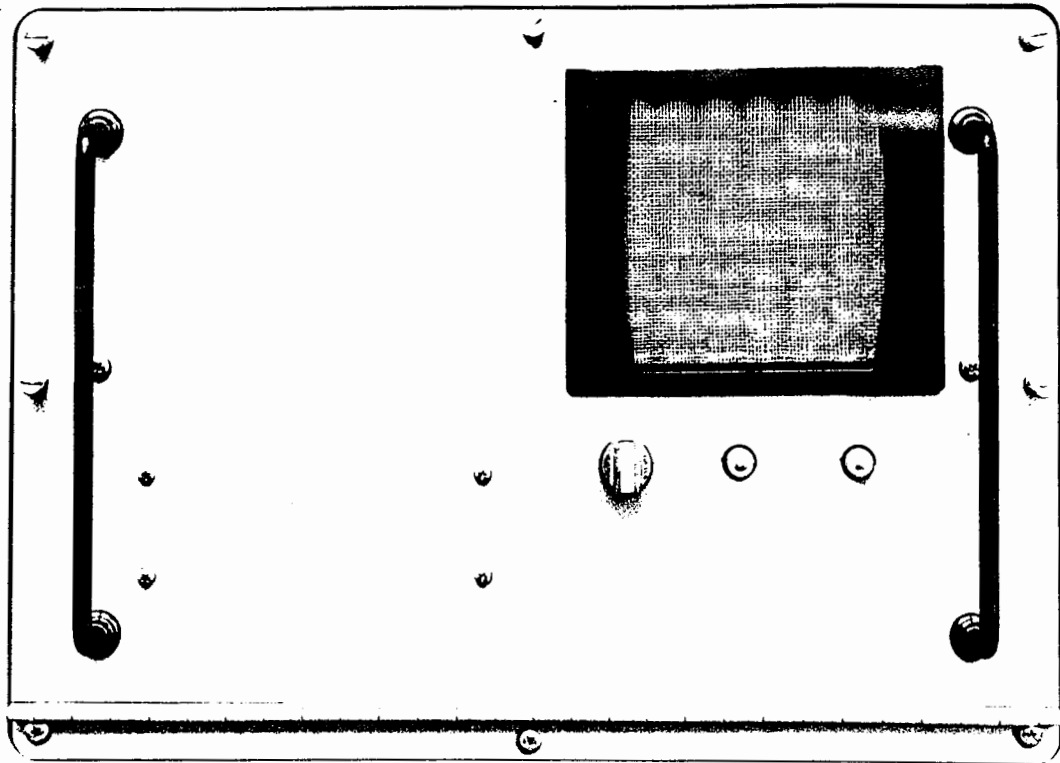
As listed in table 1-3, these are two spare parts kits available for the RF-124. A brief description of each kit follows.

#### 1.4.1 Running Spares Kit (RSK), RF-124/RSK, Part No. 1001-0151

This kit contains items readily replaced in field operation by the operator, including those which are used during equipment installation and setup. The typical complement of parts includes fuses, lamps, etc. Each RSK will generally support a single equipment for two to four years.

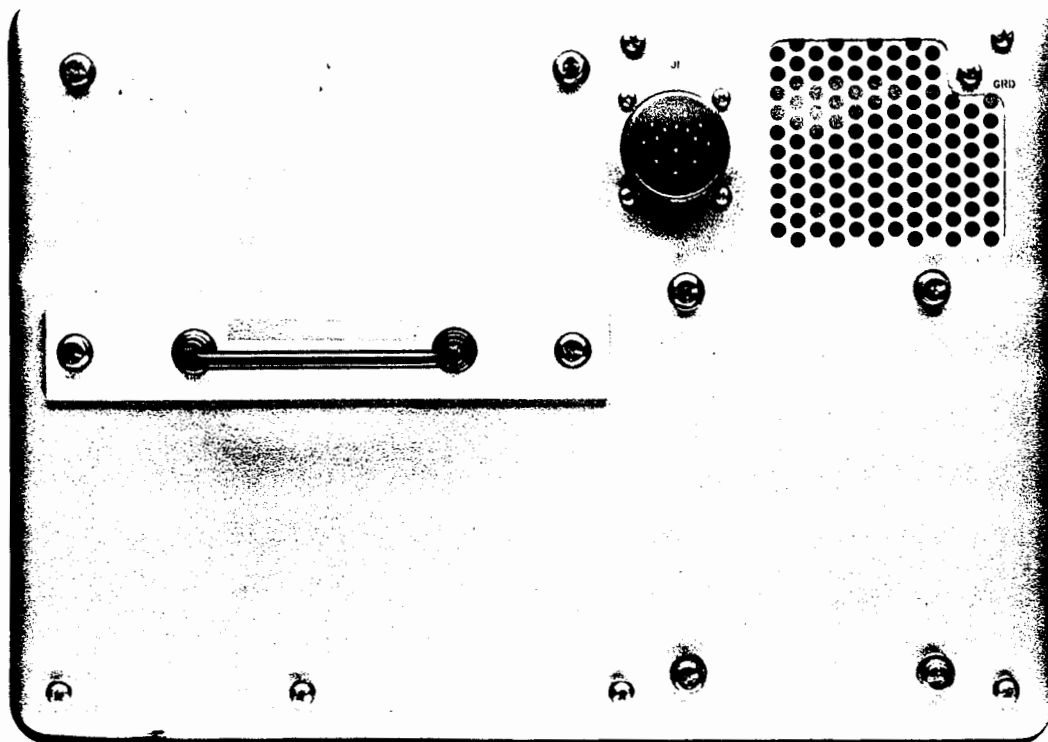
#### 1.4.2 Site Spares Kit (SSK), RF-124/SSK, Part No. 1001-0006

Site spares are those items which allow the equipment to be repaired at the highest practical level of assembly to minimize down time or off-the-air time. This type of kit includes a



124-2(P)

FRONT VIEW



124-3(P)

REAR VIEW

Figure 1-1. RF-124 Power Supply, Front and Rear View

complete set of assemblies or subassemblies (if applicable); piece parts for those items which are impractical to repair by assembly replacement, including chassis and front panel parts; and a common hardware kit. With very little test equipment and some common tools, a technician should be able to replace one of these parts if they fail. Each SSK will generally support up to five pieces of equipment for a period of two to four years.

## SECTION 2 INSTALLATION

### 2.1 GENERAL

The RF-124 is a systems-oriented power supply, frequently shipped as a component of a larger system. In systems applications (or where the intended use is known), the RF-124 is shipped with all appropriate cables prefabricated and tested at the voltage required. If purchased or delivered separately, the interconnect cable must be fabricated to the appropriate length using the connector supplied. The installer must verify that the appropriate power connections have been made at TBI.

It is not necessary to change any fuses in the RF-124 with line voltage changes. The primary power input lines are all fused at the associated RF-110A Power Amplifier. Inspection of the packing list against the received shipment is recommended. The following paragraphs address most installation considerations.

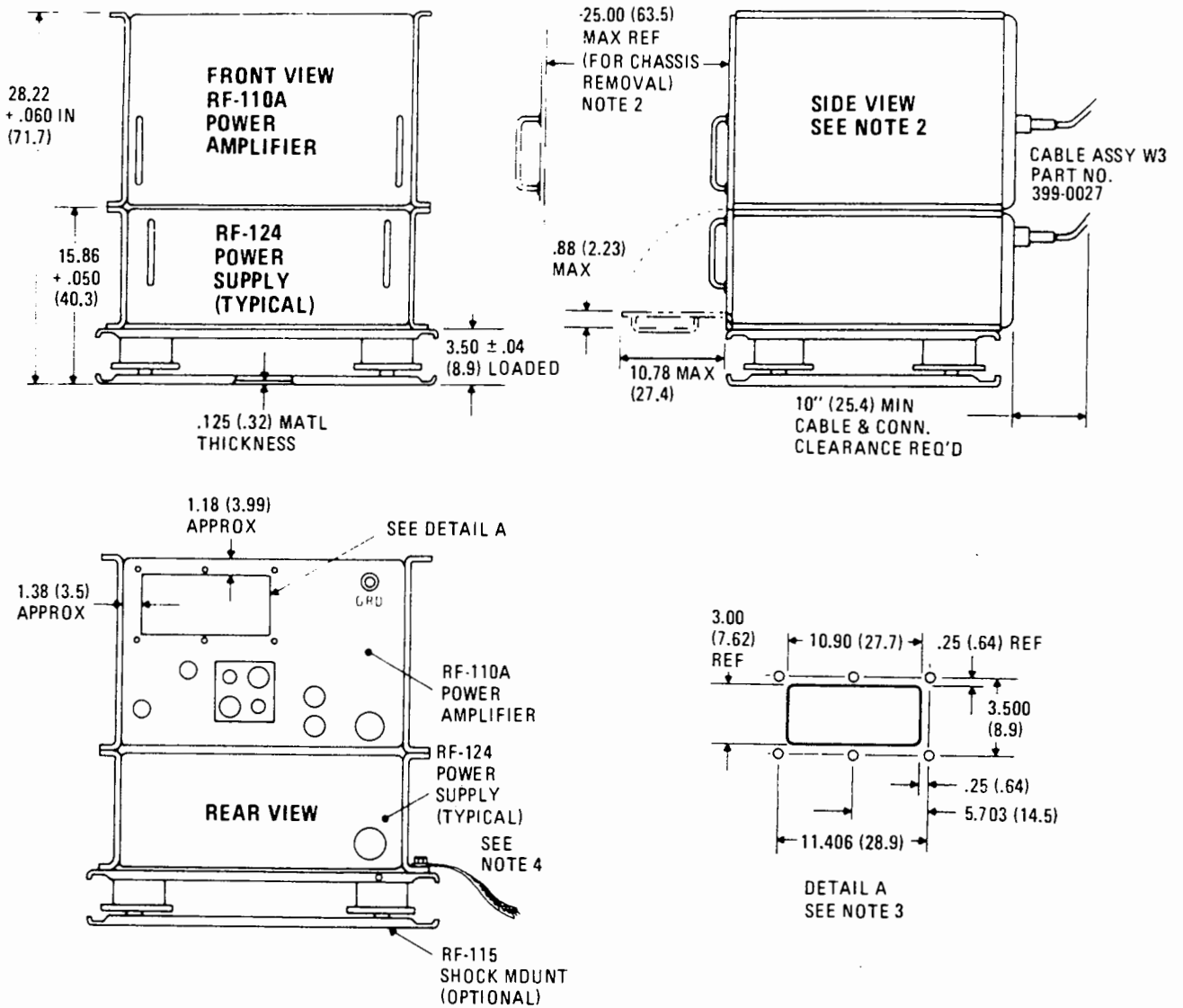
If problems occur, contact our Customer Service Department as shown in the WARRANTY at the front of this manual.

### 2.2 MOUNTING

The RF-124 can be rack or stack mounted. Stack mounting brackets are supplied with each order. The RF-115 Shock Mount Kit is designed for use in stack mounted system installations that will be subjected to shock or vibration. The RF-115 will support the RF-124 and also the loading of other vertical components of an associated system. Rack and stack mounting details are given in figures 2-1 and 2-2. Figure 2-1 gives complete dimensional details and shows a typical stack mount installation. Figure 2-2 gives similar details for rack mount configurations. The special rack mounting bracket shown will fit a MIL-STD-188 Type 19-inch rack. This bracket provides front and rear support for the RF-124.

### 2.3 PRIMARY POWER AND SYSTEM INTERFACE CONNECTIONS

All primary power to the RF-124 enters the unit through the single J1 system interface connector at the rear of the RF-124. In standard applications, primary power is controlled and fused at the RF-110A Power Amplifier. Maximum input power loading in these applications is approximately 4500 watts. Figure 2-3 gives the connector pin letter/function correlation. See table 2-1 for wire size detail. This cable is supplied when the RF-124 is purchased as part of a system, and is available, prefabricated, as part number 399-0027.



NOTES:

1. ALL DIMENSIONS ARE IN INCHES, PARENTHETICAL DIMENSIONS ARE IN CENTIMETERS.
2. DIMENSIONS SHOWN ON SIDE VIEW INDICATE CLEARANCE NECESSARY TO REMOVE CHASSIS FROM THEIR RESPECTIVE CASES. CLEARANCE FOR WITHDRAWAL AND TILTING OF CHASSIS IS WITHIN THESE LIMITS.
3. DETAIL A REPRESENTS SIX NO. 6-32 TAPPED HOLES TO FACILITATE MOUNTING OF EXHAUST AIR REMOVAL DUCT IF REQUIRED. DEPTH OF SCREW PENETRATION .100 INCH MAXIMUM. FLOW RATE OF EXHAUST AIR FROM RF-110A IS 140 FT<sup>3</sup>/MIN. EXTERIOR EXHAUST DUCT SHALL HAVE INLET PRESSURE NO GREATER THAN ATMOSPHERIC AT 140 FT<sup>3</sup>/MIN (4 M<sup>2</sup>/MIN).
4. EQUIPMENT CASES ARE BONDED TOGETHER THROUGH THE SIDE MOUNTING BRACKETS. CLEAN SURFACES BEFORE ASSEMBLY AND KEEP HARDWARE TIGHT. THE SYSTEM SHOULD BE GROUNDED TO THE NEAREST GOOD GROUND USING A SHORT, WIDE COPPER GROUND STRAP AS SHOWN.

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Figure 2-1. RF-124/RF-110A Outline and Mounting Information (Sheet 1 of 2)



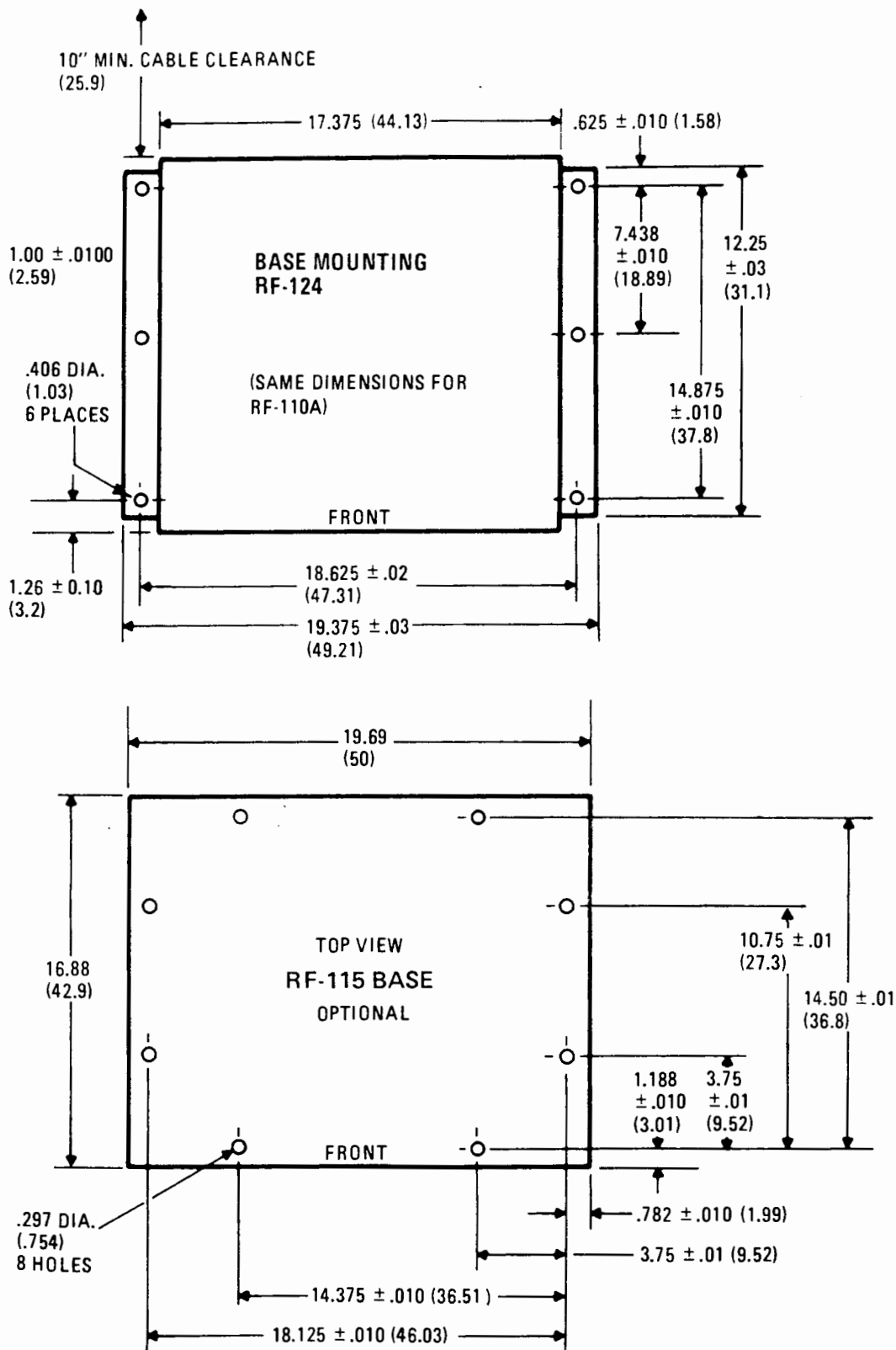
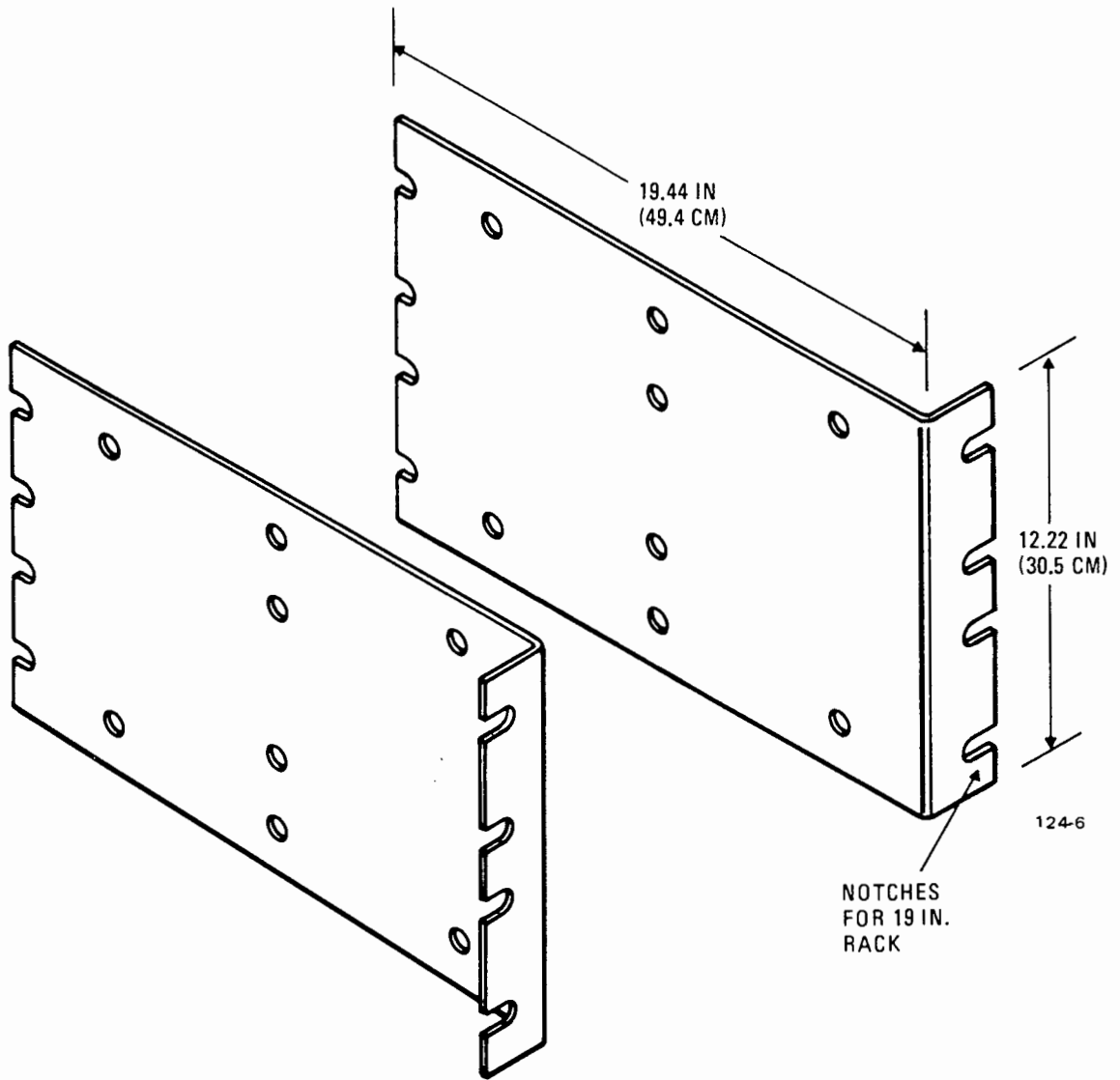


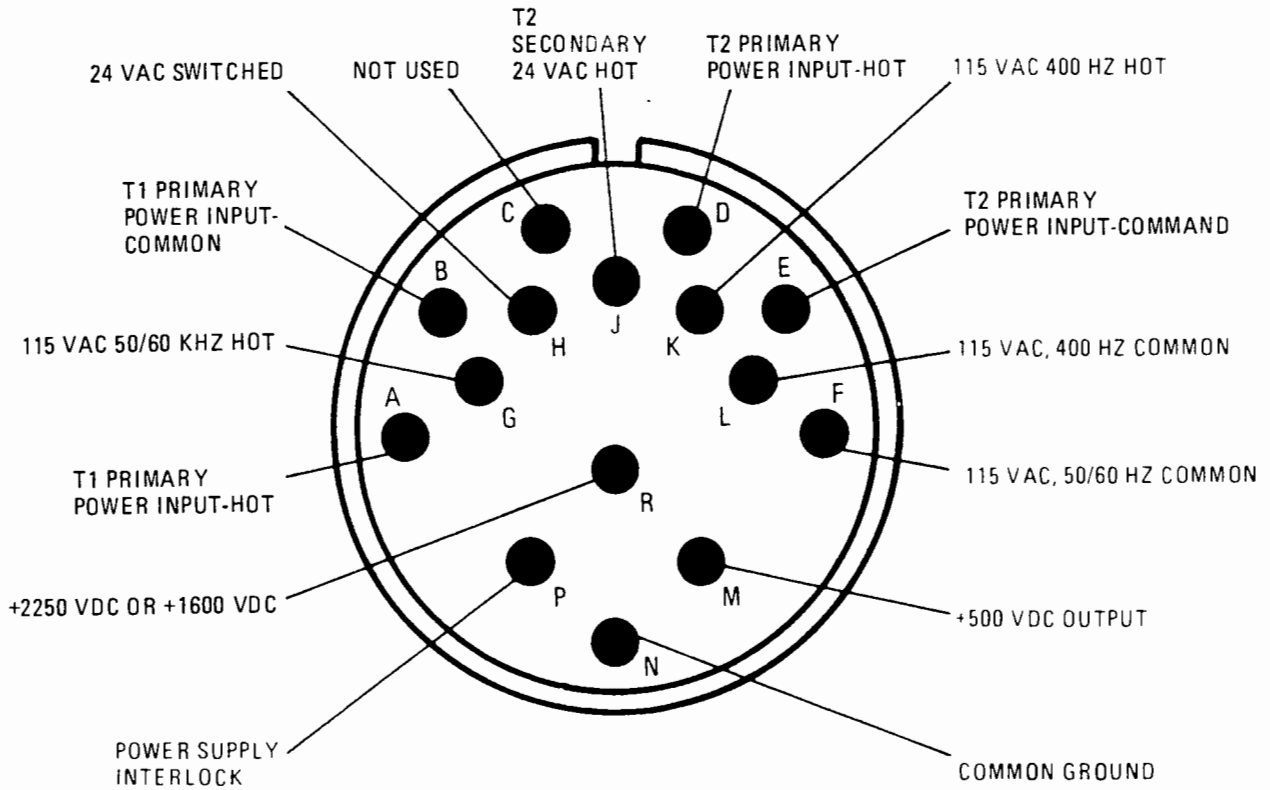
Figure 2-1. RF-124/RF-110A Outline and Mounting Information (Sheet 2 of 2)

124-5



NOTE: THESE BRACKETS MAY BE USED WITH A RACK 25 INCHES (63 CM) OR MORE IN DEPTH.

Figure 2-2. RF-124 Rack Mounting Brackets, Part No. 0292-002, Details



NOTE: THIS CONNECTOR IS SUPPLIED WITH THE RF-124 ANCILLARY KIT

124-7

Figure 2-3: Cable Connector, Part No. 10043-0074,  
Pin/Function Correlation

Table 2-1. RF-124 Connector 2A2J1  
Pin Number/Function Correlation

2A2J1 Pin No.	Function	Remarks	Suggested Wire Size
A	Phase A T1 Primary Power Input - Hot	Delivers Primary Phase A to T1 of RF-124.	14
B	Phase B T1 Primary Power Input - Common	Delivers Primary Power Phase B to T1 of RF-124.	14
C	Not Used -Phase C Primary Power Input	Not Used.	

Table 2-1. RF-124 Connector 2A2J1  
Pin Number/Function Correlation (Cont.)

2A2J1 Pin No.	Function	Remarks	Suggested Wire Size
D	T2 Primary Power Input - Hot	Used by RF-124 to develop blower power and 115 Vac for auxiliary equipment.	22
E	T2 Primary Power Input - Common	Used by RF-124 to develop blower power and 115 Vac for auxiliary equipment.	22
F	115 Vac 50/60 Hz Common	115 Vac from RF-124 for auxiliary equipment and bandswitch motor.	22
G	115 Vac 50/60 Hz Hot	115 Vac from RF-124 for auxiliary equipment and bandswitch motor.	22
H	24 Vac Switched	Jumpering J1-H to J1-J activates RF-112A inverter which provides RF-110A blower power. This is accomplished by the RF-110A standby relay. Inverter creates 115 Vac, 400 Hz at J1-K and J1-L.	22
J	24 V Hot - T2 Secondary	Jumpering J1-H to J1-J activates RF-124 inverter which provides RF-110A blower power. This is accomplished by the RF-110A standby relay. Inverter creates 115 Vac, 400 Hz at J1-K and J1-L.	22
K	115 Vac, 400 Hz Hot	From inverter in RF-124 to blower and time meter in RF-110A.	22
L	115 Vac, 400 Hz Common	From inverter in RF-124 to blower and time meter in RF-110A.	22
M	+500 Vdc	Driver plate and screen voltage from RF-124.	22
N	Common Ground	High voltage ground return.	22

Table 2-1. RF-124 Connector 2A2J1 Pin Number/Function Correlation (Cont.)

2A2J1 Pin No.	Function	Remarks	Suggested Wire Size
P	Power Supply Interlock	Goes to ground via RF-124 panel interlock switch and thermal switch.	22
R	+2250 Vdc or +1600 Vdc	RF-110A tube plate voltage from RF-124.	18

**NOTE**

Cable Assembly W3, Part Number 399-0027, pre-fabricated for use between the RF-124 and RF-110A, is available.

**2.4 PRIMARY VOLTAGE CHANGEOVER CONNECTION**

To make primary voltage changeover connections, follow the appropriate procedure shown in figure 2-4.

**2.5 GROUNDING**

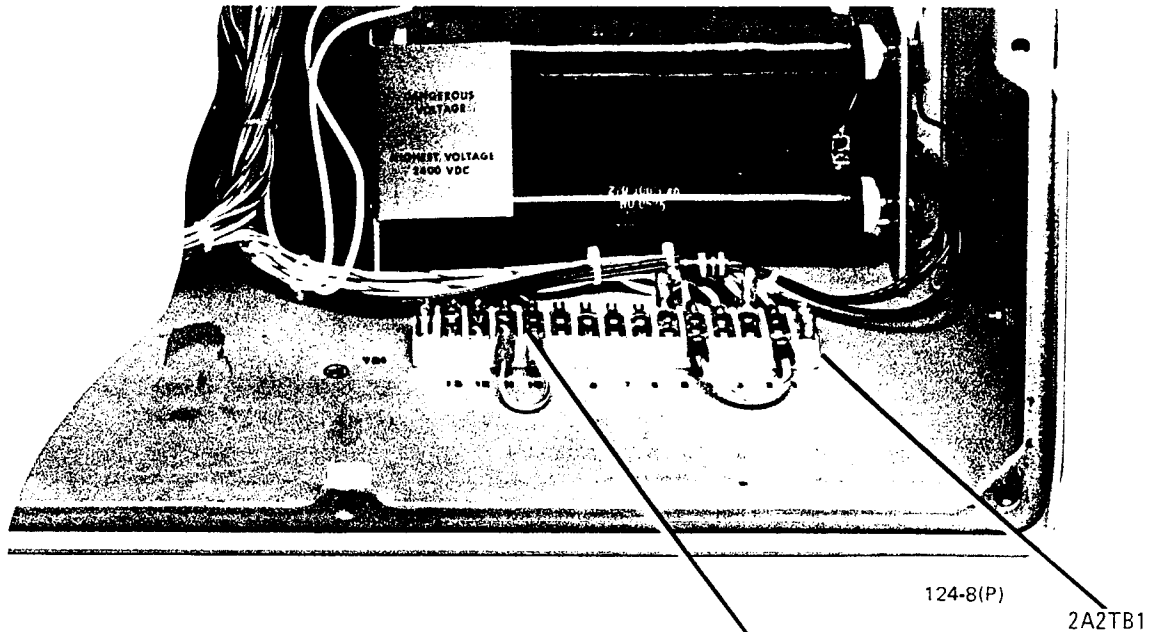
The RF-124 must be grounded to ensure that all system elements are at this same reference, and to a physical ground that brings the input power (and all other conductive material that might be simultaneously contacted) to the same neutral potential. In shipboard installations, the ship's hull normally provides an excellent ground system. In nonshipboard installations, especially in environments involving other electronic devices, it may be advisable to bond all equipment together to create a common ground using ground stakes. Figure 2-1 shows the ground bonding point on the RF-124. (Hole shown is a 10-32 threaded hole.)

**2.6 VENTING**

Exhaust vent air from the RF-124 cooling fan is only a few degrees warmer than the inlet air and does not require ducting, for most applications. If ducting is required, refer to Note 3 of figure 2-1.

**2.7 SYSTEMS APPLICATIONS**

For systems applications, see the appropriate system manual, and the RF-110A Instruction Manual.



**WARNING**

ALWAYS REMOVE PRIMARY POWER AT THE SOURCE AND USE A SHORTING STICK TO VERIFY THAT NO LETHAL VOLTAGES ARE PRESENT BEFORE MAKING CONTACT WITH ANY POWER SUPPLY COMPONENTS

2A2T1 PRIMARY VOLTAGE DESIRED	CONNECT LEADS BETWEEN 2A2T1-1 AND 2A2TB1-	2A2T2 PRIMARY VOLTAGE DESIRED	CONNECT LEADS BETWEEN 2A2T2- COMMON AND 2A2TB1-
242 VAC	3	242 VAC	13
230 VAC	4	230 VAC	12
218 VAC	1	218 VAC	11
208 VAC	5	208 VAC	9

NOTE

WHEN THE PRIMARY VOLTAGE IS CHANGED, VERIFY CORRESPONDING FUSE CHANGES ARE ALSO MADE AT THE RF-110A (SEE 1932-0005 MANUAL)

Figure 2-4. Primary Voltage Connection Details

## SECTION 3

### FUNCTIONAL DESCRIPTION

#### 3.1 GENERAL

A functional description that includes the source and control inputs and output utilization is given in figures 4-3 and 4-4 at the end of this manual. The RF-124 is shown in the center of the figure, with all significant inputs at the left and outputs at the right. All inputs and outputs are via the single, rear-panel, multi-pin connector J1.

All outputs are developed from the primary power input that is fused (F 1, F 2, F 3) and switched at the operate relay contacts in the RF-110A. All three phases are used in the RF-124 to develop the plate and screen voltages (+2250 Vdc and +500 Vdc) for the RF-110A. However, the two 115 Vac outputs (400 Hz for the blowers, and 50/60 Hz for general purposes) use only the phase A and B lines for input power.

#### 3.2 CIRCUIT DETAILS

Setting the RF-110A Primary Power Switch at ON applies switched primary power to pins D and E of A2J1 on the RF-124 (figure 4-3). The switched power is then routed through interlock switches S2 and S3 to the appropriate terminals of terminal board A2TB1 to the primary of A2T2. Transformer A2T2 has two 60-Hz outputs: 115 V and 22.5 V. The 115-V output is applied through the interconnecting cabling to the RF-110A. The 24-Vac output is applied to the 115 Vac, 400 Hz, inverter circuitry. (If the RF-110A is being used, one side of the 24-Vac line is switched by standby relay 1A1K2 in that unit, prior to being applied to the inverter circuitry.)

The RF-110A time elapsed meter and blower require 115 Vac, 400 Hz, single-phase power for operation. This power is developed whenever the system is placed in standby. The 24-Vac output from the RF-124 is applied to the standby relay at the time of initial turn-on. This 24 Vac is applied through RF-110A standby relay 1A1K2, terminal board 1A1TB2, jumper strip 1A1P5, and the interconnecting cabling to the full wave rectifier bridge in the RF-124, 400-Hz inverter. The 115 V, 400 Hz inverter output is applied to the RF-110A blower and time elapsed meter.

Upon first application of switched primary power to the system, an initial delay of three minutes will be encountered for RF-110A warmup. Following this period, the delayed power will be present when the RF-110A is put in an operate mode, if the following conditions are satisfied:

- RF-110A fan is operating (air vane interlock in the RF-110A).
- The temperature of the chassis of the RF-124 does not exceed 85°C.
- The high voltage interlock in the RF-110A is closed.

The two secondaries of A2T1 develop voltages which are full-wave rectified, supplying +2250 Vdc or +1600 Vdc to pin R of A2J1 and +500 Vdc (filtered) to pin M of A2J1. The HIGH VOLTAGE indicator will light when +500 Vdc is present.

### 3.3 60-HZ HIGH VOLTAGE POWER SUPPLY

The 60-Hz high voltage power supply (figure 4-3) consists of a transformer, diode blocks, and various other parts. The function of this circuit is to produce the +2250 Vdc and +500 Vdc required by the four electron tubes in the driver and final amplifier stages of the RF-110A.

When the system is placed in an operate condition, primary power is applied to pins A and B of connector A2J1. From there, it is routed through terminal board A2TB1 to the primary windings of transformer A2T1. The output from secondary winding X3-X4 is full wave rectified by diode stack CR3 to produce +500 Vdc. This +500 Vdc is filtered by capacitor A2C2, and applied to pin M of connector A2J1. (The 500 Vdc is used as plate voltage for the two electron tubes in the RF-110A driver amplifier. It is also used as input to the screen regulator to provide screen voltage for all four final and driver amplifier electron tubes.)

The output from secondary winding X1-X2 or X1-X5 is full wave rectified by diode stacks CR1 and CR2 to produce a +2250 Vdc or +1600 Vdc output, respectively. The +2250 Vdc or +1600 Vdc is filtered by A1C1 and applied to pin R of connector A2J1. (The +2250 Vdc or +1600 Vdc is used as plate voltage for the two electron tubes in the final amplifier of the RF-110A.)

### 3.4 115 VAC, 400 HZ INVERTER CIRCUITRY

The 400-Hz source is utilized by an RF-110A cooling fan. Refer to figure 4-3. Fan speed and source frequency are directly proportional, therefore, a 400-Hz source allows a 6.6-fold increase in rpm over a 60-Hz source, and an eight-fold increase in rpm over a 50-Hz source. Accordingly, fan effectiveness is superior at 400-Hz operation.

#### NOTE

In the following description, "current" means conventional current, which is the flow of the positive charge. The flow of negatively-charged electrons will be along the same path, but in the opposite direction.

When the RF-110A Primary Power Switch is positioned to ON, pins J and H of A2J1 are electrically connected through the RF-110A standby relay. This connection applies 24 Vac through fuse A1F1 to the full wave bridge rectifiers consisting of CR4 through CR7. This rectified voltage is filtered by C1 and C2 and applied to the center tap of the primary winding of transformer T1.

Oscillations in the primary circuit of T1 begin as resistor R9 allows transistor Q1 to conduct, first. This allows current to flow through T1-3, -4 (from T1-3, through T1, out T1-4, through Q1, to ground). The inductance of T1 causes a current to also flow through T1-5, -4 (from T1-5, through T1, out T1-4, through Q1, and return through R3-R5), increasing Q1 conductance. (A similar, but reversed current through T1-2, 1 is blocked by, and biases off, Q2.) The positive feedback to Q1 allows the current through T1-3, -4 to continue increasing (for about 1.25 ms) until T1 saturates. As T1 becomes saturated, the inductively caused current through T1-5, 4 (and Q1-E, B) is greatly reduced, decreasing Q1 conductance. This reduces the current through T1-3, -4. This reduction causes, through inductance, the current through T1-5, -4 to try to reverse. This causes Q1 to stop conducting. As Q1 is turning off inductance also causes current to flow at T1-1, -2. Q2 will start to conduct, allowing current to flow through T1-3, -2. Positive feedback holds Q2 on (and Q1 off) and allows current to



increase through T1-3, -2 (again for about 1.25 ms) until T1 again saturates, causing the current to again reverse. This turns Q2 off and Q1 on, for the start of another cycle. The switching action continues at a rate of about 400 Hz, as determined mainly by the characteristics of T1 and the value of the supply voltage.

Resistors R3-R5, R6-R8 limit the base current in Q1 and Q2 to the correct value.

R1, R2, and C3 reduce transient voltage spikes, to protect Q1 and Q2.

The peak voltage from the emitter of either transistor to ground is approximately twice the supply voltage, or 50 V.

The oscillations generated in the primary circuit of T1 are coupled by transformer action to the T1 secondary. This supplies 115 Vac, 400 Hz through A2J1-L and -K to the RF-110A.



## SECTION 4 MAINTENANCE

### 4.1 GENERAL

Periodic cleaning and checking of output voltages (depending upon usage and operating conditions) is required to maintain the RF-124. Output voltages varying more than  $\pm 20\%$  of the nominal value would indicate impending component failure. Locating and replacing the faulty component before total failure is recommended. Any accumulation of dirt or corrosion should be removed when the RF-124 is opened. Any signs of excessive heat buildup in any part of the RF-124 should immediately be investigated to find and eliminate the cause. Use water and a small amount of soap or liquid detergent to clean the air filter. Dry thoroughly before replacing.

#### WARNING

Lethal voltages are present within the RF-124 during operation. When performing any maintenance procedure, ensure that primary power is turned off and secured at the source.

#### CAUTION

Use only rosin-core solder. Never use acid-core solder or paste flux.

### 4.2 DISASSEMBLY

To swing down the front panel, loosen the five screws located around the top and side edges of the front panel. The front panel will then swing out on its hinge. Removal of the front panel requires detaching the wires of the cable coming up from the case-mounted components, then removing the three screws located along the bottom of the front panel.

To remove the chassis cover on the front panel, loosen three screws, slide the cover out, and set aside.

#### NOTE

When removing any component, carefully set aside the hardware in the order of removal to avoid confusion during reassembly.

### 4.3 TROUBLESHOOTING

When troubleshooting, use a systematic approach to isolate the malfunction to a faulty circuit. Carefully check operating procedures to eliminate the possibility of operator error.

Read paragraphs 3.1 through 3.4 of this manual to develop an understanding of circuit functions.

If the system will not energize, verify that:

- Primary power has been applied
- There are no blown fuses (RF-110A fuses F1, F2, or F3)
- RF-110A interlock switches 1A1S10 and 1A1S11 are aligned properly
- RF-124 interlock switches, 2A2S2 and 2A2S3, are aligned properly

If the system will not go into the operate mode, verify that RF-124 thermal and mechanical interlock switches 2A1S1 and 2A2S3 are operating properly. Also, verify that RF-110A air vane switch 1A1S1 and high voltage interlock switch 1A1S9 are operating properly.

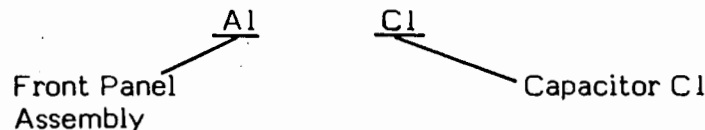
If no 115 Vac, 400 Hz power is present, RF-124 fuse F1 may be open.

#### 4.4 PARTS IDENTIFICATION

Figure 4-1 illustrates component locations on the front panel assembly (designated A1). Figure 4-2 illustrates component locations on the case assembly (designated A2).

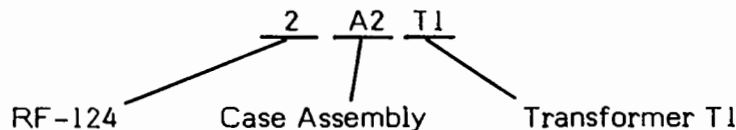
The RF-124 parts list (table 4-1) is organized with the major assembly designation followed by the part designation.

Example:



In those cases where the RF-124 is part of a system, the RF-124 is identified as equipment 2. This number appears first in the parts description thereby allowing system identification of all parts.

Example:



When ordering parts from the factory, include unit type, serial number, reference designation, part number, and description as presented in the parts list.

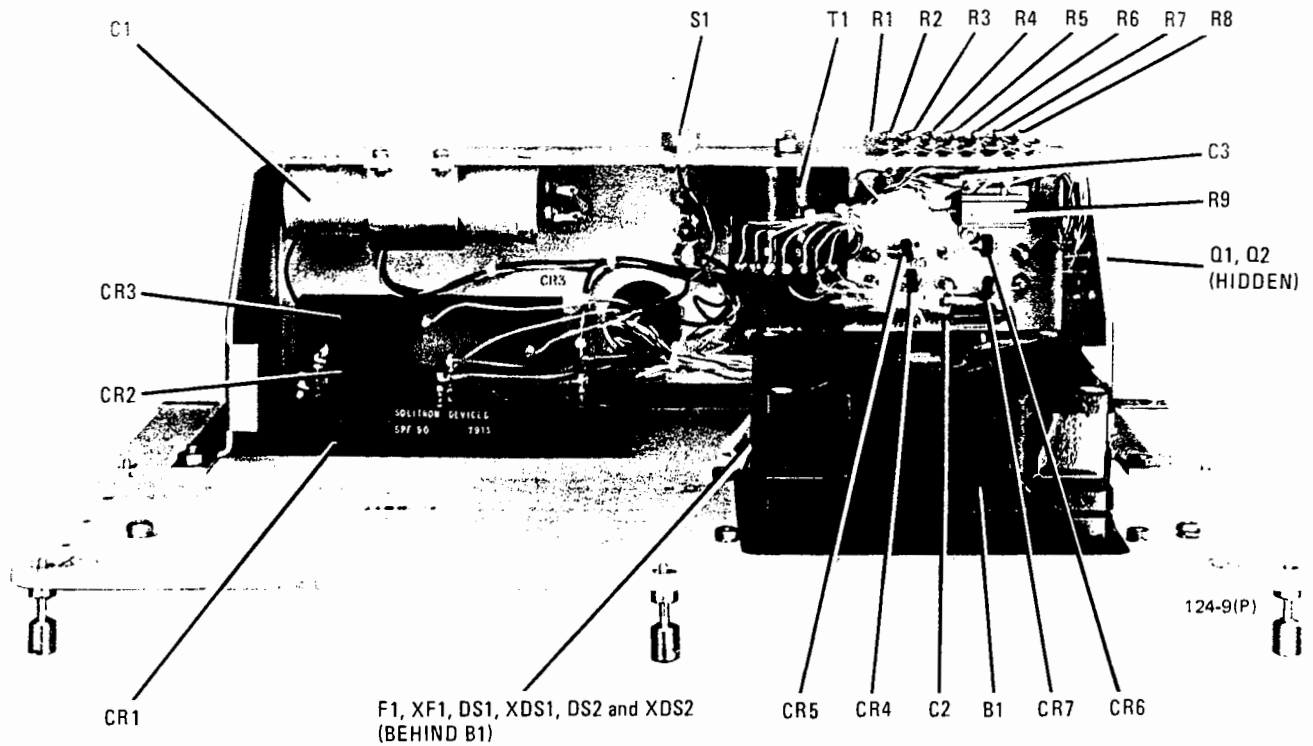


Figure 4-1. Front Panel Assembly A1, Component Locations

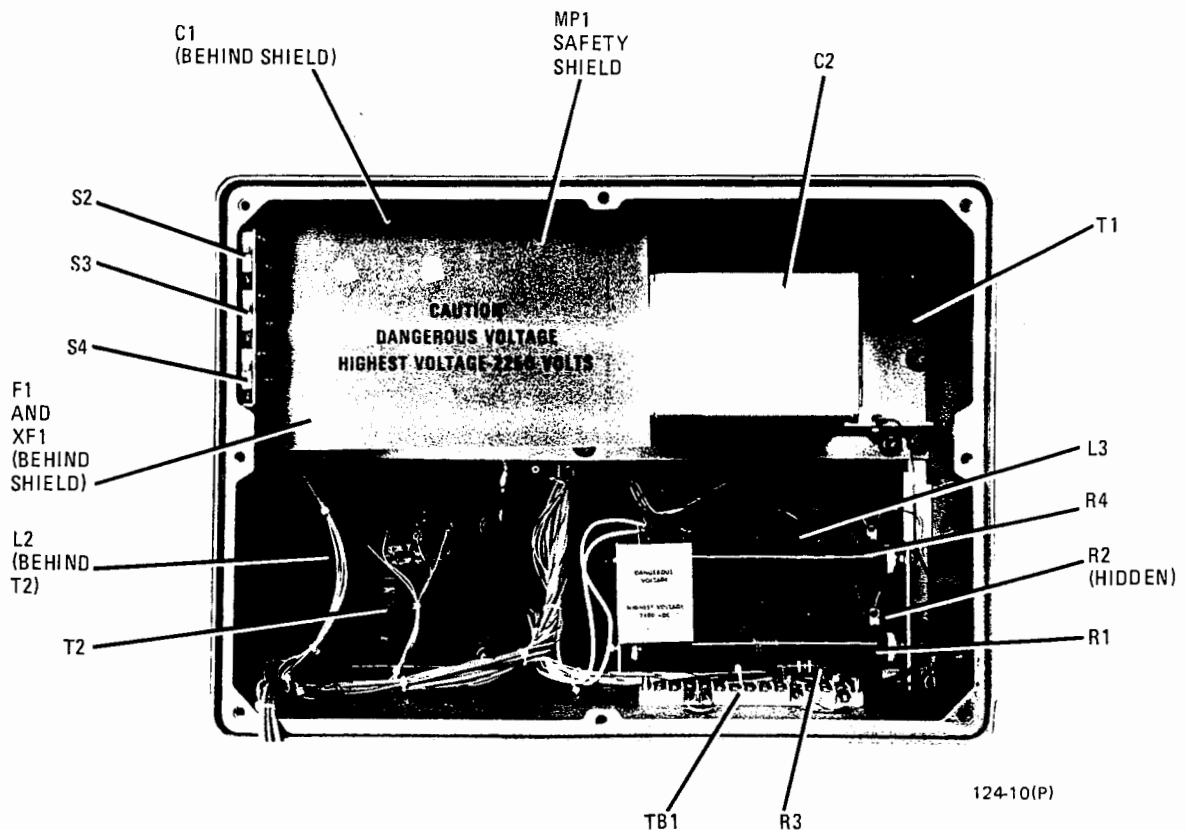


Figure 4-2. Case Assembly A2, Component Locations

Table 4-1. RF-124 Power Supply Parts List

Ref. Desig.	Part No.	Description
A1	825-0124	RF-124 Power Supply
A1B1	8913-0010	Front Panel Assembly
A1C1, A1C2	B22-0006-001	Fan and Filter Assembly
	CE71C142G	Capacitor, Fixed, Electrolytic, 1400 uF, 50 WVdc
A1C3	CL33BN0R4MNE	Capacitor, Fixed, Electrolytic, 0.4 uF, 20%, 100 WVdc
A1CR1, A1CR2	10075-0721	Rectifier Block, Single-Phase, Full Wave
A1CR3	10079-0720	Rectifier Block, Single-Phase, Full Wave
A1CR4 - A1CR7	CR-0407	Diode, 6A, 100 V-PIV
A1DS1, A1DS2	MS25252-C7A	Lamp, Neon
A1F1	F02B32V8A	Fuse, Cartridge, 32 V, 8A, Slow-Blow
A1Q1, A1Q2	2N5884	Transistor, PNP
A1R1, A1R2	RCR42G330JM	Resistor, Fixed, Composition, 33 ohms, $\pm 10\%$ , 2 W
A1R3 - A1R8	RCR42G100JM	Resistor, Fixed, Composition, 10 ohms, $\pm 10\%$ , 2 W
A1R9	RER50G1210M	Resistor, Fixed, Composition, 120 ohms, $\pm 1\%$ , 15 W
A1S1	S70-0002-000	Switch, Thermal
A1T1	391-8405	Transformer, Torroid
A1XDS1, A1XDS2	LM74/1-LC13CN2	Socket, Lamp
A1XF1	FHL1862-2	Fuseholder
A2	8913-0020	Case Assembly
A2C1	8913-0052	Capacitor, Fixed, Plastic, 25 uF 4 kV
A2C2	8913-0051	Capacitor, Fixed, Plastic, 30 uF, 1 kV
A2F1	10075-0016	Fuse, Cartridge, 1.5 A
A2J1	MS3102R28-17P	Connector
A2L1		Not Used
A2L2	1975-0055	Choke, Swing, 0.35 - 45 H
A2L3	8913-0054	Choke, Smoothing, 1 H
A2MP1	8913-0023	Shield, Plastic, High Voltage, for A2C1
A2R1	10075-0723	Resistor, Fixed, Wirewound, 100K, 100 W
A2R2	F431	Resistor, Fixed, Wirewound, 25K, 40 W
A2R3	RC42GF 104JM	Resistor, Fixed, Composition, 100K, $\pm 10\%$ , 2 W
A2R4	10075-0723	Resistor, Fixed, Wirewound, 100K, 100 W

Table 4-1. RF-112A Power Supply Parts List (Cont.)

Ref. Desig.	Part No.	Description
A2S1 A2S2 - A2S4 A2T1	MS16106-4 1975-0056	Not Used Switch, Interlock Transformer, Power, 230 Vac Primary, 2500 Vac and 575 Vac dual Secondary
A2T2	8913-0057	Transformer, Power, 230 Vac Primary, 115 Vac and 24 Vac Secondary
A2TB1 A2XF1	37TB13/TBLS 4529	Terminal Board Fuseholder

Example: To order 2A2T1

Unit:	RF-124
Serial Number:	0123
Reference Designation:	A2T1
Part Number:	1975-0056

#### 4.5 SCHEMATIC DIAGRAM

Figure 4-3 is the schematic diagram of the RF-124 Power Supply.

#### 4.6 INTEGRATED SYSTEM POWER SUPPLY CONTROL DIAGRAM

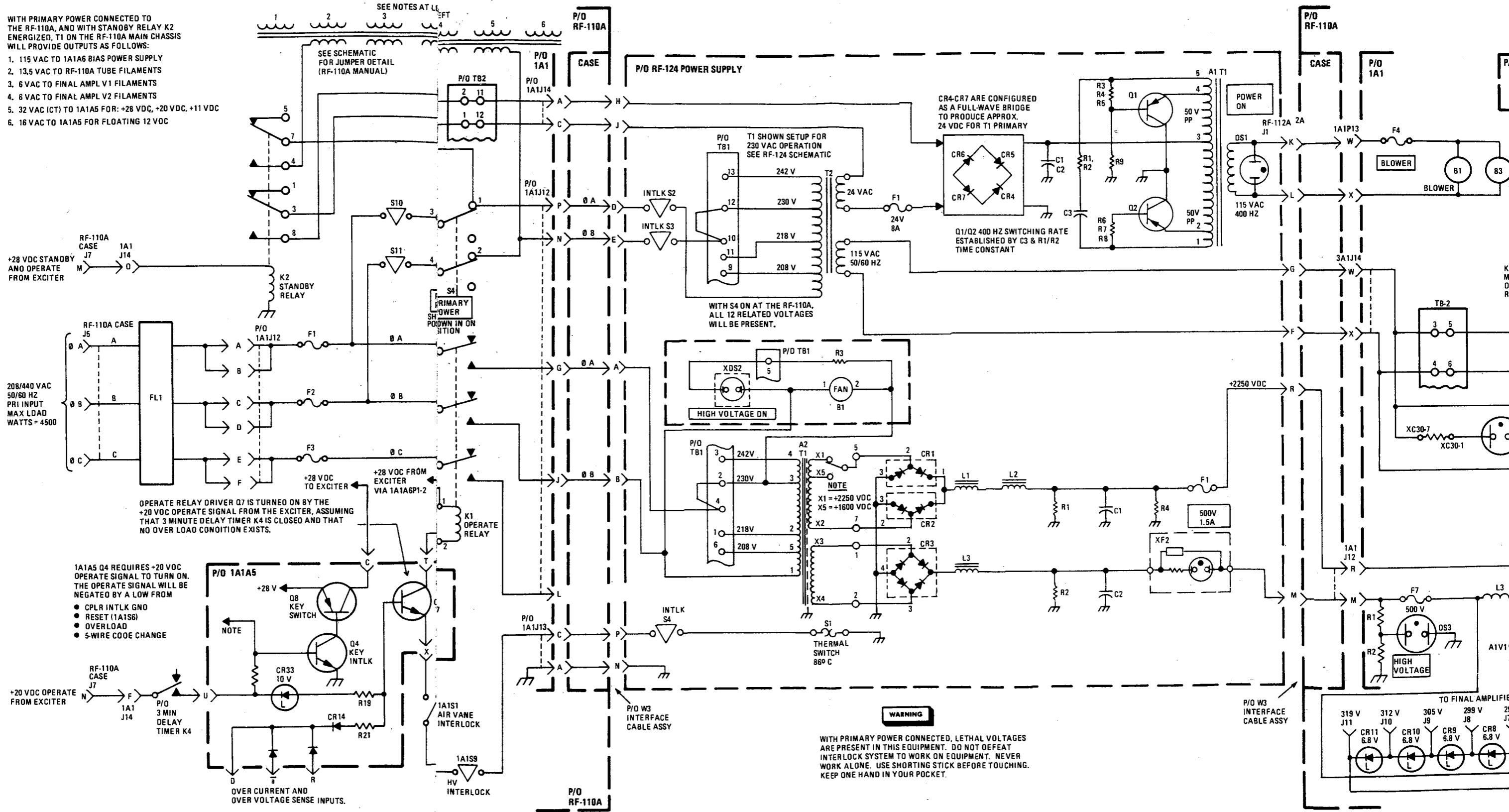
Figure 4-4 is an integrated power supply control diagram that indicates the operational relationships between the RF-124 and the RF-110A Power Amplifier. The illustration is presented here for quick-look reference, and is explained in detail in the RF-110A technical manual.





WITH PRIMARY POWER CONNECTED TO THE RF-110A, AND WITH STANDBY RELAY K2 ENERGIZED, T1 ON THE RF-110A MAIN CHASSIS WILL PROVIDE OUTPUTS AS FOLLOWS:

1. 115 VAC TO 1A1A6 BIAS POWER SUPPLY
2. 13.5 VAC TO RF-110A TUBE FILAMENTS
3. 6 VAC TO FINAL AMPL V1 FILAMENTS
4. 6 VAC TO FINAL AMPL V2 FILAMENTS
5. 32 VAC (CT) TO 1A1A5 FOR: +28 VDC, +20 VDC, +11 VDC
6. 16 VAC TO 1A1A5 FOR FLOATING 12 VDC

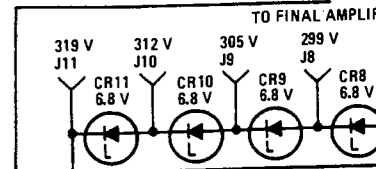


OPERATE RELAY DRIVER Q7 IS TURNED ON BY THE +20 VDC OPERATE SIGNAL FROM THE EXCITER, ASSUMING THAT 3 MINUTE DELAY TIMER K4 IS CLOSED AND THAT NO OVER LOAD CONDITION EXISTS.

1A1A5 Q4 REQUIRES +20 VDC OPERATE SIGNAL TO TURN ON. THE OPERATE SIGNAL WILL BE NEGATED BY A LOW FROM

- CPLR INTLK GND
- RESET (1A1S6)
- OVERLOAD
- 5-WIRE CODE CHANGE

**WARNING**  
WITH PRIMARY POWER CONNECTED, LETHAL VOLTAGES ARE PRESENT IN THIS EQUIPMENT. DO NOT DEFEAT INTERLOCK SYSTEM TO WORK ON EQUIPMENT. NEVER WORK ALONE. USE SHORTING STICK BEFORE TOUCHING. KEEP ONE HAND IN YOUR POCKET.



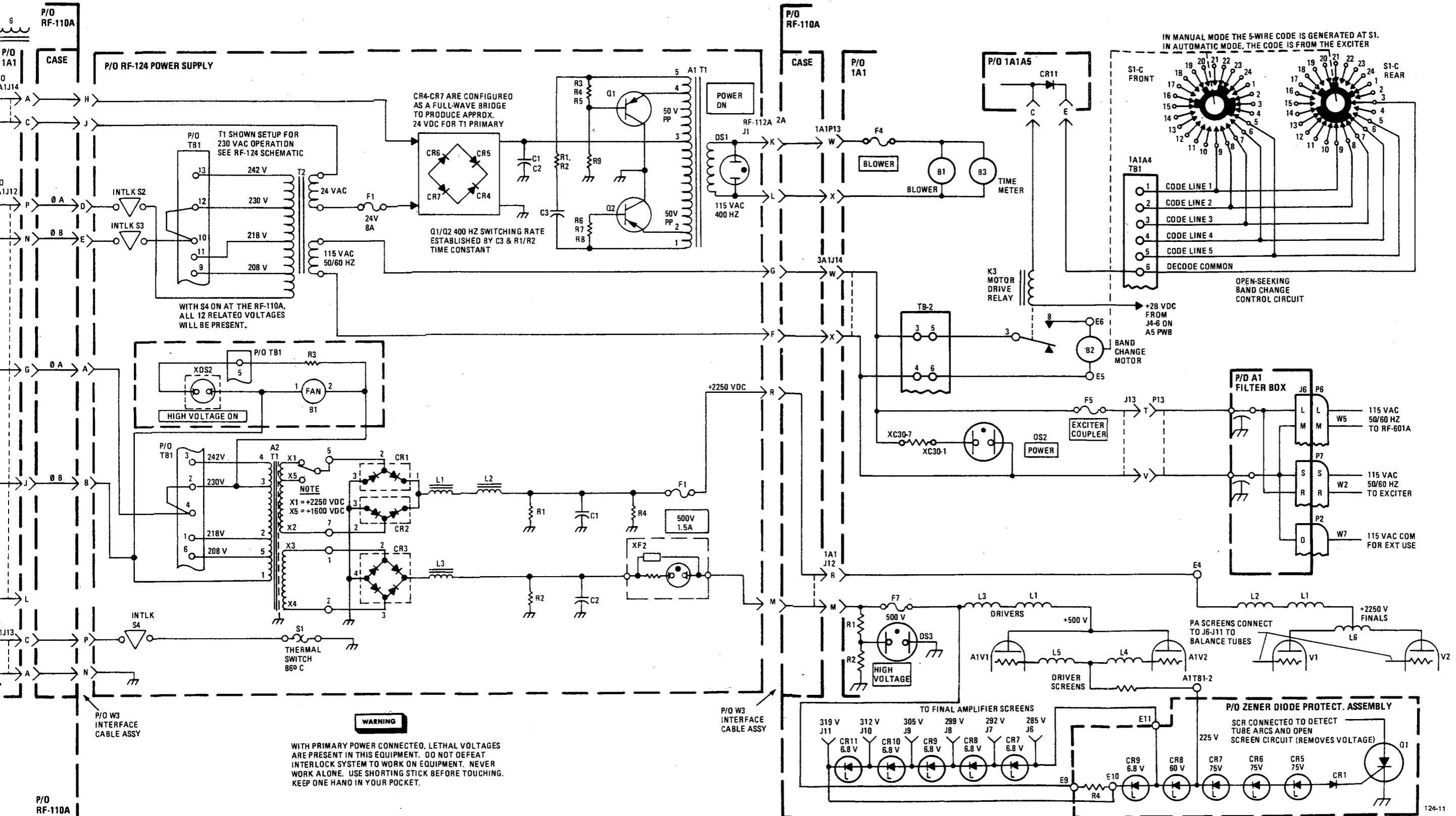
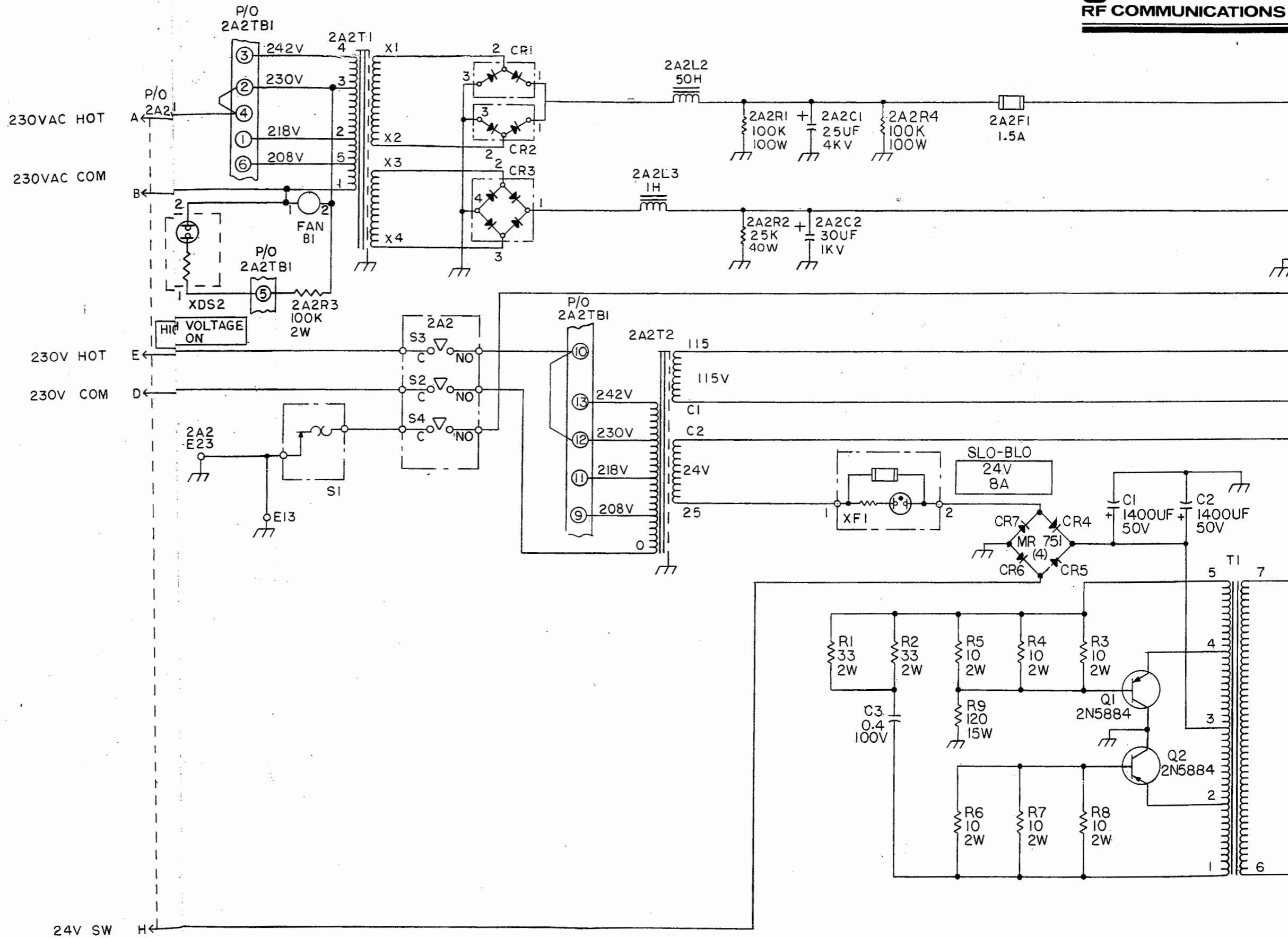


Figure 4-4. Simplified RF-124 Integrated Control Diagram

NOTES:

1. PREFIX INCOMPLETE REF DESIGNATIONS WITH 2A1.
2. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE IN OHMS, 1/2W, 10%.
3.  INDICATES FRONT PANEL MARKINGS.



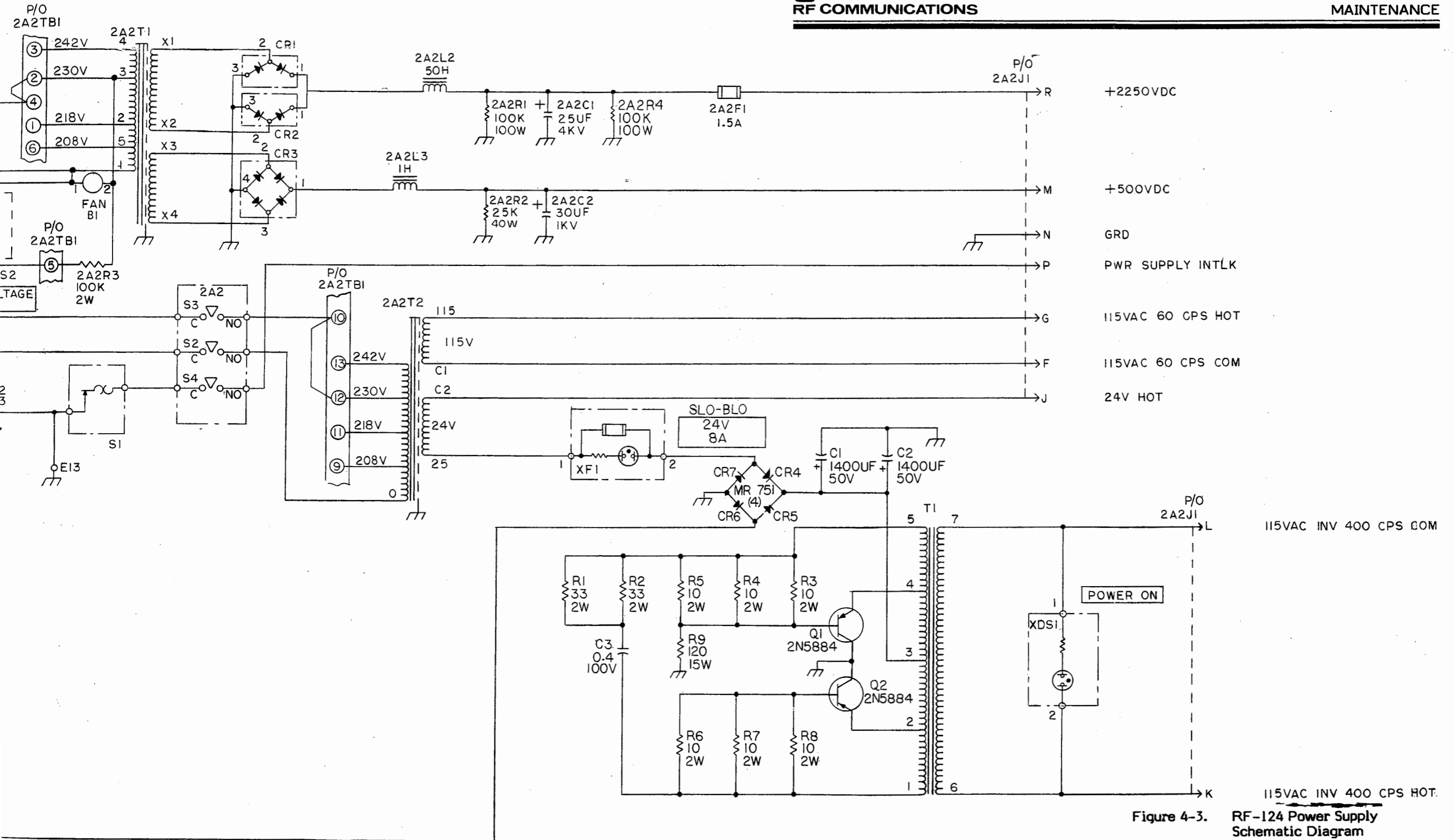


Figure 4-3. RF-124 Power Supply Schematic Diagram (8913-0011, Rev. E)

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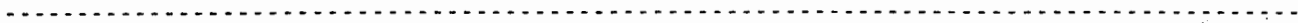
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