

TM-8085000709

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DIGITAL AUTOMATIC  
ANTENNA COUPLER

CU-9125

OPERATION AND MAINTENANCE  
MANUAL



SUNAIR

3005 SW Third Avenue, Ft. Lauderdale, FL 33315-3389

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**SUNAIR ELECTRONICS, INC.**



# CU-9125

## DIGITAL AUTOMATIC ANTENNA COUPLER



# OPERATION AND MAINTENANCE MANUAL

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# TABLE of ABBREVIATIONS

|                   |                                                              |         |                                                     |
|-------------------|--------------------------------------------------------------|---------|-----------------------------------------------------|
| ADDR              | Address                                                      | LVL     | Level                                               |
| AGC               | Automatic Gain Control                                       | MAN     | Manual                                              |
| ALC               | Automatic Level Control                                      | M CH    | Manual Channel                                      |
| AM                | Amplitude Modulation                                         | MED     | Medium                                              |
| AME               | Amplitude Modulation Equivalent                              | MHz     | Megahertz                                           |
| AMP/AMPL          | Amplifier                                                    | MIC     | Microphone                                          |
| ARQ               | Automatic Request                                            | MIL-STD | Military Standard                                   |
| AUD               | Audio                                                        | MNL     | Manual                                              |
| AUTO              | Automatic                                                    | ms      | Millisecond                                         |
| AUX               | Auxiliary                                                    | MTTR    | Mean Time To Repair                                 |
| BAUD              | A variable unit of data transmission speed (bits per second) | MTR     | Meter                                               |
| BELL U.S.         | Telephone standards                                          | NAR     | Narrow                                              |
| BFO               | Beat Frequency Oscillator                                    | O.D.    | Olive Drab                                          |
| BITE              | Built In Test Equipment                                      | PA      | Power Amplifier                                     |
| BRD               | Board                                                        | PC      | Printed Circuit                                     |
| CH /CHAN /CHL/CHN | Channel                                                      | PEP     | Peak Envelope Power                                 |
| CLR               | Clear                                                        | PLL     | Phase-Locked Loop                                   |
| CMOS              | Complementary Metal Oxide Semiconductor                      | P/N     | Part Number                                         |
| CPLR              | Coupler                                                      | PNL     | Panel                                               |
| CPU               | Computer                                                     | POSTSL  | Post-Selector                                       |
| CW                | Carrier Wave                                                 | PRESEL  | Pre-Selector                                        |
| dB                | Decibel                                                      | PTT     | Push-To-Talk                                        |
| dBm               | Decibels referred to 1 milliwatt across 600 ohms             | PWR     | Power                                               |
| DSBSC             | Double Sideband Suppressed Carrier                           | RCV/RX  | Receive                                             |
| DSP               | Display                                                      | REFL    | Reflected                                           |
| DUART             | Dual Asynchronous Receive/Transmit                           | REV     | Revision                                            |
| EEPROM            | Electrically Erasable and Programmable Read Only Memory      | RF      | Radio Frequency                                     |
| EPROM             | Electrically Programmable Read Only Memory                   | RFI     | Radio Frequency Interference                        |
| EMI               | Electromagnetic Radiation Interference                       | RFL     | Reflected                                           |
| ENTR              | Enter                                                        | RMT     | Remote                                              |
| FAX               | Facsimile                                                    | RS232   | Computer control, hardwired up to 50 feet maximum   |
| FEC               | Forward Error Correction                                     | RS422   | Computer control, hardwired up to 4000 feet maximum |
| FREQ              | Frequency                                                    | RS485   | Computer control, hardwired for multiple users      |
| FSK               | Frequency Shift Keying                                       | RTTY    | Radio Teletype                                      |
| FWD               | Forward                                                      | SEL     | Select                                              |
| GRP               | Group                                                        | SLO     | Slow                                                |
| HF                | High Frequency                                               | S MTR   | Signal Strength Meter                               |
| Hz                | Hertz                                                        | SPKR    | Speaker                                             |
| IC                | Integrated Circuit                                           | SPLX    | Simplex                                             |
| IF                | Intermediate Frequency                                       | SRAM    | Static Random Access Memory                         |
| I/O               | Input/Output                                                 | SSB     | Single Sideband                                     |
| IONCAP            | Ionospheric Communications Analysis and Prediction           | TCXO    | Temperature Controlled Crystal Oscillator           |
| kHz               | Kilohertz                                                    | TGC     | Transmit Gain Control                               |
| kW                | Kilowatt                                                     | THD     | Total Harmonic Distortion                           |
| ISB               | Independent Sideband                                         | TTL     | Transistor Transistor Logic                         |
| LCD               | Liquid Crystal Display                                       | TX/XMT  | Transmit                                            |
| LCL               | Local                                                        | USB     | Upper Sideband                                      |
| LED               | Light Emitting Diode                                         | UTC     | Universal Time                                      |
| LK                | Link                                                         | VCO     | Voltage Controlled Oscillator                       |
| LO                | Local Oscillator                                             | VHF     | Very High Frequency                                 |
| LP/LPX            | Lincompex                                                    | VRMS    | Volts Root Mean Square                              |
| LRU               | Lowest Repairable Unit                                       | VSWR    | Voltage Standing Wave Ratio                         |
| LSB               | Lower Sideband                                               | W       | Watt                                                |
| LT                | Light                                                        | WPM     | Words Per Minute                                    |

\* Asterisk indicates function selected

## SECTION I

### GENERAL INFORMATION

#### 1.1 SCOPE

This manual contains information necessary to install, operate, maintain and repair the CU-9125 Automatic Digital Antenna Coupler.

#### 1.2 DESCRIPTION

See Figure 1.1

##### 1.2.1 GENERAL

The CU-9125 is a high quality remotely controlled antenna coupler capable of matching a wide variety of antennas ranging from 9 ft. whips to 150 ft. longwires over the frequency range of 1.6000 to 29.9999 MHz. In addition, the coupler may be used as a "line flattener" to correct the VSWR of resonant antennas.

The CU-9125 is designed to operate in conjunction with the Sunair 9000 Series Equipment utilizing Cable Assembly p/n 8076004098 at separations of up to 250 feet. Manual tuning cycles are initiated by depressing the "CPLR TUNE" pushbutton on the 9000 Series Transceiver or Exciter. Tuning status metering for indicating forward and reflected power are located on the radio equipment. The coupler is mounted in a sturdy, fully gasketed case designed for outside mounting near the antenna.

##### 1.2.2 ASSEMBLIES

###### 1.2.2.1 CHASSIS ASSEMBLY 2A1

The Chassis Assembly provides the required mounting surfaces for the various electrical and mechanical components. The Motherboard 2A1A1 serves as the interconnect for all assemblies.

###### 1.2.2.2 RF ASSEMBLY 2A2

The four (4) boards comprising the RF Assembly are the Input Board 2A2A1, the Intermediate Board 2A2A2, the Inductor Board 2A2A3 and the Output Board 2A2A4. The boards contain all of the variable binary elements in the antenna matching network.

###### 1.2.2.3 COMPUTER BOARD 2A3

This assembly contains the microprocessor responsible for the operation and functions of the CU-9125.

###### 1.2.2.4 DETECTOR/PAD ASSEMBLY 2A4

The Detector Assembly 2A4A1 contains the magnitude, phase and VSWR detectors. The Pad Assembly 2A4A2 plugs into the Detector Assembly and protects the Transceiver/Exciter from impedance variations during the tuning cycle.

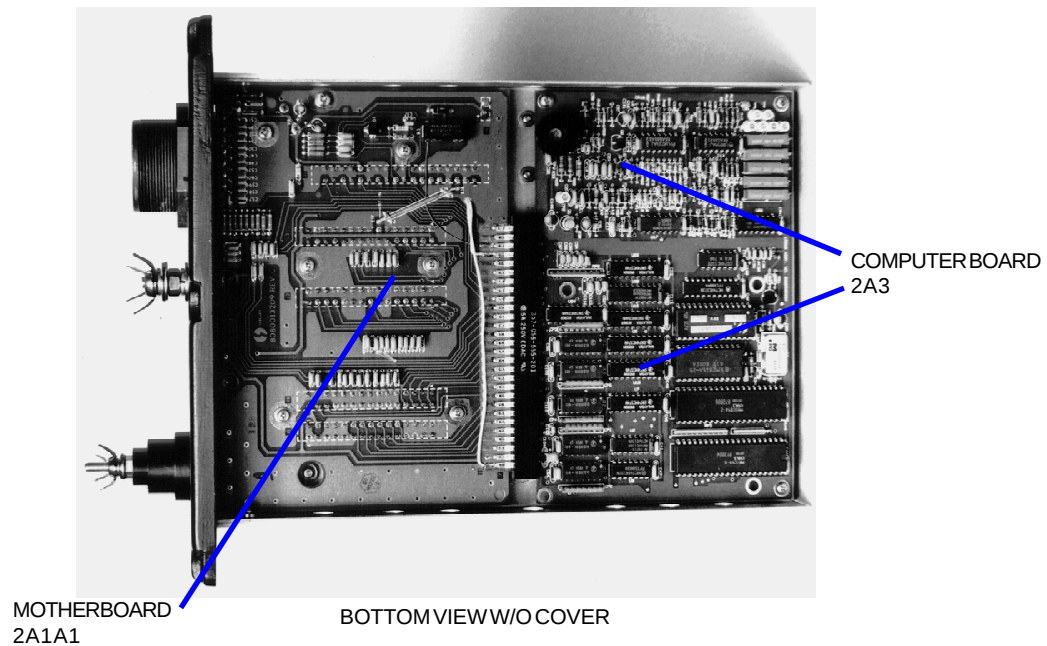
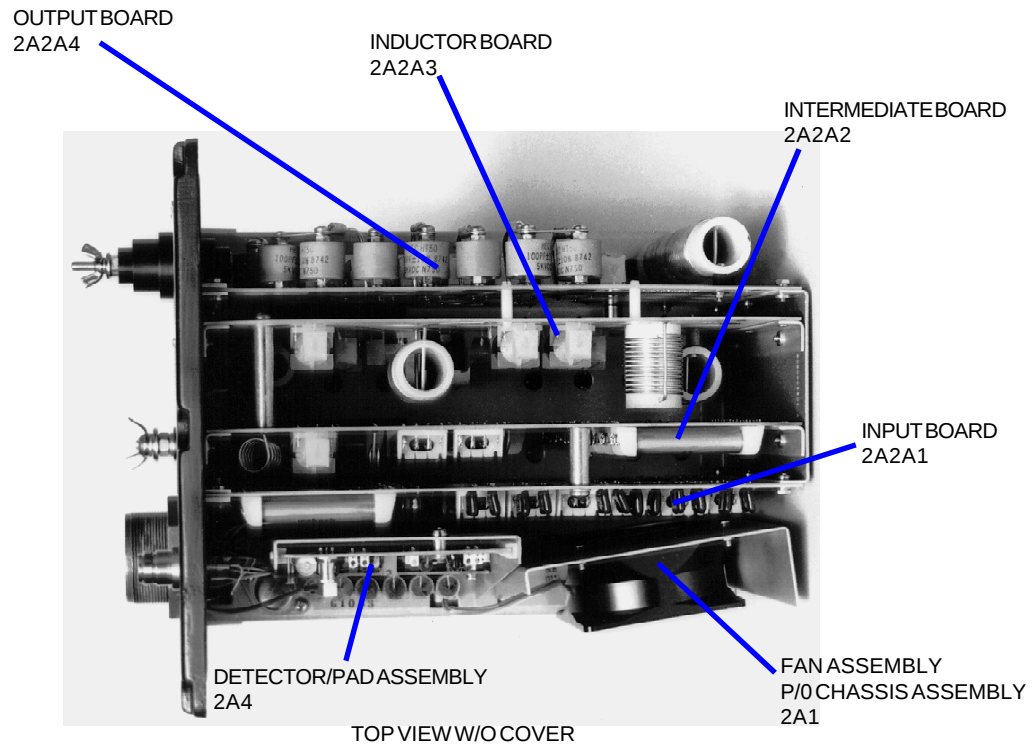


Figure 1.1 CU-9125 Major Assembly Locations.

## 1.3 SPECIFICATIONS

### 1.3.1 GENERAL

**FREQUENCY RANGE:** 1.6 to 30 MHz.

**TUNING CAPABILITIES:** 9 ft. whips  
16 ft. whips  
23 ft. whips  
35 ft. whips  
50 ft. to 150 ft. longwires  
suitable as a line flattener for broadband antennas

**RF INPUT POWER:** 150 Watts PEP and AVERAGE.

**INPUT IMPEDANCE:** 50 Ohms, non-reactive.

**DUTY CYCLE:** Continuous for antennas 23 feet and longer. Fifty percent (maximum 5 minutes continuous key down time) for 9 and 16 ft. antennas.

**TUNING TIME:** Memory Tuning - 10 milliseconds or less.  
Non-Memory Tuning: - Typical: 1 second.  
Maximum: 10 seconds.  
Memory: Non volatile, 128 channels (00 - 127).

**TUNE POWER REQUIRED:** 25 Watts RF delivered.

**TUNE ACCURACY:** 1.5:1 VSWR maximum.

**REMOTE CAPABILITY:** Up to 250 ft. from Transceiver/Exciter.

**POWER INPUT:** +28 VDC from Transceiver/Exciter, 1 Amp maximum.

**WEIGHT:** 23 lbs (10.35 kgs).

**DIMENSIONS:** (Inches) 9.1H X 9.6W X 11.4D.  
(CM) 23.1H X 24.4W X 28.96D.

**1.3.2 ENVIRONMENTAL**

**TEMPERATURE:** Operating: -30°C to +65°C.  
Storage: -50°C to +85°C.

**HUMIDITY:** MIL-STD 810C, Method 507.1, Procedure II.

**SHOCK:** MIL-STD-810C, Method 516.2, Proc I, Figure 516.2-2, Ampl. b (20 g.), Dur.d.

**VIBRATION:** MIL-STD-810C, Method 514.2 equipment category f, Table 514.2-VI for wheeled vehicles, Figure 514.2-6, curve V.

**DUST:** MIL-STD-810C, Method 510.1, Procedure I.

**RAIN:** MIL-STD-810C, Method 506.1, Procedure I.

**PACKAGING:** Rain tight, for exposed installations.

**1.4 EQUIPMENT SUPPLIED**

|                                             | <b>SUNAIR PART NUMBER</b>                |
|---------------------------------------------|------------------------------------------|
| Automatic Digital Antenna Coupler, CU-9125, | 8085000253 Grey<br>8085000296 Olive Drab |
| Connector Kit,                              | 6035002099                               |
| Operation and Maintenance Manual,           | 8085000709                               |

**1.5 EQUIPMENT REQUIRED BUT NOT SUPPLIED**

|                                                                                                                                            |            |
|--------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Control Cable Assembly:<br>Order by length desired. The Coupler will operate with up to 250 ft. of remote control cable.                   | 8076004195 |
| Cable, Control. Specify length.                                                                                                            | 0588680001 |
| Cable, Coaxial, RG-58A/U:<br>Recommended where separation between Transceiver/<br>Exciter and Coupler is less than 100 ft. Specify length. | 0588130001 |
| Cable, Coaxial, RG-8/U:<br>Recommended where separation between Transceiver/<br>Exciter and Coupler exceeds 100 ft. Specify length.        | 0588640000 |
| Cable, Coaxial, RG-213:<br>Same as RG-8/U.                                                                                                 | 1010770021 |
| Connector, RF, PL-259:<br>Mates with antenna connector J4 on 9000 Series.                                                                  | 0742190005 |

**1.6 OPTIONAL EQUIPMENT NOT SUPPLIED**

|                                  |                                |
|----------------------------------|--------------------------------|
| Transceiver/Exciter              | Consult Sunair Marketing Dept. |
| Shockmount Kit - CU-9125         | 8080000492                     |
| PC Assy, Extender CU-9125        | 8080002096                     |
| Depot Spare Parts Kit            | 8085900092                     |
| Field Module Kit                 | 8085902095                     |
| PC Assy, Detector Extender Board | 8085165091                     |
| Antenna Simulator Model TS-100   | 8084001094                     |

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## SECTION II

### INSTALLATION

#### 2.1 GENERAL

Section II contains all necessary instructions for the unpacking, inspection, and if necessary, reshipping of damaged equipment or parts. In addition, further information regarding location and mounting considerations, power requirements, antenna and ground system hook-ups and final checkouts after installation is also provided.

#### 2.2 UNPACKING AND INSPECTION

As soon as you have received your unit(s), unpack and inspect all components and accessories. Check the packing list to be sure you have received all items ordered and that all items necessary for operation have been ordered.

**NOTE:** Be sure to retain the carton and its associated packing materials should it be necessary to reship damaged equipment.

Do not accept a shipment when there are visible signs of damage to the cartons until a complete inspection is made. If there is a shortage of items or any evidence of damage, 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 of the damage should also be forwarded to Sunair's Product Services Department. Include the following:

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

When Sunair receives this information, arrangements will be made for repair or replacement.

#### 2.3 RETURN OF EQUIPMENT TO FACTORY

The shipping container for the CU-9125 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: (954)-525-1505, FAX: (954)-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 coupler. Rigid cardboard should be placed at the corners of the equipment to protect against denting.

When returning subassemblies or components for repair or replacement, be sure to pack each item separately, using suitable cushioning material.

Shipment to be made prepaid consigned to:

**Sunair Electronics, Inc.**  
**Product Services Department**  
3101 SW Third Avenue  
Ft. Lauderdale, Florida 33315-3389  
U.S.A.

Plainly mark with indelible ink all mailing documents as follows:

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

Mark ALL SIDES of the package:

**FRAGILE - ELECTRONIC EQUIPMENT!**

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

## **2.4 POWER REQUIREMENTS**

All power necessary to operate the CU-9125 Automatic Digital Antenna Coupler is supplied from a companion Exciter/Transceiver via the Control Cable Assembly. See Figure 2.8 for control cable connections. If an Exciter/Transceiver other than a Sunair model is used, an external power source of +28VDC at 1.0 amp is required to power the CU-9125.

## **2.5 INSTALLATION CONSIDERATIONS AND MOUNTING INFORMATION**

The satisfactory operation of the equipment will depend upon the care and thoroughness taken during the installation.

### **IMPORTANT INSTRUCTIONS**

#### **2.5.1 GENERAL INSTALLATION PROCEDURES AND REQUIREMENTS**

1. Carefully plan radio/coupler/antenna locations, observing the following requirements before starting installation.
2. Provide best possible RF ground for radio and coupler. Use flat copper strap 1" wide or #6 (or larger) wire and connect to the ground terminal at rear of radio. Leads to ground system should be as short as possible.
3. Provide the maximum separation between coupler output and the radio with its associated wiring. Coupler may be mounted up to 100 feet from radio when RG-58 is used, and up to 250 feet from radio when RG-8 or RG-213 is used.
4. The antenna lead from the coupler to antenna must be insulated for at least 10 kv potential. The lead should not run parallel to metal objects that are bonded to the system ground. The coupler should be as close to the antenna as possible, and never more than three (3) feet away as this will decrease antenna efficiency.
5. If the coupler is installed on a wood or fiberglass boat, a 12 square foot minimum area of metal surface area in contact with the water should be provided for use as an RF ground.

6. If operating the coupler on external DC power, check for correct polarity before applying power.
7. The installation should be carefully planned beforehand in accordance with drawings on the following pages.
8. Linear amplifiers with low level modulation such as used in Sunair Exciters/Transceivers will oscillate if the RF power output is radiated or conducted into the low level stages. Evidence of this situation is erratic or excessive power output. This is caused by too close proximity of the coupler output and antenna to the Transceiver/Exciter and/or inadequate RF grounds. Carefully following the above procedures will prevent this from occurring.

## 2.5.2 MOUNTING CONSIDERATIONS

See Figure 2.1 for Coupler dimensions.

### 2.5.2.1 BASE STATION INSTALLATION

A typical base installation consisting of an RT-9000 and a CU-9125 is shown in Figure 2.3. (Consult the RT-9000 Operation and Maintenance Manual, p/n 8076000505, for installation details for the Transceiver.) The CU-9125 can also be used with the T-9400 HF/ISB Exciter. (Consult the T-9400 HF/ISB Exciter Operation and Maintenance Manual, p/n 8103000507, for installation details.) Refer to Section 2.6 for recommendations for suitable antennas.

### 2.5.2.2 VEHICULAR INSTALLATION

Figure 2.4 shows a typical vehicular installation with an RT-9000 Transceiver and shockmount assembly.

**NOTE:** Shockmounting is required only in severe shock or vibration environments exceeding those noted in Section 1.3.2. See Figure 2.2 for installation.

See Section 2.6 for specific antenna recommendations. In order to minimize RF pickup, it is important that the ground straps supplied with the shockmount, if used, be securely fastened between the ground post on the radio and the bottom of the right rear shock isolator. (Consult the RT-9000 manual for further details.)

### 2.5.2.3 MARINE INSTALLATION

In marine installations, follow the same recommendations as outlined in paragraph 2.5.2.2 above. If the radio is installed in a wood or fiberglass boat, a ground plate of 12 square foot minimum area in contact with the water should be installed. A heavy ground lead such as 1 inch wide strap or braid should be connected between the ground post on the radio and the ground plate. The length of this ground lead should be held to an absolute minimum commensurate with a neat installation.

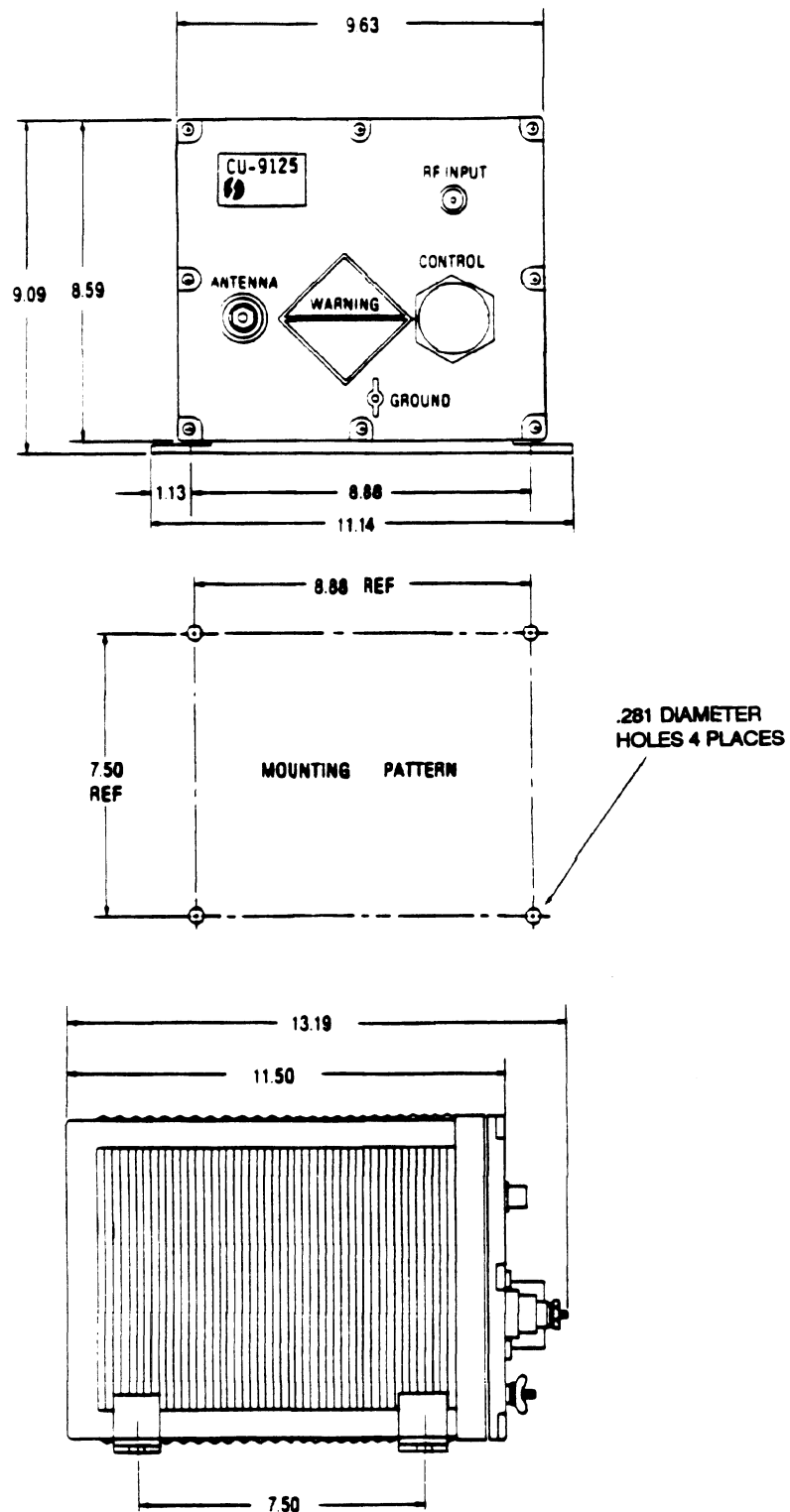


Figure 2.1 Outline Mounting Details CU-9125.

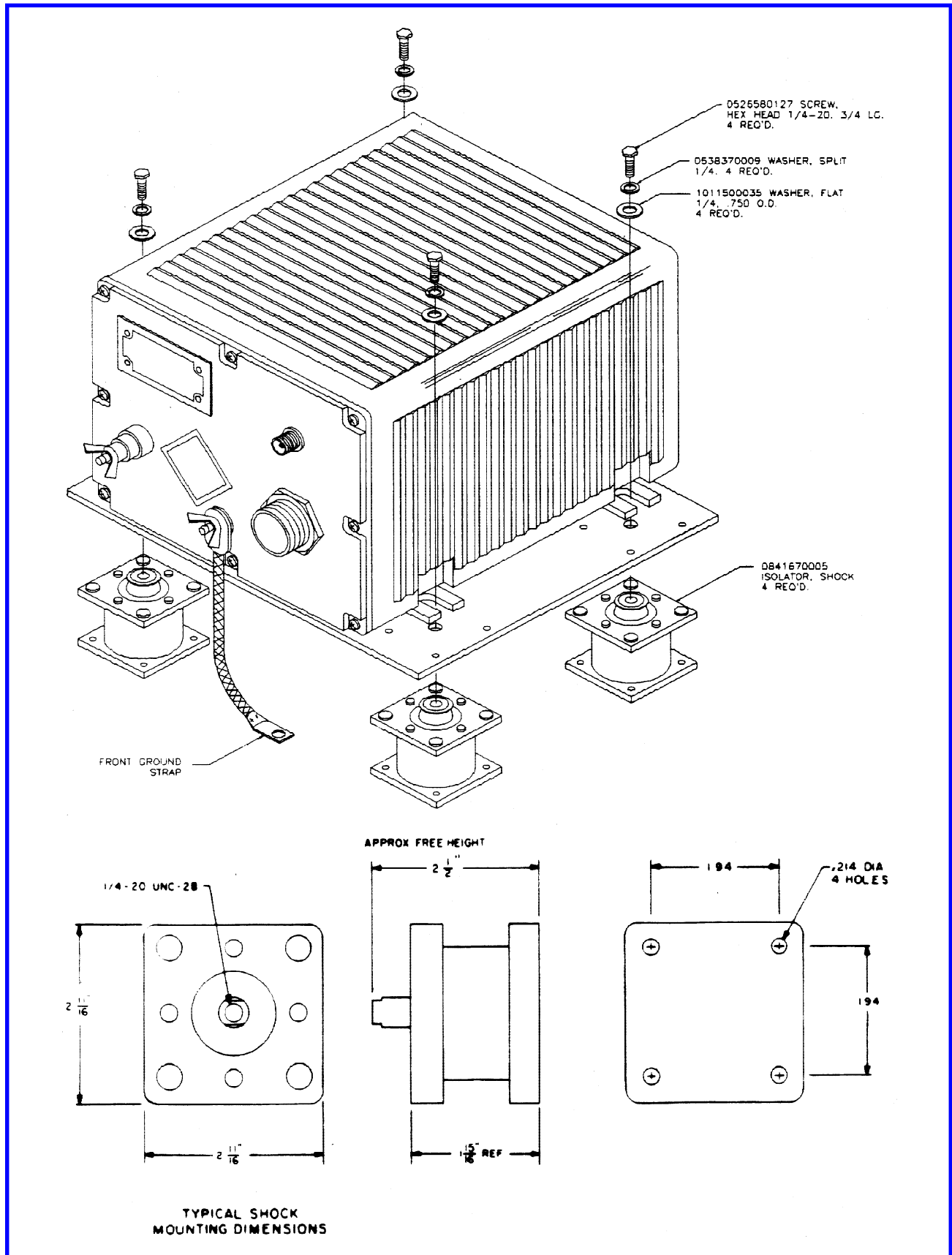


Figure 2.2 Shockmount Installation.

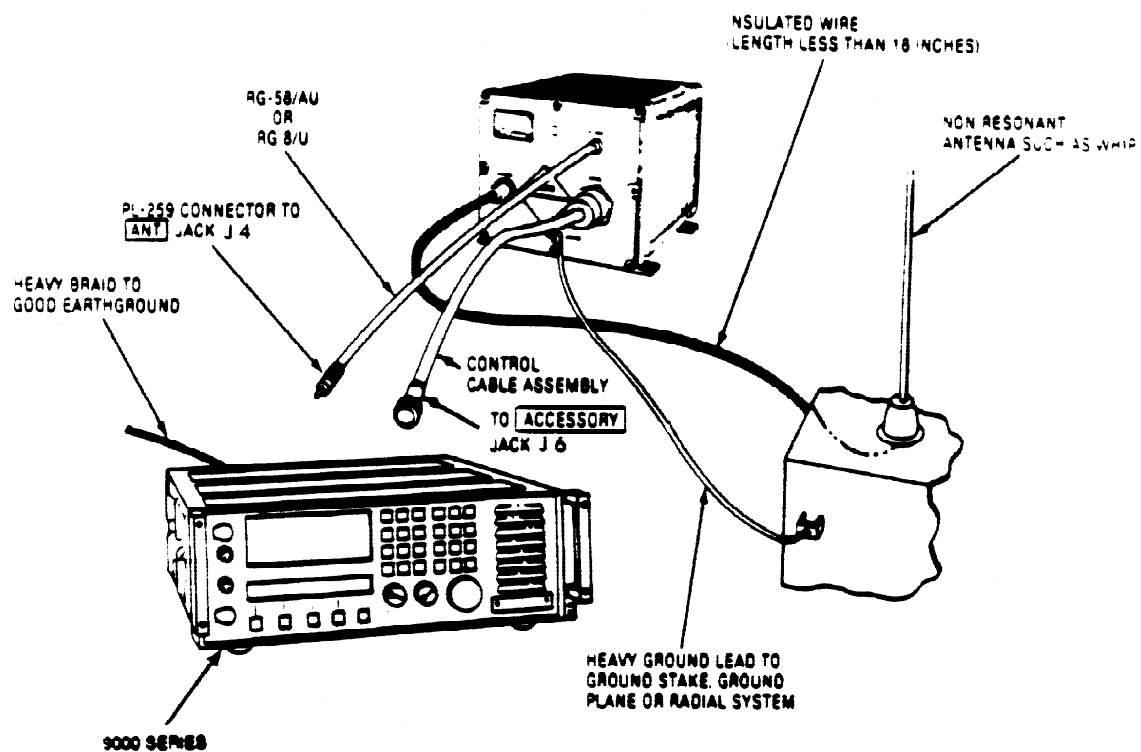


Figure 2.3 Typical Base Station Installation Using Non-Resonant Antennas.

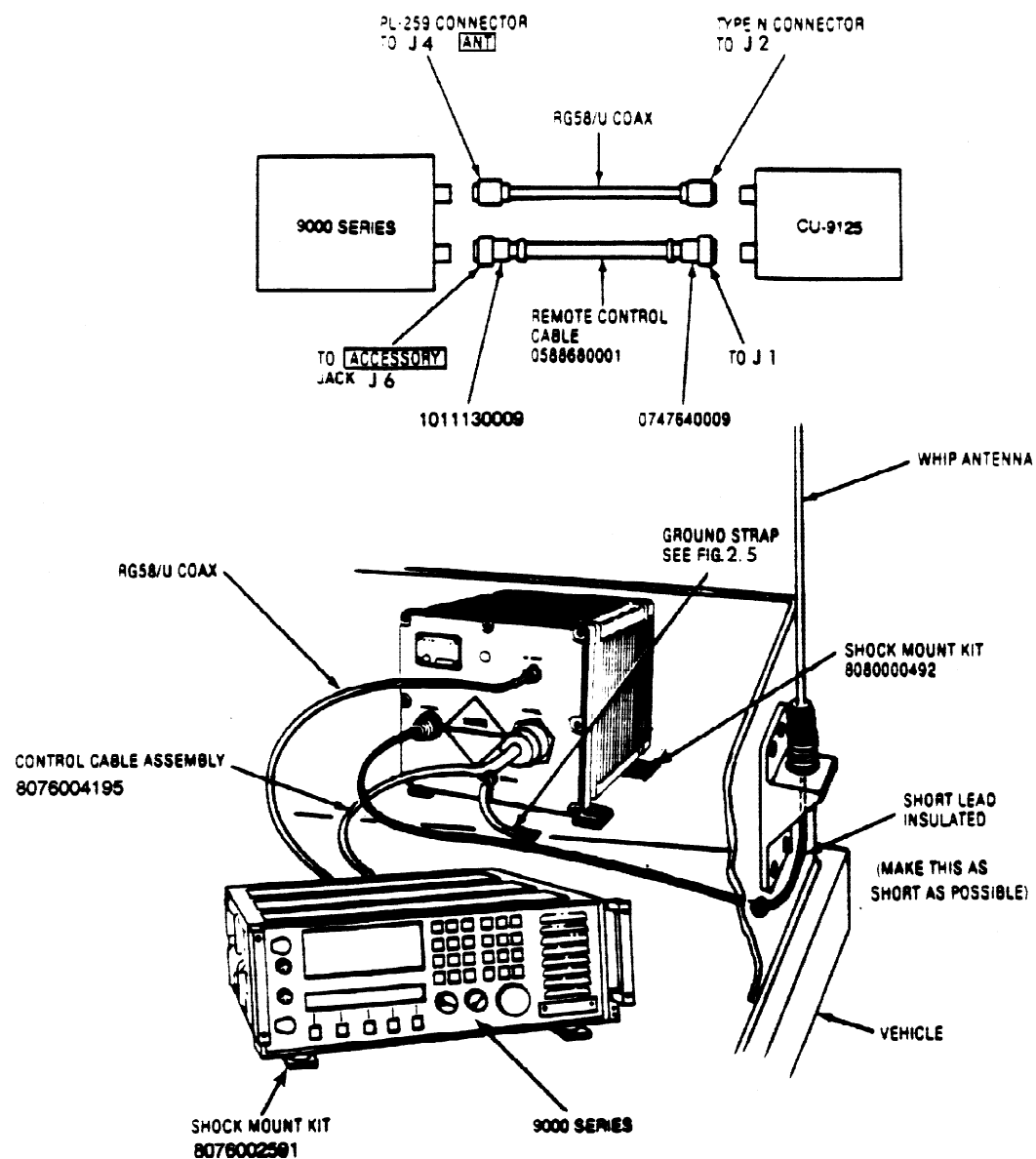
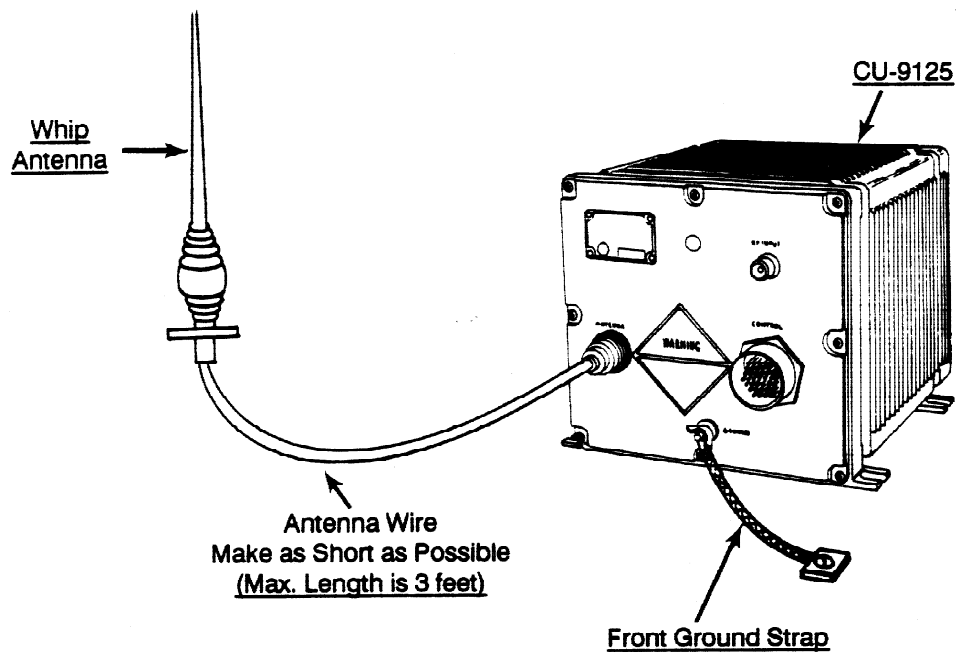


Figure 2.4 Typical Vehicular Installation.



### IMPORTANT NOTE:

In some installations, it may be necessary to install the CU-9125 adjacent to the radio. Grounding is extremely important to prevent RF from feeding back into the radio. The CU-9125 should be grounded to the front ground strap, as shown above. In addition, the ground braid used on the rear of the radio should be as short as possible. The interconnecting cable from the radio to the CU-9125 should be as short as possible and should not be routed under the antenna feed wire.

Figure 2.5 Coupler Grounding.

## 2.6 ANTENNAS AND GROUND SYSTEMS

### 2.6.1 GENERAL

Sunair Exciters/Transceivers are designed to operate into a 50 Ohm resistive antenna system with a maximum voltage standing wave ratio (VSWR) of 2:1. When used with the CU-9125 Automatic Digital Antenna Coupler the system will match antennas ranging from 9 foot whips to 150 foot longwires. Although the CU-9125 will match 9 foot whips down to 1.6 MHz, use of a 9 foot whip is not recommended for low frequency use due to poor radiation efficiency. The CU-9125 is unique in that it can be placed close to the antenna and controlled from the front panel of the Exciter/Transceiver. This optimizes both operator convenience and electrical performance. As there are numerous types of antennas, a complete discussion is beyond the scope of this manual. Antennas requiring an antenna coupler for use in the 1.6 to 30 MHz spectrum generally fall into two categories:

- a) Narrow Band 50 Ohm Antennas
- b) Random length non-resonant Antennas.

Antennas falling into each of the above mentioned categories are discussed in this section. For specific recommendations, consult our Marketing and Product Support Departments.

Some general **DOs** and **DON'Ts** of antenna installation are listed below:

- a) The antenna should be clear of all large objects such as trees and buildings.
- b) Although the coupler will match electrically short antennas (i.e. those under 1/8 wavelength), such antennas are not efficient radiators. If the installation permits, antennas over 1/8 wavelength long at the lowest operating frequency should be used. Antenna length generally limits system performance in vehicular applications at frequencies below 10 MHz as the size would be prohibitive.
- c) When using whip antennas, the ground system actually forms part of the radiating system. Where space permits (such as in a base station installation) a good ground plane or radial system should be installed at the base of the antenna. (See Figure 2.6)

**NOTE:** An inadequate ground system is most often responsible for disappointing performance when using a whip antenna.

### 2.6.2 NARROW BAND 50 OHM ANTENNAS

Typical of this type of antenna is the Inverted V illustrated in Figure 2.7. This type of antenna may be assembled from the Sunair Doublet Antenna Kit (p/n 0996240004). Its operation is efficient for only a narrow band of frequencies within approximately 2½% of their center frequency. The antenna coupler is **NOT** generally required if the above frequency span is not exceeded. Separate antennas must be erected for each small band of frequencies to be used. The antenna exhibits somewhat directional characteristics. The direction of maximum radiation is perpendicular to the antenna wire. This antenna is particularly suitable for communication with nearby mobile stations (with vertical antennas) since a portion of the radiation is in a vertical direction.

### 2.6.3 RANDOM LENGTH NON-RESONANT ANTENNAS

Whips and longwires are popular non-resonant antennas. The whip antenna (illustrated in Figure 2.6), is often used in mobile, marine, portable or semi-portable installations because it is rugged and self-supporting. The antenna impedance is strongly dependent on the operating frequency, and an antenna coupler, therefore, must be used to match the antenna to the Transceiver/Exciter. Best radiation efficiency will be obtained if the antenna is at least  $1/8$  wavelength long at the lowest operating frequency; however, this requirement does not result in a practical size antenna for low frequency operation. Thirty-five foot whip antennas offer a good compromise between practical height and good electrical performance at low frequencies. The antenna coupler is designed to efficiently match whip antennas of 15 foot length or greater. An efficient match may also be obtained for a 9 foot whip above 4 MHz. The whip's performance is greatly influenced by its ground system. For temporary base station installations, a minimum of four six-foot long ground rods should be driven into the ground symmetrically placed around the antenna base. The rods should be bonded together with heavy strap and then connected to the antenna coupler ground by another short heavy strap. If the antenna is mounted on the roof of a building where a short ground lead to coupler cannot be obtained, a minimum of four symmetrically placed ground radials should be installed at the base of the antenna, bonded together, and connected to the antenna coupler ground post. The radials should be made of number 12 gauge wire or larger and should be at least  $1/4$  wave long at the lowest operating frequency. (Radial length in feet =  $246/\text{frequency in MHz.}$ ) The whip's radiation pattern is omni-directional in the azimuthal plane.

The longwire antenna, illustrated in Figure 2.8, is a popular base station antenna where a wide range of operating frequencies are used. The antenna impedance varies greatly with frequency and, therefore, must be matched to the transmitter with the antenna coupler. The CU-9125 Antenna Coupler will efficiently match longwire antennas up to 150 foot in length. The radiation pattern of the longwire antenna is also a strong function of operating frequency. The two most popular longwire antennas, (75 and 150 foot) available from Sunair, exhibit excellent low frequency radiation efficiency.

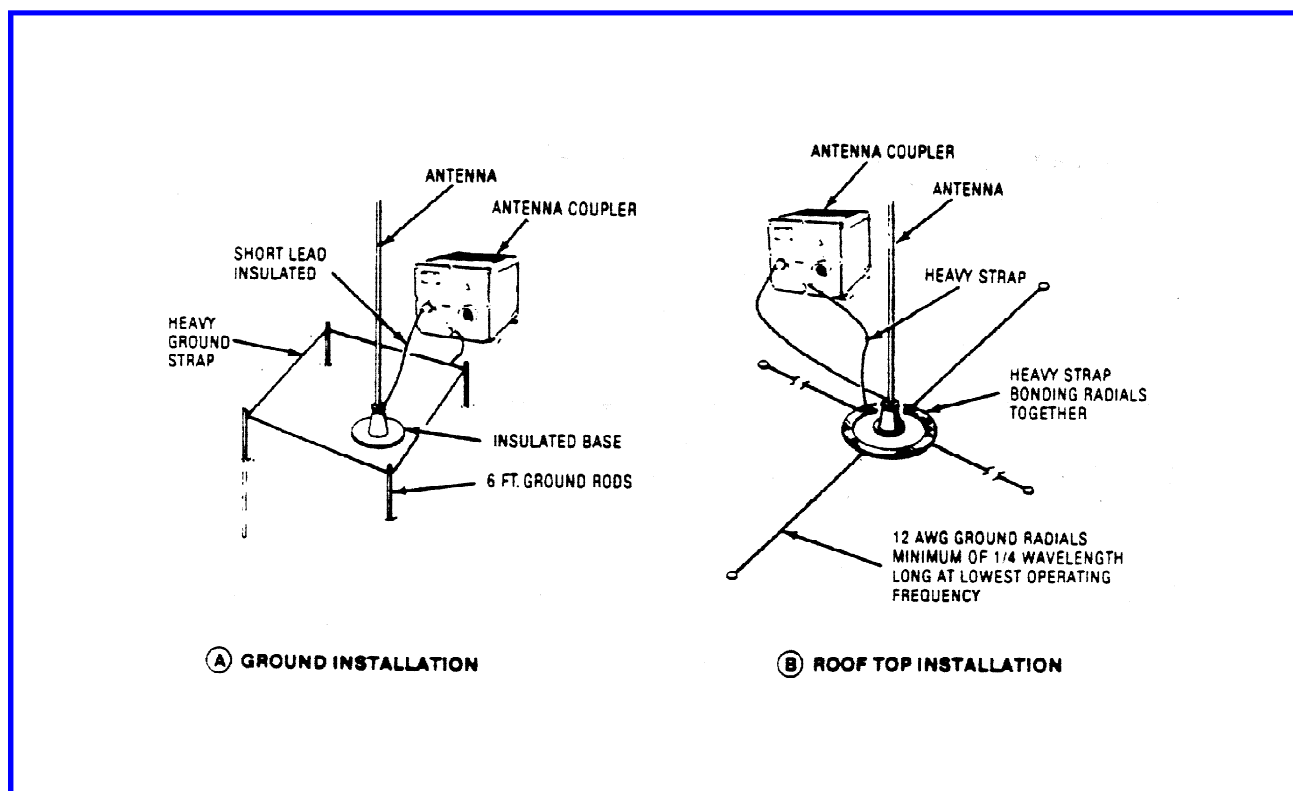


Figure 2.6 Whip Antenna.

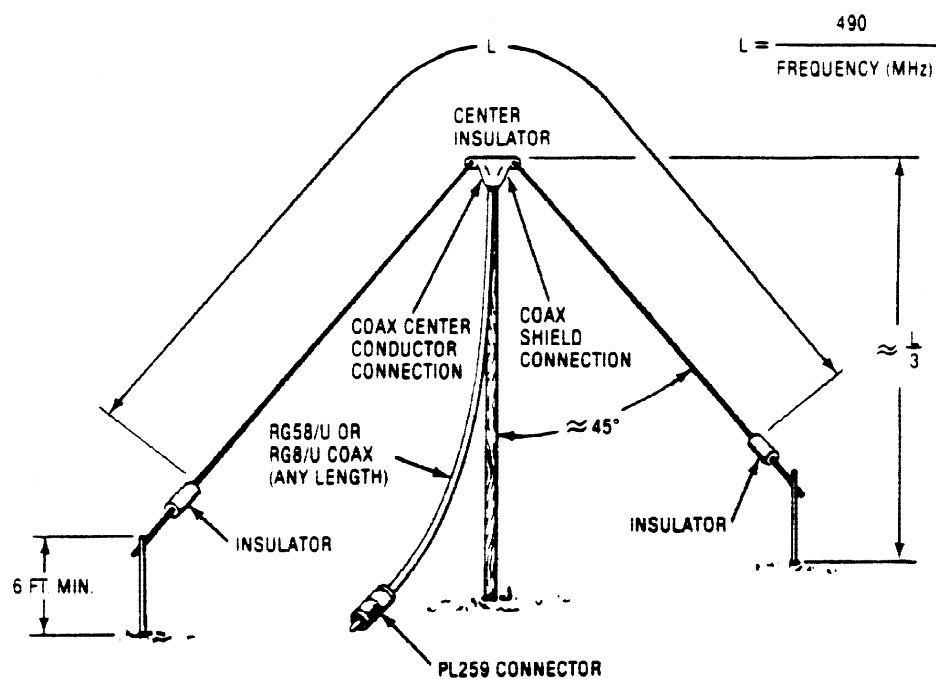
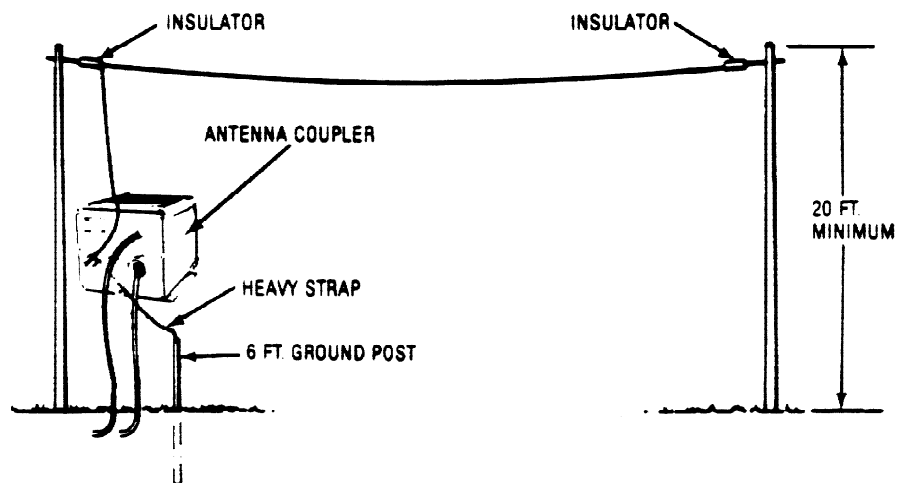


Figure 2.7 Inverted 'V' Antenna.



50 TO 150 FOOT LONGWIRE: DISTANCE FROM OUTPUT OF COUPLER TO FIRST INSULATOR IS A PART OF THE TOTAL LENGTH.

Figure 2.8 Long Wire Antenna.

## 2.7 CONSTRUCTION OF CONTROL CABLE ASSEMBLY 8076004195

It is recommended that the control cable assembly be procured from Sunair. However, if necessary, the cable may be made from individual wires of #20 AWG with an overall braided shield and PVC jacket.

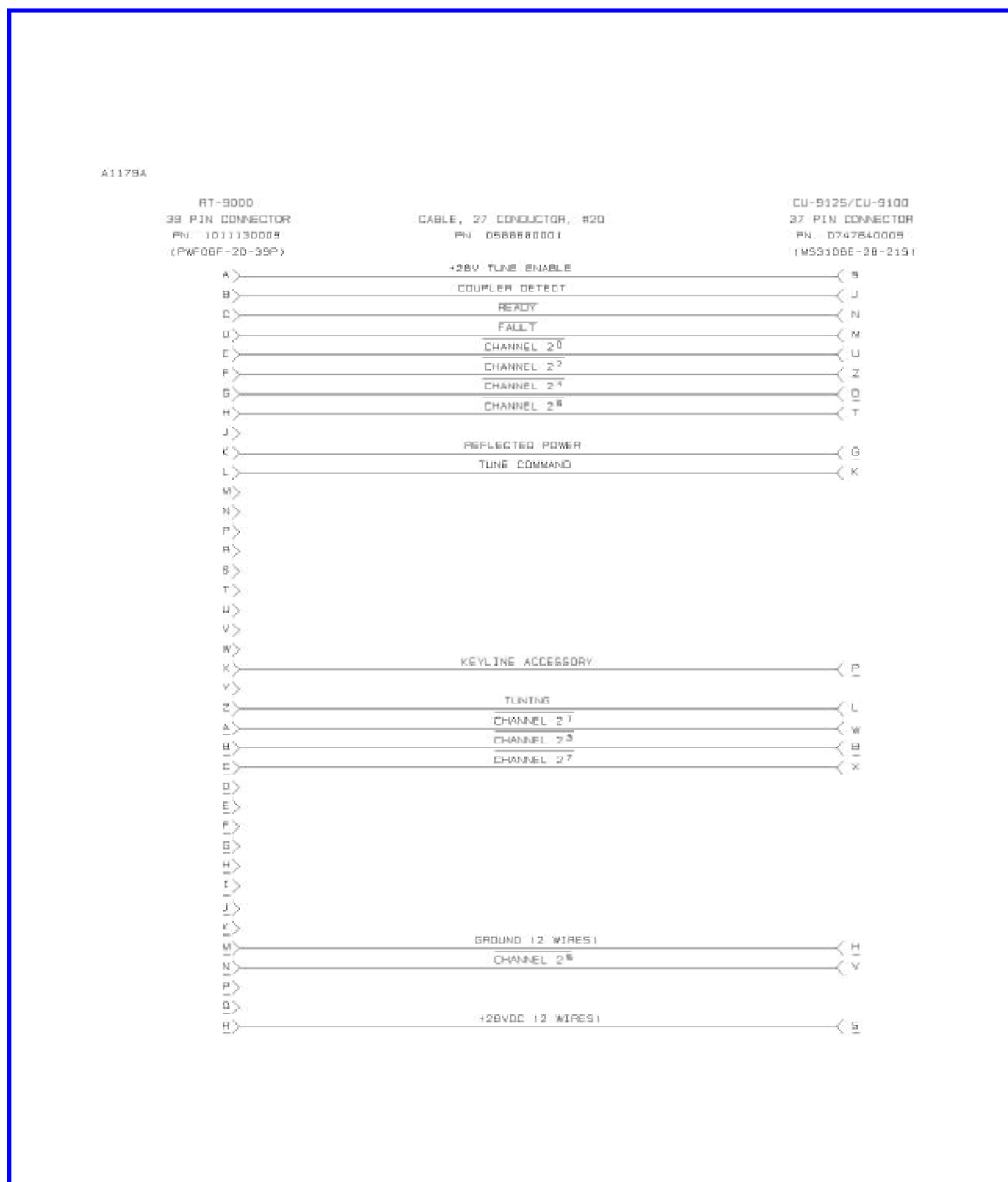
The control cable assembly may be shipped from the factory without connectors attached to facilitate the routing of this cable through walls, bulkheads, conduit, etc. After installing the cable, follow the procedure outlined below.

**NOTE:** The connector with the male pins (1011130009) should be wired at the transceiver end of the cable.

The connector with female pins (0747690008) should be wired at the coupler end of the cable. Refer to Figure 2.8

1. Loosen both screws on one of the cable clamps.
2. Insert the rubber telescoping bushing (boot) through the rubber grommet on the inside of the cable clamp and push through until the lip on the boot bottoms on the rubber grommet. The boot should extend beyond the cable clamp.
3. Insert the cable (0588680001) into the open end of the boot and cable clamp and pull through until approximately six inches of cable extends from the inside of the cable clamp.
4. Carefully remove approximately 1½ inches of the plastic outer jacket of the remote control cable using a knife or razor blade. Use care so as not to damage the shield or inner conductors.
5. Carefully unbraid the cable shield to within approximately ¼ inch of the outer jacket. Carefully cut the unbraided shield wires at this point using a pair of small wire cutters.
6. Remove approximately one inch of insulation from the end of a three-inch piece of #22 gauge hook-up wire. Wrap the wire around the outer jacket and solder the connection using a medium-size soldering iron. Attach a #8 solder lug to the other end of the wire, after pulling the wire back through the telescoping bushing.
7. Note the mylar sleeve over the wire bundle. Carefully cut this sleeve, being careful not to nick the wires in the bundle, until the wire bundle is exposed back to the end of the shield.
8. Flare out the bundle of wires and separate the individual wires. Strip approximately 1/8 inch of insulation from each wire.
9. Choose one of the wires and carefully tin it. Solder the wire to one of the cups of the connector. Make a chart showing the wire color code and pin connection.
10. Proceed in a similar manner until all required wires are installed.
11. When all connections are completed, screw the rear shell and cable clamp assembly on the connector and tighten. Push a small additional amount of cable into the connector to ensure some slack. Remove one cable clamp screw and insert the lug on the #22 shield wire. Reinsert screw into cable clamp. Tighten the two screws on the cable clamp.
12. Follow an identical procedure to connect the other end of the cable to the proper pin as shown in Figure 2.9.

**WARNING:** Connectors installed by the customer must be wired in accordance with the instructions provided in this section. The cable **MUST BE** continuity checked after connector installation and prior to system power up.



**Figure 2.9** Wiring Diagram, Control Cable Assembly (8076004195).

## **2.8 CHECKS AFTER INSTALLATION**

### 9000 Series Exciters/Transceivers

1. Select a frequency in the 2 to 3 MHz range (or a frequency you are allowed to use).
2. Upon initial power on, the LCD will display function and status of the radio. An alternating 'Coupler Untuned' message will appear on the screen.
3. Depress the 'CPLR TUNE' pushbutton.
4. While coupler is tuning, screen will display 'Coupler Tuning'.
5. When a successful tune has been completed (1-2 seconds), screen will display 'System Ready' and then return to normal display status. If a 'System Fault' or 'Coupler Fault' message is displayed see section 3.1.

## SECTION III

### OPERATION

#### 3.1 ANTENNA COUPLER TUNING

Once an operating frequency has been selected the exciter or transmitter section of the Transceiver is automatically tuned to the same frequency (Simplex Operation). If the Transceiver/Exciter output is fed to an Antenna Coupler (CU-9125), depression of the 'CPLR TUNE' key, will initiate the tune cycle. During this time (a few seconds or less), the message

'COUPLER TUNING'

will appear on the Status Display Screen. When coupler tuning has been completed, the message

'SYSTEM READY'

will appear on the Status Display Screen.

THE TRANSCEIVER/EXCITER IS NOW FULLY OPERATIONAL

**NOTE:** If there is no antenna coupler in the system, depression of the 'CPLR TUNE' key will produce the message  
'NO ANTENNA COUPLER'  
on the Operational Display Screen.

**NOTE:** If the coupler is unable to tune the antenna within 10 seconds, the message

'SYSTEM FAULT'

will appear on the Status Display Screen. If this occurs, check the installation and the antenna. If all appears in order, proceed to the troubleshooting section of the coupler manual.

**NOTE:** If the coupler remains in the tune mode for longer than 10 seconds the message

'COUPLER FAULT'

will appear on the Status Display Screen. If this occurs, proceed to the troubleshooting section of the coupler manual.

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## SECTION IV

### THEORY OF OPERATION

#### 4.1 GENERAL

The CU-9125 is a fully automatic digital antenna coupler designed for use with Sunair 9000 series equipment or their equivalent. The coupler is rated for 125 Watts PEP or average power, and will tune all common vehicular and ground based antenna systems 9 feet and longer. (For antennas shorter than 23 feet, duty cycle is limited to 5 minutes transmit, 5 minutes receive.) The tune command is generated by the Sunair 9000 series equipment with the depression of the 'CPLR TUNE' pushbutton. Completion of a successful tune is indicated by an LCD message on the front panel of the Sunair 9000 series equipment.

Memory is provided within the coupler for 128 channels to use with Transceivers/Exciters such as the RT-9000 Transceiver or the T-9400 Exciter that provide channel information to the coupler. This memory will be retained in the coupler for a minimum power off period of ten years.

#### 4.2 ANTENNA TUNING NETWORK

The antenna tuning network is basically an 'L' low pass circuit with additional shunt output capacitance, where required, to transform the network into a 'PI'. An additional capacitor is provided at the output of the network to allow tuning of inductive antennas. A block diagram of the CU-9125 is shown in Figure 4.1.

The input capacitor bank, located on the Input Board 2A2A1, Figure 5.12, and the Intermediate Board 2A2A2, Figure 5.13, consists of C1 through C11, and provides binary stepped values from 0 to 10293 picofarad (**pF**) steps. The series inductor bank, located on the Intermediate Board, Inductor Board 2A2A3, Figure 5.14, and the Output Board 2A2A4, Figure 5.15, and consisting of L1 through L11 and C12, provides binary stepped values from 0 to 21.8 microhenry (**μH**) steps. C12 is used at the higher frequencies to cancel out the coupler stray inductance. The output capacitor bank, located on the Output Board 2A2A4, consisting of C13 through C16, provides binary stepped values from 0 through 750 pF. The series phase correcting capacitor C17, is located on the Output Board.

Refer to page 4-2 for Figure 4.1; CU-9125, Antenna Coupler, Block Diagram.

#### 4.3 DETECTOR/PAD ASSEMBLY (2A4)

Refer to Figure 5.17 Detector/Relay Pad Assembly (2A4) Schematic.

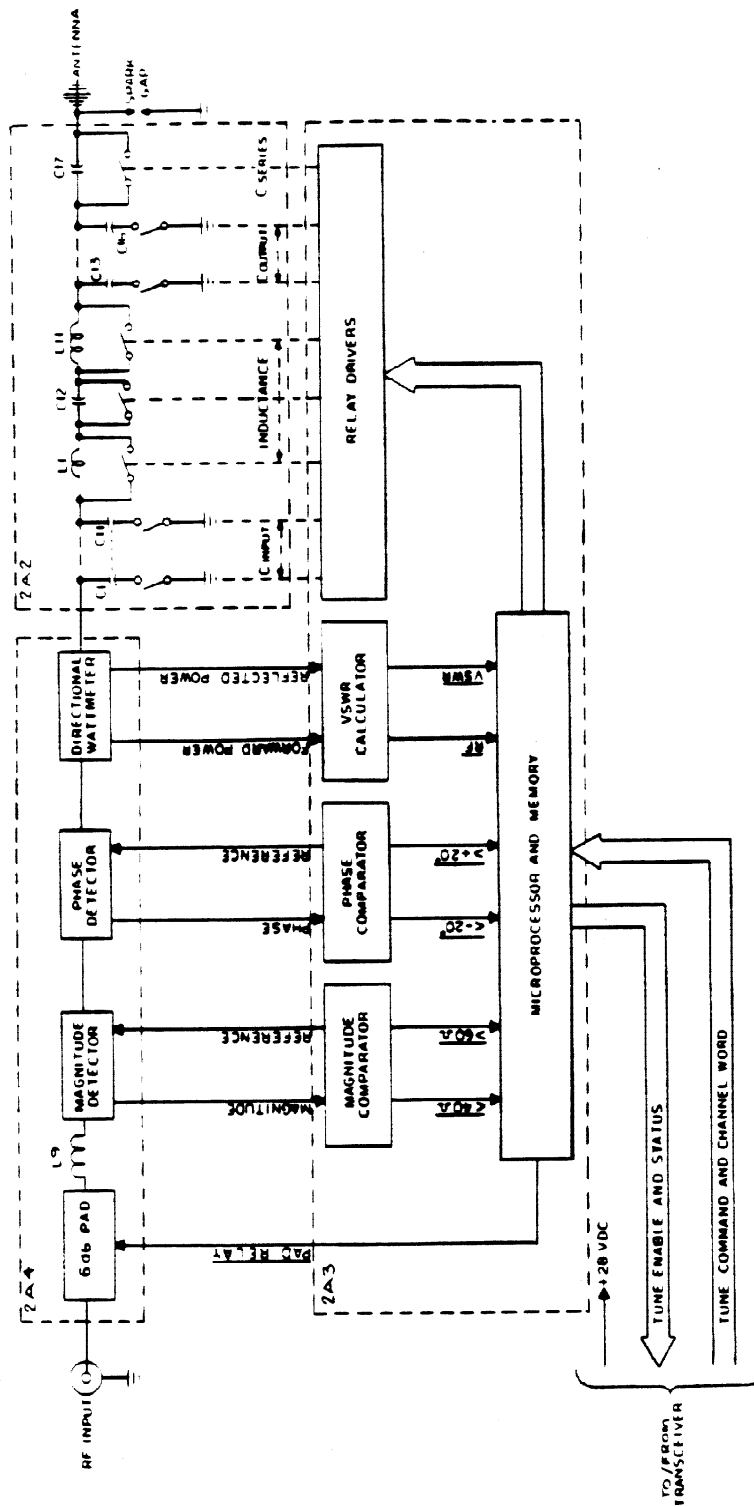


Figure 4.1 CU-9125, Antenna Coupler, Block Diagram.

### 4.3.1 GENERAL

The Detector/Pad Assembly contains the magnitude discriminator, the phase discriminator, the forward and reflected power detectors, the resistive pad network, the pad relay, and the tune relay.

### 4.3.2 MAGNITUDE DISCRIMINATOR

The magnitude discriminator consists of T1 and its associated components. It provides a means of measuring the relative magnitude of the transformed antenna impedance relative to 50 Ohms. For a magnitude greater than 50 Ohms, the magnitude discriminator produces an output voltage less than the +5 VDC reference voltage. For a magnitude less than 50 Ohms, an output greater than +5 VDC reference is produced. A voltage sample is provided from the transmission line by L1, C2, C3 and is rectified by CR2 to give a DC voltage proportional to the RF voltage on the line. A voltage proportional to the current in the transmission line is generated by transformer T1 and is rectified by CR3. Capacitor C2 is adjusted so that the voltage sample is exactly equal to the current sample when the transmission line is terminated with 50 Ohms resistance. The output of this discriminator is fed to differential amplifier U17B on the Computer Board Assembly 2A3, Figure 5.16. Note that the output of the magnitude discriminator is floating and is referenced to +5 VDC, not ground. So all measurements of the magnitude detector must be referenced to +5 VDC.

### 4.3.3 PHASE DISCRIMINATOR

The phase discriminator consists of transformer T2 and its associated components. It provides a means of measuring the relative phase angle at the input to the tuning network by comparing the phase of the line voltage with that of the line current. The discriminator output is zero when the transmission line voltage and current samples are in phase (pure resistance terminating the transmission line). The voltage sample is derived by C13, R10, C7, which shifts it in phase by 90°. The current sample is generated by transformer T2 and is in phase with the line current. The voltage sample is fed to T2 center tap, and the resulting output is detected by CR4, CR5 to produce a DC voltage proportional to the phase difference between the voltage on the transmission line and the current in the line. R12 is the phase discriminator balance control and is adjusted so the phase output is nulled (relative to +5 VDC) when the transmission line is terminated with a 50 Ohm non-inductive load.

The sensing of the phase discriminator is established to provide a positive output for inductive loads (positive phase angle) and a negative output for capacitive loads (negative phase angle). The output of this discriminator is fed to differential amplifier U17A on the Computer Board Assembly 2A3.

### 4.3.4 FORWARD AND REFLECTED POWER DETECTOR

The forward and reflected power detector consists of T3 and its associated components. The reflected power voltage sample obtained from C14, C15 is combined with the current sample obtained from T3, at CR6 to provide a DC voltage proportional to reflected RF power on the transmission line. This detector compares both phase and magnitude of the voltage and current samples. Its output is always one polarity, i.e., positive with respect to ground, and is a minimum when the coupler network has tuned the antenna to provide a 50 Ohm resistive load to the transceiver/exciter. C14 provides an adjustment to null the output when the transmission line is terminated with a 50 Ohm, non-reactive load.

The forward power voltage sample from C19, C17 is combined with the current sample from T3 at CR7 to provide a DC voltage proportional to forward power on the transmission line. It operates in much the same way as the reflected power detector, and its output is also positive with respect to ground, but maximum when the transmission line is terminated with a 50 Ohm, non-reactive load.

This output is used for (2) two functions:

- 1 - to tell the microprocessor when RF energy is present, and
- 2 - to provide a reference against which the reflected power is compared for the calculation of VSWR. The VSWR is used as an indication of the quality of the tune, and is acceptable for values of 2:1 or better.

#### **4.3.5 6 dB ATTENUATOR PAD ASSEMBLY**

The 6 dB attenuator consists of R1 through R6 and relay K1 and associated circuitry. It is switched between the coupler tuning network and the Transceiver/Exciter whenever the VSWR is greater than 2:1, and the Transceiver/Exciter is keyed. The pad provides protection for the Transceiver/Exciter by limiting the impedance variations placed on the Transceiver/Exciter during the tuning cycle. When a satisfactory tune has been accomplished, the pad is switched out of the circuit, allowing full transmit power to reach the antenna.

The Resistive Pad Subassembly 2A4A2, resistors R1 through R6, plugs into the Detector Board 2A4A1 to make up the Detector/Pad Assembly 2A4.

#### **4.3.6 TUNE RELAY**

The tune relay K2, is energized by the microprocessor following receipt of a tune command from the Transceiver/Exciter, and supplies a +28 VDC signal to the Transceiver/Exciter. This 'Tune Enable' signal is used in the transceiver/exciter to supply AM carrier for coupler tuning. When the tune cycle has been terminated, the tune relay is de-energized allowing normal keyline operation.

### **4.4 COMPUTER BOARD ASSEMBLY WITH SLEEP CIRCUIT**

Refer to Figure 5.16.

#### **4.4.1 GENERAL**

The Computer Board 2A3 combines the analog interface circuitry used to process the detector outputs for use by the microprocessor U1, with the microprocessor computer circuitry. The analog circuits are located on the left side of the board and consist of integrated circuits U17 through U22, U27, Q1, Q2, and their associated circuitry.

#### 4.4.2 PHASE DISCRIMINATOR INTERFACE

The phase discriminator interface consists of U17A, U18A, U18B, U20A and U20B. The phase discriminator output is compared with the +5 VDC reference voltage for magnitude and polarity in U17A. Potentiometer R6 and R61 determine the width of the output threshold 'window'. This window is adjusted to provide an output whenever the phase exceeds plus or minus 20 degrees. If the phase is positive and greater than 20 degrees, the discriminator output is positive, U17A output is positive, U18A output is positive, and U20A output is negative (ground), so a Low signal is sent to U5, RAM/IO/TIMER, on the PHASE > +20° line. Similarly, if the phase is negative and less than 20 degrees, an output from U17A, U18B, and U20B sends a Low signal to U5 on the PHASE < -20° line. Comparators U18A and U18B are used in conjunction with Schmitt triggers U20A and U20B to provide a toggle action to the phase commands, stabilizing the threshold limits. When the detected phase angle is within  $\pm 20^\circ$  of 0°, both the PHASE > +20° and PHASE < -20° lines are High, indicating to the microprocessor that the phase angle is within an acceptable 'window'.

#### 4.4.3 MAGNITUDE DISCRIMINATOR INTERFACE

The magnitude discriminator interface consists of U17B, U18C, U18D, U20C and U20D. The discriminator output is compared with the +5 VDC reference for magnitude and polarity, in U17B. Potentiometer R19 and R66 set the width of the magnitude window relative to 50 Ohms. The window is set to provide an output whenever the magnitude is greater than 60 Ohms or less than 40 Ohms. If the magnitude is greater than 60 Ohms, the discriminator output is negative, U17B output is negative, U18D output is positive and U20D output is negative, giving a Low on the MAG > 60 Ohm line to U5. The unaffected comparator, U18C in this case, provides a Low output to U20C, which in turn supplies a High to the MAG < 40 Ohm line. This way, only one output at a time may be Low, but both may be High, indicating to U5 that the magnitude is within an acceptable 'window'.

For magnitudes less than 40 Ohms, operation is similar to that described above, supplying a Low from U20C to the MAG < 40 Ohm line to U5.

#### 4.4.4 'RF PRESENT' DETECTOR

Transistor Q2 acts as a switch to provide a Low to microprocessor U1 on pin 5, whenever RF power is present at the coupler input. The transistor is turned on by a DC voltage from the forward RF power detector on the Detector/Pad Assembly 2A4. In order for U1 to continue its tuning program, the RF line must be held at a Low.

#### 4.4.5 VSWR COMPARATOR

Comparator U19A compares the relative magnitude of the forward and reflected power detectors to compute the VSWR. Potentiometer R43 will make this occur whenever the VSWR exceeds 2:1. Diode CR7 provides a reference to keep the VSWR line High between transmit speech pauses. Diode CR8 isolates the base circuit of Q2 from the voltage supplied by CR7. Diode CR16 isolates the reflected power detector on the Detector/Pad Assembly 2A4 from voltages generated by U19A circuitry.

U19C, U20F, U27C and U27D provide a High to microprocessor U1 on pin 9 when VSWR exceeds 2:1, U1 pin 9 is an interrupt input. This High awakens U1, permitting it to initiate a tune cycle to reduce the VSWR to an acceptable level. Normally U1 sleeps, keeping its DATA BUS and ADDRESS BUS quiet to eliminate any possible radiated BUS noise.

#### **4.4.6 REFLECTED POWER METER DRIVER**

U19B is used as a current source with a voltage gain of one to drive the Transceiver/Exciter meter proportionally to reflected power level.

#### **4.4.7 REFERENCE VOLTAGE SOURCES**

Voltage regulator U22 provides +10 VDC at TP1. Voltage divider R28 & R29 provides +5 VDC at TP2. These two voltages are used by the operational amplifiers and voltage comparators. Since plus and minus sensing is required, the reference 'ground' for U17A and U17B is established at +5 VDC. U18A, U18B, U18C, and U18D can compare the outputs of U17A and U17B to voltage thresholds set just above and below +5 VDC.

Zener Diode CR10 drops the voltage to the regulator from the supplied +28 VDC, to minimize power dissipation in the regulator.

#### **4.4.8 TUNE RELAY LATCH**

Transistor Q1 is used to provide a ground to the tune relay K2 on the Detector/Pad Assembly 2A4, energizing the relay and starting the tune cycle. A positive pulse turns Q1 on, pulling in the tune relay, and awakening microprocessor U1 to begin a tuning cycle. The microprocessor then sends a positive voltage back called TUNE LATCH to the base of Q1, keeping it on and the tune relay latched during the tune cycle. When the tune cycle is terminated, the voltage from the base is removed, Q1 no longer conducts, and the tune relay is de-energized.

#### **4.4.9 MICROPROCESSOR CIRCUITS**

##### **4.4.9.1 GENERAL**

The microprocessor circuit portion of the Computer Board is the 'brain' of the CU-9125. Here, all appropriate signals are monitored, decisions are made, and control commands are generated for controlling the capacitor and inductor steps. An algorithm, which determines the process by which the coupler elements are manipulated, to achieve the proper transformation of the antenna impedance to 50 Ohms resistive, is resident in the EPROM memory. Included in this section are the microprocessor U1, the address decoder U2 and U8, the address latch U3, the EPROM U4, the RAM/IO/TIMER U5, the output ports U6, U7, and U15, element drivers U9, U10, U11, U12, U13, storage memory EEPROM U14 and input buffer U16.

##### **4.4.9.2 MICROPROCESSOR U1**

The microprocessor U1 performs all of the required calculations from the information it receives from the discriminator and detectors, interrogates the program memory to determine the next logical step to take, and tells the element drivers which elements to connect in the RF circuit. When an acceptable tune condition has been found, i.e., both phase and magnitude signals are in their respective 'windows', U1 tells the pad and tune relays to drop out. U1 then stops all BUS activity and goes to sleep to eliminate any possible radiated BUS noise. U1, while sleeping, continuously monitors the 'CPLR TUNE' pushbutton, a channel change, and a VSWR fault condition. Any one of these conditions awakens U1 to take the proper action before going back to sleep. If a load cannot be tuned or a coupler failure occurs, a 'CPLR FAULT' indication will be displayed on the front panel of the Transceiver/Exciter. The coupler is also placed in a bypass mode (straight connection between input and the antenna), thus preventing loss of the receive path.

U23 establishes the clock frequency for U1 through a built-in oscillator circuit. Q5, R65, CR9, R63 and R64 form a power-on reset network to assure correct initialization of U1 upon application of power.

#### 4.4.9.3 ADDRESS DECODER U2

The address decoder consists of U2 and OR gates U8A, U8B, U8C, and U8D. These circuits take address codes supplied by U1 on A8-A15 and use them to enable the EPROM U4, the RAM/IO/TIMER U5, the storage memory unit U14, the output latches U6, U7 and U15, the channel update latch U25 and the input buffer U16. U1 uses the address decoder circuit to enable the proper device when it needs to transfer information.

EXAMPLE: The software in U4 requires the channel information to be sampled periodically. In order to do this U16, U25 and OR gate U8C must be addressed. U1 places an address on A8-A15 which causes Y5 pin 10 of U2 to go Low. With Y5 Low, U1 issues a Low read pulse on the RD line. At this time OR gate U8D has two Lows at its inputs, causing its output pin 11 to be a Low. This Low enables the transfer to channel information from the inputs of U16 to the DATA BUS. Once on the bus, U1 will proceed to process the information.

#### 4.4.9.4 ADDRESS LATCH U3

The address latch U3, separates the address information from the data on bus lines AD0 through AD7 from microprocessor U1. U3 is employed to produce continuous address information to U4 and U14. Each time U1 produces address information to the inputs of U3 via DATA BUS, U1 also produces a positive going pulse called ALE (Address Latch Enable). The ALE pulse latches the address information on the DATA BUS inputs to U3 through to U3's outputs. The address information is then latched on the output lines (ADDRESS BUS) and sent to the EPROM U4 to call up a specific memory location where the data requested by U1 is stored. This latching/information gathering sequence is repeated every time U1 needs to know the next step in the algorithm.

#### 4.4.9.5 ERASABLE PROGRAMMABLE READ ONLY MEMORY (EPROM) U4

The EPROM U4, contains the data bits which make up the program algorithm used by the microprocessor U1 to adjust the network elements which tune the antenna. Address information from AD0, AD7, and A8-A11 is sent to the EPROM U4, when U1 requires information for the execution of the next algorithm instruction stored in U4. U4 responds by placing the instruction from its internal memory onto the DATA BUS when U1 issues a brief LOW going read pulse on the RD line pin 32. U1 collects the instruction from the DATA BUS, analyzes it, then acts on the directions provided.

#### 4.4.9.6 INPUT PORT

Integrated circuit U5 contains the input port (Port C) to the microprocessor system. Through this port, the microprocessor U1 can call up information, giving it the status of the phase and magnitude discriminators and the VSWR detector.

U5, Magnitude and Phase Inputs:

There are six signals coming into integrated circuit U5, PHASE >+20°, PHASE <-20°, MAG >60 Ohm, MAG <40 Ohm, VSWR and TUNE command. Signals PHASE >+20°, PHASE <-20° are the phase discriminator interface outputs, and MAG >60 Ohm, MAG <40 Ohm, are the magnitude discriminator interface outputs (refer to sections 4.3.2 and 4.3.3). See Truth Tables below. These four signals direct U1 through the tuning algorithm program stored in the EPROM, U4. Truth tables for these signals follow:

|               | U5 Pin 1     | U5 Pin 39    |
|---------------|--------------|--------------|
|               | MAG > 60 OHM | MAG < 40 OHM |
| * Illegal     | 0            | 0            |
| >60           | 0            | 1            |
| <40           | 1            | 0            |
| In the window | 1            | 1            |

**Table 4.1** Magnitude Discriminator Truth Table.

\* Note that a Low indication in both signals is not possible as the magnitude cannot be both greater than 60 Ohms and less than 40 Ohms simultaneously.

|               | U5 Pin 38    | U5 Pin 37    |
|---------------|--------------|--------------|
|               | PHASE > +20° | PHASE < -20° |
| ** Illegal    | 0            | 0            |
| >+20°         | 0            | 1            |
| <-20°         | 1            | 0            |
| In the window | 1            | 1            |

**Table 4.2** Phase Discriminator Truth Table.

\*\* Note that a Low indication in both signals is not possible as the phase cannot be both positive and negative simultaneously. A Low on any of these signals indicates the true state.

The VSWR signal coming into U5 pin 2 is a product of the VSWR comparator (refer to section 4.4.5) and is used by U1 to determine a tune ready condition (High on VSWR line), once the magnitude and phase discriminators fall in the window during a tune cycle.

Channel Lines: Input Port U16:

There are eight channel lines coming into the CU-9125 in the form of inverted binary coded decimal (BCD) numbers representing channels 00 thru 127. Table 4.3 shows the Truth Table for channels 00-09.

| Channel Number | $\overline{\text{CH}}_{2^7}$ | $\overline{\text{CH}}_{2^6}$ | $\overline{\text{CH}}_{2^5}$ | $\overline{\text{CH}}_{2^4}$ | $\overline{\text{CH}}_{2^3}$ | $\overline{\text{CH}}_{2^2}$ | $\overline{\text{CH}}_{2^1}$ | $\overline{\text{CH}}_{2^0}$ |
|----------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| 00             | 1                            | 1                            | 1                            | 1                            | 1                            | 1                            | 1                            | 1                            |
| 01             | 1                            | 1                            | 1                            | 1                            | 1                            | 1                            | 1                            | 0                            |
| 02             | 1                            | 1                            | 1                            | 1                            | 1                            | 1                            | 0                            | 1                            |
| 03             | 1                            | 1                            | 1                            | 1                            | 1                            | 1                            | 0                            | 0                            |
| 04             | 1                            | 1                            | 1                            | 1                            | 1                            | 0                            | 1                            | 1                            |
| 05             | 1                            | 1                            | 1                            | 1                            | 1                            | 0                            | 1                            | 0                            |
| 06             | 1                            | 1                            | 1                            | 1                            | 1                            | 0                            | 0                            | 1                            |
| 07             | 1                            | 1                            | 1                            | 1                            | 1                            | 0                            | 0                            | 0                            |
| 08             | 1                            | 1                            | 1                            | 1                            | 0                            | 1                            | 1                            | 1                            |
| 09             | 1                            | 1                            | 1                            | 1                            | 0                            | 1                            | 1                            | 0                            |

**Table 4.3** Truth Table BCD Channels.

The Truth Tables are utilized by the Coupler when the Transceiver/Exciter supplying channel information. Each one of the channels is then assigned a memory location. These memory locations will contain the tune settings (i.e. the relay settings in the coupler network) for the channels and a code indicating that particular channel has valid settings. If a channel change occurs, U26 detects this function and awakens U1. U1 then fetches the new tune combination from its channel memory location and configures the coupler network accordingly before returning to sleep.

#### 4.4.9.7 OUTPUT PORTS

The Output Ports U5 (Port A and B), U6, U7, and U15, are used in conjunction with element drivers U9, U10, U11, U12, and U13 to energize the appropriate relays or generate command signals.

To understand how U1 performs an output operation, consider what is involved in enabling the 'READY' line. U1 issues an address on lines A8-A15, causing U2 output Y2 pin 13 to go Low. With Y2 Low, U1 issues a code onto the DATA BUS, placing a High on line AD5 pin 17. U1 also issues a short duration Low going write pulse on the WR line pin 31. OR gate U8A's Low inputs cause it to have a Low out on pin 3 to pin 11 of U6. The Low on U6 pin 11 clocks the information from the DATA BUS through U6 into Relay Driver U11, thus initiating the 'READY' line out of CU-9125.

#### 4.4.9.8 TIMER

The timer resides within U5 and, in conjunction with U1, acts as a stopwatch beginning at the initiation of the TUNE command. It is programmed to stop the microprocessor program and turn on the 'FAULT' line if a satisfactory tune is not accomplished within ten seconds. The timer is reset whenever a new tune command is received. If a proper tune is achieved, the timer is disabled, and the 'READY' line is enabled.

The timer is programmed at power up and receives its basic timing information from microprocessor U1. U1 continuously issues a signal called CLK OUT on pin 37. The timer in turn issues a brief Low going pulse on TIMER OUT pin 6 of U5, which clocks U1. As a tune cycle is initiated, U1 keeps sampling this line and uses it to stop the tune cycle if a satisfactory tune is not achieved within 10 seconds, then activates the 'FAULT' line. If a proper tune is achieved, U1 stops sampling the TIMER OUT signal which is continuously issued by U5, and sends the READY line enable.

#### 4.4.9.9 RANDOM ACCESS MEMORY (RAM)

The RAM, also a part of U5, provides an area of temporary storage which U1 uses as a 'scratch pad' when making its calculations. When the microprocessor needs to store information in RAM, U1 issues a code on lines A8-A15. This code makes output Y1 pin 14 of U2 go Low. While Y1 is Low, U1 will issue a Low on the IO/M line, the code it wants stored in RAM on the AD0-AD7 lines and a Low going write pulse on the WR line.

#### 4.4.9.10 ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) U14

Long term storage of coupler element settings by channel is handled by the non-volatile memory in U14. If the Transceiver/Exciter has the capability of supplying channel number (in BCD format) to the coupler, the coupler element settings, when tuned, will be stored in this memory in a location corresponding to the selected channel. Memory capacity is 128 channels. This provides extremely fast tuning, on the order of 10 ms, or less.

### 4.5 CHASSIS ASSEMBLY (2A1)

#### 4.5.1 GENERAL

The Chassis Assembly contains the RF Assembly 2A2 and the Motherboard 2A1A1.

#### 4.5.2 RF ASSEMBLY (2A2)

##### 4.5.2.1 GENERAL (Refer to Figures 5.12, 5.13, 5.14, and 5.15)

- a). Input Board 2A2A1 (Figure 5.12).  
The Input Board contains input capacitors C2, C3, C5, C8, C9, C10, C11 and their respective switching relays.
- b). Intermediate Board 2A2A2 (Figure 5.13).  
The Intermediate Board contains input capacitors C1, C4, C6, and C7, inductors L1, L2, L3, L4, L5 and their respective switching relays.

- c). Inductor Board 2A2A3 (Figure 5.14).  
The Inductor Board contains inductors L6, L7, L8, L9, L10, stray inductance cancelling capacitor C12, and their respective switching relays.
- d). Output Board 2A2A4 (Figure 5.15).  
The Output Board contains inductor L11, output capacitors C13, C14, C15, and C16, series phase-cancelling capacitor C17, and their respective switching relays.

#### 4.5.2.2 THEORY OF OPERATION

The four boards comprising the RF assembly contain all of the variable elements in the antenna matching network. The basic network is a low pass 'L' with the capability of adding shunt output capacitance, transforming the network to a low pass 'P'. In addition, a series capacitor is available at the output of the network to aid in tuning inductive antennas. Input capacitance is available in approximately 10 pF steps from 0 to 10293 pF (C1 through C11), selected in a binary progression. The series inductance, L1 through L11, is also binary progression, and is available in .01  $\mu$ H steps from 0 to 21.8  $\mu$ H. The output capacitance, C13 through C16, is also a binary progression and furnishes values from 0 to 750 pF in 50 pF steps. The output series capacitor, C17, is selected whenever the initial load phase angle is positive. Capacitor C12 is used at the higher frequencies to cancel out the stray coupler inductance, allowing full use of the small inductance steps available. The switching relays are high speed, where on or off transitions are made in approximately one millisecond. This allows the microprocessor 2A3U1 to make decisions very rapidly, providing extremely fast tuning time, typically less than one second.

#### 4.5.3 MOTHERBOARD (2A1A1)

Refer to Figure 5.11.

The Motherboard serves as an interconnection plane between the RF Assembly 2A2, the Computer Board 2A3, the Detector/Pad Assembly 2A4 and the coupler front panel. Transistor Q1 grounds the TUNING line during a coupler tune sequence. U1 is the primary +5 VDC regulator supplying power to the Computer Board 2A3. It is mounted on the coupler sheet metal chassis for heat sinking, and plugs into the motherboard. Figure 5.10 shows the Front Panel wiring diagram.

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## SECTION V

### ALIGNMENT

#### 5.1 GENERAL

This section provides test procedures and evaluation of overall performance for the CU-9125 Automatic Digital Antenna Coupler. A Fault Analysis Table is included to aid the repairman in isolating a fault to the defective module or subassembly.

#### 5.2 PREVENTIVE MAINTENANCE

Reduce the effects of salt air and salt water to the front panel and case of the CU-9125.

When CU-9125 Coupler is installed in a harsh environment (i.e. salt air/salt water), the following preventive maintenance procedures should be accomplished:

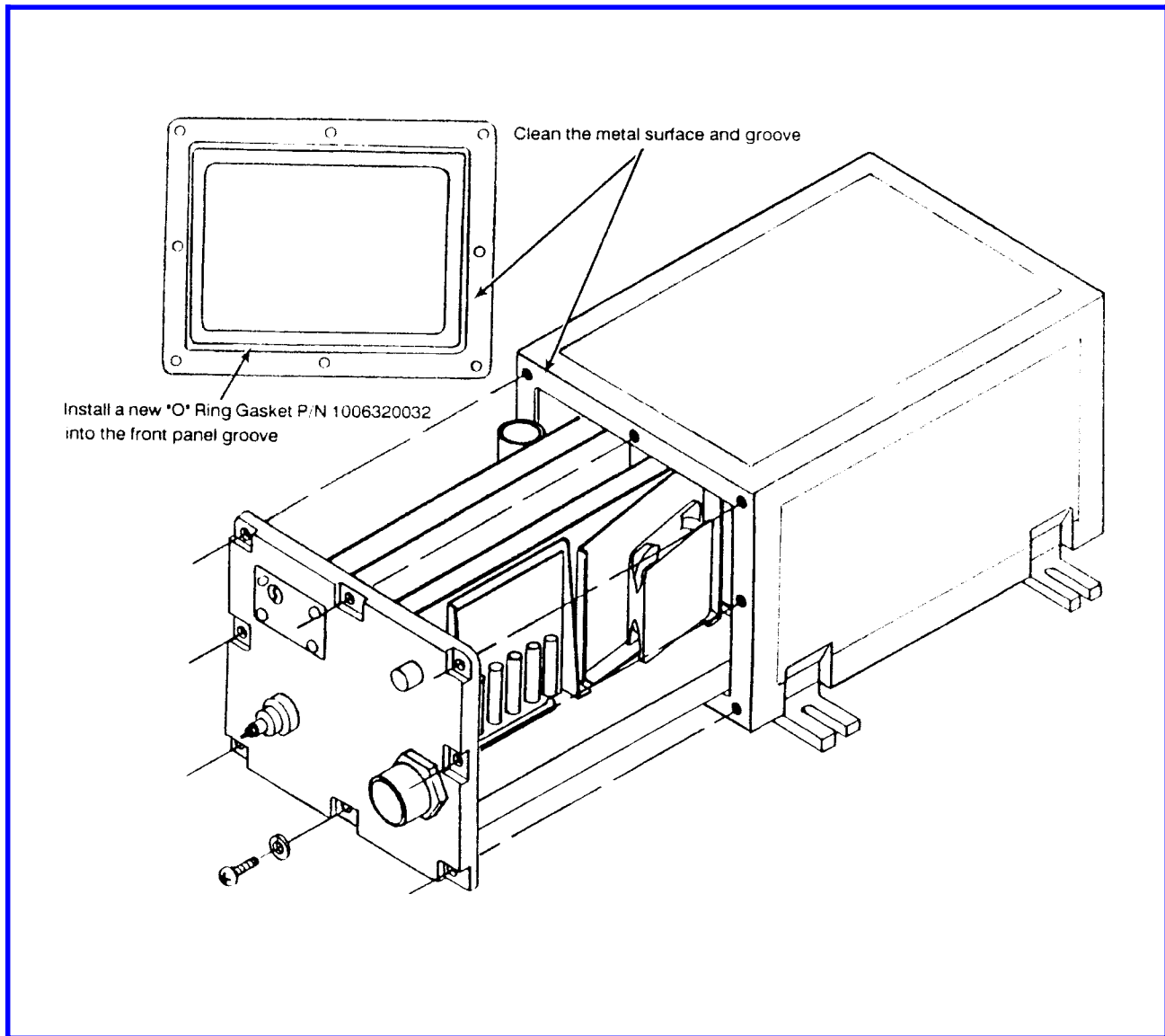
1. The complete outside of the coupler unit should be washed with fresh water every two (2) weeks.
2. Once a year open the coupler unit and remove the old gasket. Clean the metal surface and groove in the front panel. Clean the metal mating surface on the case. Install a new "O" Ring Gasket P/N 1006320032 into the front panel groove and reassemble coupler unit. See Figure 5.1.
3. Anytime the coupler unit is opened a new "O" Ring Gasket should be installed prior to reassembling the coupler unit.

#### 5.3 INSPECTION

If the CU-9125 has the case removed for maintenance, a visual inspection should be performed and the resultant corrective action should be taken as follows:

1. Inspect chassis for loose or missing mounting hardware, deformation, damaged fasteners, or damaged connectors. Replace all damaged parts.
2. Inspect connectors for broken parts; check insulation for cracks; and check the pins for damage, misalignment, or bad plating. Carefully realign pins when possible; or, if connectors are otherwise severely damaged, replace connector. Check for loose, or poorly soldered connections to terminals or connectors. Tighten or solder as required.
3. Inspect wiring of chassis and subassemblies for any signs of physical damage or charring. Any damaged wires must be replaced.
4. Inspect for leaky, blistered, charred, or cracked capacitors, resistors, or diodes. Check for loose or corroded terminal connections. Obviously damaged components should be replaced.

5. Inspect for cold soldered or resin joints. Bad joints can be recognized by a dull, porous appearance. Resolder.
6. Antenna coupler cover removal:
  - a. Remove the 8 Phillips' head screws.
  - b. Slide the unit out of the case.



**Figure 5.1** CU-9125 Antenna Coupler Cover Removal.

## 5.4 REPAIR OR REPLACEMENT

The repair or replacement of damaged and defective parts usually involves standard service techniques. Carefully examine the equipment to determine the correct technique required to effect the repair.

### 5.4.1 GENERAL PRECAUTIONS

- a) Perform repairs and replace components with power disconnected from unit.
- b) Replace connectors, shielded conductors, and twisted pairs only with identical items.
- c) Reference to component side of a printed circuit board means the side on which the majority of components are located; solder or circuit side refers to the other side.
- d) When repairing circuits, carefully observe lead dress and component orientation. Keep leads as short as possible and observe correct repair techniques.
- e) Observe cable routing prior to disassembly to enable the proper reinstallation of cabling during reassembly procedures.
- f) If component is defective beyond any reasonable doubt, remove and replace according to the procedures given in paragraph 5.4.4. If there is some doubt about the condition of a component, or if it is being removed for troubleshooting, remove it according to the procedures in paragraph 5.4.4.

### 5.4.2 CIRCUIT CARD ASSEMBLY, TWO-LEAD COMPONENT REMOVAL

(RESISTORS, CAPACITORS, DIODES, ETC.)

- a) Inspect solder side of component to determine if the leads were bent over prior to soldering. If they weren't, proceed to Step b. If they were, melt the solder and remove it with a desoldering tool, then straighten the leads and remove the component.
- b) Heat one lead from component side of board until solder flows and lift one lead from board; repeat for other lead and remove component (note orientation).
- c) Melt solder in each hole and using desoldering tool, remove solder from each hole.
- d) Dress and form leads of replacement component; insert leads into correct holes.
- e) Solder in place and clip leads on solder side of board.

### 5.4.3 CIRCUIT CARD ASSEMBLY, MULTI-LEAD COMPONENT REMOVAL

(IC's, etc.)

- a) Remove component by clipping each lead along both sides. Clip off leads as close to component as possible. Discard component.
- b) Heat hole from solder side and remove clipped lead from each hole.
- c) Melt solder in each hole and using a desoldering suction tool, remove solder from each hole.

- d) Insert replacement component, observing correct orientation.
- e) Solder component in place from solder side of board. Avoid solder runs. No solder is required on contacts where no track exists.

#### **5.4.4 REMOVAL OF COMPONENTS OF DOUBTFUL CONDITION**

- a) To remove components that are not heat sensitive melt the solder and remove it with a desoldering tool, then remove the component.
- b) To remove components that are heat sensitive, such as diodes, transistors, and IC's, connect a heat sink to the lead between the body of the component and the solder joint, melt and remove the solder. Repeat for all leads of the component, then remove the component. Apply heat to the lead for the minimum amount of time necessary to remove the solder. When working with IC's, start at one corner, then go to the lead farthest away, then back to where you started, etc....(Example: pins 1, 8, 14, 7,...) This is to keep heat buildup to a minimum. Remember that some solid state devices are extremely heat sensitive; and even though maximum care is exercised during their removal, they may still be destroyed by the removal procedure.
- c) To install a heat sensitive component, use a heat sink and the sequence outlined above to prevent heat from destroying the component.

### **5.5 PERFORMANCE TEST**

The following tests will aid in determining specific problems.

#### **5.5.1 TEST EQUIPMENT**

The following test equipment or equivalent is required to perform the test procedures outlined in this section.

1. Exciter/Transceiver
2. 35 ft. Whip Antenna Simulator, Model TS-100 Sunair P/N 8084001094
3. 'THRULINE' Wattmeter: Bird Model 43 with 100 Watt 2-30 MHz element
4. VOM: Simpson 260 (20k Ohm/Volts)
5. Digital Multimeter: H.P. Model 3476A
6. Oscilloscope: Tektronix 2445
7. Frequency Counter: Systron Donner Model 6242A
8. PC Assy, Detector Extender Board Sunair P/N 8085165091
9. Coaxial Resistor: Bird Model 8135, 50 Ohm, 150 Watt

## 5.5.2 PRELIMINARY

Connect Transceiver/Exciter, Antenna Coupler, and Test Equipment as shown in Figure 5.4, Antenna Coupler Test Set Up.

- a) Set the Transceiver/Exciter's switches and controls to the positions shown below and turn on.

| SWITCH OR CONTROL       | POSITION    |
|-------------------------|-------------|
| 'FREQUENCY'             | 1.60000 MHz |
| 'VOLUME' Control/On/Off | On          |
| 'SQUELCH' Control       | Off         |

- b) The Transceiver/Exciter display will alternately display 'COUPLER UNTUNED'. Depress the 'CPLR TUNE' pushbutton. The Thruline Wattmeter should indicate 30 to 35 Watts of forward RF power while the coupler is tuning. The Transceiver/Exciter will display 'COUPLER TUNING' and then 'SYSTEM READY' and the coupler should be tuned. The Thruline Wattmeter should show no forward RF power after the tune cycle is completed.

- c) Set mode to CW and key the Transceiver/Exciter with CW key switch. Check the forward and reflected power on the Thruline Wattmeter. An acceptable tune should show 70 to 125 forward Watts and 2.8 to 5.1 reflected Watts maximum. See chart below:

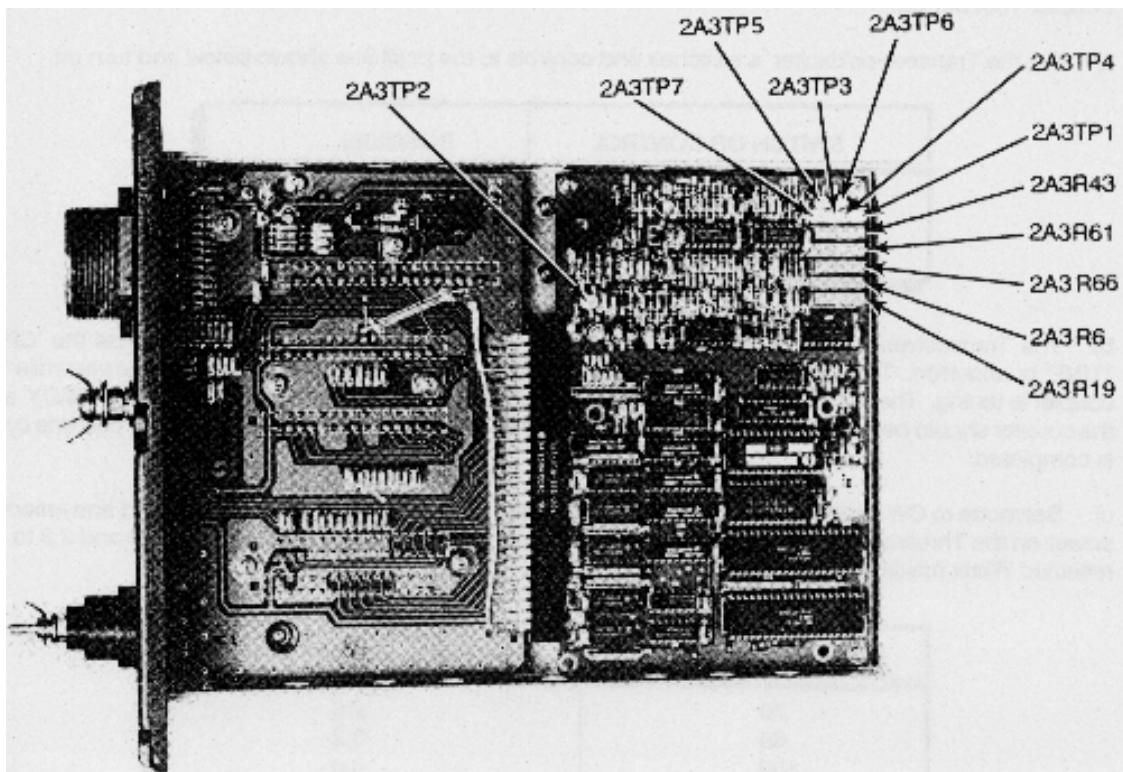
| FORWARD WATTS | REFLECTED WATTS MAXIMUM |
|---------------|-------------------------|
| 70            | 2.8                     |
| 80            | 3.2                     |
| 100           | 4.0                     |
| 110           | 4.4                     |
| 125           | 5.1                     |

Acceptable Reflected Power Chart for VSWR 1.5:1.

- d) Set the Transceiver/Exciter to the following frequencies and tune the coupler. Using the CW key switch check the forward and reflected power of each frequency to see if they fall within the parameters given in the preceding paragraph.

|            |            |             |
|------------|------------|-------------|
| 1.9900 MHz | 4.6000 MHz | 12.6000 MHz |
| 2.6000 MHz | 6.6000 MHz | 25.6000 MHz |
| 3.6000 MHz | 9.6000 MHz | 29.9900 MHz |

**NOTE:** If upon completion of the Performance Test Procedures, the CU-9125 is not operating properly, accomplish the following alignment procedures. Remove Antenna Coupler from case, see Figure 5.1.



**Figure 5.2** CU-9125, Computer Board Test Points and Adjustment Locations.

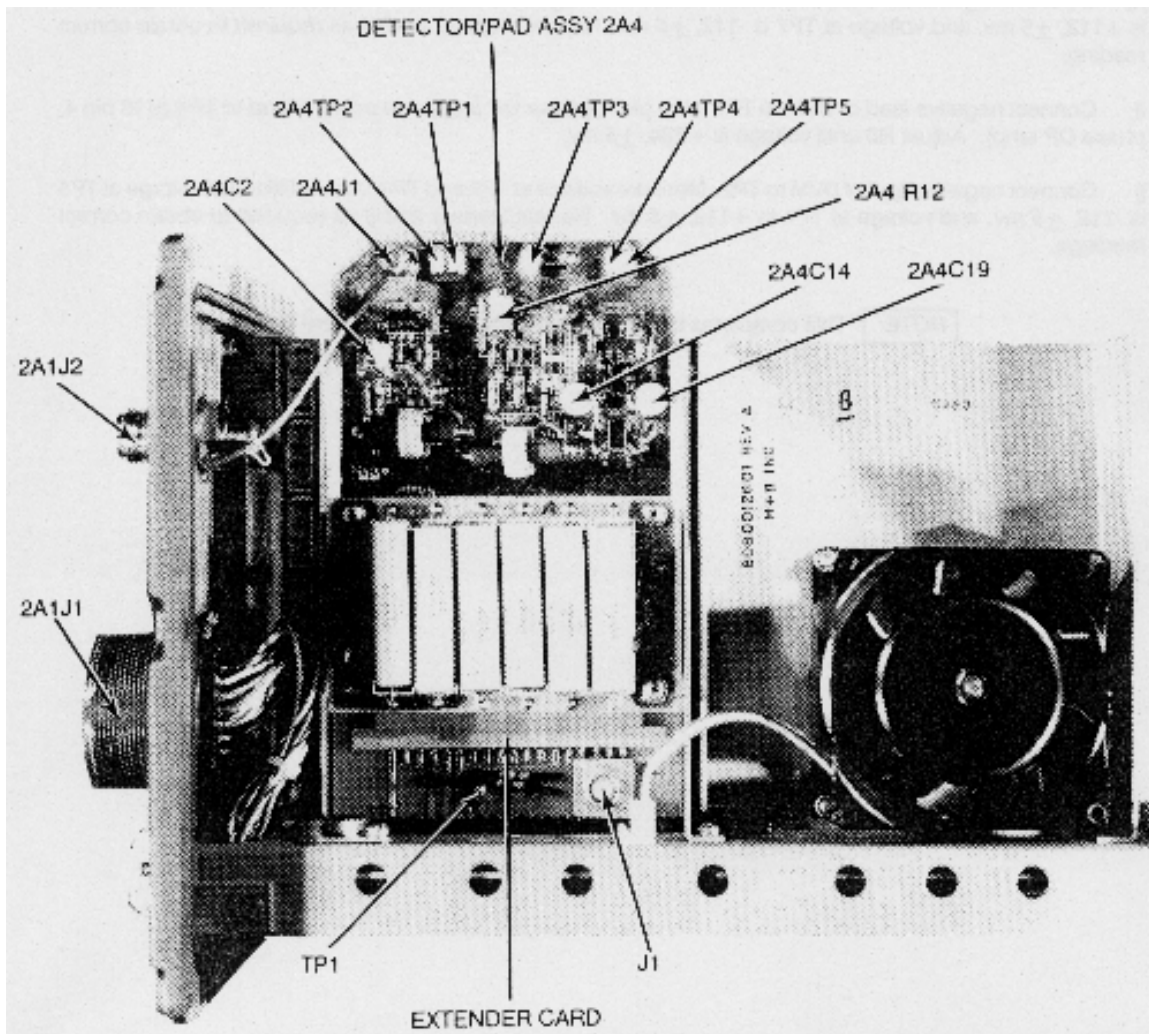
### 5.5.3 CU-9125, ALIGNMENT PROCEDURE for COMPUTER BOARD ASSEMBLY (2A3)

**NOTE:** All measurements and adjustments are accomplished on the Computer Board (2A3). (See Figure 5.2).

- a) Turn on the Exciter/Transceiver. (It is necessary to supply power to the coupler).
- b) Connect negative lead of DVM to ground. Set meter scale to read +10 VDC.
- c) Measure voltage at TP1 (U22 pin 3+10VDC regulator); should read +10.5,  $\pm$ .5 VDC.

- d) Connect negative lead of DVM to ground. Set meter scale to read +5 VDC.
- e) Measure voltage at TP2 (junction of voltage divider R28 and R29) should read +5.25,  $\pm 5$  VDC.
- f) Measure voltage at TP3 (U19 pin 4, VSWR OP amp). Adjust R43 until voltage is +1.75,  $\pm 05$  VDC.
- g) Connect negative lead of DVM to TP7 (U18 pin 11 magnitude OP amp). Set meter scale to read 200 mv. Connect positive lead to TP6 (U18 pin 8 magnitude OP amp). Adjust R19 until voltage is +224,  $\pm 5$  mv.
- h) Connect negative lead of DVM to TP2. Measure voltage at TP6 and TP7. Adjust R66 until voltage at TP6 is +112,  $\pm 5$  mv, and voltage at TP7 is -112,  $\pm 5$  mv. Repeat steps g) and h) as required to obtain correct reading.
- i) Connect negative lead of DVM to TP5 (U18 pin 7, phase OP amp) and positive lead to TP4 (U18 pin 4, phase OP amp). Adjust R6 until voltage is +224,  $\pm 5$  mv.
- j) Connect negative lead of DVM to TP2. Measure voltage at TP5 and TP4. Adjust R61 until voltage at TP5 is -112,  $\pm 5$  mv, and voltage at TP4 is +112,  $\pm 5$  mv. Repeat steps i) and j) as required to obtain correct readings.

**NOTE:** This completes the alignment of the Computer Board Assembly.



**Figure 5.3** CU-9125 Detector/Pad (2A4) and Extender Card Test Points and Adjustment Locations.

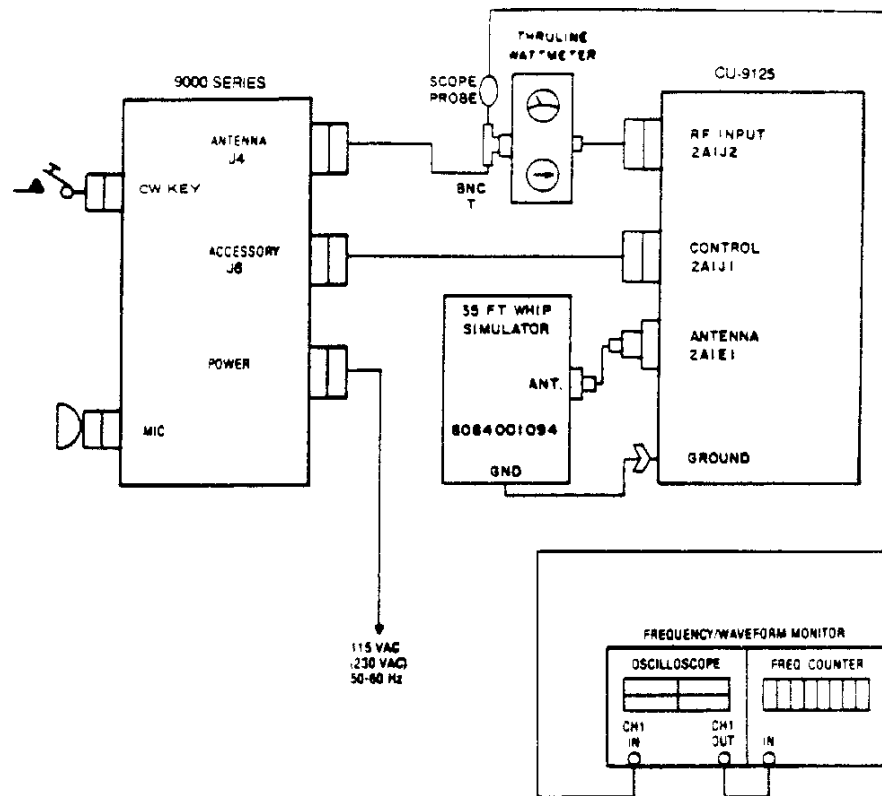
### 5.5.4 ALIGNMENT PROCEDURE for DETECTOR/RELAY PAD ASSEMBLY (2A4)

Connect Transceiver/Exciter, Antenna Coupler and Test Equipment as shown in Figure 5.4 Detector/Relay Pad Alignment Set Up. Install Detector/Relay Pad Assembly (2A4) on card extender (Sunair P/N 8085165091). (See Figure 5.3).

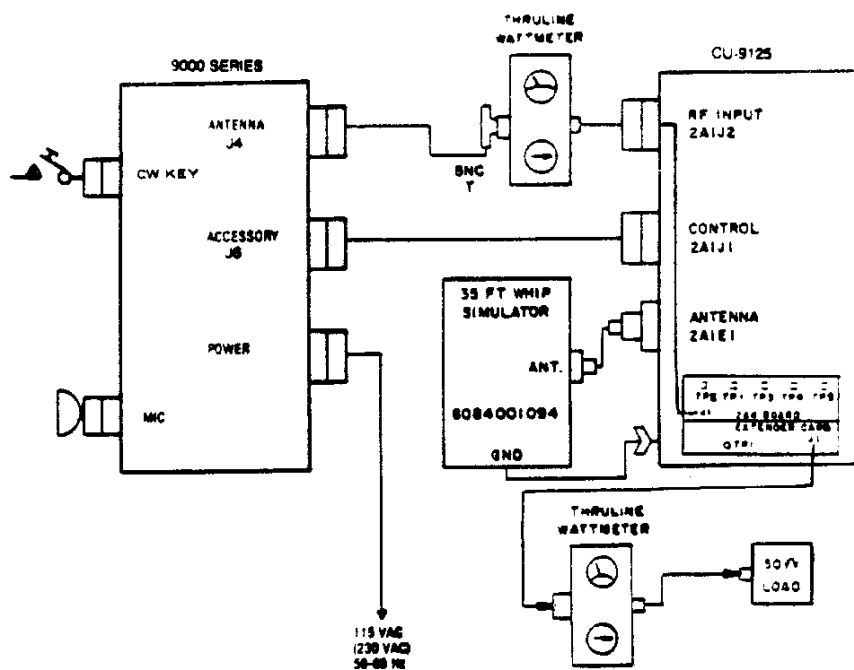
**NOTE:** All measurements and adjustments are accomplished on the 2A4 board. See Figure 5.3 for Test Point and Adjustment Locations.

- a) Turn on Transceiver/Exciter (it is necessary to supply power to the coupler). Set Transceiver/Exciter frequency to 29.6050 MHz and select 'AM' mode.
- b) Key the Transceiver/Exciter with the microphone PTT key switch. Power shown on Thruline Wattmeter connected to Transceiver/Exciter output will display 40 to 50 Watts. Thruline Wattmeter connected to J1 on Detector/Relay Pad extender card output will display 40 to 50 Watts. Ground TP1 on extender card, Transceiver/Exciter output should still display 40 to 50 Watts, but extender card output should drop to 10 to 12 Watts. This verifies that the 6 dB pad is operating. Example: 40 Watts without the pad divided by 4 equals 10 Watts with the pad energized. Unkey the Transceiver/Exciter and remove the ground from TP1.
- c) Connect common lead of DVM to ground. Connect positive lead of DVM to TP4 (Reflected Power). Key the Transceiver/Exciter with the microphone PTT key switch. AM power of 40 to 50 Watts will now be displayed on the two (2) Wattmeters. The DVM will display a positive voltage. Adjust C14 for .000 to +.050 VDC reading on DVM. Momentarily disconnect coax cable to the 50 Ohm load. Observe on DVM a positive change to 3.0 VDC or higher. If not, detector is not working and needs troubleshooting and repair. Reconnect cable to load. DVM should return to adjusted reading, unkey Transceiver/Exciter.
- d) Connect common lead of DVM to TP2 (+5 VDC Reference) and connect positive lead to TP1 (Magnitude Detector). Key Transceiver/Exciter with microphone PTT key switch. AM power of 40 to 50 Watts will be displayed on the two (2) Wattmeters. Adjust C2 for .000 to .050 VDC reading on DVM. Momentarily disconnect coax cable to the 50 Ohm load. Observe DVM, a change should be seen. If not, the detector is not working and should be troubleshot and repaired. Reconnect cable to load. DVM will return to adjusted reading, unkey Transceiver/Exciter.
- e) Leave common lead of DVM connected to TP2 (+5 VDC Reference) and move positive lead to TP3 (Phase Detector). Key Transceiver/Exciter with microphone PTT key switch. AM power of 40 to 50 Watts will be displayed on the two (2) Wattmeters. Note the DVM reading at 29.90000 MHz. Step in MHz increments to 1.60500 MHz, noting the DVM reading at each step, to get the maximum positive and negative voltage reading. Adjust R12 as needed until maximum positive and negative voltage at TP3 are equal and the magnitude of the voltage does not exceed .050 VDC. Momentarily disconnect coax cable to 50 Ohm load. A change in the DVM reading should be seen. If not, detector is not working and needs troubleshooting and repair. Reconnect cable to load. DVM should return to adjusted reading, unkey Transceiver/Exciter.
- f) Reverse coax cable connections at 2A1J2 and J1 on extender card; this will send the RF in reverse through 2A4 circuitry. Connect common lead of DVM to ground and connect positive lead to TP5 (RF Detector FWD). Key the Transceiver/Exciter with microphone PTT key switch. AM power of 40 to 50 Watts will be shown on the two (2) Thruline Wattmeters. The DVM will display a positive voltage. Adjust C19 for .000 to +.050 VDC. Momentarily disconnect coax cable to 50 Ohm load. Observe on DVM a positive change to 2.0 VDC or higher. If not, detector is not working and needs troubleshooting and repair. Reconnect cable to load. DVM will return to adjusted reading, unkey Transceiver/Exciter and turn off. Remove card extender and reinstall 2A4.

**NOTE:** This completes the alignments for the Computer Board (2A3) and the Detector/Relay Pad (2A4). Re-perform the Tests outlined in Section 5.5.2, Antenna Coupler Performance Test. If Antenna Coupler still fails the tests in Section 5.5.2, go to Tables 5.1 and 5.2, isolate and repair the problem.



ANTENNA COUPLER TEST SET UP

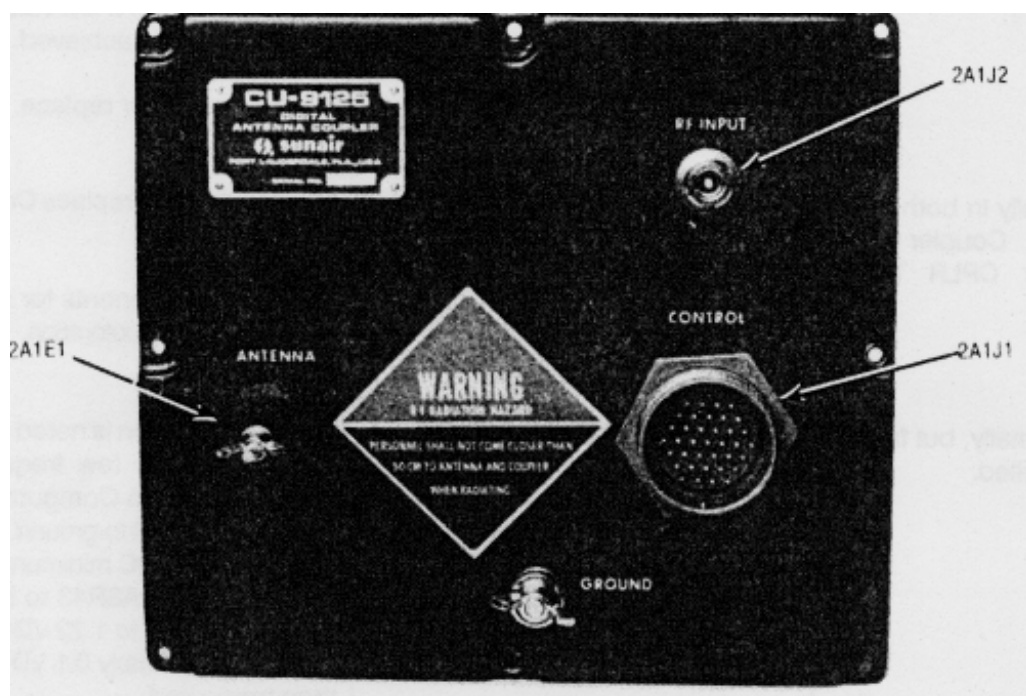


DETECTOR/RELAY PAD ALIGNMENT SET UP

Figure 5.4 Coupler Test.

**Table 5.1** Fault Analysis.

| SYMPTOM                                                                                                              | POSSIBLE TROUBLE                                                                                                                                                                       | CHECKS AND CORRECTIVE ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No meter readings in FWD or REF position, coupler faults 10 seconds after CPLR TUNE command.                         | a. No RF output from 9000 Series Exciter/Transceiver.                                                                                                                                  | a. Defective Exciter/Transceiver.<br>b. Defective Detector Assy, 2A4. Align, repair or replace.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Meter reads normally in FWD position. No reading in REF position. Coupler faults 10 seconds after CPLR TUNE command. | a. No RF to coupler.<br><br>b. Coupler Detector Board 2A4, defective.                                                                                                                  | a. Check coax cable and connectors between exciter/transceiver and coupler. Meter in REF position should read greater than zero during TUNE, dipping to a low value when coupler TUNE is achieved.<br>b. Align, repair or replace.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Meter reads normally in both FWD and REF positions. Coupler faults 10 seconds after CPLR TUNE command.               | a. Computer Board 2A3, defective.<br>b. Defective component on RF Assembly 2A2.                                                                                                        | a. Align, repair or replace Computer Board 2A3.<br>b. Check components for damage and/or severe discoloration. Replace as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Coupler tunes normally, but faults when 125 W is applied.                                                            | a. VSWR trip point set too low.<br><br>b. Internal high voltage breakdown.<br><br>c. Loose antenna or ground connection, or corrosion.<br><br>d. Defective internal ground connection. | a. If fault condition is noted on more than just a very few frequencies, check voltage on Computer Board 2A3 test point TP3 to ground. Voltage should be 1.7 VDC minimum. Adjust VSWR control 2A3R43 to increase voltage reading to 1.72 VDC or to a value approximately 0.1 VDC higher than measured.<br>b. Observe coupler tune in darkened area and look for breakdown on Output Board 2A2A4 or Inductor Board 2A2A3. Repair or replace defective component.<br>c. Check antenna and ground connections for tightness and freedom from corrosion.<br>d. (1) Check all Motherboard 2A1A1 and RF Assembly 2A2 ground screws for tightness.<br>(2) Check Computer Board 2A3 connectors for clean connector contacts. Clean or replace. |



**Figure 5.5** Major Assembly and Component Locations (Front View).

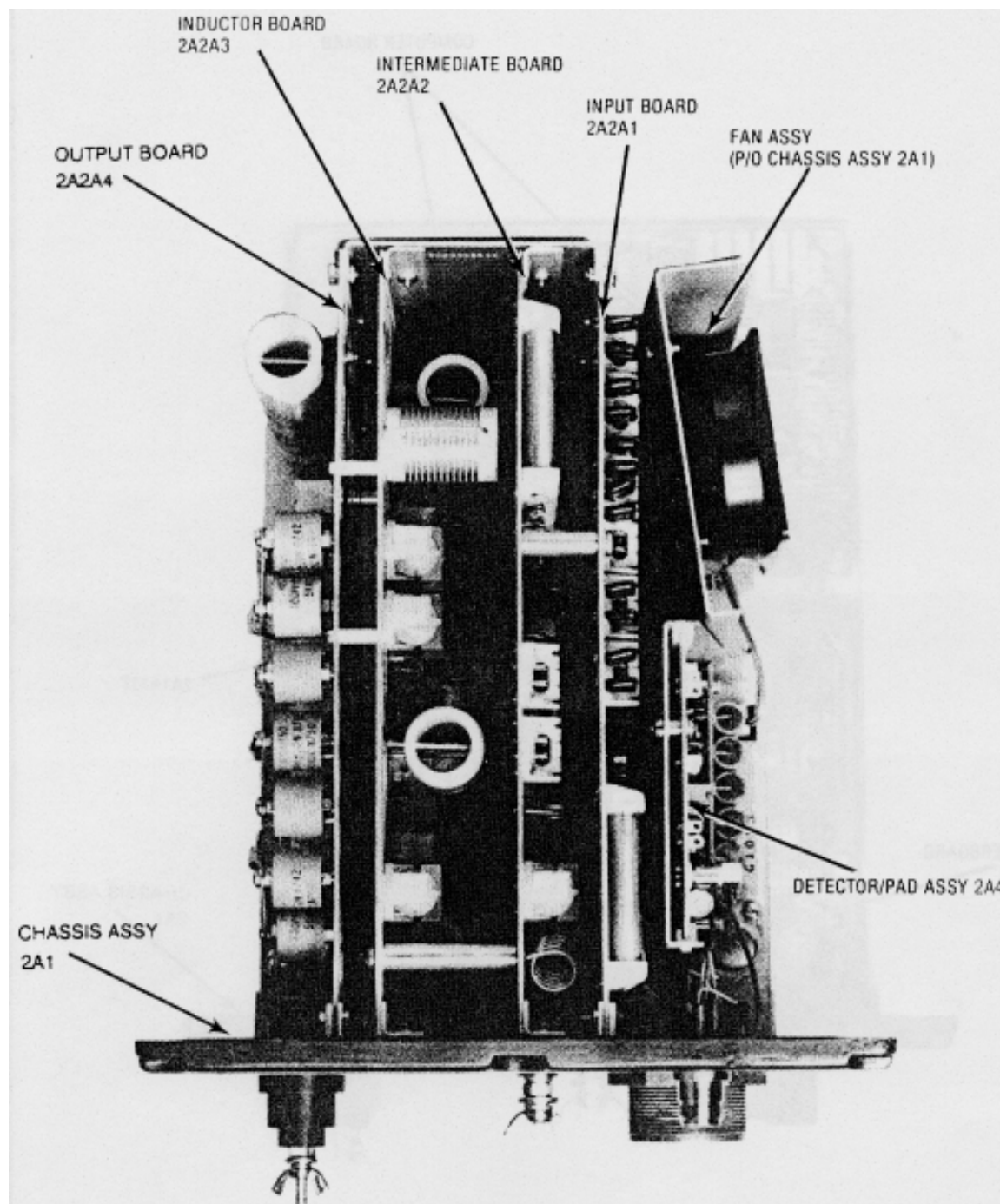
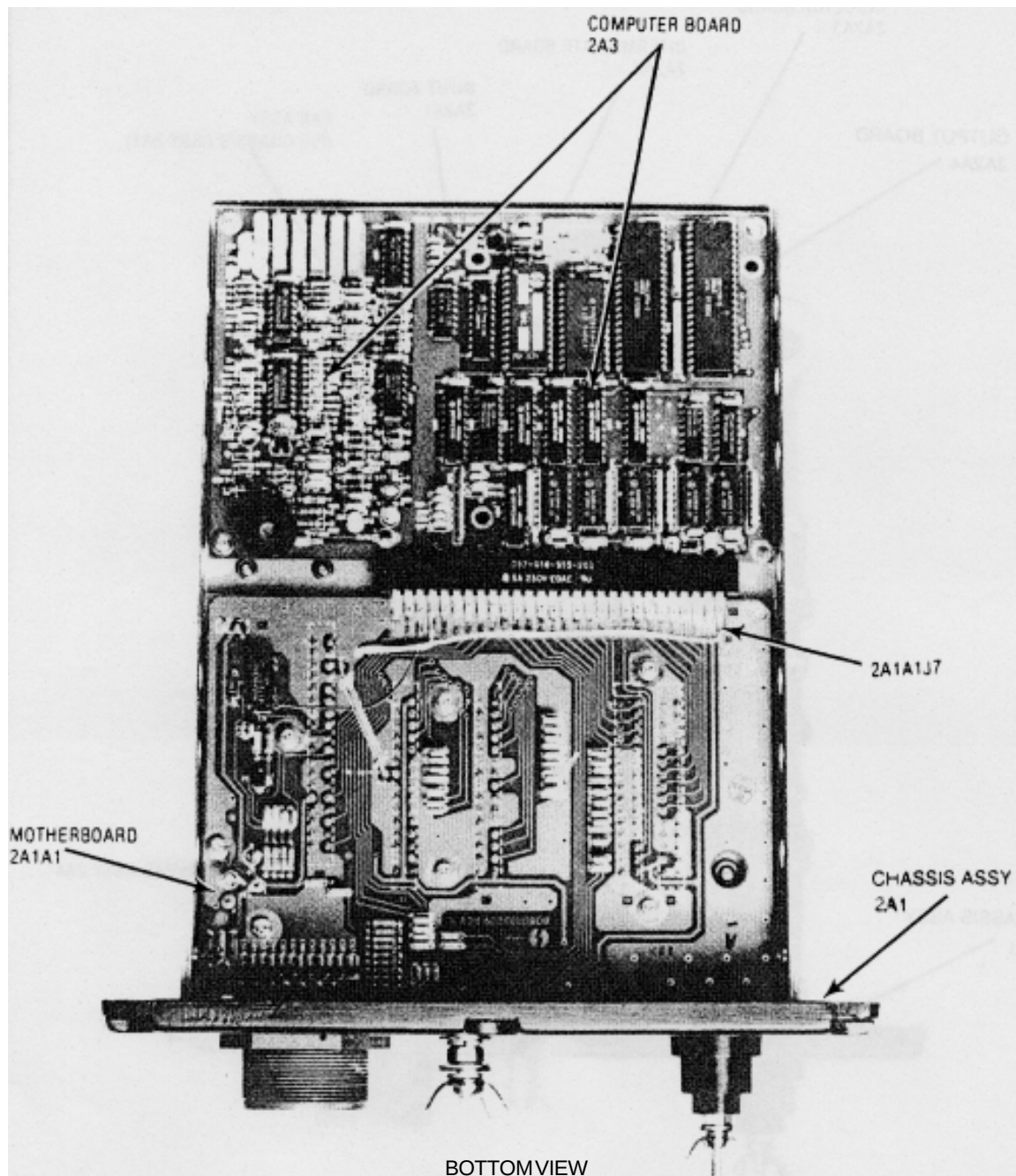
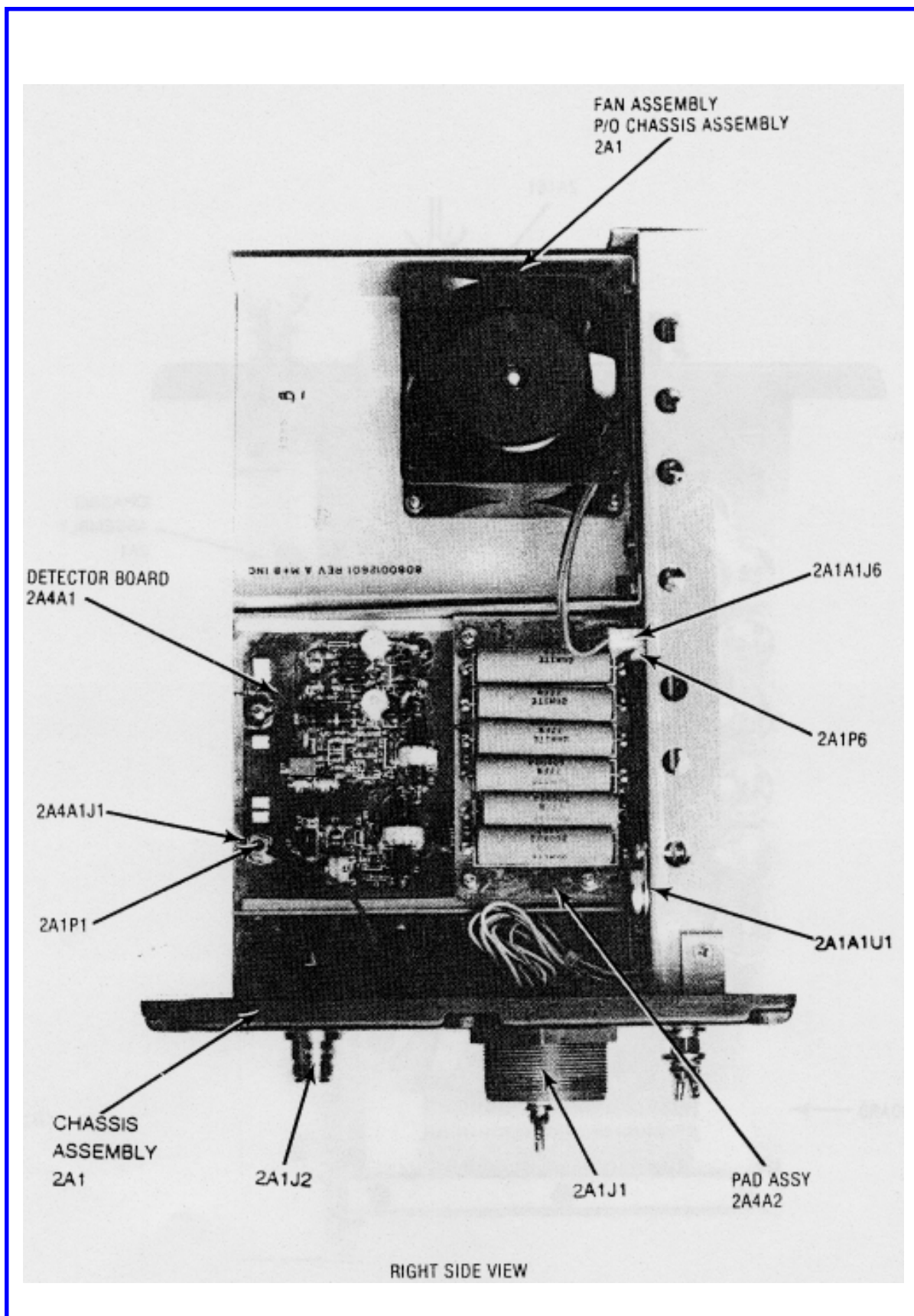


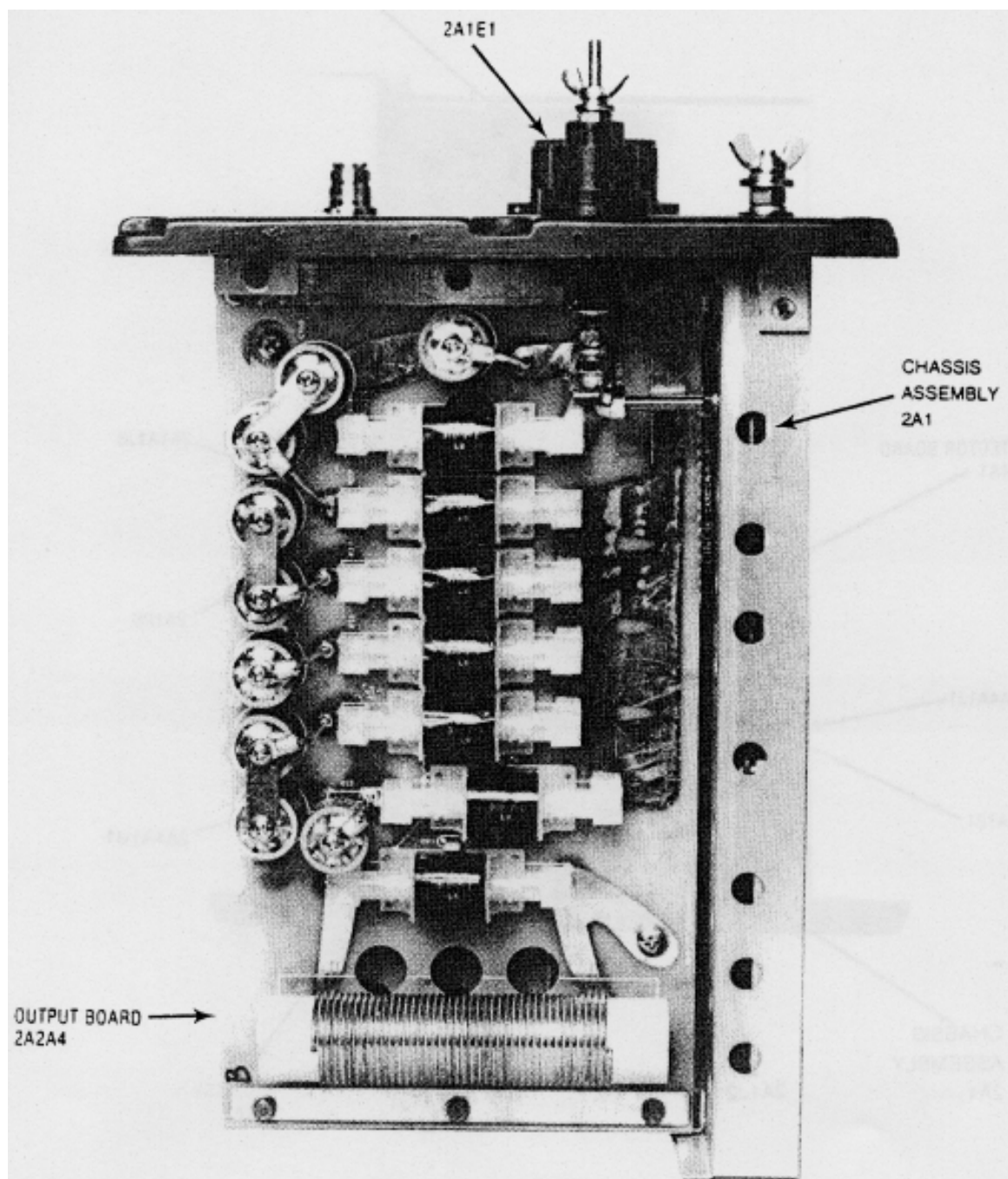
Figure 5.6 Major Assembly and Component Locations (Top View).



**Figure 5.7** Major Assembly and Component Locations (Bottom View).



**Figure 5.8** Major Assembly and Component Locations (Right Side View).



LEFT SIDE VIEW

**Figure 5.9** Major Assembly and Component Locations (Left Side View).

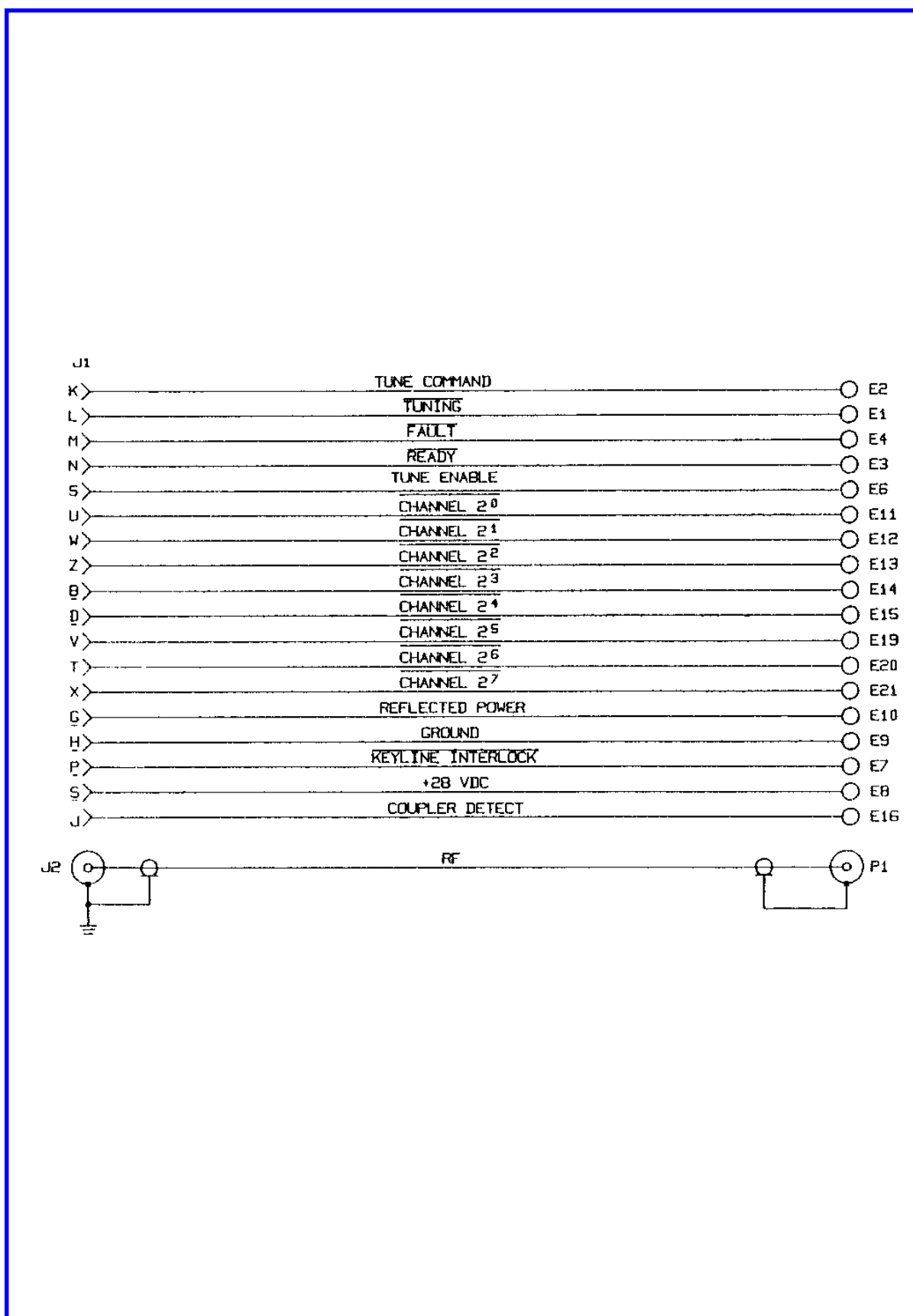


Figure 5.10 Front Panel Wiring Diagram.

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**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,  
COMPUTER BOARD (2A3)**

(Refer to Figure 5.16)

**NOTE:** For this test procedure, a 35 ft. whip antenna simulator is required. An equivalent type of simulator may be used or one may be purchased from Sunair (P/N 8084001094) or built from the schematic diagram in Figure 5.18.

Equipment necessary for preliminary setup will include the following:

- a) Test equipment: Frequency/waveform monitor, Figure 5.4 and a Digital Voltmeter (DVM).
- b) Exciter/Transceiver: AM mode of operation.
- c) Connect 35 ft. whip antenna simulator to antenna terminal on the coupler unit.

**When instructed to change Exciter/Transceiver frequency, change frequency by no less than 2 MHz.**

| CIRCUIT UNDER TEST         | INSTRUCTIONS                                                                                                                      | RESULT/ACTION                                                                                                                                                                                                                                                             |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1) +28 VDC supply.         | <b>a)</b> Connect negative lead of DVM to chassis and positive lead to Mother board connector 2A1A1 J7, pin 27. (See Figure 5.11) | <u>NORMAL</u> : DVM indicates +28 V $\pm$ 4 VDC.<br><u>ABNORMAL</u> : Unplug Computer board. If DVM reads the specified voltage, check for shorts on the board. If still reading wrong voltage, check control cable. Check for shorts on the RF Assembly, 2A2.            |
| 2) +5 VDC supply.          | <b>a)</b> Connect positive lead of DVM to Mother board connector 2A1A1 VR1 pin 2. (See Figure 5.11)                               | <u>NORMAL</u> : DVM indicates +5 V $\pm$ .5 VDC.<br><u>ABNORMAL</u> : Unplug Computer board. If DVM reads the specified voltage, check for shorts on the board. If it still reads the wrong voltage, replace the 5 V regulator (U1), mounted on the chassis assembly 2A1. |
| 3) 1 MHz clock oscillator. | <b>a)</b> Connect oscilloscope probe to U1, pin 1.                                                                                | <u>NORMAL</u> : Frequency = 1 MHz square wave, 4 V p-p minimum.<br><u>ABNORMAL</u> : Replace U23.                                                                                                                                                                         |
| 4) TUNE command circuit.   | <b>a)</b> Connect scope probe to CR2 anode. Depress 'CPLR TUNE' pushbutton on the Exciter/Transceiver.                            | <u>NORMAL</u> : Scope indicates a momentary 0 VDC to +10 VDC low to high change. Coupler tunes.<br><u>ABNORMAL</u> : Check Mother board. Check control cable between radio and coupler. Check Exciter/Transceiver for proper inputs to coupler.                           |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST     | INSTRUCTIONS                                                                                          | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        | <b>b)</b> Connect scope probe to Q1 base. Depress 'CPLR TUNE' pushbutton on Exciter/Transceiver.      | <u><b>NORMAL:</b></u> Scope indicates a +1 VDC level at Q1 base. This level remains until coupler has tuned, then indicates 0.5 V.<br><u><b>ABNORMAL:</b></u> Check Q1 and associated circuitry.                                                                                                                                                                                   |
|                        | <b>c)</b> Connect scope probe to Q1 collector. Depress 'CPLR TUNE' pushbutton on Exciter/Transceiver. | <u><b>NORMAL:</b></u> Scope indicates a voltage level of 0 VDC at Q1 collector while tuning. Level should remain low until coupler has completed the tune cycle. Scope now indicates a +24 VDC level.<br><u><b>ABNORMAL:</b></u> Repair or replace Q1 or associated circuitry. Check Mother board 2A1A1. Check Tune Relay on Detector board, assembly 2A4. Refer to Section 4.3.6. |
|                        | <b>d)</b> Connect scope probe to U5, pin 5. Depress 'CPLR TUNE' pushbutton on Exciter/Transceiver.    | <u><b>NORMAL:</b></u> Scope indicates momentary 0 V to +5 VDC pulse. Coupler tunes.<br><u><b>ABNORMAL:</b></u> Check C16, C17, C23, L4, R34, CR17, R35 and U5. Repair or replace.                                                                                                                                                                                                  |
|                        | <b>e)</b> Connect scope probe to U1, pin 8. Depress 'CPLR TUNE' pushbutton on Exciter/Transceiver.    | <u><b>NORMAL:</b></u> Scope indicates momentary 0 V to +5 VDC pulse. Coupler tunes.<br><u><b>ABNORMAL:</b></u> Check U27A, U27B and repair or replace.                                                                                                                                                                                                                             |
|                        | <b>a)</b> Connect DVM negative lead to ground (chassis) and connect positive lead to TP1.             | <u><b>NORMAL:</b></u> DVM indicates a reading of approximately 10.5 V, $\pm 0.5$ VDC.<br><u><b>ABNORMAL:</b></u> If voltage is off by more than .5 VDC, check U22 circuitry for defective component.                                                                                                                                                                               |
| 5) +10 VDC supply.     |                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                    |
| 6) Detector reference. | <b>a)</b> Connect DVM negative lead to ground (chassis) and connect positive lead to TP2.             | <u><b>NORMAL:</b></u> DVM indicates a reading of 5 V, $\pm 0.05$ VDC.<br><u><b>ABNORMAL:</b></u> If proper voltage is not present, check divider resistors R28 and R29.                                                                                                                                                                                                            |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST                  | INSTRUCTIONS                                                                                                      | RESULT/ACTION                                                                                                                                                                                                                                                                                 |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7) Phase and magnitude comparators. | <b>a)</b> Connect scope probe to U17, pin 12. Change frequency of Exciter/Transceiver and depress microphone key. | <u><b>NORMAL:</b></u> Scope indicates a varying voltage of 3 to 5 V of approximately 2 V p-p. This continues until the tune cycle is complete.<br><u><b>ABNORMAL:</b></u> Check circuitry related to U17 and check Detector/Pad Assembly 2A4. Refer to Sections 4.3 and 5.5.4.                |
|                                     | <b>b)</b> Connect scope probe to U17, pin 10. Change frequency of Exciter/Transceiver and depress microphone key. | <u><b>NORMAL:</b></u> Scope indicates a varying voltage of 3 to 5 V of approximately 2 V p-p. This continues until the tune cycle is complete.<br><u><b>ABNORMAL:</b></u> Check circuitry related to U17 and check Detector/Pad Assembly 2A4. Refer to Sections 4.3 and 5.5.4.                |
|                                     | <b>c)</b> Connect scope probe to U18, pin 2. Change frequency of Exciter/Transceiver and depress microphone key.  | <u><b>NORMAL:</b></u> Scope indicates pulses between 0 V and +10 V during the tune cycle.<br><u><b>ABNORMAL:</b></u> Check U18 and associated circuitry. Check Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4. Check set up of phase and magnitude windows according to Section 5.5.3. |
|                                     | <b>d)</b> Connect scope probe to U18, pin 1. Change frequency of Exciter/Transceiver and depress microphone key.  | <u><b>NORMAL:</b></u> Scope indicates pulses between 0 V and +10 V during the tune cycle.<br><u><b>ABNORMAL:</b></u> Check U18 and associated circuitry. Check Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4. Check set up of phase and magnitude windows according to Section 5.5.3. |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST  | INSTRUCTIONS                                                                                                                                               | RESULT/ACTION                                                                                                                                                                                                                                                                                            |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8) Reflected power. | <p><b>e)</b> Connect scope probe to U18, pin 14. Change frequency of Exciter/Transceiver and depress microphone key.</p>                                   | <p><u><b>NORMAL:</b></u> Scope indicates pulses between 0 V and +10 V during the tune cycle.</p> <p><u><b>ABNORMAL:</b></u> Check U18 and associated circuitry. Check Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4. Check set up of phase and magnitude windows according to Section 5.5.3.</p> |
|                     | <p><b>f)</b> Connect scope probe to U18, pin 13. Change frequency of Exciter/Transceiver and depress microphone key.</p>                                   | <p><u><b>NORMAL:</b></u> Scope indicates pulses between 0 V and +10 V during the tune cycle.</p> <p><u><b>ABNORMAL:</b></u> Check U18 and associated circuitry. Check Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4. Check set up of phase and magnitude windows according to Section 5.5.3.</p> |
|                     | <p><b>g)</b> Connect scope probe to U20, pin 2. Change frequency of Exciter/Transceiver and depress microphone key.</p>                                    | <p><u><b>NORMAL:</b></u> Scope indicates pulses of 0 V to +5 V p-p.</p> <p><u><b>ABNORMAL:</b></u> Check related circuitry. Check Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4.</p>                                                                                                             |
|                     | <p><b>h)</b> Repeat checks on U20, pins 4, 6, and 8. Change frequency of Exciter/Transceiver and depress microphone key.</p>                               | <p><u><b>NORMAL:</b></u> Scope indicates pulses of 0 V to +5 V p-p.</p> <p><u><b>ABNORMAL:</b></u> Check related circuitry. Check Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4.</p>                                                                                                             |
|                     | <p><b>a)</b> Connect scope probe to U19, pin 1. Change frequency of Exciter/Transceiver and depress the 'CPLR TUNE' pushbutton on Exciter/Transceiver.</p> | <p><u><b>NORMAL:</b></u> Scope indicates a varying 2 V p-p voltage. Nulling occurs when tune is complete.</p> <p><u><b>ABNORMAL:</b></u> Check U19 and associated circuitry. Check Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4.</p>                                                            |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST                       | INSTRUCTIONS                                                                                                                                                                                                                                                                                                                                                            | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                          | <p><b>b)</b> Connect scope probe to U19, pin 2. Change frequency of Exciter/Transceiver and depress microphone key.</p> <p><b>c)</b> Connect scope probe to U20, pin 10. Change frequency of Exciter/Transceiver and depress microphone key.</p> <p><b>d)</b> Connect scope probe to U1, pin 9. Change frequency of Exciter/Transceiver and depress microphone key.</p> | <p><u><b>NORMAL:</b></u> Scope indicates a high during the tune cycle, and a low at the completion of the tune.</p> <p><u><b>ABNORMAL:</b></u> Check U19 and associated circuitry. Check Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4.</p> <p><u><b>NORMAL:</b></u> Scope indicates a low during the tune cycle, and a high at the completion of the tune.</p> <p><u><b>ABNORMAL:</b></u> Check U20 and associated circuitry. Check Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4.</p> <p><u><b>NORMAL:</b></u> Scope indicates a high during the tune cycle and a low at the completion of the tune.</p> <p><u><b>ABNORMAL:</b></u> Check U19C, U24F, U27C, U27D, U1, and associated circuitry. Check Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4.</p> |
| 9) RF detector (forward power detector). | <b>a)</b> Connect scope probe to TP3. Change frequency of Exciter/Transceiver and depress microphone key.                                                                                                                                                                                                                                                               | <p><u><b>NORMAL:</b></u> Scope indicates varying voltage until the end of tune cycle. Then indicates approximately +1.75 VDC.</p> <p><u><b>ABNORMAL:</b></u> Check U19 and associated circuitry. Check Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 10) RF                                   | <b>a)</b> Connect scope probe to collector of Q2. Depress the 'CPLR TUNE' pushbutton on the Exciter/Transceiver.                                                                                                                                                                                                                                                        | <p><u><b>NORMAL:</b></u> The scope indicates a low during the tune cycle, and a high at the completion of the tune.</p> <p><u><b>ABNORMAL:</b></u> Check Q2 and associated circuitry. Check Forward Power Detector on Detector/Pad Assembly 2A4. See Sections 4.3 and 5.5.4.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST   | INSTRUCTIONS                                                                                                                                                                                                                                                                                             | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11) 'FAULT' circuit. | <p><b>a)</b> Connect scope probe to U6, pin 16. Turn the Exciter/ Transceiver's power off. Wait approximately 4 seconds and turn power back on.</p> <p><b>b)</b> Connect scope probe to U11, pin 12. Turn the Exciter/ Transceiver's power off. Wait approximately 4 seconds and turn power back on.</p> | <p><u><b>NORMAL:</b></u> Scope will show a +5 VDC level indication when Exciter/ Transceiver is turned back on. For further information on the function of the output ports, see Section 4.4.9.7.</p> <p><u><b>ABNORMAL:</b></u> Check U6 and associated circuitry. Check control cable between coupler and Exciter/ Transceiver.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 12) 'READY' circuit. | <p><b>a)</b> Connect scope probe to U6, pin 15. Depress the 'CPLR TUNE' pushbutton on the Exciter/ Transceiver.</p> <p><b>b)</b> Connect scope probe to U11, pin 13.</p>                                                                                                                                 | <p><u><b>NORMAL:</b></u> Scope will indicate a low voltage when the radio is turned back on.</p> <p><u><b>ABNORMAL:</b></u> Check U11 and associated circuitry. Check control cable between coupler and Exciter/ Transceiver.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 13) Pad relay.       | <p><b>a)</b> Connect scope probe to U6, pin 19. Depress the 'CPLR TUNE' pushbutton on the Exciter/ Transceiver.</p> <p><b>b)</b> Connect scope probe to U11, pin 11. Depress the 'CPLR TUNE' pushbutton on the Exciter/ Transceiver.</p>                                                                 | <p><u><b>NORMAL:</b></u> Scope indicates a high when tune cycle is complete. For further information on the function of the output ports, see Section 4.4.9.7.</p> <p><u><b>ABNORMAL:</b></u> Check U6 and associated circuitry. Check control cable between coupler and Exciter/ Transceiver.</p> <p><u><b>NORMAL:</b></u> Scope indicates a low.</p> <p><u><b>ABNORMAL:</b></u> Check associated circuitry of U11. Check control cable between coupler and Exciter/ Transceiver.</p> <p><u><b>NORMAL:</b></u> Scope indicates a high during the tune cycle, and a low at the completion of the tune cycle.</p> <p><u><b>ABNORMAL:</b></u> Check U6 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p> <p><u><b>NORMAL:</b></u> Scope indicates a low during the tune cycle, and</p> |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST                              | INSTRUCTIONS                                                                                                                                                                                                                                                                                                                                                | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14) NETWORK RELAY DRIVERS:<br>14a) <u>C17</u> . | <p>pushbutton on the Exciter/Transceiver.</p> <p><b>a)</b> Connect scope probe to U5, pin 21. Remove 35 ft. whip antenna</p>                                                                                                                                                                                                                                | <p>approximately +28 V level at the completion of tune.</p> <p><b>ABNORMAL:</b> Check U11 and related circuitry. For further information on the function of the output ports see Section 4.4.9.7. Also check K1 and related circuitry on Detector board (2A4A1).</p>                                                                                                                                                                                                                                                                                             |
|                                                 | <p>simulator. Short antenna terminal to ground terminal with a 3 ft. clip lead. (Short antenna terminal ONLY for the testing of 14a.a. NOT for any of the following like tests). Place exciter/transceiver in the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Reconnect Antenna simulator and connect scope probe to U9, pin</p> | <p><b>NORMAL:</b> Scope indicates a +3 V p-p, <math>\pm</math> change. If the tune cycle ends and the pulse did not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><b>ABNORMAL:</b> If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                                                                                      |
|                                                 | <p>16. Place exciter/transceiver in the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>a)</b> Connect scope probe to U5, pin 25. Place Exciter/Transceiver in</p>                                                                                                                                                                          | <p><b>NORMAL:</b> Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><b>ABNORMAL:</b> If after 6 times the scope does not change, check U9 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K28 and related circuitry on Output board (2A2A4).</p> <p><b>NORMAL:</b> Scope indicates a +3 V p-p change. If tune cycle ends and</p> |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                    | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14b) <u>C13.</u>   | <p>the 'AM' mode, at 1.6000 MHz. Depress the microphone key.<br/> <b>b)</b> Connect scope probe to U9, pin 15. Place Exciter/Transceiver in</p> | <p>the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br/> <u>ABNORMAL:</u> If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                                                                                                      |
|                    | <p>the 'AM' mode, at 1.7000 MHz. Depress the microphone key.<br/> <b>a)</b> Connect scope probe to U5, pin 26. Place Exciter/Transceiver in</p> | <p><u>NORMAL:</u> Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br/> <u>ABNORMAL:</u> If after 6 times the scope does not change, check U9 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K24 and related circuitry on Output board (2A2A4).</p> |
| 14c) <u>C14.</u>   | <p>the 'AM' mode, at 1.6000 MHz. Depress the microphone key.<br/> <b>b)</b> Connect scope probe to U9, pin 14. Place Exciter/Transceiver in</p> | <p><u>NORMAL:</u> Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br/> <u>ABNORMAL:</u> If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                             |
|                    |                                                                                                                                                 | <p><u>NORMAL:</u> Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V</p>                                                                                                                                                                                                                                                                                                                                                                                       |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                              | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14d) C15.          | the 'AM' mode, at 1.7000 MHz. Depress the microphone key.<br><b>a)</b> Connect scope probe to U5, pin 27. Place Exciter/Transceiver in    | change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u><b>ABNORMAL:</b></u> If after 6 times the scope does not change, check U9 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K25 and related circuitry on Output board (2A2A4).                                                                                                                                                                      |
|                    | the 'AM' mode, at 1.6000 MHz. Depress the microphone key.<br><b>b)</b> Connect scope probe to U9, pin 13. Place Exciter/Transceiver       | <u><b>NORMAL:</b></u> Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u><b>ABNORMAL:</b></u> If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.                                                                                                                                                         |
|                    | in the 'AM' mode, at 1.7000 MHz. Depress the microphone key.<br><b>a)</b> Connect scope probe to U5, pin 28. Place Exciter/Transceiver in | <u><b>NORMAL:</b></u> Scope indicates a +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u><b>ABNORMAL:</b></u> If after 6 times the scope does not change, check U9 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K26 and related circuitry on Output board (2A2A4).<br><br><u><b>NORMAL:</b></u> Scope indicates a +3 V p-p change. If tune cycle ends and |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                          | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14e) <u>C16</u> .  | <p>the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U9, pin 12. Place exciter/transceiver in the</p> | <p>the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                                                                                                           |
|                    | <p>'AM' mode, at 1.7000 MHz. Depress the microphone key.</p> <p><b>a)</b> Connect scope probe to U5, pin 29. Place Exciter/Transceiver</p>            | <p><u>NORMAL</u>: Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U9 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K27, K29 and related circuitry on Output board (2A2A4).</p> |
| 14f) <u>C1</u> .   | <p>in the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U9, pin 11. Place Exciter/Transceiver</p>     | <p><u>NORMAL</u>: Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p> <p><u>NORMAL</u>: Scope indicates a</p>                                          |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                         | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14g) C2.           | <p>in the 'AM' mode, at 1.7000 MHz. Depress the microphone key.</p> <p><b>a)</b> Connect scope probe to U5, pin 30. Place Exciter/Transceiver</p>    | <p>+28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL:</u> If after 6 times the scope does not change, check U9 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K11 and related circuitry on Intermediate board (2A2A2).</p>                                                                      |
|                    | <p>in the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U9, pin 10. Place Exciter/Transceiver</p>    | <p><u>NORMAL:</u> Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL:</u> If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                                                                       |
|                    | <p>in the 'AM' mode, at 1.7000 MHz. Depress the microphone key.</p> <p><b>a)</b> Connect scope probe to U5, pin 31. Place Exciter/Transceiver in</p> | <p><u>NORMAL:</u> Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL:</u> If after 6 times the scope does not change, check U9 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K10 and related circuitry on Input board (2A2A1).</p> <p><u>NORMAL:</u> Scope indicates a +3</p> |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                       | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14h) <u>C3</u> .   | <p>the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U10, pin 16. Place Exciter/Transceiver in</p> | <p>Vp-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                                                                 |
|                    | <p>the 'AM' mode, at 1.7000 MHz. Depress the microphone key.</p> <p><b>a)</b> Connect scope probe to U5, pin 32. Place Exciter/Transceiver in</p>  | <p><u>NORMAL</u>: Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U10 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K9 and related circuitry on Input board (2A2A1).</p> |
| 14i) <u>C4</u> .   | <p>the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U10, pin 15. Place Exciter/Transceiver in</p> | <p><u>NORMAL</u>: Scope indicates a +3 Vp-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p> <p><u>NORMAL</u>: Scope indicates a</p>                                     |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                               | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14j) C5.           | the 'AM' mode, at 1.7000 MHz. Depress the microphone key.<br><br><b>a)</b> Connect scope probe to U5, pin 33. Place Exciter/Transceiver in | +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U10 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K8 and related circuitry on Intermediate board (2A2A2).                                                                   |
|                    | the 'AM' mode, at 1.6000 MHz. Depress the microphone key.<br><b>b)</b> Connect scope probe to U10, pin 14. Place Exciter/Transceiver in    | <u>NORMAL:</u> Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.                                                                                                         |
|                    | the 'AM' mode, at 1.7000 MHz. Depress the microphone key.<br><b>a)</b> Connect scope probe to U5, pin 34. Place Exciter/Transceiver in     | <u>NORMAL:</u> Scope indicates a +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U10 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K7 and related circuitry on Input board (2A2A1).<br><br><u>NORMAL:</u> Scope indicates a |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                       | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14k) <u>C6</u> .   | <p>the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U10, pin 13. Place Exciter/Transceiver in</p> | <p>+3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                                                                    |
|                    | <p>the 'AM' mode, at 1.7000 MHz. Depress the microphone key.</p> <p><b>a)</b> Connect scope probe to U5, pin 35. Place Exciter/Transceiver in</p>  | <p><u>NORMAL</u>: Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U10 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K6 and related circuitry on Intermediate board (2A2A2).</p> |
| 14l) <u>C7</u> .   | <p>the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U10, pin 12. Place Exciter/Transceiver in</p> | <p><u>NORMAL</u>: Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p> <p><u>NORMAL</u>: Scope indicates a</p>                                           |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                     | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14m) C8.           | the 'AM' mode, at 1.7000 MHz.<br>Depress the microphone key.<br><br><b>a)</b> Connect scope probe to U5, pin 36. Place Exciter/Transceiver in    | +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U10 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K5 and related circuitry on Intermediate board (2A2A2).                                                                      |
|                    | the 'AM' mode, at 1.6000 MHz.<br>Depress the microphone key.<br><b>b)</b> Connect scope probe to U10, pin 11. Place Exciter/Transceiver in       | <u>NORMAL:</u> Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.                                                                                                            |
|                    | the 'AM' mode, at 1.7000 MHz.<br>Depress the microphone key.<br><br><b>a)</b> Connect scope probe to U6, pin 2. Place Exciter/Transceiver in the | <u>NORMAL:</u> Scope indicates a +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U10 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K4 and related circuitry on Input board (2A2A1).<br><br><u>NORMAL:</u> Scope indicates a +3 |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                         | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14n) <u>C9</u> .   | <p>'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U10, pin 10. Place Exciter/Transceiver in</p>       | <p>V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U6 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                                                                |
|                    | <p>the 'AM' mode, at 1.7000 MHz. Depress the microphone key.</p> <p><b>a)</b> Connect scope probe to U6, pin 5. Place Exciter/Transceiver in the</p> | <p><u>NORMAL</u>: Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U10 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K3 and related circuitry on Input board (2A2A1).</p> |
| 14o) <u>C10</u> .  | <p>'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U11, pin 16. Place Exciter/Transceiver in</p>       | <p><u>NORMAL</u>: Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U6 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p> <p><u>NORMAL</u>: Scope indicates a</p>                                    |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                          | RESULT/ACTION                                                                                                                                                                                                                                      |
|--------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14p) C11.          | the 'AM' mode, at 1.7000 MHz. Depress the microphone key.             | +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.                                                                                |
|                    | a) Connect scope probe to U6, pin 6. Place Exciter/Transceiver in the | <u>ABNORMAL</u> : If after 6 times the scope does not change, check U11 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K2 and related circuitry on Input board (2A2A1). |
|                    | 'AM' mode, at 1.6000 MHz. Depress the microphone key.                 | <u>NORMAL</u> : Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.                                           |
|                    | b) Connect scope probe to U11, pin 15. Place Exciter/Transceiver in   | <u>ABNORMAL</u> : If after 6 times the scope does not change, check U6 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.                                                                    |
|                    | the 'AM' mode, at 1.7000 MHz. Depress the microphone key.             | <u>NORMAL</u> : Scope indicates a +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.                                              |
|                    | a) Connect scope probe to U5, pin 22. Place Exciter/Transceiver in    | <u>ABNORMAL</u> : If after 6 times the scope does not change, check U11 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K1 and related circuitry on Input board (2A2A1). |
|                    |                                                                       | <u>NORMAL</u> : Scope indicates a                                                                                                                                                                                                                  |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                         | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14q) <u>C12</u> .  | <p>the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U11, pin 10. Place Exciter/Transceiver in</p>   | <p>+3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U5 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                                                         |
|                    | <p>the 'AM' mode, at 1.7000 MHz. Depress the microphone key.</p> <p><b>a)</b> Connect scope probe to U7, pin 2. Place Exciter/Transceiver in the</p> | <p><u>NORMAL</u>: Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U11 and related circuitry. For further information on the function of the output ports, see 4.4.9.7. Also check relay K17 and related circuitry on Inductor board (2A2A3).</p> |
| 14r) <u>L1</u> .   | <p>'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U12, pin 16. Place Exciter/Transceiver in</p>       | <p><u>NORMAL</u>: Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U7 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p> <p><u>NORMAL</u>: Scope indicates a</p>                                |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                 | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14s) <u>L2</u> .   | the 'AM' mode, at 1.7000 MHz. Depress the microphone key.                                                                    | +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL</u> : If after 6 times the scope does not change, check U12 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K12 and related circuitry on Intermediate board (2A2A2).                                   |
|                    | a) Connect scope probe to U7, pin 5. Place Exciter/Transceiver in the                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                    | 'AM' mode, at 1.6000 MHz. Depress the microphone key.<br>b) Connect scope probe to U12, pin 15. Place Exciter/Transceiver in | <u>NORMAL</u> : Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL</u> : If after 6 times the scope does not change, check U7 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.                                                                         |
|                    | the 'AM' mode, at 1.7000 MHz. Depress the microphone key.                                                                    | <u>NORMAL</u> : Scope indicates a +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL</u> : If after 6 times the scope does not change, check U12 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K13 and related circuitry on Intermediate board (2A2A2). |
|                    | a) Connect scope probe to U7, pin 6. Place Exciter/Transceiver in the                                                        | <u>NORMAL</u> : Scope indicates a                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                         | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14t) <u>L3</u> .   | <p>'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U12, pin 14. Place Exciter/Transceiver in</p>       | <p>+3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U7 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                                                                      |
|                    | <p>the 'AM' mode, at 1.7000 MHz. Depress the microphone key.</p> <p><b>a)</b> Connect scope probe to U7, pin 9. Place Exciter/Transceiver in the</p> | <p><u>NORMAL</u>: Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U12 and related circuitry. For further information on the function of the output ports, see Section 4.17.8.7. Also check relay K14 and related circuitry on Intermediate board (2A2A2).</p> |
| 14u) <u>L4</u> .   | <p>'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U12, pin 13. Place Exciter/Transceiver in</p>       | <p><u>NORMAL</u>: Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U7 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p> <p><u>NORMAL</u>: Scope indicates a</p>                                             |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                        | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14v) L5.           | the 'AM' mode, at 1.7000 MHz.<br>Depress the microphone key.        | +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL</u> : If after 6 times the scope does not change, check U12 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K15 and related circuitry on Intermediate board (2A2A2).                                   |
|                    | a) Connect scope probe to U7, pin 12. Place Exciter/Transceiver in  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                    | the 'AM' mode, at 1.6000 MHz.<br>Depress the microphone key.        | <u>NORMAL</u> : Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL</u> : If after 6 times the scope does not change, check U7 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.                                                                         |
|                    | b) Connect scope probe to U12, pin 12. Place Exciter/Transceiver in |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                    | the 'AM' mode, at 1.7000 MHz.<br>Depress the microphone key.        | <u>NORMAL</u> : Scope indicates a +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL</u> : If after 6 times the scope does not change, check U12 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K16 and related circuitry on Intermediate board (2A2A2). |
|                    | a) Connect scope probe to U7, pin 15. Place Exciter/Transceiver in  | <u>NORMAL</u> : Scope indicates a +3                                                                                                                                                                                                                                                                                                                                                                                                                                |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                       | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14w) <u>L6</u> .   | <p>the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U12, pin 11. Place Exciter/Transceiver in</p> | <p>Vp-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U7 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                                                                     |
|                    | <p>the 'AM' mode, at 1.7000 MHz. Depress the microphone key.</p> <p><b>a)</b> Connect scope probe to U7, pin 16. Place Exciter/Transceiver in</p>  | <p><u>NORMAL</u>: Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U12 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K18 and related circuitry on Inductor board (2A2A3).</p> |
| 14x) <u>L7</u> .   | <p>the 'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U12, pin 10. Place Exciter/Transceiver in</p> | <p><u>NORMAL</u>: Scope indicates a +3 Vp-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U7 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p> <p><u>NORMAL</u>: Scope indicates a</p>                                         |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                      | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14y) L8.           | the 'AM' mode, at 1.7000 MHz.<br>Depress the microphone key.<br><br><b>a)</b> Connect scope probe to U7, pin 19. Place Exciter/Transceiver in     | +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U12 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K19 and related circuitry on Inductor board (2A2A3).                                                                             |
|                    | the 'AM' mode, at 1.6000 MHz.<br>Depress the microphone key.<br><b>b)</b> Connect scope probe to U13, pin 16. Place Exciter/Transceiver in        | <u>NORMAL:</u> Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U7 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.                                                                                                                |
|                    | the 'AM' mode, at 1.7000 MHz.<br>Depress the microphone key.<br><br><b>a)</b> Connect scope probe to U15, pin 2. Place Exciter/Transceiver in the | <u>NORMAL:</u> Scope indicates a +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U13 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K20 and related circuitry on Inductor board (2A2A3).<br><br><u>NORMAL:</u> Scope indicates a +3 |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                                                                                                          | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14z) <u>L9</u> .   | <p>'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U13, pin 15. Place Exciter/Transceiver in</p>        | <p>V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U15 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p>                                                                                                                   |
|                    | <p>the 'AM' mode, at 1.7000 MHz. Depress the microphone key.</p> <p><b>a)</b> Connect scope probe to U15, pin 5. Place Exciter/Transceiver in the</p> | <p><u>NORMAL</u>: Scope indicates a +28 V p-p, <math>\pm</math> change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U13 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K21 and related circuitry on Inductor board (2A2A3).</p> |
| 14aa) <u>L10</u> . | <p>'AM' mode, at 1.6000 MHz. Depress the microphone key.</p> <p><b>b)</b> Connect scope probe to U13, pin 14. Place Exciter/Transceiver in</p>        | <p><u>NORMAL</u>: Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.</p> <p><u>ABNORMAL</u>: If after 6 times the scope does not change, check U15 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.</p> <p><u>NORMAL</u>: Scope indicates a</p>                                       |

**Table 5.2 FAULT ANALYSIS AND TROUBLESHOOTING,**  
**COMPUTER BOARD (2A3) CONTINUED...**

(Refer to Figure 5.16)

| CIRCUIT UNDER TEST | INSTRUCTIONS                                                           | RESULT/ACTION                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14bb) L11.         | the 'AM' mode, at 1.7000 MHz. Depress the microphone key.              | +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U13 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K22 and related circuitry on Inductor board (2A2A3).                                |
|                    | a) Connect scope probe to U15, pin 6. Place Exciter/Transceiver in the |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                    | 'AM' mode, at 1.6000 MHz. Depress the microphone key.                  | <u>NORMAL:</u> Scope indicates a +3 V p-p change. If tune cycle ends and the pulse did not occur change the frequency on the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U15 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7.                                                                  |
|                    | b) Connect scope probe to U13, pin 13. Place Exciter/Transceiver in    |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                    | the 'AM' mode, at 1.7000 MHz. Depress the microphone key.              | <u>NORMAL:</u> Scope indicates a +28 V p-p, $\pm$ change. If the +28 V change does not occur, change the frequency of the Exciter/Transceiver by 100 kHz and repeat. Perform this procedure 6 times.<br><u>ABNORMAL:</u> If after 6 times the scope does not change, check U13 and related circuitry. For further information on the function of the output ports, see Section 4.4.9.7. Also check relay K23 and related circuitry on Output board (2A2A4). |

## 5.6 SCHEMATICS AND PARTS LISTS

The following are schematics and parts lists for the CU-9125, see Table 5.3.

| DESIGNATOR |                                  | DESCRIPTION                                                                               | SUNAIR<br>PART NUMBER                                              |
|------------|----------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| ASSEMBLY   | SUBASSEMBLY                      |                                                                                           |                                                                    |
| 2A1        | 2A1A1                            | <u>CHASSIS ASSEMBLY</u><br>MOTHER BOARD                                                   | 8085010097<br>8085013096                                           |
| 2A2        | 2A2A1<br>2A2A2<br>2A2A3<br>2A2A4 | <u>RF ASSEMBLY</u><br>INPUT BOARD<br>INTERMEDIATE BOARD<br>INDUCTOR BOARD<br>OUTPUT BOARD | 8080003092<br>8080030090<br>8080040095<br>8080050091<br>8080060096 |
| 2A3        |                                  | <u>COMPUTER MODULE</u>                                                                    | 8085025094                                                         |
| 2A4        | 2A4A2                            | <u>DETECTOR/PAD ASSEMBLY</u><br>DETECTOR BOARD                                            | 8056160094                                                         |
|            | 2A4A2                            | PAD BOARD                                                                                 | 8056161091                                                         |

**Table 5.3** CU-9125 Table of Assemblies.

**CHASSIS ASSEMBLY CU-9125 (2A1)**

|      |                                 |            |
|------|---------------------------------|------------|
| 2A1  | CHASSIS ASSEMBLY CU-9125        | 8085010097 |
| E1   | INSULATOR, ANTENNA              | 8056111808 |
| A1U1 | IC. LINEAR, VOL.REG. MC7805CK   | 0447190008 |
|      | CABLE ASSY, RF                  | 8080015091 |
| P1   | CONNECTOR, RF, SUBMINIATURE     | 0753700000 |
| J2   | CONNECTOR, RF, N FEMALE         | 0756030005 |
|      | CARD GUIDE, PLASTIC             | 1005870039 |
| J1   | CONNECTOR, POWER, 37 PIN ENV.   | 1006330003 |
|      | GASKET, O-RING, .926ID X .07THK | 1006400028 |
|      | BRACKET, CARD GUIDE             | 8080012202 |
|      | BRACKET, BOTTOM, FRONT PANEL    | 8080100306 |
|      | BRACKET, TOP, FRONT PANEL       | 8080100209 |

**FAN ASSEMBLY**

|      |                             |            |
|------|-----------------------------|------------|
| 2A1  | FAN ASSEMBLY                | 8080012598 |
| A1J6 | HOUSING, CONNECTOR, 2 PIN   | 1006360000 |
| A1J6 | PIN, CONNECTOR, CRIMP, MALE | 0754180000 |
|      | FAN, 24VDC                  | 1006400036 |
|      | BRACKET, BLOWER             | 8080012601 |

**RF ASSEMBLY (2A2)**

|       |                            |            |
|-------|----------------------------|------------|
| 2A2A1 | RF ASSEMBLY                | 8080003092 |
| 2A2A2 | PC ASSY, INPUT BOARD       | 8080030090 |
| 2A2A3 | PC ASSY, INTERMEDIATE      | 8080040095 |
| 2A2A4 | PC ASSY, INDUCTOR BD       | 8080050091 |
|       | PC ASSY, OUTPUT BOARD      | 8080060096 |
|       | BRACKET, RF ASSY, FRONT    | 8080003203 |
|       | BRACKET, RF ASSY, REAR     | 8080003301 |
|       | SPACER, INSULATOR, SNAP-IN | 1006300023 |

**Table 5.4** Parts List of CU-9125 Major Assemblies.

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PC ASSEMBLY, MOTHER BOARD CU-9125 (2A1A1)

|       |                               |                         |  |            |
|-------|-------------------------------|-------------------------|--|------------|
| 2A1A1 | PC ASSY, MOTHER BOARD CU-9125 |                         |  | 8085013096 |
| C1    | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C2    | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C3    | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C4    | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C5    | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C6    | 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.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C10   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C11   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C12   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C13   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C14   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C15   | CAP.                          | 1µF, 50V, 198D          |  | 0280910002 |
| C16   | CAP.                          | 1µF, 50V, 198D          |  | 0280910002 |
| C17   | CAP.                          | 0.001µF, 100V, X7R, 20% |  | 0281630003 |
| C18   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C19   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C20   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C21   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C22   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C23   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C24   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C25   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C26   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C27   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C28   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C29   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C30   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C31   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C32   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C33   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C34   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C35   | CAP.                          | 0.47µF, 50V, X7R, 20%   |  | 0283377771 |
| C36   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C37   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C38   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C39   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C40   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C41   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C42   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| C43   | CAP.                          | 0.1µF, 50V, X7R, 20%    |  | 0281610002 |
| 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.                          | 0.001µF, 100V, X7R, 20% |  | 0281630003 |
| C48   | CAP.                          | 0.001µF, 100V, X7R, 20% |  | 0281630003 |
| C49   | CAP.                          | 0.001µF, 100V, X7R, 20% |  | 0281630003 |
| 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.                          | 0.001µF, 100V, X7R, 20% | 0281630003 |
| C54 | CAP.                          | 0.001µF, 100V, X7R, 20% | 0281630003 |
| C55 | CAP.                          | 0.001µF, 100V, X7R, 20% | 0281630003 |
| C56 | CAP.                          | 0.001µF, 100V, X7R, 20% | 0281630003 |
| C57 | CAP.                          | 0.001µF, 100V, X7R, 20% | 0281630003 |
| C58 | CAP.                          | 0.001µF, 100V, X7R, 20% | 0281630003 |
| C59 | CAP.                          | 0.001µF, 100V, X7R, 20% | 0281630003 |
| C60 | CAP.                          | 0.001µF, 100V, X7R, 20% | 0281630003 |
| C61 | CAP.                          | 0.001µF, 100V, X7R, 20% | 0281630003 |
| C62 | CAP.                          | 0.001µF, 100V, X7R, 20% | 0281630003 |
| C63 | CAP.                          | 0.001µF, 100V, X7R, 20% | 0281630003 |
| C64 | CAP.                          | 0.1µF, 50V, X7R, 20%    | 0281610002 |
| C65 | CAP.                          | 0.1µF, 50V, X7R, 20%    | 0281610002 |
| C66 | CAP.                          | 0.1µF, 50V, X7R, 20%    | 0281610002 |
| C67 | CAP.                          | 0.47µF, 50V, X7R, 20%   | 0283377771 |
| CR1 | DIODE, RECTIFIER              | 1N4004                  | 0405180004 |
| CR2 | DIODE, ZENER                  | 1N5245B                 | 0405210001 |
| J1  | CONNECTOR, PC, 18 PIN DUAL    |                         | 1006470000 |
| J2  | CONNECTOR, PC, 15 PIN DUAL    |                         | 1006450009 |
| J3  | CONNECTOR, PC, 15 PIN DUAL    |                         | 1006450009 |
| J4  | CONNECTOR, PC, 15 PIN DUAL    |                         | 1006450009 |
| J5  | CONNECTOR, PC, 15 PIN DUAL    |                         | 1006450009 |
| J6  | CONNECTOR, 2 PIN MALE, HEADER |                         | 1006480005 |
| J7  | CONNECTOR, PC.28 PIN DUAL     |                         | 1006460004 |
| K1  | RELAY, SPDT, 24V, REED        |                         | 1003400001 |
| L1  | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L2  | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L3  | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L4  | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L5  | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L6  | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L7  | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L8  | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L9  | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L10 | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L11 | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L12 | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L13 | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L14 | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L15 | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L16 | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L17 | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| L18 | INDUCTOR, MOLDED, 6.8µH 245MA |                         | 0664180001 |
| Q1  | TRANSISTOR, NPN, Si. 2N4124   |                         | 0448010003 |
| R1  | RESISTOR 47K, 10%, 1/4W       |                         | 0171060008 |
| R2  | RESISTOR 4.7K, 5%, 1/4W       |                         | 0170770001 |
|     | JACK, PCB, PRESS-IN           | 0754100006              |            |

Figure 5.11 Motherboard Assembly 2A1A1, page 1 of 3.

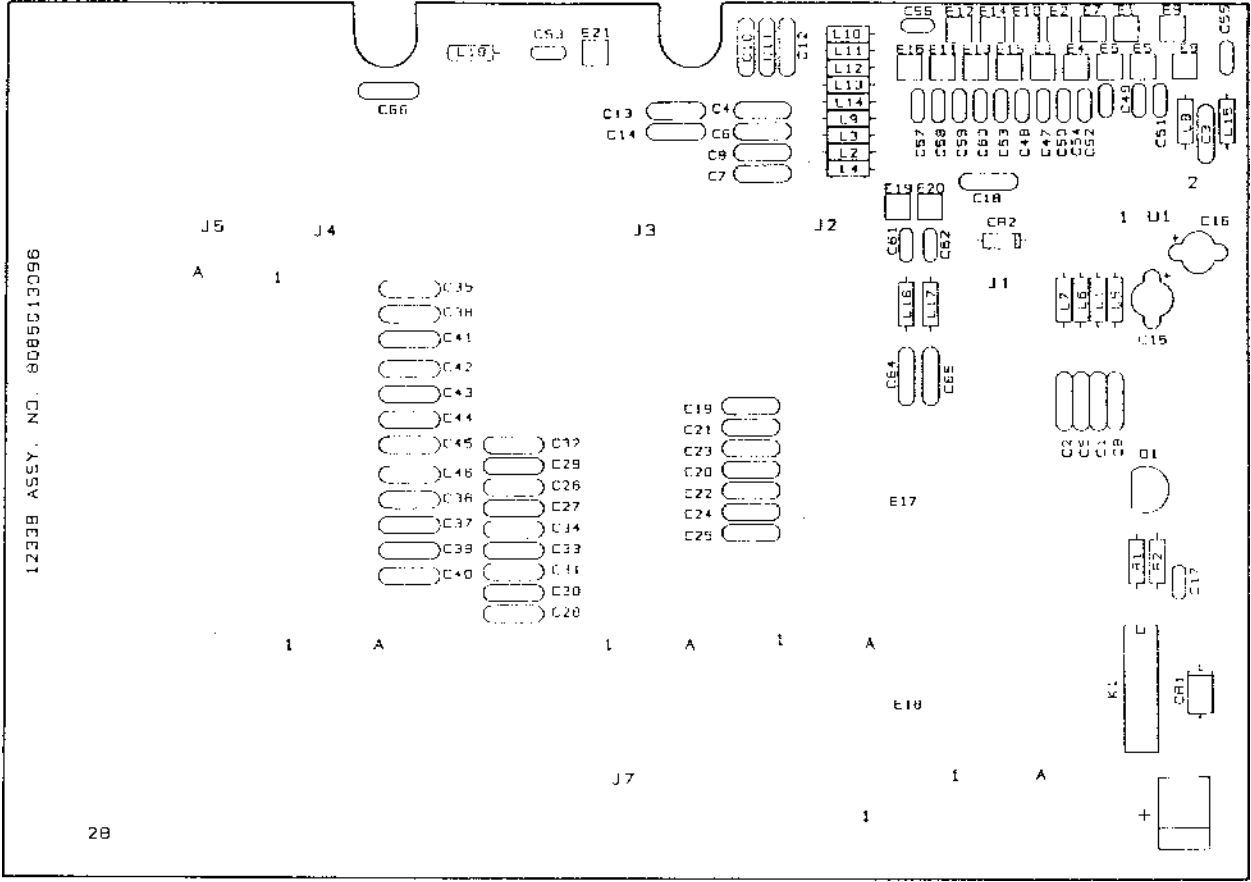


Figure 5.11 Motherboard Assembly 2A1A1, page 2 of 3.

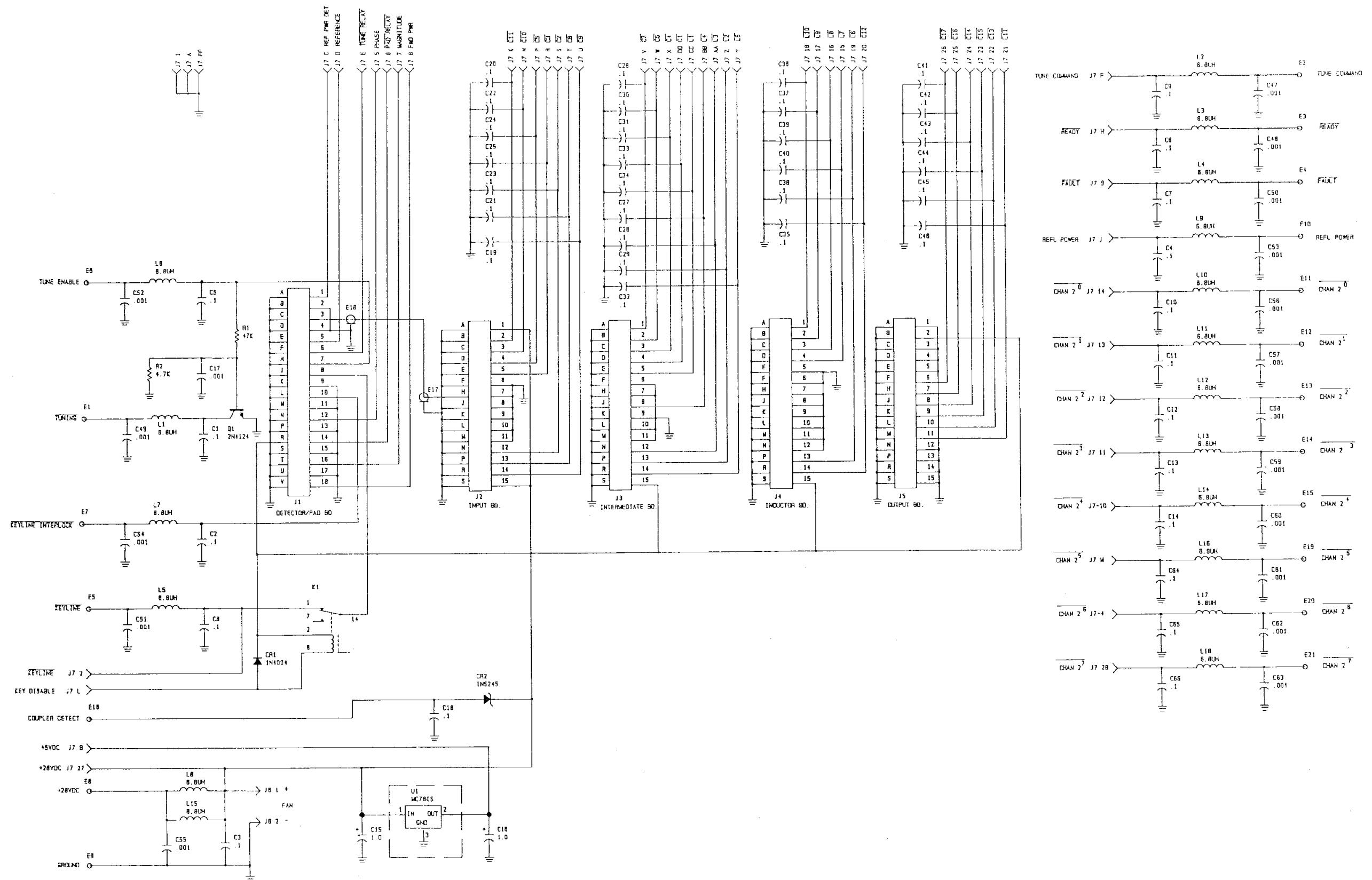


Figure 5.11 Motherboard Assembly 2A1A1, page 3 of 3.

PC ASSY, INPUT BOARD CU-9125 (2A2A1)

|      |                              |            |
|------|------------------------------|------------|
|      | PC ASSY, INPUT BOARD         | 8080030090 |
| C2   | CAP. 22PF, 500V, CD15, 2%    | 1000050025 |
| C3A  | CAP. 18PF, 500V, DM15        | 0281330000 |
| C3B  | CAP. 22PF, 500V, CD15, 2%    | 1000050025 |
| C5A  | CAP. 51PF, 500V, DM15, 2%    | 0281350001 |
| C5B  | CAP. 51PF, 500V, DM15, 2%    | 0281350001 |
| C8A  | CAP. 160PF, 500V, DM15, 2%   | 0281340005 |
| C8B  | CAP. 160PF, 500V, DM15, 2%   | 0281340005 |
| C8C  | CAP. 160PF, 500V, DM15, 2%   | 0281340005 |
| C8D  | CAP. 160PF, 500V, DM15, 2%   | 0281340005 |
| C9A  | CAP. 220PF, 500V, DM15, 2%   | 0281420009 |
| C9B  | CAP. 220PF, 500V, DM15, 2%   | 0281420009 |
| C9C  | CAP. 220PF, 500V, DM15, 2%   | 0281420009 |
| C9D  | CAP. 220PF, 500V, DM15, 2%   | 0281420009 |
| C9E  | CAP. 200PF, 500V, DM15, 5%   | 0258040009 |
| C9F  | CAP. 200PF, 500V, DM15, 5%   | 0258040009 |
| C10A | CAP. 430PF, 500V, DM19, 5%   | 0254900003 |
| C10B | CAP. 430PF, 500V, DM19, 5%   | 0254900003 |
| C10C | CAP. 430PF, 500V, DM19, 5%   | 0254900003 |
| C10D | CAP. 430PF, 500V, DM19, 5%   | 0254900003 |
| C10E | CAP. 430PF, 500V, DM19, 5%   | 0254900003 |
| C10F | CAP. 390PF, 500V, DM19, 2%   | 0282640002 |
| C11A | CAP. 910PF, 500V, DM19, 5%   | 0297570005 |
| C11B | CAP. 910PF, 500V, DM19, 5%   | 0297570005 |
| C11C | CAP. 820PF, 500V, DM19, 2%   | 0281280002 |
| C11D | CAP. 820PF, 500V, DM19, 2%   | 0281280002 |
| C11E | CAP. 820PF, 500V, DM19, 2%   | 0281280002 |
| C11F | CAP. 820PF, 500V, DM19, 2%   | 0281280002 |
| C18  | CAP. .01µF, 100V, 25V/Y5P    | 0273217771 |
| C19  | CAP. .01µF, 100V, 25V/Y5P    | 0273217771 |
| C20  | CAP. .01µF, 100V, 25V/Y5P    | 0273217771 |
| C21  | CAP. .01µF, 100V, 25V/Y5P    | 0273217771 |
| C22  | CAP. .01µF, 100V, 25V/Y5P    | 0273217771 |
| C23  | CAP. .01µF, 100V, 25V/Y5P    | 0273217771 |
| C24  | CAP. .01µF, 100V, 25V/Y5P    | 0273217771 |
| K1A  | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K1B  | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K1C  | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K2A  | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K2B  | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K2C  | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K3A  | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K3B  | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K3C  | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K4A  | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K4B  | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K7   | RELAY, REED, 24VDC, 2 FORM A | 1006070036 |
| K9   | RELAY, REED, 24VDC, FORM A   | 1006060031 |
| K10  | RELAY, REED, 24VDC, FORM A   | 1006060031 |

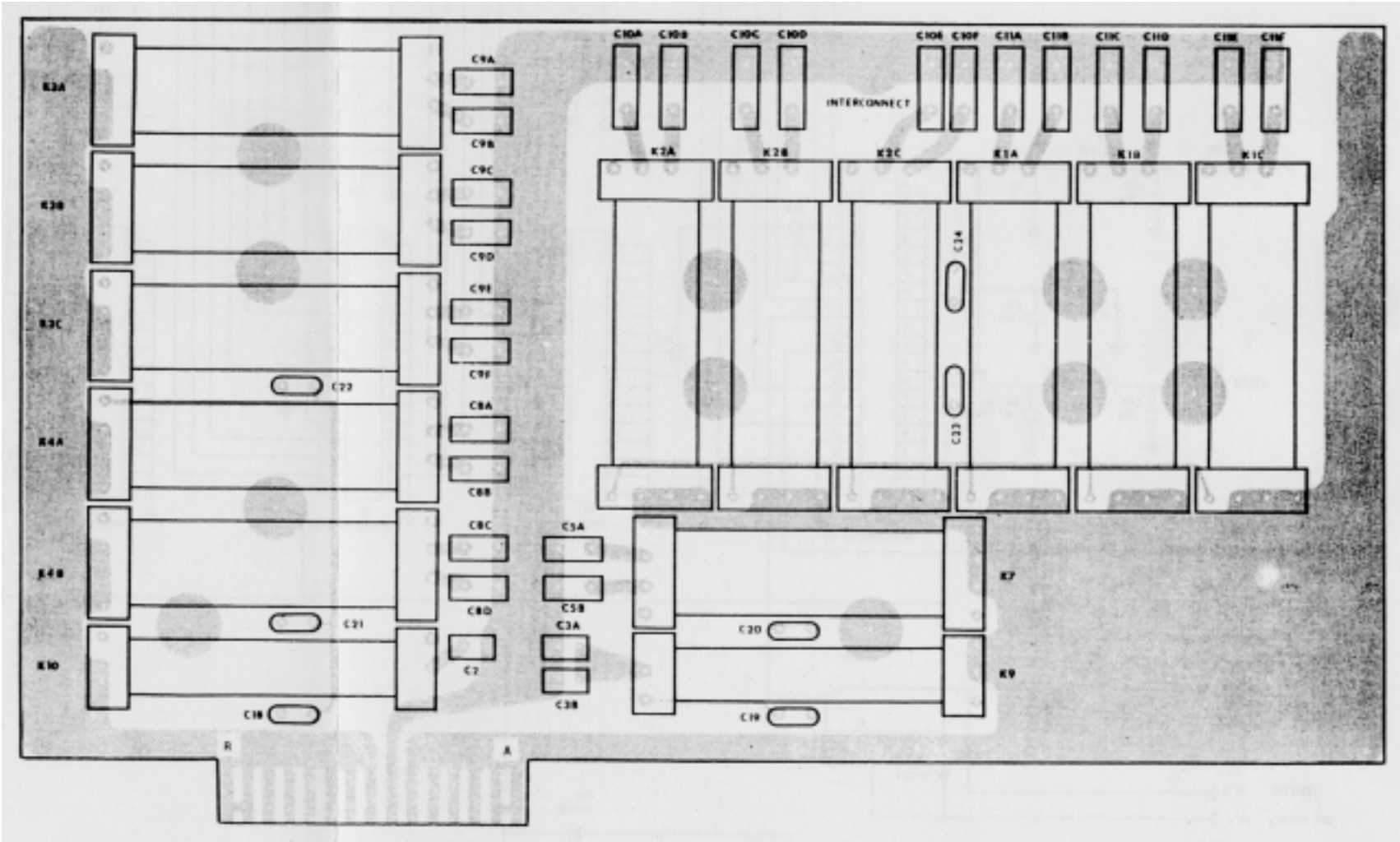
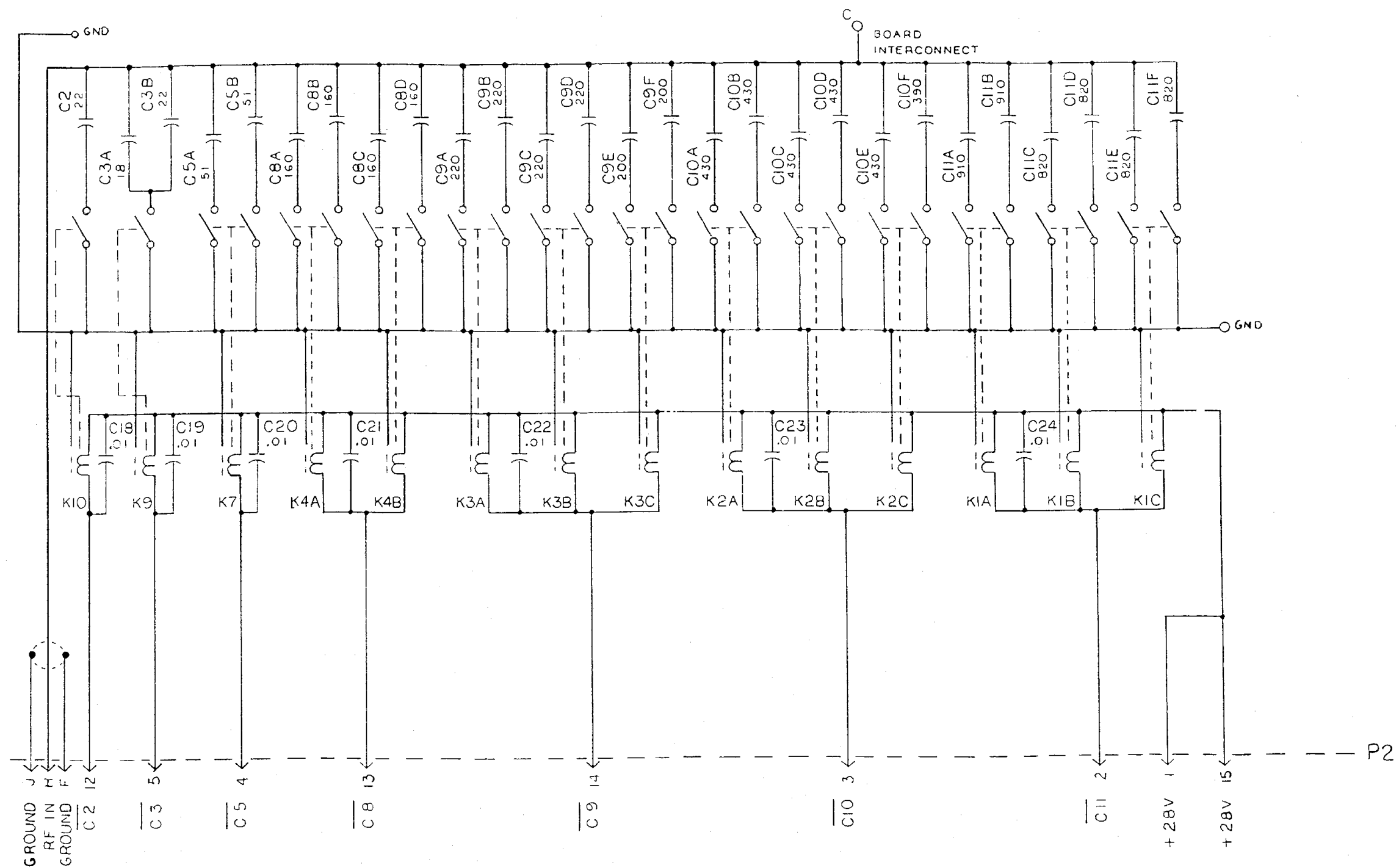


Figure 5.12 Input Board Assembly 2A2A1, page 1 of 2.



**NOTES** UNLESS OTHERWISE SPECIFIED:  
 1. DECIMAL CAPACITORS ARE IN MICROFARADS,  
 ALL OTHERS ARE IN PICO FARADS.  
 2. INDUCTORS ARE IN MICROHENRIES.

Figure 5.12 Input Board Assembly 2A2A1, page 2 of 2.

PC ASSY, INTERMEDIATE BOARD CU-9125 (2A2A2)

|     |                                |            |
|-----|--------------------------------|------------|
|     | PC ASSY, INTERMEDIATE BOARD    | 8080040095 |
| C1  | CAP. 10PF, 500V, DM10          | 0259830003 |
| C4A | CAP. 33PF, 500V, DM15, 2%      | 0281020001 |
| C4B | CAP. 33PF, 500V, DM15, 2%      | 0281020001 |
| C6A | CAP. 43PF, 500V, DM15, 2%      | 1001240031 |
| C6B | CAP. 43PF, 500V, DM15, 2%      | 1001240031 |
| C6C | CAP. 43PF, 500V, DM15, 2%      | 1001240031 |
| C6D | CAP. 43PF, 500V, DM15, 2%      | 1001240031 |
| C7A | CAP. 82PF, 500V, DM15, 2%      | 0281120005 |
| C7B | CAP. 82PF, 500V, DM15, 2%      | 0281120005 |
| C7C | CAP. 82PF, 500V, DM15, 2%      | 0281120005 |
| C7D | CAP. 75PF, 500V, DM15, 2%      | 0281110000 |
| C25 | CAP. .01μF, 100V, 25V/Y5P      | 0273217771 |
| C26 | CAP. .01μF, 100V, 25V/Y5P      | 0273217771 |
| C27 | CAP. .01μF, 100V, 25V/Y5P      | 0273217771 |
| C28 | CAP. .01μF, 100V, 25V/Y5P      | 0273217771 |
| C29 | CAP. .01μF, 100V, 25V/Y5P      | 0273217771 |
| C30 | CAP. .01μF, 100V, 25V/Y5P      | 0273217771 |
| C31 | CAP. .01μF, 100V, 25V/Y5P      | 0273217771 |
| C32 | CAP. .01μF, 100V, 25V/Y5P      | 0273217771 |
| C33 | CAP. .01μF, 100V, 25V/Y5P      | 0273217771 |
| K5A | RELAY, REED, 24VDC, 2 FORM A   | 1006070036 |
| K5B | RELAY, REED, 24VDC, 2 FORM A   | 1006070036 |
| K6A | RELAY, REED, 24VDC, 2 FORM A   | 1006070036 |
| K6B | RELAY, REED, 24VDC, 2 FORM A   | 1006070036 |
| K8  | RELAY, REED, 24VDC, 2 FORM A   | 1006070036 |
| K11 | RELAY, REED, 24VDC, FORM A     | 1006060031 |
| K12 | RELAY, REED, 24VDC, 2 FORM A   | 1006070036 |
| K13 | RELAY, REED, 24VDC, 2 FORM A   | 1006070036 |
| K14 | RELAY, REED, 24VDC, 2 FORM A   | 1006070036 |
| K15 | RELAY, REED, 24VDC, 2 FORM A   | 1006070036 |
| K16 | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| L2  | INDUCTOR, 0.02μH               | 8080041202 |
| L3  | INDUCTOR, 0.04μH               | 8080041300 |
| L4  | INDUCTOR, 0.08μH               | 8080041407 |
| L5  | INDUCTOR, 0.16μH               | 8080041504 |

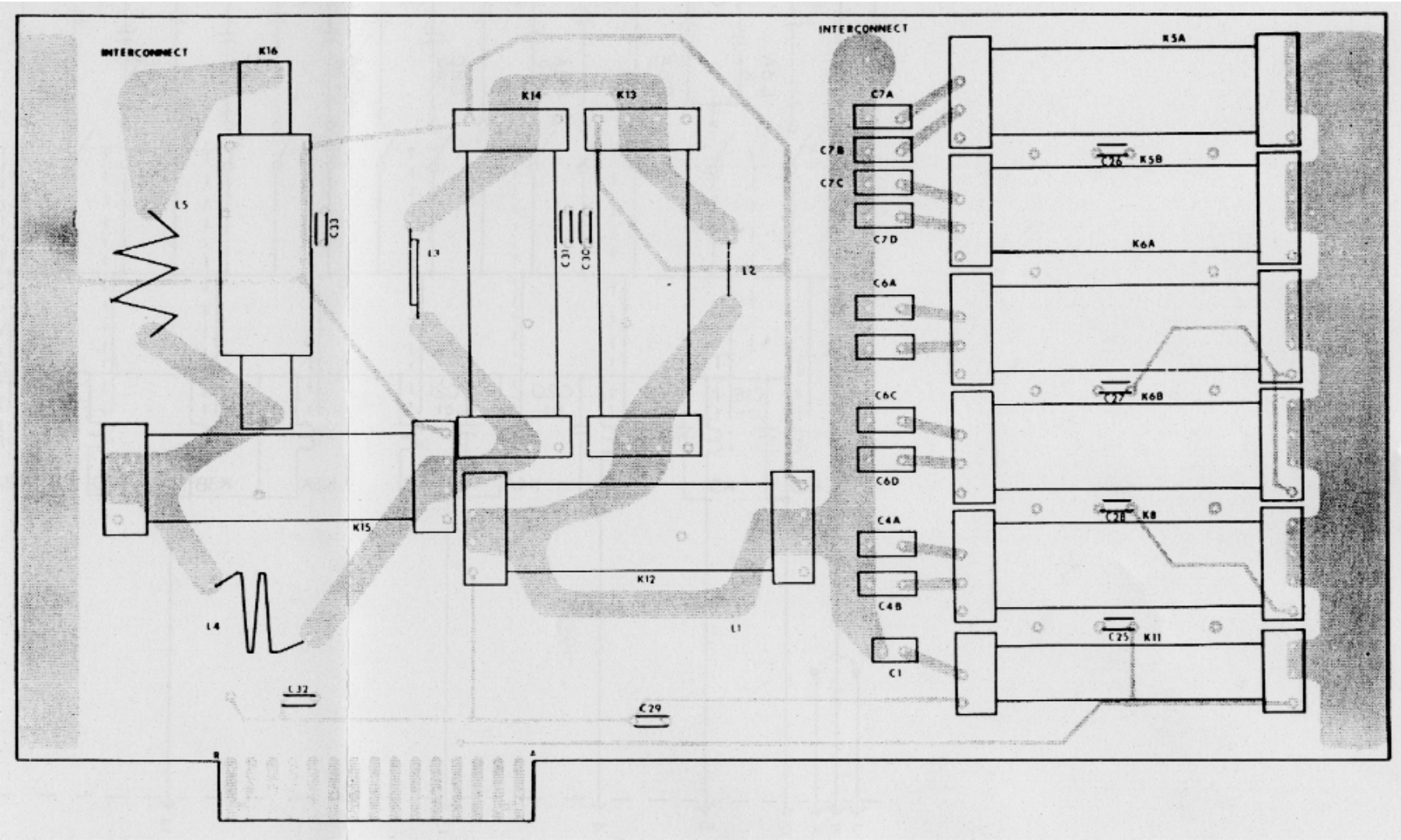
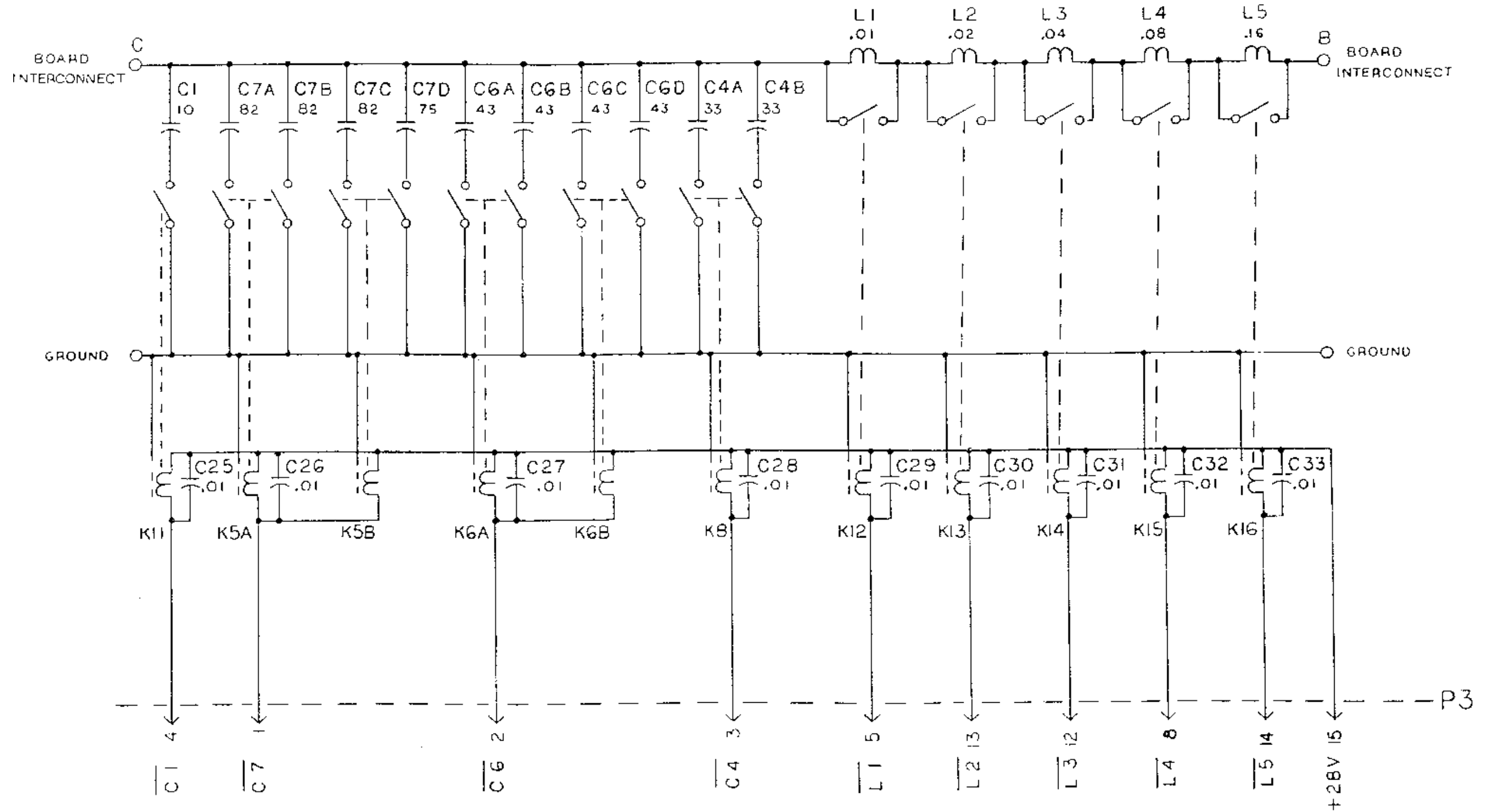


Figure 5.13 Intermediate Board Assembly 2A2A2, page 1 of 2.



NOTES, UNLESS OTHERWISE SPECIFIED:

1. DECIMAL CAPACITORS ARE IN MICROFARADS  
ALL OTHERS ARE IN PICOFARADS.

2. INDUCTORS ARE IN MICROHENRIES.

Figure 5.13 Intermediate Board Assembly 2A2A2, page 2 of 2.

| PC ASSY, INDUCTOR BOARD CU-9125 (2A2A3) |                                |            |
|-----------------------------------------|--------------------------------|------------|
| C12A                                    | PC ASSY, INDUCTOR BOARD        | 8080050091 |
| C12B                                    | CAP. 10PF, 3K0V NPO            | 0259690007 |
| C12C                                    | CAP. 10PF, 3K0V NPO            | 0259690007 |
| C34                                     | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| C35                                     | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| C36                                     | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| C37                                     | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| C38                                     | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| C39                                     | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| K17                                     | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| K18                                     | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| K19                                     | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| K20                                     | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| K21                                     | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| K22                                     | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| L6                                      | INDUCTOR, 0.35µH               | 8080050601 |
| L7                                      | INDUCTOR, 0.70µH               | 8080050708 |
| L8                                      | INDUCTOR, 1.33µH               | 8080050805 |
| L9                                      | INDUCTOR, 2.62µH               | 8080050902 |
| L10                                     | INDUCTOR, 5.64µH               | 8080051003 |

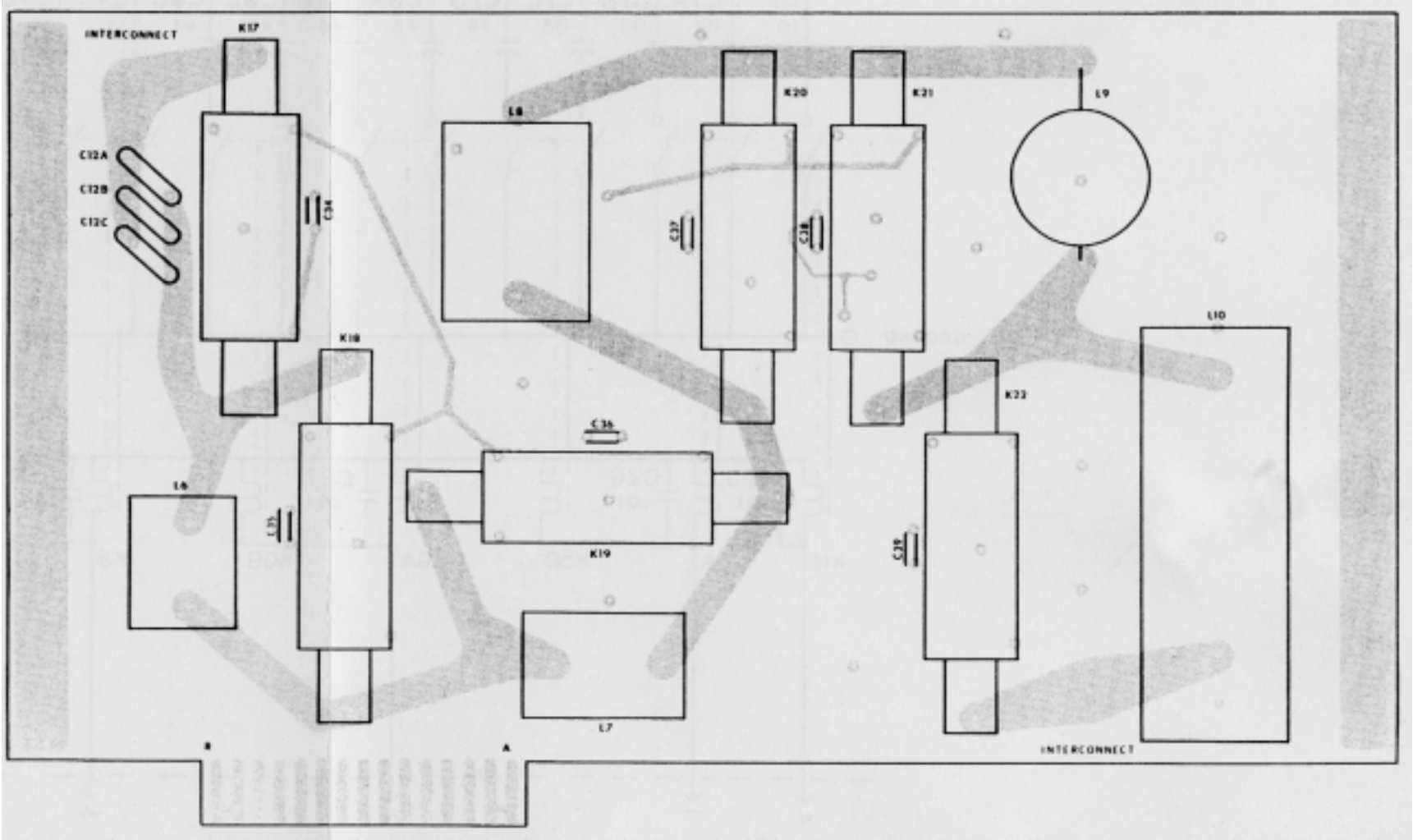
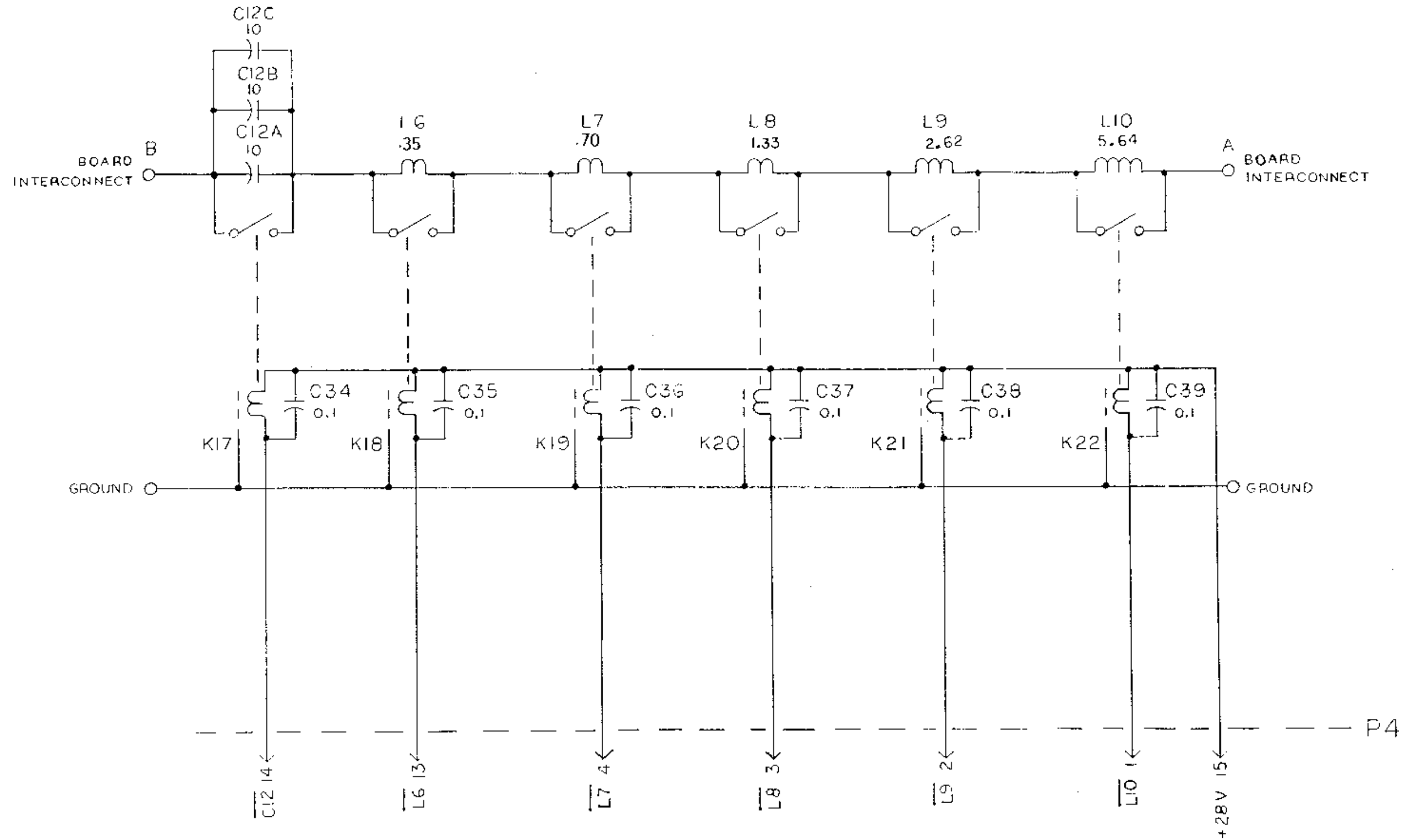


Figure 5.14 Inductor Board Assembly 2A2A3, page 1 of 2.



NOTES, UNLESS OTHERWISE SPECIFIED:

1. DECIMAL CAPACITORS ARE IN MICROFARADS,  
ALL OTHERS ARE IN PICOFARADS.

2. ALL INDUCTORS ARE IN MICROHENRIES.

Figure 5.14 Inductor Board Assembly 2A2A3, page 2 of 2.

| PC ASSY, OUTPUT BOARD CU-9125 (2A2A4) |                                |            |
|---------------------------------------|--------------------------------|------------|
| C13                                   | PC ASSY, OUTPUT BOARD          | 8080060096 |
| C14                                   | CAP. 50PF, 7.5KV, NPO          | 0290200008 |
| C15A                                  | CAP. 100PF, 5KV, N750          | 0290440009 |
| C15B                                  | CAP. 100PF, 5KV, N750          | 0290440009 |
| C16A                                  | CAP. 100PF, 5KV, N750          | 0290440009 |
| C16B                                  | CAP. 100PF, 5KV, N750          | 0290440009 |
| C16C                                  | CAP. 100PF, 5KV, N750          | 0290440009 |
| C16D                                  | CAP. 100PF, 5KV, N750          | 0290440009 |
| C17                                   | CAP. 75PF, 7.5KV, N750         | 0290560004 |
| C40                                   | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| C41                                   | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| C42                                   | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| C43                                   | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| C44                                   | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| C45                                   | CAP. 0.1µF, 50V, X7R, 20%      | 0281610002 |
| K23                                   | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| K24                                   | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| K25                                   | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| K26                                   | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| K27                                   | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| K28                                   | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| K29                                   | RELAY, REED, HV, 24V, 1 FORM A | 1005920001 |
| L11                                   | INDUCTOR,10.85µH               | 8080061106 |
|                                       | CLIP, ANTENNA                  | 8080060606 |

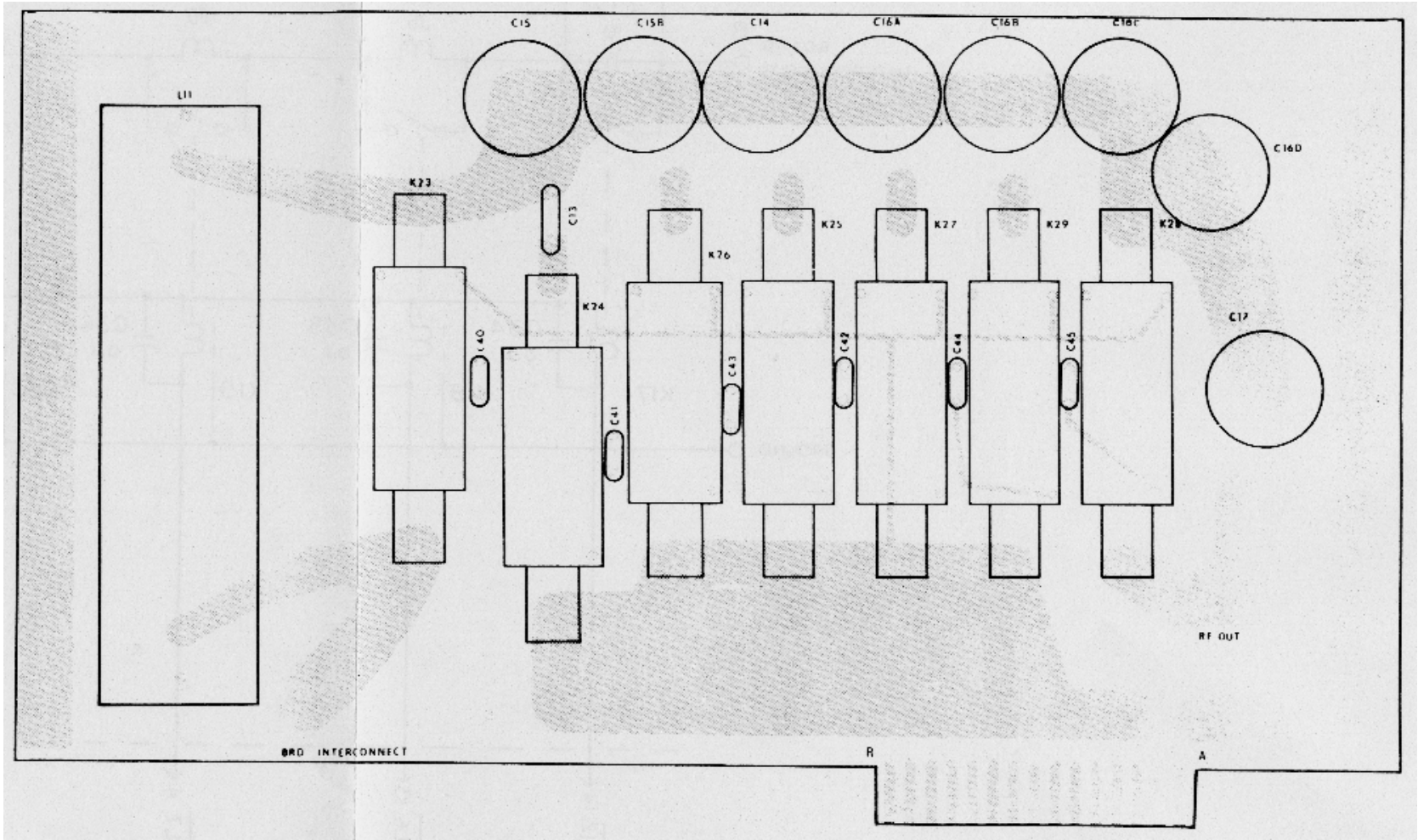
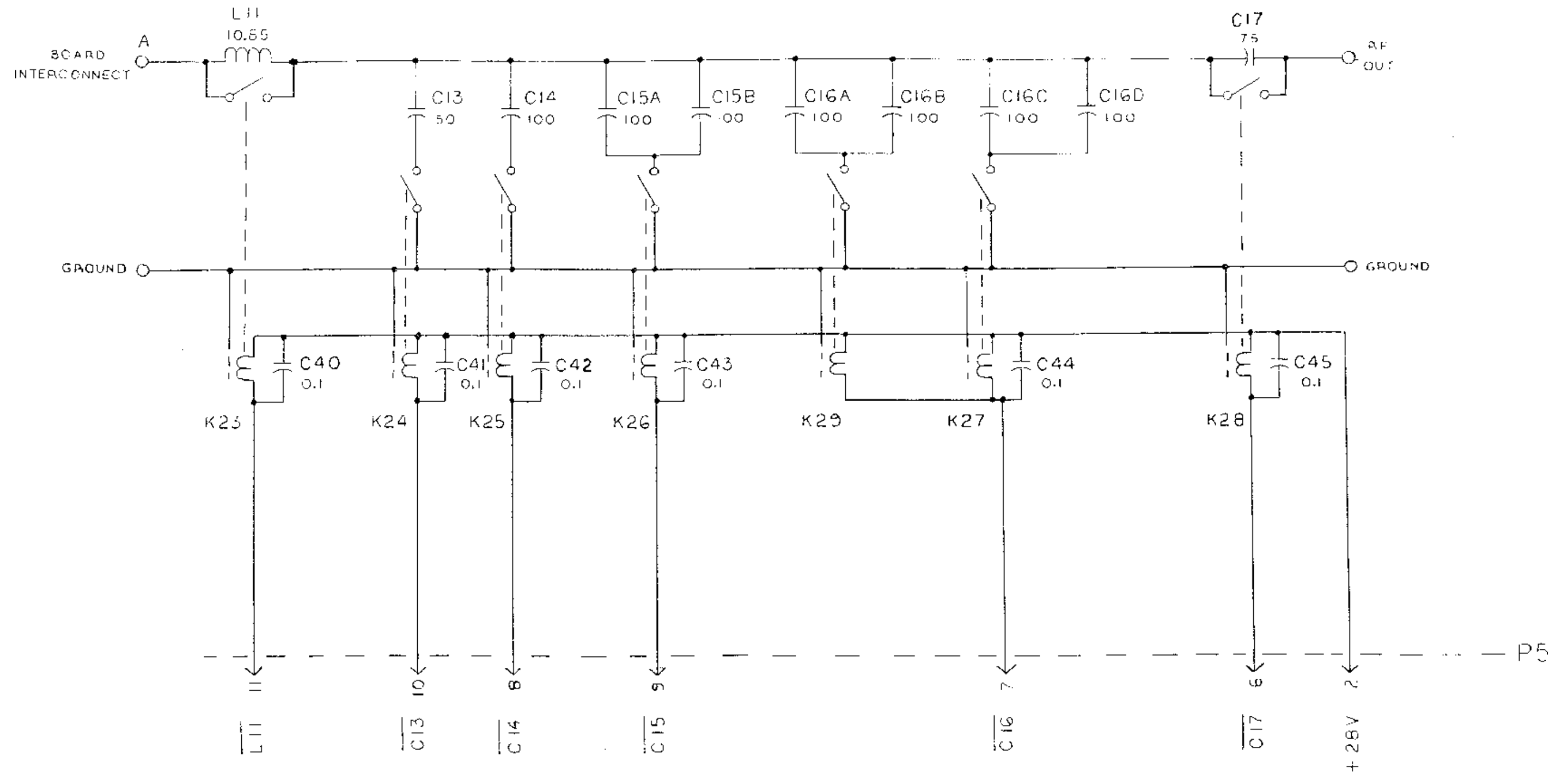


Figure 5.15 Output Board Assembly 2A2A4, page 1 of 2.



NOTES: UNLESS OTHERWISE SPECIFIED:

1. DECIMAL CAPACITORS ARE IN MICROFARADS,  
ALL OTHERS ARE IN PICO FARADS.
2. ALL INDUCTORS ARE IN MICROHENRIES.

Figure 5.15 Output Board Assembly 2A2A4, page 2 of 2.

## COMPUTER MODULE CU-9125 (2A3)

|     |                                    |            |
|-----|------------------------------------|------------|
| 2A3 | PC ASSY, COMPUTER BOARD            | 8085025094 |
| C1  | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C2  | CAP. .01 $\mu$ F, 50V, X7R 20%     | 0281730008 |
| C3  | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C4  | CAP. .01 $\mu$ F, 50V, X7R 20%     | 0281730008 |
| C5  | NOT USED                           | -          |
| C6  | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C7  | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C8  | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C9  | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C10 | NOT USED                           | -          |
| C11 | CAP. .01 $\mu$ F, 50V, X7R 20%     | 0281730008 |
| C12 | CAP. .01 $\mu$ F, 50V, X7R 20%     | 0281730008 |
| C13 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C14 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C15 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C16 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C17 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C18 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C19 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C20 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C21 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C22 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C23 | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| C24 | CAP. 6.8 $\mu$ F, 25V 20%          | 1005050031 |
| C25 | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| C26 | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| C27 | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| C28 | CAP. .01 $\mu$ F, 50V, X7R 20%     | 0281730008 |
| C29 | CAP. .01 $\mu$ F, 50V, X7R 20%     | 0281730008 |
| C30 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C31 | CAP. 0.001 $\mu$ F, 100V, X7R, 20% | 0281630003 |
| C32 | CAP. 0.001 $\mu$ F, 100V, X7R, 20% | 0281630003 |
| C33 | CAP. 0.001 $\mu$ F, 100V, X7R, 20% | 0281630003 |
| C34 | CAP. 0.001 $\mu$ F, 100V, X7R, 20% | 0281630003 |
| C35 | CAP. 0.001 $\mu$ F, 100V, X7R, 20% | 0281630003 |
| C36 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C37 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C38 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C39 | NOT USED                           | -          |
| C40 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C41 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C42 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C43 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C44 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C45 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C46 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C47 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C48 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C49 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C50 | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |

|        |                                    |            |
|--------|------------------------------------|------------|
| C51    | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C52    | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C53    | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C54    | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C55    | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C56-88 | NOT USED                           | -          |
| C89    | CAP. 1 $\mu$ F, 50V, 198D          | 0280910002 |
| C90    | CAP. 0.001 $\mu$ F, 100V, X7R, 20% | 0281630003 |
| C91    | CAP. 0.001 $\mu$ F, 100V, X7R, 20% | 0281630003 |
| C92    | NOT USED                           | -          |
| C93    | CAP. .01 $\mu$ F, 50V, X7R 20%     | 0281730008 |
| C94    | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| C95    | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| C96    | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| C97    | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| C98    | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| C99    | NOT USED                           | -          |
| C100   | NOT USED                           | -          |
| C101   | CAP. 6.8 $\mu$ F, 25V 20%          | 1005050031 |
| C102   | CAP. .01 $\mu$ F, 50V, X7R 20%     | 0281730008 |
| C103   | CAP. .01 $\mu$ F, 50V, X7R 20%     | 0281730008 |
| C104   | CAP. 1 $\mu$ F, 50V, 198D          | 0280910002 |
| C105   | CAP. 1 $\mu$ F, 50V, 198D          | 0280910002 |
| C106   | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C107   | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C108   | CAP. .01 $\mu$ F, 50V, X7R 20%     | 0281730008 |
| C109   | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C110   | CAP. 0.1 $\mu$ F, 50V, X7R, 20%    | 0281610002 |
| C111   | CAP. .01 $\mu$ F, 50V, X7R 20%     | 0281730008 |
| C112   | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| C113   | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| C114   | CAP. .47 $\mu$ F, 50V, X7R 20%     | 0283377771 |
| CP1    | CAP. NTWK, 8 PIN, .1 $\mu$ F       | 1007360003 |
| CP2    | CAP. NTWK, 8 PIN, .1 $\mu$ F       | 1007360003 |
| CP3    | CAP. NTWK, 8 PIN, .1 $\mu$ F       | 1007360003 |
| CP4    | CAP. NTWK, 8 PIN, .1 $\mu$ F       | 1007360003 |
| CP5    | CAP. NTWK, 8 PIN, .1 $\mu$ F       | 1007360003 |
| CR1    | DIODE, RECTIFIER 1N4004            | 0405180004 |
| CR2    | DIODE, RECTIFIER 1N4004            | 0405180004 |
| CR3    | DIODE, RECTIFIER 1N4004            | 0405180004 |
| CR4    | DIODE, RECTIFIER 1N4004            | 0405180004 |
| CR5    | DIODE, RECTIFIER 1N4004            | 0405180004 |
| CR6    | DIODE, RECTIFIER 1N4004            | 0405180004 |
| CR7    | DIODE, RECTIFIER 1N4004            | 0405180004 |
| CR8    | DIODE, HOT CARRIER 5082-2835       | 0405280009 |
| CR9    | DIODE, RECTIFIER 1N4004            | 0405180004 |
| CR10   | DIODE, ZENER 1N5349A               | 0405380003 |
| CR11   | NOT USED                           | -          |
| CR12   | NOT USED                           | -          |
| CR13   | NOT USED                           | -          |
| CR14   | NOT USED                           | -          |

Figure 5.16 Computer Board Assembly 2A3, page 1 of 6.

|      |                                   |            |
|------|-----------------------------------|------------|
| CR15 | DIODE, RECTIFIER 1N4004           | 0405180004 |
| CR16 | DIODE, HOT CARRIER 1N6263         | 0405610009 |
| CR17 | DIODE, HOT CARRIER 1N6263         | 0405610009 |
| CR18 | DIODE, SIGNAL, SIL. 1N4454        | 0405270003 |
| CR19 | DIODE, SIGNAL, SIL. 1N4454        | 0405270003 |
| L1   | INDUCTOR, MOLDED, 22 $\mu$ H, 10% | 0664060005 |
| L2   | INDUCTOR, MOLDED, 22 $\mu$ H, 10% | 0664060005 |
| L3   | INDUCTOR, MOLDED, 22 $\mu$ H, 10% | 0664060005 |
| L4   | INDUCTOR, MOLDED, 22 $\mu$ H, 10% | 0664060005 |
| L5   | INDUCTOR, MOLDED, 22 $\mu$ H, 10% | 0664060005 |
| L6   | INDUCTOR, MOLDED, 22 $\mu$ H, 10% | 0664060005 |
| L7   | INDUCTOR, MOLDED, 22 $\mu$ H, 10% | 0664060005 |
| L8   | INDUCTOR, MOLDED, 22 $\mu$ H, 10% | 0664060005 |
| Q1   | TRANSISTOR, NPN, SI. 2N2222A      | 0448580004 |
| Q2   | TRANSISTOR, NPN, SI. 2N4124       | 0448010003 |
| Q3   | NOT USED                          | -          |
| Q4   | NOT USED                          | -          |
| Q5   | TRANSISTOR, P-CH, FET 2N5461      | 0446160008 |
| R1   | RESISTOR 6.8K, 5%, 1/8W           | 1010806823 |
| R2   | RESISTOR 6.8K, 5%, 1/8W           | 1010806823 |
| R3   | RESISTOR 100, 5%, 1/8W            | 1010801015 |
| R4   | RESISTOR 2.2K, 5%, 1/8W           | 1010802224 |
| R5   | RESISTOR 10K, 1%, 1/8W            | 1003050026 |
| R6   | POT. 5K, 10% 3/4W, 15 TURNS       | 0338490086 |
| R7   | RESISTOR 12K, 10%, 1/4W           | 0183180003 |
| R8   | RESISTOR 4.7K, 5%, 1/8W           | 1010804723 |
| R9   | RESISTOR 100K, 5%, 1/8W           | 1010801040 |
| R10  | RESISTOR 4.7K, 5%, 1/8W           | 1010804723 |
| R11  | RESISTOR 100K, 5%, 1/8W           | 1010801040 |
| R12  | RESISTOR 22M, 10%, 1/4W           | 0180950002 |
| R13  | RESISTOR 22M, 10%, 1/4W           | 0180950002 |
| R14  | RESISTOR 6.8K, 5%, 1/8W           | 1010806823 |
| R15  | RESISTOR 6.8K, 5%, 1/8W           | 1010806823 |
| R16  | RESISTOR 100, 5%, 1/8W            | 1010801015 |
| R17  | RESISTOR 2.2K, 5%, 1/8W           | 1010802224 |
| R18  | RESISTOR 10K, 1%, 1/8W            | 1003050026 |
| R19  | POT. 5K, 10% 3/4W, 15 TURNS       | 0338490086 |
| R20  | RESISTOR 12K, 10%, 1/4W           | 0183180003 |
| R21  | RESISTOR 4.7K, 5%, 1/8W           | 1010804723 |
| R22  | RESISTOR 100K, 5%, 1/8W           | 1010801040 |
| R23  | RESISTOR 4.7K, 5%, 1/8W           | 1010804723 |
| R24  | RESISTOR 100K, 5%, 1/8W           | 1010801040 |
| R25  | RESISTOR 22M, 10%, 1/4W           | 0180950002 |
| R26  | RESISTOR 22M, 10%, 1/4W           | 0180950002 |
| R27  | NOT USED                          | -          |
| R28  | RESISTOR 220, 10%, 1/2W           | 0172850002 |
| R29  | RESISTOR 220, 10%, 1/2W           | 0172850002 |
| R30  | NOT USED                          | -          |
| R31  | RESISTOR 80.6, 1%, 1/8W           | 0195200004 |
| R32  | RESISTOR 8.45K 1%, 1/8W           | 1005900001 |
| R33  | RESISTOR 604, 1%, 1/8W            | 0193980002 |

|     |                               |            |
|-----|-------------------------------|------------|
| R34 | RESISTOR 6.8K, 5%, 1/8W       | 1010806823 |
| R35 | RESISTOR 22K, 5%, 1/8W        | 1010802232 |
| R36 | RESISTOR 10, 5%, 1/4W         | 0177160004 |
| R37 | RESISTOR 1K, 5%, 1/8W         | 1010801023 |
| R38 | RESISTOR 1K, 5%, 1/8W         | 1010801023 |
| R39 | NOT USED                      | -          |
| R40 | RESISTOR 1K, 5%, 1/8W         | 1010801023 |
| R41 | RESISTOR 47K, 5%, 1/8W        | 1010804731 |
| R42 | RESISTOR 22K, 5%, 1/8W        | 1010802232 |
| R43 | POT. 100K, 10% 3/4W, 15 TURNS | 0338490051 |
| R44 | RESISTOR 15K, 5%, 1/8W        | 1010801538 |
| R45 | RESISTOR 15K, 5%, 1/8W        | 1010801538 |
| R46 | RESISTOR 2.2M, 10%, 1/4W      | 0176870008 |
| R47 | RESISTOR 4.7K, 5%, 1/8W       | 1010804723 |
| R48 | NOT USED                      | -          |
| R49 | RESISTOR 8.45K 1%, 1/8W       | 1005900001 |
| R50 | NOT USED                      | -          |
| R51 | NOT USED                      | -          |
| R52 | NOT USED                      | -          |
| R53 | NOT USED                      | -          |
| R54 | RESISTOR 1K, 5%, 1/8W         | 1010801023 |
| R55 | RESISTOR 3.9K, 5%, 1/8W       | 1010803921 |
| R56 | NOT USED                      | -          |
| R57 | RESISTOR 8.2K, 5%, 1/4W       | 0181620006 |
| R58 | RESISTOR 15K, 5%, 1/8W        | 1010801538 |
| R59 | NOT USED                      | -          |
| R60 | RESISTOR 39K, 5%, 1/8W        | 1010803930 |
| R61 | POT. 5K, 10% 3/4W, 15 TURNS   | 0338490086 |
| R62 | RESISTOR 100K, 5%, 1/8W       | 1010801040 |
| R63 | RESISTOR 100K, 5%, 1/8W       | 1010801040 |
| R64 | RESISTOR 39K, 5%, 1/8W        | 1010803930 |
| R65 | RESISTOR 100K, 5%, 1/8W       | 1010801040 |
| R66 | POT. 5K, 10% 3/4W, 15 TURNS   | 0338490086 |
| R67 | RESISTOR 10K, 5%, 1/8W        | 1010801031 |
| R68 | RESISTOR 100K, 5%, 1/8W       | 1010801040 |
| R69 | RESISTOR 39K, 5%, 1/8W        | 1010803930 |
| R70 | RESISTOR 470, 5%, 1/8W        | 1010804715 |
| R71 | RESISTOR 15K, 5%, 1/8W        | 1010801538 |
| R72 | RESISTOR 15K, 5%, 1/8W        | 1010801538 |
| R73 | RESISTOR 4.7K, 5%, 1/8W       | 1010804723 |
| R74 | RESISTOR 15K, 5%, 1/8W        | 1010801538 |
| RP1 | RES NTWK 6 PIN SIP 10K COM    | 1006130004 |
| RP2 | RES NTWK 10 PIN SIP 10K COM   | 1006130021 |
| RP3 | RES NTWK 10 PIN SIP 10K COM   | 1006130021 |
| TP1 | VERTICAL JACK, WHITE          | 1006200029 |
| TP2 | VERTICAL JACK, WHITE          | 1006200029 |
| TP3 | VERTICAL JACK, WHITE          | 1006200029 |
| TP4 | VERTICAL JACK, WHITE          | 1006200029 |
| TP5 | VERTICAL JACK, WHITE          | 1006200029 |
| TP6 | VERTICAL JACK, WHITE          | 1006200029 |
| TP7 | VERTICAL JACK, WHITE          | 1006200029 |

Figure 5.16 Computer Board Assembly 2A3, page 2 of 6.

|        |                               |            |            |
|--------|-------------------------------|------------|------------|
| U1     | IC. DIGITAL                   | 80C85A     | 1007400013 |
| U2     | IC. DIGITAL                   | 74HC138    | 1006480013 |
| U3     | IC. DIGITAL                   | 74HC373    | 1006480030 |
| U4     | EPROM, W/CU-9125 SOFTWARE     |            | 8085026899 |
| U5     | IC. DIGITAL                   | 81C55      | 1007390026 |
| U6     | IC. DIGITAL                   | 74HC374    | 1006450033 |
| U7     | IC. DIGITAL                   | 74HC374    | 1006450033 |
| U8     | IC. DIGITAL                   | 74HC32     | 1006470026 |
| U9     | IC. LINEAR                    | ULS2003R   | 1007410019 |
| U10    | IC. LINEAR                    | ULS2003R   | 1007410019 |
| U11    | IC. LINEAR                    | ULS2003R   | 1007410019 |
| U12    | IC. LINEAR                    | ULS2003R   | 1007410019 |
| U13    | IC. LINEAR                    | ULS2003R   | 1007410019 |
| U14    | IC. DIGITAL                   | X2816A     | 1009020005 |
| U15    | IC. DIGITAL                   | 74HC374    | 1006450033 |
| U16    | IC. DIGITAL                   | 74HC244    | 1006460039 |
| U17    | IC. LINEAR                    | UA747ADMQB | 1006430024 |
| U18    | IC. LINEAR                    | LM239AJ    | 1006430032 |
| U19    | IC. LINEAR                    | LM239AJ    | 1006430032 |
| U20    | IC. DIGITAL                   | 4584B      | 1005190011 |
| U21    | NOT USED                      |            | -          |
| U22    | IC. LINEAR                    | LM117      | 1006440011 |
| U23    | CRYSTAL, OSCILLATOR, 1.00 MHZ |            | 1006670025 |
| U24    | IC. DIGITAL                   | 74HC244    | 1006460039 |
| U25    | IC. DIGITAL                   | 74HC374    | 1006450033 |
| U26    | IC. DIGITAL                   | 74HC688    | 1009050001 |
| U27    | IC. DIGITAL                   | 74HC132    | 1007360020 |
| XU1    | SOCKET, IC, 40 PIN TAILLESS   |            | 1006620010 |
| XU2    | NOT USED                      |            | -          |
| XU3    | NOT USED                      |            | -          |
| XU4    | SOCKET, IC, 28 PIN TAILLESS   |            | 1006620001 |
| XU5    | SOCKET, IC, 40 PIN TAILLESS   |            | 1006620010 |
| XU6-13 | NOT USED                      |            | -          |
| XU14   | SOCKET, IC, 24 PIN            |            | 1006240021 |
|        | MOUNTING PAD, TRANSISTOR      |            | 0502710004 |
|        | HEAT SINK                     |            | 0840730004 |

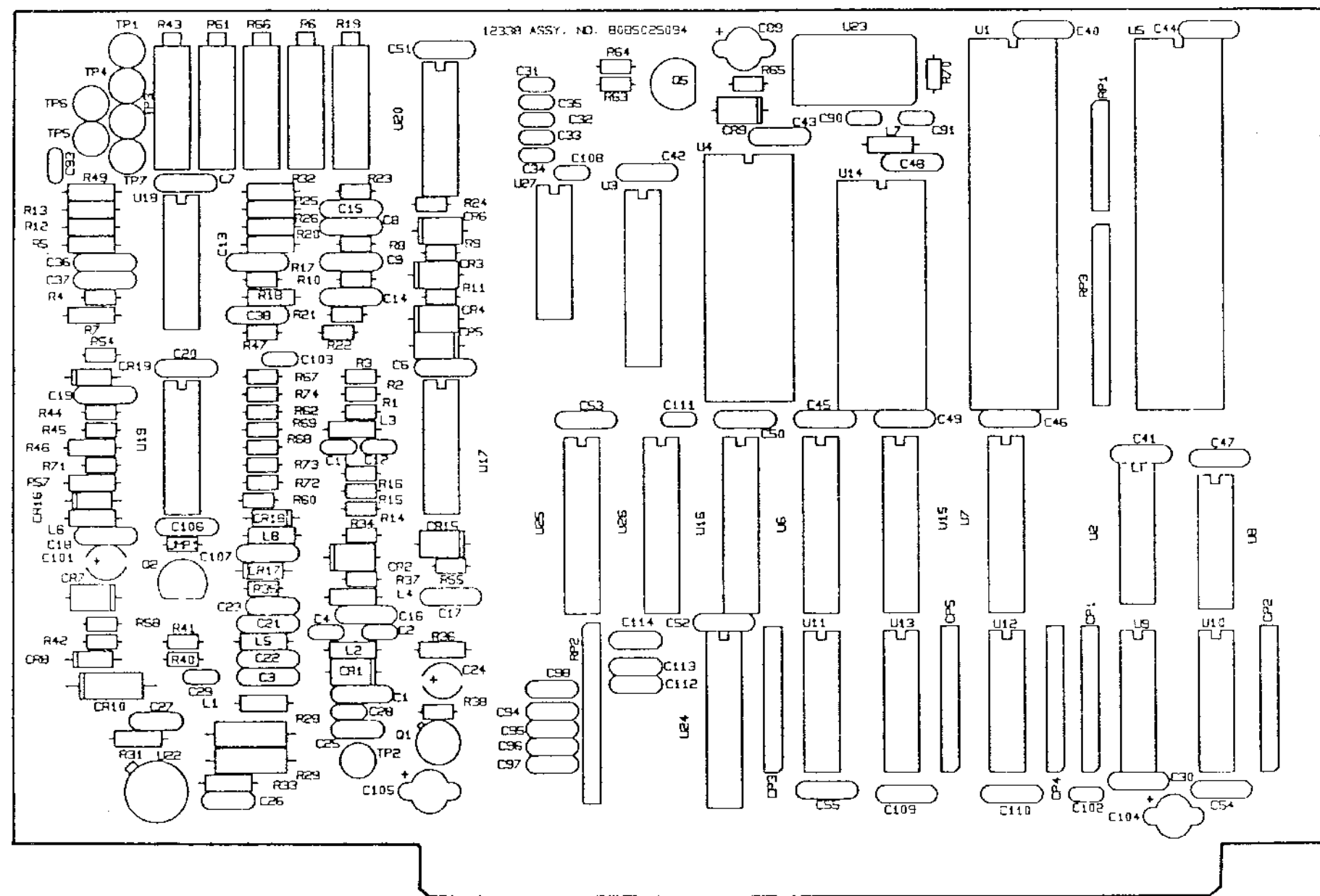


Figure 5.16 Computer Board Assembly 2A3, page 3 of 6.

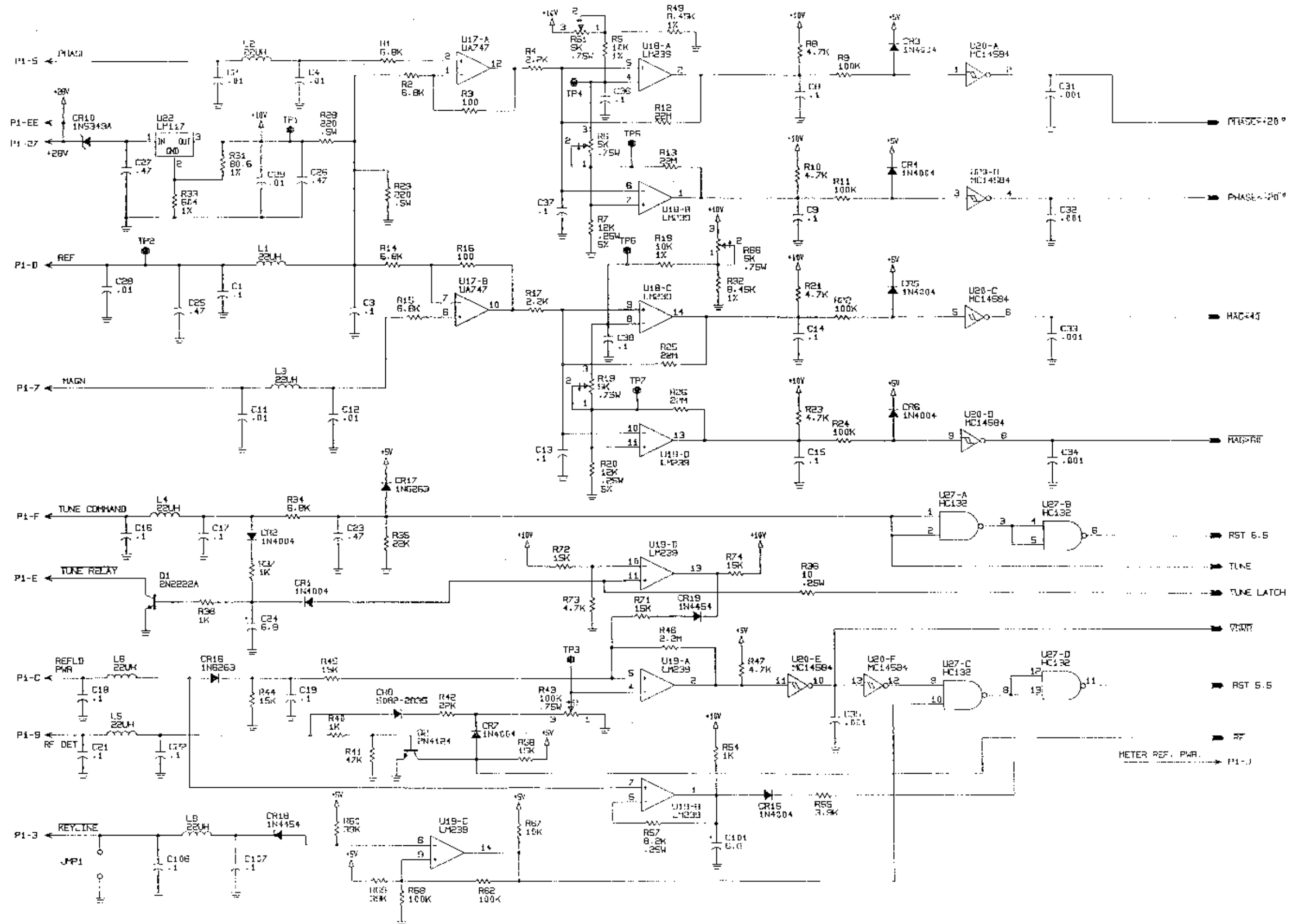


Figure 5.16 Computer Board Assembly 2A3, page 4 of 6.

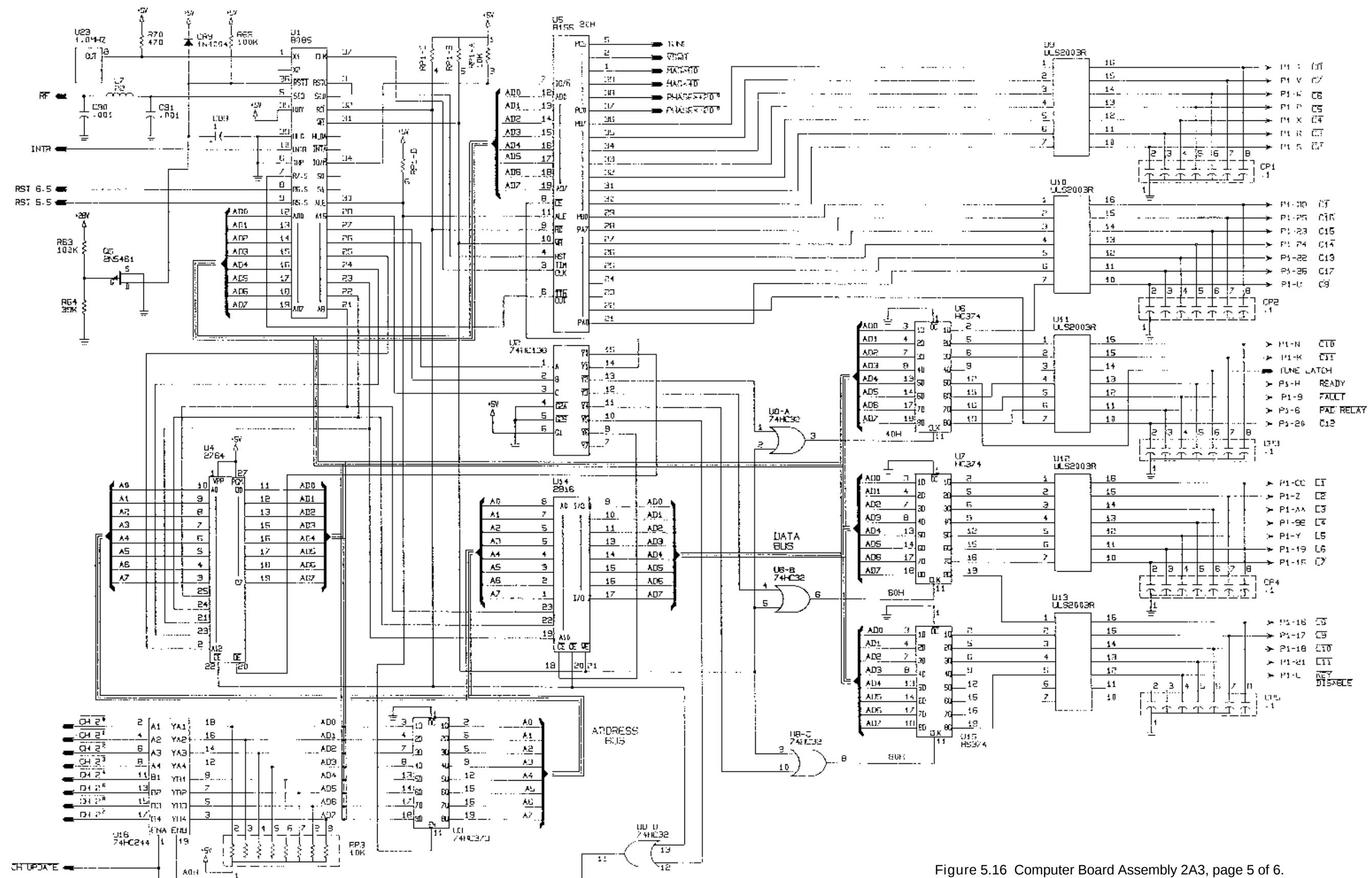


Figure 5.16 Computer Board Assembly 2A3, page 5 of 6.

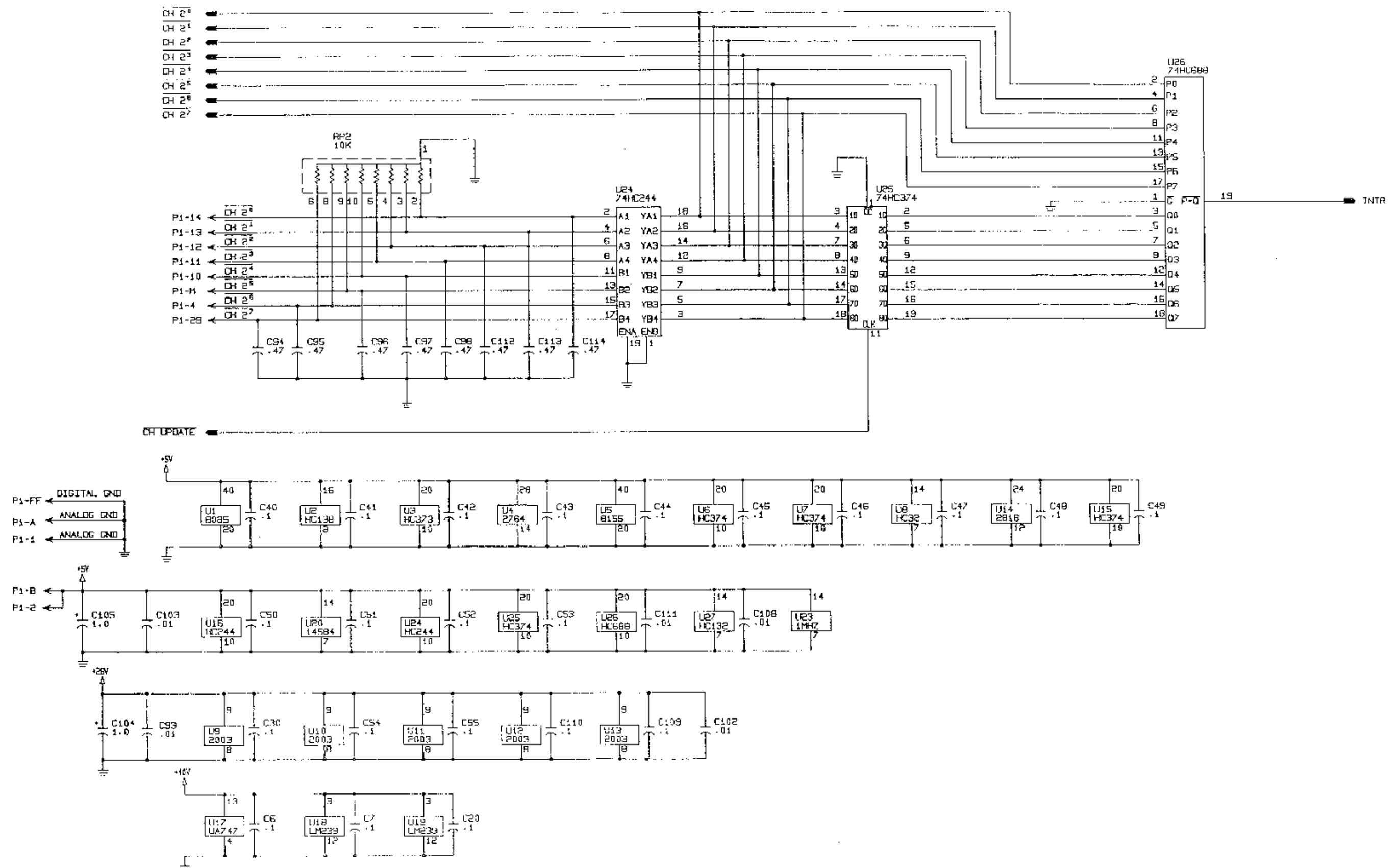
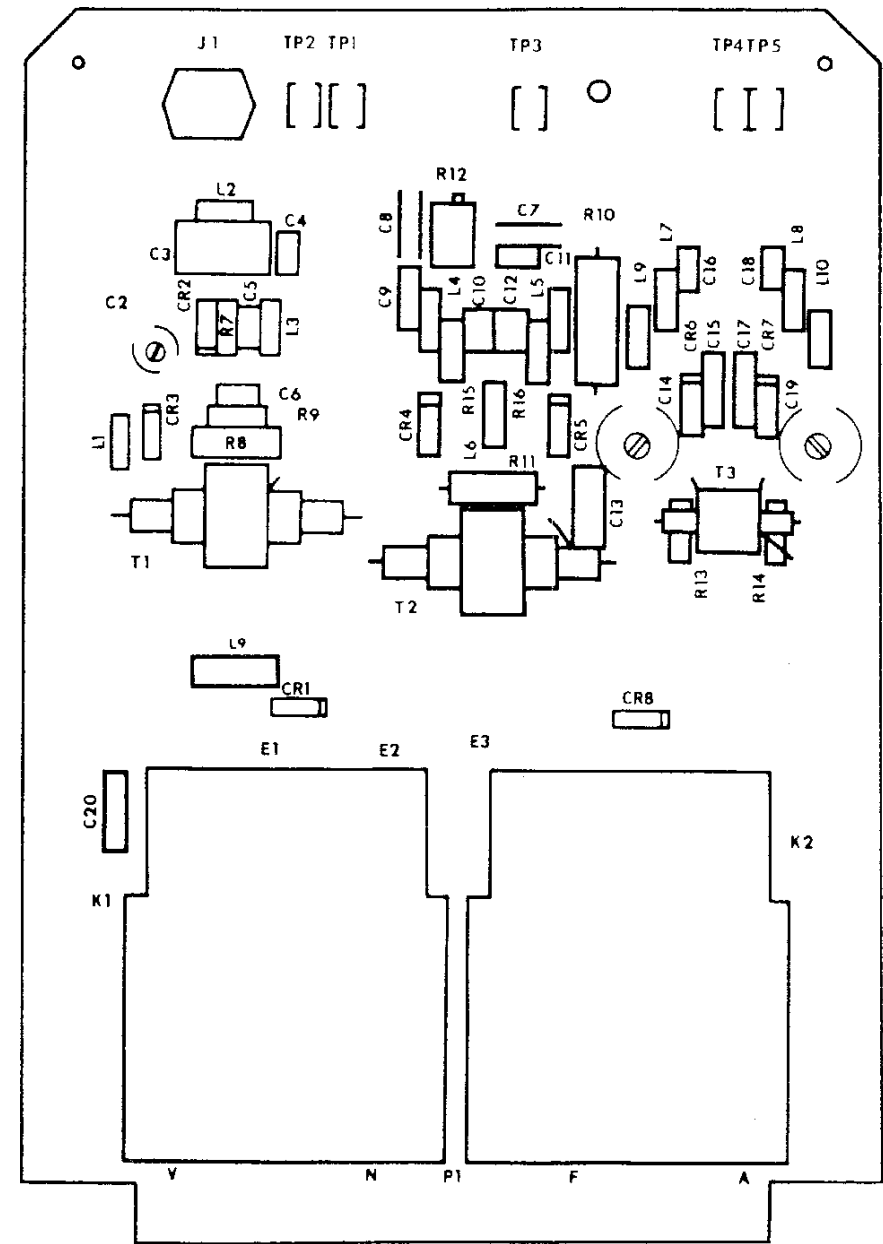


Figure 5.16 Computer Board Assembly 2A3, page 6 of 6.

| PC ASSEMBLY, DETECTOR CU-9125 (2A4A1) |                               |            |
|---------------------------------------|-------------------------------|------------|
|                                       | PC ASSY, DETECTOR/PAD         | 8056160094 |
| C2                                    | CAP. 5.5-18PF, 350V, NPO      | 1007160021 |
| C3                                    | CAP. 390PF, 500V, DM15, 5%    | 0286000008 |
| C4                                    | CAP. .01μF, 50V, X7R 20%      | 0281730008 |
| C5                                    | CAP. .01μF, 50V, X7R 20%      | 0281730008 |
| C6                                    | CAP. .01μF, 50V, X7R 20%      | 0281730008 |
| C7                                    | CAP. 0.1μF, 50V, X7R, 20%     | 0281610002 |
| C8                                    | CAP. 0.1μF, 50V, X7R, 20%     | 0281610002 |
| C9                                    | CAP. .47μF, 50V, X7R 20%      | 0283377771 |
| C10                                   | CAP. .01μF, 50V, X7R 20%      | 0281730008 |
| C11                                   | CAP. .01μF, 50V, X7R 20%      | 0281730008 |
| C12                                   | CAP. .01μF, 50V, X7R 20%      | 0281730008 |
| C13                                   | CAP. 12PF, 500V, DM15         | 1005320039 |
| C14                                   | CAP. 2-8PF, 350V, NPO         | 0268220000 |
| C15                                   | CAP. 91PF, 500V, DM15, 5%     | 0298740001 |
| C16                                   | CAP. .01UF, 50V, X7R 20%      | 0281730008 |
| C17                                   | CAP. 91PF, 500V, DM15, 5%     | 0298740001 |
| C18                                   | CAP. .01UF, 50V, X7R 20%      | 0281730008 |
| C19                                   | CAP. 2-8PF, 350V, NPO         | 0268220000 |
| C20                                   | CAP. 33PF, 500V, DM15, 2%     | 0281020001 |
| CR1                                   | DIODE, RECTIFIER 1N4004       | 0405180004 |
| CR2                                   | DIODE, HOT CARRIER 1N6263     | 0405610009 |
| CR3                                   | DIODE, HOT CARRIER 1N6263     | 0405610009 |
| CR4                                   | DIODE, HOT CARRIER 1N6263     | 0405610009 |
| CR5                                   | DIODE, HOT CARRIER 1N6263     | 0405610009 |
| CR6                                   | DIODE, HOT CARRIER 1N6263     | 0405610009 |
| CR7                                   | DIODE, HOT CARRIER 1N6263     | 0405610009 |
| CR8                                   | DIODE, RECTIFIER 1N4004       | 0405180004 |
| J1                                    | CONNECTOR, RF, SNAP-ON        | 1000170012 |
| K1                                    | RELAY, 4PDT, 24V, PC MT 7.5A  | 0661600009 |
| K2                                    | RELAY, 4PDT, 24V, PC MT 7.5A  | 0661600009 |
| L1                                    | INDUCTOR, MOLDED, 0.47μH, 5%  | 0649410009 |
| L2                                    | INDUCTOR, MOLDED, 1000μH, 10% | 0664940005 |
| L3                                    | INDUCTOR, MOLDED, 1000μH, 10% | 0664940005 |
| L4                                    | INDUCTOR, MOLDED, 1000μH, 10% | 0664940005 |
| L5                                    | INDUCTOR, MOLDED, 1000μH, 10% | 0664940005 |
| L6                                    | INDUCTOR, MOLDED, 1000μH, 10% | 0664940005 |
| L7                                    | INDUCTOR, MOLDED, 1000μH, 10% | 0664940005 |
| L8                                    | INDUCTOR, MOLDED, 1000μH, 10% | 0664940005 |
| R7                                    | RESISTOR 12K, 10%, 1/4W       | 0183180003 |
| R8                                    | RESISTOR 18, 5%, 1/2W         | 0184730007 |
| R9                                    | RESISTOR 12K, 10%, 1/4W       | 0183180003 |
| R10                                   | RESISTOR 100, 10%, 1W         | 0165540001 |
| R11                                   | RESISTOR 56, 10%, 1/2W        | 0168890003 |
| R12                                   | POT.,10K, 5%, 0.6W, 15 TURNS  | 0344410005 |
| R13                                   | RESISTOR 22, 10%, 1/4W        | 0192690001 |
| R14                                   | RESISTOR 22, 10%, 1/4W        | 0192690001 |
| R15                                   | RESISTOR 220, 10%, 1/4W       | 0171320000 |
| R16                                   | RESISTOR 220, 10%, 1/4W       | 0171320000 |
| T1                                    | TRANSFORMER, AMPL. DETECTOR   | 6035040802 |
| T2                                    | TRANSFORMER, PHASE DETECTOR   | 6035040900 |
| T3                                    | TRANSFORMER, CURRENT          | 8080003602 |

|     |                              |            |
|-----|------------------------------|------------|
| TP1 | TEST POINT, WHITE            | 0753640007 |
| TP2 | TEST POINT, WHITE            | 0753640007 |
| TP3 | TEST POINT, WHITE            | 0753640007 |
| TP4 | TEST POINT, WHITE            | 0753640007 |
| TP5 | TEST POINT, WHITE            | 0753640007 |
|     | SOCKET, RELAY, 4PDT CONTACTS | 0754700003 |
|     | SOCKET PIN                   | 1005990034 |
|     | SPRING, RELAY HOLD-DOWN      | 0881930008 |



| PCASSEMBLY, PADCU-9125 (2A4A2) |                       |            |
|--------------------------------|-----------------------|------------|
|                                | PC ASSY, PAD          | 8056161091 |
| E1                             | PIN, SWAGED           | 1005980039 |
| E2                             | PIN, SWAGED           | 1005980039 |
| E3                             | PIN, SWAGED           | 1005980039 |
| E4                             | PIN, SWAGED           | 1005980039 |
| R1                             | RESISTOR 50, 5%, 14W  | 0191160008 |
| R2                             | RESISTOR 50, 5%, 14W  | 0191160008 |
| R3                             | RESISTOR 50, 5%, 14W  | 0191160008 |
| R4                             | RESISTOR 50, 5%, 14W  | 0191160008 |
| R5                             | RESISTOR 200, 5%, 14W | 0197410006 |
| R6                             | RESISTOR 200, 5%, 14W | 0197410006 |

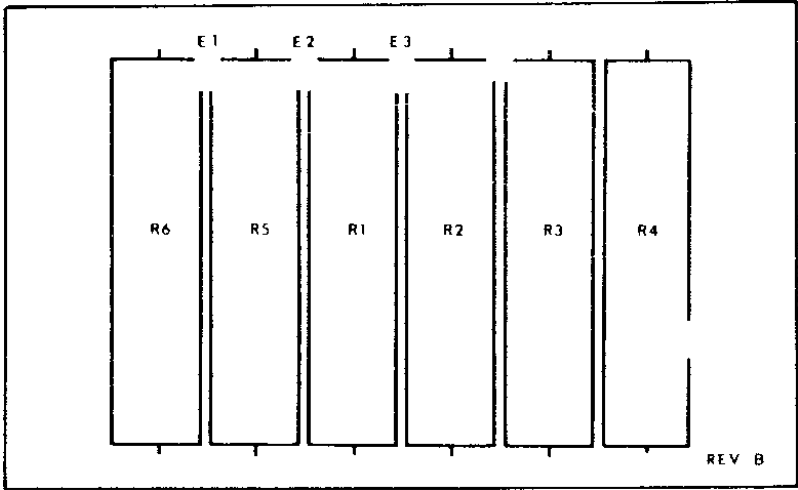


Figure 5.17 Detector Board Assembly 2A4A1, page 1 of 2.

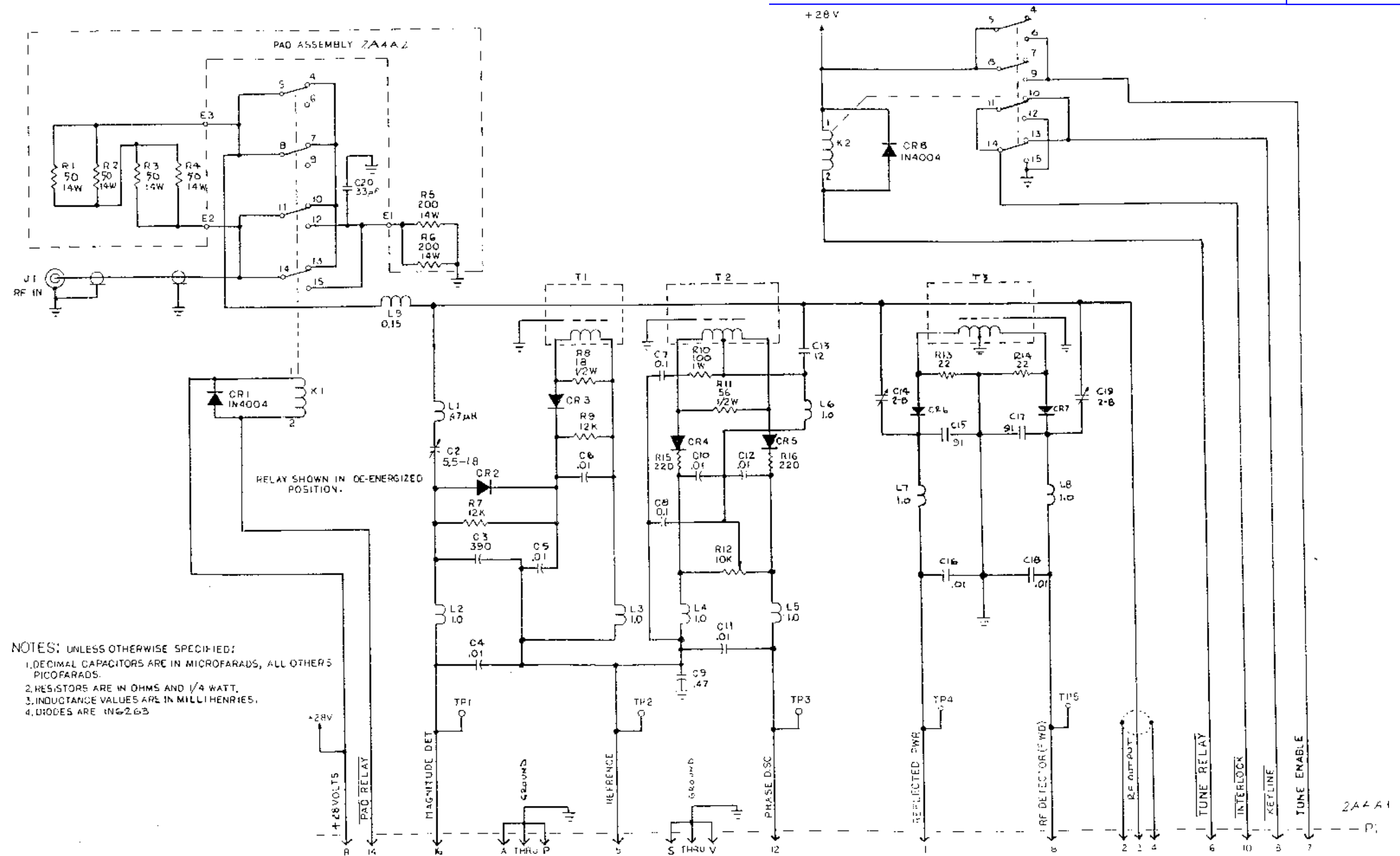


Figure 5.17 Detector Board Assembly 2A4A1, page 2 of 2.

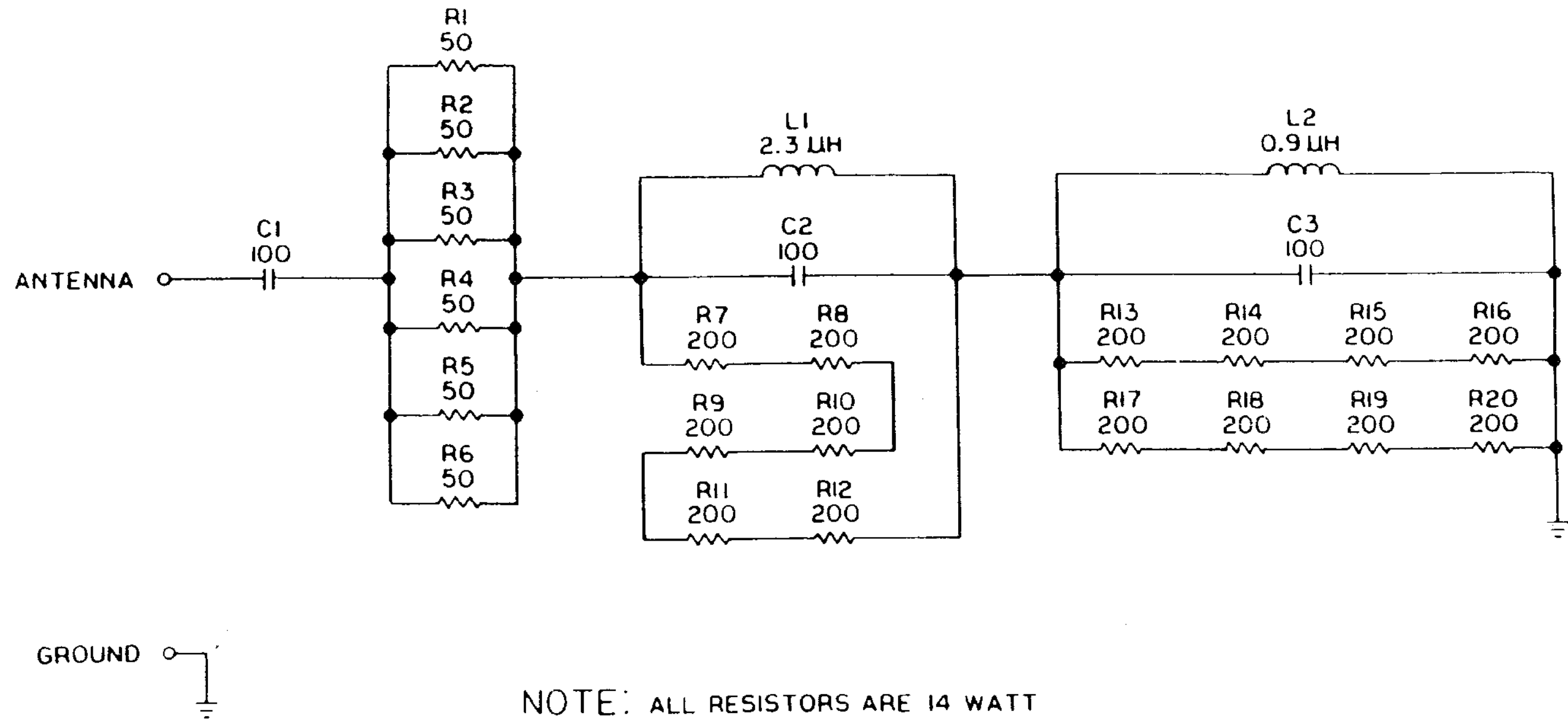


Figure 5.18 TS-100 Antenna Simulator Schematic.

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## SERVICE BULLETIN

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 **Sunair Electronics, Inc.**  
3005 S.W. Third Avenue  
Ft. Lauderdale, FL 33315-3389 U.S.A.

**Customer Services Department**  
**Telephone: (954) 525-1505**  
**Fax: (954) 765-1322**  
**Email: techsupport@sunairhf.com**

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**NUMBER:** CU-9125-002

**DATE:** 5 April 1996

**ATTENTION:** All Dealers and Customers.

**EQUIPMENT:** CU-9125 Digital Automatic Antenna Coupler.

**SUBJECT:** Use of coupler in salt air and salt water environment.

**REFERENCE:** Manual P/N 8085000709, Section V,  
Item, 5.2 PREVENTIVE MAINTENANCE, page 5-1.

**PURPOSE:** Reduce the effects of salt air and salt water to the front panel and case of the CU-9125.

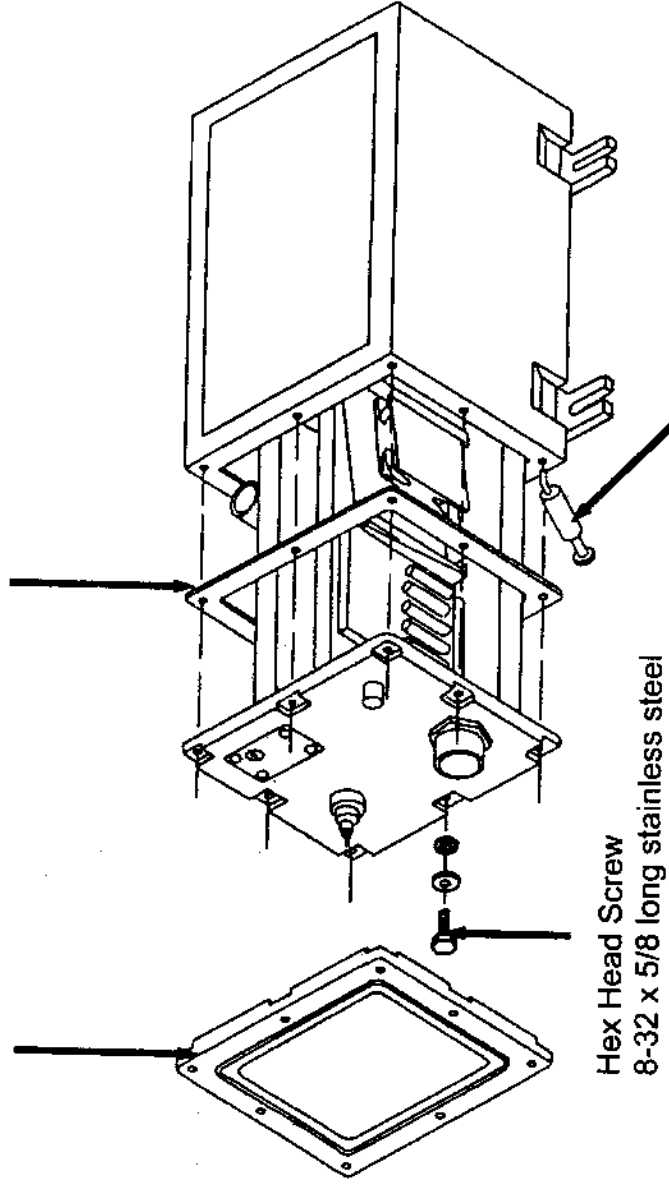
**TEXT:** When the CU-9125 Coupler is installed in a harsh environment (i.e. salt air/salt water), the following preventive maintenance procedures should be accomplished:

1. The complete outside of the coupler unit should be washed with fresh water every two (2) weeks.
2. Once a year open the coupler unit and remove the old gaskets. Clean the metal surface and groove in the front panel. Clean the metal mating surface on the case. Install a new "O" Ring Gasket P/N 1006320032 into the front panel and case. Reassemble coupler unit adding "Super Lube Corrosion Inhibitor", P/N 1013140001 to each of the eight mounting holes in case. Torque each of the eight, 8-32 x 5/8 black screws to 15 inch pounds. See Figure 1.
3. Anytime the coupler unit is opened new Gaskets should be installed prior to reassembling the coupler unit.

This Service Bulletin and Figure 1 should be inserted in front of Section V of the CU-9125 Manual. This information will be incorporated in the next Manual revision.

"O" Ring Gasket P/N 1006320032  
install on rear of Front Panel.

Flat Neoprene Gasket  
P/N 8085012006



Hex Head Screw  
8-32 x 5/8 long stainless steel  
P/N 0534850103 with  
Flat Washer #8 stainless steel P/N  
0500210004 and Lock Washer #8  
internal tooth stainless steel  
P/N 0500130001 at Eight places.

Note: When tightening screws,  
move back and forth across  
Front Panel starting with the middle  
screws, then moving to the corners.  
Tighten twice, first until screw first  
engages Front Panel. Second,  
using torque wrench, set at 15 inch  
pounds.

Super Lube Corrosion Inhibitor,  
P/N 1013140001. Fill each mounting  
hole to a depth of approximately 1/4".  
Remove excess lube from front  
surface of enclosure.

Figure 1