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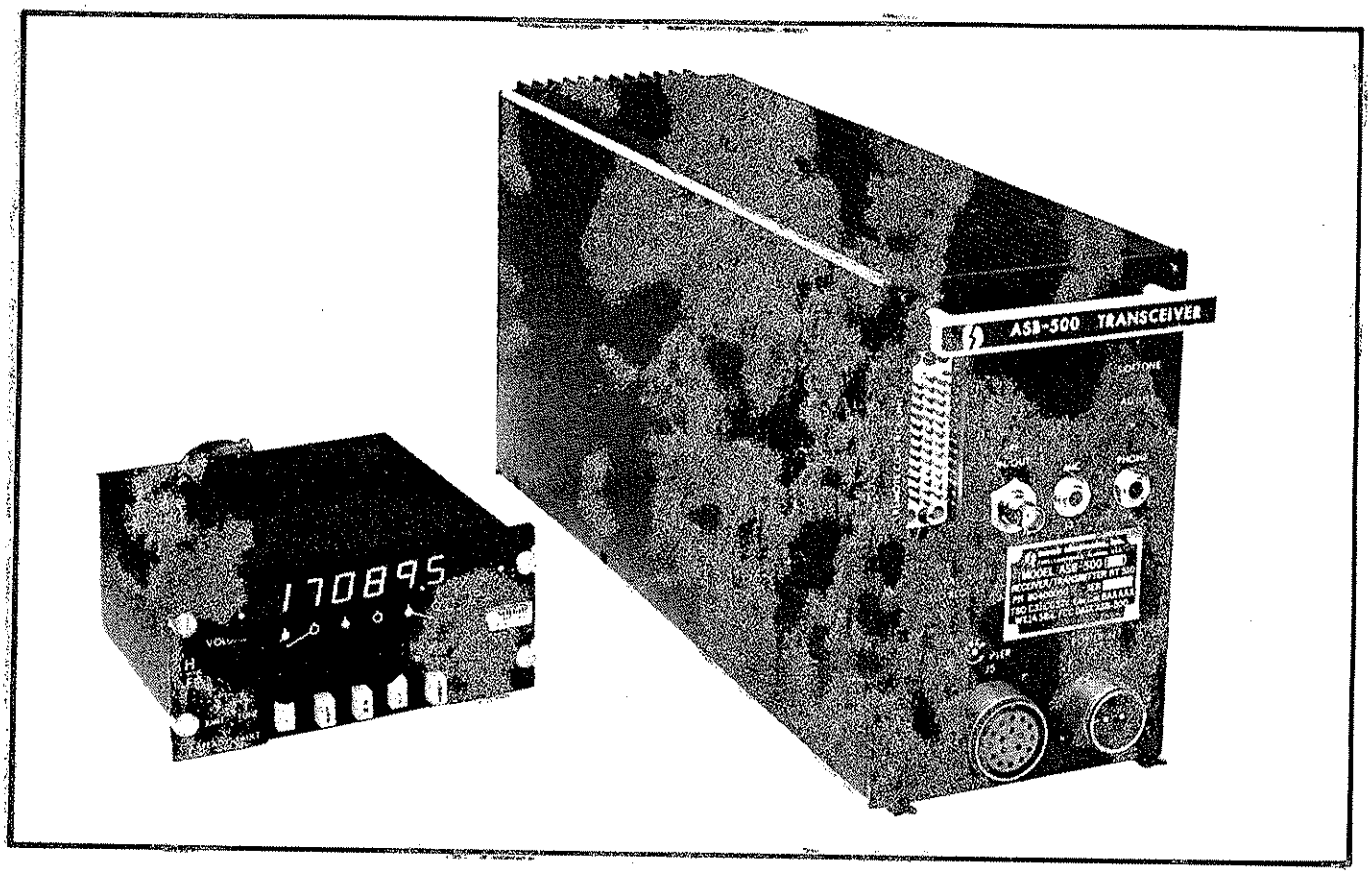

OPERATION AND MAINTENANCE MANUAL

ASB-500

AIRBORNE TRANSCEIVER

HF/SSB SYNTHESIZED SYSTEM

ACU-150D SUPPLEMENT INCLUDED
THIRD EDITION 1 OCTOBER 1985
MANUAL PART NUMBER 8040000700

TRAINING PROGRAMS

Sunair offers Training Programs of varying lengths to cover operation, service, and maintenance of all Sunair manufactured equipment. Up to eight technicians can be accomodated in these programs.

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IN CASE OF DIFFICULTY

If your Sunair Electronics, Inc. equipment, develops a malfunction, please follow the steps outlined below to expedite your equipment repair.

1. Note all of the symtoms of the problem, i.e, when does it occur; how often; which modes of operation work, which do not; and anything else which might assist in problem solving.
2. Note model number and serial number.
3. When and from whom (dealer, representative or factory) equipment was acquired.
4. Note peripheral equipment being used in conjunction with the Sunair equipment. Is the peripheral equipment working properly?

After determining the answers to the above, contact your dealer or representative and discuss the problem with him, he may be able to fix the problem locally, avoiding shipping delays. If it becomes necessary to return the equipment to the factory, please follow the procedures outlined in Section II of this manual.

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TABLE OF CONTENTS

SECTION		PAGE
I	**GENERAL INFORMATION**	
1.1	Scope	1-1
1.2	Transceiver Description	1-1
1.3	Technical Specifications	1-2
1.4	Equipment Supplied	1-4
1.5	Equipment Required But Not Supplied	1-4
1.6	Optional Equipment - Not Supplied	1-5
II	**INSTALLATION**	
2.1	General	2-1
2.2	Unpacking and Inspection	2-1
2.3	Reshipping Information	2-1
2.4	General Installation and Mounting Information	2-2
2.5	Power Requirements	2-2
2.6	Grounding Requirements	2-2
2.7	Cable Fabrication	2-2
2.8	Antenna Installation	2-5
2.9	Selcal Operation	2-12
III	**OPERATION**	
3.1	System Controls and Connectors	3-1
3.2	Checks After Installation	3-3
IV	**THEORY OF OPERATION**	
4.1	General	4-1
4.2	Synthesizer Board - 1A6	4-1
4.3	First Mixer Board - 1A5	4-4
4.4	Second Mixer Board - 1A4	4-6
4.5	Audio Board - 1A3	4-8
4.6	Mother Board - 1A1A1	4-10
4.7	PA Filter Module - 1A7	4-10
4.8	RF Power Amplifier - 1A2	4-12
4.9	Remote Control - 2A	4-13
V	**MAINTENANCE AND REPAIR**	
5.1	General	5-1
5.2	Preventive Maintenance	5-1
5.3	Cover Removal	5-1
5.4	Performance Test	5-1
5.5	Synthesizer	5-5
5.6	Receiver Alignment	5-12
5.7	Transmitter Alignment	5-13
5.8	Remote Control	5-15
5.9	Fault Analysis Table	5-16
5.10	Module Removal	5-19
5.11	Remote Control Board Removal	5-22
5.12	Schematic Diagrams	5-32
VI	**SUPPLEMENTAL INFORMATION ACU-150D HIGH SPEED DIGITAL COUPLER**	
I	**GENERAL INFORMATION**	
1.1	Scope	6-1
1.2	Description	6-1
1.3	Specifications	6-1
1.4	Equipment Supplied	6-2
II	**INSTALLATION**	
2.1	Power Requirements	6-5
2.2	Installation Considerations And Mounting Information	6-5
2.3	Grounding Requirements	6-5
2.4	Cable Fabrication	6-5
2.5	Checks After Installation	6-5
III	**OPERATION**	
3.1	General	6-11
3.2	Coupler Control/Indicators	6-11
3.3	Check Out Procedures	6-11
IV	**THEORY OF OPERATION**	
4.1	General	6-13
4.2	Antenna Tuning Network	6-14
4.3	Detector Pad Assembly - 3A4	6-14
4.4	Comparator Board - 3A3	6-15
4.5	Computer Board - 3A2	6-17
4.6	Chassis Assembly - 3A1	6-20

TABLE OF CONTENTS

SECTION		PAGE
V	MAINTENANCE AND REPAIR	
5.1	General	6-25
5.2	Preventive Maintenance	6-25
5.3	Inspection	6-25
5.4	Repair or Replacement	6-25
5.5	Performance Test	6-27

LIST OF TABLES

TABLE		PAGE
2.1	Antenna Kit Components	2-9
5.1	500 Hz Switch Programming	5-6
5.2	1 KHz Switch Programming	5-6
5.3	10 KHz Switch Programming	5-7
5.4	100 KHz Switch Programming	5-7
5.5	100 KHz Adder Programming	5-8
5.6	100 KHz Gate Programming	5-8
5.7	1 MHz Switch Programming	5-9
5.8	1 MHz Gate Programming	5-9
5.9	1 MHz Adder Programming	5-10
5.10	10 MHz Switch Programming	5-11
5.11	10 MHz Adder Programming	5-11
5.12	Display Segment Illumination vs Driver Input/Output	5-15
5.13	Table of Assemblies	5-23

TABLE		PAGE
	SUPPLEMENTAL ACU-150D TABLES	
4.1	Magnitude Discriminator Truth Table	6-19
4.2	Phase Discriminator Truth Table	6-19
5.1	Fault Analysis	6-35
5.2	Fault Analysis and Troubleshooting 3A2	6-37
5.3	Fault Analysis and Troubleshooting 3A3	6-43
5.4	ACU-150D Alignment Procedures	6-47
5.5	Table of Assemblies	6-48

LIST OF ILLUSTRATIONS

FIGURE		PAGE
2.1	Test Set-Up for Synthesizer Programming	2-4
2.2	Band Switching Test Set-Up	2-4
2.3	Typical Antenna configurations	2-7
2.4	Antenna Kit Installation	2-9
2.5	Antenna Grounding	2-10
2.6	Feed-Thru Insulator	2-11
2.7	Insulated Tension Unit	2-11
2.8	System Interconnect Wiring Diagram	2-13
2.9	Transceiver Outline Dimensions RT-510	2-14
2.10	Transceiver Installation Dimensions RT-510	2-15
2.11	Control Head Outline Dimensions SCU-55	2-16
3.1	Remote Control Head Front Panel	3-3
4.1	Transceiver Overall Block Diagram	4-3
4.2	Regulator Heat Sink Assembly	4-11
5.1	Cover and Heat Sink Removal	5-19
5.2	Power Amplifier Test Set-Up	5-20
5.3	Current ALC Waveform	5-21
5.4	ASB-500 Right Side View	5-24
5.5	Transceiver Front Panel	5-25
5.6	Transceiver Top View with Heat Sink Removed	5-26
5.7	Transceiver Left Side View	5-27
5.8	Transceiver Rear View with PA Removed	5-28
5.9	Remote Control Rear Panel	5-29
5.10	Remote Control Top View	5-30
5.11	Remote Control Bottom View	5-31
5.12	Synthesizer Board - 1A6	5-35
5.13	First Mixer Board - 1A5	5-37
5.14	Second Mixer Board - 1A4	5-28
5.15	Audio Board - 1A3	5-43
5.16	Mother Board - 1A1A1	5-47
5.17	Front Panel - 1A1A2	5-48
5.18	Filter Module with Shield Removed	5-49
5.19	Filter Module with Right Side with Interface Board Removed	5-49
5.20	Filter Assembly - 1A7	5-50
5.21	Odd Channel Filter Board - 1A7A3	5-51
5.22	Even Channel Filter Board - 1A7A2	5-52
5.23	ALC/ACC Board - 1A7A4	5-53
5.24	Interface Board - 1A7A1	5-55
5.25	RF Power Amplifier - 1A2	5-57
5.26	Decoder (2A1) and Display (2A2) Boards	5-58
5.27	Remote Control (2A) Wiring Diagram	5-59

SUPPLEMENTAL ACU-150D ILLUSTRATIONS

FIGURE		PAGE
1.1	ACU-150D Major Assembly Locations	6-3
2.1	Cable Fabrication	6-7
2.2	Outline Dimensions ACU-150D	6-9
2.3	Installation Dimensions ACU-150D	6-10
4.1	ACU-150D Block Diagram	6-23
4.2	ACU-150D Flow Chart	6-24
5.1	Coupler Test Setup	6-28
5.2	Major Assembly and Component Locations	6-29
5.3	35 FT. Antenna Simulator	6-49
5.4	3A1 Main Frame Wiring	6-51
5.5	3A2 Computer Board	6-55
5.6	3A3 Comparator Board	6-59
5.7	3A4 RF Detector/Pad Assembly	6-63
5.8	3A5A1 RF Input Board	6-67
5.9	3A5A2 RF Output Board	6-71

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SECTION 1
GENERAL INFORMATION

1.1 SCOPE

The manual contains the necessary information to install and operate the ASB-500 transceiver, and includes additional information required to test and repair the transceiver.

1.2 TRANSCEIVER DESCRIPTION

1.2.1 GENERAL

The ASB-500 is a high quality single sideband transceiver covering the frequency range of 2.0000 to 17.9995 MHz. Modes of operation are Upper Sideband (USB), Lower Sideband (LSB), and Amplitude Modulation (AME). The transceiver is fully solid state and frequency is synthesized in 500 Hz steps. The unit is designed to meet FCC requirements for Part 87, and FAA TSO C31c and C32c.

The ASB-500 is composed of two major assemblies: the Receiver/Transmitter (RT-510) and the Remote Control Head (SCU-55).

1.2.2 RECEIVER/TRANSMITTER - 1A

The receiver/transmitter contains the frequency synthesizer as well as all receive and transmit circuitry. The synthesizer provides the local oscillator frequencies (selected from the Remote Control Head) in 500 Hz steps. All frequencies are derived from an ovenized crystal oscillator which provides frequency stability of 1×10^{-6} Hz over the full specified ambient temperature range of the radio after a two minute warm-up.

The receiver/exciter circuits employ high quality crystal filters both in the front end of the radio and in the IF section for sideband selection. The first IF is 33.6 MHz, well above the 18 MHz upper limit of the transceiver, providing an unusually high spurious signal rejection found only in this modern frequency scheme.

Bandpass filtering is included in the receiver/exciter circuitry to remove harmonics and spurious from the exciter, and eliminate out of band interference in the receiver. Additional low pass filtering is provided at the output of the power amplifier for harmonic rejection.

Multiple voltage regulation is used to provide superior power supply transient suppression. The aircraft supply is first filtered, then regulated to 18 VDC (used by the oven standard), and finally regulated to 12 VDC for use by the transceiver low level circuitry. The 12 VDC is further regulated on the synthesizer board to 5 VDC for use by the digital circuits.

1.2.3 REMOTE CONTROL - 2A

The remote control head contains the switches which supply digital frequency information to the synthesizer in the receiver/transmitter unit, and to the LED display drivers. Also included are the VOLUME and SQUELCH controls, an auxiliary DIMMER control, coupler status lights, and a push-button MODE switch.

Both printed boards used in the control head are plug-in for easy removal and servicing.

1.3 TECHNICAL SPECIFICATIONS

Electrical and physical specifications of the Sunair ASB-500 Transceiver are listed below.

1.3.1 GENERAL

APPROVALS:

US FCC type accepted to part 87.
US FAA authorized to TSO C31c and C32c.

FREQUENCY RANGE:

2.0 to 17.9995 MHz (500 Hz increments).

NUMBER OF CHANNELS:

32,000 synthesized.

FREQUENCY RESOLUTION:

500 Hz.

FREQUENCY STABILITY:

±20 Hz maximum over rated temperature range.

OPERATING MODES:

USB, LSB, AME

DUTY CYCLE:

Voice, continuous.

ENVIRONMENTAL CATEGORY:

BAAAAX, TSO C31a and C32c.

ALTITUDE:

30,000 Ft.

TEMPERATURE:

Non-operating: -50° to +71°C.
Short term operating: +71° C.
Operating: -46° C to +55° C.

VIBRATION:

10 to 500 Hz, 5g peak - (TSO Cat. A)
(control head: 10 to 55 Hz, 1.5g max.; 0.25g from 55 to 500 Hz - TSO Cat. C)

HUMIDITY:

95% at 50° C.

SHOCK:

15g peak, 11 ms duration.

POWER INPUT:

27.5 VDC +10%, -20%, at 2.5A receive 13A peak transmit.

DIMENSIONS:

Rcvr/xmtr - 1/2 ATR long case.
4.875W x 7.625H x 15.5L (inches).
12.38W x 19.37H x 39.37L (cm).
Add 1.625"H (4.13H cm) for shockmount.

Control Head:

5.75W x 2.625H x 5.0D(inches).
14.61W x 6.67H x 12.70D (cm).

WEIGHT:

Rcvr/xmtr 16.0 lbs (7.2Kg.) 17.5 lb. (7.9Kg.) with shockmount.

Control head: 1.8 lbs (0.8 kg).

1.3.2 RECEIVER

SENSITIVITY:

SSB - 0.5 uv max. into 50 ohms for 10 dB S+N/N.

AM - 3.0 uv max. into 50 ohms for 10 dB S+N/N.

SELECTIVITY:

SSB - 350 Hz max. to 2500 Hz min. at -6dB.
6.0 KHz max. at -60 dB.
AM - 5.0 KHz min. at -6 dB.
20 KHz max. at -60 dB.

AUDIO OUTPUT:

50 mw into 600 ohms and 150 ohms, unbalanced.

AUDIO DISTORTION:

Less than 10% at 50 mw.

GAIN:

10 uv nominal for 50 mw audio output.

IF REJECTION:

Not less than -70 dB.

IMAGE REJECTION:

Not less than -80 dB.

AGC:

Fast attack, slow release.
Threshold: 5 uv nominal.
10 dB max audio change for 94 dB rf input change.

INTERNAL SPURIOUS RESPONSE:

99.5% below equivalent 0.2 uv noise input at antenna terminals.

EXTERNAL SPURIOUS RESPONSE:

-65 dB below 10 dB S+N/N reference.

1.3.3 TRANSMITTER

POWER OUTPUT:

SSB - 100 watts PEP ±1dB.
AM - 35 watts carrier, nominal.

HARMONIC & SPURIOUS SUPPRESSION:

-40 dB.

CARRIER SUPPRESSION:

-40 dB.

UNDESIRED SIDEBAND SUPPRESSION:

-50 dB at 1.5 KHz.

INTERMODULATION DISTORTION:

-29 dB below 2 tone PEP output.

HUM AND NOISE LEVEL:

-40 dB.

1.4 EQUIPMENT SUPPLIED

The following table is a list of equipment, with their appropriate Sunair part numbers, supplied with the ASB-500 transceiver.

	Sunair Part No.
1.4.1 Receiver/Transmitter, RT-510	8040000491
1.4.2 Remote Control Head, SCU-55	8040400091
1.4.3 Operation and Maintenance Manual	8040000505
1.4.4 Installation Kit, consisting of:	8040001595
Shockmount with isolators	8040001790
Connector, RF	0744030005
Connector, Power	0754530001
Connector, Coupler	0754630005
Connector, Control, RT-510	1003390030
Connector, Control, SCU-55	0754510000
Connector, Audio, SCU-55	0754940004

1.5 EQUIPMENT REQUIRED BUT NOT SUPPLIED

	Sunair Part No.
1.5.1 Antenna Coupler, ACU-150	8042000006
1.5.2 Antenna, wire or integral airframe.	
1.5.3 Microphone, noise cancelling.	
1.5.4 600 ohm Headphones or Speaker Driver and speaker.	
1.5.5 Cable, Power (specify length)	8033008504
1.5.6 Cable Control, RT-510 to SCU-55 (specify length).	8033008008

NOTE

All cables may be fabricated by the installer in accordance with Figure 2.

1.6 OPTIONAL EQUIPMENT - NOT SUPPLIED

		Sunair Part No.
1.6.1	Encapsulated Anti-Precipitation Static Wire Antenna Kit.	0951580001
1.6.2	Microphone, Noise Cancelling	0871510006
1.6.3	Spare Board Kit ASB-500	8040900093
1.6.4	Spare Parts Kit ASB-500	8040900590
1.6.5	Ancillary Kit, consisting of:	8040001293
	Extender card	8040002591
	Key, Hexspline socket	0882100009
1.6.6	Headphones	0840180004

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CAUTION

TO INSURE THAT CABLE HAS NOT BEEN DAMAGED DURING SHIPMENT, ALL CABLE ASSEMBLIES MUST BE CHECKED FOR CONTINUITY OR SHORTS, FROM PIN TO PIN, BETWEEN CONNECTORS BEFORE INITIAL RADIO OR SYSTEM POWER UP.

WARNING

CONNECTORS INSTALLED BY THE CUSTOMER MUST BE WIRED IN ACCORDANCE WITH INSTALLATION INSTRUCTIONS PROVIDED IN THE OPERATION AND MAINTENANCE MANUAL. THE CABLE MUST BE CONTINUITY CHECKED AFTER INSTALLATION AND PRIOR TO RADIO OR SYSTEM POWER UP.

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SECTION 2
INSTALLATION

2.1 GENERAL

Section 2 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 hookups, and final checkouts after installation, are also provided.

2.2 UNPACKING AND INSPECTION

Unpack and inspect all parts and equipment as soon as received.

NOTE

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

Do not accept a shipment where there are visible signs of damage to the cartons until a complete and thorough inspection is made. If there is a shortage or evidence of damage is noted, insist on a notation to that effect on the shipping papers before signing the receipt from the carrier.

If concealed damage is discovered after a 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. Include the following:

a. Order Number
b. Model and Serial Number
c. Name of Transportation Agency

2.3 RESHIPPING INFORMATION

The shipping carton for the ASB-500 has been carefully designed to protect the transceiver and accessories during shipment. This carton and its associated packing materials should be used to reship the radio.

If the original shipping carton is not available, be sure to carefully pack each unit separately, using suitable cushioning material. Very special attention should be given to providing enough packing material around controls, connectors and other protrusions from the radio. Rigid cardboard should be placed at the corners of the equipment to protect against damage if the carton is dropped.

When returning one or more subassemblies for repair, you must ship AIR PARCEL POST consigned to:

SUNAIR ELECTRONICS, INC.
3101 S. W. 3rd Avenue
Ft. Lauderdale, Florida 33315
U. S. A.

Plainly mark with indelible ink all mailing documents as follows:

U. S. GOODS RETURNED FOR REPAIR
VALUE FOR CUSTOMS - $100.00

and be sure to mark on all sides of the package:

"FRAGILE - ELECTRONIC EQUIPM ENT"

NOTE

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

2.4 GENERAL INSTALLATION AND MOUNTING INFORMATION

General instructions for installation and mounting are given for the ASB-500. Satisfactory operation of this equipment will depend upon the care and thoroughness taken during installation.

2.4.1 GENERAL INFORMATION

a. The location of the Receiver/Transmitter is not critical and may be placed anywhere there is available space within the fuselage. However, to minimize transmit power loss in coaxial cables connecting the transceiver to the antenna coupler, it is desirable to mount the transceiver in the same general area as the antenna coupler.

NOTE

Installation of the Receiver/Transmitter must conform to the Altitude/Temperature restrictions detailed in the equipment specifications.

b. Install the Remote Control Head in the cockput in any convenient location.

c. The installations should be carefully planned beforehand in accordance with the drawings on the following pages.

2.5 POWER REQUIREMENTS

The ASB-500 is designed to operate from a nominal 27.5 VDC +10%, -20%, source. The system should be connected to the source through the aircraft circuit breaker panel, using a 20 ampere breaker. The Antenna Coupler receives its power from the Transceiver through a 5 amp Slo Blo fuse mounted on the Transceiver front panel. All low level voltages used in the Remote Control are current limited to safe levels by voltage regulators and do not require fusing. Power used in the low level stages of the Transceiver is current limited, but is also fused inside the unit by a 5 amp standard fuse to protect against voltage regulator failure.

2.6 GROUNDING REQUIREMENTS

2.6.1 GENERAL

Connect the ground straps provided on the mounting rack securely to the aircraft frame.

2.7 CABLE FABRICATION

2.7.1 GENERAL

The cables listed in paragraph 1.5 must be wired to their appropriate connectors as shown in Figure 2.8, Interconnect Wiring Diagram.

All cables are available from Sunair with the exception of the audio wiring from Remote Control Head connector 2A3J2. Since this wiring must be routed to various locations in the aircraft instrument panel, the installer should fabricate this cable using standard aircraft installation practices.

2.7.1.1 If no main cockpit dimmer exists, or control head dimming independent of the main cockpit dimmer is desired, connect a jumper in connector 2A3P2 between pins P and H. If this is done, do not connect pin H

to the main cockpit dimmer. Now the full dimming range is available using the control head dimmer only.

2.7.2 CHECKS AFTER FABRICATION

2.7.2.1 SYNTHESIZER PROGRAMMING

Each cable must be checked for continuity and short circuits to other pins. Wiring between the Control Head and the Transceiver is pin to pin: "A" to "A", "B" to "B", etc. In order to be certain the synthesizer is being programmed correctly, it is necessary that the output carrier frequency be checked with a counter. Each decade frequency must be checked from 0 to 9 to verify that the wiring of cable 8033008008 is correct. See Figure 2.1 for a recommended test set-up to verify operation on the bench.

Rotate each frequency switch through all ten positions and check for the correct frequency readout on the counter. The 500 Hz dial alternates between "5" and "0" as the switch is rotated. The 10 MHz switch when rotated from the fully CCW position will show a blank, then a "1", and finally a "0". The "0" position is superfluous and shuts down the transceiver. The Remote Control display will flash, denoting an out of limit condition.

NOTE

Any frequency selected below 2.0000 MHz or above 17.9995 MHz is out of limit which will cause the frequency display to flash and will shut down the radio. A "0" in the 10 MHz position is also an out of limit condition.

2.7.2.2 BAND SWITCHING

Bandpass filters are located on the first mixer board and low pass filters are located in the Filter Module. These filters are automatically switched by the 10 MHz and 1 MHz frequency switches in the Control Head.

Operation of these filters may be checked by monitoring the AM carrier output in each band. The bands are divided as follows:

Freq. MHz	Band
2-2.9995	1
3-3.9995	2
4-5.9995	3
6-8.9995	4
9-12.9995	5
13-17.9995	6

Connect the equipment as shown in Figure 2.2.

Depress the ON push button, depress the AM Mode push button and set the frequency for the middle of each band. Key microphone and check for approximately 35 watts power output in each band. If the bands are not being switched properly, the power output will be essentially zero on the wattmeter in the non-operating band: Note: If the band channel drive motor can be heard continuously rotating in the Transceiver, this is generally an indication that two or more band lines are grounded within the cable or connectors.

2.7.2.3 MISCELLANEOUS CHECKS

Other functions that must be verified are shown in the following chart:

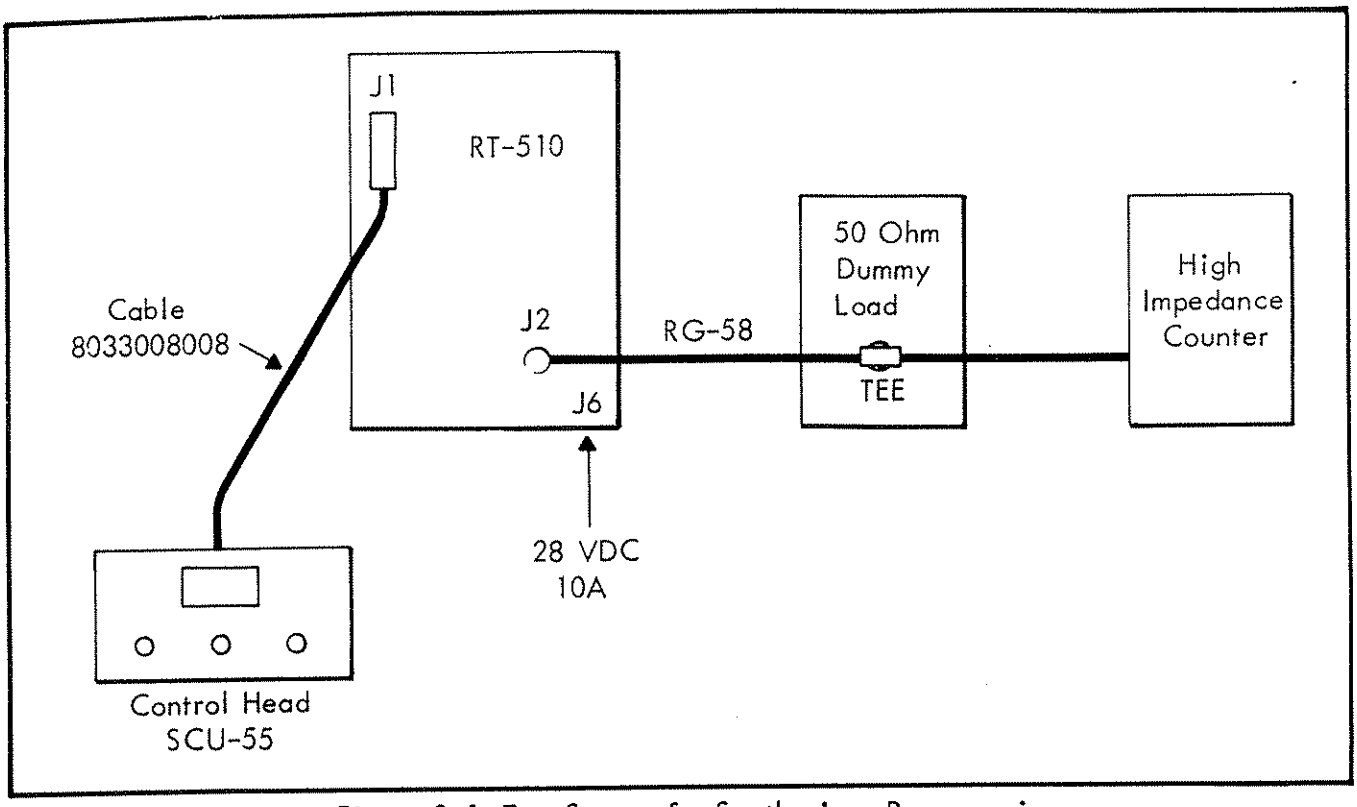


Figure 2.1 Test Set-up for Synthesizer Programming.

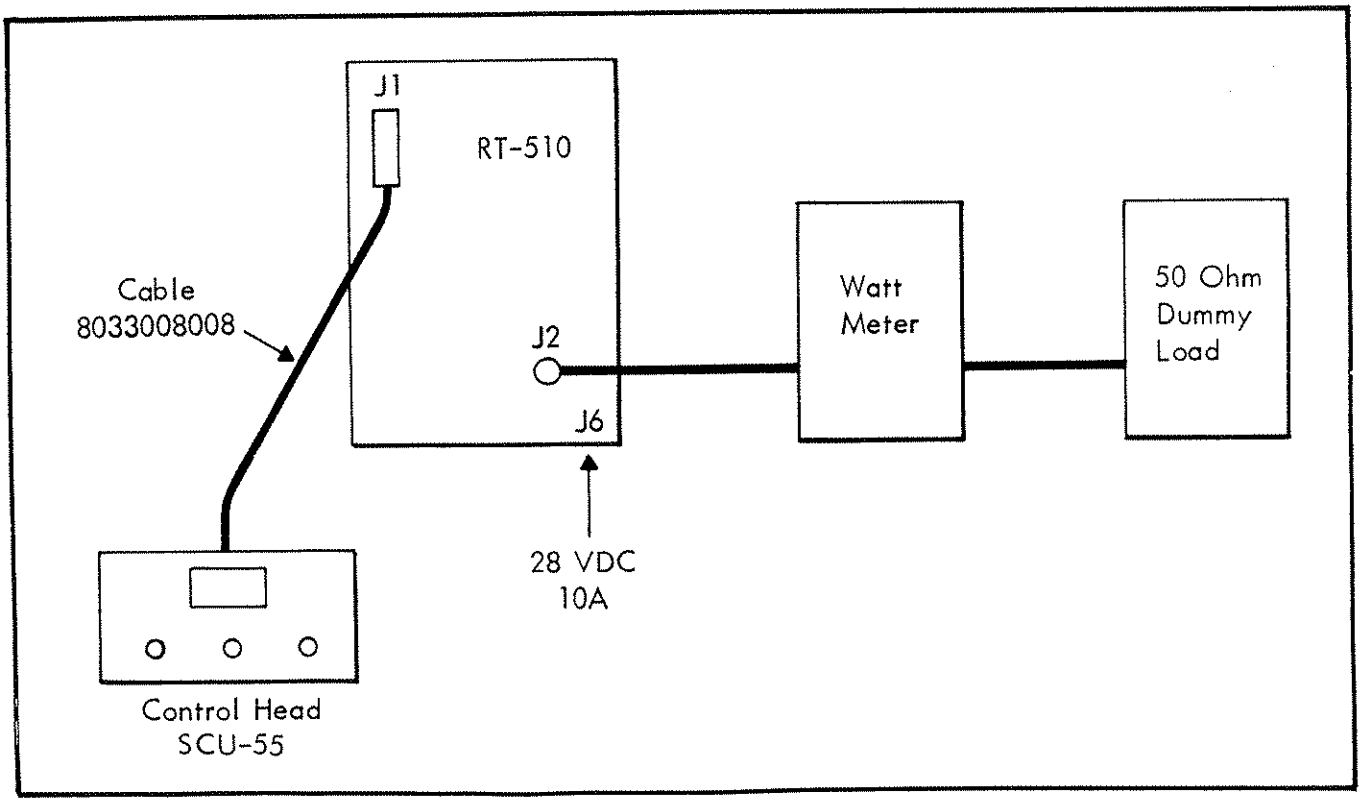


Figure 2.2 Band Switching Test Set-up

		Symptom
1.	VOLUME control	no audio
2.	SQUELCH control	no squelch fully CCW
3.	TUNE command	coupler doesn't start to tune
4.	FAULT indicator	no fault light when system is first turned on
5.	TUNE indicator	no tune light during coupler tune
6.	READY indicator	no green ready light after successful coupler tune

2.8 ANTENNA INSTALLATION

2.8.1 GENERAL

The installation of a high frequency antenna on an aircraft requires the consideration of two prime factors: the shape or configuration of the antenna must allow the transceiver to transmit and receive efficiently; the appearance of the antenna must be pleasing and the flight characteristics must not drastically alter aircraft performance.

However, in many cases, in an effort to achieve a pleasing appearance, the antenna is located in a position which drastically reduces its efficiency or radiation characteristics. So care must be taken to select an antenna that does not overly favor any one factor to the detriment of the others.

2.8.2 FACTORS TO BE CONSIDERED

In order to select the best antenna, consideration must be given to the following factors:

1. Type of aircraft
   a. Size, shape, airspeed
2. Required communications range
3. Transmitter frequencies
4. Antenna flight requirements
5. Possible antenna coupler locations
6. Antenna radiation characteristics.

Aircraft size and shape is important as it may restrict the types of possible antennas. Aircraft speed must be considered, as 260 MPH and faster aircraft cannot generally use a wing tip attached V antenna. This type of aircraft may also operate in icing conditions which adversely affect V antennas more than the straight type.

The end user's communications distance requirements must be considered, particularly if long range, such as 800 miles and greater, is required on frequencies as low as 6 to 8 MHz. This requires a V antenna or a long straight antenna 35 feet or longer, if ungrounded.

Transmitter frequencies are generally determined by the area of operation and stations to be worked. These in turn can affect the antenna selection. If most of the frequencies are above 5 MHz it is possible to use a shorter or straight antenna, as coupler efficiency above 5 MHz is good regardless of the antenna type.

The antenna aerodynamic requirements are related to the aircraft type and operating cap-

abilities. Generally, the best aerodynamic design results in the poorest radiating antenna when considering only ungrounded antennas, and care must be taken here in order not to degrade the system operation.

The antenna coupler location dictates the location of one end of the antenna. The output of the coupler is the beginning of the antenna and the antenna wire inside the aircraft must be restricted in length, ideally not more than 6 inches to a maximum of 12 inches, unless coax feed is used for the antenna.

The antenna radiation characteristics (how well does it radiate or receive a signal) is generally the hardest to determine. It is always best to install an antenna that has proven to perform well in past installations. The antennas shown on the following pages have all been installed and used with success on various aircraft. Some will work better on one type of aircraft than another, particularly the grounded type. The grounded antenna to the engine nacelle or vertical stabilizer has worked well on many different aircraft. It may be necessary to try several locations and types of antennas in order to satisfy all of the factors outlined here and not overly compromise any one factor.

TYPICAL ANTENNA CONFIGURATION

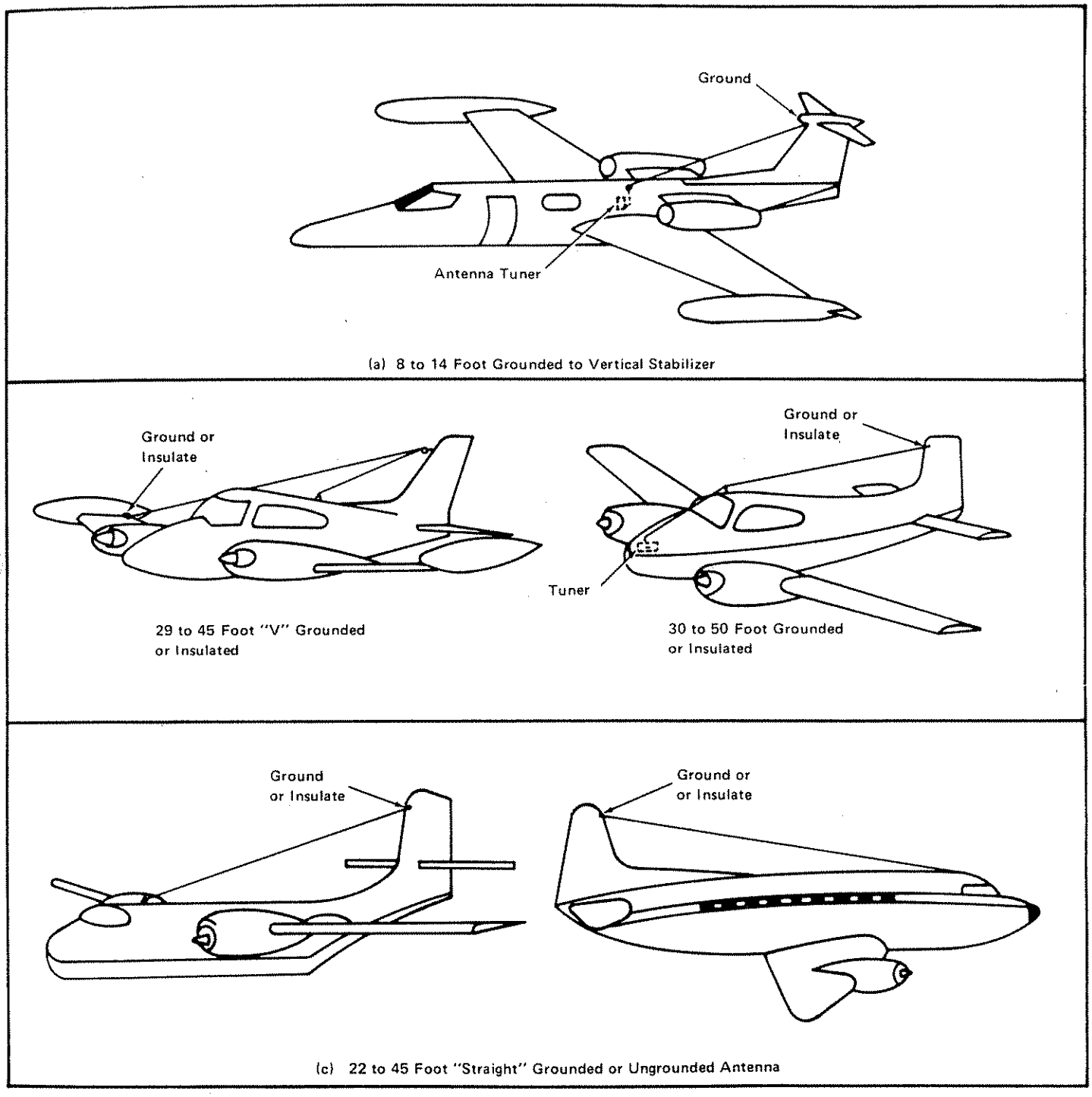


Figure 2.3 Typical Antenna Configurations

TYPICAL ANTENNA CONFIGURATION

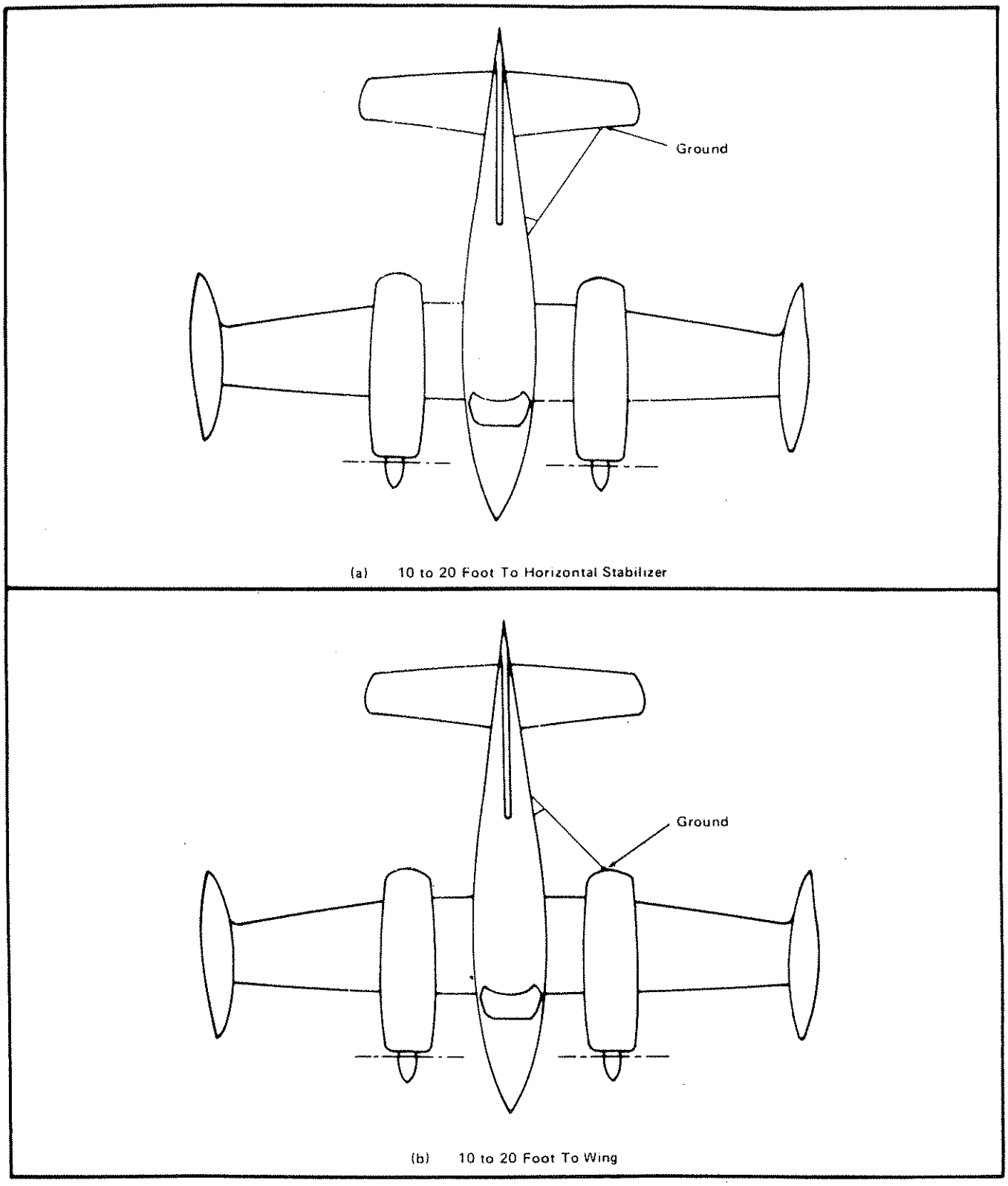


Figure 2.3 Typical Antenna Configurations (Cont.)

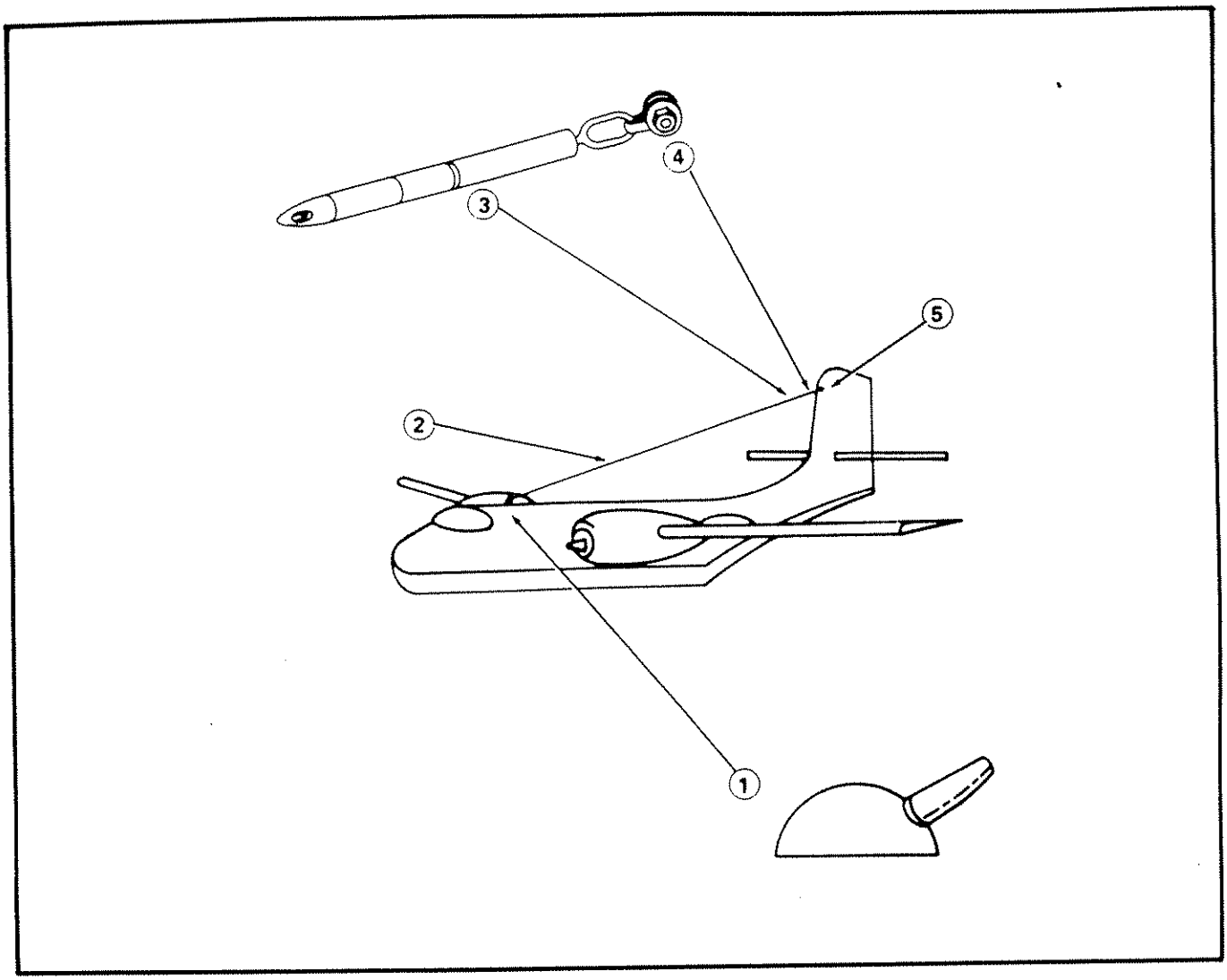


Figure 2.4 Antenna Kit Installation

ANTENNA KIT (ANTI-PRECIP) PN 095158001	
ITEM	DESCRIPTION
1	Feed-thru Insulator
2	60 Feet Insulated Antenna Wire
3	Insulated Tension Unit
4	Shackle AN115-B
5	Vertical Fin Anchor (Not Supplied)
6	Wire Retraction Tool
7	Installation Suggestions

Table 2.1 Antenna Kit Components

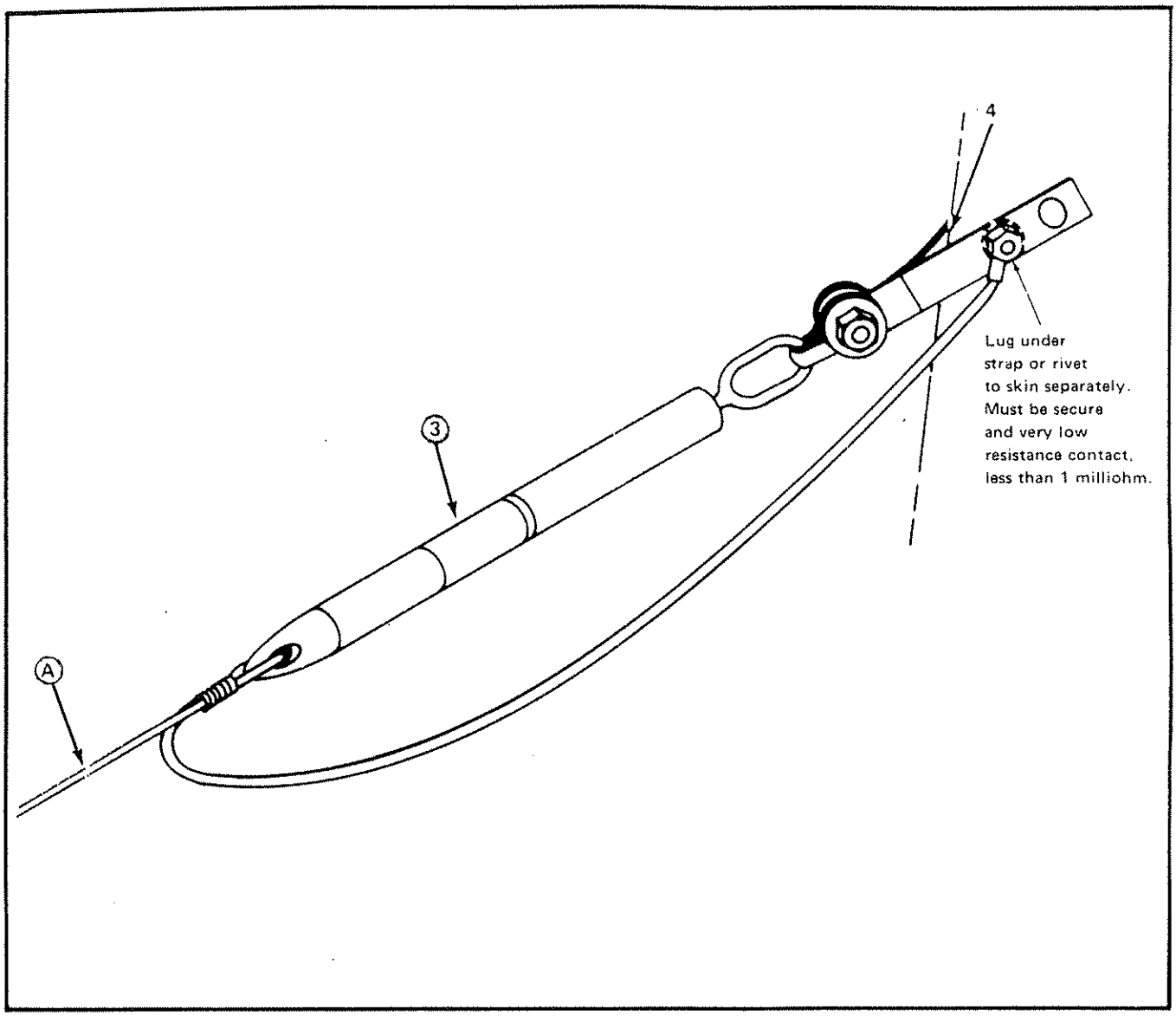


Figure 2.5 Antenna Grounding

2.8.3 ANTENNA KIT INSTALLATION

For information to install the Antenna Kit (PN0951580001) refer to Figure 2.4. Table 2.1 lists the items in the Antenna Kit.

2.8.4 ANTENNA GROUNDING METHOD

For straight grounded antennas (see Figure 2.5), the antenna (A) from feed through insulator (Item 1, Table 2.1) is fed through the insulated tension unit (Item 3) and clamped or tied with nylon cord (as shown) to proper length. Ground antenna with ground lug to Item 4 of Table 2.1 or aircraft skin. Ground connection MUST be secure, low resistance and capable of high current.

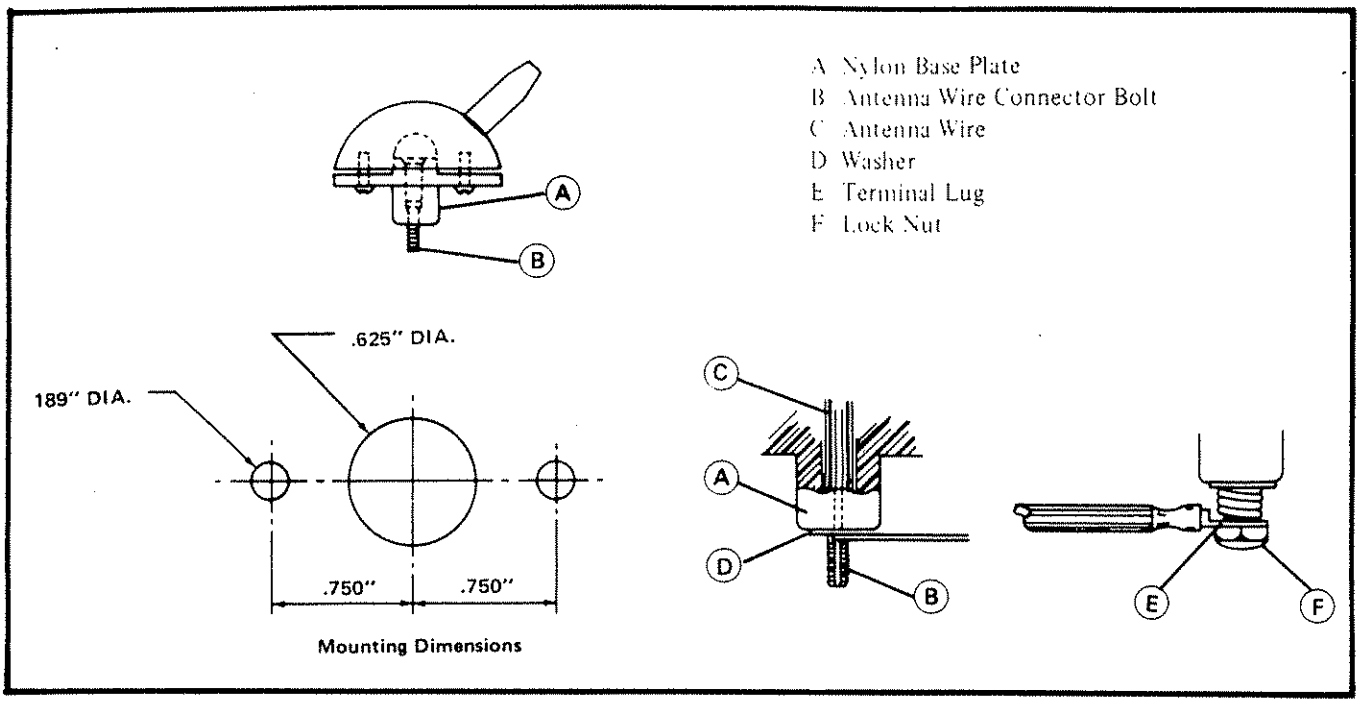


Figure 2.6 Feed-Thru Insulator

2.8.5 FEED-THRU INSULATOR

For proper installation of the Feed-Thru Insulator (PN0713080001, Item 1 of Table 2.1) refer to Figure 2.6 and the following text. Strip back polyethylene shield (C) to expose approximately 4" of antenna wire core. Insert core into connector bolt (B) and extract from slot. Insert washer (D) as shown. Wind wire around connector bolt (B) 3 1/2 to 4 turns. Install terminal lug (E) of antenna lead and secure with lock nut (F), as shown in Figure 2.6.

2.8.6 INSULATED TENSION UNIT

Application of an Insulated Tension Unit (PN0713220007, Item 3 of Table 2.1) for a "V" type antenna, refer to Figure 2.7.

The Antenna (A) is connected to the feed-thru insulator (Item 1), Table 2.1) and routed via the vertical stabilizer by the use of the insulated tension unit (B), as shown. The end is connected at the wing tip.

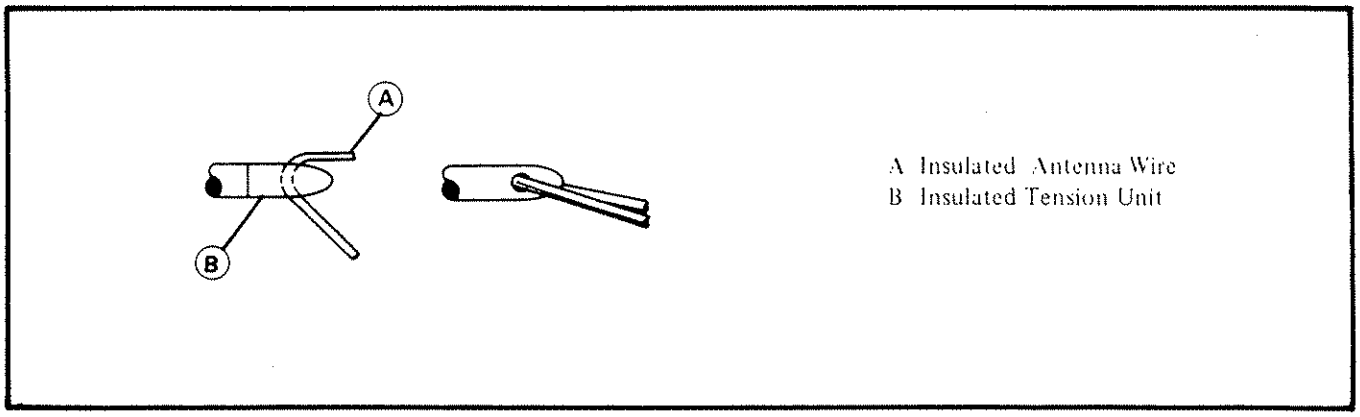
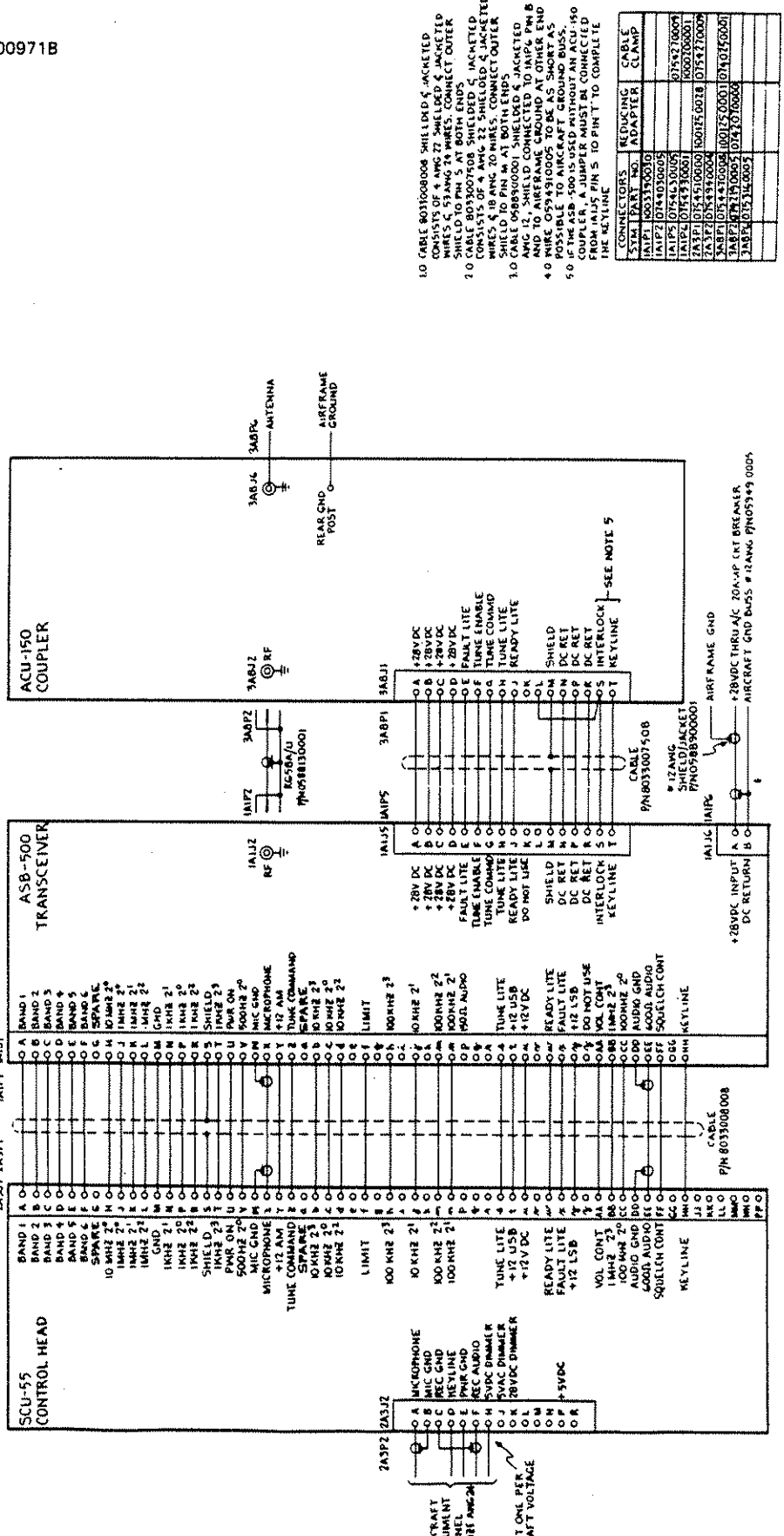


Figure 2.7 Insulated Tension Unit

2.9 SELCAL OPERATION

Audio for operation of Selcal equipment is available through the transceiver front panel phone jack. This audio level is not controlled by the remote control unit volume control but remains essentially constant.

8040000971B



1.0 CABLE 8031608008 SHIELDED & JACKETED CONSISTS OF 4 AWG 22 SHIELDED & JACKETED WIRES & 5 AWG 24 WIRES. CONNECT OUTER SHIELD TO PIN 5 AT BOTH ENDS

2.0 CABLE 8033007508 SHIELDED & JACKETED CONSISTS OF 4 AWG 22 SHIELDED & JACKETED WIRES & 18 AWG 20 WIRES. CONNECT OUTER SHIELD TO PIN 44 AT BOTH ENDS

3.0 CABLE 0688900001 SHIELDED & JACKETED AWG 12, SHIELD CONNECTED TO 1A1P6 PIN B AND TO AIRFRAME GROUND AT OTHER END

4.0 WIRE 0599491000S TO BE AS SHORT AS POSSIBLE TO AIRCRAFT GROUND BUSS.

5.0 IF THE ASB-500 IS USED WITHOUT AN ACU-150 COUPLER, A JUMPER MUST BE CONNECTED FROM 1A1J5 PIN S TO PIN T TO COMPLETE THE KEYLINE

CONNECTORS		REDUCING ADAPTER	CABLE CLAMP
SYM	PART NO.		
1A1P1	M83513/03-10		
1A1P2	0744030005		
1A1P5	0754630005		0754276009
1A1P6	0754330001		K0007060001
2A3P1	0754510600	10017560018	0754276009
2A3P2	0754990004		
3A8P1	0754430004	10017500011	0740756001
3A8P2	M24519/09-05	0437076006	
3A8P4	0753140005		

Figure 2.8 System Interconnect Wiring Diagram

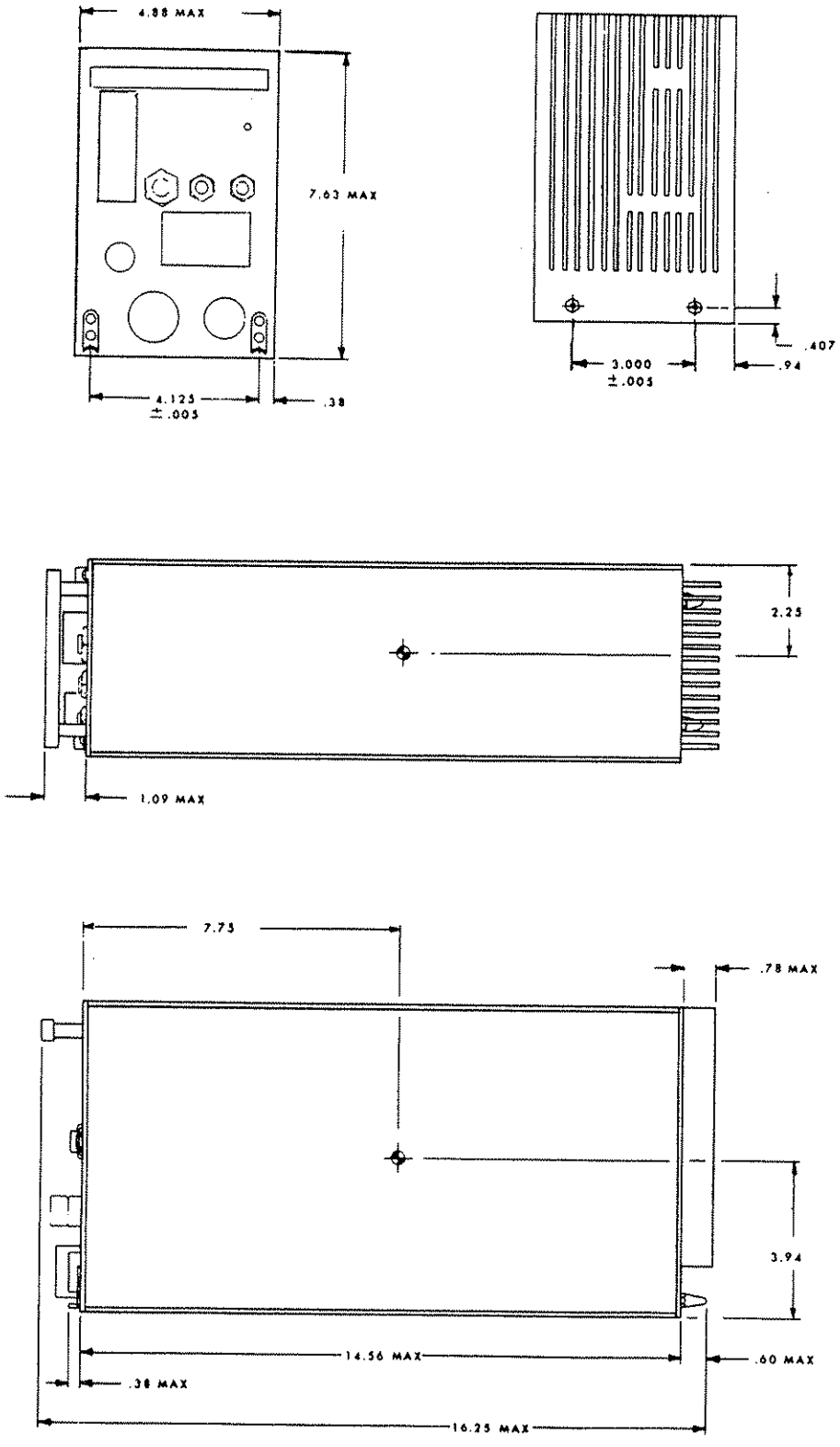


Figure 2.9 Transceiver Outline Dimensions RT-510

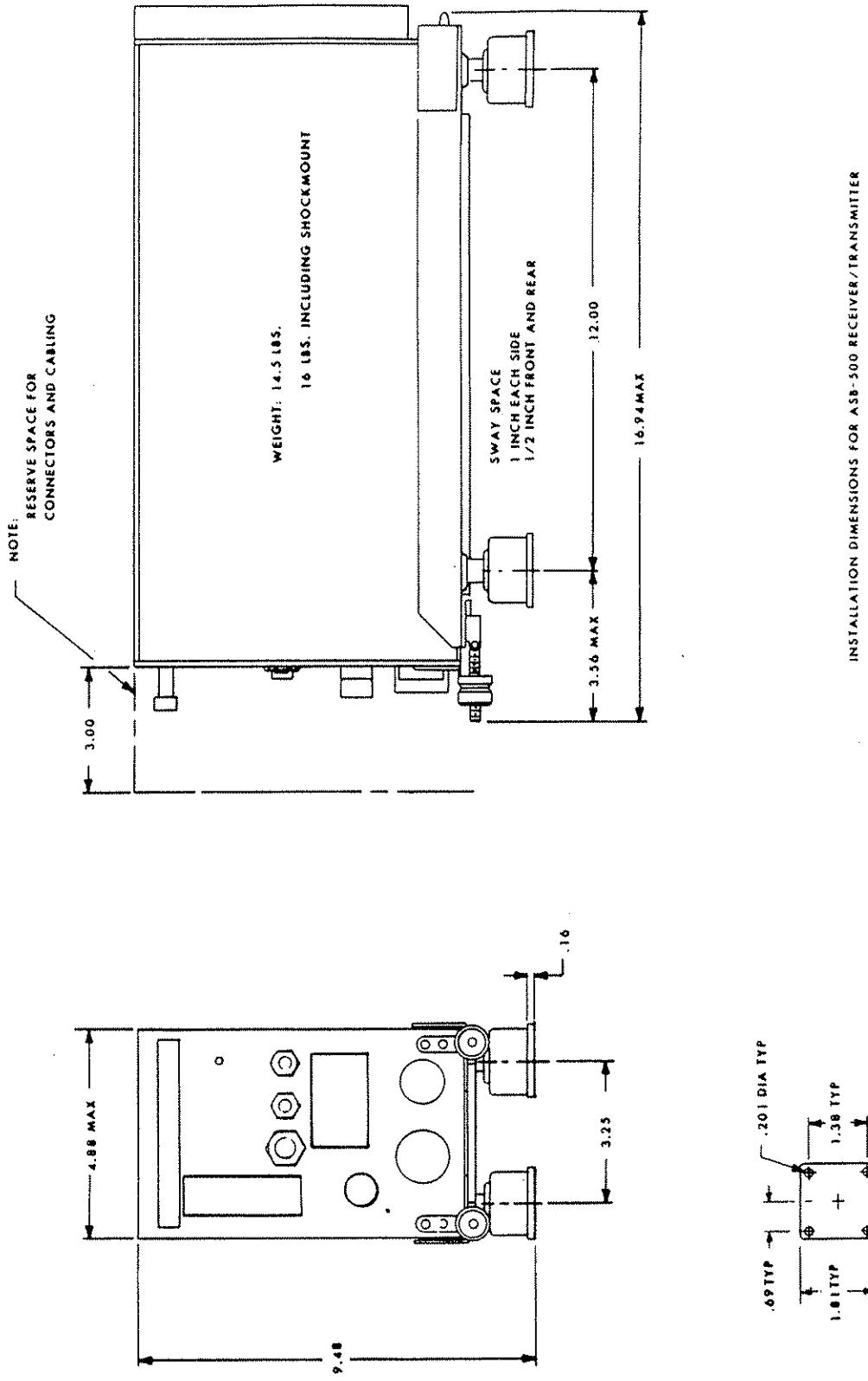


Figure 2.10 Transceiver Installation Dimensions RT-510

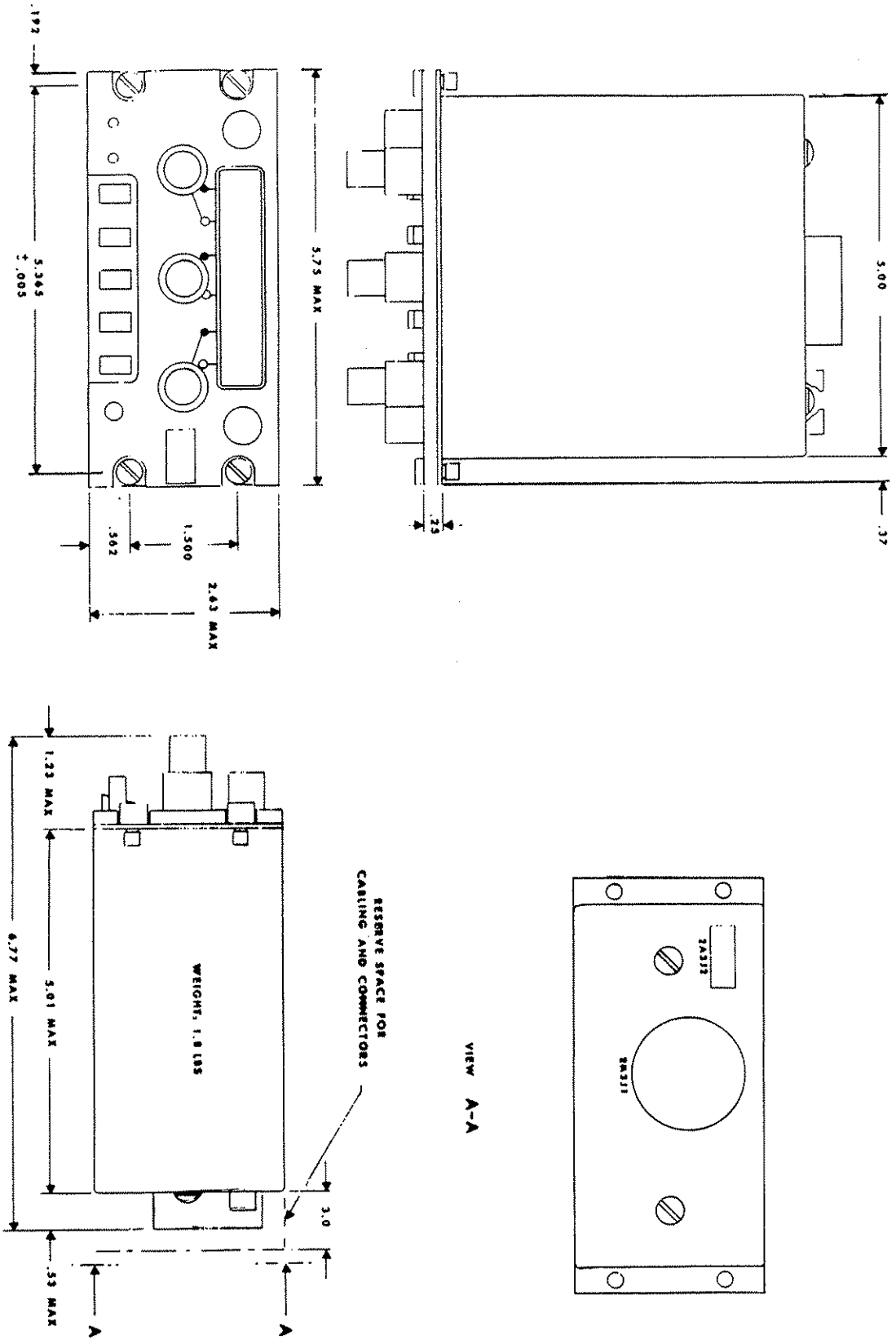


Figure 2.11 Control Head Outline Dimensions SCU-55

SECTION 3
OPERATION

3.1 SYSTEM CONTROLS AND CONNECTORS

This section provides information and instructions required for proper operation of the ASB-500 Transceiver.

3.1.1 REMOTE CONTROL HEAD

FREQUENCY SWITCHES (6) ..... Selects the operating frequency: 10 MHz switch, 1 MHz switch, 100 kHz switch, 10 kHz switch, 1 kHz switch, 500 Hz switch.

ON ..... Applies primary power when pushed in. Disconnects primary power when pushed a second time.

LSB ..... Selects Lower Sideband mode when pushed in.

AM ..... Selects AM mode when pushed in.

USB ..... Selects Upper Sideband mode when pushed in.

TUNE ..... Starts antenna coupler tuning cycle at frequency selected.

VOLUME CONTROL ..... Controls the level of the receive audio to rear panel audio connector 2A3J2 and headphone jack on Transceiver front panel.

SQUELCH CONTROL ..... Adjusts squelch threshold. Fully CCW is maximum squelch.

DIMMER CONTROL ..... Adjusts brightness of frequency display and panel lights. (Operates in conjunction with cockpit dimmer control).

FREQUENCY DISPLAY ..... Displays frequency selected by Frequency Switches. NOTE: If a frequency below 2.0 MHz or above 17.9995 MHz is selected, transceiver is disabled and display flashes on and off.

READY XMIT LIGHT (Green) ..... Indicates coupler is tuned and system is ready for use (In receive mode). In transmit mode: Indicates transmitter RF output on modulation peaks.

TUNE FAULT LIGHT (Amber) ..... Indicates a fault in the transmitting system, coupler, or antenna.

CONTROL CONNECTOR (2A3J1) ..... Supplies all control signals to the Transceiver.

AUDIO CONNECTOR (2A3J2) ..... Contains audio and light dimmer control connections to aircraft.

3.1.2 TRANSCEIVER

SIDETONE ..... Adjust from front panel. Sets sidetone volume (xmit audio in earphones).

REMOTE CONNECTOR (1A1J1) ..... Receives all control signals from Remote Control and supplies power to Remote Control.

RF CONNECTOR (1A1J2) ..... Input to receiver and output of transmitter. Goes to Antenna coupler.

MIC CONNECTOR (1A1J3) ..... Test microphone connector to allow transceiver to be locally keyed and modulated. Accepts a standard PJ-068 three-circuit phone plug.

PHONE CONNECTOR (1A1J4) ..... Test earphone connector for local receiver monitoring or for Selcal use. Accepts a standard 1/4 inch two-circuit phone plug.

COUPLER CONNECTOR (1A1J5) ..... Supplies 27.5 VDC and tune information to coupler.

POWER CONNECTOR (1A1J6) ..... Receives 27.5 VDC from aircraft power buss.

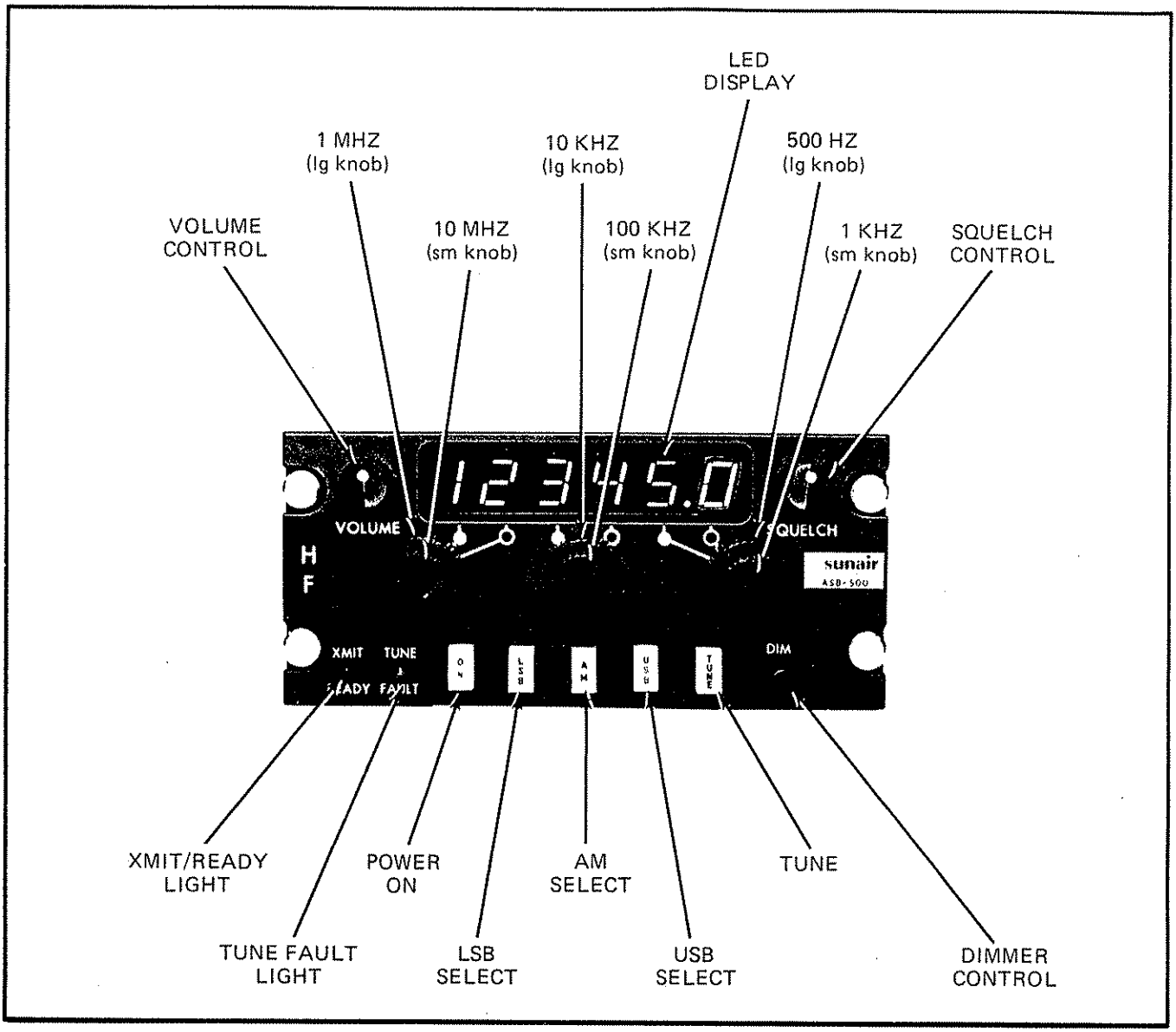


Figure 3.1 Remote Control Head Front Panel

3.2 CHECKS AFTER INSTALLATION

NOTE

If extended test time is anticipated an auxilliary power unit should be connected to the aircraft in order to maintain batery voltage.

1. Apply power to the radio by pushing in Control Head "ON" switch.	"ON" light should be illuminated. "TUNE FAULT" light should be illuminated. LED frequency display should indicate frequency of operation. NOTE: If selected frequency is below 2.0 MHz or above 17.9995 MHz the display will flash on and off indicating unusable frequency. Display will also flash if a "0" is registered in the 10 MHz display.
2. Select HF Comm system and set SQUELCH control maximum CW and set VOLUME control CW.	Audio noise or signal should be present in aircraft speaker. Reduce VOLUME to normal level after test.
3. Set SQUELCH control maximum CCW.	Aircraft speaker should be silenced except when strong signal present. After test, return SQUELCH control to CW position.
4. Adjust COCKPIT Dimmer Control.	All control head lamps and LED display should vary in intensity. Further variation may be made with control head dimmer.
5. Rotate each frequency select knob from 0 to 9.	LED display should indicate correct readout. NOTE: LED display is driven directly from control head frequency switches and this check does not verify that cable 8033008008 which controls the synthesizer is wired correctly. See paragraph 2.7.2.1.
6. Select frequency of a nearby ground station. Set mode switch to required operating mode and push TUNE switch.	TUNE FAULT or READY LIGHT should not be lit and TUNE push button light should remain on during coupler tune cycle. When tune cycle complete, TUNE light should go out and READY light should be lit, audio or noise should be heard from speaker.
7. Establish contact with ground station and request radio check. Check sidetone level in headphones.	Adjust for desired level via transceiver front panel screwdriver hole. READY light will go out when transmitter keyed but will come back on when modulating transmitter (speaking into microphone).
8. Select various frequencies from 2 to 17.9995 MHz and perform coupler tuning checks.	Coupler should tune all frequencies. Check for not more than 2 watts reflected power between Transceiver RF OUT (1A1J2) and Coupler IN (3A8P2).

SECTION 4

THEORY OF OPERATION

4.1 GENERAL

The discussion of the ASB-500 will be presented in nine parts: synthesizer board, first mixer board, second mixer board, audio board, mother board, P. A. filter module, r.f. power amplifier, and control head.

4.1.1 OVERALL BLOCK DIAGRAM

Figure 4.1 shows an overall block diagram of the transceiver. Discussion of the various functions and circuits is presented in the following sections.

4.2 SYNTHESIZER BOARD-1A6

Figure 5.12

This board contains the frequency standard and all frequency generating circuitry in the transceiver.

4.2.1 GENERAL

The synthesizer (1A6) generates the three local oscillator injection frequencies needed to determine the operating frequency of the radio. The frequency standard is oven stabilized and operates at 28 MHz, which is the second local oscillator frequency. The third local oscillator frequency is 5.6 MHz which is derived by dividing the 28 MHz reference by 5.

The first L.O. is obtained from the 28 MHz reference by digital phase lock loop techniques. The frequency accuracy of the radio is therefore determined solely by the accuracy of the frequency standard. The voltage controlled oscillator (VCO) supplying the first LO is a phase locked oscillator covering the frequency range of 35.6000 to 51.5995 MHz in 500 Hz steps. The exact frequency of the oscillator is given by:

$$F = (33.6000 + Fo)\ MHz$$

Where: F = 1st LO frequency
Fo = dialed frequency

On receive, the first LO is used to convert the incoming signal to the 1st intermediate frequency (IF) of 33.6 MHz. The second LO converts this frequency down to 5.6 MHz, the second IF. The third LO mixes in a product detector with the 2nd IF to detect the modulation of the incoming signal.

4.2.2 SECOND LO AMPLIFIER

The 28 MHz reference from the frequency standard is a TTL square wave pulse train so must be filtered to remove harmonics. The reference is applied to Q5 where it is amplified and filtered by C18, L5 and C25, L6. Q2 and Q3 make up a complementary emitter follower power amplifier to provide output at greater than 0 dBm. C22 adjusts the LO output to the proper mixing level.

4.2.3 THIRD LO AMPLIFIER

The third LO Amplifier obtains its input from the divider, U2. The 2.8 MHz pulse is amplified by Q6, whose drain is tuned (C26, L7) to the second harmonic, 5.6 MHz. The 5.6 MHz is further filtered by C13, L4 and applied to the output through emitter follower Q1. C16 adjusts the LO output to the proper level. Q4 is a gate which turns off the third LO amplifier during AM receive to prevent heterodynes.

4.2.4. REFERENCE FREQUENCY DIVIDER CHAIN

The purpose of the reference frequency divider chain is to provide the division of 56000 which is necessary to generate a 500 Hz reference signal from the 28 MHz oscillator. U2 is a dual decade counter that divides the standard by 100. U3 and U4 are up/down counters connected to divide by 56 as follows: The devices are connected as down counters with their load inputs (pin 11) connected together to the borrow output of U4. The data input lines are connected to load a 5 (0101) into U4 and a 6 (0110) into U3 when the load inputs are sent to a low condition. The devices count down until an underflow occurs, causing the borrow line of U4 to go low. This loads 56 into the counters, the borrow line rises, and the cycle repeats. Because the borrow line clears the underflow condition when it goes low, the load pulse width is only about 50 n sec, determined by the propagation delay of the devices. The borrow line of U4 (pin 13) is the divide by 56 output, and is connected to the input of U5, a decade counter. The output of U5 (pin 11) supplies 500 Hz reference to the phase detector, U9.

4.2.5 VCO

The VCO is a standard Colpitts configuration consisting of FET Q10 with tank circuit L8, L9, CR2, C45. CR2 is a varicap and determines the frequency of operation by the dc voltage across it. Diodes CR3, CR4, CR5 limit the amplitude of oscillation to prevent conduction in CR2. Integrated circuits U19 and U21 amplify the VCO output and provide isolation. Final amplification of the VCO signal to approximately +7 dBm is provided by Q11. C62, C65, C66, L17 form a low pass harmonic filter. C68, L18 is a series trap tuned to the frequency of the second LO (28 MHz).

4.2.6 PHASE DETECTOR AND LOOP FILTER

Phase detector U9 compares the frequency and phase of the VCO signal, after it has been divided by the programmable divider, with that of the 500 Hz reference. If the VCO phase leads that of the reference, Pin 13 of U9 goes from its normally high state to a low state, turning on current source, Q9. If the phase lags that of the reference, pin 2 goes from its normally high state to a low state, turning on current source, Q8. Source Q8 charges the loop filter capacitors, C38, C39, C40, C43, and causes the voltage on CR2 to rise and increase the frequency of the VCO. Current source Q9 discharges the loop capacitors and causes the VCO frequency to decrease. The use of current sources allows the loop gain to remain constant while the voltage on CR2 varies over a range of 1 to 8 volts as is necessary to determine the proper VCO frequency. The phase locked loop dynamic characteristics are determined by a passive loop filter, C38, R37, C39, R38, C40 R40, C43.

4.2.7 PROGRAMMABLE DIVIDER

The programmable divider determines the VCO frequency in the locked loop. When the loop is locked, the output of this divider is always the same as the reference frequency (500 Hz), while the input (VCO) frequency is 500 Hz multiplied by the division factor. To allow use of relatively slow divider circuits (U6, U10, U14, U18, U20, U22) while keeping the 500 Hz reference frequency, a high speed dual-modulus prescaler is required. Integrated circuits U13 and U17 form a dual modulus prescaler which divides the VCO frequency by 20 or 21 as determined by the state of U13. The programmable divider consists of six synchronous decade down counters whose operation is similar to that of U3 and U4 in the reference divider chain. The VCO

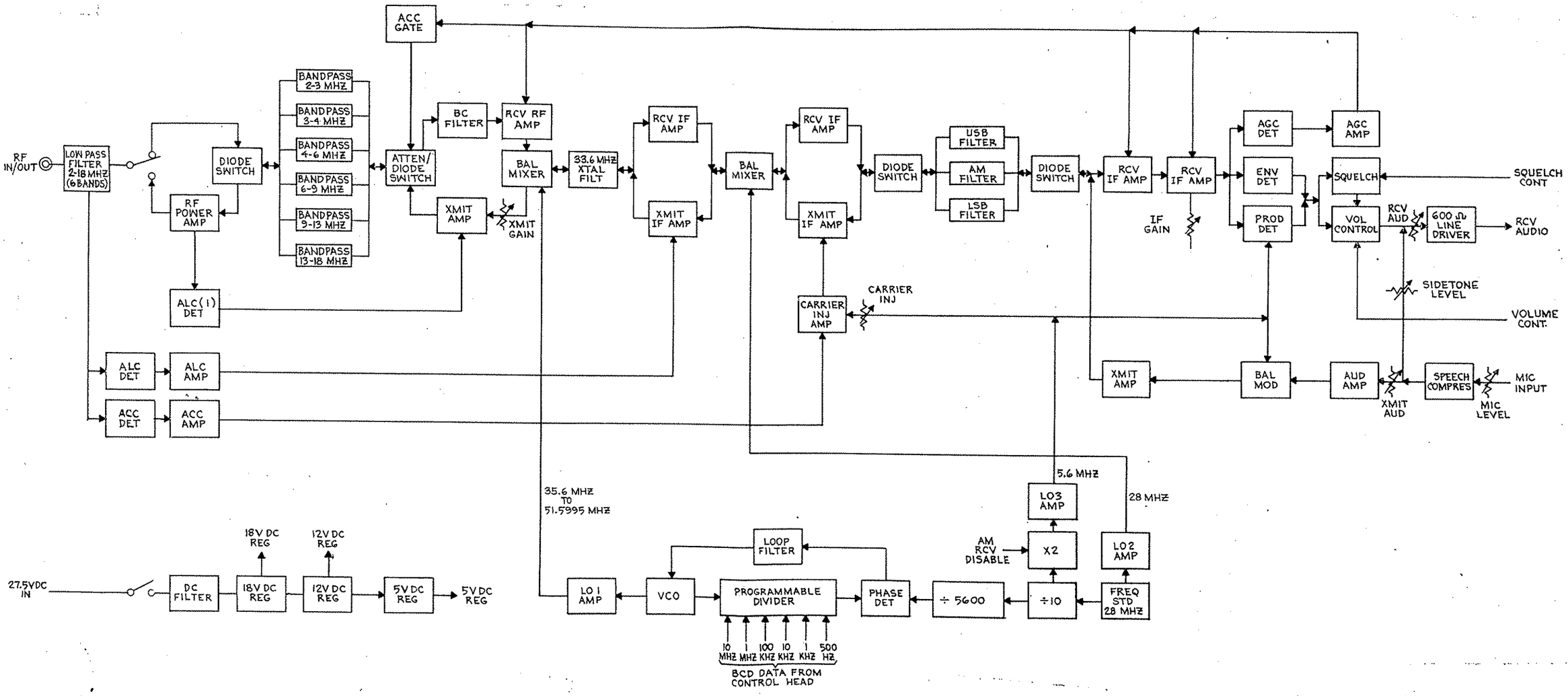


Figure 4.1 Transceiver Overall Block Diagram

frequency is numerically equal to the BCD data used to program the divider. Thus, to produce a VCO frequency of 43.4680 MHz, U6 is loaded with a 4 (0100), U10 with a 3 (0011), U14 with a 4 (0100), U18 with a 6 (0110), and U20 with an 8 (1000). Counter U22 is a divide by 2 stage that determines whether the output frequency is an odd or even multiple of 500 Hz. A logic 1 on pin 15 of U22 instead of a logic 0 would produce a frequency of 43.4685 MHz in the above example.

Because of the operation of the dual modulus prescaler, the programmable divider is broken into two groups:

The most significant group (MSG) consisting of dividers U6, U10, U14 and U18; and the least significant group (LSG) consisting of dividers U20 and U22.

The groups are clocked in parallel by the ÷ 20/21 output (pin 12 of U13). Assume flip-flop U13 is reset so that its output (pin 9) is low. This inhibits U20 and U22 by holding their load lines low. At the same time, control line pin 10 of U17 is taken high, and the circuit divides by 20. When the MSG underflows, the pulse on pin 5 of U13 sets pin 8 low and pin 9 high. Pin 10 of U17 is thus high, causing the circuit to divide by 21. The divide by 21 continues until the LSG underflows and pin 13 of U20 goes low and resets U13. To summarize: The dual modulus prescaler divides by 21 for the duration of the count programmed into the LSG, and divides by 20 for the count of MSG minus LSG.

Since the BCD data input to the synthesizer board is numerically equal to the received and transmitted frequency, a number representing the first IF must be added to the input data to obtain the correct number for the programmable divider. The function of U7, U11 U12, U15 and U16 is to add 336 to the input data for the three most significant digits. The actual addition is done in four bit binary full adders U7, U11 and U15. The purpose of U12 and U16 is to correct the output sum to BCD instead of binary. Adder U7 needs no correction because its output is always a 3, 4 or 5. The output of U11 needs the following corrections:

If the input is 0 through 5 (0000 through 0101), a 3 (0011) is added; if the input is 7 through 9 (0111 through 1001), a 9 (1001) is added; if the input is 6 (0110) without a carry from the previous stage, a 3 (0011) is added; if the input is 6 with a carry, 9 (1001) is added. The correction for U11 is made by U12 and Q7.

Correction for adder U15 is made as follows: if the input is 0 through 3, 6 is added; if the input is 4 through 9, 12 (1100) is added. This correction is made by U16.

4.2.8 28 MHz OVEN STANDARD - A1

The 28 MHz oven standard A1 operates from regulated 18 VDC and is designed to provide on-frequency operation over a temperature range of -46° C to +85° C. The frequency stability of the standard is 1 part per million. Warm up time is typically less than two minutes to full stability.

4.2.9 VOLTAGE REGULATORS

Two voltage regulators are included on the synthesizer board for isolation and stability. Regulator U8 regulates the 18 VDC input to 12 VDC for use by the VCO and its associated circuitry. Regulator U1 receives approximately 8 VDC from the transceiver mother board and regulates it to 5 VDC for use by all of the digital circuitry.

4.3 FIRST MIXER BOARD - 1A5

Figure 5.13

4.3.1 GENERAL

The first mixer board contains six band pass filters used on receive and transmit to re-

duce harmonics and spurious signals. The receiver rf amplifier, transmitter power amplifier driver, first mixer, and first IF filter are also located on this board. The band-pass filters and the receive or transmit functions are all diode switched.

4.3.2 BAND PASS FILTERS

The band pass filters are divided into six bands: 2-3 MHz, 3-4 MHz, 4-6 MHz, 6-9 MHz, 9-13 MHz and 13-18 MHz. The filters are of an elliptical design for minimum pass band ripple and maximum skirt selectivity. The appropriate filter is selected by a ground on its control line. The receiver input and transmitter output are switched with low distortion PIN diodes to prevent receiver cross modulation. Both input and output are transformer coupled to provide superior isolation and to eliminate ground "loop" currents.

4.3.3 DELAYED AGC

Transistor Q1 operates with PIN diode CR15 to provide a delayed AGC front end rf attenuator. Since the resistance of a PIN diode is proportional to the current flowing through it, i.e. high current gives low forward resistand and low current gives a large forward resistance, it can be made to attenuate the rf signal to the receiver rf amplifier under strong signal conditions.

Q1 receives its base voltage from the AGC line, which is high (approximately 8V) at no signal, and is low (approximately 1.5V) at strong signal conditions. So under normal receiving conditions, Q1 is saturated allowing maximum current to flow through CR15 (low forward resistance). As the signal increases, the AGC voltage decreases to hold the audio output constant, until at very high input levels the AGC has decreased to where Q1 no longer is saturated. From this point on, as the signal input increases, the current through Q1 and CR15 decreases, which increases the forward resistance of CR15, attenuating the signal level to the receiver rf amplifier Q3.

In transmit, the AGC voltage remains high, providing a current sink for CR16 through saturated Q1.

4.3.4 BROADCAST FILTER

The rf signal passing through CR15 on receive is filtered by C60, L43, C62, C64, L45, C65, C67, L46, C69 and C70. This network is a high pass filter with a cutoff frequency below 2 MHz to eliminate potential interference from broadcast stations. T1 matches the rf amplifier (Q3) input impedance to the 50 ohm characteristic impedance of the broadcast band filter.

4.3.5 RECEIVER R. F. AMPLIFIER

The rf amplifier is a dual gate MOSFET with protective diodes built into the input gate to prevent burnout under moderate overload. The input signal is applied to gate 1 (pin 3) and the amplified signal is taken from the drain (pin 1) through transformer T5. The source (pin 4) is biased positively to 3.6V by CR18, to increase the dynamic gain range obtained by varying the voltage on gate 2 (pin 2) The rf amplifier transistor can now be practically cut off when gate 2 voltage is taken to zero. Gate 2 receives its voltage from the AGC line, which varies between +8V at no signal to +1.5V for a very strong signal.

The output of T5 passes through CR19 to the input of the first mixer, X1. CR19 is turned on by the +12R line in receive, through L50, and applies approximately 11 volts across R39. Since the +12T line is at ground during receive, diode CR20 is back biased and turned off. During transmit, +12R goes to ground, allowing CR20 to turn on, turning CR19 off.

4.3.6 FIRST MIXER AND FIRST IF FILTER

X1 is a doubly balanced mixer which combines the input signal with the first local oscillator (LO) to provide predominantly sum and difference frequencies. The balanced mixer is used to minimize the number of mixing products because of its inherent ability to virtually eliminate the even harmonics of the mixing frequencies and their sums and differences, as well as the mixing frequencies themselves. Therefore, the primary mixer output is LO1 plus the rf signal and LO1 minus the rf signal. The first LO is variable between 35.6 MHz and 51.5995 MHz, corresponding to 2.0 to 17.9995 MHz selected by the remote control frequency control knobs. In the ASB-500, the difference frequency is selected and a first IF of 33.6 MHz was chosen to minimize spurious frequencies within the transceiver. Note that at the lowest frequency of operation, 2.0 MHz, the sum and difference frequencies in the mixer output are 4 MHz apart making it a simple task to remove the sum frequency with a narrow band crystal filter, FL1.

FL1 is matched to 50 OHMS in and out with matching networks L51, C84 and C85, L52.

4.3.7 TRANSMIT WIDEBAND AMPLIFIER

The transmit signal from X1 is amplified by Q4 and Q2 and passed through a lowpass filter C58, C59, L41, C61, C63, L44, C66 to the band pass filters through CR16. The exciter output is taken from T2. R34 adjusts the overall system transmit gain to the proper level. The gain of Q4 is controlled externally by the power amplifier (P.A.) current automatic level control (ALC) to prevent P.A. overdrive.

4.4 SECOND MIXER BOARD - 1A4

Figure 5.14

4.4.1 GENERAL

The second mixer board includes receive and transmit bilateral amplifiers, the second mixer, the sideband and AM IF filters, AM carrier injection amplifier, and the first 2nd IF receive amplifier.

4.4.2 FIRST IF BILATERAL AMPLIFIER

Dual gate MOSFETS Q1 and Q2 form a bilateral amplifier at the first IF, 33.6 MHz. In receive, the first IF is impedance matched from 50 ohms by T1 to the gate 1 (pin 2) of Q1. The output is taken from the drain (pin 1) and stepped down to 50 ohms through T2. In receive, Q1 is turned on by the +12R through R2 to gate 2 (pin 2) and Q2 is turned off by ground on the ALC (V) line through R12. CR1 sets the source voltage for both transistors at 3.6V to provide the dynamic attenuation range (see par. 4.3.5). In transmit, +12R goes to ground shutting off Q1, and Q2 is turned on and gain controlled by the ALC (V) voltage. This stage limits the transmitter output to the level set by the ALC control and also reduces output to a safe level in case an output short or open circuit is detected.

4.4.3 SECOND MIXER

The second mixer, X1, is doubly balanced and is identical to the unit used on the first mixer board. The mixer combines the 33.6 MHz first IF with 28.0 MHz from the second LO to get the second IF, 5.6 MHz, which is the difference frequency. The sum frequency, 61.6 MHz, also appears but is removed by the 5.6 MHz filters further downstream.

4.4.4 SECOND IF BILATERAL AMPLIFIER

Q3 and Q4 form a bilateral amplifier to amplify in both receive and transmit directions. Q4 amplifies in receive, and Q3 amplifies in transmit. During receive, the +12R line turns on Q4, CR2, and CR4 allowing the signal to go from T3 to the filters. In transmit mode Q4, CR2, and CR4 are turned off and Q3, CR3 and CR5 are turned on by the +12 T line.

If AM is selected, carrier at 5.6 MHz is injected into the base of Q3 through C19.

4.4.5 AM CARRIER INJECTION AMPLIFIER

When AM transmit is selected, Q5 and gate CR18 are turned on to allow 5.6 MHz to be injected into amplifier Q3. The amount of carrier is adjusted by R32 to provide 95% modulation at the audio frequency of maximum response, and maximum audio level to insure that 100% modulation cannot be exceeded. During sideband operation, Q5 is turn-off to prevent carrier leakage. Diodes CR18, CR19 form a gate to further prevent carrier leakage.

4.4.6 DIODE GATE AND IF FILTERS

The 5.6 MHz receive signal from Q4 is fed to the junction of diodes CR6, CR7 and CR8. Diodes CR6 and CR9 form a gate for the input of FL1, the USB filter; CR7 and CR10 form a gate for the AM filter, FL2; and CR8 and CR11 form a gate for the LSB filter, FL3.

The diode gates are repeated at the filter outputs and operate as follows:

Assume the USB mode is selected. A+12 VDC voltage is applied to pin 4 of 1A4P2. This turns on CR25, CR6 and CR15. Using the input gate (CR6, CR9) as an example, current flows through L5, CR6, and R25. A voltage of approximately 11 volts exists across R25 as a result, which turns off CR7 and CR8. CR9 is also turned off because the cathode is more positive (+12V) than the anode (+4V). So the signal is allowed to pass into the filter. At the same time, the other filter gates are turned off. Using CR7 and CR10 as an example, CR10 is conducting (+4V on the anode with a path to ground through L6, R28 for the cathode). This shorts to ground any signal leakage through CR7; and CR7 is turned off with +4V on the anode and +11V on its cathode.

The input and output gates for the other filters operate in a similar manner. Diodes CR22 through CR26 prevent interaction with other control circuits. CR20 and CR21 switch between receive and transmit.

4.4.7 FIRST 5.6 MHz RECEIVE IF AMPLIFIER

Integrated circuit U1 is a transistor array making up the first 5.6 MHz receive IF amplifier. U1A and U1B are connected as a cascade amplifier with AGC capability through the base of U1A (pin 4). The output of U1B (pin 8) is impedance matched to 50 ohms by emitter follower U1C and ground loop isolated by transformer T4.

4.4.8 TRANSCEIVER DISABLE GATES

When a frequency is selected beyond the capability of the transceiver, i.e. below 2.0 MHz or above 17.9995 MHz, a +12 VDC signal appears at pin P of 1A4P1. This voltage turns on Q6 through R4 and Q7 through R9. Q6 shunts the AGC line to ground, disabling the receiver, and Q7 shunts the ALC line to ground, disabling the transmitter.

4.5 AUDIO BOARD-1A3

Figure 5.15

4.5.1 GENERAL

This board contains the receiver detectors and all audio processing circuitry for both transmit and receive functions.

4.5.2 SECOND 5.6 MHz IF AMPLIFIER

Integrated circuit U1 is a transistor array which makes up the second 5.6 MHz IF Amplifier stage plus two emitter followers: one (U1D) to feed the SSB AM detectors, and one (U1C) to feed the AGC detectors. U1A and U1B are connected in cascade with AGC capability through the base (pin 12) of U1B. R4 adjusts the overall receive gain for the proper AGC characteristics.

4.5.3 AGC DETECTOR

Integrated circuit U2 contains an AGC amplifier (U2A), detector (U2B), and emitter follower (U2D). Detection is accomplished by the emitter-base junction of U2B, with CR7 equalizing the load for amplifier U2A. When U2B conducts, the collector (pin 1) is pulled down toward ground, causing CR8 to conduct, discharging C30 rapidly, providing a fast attack. When the signal disappears, even momentarily as between words on SSB, U2B ceases to conduct and the collector returns to +12VDC, shutting off CR8. Capacitor C30 charges slowly through R45, providing the slow decay characteristic. Because the forward conduction voltage (and hence the AGC threshold) of the U2B base emitter junction changes with temperature, a differential amplifier configuration is used. Transistor U2C provides bias to U2B that is proportional to its base emitter junction voltage, cancelling out the variation in the junction of U2B. Transistor U2D provides a low output impedance to feed the AGC to the first and second 5.6 MHz IF amplifiers, the rf amplifier, and the front end attenuator. AGC voltage may be read at the test point TP1.

4.5.4 PRODUCT DETECTOR AND ENVELOPE DETECTOR

Integrated circuit U3 contains the transistors used in the product and envelope detectors. The product detector U3A, U3B and U3C combines the 5.6 MHz IF signal from emitter follower U1D with the third local oscillator signal, 5.6 MHz. U3B amplifies the third LO signal and injects it into the detector where the audio components are detected. The rf components are removed by C40. The product detector is turned on only in USB or LSB modes by voltages on connector 1A3P2 pin 4 or pin 6. Diodes CR1 and CR2 are used to prevent interaction between the +12LSB and +12USB lines.

The envelope detector consists of a high gain IF amplifier U3D and a detector U3E. Transistor U3D drives the detector with a large signal for best linearity. U3E is biased almost at cutoff so it can detect amplitude variations. The rf components are removed by capacitor C54. The envelope detector is turned on only in the "AM" mode by the +12AMR voltage on pin 5 of 1A3P2.

4.5.5 VOLUME CONTROL

Transistor Q4 is a dual gate MOSFET which has gain control capability by variation of dc voltage on its gate 2 (pin 2). Diodes CR12, CR13 and CR14 provide a bias to the source (pin 4) so that the gate 2 may be taken negative with respect to the source, providing a total dynamic range of about 80 dB.

4.5.6 600 OHM LINE DRIVER

The output from the volume control stage feeds the receive audio potentiometer, R116, which controls overall receiver audio output. The line driver, U4, is a conventional push-pull multi-stage amplifier feeding output transformer T3. The output transformer is

center tapped to provide 150 ohm audio as well as 600 ohm audio. A side tone from the microphone amplifier is provided on pin K of 1A3P1 as an additional input to the line driver. The sidetone level is adjustable on the front panel of the transceiver.

4.5.7. SQUELCH

The audio from the product and envelope detectors is also fed to the amplifier U7A which supplies audio to the squelch circuit. Potentiometer R110 adjusts the "fail safe" squelch break point with the squelch control on the Remote Control front panel set fully CCW, so that an incoming signal of 30 to 50 μV will always break the squelch.

Transistors U7B and U7C are a high gain cascade audio amplifier with audio passband narrowed and centered around 1KHz to minimize interference from high and low frequency external noise sources. The amplified audio is detected by CR15 and CR16 and the dc voltage applied to the base (pin 12) of U7D. When this stage conducts, the base of Q5 is taken to ground, causing it and Q6 to cease conduction, opening the squelch. Squelch is accomplished by turning off the volume control with transistor Q6. So when no audio is present (and the unit has been set to squelch), transistors Q5 and Q6 both conduct, shutting off the volume control.

The squelch control (on the Remote Control Unit), when turned fully CW, supplies a bias to the squelch circuit to keep it open when not required. C82 and R131 establish a "hold" time constant to keep the squelch open between words.

Transistor Q3 receives its base voltage from the AGC circuit and applies a dc voltage proportional to signal strength to the squelch control line. This insures that strong signals will break the squelch regardless of the control setting.

4.5.8 MICROPHONE AMPLIFIER AND SPEECH COMPRESSOR

Operational amplifier U6 is used as a high gain microphone amplifier which, by controlling the conduction of FET Q7 acts as a very tightly controlled speech compressor. The microphone audio is detected by CR10, CR11 and fed to the gate of Q7. This in turn determines the conduction resistance across the source and drain of Q7, shunting feed back resistor R75. This changes the amplifier feedback decreasing the gain and holding the amplifier output constant. Transistor U5C samples the microphone output and applies it to 1A3P1 pin N, the sidetone output. Microphone excitation voltage is present at the microphone input.

4.5.9 BALANCED MODULATOR

The balanced modulator is a full ring of hot carrier diodes with provisions for resistive and reactive balance. The third LO is amplified by Q2 and fed as a current source to the carrier balance potentiomenter, R34. A coarse carrier balance is made with R34, then a final balance is made using variable capacitor C26.

Audio from the microphone amplifier is applied to the bridge by emitter follower U5A. SSB audio level is adjusted by SSB AUDIO control R58. In AM operation, U5B is turned on shunting a portion of the audio to provide the proper level for 100% modulation. This level is adjusted with AM MOD LEVEL control R56.

Transistor Q1 amplifies the double sideband suppressed carrier output from transformer T2 and supplies it to the second mixer board for unwanted sideband removal.

4.6 MOTHER BOARD -1A1A1
Figure 5.16

4.6.1 GENERAL

The mother board provides interconnection for transceiver plug-in boards. Almost all interconnection within the radio is done on the mother board, keeping wiring to an absolute minimum.

4.6.2 FRONT PANEL 1A1A2 Figure 5.17

Figure 5.17 shows the interface between the transceiver front panel and the mother board. Capacitors C1 through C5 and inductors L1 and L2 filter the incoming d.c. line to remove transients or conducted audio frequencies. Capacitors C6 and C7 prevent conduction of transmit rf energy along the power leads.

4.7 PA FILTER MODULE -1A7
Figures 5.18 and 5.19

4.7.1 GENERAL

The PA Filter Module contains the transmitter low pass filters and switching circuitry, the interface board, and the regulator heat sink assembly.

4.7.2 FILTER ASSEMBLY
Figure 5.20

4.7.2.1 GENERAL

The Filter Assembly includes the odd channel filter board (1A7A3), the even channel filter board (1A7A2), the ALC/ACC detector board (1A7A4), the regulator heat sink assembly, and the motor and its control circuitry.

4.7.2.2 ODD CHANNEL FILTER BOARD - 1A7A3 - Figure 5.21

The odd channel filter board contains the elliptical low pass filters for bands 1, 3 and 5. Band 1 operates from 2 to 3 MHz, band 3 operates from 4 to 6 MHz, and band 5 operates from 9 to 13 MHz.

4.7.2.3 EVEN CHANNEL FILTER BOARD 1A7A2 - Figure 5.22

The even channel filter board contains the elliptical low pass filters for bands 2, 4 and 6. Band 2 operates from 3 to 4 MHz, band 4 operates from 6 to 9 MHz, and band 6 operates from 13 to 18 MHz.

4.7.2.4 ALC/ACC Detector Board - 1A7A4 Figure 5.23

This board contains three detectors: the voltage automatic level control (ALC) detector (to limit the transmitter voltage output), the automatic carrier control (ACC) detector (used to keep the AM carrier level constant), and the reflected power detector (to protect the power amplifier in the event of a short or open circuit on the output). Capacitor C1 compensates the ALC detector for changes due to frequency. This is normally set at the factory and should not require readjustment in the field.

Capacitor C5 adjusts the balance on the reflected power bridge to provide zero output when the antenna is a pure 50 ohm resistive load. This detector has no effect on radio operation until the VSWR exceeds 2:1. Above this point it rapidly decreases drive to the power amplifier to keep PA dissipation within safe limits.

4.7.2.5 REGULATOR BOARD - 1A7A5
Figure 5.20

The regulator board contains the open-seeking wafer S1A, which controls the filter band motor B1, and all of the low power elements of the 18V and 12V regulators. A ground on any of the band lines will cause the motor to turn the open-seeking wafer to that line. Dynamic braking is applied to the motor to minimize overshoot. C1, L1, C2 form a hash filter to prevent motor hash from appearing in the receiver output. The keyline is de-energized any time the filter motor is operating. The 18V regulator, U1, and the 12V regulator, U2, and its high current pass element, Q2, are all electrically connected to this board. Zener diode CR1 reduces the regulated 18VDC to 13VDC for use by the T/R relays K1 and K2.

4.7.2.6 REGULATOR HEAT SINK ASSEMBLY
Figure 4.2

The 18V regulator, U1, and its high current pass element, Q1, and the 12V regulator, U2, and its high current pass element are all physically mounted on the heat sink block which provides an interface with the top cover heat sink. The 18V regulator, U1 and Q1, is correct limited to approximately 5 amps, which in effect limits the current in the low level stages of the transceiver and the remote control.

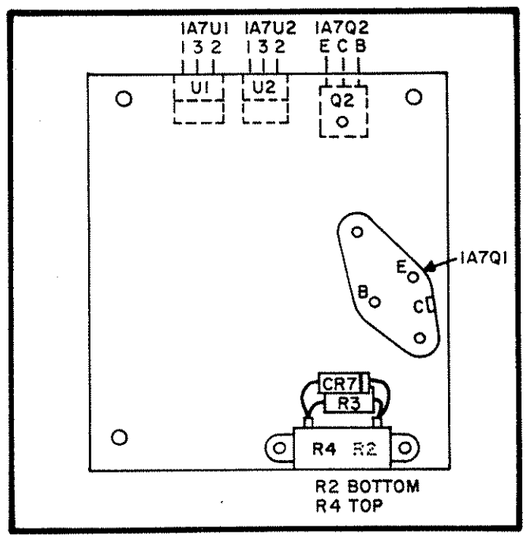


Figure 4.2 Regulator Heat Sink Assy.

4.7.3 INTERFACE BOARD - 1A7A1
Figure 5.24

The interface board contains the ALC and ACC control circuits and the main transmit/receive relay, K1. This relay switches all necessary voltages when the radio goes from receive to transmit.

Transistor Q1 is the ACC tailoring amplifier which removes the modulation from the detector signal and supplies a dc voltage proportional to average transmitted power. This voltage is inverted by Q2 and fed to Q5. Transistor Q5 conducts through R23, reducing the voltage output on 1A7A1 P2 pin M which controls the gain of transmit IF amplifier 1A4Q2 on the second mixer board (1A4). Inputs from the reflected power detector and the power amplifier VSWR detector also act on Q5 to reduce transmitter gain. The ACC control circuits are energized only in AM transmit mode.

Transistors Q3 and Q4 are current amplifiers for the voltage ALC circuit. Output from the voltage ALC detector charges capacitor C6 rapidly through Q3 and Q4. Between syllables and words, C6 must discharge through R17 and R20, giving a slow decay. The ALC voltage turns on transistor Q8 which conducts through R23, reducing the gain of transmit amplifier 1A4Q2. The emitter-base junction voltage of Q8 is temperature compensated by Q6 to provide constant transmitter output over the temperature range of -46° C to +55° C. Transistor Q7 shuts off the ALC during AM operation to prevent interaction with the ACC. ALC may be monitored at the test-point TP1.

Transistor Q9 receives its base input from the current ALC detector on the power amplifier. If the current exceeds a preset level, Q9 is turned on, controlling the gain of 1A5Q4 on the first mixer board (1A5). A prebias is placed on the base of Q9 during receive to shut down 1A5Q4 during T/R switching, eliminating transients in the output. CR4 charges C8 to 12 VDC during receive. Then upon switching to transmit, C8 must discharge through R28, keeping Q9 turned on for approximately 10 m sec.

The interface board plugs into the filter assembly and subsequently plugs into the mother board.

4.8 RF POWER AMPLIFIER - 1A2

Figure 5.25

4.8.1 GENERAL

The power amplifier consists of three push-pull stages; predriver, driver and output. The predriver amplifies the 10 milliwatt exciter output to approximately 1 watt, the driver amplifies this to the 10 watt level, and the output stage amplifies to the 100 watt level.

4.8.2 PREDRIVER, DRIVER AND POWER AMPLIFIER

Input from the exciter is connected to 1A2J1 by a coaxial cable from the mother board. Transformer T1 converts the single ended exciter input to push-pull, to drive predriver transistors Q1 and Q2. Bias for the predriver (for AB2 operation) is taken from CR1, which is in a forward conduction state. C2, L6, R4 and C3, L7, R5 are feedback networks for gain stabilization. The driver Q3 and Q4, is driven push-pull through T2, and obtains its bias from CR2 and associated circuitry. R10, C10 and R12, C11 are feed back networks for gain stabilization. The output stage, Q5 and Q6, is fed push-pull through T4 and obtains its bias from CR3. R23 allows the bias voltage to be varied to provide the optimum no-signal idle current for minimum cross-over and intermodulation distortion in the output stage. All bias lines are tied together and are energized only in transmit mode to minimize receive power dissipation. The push-pull output from Q5 and Q6 is transformed to single ended output at 50 ohms by T6.

4.8.3 CURRENT ALC DETECTOR

Transistor Q7 monitors the voltage across resistor R24, which is proportional to the current drawn by the amplifier (primarily the output stage). The values of R18 and R19 have been chosen to cause Q7 to conduct heavily when a current of 10.5 amperes flows through R24. When Q7 conducts, a voltage appears across R33. This voltage is connected to the interface board 1A7A1 where it controls the gain of the power amplifier driver on the First Mixer Board, 1A5.

4.8.4 VSWR ALC DETECTOR

A detector circuit, C26, R30, R31, CR4, C28, is coupled to the collector of Q6 to monitor peak collector voltage. If the voltage should exceed 70V peak (normally caused by high VSWR to the PA itself), the voltage appearing at pin D of the PA power connector causes the VSWR ALC amplifier on the interface board 1A7A1 to reduce the transmit IF gain (on the second Mixer Board) to bring the voltage to within safe limits on the output transistor collectors.

4.9 REMOTE CONTROL HEAD-2A

Figure 5.27

4.9.1 GENERAL

The Control Head contains the switches which supply digital frequency information to the synthesizer in the transceiver, and to the digital display drivers. Also included are the VOLUME and SQUELCH controls, and auxiliary DIMMER control, coupler status lights, and a push button MODE switch.

4.9.2 DECODER BOARD - 2A1

Figure 5.26

Digital signals, ground for a "0" state and open circuit for a "1" state are applied by the digital switches to display drivers U1 through U6. These in turn drive the appropriate seven segment LED display. A special lamp and display dimmer circuit consisting of Q3 and Q4 allows the operator to use the cockpit dimmer control and "fine adjust" the intensity with a control on the CONTROL HEAD front panel.

The illuminated push-button MODE switch is also a part of this board.

A "limit" circuit is included on the board to warn the operator that he has dialed a frequency below 2.0 MHz or above 17.9995 MHz. Q1, Q2 form a display flasher circuit which pulses the display on and off at a slow rate, allowing the operator to observe the incorrect dial setting. In conjunction with the frequency display, a voltage is sent to the transceiver to disable the receiver and transmitter.

4.9.3 DISPLAY BOARD - 2A2

Figure 5.26

The display board contains the seven segment LED displays used to indicate the selected frequency. A decimal point is illuminated to show the frequency in kHz.

4.9.4 DIMMER

Transistor 2A3Q1 is a controllable regulator which supplies voltage to the lamps and the digital display. If a cockpit dimmer is not used, the regulator supplies 5V to the lamps and display, giving maximum brightness.

NOTE

The CONTROL HEAD DIMMER control will not function and the display will be at full brightness unless a cockpit dimmer voltage is present. If a cockpit dimmer is used, the voltage on the base of Q1 is decreased by the dimmer causing the lamp voltage to decrease accordingly.

4.9.5 5VDC REGULATOR

Figure 5.27

U1 is a single packaged 5VDC regulator which supplies power to the display drivers.

4.9.6 CONTROL LIGHTS

Figures 5.26 and 5.27

Lamps DS1, DS2, DS3 and DS4 are located behind the ON, LSB, AM and USB push-buttons for button illumination, and are controlled by their respective push-button switches. DS5 is located behind the TUNE push button to illuminate it, but it is controlled by the automatic coupler unit (ACU-150) and is illuminated only when the coupler is tuning.

Panel lamps 2A3DS1 and DS2 back light the front panel for night time use.

FAULT lamp 2A3DS3 (yellow) is illuminated only if the coupler detects a fault, such as failure to tune the antenna. READY lamp 2A3DS4 (green) is illuminated when the coupler tuning sequence is successfully completed and the transceiver is ready to transmit.

SECTION 5
MAINTENANCE AND REPAIR

5.1 GENERAL

This section provides test procedures for routine maintenance and evaluation of overall performance. A fault analysis table is included to aid the repairman in isolating a fault to the defective printed circuit board or subassembly. Also included in this section are module removal procedures.

5.2 PREVENTIVE MAINTENANCE

The equipment should be periodically inspected internally for loose or damaged components; kinked, frayed or broken wires; and loose hardware. All cable connections should be checked for proper mating.

5.3 COVER REMOVAL

5.3.1 TRANSCEIVER

a. To expose the plug-in printed circuit cards, remove the right side cover of the unit (8 flat head screws). Then, remove the six screws holding the cover on the card basket.

5.3.2 REMOTE CONTROL UNIT

a. Locate the two screws at the rear of the unit. Turn these 1/4 turn CCW and pull cover from the unit.

5.4 PERFORMANCE TEST

The following tests will provide overall performance data on this equipment as well as aid in determining specific problems or a deterioration in performance.

5.4.1 TEST EQUIPMENT

The following test equipment or equivalent is required to perform the following procedures:

a. RF Signal Generator - HP Model 606B
b. VTVM - HP Model 410B
c. Dummy load, 50 ohms @ 100W - Bird Model 8135
d. Coax Tee Connector - HP11042A
e. Audio VTVM - HP Model 400D
f. Oscilloscope, 100 MHz Bandwidth - Tektronix 465
g. VOM - Simpson Model 260 (20K ohms/volt).
h. 100 Watt Wattmeter - Bird Model 43
j. RF Voltmeter - Boonton Model 92C with both open circuit probe tip and 50 ohm BNC adapter.
k. Frequency Counter - HP Model 5382A
l. DC Power Supply - 0-30VDC, 15A
m. Spectrum Analyzer (optional).
   HP141T Display Section
   HP8554L RF Section
   HP8552A IF Section

5.4.2 MATERIAL REQUIRED

a. Humiseal* 1B31 - 1 Quart size, Sunair P/N1002840023 (for PC board repair)
b. Ancillary kit, Sunair P/N 8040001293 (for PC board extender card)

* Trademark of Columbia Technical Corporation.

5.4.3 PRELIMINARY PREPARATIONS

a. Connect interconnecting cable between transceiver and remote control.
b. Connect the main power cable between the transceiver and the power supply, par. 5.4.1, item 1, set for 28VDC.
c. Attach a coaxial cable from the transceiver rf connector to the signal generator, par. 5.4.1, item a.
d. Set remote control switches and controls per the following.

SWITCH OR CONTROL	POSITION
FREQUENCY Switches	2000.0 kHz
MODE Switch	LSB
DIMMER Control	Fully CW
SQUELCH Control	Fully CW
VOLUME Control	1/2 CW
POWER Switch	ON

Refer to Figures 5.16, 5.17 and 5.27 for internal wiring diagrams of the two units.

CAUTION

All the connectors for the plug-in P.C. boards are dual readout types and care should be exercised to prevent shorting one side to the other or adjacent pins to one another.

e. Remove left side cover (8 flat head screws) to allow access to mother board test points.

5.4.4 REGULATOR TESTS

STEP NO.	TEST	TEST EQUIPMENT AND TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
1	Power Turn on		Push ON button in.	ON button, LSB button and display should be lit.
2	28V D.C. Input	VOM on 50V D.C. range,common lead on chassis ground, "+" lead on "28V D.C." line on Mother Board.	Read voltage on VOM.	VOM should read 28V D.C. If not, check main power cable and Mother Board for continuity.
3	+18V D.C.	VOM on 50V D.C. range, common lead on chassis ground, "+" lead on"18V D.C." line on Mother Board.	Read voltage on VOM.	VOM should read between 17.0 and 19.0V D.C. If not, check 1A7U1, 1A7Q1 and associated components.
4	+12V D.C.	VOM on 50V D.C. range, common lead on chassis ground, "+" lead on "12V D.C." line on Mother Board.	Read voltage on VOM.	VOM should read between 11.2 and 12.8V D.C. If not, check 1A7U2, 1A7Q2 and associated components.

5.4.5 RECEIVER TEST

STEP NO.	TEST	TEST EQUIPMENT AND TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
1	Sensitivity	Audio VTVM in phone jack on front panel for steps 1 through 6.	With VOLUME control at 1/2 CW, set rf signal generator to 50 microvolts at 2.000 MHz, and adjust frequency for peak audio signal on VTVM.	Peak indication. If none, consult sections 4.3, 4.4 and 4.5. Check Mother Board for synthesizer outputs LO#1, LO#2 and LO#3. See Figure 5.5.
2	Sensitivity		Remove coax from rf signal generator output. Adjust VOLUME control for VTVM reading of -10 dB on 0.1 VRMS scale.	-10 dB on 0.1 VRMS scale.
3	Sensitivity		Set rf generator to 0.5uv into 50 ohms and reconnect coax.	VTVM increase of 10 dB minimum over step 2. If not, check First Mixer Board, Second Mixer Board and Audio Board.
4	Sensitivity		Depress USB button and repeat steps 1, 2 and 3 above.	If no output, check wiring for USB function, check switching diodes on Second Mixer Board and CR1 on Audio Board.
5	Sensitivity		Adjust rf signal generator for "zero beat", and increase output to 3uv (into 50 ohms). Depress AM button and adjust VOLUME control for VTVM reading of -10 dB,0.1 VRMS scale.	-10 dB on 0.1 VRMS scale. If no output, check wiring and switching diodes on Second Mixer Board.
6	AM Sensitivity		Turn on 30% modulation at 1 KHz on rf signal generator.	Minimum 10 dB increase over level in step 5.

5.4.5 RECEIVER TEST (Cont.)

STEP NO.	TEST	TEST EQUIPMENT AND TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
7	AGC Control	Audio VTVM in PHONE jack on front panel and VOM (on 10V D.C. range) between test point 1A3TP1, on Audio Board, and chassis ground for steps 7 through 10.	Remove 1 kHz modulation and set signal generator output to zero. Depress USB button.	VOM should read approximately 8.5V D.C.
8	AGC Control		Set signal generator output to 5uv and adjust frequency for peak audio VTVM reading.	VOM should read down scale from step 7.
9	AGC Control		Adjust VOLUME control for VTVM reading of -10 dB on 1 VRMS scale.	-10 dB on 1 VRMS scale.
10	AGC Control		Increase rf signal generator output to 250,000uv.	VTVM should increase a maximum of 10 dB from step 9. If greater than 10 dB, adjust IF gain pot R4 on the Audio Board.
11	Squelch Control	Audio VTVM on PHONE jack on front panel for steps 11 and 12.	Depress AM button, set signal generator to 25uv, 30% modulated at 1 kHz, turn SQUELCH control fully CCW.	Receiver audio should squelch. If not, readjust 1A3R110 on Audio Board. Check 1A3U7, 1A3Q5 and 1A3Q6.
12	Squelch Control		Increase signal level to 100uv.	Squelch should open allowing audio to pass.
13	600 Ohm Audio Output	Audio VTVM between pins F and C (audio ground) on Remote Control audio connector 2A3J2. Add 600 ohm resistive load across pins F and C.	Depress USB switch. Set signal generator level at 10uv. Adjust frequency for peak on VTVM. Adjust VOLUME control to max. CW.	Output shall be a minimum of 5.5 VRMS. If not, readjust 1A3R116 on the Audio Board.

5.4.6 TRANSMITTER TEST (Note: Connect a jumper between pins S and T on 1A1P5 to complete keyline.)

1		Dummy load connected through coaxial cable to transceiver rf connector using coaxial tee. HP410B VTVM connected to remaining part of tee for steps 1 through 4.	Frequency dials set to 10000.0 kHz, depress AM button.	
2	AM carrier check and adjustment	Connect microphone to MIC connector on front panel for steps 2 and 3.	Key microphone. Adjust ACC potentiometer 1A7A1 R4 on the Interface Board to give a VTVM reading of 42 VRMS.	VTVM should read 42 VRMS. If not, check for exciter output on Mother Board (E34). Should be approx. 1v p-p. If okay, check power amp and T/R relay 1A7K1. Also check filter module for proper channelling.
3	SSB Power output		Depress USB button. Key microphone and talk into it. Adjust ALC control, 1A7A1 R20 on the Interface Board to give a VTVM reading of 70.7 VRMS on the HP410B.	VTVM should read 70.7 VRMS. If not, check microphone circuits on Audio Board 1A3 and balanced modulator.
4	Carrier Balance	Remove microphone and insert a small metal rod, such as a screwdriver shaft into the MIC connector to key the transmitter.	Depress LSB switch. Adjust 1A3R34 and 1A3C26 on the Audio Board until the VTVM reads less than 0.7 VRMS. Check USB.	VTVM should read less than 0.7 VRMS in both LSB and USB modes. If not, check CR3-6 and associated circuitry on Audio Board.

5.5 SYNTHESIZER

The following paragraphs provide troubleshooting and fault isolation information for those problems peculiar to the synthesizer.

5.5.1 PRELIMINARY CHECKS

STEP NO.	TEST	TEST EQUIPMENT AND TEST POINT	PROCEDURE	REQUIRED PERFORMANCE	IF FAULTY, CHECK:
1	12VDC Regulator	VOM at U8 pin 2, 50VDC scale.	Check dc voltage.	12VDC ±0.8V	L1, R19, U8, or short circuit.
2	5VDC Regulator	VOM at U1 pin 2, 12VDC scale	Check dc voltage.	5VDC ±0.5V	L2, U1 or short circuit.
3	Freq. Std. Output	Oscilloscope probe on A1 pin 4	Check for proper wave form and amplitude.	Square wave approx 4V p-p, 35.7n sec rep rate.	Freq std A1 and associated circuitry.
4	Freq. Std. Alignment	Same as step 3. Connect Freq. counter to vertical output of oscilloscope.	Measure frequency. If out of tolerance, adjust frequency trim on top of standard A1.	Frequency within ±28 Hz of 28.000000 MHz.	If proper alignment cannot be obtained, replace Freq. Std.

5.5.2 FREQUENCY CODING

The following tables are provided to assist in trouble-shooting the programmable divider chain. The relationship between the Remote Control frequency dials (BCD) and the counters is as follows:

10 MHz dial	add 3 to counter
1 MHz dial	add 3 to counter
100 kHz dial	add 6 to counter
10 kHz dial	BCD standard
1 kHz dial	BCD standard
500 Hz dial	BCD standard

NOTE

33.6 MHz is the first IF, hence the addition to the first three most significant counters.

500 Hz Dial	U22 Pin No. (Function)			
	9 (2^3)	10 (2^2)	1 (2^1)	15 (2^0)
0	0	0	0	0
1	0	0	0	1

Table 5.1 500 Hz Switch

1 kHz Dial	U20 Pin No. (Function)			
	9 (2^3)	10 (2^2)	1 (2^1)	15 (2^0)
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

Table 5.2 1 KHz Switch

10 kHz Dial	U18 Pin No. (Function)			
	9 (2^3)	10 (2^2)	1 (2^1)	15 (2^0)
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

Table 5.3 10 KHz Switch

100 kHz Dial	U14 Pin No. (Function)			
	9 (2^3)	10 (2^2)	1 (2^1)	15 (2^0)
0	0	1	1	0
1	0	1	1	1
2	1	0	0	0
3	1	0	0	1
4	0	0	0	0
5	0	0	0	1
6	0	0	1	0
7	0	0	1	1
8	0	1	0	0
9	0	1	0	1

Table 5.4 100 KHz Switch

Dial	Function (Pin No.) U15													
	A4(12)	A3(14)	A2(3)	A1(5)	B4(11)	B3(15)	B2(2)	B1(6)	Carry in (7)	Σ4(10)	Σ3(13)	Σ2(1)	Σ1(4)	Carry out (9)
0	0	0	0	0	0	1	1	0	0	0	1	1	0	0
1	0	0	0	1	0	1	1	0	0	0	1	1	1	0
2	0	0	1	0	0	1	1	0	0	1	0	0	0	0
3	0	0	1	1	0	1	1	0	0	1	0	0	1	0
4	0	1	0	0	1	1	0	0	0	0	0	0	0	1
5	0	1	0	1	1	1	0	0	0	0	0	0	1	1
6	0	1	1	0	1	1	0	0	0	0	0	1	0	1
7	0	1	1	1	1	1	0	0	0	0	0	1	1	1
8	1	0	0	0	1	1	0	0	0	0	1	0	0	1
9	1	0	0	1	1	1	0	0	0	0	1	0	1	1

Table 5.5 100 kHz Adder (U15) Programming [A+B = Σ]

Dial	U16 Pin No.			
	2, 3	5, 6	8, 9	10
0	0	0	1	0
1	0	0	1	0
2	0	0	1	0
3	0	0	1	0
4	0	1	0	1
5	0	1	0	1
6	0	1	0	1
7	0	1	0	1
8	1	0	0	1
9	1	0	0	1

Table 5.6 100 kHz Gate (U16) Programming

1 MHz Dial	U10 Pin No. (Function)			
	9 (2^3)	10 (2^2)	1 (2^1)	15 (2^0)
0	0	0	1	1
1	0	1	0	0
2	0	1	0	1
3	0	1	1	0
4	0	1	1	1
5	1	0	0	0
6	1	0	0	1
7	0	0	0	0
8	0	0	0	1
9	0	0	1	0

Table 5.7 1 MHz Switch

Dial	U12 Pin No.						Q7 Collector
	9,10,11	2, 5	1, 4	3	1, 3	6,8,12	
0	0	0	0	0	0/1	1	0
1	0	0	0	1	0/1	1	0
2	0	0	1	0	0/1	1	0
3	0	0	1	1	0/1	1	0
4	0	1	0	0	0/1	1	0
5	0	1	0	1	0/1	1	0
6	0	1	1	0	0	1	0
6	0	1	1	0	1	0	1
7	0	1	1	1	0/1	0	1
8	1	0	0	0	0/1	0	1
9	1	0	0	1	0/1	0	1

Table 5.8 1 MHz Gate (U12) Programming

Dial	Function (Pin No.)U11													
	A4(12)	A3(14)	A2(3)	A1(5)	B4(11)	B3(15)	B2(2)	B1(6)	Carry in(7)	Σ4(10)	Σ3(13)	Σ2(1)	Σ1(4)	Carry out(9)
0	0	0	0	0	0	0	1	1	0	0	0	1	1	0
1	0	0	0	1	0	0	1	1	0	0	1	0	0	0
2	0	0	1	0	0	0	1	1	0	0	1	0	1	0
3	0	0	1	1	0	0	1	1	0	0	1	1	0	0
4	0	1	0	0	0	0	1	1	0	0	1	1	1	0
5	0	1	0	1	0	0	1	1	0	1	0	0	0	0
6	0	1	1	0	0	0	1	1	0	1	0	0	1	0
7	0	1	1	1	1	0	0	1	0	0	0	0	0	1
8	1	0	0	0	1	0	0	1	0	0	0	0	1	1
9	1	0	0	1	1	0	0	1	0	0	0	1	0	1
0	0	0	0	0	0	0	1	1	1	0	1	0	0	0
1	0	0	0	1	0	0	1	1	1	0	1	0	1	0
2	0	0	1	0	0	0	1	1	1	0	1	1	0	0
3	0	0	1	1	0	0	1	1	1	0	1	1	1	0
4	0	1	0	0	0	0	1	1	1	1	0	0	0	0
5	0	1	0	1	0	0	1	1	1	1	0	0	1	0
6	0	1	1	0	1	0	0	1	1	0	0	0	0	1
7	0	1	1	1	1	0	0	1	1	0	0	0	1	1
8	1	0	0	0	1	0	0	1	1	0	0	1	0	1
9	1	0	0	1	1	0	0	1	1	0	0	1	1	1

Table 5.9 1 MHz Adder (U11) Programming [A+B = Σ]

10 MHz Dial	U6 Pin No. (Function)				1 MHz Dial
	9 (2^3)	10 (2^2)	1 (2^1)	15 (2^0)	
0	0	0	1	1	0-6
0	0	1	0	0	7-9
1	0	1	0	0	0-6
1	0	1	0	1	7-9

Table 5.10 10 MHz Switch

Dial	Function (Pin No. U7)											
	A4(12)	A3(14)	A2(3)	A1 (5)	B4(11)	B3(15)	B2(2)	B1(16)	Carry in (7)	Σ3(13)	Σ2(1)	Σ1(4)
0	0	0	0	0	0	0	1	1	0	0	1	1
1	0	0	0	1	0	0	1	1	0	1	0	0
0	0	0	0	0	0	0	1	1	1	1	0	0
1	0	0	0	1	0	0	1	1	1	1	0	1

Table 5.11 10 MHz Adder (U7) Programming [A+B = Σ]

NOTE

For the previous tables, a "0" indicates a low (0 VDC) relative to chassis ground; a "1" indicates a high state (approx. +5 VDC) relative to chassis ground. All data taken with synthesizer on an extender card and operating voltages applied.

5.5.3 SYNTHESIZER ALIGNMENT AND TEST PROCEDURES

STEP NO.	TEST	TEST EQUIPMENT AND TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
1	LO#1 Output	Oscilloscope probe on pin S of 1A6P1.	Read peak to peak output voltage.	1.4 ±0.4V p-p. If low or no output, check Q11, U19, Q10 and associated components.
2	LO#1 programming	Oscilloscope probe on pin S of 1A6P1. Frequency counter connected to vertical ampl. output of scope.	Rotate frequency dials and observe output frequency. Note 0000.0 kHz corresponds to 33600.0 kHz.	Frequency shall program correctly. If not, refer to Section 5.5.2 to check programming sequence.
3	LO#2 output level adjust	Oscilloscope probe on pin 1 of 1A6P2.	Adjust C22 for 0.8V ±0.1V p-p.	0.8V ±0.1V p-p on oscilloscope. If low or no output, check Q2, Q3, Q5 and associated components.
4	LO#3 output level adjust	Oscilloscope probe on pin S of 1A6P2. Frequency counter connected to vertical ampl. output of scope.	Note frequency 5.600000 MHz ±5.6 Hz. Adjust C16 for 0.4 ±0.1V p-p. MODE switch on USB.	0.4V ±0.1V p-p on oscilloscope, 5.600000 MHz ±5.6 Hz on counter. If frequency is 2.8 MHz, check Q6, L7, C26. If no or low output check Q1, Q6 and associated components.
5	LO#3 disable	Oscilloscope probe on pin S of 1A6P2.	Depress AM mode button.	LO#3 should disappear. If not, check Q4 and LO3 disable (12 AMR) on pin 13 of 1A6P2.

5.6 RECEIVER ALIGNMENT

1	1st IF Alignment	Connect rf signal generator to transceiver rf connector, 1A1J2, and set frequency for 2123 kHz. Connect VOM, set on 10v scale with "+" lead on TP1 on the Audio Board (1A3) and "-" lead on chassis ground. Set rf generator level to 50uv rms into 50 ohms.	Remove First Mixer Board (1A5) from card basket and install on the extender card. Set frequency switches to 2123 kHz. Depress AM button. Adjust generator frequency for a minimum reading on the VOM. Adjust C84 and C85 for further minimum on the VOM. When complete, replace First Mixer Board in card basket.	If no meter dip is observed, check LO# 1 input on pin R of 1A5P1. If LO#1 is present, check band switching diodes, bandpass filters, diodes CR15, CR16, CR19 and CR20, and Q3 and associated circuitry. Also check 1A4 (second mixer) and 1A3 (Audio Board) for defects.
2	1st IF Alignment	Same as step 1.	Remove Second Mixer Board (1A4) from card basket and install on the extender card. Adjust the generator frequency for a minimum reading on the VOM. Adjust C50 and C51 for minimum reading on the VOM.	If no meter dip is observed, check Q1, L1, C50 and associated components. Check for presence of LO#2 on 1A4P1, pin 14. Check Q4 and associated components. Change mode to check filter and switching network. Check U1 and associated components.
3	2nd IF Alignment	Same as step 1. Reduce rf generator level to 10uv rms into 50 ohms.	Adjust C37 for minimum reading on the VOM. When complete, replace Second Mixer Board in the card basket.	If no dip is observed, check C37, L11 and U1.
4	2nd IF Alignment	Same as step 3.	Remove Audio Board (1A3) from card basket and install on the extender card. Adjust the generator frequency for a mimimum reading on the VOM. Turn IF gain pot, R4, to minimum gain (fully CCW). Adjust C6 for minimum on the VOM.	If no dip is observed, check C6, 12, and U1.

5.6 RECEIVER ALIGNMENT (Cont.)

STEP NO.	TEST	TEST EQUIPMENT AND TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
5	AGC Adjustment	Connect Audio VTVM to PHONE jack on front panel. Set rf generator level to 5uv rms into 50 ohms. Modulate signal at 1 kHz, 30%.	Adjust VOLUME control for -10 dB reading on 1 VRMS scale on VTVM. Rock generator frequency to peak the signal. Increase signal level to 250,000 uv into 50 ohms. When complete, replace Audio Board in the card basket.	Audio output on VTVM must not increase more than 10 dB from the 5uv level to the 250,000 uv level. If audio change is greater than 10 dB, increase R4 CW to increase IF gain until audio change is 10 dB or less.
6	System Gain	Same as step 5. Adjust rf generator level to 10uv rms into 50 ohms, modulated 30% at 1kHz.	Set audio VTVM to 10 VRMS scale. Turn VOLUME control fully CW. Adjust 1A3R116 to give an audio output between 6 VRMS and 8 VRMS.	If audio output of 6 VRMS cannot be obtained, check 1A3R116 and 1A3U4.
7	Squelch Alignment	Same as step 5. Adjust rf generator level to 30 uv rms into 50 ohms, modulated 30% at 1 kHz.	Turn SQUELCH control on Remote Control unit fully CCW. Turn 1A3R110 CW until the squelch just breaks.	Squelch should break at maximum CCW control, with signal level between 30 and 50uv rms, but should remain squelched below 30uv. If operation is improper, check 1A3U7, Q5, Q6, and associated circuitry.

5.7 TRANSMITTER ALIGNMENT (Connect a jumper from pin S to pin T on 1A1J5.)

1	Carrier Balance	Connect 50 ohm dummy load and thruline wattmeter to transceiver rf connector, 1 A1 J2, using coaxial tee. Connect oscilloscope to unused side of tee.	Key transceiver in USB mode by inserting a metal rod, such as a screwdriver shaft into the MIC jack on the front panel. Connect a jumper between pins S and T on coupler connector 1 A1 J5. Depress LSB button. Observe output on oscilloscope set on 0.5 v/div scale. Adjust 1 A3 R34 and 1 A3 C26 alternately for minimum output on the scope. Check USB and balance the controls for equal carrier rejection on LSB and USB.	Output must be less than 200 mv P-P If not, check 1 A3 CR3-6 and other components in the balanced modulator.
2	AM Carrier Level Set and ACC Adjustment	Same as Step 1. Connect VOM set on 10 VDC scale with "+" lead on ALC TP1 (on interface board) and "-" lead on chassis ground.	Place Second Mixer Board on extender card. Depress the AM mode button. Set frequency dials to 17900.0 kHz. Key transceiver and adjust ACC control (1 A7 A1 R4) to give a 35 W carrier output. Note VOM. Reading should be 5.5 VDC ±1 VDC. If not, adjust 1 A4 R32. Check carrier at 2000.0 kHz. If necessary, adjust 1 A7 A1 R4 to give carrier level between 30 and 40 watts across the entire frequency range. When test is complete replace second Mixer board in card basket.	Carrier level ≈ 35 W. ALC voltage 5.5 ±.1 VDC at 17900.0 kHz. If not, check 1 A4 Q3 and associated circuitry.

5.7 TRANSMITTER ALIGNMENT (Cont.)

STEP NO.	TEST	TEST EQUIPMENT AND TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
3	SSB Transmit Audio Level	Same as Step 2.	Apply two tone audio, 500 Hz and 2400 Hz, to the MIC input. Set frequency dials to 17999.5 kHz. Adjust audio level to 0.2vrms. Key transceiver and adjust ALC control (1A7A1 R20) to give 200v P-P output on scope. Adjust SB Audio pot (1A3 R58) to give a VOM reading of 5.5 VDC±.1 VDC.	Two tone output=200v P-P. ALC voltage 5.5 ±.1 VDC at 17999.5 kHz. If not, check MIC circuit, 1A3U5, U6, 1A3P2, pin 14 (for LO No. 3),Q2, and the balanced modulator CR3-6. Also check 1A3Q1 and associated circuitry.
4	AM Transmit Audio Level	Same as Step 2.	Apply a single tone, 1000 Hz, at 0.6 vrms to the microphone input. Key transmitter in AM mode. Observe pattern on oscilloscope. Swing audio frequency back and forth to find the maximum modulation point. At this audio frequency, adjust 1A3 R42 until the pattern just closes, indicating 100% modulation.	AM adjusted to 100% modulation. If no adjustment is possible check 1A4 Q5, CR18, CR19 and associated circuitry.
5	Audio Compression Adjustment	Same as Step 2. Set scope on 20v/div scale.	Adjust the single tone level to 0.2 vrms. Key transmitter and observe oscilloscope pattern. Adjust scope vertical gain to give 8 divisions P-P. Adjust 1A3 R90 (MIC LEVEL) to give a modulation null one division high.	AM adjusted at -10dB audio for 85% modulation. If level cannot be adjusted, check 1A3 R90, U6, and associated components.

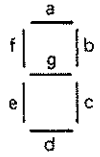
5.8 REMOTE CONTROL (2A)

5.8.1 FAULT ANALYSIS

The remote control assembly consists primarily of switches and display drivers. The display drivers operate from a Standard BCD code (see table below) obtained from the switches directly. For instance, if a display segment is continuously illuminated, the problem may be located in the corresponding driver. Table 5.12 is provided as an aid to troubleshooting display problems.

Display Number	2^3 IC Pin 6	2^2 IC Pin 2	2^1 IC Pin 1	2^0 IC Pin 7
0	Low	Low	Low	Low
1	Low	Low	Low	High
2	Low	Low	High	Low
3	Low	Low	High	High
4	Low	High	Low	Low
5	Low	High	Low	High
6	Low	High	High	Low
7	Low	High	High	High
8	High	Low	Low	Low
9	High	Low	Low	High

Low = Less than 0.5V
High = Greater than 2.5V



Segment Identification

a = pin 1
b = pin 13
c = pin 10
d = pin 8
e = pin 7
f = pin 2
g = pin 11

Display Segments	2^3 Pin 6	2^2 Pin 2	2^1 Pin 1	2^0 Pin 7	Balancing Pin 4	a Pin 13	b Pin 12	c Pin 11	d Pin 10	e Pin 9	f Pin 15	g Pin 14
0	0	0	0	0	1	0	0	0	0	0	0	1
	0	0	0	1	1	1	0	0	1	1	1	1
1	0	0	1	0	1	0	0	1	0	0	1	0
	0	0	1	1	1	0	0	0	0	1	1	0
2	0	1	0	0	1	1	0	0	1	1	0	0
	0	1	0	1	1	0	1	0	0	1	0	0
3	0	1	1	0	1	1	1	0	0	0	0	0
	0	1	1	1	1	0	0	0	1	1	1	1
4	1	0	0	0	1	0	0	0	0	0	0	0
	1	0	0	1	1	0	0	0	1	1	0	0
5	1	0	1	0	1	1	1	1	0	0	1	0
	1	0	1	1	1	1	1	0	0	1	1	0
6	1	1	0	0	1	1	0	1	1	1	0	0
	1	1	0	1	1	0	1	1	0	1	0	0
7	1	1	1	0	1	1	1	1	0	0	0	0
(Blank)	1	1	1	1	1	1	1	1	1	1	1	1

Table 5.12 Display Segment Illumination vs Driver Input/Output

5.9 FAULT ANALYSIS TABLE

SYMPTOM	POSSIBLE TROUBLE	CHECKS AND CORRECTIVE ACTION
Receiver inoperative, no lights on Remote Control panel.	a. Primary power (28V D.C.) missing. b. Transceiver internal fuse blown. c. 18V D.C. regulator (1A7A1U1) or 18V pass element (1A7A1Q1) defective. d. 12V D.C. regulator (1A7A1U2) or 12V pass element, (1A7A1Q2) defective. e. Short circuit on 12V or 18V lines.	a. Check power cable and aircraft circuit breaker. b. Check for fault, then replace internal fuse (5 amp). c. Replace 1A7A1U1 or 1A7A1Q1. Refer to Section 4.7.2. d. Replace 1A7A1U2 or 1A7A1Q2. Refer to Section 4.7.2.6. e. Check for short circuits on +18V. D.C., +12V D.C., +12AMR, +12USB and +12LSB lines.
No audio in speaker or on PHONE jack on front panel. AGC test point shows rf signal present (<8.5V D.C.).	a. Short circuit on audio lines. b. Audio driver 1A3U4 inoperative. c. SQUELCH control fully CCW and signal level below 30uv.	a. Check audio lines for short circuit. b. Replace 1A3U4. c. Advance SQUELCH control fully CW.
No audio in speaker or on phone jack in all modes, AGC test point shows no signal (+8.5V D.C.).	a. Synthesizer inoperative. b. First Mixer Board inoperative. c. Second Mixer Board inoperative. d. Audio Board inoperative.	a. Check 1A6U1 and 1A6UB. Refer to Section 4.2. Check for all LO's in USB mode. Replace defective components. b. Refer to Section 4.3. Replace defective components. c. Refer to Section 4.4. Replace defective components. d. Check U1, U2 and U3. Refer to Section 4.5. Replace defective components.
AM mode normal, USB or LSB inoperative.	a. LO#3 missing.	a. Check synthesizer board. Refer to Section 4.2. Replace defective components.
Received signals weak in all modes.	a. Filter module defective or does not channel. b. First Mixer Board defective. c. Second Mixer Board defective. d. LO injection levels low.	a. Refer to Section 4.7 or replace defective components. b. Refer to Section 4.3. Replace defective components. c. Refer to Section 4.4. Replace defective components. d. Refer to Section 4.2. Replace defective components.
Transmitter will not key.	a. Keyline interlock missing(1A1J5 pin S to T). b. Relay 1A7K2 or 1A7A1K1 defective. c. Defective microphone.	a. Check to see if coupler connected. Check coupler cable for open circuit. b. Replace defective component. c. Repair or replace.
Transceiver will not turn on.	a. Defective relay 1A1K1.	a. Check for broken wiring. Replace defective component.

5.9 FAULT ANALYSIS TABLE (Cont.)

SYMPTOM	POSSIBLE TROUBLE	CHECKS AND CORRECTIVE ACTION
Transmitter keys but little or no output in all modes.	a. Defective Second Mixer Board. b. Defective First Mixer Board. c. Defective filter module or band motor does not channel. d. Defective RF Power Amplifier. e. Defective or disconnected coaxial cables.	a. Refer to Section 4.4. Replace defective component. b. Refer to Section 4.3. Replace defective component. c. Refer to Section 4.7. Replace defective component. d. Refer to Section 4.8. Replace defective components. e. Check coaxial cables and fittings. Check cables for continuity. Repair or replace, as required.
Transmitter keys. Carrier ok in AM. No modulation. No output in USB or LSB.	a. Defective microphone. b. Defective cable in transceiver or between transceiver and remote unit. c. Defective Audio Board.	a. Repair or replace. b. Perform continuity test on cables. Repair broken wire. c. Refer to Section 4.5. Replace defective components.
Transmitter keys. Output ok in USB or LSB. No carrier on AM.	a. Defective Second Mixer Board.	a. Check 1A4Q5 and associated circuitry.
Too much carrier in AM. Cannot adjust.	a. Defective ACC.	a. Check 1A7A4 CR2, 3. Check 1A7A1 Q1, Q2, Q3 and associated components.
SSB output too high or too low.	a. ALC adjusted incorrectly.	a. Adjust 1A7A1 R20 for 70.7 VRMS into 50 ohms at 10000.0 kHz.
AM carrier level too high or too low.	a. ACC adjusted incorrectly.	a. Adjust 1A7A1 R4 to 42 VRMS into 50 ohms at 10000.0 kHz.
Filter channel motor rotates continously.	a. Two or more band lines grounded or shorted together. b. Defective 1A7K1. c. Diode 1A7 CR6 shorted.	a. Check cable between transceiver and remote control for shorted, grounded or interchanged band lines. b. Replace defective part. c. Replace defective part.
Frequency Display flashes. Radio is inoperative.	a. Frequency selected is below 2000 kHz or above 17.9995 kHz. b. 10 MHz switch too far clockwise, so first digit is a "0".	a. Select a frequency between 2000.0 kHz and 17.9995 kHz. b. Rotate 10 MHz switch CCW one or two positions.
Coupler does not tune when TUNE button is pushed. No TUNE light.	a. Coupler is not connected or defective cable between coupler and transceiver. b. Fuse 1A7F1 on front panel blown.	a. Check cable between coupler and transceiver. b. Replace fuse.

5.9 FAULT ANALYSIS TABLE (Cont.)

SYMPTOM	POSSIBLE TROUBLE	CHECKS AND CORRECTIVE ACTION
Coupler does not tune when TUNE button is pushed. TUNE light illuminates, then FAULT light comes on.	a. Defective rf cable between coupler and transceiver. b. Defective coupler. c. Defective control cable between coupler and transceiver.	a. Check cable and connectors. Repair or replace. b. See coupler manual for corrective action. c. Check cable and connectors. Repair as required.
Transmit and receive frequency is not the same as the display frequency.	a. Cable between remote control and transceiver incorrectly wired. b. Defective remote control unit. c. Connector 1A1P1 improperly seated on front panel. d. Defective synthesizer board.	a. Refer to Figure 2.8 and repair cable. b. Refer to Section 4.9. Repair broken wire. c. Install connector with full seating. d. Refer to Section 4.2. Replace defective components.
DIMMER control does not affect display intensity.	a. Cockpit DIMMER turned off or disconnected. b. Dimmer circuit in control head defective.	a. Turn cockpit DIMMER on or connect dimmer voltage to 2A3J2. b. Check 2A2Q3 and Q4 and associated components. Replace defective components.

5.10 MODULE REMOVAL

This section provides special test information and module removal instructions.

5.10.1 FILTER MODULE REMOVAL

a. Remove right cover and heat sink per Figure 5.1
b. Remove left cover (8 screws).
c. Remove four marked screws from mother board.
d. Disconnect receive coaxial connector on rear of filter module.
e. Disconnect RF amplifier output connector.
f. Slowly pull filter module from its mother board mating connector.
g. When filter power connector is disengaged, disconnect BNC connector and cable from front of filter compartment.
h. Filter module may now be completely removed.
i. To remove filter compartment cover, remove all 12 screws holding it to the filter chassis. Figure 5.2 shows the Filter module with cover removed.
j. To remove the Interface board, remove the one holding screw in the upper left hand corner (looking at the rear of the board.) Rotate the board clockwise out of its socket. Figure 5.3 shows the Filter module with the Interface board removed.

5.10.2 SYNTHESIZER BOARD REMOVAL

a. Remove the right cover and heat sink per Figure 5.1.
b. Remove the Filter module per 5.10.1.
c. Set the unit in normal mounting position.
d. Remove the four 3-48 screws holding the synthesizer shield plate to the card guides.
e. Slowly pull the synthesizer board and shield to the right to disengage the board from the mother board connectors. Three holes are located at the top of each board to assist in board removal.
f. Upon reinstalling the synthesizer board in the radio, do not forget to install the four 3-48 screws and lock-

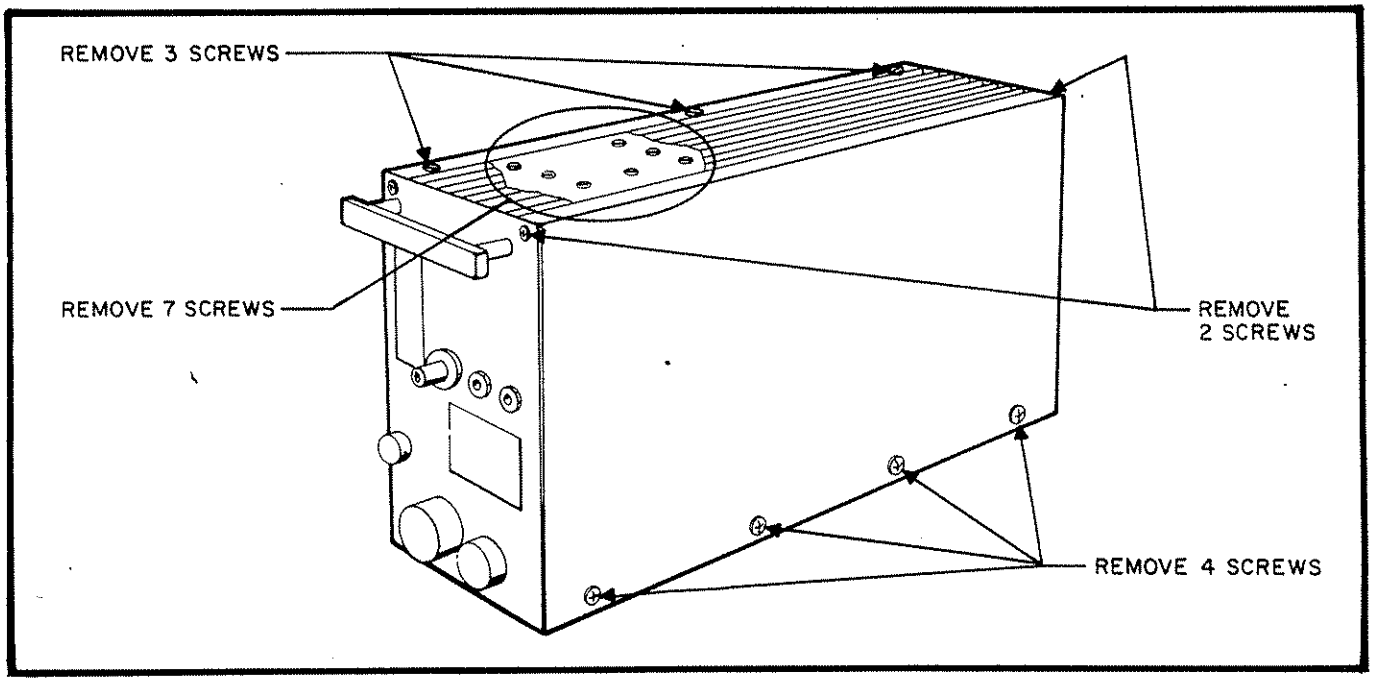


Figure 5.1 Cover and Heat Sink Removal

washers to hold the shield to the card guides. Failure to do so will result in severe frequency warble under vibration.

5.10.3 RF POWER AMPLIFIER REMOVAL AND SERVICING

5.10.3.1 To remove the rf Power Amplifier:

a. Remove the four rear corner black screws holding the rf power amplifier to the rest of the chassis.
b. Disconnect (pull off) the rf input and output connectors.
c. Disconnect the P.A. power connector.

5.10.3.2 For servicing the power amplifier, it is desirable to use an external power source capable of 28VDC at 12 amperes, continuously variable from 0 to 28 VDC. If such a power source is not available, the transceiver power supply can be used. A typical test set-up is shown in Figure 5.2.

CAUTION

When using a HP 606 or other RF signal generator to test the power amplifier, extreme caution should be exercised to prevent overdriving the unit and needlessly destroying transistors. Remember, the protection circuits are disconnected during tests of this type.

5.10.3.3 Before applying D.C. power, make sure the signal generator output is at zero. Then slowly increase the power supply voltage, observing the ammeter, until +28V is reached. At this point the ammeter should be reading approximately 1 ampere. If, during the increasing of the source voltage, the current rises well beyond the 1 ampere level, a short circuit exists on the line, or one or both output transistors have failed. To determine which output transistor is defective, allow the current to remain at approximately 3 amperes for 30 seconds. Then feel both transistors. The defective one will be much hotter than the good one.

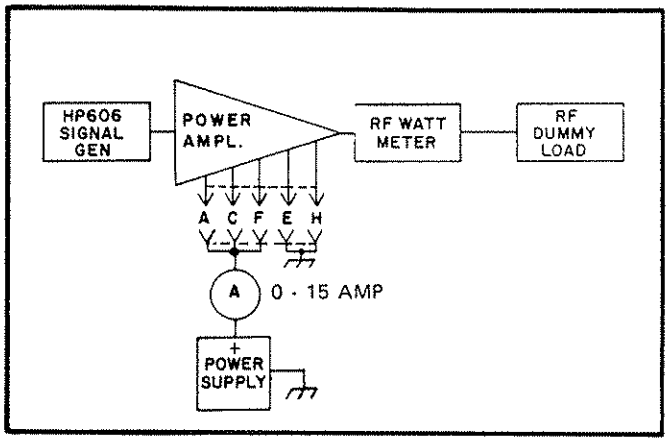


Figure 5.2 Power Amplifier Test Setup

5.10.3.4 If power output is low, the defective stage can be readily determined by observing with an oscilloscope the wave form at the input center tap of T2 (the 10 turn side) for the predriver, T3 for the driver, or T5 for the output stage. Under normal operating conditions, these points will show primarily second harmonic energy, so if a large amount of fundamental frequency energy is present, it means only half of the push pull stage is operational. Now that the defective stage has been located, an observation of the respective collector wave forms will determine the failed transistor. The collector wave form on the good transistor will be much greater in amplitude than that of the defective one.

5.10.3.5 While it is necessary to remove the printed circuit board from the heat sink to replace 1A2Q1 or Q2, it is NOT necessary to remove the board to replace 1A2Q3, Q4, Q5, or Q6. Transistors Q3 and Q4 may be removed by unscrewing the two nuts from the studs on these components and unsoldering four connections on the top of the board for each transistor. The transistors may be removed from the top of the board. Transistors Q5 and Q6 may be removed by unscrewing the four hold down screws (two per transistor), and unsoldering four connections for each transistor. These transistors also remove from the top of the board.

5.10.3.6 Before replacing any or all of the four high power transistors, Q3, Q4, Q5 and Q6, clean the heat sink area thoroughly around each transistor making sure no foreign particles can come between the transistor and the heat sink. Apply a fresh coat of heat sink compound to the transistor and mount the transistor solidly to the heat sink before soldering. Make sure all collector leads point toward the output connector 1A7J2. Trim the leads to convenient lengths and solder to the printed circuit board.

5.10.3.7 When transistor replacement is complete, test the power amplifier per test setup shown in figure 5.2. Apply D.C. power and slowly increase signal generator drive until 100 watts is shown on the wattmeter. The ammeter should indicate approximately 8.5 amperes. Allow the amplifier output to remain at 100 watts for one or two minutes. Remove the signal drive. The ammeter should drop to 1 ampere or slightly greater. If the current drops to 2 amperes or higher and slowly decays toward the 1 ampere level, this means that one or both output transistors has not been properly seated to the heat sink. They should be removed, examined for foreign particles and replaced carefully. Repeat the above test to insure proper installation.

5.10.3.8 After installing power amplifier in transceiver, check current ALC to be sure it is operational. This may be done by placing an oscilloscope probe on pin P of connector 1A1A1J9 on the mother board. Set the ver-

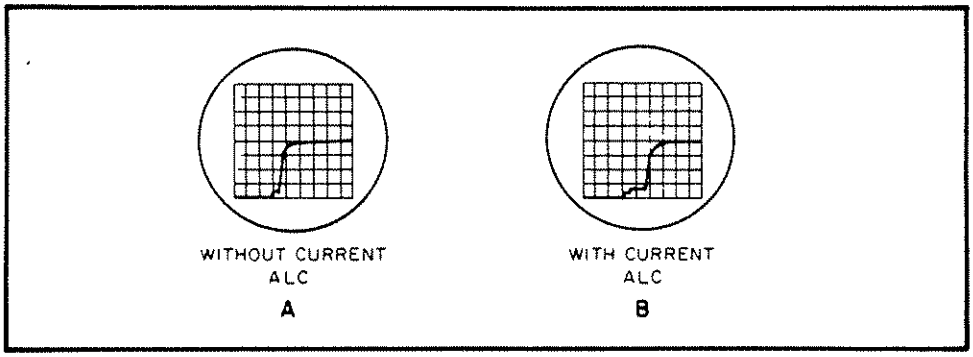


Figure 5.3 Current ALC Wave Form

tical range to 2VDC per division, sweep speed at 50 milliseconds per division and set trace at lowest marker division. Set transceiver mode switch to USB. Key transceiver and observe voltage rise. Trace should appear as in Figure 5.3A. Now place MODE switch in AM position and key transceiver. Oscilloscope trace should appear as in Figure 5.3B. The additional step in the wave form is evidence that the current ALC is operational and is preventing overdrive to the power amplifier. If this additional step is not observed, trouble shoot the current ALC loop and correct the problem before rekeying the transmitter. Without the current ALC protection, the power amplifier can be destroyed. It is designed to limit the amplifier current to 10 amperes. This current can then be monitored across 1A2R24 in the power amplifier. Since this resistor is 0.1 ohm resistance, a voltage of 1 volt across it represents 10 amperes current.

5.11 REMOTE CONTROL BOARD REMOVAL

5.11.1 DISPLAY BOARD REMOVAL

This board removes simply by pulling straight up, disengaging it from its mating connectors on the decoder board.

5.11.2 DECODER BOARD REMOVAL

a. First remove the display board.
b. Carefully disconnect the four connectors from the switch harness.
c. Remove the four corner hold-down screws.
d. Carefully pull the board down and to the rear of the remote control chassis to clear the push buttons from the front panel.
e. When replacing this board in the chassis, be sure to carefully insert the buttons through their proper holes in the front panel.

DESIGNATOR ASSY.	DESIGNATOR SUBASSY.	DESCRIPTION	SUNAIR PART NUMBER
1A1		CHASSIS ASSY	8040080096
	1A1A1	MOTHER BOARD	8040070091
	1A1A2	FRONT PANEL ASSY	8040140099
1A2		POWER AMPLIFIER	8040090091
1A3		AUDIO BOARD	8040060095
1A4		SECOND MIXER BOARD	8040050090
1A5		FIRST MIXER BOARD	8040040094
1A6		SYNTHESIZER BOARD	8040010098
1A7		PA FILTER ASSY	8040030099
	1A7A1	INTERFACE BOARD	8040020093
	1A7A2	EVEN FILTER BOARD	8040110092
	1A7A3	ODD FILTER BOARD	8040100097
	1A7A4	ALC/ACC BOARD	8040120098
	1A7A5	REGULATOR BOARD	8040033098
2A		REMOTE CONTROL	8040400091
	2A1	DECODER BOARD	8033230096
	2A2	DISPLAY BOARD	8033240091

Table 5.13 Table of Assemblies

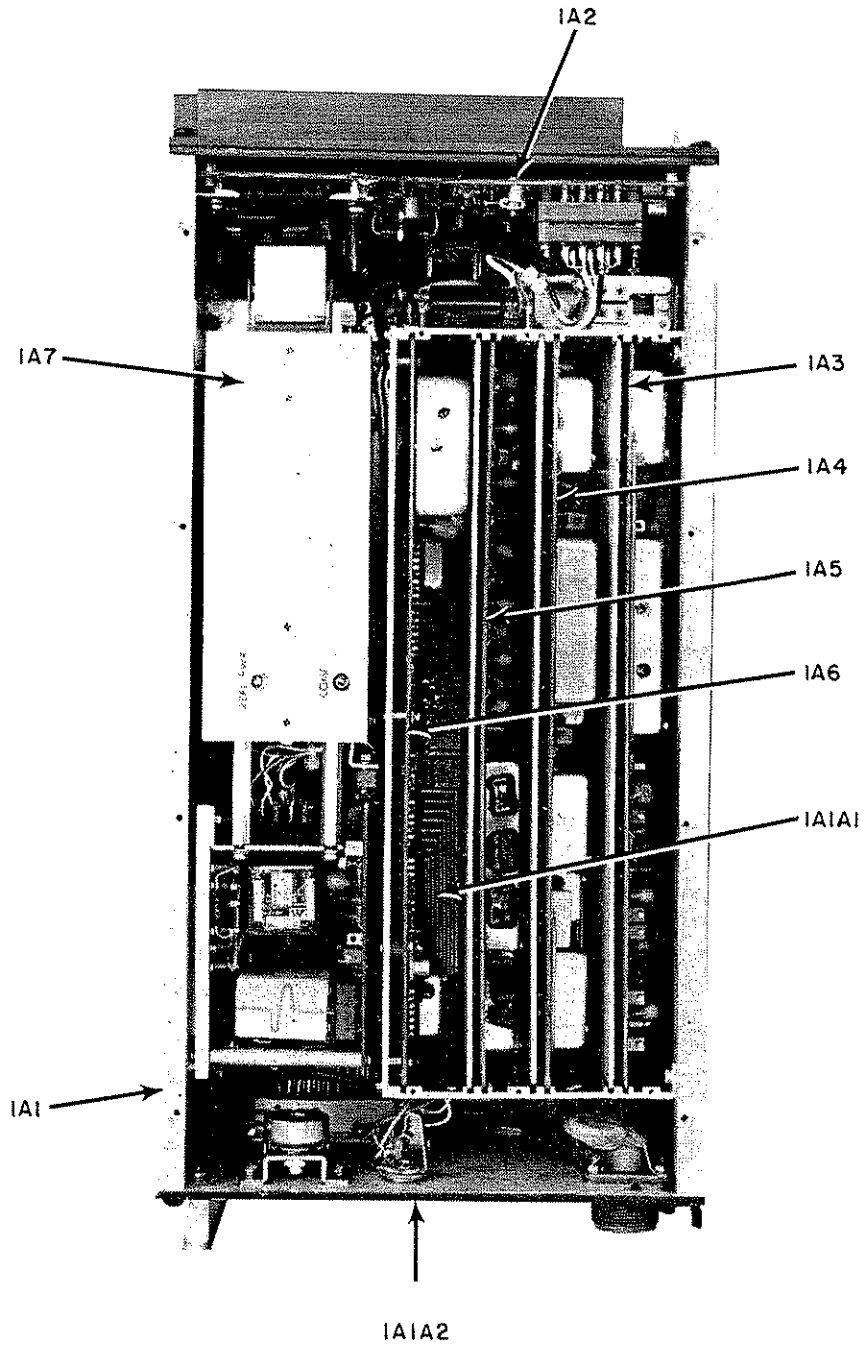


Figure 5.4 ASB-500 Right Side View and Table of Assemblies

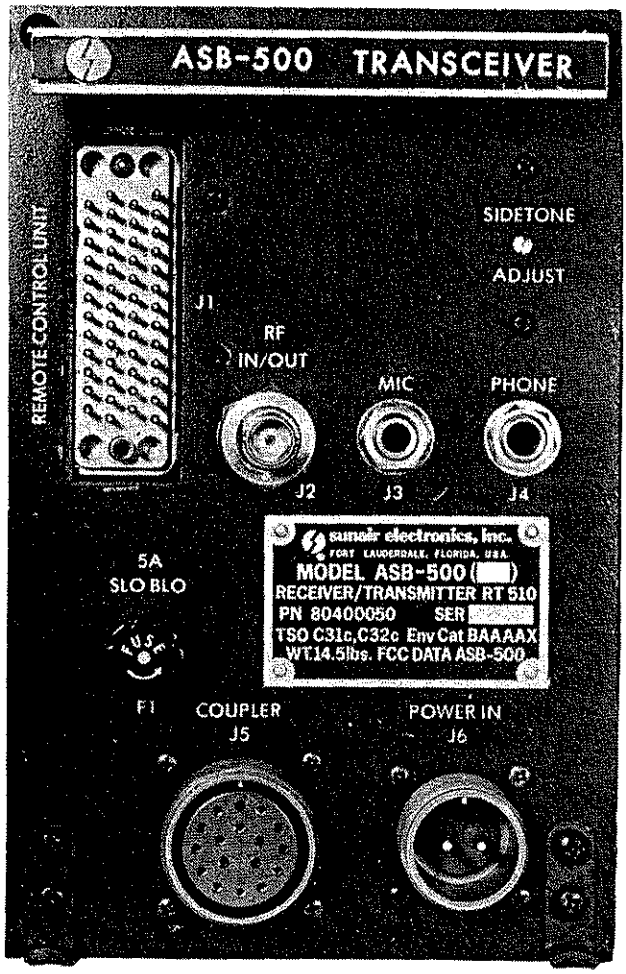


Figure 5.5 Transceiver Front Panel

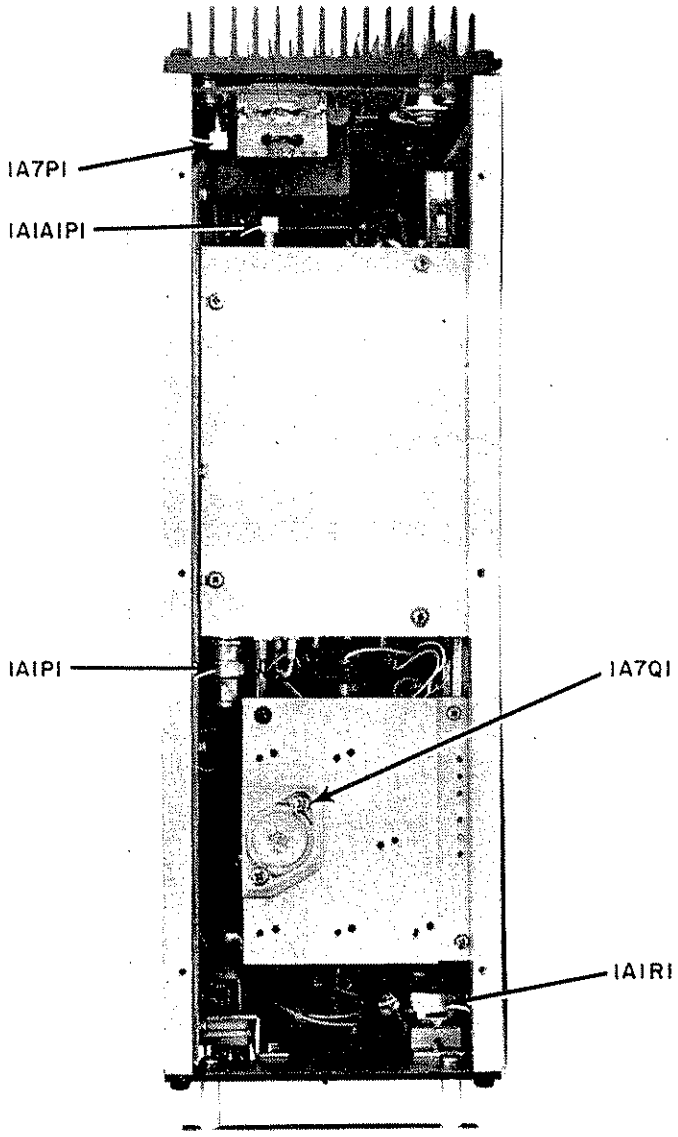


Figure 5.6 Transceiver Top View with Heatsink Removed

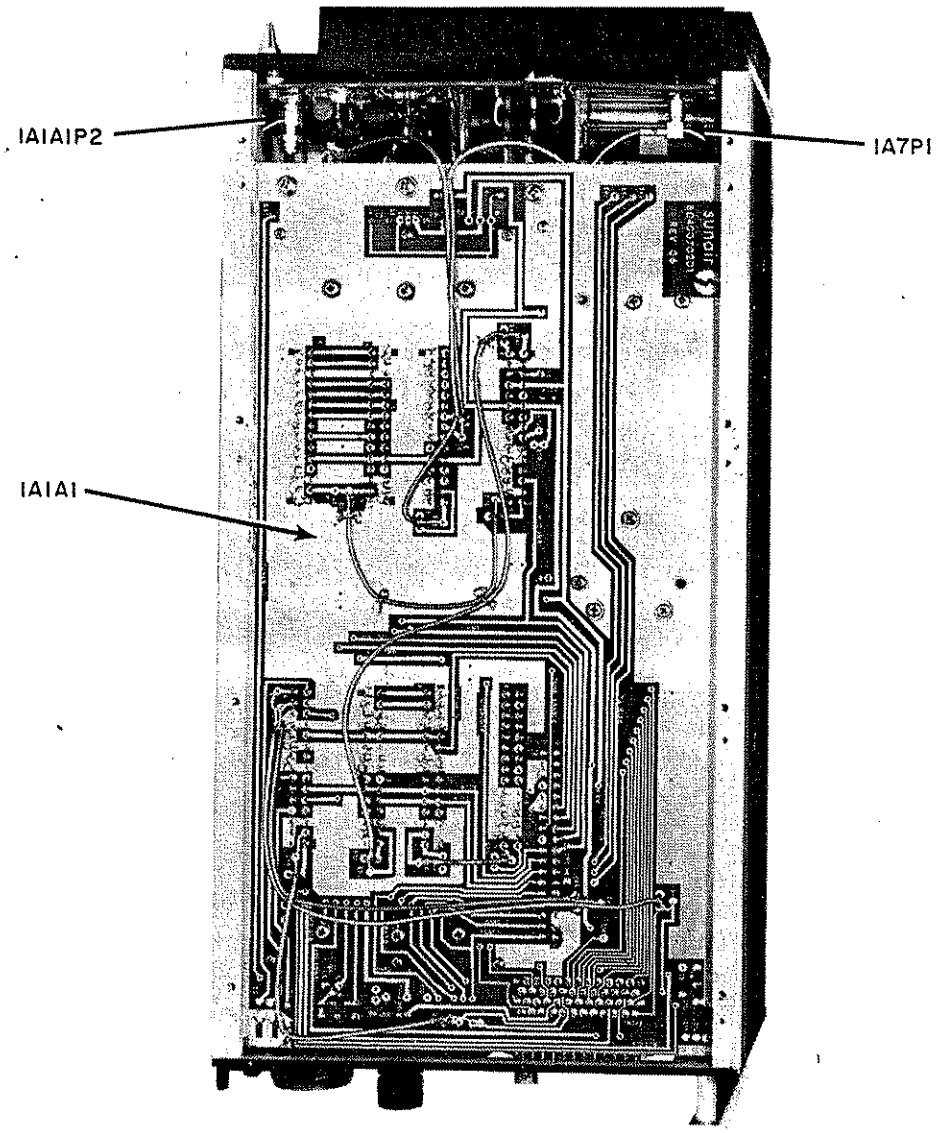


Figure 5.7 Transceiver Left Side View

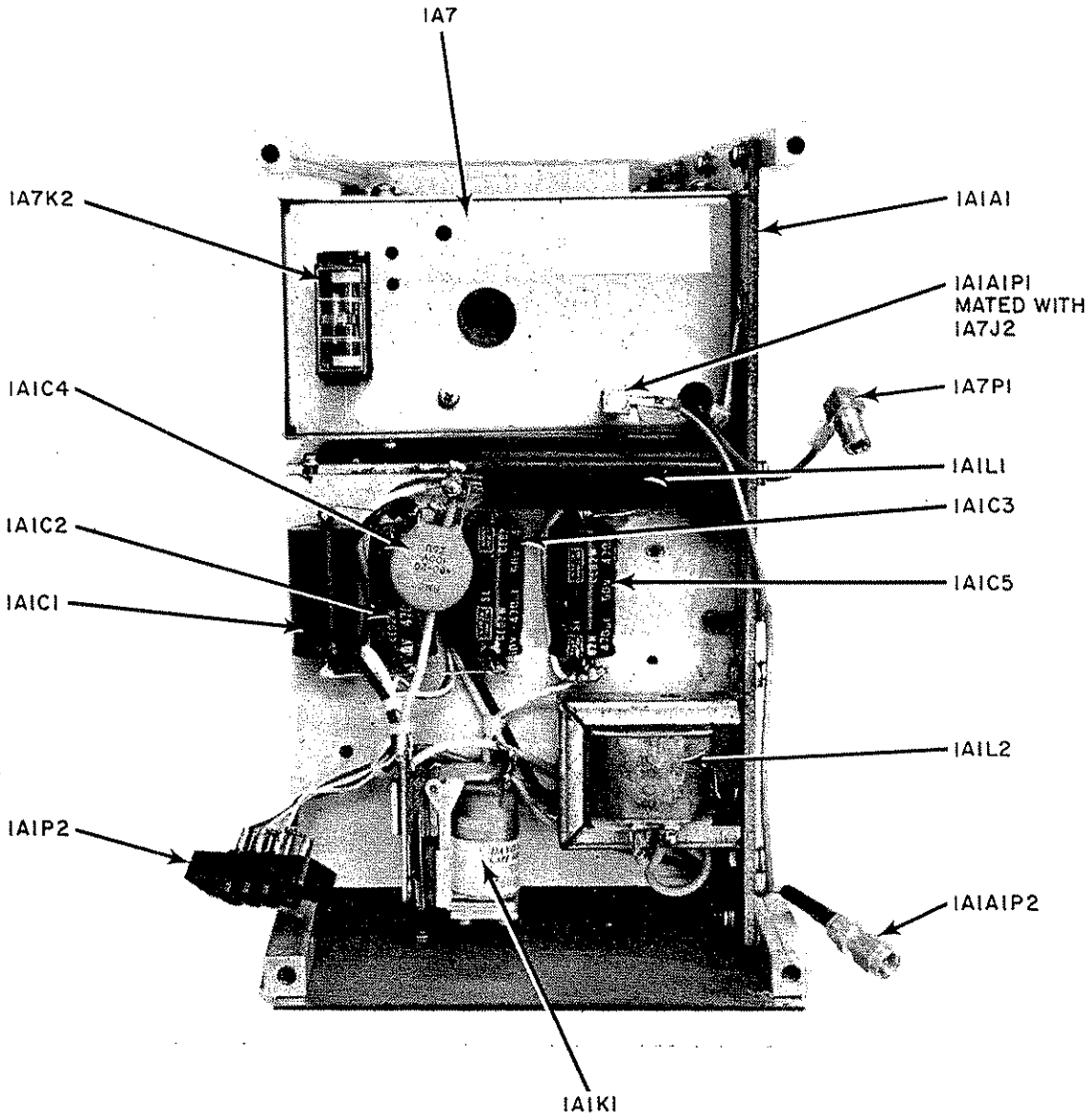


Figure 5.8 Transceiver Rear View with PA Removed

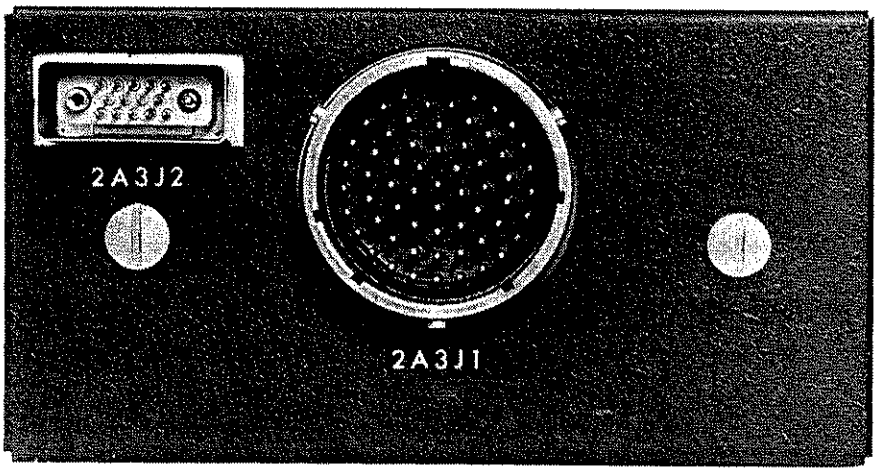


Figure 5.9 Remote Control Rear Panel

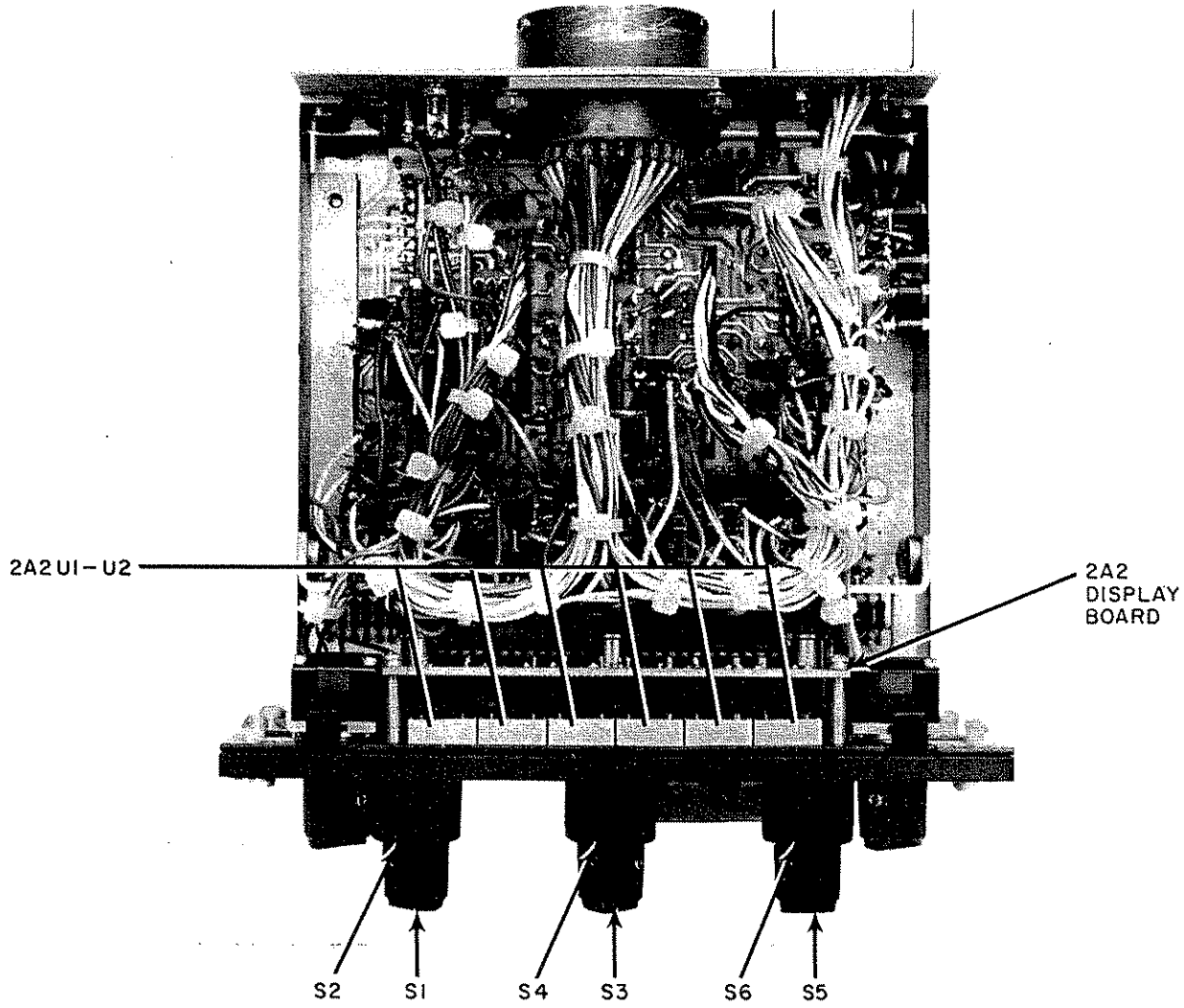


Figure 5.10 Remote Control Top View

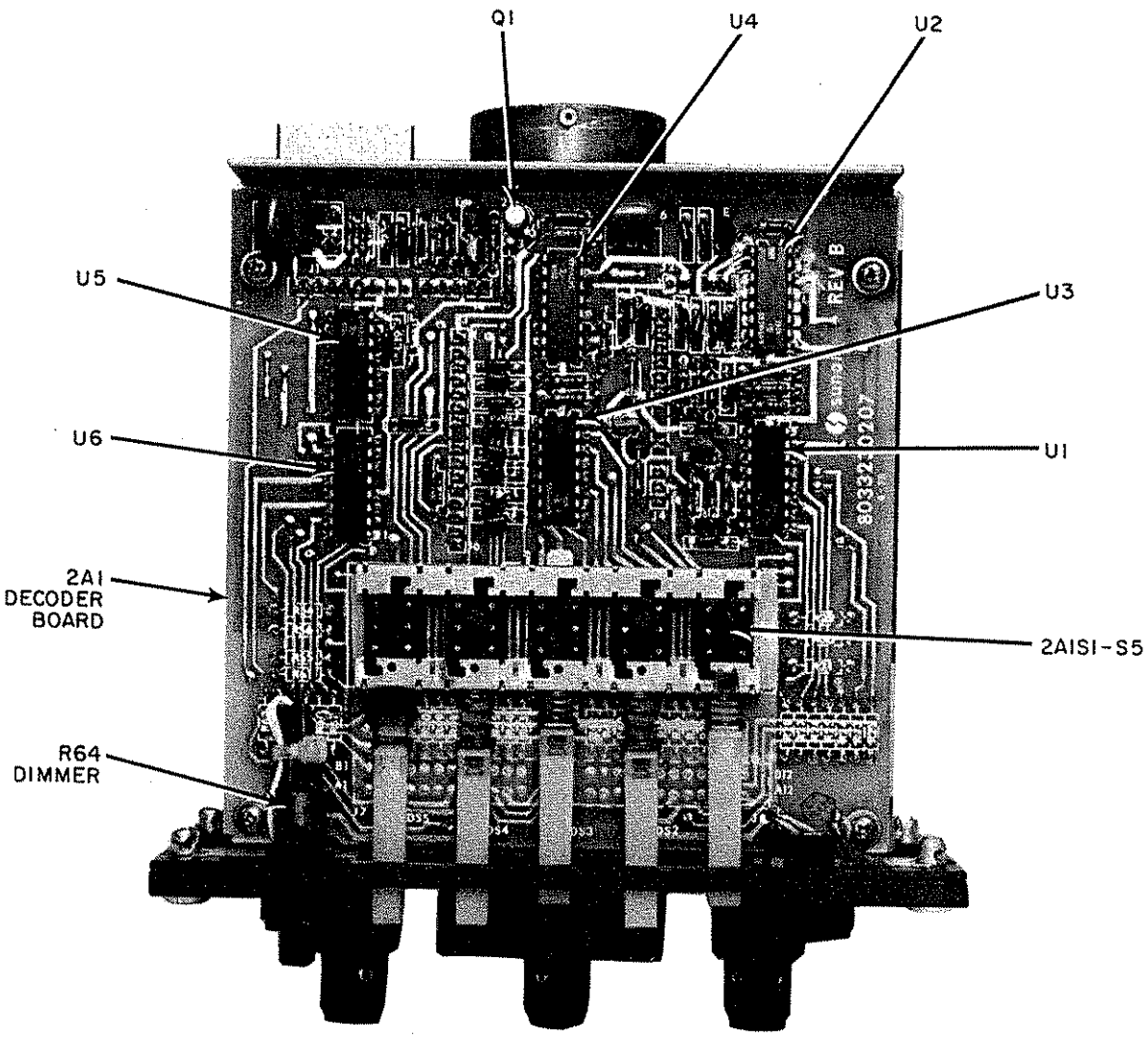


Figure 5.11 Remote Control Bottom View

5.12 SCHEMATIC DIAGRAMS

The following pages contain schematic diagrams, voltage charts, and parts lists for all assemblies in the ASB-500.

Synthesizer Board (1A6) Parts List

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Synthesizer Board Assy. ASB-500	8040010195
A1	Ovenized Freq. Std. 28 MHz	8040010501
C1	Capacitor, 2.2 UF, 35 V, T368	0273950002
C2	Capacitor, 22 UF, 15 V, 196D	0281690006
C3	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C4	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C5	Capacitor, 2.2 UF, 35 V, T368	0273950002
C6	Capacitor, 22 UF, 15 V, 196D	0281690006
C7	Capacitor, 22 UF, 15 V, 196D	0281690006
C8	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C9	Capacitor, 22 UF, 15 V, 196D	0281690006
C10	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C11	Capacitor, 1 UF, 35 V, 196D	0281660000
C12	Capacitor, 1 UF, 35 V, 196D	0281660000
C13	Capacitor, 43 PF, 500 V, DM10, 2%	0260800007
C14	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C15	Capacitor, 47 UF, 35 V	0282190007
C16	Capacitor, 3.5-20 PF, 100 V, Ceramic	0282930001
C17	Capacitor, 5 PF, 500 V, DM10	0261190008
C18	Capacitor, 47 PF, 500 V, DM10, 5%	0294960007
C19	Capacitor, 1 UF, 35 V, 196D	0281660000
C20	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C21	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C22	Capacitor, 3.5-20 PF, 100 V, Ceramic	0282930001
C23	Capacitor, 18 PF, 500 V, DM10, 5%	0260300004
C24	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C25	Capacitor, 39 PF, 500 V DM10, 5%	0293290008
C26	Capacitor, 50 PF, 500 V, DM10, 2%	10000600[illegible]
C27	Capacitor, 27 PF, 500 V, DM10, 5%	0260660001
C28	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C29	Capacitor, 10 PF, 500 V, DM10, 5%	0259830003
C30	Capacitor, 10 PF, 500 V, DM10, 5%	0259830003
C31	Capacitor, 0.01 UF, 25V, X5S	0281620008
C32	Capacitor, 27 PF, 500 V, DM10, 5%	0260660001
C33	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C34	Capacitor, 2.2 UF, 35 V, T368	0273950002
C35	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C36	Capacitor, 2.2 UF, 35 V, T368	0273950002
C37	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C38	Capacitor, 0.1 UF, 100 V, Mylar	1004610009
C39	Capacitor, 0.1 UF, 100 V, Mylar	1004610009
C40	Capacitor, 1 UF, 100 V, Mylar	1004610017

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
C41	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C42	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C43	Capacitor, 0.1 UF, 100 V, Mylar	1004610009
C44	Capacitor, 100 PF, 500 V, DM10, 5%	0274740001
C45	Capacitor, 12 PF, 500 V, DM10	0260280003
C46	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C47	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C48	Capacitor, 22 UF, 15 V, 196D	0281690005
C49	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C50	Capacitor, 10 PF, 500 V, DM10	0259830003
C51	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C52	Capacitor, 47 PF, 500 V, DM10, 5%	0294960007
C53	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C54	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C55	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C56	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C57	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C58	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C59	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C60	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C61	Capacitor, 27 PF, 500 V, DM10, 5%	0260660001
C62	Capacitor, 47 PF, 500 V, DM10, 5%	0294960007
C63	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C64	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C65	Capacitor, 27 PF, 500 V, DM10, 5%	0260660001
C66	Capacitor, 39 PF, 500V, DM10, 5%	0293290008
C67	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C68	Capacitor, 68 PF, 500 V, DM10, 5%	0261070002
C69	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C70	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C71	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C72	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C73	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C73	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C74	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C75	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C76	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C77	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C78	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C79	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C80	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C81	Capacitor, 0.01 UF, 25 V, X5S	0281620008

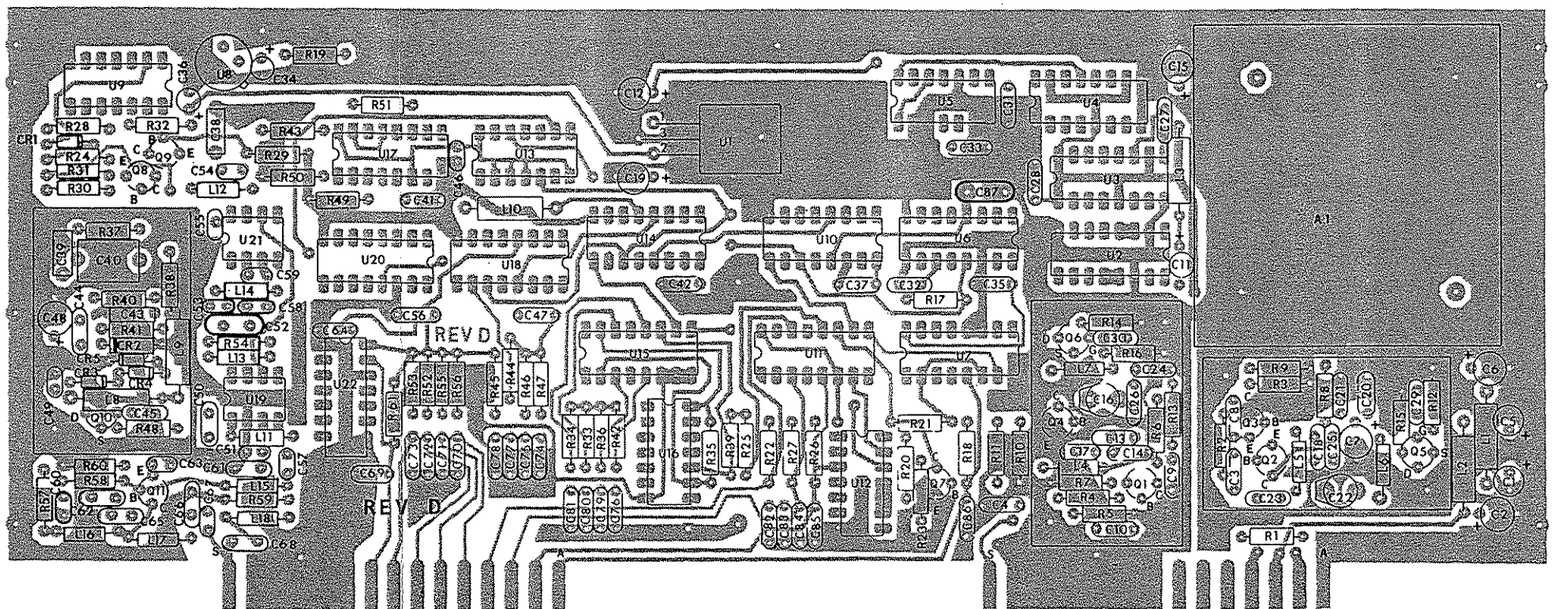
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
C82	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C83	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C84	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C85	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C86	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C87	Capacitor, 130 PF, 500 V	0293430004
CR1	Diode, Zener 1N5237B	0405240007
CR2	Diode, Varicap MV1404	1004560001
CR3	Diode, Signal, Silicon, 1N4454	0405270003
CR4	Diode, Signal, Silicon, 1N4454	0405270003
CR5	Diode, Signal, Silicon, 1N4454	0405270003
L1	Inductor, Molded, 1.0 UH, 5%	0648360008
L2	Inductor, Molded, 1.0 UH, 5%	0648360008
L3	Inductor, Molded, 47 UH, 5%	0646420003
L4	Inductor, Molded, 15 UH, 10%	0659070006
L5	Inductor, Molded, 0.68 UH, 5%	0649030001
L6	Inductor, Molded, 0.68 UH, 5%	0649030001
L7	Inductor, Molded, 15 UH, 10%	0659070006
L8	Inductor, Molded, 0.15 UH, 5%	0648620000
L9	Inductor, Molded, 0.15 UH, 5%	0648620000
L10	Inductor, Molded, 1.0 UH, 5%	0648360008
L11	Inductor, Molded, 15 UH, 10%	0659070006
L12	Inductor, Molded, 15 UH, 10%	0659070006
L13	Inductor, Molded, 15 UH, 10%	0659070006
L14	Inductor, Molded, 0.18 UH, 5%	0648740005
L15	Inductor, Molded, .33 UH, 10%	0664200001
L16	Inductor, Molded, 1.2 UH, 5%	0649910001
L17	Inductor, Molded, 0.18 UH, 5%	0648740005
L18	Inductor, Molded, 0.47 UH, 5%	0649410009
Q1	Transistor, NPN, Si. 2N4124	0448010003
Q2	Transistor, NPN, Si. 2N4124	0448010003
Q3	Transistor, PNP, Si 2N4126	0448020009
Q4	Transistor, NPN, Si. 2N4124	0448010003
Q5	Transistor, N-CH, FET 2N5486	0448050005
Q6	Transistor, N-CH, FET 2N5486	0448050005
Q7	Transistor, NPN, Si. 2N4124	0448010003
Q8	Transistor, PNP, Si. 2N2946	1004560010
Q9	Transistor, NPN, Si. 2N4124	0448010003
Q10	Transistor, N-CH, FET 2N5486	0448050005
Q11	Transistor, NPN, Si. 2N3646	0442520000
R1	Resistor, 10 K, 5%, 1/4 W	0177160004
R2	Resistor, 100 ohm, 10%, 1/4 W	0171180003

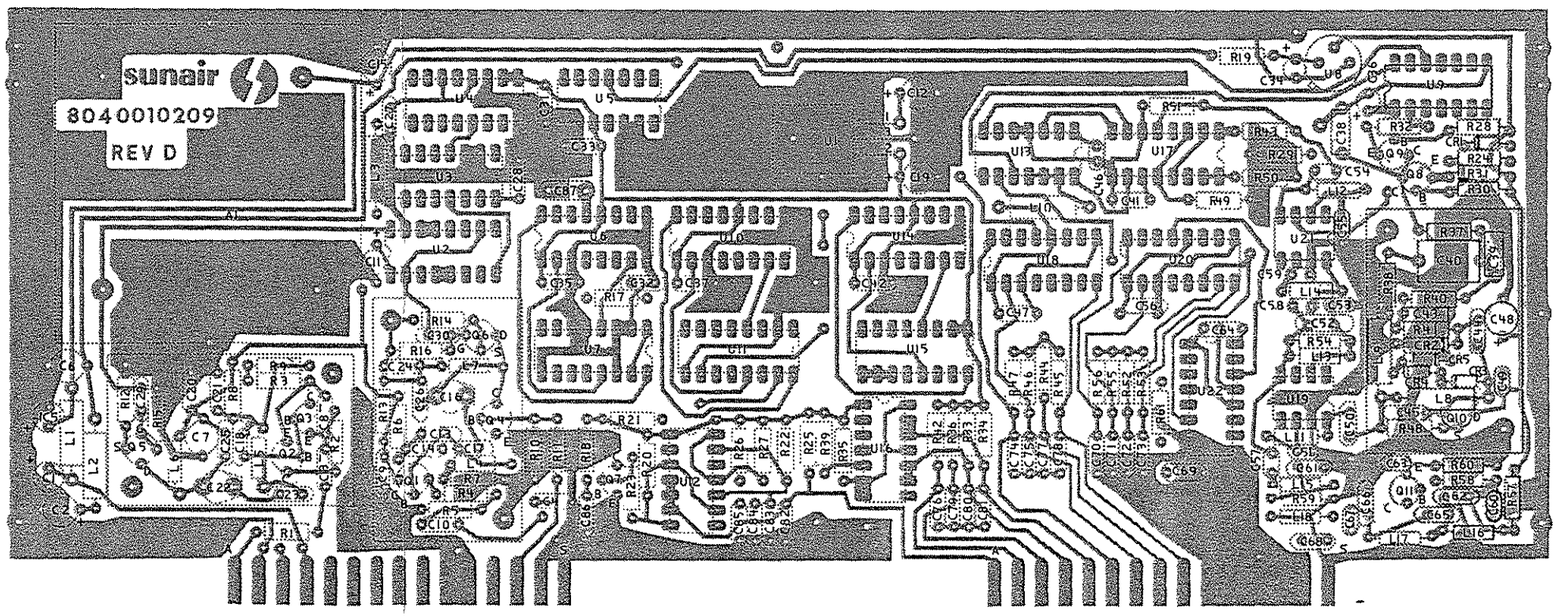
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R3	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R4	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R5	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R6	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R7	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R8	Resistor, 1 K, 10%, 1/4 W	0171560001
R9	Resistor, 1 K, 10%, 1/4 W	0171560001
R10	Resistor, 1 K, 10%, 1/4 W	0171560001
R11	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R12	Resistor, 1 K, 10%, 1/4 W	0171560001
R13	Resistor, 220 ohm, 10%, 1/4 W	0171320000
R14	Resistor, 1 K, 10%, 1/4 W	0171560001
R15	Resistor, 22 K, 10%, 1/4 W	0172230004
R16	Resistor, 22 K, 10%, 1/4 W	0172230004
R17	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R18	Resistor, 10 K, 1/4 W	0170410005
R19	Resistor, 10 ohm, 5%, 1/4 W	0177160004
R20	Resistor, 1 K, 10%, 1/4 W	0171560001
R21	Resistor, 10 K, 10%, 1/4 W	0170410005
R22	Resistor, 10 K, 10%, 1/4 W	0170410005
R23	Resistor, 10 K, 10%, 1/4 W	0170410005
R24	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R25	Resistor, 10 K, 10%, 1/4 W	0170410005
R26	Resistor, 10 K, 10%, 1/4 W	0170410005
R27	Resistor, 10 K, 10%, 1/4 W	0170410005
R28	Resistor, 10 K, 10%, 1/4 W	0170410005
R29	Resistor, 1 K, 10%, 1/4 W	0171560001
R30	Resistor, 1 K, 10%, 1/4 W	0171560001
R31	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R32	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R33	Resistor, 10 K, 10%, 1/4 W	0170410005
R34	Resistor, 10 K, 10%, 1/4 W	0170410005
R35	Resistor, 10 K, 10%, 1/4 W	0170410005
R36	Resistor, 10 K, 10%, 1/4 W	0170410005
R37	Resistor, 10 K, 10%, 1/4 W	0170410005
R38	Resistor, 22 K, 10%, 1/4 W	0172230004
R39	Resistor, 10 K, 10%, 1/4 W	0170410005
R40	Resistor, 10 K, 10%, 1/4 W	0170410005
R41	Resistor, 10 K, 10%, 1/4 W	0170410005
R42	Resistor, 10 K, 10%, 1/4 W	0170410005
R43	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R44	Resistor, 10 K, 10%, 1/4 W	0170410005

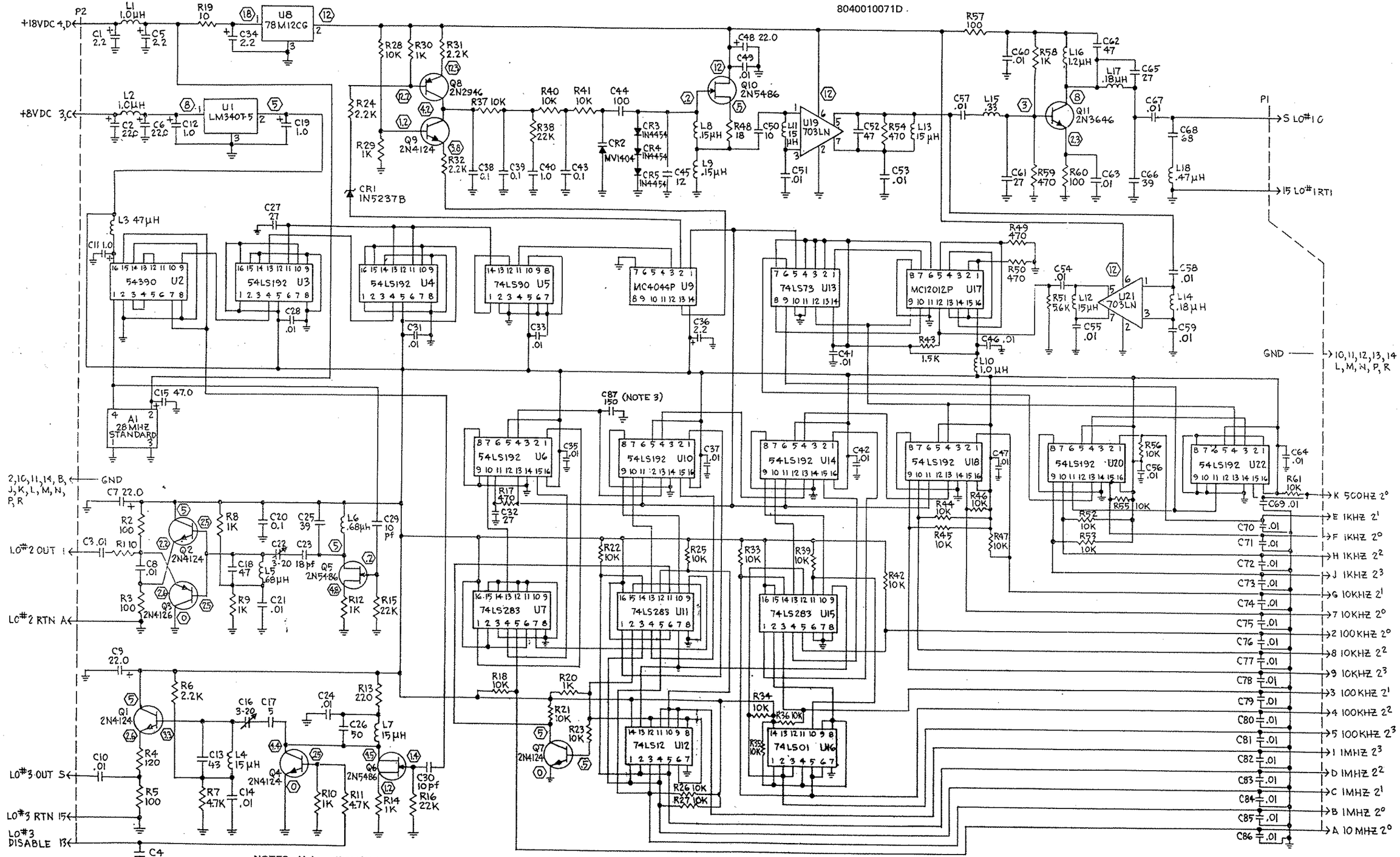
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R45	Resistor, 10 K, 10%, 1/4 W	0170410005
R46	Resistor, 10 K, 10%, 1/4 W	0170410005
R47	Resistor, 10 K, 10%, 1/4 W	0170410005
R48	Resistor, 18 ohm, 10%, 1/4 W	0184590001
R49	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R50	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R51	Resistor, 5.6 K, 5%, 1/4 W	0192210009
R52	Resistor, 10 K, 10%, 1/4 W	0170410005
R53	Resistor, 10 K, 10%, 1/4 W	0170410005
R54	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R55	Resistor, 10 K, 10%, 1/4 W	0170410005
R56	Resistor, 10 K, 10%, 1/4 W	0170410005
R57	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R58	Resistor, 1 K, 10%, 1/4 W	0171560001
R59	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R60	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R61	Resistor, 10 K, 10%, 1/4 W	0170410005
U1	Integrated Circuit, Linear, LM340T5	0448600005
U2	Integrated Circuit, Digital, SN54390J	1004560028
U3	Integrated Circuit, Digital, 54LS192PC	1004560036
U4	Integrated Circuit, Digital, 74LS192PC	1004560036
U5	Integrated Circuit, Digital, 74LS90PC	1004570007
U6	Integrated Circuit, Digital, 74LS192PC	1004560036
U7	Integrated Circuit, Digital, SN74LS283N	1003890008
U8	Integrated Circuit, Linear, MC78M12CG	1004570023
U9	Integrated Circuit, Digital, MC4044P	0448100002
U10	Integrated Circuit, Digital, 74LS192PC	1004560036
U11	Integrated Circuit, Digital, SN74LS283N	1003890008
U12	Integrated Circuit, Digital, 74LS12N	1004570031
U13	Integrated Circuit, Digital, 74LS73PC	1004580002
U14	Integrated Circuit, Digital, 74LS192PC	1004560036
U15	Integrated Circuit, Digital, SN74LS283N	1003890008
U16	Integrated Circuit, Digital, 74LSO1PC	1004580011
U17	Integrated Circuit, Digital, MC12012P	1004580029
U18	Integrated Circuit, Digital, 74 LS192PC	1004560036
U19	Integrated Circuit, Linear, LM703LN	1004580037
U20	Integrated Circuit, Digital, 74LS192PC	1004560036
U21	Integrated Circuit, Digital, LM703LN	1004580037
U22	Integrated Circuit, Digitsl, 74LS192PC	1004560036

Synthesizer Board (1A6)

8040010209D





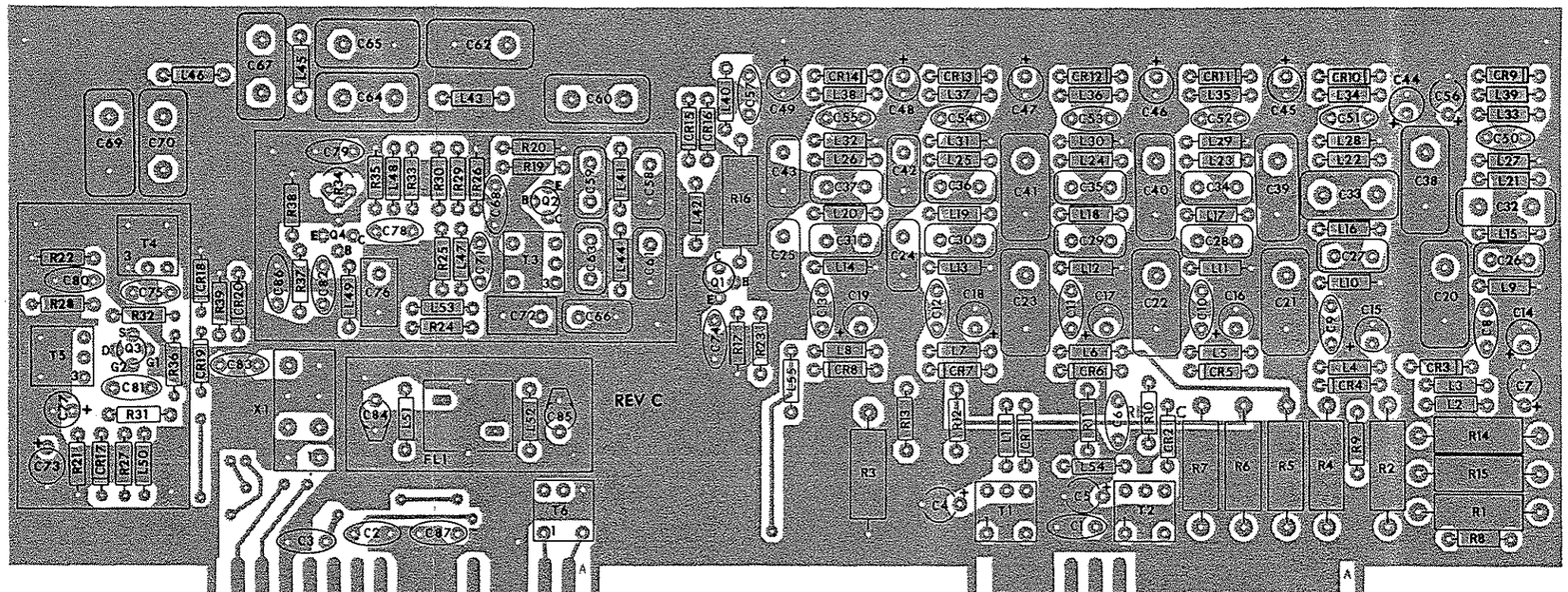


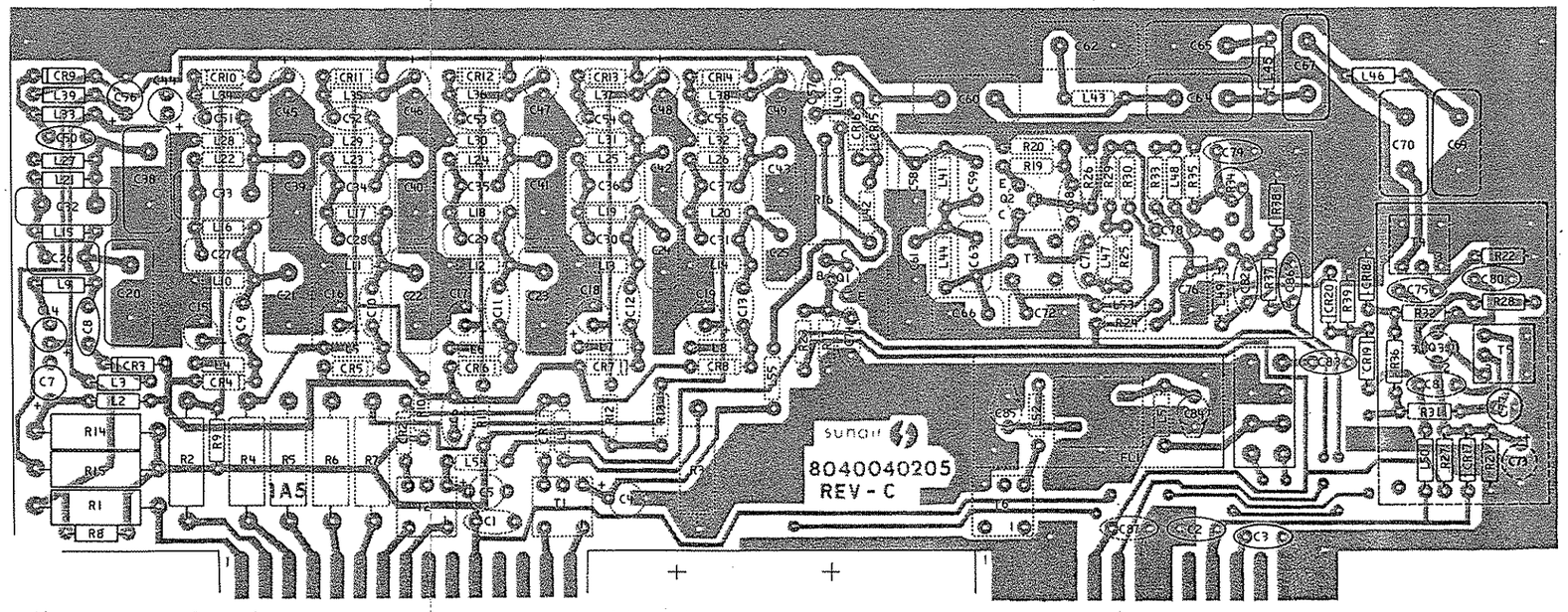
NOTES: Unless otherwise specified
1. Resistors are 1/4 watts and resistance values are in ohms.
2. All decimal capacitors are in microfarads. All others are in PF.
3. Selected part. Nominal value shown.

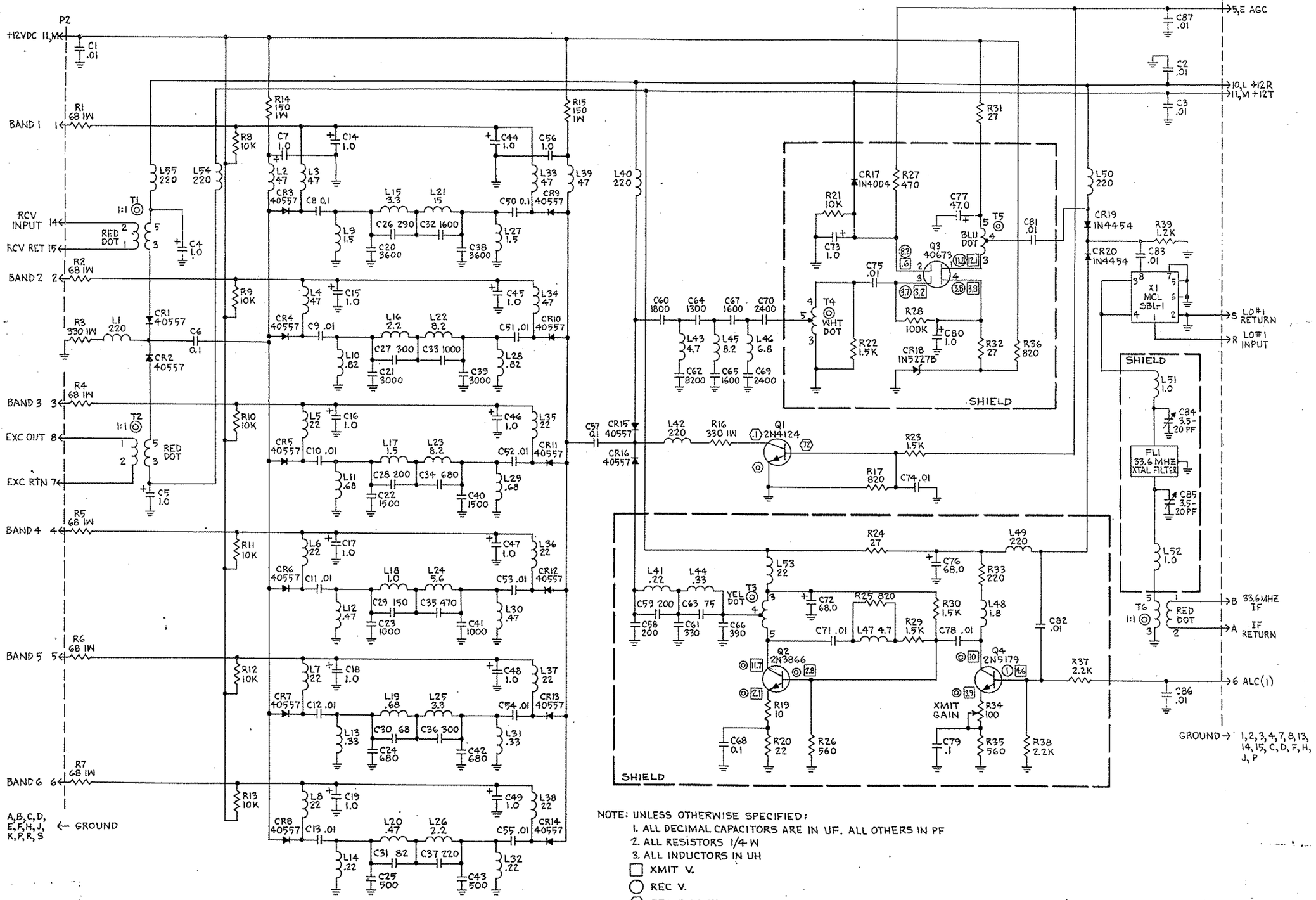
Figure 5.12 Synthesizer Board (1A6)

8040040205C

First Mixer Board (1A5)







NOTE: UNLESS OTHERWISE SPECIFIED:

1. ALL DECIMAL CAPACITORS ARE IN UF. ALL OTHERS IN PF
2. ALL RESISTORS 1/4 W
3. ALL INDUCTORS IN UH

□ XMIT V.
○ REC V.
⬡ REC & XMIT

Figure 5.13 First Mixer Board (1A5)

First Mixer Board (1A5) Parts List

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	First Mixer Board Assy. ASB-500	8040040094
C1	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C2	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C3	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C4	Capacitor, 1 UF, 35 V, 196D	0281660000
C5	Capacitor, 1 UF, 35 V, 196D	0281660000
C6	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C7	Capacitor, 1 UF, 35 V, 196D	0281660000
C8	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C9	Capacitor, 0.01 UF, 25 V, X5S	0281620003
C10	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C11	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C12	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C13	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C14	Capacitor, 6.8 UF, 20 V, T368	0296780006
C15	Capacitor, 6.8 UF, 20 V, T368	0296780006
C16	Capacitor, 6.8 UF, 20 V, T368	0296780006
C17	Capacitor, 6.8 UF, 20 V, T368	0296780006
C18	Capacitor, 6.8 UF, 20 V, T368	0296780006
C19	Capacitor, 6.8 UF, 20 V, T368	0296780006
C20	Capacitor, 3600 PF, 500 V, DM19, 2%	1002370001
C21	Capacitor, 3000 PF, 500 V, DM19, 2%	0281320004
C22	Capacitor, 1500 PF, 500 V, DM19, 2%	0281270007
C23	Capacitor, 1000 PF, 500 V, DM19, 2%	0281210004
C24	Capacitor, 680 PF, 300 V, DM15, 5%	0286240009
C25	Capacitor, 500 PF, 500 V, DM15, 5%	0286120003
C26	Capacitor, 270 PF, 500 V, Dm15, 2%	0280970005
C27	Capacitor, 300 PF, 500 V, DM15, 2%	0282330003
C28	Capacitor, 200 PF, 500 V, DM15, 5%	0258040009
C29	Capacitor, 150 PF, 500V, DM15, 2%	0281200009
C30	Capacitor, 68 PF, 500 V, DM15, 2%	1000050041
C31	Capacitor, 82 PF, 500 V, DM15, 2%	0281120005
C32	Capacitor, 1600 PF, 500 V, DM19, 2%	0281220000
C33	Capacitor, 1000 PF, 500 V, DM19, 2%	0281210004
C34	Capacitor, 680 PF, 300 V, DM15, 5%	0286240009
C35	Capacitor, 470 PF, 500 V, DM15, 2%	0281440000
C36	Capacitor, 300 PF, 500 V, DM15, 2%	0282330003
C37	Capacitor, 220 PF, 500 V, DM15, 2%	0281420009
C38	Capacitor, 3600 PF, 500 V, DM19, 2%	1002370001
C39	Capacitor, 3000 PF, 500 V, DM19, 2%	0281320004
C40	Capacitor, 1500 PF, 500 V, DM19, 2%	0281270007
C41	Capacitor, 1000 PF, 500 V, DM19, 2%	0281210004

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
C42	Capacitor, 680 PF, 300 V, DM15, 5%	0286240009
C43	Capacitor, 500 PF, 500 V, DM15, 5%	0286120003
C44	Capacitor, 6.8 UF, 20 V, T368	0296780006
C45	Capacitor, 6.8 UF, 20 V, T368	0296780006
C46	Capacitor, 6.8 UF, 20 V, T368	0296780006
C47	Capacitor, 6.8 UF, 20 V, T368	0296780006
C48	Capacitor, 6.8 UF, 20 V, T368	0296780006
C49	Capacitor, 6.8 UF, 20 V, T368	0296780006
C50	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C51	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C52	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C53	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C54	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C55	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C56	Capacitor, 1 UF, 35 V, 196D	0281660000
C57	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C58	Capacitor, 200 PF, 500 V, DM15, 5%	0258040009
C59	Capacitor, 200 PF, 500 V, DM15, 5%	0258040009
C60	Capacitor, 1800 PF, 500 V, DM19, 2%	0281300003
C61	Capacitor, 330 PF, 500 V, DM15, 2%	0281070008
C62	Capacitor, 8200 PF, 100 V, DM19, 5%	0298620006
C63	Capacitor, 75 PF, 500 V, DM15, 2%	0281110000
C64	Capacitor, 1300 PF, 500 V, DM19, 2%	0281380007
C65	Capacitor, 1600 PF, 500 V, DM19, 2%	0281220000
C66	Capacitor, 390 PF, 500 V, DM15, 2%	0281040001
C67	Capacitor, 1600 PF, 500 V, DM19, 2%	0281220000
C68	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C69	Capacitor, 2400 PF, 500 V, DM19, 2%	0280980001
C70	Capacitor, 2400 PF, 500 V, DM19, 2%	0280980001
C71	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C72	Capacitor, 68 UF, 15V, T368	0296540005
C73	Capacitor, 1 UF, 35 V, 196D	0281660000
C74	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C75	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C76	Capacitor, 68 UF, 15 V, T368	0296540005
C77	Capacitor, 22 UF, 15 V, T368	0296660001
C78	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C79	Capacitor, 0.1 UF, 25 V, X5S	0281610002
C80	Capacitor, 1 UF, 35 V, 196D	0281660000
C81	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C82	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C83	Capacitor, 0.01 UF, 25 V, X5S	0281620008

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
C84	Capacitor, 3.5-20 PF, 100 V, Ceramic	0282930001
C85	Capacitor, 3.5-20 PF, 100 V, Ceramic	0282930001
C86	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C87	Capacitor, 0.01 UF, 25 V, X5S	0281620008
CR1	Diode, Pin	0405570007
CR2	Diode, Pin	0405570007
CR3	Diode, Pin	0405570007
CR4	Diode, Pin	0405570007
CR5	Diode, Pin	0405570007
CR6	Diode, Pin	0405570007
CR7	Diode, Pin	0405570007
CR8	Diode, Pin	0405570007
CR9	Diode, Pin	0405570007
CR10	Diode, Pin	0405570007
CR11	Diode, Pin	0405570007
CR12	Diode, Pin	0405570007
CR13	Diode, Pin	0405570007
CR14	Diode, Pin	0405570007
CR15	Diode, Pin	0405570007
CR16	Diode, Pin	0405570007
CR17	Diode, Rectifier 1N4004	0405180004
CR18	Diode, Zener 1N5227B	0405250002
CR19	Diode, Signal, Silicon 1N4454	0405270003
CR20	Diode, Signal, Silicon 1N4454	0405270003
FL1	Filter, Monolithic, 33.6 MHz	8040050707
L1	Inductor, Molded, 220 UH, 5%	0650500008
L2	Inductor, Molded, 47 UH, 5%	0652680003
L3	Inductor, Molded, 47 UH, 5%	0652680003
L4	Inductor, Molded, 47 UH, 5%	0652680003
L5	Inductor, Molded, 22 UH, 5%	0650000005
L6	Inductor, Molded, 22 UH, 5%	0650000005
L7	Inductor, Molded, 22 UH, 5%	0650000005
L8	Inductor, Molded, 22 UH, 5%	0650000005
L9	Inductor, Molded, 1.5 UH, 5%	0649270002
L10	Inductor, Molded, 0.82 UH, 5%	0652320007
L11	Inductor, Molded, 0.68 UH, 5%	0649030001
L12	Inductor, Molded, 0.47 UH, 5%	0649410009
L13	Inductor, Molded, .33 UH, 10%	0664200001
L14	Inductor, Molded, 0.22 UH, 5%	0650620003
L15	Inductor, Molded, 3.3 UH, 5%	0658920006
L16	Inductor, Molded, 2.2 UH, 5%	0649890001
L17	Inductor, Molded, 1.5 UH, 5%	0649270002

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
L18	Inductor, Molded, 1.0 UH, 5%	0649150007
L19	Inductor, Molded, 0.68 UH, 5%	0649030001
L20	Inductor, Molded, 0.47 UH, 5%	0649410009
L21	Inductor, Molded, 15 UH, 5%	0659070006
L22	Inductor, Molded, 8.2 UH, 5%	0652060005
L23	Inductor, Molded, 8.2 UH, 5%	0652060005
L24	Inductor, Molded, 5.6 UH, 5%	0650360001
L25	Inductor, Molded, 3.3 UH, 5%	0658920006
L26	Inductor, Molded, 2.2 UH, 5%	0649890001
L27	Inductor, Molded, 1.5 UH, 5%	0649270002
L28	Inductor, Molded, 0.82 UH, 5%	0652320007
L29	Inductor, Molded, 0.68 UH, 5%	0649030001
L30	Inductor, Molded, 0.47 UH, 5%	0649410009
L31	Inductor, Molded, .33 UH, 10%	0664200001
L32	Inductor, Molded, 0.22 UH, 5%	0650620003
L33	Inductor, Molded, 47 UH, 5%	0652680003
L34	Inductor, Molded, 47 UH, 5%	0652680003
L35	Inductor, Molded, 22 UH, 5%	0650000005
L36	Inductor, Molded, 22 UH, 5%	0650000005
L37	Inductor, Molded, 22 UH, 5%	0650000005
L38	Inductor, Molded, 22 UH, 5%	0650000005
L39	Inductor, Molded, 47 UH, 5%	0652680003
L40	Inductor, Molded, 220 UH, 5%	0650500008
L41	Inductor, Molded, 0.22 UH, 5%	0650620003
L42	Inductor, Molded, 220 UH, 5%	0650500008
L43	Inductor, Molded, 4.7 UH, 5%	0651910005
L44	Inductor, Molded, .33 UH, 10%	0664200001
L45	Inductor, Molded, 8.2 UH, 5%	0652060005
L46	Inductor, Molded, 6.8 UH, 5%	0659210002
L47	Inductor, Molded, 4.7 UH, 5%	0651910005
L48	Inductor, Molded, 1.8 UH, 5%	0652440002
L49	Inductor, Molded, 220 UH, 5%	0650500008
L50	Inductor, Molded, 220 UH, 5%	0650500008
L51	Inductor, Molded, 1.0 UH, 5%	0649150007
L52	Inductor, Molded, 1.0 UH, 5%	0649150007
L53	Inductor, Molded, 22 UH, 5%	0650000005
L54	Inductor, Molded, 220 UH, 5%	0650500008
L55	Inductor, Molded, 220 UH, 5%	0650500008
Q1	Transistor, NPN, Silicon 2N4124	0448010003
Q2	Transistor, NPN, Silicon 2N3866	0448140004
Q3	Transistor, N-CH, FET 40673	0447450000
Q4	Transistor, NPN, Silicon 2N5179	0445130008

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R1	Resistor, 68 ohm, 10%, 1 W	1000860027
R2	Resistor, 68 ohm, 10%, 1 W	1000860027
R3	Resistor, 330 ohm, 10%, 1 W	0165300001
R4	Resistor, 68 ohm, 10%, 1 W	1000860027
R5	Resistor, 68 ohm, 10%, 1 W	1000860027
R6	Resistor, 68 ohm, 10%, 1 W	1000860027
R7	Resistor, 68 ohm, 10%, 1 W	1000860027
R8	Resistor, 10 K, 10%, 1/4 W	0170410005
R9	Resistor, 10 K, 10%, 1/4 W	0170410005
R10	Resistor, 10 K, 10%, 1/4 W	0170410005
R11	Resistor, 10 K, 10%, 1/4 W	0170410005
R12	Resistor, 10 K, 10%, 1/4 W	0170410005
R13	Resistor, 10 K, 10%, 1/4 W	0170410005
R14	Resistor, 150 ohm, 10%, 1 W	0187840008
R15	Resistor, 150 ohm, 10%, 1 W	0187840008
R16	Resistor, 330 ohm, 10%, 1 W	0165300001
R17	Resistor, 820 ohm, 10%, 1/4 W	0178210005
R18	Not Used	
R19	Resistor, 10 ohm, 5%, 1/4 W	0177160004
R20	Resistor, 22 ohm, 10%, 1/4 W	0192690001
R21	Resistor, 10 K, 10%, 1/4 W	0170410005
R22	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R23	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R24	Resistor, 27 ohm, 10%, 1/4 W	0172590001
R25	Resistor, 820 ohm, 10%, 1/4 W	0178210005
R26	Resistor, 560 ohm, 5%, 1/4 W	0183200004
R27	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R28	Resistor, 100 K, 10%, 1/4W	0170390004
R29	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R30	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R31	Resistor, 27 ohm, 10%, 1/4 W	0172590001
R32	Resistor, 27 ohm, 10%, 1/4 W	0172590001
R33	Resistor, 220 ohm, 10%, 1/4 W	0171320000
R34	Potentiometer, 100 ohm, 10%, 1/2 W, P.C. Mount	0346350000
R35	Resistor, 560 ohm, 5%, 1/4 W	0183200004
R36	Resistor, 820 ohm, 10%, 1/4 W	0178210005
R37	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R38	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R39	Resistor, 1.2 K, 10%, 1/4 W	0181860007
T1	Transformer, Interstage 1-1	8040040701
T2	Transformer, Interstage 1-1	8040040701
T3	Transformer	5024111401

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
T4	Transformer, Input	5024110706
T5	Transformer, RF Amp	5024110803
T6	Transformer, Interstage 1-1	8040040701
X1	Mixer, Broadband, Balanced	1003300006

Second Mixer Board (1A4) Parts List

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Second Mixer Board Assy. ASB-500	8040050090
C1	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C2	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C3	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C4	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C5	Capacitor, 1 UF, 35 V, 196D	0281660000
C6	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C7	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C8	Capacitor, 1 UF, 35 V, 196D	0281660000
C9	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C10	Capacitor, 68 UF, 15 V, T368	0296540005
C11	Capacitor, 68 UF, 15 V, T368	0296540005
C12	Capacitor, 1 UF, 35 V, 196D	0281660000
C13	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C14	Capacitor, 0.001 UF, 100 V, X5E, 10%	0282080007
C15	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C16	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C17	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C18	Capacitor, 68 UF, 15 V, T36B	0296540005
C19	Capacitor, 56 PF, 500 V, DM15, 2%	0282360000
C20	Capacitor, 68 UF, 15 V, T368	0296540005
C21	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C22	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C23	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C24	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C25	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C26	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C27	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C28	Capacitor, 0.1 UF, 50 V, X7r, 20%	0281610002
C29	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C30	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C31	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C32	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C33	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C34	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C35	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C36	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C37	Capacitor, 3.5-20 PF, 100 V, Ceramic	0282930001
C38	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C39	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C40	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C41	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C42	Capacitor, 0.01 UF, 25 V, X5S	0281620008

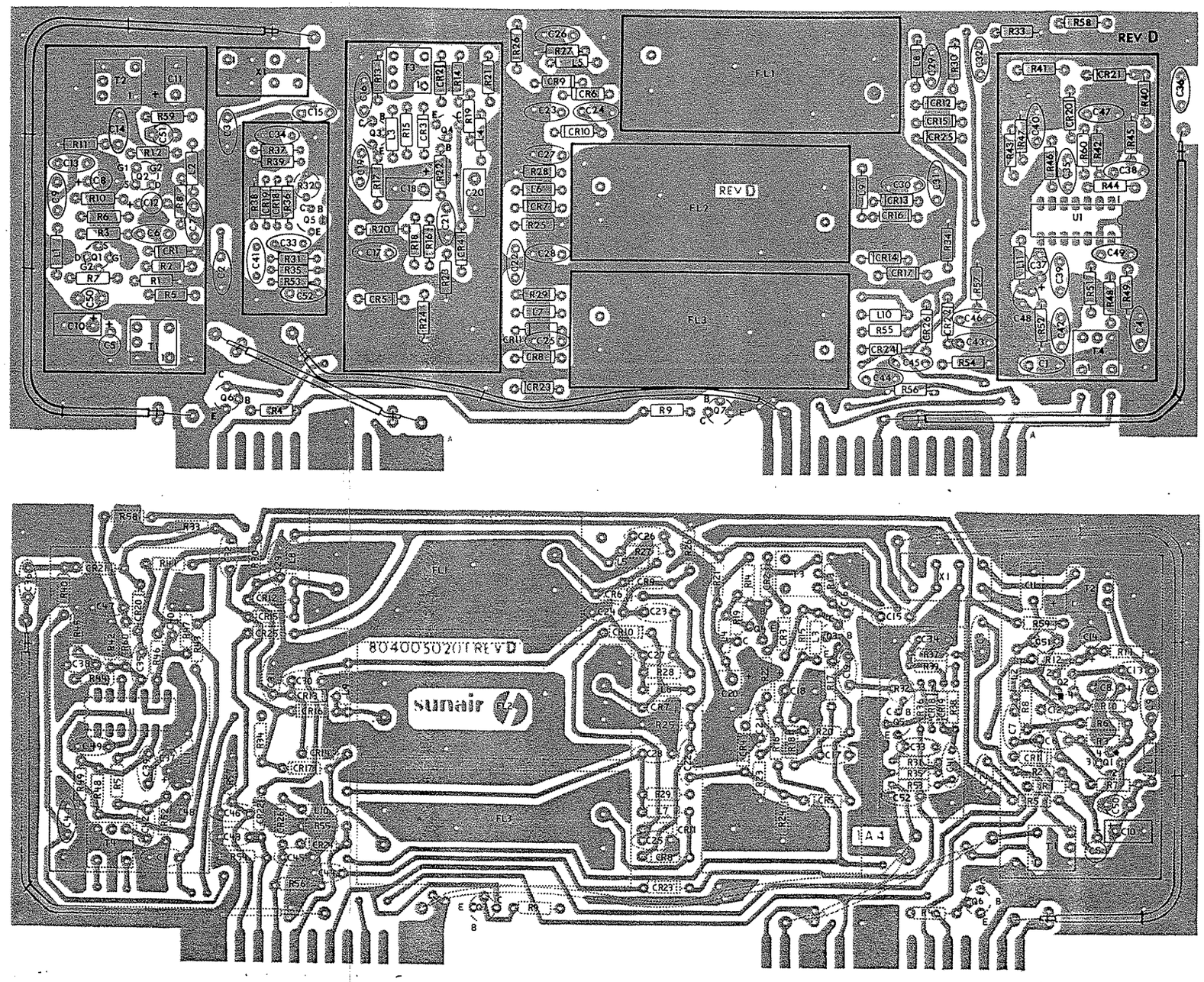
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
C43	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C44	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C45	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C46	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C47	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C48	Capacitor, 6.8 UF, 20 V, T368	0296780006
C49	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C50	Capacitor, 3.5-20 PF, 100 V, Ceramic	0282930001
C51	Capacitor, 3.5-20 PF, 100 V, Ceramic	0282930001
C52	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
CR1	Diode, Zener 1N52278	0405250002
CR2	Diode, Signal, Silicon, 1N4454	0405270003
CR3	Diode, Signal, Silicon, 1N4454	0405270003
CR4	Diode, Signal, Silicon, 1N4454	0405270003
CR5	Diode, Signal, Silicon, 1N4454	0405270003
CR6	Diode, Signal, Silicon, 1N4454	0405270003
CR7	Diode, Signal, Silicon, 1N4454	0405270003
CR8	Diode, Signal, Silicon, 1N4454	0405270003
CR9	Diode, Signal, Silicon, 1N4454	0405270003
CR10	Diode, Signal, Silicon, 1N4454	0405270003
CR11	Diode, Signal, Silicon, 1N4454	0405270003
CR12	Diode, Signal, Silicon, 1N4454	0405270003
CR13	Diode, Signal, Silicon, 1N4454	0405270003
CR14	Diode, Signal, Silicon, 1N4454	0405270003
CR15	Diode, Signal, Silicon, 1N4454	0405270003
CR16	Diode, Signal, Silicon, 1N4454	0405270003
CR17	Diode, Signal, Silicon, 1N4454	0405270003
CR18	Diode, Signal, Silicon, 1N4454	0404270003
CR19	Diode, Signal, Silicon, 1N4454	0405270003
CR20	Diode, Signal, Silicon, 1N4454	0405270003
CR21	Diode, Signal, Silicon, 1N4454	0405270003
CR22	Diode, Signal, Silicon, 1N4454	0405270003
CR23	Diode, Signal, Silicon, 1N4454	0405270003
CR24	Diode, Signal, Silicon, 1N4454	0405270003
CR25	Diode, Signal, Silicon, 1N4454	0405270003
CR26	Diode, Signal, Silicon, 1N4454	0405270003
FL1	Filter, Crystal, USB, 5.6 MHz	8040050502
FL2	Filter, Crystal, AM, 5.6 MHz	8040050600
FL3	Filter, Crystal, LSB, 5.6 MHz	8040050804
L1	Inductor, Molded, 0.82 UH, 5%	0652320007
L2	Inductor, Molded, 0.82 UH, 5%	0652320007
L3	Inductor, Molded, 150 UH, 5%	0659190001
L4	Inductor, Molded, 150 UH, 5%	0659190001

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
L5	Inductor, Molded, 33 UH, 5%	0659690004
L6	Inductor, Molded, 33 UH, 5%	0659690004
L7	Inductor, Molded, 33 UH, 5%	0659690004
L8	Inductor, Molded, 33 UH, 5%	0659690004
L9	Inductor, Molded, 33 UH, 5%	0659690004
L10	Inductor, Molded, 33 UH, 5%	0659690004
L11	Inductor, Molded, 33 UH, 5%	0659690004
Q1	Transistor, N-CH, FET 40673	0447450000
Q2	Transistor, N-CH, FET 40673	0447450000
Q3	Transistor, NPN, Silicon, 2N4124	0448010003
Q4	Transistor, NPN, Silicon, 2N4124	0448010003
Q5	Transistor, PNP, Silicon, 2N4126	0448020009
Q6	Transistor, NPN, Silicon, 2N4124	0448010003
Q7	Transistor, NPN, Silicon, 2N4124	0448010003
R1	Resistor, 10 K, 10%, 1/4 W	0170410005
R2	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R3	Resistor, 100K, 10%, 1/4W	0170390004
R4	Resistor, 1 K, 10%, 1/4 W	0171560001
R5	Resistor, 47 ohm, 10%, 1/4 W	0179360001
R6	Resistor, 27 ohm, 10%, 1/4 W	0172590001
R7	Resistor, 560 ohm, 5%, 1/4 W	0183200004
R8	Resistor, 27 ohm, 10%, 1/4 W	0172590001
R9	Resistor, 1 K, 10%, 1/4 W	0171560001
R10	Resistor, 10 K, 10%, 1/4 W	0170410005
R11	Resistor, 10 K, 1/4 W	0170410005
R12	Resistor, 3.3 K, 10%, 1/4 W	0170890007
R13	Resistor, 1 K, 10%, 1/4 W	0171560001
R14	Resistor, 1 K, 10%, 1/4 W	0171560001
R15	Resistor, 1.8 K, 10%, 1/4 W	0178190004
R16	Resistor, 47 ohm, 10%, 1/4 W	0179360001
R17	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R18	Resistor, 330 ohm, 5%, 1/4 W	0170910008
R19	Resistor, 1.8 K, 10%, 1/4 W	0178190004
R20	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R21	Resistor, 47 ohm, 10%, 1/4 W	0179360001
R22	Resistor, 33 ohm, 10%, 1/4 W	0182530001
R23	Resistor, 680 ohm, 10%, 1/4 W	0176630007
R24	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R25	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R26	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R27	Resistor, 2.2 K, 5%, 1/4 W	0178070009

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R28	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R29	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R30	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R31	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R32	Potentiometer, 10 K, 10%, 1/2 W, PC Mount	0346630002
R33	Resistor, 2.7 K, 10%, 1/4 W	0186670001
R34	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R35	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R36	Resistor, 1 K, 10%, 1/4 W	0171560001
R37	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R38	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R39	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R40	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R41	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R42	Resistor, 22 K, 10%, 1/4 W	0172230004
R43	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R44	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R45	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R46	Resistor, 1.2 K, 10%, 1/4 W	0181860007
R47	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R48	Resistor, 12 K, 10%, 1/4 W	0183180003
R49	Resistor, 12 K, 10%, 1/4 W	0183180003
R50	Not Used	
R51	Resistor, 10 ohm, 5%, 1/4 W	0177160004
R52	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R53	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R54	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R55	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R56	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R57	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R58	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R59	Resistor, 47 ohm, 10%, 1/4 W	0179360001
R60	Resistor, 22 K, 10%, 1/4 W	0172230004
T1	Transformer, Interstage 2-11	8040051100
T2	Transformer, Interstage 2-11	8040051100
T3	Transformer	5024101103
T4	Transformer, Interstage 1-1	8040040701
U1	Integrated Circuit, Linear CA3086	0447950002
X1	Mixer, Broadband, Balanced	1003300006

Second Mixer Board (1A4)

8040050201D



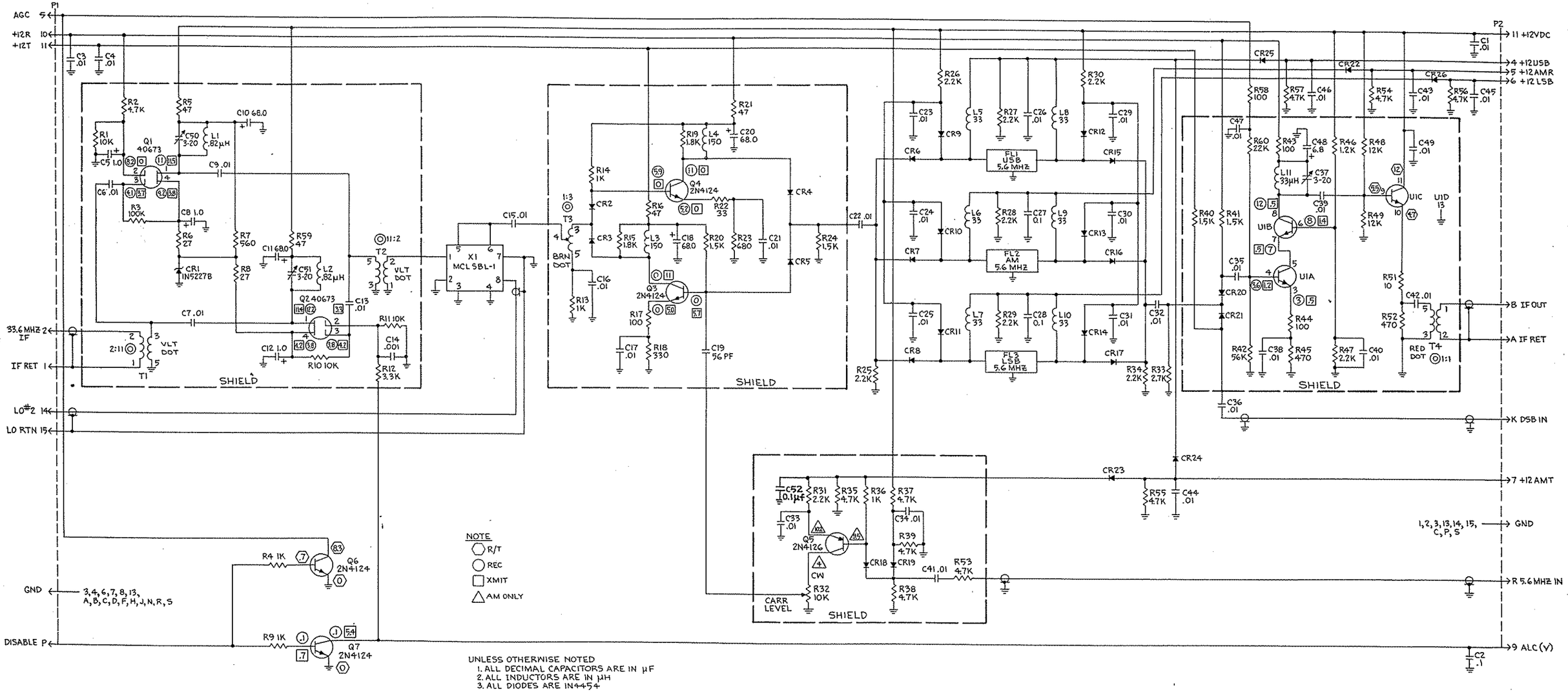
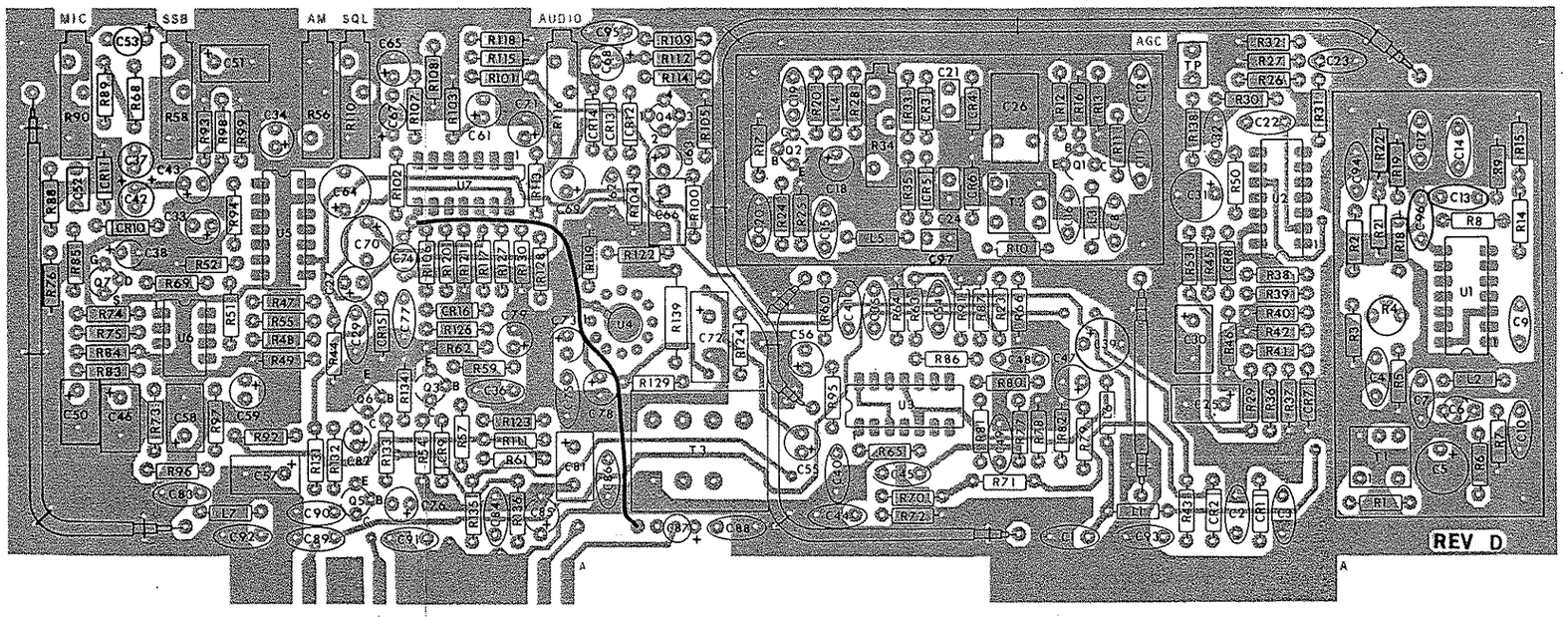
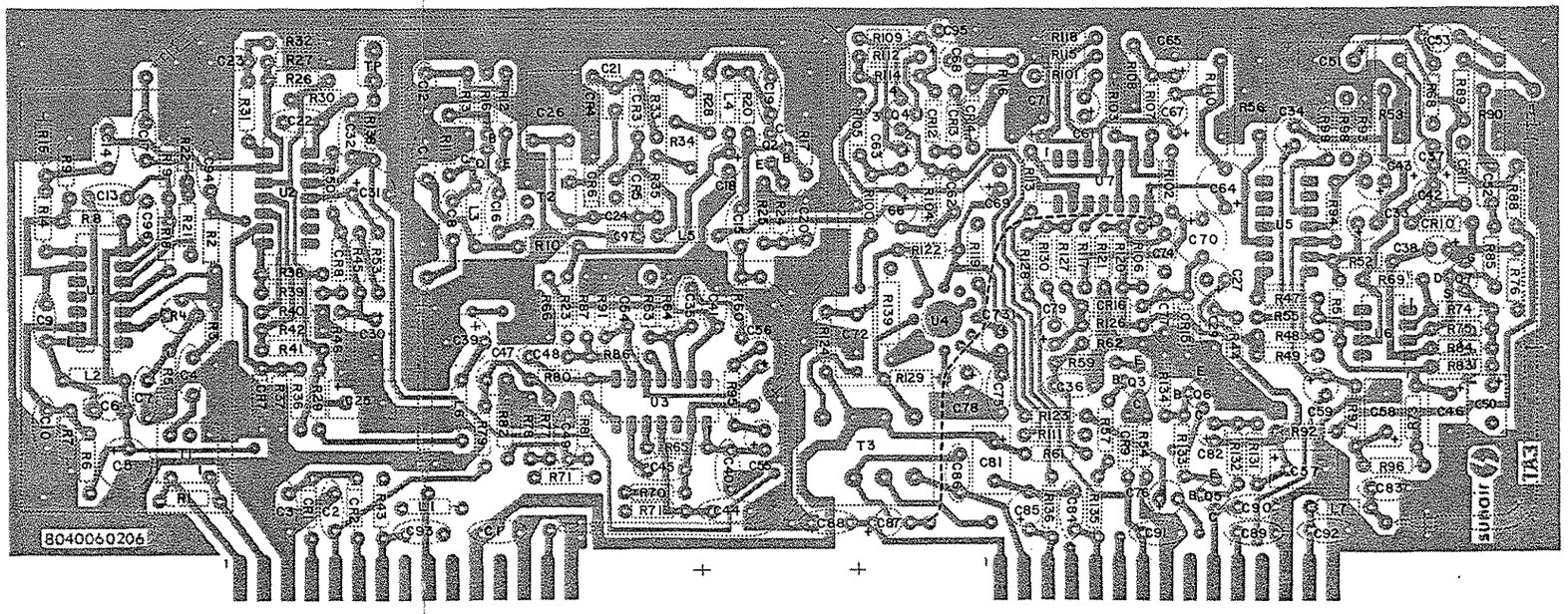


Figure 5.14 Second Mixer Board (1A4)

Audio Board (1A3)

8040060206D





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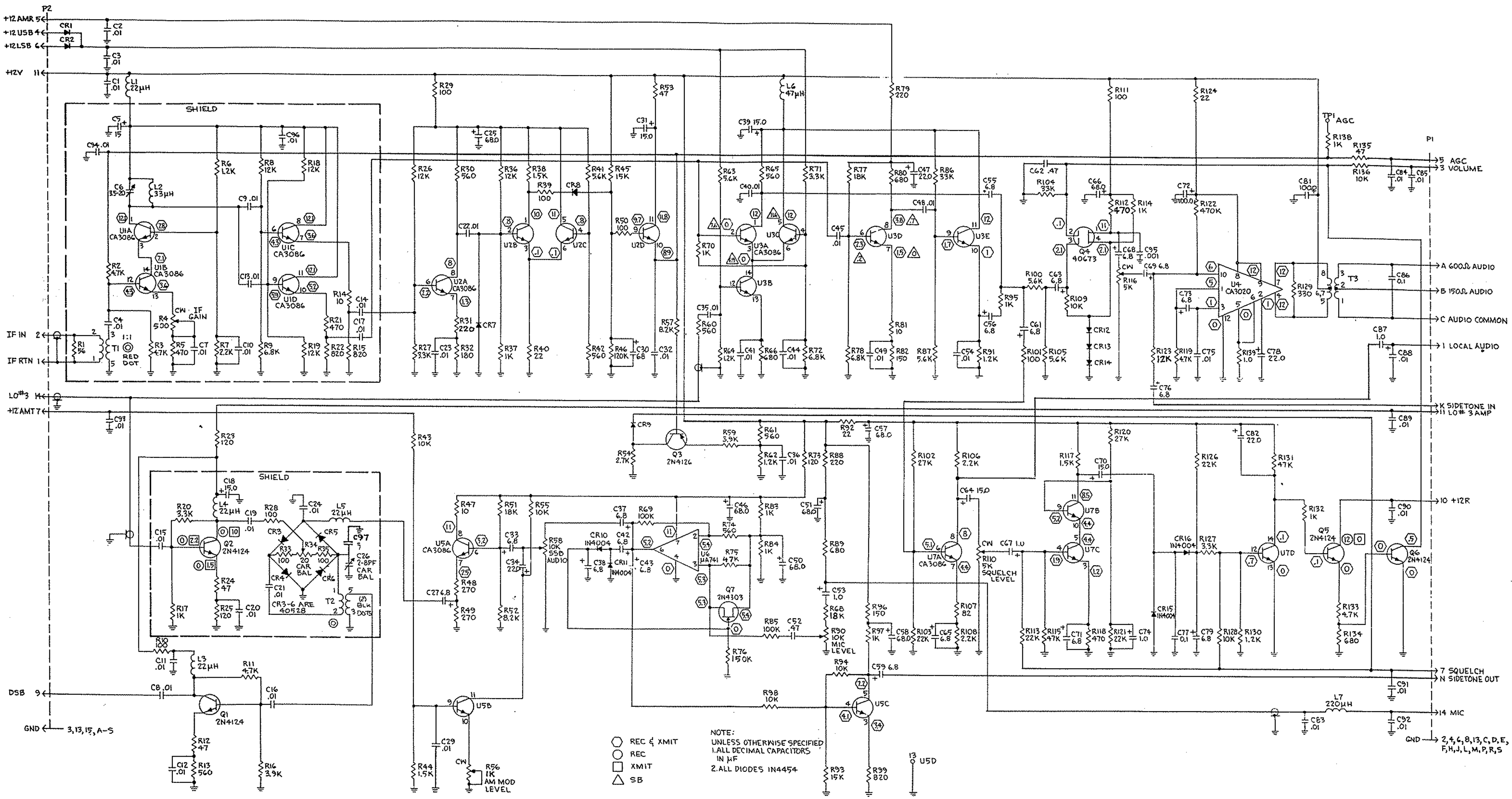
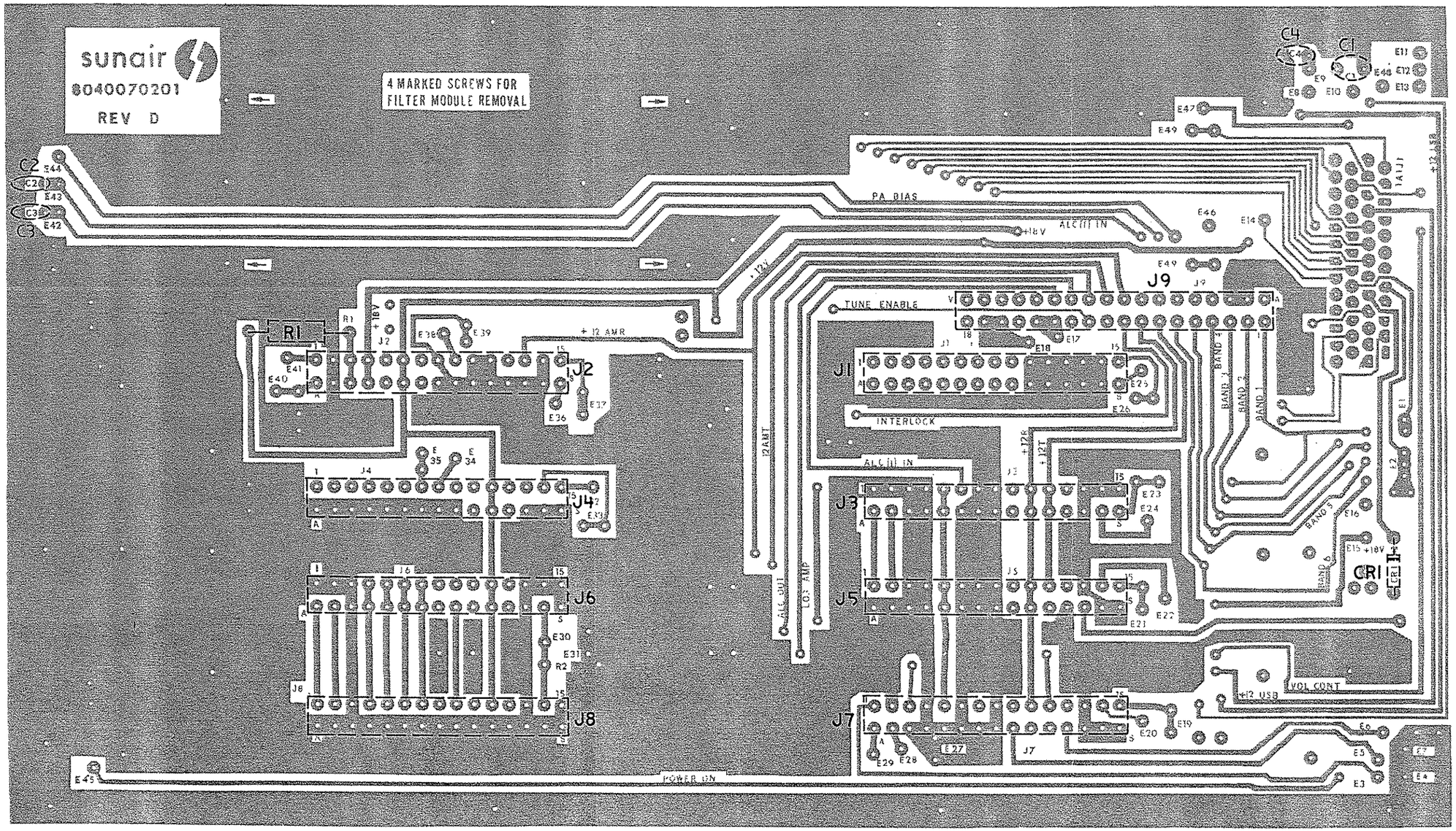


Figure 5.15 Audio Board (1A3)

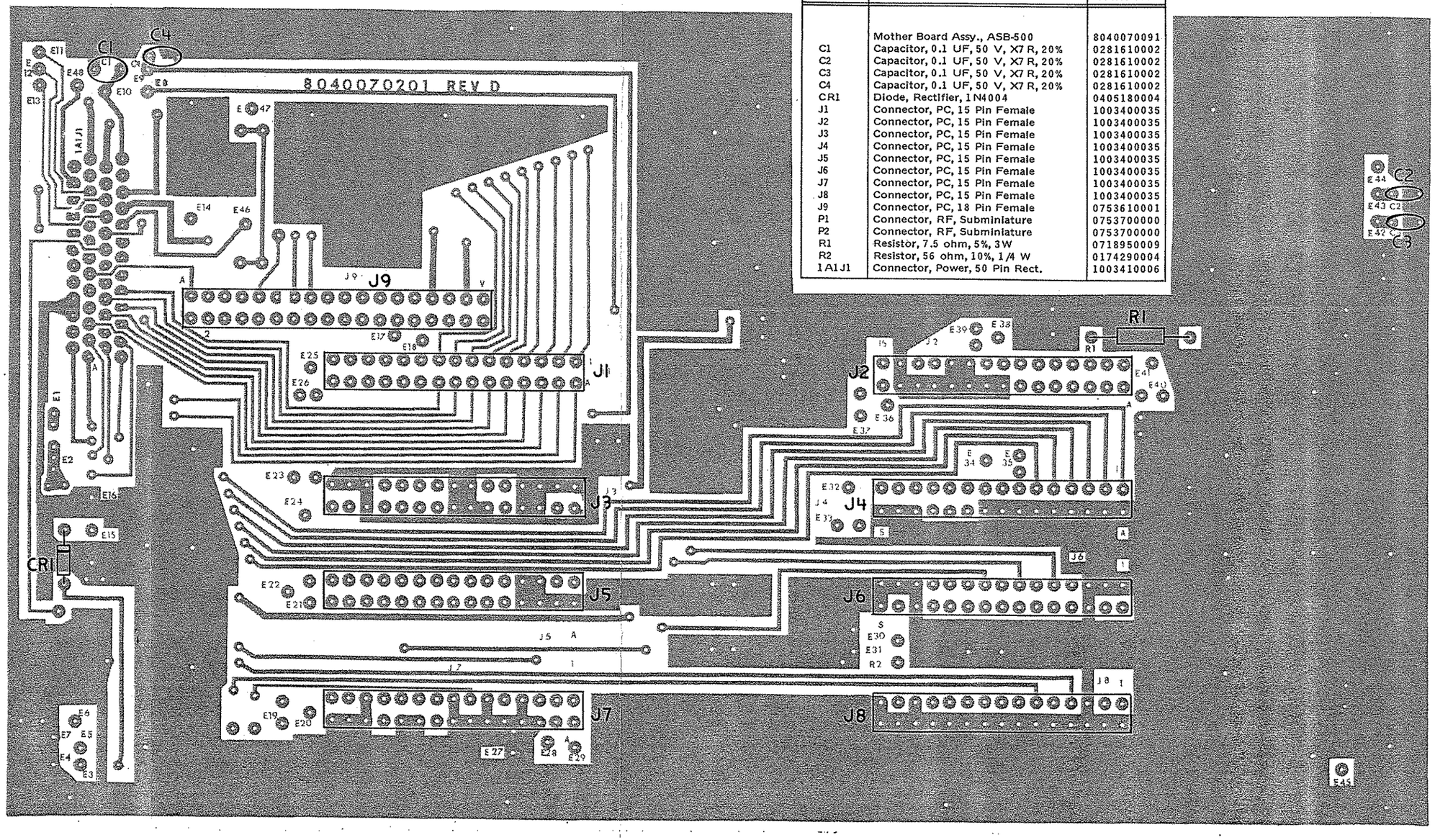
Audio Board (1A3) Parts List

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Audio Board Assy, ASB 500	8040060095
C1	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C2	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C3	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C4	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C5	Capacitor, 22 UF, 15 V, T368	0296660001
C6	Capacitor, 3.5-20 PF, 100 V, Ceramic	0282930001
C7	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C8	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C9	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C10	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C11	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C12	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C13	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C14	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C15	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C16	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C17	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C18	Capacitor, 22 UF, 15 V, T368	0296660001
C19	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C20	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C21	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C22	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C23	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C24	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C25	Capacitor, 68 UF, 15 V, T368	0296540005
C26	Capacitor, .8-8PF, PC Mt. Glass	1000060012
C27	Capacitor, 6.8 UF, 20 V, T368	0296780006
C28	Not Used	
C29	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C30	Capacitor, 68 UF, 15 V, T368	0296540005
C31	Capacitor, 15 UF, 50 V, 196D	0274000008
C32	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C33	Capacitor, 6.8 UF, 20 V, T368	0296780006
C34	Capacitor, 22 UF, 15 V, T368	0296660001
C35	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C36	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C37	Capacitor, 6.8 UF, 20 V, T368	0296780006
C38	Capacitor, 6.8 UF, 20 V, T368	0296780006
C39	Capacitor, 15 UF, 50 V, 196D	0274000008
C40	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C41	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C42	Capacitor, 6.8 UF, 20 V, T368	0296780006
C43	Capacitor, 6.8 UF, 20 V, T368	0296780006
C44	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C45	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C46	Capacitor, 68 UF, 15 V, T368	0296540005
C47	Capacitor, 22 UF, 15 V, T368	0296660001
C48	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C49	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C50	Capacitor, 68 UF, 15 V, T368	0296540005
C51	Capacitor, 68 UF, 15 V, T368	0296540005
C52	Capacitor, 0.47 UF, 50 V, X5V, 20%	0283370009
C53	Capacitor, 1 UF, 35 V, 196D	0281660000
C54	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C55	Capacitor, 6.8 UF, 20 V, T368	0296780006
C56	Capacitor, 6.8 UF, 20 V, T368	0296780006
C57	Capacitor, 68 UF, 15 V, T368	0296540005
C58	Capacitor, 68 UF, 15 V, T368	0296540005
C59	Capacitor, 6.8, 20 V, T368	0296780006
C60	Not Used	
C61	Capacitor, 6.8 UF, 20 V, T368	0296780006
C62	Capacitor, 0.47 UF, 50 V, X5V, 20%	0283370009
C63	Capacitor, 6.8 UF, 20 V, T368	0296780006
C64	Capacitor, 15 UF, 50 V, 196D	0274000008
C65	Capacitor, 6.8 UF, 20 V, T368	0296780006
C66	Capacitor, 68 UF, 15 V, T368	0296540005
C67	Capacitor, 1 UF, 35 V, 196D	0281660000
C68	Capacitor, 6.8 UF, 20 V, T368	0296780006
C69	Capacitor, 6.8 UF, 20 V, T368	0296780006
C70	Capacitor, 15 UF, 50 V, 196D	0274000008
C71	Capacitor, 6.8 UF, 20 V, T368	0296780006
C72	Capacitor, 100 UF, 20 V	0282230009
C73	Capacitor, 6.8 UF, 20 V, T368	0296780006
C74	Capacitor, 1 UF, 35 V, 196D	0281660000
C75	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C76	Capacitor, 6.8 UF, 20 V, T368	0296780006
C77	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C78	Capacitor, 22 UF, 15 V, T368	0296660001
C79	Capacitor, 6.8 UF, 20 V, T368	0296780006
C80	Not Used	
C81	Capacitor, 100 UF, 20 V	0282230009
C82	Capacitor, 22 UF, 15 V, T368	0296660001
C83	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C84	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C85	Capacitor, 15 UF, 50 V, 196D	0274000008
C86	Capacitor, 0.1 UF, 50 V, X7R	0281610002
C87	Capacitor, 1 IF, 35 V, 196D	0281660000
C88	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C89	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C90	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C91	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C92	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C93	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C94	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C95	Capacitor, 0.001 UF, 100 V, X5E, 10%	0282080007
C96	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C97	Capacitor, 5 PF, 500 V,	0261190008
CR1	Diode, Signal, Silicon 1N4454	0405270003
CR2	Diode, Signal, Silicon 1N4454	0405270003
CR3	Diode, Hot Carrier	0405280009
CR4	Diode, Hot Carrier	0405280009
CR5	Diode, Hot Carrier	0405280009
CR6	Diode, Hot Carrier	0405280009
CR7	Diode, Signal, Silicon 1N4454	0405270003
CR8	Diode, Signal, Silicon 1N4454	0405270003
CR9	Diode, Signal, Silicon 1N4454	0405270003
CR10	Diode, Rectifier 1N4004	0405180004
CR11	Diode, Rectifier 1N4004	0405180004
CR12	Diode, Signal, Silicon 1N4454	0405270003
CR13	Diode, Signal, Silicon 1N4454	0405270003
CR14	Diode, Signal, Silicon 1N4454	0405270003
CR15	Diode, Rectifier 1N4004	0405180004
CR16	Diode, Rectifier 1N4004	0405180004
L1	Inductor, Molded, 22 UH, 5%	0650000005
L2	Inductor, Molded, 33 UH, 5%	0659690004
L3	Inductor, Molded, 22 UH, 5%	0650000005
L4	Inductor, Molded, 22 UH, 5%	0650000005
L5	Inductor, Molded, 22 UH, 5%	0650000005
L6	Inductor, Molded, 47 UH, 5%	0652680003
L7	Inductor, Molded, 220 UH, 5%	0650500008
Q1	Transistor, NPN, Silicon 2N4124	0448010003
Q2	Transistor, NPN, Silicon 2N4124	0448010003
Q3	Transistor, PNP, Silicon 2N4126	0448020009
Q4	Transistor, N-CH, FET 40673	0447450000
Q5	Transistor, NPN, Silicon 2N4124	0448010003
Q6	Transistor, NPN, Silicon 2N4124	0448010003
Q7	Transistor, N-CH FET 2N4303	0443930007
R1	Resistor, 56 ohm, 10%, 1/4 W	0174290004
R2	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R3	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R4	Potentiometer, 500 ohm, 20%, 1/2 W, PC Mount	0345980000
R5	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R6	Resistor, 1.2 K, 10%, 1/4 W	0181860007
R7	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R8	Resistor, 12 K, 10%, 1/4 W	0183180003
R9	Resistor, 6.8 K, 5%, 1/4 W	0192190008
R10	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R11	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R12	Resistor, 47 ohm, 10%, 1/4 W	0179360001
R13	Resistor, 560 ohm, 5%, 1/4 W	0183200004
R14	Resistor, 10 ohm, 5%, 1/4 W	0177160004
R15	Resistor, 820 ohm, 10%, 1/4 W	0178210005
R16	Resistor, 3.9 K, 10% 1/4 W	0178830003
R17	Resistor, 1 K, 10%, 1/4 W	0171560001
R18	Resistor, 12 K, 10%, 1/4 W	0183180003
R19	Resistor, 12 K, 10%, 1/4 W	0183180003
R20	Resistor, 3.3 K, 10%, 1/4 W	0170890007
R21	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R22	Resistor, 820 ohm, 10%, 1/4 W	0178210005
R23	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R24	Resistor, 47 ohm, 10% 1/4 W	0179360001
R25	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R26	Resistor, 12 K, 10%, 1/4 W	0183180003
R27	Resistor, 3.3 K, 10%, 1/4 W	0170890007
R28	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R29	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R30	Resistor, 560 ohm, 5%, 1/4 W	0183200004
R31	Resistor, 220 ohm, 10%, 1/4 W	0171320000
R32	Resistor, 180 ohm, 10%, 1/4 W	0175220000
R33	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R34	Potentiometer, 20 ohm, 10%, 3/4 W, 20 Turns	0346770009
R35	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R36	Resistor, 12 K, 10%, 1/4 W	0183180003
R37	Resistor, 1 K, 10%, 1/4 W	0171560001
R38	Resistor, 1.5K, 10%, 1/4 W	0172470005
R39	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R40	Resistor, 22 ohm, 10%, 1/4 W	0192690001
R41	Resistor, 5.6 K, 5%, 1/4 W	0192210009
R42	Resistor, 560 ohm, 5%, 1/4 W	0183200004
R43	Resistor, 10 K, 10%, 1/4 W	0170410005
R44	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R45	Resistor, 15 K, 5%, 1/4 W	0195700007
R46	Resistor, 120 K, 10%, 1/4 W	0175100004
R47	Resistor, 10 ohm, 5%, 1/4 W	0177160004
R48	Resistor, 270 ohm, 10%, 1/4 W	0178450006
R49	Resistor, 270 ohm, 10%, 1/4 W	0178450006
R50	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R51	Resistor, 18K, 10%, 1/4 W	0175720002
R52	Resistor, 8.2 K, 5%, 1/4 W	0192070002
R53	Resistor, 47 ohm, 10%, 1/4 W	0179360001
R54	Resistor, 2.7 K, 10%, 1/4 W	0186670001
R55	Resistor, 10 K, 10%, 1/4 W	0170410005
R56	Potentiometer, 500 ohm, 10%, 3/4 W, 15 Turns	0338490078
R57	Resistor, 8.2 K, 5%, 1/4 W	0192070002
R58	Potentiometer, 10 K, 10%, 3/4 W, 15 Turns	0338490043
R59	Resistor, 3.9 K, 10%, 1/4 W	0178830003
R60	Resistor, 560 ohm, 5%, 1/4 W	0183200004
R61	Resistor, 560 ohm, 5%, 1/4 W	0183200004
R62	Resistor, 1.2 K, 10%, 1/4 W	0181860007
R63	Resistor, 5.6 K, 5%, 1/4 W	0192210009
R64	Resistor, 1.2 K, 10%, 1/4 W	0181860007
R65	Resistor, 560 ohm, 5%, 1/4 W	0183200004
R66	Resistor, 680 ohm, 10%, 1/4 W	0176630007
R67	Not Used	
R68	Resistor, 18 K, 10%, 1/4 W	0175720002
R69	Resistor, 100 K, 10%, 1/4 W	0170390004
R70	Resistor, 1K, 10%, 1/4 W	0171560001
R71	Resistor, 3.3 K, 10%, 1/4 W	0170890007
R72	Resistor, 6.8 K, 5%, 1/4 W	0192190008
R73	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R74	Resistor, 560 ohm, 5%, 1/4 W	0183200004
R75	Resistor, 47 K, 10%, 1/4 W	0171060008
R76	Resistor, 150 K, 10%, 1/4 W	0176750002
R77	Resistor, 18 K, 10%, 1/4 W	0175720002
R78	Resistor, 6.8 K, 5%, 1/4 W	0192190008
R79	Resistor, 220 ohm, 10%, 1/4 W	0171320000
R80	Resistor, 680 ohm, 10%, 1/4 W	0176630007
R81	Resistor, 10 ohm, 5%, 1/4 W	0177160004
R82	Resistor, 150 ohm, 10%, 1/4 W	0172730007
R83	Resistor, 1 K, 10%, 1/4 W	0171560001
R84	Resistor, 1K, 10%, 1/4 W	0171560001
R85	Resistor, 100 K, 10%, 1/4 W	0170390004
R86	Resistor, 33 K, 10%, 1/4 W	0177920009
R87	Resistor, 5.6 K, 5%, 1/4 W	0192210009
R88	Resistor, 220 ohm, 10%, 1/4 W	0171320000
R89	Resistor, 680 ohm, 10%, 1/4 W	0176630007
R90	Potentiometer, 10 K, 10%, 3/4 W, 15 Turns	0338490043
R91	Resistor, 1.2 K, 10%, 1/4 W	0181860007
R92	Resistor, 22 ohm, 10%, 1/4 W	0192690001
R93	Resistor, 15 K, 5%, 1/4 W	0195700007
R94	Resistor, 10K, 10%, 1/4 W	0170410005
R95	Resistor, 1 K, 10%, 1/4 W	0171560001
R96	Resistor, 150 ohm, 10%, 1/4 W	0172730007
R97	Resistor, 1 K, 10%, 1/4 W	0171560001
R98	Resistor, 10 K, 10%, 1/4 W	0170410005
R99	Resistor, 820 ohm, 10%, 1/4 W	0178210005
R100	Resistor, 5.6 K, 5%, 1/4 W	0192210009
R101	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R102	Resistor, 27 K, 10%, 1/4 W	0171200004
R103	Resistor, 22 K, 10%, 1/4 W	0172230004
R104	Resistor, 33K, 10%, 1/4 W	0177920009
R105	Resistor, 5.6 K, 5%, 1/4 W	0192210009
R106	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R107	Resistor, 82 ohm, 10%, 1/4 W	0184610001
R108	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R109	Resistor, 10 K, 10%, 1/4 W	0170410005
R110	Potentiometer, 5 K, 10%, 3/4 W, 15 Turns	0338490086
R111	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R112	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R113	Resistor, 22 K, 10%, 1/4 W	0172230004
R114	Resistor, 1 K, 10%, 1/4 W	0171560001
R115	Resistor, 47 K, 10%, 1/4 W	0171060008
R116	Potentiometer, 5 K, 10%, 3/4 W, 15 Turns	0338490086
R117	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R118	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R119	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R120	Resistor, 27 K, 10%, 1/4 W	0171200004
R121	Resistor, 22 K, 10%, 1/4 W	0172230004
R122	Resistor, 470 K, 10%, 1/4 W	0180570005
R123	Resistor, 12 K, 10%, 1/4 W	0183180003
R124	Resistor, 22 ohm, 10%, 1/4 W	0192690001
R125	Not Used	
R126	Resistor, 22 K, 10%, 1/4 W	0172230004
R127	Resistor, 3.3 K, 10%, 1/4 W	0170890007
R128	Resistor, 10 K, 10%, 1/4 W	0170410005
R129	Resistor, 330 ohm, 5%, 1/4 W	0170910008
R130	Resistor, 1.2 K, 10%, 1/4 W	0181860007
R131	Resistor, 47 K, 10%, 1/4 W	0171060008
R132	Resistor, 1 K, 10%, 1/4 W	0171560001
R133	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R134	Resistor, 680 ohm, 10%, 1/4 W	0176630007
R135	Resistor, 47 ohm, 10%, 1/4 W	0179360001
R136	Resistor, 10 K, 10%, 1/4 W	0170410005
R137	Resistor, 470 ohm, 5%, 1/4 W	0184110009
R138	Resistor, 1 K, 10%, 1/4 W	0171560001
R139	Resistor, 1 ohm, 10%, 1/2 W	0194770001
T1	Transformer, Interstage 1-1	8040040701
T2	Transformer, Balanced Mod.	8040060605
T3	Transformer, Audio, PC Mount	0491660006
U1	Integrated Circuit, Linear CA3086	0447950002
U2	Integrated Circuit, Linear CA3086	0447950002
U3	Integrated Circuit, Linear CA3086	0447950002
U4	Integrated Circuit, Linear CA3020	0444600001
U5	Integrated Circuit, Linear CA3086	0447950002
U6	Integrated Circuit, Linear LM741CN	1003420028
U7	Integrated Circuit, Linear CA3086	0447950002

Mother Board (1A1A1)

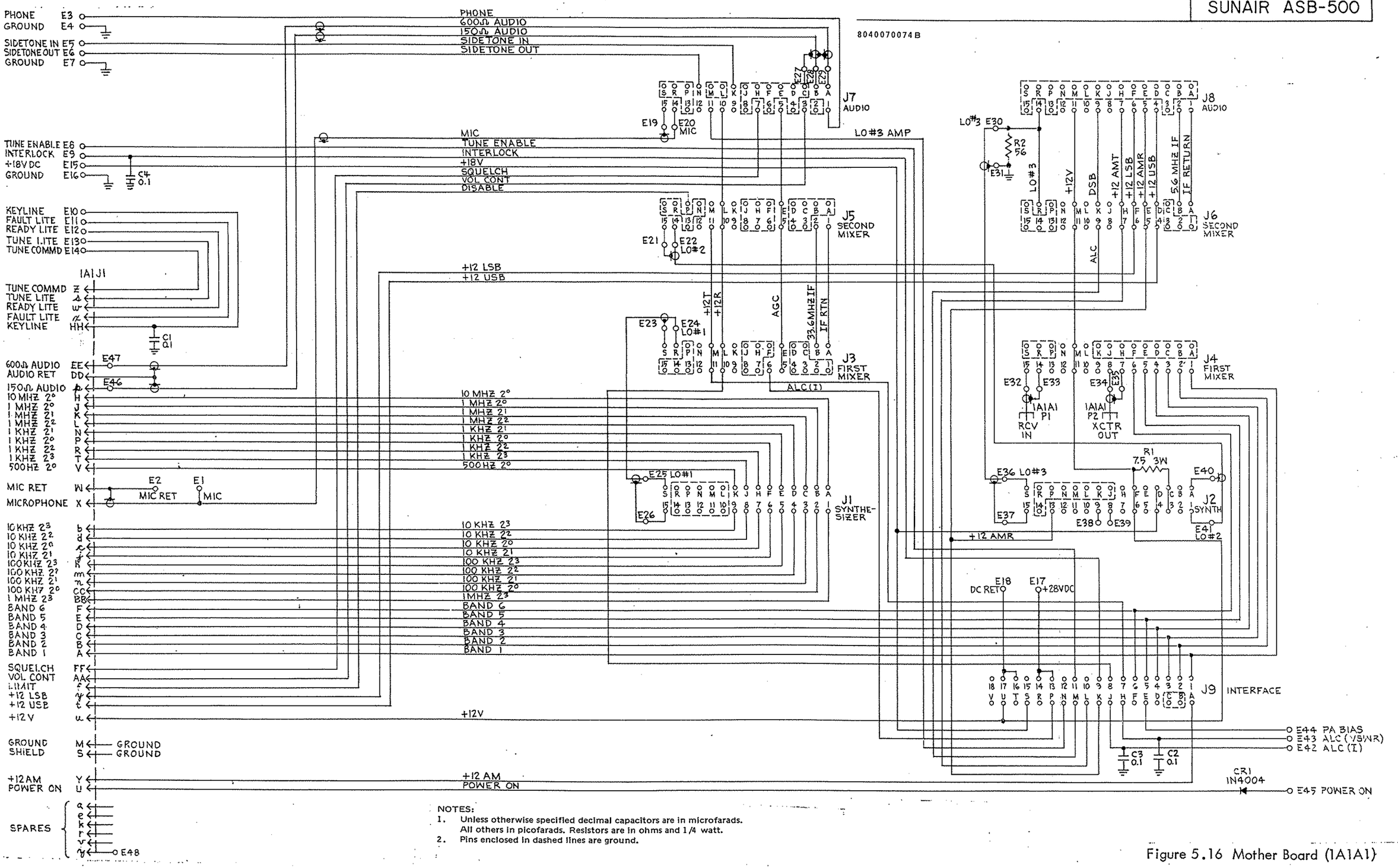


Mother Board (1A1A1)



REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Mother Board Assy., ASB-500	8040070091
C1	Capacitor, 0.1 UF, 50 V, X7 R, 20%	0281610002
C2	Capacitor, 0.1 UF, 50 V, X7 R, 20%	0281610002
C3	Capacitor, 0.1 UF, 50 V, X7 R, 20%	0281610002
C4	Capacitor, 0.1 UF, 50 V, X7 R, 20%	0281610002
CR1	Diode, Rectifier, 1N4004	0405180004
J1	Connector, PC, 15 Pin Female	1003400035
J2	Connector, PC, 15 Pin Female	1003400035
J3	Connector, PC, 15 Pin Female	1003400035
J4	Connector, PC, 15 Pin Female	1003400035
J5	Connector, PC, 15 Pin Female	1003400035
J6	Connector, PC, 15 Pin Female	1003400035
J7	Connector, PC, 15 Pin Female	1003400035
J8	Connector, PC, 15 Pin Female	1003400035
J9	Connector, PC, 18 Pin Female	0753610001
P1	Connector, RF, Subminiature	0753700000
P2	Connector, RF, Subminiature	0753700000
R1	Resistor, 7.5 ohm, 5%, 3W	0718950009
R2	Resistor, 56 ohm, 10%, 1/4 W	0174290004
1A1J1	Connector, Power, 50 Pin Rect.	1003410006

8040070074B



NOTES:
1. Unless otherwise specified decimal capacitors are in microfarads. All others in picofarads. Resistors are in ohms and 1/4 watt.
2. Pins enclosed in dashed lines are ground.

Figure 5.16 Mother Board (1A1A1)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Front Panel and Chassis Assy, ASB-500	
C1	Capacitor, 470 UF, 50 V	0280890001
C2	Capacitor, 470 UF, 50 V	0280890001
C3	Capacitor, 470 UF, 50 V	0280890001
C4	Capacitor, 0.1 UF, 100 V, Z5U	0244080003
C5	Capacitor, 470 UF, 50 V	0280890001
C6	Capacitor, 0.1 UF, 100 V, Z5U	0244080003
C7	Capacitor, 0.1 UF, 100 V, Z5U	0244080003
CR1	Diode, Rectifier, 1N4004	0405180004
F1	Fuse, MDL, 5 Amp, 32 V	0858660008
J1	Part of Mother Board Assy	
J2	Connector, RF, BNC	0754680002
J3	Connector, Mike Jack, 3 Cond.	0840560001
J4	Connector, Headphone	0840850000
J5	Connector, Power, 17 Pin Round	0754620000
J6	Connector, Power, 2 Pin Round	0754560007
K1	Relay, SPST, 24 V, Power	0660040000
L1	Inductor, Power	8033117206
L2	Inductor, Choke	0563720000
P1	Connector, RF, BNC	0744030005
P2	Connector, Power, 7 pin Rect.	0753530007
R1	Potentiometer	0346760003

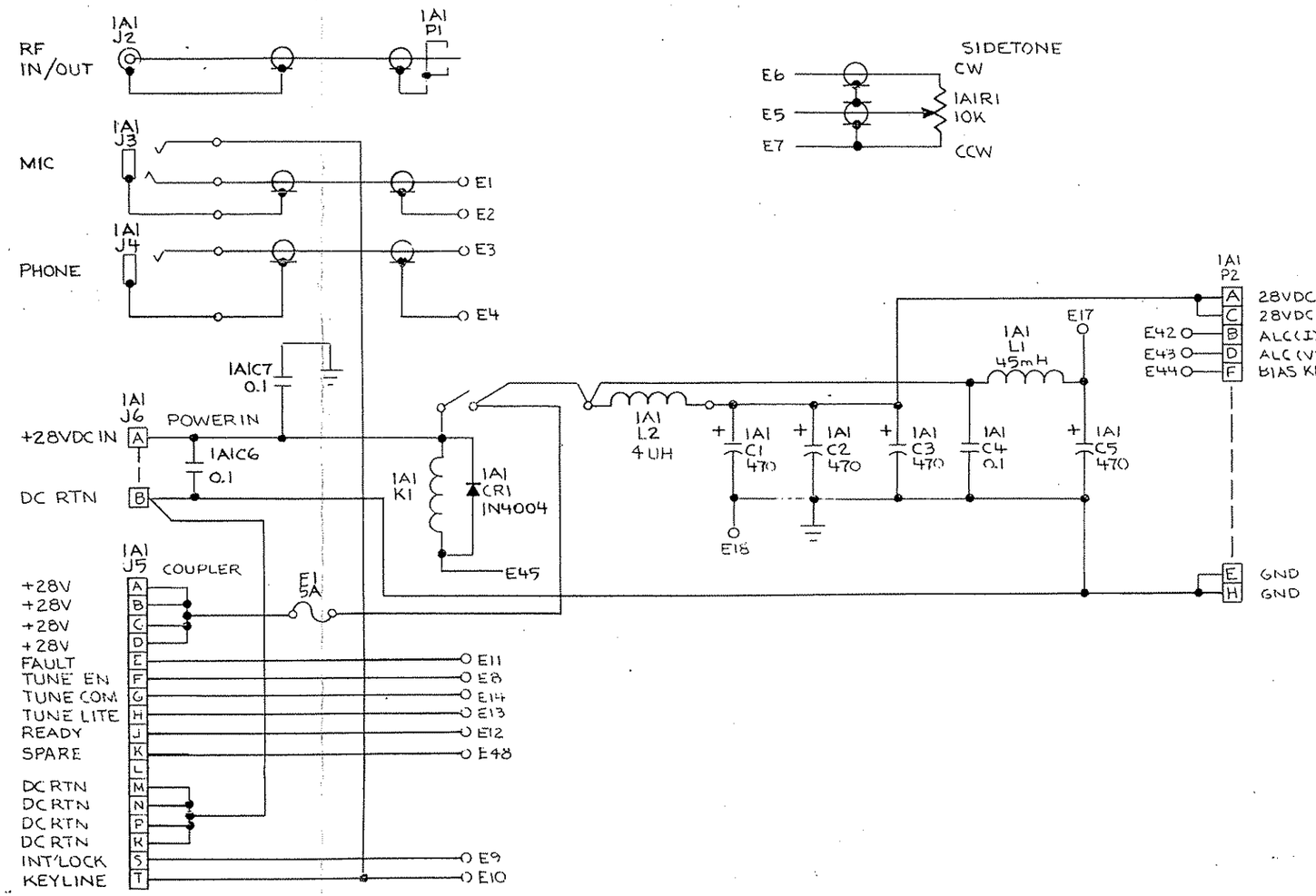


Figure 5.17 Front Panel (1A1A2)

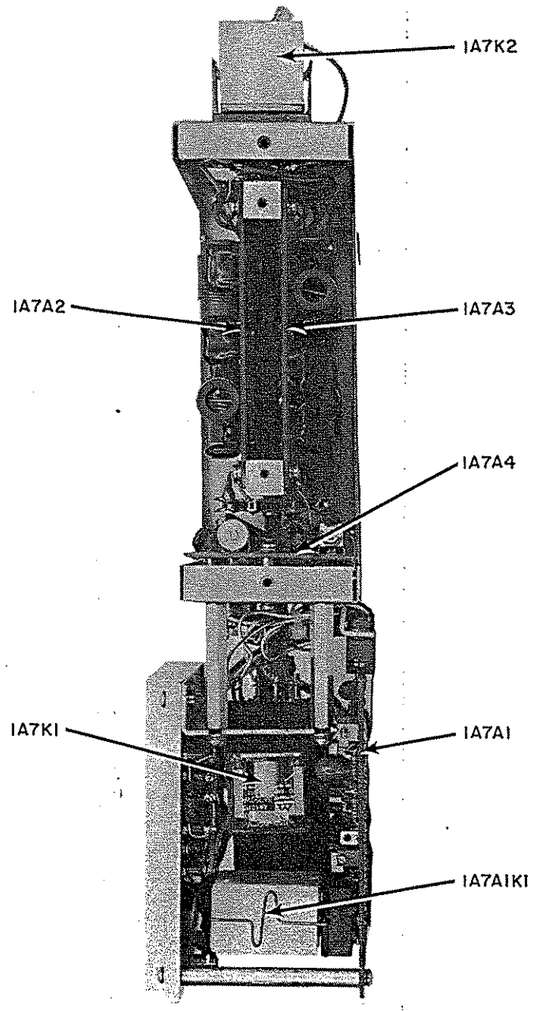


Figure 5.18 Filter Module with Shield Removed

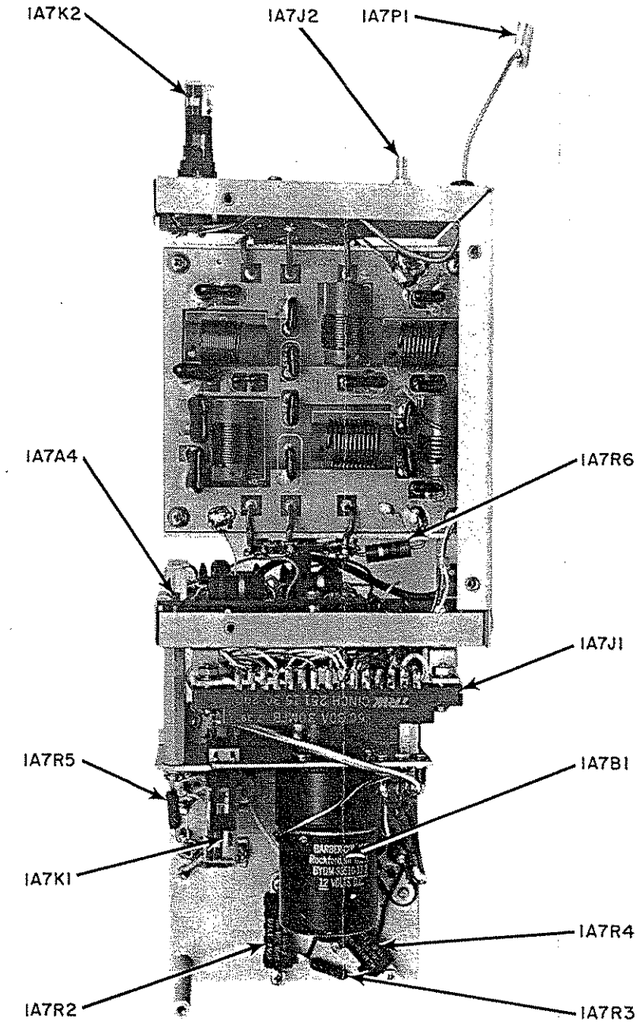


Figure 5.19 Filter Module Right Side View with Interface Board Removed

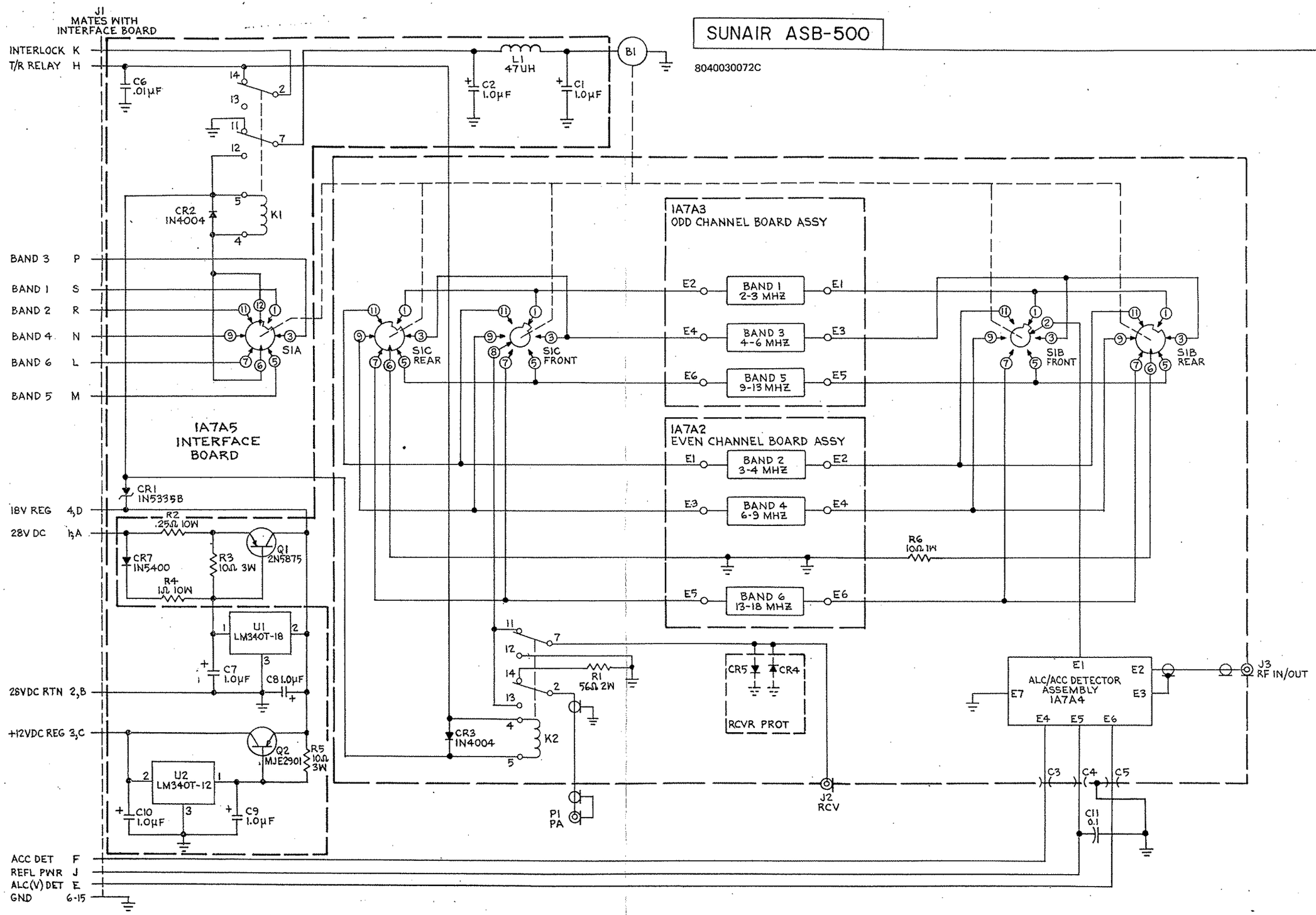
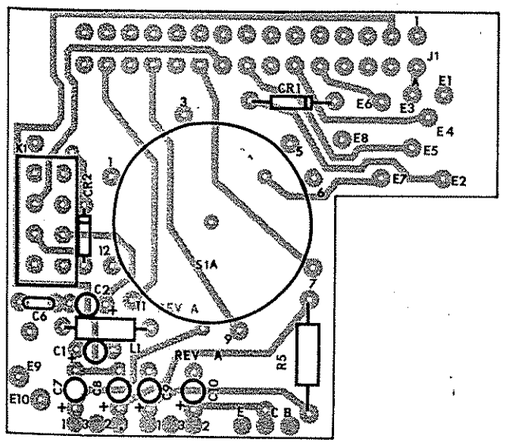


Figure 5.20 Filter Assembly (1A7) -

Filter Assembly (1A7) Parts List

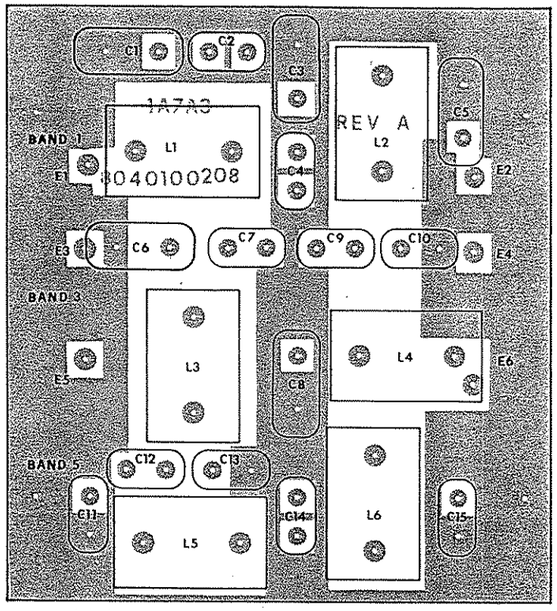
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Power Amplifier Filter Assy., ASB-500	
B1	Motor, 12 VDC, 96.7/1 Gear. Red.	5024053508
C3	Capacitor, 1000 PF, 500 V	0286270005
C4	Capacitor, 1000 PF, 500 V	0286270005
C5	Capacitor, 1000 PF, 500 V	0286270005
C11	Capacitor, 0.1, 50 V, 20%	0281610002
CR3	Diode, Rectifier 1N4004	0405180004
CR4	Diode, Pin	0405430001
CR5	Diode, Pin	0405440006
CR7	Diode, Rectifier 1N5400	0403970008
J2	Connector, RF, Subminiature	0753670003
J3	Connector, RF, BNC UG-1094/U	0743740009
K2	Relay, DPDT, 12 V, Plug-in 5A	1003410031
P1	Connector, RF, Subminiature	0753700000
Q1	Transistor, PNP, Silicon 2N5875	1003400027
Q2	Transistor, PNP, Silicon MJE2901	1003410014
R1	Resistor, 56 ohm, 10%, 2W	0197210007
R2	Resistor, 0.25 ohm, 10%, 10 W	1003430015
R3	Resistor, 10 ohm, 5%, 3W	0163220000
R4	Resistor, 1 ohm, 5%, 10W	0169680002
R6	Resistor, 10 ohm, 10%, 1 W	0196090008
S1B	Switch, Wafer, Band Select	8040030501
S1C	Switch, Wafer, Band Select	8040030501
U1	Integrated Circuit, Linear LM340T18	1003400019
U2	Integrated Circuit, Linear LM340T12	1003410022

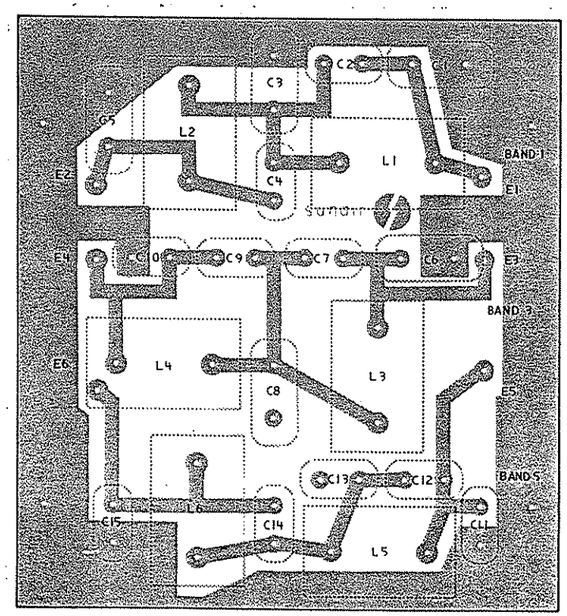


Regulator Board (1A7A5) Parts List

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Regulator Board (1A7A5)	
C1	Capacitor, 1 UF, 35 V, 196D	0281660000
C2	Capacitor, 1 UF, 35 V, 196D	0281660000
C6	Capacitor, .01 UF, 25 V, X5S	0281620008
C7	Capacitor, 1 UF, 35 V, 196D	0281660000
C8	Capacitor, 1 UF, 35 V, 196D	0281660000
C9	Capacitor, 1 UF, 35 V, 196D	0281660000
C10	Capacitor, 1 UF, 35 V, 196D	0281660000
CR1	Diode, Zener	1005040001
CR2	Diode, Rectifier, 1N4004	0405180004
J1	Connector, PC, 15 Pin Female	1003400035
K1	Relay, 12 VDC, DPDT	1005090009
L1	Inductor, 47 UH	0646420003
R5	Resistor, 10 ohm, 5%, 3W	0163220000
S1A	Switch, Wafer, Motor Control	8040033608

Odd Channel Filter Board (1A7A3)

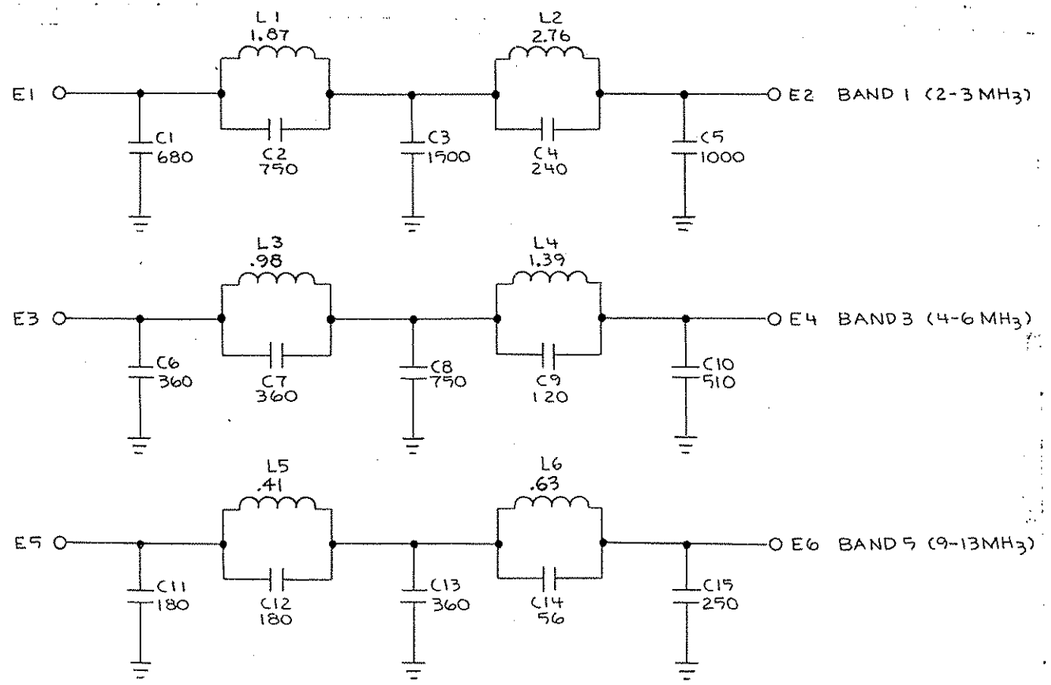




8040100071A

Odd Channel Filter Board (1A7A3) Parts List

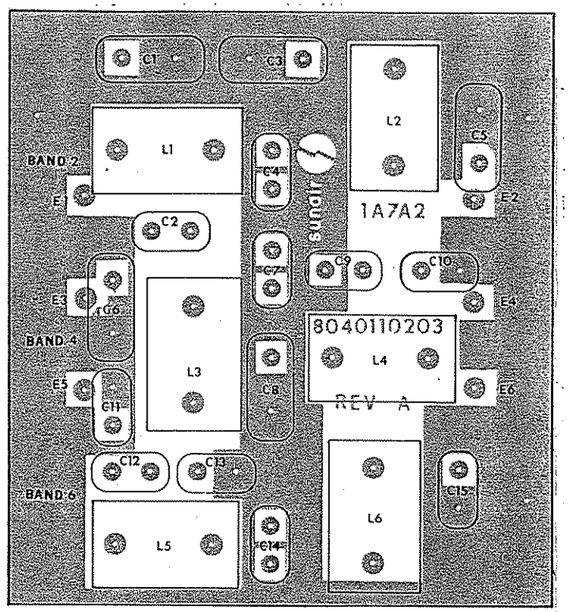
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Odd Channel Filter Assy. ASB-500	
C1	Capacitor, 680 PF, 500 V, DM19, 2%	0282290001
C2	Capacitor, 750 PF, 500 V, DM19, 2%	0280990006
C3	Capacitor, 1500 PF, 500 V, DM19, 2%	0281270007
C4	Capacitor, 240 PF, 500 V, DM15, 2%	0281140006
C5	Capacitor, 1000 PF, 500 V, DM19, 2%	0281210004
C6	Capacitor, 360 PF, 500 V, DM15, 2%	0281160007
C7	Capacitor, 360 PF, 500 V, DM15, 2%	0281160007
C8	Capacitor, 750 PF, 500 V, DM19, 2%	0280990006
C9	Capacitor, 120 PF, 500 V, DM15, 2%	0281180008
C10	Capacitor, 510 PF, 500 V, DM15, 2%	0281230005
C11	Capacitor, 180 PF, 500 V, DM15, 2%	0281090009
C12	Capacitor, 180 PF, 500 V, DM15, 2%	0281090009
C13	Capacitor, 360 PF, 500 V, DM15, 2%	0281160007
C14	Capacitor, 56 PF, 500 V, DM15, 2%	0282360000
C15	Capacitor, 250 PF, 500 V, DM15, 2%	0281100004
L1	Inductor, Filter 1.87 UH OR/RED	8040100321
L2	Inductor, Filter 2.76 UH OR/BLK	8040100305
L3	Inductor, Filter 0.98 UH OR/GRN	8040100356
L4	Inductor, Filter 1.39 UH OR/YEL	8040100348
L5	Inductor, Filter 0.41 UH OR/GRY	8040100381
L6	Inductor, Filter 0.63 UH OR/BLU	8040100364

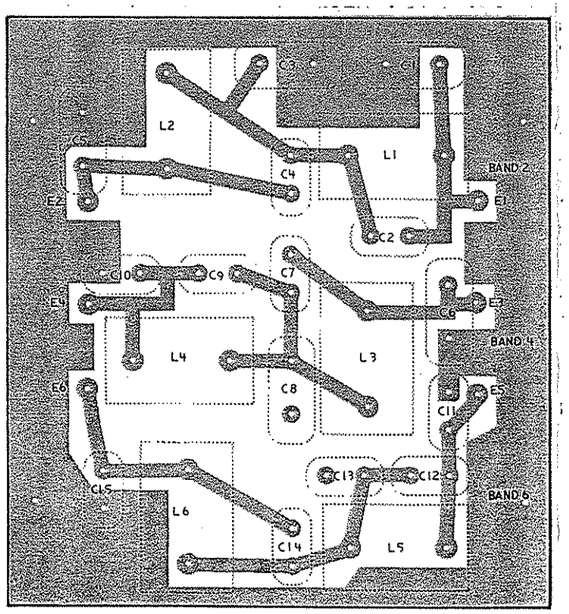


NOTES:
1 ALL CAPACITORS IN pF
2 ALL INDUCTORS IN μH

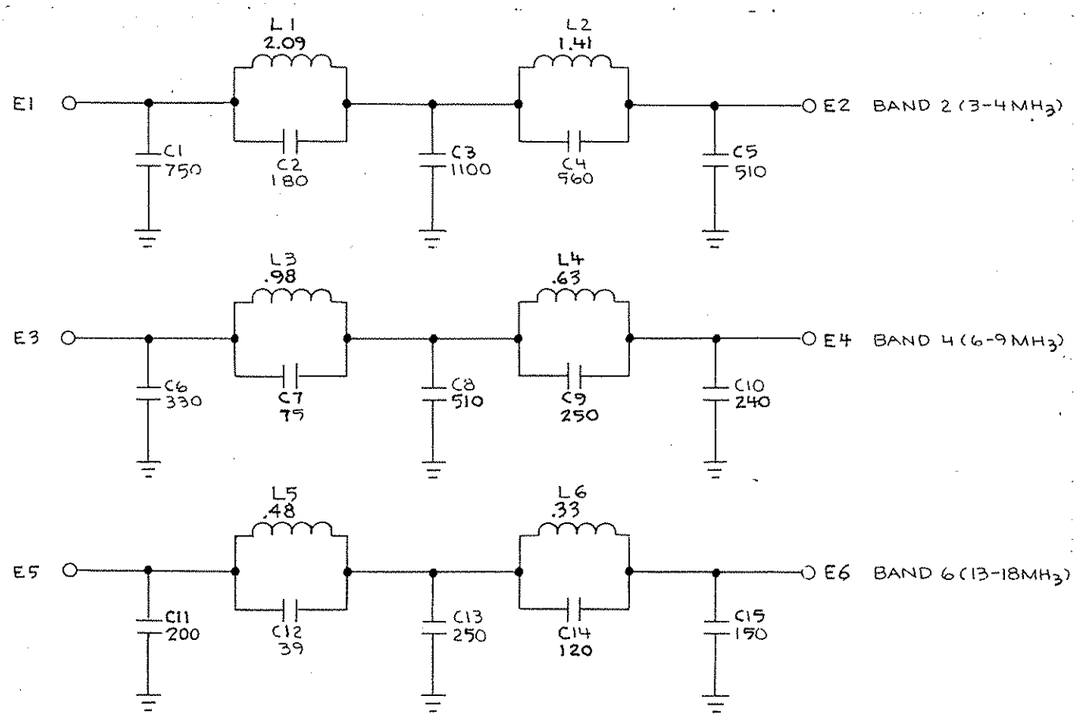
Figure 5.21 Odd Channel Filter Board (1A7A3)

8040110076A





REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Even Filter Board Assy. ASB-500	
C1	Capacitor, 750 PF, 500 V, DM19, 2%	0280990006
C2	Capacitor, 180 PF, 500 V, DM15, 2%	0281090009
C3	Capacitor, 1100 PF, 500 V, DM19, 2%	0281000000
C4	Capacitor, 560 PF, 500 V, DM19, 2%	0281060002
C5	Capacitor, 510 PF, 500 V, DM19, 2%	0282630007
C6	Capacitor, 330 PF, 500 V, DM19, 2%	0282660003
C7	Capacitor, 75 PF, 500 V, DM15, 2%	0281110000
C8	Capacitor, 510 PF, 500 V, DM19, 2%	0282630007
C9	Capacitor, 250 PF, 500 V, DM15, 2%	0281100004
C10	Capacitor, 240 PF, 500 V, DM15, 2%	0281140006
C11	Capacitor, 200 PF, 500 V, DM15	0258040009
C12	Capacitor, 39 PF, 500 V, DM15, 2%	0281150001
C13	Capacitor, 250 PF, 500 V, DM15, 2%	0281100004
C14	Capacitor, 120 PF, 500 V, DM15, 2%	0281180008
C15	Capacitor, 150 PF, 500 V, DM15, 2%	0281200009
L1	Inductor, Filter 2.09 UH OR/BRN	8040100313
L2	Inductor, Filter 1.41 UH OR/BRN	8040100330
L3	Inductor, Filter 0.98 UH OR/GRN	8040100356
L4	Inductor, Filter 0.63 UH OR/BLU	8040100364
L5	Inductor, Filter 0.48 UH OR/VIO	8040100372
L6	Inductor, Filter 0.33 UH OR/WHT	8040100399

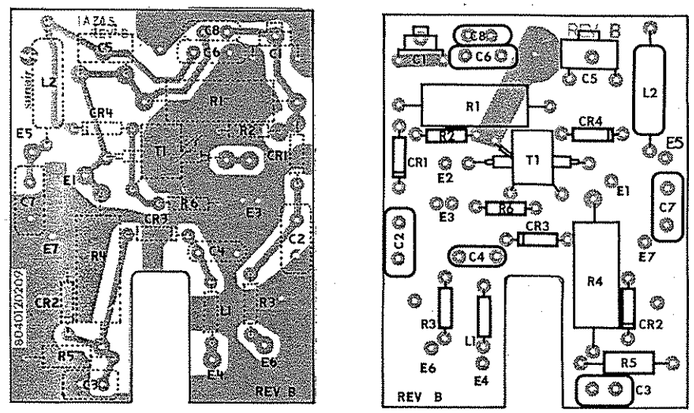


NOTES:
1 ALL CAPACITORS IN pF
2 ALL INDUCTORS IN μH

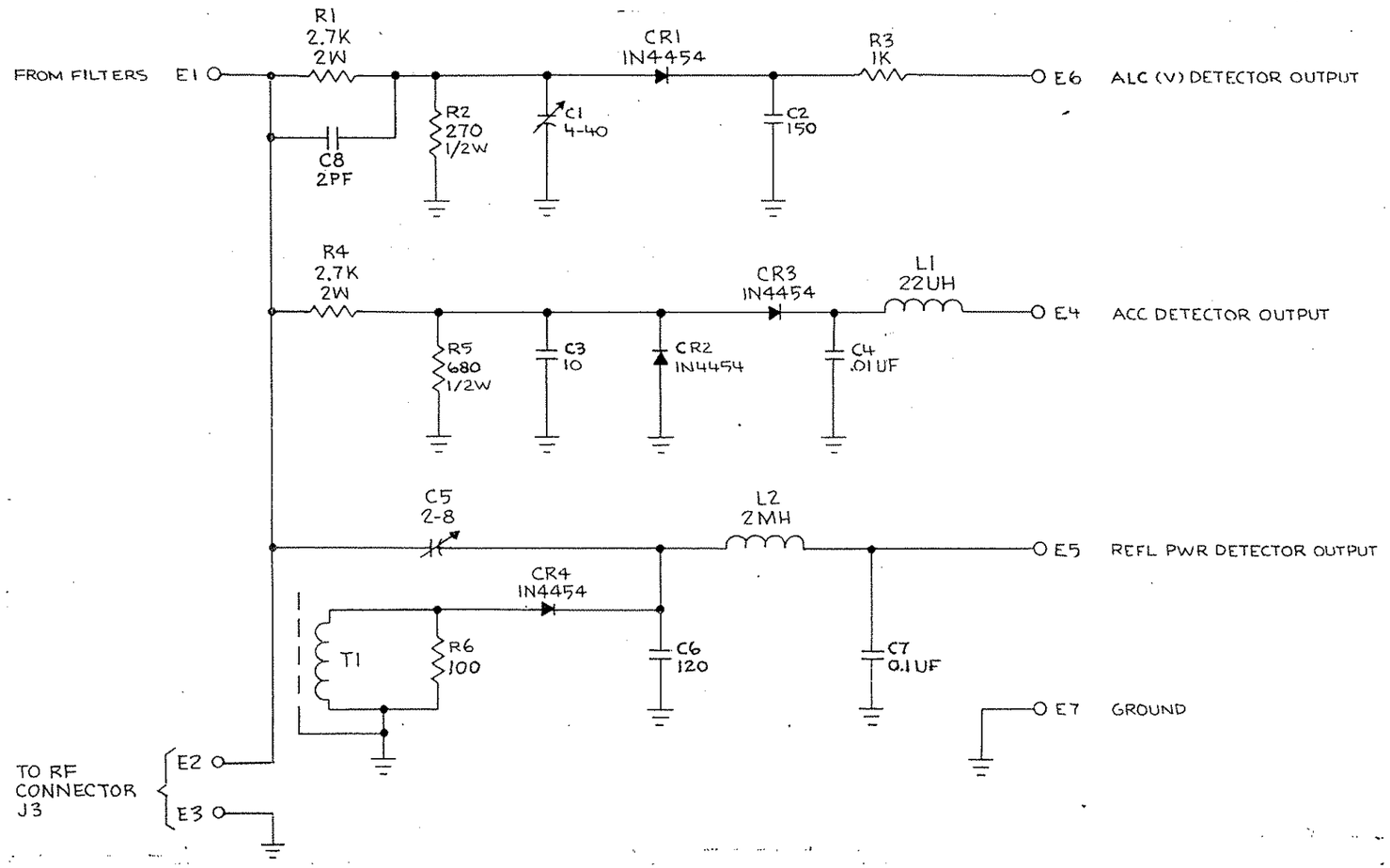
Figure 5.22 Even Channel Filter Board (1A7A2)

8040120071B

8040120209B



REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	ALC/ACC Detector Assy. ASB-500	
C1	Capacitor, 4-40 PF, 25 V	0295490004
C2	Capacitor, 150 PF, 500 V, DM15, 5%	0274980002
C3	Capacitor, 10 PF, 500 V, DM10	0259830003
C4	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C5	Capacitor, 2-8 PF, 200 V, NPO	0284300004
C6	Capacitor, 120 PF, 500 V, DM15, 5%	0289850002
C7	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C8	Capacitor, 2 PF, 500 V	0259710008
CR1	Diode, Signal, Silicon 1N4454	0405270003
CR2	Diode, Signal, Silicon 1N4454	0405270003
CR3	Diode, Signal, Silicon 1N4454	0405270003
CR4	Diode, Signal, Silicon 1N4454	0405270003
L1	Inductor, Molded, 22 UH, 5%	0650000005
L2	Inductor, Molded, 2000 UH, 5%	0653590008
R1	Resistor, 2.7 K, 10%, 2 W	0195940008
R2	Resistor, 270 ohm, 10%, 1/4 W	0178450006
R3	Resistor, 1 K, 10%, 1/4 W	0171560001
R4	Resistor, 2.7 K, 10%, 2W	0195940008
R5	Resistor, 680 ohm, 10%, 1/2 W	0167500007
R6	Resistor, 100 ohm, 5%, 1/4 W	0171180003
T1	Transformer, Current	5024055608

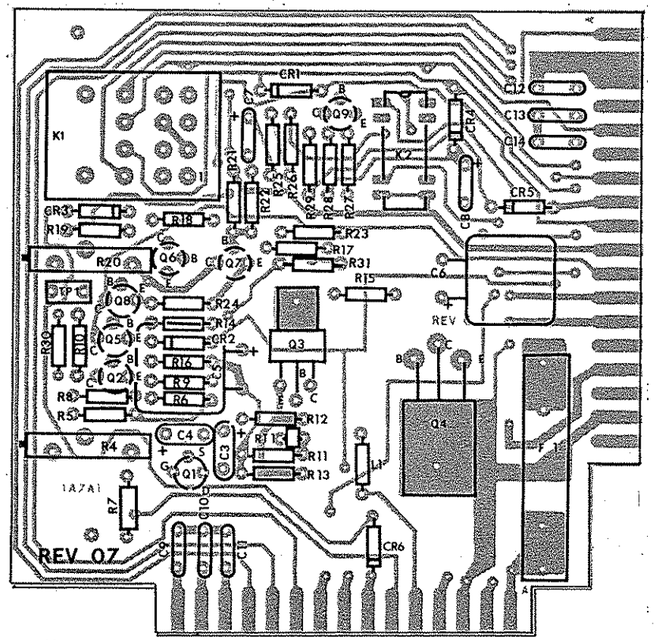


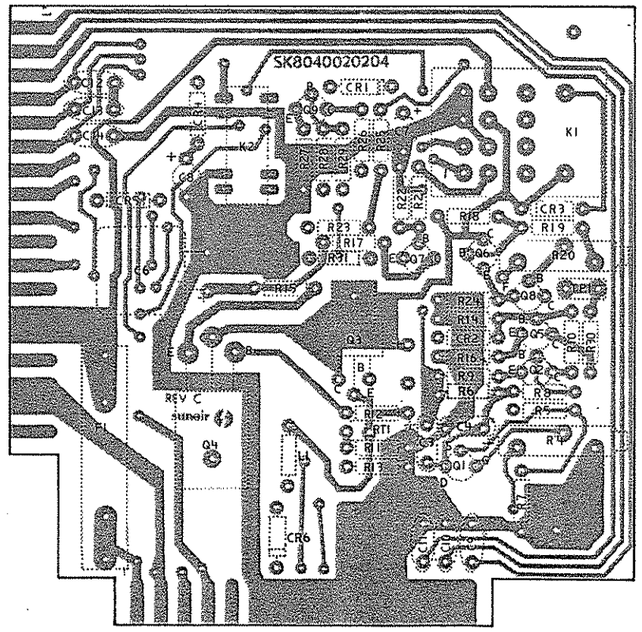
NOTES: Unless otherwise specified -

1. All resistors are 1/4W ±5%; Resistance values are in ohms.
2. Capacitance values are in picofarads.
3. All diodes to be type 1N4454.
4. Inductance values are in microhenries.

Figure 5.23 ALC/ACC Board (1A7A4)

8040020204C

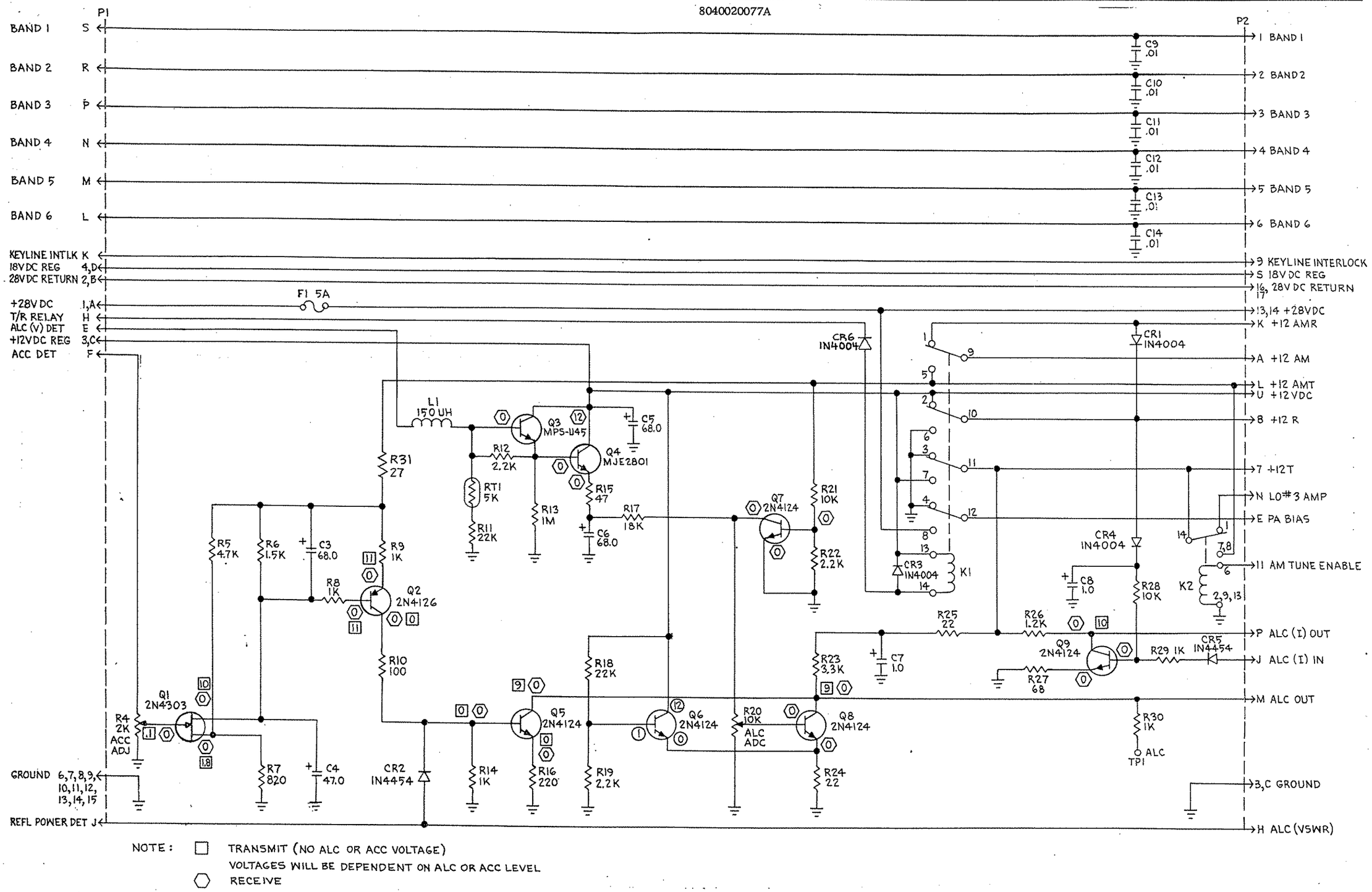




Interface Board (1A7A1) Parts List

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Interface Board Assy, ASB-500	8040020093
C1	Not Used	
C2	Not Used	
C3	Capacitor, 68 UF, 15 V T368	0296540005
C4	Capacitor, 47 UF, 20 V, 196D	0281700001
C5	Capacitor, 68 UF, 25 V, T368	0282150005
C6	Capacitor, 68 UF, 25 V, T368	0282150005
C7	Capacitor, 1 UF, 50 V, 198D	0280910002
C8	Capacitor, 1 UF, 50 V, 198D	0280910002
C9	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C10	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C11	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C12	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C13	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C14	Capacitor, 0.01 UF, 25 V, X5S	0281620008
CR1	Diode, Rectifier, 1N4004	0405180004
CR2	Diode, Signal, Silicon, 1N4454	0405270003
CR3	Diode, Rectifier, 1N4004	0405180004
CR4	Diode, Rectifier, 1N4004	0405180004
CR5	Diode, Signal, Silicon, 1N4454	0405270003
CR6	Diode, Rectifier, 1N4004	0405180004
F1	Fuse, AGC, 5 Amp, 32 V	0848980000
K1	Relay, 4 PDT, 12 V, Sensitive	0666640009
K2	Relay, SPDT, 24 V, Reed	1003400001
L1	Inductor, Molded, 150 UH, 5%	0659190001
Q1	Transistor, N-CH, FET 2N4303	0443930007
Q2	Transistor, PNP, Silicon, 2N4126	0448020009
Q3	Transistor, NPN, Silicon, MPSU45	0448570009
Q4	Transistor, NPN, Silicon, MJE2801	0448530007
Q5	Transistor, NPN, Silicon, 2N4124	0448010003
Q6	Transistor, NPN, Silicon, 2N4124	0448010003
Q7	Transistor, NPN, Silicon, 2N4124	0448010003
Q8	Transistor, NPN, Silicon, 2N4124	0448010003
Q9	Transistor, NPN, Silicon, 2N4124	0448010003
R1	Not Used	
R2	Not Used	
R3	Not Used	
R4	Potentiometer, 2 K, 10%, 3/4 W, 15 turns	0338490060
R5	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R6	Resistor, 1.5 K, 10%, 1/4 W	0172470005
R7	Resistor, 820 ohm, 10%, 1/4 W	0178210005
R8	Resistor, 1 K, 10%, 1/4 W	0171560001
R9	Resistor, 1 K, 10%, 1/4 W	0171560001
R10	Resistor, 100 ohm, 5%, 1/4 W	0171180003
R11	Resistor, 22 K, 10%, 1/4 W	0172230004
R12	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R13	Resistor, 1 M, 10%, 1/4 W	0170650006
R14	Resistor, 1 K, 10%, 1/4 W	0171560001
R15	Resistor, 47 ohm, 10%, 1/4 W	0179360001
R16	Resistor, 220 ohm, 10%, 1/4 W	0171320000
R17	Resistor, 18 K, 10%, 1/4 W	0175720002
R18	Resistor, 22 K, 10%, 1/4 W	0172230004
R19	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R20	Potentiometer, 10 K, 10%, 3/4 W, 15 Turns	0338490043
R21	Resistor, 10 K, 1/4 W	0170410005
R22	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R23	Resistor, 3.3 K, 10%, 1/4 W	0170890007
R24	Resistor, 22 ohm, 10%, 1/4 W	0192690001
R25	Resistor, 22 ohm, 10%, 1/4 W	0192690001
R26	Resistor, 1.2 K, 10%, 1/4 W	0181860007
R27	Resistor, 68 ohm, 10%, 1/4 W	0187960003
R28	Resistor, 10 K, 10%, 1/4 W	0170410005
R29	Resistor, 1 K, 10%, 1/4 W	0171560001
R30	Resistor, 1 K, 10%, 1/4 W	0171560001
R31	Resistor, 27 ohm, 10%, 1/4 W	0172590001
RT1	Resistor, 5 K At 25°C	1001340001

8040020077A



NOTE: □ TRANSMIT (NO ALC OR ACC VOLTAGE)
VOLTAGES WILL BE DEPENDENT ON ALC OR ACC LEVEL
⬡ RECEIVE

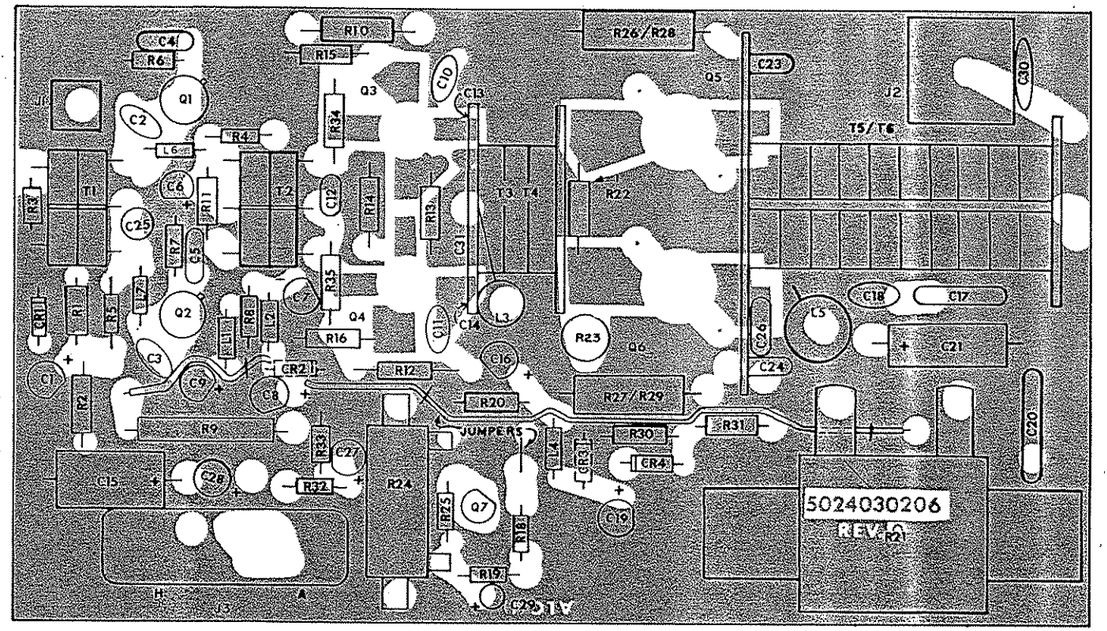
Figure 5.24 Interface Board (1A7A1)

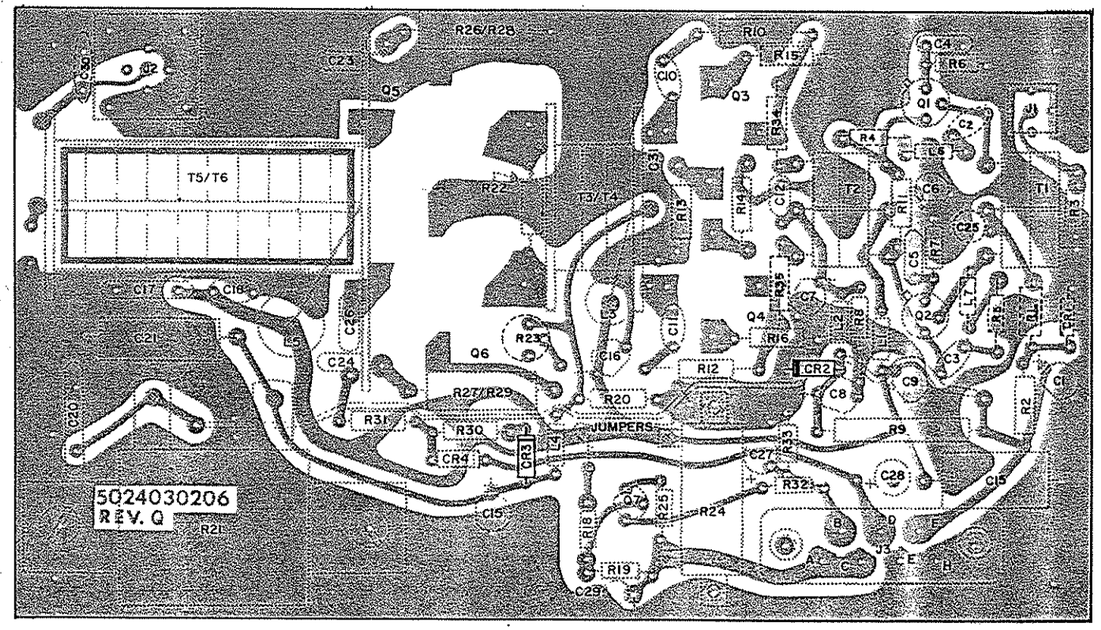
RF Power Amplifier (1A2) Parts List

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Power Amplifier Assy, ASB-500	
C1	Not Used	
C2	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C3	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C4	Capacitor, 0.0022 UF, 200 V, Z5F, 10%	0272780006
C5	Capacitor, 0.0022 UF, 200 V, Z5F, 10%	0272780006
C6	Capacitor, 1 UF, 50 V, 198D	0280910002
C7	Capacitor, 1 UF, 50 V, 198D	0280910002
C8	Capacitor, 1 UF, 50 V, 198D	0280910002
C9	Capacitor, 1 UF, 50 V, 198D	0280910002
C10	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C11	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C12	Capacitor, 0.01 UF, 25 V, X5S	0281620008
C13	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C14	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C15	Capacitor, 47 UF, 50 V, CL65B	0245750002
C16	Capacitor, 1 UF, 50 V, 198D	0280910002
C17	Capacitor, 0.01 UF, 250 V, Z5R, 10%	0280950004
C18	Capacitor, 0.01 UF, 50 V, X7R, 20%	0281610002
C19	Capacitor, 1 UF, 50 V, 198D	028091002
C20	Not Used	
C21	Capacitor, 125 UF, 3 V	0266020003
C22	Not Used	
C23	Capacitor, 0.1 UF, 50 V, X7R, 20%	028161002
C24	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C25	Capacitor, 47 UF, 20 V, 196D	0281700001
C26	Capacitor, 0.001 UF, 250 V, X5R, 10%	0286260000
C27	Capacitor, .22 UF, 35 V, T368	0283510005
C28	Capacitor, 47 UF, 20 V, 196D	0281700001
C29	Capacitor, 1 UF, 50 V, 198D	0280910002
C30	Capacitor, 22 PF, 500 V, CD15, 2%	1000050025
C31	Capacitor, 18 PF, 500 V, DM10, 5%	0260300004
CR1	Diode, Signal, Silicon 1N4454	0405270003
CR2	Diode, Rectifier 1N4004	0405180004
CR3	Diode, Rectifier 1N4004	0405180004
CR4	Diode, Signal, Silicon 1N4454	0405270003
J1	Connector, RF, Snap-on	1000170012
J2	Connector, RF, Snap-on	1000170012
J3	Connector, Power, 7 Pin Rect.	0753590000
L1	Inductor, Molded, 22 UH, 5%	0650000005
L2	Inductor, Molded, 6.8 UH, 5%	0659210002
L3	Choke, RF	5024030605
L4	Inductor, Molded, 2.7 UH, 5%	0652180001

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
L5	Choke, RF	5024030702
L6	Inductor, Molded, 2.7 UH, 5%	0652180001
L7	Inductor, Molded, 2.7 UH, 5%	0652180001
Q1	Transistor, NPN, Silicon 2N3866	0448140004
Q2	Transistor, NPN, Silicon 2N3866	0448140004
Q3	Transistor, NPN, Silicon PT6619	0448150000
Q4	Transistor, NPN, Silicon PT6619	0448150000
Q5	Transistor, NPN, Silicon, RF Power	0448170001
Q6	Transistor, NPN, Silicon, RF Power	0448170001
Q7	Transistor, PNP, Silicon 2N4249	0446780006
R1	Resistor, 10 ohm, 5%, 1/4 W	0177160004
R2	Resistor, 1 K, 10%, 1/2 W	0167480006
R3	Resistor, 82, 10%, 1/4 W	0184610001
R4	Resistor, 330 ohm, 5%, 1/4 W	0170910008
R5	Resistor, 330 ohm, 5%, 1/4 W	0170910008
R6	Resistor, 10 ohm, 5%, 1/4 W	0177160004
R7	Resistor, 10 ohm, 5%, 1/4 W	0177160004
R8	Resistor, 22 ohm, 10%, 1/4 W	0192690001
R9	Resistor, 300 ohm, 5%, 5 W	0161140009
R10	Resistor, 820 ohm, 10%, 1/2 W	0175600007
R11	Resistor, 1 K, 10%, 1/2 W	0167480006
R12	Resistor, 820 ohm, 10%, 1/2 W	0175600007
R13	Resistor, 1 ohm, 10%, 1/2 W	0194770001
R14	Resistor, 1 ohm, 10%, 1/2 W	0194770001
R15	Resistor, 1 ohm, 10%, 1/2 W	0194770001
R16	Resistor, 1 ohm, 10%, 1/2 W	0194770001
R17	Not Used	
R18	Resistor, 1 K, 10%, 1/2 W	0167480006
R19	Resistor, 3.3 K, 5%, 1/2 W	0184090008
R20	Resistor, 3.3 ohm, 10%, 1/2 W	0186050003
R21	Resistor, 50 ohm, 10%, 30 W	0193240009
R22	Resistor, 39 ohm, 10%, 1/2 W	0165920009
R23	Potentiometer, 10 ohm, 5%, 1/2 W, PC Mount	0346380006
R24	Resistor, 0.1 ohm, 10%, 15 W	0193360004
R25	Resistor, 470 ohm, 10%, 1/4 W	0172610001
R26	Resistor, 10 ohm, 10%, 2W	0163840008
R27	Resistor, 10 ohm, 10%, 2W	0163840008
R28	Resistor, 10 ohm, 10%, 2W	0163840008
R29	Resistor, 10 ohm, 10%, 2W	0163840008
R30	Resistor, 150 ohm, 10%, 1/4 W	0172730007
R31	Resistor, 5.1 K, 5%, 1/2 W	0183700007
R32	Resistor, 470 ohm, 10%, 1/4 W	0172610001

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R33	Resistor, 2.7 K, 10%, 1/4 W	0186670001
R34	Resistor, 2.2 ohm, 10%, 1/2 W	0178690007
R35	Resistor, 2.2 ohm, 10%, 1/2 W	0178690007
T1	Transformer Input	5024030401
T2	Transformer, Interstage	5024030508





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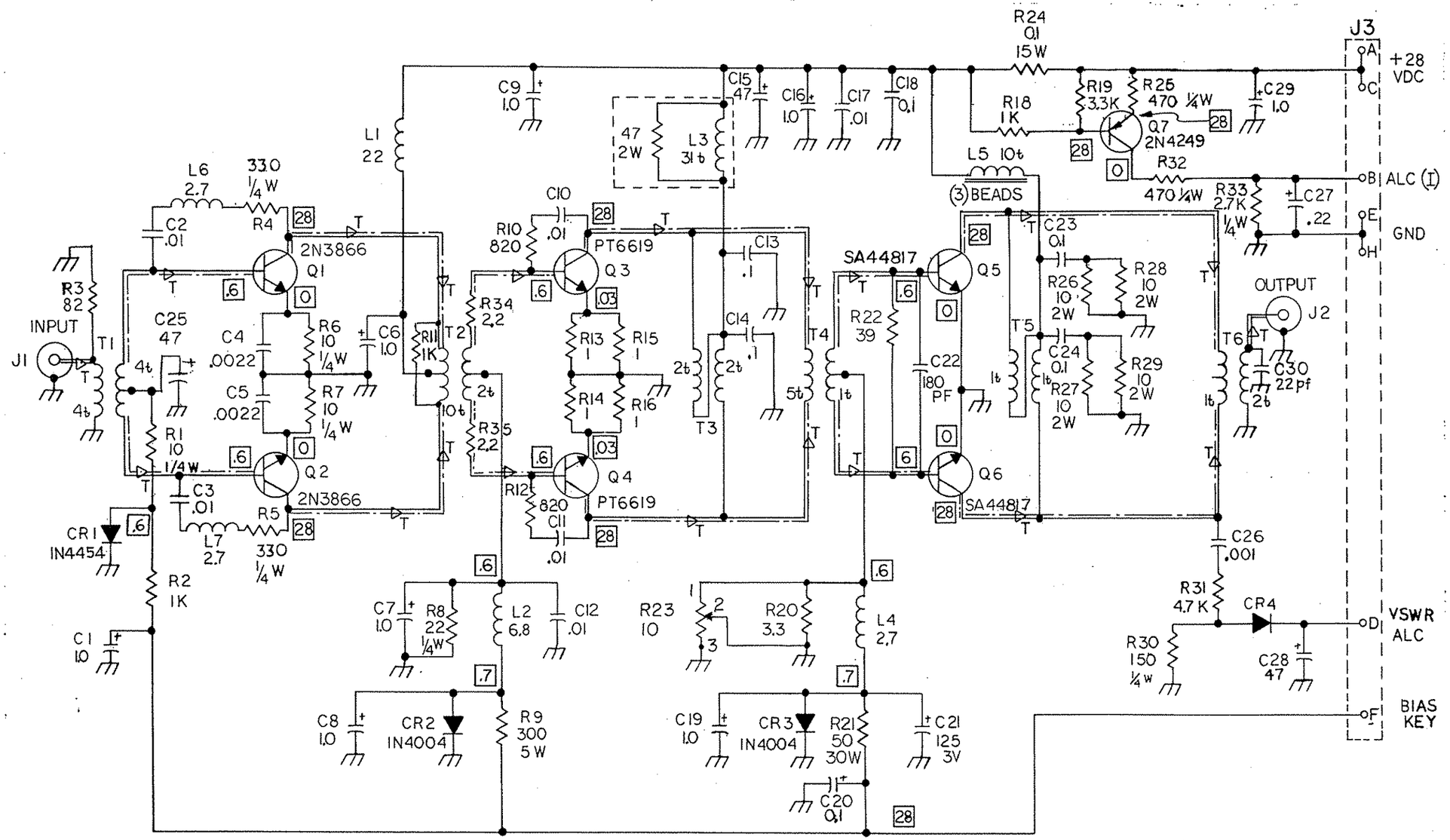


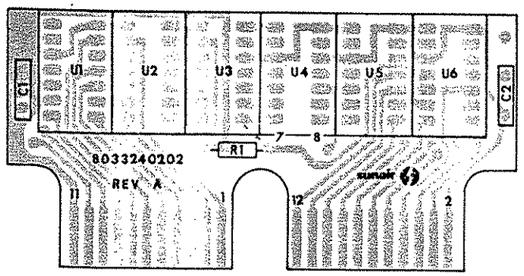
UNLESS OTHERWISE SPECIFIED:

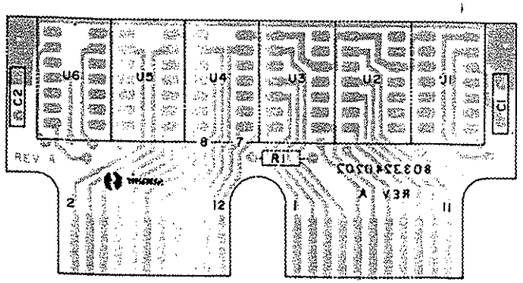
1. ALL—RESISTORS IN OHMS, 1/2 W
   —CAPACITORS IN μF
   —INDUCTORS IN μH
   =DIODES ARE IN4454
2. PREFIX ALL DESIGNATORS WITH "1A7A1"
3. UNUSED DESIGNATORS:
   R17
4. VOLTAGES ARE GIVEN WITH XMTR KEYED IN SSB AND NO MODULATION

Figure 5.25 RF Power Amplifier (1A2)

Display (2A2) Parts List

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Printed Circuit Board Display Assy, SCU-80	8033240091
C1	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C2	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
R1	Resistor, 120 ohm, 10%, 1/4 W	0186550006
U1	Diode, Led, 7 Segment, Hi Int.	1001260015
U2	Diode, Led, 7 Segment, Hi Int.	1001260015
U3	Diode, Led, 7 Segment, Hi Int.	1001260015
U4	Diode, Led, 7 Segment, Hi Int.	1001260015
U5	Diode, Led, 7 Segment, Hi Int.	1001260015
U6	Diode, Led, 7 Segment, Hi Int.	1001260015





Decoder (2A1) Parts List

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Decoder Assy, ASB-500	8033230096
C1	Capacitor, 68 UF, 15 V, T368	0296540005
C2	Capacitor, 100 UF, 20 V	0282230009
C3	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C4	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C5	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C6	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C7	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C8	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C9	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C10	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C11	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C12	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C13	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C14	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C15	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C16	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C17	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C18	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C19	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C20	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C21	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C22	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C23	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C24	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C25	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
C26	Capacitor, 0.01 UF, 50 V, W5R, 20%	0281730008
CR1	Diode, Signal, Sil., 1N4454	0405270003
CR2	Diode, Rectifier, 1N4004	0405180004
CR3	Diode, Signal Germ., 1N270	0405510004
CR4	Diode, Signal Germ., 1N270	0405510004
CR5	Diode, Signal Germ., 1N270	0405510004
CR6	Diode, Signal Germ., 1N270	0405510004
CR7	Diode Signal Germ., 1N270	0405510004
DS1	Lamp, Wire Term. T-1, Clear	0842330003
DS2	Lamp, Wire Term. T-1, Clear	0842330003
DS3	Lamp, Wire Term. T-1, Clear	0842330003
DS4	Lamp, Wire Term. T-1, Clear	0842330003
DS5	Lamp, Wire Term. T-1, Clear	0842330003
J1	Connector, PC, 16 Pin Male	8033235101
J2	Connector, PC, 5 Pin Male	8033235403
J3	Connector, PC, 14 Pin Male	8033235306
J4	Connector, PC, 14 Pin Male	8033235209
J5	Not Used	
J6	Not Used	
J7	Connector, PC, 12 Pin Female	0754760006
J8	Connector, PC, 12 Pin Female	0754760006
Q1	Transistor, UJT, 2N2646	0448340003
Q2	Transistor, NPN, Si., 2N4124	0448010003
Q3	Transistor, PNP, Si., MPS-A63	0448650002
Q4	Transistor, NPN, Si., 2N4124	0448010003
Q5	Transistor, NPN, Si., 2N4124	0448010003
Q6	Transistor, NPN, Si., 2N4124	0448010003
R1	Resistor, 10 K, 10%, 1/4 W	0170410005
R2	Resistor, 8.2 K, 10%, 1/4 W	0181620006
R3	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R4	Resistor, 2.2 K, 5%, 1/4 W	0178070009
R5	Resistor, 68 K, 10%, 1/4 W	0173520006
R6	Not Used	
R7	Resistor, 10 ohm, 10%, 1/4W	0177160004
R8	Resistor, 10 K, 10%, 1/4 W	0170410005
R9	Resistor, 1 K, 10%, 1/4 W	0171560001
R10	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R11	Resistor, 4.7 K, 5%, 1/4 W	0170770001
R12	Resistor, 5.6 K, 10%, 1/4 W	0183060008
R13	Resistor, 5.6 K, 10%, 1/4 W	0183060008
R14	Resistor, 5.6 K, 10%, 1/4 W	0183060008
R15	Resistor, 5.6 K, 10%, 1/4 W	0183060008
R16	Resistor, 5.6 K, 10%, 1/4 W	0183060008
R17	Resistor, 5.6 K, 10%, 1/4 W	0183060008
R18	Resistor, 5.6 K, 10%, 1/4 W	0183060008
R19	Resistor, 5.6 K, 10%, 1/4 W	0183060008
R20	Resistor, 5.6 K, 10%, 1/4 W	0183060008
R21	Resistor, 5.6 K, 10%, 1/4 W	0183060008
R22	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R23	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R24	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R25	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R26	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R27	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R28	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R29	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R30	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R31	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R32	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R33	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R34	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R35	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R37	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R38	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R39	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R40	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R41	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R42	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R43	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R44	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R45	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R46	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R47	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R48	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R49	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R50	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R51	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R52	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R53	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R54	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R55	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R56	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R57	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R58	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R59	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R60	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R61	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R62	Resistor, 120 ohm, 10%, 1/4 W	0186550006
R63	Resistor, 120 ohm, 10%, 1/4 W	0186550006
S1	Switch, Multiple Pushbutton	8033231009
S2	Switch, Multiple Pushbutton	
S3	Switch, Multiple Pushbutton	
S4	Switch, Multiple Pushbutton	
S5	Switch, Multiple Pushbutton	
U1	IC. Digital	0448560003
U2	IC. Digital	0448560003
U3	IC. Digital	0448560003
U4	IC. Digital	0448560003
U5	IC. Digital	0448560003
U6	IC. Digital	0448560003

8033230207C

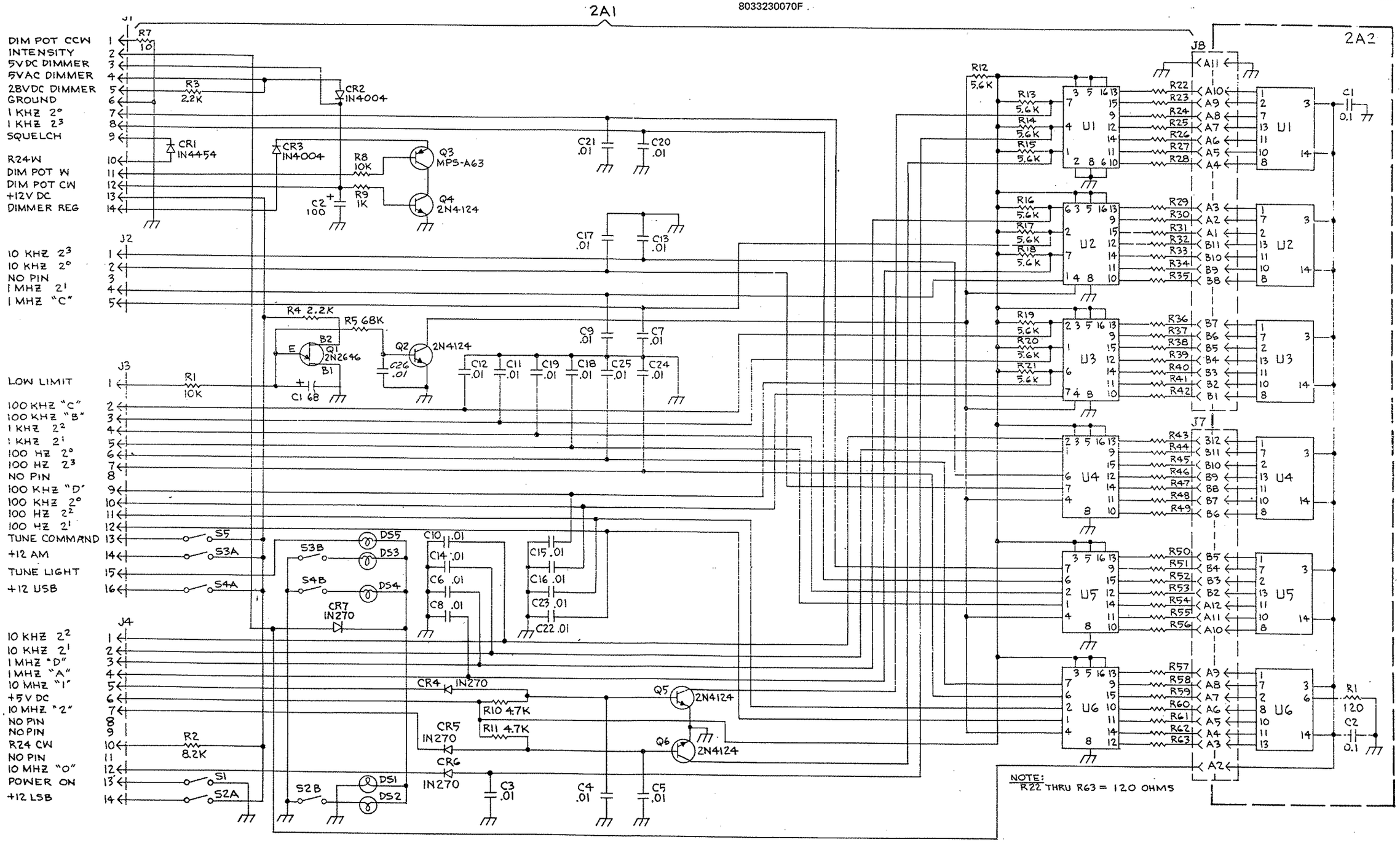


Figure 5.26 Decoder (2A1) and Display (2A2) Boards

8040400078A

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Chassis Assy, SCU-80	
C1	Capacitor, 1 UF, 35 V, 196D	0281660000
C2	Capacitor, 0.1 UF, 50 V, X7R, 20%	0281610002
C3	Capacitor, 100 UF, 20 V	0282230009
C4	Capacitor, 100 UF, 20 V	0282230009
CR1	Diode, Zener 1N5339B	0405530005
CR2	Diode, Rectifier 1N4004	0405180004
Q1	Transistor, NPN, SI MJE521	0448610001
R23	Potentiometer, 5K, 20%, 1/2 W W/Std. Hdw.	0346710006
R24	Potentiometer, 5K, 20%, 1/2 W W/Std. Hdw.	0346710006
R25	Resistor, 330 ohm, 10%, 1/2 W	0173380000
R64	Potentiometer, 500 ohm, 1/2 W, 10%, 1 Turn	1000080013
U1	Integrated Circuit, Linear LM340T5	0448600005

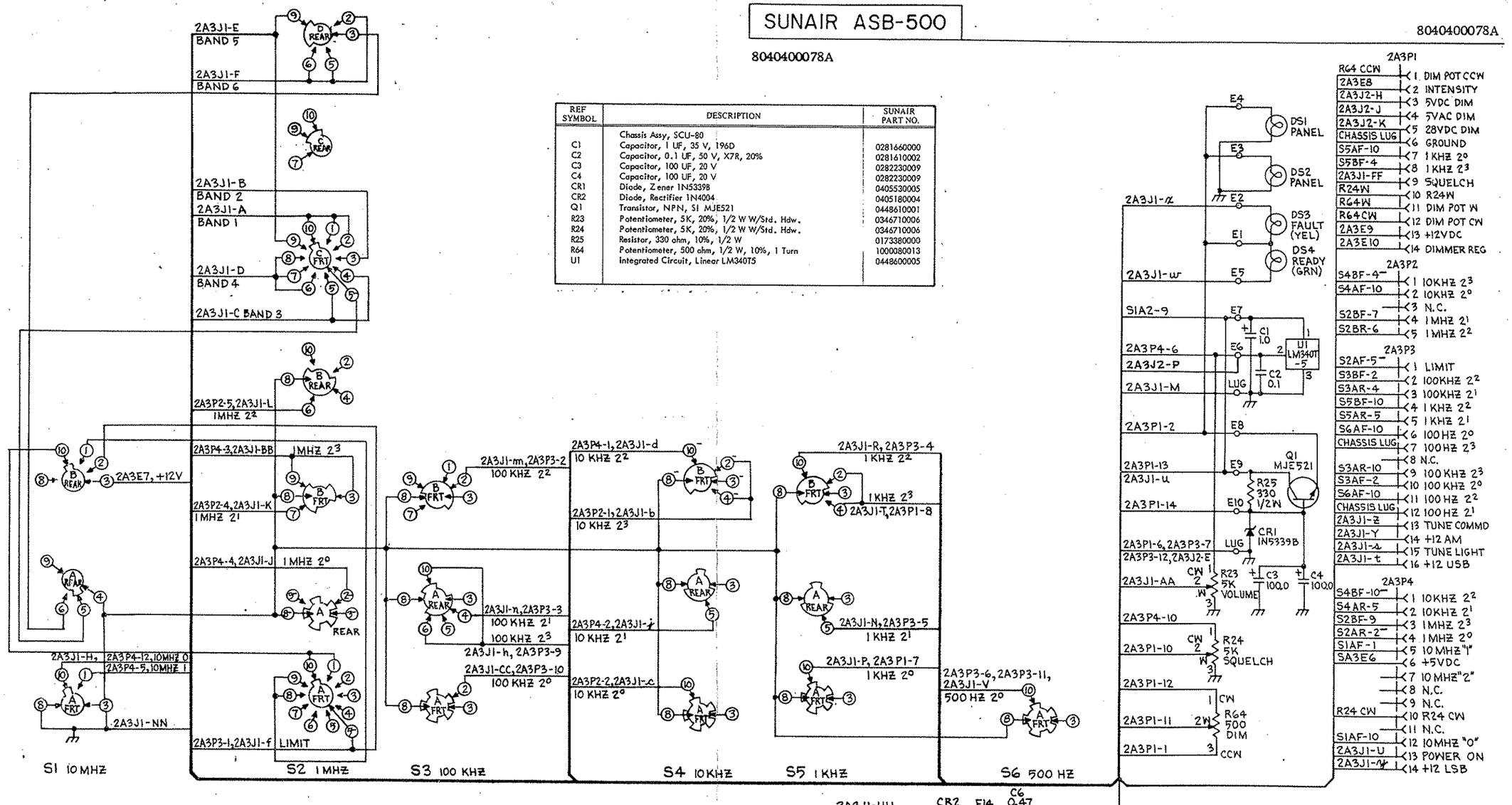


Figure 5.27 Remote Control Head (2A) Wiring Diagram

ACU-150D SUPPLEMENT

TO ASB-500

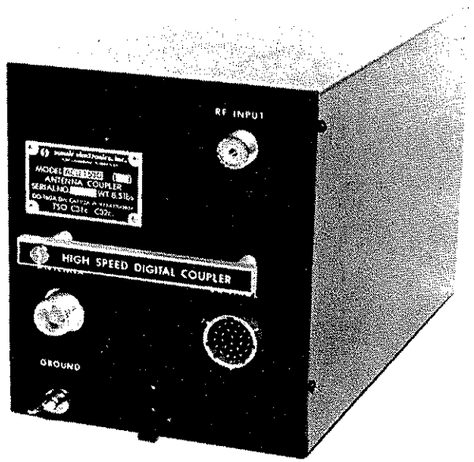
OPERATION AND MAINTENANCE MANUAL

P/N 8040000700

AND

INSTALLATION AND OPERATION MANUAL

P/N 8040000718



ACU-150D

DIGITAL AUTOMATIC ANTENNA COUPLER

1 NOVEMBER 1985

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SECTION I

GENERAL INFORMATION

1.1 SCOPE

This manual contains information necessary to install, operate, maintain and repair the ACU-150D High Speed Digital Antenna Coupler.

1.2 DESCRIPTION

See Figure 1.1

1.2.1 GENERAL

The ACU-150D is a high quality remotely controlled antenna coupler, capable of matching a wide variety of antennas over the frequency range of 2.0000 to 17.9999 MHz. The unit is designed for use with the ASB-500 system.

Operation of the ACU-150D requires only the initiation of a "TUNE" command. When tuning has been completed (minimum VSWR of the antenna at the selected frequency), the green XMIT/READY Lamp on the control panel indicates the transceiver is ready for use. The ACU-150D continuously monitors the antenna VSWR when transmitting. If the antenna becomes detuned during operation (VSWR exceeds 2.0:1), the TUNE/FAULT Lamp will light on the control panel and the operator repeats the tune cycle.

1.2.2 ASSEMBLIES

1.2.2.1 Chassis Assembly 3A1

Provides the required mounting surfaces for the various electrical and mechanical components. The Motherboard 3A1A1 serves as the interconnect for all assemblies.

1.2.2.2 Computer Board 3A2

This assembly contains the microprocessor responsible for the operations and functions of the ACU-150D.

1.2.2.3 Comparator Board 3A3

This assembly contains the analog interface circuitry used to process the detector inputs to the microprocessor.

1.2.2.4 Detector/Pad Assembly 3A4

The Detector Assembly 3A4A1 contains the magnitude, phase and VSWR detectors. The Pad Assembly 3A4A2 plugs into the Detector Assembly and protects the transmitter from impedance variations during the tuning cycle.

1.2.2.5 RF Assembly 3A5

The two boards comprising the RF Assembly are the RF Input Board 3A5A1 and the RF Output Board 3A5A2. The boards contain all of the binary variable elements in the antenna matching network.

1.3 SPECIFICATIONS

1.3.1 GENERAL

FREQUENCY RANGE: 2.0000 to 17.9999 MHz

RF INPUT POWER: 100 Watts PEP

INPUT IMPEDANCE: 50 ohms, non-reactive

DUTY CYCLE: Continuous

TUNING TIME: Typically 2.5 seconds first tune, 1.0 seconds or less from memory

TUNE POWER REQUIRED: 25 Watts RF delivered

TUNE ACCURACY: 1.2:1 VSWR Typical

REMOTE CAPABILITY: Up to 250 ft. from transmitter

POWER INPUT: 27.5VDC + 10%-20%, 1 amp maximum

WEIGHT: 8.5 lbs (3.825 kgs)

SIZE: (INCHES) 6.88H X 5.80W X 12.11D
(CM) 17.48H X 14.73W X 30.75D

1.3.2 ENVIRONMENTAL

TEMPERATURE: Operating: -55°C to +70°C (RTCA/DO-160A Category B)

HUMIDITY: +95% at +50°C (RTCA/DO-160A Category A)

SHOCK: 6G in all planes, 15G crash safety

VIBRATION: 0.20" DA, 5 Hz to 14 Hz
0.02" DA, or 2G peak, 14 Hz to 44 Hz
3G peak, 44 Hz to 2 KHz
(RTCA/DO-160A Category J & Y)

ALTITUDE: 35,000 ft. (RTCA/DO-160A Category C)

1.4 EQUIPMENT SUPPLIED

	SUNAIR PART NUMBER
High Speed Digital Antenna Coupler, ACU-150D	8064200296
Installation Kit	8064200598
Mounting Plate Assembly	8064202591
Installation and Operation Manual	8064200407

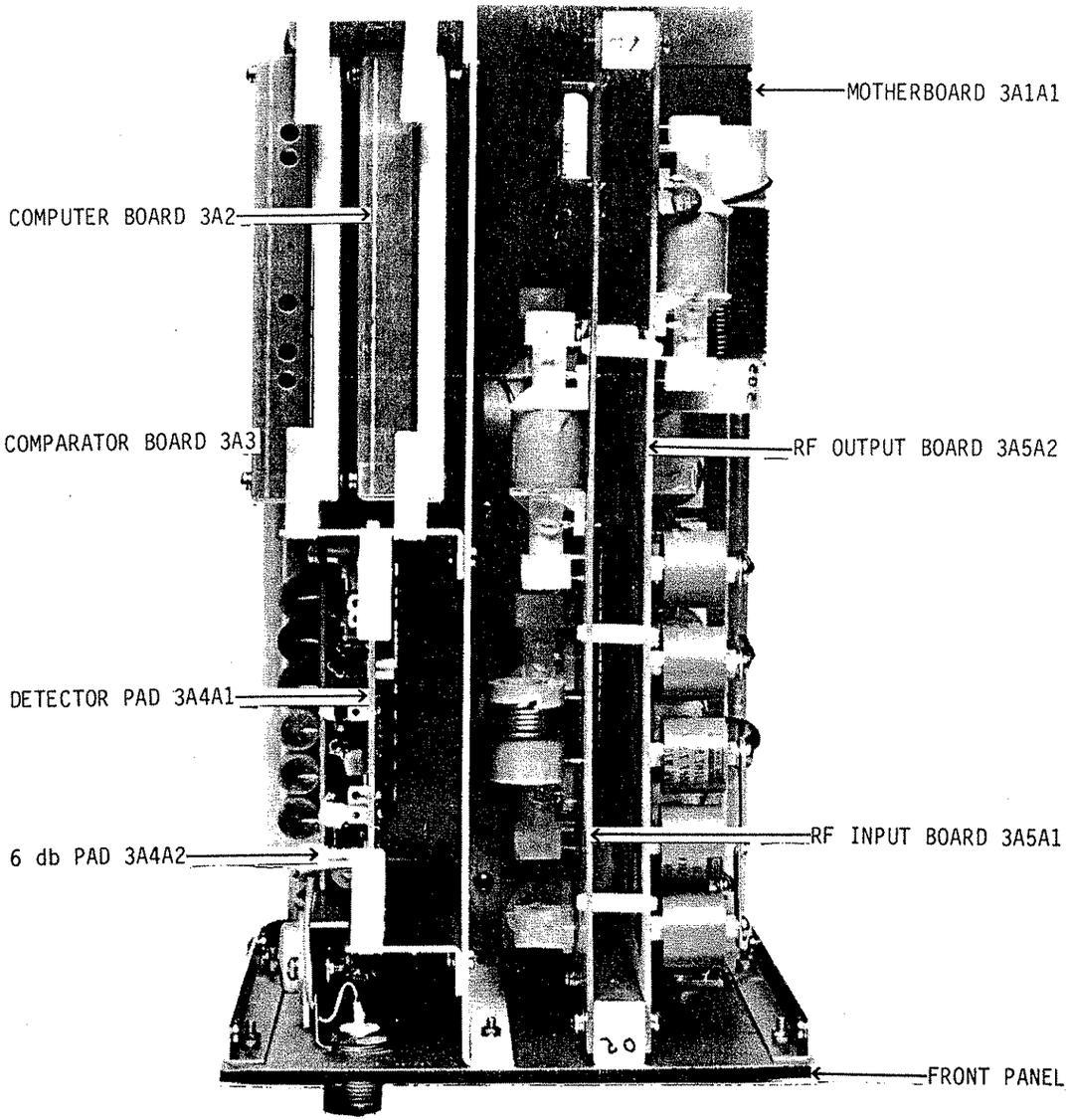

FIGURE 1.1 ACU-150D MAJOR ASSEMBLY LOCATIONS

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SECTION II

INSTALLATION

2.1 POWER REQUIREMENTS

The ACU-150D is designed to operate from a nominal 27.5 VDC +10%-20% source. The input 27.5 VDC should be supplied by the companion transceiver so the antenna coupler power will be turned off when the transceiver is turned off.

2.2 INSTALLATION CONSIDERATIONS AND MOUNTING INFORMATION

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

IMPORTANT INSTRUCTIONS

a) Carefully plan the antenna installation to minimize the length of wire between the coupler output and the antenna itself. This lead should be kept as short as physically possible. Six inches or less is optimum, the wire inside the aircraft is a part of the antenna, but will radiate inside the fuselage, not outside. This energy may cause interference with other electronic equipment in the vicinity. This interference can often be reduced by using high voltage coaxial cable such as RG-8/U, between the coupler and the antenna feedthrough. The coax must be kept short because coax lengths longer than three feet can cause large losses, particularly at the antenna resonant and anti-resonant frequencies, when VSWR exceeds 10.

NOTE

Installation of the Antenna Coupler must conform to the Altitude-/Temperature restrictions detailed in the equipment specifications.

b) The installations should be carefully planned beforehand.

2.3 GROUNDING REQUIREMENTS

2.3.1 GENERAL

It is very important that the mounting plate be securely connected to the aircraft frame. The radiation resistance of some aircraft antennas is quite low, sometimes less than one ohm at the lower frequencies. In order not to decrease the efficiency, the coupler must be securely bonded to the aircraft such that the resistance readings should be in the order of one milliohm or less from the aircraft frame to the ground portion of the antenna RF output connector, 3A1J3.

2.4 CABLE FABRICATION

2.4.1 USE OF COAX BETWEEN 3A1J3 (ANTENNA COUPLER OUTPUT) AND THE ANTENNA

As stated previously in paragraph 2.2, the use of a coax should be avoided, if possible, for maximum system efficiency. If coax must be used, it should be as short as possible. The loss introduced by the coax is directly related to the antenna impedance, particularly the real part. Maximum coax loss will generally occur when the antenna impedance is high and crossing from inductive to capacitive or from capacitive to inductive.

2.4.2 GENERAL

The cables must be wired to their appropriate connections as shown in the Interconnect Wiring Diagrams.

All cables are available from Sunair. Since the wiring must be routed to various locations in the aircraft instrument panel, the installer should fabricate this cable using standard aircraft in-

stallation practices. Figure 2.1 illustrates the method of fabricating the control cable connector. If the transceiver is located adjacent to the ACU-150D it may not be practical to use cable 8040007003. In this case, any cable used should be shielded, with the shield grounded on both ends.

2.4.3 CHECKS AFTER FABRICATION

Each cable should be checked after fabrication. The control cable should be checked for pin to pin continuity and for shorts to other pins. The RF cables should be checked for continuity and shorts.

2.5 CHECKS AFTER INSTALLATION

1. Select a frequency in the 2 to 3 MHz range. Set MODE switch to AM position.

2. Upon initial power on, the FAULT Lamp will come on.

3. Depress the TUNE Pushbutton.

4. The TUNE/FAULT Lamp will be on.

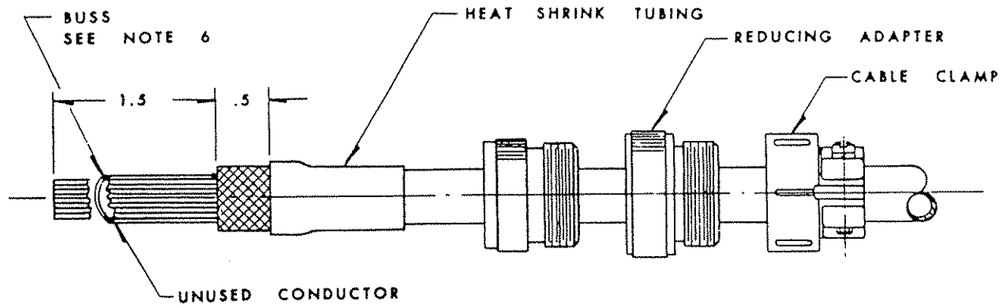
5. After a short delay (7 sec. max) the TUNE Lamp will extinguish and the READY Lamp will come on.

6. Select a frequency in the 12 to 18 MHz range. Depress the TUNE Pushbutton. When the READY Lamp illuminates, key the MIC in AM mode and check for a fault.

7. Return to the first frequency tuned in step (1). Key the MIC in AM mode. The coupler status lights will show FAULT/TUNE, then READY rapidly.

8. Remove the RF coaxial cable from the transceiver RF connector. Depress the TUNE Pushbutton. After approximately 7 seconds, the FAULT Lamp will illuminate. Key the MIC. The transceiver will not transmit.

9. Replace the RF coaxial cable on the transceiver and depress the TUNE Pushbutton. When the READY Lamp comes on, the system is checked out and ready for use.



INSTRUCTIONS

1. Strip outer rubber covering back from end of cable as shown.
2. Pull braid back over outer rubber covering. Pull braid tight to make smallest diameter of cable.
3. Slide cable clamp and reducing adapters over cable as shown.
4. Put heat shrink tubing over end of braid as shown.
5. Check to be sure cable clamp will slide over heat shrink tubing braid. The two clamps on the cable clamp should clamp over the exposed braid to provide a ground for the shield.
6. Any unused conductors should be tied together with a small buss wire and soldered to outer braid at one point. Make sure clamp will pass over braid.
7. CAUTION: If 8040007003 is used, care should be exercised to avoid use of excess heat on the braid to prevent melting the inner conductor insulation. (Conductor insulation is PVC.)
8. Strip 1/8" of insulation off conductors to be soldered in connector.
9. Solder wires into connector.
10. Screw adapter into connector. Slide cable clamps up cable and tighten clamps on exposed braid.
11. If Sunair part number 8040007003 is not used, be sure to check O.D. of cable to be used to be sure it will fit through I.D. of cable clamp.

FIGURE 2.1 CABLE FABRICATION

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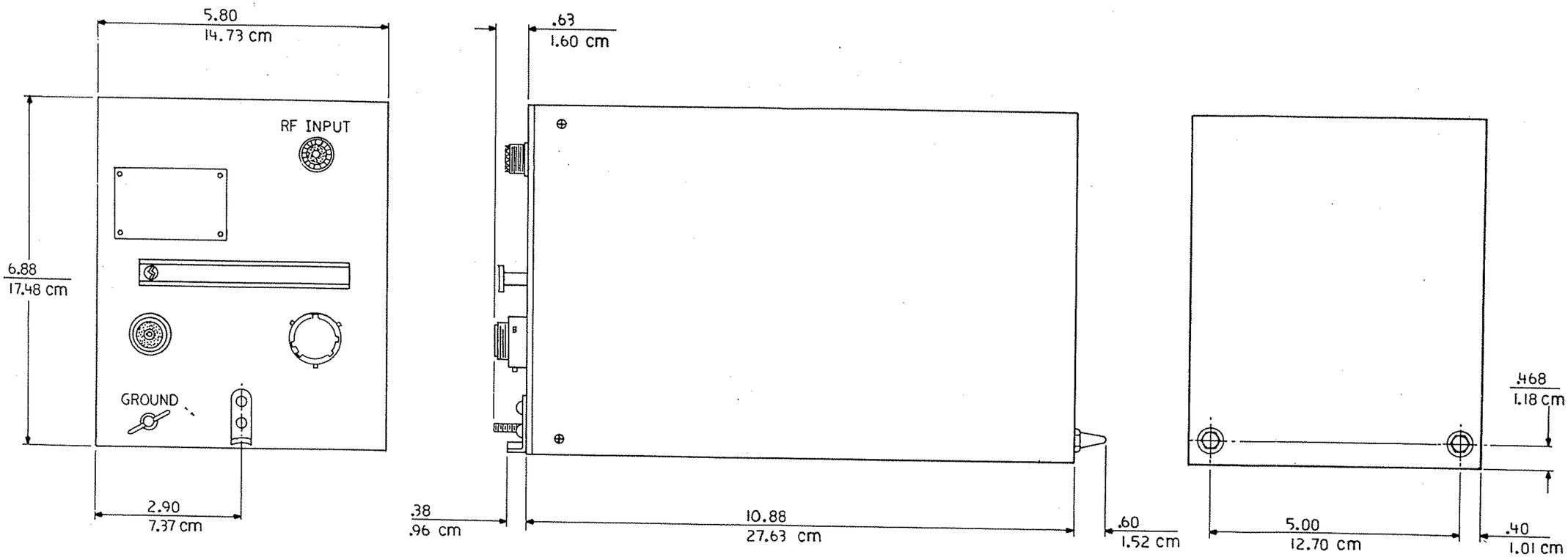
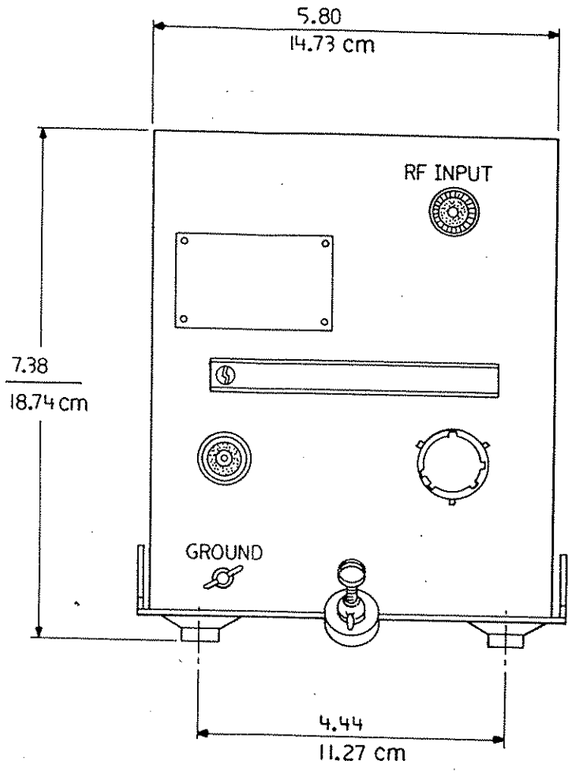
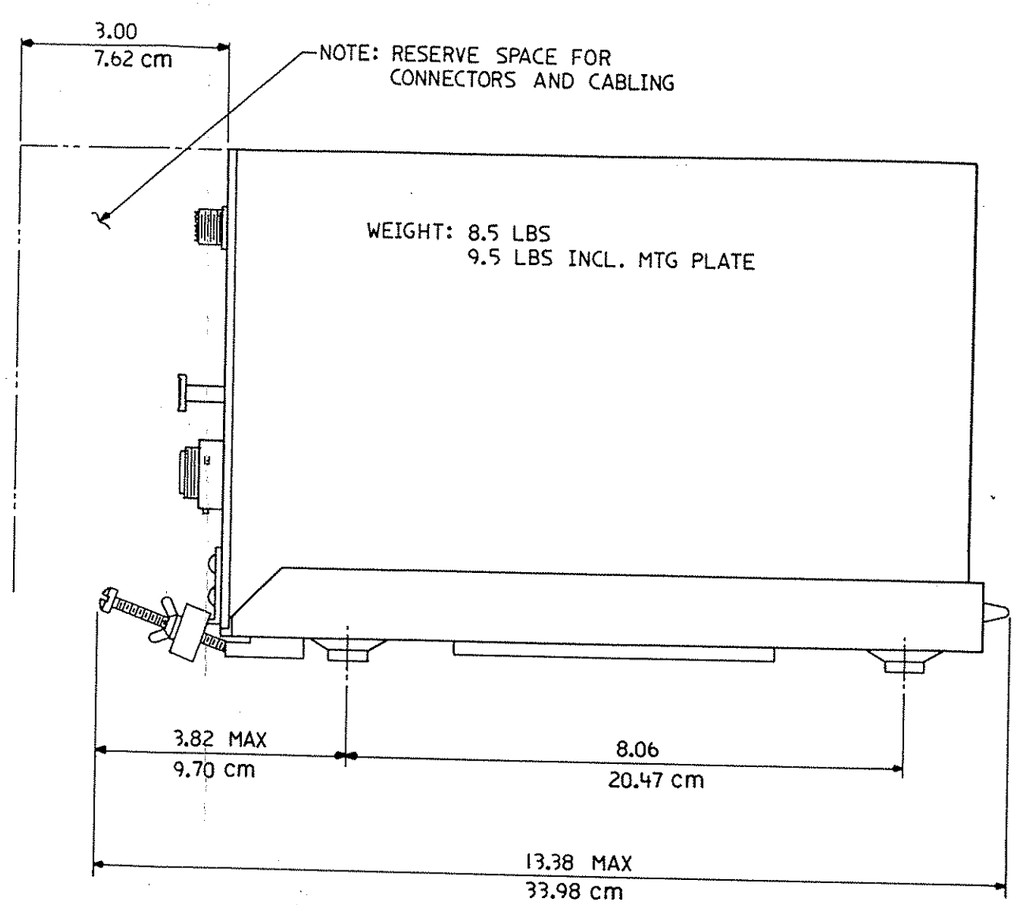


FIGURE 2.2 OUTLINE DIMENSIONS, ACU-150D

8064001609A





SECTION III

OPERATION

3.1 GENERAL

This section contains information concerning the proper operation of the ACU-150D High Speed Digital Antenna Coupler.

3.2 COUPLER CONTROLS/INDICATORS

The controls and indicators for the ACU-150D are contained on the ASB-500 system's control head, the SCU-55.

TUNE PUSHBUTTON

a) Initiates a tune cycle.

b) Illuminates during a tune cycle.

TUNE/FAULT LAMP

This lamp is illuminated for the following conditions:

a) STEADY: When the transceiver is initially turned on.

b) MOMENTARY: Illuminates for a moment when returning to a previously tuned frequency.

c) When a tune cannot be properly achieved. (Approximately 7 seconds after initiation of TUNE).

XMIT/READY LAMP

This lamp is illuminated after a tuning cycle has been completed.

3.3 CHECK OUT PROCEDURES

See Checks After Installation Section 2.5.

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SECTION IV

THEORY OF OPERATION

4.1 GENERAL

The ACU-150D is a fully automatic high speed digital antenna coupler designed for use with the Sunair ASB-500 System. The coupler is rated for 100 Watts PEP and will "tune" airborne antenna systems. This unit is designed as a replacement for the Sunair ACU-150A analog servo antenna coupler. The ACU-150D tune cycle can be initiated either by depressing the TUNE Pushbutton located on the SCU-55 Control Head (ASB-500 Transceiver Control Head), or automatically, upon the detection by the ACU-150D electronics of a VSWR condition of 2:1 lasting for 100 ms to 200 ms or greater.

Automatic retuning of the ACU-150D is limited to a single automatic tune cycle, preventing continuous automatic tune cycling when presented with a defective antenna. Depressing the TUNE Pushbutton on the SCU-55 Control Head will reset the ACU-150D and initiate a new tune cycle.

Upon initial application of power to the ACU-150D (via the ON/OFF power switch of the SCU-55), the yellow FAULT Lamp on the SCU-55 Control Head will illuminate and remain illuminated until a tune cycle has been initiated. (This tune cycle can be initiated either by depressing the SCU-55 TUNE Pushbutton or automatically via VSWR detection. It should be noted here that detection of a VSWR 2.0:1 or greater can only be detected when the transmitter is keyed and a minimum of 25 watts of RF power is exciting the ACU-150D detector circuits). Upon completion of the tune cycle and a successful tune, the TUNE Pushbutton Lamp extinguishes and the green READY Lamp illuminates. NOTE: With the exception of initial power application, illumination of the yellow FAULT Lamp indicates the coupler is prevented from automatic retuning, so the SCU-55 TUNE Pushbutton must be used to initiate a tune.

After a change to a new (or different) frequency, the SCU-55 Control Head green READY Lamp will remain illuminated. This is a false READY indication as the ACU-150D Antenna Coupler which generates the signal for the green READY Lamp has no way of knowing the transmit/receive frequency was changed.

If the SCU-55 Control Head TUNE Pushbutton is depressed following the change to a new transmit/receive frequency, then, the green SCU-55 READY Lamp will extinguish, the TUNE Pushbutton Lamp will illuminate and the ACU-150D will enter a tune cycle. If the SCU-55 Control Head TUNE Pushbutton is not depressed following the operating frequency change, then one of the following events will occur:

a. If in AM mode of operation, the ACU-150D Antenna Coupler will detect a VSWR fault upon keying of the transmitter, and the Antenna Coupler will enter a tune cycle.

b. If in SSB mode of operation, the ACU-150D will detect a VSWR fault and enter the tune mode at the beginning of the first voice transmission.

c. In some cases, the green READY Lamp will remain lit and the coupler will not go through a tuning cycle. This may occur if the frequency change is small, or if the antenna impedance presented at the new frequency falls within the VSWR window, and no retune is required.

Completion of a successful tune is indicated by illumination of the green READY Lamp. The FAULT Lamp also provides an indication that the coupler is not correctly tuned and a tune command must be initiated.

Memory is provided within the coupler for ten "last-tuned" channels. This memory

will be retained in the coupler for as long as the coupler is on. Whenever the FAULT Lamp is illuminated, the coupler is automatically placed into a "bypass" mode with RF input tied directly to the antenna terminal.

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 ACU-150D is shown in Figure 4.1.

The input capacitor bank, located on the RF Input Board 3A5A1 (Figure 5.8) consists of C1 through C36, and provides binary stepped values from 0 to 10,276pf. The series inductor bank, located on the RF Input Board and RF Output Board 3A5A2 (Figure 5.9) and consisting of L1 through L10 provides binary stepped values from 0 to 21.25uh. The output capacitor bank, located on the RF Output Board consisting of C65 through C69 provides binary stepped values from 0 through 450 pf. The series phase correcting capacitor C70 located on the RF Output Board, provides 75 pf of series capacitance.

4.3 DETECTOR/PAD ASSEMBLY 3A4

Refer to Figure 5.7

4.3.1 GENERAL

The Detector/Pad Assembly contains the magnitude discriminator, the phase discriminator, the forward and reflected power detectors (Directional Wattmeter), 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 (TP1) voltage less than the +5 VDC reference voltage (TP2). For a magnitude less than 50 ohms, an output greater than the +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 U1B on the Comparator Board Assembly 3A3, Figure 5.6. Note that the output of the magnitude discriminator is floating and is referenced to +5 VDC, not ground. So all measurements of the magnitude discriminator must be referenced to +5 VDC (TP2).

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 measured at TP3 is nulled (with respect to +5 VDC, TP2) 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 U1A on the Comparator Board Assembly 3A3.

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 measured at TP4 which is 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 transmitter. 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 measured at TP5 which is 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 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 Voltage Standing Wave Ratio (VSWR). The VSWR is used as an indication of the quality of the "tune" and is acceptable for values of 2:1 or better. If the VSWR exceeds 2:1, the FAULT Lamp will be illuminated, indicating that a tune command is required.

4.3.5 6 db ATTENUATOR PAD

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 transmitter whenever the VSWR is greater than 2:1, and the transmitter is keyed. The pad provides protection for the transmitter by limiting the impedance variations placed on the transmitter during the tuning cycle. When a satisfactory tune has been accomplished, the READY Lamp will come on and the pad is switched out of the circuit, allowing full transmit power to reach the antenna.

The Resistive Pad Subassembly 3A4A2, resistors R1 through R6, plugs into the Detector Board 3A4A1 to make up the Detector/Pad Assembly 3A4.

4.3.6 TUNE RELAY

The tune relay, K2, is energized by the microprocessor following receipt of a tune command from the transceiver. It grounds the transceiver keyline interlock line, putting the transceiver in transmit mode, disables the keyline, and supplies a +28 VDC signal to the transceiver. When the tune cycle has been terminated, the tune relay is de-energized allowing normal keyline operation.

4.4 COMPARATOR BOARD 3A3

Refer to Figure 5.6

4.4.1 GENERAL

The Comparator Board 3A3 contains the analog interface circuitry used to process the detector outputs for use by the Computer Board 3A2. The Comparator Board consists of integrated circuits U1 through U4, Q1, Q2, and their associated circuitry.

4.4.2 PHASE DISCRIMINATOR INTERFACE

The phase discriminator interface consists of U1A, U2A, U2B, U4A and U4B. The phase discriminator output is compared with the +5 VDC reference voltage for magnitude and polarity in U1A. Potentiometer R6 determines 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 (3A4) is positive, U1A output is positive, U2A output is positive and U4A output is a low signal (ground), so a Low signal is sent to the Computer Board 3A2 on the >+20° line. Similarly if the phase is negative and less than 20 degrees, an output from U1A, U2B and U4B sends a Low signal to the Computer Board 3A2 on the <-20°line. Comparators U2A and U2B are used in conjunction with Schmitt triggers U4A and U4B to provide a toggle action to the phase commands, stabilizing the threshold limits. When the detected phase angle is within +/- 20° of 0°, both the >+20° and <-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 U1B, U2C, U2D, U4C and U4D. The discriminator output is compared with the +5 VDC reference for magnitude and polarity, in U1B. Potentiometer R19 sets 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 at the input of the Comparator Board 3A3 giving a Low on the >60 ohm line to the Computer Board 3A2. The unaffected comparator, U2C in this case, provides a Low output to U4C, which in turn supplies a High on the <40 ohm line. This way, only one output at a time may be Low, but both may be High, indicating to the Computer Board 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 U4C to the <40 ohm line to the Computer Board 3A2.

4.4.4 "RF PRESENT" DETECTOR

Transistor Q2 acts as a switch to provide a Low to the Computer Board 3A2 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 3A4. In order for the Computer Board to continue its tuning program, the RF line must be held Low.

4.4.5 VSWR COMPARATOR

Comparator U3A compares the relative magnitude of the forward and reflected power detectors to compute the VSWR. U4E will trigger when the computed VSWR exceeds 2:1. Potentiometer R43 sets the trigger level threshold of U4E. Diode CR7 provides a reference to keep the VSWR line High between transmit speech pauses, to keep the READY and FAULT Lamps from blinking. Diode CR8 isolates the base circuit of Q2 from the voltage supplied by CR7. Diode CR10 isolates the reflected power detector on the Detector/Pad Assembly 3A4 from voltages generated by U13A circuitry.

4.4.6 REFERENCE VOLTAGE SOURCES

Voltage regulators U5 and U6 provide +5 VDC and +10 VDC respectively for use by the operational amplifiers and voltage comparators. Since plus and minus sensing is required, U1 and U2 are "ground" referenced to +5 VDC (TP2).

Potentiometer R29 adjusts the output voltage of regulator U5 on pin 3 (TP2) to +5 VDC. Potentiometer R32 adjusts the output voltage of regulator U6, pin 3 to approximately 10 VDC (see section 5.3.3 and 5.3.7 for setting of the 10 VDC refer-

ence voltage). Zener diode CR9 drops the voltage to the regulators from the supplied +28 VDC, to minimize power dissipation in the regulators.

4.4.7 TUNE RELAY LATCH

A positive pulse from the transceiver turns Q1 on, pulling in the tune relay (3A4K2), and telling the Computer Board 3A2 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.

4.5 COMPUTER BOARD 3A2

Refer to Figure 5.5

4.5.1 GENERAL

The microprocessor circuit on the Computer Board is the "brains" of the ACU-150D. 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 memory. Included in this section are the microprocessor U1, the address decoder U2 and U8, the address latch U3, the PROM U4, the RAM-I/O U5, the output ports U6, U7, element drivers U9, U10, U11, U12, and crystal oscillator circuit U13.

4.5.2 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 instructs 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 instructs the pad and tune relays to drop out, and illuminates the green READY Lamp on the Control Head SCU-55. U1 remains active at all times when power is applied and continuously monitors the VSWR. If following a good tune condition, the antenna load should change for any reason, U1 will initiate a retune cycle to correct the mismatch. If a load cannot be tuned or a coupler failure occurs, the FAULT Lamp will be illuminated. The coupler is also placed in a bypass mode (straight connection between the input and the antenna) whenever the FAULT Lamp is on. This prevents loss in the receive path, should a coupler fault occur. If the fault condition is only temporary, it may be cleared by depressing the TUNE Pushbutton on the Control Head. When power is initially applied, the FAULT Lamp is automatically illuminated, indicating that the status of the coupler to the selected frequency is unknown. A TUNE command to the coupler is required to clear the initial FAULT Lamp.

Crystal Oscillator U13 establishes the clock frequency for U1. Q1, R5, C50, R7 and R8 form a power-on reset network to assure correct initialization of U1 upon application of power.

4.5.3 ADDRESS DECODER U2

The address decoder consists of U2 and OR gates U8A and U8B. These circuits take address codes supplied by U1 on A8-A15 and uses them to enable the PROM U4, the RAM/IO/Timer U5, and the output latches U6 and U7. U1 uses the address decoder circuit to enable the proper device when it needs to transfer information.

EXAMPLE: The software in U4 requires the VSWR status information to be sampled periodically. In order to do this U5 must be addressed. U1 places an address on A8-A15 which causes Y1 pin 14 of U2 to go Low. With Y1 Low, U1 issues a Low

read pulse on the $\overline{RD}$ line, which is connected to U5 pin 9. This Low enables the transfer of VSWR static information from the inputs of U5 to the DATA BUS. Once on the bus, U1 will proceed to process the information.

4.5.4 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. Each time U1 produces address information to the inputs of U5 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 PROM 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.

4.5.5 PROGRAMMABLE READ ONLY MEMORY (PROM) U4

The PROM 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 A8-A15 is sent to the PROM 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 $\overline{RD}$ line pin 32. U1 collects the instruction from the DATA BUS, analyzes it, then acts on the directions provided.

4.5.6 INPUT PORTS

Integrated circuit U5 contains all the input ports to the microprocessor system. Through these ports, the microprocessor U1, can call up information, giving it the status of the phase and magnitude discriminators, and the VSWR detector.

4.5.6.1 U5, Magnitude and Phase Inputs

There are six signals coming into integrated circuit U5: >+20°, <-20°, >60 ohm, <40 ohm, VSWR and TUNE Command. Signals >+20°, <-20° are the magnitude discriminator interface outputs (refer to Sections 4.3.2 and 4.3.3). These four signals direct U1 through the tuning algorithm program stored in the PROM U4. A Truth Table for these signals follows.

The VSWR signal coming into U5 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. The VSWR is also sampled by U1 during transmissions. If the VSWR line into U5 goes Low for more than 100ms a retune is initiated by U1.

TUNE signal into U5 is sampled by U1 and when a High is detected on this line U1 initiates a tune cycle.

4.5.7 OUTPUT PORTS

The Output Ports U5, U6 and U7 are used in conjunction with element drivers U9, U10, U11, and U12, to energize the appropriate relays or lamps.

To understand how U1 performs an output operation, consider what is involved in turning on the READY Lamp. 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 AD4 pin 16. U1 also issues a short duration Low going write pulse on the $\overline{WR}$ 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 Lamp/Relay Driver U2 illuminating the READY Lamp on the Control Head SCU-55.

	U5 PIN 1 > 60 ohm	U5 PIN 39 < 40 ohm
*Illegal	0	0
> 60	0	1
< 40	1	0
In the window	1	1

*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.

TABLE 4.1 MAGNITUDE DISCRIMINATOR TRUTH TABLE

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

** 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.

TABLE 4.2 PHASE DISCRIMINATOR TRUTH TABLE

4.5.8 TIMER

The timer resides within U5 and, in conjunction with U1, acts as a stop watch beginning at the initiation of the TUNE command. It is programmed to stop the microprocessor program and turn on the FAULT Lamp if a satisfactory tune is not accomplished within 7 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 Lamp is illuminated.

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 7 seconds, then illuminates the FAULT Lamp. If a proper tune is achieved, U1 stops sampling the timer out signal, which is continuously issued by U5, and illuminates the READY Lamp.

4.5.9 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/$\overline{M}$ line, the code it wants stored in RAM on the AD0-AD7 lines and a Low going write pulse on the $\overline{WR}$ line.

Also the RAM has the capacity to remember the last ten "tunes", so if a previous frequency is repeated, the tuning data already exists in memory, and is extracted first, rather than requiring a complete tuning cycle. Tunes obtained in this manner typically take less than 300 msec. When the "ten last tuned" memory is filled, the next new tune information will be stored in the #1 memory location, all previous data will move up one memory location, and the data previously stored in memory location #10 will be dropped. Whenever a TUNE command is initiated from the Control Heads's TUNE Pushbutton, the ten last tuned channels are polled first, before the coupler begins a tuning cycle. If a retune is called for, i.e. a FAULT condition following a previous READY, the 10 channels are bypassed and the coupler is forced to retune.

4.6 CHASSIS ASSEMBLY 2A1

4.6.1 GENERAL

The Chassis Assembly contains the RF Assembly 3A5 and the Motherboard 3A1.

4.6.2 RF ASSEMBLY 3A5

4.6.2.1 General (Refer to Figures 5.8 and 5.9)

a) RF Input Board 3A5A1 (Figure 5.8)

The RF Input Board contains input capacitors C1-C36, L1-L6 and their respective switching relays.

b) RF Output Board 3A5A2 (Figure 5.9)

The RF Output Board contains inductor L7-L10 output capacitors C65, C66, C67, C68, C69 and C70 and their respective switching relays.

4.6.2.2 Theory of Operation

The two 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 "PI". 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 10276 pf (C1 through C36), selected in a binary progression, and is available in

.02 uh steps from 0 to 21.265 uh. The output capacitance, C65 through C69, is also a binary progression and furnishes values from 0 to 450 pf in 50 pf steps. The output series capacitor, C70, is selected whenever the initial load phase angle is positive.

The switching relays are high speed, where on or off transitions are made in approximately one millisecond. This allows the microprocessor to make decisions very rapidly, providing extremely fast tuning time, typically less than one second.

4.6.3 MOTHERBOARD 3A1

(Refer to Figure 5.4)

The Motherboard serves as an interconnection plane between the RF Assembly 3A5, the Computer Board 3A2, the Detector/Pad Assembly 3A4 and the coupler front panel. Transistor Q1 grounds the TUNING line during a coupler tune sequence, to illuminate the yellow TUNE Lamp on the Control Head. U1 is the primary +5 VDC regulator supplying power to the Computer Board 3A2. It is mounted on the coupler sheet metal chassis for heat sinking, CR1 protects the coupler from high voltage transients.

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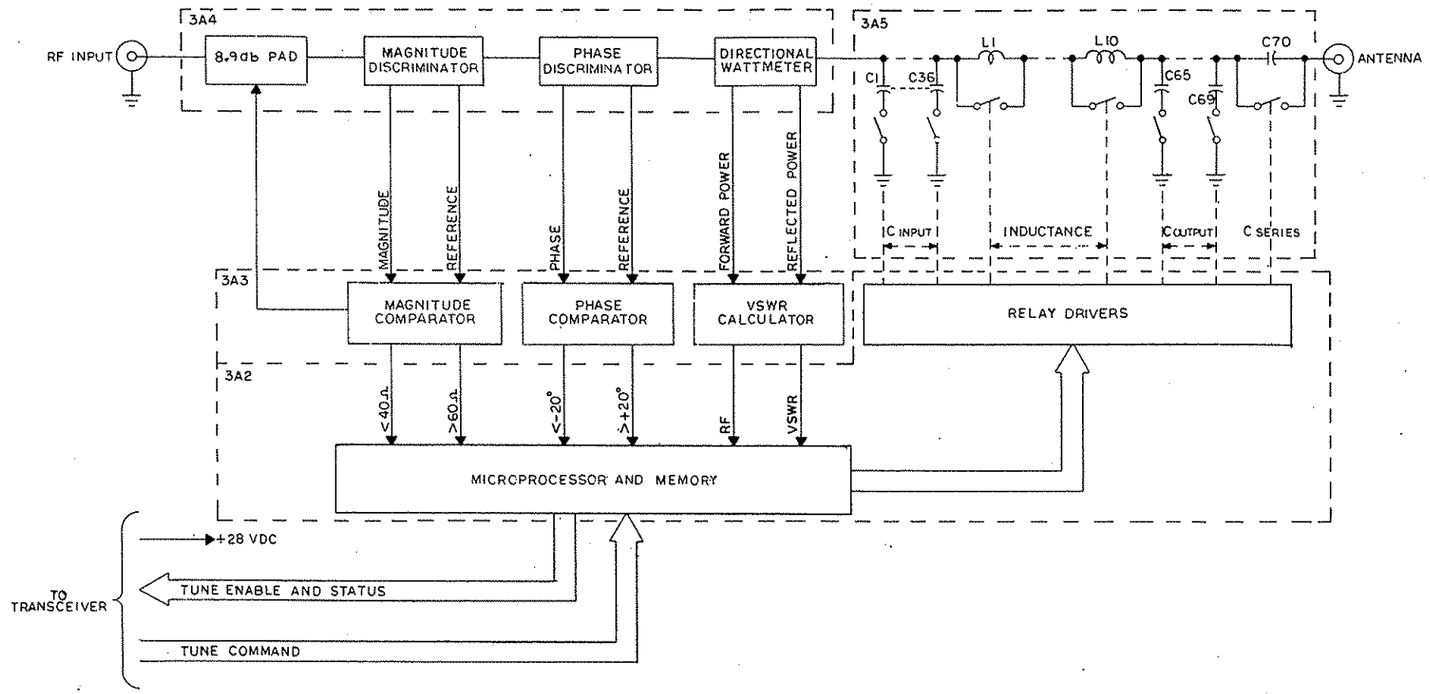

FIGURE 4.1 ACU-150D BLOCK DIAGRAM

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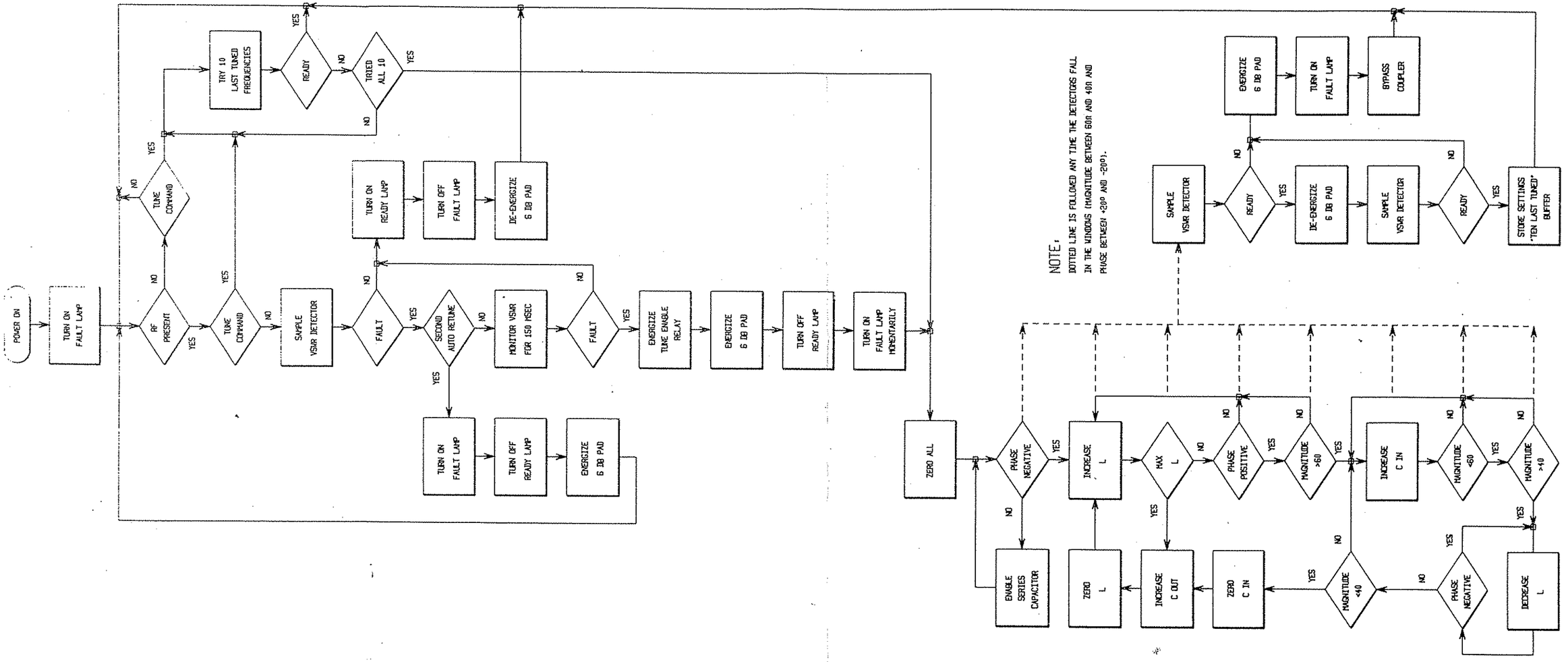


FIGURE 4.2 ACU-150D FLOW CHART

SECTION V

MAINTENANCE AND REPAIR

5.1 GENERAL

This section provides test procedures and evaluation of overall performance for the ACU-150D High Speed 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

No preventive or periodic maintenance is required in the ACU-150D.

5.3 INSPECTION

If the ACU-150D 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 of 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.

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.

NOTE

The RF Output Board (3A5A2) standoff, the rear of the antenna coaxial connector (3A1J3) and the screw joining them together have been coated with RF Corona Dope. It is essential that the standoff, connector and screw be recoated with RF Corona Dope following servicing which requires the RF Output Board 3A5A2 to be removed or disconnected.

Several solder points, connections, screws and straps on both the top and bottom sides of the RF Output and RF Input Boards have been coated with RF Corona Dope. It is essential that these areas be recoated with RF Corona Dope following any service which disturbed the integrity of the coating.

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 it according to the procedures given in paragraphs 5.5.2 through 5.5.4. 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 with 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 boards.

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 heatsink to the lead between 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 heatsink and the sequence outlined above to prevent heat from destroying the component.

5.5 PERFORMANCE TEST

The following tests will provide overall performance data on the ACU-150D as well as 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. ASB-500 System (RT-510 with SCU-55)
2. 35 ft. antenna simulator Sunair p/n 8084001094
3. "THRULINE" wattmeter: Bird Model 43 with 100 watt 2-30 MHz element
4. VOM: Simpson 260
5. Digital Multimeter: H.P. Model 3476A
6. Oscilloscope: Tektronix 2445
7. Frequency Counter: Systron Donner Model 6242A
8. CARD Extender Sunair P/N 8064201594
9. Corona Dope Sunair P/N 1006040013.

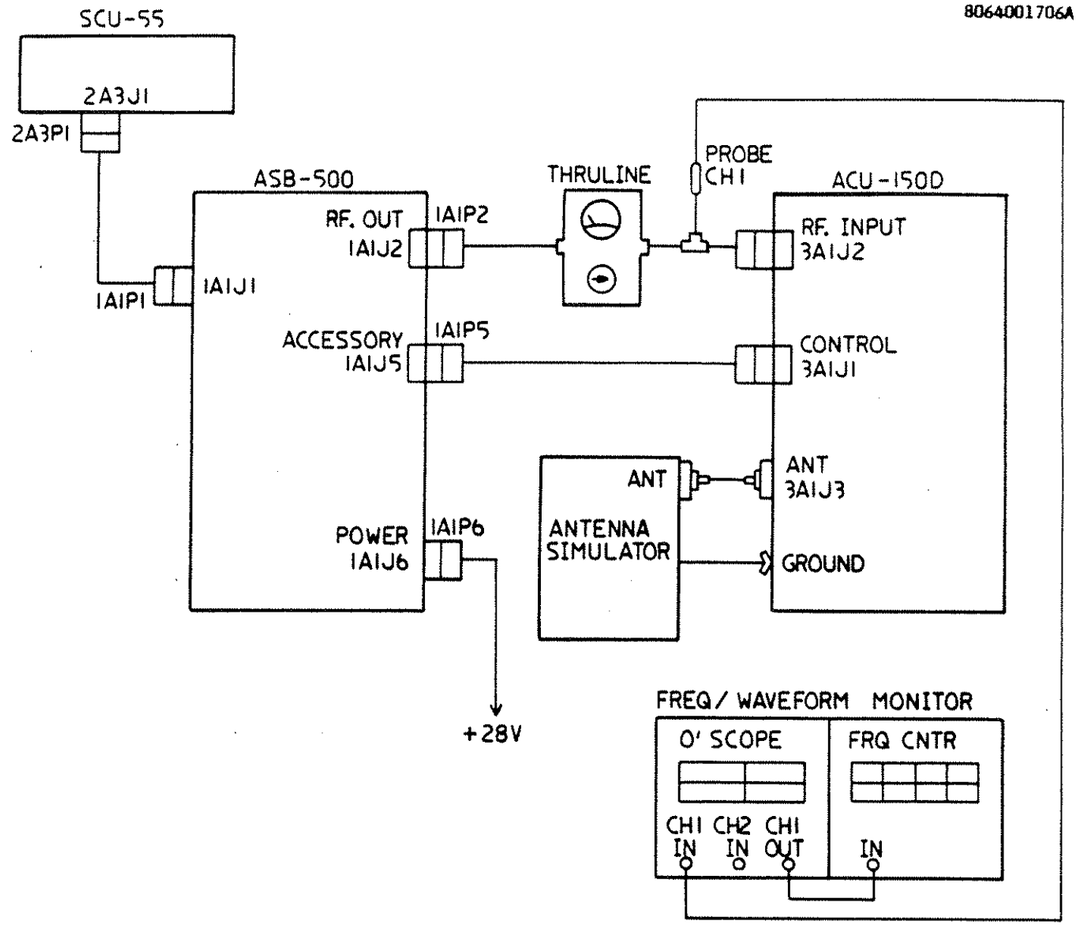
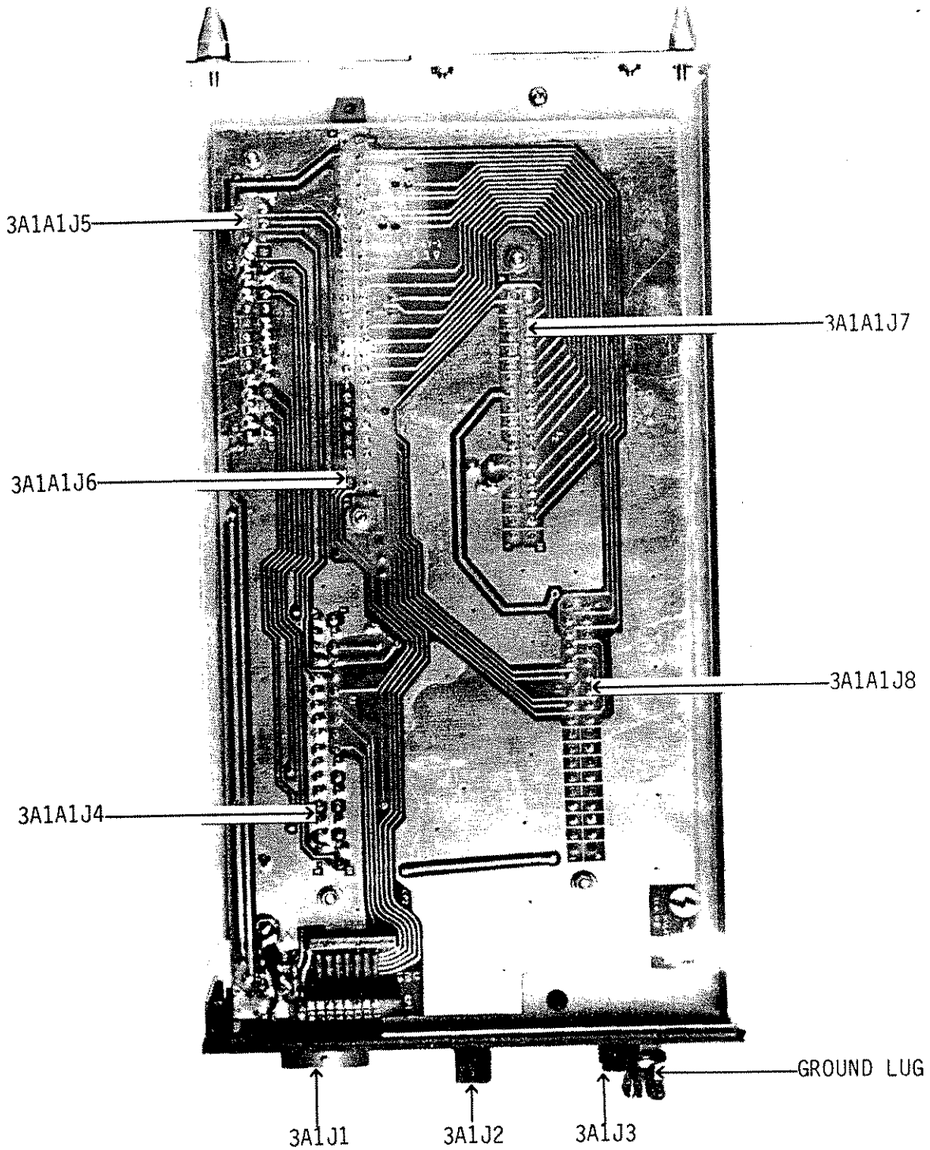
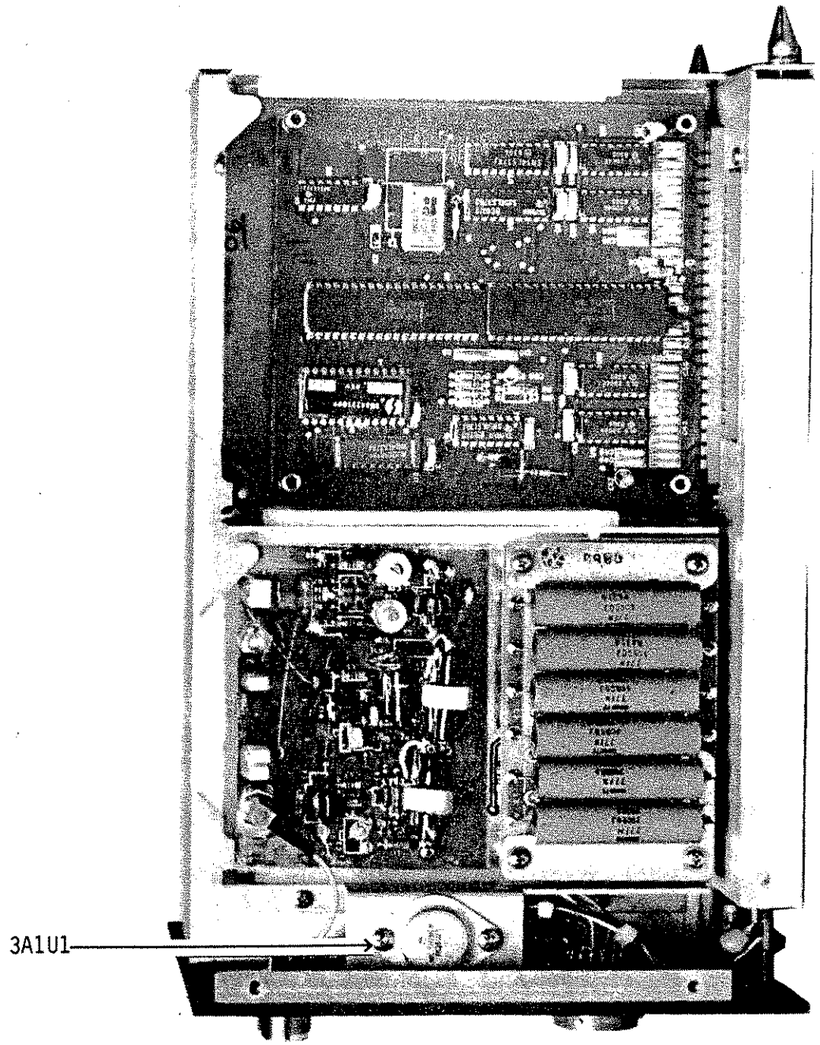


FIGURE 5.1 COUPLER TEST SETUP



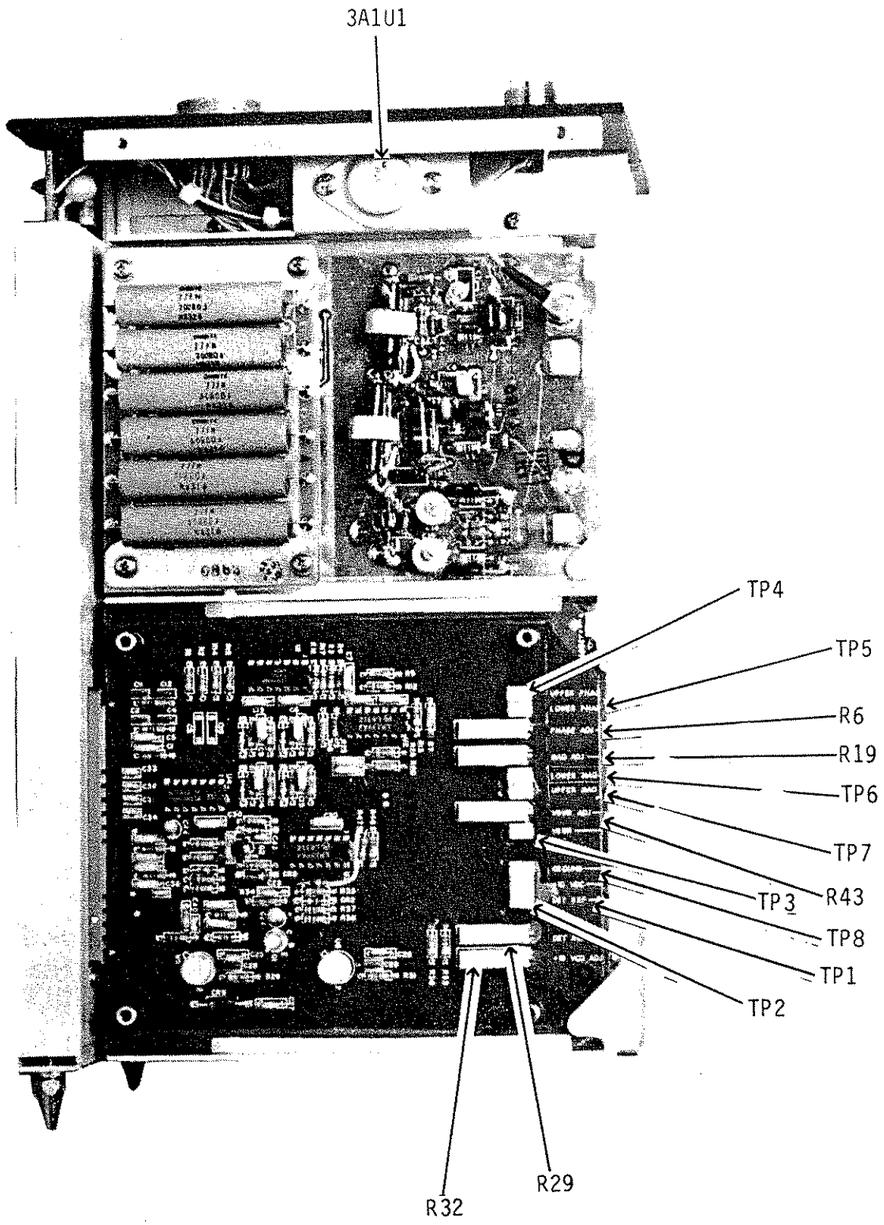
3A1A1 MOTHERBOARD ASSEMBLY

FIGURE 5.2 MAJOR ASSEMBLY AND COMPONENT LOCATIONS (Sheet 1 of 5)



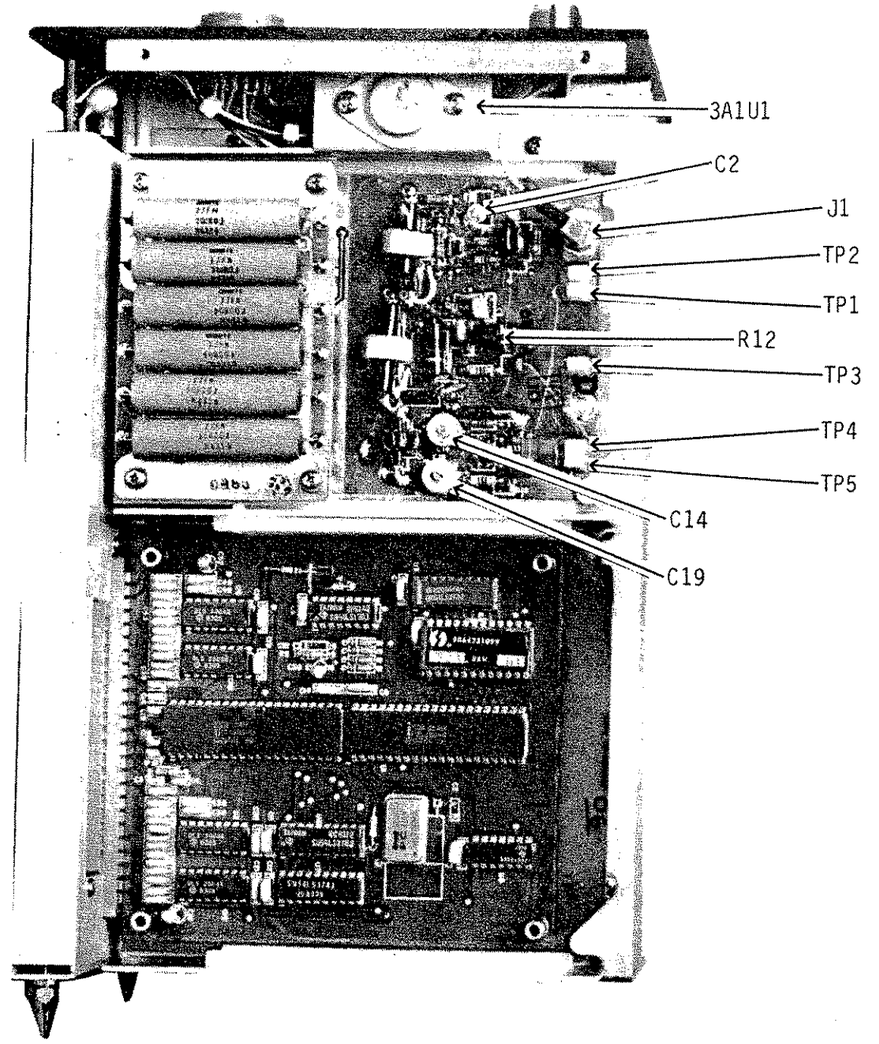
3A2 COMPUTER BOARD ASSEMBLY W/SHIELD AND 3A3 COMPARATOR BOARD REMOVED

FIGURE 5.2 MAJOR ASSEMBLY AND COMPONENT LOCATIONS (Sheet 2 of 5)



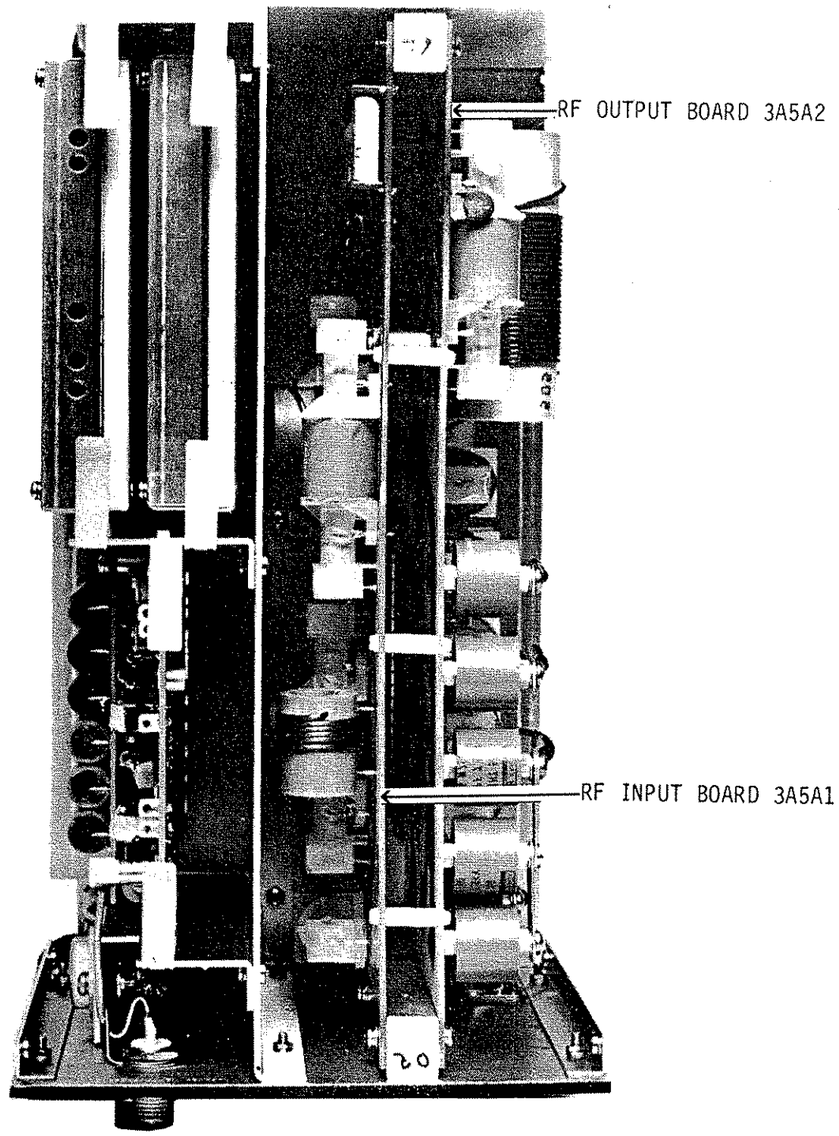
3A3 COMPARATOR BOARD ASSEMBLY W/SHIELD REMOVED

FIGURE 5.2 MAJOR ASSEMBLY AND COMPONENT LOCATIONS (Sheet 3 of 5)



3A4 DETECTOR/PAD ASSEMBLY

FIGURE 5.2 MAJOR ASSEMBLY AND COMPONENT LOCATIONS (Sheet 4 of 5)



3A5 RF ASSEMBLY

FIGURE 5.2 MAJOR ASSEMBLY AND COMPONENT LOCATIONS (Sheet 5 of 5)

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TABLE 5.1 OPERATIONAL FAULT ANALYSIS

SYMPTOM	POSSIBLE TROUBLE	CHECKS AND CORRECTIVE ACTION
1. Coupler faults 7 seconds after TUNE Command.	a. No RF output from transceiver.	a. Defective transceiver. b. Defective Detector/Pad Assembly 3A4. Repair or replace.
2. Thruline Wattmeter reads normally in FWD position. No reading in REF position. Coupler faults 7 seconds after TUNE Command.	a. No RF to coupler.	a. Check coax cable and connectors between transceiver and coupler. Meter in REF position should read greater than zero during TUNE, dipping to a low value when coupler TUNE is achieved.
	b. Coupler Detector Board 3A4, defective.	b. Repair or replace.
3. Thruline Wattmeter reads normally in both FWD and REF positions. Coupler faults 7 seconds after TUNE Command.	a. Computer Board 3A2 defective.	a. Repair or replace Computer Board 3A2.
	b. Defective component on RF Assembly 3A5.	b. Check components for damage and/or severe discoloration. Replace as required.
	c. Defective component on Comparator Board 3A3.	c. Check components for damage. Repair as required.
	d. Check antenna system.	d. Repair or replace.
4. More than one coupler status light on.	a. +28VDC in transceiver is shut off.	a. Check for +28VDC at RF Power Amplifier connector. Repair as necessary.
	b. Defective Computer Board 3A2.	b. Repair or replace Computer Board 3A2.
5. Coupler tunes normally, but faults when 100 watts is applied.	a. VSWR trip point set too low.	a. (1) Try to retune. (2) If tune is not satisfactory or fault condition is noted on more than just a few frequencies, check voltage on Comparator Board 3A3 TP3 to ground. Voltage should be 1.2VDC min. Reset by adjusting the VSWR control 3A3R43 to increase voltage reading to 1.2VDC or to a value approximately

(Table 5.1 Continued)

		b. Internal high voltage breakdown.	0.1 VDC higher than measured. b. Observe coupler tune in darkened area and look for breakdown on RF Output Board 3A5A2. Repair or replace defective component.
		c. Loose antenna or ground connection, or corrosion.	c. Check antenna and ground connections for tightness and freedom from corrosion.
		d. Defective internal ground connection.	d. (1) Check all Motherboard 3A1A1 and RF Assembly 3A5 ground screws for tightness. (2) Check Computer Board 3A2 and Comparator Board 3A3 connector contacts. Clean or replace.
6.	TUNE light remains on, READY light blinks on and off.	a. TUNE Command is held high by transceiver.	a. Transceiver defective. Check manual for corrective action.
		b. TUNE Command line is held high by Comparator Board 3A3.	b. Check TUNE Command circuit on Comparator Board.
		c. Control cables shorted.	c. Repair or replace cables.

TABLE 5.2 FAULT ANALYSIS AND TROUBLESHOOTING, COMPUTER BOARD 3A2

NOTE: For this Test Procedure a Card Extender Sunair p/n 8064201594 and a 35Ft. Antenna Simulator Sunair p/n 8084001094 or equivalent is required. The Antenna Simulator may be constructed from the schematic diagram in Figure 5.3.

CIRCUIT UNDER TEST	INSTRUCTIONS	RESULT/ACTION
Preliminary Setup	a. Test Equipment: Freq/Waveform Monitor, Figure 5.1.	
	b. Remove dust cover from the coupler.	
	c. Place Computer Board 3A2 on card extender.	
	d. Connect 35FT. Antenna Simulator to couplers' antenna terminal, Figure 5.1.	
	e. Transceiver: Power-up transceiver and place in AM Mode of operation.	
	f. Refer to Figure 5.5.	

NOTE: When instructed to change transceiver frequency, be sure to change frequency by no less than 500 KHz.

1. 28V Supply	a.	Connect negative lead of DVM to Chassis and positive lead to Motherboard connector 3A1A1J6 pin B.	NORMAL: DVM indicates 28V ± 4V. ABNORMAL: Unplug the Computer and Comparator Boards. If DVM reads the specified voltage, check for shorts on the boards. If still reading the wrong voltage, check control cable. Check for shorts on the RF Assembly 3A5. Check 28V circuitry on Motherboard 3A1A1.
2. 5V Supply	a.	Connect positive lead of DVM to Motherboard connector 3A1A1J5 pin K.	NORMAL: DVM indicates 5V ± .5V. ABNORMAL: Unplug Computer and Comparator Boards. If DVM reads the specified voltage, check the 5V regulator 3A1U1 mounted

TABLE 5.2 FAULT ANALYSIS AND TROUBLESHOOTING, COMPUTER BOARD 3A2 (Continued)

			on the Chassis Assembly 3A1, repair or replace.
3.	1 MHz Clock	a. Remove RF Shield from board.	NORMAL: Frequency = 1MHz square wave, 4V p-p minimum. ABNORMAL: Replace U13.
4.	TUNE Command Circuit	a. Connect scope probe to U5 pin 5. Momentarily depress TUNE button on the control head, SCU-55.	NORMAL: While TUNE button is depressed, line will go high (+5V). Coupler tunes. ABNORMAL: Check U5. Repair or replace.
5.	FAULT Lamp Circuit	a. Connect scope probe to U6 pin 12. Turn transceiver power off. Wait approximately 4 seconds and turn power back on.	NORMAL: Scope will show a 3V level indication when transceiver is turned back on. For information on the function of the Output Ports, see paragraph 4.5.7. ABNORMAL: Check U6 and associated circuitry. Check FAULT Lamp on control head, SCU-55. Check control cable between coupler and transceiver.
		b. Connect scope probe to U12 pin 11. Turn transceiver power off for approximately 4 seconds, then turn back on.	NORMAL: Scope will indicate a low voltage when the transceiver is turned back on. ABNORMAL: Check U12 and associated circuitry. Check FAULT Lamp on control head, SCU-55. Check control cable between coupler and transceiver.
6.	READY Lamp Circuit	a. Connect scope probe to U6 pin 9. Momentarily depress TUNE button on control head, SCU-55.	NORMAL: Coupler will enter a tune cycle, scope will indicate a low and go high at the end of the tune cycle. For further information on the function of the Output Ports, see paragraph 4.5.7. ABNORMAL: Check U6 and associated circuitry. Check READY Lamp on control head, SCU-55. Check control cable between coupler and transceiver.

TABLE 5.2 FAULT ANALYSIS AND TROUBLESHOOTING, COMPUTER BOARD 3A2 (Continued)

	b. Connect scope probe to U12 pin 12.	NORMAL: Scope indicates a low. ABNORMAL: Check related circuitry of U12. Check READY lamp on control head, SCU-55. Check control cable between coupler and transceiver.
7. Pad Relay	a. Connect scope probe to U6 pin 15. Momentarily depress the TUNE button on the control head, SCU-55.	NORMAL: Scope indicates a High during the tune cycle, and a Low at the completion of the tune cycle. ABNORMAL: Check related circuitry. For further information on the function of the Output ports see paragraph 4.5.7.
	b. Connect scope probe to U12 pin 10. Momentarily depress the TUNE button on the control head, SCU-55.	NORMAL: Scope indicates a Low during tuning, then it goes to approximately +28V at completion of tune cycle. ABNORMAL: Same as 7.a. above. Also check Detector/Pad Assembly 3A4. See Section 4.3.
8. RF Network Relay Drivers		
8a. C S 1 Circuit	a. Connect scope probe to U5 pin 23. Disconnect the 35FT. antenna simulator and short antenna terminal to ground terminal with a 3FT. clip lead. (WARNING: Short antenna terminal ONLY for testing of steps 8a.a. and b. NOT for any of the following like tests.) Set transceiver to AM Mode at 2.0000 MHz. Momentarily depress microphone key which will initiate a tune cycle.	NORMAL: Scope will indicate a 3V (200 msec minimum) change-of-state. NOTE: If the change-of-state was not observed during the tune cycle, then repeat the same procedure at a frequency 500 KHz higher. This procedure should be repeated several times to insure that the change-of-state is being observed. ABNORMAL: If after several cycles the scope does not indicate a change-of-state, check related circuitry. For further information on the function of the Output Ports, see paragraph 4.5.7.

TABLE 5.2 FAULT ANALYSIS AND TROUBLESHOOTING, COMPUTER BOARD 3A2 (Continued)

	b. Connect scope probe to U9 pin 14. Set transceiver to AM Mode at 2.0000 MHz. Depress microphone key.	NORMAL: Scope indicates a 28V change-of-state. If the 28V change does not occur, then change the frequency by 500 KHz and repeat procedure in step 8a.a. ABNORMAL: Same as in 8a.a. above. Also check relay K33 on the RF Output Board 3A5A2.
NOTE: DISCONNECT CLIP LEAD SHORT CIRCUIT AND RECONNECT 35 FT. ANTENNA SIMULATOR.		
8b. C Out 1 Circuit	a. Connect scope probe to U5 pin 25. Set transceiver in AM Mode at 2.0000 MHz. Momentarily depress microphone key which will initiate a tune cycle.	NORMAL: Scope will indicate a 3V (200 msec minimum) change-of-state was not observed during the tune cycle, then repeat the same procedure at a frequency 500 KHz higher. This procedure should be repeated several times to insure that the change-of-state is being observed. ABNORMAL: If after several cycles the scope does not change, check related circuitry. For further information on the function of the Output Ports see paragraph 4.5.7. Also check relay K31 on the RF Output Board 3A5A2.
8c. C Out 2	a. Connect scope probe to U5 pin 26. Proceed as in step 8b.a. above.	NORMAL: Same as in step 8b.a. above. ABNORMAL: Same as in step 8b.a. above.
	b. Connect scope probe to U9 pin 12. Proceed as in step 8b.b. above.	NORMAL: Same as in step 8b.b. ABNORMAL: Same as in step 8b.b. above. Also check relay K30 on the RF Output Board 3A5A2.
8d. C Out 3	a. Connect scope probe to U5 pin 27. Proceed as in step 8b.a. above.	NORMAL: Same as in step 8b.a. ABNORMAL: Same as in step 8b.a.

TABLE 5.2 FAULT ANALYSIS AND TROUBLESHOOTING, COMPUTER BOARD 3A2 (Continued)

	b. Connect scope probe to U9 pin 11. Proceed as in step 8b.b. above.	NORMAL: Same as in step 8b.b. ABNORMAL: Same as in step 8b.b. Also check relay K29 on the RF Output Board 3A5A2.

NOTE: For the remainder of these checks, only the component and pin numbers along with the relay number will be listed. Follow the established test procedures which have been outlined above in steps 8b through 8d.

8e. C IN 1	a. U5 pin 29 b. U9 pin 10	Relay K19 on RF Input Board 3A5A1.
8f. C IN 2	a. U5 pin 30 b. U10 pin 16	Relay K18 on RF Input Board 3A5A1.
8g. C IN 3	a. U5 pin 31 b. U10 pin 15	Relay K17 on RF Input Board 3A5A1.
8h. C IN 4	a. U5 pin 32 b. U10 pin 14	Relay K16 on RF Input Board 3A5A1.
8i. C IN 5	a. U5 pin 33 b. U10 pin 13	Relay K15 and K14 on RF Input Board 3A5A1.
8j. C IN 6	a. U5 pin 34 b. U10 pin 12	Relay K13 and K12 on RF Input Board 3A5A1.
8k. C IN 7	a. U5 pin 35 b. U10 pin 11	Relay K10 and K11 on RF Input Board 3A5A1.
8l. C IN 8	a. U5 pin 36 b. U10 pin 10	Relay K7, K8 and K9 on the RF Input Board 3A5A1.
8m. C IN 9	a. U6 pin 2 b. U11 pin 16	Relay K4, K5 and K6 on the RF Input Board 3A5A1.
8n. C IN 10	a. U6 pin 5 b. U11 pin 15	Relay K1, K2 and K3 on the RF Input Board 3A5A1.
8o. L1	a. U7 pin 5 b. U11 pin 13	Relay K25 on RF Input Board 3A5A1.
8p. L2	a. U7 pin 6 b. U11 pin 12	Relay K24 on RF Input Board 3A5A1.
8q. L3	a. U7 pin 9 b. U11 pin 11	Relay K23 on RF Input Board 3A5A1.
8r. L4	a. U7 pin 12 b. U11 pin 10	Relay K22 on RF Input Board 3A5A1.

TABLE 5.2 FAULT ANALYSIS AND TROUBLESHOOTING, COMPUTER BOARD 3A2 (Continued)

8s. L5	a. U7 pin 15 b. U12 pin 16	Relay K21 on the RF Input Board 3A5A1.
8t. L6	a. U7 pin 16 b. U12 pin 15	Relay K20 on the RF Input Board 3A5A1.
8u. L7	a. U7 pin 19 b. U12 pin 14	Relay K28 on the RF Output Board 3A5A2.
8v. L8	a. U6 pin 16 b. U12 pin 13	Relay K27 on the RF Output Board 3A5A2.
8w. L9	a. U6 pin 19 b. U11 pin 14	Relay K26 on the RF Output Board 3A5A2.
8x. L10	a. U7 pin 2 b. U9 pin 15	Relay K23 on the RF Output Board 3A5A2.

TABLE 5.3 FAULT ANALYSIS AND TROUBLESHOOTING, COMPARATOR BOARD 3A3

NOTE: For this Test Procedure a Card Extender Sunair p/n 8064201594 and a 35FT. Antenna Simulator Sunair p/n 8084001094 or equivalent is required. The Antenna Simulator may be constructed from the schematic diagram in Figure 5.3.

CIRCUIT UNDER TEST	INSTRUCTIONS	RESULT/ACTION
Preliminary Setup	a. Test Equipment: Freq/Waveform Monitor, Figure 5.1.	
	b. Remove dust cover from the coupler.	
	c. Place Comparator Board 3A3 on card extender, and remove R F shield.	
	d. Connect 35FT. Antenna Simulator to couplers' antenna terminal, Figure 5.1.	
	e. Transceiver: Power-up transceiver and place in AM Mode of operation.	
	f. Refer to Figure 5.6.	

NOTE: When instructed to change transceiver frequency, be sure to change frequency by no less than 500 KHz.

1. TUNE Command Circuit	a. Connect scope probe to CR2 anode. Depress TUNE button on control head SCU-55.	NORMAL: Scope indicates a momentary +0VDC to +12VDC low to high change. Coupler tunes. ABNORMAL: Check Motherboard 3A1A1. Check control cable between transceiver and coupler. Check transceiver for proper inputs to the coupler.
	b. Connect scope probe to Q1 base. Depress TUNE button on control head SCU-55.	NORMAL: Scope indicates a +1V level at Q1 base. This level remains until coupler has tuned, then indicates 0V. ABNORMAL: Check Q1 and associated circuitry.

TABLE 5.3 FAULT ANALYSIS AND TROUBLESHOOTING, COMPARATOR BOARD 3A3 (Continued)

		c. Connect scope probe to Q1 collector. Depress TUNE button on control head SCU-55.	NORMAL: Scope indicates a voltage level of +1V at Q1 collector while tuning. Level should remain low until coupler has completed the tune cycle. Scope indicates a +24V level. ABNORMAL: Repair or replace Q1 or associated circuitry. Check Motherboard 3A1A1. Check Tune Relay on Detector Board Assembly 3A4. Refer to Section 4.3.
2.	+10VDC Regulator	a. Connect DVM negative lead to ground (chassis) and connect positive lead to TP1.	NORMAL: DVM indicates a reading of approximately 10V ± .5V. ABNORMAL: If voltage is off by more than .5V check U6 circuitry for defective component.
3.	Detector 5V Reference Level	a. Connect DVM negative lead to ground (chassis) and connect positive lead to TP2, Detector Reference test point.	NORMAL: DVM indicates a reading of 5V ± 0.01V. ABNORMAL: Adjust R29 for proper reading. If proper voltage cannot be obtained, check voltage at CR9 cathode. Cathode reading should be approximately 28V. Anode readings should be approximately 16V. If these are correct, replace U5.
4.	Phase and Magnitude Comparators	a. Connect scope probe to U1A pin 12. Change frequency of transceiver and momentarily depress microphone key. Coupler tunes.	NORMAL: Scope indicates a 2V p-p varying voltage (3 to 5 V). This continues until the tune cycle is complete. ABNORMAL: Check circuitry related to U1A and check Detector/Pad Assembly 3A4. Refer to Section 4.3.
		b. Connect scope probe to U1B pin 10. Change frequency of transceiver and momentarily depress microphone key. Coupler tunes.	NORMAL: Same as 4a. above. ABNORMAL: Same as 4a. above.

TABLE 5.3 FAULT ANALYSIS AND TROUBLESHOOTING, COMPARATOR BOARD 3A3 (Continued)

	c.	Connect scope probe to U2A pin 2. Change frequency of transceiver and momentarily depress microphone key. Coupler tunes.	NORMAL: Scope indicates pulses between 0V and +10V during the tune cycle. ABNORMAL: Check U2A and associated circuitry. Check Detector/Pad Assembly 3A4. See Section 4.3. Check setup of Phase and Magnitude windows according to Section 4.3.
	d.	Connect scope probe to U2B pin 1. Repeat as in step 4c. above.	NORMAL: Same as 4c. above. ABNORMAL: Same as 4c. above.
	e.	Connect scope probe to U2C pin 14. Repeat as in step 4c. above.	NORMAL: Same as 4c. above. ABNORMAL: Same as 4c. above.
	f.	Connect scope probe to U2D pin 13. Repeat as in step 4c. above.	NORMAL: Same as 4c. above. ABNORMAL: Same as 4c. above.
	g.	Connect scope probe to U4A pin 2. Change frequency of transceiver and momentarily depress microphone key. Coupler tunes.	NORMAL: Scope indicates pulses of 0V to +5V p-p. ABNORMAL: Check related circuitry. Check Detector/Pad Assembly 3A4. See Section 4.3.
	h.	Repeat checks on U4 pin 4, pin 6, pin 8 and follow same procedure as in 4g. above.	NORMAL: Same as 4g. above. ABNORMAL: Same as 4g. above.
5. Reflected Power Sampling Circuitry	a.	Connect scope probe to U3A pin 2. Change frequency of transceiver. Momentarily depress microphone key.	NORMAL: Scope indicates a high during the tune cycle, and a low at the completion of the tune. ABNORMAL: Check U3A and associated circuitry. Check Detector/Pad Assembly 3A4. See Section 4.3.
	b.	Connect scope probe to U4E pin 10. Change frequency of transceiver. Momentarily depress microphone key.	NORMAL: Scope indicates a low and at end of tune cycle goes high. ABNORMAL: Check U4E and associated circuitry. Check

TABLE 5.3 FAULT ANALYSIS AND TROUBLESHOOTING, COMPARATOR BOARD 3A3 (Continued)

			Detector/Pad Assembly 3A4. See Section 4.3.
6.	RF Detector (Forward Power Det) Sampling Circuitry	a. Connect scope probe to TP3. Change frequency of transceiver. Momentarily depress microphone key.	NORMAL: Scope indicates varying voltage until end of tune cycle. Then it reads approximately 1.2V. ABNORMAL: Check U3A and associated circuitry. Check Detector/Pad Assembly 3A4. See Section 4.3.
7.	$\overline{RF}$	a. Connect scope probe to collector of Q2. Momentarily depress TUNE button on control head SCU-55.	NORMAL: The scope indicates a low during the tune cycle. At the end of the cycle the scope indicates a high. ABNORMAL: Check Q2 and associated circuitry. Check Forward Power Detector on Detector/Pad Assembly 3A4. See Section 4.3.

TABLE 5.4 ACU-150D ALIGNMENT PROCEDURE

IF UPON COMPLETION OF THE FAULT ANALYSIS TABLES 5.1, 5.2 AND 5.3, THE ACU-150D IS STILL NOT OPERATING PROPERLY, THEN ACCOMPLISH THE FOLLOWING ALIGNMENT PROCEDURE.

NOTE: All of the following measurements and adjustments are accomplished on the Comparator Board 3A3.

1. Turn on the transceiver. (Necessary to supply power to the coupler.)

2. Connect negative lead of DVM to ground, TP8. Set meter scale to read +50 VDC.

3. Measure voltage on TP1 (U6 pin 3). Adjust R32 until voltage is +10VDC.

4. Set meter scale to read +5VDC. Measure voltage on TP2 (U5 pin 3). Adjust R29 until voltage is +5VDC.

5. Measure voltage on TP3 (U3A pin 4). Adjust R43 until voltage is +1.2 VDC.

6. Connect negative lead of DVM to TP7 (U2D pin 11) and connect positive lead to TP6 (U2C pin 8). Set meter scale to read +1 VDC. Adjust R19 until a reading of +200 mv $\pm$ 10 mv is obtained.

7. Connect negative lead of DVM to TP2 (DET REF). Measure voltages on TP6 (U2C pin 8) and TP7 (U2D pin 11). Adjust R32 until TP6 reads +100 mv $\pm$ 5 mv and TP7 read +100 mv $\pm$ 5 mv.

8. Connect negative lead of DVM to TP5 (U2B pin 7) and positive lead to TP4 (U2A pin 4). Adjust R6 until a reading of +120 mv $\pm$ 6 mv is obtained.

9. Repeat steps 7 and 8 as required to obtain correct reading.

TABLE 6.5 TABLE OF ASSEMBLIES

DESIGNATOR		DESCRIPTION	SUNAIR PART NUMBER
ASSEMBLY	SUBASSEMBLY		
3A1		Chassis Assembly	8064210097
	3A1A1	Motherboard Assembly	8064215099
3A2		Computer Board Assembly	8064220092
3A3		Comparator Board Assembly	8064230098
3A4		RF Detector Assembly	8064260094
	3A4A1	Detector/Pad Assembly	8056160094
	3A4A2	Pad Assembly	8056161091
3A5		RF Assembly	8064203091
	3A5A1	RF Input Board Assembly	8064240093
	3A5A2	RF Output Board Assembly	8064250099

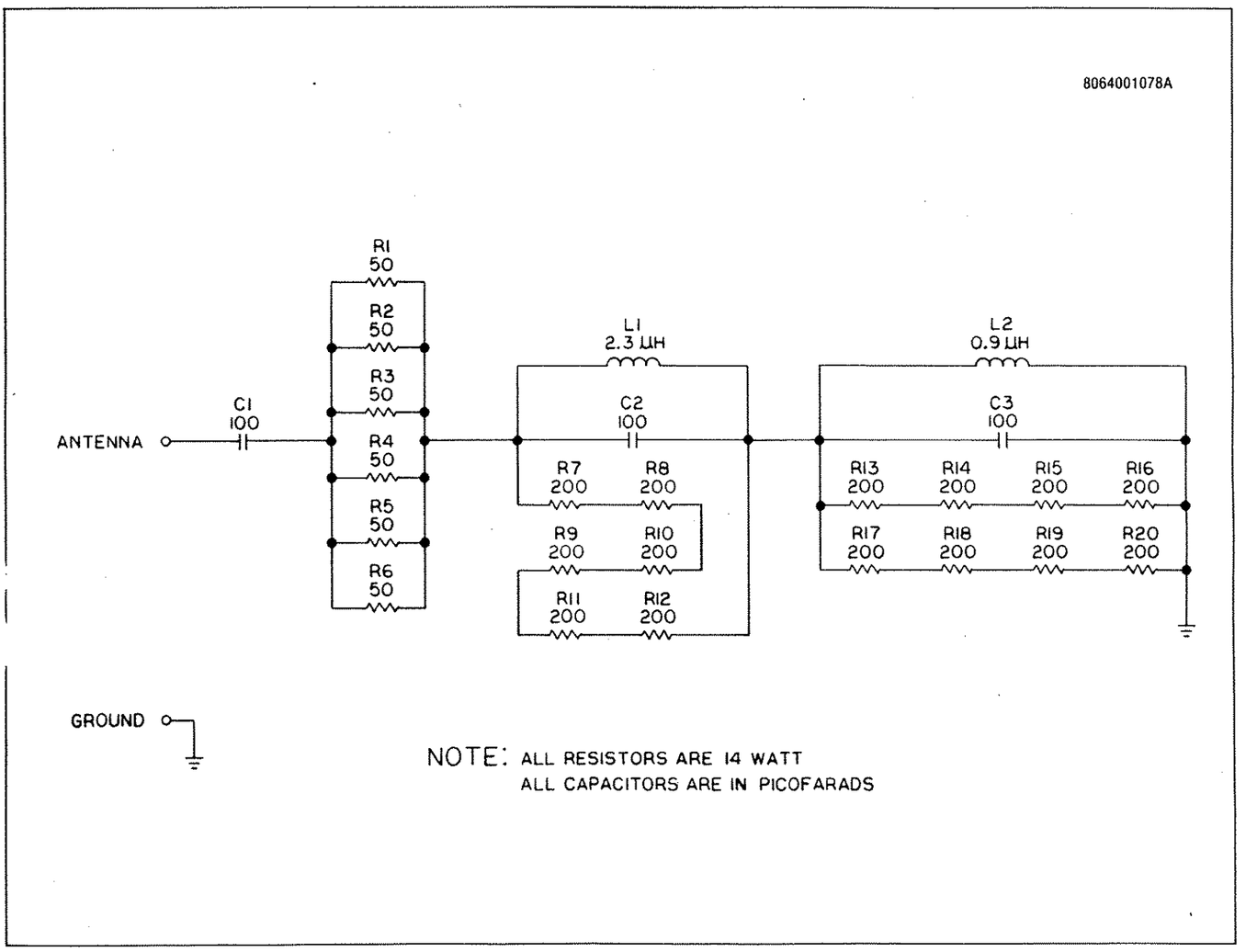

FIGURE 5.3 35 FT. ANTENNA SIMULATOR

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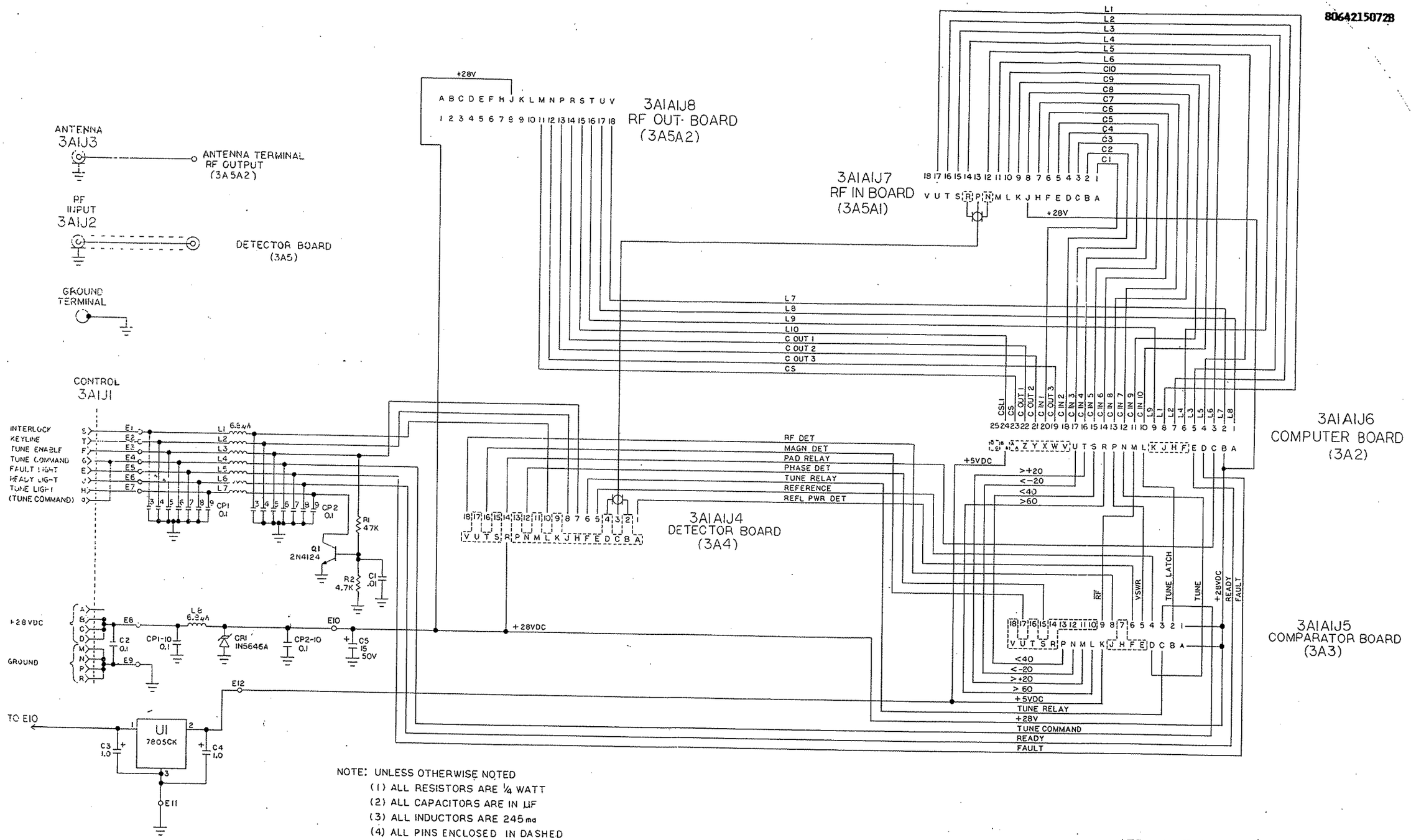

NOTE: UNLESS OTHERWISE NOTED
(1) ALL RESISTORS ARE 1/4 WATT
(2) ALL CAPACITORS ARE IN μF
(3) ALL INDUCTORS ARE 245 ma
(4) ALL PINS ENCLOSED IN DASHED LINES ARE CONNECTED TO GROUND

FIGURE 5.4 3A1 MAIN FRAME WIRING

COMPONENT SIDE

CIRCUIT SIDE

8064210097C CHASSIS ASSY 3A1

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	CHASSIS ASSY 3A1	8064210097
3A1A1	PC Assy, Mother	8064215099
3A1J1	Connector, Power, 26 Pin Round	0754480003
3A1J2	Connector, RF, UHF	0753300001
3A1J3	Connector, RF, HN UG-496/U	0753040000
C2	Cap. 0.1µf, 100V, Z5U	0244080003
C3	Cap. 1µf, 35V, T368	0283630001
C4	Cap. 1µf, 35V, T368	0283630001
U1	IC. Linear, Vol. Reg. MC7805CK	0447190008
	MISCELLANEOUS	
	Bracket, Card Guide	8064207100
	Bracket, Card Guide/Heatsink	8064207207
	Bracket, Cover	8064211107
	Card, Guide, Plastic	1005870039
	Chassis	8064211000
	Connector, RF, Subminiature	0753700000
	Handle, Modified	1003130003
	Hook, Front, BLK	0870840011
	Nut, Wing No. 10-32	0519320000
	Panel, Front	8064205107
	Retainer, Rear, Male	0505620006
	Shield, Center	8064207002
	Socket, Transistor TO-3	0841550000

8064201098A FINAL ASSY, TESTED

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	FINAL ASSY, TESTED	8064201098
	Brace, RF ASSY	8064207509
	Dust Cover	8064205000
	Final Assy	8064201292

8064215099A PC ASSY, MOTHER 3A1A1

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, MOTHER 3A1A1	8064215099
3A1A1J4	Connector, PC, 18 Pin Female	0753610001
3A1A1J5	Connector, PC, 18 Pin Female	0753610001
3A1A1J6	Connector, PC, 25 Pin OBL Root	1005820015
3A1A1J7	Connector, PC, 18 Pin Female	0753610001
3A1A1J8	Connector, PC, 18 Pin Female	0753610001
C1	Cap. 0.01µf, 25V, X5S	0281620008
C5	Cap. 15µf, 50V, 196D	0274000008
CP1	Capacitor, NTWK, 10 Pin, .1µf	1006580018
CP2	Capacitor, NTWK, 10 Pin, .1µf	1006580018
CR1	Diode, Transzorb 1N5646A	1006680021
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 1080ma	0652200001
Q1	Transistor, NPN, SI. 2N4124	0448010003
R1	Resistor, 47K, 10%, ¼W	0171060008
R2	Resistor, 4.7K, 5%. ¼W	0170770001

8064201292A FINAL ASSY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	FINAL ASSY	8064201292
3A1	Chassis Assy	8064210097
3A2	PC Assy, Computer	8064220092
3A3	PC Assy, Comparator	8064230098
3A4	PC Assy, RF Detector, Airborne	8064260094
3A5	RF Assembly	8064203091

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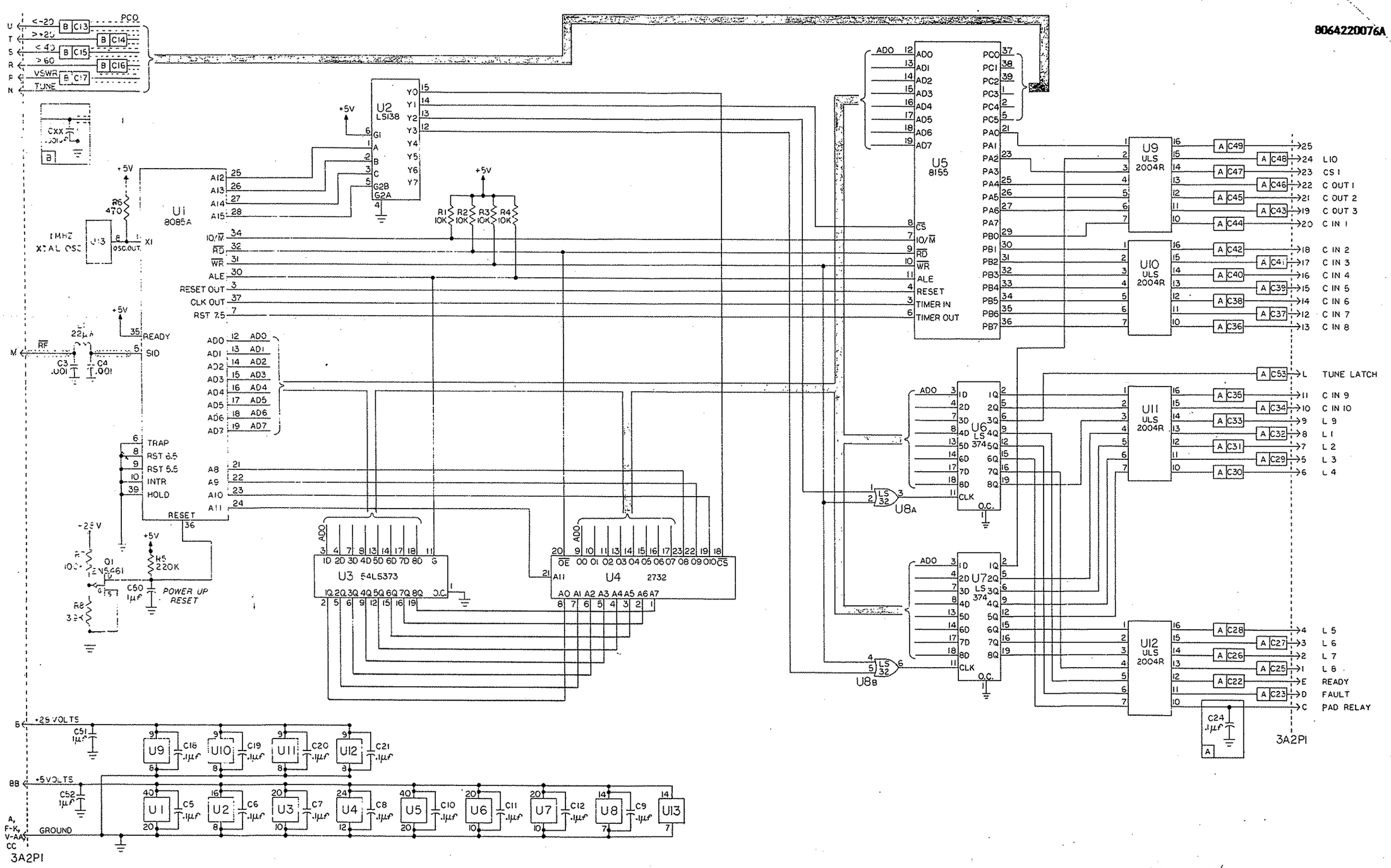
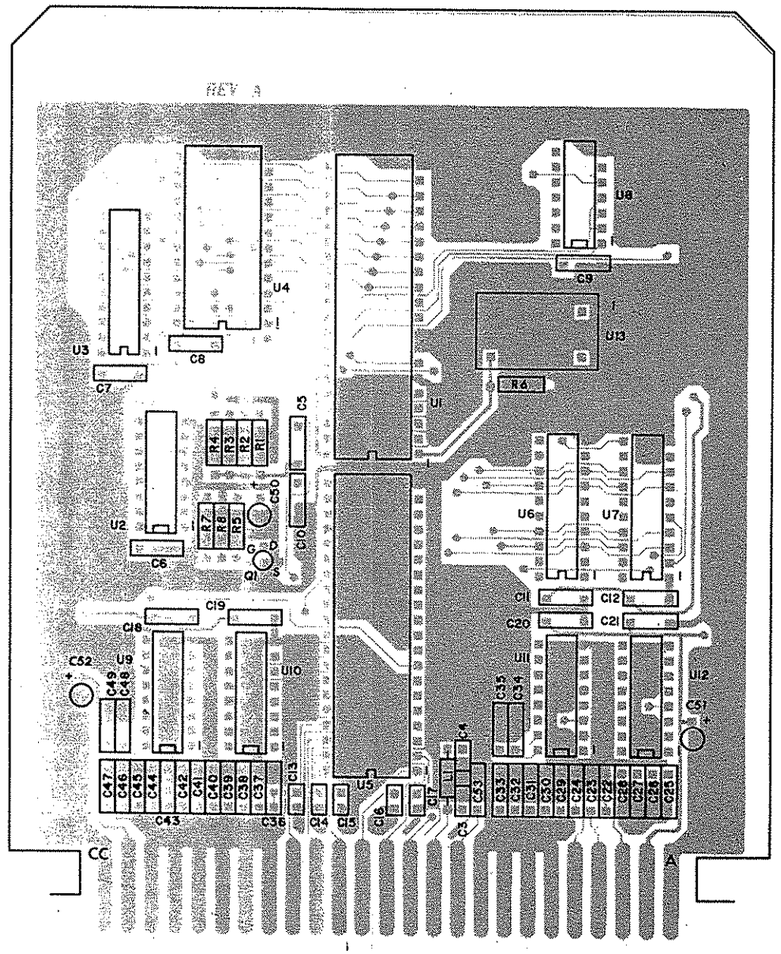
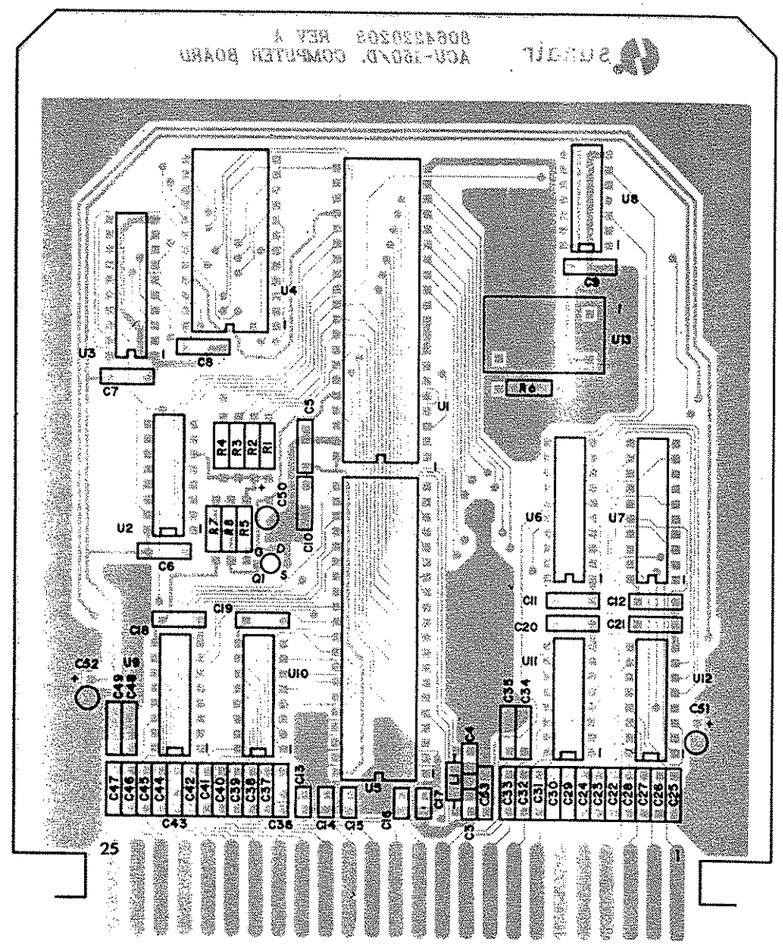


FIGURE 5.5 3A2 COMPUTER BOARD



COMPONENT SIDE



CIRCUIT SIDE

80642200928 PC ASSY, COMPUTER 3A2

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, COMPUTER 3A2	8064220092
C3	Cap. 0.001µf, 100V, X7R, 20%	0281630003
C4	Cap. 0.001µf, 100V, X7R, 20%	0281630003
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. 0.001µf, 100V, X7R, 20%	0281630003
C14	Cap. 0.001µf, 100V, X7R, 20%	0281630003
C15	Cap. 0.001µf, 100V, X7R, 20%	0281630003
C16	Cap. 0.001µf, 100V, X7R, 20%	0281630003
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. 0.1µf, 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
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. 0.1µf, 50V, X7R, 20%	0281610002
C48	Cap. 0.1µf, 50V, X7R, 20%	0281610002
C49	Cap. 0.1µf, 50V, X7R. 20%	0281610002

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
C50	Cap. 1µf, 50V, 198D	0280910002
C51	Cap. 1µf, 50V, 198D	0280910002
C52	Cap. 1µf, 50V, 198D	0280910002
C53	Cap. 0.1µf, 50V, X7R, 20%	0281610002
L1	Inductor, Molded, 22µh, 10%	0664060005
Q1	Transistor, P-CH, FET 2N5461	0446160008
R1	Resistor, 10K, 10%, ¼W	0170410005
R2	Resistor, 10K, 10%, ¼W	0170410005
R3	Resistor, 10K, 10%, ¼W	0170410005
R4	Resistor, 10K, 10%, ¼W	0170410005
R5	Resistor, 220K, 10%, ¼W	0177780002
R6	Resistor, 470, 5%, ¼W	0184110009
R7	Resistor, 100K, 10%, ¼W	0170390004
R8	Resistor, 39K, 10%, ¼W	0177800003
U1	IC. Digital ID8085AH	1006410007
U2	IC. Digital SN54LS138J	1006410015
U3	IC. Digital SN54LS373J	1006410023
U4	EPROM	8064221099
U5	IC. Digital ID8155H	1006420002
U6	IC. Digital SN54LS374J	1006420011
U7	IC. Digital SN54LS374J	1006420011
U8	IC. Digital SN54LS32J	1006420029
U9	IC. Linear ULS2004R	1006420037
U10	IC. Linear ULS2004R	1006420037
U11	IC. Linear ULS2004R	1006420037
U12	IC. Linear ULS2004R	1006420037
U13	Crystal, Oscillator, 1.00 MHz	1006670025
	MISCELLANEOUS	
	Card Ejectors	1003320015
	Shield, Front, Computer	8064220408
	Shield, Rear	8064220505
	Socket, IC. 24 Pin	1006240021

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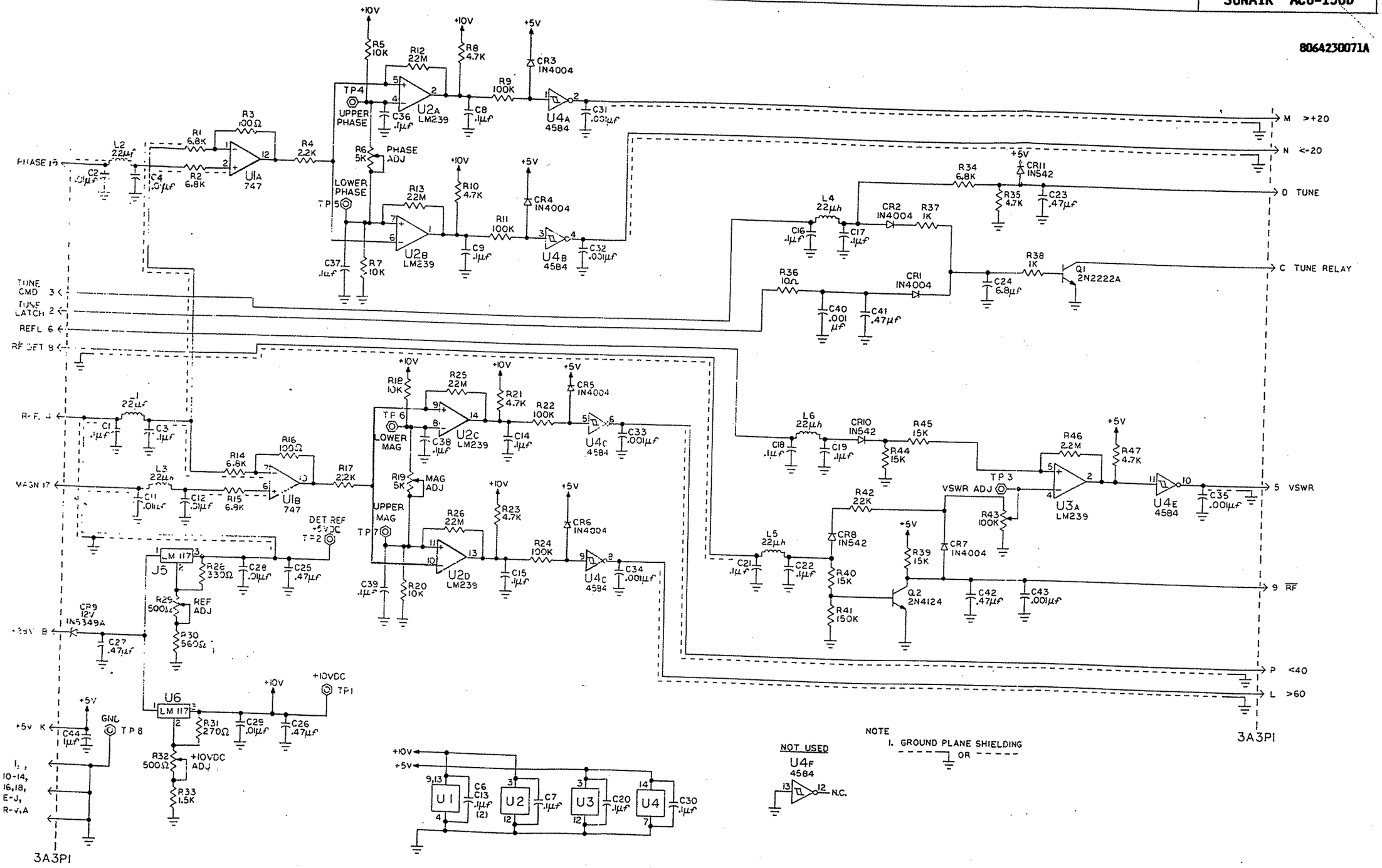
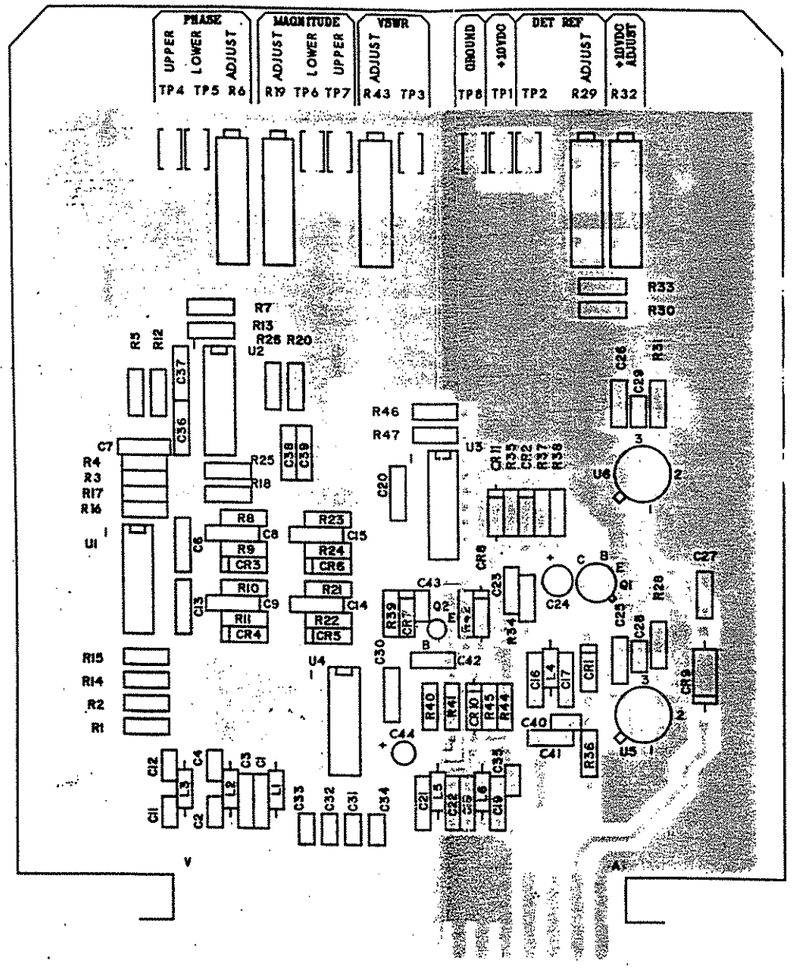
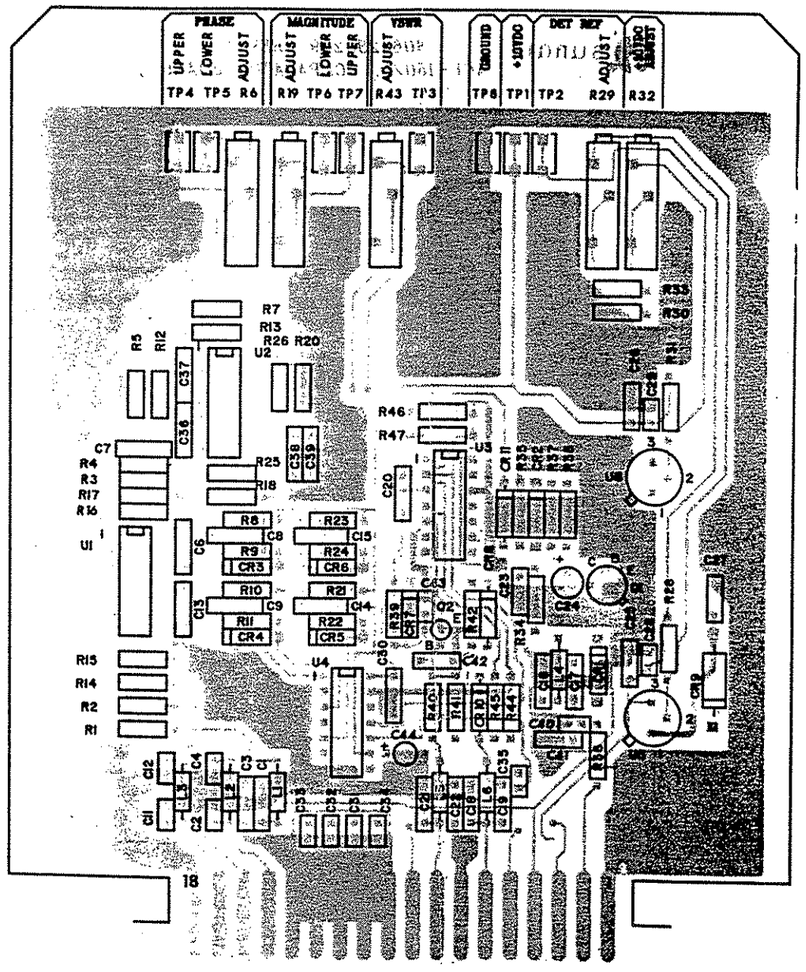


FIGURE 5.6 3A3 COMPARATOR BOARD



COMPONENT SIDE



CIRCUIT SIDE

8064230098A PC ASSY, COMPARATOR 3A3

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, COMPARATOR 3A3	8064230098
C1	Cap. 0.1µf, 50V, X7R, 20%	0281610002
C2	Cap. .01µf, 50V, X7R, 20%	0281730008
C3	Cap. 0.1µf, 50V, X7R, 20%	0281610002
C4	Cap. .01µf, 50V, X7R, 20%	0281730008
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
C11	Cap. .01µf, 50V, X7R, 20%	0281730008
C12	Cap. .01µf, 50V, X7R, 20%	0281730008
C13	Cap. 0.1µf, 50V, X7R, 20%	0281610002
C14	Cap. 0.1µf, 50V, X7R, 20%	0281610002
C15	Cap. 0.1µf, 50V, X7R, 20%	0281610002
C16	Cap. 0.1µf, 50V, X7R, 20%	0281610002
C17	Cap. 0.1µf, 50V, X7R, 20%	0281610002
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. 0.47µf, 50V, X5V, 20%	0283370009
C24	Cap. 6.8µf, 20V, T368	0296780006
C25	Cap. 0.47µf, 50V, X5V, 20%	0283370009
C26	Cap. 0.47µf, 50V, X5V, 20%	0283370009
C27	Cap. 0.47µf, 50V, X5V, 20%	0283370009
C28	Cap. .01µf, 50V, X7R, 20%	0281730008
C29	Cap. .01µf, 50V, X7R, 20%	0281730008
C30	Cap. 0.1µf, 50V, X7R, 20%	0281610002
C31	Cap. 0.001µf, 100V, X7R, 20%	0281630003
C32	Cap. 0.001µf, 100V, X7R, 20%	0281630003
C33	Cap. 0.001µf, 100V, X7R, 20%	0281630003
C34	Cap. 0.001µf, 100V, X7R, 20%	0281630003
C35	Cap. 0.001µf, 100V, X7R, 20%	0281630003
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. 0.001µf, 100V, X7R, 20%	0281630003
C41	Cap. 0.47µf, 50V, X5V, 20%	0283370009
C42	Cap. 0.47µf, 50V, X5V, 20%	0283370009
C43	Cap. 0.001µf, 100V, X7R, 20%	0281630003
C44	Cap. 1µf, 50V, 198D	0280910002
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, Signal, Germ. 1N542E	0405610009
CR9	Diode, Zener 1N5349A	0405380003
CR10	Diode, Signal, Germ. 1N542E	0405610009
CR11	Diode, Signal, Germ. 1N542E	0405610009
L1	Inductor, Molded, 22µh, 10%	0664060005
L2	Inductor, Molded, 22µh, 10%	0664060005
L3	Inductor, Molded, 22µh, 10%	0664060005
L4	Inductor, Molded, 22µh, 10%	0664060005
L5	Inductor, Molded, 22µh, 10%	0664060005
L6	Inductor, Molded, 22µh, 10%	0664060005
Q1	Transistor, NPN, SI, 2N2222A	0448580004
Q2	Transistor, NPN, SI, 2N4124	0448010003
R1	Resistor, 6.8K, 5%, ¼W	0174810008
R2	Resistor, 6.8K, 5%, ¼W	0174810008
R3	Resistor, 100, 5%, ¼W	0171180003
R4	Resistor, 2.2K, 5%, ¼W	0178070009
R5	Resistor, 10K, 1%, 1/8W	1003050026
R6	Pot. 5K, 10%, ¾W, 15 Turns	0338490086
R7	Resistor, 10K. 1%, 1/8W	1003050026

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R8	Resistor, 4.7K, 5%, ¼W	0170770001
R9	Resistor, 100K, 10%, ¼W	0170390004
R10	Resistor, 4.7K, 5%, ¼W	0170770001
R11	Resistor, 100K, 10%, ¼W	0170390004
R12	Resistor, 22M, 10%, ¼W	0180950002
R13	Resistor, 22M, 10%, ¼W	0180950002
R14	Resistor, 6.8K, 5%, ¼W	0174810008
R15	Resistor, 6.8K, 5%, ¼W	0174810008
R16	Resistor, 100, 5%, ¼W	0171180003
R17	Resistor, 2.2K, 5%, ¼W	0178070009
R18	Resistor, 10K, 1%, 1/8W	1003050026
R19	Pot. 5K, 10%, ¾W, 15 Turns	0338490086
R20	Resistor, 10K, 1%, 1/8W	1003050026
R21	Resistor, 4.7K, 5%, ¼W	0170770001
R22	Resistor, 100K, 10%, ¼W	0170390004
R23	Resistor, 4.7K, 5%, ¼W	0170770001
R24	Resistor, 100K, 10%, ¼W	0170390004
R25	Resistor, 22M, 10%, ¼W	0180950002
R26	Resistor, 22M, 10%, ¼W	0180950002
R28	Resistor, 330, 5%, ¼W	0170910008
R29	Pot. 500, 10%, ¾W, 15 Turns	0338490078
R30	Resistor, 560, 5%, ¼W	0183200004
R31	Resistor, 270, 10%, ¼W	0178450006
R32	Pot. 500, 10%, ¾W, 15 Turns	0338490078
R33	Resistor, 1.5K, 10%, ¼W	0172470005
R34	Resistor, 6.8K, 5%, ¼W	0174810008
R35	Resistor, 4.7K, 5%, ¼W	0170770001
R36	Resistor, 10, 5%, ¼W	0177160004
R37	Resistor, 1K, 10%, ¼W	0171560001
R38	Resistor, 1K, 10%, ¼W	0171560001
R39	Resistor, 15K, 10%, ¼W	0172350000
R40	Resistor, 15K, 10%, ¼W	0172350000
R41	Resistor, 150K, 10%, ¼W	0176750002
R42	Resistor, 22K, 5%, ¼W	0172230004
R43	Pot. 100K, 10%, ¾W, 15 Turns	0338450051
R44	Resistor, 15K, 10%, ¼W	0172350000
R45	Resistor, 15k, 10%, ¼W	0172350000
R46	Resistor, 2.2M, 10%, ¼W	0176870008
R47	Resistor, 4.7K, 5%, ¼W	0170770001
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
TP6	Test Point, White	0753640007
TP7	Test Point, White	0753640007
TP8	Test Point, White	0753640007
U1	IC. Linear UA747ADMQB	1006430024
U2	IC. Linear LM239AJ	1006430032
U3	IC. Linear LM239AJ	1006430032
U4	IC. Digital MC14584BAL	1006440003
U5	IC. Linear LM117	1006440011
U6	IC. Linear LM117	1006440011
	MISCELLANEOUS	
	Card Ejectors	1003320015
	Mounting Pad, Transistor	0502710004
	Shield, Front, Computer	8064220408
	Shield, Rear	8064220505

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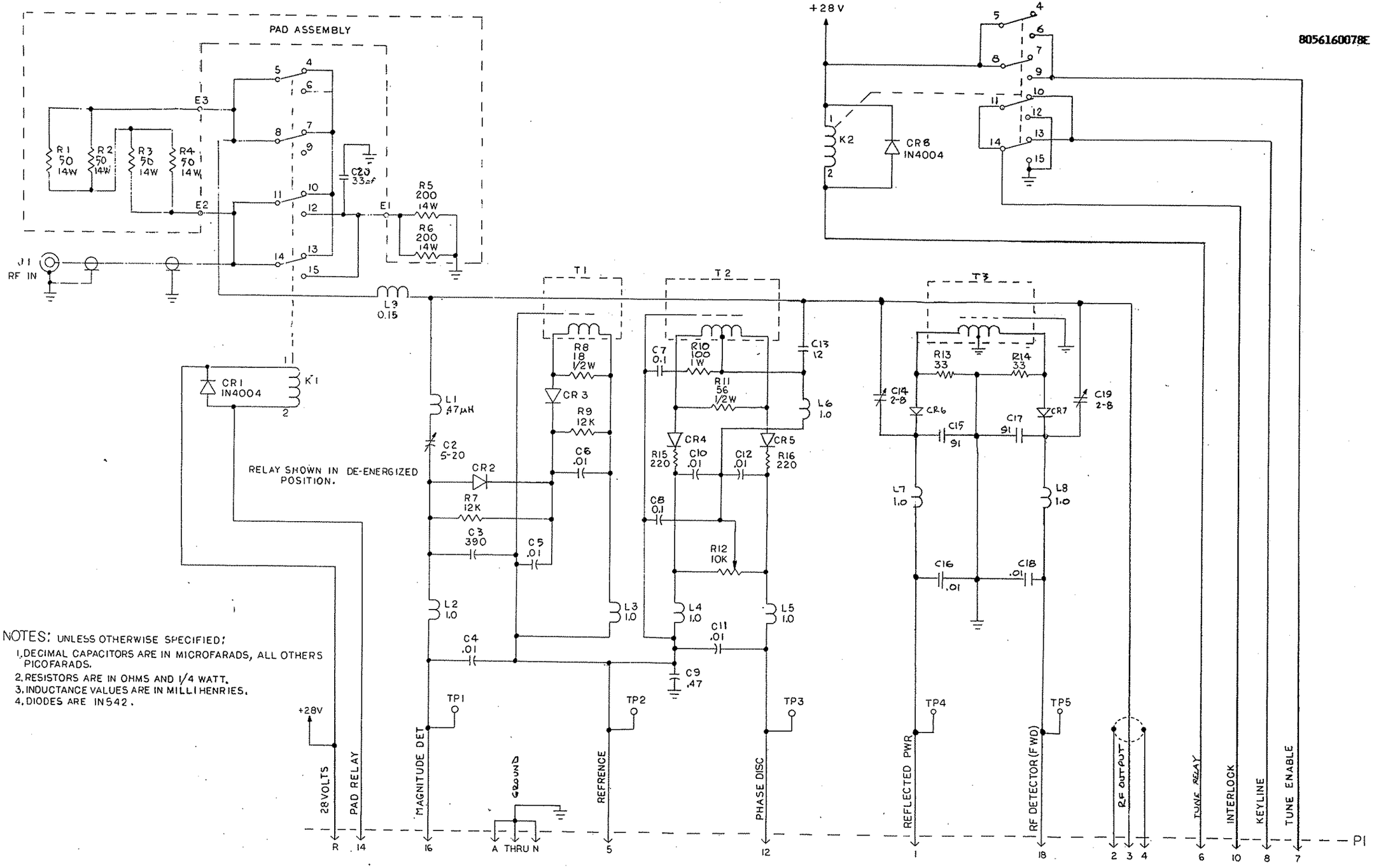
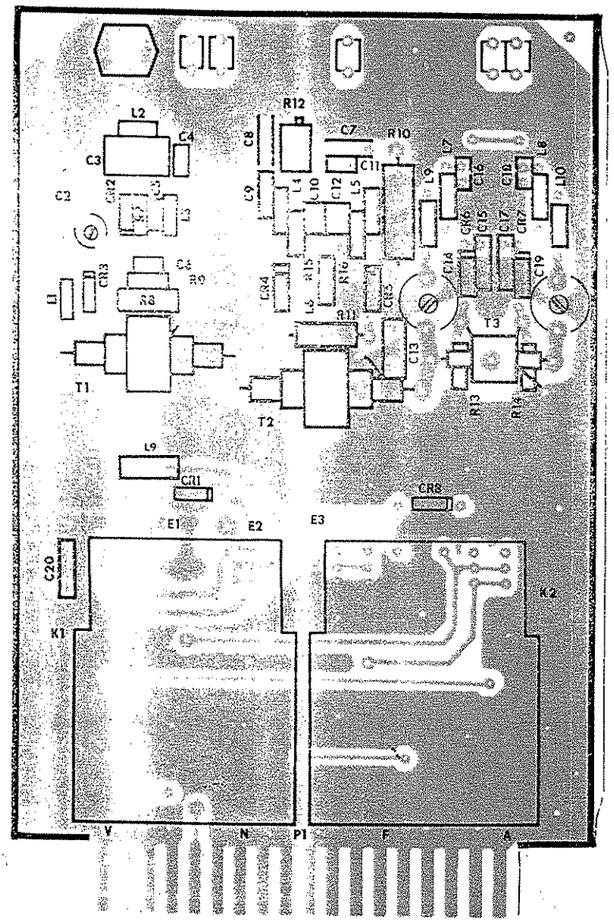
8056160078E



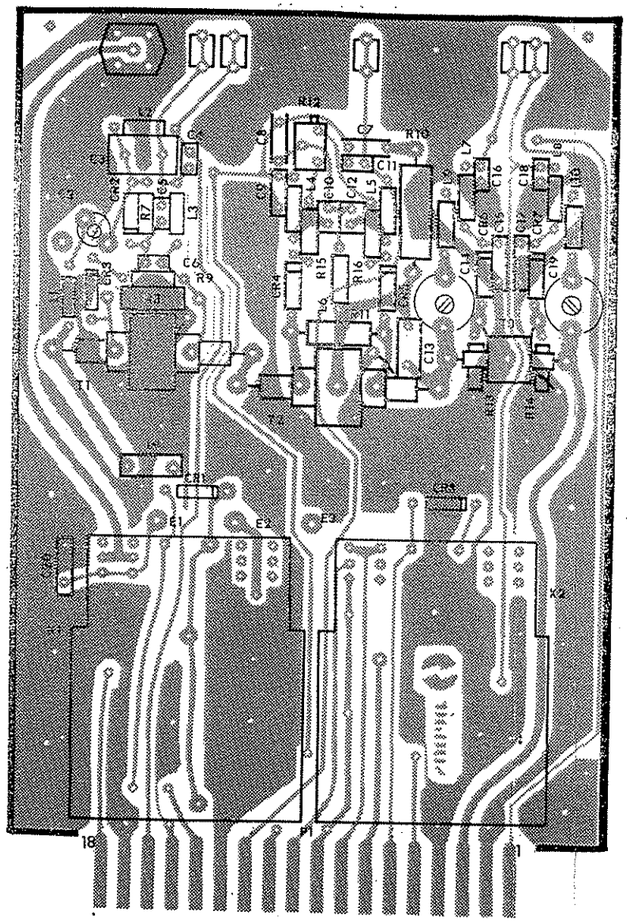
NOTES: UNLESS OTHERWISE SPECIFIED;

1. DECIMAL CAPACITORS ARE IN MICROFARADS, ALL OTHERS PICOFARADS.
2. RESISTORS ARE IN OHMS AND 1/4 WATT.
3. INDUCTANCE VALUES ARE IN MILLIHENRIES.
4. DIODES ARE IN542.

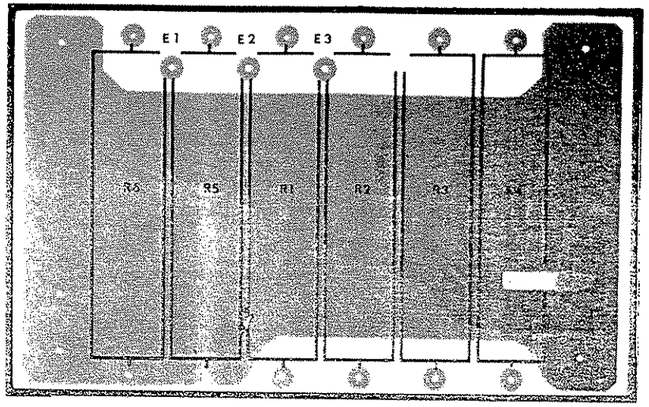
FIGURE 5.7 3A4 RF DETECTOR/PAD ASSEMBLY



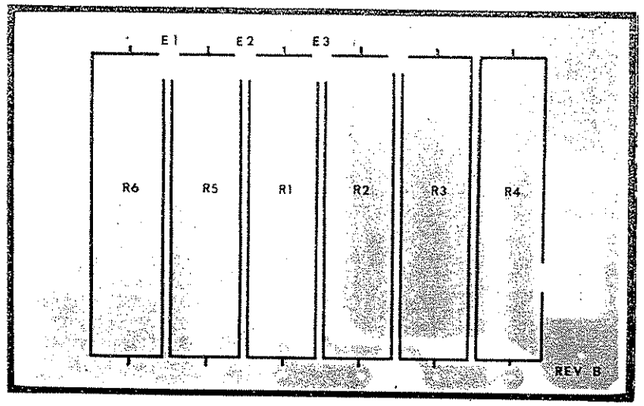
COMPONENT SIDE



CIRCUIT SIDE



COMPONENT SIDE



CIRCUIT SIDE

8056160094E PC ASSY, DETECTOR/PAD 3A4A1

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, DETECTOR/PAD	8056160094
3A4A2	PC Assy, Pad	8056161091
C2	Cap. 5-20pf, 100V, Ceramic	0282930001
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%	0283777771
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. .01µf, 50V, X7R, 20%	0281730008
C17	Cap. 91pf, 500V, DM15, 5%	0298740001
C18	Cap. .01µf, 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, Signal, Germ. 1N542E	0405610009
CR3	Diode, Signal, Germ. 1N542E	0405610009
CR4	Diode, Signal, Germ. 1N542E	0405610009
CR5	Diode, Signal, Germ. 1N542E	0405610009
CR6	Diode, Signal, Germ. 1N542E	0405610009
CR7	Diode, Signal, Germ. 1N542E	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
L9	Inductor, 0.15µh	8056162097
R7	Resistor, 12K, 10%, ½W	0183180003
R8	Resistor, 18, 5%, ½W	0184730007
R9	Resistor, 12K, 10%, ½W	0183180003
R10	Resistor, 100, 10%, 1W	0165540001
R11	Resistor, 56, 10%, ½W	0168890003
R12	Pot. 10K, 5%, 0.6W, 15 Turns	0344410005
R13	Resistor, 33, 10%, ½W	0182530001
R14	Resistor, 33, 10%, ½W	0182530001
R15	Resistor, 220, 10%, ½W	0171320000
R16	Resistor, 220, 10%, ½W	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
	MISCELLANEOUS	
	Socket, Pin	1005990034
	Socket, Relay, 4PDT Contacts	0754700003
	Spring, Relay, Hold-Down	0881930008

8056161091A PC ASSY, PAD 3A4A2

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, PAD 3A4A2	8056161091
R1	Resistor, 50, 5%, 1/4W	0191160008
R2	Resistor, 50, 5%, 1/4W	0191160008
R3	Resistor, 50, 5%, 1/4W	0191160008
R4	Resistor, 50, 5%, 1/4W	0191160008
R5	Resistor, 200, 5%, 1/4W	0197410006
R6	Resistor, 200, 5%, 1/4W	0197410006

8064260094A PC ASSY, RF DETECTOR, AIRBORNE 3A4

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, RF DETECTOR, AIRBORNE	8064260094
3A4A1	PC ASSY, Detector/Pad	8056160094
	Card Ejectors	1003320015

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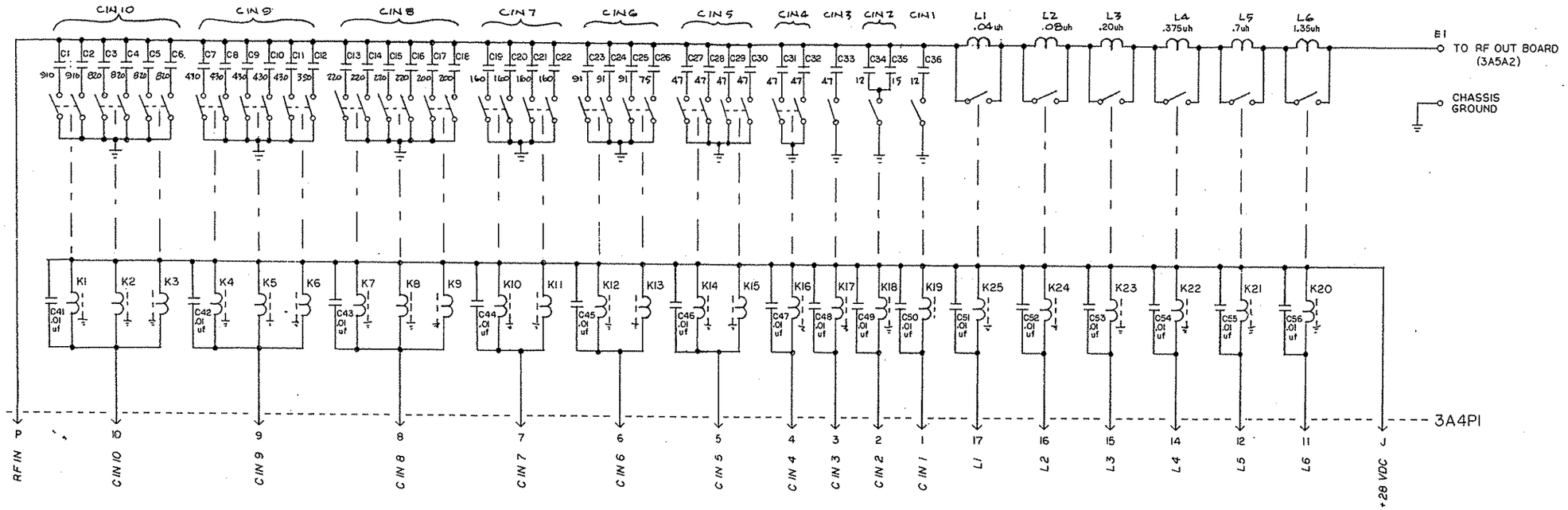

NOTE: UNLESS OTHERWISE SPECIFIED
(1) ALL CAPACITORS ARE IN PF

FIGURE 5.8 3A5A1 RF INPUT BOARD

COMPONENT SIDE

CIRCUIT SIDE

8064240093A PC ASSY, RF INPUT 3A5A1

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, RF INPUT 3A5A1	8064240093
C1	Cap. 910pf, 500V, DM19, 5%	0297570005
C2	Cap. 910pf, 500V, DM19, 5%	0297570005
C3	Cap. 820pf, 500V, DM19, 2%	0281280002
C4	Cap. 820pf, 500V, DM19, 2%	0281280002
C5	Cap. 820pf, 500V, DM19, 2%	0281280002
C6	Cap. 820pf, 500V, DM19, 2%	0281280002
C7	Cap. 430pf, 500V, DM19, 5%	0254900003
C8	Cap. 430pf, 500V, DM19, 5%	0254900003
C9	Cap. 430pf, 500V, DM19, 5%	0254900003
C10	Cap. 430pf, 500V, DM19, 5%	0254900003
C11	Cap. 430pf, 500V, DM19, 5%	0254900003
C12	Cap. 390pf, 500V, DM19, 2%	0282640002
C13	Cap. 220pf, 500V, DM15, 2%	0281420009
C14	Cap. 220pf, 500V, DM15, 2%	0281420009
C15	Cap. 220pf, 500V, DM15, 2%	0281420009
C16	Cap. 220pf, 500V, DM15, 2%	0281420009
C17	Cap. 200pf, 500V, DM15, 5%	0258040009
C18	Cap. 200pf, 500V, DM15, 5%	0258040009
C19	Cap. 160pf, 500V, DM15, 2%	0281340005
C20	Cap. 160pf, 500V, DM15, 2%	0281340005
C21	Cap. 160pf, 500V, DM15, 2%	0281340005
C22	Cap. 160pf, 500V, DM15, 2%	0281340005
C23	Cap. 91pf, 500V, DM15, 5%	0298740001
C24	Cap. 91pf, 500V, DM15, 5%	0298740001
C25	Cap. 91pf, 500V, DM15, 5%	0298740001
C26	Cap. 75pf, 500V, DM15, 2%	0281110000
C27	Cap. 47pf, 500V, DM15, 2%	0282420002
C28	Cap. 47pf, 500V, DM15, 2%	0282420002
C29	Cap. 47pf, 500V, DM15, 2%	0282420002
C30	Cap. 47pf, 500V, DM15, 2%	0282420002
C31	Cap. 47pf, 500V, DM15, 2%	0282420002
C32	Cap. 47pf, 500V, DM15, 2%	0282420002
C33	Cap. 47pf, 500V, DM15, 2%	0282420002
C34	Cap. 12pf, 500V, DM15	1005320039
C35	Cap. 15pf, 500V, DM15	1005320021
C36	Cap. 12pf, 500V, DM15	1005320039
C41	Cap. 0.01µf, 100V, Z5V	0273210009
C42	Cap. 0.01µf, 100V, Z5V	0273210009
C43	Cap. 0.01µf, 100V, Z5V	0273210009
C44	Cap. 0.01µf, 100V, Z5V	0273210009
C45	Cap. 0.01µf, 100V, Z5V	0273210009
C46	Cap. 0.01µf, 100V, Z5V	0273210009
C47	Cap. 0.01µf, 100V, Z5V	0273210009
C48	Cap. 0.01µf, 100V, Z5V	0273210009
C49	Cap. 0.01µf, 100V, Z5V	0273210009
C50	Cap. 0.01µf, 100V, Z5V	0273210009
C51	Cap. 0.01µf, 100V, Z5V	0273210009

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
C52	Cap. 0.01µf, 100V, Z5V	0273210009
C53	Cap. 0.01µf, 100V, Z5V	0273210009
C54	Cap. 0.01µf, 100V, Z5V	0273210009
C55	Cap. 0.01µf, 100V, Z5V	0273210009
C56	Cap. 0.01µf, 100V, Z5V	0273210009
K1	Relay, Reed, 24V, 2 Form A	1005900027
K2	Relay, Reed, 24V, 2 Form A	1005900027
K3	Relay, Reed, 24V, 2 Form A	1005900027
K4	Relay, Reed, 24V, 2 Form A	1005900027
K5	Relay, Reed, 24V, 2 Form A	1005900027
K6	Relay, Reed, 24V, 2 Form A	1005900027
K7	Relay, Reed, 24V, 2 Form A	1005900027
K8	Relay, Reed, 24V, 2 Form A	1005900027
K9	Relay, Reed, 24V, 2 Form A	1005900027
K10	Relay, Reed, 24V, 2 Form A	1005900027
K11	Relay, Reed, 24V, 2 Form A	1005900027
K12	Relay, Reed, 24V, 2 Form A	1005900027
K13	Relay, Reed, 24V, 2 Form A	1005900027
K14	Relay, Reed, 24V, 2 Form A	1005900027
K15	Relay, Reed, 24V, 2 Form A	1005900027
K16	Relay, Reed, 24V, 2 Form A	1005900027
K17	Relay, Reed, 24V, 1 Form A	1005910006
K18	Relay, Reed, 24V, 1 Form A	1005910006
K19	Relay, Reed, 24V, 1 Form A	1005910006
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
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
L1	Inductor, 0.04µh	8064240506
L2	Inductor, 0.08µh	8064240603
L3	Inductor, 0.20µh	8064240701
L4	Inductor, 0.375µh	8064240808
L5	Inductor, 0.70µh	8064240905
L6	Inductor, 1.35µh	8064241006

8064203091A RF ASSEMBLY 3A5

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	RF ASSEMBLY 3A5	8064203091
3A5A1	PC Assy, RF Input	8064240093
3A5A2	PC Assy, RF Output	8064250099
	MISCELLANEOUS	
	Bracket, PC Board	8064203201
	Spacer, Insulator, Snap-In	1006300023

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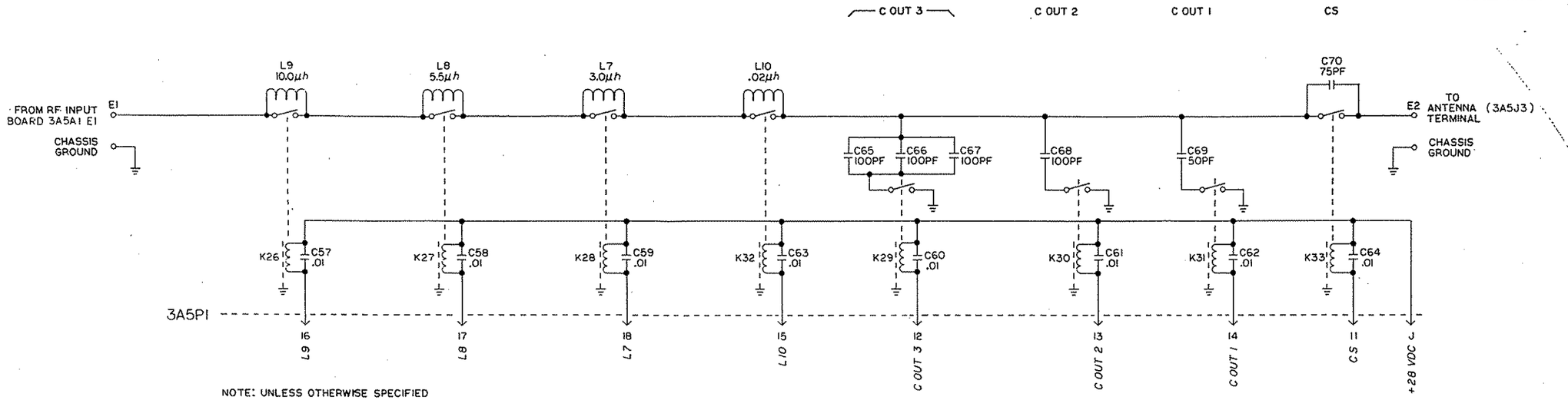
8064250072A



NOTE: UNLESS OTHERWISE SPECIFIED
(1) ALL CAPS ARE IN µF

8064250099A PC ASSY, RF OUTPUT 3A5A2

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY, RF OUTPUT 3A5A2	8064250099
C57	Cap. 0.01µf, 100V, Z5V	0273210009
C58	Cap. 0.01µf, 100V, Z5V	0273210009
C59	Cap. 0.01µf, 100V, Z5V	0273210009
C60	Cap. 0.01µf, 100V, Z5V	0273210009
C61	Cap. 0.01µf, 100V, Z5V	0273210009
C62	Cap. 0.01µf, 100V, Z5V	0273210009
C63	Cap. 0.01µf, 100V, Z5V	0273210009
C64	Cap. 0.01µf, 100V, Z5V	0273210009
C65	Cap. 100pf, 5KV, N750	0290440009
C66	Cap. 100pf, 5KV, N750	0290440009
C67	Cap. 100pf, 5KV, N750	0290440009
C68	Cap. 100pf, 5KV, N750	0290440009
C69	Cap. 50pf, 7.5KV, NPO	0290200008
C70	Cap. 75pf, 7.5KV, N750	0290560004
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
K30	Relay, Reed, HV, 24V, 1 Form A	1005920001
K31	Relay, Reed, HV, 24V, 1 Form A	1005920001
K32	Relay, Reed, HV, 24V, 1 Form A	1005920001
K33	Relay, Reed, HV, 24V, 1 Form A	1005920001
L7	Inductor, 3.0µh	8064250706
L8	Inductor, 5.5µh	8064250609
L9	Inductor, 10.0µh	8064250501
L10	Inductor, 0.02µh	8064250803

FIGURE 5.9 3A5A2 RF OUTPUT BOARD

C67
C66
C65
C68
C69
C70
ANTENNA TERMINAL
C64
K33
C60
K29
C61
K30
C62
K31
C63
K32
L10
L7
C59
L8
K28
L9
K27
C58
C57
K26
A
V
COMPONENT SIDE

C67
C66
C65
C68
C69
C70
ANTENNA TERMINAL
C64
K33
C60
K29
C61
K30
C62
K31
C63
K32
L10
L7
C59
L8
K28
L9
K27
C58
C57
K26
18
1
CIRCUIT SIDE