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SOLID STATE  
500 WATT LINEAR  
POWER AMPLIFIER

LPA-9500

OPERATION and MAINTENANCE  
MANUAL



SUNAIR ELECTRONICS LLC 3400 SW 60<sup>th</sup> Ave. Ocala, FL 34474 U.S.A.

# WARRANTY POLICY

## GROUND AND MARINE PRODUCTS

Sunair Electronics warrants equipment manufactured by it to be free from defects in material or workmanship, under normal use for the lesser of one (1) year from the date of installation or 15 months from date of shipment by Sunair.

Sunair will repair or replace, at its option, any defective equipment or component of the equipment returned to it at its factory, transportation prepaid, within such warranty period. No reimbursement will be made for non-factory repair charges.

This warranty is void if equipment is modified or repaired without authorization, subject to misuse, abuse, accident, water damage or other neglect, or has its serial number defaced or removed.

THIS WARRANTY IS ESPECIALLY IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. The obligation and responsibility of Sunair shall be limited to that expressly provided herein and Sunair shall not be liable for consequential or other damage or expense whatsoever therefore or by any reason thereof.

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## PRODUCT SERVICE:

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Sunair Electronics, LLC  
3400 SW 60th Ave.  
Ocala, Fl. 34474  
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FAX: (352) 854-6238

Email: [Techsupport@sunairelectronics.com](mailto:Techsupport@sunairelectronics.com)

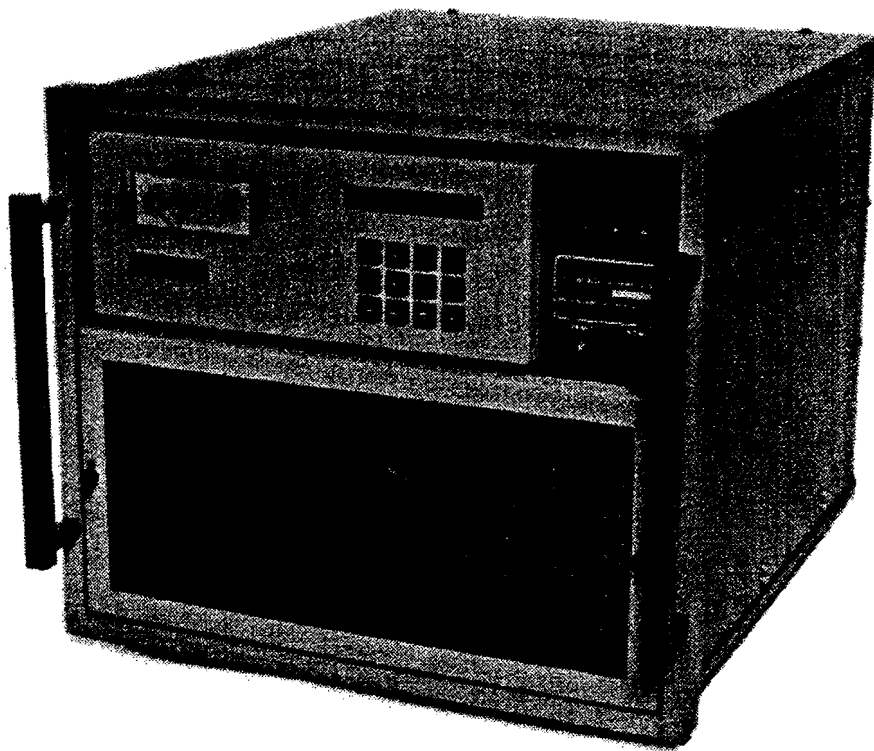
## TRAINING:

Sunair offers training programs of varying lengths covering operation, service, and maintenance of all Sunair manufactured equipment. For details please Contact Product Services Department.



LPA-9500

SOLID STATE 500 WATT  
LINEAR POWER AMPLIFIER



OPERATION  
AND  
MAINTENANCE MANUAL

FIRST EDITION SEPTEMBER, 1995

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**SECTION II**  
**INSTALLATION**

**2.1 UNPACKING AND INSPECTION OF EQUIPMENT**

The LPA-9500 500 Watt Linear Solid State Power Amplifier is packed in a box using double wall construction. The packing material should be removed carefully and the contents inspected for physical damage. Any claims for shipping damage must be filed promptly with the transportation company. If it is found necessary to file such a claim, retain all packing material.

Do not accept a shipment when there are visible signs of damage to the shipping container until a complete inspection is made. If there is a shortage of items or evidence of damage is noted, insist on a notation to that effect on the shipping papers before signing the receipt from the carrier. If concealed damage is discovered after the shipment has been accepted, notify the carrier immediately in writing and await his inspection before making any disposition of the shipment. A full report should also be forwarded to Sunair.

Include the following:

- a) Order Number
- b) Model and Serial Number
- c) Name of Transportation Agency
- d) Applicable Dates.

When this information is received by Sunair, arrangements will be made for repair or replacement.

**2.2 RETURN OF EQUIPMENT TO FACTORY**

The shipping container for the LPA-9500 has been carefully designed to protect the equipment during shipment. The container and its associated packing materials should be used to reship the unit. When necessary to return equipment to Sunair for warranty or non-warranty repair, an authorization number is required. This number can be obtained from our Product Services Department, Telephone: 305-525-1505, FACSIMILE: (305) 765-1322.

If the original shipping carton is not available, be sure to carefully pack each unit separately, using suitable cushioning material where necessary. Very special attention should be given to providing enough packing material around connectors and other protrusions from the equipment. Rigid cardboard should be placed at the corners of the equipment to protect against denting. **DO NOT USE DUNNAGE (STYROFOAM PEANUTS) FOR PACKING PROTECTION**, they may allow the unit to shift while being shipped, and, therefore, become damaged.

Shipment should be AIR PARCEL POST consigned to:

**SUNAIR ELECTRONICS, LLC**  
**3400 SW 60<sup>TH</sup> AVE.**  
**OCALA, FL. 34474**

**PHONE: 352-873-4000**  
**FAX: 352-854-6238**

Plainly mark with indelible ink all mailing documents as follows:

## SECTION I

### GENERAL INFORMATION

#### 1.1 PURPOSE OF MANUAL

This manual describes the LPA-9500 500W Linear Solid State Power Amplifier and includes installation details, operating instructions and maintenance procedures. Information in this manual applies to all equipment configurations unless otherwise stated in the text or illustrations. The LPA-9500 is designed specifically for operation with Sunair Transceivers and Exciters.

##### 1.1.1 PURPOSE OF EQUIPMENT

The purpose of the LPA-9500 is to amplify the low level RF output of a separate exciter to produce 500 W peak envelope power (PEP) or average power. The LPA-9500 is microprocessor controlled and operates in the frequency range of 1.6 to 30 MHz. It is intended for a 100% unattended duty cycle for HF communications systems networks.

#### 1.2 GENERAL DESCRIPTION

##### 1.2.1 PHYSICAL DESCRIPTION

Outline and mounting dimensions for the LPA-9500 are given in Figure 1.1. Control, power and RF connections to the unit are made on the rear panel.

The LPA-9500 is shown in Figure 1.2. The amplifier is a single enclosed unit and is smaller and much lighter, weighing only 71 lbs., than the traditional amplifiers and power supplies contained in separate units. Top and bottom covers provide complete access for servicing. One blower is provided behind the front panel filter to force cooling air throughout the amplifier.

##### 1.2.2 ELECTRICAL DESCRIPTION

The LPA-9500 500W Solid State Linear Power Amplifier is a new generation amplifier, combining solid state RF power amplification and microprocessor technology to produce over 500 watts of reliable HF power into a 50 ohm load. The unit operates in the frequency range of 1.6 to 30 MHz and at a rated output of 1.5 to 1 VSWR. Two amplifier/power supply modules, each capable of producing over 300 watts, in combination deliver a very conservative 500 watts of peak envelope or continuous RF output power.

The LPA-9500 operates from 115 or 230 VAC (50 to 60 Hz). It is extremely rugged and withstands temperatures up to +65°C while operating at a 100% duty cycle. Forced air cooling, under microprocessor control, is utilized to maintain safe operating temperature.

The unit is capable of providing a bypass mode (125 watts) that is locally keyboard selected. Also available by keyboard are status indications of power, individual amplifier voltages and currents. The liquid crystal display (LCD) indicates the specific function selected.

Sophisticated diagnostics, status monitoring and routine housekeeping are all under microprocessor and software control. In the event of malfunction the LPA-9500 automatically selects the next lower safe operating

level, flashes a warning light locally, and displays the cause of the malfunction on the LCD. If the malfunction is caused by more than one failure, the operator or technician is able to obtain detailed diagnostics by use of the keyboard.

### **1.3 SPECIFICATIONS**

**RF OUTPUT POWER:** 500W  $\pm$  1 dB PEP and average.

**RF INPUT POWER:** 75W maximum.

**FREQUENCY RANGE:** 1.6 to 30.0 MHz.

**DUTY CYCLE:** Continuous.

**TYPE OF EMISSION:** AM, SSB, CW or any other type within the bandwidth and power capabilities of the amplifier.

**WEIGHT:** 71 lbs. (32 kg).

**DIMENSIONS:** CM: 45.42W X 48.26D X 40.01H  
Inches: 17.88W X 19D X 15.75H

**INPUT IMPEDANCE:** 50 Ohm nominal.  
2.0:1 VSWR maximum.

**OUTPUT IMPEDANCE:** 50 Ohm unbalanced.

**LOAD VSWR:** Rated power at 1.5 to 1.0, reduced power up to 2 to 1, protected above 2 to 1.

**INPUT VOLTAGE:** 115/230 Vac  $\pm$  15%, single phase, 50 to 60 Hz.

**INPUT POWER:** 2.5 kVA Typical.

**INTERMODULATION DISTORTION:** 36 dB or better below PEP with a standard two tone test signal at rated power output.

**HARMONIC ATTENUATION:** 73 dB or better below carrier at rated power output into a 50 Ohm load.

**SPURIOUS:** 80 dB below PEP.

**BAND CHANGE TIME:** 10 ms maximum.

**TUNING TIME:** 0 seconds without coupler. With an Automatic Antenna Coupler, tuning time dependent on coupler type.

**TEMPERATURE RANGE:** Operating -30°C to +65°C, Storage: -40°C to +85°C.

**HUMIDITY:** MIL-STD-810C, Method 507.1, Proc. III.

**ALTITUDE:** 0-10,000 feet.

**VIBRATION:** MIL-STD-810C, Method 514.2, Equipment Category f, Table 514.2-VI for wheeled vehicles,

Figure 514.2-6, Curve V.

**MTBF:** 6,000 hours (calculated).

**MTTR:** 15 minutes.

**DIAGNOSTICS:** Microprocessor controlled with English Language Readout.

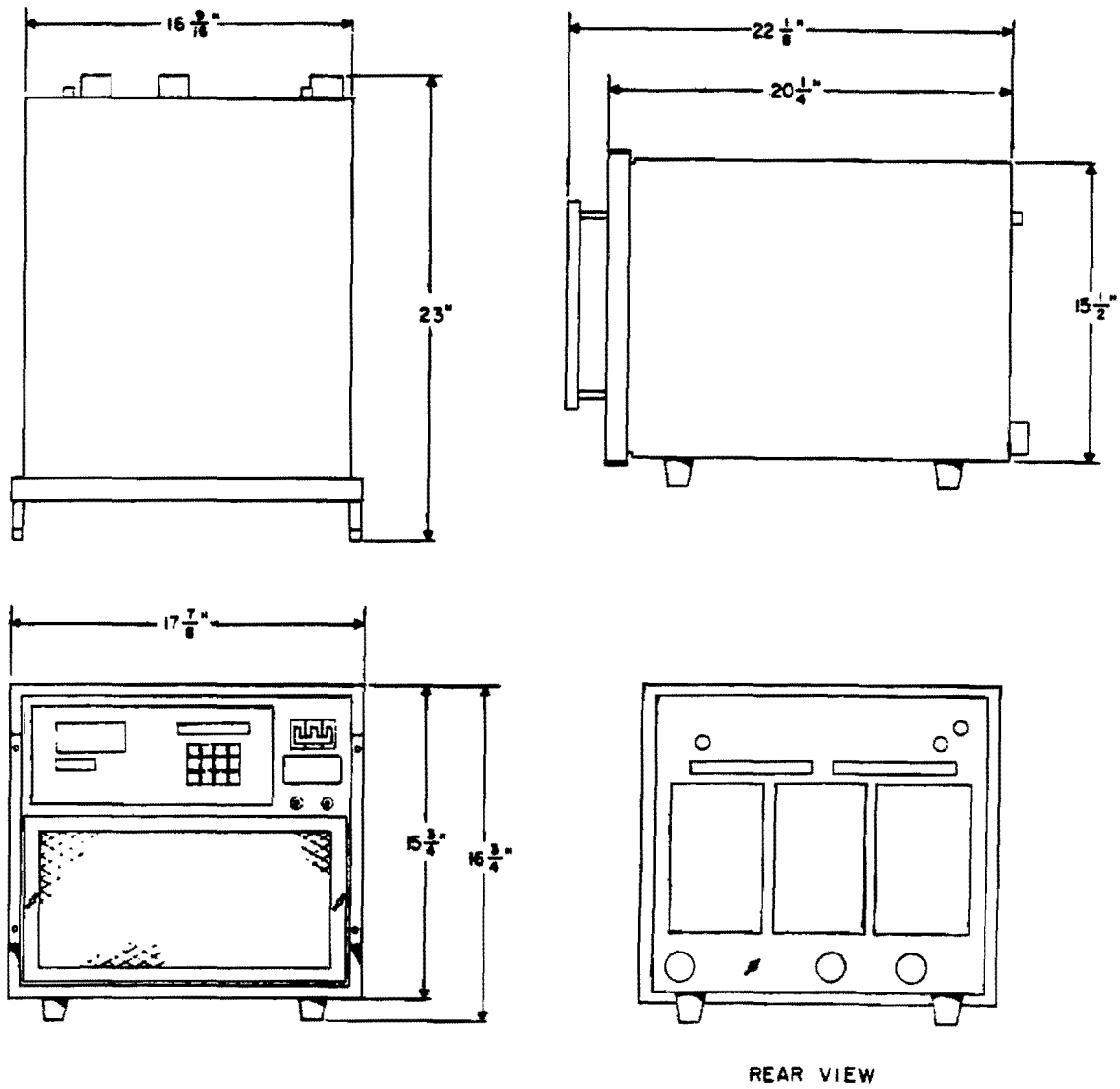
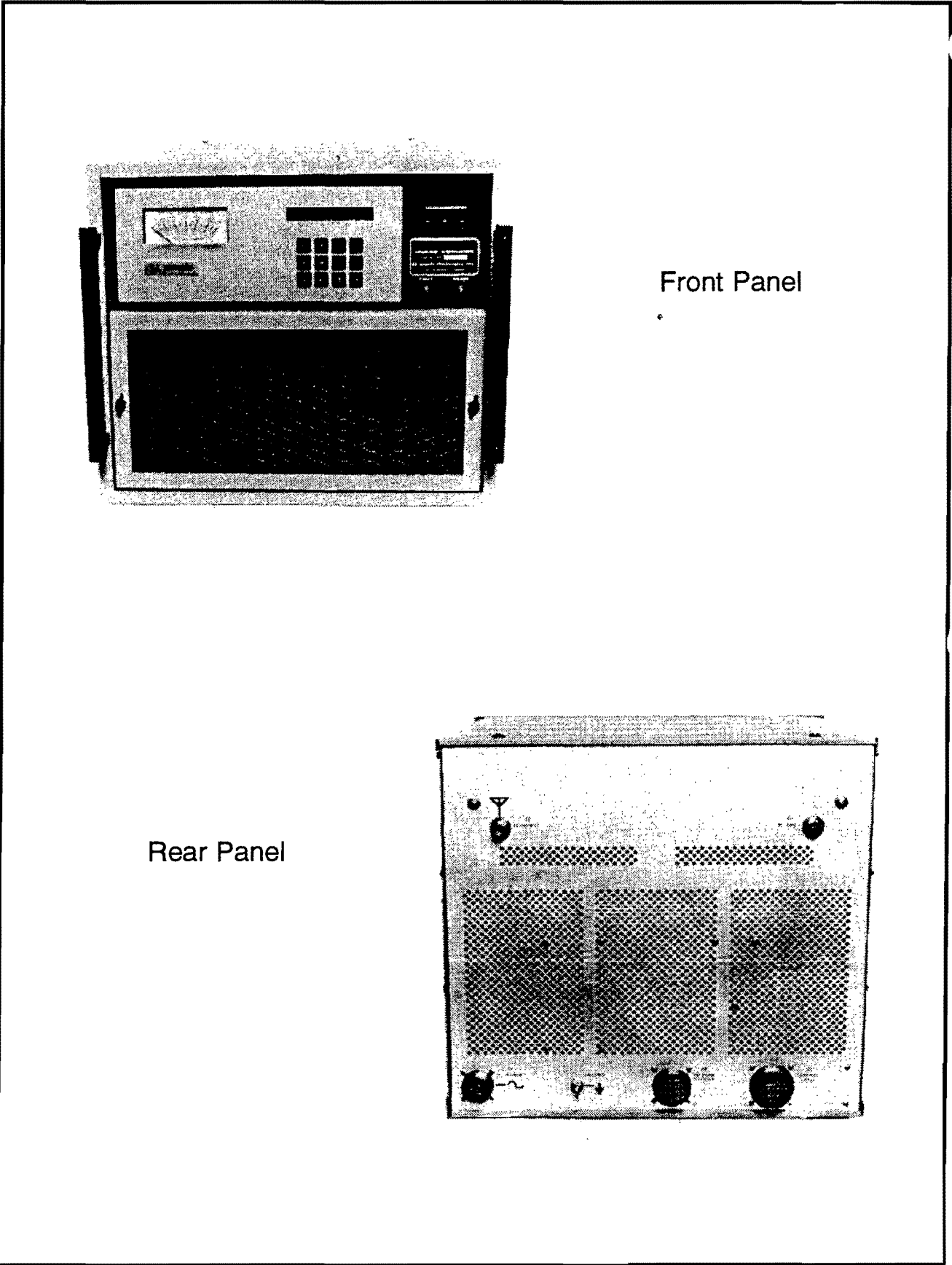


Figure 1.1 Outline and Mounting Dimensions, LPA-9500.



Front Panel

Rear Panel

Figure 1.2 LPA-9500 (Front Panel and Rear Panel).

**1.4 EQUIPMENT SUPPLIED**

**SUNAIR PART NUMBER**

LPA-9500, 500W Linear Solid State Power Amplifier	8116001256
Power Cable Assembly (10 feet)	8066002297
Operation and Maintenance Manual	8116000501
Connector Kit	8066000294
Consisting of:	
2 EA Bushing, Telescoping, .56 ID	0700550054
2 EA Bushing, Telescoping, .62 ID	0700550062
2 EA Bushing, Telescoping, .75 ID	0700550071
1 EA Connector, RF, UHF, PL-259	0742190005
1 EA Connector, RF, N UG-536B/U	0747020001
1 EA Connector, RF, N UG-21B/U	0754140008
1 EA Connector, Power, 37 Pin Round	0754320006
2 EA Clamp, Cable, Connector	0754570002
1 EA Connector, Power, 24 Pin Male	1008390011

**1.5 EQUIPMENT REQUIRED, NOT SUPPLIED**

External AC Power Connector	User Supplied
Transceiver or Exciter	Consult Sunair
Coaxial Cable, RG-8A/U	0588640000
Coaxial Cable, RG-58A/U	0588130001
Antenna System, 50 Ohm Nominal	User Supplied
Transceiver to LPA-9500 Control Cable without connectors	0579240002
Transceiver to LPA-9500 Control Cable assembly (specify length) consisting of: Cable 0579240002, 9000 Series Mating Connector and hardware.	8076004098

**1.6 OPTIONAL EQUIPMENT**

**SUNAIR PART NUMBER**

Running Spares Kit	8066900198
Service Kit (Contains PC Assy Card Extenders)	8066000995
Depot Spares Kit	8116900099
Field Module Kit	8116905791
CU-9100 High Speed Digital Antenna Coupler	8104000055 Gray 8104000098 Green
LPA-9500 to CU-9100 Control Cable	8092500096
Rack Mounting Kit	8066004257 Gray 8066004290 Green
Wired Rack	6032091058 Gray 6032091091 Green
Shockmount Kit, Equipment Rack	6032090892
35 Foot Fiberglass Antenna	0715850008
KW Longwire Antenna Kit	1003090010



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**U.S. Goods Returned For Repair  
Value For Customs - \$100.00**

Mark **ALL SIDES** of package:

**FRAGILE - ELECTRONIC EQUIPMENT!**

**NOTE:** Before shipping, carefully inspect the package to be sure it is marked properly and is securely wrapped.

## **2.3 INSTALLATION PROCEDURE**

### **2.3.1 STATION LAYOUT**

The LPA-9500 must be installed in a structure which provides protection from the weather. Ambient temperature must be maintained between -30°C (-22°F) and +65°C (144°F).

Reference to Figure 1.1 will provide the necessary outline dimensions required for installation. Floor load is 71 pounds. Allow free circulation of air around the cabinet, and at least six inches air space between the back of the unit and any wall or partition. The companion transceiver may be placed on top of the LPA-9500 for voice or CW modes of communications. For FSK or other modes requiring a full kilowatt of average power output, the transceiver should be located on an adjacent table and have a blower kit. The transceiver may also be rack mounted above the LPA-9500 if blowers are provided in the top of the rack.

## **2.4 CONFIGURATIONS**

Figures 2.1 through 2.3 are illustrations of various LPA-9500 configurations.

## **2.5 ANTENNAS AND GROUND SYSTEMS**

The LPA-9500 is designed to work into two types of antenna:

- a) Nonresonant antennas where an antenna coupler is used and
- b) Broadband antennas where the LPA-9500 is connected directly to the antenna.

Figures 2.1 thru 2.3 illustrate configurations where each of these two types of antennas are used.

### **2.5.1 RANDOM LENGTH NONRESONANT ANTENNAS**

The antenna impedance of nonresonant antennas is dependent on the operating frequency. An antenna coupler must be used to match the antenna to the LPA-9500. Thirty-five foot whip antennas offer a good compromise between practical height and good electrical performance at low operating frequencies. The performance of the 35 foot whip is greatly influenced by its ground system. For Base Station roof top installation refer to Figure 2.2 for grounding details.

Another nonresonant antenna is the longwire. The two most popular length longwire antennas are 75 and 150 feet. Both of these antennas require an antenna coupler to match the antenna to the LPA-9500. Figure 2.4 is an illustration of a 75 foot longwire installation. Note that the feed line from the antenna to the coupler is part of the antenna's length.

## 2.5.2 BROADBAND 50 OHM ANTENNAS

These are generally complex, expensive antennas requiring a large area for installation. Their use is usually limited to high performance base station installations which must operate at diverse frequencies. As this class of antenna has approximately 50 ohm output impedance over the rated band of frequencies, an antenna coupler is not required. Some common types of broadband antenna are the Discone and Log-Periodic. Figure 2.1 is an example of a system configuration utilizing a broadband antenna.

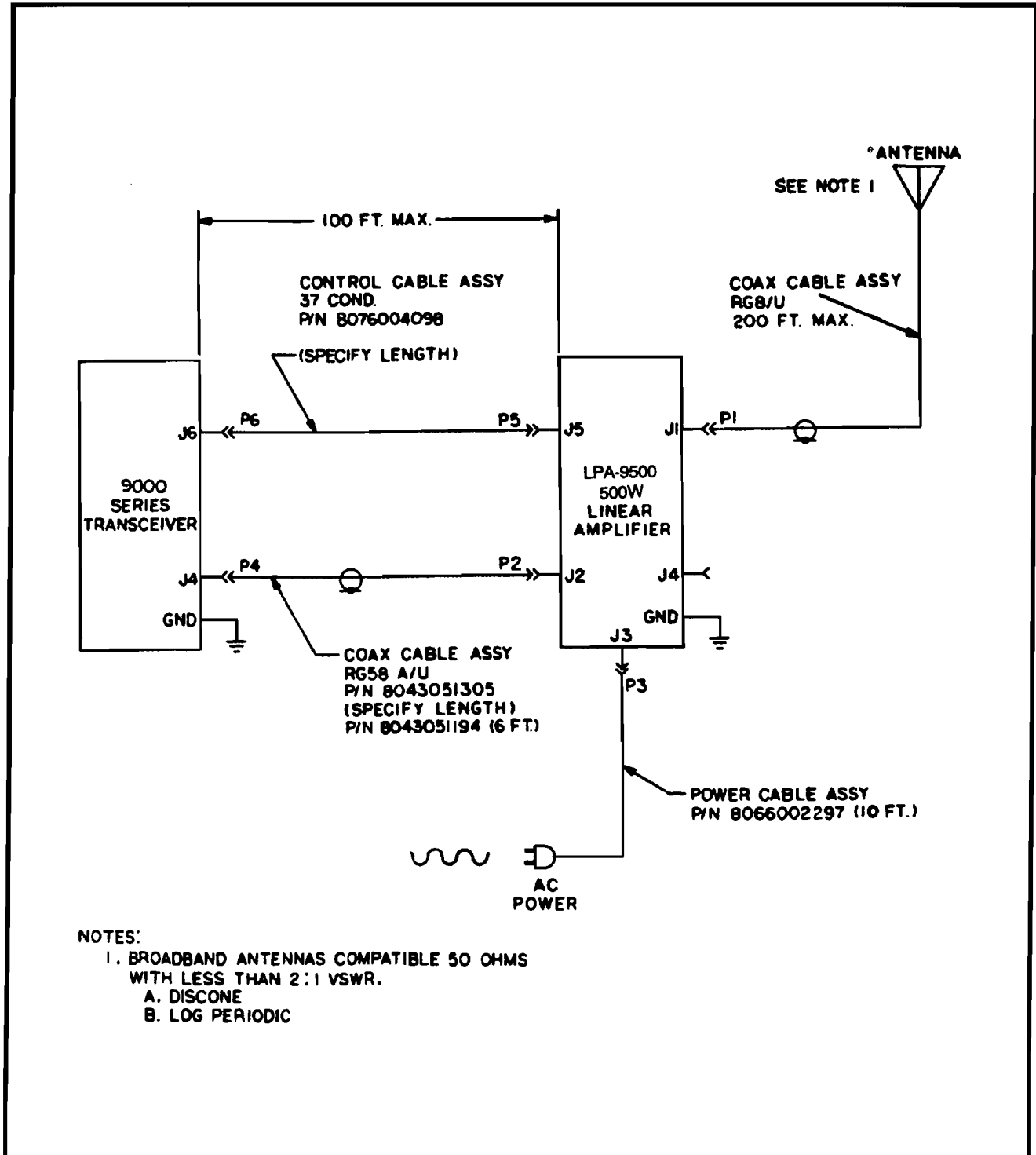


Figure 2.1 LPA-9500 With Broadband Antenna.

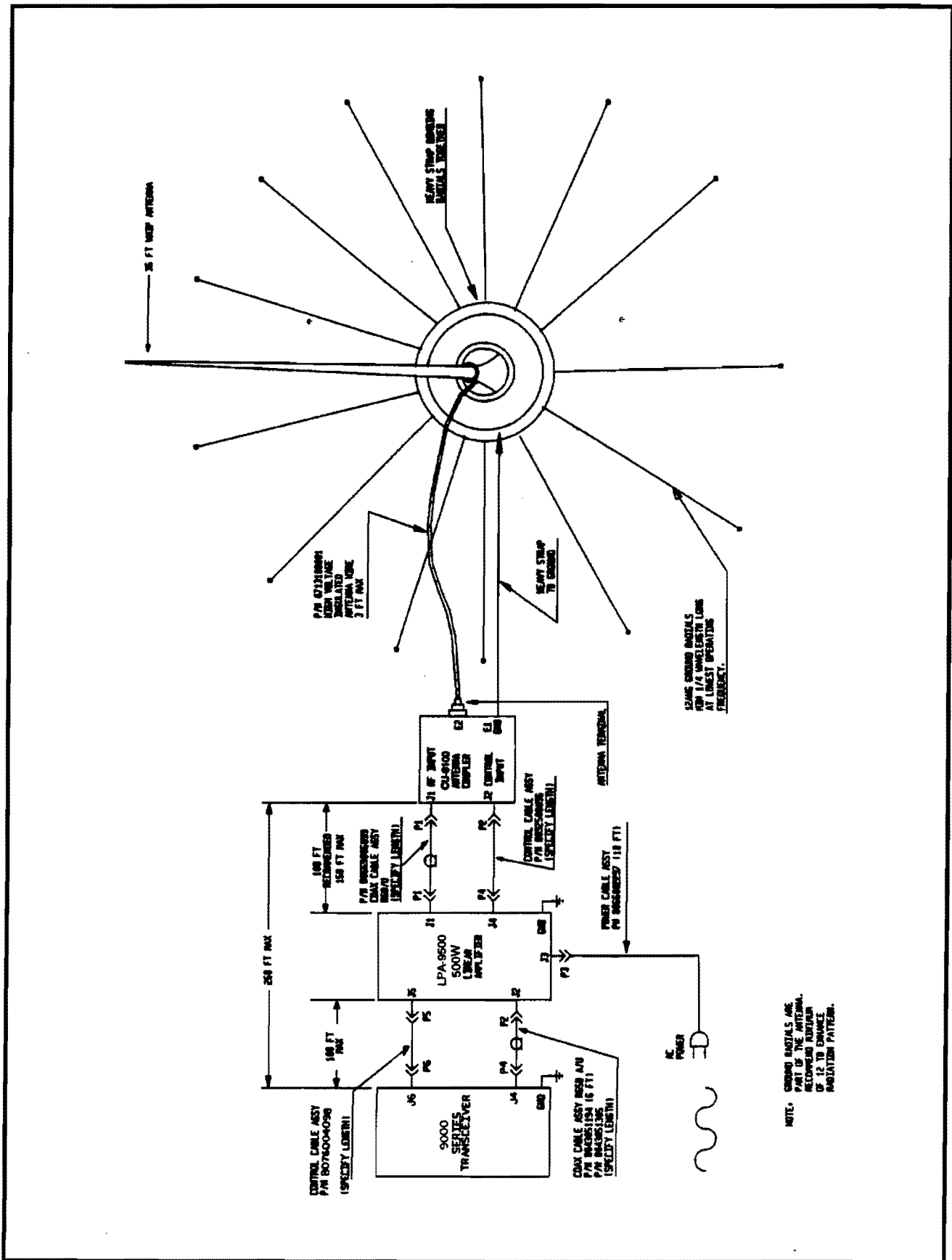


Figure 2.2 LPA-9500 W/CU-9100, 35 Ft Antenna (Roof Top Installation).

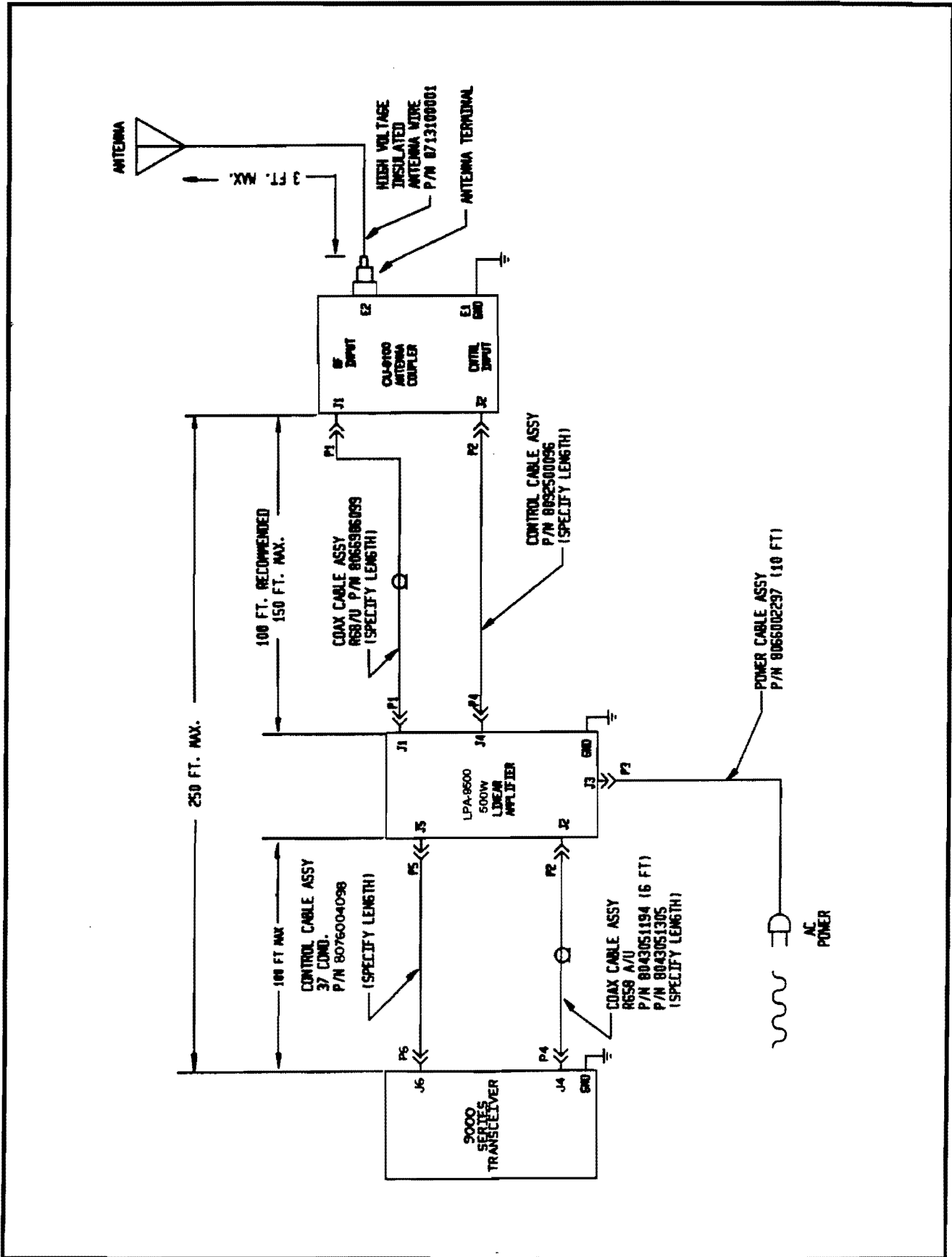


Figure 2.3 Non-Resonant Antenna.

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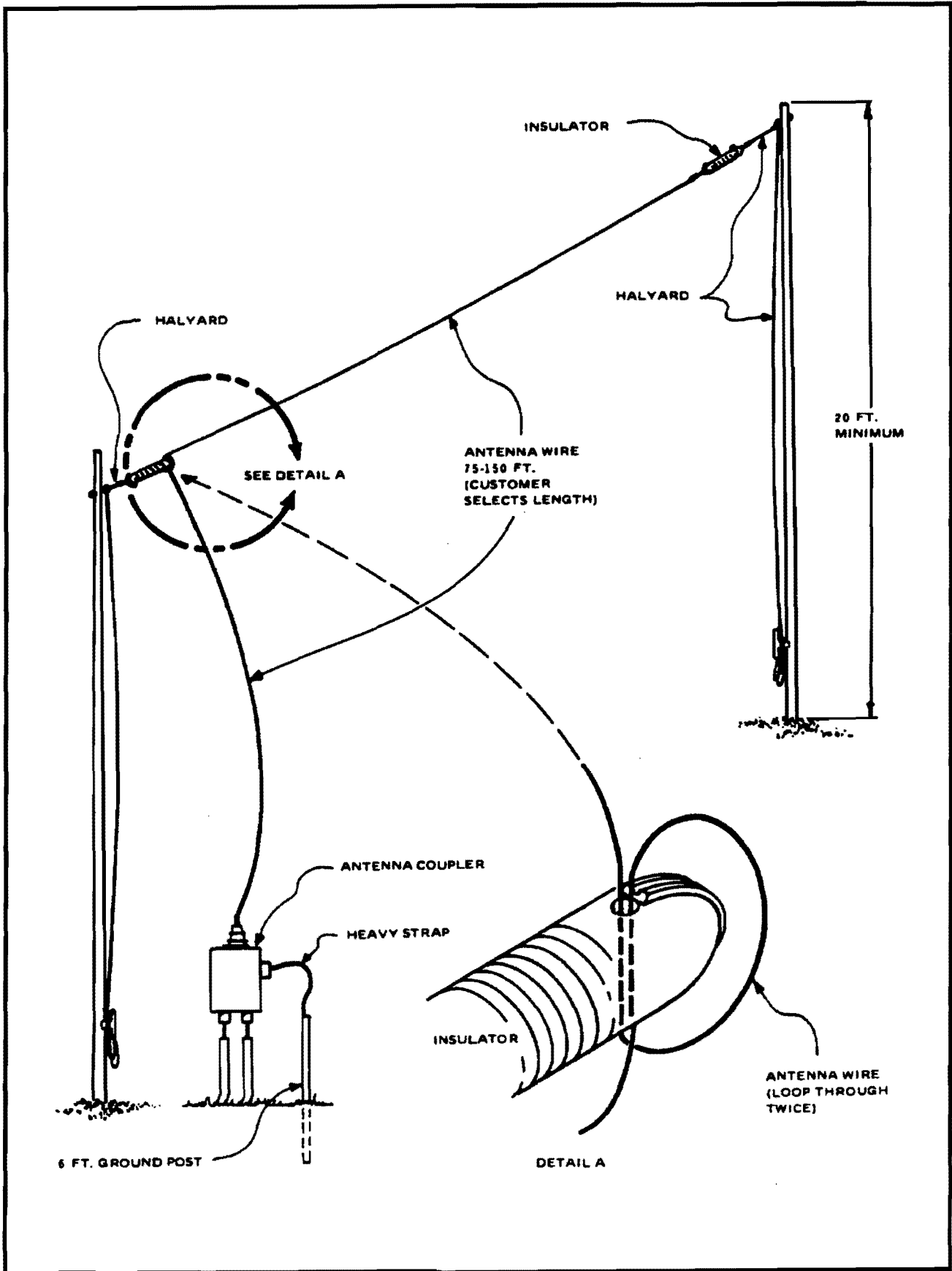


Figure 2.4 KW Longwire Antenna Kit.

## 2.6 EXTERNAL CONNECTIONS

### 2.6.1 PRIMARY POWER CONNECTIONS

The LPA-9500 requires a primary power source that can provide up to 2.5 kVA (115 or 230 VAC).

Whenever possible, the primary power source should be connected to the amplifier through a double-pole, 20 ampere capacity, manual disconnect switch (40 ampere if primary source is 115 VAC). An arrangement of this type will insure that all power has been removed from the unit prior to entrance for servicing. Refer to Figure 2.5 primary power interconnect diagram for the line voltage connection details. The Power Cable Assembly contains three each NO. 10 AWG conductors. The green wire connects to the station primary power ground system. The black and the white wires connect to the 115 or 230 volt power source at the disconnect switch previously described. The standard cable as furnished is 10 feet long.

### 2.6.2 TRANSCEIVER CONNECTIONS

Separation between the transceiver and the amplifier may be up to 150 feet. The control cable to the transceiver is shown in Figure 2.6. The transceiver accessory plug, P6, is furnished with the transceiver. The plug P5, is furnished with the LPA-9500. The control cable 0579240002 is 37 conductor, NO. 20 AWG wire, shielded and jacketed. This cable is available in lengths specified by the customer.

The RF coaxial cable is also available in lengths specified by the customer. Type RG-58A/U, P/N 0588130001 is adequate for transceiver to amplifier spacings of less than 50 feet. For distances above 50 feet, RG-8A/U, P/N 0588640000 should be used. Connector kits are provided with the LPA-9500 and the transceiver.

### 2.6.3 RF OUTPUT CONNECTIONS

The amplifier's RF output connector is also furnished in the Connector Kit. RG-8A/U coaxial cable should be used, regardless of the distance to the antenna or antenna coupler.

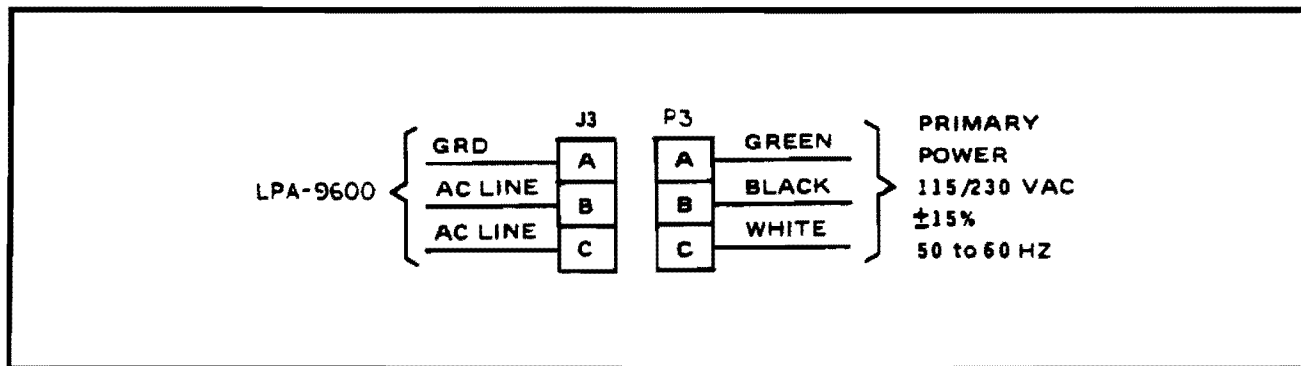


Figure 2.5 Power Cable Assembly P/N 8066002297.



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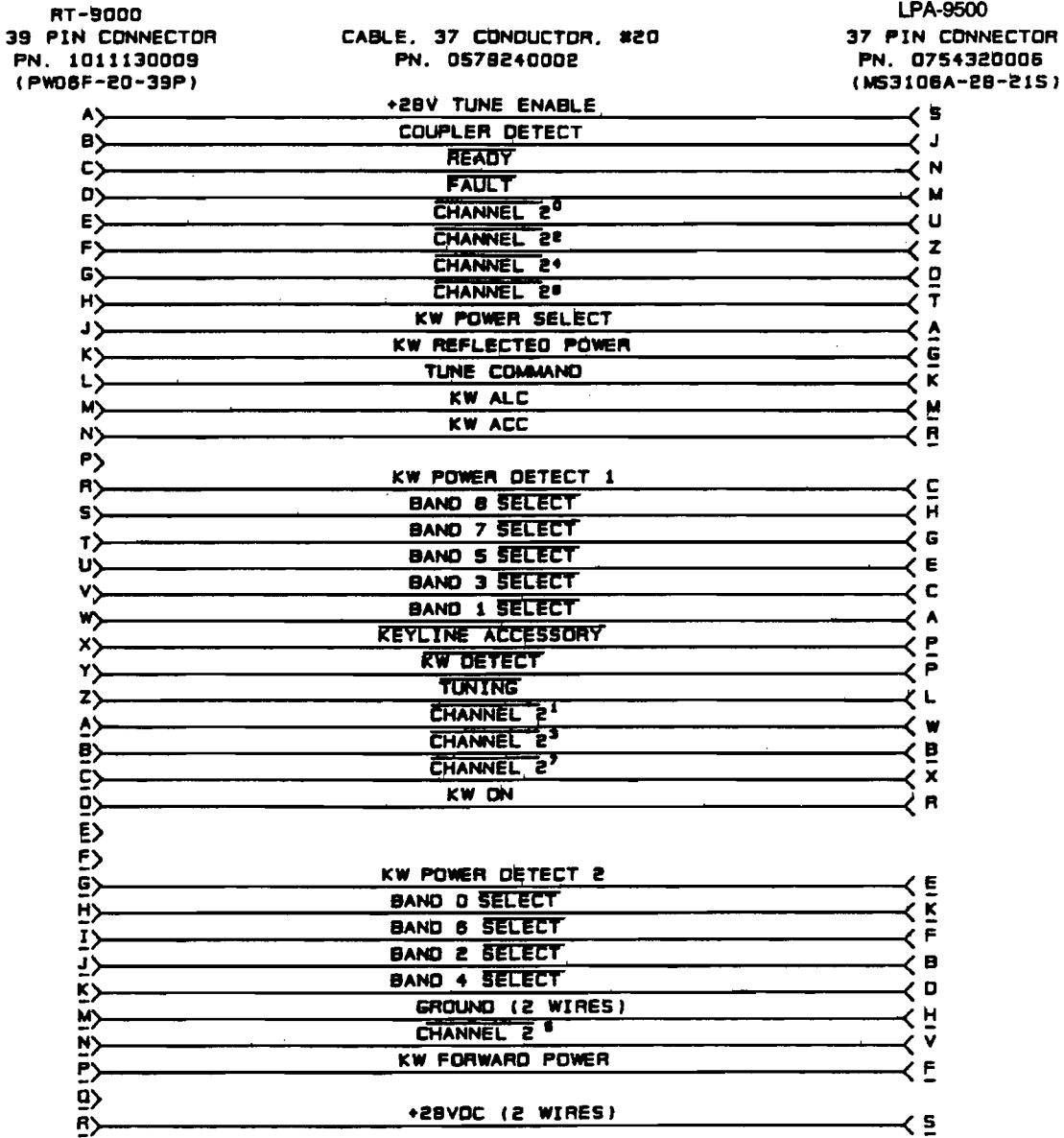


Figure 2.6 9000 Series Exciter/Transceiver To LPA-9500 Control Cable.

## 2.6.4 ANTENNA COUPLER CONNECTIONS

When an antenna coupler is to be used, cable construction is accomplished using connector P/N 1008390011 or use control cable assembly P/N 8092500096 (specify length) see Figures 2.2 and 2.3.

## 2.6.5 STATION RF GROUND SYSTEM CONNECTIONS

Grounding terminals are provided on the transceiver, LPA-9500 and antenna coupler for connection to the station RF ground system. Use 1 or 2 inch wide copper strap or NO. 6 AWG wire or larger for this bonding. Keep lead lengths to a minimum.

## 2.7 PRELIMINARY CHECKS AND ADJUSTMENTS

Determine from the voltage customizing label the proper line voltage for the unit being installed. Connection changes necessary to change voltage customizing are shown in Figures 2.7 and 2.8. Be sure that the Fan Voltage Switch, A10S1, is in the proper position.

If the LPA-9500 is received as a system with its companion transceiver/exciter, no adjustments should be necessary. Otherwise, set the power levels as follows( see Figure 5.1 for component locations):

- a) Set transceiver/exciter frequency to 14.2000 MHz. Set transceiver/exciter MODE to CW, LPA-9500 to 500W. Key transceiver/exciter and adjust A3A2R33 for 500 watts out.
- b) Set transceiver/exciter to AM. Key transceiver/exciter and adjust A3A2R43 for 200 watts out.

## 2.8 RACK MOUNTING KIT OPTION

An optional slide rack mounting kit is available to facilitate installation of the LPA-9500 in standard E.I.A. equipment racks. See Figures 2.9 and 2.10.

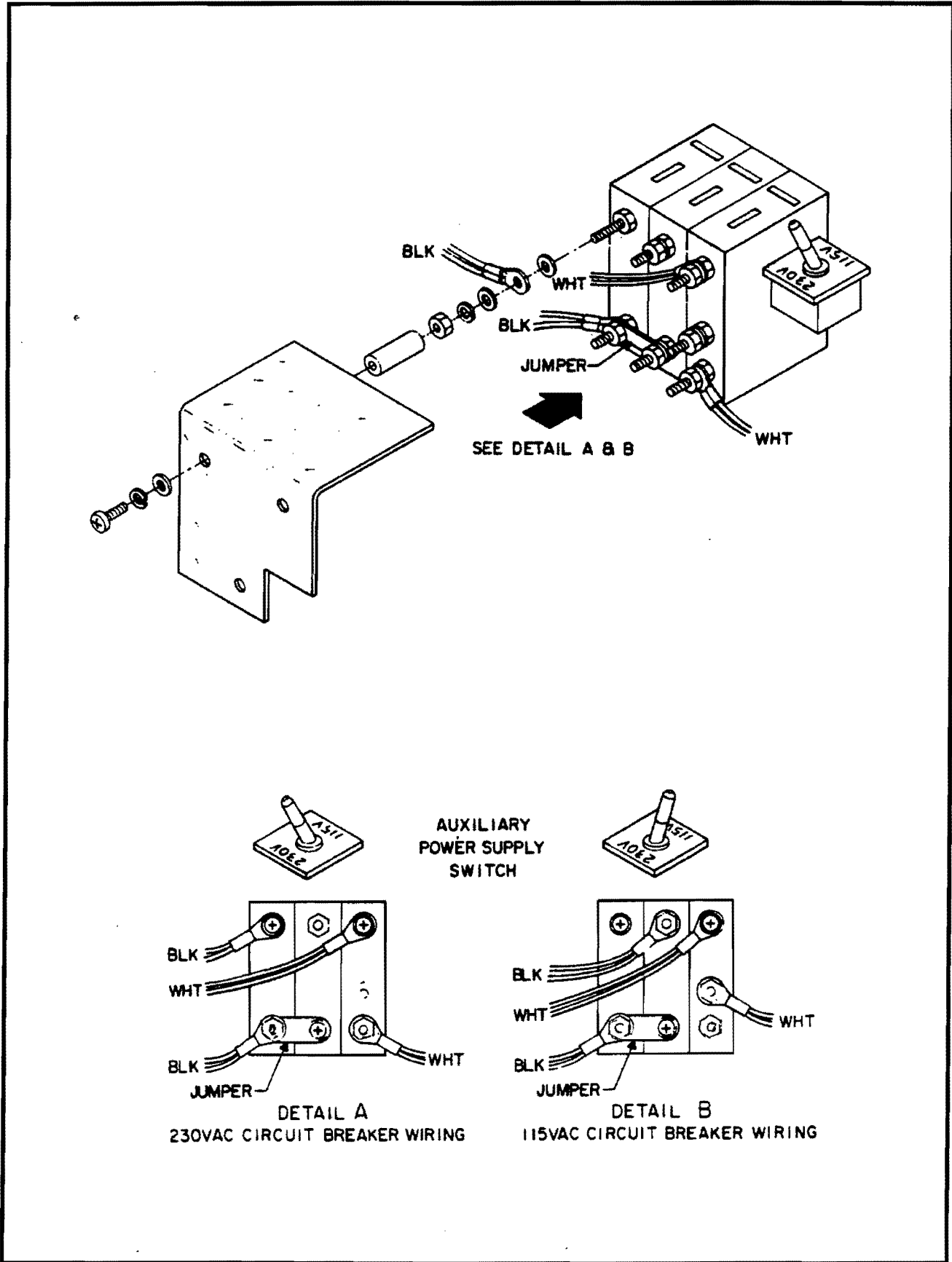
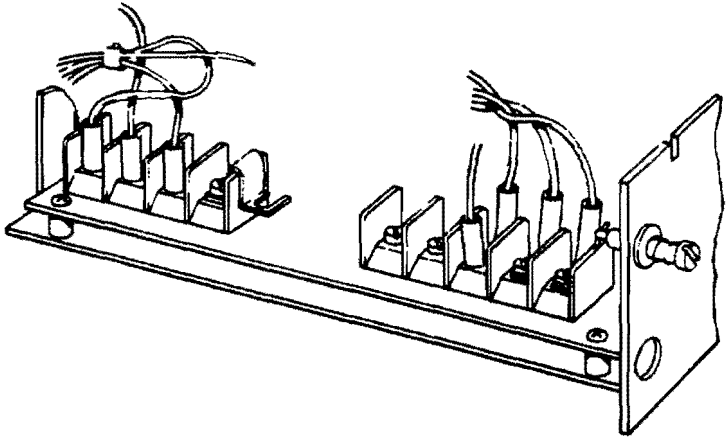
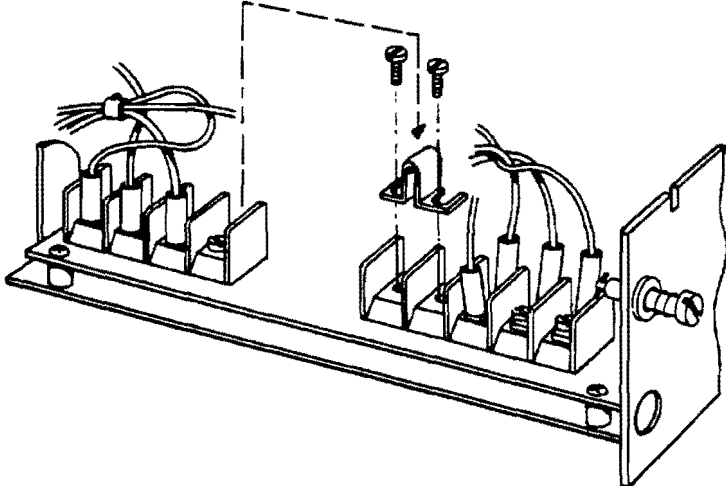


Figure 2.7 Voltage Customizing - Circuit Breaker/Auxiliary Power Supply.

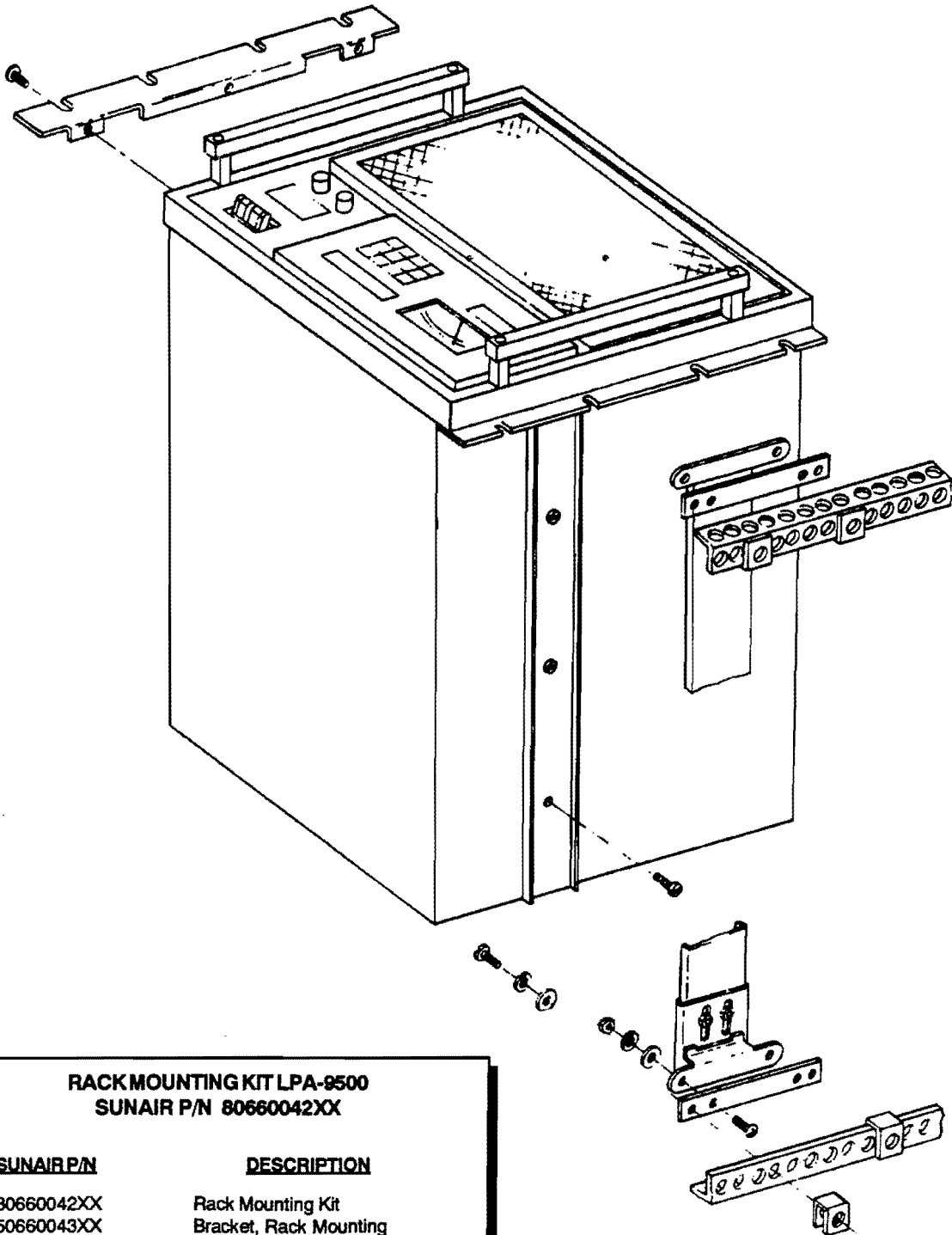


230VAC UNIT



CONVERTING 230VAC UNIT TO 115VAC

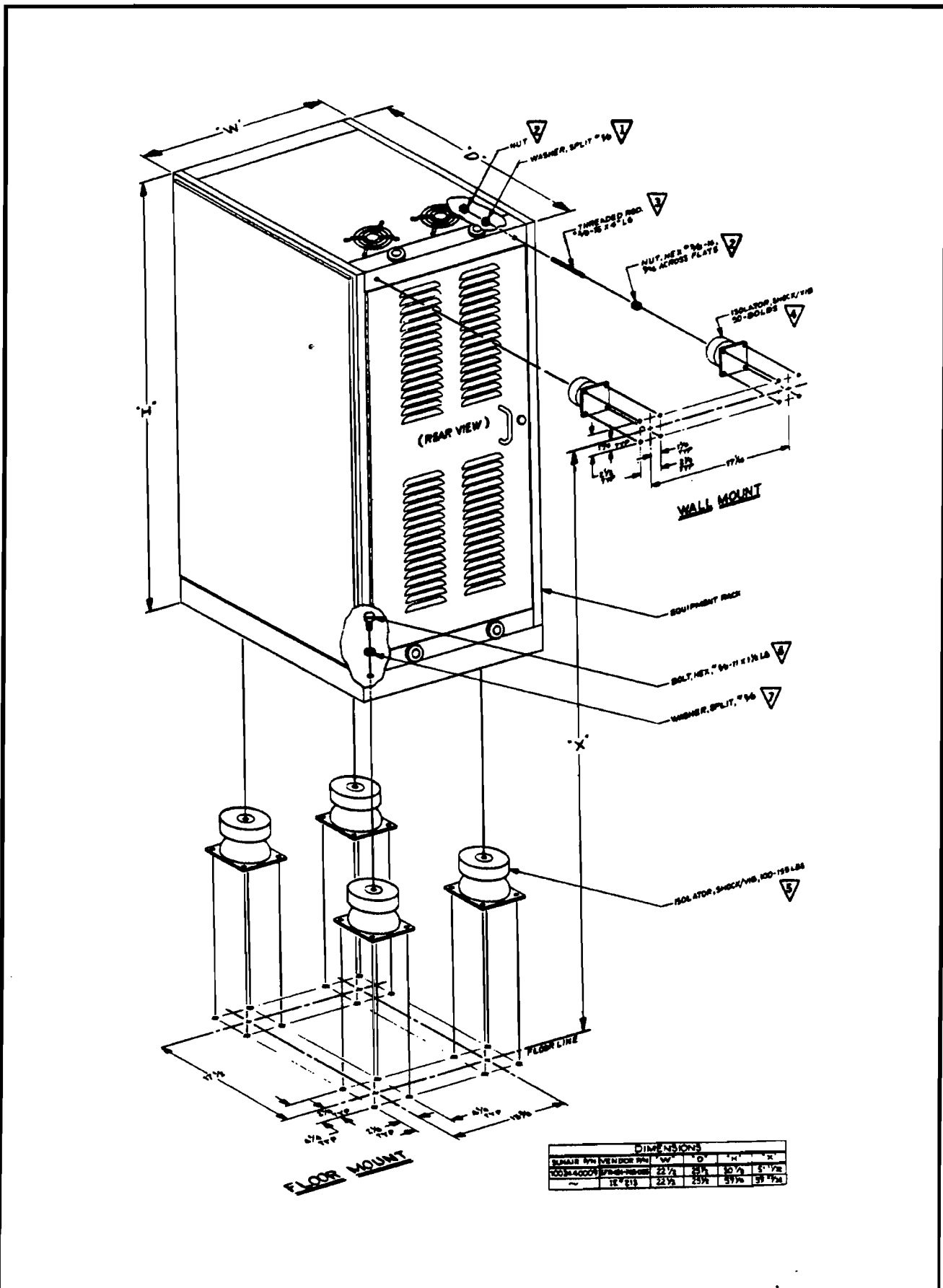
Figure 2.8 Voltage Customizing - RF/PS Module A4 (4 Each).



**RACK MOUNTING KIT LPA-9500  
SUNAIR P/N 80660042XX**

<b>SUNAIR P/N</b>	<b>DESCRIPTION</b>
80660042XX	Rack Mounting Kit
50660043XX	Bracket, Rack Mounting
6032041204	Chassis Slide
0538750006	Nut, Clip 10-32
0538870001	Screw, Ornamental 10-32 x 1/2 L
1002860032	Shim, Plate LPA/PS

Figure 2.9 Rack Mount Slide Details.



DIMENSIONS					
SUNAIR 8741 VENDOR 9741	W	D	H	W	H
100-140000 8741-9500	22 1/2"	23 1/2"	30 1/2"	5 1/2"	
~	18" 1/2"	22 1/2"	23 1/2"	5 1/2"	31 1/2"

Figure 2.10.1 Shockmount Equipment Rack With Outline Dimensions And Details (Sheet 1/2).

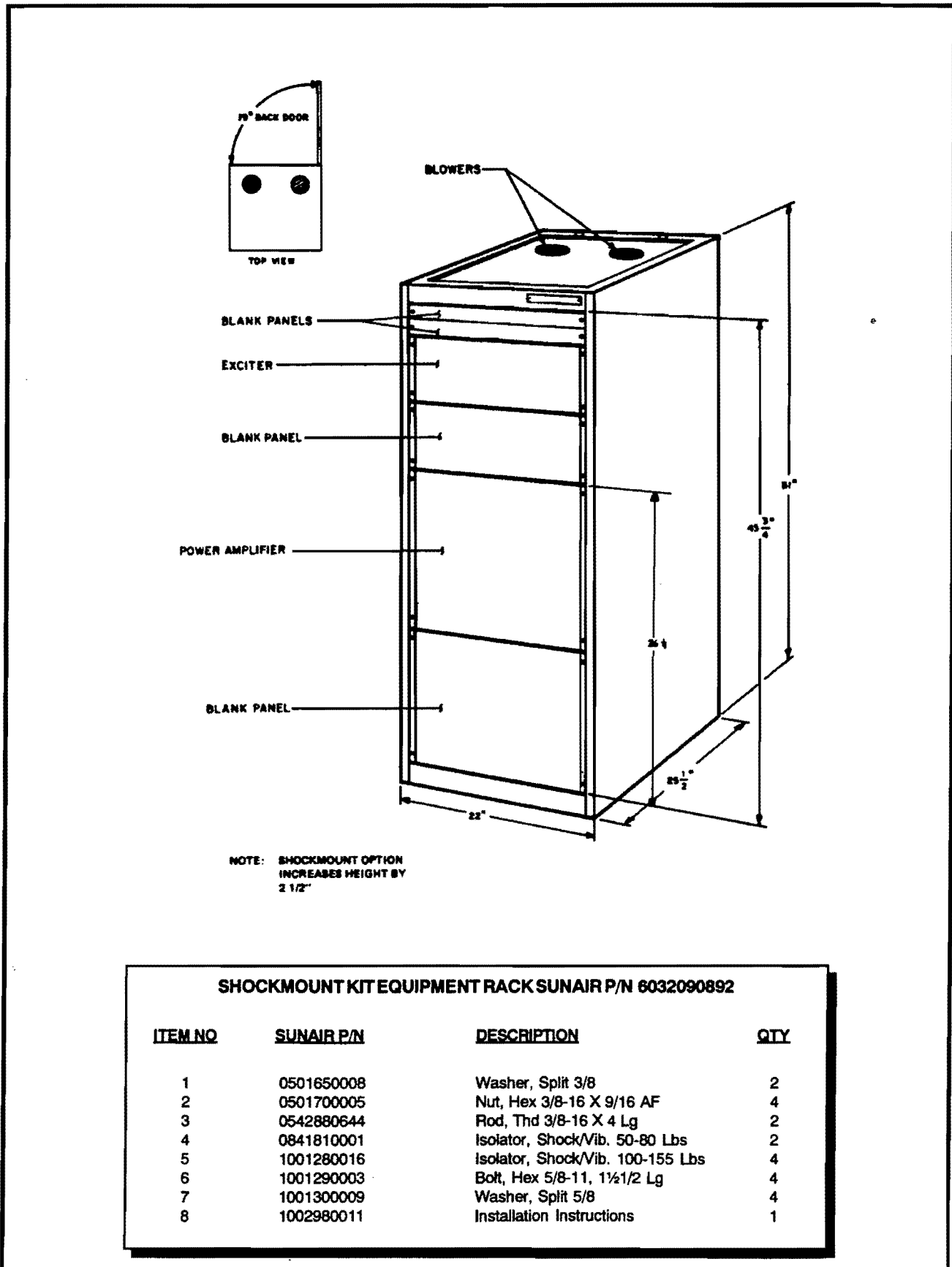


Figure 2.10.2 Shockmount Equipment Rack With Outline Dimensions And Details (Sheet 2/2).

## LPA-9500 LINEAR POWER AMPLIFIER

### INSTALLATION WARNING

If the LPA-9500 is installed with a RT-9000 that has previously been operating with a LPA-9600 (1kW) Amplifier, accomplish the following procedure before turning the LPA-9500 power on.

- 1.0 Turn the LPA-9500 Circuit Breaker (A8CB1) **OFF**.
- 2.0 Turn the RT-9000 power **ON**.
- 3.0 Set each operating channel position to **125 WATTS**. Press the **ENTER** key to store the value.
- 4.0 Turn the LPA-9500 power **ON** and program the RT-9000 operating channel positions with the desired RF power levels.



## SECTION III

### OPERATION

#### 3.1 GENERAL

This section provides information and instructions required for operation of a transceiver, the LPA-9500 500W Linear Solid State Power Amplifier and an automatic antenna coupler. Refer to the transceiver and the coupler Operation and Maintenance Manuals for detailed information regarding operation of these units.

#### 3.2 FUNCTION AND LOCATION OF CONTROLS AND INDICATORS

Table 3.1 lists the controls and indicators of the LPA-9500 front panel. Locations are shown in Figure 3.1.

#### 3.3 OPERATING THE LPA-9500

##### 3.3.1 OPERATION WITH 9000 SERIES EXCITER/TRANSCEIVER

Insure that the transceiver/exciter and the LPA-9500 are installed properly by referring to Section II in this manual and in the radio manual. If an antenna coupler is being used, insure its proper installation also.

- a) Apply power to the transceiver/exciter and LPA-9500.
- b) On LPA-9500, POWER lamp will light and LCD will display system message:
  1. Without an automatic antenna coupler, "SYSTEM OPERATIONAL, METER: FWD, PWR LVL: 500W".
  2. With a CU-9100 antenna coupler, "FAULT: COUPLER UNTUNED, METER: FWD, PWR LVL: 500W".
- c)
  1. Without an automatic antenna coupler, 'SYSTEM OPERATIONAL' is displayed and system is ready to operate. If instead the FAULT lamp on the LPA-9500 flashes, this indicates a fault in the LPA-9500. Reset the LPA-9500 by turning the transceiver/exciter off, wait 30 seconds, then turn back on; or at the LPA-9500 turn circuit breaker OFF then ON; or using the PWR LVL key on the keyboard, reset the LPA-9500. If FAULT does not clear, see Section V of this manual.
  2. With a CU-9100 antenna coupler FAULT, the LPA-9500 FAULT lamp will bum steadily. Follow steps d through f below.
- d) Select operating frequency on transceiver/exciter.
- e) Depress 'CPLR TUNE' button on the 9000 Series Front Panel.
- f) On LPA-9500, LCD will display system messages: "COUPLER TUNING", "COUPLER TUNED", "SYSTEM OPERATIONAL". After completion of tune, (maximum 2 seconds) system is ready for operation.
  1. If after tune attempt, FAULT lamp on LPA-9500 burns steadily, this indicates a fault in the coupler, antenna or feedline. Attempt retuning. If FAULT does not clear, see Section V of this manual and the 9000 Series or coupler manual.

2. If FAULT lamp on LPA-9500 flashes, this indicates a fault in the LPA-9500. Reset LPA-9500. If FAULT does not clear, see Section V of this manual.

**NOTE:** If an antenna coupler is not used, tuning is not required when the operating frequency of the transceiver/exciter is changed. With an antenna coupler, coupler tuning is required with each frequency change.

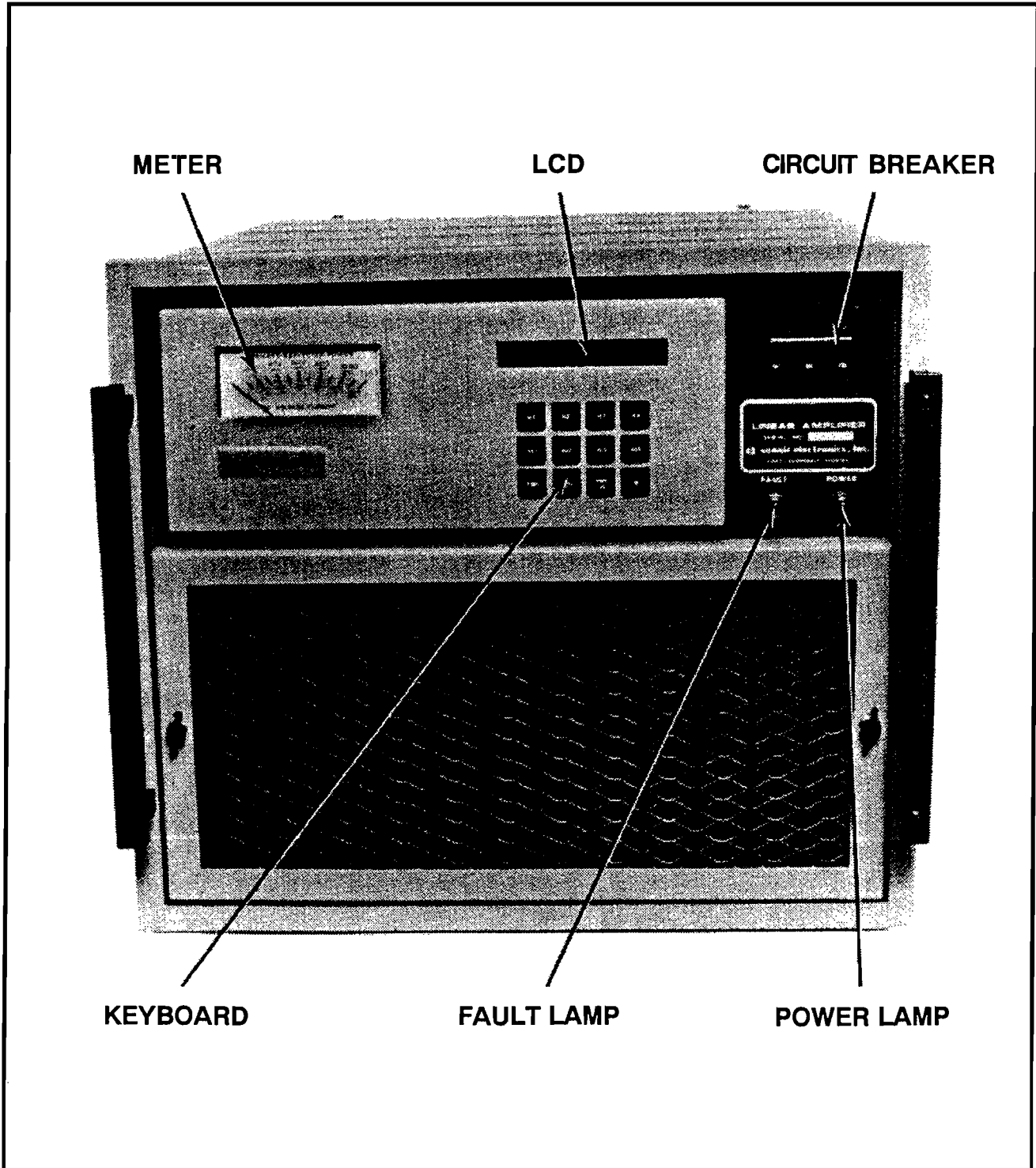


Figure 3.1 LPA-9500 Controls And Indicators.

**Table 3.1** Controls And Indicators - Front Panel.

CONTROL OR INDICATOR	FUNCTION
Meter, A2M1	Displays the following: <ol style="list-style-type: none"> <li>1. 0 - 650: Forward Power in watts</li> <li>2. 0 - 140: Reflected Power in watts</li> <li>3. 0 - 60V: Selected PA's voltage</li> <li>4. 0 - 18A: Selected PA's current</li> </ol>
LCD Assembly, A2A2	This Liquid Crystal Display (LCD) displays all systems messages and conditions.
Circuit Breaker, A8CB1	Applies primary power to the LPA-9500.
FAULT Lamp, A8DS2	A red fault lamp which, when flashing, indicates a fault in the LPA-9500. A steady fault lamp indicates a fault external to the LPA-9500.
POWER Lamp, A8DS1	A green lamp which indicates that primary power has been applied to the LPA-9500.
Keyboard, A2A1S1	The keyboard affords the operator/technician the ability to check individual voltage, current and power levels. The keyboard also provides the operator/technician with the ability to select desired power operating levels and to read failure indications.
	<ol style="list-style-type: none"> <li>1. I<sub>c</sub>#1: When depressed displays power supply current of PA#1 on meter.</li> <li>2. I<sub>c</sub>#2: When depressed displays power supply current of PA#2 on meter.</li> <li>3. V<sub>c</sub>#1: When depressed displays power supply voltage of PA#1 on meter.</li> <li>4. V<sub>c</sub>#2: When depressed displays power supply voltage of PA#2 on meter.</li> <li>5. FWD: When depressed displays forward output power in watts on meter.</li> <li>6. REFD: When depressed displays reflected output power in watts on meter.</li> <li>7. PWR LVL: When depressed changes output power level reading on LCD Assembly from 1 kW to 500 watts to 100 watts (bypass). Also used to reset LPA-9500.</li> <li>8. *: When more than one fault occurs, the LCD Assy will read 'Fault: MULTIPLE..PRESS *'. Depress this key to display each fault message. A different fault message will be displayed each time the key is depressed until all faults detected have had messages displayed.</li> </ol>

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## SECTION IV

### THEORY OF OPERATION

#### 4.1 GENERAL

Refer to Figures 4.1 and 5.4.

The LPA-9500 is an all-solid-state, self-contained, 500 watt linear power amplifier designed for use with 9000 Series transceivers or exciters. The unit is complete in one package and includes RF amplifier modules, power supplies, combining networks, harmonic filters and microprocessor control circuitry. Built-in diagnostics monitor the functional operation of the unit and report malfunctions in English language on a front panel liquid crystal alphanumeric display. In addition to reporting malfunctions, the microprocessor reconfigures the amplifier to a safe operating power level, or shuts it down completely, providing exciter only operation.

The RF circuitry consists of an input power splitter, two broadband RF power amplifier modules, an output power combiner, and a harmonic low pass filter. The input power splitter divides the exciter power equally among the two RF modules. Each RF amplifier module consists of two conservatively rated power amplifiers combined to provide over 300 watts power output capability. The output from the two RF amplifier modules is combined in the output power combiner, providing over 600 watts output capability in one feedline. The harmonic low pass filter attenuates the harmonic output of the amplifiers by at least 75 dB. The filter is split into 8 bands, each a maximum of one-half octave frequency span (1.5 x frequency), automatically selected by the exciter and buffered by the microprocessor circuitry, so that no tuning is required.

Each power amplifier module consists of an RF module, a power supply, and an RF module control assembly. The power supplies are high-efficiency switching regulators, with built-in current foldback and overvoltage protection. The RF module control assembly provides microprocessor-controlled AC power input to the power supplies, and regulated bias voltage to the dual amplifier, ensuring linearity.

#### 4.2 CONTROL PANEL MODULE A2

Refer to Figure 5.5.

The Control Panel Module is a plug-in panel arrangement on the front of the LPA-9500 which contains the meter, the LCD Assembly, and the 3 x 4 keyboard. The LCD Assembly A2A1 is used to display the power level selected, the diagnostic information, and the function selected to be displayed on the meter. The 3 x 4 keyboard is used to select the meter display functions. The PC Assembly Control Panel A2A2 provides the interconnections which permit the keyboard to close the proper row to the proper column when a key is depressed and pass the information on to the Computer MOTHERBOARD A3A1. The PWR LVL key is used to select the desired operating power level of the LPA-9500. The \* key is used to scroll through multiple fault indications. The meter is used to display any of the four collector currents, four collector voltages, and either forward or reflected power.

## 4.3 COMPUTER ASSEMBLY A3

### 4.3.1 PC ASSY COMPUTER MOTHERBOARD A3A1

Refer to Figure 5.6.

The Computer MOTHERBOARD acts as a back plane to interconnect the Peripheral Board A3A2 to the Microprocessor Board A3A3 and to interconnect these two boards to the balance of the LPA-9500. The Microprocessor Board plugs into A3A1J6 and A3A1J7. The Peripheral Board plugs into A3A1J8 and A3A1J9. Connector A3A1J1 provides routing for the signals to and from the power amplifier assemblies. Connector A3A1J2 interfaces to the Filter Module A5. Connector A3A1J3 connects to the Control Panel Module A2. Connector A3A1J4 interfaces with the transceiver/exciter and the antenna coupler. Connector A3A1J5 interfaces with the front panel of the LPA-9500 by transferring control signals to the front panel lights, the bypass relay, and overtemperature fan.

### 4.3.2 PERIPHERAL BOARD A3A2

Refer to Figures 4.2 and 5.7.

#### 4.3.2.1 GENERAL

The Peripheral Board A3A2 contains much of the analog circuitry used to monitor and control the LPA-9500. Many fault indicators and detectors are located on this board. These circuits are designed to inform Microprocessor A3A3U1 when a fault has occurred in the electronic operation of the LPA-9500. Also provided are circuits which interface it with a CU-9100 Digital 1000W Coupler.

The Peripheral Board is responsible for the following functions required for proper operation of the LPA-9500:

1. The signal BYPASS which causes the LPA-9500 to be bypassed in the event of a fault which in turn inhibits it from producing its power output.
2. The signals READY REMOTE, KW DETECT, FAULT REMOTE, KW POWER DETECT 1, and KW POWER DETECT 2 operate circuits in the 9000 Series Exciter/Transceiver.
3. The signal used to drive the fault lamp on the front panel of the LPA-9500.
4. The signal +28 VDC TUNE ENABLE which instructs the transceiver that a CU-9100 antenna coupler is attached and is tuning.

The Peripheral Board contains the multiplexer circuits which permit ten of the twelve front panel keys on the keyboard to select meter functions. Contained also is a DC to DC converter to provide contrast adjustment for the front panel LCD Assembly. Similarly, a DC to AC inverter is provided which drives the EL (electroluminescent lamp) backlight for night time viewing of the LCD Assembly. Also provided is the ALC/ACC Control Circuit which monitors the forward and reflected power. This circuit is responsible for selecting and producing the proper level of ALC or ACC needed to control the 9000 Series equipment attached to the LPA-9500.

#### 4.3.2.2 TEMPERATURE SENSE COMPARATORS U1, U2

The purpose of the Temperature Sense Comparators is to detect when the temperature on any of the two heatsinks on the two individual power amplifiers has reached either of two thresholds. When the temperature on any power amplifier heatsink reaches between 75° and 85°C, Microprocessor A3A3U1 causes the fan to operate at a higher speed. If the temperature continues to increase and reaches between 100°C to 120°C, A3A3U1 shuts down the

overheating power amplifier.

#### **4.3.2.3 OVERTEMPERATURE BUFFER U3**

The purpose of the Overtemperature Buffer U3 is to provide a means by which Microprocessor A3A3U1 can monitor the temperature of power amplifier assemblies 1, and 2. U3 also acts as a position from which A3A3U1 can monitor a signal called FILTER MODULE FAULT. This signal originates in the Filter Fault Detector U9C, U20A. If this signal is high, A3A3U1 will cause an indication on the LCD Assembly pointing out the faulty filter module. In addition, A3A3U1 will force the LPA-9500 to BYPASS operation to protect the filter module from damage.

#### **4.3.2.4 GAIN FAULT COMPARATORS U12**

The Gain Fault Comparators are a series of two detector circuits used to monitor the power gain of the individual power amplifier assemblies. The input power to a particular power amplifier assembly is compared to its output power. If the power amplifier is not producing the required amount of power, Microprocessor A3A3U1 is alerted.

#### **4.3.2.5 GAIN FAULT BUFFER U7**

The Gain Fault Buffer is the device by which Microprocessor A3A3U1 monitors the status of the gain of the two power amplifier assemblies. When any of the GAIN FAULT signals go high, A3A3U1 will cause a gain fault message to be displayed on the LCD Assembly A2A2. At the same time A3A3U1 will place the LPA-9500 in BYPASS. The signal VSWR FAULT is also monitored by A3A3U1 thru U7. If this signal goes high, A3A3U1 will place LPA-9500 in BYPASS, protecting it from the excessive VSWR.

#### **4.3.2.6 VC MONITOR COMPARATORS U11**

The purpose of the VC Monitor Comparators comprising U11 is to monitor the individual +48V power supplies that are mounted in each of the power amplifier assemblies. When the voltage in a power supply falls below +42.3 volts, the output of U11 goes high. Microprocessor A3A3U1 will sense this and remove the defective power supply from operation.

#### **4.3.2.7 VOLTAGE MONITOR COMPARATORS U13**

The purpose of the Voltage Monitor Comparators comprising U13 is to monitor the +28VDC and +5VDC utilized by the logic control circuitry in the LPA-9500. Microprocessor A3A3U1 monitors the outputs of U13 to determine if the voltages are too high or too low.

#### **4.3.2.8 VC MONITOR/VOLTAGE MONITOR BUFFER U19**

U19 is used by Microprocessor A3A3U1 to determine if any of the +48V power supplies is producing a voltage that is too low. U19 is also used to determine if the +28V logic control voltage is too low or if the +5 V logic control voltage is too high or too low. A3A3U1 periodically samples the inputs of U19. If any of these inputs are high, A3A3U1 takes appropriate action and alerts the operator to the condition.

#### 4.3.2.9 COLLECTOR VOLTAGE METER CONDITIONING CIRCUIT U14

U14 functions as four distinct identical stages. U14A conditions the +48V from PA #1 for display on the meter, U14C conditions the +48V for PA #2, U14B conditions the +48V for the PA #3, and U14D conditions the +48V for PA #4. (PA #3 and PA #4 are not installed in the LPA-9500). These circuits are voltage follower circuits which function identically. For example: For PA #1, +48V is applied to U14A through a resistor divider. The resistor divider reduces the +48V to +3V, which when applied through a 33.2 k ohm resistor and U17, the 16 Channel Multiplexer (approximately 470 ohms resistance), supplies approximately 80  $\mu$ A to the meter (3.7 k ohms resistance) causing a +48V indication. (Full scale on the meter is 100  $\mu$ A.)

#### 4.3.2.10 COLLECTOR CURRENT METER CONDITIONING CIRCUIT U16

The Collector Current Meter Conditioning Circuit performs a function similar to that performed by the Collector Voltage Meter Conditioning Circuit U14. U16 is divided into four sections, A thru D, and acts as a unity gain inverting amplifier which inverts a minus voltage to plus voltage for indication on the meter. Each one is capable of conditioning the voltage which is equivalent to the collector current being drawn by each power amplifier assembly and producing a proportionate current source to the meter to deflect it the proper amount. Full scale deflection of the meter is equivalent to 18 amps. If a power amplifier is drawing a current of 9 amps, the meter deflection would indicate a half-scale deflection resulting from a 50  $\mu$ A current source produced by the concerned section of U16.

#### 4.3.2.11 16 CHANNEL MULTIPLEXER U17

The purpose of the 16 Channel Multiplexer is to provide a means by which different current sources can be applied to the front panel meter as they are selected by the keyboard. Microprocessor A3A3U1 provides binary input selection which enables U17 to select the proper analog gate circuit output to be supplied to the meter.

#### 4.3.2.12 MULTIPLEXER SWITCH SELECTOR LATCH U18

The purpose of the Multiplexer Switch Selector Latch is to provide a means by which Microprocessor A3A3U1 can select the proper meter information to be sent to the front panel meter to be displayed. U18 provides the binary inputs to U17 to cause U17 to select the proper keyboard selected current source to be supplied to the meter.

#### 4.3.2.13 OVERCURRENT DETECTORS U15

The Overcurrent Detectors are comprised of four identical circuits U15 A thru D. U15A monitors the current in PA #1, U15B monitors PA #2, U15C monitors PA #3, and U15D monitors PA #4. (PA #3 and PA #4 are not installed in the LPA-9500). The detectors are set to detect a condition of 17.5 amps in the four power amplifier assemblies respectively. If a power amplifier is drawing too much current, then Microprocessor A3A3U1 is alerted to the overcurrent condition by U15. Once the condition is verified, then A3A3U1 removes that amplifier from operation, reducing the output of the LPA-9500 from 1000 to 500 watts.

#### 4.3.2.14 LCD ENABLE INVERTER U6E

A signal called LCD E is produced on the Microprocessor Board A3A3 and needs to be inverted before it can be used by the LCD Assembly A2A2 as an enable. U6E inverts the signal to a signal called E and sends it to the LCD Assembly where it permits the LCD to read or write information from or to Address/Data Bus BAD0 through BAD7.



#### 4.3.2.15 VSWR FAULT DETECTOR U9B

The purpose of the VSWR Fault Detector is to alert Microprocessor A3A3U1 that a VSWR fault is occurring, indicating that action is required. U9B may be adjusted to trip on VSWR faults of 2:1 or 3:1 using potentiometer A3A2R56. U9B compares the ratio of FWD PWR to REFD PWR. When REFD PWR exceeds the threshold established by R56, the output of U9B goes high alerting A3A3U1 of the excessive VSWR.

#### 4.3.2.16 FILTER FAULT DETECTOR U9C, U20A

The purpose of the Filter Fault Detector is to warn Microprocessor A3A3U1 when one of the filters of the eight available is malfunctioning in such a way that power is being sent into the filter assembly but is not exiting from it. U20A monitors the forward power leaving the LPA-9500. U9C compares the power entering the filter modules from the power amplifiers with the power leaving the LPA-9500. A3A3U1 monitors the output of U9C and if it goes high for longer than 50 ms, then A3A3U1 causes the LPA-9500 to go to BYPASS by shutting down the power amplifier assemblies, preventing them from damaging the filter module.

#### 4.3.2.17 RF PRESENT DETECTOR Q4

The RF Present Detector is connected to the signal P OUT MONITOR as is U9C of the Filter Fault Detector circuit. If power is present on P OUT MONITOR, Q4 will be turned on, producing a low on U8, the Coupler Interface Buffer. When Microprocessor A3A3U1 detects the low, then it knows through its software that the power amplifiers are producing power. Since certain faults can only be legitimate faults in the presence of RF, A3A3U1 will monitor these only if RF is present.

#### 4.3.2.18 FORWARD POWER METER CONDITIONING CIRCUIT U10B, U23A AND Q13

U23A and Q13 is a peak detector circuit used to drive U10B. U10B is configured as a voltage follower. Its purpose is to buffer the forward power information that the Peripheral Board receives. U10B produces a voltage which is sent to two places. Through potentiometer A3A2R61 this information is called FWD PWR LOCAL and goes to A3A2U17, the 16 Channel Multiplexer. (R61 is used to adjust the full scale level of FWD PWR LOCAL on the front panel meter of LPA-9500.) The other signal produced is FWD PWR REMOTE which is transferred to the meter on the 9000 Series Exciter/Transceiver display. The approximate power level of the LPA-9500 is read on this meter.

#### 4.3.2.19 REFLECTED POWER METER CONDITIONING CIRCUIT U10A, U23B AND Q14

U23B and Q14 is a peak detector circuit used to drive U10A. The function of the Reflected Power Meter Conditioning Circuit is identical to the function of U10B. A3A2R59 is used to adjust the full scale deflection of the reflected power information on the front panel meter of the LPA-9500.

#### 4.3.2.20 REFLECTED FAULT DETECTOR U9D

The purpose of the Reflected Fault Detector is to warn Microprocessor A3A3U1 when a severe reflected fault condition is occurring in the LPA-9500. If the reflected power level reaches and exceeds 200 watts, U9D goes high. A3A3U1 checks the reflected fault condition indicated by the Reflected Fault Detector to insure that it actually exists, and if so, immediately places the LPA-9500 in BYPASS.

#### 4.3.2.21 ALC/ACC CONTROL CIRCUIT U10C, U10D, U20A, B AND C, Q3 AND Q12

The purpose of the ALC/ACC Control Circuit is to provide ACC feedback to the transceiver when operating in AM, and to provide ALC feedback when operating in SSB or CW. The ALC/ACC Control Circuit monitors the summation of forward and reflected power and either increases or decreases the feedback to the transceiver, enabling the transceiver to provide the LPA-9500 with the correct power output level.

The ALC/ACC Control Circuit functions in one of two modes. It functions either as a 1000 watt or as a 500 watt ALC/ACC circuit. The signal 1 KW ALC/ACC is received from the Microprocessor Board A3A3. If this signal is a low it means that the Microprocessor Board wishes to operate in a 1000 watt mode. This low turns on transistors Q10 and Q11 shorting out potentiometers A3A2R33 and R43. With R33 and R43 shorted, A3A2R32 and R42 would be used to adjust the ALC and ACC control levels. If 1 KW ALC/ACC is a high indicating operation at 500 watts, this high turns off Q10 and Q11. R33 and R43 now become part of the effect controlling the ALC and ACC voltage.

U10C is used as a buffer to amplify the reflected power. A3A2R28 is used to adjust the output of U10C. Forward power and reflected power are summed and fed to R32 and R42 where all four potentiometers can affect the relative level. U10D amplifies the level adjusted by R42, or R42 and R43, and drives Q3. If the output of U10D decreases, the output of Q3 will decrease, reducing the ACC to the transceiver which increases the RF power supplied to the LPA-9500 to compensate. U20B and U20C amplify the level adjusted by R32 or R32 and R33 to drive Q12. If the output of U20C decreases, the output of Q12 decreases, reducing the ALC voltage to the 9000 Series Exciter/Transceiver which increases the RF power supplied to LPA-9500 to compensate.

#### 4.3.2.22 DC TO DC CONVERTER U21

The purpose of U21 is to provide the LCD Assembly A2A2 with a negative voltage which can be used to vary the display contrast and intensity. +5VDC is converted to -5VDC by U21 and applied to potentiometer A3A2R164. R164 is the adjustment for the display contrast and intensity.

#### 4.3.2.23 DC TO AC CONVERTER U22

The purpose of U22 is to provide an AC signal to the electroluminescent lamp which backlights the LCD Assembly A2A2. U22 accepts a +5VDC input and produces approximately 90VAC out which excites the electroluminescent backlight, permitting night viewing of the LCD display.

#### 4.3.2.24 COUPLER CONTROL CIRCUITS

##### 4.3.2.24.1 GENERAL

The coupler control circuits employed in the LPA-9500 to permit interfacing with the CU-9100 are all located on the Peripheral Board A3A2. The signals interfacing the CU-9100 to the LPA-9500 include: +28VOLT TUNE ENABLE, READY, FAULT, and COUPLER PRESENT. These signals are inputs to the LPA-9500 from the CU-9100. Several signals exit the LPA-9500 for use in the 9000 Series equipment. These are: READY REMOTE, KW DETECT, FAULT REMOTE, KW POWER DETECT 1 and KW POWER DETECT 2.

The LPA-9500 is notified that the CU-9100 is ready to tune when the LPA-9500 receives the signal +28 VOLT TUNE ENABLE. When the LPA-9500 detects this signal, it immediately selects BYPASS operation so that the power being sent through the LPA-9500 to the CU-9100 is the power from the transceiver. The LPA-9500 monitors signals READY and FAULT from the CU-9100. These signals indicate the status of the CU-9100. The LPA-9500 utilizes these signals in an algorithm which produces the signals sent to the 9000 Series equipment to display the condition of the CU-9100 on their front panel displays.

#### 4.3.2.24.2 COUPLER INPUT DETECTORS U6A-D, U9A

The purpose of the Coupler Input Detectors is to buffer signals that originate in the CU-9100. These signals are: +28 VOLT TUNE ENABLE, READY, COUPLER PRESENT, and FAULT. Microprocessor A3A3U1 monitors these signals through U8, Coupler Interface Buffer. The +28 VOLT TUNE ENABLE arrives at U9A as a high anytime the CU-9100 wishes to tune. The signal called READY when low, indicates to the LPA-9500 at the end of the tune cycle that the CU-9100 has tuned properly. COUPLER PRESENT is used by A3A3U1 to detect if a CU-9100 coupler is attached. FAULT when low, indicates to the LPA-9500 at the end of the tune cycle that the CU-9100 has failed to tune properly.

#### 4.3.2.24.3 COUPLER INTERFACE BUFFER U8

The Coupler Interface Buffer is used by Microprocessor A3A3U1 to monitor the signals from the coupler Input Detectors. U8 also monitors a signal called RF PRESENT which originates in the RF Present Detector Q4. When RF PRESENT is low, this indicates to A3A3U1 that RF is present in the LPA-9500, and that certain fault conditions can be monitored or detected. If the signal is high, meaning RF is not present, A3A3U1 will ignore those fault indications. Another input to U8 is a signal called +28V TOO HIGH. If this signal is high, it is an indication to Microprocessor A3A3U1 that the +28V is out of tolerance on the high side.

#### 4.3.2.24.4 OUTPUT LATCH U4

Latch U4 outputs the signals produced by microprocessor A3A3U1 to activate the display messages on the 9000 Series equipment front panels and the FAULT light on the front panel of the LPA-9500. The output signals are READY, KW DETECT, FAULT, KW POWER DETECT 1, KW POWER DETECT 2 and BYPASS. The signal BYPASS is produced by A3A3U1 when it wishes the LPA-9500 to operate in BYPASS. This command is issued both when A3A3U1 detects fault conditions within its operation which warrant going to BYPASS, and when the CU-9100 is tuning.

#### 4.3.2.24.5 LAMP DRIVER/RELAY DRIVER CIRCUIT U5G, Q1, Q5, Q6

The purpose of the Lamp Driver/Relay Driver Circuit is to provide drive capability to the signals exiting Latch U4 to the 9000 Series equipment and to control the Bypass relay. Transistors Q1, Q5 and Q6 control READY REMOTE, KW DETECT, and FAULT REMOTE respectively. Q6 also controls FAULT OUT LOCAL. U5G receives a high anytime Microprocessor A3A3U1 wishes to operate the LPA-9500 in BYPASS. This causes the Bypass relay K18 in the A5 Filter Module to energize.

#### 4.3.2.25 BITE BITS

The LPA-9500 is capable of self-checking certain elements of its circuit operation. Microprocessor A3A3U1 controls these BITE BITS, monitors them for circuits not operating properly and takes action accordingly.

### 4.3.3 MICROPROCESSOR BOARD A3A3

#### 4.3.3.1 GENERAL

Refer to Figures 4.3 and 5.8.

The Microprocessor Board A3A3 produces three major functions in the LPA-9500. The first function is the interfacing of the Keyboard to the meter. The second function is the driving of the LCD Display providing it with intelligent information. The third function is the controlling of the diagnostic feature, in which all major functions within the LPA-9500 are monitored both to provide failure information and to trigger corrective action if a failure occurs.

Specific to the three major functions, the Microprocessor Board A3A3 is responsible for the following activities of the LPA-9500:

- a) Monitors overcurrent signals and reflected fault signals from the Peripheral Board A3A2.
- b) Produces drive dump commands to control the Power Amplifier Assemblies A4A3 (2 each).
- c) Monitors band information from the 9000 Series equipment so that it can produce the controlling signals for the Filter Module Assembly A5 to select the proper Band Filter (1 thru 8).
- d) Produces buffered address/data AD0 thru AD7 lines to the Peripheral Board and the LCD Assembly A2A2.
- e) Produces signals A0 and A1 for the LCD Assembly to indicate to the LCD Assembly whether the information it has received from the Microprocessor Board is a command or a data word.
- f) Produces chip selects which are used to enable various bus driven components on the Peripheral Board.
- g) Produces signals which drive the power supply relays providing +48VDC to the Power Amplifier assemblies (2 each).

#### 4.3.3.2 MICROPROCESSOR U1

The Microprocessor U1 controls the functions of Microprocessor Board A3A3. U1 contains three major busses. The first bus is AD0 thru AD7, a multiplexed address/data bus containing either data or address information. The second bus is A8 thru A15 and always contains address information. The third bus is the control/status bus which contains signals RD, WR, IO/M, and ALE.

When U1 wishes to obtain an instruction from EPROM U9 it produces an address on AD0 thru AD7. U1 then produces an ALE signal which latches that address into Address Latch U8 which forwards it to U9. Once the address is directed to U9, U1 then produces RD to U9 and U9 responds by giving the instruction stored at that address onto the AD0 thru AD7 line. U1 reads the instruction, then acts upon it.

When U1 requires a Device Selection mechanism to communicate with its input or output ports, it produces the address on the A8 thru A15 address lines causing that port device to become enabled. When the device is enabled, it can either read information from or write information to U1 on the AD0 thru AD7 lines.

The signals present on the control/status bus are used by U1 to transfer information.  $\overline{RD}$  is used by U1 when it wishes to obtain (read) information from a device on the AD0 thru AD7 lines. WR is used by U1 when it wishes to give (write) information to a device on the AD0 thru AD7 lines. IO/M is used by U1 to discriminate between IO and Memory operations. If U1 is reading from or writing to memory, the IO/M line is low. If U1 is reading from

or writing to IO the  $\overline{IO/\overline{M}}$  line is high. ALE (address latch enable) is pulsed high when U1 wishes to write an address from AD0 thru AD7 lines into the Address Latch U8 to select an instruction from EPROM U9. When data is present on the AD0 thru AD7 lines, ALE is low.

#### 4.3.3.3 ADDRESS LATCH U8

When Microprocessor U1 produces an address on AD0 thru AD7, it also produces an ALE signal which latches the address into U8. U8 provides continuous address information A0 thru A7 for the EPROM U9 by sorting out the address from the data information on the AD0 thru AD7 bus. U8 also provides A0 and A1 to drive the LCD address buffer U19.

#### 4.3.3.4 EPROM U9

The EPROM U9 is the storage device where Microprocessor U1's programming code is stored. When U1 wishes to fetch an instruction from U9, it will produce the upper order address of the instruction it wishes to read on lines A8 thru A15, and the lower order address of the instruction it wishes to read on lines AD0 thru AD7. The lower order address on AD0 thru AD7 is connected to address latch U8. When the address information at U8 is correct and present, U1 will issue an ALE signal to latch that information into U8, causing the output of U8, A0 thru A7, to contain the lower order address information of the instruction which U1 wishes to fetch from U9. At the same time, U1 also causes Memory Device Selector U6A, U7, U21A, to issue a signal called EPROM to enable U9. After a short delay, U1 will issue a  $\overline{RD}$  signal to U9 causing U9 to deposit on its output lines, AD0 thru AD7, the instruction that was stored at the address selected. When U1 causes the  $\overline{RD}$  signal to make a low to high transition, it will fetch into itself the instruction on AD0 thru AD7 it has selected to act upon.

#### 4.3.3.5 POWER CLEAR CIRCUIT U2C, U4A, U4B

The Power Clear Circuit is necessary to initialize Microprocessor U1 when power is first applied to the LPA-9500. The circuit provides a low on pin 36 of U1 for a time after the voltage is applied to the LPA-9500. This holds U1 reset until transient conditions have passed. At that point, U1 is permitted to run because the Power Clear Circuit transfers U1 pin 36 to a high.

#### 4.3.3.6 CRYSTAL OSCILLATOR U34

U34 provides a reference frequency of 6.144 MHz to Microprocessor U1. All activities of U1 occur at rates dependent on the output of U34.

#### 4.3.3.7 MEMORY DEVICE SELECTOR U6A, U7, U21A

When U7A or U7B produce a low output they are doing so as a result of the addresses being selected properly by Microprocessor U1 on their inputs from bus A8 thru A15. The low output enables a particular memory device, either EPROM U9, RAM U13 or the LCD Assembly, to allow Microprocessor U1 to read from or write to that device.

#### 4.3.3.8 DIVIDE BY 2 CIRCUIT U24B

U24B is a flip-flop which receives the clock output of Microprocessor U1. The clock frequency is 3.072 MHz on input pin 11 of the flip-flop. U24B divides its input and produces an output frequency of 1.536 MHz on pin 9 to the timer portion of RAM-IO-TIMER U13.

#### 4.3.3.9 RAM-IO-TIMER U13

U13 contains a RAM (Random Access Memory), three IO ports (has input or output capabilities), and a TIMER which is driven by U24B.

The RAM is used by Microprocessor U1 as a temporary storage facility for information that needs to be stored for future access or which is being acted upon in real time. The IO Ports (Input/Output Ports A, B, C) are all selected by U1 for output operation. Port A (PA0-PA7) provides the BAND 1 thru BAND 8 information for driving the proper relay in the Filter Module A5. Port B (PB0-PB7) outputs the latch signals which drive the power supply relays providing the power amplifier assemblies with +48 VDC. Also output are Drive Enable which disables or enables the PA assemblies' drive capability, Overtemp Command to increase the speed of the blower fan 1 KW, ALC/ACC to tell U1 to operate the LPA-9500 at 500 watts, and the Bite Bit 2 which allows U1 to self-test various ports on the Microprocessor Board. Port C (PC0-PC5) outputs sequential lows on Rows 1-3 to the Keyboard Assembly, in conjunction with U1 reading the four columns to determine which key is being depressed. This permits U1 to act accordingly to each key stroke on the Keyboard Assembly. Also, output from Port C is the reset for the Watchdog circuit, QUICK FAULT RESET to reset the flip-flop section of the Drive Dump control circuit, and Bite Bit 1 which, like Bite Bit 2, is used as part of the Microprocessor Board's self-diagnostic routine. The TIMER portion of U13 is employed to generate the Real Time Interrupt which is used to relieve U1 of timing routines. The Real Time Interrupt allows U1 to keep track of how much time has transpired simply by counting interrupts while permitting U1 to process other programming code between interrupts.

#### 4.3.3.10 RELAY DRIVERS U14, U15

The purpose of the relay drivers is to accept a high from U13 and convert that signal to a low with sufficient current-carrying capability to energize a relay.

#### 4.3.3.11 WATCHDOG CIRCUIT Q1, U2B, U3B

The purpose of the watchdog circuit is to monitor the actions of Microprocessor U1 as it processes programming code. If U1 fails to function properly, then the watchdog circuit will time out and reinitialize U1. The watchdog timer U3B is reset, preventing it from timing out every time a Real Time Interrupt occurs as long as U1 is processing properly.

#### 4.3.3.12 INPUT/OUTPUT DEVICE SELECTOR U10C, U10D, U11, U12

The purpose of the Input/Output Device Selector is similar to that of the Memory Device Selector U6A, U7, U21A. However, the Input/Output Device Selector accesses I/O mapped devices rather than memory mapped devices. U11 functions as the device selector for all input devices and U12 functions as the device selector for all output devices. U11 and U12 are controlled by the IO/M signal. In addition, U11 is controlled by the address signals A12 thru A15 and RD. The device accessed by U11 places its information on the AD0 thru AD7 bus allowing U1 to read its contents. U12 functions as does U11 except that it uses the signal WR. The device accessed by U12 is written to by U1 with the information contained on the AD0 thru AD7 bus. U10C and U10D permit a device to be controlled which has both input and output capability.

#### 4.3.3.13 MEMORY I/O DEVICE SELECTOR U10B, U35

This device is present since RAM U13 requires treatment either as a memory device or as an input/output device. U35 uses the address lines A12 thru A15 to select the output desired by Microprocessor U1 to control U13 either as a RAM or as an I/O device.

#### 4.3.3.14 AD0-AD7 BUFFER CIRCUIT U2D, U2E, U6C, U20E, U20F, U32

The purpose of the AD0 thru AD7 Buffer Circuit is to prevent AD0 thru AD7 signals from leaving the Microprocessor Board A3A3 unless the signals are necessary either to write to a device on the Peripheral Board A3A2 or to write to the LCD Assembly A2A2. Containing AD0 thru AD7 on the Microprocessor Board A3A3, except when necessary to communicate off board, minimizes the conducted and radiated RF produced by the bus signals. This circuit also permits Microprocessor U1 to read information from the Peripheral Board and the LCD Assembly which is placed on the AD0 thru AD7 lines.

#### 4.3.3.15 LCD ADDRESS BUFFER U19

The purpose of U19 is to provide the address signals A0 and A1 to the LCD Assembly A2A2, only when Microprocessor U1 wishes to read from or write to the LCD. U19 is enabled by the signal SELECT LCD from the Memory Device Selector U7.

#### 4.3.3.16 LCD ENABLE CIRCUIT U6B, U10A

This is a two-gate circuit intended to provide the proper device enable to the LCD Assembly A2A2. When the LCD is enabled by this circuit, Microprocessor U1 will either read or write data or commands from or to the LCD Assembly via the AD0 thru AD7 bus.

#### 4.3.3.17 WAIT STATE GENERATOR U4C, U4D, U4E, U5

The Wait State Generator produces a wait condition which forces Microprocessor U1 to delay one clock cycle when communicating with the LCD Assembly A2A2. The Wait State is necessary because the LCD Assembly A2A2 requires more time to have information written to it or read from it than U1 normally would take. The generator is a dual flip-flop device which is stimulated initially by signal SELECT LCD. A low from the generator on U1 pin 35 RDY, will hold U1 until the LCD Assembly has an opportunity to accept data or to produce data.

#### 4.3.3.18 DRIVE DUMP CONTROL CIRCUIT Q2-Q5, U22, U23, U24A, U26A, U27

The purpose of the Drive Dump Control Circuit is to provide rapid response to certain fault conditions. The circuit produces interrupt signals to the Interrupt Control Circuit U28, U29 anytime a reflected fault or an overcurrent fault occurs.

If a reflected fault occurs, U22A pin 6 goes low causing U26A and U27A-C to output a high on Drive Dump lines 1 through 4 to the power amplifier assemblies. This causes each power amplifier assembly to turn off its input to protect itself from the effects of the reflected fault. In addition, a high on U22A pin 5 causes U28 to notify Microprocessor U1 that a reflected fault has occurred. This allows U1 to take the appropriate action of placing the LPA-9500 in BYPASS.

If an overcurrent occurs, either U22B, U23A, U23B, or U24A will set. The overcurrent function causes an activity similar to that caused by a reflected fault. A Drive Dump is issued to the affected power amplifier assembly(s) and U28 interrupts U1 notifying U1 that an overcurrent has occurred. If the overcurrent condition is continuing rather than transient, the LPA-9500 will go to BYPASS.

After either a reflected fault or an overcurrent occurs, Microprocessor U1 instructs U13 to issue a signal called QUICK FAULT RESET. This signal is used to reset U22A, B, U23A, B and U24A. U1 resets these flip-flops to

determine if a fault actually does exist. If the fault condition is genuine and not caused by a transient, the respective flip-flop will be set again by the fault signal again notifying U1. The DRIVE ENABLE signal is used by U1 if it wishes to initiate its own DRIVE DUMP. This occurs during power level changes to protect the Bypass relay and during band changes to protect the band relays.

#### **4.3.3.19 BAND BUFFER CIRCUIT U30, U31, U33**

The purpose of the Band Buffer Circuit is to provide a means by which Microprocessor U1 can determine which filter band has been selected in the transceiver driving the LPA-9500. When a band change occurs, U29 of the Interrupt Control Circuit will detect it and inform U1 that a band change has occurred. The band information is read on bus lines AD0 thru AD7 via U33. When U1 sees that a band change has occurred, U1 will produce an equivalent band change on Port A of RAM U13.

#### **4.3.3.20 INTERRUPT CONTROL CIRCUIT U28, U29**

The purpose of the Interrupt Control Circuit is to notify Microprocessor U1 when an overcurrent has occurred, when a reflected fault has occurred, or when a band change has occurred. U1 will stop all activity and act upon the cause of the interrupt.

#### **4.3.3.21 KEYBOARD INPUT BUFFERS U16A-U16D, U18, U20A-D**

The purpose of the Keyboard Input Buffers is to provide Microprocessor U1 a means by which it can detect which key of the 3 x 4 keyboard is being pushed. U1 reads Column 1 thru 4 of the keyboard via U18 on the AD0 thru AD7 lines.

#### **4.3.3.22 KEYBOARD PUSHED INTERRUPT GENERATOR U4F, U16F, U17A**

The purpose of the Keyboard Pushed Interrupt Generator is to alert Microprocessor U1 immediately when one of the twelve keys on the front panel keyboard is pushed. A high on RST6.5 interrupts U1, causing U1 to enter its keyboard scan routine to determine which key is being pushed. U1, when it determines which key is being pushed, acts accordingly.

#### **4.3.3.23 +12V GENERATOR R36, CR8**

The purpose of the +12V Generator is to produce the +12V necessary for the band buffer circuits to permit them to interface with the +12V band signals being supplied from the transceiver. +28 VDC is received at R36 from the Auxiliary Power Supply. CR8 is a zener diode which regulates the +28 VDC to +12 VDC.

#### **4.3.3.24 VOLTAGE PRESENT INDICATORS CR9-CR11**

The Voltage Present Indicators are a series of three LED's which are positioned on the board to indicate the state of three voltages. When the LED's are illuminated, the voltage they represent is correct. CR9 indicates the state of +5VDC, CR10 indicates the state of +12VDC, and CR11 indicates the state of the +28VDC.



## 4.4 **RF/PS MODULE A4**

### 4.4.1 **RF MODULE CONTROL ASSEMBLY A4A1**

Refer to Figure 5.9.

This assembly contains the bias voltage regulators for each of the two pairs of amplifier transistors in a single rf module. The AC power relay, which is energized by the microprocessor circuitry to control input to the module's main power supply, is also a part of this module.

Voltage sensing elements located on the RF Power Amplifier are used by U1 and U2 to govern the bias voltage for each pair of rf output transistors. Bias adjust potentiometers R10 and R15 are used to initially establish the correct operating idle current for each transistor pair. Actual idle current is supplied by power transistors Q3 and Q4. R6 and R11 provide current sense feedback to U1 and U2, respectively, to limit the bias supply current to safe limits in case of an amplifier failure.

One complete RF Module Control Assembly is provided for each RF Module Assembly A4.

### 4.4.2 **+48VDC SWITCHING POWER SUPPLY A4A2**

Refer to Figure 5.10.

#### 4.4.2.1 **GENERAL**

The +48VDC Switching Power Supply is of the pulse-width modulating type, employing high efficiency and small size. The AC input is converted to high voltage DC (Input Section). The DC drives a half-bridge inverter operating at 50 kHz (Inverter Section). The DC output voltage is provided from associated rectification and filtering components via an output transformer driven by the Inverter Section (Output Section). Sense leads connected to the load provide the regulator with an indication as to whether the pulse-width modulation control voltage must increase or decrease in size, depending on line and load conditions (Control Section). Short circuit protection is provided through a current limit circuit which limits the maximum amount of current available from the supply to 120% of the nominal output current (Current Limiting). Overvoltage protection is provided to insure the power supply will not exceed a preset level (Overvoltage Protection).

#### 4.4.2.2 **INPUT SECTION**

The 110VAC to 220VAC is routed through RFI coil L1 to prevent power supply induced noise from reaching the AC line. Surgeistors R1 and R2 limit the inrush current when power is first applied to the power supply. Bridge rectifier CR1 rectifies the AC input voltage. Capacitors C5-C8 provide the inverter section with  $\pm 175$ VDC.

#### 4.4.2.3 **INVERTER SECTION**

Transformer T1 receives a pulse-width modulated signal from the control section which turns on Q1 and Q2 alternately. CR4-7, CR8-11, and C15-C16 provide negative bias from Q1 and Q2 for faster turn-off. The action of Q1 and Q2 is applied to the primary side of T2 in the form of a pulse-width modulated waveform swinging from +175VDC to -175VDC at a 50 kHz rate.

#### 4.4.2.4 CONTROL SECTION

The main component of the control section is regulator U1. Pin 1 monitors the output voltage of the power supply and makes the necessary correction to the pulse-width modulator. This correction will be necessary when (1) the voltage adjust pot R35 is moved, (2) the load current has changed, (3) the AC line voltage has changed. The output of the pulse-width modulator may be seen as two signals 180° out of phase at U1 pin 12 and U1 pin 13.

The two signals are used to drive transistors Q4 and Q5. A 20-30 volt bias supply for the control section is generated by T2 winding through CR22, CR23 and filtered by C30. The push-pull circuit derived from Q4, Q5, T1 winding, CR21 provides the necessary control signal required to drive the Inverter Section. R9 and C19 provide the RC time constant for a 100 kHz clock which can be seen at U1, pin 3. This clock is internally divided by two within U1.

#### 4.4.2.5 OUTPUT SECTION

The action of pulse-width modulation through T2 provides a means of increasing or decreasing secondary output voltage even though the peak-to-peak value remains unchanged. The secondary voltage is rectified by CR24 and filtered by L2, L3 and C36 thru C41. C43, C44 and R33, R34 are provided as protection if the sense leads are left open. R32 is used for preload, minimum load to insure proper operation of the pulse-width modulator at a "no load" condition.

#### 4.4.2.6 CURRENT LIMITING

Current limiting is accomplished by determining when a certain level of inverter section current has been reached. T3 is in series with T2 and has a single-turn primary side. The secondary side of T3 has 100 turns. R26 connected across T3 will cause a voltage to be generated across R26 proportional to the amount of current going through the primary of T3. Hence, T3 primary current will be proportional to output load current. The voltage generated across R26 is rectified and filtered by CR18, CR19 and C27. This voltage, proportional to load current, is programmed with R24 (current limit adjust) to turn on Q3 when the power supply is loaded to 120% of the nominal output current. When Q3 is on, it will affect the pulse-width modulator, such as to limit the output current to 120% of nominal, even with a further increase in load (i.e., a direct short across the output of the power supply).

#### 4.4.2.7 OVERVOLTAGE PROTECTION

When the output voltage increases over 120% of the nominal value, it exceeds the breakdown voltage of CR20. With CR20 on CR12 will turn on and a voltage of .2 volts will be seen on pin 4 of U1 with respect to pin 5 of U1. This condition will cause the pulse-width modulator to go to absolute minimum pulse-width and will cause the output voltage to collapse to nearly zero volts. CR12 will return to "off" condition by removing the AC input.

### 4.4.3 POWER AMPLIFIER ASSEMBLY A4A3

Refer to Figures 4.4 and 5.11.

The two Power Amplifier Assemblies A4A3 contain the solid state power amplifiers which produce the approximate 13 dB power gain of the LPA-9500. Refer to Figure 4.4 for the block diagram of one PA Assembly.

A PA Assembly is composed of two push-pull class AB power amplifiers which are interconnected by an input power splitter circuit and an output power combiner circuit. Refer to the schematic diagram Figure 5.11. Notice

that the amplifier circuits above and below the splitter and combiner are identical. Therefore, the description of the upper amplifier (Q2-Q3) will apply equally to the lower amplifier (Q4-Q5).

The Input Splitter T1 is a hybrid transformer circuit which splits the 50 ohm module input into two 100 ohm outputs to drive the two push-pull amplifiers. The circuit has isolation between the two 100 ohm outputs which prevents any interaction between the amplifier inputs. Assuming a 50 ohm driver, each amplifier input is presented with a 100 ohm impedance regardless of the other amplifier's input impedance. This preserves the performance of the remaining push-pull stage, should one amplifier fail. In this failure condition, the splitter dump resistors R6-R8 absorb part of the input power that would normally go to the failed amplifier.

Referring to the top amplifier Q2, Q3 the stage input impedance is matched to 100 ohms by the input transformer T3. Computer designed RCL networks R11 thru R20, C10, C12, C13, and L9, L10 establish the stage input impedance and, in conjunction with R34, R35 and feedback from output transformer T7, flatten the gain variation over the 1.6 to 30 MHz frequency range.

Each push-pull stage is biased separately. Temperature sensing diodes CR6, CR7 provide thermal feedback to the bias supply board for bias temperature tracking. Controls for quiescent (idling) current are provided on the bias supply board.

Output transformer T7 matches the stage output impedance to 100 ohms. The 48V collector bias is applied to the high current center tap formed by the shield conductors of the coaxial windings on T7. The balun transformer T5 converts the push-pull output to a 100 ohm unbalanced configuration suitable for driving the output combiner.

T2 combines the two 100 ohm amplifier outputs into a single 50 ohm module output which delivers a nominal output power of 300 watts. This output combiner has properties similar to the input splitter. Each amplifier output is presented a load impedance of 100 ohms, regardless of the condition of the other output. In the event that one amplifier is delivering more output power than the other, half of the power imbalance is dissipated in the combiner dump resistor R40, and the other half appears as additional module output power.

CR2 is a power PIN diode which shorts the module input to ground when certain fault conditions exist. This removes drive from the power amplifiers during periods of uncertain loading. Normally, 40 volts of reverse bias is applied to the PIN diode thru R5. When Microprocessor A3A3U1 determines that a fault exists, it causes J3 pin 2 to go high, saturating the dump transistor Q1. Q1's collector pulls the cathode of CR2 low. CR2 is then forward biased by current from unregulated 5 volts thru R9, T4, and T1, shunting any input signals to ground.

Input and output BITE samples are developed in CR1, CR3 and associated circuitry. Frequency compensated resistive voltage dividers deliver RF samples to the diodes which develop a positive output voltage for the input BITE sample and a negative voltage for the output BITE sample.

Thermistor RT1 is mounted to the heatsink close to the PA transistors. The resistance of the thermistor is a positive function of heatsink temperature, rising from a nominal resistance of 100 ohms at room temperature to several thousand ohms at 85°C. This change in resistance is monitored by Microprocessor A3A3U1 and a temperature fault is generated when the resistance exceeds the preset threshold.

## 4.5 FILTER MODULE A5

Refer to Figure 5.12.

The Filter Module consists of a fan cooled shielded enclosure, a MOTHERBOARD, eight plug-in filter assemblies, and a plug-in wattmeter assembly.

#### **4.5.1 PLUG-IN FILTER MODULES A5A1 THRU A5A8**

The band filters consist of three sections each and cover a useful frequency span of one-half octave maximum. The bands are divided as follows: 1.6 to 2 MHz, 2 to 3 MHz, 3 to 4 MHz, 4 to 6 MHz, 6 to 9 MHz, 9 to 13.5 MHz, 13.5 to 20 MHz, and 20 to 30 MHz. Harmonic output from the filter modules is at least 75 dB below PEP.

#### **4.5.2 PLUG-IN WATTMETER MODULE A5A9**

The Wattmeter Board consists of a directional wattmeter which supplies signals proportional to forward and reflected power, the T/R relay and bypass relays, and a VHF filter. The T/R relay, K17 and K19, provides a straight bypass for the antenna to the transceiver when in receive mode, and inserts the power amplifier when transmitting in the 500W mode. This relay may be disabled by K18, the Bypass relay, which is controlled by Microprocessor A3A3U1. The Bypass relay is energized whenever the linear amplifier has been placed in bypass mode, either manually or by the microprocessor.

The directional wattmeter consists of current transformer T1 and associated components. A current sample of the rf is combined with a voltage sample (from C67 and C68) at CR5 to provide a voltage output proportional to forward rf power. This signal is processed on the Peripheral Board A3A2 and displayed on the front panel meter. Similarly, the reflected power is combined at CR4 to provide reflected power voltage data for meter display.

The VHF filter, consisting of C69-C72 and L29-L31, provides assurance that all harmonics over 30 MHz are adequately attenuated, regardless of the filter band chosen.

#### **4.5.3 MOTHERBOARD ASSEMBLY A5A10**

The MOTHERBOARD is attached to the enclosure and supplies all rf and control interconnect for the nine plug-in assemblies. The band switching relays, K1 thru K16, PA Output Power Monitor, and band line decoupling networks are a part of this assembly. Band switching relays located at either end of the selected filter direct the rf signal through the filter and out to the wattmeter board. All unused filters are terminated to prevent interaction with the active filter.

### **4.6 OUTPUT POWER COMBINER A6**

Refer to Figure 5.13.

The Output Power Combiner consists of transformers T1, and T2 plus balancing resistors R1, R2, R3 and R4. Its purpose is to combine the outputs of the two rf modules, summing them to provide the required 500 watts. In normal operation, the balancing resistors dissipate a minimal amount of power. However, if a module fails, the balancing resistors provide the remaining module with an acceptable load until the microprocessor board detects the fault and switches the amplifier to bypass.

### **4.7 INPUT POWER SPLITTER ASSEMBLY A7**

Refer to Figure 5.14.

The Input Power Splitter Assembly consists of transformers T1, T2, T3, T4 and T5 and balancing resistors R1, R2, R3 and R4. The purpose of this network is to divide the input power from the transceiver into four equal parts, providing isolation between each. Under normal operating conditions, only a very small amount of power is dissipated by this network to compensate for slight imbalances in rf module input characteristics. If an rf module input should short

or open or a module be removed, the balancing resistor corresponding to that module will absorb excessive input power.

#### **4.8 FRONT PANEL A8**

The Front Panel Assembly A8 contains the power ON/OFF circuit breaker A8CB1, the overtemperature fan A8B1 and the FAULT and POWER lamps.

#### **4.9 REAR PANEL CONNECTOR ASSEMBLY A9**

Refer to Figure 5.15.

The Rear Panel Connector Assembly contains the power and control connectors and provides rf filtering on all power and control lines going into and out of the LPA-9500.

#### **4.10 AUXILIARY POWER SUPPLY A10**

Refer to Figure 5.16.

The Auxiliary Power Supply is a conventional linear regulated supply designed to provide voltages required within the amplifier for relays (+28VDC), rf power amplifier bias (unregulated +5VDC), and regulated voltage (+5VDC) for all microprocessor circuitry. The power transformer not only supplies low voltage to the +28V and +5V regulators, but it supplies the AC voltage source for high speed and low speed blower operation. The +28VDC regulated supply consists of rectifier bridge CR2, CR3, CR4 and CR5, and regulator U1 with associated components. The +5VDC regulated supply consists of rectifier bridge CR6 and regulator U2 with its associated components. The unregulated +5 VDC voltage is taken from the input to the regulator, switched through K2 and sent to each of the four rf amplifier modules for use in the bias supplies. Relay K2 is energized whenever the KEYLINE ACCESSORY is closed. Relay K3 prevents bias from being applied to the rf amplifier modules whenever the power amplifier is in the BYPASS mode. Relay K1 switches the blowers from low speed to high speed whenever the heatsink temperatures exceed a preset threshold as determined by Microprocessor A3A3U1.

#### **4.11 DUAL DUMMY LOAD A11**

Refer to Figure 5.17.

The purpose of this assembly is to terminate the two unused outputs of the Input Splitter A7.

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## SECTION V

### MAINTENANCE AND REPAIR

**WARNING:** 115/230 VAC APPEARS ON CIRCUIT BREAKER AND CONNECTOR STRIP.  
115/230 VAC APPEARS ON +48V POWER SUPPLY TERMINAL STRIP.

**NOTE:** All Figures applicable to Section V appear following paragraph 5.5.6.

#### 5.1 PREVENTIVE MAINTENANCE

In the normal service life of any piece of equipment, faults and breakdowns will develop. In order that the necessary repairs may be carried out in a reasonably short time, a logical testing routine must be followed. The maintenance technician should familiarize himself/herself with the circuitry and the physical layout of the equipment prior to the occurrence of trouble. Refer to Figure 5.1 for major assembly locations.

When repairs are necessary, it is recommended that this servicing be done whenever possible by competent technicians, supplied with suitable tools and test equipment.

##### 5.1.1 PERIODIC INSPECTIONS

The LPA-9500 design calls for periodic cleaning of the air filter on the front panel assembly. Remove the air filter and clean by vacuuming or forced air. The air filter should be periodically cleaned with soap and fresh water (air filter must be completely dry before reinstallation). **Do Not Use Any Form of Petroleum Based Fluid for Cleaning of the Air Filter.** Inspect and clean the air filter a minimum of every three (3) months when the LPA-9500 is installed in a controlled environment. Unusually severe environmental conditions will require more frequent inspections. If during the three (3) month inspection the filter shows signs of deterioration, replace the air filter (P/N 8066002301).

**NOTE:** In the case of LPA-9500 faults due to overtemperature, always insure that the air filter is clean before progressing with further repair.

No lubrication of any kind is required in the LPA-9500.

#### 5.2 CORRECTIVE MAINTENANCE

##### 5.2.1 TEST EQUIPMENT REQUIRED

The following list of equipment or its equivalent is required to perform the specified tests in this section.

- a) Transceiver/Exciter
- b) Wattmeter, Bird ThruLine Model 43, Qty. 1
- c) Coaxial Dummy Load, 2500 Watt, Bird No. 8890-300, Qty. 3
- d) RF VTVM, HP-410C, Qty. 1

- e) Coaxial Tee, HP-11042A, Qty. 1
- f) Multimeter, Simpson 260, Qty. 1
- g) Oscilloscope, Tektronix No. 465B, Qty. 1
- h) Wattmeter Elements, 1000W and 100W
- i) Audio Oscillator, HP-200CD
- j) Artificial Antenna
- k) Audio Injection Test Cable, see Figure 5.3
- l) Coaxial Dummy Load, 150 Watt, Bird Model 8135, Qty.2

### **5.2.2 CONNECTORS AND CABLES REQUIRED**

- a) 1011130009 Connector, Power, 39 Pin Round (to 9000 Series, P2)
- b) Connector Kit, Sunair P/N 8105000296 (see section 1.4 for contents)
- c) 0579240002, Cable, 37 Cond.
- d) Power Cable Assembly, Sunair P/N 8066002297
- e) Miscellaneous coaxial cables:
  - RG-58A/U for Input
  - RG-8A/U for Output

### **5.2.3 PRIMARY POWER INPUT**

Primary power should be supplied through a switch box with either fuses or circuit breaker protection. It should be capable of supplying 230 VAC at 20 amps or 115 VAC at 40 amps. **Insure Proper Voltage Customizing Before Applying Power.** See Figures 2.7 and 2.8.

### **5.2.4 TEST CONDITIONS**

Set up LPA-9500 and required test equipment as shown in Figure 5.2.

## **5.3 ALIGNMENT PROCEDURES**

The LPA-9500 is tested and aligned at the factory before shipment. The following alignment procedures should be used only by a competent technician after repair has been accomplished to the unit. If the LPA-9500 is to be utilized with an exciter other than the one it was originally aligned to, it may be necessary to reset the power levels. If during the alignment procedures a failure occurs, refer to the Fault Isolation procedure applicable to the failure.

These alignment procedures must be followed in their entirety to be assured of the correct alignment of the LPA-9500.



### 5.3.1 PRELIMINARY

- a) Connect LPA-9500 to 9000 Series equipment at CONTROL CABLE J5 and appropriate power source at AC POWER J3. Be sure 9000 Series equipment is OFF.
- b) Remove top cover of LPA-9500.
- c) Connect coaxial cables to RF OUTPUT J1 and RF INPUT J2 of LPA-9500.

### 5.3.2 POWER UP

- a) Set circuit breaker on LPA-9500 to ON.
- b) Turn ON 9000 Series Exciter/Transceiver.
- c) The green POWER lamp on the LPA-9500 front panel should illuminate. The three power supply LED's on Microprocessor Board A3A3 should illuminate.
- d) On Peripheral Board A3A2 adjust R164 until the LCD Assembly A2A2 has its best contrast. The display should read: 'SYSTEM OPERATIONAL METER: FWD PWR LVL: 500W'. The LPA-9500 front panel meter should read zero.

### 5.3.3 KEYBOARD

- a) Press pushbuttons IC<sub>1</sub> and IC<sub>2</sub> in sequence. The display should change to show that the meter indicates the function selected. The meter should continue to read zero.
- b) Press pushbuttons VC<sub>1</sub> and VC<sub>2</sub> in sequence. The display should change to show that the meter indicates the function selected. The meter should indicate 48V.
- c) Press the REFLD pushbutton. The display should change to show that the meter indicates REFLD. The meter should read zero.
- d) Press the FWD pushbutton. The display should show that the meter indicates FWD. The meter should read zero.
- e) Depress PWR LVL pushbutton. The display should show a 'BYPASS'. Depress PWR LVL again. The display should show 500 Watts.

### 5.3.4 POWER ADJUSTMENT

- a) Select 1.6050 MHz and set the exciter MODE to CW and depress CW KEY. On Peripheral Board A3A2 adjust R32 and R33 until the HP-410C voltmeter indicates 158 VRMS.
- b) While holding the CW KEY down, adjust R61 on the Peripheral Board A3A2 until the LPA-9500 panel meter indicates 500 watts. On the keyboard depress the REFLD key, which causes the front panel meter to indicate

reflected power. On the RF Wattmeter Assembly A5A9 in the Filter Module A5, adjust C62 for minimum indication on the panel meter. On the keyboard, depress the FWD key. Set the exciter to 29.9999 MHz. Depress the CW key, and adjust C68 for maximum indication on panel meter.

c) Select the following frequencies individually on the exciter and observe that the CW power remains within limits of 450 to 550 watts on each frequency as displayed on the front panel meter.

1.9999 MHz  
2.0000 MHz  
2.9999 MHz  
3.0000 MHz  
3.9999 MHz  
4.0000 MHz  
5.9999 MHz  
6.0000 MHz  
8.9999 MHz  
9.0000 MHz  
13.4999 MHz  
13.5000 MHz  
19.5999 MHz  
20.5000 MHz  
29.9999 MHz

d) With exciter frequency at 29.9999 MHz, depress the CW Key. Select meter function IC<sub>1</sub> and IC<sub>2</sub> in turn. Observe panel meter and note that IC is not more than 17 amperes. Return meter function to FWD.

### **5.3.5 AM POWER**

a) Depress PWR LVL pushbutton until 500 watt power level is selected. Set exciter MODE to AM and depress microphone PTT button.

b) On Peripheral Board A3A2 adjust R42 and R43 until HP-410C indicates 100 VRMS.

### **5.3.6 VSWR ADJUSTMENT**

a) Reverse the LPA-9500 RF INPUT (J2) and RF OUTPUT (J1) cables on rear of unit. Depress PWR LVL pushbutton until the LPA-9500 is in BYPASS. Depress REFL pushbutton.

b) Set exciter MODE to CW. Depress CW KEY and adjust R59 on the Peripheral Board for a meter reading of 125 watts.

- c) Return RF INPUT and RF OUTPUT cables to proper \*J\* connector. Connect a second dummy load in parallel with first. Set power to 500 watts. Set 9000 equipment to USB Mode and frequency to 2.000 MHz.
- d) Depress the PWR LVL pushbutton until the 500 watt level is selected. Key the radio and adjust R28 on the Peripheral Board until it just begins to decrease the indication on the forward power meter. Unkey the radio.
- e) Connect a third dummy load in parallel with the first two. Adjust R56 on the Peripheral Board until the LPA-9500 just fails to display a VSWR FAULT when keyed.
- f) Turn the 9000 Series equipment OFF.

## END OF ALIGNMENT PROCEDURES

### **5.4 FAULT MESSAGES**

Failures in the LPA-9500 cause fault messages to be displayed on the LCD Display A2A2. These messages direct attention to the areas in which failures have occurred. If more than one fault occurs, the message 'Fault: MULTIPLE..PRESS \*' will be displayed. When this happens, depress the asterisk (\*) pushbutton on the keyboard to display the fault messages. A different fault message will be displayed each time the button is depressed until all fault messages which describe existing malfunctions have been displayed.

Table 5.1 defines the fault messages and indicates the areas in which the problems are most likely to be found. The messages with which the symbol '#' appears, followed by a number, indicate either a particular RF/PS Module A4 (1 through 2) or Filter Band (1 through 8). For the purpose of discussion, the letter X will be used in place of any one specific number.

### **5.5 FAULT ISOLATION PROCEDURES**

#### **5.5.1 RF/PS MODULE A4**

The RF/PS Module is a self-contained module consisting of the Module Control Assembly A4A1, the +48VDC Power Supply A4A2, and the Power Amplifier Assembly A4A3. The RF/PS Module may be removed as a whole and bench tested, or tests may be performed in the LPA-9500 provided the faults do not activate the LPA-9500 protection circuits. If the RF/PS Module is removed for testing, forced air cooling of the Power Amplifier and +48 VDC Power Supply **MUST** be provided. Failure to provide this cooling may result in failure of the power transistors.

##### **5.5.1.1 DIAGNOSTIC PROCEDURE**

- a) Connect AC power of proper voltage (115 or 230 VAC) and frequency to A4A1J5 pins 1 and 2.
- b) Connect +28 VDC to A4A1J4 pin 2, with power supply negative to ground.
- c) Connect +12 VDC between A4J1 pin 1 (positive) and A4A1J4 pin 3 (negative).
- d) Connect A4A3J2 through a Bird Thru Line Wattmeter to a 50 ohm coaxial resistor of at least 500 watt power capacity.
- e) Utilize Table 5.2 to perform testing.

**5.5.2 PERIPHERAL BOARD A3A2**

See Table 5.3.

**5.5.3 FILTER MODULE A5****5.5.3.1 FAULT, ALL BANDS**

If a Fault exists in all bands, proceed as follows:

- a) Remove exciter and antenna connections from rear panel.
- b) With exciter unkeyed, measure for continuity between exciter and antenna connectors.

If no continuity is indicated, check A5K17 and A5K19 contacts and check for open connections on the RF Wattmeter Assembly A5A9.

- c) If continuity exists, measure resistance from antenna connector J1 to ground. The resistance should be high.

If a short circuit is indicated, check capacitors A5A9C69, C70, C71, C72 for shorted components. Check for bridging of the RF circuit. Check for internal shorts in A5K17 and A5K19.

- d) Remove connections from A5J3 and A5J4 on the front of the A5 module.
- e) Select 500W or 1kW power level and key exciter.
- f) Check for continuity between A5J3 and A5J2 of the A5 module.

If no continuity exists, check circuits and coax between A5A10E21A and A5A10J22 pin T, U, 16 and 17 and connection between A5J3 and A5A10E9.

- g) If continuity exists, check for short circuit from antenna connection to ground.
- h) If all measurements fail to indicate a defect, turn power off, and remove RF Wattmeter Assembly A5A9 and inspect for burned or discolored components.
- i) If still no defect appears, the antenna system may be at fault. Refer to technical manuals for the antenna coupler and antenna system.

**5.5.3.2 FAULT, ONE BAND**

- a) Remove connections from A5J3 and A5J2. Select 500W or 1 kW power level.
- b) Select defective band in exciter and key exciter.
- c) Measure for continuity between A5J2 and A5J3.

If no continuity is measured, check appropriate relays A5A10K1 thru K8 and A5A10K9 thru K16.

Check for open circuits on the filter for the defective band.

- d) If continuity exists, measure for short circuit to ground.

If a short circuit exists, check capacitors on defective band module.

- e) Examine the defective band module for burned or discolored components and replace as necessary.

#### 5.5.4 OUTPUT COMBINER A6

Using Figure 5.13 and a multimeter, check for opens and shorts on the Output Combiner. Check for visual damage and continuity through the coaxial cables. **OPTION:** If a vector impedance meter is available for troubleshooting use, refer to the following as a means of board check out. Faults in the Output Combiner will show up as an improper impedance into one or more connectors when the others are properly terminated. If any two of the three connections are terminated with 50 ohm load resistors, the impedance measured at the remaining connector should be  $52 \pm 8$  ohms with a phase angle of  $\pm 10$  degrees. This impedance should be measured at a frequency of 10.0 MHz. Impedance will be measured with a vector impedance meter displaying magnitude and phase angle of the impedance. Variations in impedance will be caused by open or shorted coaxial cables or balancing resistors.

#### 5.5.5 INPUT SPLITTER A7

Comments applying to the Output Combiner A6 also apply to the Input Splitter as these devices are identical except for power handling capability.

#### 5.5.6 MICROPROCESSOR BOARD A3A3

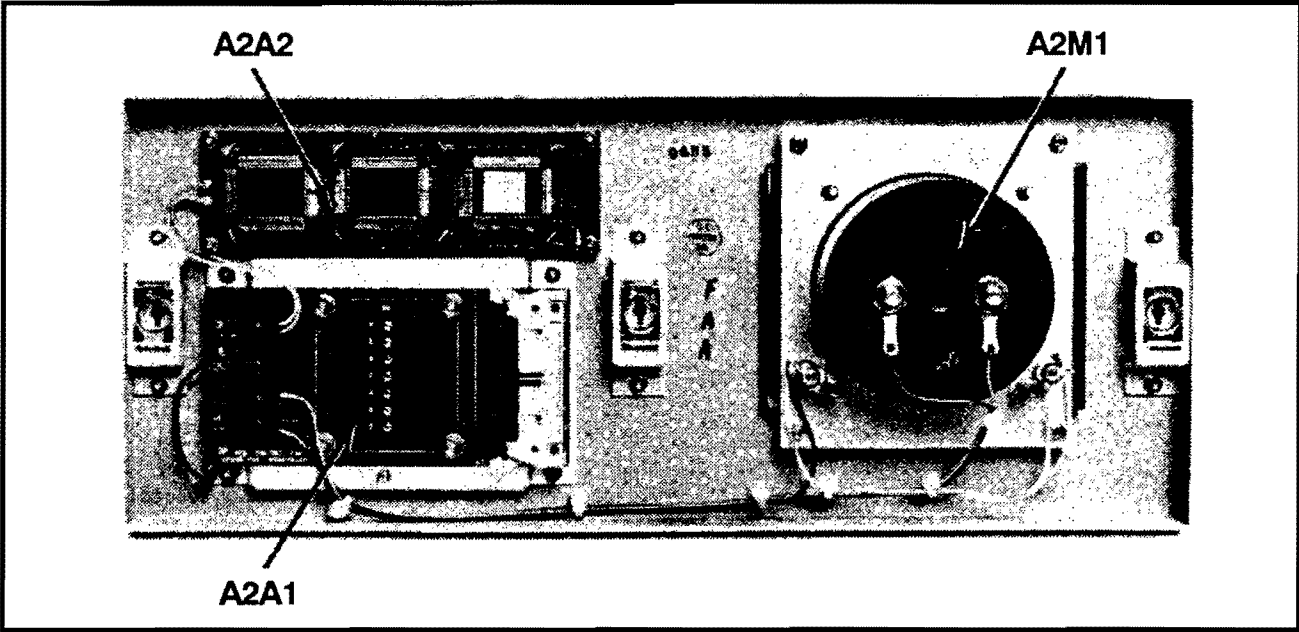
Because of the transient nature of signals existing on this board, trouble-shooting requires test equipment which is unduly expensive to have in a field service facility. In addition, a particular knowledge of the software is required. For these reasons, it is recommended that if fault is found to be this board, the board must be removed and replaced with a known good board. Repair of this board must be accomplished at depot or factory level.

### 5.6 DISASSEMBLY INSTRUCTIONS

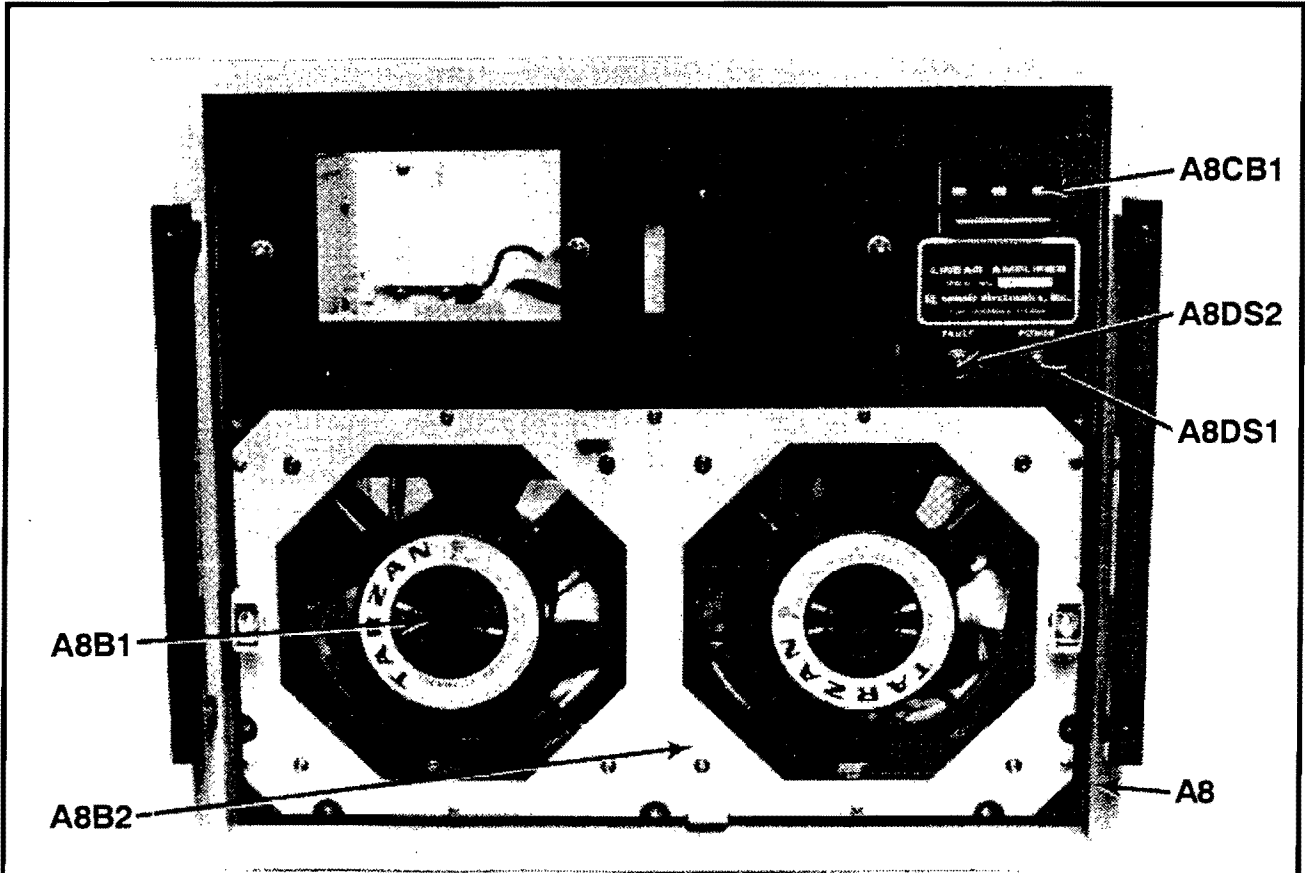
- a) TOP COVER: Loosen 2 zeus screws.
- b) BOTTOM COVER: Loosen 2 zeus screws.
- c) FILTER MODULE COVER: Loosen 4 zeus screws, lift out and up.
- d) FILTER MODULE A5: With unit upright, remove A3A2 and A3A3 assemblies by pulling straight up, one at a time. Disconnect ribbon cable at J5. Disconnect 2 RF connectors at J3 and J4. Disconnect 2 fan connectors. Loosen 4 zeus screws. Lift out and up.
- e) RF/PS MODULE A4: With unit upright, disconnect 3 power and control connectors at J3, J4 and J5. Loosen 2 zeus screws. Lift up and out to remove 2 RF connectors at J1 and J2 on bottom of module.

**NOTE:** Removal is easiest if center module is removed first before removing end modules. Modules are numbered 1 thru 4 with number 1 being the module to the left when facing the front of the unit. Also, RF cables are interchangeable between modules.

- f) **POWER AMPLIFIER ASSEMBLY A4A3:** To remove the A4A3 from the A4 Module, remove 2 crimp connectors at P1, P2, ribbon cable at P3 and 2 screws. To open power supply loosen 2 zeus screws.
- g) **AUXILIARY POWER SUPPLY A10:** With unit upright, remove the A3A2 and A3A3 assemblies. Remove 3 screws. Lift up and out. Remove 2 connectors at J1 and J2.
- h) **CONTROL PANEL MODULE A2:** With unit upright, remove the A3A2, A3A3 and A5 assemblies. Loosen 3 zeus screws inside front panel. Pull module free from front panel. Remove ribbon cables at J1 and J2.
- i) **FRONT PANEL AIR FILTER:** Loosen 2 zeus fasteners, filter will fall free. See paragraph 5.1.1 for cleaning instructions.



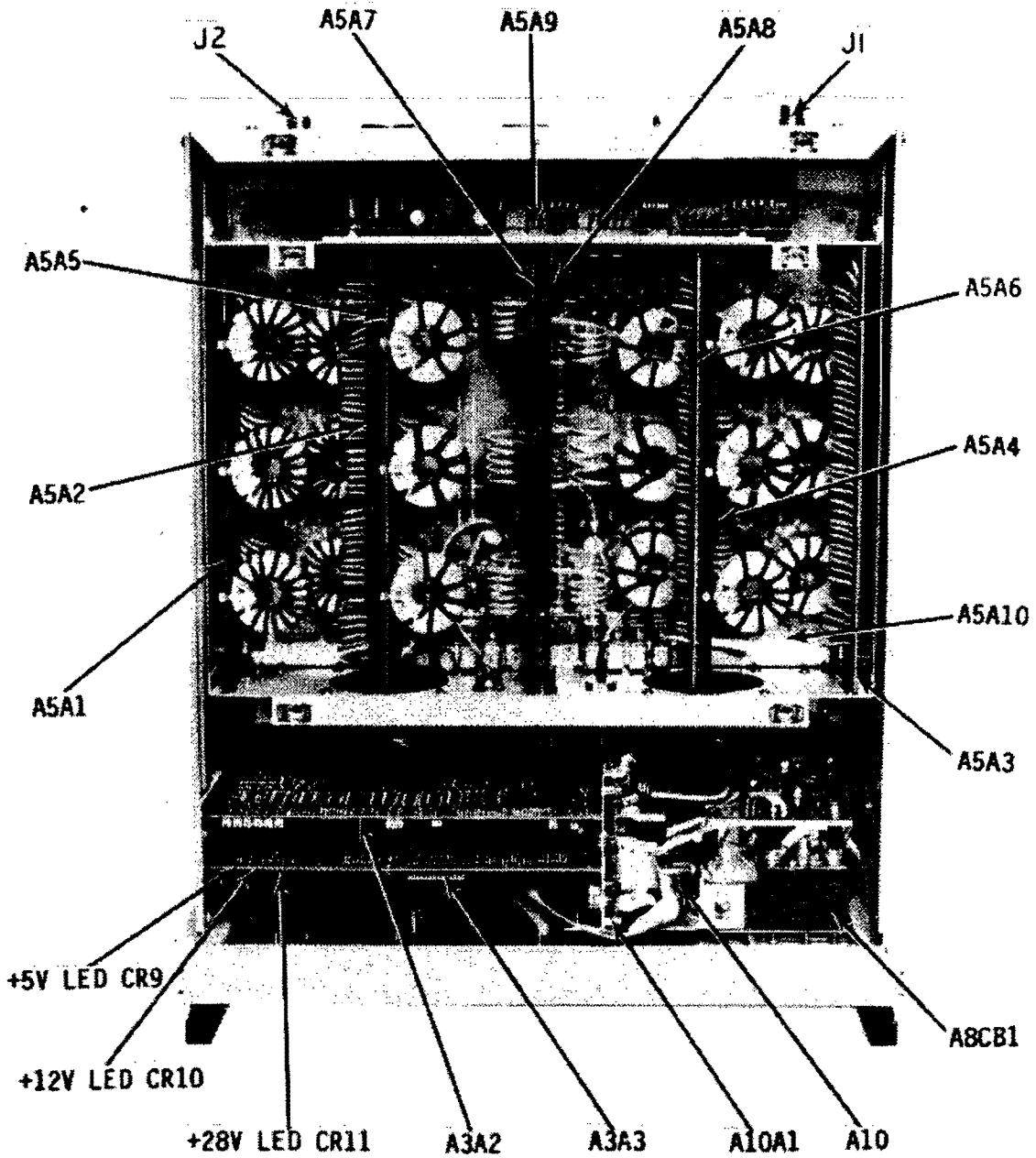
Control Panel Module A2



(A8B2 is not installed in the LPA-9500).

Front Panel with Control Panel Module A2 and Filter Module Removed.

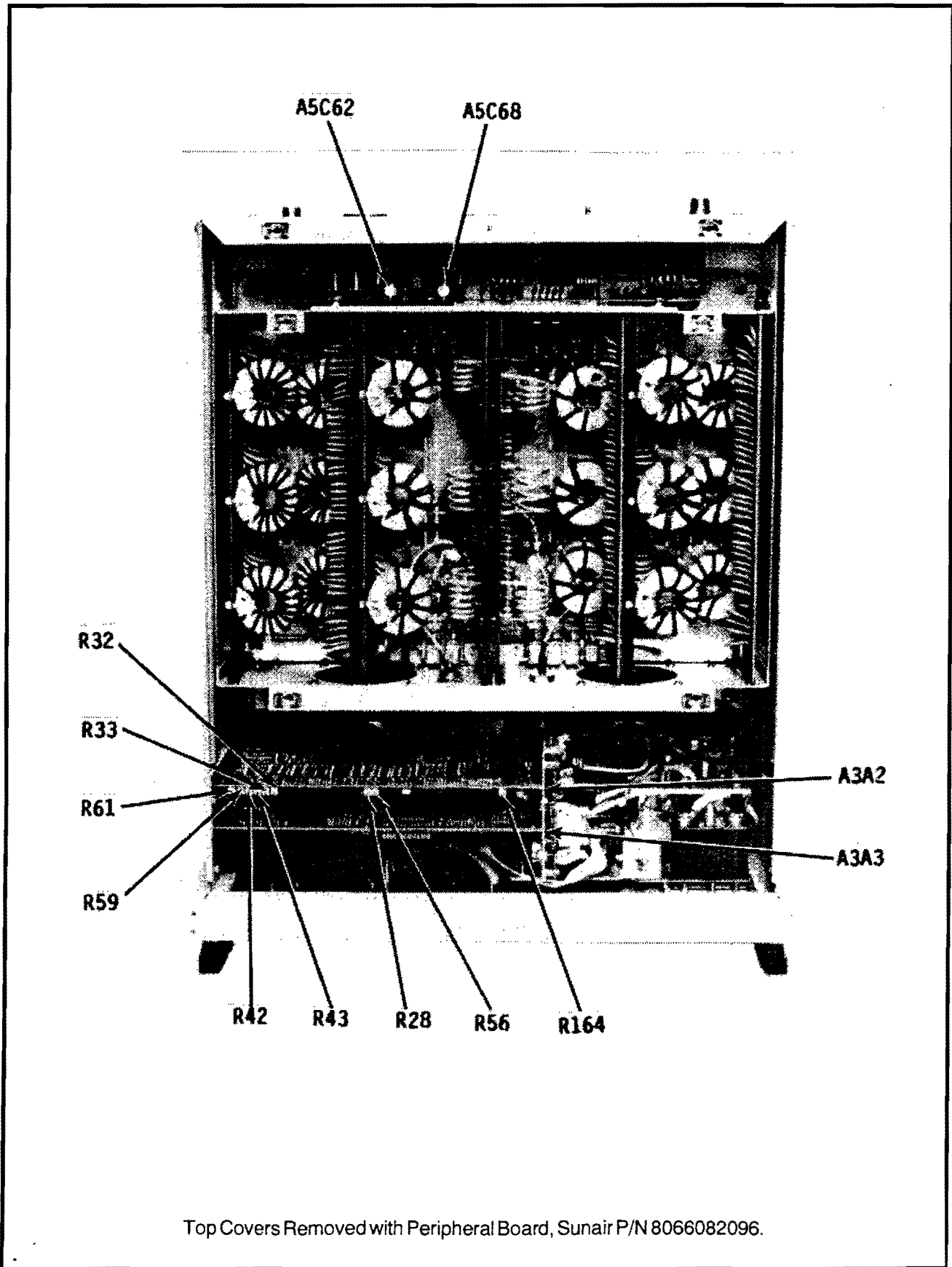
Figure 5.1 (Sheet 1/8) Major Assembly Locations.



Top Covers Removed with Peripheral Board, Sunair P/N 8066082096.

Figure 5.1 (Sheet 2/8) Major Assembly Locations.

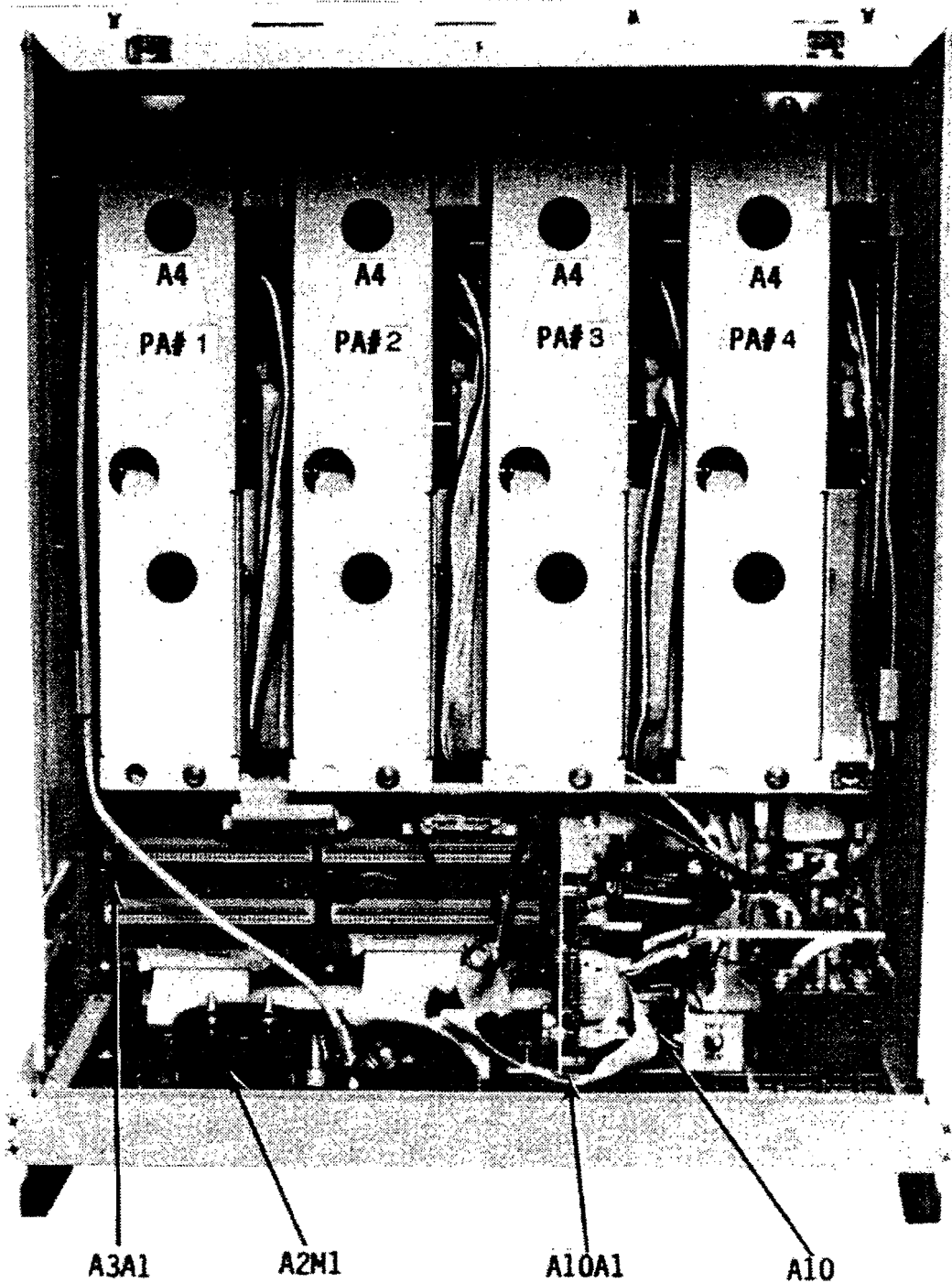




Top Covers Removed with Peripheral Board, Sunair P/N 8066082096.

Figure 5.1 (Sheet 3/8) Major Assembly Locations.

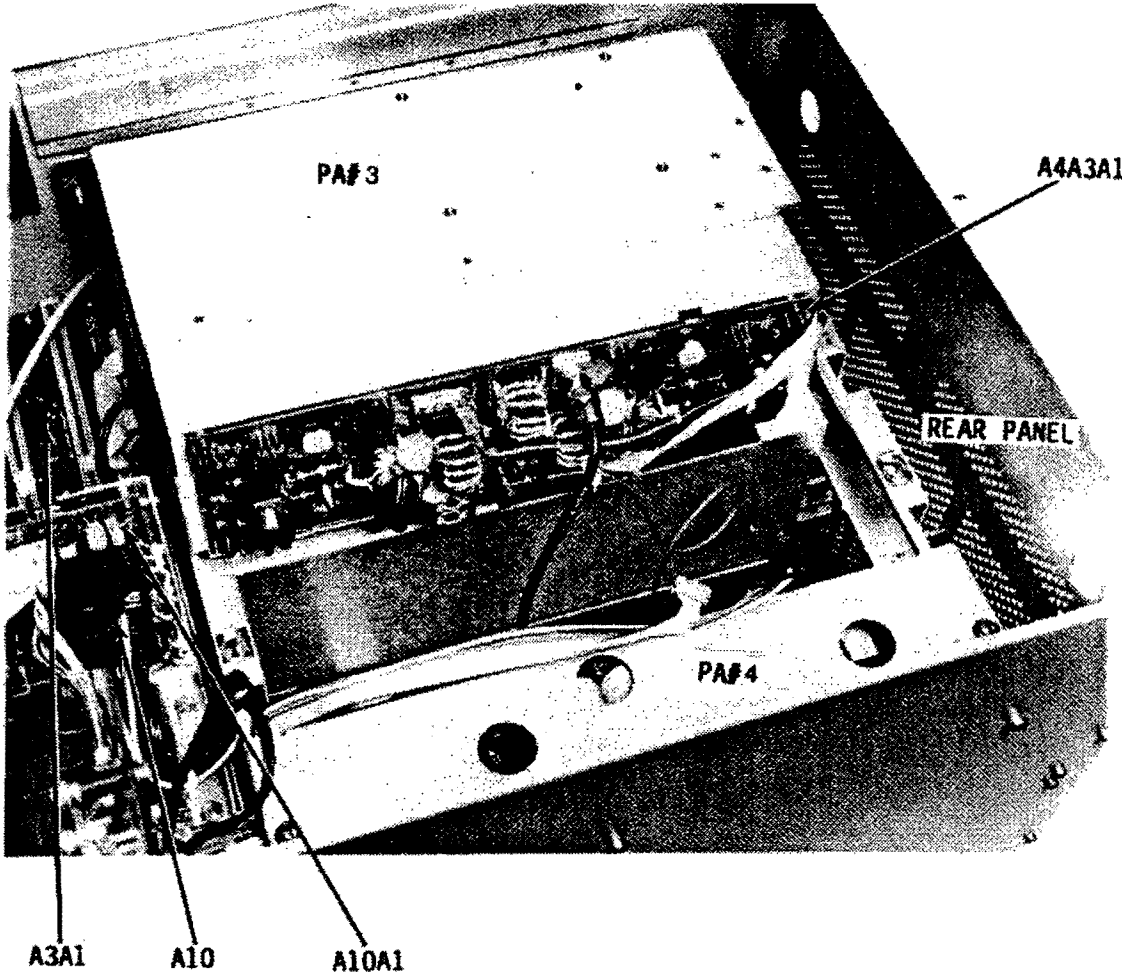
(PA #3 and PA #4 are not installed in the LPA-9500).



Top View with A3A2, A3A3, A5, Removed.

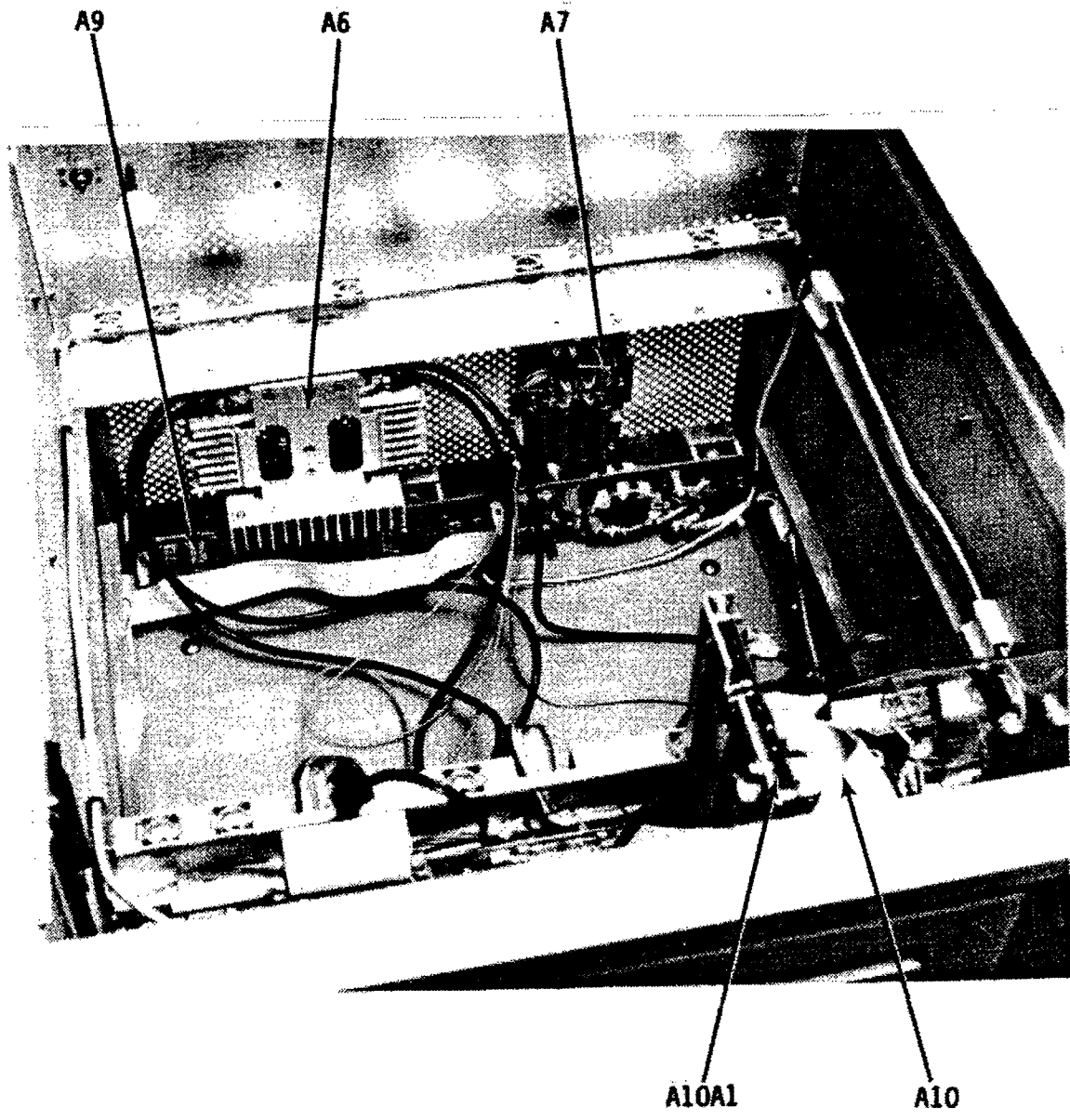
Figure 5.1 (Sheet 4/8) Major Assembly Locations.

(PA #3 and PA #4 are not installed in the LPA-9500).



Top View with A3A2, A3A3, A5 Removed and A4#3 Pulled Out.

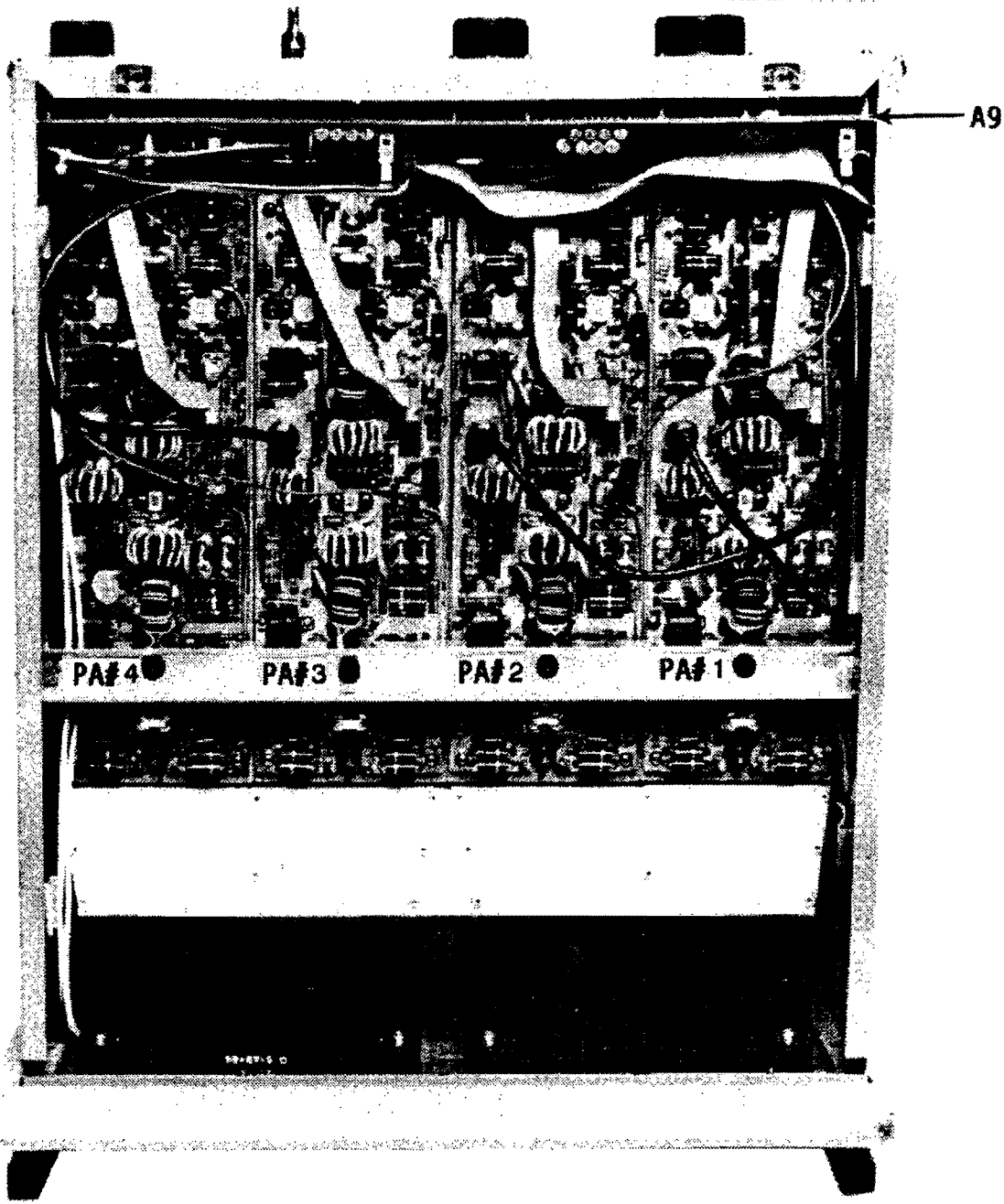
Figure 5.1 (Sheet 5/8) Major Assembly Locations.



Top View with A3A2, A3A3, A5, A4 (4 each) Removed.

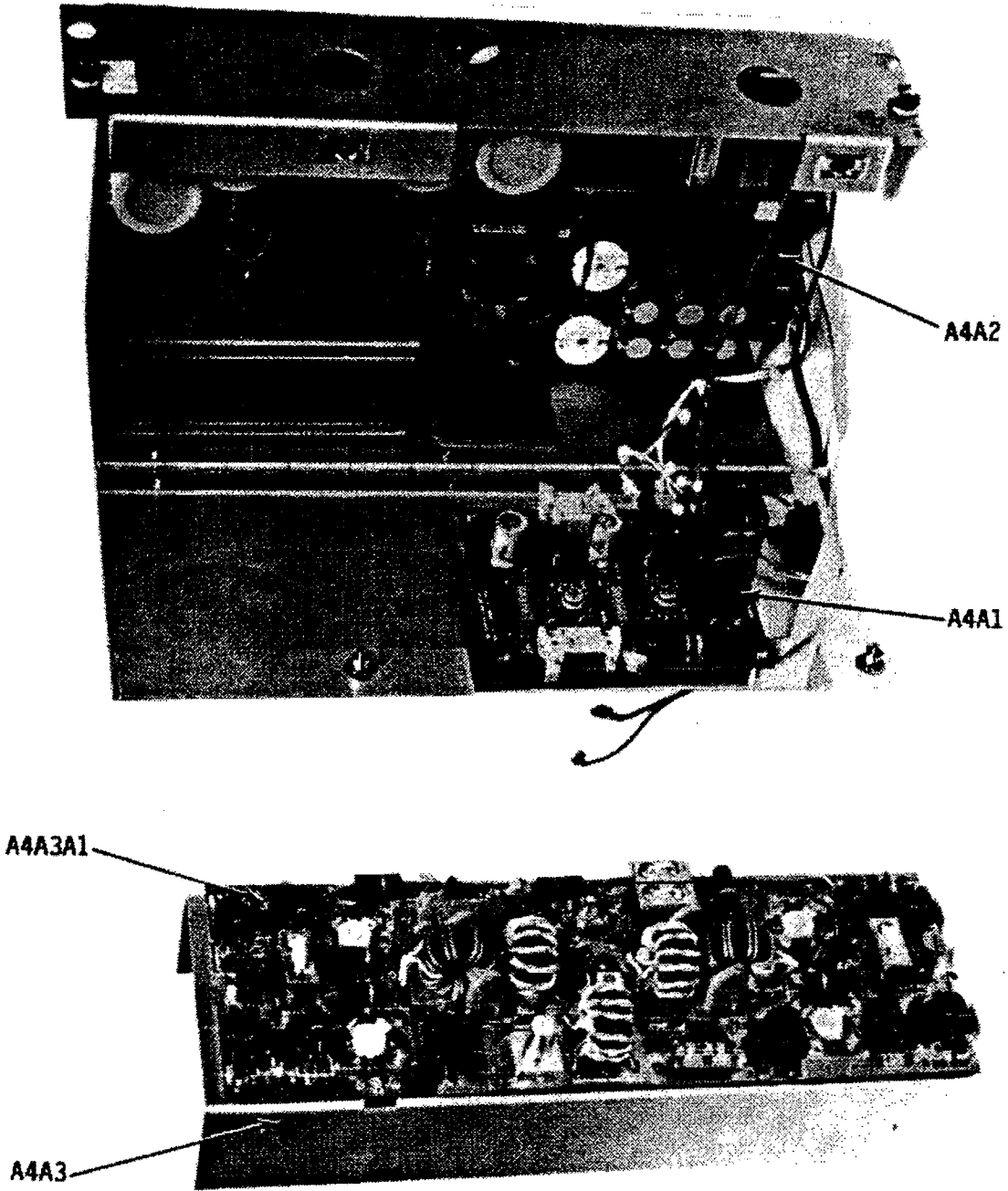
Figure 5.1 (Sheet 6/8) Major Assembly Locations.

(PA #3 and PA #4 are not installed in the LPA-9500).



Bottom Cover Removed.

Figure 5.1 (Sheet 7/8) Major Assembly Locations.



RF/PS Module A4.

Figure 5.1 (Sheet 8/8) Major Assembly Locations.

## Table 5.1 Fault Messages.

### 1. 'Fault: PA#X GAIN LOW'

This indicates that the gain of this RF/PS Module A4 has decreased more than 3 dB.

- a) Remove bottom cover from LPA-9500 and interchange output coax connections between the defective A4 Module and another A4 Module which is operating.
- b) Reset LPA-9500 controls and attempt to transmit.
- c) Note the fault message displayed. If this message shows the same A4 Module to be defective, then the trouble lies in this A4 Module. Follow the RF/PS Module A4 fault isolation procedure, paragraph 5.5.1, to locate the fault. If no fault is found, follow the Peripheral Board A3A2 fault isolation procedure, paragraph 5.5.2.
- d) If the fault message cites the A4 with which the output connection has been interchanged, then the trouble lies with the output combiner. Follow the Combiner Assembly A6 fault isolation procedure, paragraph 5.5.4.

### 2. 'Fault: VC#X LOW'

This indicates that the output voltage from this +48V Power Supply A4A2 is low or missing.

- a) Remove LPA-9500 bottom cover and disconnect +48 volts input from the indicated A4 Module.
- b) Reset LPA-9500 controls and observe LCD display.
- c) If fault message is not displayed, then the trouble lies in the A4 Module. Follow the RF/PS Module A4 fault isolation procedure, paragraph 5.5.1.
- d) If fault message is still displayed, follow +48V Power Supply A4A2 fault isolation procedure in Table 5.2. If no fault is found, follow Peripheral Board A3A2 fault isolation procedure, paragraph 5.5.2.

### 3. 'Fault: PA#X OVERTEMP'

This message indicates that the temperature of this A4 Module has exceeded its limit.

- a) Remove and clean or replace the front panel air filter.
- b) Check fans for operation and freedom from obstruction.
- c) Insure that the fans change to HI SPEED operation before temperature limit occurs.
- d) Check air passage for freedom from obstruction.
- e) If no fault is found, follow Peripheral Board A3A2 fault isolation procedure in paragraph 5.5.2.
- f) If Peripheral Board is operational, check thermistor on this A4 Module.

### 4. 'Fault: HIGH VSWR'

This indicates a fault in the coupler or antenna system or transmission line. Refer to antenna coupler manual. If a coupler is not installed, follow general maintenance and troubleshooting procedures for the antenna system.

**5. 'Fault: TIMEOUT'**

This indicates that the antenna coupler failed to tune. Reset LPA-9500 and attempt retuning. If fault is repeated, refer to antenna coupler manual.

**6. 'Fault: COUPLER UNTUNED'**

This message appears when the LPA-9500 is turned on, if an antenna coupler is connected to the LPA-9500. Initiate an antenna coupler tune cycle.

**7. 'Fault: IC#X HIGH'**

This message indicates that the Power Supply current drain on this A4 Module has exceeded 17.5 amperes.

- a) Remove LPA-9500 bottom cover and interchange output coax connections between the affected A4 Module and an operational module.
- b) Reset LPA-9500 controls and attempt to transmit.
- c) If the same A4 Module faults, then the trouble lies in the A4 Module. Follow the RF/PS Module A4 fault isolation procedure, paragraph 5.5.1. If no fault is found on the RF/PS Module A4, follow the peripheral Board A3A2 fault isolation procedure, paragraph 5.5.2.
- d) If fault occurs in PA with which outputs have been interchanged, follow Combiner Assembly A6 fault isolation procedure, paragraph 5.5.4.

**8. 'Fault: TUNE FAILURE'**

This message indicates that the antenna coupler failed to tune. Reset LPA-9500 and attempt retuning. If fault is repeated, refer to antenna coupler manual.

**9. 'Fault: NO BANDS'**

This message indicates that no Filter Band has been selected by the transceiver/exciter. This message may indicate that the frequency selected on the transceiver/exciter is below 1.6 MHz.

- a) Check transceiver/exciter frequency to insure that it is between 1.6000 and 29.9999 MHz.
- b) Check transceiver/exciter for proper operation without the LPA-9500. Refer to transceiver manual.
- c) Check interconnecting cables between transceiver/exciter and LPA-9500 for opens or shorts.
- d) Check wiring between LPA-9500 control connector and Microprocessor Board A3A3.
- e) If no fault found, follow Microprocessor Board A3A3 fault isolation procedure, paragraph 5.5.6.



## 10. 'Fault: MULTIPLE OVERTEMP'

This message indicates that more than one RF/PS Module A4 has exceeded its temperature limit.

- a) Depress the asterisk (\*) pushbutton on the keyboard to determine which A4 Modules have exceeded the temperature limit.
- b) Remove and clean or replace the front panel air filter.
- c) Check fans for operation and freedom from obstruction.
- d) Assure that the fans change to HI SPEED operation before temperature limit occurs.
- e) Check air passages for freedom from obstruction.
- f) If no fault is found, follow Peripheral Board A3A2 fault isolation procedure, paragraph 5.5.2.
- g) If Peripheral Board is operational, check thermistors on the A4 Modules.

## 11. 'Fault: REFL'D POWER HIGH'

This message indicates that a defect exists in the antenna coupler or antenna system. Refer to antenna coupler manual or follow general maintenance procedures for the antenna system.

## 12. 'Fault: FILTER#X'

This message indicates that RF is present at the Filter A5 input, but is either absent or the level is too low at the output.

- a) Check outputs of A3A3U14 and U15 on Microprocessor Board A3A3 for a Low on selected band and High on all other bands.
- b) If bands are being selected properly, follow Filter A5 fault isolation procedure, paragraph 5.5.3.
- c) If bands are not selected properly, follow Microprocessor Board A3A3 fault isolation procedure, paragraph 5.5.6.

## 13. 'Fault: BAND#X'

This message appears in conjunction with the multiple fault message and indicates that more than one filter band is being selected by the transceiver/exciter.

- a) Check control cable between transceiver/exciter and LPA-9500 for opens or shorts.
- b) Refer to transceiver/exciter manual.

## 14. 'Fault: 5 VOLT SUPPLY LO'

This message indicates that the +5 volt power supply output from the Auxiliary Power Supply A10 is too low.

- a) Measure resistance to ground on the +5 volt line. This can be measured from C14 positive on the Peripheral Board A3A2 while the board is connected to its edge connector. Clear any shorts if they exist.
- b) Check input to 5 Volt Regulator (A10U2) of the Auxiliary Power Supply A10.

- c) Replace 5 Volt Regulator, if necessary.
- d) Follow Peripheral Board A3A2 fault isolation procedure, paragraph 5.5.2.

15. 'Fault: 5 VOLT SUPPLY HI'

This message indicates that the +5 volts is too high.

- a) Measure +5 Volt Power Supply A10U2 output.
- b) If output voltage is high, replace 5 Volt regulator.
- c) If output voltage is normal, follow Peripheral Board A3A2 fault isolation procedure, paragraph 5.5.2.

16. 'Fault: 28 VOLT SUPPLY LO'

This message indicates that the +28 volts is too low.

- a) Measure resistance from +28 Volt Power Supply A10U1 to ground. This can be measured at C16 positive on the Peripheral Board A3A2 while the board is connected. Clear any shorts detected.
- b) Check input voltage to 28 Volt Regulator.
- c) Replace 28 Volt Regulator, if necessary.
- d) Follow Peripheral Board A3A2 fault isolation procedure, paragraph 5.5.2.

17. 'Fault: 28 VOLT SUPPLY HI'

This message indicates that the +28 volts is too high.

- a) Measure +28 Volt Power Supply A10U1 voltage.
- b) If voltage is too high, replace 28 Volt Regulator.
- c) If voltage is normal, follow Peripheral Board A3A2 fault isolation procedure, paragraph 5.5.2.

**Table 5.2 RF/PS Module A4 Fault Isolation Procedures.**

STEP	NORMAL INDICATION	FAILURE PROCEDURE
<p>1. Remove +48VDC connection from P1 of A4A3.</p> <p>2. Connect multimeter to read current between +48V supply and A4A3P1.</p> <p>3. Ground A4A1J3 pin 4.</p>	<p>a. 600 mA, if so proceed to Step 8.</p>	<p>a. Check collector voltage on A4A3Q2, Q3, Q4, Q5 and +48 VDC.</p> <p>b. If wrong, check +48V Power Supply A4A2.</p> <p>c. If correct, adjust Idle current, see Step 4.</p>
<p>4. Adjust Idle Current by following Steps 5 thru 7 below.</p> <p>5. Set A4A1R10 and R15 fully clockwise.</p>		
<p>6. Adjust A4A1R10 counterclockwise until meter indicates 300 mA.</p>	<p>a. 300 mA, if so proceed to Step 7.</p>	<p>a. Check base voltage on A4A3Q2 and Q3 for approximately +0.7 VDC.</p> <p>b. If voltage is wrong and cannot be varied by A4A1R10, check bias regulator #1, A4A1U1.</p> <p>c. If voltage can be varied and current is wrong, replace Q2 and Q3.</p>
<p>7. Adjust A4A1R15 counterclockwise until meter reads 600 mA.</p>	<p>a. 600 mA, if so proceed to Step 8.</p>	<p>a. Check base voltage on A4A3Q4 and Q5 for +0.7 VDC.</p> <p>b. If voltage is wrong and cannot be varied by A4A1R15, check bias regulator #2, A4A1U2.</p> <p>c. If voltage can be varied and current is wrong, replace Q4 and Q5.</p>

**Table 5.2 RF/PS Module A4 Fault Isolation Procedures (Cont...).**

STEP	NORMAL INDICATION	FAILURE PROCEDURE
8. Remove ground from A4A1J3 pin 4 and reconnect P1 to +48V Power Supply A4A2.		
9. Connect a source of RF excitation 1.6 to 30 MHz at 0 to 20 watts through a thru-line wattmeter to A4A3J1. Set excitation level to 0. <b><u>BE SURE COOLING FANS ARE OPERATIVE.</u></b>		
10. Set Exciter frequency to 1.6 MHz and ground A4A1J3 pin 4.		
11. Increase excitation level until output from amplifier is 300 watts, or input from exciter is 20 watts, whichever occurs first.	a. Output 300W, input <20W.	<p>a. Check DCV on collector of A4A3Q1. This should exceed +15VDC. If voltage is low, replace Q1.</p> <p>b. If output is 100W to 200W, measure RF outputs on collectors of A4A3Q2, Q3, Q4, Q5.</p> <p>c. If all outputs are equal, check +48V supply voltage to assure that it is not decreasing.</p> <p>d. If any outputs are low, compare inputs with other transistors.</p> <p>e. If inputs are correct, check output circuitry and transistors.</p> <p>f. If inputs are low, check input circuitry.</p>
12. If all inputs and outputs are normal, check input and output BITE circuits.	<p>a. Output BITE, nominal -12VDC.</p> <p>b. Input BITE, +2 to +5VDC.</p>	<p>a. Check A4A3R45, R46, C33, CR3, L19, C30, C31.</p> <p>b. Check A4A3R2, R3, C1, C2, C3, L1, CR1.</p>

**Table 5.3** Peripheral Board A3A2 Fault Isolation Procedures

**NOTE:** The LPA-9500 has been designed to work with the CU-9100 Digital Antenna Coupler.

SYMPTOM	PROCEDURE
1. ALC and ACC Inop.	<ul style="list-style-type: none"> <li>a. Check FWD Power input to A3A2R32 and A3A2R42.</li> <li>b. Check A3A2CR4.</li> </ul>
2. ALC Inop.	<ul style="list-style-type: none"> <li>a. Check operation of A3A2U20 B and C and A3A2Q12.</li> </ul>
3. ACC Inop.	<ul style="list-style-type: none"> <li>a. Check operation of A3A2U10D and A3A2Q3.</li> </ul>
4. VSWR Fault.	<ul style="list-style-type: none"> <li>a. Check operation of A3A2U9B</li> <li>b. Check FWD and REFL power inputs to A3A2U9B</li> </ul>
5. REFL Power High Fault.	<ul style="list-style-type: none"> <li>a. Check operation of A3A2U9D.</li> <li>b. Check reference voltage on A3A2U9D pin 10 (2V).</li> </ul>
6. Band #X Fault.	<ul style="list-style-type: none"> <li>a. Check operation of A3A2U9C.</li> <li>b. Check P Out and FWD Power inputs to A3A2U9C.</li> </ul>
7. PA #X, Overtemp Fault.	<ul style="list-style-type: none"> <li>a. Check reference potential on A3A2U1B, D and A3A2U2B, D.</li> <li>b. Check operation of A3A2U1 and A3A2U2.</li> <li>c. Check operation of A3A2U3 and A3A2U7.</li> </ul>
8. PA #X Low.	<ul style="list-style-type: none"> <li>a. Check operation of A3A2U12.</li> <li>b. Check inputs and references of A3A2U12.</li> <li>c. Check operation of A3A2U7.</li> </ul>
9. Vc #X Low.	<ul style="list-style-type: none"> <li>a. Check inputs and references to A3A2U11.</li> <li>b. Check operation of A3A2U11.</li> <li>c. Check operation of A3A2U19.</li> </ul>
10. Ic #X High.	<ul style="list-style-type: none"> <li>a. Check inputs and references to A3A2U15.</li> <li>b. Check operation of A3A2U15.</li> </ul>
11. Multiple Overtemp.	<ul style="list-style-type: none"> <li>a. Check inputs and references to A3A2U1 and A3A2U2.</li> <li>b. Check operation of A3A2U1 and A3A2U2.</li> <li>c. Check operation of A3A2U3 and A3A2U7.</li> </ul>
12. 5 Volt Supply HI or LO	<ul style="list-style-type: none"> <li>a. Check inputs and references to A3A2U13B and D.</li> <li>b. Check operation of A3A2U13.</li> </ul>
13. 28 Volt Supply HI or LO.	<ul style="list-style-type: none"> <li>a. Check inputs and references to A3A2U13A and C.</li> <li>b. Check operation of A3A2U13.</li> </ul>

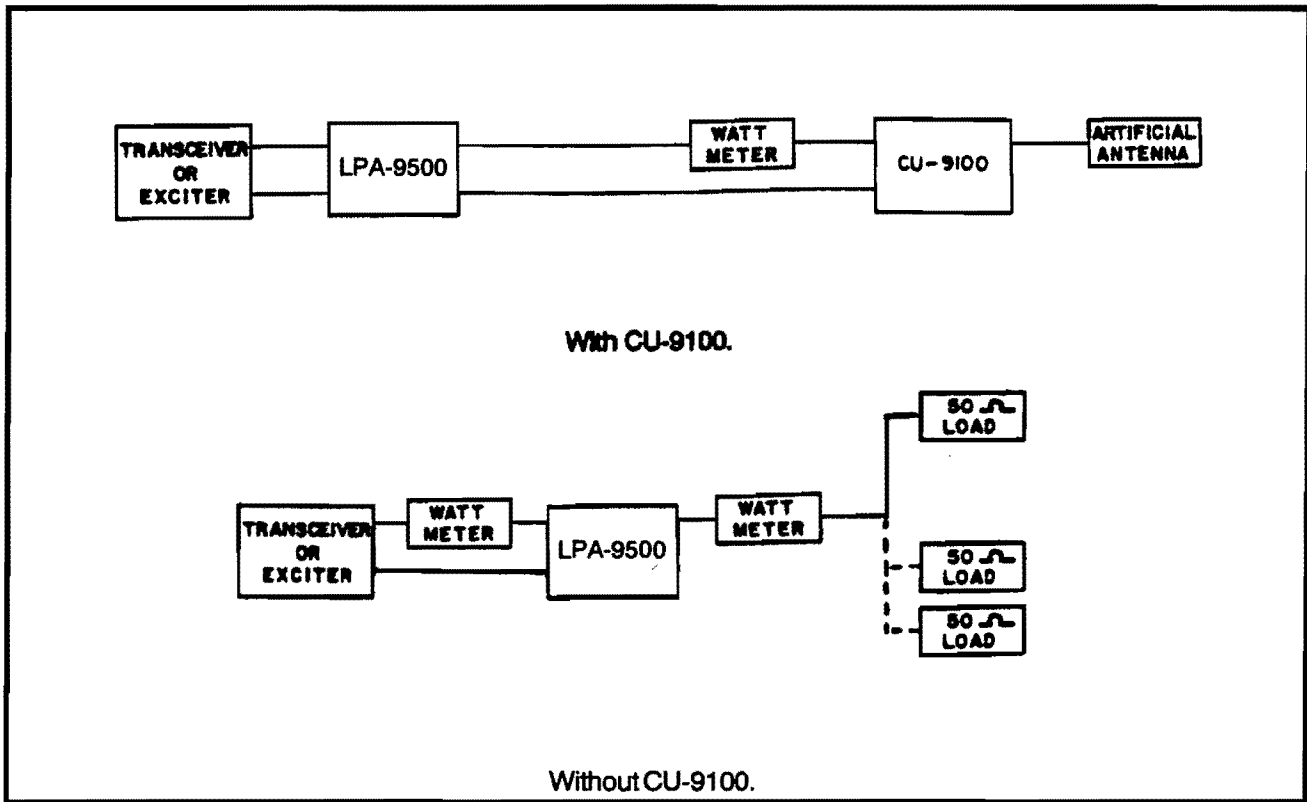


Figure 5.2 LPA-9500 Test Setup.

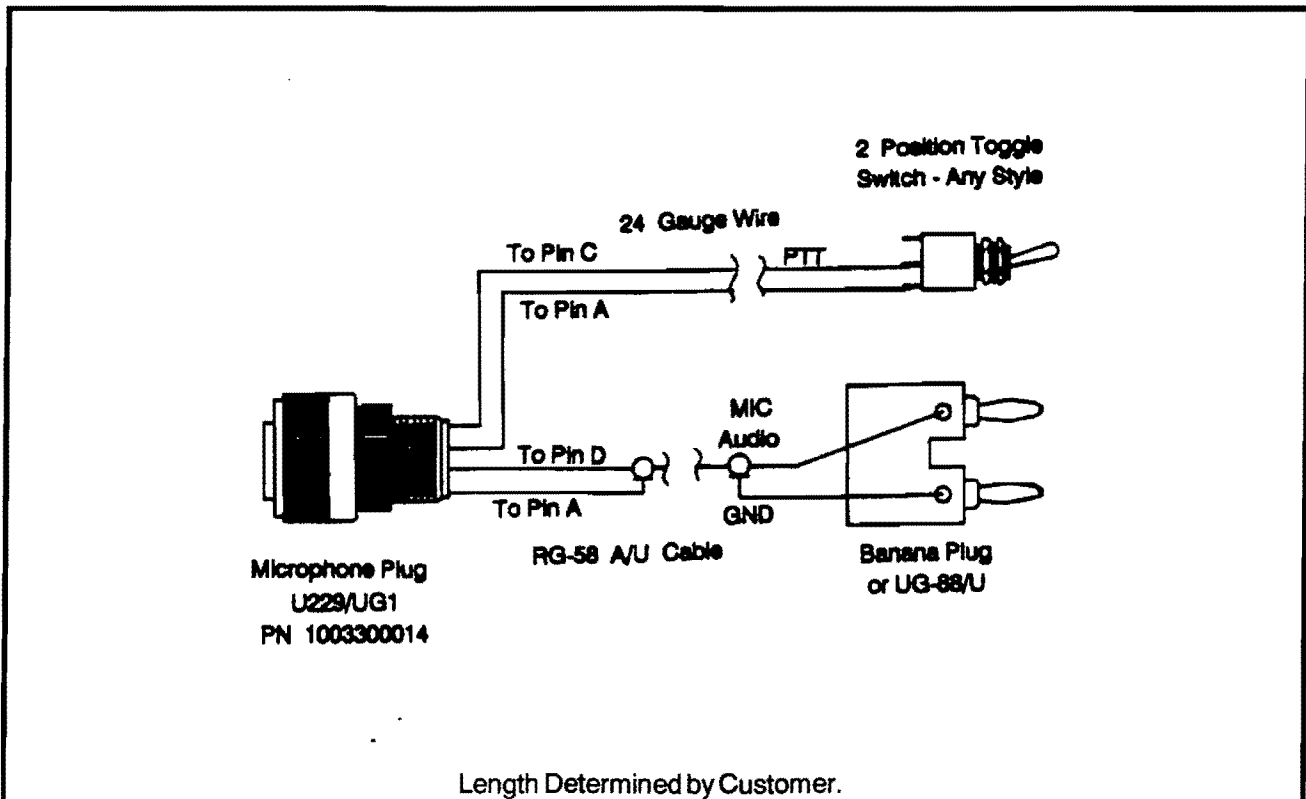


Figure 5.3 Audio Injection Test Cable (Used in Test Setup).

**5.7 SCHEMATICS AND PARTS LISTS**

The following pages contain schematics and parts lists for the LPA-9500, see Table 5.4 below.

DESIGNATOR		DESCRIPTION	SUNAIR PART NUMBER
ASSEMBLY	SUBASSEMBLY		
A1	W2A1 W3A1 W4A1 W5A1 W6A1	<u>CHASSIS ASSEMBLY</u> HARNESS ASSY CHASSIS HARNESS ASSY CHASSIS HARNESS ASSY CHASSIS HARNESS ASSY CHASSIS HARNESS ASSY CHASSIS	80660100XX 8066013299 8066013396 8066013493 8066013591 8066013698
A2	A2A1 A2A2 A2M1	<u>CONTROL PANEL MODULE</u> PC ASSY, CONTROL PANEL LCD ASSY METER ILLUMINATED	80660900XX 8066093098 8066092091 8066090803
A3	A3A1 A3A2 A3A3	<u>COMPUTER MOTHERBOARD</u> PC ASSY PERIPHERAL PC ASSY MICRO P	8105081091 8105085097 8105083094
A4	A4A1 A4A2 A4A3 A4A3A1	<u>RF/PS MODULE</u> PC ASSY, MODULE CONTROL PC ASSY, 48V SWITCHING PS POWER AMP ASSY PC ASSY, POWER AMP	8066030096 8066037091 8066335091 8066031092 8066033095
A5	A5A1 A5A2 A5A3 A5A4 A5A5 A5A6 A5A7 A5A8 A5A9 A5A10	<u>FILTER MODULE</u> PC ASSY BAND FILTER 1 PC ASSY BAND FILTER 2 PC ASSY BAND FILTER 3 PC ASSY BAND FILTER 4 PC ASSY BAND FILTER 5 PC ASSY BAND FILTER 6 PC ASSY BAND FILTER 7 PC ASSY BAND FILTER 8 PC ASSY, WATTMETER PC ASSY, MOTHERBOARD	8066020091 8066021097 8066022093 8066023090 8066024096 8066025092 8066026099 8066027095 8066028091 8066029098 8066020899
A6		<u>COMBINER MODULE</u>	8116060091
A7		<u>SPLITTER MODULE</u>	8066070098
A8		<u>FRONT PANEL ASSY</u>	8116015095
A9		<u>PC ASSY, REAR PANEL CONNECTOR</u>	8105041090
A10 A11 A11A1	A10A1	<u>AUX POWER SUPPLY MODULE</u> PC ASSY, AUX PWR SUPPLY FILLER ASSY PC ASSY, DUAL DUMMY LOAD	8066050097 8066051093 8116016296 8116071092

Table 5.4 LPA-9500 Table of Assemblies.

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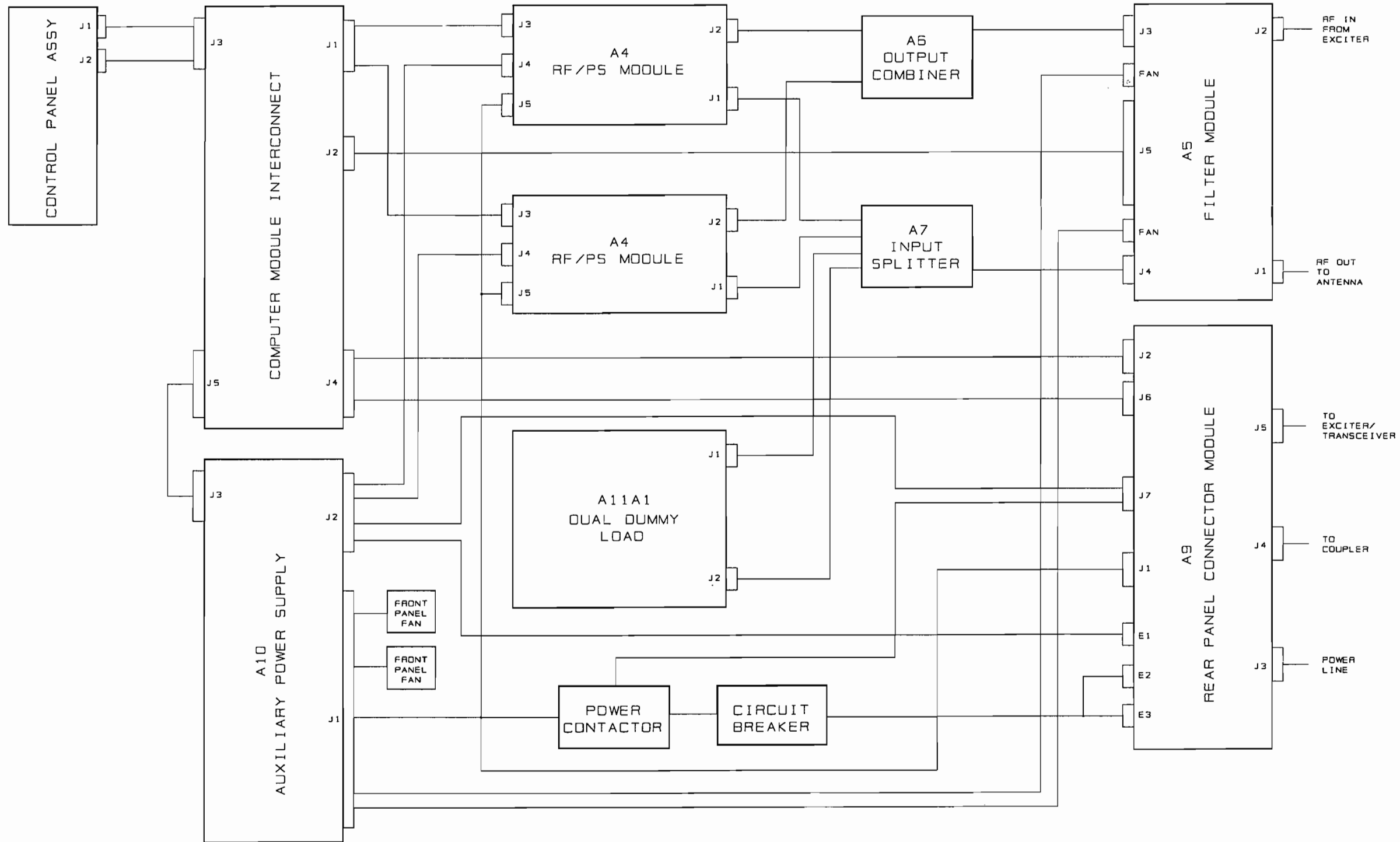


Figure 4.1 LPA-9500 Overall Block Diagram.

SUNAIR LPA-9500

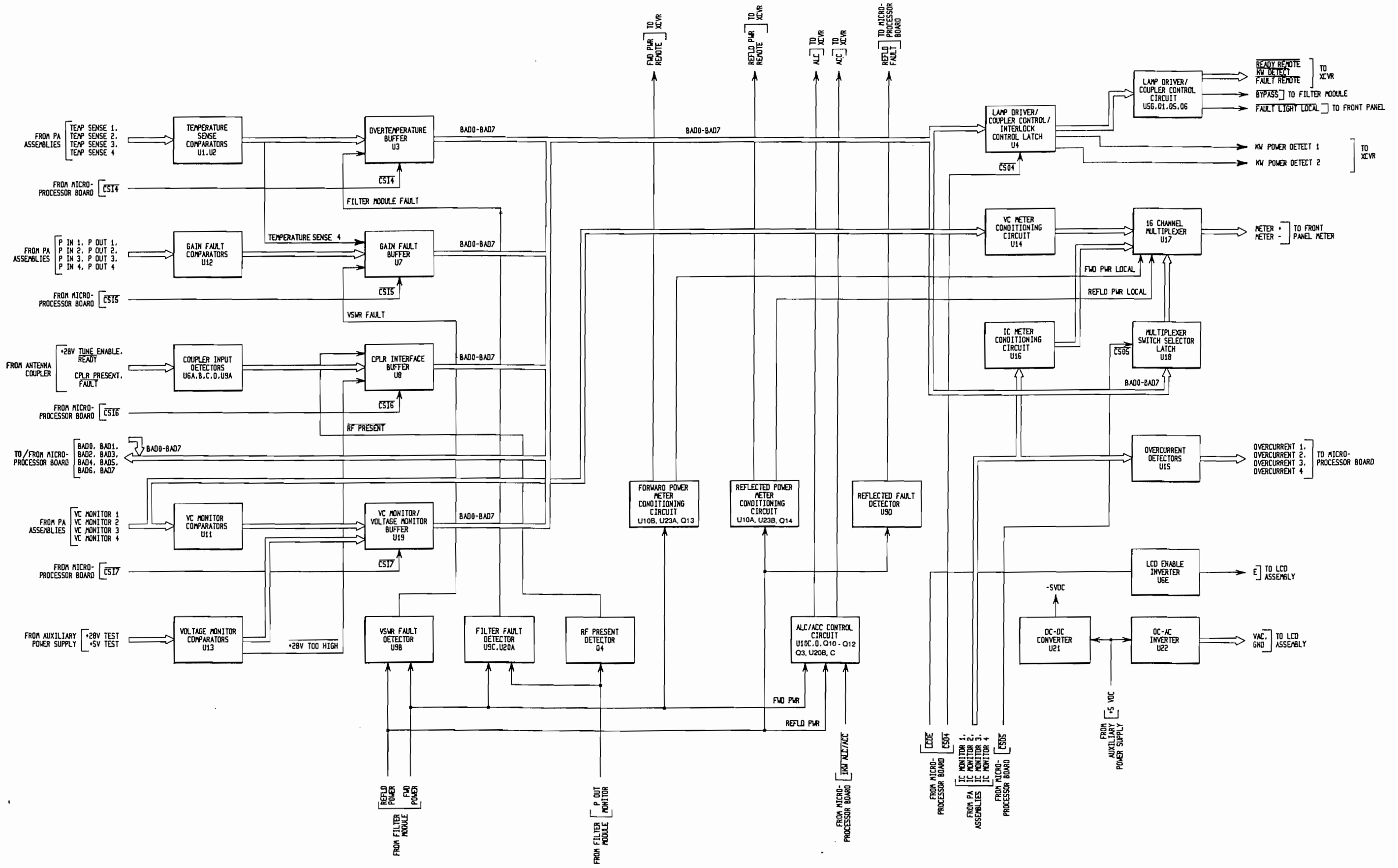


Figure 4.2 Peripheral Board A3A2 Block Diagram.

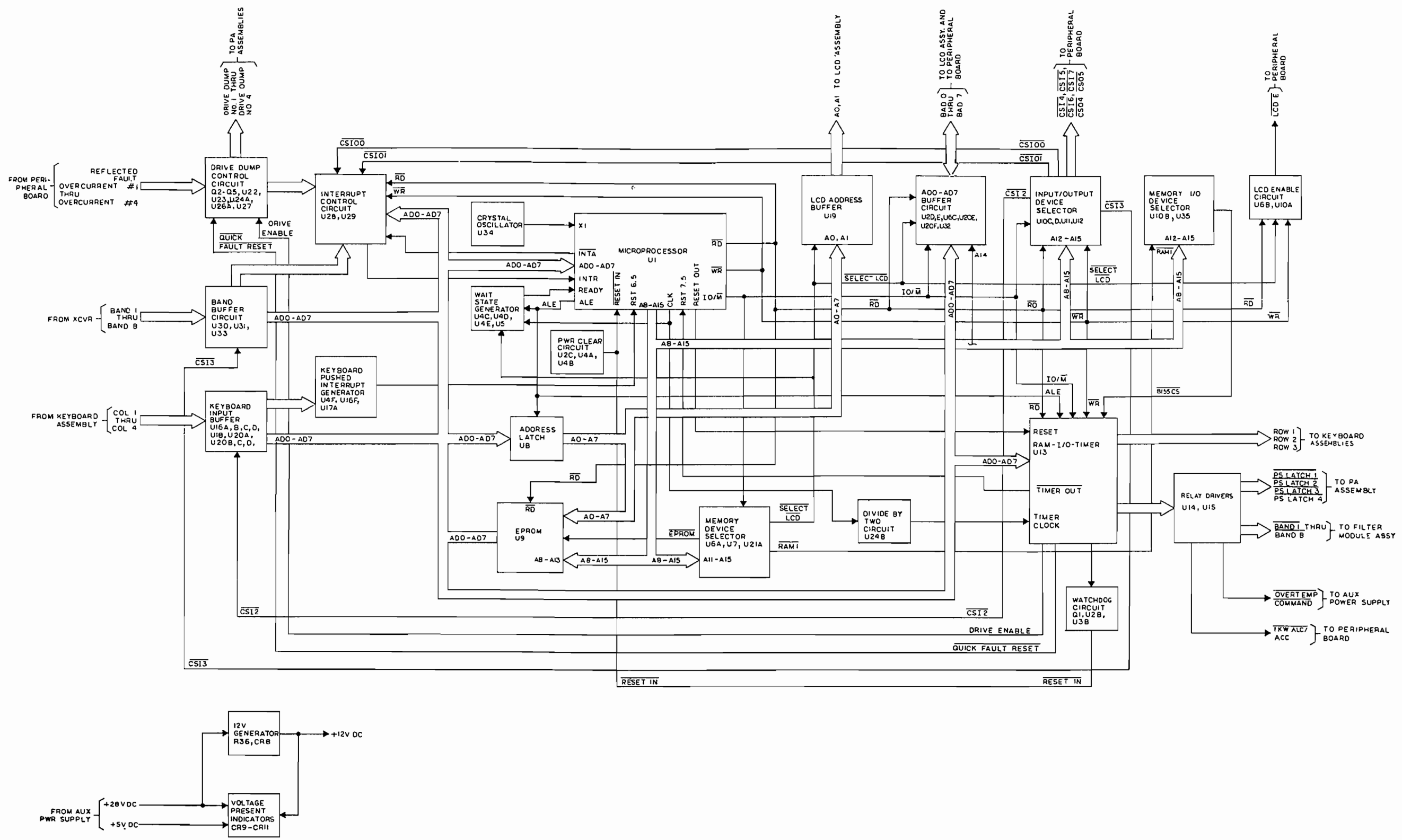


Figure 4.3 Microprocessor Board A3A3 Block Diagram.

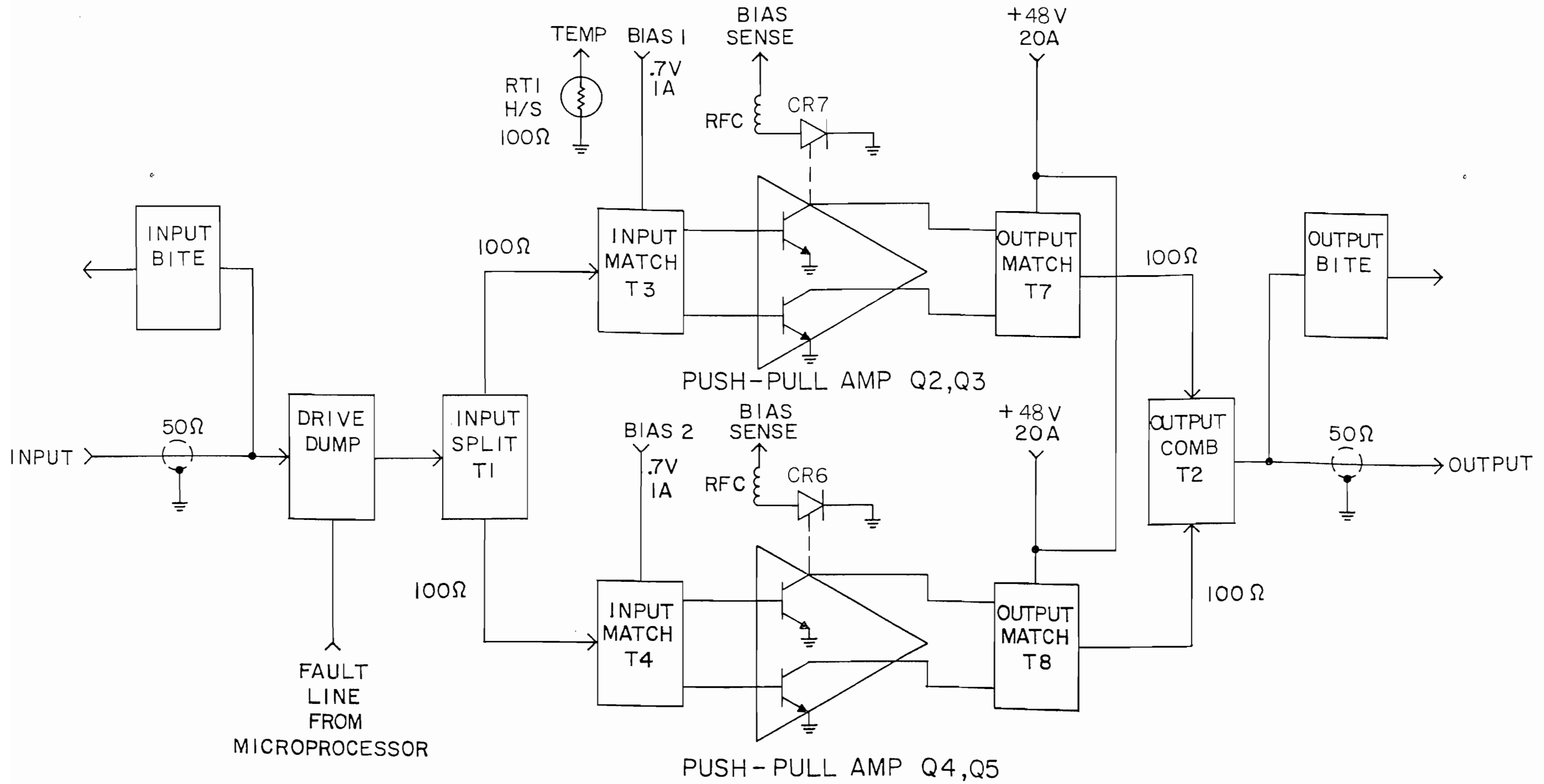


Figure 4.4 Power Amplifier Assembly A4A3 Block Diagram.

FINAL ASSY, TESTED

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
A1	FINAL ASSY, TESTED	8116001256
A2	CHASSIS ASSY, (A1)	81050100XX
A3A2	CONTROL PANEL MODULE, (A2)	8116090054
A3A3	PC ASSY, PERIPHERAL	8105085097
A4	PC ASSY, MICROPROCESSOR	8105083094
A5	RF/PS MODULE (A4)	8066030096
A8	FILTER MODULE (A5)	8066020091
A11	FRONT PANEL ASSY (A8)	8116015095
A11A1	FILLER ASSY	8116016296
	PC ASSY DUAL DUMMY LOAD	8116071092
	BLOCK, FASTENER, FRAME	8066011105
	BUMPER, PLASTIC	0507740009
	COVER, CIRCUIT BREAKER	8066014201
	FASTENER, 1/4 TURN, T-KNOB, BLK	1007390018
	FASTENER, 1/4 TURN, SLOTTED	1008370002
	FILTER, AIR	8066002301
	FRAME, F/P, TOP	80660116XX
	FRAME, F/P, BOTTOM	80660117XX
	FRAME, F/P, LEFT SIDE	80660118XX
	FRAME, F/P, RIGHT SIDE	80660118XX
	FRAME, FILTER	80660020XX
	GRILL, FILTER	8066002106
	HANDLE	8066011504
	PANEL, TOP	80660006XX
	PANEL, BOTTOM	80660006XX
	RING, RETAINER	1008580007
	SPACER, HANDLE	8066011407
	STANDOFF, F-F, 10-32, .75L CKT BR	1008700002
	STANDOFF, SELF-CLINCH 4-40	1010610007

CHASSIS ASSEMBLY (A1)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	CHASSIS ASSEMBLY (A1)	81050100XX
A1CR1	DIODE, RECTIFIER 1N4004	0405180004
A1K1	RELAY, DPST, 24V, 30A	1007120011
A3A1	PC ASSY, MOTHER BOARD	8105081091
A6	COMBINER MODULE (A6)	8116060091
A7	SPLITTER MODULE (A7)	8066070098
A9	PC ASSY, CONN., REAR PNL (A9)	8105041090
A10	AUX. POWER SUPPLY MODULE (A10)	8066050097
W2A1	HARNESS ASSY, W2A1 CHASSIS	8066013299
W3A1	HARNESS ASSY, W3A1 CHASSIS	8066013396
W4A1	HARNESS ASSY, W4A1 CHASSIS	8066013493
W5A1	HARNESS ASSY, W5A1 CHASSIS	8066013591
W6A1	HARNESS ASSY, W6A1 CHASSIS	8066013698
	BLOCK, LOCATING	8066012101
	BOTTOM BRACE	8066012209
	BRACKET, MODULE HOLD-DOWN	8066010109
	BUSHING, HEYCO SNAP 3/8	0874000041
	CARD GUIDE, MTG HDW ASSY	8066012594
	CHASSIS, FRONT	8066010508
	CHASSIS, REAR	8066010206
	CLAMP, CABLE, FLAT 1 1/16 WIDE	1008650005
	CLAMP, CABLE, FLAT 9/16 WIDE	1008660001
	FASTENER, 1/4 TURN, SLOTTED	1008370002
	J CLIP, ADHESIVE BACK	1008640000
	NUT, WING 1/4-20	0507730003
	RECEPTACLE, 1/4 TURN FASTENER	1008360031
	RING, RETAINER	1008580007
	SIDE, CHASSIS, RIGHT	80660113XX
	SIDE, CHASSIS, LEFT	80660113XX
	STANDOFF, M-F, 4-40 X .875L	1010550004
	TERMINAL STRIP, 2 TERM. 1 GND.	0848120001
	COVER, POWER CONNECTOR	8066017201

HARNESS ASSY, W2A1 CHASSIS

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
W2A1P1	HARNESS ASSY, W2A1 CHASSIS	8066013299
W2A1P2	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
	CABLE, FLAT, 20 COND. 28AWG	1008080004

HARNESS ASSY, W3A1 CHASSIS

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
W3A1P1	HARNESS ASSY, W3A1 CHASSIS	8066013396
W3A1P2	CONNECTOR, RIBBON, 40 PIN FEM	1008110035
W3A1P3	CONNECTOR, RIBBON, 26 PIN FEM	1008340031
	CONNECTOR, RIBBON, 14 PIN FEM	1008350001
	CABLE, RIBBON, 40 COND.	1008080012

HARNESS ASSY, W4A1 CHASSIS

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
W4A1P1	HARNESS ASSY, W4A1 CHASSIS	8066013493
W4A1P2	CONNECTOR, RIBBON, 40 PIN FEM	1008110035
W4A1P3	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
	CABLE, RIBBON, 40 COND.	1008080012

HARNESS ASSY, W5A1 CHASSIS

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
W5A1P1	HARNESS ASSY, W5A1 CHASSIS	8066013591
W5A1P2	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
	CABLE, FLAT, 20 COND. 28AWG	1008080004

HARNESS ASSY, W1A4

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	HARNESS ASSY, W1A4	8066030592
	TERMINAL, RING TONGUE NO. 6	0508460000
	CONNECTOR, PC, 2 PIN HOUSING	1008040037
	TERMINAL, 1/4" FEMALE	1008210005

HARNESS ASSY, W6A1 CHASSIS

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	HARNESS ASSY, W6A1 CHASSIS	8066013698
W1A1P1	CONNECTOR, RIBBON, 10 PIN FEM	1008070017
W1A1P2	CONNECTOR, RIBBON, 10 PIN FEM	1008070017
W1A1P3	CONNECTOR, RIBBON, 10 PIN FEM	1008070017
W1A1P4	CONNECTOR, RIBBON, 10 PIN FEM	1008070017
W1A1P5	CONNECTOR, RIBBON, 40 PIN FEM	1008110035
W6A1P1	CONNECTOR, HOUSING, 3 PIN FEM	1008050016
W6A1P2	CONNECTOR, HOUSING, 3 PIN FEM	1008050016
W6A1P3	CONNECTOR, HOUSING, 3 PIN FEM	1008050016
W6A1P4	CONNECTOR, HOUSING, 3 PIN FEM	1008050016
W6A1P5	CONNECTOR, HOUSING, 3 PIN FEM	1008050016
W6A1P6	CONNECTOR, HOUSING, 20 PIN FEM	1008090026
W7A1P1	CONNECTOR, BLOCK, 3 PIN FEMALE	1008770001
W7A1P2	CONNECTOR, BLOCK, 3 PIN FEMALE	1008770001
W7A1P3	CONNECTOR, BLOCK, 3 PIN FEMALE	1008770001
W7A1P4	CONNECTOR, BLOCK, 3 PIN FEMALE	1008770001
W7A1P5	CONNECTOR, BLOCK, 3 PIN FEMALE	1008770001
W7A1P6	CONNECTOR, BLOCK, 10 PIN FEM	1008100013
W7A1P7	AC CORD, FAN W/PLUG	0841580006
W7A1P8	AC CORD, FAN W/PLUG	0841580006
W7A1P9	AC CORD, FAN W/PLUG	0841580006
W7A1P10	AC CORD, FAN W/PLUG	0841580006
	TERMINAL, 1/4" FEMALE	1008210005
	CABLE, RIBBON, 10 COND. SHIELDED	1008780006
	BRACKET, MODULE HOLD DOWN, FRONT	8066014503

CONNECTOR KIT

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	CONNECTOR KIT	8105000296
	BUSHING, TELESCOPING, .56 ID	0700550054
	BUSHING, TELESCOPING, .62 ID	0700550062
	BUSHING, TELESCOPING, .75 ID	0700550071
	ADAPTER, RF, FOR PL-259	0742070000
	CONNECTOR, RF, UHF PL-259	0742190005
	CONNECTOR, RF, N UG-21B/U	0754140008
	CONNECTOR, POWER, 37 PIN ROUND	0754320006
	CLAMP, CABLE, CONNECTOR	0754570002
	CONNECTOR, POWER, 24 PIN MALE	1008390011

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FRONT PANEL ASSY A8

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
A8	FRONT PANEL ASSY A8	8116015095
ABB1	FAN, 340 CFM	1007120037
A8CB1	CIRCUIT BREAKER, 3 SECTION	1013340001
A8DS1	LAMP, 28V, .04A, T-1 3/4	1008370011
A8DS2	LAMP, 6V, .20A, T-1 3/4	1008400033
	RECEPTACLE, 1/4 TURN FASTENER	1008360031
	FASTENER, 1/4 TURN, SLOTTED	1008370002
	SOCKET, LAMP, RED LENS	1008380008
	SOCKET, LAMP, GREEN LENS	1008380016
	RING, RETAINER	1008580007
	PLATE, MOUNTING, CIRCUIT BRKR	8066010303
	VENTURI, BLOWERS	8066010401
	PANEL, FRONT	8066011008
	PANEL, FAN MOUNTING	8066014104
	BRACKET, VENTURI	8116016008

POWER CABLE ASSY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
2P1	POWER CABLE ASSY	8066002297
2XP1	CONNECTOR, POWER, 3 PIN ROUND	0754250008
	CLAMP, CABLE, CONNECTOR	0754270009
	CABLE, 3 COND. NO. 10	0841050007

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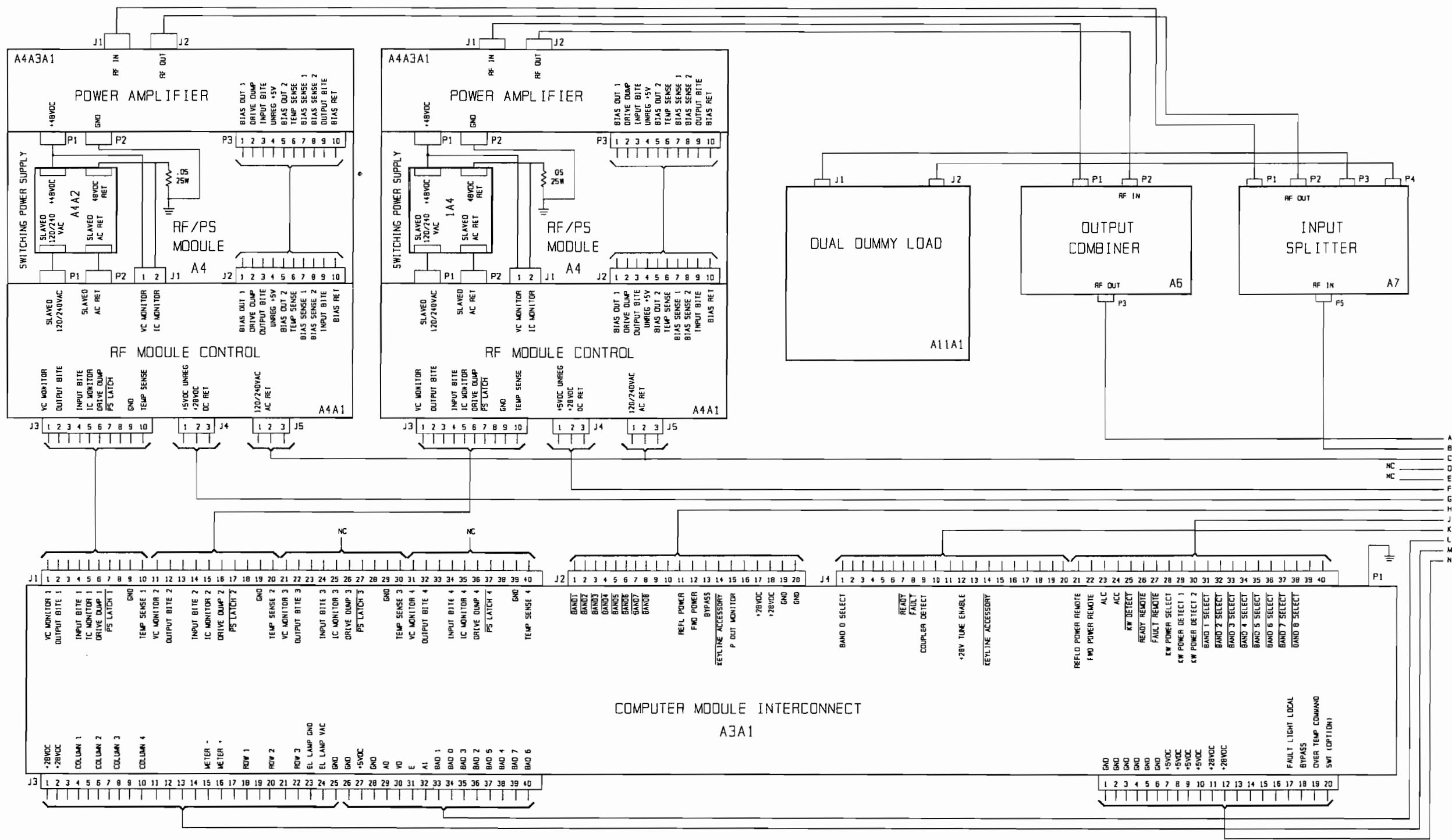


Figure 5.4 Chassis Wiring Diagram (Sheet 1/2).

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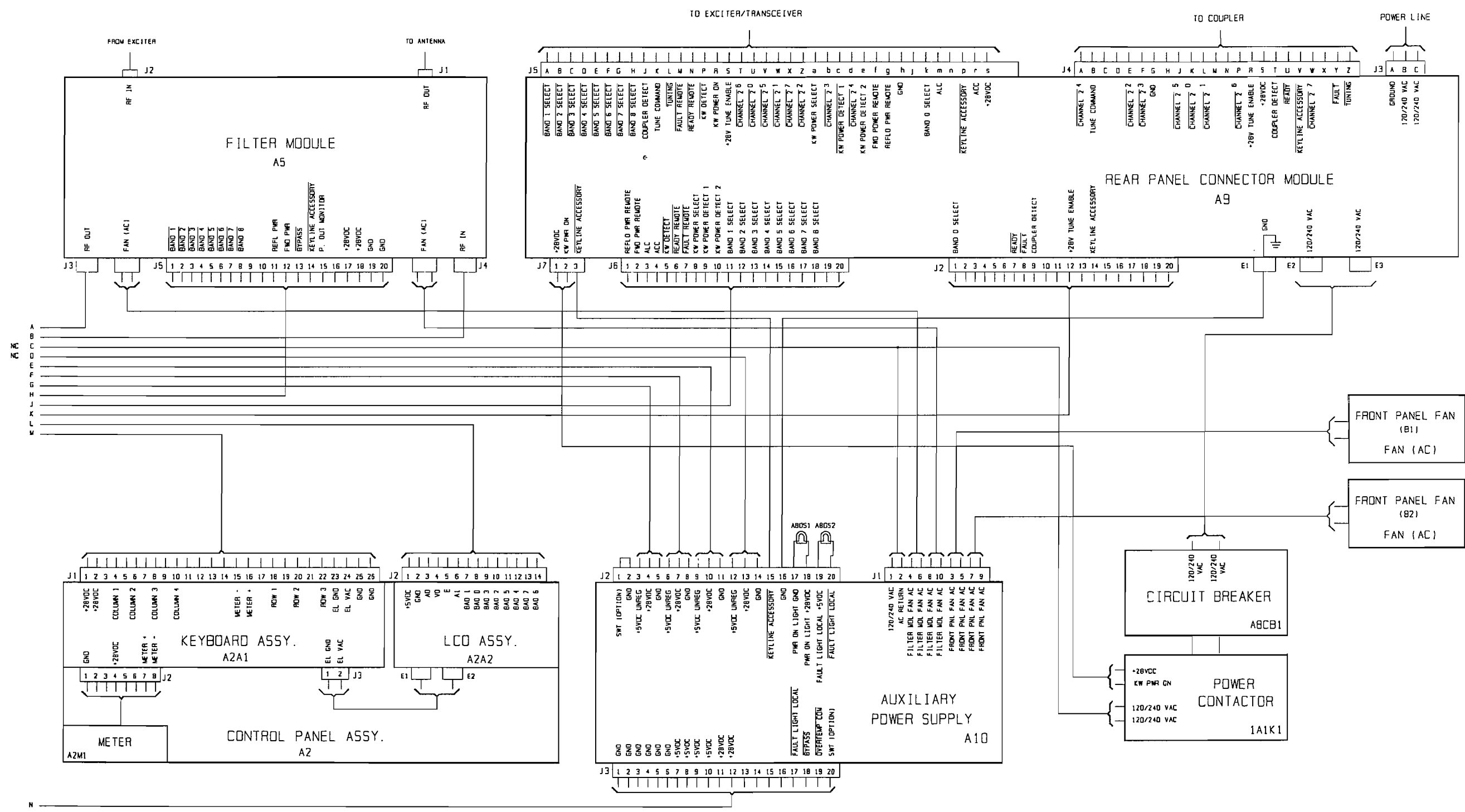
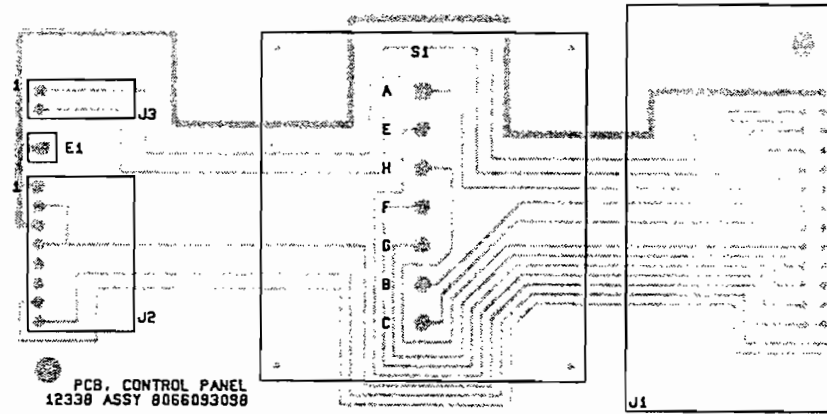


Figure 5.4 Chassis Wiring Diagram (Sheet 2/2).



CONTROL PANEL MODULE (A2)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
A1	CONTROL PANEL MODULE (A2)	8116090054
A2	PC ASSY, CONTROL PANEL	8066093098
M1	LCD ASSY	8066092091
W1A2P1	METER, ILLUMINATED	8116090801
	CONNECTOR, PC, 8 PIN HOUSING	1008050032
	SPACER, .115 ID., .187 OD, .250L	0521420041
	SPACER, .112 ID., .152 OD, .187L	0856100005
	RECEPTACLE, 1/4 TURN FASTENER	1008360031
	LAMP, MIDG. GROOVED 14.0V .08A	1008680001
	PANEL, CONTROL, GRY	80660902XX
	BRACKET, CONTROL PANEL	8066090404
	PLATE, METER MOUNTING	8066091109

PC ASSY, CONTROL PANEL (A2A1)

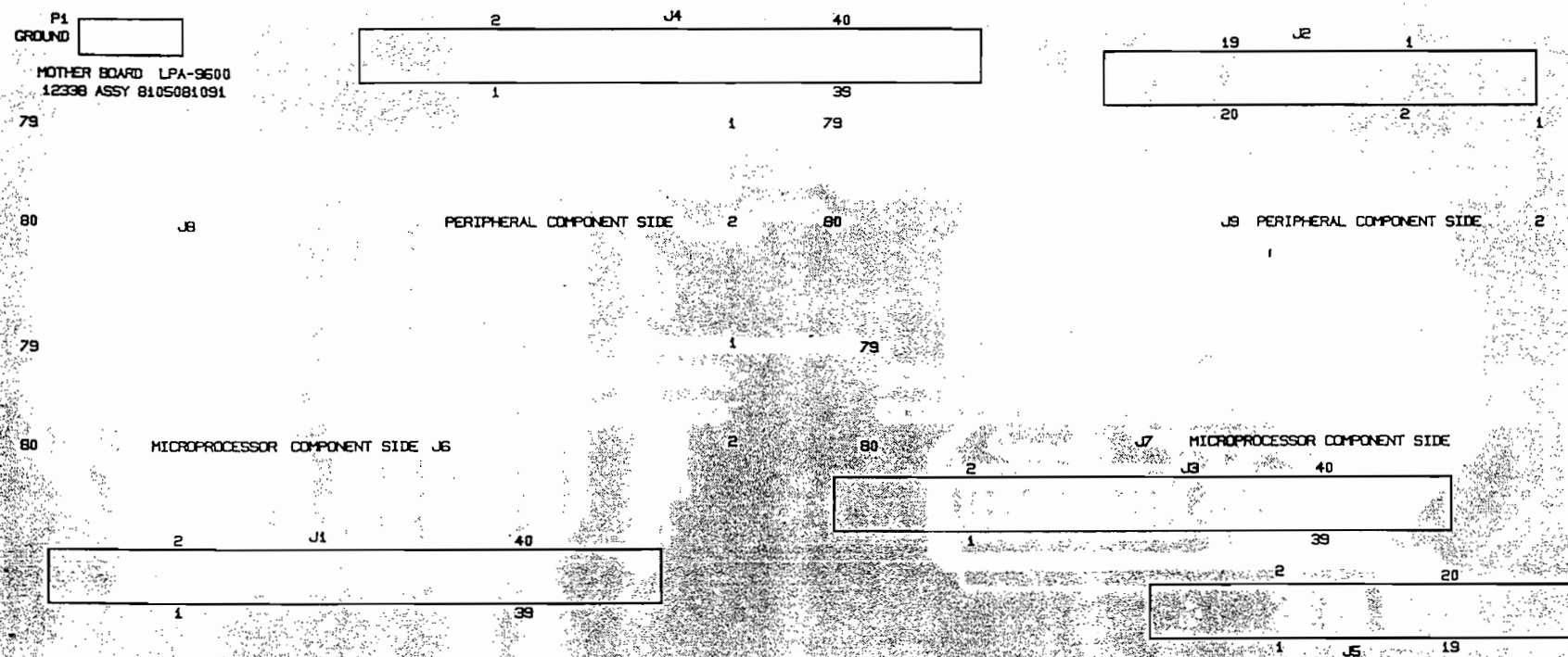
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
J1	PC ASSY, CONTROL PANEL (A2A1)	8066093098
J2	HEADER, PC, 26 PIN RIGHT ANGLE	1008180025
J3	CONNECTOR, PC, 8 PIN	1008050024
S1	CONNECTOR, PC, 2 PIN	1008040029
	KEYBOARD	8066093101
	KEY, POLARIZING	1008070033
	BRACKET, KEYBOARD MOUNTING	8066091001

LCD ASSY (A2A2)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
A2A3J1	LCD ASSY, A2A2	8066092091
W1A2A2	DOT MATRIX LCD W/E-L BACKLIGHT	1008180017
	HEADER, PC, 14 PIN DUAL	1008180009
	CONNECTOR, PC, 2 PIN HOUSING	1008040037

Figure 5.5 Control Panel Module A2.





PC ASSY, COMPUTER MOTHER BOARD (A3A1)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	COMPUTER MOTHER BOARD (A3A1)	8105081091
J1	CONNECTOR, PC, 40 PIN, STR.	1008110019
J2	CONNECTOR, PC, 20 PIN, STR.	1008120014
J3	CONNECTOR, PC, 40 PIN, STR.	1008110019
J4	CONNECTOR, PC, 40 PIN, STR.	1008110019
J5	CONNECTOR, PC, 20 PIN, STR.	1008120014
J6	CONNECTOR, PC, 40 PIN DUAL	1008130010
J7	CONNECTOR, PC, 40 PIN DUAL	1008130010
J8	CONNECTOR, PC, 40 PIN DUAL	1008130010
J9	CONNECTOR, PC, 40 PIN DUAL	1008130010
	KEY, POLARIZING	1008070033
	TERMINAL, PC MOUNT, 1/4" MALE	1008330035

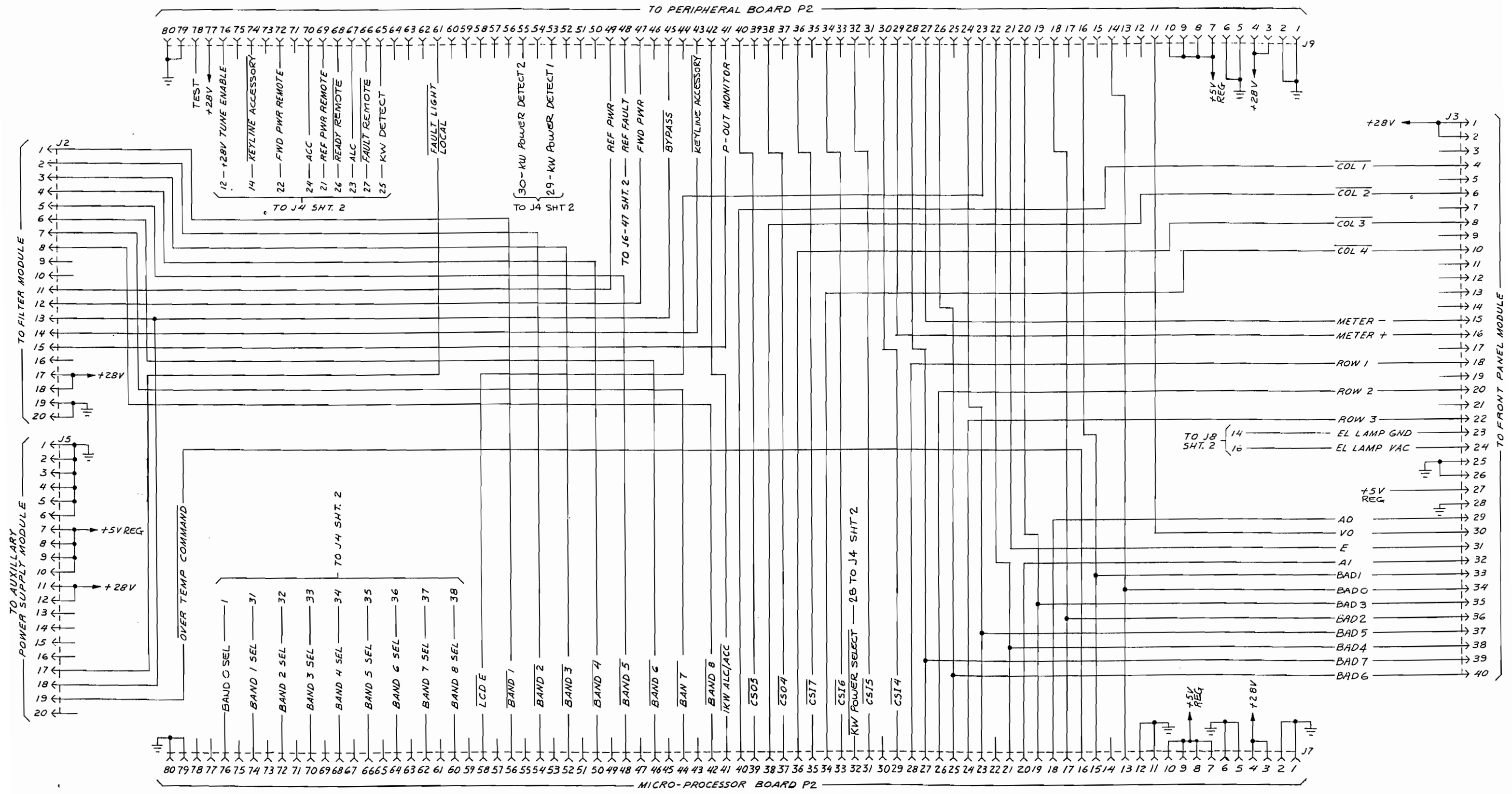


Figure 5.6 Computer Mother Board A3A1 (Sheet 1/2).

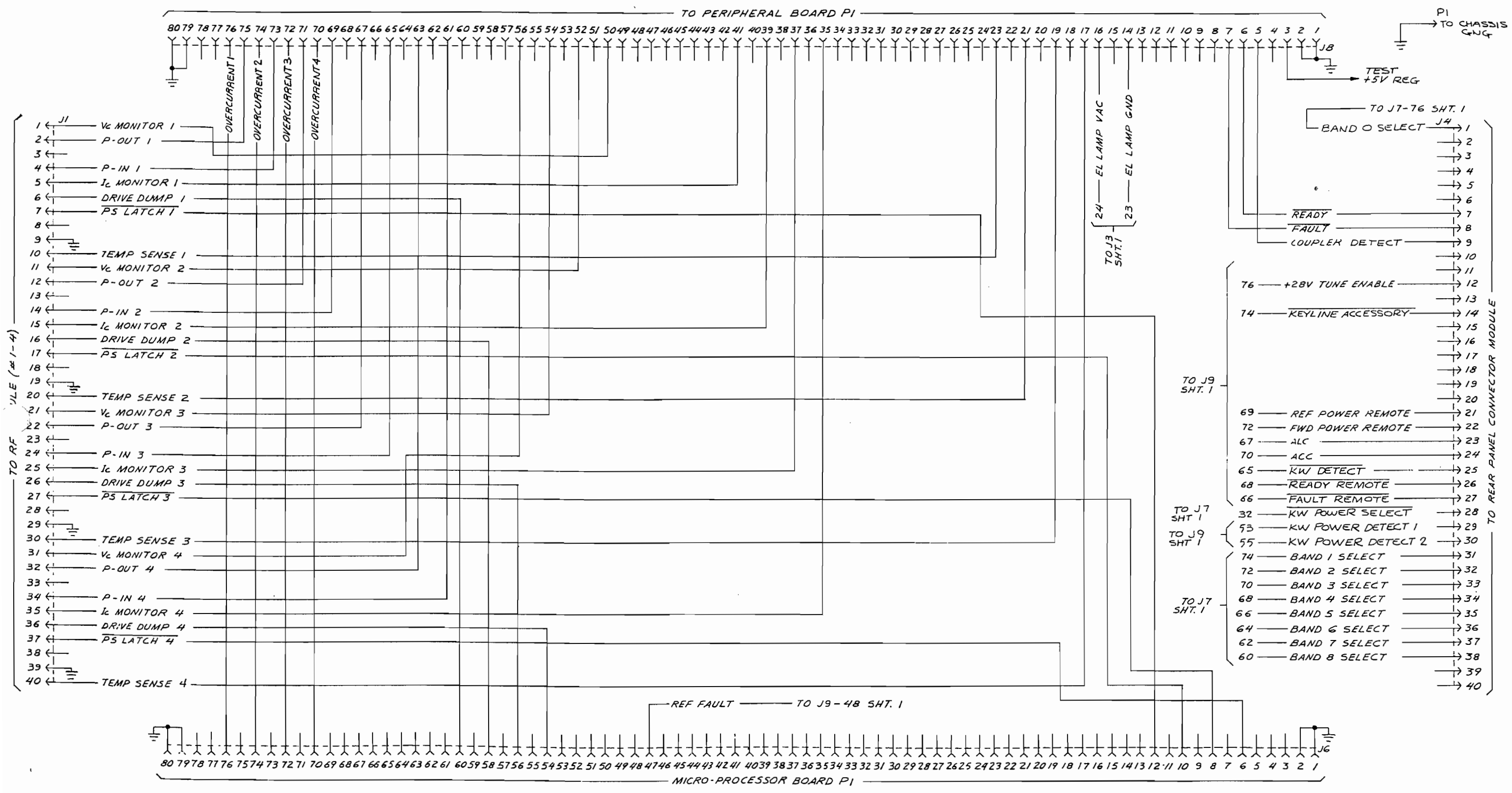
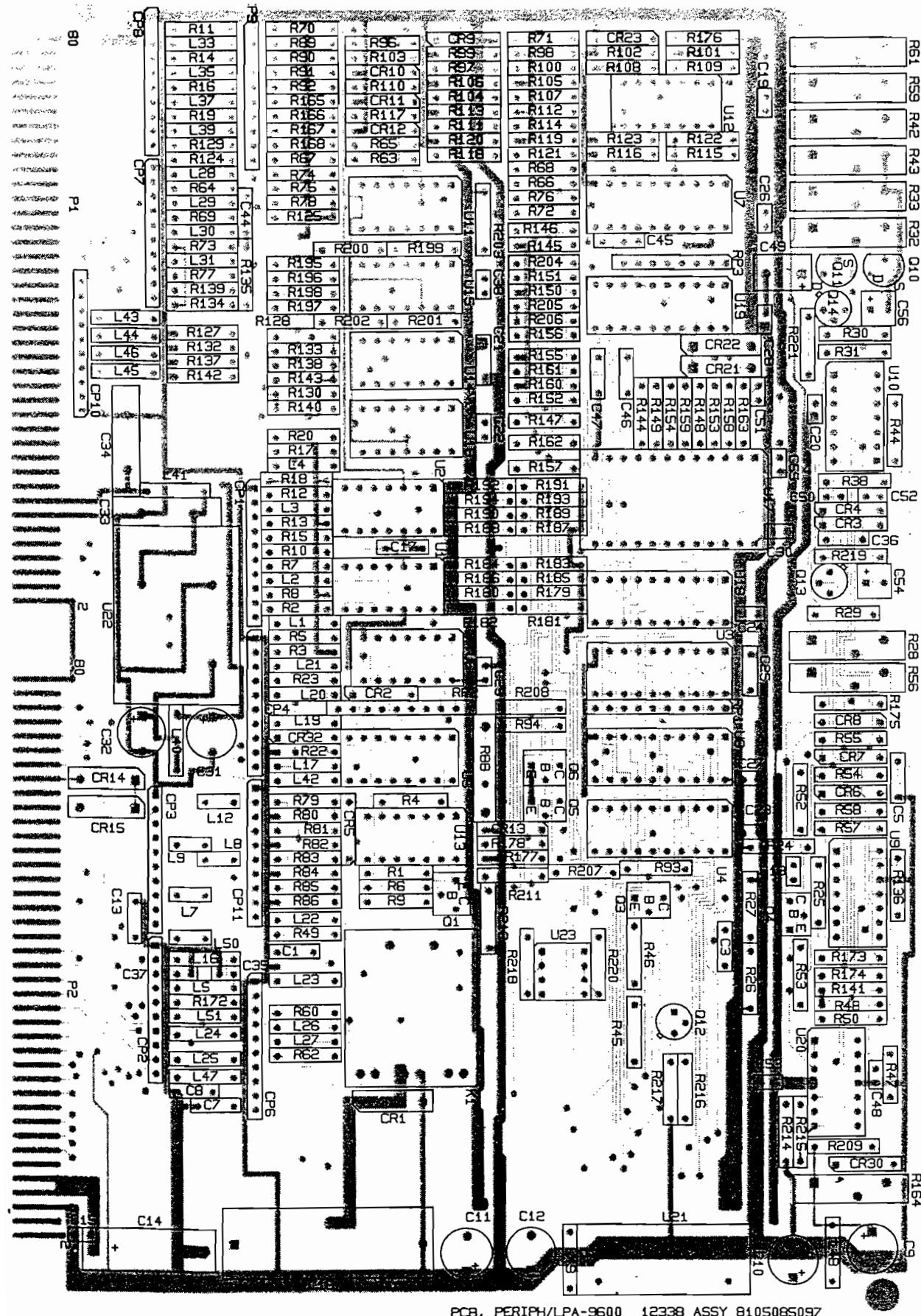


Figure 5.6 Computer Mother Board A3A1 (Sheet 2/2).

SUNAIR LPA-9500



PCB, PERIPH/LPA-9600 12338 ASSY 8105085097

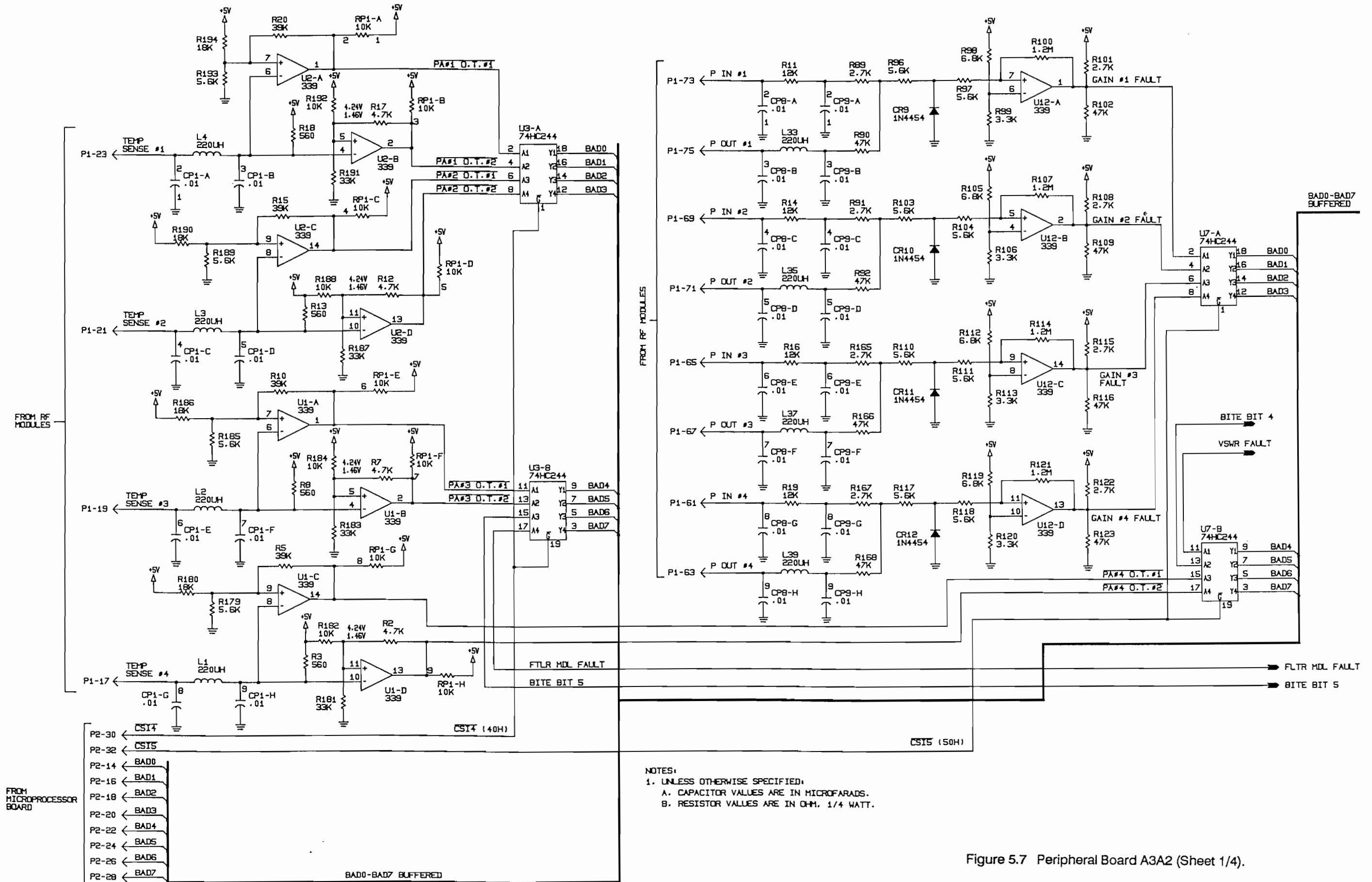
PC ASSY, PERIPHERAL BOARD (A3A2)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, PERIPHERAL BOARD A3A2	8105085097
C1	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C3	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C5	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C7	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C8	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C9	CAP. 47μF, 20V, 196D	0281700001
C10	CAP. 47μF, 20V, 196D	0281700001
C11	CAP. 47μF, 20V, 196D	0281700001
C12	CAP. 47μF, 20V, 196D	0281700001
C13	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C14	CAP. 150μF, 16V	1006150013
C15	CAP. 0.1μF, 50V, X7R 20%	0281730008
C16	CAP. 100μF, 50V,	1004260016
C17	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C18	CAP. .01μF, 50V, X7R 20%	0281730008
C19	CAP. .01μF, 50V, X7R 20%	0281730008
C20	CAP. 0.1μF, 50V, X7R 20%	0281730008
C21	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C22	CAP. .01μF, 50V, X7R 20%	0281730008
C23	CAP. .01μF, 50V, X7R 20%	0281730008
C24	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C25	CAP. 0.1μF, 50V, X7R, 20%	0281730008
C26	CAP. .01μF, 50V, X7R 20%	0281730008
C27	CAP. .01μF, 50V, X7R 20%	0281730008
C28	CAP. .01μF, 50V, X7R 20%	0281730008
C29	CAP. 0.1μF, 50V, X7R 20%	0281730008
C30	CAP. .01μF, 50V, X7R 20%	0281730008
C31	CAP. 47μF, 20V, 196D	0281700001
C32	CAP. 47μF, 20V, 196D	0281700001
C33	CAP. 0.01μF, 1000V, Z5U, 20%	0243550006
C34	CAP. 0.01μF, 1000V, Z5U, 20%	0243550006
C35	CAP. .01μF, 50V, X7R 20%	0281730008
C36	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C37	CAP. .01μF, 50V, X7R 20%	0281730008
C38	CAP. 0.1μF, 50V, X7R 20%	0281730008
C44	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C45	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C46	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C47	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C48	CAP. .01μF, 50V, X7R 20%	0281730008
C49	CAP. 15μF, 20V, 198D	0280920008
C50	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C51	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C52	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C53	CAP. .01μF, 50V, X7R 20%	0281730008
C54	CAP. 6.8μF, 20V, T368	0296780006
C55	CAP. .01μF, 50V, X7R 20%	0281730008
C56	CAP. 6.8μF, 20V, T368	0296780006
CP1	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP2	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP3	CAPACITOR, NTWK, 10 PIN, .1 μF	1006580018
CP4	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP6	CAPACITOR, NTWK, 10 PIN, .1 μF	1006580018
CP7	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP8	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP9	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP10	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP11	CAPACITOR, NTWK, 10 PIN, .1 μF	1006580018
CR1	DIODE, RECTIFIER 1N4004	0405180004

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
CR2	DIODE, HOT CARRIER 1N6263	0405610009
CR3	DIODE, SIGNAL, SIL 1N3064	0405460007
CR4	DIODE, SIGNAL, SIL 1N3064	0405460007
CR5	DIODE, HOT CARRIER 1N6263	0405610009
CR6	DIODE, SIGNAL, SIL 1N4454	0405270003
CR7	DIODE, SIGNAL, SIL 1N4454	0405270003
CR8	DIODE, SIGNAL, SIL 1N4454	0405270003
CR9	DIODE, SIGNAL, SIL 1N4454	0405270003
CR10	DIODE, SIGNAL, SIL 1N4454	0405270003
CR11	DIODE, SIGNAL, SIL 1N4454	0405270003
CR12	DIODE, SIGNAL, SIL 1N4454	0405270003
CR13	DIODE, ZENER, 1% 1N5231D	1008530000
CR14	DIODE, RECTIFIER 1N4004	0405180004
CR15	DIODE, RECTIFIER 1N4004	0405180004
CR21	DIODE, SIGNAL, SIL 1N4454	0405270003
CR22	DIODE, SIGNAL, SIL 1N4454	0405270003
CR23	DIODE, ZENER 1N5227B	0405250002
CR30	DIODE, SIGNAL, SIL 1N4454	0405270003
CR32	DIODE, SIGNAL, SIL 1N4454	0405270003
K1	RELAY, DPDT, 24V	1008030023
L1	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L2	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L3	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L4	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L5	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L7	FERRITE BEAD .047ID .138 OD	0564510009
L8	FERRITE BEAD .047ID .138 OD	0564510009
L9	FERRITE BEAD .047ID .138 OD	0564510009
L12	FERRITE BEAD .047ID .138 OD	0564510009
L14	FERRITE BEAD .047ID .138 OD	0564510009
L15	FERRITE BEAD .047ID .138 OD	0564510009
L16	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L17	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L19	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L20	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L21	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L22	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L23	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L24	INDUCTOR, MOLDED, 150μH, 5%	0659190001
L25	INDUCTOR, MOLDED, 150μH, 5%	0659190001
L26	INDUCTOR, MOLDED, 150μH, 5%	0659190001
L27	INDUCTOR, MOLDED, 150μH, 5%	0659190001
L28	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L29	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L30	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L31	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L33	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L35	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L37	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L39	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L40	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L41	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L42	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L43	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L44	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L45	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L46	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L47	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L48	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L49	INDUCTOR, MOLDED, 33μH, 5%	0659690004







NOTES:  
 1. UNLESS OTHERWISE SPECIFIED:  
 A. CAPACITOR VALUES ARE IN MICROFARADS.  
 B. RESISTOR VALUES ARE IN OHM, 1/4 WATT.

Figure 5.7 Peripheral Board A3A2 (Sheet 1/4).

BAD0-BAD7 BUFFERED

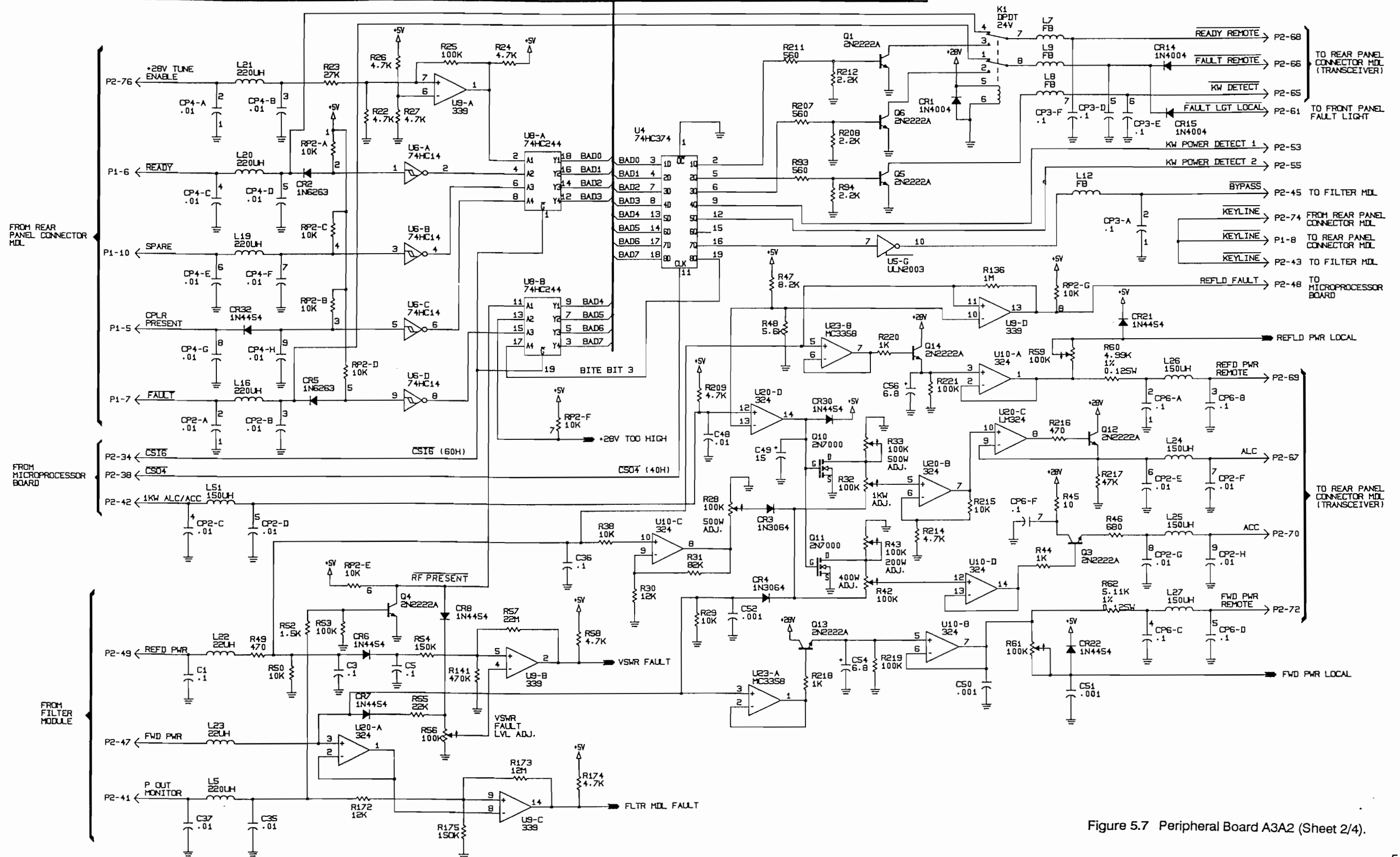


Figure 5.7 Peripheral Board A3A2 (Sheet 2/4).

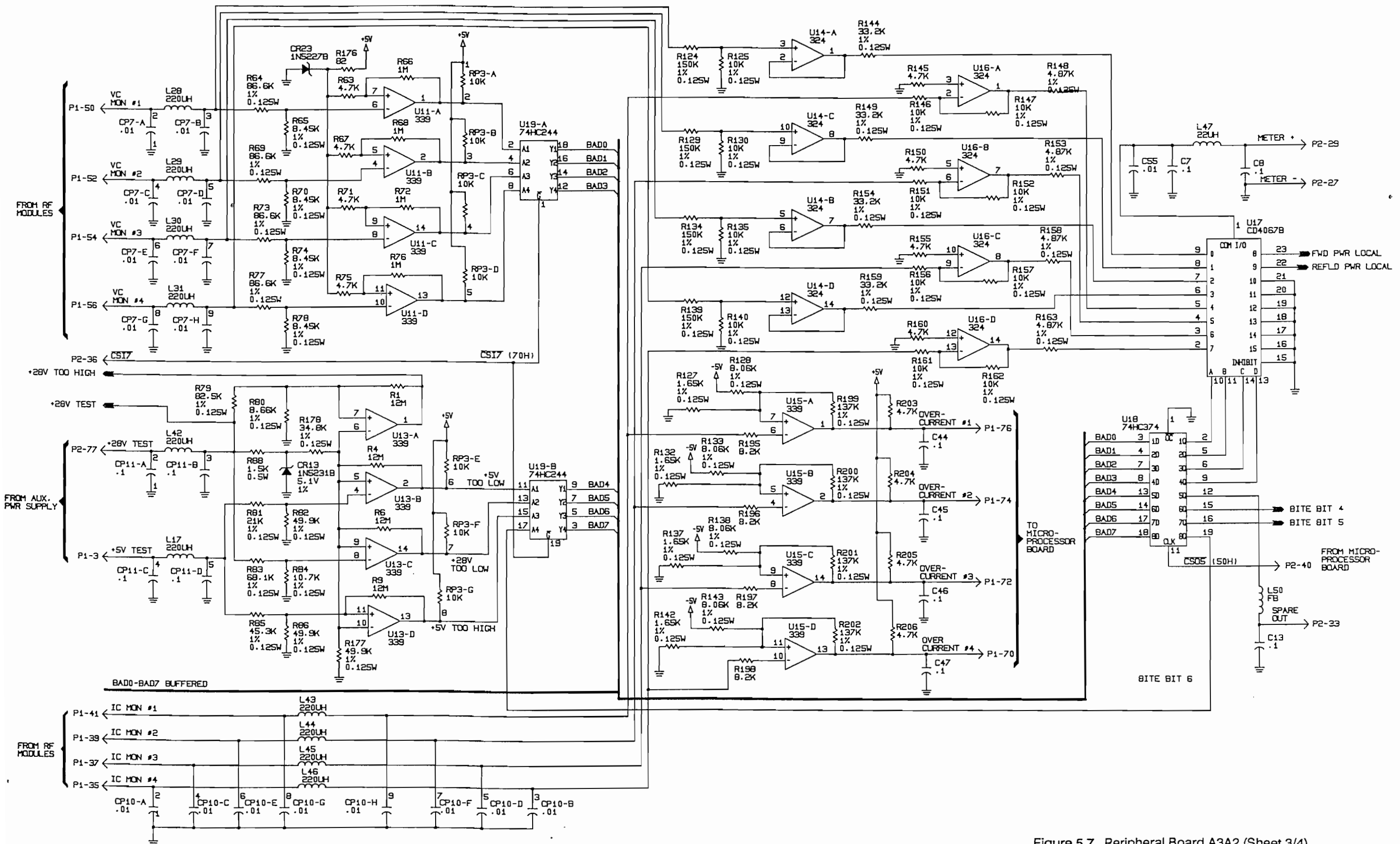
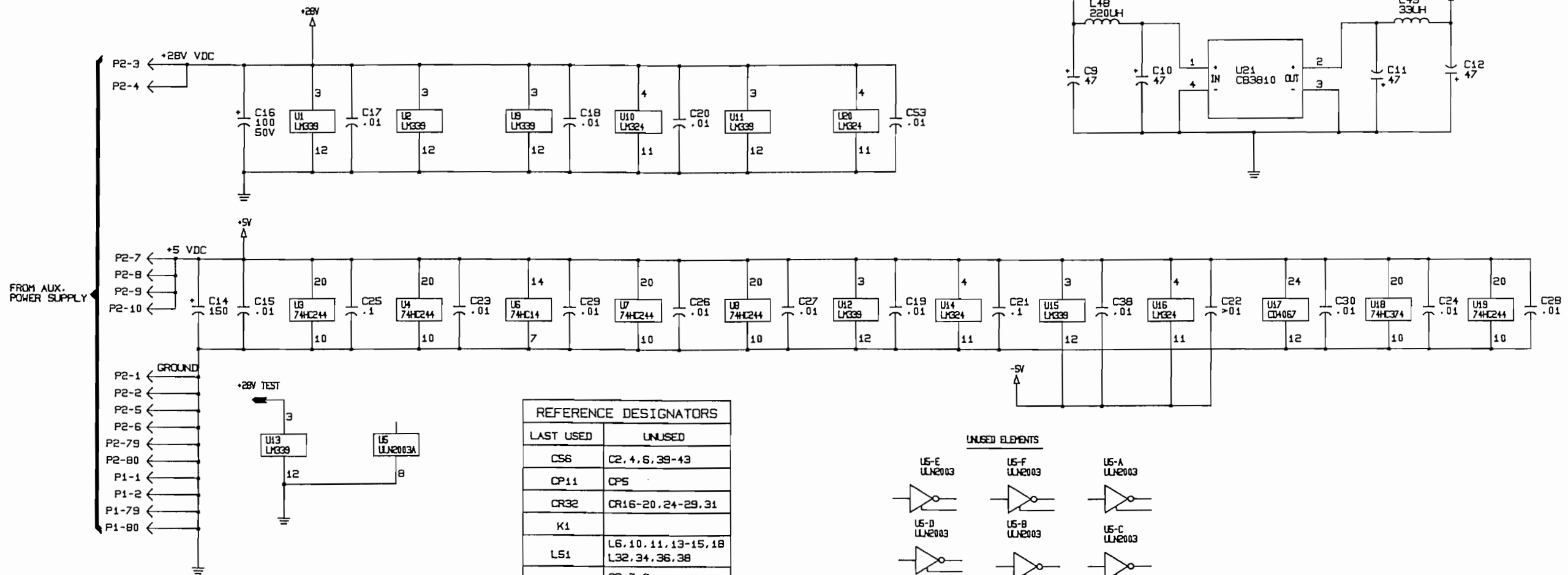
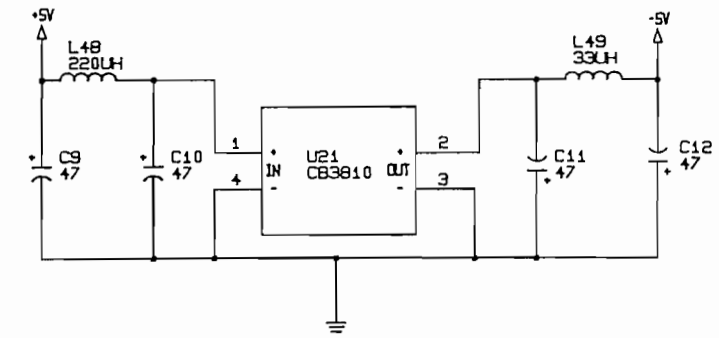
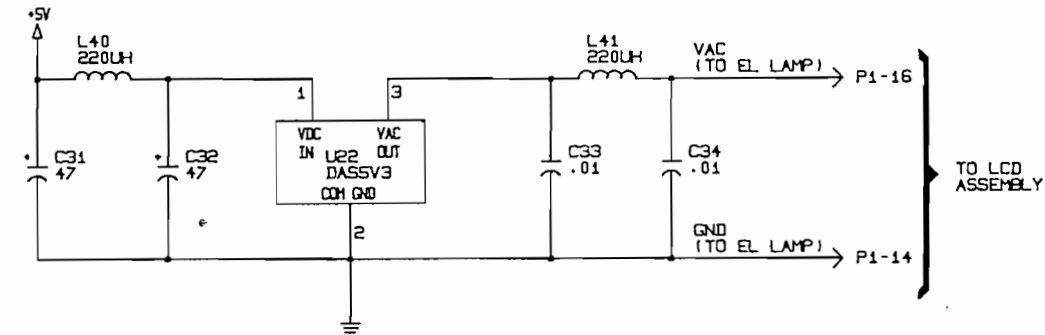
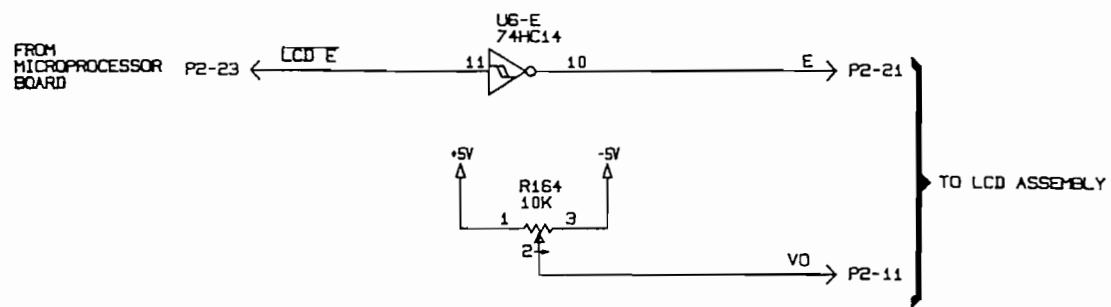


Figure 5.7 Peripheral Board A3A2 (Sheet 3/4).





REFERENCE DESIGNATORS	
LAST USED	UNUSED
CS6	C2, 4, 6, 39-43
CP11	CP5
CR32	CR16-20, 24-29, 31
K1	
LS1	L6, 10, 11, 13-15, 18, 32, 34, 36, 38
Q14	Q2, 7-9
R221	R21, 34-37, 39-41, 51, 87, 95, 126, 131, 169-171, 210, 213
RP3	
U23	

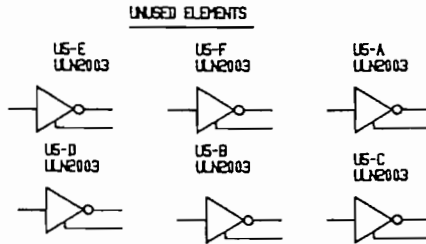
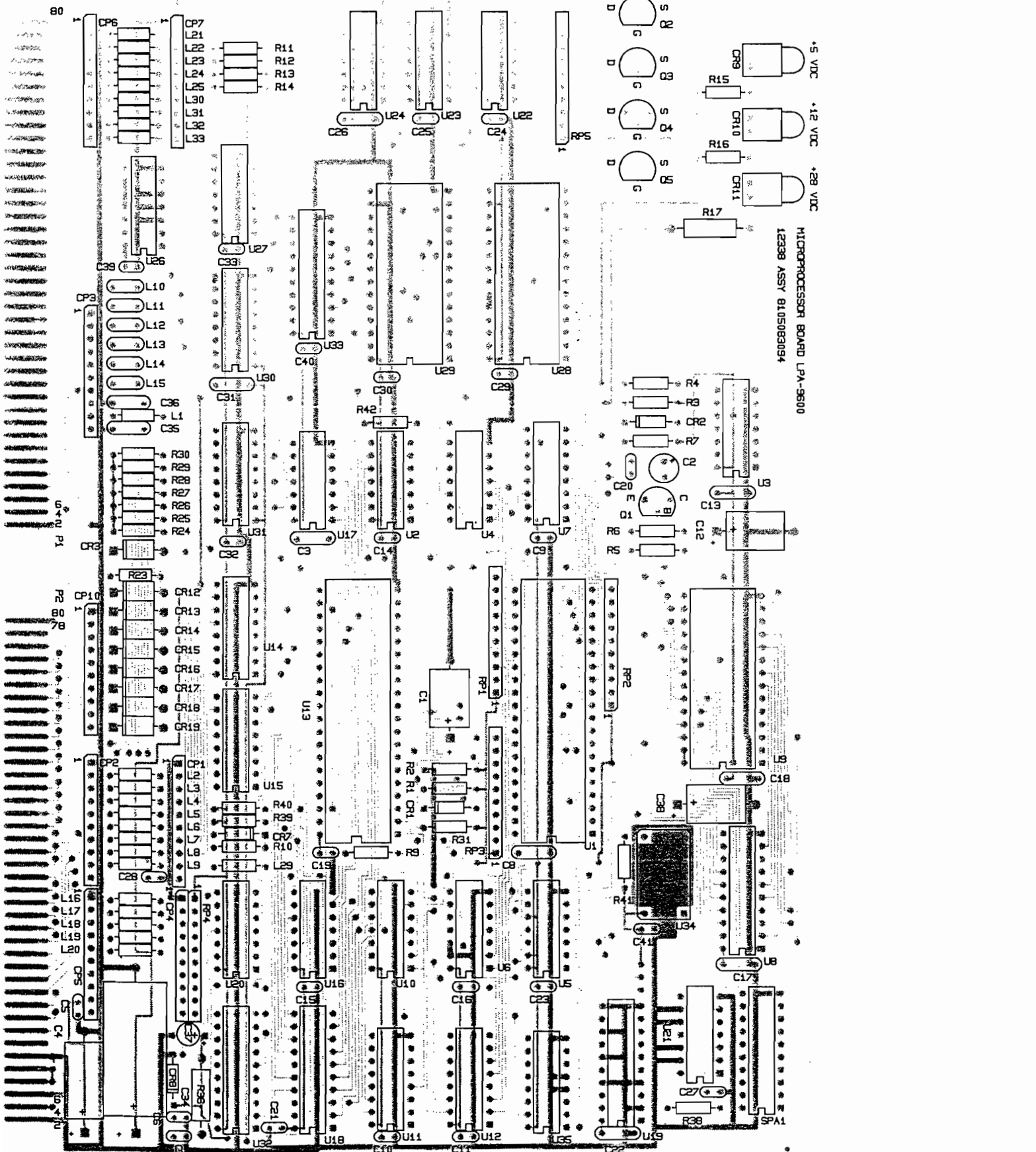


Figure 5.7 Peripheral Board A3A2 (Sheet 4/4).

SUNAIR LPA-9500

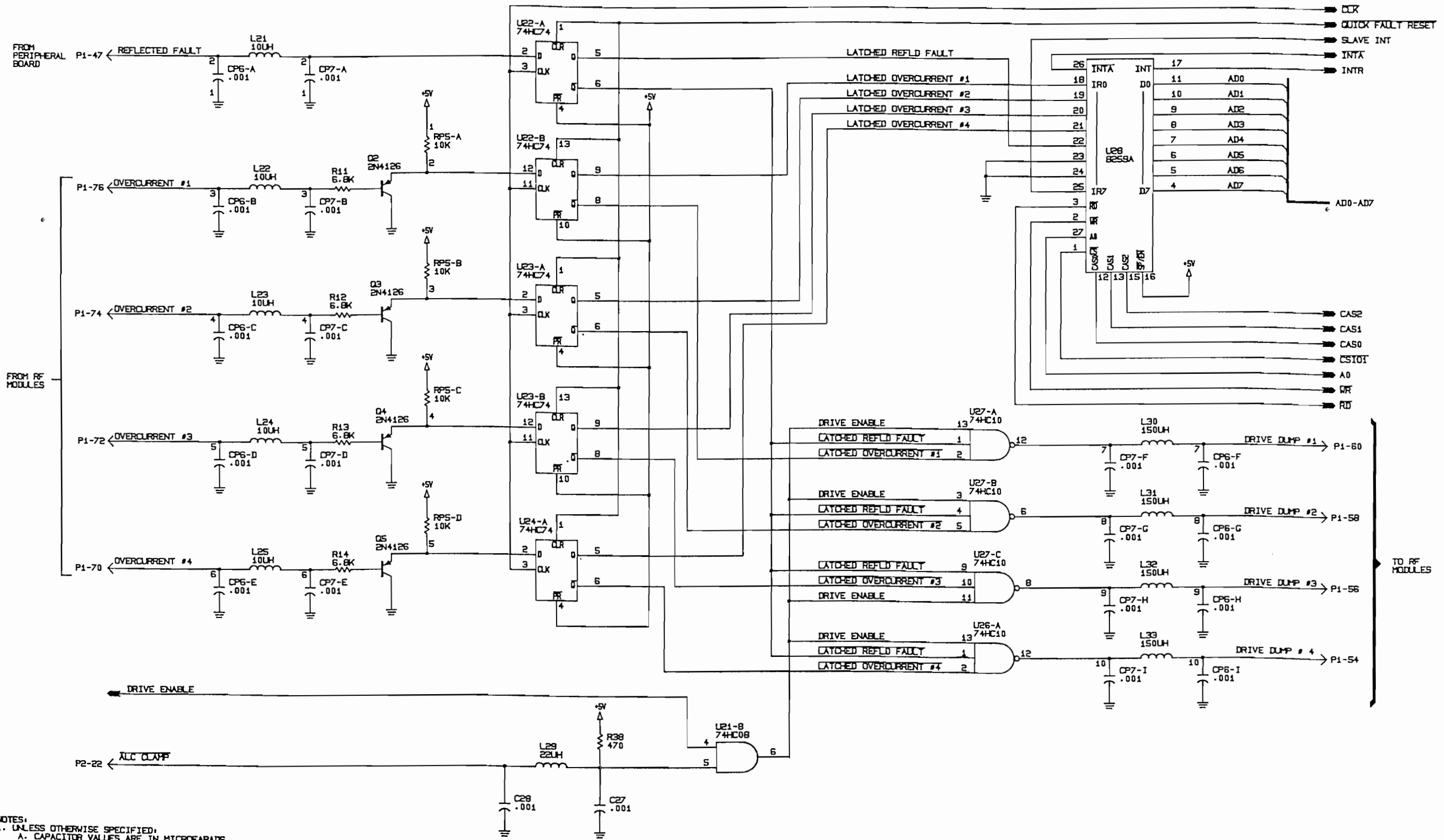
PC ASSY, MICROPROCESSOR BOARD (A3A3)



REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	MICROPROCESSOR BOARD A3A3	8105083094
C1	CAP. 47μF, 16V	1006150021
C2	CAP. 6.8μF, 20V, T368	0296780006
C3	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C4	CAP. 150μF, 16V	1006150013
C5	CAP. .01μF, 50V, X7R 20%	0281730008
C6	CAP. 100μF, 50V,	1004260016
C7	CAP. .01μF, 50V, X7R 20%	0281730008
C8	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C9	CAP. .01μF, 50V, X7R 20%	0281730008
C10	CAP. .01μF, 50V, X7R 20%	0281730008
C11	CAP. .01μF, 50V, X7R 20%	0281730008
C12	CAP. 10μF, 25V	1006150005
C13	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C14	CAP. .01μF, 50V, X7R 20%	0281730008
C15	CAP. .01μF, 50V, X7R 20%	0281730008
C16	CAP. .01μF, 50V, X7R 20%	0281730008
C17	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C18	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C19	CAP. .01μF, 50V, X7R 20%	0281730008
C20	CAP. .01μF, 50V, X7R 20%	0281730008
C21	CAP. .01μF, 50V, X7R 20%	0281730008
C22	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C23	CAP. .01μF, 50V, X7R 20%	0281730008
C24	CAP. .01μF, 50V, X7R 20%	0281730008
C25	CAP. .01μF, 50V, X7R 20%	0281730008
C26	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C27	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C28	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C29	CAP. .01μF, 50V, X7R 20%	0281730008
C30	CAP. .01μF, 50V, X7R 20%	0281730008
C31	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C32	CAP. .01μF, 50V, X7R 20%	0281730008
C33	CAP. .01μF, 50V, X7R 20%	0281730008
C34	CAP. .01μF, 50V, X7R 20%	0281730008
C35	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C36	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C37	CAP. 1μF, 35V, 196D	0281660000
C38	CAP. 10μF, 25V	1006150005
C39	CAP. .01μF, 50V, X7R 20%	0281730008
C40	CAP. .01μF, 50V, X7R 20%	0281730008
C41	CAP. .01μF, 50V, X7R 20%	0281730008
CP1	CAPACITOR, NTWK, 10 PIN, .1 μF	1006580018
CP2	CAPACITOR, NTWK, 10 PIN, .1 μF	1006580018
CP3	CAPACITOR, NTWK, 10 PIN, .1 μF	1006580018
CP4	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP5	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP6	CAPACITOR, NTWK, .001 μF	1008020001
CP7	CAPACITOR, NTWK, .001 μF	1008020001
CP10	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CR1	DIODE, SIGNAL, GERM. 1N270	0405510004
CR2	DIODE, SIGNAL, SIL 1N4454	0405270003
CR3	DIODE, RECTIFIER 1N4004	0405180004
CR7	DIODE, SIGNAL, GERM. 1N270	0405510004
CR8	DIODE, ZENER 1N5242B	0400120003
CR9	DIODE, LED, GREEN PC MOUNT	1011030012
CR10	DIODE, LED, GREEN PC MOUNT	1011030012
CR11	DIODE, LED, GREEN PC MOUNT	1011030012
CR12	DIODE, RECTIFIER 1N4004	0405180004
CR13	DIODE, RECTIFIER 1N4004	0405180004

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
CR14	DIODE, RECTIFIER 1N4004	0405180004
CR15	DIODE, RECTIFIER 1N4004	0405180004
CR16	DIODE, RECTIFIER 1N4004	0405180004
CR17	DIODE, RECTIFIER 1N4004	0405180004
CR18	DIODE, RECTIFIER 1N4004	0405180004
CR19	DIODE, RECTIFIER 1N4004	0405180004
L1	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L2	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L3	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L4	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L5	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L6	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L7	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L8	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L9	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L10	FERRITE BEAD .047ID .138 OD	0564510009
L11	FERRITE BEAD .047ID .138 OD	0564510009
L12	FERRITE BEAD .047ID .138 OD	0564510009
L13	FERRITE BEAD .047ID .138 OD	0564510009
L14	FERRITE BEAD .047ID .138 OD	0564510009
L15	FERRITE BEAD .047ID .138 OD	0564510009
L16	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L17	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L18	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L19	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L20	INDUCTOR, MOLDED, 220μH, 5%	0650500008
L21	INDUCTOR, MOLDED, 10μH, 5%	0659570009
L22	INDUCTOR, MOLDED, 10μH, 5%	0659570009
L23	INDUCTOR, MOLDED, 10μH, 5%	0659570009
L24	INDUCTOR, MOLDED, 10μH, 5%	0659570009
L25	INDUCTOR, MOLDED, 10μH, 5%	0659570009
L29	INDUCTOR, MOLDED, 22μH, 5%	0650000005
L30	INDUCTOR, MOLDED, 150μH, 5%	0659190001
L31	INDUCTOR, MOLDED, 150μH, 5%	0659190001
L32	INDUCTOR, MOLDED, 150μH, 5%	0659190001
L33	INDUCTOR, MOLDED, 150μH, 5%	0659190001
Q1	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q2	TRANSISTOR, PNP, SI 2N4126	0448020009
Q3	TRANSISTOR, PNP, SI 2N4126	0448020009
Q4	TRANSISTOR, PNP, SI 2N4126	0448020009
Q5	TRANSISTOR, PNP, SI 2N4126	0448020009
R1	RESISTOR 4.7K, 5%, 1/4W	0170770001
R2	RESISTOR 470, 5%, 1/4W	0184110009
R3	RESISTOR 100K, 10%, 1/4W	0170390004
R4	RESISTOR 3.9K, 10%, 1/4W	0178830003
R5	RESISTOR 10, 5%, 1/4W	0177160004
R6	RESISTOR 10K, 10%, 1/4W	0170410005
R7	RESISTOR 10K, 10%, 1/4W	0170410005
R9	RESISTOR 10K, 10%, 1/4W	0170410005
R10	RESISTOR 1K, 10%, 1/4W	0171560001
R11	RESISTOR 6.8K, 5%, 1/4W	0174810008
R12	RESISTOR 6.8K, 5%, 1/4W	0174810008
R13	RESISTOR 6.8K, 5%, 1/4W	0174810008
R14	RESISTOR 6.8K, 5%, 1/4W	0174810008
R15	RESISTOR 270, 10%, 1/4W	0178450006
R16	RESISTOR 1K, 10%, 1/4W	0171560001
R17	RESISTOR 2.7K, 10%, 1/2W	0165780002
R23	RESISTOR 10K, 10%, 1/4W	0170410005
R24	RESISTOR 10K, 10%, 1/4W	0170410005
R25	RESISTOR 10K, 10%, 1/4W	0170410005

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R26	RESISTOR 10K, 10%, 1/4W	0170410005
R27	RESISTOR 10K, 10%, 1/4W	0170410005
R28	RESISTOR 10K, 10%, 1/4W	0170410005
R29	RESISTOR 10K, 10%, 1/4W	0170410005
R30	RESISTOR 10K, 10%, 1/4W	0170410005
R31	RESISTOR 10K, 10%, 1/4W	0170410005
R36	RESISTOR 820, 10%, 1/2W	0175600007
R38	RESISTOR 470, 5%, 1/4W	0184110009
R39	RESISTOR 10K, 10%, 1/4W	0170410005
R40	RESISTOR 10K, 10%, 1/4W	0170410005
R41	RESISTOR 470, 5%, 1/4W	0184110009
R42	RESISTOR 10K, 10%, 1/4W	0170410005
RP1	RES NTWK 10 PIN SIP 10K COM	1006130021
RP2	RES NTWK 10 PIN SIP 10K COM	1006130021
RP3	RES NTWK 6 PIN SIP 10K COM	1006130004
RP4	RES NTWK 6 PIN SIP 10K COM	1006130004
RP5	RES NTWK 10 PIN SIP 10K COM	1006130021
U1	IC. DIGITAL 8085A	1005780021
U2	IC. DIGITAL 7417	1003870007
U3	IC. LINEAR 556C/3456	1005620032
U4	IC. DIGITAL 74HC14	1006490027
U5	IC. DIGITAL 74HC74	1008000019
U6	IC. DIGITAL 74HC32	1006470026
U7	IC. DIGITAL 74HC139	1006770038
U8	IC. DIGITAL 74HC373	1006480030
U9	EPROM W/LPA-9600 SOFTWARE	8105084295
U10	IC. DIGITAL 74HC08	1006490019
U11	IC. DIGITAL 74HC138	1006480013
U12	IC. DIGITAL 74HC138	1006480013
U13	IC. DIGITAL P8155H	1005780030
U14	IC. DIGITAL ULN2003A	1005630038
U15	IC. DIGITAL ULN2003A	1005630038
U16	IC. DIGITAL 74HC14	1006490027
U17	IC. DIGITAL 74HC20	1008000035
U18	IC. DIGITAL 74HC244	1006460039
U19	IC. DIGITAL 74HC244	1006460039
U20	IC. DIGITAL 74HC14	1006490027
U21	IC. DIGITAL 74HC08	1006490019
U22	IC. DIGITAL 74HC74	1008000019
U23	IC. DIGITAL 74HC74	1008000019
U24	IC. DIGITAL 74HC74	1008000019
U26	IC. DIGITAL 74HC10	1008010006
U27	IC. DIGITAL 74HC10	1008010006
U28	IC. DIGITAL 8259A	1006800018
U29	IC. DIGITAL 8259A	1006800018
U30	IC. DIGITAL MC14504	1006090037
U31	IC. DIGITAL MC14504	1006090037
U32	IC. DIGITAL 74HC245	1006470034
U33	IC. DIGITAL 74HC244	1006460039
U34	CRYSTAL OSCILLATOR, 6.144 MHZ	1008180033
U35	IC. DIGITAL 74HC138	1006480013
XU1	SOCKET, IC, 40 PIN TAILLESS	1006620010
XU9	SOCKET, IC, 28 PIN TAILLESS	1006620001
XU13	SOCKET, IC, 40 PIN TAILLESS	1006620010



NOTES:  
 1. UNLESS OTHERWISE SPECIFIED:  
 A. CAPACITOR VALUES ARE IN MICROFARADS  
 B. RESISTORS ARE 1/4 WATT.

Figure 5.8 Microprocessor Board A3A3 (Sheet 1/4).

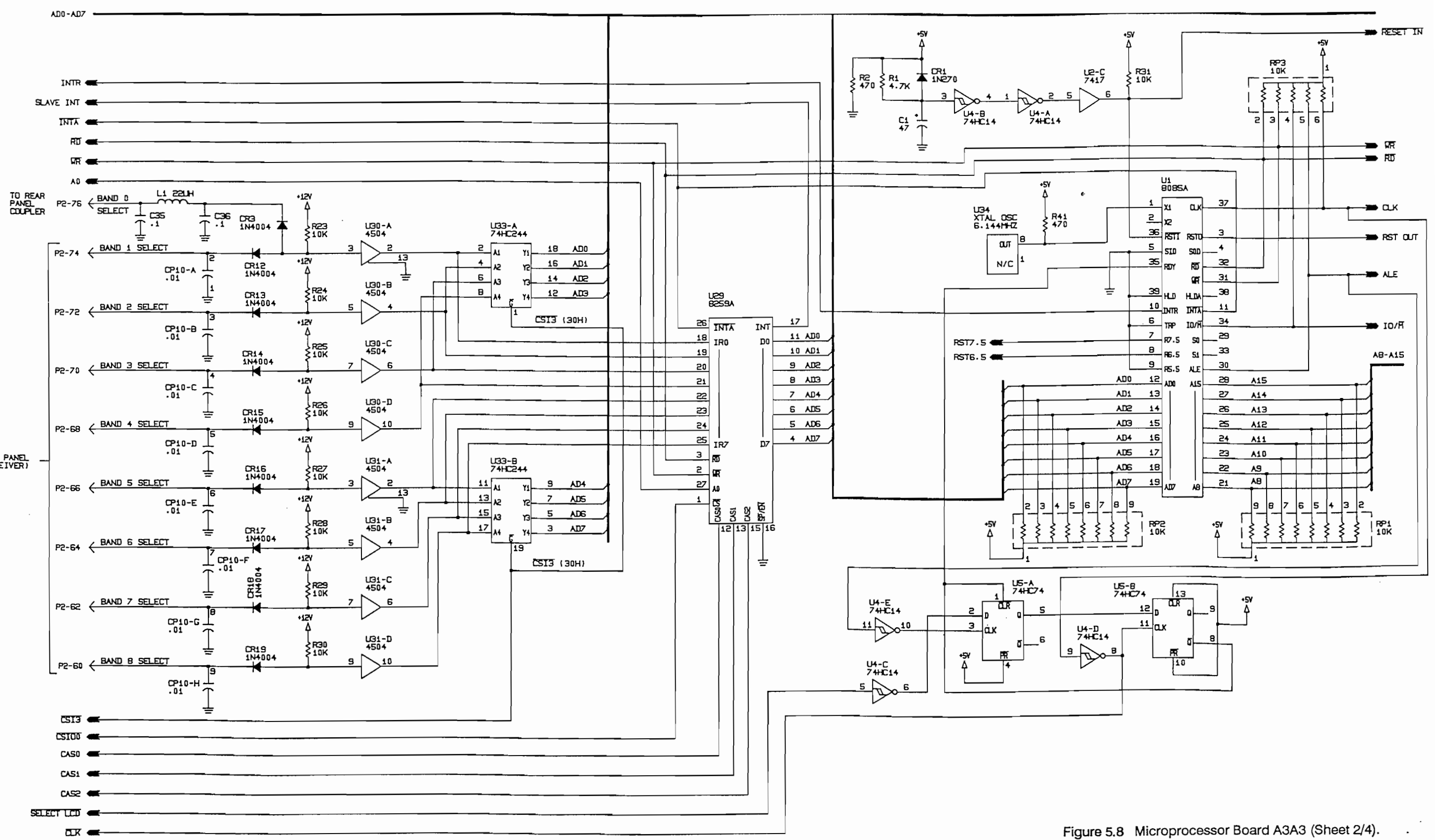


Figure 5.8 Microprocessor Board A3A3 (Sheet 2/4).

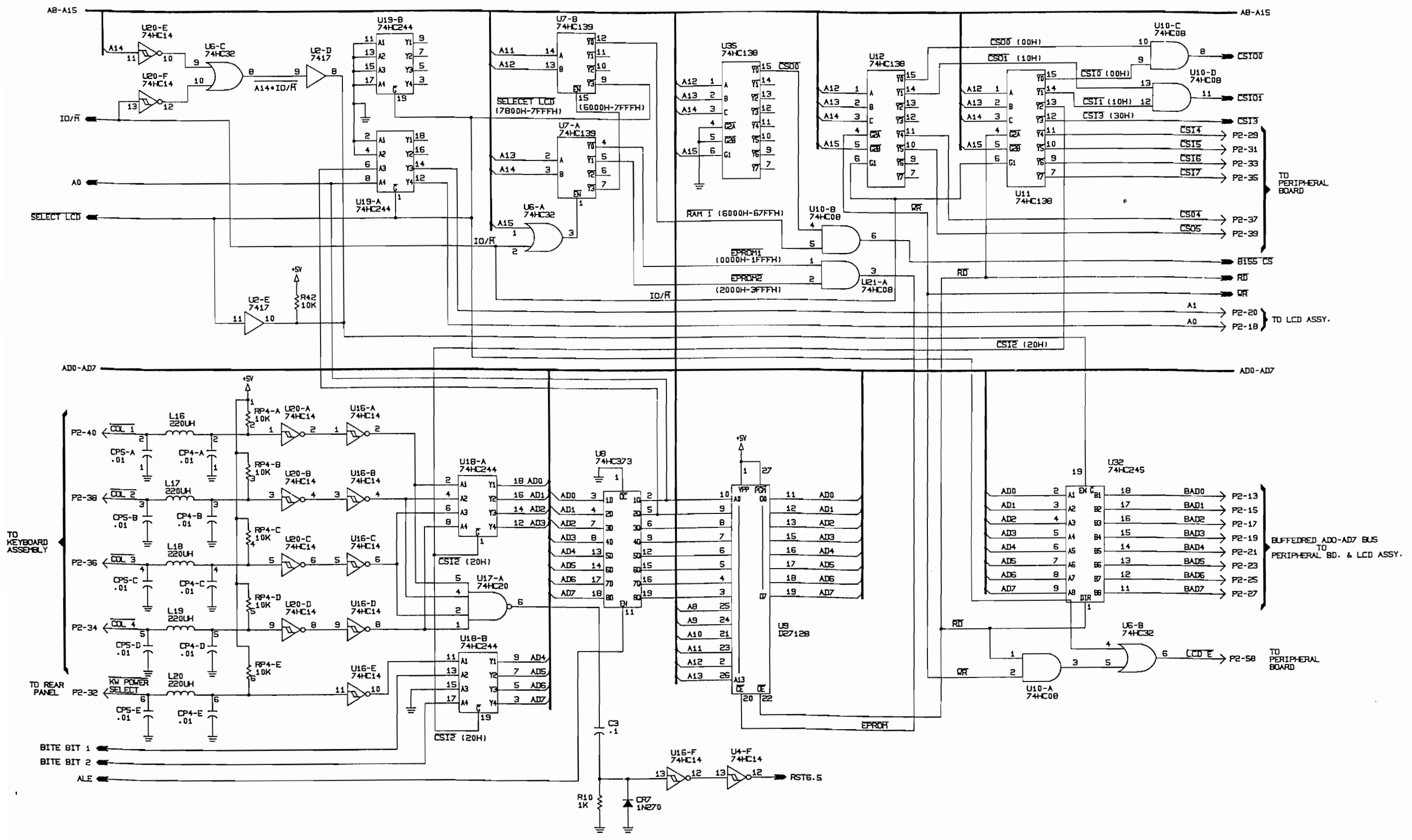


Figure 5.8 Microprocessor Board A3A3 (Sheet 3/4).

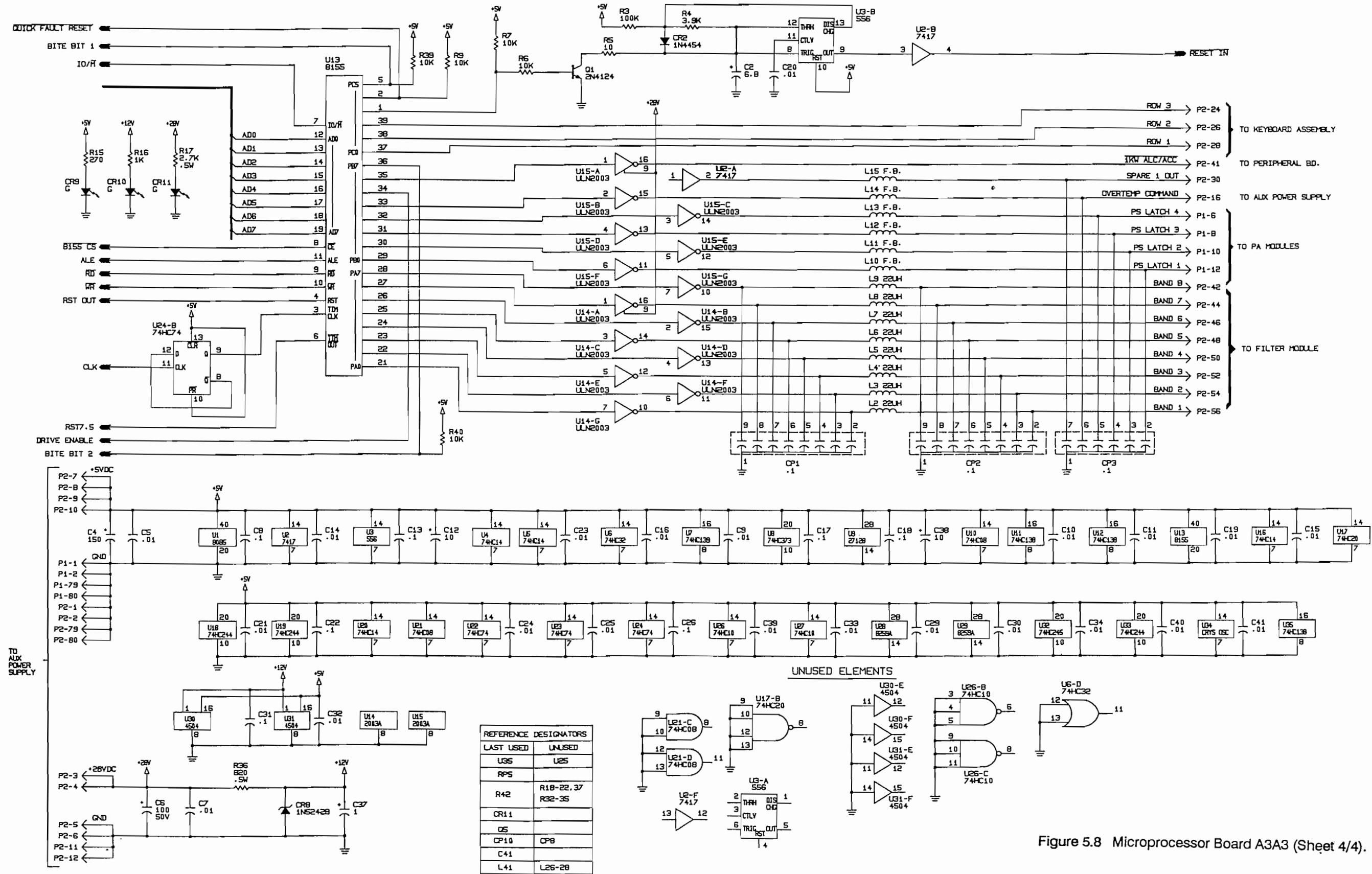
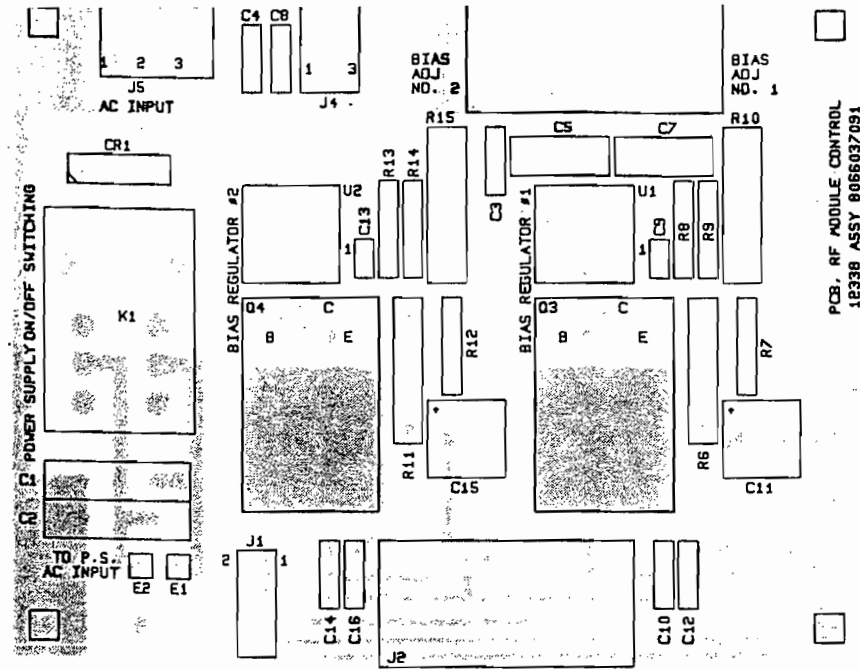


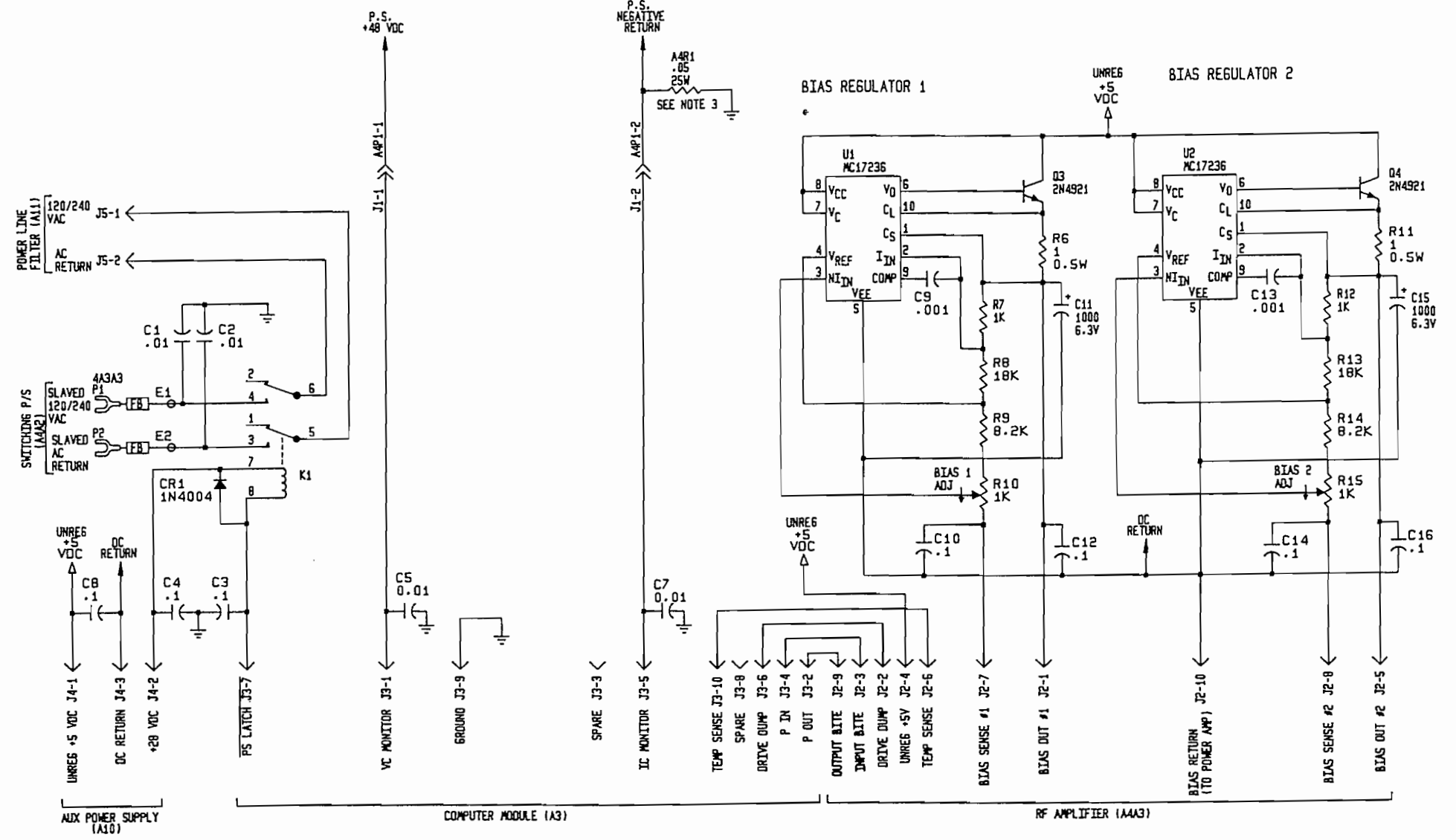
Figure 5.8 Microprocessor Board A3A3 (Sheet 4/4).





PC ASSY, MODULE CONTROL (A4A1)

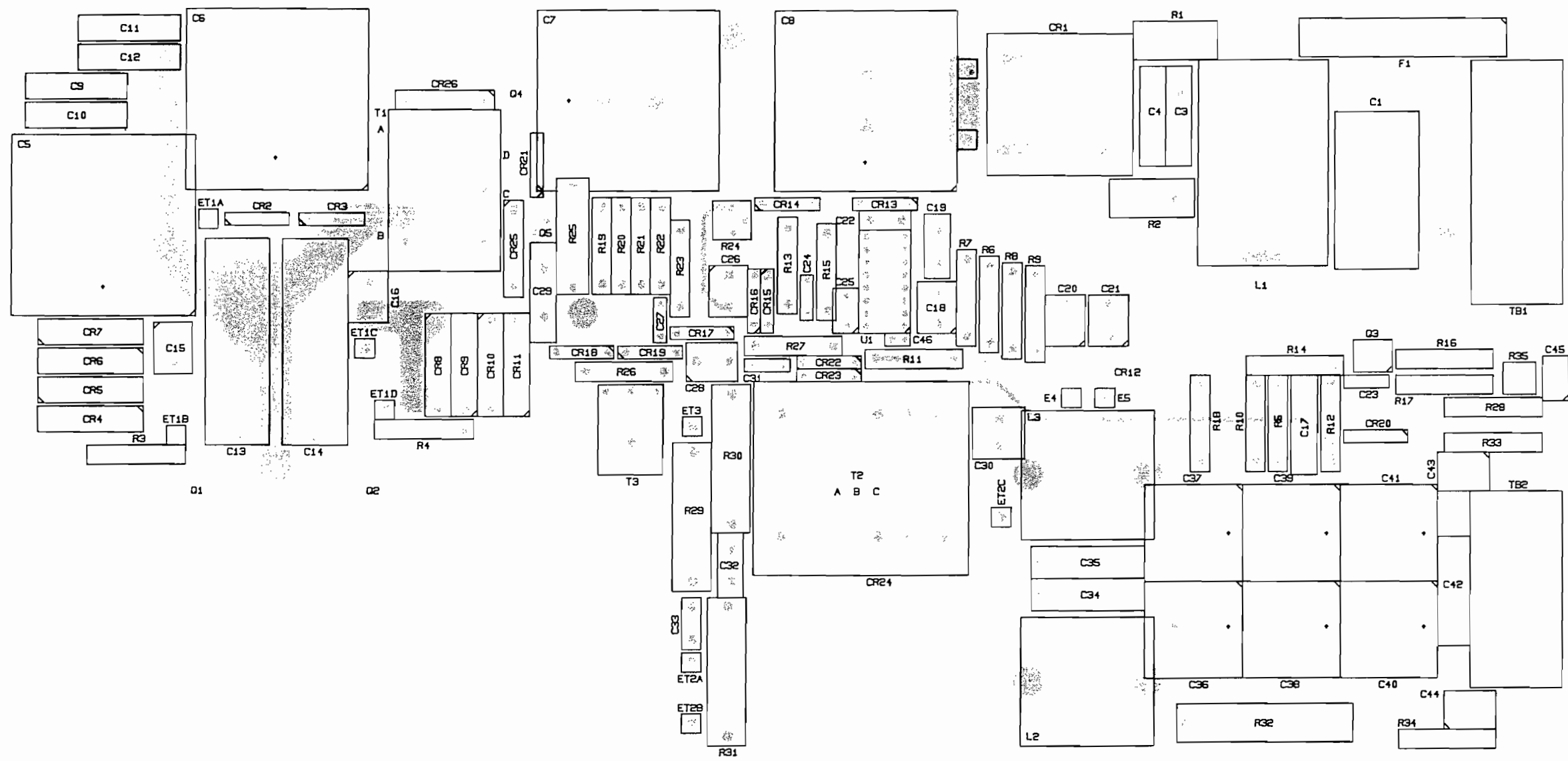
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
A4A1J1	PC ASSY, MODULE CONTROL A4A1	8066037091
A4A1J2	CONNECTOR, PC, 2 PIN	1008040029
A4A1J3	CONNECTOR, PC, 10 PIN HEADER	1008070009
A4A1J4	CONNECTOR, PC, 10 PIN HEADER	1008070009
A4A1J5	CONNECTOR, PC, 3 PIN	1008050008
A4A1J6	CONNECTOR, PC, 3 PIN HEADER	1008760005
C1	CAP. 0.01μF, 1000V, Z5U, 20%	0243550006
C2	CAP. 0.01μF, 1000V, Z5U, 20%	0243550006
C3	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C4	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C5	CAP. .01μF, 100V, 25V/Y5P	0273217771
C6	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C7	CAP. .01μF, 100V, 25V/Y5P	0273217771
C8	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C9	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C10	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C11	CAPACITOR, 1000μF, 10V	1007160012
C12	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C13	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C14	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C15	CAPACITOR, 1000μF, 10V	1007160012
C16	CAP. 0.1μF, 50V, X7R, 20%	0281610002
CR1	DIODE, RECTIFIER 1N4004	0405180004
K1	RELAY, DPDT, 24 VDC, 10A	1006920005
(XK1)	SPRING, RELAY SOCKET	1006920021
(XK1)	SOCKET, RELAY	1007130008
Q3	TRANSISTOR, NPN, SI 2N4921	0448040000
Q4	TRANSISTOR, NPN, SI 2N4921	0448040000
R6	RESISTOR 1, 10%, 1/2W	0194770001
R7	RESISTOR 1K, 10%, 1/4W	0171560001
R8	RESISTOR 18K, 10%, 1/4W	0175720002
R9	RESISTOR 8.2K, 5%, 1/4W	0181620006
R10	POT. 1K, 10% 3/4W, 15 TURNS	0338490019
R11	RESISTOR 1, 10%, 1/2W	0194770001
R12	RESISTOR 1K, 10%, 1/4W	0171560001
R13	RESISTOR 18K, 10%, 1/4W	0175720002
R14	RESISTOR 8.2K, 5%, 1/4W	0181620006
R15	POT. 1K, 10% 3/4W, 15 TURNS	0338490019
U1	IC. LINEAR MC1723G	0448190001
U2	IC. LINEAR MC1723G	0448190001
	HEATSINK, TRANSISTOR	1003322905
	FERRITE BEAD, .23D,-12ID,-16L KEY, POLARIZING	1005850011
		1008070033



- NOTES:
- UNLESS OTHERWISE SPECIFIED:
    - A. CAPACITOR VALUES ARE IN μF.
    - B. RESISTOR VALUES ARE IN Ω'S AND ARE 1/4 WATT.
  - PREFIX ALL DESIGNATORS WITH A4A1.
  - COMPONENT A4R1 IS MOUNTED OFF-BOARD.

Figure 5.9 Module Control Board A4A1.





SUNAIR LPA-9500

PC ASSY, 48V SWITCHING PS (A4A2)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, 48V SWITCHING PS (A4A2)	8066335091
C1	CAP. 1μF, 250VAC 20%	1007280000
C3	CAP. 0.02μF, 1000V, Y5U, 20%	1007280018
C4	CAP. 0.02μF, 1000V, Y5U, 20%	1007280018
C5	CAP. 1000μF, 200V	1007280026
C6	CAP. 1000μF, 200V	1007280026
C7	CAP. 1000μF, 200V	1007280026
C8	CAP. 1000μF, 200V	1007280026
C9	CAP. 0.02μF, 1000V, Y5U, 20%	1007280018
C10	CAP. 0.02μF, 1000V, Y5U, 20%	1007280018
C11	CAP. 0.02μF, 1000V, Y5U, 20%	1007280018
C12	CAP. 0.02μF, 1000V, Y5U, 20%	1007280018
C13	CAP. 2.2μF, 250V	1007280034
C14	CAP. 2.2μF, 250V	1007280034
C15	CAP. 10μF, 20V	1007290005
C16	CAP. 10μF, 20V	1007290005
C17	CAP. 0.01μF, 1000V, Z5U, 20%	0243550006
C18	CAP. 10μF, 20V	1007290005
C19	CAP. 0.0022μF, 200V, Z5F, 10%	0272780006
C20	CAP. 10μF, 20V	1007290005
C21	CAP. 10μF, 20V	1007290005
C22	CAP. 0.0022μF, 1000V, Y5P, 10%	1007290013
C23	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C24	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C25	CAP. 1μF, 35V, 196D	0281660000
C26	CAP. 10μF, 20V	1007290005
C27	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C28	CAP. 10μF, 20V	1007290005
C29	CAP. 0.02μF, 1000V, Y5U, 20%	1007280018
C30	CAP. 100μF, 50V	1009410008
C31	CAP. 0.001μF, 1000V, Z5R, 10%	0295010002
C32	CAP. 0.0047μF, 1000V, Y5U, 20%	1007290021
C33	CAP. 0.0022μF, 1000V, Y5P, 10%	1007290013
C34	CAP. 0.47μF, 250V, 10%	1007290030
C35	CAP. 0.47μF, 250V, 10%	1007290030
C36	CAP. 470μF, 100V	1007300001
C37	CAP. 470μF, 100V	1007300001
C38	CAP. 470μF, 100V	1007300001
C39	CAP. 470μF, 100V	1007300001
C40	CAP. 470μF, 100V	1007300001
C41	CAP. 470μF, 100V	1007300001
C42	CAP. 0.47μF, 250V, 10%	1007290030
C43	CAP. 10μF, 20V	1007290005
C44	CAP. 10μF, 20V	1007290005
C45	CAP. 1μF, 35V, 196D	0281660000
C46	CAP. 0.001μF, 100V, X7R, 20%	0281630003
CR1	DIODE, BRIDGE KBPC25	1007300027
CR2	DIODE, RECTIFIER 1N4936	1007300035
CR3	DIODE, RECTIFIER 1N4936	1007300035
CR4	DIODE, RECTIFIER 1N5402	1007310006
CR5	DIODE, RECTIFIER 1N5402	1007310006
CR6	DIODE, RECTIFIER 1N5402	1007310006
CR7	DIODE, RECTIFIER 1N5402	1007310006
CR8	DIODE, RECTIFIER 1N5402	1007310006
CR9	DIODE, RECTIFIER 1N5402	1007310006
CR10	DIODE, RECTIFIER 1N5402	1007310006
CR11	DIODE, RECTIFIER 1N5402	1007310006
CR12	DIODE, SCR 2N1595	1007330015
CR13	DIODE, RECTIFIER 1N4004	0405180004
CR14	DIODE, RECTIFIER 1N5819	1007310014

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
CR15	DIODE, RECTIFIER 1N4004	0405180004
CR16	DIODE, RECTIFIER 1N4004	0405180004
CR17	DIODE, RECTIFIER 1N5819	1007310014
CR18	DIODE, RECTIFIER 1N5819	1007310014
CR19	DIODE, RECTIFIER 1N5819	1007310014
CR20	DIODE, ZENER 1N4758A	1007310022
CR21	DIODE, RECTIFIER 1N4936	1007300035
CR22	DIODE, RECTIFIER 1N4936	1007300035
CR23	DIODE, RECTIFIER 1N4936	1007300035
CR24	DIODE, RECTIFIER, DUAL, 2605	1007320010
CR25	DIODE, TRANSZORB 75V	1006050035
CR26	DIODE, TRANSZORB 75V	1006050035
F1	FUSE, MDA, 20 AMP, 250V	1007340002
L1	INDUCTOR, CHOKE, INPUT PS	8066335407
L2	INDUCTOR, CHOKE, OUTPUT PS	8066335504
L3	INDUCTOR, CHOKE, OUTPUT PS	8066335504
Q1	TRANSISTOR, NPN SI 2N6678	1007320028
Q2	TRANSISTOR, NPN SI 2N6678	1007320028
Q3	TRANSISTOR, NPN, SI 2N3566	1007320036
Q4	TRANSISTOR, N-CH, FET 2N6782	1007070013
Q5	TRANSISTOR, N-CH, FET 2N6782	1007070013
R1	THERMISTOR, NTC, 0.5 AT 25C	1007300019
R2	THERMISTOR, NTC, 5 AT 25C	1007320001
R3	RESISTOR 240K, 5%, 1/2W	1007250003
R4	RESISTOR 240K, 5%, 1/2W	1007250003
R5	RESISTOR 32.4K, 1%, 1/4W	1007260009
R6	RESISTOR 2K, 1%, 1/4W	1007260017
R7	RESISTOR 2.49K, 1%, 1/4W	1007260025
R8	RESISTOR 27, 10%, 1/2W	1007250011
R9	RESISTOR 4.99K, 1%, 1/4W	1007260041
R10	RESISTOR 1K, 10%, 1/2W	0167480006
R11	RESISTOR 2.49K, 1%, 1/4W	1007260025
R12	RESISTOR 10.7K, 1%, 1/4W	1007260033
R13	RESISTOR 20.5K, 1%, 1/4W	1007270004
R14	RESISTOR 2.2K, 10%, 1/2W	0167360001
R15	RESISTOR 22K, 10%, 1/2W	0167120000
R16	RESISTOR 45.3K, 1%, 1/4W	1007270012
R17	RESISTOR 97.6, 1%, 1/4W	1007270021
R18	RESISTOR 1K, 10%, 1/2W	0167480006
R19	RESISTOR 2.2K, 10%, 1/2W	0167360001
R20	RESISTOR 2.2K, 10%, 1/2W	0167360001
R21	RESISTOR 2.2K, 10%, 1/2W	0167360001
R22	RESISTOR 2.2K, 10%, 1/2W	0167360001
R23	RESISTOR 10.7K, 1%, 1/4W	1007260033
R24	POT. 5K, 10% 1/2W, 4 TURNS	0197510001
R25	RESISTOR 350, 5%, 3W	0162930003
R26	RESISTOR 226, 1%, 1/4W	1007270039
R27	RESISTOR 27, 10%, 1/2W	1007250011
R28	RESISTOR 4.7K, 10%, 1/2W	0169200001
R29	RESISTOR 10, 10%, 2W	1007250020
R30	RESISTOR 10, 10%, 2W	1007250020
R31	RESISTOR 33, 10%, 2W	1007250038
R32	RESISTOR 1K, 5%, 5W	0190370009
R33	RESISTOR 220, 10%, 1/2W	0172850002
R34	RESISTOR 470, 10%, 1/2W	0173900003
R35	POT. 10K 1/2W, 10% 4 TURN	1009420003
S1	THERMOSTAT, N.O., 82 DEG C	1007330031
T1	TRANSFORMER, DRIVER, PS	8066335601
T2	TRANSFORMER, POWER, PS	8066335709
T3	TRANSFORMER, CURRENT SENSE PS	8066335806

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
TB1	BARRIER STRIP, 5 POS, PC MT	1007340011
TB2	BARRIER STRIP, 4 POS, PC MT	1007340029
U1	IC. LINEAR LM3524	1007330023
	MICA INS. TO-3 TRANSISTOR	0440940001
	MOUNTING PAD, TRANSISTOR	0502710004
	FUSECLIP, PC MOUNT	0534610005
	BARRIER JUMPER, 2 POS	1007340037
	HEATSINK, BRIDGE RECTIFIER	8066336403
	HEATSINK, DUAL RECTIFIER	8066336608
	HEATSINK, TRANSISTOR, INNER	8066336802
	HEATSINK, TRANSISTOR, OUTER	8066336900

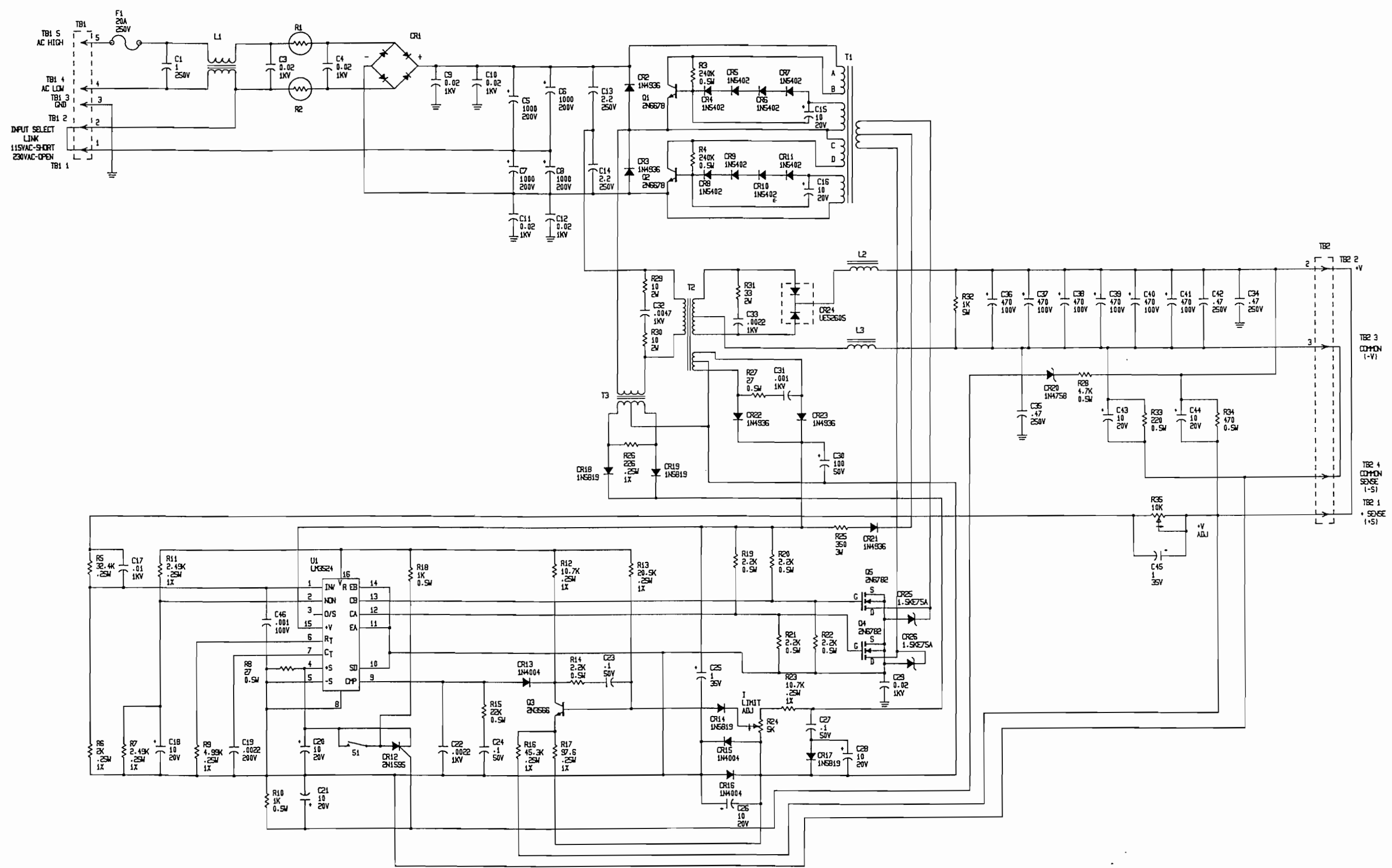
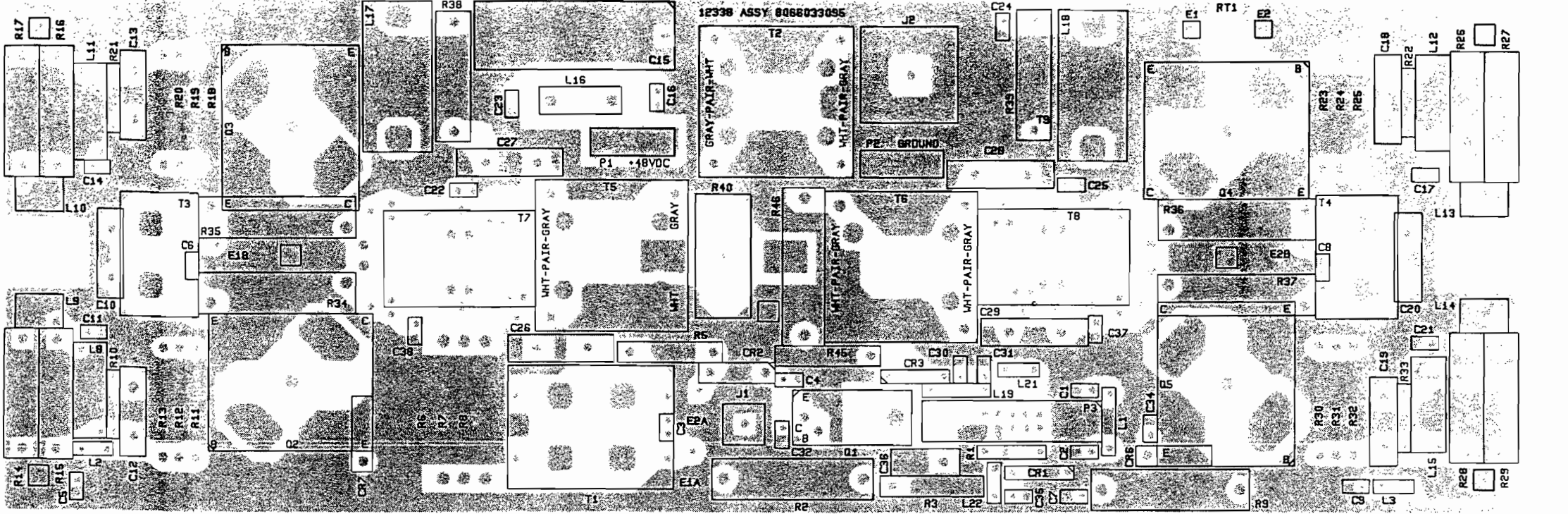


Figure 5.10 48VDC Switching Power Supply A4A2.

SUNAIR LPA-9500



REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
L18	CHOKE, RF	5024030702
L19	INDUCTOR, MOLDED, 1000μH, 10%	0664940005
L20P/O	FERRITE BEAD .047ID .138 OD	0564510009
L21P/O	FERRITE BEAD .047ID .138 OD	0564510009
L22P/O	FERRITE BEAD .047ID .138 OD	0564510009
P1	TERMINAL, PC MOUNT, 1/4" MALE	1008330035
P2	TERMINAL, PC MOUNT, 1/4" MALE	1008330035
Q1	TRANSISTOR, NPN, SI. 2N4922	0445490004
R1	RESISTOR 220, 10%, 1/4W	0197630006
R2	RESISTOR 2.7K, 5%, 2W	0195940008
R3	RESISTOR 680, 10%, 1/2W	0167500007
R5	RESISTOR 10K, 10%, 1/2W	1008410039
R6	RESISTOR 150, 10%, 2W	0171820002
R7	RESISTOR 150, 10%, 2W	0171820002
R8	RESISTOR 150, 10%, 2W	0171820002
R9	RESISTOR 150, 10%, 2W	0171820002
R10	RESISTOR 100, 5%, 1/4W	1008420000
R11	RESISTOR 10, 10%, 1W	0187720002
R12	RESISTOR 10, 10%, 1W	0187720002
R13	RESISTOR 10, 10%, 1W	0187720002
R14	RESISTOR 10, 10%, 1W	0187720002
R15	RESISTOR 10, 10%, 1W	0187720002
R16	RESISTOR 10, 10%, 1W	0187720002
R17	RESISTOR 10, 10%, 1W	0187720002
R18	RESISTOR 10, 10%, 1W	0187720002
R19	RESISTOR 10, 10%, 1W	0187720002
R20	RESISTOR 10, 10%, 1W	0187720002
R21	RESISTOR 100, 5%, 1/4W	1008420000
R22	RESISTOR 100, 5%, 1/4W	1008420000
R23	RESISTOR 10, 10%, 1W	0187720002
R24	RESISTOR 10, 10%, 1W	0187720002
R25	RESISTOR 10, 10%, 1W	0187720002
R26	RESISTOR 10, 10%, 1W	0187720002
R27	RESISTOR 10, 10%, 1W	0187720002
R28	RESISTOR 10, 10%, 1W	0187720002
R29	RESISTOR 10, 10%, 1W	0187720002
R30	RESISTOR 10, 10%, 1W	0187720002
R31	RESISTOR 10, 10%, 1W	0187720002
R32	RESISTOR 10, 10%, 1W	0187720002
R33	RESISTOR 100, 5%, 1/4W	1008420000
R34	RESISTOR 10, 10%, 2W	0163840008
R35	RESISTOR 10, 10%, 2W	0163840008
R36	RESISTOR 10, 10%, 2W	0163840008
R37	RESISTOR 10, 10%, 2W	0163840008
R38	RESISTOR 10, 10%, 1W	0187720002
R39	RESISTOR 10, 10%, 1W	0187720002
R45	RESISTOR 2.4K, 1/2W	1006890033
R46	RESISTOR 27K 2W	1008450006
R47	RESISTOR 12K, 10%, 1/4W	0183180003
T1 P/O	FERRITE BEAD .375 OD, .187 ID	1008130028
T1 P/O	TUBE, BRASS, .8 LONG	1008410021
T2	BALUN, RF ASSY	8066033591
T3 P/O	SPACER, .155 ID, .187 OD, .800L	0508050006
T3 P/O	CORE, FERRITE 3/8 OD X 3/16 LG	0613650000
T4 P/O	SPACER, .155 ID, .187 OD, .800L	0508050006
T4 P/O	CORE, FERRITE 3/8 OD X 3/16 LG	0613650000
T5	BALUN, RF ASSY	8066033591
T6	BALUN, RF ASSY	8066033591
T7	TRANSFORMER, OUTPUT	8066033494
T8	TRANSFORMER, OUTPUT	8066033494
	KEY, POLARIZING	1008070033

RF/PS MODULE (A4)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
A4A1	RF/PS MODULE A4	8066030096
A4A2	PC ASSY, MODULE CONTROL	8066037091
A4A3	PC ASSY, 48V SWITCHING PS	8066335091
A4A3	POWER AMP ASSY	8066031092
A4R1	RESISTOR .05, 1% 25W	1008390003
W1A4	W1A4 HARNESS ASSY	8066030592
W2A4	CABLE ASSY, RF/PS MODULE	8066030690
	RECEPTACLE, 1/4 TURN FASTENER	1008360031
	FASTENER, 1/4 TURN, SLOTTED	1008370002
	STANDOFF, F-F, 1.69L	1008410012
	RING, RETAINER	1008580007
	SIDE PLATE, HINGED	8066030207
	HINGE	8066030401
	CHASSIS, POWER SUPPLY	8066035501

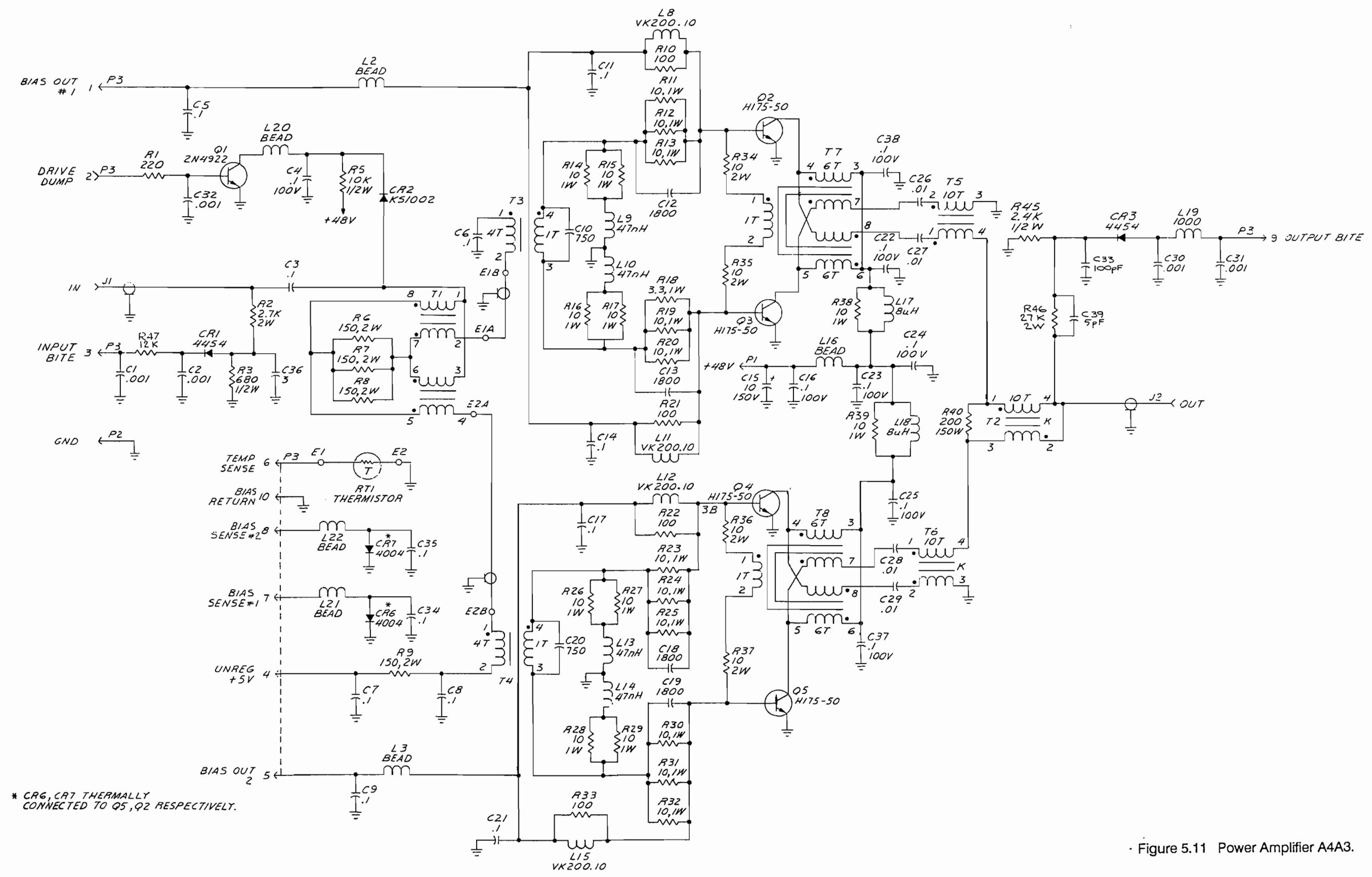
PC ASSY, POWER AMPLIFIER (A4A3A1)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
A4A3J1	PC ASSY, POWER AMPLIFIER A4A3A1	8066033095
A4A3J2	CONNECTOR, RF, SNAP-ON	1000170012
A4A3P3	CONNECTOR, RF, BNC	0753490005
A4A3P3	CONNECTOR, PC, 10 PIN HEADER	1008330027
C1	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C2	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C3	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C4	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C5	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C6	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C7	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C8	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C9	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C10	CAP. 750PF, 500V, DM19, 5%	0249150000
C11	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C12	CAP. 1800PF, 500V, DM19, 2%	0281300003
C13	CAP. 1800PF, 500V, DM19, 2%	0281300003
C14	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C15	CAP. 10μF, 150V, BR	0295750006
C16	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C17	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C18	CAP. 1800PF, 500V, DM19, 2%	0281300003
C19	CAP. 1800PF, 500V, DM19, 2%	0281300003
C20	CAP. 750PF, 500V, DM19, 5%	0249150000
C21	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C22	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C23	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C24	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C25	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C26	CAP. .01μF, 2000V, Y5U	1008300012

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
C27	CAP. .01μF, 2000V, Y5U	1008300012
C28	CAP. .01μF, 2000V, Y5U	1008300012
C29	CAP. .01μF, 2000V, Y5U	1008300012
C30	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C31	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C32	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C33	CAP. 100PF, 500V, DM10, 5%	0274740001
C34	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C35	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C36	CAP. 3PF, 500V, DM15	1006890025
C37	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C38	CAP. 0.1μF, 100V, Z5U, 20%	1008420026
C39	CAP. 5PF, 500V, DM10	0261190008
CR1	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR2	DIODE, PIN KS1002	1008210013
CR3	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR6	DIODE, RECTIFIER 1N4004	0405180004
CR7	DIODE, RECTIFIER 1N4004	0405180004
L2 P/O	FERRITE BEAD .047ID .138 OD	0564510009
L3 P/O	FERRITE BEAD .047ID .138 OD	0564510009
L8	INDUCTOR, VK 200.10	1008310018
L9	INDUCTOR, VK 200.10	1008310018
L10	INDUCTOR, 47NH	1008310026
L11	INDUCTOR, VK 200.10	1008310018
L12	INDUCTOR, VK 200.10	1008310018
L13	INDUCTOR, 47NH	1008310026
L14	INDUCTOR, 47NH	1008310026
L15	INDUCTOR, VK 200.10	1008310018
L16P/O	BEAD, FERRITE, .296OD, .297LG	1008200034
L17	CHOKE, RF	5024030702

POWER AMPLIFIER ASSY (A4A3)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
A4A3A1	POWER AMPLIFIER ASSY. A4A3	8066031092
Q2	PC ASSY, POWER AMPLIFIER	8066033095
Q3	TRANSISTOR, POWER, RF	1008340006
Q4	TRANSISTOR, POWER, RF	1008340006
Q5	TRANSISTOR, POWER, RF	1008340006
R40	TRANSISTOR, POWER, RF	1008340006
RT1	RESISTOR, 200, 150W	1008360007
	THERMISTOR, 100, PTC	1008100021
	SPACER, .171 ID, .312 OD, .187L	0502270691
	ROD, THD. 6-32 X 3/4 LG	0502390123
	RETAINER, REAR, FEMALE	0870960008
	CHASSIS, PA	8066031106
	HEATSINK, MACHINED	8066032005



\* CR6, CR7 THERMALLY CONNECTED TO Q5, Q2 RESPECTIVELY.

Figure 5.11 Power Amplifier A4A3.

## FILTER MODULE (A5)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
A5A1	FILTER MODULE (A5)	8066020091
A5A2	PC ASSY, BAND FILTER 1	8066021097
A5A3	PC ASSY, BAND FILTER 2	8066022093
A5A4	PC ASSY, BAND FILTER 3	8066023090
A5A5	PC ASSY, BAND FILTER 4	8066024096
A5A6	PC ASSY, BAND FILTER 5	8066025092
A5A7	PC ASSY, BAND FILTER 6	8066026099
A5A8	PC ASSY, BAND FILTER 7	8066027095
A5A9	PC ASSY, BAND FILTER 8	8066028091
A5A10	PC ASSY, WATTMETER	8066029098
A5B1	PC ASSY, MOTHER, FILTER MDL	8066020899
A5B2	FAN, 34 CFM, 115 VAC	1008300021
A5J2	FAN, 34 CFM, 115 VAC	1008300021
	CONNECTOR, RF, N UG-680/U	0756030005
	BRACKET, RH MOUNTING, FILTERMDL	8066020325
	BRACKET, LH MOUNTING, FILTERMDL	8066020333
	BRACKET, CARD GUIDE MOUNTING	8066020406
	CHASSIS, FILTER MODULE	8066020309
	CONNECTOR, RF, UHF, BULKHEAD	1008300004
	COVER, FILTER MODULE	8066020201
	FASTENER, 1/4 TURN, SLOTTED	1008370002
	HOLDDOWN, PCB LPA	8066012705
	PLATE, BOTTOM, FILTER MDL	8066020317
	RECEPTACLE, 1/4 TURN FASTENER	1008360031
	RING, RETAINER	1008580007



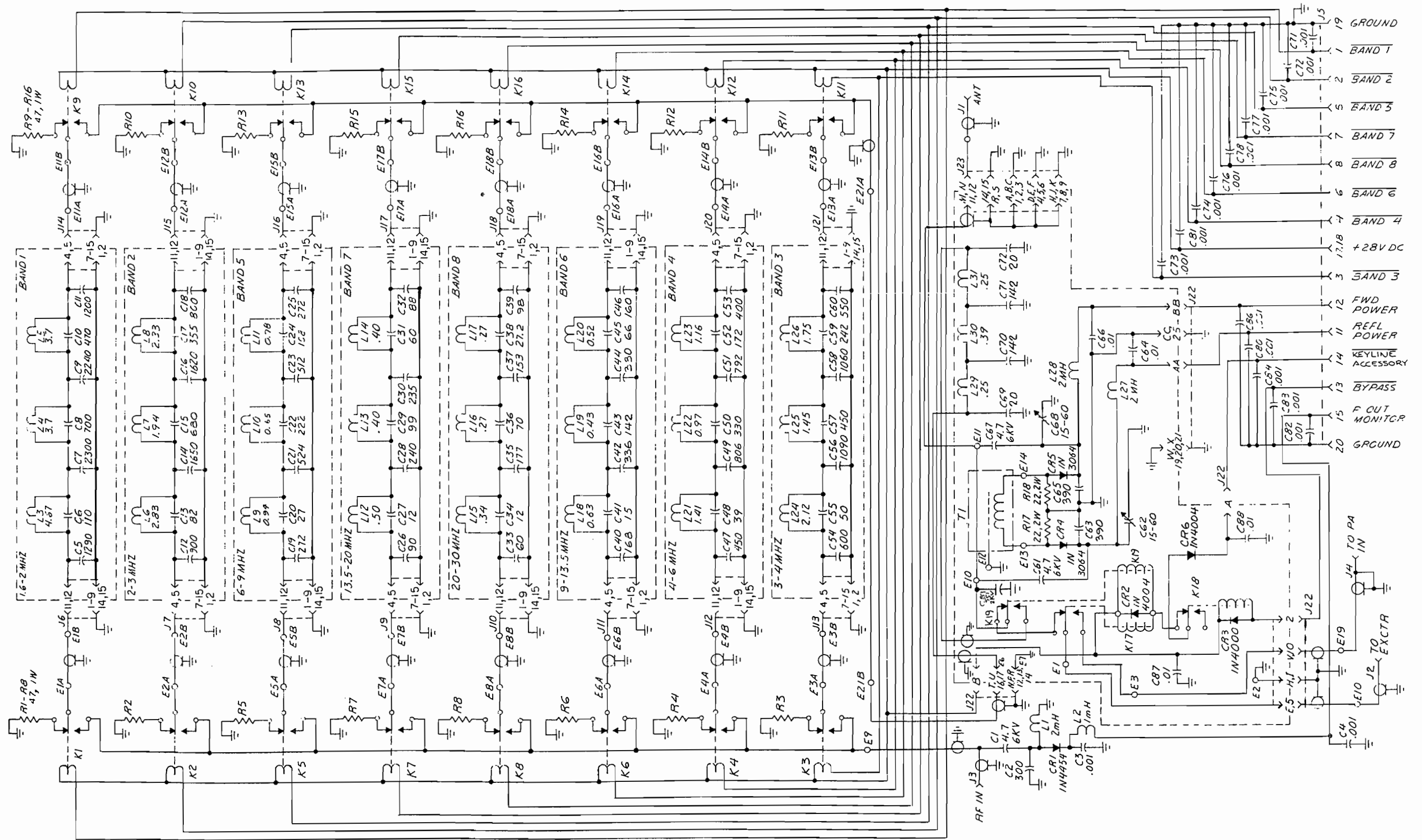
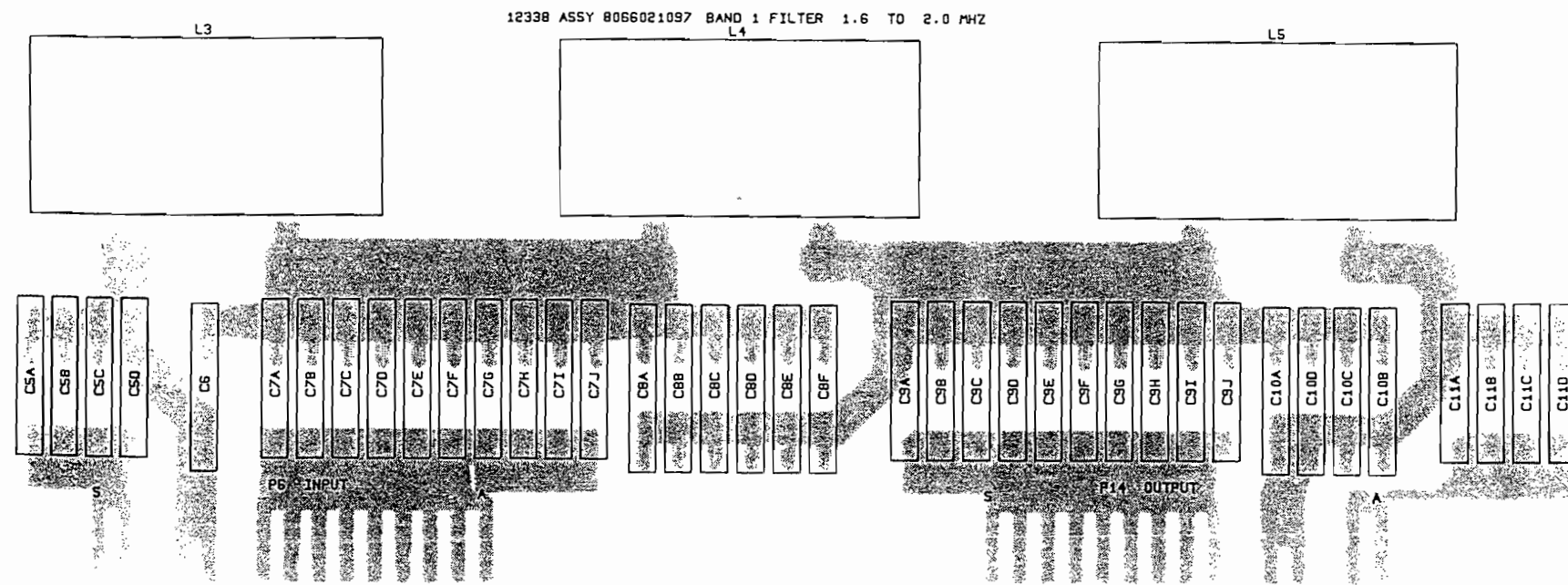


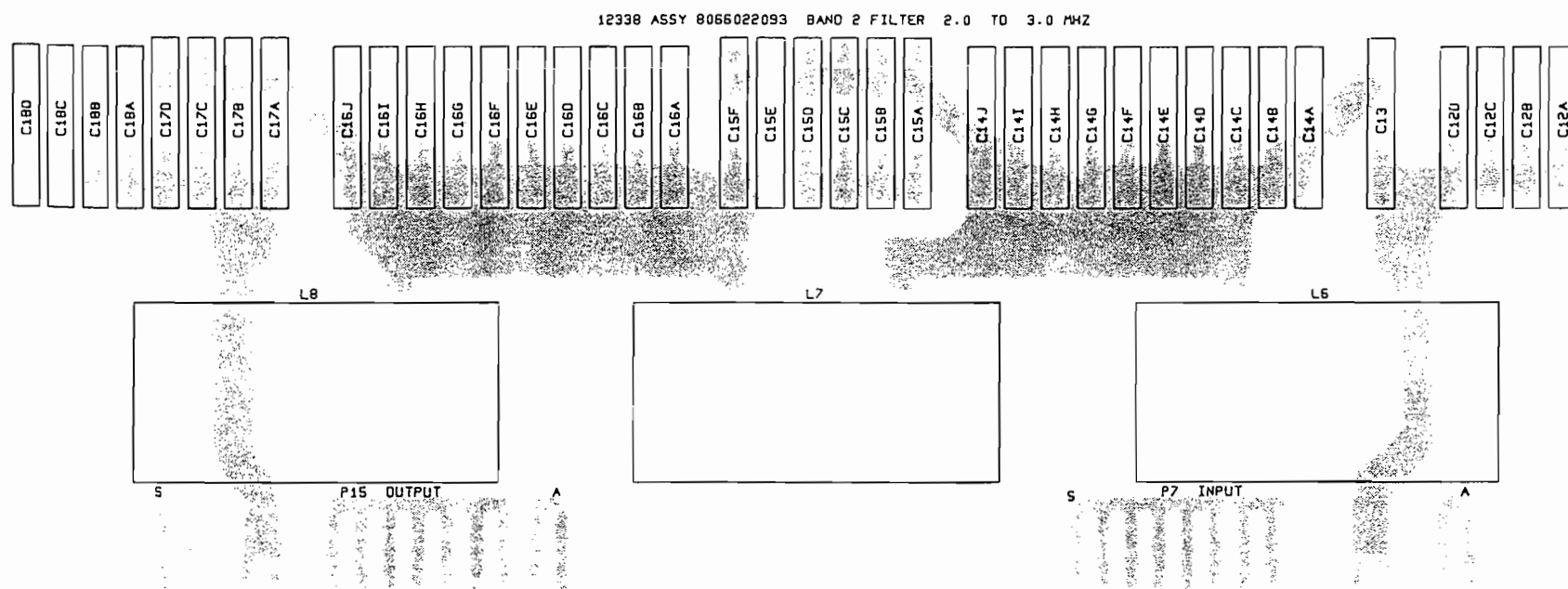
Figure 5.12 Filter Module A5.

PC ASSY, BAND FILTER 1 (A5A1)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, BAND FILTER 1, A5A1	8066021097
C5A	CAP. 330PF 2KV N750	1008280038
C5B	CAP. 330PF 2KV N750	1008280038
C5C	CAP. 330PF 2KV N750	1008280038
C5D	CAP. 300PF 2KV N750	1008470015
C6	CAP. 110PF 2KV N750	1008260002
C7A	CAP. 240PF 2KV N750	1008280011
C7B	CAP. 240PF 2KV N750	1008280011
C7C	CAP. 240PF 2KV N750	1008280011
C7D	CAP. 240PF 2KV N750	1008280011
C7E	CAP. 240PF 2KV N750	1008280011
C7F	CAP. 220PF 2KV N750	1008280003
C7G	CAP. 220PF 2KV N750	1008280003
C7H	CAP. 220PF 2KV N750	1008280003
C7I	CAP. 220PF 2KV N750	1008280003
C7J	CAP. 220PF 2KV N750	1008280003
C8A	CAP. 120PF 2KV N750	1008260011
C8B	CAP. 120PF 2KV N750	1008260011
C8C	CAP. 120PF 2KV N750	1008260011
C8D	CAP. 120PF 2KV N750	1008260011
C8E	CAP. 110PF 2KV N750	1008260002
C8F	CAP. 110PF 2KV N750	1008260002
C9A	CAP. 240PF 2KV N750	1008280011
C9B	CAP. 240PF 2KV N750	1008280011
C9C	CAP. 220PF 2KV N750	1008280003
C9D	CAP. 220PF 2KV N750	1008280003
C9E	CAP. 220PF 2KV N750	1008280003
C9F	CAP. 220PF 2KV N750	1008280003
C9G	CAP. 220PF 2KV N750	1008280003
C9H	CAP. 220PF 2KV N750	1008280003
C9I	CAP. 220PF 2KV N750	1008280003
C9J	CAP. 220PF 2KV N750	1008280003
C10A	CAP. 120PF 2KV N750	1008260011
C10B	CAP. 120PF 2KV N750	1008260011
C10C	CAP. 120PF 2KV N750	1008260011
C10D	CAP. 110PF 2KV N750	1008260002
C11A	CAP. 300PF 2KV N750	1008470015
C11B	CAP. 300PF 2KV N750	1008470015
C11C	CAP. 300PF 2KV N750	1008470015
C11D	CAP. 300PF 2KV N750	1008470015
L3	INDUCTOR, FILTER, 4.67 $\mu$ H	8066021593
L4	INDUCTOR, FILTER, 3.7 $\mu$ H	8066021691
L5	INDUCTOR, FILTER, 3.7 $\mu$ H	8066021691

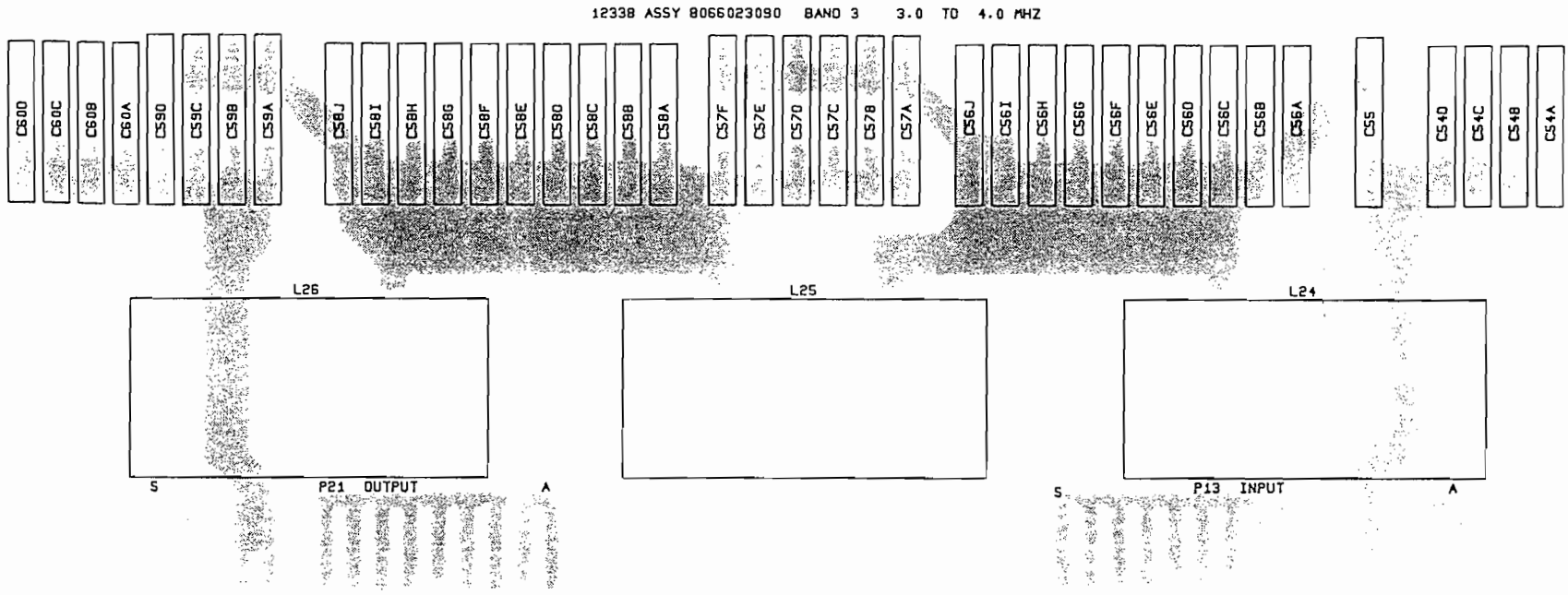






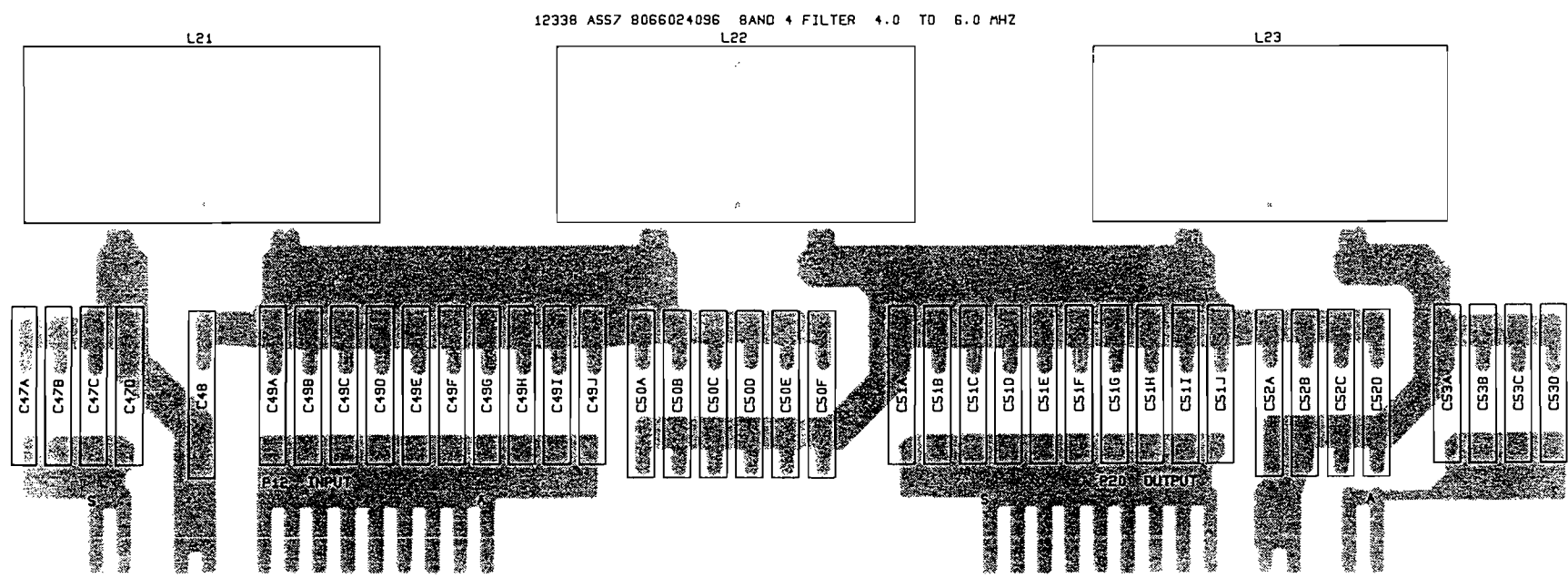
PC ASSY, BAND FILTER 2 (A5A2)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, BAND FILTER 2, A5A2	8066022093
C12A	CAP. 220PF 2KV N750	1008280003
C12B	CAP. 220PF 2KV N750	1008280003
C12C	CAP. 220PF 2KV N750	1008280003
C12D	CAP. 240PF 2KV N750	1008280011
C13	CAP. 82 PF 2KV N750	1008270024
C14A	CAP. 150PF 2KV N750	1008260037
C14B	CAP. 150PF 2KV N750	1008260037
C14C	CAP. 150PF 2KV N750	1008260037
C14D	CAP. 150PF 2KV N750	1008260037
C14E	CAP. 150PF 2KV N750	1008260037
C14F	CAP. 180PF 2KV N750	1008270008
C14G	CAP. 180PF 2KV N750	1008270008
C14H	CAP. 180PF 2KV N750	1008270008
C14I	CAP. 180PF 2KV N750	1008270008
C14J	CAP. 180PF 2KV N750	1008270008
C15A	CAP. 120PF 2KV N750	1008260011
C15B	CAP. 120PF 2KV N750	1008260011
C15C	CAP. 120PF 2KV N750	1008260011
C15D	CAP. 120PF 2KV N750	1008260011
C15E	CAP. 100PF 2KV N750	1008250031
C15F	CAP. 100PF 2KV N750	1008250031
C16A	CAP. 180PF 2KV N750	1008270008
C16B	CAP. 180PF 2KV N750	1008270008
C16C	CAP. 180PF 2KV N750	1008270008
C16D	CAP. 180PF 2KV N750	1008270008
C16E	CAP. 150PF 2KV N750	1008260037
C16F	CAP. 150PF 2KV N750	1008260037
C16G	CAP. 150PF 2KV N750	1008260037
C16H	CAP. 150PF 2KV N750	1008260037
C16I	CAP. 150PF 2KV N750	1008260037
C16J	CAP. 150PF 2KV N750	1008260037
C17A	CAP. 91 PF, 2KV N750	1008250023
C17B	CAP. 91 PF, 2KV N750	1008250023
C17C	CAP. 91 PF, 2KV N750	1008250023
C17D	CAP. 82 PF 2KV N750	1008270024
C18A	CAP. 200PF 2KV N750	1008270016
C18B	CAP. 200PF 2KV N750	1008270016
C18C	CAP. 200PF 2KV N750	1008270016
C18D	CAP. 200PF 2KV N750	1008270016
L6	INDUCTOR, 2.83 μH, BAND 2	8066022590
L7	INDUCTOR, 1.94 μH, BAND 2	8066022697
L8	INDUCTOR, 2.33 μH, BAND 2	8066022794



PC ASSY, BAND FILTER 3 (A5A3)

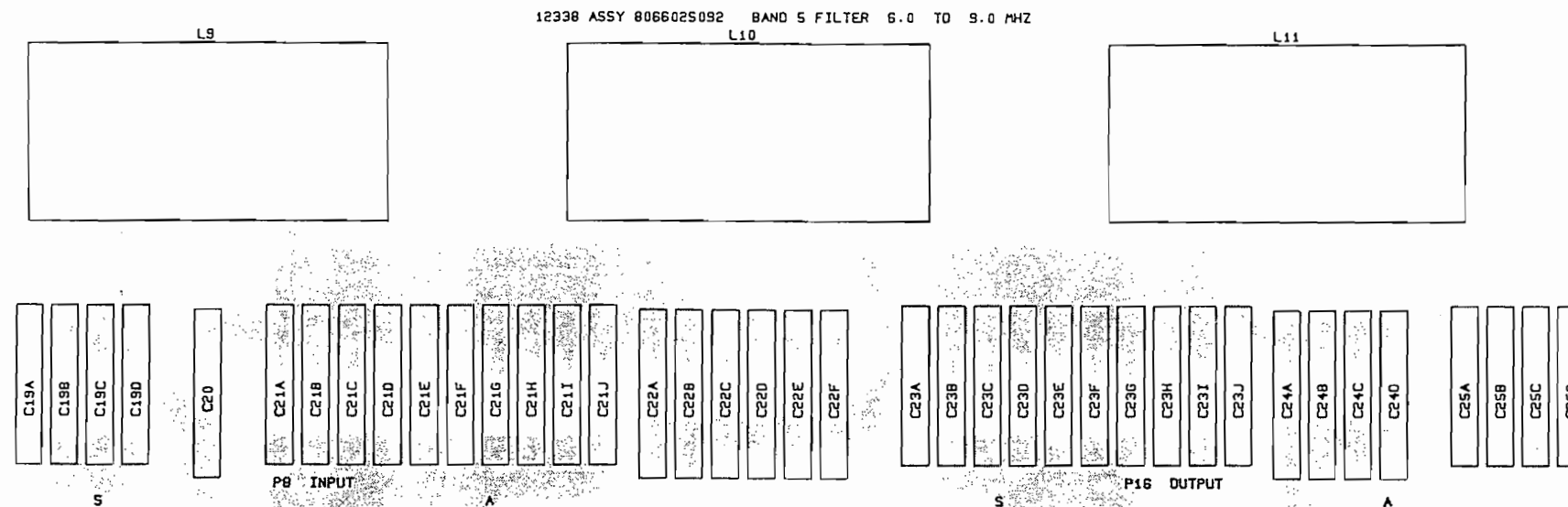
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, BAND FILTER 3, A5A3	8066023090
C54A	CAP. 150PF 2KV N750	1008260037
C54B	CAP. 150PF 2KV N750	1008260037
C54C	CAP. 150PF 2KV N750	1008260037
C54D	CAP. 150PF 2KV N750	1008260037
C55	CAP. 50 PF, 2KV, N750	1008240010
C56A	CAP. 110PF 2KV N750	1008260002
C56B	CAP. 110PF 2KV N750	1008260002
C56C	CAP. 110PF 2KV N750	1008260002
C56D	CAP. 110PF 2KV N750	1008260002
C56E	CAP. 110PF 2KV N750	1008260002
C56F	CAP. 110PF 2KV N750	1008260002
C56G	CAP. 110PF 2KV N750	1008260002
C56H	CAP. 110PF 2KV N750	1008260002
C56I	CAP. 110PF 2KV N750	1008260002
C56J	CAP. 100PF 2KV N750	1008250031
C57A	CAP. 75 PF, 2KV N750	1008250015
C57B	CAP. 75 PF, 2KV N750	1008250015
C57C	CAP. 75 PF, 2KV N750	1008250015
C57D	CAP. 75 PF, 2KV N750	1008250015
C57E	CAP. 75 PF, 2KV N750	1008250015
C57F	CAP. 75 PF, 2KV N750	1008250015
C58A	CAP. 110PF 2KV N750	1008260002
C58B	CAP. 110PF 2KV N750	1008260002
C58C	CAP. 110PF 2KV N750	1008260002
C58D	CAP. 110PF 2KV N750	1008260002
C58E	CAP. 110PF 2KV N750	1008260002
C58F	CAP. 110PF 2KV N750	1008260002
C58G	CAP. 100PF 2KV N750	1008250031
C58H	CAP. 100PF 2KV N750	1008250031
C58I	CAP. 100PF 2KV N750	1008250031
C58J	CAP. 100PF 2KV N750	1008250031
C59A	CAP. 62 PF, 2KV, N750	1008240036
C59B	CAP. 62 PF, 2KV, N750	1008240036
C59C	CAP. 62 PF, 2KV, N750	1008240036
C59D	CAP. 56 PF, 2KV, N750	1008240028
C60A	CAP. 150PF 2KV N750	1008260037
C60B	CAP. 150PF 2KV N750	1008260037
C60C	CAP. 130PF 2KV N750	1008260029
C60D	CAP. 120PF 2KV N750	1008260011
L24	INDUCTOR, 2.12 μH, BAND 3	8066023596
L25	INDUCTOR, 1.45 μH, BAND 3	8066023693
L26	INDUCTOR, 1.75 μH, BAND 3	8066023791



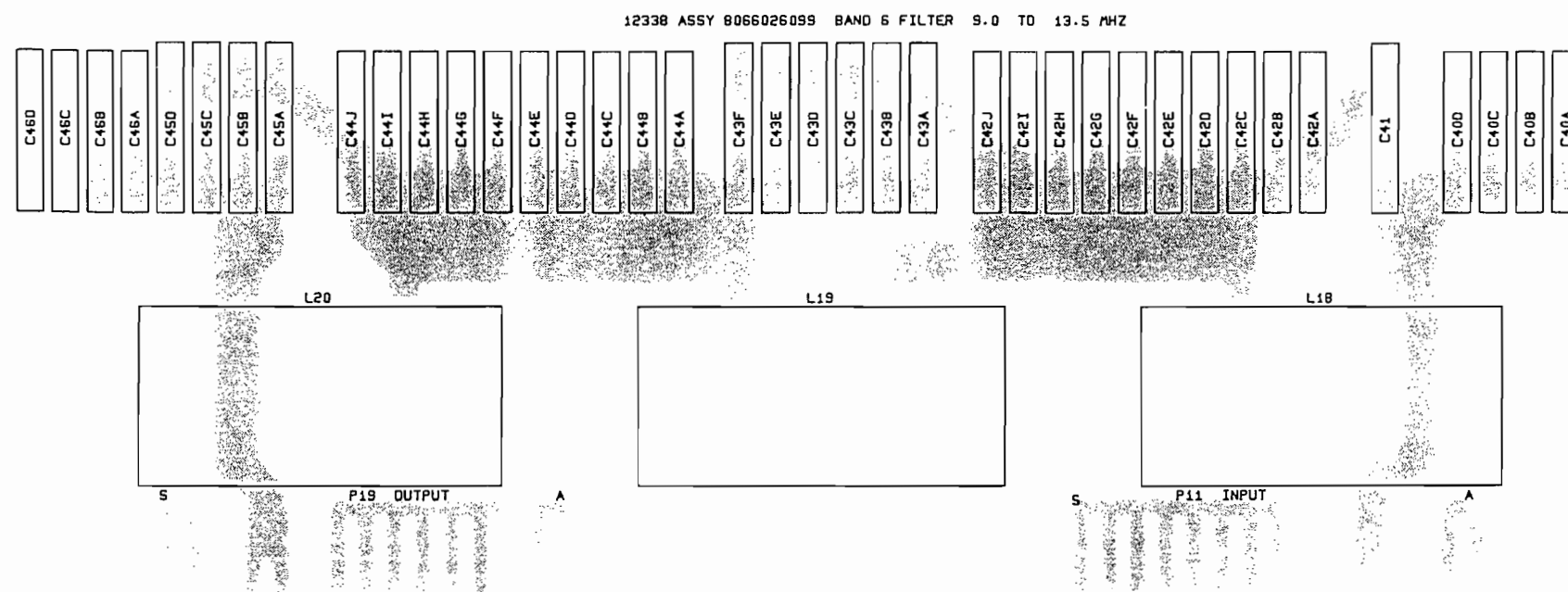
PC ASSY, BAND FILTER 4 (A5A4)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, BAND FILTER 4, A5A4	8066024096
C47A	CAP. 120PF 2KV N750	1008260011
C47B	CAP. 110PF 2KV N750	1008260002
C47C	CAP. 110PF 2KV N750	1008260002
C47D	CAP. 110PF 2KV N750	1008260002
C48	CAP. 39 PF, 2KV, N750	1008240001
C49A	CAP. 82 PF 2KV N750	1008270024
C49B	CAP. 82 PF 2KV N750	1008270024
C49C	CAP. 82 PF 2KV N750	1008270024
C49D	CAP. 82 PF 2KV N750	1008270024
C49E	CAP. 82 PF 2KV N750	1008270024
C49F	CAP. 82 PF 2KV N750	1008270024
C49G	CAP. 82 PF 2KV N750	1008270024
C49H	CAP. 82 PF 2KV N750	1008270024
C49I	CAP. 75 PF, 2KV N750	1008250015
C49J	CAP. 75 PF, 2KV N750	1008250015
C50A	CAP. 56 PF, 2KV, N750	1008240028
C50B	CAP. 56 PF, 2KV, N750	1008240028
C50C	CAP. 56 PF, 2KV, N750	1008240028
C50D	CAP. 56 PF, 2KV, N750	1008240028
C50E	CAP. 56 PF, 2KV, N750	1008240028
C50F	CAP. 50 PF, 2KV, N750	1008240010
C51A	CAP. 82 PF 2KV N750	1008270024
C51B	CAP. 82 PF 2KV N750	1008270024
C51C	CAP. 82 PF 2KV N750	1008270024
C51D	CAP. 82 PF 2KV N750	1008270024
C51E	CAP. 82 PF 2KV N750	1008270024
C51F	CAP. 82 PF 2KV N750	1008270024
C51G	CAP. 75 PF, 2KV N750	1008250015
C51H	CAP. 75 PF, 2KV N750	1008250015
C51I	CAP. 75 PF, 2KV N750	1008250015
C51J	CAP. 75 PF, 2KV N750	1008250015
C52A	CAP. 43PF 2KV N750	1008470023
C52B	CAP. 43PF 2KV N750	1008470023
C52C	CAP. 43PF 2KV N750	1008470023
C52D	CAP. 43PF 2KV N750	1008470023
C53A	CAP. 100PF 2KV N750	1008250031
C53B	CAP. 100PF 2KV N750	1008250031
C53C	CAP. 100PF 2KV N750	1008250031
C53D	CAP. 100PF 2KV N750	1008250031
L21	INDUCTOR, 1.41 μH, BAND 4	8066024592
L22	INDUCTOR, 0.97 μH, BAND 4	8066024690
L23	INDUCTOR, 1.16 μH, BAND 4	8066024797

PC ASSY, BAND FILTER 5 (A5A5)



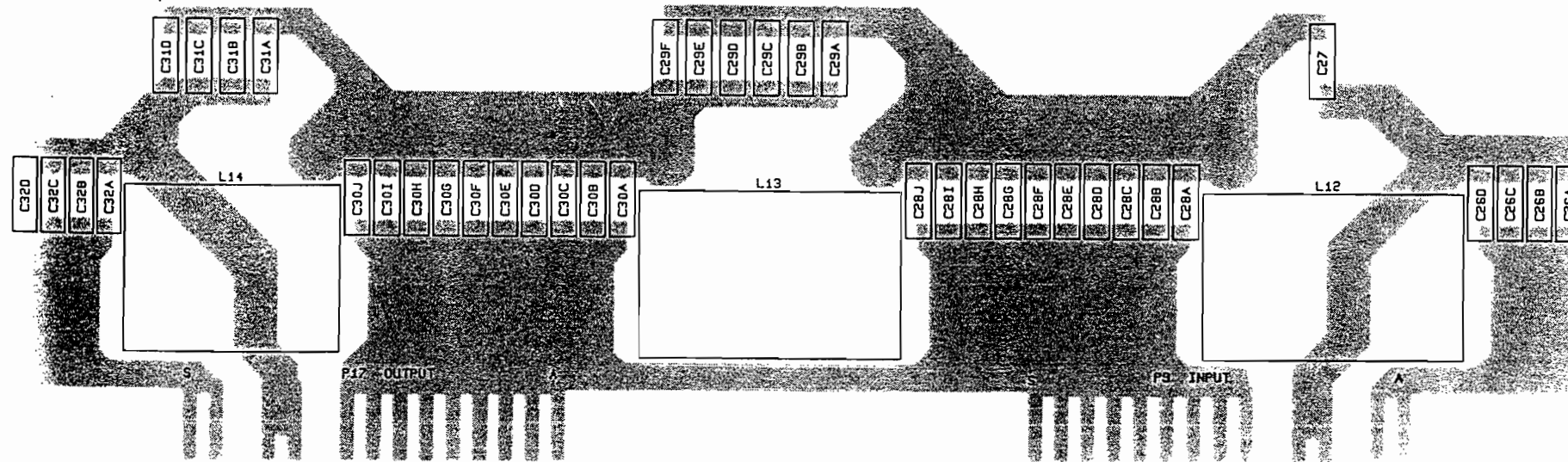
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, BAND FILTER 5, A5A5	8066025092
C19A	CAP. 68 PF, 2KV N750	1008250007
C19B	CAP. 68 PF, 2KV N750	1008250007
C19C	CAP. 68 PF, 2KV N750	1008250007
C19D	CAP. 68 PF, 2KV N750	1008250007
C20	CAP. 27 PF, 2KV, N750	1008230006
C21A	CAP. 56 PF, 2KV, N750	1008240028
C21B	CAP. 56 PF, 2KV, N750	1008240028
C21C	CAP. 56 PF, 2KV, N750	1008240028
C21D	CAP. 56 PF, 2KV, N750	1008240028
C21E	CAP. 50 PF, 2KV, N750	1008240010
C21F	CAP. 50 PF, 2KV, N750	1008240010
C21G	CAP. 50 PF, 2KV, N750	1008240010
C21H	CAP. 50 PF, 2KV, N750	1008240010
C21I	CAP. 50 PF, 2KV, N750	1008240010
C21J	CAP. 50 PF, 2KV, N750	1008240010
C22A	CAP. 39 PF, 2KV, N750	1008240001
C22B	CAP. 39 PF, 2KV, N750	1008240001
C22C	CAP. 36 PF, 2KV, N750	1008230031
C22D	CAP. 36 PF, 2KV, N750	1008230031
C22E	CAP. 36 PF, 2KV, N750	1008230031
C22F	CAP. 36 PF, 2KV, N750	1008230031
C23A	CAP. 56 PF, 2KV, N750	1008240028
C23B	CAP. 56 PF, 2KV, N750	1008240028
C23C	CAP. 50 PF, 2KV, N750	1008240010
C23D	CAP. 50 PF, 2KV, N750	1008240010
C23E	CAP. 50 PF, 2KV, N750	1008240010
C23F	CAP. 50 PF, 2KV, N750	1008240010
C23G	CAP. 50 PF, 2KV, N750	1008240010
C23H	CAP. 50 PF, 2KV, N750	1008240010
C23I	CAP. 50 PF, 2KV, N750	1008240010
C23J	CAP. 50 PF, 2KV, N750	1008240010
C24A	CAP. 27 PF, 2KV, N750	1008230006
C24B	CAP. 27 PF, 2KV, N750	1008230006
C24C	CAP. 27 PF, 2KV, N750	1008230006
C24D	CAP. 27 PF, 2KV, N750	1008230006
C25A	CAP. 68 PF, 2KV N750	1008250007
C25B	CAP. 68 PF, 2KV N750	1008250007
C25C	CAP. 68 PF, 2KV N750	1008250007
C25D	CAP. 68 PF, 2KV N750	1008250007
L9	INDUCTOR, 0.94 μH, BAND 5	8066025599
L10	INDUCTOR, 0.65 μH, BAND 5	8066025696
L11	INDUCTOR, 0.78 μH, BAND 5	8066025793



PC ASSY, BAND FILTER 6 (A5A6)

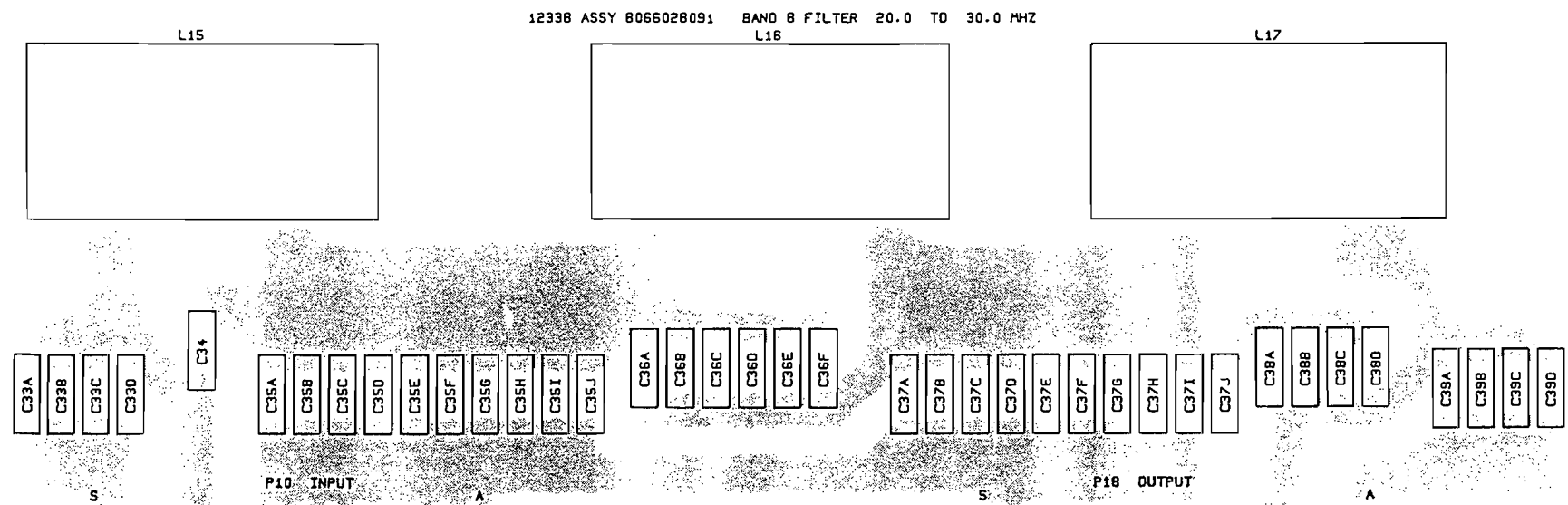
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, BAND FILTER 6, A5A6	8066026099
C40A	CAP. 43PF 2KV N750	1008470023
C40B	CAP. 39 PF, 2KV, N750	1008240001
C40C	CAP. 39 PF, 2KV, N750	1008240001
C40D	CAP. 39 PF, 2KV, N750	1008240001
C41	CAP. 15 PF, 2KV, N750	1008220001
C42A	CAP. 33 PF, 2KV, N750	1008230022
C42B	CAP. 33 PF, 2KV, N750	1008230022
C42C	CAP. 33 PF, 2KV, N750	1008230022
C42D	CAP. 33 PF, 2KV, N750	1008230022
C42E	CAP. 33 PF, 2KV, N750	1008230022
C42F	CAP. 33 PF, 2KV, N750	1008230022
C42G	CAP. 33 PF, 2KV, N750	1008230022
C42H	CAP. 33 PF, 2KV, N750	1008230022
C42I	CAP. 33 PF, 2KV, N750	1008230022
C42J	CAP. 39 PF, 2KV, N750	1008240001
C43A	CAP. 22 PF, 2KV, N750	1008220035
C43B	CAP. 22 PF, 2KV, N750	1008220035
C43C	CAP. 22 PF, 2KV, N750	1008220035
C43D	CAP. 22 PF, 2KV, N750	1008220035
C43E	CAP. 27 PF, 2KV, N750	1008230006
C43F	CAP. 27 PF, 2KV, N750	1008230006
C44A	CAP. 33 PF, 2KV, N750	1008230022
C44B	CAP. 33 PF, 2KV, N750	1008230022
C44C	CAP. 33 PF, 2KV, N750	1008230022
C44D	CAP. 33 PF, 2KV, N750	1008230022
C44E	CAP. 33 PF, 2KV, N750	1008230022
C44F	CAP. 33 PF, 2KV, N750	1008230022
C44G	CAP. 33 PF, 2KV, N750	1008230022
C44H	CAP. 33 PF, 2KV, N750	1008230022
C44I	CAP. 33 PF, 2KV, N750	1008230022
C44J	CAP. 33 PF, 2KV, N750	1008230022
C45A	CAP. 18 PF, 2KV, N750	1008220019
C45B	CAP. 18 PF, 2KV, N750	1008220019
C45C	CAP. 15 PF, 2KV, N750	1008220001
C45D	CAP. 15 PF, 2KV, N750	1008220001
C46A	CAP. 43PF 2KV N750	1008470023
C46B	CAP. 39 PF, 2KV, N750	1008240001
C46C	CAP. 39 PF, 2KV, N750	1008240001
C46D	CAP. 39 PF, 2KV, N750	1008240001
L18	INDUCTOR, 0.63 $\mu$ H, BAND 6	8066026595
L19	INDUCTOR, 0.43 $\mu$ H BAND 6	8066026692
L20	INDUCTOR, 0.52 $\mu$ H, BAND 6	8066026790

12338 ASSY 8066027095 BAND 7 FILTER 13.5 TO 20.0 MHZ



PC ASSY, BAND FILTER 7 (A5A7)

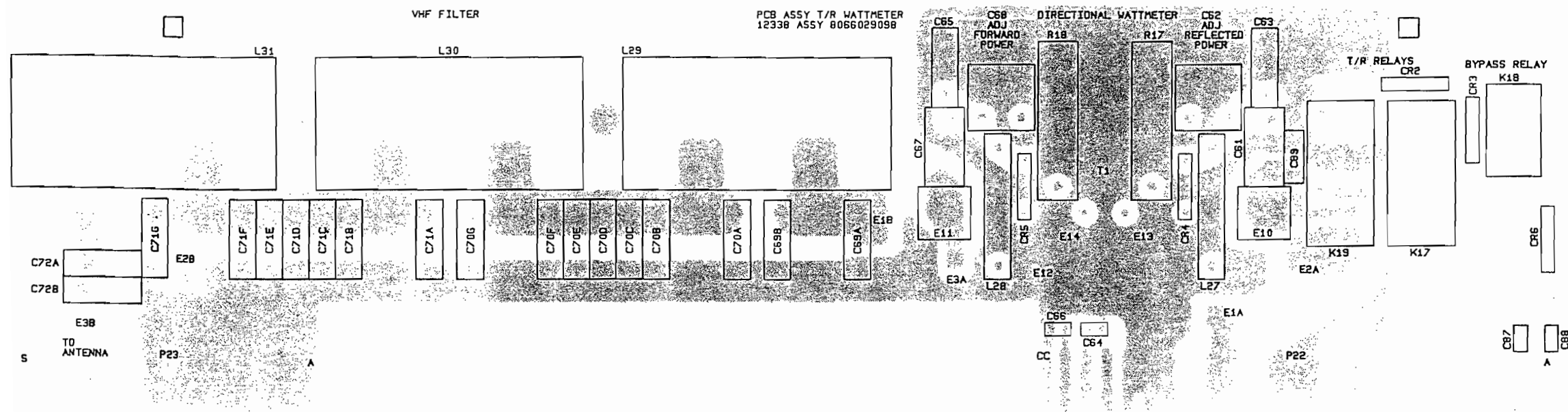
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, BAND FILTER 7, A5A7	8066027095
C26A	CAP. 24PF 2KV N750	1008470031
C26B	CAP. 22 PF, 2KV, N750	1008220035
C26C	CAP. 22 PF, 2KV, N750	1008220035
C26D	CAP. 22 PF, 2KV, N750	1008220035
C27	CAP. 12 PF, 2KV, N750	1008210030
C28A	CAP. 24PF 2KV N750	1008470031
C28B	CAP. 24PF 2KV N750	1008470031
C28C	CAP. 24PF 2KV N750	1008470031
C28D	CAP. 24PF 2KV N750	1008470031
C28E	CAP. 24PF 2KV N750	1008470031
C28F	CAP. 24PF 2KV N750	1008470031
C28G	CAP. 24PF 2KV N750	1008470031
C28H	CAP. 24PF 2KV N750	1008470031
C28I	CAP. 24PF 2KV N750	1008470031
C28J	CAP. 22 PF, 2KV, N750	1008220035
C29A	CAP. 18 PF, 2KV, N750	1008220019
C29B	CAP. 18 PF, 2KV, N750	1008220019
C29C	CAP. 18 PF, 2KV, N750	1008220019
C29D	CAP. 15 PF, 2KV, N750	1008220001
C29E	CAP. 15 PF, 2KV, N750	1008220001
C29F	CAP. 15 PF, 2KV, N750	1008220001
C30A	CAP. 27 PF, 2KV, N750	1008230006
C30B	CAP. 27 PF, 2KV, N750	1008230006
C30C	CAP. 27 PF, 2KV, N750	1008230006
C30D	CAP. 22 PF, 2KV, N750	1008220035
C30E	CAP. 22 PF, 2KV, N750	1008220035
C30F	CAP. 22 PF, 2KV, N750	1008220035
C30G	CAP. 22 PF, 2KV, N750	1008220035
C30H	CAP. 22 PF, 2KV, N750	1008220035
C30I	CAP. 22 PF, 2KV, N750	1008220035
C30J	CAP. 22 PF, 2KV, N750	1008220035
C31A	CAP. 15 PF, 2KV, N750	1008220001
C31B	CAP. 15 PF, 2KV, N750	1008220001
C31C	CAP. 15 PF, 2KV, N750	1008220001
C31D	CAP. 15 PF, 2KV, N750	1008220001
C32A	CAP. 22 PF, 2KV, N750	1008220035
C32B	CAP. 22 PF, 2KV, N750	1008220035
C32C	CAP. 22 PF, 2KV, N750	1008220035
C32D	CAP. 22 PF, 2KV, N750	1008220035
L12	INDUCTOR, BAND 7, 6T, 1.25 LG.	8066027591
L13	INDUCTOR, BAND 7, 5T, 1.25 LG.	8066027699
L14	INDUCTOR, BAND 7, 5T, 1.00 LG.	8066027796



PC ASSY, BAND FILTER 8 (A5A8)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, BAND FILTER 8, A5A8	8066028091
C33A	CAP. 15 PF, 2KV, N750	1008220001
C33B	CAP. 15 PF, 2KV, N750	1008220001
C33C	CAP. 15 PF, 2KV, N750	1008220001
C33D	CAP. 15 PF, 2KV, N750	1008220001
C34	CAP. 12 PF, 2KV, N750	1008210030
C35A	CAP. 18 PF, 2KV, N750	1008220019
C35B	CAP. 18 PF, 2KV, N750	1008220019
C35C	CAP. 18 PF, 2KV, N750	1008220019
C35D	CAP. 18 PF, 2KV, N750	1008220019
C35E	CAP. 18 PF, 2KV, N750	1008220019
C35F	CAP. 18 PF, 2KV, N750	1008220019
C35G	CAP. 18 PF, 2KV, N750	1008220019
C35H	CAP. 18 PF, 2KV, N750	1008220019
C35I	CAP. 18 PF, 2KV, N750	1008220019
C35J	CAP. 15 PF, 2KV, N750	1008220001
C36A	CAP. 12 PF, 2KV, N750	1008210030
C36B	CAP. 12 PF, 2KV, N750	1008210030
C36C	CAP. 12 PF, 2KV, N750	1008210030
C36D	CAP. 12 PF, 2KV, N750	1008210030
C36E	CAP. 12 PF, 2KV, N750	1008210030
C36F	CAP. 10 PF, 2KV, N750	1008210021
C37A	CAP. 18 PF, 2KV, N750	1008220019
C37B	CAP. 15 PF, 2KV, N750	1008220001
C37C	CAP. 15 PF, 2KV, N750	1008220001
C37D	CAP. 15 PF, 2KV, N750	1008220001
C37E	CAP. 15 PF, 2KV, N750	1008220001
C37F	CAP. 15 PF, 2KV, N750	1008220001
C37G	CAP. 15 PF, 2KV, N750	1008220001
C37H	CAP. 15 PF, 2KV, N750	1008220001
C37I	CAP. 15 PF, 2KV, N750	1008220001
C37J	CAP. 15 PF, 2KV, N750	1008220001
C38A	CAP. 6.8PF, 1000V, NPO	0262480000
C38B	CAP. 6.8PF, 1000V, NPO	0262480000
C38C	CAP. 6.8PF, 1000V, NPO	0262480000
C38D	CAP. 6.8PF, 1000V, NPO	0262480000
C39A	CAP. 22 PF, 2KV, N750	1008220035
C39B	CAP. 22 PF, 2KV, N750	1008220035
C39C	CAP. 27 PF, 2KV, N750	1008230006
C39D	CAP. 27 PF, 2KV, N750	1008230006
L15	INDUCTOR, BAND 8, 4T, 1.00 LG.	8066028598
L16	INDUCTOR-BAND 8,4T,1.38 LG	8066028695
L17	INDUCTOR, BAND 8, 4T, 1.00 LG.	8066028598



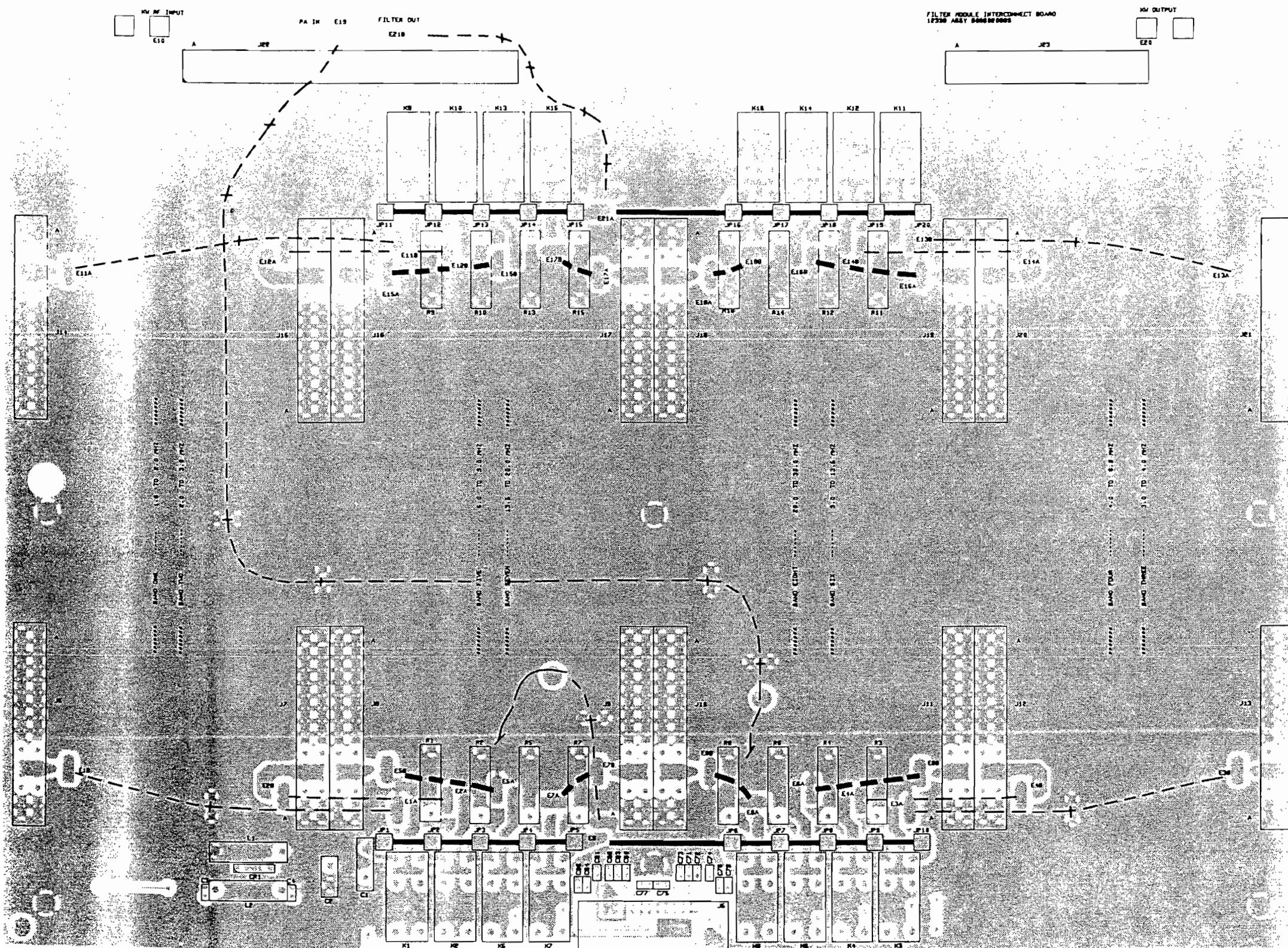


PC ASSY, WATTMETER (A5A9)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, WATTMETER A5A9	8066029098
C61	CAP. DISC, 4.7 PF, 3KV NPO	1007150025
C62	CAP. 15/60 PF NPO	1007160004
C63	CAP. 390PF, 500V, DM15, 2%	0281040001
C64	CAP. .01μF, 50V, X7R 20%	0281730008
C65	CAP. 390PF, 500V, DM15, 2%	0281040001
C66	CAP. .01μF, 50V, X7R 20%	0281730008
C67	CAP. DISC, 4.7 PF, 3KV NPO	1007150025
C68	CAP. 15/60 PF NPO	1007160004
C69A	CAP. 10 PF, 2KV, N750	1008210021
C69B	CAP. 10 PF, 2KV, N750	1008210021
C70A	CAP. 22 PF, 2KV, N750	1008220035
C70B	CAP. 18 PF, 2KV, N750	1008220019
C70C	CAP. 18 PF, 2KV, N750	1008220019
C70D	CAP. 18 PF, 2KV, N750	1008220019
C70E	CAP. 22 PF, 2KV, N750	1008220035
C70F	CAP. 22 PF, 2KV, N750	1008220035
C70G	CAP. 22 PF, 2KV, N750	1008220035
C71A	CAP. 22 PF, 2KV, N750	1008220035
C71B	CAP. 18 PF, 2KV, N750	1008220019
C71C	CAP. 18 PF, 2KV, N750	1008220019
C71D	CAP. 18 PF, 2KV, N750	1008220019
C71E	CAP. 22 PF, 2KV, N750	1008220035
C71F	CAP. 22 PF, 2KV, N750	1008220035
C71G	CAP. 22 PF, 2KV, N750	1008220035
C72A	CAP. 10 PF, 2KV, N750	1008210021
C72B	CAP. 10 PF, 2KV, N750	1008210021
C87	CAP. .01μF, 50V, X7R 20%	0281730008
C88	CAP. .01μF, 50V, X7R 20%	0281730008
C89	CAP. 50 PF, 2KV, N750	1008240010
CR2	DIODE, RECTIFIER 1N4004	0405180004
CR3	DIODE, RECTIFIER 1N4004	0405180004
CR4	DIODE, SIGNAL, SIL 1N3064	0405460007
CR5	DIODE, SIGNAL, SIL 1N3064	0405460007
CR6	DIODE, RECTIFIER 1N4004	0405180004
K17	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K18	RELAY, SPDT, 24V, REED	1003400001
K19	RELAY, SPDT, 24VDC, 10 AMP	1008290009
L27	INDUCTOR, MOLDED, 2000μH, 5%	0653590008
L28	INDUCTOR, MOLDED, 2000μH, 5%	0653590008
L29	INDUCTOR, VHF FL, 5T, 1.00 LG.	8066029594
L30	INDUCTOR, VHF FL, 6T, 1.00 LG.	8066029691
L31	INDUCTOR, VHF FL, 5T, 1.00 LG.	8066029594
R17	RESISTOR 22, 10%, 2W	0169940004
R18	RESISTOR 22, 10%, 2W	0169940004
T1	TOROID/SHIELD ASSY.	5025130204



PC ASSY, MOTHER BOARD (A5A10)



REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, MOTHER BOARD A5A10	8066020899
C1	CAP. DISC, 4.7 PF, 3KV NPO	1007150025
C2	CAP. 300PF, 500V, DM15, 2%	0282330003
C3	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C4	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C71	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C72	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C73	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C74	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C75	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C76	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C77	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C78	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C80	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C81	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C82	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C83	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C84	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C86	CAP. 0.001μF, 100V, X7R, 20%	0281630003
CR1	DIODE, SIGNAL, SIL 1N4454	0405270003
J4	CONNECTOR, RF, BNC, BULKHEAD	1008290033
J5	HEADER, CONNECTOR, 20 PIN	1008120006
J6	CONNECTOR, PC, 15 PIN DUAL	1006450009
J7	CONNECTOR, PC, 15 PIN DUAL	1006450009
J8	CONNECTOR, PC, 15 PIN DUAL	1006450009
J9	CONNECTOR, PC, 15 PIN DUAL	1006450009
J10	CONNECTOR, PC, 15 PIN DUAL	1006450009
J11	CONNECTOR, PC, 15 PIN DUAL	1006450009
J12	CONNECTOR, PC, 15 PIN DUAL	1006450009
J13	CONNECTOR, PC, 15 PIN DUAL	1006450009
J14	CONNECTOR, PC, 15 PIN DUAL	1006450009
J15	CONNECTOR, PC, 15 PIN DUAL	1006450009
J16	CONNECTOR, PC, 15 PIN DUAL	1006450009
J17	CONNECTOR, PC, 15 PIN DUAL	1006450009
J18	CONNECTOR, PC, 15 PIN DUAL	1006450009
J19	CONNECTOR, PC, 15 PIN DUAL	1006450009
J20	CONNECTOR, PC, 15 PIN DUAL	1006450009
J21	CONNECTOR, PC, 15 PIN DUAL	1006450009
J22	CONNECTOR, PC, 25 PIN DBL RDOT	1005820015
J23	CONNECTOR, PC, 15 PIN DUAL	1006450009
K1	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K2	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K3	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K4	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K5	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K6	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K7	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K8	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K9	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K10	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K11	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K12	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K13	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K14	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K15	RELAY, SPDT, 24VDC, 10 AMP	1008290009
K16	RELAY, SPDT, 24VDC, 10 AMP	1008290009
L1	INDUCTOR, MOLDED, 2000μH, 5%	0653590008
L2	INDUCTOR, MOLDED, 1000μH, 5%	0643310002
R1	RESISTOR 47, 10%, 1W	0164990003
R2	RESISTOR 47, 10%, 1W	0164990003
R3	RESISTOR 47, 10%, 1W	0164990003
R4	RESISTOR 47, 10%, 1W	0164990003
R5	RESISTOR 47, 10%, 1W	0164990003
R6	RESISTOR 47, 10%, 1W	0164990003
R7	RESISTOR 47, 10%, 1W	0164990003
R8	RESISTOR 47, 10%, 1W	0164990003
R9	RESISTOR 47, 10%, 1W	0164990003
R10	RESISTOR 47, 10%, 1W	0164990003
R11	RESISTOR 47, 10%, 1W	0164990003
R12	RESISTOR 47, 10%, 1W	0164990003
R13	RESISTOR 47, 10%, 1W	0164990003
R14	RESISTOR 47, 10%, 1W	0164990003
R15	RESISTOR 47, 10%, 1W	0164990003
R16	RESISTOR 47, 10%, 1W	0164990003
	KEY, POLARIZING, CONNECTOR	0753620006
	KEY, POLARIZING	1008070033

A21361

COMBINER MODULE (A6)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	COMBINER MODULE A6	8116060091
C1	CAP 56PF 2KV	1008240028
P1	CONNECTOR, RF, BNC UG-88/U	0744030005
P2	CONNECTOR, RF, BNC UG-88/U	0744030005
P3	CONNECTOR, RF, UHF, RT, ANGLE	1008460028
R1	RESISTOR, 400, 5%, 14W	0197380000
R2	RESISTOR, 400, 5%, 14W	0197380000
R3	RESISTOR, 400, 5%, 14W	0197380000
R4	RESISTOR, 400, 5%, 14W	0197380000

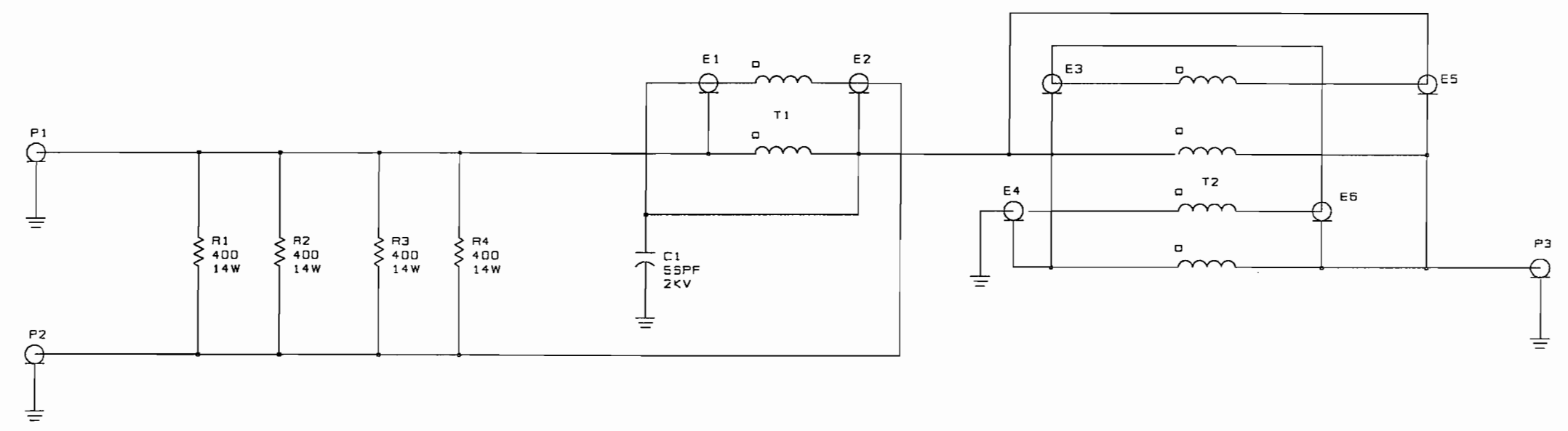
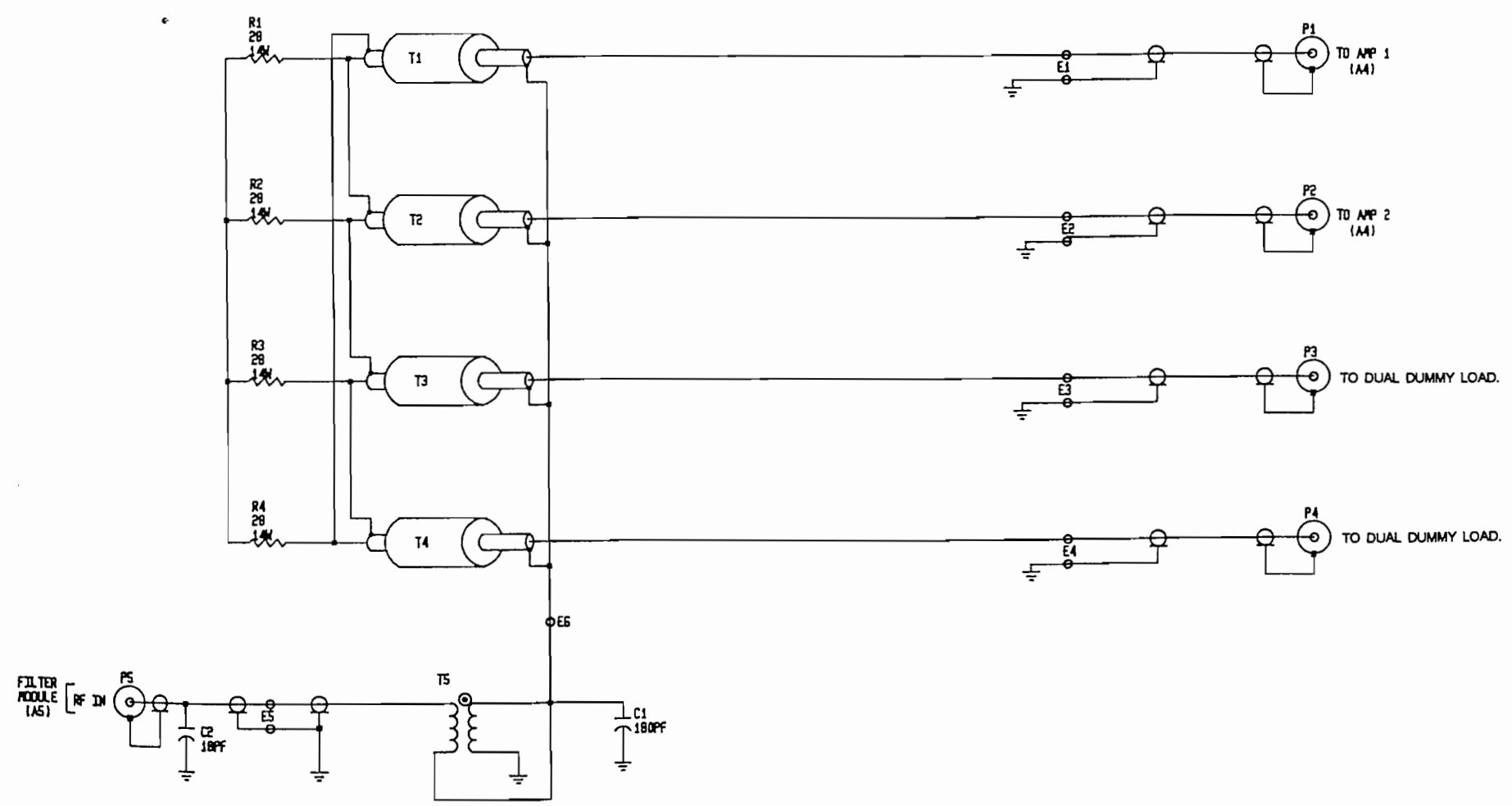


Figure 5.13 Combiner Module A6.



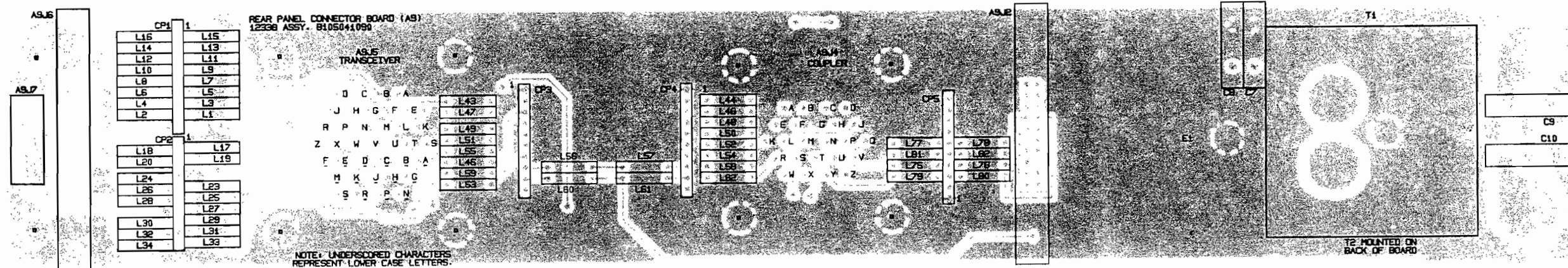
NOTE: PREFIX ALL REFERENCE DESIGNATORS WITH A7.

SPLITTER MODULE (A7)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	SPLITTER MODULE A7	8066070098
C1	CAP. 180PF, 500V, DM15, 5%	0258280000
C2	CAP. 18PF, 500V, DM15	0281330000
P1	CONNECTOR, RF, SUBMINIATURE	0753700000
P2	CONNECTOR, RF, SUBMINIATURE	0753700000
P3	CONNECTOR, RF, SUBMINIATURE	0753700000
P4	CONNECTOR, RF, SUBMINIATURE	0753700000
P5	CONNECTOR, RF, BNC UG-913	1008460036
R1	RESISTOR, NON-IND 28, 14W	1006910034
R2	RESISTOR, NON-IND 28, 14W	1006910034
R3	RESISTOR, NON-IND 28, 14W	1006910034
R4	RESISTOR, NON-IND 28, 14W	1006910034

Figure 5.14 Splitter Module A7.



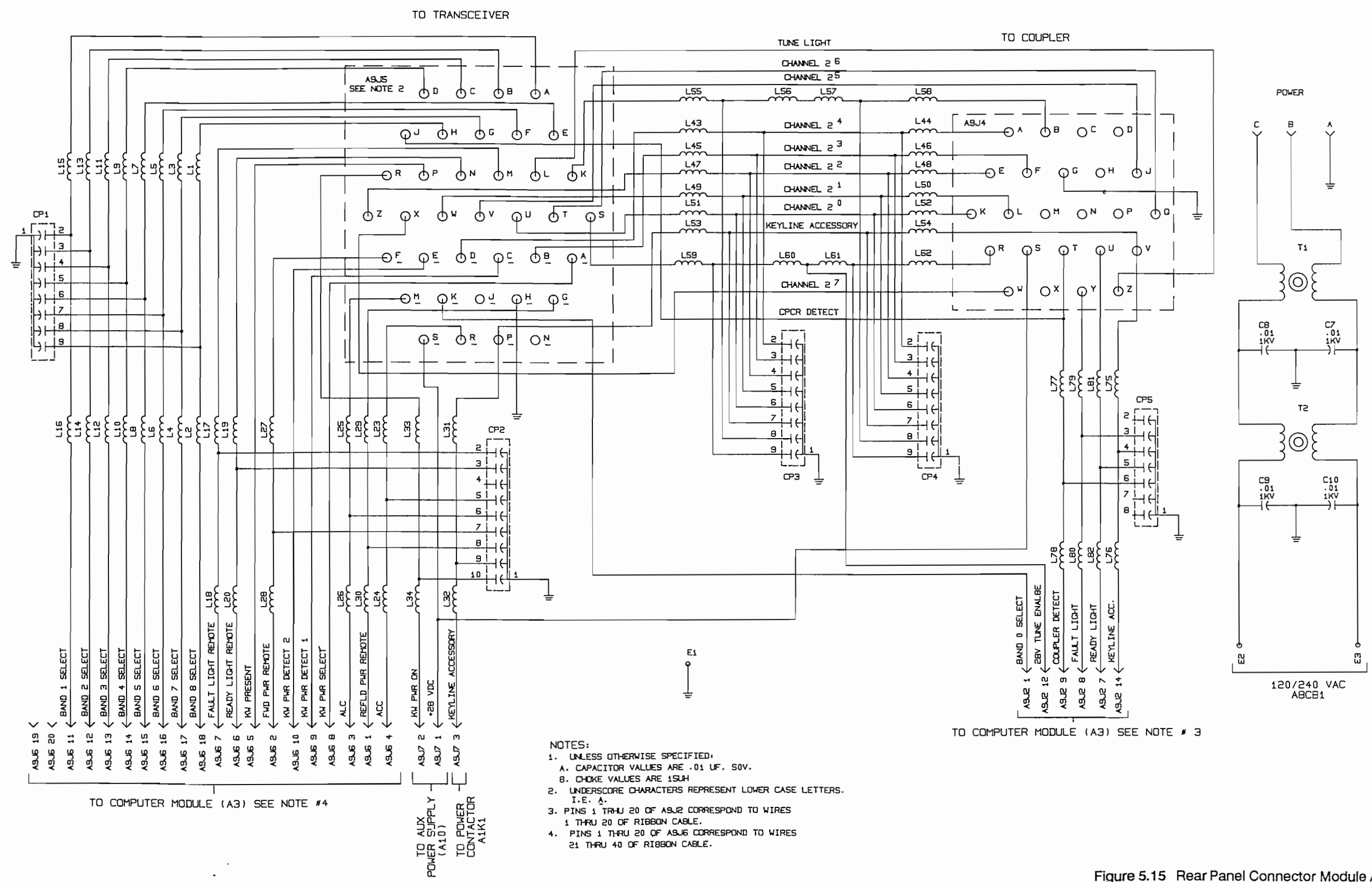


PC ASSY, REAR PANEL CONNECTOR (A9)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, REAR PANEL CONN. A9	8105041090
C7	CAP. 0.01μF, 1000V, Z5U, 20%	0243550006
C8	CAP. 0.01μF, 1000V, Z5U, 20%	0243550006
C9	CAP. 0.01μF, 1000V, Z5U, 20%	0243550006
C10	CAP. 0.01μF, 1000V, Z5U, 20%	0243550006
CP1	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP2	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP3	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP4	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
CP5	CAPACITOR, NTWK, 10 PIN, .01μF	1006540016
J2	CONNECTOR, PC, 20 PIN, STR.	1008120014
J3	CONNECTOR, POWER, 3 PIN ROUND	0754240002
J4	CONNECTOR, POWER, 24 PIN ROUND	1008320013
J5	CONNECTOR, POWER, 37 PIN ROUND	0754310001
J6	CONNECTOR, PC, 20 PIN, STR.	1008120014
J7	CONNECTOR, PC, 3 PIN	1008050008
L1	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L2	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L3	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L4	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L5	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L6	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L7	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L8	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L9	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L10	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L11	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L12	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L13	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L14	INDUCTOR, MOLDED, 15μH, 5%	0659070006

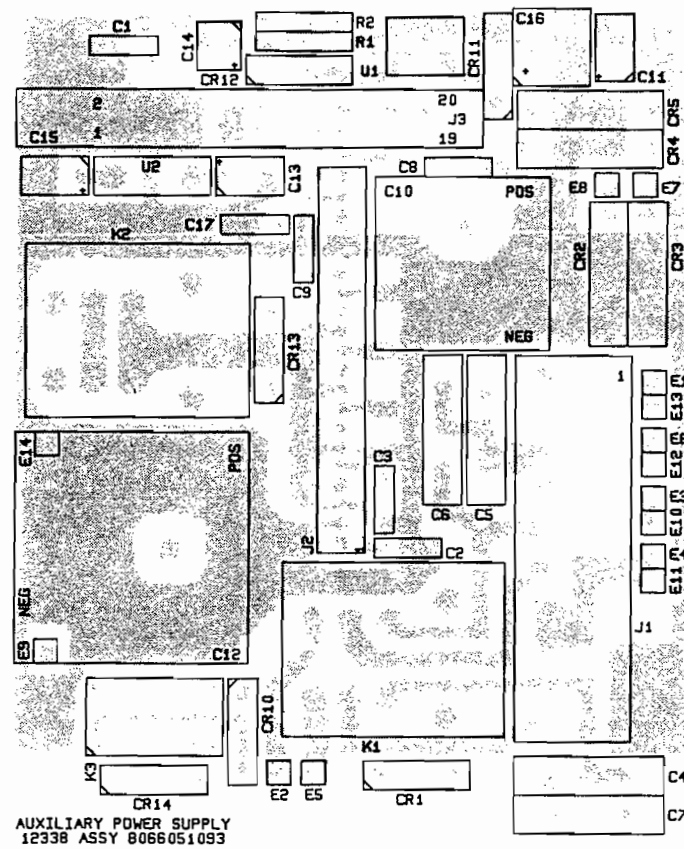
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
L15	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L16	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L17	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L18	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L19	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L20	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L23	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L24	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L25	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L26	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L27	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L28	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L29	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L30	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L31	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L32	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L33	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L34	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L43	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L44	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L45	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L46	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L47	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L48	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L49	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L50	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L51	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L52	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L53	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L54	INDUCTOR, MOLDED, 15μH, 5%	0659070006

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
L55	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L56	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L57	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L58	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L59	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L60	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L61	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L62	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L75	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L76	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L77	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L78	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L79	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L80	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L81	INDUCTOR, MOLDED, 15μH, 5%	0659070006
L82	INDUCTOR, MOLDED, 15μH, 5%	0659070006
T1	INDUCTOR, POWER LINE	8066041497
T2	INDUCTOR, POWER LINE	8066041497
	ROD, THD. 1/4-20 X 2 1/2 LG.	0502970405
	KEY, POLARIZING	1008070033
	STANDOFF, THD 1/4-20 X 1.0 LG	1008440035



- NOTES:
- UNLESS OTHERWISE SPECIFIED,
    - CAPACITOR VALUES ARE .01 UF, 50V.
    - CHOKE VALUES ARE 15UH.
  - UNDERSCORE CHARACTERS REPRESENT LOWER CASE LETTERS. I.E. A.
  - PINS 1 THRU 20 OF ASJ2 CORRESPOND TO WIRES 1 THRU 20 OF RIBBON CABLE.
  - PINS 1 THRU 20 OF ASJ6 CORRESPOND TO WIRES 21 THRU 40 OF RIBBON CABLE.

Figure 5.15 Rear Panel Connector Module A9.

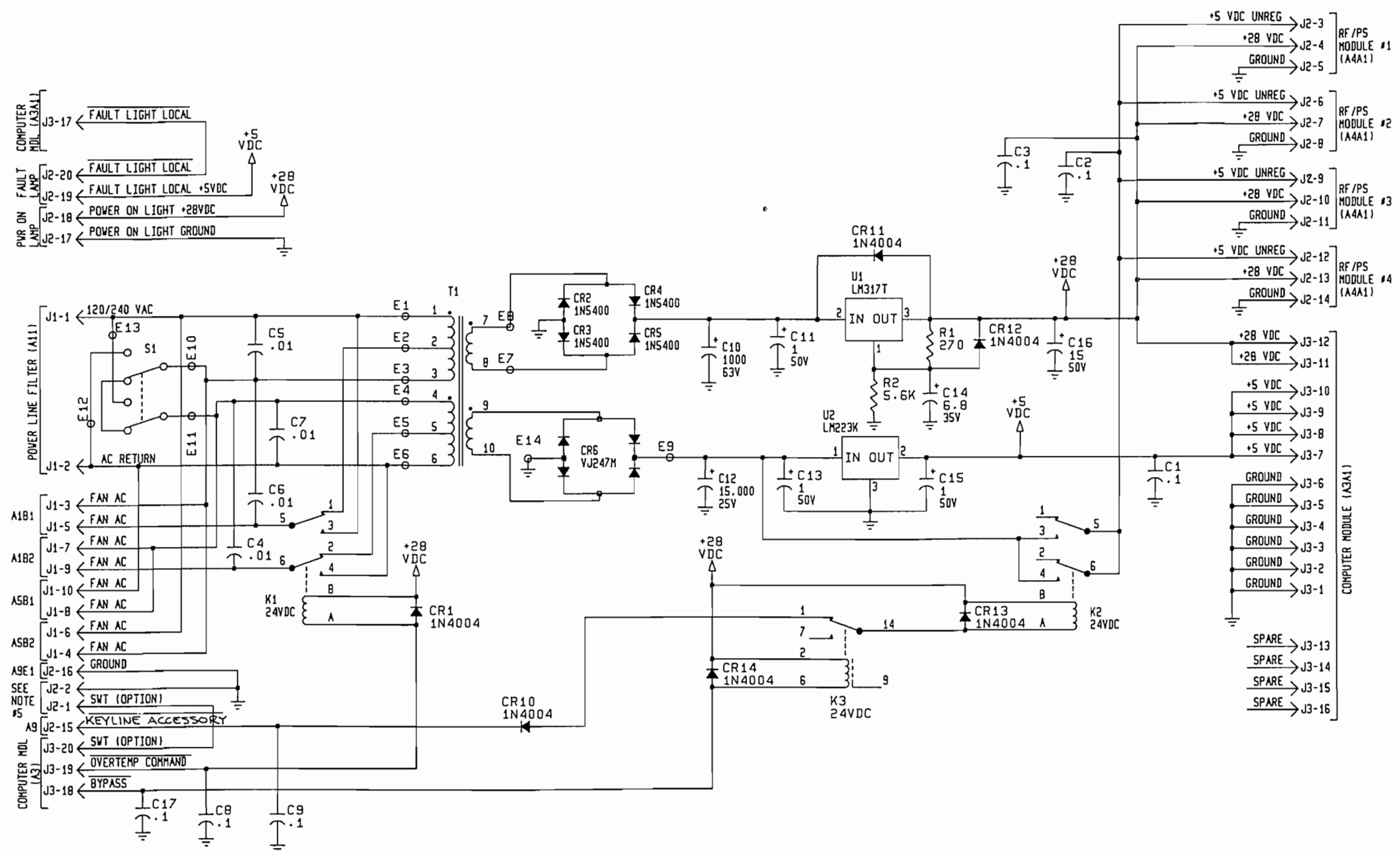


AUX. POWER SUPPLY MODULE (A10)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
T1	AUX. POWER SUPPLY MODULE A10	8066050097
	TRANSFORMER, POWER	8066050607
CR6	DIODE, BRIDGE VJ247TT	0405550006
K1	RELAY, DPDT, 24 VDC, 10A	1006920005
(XK1)	SPRING, RELAY SOCKET	1006920021
K2	RELAY, DPDT, 24 VDC, 10A	1006920005
(XK2)	SPRING, RELAY SOCKET	1006920021
S1	SWITCH, DPDT, 6A	1008410004
U1	IC. LINEAR LM317T	1006920013
U2	IC. LINEAR, LM223K	1006920030
	INSULATOR, MICA TO-220AB	0448670003
	BUSHING, INSULATING, TO-220AB	1008380024
	HARNES ASSY ,AUX.POWER SUPPLY	8066050496
	CHASSIS,AUX. PWR SUPPLY W/HDWE	8066052197

PC ASSY, AUX. POWER SUPPLY (A10A1)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, AUX. POWER SUPPLY A10A1	8066051093
C1	CAP. 0.1 $\mu$ F, 50V, X7R, 20%	0281610002
C2	CAP. 0.1 $\mu$ F, 50V, X7R, 20%	0281610002
C3	CAP. 0.1 $\mu$ F, 50V, X7R, 20%	0281610002
C4	CAP. 0.01 $\mu$ F, 1000V, Z5U, 20%	0243550006
C5	CAP. 0.01 $\mu$ F, 1000V, Z5U, 20%	0243550006
C6	CAP. 0.01 $\mu$ F, 1000V, Z5U, 20%	0243550006
C7	CAP. 0.01 $\mu$ F, 1000V, Z5U, 20%	0243550006
C8	CAP. 0.1 $\mu$ F, 50V, X7R, 20%	0281610002
C9	CAP. 0.1 $\mu$ F, 50V, X7R, 20%	0281610002
C10	CAP. 1000 $\mu$ F, 63V	1008040011
C11	CAP. 1 $\mu$ F, 50V, 20%	1005330018
C12	CAP. 15,000 $\mu$ F, 25V	1008000001
C13	CAP. 1 $\mu$ F, 50V, 20%	1005330018
C14	CAP. 6.8 $\mu$ F, 35V, 20%	1005330034
C15	CAP. 1 $\mu$ F, 50V, 20%	1005330018
C16	CAP. 15 $\mu$ F, 50V, 196D	0274000008
C17	CAP. 0.1 $\mu$ F, 50V, X7R, 20%	0281610002
CR1	DIODE, RECTIFIER 1N4004	0405180004
CR2	DIODE, RECTIFIER 1N5400	0403970008
CR3	DIODE, RECTIFIER 1N5400	0403970008
CR4	DIODE, RECTIFIER 1N5400	0403970008
CR5	DIODE, RECTIFIER 1N5400	0403970008
CR10	DIODE, RECTIFIER 1N4004	0405180004
CR11	DIODE, RECTIFIER 1N4004	0405180004
CR12	DIODE, RECTIFIER 1N4004	0405180004
CR13	DIODE, RECTIFIER 1N4004	0405180004
CR14	DIODE, RECTIFIER 1N4004	0405180004
J1	CONNECTOR, HEADER, 10 PIN VERT	1008090034
J2	CONNECTOR, PC, 20 PIN STRAIGHT	1008090018
J3	CONNECTOR, PC, 20 PIN, STR.	1008120014
K3	RELAY, SPDT, 24V, REED	1003400001
R1	RESISTOR 270, 10%, 1/4W	0178450006
R2	RESISTOR 5.6K, 10%, 1/4W	0183060008
XK1	SOCKET, RELAY	1007130008
XK2	SOCKET, RELAY	1007130008
XU2	JACK, PCB, PRESS-IN	0754100006
	SOCKET STRIP, 20 CONTACTS	1007350008
	KEY, POLARIZING	1008070033



- NOTES:
1. UNLESS OTHERWISE SPECIFIED:  
 A. CAPACITOR VALUES ARE IN  $\mu$ F.  
 B. RESISTORS ARE 1/4 WATT AND ARE IN  $\Omega$ .
  2. PREFIX ALL REFERENCE DESIGNATORS WITH A10.
  3. S1 SHOWN IN THE 240 VAC OPERATING POSITION.
  4. K1 SHOWN IN THE LOW FAN SPEED POSITION.
  5. J2-1 IS EXTERNALLY JUMPED TO J2-2.

Figure 5.16 Auxiliary Power Supply A10.

A21351

DUAL DUMMY LOAD

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
J1	PC ASSEMBLY, DUAL DUMMY LOAD	8116071092
J2	CONNECTOR, RF, SNAP-ON	1000170012
R1	RESISTOR, 50, 10%, 30W	6032071502
R2	RESISTOR, 50, 10%, 30W	6032071502
	FUSECLIP, 3/4 DIA .144 MTG HOLE	1013330005

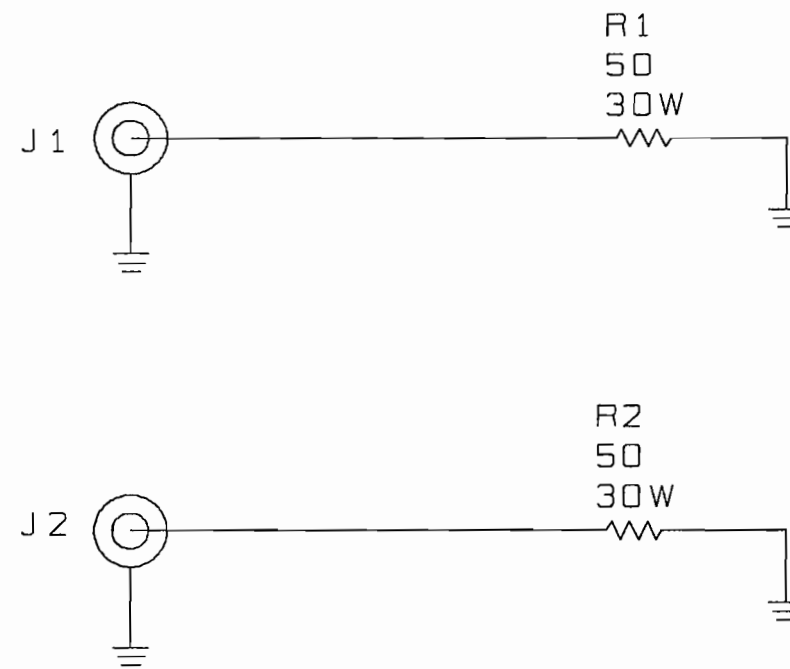


Figure 5.17 PC Assembly, Dual Dummy Load A11A1, page 1/1.