

INSTRUCTION MANUAL
FOR
RF POWER AMPLIFIER
COMTECH PST CORP.
MODEL NO. AR1929-100
Part Number 15P13444-01, 15P13444-02,
15P13444-03 and 15P13444-04

STD
M1T9A00

COMTECH PST
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PROPRIETARY NOTICE

This document contains information, data, specification, drawings and photographs which are proprietary and confidential in nature and neither the document or said proprietary information shall be disclosed, reproduced, copied, or documented in whole or in part without the express written permission of Comtech PST Corporation.

FOREWORD

This instruction manual has been prepared specifically for support of the RF Power Amplifier, Model No. AR1929-100, part number 15P13444-01, -02, -03 and -04 manufactured by Comtech PST Corporation. The different dash numbers (-01, -02, -03, or-04) reflect panel mounting of RF input and output connectors and different prime input AC power requirements. Part number 15P13444-01 and 15P13444-02 have front panel mounted RF connectors. Power amplifier part number 15P13444-03 and 15P13444-04 have rear panel mounted RF connectors. Part number 15P13444-01 and -03 require 100 to 120 VAC, while 15P13444-02 and -04 operate from 200 to 240 VAC. The instruction manual contains the information necessary for operation and maintenance at the equipment site and is composed of the following six sections:

- Section I. Description and Technical Data.** This section of the manual contains information of a general nature, such as purpose, equipment supplied, general description, electrical and mechanical specifications and connector interface data.
- Section II. Installation.** This section of the manual contains the information necessary for installation, such as unpacking and inspection, power amplifier installation and pre-operation testing.
- Section III. Operation.** This section of the manual contains required operating instructions for the modes of operation. Illustrations of the equipment panels showing the operating controls, indicators and connectors, together with tables listing their functions, are also included.
- Section IV. Theory of Operation.** This section of the manual contains information necessary for understanding the theory of operation. Functional block diagram descriptions are provided.
- Section V. Maintenance.** This section of the manual contains information necessary for on-site maintenance. Preventive maintenance schedules, performance tests, removal and replacement instructions and troubleshooting information is contained in this chapter. In addition, cleaning and inspection instructions are provided where required.
- Section VI. Spare and Replacement Parts List.** This section of the manual contains the equipment parts list and information necessary for ordering spare or replacement parts.

SAFETY NOTICE

GENERAL

This equipment has been designed to minimize exposure of personnel to hazards. While the power amplifier is designed for safe operation, certain precautions must be observed. The power amplifier is intended to be operated and serviced by technically competent personnel familiar with the principles of electrical and RF safety.

KNOWLEDGE OF WARNINGS AND CAUTIONS

The operator and technician must know where dangerous areas are, exercise every precaution to ensure personnel safety, and be familiar with the warnings and cautions presented throughout this manual and summarized below.



**PHYSICAL HARM
DUE TO SHOCK
HAZARD**



**USE CAUTION TO
PREVENT HARM TO
PERSONNEL OR
EQUIPMENT DAMAGE**



**STATIC SENSITIVE
DEVICE NEEDS
SPECIAL
HANDLING**

WARNING

HIGH VOLTAGE



CONTACTING HIGH VOLTAGE CAN CAUSE SERIOUS INJURY OR EVEN DEATH. EXERCISE EXTREME CARE WHEN WORKING NEAR SUCH VOLTAGES.

REMOVAL OF POWER



REMOVE ALL POWER TO THE AMPLIFIER SYSTEM WHEN ATTEMPTING TO PERFORM INSPECTION OR CLEANING PROCEDURES.

REMOVAL OF POWER



REMOVE ALL POWER TO THE AMPLIFIER SYSTEM WHEN PERFORMING REPLACEMENT PROCEDURES.

SAFETY NOTICE

CAUTION

STATIC SENSITIVE DEVICES



THE RF POWER AMPLIFIER CONTAINS SOLID STATE DEVICES THAT ARE SENSITIVE TO ELECTROSTATIC DISCHARGE (ESD). USE ESD CONTROL PROCEDURES WHEN HANDLING DEVICES.

VOLTAGE ARCING



REMOVE ALL POWER PRIOR TO DISCONNECTING INTERCONNECTION CABLES. CAREFULLY PERFORM PROPER VOLTAGE MEASUREMENT TECHNIQUES TO AVOID VOLTAGE ARCING WHICH COULD CAUSE DAMAGE TO EQUIPMENT.

COAXIAL CABLE BENDING



DO NOT EXCESSIVELY BEND COAXIAL CABLES WHEN CONNECTING OR DISCONNECTING.

CONNECTOR DAMAGE



CAREFULLY ENGAGE OR DISENGAGE CONNECTORS AS APPLICABLE TO AVOID DAMAGE TO CONNECTOR PINS OR CIRCUIT BOARDS.

THERMAL COMPOUND



MAINTAIN HEAT-SINKING INTEGRITY BETWEEN RF DEVICE AND HEATSINK. APPLY THERMAL COMPOUND, SUCH AS WAKEFIELD 120-8 WHERE APPLICABLE.

SOLDERING TECHNIQUES



USE HEATSINK ON HEAT SENSITIVE COMPONENTS. PERFORM PROPER SOLDERING TECHNIQUES TO AVOID COLD-SOLDER CONNECTIONS.

COOLING FAN POSITION



MAKE SURE FAN ASSEMBLY IS FACING TO EXHAUST THROUGH REAR PANEL FOR PROPER COOLING OF THE CHASSIS ASSEMBLY.

THERMAL SWITCH RESET



DURING A THERMAL OVERLOAD CONDITION, THE THERMAL SWITCH WILL AUTOMATICALLY RESET WHEN TEMPERATURE FALLS BELOW THE SWITCH SET POINT CAUSING RF SIGNAL PROCESSING TO RESUME.

Section I

DESCRIPTION AND TECHNICAL DATA

1-1. PURPOSE AND SCOPE

This section contains general information for the Power Systems Technology Inc. (PST) RF Power Amplifier Model No. AR1929-100, part number D0413444-1, -2, -3 and -4 (hereinafter referred to as the amplifier). The purpose, equipment supplied, and general description of the power amplifier are contained in this section. In addition, electrical and mechanical specifications, connector interface data, and environmental data are also provided.

The amplifier is designed for use in a communication system or laboratory environment where the amplification of RF signals is required. The amplifier is a broad-band amplifier that accepts any RF signal in the 1000 to 2000 MHz frequency range with a power output at 1 dB gain compression of 100 watts. The amplifier part numbers D0413444-1 and -3 operate from 95 to 132 VAC prime power. Amplifier part numbers D0413444-2 and -4 operate from 180 to 264 VAC prime power.

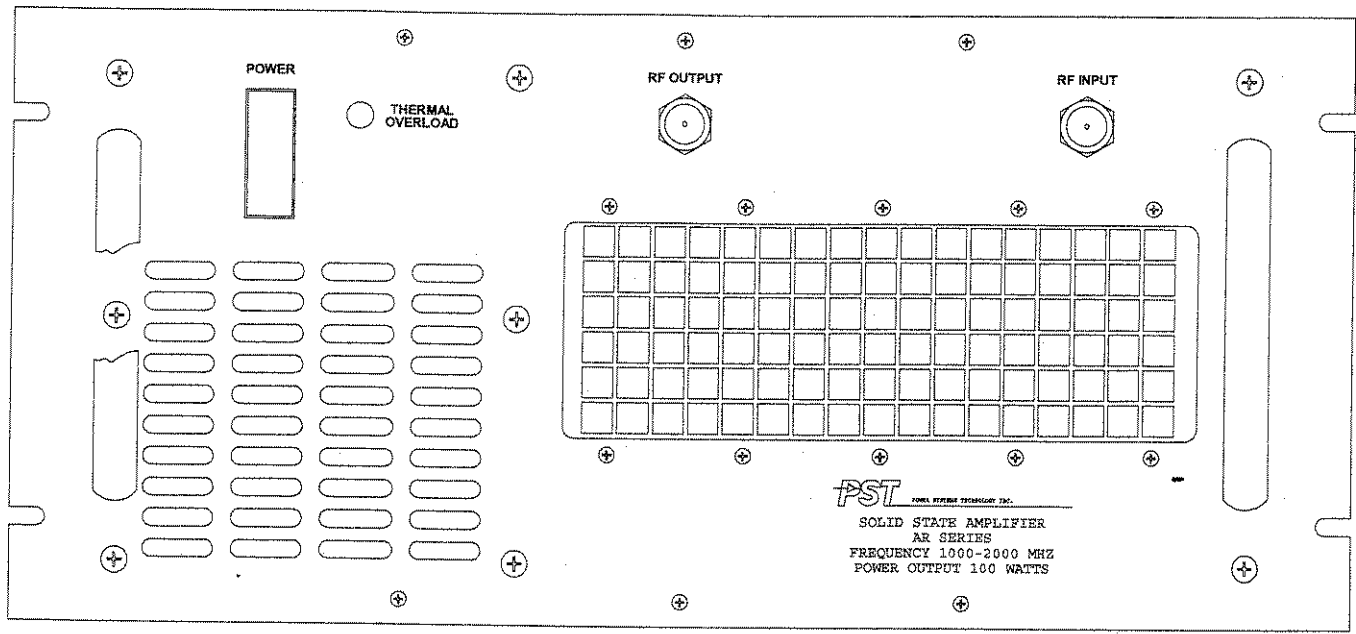
1-2. EQUIPMENT SUPPLIED

The amplifier is supplied as a self-contained 19-inch, rack-mountable single drawer unit. A power connector MS1106A24-10S which mates with connector MS3102A24-10P is included for fabrication of a power line cord to connect the amplifier to a source of power.

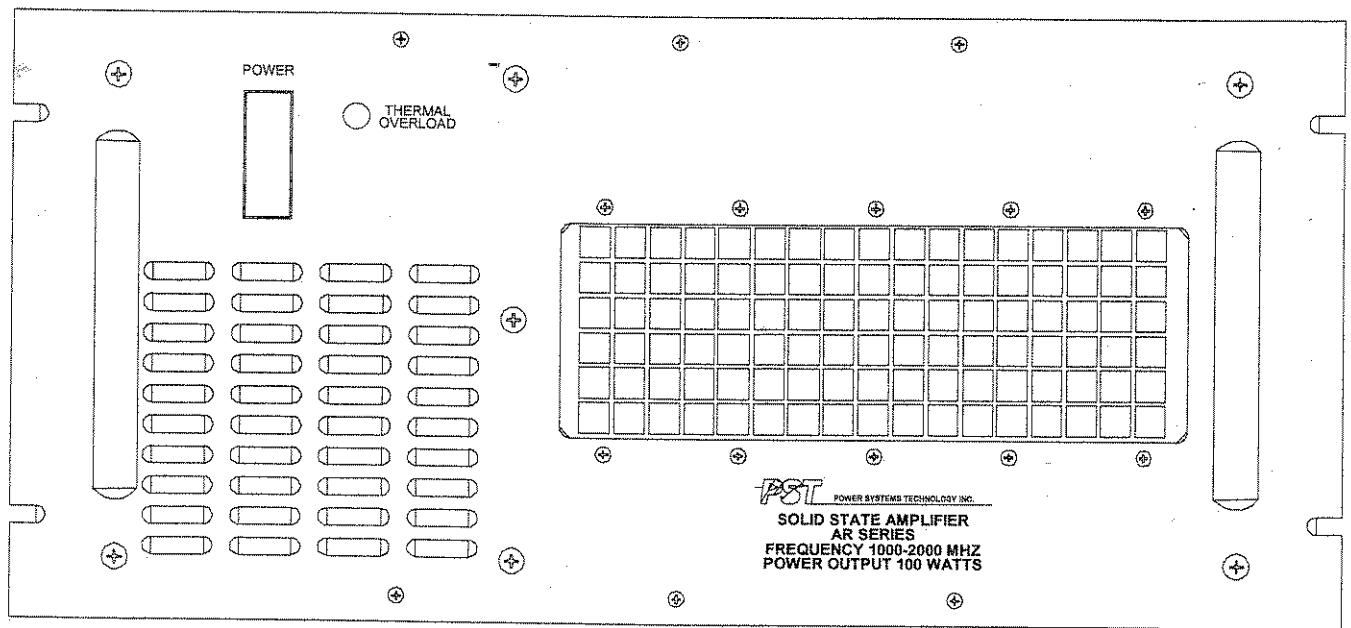
1-3. GENERAL DESCRIPTION

The power amplifier consists of one rack-mountable single drawer unit: the RF power amplifier and its integral power supplies. The cabinet is 19 inch wide, 8.72 inch high and 24 inch. deep and is forced air cooled by integral fans.

Controls for operation including POWER circuit breaker and THERMAL OVERLOAD indicator are located on the front panel. Coaxial connectors J1 (RF INPUT) and J2 (RF OUTPUT), are mounted on either the front or rear panel depending on amplifier part number. They are front-panel mounted on amplifier part numbers D0413444-1 and -2. The RF connectors are mounted on the rear panel for part numbers D0413444-3 and -4. POWER connector J3 is located on the rear panel on all amplifier configurations.



FRONT PANEL MOUNTED RF CONNECTORS Part Number D0413444-1 and -2



REAR PANEL MOUNTED RF CONNECTORS Part Number D0413444-3 and -4

Figure 1-2. RF Power Amplifier Model No. AR1929-100

1-4. AMPLIFIER SPECIFICATIONS

1-5. ELECTRICAL.

AC Input	115 VAC, 50/60 Hz, 1-Phase (for -1 and -3) 220 VAC, 50/60 Hz, 1-Phase (for -2 and -4)
Class of Operation	A Linear
Frequency Range	1000 to 2000 MHz
Gain	60 dB minimum
Gain Flatness	± 1.0 dB
Power Output (@ 1 db compression)	100 watts
Power Output (saturation)	115 watts
RF Gain (small signal)	50 dB minimum
RF Gain Variation (small signal)	± 1.5 dB maximum
RF Input Signals	CW, FM, Pulse, AM and Phase
Input Overdrive	+10 dB above 1 dB compression
Noise Figure	+8 dB maximum
Harmonics	-20 dBc maximum
Input VSWR	2:1 maximum, 50 ohms
Output Load VSWR	2:1 full forward power output
Stability	unconditionally stable vs input/output infinity VSWR
Spurious Signals	-128 dBc for 30 Mhz or more from carrier

1-6. MECHANICAL

Dimensions	
Height	8.72 inches (22.15 cm)
Width	19.0 inches (48.26 cm)
Depth	24 inches (60.96 cm)
Weight	77 pounds (34.65 kg)

1-7. CONNECTOR INTERFACE DATA

Connectors	Description
RF Input	Type N female bulkhead coaxial
RF Output	Type N female bulkhead coaxial
DC Input	MS3102A24-10P mates with MS3106A24-10S (supplied)

1-8. ENVIRONMENTAL

Temperature Range	
Operating	0° to +50° C
Storage	-40°C to +85°C
Relative Humidity	95% at 0 to +40° C (non-condensing)
Altitude	Up to 10,000 feet
Shock and Vibration	Normal conditions as encountered in truck transportation. Shipment and handling.

Section II INSTALLATION

2-1. INTRODUCTION

This section provides necessary information for installing the power amplifier in a standard 19-inch equipment rack or cabinet. The section also provides a preoperation test to ensure power amplifier operational readiness.

2-2. UNPACKING AND INSPECTION

The power amplifier is shipped packaged in a single shipping container. See figure 2-1. Unpack and inspect the power amplifier as follows:

NOTE

Do not destroy packing crate or materials as they can be used for reshipment, if necessary.

- a. Pry open nailed down plywood sheathed crate (when used) top and remove top.
- b. Lift power amplifier in inner cardboard carton, sealed in barrier bag*, from crate and place on assigned work area.
- c. Untape and remove barrier bag from around inner cardboard carton.
- d. Cut open inner cardboard carton*.
- e. Remove cushioning from around the power amplifier and remove it from the carton using care not to damage controls, indicators or chassis.
- f. Remove Test Data and packaging slip attached.
- g. Inspect for any type of damage. If any damage has occurred, notify PST and carrier immediately so that corrective action can be taken.

* If supplied.

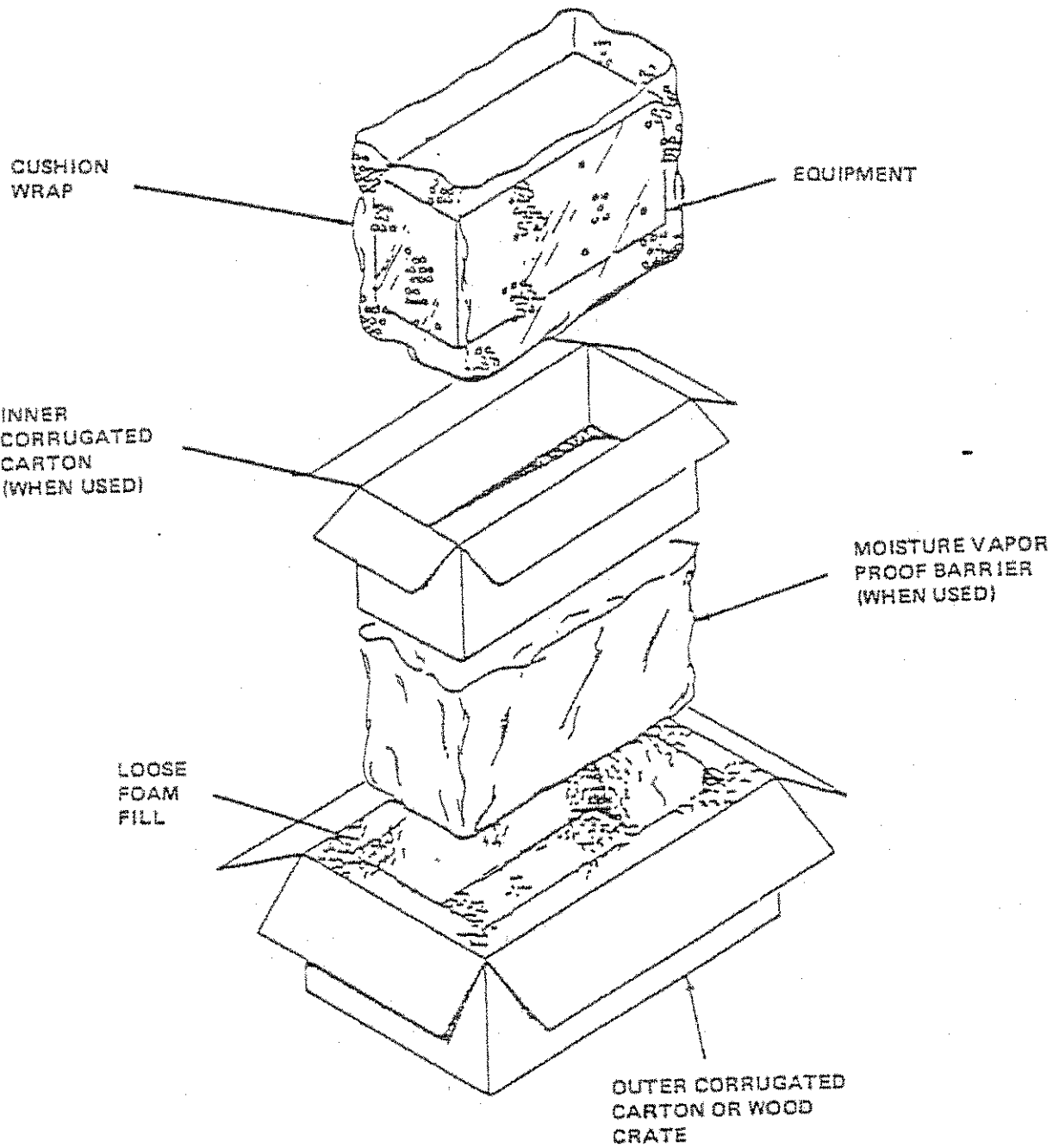


FIGURE 2-1 PACKAGING DIAGRAM

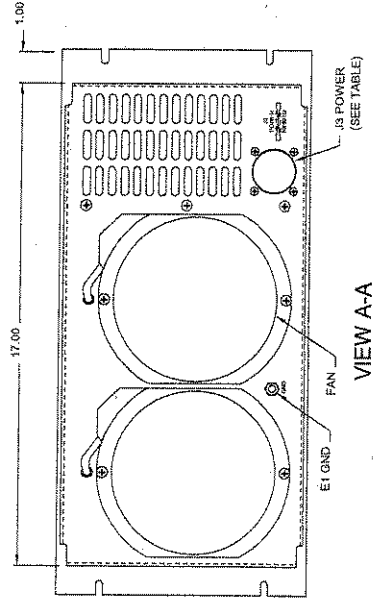
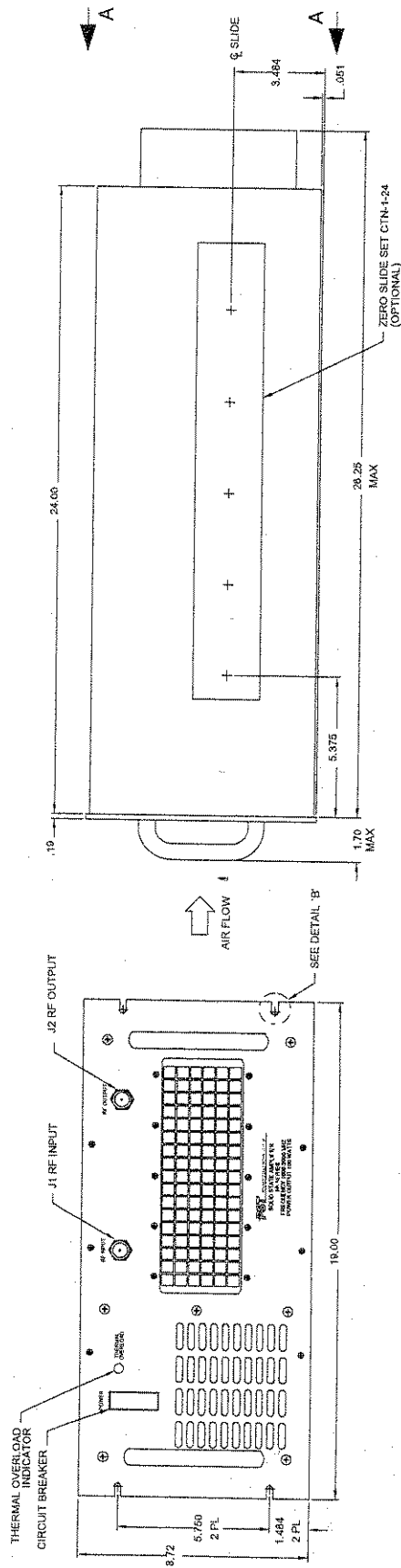
2-3. POWER AMPLIFIER INSTALLATION

The power amplifier is designed for mounting in a standard 19-inch equipment rack or cabinet containing a shelf. The power amplifier is also suitable for bench mounting. Refer to figures 2-2 or 2-3 and proceed as follows:

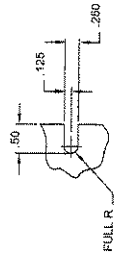
- a. When installing the power amplifier in a rack or cabinet, slide the amplifier into the rack or cabinet until the rear face of the front panel contacts the mounting angle of the rack or cabinet. Secure the amplifier to the rack or cabinet with four screws through the slotted holes in the front panel.
- b. When bench mounting, select a clean and secure area on the bench for the power amplifier.
- c. The power amplifier is supplied with a power line cord that mates with POWER connector J3. Connect the power cord to prime AC input (115 or 220, 50/60 Hz, 1-phase) power source capable of supplying 600 VA.
- d. Perform pre-operation test contained in paragraph 2-4.
- e. After completing the pre-operation test, connect the appropriate coaxial cables to power amplifier RF INPUT connector J1, and RF OUTPUT connector J2

2-4. PRE-OPERATION TEST

- a. Connect the power amplifier in the test setup shown in figure 2-4. Refer to table 5-1 for further test equipment information.
- b. Set the signal generator output frequency to 1000 MHz and its power output so that the input to the amplifier is -20 dBm.
- c. Set POWER switch/circuit breaker to ON and verify that POWER ON lamp lights and that all cooling fans are operating.
- d. Adjust the signal generator power output until the power output of the power amplifier shown on the power meter is at maximum. The amplifier output must be greater than 100 watts.
- e. Repeat steps c and d adjusting the signal generator output frequency to 1200 MHz, 1400 MHz, 1600 MHz, 1800 MHz, and 2000 MHz. For each frequency, the amplifier output must be greater than 100 watts as indicated on the power meter.
- f. Turn off power, disconnect test equipment and perform steps e of paragraph 2-3.



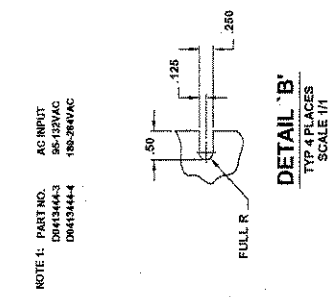
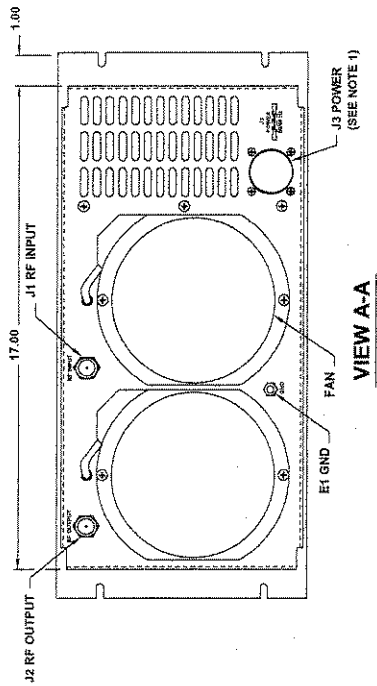
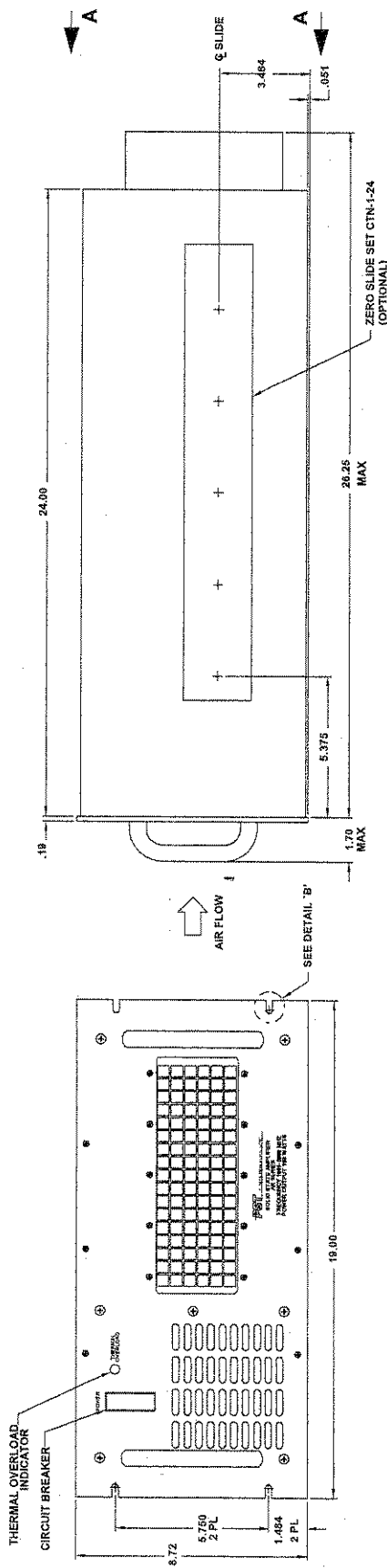
OUTLINE NO.	ASSEMBLY NO.	LO INPUT
00013444-1	D0413444-1	50-132V/AC
00013444-2	D0413444-2	180-264V/AC



DETAIL B'
TYP 4 PLACES
SCALE 1/1

CONNECTOR TABLE								
CONN.	FUNCTION TYPE							
J1	RF INPUT TYPE 'N' BLK HD FEM							
J2	RF OUTPUT TYPE 'N' BLK HD FEM							
J3	POWER AC INPUT							
	<table border="0"> <tr> <td>PHX</td> <td rowspan="4">MS3102A4-10P (MATES WITH MS106A24-10S) DESCRIPTION L } FOR-1 ASSY A } 85-132VAC, 50/60HZ B } FOR-2 ASSY G } 180-264VAC, 50/60HZ</td> </tr> <tr> <td>NEUT</td> </tr> <tr> <td>GND</td> </tr> <tr> <td>C,D,E,F</td> </tr> <tr> <td></td> <td>SPARES</td> </tr> </table>	PHX	MS3102A4-10P (MATES WITH MS106A24-10S) DESCRIPTION L } FOR-1 ASSY A } 85-132VAC, 50/60HZ B } FOR-2 ASSY G } 180-264VAC, 50/60HZ	NEUT	GND	C,D,E,F		SPARES
PHX	MS3102A4-10P (MATES WITH MS106A24-10S) DESCRIPTION L } FOR-1 ASSY A } 85-132VAC, 50/60HZ B } FOR-2 ASSY G } 180-264VAC, 50/60HZ							
NEUT								
GND								
C,D,E,F								
	SPARES							

Figure 2-2. Power Amplifier with Front Panel RF Connectors Installation/Outline Diagram



NOTE 1: PART NO.
 D861344-3
 D861344-4
 AC INDT.
 60-125VAC
 180-284VAC

CONNECTOR TABLE	
CONN.	FUNCTION TYPE
J1	RF INPUT TYPE 'N' BLK HD FEM
J2	RF OUTPUT TYPE 'N' BLK HD FEM
J3	POWER AC INPUT MS3102A24-10P MATES WITH MS3108A24-10S (SUPPLIED)
	DESCRIPTION
	L FOR 6 LBSY
	A FOR 132VAC, 50/60HZ
	B FOR 4 ASSY
	G 180-284VAC, 50/60HZ
C,D,E,F	SPARES

Figure 2-3. Power Amplifier with Rear Panel RF Connectors Installation/Outline Diagram

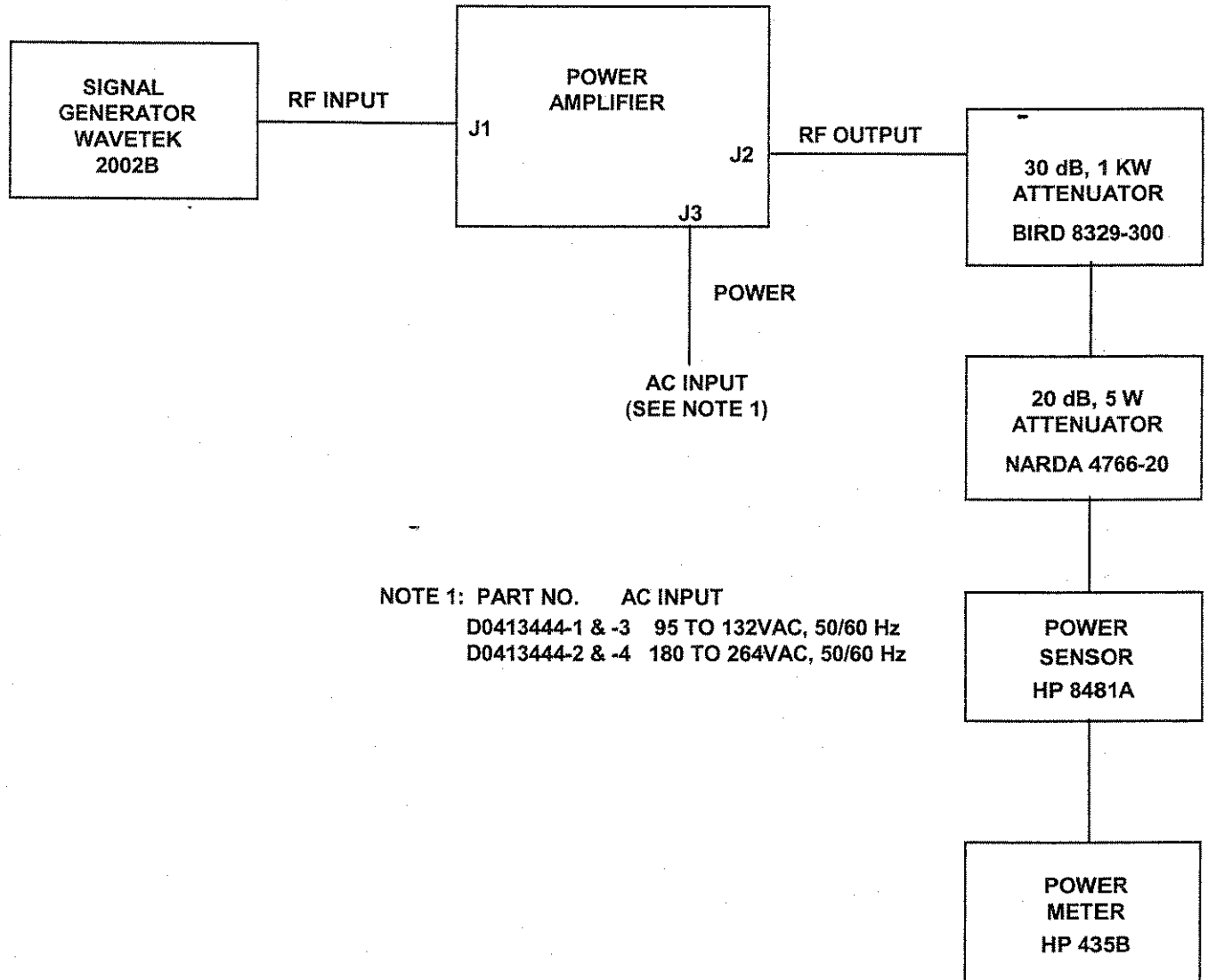


Figure 2-4. Power Amplifier Test Setup Diagram

SECTION III OPERATION

3-1. INTRODUCTION

This section contains instructions for operation of the power amplifier. Illustrations of the front and rear panels showing the operating control, indicators and connectors, together with appropriate tables listing their functions, are also included.

3-2. CONTROL, INDICATORS AND CONNECTORS

Figure 3-1 is the power amplifier front panel view. Table 3-1 is the power amplifier front panel controls, indicators and connector nomenclature, function and reference designation. Figure 3-2 is the power amplifier rear panel view. Table 3-2 is the power amplifier rear panel connector nomenclature, function and reference designation. The tables list the control, indicators and connectors in order of their physical location on the equipment panels from left to right.

3-3. OPERATING PROCEDURE

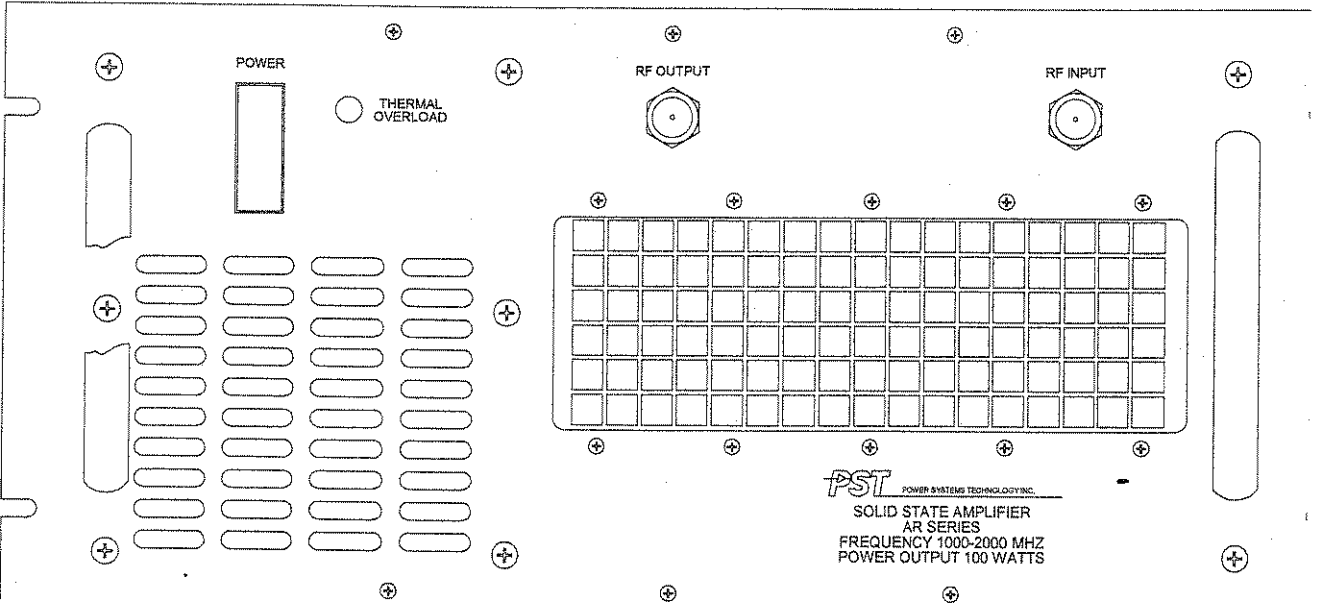
The following instructions provide the necessary steps for operating the power amplifier in an environment where amplification of RF signals is required. The power amplifier is operated locally at the front panel. Refer to Section II and verify that the power amplifier is properly installed and connected to the necessary power source, RF input source and RF output load. Refer to figure 3-1 for controls, connectors, and indicator locations.

- a. Set POWER switch/circuit breaker to the ON position.
- b. Verify the following:
 1. POWER ON front panel lamp is lit.
 2. All cooling fans are operating.

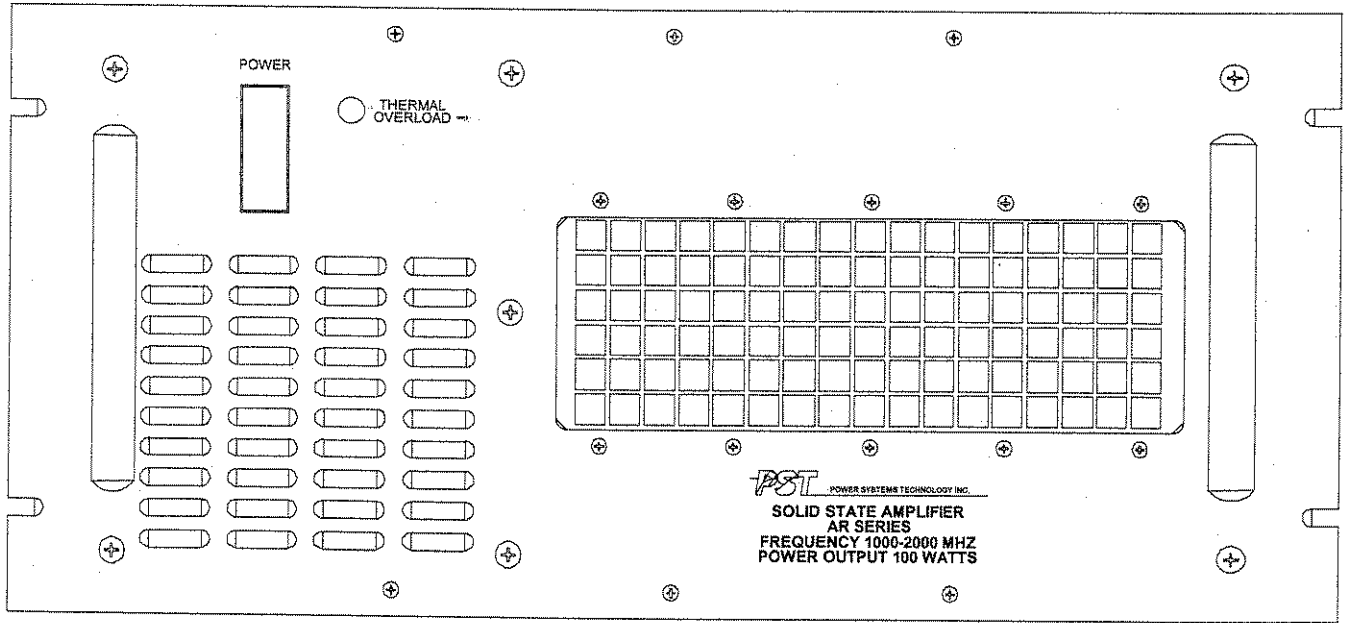
NOTE

The following procedures require an RF input signal to the power amplifier and a load connected to the power amplifier RF output.

- c. Verification of RF output may be made by an external power meter connected to the output of the high power attenuator. Output should be greater than 100 watts.
- d. The power amplifier will operate unattended. Observe the following:
 1. Maintain an RF input power level of -10 dBm.
 2. Maintain an RF input frequency between 1000 and 2000 MHz.

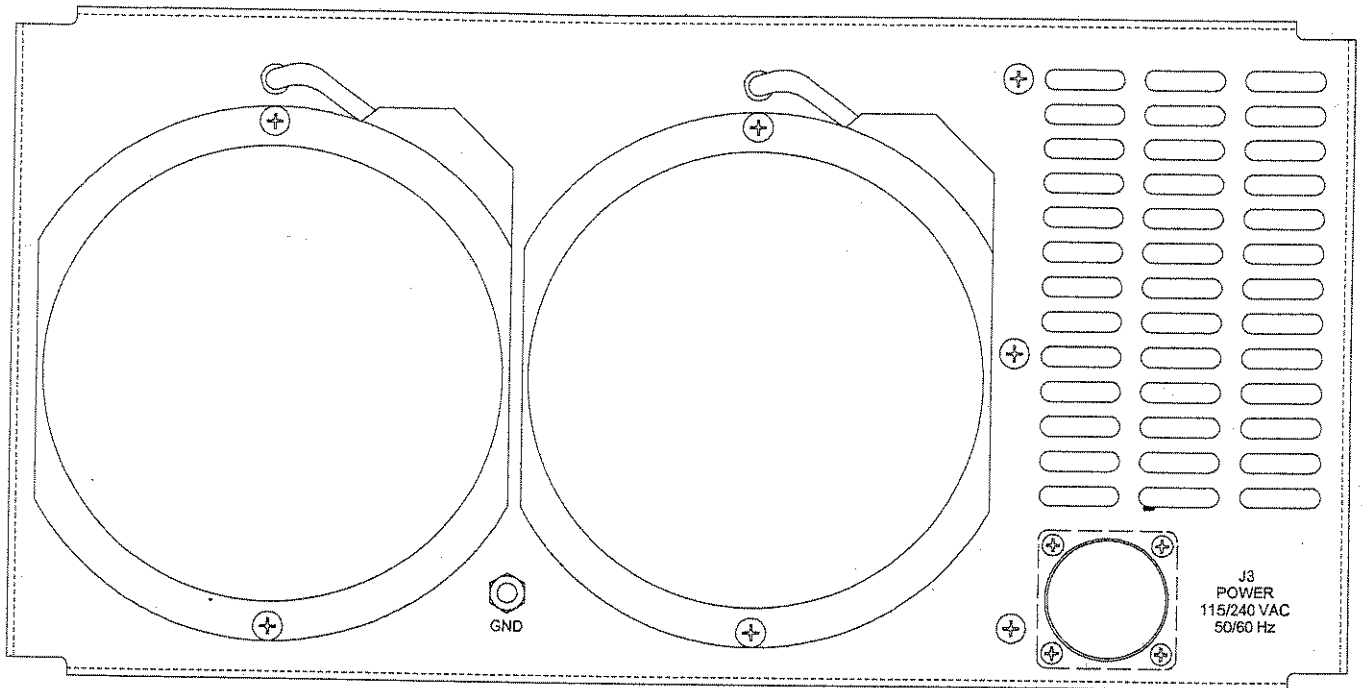


FRONT PANEL MOUNTED RF CONNECTORS Part Number D0413444-1 and -2

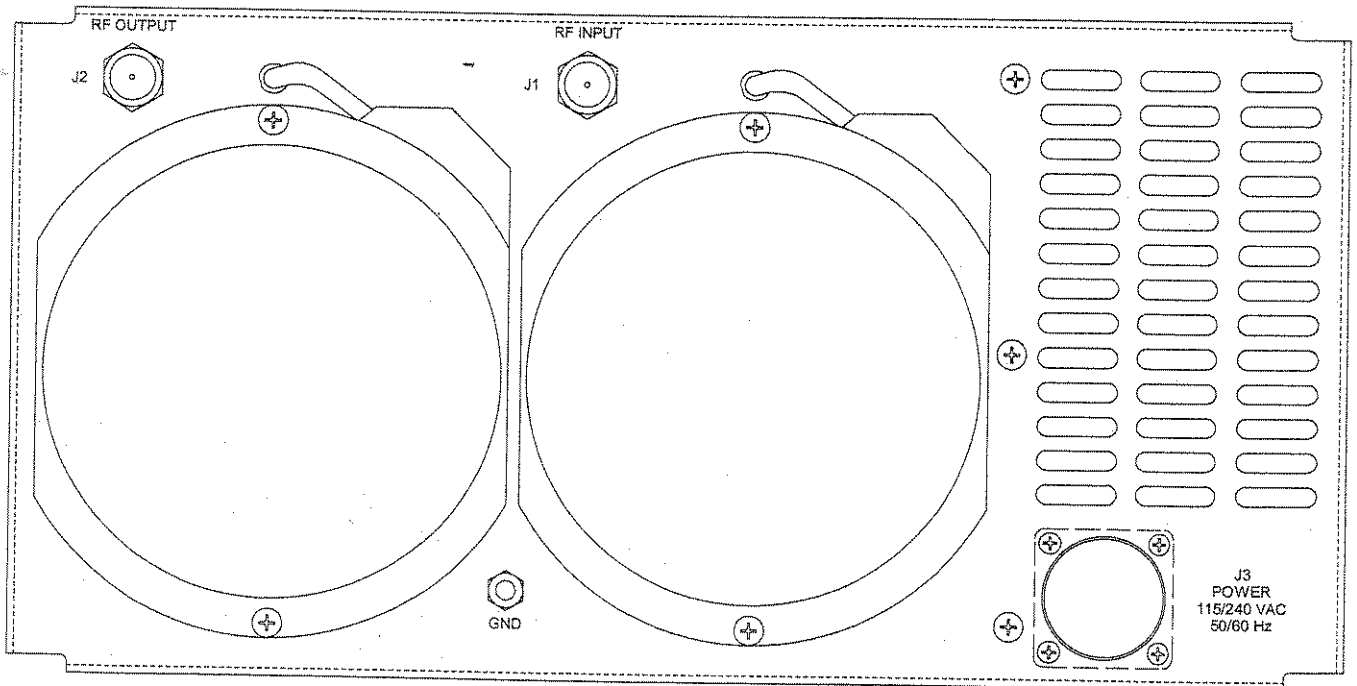


REAR PANEL MOUNTED RF CONNECTORS Part Number D0413444-3 and -4

Figure 3-1. Power Amplifier Front Panel View



FRONT PANEL MOUNTED RF CONNECTORS Part Number D0413444-1 and -2



REAR PANEL MOUNTED RF CONNECTORS Part Number D0413444-3 and -4

Figure 3-2. Power Amplifier Rear Panel View

Table 3-1. Power Amplifier Front Panel Controls, Indicators, and Connectors

ITEM	FUNCTION	REFERENCE DESIGNATION
POWER Switch/ Circuit Breaker	A combination on/off switch and circuit breaker that controls application of prime input VAC, 1-phase power and protects the power source from overload.	CB1
THERMAL OVERLOAD Lamp	An LED lamp (yellow) that lights when internal thermal switch S1 senses an overtemperature condition.	CR1

Table 3-2. Power Amplifier Rear Panel Connectors

ITEM	FUNCTION	REFERENCE DESIGNATION
GND Terminal	Provides chassis ground connection to customer system ground.	
J3 POWER Connector	Accepts supplied AC line cord for customer's prime power input.	J3
RF OUTPUT Connector	A type N-type female coaxial connector that provides a 1000 to 2000 MHz output at 100 watts amplification.	J2
RF INPUT Connector	A type N-type female coaxial connector that accepts 1000 to 2000 MHz RF input.	J1

Section IV THEORY OF OPERATION

4-1. INTRODUCTION

This section contains information necessary for understanding the Model AR1929-100 PST power amplifier theory of operation. A functional block diagram description and specific amplifier assembly functional descriptions are provided in the following paragraphs. The amplifier assembly block and wiring diagram is shown by figure 4-1.

4-2. FUNCTIONAL BLOCK DIAGRAM DESCRIPTION

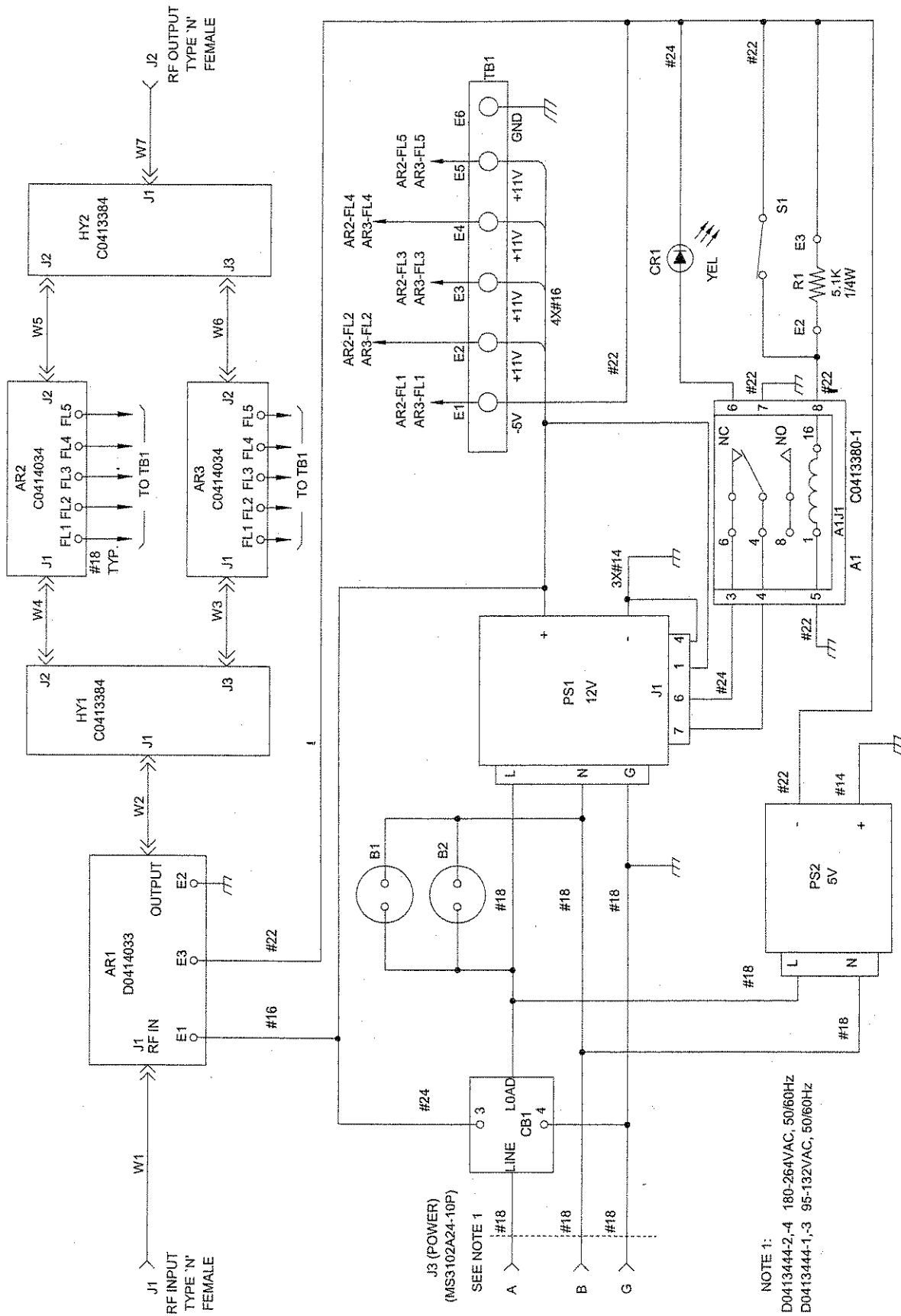
As shown in figure 4-1, RF input signals in the 1000 to 2000 MHz range at an input level of 1.0 milliwatt enter the power amplifier at RF INPUT connector J1 and are applied to amplifier assembly AR1. Amplifier AR1 is a standard PST 10 watt amplifier module, Model No. AM198228-10. The 10-watt output is divided into two equal amplitude paths by two-way divider/combiner HY1. Each path is applied to amplifier assemblies AR2 and AR3 for further amplification to a total power level of 100 watts. AR2 and AR3 are each standard PST 50 watt amplifier modules Model No. PA1929-50. The two signals are recombined into a single path by two-way divider/combiner HY2. The resultant output signal is fed to RF OUTPUT connector J2.

With circuit breaker CB1 set to ON, prime power (as connected) enters the amplifier via POWER connector J3. The prime power input operates cooling fans B1 and B2, and 12 VDC power supply PS1 and 5 VDC power supply PS2. The outputs of PS1 and PS2 supply +11 and -5 VDC for the operation of all internal RF components of amplifier modules AR1, AR2 and AR3. Additionally, the -5 VDC output of power supply PS2 provides a control voltage to supply PS1 via thermal switch S1 and relay board A1. Relay board assembly A1 contains a normally closed relay. The relay contactor opens stopping the operation of power supply PS1 whenever -5 VDC is not present due to either a overtemperature condition or malfunction of power supply PS2. When the thermal switch senses an overtemperature, it opens, removing -5 VDC from relay board assembly A1 causing the relay to open and shutting down PS1. This inhibits further RF signal processing. THERMAL OVERLOAD lamp CR1 lights. The thermal switch is self resetting when temperature conditions stabilize and, thus, RF signal processing is restored.

4-3. LOW LEVEL AMPLIFIER MODULE ASSEMBLY AR1

The low level amplifier module assembly AR1 is a PST amplifier model AM198228-10. The low level amplifier consists of five stages. The first two stages are single ended bipolar transistors. The third stage is a single ended GaAs FET and the fourth and fifth stages are quadrature combined GaAs FETs. All five stages are biased in a class A mode of operation to achieve excellent gain linearity and low distortion products. The characteristics are:

Frequency Range:	1000 to 2000 MHz
Gain:	40 dB minimum
Power Output:	10 Watts
Bias:	+ 1.0 dB



NOTE 1:
 D0413444-2,-4 180-264VAC, 50/60HZ
 D0413444-1,-3 95-132VAC, 50/60HZ

Figure 4-1. Power Amplifier AR1929-100 Block and Wiring Diagram

4-4. **TWO-WAY COMBINER/DIVIDERS HY1 AND HY2.** The two-way combiner/divider HY1 and HY2 are identical. Each consists of a wide-band, two-way, in-phase power combiner/divider. HY1 takes the output signal of AR1 and divides it into two in-phase signal paths that are equal in amplitude for input to power amplifiers AR2 and AR3. HY2 combines the output from power amplifiers AR2 and AR3 into a single path for output at connector J2 via coupler DC1. The construction is microstrip lines on a high quality soft-board substrate. The divider characteristics are:

Frequency Range:	1000 to 2000 MHz
Loss:	0.5 dB maximum
Isolation:	12 dB minimum
Input VSWR:	17 dBR minimum

4-5. **POWER AMPLIFIER MODULE ASSEMBLIES AR2 AND AR3**

The power amplifier module assemblies AR2 and AR3 are identical. Each is a PST amplifier model PA1929-50 which consists eight stages. Each of the eight stages is a quadrature combined GaAs FETs. All eight stages are biased in a class A mode of operation to achieve excellent gain linearity and low distortion products. The power amplifier has the following characteristics:

Frequency Range:	1000 to 2000 MHz
Gain:	10 dB minimum
Power Output:	50 Watts at 1 dB compression
Bias:	+10 Volts

4-6. **12 VDC POWER SUPPLY PS1.** The power supply is of a high efficiency switching type design. It takes the prime power input and converts it to 12 VDC for use throughout the power amplifier.

4-7. **5 VDC POWER SUPPLY PS2.** The power supply is of a high efficiency switching type design. It takes the prime power input and converts it to -5 VDC for use throughout the power amplifier.

Section V MAINTENANCE

5-1. INTRODUCTION

This section contains information necessary for maintenance of the amplifier. Included are preventive maintenance schedule, performance tests, alignment procedures, removal and replacement instructions, calibration procedures, and troubleshooting procedures. In addition, cleaning, inspection, and lubricating instructions are provided where required.

5-2. TOOLS AND TEST EQUIPMENT

No special tools are required beyond common hand tools. Standard test equipment, or equivalent, is listed in Table 5-1.

Table 5-1. Test Equipment Required

DESCRIPTION	MANUFACTURER'S NAME AND MODEL No.
Signal Generator	Wavetek 2002B
Attenuator, 30 dB, 1 KW	Bird 8329-300
Attenuator, 20 dB, 5 KW	Narda 4766-20
Sensor	Hewlett-Packard 8481A
Power Meter Base	Hewlett-Packard 435B

5-3. PREVENTIVE MAINTENANCE

A well organized maintenance program aids dependable equipment operation and reduces breakdown to a minimum. Routine checks help to detect general overall wear, and replacement of parts can often be made before a failure causes a prolonged shut-down. A log should be maintained periodically recording normal equipment operation while noting any erratic or abnormal indications. Adherence to maintenance schedule insures optimum performance 24 hours a day, and keeps downtime to an absolute minimum. The following maintenance instructions are based on average requirements. They may be revised by the maintenance supervisor to reflect individual requirements.

5-4. INSPECTION AND CLEANING

Perform inspection and cleaning periodically as a preventive maintenance procedure. Repair and replacement of components and assemblies found to be defective, damaged, or worn will reduce the possibility of amplifier shutdown during operation.

WARNING

Remove all power to the power amplifier when attempting to perform inspections or cleaning procedures.

5-5. **INSPECTION.** Perform inspection of the amplifier using Table 5-2 as a guide to inspection and possible defects.

5-6. **CLEANING.** Perform the following steps in routine cleaning of the amplifier.

- a. **Cabinet.** Clean the interior of the cabinet with a clean cloth. A vacuum cleaner or forced air may be used to remove accumulated dirt and dust in corners or under cabinet.
- b. **Cooling Fans.** The cooling fans and air intake fans are of the permanently lubricated type and do not require oiling. Remove dust using a water dampened lint-free cloth.
- c. **Cable Connectors.** Clean connectors with a fine brush dipped in a general cleaning solvent and dry thoroughly. Corroded contacts should be cleaned with a crocus cloth or sandpaper. Replace any badly corroded connectors, especially if the contacts are damaged.

5-7. PERFORMANCE TESTS

The following performance tests are designed to serve as preventive maintenance tests to discover general deterioration, erratic or abnormal operation of equipment, prior to the maintenance program. If the equipment does not perform or give the indications as described, perform troubleshooting procedures contained in this section.

- a. Connect the amplifier to the test equipment as shown in figure 2-3.
- b. Set the signal generator for CW mode and its output frequency for 1000 MHz at a level of -20 dBm.
- c. Measure and record the amplifier gain compression, second and third harmonics and spurious output at the 100 watt output level. Indications should be as shown on the test data sheet included in Appendix A.
- d. Repeat steps b and c at frequencies between 1100 MHz and 2000 MHz in increments of 100 MHz, maintaining a signal generator output level of -20 dBm.
- e. Turn off all power and disconnect all test equipment. Test is complete.

Table 5-2. Routine Inspection

POINT OF INSPECTION	POSSIBLE TROUBLE
Connectors and Receptacles	<ul style="list-style-type: none"> • loose or incorrect mounting • bent or missing pins • damaged shells or clamps
Cables	<ul style="list-style-type: none"> • damaged or deteriorated insulation • improper routing or replacement • kinking or twisting • loose or damaged cable clamps and connectors
Wiring	<ul style="list-style-type: none"> • frayed, broken, or damaged insulation • pinched or broken leads • loose connections • disconnected leads
Controls	<ul style="list-style-type: none"> • loose or missing knobs or controls • improper switching action • loose or insecure mounting
Chassis and Panels	<ul style="list-style-type: none"> • loose or missing hardware • physical damage • illegible marking
Grounding	<ul style="list-style-type: none"> • corrosion or dirt on contact surfaces • pitted or worn contact surfaces
Terminal Boards	<ul style="list-style-type: none"> • breaks, cracks, or loose terminals • loose mounting
Indicators and Lamps	<ul style="list-style-type: none"> • missing or broken lamps • damaged or missing lenses • loose or insecure mounting
Resistors	<ul style="list-style-type: none"> • cracks, chipping, or broken leads • discoloration or bulging due to overheating • loose or insecure mounting
Capacitors	<ul style="list-style-type: none"> • loose or insecure mounting

5-8. TROUBLESHOOTING

5-9. FAULT LOCALIZATION. As an aid in tracing trouble, a review of the Operation and Theory of Operation as given in Sections III and IV, respectively, of this manual is recommended. Some trouble indications and possible causes are given in Table 5-3. Refer to table 5-4 for wiring information.

Table 5-3. Trouble Indications and Possible Causes

<u>TROUBLE INDICATION</u>	<u>POSSIBLE CAUSES</u>
Power circuit breaker CB1 is in the ON position and not lit and/or cooling fan is not operating.	<ol style="list-style-type: none">1. AC input is not connected or incorrect2. Power circuit breaker CB1 is damaged.3. Trouble with cooling fans B1, and/or B2.
No output power.	<ol style="list-style-type: none">1. Power supply (PS1 or PS2) problem.2. Interlock relay damaged.3. No RF input power applied.4. Power Amplifier AR1 is damaged.5. Amplifier is in thermal overload.

5-10. REMOVAL AND REPLACEMENT

Normal electronic module removal and replacement procedures apply to the repair of the amplifier. Module locations are shown in figure 5-1.

CAUTION

Perform proper soldering techniques to avoid cold-solder connections.

Do not excessively bend coaxial cables or overtighten connectors.


Maintain heat-sinking integrity where applicable. Apply thermal compound, such as Wakefield 120-8 where applicable.

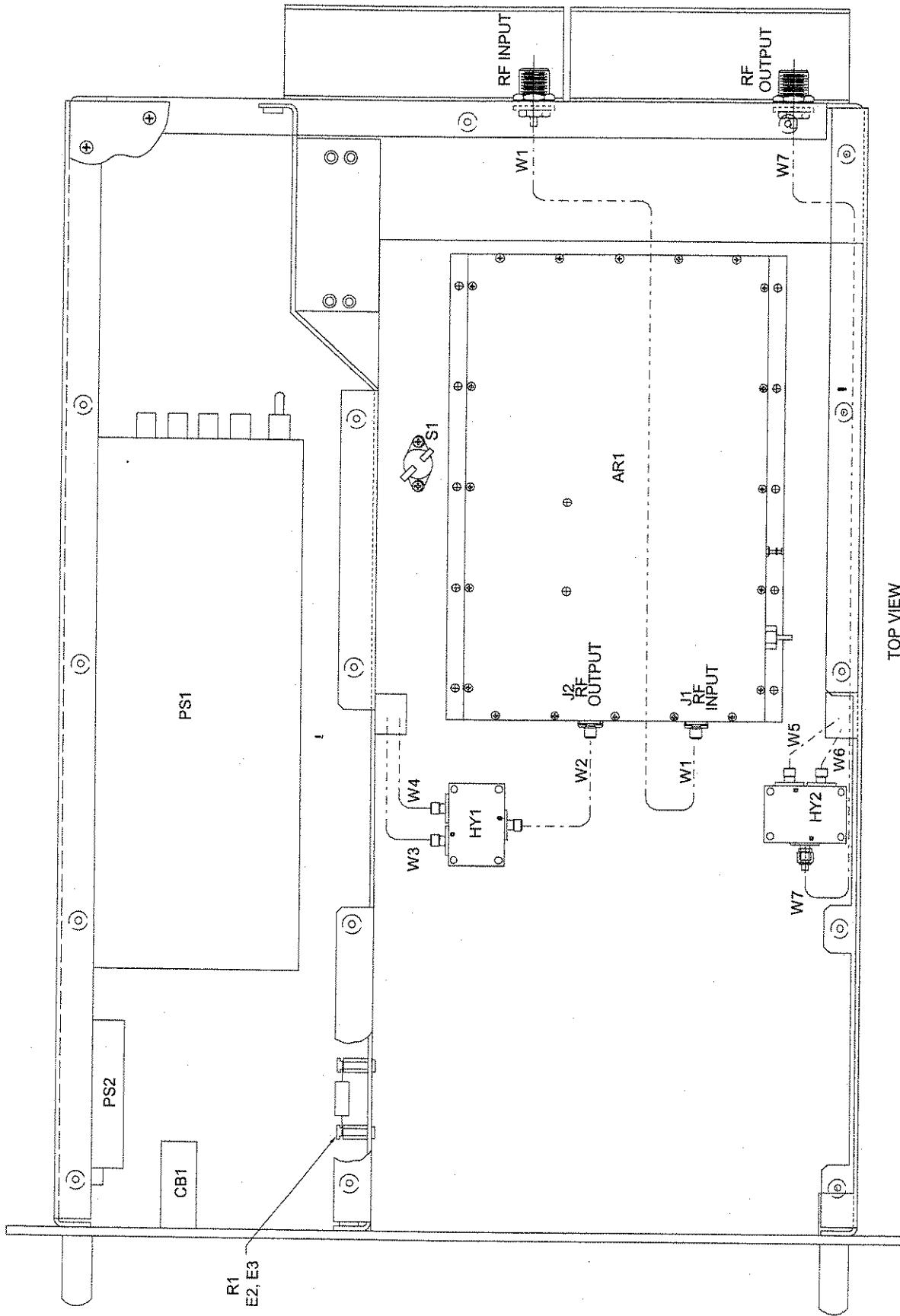
Carefully disengage connectors to avoid damaging printed circuit boards.

Use heatsink on heat sensitive components.

5-11. REPAIR. Repair of the amplifier is limited to replacement of modules, chassis mounted components, cables and connectors. After repair perform tests contained in paragraph 5-7. All spare modules are supplied pre-aligned and adjusted for direct replacement.

Table 5-4. Power Amplifier AR1929-100 Wire Run List

WIRE NO.	FROM		TO		HARNESS		TEFLON WIRE AWG			REMARKS	STOCK CODE	LG-INCH
	SYM NO	PIN	SYM NO	PIN	FROM STA	TO STA	ITEM	COLOR	SIZE			
1	J3	G	Chassis	GND				GRN	18	115VAC 50/60 Hz		
2	J3	A	CB1	Line				GRY	18	OR		
3	J3	B	PS1	N				WHT	18	220VAC 50/60 Hz		
4	CB1	Load	PS1	L				GRY	18			
5	B1	A	PS1	L				BLK	18			
6	B2	A	PS1	L				BLK	18			
7	B1	B	PS1	N				BLK	18			
8	B2	B	PS1	N				BLK	18			
9	PS2	N	PS1	N				WHT	18			
10	PS2	L	PS1	L				GRY	18			
11	Chassis	GND	PS1	G				GRN	18			
12	Chassis	GND	CB1	4				BLK	22			
13	PS1	+V	CB1	3				RED	22			
14	PS1	+V	TB1	E2				RED	16			
15	PS1	+V	TB1	E3				RED	16			
16	PS1	+V	TB1	E4				RED	16			
17	PS1	+V	TB1	E5				RED	16			
18	PS1	+V	AR1	E1				RED	18			
19	PS1	+V	PS1-J1	1				RED	22			
20	PS1	-V	PS1-J1	4				BLK	22			
21	PS1	-V	Chassis	GND				BLK	14			
22	PS1	-V	Chassis	GND				BLK	14			
23	PS1	-V	Chassis	GND				BLK	14			
24	A1-J1	5	Chassis	GND				BLK	22			
25	A1-J1	7	Chassis	GND				BLK	22			
26	A1-J1	3	PS1-J1	6				WHT	22			
27	A1-J1	4	PS1-J1	7				WHT	22			
28	A1-J1	8	R1	E2				VIO	22			
29	A1-J1	6	CR1	AN				VIO	22			
30	R1	E3	CR1	CA				VIO	22			
31	R1	E3	PS2	-V				VIO	22			
32	TB1	E1	PS2	-V				VIO	22			
33	TB1	E1	S1	B				VIO	22			
34	AR1	E3	S1	B				VIO	22			
 POWER SYSTEMS TECHNOLOGY INC. MELVILLE, NEW YORK 11747					SIZE A	AMPLIFIER ASSEMBLY AR1929-100 A1113444					REV	
JOB NO. 1H9A00			DRAWN BY:			DATE			SHEET 1 OF 2			



TOP VIEW

Figure 5-1. Power Amplifier AR1929-100 Module Location Diagram (Sheet 1 of 2)

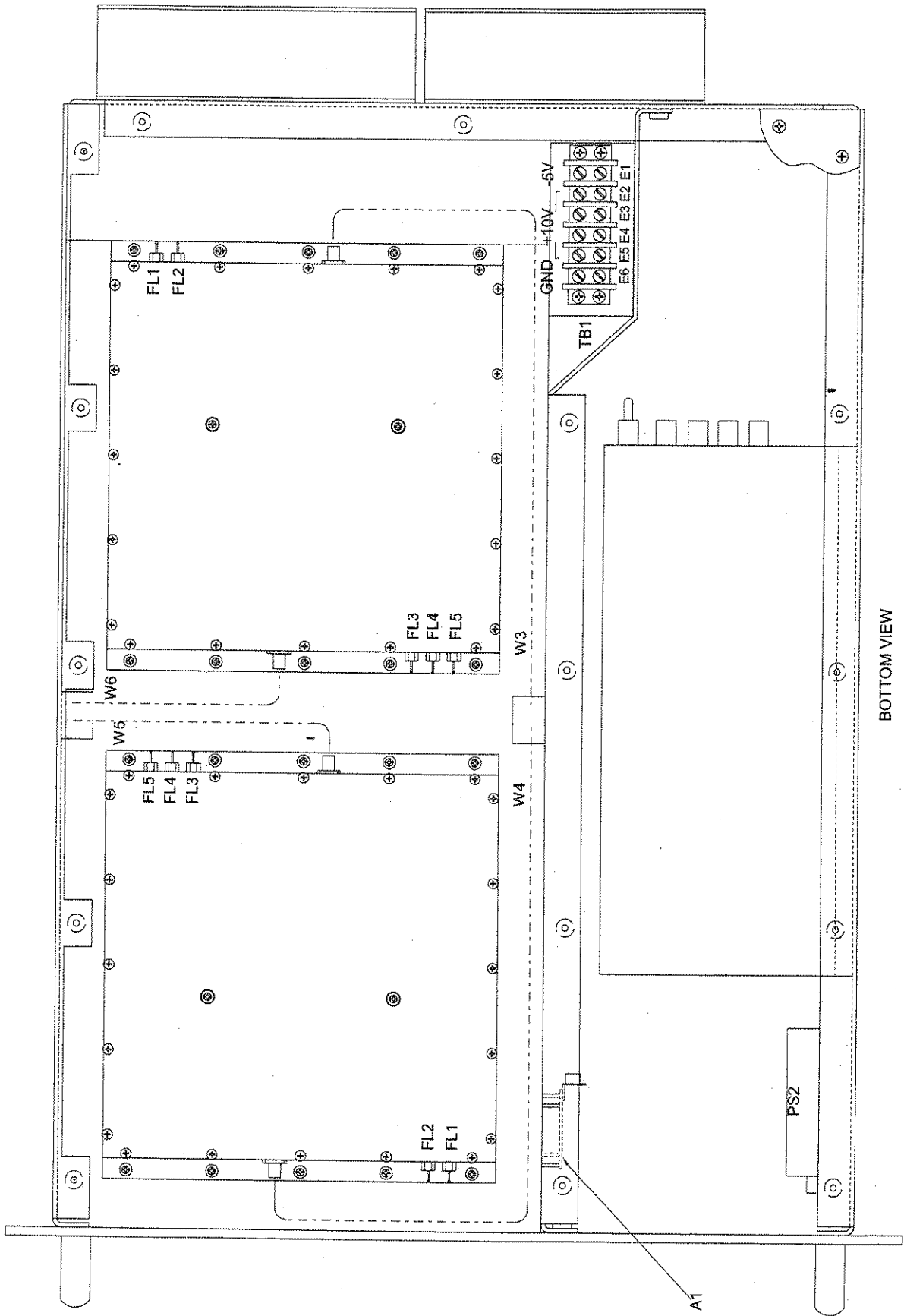


Figure 5-1. Power Amplifier AR1929-100 Module Location Diagram (Sheet 2 of 2)

Section VI

SPARE AND REPLACEMENT PARTS LIST

6-1. INTRODUCTION

This section contains the power amplifier parts list in addition to information necessary for ordering spare and replacement parts.

6-2. CORRESPONDENCE AND ORDERING OF SPARE AND REPLACEMENT PARTS

When ordering spare and replacement parts, the user should follow the logistics procedures established by his organization. Where activities are authorized to order directly from PST, parts and additional service information can be obtained from:

Power Systems Technology, Inc.
105 Baylis Road
Melville, New York 11747 USA

Telephone: (631) 777-8900
Fax: (631) 777-8877
E-mail: info@comtechpst.com
<http://www.comtechpst.com>

When requesting information, or ordering spare or replacement parts, the following information should be supplied:

- a. Name, model, and serial number of equipment.
- b. Part number and/or stock number.
 - (1) For parts manufactured by PST, include part number.
 - (2) For parts not manufactured by PST, include manufacturer part number and manufacturer.
- c. Assembly or subassembly and serial number.
- d. Reference designation.
- e. Commercial description.

6-3. PARTS SUPPLIED

Table 6-1 lists the major assemblies and their reference designation, part number and manufacturer. Refer to figure 5-1, Section V, MAINTENANCE, for parts location.

Table 6-1. Power Amplifier Replacement Parts List
(Part Numbers D0413444-1, D0413444-2, D0413444-3 and D0413444-4)

REFERENCE DESIGNATION	DESCRIPTION	PART NO.	MANUFACTURER
A1	Assembly, Relay Board	C0413380-1	PST
AR1	Assembly, Amplifier, AM198228-10	D0414033-2	PST
AR2, AR3	Assembly, Amplifier, 50W, 1-2 GHz	C0414034	PST
B1, B2	Assembly, Fan, 6 Inch, 115 V (-1 & -3)	028245	Rotron
B1, B2	Assembly, Fan, 6 Inch, 220 V (-2 & -4)	028309	Rotron
	Fan Finger Guard	5506	Pamotor
	Strain Relief, Block	1034 BLK	Heyco
	Fan Line Cord	17902	Belden
CB1	Circuit Breaker (-1 & -3)	203-2-1-62-203-5-1-6	Airpax
	Circuit Breaker (-2 & -4)	203-2-1-62-103-5-1-6	Airpax
CR1	LED, Yellow	559-0302-001	Dialight
E2, E3	Terminal Insulated 4-40	572-4822-01-07-16	Cambion
HY1, HY2	Assembly, 2-Way Divider/Combiner	C0413384	PST
J3	Connector, AC Adapter Receptacle	MS3102A24-10P	Cannon
	Clamp, Cable, Bushing	MS3057-16A/BUSH	
PS1	Assembly, Power Supply, 28 VDC, 72A	HC10-2	HC Power
PS2	Assembly, Power Supply, 5 VDC, 2A	LVS-42E-5B	Lambda
R1	Resistor, 5.1K, ¼ W, 5%	RCLR07C5101GS	
S1	Thermal Switch, 76° C	S0-170-A	Selco
TB1	Terminal Block	601-6	Kulka
	Jumper Straps for TB1	601-J	Kulka
W1 thru W7	Assembly, Cable, Coaxial	A1213444-1 thru -7	PST
Mate J3	Connector, Straight	MS3106A24-10S	Cannon
Mate A1J1	Connector, "D" Type, 9 Pins	DE9P	Cannon
	Female Screw Lock	D20418-2	Cannon
Mate PS1-J1	Connector, 9 Pin	03-06-2092	Molex
	Male Connector Pins	02-06-2103	Molex
	AC Line Cord	17502S	Belden
	Grill, Front Panel	C0910358-2	PST
	Handle, Front Panel	D2535-4	Unicorp
	Slides, Chassis Drawer (1 Set, optional)	CTN-1-24	Zero



105 Baylis Road, Melville, N.Y. 11747

WARRANTY POLICY

Comtech PST Corporation warrants its equipment to be free from defects in material and workmanship for a period of one year from the date of shipment. In the event that any defect in materials or workmanship in the fabrication of materials to be furnished hereto become apparent, under normal use, in accordance with authorized instructions, during the aforesaid warranty period, Comtech PST will, without charge, correct such defects by repair or replacement f.o.b. its plant in Melville, N.Y. Disassembly and reinstallation costs associated with the removal of the defective part(s) from the Purchaser's installation shall be borne by the Purchaser. Such correction shall constitute a fulfillment of Comtech PST's responsibilities with respect to such apparatus unless otherwise stated hereto. This warranty does not cover parts required for normal maintenance specified in the operator manual for the equipment. With respect to items purchased directly from other suppliers and included with this equipment, the respective warranty (ies) of the supplier(s) will extend as applicable in each case. No allowance will be granted for repairs or replacements made by the Purchaser unless they have been specifically authorized in writing by Comtech PST. Comtech PST shall not be liable for consequential damages nor for damages caused by improper installation if not supervised by Comtech PST. No additional warranty will be implied; all warranties made being as expressed and stated herein.

Should the Purchaser elect to have the system serviced at the using facility rather than returning it to Comtech PST's plant as described above, the following provisions will apply:

1. Purchaser will be charged for the services of qualified Comtech PST Field Engineer at a quoted standard per eight-hour-day or any part thereof plus travel, subsistence and expenses at cost plus G&A and fee. Should Comtech PST's field examination of the reasons for malfunction disclose a defect in Comtech PST's design, material or workmanship, the Purchaser will only be billed for those charges associated with the trip to and from the site (labor, travel and expenses). Purchaser will not be charged for time spent at the using facility in locating and correcting the defect.
2. Should Comtech PST's field examination of the reasons for malfunction disclose that the defect was not due to poor design, material or workmanship on the part of Comtech PST, the Purchaser will be charged at the rates stated in 1 above, for all labor, travel and expenses associated with the trip.
3. Since certain maintenance and/or warranty services cannot be properly performed in the field, it may become necessary to return the system(s) to Comtech PST's plant. Comtech PST reserves the right to determine which services may or may not be accomplished in the field.
4. Comtech PST reserves the right to determine manpower requirements inasmuch as certain on-site services may require the utilization of two individuals.
5. Repairs performed by Comtech PST personnel either at site or in plant are warranted for a period of 90 days. This warranty applies only to the specific repair action performed and does not extend the original warranty on the total equipment.
6. Comtech PST will endeavor to provide a prompt response to service requests; however, all responses are, of course, subject to availability of manpower.

July 1, 1997 - Supersedes all previous Warranty Policies