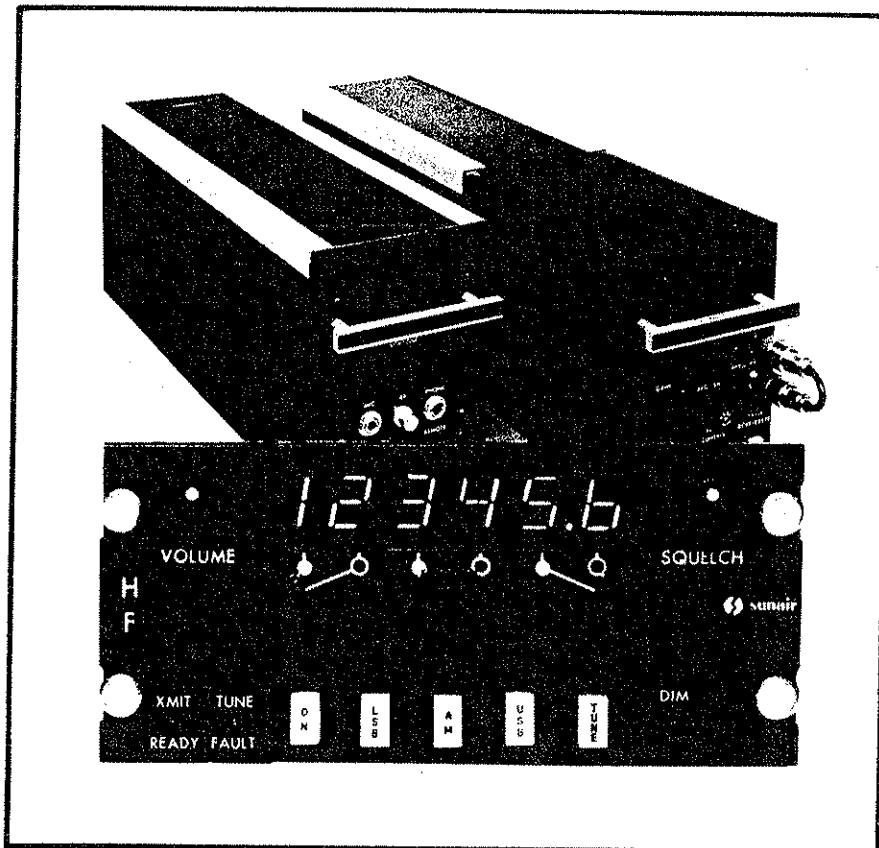


SUNAIR ELECTRONICS LLC 3400 SW 60TH Ave. Ocala, FL. 34474 USA



**OPERATION AND
MAINTENANCE MANUAL**

**AIRBORNE TRANSCEIVER
HF/SSB SYNTHESIZED**

ASB - 850

SECOND EDITION OCTOBER 1981
MANUAL PART NUMBER 8033000708



PRODUCT SERVICE:

In case of difficulty please contact the Sunair Product Service Department between the hours of 8:00 AM and 5:00 PM Eastern Time, or write to:

Product Service Dept.
Sunair Electronics, LLC
3400 SW 60th Ave.
Ocala, Fl. 34474
U.S.A.

Telephone: (352) 873-4000

Fax: (352) 854-6238

Email: Techsupport@sunairelectronics.com

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SECTION 1

GENERAL INFORMATION

1.1 SCOPE

The installation manual contains the necessary information to install and operate the ASB-850 Airborne Transceiver. The maintenance manual contains additional information necessary to test and repair the transceiver.

1.2 TRANSCEIVER DESCRIPTION

1.2.1 GENERAL

The ASB-850 is a high quality single sideband transceiver covering the frequency range of 2.0000 to 29.9999 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 100 Hz steps. The unit is designed to meet FCC requirements for Part 87, and FAA TSO C31c and C32c.

The ASB-850 is composed of three major assemblies, the Receiver/Exciter (RE-800), the Remote Control Head (SCU-80), and the Amplifier/Coupler (ACU-810).

1.2.2 RECEIVER/EXCITER - 1A

The receiver/exciter contains the synthesizer and all low level transmit and receive circuitry. The synthesizer provides the local oscillation frequency (selected from the Remote Control Head) in 100 Hz steps. All frequencies are derived from a Temperature Compensated Crystal Oscillator (TCXO) which provides instant on frequency operation with no warm up. The frequency stability is better than $\pm 0.6 \times 10^{-6}$ Hz over the full specified ambient temperature range of the radio. The long term stability is $\pm 5 \times 10^{-7}$ per year, permitting long intervals between calibration.

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 I.F. is well above the 30 MHz upper limit of the transceiver, providing the unusually high spurious signal rejection found only in this frequency scheme.

A bandpass filter module is included in the receiver/exciter unit to remove harmonics from the exciter and eliminate out of band interference in the receiver.

A plug-in switching regulator assembly, efficiently converts the 27.5 VDC aircraft power to + 12 VDC and + 5 VDC for use by the low level circuitry and digital integrated circuits.

A speech compressor and receiver squelch are supplied on a plug-in board. This board may be rewired to provide r.f. gain control in place of squelch, if desired.

1.2.3 REMOTE CONTROL - 2A

The remote control head contains the switches which supply digital frequency information to the synthesizer in the receiver/exciter 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.

1.2.4 AMPLIFIER/COUPLER - 3A

This unit takes the low level rf signal from the receiver/exciter unit and increases the power level to 100 watts PEP. The amplifier output is routed through a low pass filter module to suppress the harmonics, and then fed to the automatic antenna coupler, where it is impedance matched to the antenna. The power amplifier is an all solid state linear

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broadband unit with no frequency dependent components. The unit is cooled by an integral heatsink and is protected from damage by internal Automatic Level Control (ALC) circuits.

The antenna coupler is connected to the 50 ohm

power amplifier output and automatically matches the antenna impedance to 50 ohms.

The coupler is designed to tune the wide variety of HF antennas that are installed on various aircraft. See para 2.8 for antenna types.

1.3 TECHNICAL SPECIFICATIONS

Electrical and physical specifications of the Sunair ASB-850 Transceiver are listed below.

1.3.1 GENERAL**APPROVALS:**

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

FREQUENCY RANGE:

2.0 to 29.9999 MHz (100 Hz Increments).

NUMBER OF CHANNELS:

280,000. Synthesized.

FREQUENCY RESOLUTION:

100 Hz.

FREQUENCY STABILITY:

± 20 Hz maximum over rated temperature range.

OPERATING MODES:

USB, LSB, AME.

DUTY CYCLE:

Voice, Continuous.

ENVIRONMENTAL CATEGORY:

BAAAAX, TSO C31c and C32c

ALTITUDE:

30,000 Ft.

TEMPERATURE:

Non-operating: - 50°C 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 500 Hz 1.5G max.
0.25 max acceleration (TSO Cat. C).

HUMIDITY:

95% at 50°C

SHOCK: 6g peak, 11ms duration.

CRASH SAFETY:

15g peak, 11ms duration.

POWER INPUT:

27.5 VDC + 10%, - 20%, at 2.0 amp receive.
14 amp peak transmit.

DIMENSIONS:

Rcvr/Exctr: 1/2 ATR long case.
4.875W X 7.62H X 16.8L (inches)
12.38W X 19.37H X 42.67L (CM).
Add 1.6" H (4.13 cm) for shockmount.
Amp/Cplr: 1/2 ATR long case.
4.875W X 7.625H X 19.8L (inches)
12.38W X 19.37H X 50.29L (CM)
Add 1.6" H (4.13 cm) for shockmount.
Control Head: 5.75W X 2.625H X 5.0L (inches)
14.6W X 6.67H X 12.7D (CM).

WEIGHT:

Rcvr/Exctr: 16.0 lbs (7.3 kg); 17.6 lbs (8 kg)
with shockmount.
Amp/Cplr: 22.0 lbs (10 kg); 24 lbs (10.9 kg)
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 $\frac{S+N}{N}$
AM: 3.0 uv max into 50 ohms for 10 db $\frac{S+N}{N}$

SELECTIVITY:

SSB: 350 Hz maximum to 2500 Hz
minimum
6.0 kHz max at - 60db.
AM: 5.0 kHz minimum @ - 6db
20 kHz maximum at - 60db.

AUDIO OUTPUT:

50 mw into 600 ohms and 150 ohms.
unbalanced.

AUDIO DISTORTION:

Less than 10% at 50 mw.

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GAIN:

10 uv nominal for 50 mw Audio Output.

IF REJECTION: Not less than -70db.

IMAGE REJECTION:

Not less than -80db.

AGC:

Fast attack, slow release, threshold 5 uv nominal: 10db audio change for 94db rf input change.

INTERNAL SPURIOUS RESPONSE:

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

EXTERNAL SPURIOUS RESPONSE:

-65db below 10db $\frac{S + N}{N}$ reference.

1.3.3 TRANSMITTER

POWER OUTPUT:

SSB: 100 watts PEP $\pm$ 1db

AM: 40 watts carrier, nominal.

HARMONIC & SPURIOUS SUPPRESSION: -40db.

CARRIER SUPPRESSION: - 40 db.

UNDESIRE SIDE BAND SUPPRESSION:

- 50 db @ 1.5 kHz.

INTERMODULATION DISTORTION:

- 29 db below 2 tone PEP output.

HUM AND NOISE LEVEL: - 40 db.

1.3.4 ANTENNA COUPLER

RF POWER CAPABILITY: 100 watts average.

VSWR:

1.3:1 or better typical: 1.5:1 maximum.

TUNING TIME:

3 seconds typical, 30 seconds maximum. *

*For standard test conditions using the following test antenna impedances:

a) 10 ft. grounded.

b) 29 ft. grounded.

c) 8 ft. grounded

d) Jetstar.

3) Mystere 20.

f) 707 tailprobe.

g) 34 ft. grounded.

For some frequency-impedance combinations with other antennas, the tuning time may exceed 30 seconds.

ANTENNA MATCHING CAPABILITY:

Wire: 8 ft. to 80 ft. (2.4 m to 24.4 m) grounded and ungrounded, Vee and long wire.

Whip: 8 ft. (2.4 m) and longer.

Integral airframe, shunt and notch.

1.4 EQUIPMENT SUPPLIED

The following table is a list of equipment, with their Sunair part numbers, supplied with the ASB-850 Transceiver System.

	Sunair Part No.
1.41 Receiver/Exciter Assembly, RE-800	8033100095
1.42 Remote Control Head, SCU-80	8033200090
1.4.3 Amplifier/Coupler Assembly, ACU-810	8033300094
1.4.4 Operation and Maintenance Manual	8033000708
1.4.5 Installation Kit,	8033001593
Clamp, Cable, Connector	0740250001
Connector, RF, BNC UG-88/U	0744030005
Connector, RF, HN UG-59B/U MOD	0753160005
Clamp, Cable, Connector	0754270009
Connector, Power, 26 Pin Round	0754470008
Connector, Power, 55 Pin Round	0754490009
Connector, Power, 61 Pin Round	0754510000
Connector, Power, 2 Pin Round	0754530001
Connector, Power, 26 Pin Round	0754540006
Connector, Power, 14 Pin Rect.	0754940004
Reducing Adapter	1001250001
Reducing Adapter	1001250028
Cable Assy. UHF, 5 in Long	1001360001
Manual, Maintenance, ASB-850	8033000708
Mtg Rack Assy, RCV/Exc, RE-800	8033002794
Mtg Rack Assy, PA/CPLR, ACU-810	8033003791
Strap, Ground	8033390603
Connector, HN Adaptor	8042390700

1.5 EQUIPMENT REQUIRED BUT NOT SUPPLIED

1.5.1 Antenna, wire or integral air frame.	
1.5.2 Microphone, noise cancelling.	
1.5.3 600 ohm Headphones or Speaker Driver and Speaker.	
1.5.4* Cable, Control, ACU-810/RE-800	8040007003
1.5.5 Cable, Control, SCU-80/RE-800	8040007500
1.5.6 Cable, Power, ACU-810	8033008504

1.5.7	Cable, Coax, RG-58	0588130001
1.5.8	Cable, SCU-80 Audio to Aircraft System	Installer fabricated

* All cables may be fabricated by the installer in accordance with figure 2.8.

1.6 OPTIONAL EQUIPMENT - NOT SUPPLIED

1.6.1	Encapsulated Anti-Precipitation Static Wire Antenna Kit	0951580001
1.6.2	Microphone, Noise Cancelling	0871510006
1.6.3	Field Module Kit, ASB-850	8033900091
1.6.4	Depot Spares Kit, ASB-850	8033900598
1.6.5	Low Profile All Attitude Vibration Isolator Kit	8033003804
1.6.6	Ancillary Kit	8033100893
	consists of:	
	Tool, Alignment	0878380001
	Tool, Alignment	0878400001
	Key, Hex Socket, Allen	0882100009
	Key, Spline, 6 Flute	0882460005
	Card Extender	5024003098
	Card Extender	8033101598
	Card Extender	8033393114
1.6.7	Headphones	0840180004
1.6.8	RG-8 Coaxial Cable	0588640000
1.6.9	LSB Crystal Filter, 10.5 Mhz	8033005092

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 hook-ups, 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 when there are visible signs of damage to the cartons until a complete inspection is made. If there is a shortage of items or any evidence of damage 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 cartons for the ASB-850 have 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, please ship **AIR PARCEL POST** consigned to:

SUNAIR ELECTRONICS, INC.
3101 SW 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 EQUIPMENT"

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

Satisfactory operation of this equipment will depend upon the care and thoroughness taken during installation.

2.4.1 GENERAL INSTALLATION

a. Carefully plan the Amplifier/Coupler 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, 6 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 3 feet can cause large losses, particularly at the antenna resonant and antiresonant frequencies, when VSWR exceeds 10.

b. The location of the Receiver/Exciter unit is not critical, and may be placed anywhere there is available space within the fuselage.

NOTE

Installation of the Amplifier/Coupler and Receiver/Exciter must conform to the Altitude/Temperature restrictions detailed in the equipment specifications.

c. Install the Remote Control Head in the cockpit in any convenient location.

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

2.5 POWER REQUIREMENTS

The ASB-850 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 Receiver/Exciter receives aircraft 28V through a 5A SB fuse mounted in the PA/Cplr. 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 PA/Cplr is fed through a 10A SB fuse located in the PA/Cplr.

2.6 GROUNDING REQUIREMENTS

2.6.1 GENERAL

It is very important that all ground straps provided on the mounting racks and the ground strap attached to the rear panel of the PA/Cplr be securely connected to the aircraft frame. The radiation resistance of some aircraft antennas is quite low, sometimes less than 1 ohm at the lower frequencies. In order not to decrease the efficiency the bonding straps from the PA/Cplr must be very securely bonded to the aircraft such that the resistance readings should be in the order of 1 milliohm or less from the aircraft frame to the ground portion of the antenna RF output connector, 3A1J6. Connecting all ground straps properly should result in an adequate ground system.

2.7 CABLE FABRICATION

2.7.1 GENERAL

The cables listed in paragraph 1.5 must be wired to their appropriate connections as shown in Figure 2.8 Interconnect Wiring Diagram. Cable Fabrication is shown in Figure 2.9.

All cables are available from Sunair with the exception of the audio wiring from the 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.

2.7.2 CHECKS AFTER FABRICATION

2.7.2.1 SYNTHESIZER PROGRAMMING

Each cable must be checked for continuity and shorts to other pins. All wiring 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 exciter frequency be checked with a counter as each decade frequency must be checked from 0 to 9 to verify that the wiring of cable 8040007500 is correct. See Figure 2.1 for a recommended test set-up to verify operation on the bench.

Rotate each frequency switch through all 10 positions and check for the correct frequency readout on the counter.

2.7.2.2 BAND SWITCHING

Bandpass filters are located in the exciter unit at the exciter output and low pass filters are located in the PA/Cplr unit at the output of the power amplifier. 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 power output of the PA in each band.

Bands are divided as shown below:

Freq. MHz	Band
2 - 3	1
3 - 4	2
4 - 6	3
6 - 9	4
9 - 13	5
13 - 20	6
20 - 30	7

Connect the equipment as shown in Figure 2.2.

Turn equipment ON and set mode switch to AM and set frequency for the middle of each band. Key microphone and check for power output in each band. If the bands are not being switched properly the power will be essentially zero on the watt meter in the non-operating band. Note: The

PA filters are of the low pass type so a low band frequency could pass through a higher band but not the reverse.

2.7.2.3 MISCELLANEOUS CHECKS

Other functions that must be verified are shown in chart form below. Functions such as audio, squelch, etc are self explanatory and are not shown.

	Symptoms of Incorrect Wiring
1 - VHF VCO Steer.	Sluggish frequency lock or failure to lock.
2 - LO Digit Steer.	Same as 1.
3 - Tune Command	Failure of Coupler to start tuning.
4 - Fault Indication	No fault light when system first tuned on.
5 - Tune Indication	No tune light and no fault light after coupler has successfully tuned antenna.
6 - ACC	AM power output excessively high, over 50 watts.
7 - ALC (V)	No SSB power control, signal flat tapping and excessive power reading on wattmeter when talking into microphone (over 50 watts).

2.8 ANTENNA INSTALLATION

2.8.1 GENERAL

The installation of a high frequency antenna on an aircraft involves the consideration of several factors. The shape or configuration of the antenna must allow the transceiver to transmit and receive as required by the user. The user or aircraft owner also usually has a requirement regarding appearance and flight qualities of the antenna and of course these should be considered by the installer also. However, as occurs in most things in nature,

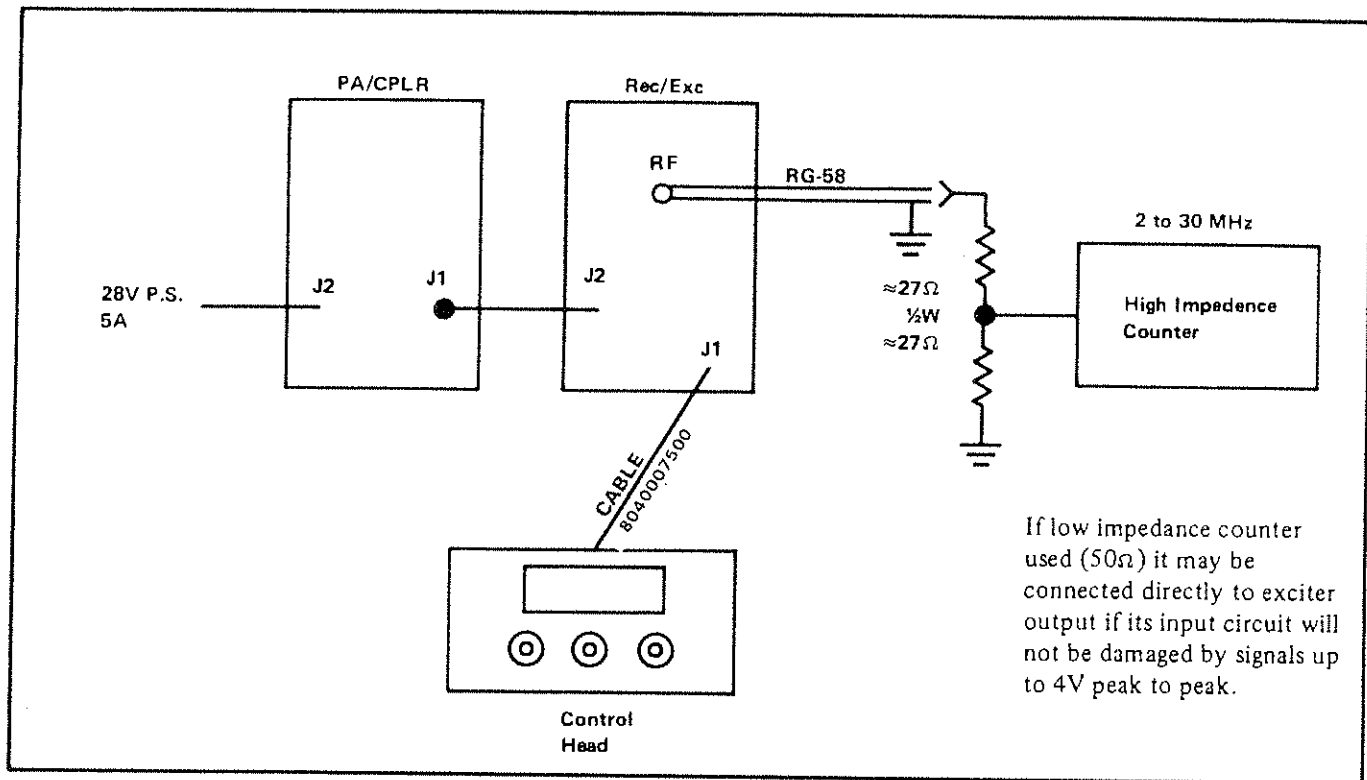


Figure 2.1 Test Set-up To Check Synthesizer Programming

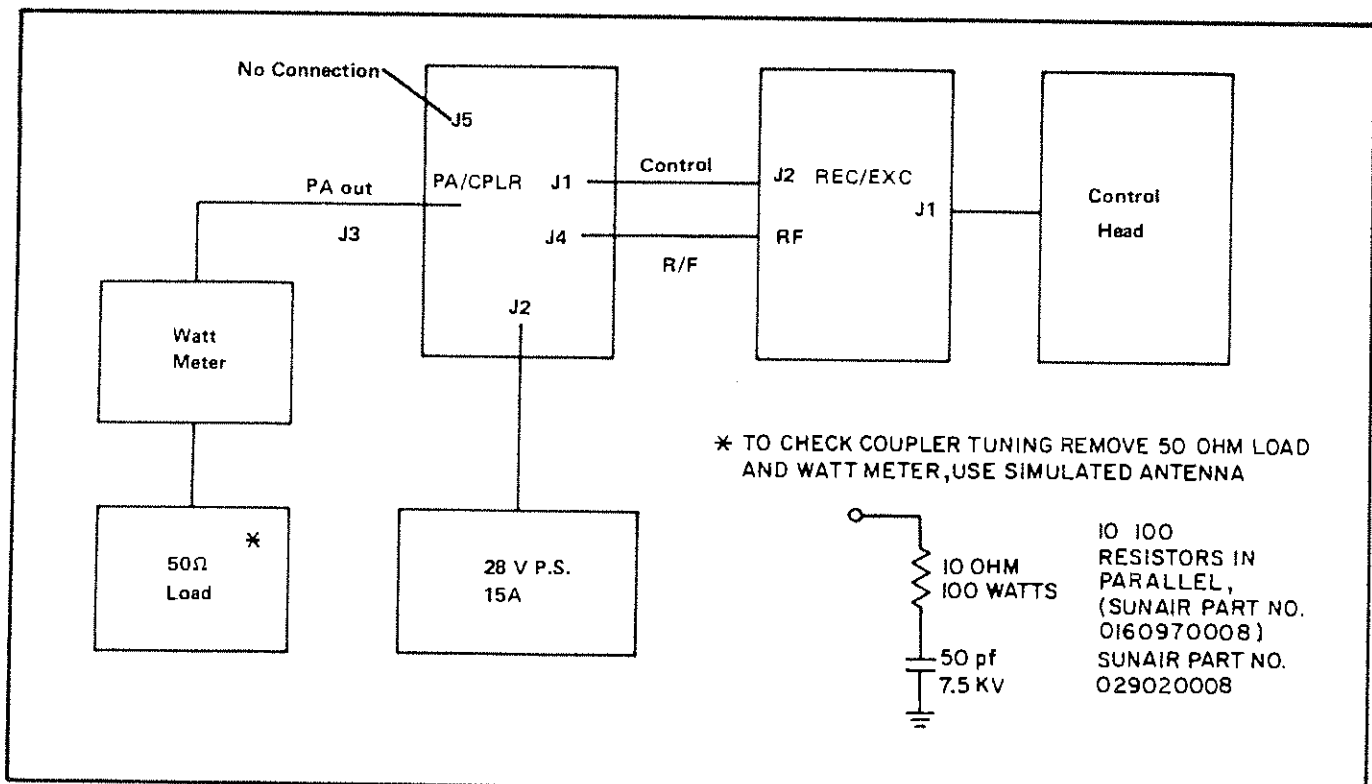


Figure 2.2 Band Switching Test Set-up

what is best for one parameter is not best for another. The HF antenna is no exception. What sometimes occurs is that the length, shape (configuration) and location of the antenna on an aircraft is something very visible and these factors receive the major consideration. The communications performance of the antenna is not readily apparent or known, particularly at the time of installation and decisions are made regarding the antenna installation which later prove to be bad for system operation. The solution then is to select an antenna that does not overly favor any factor to the detriment of the other factors.

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 type of 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 users 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 would require 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 capabilities. 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

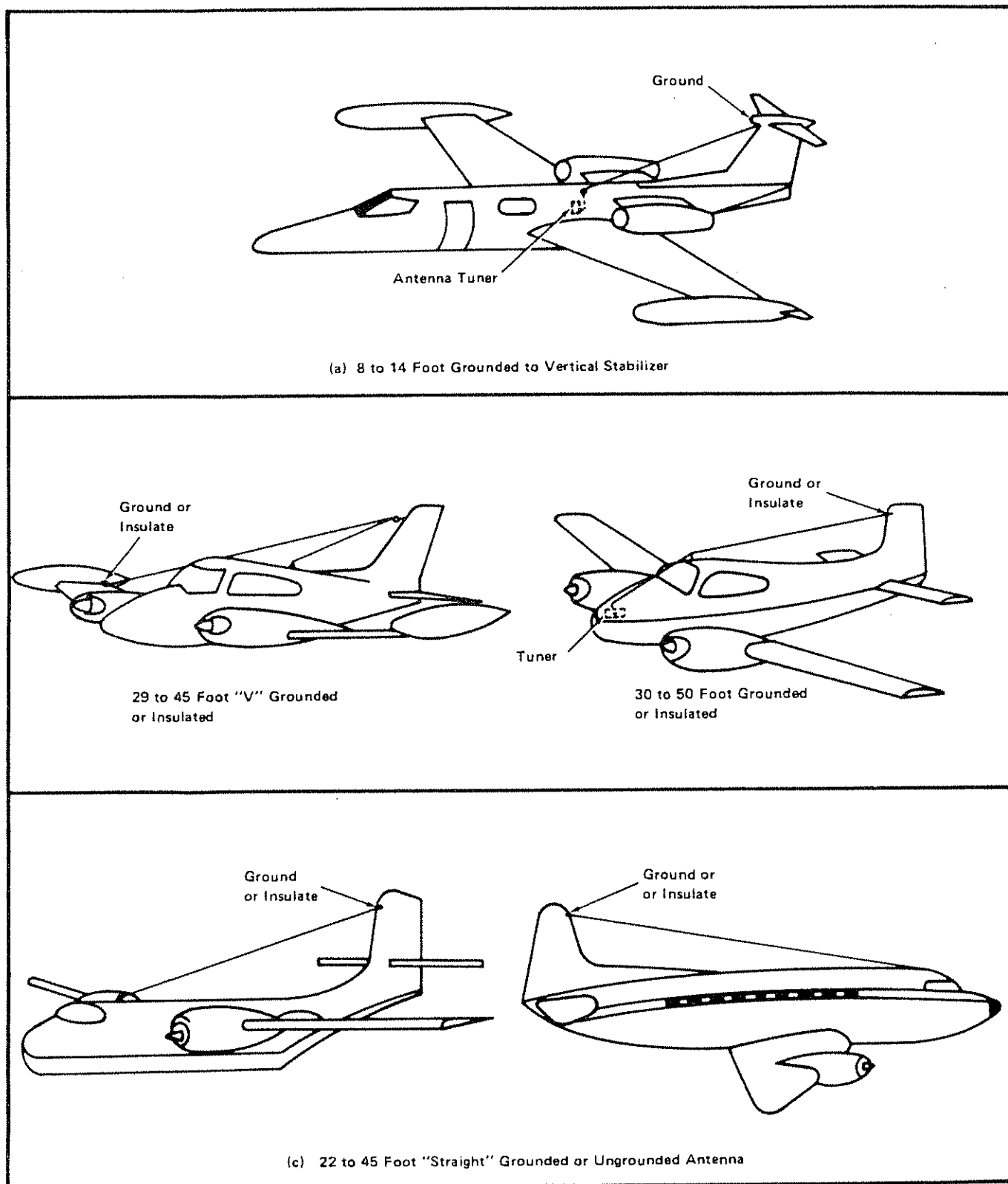
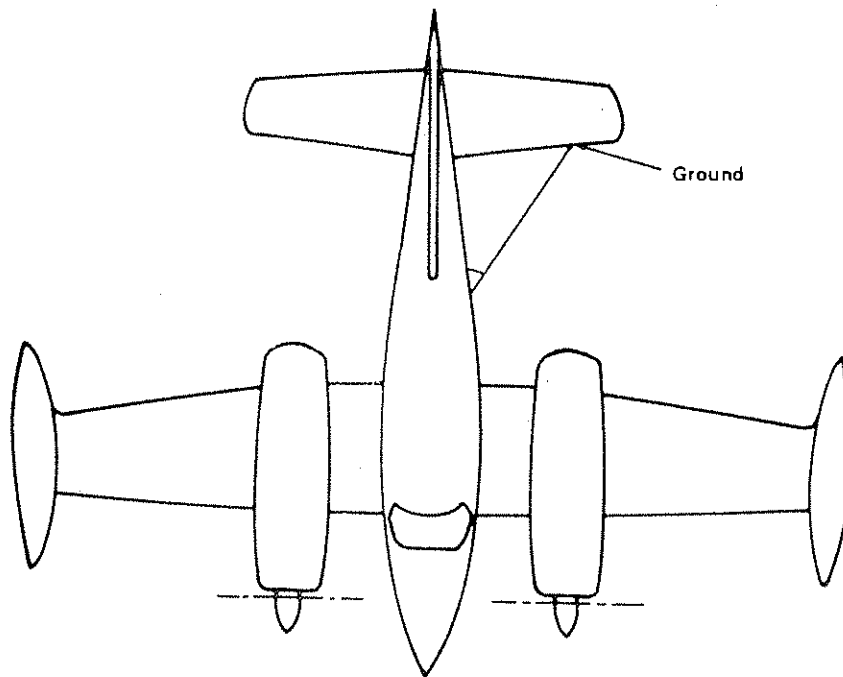
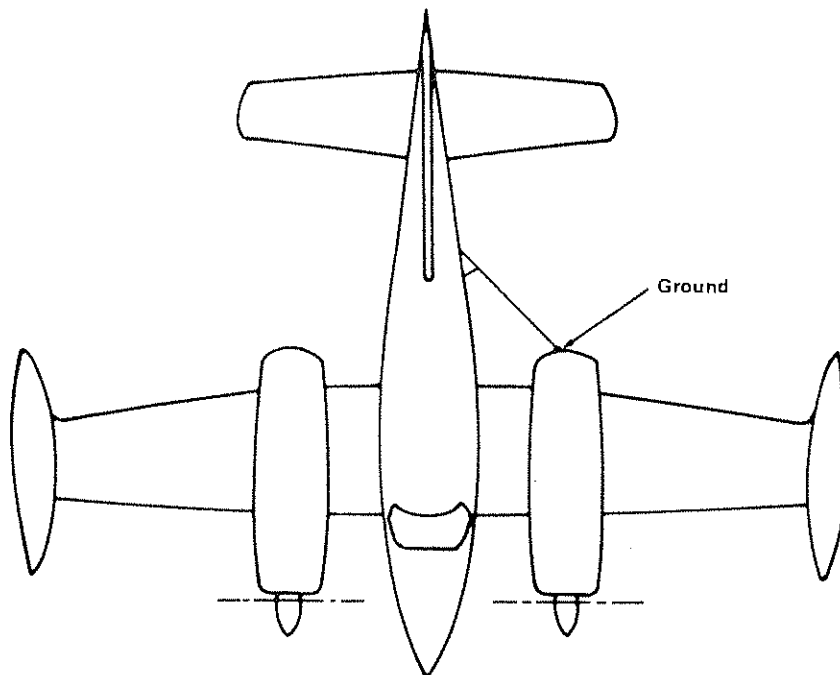


Figure 2.3 Typical Antenna Configurations

TYPICAL ANTENNA CONFIGURATION



(a) 10 to 20 Foot To Horizontal Stabilizer



(b) 10 to 20 Foot To Wing

Figure 2.3 Typical Antenna Configurations (Cont.)

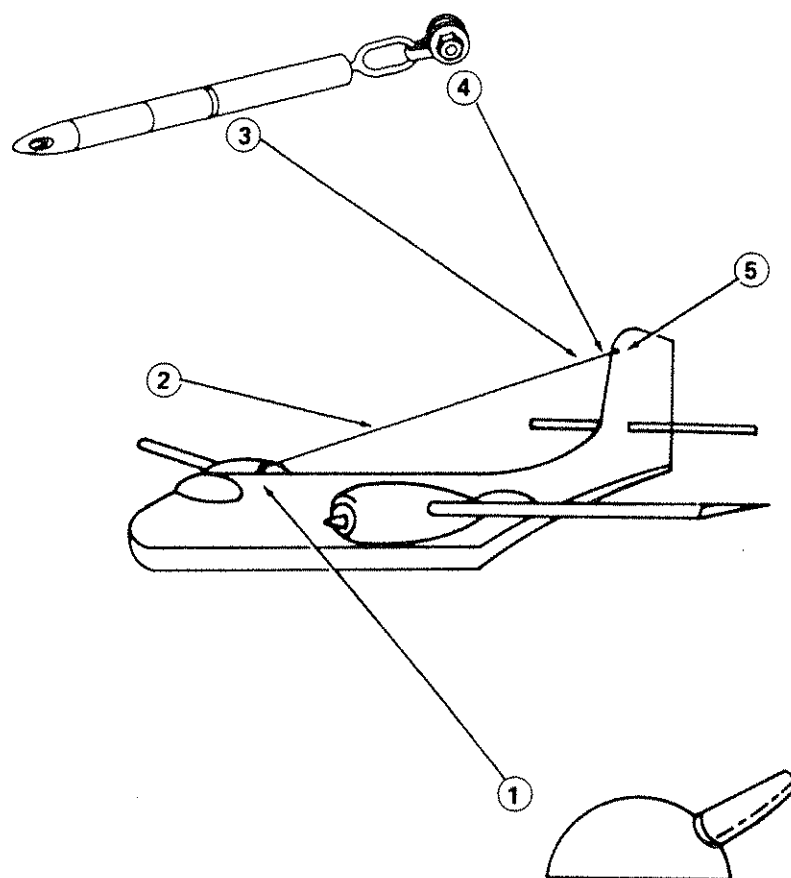


Figure 2.4 Antenna Kit Installation

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

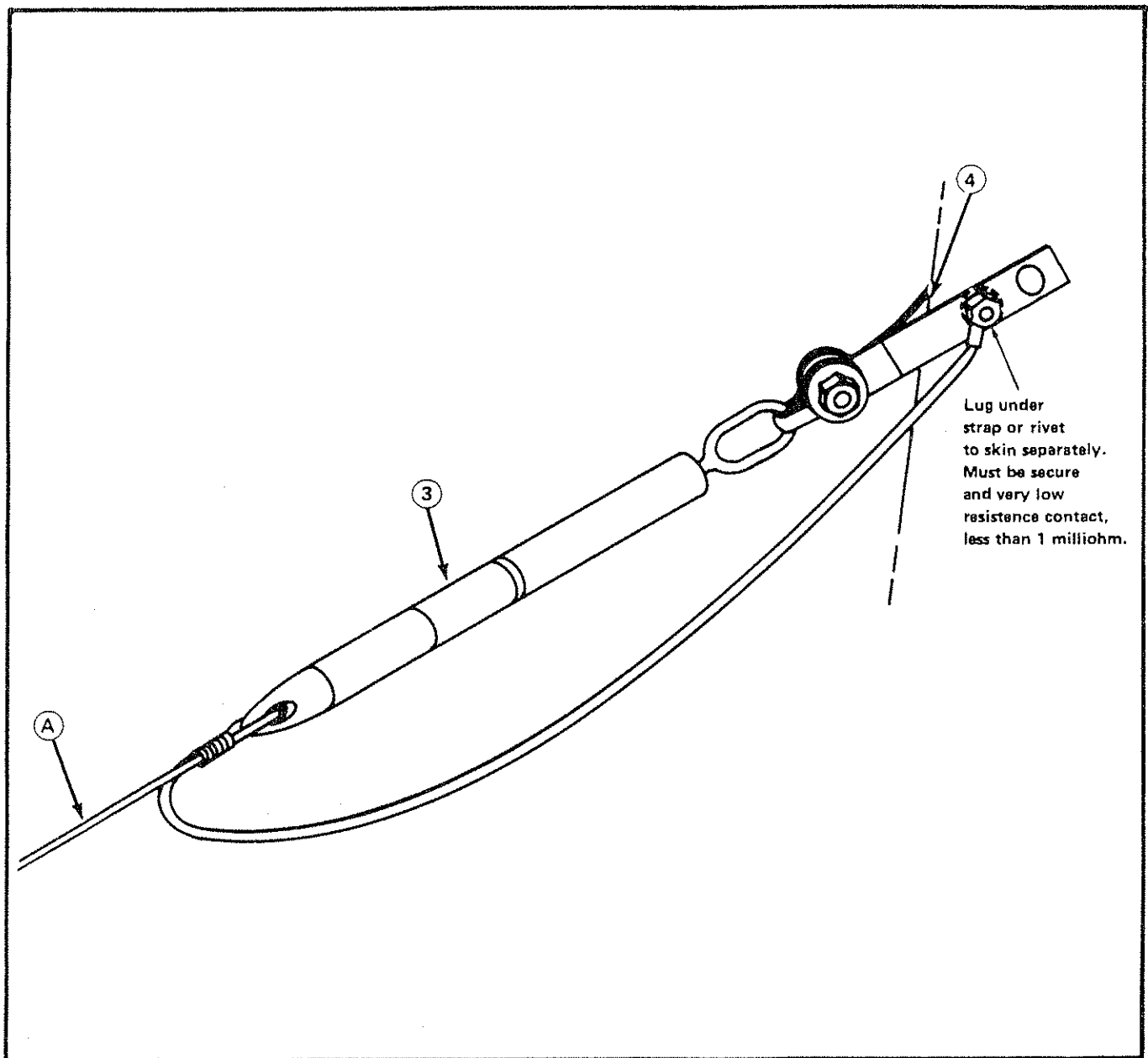


Figure 2.5 Antenna Grounding

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.

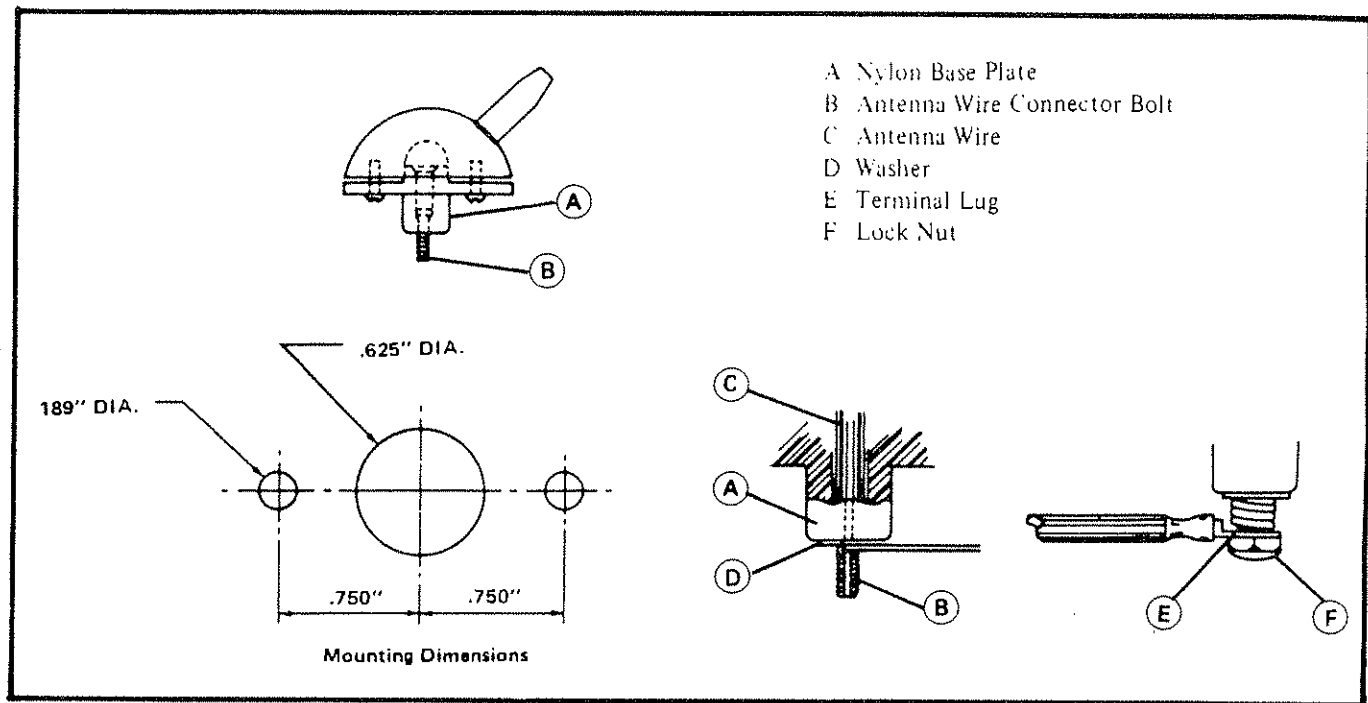


Figure 2.6 Feed-Thru Insulator

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) $3\frac{1}{4}$ to 4 turns. Install terminal lug (E) of antenna lead and secure with lock nut (F), as shown in Fig. 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.

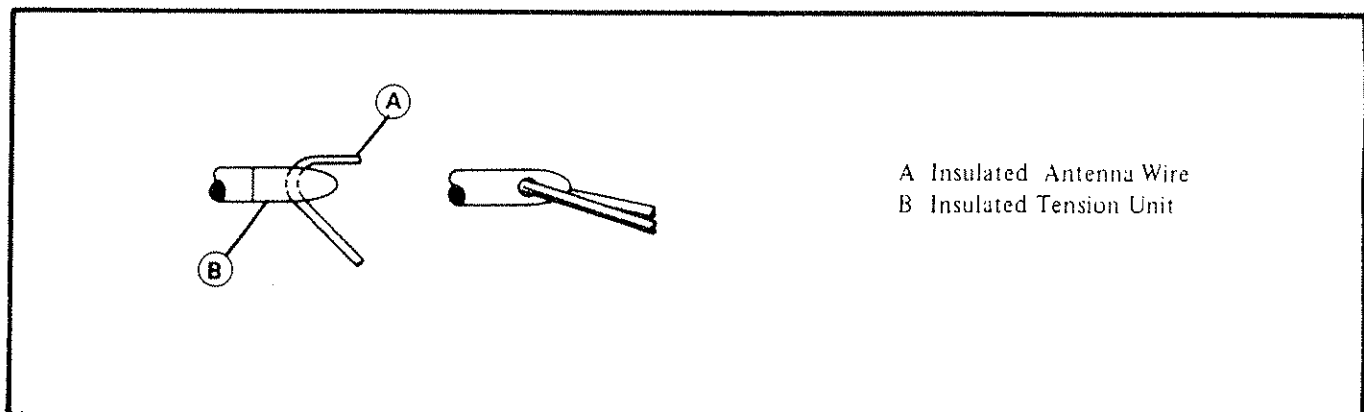


Figure 2.7 Insulated Tension Unit

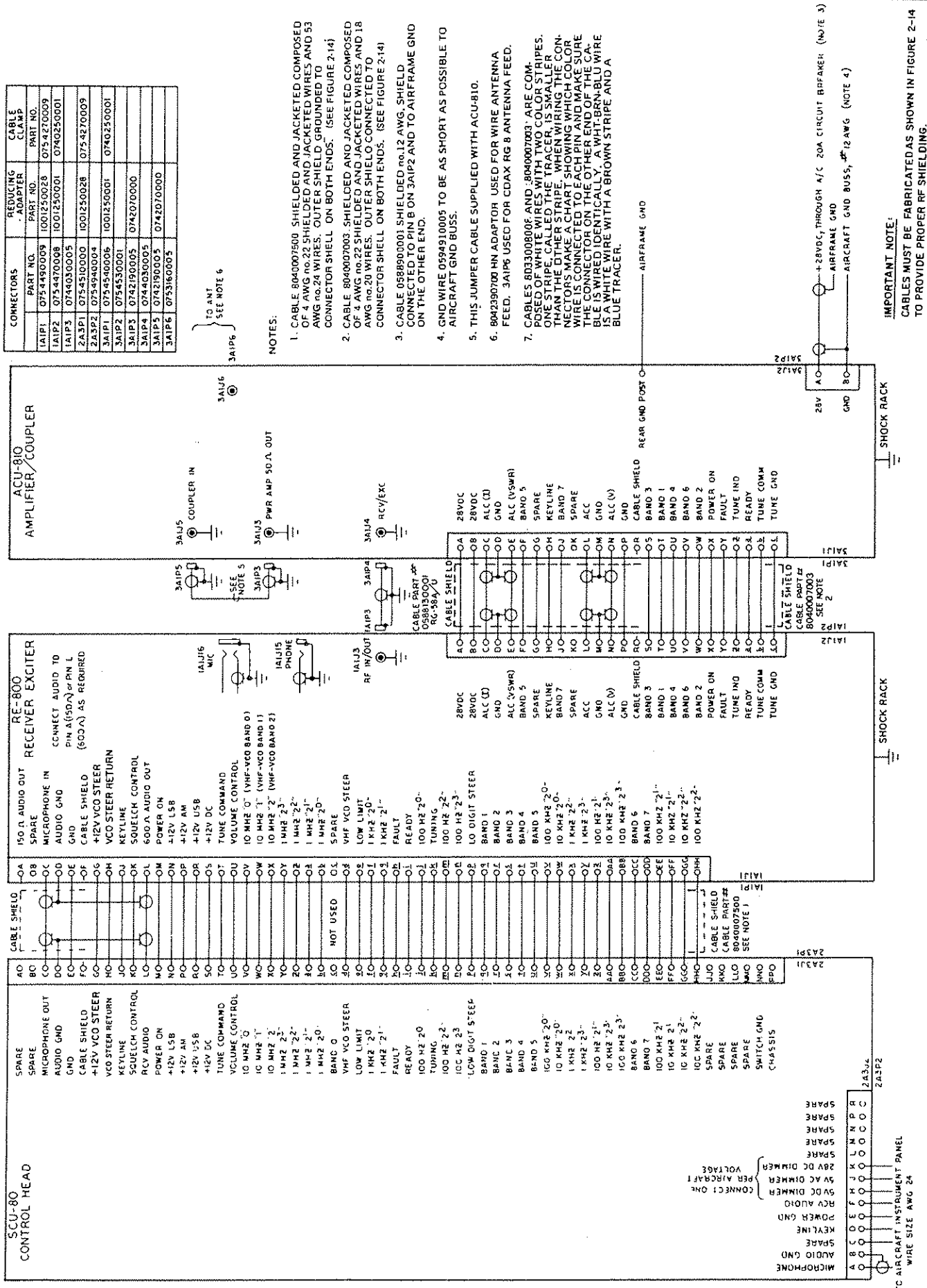


Figure 2.8 Interconnect Wiring Diagram ASB-850

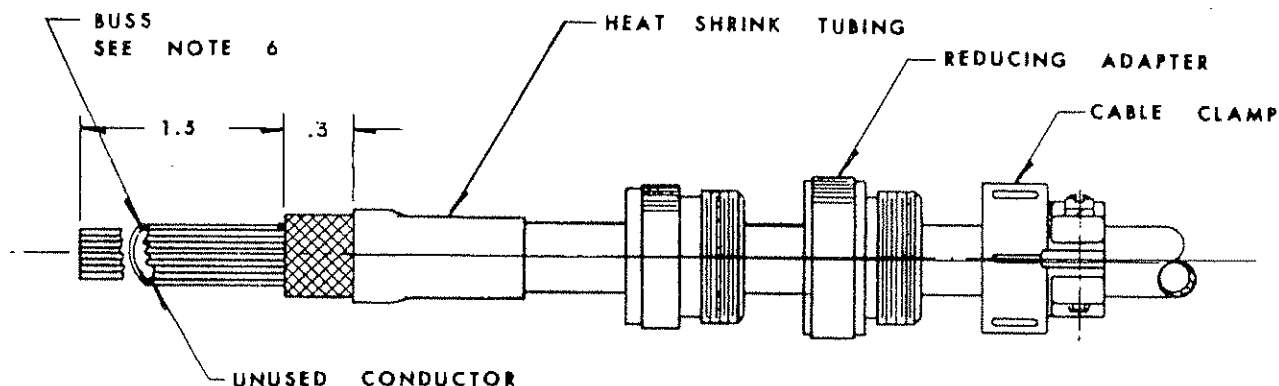
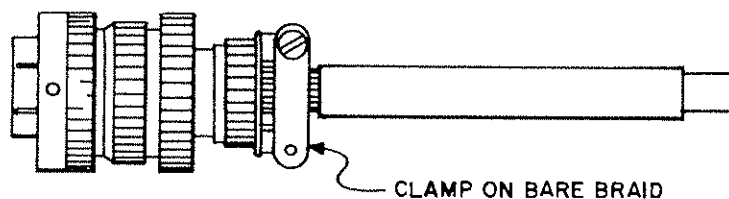


Figure 2-9A

NOTES.

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 (a) cable clamp and (b) 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 and 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 busswire and soldered to outer braid at one point. Make sure cable clamp will pass over braid.
7. Caution: If 8033007508 or 8033008008 are 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 No's 8033007508 and 8033008008 are 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.
12. Completed cable should look like Figure 2-9B.



ASSEMBLE PARTS PREVIOUSLY SHOWN ABOVE, MAKING CERTAIN THAT THE CLAMP IS MAKING GOOD CONTACT WITH THE BRAID.

Figure 2-9B

Figure 2.9 Cable Fabrication

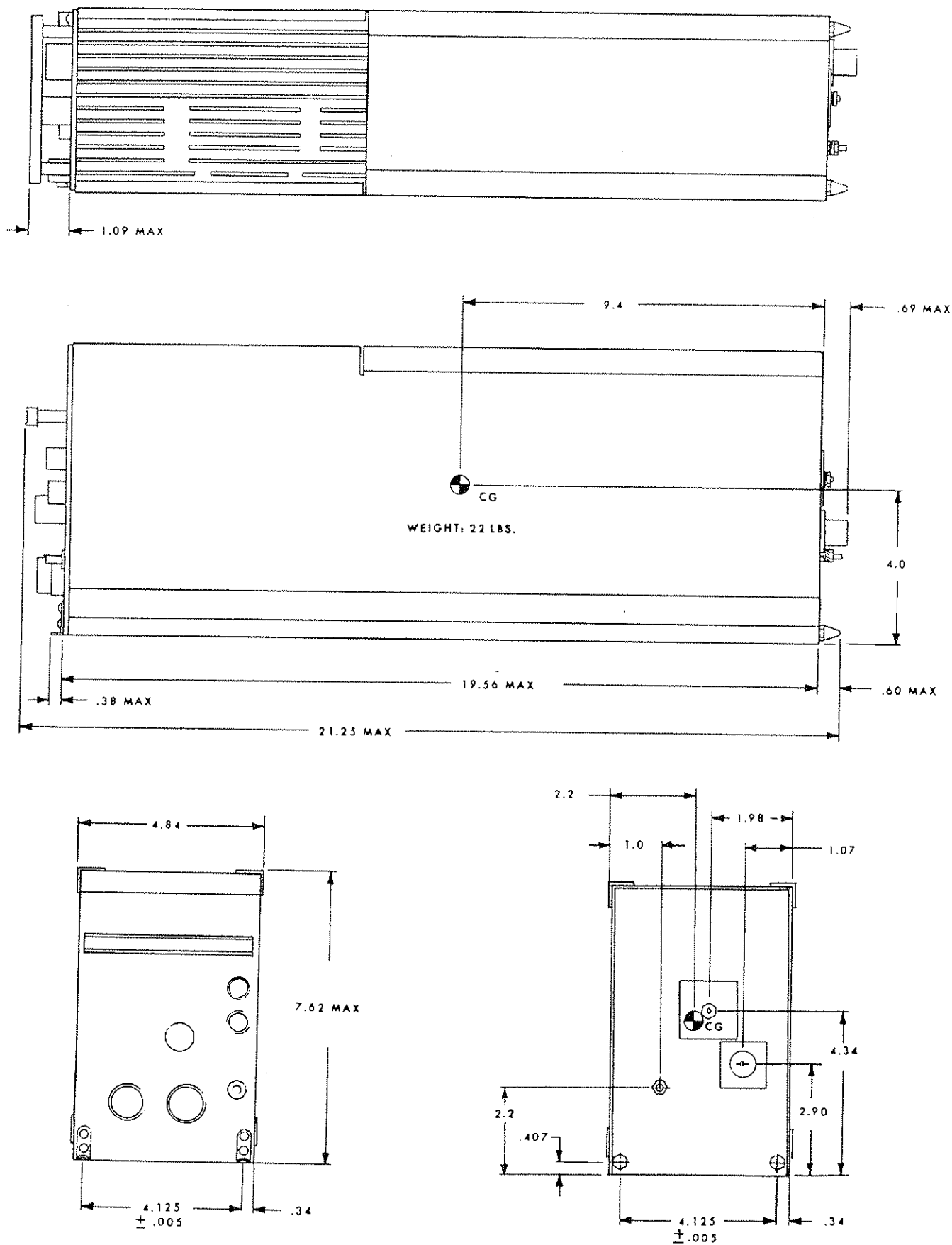
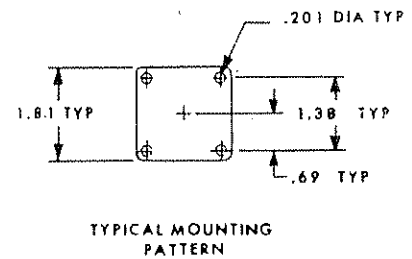
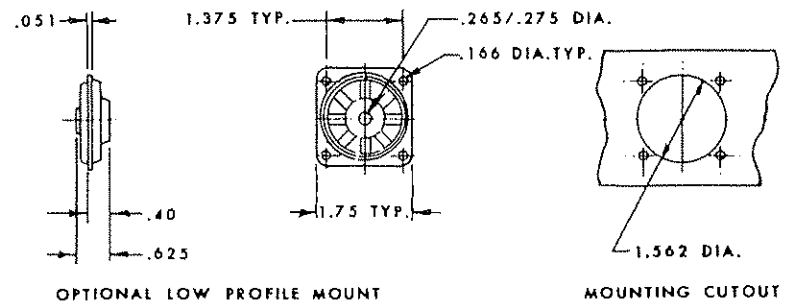
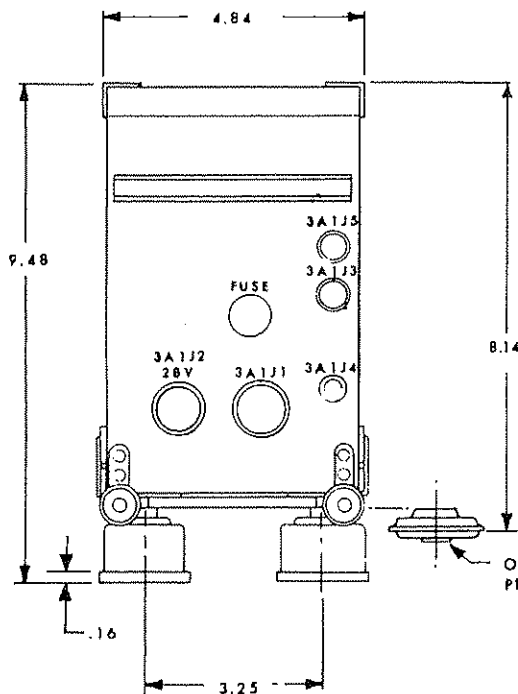
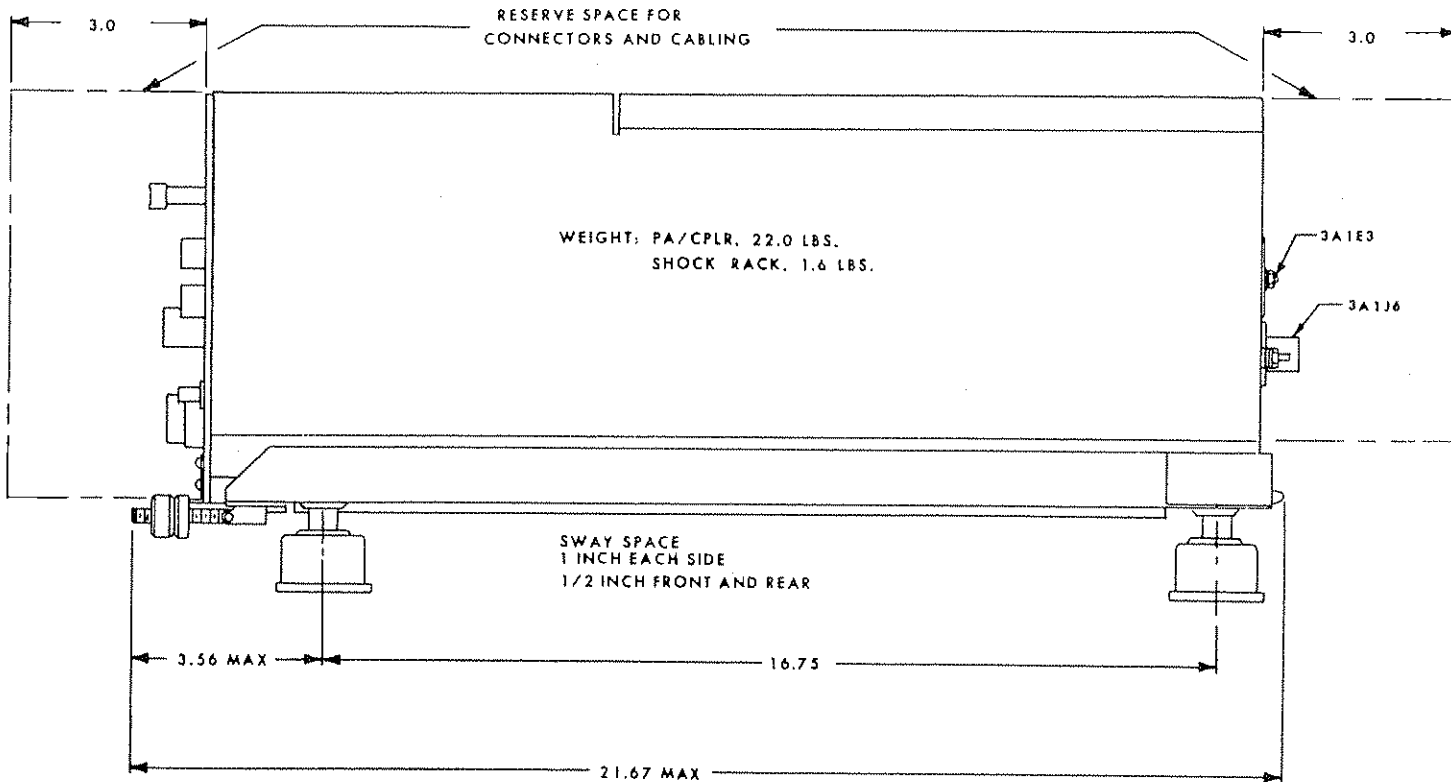


Figure 2.10 Amplifier/Coupler Outline Dimensions ACU-810

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NOTE:
1. A HEIGHT REDUCTION OF 1.4 INCHES MAY BE OBTAINED BY USING THE ALL ATTITUDE SHOCK ISOLATOR KIT. SUNAIR PART NO. 8033003804

Figure 2.11 Amplifier/Coupler Installation Dimensions, ACU-810

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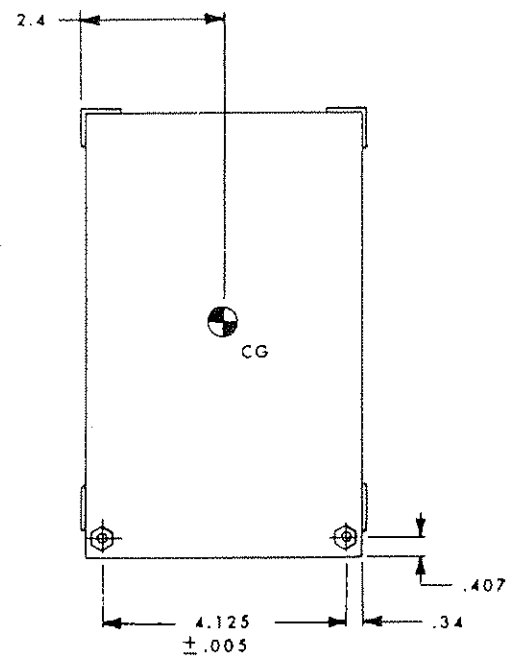
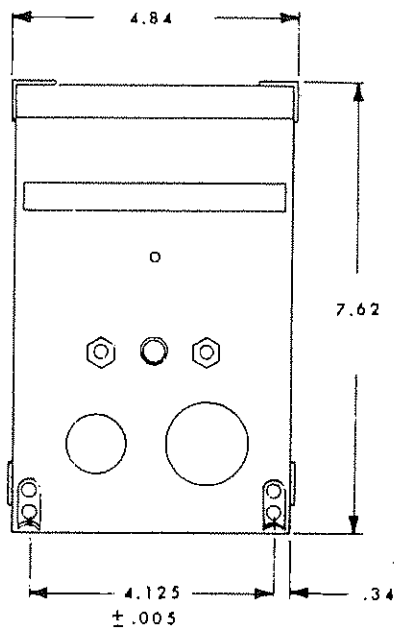
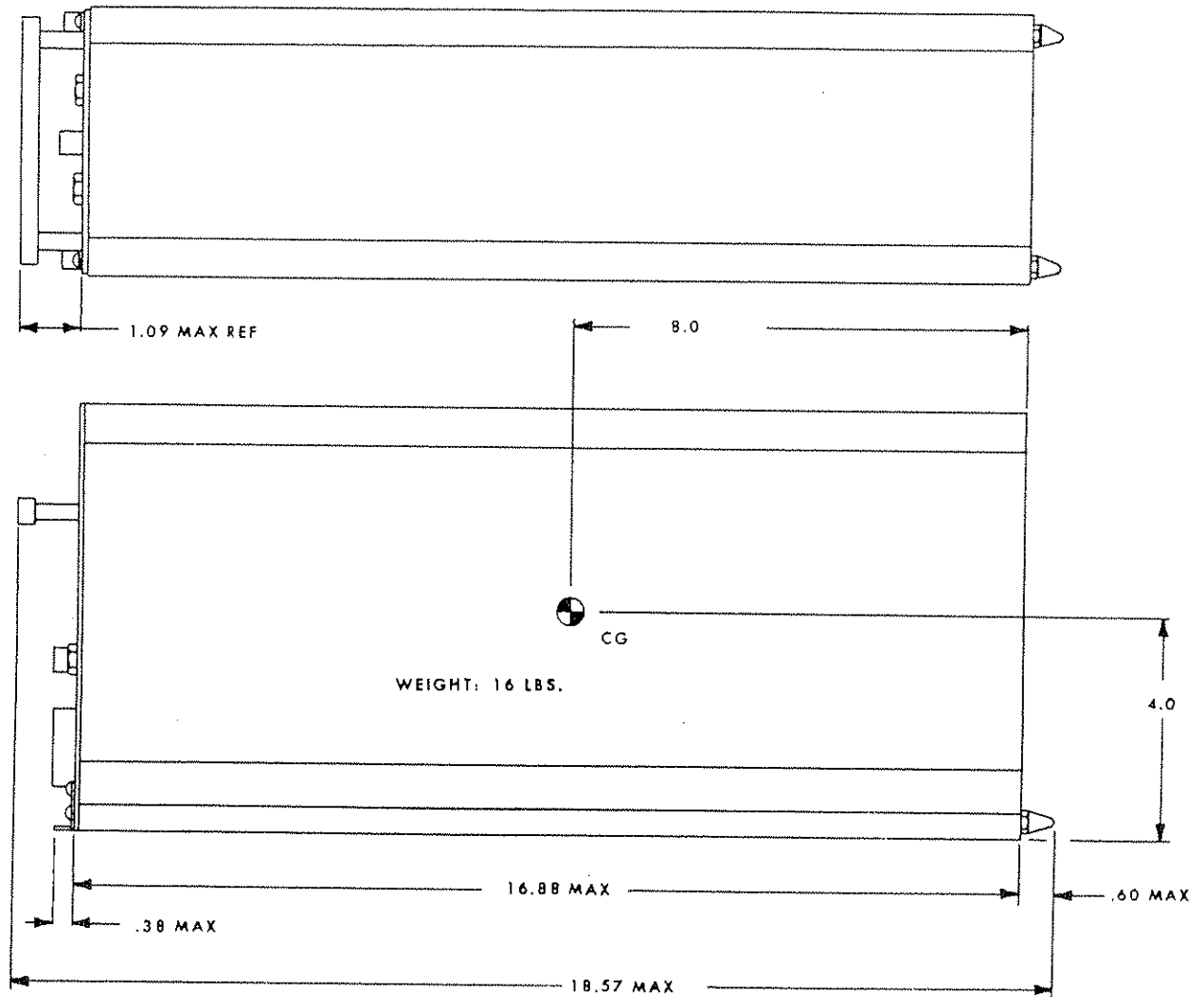
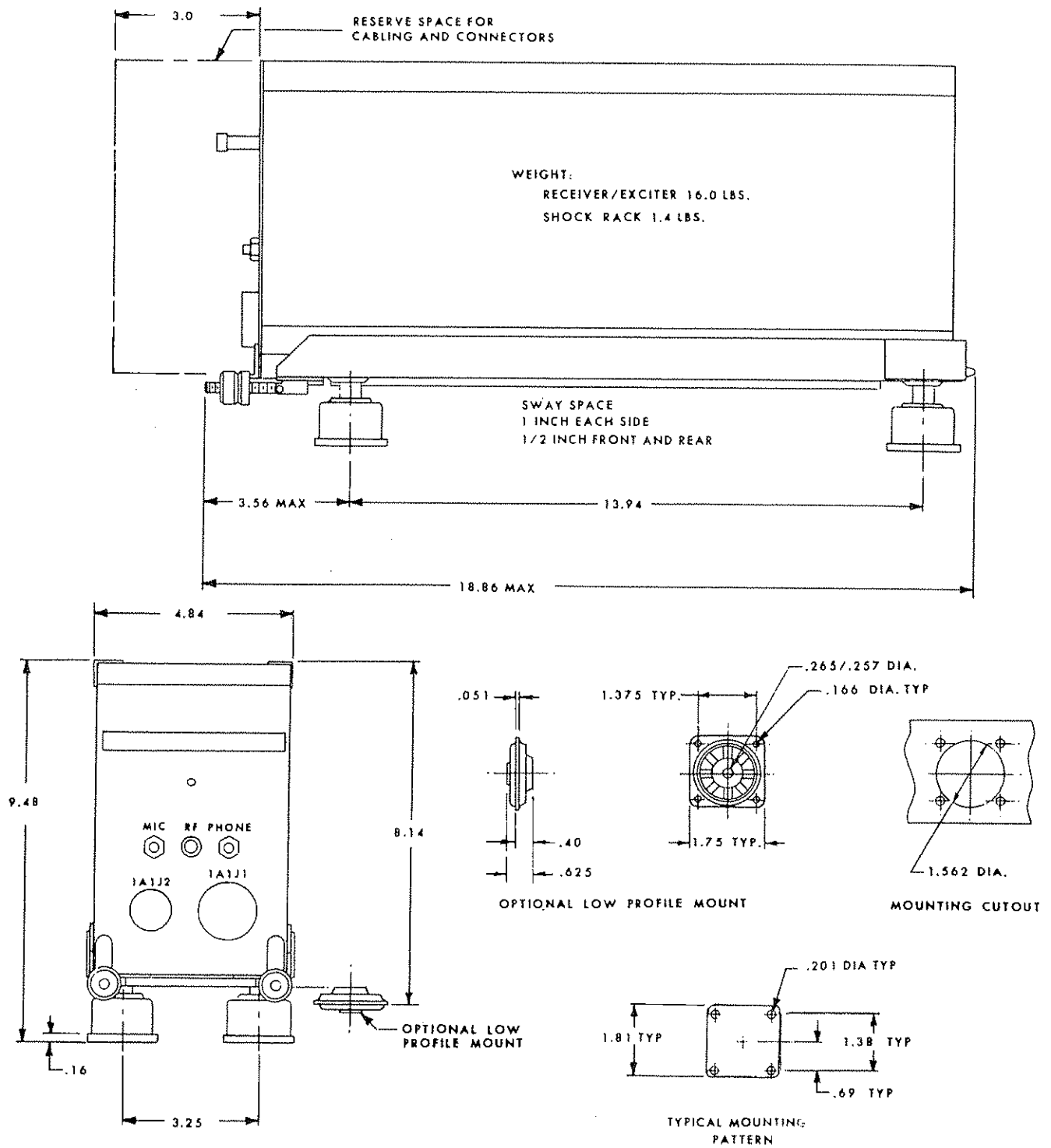


Figure 2.12 Receiver/Exciter Outline Dimensions RE-800I

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INSTALLATION DIMENSIONS FOR ASB-850 RECEIVER/EXCITER

NOTE:

1. A HEIGHT REDUCTION OF 1.4 INCHES MAY BE OBTAINED BY USING THE ALL ATTITUDE SHOCK ISOLATOR KIT SUNAIR PART NO. 8033003804

Figure 2.13 Receiver/Exciter Installation Dimensions, RE-800

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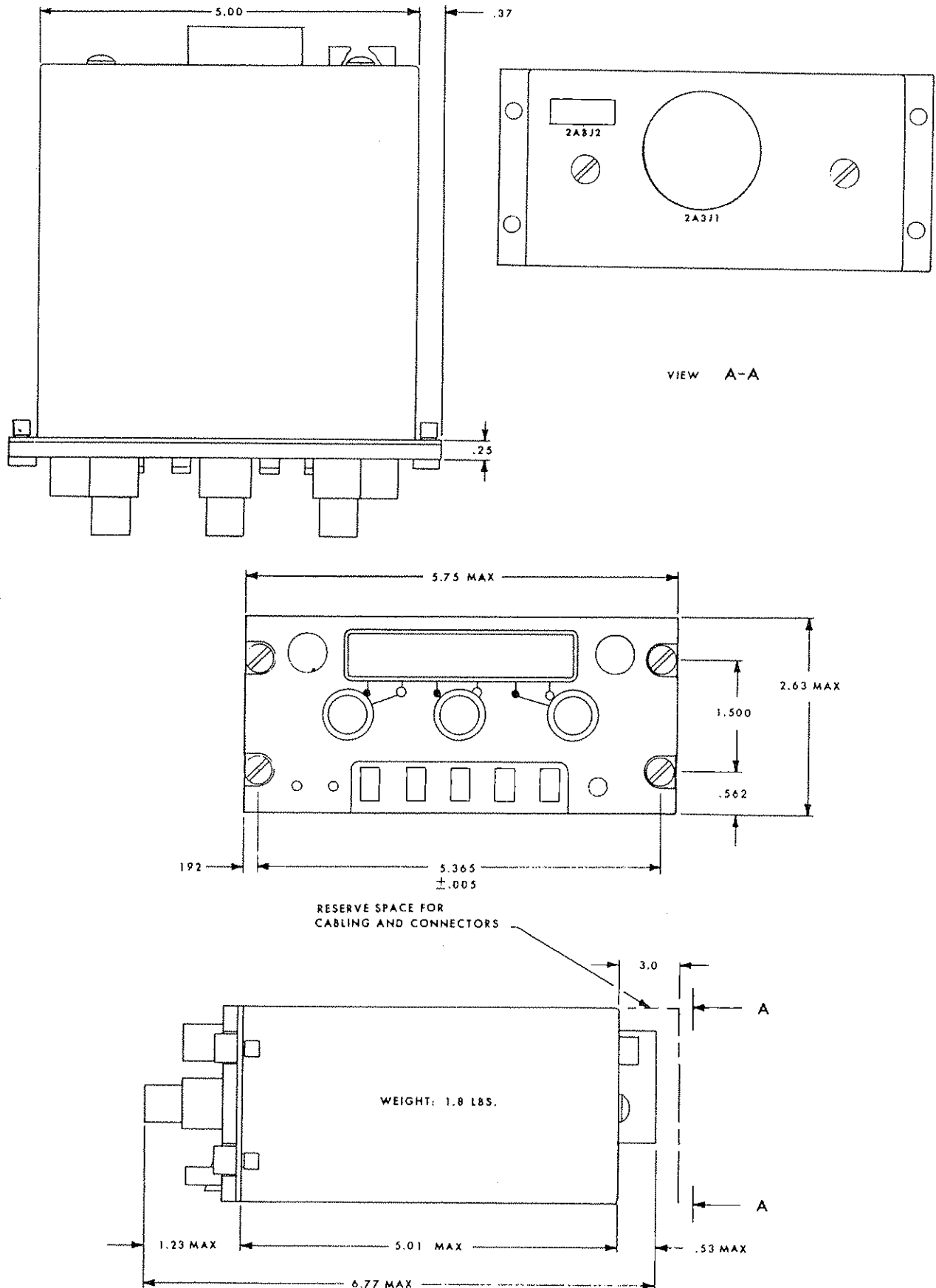


Figure 2.14 Control Head Outline Dimensions SCU-80

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SECTION 3

OPERATION

3.1 SYSTEM CONTROLS AND CONNECTORS

This section provides information and instructions required for proper operation of the ASB-850 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, 100 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 R/E 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 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 Receiver/Exciter unit.
AUDIO CONNECTOR (2A3J2)	Contains audio and light dimmer control connections to aircraft.

3.1.2 RECEIVER/EXCITER

SIDETONE	Adjust from front panel. Sets sidetone volume level (xmit audio in earphones)
REMOTE CONNECTOR (1A1J1)	Receives all control signals from the Remote Control unit and supplies power to Remote Control.
AMP/CPLR. CONNECTOR (1A1J2)	Receives 27.5 VDC and ALC signals from AMP/COUPLER Unit. Supplies filter channeling information to AMP/COUPLER unit.
RF CONNECTOR (1A1J3)	Input to receiver and output of exciter -- goes to AMP/COUPLER unit.
MIC CONNECTOR (1A1J16)	Test microphone connector to allow unit to be keyed and modulated at the Receiver/Exciter unit. Accepts a standard PJ-068 three circuit phone plug.
PHONE CONNECTOR (1A1J15)	Test earphone connector to allow receiver monitoring at the Receiver/Exciter unit. Accepts a standard 1/4 inch two circuit phone plug.

3.1.3 POWER AMPLIFIER/COUPLER

GAIN	Adjust from front panel. Sets tuning VSWR of coupler.
CONTROL CONNECTOR (3A1J1)	Supplies 28V, ALC and Tuning information to Rec/Exc. Receiver band information and tuning commands from Rec/Exc.
POWER CONNECTOR (3A1J2)	Receives 28V from Aircraft buss.
RF IN/OUT (3A1J3)	RF transmit path from PA to coupler or RF receive path to PA from Coupler.
RF IN/OUT (3A1J4)	RF path to and from Rec/Exc. and PA.

- RF IN/OUT (3A1J5) RF transmit path into coupler or RF receive path from coupler to PA.
- RF IN/OUT (3A1J6) Coax (RG-8) connector to antenna. Wire antenna terminal with HN adapter.
- GROUND POST Rear Panel ground stud. Tie to airframe ground.

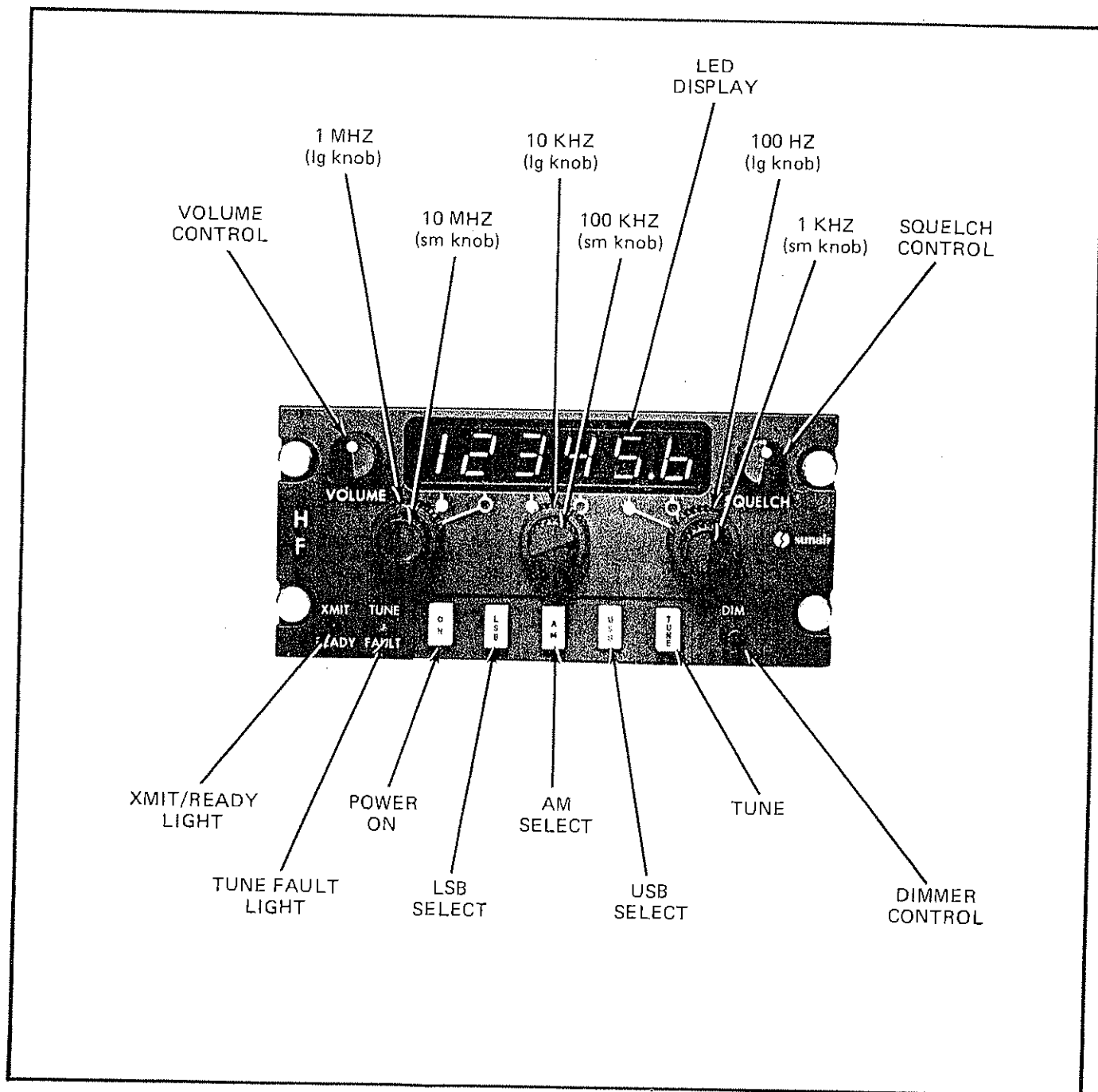


Figure 3.1 Remote Control Head Front Panel

3.2 CHECKS AFTER INSTALLATION

NOTE

If extended test time is anticipated an auxiliary power unit should be connected to the aircraft or one engine started in order to maintain battery voltage.

NOTE

From tuning from one band end to the other it is possible, with certain antennas, to get a Fault light for the first Tune pulse. If this occurs, tune again and the Ready light should come on. If it doesn't, the antenna impedance can't be tuned and the antenna configuration may have to be altered.

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 the display will flash on and off indicating unusable frequency.
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.
3. Set SQUELCH control maximum CCW.

Aircraft speaker should be silenced except when strong signal present.
4. Adjust Dimmer Control.

All control head lamps and LED display should vary in intensity.
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 8040007500 which controls the synthesizer is wired correctly. See paragraph 2.7.2.1.
6. Select frequency of a near by 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 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 receiver/exciter front panel screwdriver hole. READY light out when transmitter keyed but will come back on when modulating transmitter (speaking into microphone).
8. Select various frequencies from 2 to 29.9 MHz and perform coupler tuning checks.

Coupler should tune all frequencies. Check for not more than 2 watts reflected power between PA OUT (J3) and Coupler IN (J5).

SECTION 4

THEORY OF OPERATION

4.1 GENERAL

The discussion of the theory of operation of the ASB-850 will be presented in eight parts; synthesizer, receiver, exciter, power supply, control head, RF power amplifier, filter module and antenna coupler. Each part will contain a block diagram discussion followed by a detailed explanation of the circuit theory.

4.1.1. OVERALL BLOCK DIAGRAM

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

4.2 SYNTHESIZER 1A4

This unit consists of six printed circuit boards: Spectrum Generator (1A4A1), Low Digit Generator (1A4A2), Translator (1A4A3), VHF Divider (1A4A4), VCO (1A4A5) and the Synthesizer Mother board (1A4A6).

4.2.1 GENERAL

The synthesizer (1A4) generates the three local oscillator injection frequencies needed to determine the operating frequency of the radio. The synthesizer input is the 5 MHz reference signal from the Frequency Standard. The three local oscillator injection frequencies are obtained from the 5 MHz reference by a combination of direct synthesis and digital phase lock techniques. The frequency accuracy of the radio is therefore solely determined by the accuracy of the Frequency Standard.

The 3rd L.O. (10.5 MHz reference) is derived by direct synthesis techniques (i.e. by dividing and mixing). This local oscillator signal is used as a product detector injection on receive and as a

carrier generator on transmit. This reference is derived in the Spectrum Generator assembly, 1A4A1.

The 2nd L.O. generator consists of a crystal oscillator at a nominal frequency of 80.7500 MHz located in the Translator assembly (1A4A3). This frequency is used in the VHF Mixer assembly (1A3A1), in the Receiver/Exciter, to convert the 1st I.F. frequency of 91.2500 MHz to the 2nd I.F. of 10.5 MHz. Since the 2nd L.O. oscillator is not referenced to the Frequency Standard, a small frequency error can exist on this L.O. However, because of the mixing scheme used in the Translator, this same error appears on the 1st L.O. frequency and is therefore cancelled at the output of the VHF Mixer.

The VCO (1st L.O.) generator is a phase locked oscillator covering the frequency range of 92.8500 to 121.2499 Hz in 100 Hz steps. The exact frequency of the oscillator is given by:

$$F_1 = 91.2500 + F_0 + e \text{ (MHz)}$$

Where: F_1 = 1st L.O. frequency

F_0 = dialed frequency

e = 2nd L.O. error

On receive, the 1st L.O. is used to convert the incoming signal up to the 1st I.F. frequency (91.25 MHz). On transmit, the 1st L.O. is used to convert the transmit signal at the 1st I.F. frequency down to its final operating frequency.

4.2.2 SPECTRUM GENERATOR -1A4A1

Refer to Schematic Diagram, Figure 5.13.

4.2.2.1 GENERAL

The Spectrum Generator (1A4A1) generates the fixed reference frequencies needed in the syn-

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panel). The output is 1.5000 to 1.5999 MHz in 100 Hz steps and is fed to the Translator as a mixing reference.

4.2.3.2 VOLTAGE CONTROLLED OSCILLATOR

The Voltage Controlled Oscillator or VCO (Q1) is a Colpitts oscillator covering the range of 15.000 to 15.999 MHz. Coarse frequency tuning is provided by the action of the Coarse Steering voltage on varactor diodes CR1 and CR2. Fine frequency control is provided by the Phase Detector (U2) acting through the loop filter (R8, C7, R5 and C3) and 1 kHz notch filter (R4, C6, R6, C5, C4, C68 and R3) on varactor diodes CR3 and CR4. The oscillator output is loosely coupled through C15 to isolation amplifier U1.

The VCO is fed from a voltage regulator (R9, CR5, Q2 and R10) which provides a finely regulated 7.6 volts.

4.2.3.3 MIXER AND PULSE GENERATOR

The mixer (Q3) transforms the VCO frequency to 2.000-1.001 MHz to place the signal in the range of the Preset Counters. The inputs to the mixer consist of the VCO signal (fed from the output of U1) and the 17 MHz reference. The output of the mixer is filtered by a 2.5 MHz low pass filter (C23, C24, L7, C25, C26, L8 and C27) and is then amplified by U6. Quad NAND Gate, U7, connected as a monostable multivibrator, forms the signal into a short pulse to drive the preset counter.

4.2.3.4 PRESET COUNTER

The Preset Counter (U8, U9, U10, U11) is a counter whose division ratio is controlled by the 100 Hz, 1 kHz and 10 kHz Frequency control switches on the front panel. During the normal counting interval, the counter functions as a divide-by-2000 counter. During the Preset interval, the clock is disabled and the counter is loaded (or preset) to a count determined by the settings of the frequency control switches. The frequency control information is entered in binary-coded-decimal (BCD) format and the division ratio, D, is therefore determined by the formula:

$$D=2000-(100 N_{10\text{kHz}} + 10 N_{1\text{kHz}} + N_{100\text{Hz}})$$

where:

$N_{10\text{kHz}}$, $N_{1\text{kHz}}$ and $N_{100\text{Hz}}$ are, respec-

tively, the settings of the 10 kHz, 1 kHz and 100 Hz frequency dials.

Or, for example:

DIAL SETTINGS			PRESET	COUNT (D)
10 kHz	1 kHz	100 Hz		
0	0	0	000	2000
0	0	1	001	1999
0	0	2	002	1998
0	1	1	011	1989
1	9	9	199	1801
9	9	9	999	1001

4.2.3.5 PRESET GENERATOR

The preset generator applies a short pulse to the data strobe inputs of the preset counter when a full count is detected. A "look ahead" scheme is employed to eliminate miscounting due to the propagation delays in the counter. When the counter has reached a count of 1999, the inputs to pins 2, 3, 4, 5, 6, 11, and 12 of NAND gate U3 will be in a "one" state. As soon as the clock input to pin 1 of this gate returns to a "one" state, the output of U3 will change to a "zero" state, thereby triggering monostable multivibrator U4. Then U4 presets the counters by applying a "zero" to their data strobe inputs for approximately 100 nsec. The output of U4 will return to a "one" state before the beginning of the next clock pulse.

4.2.3.6 PHASE DETECTOR, LOOP FILTER and 1 kHz NOTCH FILTER

The phase detector compares the frequency of the output of the Preset Counter with that of the 1 kHz reference from the Spectrum Generator. Action of the phase detector is as follows:

If the VCO frequency is high, the output frequency of mixer Q3 will be low. The output frequency of the Preset Counter will, therefore, also be low. The Phase Detector output voltage will decrease until the frequency error is corrected. Conversely, if the VCO frequency is low, the mixer output frequency will be high and the Phase Detector will increase until the error is corrected. If there is no frequency error, the output voltage of the Phase Detector will remain constant. The Loop Filter (R8, C7, R5, and C3) removes any 1 kHz components in the Phase Detector output and also determines the transient response of the loop. The 1 kHz frequency components are further attenuated by twin tee notch filter R3, R4, R6, C4, C5, C6, and C68. The action of this Phase Lock Loop is to make the VCO frequency follow the relationship: $F_{VCO} = 17.000 - D$ (kHz); where D is the count ratio. The VCO will therefore vary from 15.000 to 15.999 MHz in 1 kHz steps.

4.2.3.7 OUTPUT DIVIDER CIRCUITRY

The output from Buffer U1 is further amplified by Q5 and fed to divide-by-10 counter U5. The output of U5 is filtered to a sine wave by a bandpass filter (L11, C39, C40, C41, and L13) and is fed to emitter follower, Q6 which matches the output to 50 ohms. The output from the Low Digit Generator is 1.5000 to 1.5999 MHz in 100 Hz steps and follows the relationship:

$$F_{OUT} = 1.5000(\text{MHz}) + N(\text{kHz})$$

where N=knob settings of the 10 kHz, 1 kHz and 100 Hz (i.e. 0.1 kHz) dials.

4.2.4 TRANSLATOR-1A4A3

Refer to Schematic Diagram 5.15

4.2.4.1 GENERAL

The translator (1A4A3) combines the signals from the Low Digit Generator (1A4A2) and VCO (1A4A5) and generates a signal which, after subsequent frequency division in the VHF Divider

(1A4A4), is used to phase lock the VCO to the proper frequency. The second L.O. is also generated in this assembly. The inputs to this assembly are: 20 and 21 MHz references (from the Spectrum Generator); 1st L.O. (from the VCO); and 1.5000-1.5999 MHz (from the Low Digit Generator). The output is the 10.0-39.9 MHz reference signal which is fed to the VHF Divider.

4.2.4.2 ERROR CANCELLING

Since the 2nd L.O. is a free running crystal oscillator and is not referenced to the Frequency Standard, a small frequency error can exist. However, because of the mixing scheme employed in this assembly, both the 1st L.O. and 2nd L.O. will have the same frequency error. This error will therefore be cancelled in the VHF Mixer Assembly (1A3A1).

4.2.4.3 21 MHz REFERENCE AMPLIFIER

The 21 MHz reference from the spectrum generator is amplified by U1.

Since this and other boards in the ASB-850 are also used in other products requiring VFO capability, a VFO consisting of Q1, U2 and associated components exists on this board. However, the VFO is disabled in the ASB-850.

4.2.4.4 2nd L.O. CIRCUITRY

The 2nd L.O. (Q7) is a Colpitts crystal oscillator. Tuned circuit L17, C46 and C47 tunes the circuit to resonance at 80.75 MHz. A small sample of oscillator output is taken from the junction of C46, C47 and Y2 and is fed to Amplifier Q9. The 2nd L.O. output to the receiver/exciter module is taken from the drain of Q9 through pi network C67, L25 and C68 which matches the output to 50 ohms.

4.2.4.5 100.75 MHz MIXER

The 100.75 MHz mixer (Q8) heterodynes the 2nd L.O. output from Q7 and the 20 MHz reference from the Spectrum Generator. The triple tuned 100.75 MHz bandpass filter selects the desired sum

frequency while rejecting the 80.75 MHz and 60.75 MHz components. Tuned circuit L28, C72 prevents loading of the 20 MHz signal by the oscillator. Tuned circuit L27, C71 prevents the loading of the oscillator by the pi network. Pi network C48, L18, C49 transforms the 50 ohm input impedance to 200 ohms thereby increasing the voltage level by approximately 2:1 to ensure adequate mixer drive. Test point TP3 provides a convenient 50 ohm test point for the connection of a spectrum analyzer or any other suitable measuring instrument to aid in bandpass filter alignment.

4.2.4.6. BALANCED MIXER

Depending on the mode selected, the balanced mixer heterodynes the 1.5000-1.5999 MHz output of the Low Digit Generator and the 21 MHz reference. The mixer is a doubly-balanced mixer design. The 19.45 MHz bandpass filter selects the desired difference frequency. The output is fed to U3 where the signal is amplified and further filtered by tuned circuit L5-C17. Automatic Gain Control (AGC) is provided by diodes CR5, CR12 and their associated circuitry to ensure a constant and proper level to the 81.25 MHz mixer. Test point TP1 provides a well isolated point for observation of the signal without appreciable loading of the tuned circuit.

4.2.4.7 81.25 MHz MIXER

The 81.25 MHz Mixer (Q11) combines the 19.5000-19.4001 MHz signal from amplifier U3 and the 100.7500 MHz signal from mixer Q8 to produce the difference frequency of 81.2500-81.3499 MHz. The 81.25 MHz bandpass filter (L7, C20, L38, C21, L8, C22, C23 and C24) selects the desired difference frequency. A well-isolated test point, TP2, is also provided here to permit observation of the signal with 50 ohm equipment.

4.2.4.8 OUTPUT MIXER AND BROADBAND AMPLIFIER

The output mixer, Q4, heterodynes the 81.25 MHz mixer output and the VCO sample from the VCO

assembly (1A4A5). The VCO sample is fed to the mixer through balun transformer T3 which transforms the signal to a 200 ohm impedance level to ensure adequate voltage drive to the mixer. The mixer output is filtered by a 10-50 MHz bandpass filter (L9, C29, L10, C86 and L11) and then transformed to a low impedance by emitter follower Q10. Potentiometer R54 in the base circuit of Q10 permits output level adjustment. The output of Q10 passes through 50 MHz Low Pass Filter (C74, C75, L30, C76, C82, C77, L31) to the broadband amplifier (Q5, Q6). Negative feedback around the the amplifier (R17, R19, R6) provides flat gain to well beyond 50 MHz as well as a constant input impedance, stable D.C. operating point, and low output impedance.

4.2.5 V.H.F. DIVIDER-1A4A4

Refer to Schematic Diagram 5.16

4.2.5.1 GENERAL

The V.H.F. Divider (1A4A4) contains a divide-by-400 high speed preset counter which forms the 10 MHz, 1 MHz and 100 kHz frequency steps. A phase detector compares the frequency and phase of the output of this counter with that of the 100 kHz reference from the Spectrum Generator (1A4A1) and develops a fine steering correction voltage which is fed back to control the frequency of the VCO (1A4A5). This "phase lock loop", by controlling the VCO frequency, forces the input to the V.H.F. Divider to follow the relationship:

$$F_{in} = 10.0 + 10 N_{10 \text{ MHz}} + N_{1 \text{ MHz}} + 0.1 N_{100 \text{ kHz}}$$

where: $N_{10 \text{ MHz}}$ = the 10 MHz digit

$N_{1 \text{ MHz}}$ = the 1 MHz digit

$N_{100 \text{ kHz}}$ = 100 kHz (i.e. .1 MHz) digit

and F_{in} is given in MHz

The input frequency therefore varies from 10.0 to 39.9 MHz in 100 kHz steps. The 10 MHz input corresponds to dial settings of "000" whereas the 39.9 MHz input corresponds to dial settings of "299" on the 10 MHz, 1 MHz and 100 kHz dials respectively.

The inputs to the V.H.F. Divider are: the 100 kHz reference (from the Spectrum Generator); the output signal from the Translator; the frequency control lines from the 1 MHz and 100 kHz switches on the front panel (8 wires); and the 10 MHz preset lines (from the V.C.O.). The output is the fine steering voltage which is fed back to the V.C.O.

4.2.5.2 BROADBAND AMPLIFIER

The broadband amplifier consists of a two stage feedback amplifier (Q1,Q2) followed by a complementary emitter follower (Q3,Q4). The negative feedback network, (R6,R7,R4) around Q1 and Q2, provides flat gain to well beyond 50 MHz, a constant input impedance over the frequency range, and stable D.C. operating point. R1 establishes the input impedance of this amplifier at 50 ohms. The output of the feedback amplifier is fed to the complementary emitter follower (Q3, Q4). This emitter follower provides a low driving impedance for the subsequent high speed prescaler, and also establishes the proper logical zero and logical one levels to be compatible with the subsequent TTL logic integrated circuits.

4.2.5.3 PRESCALER

The prescaler (U2) is a high speed dual flip-flop connected in a conventional divide-by-four configuration. Its output is buffered by NAND gate A1C so as not to place excessive loading on U2.

4.2.5.4 PRESET COUNTERS

The preset counters (U3, U6, U7) consist of two stages of preset decade counters (U3, U6) followed by a preset divide-by-four dual flip-flop (U7). U7 is preset by quad two input NAND gate U13 and the A and B sections of quad two input NAND gate U8. During the normal counting mode (that is, when the counters are not being preset) the data strobe (D_S) lines on U3 and U6 are held in a "1" state by preset flip-flop U10. This permits these counters to function in their normal divide-by-ten mode. Similarly, the 10 MHz preset bus is held in a "0" state by U10. This forces the outputs of gates U8A and U8B and, therefore, the preset inputs to dual flip-flop U7, to be in a "1" state.

Also the outputs of U13C and U13D, and therefore the clear inputs to U7 are forced to a "1" state. U7, therefore, counts in its normal divide-by-four mode. During the preset interval, the D_S lines to U3 are held in a "0" state by U10 and the inputs to U8A, U8B, U13C and U13D are held in a "1" state by U10. The clock pulse to the counters is inhibited and the preset information from the 10 frequency control lines is entered into counters U3, U6 and U7.

4.2.5.6 100 kHz CARRY GENERATOR

When all four 100 kHz preset lines are programmed to a "0" state by the front panel switches (corresponding to a dial setting of 0 on the 100 kHz frequency control), a special "carry" signal must be generated to program the counters to the correct division ratio.

Mathematically, this is necessary because a dial setting of zero requires the input counter, U3, to divide by zero—an impossible operation. The count is corrected by programming U3 to divide-by-ten in this state and then subtracting one count from the next decade counter. Note that this is the same mathematical operation of "borrowing" when, for example, one subtracts nine from ten.

Quad two input NAND gate U4 is connected as a quad inverter with a common output. One of the four 100 kHz input lines is connected to each section of the gate. This special gate is of the "open collector" type enabling all four outputs to be connected together. The output of U4 is inverted by U5A. If all four inputs to U4 are zero, (dial set to "0" on the 100 kHz switch), the output of U4 will be in a "one" state and the U5A output will be a "zero". If any of the 100 kHz inputs are in a "1" state, the U5A output will also be a "1".

4.2.5.7 PRESET GENERATOR

During the normal counting interval, the Q output of flip-flop U10 is in a "1" state, the preset bus is in a "1" state and the 10 MHz preset bus is in a "0" state. In order to count properly, the pre-setting must occur between input clock pulses. A "look ahead" scheme is therefore employed to eliminate the propagation delays through the various counters.

OSCILLATOR	F _O RANGE (MHz)	VCO FREQUENCY RANGE (MHz)
Band 0	0.0000 to 9.9999	91.2500 to 101.2499
Band 1	10.0000 to 19.9999	101.2500 to 111.2499
Band 2	20.0000 to 29.9999	111.2500 to 121.2499

First assume that the 100 kHz dial is not in the "0" position (that is, that the output of U5A is in a "1" state). When the preset counter has reached a count of 399 (that is, one count from being filled); counter U3 will have a count of "9" (or binary 1001), U6 will have a count of "9" (or binary 1001) and U7 will have a count of "3" (or binary 11). The output of 8 input NAND gate U9 will sense this unique state and will go to a "0" state. U8C inverts this output to a "1" state, making the K1 input to master/slave flip-flop U10 a "1". On the next transition of the U3 input clock to a "0" state, the Q output of U10 will toggle to a "0" state and, therefore, the preset bus will be in a "0" state and the 10 MHz preset bus will be in a "1" state. Presetting will therefore occur. On the next transition of the U3 input clock back to a "1" state, the output of U8D will transition from a "1" to a "0" state, applying a "0" to the preset input (P) of U10 and forcing the Q output of U10 back to a "1" state. This terminates the preset cycle, and the normal counting sequence is restored.

If the 100 kHz dial is set in the "0" position, the U5A output will be in a "0" state. The output of carry gate U5B will therefore always be in a "1" state and will not follow the Q_A output of U6. Flip-flop U10 will now be "armed" at the 389th counter state instead of at the 399th state. The desired "carry" of ten counts will therefore occur.

4.2.5.8 PHASE DETECTOR

The 100 kHz reference from the Spectrum Generator is divided in frequency by four to 25 kHz by dual flip-flop U11. In the phase detector (U12), the frequency and phase of the output of the preset counter is compared with that of the 25 kHz

reference and a fine steering correction voltage is fed back to control the frequency of the V.C.O. (1A4A5). This feedback voltage changes in the correct direction to bring the V.C.O. into phase lock. The phase detector operates in the following manner: If the frequency of the preset counter output is greater than that of the 25 kHz reference, the phase detector output will decrease in voltage. If the frequency of the preset counter output is less than that of the 25 kHz reference, the phase detector output will increase in voltage. If the two frequencies are exactly the same, the phase detector output will remain constant.

4.2.6 V.C.O.—1A4A5

Refer to Schematic Diagram, Figure 5.17.

4.2.6.1 GENERAL

The V.C.O. (1A4A5) generates the variable frequency 1st L.O. signal which controls the operating frequency, F_O, of the radio. This signal is generated in three voltage controlled oscillators each covering a 10 MHz frequency range, and selected by the 10 MHz switch on the front panel of the radio. The frequency ranges of the oscillators are (assuming a 2nd L.O. frequency of nominal 80.7500 MHz):

The actual oscillator frequencies will deviate from the above by an amount equal to the difference between the actual 2nd L.O. frequency and its nominal 80.7500 MHz.

The exact operating frequency of the oscillators is controlled by two independent D.C. voltages, designated coarse and fine steering. Each steering voltage is applied to a voltage variable capacitance

diode (varactor) connected across the oscillator tank circuit. The coarse steering voltage is derived from a precision voltage divider located on the 1 MHz frequency control switch on the front panel. This voltage sets the oscillator frequency within the acquiring range of the phase lock loop. The fine steering voltage is derived from the phase detector on the V.H.F. Divider (1A4A4) after subsequent filtering by the loop filter. This voltage is the D.C. feedback within the phase lock loop which forces the oscillator to the correct frequency.

The oscillator outputs are buffered by two independent amplifiers: one providing the output to the Receiver Exciter module (1A3) and the other providing the oscillator sample to the Translator (1A4A3). Two transistor switches develop the 10 MHz preset signals for the V.H.F. Divider (1A4A4).

4.2.6.2 OSCILLATORS

The three oscillators are of identical design and, therefore, only the "Band 0" Oscillator will be discussed. The "Band 0" Oscillator is a conventional Colpitts oscillator employing a low noise dual gate MOSFET(Q6). The resonant tank circuit consisting of C20, C21, L1, C16, CR3 and CR4 determines the oscillation frequency of the circuit. Feedback is provided by C20 and C21. Two point tracking of the oscillator frequency is provided by L1 at the low frequency end of the band and C16 at the high frequency end. The coarse steering voltage from a resistor string on the 1 MHz switch is applied to voltage variable capacitance diode (varactor) CR3 through the filter network (C10, R26, C11, and R27) and RF bypass network (R28, C12, R29 and C13). Fine steering voltage from the phase detector in the VHF Divider assembly, 1A4A4, is applied to varactor diode CR4 through the loop filter (R23, C7, R24, C8, R25, and C9) and the 25 kHz twin tee notch filter (R20, C5, R22, C3, C4, R21 and C6). The output is taken from the drain of Q6 through C22. Hot carrier diodes CR5 and CR6 prevent the RF signal from biasing the varactor diodes into their conducting region.

4.2.6.3 OUTPUT BUFFER AMPLIFIER

The output of each oscillator is fed to the output buffer amplifier (Q9, Q10). This amplifier is a conventional cascode configuration providing high input impedance, high isolation, and negligible feedback. The output of the amplifier is fed through bandpass filter (C46, L11, L12, C48, L13, and C50) and matching transformer (T1) to the Receiver/Exciter module.

4.2.6.4 TRANSLATOR BUFFER AMPLIFIER

The translator buffer amplifier (Q11, Q12) is similar in operation to the output buffer. The output is taken from the collector of Q11 through C54 and matching transformer T2.

4.2.6.5 LOGIC SWITCHING

Transistors Q3, Q4 and Q5 apply +12 volts to the appropriate oscillator circuit when the respective band command line is connected to ground by the 10 MHz switch on the front panel. Transistors Q1 and Q2 generate the required 10 MHz preset code for the VHF Divider (1A4A4) in the following sequence:

10 MHz switch Position	2 ⁰ Preset logic level	2 ¹ Preset logic level
0	0	1
1	1	0
2	0	0

NOTE

The TTL compatible logic levels are as follows:

Logical 0 = less than 0.8 volts
Logical 1 = greater than 2.0 volts but less than 5.0 volts

4.2.7 SYNTHESIZER MOTHER BOARD-1A4A6

Refer to Figure 5.18.

The synthesizer mother board consists of five receptacles and their related components and circuitry. It is mounted on four standoffs located on the chassis, under the synthesizer module. The five printed circuit cards (1A4A1, 1A4A2, 1A4A3, 1A4A4 and 1A4A5), described previously in this section, insert into this mother board thereby constituting the entire synthesizer module.

4.2.7.1 L.O. BLANKER CIRCUITRY (PART OF SYNTHESIZER MOTHER BOARD 1A4A6)

The L.O. Blanker Circuitry protects the power amplifier from transients due to a frequency change while in the transmit mode. If the radio operator inadvertently changes the 1 MHz frequency dial on the front panel while in one of the transmit modes, the Synthesizer may momentarily change frequency by several MHz while the switch is between its detent positions. This would result in a large transient on the output and could damage the power amplifier.

When the setting of the 1 MHz switch is changed, the "preset 2⁰ 1 MHz" frequency control line will change from either:

- a) logical "0" (approximately 0.2 volts) to logical "1" (approximately 3 volts) state

or

- b) logical "1" to logical "0" state

In case a) a positive-going differentiated pulse is formed by differentiating network C7, R2, CR2 and R3 and is applied to the base of switch Q1 through R8. Q1 will saturate driving switch Q2 into conduction and generate a 12 volt blanking pulse through isolation diode CR4. The blanking pulse is applied to the Spectrum Gen-

erator (1A4A1) to blank the 3rd L.O. (10.5 MHz) output. The blanking duration is approximately 100 to 200 msec and is controlled by the time constant of the differentiating network.

In case b) a negative-going pulse is formed by differentiating network C8, R4, CR1 and R5 and is applied to the base of Q2 through R6. Q2 will saturate, forming the blanking pulse. Blanking duration is 100 to 200 msec and is controlled by the time constant of the differentiating network.

In the AM RECEIVE mode, +12 volts is applied to the output through isolation diode CR5. This blanks the 3rd L.O. while in this mode and prevents a beat note between the 3rd L.O. and the carrier of the received signal.

4.2.8 TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR

The TCXO is a purchased precision frequency standard which is used by the synthesizer to determine the exact transmit and receive frequency on which the transceiver is operated. All frequencies required in the transceiver are referenced (clocked) to the TCXO by direct or indirect synthesis techniques. Therefore, the frequency stability of the transceiver is determined solely by the TCXO, and is specified as 0.66 Hz/MHz over the temperature range of -46°C to +65°C. This provides "instant-on" frequency operation with no warm-up required.

The long term aging rate of the TCXO is less than 0.5 ppm per year. A frequency trim control is provided in the TCXO, and the TCXO should be checked and adjusted if necessary, on a yearly basis.

4.3 RECEIVER

The receiver electronics are divided among three printed circuit boards: VHF MIXER (1A3A1), IF/FILTER (1A3A2) and AUDIO (1A3A4). The three boards are interconnected by plugging into

the RECEIVER/EXCITER MOTHER BOARD (1A3A5). The block diagram is shown in figure 4.1.

4.3.1 GENERAL

Received signals are first passed through a band pass filter network in the filter module, then are fed into an 11 pole high pass filter on the VHF mixer board. This filter is a very sharp cut off broadcast band rejection network. The signal is then amplified and mixed in a balanced mixer with the first local oscillator, providing an output on 91.25 MHz.

In addition to 91.25 MHz, the mixer output contains several other significant mixing products, but because of the high frequencies involved they are separated in frequency from 91.25 MHz by a relatively large amount. The unwanted products are removed by passing the mixer output through a narrow band 91.25 MHz crystal filter. The resulting 91.25 MHz signal is then amplified and mixed again in another balanced mixer with the second local oscillator (80.75 MHz), which yields an output at 10.5 MHz. High frequency products from this mixing are removed by a low pass filter.

The 10.5 MHz I.F. signal is amplified, then fed to a diode gating network which selects the upper sideband filter (USB), lower sideband filter (LSB), or amplitude modulation filter (AM). These filters determine the receiver's bandwidth and reduce the interference from adjacent channels. The filtered I.F. signal is passed through another diode gate, then is highly amplified in two integrated circuit I.F. amplifiers. The output of the second I.F. amplifier is coupled to a product detector when receiving sideband signals and to a fixed amplifier and an envelope detector for receiving amplitude modulated signals. The fixed amplifier also feeds into the AGC detector which develops a D.C. voltage proportional to the received signal amplitude. The AGC voltage is amplified and used to control the voltage gain of the RF amplifier and the two integrated circuit I.F. amplifiers.

The product detector combines the 2nd I.F. signal with the 3rd local oscillator (10.5 MHz), giving an audio signal which reproduces the original trans-

mitted audio. The audio is fed to a 600 ohm line driver and to a fixed audio amplifier. The envelope detector detects the amplitude of the received signal reproducing the audio on a transmitted AM signal. The resultant audio is also fed to the 600 ohm line driver and to the fixed audio amplifier.

The output of the fixed audio amplifier is connected to the squelch circuit on the COMPRESSOR board 1A5.

The 600 ohm linedriver output provides the receive audio to the front panel PHONE monitor jack and to the CONTROL HEAD where it is applied to the aircraft main audio distribution system. Audio is available at 600 ohm or 150 ohm impedance by appropriate output connector pin selection.

4.3.2 VHF MIXER BOARD -1A3A1

Figure 5.19 consists of a front view (component side) and a rear view (foil side) plus a schematic of the VHF MIXER printed circuit board. In addition a complete parts list is provided on the reverse side of the fold out page.

4.3.2.1 BROADCAST FILTER

The R.F. input signal appears on pin 15 of 1A3A1-P1, and is passed through the broadcast band filter network, starting with C9 and ending at C13, to stepup transformer T1, which matches the R.F. amplifier (Q2) input impedance to the 50 ohm characteristic impedance of the broadcast band filter.

4.3.2.2. RF AMPLIFIER

The R.F. amplifier is a dual gate MOSFET with protection diodes built into the input gate to prevent burnout under overload. The input signal is applied to gate 1 and the amplified signal is taken from the drain through transformer T3. The source (gate 1 through R8) is biased positively by 3.6V to increase the dynamic gain range when Gate 2 voltage is varied. The MPF120 transistor can now be practically cut off when gate 2 voltage is taken to zero. Gate 2 derives its voltage from the automatic gain control (AGC) line, which varies between +8V at no signal to approximately +2V for an extremely strong signal.

The output of T3 passes through diode CR3 to the input of balanced mixer. Since the +12R voltage is +12V during receive (and ground during transmit) and the +12T voltage is ground during receive (and +12V during transmit), diode CR3 is switched on (conducts) by the voltage on T3, through the mixer, and R14 to the +12T line (which is at ground potential). Likewise, diode CR1 is turned off during receive and has no effect on the operation.

4.3.2.3 1st LO AMPLIFIER AND BALANCED MIXER

Local oscillator number 1 is injected at pin 18 of 1A3A1-P1 into amplifier Q5. The amplified L.O. is applied to the balanced mixer, Pin 8. The injected R.F. signal at Pin 1 now mixes with the L.O. Signal to provide several outputs, one of which is 91.25 MHz. 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 L.O. number 1 plus the R.F. signal and L.O. number 1 minus the RF signal. L.O. number 1 frequency is variable between 93.25 MHz and 121.25 MHz, corresponding to 2.0 to 29.999 MHz selected by the front panel frequency dials. In the ASB-850, the difference frequency is selected and a first I.F. of 91.25 MHz was picked 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 4.0 MHz apart making it a simple task to remove the sum frequency with a narrow band crystal filter.

For instance, if the received signal is on 10.000 MHz, the first L.O. frequency is 101.25 MHz, and the two mixer output frequencies are 91.25 and 111.25 MHz.

4.3.2.4 VHF FILTER AND BILATERAL AMPLIFIER

The mixer output is taken from Pins 3 and 4 of the balanced mixer and fed through a matching net-

work, L10 and C41, into filter FL1 at 91.25 MHz. The filter impedance is approximately 4000 ohms, hence the need for matching from the low impedance mixer output. Another matching network, C44 and L11, match the filter into the 50 ohm input impedance of the bilateral amplifier, Q6 and Q7. The amplifier is bilateral in that it amplifies in both directions, Q6 is active on receive, and Q7 is active on transmit.

Capacitors C46 and C47 form an impedance transformation network with T7 to match the gate 1 impedance of Q6. When Q6 is turned on by +12R on gate 2; Q7 is turned off by the +12T ground on its gate 2 (for explanation see paragraph 4.3.2.2). As with the R.F. amplifier, the source is biased positively by 3.6V to allow gate 2 to turn the device on or off.

The output of amplifier Q6 is taken through impedance matching network T8, C55, and C56 to the input second balanced mixer X2. Note that in the receive mode, T7 is the input transformer and T8 is the output transformer for Q6; while in transmit mode, T8 is the input transformer and T7 is the output transformer for Q7.

4.3.2.5 2ND LO AMPLIFIER AND BALANCED MIXER

The second mixer operates in a manner similar to the first mixer. The main difference is that the first mixer is an "up converter", that is, its output frequency is higher than the input frequency. The second mixer is a "down converter" changing the 91.25 MHz signal to 10.5 MHz. Transistor Q8 amplifies the second local oscillator signal, 80.75 MHz, and feeds it to the mixer Pin 8. The output of the second mixer is taken from Pins 3 and 4 and passes through a low pass filter to eliminate the high frequency mixing products. The output of the VHF mixer board is on pin number 5 of 1A3A1-P1.

Other circuits on the VHF mixer board are used during transmit and will be discussed in Section 4.4, Exciter.

4.3.3 IF/FILTER BOARD -1A3A2

Refer to Figure 5.20.

4.3.3.1 GENERAL

The IF/Filter board accepts the output of the VHF mixer, routes the signal through the selected band-pass IF filter and amplifies the resultant signal in the two IF amplifiers, U1 and U2.

4.3.3.2 DIODE GATES AND IF FILTERS

The signal from the VHF mixer board is fed to the IF/Filter board on pin 5 of 1A3A2-P1. This 10.5 MHz signal is amplified by Q3 and fed to the junction of diodes CR1, CR3, and CR5. Diodes CR1 and CR2 form a gate for the input of FL1, the LSB filter; CR3 and CR4 form a gate for the input of FL2, the AM filter; CR5 and CR6 form a gate for the input of FL3 the USB filter.

As the ASB-850 uses "high side" conversion, that is, the first local oscillator is always higher in frequency than the received signal, the sidebands are reversed. This means that a lower sideband signal received at the antenna is converted by the mixer to an upper sideband signal at the 10.5 MHz I.F. To pass the upper sideband IF signal on to the detector, an upper sideband filter must be used. Therefore, FL1 is the filter used for receiving and transmitting the lower sideband, but is in reality an upper sideband filter. Similarly the upper sideband is received and transmitted by lower sideband filter, FL3.

The diode gates, which are also repeated at the filter outputs, operate as follows: Assume the LSB mode is selected. A +12VDC voltage is applied to pin 9 of 1A3A2-P1. This turns on CR8, CR1 and CR12. Using the input gate as an example, current flows through L8, CR8, R27, CR1 and R19. A voltage of approximately +5VDC exists across R19 as a result, which turns off CR3 and CR5. CR2 is turned off because the cathode is more positive (+6V) than the anode (+4V). So the signal is allowed to pass into the filter. Additionally, the other filter input gates are turned off. Using CR3 and CR4 as an example, CR4 is conducting, (+4 VDC on its anode), with a path to ground for the cathode through R28 and R32. This shorts any signal leakage across CR3 to ground through C19; and CR3 is turned off with +5V on the cathode and +4V on the anode.

The input and output gates for the other filters operate in a similar manner. CR7, CR8, CR9 and CR10 prevent interaction with other control circuits.

4.3.3.3 INTEGRATED CIRCUIT IF AMPLIFIER

The filter output is fed through C37 to another diode gate, CR17 and CR18. This gate switches circuits from receive to transmit, so during receive, CR17 is turned on and CR18 is off. This allows the signal to go to pin 2 of U1, an integrated circuit amplifier. There it is amplified by approximately 30db and fed to pin 2 of U2, another integrated circuit amplifier. Schematics of U1 and U2, CA-3053, are given in Figure 4.2.

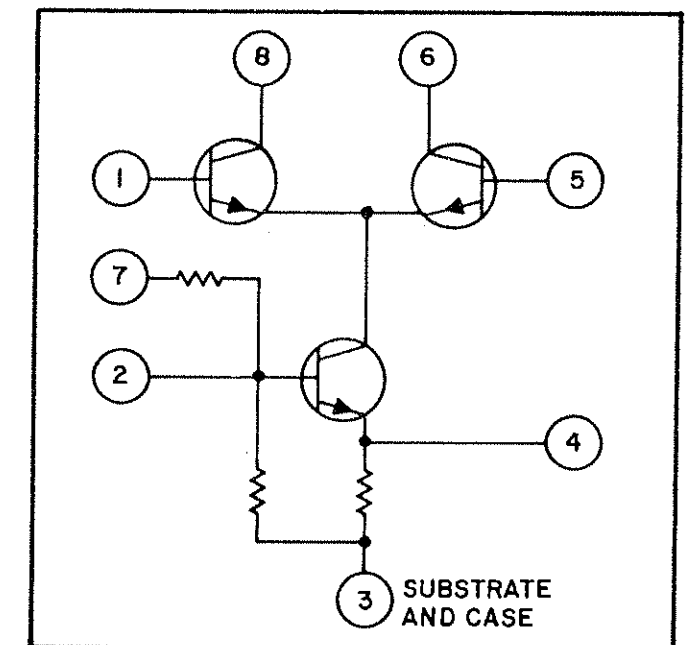


Figure 4.2 CA3053 Schematic of U1 and U2

The networks L3, C51, C52 and L4, C58, C59 are tuned to 10.5 MHz and are used for impedance transformation. The output of the I.F./Filter board is on pin 11 of 1A3A2-P1. AGC voltage for gain control of U1 and U2 is supplied through pin 13 of 1A3A2-P1.

Other circuits on the IF/Filter board are used during transmit and will be discussed in Section 4.4, Exciter.

4.3.4 AUDIO BOARD—1A3A4

See Figure 5.21.

4.3.4.1 GENERAL

The 10.5 MHz I.F. output from the IF/Filter board is supplied to pin 11 of 1A3A4-P1, and then is routed to two circuits: the product detector, Q6, Q8, and Q9, and the fixed gain I.F. amplifier, Q1.

4.3.4.2 FIXED IF AMPLIFIER AND AGC DETECTOR

The output from Q1 is fed to variable gain amplifier Q2, to drive the AGC detector amplifier, Q3. A threshold bias is established on Q3 by R11 and R12. Any received signal of sufficient amplitude to overcome this pre bias will cause Q3 to conduct thereby lowering the collector voltage. This allows diode CR4 to conduct, reducing the base voltage on AGC amplifier Q4. In turn this causes the emitter voltage on Q4, which is the AGC voltage, to drop proportional to received signal strength. The "no signal" value of AGC voltage is approximately +8.8 VDC which provides maximum R.F. and I.F. gains. A signal of 100,000 uv will cause the AGC voltage to drop to approximately +2.5 to +3.0 VDC. The "no signal" AGC voltage is established primarily by R16 and R17. The AGC attack time is determined by R13 and C11. CR3 is used to equalize the load on Q2. R10 provides AGC gain control.

4.3.4.3 AGC SQUELCH AMPLIFIER

Transistor Q5 is a D.C. amplifier which drives the squelch threshold line to provide positive squelch action on strong signals. Its threshold is set so that squelch will break if the CONTROL HEAD squelch control is fully CCW (maximum squelch) and a signal of 100 μ V maximum is received.

4.3.4.4 RF GAIN CONTROL AMPLIFIER

(Optional — In place of squelch.)

Amplifier Q12 is driven from the RF GAIN CONTROL on the control head to reduce the AGC voltage which in turn reduces the R.F. and I.F. amplifier gains. As the RF GAIN CONTROL is

turned counter clockwise, the base voltage of Q12 is made more positive causing Q12 to conduct lightly at first, then more heavily to "pull down" the AGC voltage. With the RF GAIN CONTROL fully counter-clockwise, it should be possible to completely disable the receiver.

4.3.4.5 AM DETECTOR

In addition to the AGC circuitry, amplifier Q1 also drives the AM detector, Q7 and Q10. Transistor Q7 is a high gain amplifier used to drive amplitude detector Q10 with a large signal for best linearity. Q10 is biased almost to cutoff so that it will detect amplitude variations. The output is reduced by R43 to equal the product detector output voltage. The AM detector is turned on in the "AM" mode by the +12R AM voltage on pin 7 of 1A3A4-P1.

4.3.4.6 PRODUCT DETECTOR

The product detector Q6, Q8, and Q9 combines the 10.5 Mhz I.F. signal with that of the 3rd local oscillator, 10.5 MHz. Q9 amplifies the 3rd L.O. and injects it into the detector where the R.F. components are removed by C29 leaving only the audio. The product detector is turned on only in USB, LSB, or CW by voltages on either pin 8 or pin 9 of 1A3A4-P1. CR1 and CR2 are diode gates used to prevent interaction between the +12 USB and +12 LSB lines.

4.3.4.7 600 OHM LINE DRIVER

Both the product detector output and the envelope detector outputs are combined in R42 and feed integrated circuit 600 ohm line driver, U1, and fixed gain audio amplifier Q11. The CA3020 line driver is a conventional push-pull multistage amplifier feeding output transformer T1. The input to U1 is controlled by R48 and the balanced 600 ohm output appears on pins R and T of 1A3A4-P1. Pin S is the output transformer center tap and is used to provide 150 ohm audio output. A side tone is provided from the microphone amplifier through pin F of 1A3A4-P1 to the audio system of the receiver to allow monitoring of the signal. This sidetone is injected into the audio line driver input.

The detector outputs are taken to a volume control amplifier on the mother board 1A3A5, then brought into the 600 ohm line driver input.

4.3.4.8 MOTHER BOARD — 1A3A5

See Figure 5.23.

4.3.4.8.1 GENERAL

The mother board provides interconnection for the RCV/EXC module printed boards. It also contains the volume control circuit which provides attenuation of the receive audio signal through the use of a variable DC voltage from the Control Head.

4.3.4.8.2 VOLUME CONTROL

The audio from the detectors on the audio board is supplied to gate 1 of Q1. The audio output is taken from the drain of Q1 and supplied to the 600 ohm line driver input. CR5 and CR6 apply a fixed 1.4V bias to the source of Q1, allowing gate 2 to be driven negative with respect to the source. This provides 70 to 80 db overall gain control. The unit is squelched by disabling the volume control amplifier at E33.

4.3.4.8.3 DELAYED AGC ATTENUATOR

AGC voltage is applied to the base of Q2 through resistive divider R13, R14. Under weak signal conditions, the AGC voltage is high causing Q2 to conduct and keep CR8 turned on. CR8 is a pin diode whose attenuation is inversely proportional to its forward current. As the r.f. signal level increases, the AGC voltage decreases until Q2 no longer conducts, decreasing the current in CR8 and increasing its forward resistance, attenuating the input rf signal.

4.4 EXCITER

The exciter is contained on three printed circuit boards; sideband generator board (1A3A3), IF/Filter board (1A3A2), and VHF mixer board (1A3A1). Since the ASB-850 is a transceiver, a number of the same circuits and components are used in both the receive and transmit modes. A block diagram is shown in Figure 4.1.

4.4.1 GENERAL

Input to the exciter is provided by the speech compressor on the COMPRESSOR board (1A5). The microphone input signal is compressed, then is amplified and fed to the balanced modulator.

The balanced modulator takes an R.F. signal, 10.5 MHz, from the 3rd local oscillator amplifier, and "audio" from the microphone. It then suppresses the R.F. carrier, 10.5 MHz and supplies two signals as outputs: 10.5 MHz plus the audio frequencies (upper sideband, USB) and 10.5 MHz minus the audio frequencies (lower sideband, LSB). Hence, the output of the balanced modulator is double sideband, DSB. After amplification in a fixed gain I.F. amplifier, the DSB signal is gated into either the USB filter or LSB filter as selected on the front panel. AM operation in the ASB-850 is, in reality, carrier plus USB only, so the AM filter is not used in transmit. The appropriate sideband filter eliminates the unwanted sideband and feeds through another diode gate into a bilateral amplifier. The gain of the bilateral amplifier is controlled by a peak voltage ALC and a VSWR ALC (automatic level control). The voltage ALC controls the peak transmitter output, and the VSWR ALC protects the P.A. transistors from high standing wave ratios.

The bilateral amplifier output is then impedance matched by an emitter follower. For AM operation, the AM carrier is injected from the automatic carrier control (ACC) amplifier into the bilateral amplifier.

The ACC detector operates on an average output level to maintain a constant carrier output. This helps prevent "carrier wipe out" by the ALC system. The emitter follower output is passed through a low pass filter to a balanced mixer. Notice that the transmit signal from the filter gate has been flowing in a direction exactly reversed from the receive signal flow. Therefore, this balanced mixer is the second VHF mixer described in the receiver section, and the second L.O. amplifier is the same as in receive.

The transmit output of the balanced mixer is the second L.O. frequency (80.75 MHz) plus the I.F. frequency (10.5 MHz) or 91.25 MHz. This output

is amplified in the transmit side of the VHF bilateral amplifier, filtered in the 91.25 MHz crystal filter, and mixed again in another balanced mixer (the first mixer described in the receiver section). The 91.25 MHz signal is combined with the first local oscillator frequency to provide the desired frequency output between 2.0 and 30 MHz. The desired frequency signal is amplified in a pre-amplifier and a linear amplifier, then passes through a low pass filter. This is now the exciter output.

A detector, which monitors current in the power amplifier transistors, supplies a signal to provide an ALC to control the gain of the pre-amplifier stage, limiting the P.A. current to a safe level.

The following subparagraphs describe circuit operation of the individual circuits by printed circuit board.

4.4.2 SIDEBAND GENERATOR BOARD-1A3A3

Refer to Figure 5.22.

4.4.2.1 GENERAL

The sideband generator board processes the audio input and translates the audio in a balanced modulator to a DSB suppressed carrier signal centered around 10.5 MHz. The board also contains ALC and ACC control circuitry.

4.4.2.2 AUDIO AND BALANCED MODULATOR

Compressed microphone input is supplied on pin 18 of 1A3A3-P1. At this point the level has been set by the compressor. The microphone audio is amplified by Q4 and feeds into the balanced modulator, CR3, CR4, CR5 and CR6. Carrier balance is achieved by nulling the 10.5 MHz output with potentiometer R34 and capacitor C26. Transformer T1 is tuned to 10.5 MHz and capacitors C23, C24 provide an impedance transformation to match the input impedance of the next stage. The double sideband suppressed carrier signal output is on pin 16 of 1A3A3-P1.

R.F. carrier energy for switching the balanced

modulator is supplied through pin F of 1A3A3-P1 and amplified by Q1.

4.4.2.3 AUTOMATIC CARRIER CONTROL (ACC)

A small amount of 10.5 MHz carrier is supplied to the automatic carrier control amplifier Q5 through a diode gate, CR1, CR2. This gate prevents carrier energy from being transmitted in USB, LSB, or CW modes, but allows the carrier to be passed and amplified in the AM mode. (A3H emission).

The +12 AM(T) signal, on pin 5 of 1A3A3-P1, turns CR1 on and CR2 off. It also supplies operating voltage for ACC detector amplifiers Q2 and Q3, and carrier control gate Q5.

Detected R.F. voltage from the ACC detector (in the Amplifier/Coupler Unit) is applied to Q2 through threshold control R1. The amplified D.C. voltage has the audio frequency removed by R9, C39, so it will maintain an average power characteristic and not follow the peak envelope of the output wave-form. C4 provides a "soft" initial carrier turn-on. The dc control voltage is inverted in Q3 and applied to ALC amplifier Q9. This controls the system gain and maintains a constant carrier level. Switch Q1 is required to disable the voltage ALC stage Q10, preventing unwanted ALC interaction.

NOTE

*Q6, Q7, Q8, Q12 and Q13
are not used in this
transceiver.*

4.4.2.4 VSWR AND VOLTAGE ALC AMPLIFIERS

Transistors Q9 and Q10 are ALC amplifiers for voltage ALC (Q10) and VSWR ALC (Q9). The VSWR ALC is set by a fixed resistance ratio, but the voltage ALC, which determines the peak power output of the transmitter, is set by potentiometer, R55. Q15 acts with Q10 as a differential amplifier to provide temperature compensation of the ALC.

4.4.3 IF/FILTER BOARD-1A3A2

Refer to Figure 5.20.

4.4.3.1 GENERAL

The IF/Filter board accepts the DSB output from the SB generator board, routes the signal through the selected SB filter and amplifies the resultant IF signal. Carrier injection for AM operation also occurs on this board.

4.4.3.2 TRANSMIT IF AMPLIFIER

The double sideband suppressed carrier output from the sideband generator is injected at pin 16 of 1A3A2-P1. Here it is amplified by a fixed gain IF amplifier, Q4. Application of +12 T to pin 10 of 1A3A2-P1 energizes Q4, turns CR18 on and turns CR17 off (+12R goes to ground during xmit, as +12T does during receive).

4.4.3.3 TRANSMIT FILTER SELECTION

The CONTROL HEAD MODE switch selects the desired mode of operation, so the DSB signal passes through either the USB filter or LSB filter to eliminate the undesired sideband. Note that in the AM position, the +12AM(T) voltage selects the lower sideband filter in transmit, providing USB at the exciter output (See section 4.3.3.2 for an explanation of sideband inversion).

4.4.3.4 TRANSMIT GAIN CONTROL AMPLIFIER

The SSB signal thus produced is amplified in transistor Q2 and impedance matched to the output by emitter follower Q1. Note that in the bilateral amplifier Q1, Q2, and Q3, transistor Q3 is turned on only in receive, and Q1 and Q2 are turned on only in transmit.

Since the base of Q2 represents a high impedance, it is used as the carrier injection point for AM operation.

ALC controls the gain of transistor Q2 to limit its output when either the transmitter output has reached 100W peak, or the output transistor voltage rating is in danger of being exceeded by a high voltage standing wave ratio (VSWR) at the transmitter output. When a voltage appears at 1A3A3-P1 pin T or at the base of Q10 of sufficient amplitude to bias either Q9 or Q10 "on", the appropriate transistor conducts through R8, on 1A3A2, causing a large voltage drop to appear across R8. This decreases the bias voltage on the base of Q2, reducing its gain and the output from pin 5 of 1A3A2-P1.

4.4.4 VHF MIXER-1A3A1 (Transmit)

Refer to Figure 5.19.

4.4.4.1 GENERAL

The IF signal from the SB generator board is up converted to 91.25 MHz, filtered and then mixed with the first LO frequency to yield the desired transmit RF output frequency. ALC current control is also performed on this board.

4.4.4.2 LOW PASS FILTER AND BALANCED MIXER

The SSB (or AM) signal from the IF/Filter board enters the VHF mixer board on pin 5 of 1A3A1-P1. From there, it passes through a low pass filter, C62 thru C66, L14 and L15, to attenuate harmonics of the 10.5 MHz signal. Then it is injected into a balanced mixer. Operation of the balanced mixers is described in Section 4.3.2.

4.4.4.3 TRANSMIT BILATERAL AMPLIFIER AND FILTER

The 10.5 MHz signal is converted up to 91.25 MHz and fed to the bilateral amplifier. In transmit, Q7 is activated and Q6 is turned off (again see Section 4.3.3 for discussion). Input to Q7 is at T8, and the output is T7. Capacitors C55 and C56 match between the low impedance of the mixer and the

high impedance across T8. At the output, C46 and C47 provide impedance matching into the filter matching network, L11 and C44. The 91.25 MHz signal is filtered by FL1 to remove unwanted mixing products. C41 and L10 match the filter impedance to the balanced mixer.

4.4.4.4 BALANCED MIXER AND RECEIVER SHUT DOWN

The balanced mixer combines the 91.25 MHz signal with the first L.O. providing a difference frequency equal to the desired output frequency. This signal now has the sideband reversed per the earlier discussion, in paragraph 4.3.3.2, and is fed to the pre-amplifier Q3. The +12V voltage at pin 10 of 1A3A1-P1 turns on Q1 and Q3 and turns off diode CR3. During transmit, +12R goes to ground, but the AGC voltage remains at approximately +9VDC on pin 13 of 1A3A1-P1, which turns diode CR1 on. This drops the voltage on gate 2 of Q2 to approximately +1 VDC, turning off Q2. This prevents transmit loop oscillations by breaking the path between RF input (Receive) on pin 15 of 1A3A1-P1, and input to the transmitter pre-amplifier at C34.

4.4.4.5 EXCITER LINEAR AMPLIFIER

The signal is amplified in Q3 and Q1 and passed through a low pass filter, C10, C11, C12, C19, C20, L6 and L7, to pin 8 of 1A3A1-P1. R16 sets the over-all system gain to the proper level.

4.4.4.6 CURRENT ALC AMPLIFIER

Transistor Q4 is the current ALC control stage which, upon conduction, causes a large voltage drop to appear across R18, reducing the base bias on Q3 thus lowering its gain. During receive, +12R voltage through CR13 and R48 keeps Q4 turned on, and capacitor C36 charges to +12V. When the transmitter is keyed, CR13 is turned off and C36 must discharge through R48 into Q4, keeping Q4 turned on, and Q3 turned off for approximately one millisecond. This allows "Switch On" transients to be dissipated before the P.A. receives the signal.

Whenever the P.A. current exceeds a preset threshold, a DC voltage appears at pin U of 1A3A1-P1. This turns Q4 on, reducing the gain of Q3, which decreases the output and brings the P.A. current back to a safe level.

4.4.5 COMPRESSOR BOARD—1A5

See Figure 5.24.

4.4.5.1 GENERAL

The compressor board includes the transmit microphone speech compressor and the receiver audio squelch circuits. If desired by the customer squelch may be disabled and r.f. gain substituted by changing a jumper wire.

4.4.5.2 SQUELCH

Receiver audio from the Audio Board (1A3A4) is applied to IC1, pin 4, through level control R1. A voltage proportional to received signal strength is applied to the threshold input. This voltage combined with the level control establish the received signal level which will open the squelch, when the Control Head squelch control is turned to maximum. This is adjusted so a received signal of 100 uv maximum will open the squelch under all conditions.

The audio passband of the squelch circuit is narrowed and centered around 1 kHz to minimize interference from high and low frequency external noise sources. The amplified audio is detected by CR1, CR2 and the d.c. voltage applied to pin 12 of IC1. When this stage conducts, the base of Q1 is taken to ground causing it and the transistor on pins 6, 7, 8 of IC1 to cease conduction, opening the squelch. When no audio is present, Q1 and transistor 6, 7, 8 of IC1 both conduct, squelching the volume control amplifier. The squelch control, when turned CW, supplies a bias to the squelch circuit to keep it open when not required. C7, R13 established a "hold on" time constant to keep the squelch open for about one and one-half seconds after loss of audio.

4.4.5.3 SPEECH COMPRESSOR

Audio from the microphone is applied to IC2 pin 4 through the carbon microphone bias and filter

circuits. R36 is the microphone input level control and is set for carbon or transistor microphones having outputs of 200 to 600 mv rms. The output of transistor 3, 4, 5 of IC 2 is applied to the base of Q2 and through R20 is adjustable to the proper level for full SSB output. Q2 amplifies the audio and supplies the sidetone output (adjustable through R27) and emitter follower transistor 6, 7, 8 of IC2. The audio is then rectified by CR3, CR4 and the resultant d.c. voltage applied to pin 9 of IC2. This causes transistor 9, 10, 11 of IC2 to conduct decreasing the input audio to pin 4 of IC2. This maintains a constant output at pin 5 of IC2 over a 15 to 20 db audio level range at the input. The AM audio level is adjusted by R29, which is effective only in AM mode. Transistor 12, 13, 14 of IC2 is a switch grounding R29 in AM, allowing it to set the proper AM audio level.

4.5 SWITCHING REGULATOR 1A6

See Figure 5.25.

4.5.1 GENERAL

The switching regulator assembly contains a high efficiency switching regulator to reduce the 27.5 VDC nominal input to 18 VDC with minimum power dissipation. The 18 VDC is then regulated to 12 VDC, part of which is further regulated to 5 VDC for the synthesizer digital circuitry.

4.5.2 SWITCHING REGULATOR

Integrated circuit, UI, is connected in a regenerative switching mode and drives Q1, a high gain Darlington power transistor to supply the required current to the system. The switching frequency is approximately 25 kHz and is filtered from input and output leads to prevent spurious pickup. The entire module is completely shielded to eliminate spurious radiation of the switching frequency and its harmonics. U2 is a standard regulator set for 12 VDC. It supplies low power to 1A1Q1 on the main chassis which supplies the needed current to the transceiver.

4.5.3 5 VDC REGULATOR

1A1U1 is a complete 5 volt regulator in a standard TO-3 package. It is mounted on the main chassis along with 1A1Q1 and receives its voltage from the regulated +12V line. C5 and C6 are added to improve transient response.

4.6 FILTER ASSEMBLY 1A2

See Figures 5.26, 5.27 and 5.28.

4.6.1 GENERAL

The filter assembly consists of two boards, odd channel board (1A2A1) and even channel board (1A2A2). The odd channel board contains the odd number filters, band 1 (2-3MHz), band 3 (4-6MHz), band 5 (9-13MHz) and band 7 (20-30MHz). The even channel board contains the even number filters, band 2 (3-4MHz), band 4 (6-9MHz), and band 6 (13-20MHz).

The filters are switched electrically using pin diodes. The appropriate filter is selected automatically by the digital frequency switches on the control head.

Each filter consists of a high pass section in series with a low pass section, giving a band pass characteristic. The filters are used for receiver input as well as exciter output, to minimize harmonic and spurious input to the power amplifier unit.

4.7 CONTROL HEAD 2A

See Figure 5.29.

4.7.1 GENERAL

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

4.7.1.1. DECODER BOARD — 2A1 Figure 5.30.

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 "low limit" circuit is included on the board to warn the operator that he has dialed a frequency below 2.0 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 following display, a voltage is sent back to the Receiver/Exciter unit disabling the receiver and transmitter.

4.7.1.2. DISPLAY BOARD — 2A2 Figure 5.30.

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

4.7.1.3 DIMMER

Transistor 2A3Q1 is a controllable regulator which supplies voltage to the lamps and the digital display. If no dimmer voltage exists the regulator supplies 5V to the lamps and display giving maximum brightness. If a dimmer is used, the voltage on Q1 base is decreased by the dimmer causing the dimmer output to decrease accordingly.

4.7.1.4 5 VDC REGULATOR

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

4.7.1.5 CONTROL LIGHTS

Lamps DS1, DS2, DS3 and DS4 are located behind the ON, LSB, AM and USB pushbuttons for button illumination, and are controlled by their respective pushbutton switches. DS5 is located behind the TUNE pushbutton to illuminate it, but it is controlled by the AMPLIFIER/COUPLER unit, and is illuminated only when the coupler is tuning.

Panel lamps 2A3 DS1 and DS2 back light the front panel for night use.

Fault lamp 2A3 DS3 (yellow) is illuminated only if the AMPLIFIER/COUPLER unit detects a fault, such as failure to tune the antenna. Ready lamp 2A3 DS4 (green) is illuminated when the coupler tuning sequence is successfully completed and the

transceiver is ready to transmit. When the transceiver is keyed, this lamp acts as a modulation indicator.

4.8 AMPLIFIER/COUPLER UNIT (ACU-810)

4.8.1 GENERAL FIGURE 5.31

Low level rf energy from the Receiver/Exciter unit is fed to the power amplifier, which increases the power to 100 watts PEP. The power amplifier output is fed through the filter module to suppress the harmonics, then is applied to the automatic coupler section, where it is impedance matched to the antenna.

4.8.2 POWER AMPLIFIER—3A6

See Figure 5.37.

4.8.2.1 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.

4.8.2.2 PREDRIVER, DRIVER AND POWER AMPLIFIER

Input from the exciter is connected through T/R relay K4 to connector 3A6J1. 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 feedback 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.

4.8.2.3 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 back to the RECEIVER/EXCITER to control the gain of the exciter output amplifier on the VHF mixer board (1A3A1).

4.8.2.4 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), the voltage appearing at pin D of the power connector causes the VSWR ALC amplifier on the sideband generator board (1A3A3) in the RECEIVER/EXCITER unit to reduce the transmit I.F. gain to bring the output to within safe limits for the output transistors.

4.8.3 FILTER MODULE—3A7

See Figure 5.38.

4.8.3.1 GENERAL

The filter module consists of three printed circuit boards; low band filter board, high band filter board, and motor control board. The filters are elliptical design with an ultimate attenuation of 40 db. This attenuation is added to that normally present in the RF power amplifier to give excellent harmonic attenuation. The filters are divided into seven bands and are split between the two boards: low bands 1 (2-3 MHz), 2 (3-4 MHz), 3 (4-6 MHz) and high bands 4 (6-9 MHz), 5 (9-13 MHz), 6 (13-20 MHz) and 7 (20-30 MHz). The bands are automatically selected by the CONTROL HEAD digital frequency control switches. The filter switches are motor driven through an open-seeking switch wafer.

4.8.3.2 MOTOR CONTROL BOARD

The motor control board incorporates components associated with the channeling circuitry. It also includes the voltage ALC detector and the ACC detector.

Channeling of the band switch is accomplished by applying a ground to any of the band control lines. This causes the relay, K1 to be energized, in turn energizing the motor causing the open seeking wafer to rotate until it finds the band line with the ground. At this point, the circuit is broken and the relay is deenergized, shorting the motor. This provides dynamic braking which stops the motor very rapidly, preventing excessive overshoot.

4.8.3.3 VOLTAGE ALC DETECTOR

The voltage ALC detector consists of a resistive voltage divider, R1 and R2, an rf detector CR1, and emitter followers Q1 and Q2. This combination provides an extremely fast and responsive ALC. The detector output drives the emitter followers to charge capacitor C4, which discharges through R4 into the RECEIVER/EXCITER voltage ALC amplifier circuit on the sideband generator board (1A3A3). The decay time is long enough to eliminate the audio modulation from the ALC line. Capacitor C1 is adjusted to provide optimum ALC performance over the full frequency range of the transceiver. The output from the emitter of Q2 on pin 3 (RF indicate) is used on 3A2 for the modulation peak detector.

4.8.3.4 AUTOMATIC CARRIER CONTROL (ACC) DETECTOR

The ACC detector derives its output by rectifying the voltage at divider R5 and R6 with diodes CR2 and CR3. This detector has a fast rise and fast decay time, so is a good peak voltage detector. The averaging networks required to give proper ACC action are located in the RECEIVER/EXCITER unit. Capacitor C7 is adjusted to provide optimum ACC performance over the full frequency range of the transceiver.

4.8.4 ANTENNA COUPLER

4.8.4.1 GENERAL

The RF output from the filter module, 3A7, is fed to the coupler input from J5. A coaxial jumper is provided from the 50 ohm output, J3, to the antenna coupler input, J5. This jumper provides a method of measuring the power output from the PA/Filter directly into a 50 ohm load and also checking VSWR at the antenna coupler input.

A chassis wiring diagram of the Antenna Coupler is shown in Figure 5.31. The antenna coupler consists of the following subassemblies:

Pad, Phase and Amplitude Detectors	
P.C. Board	3A1A1
Control Logic P.C. Board	3A2
Phase and Amplitude Control P.C. Board . . .	3A3
C3 and C6 Control P.C. Board	3A4
Servo Motor Control P.C. Board	3A5
Filter Regulator-P.C. Board	3A8A2
C1 Assembly	3A9
L4 Assembly	3A10
C3 and C6 Assembly	3A11

Each of the subassemblies will be discussed in the following paragraphs.

4.8.4.2 PAD AND PHASE AND AMPLITUDE DETECTORS, (3A1A1)

A schematic diagram of the Pad, Phase and Amplitude Detectors is shown in Figure 5.32. A 3 DB pad attenuator, consisting of R7, 8, 9, 11, 12, and 13, is used to offer a near constant 50 ohm load for the Power Amplifier during a tune cycle. C17 is a compensation capacitor to balance lead inductance of the pad resistors. Relay K1, the Pad relay, is energized by circuitry on 3A2 and is controlled by reflected power. If the reflected power exceeds a VSWR of 1.5:1, relay K1 is energized and the pad is pulled in. This feature offers further protection for the power amplifier.

4.8.4.2.1 AMPLITUDE DETECTOR

The amplitude detector consists of transformer T1 and associated circuitry. The purpose of the magnitude (amplitude) detector is to determine if the magnitude of the impedance at the input to the 12.5-50 ohm transformer is greater than or less than 50 ohms. When the magnitude of the impedance is 50 ohms, the output of the magnitude detector is near zero (null). In order to determine

the magnitude of the impedance on the line, a voltage sample and a current sample are taken. The current sample is derived from transformer T1, diode CR2, and R2-C6 time constant.

The voltage sample is generated by capacitive divider L1, C1 and C2. L1 provides frequency compensation for the voltage sample. The voltage sample is rectified with diode CR3 and time constant R3 and C3. The voltage sample is adjusted to be equal to the current sample with the output of the detector terminated in a non-reactive 50 ohm load. It should be noted that both voltage and current samples are independent of the phase of the RF signal flowing through the line because both samples are rectified DC voltages.

The output from the magnitude detector is taken between pins 6 and 9, and since the voltage sample and the current sample are opposite, the output is at null when the detector is terminated in 50 ohms. If the magnitude of the impedance on the line is greater than 50 ohms, the current sample decreases and the voltage sample increases, resulting in a negative error voltage measured from pin 6 to pin 9. A magnitude less than 50 ohms causes the current sample voltage to increase and the voltage sample to decrease and the error voltage is positive from pin 6 to pin 9. This error voltage is fed to the 3A3 P.C. board where it is amplified and used to control the servo motor that drives the variable inductor, L4. A magnitude greater than 50 ohms will drive the inductor toward minimum inductance. A magnitude less than 50 ohms will drive L4 toward maximum inductance.

Other components associated with the amplitude detector --

R1 is used to flatten the response of the current sample transformer T1. C24 is a variable capacitor used to compensate for the inductance in the wiring of K1 and the pad resistors. C16, in conjunction with C1, provides the proper division for the voltage sample. L4 and L6, with C5 and C12, prevent RF voltages on the board from getting on the DC outputs.

4.8.4.2.2 REFLECTED POWER DETECTOR

A reflected power detector is provided to detect when the reflected power on the antenna transmission line is below the VSWR limit. Since

reflected power is a function of the magnitude and the phase on the line, a detector must be used to detect both of these. Diode CR1 is floating between the current sample (AC) and the voltage sample (AC). C4 couples the AC voltage sample to the cathode of CR1 therefore any DC voltage generated by CR1 is a function of the difference in the amplitude and the phase of the voltage across CR1. The output of the reflected power detector is taken from pin 6 to pin K and is at a null when the detector is terminated with a 50 ohm load. When the load on the detector is anything other than 50 ohms, the output from pin 6 to pin K increases in a positive direction. The output of the reflected power detector is fed to 3A2 and is used on this board to control the tuning cycle. Inductor L5 and capacitor C13 prevent RF from appearing on the DC line.

4.8.4.2.3 PHASE DETECTOR (ϕ means phase)

The phase detector consists of transformer T2 and associated circuitry. An AC voltage sample, derived from C22 and R6, is fed to the centertap of T2. T2 provides a current sample. The voltage sample is shifted 90 degrees in phase by C22 and R6. The AC output of T2, measured across R4, is the sum of two quadrature voltages and is changed to DC by CR4 and CR5. C7, C8 and R5 provide the time constant and load for T2. R5 is adjusted for null with the phase detector terminated by 50 ohms. The DC phase detector output is taken from pin 7 to pin 8 and is positive for a positive phase angle and negative for a negative phase angle. The DC output is fed to the 3A3 P.C. board where it is amplified and used to control the servo motor that drives the vacuum variable capacitor. L3 and C9 provide isolation for the RF voltage at the center tap of T2. L7 and L8 and C14 and C15 prevent RF from appearing on the phase detector DC lines. C10 and C11 are RF bypasses.

4.8.4.2.4 AMPLITUDE DETECTOR, PHASE DETECTOR, AND REFLECTED POWER DETECTOR REFERENCE

The three detectors are all referenced to a floating voltage, 12V REF. This action is required because all three detectors operate into differential amplifiers that are floated between +28 VDC and ground.

4.8.4.2.5 TUNE CONTROL RELAY

K2 is the tune control relay and is energized by

initiated by depressing the control head TUNE button, K2 is energized and switches +28 VDC and +12 VDC to circuits that are used during the tune cycle.

4.8.4.3 CONTROL LOGIC (3A2)

See Figure 5.33.

This plug-in module controls all the major functions in the coupler. It is composed of the following basic circuits:

1. Reflected Power Amplifier
2. Time Delay Circuit
3. Tune Bistable Multi Vibrator (BSMV)
4. Fault BSMV
5. 50 ohm BSMV
6. Lamp Drivers
7. RF Detector
8. Modulation Indicator Control
9. Other Circuitry
10. Circuitry contained on board not used for ASB-850.
11. Diode List

Each of these circuits will be discussed individually.

4.8.4.3.1 REFLECTED POWER AMPLIFIER (Logic "1" = +3 to +5 VDC) (Logic "0" = 0 to +.5 VDC)

The reflected power amplifier consists of U1, Q1, Q2, Q3, Q4, and Q5 and associated components. The output from the reflected power detector (3A1A1) is fed to the input of U1, a differential amplifier. The reflected power detector output is floating on the 12V reference and U1 output, pin 10, is also at 12 VDC. U1 operates between +28 VDC and ground. Transistor Q1 emitter is referenced to 12 VDC. Therefore, when the reflected power detector has an output, pin 4 of U1 goes positive with respect to pin 5 of U1. This causes pin 10 of U1 to decrease below +12 VDC and transistor Q1 conducts. R8 is connected to the base of Q1 and is driven by the GAIN control located on the front panel. The GAIN control voltage can be varied from +12 VDC to +18 VDC, thereby effectively adjusting the threshold of reflected power that will cause an output from Q1.

Q2 and Q3 amplify the output of Q1. The collector of Q3 is important and is designated 50 ohm (—). When the collector of Q3 is at ground, the reflected power has dropped below the threshold and the system is correctly tuned.

Q4 drives Q5 and is a short time delay circuit. C32 can be discharged rapidly with CR3, but charges up slowly through R17. This action prevents a momentary drop in reflected power from terminating the tuning cycle. During the tune cycle, the reflected power may drop below the threshold several times for a short interval of time before finally coming to a steady condition of no reflected power.

The short time delay circuit prevents premature termination of the tune cycle. R17, in conjunction with C32, acts as a noise filter to remove sharp noise pulses. Q5 changes the 28 VDC signals in the reflected power amplifier to a logic level suitable to apply to the logic circuits. A logic "1" output from Q5 emitter terminates the tune cycle. Resistors R53 and R54 are attenuator resistors and reduce the input to the differential amplifier when the coupler is not in the tune cycle. C39 is a filter capacitor used to prevent transmitter turn on spikes from causing a fault light during normal operate mode.

The purpose of R54 is to compensate for the difference in input power level from tuning (30 watts input, attenuated to 15 watts [3db pad] into the phase and amplitude detectors) and 100 or 130 watts power during normal operate conditions. R63 and CR29 are used to disable the reflected power amplifier any time the transmitter is not keyed on.

4.8.4.3.2 TIME DELAY CIRCUIT

The time delay circuit consists of Q16, Q17, Q18, and associated circuitry. R46 is an adjustment used to set the length of the time delay, normally 40-45 seconds. When a tune cycle is initiated, the collector of Q16 rises to near 12 VDC. C40 begins charging through R47 and the voltage on the anode of Q17 increases toward 8 VDC. Q17 is a PUT (Programmable Unijunction Transistor) and will fire when the anode voltage reaches the voltage applied to the gate. R50 and R49 divide the 12 VDC down to approximately 8 volts.

When Q17 fires, a pulse is generated across R48. This positive pulse saturates Q18. The collector of

Q18 drops to ground and CR21 re-sets the TUNE BSMV while CR20 re-sets the fault BSMV. This action terminates the tune cycle and turns on the FAULT light. CR26 (through U2C and Q6), places a logic 0 on the L max line when the time delay fires. This action is required to terminate the L4 force function at the end of the time delay.

4.8.4.3.3 TUNE BSMV

This BSMV (toggle) consists of U3B and U3C, R33, and R34. C35, along with R25 and R26, provide sufficient loading on pin 6 to assure that the TUNE BSMV will come on with logic 0 on pin 6 when the unit is first turned on. When a TUNE pulse (+28 VDC or +12 VDC) is applied to pin A the anode of CR17, Q15 is saturated and diode CR18 turns on the TUNE BSMV by grounding pin 8 of U3. Pin 6 of U3 now has a logic 1 and Q9 and Q10 are saturated. Q9 causes the TUNING light to be illuminated while Q10 places a ground on the interlock line and the tune control relay on 3A1 is pulled in.

The TUNE BSMV is re-set at the end of the tune cycle by a logic output from U4C pin 8. U4C is an AND gate that produces a logic 0 output when RF is present and when the emitter of Q5 is at logic 1. (The emitter of Q5 will be logic 1 when the reflected power has fallen below the threshold.) In other words, the TUNE BSMV is re-set when RF is present and the reflected power drops below the threshold.

4.8.4.3.4 FAULT BSMV

The FAULT BSMV consists of U4A and U4B, R35 and R36. When the unit is initially turned on, C41 causes U4 pin 6 to be logic 0. Pin 3 of U4 is logic 1 and drives Q12 to saturation through R28.

The resulting ground through Q12 causes the FAULT lamp to be illuminated. The FAULT BSMV is reset by U4 pin 8, logic 0, which signals the tuned condition. The FAULT BSMV is also set by U5A pin 11, logic 0. U5A is a NAND gate that has a logic 0 output when there is reflected power present (Q3 collector logic 1) and the tuner is not in the TUNE mode (U3 pin 8, logic 1). This feature allows the FAULT light to come on any time the antenna changes or the frequency has been

changed without tuning the antenna tuner. Diode CR25 resets the 50 ohm BSMV and saturates Q14, causing the 3DB pad to be switched into the RF path. This action assures a 50 ohm load for the transmitter when the reflected power exceeds the threshold. As mentioned previously, the time delay will also set the FAULT BSMV with a logic 0 applied to the cathode of CR20. CR9 resets the FAULT BSMV (fault light off) during the tune mode.

4.8.4.3.5 50 OHM BSMV

The 50 OHM BSMV is contained in U6C and U6D. R38 and R39 are cross coupling resistors to make the two gates a latch. The purpose of the 50 OHM BSMV is to control the 3DB attenuator relay. When a TUNE pulse initiates a tuning cycle, diode CR15 pulls U6 pin 8 to logic 0. This causes logic 1 on pin 11 of U6, causing R40 to saturate Q14. When the collector of Q14 is at ground, the pad relay is energized and the 3DB attenuator is switched between the transmitter output and the 50:12.5 ohm transformer. When RF power is present at the input of the coupler (logic 1 on pin 3 of U3) and when the reflected power is below the threshold (logic 0 on the collector of Q3, logic 1 on pin 3 of U6) logic 0 will be present on pin 6 of U6. This logic 0 sets the 50 OHM BSMV and switches the 3Db attenuator out of the RF path, allowing the coupler to tune on full RF power during the last few milliseconds of the tune cycle.

There are some frequency impedance combinations that will cause the 50 OHM BSMV to be set and the tuner will not tune. When this occurs, after a few milliseconds, R29-C36 time constant will charge up to logic 1 and Q13 collector will drive U6 pin 13 to logic 0. When this occurs, the 50 OHM BSMV is re-set and the 3Db attenuator is again switched into the circuit. In other words, if the reflected power does not stay below the threshold, the pad will be switched in again. This action is required to prevent transmitting into an open or short circuit.

4.8.4.3.6 LAMP DRIVERS

The three tuner status lamps, located in the control panel or the light panel, are controlled by Q9, Q11 and Q12. These light drivers are saturated by the logic circuits at the appropriate time. The FAULT light driver is Q12 and is saturated (collector at ground) anytime the FAULT BSMV is set (logic 1

on pin 3 of U4). The READY light is driven by Q11 and is saturated by pin 11 of U4. This will occur when the tuning cycle is complete and the unit is ready to use. The TUNING light is controlled by Q9 and it is saturated any time the TUNE BSMV is set (logic 1 on pin 6 of U3).

4.8.4.3.7 RF DETECTOR

Q8 generates a logic 0 on its collector when RF is present at the input of the coupler. 3A8A2, R3, 3A8A2CR1 and 3A8A2CR2 detect the RF from the PA and generate a DC output. This output is fed to R23 and saturates Q8. R23 and C34 delay the time of saturation of Q8 and prevent RF signal perturbations from turning the tuner off when the transmitter is first keyed on.

4.8.4.3.8, MODULATION INDICATOR CONTROL

The green light in the control head flashes on modulation peaks to indicate that the output RF is reaching peak modulation levels. This is accomplished by Q20, Q21 and associated circuitry. The output from the ALC detector on 3A7 (Filter Module) is fed to pin L and drives the base of Q21 through R62 and R63 voltage divider. When the coupler is not in the Tune mode, the ALC output will saturate Q21 and cause the green light (ready) to come on during the modulation peak. However, when the coupler is in a tune cycle, diode CR11 will prevent the green light from being driven by the ALC voltage. (The Tune BSMV is set and pin 8 of U3 is logic 0). Also, if the coupler is not in the Tune mode and the VSWR exceeds the limit, diode CR6 will prevent the green light from coming on with ALC peaks and the Fault light will come on. When a tune cycle is initiated, the Tuning light comes on and when the tune cycle is completed, the Ready light is illuminated. When the transmitter is keyed on after the tune cycle, Q20 is saturated by the transmitter bias (R60-R61 voltage divider) and prevents Q11 from being driven by U4 pin 11. However, the Ready light will be illuminated on modulation peaks by Q21.

4.8.4.3.9 OTHER CIRCUITRY

Q19, R57, R58, and R59 are used to cause the Pad relay (3DB attenuator) to be energized any time the antenna coupler is in a tuning cycle and there is no RF present. This condition can occur if a tuning cycle is initiated and the frequency of transmission is changed. When the transmitter is keyed on again

after the frequency change, the Pad relay is pulled in and the transmitter will see a 50 ohm load rather than an open or a short. The Pad relay is pulled in by the action of U5C and diode CR27. If the coupler is in a tune mode, a logic 1 appears on pin 6 of U3 and also on pin 1 of U5. If no RF is present, a logic 1 will appear on the collector of Q19 and pin 2 of U5. When a logic 1 appears on pin 1 and pin 2 of U5, a logic 0 appears on pin 3 of U5, causing a logic 0 on pin 13 of U6, via CR27. This logic 0 on pin 13 of U6 causes Q14 to saturate and the Pad relay pulls in.

Capacitors C1 through C24 and C25, C44, C45, C48, C50, C51, C52 and C53 are RF bypasses to prevent RF on the wiring from entering the PC board and disturbing the operation of the logic circuits. C26, R2 and R1 provide filtering between the reflected power detector and the input to the differential amplifier, U1. R5, C27 and C28 provide filtering on the 28 volt line for the amplifier U1. R4, C29 and C30 are feedback networks to stabilize the operation of U1. R3 is the negative feedback resistor and determines the gain of U1. R6 is an isolation resistor from pin 10 of U1 and the base of Q1. C31 increases the AC gain of the reflected power amplifier. CR1 and R7 reduce the gain of the reflected power amplifier when the interlock line is at 12 volts. (When the unit is in the receive mode the interlock line rises to 12 volts.) CR22 and R8 set the threshold of the reflected power amplifier and connect to the gain control potentiometer on the front panel. R9 is an isolation resistor for the emitter of Q1, while R10 and R11

divide the output of Q1 down to a voltage suitable to drive the base of Q2. R13 is the collector load for Q2 and R14 is the drive resistor to the base of Q3. R15 is the collector load for Q3 and R16 is the collector load for Q4. R55 is a bias resistor for pin 9 of U2. R41 and R43 form a divider to the base of Q15 while R42 is the collector load for Q15.

4.8.4.3.10 CIRCUITRY CONTAINED ON P.C. BOARD BUT NOT USED IN THE ASB-850

Some circuits on 3A2 are not actively used for operation of the PA/CPLR for the ASB-850 but are used for functions when this PC board is used in other equipments. The following is a list of all components not used for ASB-850 operation:

C3 - C6 Control - U2, Q6, Q7, R19, R20, R21, R22 and C33 are not actively used on the 3A2 board on the ASB-850.

SW 12V Differentiating Network - CR12, R31, C37, C38, C43, CR13 and R32 are not used in the ASB-850. This network drives U5D and CR14, which also are not actively used in the ASB-850.

R51, R52, U5B, CR23 and CR24 are used in other applications to terminate the tune cycle but are not actively used in the ASB-850.

4.8.4.3.11 DIODE FUNCTION LIST

Since diodes are used for logic functions, it is important to indicate the purpose of the diodes used on 3A2. The following Table 4.1, lists the diode, the major line and its specific function.

DIODE	LINE	FUNCTION
CR22	GAIN	Isolates the gain voltage, supplied by the GAIN control from the base voltage of Q1.
CR1	Interlock	Isolates Q1 base voltage from the collector of Q10 when Q10 is saturated.
CR2	Base of Q4	This zener diode (3.6V) isolates the base of Q4 from the collector of Q3 and allows the collector to rise to a logic 1 level.
CR3	Collector of Q4	CR3 allows for the fast discharge of C32 when the reflected power rises to above the threshold.
CR4	CPLR TUNE	CR4 generates a 50(-) logic 0 when a CPLR TUNE pulse occurs. This is done to prevent the driven elements (L4 and C1) from moving during the duration of the CPLR TUNE pulse. If the unit is already tuned, the home functions are inhibited and the green ready light comes on immediately.
CR5	CPLR TUNE	CR5 is used to discharge C32 during the interval of the CPLR TUNE pulse. This prevents C32 from having a logic 1 immediately after the CPLR TUNE pulse and shutting off the unit prematurely.
CR7	CPLR TUNE	CR7 generates a logic 0 on the C1 Home line and sets the C1 Home BSMV on 3A3.
CR8	CPLR TUNE	CR8 generates a logic 0 on the L4 Home line and sets the L4 Home BSMV on 3A3.
CR10	50(-)	Allows the fast discharge of C36 so the Pad relay can drop out fast when a 50 ohm impedance has been found.
CR9	Pin 3 of U4	When the TUNE BSMV is set, CR9 turns off the fault light and resets the Fault BSMV.
CR12	SW12V	Prevents the negative going edge of this voltage from generating a spike.
CR13	C38 and R32 junction	This zener diode prevents a positive spike greater than 5 volts.
CR11	Base of Q21	Prevents ALC modulation peaks from turning on the green light during the tune mode.

Table 4.1 Control Logic (3A2) Diode Functions

DIODE	LINE	FUNCTION
CR16	Lmax	This diode forces the Pad relay to pull in when the inductor reaches maximum inductance. It is required to prevent the coupler from locking up at certain impedance – frequency combinations.
CR15	CPLR TUNE	Forces the Pad relay to pull in when a tuning cycle is initiated.
CR17	CPLR TUNE (Pin A)	Isolates the CPLR TUNE input from the base of transistor Q15.
CR18	CPLR TUNE	CR18 sets the tune BSMV when a tune cycle is started.
CR19	Anode of Q17	Rapidly discharges C40 when a tune cycle is ended.
CR20	Collector of Q18 (Time Delay)	Sets the Fault BSMV when the time delay runs out and causes the Yellow Fault light to be illuminated.
CR21	Collector of Q18	CR21 re-sets the Tune BSMV when the time delay runs out.
CR14	U5 pin 8	CR14 sets the Fault BSMV when SW12V is applied to 3A2.
CR23	U5 pin 6	CR 23 re-sets the Tune BSMV when nominal 28V is applied to 3A2, if the coupler is in the tune mode (Tune BSMV is set). This function not used in the ACU-150 ().
CR24	U5 pin 6	Sets the Fault BSMV when 28V Nom is switched to 3A2, if the unit is in the tune mode. This function not used in the ACU-150 ().
CR27	U5 pin 3	If, during a tune mode, the collector of Q19 goes to a logic 1 (indicating no RF input), CR27 causes a logic 0 on pin 13 of U6, pulling the Pad relay in.
CR25	U5 pin 11	If the coupler is NOT in a tune mode (logic 1 on pin 12 of U5) and the reflected power exceeds the threshold (logic 1 on pin 13 of U5), U5 pin 11 will have logic 0 and CR25 will cause the Pad relay to pull in.
CR26	Collector of Q6 Function (Time Delay)	If the time delay runs out while L4 is being forced toward maximum L, CR26 places a logic 0 on the Lmax line and terminates the force function.
CR6	Base of Q21	Prevents the ALC modulation peaks from turning on the green light when the Fault light is turned on by excess VSWR.

Table 4.1 Control Logic (3A2) Diode Functions (Cont.)

4.8.4.4 PHASE AND AMPLITUDE CONTROL (3A3)

Figure 5.34.

This plug in module contains all the circuitry to control the servo motors that drive the variable tuning elements, C1 and L4. The following major functions are contained on the board:

1. Phase Preamplifier (U1)
2. Amplitude Preamplifier (U3)
3. Phase and Amplitude Level Changer
4. Positive and Negative Phase Detectors
5. Greater than 50 Ohm and Less than 50 Ohm Detectors
6. Lmin-Cmax Gate
7. Positive and Negative Phase Drivers
8. Greater than and less than Drivers
9. Lmin, 0 Phase, Greater than 50 Ohm Detector
10. Positive Phase; Greater than 50 Ohm Detector
11. C1 Home BSMV
12. L4 Home BSMV
13. L4 Force BSMV
14. Phase Shorting Switch
15. Amplitude Shorting Switch
16. Brake Circuit
17. Lmin Pulse Reversing Circuit
18. Lmax Reversing Circuit
19. Other Components

Each of these functions will be discussed in later paragraphs.

4.8.4.4.1 GENERAL OPERATIONS OF THE PHASE AND AMPLITUDE CONTROL BOARD

The phase and amplitude detectors, along with the reflected power detector, are constantly monitoring the input to the tuning elements. The 50:12.5 Ohm transformer transfers the impedance at the input to C1 (12.5 ohms) to 50 Ohms when the unit is tuned. The Phase preamplifier and the positive and negative phase drivers control the servo amplifier in such a manner that when the phase is positive, C1 decreases in value (less pf) and when the phase is negative, it increases in capacitance. The amplitude preamplifier, along with the greater than 50 ohm and the less than 50 ohm drivers,

controls the amplitude servo to drive the inductor L4 toward minimum inductance for an amplitude greater than 50 ohms and toward maximum inductance for an amplitude less than 50 ohms. Both the phase and the amplitude servos are closed loop but are interrupted for various functions while the closed loop tuning is in progress.

The 50(-) and the 50(+) lines are two control lines from the control logic board (3A2) and signify that the reflected power has dropped below the threshold. The 50(-) line has a negative pulse (logic 0) while the 50(+) line has a logic 1 to signify that the reflected power is below the threshold. During a tuning cycle, when the reflected power drops to below the threshold, the 50(+) line drives through diodes CR8 and CR25 to short out the drives to both phase and amplitude drivers to effectively remove the drive to both servo motors. Q8 generates a brake pulse for both the phase and the amplitude servo amplifiers. The action of the 50(-) and the 50(+) lines effectively removes the drive and applies a brake pulse to both servos, even if there is a phase error or an amplitude error present. (A small phase and amplitude error could exist while the reflected power would be below the acceptable threshold.)

During the tuning cycle, certain combinations of events are monitored and, when these occur, are used to control other functions. The following combinations of events are detected:

1. When the phase is positive and the magnitude is greater than 50 ohms.
2. When the inductor is at minimum, the phase error is zero, and the amplitude is greater than 50 ohms.
3. When the inductor is at minimum and the capacitor is at maximum.

When a tuning cycle is initiated, the C1 Home BSMV begins driving the variable capacitor toward maximum capacity and the L4 Home BSMV begins driving the inductor toward minimum inductance. This method of homing is required in order to force the phase positive so tuning can be accomplished and the unit will not lock up at certain impedance-frequency combinations. The homing of both elements is stopped as soon as the phase is positive and the amplitude is greater than 50 ohms.

Since the homing functions are driving the elements toward minimum L and maximum C, as soon as the amplitude error voltage becomes the same polarity as the homing voltage and the phase becomes positive, the homing function can be turned off and the tuning can be accomplished in a shorter time. (Greater than 50 ohms drives the L toward minimum, and positive phase drives the capacitor toward minimum, so further homing of the capacitor would result in longer tuning time.)

When the inductor is at minimum, the phase error zero and the magnitude is greater than 50 ohms, the coupler would hang up if it weren't for a detection circuit (2 above). Since the magnitude is greater than 50 ohms and the inductor is at minimum L, the inductor would just remain stationary (greater than 50 ohms drives the L toward minimum) and the capacitor would also remain stationary since there is no phase error.

The third detector mentioned above is for Lmin and Cmax. This condition is detected in U5 pin 6 and is connected to 3A4 where it is compared with the status of C3, the capacitor placed in series with the antenna. If the condition of Lmin and Cmax exists, and if C3 is not in the home position, then the next step of C3 is inserted. This action reduces tuning time.

The L4 Force BSMV is set by the condition of Lmin and Cmax. This condition can occur when tuning certain antennas from a high frequency, such as 20 MHz and then moving to 2 MHz. The capacitor will run to maximum because of the home function and the inductor will run to minimum. However, at this time, the phase will be negative and the magnitude will be greater than 50 ohms and both elements would remain stationary if it were not for the L4 Force BSMV. The L4 Force BSMV will force the L toward maximum inductance until the phase becomes positive and then normal tuning will take over. The L4 Force BSMV is re-set by the condition of positive phase and amplitude greater than 50 ohms.

The servo amplifier is controlled by transistors Q6 and Q7 for phase drive and Q13 and Q14 for amplitude drive. During the normal tuning portion of the tune cycle, when there is no Home, Force, Lmin, Lmax, Cmin, or Cmax conditions, the level changers drive Q6, Q7, Q13 and Q14 in a normal

closed loop manner. These drives are interrupted or removed from the servo driver transistors as shown below:

- Q6 Positive Phase Driver -- This transistor has only one source of input, the positive phase error from the phase level changer.
- Q7 Negative Phase Driver -- This transistor has two sources of drive. One is from the negative phase error voltage from the phase level changer (R23) and the C1 home drive (R22).
- Q13 Less than 50 Ohm Driver -- The error voltage from the amplitude level changer is fed to the base through R60. The L4 force drive is applied through R61. CR41 applies a pulse to force the inductor off Lmin.
- Q14 Greater than 50 Ohm Driver -- The L4 Home drive is applied through R57 and the error voltage from the amplitude level changer is fed to the base via R58. R76 supplies a drive voltage to force the inductor off the Lmax switch when it reaches maximum L.

4.8.4.4.2 PHASE PREAMPLIFIER (U1)

The phase preamplifier is contained in U1 and associated circuitry. The output from the phase detector is floating about +12 VDC and is fed to pin 4 and 5 of U1. This circuit is a differential amplifier and if pin 5 goes positive with respect to pin 4, the output, pin 10, will rise above +12 VDC. (The differential amplifier operates between +28 VDC and ground; pin 10 is at +12 VDC with no input between pins 4 and 5). The input to the differential amplifier is very small at null (voltage and current in phase), but rises to ± 1 volt while tuning.

Diodes CR1 and CR2 are used to protect the input of the differential amplifier from excessive inputs from the phase detector. C23, along with R1 and R2, filters noise pulses from the input. R3 and C22 provide filtering for the 28 volts to the amplifier. R4 and C24, along with C25, provide feedback to stabilize the frequency response of the amplifier. R5 is a negative feedback resistor to limit the gain of the amplifier. R6 is an isolation resistor to the input of the level changer, Q1 and Q2.

4.8.4.4.3 AMPLITUDE PREAMPLIFIER (U3)

The amplitude preamplifier consists of U3 and associated components. The operation of the amplitude preamplifier is exactly the same as the phase preamplifier, except the amplitude preamplifier has more gain. This is accomplished by making the feedback resistor (R45) larger than for the phase preamplifier. The output of the amplitude preamplifier (pin 10) is also floating about +12 VDC and must be shifted in a level changer.

R41, 42, 43, 44, and 46 perform identical functions as in the phase preamplifier. C27, 28, 29 and 30 also perform the same functions as in the phase preamplifier. CR20 and CR21 protect the amplifier from over load.

4.8.4.4.4 PHASE AND AMPLITUDE LEVEL CHANGER

The phase level changer consists of Q1, Q2, Q3 and associated components. A positive phase angle will cause U1 pin 10 to rise above +12 VDC. This action will cause transistor Q1 to conduct (its emitter is referenced to +12 VDC). When Q1 conducts, the voltage drop across R11 causes Q3 to conduct. When Q3 conducts, a positive voltage appears on the collector. This voltage supplies the drive for the servo preamplifier for a positive phase angle.

If the output voltage of the phase preamplifier drops below +12 VDC (the condition for a negative phase angle) Q2 will conduct and a positive voltage will appear on the collector of Q2. This voltage is the drive voltage for the phase servo preamplifier for a negative phase angle. The amplitude level changer consist of Q10, Q11 and Q12. It operates identically to the phase level changer. R47 is the collector load for Q10 while R9, 10, 48, and 49 are isolation resistors that provide degeneration for Q1, 2, 10, and 11. R12 and R51 provide degeneration for Q3 and Q12, respectively.

4.8.4.4.5 POSITIVE AND NEGATIVE PHASE DETECTORS

A positive phase is detected when a logic 1 appears across R14. R13 divides the output of Q3 to a logic 1 level. This signal is fed to pin 9 of U2 and compared with the greater than 50 ohm logic input

on pin 10. When both are logic 1, a logic 0 appears on pin 8 of U2. The logic 1 across R14 also saturates Q4 thru R70. Q4 collector will rise to logic 1 when the phase error is zero (provided the amplitude is greater than 50 ohms, L is at minimum, and C is not at maximum). A negative phase angle appears as a positive voltage across R67. R7 divides Q2 output down to approximately 1 volt. If the phase error is zero, Q4 or Q18 will not be saturated.

4.8.4.4.6 GREATER THAN 50 OHMS AND LESS THAN 50 OHM DETECTOR

The greater than 50 ohm signal is divided by R50 and appears across R68 as a logic 1. Less than 50 ohms is divided by R52 and appears across R69. If the amplitude error is greater than 50 ohms or zero, Q19 will not be saturated.

4.8.4.4.7 LMIN--CMAX GATE

When the inductor is at minimum L and the capacitor is at maximum C, these logic 0 inputs are fed to U5 pin 10 and pin 13, respectively. The logic 0's are inverted to logic 1's in U5C and U5D and are compared in U5B. When U5 pin 4 and pin 5 are both logic 1, pin 6 is logic 0 and indicates the condition of Lmin-Cmax. This is used to set the L4 Force BSMV U4C and D and is fed to 3A4 on pin D.

4.8.4.4.8 POSITIVE AND NEGATIVE PHASE DRIVERS

These two transistors, Q6 for positive phase and Q7 for negative phase, are used to drive the phase servo bridge. R26 and R28 are used for degeneration for the devices. R16 and R25 couple the positive phase drive from Q3 collector. When the collector of Q6 is less than 28 volts, the servo motor will run in a direction to decrease the capacitance. When the collector of Q7 is less than 28 volts, the phase servo will run in a direction to increase the capacitance. R8 and R23 couple the drive from Q2 collector.

4.8.4.4.9 GREATER THAN AND LESS THAN DRIVERS

Q13 is the amplitude driver for an amplitude less than 50 ohms. Q14 is the amplitude driver for an

amplitude greater than 50 ohms. If the collector of Q13 is less than 28 volts, the servo motor will run in a direction to increase the inductance. If the collector of Q14 is less than 28 volts, the servo motor will run in a direction to decrease the value of inductance. R53 and R60 couple the less than 50 ohm drive from Q12 collector. R54 and R58 couple the greater than 50 ohm drive from the collector of Q11.

4.8.4.4.10 LMIN, 0 PHASE, GREATER THAN 50 OHM DETECTOR

This detector consists of transistors Q4 and Q18 (for zero phase) and Q19 for greater than 50 ohms. These three transistors operate into a common collector load, R15, and the collectors will rise to logic 1 when all three transistors are cutoff.

Diode CR34 prevents the collectors from rising to a logic 1 unless a logic 0 is on the Lmin line. The logic 1, indicating Lmin, 0 phase, and greater than 50 ohms, appearing on the collectors of Q4, 18, and 19, is fed through R71 to the base of Q17 and is inverted to a logic 0. R72 is the collector load for Q17. This logic zero is fed to the 3A4 board on pin E. This control signal causes circuitry on 3A4 to switch a value of C3 in series with the antenna.

CR33 inhibits the Lmin, 0 phase, greater than 50 ohm function when the capacitor is at Cmax. CR19 prevents a logic 1 from appearing on Q4 collector while C1 is being homed.

4.8.4.4.11 POSITIVE PHASE AND GREATER THAN 50 OHM DETECTOR

This function is accomplished by recognizing a positive phase and a magnitude greater than 50 ohms. The positive phase is detected by a logic 1 across R14. This logic 1 is fed to gate U2D pin 9. Greater than 50 ohms appears as a logic 1 across R68 and is fed to gate U2D pin 10. A logic 0 results on U2D pin 8. Diode CR15 terminates the L4 Home BSMV, CR16 terminates the L4 Force BSMV and the logic 0 input to pin 5 of gate U2B terminates the C1 Home BSMV.

4.8.4.4.12 C1 HOME BSMV

The C1 Home BSMV (toggle or latch) consists of U2 gates A and B and cross coupling resistors R17 and R18. C26 is a delay capacitor to assure that U2 pin 3 will be a logic 0 when power is first applied

to the circuit. When a Tune pulse is initiated, a logic 0 appears on the C1 Home line and a logic 1 appears on pin 3 of gate U2A. This logic 1 is fed through R22 to the base of Q7 and the variable capacitor is forced to run toward Cmax. This forcing of C1 will continue until Cmax is reached or the phase becomes positive and the magnitude is greater than 50 ohms. Cmax logic 0 will stop the C1 home through CR7 while positive phase and magnitude greater than 50 ohms will terminate the home function with the logic 0 on pin 5 of gate U2B. When the C1 Home BSMV is set (logic 0 on pin 6 of U2B), a logic 1 appears on pin 11 of gate U2C. This output saturates Q5 through R19.

Diodes CR9 and 10 short out any drive that might be coming from the phase level changers. This action is required to prevent turning on both sides of the phase servo at the same time. The C1 Home logic 0 input to pin 13 of gate U2C also shorts out any drive that may come from the phase level changers to prevent the capacitor from moving during the duration of the Tune pulse. This action is required to prevent the capacitor from moving if the unit is already tuned.

4.8.4.4.13 L4 HOME BSMV

The L4 Home BSMV consists of U4 gates A and B and cross coupling resistors R31 and R32. Capacitor C32 is a time delay capacitor to assure that pin 3 of U4 will be a logic 0 when power is first applied to the board. When a Tune pulse is initiated, a logic 0 appears on the Home L4 line. This causes a logic 1 on pin 3 of U4 gate A. This logic 1 drives the base of Q14, the greater than 50 ohm driver, through CR35 and R57. This action causes the inductor to run toward the homed position — Lmin. The L4 Home drive can be turned off by a positive phase-greater than 50-ohm logic 0 through CR15. If the inductor reaches Lmin, a logic 0 on the Lmin line will turn off the L4 Home drive through CR17.

4.8.4.4.14 L4 FORCE BSMV

The L4 Force BSMV consists of U4 gates C and D and cross coupling resistors R33 and R34. C31 is a time delay capacitor to assure that U4 pin 8 will be logic 0 when power is first turned on. The L4 Force BSMV is turned on only when Lmin and Cmax occur simultaneously. When this condition occurs, a logic 0 output from pin 6 of U5 gate B causes pin 8

of U4 to become a logic 1. This logic 1 is fed through CR39 and R61 to the base of Q13, the less than 50 ohm driver. This action forces the inductor to run toward maximum inductance.

This action is required for some frequency-impedance combinations when the capacitor is maximum and the inductor is minimum but the magnitude is still greater than 50 ohms. The L4 Force function is terminated by a positive phase and greater than 50 ohm condition through CR16. Pin R is shorted to logic 0 by circuitry on 3A4 to inhibit the L4 force function when Lmin-Cmax occurs and C3 is not in the home position.

4.8.4.4.15 PHASE SHORTING SWITCH

Q5, in conjunction with CR9 and CR10, shorts out the drive from the positive phase driver and the negative phase driver. This action is required when the C1 Home BSMV is set or when a Tune pulse is initiated. When the C1 Home BSMV is set, drive is supplied to the base of Q7. If the phase were positive, drive would be supplied to the base of Q6 and both sides of the servo would be turned on at the same time. Therefore, the shorting switch shorts out the positive phase drive (if it occurs) and prevents this from happening.

When a Tune pulse is initiated, a logic 1 is forced to appear on the 50(+) line by circuitry on 3A2. This logic 1 is fed to the base of Q5 through CR8 and R21, causing both positive and negative drive to be shorted out. This action is required because if the coupler is already tuned, it prevents the capacitor from moving during the interval of the Tune pulse, and results in a faster tune. R24 provides the back bias for diodes CR9 and CR10.

4.8.4.4.16 AMPLITUDE SHORTING SWITCH

Q15, along with CR26 and CR27, shorts out the drive from the amplitude drivers Q13 and Q14. The greater than 50 ohm and the less than 50 ohm drive must be shorted out when either the L4 home BSMV is set, L4 Force BSMV is set or a Tune pulse is initiated. When the L4 Home BSMV is set, the base of Q14 is driven so the inductor will be driven toward minimum L. If the amplitude error is less than 50 ohms, Q13 would also be turned on, resulting in both sides of the L4 servo being turned on at the same time. Q15 prevents this by shorting out both drive voltages. When the L4 Force BSMV is set, the base of Q13 is driven and

if the amplitude error is greater than 50 ohms, then Q14 would also be turned on.

Q15 also prevents this from occurring. If either the L4 Home BSMV or the L4 Force BSMV are turned on, U5 gate A will have a logic 1 output that will saturate Q15 through R55. When a Tune pulse is initiated, the logic 1 on the 50(+) line saturates Q15 through CR25 and R56. This action prevents the inductor from moving during the interval of the Tune pulse and results in a faster tune. R59 provides the back bias for diodes CR26 and CR27.

4.8.4.4.17 BRAKE CIRCUIT

Each time the reflected power drops below a predetermined threshold, a brake pulse is generated in order to reduce the gain of both servo amplifiers and dampen oscillation. The 50(+) line has a logic 1 each time the reflected power is below the threshold while the 50(-) line has a logic 0. Q8 and R36 form an emitter follower circuit that provides current gain for the pulse. The brake diodes in the servo amplifier are driven through R37. R78 is a voltage dropping resistor that prevents excess dissipation in Q8.

4.8.4.4.18 LMIN PULSE REVERSING CIRCUIT

C35, CR40, CR41, and R38 generate a pulse each time the inductor reaches Lmin. When the Lmin switch closes, a logic 1 is generated on pin 8 of U5. This pulse is differentiated in C35. The negative spike is clipped by CR40 and the positive portion is fed to the base of Q13 by CR41. If the inductor is being driven toward Lmin at a fast speed, some means must be provided to stop it or it will hit the end stop. While the inductor is being driven, Q14 is being driven by a greater than 50 ohm error signal or by the L4 Home BSMV. When Lmin is reached, CR23 removes the error voltage drive and CR17 terminates the L4 Home function. At the same time, the Lmin Pulse Reversing Circuit reverses the drive on the inductor for the duration of the pulse. This is effective in stopping the inductor and preventing it from hitting the end stop.

4.8.4.4.19 LMAX REVERSING CIRCUIT

This circuit consists of CR37, R73, R74, R75, Q20, CR36 and R76. When L4 is being driven toward Lmax, whether by error voltage (less than 50 ohms) or by the L4 Force BSMV, it has to be stopped rapidly to prevent hitting the end stop and

must be forced off Lmax. It must be forced off Lmax because the Lmax signal is used on 3A4 to switch in C6 capacitors across the antenna. If the inductor were allowed to close the Lmax switch and keep it closed, the C6 capacitor drive motor would continually run. Therefore, an Lmax logic 0 applied to the cathode of CR37 cuts off Q20 and its collector rises to a logic 1 and drives the base of Q14 through CR36 and R76. Since Q14 is the greater than 50 ohm driver, the inductor will be forced toward Lmin until the inductor roller is no longer contacting the Lmax switch. R73 provides a logic 1 bias for the Lmax line. R74 saturates Q20 when there is no Lmax signal. R75 is the collector load for Q20. CR24 shorts out the drive to Q13 when Lmax is reached.

4.8.4.4.20 OTHER COMPONENTS

R30 supplies a logic 1 bias for the Lmin-Cmax line. R29 supplies the logic 1 bias for the L4 Home BSMV. R35 supplies a logic 1 bias for the Lmin line. R77 supplies a logic 1 bias for the Cmax line. CR18 is an isolation diode between the Lmin line and pin 10 of U5. Capacitors C1-C13, C34, etc. are rf bypass capacitors to prevent rf on the wires from disturbing the logic functions on the PC board.

4.8.4.4.21 DIODE FUNCTION LIST

The following Table 4.2 lists the diodes on 3A3 and their function.

DIODE	LINE	FUNCTION
CR5	Cmin	Removes the drive voltage from the positive phase driver when the capacitor reaches minimum C to prevent turning on both sides of the servo amp at the same time.
CR4	Cmin	Sets the C1 Home BSMV to force the capacitor toward maximum C when the Cmin switch closes.
CR8	50(+)	Drives R21 to saturate Q5 and remove the drive from the phase drivers when the reflected power drops below the threshold.
CR25	50(+)	Drives R56 to saturate Q15 and remove the drive from the amplitude drivers when the reflected power drops below the threshold.
CR19	Lmin 00, greater than 50	Prevents the Lmin, 00, greater than 50 ohm function from occurring when the C1 Home BSMV is set.
CR11	50(-)	Shorts out the drive to the negative phase driver when the reflected power drops below the threshold. If the antenna coupler is tuned to a frequency that requires no auxiliary C3 or C6, and a tune cycle is initiated, both elements would begin homing. However, since when the transmitter is turned on, a logic 0 exists on the 50(-) line (coupler already tuned), CR11 prevents the capacitor from moving and lets the green light come on immediately.
CR30	50(-)	This diode shorts out the drive to the greater than 50 ohm amplitude driver for the same reason as CR11. CR30 prevents the inductor from moving when a tune cycle is initiated and the coupler is already tuned.

Table 4.2 Phase and Amplitude Control (3A3) Diode Functions

DIODE	LINE	FUNCTION
CR17	Lmin	When the inductor reaches minimum L and the Lmin switch closes to ground, CR17 resets the L4 Home BSMV.
CR23	Lmin	CR17 removes the drive from the L4 Home BSMV when the inductor reaches Lmin, but there could be drive from the greater than 50 ohm level changer (if the amplitude of the impedance is greater than 50 ohms). CR23 shorts out any drive that could be present on R58 from the greater than 50 ohm level changer.
CR12	Home L4	If a tuning cycle has been initiated and the L4 Force BSMV is set and ANOTHER tune pulse is initiated, the L4 Home BSMV will also be set. This action would cause drive to both amplitude drivers and the amplitude servo amplifier would have both sides turned on and could destroy the transistors. CR12 resets the L4 Force BSMV each time a tuning cycle is initiated, thereby preventing this double drive condition from occurring.
CR7	Cmax	When the variable capacitor reaches maximum C, and the Cmax switch closes to ground, CR7 resets the C1 Home BSMV and removes the drive from R22 at the base of Q7, which had driven the capacitor toward maximum.
CR6	Cmax	If there is error voltage from the negative phase level changer after CR7 has reset the C1 Home BSMV, CR6 will short out this drive.
CR33	Cmax	CR33 forces a logic 0 on the Lmin, 0 phase, and greater than 50 ohm line (Collectors of Q4, Q18, Q19) to inhibit these functions with the capacitor at maximum.
CR24	Lmax	When the L4 Force BSMV is set by Lmin-Cmax combination, the inductor is driven toward maximum L by the drive from R61. When the inductor reaches Lmax and the Lmax switch closes to ground, CR24 shorts out the drive to the base of Q13, but does not reset the L4 force function.
CR22	50(-)	CR22 turns off the L4 force function anytime the reflected power drops below the threshold.
CR37	Lmax	CR37 places a logic 0 on the base of Q20 and generates a drive voltage to force the inductor off the Lmax switch. When the inductor moves off the Lmax switch, the drive is removed.
CR15	Positive Phase and Greater than 50 ohms	When the phase becomes positive and the amplitude is greater than 50 ohms, CR15 resets the L4 Home BSMV.

Table 4.2 Phase and Amplitude Control (3A3) Diode Functions (Cont.)

DIODE	LINE	FUNCTION
CR16	Positive Phase and Greater than 50 ohms	CR16 resets the L4 Force BSMV, if it is set, when the phase becomes positive and the amplitude is greater than 50 ohms.
CR3	C1 Home	When the C1 Home BSMV is set drive is applied to Q7 through R22. If the phase is positive, drive would also be applied to Q6 through R25, CR3 shorts out this drive during the interval of the C1 Home logic 0 pulse to prevent drive to Q6 and Q7 at the same time.
CR9	Collector of Q5	Shorts out the drive to Q6 when the reflected power is less than the treshold.
CR10	Collector of Q5	Shorts out the drive to Q7 when the reflected power is less than the threshold.
CR26	Collector of Q15	Shorts out the drive to Q13 when the reflected power is less than the threshold.
CR27	Collector of Q15	Shorts out the drive to Q14 when the reflected power is less than the threshold.
CR35	U4, pin 3	CR35 isolates the drive from the collector of Q20 from pin 3, U4.
CR36	Collector of Q20	CR36 isolates the drive from pin 3 of U4 from the collector of Q20.
CR34	Lmin, 0 phase, Greater than 50 ohms	When the inductor is at minimum L the logic 0 is inverted in USC to a logic 1 and allows the Lmin, 0 phase, greater than 50 ohm line to rise to logic 1.
CR1	Input of U1	Protective diode to prevent overvoltage on pins 4 and 5.
CR2	Input of U1	Protective diode to prevent overvoltage on pins 4 and 5.
CR20	Input of U3	Protective diode to prevent overvoltage on pins 4 and 5.
CR21	Input of U3	Protective diode to prevent overvoltage on pins 4 and 5.
CR40 & CR41	Base of Q13	CR40 and CR41 form a voltage doubler circuit to generate a positive pulse on the base of Q13 when the inductor reaches minimum. Lmin is inverted to a logic 1 in U5, pin 8 and differentiated in C35. This action is required to prevent the inductor from hitting the end stop when it is driven by a home function and reaches Lmin before the variable capacitor reaches maximum.

Table 4.2 Phase and Amplitude Control (3A3) Diode Functions (Cont.)

DIODE	LINE	FUNCTION
CR18	Lmin	Isolates the Lmin line from pin 10 of U5.
CR19	0 ϕ , greater than 50 ohms	Prevents this function when the C1 Home BSMV is set.
CR39	U4, pin 8	Isolates the L4 Force drive from the base of Q13.

Table 4.2 Phase and Amplitude Control (3A3) Diode Functions (Cont.)

4.8.4.5 C3 & C6 CONTROL (3A4)

See Figure 5.35.

This plug in board is used to control the antenna modification capacitors, C3 and C6, which are located in the RF section. C6 is composed of 12-100pf transmitting capacitors and they are switched in shunt with the variable inductor, L4. C6 is stepped in steps of 100, 300, 500, 800 and 1200 pf. That is, the first step of the C6 is 100pf, the second step is 300pf, the third step is 500 pf, etc. C3 is also located in the RF compartment and is composed of 4 transmitting capacitors, 100pf, 50pf, 50pf, and 25pf. The C3 capacitors are switched in series with the antenna in steps of 225pf, 125pf, 75pf and 25pf. The C3 and C6 antenna modification capacitors are required to tune a large range of antenna impedances.

(See 3A4 and C3 and C6 schematic diagrams.)

3A4 consists of three integrated circuits, three transistors, two relays and associated circuitry. The major functions of 3A4 can be separated as follows:

1. C6 Home BSMV (latch or flip-flop)
2. C3 Home BSMV
3. C6 Advance BSMV
4. K1 driver
5. K2 driver
6. K1 motor control
7. K2 motor control
8. C3 Advance functions
9. Other circuitry

These individual functions will be discussed in detail.

4.8.4.5.1 C6 HOME BSMV

This BSMV consists of U1A and U1B and associated circuitry. Its purpose is to remove all capacitance from the inductor, L4, when a tuning cycle is initiated. When a tuning cycle is initiated Q15 collector (located on 3A2) generates a logic 0 (0-.3V) and diode CR1 causes a logic 0 on pin 1 of U1. This action causes a logic 1 on pin 3 of U1 and gate B of U1 has a logic 0 on its output, pin 6. The cross coupling resistors R3 and R4 cause the BSMV to remain in that condition. R1 is a bias resistor that causes a logic 1 on pin 1. R2 and C18 force the BSMV to “come up” in the right condition when the unit is first turned on. (A logic 0 should be on pin 3 when the unit is first turned on.)

Immediately after the tuning cycle is initiated, pin 6 of U1 has a logic 0 and CR4 pulls pin 1 of U2 to a logic 0. R8 is a bias resistor. This action causes Q2 to be saturated by R12. Relay K1 is pulled in and the motor that controls C6 begins to run. When the motor runs, SW3 (on the C3-C6 assembly) revolves until the wiper comes to position 5. (See Figure 4.5.) This is the C6 home position. The logic 0 generated by SW3 position 5 is fed to 3XA4 pin A.

4.8.4.5.2 C3 HOME BSMV

The C3 Home BSMV consists of U3A and U3B. Its purpose is to assure that C3 is not in series with the antenna when a tuning cycle is started. When a tuning cycle is initiated, Q15 collector generates a logic 0 and CR2 causes a logic 0 on pin 1 of U3. (R15 is a bias resistor to assure a logic 1 on pin 1.) When the logic 0 appears

on pin 1 of U3, pin 6 of U3 has a logic 0 and the cross coupling resistors, R19 and R20, cause the BSMV to remain in that condition. (R18 and C21 assure that the BSMV will come up in the proper condition as soon as power is applied.)

The logic 0 on pin 6 of U3 is inverted to a logic 1 in U3C (pin 8) and Q3 is saturated. This action causes K2 to pull in and the C3 control motor begins to turn. SW1 in the C3-C6 Assembly will rotate until the wiper reaches position 2, the C3 home position. 3XA4, pin 7, couples the logic 0 generated by SW1 position 2 to U3 pin 4 via CR14. (R9 is a bias resistor for the C3 home line.) SW1 of the C3-C6 Assembly is now in the home position and the series capacitors are shorted out.

4.8.4.5.3 C6 ADVANCE BSMV

The C6 advance BSMV consists of U1C and U1D plus cross coupling resistors R5 and R6. (R7 and C19 are used to make the BSMV come up in the proper condition when it is turned on.) Each time the variable inductor, L4, reaches maximum L, the Lmax switch generates a logic 0. This logic 0 is fed to U1 pin 11 via CR20 which sets the C6 advance BSMV and causes a logic 0 to appear on pin 2 of U2. This causes Q2 to saturate, pulling in K1, and the C6 motor begins to run. As soon as SW3 of the C3-C6 assembly is in position 1 (100pf across L4), a logic 0 is fed to pin 4 of 3XA4, and the C6 advance BSMV is reset via CR3.

This action will continue and another step of C6 will be switched across L4 until L4 stops contacting the Lmax switch. L4 will begin running toward Lmin when the phase is positive and the magnitude is greater than 50 ohms, or when C6 reaches position 16 and the magnitude is greater than 50 ohms, even if the phase is negative. This is caused by position 16 on SW3 of the C3-C6 assembly placing a logic 0 on the cathode of CR23 and simulating a plus phase and greater than 50 ohm condition. Pin F on 3XA4 connects to pin C on 3XA3, the plus phase-greater than 50 ohm output. The C6 motor will increase one step of C6 for each Lmax pulse, until 1200 pf is reached. At this time, the first step of C3 will be inserted. If the C6 advance BSMV is set and C6 reaches the home position, CR21 will reset this BSMV.

4.8.4.5.4 K1 DRIVER

Transistor Q2 drives K1. A logic 1 on pin 3 of U2 causes Q2 to saturate and relay K1 pulls in and the C6 motor begins to run, switching C6 across the inductor. R12 is the base drive resistor for Q2.

4.8.4.5.5 K2 DRIVER

Transistor Q3 is the driver for relay K2. A logic 1 on pin 8 of U3 drives Q3 to saturation through R21, the base drive resistor. When Q3 saturates, relay K2 pulls in and the C3 motor begins to run, switching capacity in series with the antenna.

4.8.4.5.6 K1 MOTOR CONTROL

K1 motor control consists of K1 and associated components. When K1 is energized, pole 2 of K1 connects to pin 5 and a ground is placed on one side of the C6 motor. (Pin 14 of 3XA4.) The C6 motor then runs until relay K1 is de-energized. When the relay is de-energized, pole 2 of K1 contacts pin 4 and the side of the motor that was at ground is switched to the 28V line, effectively dynamically braking the motor and preventing overshoot. Diode CR11 clamps the positive going spike across the relay coil to protect transistor Q2 from overvoltage. Diode CR12 clamps the positive going spike across the contacts of the relay. Diode CR13 clamps the negative going spike across the relay contacts.

4.8.4.5.7 K2 MOTOR CONTROL

K2 motor control consists of K2 and associated components. When K2 is energized, the C3 motor runs until the relay is de-energized. Diodes CR15, 16 and 17 are spike suppressors. The operation of the K2 relay is identical to the K1 relay, except the K2 relay controls the C3 motor and the K1 relay controls the C6 motor. Pole 6 of K2 places a logic 0 on pin 10 of U1 when the C3 motor first starts to turn. This action is required to force the C6 motor to home. Each time a C3 is switched in series with the antenna, all the C6 is removed.

4.8.4.5.8 C3 ADVANCE FUNCTIONS

The series capacitor is switched into the RF tuning circuits when the following 3 conditions exist:

1. SW3 WIPER (ON THE C3-C6 ASSEMBLY) COMES TO POSITION 16.

When a tuning cycle is started, all capacitance, C3 and C6 is removed from the RF tuning circuit. The tuning cycle begins with just a series C1 and the shunt L4. NO ANTENNA MODIFICATION CAPACITORS ARE USED UNLESS THEY ARE REQUIRED. The inductor L4 and the vacuum variable capacitor C1 both begin tuning and if the inductor reaches Lmax, C6 is switched across the inductor. If C6 reaches 1200pf and the circuit still needs more shunt C, the next position is SW3 position 16. This generates a logic 0 on 3XA4 pin 2 and resets the C6 advance BSMV via CR21. CR5 generates a logic 0 to pin 1 of U2 so the C6 motor will not stop on position 16. The logic 0 generated on pin 4 of U2 is inverted in U2B and a logic 1 appears on pin 9 of U2. If the C6 home BSMV is not set (it is set when it has logic 0 on pin 6) then a logic 0 will be generated on pin 8 of U2. This logic 0 will cause a logic 0 on pin 10 of U3 through CR8. R14 is a bias resistor. The resulting logic 1 on pin 8 of U3 will saturate Q3 causing the C3 motor to advance one position. It should be noted that if the C6 home BSMV is set, pin 6 of U1 will have a logic 0 and this will inhibit SW3 position 16 from advancing C3. This action is required to prevent C3 from advancing one position when C6 homes. (If C3 is already home.)

2. L MIN, 0 PHASE ERROR AND GREATER THAN 50 OHMS.

During the tuning cycle, certain impedances will cause the inductor to run to minimum inductance and the capacitor to resonate this inductance. If this happens, no tuning can occur and the time delay will run out if certain actions are not taken. On the 3A3 board (Phase and Amplitude Control) the condition of Lmin, 0 phase error, and greater than 50 ohms is detected and fed to 3A4 on pin 5 of 3XA4. A logic 0 is provided on pin 5 and through CR9, a logic 0 is forced on pin 10 of U3. This causes a logic 1 on pin 8 of U3 and C3 is advanced.

3. L MIN-C MAX AND C3 IS NOT IN THE HOME POSITION.

If, during a tuning cycle, the inductor reaches minimum L and the capacitor reaches maximum capacity, and if some C3 is switched into the circuit, then some action must be taken. If some C3 is already in the RF tuning circuit it means that the inductor has already been to maximum L at least one time. Therefore, when Lmin-Cmax condition exists and C3 is not homed, the next step of C3 should be inserted. This is accomplished by transistor Q1 and other circuits. Lmin-Cmax is detected on 3A3 and fed to the 3A4 board on pin 6 of 3XA4. This logic 0 is transferred to the base of Q1 via CR10 and is inverted to a logic 1 on the collector of Q1. R10 is the base bias resistor and R11 is the collector load resistor.

The logic 1 on the collector of Q1 is fed to pin 12 of U2. If C3 is not in the home position, pin 13 of U2 will be a logic 1 and pin 11 of U2 will be logic 0, forcing a logic 0 on pin 10 of U3 through CR7. This action causes logic 1 on pin 8 of U3, causing C3 to advance one or more positions. The L4 force function generated on 3A3 is inhibited by a logic 0 on pin 11 of U3. Diode CR24 is connected to 3A3 pin R by 3XA4 pin J. The L4 force/inhibit prevents L4 from running up to the Lmax again and shortens tuning time. When C3 is not in the home position, a logic 1 on pin 12 of U3 generates the L4 force inhibit.

4.8.4.5.9 OTHER CIRCUITRY

Capacitors C1 through C17, C22 and C23 are RF bypasses to prevent RF in the tuning compartment from entering the PC board. Diode CR18 connects the 75pf line (pin 16) to the Home L4 line (pin 15). If, during the tuning cycle, C3 reaches 75pf, a logic 0 is generated by SW1 on the C3 and C6 assembly. When SW1 reaches position 21 (75pf) a logic 0 is generated and connected to pin 16 of 3XA4. Diode CR18 forces a logic 0 on the Home L4 line and the inductor will begin homing toward minimum L. This action reduces tuning time.

4.8.4.5.10 C3 AND C6 CONTROL (3A4) DIODE FUNCTIONS

DIODE	LINE	FUNCTION
CR1	Q15 Collector	Sets the C6 home BSMV when a tuning cycle is initiated.
CR2	Q15 Collector	Sets the C3 home BSMV when a tuning cycle is initiated.
CR3	C6 (100-1200)	Resets the C6 advance BSMV when the C6 capacitor is in positions 100pf, 300pf, 500pf, 800pf and 1200pf.
CR4	U2 pin 1	When the C6 home BSMV is set, CR4 places a logic 0 on pin 1 of U2 and causes the C6 motor to run.
CR5	C6 position 16	Causes a logic 0 on pin 1 of U2 and causes the C6 motor to keep running and not stop on position 16.
CR7	U2 pin 11	When the condition of Lmin and Cmax occurs, and C3 is not in the home position, CR7 places a logic 0 on pin 10 of U3, causing the C3 motor to advance.
CR8	U2 pin 8	When the C6 home BSMV is not set (C6 motor not homing), and the C6 control wafer comes to position 16, U2 pin 8 has a logic 0; CR8 causes the C3 motor to advance. If the C6 home BSMV is set, there will be a logic 1 on pin 2 of U2 and the C3 motor will not be advanced. This action prevents C3 from advancing when C6 is homing.
CR9	Lmin, 0 Ω , greater than 50 ohms	When this condition occurs, CR9 causes the C3 motor to advance.
CR10	Lmin-Cmax	Causes a logic 0 on the base of Q1 when this condition exists. Will advance C3 if C3 is not in the home position.
CR11	Across K1	Clamps relay turn off inductive spike to 28V.
CR12	K1 pin 4	Clamps voltage spikes across the relay contacts to 28V.
CR13	K1 pin 5	Clamps negative voltage spikes across relay contacts to ground.
CR14	C3 Home	When C3 is in the home position, a logic 0 on this line resets the C3 home BSMV.
CR15, 16, 17	K2 Relay	Perform the same voltage transient protection as CR11, 12 and 13.
CR18	75pf	This diode causes L4 to home when C3 reaches 75pf.

Table 4.3 C3 and C6 Control (3A4) Diode Functions

DIODE	LINE	FUNCTION
CR21	C6 Home	CR21 resets the C6 Advance BSMV when C6 reaches home.
CR22	C6 Home	CR22 resets the C6 Home BSMV when the C6 capacitor reaches the home position.
CR23	C6 position 16	This diode places a logic 0 on the + ϕ , greater than 50 ohm line when C6 reaches position 16. When the inductor reaches Lmax, and is being forced by the L4 force function, C6 will switch through its capacitive range until the phase is positive and the magnitude is greater than 50 ohms. If the capacitor reaches 1200pf, the phase is not positive and the magnitude is not greater than 50 ohms, then position 16 on C6 will terminate the L4 force function.
CR24	L4 Force inhibit	CR24 places a logic 0 on pin J of 3XA4 and inhibits the L4 force function on 3A3. This inhibit function occurs only when C3 is not in the home position.

Table 4.3 C3 and C6 Control (3A4) Diode Functions (Cont.)

4.8.4.6 SERVO MOTOR CONTROL (3A5)

The servo motor control assembly is a plug-in board and is shown schematically in Figure 5.36.

The amplitude and the phase servo amplifiers are identical, so only one will be discussed. The servo amplifiers drive the motors for the vacuum variable capacitor and the variable inductor directly. The phase servo will be discussed.

The + ϕ input is on pin 3 and is driven from 3A3 by the positive phase driver 3A3Q6. When this line drops below 28 VDC, transistor Q1 is allowed to conduct through R2. R1 is a bias resistor to keep Q1 cutoff when pin 3 is at 28 VDC. Q1 conducting causes a positive voltage to appear on the emitter of Q2, which is connected to the ϕ servo motor. At the same time R6 and R7 voltage divider causes Q4 to conduct, creating a path to ground for the other side of the ϕ motor. Therefore, negative drive on pin 3 causes a positive voltage on pin 6 with respect to pin 7 and the servo motor will run in one direction at a speed proportional to the magnitude of the voltage.

If a negative drive is presented on pin 4, the negative ϕ drive, R8 will allow Q6 to conduct. R9

is a bias resistor to keep Q6 cut off when pin 4 is at 28 VDC. Q6 conducting causes a positive voltage on the emitter of Q5, and a positive voltage is applied to one side of the servo amplifier. At the same time, Q3 is caused to conduct by voltage divider R3 and R4. When Q3 conducts, a current path to ground is provided for the other side of the servo motor. A negative drive on pin 4 causes a positive voltage between pin 6 and pin 7 and the servo motor will turn in the opposite direction than it did for negative drive on pin 3.

It should be noted that the operation of the servo amplifier is completely analog. That is, pin 3 could be at 12 volts and pin 4 at 10 volts and the motor would operate in a direction for a negative phase. Pin 4 could be 22 volts and pin 3 zero volts and the motor would turn in a direction for a positive phase.

C1 and R5 form a spike filter network. Diode CR1 clamps positive voltage spikes to the 28 VDC input. CR2 clamps negative voltage transients to ground. CR5 and CR6 are also transient suppressor diodes. CR3 and CR4 are brake diodes and are driven from the brake circuit on 3A3. The purpose of these diodes is to dampen oscillations when 50 ohm crossovers are detected.

The amplitude servo amplifier has identical components and operates in the same manner as the phase servo.

4.8.4.7 REGULATOR-DETECTOR 3A8A2.

This plug-in assembly is shown schematically in Figure 5.39. This P.C. board is composed of three basic circuits — 5 volt regulator, R.F. Detector, and the Anti-oscillation Circuit. Each of these circuits will be discussed in detail.

4.8.4.7.1 5 VOLT REGULATOR

The 5 volt regulator is composed of R1, CR1, C13 and C14. The 12 VDC input is brought to pin 8 and is filtered by C14. R1 drops the 12 VDC to 5 VDC. CR1 is a zener diode and regulates the 5 VDC that is used for the logic circuits on 3A2, 3A3 and 3A4. C13 is a filter capacitor. The 5 volt output is fed to pin 3.

4.8.4.7.2 RF DETECTOR

The RF detector is composed of R3, CR2, CR3, and C16. The RF input to the antenna coupler is fed to pin 3 on a coax. When RF is present, a positive DC voltage is rectified by CR2 and CR3 and fed to pin 9. The RF detector is important in the operation of the antenna coupler. Logic circuits on 3A2 accept the output from the RF detector and use it to signal the end of a tune cycle when (a) RF is present and (b) the reflected power is below the threshold.

4.8.4.7.3 ANTI-OSCILLATION CIRCUIT

This circuit is important to the operation of the antenna coupler when certain extremely high Q impedances are being tuned. That is, when a very small change of L4 or C1 causes a tremendous change in the output, from the magnitude and phase detectors, and the driven elements are oscillating about the tune point. The anti-oscillation circuit consists of Q1, Q2, Q3 and associated circuit components.

If the elements are oscillating about the tune point, the 50(+) line will have positive pulses, indicating that the reflected power has dropped below the required threshold for a brief moment. These 50(+) pulses are fed to pin B and through C5 to the base of Q1. CR5 clamps any negative overshoot to the emitter of Q1. Q1, R2, R4 and C6 form a boot-strap circuit. For each 50(+) pulse applied to the base of Q1, capacitor C6 is charged up to the peak value of the pulse. The next pulse increases the voltage on C6, and subsequent pulses continue to increase the voltage across C6. The voltage is essentially a stair case for repeated 50(+) pulses. The voltage on C6 is fed through R9 to the base of Q2, and charges C7. Q2 is a high impedance darlington to minimize discharge of C7, which provides a near constant DC voltage on the emitter of Q2. The voltage across R6 increases until the breakdown voltage of Zener diode CR13 is reached (6.8V). When CR13 conducts, Q3 is saturated and R23 is switched across the output of the reflected power detector. This action causes the reflected power to drop below the threshold and the antenna coupler tune cycle ends. C1 and C2 are r.f. bypass capacitors.

The anti-oscillation circuit is dormant except during a tune cycle. The collector voltages for Q1 and Q2 are switched off at the end of a tune cycle. Diode CR4 is connected to the C6 relay and inhibits the 50(+) inputs that might occur when C6 is switching.

4.8.4.8 C1 ASSEMBLY (3A9)

The C1 assembly consists of C1, the vacuum variable capacitor, the ϕ servo motor, T1 (12.5-50 ohm transformer), and the Cmax and Cmin switches. This subassembly is shown schematically in Figure 5.31 and pictorially in 5-40.

Capacitor C1 has a range of 7-1000pf and is driven by the ϕ motor to increase capacitance for a negative phase and to decrease capacitance for a positive phase. C1 is connected from the center tap of the transformer to the antenna and changes both the magnitude and the phase presented to the transformer. (C1 does not alter the real part of the antenna impedance, however.) C1 is controlled by the phase detector on 3A1A1 except for the C1 home function.

Transformer T1 transforms the 12.5 ohm input to C1 (when tuned) to 50 ohms for the transmitter output. Cmin and Cmax switches provide a logic 0 when the capacitor reaches its limits.

4.8.4.9 L4 ASSEMBLY (3A10)(Figure 5-41)

See Figure 5-31. This assembly consists of a .2 to 18 microhenry variable inductor, the amplitude servo motor and the limit switches. The amplitude detector on 3A1A1 drives the variable inductor toward maximum inductance for an amplitude less than 50 ohms and toward minimum inductance for an amplitude greater than 50 ohms. L4 is under the control of the amplitude detector except for the L4 home and L4 force functions. The variable inductor is connected in parallel with the antenna (or antenna modified by C6-C3 capacitors) and changes both the amplitude and the phase presented to 3A1. However, L4 can change the real part of the antenna impedance, where C1 cannot change the real part. The Lmin and Lmax switches indicate when the inductor reaches its limits.

4.8.4.10 C3 AND C6 ANTENNA MODIFICATION CAPACITORS (3A11)

These modification capacitors are used when the antenna coupler cannot tune a particular frequency-impedance point within the range of the C1 and L4 network. Operation of these capacitors is controlled by circuitry on 3A4. The schematic diagram is shown in Figure 4.3. SW1 and SW3 are motor control switch wafers that can signal 3A4 the exact location of SW2 and SW4. SW2 and SW4 are high voltage ceramic switches that switch the RF power from the C1-L4 tuning network to the antenna. Figure 5-42 is a photograph of the C3-C6 Assembly.

When a tune cycle is initiated, if any C3 or C6 is in the circuit, motors B1 and B2 are controlled by 3A4 and cause SW1 and SW3 to advance to the home positions. SW1 homes to position 2 and SW2 is positioned as shown. In this condition, all the C3 capacitors are shorted. SW3 homes to position 5 and SW4 is positioned as shown in the schematic. In this position, all C6 capacitors are removed from the circuit. When no C3 or C6 capacitors are used (SW1 and SW3 are already in the home position) and a tune cycle is initiated, motors B1 and B2 do not run.

During the tune cycle, when L4 reaches Lmax, circuitry on 3A4 causes C6 to advance to position 1 and stop. C6 remains in this position until another Lmax pulse is generated. At this time, C6 will advance to position 23. This action will continue, one advance of C6 for each Lmax pulse, until C6 reaches position 16. By referring to the

schematic diagram it can be seen that the total C6 capacity placed in shunt with the antenna is stepped as follows: 100pf, 300pf, 500pf, 800pf, and 1200pf. If, after C6 is 1200pf, another Lmax pulse occurs, SW3 is advanced to position 16 and the first step of C3 is inserted in series with the antenna, and C6 is forced to go to the home position. If Lmax pulses continue to occur, the same sequence will continue. For a few rare frequency-impedance conditions, C6 will go through three complete cycles, resulting in C3 being 75pf. Circuitry on 3A4 causes L4 to run toward minimum inductance when C6 reaches 75pf. When L4 reaches Lmin, C1 will be at maximum and circuitry on 3A4 will cause C3 to decrease to 25pf.

There are special conditions when C3 will be inserted in series with the antenna without C6 being switched at all. These conditions are:

1. Lmin, 0 ϕ , greater than 50 ohms.
2. Lmin, Cmax and C3 not in the home position.

Circuitry on 3A3 and 3A4 control the switching of C3 for these conditions.

There are 25 combinations of C3 and C6 capacitor configurations and it can be seen that the range of antenna impedance, that can be tuned, is large. The C3 capacitors are generally used only when the magnitude of the impedance is less than 12.5 ohms. The C6 capacitors are used only when the impedance of the antenna is out of the range of the 18 microhenry inductor.

4.8.4.11 TYPICAL TUNING SEQUENCE

The impedance selected for this example is for a Jetstar antenna at 2 MHz. This impedance is .58 +j34 and was selected because it requires C6 to go through all steps to 1200pf, switch in the first step of C3, and again switch in 100pf of C6. The tuning sequence will be broken up into three steps as follows:

- (a) Initial conditions immediately after the Tune cycle is initiated.
 1. Conditions on 3A2
 2. Conditions on 3A3
 3. Conditions on 3A4
 4. Conditions on 3A11
- (b) C1 and L4 Operation during the Tune cycle.
- (c) Termination of the Tune cycle.

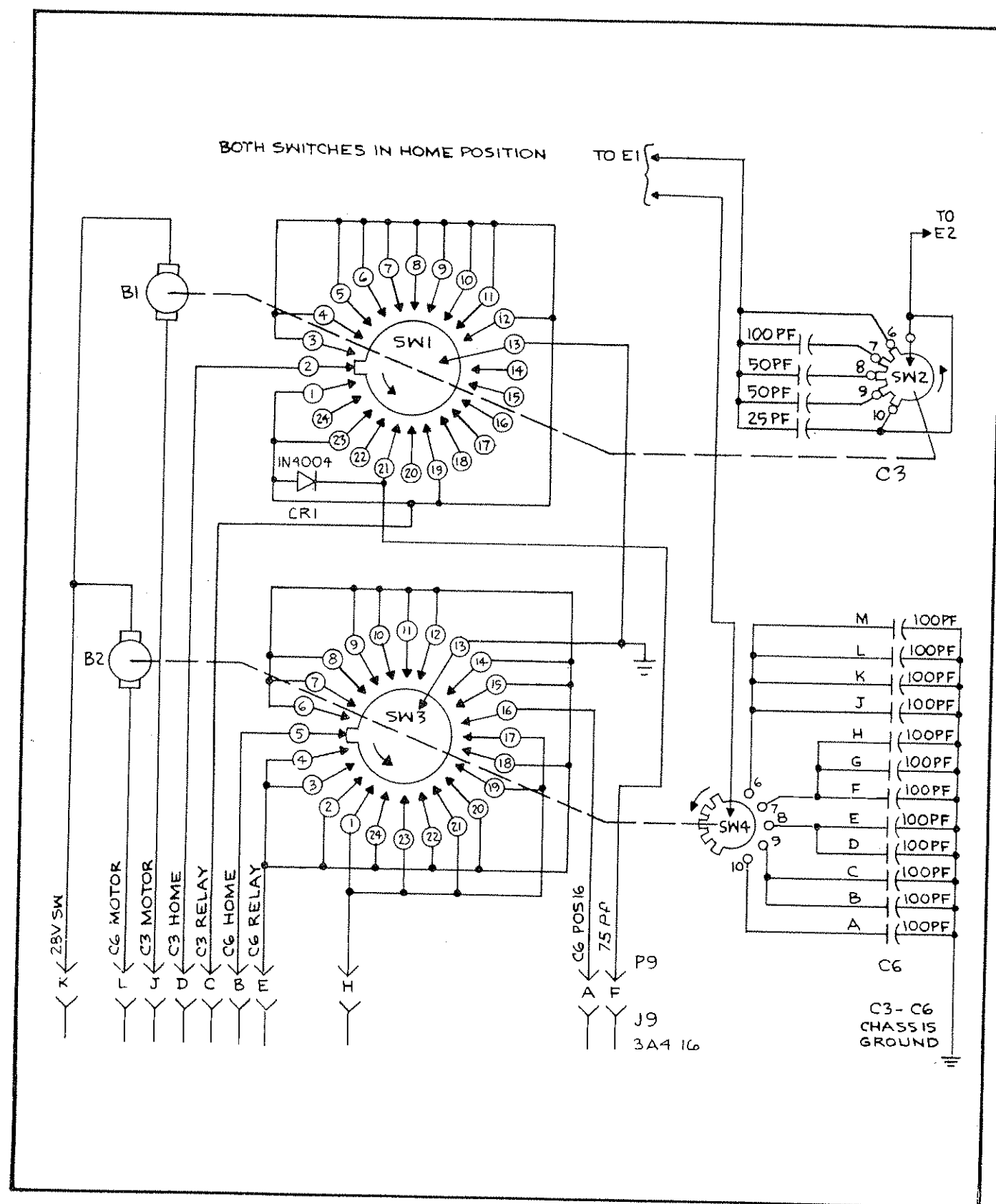


Figure 4.3 C3-C6 Antenna Modification Capacitors

[illegible]

4-46

4.8.4.11.1 INITIAL CONDITIONS IMMEDIATELY AFTER THE TUNE CYCLE IS INITIATED

4.8.4.11.1.1 CONDITIONS ON 3A2
The tune start pulse is applied to pin A of 3XA2 generating a tune start pulse. Q15 is saturated and the following actions occur on 3A2:

ACTION	PURPOSE
1. The Tune BSMV is set	Saturates Q9 and Q10, illuminating the Tune light and grounding the interlock line. This action pulls in the Tune Control relay on 3A1A1 and switches 28 VDC, 12 VDC, and keys on the transmitter.
2. The 50 ohm BSMV is set	This action pulls in the pad relay to assure a near 50 ohm load on the transmitter.
3. C1 Home and L4 Home pulses are generated	To set the C1 Home BSMV and the L4 Home BSMV on 3A3.
4. R17-C32 and R15-C31 time constants are discharged	To prevent getting a false tune in case the transmitter power is delayed in coming on. Also, to prevent the driven elements from moving during the duration of the tune pulse.
5. The Fault BSMV is turned off	It is turned off, if it is on, by the tune pulse and will be set again by the time delay or reflected power.

4.8.4.11.1.2 CONDITIONS ON 3A3

ACTION	PURPOSE
1. The C1 Home BSMV is set	To force C1 to begin running toward Cmax.
2. The L4 Home BSMV is set	To force L4 to run toward Lmin.

4.8.4.11.1.3 CONDITIONS ON 3A4

ACTION	PURPOSE
1. C6 Home BSMV is set	To force C6 to the home position and remove all C6 from the antenna.
2. C3 Home BSMV is set	To force C3 to the Home position and short out C3.

Both C3 and C6 Home BSMVs are set by the collector of Q15, 3A2 pin S and 3A4 pin 3.

4.8.4.11.1.4 CONDITIONS ON 3A11 (C3 AND C6 ASSEMBLY)

ACTION	PURPOSE
1. SW3 moves to position 5,	C6 is removed from the antenna.
2. SW1 moves to position 2,	C3 is shorted out.

4.8.4.11.2 C1 AND L4 OPERATION

The impedance presented (.58 + j34) with L4 across it and C1 in series represents a magnitude greater than 50 ohms with a negative phase. C1 will run to Cmax because of the home function (or because of the negative phase) and L4 will run to Lmin because of the L4 force or the magnitude error voltage. With L4 at min and C1 at maximum, the L4 force function will force L4 to run to Lmax. The first Lmax pulse will switch in 100pf of C6, the second Lmax pulse will switch in 300pf of C6, etc. until C6 is 1200pf. At this time the magnitude is still greater than 50 ohms and the phase is negative. Since L4 is being forced toward Lmax, the force causes another Lmax pulse and SW3 advances to position 16 and the first step of C3 is switched in and C6 homes. Also, the L4 force function is terminated. The condition at this time is that the antenna, .58 +j34 has 225pf in series with it.

The impedance presented to the antenna coupler is now .58 -j320. With nearly 18 microhenries across the antenna (.58 -j320) and C1 at maximum, the magnitude is greater than 50 ohms and the phase is positive. C1 begins to decrease in capacity (driven by a positive phase angle) and L4 begins to run toward Lmin (driven by an amplitude signal greater than 50 ohms and the L4 force terminated). Normal servo operation takes over. The action of L4 and C1 decreasing causes the amplitude error to reverse and L4 begins running back toward Lmax while the capacitor resonates along zero phase. The inductor reaches Lmax and 100pf of C6 is switched across the antenna (.58 -j320). This added capacity has raised the real part of the antenna to greater than 50 ohms and both elements tune to null.

4.8.4.11.3 TERMINATION OF THE TUNE CYCLE

When C1 and L4 are close to the correct values, along with 225pf of series C and 100pf of shunt C,

the reflected power has dropped below the threshold and a logic output on the collector of 3A2Q3 (50(-) line) indicates this condition. The 50(-) logic 0 is inverted in 3A2U6A and combined with a logic 1 on pin 5 of 3A2U6B. The logic 1 on pin 5 indicates that RF is present and is derived from the RF detector. The resulting logic 0, on pin 6 of 3A2U6, causes the 50 ohm BSMV to be reset and the pad relay falls out.

This action removes the 3DB pad and full tune power is applied to the phase and amplitude detectors. C1 and L4 are now driven with more error voltage and they will position themselves accordingly. The first time the pad relay falls out, it is usually for a short duration and the pad may pull in again. On some tunes the 50 ohm BSMV may be set and reset several times before the reflected power remains below the threshold continuously.

This action is extremely important to the tuning of the coupler. Each time a 50 ohm point is found the following occurs:

1. The 50 ohm BSMV is set.
2. Relay K1 (on 3A1A1) falls out applying full power to the phase and amplitude detectors.
3. The 50(+) line shorts out the outputs from the level changers on 3A3.
4. The 50(+) line causes a brake pulse to be generated.

All four of the above actions are required to reduce servo loop oscillation and reduce tuning time.

When the reflected power has settled below the threshold, 3A2Q5 will generate a logic 1 and terminate the tune cycle.

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 module 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 RECEIVER/EXCITER ASSEMBLY

- a. To remove the top cover, invert the assembly to expose the bottom of the unit. Six flat head screws will be seen in the bottom cover. Remove these six screws. Carefully pull the cover off of the unit.
- b. To remove the bottom cover, note the four screws in line along the side of the chassis on each side (see figure 5.1). Remove these eight screws and carefully pull the cover from the unit.

5.3.2 REMOTE CONTROL UNIT

- a. Locate the two screws at the rear of the unit. Turn these $\frac{1}{4}$ turn CCW and pull cover from the unit.

5.3.3 AMPLIFIER/COUPLER UNIT

- a. Remove the screw located at the top center of the rear panel. Invert the assembly and remove the two marked screws in the bottom pan, close to the front panel. Carefully separate the top cover from the bottom pan by raising the rear of the cover first.

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 — Wavetex Model 3001
1-520 MHz
- b. VTVM — HP Model 410C
- c. Dummy load, 50 ohms @ 150W — Bird Model 8135
- d. Coax Tee Connector — HP 11042A
- e. Audio VTVM — HP model 400D
- f. Oscilloscope, 100 MHz Bandwidth — Tektronix 465B
- g. VOM — Simpson Model 260 (20V ohms/volt)
- h. 100 Watt Wattmeter — Bird Model 43
- i. RF Voltmeter — Boonton Model 92C with both open circuit probe tip and 50 ohm BNC adapter 918A.
- j. Frequency Counter — HP Model 5382A
- k. D.C. Power Supply — 0-30VDC, 15A
- l. Spectrum Analyzer (optional)
HP 141T Display Section
HP 8554L RF Section
HP 8552A IF Section
- m. BNC to clip lead cable approximately 3 ft. long (for phase and amplitude balance).

5.4.2 MATERIALS REQUIRED

- a. Lubricants
Blue Cramolin, Sunair P/N 1001270002
Red Cramolin, Sunair P/N 1001270011 (for lubrication of variable inductor in coupler unit)
Beacon 325 grease (made by Esso) or equivalent (for lubrication of vacuum variable capacitor shaft)
- b. Humiseal* 1B31 — 1 quart size, Sunair P/N 1002840023 (for PC board repair)

- c. Ancillary Kit, R/E, Sunair P/N 8033100893 (for PC board extender cards and tuning tools)

Refer to Figs. 5.11, 5.28 and 5.30 for internal wiring diagrams of the three units.

*Trademark of COLUMBIA TECHNICAL Corporation

5.4.3 PRELIMINARY PREPARATIONS

- a. Connect all interconnecting cables between units.
- b. Connect the main power cable to the power supply, par. 5.4.1, item m, set for 28 VDC.
- c. Disconnect the small jumper on the front panel of the PA/coupler unit.
- d. Attach a coaxial cable from the signal generator, par. 5.4.1, item a, to the P.A. Out connector on the PA/coupler front panel.
- e. Set remote control switches and controls per Table 5.1.

SWITCH OR CONTROL	POSITION
FREQUENCY Switches	2000.0 kHz
MODE Switch	LSB
DIMMER Control	Fully CW
SQUELCH Control	Fully CW
VOLUME Control	½ CW
POWER Switch	ON

Table 5.1 Remote Control Test Positions

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 each other.

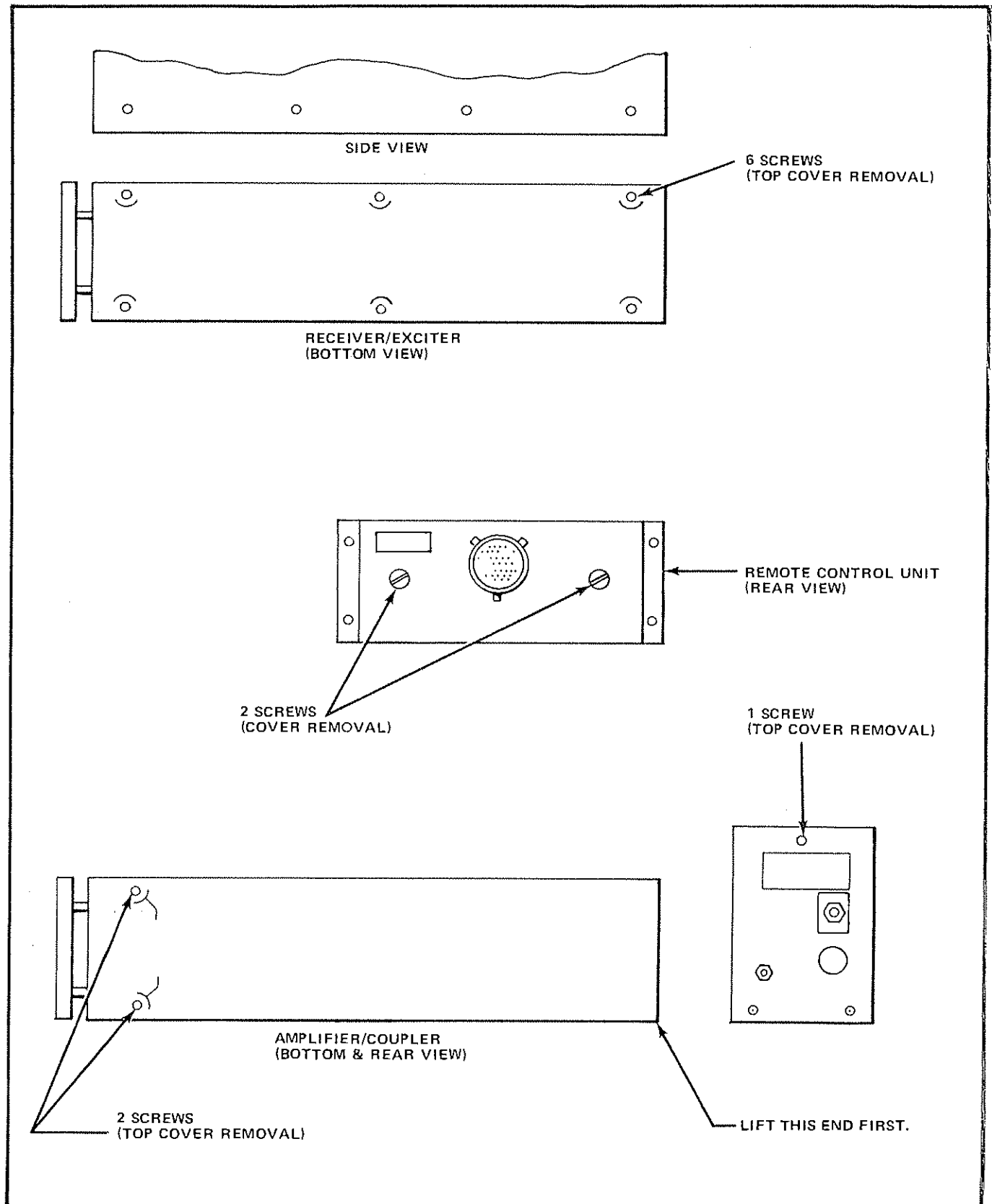


Figure 5.1 Cover Removal for ASB-850 Units

5.4.4 RECEIVER/EXCITER TEST PROCEDURES

5.4.4.1 SWITCHING REGULATOR (1A6)

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 illuminated.
2	28 VDC Input	VOM on 50 VDC range, common lead on chassis ground, "+" lead on either terminal of input choke 1A1L2, located beneath main chassis near front panel	Read voltage on VOM	VOM should read approximately 28 VDC. If not, check fuse on front panel of PA/coupler and cabling between PA/coupler and Receiver/Exciter units.
3	Switching regulator output	VOM on 50 VDC range, common lead on chassis ground, "+" lead on case of 1A1Q1, located beneath chassis on bracket attached to rear panel.	Read voltage on VOM	VOM should read approximately 18 VDC. If voltage is over 20 VDC, check 1A6U1 and 1A6Q1. If below 16 VDC, check for short circuit on +12 VDC or +5 VDC lines.
4	+12 VDC	VOM on 50 VDC range. Common lead on chassis ground, "+" lead on either side of 1A4A6 L1, located beneath chassis on synth mother board.	Read voltage on VOM	VOM should read between 11.2 and 12.8 VDC. If not, check 1A6U2 and 1A1Q1 and associated circuitry.
5	+5 VDC	VOM on 10 VDC range, common lead on chassis ground, "+" lead on either side of 1A4A6 L2, located beneath chassis on synth mother board.	Read voltage on VOM	VOM should read between +4.75 and +5.25 VDC. If not, check 1A1U1 and 5V line for open or short circuit.

5.4.4.2 RECEIVER TEST

STEP No.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
1	Sensitivity	Audio VTVM on phone jack on front panel for steps 1 through 6.	With VOLUME control at approximately mid scale, set rf signal generator to 50 microvolts at 2,000 MHz and adjust frequency for a peak audio signal on Audio VTVM.	Peak indication. If none, consult sections 4.3.2, 4.3.3 and 4.3.4. Check for synthesizer outputs LO#1, LO#2 and LO#3 on Receiver/Exciter Mother Board 1A3A5. See Figure 5.22
2	Same		Remove coax from rf signal generator output. Adjust VOLUME control for audio VTVM reading of -10db on 100mv scale.	-10db on 100 mv scale.
3	Same		Set rf signal generator to 0.5 microvolts (into 50 ohms)	VTVM increase of 10db minimum over step 2. If not, check VHF mixer board (1A3A1), IF/Filter board (1A3A2) and repeat if necessary. See paragraphs 5.6.1 and 5.6.2.
4	Same		Depress USB switch and repeat steps 1, 2 and 3 above.	If no output, check wiring for USB function, check switching diodes on IF/Filter board 1A3A2, and check CR1 on Audio Board 1A3A4.
5	Same		Adjust rf signal generator for "zero beat", and increase output to 3 microvolts (into 50 ohms). Depress AM switch and adjust VOLUME control for audio VTVM reading of -10db on 100 mv scale.	-10db on 100 mv scale. If no output, check wiring and switching diodes on IF/Filter board (1A3A2).
6	AM Sensitivity		Turn on 30% modulation at 1 kHz on rf signal generator.	Minimum 10db increase over level in step 5.
7	AGC Control	Audio VTVM on PHONE jack on front panel and VOM (on 10 VDC range) between test point 1A3A4 TP 1, on AUDIO board, and chassis ground for steps 7 through 10.	Remove 1 kHz modulation and set signal generator output to zero. Depress USB switch.	VOM should read approximately 8.5 VDC.
8	Same		Set signal generator output to 5 microvolts and adjust frequency for peak audio VTVM reading.	VOM should read down scale.
9	Same		Adjust VOLUME control for audio VTVM reading of -10 db on 1V scale.	-10 db on 1V scale
10	Same		Increase rf signal generator output to 250,000 microvolts.	VTVM should increase 10 db or less from reading in Step 9. If not, readjust 1A3A4 R10 on AUDIO board for 10 db audio change. Repeat steps 7 through 10.
11	Squelch control	Audio VTVM on PHONE jack on front panel, for steps 11 and 12.	Depress AM switch, set signal generator at 10 microvolts with 30%, 1 kHz modulation. Turn SQUELCH control fully CCW.	Receiver audio should squelch. If not, readjust 1A5R1 CCW until unit squelches; check 1A5U1 and associated components, check 1A3A5U1 and associated components.
12	Same		Increase signal level to 100 microvolts.	Squelch should open, allowing audio to pass.
13	600 Ohm Audio Output	Audio VTVM between pins F and B (audio ground) on Remote Control audio connector 2A3U2. Add 600 ohm resistive load across pins F and B.	Depress USB switch. Leave signal generator level at 100 microvolts, adjust frequency for peak on VTVM. Adjust VOLUME control to max CW position.	Output shall be minimum of 5.5 VRMS. If not, readjust 1A3A4 R48 on Audio board.

5.4.4.3 TRANSMITTER TEST

STEP No.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
1		Dummy load connected through coaxial cable to PA output connector on PA/coupler unit, using coaxial tee. HP410B VTVM connected to remaining port at tee for steps 1 through 4.	Frequency dials set for 16000.0 kHz, depress AM switch.	VTVM should read 44.6 VRMS. If not, check for output from Receiver/Exciter. VTVM should read approximately 1.5 VRMS. If ok, check power amplifier and relays in PA/coupler unit. If no output from Receiver/Exciter, check relays K1 and K2, Sideband Generator board, 1A3A3 (refer to section 4.4.2).
2	AM Carrier Check and Adjustment	Connect microphone to MIC connector on Receiver/Exciter front panel for steps 2 and 3.	Key microphone. Adjust potentiometer 1A3A3 R18 (ACC control) on SB generator board to give a VTVM reading of 44.6 VRMS.	VTVM should read 70.7 VRMS. If not, check microphone circuits on Compressor board 1A5, balanced modulator on Sideband generator board 1A3A3, and diode switches on IF/filter board, 1A3A2. Refer to sections 4.4.2, 4.4.3 and 4.4.5.
3	SSB Power Output		Depress USB switch. Key microphone and talk into it. Adjust ALC control, 1A3A3 R55 on Sideband Generator board to give a peak reading of 70.7 VRMS on the HP410B.	VTVM should read less than 0.7 VRMS. If not, check CR3-6 and associated circuitry on sideband generator board.
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 1A3A3 C25 and R34 on sideband generator board alternately until VTVM reads below 0.7 VRMS.	

5.5 SYNTHESIZER

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

5.5.1 FAULT ANALYSIS

subparagraphs, is designed to isolate a faulty assembly first and then a faulty stage. If the defective assembly has been isolated by substitution, then the technician may proceed directly to the appropriate paragraph to isolate the faulty stage. Once a defective stage has been found, refer to the appropriate circuit diagram and make voltage checks to isolate the faulty component.

The Synthesizer Fault Analysis Table, contained in the following

5.5.1.1 PRELIMINARY CHECKS

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE	IF FAULTY, CHECK-
1	Freq. Std. output	Oscilloscope probe at X1A4A1 pin 5.	Check for proper wave form.	300 to 900 mv p-p sine wave, 200 nsec. rep. rate	a) Freq. Std. (1A1U2) and associated wiring. b) Spectrum Gen. (1A4A1) for shorted input.
2	Freq. Std. Alignment	Same as step 1 above except connect Frequency Counter to Vertical Output of oscilloscope.	Measure frequency. If out of tolerance: remove access screw at top of Freq. Std., adjust Frequency Trim and replace access screw.	Frequency within ± 5 Hz of 5.000000 MHz.	If proper alignment cannot be obtained, Frequency Standard must be replaced.
3	Low Digit Phase Lock	Oscilloscope probe at test point 1A4A2TP3.	Set all FREQUENCY knobs to "O": Refer to Low Digit Gen. schematic and check waveform.	D.C. level of 1.5V to 2.5V	a) H.F. VCO Coarse Steering Voltage (see table 5.8) If faulty, check R12 through R22 located on the back of the 10 kHz switch (1A1S4). Also check associated remote control switch wiring. b) 1 kHz and 17 MHz references (consult Spectrum Gen., 1A4A1 schematic). If faulty, check Spectrum Gen.

5.5.1.1 PRELIMINARY CHECKS (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE	IF FAULTY, CHECK-
4	VHF Loop Phase Lock	Oscilloscope probe at test point 1A4A4TP1.	Set all FREQUENCY knobs to "0". Consult VHF Divider schematic and check waveform.	D.C. level of 1.5V to 2.5V	c) Frequency Control lines (consult tables 5.2 thru 5.8). If faulty, check Frequency control switches on remote control and associated main frame wiring. d) Low Digit Gen. voltage readings (consult schematic). e) Low Digit Gen. alignment (See section 5.5.2.2). a) VHF VCO Coarse Steering Voltage (see table 5.8). If faulty, check R1 thru R11 located on the back of the 1 MHz switch (1A1S2). Also check associated remote control switch wiring. b) Translator output (consult Translator schematic and if faulty, repair translator section 5.5.2.3). c) Frequency Control lines (consult tables 5.2 thru 5.8). If faulty check Frequency Control switches on remote control and associated wiring. d) VHF Divider voltage readings (consult schematic). If faulty repair VHF Divider. e) VCO output (consult VCO schematic and section 5.5.2.5). If faulty repair VCO.

5.5.1.2 FREQUENCY CODING

The following tables (5.2 thru 5.8) are provided to assist in making the preliminary checks described in this section.

10 MHz DIAL	X1A4A5 Pin Numbers (Function)		
	18(Band "0" Command)	17(Band "1" Command)	16(Band "2" Command)
0	0	1	1
1	1	0	1
2	1	1	0

NOTE

1. A "0" indicates short circuit to chassis ground
2. A "1" indicates open circuit to chassis ground
3. All readings taken with VCO (1A4A5) disconnected from X1A4A5

Table 5.2 10 MHz Switch

1 MHz DIAL	X1A4A4 Pin Numbers (Function)			
	7 (2^3 1 MHz)	8 (2^2 1 MHz)	H (2^1 1 MHz)	J (2^0 1 MHz)
0	1	0	0	1
1	1	0	0	0
2	0	1	1	1
3	0	1	1	0
4	0	1	0	1
5	0	1	0	0
6	0	0	1	1
7	0	0	1	0
8	0	0	0	1
9	0	0	0	0

NOTE

1. A "0" indicates short circuit to chassis ground
2. A "1" indicates open circuit to chassis ground
3. All readings taken with VHF Divider (1A4A4) disconnected from X1A4A4.

Table 5.3 1 MHz Switch

100 kHz DIAL	X1A4A4 Pin Numbers (Function)			
	4 (2^3 100 kHz)	5 (2^2 100 kHz)	D (2^1 100 kHz)	E (2^0 100 kHz)
0	0	0	0	0
1	1	0	0	1
2	1	0	0	0
3	0	1	1	1
4	0	1	1	0
5	0	1	0	1
6	0	1	0	0
7	0	0	1	1
8	0	0	1	0
9	0	0	0	1

NOTE

1. A "0" indicates short circuit to chassis ground

2. A "1" indicates open circuit to chassis ground

3. All readings taken with VHF Divider (1A4A4) disconnected from X1A4A4

Table 5.4 100 KHz Switch

10 kHz DIAL	X1A4A2 Pin Numbers (Function)			
	R (2^3 10 kHz)	15 (2^2 10 kHz)	14 (2^1 10 kHz)	S (2^0 1 kHz)
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

NOTE

1. A "0" indicates short circuit to chassis ground

2. A "1" indicates open circuit to chassis ground

3. All readings taken with Low Digit Generator (1A4A2) disconnected from X1A4A4

Table 5.5 10 KHz Switch

1 kHz DIAL	X1A4A2 Pin Numbers (Function)			
	N (2^3 1 kHz)	13 (2^2 1 kHz)	12 (2^1 1 kHz)	P (2^0 1 kHz)
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

NOTE

1. A "0" indicates short circuit to chassis ground

2. A "1" indicates open circuit to chassis ground

3. All readings taken with Low Digit Generator (1A4A2) disconnected from X1A4A2

Table 5.6 1 kHz Switch

100 Hz DIAL	X1A4A2 Pin Numbers (Function)			
	L (2^3 100 Hz)	11 (2^2 100 Hz)	10 (2^1 100 Hz)	M (2^0 100 Hz)
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

NOTE

1. A "0" indicates short circuit to chassis ground

2. A "1" indicates open circuit to chassis ground

3. All readings taken with Low Digit Generator (1A4A2) disconnected from X1A4A2

Table 5.7 100 Hz Switch

I H.F. VCO (Low Digit Coarse Steering)

10 kHz DIAL	X1A4A2 pin U VOLTS
0	3.50
1	3.85
2	4.15
3	4.55
4	4.95
5	5.40
6	5.90
7	6.40
8	7.00
9	7.70

II VHF VCO (VCO Coarse Steering)

1 MHz DIAL	X1A4A5 pin 15 VOLTS
0	1.37
1	1.78
2	2.18
3	2.75
4	3.31
5	4.12
6	4.93
7	6.15
8	7.85
9	9.56

NOTE

*All voltages above measured with
20,000 ohm/volt meter. Variations
of $\pm 5\%$ are permissible*

Table 5.8 Coarse Steering Voltage Readings

5.5.2 SYNTHESIZER SUBASSEMBLY TESTING AND ALIGNMENT PROCEDURES

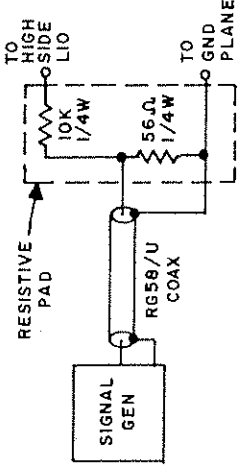
The following paragraphs give the testing and alignment procedures for the synthesizer printed circuit board subassemblies. It is assumed that the defective subassembly has first been isolated either by substitution or by following the preliminary checks of Section 5.5.1.1. During the following tests, the printed circuit board being tested should be extended from the card basket using the extender card (Sunair #5024003098) supplied in the optional ancillary kit.

At any step in the procedure, if the required result cannot be obtained, refer to the schematic of the subassembly and make suitable voltage measurements to isolate the faulty component. When the faulty subassembly has been restored to operation the preliminary checks of Section 5.5.1.1 should be repeated to ensure full synthesizer operation.

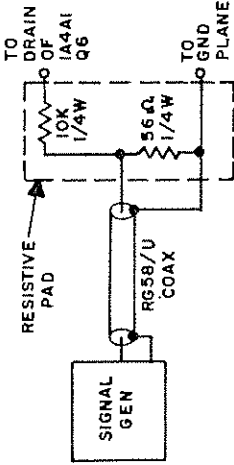
5.5.2.1 SPECTRUM GENERATOR TESTING AND ALIGNMENT

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
1	20 MHz ref. alignment and test	Oscilloscope probe at 1A4A1 pin 1. Connect frequency counter to Vertical Ampl. output of oscilloscope.	Tune L2, L3 & L4 for maximum output. NOTE <i>Adjustments interact and must be repeated until no further increase in output can be obtained.</i>	Minimum output of 300 mv p-p (sine wave) on oscilloscope. Frequency of 20 MHz $\pm$ 20 Hz on Frequency counter. NOTE <i>If proper output cannot be obtained, refer to the schematic and check U1, U2, U3 and their associated circuitry.</i>
2	1 kHz ref. output	Oscilloscope probe on 1A4A1 pin 18	Consult schematic and check waveform	Pulse with following parameters: Rep. rate= 1 millisecond Duty ratio=0.2 Logical "0" level: less than 0.6V Logical "1" level: greater than 2.2V
3	100 kHz Ref. output	Oscilloscope probe on 1A4A1 pin 17	Consult schematic and check waveform	Pulse with following parameters: Rep. rate= 10 microseconds Duty ratio=0.2 Logical "0" level: less than 0.6V Logical "1" level: greater than 2.2V

5.5.2.1 SPECTRUM GENERATOR TESTING AND ALIGNMENT (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
4a	21 MHz Ref. alignment and test	RF voltmeter with unterminated tip on 1A4A1 pin 4. Connect signal generator as shown below. Set generator frequency to 21.00 MHz using Frequency Counter. Temporarily short jumper between U8 pin 2 and ground plane of printed circuit board. Similarly solder short jumper across L7. 	Set generator level to 250 mv RMS. Tune L8, L9 & L10 for maximum output on RF voltmeter. NOTE <i>Adjustments interact and must be repeated until no further increase in output can be obtained.</i> Tune L10 for maximum output on RF voltmeter	
4b	21 MHz Ref. alignment and test	Same as 4a above except remove 10K resistor from L10 and connect to high side of L9	Tune L9 for maximum output. Repeat L10 for maximum output. Repeat tuning of L9 and L10 until no further output can be obtained	
4c	21 MHz Ref. alignment and test	Same as 4a above except remove 10K resistor from L10 and connect to high side of L8.	Tune L8, L9 and L10 for maximum output. Repeat tuning, in sequence, until no further output can be obtained.	
4d	21 MHz Ref. alignment and test	Leave RF voltmeter connected as in step 4a above. Disconnect the (2) jumpers and resistive pad network added in step 4a.	Carefully repeat L8, L9 and L10 for maximum output. Repeat tuning, in sequence, until no further output can be obtained	Meter indication of 85 mv RMS minimum, when tuning is complete. NOTE <i>If proper output cannot be obtained, refer to schematic and check Q1, Q2, and U8 and their associated circuitry. Also check CR4 thru CR7 and associated circuitry.</i>
5a	3rd L.O. (10.5 MHz Ref.) output	Connect RF voltmeter to 1A4A1 pin 13. Connect oscilloscope to U10 pin 8.	Place MODE switch on front panel in USB position. Refer to schematic and check waveform at U10 pin 8. Disconnect oscilloscope.	a) Proper oscilloscope waveform. b) RF voltmeter indication of 100 mv RMS minimum.
5b	3rd L.O. (10.5 MHz Ref.) output	Same as 5a above	Place MODE switch in AM position	RF voltmeter reading decreases at least 20 dB from that obtained in 5a above

5.5.2.1 SPECTRUM GENERATOR TESTING AND ALIGNMENT (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
6a	17 MHz Ref. alignment and test	RF voltmeter with unterminated tip on 1A4A1 pin 6. Temporarily solder a short jumper between gate #1 of Q6 and the ground plane of the printed circuit board. NOTE <i>Gate #1 is the junction of C56, C61 and R50.</i> Connect the signal generator as shown below. Set generator frequency to 17.000 MHz (using the frequency counter) and set its level to 250 mv RMS. 	Tune L16 and L17 for maximum output on the RF voltmeter. NOTE <i>Adjustments interact and must be repeated until no further increase in output can be obtained.</i>	Minimum output level of 90 mv RMS after tuning is completed NOTE <i>If proper output cannot be obtained, refer to the schematic and check Q5, Q6, Q7, Q8, and their associated circuitry.</i>
6b	17 MHz Ref. alignment and test	Leave RF voltmeter connected as in 6a above. Disconnect resistive pad and jumper.	Tune L14 for maximum output on the RF voltmeter. Carefully repeat L16 and L17 for maximum output.	

5.5.2.2 LOW DIGIT GENERATOR (1A4A2)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
1	17 MHz Ref.	Connect RF voltmeter to 1A4A2 pin C	Check RF voltmeter reading	Reading greater than 100 mv RMS. If out of specification, check C28, L9 and R21
2	1 kHz Ref.	Connect oscilloscope to 1A4A2 pin 18	Display waveform on scope	Pulse present with the following parameters: rep. rate=1 msec. Duty ratio=0.2 Logical "0" level: less than 0.6V Logical "1" level: greater than 2.2V If out of specification, check U2 and associated circuitry
3	Phase Lock	Connect oscilloscope to 1A4A2 pin 1. Connect vertical Ampl. output of oscilloscope to frequency counter. Connect V.O.M. to TP3.	Set 10 kHz, 1 kHz and 100 Hz frequency dials on remote control to "0"	V.O.M. should indicate approximately 1.5V.

NOTE

If V.O.M. reads approximately 0.8V or 5V, this is an "out of phase lock" indication. Check:

- Voltage at TP1 (see schematic) if incorrect, check CR5, Q2 and associated circuitry
- Refer to schematic and check waveform at TP2. If no signal is present, check Q1, U1 and associated circuitry
- Refer to schematic and check waveforms at U7, U8, U9, U10, U11, and U2.
- If the waveform at pin 1 of U7A deviates from the correct waveform on the schematic, check U6, Q3 and associated circuitry.

If "out of Phase Lock" condition does not exist proceed to Step 4.

5.5.2.2 LOW DIGIT GENERATOR (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
4a	Output frequency	Same as Step 3 above	Measure output frequency	Output frequency of 1.5000 MHz ± 2 Hz. If out of tolerance: a) Refer to tables 5.9, 5.10, 5.11 and check 10 kHz, 1 kHz and 100 Hz preset lines. b) Refer to schematic and check waveforms at U3, U4, U7, U8, U9, U10 and U11
4b	Output frequency	Same as Step 3 above	Set 1 kHz and 100 Hz dials at "5"	Output frequency of 1.5055 MHz ± 2 Hz, V.O.M. indication of $1.95 \pm 0.25V$. NOTE a) If V.O.M. indication is out of tolerance but frequency is correct, proceed to step 5 and align VCO (Q1). b) If both frequency and V.O.M. readings are out of tolerance, refer to schematic and check U3, U4, U8, U9 and associated circuitry.
4c	Output frequency	Same as Step 3 above	Leave 1 kHz and 100 Hz dials set at "0". Set 10 kHz dial at 9.	Output frequency of 1.5955 MHz ± 2 Hz V.O.M. indication of $1.95 \pm 0.25V$. NOTE a) If V.O.M. indication is out of tolerance but frequency is correct, proceed to Step 6 and align VCO (Q1) b) If both frequency and V.O.M. readings are out of tolerance, refer to schematic and check U10 and associated circuitry.

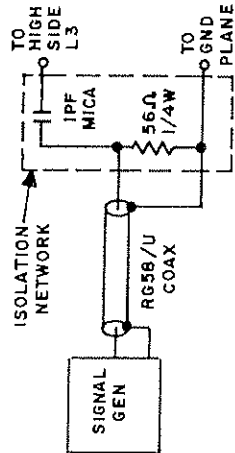
5.5.2.2 LOW DIGIT GENERATOR (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE																														
4d	Output frequency	Same as Step 3 above	Follow the table below and check for required frequencies <table><tr><th>10 kHz DIAL</th><th>1 kHz DIAL</th><th>100 Hz DIAL</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>2</td></tr><tr><td>0</td><td>0</td><td>3</td></tr><tr><td>0</td><td>0</td><td>4</td></tr><tr><td>0</td><td>0</td><td>5</td></tr><tr><td>0</td><td>0</td><td>6</td></tr><tr><td>0</td><td>0</td><td>7</td></tr><tr><td>0</td><td>0</td><td>8</td></tr><tr><td>0</td><td>0</td><td>9</td></tr></table> FREQUENCY (+2 Hz) 1.5001 MHz 1.5002 MHz 1.5003 MHz 1.5004 MHz 1.5005 MHz 1.5006 MHz 1.5007 MHz 1.5008 MHz 1.5009 MHz <i>If the required frequencies cannot be obtained, refer to schematic and check U8.</i>	10 kHz DIAL	1 kHz DIAL	100 Hz DIAL	0	0	1	0	0	2	0	0	3	0	0	4	0	0	5	0	0	6	0	0	7	0	0	8	0	0	9	
10 kHz DIAL	1 kHz DIAL	100 Hz DIAL																																
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0	0	4																																
0	0	5																																
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0	0	7																																
0	0	8																																
0	0	9																																
4e	Output frequency	Same as Step 3 above	Follow the table below: <table><tr><th>10 kHz DIAL</th><th>1 kHz DIAL</th><th>100 Hz DIAL</th></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>0</td><td>2</td><td>0</td></tr><tr><td>0</td><td>3</td><td>0</td></tr><tr><td>0</td><td>4</td><td>0</td></tr><tr><td>0</td><td>5</td><td>0</td></tr><tr><td>0</td><td>6</td><td>0</td></tr><tr><td>0</td><td>7</td><td>0</td></tr><tr><td>0</td><td>8</td><td>0</td></tr><tr><td>0</td><td>9</td><td>0</td></tr></table> FREQUENCY (+2 Hz) 1.5010 MHz 1.5020 MHz 1.5030 MHz 1.5040 MHz 1.5050 MHz 1.5060 MHz 1.5070 MHz 1.5080 MHz 1.5090 MHz <i>If the required frequencies cannot be obtained, refer to schematic and check U9.</i>	10 kHz DIAL	1 kHz DIAL	100 Hz DIAL	0	1	0	0	2	0	0	3	0	0	4	0	0	5	0	0	6	0	0	7	0	0	8	0	0	9	0	
10 kHz DIAL	1 kHz DIAL	100 Hz DIAL																																
0	1	0																																
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0	5	0																																
0	6	0																																
0	7	0																																
0	8	0																																
0	9	0																																
4f	Output frequency	Same as Step 3 above	Follow the table below: <table><tr><th>10 kHz DIAL</th><th>1 kHz DIAL</th><th>100 Hz DIAL</th></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>0</td></tr><tr><td>3</td><td>0</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td></tr><tr><td>5</td><td>0</td><td>0</td></tr><tr><td>6</td><td>0</td><td>0</td></tr><tr><td>7</td><td>0</td><td>0</td></tr><tr><td>8</td><td>0</td><td>0</td></tr><tr><td>9</td><td>0</td><td>0</td></tr></table> FREQUENCY (+2 Hz) 1.5100 MHz 1.5200 MHz 1.5300 MHz 1.5400 MHz 1.5500 MHz 1.5600 MHz 1.5700 MHz 1.5800 MHz 1.5900 MHz <i>See Note on following page.</i>	10 kHz DIAL	1 kHz DIAL	100 Hz DIAL	1	0	0	2	0	0	3	0	0	4	0	0	5	0	0	6	0	0	7	0	0	8	0	0	9	0	0	
10 kHz DIAL	1 kHz DIAL	100 Hz DIAL																																
1	0	0																																
2	0	0																																
3	0	0																																
4	0	0																																
5	0	0																																
6	0	0																																
7	0	0																																
8	0	0																																
9	0	0																																

5.5.2.2 LOW DIGIT GENERATOR (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
				NOTE <i>If the required frequencies cannot be obtained, refer to schematic and check U10.</i>
5a	Output Level	Same as Step 3 above	Set 10 kHz, 1 kHz and 100 Hz dials to "0"	Output level of 200 mv p-p minimum.
5b	Output Level	Same as Step 3 above	Set 10 kHz, 1 kHz and 100 Hz dials to "g"	Output level of 200 mv p-p minimum.
				NOTE <i>If the required results cannot be obtained in Steps 5a and 5b above, refer to schematic and check Q5, Q6, U5 and associated circuitry.</i>
			NOTE <i>The alignment of the VCO, detailed in Step 6 below, should only be necessary if a component has been replaced in the voltage controlled oscillator (VCO) circuit (Q1). All other causes of improper operation should first be checked before proceeding with the alignment.</i>	
6a	VCO alignment	Same as Step 3 above	Set 1 kHz and 10 kHz dials to "5"; Set 10 kHz dial to "0". Tune L3 for a V.O.M. indication of 1.95 ± 0.25 volts.	
6b	VCO alignment	Same as Step 3 above	Leave 1 kHz and 100 Hz dials set at "5". Tune C8 for a V.O.M. indication of 1.95 ± 0.25 volts.	
6c	VCO alignment	Same as Step 3 above	Repeat 6a and 6b until required performance is obtained.	When tracking is complete, the V.O.M. should read 1.95 ± 0.25 volts at both settings of the 10 kHz dial.

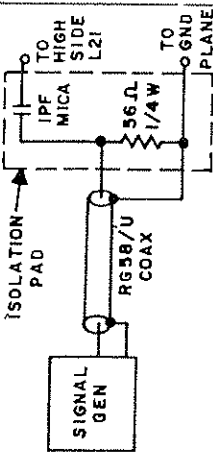
5.5.2.3 TRANSLATOR (1A4A3)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
1	21 MHz Ampl. alignment and test	Oscilloscope probe on TP4.	Tune L13 for maximum output.	Sine wave, 800 mv p-p min. rep. rate=47.6 nsec.
2a	19.45 MHz Ampl.	 Connect RF voltmeter to U3 pin 6. Temporarily unplug the Low Digit Generator, 1A4A2, from the mother board. Temporarily solder a short jumper from U1 pin 2 to the printed circuit board ground plane. Set the signal generator frequency to 19.45 MHz using the Frequency Counter. Set the generator level to 250 mv RMS and connect as shown above.	Tune L3 and L5 for max. RF voltmeter reading. As tuning progresses, reduce signal generator level to keep RF voltmeter reading below 100 mv RMS.	NOTE <i>If required output cannot be obtained, refer to schematic and check U1 and associated circuitry.</i>

5.5.2.3 TRANSLATOR (1A4A3)

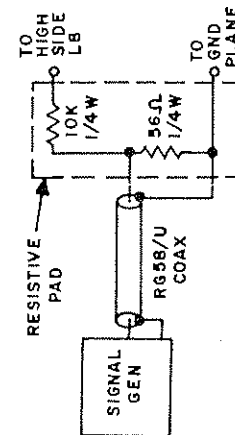
STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
2b	19.45 MHz alignment (cont'd)	Disconnect 1 pf capacitor from high side of L2 and connect to the high side of L1. Set the generator level to 250 mv RMS.	Tune L2 and L3 for max. RF voltmeter reading (adjustments interact). As the tuning progresses, reduce the generator level to keep the RF voltmeter reading below 100 mv RMS.	When tuning is complete, the RF voltmeter should read approximately 7 mv RMS. NOTE <i>If the required performance cannot be obtained, consult the schematic and check U3, CR1 through CR4 and associated circuitry. Also check the output of the Low Digit Generator (consult schematic).</i> Approximate output level of -30 dBm at 19.45 MHz. All spurious outputs down at least 40 db from the 19.45 MHz output (typically will be 50 db down).
2c	19.45 MHz alignment (cont'd)	Disconnect 1 pf capacitor from high side of L2 and connect to the high side of L1. Set the generator level to 250 mv RMS.	Tune L1, L2 and L3 for max. RF voltmeter reading (adjustments interact). As the tuning progresses, reduce the generator level to keep the RF voltmeter reading below 100 mv RMS.	
2d	19.45 MHz alignment (cont'd)	Disconnect the isolation network signal generator and jumper wire added in 3a above. Plug the Low Digit Generator back into the mother board. Place the V.O.M. on the 10V D.C. range and connect to U3 pin 1. Connect the RF voltmeter to TP1. Terminate TP1 in a 50 ohm lead.	Carefully repeak the slugs on L1, L2, L3 and L4. A point will be found where the voltage on the V.O.M. begins to increase. Tune the four inductors for max. V.O.M. indication.	
		NOTE <i>If a spectrum analyzer is available, the following tuneup and test procedure may be used in lieu of steps 5a through 5d</i> Connect spectrum analyzer to TP1 using 50 ohm coaxial cable. Set C.F. to 19.45 MHz and Scan width to 1 MHz/div. Set B.W. at 30 kHz. Set control for a Log display.	NOTE <i>The V.O.M. is monitoring the Automatic Gain control (AGC) voltage on this amplifier.</i>	
	19.45 MHz Ampl. Alternate Alignment and test (using Spectrum Analyzer)		Tune L1, L2, L3 and L5 for max. output at 19.45 MHz on the spectrum analyzer. A point will be found where the output appears to level off and becomes insensitive to tuning adjustments. This is the onset of Automatic Gain control (AGC) action. Carefully adjust the above inductors for lowest levels of spurious responses. NOTE <i>The adjustments of L1, L2 and L3 interact and must be repeated, in sequence for best spurious rejection and maximum output.</i>	

5.5.2.3 TRANSLATOR (1A4A3) (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
3	2nd L.O. alignment and test	Oscilloscope probe at 1A4A3 pin 11. Connect ground lead of probe to printed circuit board ground plane. Connect Vertical Ampl. output of oscilloscope to frequency counter.	Tune L17 until the circuit breaks into oscillation (as evidenced by a sudden increase in meter reading). Tune L25 for maximum meter indication. Carefully rock L17 back and forth to adjust the circuit to the center of its oscillation range.	Minimum output level of 300 mv p-p. Output frequency of 80.7500 MHz ± 4 kHz.
NOTE <i>If required output cannot be obtained, refer to schematic and check Q7, Q9 and their associated circuitry. If the frequency is out of tolerance, replace crystal Y2.</i>				
4a	100.75 MHz Band-pass Filter alignment and test	Temporarily solder a short jumper between Q8 gate #1 and the printed circuit board ground plane. Connect RF Voltmeter, terminated in a 50 ohm tip probe, to TP3. Set signal generator to 100.75 MHz using the frequency counter. Connect signal generator as shown below. Set generator level to 250 mv RMS.	Tune L21 for maximum output on RF Voltmeter.	
				
4b	100.75 MHz Band-pass Filter alignment and test	Disconnect 1 pf capacitor from L21 and connect to the high side of L36	Tune L36 and L21 for maximum output on RF Voltmeter (adjustments interact and must be repeated until no further increase in output can be obtained).	
4c	100.75 MHz Band-pass Filter alignment and test	Disconnect 1 pf capacitor from L36 and connect to the high side of L20.	Tune L20, L36 and L21 for maximum output on RF Voltmeter (adjustments interact)	

5.5.2.3 TRANSLATOR (1A4A3) (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
4d	100.75 MHz Bandpass Filter alignment and test	Disconnect 1 pF capacitor, 56 ohm resistor and signal generator. Disconnect jumper added in Step 5a above.	Carefully repeak L20, L36 and L21 for maximum RF Voltmeter indication (adjustments interact). NOTE <i>If a spectrum analyzer is available, the following tuneup and test procedure may be used in lieu of steps 5a through 5d</i>	After tuning is complete, RF Voltmeter should read approximately 70 mv RMS.
5a	100.75 MHz Bandpass Filter alignment and test (alternate procedure for use with spectrum analyzer)	Connect spectrum analyzer to TP3. Set C.F. to 100.75 MHz, scan width to 5 MHz/div & bandwidth to 300 kHz. Set display mode to LOG.	Peak L20, L36 and L21 for maximum amplitude at 100.75 MHz (adjustments interact and must be repeated until no further output can be obtained).	After tuning is complete, output level on analyzer at 100.7500 MHz should be approximately -10 dBm. All spurious outputs should be at least 40 db below the 100.75 MHz output.
	81.25 MHz Bandpass Filter alignment and test	Temporarily solder a short jumper between Q11 gate 1 and the ground plane on the printed circuit board. Connect the RF voltmeter to TP2. Set the signal generator frequency to 81.25 MHz, using the frequency counter. Set the generator level at 250 mv RMS. Connect the signal generator as shown below.	Tune L8 for maximum reading on RF voltmeter.	



5.5.2.3 TRANSLATOR (1A4A3) (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
5b	81.25 MHz B.P.F. alignment and test	Disconnect the 10K resistor from L8 and connect to the high side of L7.	Tune L7 and L8 for maximum RF voltmeter indication. NOTE <i>These adjustments interact and must be repeated until no further increase in output can be obtained.</i>	
5c	81.25 MHz B.P.F. alignment and test	Disconnect jumper, 10K resistor, 56 ohm resistor and signal generator added in step 6a.	Carefully repeak L7 and L8 for maximum indication on RF voltmeter (adjustments interact). NOTE <i>Indication of approximately 40 mv on RF voltmeter when tuning is complete.</i> NOTE <i>If required output cannot be obtained, check Q11 and associated circuitry.</i>	
6a	Output level adjustment	Connect oscilloscope probe to 1A4A3 pin 15 and connect ground lead of probe to the printed circuit board ground plane near pin 15.	Set remote control frequency dials (6) to 29.9999 MHz. Adjust R54 for a reading of 600 mv p-p on oscilloscope.	Oscilloscope display of 600 mv p-p, rep rate of 25 nsec (slightly distorted sine wave)
6b	Output level adjustment	Same as 7a above.	Set frequency dials to 00.0000 MHz	Oscilloscope display of 600 mv p-p minimum amplitude (distorted sine wave), rep rate of 100 nsec.
				NOTE <i>If required results cannot be obtained, refer to schematic and check: Q4, Q5, Q6, Q10 and associated circuitry. Also check the VCO (1A4A5) for proper output (refer to VCO schematic.)</i>

5.5.2.4 VHF DIVIDER (1A4A4)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE																														
1a	100 kHz Dial test	Connect Signal Generator to X1A4A4 pin B using 50 ohm coaxial cable. Set generator level to 100 mv RMS.	Connect VOM to TP1. Set signal generator frequency to 9.9 MHz using the frequency counter. Temporarily unplug the Translator (1A4A3) from the card basket. Set 10 MHz, 1 MHz, and 100 kHz dials on front panel to "0".	VOM indication of greater than 4.5 volts																														
1b	100 kHz Dial test	Same as 1a above	Slowly increase generator frequency	At 10.0 MHz ± 1 kHz, VOM indication should abruptly change to an indication of less than 0.9 volts.																														
NOTE If the proper indication in Steps 1a and 1b above cannot be obtained, refer to schematic and check all D.C. voltages and waveforms.																																		
1c	100 kHz Dial test	Same as 1a above	Follow the table below. In each case, the V.O.M. should indicate greater than 4.5 volts with the generator below the transition frequency and less than 0.9 volts above the transition frequency <table><tr><th>10 MHz DIAL</th><th>1 MHz DIAL</th><th>100 kHz DIAL</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>2</td></tr><tr><td>0</td><td>0</td><td>3</td></tr><tr><td>0</td><td>0</td><td>4</td></tr><tr><td>0</td><td>0</td><td>5</td></tr><tr><td>0</td><td>0</td><td>6</td></tr><tr><td>0</td><td>0</td><td>7</td></tr><tr><td>0</td><td>0</td><td>8</td></tr><tr><td>0</td><td>0</td><td>9</td></tr></table> Transition Frequency (± 1 kHz) 10.1 MHz 10.2 MHz 10.3 MHz 10.4 MHz 10.5 MHz 10.6 MHz 10.7 MHz 10.8 MHz 10.9 MHz	10 MHz DIAL	1 MHz DIAL	100 kHz DIAL	0	0	1	0	0	2	0	0	3	0	0	4	0	0	5	0	0	6	0	0	7	0	0	8	0	0	9	NOTE If the required results cannot be obtained, refer to schematic and check U3, U4, U5, U8, U9, U10, U13 and associated circuitry.
10 MHz DIAL	1 MHz DIAL	100 kHz DIAL																																
0	0	1																																
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0	0	4																																
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0	0	6																																
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0	0	8																																
0	0	9																																

5.5.2.4 VHF DIVIDER (1A4A4) (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE																														
2	1MHz Dial test	Same as Step 1a above	Follow the table below. In each case the V.O.M. should indicate greater than 4.5V below the transition frequency and less than 0.9 volts above the transition frequency. <table border="1"> <thead> <tr> <th>10 MHz DIAL</th><th>1 MHz DIAL</th><th>100 kHz DIAL</th></tr> </thead> <tbody> <tr><td>0</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>2</td><td>0</td></tr> <tr><td>0</td><td>3</td><td>0</td></tr> <tr><td>0</td><td>4</td><td>0</td></tr> <tr><td>0</td><td>5</td><td>0</td></tr> <tr><td>0</td><td>6</td><td>0</td></tr> <tr><td>0</td><td>7</td><td>0</td></tr> <tr><td>0</td><td>8</td><td>0</td></tr> <tr><td>0</td><td>9</td><td>0</td></tr> </tbody> </table>	10 MHz DIAL	1 MHz DIAL	100 kHz DIAL	0	1	0	0	2	0	0	3	0	0	4	0	0	5	0	0	6	0	0	7	0	0	8	0	0	9	0	Transition Frequency (± 1 kHz) 11.0 MHz 12.0 MHz 13.0 MHz 14.0 MHz 15.0 MHz 16.0 MHz 17.0 MHz 18.0 MHz 19.0 MHz
10 MHz DIAL	1 MHz DIAL	100 kHz DIAL																																
0	1	0																																
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NOTE <i>If required results cannot be obtained, refer to schematic and check U6, U5 and associated circuitry.</i>																																		
3	10 MHz Dial test	Same as Step 1a above	Follow the table below. In each case the V.O.M. should indicate greater than 4.5V below the transition frequency and less than 0.9V above the transition frequency <table border="1"> <thead> <tr> <th>10 MHz DIAL</th><th>1 MHz DIAL</th><th>100 kHz DIAL</th></tr> </thead> <tbody> <tr><td>1</td><td>0</td><td>0</td></tr> <tr><td>2</td><td>0</td><td>0</td></tr> <tr><td>2</td><td>9</td><td>9</td></tr> </tbody> </table>	10 MHz DIAL	1 MHz DIAL	100 kHz DIAL	1	0	0	2	0	0	2	9	9	Transition Frequency (± 1 kHz) 20.0 MHz 30.0 MHz 39.9 MHz																		
10 MHz DIAL	1 MHz DIAL	100 kHz DIAL																																
1	0	0																																
2	0	0																																
2	9	9																																
NOTE <i>If required results cannot be obtained, refer to schematic and check U7, U8A, U8B, U13 and associated circuitry.</i>																																		

5.5.2.4 VHF DIVIDER (1A4A4) (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
4a	Max. toggle frequency	Same as Step 1a above	Set 10 MHz dial at "2". Set 1 MHz and 100 kHz dials at "g". Set the signal generator frequency at 45 MHz. Set the generator level at 100 mv RMS.	V.O.M. should indicate less than 0.9V
4b	Max. toggle frequency	Same as Step 1a above	Slowly increase the generator frequency until the V.O.M. indicates greater than 4.5 volts.	Generator frequency greater than 50.0 MHz.

NOTE

If the required results cannot be obtained, refer to schematic and check:
a) Q1 through Q4
b) Waveform at U2 pin 3
If a) and b) above check o.k. U2 should be replaced.

5.5.2.5 V.C.O. (1A4A5)

1a	BAND "0" alignment and test	Connect frequency counter to 1st L.O. output (J1). Connect external +1.95 volts D.C. from power supply to X1A4A5 pin 4.	Set remote control 10 MHz frequency selector switch (1A1S1) to "0". Set 1 MHz frequency selector switch (1A1S2) to "0". Adjust L1 for required performance.	Frequency indication of 91.75 $\pm$ 0.2 MHz. If no output present, proceed to steps 2 and 3. If steps 2 and 3 performance is acceptable, check Q3, Q6, and associated circuitry. If no output is obtained in all three steps, -1, 2, and 3- check buffer stage Q9, Q10.
1b	BAND "0" alignment and test	Same as 1a above.	Leave 10 MHz frequency selector switch (1A1S1) set at "0". Set 1 MHz frequency selector switch (1A1S2) to "g". Adjust C16 for required performance.	Frequency indication of 100.75 $\pm$ 0.75 MHz
1c	BAND "0" alignment and test	Same as 1a above.	Repeat steps 1a and 1b until both conditions are satisfied.	91.75 $\pm$ 0.2 MHz 100.75 $\pm$ 0.75 MHz.
2a	BAND "1" alignment and test	Same as 1a above.	Set 10 MHz frequency selector switch (1A1S1) to "1". Set 1 MHz frequency selector switch (1A1S2) to "0". Adjust L4 for required performance.	Frequency indication of 101.75 $\pm$ 0.2 MHz. If no output present, but steps 1 and 3 are correct, check Q4, Q7, and associated circuitry.
2b	BAND "1" alignment and test	Same as 1a above.	Leave 10 MHz frequency selector switch (1A1S1) set at "1". Set 1 MHz frequency selector switch (1A1S2) to "g".	Frequency indication of 110.75 $\pm$ 0.75 MHz
2c	BAND "1" alignment and test	Same as 1a above.	Repeat steps 2a and 2b until both conditions are satisfied.	101.75 $\pm$ 0.2 MHz, 110.75 $\pm$ 0.75 MHz.

5.5.2.5 VCO (1A4A5) (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
3a	BAND "2" alignment and test	Same as 1a above.	Set 10 MHz frequency selector switch (1A1S1) to "2". Set 1 MHz frequency selector switch (1A1S2) to "0". Adjust L7 for required performance.	Frequency indication of 111.75 ± 0.2 MHz. If no output present, but steps 1 and 2 are correct, check Q5, Q8 and associated circuitry.
3b	BAND "2" alignment and test	Same as 1a above.	Leave 10 MHz frequency selector switch (1A1S1) set at "2". Set 1 MHz frequency selector switch (1A1S2) to "9". Adjust C38 for required performance.	Frequency indication of 120.75 ± 0.75 MHz.
3c	BAND "2" alignment and test	Same as 1a above.	Repeat steps 3a and 3b until both conditions are satisfied.	111.75 ± 0.2 MHz, 120.75 ± 0.75 MHz.
4a	1st L.O. output level	Connect R.F. Voltmeter with 50 ohm BNC adapter to 1st L.O. output connector (J1). Connect external +1.95 volts D.C. from power supply to X1A4A5 pin 4. Tack solder 47 ohm 1/4 or 1/2 watt carbon resistor from X1A4A5 pin 2 to ground.	Set 10 MHz frequency selector switch (1A1S1) to "1". Set 1 MHz frequency selector switch (1A1S2) to "6". Adjust L12 (access hole near 1st L.O. output connector J1) for maximum level.	Reading greater than 100 mV rms (225 mV typical).
4b	1st L.O. output level	Same as 4a above.	Set 10 MHz frequency selector switch (1A1S1) and 1 MHz frequency selector switch (1A1S2) to "0". Record this output level.	Reading greater than 100 mV RMS (225 mV typical).
4c	1st L.O. output level	Same as 4a above.	Set 10 MHz frequency selector switch (1A1S1) to "2". Set 1 MHz frequency selector switch (1A1S2) to "9". Record this output level.	Reading greater than 100 mV RMS (225 mV typical).
4d	1st L.O. output level	Same as 4a above.	If necessary, adjust L12 slightly so that the readings of steps 4a, b, and c are within 3 db of each other.	If any reading in steps 4a, b, or c is low, check buffer stage Q9, Q10 and associated circuitry.

5.5.2.5 VCO (1A4A5) (CONT'D)

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
5a	1st L.O. output level to translator	Tack solder 47 ohm 1/4 or 1/2 watt carbon resistor from X1A4A5 pin 2 to ground. Connect open circuit probe tip from R.F. Voltmeter to X1A4A5 pin 2. Place a 50 ohm load on 1st L.O. output connector J1. Connect +1.95 volts D.C. from external power supply to X1A4A5 pin 4.	Set 10 MHz frequency selector switch (1A1S1) to "0". Sequence the 1 MHz frequency selector switch (1A1S2) from "0" through "9".	Reading should remain greater than 100 mV RMS (225 mV typical) in each position of 1A1S2. If proper output cannot be obtained, refer to schematic and check buffer stage Q11 and Q12 and associated circuitry.
5b	1st L.O. output level to translator	Same as 5a above.	Set 10 MHz frequency selector switch (1A1S1) to "1". Sequence the 1 MHz frequency selector switch (1A1S2) from "0" through "9".	Reading should remain greater than 100 mV RMS (225 mV typical) in each position of 1A1S2.
5c	1st L.O. output level to translator	Same as 5a above.	Set 10 MHz frequency selector switch (1A1S1) to "2". Sequence the 1 MHz frequency selector switch (1A1S2) from "0" through "9".	Reading should remain greater than 100 mV RMS (225 mV typical) in each position of 1A1S2.
6a	Logic Outputs	V.O.M. on X1A4A5 pin 17.	Remote control 10 MHz frequency selector switch (1A1S1) position: "0" "1" "2"	less than 0.5 V.D.C. greater than 2.2 V.D.C. less than 0.5 V.D.C.
6b	Logic Outputs	V.O.M. on X1A4A5 pin 18.	Remote control 10 MHz frequency selector switch (1A1S1) position: "0" "1" "2"	greater than 2.2 V.D.C. less than 0.5 V.D.C. less than 0.5 V.D.C. If these readings cannot be obtained, consult the schematic and check logic switches Q1, Q2, and associated circuitry.

5.6 RECEIVER/EXCITER BOARD ALIGNMENT

The following paragraphs provide alignment instructions for the Receiver/Exciter printed boards.

STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
5.6.1 V.H.F. MIXER BOARD (1A3A1)				
1	1st IF alignment	Connect RF Signal Generator to R/E rf connector (1A1J3) and set frequency for 29.9 MHz.	Remove VHF Mixer Board from RCVR/Exciter card basket by grasping corners of board and pulling upward. Install extender card in slot for connector 1A3J1 and plug VHF mixer into extender card. Set Frequency switches at 29.900.0. Mode switch at USB. Set RF generator level to 10 MV and adjust frequency until a tone of approximately 1 kHz is heard in the speaker. Adjust capacitors C41 and C44 for peak on the "S" meter. Next adjust Transformer T7 and T8 for peak on the "S" meter. Recheck C44 and T7 for meter peak.	If no peaking is observed check E24 and E18 on the RCVR/Exciter Mother board, using a high frequency oscilloscope to determine if 1st L.O. and 2nd L.O. are present (approximate OdBM). If not, check synthesizer sections 4.2 and 5.5. If 1st L.O. and 2nd L.O. are present, check outputs of Q5 and Q8 on VHF mixer board, then check Q2 and associated circuitry.
2	Overall Gain	Remove RF signal generator. Connect R/E to PA/coupler. Connect dummy 50 ohm load to Pwr Amp output along with HP410B VTVM.	Check output at 29.9 MHz in USB and AM. Adjust R16 until rated output is obtained for both modes. Check carrier level at 45 VRMS ± 5 VRMS and SSB (with microphone) at 71 VRMS ± 8 VRMS. If necessary, turn potentiometer R16 CW for more drive or CCW for less drive. Adjust R16 to a drive level just greater than that required for minimum rated output.	If rated output cannot be obtained, check setting of ALC control, R55, on sideband generator board.
5.6.2 IF/FILTER BOARD (1A3A2)				
1	2nd IF alignment	Connect RF Signal Generator to R/E rf connector (1A1J3) and set frequency for 16.0 MHz.	Remove IF/Filter board from RCVR/Exciter card basket by grasping corners of board and pulling upward. Install extender card in slot for connector 1A3J2, and plug IF/Filter board into extender card. Set frequency switches at 16.0000, mode switch at USB. Set RF Generator level to 10 MV and adjust frequency until a tone of approximately 1 kHz is heard in the speaker. Adjust inductors L3 and L4 for peak on the "S" meter. Remove Extender card and replace IF/Filter board in its connector in the card basket.	If no peak is observed, check U1 and U2 plus associated circuitry on IF/Filter board. Also check Q3 and associated circuitry.

5.6.3 SIDEBAND GENERATOR BOARD (1A3A3)

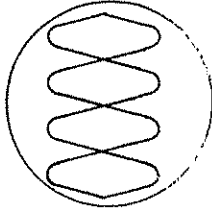
STEP NO.	TEST	TEST EQUIPMENT and TEST POINT	PROCEDURE	REQUIRED PERFORMANCE
1	BALANCED MODULATOR TUNING	Connect RF VTVM and dummy load to PA output connector on PA/coupler unit.	Remove sideband generator board from RCVR/Exciter card basket by grasping corners of board and pulling upward. Install extender card in slot for connector 1A3J3, and plug sideband generator board into extender card. Turn potentiometer 1A3A3, R34, approximately B turns CW. Turn XMIT GAIN full CCW and set mode switch to USB. Key transceiver with microphone and, observing RF VTVM, tune Transformer T1 for maximum output. Remove extender card and replace sideband generator board in its connector in the card basket. Repeat carrier null alignment per par. 5.5.4.3, step 4.	If no carrier output is observed, check E16 on RCVR/Exciter mother board to determine if 3rd L.O. is present (approximately OdBM). If not, refer to synthesizer sections 4.2 and 5.5. If 3rd L.O. is present, check output of 1A3A3 Q1 and associated circuitry.

5.6.4 AUDIO BOARD (1A3A4)

1a	AGC Adjustment	Connect RF signal generator to Receiver/Exciter rf output connector 1A1J3. Connect Audio VTVM to Phone jack on R/E front panel. Connect VOM, set on 10 VDC scale, "+" lead to AGC test point, other lead to chassis ground.	Set frequency to 16000.0 kHz. Depress USB switch. Set rf signal generator output to zero. Note AGC voltage on VOM.	AGC voltage should read 8.3 VDC MIN. If not, turn AGC pot R10 CCW until AGC voltage is greater than 8.3 VDC and its value is not dependent on position of R10.
1b			Adjust signal generator to 10 microvolt level. Set VOLUME control to provide -10 db reading on 1U scale. Rock generator frequency until peak is observed.	VTVM should read -10 db
1c			Increase signal level to 250000 microvolts. Adjust R10 until 10 db total audio change is recorded.	VTVM should read 0dbm maximum on 1v scale. If difficulty observed, check 5.6.1, step 1, and 5.6.2, step 1. Check step 1a above to be sure AGC voltage has proper zero signal level. If not, it may be necessary to begin adjustments with R10 fully CCW.

5.6.5 COMPRESSOR BOARD (1A5)

1	Microphone Input Level	Connect audio VTVM between pin 6 of 1A5J1 and chassis ground. Disconnect coax between Receiver/Exciter and PA/coupler.	Connect actual microphone (or duplicate) to PHONE jack on Receiver/Exciter front panel. Turn compression level potentiometer, R17, fully CCW. Key microphone and whistle a loud steady tone into microphone, while adjusting mic input level pot, R36, to give a VTVM reading of 70mvrms.	VTVM reading should be 70 mvrms $\pm$ 10 mvrms.
2	Compression Level		Turn compression level potentiometer, R17, fully CW (15 turns). Check compressor by whistling into microphone at varying levels.	Audio output on VTVM will be lower than 1 above, but should remain essentially constant with varying input levels.
3	SB Modulation Level		Turn Mic output potentiometer, R20, fully CW, then turn CCW two full turns.	
4	AM Modulation Level	Connect the oscilloscope across dummy load connected to PA output. Reconnect Receiver/Exciter to PA/coupler. Set scope on 50 v/div scale.	Depress AM switch. Key microphone and whistle into it with a steady tone. Turn R29 until the scope pattern just closes per sketch.	



5.7 REMOTE CONTROL (2A)

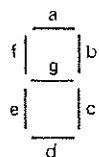
5.7.1 FAULT ANALYSIS

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 5.9 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
1	0	0	0	1	1	1	0	0	1	1	1	1
2	0	0	1	0	1	0	0	1	0	0	1	0
3	0	0	1	1	1	0	0	0	0	1	1	0
4	0	1	0	0	1	1	0	0	1	1	0	0
5	0	1	0	1	1	0	1	0	0	1	0	0
6	0	1	1	0	1	1	1	0	0	0	0	0
7	0	1	1	1	1	0	0	0	1	1	1	1
8	1	0	0	0	1	0	0	0	0	0	0	0
9	1	0	0	1	1	0	0	0	1	1	0	0
A	1	0	1	0	1	1	1	1	0	0	1	0
B	1	0	1	1	1	1	1	0	0	1	1	0
C	1	1	0	0	1	1	0	1	1	1	0	0
D	1	1	0	1	1	0	1	1	0	1	0	0
E	1	1	1	0	1	1	1	1	0	0	0	0
F	1	1	1	1	1	1	1	1	1	1	1	1
(Blank)	1	1	1	1	1	1	1	1	1	1	1	1

Table 5.9 Display Segment Illumination vs Driver Input/Output

5.8 POWER AMPLIFIER/COUPLER (3A)

5.8.1 FAULT ANALYSIS

Should a failure occur in the PA/coupler assembly, refer to Table 5.10 before proceeding to the detailed test in section 5.8.2. This table will allow you to isolate the problem to a subassembly and should result in less maintenance time.

SYMPTOM	PROBABLE CAUSE	REMEDY
No power output, but excitation from Receiver/Exciter ok.	1. Defective power amplifier 2. Defective cables 3. Transistor 3A2Q10 defective (does not pull in TUNE CONTROL relay on 3A1A1.) 4. Defective TUNE CONTROL relay	1. Replace defective power transistors 2. Repair or replace defective rf or dc cable 3. Replace 3A2Q10 4. Replace relay
No FAULT light when system is turned on.	1. Defective 3A2 board, probably 3A2Q12 2. Broken wire in cable 3. Defective bulb 4. No 12 VDC or 5 VDC on antenna coupler	1. Replace or repair 3A2 board 2. Repair 3. Replace 4. Repair
No TUNING or READY light.	1. Same probable causes as listed for FAULT light above. Check READY and TUNING drive circuits.	1. Replace or repair as required.
After transceiver is channeled and FAULT light comes on, PTT is grounded and unit does not go into a tune mode.	1. Check for ground on K2(-) while PTT at ground. If no ground, probably open wire in cable. 2. 3A1A1K2 (TUNE CONTROL) relay is bad.	1. Repair wire. 2. Replace relay.

Table 5.10 Fault Isolation Table

SYMPTOM	PROBABLE CAUSE	REMEDY
After initiating a TUNE command, TUNING light comes on, RF is getting to the antenna coupler, but the motors do not run.	3A1A1K2 (TUNE CONTROL) relay is faulty. - No 28 VDC getting to the SERVO AMP. - Bad 3A5, SERVO AMPLIFIER - Bad motor (motors) - Broken wire to one or both servo motors.	- Replace relay. - Check R4, R5, R6, or R7 - Replace SERVO AMP. - Check motor(s) and replace. - Repair.
TUNING light comes on with CPLR TUNE pulse, but motors do not run.	- Relay 3A1A1K1 faulty. - R3, R4, R5 or R6 open 3A5 faulty - Bad motor - Reflected power detector faulty 3A2U1 faulty	Repair using normal troubleshooting techniques.
Coupler fuse blows	Short on 28V line in coupler.	Remove short
TUNING light comes on with CPLR TUNE pulse but transmitter is keyed on.	3A2Q10 faulty - Broken cable wire	- Replace transistor. - Check cable.
Antenna tuner tunes properly but cannot key transmitter with microphone.	3A1A1K2 relay or broken wire in cable	Replace relay or check cable.
Roller on L4 runs to either end of coil and hits bracket	- L max or L min switch not working properly - Broken wire 3A3 reversing circuit or brake circuit not working	Replace faulty components.
No TUNING light when CPLR TUNE pushbutton depressed.	- Broken wire 3A2Q15 is faulty 3A2CR17 open - Amber bulb burned out - Tune BSMV not functioning	Repair using normal troubleshooting techniques.

Table 5.10 Fault Isolation Table (Cont.)

SYMPTOM	PROBABLE CAUSE	REMEDY
FAULT light comes on after 5 seconds and RCVR sounds like it is tuned.	- Gain control on front panel set too high - Broken wire in gain control circuit - Diode 3A2CR22 open	- Readjust gain control - Repair using normal troubleshooting techniques
FAULT light comes on after 40 seconds but reflected power is zero and coupler is tuned.	- Low tuning power from transmitter - RF detector not functioning	Repair using normal troubleshooting techniques.
Excess reflected power when tuning above 20 MHz.	3A1C24 in coupler should be adjusted	Adjust C24
Excess reflected power on all frequencies.	- Gain control adjusted too low - Phase Detector and magnitude detector should be readjusted	- Adjust gain control - Readjust Phase and magnitude detectors.
Will not tune below 3 MHz. Time delay continues to run out.	- L max switch not working properly - C3 and C6 assembly not working properly.	Repair using normal troubleshooting techniques.
Antenna Coupler tunes ok gets READY light but FAULT light comes on in SB.	- Antenna or lead in arcing - Antenna tuner arcing internally - Frequency of transmit signal shifting from AM to SB. - Gain control adjusted too high	- Check antenna for arcing - Check antenna tuner for arcing - Check transmitter frequency. - Readjust gain control.
Capacitor C1 decreases to minimum and motor stalls.	- C min microswitch not operating - Microswitch bracket not set properly 3A2CR4 open - Broken wire	Check C min switch for proper operation. Check for broken wire.
Time Delay does not operate.	3A2Q17 or 3A2CR20 bad	Replace faulty components.
Green READY light does not go off when keyed on in AM after a tune cycle.	AM carrier power too high	Readjust

Table 5.10 Fault Isolation Table (Cont.)

SYMPTOM	PROBABLE CAUSE	REMEDY
L4 and C1 oscillate on some frequencies.	1. Anti-oscillation circuit on 3A8A2 not functioning. 2. Gain control set too high. 3. Antenna not connected	1. Repair by replacing faulty components. 2. Reduce gain control. 3. Repair
Capacitor C1 oscillates but inductor L4 doesn't move.	1. Broken wire 2. Bad L4 motor 3. L4 servo amp bad	Repair using normal troubleshooting techniques.
Inductor L4 oscillates but C1 does not move.	1. Broken wire 2. Bad C1 motor 3. C1 servo amp bad	Repair using normal troubleshooting techniques.
5V line reads 0 to 4 VDC.	1. Shorted IC on 3A2, 3A3 or 3A4	Locate PC board with short and replace or repair.
12V line reads low voltage	Short on 12V line.	Remove PC boards and subassemblies to determine which module has short. Repair or replace subassembly.

Table 5.10 Fault Isolation Table (Cont.)

5.8.2 PRIMARY VOLTAGES

The primary DC voltages in the PA/Coupler are listed below:

28V all the time — This 28V is present any time the transceiver is turned on.

28V Nominal — This 28V exists when the coupler is not in a tune cycle.

Switched 28V — This voltage is present when the coupler is in a tune cycle.

12V all the time — This 12V exists when the transceiver is turned on.

12V Nominal — This exists when the coupler is not in a tune cycle.

SW 12V — This exists when the coupler is in a tune cycle.

5V — Exists any time the transceiver is turned on. This voltage is not switched from the tune cycle to the normal receive mode.

5.8.2.1 TEST FOR PRIMARY VOLTAGES

Apply 28 VDC input to the antenna coupler. Use the VTVM and check the pin voltages on 3XA1A1 connector. Relay K2, on 3A1A1, controls the switching of the switched primary voltages. K2 may be energized by placing a clip lead ground on TP-5 on the top of the PC board, which simulates the condition of K2 during the TUNE cycle. Table 5.11 lists the pin voltages on 3XA1A1 (Phase and Amp. Detector and Pad).

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3XA1A1 Connector Voltages (with 3A1A1 installed)
All voltages $\pm 10\%$ (Referenced to chassis ground)

PIN	FUNCTION	VOLTAGE	
		NOM	TUNE
A	GROUND	0	0
B			
C			
D			
E			
F			
H			
J	R7	0	Note 1
K	REF. PWR OUT	12V	12V
L	PAD RELAY (-)	28V	Note 2
M	PAD RELAY (+)	28V	28V
N	PAD RELAY	0	Note 3
P	SW 28V	0	28V
R	K2 (-)	12V	0
S	28V	28V	28V
T	NOM. 28V	28V	0
U	KEY/INT	Note 4	0
V			

PIN	FUNCTION	VOLTAGE	
		NOM	TUNE
1	GROUND	0	0
2			
3			
4			
5			
6	12V REF.	12V	12V
7	12V REF.	12V	12V
8	0 DET. OUT	12V	12V
9	AMP. DET. OUT	12V	12V
10	PAD RELAY	0	28V
11	SW 12V	0	12V
12	12V	12V	12V
13	TC RELAY NOM. 12V	12V	0
14	K2 ()	12V	12V
15	SW 28V	0	28V
16	TC RELAY PTT/KEY	Note 4	0
17	CPLR IN	ODC	Note 5
18			

Table 5.11 3XA1A1 Connector Voltages

3XA1A1 Connector Voltage Notes: NOM. - 3A1A1K2 not energized; TUNE - 3A1A1K2 energized.

1. During the TUNE cycle, this voltage will be zero until the PAD relay is de-energized and then it should rise to approximately 9 VDC.
2. Will be zero volts during the TUNE cycle except the reflected power drops below the threshold and then it rises to 28 VDC.
3. This is the servo amplifier drive voltage. During the TUNE cycle, 18 to 22 volts, dropping to approximately 9 VDC near termination of the TUNE cycle.
4. When the coupler is not tuning, this voltage will be the PTT voltage of the transceiver. This voltage will also drop to zero when the transceiver is keyed with microphone.
5. CPLR IN — This is the RF input to the Phase, Amplitude and reflected power detectors. Will be 30 to 40 watts during the TUNE cycle.

3XA8A2 Connector Voltages (with PC board installed)
All voltages ±10% (Referenced to chassis ground)

PIN	FUNCTION	VOLTAGE	
		NOM	TUNE
A	C6 Relay	0	28V
B	50(+)	3V	3V
C	SW 12V	0	12V
D			
E	SW 28V	0	28V
F			
H			
J			
K			
L			
M			
N			
P			
R			
S			
T	Fault	Note 1	Note 1
U			
V			

PIN	FUNCTION	VOLTAGE	
		NOM	TUNE
1	Ground	0	0
2	12V Nom	12V	12V
3	5V	5V	5V
4			
5			
6			
7			
8	12V	12V	12V
9	RF Det. Out	0	3-8V
10	PA/FLT Output	Note 2	Note 2
11	Ground	0	0
12			
13			
14			
15			
16	Fault	Note 1	Note 1
17			
18	Ground	0	0

Table 5.12 3XA8A2 Connector Voltages

3XA8A2 Connector Voltage Notes: NOM. - 3A1A1K2 not energized; TUNE - 3A1A1K2 energized.

Note 1 — Logic 0 when fault light on. 5 volts all other times.

Note 2 — This is the RF output from the PA Filter assembly.

5.8.2.2 3XA8A2 CONNECTOR VOLTAGES
(Filter Regulator)

Use the same test setup as for measuring the 3XA1A1 connector voltages. Table 5.12 lists the switched primary voltages.

5.8.2.3 3XA4 CONNECTOR VOLTAGES
(C3 and C6 Control)

Use the same test setup used for 3XA1A1 and check the pin voltages on 3XA4. Table 5.13 lists the pin voltages with explanatory notes.

5.8.2.4 3XA2, 3XA3, AND 3XA5 CONNECTOR
VOLTAGES (Control Logic, Phase and
Amplitude Control, and Servo Amplifier)

In order to check the pin voltages for these three plug in assemblies, they should be removed from the connectors. Remove the three assemblies and use the clip lead to energize 3A1A1K2 to simulate a TUNE cycle. Tables 5.14, 5.15 and 5.16 list the voltages for these three assemblies.

5.8.3 GROUNDING TEST THAT CAN BE
PERFORMED

Certain functions can be simulated by removing subassemblies and grounding the pins of the connector. A short clip lead with a piece of bus wire works well.

5.8.3.1 3XA2 GROUNDING CHECKS

Remove 3A2 and 3A3 from their connectors. Turn on the companion transceiver or the power supply. Perform the following test on 3A2.

- A. Ground pin 15. K1 on 3A1A1 should pull in and remain in as long as the ground is present.
- B. Ground pin N. the READY light should be illuminated.
- C. Ground pin 6. The TUNING light should be illuminated.
- D. Ground pin 12. The FAULT light should be illuminated.
- E. Pin 7 — INTERLOCK. When a ground is placed on pin 7, 3A1A1K2 should energize and the transmitter should be keyed on.

3XA4 Connector Voltages (with PC Board installed)
All voltages $\pm 10\%$ (Referenced to chassis ground)

(ϕ means phase)

PIN	FUNCTION	VOLTAGE	
		NOM	TUNE
A	C6 HOME	Note 1	Note 1
B			
C			
D			
E			
F	$+\phi > 50$ OHMS	Note 8	Note 8
H			
J	L4 FORCE INHIB.	Note 9	Note 9
K			
L	5V	5V	5V
M	SW 28V	0	28V
N			
P			
R			
S			
T			
U			
V	MOTOR GROUND	0	0

PIN	FUNCTION	VOLTAGE	
		NOM	TUNE
1	GROUND	0	0
2	C6 POS 16	Note 2	Note 2
3	Q15 COL	Note 3	Note 3
4	C6 100-1200	Note 4	Note 4
5	Lmin 0 ϕ	Note 5	Note 5
6	Lmin Cmax	Note 6	Note 6
7	C3 HOME	Note 7	Note 7
8	L max	Note 10	Note 10
9			
10			
11	C3 MOTOR	0	Note 11
12	SW 28V	0	28V
13	C3 RELAY	0	Note 12
14	C6 MOTOR	0	Note 13
15	HOME L4	Note 14	Note 14
16	75 Pf	Note 15	Note 15
17	C6 RELAY	0	Note 16
18	GROUND	0	0

Table 5.13 3XA4 Connector Voltages

3XA4 Connector Voltage Notes when unit has all modules installed.
NOM. - 3A1A1K2 not energized; TUNE - 3A1A1K2 energized.

1. If C6 in the home position Logic "0", if not, Logic "1".
2. Logic "1" unless C6 is on position 16.
3. Logic "0" only when TUNE cycle initiated.
4. Logic "0" only when C6 in 100, 300, 500, 800, or 1200 pf.
5. Logic "0" only when inductor at minimum and phase error is 0.
6. Logic "0" when L is minimum and C1 is maximum.
7. Logic "0" when C3 in the homed position.
8. Logic "0" when phase error positive and the magnitude error greater than 50 ohms.
9. Logic "0" when C3 is NOT in the homed position.
10. Logic "0" when the inductor is at maximum.
11. 28V during the TUNE cycle except when C3 motor is running.
12. 28V during the TUNE cycle except when C3 motor is running.
13. 28V during the TUNE cycle except when C6 motor running.
14. Logic "1" except when C3 in the 75Pf position. The logic "0" forces L4 to move toward Home position.
15. Logic "0" when C3 in the 75 Pf position.
16. 28V during the TUNE cycle except when C6 motor is running.

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3XA2 Connector Voltages (PC Board removed from connector)
All voltages $\pm 10\%$ (Referenced to chassis ground)

PIN	FUNCTION	VOLTAGE	
		NOM	TUNE
A	CPLR TUNE	Note 1	Note 1
B	RF DETECTOR	0	Note 2
C			
D			
E	REF PWR AMP INH	Note 3	0
F	12V REF	12V	12V
H	28V	28V	28V
J	28V NOM	28V	0
K	12V	12V	12V
L	TO ALC	0	Note 8
M	XMIT BIAS	Note 9	Note 9
N	READY	Note 4	Note 4
P	5V	5V	5V
R	HOME L4	Note 11	Note 11
S	Q15 COL.	Note 13	Note 13
T	L max	Note 15	Note 15
U	C6+	Note 8	Note 8
V	C6 CONT	Note 8	Note 8

PIN	FUNCTION	VOLTAGE	
		NOM	TUNE
1	GROUND	0	0
2	SW 12V	0	12V
3	REF PWR	12V	12V
4	12V REF	12V	12V
5			
6	TUNING	Note 4	Note 4
7	INTERLOCK	Note 5	0
8	GAIN	Note 6	Note 6
9	REF PWR	Note 7	Note 7
10			
11	50(-)	Note 10	Note 10
12	FAULT	Note 4	Note 4
13	C1 HOME	Note 11	Note 11
14	50(+)	Note 12	Note 12
15	PAD RELAY	Note 14	Note 14
16	Lmin	Note 15	Note 15
17	TIME DELAY	Note 16	Note 16
18	GROUND	0	0

Table 5.14 3XA2 Connector Voltages

3XA2 Connector Voltage Notes when all modules are installed.

NOM. - 3A1A1K2 not energized; TUNE - 3A1A1K2 energized.

- +12 or 28 VDC pulse when CPLR TUNE pulse generated.
- 4 to 8 VDC when 30 to 40 watts input to coupler.
- +12 or 28 VDC when transmitter not keyed. Depends on transmitter used.
- TUNING, READY, OR FAULT lights will be 5V depending on dimmer control. When lights on, pin voltage near zero.
- The interlock line may be 0 or 12V in the NOM mode when the transmitter is unkeyed.
- 12 to 18 VDC controlled by front panel control.
- 6 to 9 VDC when there is reflected power.
- Proportional to RF output, $\approx 7\text{VDC}$ with 100 watts.
- Near zero VDC when the transmitter is not keyed on. 28VDC when transmitter is keyed on.
- Logic "0" when reflected power below threshold.
- C1 HOME and L4 HOME lines logic "0" during CPLR TUNE pulse.
- 50(+) line rises to logic "1" when reflected power below threshold.
- Q15 COL logic "0" during CPLR TUNE pulse.
- 0VDC during TUNE cycle except near end it rises to 28 VDC.
- Lmin and Lmax both logic "0" when coil is maximum L or minimum L.
- Logic "0" pulse when the time delay runs out.

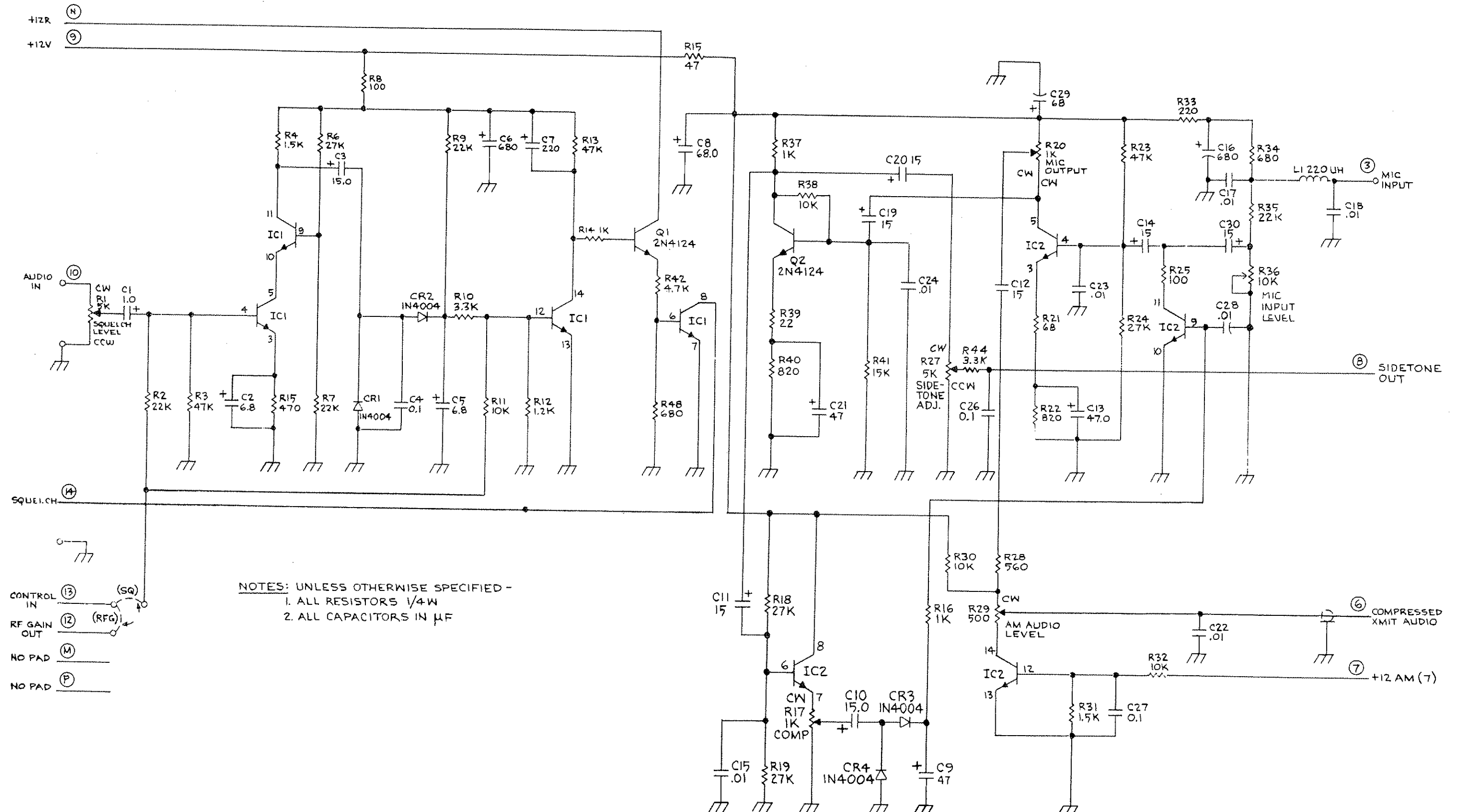
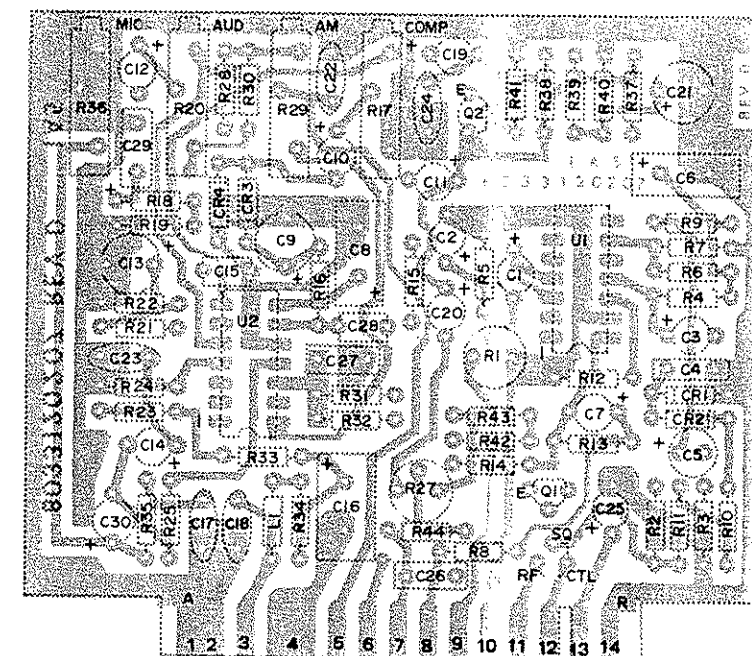
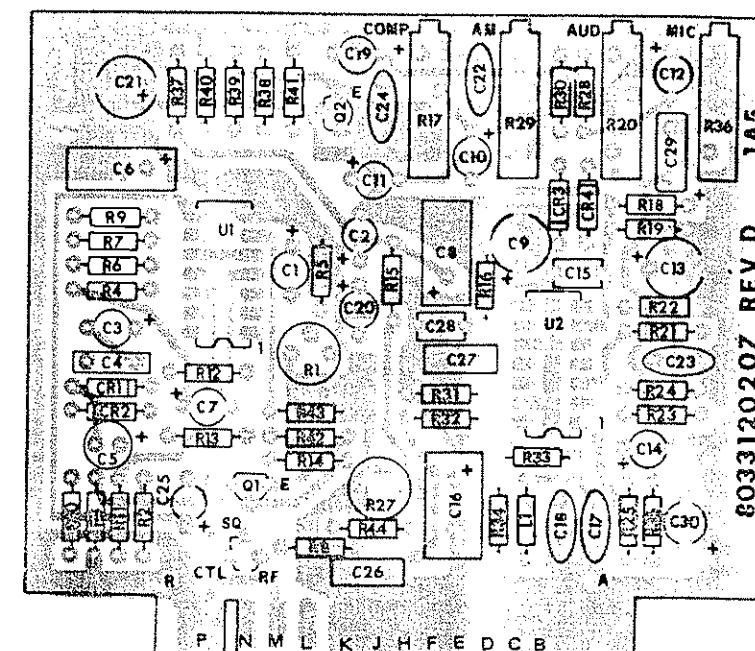


Figure 5.24 Compressor Board (1A5)

8033120096G PC ASSY COMPRESSOR

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY COMPRESSOR	8033120096
C1	Capacitor, 1UF, 35V, 196D	0281660000
C2	Capacitor, 6.8UF, 25V, 20%	1005050031
C3	Capacitor, 15UF, 15V, 196D	0281720002
C4	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C5	Capacitor, 6.8UF, 20V, T368	0296780006
C6	Capacitor, 68UF, 25V, T368	0282150005
C7	Capacitor, 22UF, 15V, 196D	0281690006
C8	Capacitor, 68UF, 25V, T368	0282150005
C9	Capacitor, 47UF, 20V, 196D	0281700001
C10	Capacitor, 15UF, 15V, 196D	0281720002
C11	Capacitor, 15UF, 15V, 196D	0281720002
C12	Capacitor, 15UF, 15V, 196D	0281720002
C13	Capacitor, 47UF, 20V, 196D	0281700001
C14	Capacitor, 15UF, 15V, 196D	0281720002
C15	Capacitor, 0.01UF, 25V, X55	0281620008
C16	Capacitor, 68UF, 25V, T368	0282150005
C17	Capacitor, 0.01UF, 25V, X55	0281620008
C18	Capacitor, 0.01UF, 25V, X55	0281620008
C19	Capacitor, 15UF, 15V, 196D	0281720002
C20	Capacitor, 15UF, 15V, 196D	0281720002
C21	Capacitor, 47UF, 20V, 196D	0281700001
C22	Capacitor, 0.01UF, 25V, X55	0281620008
C23	Capacitor, 0.01UF, 25V, X55	0281620008
C24	Capacitor, 0.01UF, 25V, X55	0281620008
C25	Not used	
C26	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C27	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C28	Capacitor, 0.01UF, 25V, X55	0281620008
C29	Capacitor, 68UF, 25V, T368	0282150005
C30	Capacitor, 15UF, 15V, 196D	0281720002
CR1	Diode, Rectifier 1N4004	0405180004
CR2	Diode, Rectifier 1N4004	0405180004
CR3	Diode, Rectifier 1N4004	0405180004
CR4	Diode, Rectifier 1N4004	0405180004
IC1	IC, Linear CA3086	0447950002
IC2	IC, Linear CA3086	0447950002
L1	Inductor, Molded, 220UH, 5%	0650500008
Q1	Transistor, NPN, Si, 2N4124	0448010003
Q2	Transistor, NPN, Si, 2N4124	0448010003
R1	POT 5K, 10%, 1/2W, 4 Turns	0197510001
R2	Resistor, 22K, 5%, 1/4W	0172230004
R3	Resistor, 47K, 10%, 1/4W	0171060008
R4	Resistor, 1.5K, 10%, 1/4W	0172470005
R5	Resistor, 470, 5%, 1/4W	0184110009
R6	Resistor, 27K, 10%, 1/4W	0171200004
R7	Resistor, 22K, 5%, 1/4W	0172230004
R8	Resistor, 100, 5%, 1/4W	0171180003
R9	Resistor, 22K, 5%, 1/4W	0172230004
R10	Resistor, 3.3K, 10K, 1/4W	0170890007
R11	Resistor, 10K, 10%, 1/4W	0170410005
R12	Resistor, 1.2K, 10%, 1/4W	0181860007
R13	Resistor, 47K, 10%, 1/4W	0171060008
R14	Resistor, 1K, 10%, 1/4W	0171560001
R15	Resistor, 47, 10%, 1/4W	0179360001
R16	Resistor, 1K, 10%, 1/4W	0171560001
R17	POT 1K, 10%, 3/4W, 15 Turns	0338490019
R18	Resistor, 27K, 10%, 1/4W	0171200004
R19	Resistor, 27K, 10%, 1/4W	0171200004
R20	POT 1K, 10%, 3/4W, 15 Turns	0338490019
R21	Resistor, 68, 10%, 1/4W	0187960003
R22	Resistor, 820, 10%, 1/4W	0178210005
R23	Resistor, 47K, 10%, 1/4W	0171060008
R24	Resistor, 27K, 10%, 1/4W	0171200004
R25	Resistor, 100, 5%, 1/4W	0171180003
R26	Not used	
R27	POT 5K, 10%, 1/2W, 4 Turns	0197510001
R28	Resistor, 560, 5%, 1/4W	0183200004
R29	POT 500, 10%, 3/4W, 15 Turns	0338490078
R30	Resistor, 10K, 10%, 1/4W	0170410005
R31	Resistor, 1.5K, 10%, 1/4W	0172470005
R32	Resistor, 10K, 10%, 1/4W	0170410005
R33	Resistor, 220, 10%, 1/4W	0171320000
R34	Resistor, 680, 10%, 1/4W	0176630007
R35	Resistor, 22K, 5%, 1/4W	0172230004

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R36	POT 10K, 10%, 3/4W, 15 Turns	0338490043
R37	Resistor, 1K, 10%, 1/4W	0171560001
R38	Resistor, 10K, 10%, 1/4W	0170410005
R39	Resistor, 22, 10%, 1/4W	0192690001
R40	Resistor, 820, 10%, 1/4W	0178210005
R41	Resistor, 15K, 10%, 1/4W	0172350000
R42	Resistor, 4.7K, 5%, 1/4W	0170770001
R43	Resistor, 680, 10%, 1/4W	0176630007
R44	Resistor, 3.3K, 10%, 1/4W	0170890007



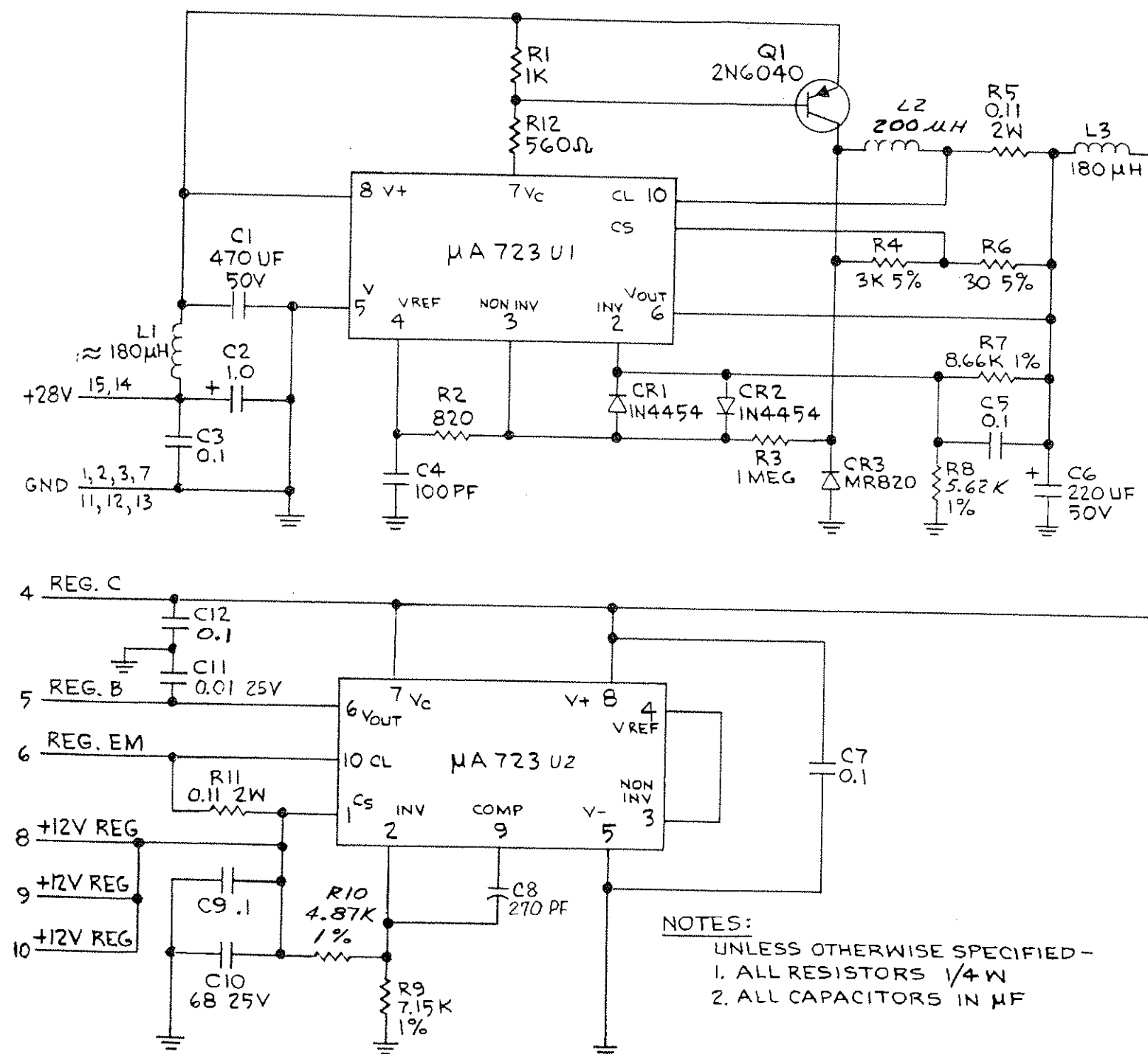
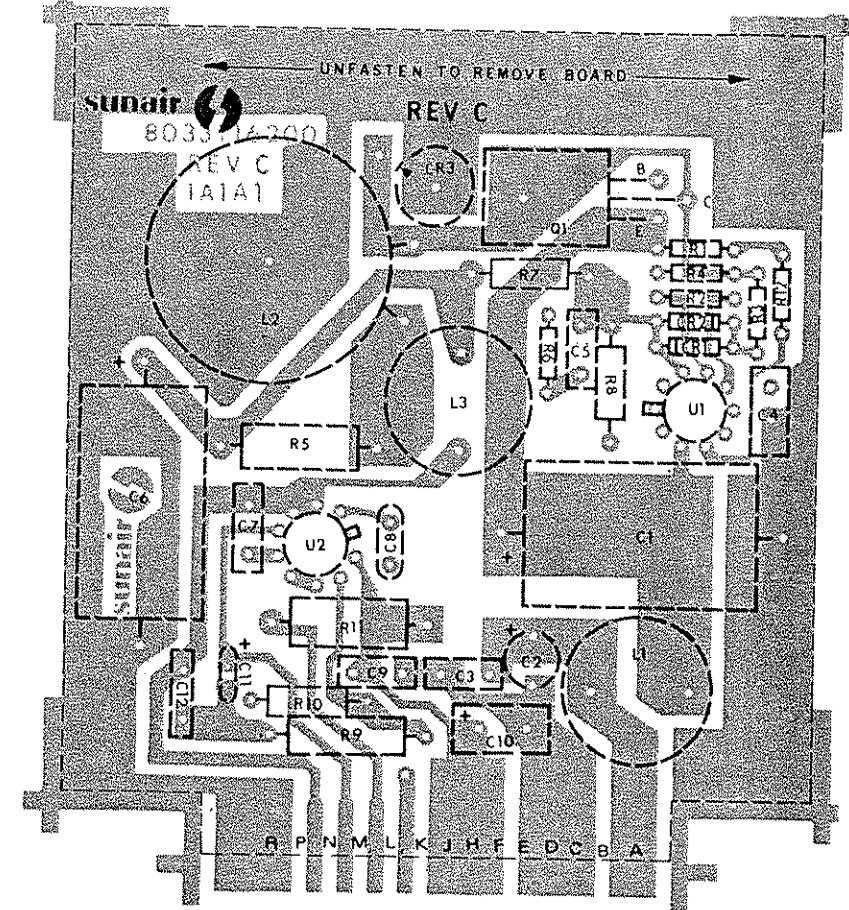
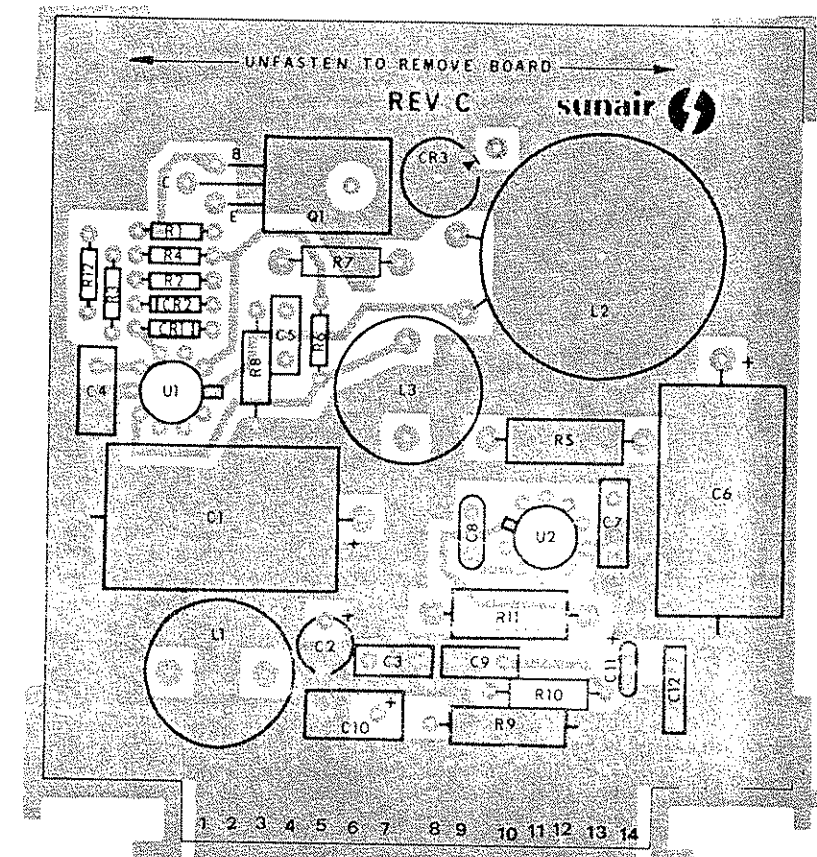


Figure 5.25 Switching Regulator (1A6)

8033116099H PC ASSY SWITCHING REG		
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PCASSY SWITCHING REG	8033116099
C1	Capacitor, 470UF, 50V, TAL	0280890001
C2	Capacitor, 1UF, 50V, 198D	0280910002
C3	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C4	Capacitor, 100PF, 500V, DM10, 5%	0274740001
C5	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C6	Capacitor, 220MF, 50V	0282200002
C7	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C8	Capacitor, 270PE, 500V, DM15, 5%	0275030008
C9	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C10	Capacitor, 68UF, 25V, T368	0282150005
C11	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C12	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
CR1	Diode, Signal, Sil. 1N4454	0405270003
CR2	Diode, Signal, Sil. 1N4454	0405270003
CR3	Diode, Rectifier MR-820	0405620004
L1	Inductor, Filter	8033117001
L2	Inductor, Toroid	8033116803
L3	Inductor, Filter	8033117001
Q1	Transistor, PNP, Si. 2N6040	0448590000
R1	Resistor, 1K, 10%, 1/4W	0171560001
R2	Resistor, 820, 10%, 1/4W	0178210005
R3	Resistor, 1M, 10%, 1/4W	0170650006
R4	Resistor, 3K, 5%, 1/4W	0197180001
R5	Resistor, 0.11, 5%, 2W	0197570003
R6	Resistor, 30, 5%, 1/4W	0192570005
R7	Resistor, 8.66K, 1%, 1/4W	0197580009
R8	Resistor, 5.62K, 1%, 1/4W	0197590004
R9	Resistor, 7150, 1%, 1/2W	0193860007
R10	Resistor, 4.87K, 1%, 1/4W	0197680003
R11	Resistor, 0.11, 5%, 2W	0197570003
R12	Resistor, 560, 5%, 1/4W	0183200004



W8033-1300

8033131098

8033132094

8033130202

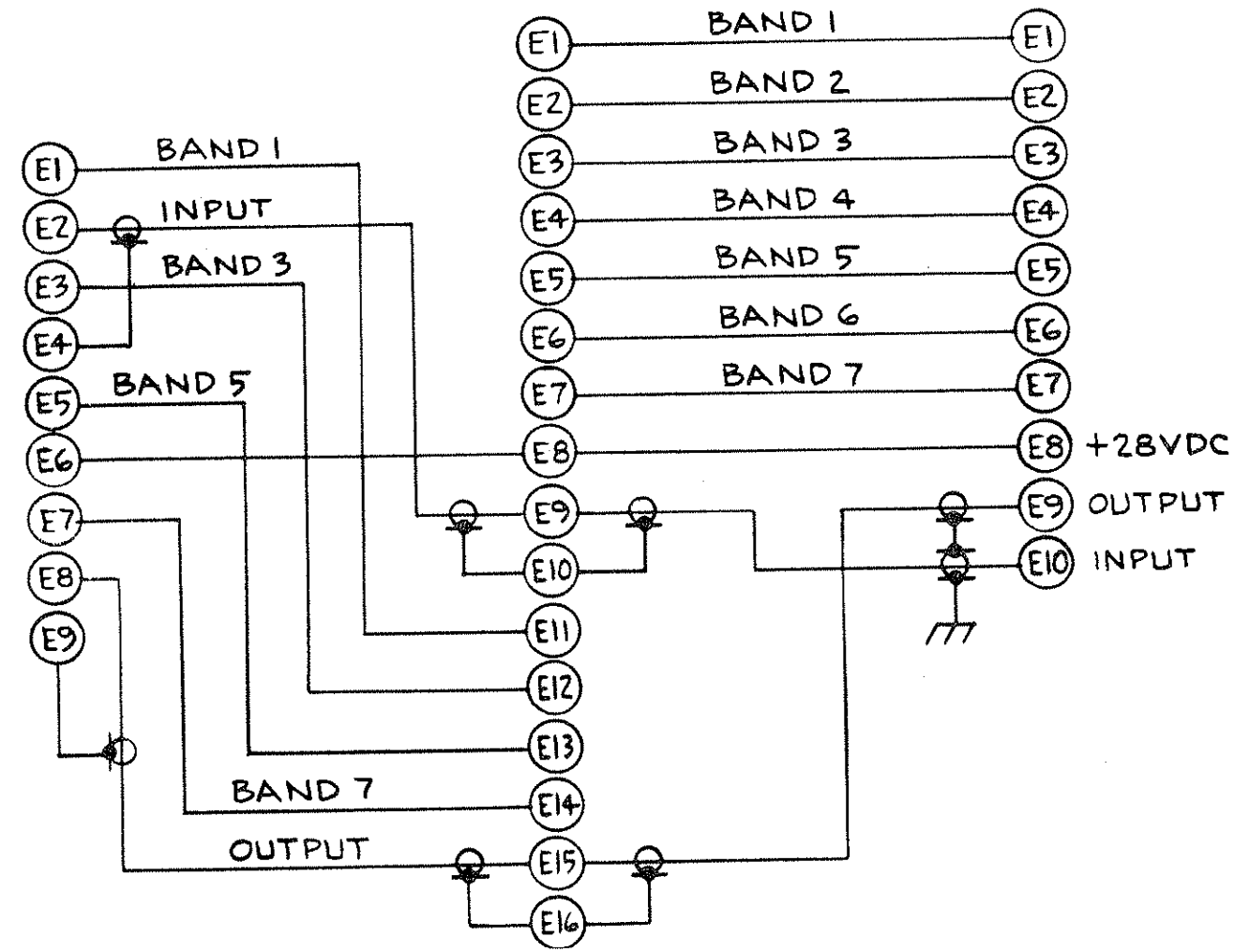
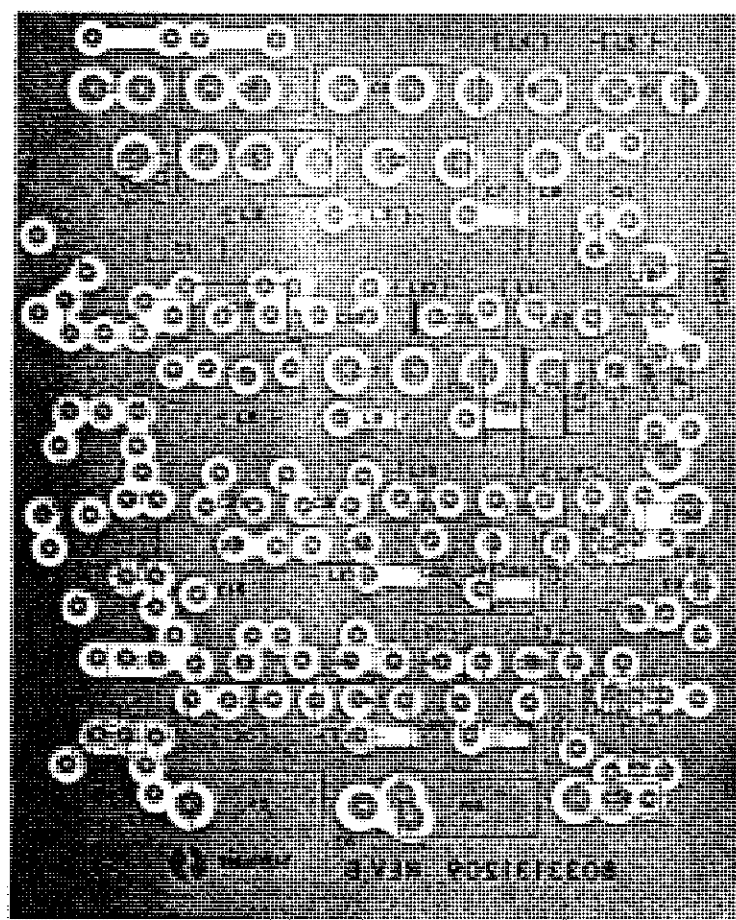
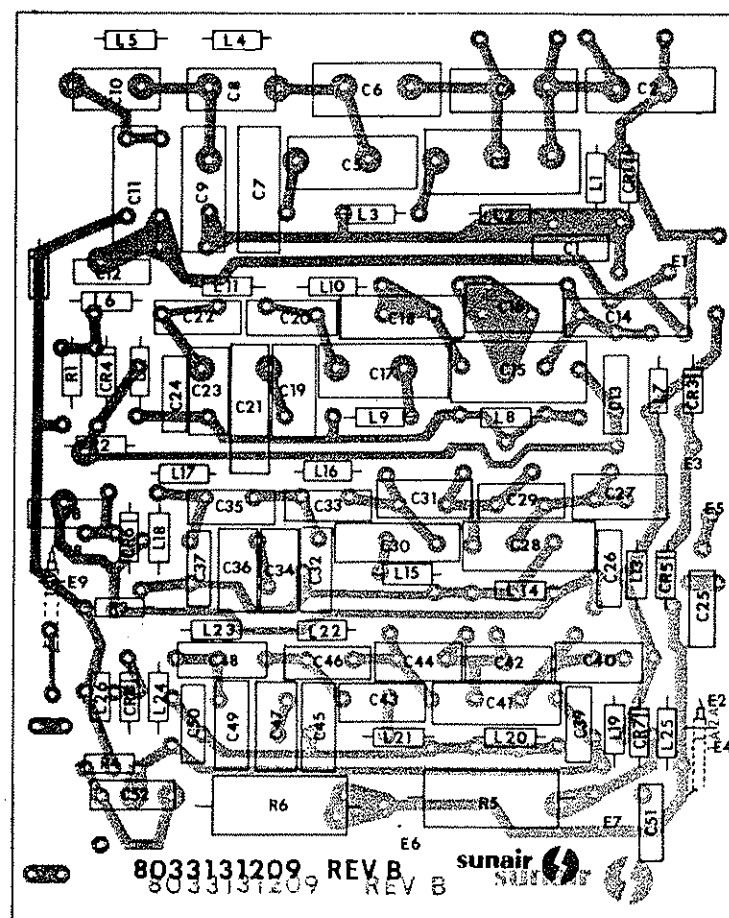


Figure 5.26 Filter Module (1A2) Interconnection Diagram

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8033131071C

SUNAIR ASB-850

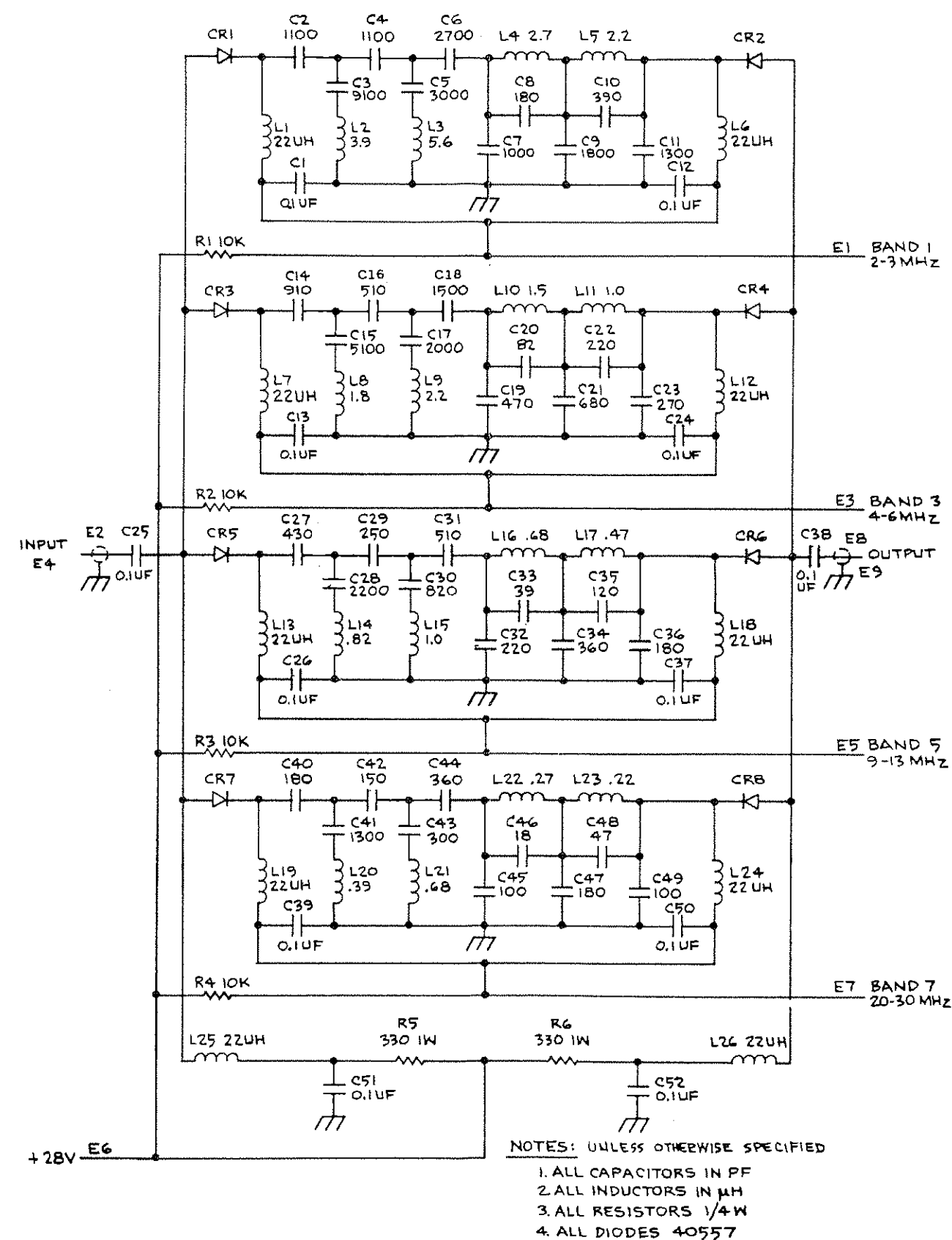


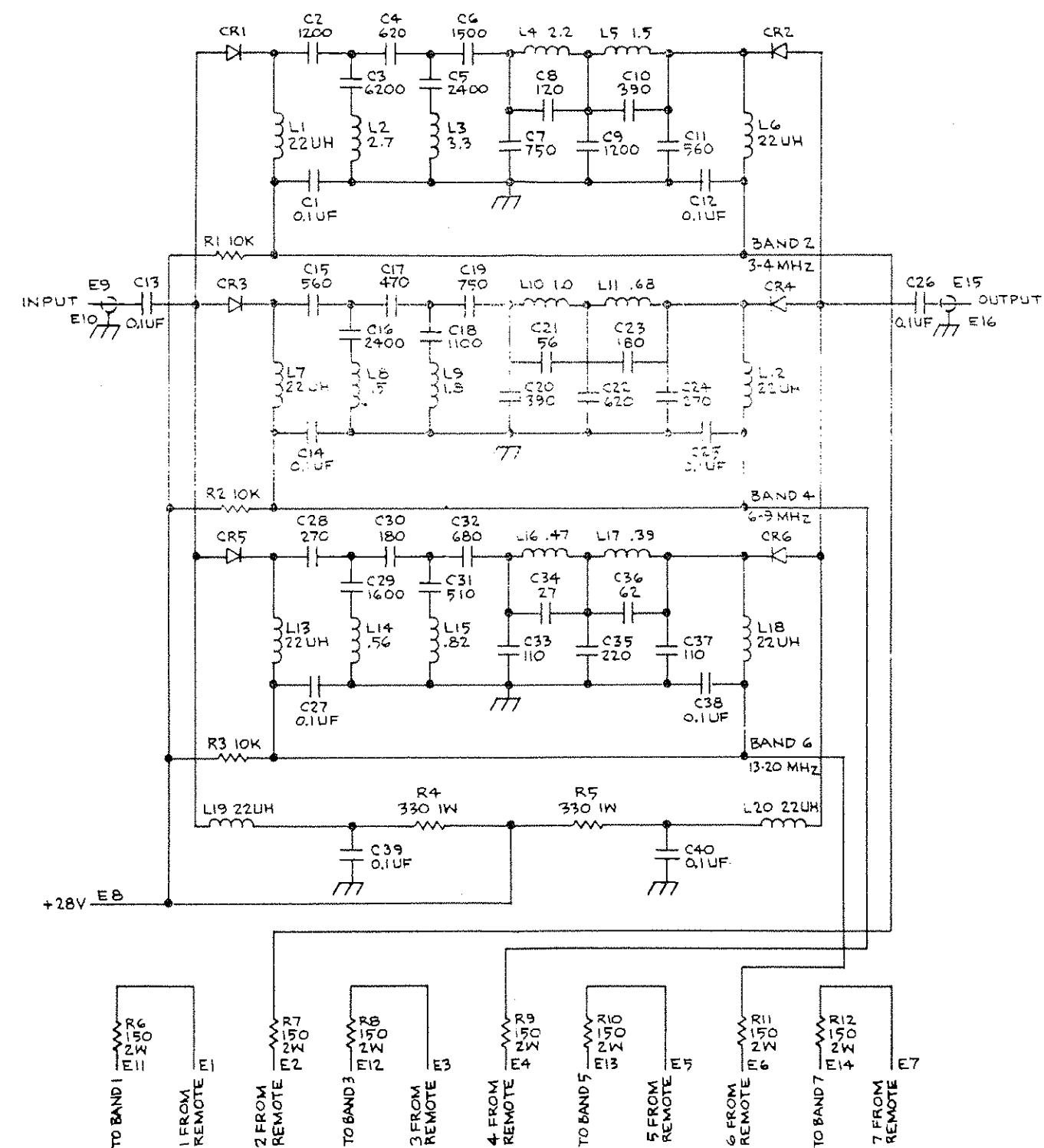
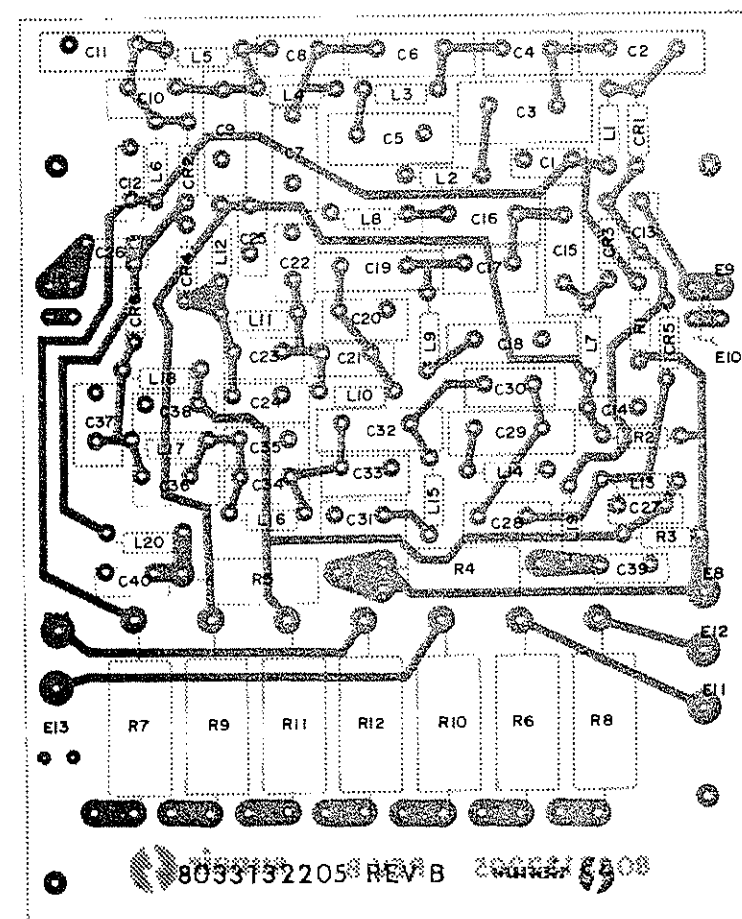
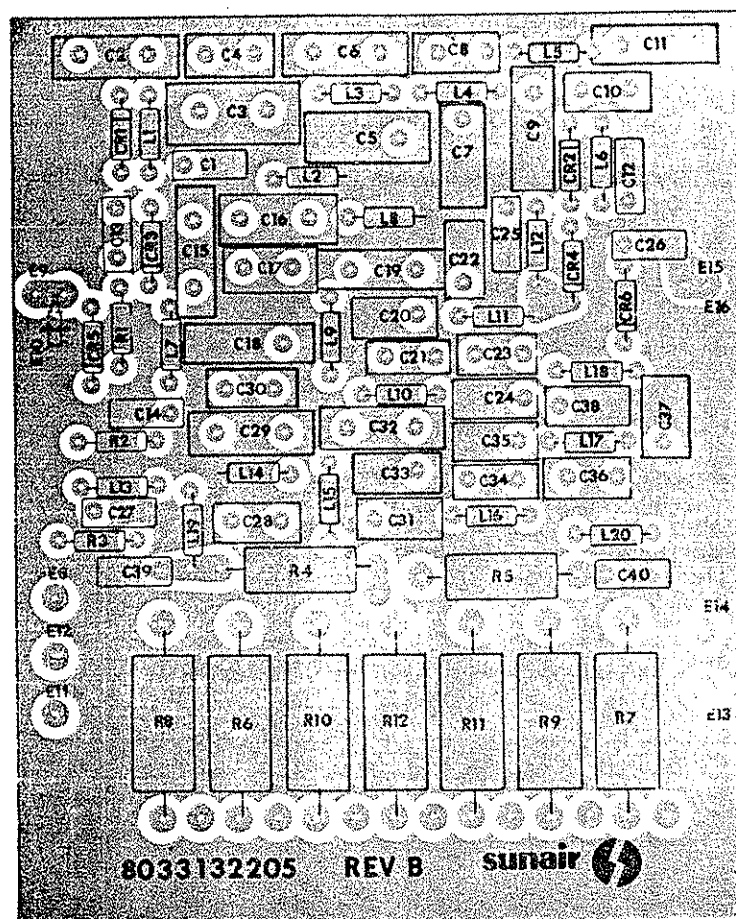
Figure 5.2/ Odd Channel Filter Board (1A2A1)

8033131098B PC ASSY ODD CHANNEL

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY ODD CHANNEL	8033131098
C1	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C2	Capacitor, 1100PF, 500V, DM19, 2%	0281000000
C3	Capacitor, 9100PF, 500V, DM30, 2%	0280960000
C4	Capacitor, 100PF, 500V, DM19, 2%	0281000000
C5	Capacitor, 3000PF, 500V, DM19, 2%	0281320004
C6	Capacitor, 2700PF, 500V, DM19, 2%	0281240001
C7	Capacitor, 1000PF, 500V, DM19, 2%	0281210004
C8	Capacitor, 180PF, 500V, DM15, 2%	0281090009
C9	Capacitor, 1800PF, 500V, DM19, 2%	0281300003
C10	Capacitor, 390PF, 500V, DM15, 2%	0281040001
C11	Capacitor, 1300PF, 500V, DM19, 2%	0281380007
C12	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C13	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C14	Capacitor, 910PF, 500V, DM19, 2%	0281450005
C15	Capacitor, 5100PF, 300V, DM19, 5%	0282390006
C16	Capacitor, 510PF, 500V, DM15, 2%	0281230005
C17	Capacitor, 2000PF, 500V, DM19, 2%	0281410003
C18	Capacitor, 1500PF, 500V, DM19, 2%	0281270007
C19	Capacitor, 470PF, 500V, DM15, 2%	0281440000
C20	Capacitor, 28PF, 500V, DM15, 2%	0281120005
C21	Capacitor, 680PF, 500V, DM19, 2%	0282290001
C22	Capacitor, 220PF, 500V, DM15, 2%	0281420009
C23	Capacitor, 270PF, 500V, DM15, 2%	0280970005
C24	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C25	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C26	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C27	Capacitor, 430PF, 500V, DM15, 2%	0282370005
C28	Capacitor, 2200PF, 500V, DM19, 2%	0281360006
C29	Capacitor, 250PF, 500V, DM15, 2%	0281100004
C30	Capacitor, 820PF, 500V, DM19, 2%	0281280002
C31	Capacitor, 510PF, 500V, DM15, 2%	0281230005
C32	Capacitor, 220PF, 500V, DM15, 2%	0281420009
C33	Capacitor, 39PF, 500V, DM15, 2%	0281150001
C34	Capacitor, 360PF, 500V, DM15, 2%	0281160007
C35	Capacitor, 120PF, 500V, DM15, 2%	0281180008
C36	Capacitor, 180PF, 500V, DM15, 2%	0281090009
C37	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C38	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C39	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C40	Capacitor, 180PF, 500V, DM15, 2%	0281090009
C41	Capacitor, 1300PF, 500V, DM19, 2%	0281380007
C42	Capacitor, 150PF, 500V, DM15, 2%	0281200009
C43	Capacitor, 300PF, 500V, DM15, 2%	0282330003
C44	Capacitor, 360PF, 500V, DM15, 2%	0281160007
C45	Capacitor, 100PF, 500V, DM15, 2%	0281190003
C46	Capacitor, 18PF, 500V, DM15, 2%	0281330000
C47	Capacitor, 180PF, 500V, DM15, 2%	0281090009
C48	Capacitor, 47PF, 500V, DM15, 2%	0282420002
C49	Capacitor, 100PF, 500V, DM15, 2%	0281190003
C50	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C51	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C52	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
CR1	Diode, Pin 50823080	0405570007
CR2	Diode, Pin 50823080	0405570007
CR3	Diode, Pin 50823080	0405570007
CR4	Diode, Pin 50823080	0405570007
CR5	Diode, Pin 50823080	0405570007
CR6	Diode, Pin 50823080	0405570007
CR7	Diode, Pin 50823080	0405570007
CR8	Diode, Pin 50823080	0405570007
L1	Inductor, Molded, 22UH, 5%	0650000005
L2	Inductor, Molded, 3.9UH, 5%	0650480007
L3	Inductor, Molded, 6.8UH, 5%	0659210002
L4	Inductor, Molded, 2.7UH, 5%	0652180001
L5	Inductor, Molded, 2.2UH, 5%	0649890001
L6	Inductor, Molded, 22UH, 5%	0650000005
L7	Inductor, Molded, 22UH, 5%	0650000005
L8	Inductor, Molded, 1.8UH, 5%	0652440002
L9	Inductor, Molded, 2.2UH, 5%	0649890001
L10	Inductor, Molded, 1.5UH, 5%	0649270002
L11	Inductor, Molded, 1.0UH, 5%	0649150007
L12	Inductor, Molded, 22UH, 5%	0650000005
L13	Inductor, Molded, 22UH, 5%	0650000005
L14	Inductor, Molded, 0.82UH, 5%	0652320007

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
L15	Inductor, Molded, 1.0UH, 5%	0649150007
L16	Inductor, Molded, 0.6UH, 5%	0649030001
L17	Inductor, Molded, 0.4UH, 5%	0659410009
L18	Inductor, Molded, 22UH, 5%	0650000005
L19	Inductor, Molded, 22UH, 5%	0650000005
L20	Inductor, Molded, 0.3UH, 5%	0649770005
L21	Inductor, Molded, 0.68UH, 5%	0649030001
L22	Inductor, Molded, 0.27UH, 5%	0649390008
L23	Inductor, Molded, 0.22UH, 10%	0650740009
L24	Inductor, Molded, 22UH, 5%	0650000005
L25	Inductor, Molded, 22UH, 5%	0650000005
L26	Inductor, Molded, 22UH, 5%	0650000005
R1	Resistor, 10K, 10%, 1/4W	0170410005
R2	Resistor, 10K, 10%, 1/4W	0170410005
R3	Resistor, 10K, 10%, 1/4W	0170410005
R4	Resistor, 10K, 10%, 1/4W	0170410005
R5	Resistor, 330, 10%, 1W	0165300001
R6	Resistor, 330, 10%, 1W	0165300001

80331302788



NOTES: UNLESS OTHERWISE SPECIFIED -
 1. ALL CAPACITORS IN PF
 2. ALL INDUCTORS IN uH
 3. ALL RESISTORS 1/4 W
 4. ALL DIODES 40557

Figure 5.28 Even Channel Filter Board (1A2A2)

8033132094A PC ASSY EVEN CHANNEL

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY EVEN CHANNEL	8033132094
C1	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C2	Capacitor, 1200PF, 500V, DM19, 2%	0281030006
C3	Capacitor, 6200PF, 300V, DM19, 5%	0282410007
C4	Capacitor, 620PF, 300V, DM15, 2%	0282280006
C5	Capacitor, 2400PF, 500V, DM19, 2%	0280980001
C6	Capacitor, 1500PF, 500V, DM19, 2%	0281270007
C7	Capacitor, 750PF, 500V, DM19, 2%	0280990006
C8	Capacitor, 120PF, 500V, DM15, 2%	0281180008
C9	Capacitor, 1200PF, 500V, DM19, 2%	0281030006
C10	Capacitor, 390PF, 500V, DM15, 2%	0281040001
C11	Capacitor, 560PF, 500V, DM19, 2%	0281060002
C12	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C13	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C14	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C15	Capacitor, 560PF, 500V, DM19, 2%	0281060002
C16	Capacitor, 2400PF, 500V, DM19, 2%	0280980001
C17	Capacitor, 470PF, 500V, DM15, 2%	0281440000
C18	Capacitor, 1100PF, 500V, DM19, 2%	0281000000
C19	Capacitor, 750PF, 500V, DM19, 2%	0280990006
C20	Capacitor, 390PF, 500V, DM15, 2%	0281040001
C21	Capacitor, 56PF, 500V, DM15, 2%	0282360000
C22	Capacitor, 620PF, 300V, DM15, 2%	0282280006
C23	Capacitor, 180PF, 500V, DM15, 2%	0281090009
C24	Capacitor, 270PF, 500V, DM15, 2%	0280970005
C25	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C26	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C27	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C28	Capacitor, 270PF, 500V, DM15, 2%	0280970005
C29	Capacitor, 1600PF, 500V, DM19, 2%	0281220000
C30	Capacitor, 180PF, 500V, DM15, 2%	0281090009
C31	Capacitor, 510PF, 500V, DM15, 2%	0281230005
C32	Capacitor, 680PF, 500V, DM19, 2%	0282290001
C33	Capacitor, 110PF, 500V, DM15, 2%	0281460001
C34	Capacitor, 27PF, 500V, DM15, 2%	0282320008
C35	Capacitor, 220PF, 500V, DM15, 2%	0281420009
C36	Capacitor, 62PF, 500V, DM15, 2%	0282400001
C37	Capacitor, 110PF, 500V, DM15, 2%	0281460001
C38	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C39	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C40	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
CR1	Diode, Pin 50823080	0405570007
CR2	Diode, Pin 50823080	0405570007
CR3	Diode, Pin 50823080	0405570007
CR4	Diode, Pin 50823080	0405570007
CR5	Diode, Pin 50823080	0405570007
CR6	Diode, Pin 50823080	0405570007
L1	Inductor, Molded, 22UH, 5%	0650000005
L2	Inductor, Molded, 2.7UH, 5%	0652180001
L3	Inductor, Molded, 3.3UH, 5%	0658920006
L4	Inductor, Molded, 2.2UH, 5%	0650000001
L5	Inductor, Molded, 1.5UH, 5%	0649270002
L6	Inductor, Molded, 22UH, 5%	0650000005
L7	Inductor, Molded, 22UH, 5%	0650000005
L8	Inductor, Molded, 1.5UH, 5%	0649270002
L9	Inductor, Molded, 1.8UH, 5%	0652440002
L10	Inductor, Molded, 1.0UH, 5%	0649150007
L11	Inductor, Molded, 0.68UH, 5%	0649030001
L12	Inductor, Molded, 22UH, 5%	0650000005
L13	Inductor, Molded, 22UH, 5%	0650000005
L14	Inductor, Molded, 0.56UH, 5%	0649530004
L15	Inductor, Molded, 0.82UH, 5%	0652320007
L16	Inductor, Molded, 0.47UH, 5%	0649410009
L17	Inductor, Molded, 0.39UH, 5%	0649770005
L18	Inductor, Molded, 22UH, 5%	0650000005
L19	Inductor, Molded, 22UH, 5%	0650000005
L20	Inductor, Molded, 22UH, 5%	0650000005
R1	Resistor, 10K, 10%, 1/4W	0170410005
R2	Resistor, 10K, 10%, 1/4W	0170410005
R3	Resistor, 10K, 10%, 1/4W	0170410005
R4	Resistor, 330, 10%, 1W	0165300001
R5	Resistor, 330, 10%, 1W	0165300001
R6	Resistor, 150, 10%, 2W	0171820002
R7	Resistor, 150, 10%, 2W	0171820002
R8	Resistor, 150, 10%, 2W	0171820002

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R9	Resistor, 150, 10%, 2W	0171820002
R10	Resistor, 150, 10%, 2W	0171820002
R11	Resistor, 150, 10%, 2W	0171820002
R12	Resistor, 150, 10%, 2W	0171820002

8033220074C

2 A 3

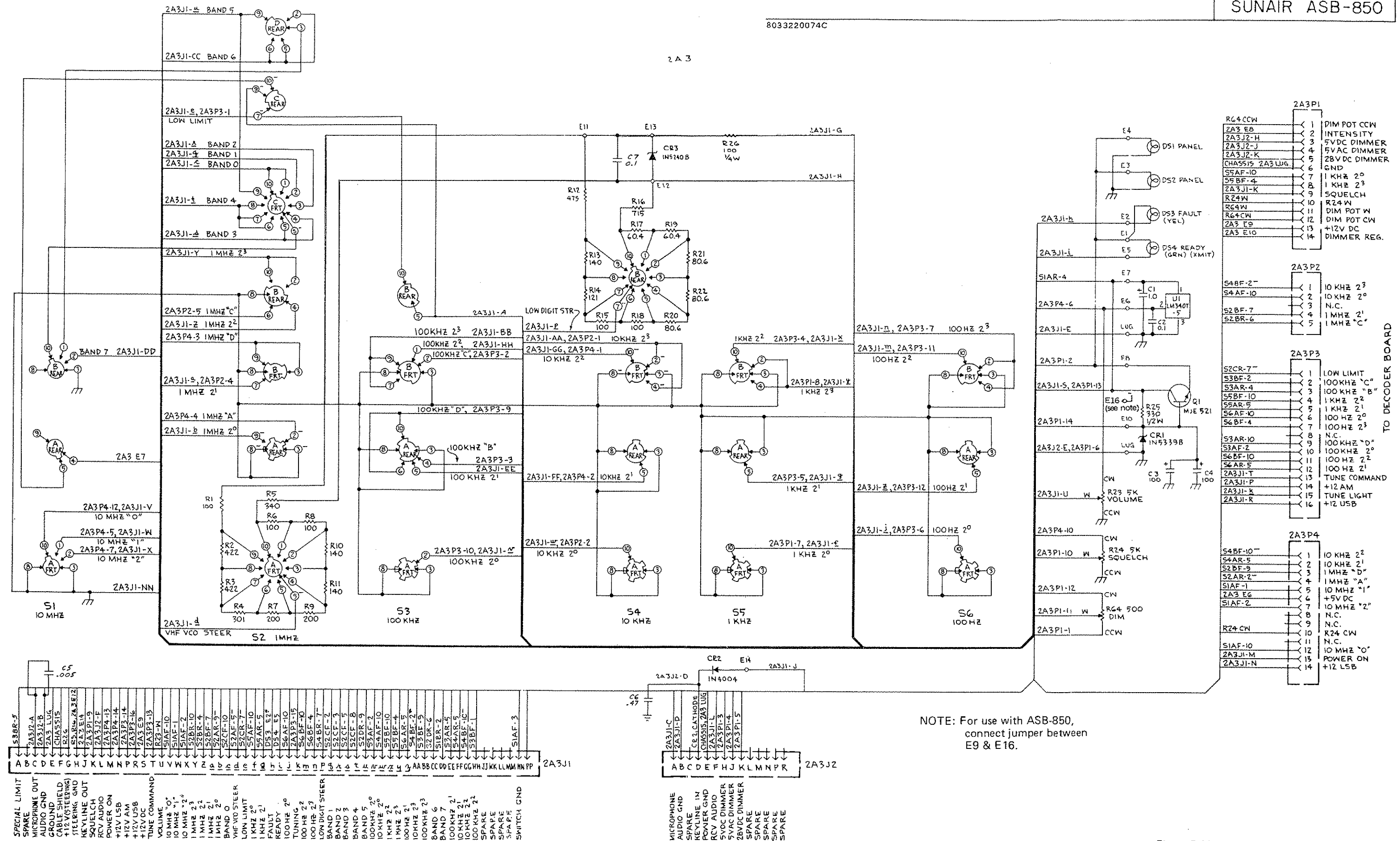


Figure 5.29 Control Head (2A) Wiring Diagram

8033210095 CHASSIS ASSY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	CHASSIS ASSY	8033210095
C1	Capacitor, 1UF, 35V, 196D	0281660000
C2	Capacitor, 0.1UF, 50V	1001010027
C3	Capacitor, 100UF, 20V, 20%	1005120030
C4	Capacitor, 100UF, 20V, 20%	1005120030
CR1	Diode, Zener 1N5339B	0405530005
Q1	Transistor, NPN, Si. MJE521	0448610001
R25	Resistor, 330, 10%, 1/2W	0173380000
U1	IC Linear LM340T5	0448600005

8033200103 FINAL ASSY

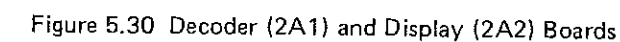
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	FINAL ASSY	8033200103
C6	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009

8033220091J HARNESS ASSY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	HARNESS ASSY	8033220091
C5	Capacitor, 0.005UF, 100V, Z5V	0273330004
C6	Not used	
C7	Capacitor, 0.1UF, 50V	1001010027
CR2	Diode, Rectifier 1N4004	0405180004
CR3	Diode, Zener 1N5240B	0403850002
J1	Connector, Power, 61 Pin Round	0754520005
J2	Connector, Power, 14 Pin Rect.	0754930009
R1	Resistor, 100, 1%, 1/8W	0194890007
R2	Resistor, 422, 1%, 1/8W	0194030008
R3	Resistor, 422, 1%, 1/8W	0194030008
R4	Resistor, 301, 1%, 1/8W	0194150003
R5	Resistor, 340, 1%, 1/8W	0194910008
R6	Resistor, 100, 1%, 1/8W	0194890007
R7	Resistor, 200, 1%, 1/8W	0194270009
R8	Resistor, 100, 1%, 1/8W	0194890007
R9	Resistor, 200, 1%, 1/8W	0194270009
R10	Resistor, 140, 1%, 1/8W	0194390004
R11	Resistor, 140, 1%, 1/8W	0194390004
R12	Resistor, 475, 1%, 1/8W	0196610001
R13	Resistor, 140, 1%, 1/8W	0194390004
R14	Resistor, 121, 1%, 1/8W	0195320000
R15	Resistor, 100, 1%, 1/8W	0194890007
R16	Resistor, 715, 1%, 1/8W	0195060008
R17	Resistor, 60.4, 1%, 1/8W	0195180003
R18	Resistor, 100, 1%, 1/8W	0194890007
R19	Resistor, 60.4, 1%, 1/8W	0195180003
R20	Resistor, 80.6, 1%, 1/8W	0195200004
R21	Resistor, 80.6, 1%, 1/8W	0195200004
R22	Resistor, 80.6, 1%, 1/8W	0195200004
R23	Not used	
R24	Not used	
R25	Not used	
R26	Resistor, 100, 5%, 1/4W	0194030008
S1	Switch, Dual, Concentric	8033220201
S2	Switch, Dual, Concentric	8033220201
S3	Switch, Dual, Concentric	8033220406
S4	Switch, Dual, Concentric	8033220406
S5	Switch, Dual, Concentric	8033220601
S6	Switch, Dual, Concentric	8033220601
	Pin, Connector, Female DNP	0754790002

8033215097K FRONT PANEL ASSY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	FRONT PANEL ASSY	8033215097
R23	POT 5K, 20%, 1/2W, W/STD HDW	0346710006
R24	POT 5K, 20%, 1/2W, W/STD HDW	0346710006
R25	Not used	
R26	Not used	
R27	Not used	
R28	Not used	
R29	Not used	
R30	Not used	
R31	Not used	
R32	Not used	
R33	Not used	
R34	Not used	
R35	Not used	
R36	Not used	
R37	Not used	
R38	Not used	
R39	Not used	
R40	Not used	
R41	Not used	
R42	Not used	
R43	Not used	
R44	Not used	
R45	Not used	
R46	Not used	
R47	Not used	
R48	Not used	
R49	Not used	
R50	Not used	
R51	Not used	
R52	Not used	
R53	Not used	
R54	Not used	
R55	Not used	
R56	Not used	
R57	Not Used	
R58	Not used	
R59	Not used	
R60	Not used	
R61	Not used	
R62	Not used	
R63	Not used	
R64	POT 500 OHM, 1/2W, 10%, 1 Turn	1000080013



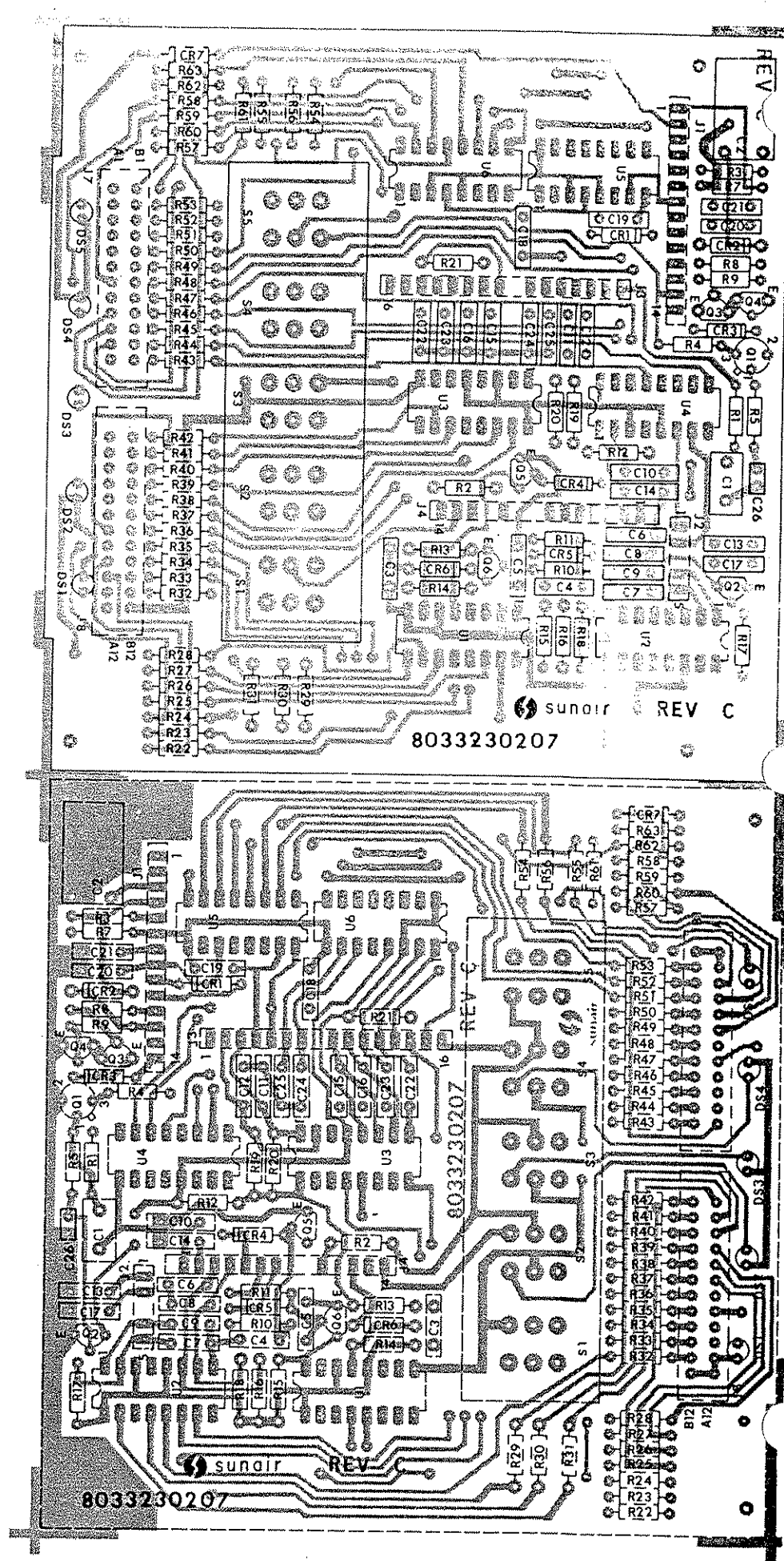
8033230096J PC ASSY DECODER

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY DECODER	8033230096
C1	Capacitor, 68UF, 15V, T368	0296540005
C2	Capacitor, 100UF, 20V	0282230009
C3	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C4	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C5	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C6	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C7	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C8	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C9	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C10	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C11	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C12	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C13	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C14	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C15	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C16	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C17	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C18	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C19	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C20	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C21	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C22	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C23	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C24	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C25	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C26	Capacitor, 0.01UF, 50V, 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, 14 Pin Male	8033245209
J2	Connector, PC, 5 Pin Male	8033235403
J3	Connector, PC, 16 Pin Male	8033235101
J4	Connector, PC, 14 Pin Male	8033235306
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, 10K, 10%, 1/4W	0170410005
R2	Resistor, 8.2K, 10%, 1/4W	0181620006
R3	Resistor, 2.2K, 5%, 1/4W	0178070009
R4	Resistor, 2.2K, 5%, 1/4W	0178070009
R5	Resistor, 68K, 10%, 1/4W	0173520006
R6	Not used	
R7	Resistor, 10, 5%, 1/4W	0177160004
R8	Resistor, 10K, 10%, 1/4W	0170410005
R9	Resistor, 1K, 10%, 1/4W	0171560001
R10	Resistor, 4.7K, 5%, 1/4W	0170770001
R11	Resistor, 4.7K, 5%, 1/4W	0170770001
R12	Resistor, 5.6K, 10%, 1/4W	0183060008
R13	Resistor, 5.6K, 10%, 1/4W	0183060008
R14	Resistor, 5.6K, 10%, 1/4W	0183060008
R15	Resistor, 5.6K, 10%, 1/4W	0183060008
R16	Resistor, 5.6K, 10%, 1/4W	0183060008
R17	Resistor, 5.6K, 10%, 1/4W	0183060008
R18	Resistor, 5.6K, 10%, 1/4W	0183060008
R19	Resistor, 5.6K, 10%, 1/4W	0183060008
R20	Resistor, 5.6K, 10%, 1/4W	0183060008
R21	Resistor, 5.6K, 10%, 1/4W	0183060008
R22	Resistor, 120, 10%, 1/4W	0186550006

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R23	Resistor, 120, 10%, 1/4W	0186550006
R24	Resistor, 120, 10%, 1/4W	0186550006
R25	Resistor, 120, 10%, 1/4W	0186550006
R26	Resistor, 120, 10%, 1/4W	0186550006
R27	Resistor, 120, 10%, 1/4W	0186550006
R28	Resistor, 120, 10%, 1/4W	0186550006
R29	Resistor, 120, 10%, 1/4W	0186550006
R30	Resistor, 120, 10%, 1/4W	0186550006
R31	Resistor, 120, 10%, 1/4W	0186550006
R32	Resistor, 120, 10%, 1/4W	0186550006
R33	Resistor, 120, 10%, 1/4W	0186550006
R34	Resistor, 120, 10%, 1/4W	0186550006
R35	Resistor, 120, 10%, 1/4W	0186550006
R36	Resistor, 120, 10%, 1/4W	0186550006
R37	Resistor, 120, 10%, 1/4W	0186550006
R38	Resistor, 120, 10%, 1/4W	0186550006
R39	Resistor, 120, 10%, 1/4W	0186550006
R40	Resistor, 120, 10%, 1/4W	0186550006
R41	Resistor, 120, 10%, 1/4W	0186550006
R42	Resistor, 120, 10%, 1/4W	0186550006
R43	Resistor, 120, 10%, 1/4W	0186550006
R44	Resistor, 120, 10%, 1/4W	0186550006
R45	Resistor, 120, 10%, 1/4W	0186550006
R46	Resistor, 120, 10%, 1/4W	0186550006
R47	Resistor, 120, 10%, 1/4W	0186550006
R48	Resistor, 120, 10%, 1/4W	0186550006
R49	Resistor, 120, 10%, 1/4W	0186550006
R50	Resistor, 120, 10%, 1/4W	0186550006
R51	Resistor, 120, 10%, 1/4W	0186550006
R52	Resistor, 120, 10%, 1/4W	0186550006
R53	Resistor, 120, 10%, 1/4W	0186550006
R54	Resistor, 120, 10%, 1/4W	0186550006
R55	Resistor, 120, 10%, 1/4W	0186550006
R56	Resistor, 120, 10%, 1/4W	0186550006
R57	Resistor, 120, 10%, 1/4W	0186550006
R58	Resistor, 120, 10%, 1/4W	0186550006
R59	Resistor, 120, 10%, 1/4W	0186550006
R60	Resistor, 120, 10%, 1/4W	0186550006
R61	Resistor, 120, 10%, 1/4W	0186550006
R62	Resistor, 120, 10%, 1/4W	0186550006
R63	Resistor, 120, 10%, 1/4W	0186550006
S1	Switch, Pushbutton Multiple	8033231009
S2	Switch, Pushbutton Multiple	8033231009
S3	Switch, Pushbutton Multiple	8033231009
S4	Switch, Pushbutton Multiple	8033231009
S5	Switch, Pushbutton Multiple	8033231009
U1	IC Digital SN7446A	0448560003
U2	IC Digital SN7446A	0448560003
U3	IC Digital SN7446A	0448560003
U4	IC Digital SN7446A	0448560003
U5	IC Digital SN7446A	0448560003
U6	IC Digital SN7446A	0448560003
	Button On	8033231203
	Button, LSB	8033231301
	Button, USB	8033231408
	Button, AM	8033231505
	Button, Tune	8033231602

8033240091B PC ASSY DISPLAY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY DISPLAY	8033240091
C1	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
C2	Capacitor, 0.1UF, 50V, X7R, 20%	0281610002
R1	Resistor, 120, 10%, 1/4W	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
	Socket, IC 14 Pin STD Profile	1002650003



8033301104G

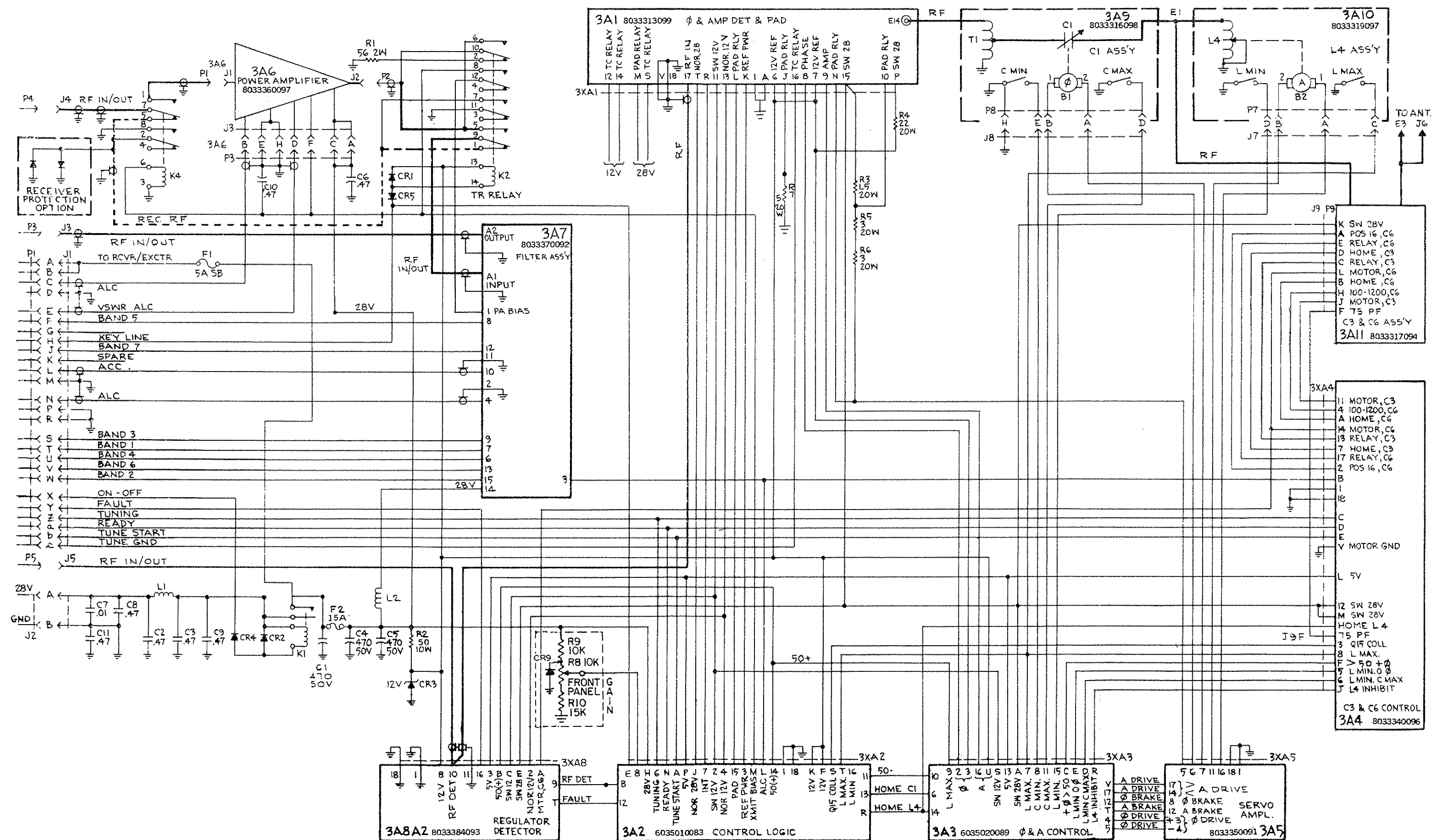


Figure 5.31 Power/Amplifier Coupler Interconnection Diagram

8033310090AA CHASSIS ASSY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	CHASSIS ASSY	8033310090
C1	Capacitor, 470UF, 50V, TAL	0280890001
C2	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C3	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C4	Capacitor, 470UF, 50V, TAL	0280890001
C5	Capacitor, 470UF, 50V, TAL	0280890001
C6	Not used	
C7	Not used	
C8	Not used	
C9	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C10	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
CR1	Diode, Rectifier 1N4004	0405180004
CR2	Diode, Rectifier 1N4004	0405180004
CR3	Diode, Zener 1N2976B	0405640005
CR4	Diode, Rectifier 1N4004	0405180004
CR5	Diode, Rectifier 1N4004	0405180004
F2	Fuse, AGC, 15 AMP, 32V	0848740009
K1	Relay, SPST, 24V, Power 60A	0660040000
K2	Relay, 4PDT, 12V, General 3A	1000190005
L1	Inductor, Choke, A+, 40UH	0563720000
R1	Resistor, 56, 10%, 2W	0197210007
R2	Resistor, 50, 5%, 10W	0188510001
R3	Resistor, 1.5, 10%, 20W	0197620001
R4	Resistor, 22, 5%, 20W	0197660002
R5	Resistor, 3, 5%, 20W	0197390005
R6	Resistor, 3, 5%, 20W	0197390005
R7	Resistor, 5, 5%, 20W	1000080021
3A6P1	Connector, RF, Subminiature	0753700000
3A6P2	Connector, RF, Subminiature	0753700000
	Connector, PC, 18 Pin Female	0755890000

8033380098K FRONT PANEL ASSY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	FRONT PANEL ASSY	8033380098
C7	Capacitor, 0.01UF, 50V, W5R, 20%	0281730008
C8	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C9	Not used	
C10	Not used	
C11	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
CR9	Diode, Zener 1N5358B	0404900003
F1	Fuse, AGC, 5 AMP, 32V	0848980000
J2	Connector, Power, 2 Pin Round	0754560007
J3	Connector, RF, UHF	0753300001
J4	Connector, RF, BNC UG-1094/U	0743740009
J5	Connector, RF, UHF	0753300001
L2	Inductor, Choke, Toroid, 9.OHM	0937720003
R8	POT 10K, 10%, 3/4W, 1/8 Shaft	0335900003
R9	Resistor, 220, 10%, 1W	0197190006
R10	Resistor, 15K, 10%, 1/4W	0172350000
	Terminal Strip, 5TERM, 1GND	0996700099

8033314095F HARNESS ASSY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	HARNESS ASSY	8033314095
C6	Capacitor 0.47UF, 50V, 20%	0283370009
J7	Connector, Power, 4 Pin Round	0754810003
J8	Connector, Power, 5 Pin Round	0754840000
J9	Connector, Power, 10 Pin Round	0754860001
P1	Connector, Power, 26 Pin Round	0754550001
3A6P3	Connector, Power, 7 Pin Rect.	0753530007
3A7J1	Connector, Power, 15 Pin Rect.	0754880001
	Pin, RF, Connector, Female	0754910008
	Connector, PC, 18 Pin Female	0755980000
	End Disc Latch Assy. Connector	1000110001

8033316098N C1 ASSY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	C1 ASSY	8033316098
C1	Capacitor, Var, Vacuum	6035080707
B1	Motor, Torque, 19.1VDC	8033319500
T1	Transformer, 50 OHM-12.5 OHM	6035142001
	Resistor 1K, 5%, 5W	0190370009
	Bearing, Flanged .250 ID	0501790004
	Connector, Power, 5 Pin Round	0754850005
	Bearing Thrust	0841460001
	Gear, Spur, 60 Teeth, .187 Bore	1000120007
	Gear, Spur, 120 Teeth, .250 Bore	1000120031
	Terminal, Insul. 4-40 Male	1000140008

8033319097H L4 ASSY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	L4 ASSY	8033319097
B2	Motor, Torque, 19.1VDC	8033319500
L4	Inductor, VAR, 0.2-18.OUH	8033319607
P7	Connector, Power, 4 Pin Round	0754820009
	Gear, Spur, 72 teeth, .187 Bore	1000120015
	Gear, Spur, 108 Teeth, .250 Bore	1000120023

8033312696A PC ASSY K4 RELAY

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY K4 RELAY	8033312696
K4	Relay, DPDT, 24V, Crystal Can	0661630005

58033313099B

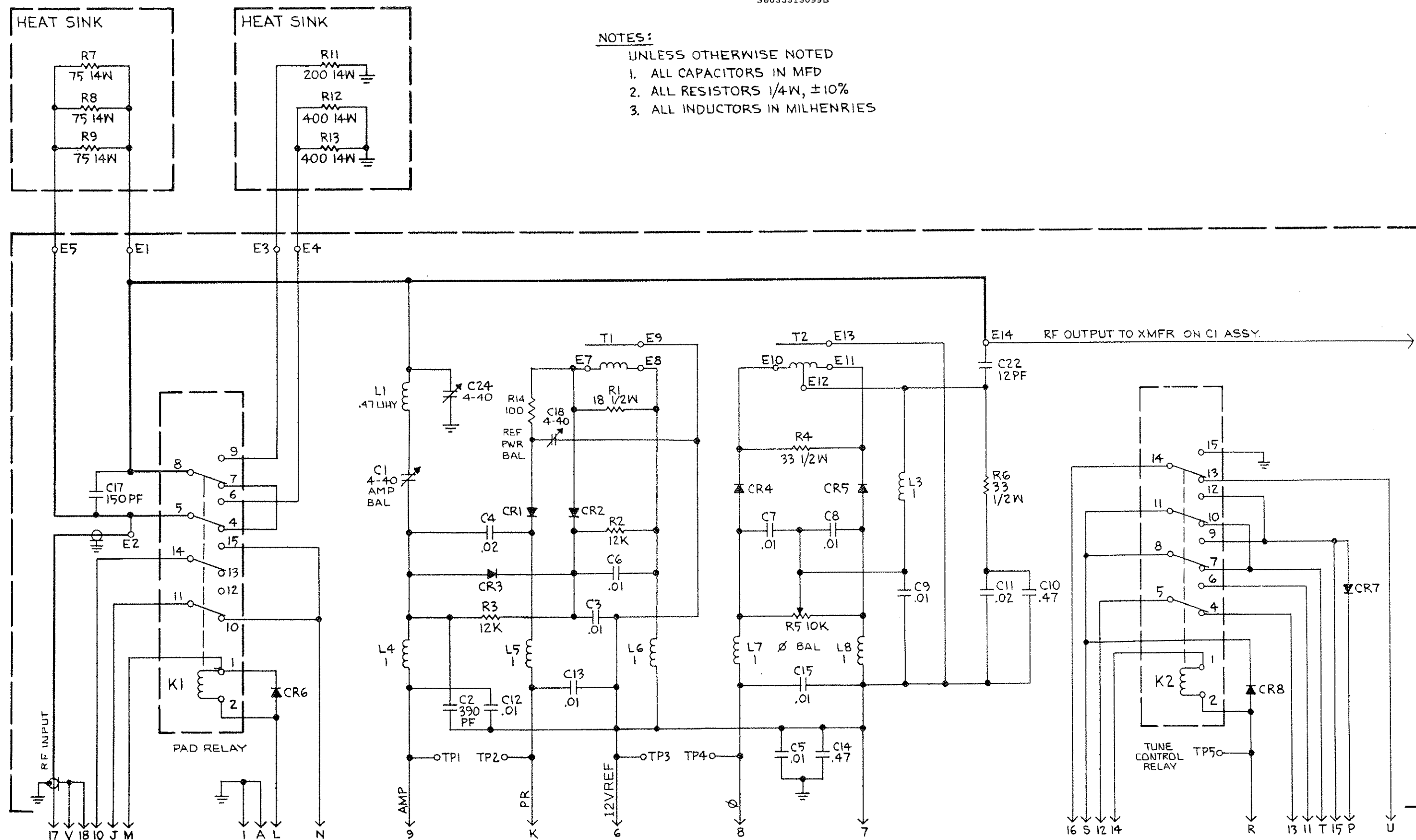
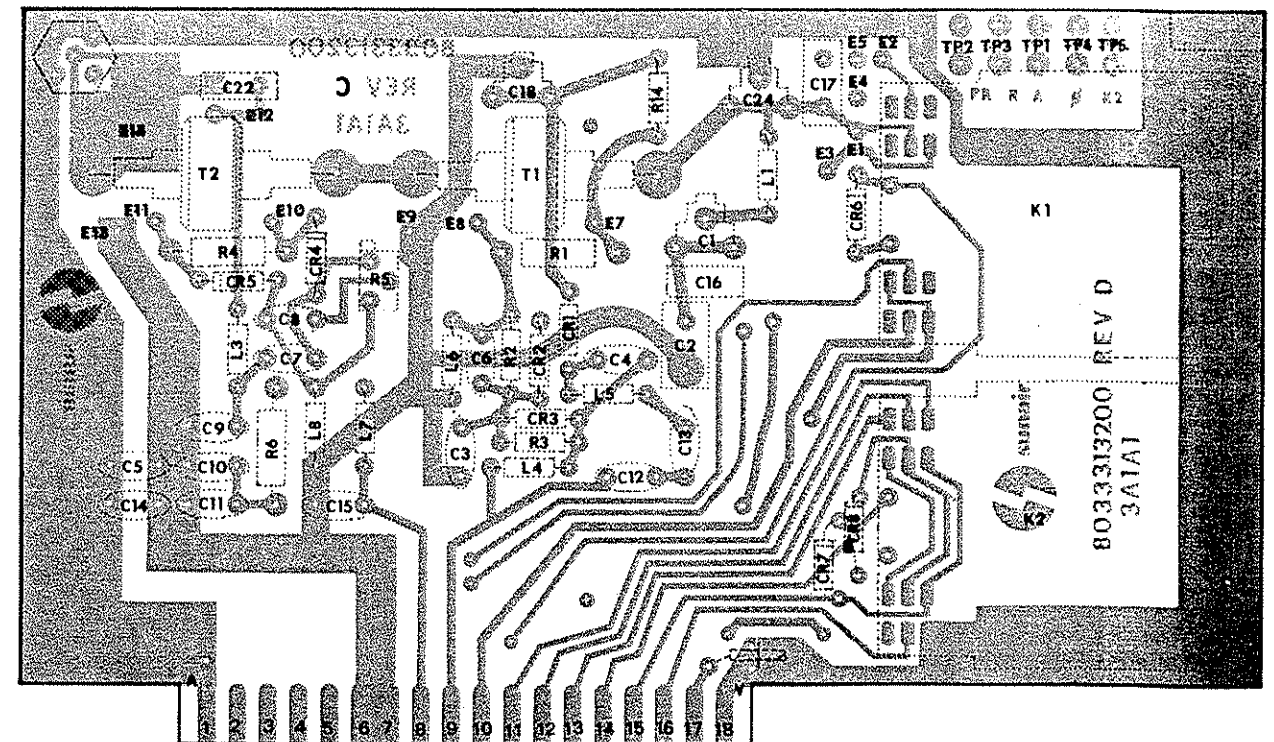
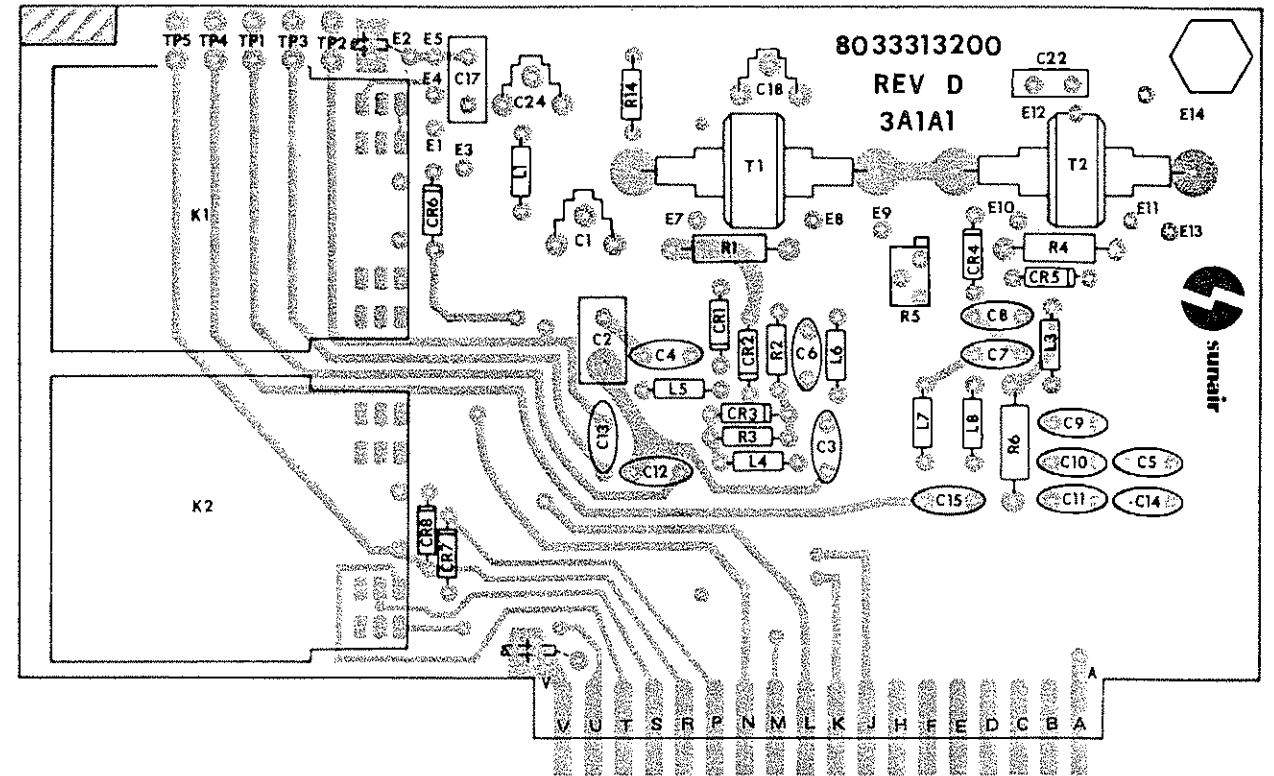


Figure 5.32 Pad, Phase and Amplitude Detectors (3A1A1)

8033313099D PC ASSY PHASE AMP PAD

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY PHASE AMP PAD	8033313099
C1	Capacitor, 4-40PF, 25V	0295490004
C2	Capacitor, 390PF, 500V, DM15, 5%	0286000008
C3	Capacitor, 0.01UF, 100V, Z5V	0273210009
C4	Capacitor, 0.02UF, 25V, Y5U	0269130004
C5	Capacitor, 0.01UF, 100V, Z5V	0273210009
C6	Capacitor, 0.01UF, 100V, Z5V	0273210009
C7	Capacitor, 0.01UF, 100V, Z5V	0273210009
C8	Capacitor, 0.01UF, 100V, Z5V	0273210009
C9	Capacitor, 0.01UF, 100V, Z5V	0273210009
C10	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C11	Capacitor, 0.02UF, 25V, Y5U	0269130004
C12	Capacitor, 0.01UF, 100V, Z5V	0273210009
C13	Capacitor, 0.01UF, 100V, Z5V	0273210009
C14	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C15	Capacitor, 0.01UF, 100V, Z5V	0273210009
C16	Not used	
C17	Capacitor, 150PF, 500V, DM15, 5%	0274980002
C18	Capacitor, 4-40PF, 25V	0295490004
C19	Not used	
C20	Not used	
C21	Not used	
C22	Capacitor, 12PF, 500V, DM10, 5%	0260280003
C23	Not used	
C24	Capacitor, 4-40PF, 25V	0295490004
CR1	Diode, Signal, Germ. 1N542E	0405610009
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, Rectifier 1N4004	0405180004
CR7	Diode, Rectifier 1N4004	0405180004
CR8	Diode, Rectifier 1N4004	0405180004
K1	Relay, 4PDT, 24V, PC MT 7.5A	0661600009
K2	Relay, 4PDT, 12V, PC MT 7.5A	0661610004
L1	Inductor, Molded, 0.47UH, 5%	0649410009
L2	Not used	
L3	Inductor, Molded, 1000UH, 10%	0664940005
L4	Inductor, Molded, 1000UH, 10%	0664940005
L5	Inductor, Molded, 1000UH, 10%	0664940005
L6	Inductor, Molded, 1000UH, 10%	0664940005
L7	Inductor, Molded, 1000UH, 10%	0664940005
L8	Inductor, Molded, 1000UH, 10%	0664940005
R1	Resistor, 18, 5%, 1/2W	0184730007
R2	Resistor, 12K, 10%, 1/4W	0183180003
R3	Resistor, 12K, 10%, 1/4W	0183180003
R4	Resistor, 33, 10%, 1/2W	0171700007
R5	POT., 10K, 5%, 0.6W, 15 Turns	0344410005
R6	Resistor, 33, 10%, 1/2W	0171700007
R7	Resistor, 75, 5%, 14W	0191300004
R8	Resistor, 75, 5%, 14W	0191300004
R9	Resistor, 75, 5%, 14W	0191300004
R10	Not used	
R11	Resistor, 200, 5%, 14W	0197410006
R12	Resistor, 400, 5%, 14W	0197380000
R13	Resistor, 400, 5%, 14W	0197380000
R14	Resistor, 100, 5%, 1/4W	0171180003
T1	Transformer, AMPL. Detector	6035040802
T2	Transformer, Phase Detector	6035040900
	Test Point, White	0753640007



6035010075J

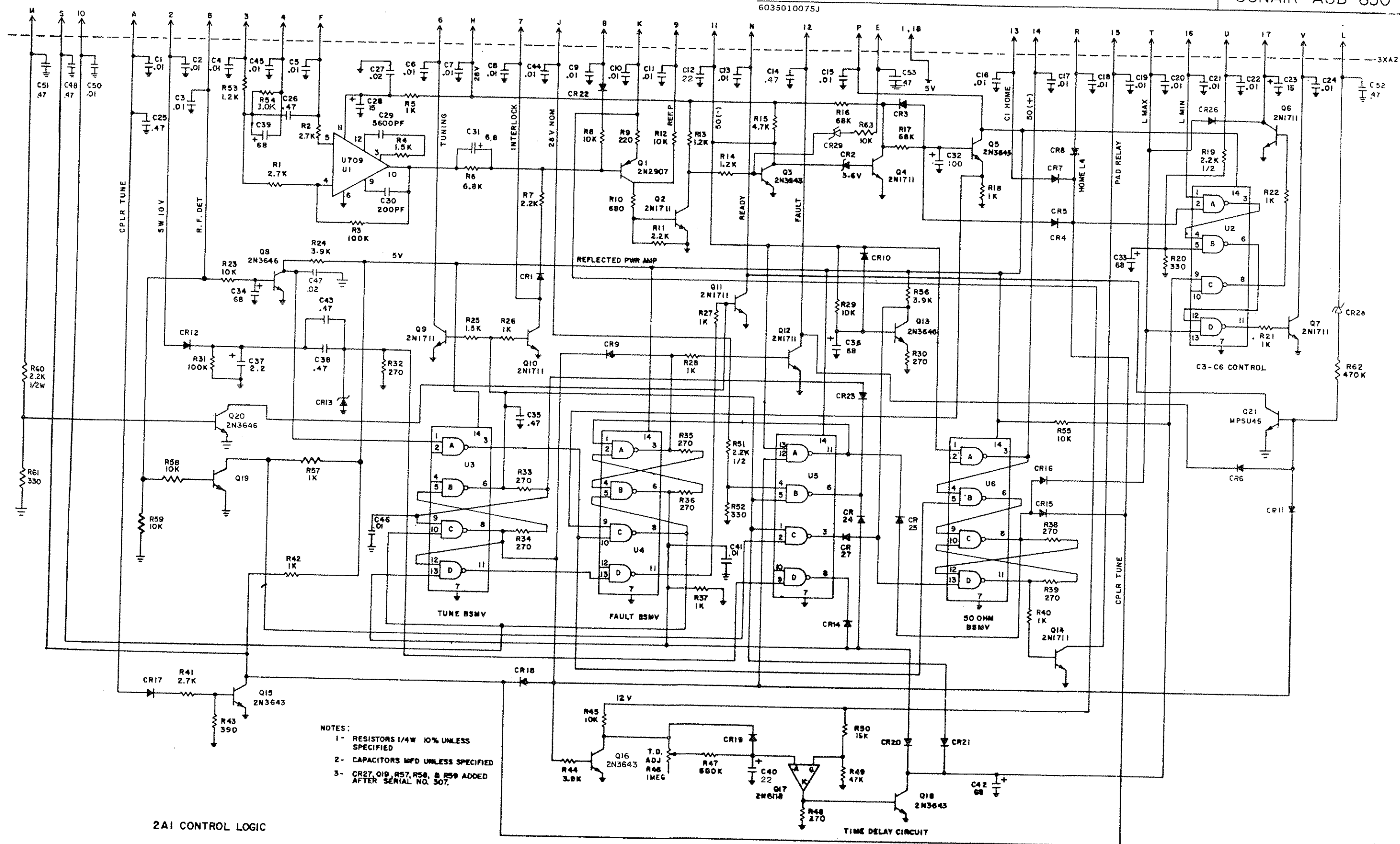


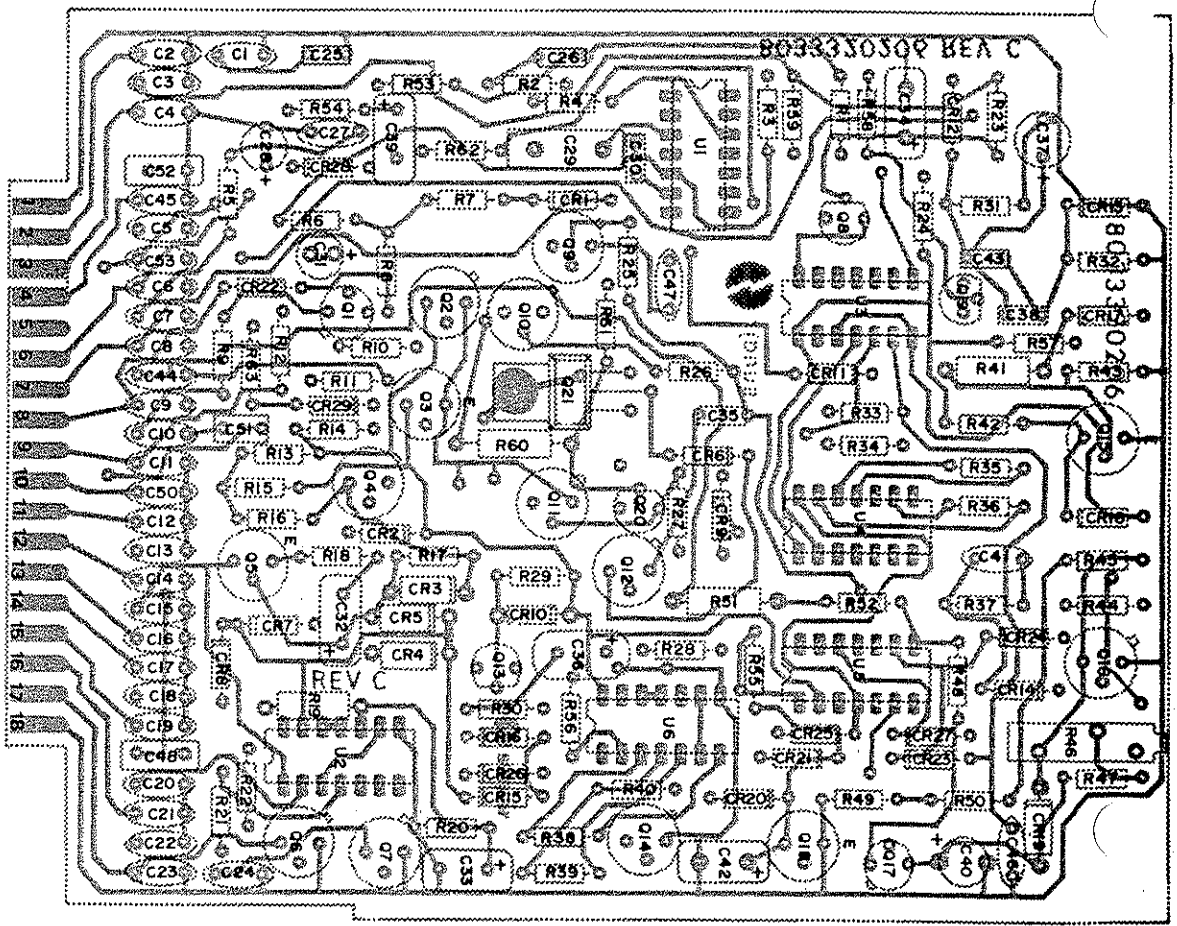
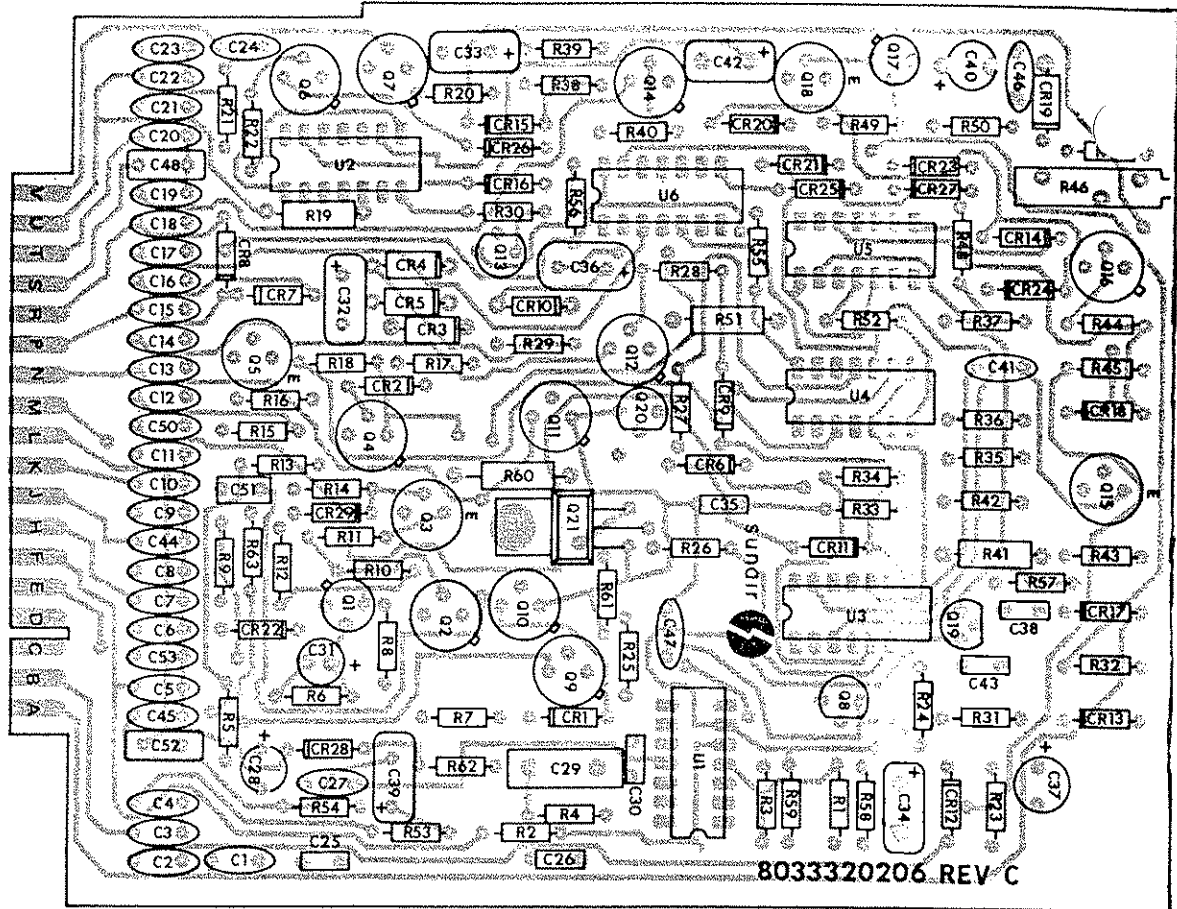
Figure 5.33 Control Logic (3A2)

6035010083L PC ASSY CONTROL LOGIC

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
C1	PC ASSY CONTROL LOGIC	6035010083
C2	Capacitor, 0.01UF, 100V, Z5V	0273210009
C3	Capacitor, 0.01UF, 100V, Z5V	0273210009
C4	Capacitor, 0.01UF, 100V, Z5V	0273210009
C5	Capacitor, 0.01UF, 100V, Z5V	0273210009
C6	Capacitor, 0.01UF, 100V, Z5V	0273210009
C7	Capacitor, 0.01UF, 100V, Z5V	0273210009
C8	Capacitor, 0.01UF, 100V, Z5V	0273210009
C9	Capacitor, 0.01UF, 100V, Z5V	0273210009
C10	Capacitor, 0.01UF, 100V, Z5V	0273210009
C11	Capacitor, 0.01UF, 100V, Z5V	0273210009
C12	Capacitor, 2.2UF, 15V, T368	0296420000
C13	Capacitor, 0.01UF, 100V, Z5V	0273210009
C14	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C15	Capacitor, 0.01UF, 100V, Z5V	0273210009
C16	Capacitor, 0.01UF, 100V, Z5V	0273210009
C17	Capacitor, 0.01UF, 100V, Z5V	0273210009
C18	Capacitor, 0.01UF, 100V, Z5V	0273210009
C19	Capacitor, 0.01UF, 100V, Z5V	0273210009
C20	Capacitor, 0.01UF, 100V, Z5V	0273210009
C21	Capacitor, 0.01UF, 100V, Z5V	0273210009
C22	Capacitor, 0.01UF, 100V, Z5V	0273210009
C23	Capacitor, 15UF, 35V	0282240004
C24	Capacitor, 0.01UF, 100V, Z5V	0273210009
C25	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C26	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C27	Capacitor, 0.02UF, 25V, Y5U	0269130004
C28	Capacitor, 15UF, 35V	0282240004
C29	Capacitor, 5600PF, 50V, Mylar	0282270001
C30	Capacitor, 200PF, 500V, DM10, 5%	0293050007
C31	Capacitor, 6.8UF, 20V, T368	0296780006
C32	Capacitor, 100UF, 20V	0282230009
C33	Capacitor, 68UF, 15V, T368	0296540005
C34	Capacitor, 68UF, 15V, T368	0296540005
C35	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C36	Capacitor, 68UF, 15V, T368	0296540005
C37	Capacitor, 2.2UF, 35V, T368	0273950002
C38	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C39	Capacitor, 68UF, 15V, T368	0296540005
C40	Capacitor, 22UF, 15V, 196D	0281690006
C41	Capacitor, 0.01UF, 100V, Z5V	0273210009
C42	Capacitor, 68UF, 15V, T368	0296540005
C43	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C44	Capacitor, 0.01UF, 100V, Z5V	0273210009
C45	Capacitor, 0.01UF, 100V, Z5V	0273210009
C46	Capacitor, 0.01UF, 100V, Z5V	0273210009
C47	Capacitor, 0.02UF, 25V, Y5U	0269130004
C48	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C49	Not used	
C50	Capacitor, 0.01UF, 100V, Z5V	0273210009
C51	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C52	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C53	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
CR1	Diode, Signal, Si. 1N914	0442900007
CR2	Diode, Zener 1N5227B	0405250002
CR3	Diode, Rectifier 1N4004	0405180004
CR4	Not used	
CR5	Diode, Rectifier 1N4004	0405180004
CR6	Diode, Signal, Si. 1N914	0442900007
CR7	Diode, Signal, Si. 1N914	0442900007
CR8	Diode, Signal, Germ. 1N270	0405510004
CR9	Diode, Signal, Si. 1N914	0442900007
CR10	Diode, Rectifier 1N4004	0405180004
CR11	Diode, Signal, Si. 1N914	0442900007
CR12	Diode, Rectifier 1N4004	0405180004
CR13	Diode, Zener 1N5231B	0405390009
CR14	Diode, Signal, Si. 1N914	0442900007
CR15	Diode, Signal, Si. 1N914	0442900007
CR16	Diode, Signal, Si. 1N914	0442900007
CR17	Diode, Signal, Si. 1N914	0442900007
CR18	Diode, Signal, Si. 1N914	0442900007
CR19	Diode, Rectifier 1N4004	0405180004
CR20	Diode, Signal, Si. 1N914	0442900007
CR21	Diode, Signal, Si. 1N914	0442900007

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
CR22	Diode, Signal, Si. 1N914	0442900007
CR23	Diode, Signal, Si. 1N914	0442900007
CR24	Diode, Signal, Si. 1N914	0442900007
CR25	Diode, Signal, Si. 1N914	0442900007
CR26	Diode, Signal, Si. 1N914	0442900007
CR27	Diode, Signal, Si. 1N914	0442900007
CR28	Diode, Zener 1N5235B	0405200005
CR29	Diode, Zener 1N5231B	0405390009
Q1	Transistor, PNP, Si. 2N2907A	0448390001
Q2	Transistor, NPN, Si. 2N1711	0440380005
Q3	Transistor, NPN, Si. 2N3643	0443310009
Q4	Transistor, NPN, Si. 2N1711	0448380005
Q5	Transistor, NPN, Si. 2N3643	0443310009
Q6	Transistor, NPN, Si. 2N1711	0448380005
Q7	Transistor, NPN, Si. 2N1711	0448380005
Q8	Transistor, NPN, Si. 2N3646	0442520000
Q9	Transistor, NPN, Si. 2N1711	0448380005
Q10	Transistor, NPN, Si. 2N1711	0448380005
Q11	Transistor, NPN, Si. 2N1711	0448380005
Q12	Transistor, NPN, Si. 2N1711	0448380005
Q13	Transistor, NPN, Si. 2N3646	0442520000
Q14	Transistor, NPN, Si. 2N1711	0448380005
Q15	Transistor, NPN, Si. 2N3643	0443310009
Q16	Transistor, NPN, Si. 2N3643	0443310009
Q17	Transistor, UJT 2N6028	1001260007
Q18	Transistor, NPN, Si. 2N3643	0443310009
Q19	Transistor, NPN, Si. 2N3646	0442520000
Q20	Transistor, NPN, Si. 2N3646	0442520000
Q21	Transistor, NPN, Si. MPSU45	0448570009
R1	Resistor, 2.7K, 10%, 1/4W	0186670001
R2	Resistor, 2.7K, 10%, 1/4W	0186670001
R3	Resistor, 100K, 10%, 1/4W	0170390004
R4	Resistor, 1.5K, 10%, 1/4W	0172470005
R5	Resistor, 1K, 10%, 1/4W	0171560001
R6	Resistor, 6.8K, 5%, 1/4W	0174810008
R7	Resistor, 2.2K, 5%, 1/4W	0174070009
R8	Resistor, 10K, 10%, 1/4W	0170410005
R9	Resistor, 220, 10%, 1/4W	0171320000
R10	Resistor, 680, 10%, 1/4W	0176630007
R11	Resistor, 2.2K, 5%, 1/4W	0178070009
R12	Resistor, 10K, 10%, 1/4W	0170410005
R13	Resistor, 1.2K, 10%, 1/4W	0181860007
R14	Resistor, 1.2K, 10%, 1/4W	0181860007
R15	Resistor, 4.7K, 5%, 1/4W	0170770001
R16	Resistor, 68K, 10%, 1/4W	0173520006
R17	Resistor, 68K, 10%, 1/4W	0173520006
R18	Resistor, 270, 10%, 1/4W	0178450006
R19	Resistor, 2.2K, 10%, 1/2W	0167360001
R20	Resistor, 330, 5%, 1/4W	0170910008
R21	Resistor, 1K, 10%, 1/4W	0171560001
R22	Resistor, 1K, 10%, 1/4W	0171560001
R23	Resistor, 10K, 10%, 1/4W	0170410005
R24	Resistor, 3.9K, 10%, 1/4W	0178830003
R25	Resistor, 1.5K, 10%, 1/4W	0172470005
R26	Resistor, 1K, 10%, 1/4W	0171560001
R27	Resistor, 1K, 10%, 1/4W	0171560001
R28	Resistor, 1K, 10%, 1/4W	0171560001
R29	Resistor, 10K, 10%, 1/4W	0170410005
R30	Resistor, 270, 10%, 1/4W	0178450006
R31	Resistor, 100K, 10%, 1/4W	0170390004
R32	Resistor, 270, 10%, 1/4W	0178450006
R33	Resistor, 270, 10%, 1/4W	0178450006
R34	Resistor, 270, 10%, 1/4W	0178450006
R35	Resistor, 270, 10%, 1/4W	0178450006
R36	Resistor, 270, 10%, 1/4W	0178450006
R37	Resistor, 1K, 10%, 1/4W	0171560001
R38	Resistor, 270, 10%, 1/4W	0178450006
R39	Resistor, 270, 10%, 1/4W	0178450006
R40	Resistor, 1K, 10%, 1/4W	0171560001
R41	Resistor, 1.2K, 5%, 1/2W	0175960003
R42	Resistor, 1K, 10%, 1/4W	0171560001
R43	Resistor, 390, 10%, 1/4W	0178330001
R44	Resistor, 3.9K, 10%, 1/4W	0178830003
R45	Resistor, 10K, 10%, 1/4W	0170410005
R46	POT., 1M, 10%, 3/4W, 15 Turns	0338490116

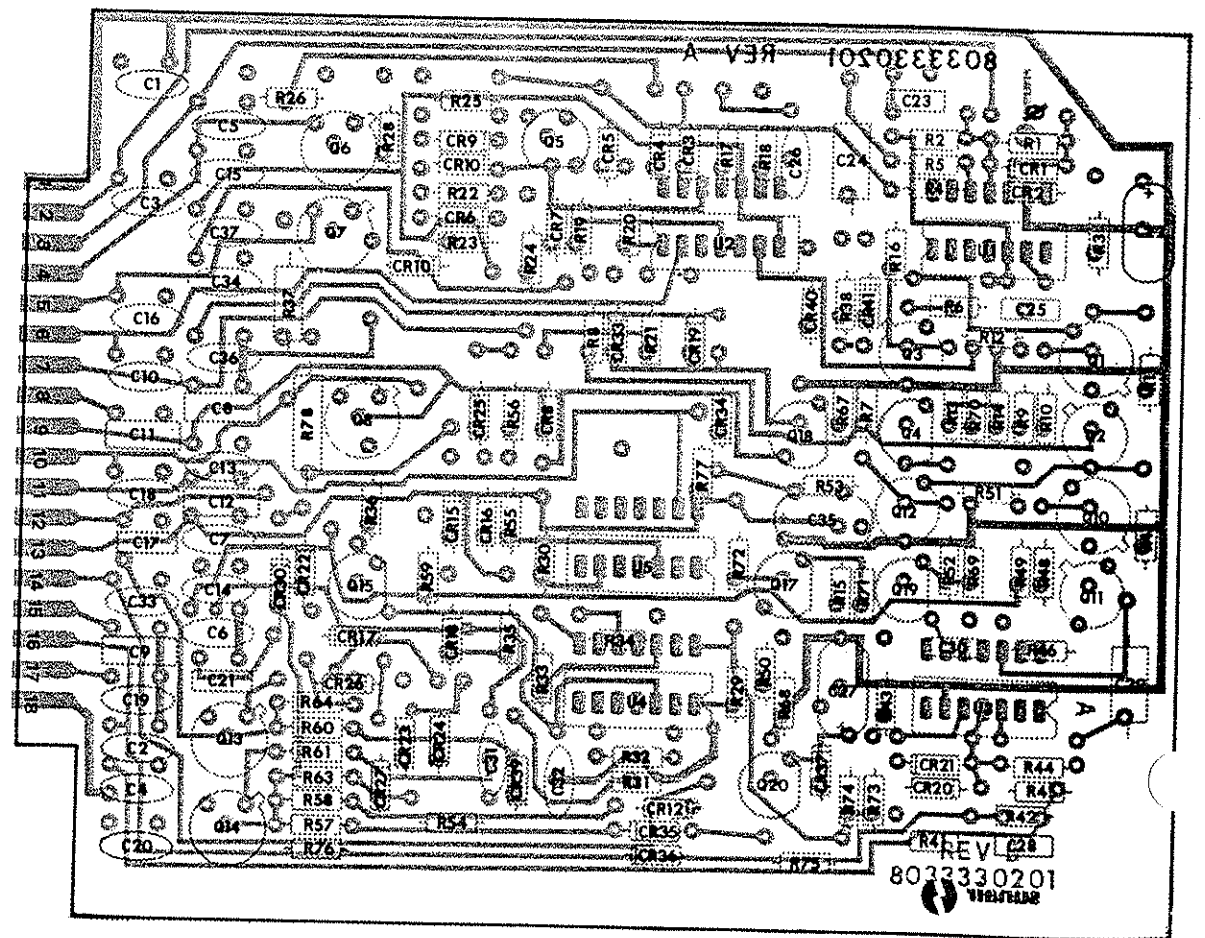
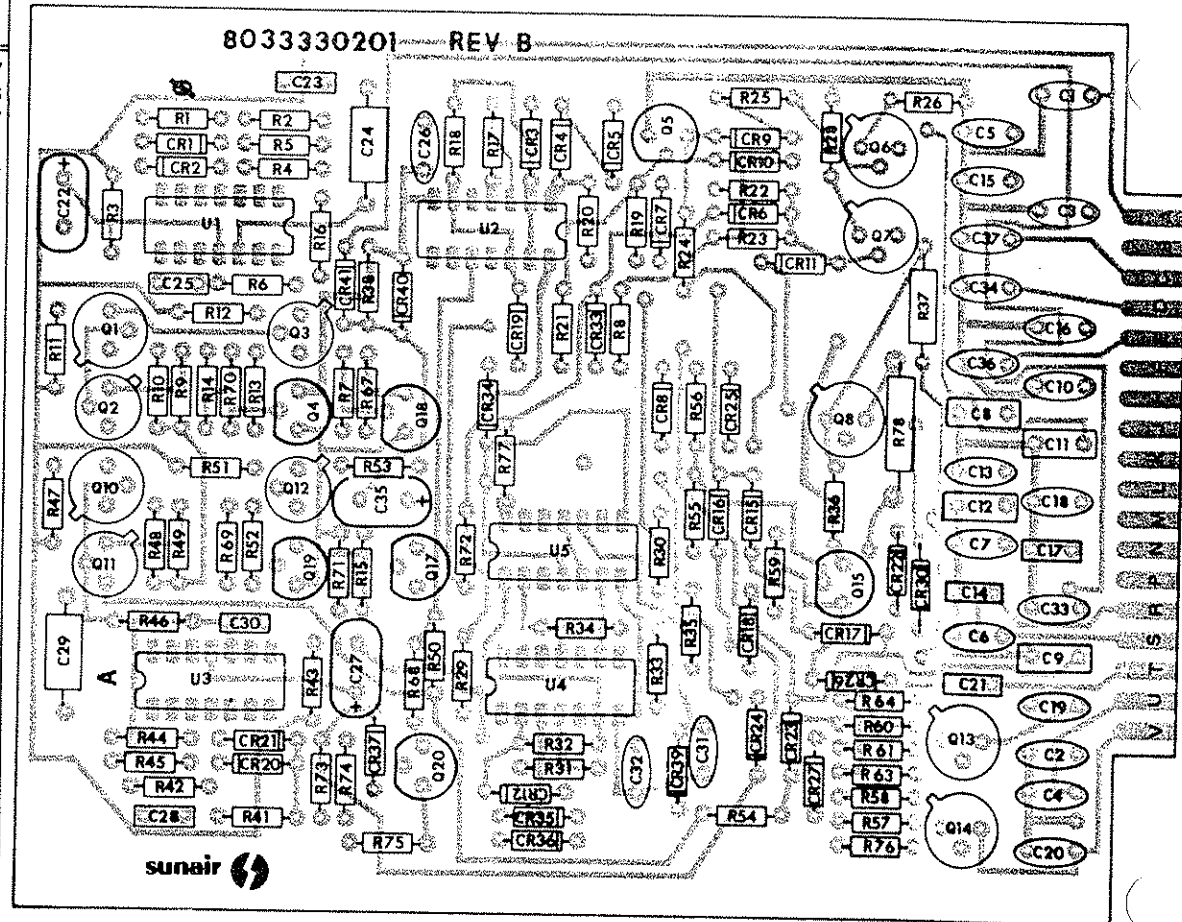
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R47	Resistor, 680K, 10%, 1/4W	0181480000
R48	Resistor, 270, 10%, 1/4W	0178450006
R49	Resistor, 47K, 10%, 1/4W	0171060008
R50	Resistor, 15K, 10%, 1/4W	0172350000
R51	Resistor, 2.2K, 10%, 1/2W	0167350001
R52	Resistor, 330, 5%, 1/4W	0170910008
R53	Resistor, 1.2K, 10%, 1/4W	0181860007
R54	POT., 1K, 10%, 1/2, 4 Turns	1000850021
R55	Resistor, 10K, 10%, 1/4W	0170410005
R56	Resistor, 3.9K, 10%, 1/4W	0178830003
R57	Resistor, 1K, 10%, 1/4W	0171560001
R58	Resistor, 10K, 10%, 1/4W	0170410005
R59	Resistor, 10K, 10%, 1/4W	0170410005
R60	Resistor, 2.2K, 10%, 1/2W	0167360001
R61	Resistor, 330, 5%, 1/4W	0170910008
R62	Resistor, 470K, 10%, 1/4W	0180570005
R63	Resistor, 10K, 10%, 1/4W	0170410005
U1	IC Linear, OP. AMP UA709DC	0447330004
U2	IC Digital SN7400N	0448070006
U3	IC Digital SN7400N	0448070006
U4	IC Digital SN7400N	0448070006
U5	IC Digital SN7400N	0448070006
U6	IC Digital SN7400N	0448070006

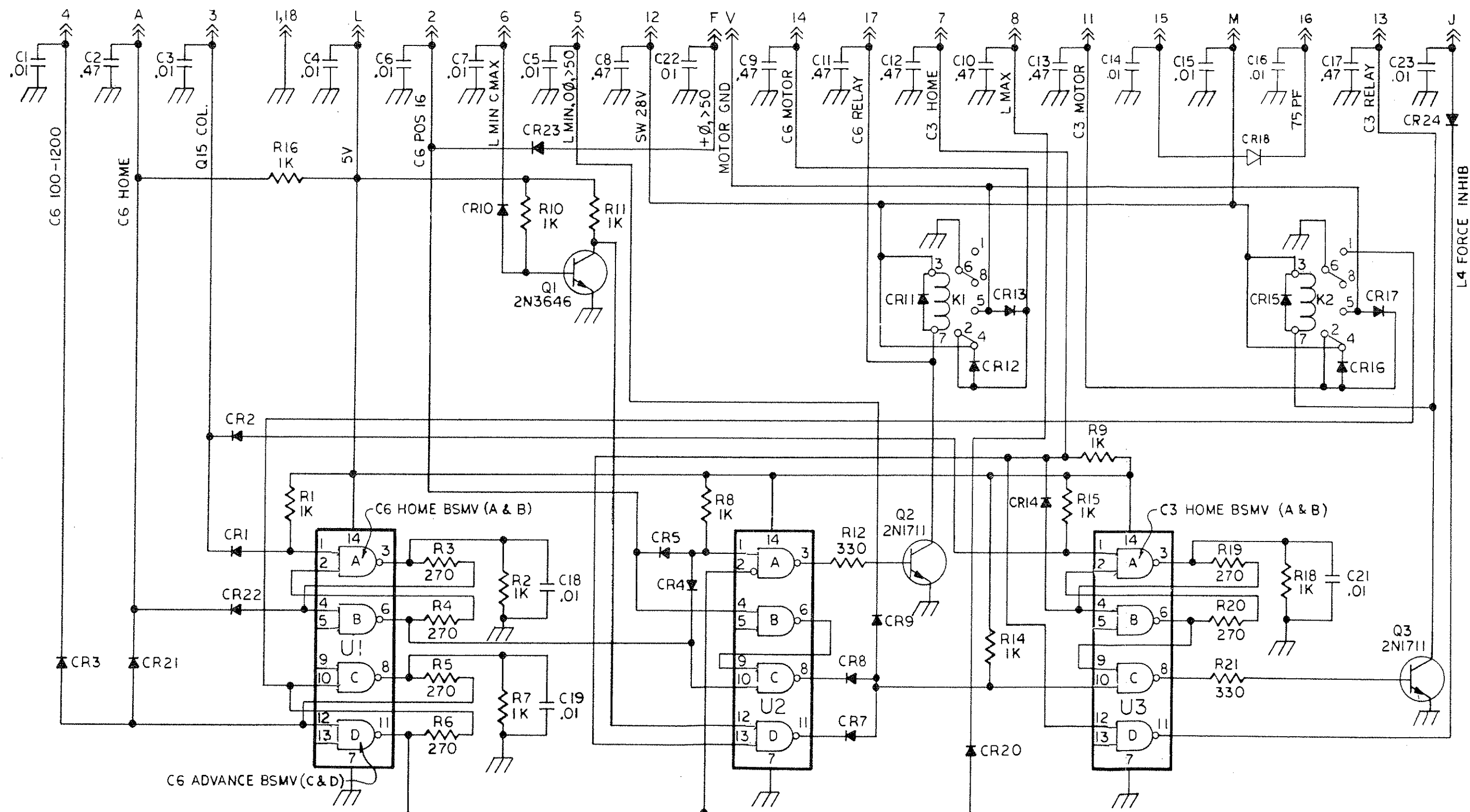


REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
C1	PC ASSY PHASE & AMPL CTRL	6035020089
C2	Capacitor, 0.01UF, 100V, Z5V	0273210009
C3	Capacitor, 0.01UF, 100V, Z5V	0273210009
C4	Capacitor, 0.01UF, 100V, Z5V	0273210009
C5	Capacitor, 0.01UF, 100V, Z5V	0273210009
C6	Capacitor, 0.01UF, 100V, Z5V	0273210009
C7	Capacitor, 0.01UF, 100V, Z5V	0273210009
C8	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C9	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C10	Capacitor, 0.01UF, 100V, Z5V	0273210009
C11	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C12	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C13	Capacitor, 0.01UF, 100V, Z5V	0273210009
C14	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C15	Capacitor, 0.01UF, 100V, Z5V	0273210009
C16	Capacitor, 0.01UF, 100V, Z5V	0273210009
C17	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C18	Capacitor, 0.01UF, 100V, Z5V	0273210009
C19	Capacitor, 0.01UF, 100V, Z5V	0273210009
C20	Capacitor, 0.01UF, 100V, Z5V	0273210009
C21	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C22	Capacitor, 15UF, 35V	0282240004
C23	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C24	Capacitor, 5600PF, 50V, Mylar	0282270001
C25	Capacitor, 200PF, 500V, DM10, 5%	0293050007
C26	Capacitor, 0.01UF, 100V, Z5V	0273210009
C27	Capacitor, 15UF, 35V	0282240004
C28	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C29	Capacitor, 5600PF, 50V, Mylar	0282270001
C30	Capacitor, 200PF, 500V, DM10, 5%	0293050007
C31	Capacitor, 0.01UF, 100V, Z5V	0273210009
C32	Capacitor, 0.01UF, 100V, Z5V	0273210009
C33	Capacitor, 0.01UF, 100V, Z5V	0273210009
C34	Capacitor, 0.01UF, 100V, Z5V	0273210009
C35	Capacitor, 15UF, 35V	0282240004
C36	Capacitor, 0.01UF, 100V, Z5V	0273210009
C37	Capacitor, 0.01UF, 100V, Z5V	0273210009
CR1	Diode, Signal, Si. 1N914	0442900007
CR2	Diode, Signal, Si. 1N914	0442900007
CR3	Diode, Rectifier 1N4004	0405180004
CR4	Diode, Signal, Si. 1N914	0442900007
CR5	Diode, Signal, Si. 1N914	0442900007
CR6	Diode, Signal, Si. 1N914	0442900007
CR7	Diode, Signal, Si. 1N914	0442900007
CR8	Diode, Signal, Si. 1N914	0442900007
CR9	Diode, Rectifier 1N4004	0405180004
CR10	Diode, Signal, Si. 1N914	0442900007
CR11	Diode, Signal, Germ. 1N270	0405510004
CR12	Diode, Signal, Germ. 1N270	0405510004
CR13	Not used	
CR14	Not used	
CR15	Diode, Signal, Si. 1N914	0442900007
CR16	Diode, Signal, Si. 1N914	0442900007
CR17	Diode, Signal, Si. 1N914	0442900007
CR18	Diode, Rectifier 1N4004	0405180004
CR19	Diode, Rectifier 1N4004	0405180004
CR20	Diode, Signal, Si. 1N914	0442900007
CR21	Diode, Signal, Si. 1N914	0442900007
CR22	Diode, Signal, Si. 1N914	0442900007
CR23	Diode, Signal, Si. 1N914	0442900007
CR24	Diode, Signal, Germ. 1N270	0405510004
CR25	Diode, Signal, Si. 1N914	0442900007
CR26	Diode, Signal, Si. 1N914	0442900007
CR27	Diode, Signal, Si. 1N914	0442900007
CR28	Not used	
CR29	Not used	
CR30	Diode, Rectifier 1N4004	0405180004
CR31	Not used	
CR32	Not used	
CR33	Not used	
CR34	Diode, Signal, Germ. 1N270	0405510004
CR35	Diode, Signal, Si. 1N914	0442900007
CR36	Diode, Signal, Si. 1N914	0442900007
CR37	Diode, Signal, Germ. 1N270	0405510004

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
CR38	Not used	
CR39	Diode, Signal, Si. 1N914	0442900007
CR40	Diode, Signal, Si. 1N914	0442900007
CR41	Diode, Signal, Si. 1N914	0442900007
Q1	Transistor, NPN, Si. 2N1711	0448380005
Q2	Transistor, PNP, Si. 2N2907A	0448390001
Q3	Transistor, PNP, Si. 2N2907A	0448390001
Q4	Transistor, NPN, Si. 2N3646	0442520000
Q5	Transistor, NPN, Si. 2N3646	0442520000
Q6	Transistor, NPN, Si. 2N1711	0448380005
Q7	Transistor, NPN, Si. 2N1711	0448380005
Q8	Transistor, NPN, Si. 2N1711	0448380005
Q9	Not used	
Q10	Transistor, NPN, Si. 2N1711	0448380005
Q11	Transistor, PNP, Si. 2N2907A	0448390001
Q12	Transistor, PNP, Si. 2N2907A	0448390001
Q13	Transistor, NPN, Si. 2N1711	0448380005
Q14	Transistor, NPN, Si. 2N1711	0448380005
Q15	Transistor, NPN, Si. 2N3646	0442520000
Q16	Not used	
Q17	Transistor, NPN, Si. 2N3646	0442520000
Q18	Transistor, NPN, Si. 2N3646	0186670001
Q19	Transistor, NPN, Si. 2N3646	0186670001
Q20	Transistor, NPN, Si. 2N3646	0186670001
R1	Resistor, 2.7K, 10%, 1/4W	0186670001
R2	Resistor, 2.7K, 10%, 1/4W	0186670001
R3	Resistor, 1K, 10%, 1/4W	0171560001
R4	Resistor, 1.5K, 10%, 1/4W	0172470005
R5	Resistor, 220K, 10%, 1/4W	0177780002
R6	Resistor, 6.8K, 5%, 1/4W	0174810008
R7	Resistor, 820, 10%, 1/4W	0178210005
R8	Resistor, 3.3K, 10%, 1/4W	0170890007
R9	Resistor, 220, 10%, 1/4W	0171320000
R10	Resistor, 220, 10%, 1/4W	0171320000
R11	Resistor, 330, 5%, 1/4W	0170910008
R12	Resistor, 220, 10%, 1/4W	0171320000
R13	Resistor, 1.2K, 10%, 1/4W	0181860007
R14	Resistor, 220, 10%, 1/4W	0171320000
R15	Resistor, 1.5K, 10%, 1/4W	0172470005
R16	Resistor, 10K, 10%, 1/4W	0170410005
R17	Resistor, 270, 10%, 1/4W	0178450006
R18	Resistor, 270, 10%, 1/4W	0178450006
R19	Resistor, 1K, 10%, 1/4W	0171560001
R20	Resistor, 1K, 10%, 1/4W	0171560001
R21	Resistor, 1.8K, 10%, 1/4W	0178190004
R22	Resistor, 1.8K, 10%, 1/4W	0178190004
R23	Resistor, 3.9K, 10%, 1/4W	0178830003
R24	Resistor, 10K, 10%, 1/4W	0170410005
R25	Resistor, 10K, 10%, 1/4W	0170410005
R26	Resistor, 68, 10%, 1/4W	0187960003
R27	Not used	
R28	Resistor, 68, 10%, 1/4W	0187960003
R29	Resistor, 1K, 10%, 1/4W	0171560001
R30	Resistor, 1K, 10%, 1/4W	0171560001
R31	Resistor, 270, 10%, 1/4W	0178450006
R32	Resistor, 270, 10%, 1/4W	0178450006
R33	Resistor, 270, 10%, 1/4W	0178450006
R34	Resistor, 270, 10%, 1/4W	0178450006
R35	Resistor, 470, 5%, 1/4W	0184110009
R36	Resistor, 10K, 10%, 1/4W	0170410005
R37	Resistor, 5.6, 10%, 1/2W	0168030004
R38	Resistor, 68K, 10%, 1/4W	0173520006
R39	Not used	
R40	Not used	
R41	Resistor, 2.7K, 10%, 1/4W	0186670001
R42	Resistor, 2.7K, 10%, 1/4W	0186670001
R43	Resistor, 1K, 10%, 1/4W	0171560001
R44	Resistor, 1.5K, 10%, 1/4W	0172470005
R45	Resistor, 470K, 10%, 1/4W	0180570005
R46	Resistor, 6.8K, 5%, 1/4W	0174810008
R47	Resistor, 330, 5%, 1/4W	0170910008
R48	Resistor, 220, 10%, 1/4W	0171320000
R49	Resistor, 220, 10%, 1/4W	0171320000
R50	Resistor, 470, 5%, 1/4W	0184110009
R51	Resistor, 220, 10%, 1/4W	0171320000

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R52	Resistor, 1.2K, 10%, 1/4W	0181860007
R53	Resistor, 10K, 10%, 1/4W	0170410005
R54	Resistor, 3.3K, 10%, 1/4W	0170890007
R55	Resistor, 1K, 10%, 1/4W	0171560001
R56	Resistor, 1.8K, 10%, 1/4W	0178190004
R57	Resistor, 1.8K, 10%, 1/4W	0178190004
R58	Resistor, 3.9K, 10%, 1/4W	0178830003
R59	Resistor, 10K, 10%, 1/4W	0170410005
R60	Resistor, 10K, 10%, 1/4W	0170410005
R61	Resistor, 4.7K, 5%, 1/4W	0170770001
R62	Not used	
R63	Resistor, 68, 10%, 1/4W	0187960003
R64	Resistor, 68, 10%, 1/4W	0187960003
R65	Not used	
R66	Not used	
R67	Resistor, 100, 5%, 1/4W	0171180003
R68	Resistor, 390, 10%, 1/4W	0178330001
R69	Resistor, 100, 5%, 1/4W	0171180003
R70	Resistor, 5.6K, 10%, 1/4W	0183060008
R71	Resistor, 6.8K, 5%, 1/4W	0174810008
R72	Resistor, 1.5K, 10%, 1/4W	0172470005
R73	Resistor, 1K, 10%, 1/4W	0171560001
R74	Resistor, 1K, 10%, 1/4W	0171560001
R75	Resistor, 1K, 10%, 1/4W	0171560001
R76	Resistor, 1.8K, 10%, 1/4W	0178190004
R77	Resistor, 1K, 10%, 1/4W	0171560001
R78	Resistor, 30, 5%, 3W	0179240005
U1	iC. Linear, OP. AMP UA709DC	0447330004
U2	iC. Digital SN7400N	0448070006
U3	iC. Linear, OP. AMP UA709DC	0447330004
U4	iC. Digital SN7400N	0448070006
U5	iC. Digital SN7400N	0448070006





NOTES:

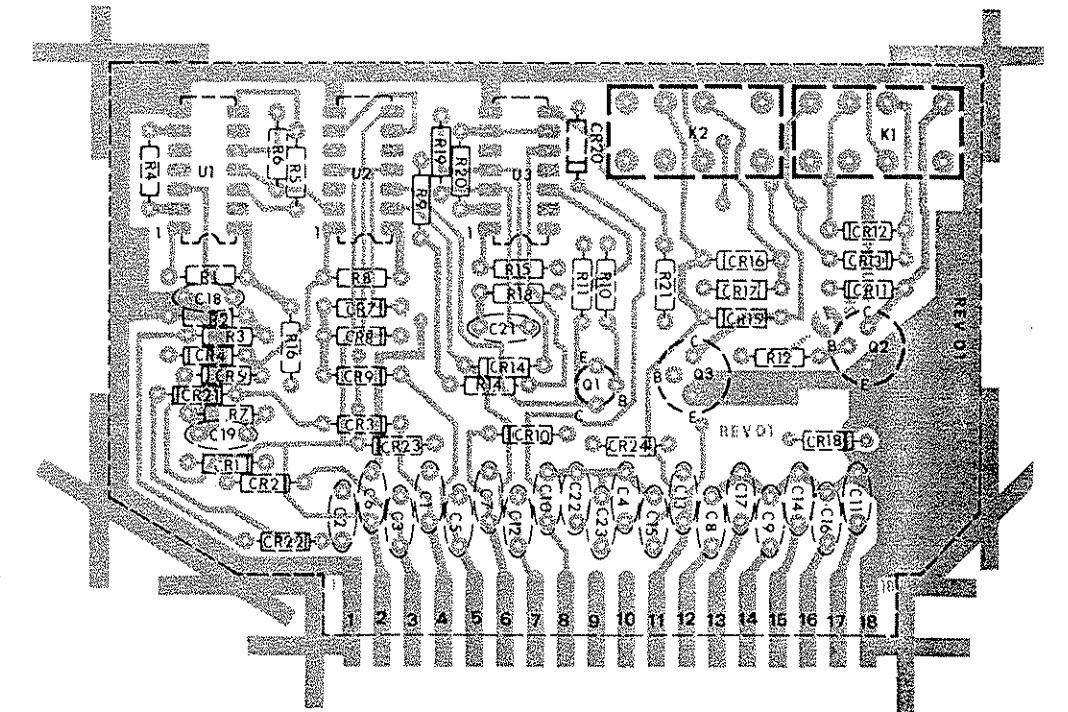
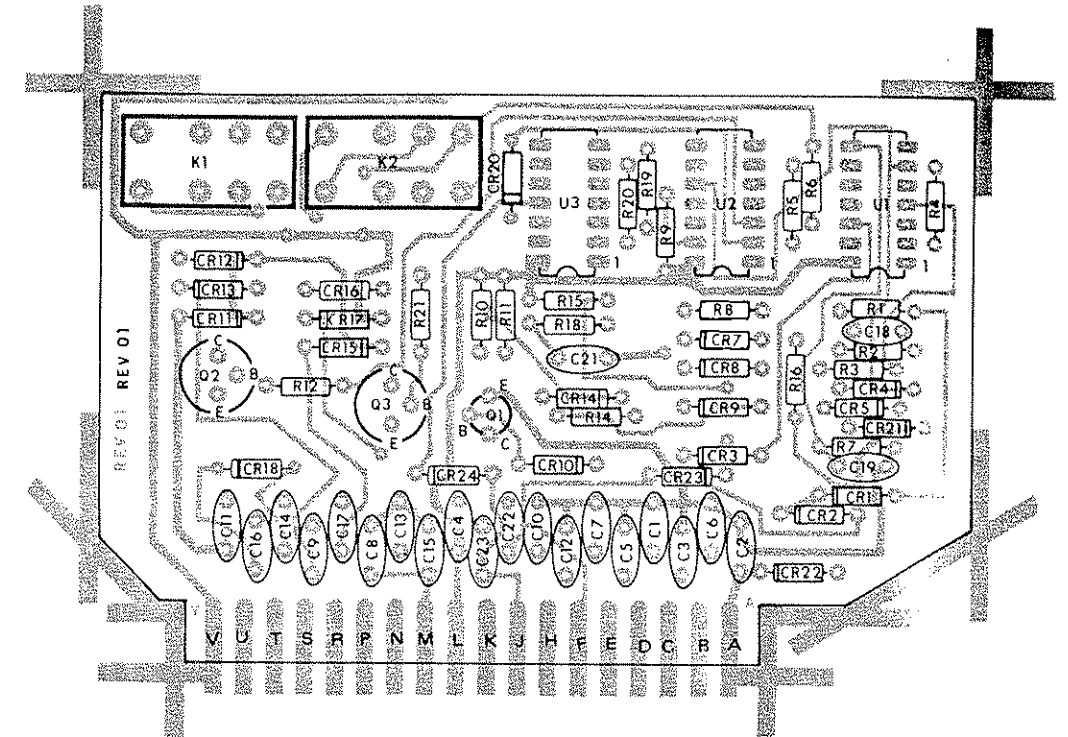
- 1) UNLESS OTHERWISE SPECIFIED:
ALL RESISTOR VALUES ARE IN OHMS, $\pm 10\%$, 1/4 WATT.
ALL CAPACITOR VALUES ARE IN MICROFARADS, $\pm 10\%$.

Figure 5.35 C3 and C6 Control Assembly (3A4)

8033340096C PC ASSY C3 & C6 CONT

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY C3 & C6 CDNT	8033340096
C1	Capacitor, 0.01UF, 100V, Z5V	0273210009
C2	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C3	Capacitor, 0.01UF, 100V, Z5V	0273210009
C4	Capacitor, 0.01UF, 100V, Z5V	0273210009
C5	Capacitor, 0.01UF, 100V, Z5V	0273210009
C6	Capacitor, 0.01UF, 100V, Z5V	0273210009
C7	Capacitor, 0.01UF, 100V, Z5V	0273210009
C8	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C9	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C10	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C11	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C12	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C13	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C14	Capacitor, 0.01UF, 100V, Z5V	0273210009
C15	Capacitor, 0.01UF, 100V, Z5V	0273210009
C16	Capacitor, 0.01UF, 100V, Z5V	0273210009
C17	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C18	Capacitor, 0.01UF, 100V, Z5V	0273210009
C19	Capacitor, 0.01UF, 100V, Z5V	0273210009
C20	Not used	
C21	Capacitor, 0.01UF, 100V, Z5V	0273210009
C22	Capacitor, 0.01UF, 100V, Z5V	0273210009
C23	Capacitor, 0.01UF, 100V, Z5V	0273210009
CR1	Diode, Signal, Si. 1N914	0442900007
CR2	Diode, Signal, Si. 1N914	0442900007
CR3	Diode, Signal, Si. 1N914	0442900007
CR4	Diode, Signal, Si. 1N914	0442900007
CR5	Diode, Signal, Si. 1N914	0442900007
CR6	Not used	
CR7	Diode, Signal, Si. 1N914	0442900007
CR8	Diode, Signal, Si. 1N914	0442900007
CR9	Diode, Signal, Si. 1N914	0442900007
CR10	Diode, Signal, Germ. 1N270	0405510004
CR11	Diode, Rectifier 1N4004	0405180004
CR12	Diode, Rectifier 1N4004	0405180004
CR13	Diode, Rectifier 1N4004	0405180004
CR14	Diode, Signal, Si. 1N914	0442900007
CR15	Diode, Rectifier 1N4004	0405180004
CR16	Diode, Rectifier 1N4004	0405180004
CR17	Diode, Rectifier 1N4004	0405180004
CR18	Diode, Rectifier 1N4004	0405180004
CR19	Not used	
CR20	Diode, Signal, Si. 1N914	0442900007
CR21	Diode, Signal, Si. 1N914	0442900007
CR22	Diode, Signal, Si. 1N914	0442900007
CR23	Diode, Signal, Germ. 1N270	0405510004
CR24	Diode, Signal, Si. 1N914	0442900007
K1	Relay, DPDT, 24V, Crystal Can	0661630005
K2	Relay, DPDT, 24V, Crystal Can	0661630005
Q1	Transistor, NPN, Si. 2N3646	0442520000
Q2	Transistor, NPN, Si. 2N1711	0448380005
Q3	Transistor, NPN, Si. 2N1711	0448380005
R1	Resistor, 1K, 10%, 1/4W	0171560001
R2	Resistor, 1K, 10%, 1/4W	0171560001
R3	Resistor, 270, 10%, 1/4W	0178450006
R4	Resistor, 270, 10%, 1/4W	0178450006
R5	Resistor, 270, 10%, 1/4W	0178450006
R6	Resistor, 270, 10%, 1/4W	0178450006
R7	Resistor, 1K, 10%, 1/4W	0171560001
R8	Resistor, 1K, 10%, 1/4W	0171560001
R9	Resistor, 1K, 10%, 1/4W	0171560001
R10	Resistor, 1K, 10%, 1/4W	0171560001
R11	Resistor, 1K, 10%, 1/4W	0171560001
R12	Resistor, 330, 5%, 1/4W	0170910008
R13	Not used	
R14	Resistor, 1K, 10%, 1/4W	0171560001
R15	Resistor, 1K, 10%, 1/4W	0171560001
R16	Resistor, 1K, 10%, 1/4W	0171560001
R17	Not used	
R18	Resistor, 1K, 10%, 1/4W	0171560001
R19	Resistor, 270, 10%, 1/4W	0178450006
R20	Resistor, 270, 10%, 1/4W	0178450006
R21	Resistor, 330, 5%, 1/4W	0170910008

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
U1	IC, Digital SN7400N	0448070006
U2	IC, Digital SN7400N	0448070006
U3	IC, Digital SN7400N	0448070006



S8033-3500A

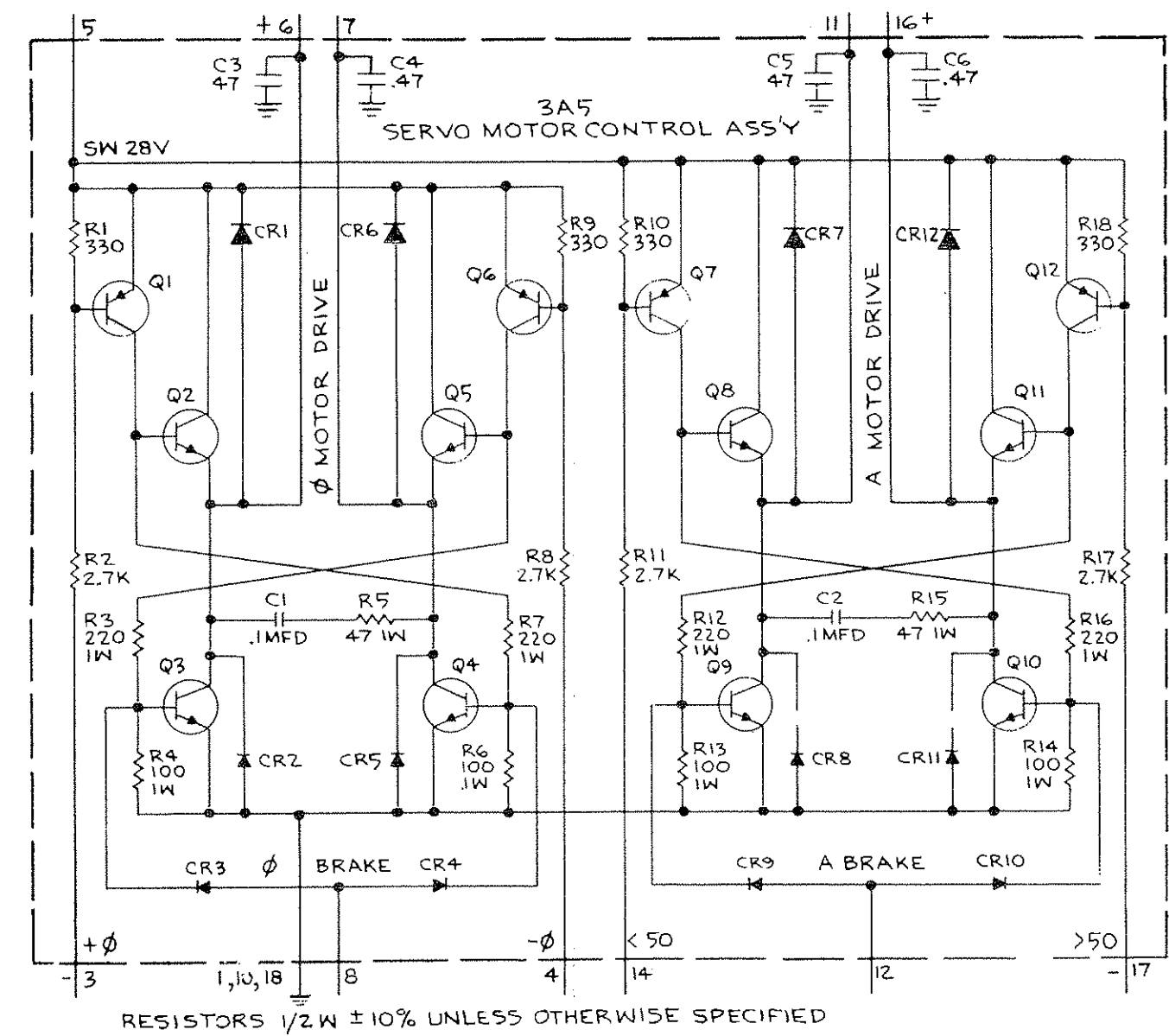
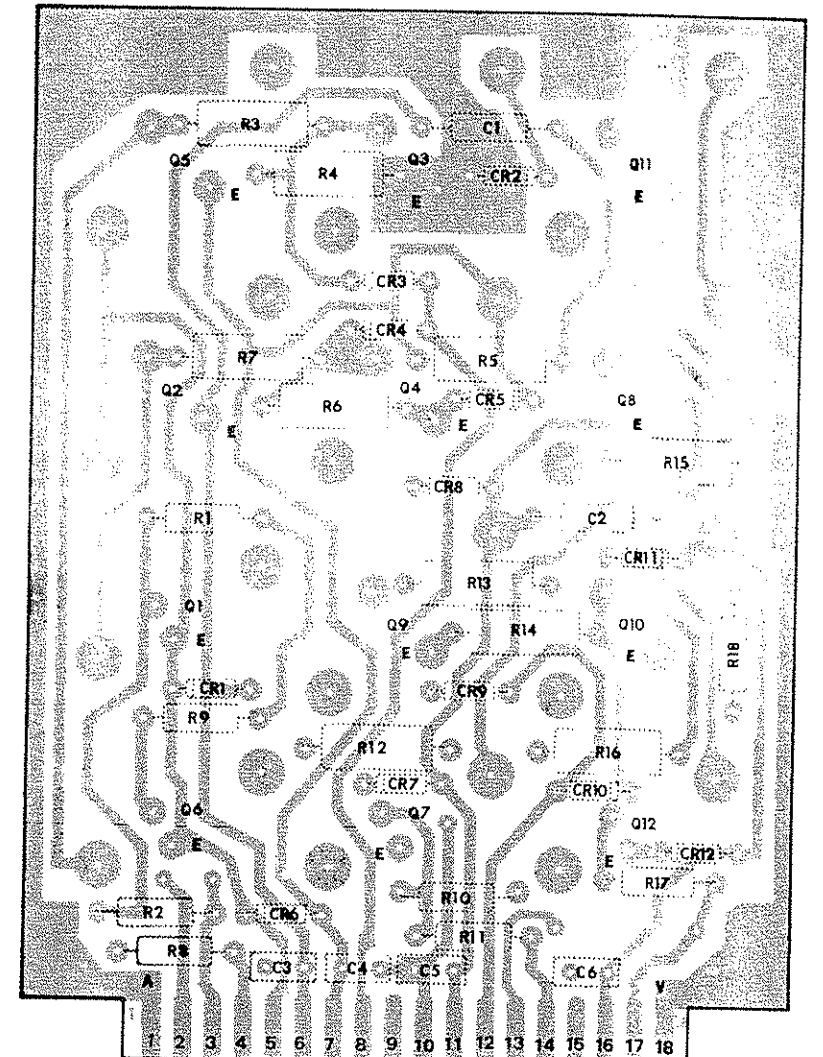
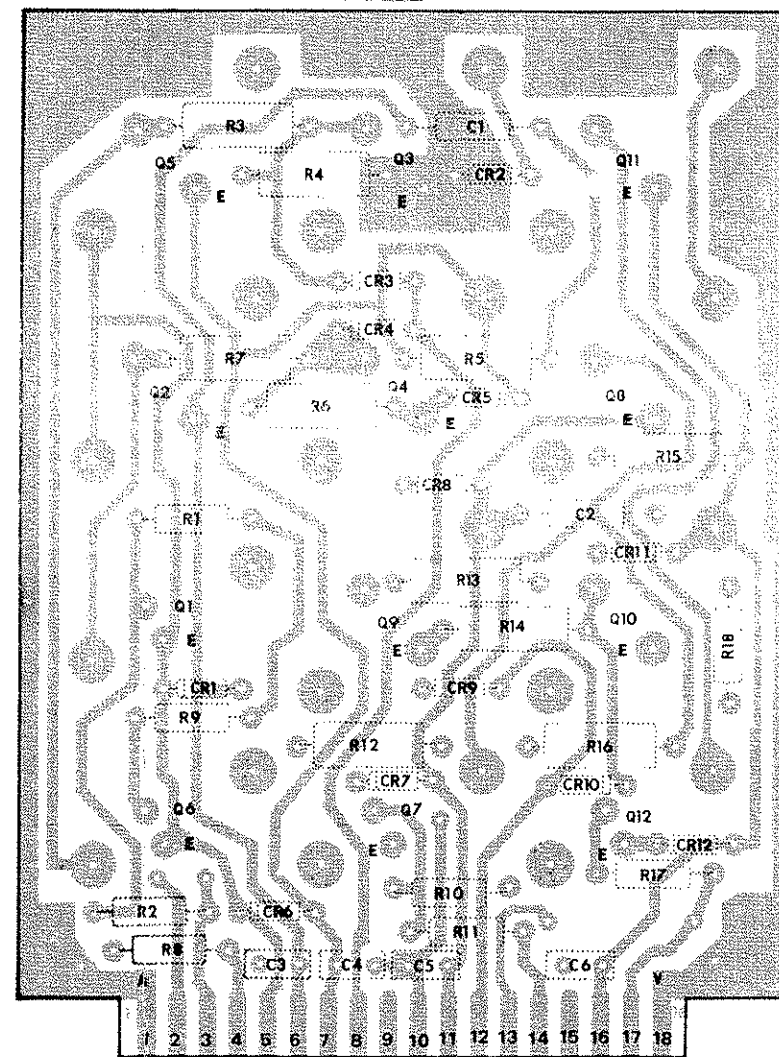


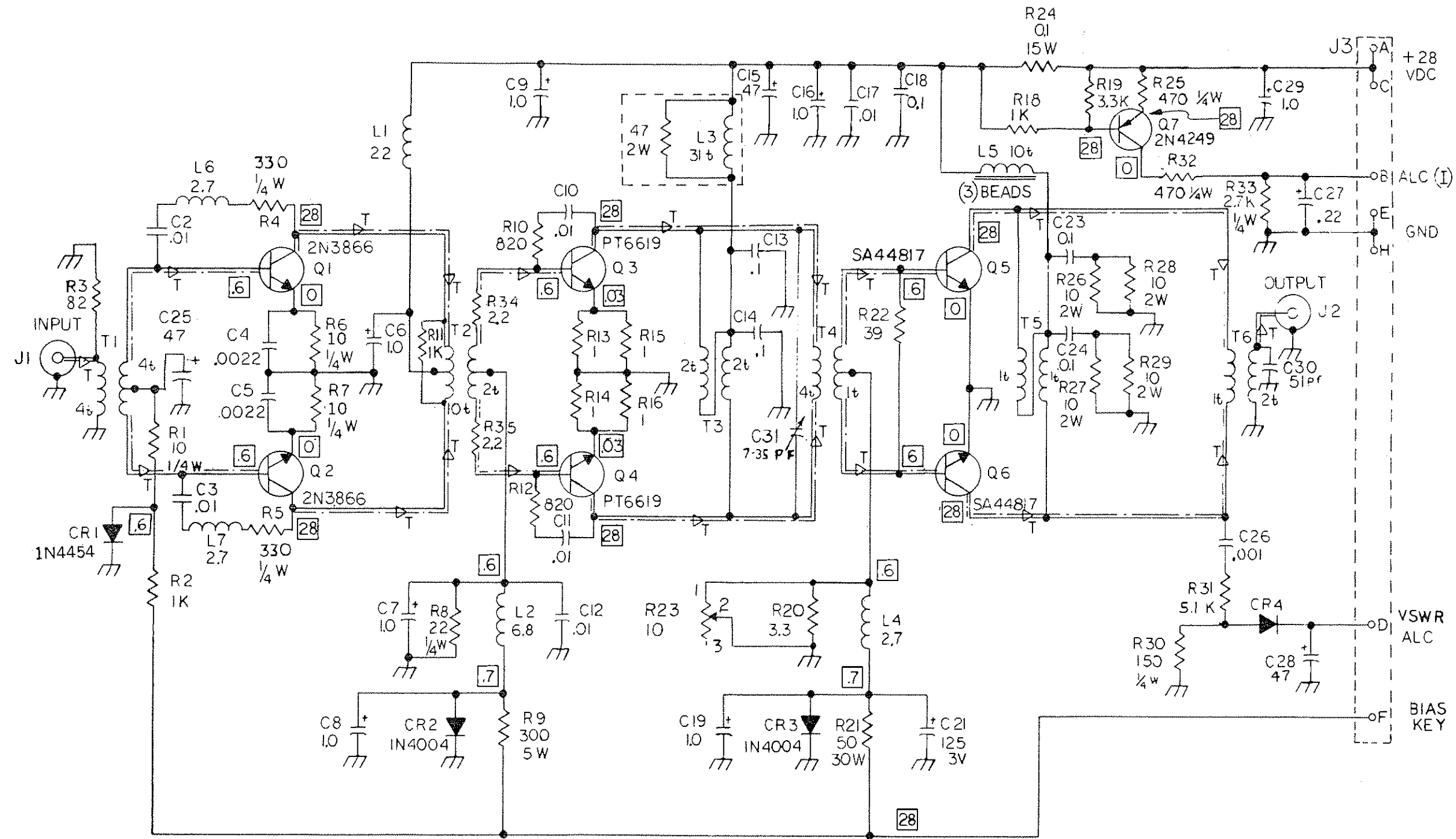
Figure 5.36 Servo Motor Control Assembly (3A5)

8033350091F PC ASSY SERV MOTOR CEN

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	PC ASSY SERV MOTOR CEN	8033350091
C1	Capacitor, 0.10UF, 100V, Mylar	0272160008
C2	Capacitor, 0.10UF, 100V, Mylar	0272160008
C3	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C4	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C5	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
C6	Capacitor, 0.47UF, 50V, X5V, 20%	0283370009
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, Rectifier 1N4004	0405180004
CR9	Diode, Rectifier 1N4004	0405180004
CR10	Diode, Rectifier 1N4004	0405180004
CR11	Diode, Rectifier 1N4004	0405180004
CR12	Diode, Rectifier 1N4004	0405180004
Q1	Transistor, PNP, Si. 2N3741	0448360004
Q2	Transistor, NPN, Si. 2N3772	0448370000
Q3	Transistor, NPN, Si. 2N3772	0448370000
Q4	Transistor, NPN, Si. 2N3772	0448370000
Q5	Transistor, NPN, Si. 2N3772	0448370004
Q6	Transistor, PNP, Si. 2N3741	0448360004
Q7	Transistor, PNP, Si. 2N3741	0448360004
Q8	Transistor, NPN, Si. 2N3772	0448370000
Q9	Transistor, NPN, Si. 2N3772	0448370000
Q10	Transistor, NPN, Si. 2N3772	0448370000
Q11	Transistor, NPN, Si. 2N3772	0448370000
Q12	Transistor, PNP, Si. 2N3741	0448360004
R1	Resistor, 330, 10%, 1/2W	0173380000
R2	Resistor, 2.7K, 10%, 1/2W	0165780002
R3	Resistor, 220, 10%, 1W	0197190006
R4	Resistor, 100, 10%, 1W	0165540001
R5	Resistor, 47, 10%, 1W	0164990003
R6	Resistor, 100, 10%, 1W	0165540001
R7	Resistor, 220, 10%, 1W	0197190006
R8	Resistor, 2.7K, 10%, 1/2W	0165780002
R9	Resistor, 330, 10%, 1/2W	0173380000
R10	Resistor, 330, 10%, 1/2W	0173380000
R11	Resistor, 2.7K, 10%, 1/2W	0165780002
R12	Resistor, 220, 10%, 1W	0197190006
R13	Resistor, 100, 10%, 1W	0165540001
R14	Resistor, 100, 10%, 1W	0165540001
R15	Resistor, 47, 10%, 1W	0164990003
R16	Resistor, 220, 10%, 1W	0197190006
R17	Resistor, 2.7K, 10%, 1/2W	0165780002
R18	Resistor, 330, 10%, 1/2W	0173380000



5024030079J



UNLESS OTHERWISE SPECIFIED :

- 1. ALL-RESISTORS IN OHMS, $\frac{1}{2}$ W
- CAPACITORS IN μ F
- INDUCTORS IN μ H
- DIODES ARE IN4454

2. PREFIX ALL DESIGNATORS WITH "1A7A1"

3. UNUSED DESIGNATORS :

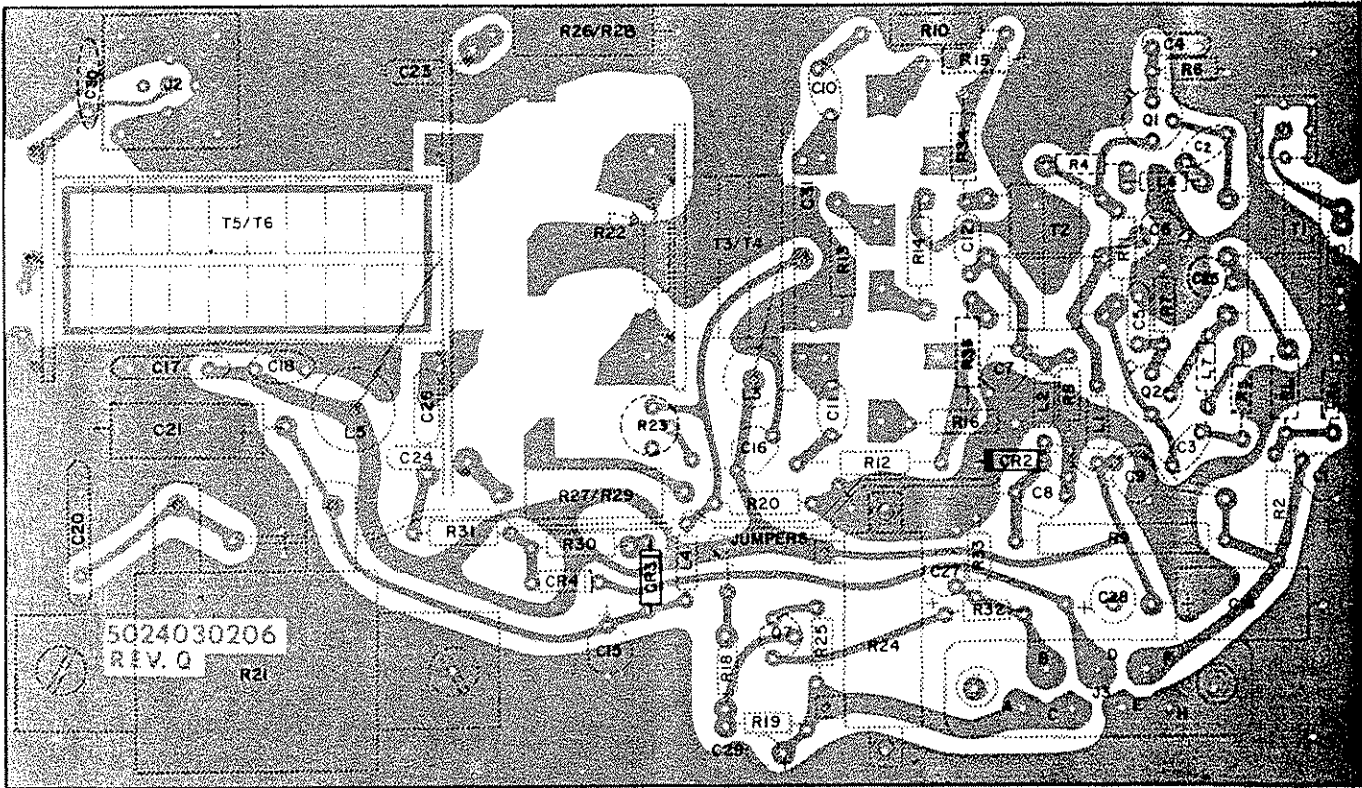
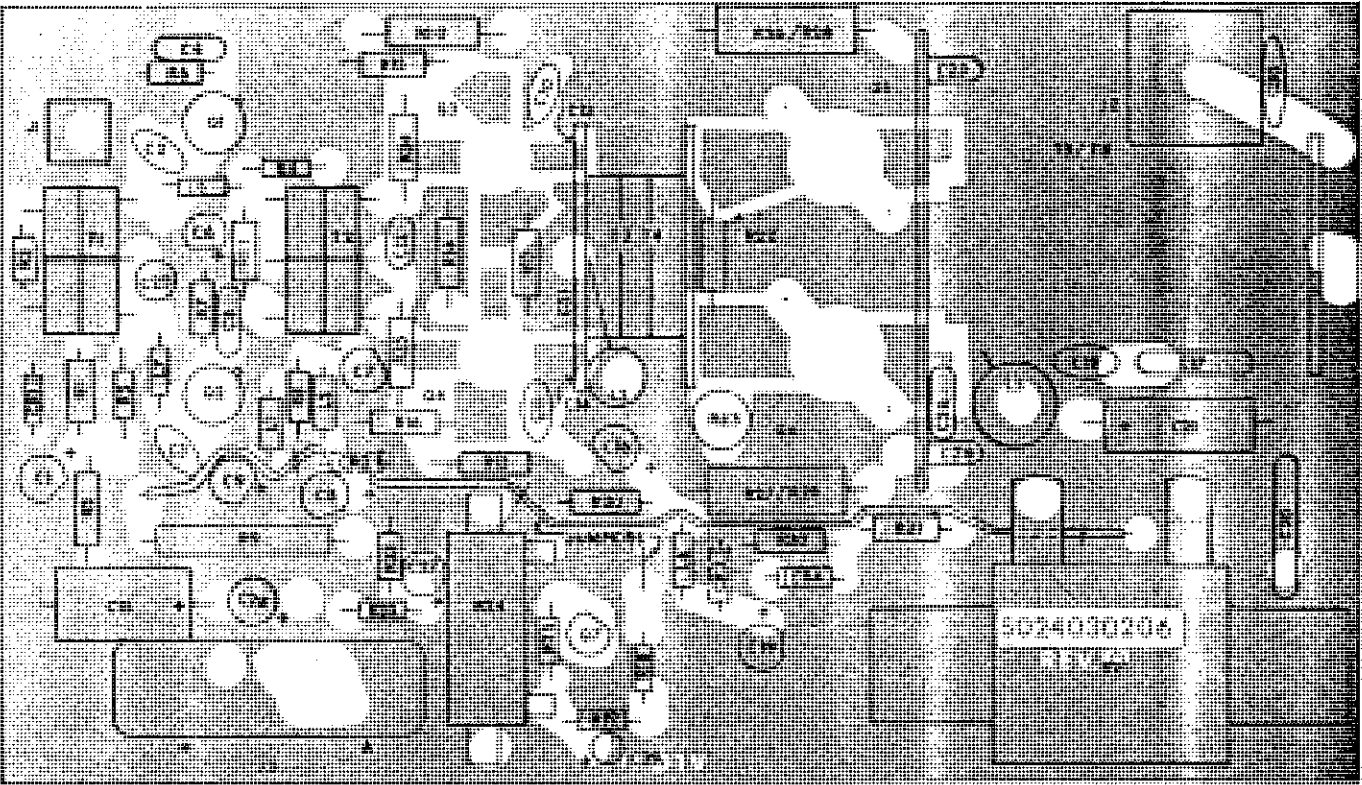
R17 C1, C20

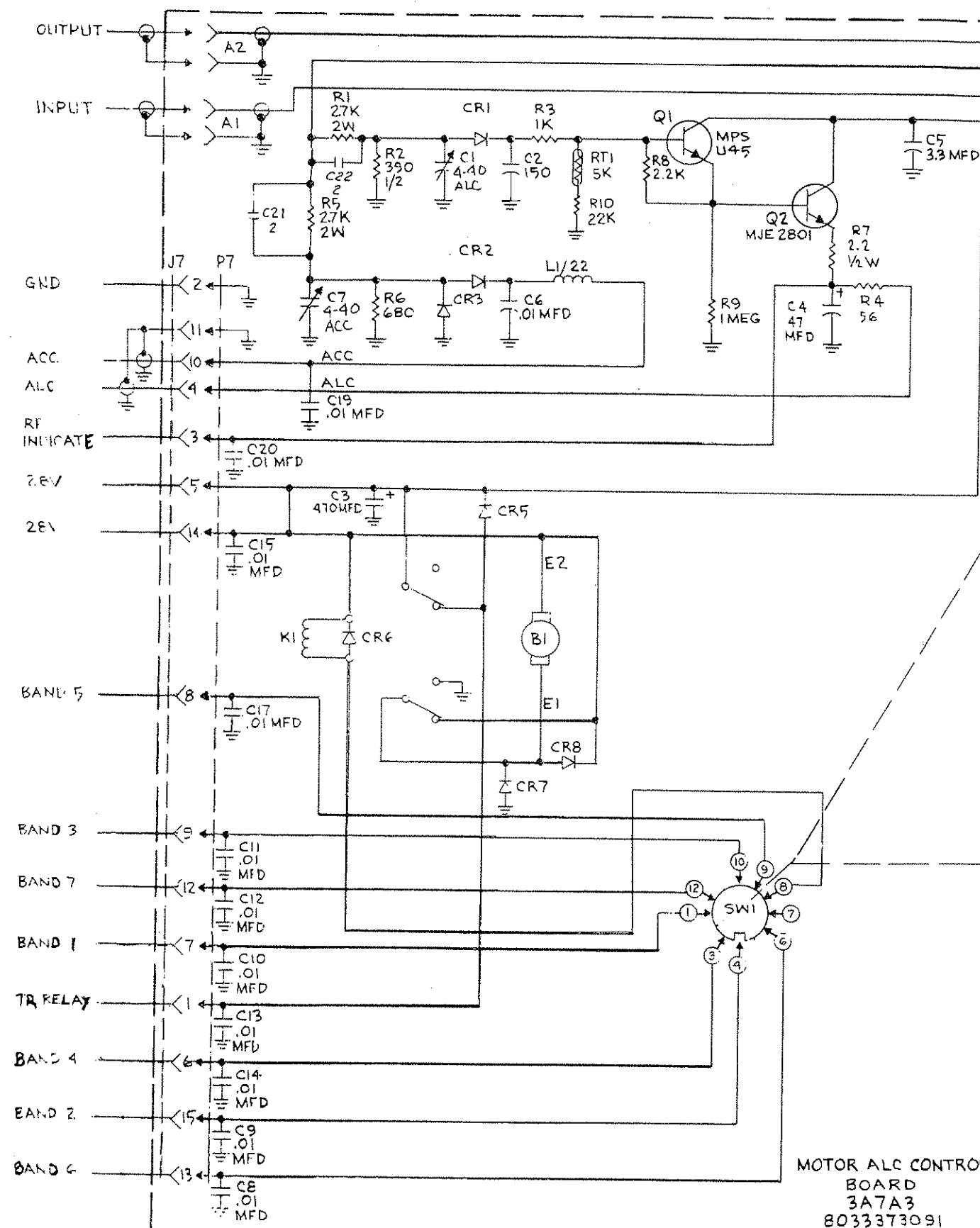
4. VOLTAGES ARE GIVEN WITH XMTR KEYED IN SSB AND NO MODULATION

Figure 5.37 RF Power Amplifier Schematic (1A7A1)

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	POWER AMPLIFIER ASSY	5024030192
C1	Not used	
C2	Capacitor, 0.01UF, 50 V, W5 R, 20%	0281730008
C3	Capacitor, 0.01UF, 50 V, W5 R, 20%	0281730008
C4	Capacitor, 0.0022 UF, 200 V, Z5 F, 10%	0272780006
C5	Capacitor, 0.0022 UF, 200 V, Z5 F, 10%	0272780006
C6	Capacitor, 1UF, 50 V, 198 D	0280910002
C7	Capacitor, 1UF, 50 V, 198 D	0280910002
C8	Capacitor, 1UF, 50 V, 198 D	0280910002
C9	Capacitor, 1UF, 50 V, 198 D	0280910002
C10	Capacitor, 0.01UF, 50 V, W5 R, 20%	0281730008
C11	Capacitor, 0.01UF, 50 V, W5 R, 20%	0281730008
C12	Capacitor, 0.01UF, 25 V, X55	0281620008
C13	Capacitor, 0.1UF, 50 V, X7 R, 20%	0281610002
C14	Capacitor, 0.1UF, 50 V, X7 R, 20%	0281610002
C15	Capacitor, 47 UF, 50 V, CL65 B	0245750002
C16	Capacitor, 1UF, 50 V, 198 D	0280910002
C17	Capacitor, 0.01UF, 250 V, Z5 R, 10%	0280950004
C18	Capacitor, 0.1UF, 50 V, X7 R, 20%	0281610002
C19	Capacitor, 1UF, 50 V, 198 D	0280910002
C20	Not used	
C21	Capacitor, 125 UF, 3 V	0266020003
C22	Not used	
C23	Capacitor, 0.1UF, 50 V, X7 R, 20%	0281610002
C24	Capacitor, 0.1UF, 50 V, X7 R, 20%	0281610002
C25	Capacitor, 47 UF, 20 V, 196 D	0281700001
C26	Capacitor, 0.001UF, 250 V, X5 R, 10%	0286260000
C27	Capacitor, .22UF, 35 V, T368	0283510005
C28	Capacitor, 47 UF, 20 V, 196 D	0281700001
C29	Capacitor, 1UF, 50 V, 198 D	0280910002
C30	Capacitor, 51 PF, 500 V, DM15, 2%	0281350001
C31	Capacitor, 7-35 PF, 160 V, N1500	0287390004
CR1	Diode, Signal, Sil. 1N4454	0405270003
CR2	Diode, Rectifier, 1N4004	0405180004
CR3	Diode, Rectifier, 1N4004	0405180004
CR4	Diode, Signal, Sil. 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
L5	Choke, RF	5024030702
L6	Inductor, Molded, 2.7 UH, 5%	0652180001
L7	Inductor, Molded, 2.7 UH, 5%	0652180001
Q1	Transistor, NPN, Si. 2N3866	0448140004
Q2	Transistor, NPN, Si. 2N3866	0448140004
Q3	Transistor, NPN, Si PT6619	0448150000
Q4	Transistor, NPN Si PT6619	0448150000
Q5	Transistor, NPN Si	0448170001
Q6	Transistor, NPN Si	0448170001
Q7	Transistor, PNP, Si. 2N4249	0446780006
R1	Resistor, 10, 5%, 1/4 W	0177160004
R2	Resistor, 1K, 10%, 1/2 W	0167480006
R3	Resistor, 82, 10%, 1/4 W	0184610001
R4	Resistor, 330, 5%, 1/4 W	0170910008
R5	Resistor, 330, 5%, 1/4 W	0170910008
R6	Resistor, 10, 5%, 1/4 W	0177160004
R7	Resistor, 10, 5%, 1/4 W	0177160004
R8	Resistor, 22, 10%, 1/4 W	0192690001
R9	Resistor, 300, 5%, 5 W	0161140009
R10	Resistor, 820, 10%, 1/2 W	0175600007
R11	Resistor, 1K, 10%, 1/2 W	0167480006
R12	Resistor, 820, 10%, 1/2 W	0175600007
R13	Resistor, 1, 10%, 1/2 W	0194770001
R14	Resistor, 1, 10%, 1/2 W	0194770001
R15	Resistor, 1, 10%, 1/2 W	0194770001
R16	Resistor, 1, 10%, 1/2 W	0194770001
R17	Not used	
R18	Resistor, 1K, 10%, 1/2 W	0167480006
R19	Resistor, 3.3K, 5%, 1/2 W	0184090008
R20	Resistor, 3.3, 10%, 1/2 W	0186050003
R21	Resistor, 50, 10%, 30 W	0193240009
R22	Resistor, 39, 10%, 1/2 W	0165920009

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
R23	Pot., 10, 5%, 1/2 W, PC Mount	0346380006
R24	Resistor, 0.1, 10%, 15 W	0193360004
R25	Resistor, 470, 10%, 1/4 W	0172610001
R26	Resistor, 10, 10%, 2 W	0163840008
R27	Resistor, 10, 10%, 2 W	0163840008
R28	Resistor, 10, 10%, 2 W	0163840008
R29	Resistor, 10, 10%, 2 W	0163840008
R30	Resistor, 150, 10%, 1/4 W	0172730007
R31	Resistor, 5.1 K, 5%, 1/2 W	0183700007
R32	Resistor, 470, 10%, 1/4 W	0172610001
R33	Resistor, 2.7 K, 10%, 1/4 W	0186670001
R34	Resistor, 2.2, 10%, 1/2 W	0178690007
R35	Resistor, 2.2, 10%, 1/2 W	0178690007
T1	Transformer Input	5024030401
T2	Transformer Interstage	5024030508
T3	Driver, Transformer Assy	5024030893
T4	Driver, Transformer Assy	5024030893
T5	Output, Transformer Assy	5024031199
T6	Output, Transformer Assy	5024031199





NOTE: UNLESS OTHERWISE SPECIFIED 3A7 FILTER ASSY.

1. ALL CAPACITORS IN PF
2. ALL INDUCTORS IN MICROHENRIES
3. ALL RESISTORS 1/4 W $\pm 10\%$ UNLESS OTHERWISE SPECIFIED.

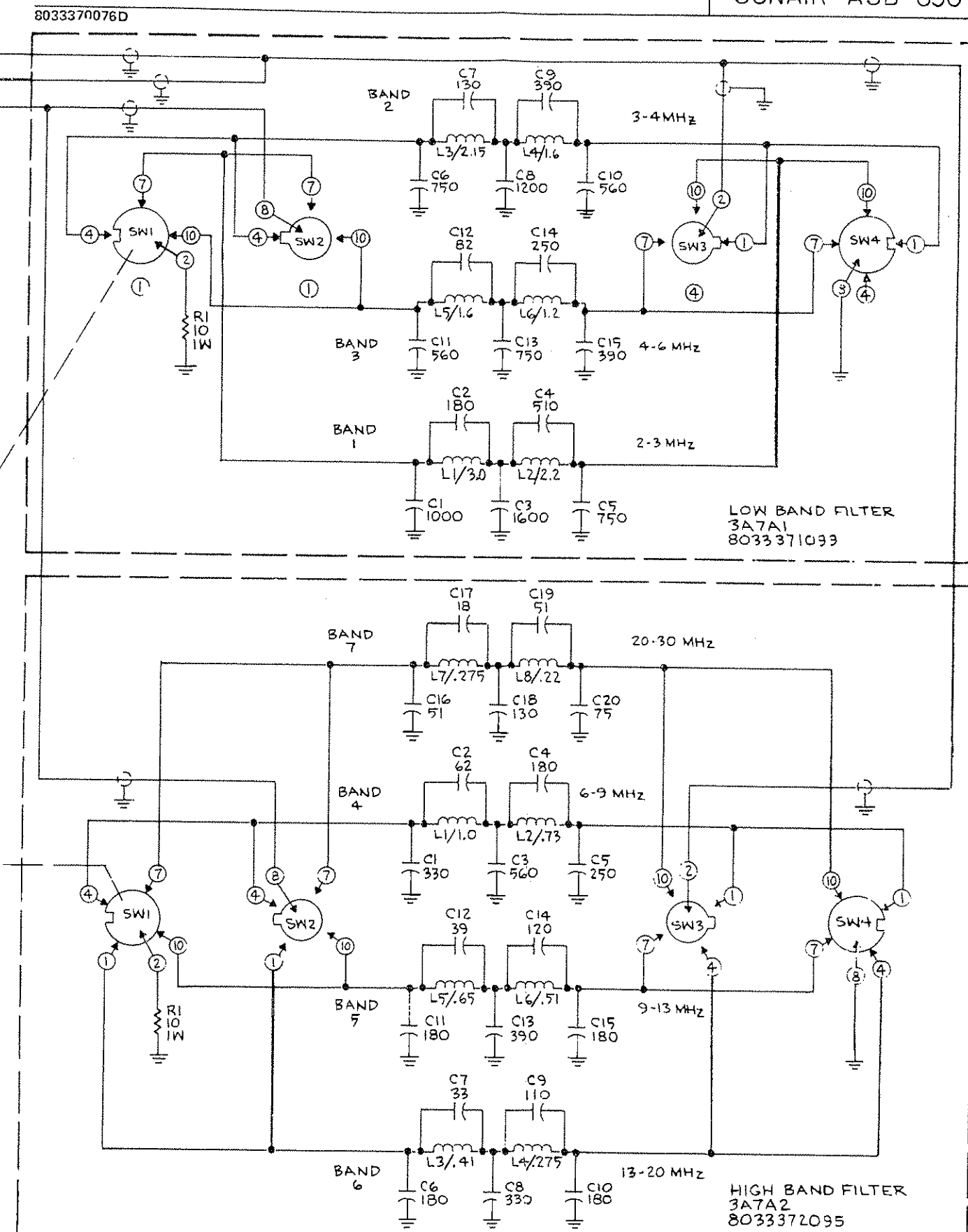
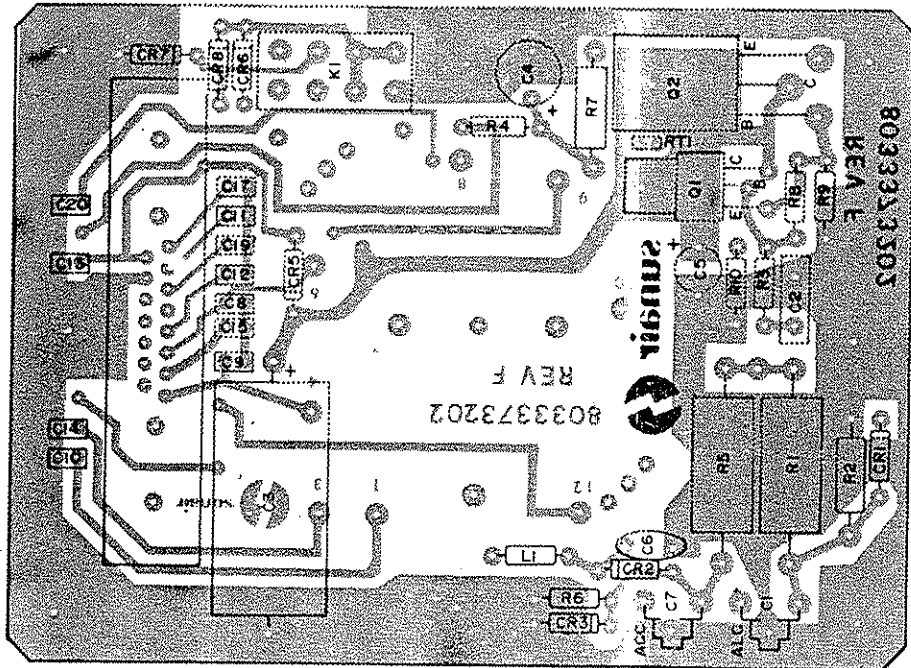
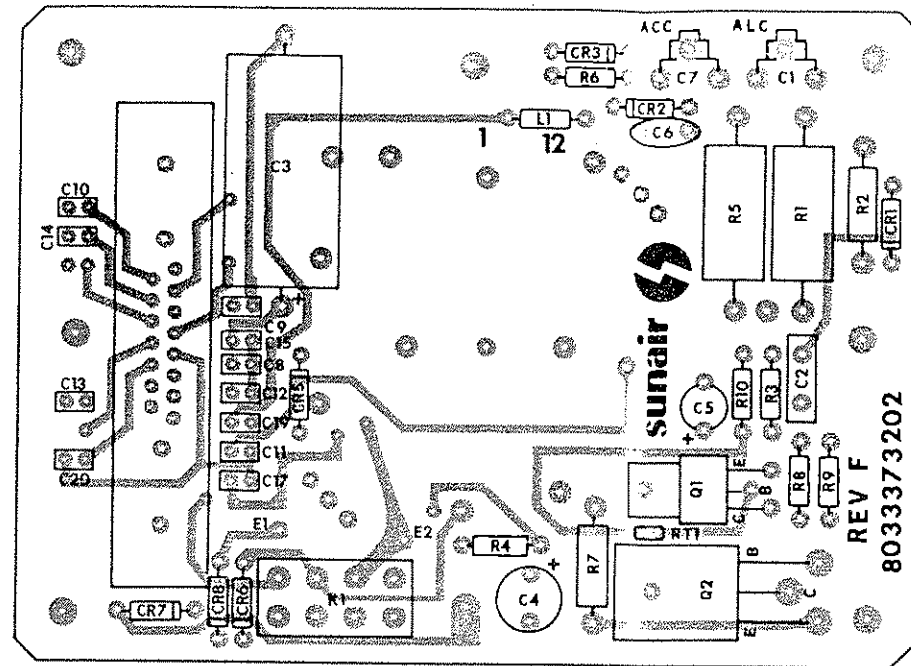
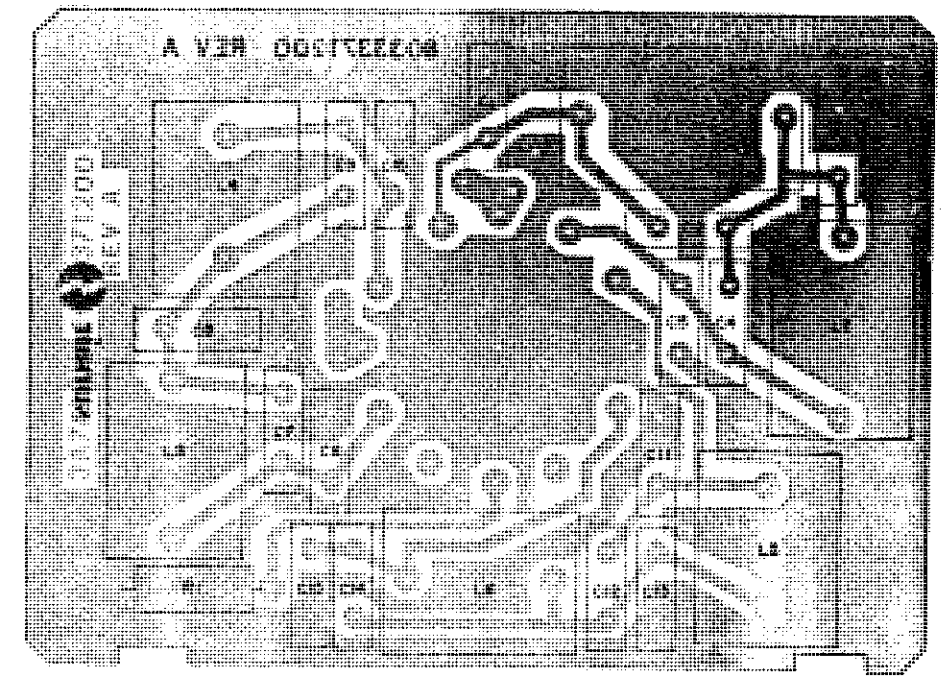
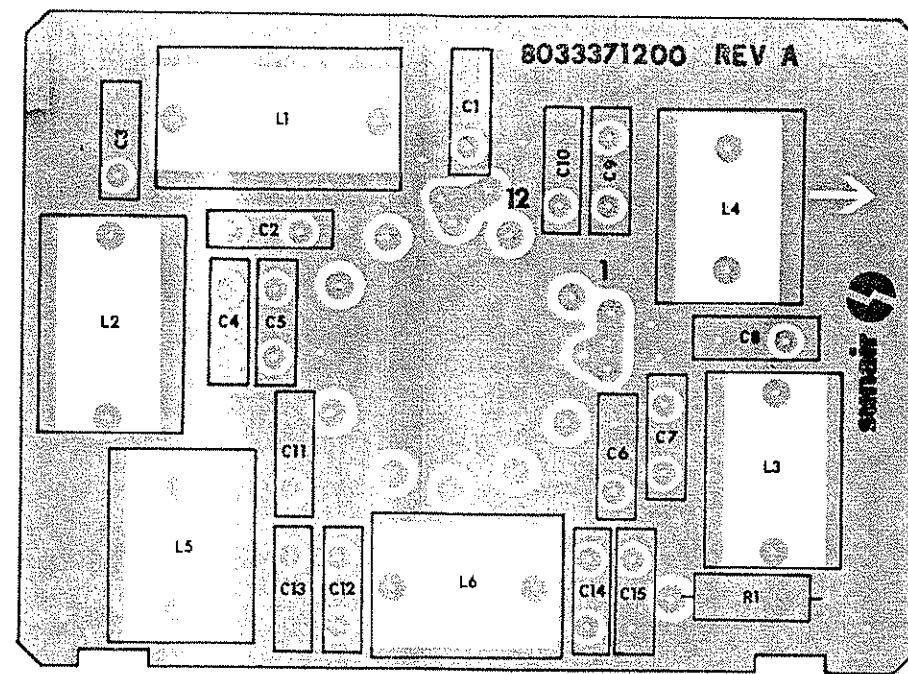


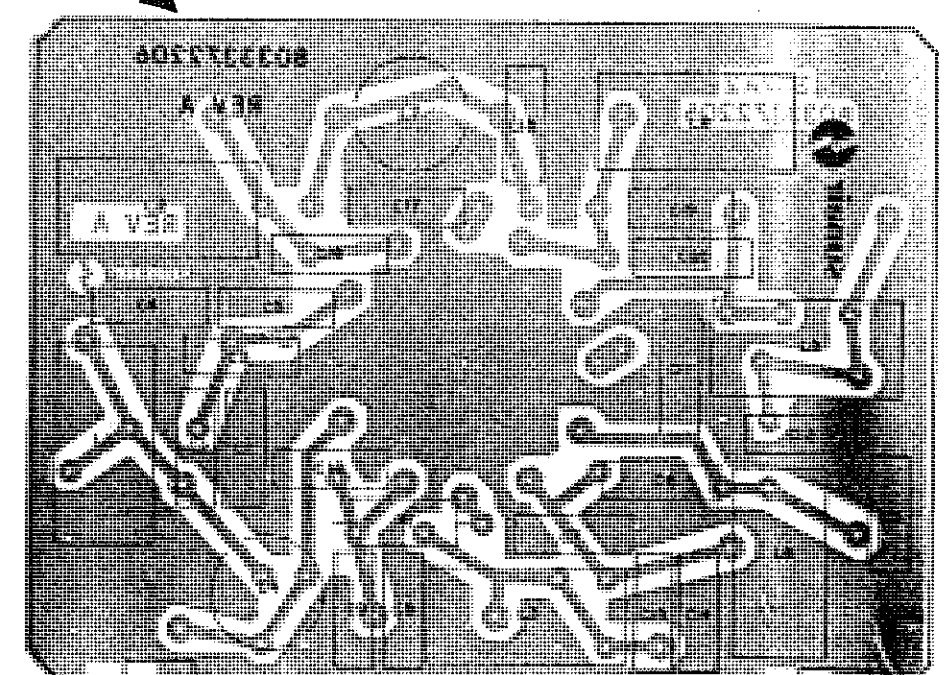
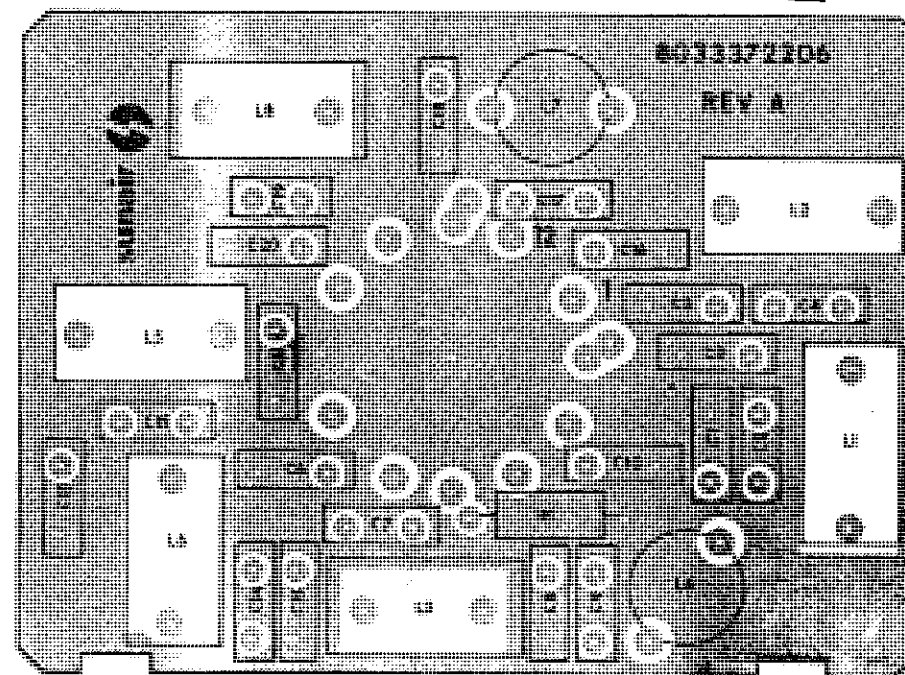
Figure 5.38 Filter Module Assembly (3A7)



MOTOR CONT.



LOW BAND



HIGH BAND

98033384093C

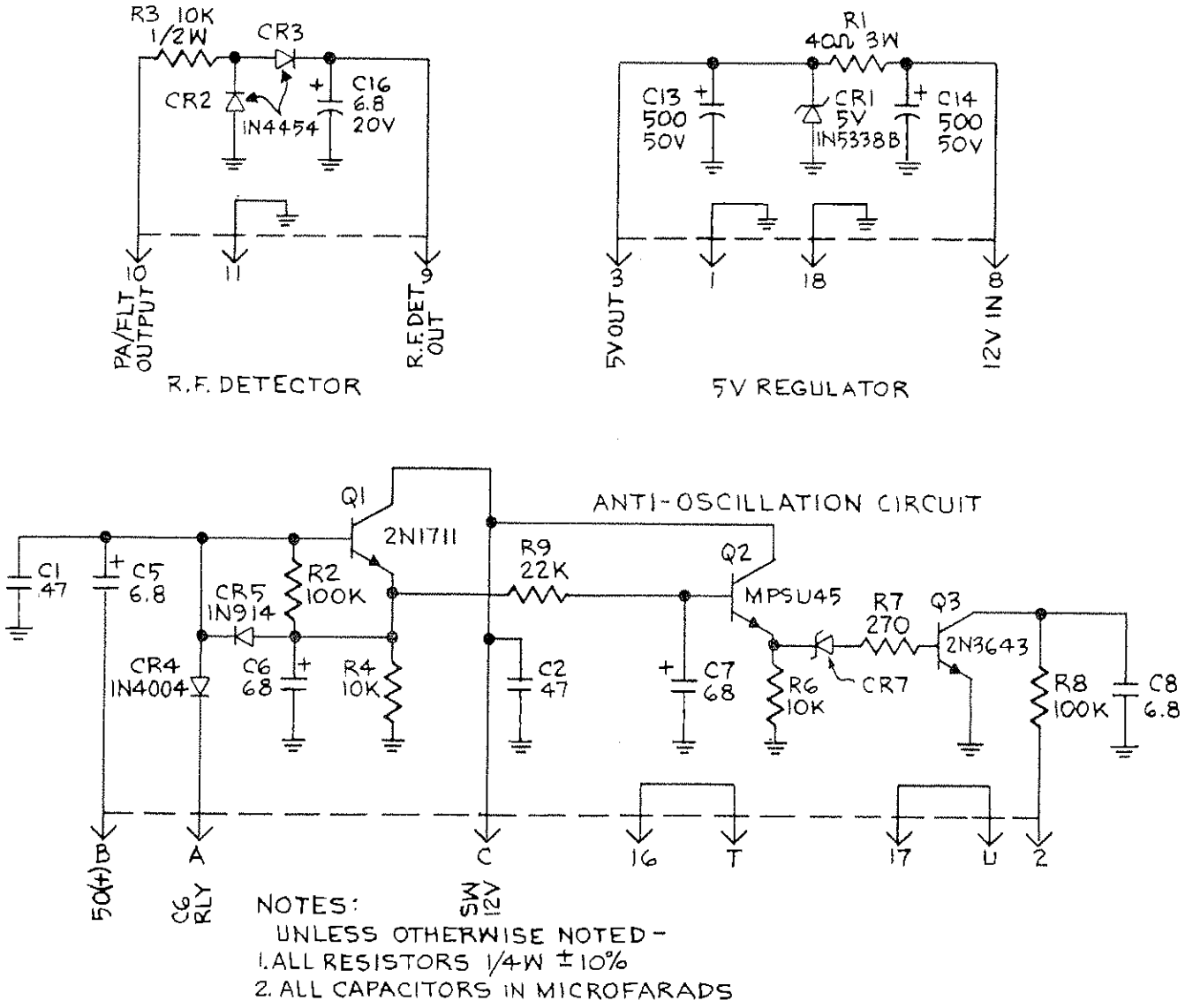
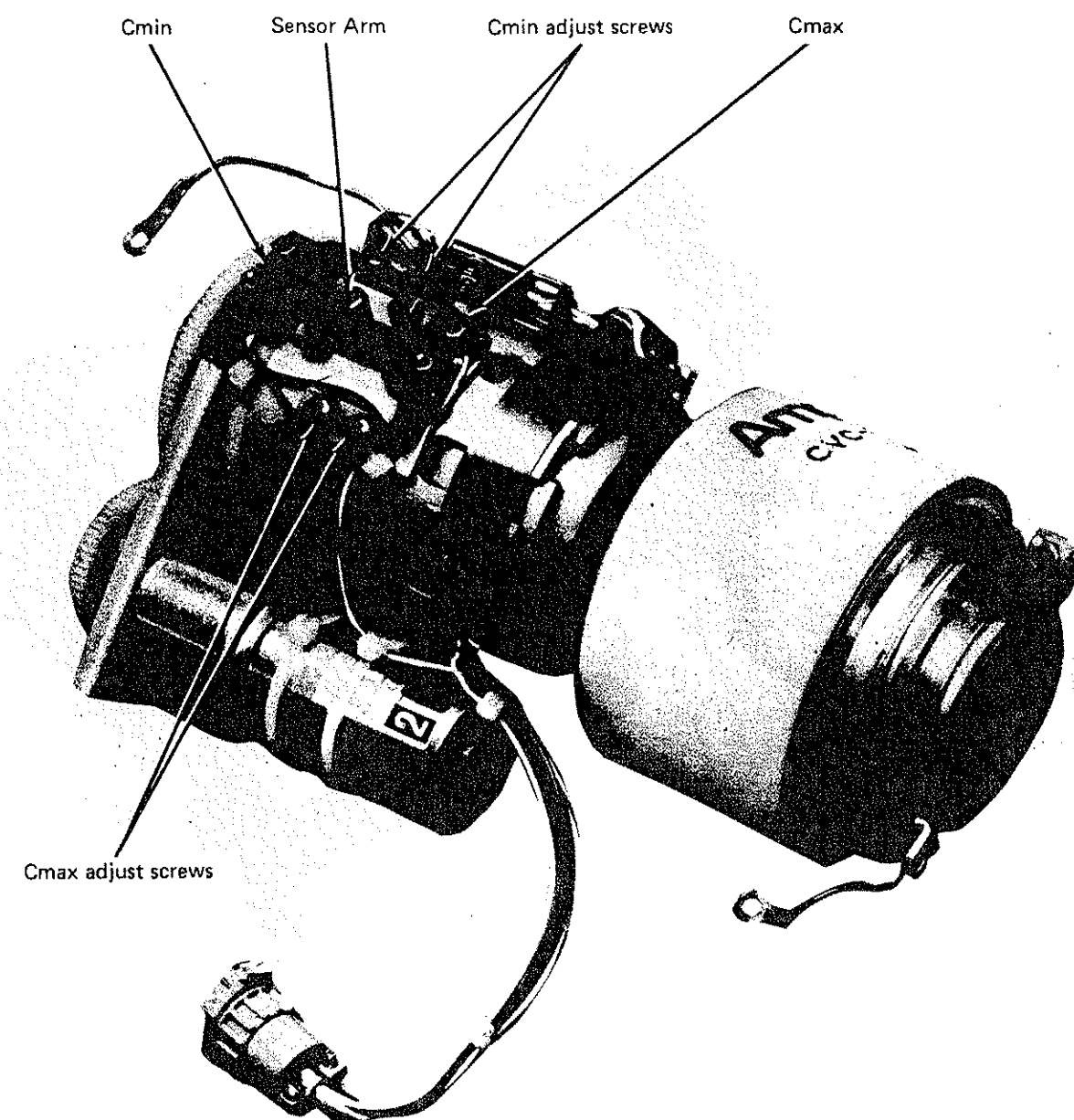


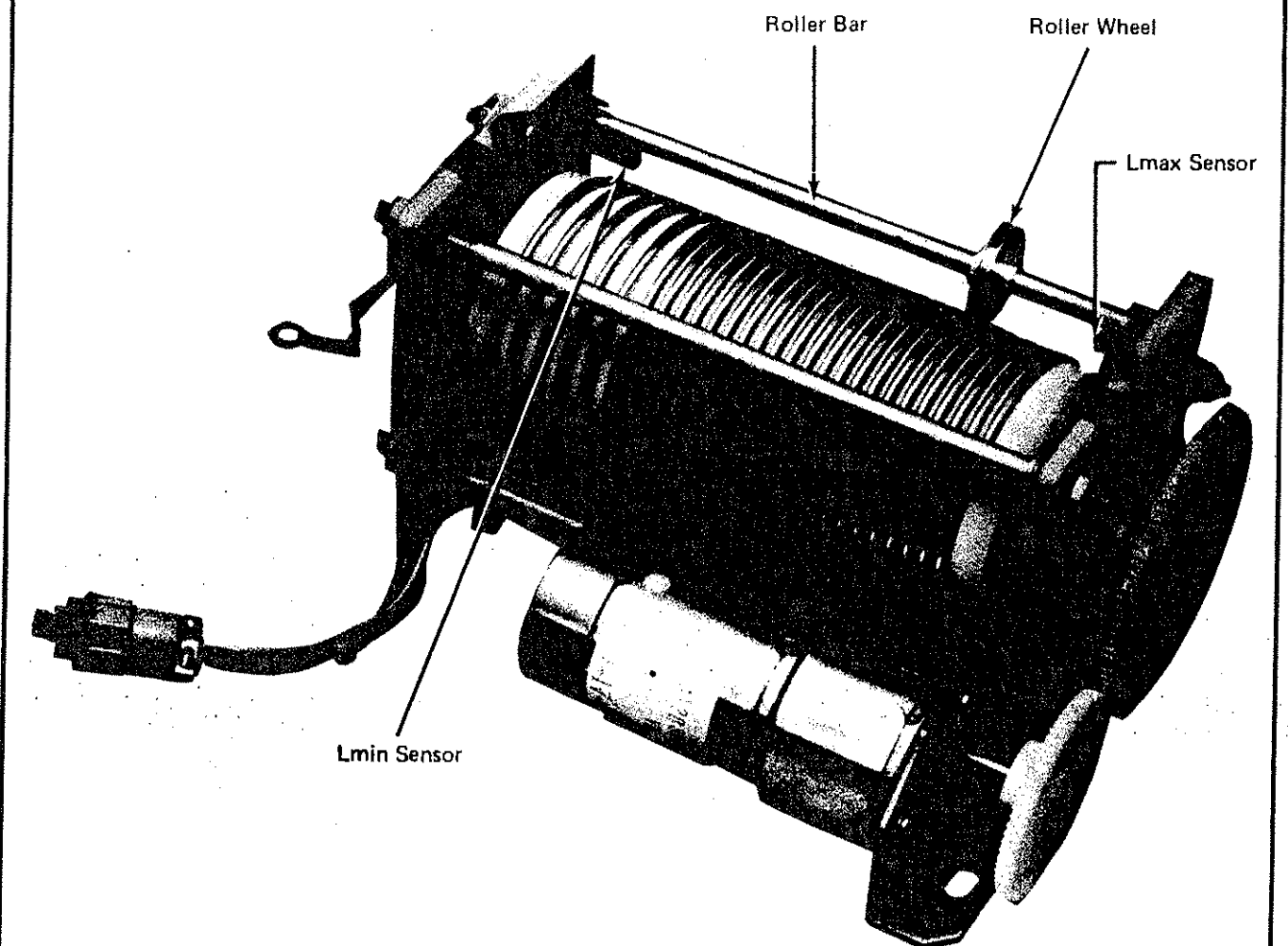
Figure 5.39 Regulator Detector Assembly (3A8A2)



C1 ASSEMBLY 8033316098

REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	Resistor, 1 K, 5%, 5 W	0190370009
	Switch, Micro, SPDT	0345560001
	Bearing, Flanged, .250 ID	0501790004
	Connector, Power, 5 Pin Round	0754850005
	Bearing, Thrust	0841460001
	Gear, Spur, 60 Teeth, .187 Bore	1000120007
	Gear, Spur, 120 Teeth, .250 Bore	1000120031
	Cap. Var. Vacuum	6035080707
	Transformer, 50 Ohm-12.5 Ohm	6035142001
	Motor, Torque, 19.1 VDC	8033319500

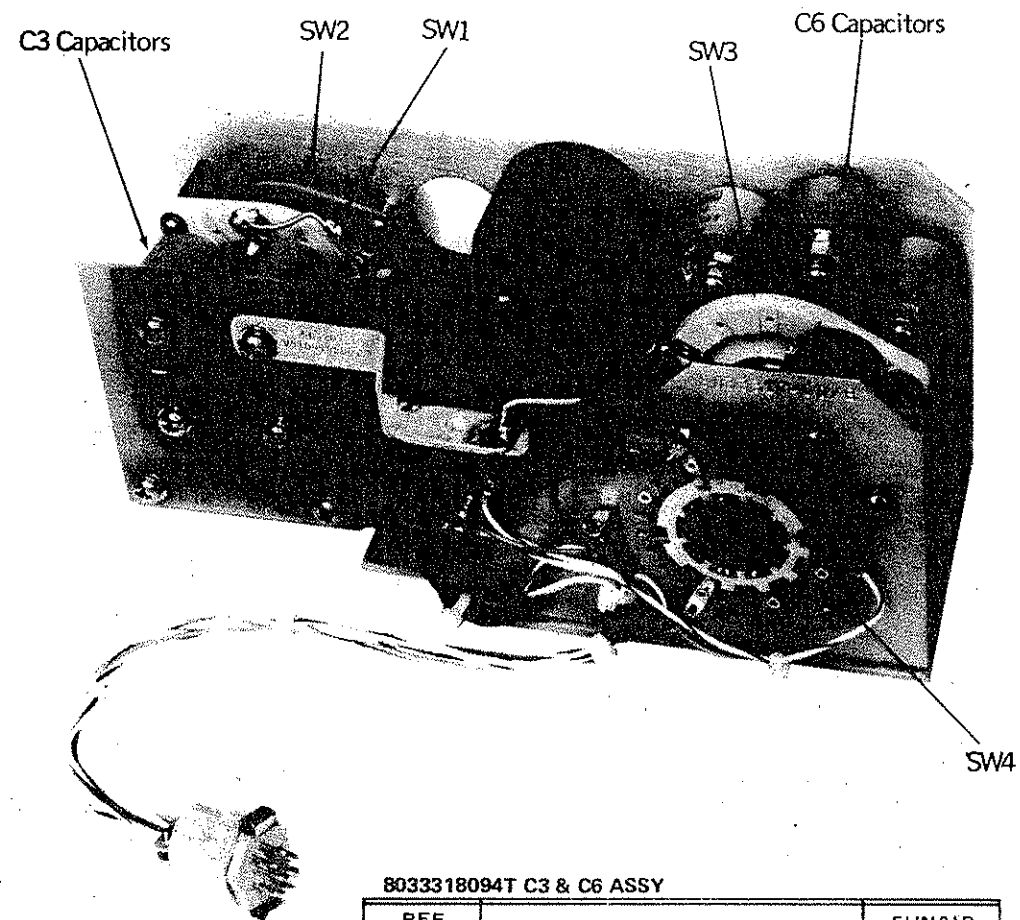
Figure 5.40 C1Assembly (3A9)



L4 ASSEMBLY 8033319097

REF SYMBOL	DESCRIPTION	SUNAIR PART NO
P7	Connector, Power, 4 Pin Round	0754820009
	Gear, Spur, 72 Teeth, .187 Bore	1000120015
	Gear, Spur, 108 Teeth, .250 Bore	1000120023
	Motor, Torque, 19.1 VDC	8033319500
	Inductor, Var. 0.2-18.0 UH	8033319607

Figure 5.41 L4 Assembly (3A10)



8033318094T C3 & C6 ASSY		
REF SYMBOL	DESCRIPTION	SUNAIR PART NO.
	C3 & C6 ASSY	8033318094
C3B	Capacitor, 50PF, 7.5KV, NPO	0290200008
C3C	Capacitor, 50PF, 7.5KV, NPO	0290200008
C3O	Capacitor, 25PF, 7.5KV, NPO	0290320003
C6A	Capacitor, 100PF, 5KV, N750	0290440009
C6B	Capacitor, 100PF, 5KV, N750	0290440009
C6C	Capacitor, 100PF, 5KV, N750	0290440009
C6D	Capacitor, 100PF, 5KV, N750	0290440009
C6E	Capacitor, 100PF, 5KV, N750	0290440009
C6F	Capacitor, 100PF, 5KV, N750	0290440009
C6G	Capacitor, 100PF, 5KV, N750	0290440009
C6H	Capacitor, 100PF, 5KV, N750	0290440009
C6I	Not used	
C6J	Capacitor, 100PF, 5KV, N750	0290440009
C6K	Capacitor, 100PF, 5KV, N750	0290440009
C6L	Capacitor, 100PF, 5KV, N750	0290440009
C6M	Capacitor, 100PF, 5KV, N750	0290440009
C63A	Capacitor, 100PF, 5KV, N750	0290440009
CR1	Diode, Rectifier 1N4004	0405180004
B1	Motor, 24VDC, 95.4/1 Gear/Red	5024204107
B2	Motor, 24VDC, 95.4/1 Gear/Red	5024204207
P9	Connector, Power, 10 Pin Round	0754870006
S1	Switch, Wafer, Motor Cont.	1004870019
SW2	Switch, Progressive HV	5024204808
SW3	Not used	
SW4	Switch, Progressive HV	5024204808
	Collar	0878900004
	Pin, Cotter, .062 DX .500 L	1000100006
	Gear, Spur, 60 Teeth, .187 Bore	1000120007
	Gear, Spur, 108 Teeth, .25 Bore	1000120023
	Switch, Wafer, S3, Motor Cont.	1004840021

Figure 5.42 C3 and C6 Assembly

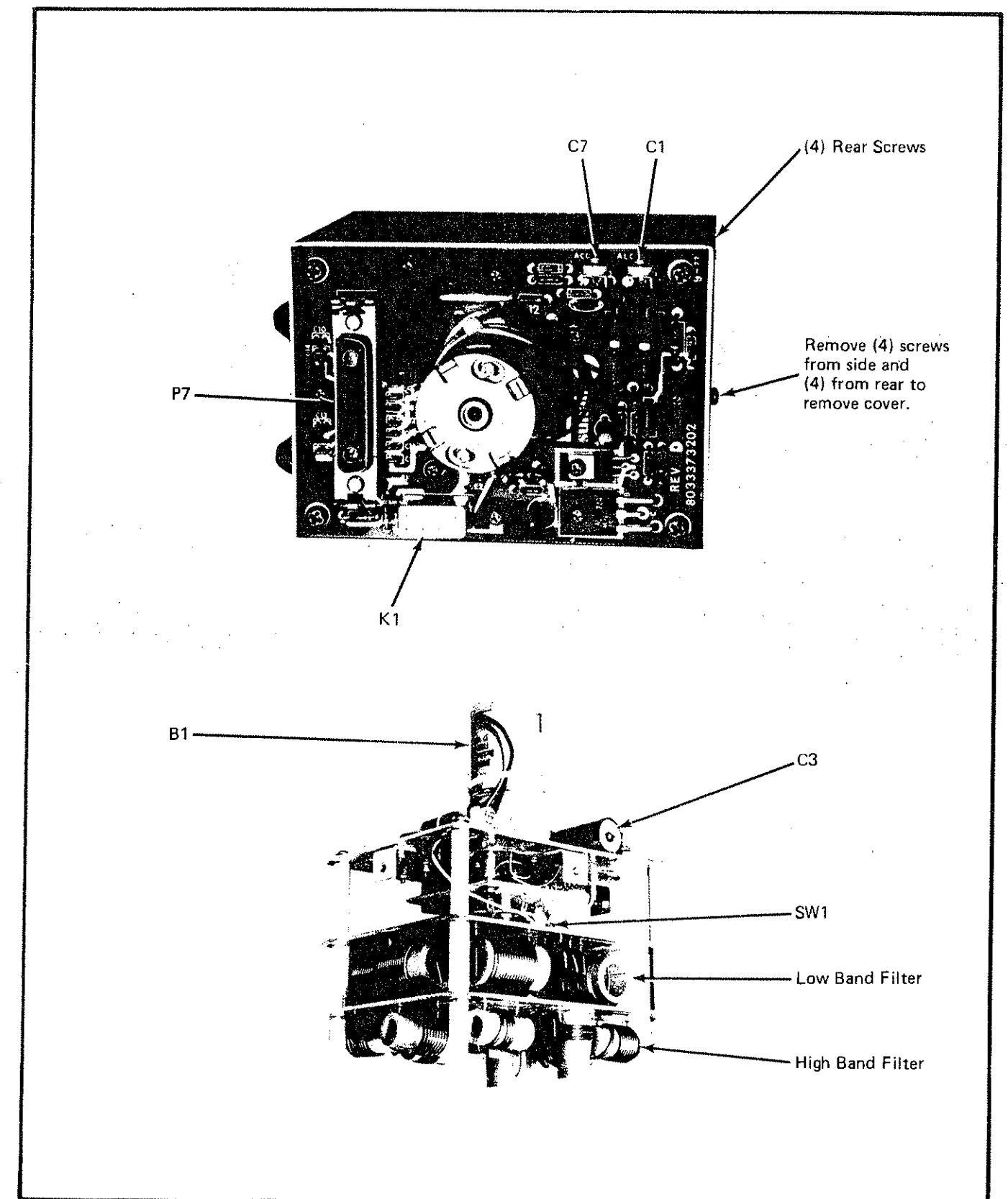


Figure 5.43 Filter Module Assembly (3A7)

SECTION I

GENERAL INFORMATION

1.1 SCOPE

The information contained in this Supplement is to be used with TM-8033000708, ASB-850 OPERATION AND MAINTENANCE MANUAL.

The Receiver/Exciter, RE 800 P/N 8033100095 and Remote Control Head, SCU-80 P/N 8033200090 are in TM-8033000708.

The Amplifier/Coupler, ACU-810A P/N 809930092 information on alignments, parts lists and schematics is in this ACU-810A Supplement.

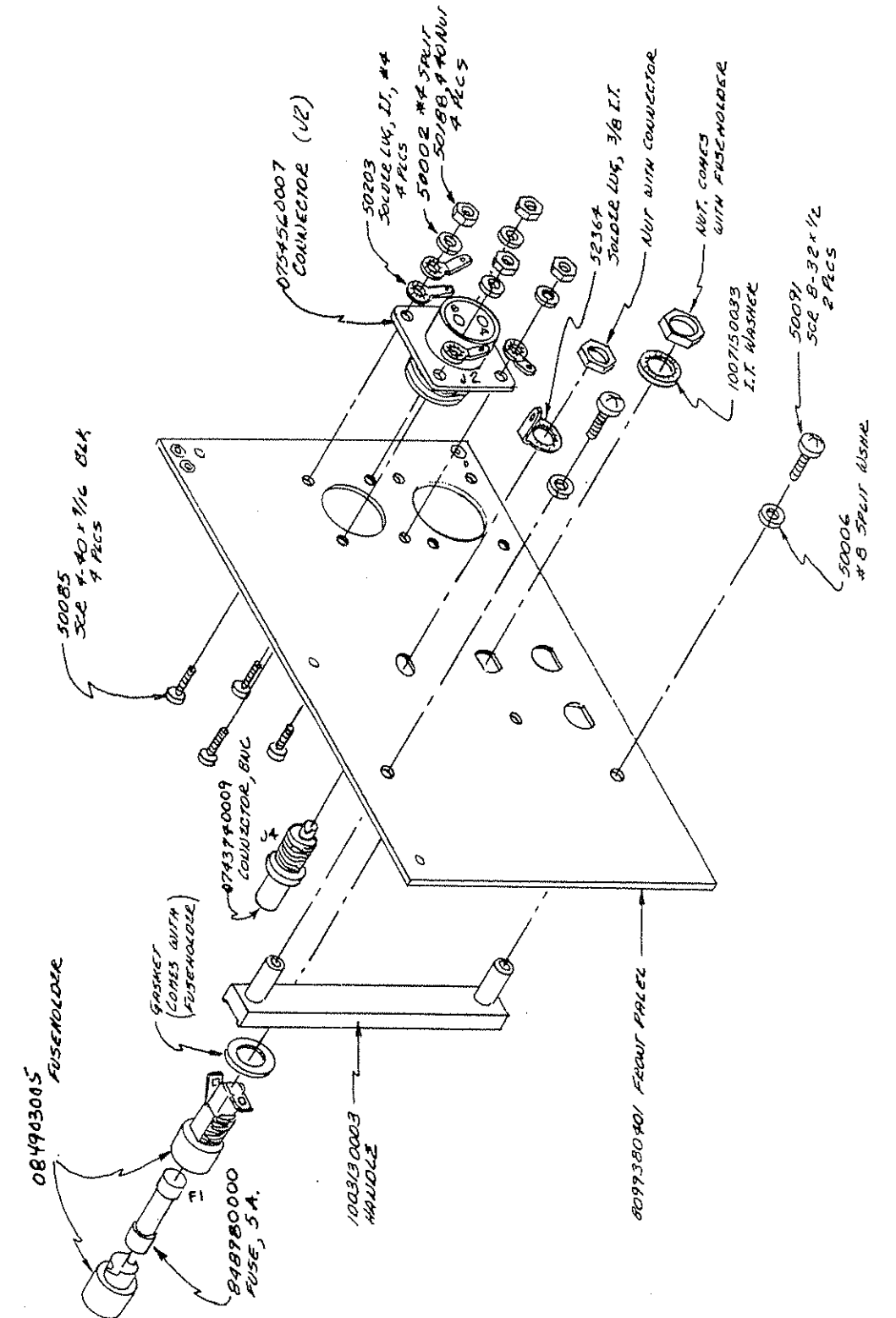
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	FINAL ASSY, TESTED	8099300092
	PC ASSY, DETECTOR/PAD	8056160094
	RF ASSEMBLY DCU-100	8060003092
	CHASSIS ASSY ACU-810A	8099310098
	COMPUTER MODULE, ACU-810A	8099324099
	RF PWR AMP ASSY ACU-810A	8099360095
	FILTER ASSY, ACU-810A	8099370091
	COVER, BOTTOM 810A	8099310802
	ENCLOSURE, PA/COUPLER 810A	8099303202
	LABEL, ALIGNMENT, ASB-850	1005040028
	NAME PLATE, TSO ACU-810A	8099381203
	PIN, DRIVE NO. 0 X 1/8 LG.	0533180007
	STANDOFF, F-F, 6-32 .500 L	1000960013

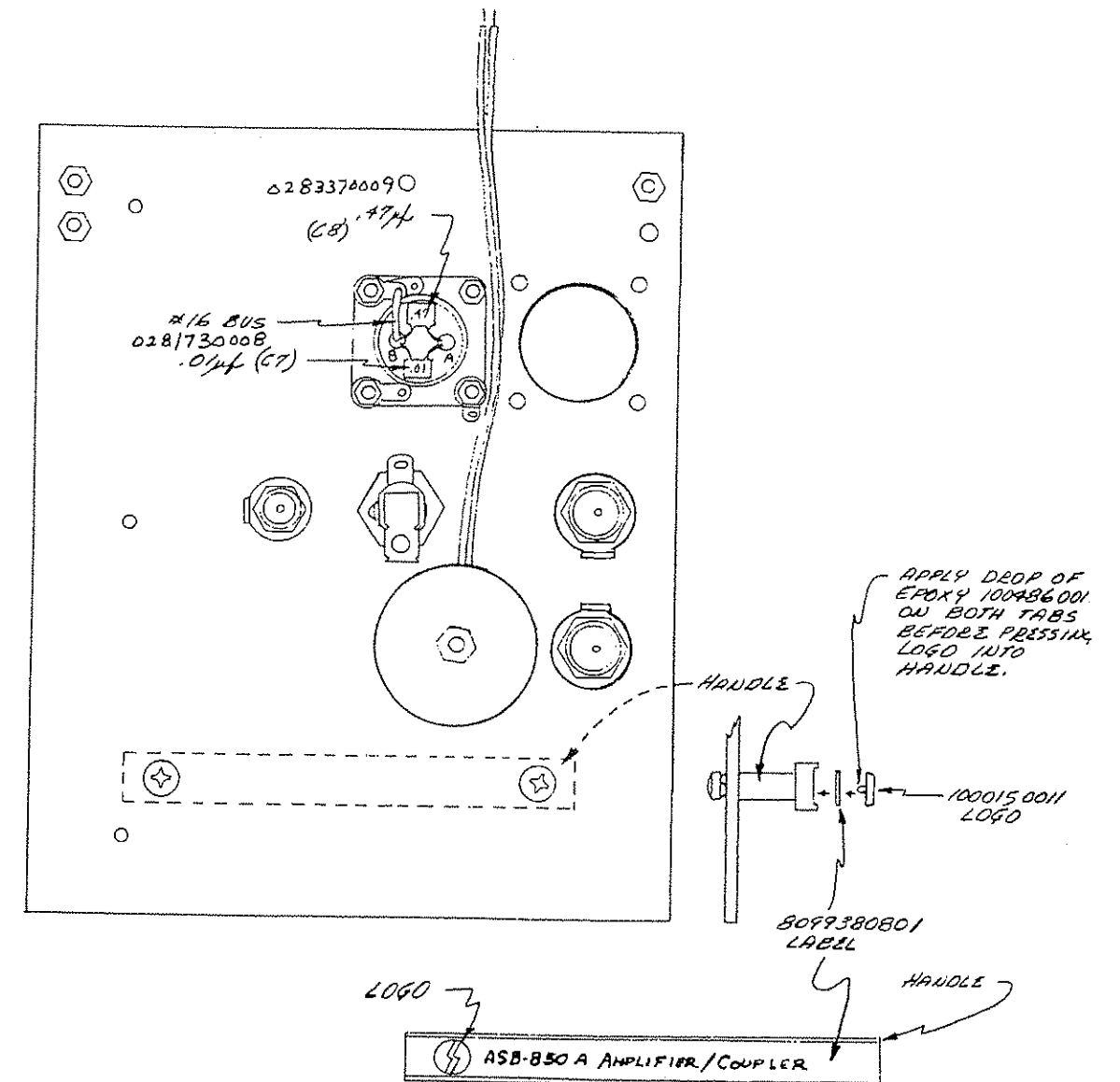
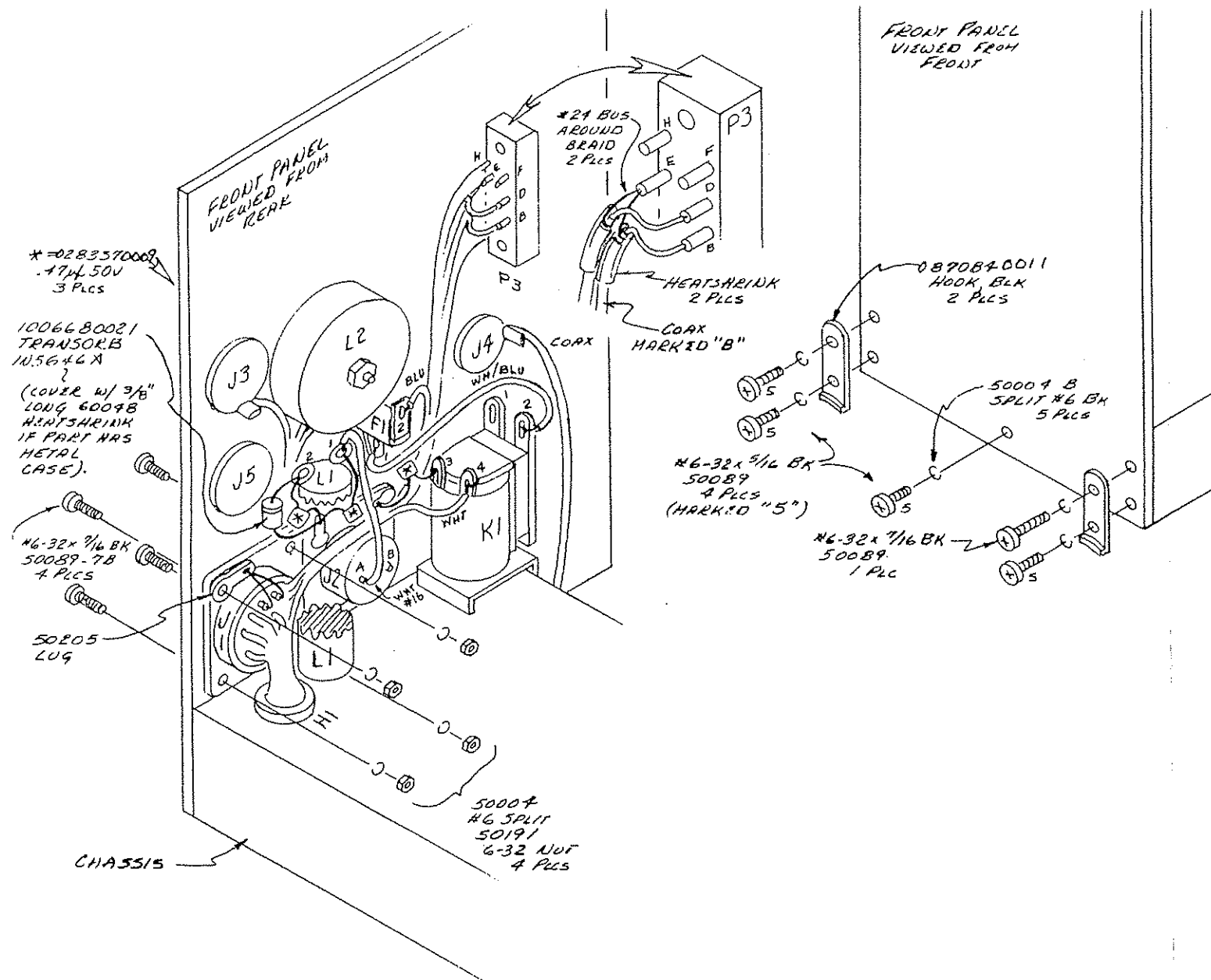
C2	FRONT PANEL ASSY	8099380096
C3	CAP. 0.47μF, 50V, X5V, 20%	0283370009
C7	CAP. 0.47μF, 50V, X5V, 20%	0283370009
C8	CAP. .01μF, 50V, X7R 20%	0281730008
C9	CAP. 0.47μF, 50V, X5V, 20%	0283370009
C11	CAP. 0.47μF, 50V, X5V, 20%	0283370009
F1	FUSE, AGC, 5 AMP, 32V	0848980000
L2	INDUCTOR, CHOKE, TOROID, 9.0MH	0937720003
	CONNECTOR, RF, BNC UG-1094/U	0743740009
	CONNECTOR, RF, UHF	0753300001
	CONNECTOR, POWER, 2 PIN ROUND	0754560007
	FUSEHOLDER, PANEL MOUNT	0849030005
	HANDLE, MODIFIED	1003130003
	LABEL, AMPLIFIER/COUPLER	8099380801
	LOGO, BUTTON STYLE SUNAIR	1000150011
	PANEL, FRONT	8099380401

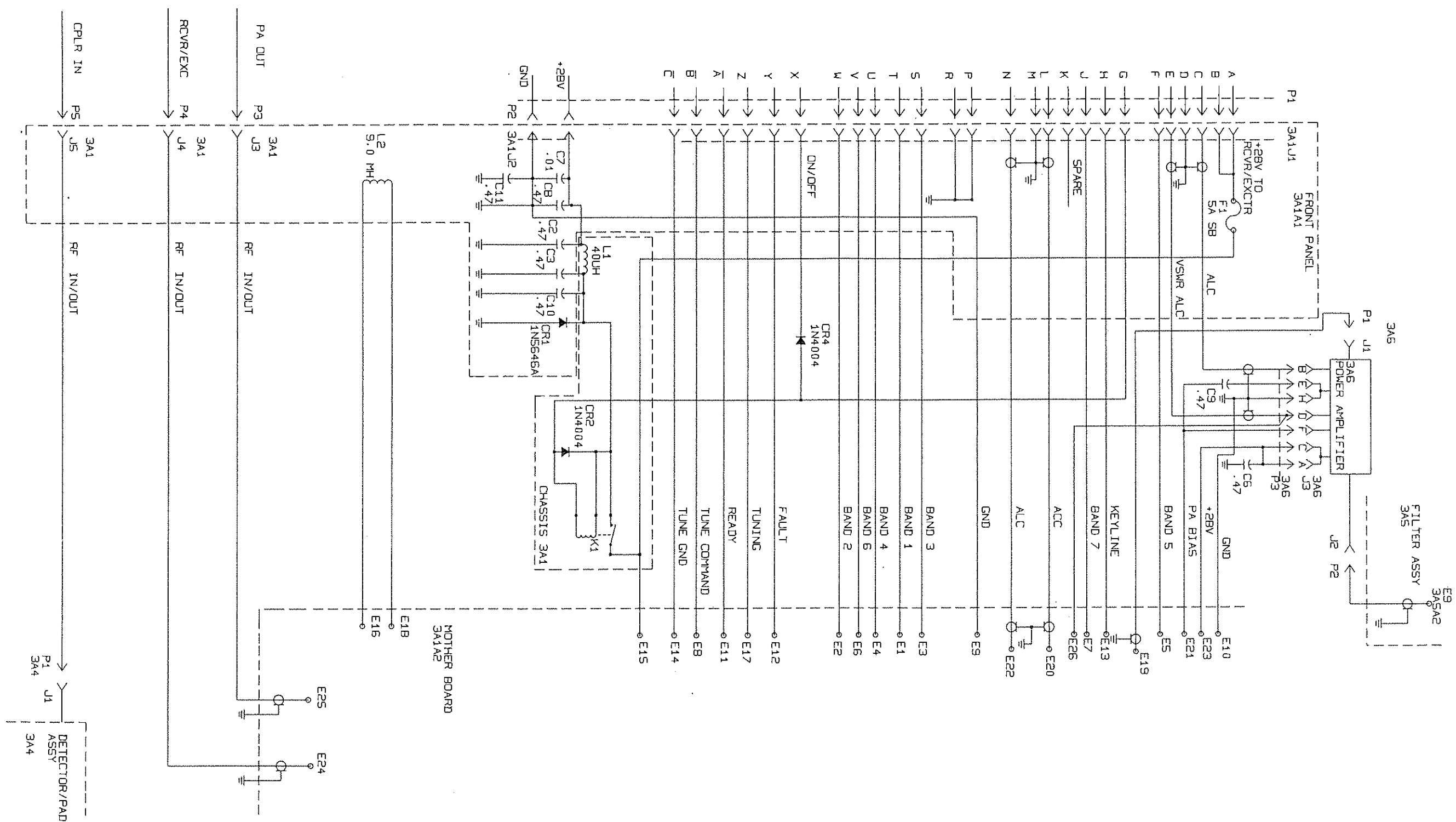
C6	CHASSIS ASSY	8099310098
C10	CAP. 0.47μF, 50V, X5V, 20%	0283370009
CR1	CAP. 0.47μF, 50V, X5V, 20%	0283370009
CR2	DIODE, TRANSZORB 1N5646A	1006680021
CR4	DIODE, RECTIFIER 1N4004	0405180004
K1	DIODE, RECTIFIER 1N4004	0405180004
L1	RELAY, SPST, 24V, POWER 60A	0660040000
	INDUCTOR, CHOKE, A+, 40μH	0563720000
	BRACKET, RELAY MTG	8099310217
	CONNECTOR, RF, HN UG-496/U	0753040000
	CONNECTOR, POWER, 7 PIN RECT.	0753530007
	CONNECTOR, RF, SUBMINIATURE	0753700000
	CONNECTOR, POWER, 26 PIN ROUND	0754550001
	GROMMET, RUBBER.187 ID .437 OD	0500530009
	GROMMET, RUBBER.500 ID .812 OD	0500580006
	HOOK, FRONT, BLK	0870840011
	IC, LINEAR, VOL.REG. MC7805CK	0447190008
	FRONT PANEL ASSY ACU 810A	8099380096
	PANEL, REAR	8099390407
	PC ASSY, MOTHER ACU-810A	8099013093
	RETAINER, REAR, MALE	0505620006

2A2A1	RF ASSEMBLY	8060003092
2A2A2	PC ASSY, INPUT BOARD DCU-100	8080030090
2A2A3	PC ASSY, INTERMEDIATE DCU-100	8080040095
2A2A4	PC ASSY, INDUCTOR BD DCU-100	8080050091
	PC ASSY, OUTPUT BOARD DCU-100	8080060096
	BRACKET, RF ASSY, FRONT	8080003203
	BRACKET, RF ASSY, FRONT	8080003203
	BRACKET, RF ASSY, REAR	8080003301
	BRACKET, RF ASSY, REAR	8080003301
	SPACER, INSULATOR, SNAP-IN	1006300023
	SPACER, INSULATOR, SNAP-IN	1006300023



FRONT PANEL ASSY





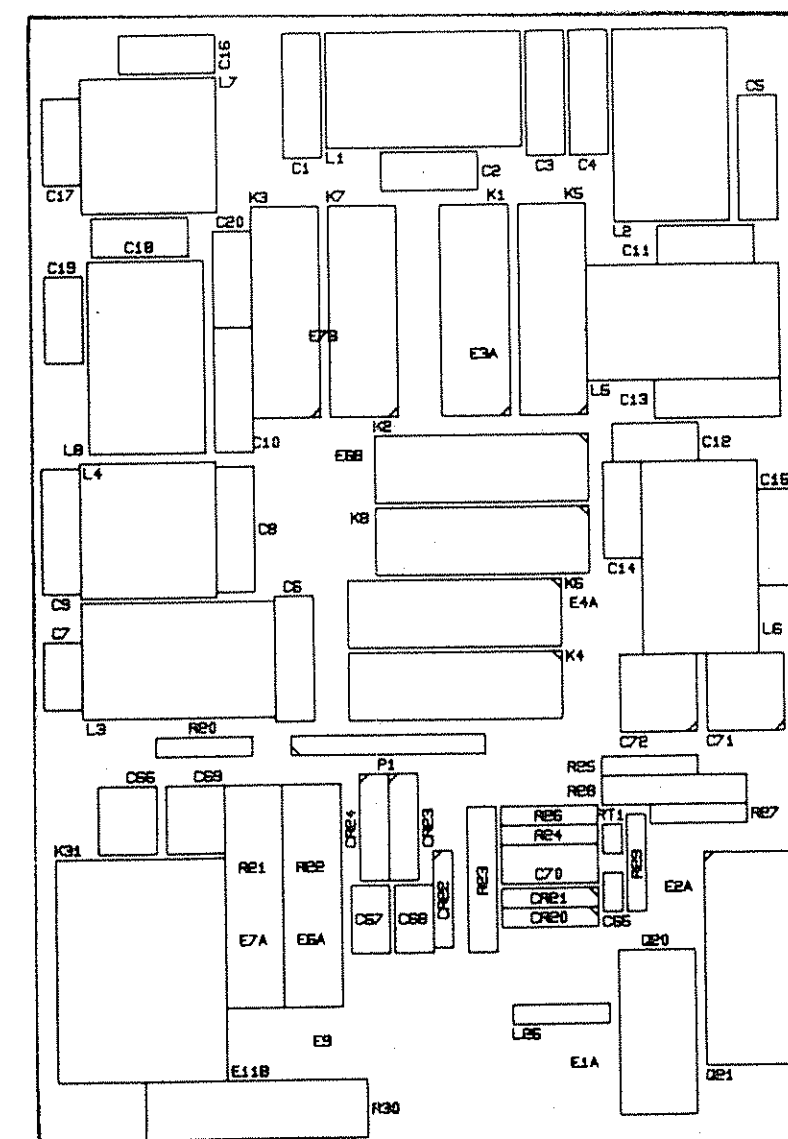
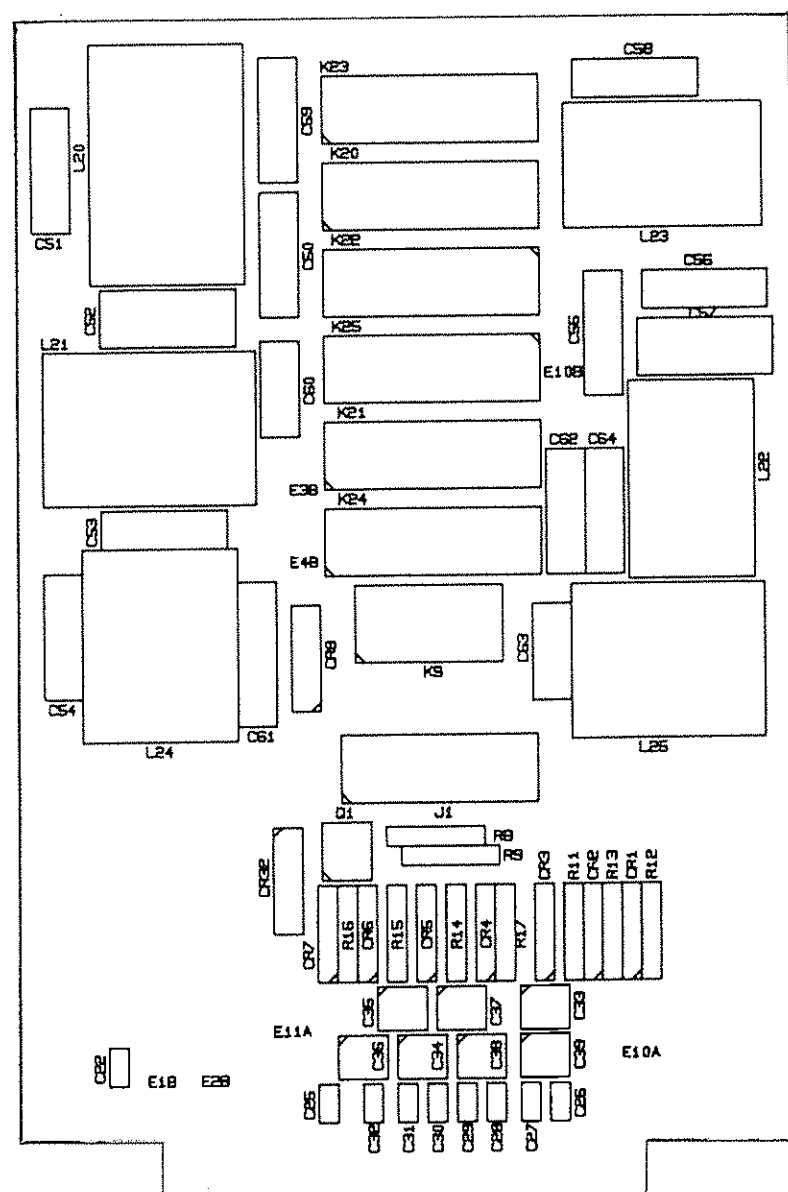
C1	PC ASSY, HIGH BAND FILTER	8099372093
C2	CAP. 360PF, 500V, DM19, 2%	0282650008
C3	CAP. 75PF, 500V, DM15, 2%	0281110000
C4	CAP. 560PF, 500V, DM19, 2%	0281060002
C5	CAP. 180PF, 500V, DM19, 2%	0282700005
C6	CAP. 250PF, 500V, DM19, 2%	0282680004
C7	CAP. 180PF, 500V, DM19, 2%	0282700005
C8	CAP. 10PF, 500V, DM10	0259830003
C9	CAP. 270PF, 500V, DM19, 2%	0282670009
C10	CAP. 120PF, 500V, DM19, 2%	0282750002
C11	CAP. 100PF, 500V, DM19, 2%	0282770003
C12	CAP. 200PF, 500V, DM15, 2%	1010430025
C13	CAP. 56PF, 500V, DM15, 2%	0282360000
C14	CAP. 330PF, 500V, DM19, 2%	0282660003
C15	CAP. 150PF, 500V, DM15, 2%	0281200009
C16	CAP. 150PF, 500V, DM15, 2%	0281200009
C17	CAP. 68PF, 500V, DM15, 2%	1000050041
C18	CAP. 27PF, 500V, DM15, 2%	0282320008
C19	CAP. 150PF, 500V, DM15, 2%	0281200009
C20	CAP. 47PF, 500V, DM15, 2%	0282420002
C65	CAP. 43PF, 500V, DM15, 2%	1001240031
C66	CAP. .01μF, 50V, X7R 20%	0281730008
C67	CAP. VARIABLE, 5-40 PF.	1008990027
C68	CAP. 2PF, 500V, DM10	0259710008
C69	CAP. 2PF, 500V, DM10	0259710008
C70	CAP. VARIABLE, 5-40 PF.	1008990027
C71	CAP. 150PF, 500V, DM15, 5%	0274980002
C72	CAP. 15μF, 50V, 196D	0274000008
CR20	DIODE, SIGNAL, SIL 1N4454	0405270003
CR21	DIODE, SIGNAL, SIL 1N4454	0405270003
CR22	DIODE, SIGNAL, SIL 1N4454	0405270003
CR23	DIODE, RECTIFIER 1N4004	0405180004
CR24	DIODE, RECTIFIER 1N4004	0405180004
K1	RELAY, SPST, 12V, REED	1005330000
K2	RELAY, SPST, 12V, REED	1005330000
K3	RELAY, SPST, 12V, REED	1005330000
K4	RELAY, SPST, 12V, REED	1005330000
K5	RELAY, SPST, 12V, REED	1005330000
K6	RELAY, SPST, 12V, REED	1005330000
K7	RELAY, SPST, 12V, REED	1005330000
K8	RELAY, SPST, 12V, REED	1005330000
K31	RELAY, 4PDT, 12V, SENSITIVE	0666640009
L1	INDUCTOR, FILTER, 1.00μH YEL	5024051203
L2	INDUCTOR, FILTER, 0.73μH GRN	5024051301
L3	INDUCTOR, FILTER, 0.41μH BLU	5024051408
L4	INDUCTOR, FILTER, 0.275μH VIO	5024051505
L5	INDUCTOR, FILTER, 0.65μH WH/ORN	5024052200
L6	INDUCTOR, FILTER, 0.51μH WH/YEL	5024052307
L7	INDUCTOR, FILTER, 0.275μH VIO	5024051505
L8	INDUCTOR, FILTER, 0.22μH WH/GRN	5024052501
L26	INDUCTOR, MOLDED, 22μH, 5%	0650000005
P1	CONNECTOR, PC, 10 PIN STRIP	1009020013
Q20	TRANSISTOR, NPN, SI MPSU45	0448570009
Q21	TRANSISTOR, NPN, SI. MJE2801	0448530007
R20	RESISTOR 680, 10%, 1/4W	0176630007
R21	RESISTOR 2.7K, 5%, 2W	0195940008
R22	RESISTOR 2.7K, 5%, 2W	0195940008

R23	RESISTOR 390, 10%, 1/2W	0173260004
R24	RESISTOR 1K, 10%, 1/4W	0171560001
R25	RESISTOR 22K, 5%, 1/4W	0172230004
R26	RESISTOR 2.2K, 5%, 1/4W	0178070009
R27	RESISTOR 1M, 10%, 1/4W	0170650006
R28	RESISTOR 2.2, 10%, 1/2W	0178690007
R29	RESISTOR 56, 10%, 1/4W	0174290004
R30	RESISTOR 56, 10%, 2W	0197210007
RT1	RESISTOR 5K AT 25C	1001340001
	MICA INSULATOR MOT.CASE 199	0508700001
	SOCKET, RELAY, 4PDT, PC MOUNT	1003420036
	SPRING, RELAY HOLD-DOWN	0878260005

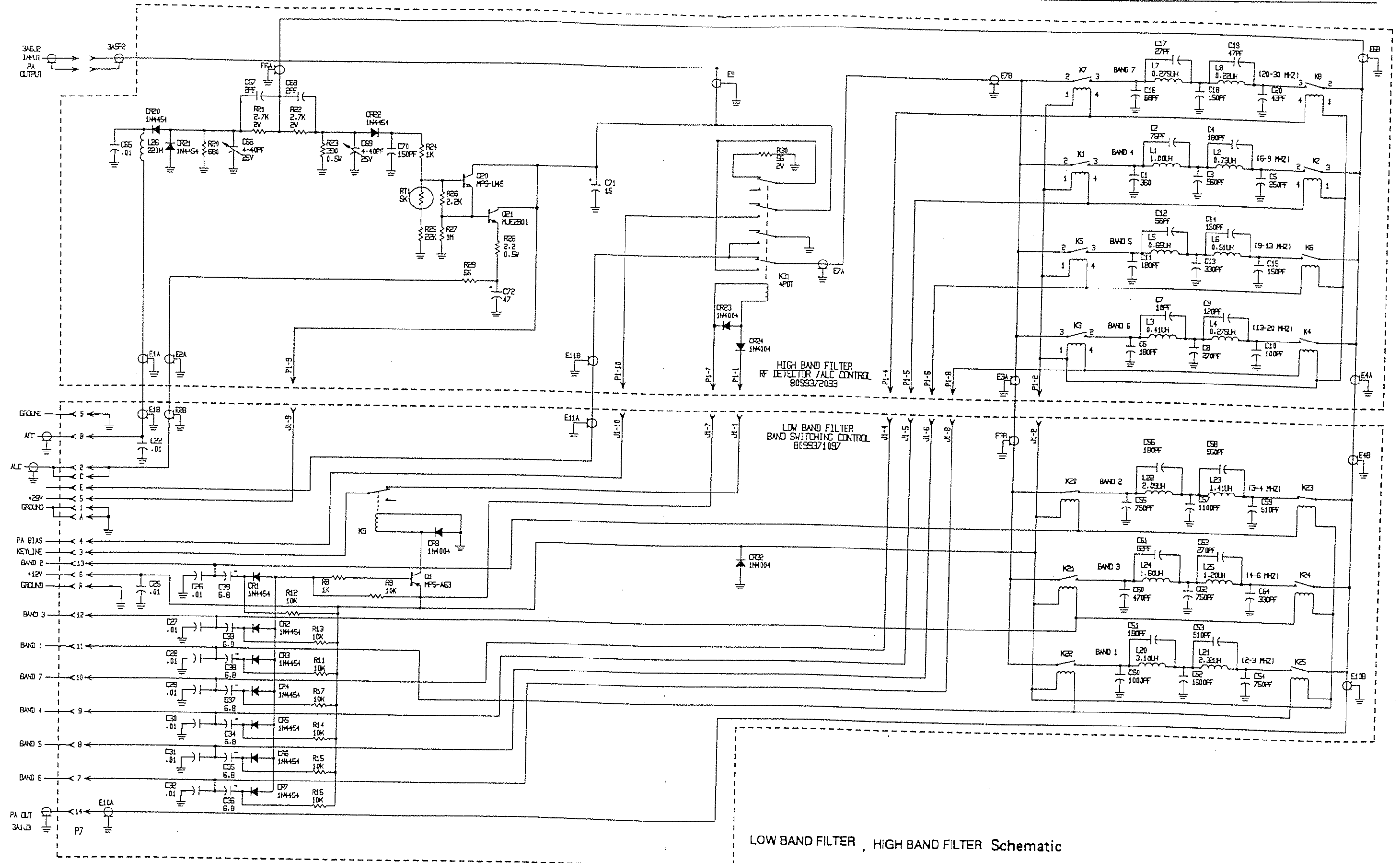
C22	PC ASSY, LOW BAND FILTER	8099371097
C25	CAP. .01μF, 50V, X7R 20%	0281730008
C26	CAP. .01μF, 50V, X7R 20%	0281730008
C27	CAP. .01μF, 50V, X7R 20%	0281730008
C28	CAP. .01μF, 50V, X7R 20%	0281730008
C29	CAP. .01μF, 50V, X7R 20%	0281730008
C30	CAP. .01μF, 50V, X7R 20%	0281730008
C31	CAP. .01μF, 50V, X7R 20%	0281730008
C32	CAP. .01μF, 50V, X7R 20%	0281730008
C33	CAP. 6.8μF, 20V, T368	0296780006
C34	CAP. 6.8μF, 20V, T368	0296780006
C35	CAP. 6.8μF, 20V, T368	0296780006
C36	CAP. 6.8μF, 20V, T368	0296780006
C37	CAP. 6.8μF, 20V, T368	0296780006
C38	CAP. 6.8μF, 20V, T368	0296780006
C39	CAP. 6.8μF, 20V, T368	0296780006
C50	CAP. 1000PF, 500V, DM19, 2%	0281210004
C51	CAP. 180PF, 500V, DM19, 2%	0282700005
C52	CAP. 1600PF, 500V, DM19, 2%	0281220000
C53	CAP. 510PF, 500V, DM19, 2%	0282630007
C54	CAP. 750PF, 500V, DM19, 2%	0280990006
C55	CAP. 750PF, 500V, DM19, 2%	0280990006
C56	CAP. 180PF, 500V, DM19, 2%	0282700005
C57	CAP. 1100PF, 500V, DM19, 2%	0281000000
C58	CAP. 560PF, 500V, DM19, 2%	0281060002
C59	CAP. 510PF, 500V, DM19, 2%	0282630007
C60	CAP. 470PF, 500V, DM15, 2%	0281440000
C61	CAP. 82PF, 500V, DM20, 2%	0282790004
C62	CAP. 750PF, 500V, DM19, 2%	0280990006
C63	CAP. 270PF, 500V, DM15, 2%	0280970005
C64	CAP. 330PF, 500V, DM19, 2%	0282660003
CR1	DIODE, SIGNAL, SIL 1N4454	0405270003
CR2	DIODE, SIGNAL, SIL 1N4454	0405270003
CR3	DIODE, SIGNAL, SIL 1N4454	0405270003
CR4	DIODE, SIGNAL, SIL 1N4454	0405270003
CR5	DIODE, SIGNAL, SIL 1N4454	0405270003
CR6	DIODE, SIGNAL, SIL 1N4454	0405270003
CR7	DIODE, SIGNAL, SIL 1N4454	0405270003
CR8	DIODE, RECTIFIER 1N4004	0405180004
CR32	DIODE, RECTIFIER 1N4004	0405180004
J1	CONNECTOR, PC, 10 PIN FEMALE	1006610006
K9	RELAY, REED, 12VDC 1 FORM C	1004630026
K20	RELAY, SPST, 12V, REED	1005330000
K21	RELAY, SPST, 12V, REED	1005330000
K22	RELAY, SPST, 12V, REED	1005330000
K23	RELAY, SPST, 12V, REED	1005330000
K24	RELAY, SPST, 12V, REED	1005330000
K25	RELAY, SPST, 12V, REED	1005330000
L20	INDUCTOR, FILTER, 3.10μH GRAY	5024051904
L21	INDUCTOR, FILTER, 2.32μH WHT	5024052005
L22	INDUCTOR, FILTER 2.09μH OR/BRN	8040100313
L23	INDUCTOR, FILTER 1.41μH OR/ORN	8040100330
L24	INDUCTOR, FILTER, 1.60μH ORN	5024051106
L25	INDUCTOR, FILTER, 1.20μH WH/RED	5024052102
Q1	TRANSISTOR, PNP, SI MPS-A63	0448650002
R8	RESISTOR 1K, 10%, 1/4W	0171560001
R9	RESISTOR 10K, 10%, 1/4W	0170410005

R11	RESISTOR 10K, 10%, 1/4W	0170410005
R12	RESISTOR 10K, 10%, 1/4W	0170410005
R13	RESISTOR 10K, 10%, 1/4W	0170410005
R14	RESISTOR 10K, 10%, 1/4W	0170410005
R15	RESISTOR 10K, 10%, 1/4W	0170410005
R16	RESISTOR 10K, 10%, 1/4W	0170410005
R17	RESISTOR 10K, 10%, 1/4W	0170410005

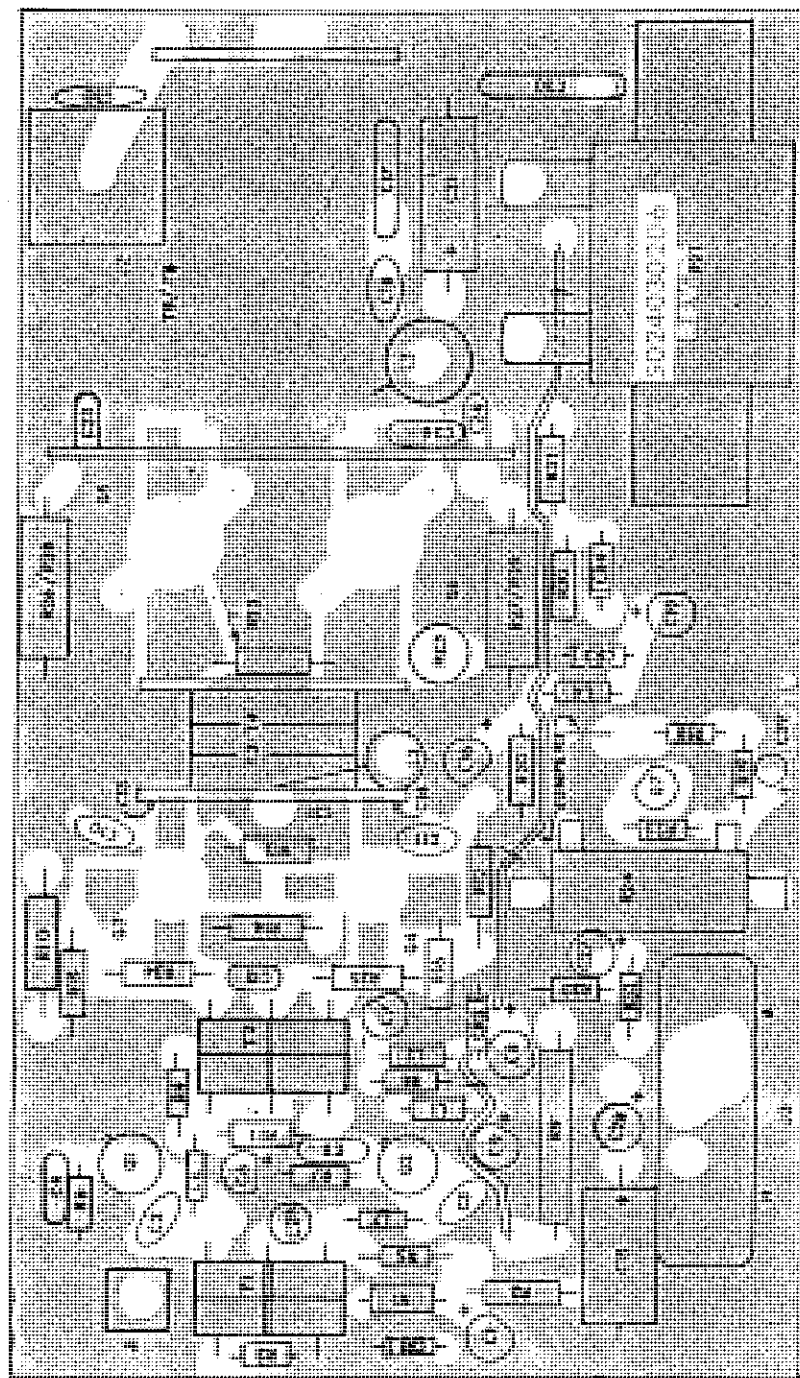
	FILTER ASSY	8099370091
	CARD GUIDE, PLASTIC	1005670039
	CONNECTOR, RF, SUBMINIATURE	0753700000
	COVER, FILTER	8099370104
	ENCLOSURE, FILTER	8099370309
	GROMMET, RUBBER.187 ID .437 OD	0500530009
	INSULATOR SHEET, FILTER MDL	8099370601
	PC ASSY, LOW BAND FILTER	8099371097
	PC ASSY, HIGH BAND FILTER/ALC	8099372093
	SHIELD, FILTER	8099370201
	STANDOFF, M-F, 6-32 1.000 L	0507880005



PC ASSY, LOW BAND FILTER , HIGH BAND FILTER

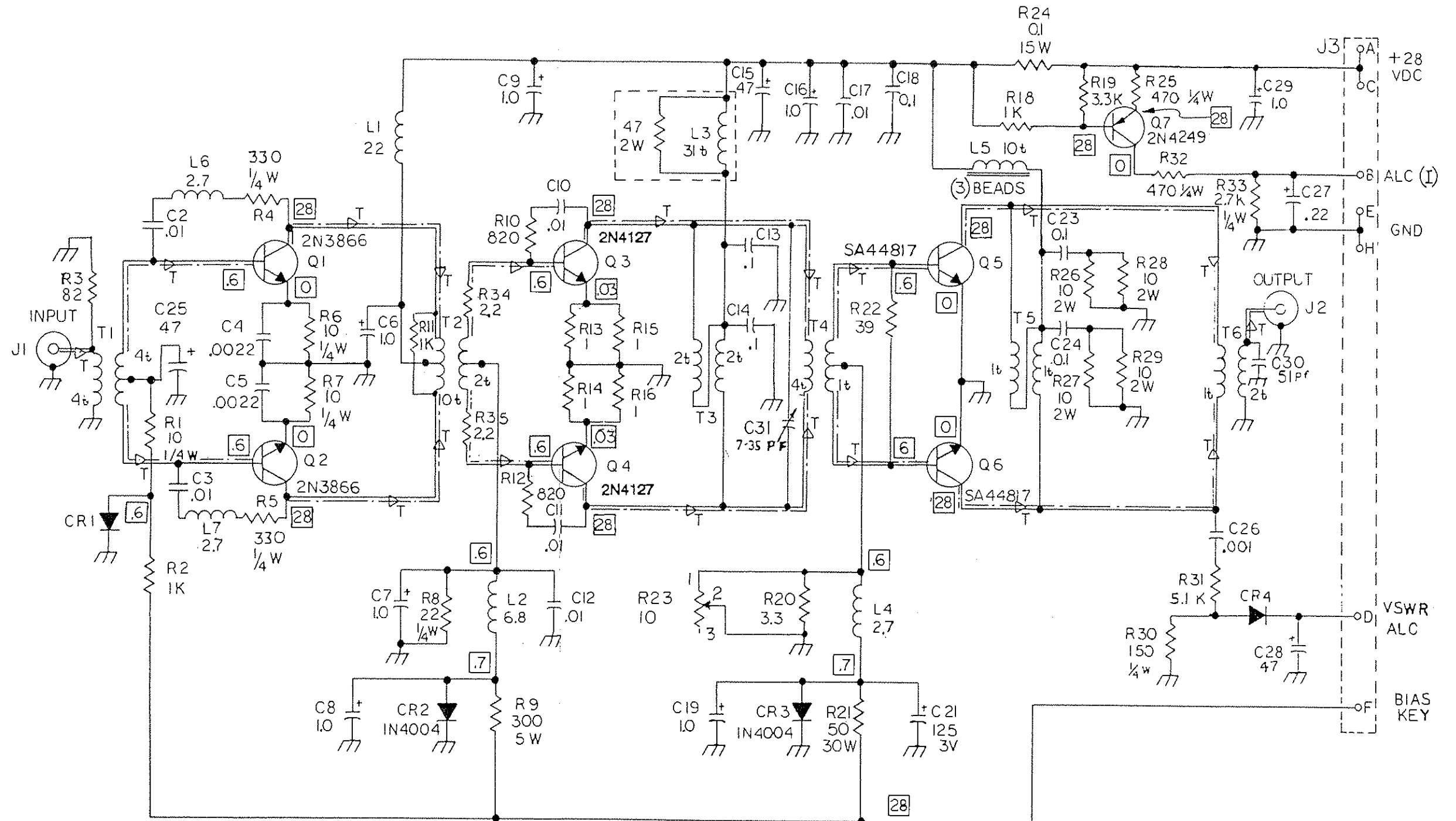


LOW BAND FILTER , HIGH BAND FILTER Schematic



A1	RF POWER AMPLIFIER ASSY	8099360095
A2	DRIVER TRANSFORMER ASSY.	5024030893
C2	OUTPUT TRANSFORMER ASSY.	5024031199
C3	CAP. .01 μ F, 50V, X7R 20%	0281730008
C4	CAP. .01 μ F, 50V, X7R 20%	0281730008
C5	CAP. 0.0022 μ F, 200V, Z5F, 10%	0272780006
C6	CAP. 0.0022 μ F, 200V, Z5F, 10%	0272780006
C7	CAP. 1 μ F, 50V, 198D	0280910002
C8	CAP. 1 μ F, 50V, 198D	0280910002
C9	CAP. 1 μ F, 50V, 198D	0280910002
C10	CAP. .01 μ F, 50V, X7R 20%	0281730008
C11	CAP. .01 μ F, 50V, X7R 20%	0281730008
C12	CAP. .01 μ F, 25V, X55/Y5P	0281627771
C13	CAP. 0.1 μ F, 50V, X7R, 20%	0281610002
C14	CAP. 0.1 μ F, 50V, X7R, 20%	0281610002
C15	CAP. 47 μ F, 50V, CL65B	0245750002
C16	CAP. 1 μ F, 50V, 198D	0280910002
C17	CAP. 0.01 μ F, 250V, X5V, 20%	0280950004
C18	CAP. 0.1 μ F, 50V, X7R, 20%	0281610002
C19	CAP. 1 μ F, 50V, 198D	0280910002
C21	CAP. 125 μ F, 3V,	0266020003
C23	CAP. 0.1 μ F, 50V, X7R, 20%	0281610002
C24	CAP. 0.1 μ F, 50V, X7R, 20%	0281610002
C25	CAP. 47 μ F, 20V, 196D	0281700001
C26	CAP. 0.001 μ F, 250V, X5R, 10%	0286260000
C27	CAP. .22 μ F, 35V, T368	0283510005
C28	CAP. 47 μ F, 20V, 196D	0281700001
C29	CAP. 1 μ F, 50V, 198D	0280910002
C30	CAP. 51PF, 500V, DM15, 2%	0281350001
C31	CAP. 7-35PF, 160V, N1500	0287390004
CR1	DIODE, SIGNAL, SIL 1N4454	0405270003
CR2	DIODE, RECTIFIER 1N4004	0405180004
CR3	DIODE, RECTIFIER 1N4004	0405180004
CR4	DIODE, SIGNAL, SIL 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 μ H, 5%	0650000005
L2	INDUCTOR, MOLDED, 6.8 μ H, 5%	0659210002
L3	CHOKE, RF	5024030605
L4	INDUCTOR, MOLDED, 2.7 μ H, 5%	0652180001
L5	CHOKE, RF	5024030702
L6	INDUCTOR, MOLDED, 2.7 μ H, 5%	0652180001
L7	INDUCTOR, MOLDED, 2.7 μ H, 5%	0652180001
Q1	TRANSISTOR, NPN, SI. 2N3866	0448140004
Q2	TRANSISTOR, NPN, SI. 2N3866	0448140004
Q3	TRANSISTOR, NPN, SI. 2N4127	0448150000
Q4	TRANSISTOR, NPN, SI. 2N4127	0448150000
Q5	TRANSISTOR, NPN, SI.	0448170001
Q6	TRANSISTOR, NPN, SI.	0448170001
Q7	TRANSISTOR, PNP, SI. 2N4249	0446780006
R1	RESISTOR 10, 5%, 1/4W	0177160004
R2	RESISTOR 50, 10%, 30W	0193240009
R2	RESISTOR 1K, 10%, 1/2W	0167480006
R3	RESISTOR 82, 10%, 1/4W	0184610001
R4	RESISTOR 330, 5%, 1/4W	0170910008
R5	RESISTOR 330, 5%, 1/4W	0170910008

R6	RESISTOR 10, 5%, 1/4W	0177160004
R7	RESISTOR 10, 5%, 1/4W	0177160004
R8	RESISTOR 22, 10%, 1/4W	0192690001
R9	RESISTOR 300, 5%, 5W	0161140009
R10	RESISTOR 820, 10%, 1/2W	0175600007
R11	RESISTOR 1K, 10%, 1/2W	0167480006
R12	RESISTOR 820, 10%, 1/2W	0175600007
R13	RESISTOR 1, 10%, 1/2W	0194770001
R14	RESISTOR 1, 10%, 1/2W	0194770001
R15	RESISTOR 1, 10%, 1/2W	0194770001
R16	RESISTOR 1, 10%, 1/2W	0194770001
R18	RESISTOR 1K, 10%, 1/2W	0167480006
R19	RESISTOR 3.3K, 5%, 1/2W	0184090008
R20	RESISTOR 3.3, 10%, 1/2W	0186050003
R22	RESISTOR 39, 10%, 1/2W	0165920009
R23	POT. 10, 5% 1/2W, PC MOUNT	0346380006
R24	RESISTOR 0.1, 10%, 15W	0193360004
R25	RESISTOR 470, 5%, 1/4W	0184110009
R26	RESISTOR 10, 10%, 2W	0163840008
R27	RESISTOR 10, 10%, 2W	0163840008
R28	RESISTOR 10, 10%, 2W	0163840008
R29	RESISTOR 10, 10%, 2W	0163840008
R30	RESISTOR 150, 10%, 1/4W	0172730007
R31	RESISTOR 5.1K, 5%, 1/2W	0183700007
R32	RESISTOR 470, 5%, 1/4W	0184110009
R33	RESISTOR 2.7K, 10%, 1/4W	0186670001
R34	RESISTOR 2.2, 10%, 1/2W	0178690007
R35	RESISTOR 2.2, 10%, 1/2W	0178690007
T1	TRANSFORMER INPUT	5024030401
T2	TRANSFORMER INTERSTAGE	5024030508
	BRACKET, COVER SUPPORT	8099300106
	HEAT SINK	0840730004
	HEAT SINK, MACHINED	8099361407
	MOUNTING PAD, TRANSISTOR	0502710004
	SPACER, .171 ID, .312 OD, .187L	0502270691
	SPACER, .140 ID, .250 OD, .250L	0502270616
	SPACER, .140 ID, .250 OD, .187L	0535400004
	SPACER, .155 ID, .187 OD, .800L	0508050006
	SPACER, .155 ID, .187 OD, 2.150L	0508210003
	SPACER, PLATE	5024031504



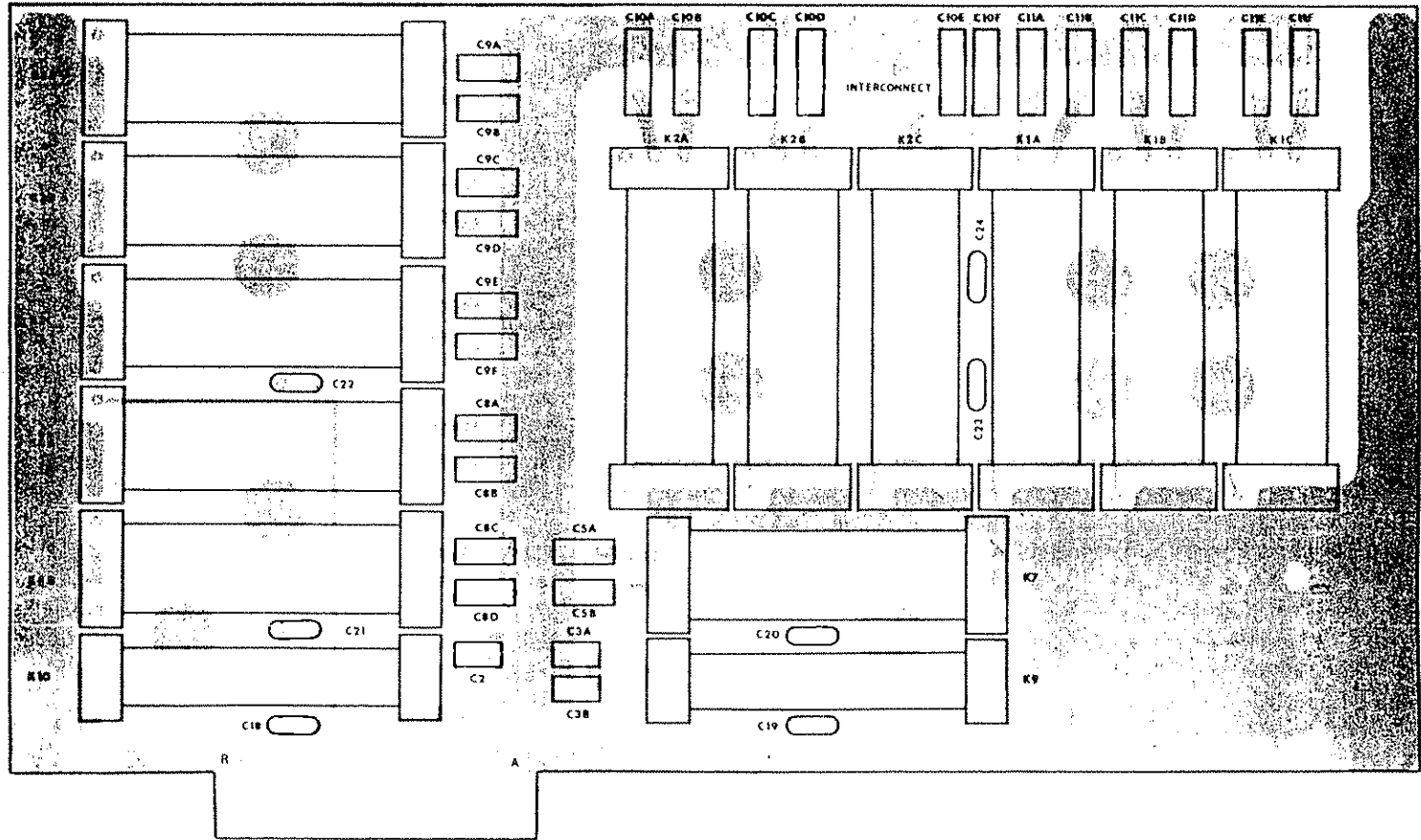
UNLESS OTHERWISE SPECIFIED :

1. ALL-RESISTORS IN OHMS, $\frac{1}{2}$ W
-CAPACITORS IN μ F
-INDUCTORS IN μ H
-DIODES ARE IN4454
2. PREFIX ALL DESIGNATORS WITH "A7A1"

3. UNUSED DESIGNATORS :

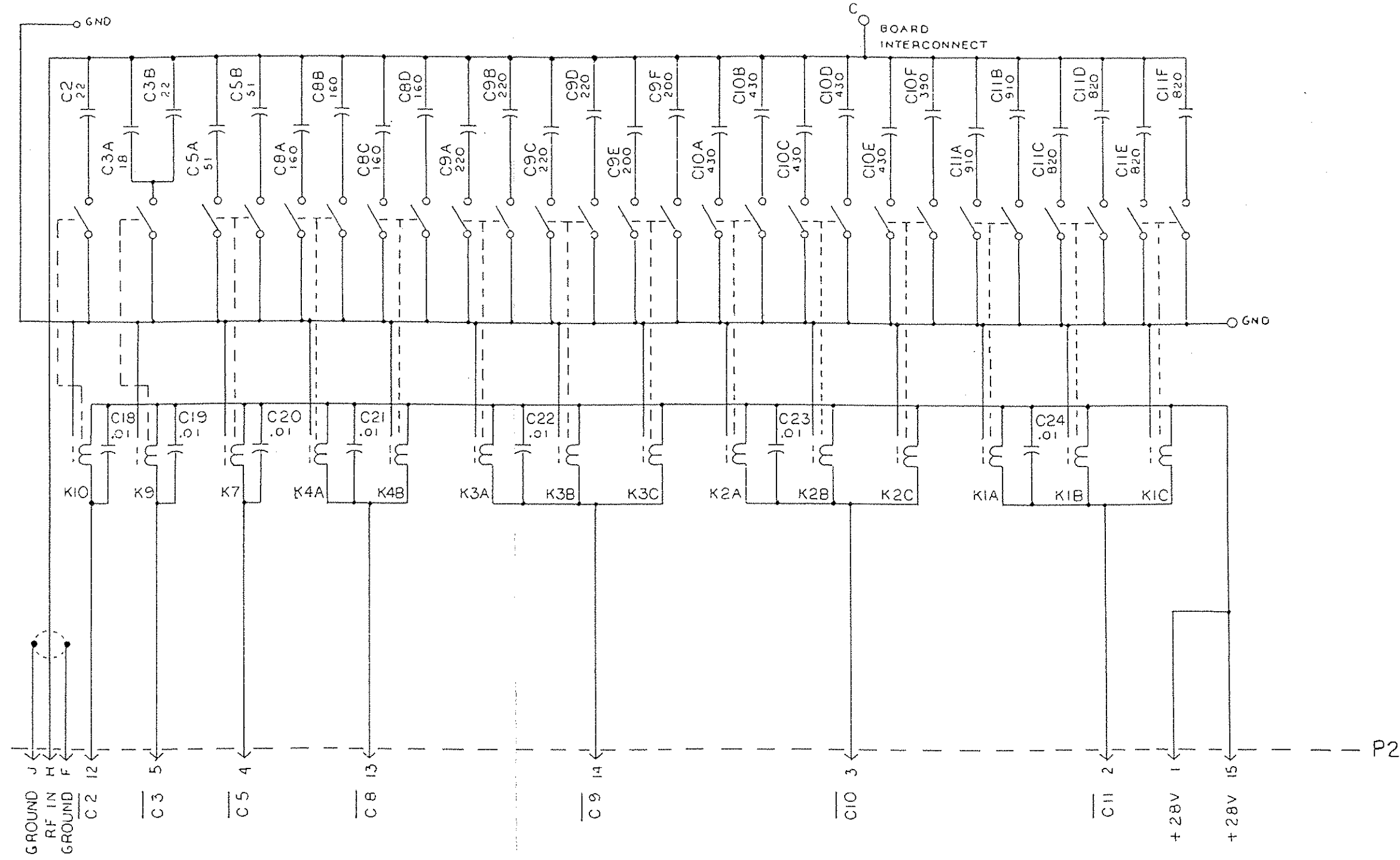
R17 C1, C20

4. VOLTAGES ARE GIVEN WITH XMTR KEYED IN
SSB AND NO
MODULATION



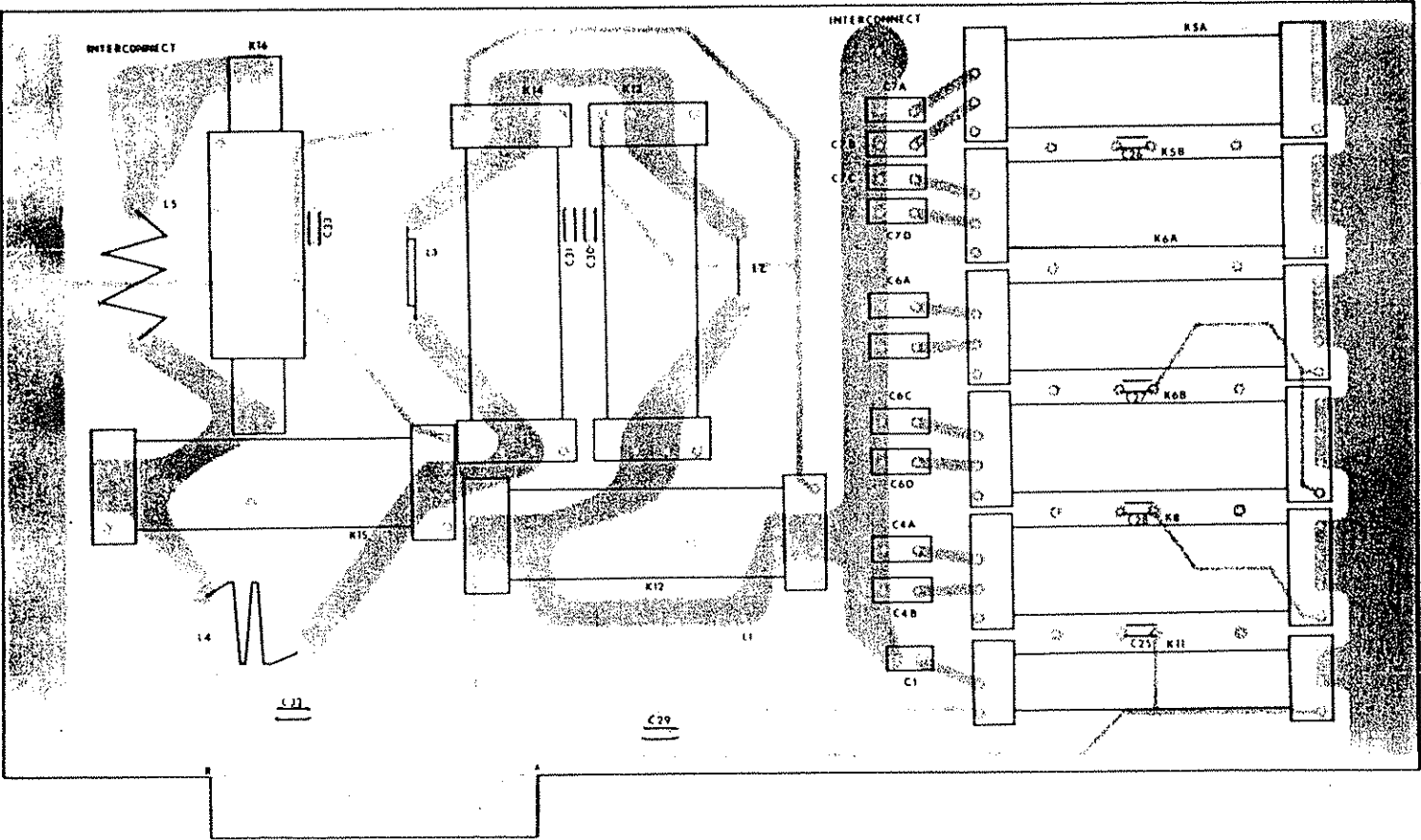
	PC ASSY, INPUT BOARD	8080030090
C2	CAP. 22PF, 500V, CD15, 2%	1000050025
C3A	CAP. 18PF, 500V, DM15	0281330000
C3B	CAP. 22PF, 500V, CD15, 2%	1000050025
C5A	CAP. 51PF, 500V, DM15, 2%	0281350001
C5B	CAP. 51PF, 500V, DM15, 2%	0281350001
C8A	CAP. 160PF, 500V, DM15, 2%	0281340005
C8B	CAP. 160PF, 500V, DM15,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

PC ASSY, INPUT BOARD

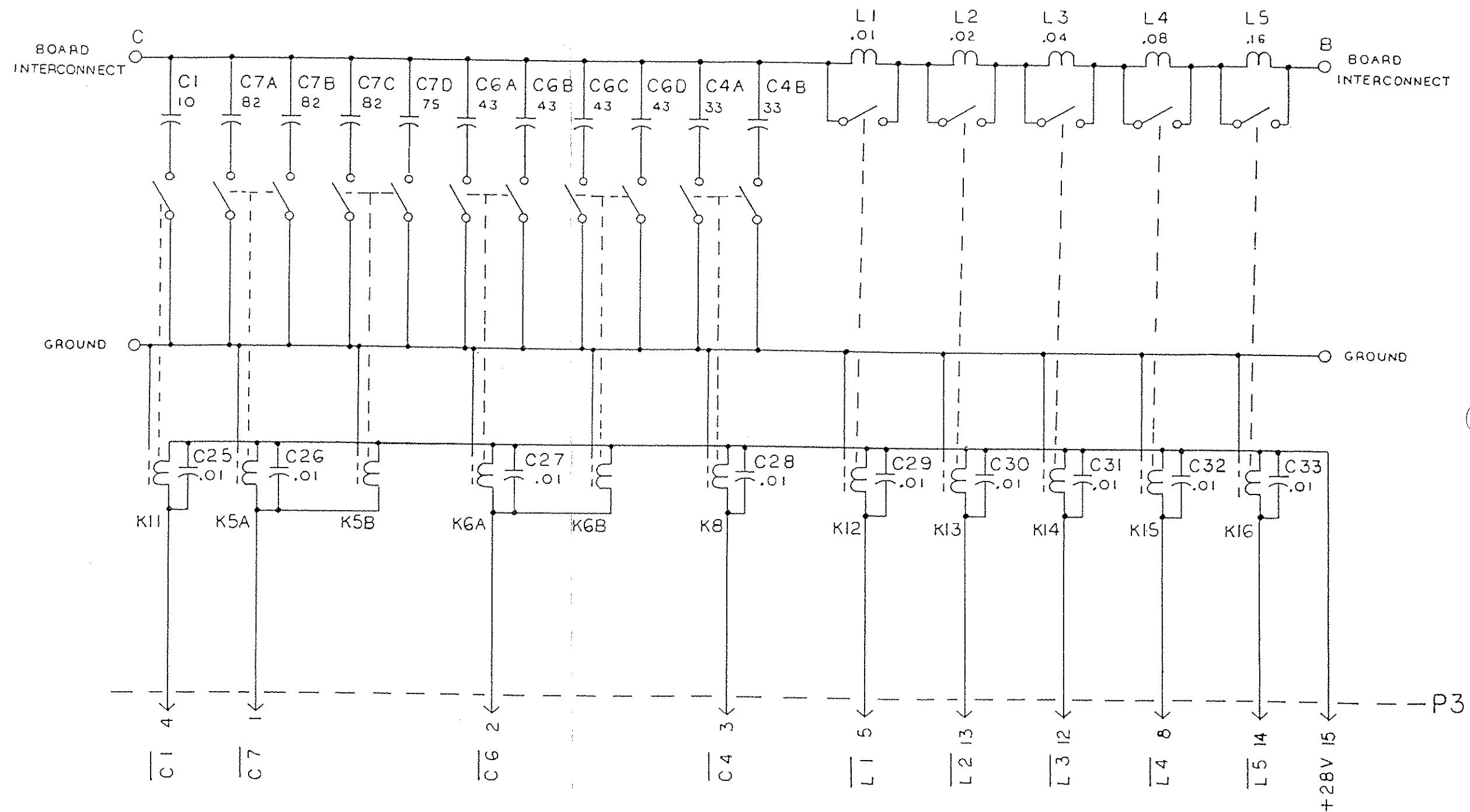


NOTES, UNLESS OTHERWISE SPECIFIED;
 1. DECIMAL CAPACITORS ARE IN MICROFARADS,
 ALL OTHERS ARE IN PICO FARADS.
 2. INDUCTORS ARE IN MICROHENRIES.

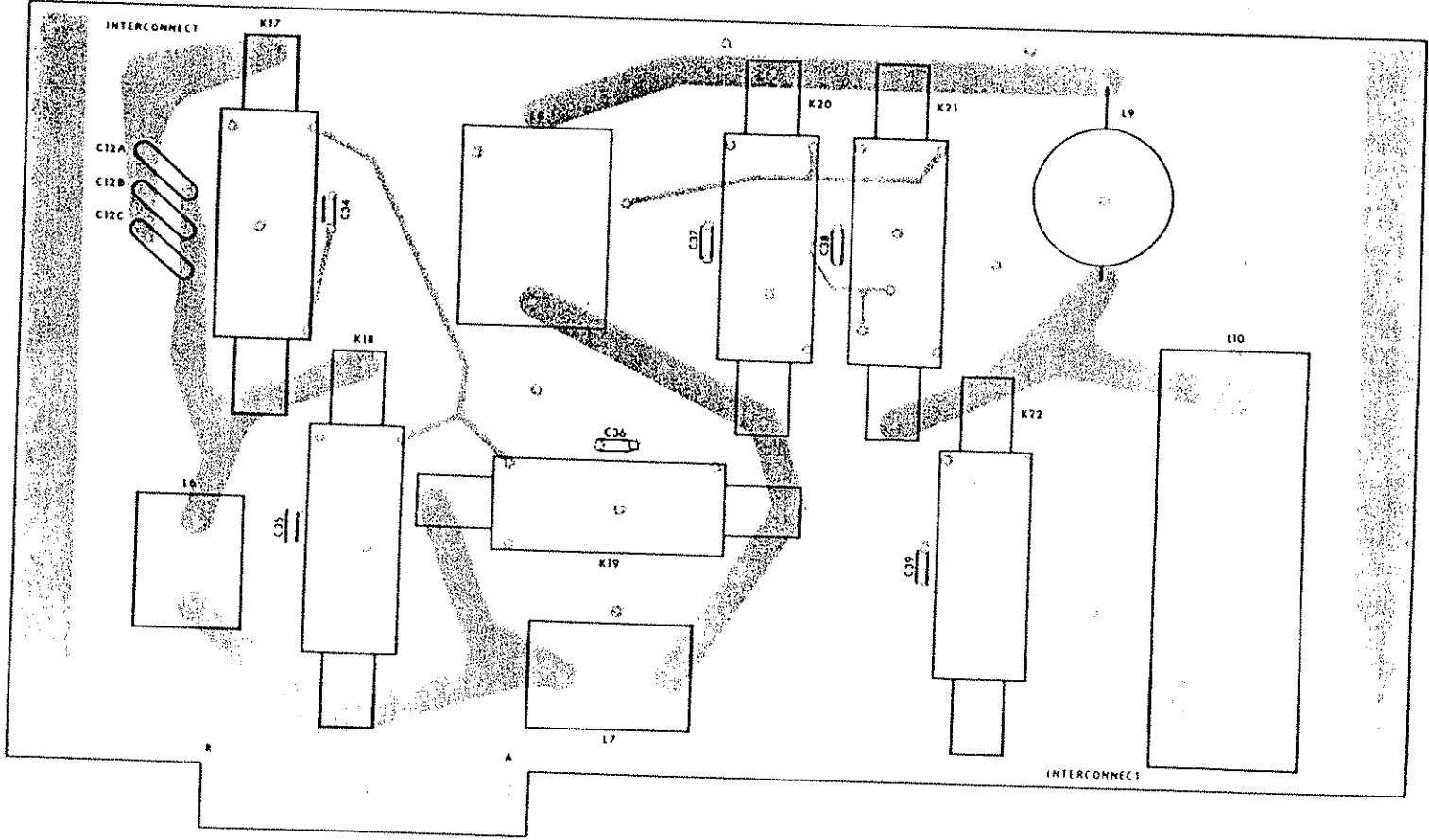
Input Board Schematic



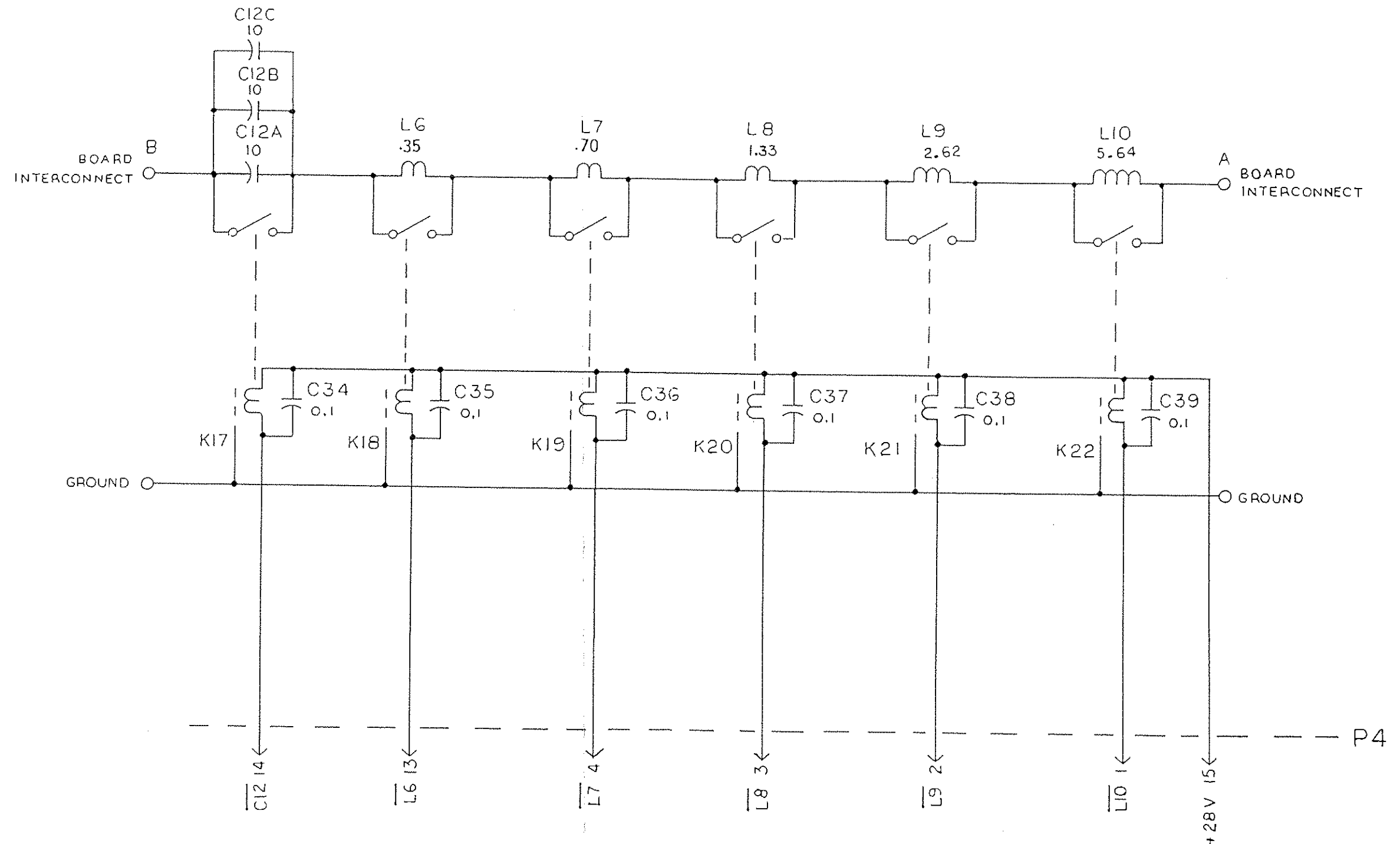
	PC ASSY, INTERMEDIATE	8080040095
C1	CAP. 10PF, 500V, DM10	0259830003
C4A	CAP. 33PF, 500V, DM15, 2%	0281020001
C4B	CAP. 33PF, 500V, DM15, 2%	0281020001
C6A	CAP. 43PF, 500V, DM15, 2%	1001240031
C6B	CAP. 43PF, 500V, DM15, 2%	1001240031
C6C	CAP. 43PF, 500V, DM15, 2%	1001240031
C6D	CAP. 43PF, 500V, DM15,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



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 - 2. INDUCTORS ARE IN MICROHENRIES.



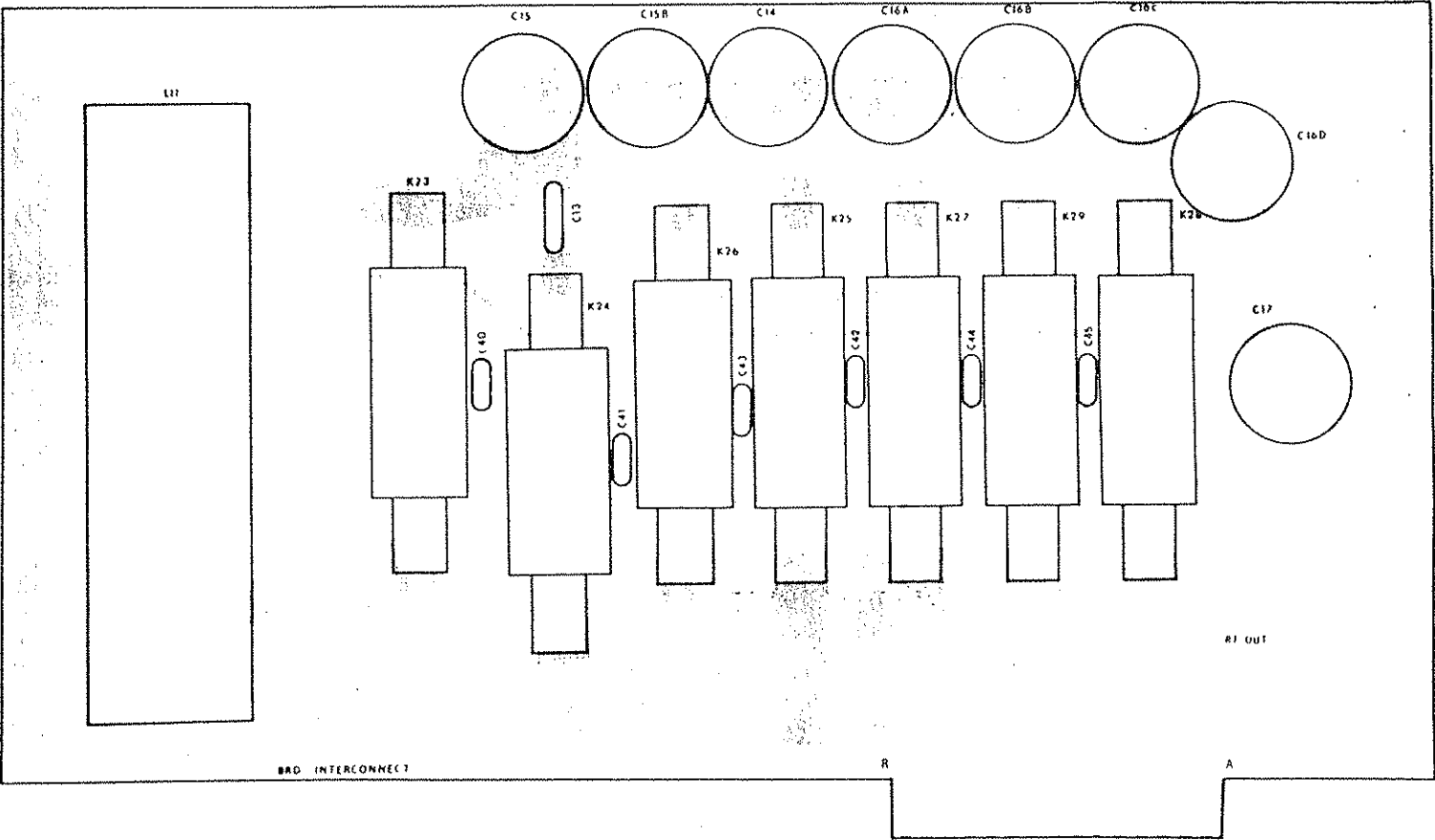
	PC ASSY, INDUCTOR BOARD	
C12A	CAP. 10PF, 3K0V NPO	8080050091
C12B	CAP. 10PF, 3K0V NPO	0259690007
C12C	CAP. 10PF, 3K0V NPO	0259690007
C34	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C35	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C36	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C37	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C38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



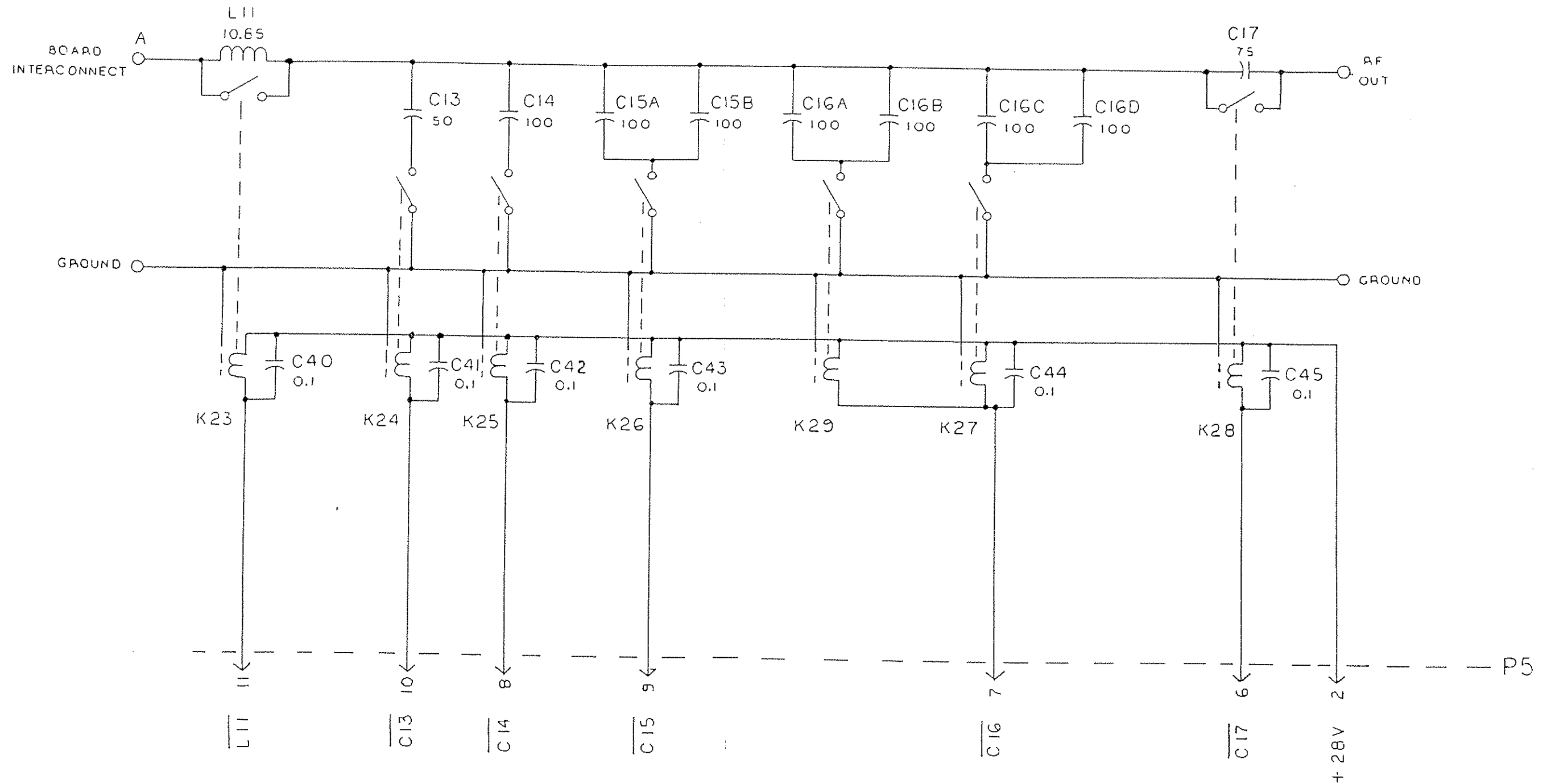
NOTES, UNLESS OTHERWISE SPECIFIED:

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

2. ALL INDUCTORS ARE IN MICROHENRIES.



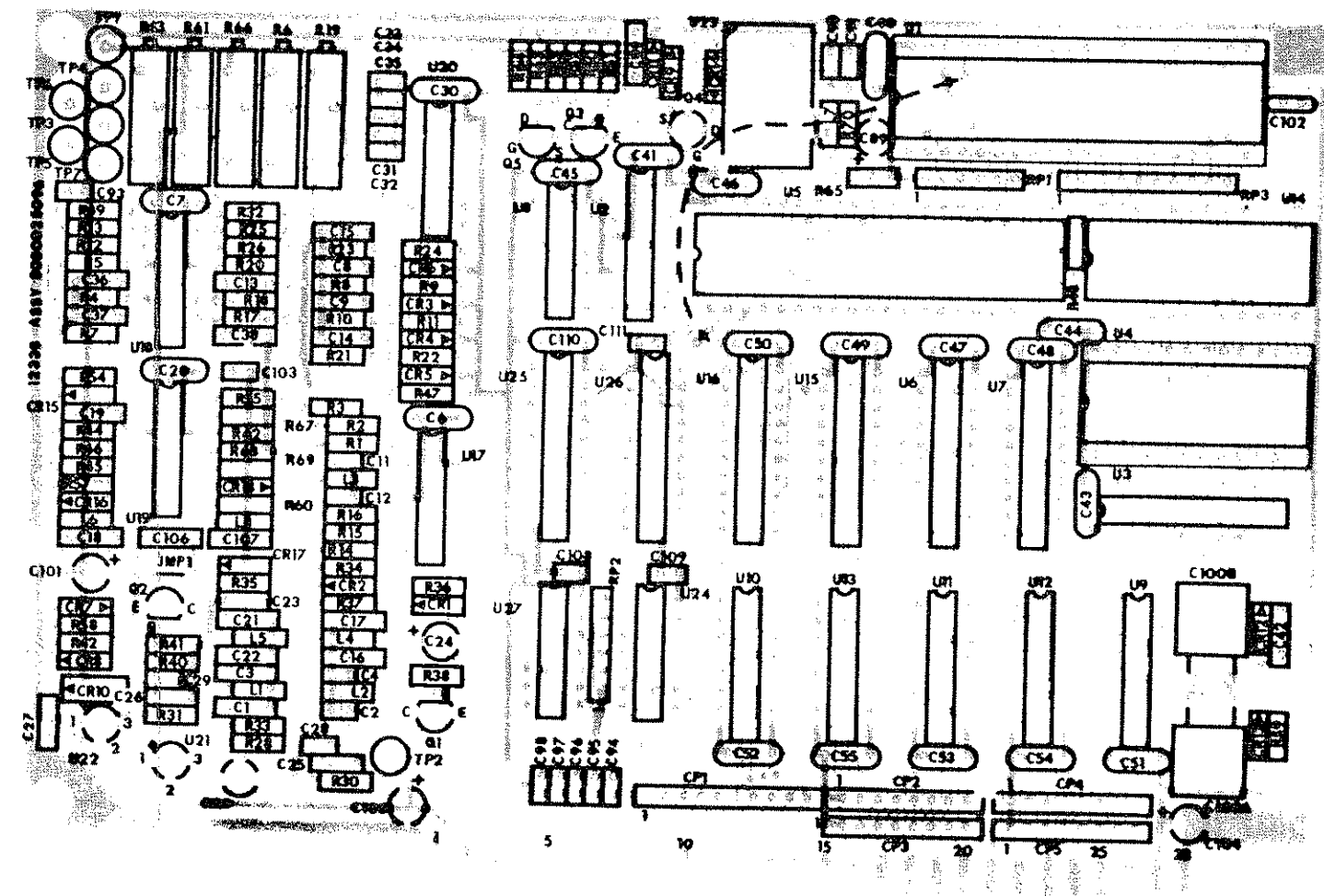
	PC ASSY, OUTPUT BOARD	
C13	CAP. 50PF, 7.5KV, NPO	8080060096
C14	CAP. 100PF, 5KV, N750	0290200008
C15A	CAP. 100PF, 5KV, N750	0290440009
C15B	CAP. 100PF, 5KV, N750	0290440009
C16A	CAP. 100PF, 5KV, N750	0290440009
C16B	CAP. 100PF, 5KV, N750	0290440009
C16C	CAP. 100PF, 5KV, N750	0290440009
C16D	CAP. 100PF,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

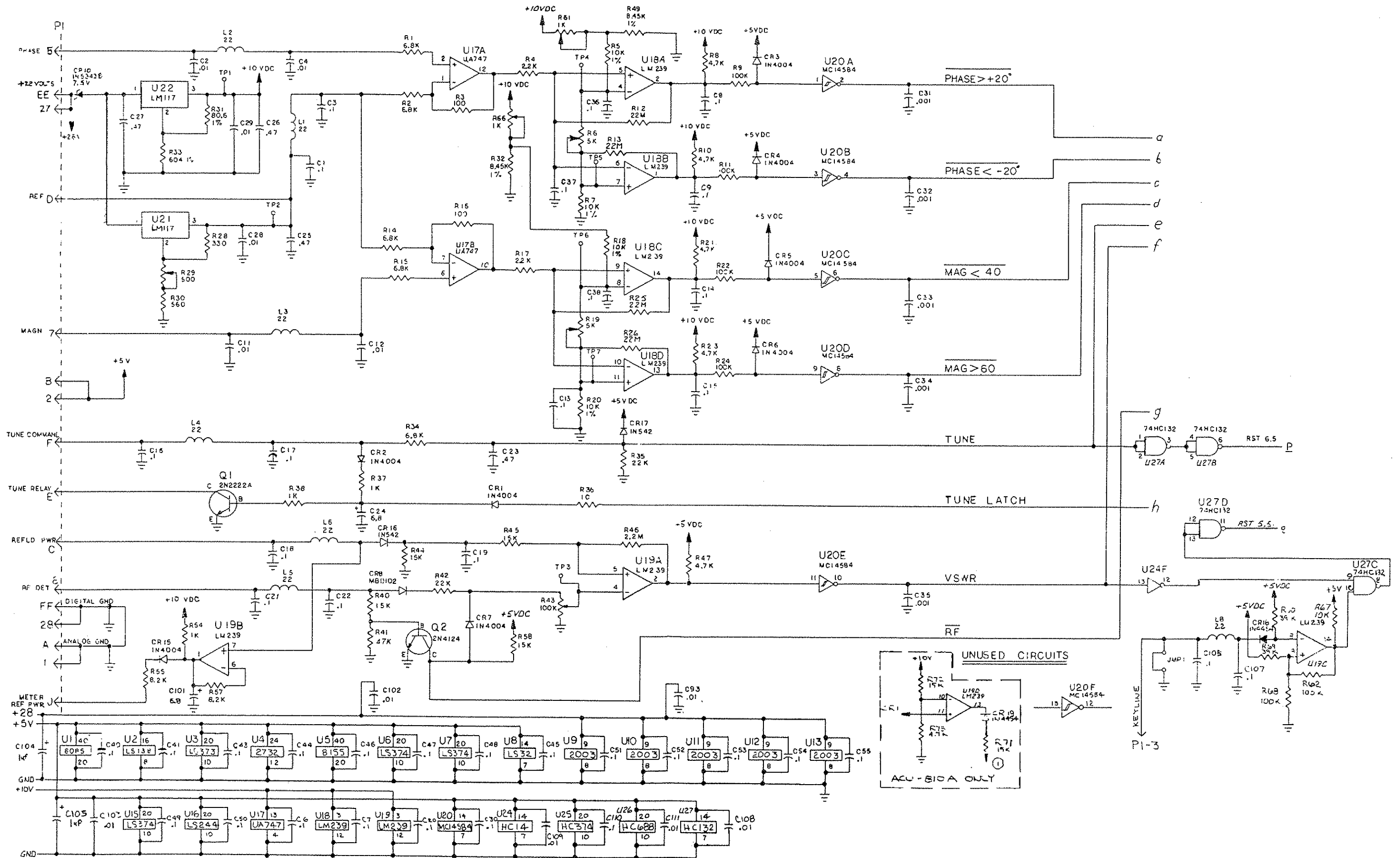


NOTES: UNLESS OTHERWISE SPECIFIED:

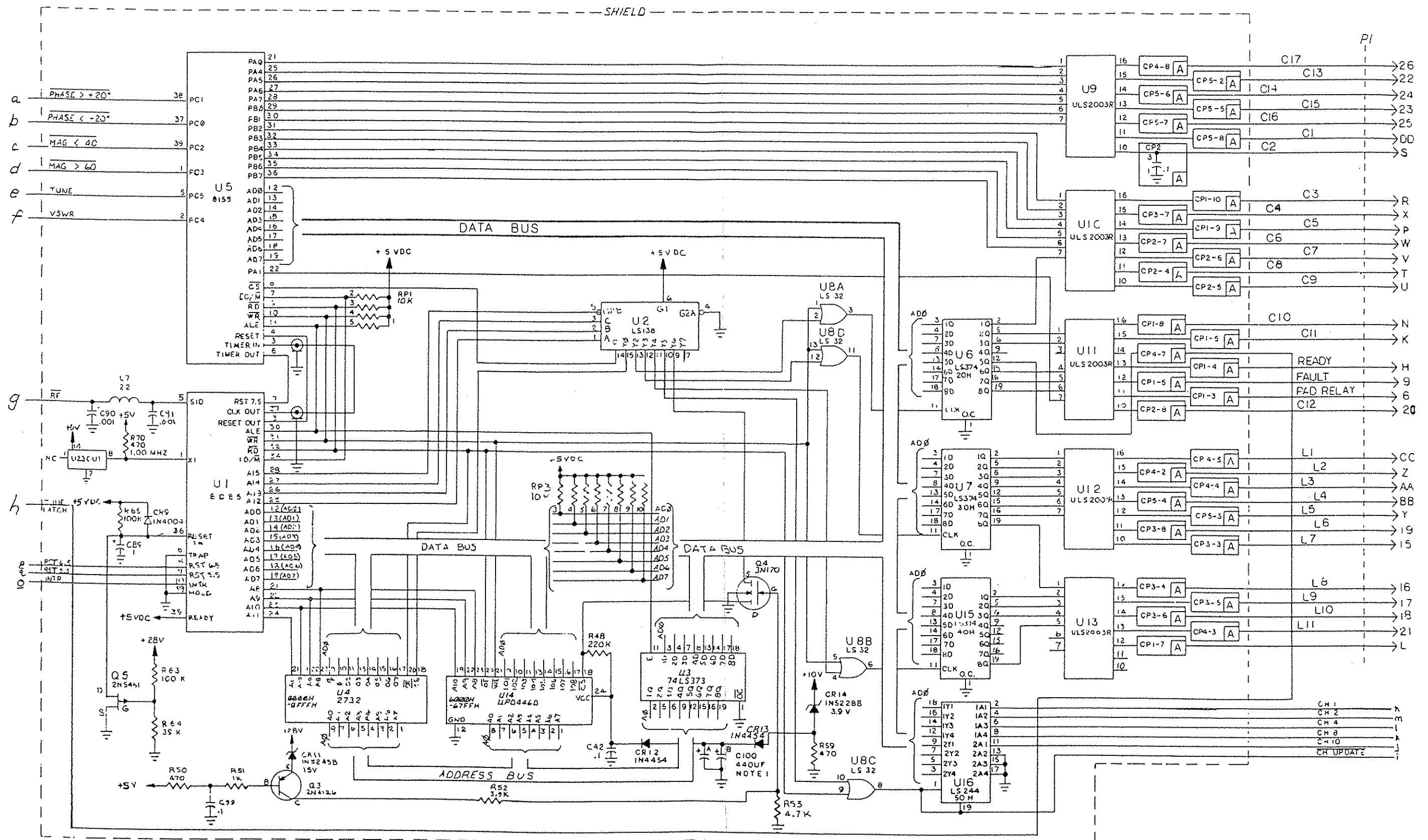
1. DECIMAL CAPACITORS ARE IN MICROFARADS,
ALL OTHERS ARE IN PICOFARADS.
2. ALL INDUCTORS ARE IN MICROHENRIES.

C1	COMPUTER MODULE	8099324099	C95	CAP. .47μF, 50V Z5U	1006680039	R7	RESISTOR 10K, 1%, 1/8W	1003050026	R71	RESISTOR 15K, 5%, 1/4W	0172350000
C2	CAP. .01μF, 50V, X7R, 20%	0281610002	C96	CAP. .47μF, 50V Z5U	1006680039	R8	RESISTOR 4.7K, 5%, 1/4W	0170770001	R72	RESISTOR 15K, 5%, 1/4W	0172350000
C3	CAP. .01μF, 50V, X7R, 20%	0281730008	C97	CAP. .47μF, 50V Z5U	1006680039	R9	RESISTOR 100K, 10%, 1/4W	0170390004	R73	RESISTOR 4.7K, 5%, 1/4W	0170770001
C4	CAP. .01μF, 50V, X7R, 20%	0281610002	C98	CAP. .47μF, 50V Z5U	1006680039	R10	RESISTOR 4.7K, 5%, 1/4W	0170770001	RP1	RES NTWK 6 PIN SIP 10K COM	1006130004
C6	CAP. .01μF, 50V, X7R, 20%	0281730008	C99	CAP. .01μF, 50V, X7R, 20%	0281610002	R11	RESISTOR 100K, 10%, 1/4W	0170390004	RP2	RES NTWK 6 PIN SIP 1.8K COM	1006520031
C7	CAP. .01μF, 50V, X7R, 20%	0281610002	C100A	CAP. 220μF, 16V	1004290021	R12	RESISTOR 22M, 10%, 1/4W	0180950002	RP3	RES NTWK 10 PIN SIP 10K COM	1006130021
C8	CAP. .01μF, 50V, X7R, 20%	0281730008	C100B	CAP. 220μF, 16V	1004290021	R13	RESISTOR 22M, 10%, 1/4W	0180950002	TP1	VERTICAL JACK, WHITE	1006200029
C9	CAP. .01μF, 50V, X7R, 20%	0281610002	C101	CAP. 6.8μF, 25V 20%	1005050031	R14	RESISTOR 6.8K, 5%, 1/4W	0174810008	TP2	VERTICAL JACK, WHITE	1006200029
C11	CAP. .01μF, 50V, X7R, 20%	0281730008	C102	CAP. .01μF, 50V, X7R 20%	0281730008	R15	RESISTOR 6.8K, 5%, 1/4W	0174810008	TP3	VERTICAL JACK, WHITE	1006200029
C12	CAP. .01μF, 50V, X7R, 20%	0281610002	C103	CAP. .01μF, 50V, X7R 20%	0281730008	R16	RESISTOR 100, 5%, 1/4W	0171180003	TP4	VERTICAL JACK, WHITE	1006200029
C13	CAP. .01μF, 50V, X7R, 20%	0281730008	C104	CAP. 1μF, 50V, 198D	0280910002	R17	RESISTOR 2.2K, 5%, 1/4W	0178070009	TP5	VERTICAL JACK, WHITE	1006200029
C14	CAP. .01μF, 50V, X7R, 20%	0281610002	C105	CAP. 1μF, 50V, 198D	0280910002	R18	RESISTOR 10K, 1%, 1/8W	1003050026	TP6	VERTICAL JACK, WHITE	1006200029
C15	CAP. .01μF, 50V, X7R, 20%	0281730008	C106	CAP. 0.1μF, 50V, X7R, 20%	0281610002	R19	POT. 5K, 10% 3/4W, 15 TURNS	0338490086	TP7	VERTICAL JACK, WHITE	1006200029
C16	CAP. .01μF, 50V, X7R, 20%	0281610002	C107	CAP. 0.1μF, 50V, X7R, 20%	0281610002	R20	RESISTOR 10K, 1%, 1/8W	1003050026	U1	IC. DIGITAL 80C85A	1007400013
C17	CAP. .01μF, 50V, X7R, 20%	0281730008	C108	CAP. 0.1μF, 50V, X7R, 20%	0281730008	R21	RESISTOR 4.7K, 5%, 1/4W	0170770001	U2	IC. DIGITAL 54LS138	1006410015
C18	CAP. .01μF, 50V, X7R, 20%	0281610002	C109	CAP. .01μF, 50V, X7R 20%	0281730008	R22	RESISTOR 100K, 10%, 1/4W	0170390004	U3	IC. DIGITAL 54LS373	1006410023
C19	CAP. .01μF, 50V, X7R, 20%	0281730008	C110	CAP. .01μF, 50V, X7R, 20%	0281610002	R23	RESISTOR 4.7K, 5%, 1/4W	0170770001	U5	IC. DIGITAL 81C55	1007390026
C20	CAP. .01μF, 50V, X7R, 20%	0281610002	C111	CAP. .01μF, 50V, X7R 20%	0281730008	R24	RESISTOR 100K, 10%, 1/4W	0170390004	U6	IC. DIGITAL 54LS374	1006420011
C21	CAP. .01μF, 50V, X7R, 20%	0281730008	CP1	CAPACITOR, NTWK, 10 PIN, .1 μF	1006580018	R25	RESISTOR 22M, 10%, 1/4W	0180950002	U7	IC. DIGITAL 54LS374	1006420011
C22	CAP. .01μF, 50V, X7R, 20%	0281610002	CP2	CAP. NTWK, 8 PIN, .1μF	1007360003	R26	RESISTOR 22M, 10%, 1/4W	0180950002	U8	IC. DIGITAL 54LS32	1006420029
C23	CAP. .47μF, 50V, X7R 20%	0283377771	CP3	CAP. NTWK, 8 PIN, .1μF	1007360003	R28	RESISTOR 330, 5%, 1/4W	0170910008	U9	IC. LINEAR ULS2003R	1007410019
C24	CAP. 6.8μF, 25V 20%	1005050031	CP4	CAP. NTWK, 8 PIN, .1μF	1007360003	R29	POT. 500, 10% 1/2W, 4 TURNS	0197510019	U10	IC. LINEAR ULS2003R	1007410019
C25	CAP. .47μF, 50V, X7R 20%	0283377771	CP5	CAP. NTWK, 8 PIN, .1μF	1007360003	R30	RESISTOR 560, 5%, 1/4W	0183200004	U11	IC. LINEAR ULS2003R	1007410019
C26	CAP. .47μF, 50V, X7R 20%	0283377771	CR1	DIODE, RECTIFIER 1N4004	0405180004	R31	RESISTOR 80.6, 1%, 1/8W	0195200004	U12	IC. LINEAR ULS2003R	1007410019
C27	CAP. .47μF, 50V, X7R 20%	0283377771	CR2	DIODE, RECTIFIER 1N4004	0405180004	R32	RESISTOR 8.45K 1%, 1/8W	1005900001	U13	IC. LINEAR ULS2003R	1007410019
C28	CAP. .01μF, 50V, X7R 20%	0281730008	CR3	DIODE, RECTIFIER 1N4004	0405180004	R33	RESISTOR 604, 1%, 1/8W	0193980002	U14	IC. DIGITAL RAM UPD446D	1006430008
C29	CAP. .01μF, 50V, X7R 20%	0281730008	CR4	DIODE, RECTIFIER 1N4004	0405180004	R34	RESISTOR 6.8K, 5%, 1/4W	0174810008	U15	IC. DIGITAL 54LS374	1006420011
C30	CAP. .01μF, 50V, X7R, 20%	0281610002	CR5	DIODE, RECTIFIER 1N4004	0405180004	R35	RESISTOR 22K, 5%, 1/4W	0172230004	U16	IC. DIGITAL 54LS244	1006510028
C31	CAP. 0.001μF, 100V, X7R, 20%	0281630003	CR6	DIODE, RECTIFIER 1N4004	0405180004	R36	RESISTOR 10, 5%, 1/4W	0177160004	U17	IC. LINEAR UA747ADMQB	1006430024
C32	CAP. 0.001μF, 100V, X7R, 20%	0281630003	CR7	DIODE, RECTIFIER 1N4004	0405180004	R37	RESISTOR 1K, 10%, 1/4W	0171560001	U18	IC. LINEAR LM239AJ	1006430032
C33	CAP. 0.001μF, 100V, X7R, 20%	0281630003	CR8	DIODE, HCT CARRIER 5082-2835	0405280009	R38	RESISTOR 1K, 10%, 1/4W	0171560001	U19	IC. LINEAR LM239AJ	1006430032
C34	CAP. 0.001μF, 100V, X7R, 20%	0281630003	CR9	DIODE, RECTIFIER 1N4004	0405180004	R40	RESISTOR 1K, 10%, 1/4W	0171560001	U20	IC. DIGITAL 4584B	1005190011
C35	CAP. 0.001μF, 100V, X7R, 20%	0281630003	CR10	DIODE, ZENER 1N5343B	1003060005	R41	RESISTOR 47K, 10%, 1/4W	0171060008	U21	IC. LINEAR LM117	1006440011
C36	CAP. 0.1μF, 50V, X7R, 20%	0281610002	CR11	DIODE, ZENER 1N5245B	0405210001	R42	RESISTOR 22K, 5%, 1/4W	0172230004	U22	IC. LINEAR LM117	1006440011
C37	CAP. 0.1μF, 50V, X7R, 20%	0281610002	CR12	DIODE, SIGNAL, SIL 1N4454	0405270003	R43	POT. 100K, 10% 3/4W, 15 TURNS	0338490051	U23	CRYSTAL, OSCILLATOR, 1.00 MHZ	1006670025
C38	CAP. 0.1μF, 50V, X7R, 20%	0281610002	CR13	DIODE, SIGNAL, SIL 1N4454	0405270003	R44	RESISTOR 15K, 5%, 1/4W	0172350000	U24	IC. DIGITAL 74HC14	1006490027
C40	CAP. 0.1μF, 50V, X7R, 20%	0281610002	CR14	DIODE, ZENER 1N5228B	1004320027	R45	RESISTOR 15K, 5%, 1/4W	0172350000	U25	IC. DIGITAL 74HC374	1006450033
C41	CAP. 0.1μF, 50V, X7R, 20%	0281610002	CR15	DIODE, RECTIFIER 1N4004	0405180004	R46	RESISTOR 2.2M, 10%, 1/4W	0176870008	U26	IC. DIGITAL 74HC688	1009050001
C42	CAP. 0.1μF, 50V, X7R, 20%	0281610002	CR16	DIODE, HOT CARRIER 1N6263	0405610009	R47	RESISTOR 4.7K, 5%, 1/4W	0170770001	U27	IC. DIGITAL 74HC132	1007360020
C43	CAP. 0.1μF, 50V, X7R, 20%	0281610002	CR17	DIODE, HOT CARRIER 1N6263	0405610009	R48	RESISTOR 220K, 10%, 1/4W	0177780002	XU1	SOCKET, IC, 40 PIN TAILLESS	1006620010
C44	CAP. 0.1μF, 50V, X7R, 20%	0281610002	CR18	DIODE, SIGNAL, SIL 1N4454	0405270003	R49	RESISTOR 8.45K 1%, 1/8W	1005900001	XU4	SOCKET, IC, 24 PIN	1006240021
C45	CAP. 0.1μF, 50V, X7R, 20%	0281610002	CR19	DIODE, SIGNAL, SIL 1N4454	0405270003	R50	RESISTOR 470, 5%, 1/4W	0184110009	XU5	SOCKET, IC, 40 PIN TAILLESS	1006620010
C46	CAP. 0.1μF, 50V, X7R, 20%	0281610002	L1	INDUCTOR, MOLDED, 22μH, 10%	0664060005	R51	RESISTOR 1K, 10%, 1/4W	0171560001		EPROM, W/ACU-810A SOFTWARE	8099324595
C47	CAP. 0.1μF, 50V, X7R, 20%	0281610002	L2	INDUCTOR, MOLDED, 22μH, 10%	0664060005	R52	RESISTOR 3.9K, 10%, 1/4W	0178830003		MOUNTING PAD, TRANSISTOR	0502710004
C48	CAP. 0.1μF, 50V, X7R, 20%	0281610002	L3	INDUCTOR, MOLDED, 22μH, 10%	0664060005	R53	RESISTOR 4.7K, 5%, 1/4W	0170770001		SHIELD, COMPONENT, CPU DCU-150	8080025801
C49	CAP. 0.1μF, 50V, X7R, 20%	0281610002	L4	INDUCTOR, MOLDED, 22μH, 10%	0664060005	R54	RESISTOR 1K, 10%, 1/4W	0171560001			
C50	CAP. 0.1μF, 50V, X7R, 20%	0281610002	L5	INDUCTOR, MOLDED, 22μH, 10%	0664060005	R55	RESISTOR 3.9K, 10%, 1/4W	0178830003			
C51	CAP. 0.1μF, 50V, X7R, 20%	0281610002	L6	INDUCTOR, MOLDED, 22μH, 10%	0664060005	R57	RESISTOR 8.2K, 5%, 1/4W	0181620006			
C52	CAP. 0.1μF, 50V, X7R, 20%	0281610002	L7	INDUCTOR, MOLDED, 22μH, 10%	0664060005	R58	RESISTOR 15K, 5%, 1/4W	0172350000			
C53	CAP. 0.1μF, 50V, X7R, 20%	0281610002	L8	INDUCTOR, MOLDED, 22μH, 10%	0664060005	R59	RESISTOR 470, 5%, 1/4W	0184110009			
C54	CAP. 0.1μF, 50V, X7R, 20%	0281610002	Q1	TRANSISTOR, NPN, SI. 2N2222A	0448580004	R60	RESISTOR 39K, 10%, 1/4W	0177800003			
C55	CAP. 0.1μF, 50V, X7R, 20%	0281610002	Q2	TRANSISTOR, NPN, SI. 2N4124	0448010003	R61	POT. 1K, 10% 3/4W, 15 TURNS	0338490019			
C89	CAP. 1μF, 50V, 198D	0280910002	Q3	TRANSISTOR, PNP, SI. 2N4126	0448020009	R62	RESISTOR 100K, 10%, 1/4W	0170390004			
C90	CAP. 0.001μF, 100V, X7R, 20%	0281630003	Q4	TRANSISTOR, N-CH, FET 3N170	1003980015	R63	RESISTOR 100K, 10%, 1/4W	0170390004			
C91	CAP. 0.001μF, 100V, X7R, 20%	0281630003	Q5	TRANSISTOR, P-CH, FET 2N5481	0446160008	R64	RESISTOR 39K, 10%, 1/4W	0177800003			
C93	CAP. .01μF, 50V, X7R 20%	0281730008	R1	RESISTOR 6.8K, 5%, 1/4W	0174810008	R65	RESISTOR 100K, 10%, 1/4W	0170390004			
C94	CAP. .47μF, 50V Z5U	1006680039	R2	RESISTOR 6.8K, 5%, 1/4W	0174810008	R66	POT. 1K, 10% 3/4W, 15 TURNS	0338490019			
			R3	RESISTOR 100, 5%, 1/4W	0171180003	R67	RESISTOR 10K, 10%, 1/4W	0170410005			
			R4	RESISTOR 2.2K, 5%, 1/4W	0178070009	R68	RESISTOR 100K, 10%, 1/4W	0170390004			
			R5	RESISTOR 10K, 1%, 1/8W	1003050026	R69	RESISTOR 39K, 10%, 1/4W	0177800003			
			R6	POT. 5K, 10% 3/4W, 15 TURNS	0338490086	R70	RESISTOR 470, 5%, 1/4W	0184110009			



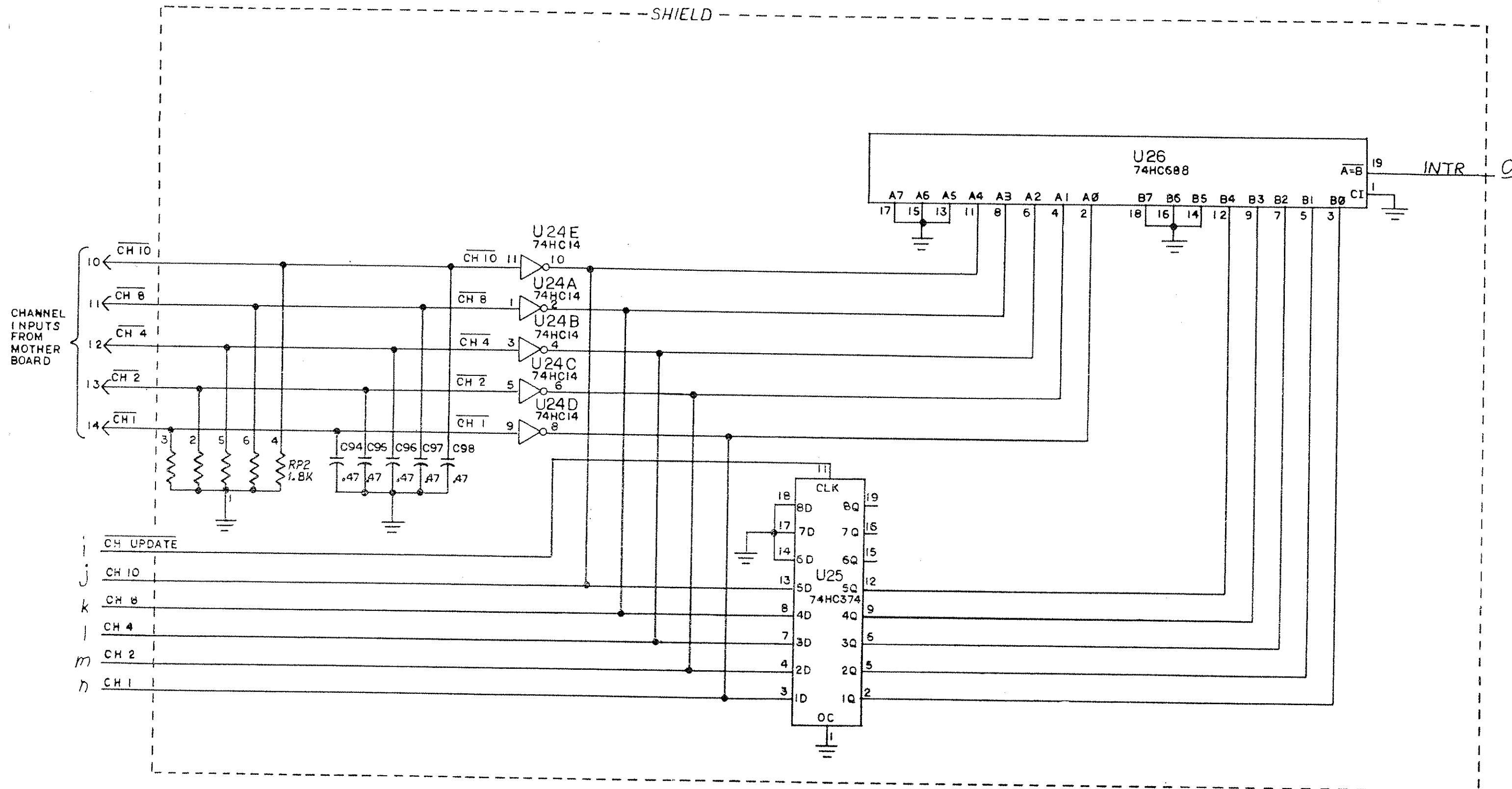


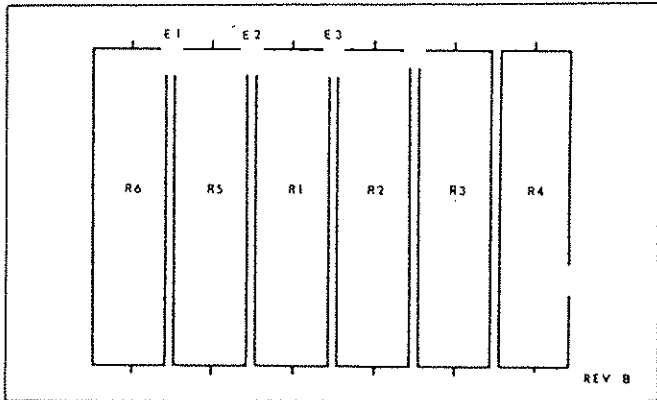
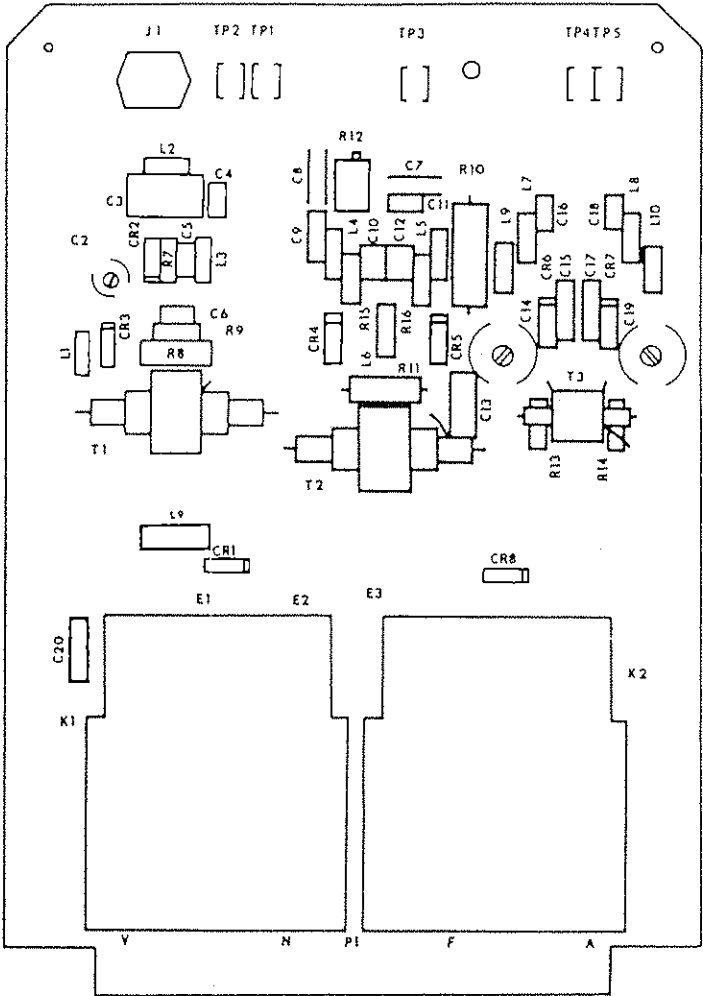
Computer Board Schematic



NOTES:
1. CAPACITORS A AND B ARE 220 UF EACH.

Computer Board Schematic

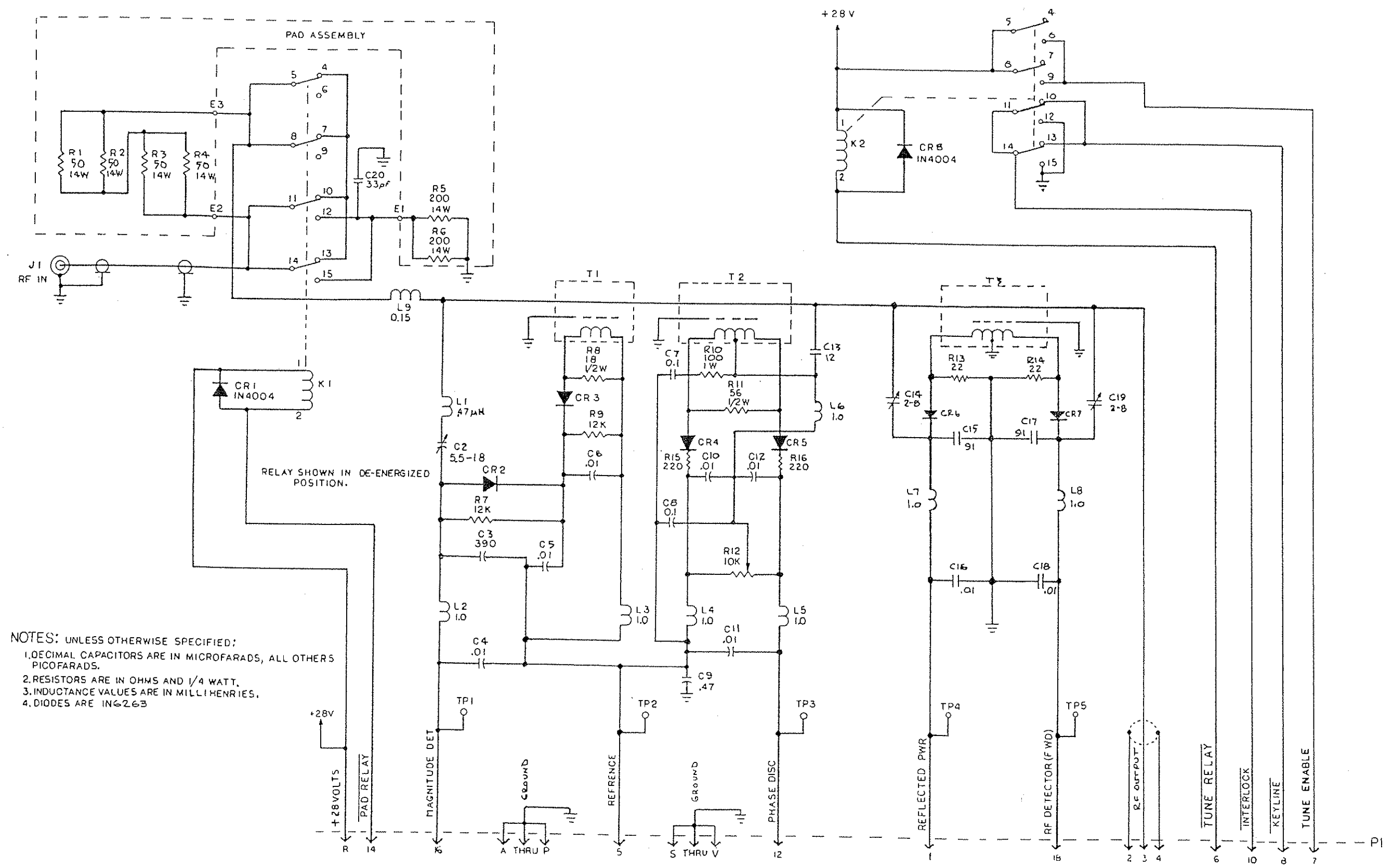




C2	PC ASSY, DETECTOR/PAD	8056160094
C3	CAP. 5.5-18PF, 350V, NPO	1007160021
C4	CAP. 390PF, 500V, DM15, 5%	0286000008
C5	CAP. .01μF, 50V, X7R 20%	0281730008
C6	CAP. .01μF, 50V, X7R 20%	0281730008
C7	CAP. .01μF, 50V, X7R 20%	0281730008
C8	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C9	CAP. 0.1μF, 50V, X7R, 20%	0281610002
C10	CAP. .47μF, 50V, X7R 20%	0283377771
C11	CAP. .01μF, 50V, X7R 20%	0281730008
C12	CAP. .01μF, 50V, X7R 20%	0281730008
C13	POT. 10K, 5% 0.6W, 15 TURNS	0344410005
C14	CAP. 12PF, 500V, DM15	1005320039
C15	CAP. 2-8PF, 350V, NPO	0268220000
C16	CAP. 91PF, 500V, DM15, 5%	0298740001
C17	CAP. .01μF, 50V, X7R 20%	0281730008
C18	CAP. 91PF, 500V, DM15, 5%	0298740001
C19	CAP. .01μF, 50V, X7R 20%	0281730008
C20	CAP. 2-8PF, 350V, NPO	0268220000
CR1	DIODE, RECTIFIER 1N4004	0281020001
CR2	DIODE, HOT CARRIER 1N6263	0405180004
CR3	DIODE, HOT CARRIER 1N6263	0405610009
CR4	DIODE, HOT CARRIER 1N6263	0405610009
CR5	DIODE, HOT CARRIER 1N6263	0405610009
CR6	DIODE, HOT CARRIER 1N6263	0405610009
CR7	DIODE, HOT CARRIER 1N6263	0405610009
CR8	DIODE, RECTIFIER 1N4004	0405180004
J1	CONNECTOR, RF, SNAP-ON	1000170012
K1	RELAY, 4PDT, 24V, PC MT 7.5A	0661600009
K2	RELAY, 4PDT, 24V, PC MT 7.5A	0661600009
L1	INDUCTOR, MOLDED, 0.47μH, 5%	0649410009
L2	INDUCTOR, MOLDED, 1000μH, 10%	0664940005
L3	INDUCTOR, MOLDED, 1000μH, 10%	0664940005
L4	INDUCTOR, MOLDED, 1000μH, 10%	0664940005
L5	INDUCTOR, MOLDED, 1000μH, 10%	0664940005
L6	INDUCTOR, MOLDED, 1000μH, 10%	0664940005
L7	INDUCTOR, MOLDED, 1000μH, 10%	0664940005
L8	INDUCTOR, MOLDED, 1000μH, 10%	0664940005
R7	RESISTOR 12K, 10%, 1/4W	0183180003
R8	RESISTOR 18, 5%, 1/2W	0184730007
R9	RESISTOR 12K, 10%, 1/4W	0183180003
R10	RESISTOR 100, 10%, 1W	0165540001
R11	RESISTOR 56, 10%, 1/2W	0168890003
R13	RESISTOR 22, 10%, 1/4W	0192690001
R14	RESISTOR 22, 10%, 1/4W	0192690001
R15	RESISTOR 220, 10%, 1/4W	0171320000
R16	RESISTOR 220, 10%, 1/4W	0171320000
T1	TRANSFORMER, AMPL DETECTOR	6035040802
T2	TRANSFORMER, PHASE DETECTOR	6035040900
T3	TRANSFORMER, CURRENT	8080003602
TP1	TEST POINT, WHITE	0753640007
TP2	TEST POINT, WHITE	0753640007
TP3	TEST POINT, WHITE	0753640007
TP4	TEST POINT, WHITE	0753640007
TP5	TEST POINT, WHITE	0753640007
	INDUCTOR, 0.1544	8056162097

INSULATION SHEET ACU-810	1002650011
PC ASSY, PAD DCU-100	8056161091
SOCKET, RELAY, 4PDT CONTACTS	0754700003
SOCKET PIN	1005990034
SPRING, RELAY HOLD-DOWN	0881930008

R1	PC ASSY, PAD	8056161091
R2	RESISTOR 50, 5%, 14W	0191160008
R3	RESISTOR 50, 5%, 14W	0191160008
R4	RESISTOR 50, 5%, 14W	0191160008
R5	RESISTOR 200, 5%, 14W	0197410006
R6	RESISTOR 200, 5%, 14W	0197410006



Detector Board Assembly Schematic

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**RT-2400
HF/SSB
RADIO SET**

**OPERATION AND MAINTENANCE
MANUAL**

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In case of difficulty please contact the Sunair Product Service Department, between the hours of 8:00 AM and 5:00 PM Eastern Time or write to:

Product Service Dept.
Sunair Electronics, Inc.
3101 SW Third Avenue
Ft. Lauderdale, FL 33315-3389
U.S.A.

Telephone: (954) 525-1505

Fax: (954) 765-1322

e-mail: techsupport@sunairhf.com

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TABLE of ABBREVIATIONS

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

* Asterisk indicates function selected

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SECTION I

GENERAL INFORMATION

1.1 SCOPE OF MANUAL

This manual contains information necessary to install, operate, and maintain the RT-2400 HF/SSB Radio Set. Installation information is in Section II. Operating Instructions are in Section III. Theory of Operation is in Section IV. Maintenance and Repair Procedures are in Section V. Information in this manual applies to all equipment configurations, unless otherwise stated in the text or illustrations.

1.2 PURPOSE OF EQUIPMENT

The RT-2400 is a 125 Watt HF/SSB Radio Set capable of providing communications from 2.0 to 29.99999 MHz (receive 100 kHz to 29.99999 MHz). Modes of operation include USB, LSB, AME, and CW (FSK, ARQ and FEC are available with optional external modems). The RT-2400 is designed to be used in fixed station or mobile environments.

Features of the RT-2400 include: simplex or half-duplex operation, manual or memory frequency selection in 10 Hz steps, programmable channels, keyboard entry, nonvolatile memory using EEPROM (no batteries required), BITE to LRU (Lowest Repairable Unit), receive scanning, and noise blanker.

1.3 GENERAL DESCRIPTION

The RT-2400 can be used in base station as well as mobile installations. Its rugged splashproof package makes it ideal for all environments. Internally, the RT-2400 is designed with the service technician in mind. Built-In Test Equipment (BITE) and Modularized Plug-In Assemblies make the MTTR (Mean Time To Repair) less than fifteen (15) minutes. LEDs located on the assemblies allow the technician to pinpoint the faulty module immediately.

The RT-2400 has a simple, easily understood front panel. First time users can operate the radio without extensive training. This, in conjunction with the BITE, results in a reliable radio system that is easy to operate and maintain.

1.4 TECHNICAL SPECIFICATIONS

1.4.1 GENERAL

FREQUENCY RANGE: Transmit - 2.0 to 29.99999 MHz; Receive - 100 kHz to 29.99999 MHz in 10 Hz steps.

PROGRAMMABLE CHANNELS: 100 Simplex or Half-Duplex.

FREQUENCY STABILITY: 1×10^6

MODES OF OPERATION: USB, LSB, CW, AME, DATA (RTTY, ARQ, FEC, FAX with optional external modems).

MEMORY RETENTION: Non-Volatile.

SCAN: Automatic.

CLARIFIER: ± 500 Hz, 10 Hz Resolution.

SYNTHESIZER LOCK: 10 ms.

T/R SWITCHING TIME: 10 ms.

RF OUTPUT IMPEDANCE: 50 Ohm nominal, unbalanced.

BITE: Fault isolated to module level (LRU).

INPUT POWER: 28V Version: 20.0 to 30.0 VDC @ 14A.
12V Version: 10.8V to 16.3V @ 25A.

SIZE - INCHES (CM): Transceiver: 5.05"H (12.8) X 13.32"W (33.8) X 13.87"D (35.2)
Control Head: 4.67"H (11.9) X 10.92"W (27.7) X 4.60"D (11.7).

WEIGHT - LBS (KG): Transceiver: 22(10)
Control Head: 4.7(2.1)

CONSTRUCTION: Modular plug-in assemblies.

1.4.2 RECEIVER SECTION

SELECTIVITY: SSB - 300 to 3000 Hz @ 6 dB; CW - 500 Hz @ 3 dB, centered at 800 Hz (Optional);
AM - ± 300 Hz @ 6 dB (Optional).

SENSITIVITY: SSB - $0.5\mu\text{V}$ for 10 dB (S+N)/N; AM - $3.0\mu\text{V}$ for 10 dB (S+N)/N; (Degradation below 2.0 MHz).

AUDIO OUTPUT: 5 Watts into internal speaker < 5% THD. Headset, low impedance. (600 OHM Output in Data Mode).

IMAGE & IF REJECTION: 80 dB minimum.

SPURIOUS REJECTION: 80 dB minimum.

AGC CHARACTERISTICS: Attack Time - 10 ms nominal; Release Time - Data 30 ms, CW 200 $\pm$ 100 ms
SSB 1 $\pm$.2 sec.

SQUELCH: Syllabic.

ANTENNA INPUT PROTECTION: 100 VRMS, self resetting.

INTERNALLY GENERATED SPURIOUS: 99.5% of the available frequencies from 100 kHz to 30 MHz at or below 0.5 μ V equivalent input at the antenna terminal.

1.4.3 TRANSMITTER SECTION

OUTPUT POWER: 28V Version: 125 Watts PEP and Average for SSB; 125 Watts CW; 40 Watts Carrier in AM.
12V Version: 100 Watts PEP and Average for SSB; 100 Watts CW; 40 Watts Carrier in AM.

HARMONIC SUPPRESSION: -45 dB second order, -55 dB third and higher orders.

INTERMODULATION DISTORTION: 28V Version: 36 dB below PEP.
12V Version: 32 dB below PEP.

CARRIER SUPPRESSION: 50 dB below PEP.

UNDESIRED SIDEBAND: 50 dB below PEP @ 1.5 kHz.

HUM & NOISE LEVEL: 50 dB below PEP.

VSWR: Operates at VSWR 2.0:1 (Automatic power reduction above 2.0:1).

AUDIO INPUT: Microphone, High Impedance (600 OHM in Data Mode).

AUTOMATIC LEVEL CONTROL: 28V Version: 125 Watts $\pm$ 1 dB.
12V Version: 125 Watts $\pm$ 1 dB.

AUDIO COMPRESSION: 10 dB nominal.

1.4.4 ENVIRONMENTAL

TEMPERATURE: -30°C to +50°C.

HUMIDITY: 100% at 50°C.

SHOCK: MIL-STD-810E, Method 516.4.

VIBRATION: MIL-STD-810E, Method 514.4.

SPLASHPROOF: MIL-STD-108E.

1.5 EQUIPMENT SUPPLIED

The following is a list of equipment, with appropriate Sunair part numbers, supplied with the RT-2400 Radio Set.

<u>Supplied Equipment:</u>	<u>Sunair Part Numbers:</u>
Transceiver, RT-2410	8108001293
Control Head, C-2420	8108101298
Hand Held Microphone Assembly	8076000602
Manual	8108000505
Mating Connector Kit	8108000491

1.6 OPTIONS AVAILABLE

The following is a list of optional equipment or accessories available for use with the RT-2400 Radio Set.

<u>Optional Equipment/Accessories:</u>	<u>Sunair Model /Part Numbers:</u>
Digital Antenna Coupler, CU-2430	8108401291
Digital Antenna Coupler, CU-9125	8085000296 O.D. 8085000253 GRAY
Kilowatt Digital Antenna Coupler, 1000 Watt Operation, CU-9100	8104001094 O.D. 8104001051 GRAY
Solid State Kilowatt Amplifier, LPA-9600	8105001098 O.D. 8105001055 GRAY
Handset Assembly	8076000793
Desktop Microphone	8076000891
Mounting Tray Assy, Transceiver	8108002095
Field Module Kit	8108905095
CW Filter	8108051207

AM Filter	1010380010
Wire, No. 8 White	1009490010
Wire, No. 8 Black	1009500015
Cable 19 Cond No. 24	1011200015
Shockmount Kit	8108002591
Blower Kit	8108006091
Power Cord Assembly, DC	8076002290

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SECTION II

INSTALLATION

2.1 GENERAL

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

2.2 UNPACKING AND INSPECTION

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

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

Do not accept a shipment when there are visible signs of damage to the cartons until a complete inspection is made. If there is a shortage of items or any evidence of damage, insist on a notation to that effect on the shipping papers before signing the receipt from the carrier. If concealed damage is discovered after the shipment has been accepted, notify the carrier immediately in writing and await his inspection before making any disposition of the shipment. A full report of the damage should also be forwarded to Sunair's Product Services Department. Please be sure to include the following information for prompt service:

- a) ORDER NUMBER.
- b) MODEL AND SERIAL NUMBER.
- c) NAME OF TRANSPORTATION AGENCY.
- d) APPLICABLE DATES.

Upon receipt of this information arrangements will be made, by Sunair, for repair or replacement.

2.3 RETURN OF EQUIPMENT TO FACTORY

The shipping carton for the RT-2400 has been designed to protect the equipment during shipment. The container and its associated packing materials should be used to reship the unit. When necessary to return equipment to Sunair for warranty or non-warranty repair, an authorization number is required. This number can be obtained from our Product Services Department: TELEPHONE: (305) 525-1505, FACSIMILE: (305) 765-1322.

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

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

Shipment to be made PREPAID consigned to:

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

Plainly mark with indelible ink all mailing documents as follows:

US Goods Returned For Repair
Value For Customs - \$(Amt.)

Mark ALL SIDES of the package:

FRAGILE - ELECTRONIC EQUIPMENT!

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

2.4 GENERAL INSTALLATION AND MOUNTING INFORMATION

Satisfactory operation of this equipment will depend upon the care and thoroughness taken during installation.

2.4.1 GENERAL INSTALLATION

For installation and use with KW equipment, modems, and other peripherals. Use this manual in conjunction with their respective operating manuals for complete installation information.

- a) Carefully plan transceiver/peripherals/coupler/antenna locations, observing the following requirements before starting installation.
- b) Provide best possible RF ground for transceiver and coupler. Use flat copper strap 1" wide, or No. 6 or larger wire, and connect to ground terminal at rear of transceiver. Leads to ground system should be as short as possible.
- c) Provide separation between coupler output and transceiver with its associated wiring. Coupler may be mounted up to 100 feet from transceiver if RG58 RF coax cable is used, or further if RG8 RF coax cable is used.
- d) Antenna lead from coupler to antenna must be insulated for at least 10kV potential. The lead should run parallel to metal fittings or other metal objects that are bonded to the system ground. The coupler should be as close to the antenna as possible, and never more than three (3) feet distant as this will decrease antenna efficiency.

- e) If the transceiver is installed on a wood or fiberglass boat, approximately ten (10) to twelve (12) square feet of metal surface area in contact with the water should be provided for use as an RF ground.
- f) If operated on DC power, check for correct polarity before applying power.

NOTE: Linear amplifiers with low level drive such as used in the RT-2400 will oscillate if the RF power output is radiated or conducted into the low level stages. Evidence of this situation is erratic or excessive power output. This is caused by close proximity of the coupler output and antenna to the transmitter and/or inadequate RF grounds. Carefully following the above procedures will prevent this from occurring.

2.4.2 HIGH FREQUENCY PROPAGATION

When HF radio is used, a limited amount of communication is accomplished in a direct line. Some radio waves will travel outward from the transmit antenna along the ground (ground wave propagation) but these waves soon lose their strength and are eventually lost. The greater use of HF radio is via Skywave Propagation which, simply stated, is a process of using the ionosphere to bend the radio waves back to earth to arrive at the distant station. To be successful in using the ionosphere in this manner you must:

- a) Have a general knowledge of the ionosphere and its affect on radio waves.
- b) Select the proper frequency to work in conjunction with the condition of the ionosphere.
- c) Insure the angle of radiation of the radio waves is correct for the condition of the ionosphere and the distance to the receiving station.

Proper frequency selection is critical for effective communication. To select the proper frequency, consulting any of the available sources of such information as 'IONCAP' would be of great benefit. In the absence of such information, viable paths may be selected by receiver monitoring for calls originating near the destination of interest or by trial and error. The general rule of thumb is: higher frequencies during the day, lower frequencies at night.

The angle of radiation or take-off angle of a given antenna is also crucial to effective communication. The distance from where the signal exits the transmit antenna to the point at which it returns to earth depends on the angle it enters the ionosphere. If the angle is HIGH, the distance will be SHORT. If the angle is LOW, the distance will be FAR. The angle of radiation also presents another problem. Too steep an angle means the area of interaction between radio wave and ionosphere is smaller and the danger of the radio wave going straight through and into space increases. Check the literature of the antenna system in use to be sure the angle of radiation or take off angle is consistent with the distance over which you wish to communicate.

Connection of the RT-2400 to power sources, antennas, antenna couplers and other equipment may be accomplished as follows:

TO ADD	CONNECT	NOTE
Control Head	Control cable from J2(C-2420) to J4 (RT-2410)	See Figures 2.4.1.1 and 2.4.1.2.
DC Power	DC source to J1 on RT-2410.	See Figure 2.4.1.1.
Antenna	Antenna to J3 on RT-2410.	Only if antenna coupler not required.
Microphone	Microphone to J1 on C-2420.	See Figure 2.4.1.2.
Antenna Coupler (CU-2430)	Coaxial signal line from J2 (CU-2430) to antenna connector J3 of the RT-2410.	12 VDC power is supplied to the coupler over the coaxial line. No other control or power cables are required.
Antenna Coupler (CU-9125)	Antenna coupler control line from J1 (CU-9125) to accessory connector J5 of the RT-2410. Coaxial signal line from J2 (CU-9125) to antenna connector J3 of the RT-2410.	See Figure 2.4.1.1 and consult CU-9125 Manual (Figures 2.2 and 2.8).
Power Amplifier (LPA-9600)	LPA control lines from J5 (LPA-9600) to accessory connector J5 of the RT-2410. Coaxial signal line from J2 (LPA-9600) to antenna connector J3 of the RT-2410.	See Figure 2.4.1.1 and consult LPA-9600 Manual (Figure 2.1).
External Data Modems	Connect modem audio and keyline to audio connector J1 on the C-2420.	See Figure 2.4.1.2.
Blower Kit	Connect Fan Plug to J2 on front panel of RT-2410.	See Figure 2.4.1.1.

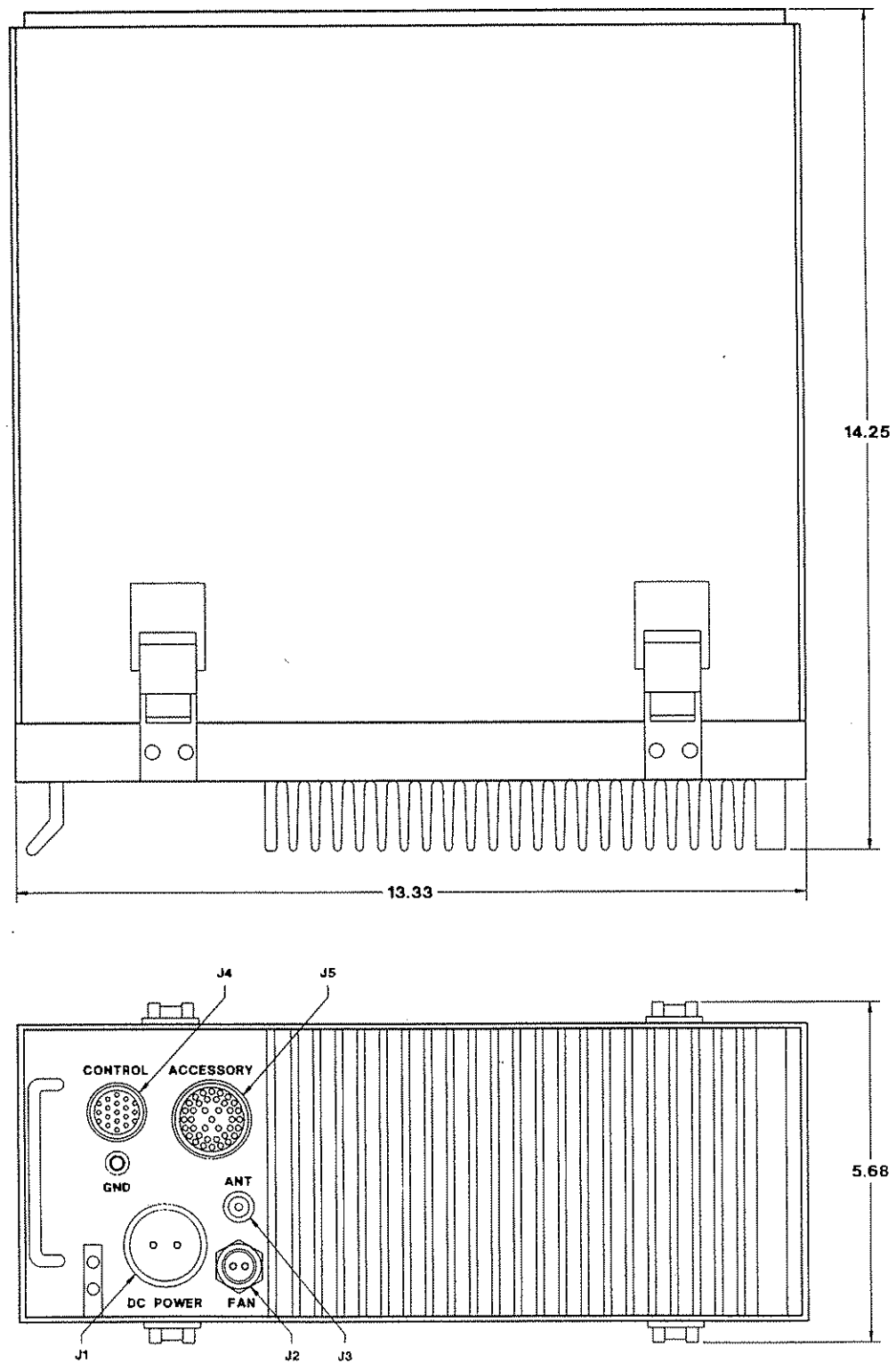


Figure 2.4.1.1 RT-2410 Outline Dimensions.

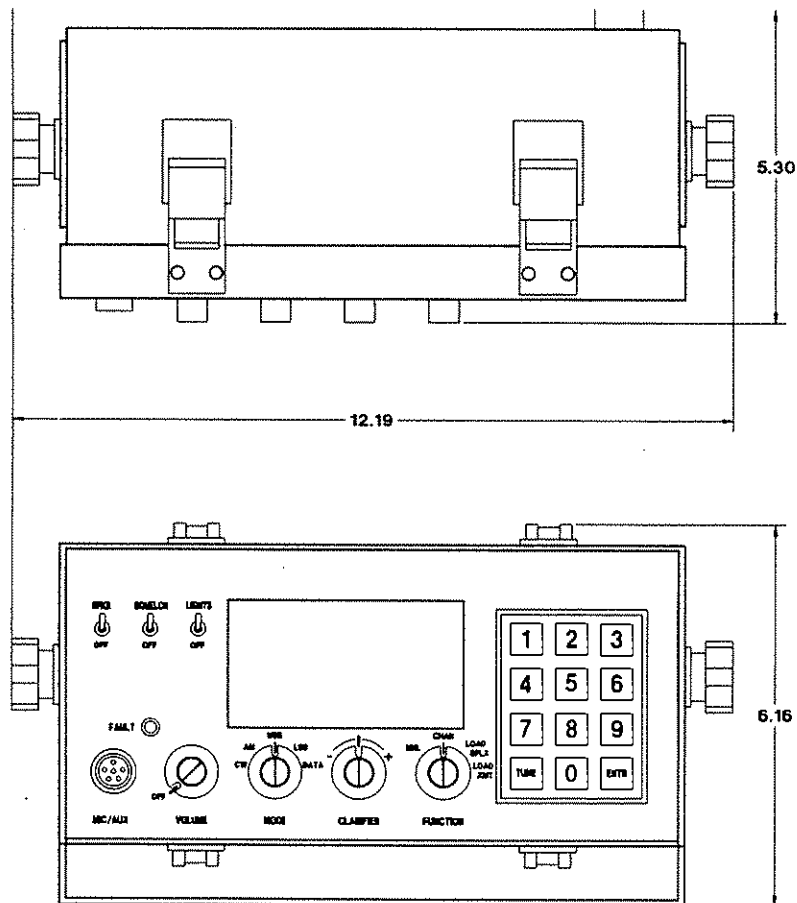
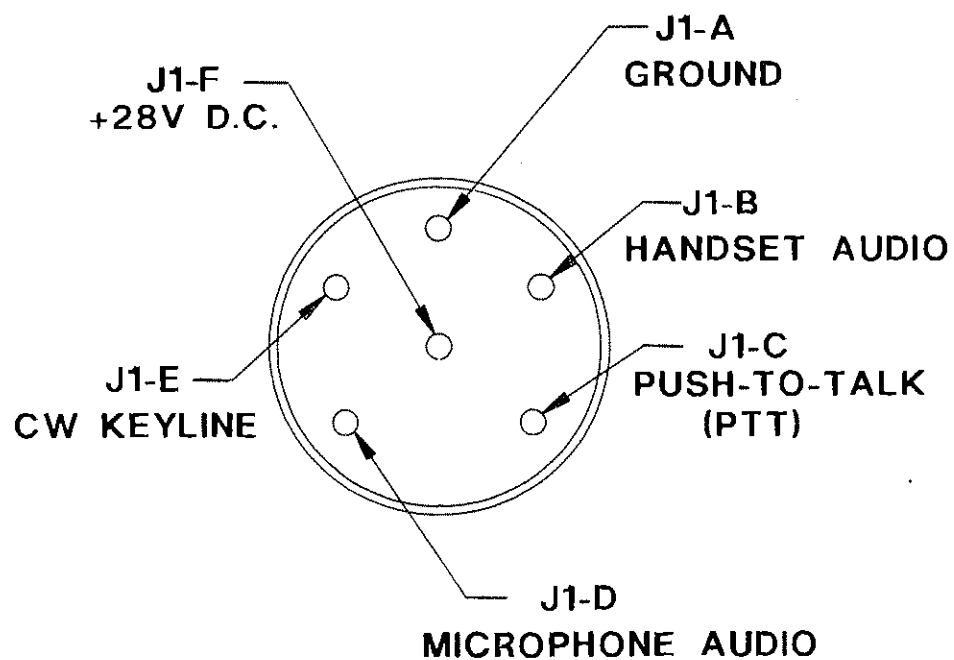


Figure 2.4.1.2 C-2420 Outline Dimensions with Mounting Bracket.



As viewed from the front of the C-2420 Control Head.

FIGURE 2.4.1.3 MIC/AUX Connector Pinout J1 of C-2420.

F20981

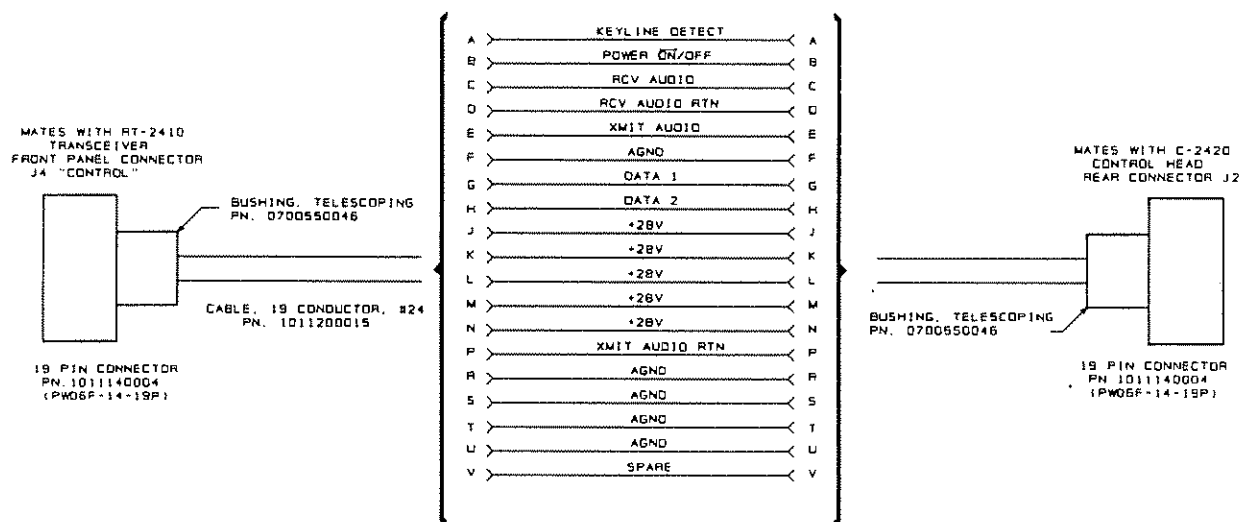
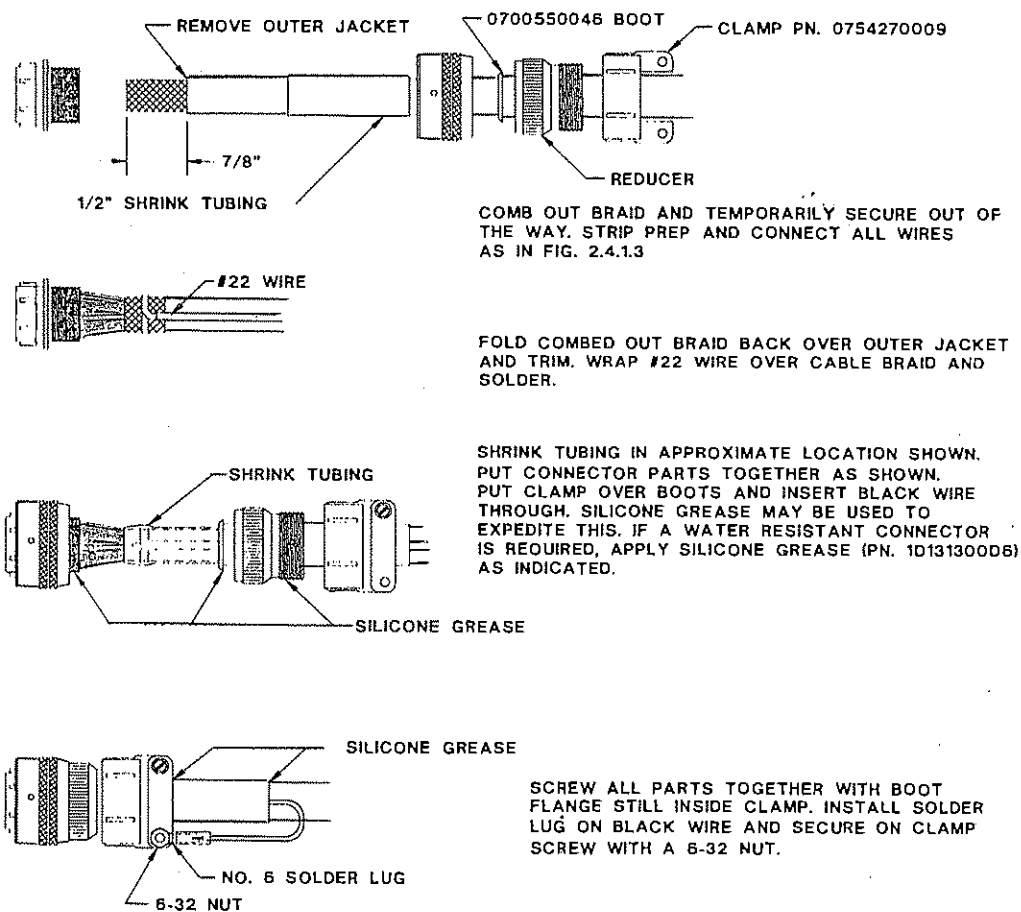


Figure 2.4.1.4 Control Cable Wiring Diagram.



SUNAIR PN. 1011140004 (PW06A-14-19P) 19 PIN MALE.

Figure 2.4.1.5 Control Cable Connector Installation.

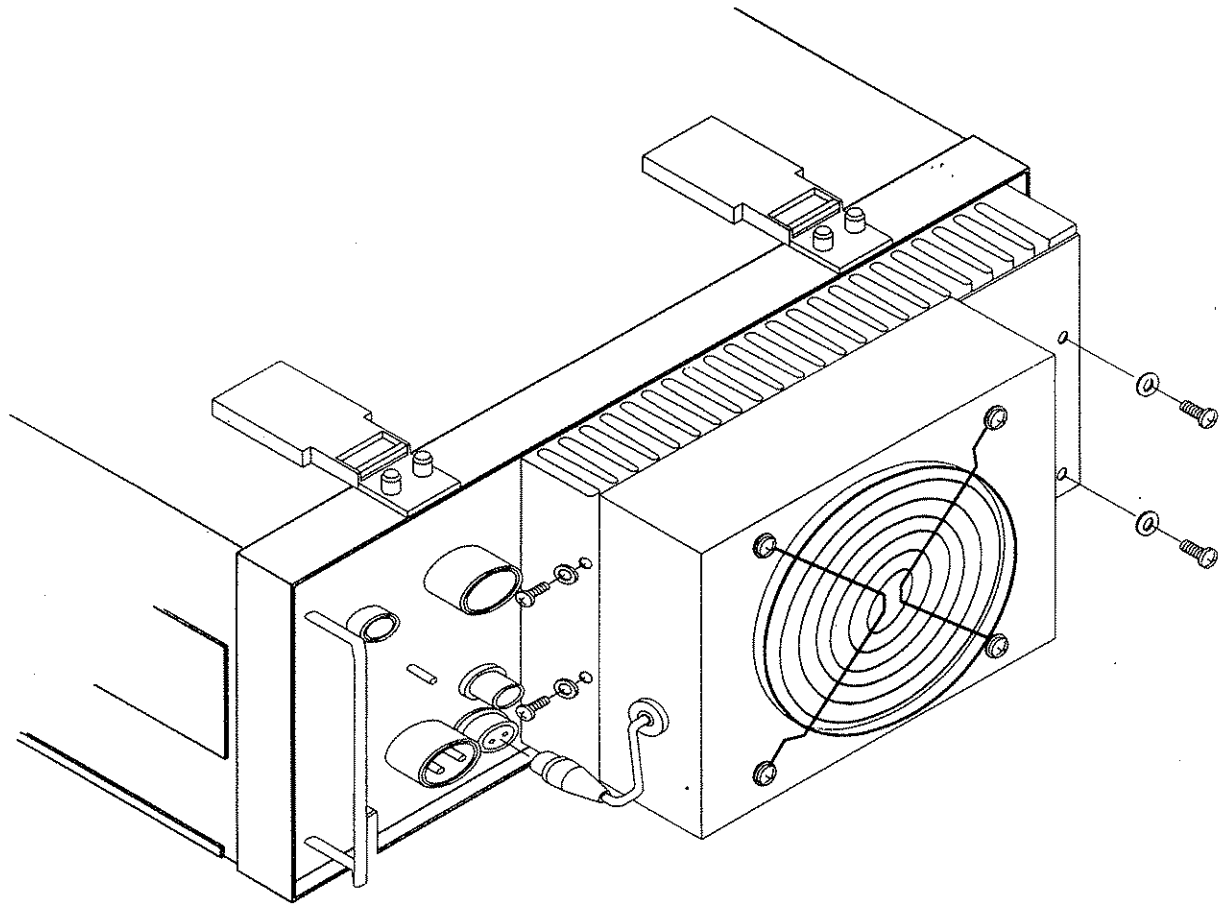


Figure 2.4.1.6 Blower Kit Installation.

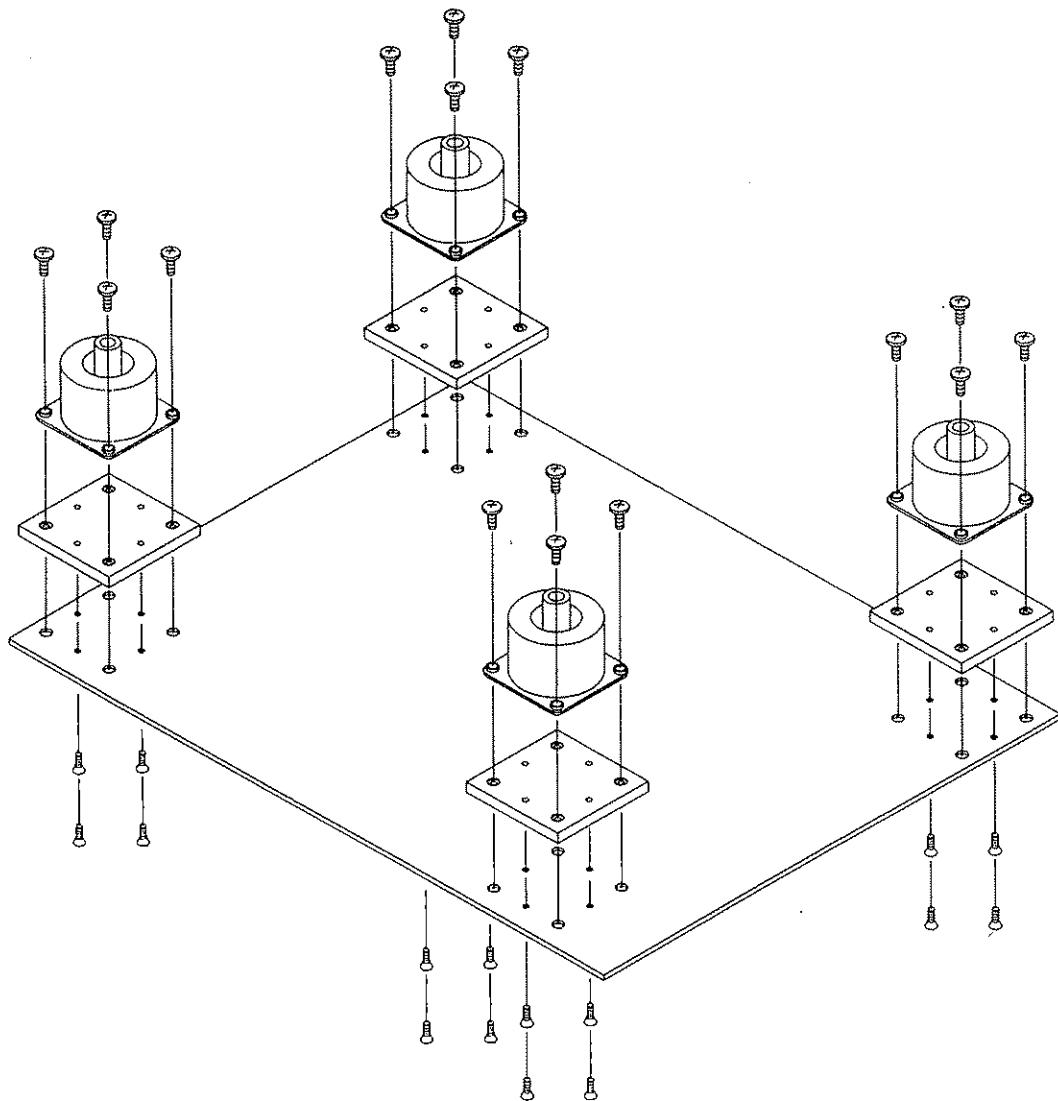


Figure 2.4.1.7 Shockmount Assembly.

2.4.3 VEHICULAR INSTALLATIONS

The RT-2400 Mounting Tray Assembly (Sunair p/n 8108002095) is designed to mount the RT-2410 in vehicular installations. Figure 2.4.2.1 gives the applicable outline dimensions for the RT-2410 in the mounting tray.

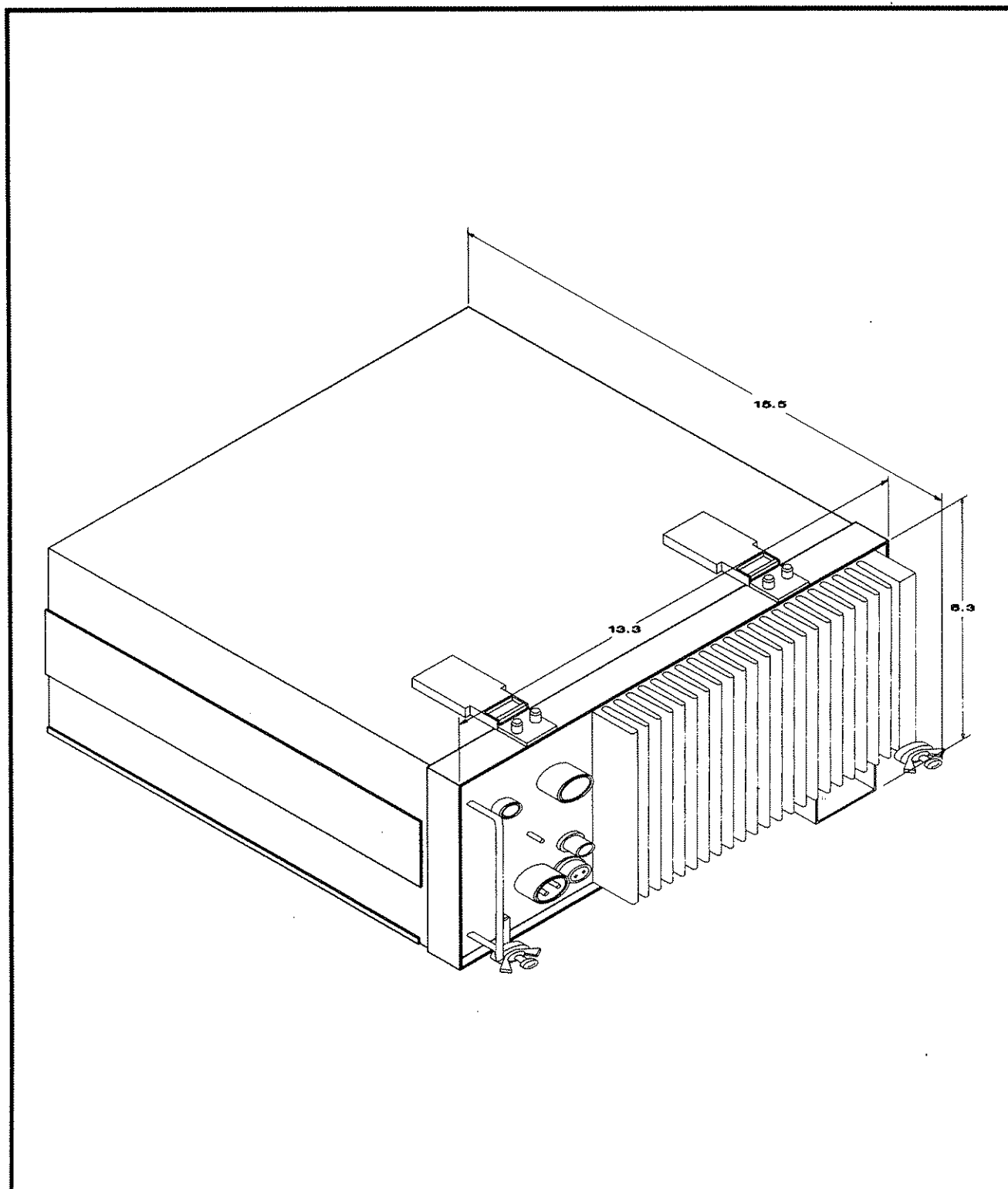


Figure 2.4.2.1 Outline Dimensions of RT-2410 with Mounting Tray.

M0881B

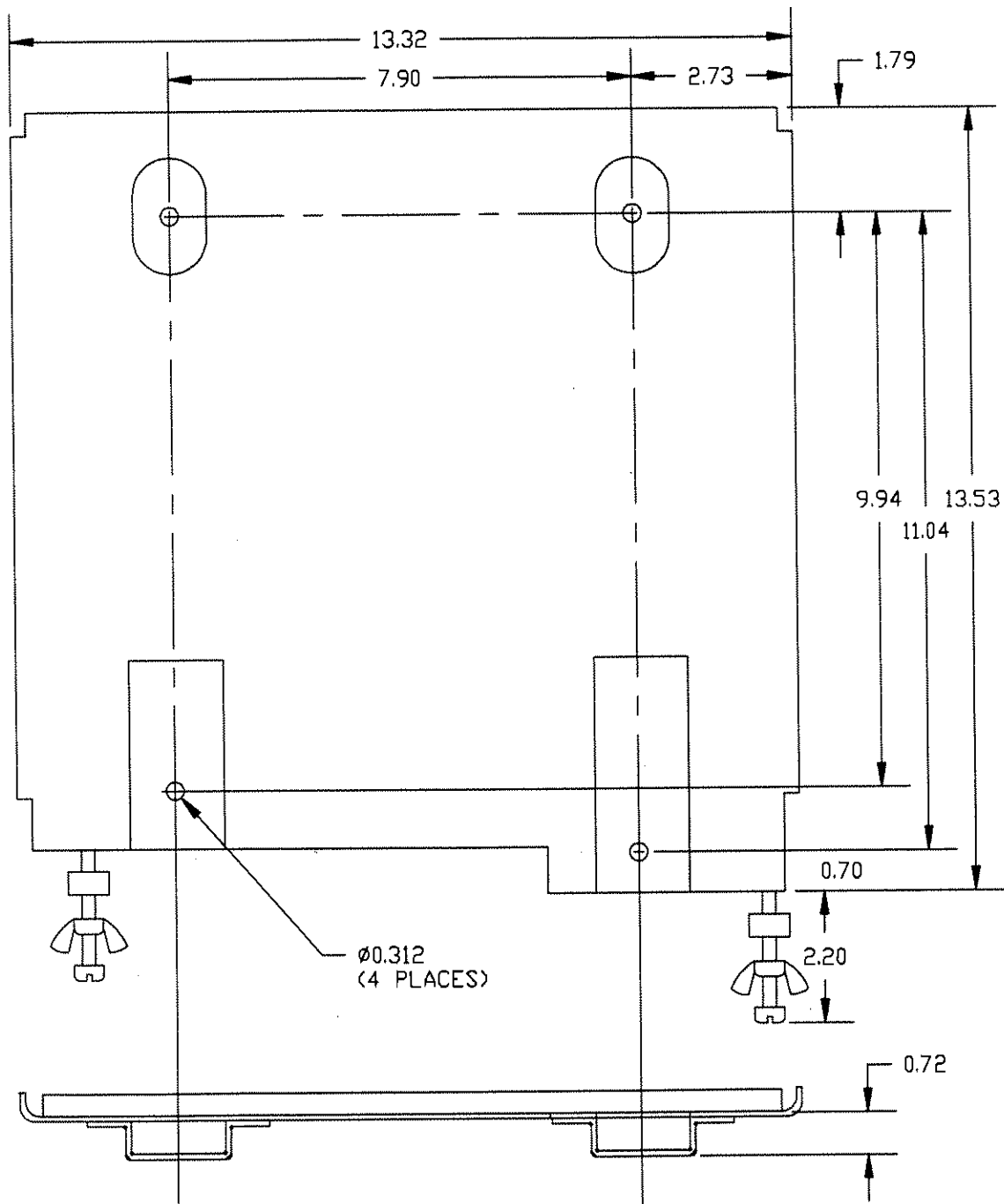


Figure 2.4.2.2 Mounting Dimensions of Mounting Tray.

M0881A

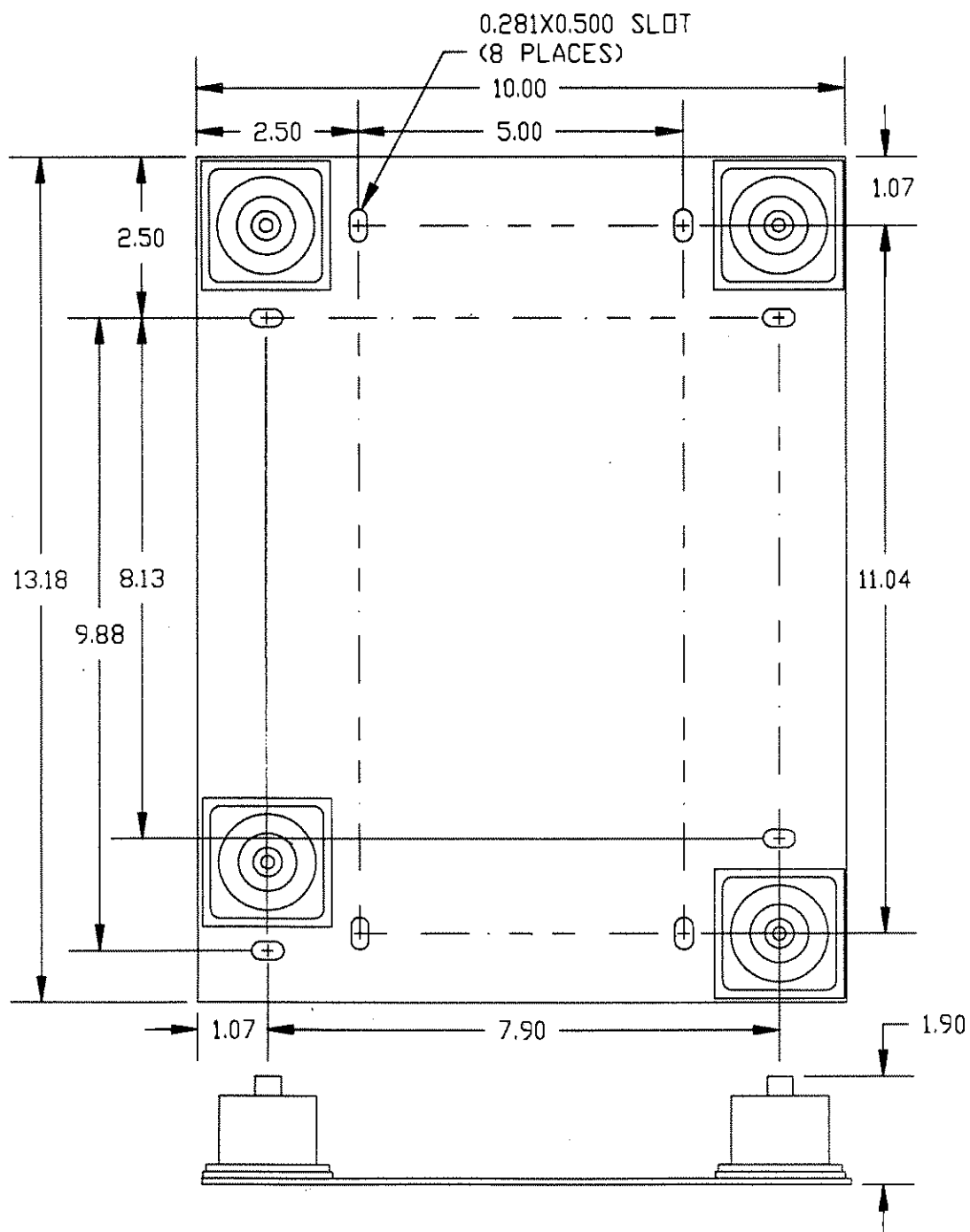


Figure 2.4.2.3 Mounting Dimensions of Shockmount Kit.

In order to minimize RF pickup, it is important that the ground strap supplied with the shockmount be securely fastened between the ground post on the transceiver and the bottom of the right rear shock isolator (see detail in Figure 2.4.3.2). It is also important to ground the antenna coupler to the frame of the vehicle by the shortest possible path.

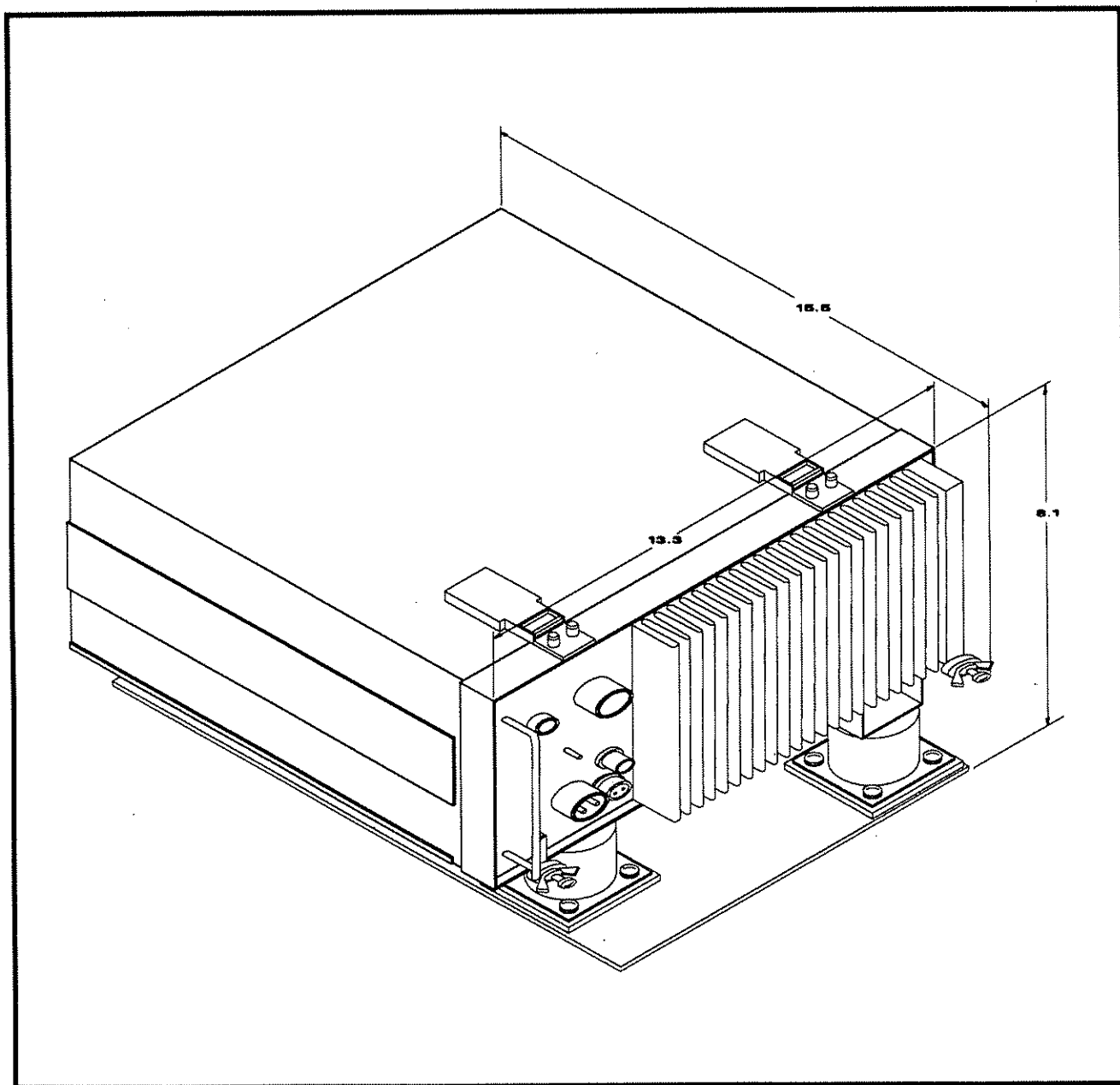


Figure 2.4.3.1 Outline Dimensions of RT-2410 with Mounting Tray and Shockmount Kit.

2.4.4 MARINE INSTALLATIONS

In marine installations, it is recommended that the RT-2410 be installed using the Mounting Tray (Sunair p/n 8108002095) and Shockmount Kit (Sunair p/n 8108002591). Figure 2.4.3.1 gives the applicable dimensions.

In order to minimize RF pickup, it is important that the ground strap supplied with the Shockmount Kit be securely fastened between the ground post on the RT-2410 and the right front shock isolator (See Figure

2.4.3.2). It is also important to ground the antenna coupler to the frame of the vehicle by the shortest possible path.

If the radio is installed on a wood or fiberglass boat, a ground plate of twelve (12) square feet minimum area in contact with the water should be installed. A heavy ground lead such as a one inch (1") wide strap or braid should be connected between the ground post on the RT-2410 and the ground plate. The length of this ground lead should be held to an absolute minimum commensurate with a neat installation.

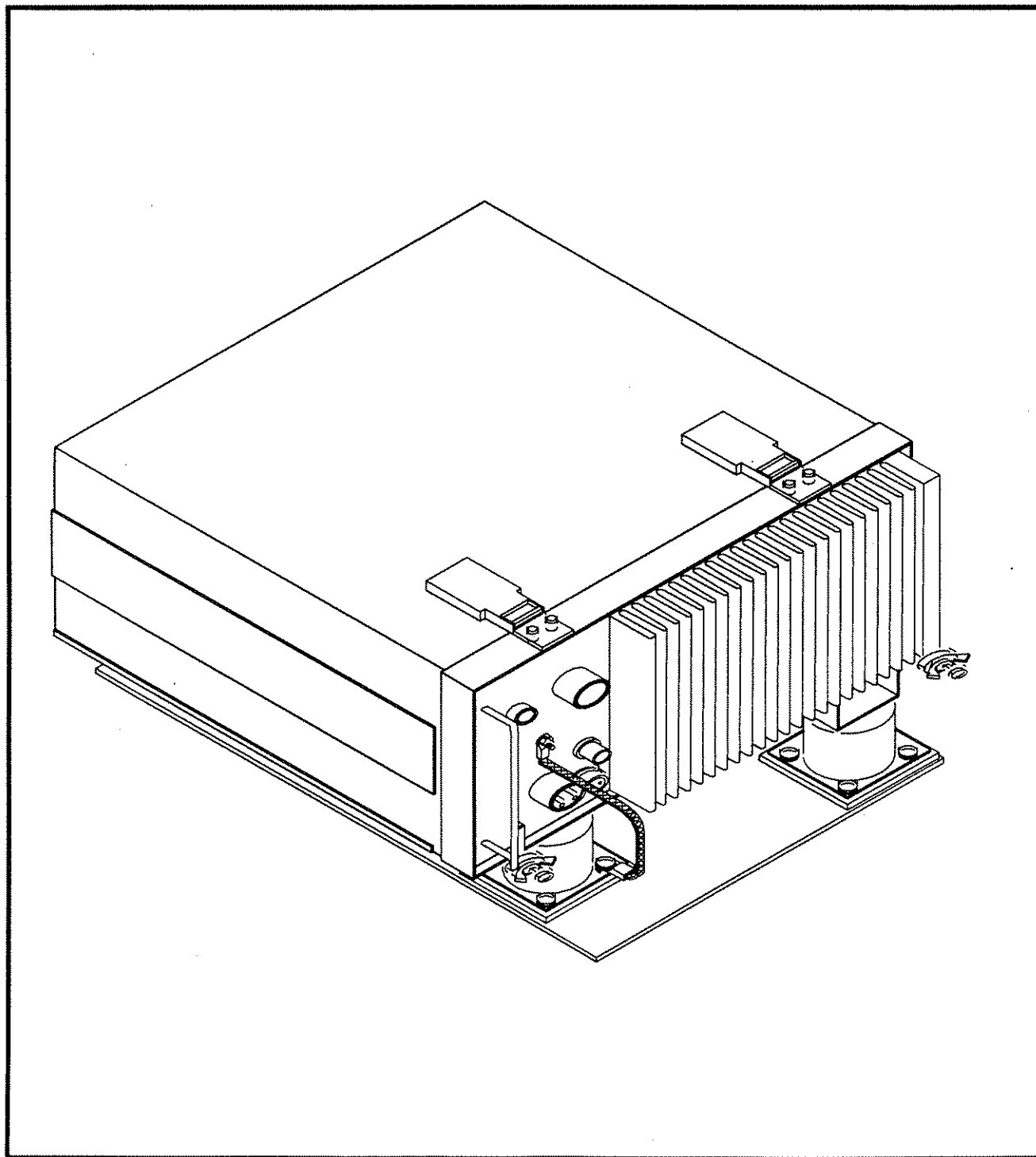


Figure 2.4.3.2 Grounding of RT-2400 with Shockmount Kit.

2.5 ANTENNAS AND GROUND SYSTEMS

2.5.1 GENERAL

The RT-2400 is designed to operate into a 50 ohm resistive antenna system with a maximum Voltage Standing Wave Ratio (VSWR) of 2:1. When used with the CU-9125 Digital Antenna Coupler, the system will match antennas ranging from sixteen (16) foot whips to 150 foot long wires. The coupler will also efficiently match nine (9) foot whip antennas at frequencies above 4 MHz.

As there are numerous types of antennas, a complete discussion is beyond the scope of this manual. Antennas for use in the 2.0 to 30 MHz spectrum generally fall into three of the following categories:

- a) Narrow Band 50 ohm Antennas.
- b) Random Length Non-Resonant Antennas.
- c) Broad Band 50 ohm Antennas.

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

- a) The antenna should be clear of all large objects such as trees, buildings and power lines.
- b) Although the CU-9125 Digital Antenna Coupler will match electrically short antennas (i.e. those under 1/8 wavelength), such antennas are not efficient radiators. If the installation permits, antennas over 1/8 wavelength long at the lowest operating frequency should be used. (Antenna length generally limits system performance in vehicular applications at frequencies below four [4] MHz) as proper size would be inappropriate for the vehicle.
- c) When using whip antennas, the ground system actually forms part of the radiating system. Where space permits (such as in a base station installation) a good ground plane or radial system should be installed at the base of the antenna.

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

- d) In vehicular installations and marine installations in a metal hull ship, one inch (1") wide strap or braid should be connected between the antenna coupler ground and the frame of the vehicle. The length should be as short as possible. In an installation aboard a wood or fiberglass boat, a ground plate with at least twelve (12) square feet in contact with the water should be attached to the hull and a short one (1) inch wide strap should be connected between the coupler ground post and the plate. As previously mentioned this ground lead should be as short as possible.

2.5.2 NARROW BAND 50 OHM ANTENNAS

Typical of this type of antenna are the Doublet and the Inverted V. Both types of antennas may be assembled from the Sunair Doublet Antenna Kit (Sunair p/n 0996240004). Their operation is efficient for only a narrow band of frequencies within approximately 1 1/2% of their center frequency. The antenna coupler is NOT generally required if the frequency span of the antenna is not exceeded. Both antennas exhibit somewhat directional characteristics. The direction of maximum radiation is perpendicular to the antenna wire. The inverted V antenna is particularly suitable for communication with nearby mobile stations (with vertical antennas) since a portion of the radiation is in a vertical direction.

2.5.3 RANDOM LENGTH NON-RESONANT ANTENNAS

Whips and longwires are popular non-resonant antennas. The whip antenna is often used in mobile, marine, portable or semi-portable installations because it is rugged and self-supporting. The antenna impedance is strongly dependent on the operating frequency, therefore, an antenna coupler **MUST BE** used to match the antenna to the transceiver. Best radiation efficiency will be obtained if the antenna is at least $1/8$ wavelength long at the lowest operating frequency; however, this requirement does not result in a practical size antenna for low frequency operation. Thirty-five (35) foot whip antennas offer a good compromise between practical height and good electrical performance at low frequencies. The CU-9125 Digital Antenna Coupler is designed to efficiently match whip antennas of sixteen (16) foot length or greater. An efficient match may also be obtained for a nine (9) foot whip above 4 MHz. The whip's performance is greatly influenced by its ground system. For temporary base station installations, a minimum of four (4), six (6) foot long ground rods should be driven into the ground symmetrically placed around the antenna base. The rods should be bonded together with heavy strap and then connected to the antenna coupler ground by another short heavy strap. If the antenna is mounted on the roof of a building, where a short ground lead to the coupler cannot be obtained, a minimum of four (4) symmetrically placed ground radials should be installed at the base of the antenna, bonded together, and connected to the antenna coupler ground post. The radials should be made of number twelve (12) gauge wire or larger and should be at least $1/4$ wave long at the lowest operating frequency. The radiation pattern is omni-directional in the horizontal plane.

The longwire antenna, is a popular base station antenna where a wide range of operating frequencies are used. The antenna impedance varies greatly with frequency and, therefore, **MUST BE** matched to the transceiver with an antenna coupler. The CU-9125 will efficiently match longwire antennas up to 150 feet in length. The radiation pattern of the longwire antenna is also a function of the operating frequency. The two (2) most popular length longwire antennas, 75 and 150 feet (Sunair P/N's 0999200003 and 099210009) exhibit excellent low frequency radiation efficiency.

2.5.4 BROADBAND 50 OHM ANTENNAS

These are generally complex, expensive antennas requiring a large area for installation. Their use is usually limited to high performance base station installations which must operate at an extended frequency range. As this class of antennas has approximately 50 ohm output impedance over the rated band of frequencies, an antenna coupler is NOT required.

Some common examples are:

- a) Discone (a vertical antenna with an omni-directional pattern).
- b) Log Periodic (a broadband antenna with a directional pattern, this antenna is often made in a rotatable configuration).

Consult Sunair's Marketing and Product Services Departments for specific recommendations.

SECTION III

OPERATION

3.1 GENERAL

This section provides the operator with the location and use of the C-2420 front panel controls for utilization of the equipment. Reference to Figure 3.1.1 below, shows the location of the controls and displays.

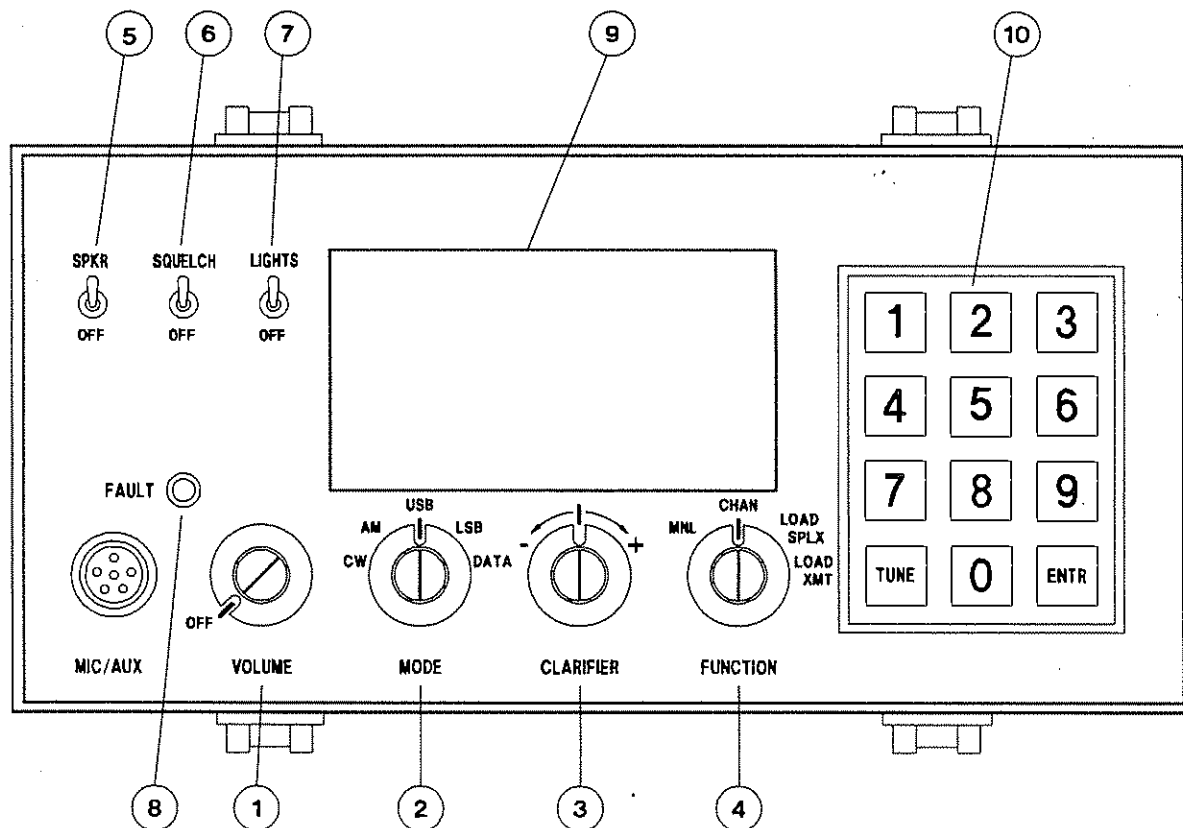


Figure 3.1.1 Front panel controls for the C-2420.

1 ON/OFF VOLUME CONTROL

When this control is in the full counterclockwise position, the equipment is off. To apply power turn the control clockwise. Once on, the audio signals to the internal speaker are initially at minimum. More speaker audio is achieved by advancing the volume control clockwise to a comfortable listening level.

2 **MODE CONTROL**

This control sets the mode and automatic gain control (AGC) of the radio set.

3 **CLARIFIER**

This control is used to change the receive frequency slightly to clarify reception of a station that is not quite on frequency.

4 **FUNCTION**

The main purpose of this control is to select the function of the keypad.

SCAN This selection sets the radio to scanning through any channels in the current group which have been programmed.

MNL This setting allows the user to enter a frequency and operate the radio without programming a channel. The current frequency is shown on the display. This setting only allows simplex operation (the receive and transmit frequencies are the same).

CHAN This setting allows channels to be selected. All keypad entries are interpreted as a channel number. To select a channel, enter the channel number on the keypad and press **ENTR**.

This selection is used both to select previously programmed channels, and to select a channel number for programming before using **LOAD SPLX** and **LOAD XMT**.

LOAD SPLX This selection is used to program simplex channels, (those in which the receive and transmit frequencies are the same).

LOAD XMT If a half duplex channel is desired, first program the receive frequency in **LOAD SPLX**, set the function knob to **LOAD XMT**, and enter the transmit frequency.

5 **SPKR**

This switch is used to turn the speaker on and off. Regardless of its setting, receive audio is still available on the handset audio line of the MIC/AUX connector (J1-B).

6 **SQUELCH**

The purpose of this switch is to turn the syllabic squelch on or off.

7 **LIGHTS**

This switch controls the lighting of the front panel. This switch has three positions.

In the fully down (off) position, all lighting is turned off.

In the middle position, the keypad and control labels are lit. The display backlight is dim.

In the fully up position, the keypad and control labels stay lit, and the display backlight is bright.

8 FAULT INDICATOR

If at any time after initial power-up this red indicator is lit, there is a fault in the radio. Please check the installation and proceed to the section on BITE, located in section 5.4 of this manual.

9 DISPLAY

This liquid crystal display (LCD) provides the user with information on the status of the radio. It displays:

- The current channel or frequency
- Whether the radio is in receive or transmit
- A bar graph showing the signal strength in receive, or the output power in transmit
- Annunciators indicating that the clarifier is in use, that the radio is scanning, or that the antenna coupler is being tuned.

10 KEYPAD

As noted above, the keypad is used to enter channel or frequency information into the radio. It is also used to control the antenna coupler and enable the noise blanker.

TUNE Tunes the antenna coupler.

ENTR (NB) This button is used to enter data into the radio after it has been typed in at the keypad. If no data has been entered, then pressing this key will toggle the state of the noise blanker (if it was on it will turn off, and if it was off it will be turned on). If the noise blanker is turned on, this will be indicated by the "NB" annunciator on the display.

3.2 PRIMARY OPERATIONS

3.2.1 MODE AND AGC SELECTION

The mode and automatic gain control (AGC) settings are controlled by the **MODE** knob on the front panel.

CW Sets radio mode to CW and AGC release time to medium (200 mS). The radio is keyed using a CW key connected to the MIC/AUX connector (Between J1-E, CW Keyline, and J1-A, ground).

AM Sets the radio mode to AME and AGC release time to slow (1 sec).

USB Sets the radio mode to USB and AGC release time to slow (1 sec).

LSB Sets the radio mode to LSB and AGC release time to slow (1 sec).

DATA Sets the radio mode to USB and AGC release time to fast (10 mS). The mic audio line on the MIC/AUX connector (J1-D) becomes a 600 ohm input. The handset audio line on the MIC/AUX connector (J1-B) becomes a 600 ohm audio output. This mode is meant to be used in conjunction with external data modems.

3.2.2 ESTABLISHING AN OPERATING FREQUENCY

Set the **FUNCTION** knob to **MNL**. All entries on the keypad are now interpreted by the radio as a frequency. When entering a frequency, all digits, including any trailing zeroes, must be entered before pressing enter. For example, to enter 4500.00 kHz, press 450000 **ENTR**.

THE RECEIVER IS NOW OPERATIONAL ON THE FREQUENCY SELECTED

NOTE: If an error is made in entering a frequency, simply press **ENTR** and enter the frequency again.

NOTE: If an illegal frequency is entered (one below 100 kHz or above 29.99999 MHz) the display will blink.

NOTE: If a frequency between 100 kHz and 2 MHz is entered, it will be accepted and the receiver will function normally. The radio will not be allowed to key however.

3.2.3 TRANSMIT TUNING

If the radio output is terminated in a broadband antenna or an antenna tuned for the frequency of operation, transmitter tuning is not necessary and:

THE RADIO SET IS NOW FULLY OPERATIONAL

3.2.4 ANTENNA COUPLER TUNING

To tune the antenna coupler, press the **TUNE** button momentarily. During the tuning cycle, the "TUNING" annunciator will be lit on the display. If the tune is successful, the "TUNING" annunciator will be turned off and the radio will return to normal operation.

NOTE: If the coupler is unable to tune the antenna, then the display will show "TUNING FAULT" after the tune cycle is complete.

THE RADIO SET IS NOW FULLY OPERATIONAL

3.2.5 LOADING CHANNEL FREQUENCIES

The RT-2400 is capable of storing frequency information for 100 channels (numbers 00-99) for later recall and use. Each channel stores the receive frequency and the transmit frequency (if different).

The following procedure should be followed to properly load channels.

- Set the **FUNCTION** knob to **CHAN**. The display will show **CH** and the number of the last channel used.
- Using the keypad, enter the channel number to be programmed and press **ENTR**.
- Set the **FUNCTION** knob to **LOAD SPLX** and enter the receive frequency. When entering a frequency, all digits, including any trailing zeroes, must be entered before pressing **ENTR**. For example, to enter 4500.00 kHz, press 450000 **ENTR**.
- If the transmit frequency is different from the receive frequency, set the **FUNCTION** knob to **LOAD XMT** and enter the transmit frequency.

All of the storage data for this channel has now been entered and the radio set is fully operational on this channel. Additional channel may be loaded by simply repeating this process.

NOTE: The mode is not saved as part of the channel information. The mode of the radio set is always indicated by the setting of the **MODE** knob.

NOTE: Entering a frequency of 0 kHz in **LOAD SPLX** will cause the channel to be cleared. This causes the channel not to be selected in **SCAN** mode.

3.2.6 CLARIFIER OPERATION

This control is used to change the receive frequency slightly (± 500 Hz) to clarify reception of a station that is not quite on frequency. The transmit frequency remains unaffected.

The clarifier setting is ignored when the radio is scanning.

3.2.7 SCAN

This selection sets the radio to scanning through any channels in the current group which have been programmed.

Channels in the same group have the same first digit. For example, group 5 consists of channels 50 through 59, while channels 00 through 09 are in group 0.

Pressing a single digit will cause the radio to start scanning channels in that group, provided there is at least one programmed channel in the group.

The radio will stop scanning when keyed or when the **FUNCTION** knob is changed to another setting.

3.2.8 BITE (Built In Test Equipment)

The RT-2400 is equipped with sufficient self-diagnostics to permit the operator to assure himself that all internal subassemblies (LRUs) are functioning correctly or, in the case of malfunction, which specific LRU(s) are faulty.

To execute a BITE test, set the **FUNCTION** knob to **MNL** and press the 0 button, holding it down for 4 seconds until the display shows "BITE". The radio will then test each LRU. At the conclusion of the test "END" will appear briefly on the display and the radio will return to normal operation.

If any of the modules (LRUs) are faulty, "FAULT" will be displayed along with a number corresponding to the suspect module according to the following list:

- FAULT 1 -- RT-2410 Receiver/Exciter
- FAULT 2 -- RT-2410 Synthesizer
- FAULT 3 -- RT-2410 CPU
- FAULT 4 -- RT-2410 Power Supply/RF Filter
- FAULT 5 -- RT-2410 Power Amplifier
- FAULT 10 -- C-2420 Audio Board
- FAULT 11 -- C-2420 Control Head CPU

SECTION IV

THEORY OF OPERATION

4.1 GENERAL

The theory of operation of the RT-2400 Radio Set is presented below. Please reference Figure 4.1.1 RT-2410 Transceiver Block Diagram and Figure 4.1.2 C-2420 Control Head Block Diagram for an overview of the signal flow within the radio.

4.2 COMMON SECTION

The following assemblies are utilized in both the receive and transmit conditions.

4.2.1 FRONT PANEL ASSEMBLY (2A1)

The front panel assembly contains the circuitry necessary to provide analog and control interfacing with appropriate sub-assemblies. A liquid crystal display (LCD) indicates operating status such as frequency, channel, receive signal strength, and transmit power. It also shows the status of the clarifier and noise blanker.

The keypad and the most of the rest of the switches on the front panel are read by the Control Head CPU (2A2) and the Audio board (2A3).

The only switch that is not read by another assembly is the **LIGHTS** switch. The circuitry to control the lighting of the front panel is contained on the Front Panel Interface board (2A1A1). The LCD display, the display drivers, and the backlight are contained on the Display board (2A1A2).

4.2.2 CONTROL HEAD CPU (2A2)

4.2.2.1 GENERAL

The function of the Control Head CPU is to process or generate all of the digital signals in the control head.

The Control Head CPU takes care of reading the **MODE**, **CLARIFIER**, and **FUNCTION** knobs as well as the **SPKR** switch. It also reads the keypad and controls the LCD display.

This board also communicates with the CPU in the RT-2410 (1A2A3) via an RS-485 link. Over this link it communicates frequency, channel, mode, clarifier and other control information.

4.2.2.2 MICROPROCESSOR U102

The Control Head CPU contains the 80C85 microprocessor U102. It executes instructions (software) contained in EPROM U106. U102 controls circuits on the board by three busses:

- a) AD0 through AD7, a multiplexed address/data bus containing either data or address information.
- b) A8 through A15, which always contain address information.
- c) The Control/Status bus which contains signals RD, WR, IO/M and ALE signals.

4.2.2.3 STATIC RANDOM ACCESS MEMORY (SRAM) U107

The SRAM provides an area of temporary storage which U102 uses as a "scratch pad" during the execution of its program in U106.

4.2.2.4 ERASABLE PROGRAMMABLE READ ONLY MEMORY (EPROM) U106

This IC contains the instructions that are executed by U102. This memory is never altered, and the instructions are retained even when the radio is not powered.

4.2.2.5 DUAL UNIVERSAL ASYNCHRONOUS RECEIVER TRANSMITTER (DUART) U108

This IC converts parallel data on the data bus into serial data to be sent to the 1A2A3 CPU in the RT-2410. It also converts data from serial to parallel in order to receive information from the RT-2410.

4.2.3 AUDIO BOARD (2A3)

The function of the audio board is to process all of the analog signals in the control head.

4.2.4 SYNTHESIZER (1A2A2)

4.2.4.1 GENERAL

The synthesizer assembly generates the three local oscillator (LO) injection frequencies necessary to determine the operating frequency of the RT-2400 Radio Set.

4.2.4.2 THIRD LO

The third LO is produced by a bus controlled phase-locked loop (PLL) operating on a voltage-controlled oscillator (VCO). The output of the third LO is used for product detection in receive and carrier generation in transmit. The LO is 456.55 kHz in USB, CW, Data, and AM transmit. If the AM option filter is not installed, the LO is 456.55 kHz in AM receive. The LO is not used in AM receive if the AM option filter is installed. The LO is 454.45 kHz in LSB.

4.2.4.3 SECOND LO

The 47.850 MHz second LO is varied ± 5 kHz in 10 Hz steps by means of two bus controlled PLL VCOs. The second LO output is used in the Receiver/Exciter (1A2A1) to downconvert the 48.305 MHz received first IF frequency to the 455 kHz second IF frequency. In the transmit mode the second LO is used to convert the 455 kHz first IF frequency to the second IF frequency of 48.305 MHz.

4.2.4.4 FIRST LO

The first LO consists of four individual bus controlled PLL VCOs, covering the frequency range of 48.31 to 78.31 MHz in 10 kHz steps. Only one of the VCOs is activated at any given time. The frequency output of the first LO is given by:

$$F1 = 48.310 \text{ MHz} + F0$$

where F1 = First LO output frequency

F0 = Selected RT-2400 operating frequency rounded down to 10 kHz accuracy

For example, if the radio frequency is 2014 kHz:

$$F1 = 48.310 \text{ MHz} + 2.01 \text{ MHz} = 50.320 \text{ MHz}$$

The first LO frequency is used in the Receiver/Exciter (1A2A1) during receive to up convert the selected incoming RF signal to the receive first IF of 48.305 MHz. During transmit the first LO frequency is used to down convert the transmit second IF of 48.305 MHz to the final desired RF output frequency.

4.2.4.5 REFERENCE LOOP AND DOUBLER

The Reference Loop and Doubler consists of a reference frequency divider, a PLL controlled 40 MHz crystal oscillator, and a frequency doubler circuit that produce the 1 MHz and 40 MHz outputs used by the third LO and the 40 MHz and 80 MHz used by the second LO in synthesizing their outputs.

4.2.5 CPU (1A2A3)

4.2.5.1 GENERAL

The function of the CPU is to process or generate all of the digital signals in the RT-2410 Transceiver.

The CPU generates the control signals needed by the 1A2A1 Receiver/Exciter, 1A2A2 Synthesizer, and 1A2A4 Power Supply/RF Filter

This board also communicates with the Control Head CPU in the C-2420 (2A2) via an RS-485 link. Over this link it communicates frequency, channel, mode, clarifier and other control information.

4.2.5.2 MICROPROCESSOR U101

The CPU contains the 80C85 microprocessor U101. It executes instructions (software) contained in EPROM

U118. U101 controls circuits on the board by three busses:

- a) AD0 through AD7, a multiplexed address/data bus containing either data or address information.
- b) A8 through A15, which always contain address information.
- c) The Control/Status bus which contains signals RD, WR, IO/M and ALE signals.

4.2.5.3 STATIC RANDOM ACCESS MEMORY (SRAM) U115

The SRAM provides an area of temporary storage which U101 uses as a "scratch pad" during the execution of its program in U118.

4.2.5.4 ERASABLE PROGRAMMABLE READ ONLY MEMORY (EPROM) U118

This IC contains the instructions that are executed by U101. This memory is never altered, and the instructions are retained even when the radio is not powered.

4.2.5.5 I/O MICROPROCESSOR U510

The 80C85 microprocessor U510 is the interface between U101 and the RS-485 serial link to the C-2420 control head. U510 has its own bus, over which it controls:

U513 Static RAM
U512 EPROM
U601 DUART

4.3 RECEIVER SECTION

4.3.1 GENERAL SIGNAL FLOW

All received signals are routed through the 1A2A4 Power Supply/RF Filter. The signal passes through relay K302 and on to the 1A2A1 Receiver/Exciter. The signal goes through a receiver protection circuit which prevents damage to the receiver "front end" when extremely high level interfering RF signals are picked up by the antenna. The received signal is then routed through a high pass filter and one of three band pass filters. The filtered receive signal is then sent through a variable attenuator and into mixer X601 where it is upconverted to 48.305 MHz. The signal is amplified by U603 and U604 before being filtered by FL1. The purpose of FL1 is to remove unwanted mixing products produced by X601.

The resulting 48.305 MHz signal is amplified by monolithic IF amplifiers U1 and U2, then mixed again in another balanced mixer, X1, with the second LO frequency of 47.845 through 47.855 MHz. This yields an output of 455 KHz. The signal is then amplified in the mixer postamplifier. The 455 KHz second IF signal is fed to a diode gating network which selects (via control signals from the 1A2A3 CPU assembly) the sideband filter (FL101), the optional CW filter (FL102), or the optional AM filter (FL103). The filtered second IF signal is then passed through another diode gate, and is amplified by a high-speed op-amp and three monolithic IF stages. The resulting signal is coupled to a product detector when receiving sideband signals, and to an envelope detector when the optional AM filter is selected. The second IF output also feeds into the AGC detector and time

constant circuit which develops a DC voltage which is a function of the received signal amplitude. The AGC voltage is amplified and used to control the gain of the receiver. The AGC voltage is also used to give a visual indication of the received signal strength on the bar graph of the front panel LCD.

The product detector mixes the second IF signal with the third LO, yielding an audio signal consistent with the original transmitted audio. This audio signal is routed to a fixed gain audio amplifier and then over the control cable to the 2A3 audio assembly.

At the audio assembly, the signal is attenuated by the front panel volume control and sent through the U202 speaker driver, which is capable of producing 5 watts of audio power. The output is dropped through R214 and routed to 2A1 Front Panel for headphone audio. Full power audio is routed through an energized K202 to the speaker.

The RT-2400 squelch circuit is a true syllabic type which operates on voice characteristics and rejects other types of received audio, such as noise, data, etc. The receiver audio is sampled in the syllabic squelch circuit and if it has syllabic characteristics, it will turn on the receive audio switch. This allows audio to pass through to the speaker. The syllabic squelch circuit is designed so as to remain unsquelched during voice pauses or short fades, minimizing the effects of nuisance interruptions.

Also included on the 2A3 audio assembly is a BITE circuit that samples the speaker audio to determine whether or not the receive audio path is functional.

4.3.2 NOISE BLANKER OPERATION

A noise blanker has been included on the 1A2A1 Receiver/Exciter to give the radio resistance to the effects of ignition and other types of impulse noise.

The noise blanker samples the first IF just before the first IF filter (FL1). This sample is attenuated by CR801 and CR802 and then amplified by U801 and U802. The purpose of the amplifiers using U804 is to control the attenuation of CR801 and CR802 such that the output of U802 has a constant average value. The response time of this gain control circuit is slow enough that impulse noise does not affect the gain of the circuit. U803 then detects when a much stronger than average signal is present and produces a blanking signal which is sent to the 1A2A2 Synthesizer. There it turns off the second LO for a brief period. This mutes the receiver since without LO energy no signals can pass thru the second mixer (X1).

4.4 EXCITER SECTION

4.4.1 GENERAL SIGNAL FLOW

The microphone input signal from the 2A1 Front Panel is routed to the 2A3 Audio Board where it is amplified and fed through the transmit audio compressor. It is amplified again and sent over the control cable to the RT-2410 Transceiver.

If the radio is in CW mode, the microphone is disabled and the signal sent over the control cable is generated by the CW oscillator on the 2A3 Audio Board.

Once the signal reaches the RT-2410 Transceiver, it is routed to the 1A2A1 Receiver/Exciter Board. There it is amplified and sent to the U305 balanced modulator. In this circuit it is mixed with the third LO to produce a 455

kHz first IF. This signal is routed through the IF filter selected by the 1A2A3 CPU. FL101 is used for USB, LSB, DATA, and AM. FL102 is used for CW if it is installed. The purpose of this filtering is to remove the unwanted sideband from the double sideband (DSB) signal generated by U305.

At this point if the AM mode of operation has been selected, the AM carrier is injected into the mixer preamplifier. The balanced mixer (X2) mixes the signal and the second LO frequency of 47.845 MHz through 47.855 MHz, producing the desired transmit second IF of 48.305 MHz and the unwanted mixer products. These signals are amplified by U3 and U8, and then routed through the narrowband 48.305 MHz crystal filter (FL1) to remove the unwanted products. The output of the filter is amplified by U9 and passed through the VHF transmit gain control circuit (CR21 and CR22).

The amount that CR21 and CR22 attenuate the signal is controlled by the Automatic Level Control/Automatic Carrier Control (ALC/ACC) circuits. The ALC/ACC circuits sample the forward and reflected power in the 1A2A4 Power Supply/RF Filter board and produce the voltages to control the gain of the transmit second IF output signal. When the RT-2400 is used with the external LPA-9600 the ALC and ACC voltages from the LPA-9600 are also samples in the ALC/ACC control circuits.

The 48.305 MHz transmit second IF is mixed with the first LO frequency in X602. This produces the desired output frequency between 2 and 30 MHz. The mixer output is amplified by U609 and U607 and then low pass filtered to remove unwanted mixing products. The signal is then amplified by Q604 and Q605 to produce .5 watts PEP which is then routed to the 1A1 Power Amplifier/Front Panel Assembly.

On the 1A1 Power Amplifier/Front Panel Assembly this signal is amplified by push-pull driver Q1 and Q2. The amplified RF is transformer coupled into two sets of push-pull amplifiers (Q3, Q4, and Q5, Q6) whose output is put through an output combiner circuit to produce 125 watts PEP of RF output. This is supplied to the 1A2A4 Power Supply/RF Filter board. This contains seven low pass filter bands, one of which is selected by the 1A2A3 CPU. The RF output from the selected filter is routed through the VHF filter and the forward and reflected power detector circuits and out to the antenna.

A current ALC circuit on the 1A2A4 Power Supply/RF Filter board senses the current drawn from the DC power supply. Whenever the power amplifier transistors draw excessive current, this circuit sends a signal to the ALC circuit on the 1A2A1 Receiver/Exciter, causing it to reduce the drive to the power amplifier.

constant circuit which develops a DC voltage which is a function of the received signal amplitude. The AGC voltage is amplified and used to control the gain of the receiver. The AGC voltage is also used to give a visual indication of the received signal strength on the bar graph of the front panel LCD.

The product detector mixes the second IF signal with the third LO, yielding an audio signal consistent with the original transmitted audio. This audio signal is routed to a fixed gain audio amplifier and then over the control cable to the 2A3 audio assembly.

At the audio assembly, the signal is attenuated by the front panel volume control and sent through the U202 speaker driver, which is capable of producing 5 watts of audio power. The output is dropped through R214 and routed to 2A1 Front Panel for headphone audio. Full power audio is routed through an energized K202 to the speaker.

The RT-2400A squelch circuit is a true syllabic type which operates on voice characteristics and rejects other types of received audio, such as noise, data, etc. The receiver audio is sampled in the syllabic squelch circuit and if it has syllabic characteristics, it will turn on the receive audio switch. This allows audio to pass through to the speaker. The syllabic squelch circuit is designed so as to remain unsquelched during voice pauses or short fades, minimizing the effects of nuisance interruptions.

Also included on the 2A3 audio assembly is a BITE circuit that samples the speaker audio to determine whether or not the receive audio path is functional.

4.3.2 NOISE BLANKER OPERATION

A noise blanker has been included on the 1A2A1 Receiver/Exciter to give the radio resistance to the effects of ignition and other types of impulse noise.

The noise blanker samples the first IF just before the first IF filter (FL1). This sample is attenuated by CR801 and CR802 and then amplified by U801 and U802. The purpose of the amplifiers using U804 is to control the attenuation of CR801 and CR802 such that the output of U802 has a constant average value. The response time of this gain control circuit is slow enough that impulse noise does not affect the gain of the circuit. U803 then detects when a much stronger than average signal is present and produces a blanking signal which is sent to the 1A2A2 Synthesizer. There it turns off the second LO for a brief period. This mutes the receiver since without LO energy no signals can pass thru the second mixer (X1).

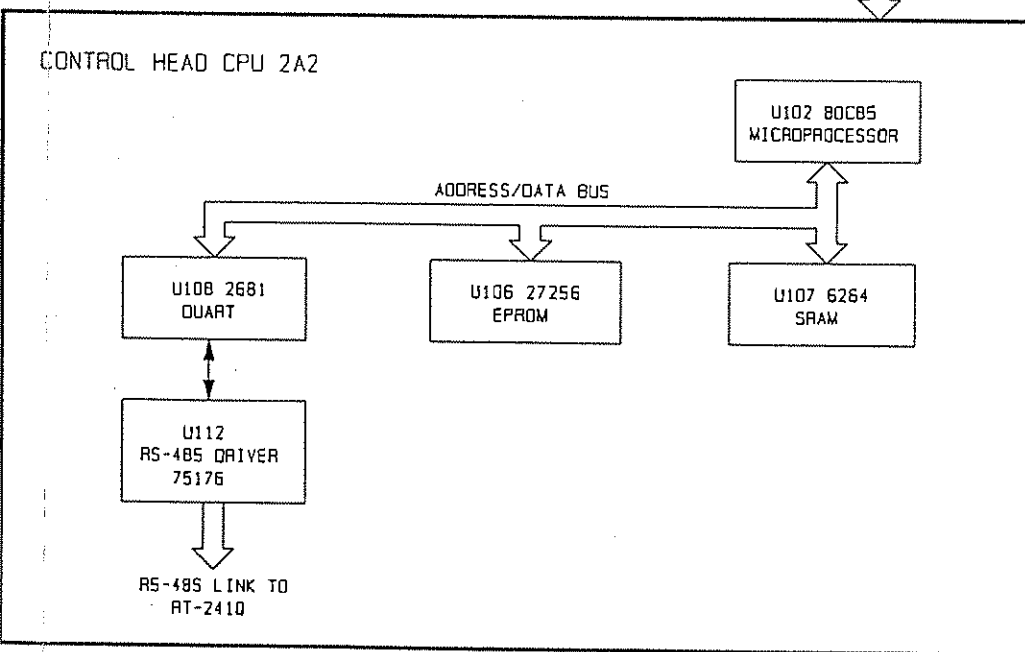
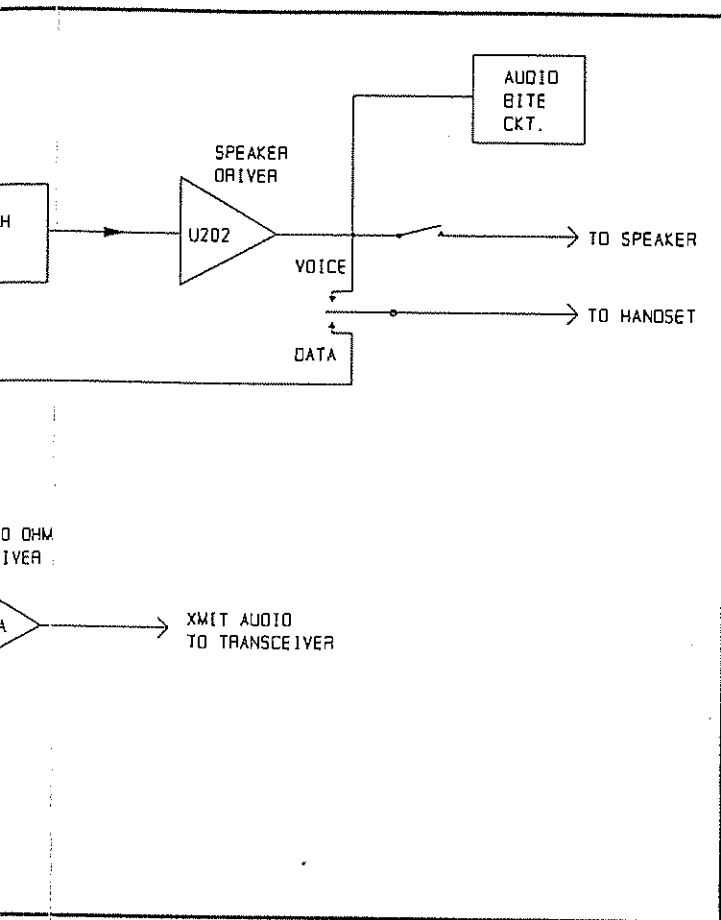
4.4 EXCITER SECTION

4.4.1 GENERAL SIGNAL FLOW

The microphone input signal from the 2A1 Front Panel is routed to the 2A3 Audio Board where it is amplified and fed through the transmit audio compressor. It is amplified again and sent over the control cable to the RT-2410 Transceiver.

If the radio is in CW mode, the microphone is disabled and the signal sent over the control cable is generated by the CW oscillator on the 2A3 Audio Board.

Once the signal reaches the RT-2410 Transceiver, it is routed to the 1A2A1 Receiver/Exciter Board. There it is amplified and sent to the U305 balanced modulator. In this circuit it is mixed with the third LO to produce a 455



SECTION V

FAULT ISOLATION/MAINTENANCE AND REPAIR

5.1 GENERAL

This section provides the procedures for fault isolation, maintenance and repair to the Lowest Repairable Unit (LRU) level.

5.2 DISASSEMBLY

Disassembly should be only to the extent necessary to accomplish the repair or replacement of the defective LRU. Procedures for the disassembly of major modules and assemblies are given in the following paragraphs.

5.2.1 COVER REMOVAL

To remove the cover on either the RT-2410 or the C-2420, release the four cover latches and remove the cover. No screws need to be removed in either case.

5.3 TEST SET-UP

Connect the RT-2400 and test equipment as shown in Figure 5.3

WARNING: For personal safety and to prevent damage to voltage sensitive components in the radio, always turn OFF the RT-2400 whenever reseating printed circuit cards, LRUs, and when replacing fuses.

5.4 BITE

5.4.1 PRELIMINARY

The BITE of the RT-2400 Radio Set provides immediate LRU faults. The BITE is controlled by the microprocessor on CPU 1A2A3. It checks the operational status of the LRUs with the exception of the DC to DC power supply on 1A2A4. The DC to DC power supply has a self-surveillance BITE which is not dependent upon the 1A2A3 CPU.

With the RT-2400 Radio Set connected as in 5.3, turn on the radio set and perform the following:

Set the **FUNCTION** switch to **MNL**. Press the 0 button, holding it down for 4 seconds until the display shows "BITE". The radio will then test each LRU. At the conclusion of the test "END" will appear briefly on the display and the radio will return to normal operation.

If any of the modules (LRUs) are faulty, "FAULT" will be displayed along with a number corresponding to the suspect module according to the following list:

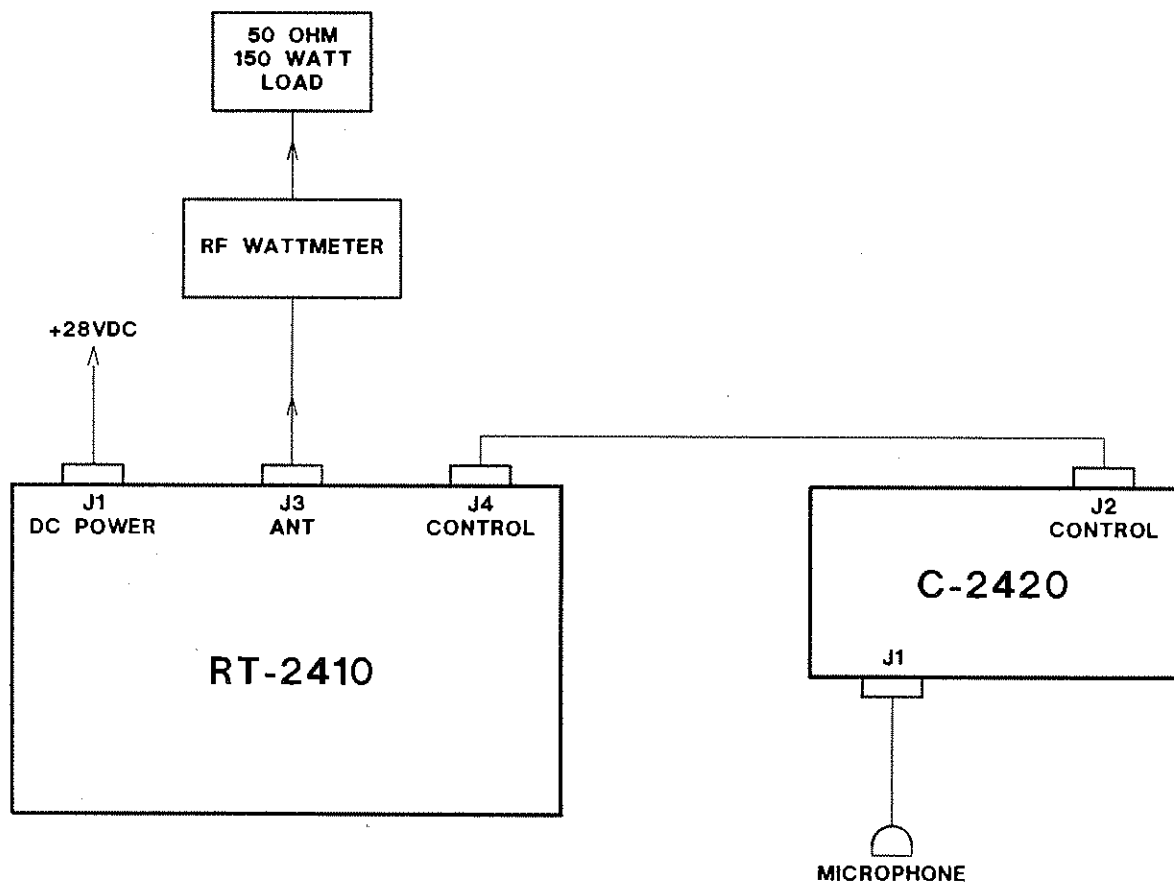


Figure 5.3 Bite Test Set-Up

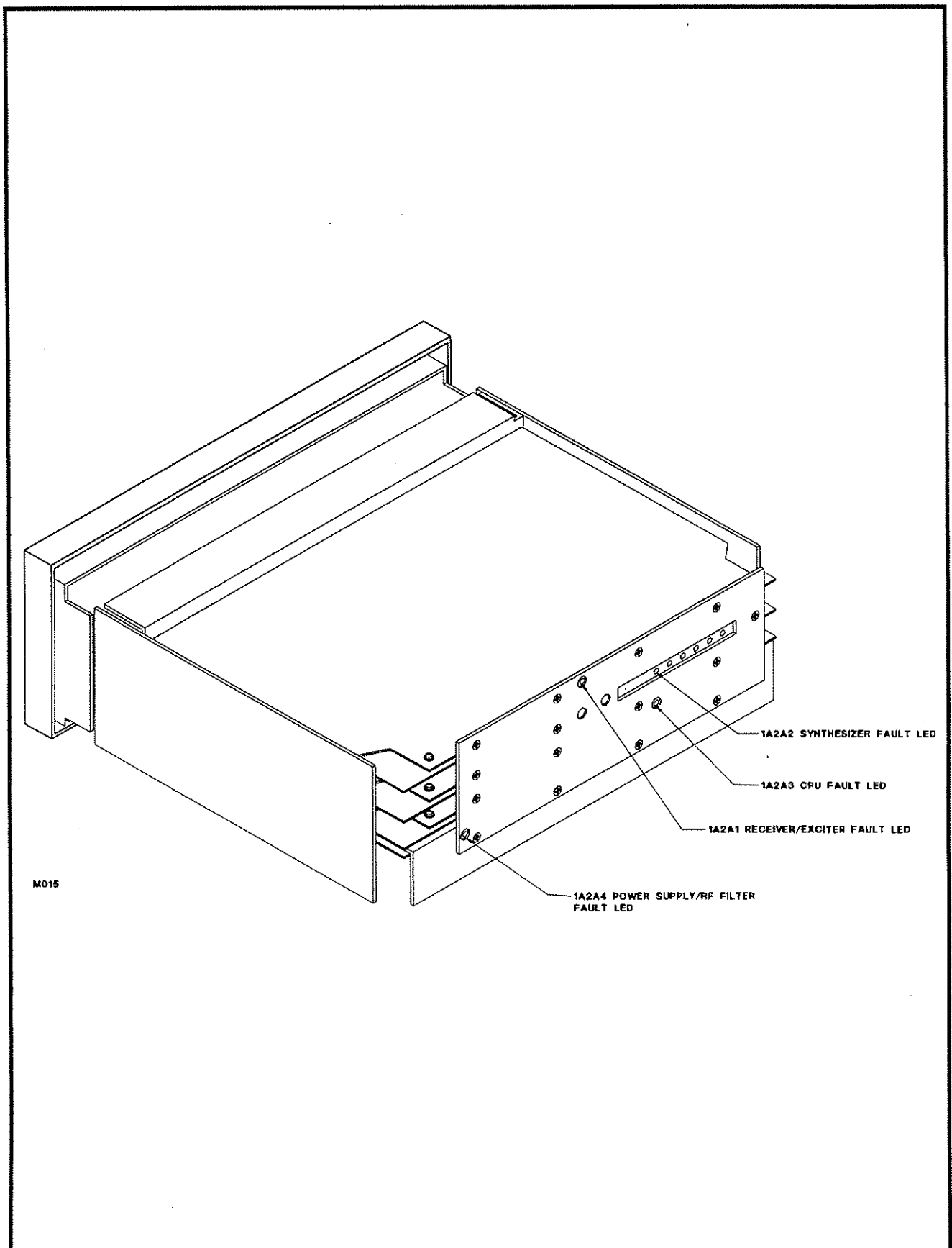


Figure 5.4.1.1 RT-2410 Rear View of LRU Fault Indicators.

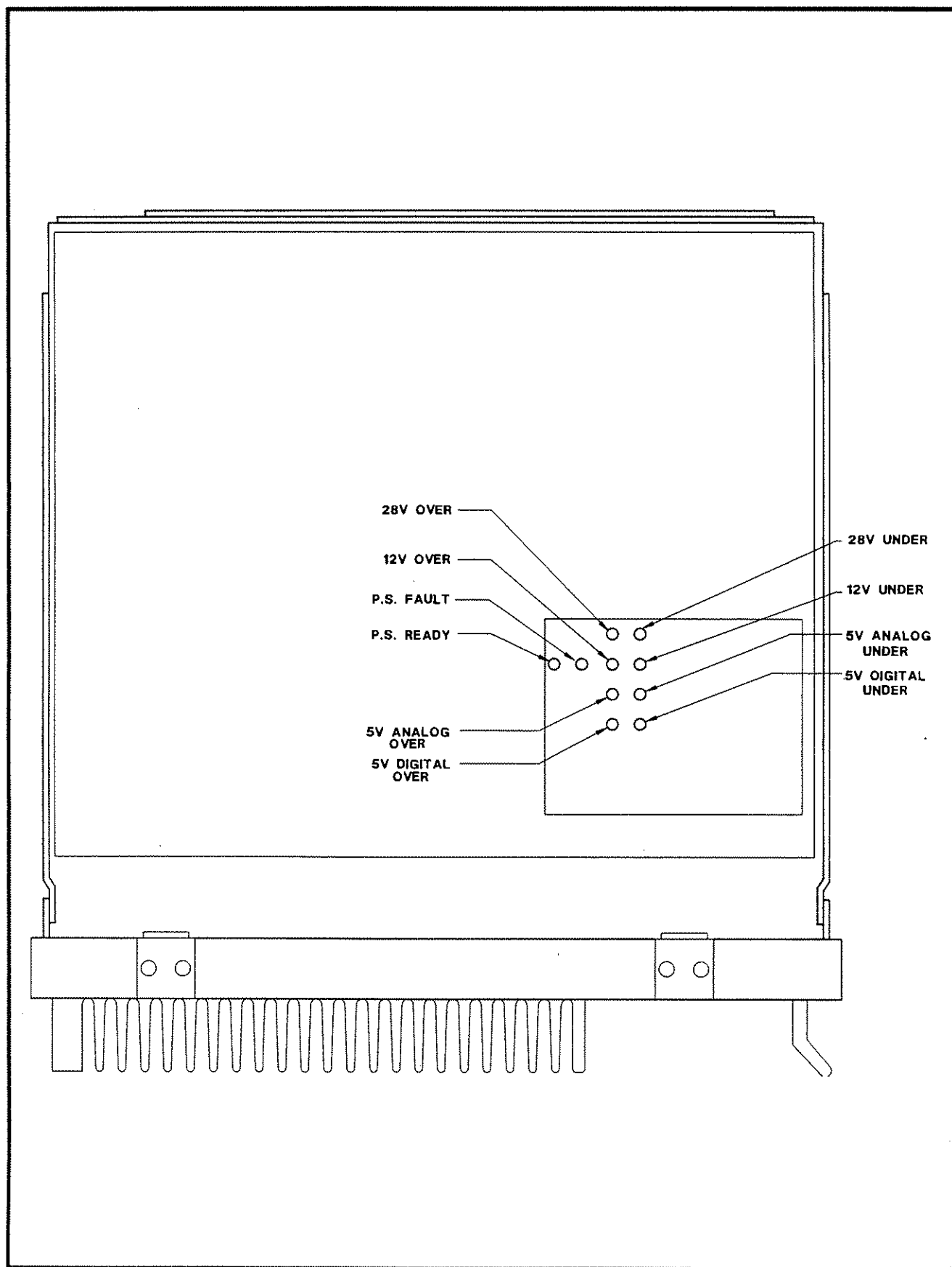


Figure 5.4.1.2 RT-2410 Bottom View of LRU Fault Indicators.

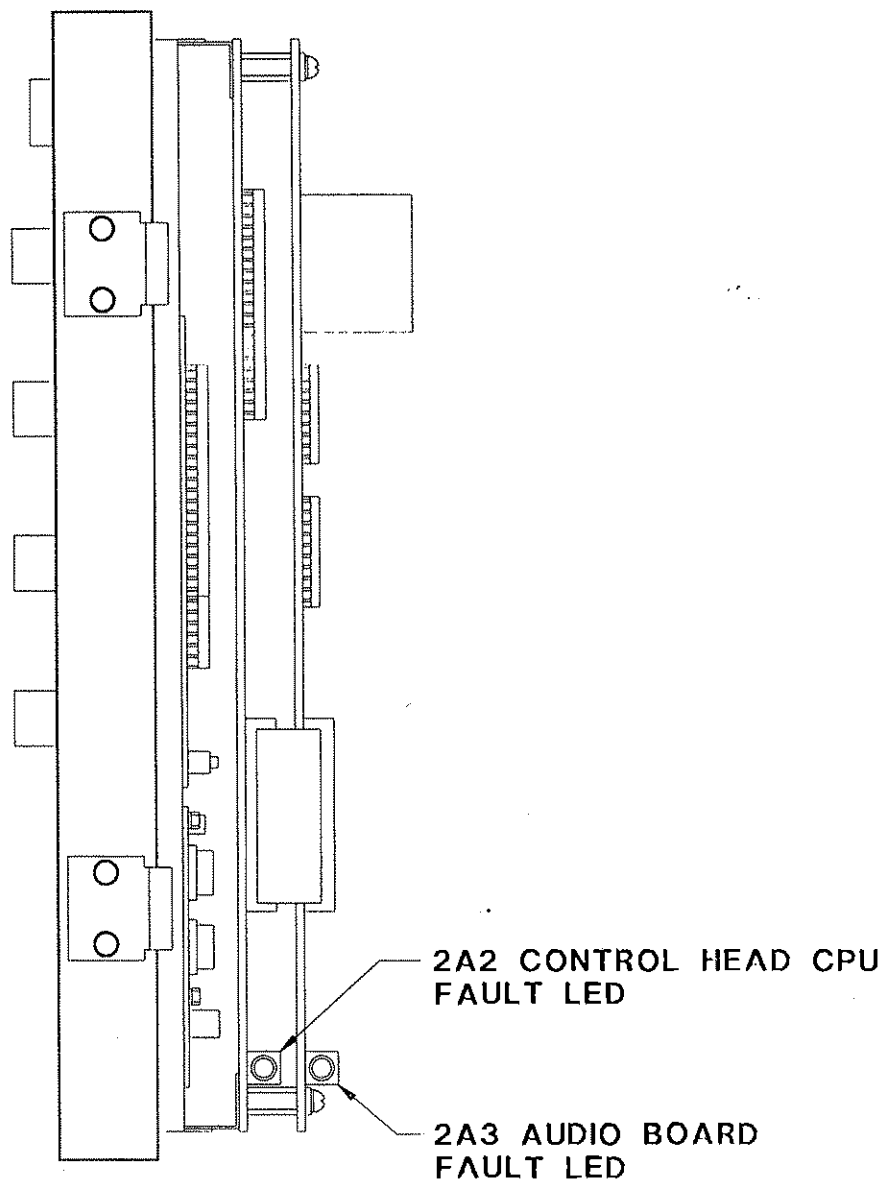


Figure 5.4.1.3 C-2420 Top View of LRU Fault Indicators.

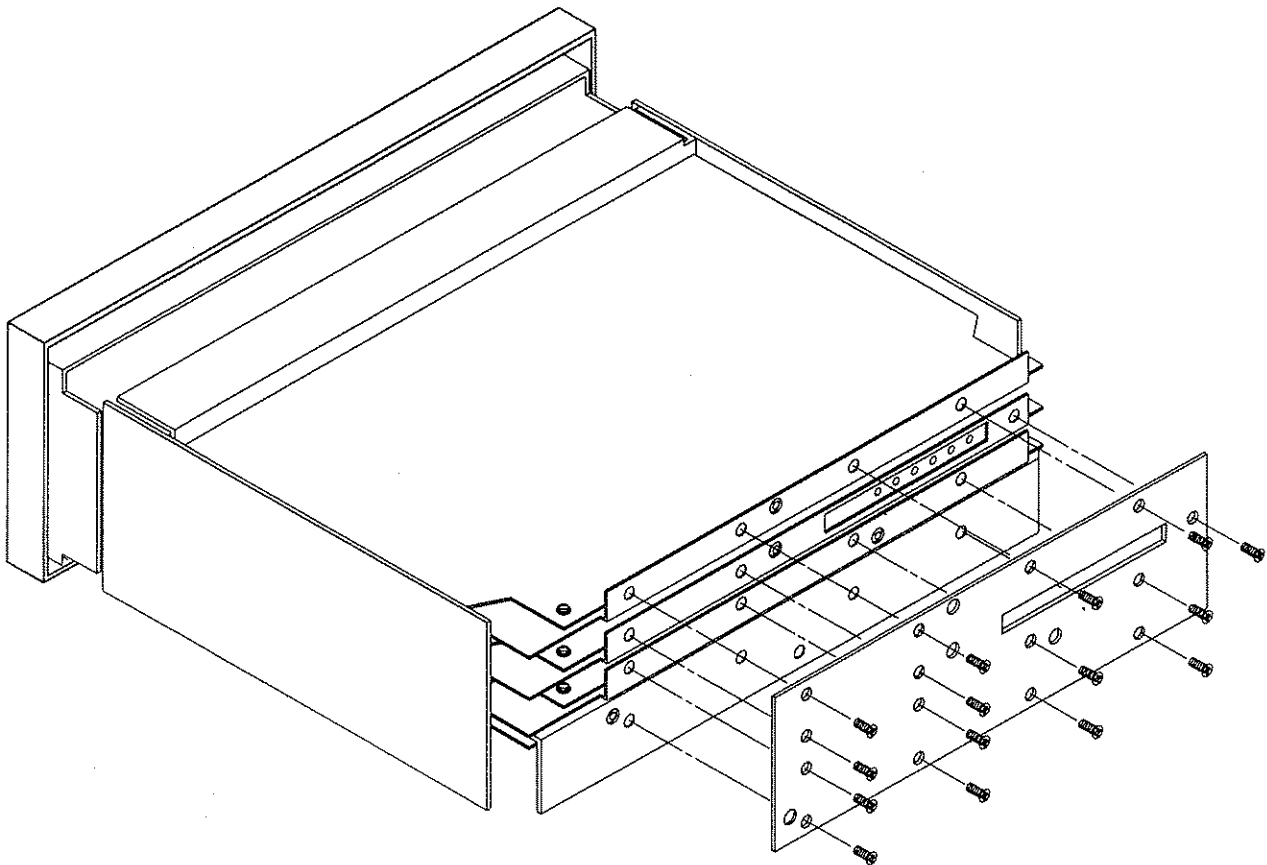


Figure 5.4.1.4 RT-2410 Retainer Plate Removal.

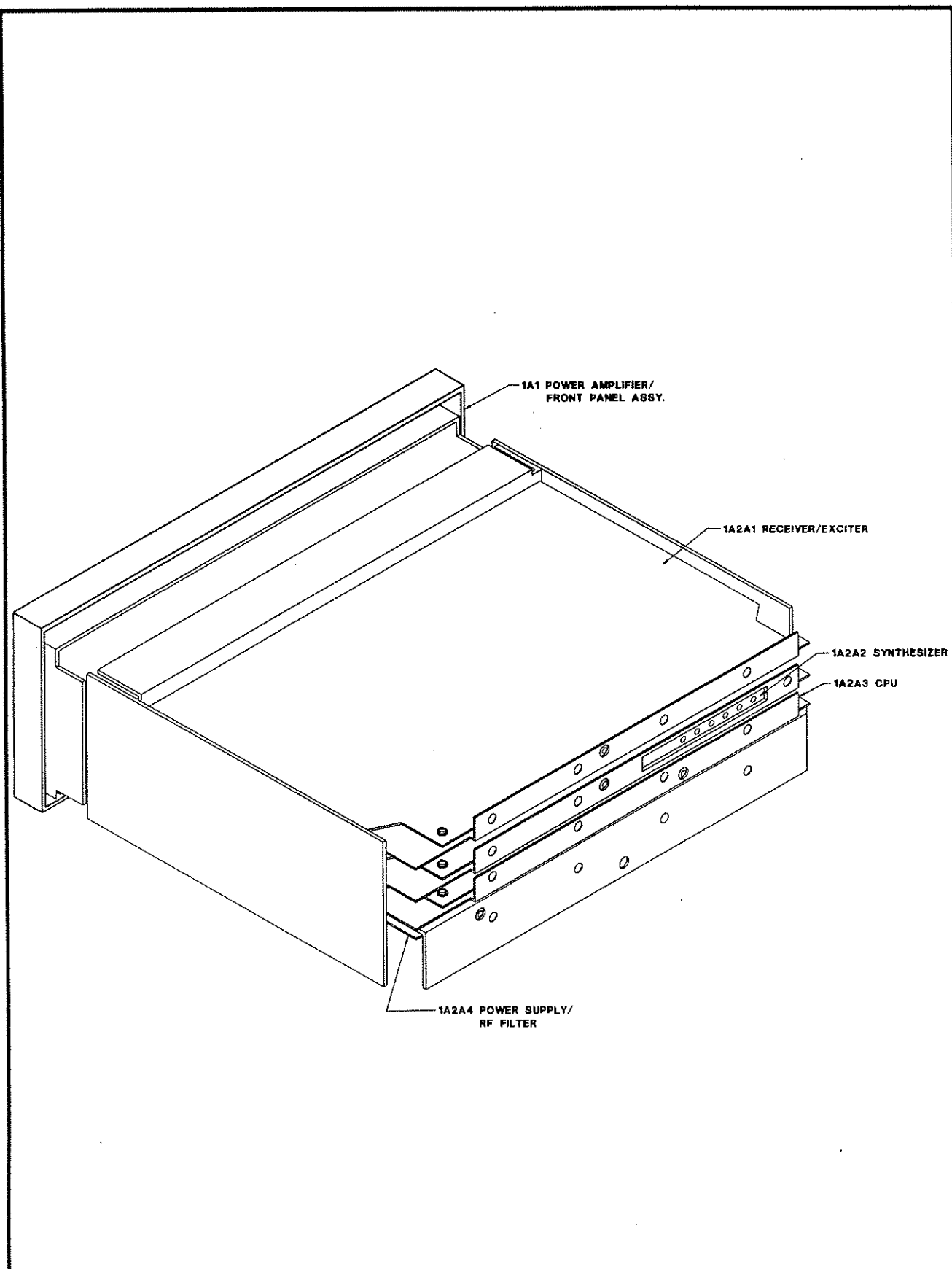


Figure 5.4.1.5 RT-2410 Major Assembly Locations.

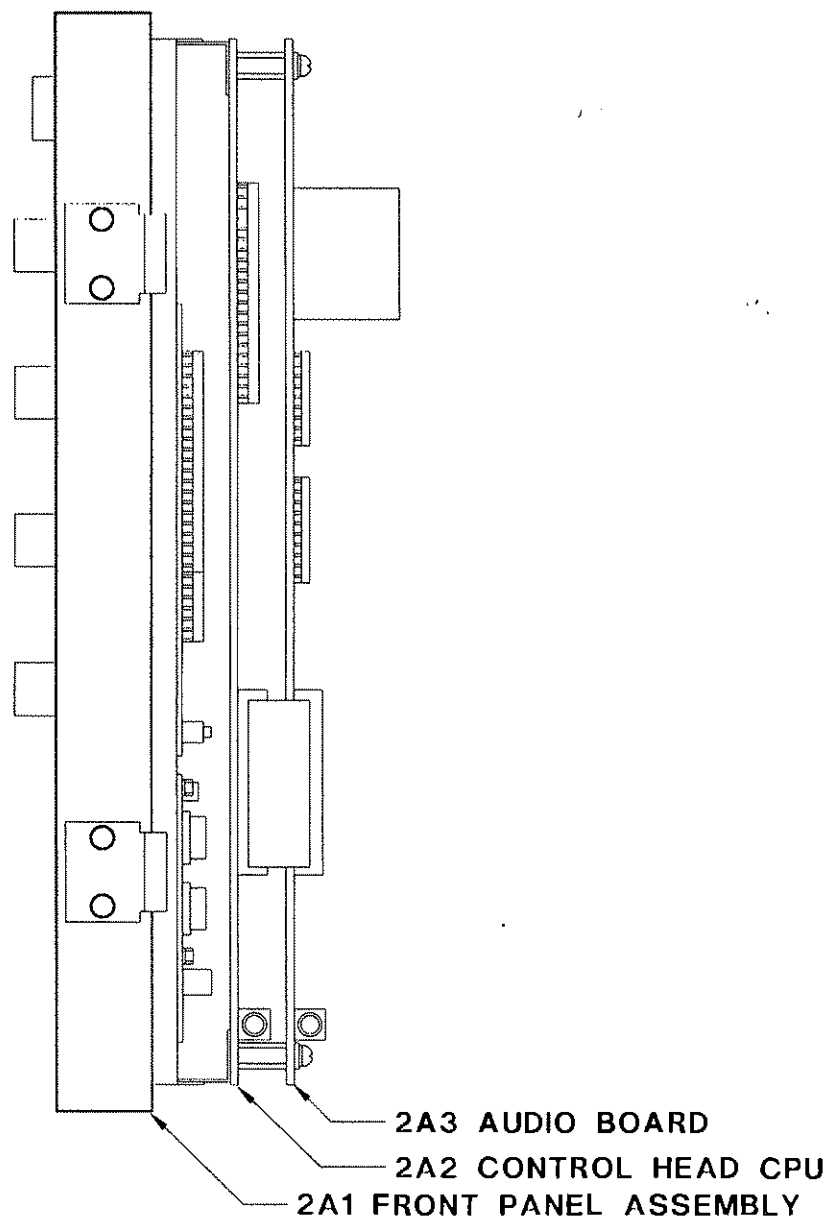


Figure 5.4.1.6 C-2420 Major Assembly Locations.

FAULT 1 — RT-2410 Receiver/Exciter
FAULT 2 — RT-2410 Synthesizer
FAULT 3 — RT-2410 CPU
FAULT 4 — RT-2410 Power Supply/RF Filter
FAULT 5 — RT-2410 Power Amplifier
FAULT 10 — C-2420 Audio Board
FAULT 11 — C-2420 Control Head CPU

5.4.2 LRU REPLACEMENT

5.4.2.1 FAULT 01 RT-2410 RECEIVER/EXCITER

This is an indication of a failure on the Receiver/Exciter board 1A2A1.

- a) Turn the radio set off and replace Module. See Figures 5.4.1.4 and 5.4.1.5.
- b) Turn the radio set on and repeat "BITE TEST". Upon completion of a successful test, return radio set to operational status.
- c) Return failed Module 1A2A1 to factory for repair.

5.4.2.2 FAULT 02 RT-2410 SYNTHESIZER

This is an indication of a failure on the Synthesizer board 1A2A2.

- a) Turn the radio set off and replace Module. See Figures 5.4.1.4 and 5.4.1.5.
- b) Turn the radio set on and repeat "BITE TEST". Upon completion of a successful test, return radio set to operational status.
- c) Return failed Module 1A2A2 to factory for repair.

5.4.2.3 FAULT 03 RT-2410 CPU

This is an indication of a failure on the CPU board 1A2A3.

- a) Turn the radio set off and replace Module. See Figures 5.4.1.4 and 5.4.1.5.
- b) Turn the radio set on and repeat "BITE TEST". Upon completion of a successful test, return radio set to operational status.
- c) Return failed Module 1A2A3 to factory for repair.

5.4.2.4 FAULT 04 RT-2410 POWER SUPPLY/RF FILTER

This is an indication of a failure on the Power Supply/RF Filter board 1A2A4.

- a) Turn the radio set off and replace Module. See Figure 5.4.1.7 and 5.4.1.8.

- b) Turn the radio set on and repeat "BITE TEST". Upon completion of a successful test, return radio set to operational status.
- c) Return failed Module 1A2A4 to factory for repair.

5.4.2.5 FAULT 05 RT-2410 POWER AMPLIFIER/FRONT PANEL

This is an indication of a failure on the Power Amplifier/Front Panel 1A1.

- a) Turn the radio set off and replace Module. See Figure 5.4.1.9.
- b) Turn the radio set on and repeat "BITE TEST". Upon completion of a successful test, return radio set to operational status.
- c) Return failed Module 1A1 to factory for repair.

5.4.2.6 FAULT 10 C-2420 AUDIO BOARD

This is an indication of a failure on the Audio Board 2A3.

- a) Turn the radio set off and replace Module. See Figure 5.4.1.10.
- b) Turn the radio set on and repeat "BITE TEST". Upon completion of a successful test, return radio set to operational status.
- c) Return failed Module 2A3 to factory for repair.

5.4.2.7 FAULT 11 C-2420 CONTROL HEAD CPU

This is an indication of a failure on the Control Head CPU 2A2.

- a) Turn the radio set off and replace Module. See Figure 5.4.1.10.
- b) Turn the radio set on and repeat "BITE TEST". Upon completion of a successful test, return radio set to operational status.
- c) Return failed Module 2A2 to factory for repair.

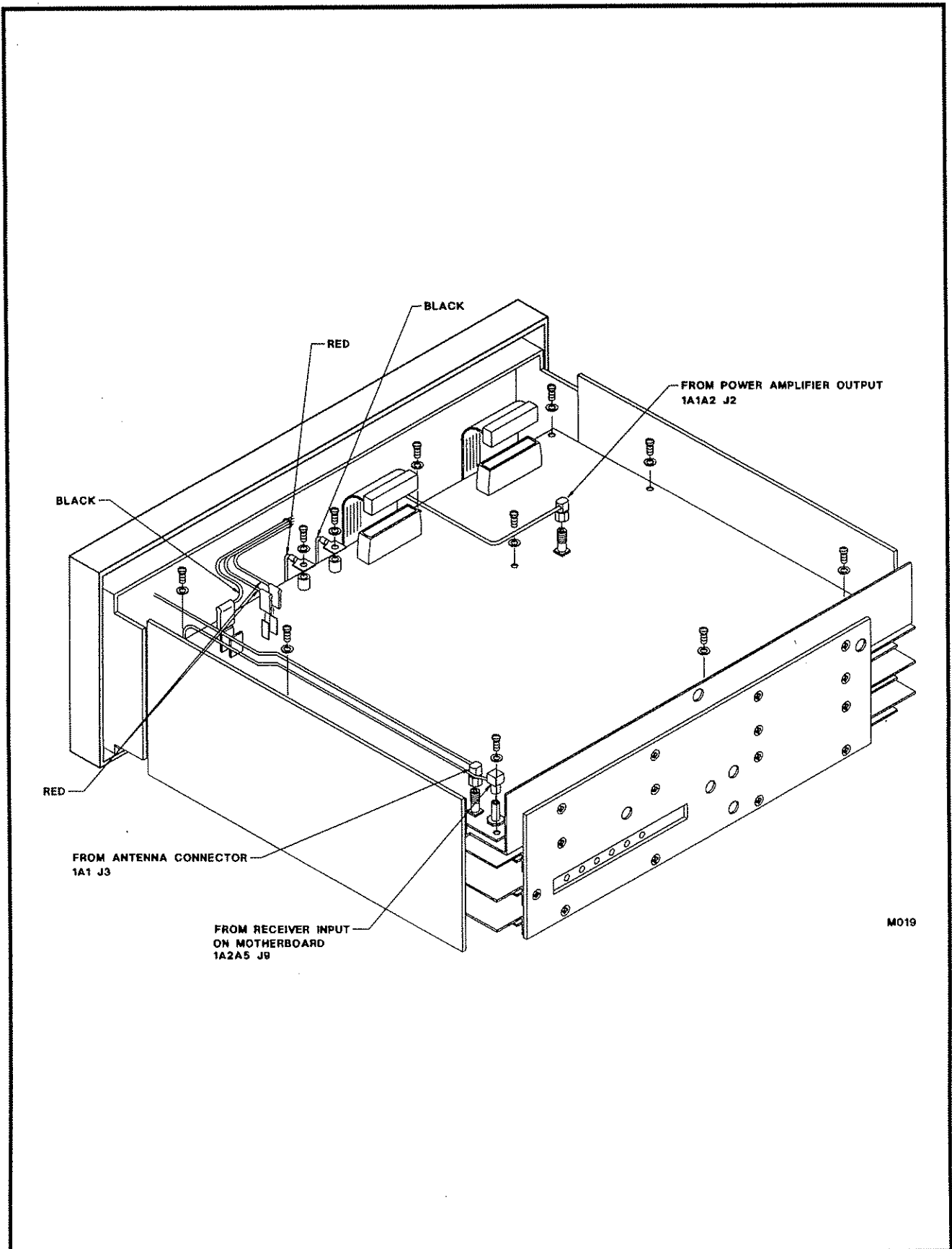


Figure 5.4.1.7 Removal/Replacement of 1A2A4 Power Supply/RF Filter.

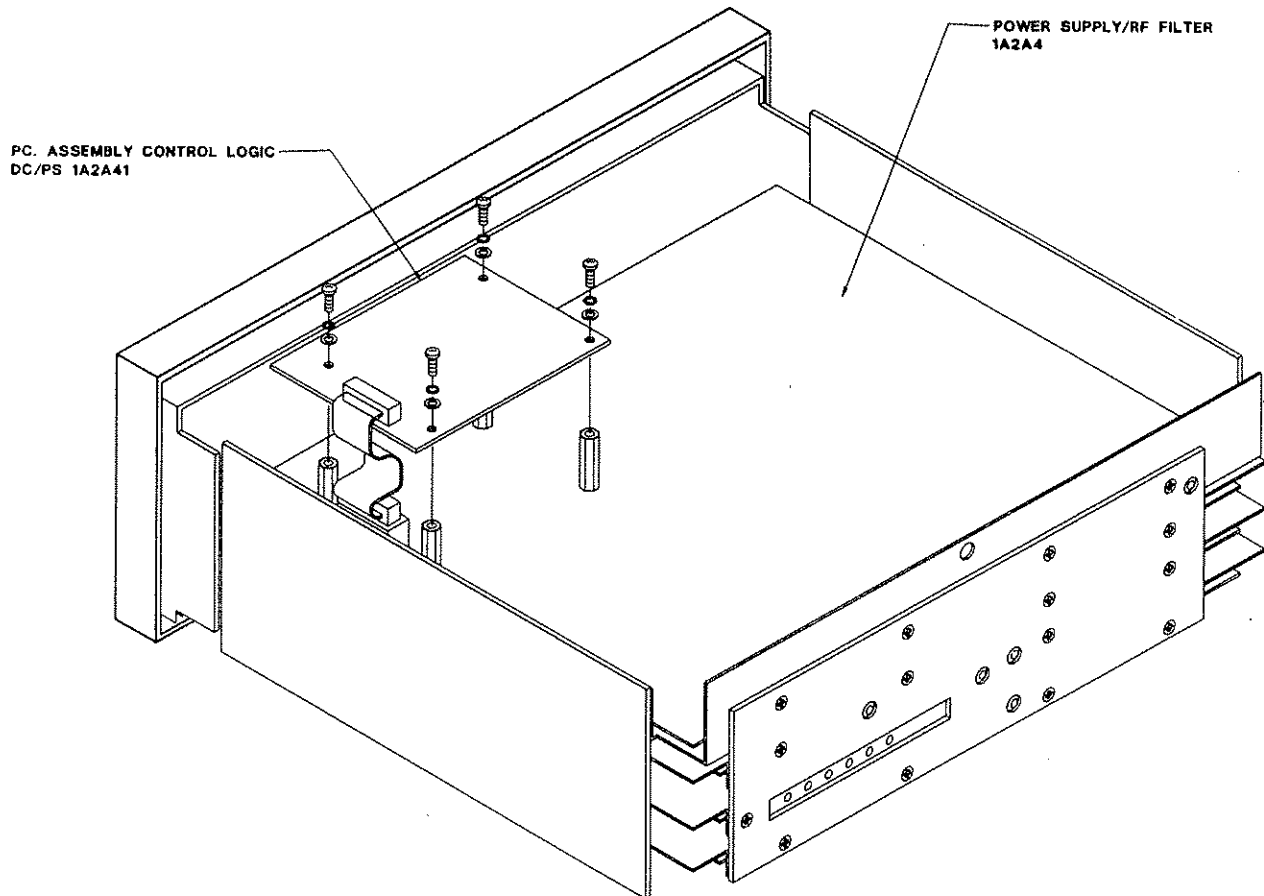


Figure 5.4.1.8 Removal/Replacement of 1A2A4A1 Control Logic Board.

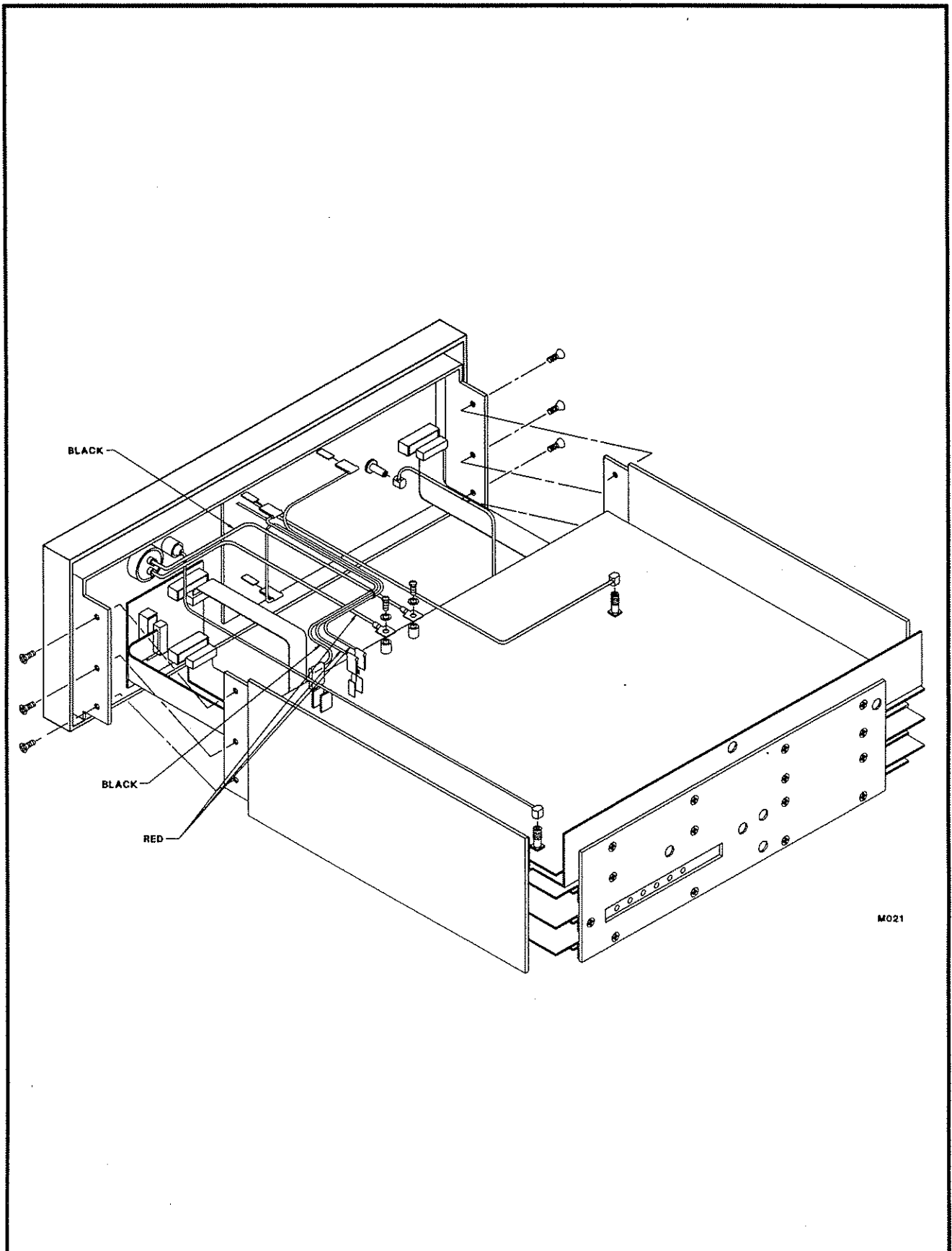


Figure 5.4.1.9 Removal/Replacement of 1A1 Power Amplifier/Front Panel Assembly.

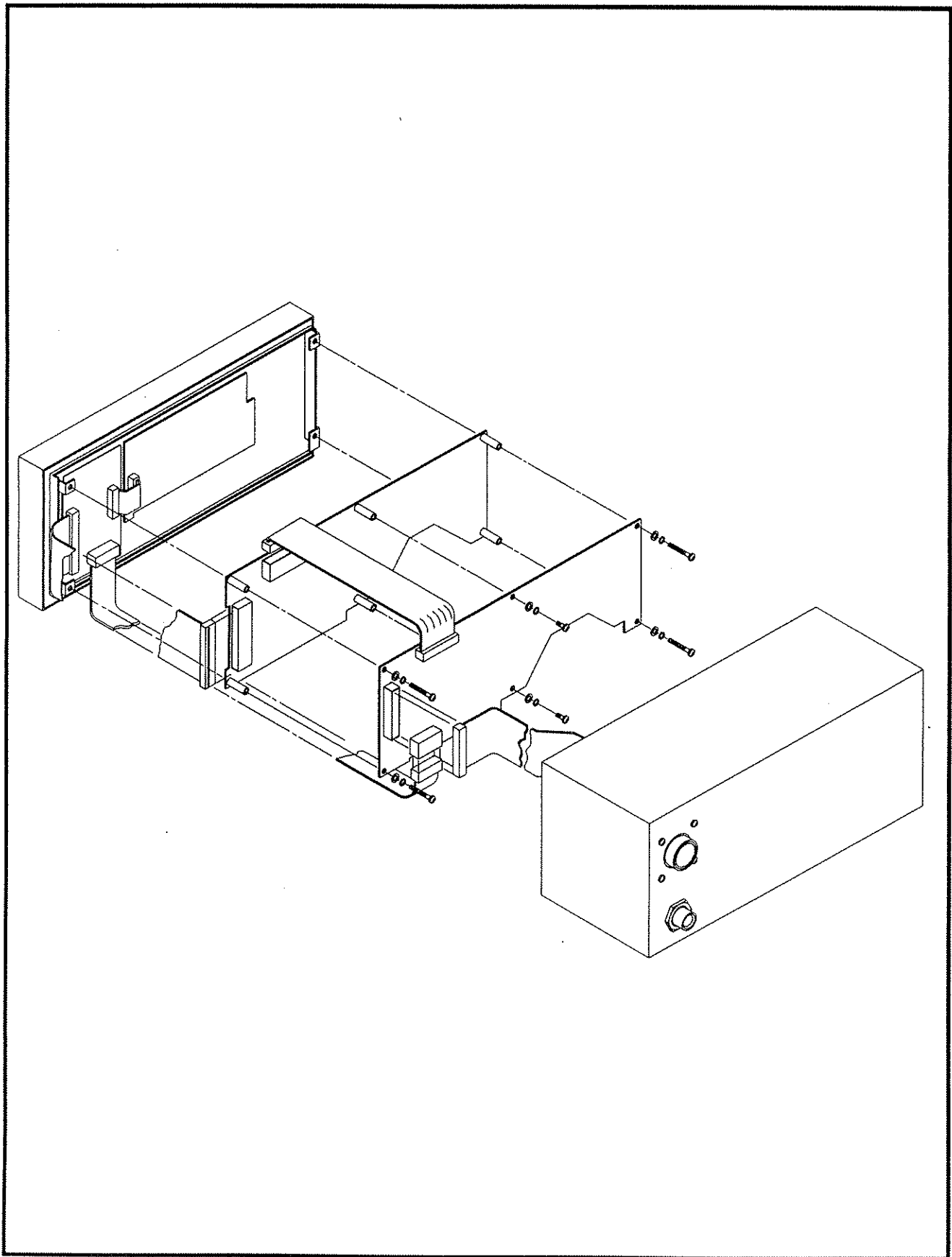


Figure 5.4.1.10 Removal/Replacement of 2A1, 2A2, and 2A3.

5.5 TROUBLESHOOTING THE DC TO DC SUPPLY WITH SELF-SURVEILLANCE BITE

Reference Table 5.5.1

WARNING: The adjustments called out in the following alignments are all that should be attempted. Any other adjustments not called out are factory adjustments and cannot be done in the radio set. See Figure 5.6.1 for test equipment connections.

	DC TO DC POWER SUPPLY 1A2A4										POSSIBLE TROUBLE	CORRECTIVE ACTION
LED's X=ON BLANK=OFF	READY	FAULT	5D		5A		12 V		28 V			
			OVER	UNDER	OVER	UNDER	OVER	UNDER	OVER	UNDER		
1	X										No Trouble	No Action Required
2		X								X	1. 1A2A4 F101 Open. 2. NO DC POWER. 3. 1A2A4 F102 OPEN.	1. Replace F101. If fuse opens again, use normal trouble shooting procedures and locate and repair short. 2. Check for +28 VDC input. 3. Replace F102. If it opens again, use normal troubleshooting procedures to locate and repair short.
3		X		X	X			X			U103 and associated circuitry in 1A2A4.	Replace 1A2A4 assembly.
4		X	X			X		X			U102 and associated circuitry in 1A2A4.	Replace 1A2A4 assembly.
5		X		X		X	X				U101 and associated circuitry in 1A2A4.	Replace 1A2A4 assembly.
6		X						X		X	DC power input low.	Correct DC input voltage.
7		X							X		DC power input high.	Correct DC input voltage.
8		X				X					1. U103 and associated circuitry in 1A2A4. 2. Short on +5 V analog line in Transceiver.	1. Replace 1A2A4 assembly. 2. Use normal trouble shooting procedures, locate and repair short.
9		X		X							1. U102 and associated circuitry in 1A2A4. 2. Short on +5 V digital line in Transceiver.	1. Replace 1A2A4 assembly. 2. Use normal trouble shooting procedures to locate and repair short.
10		X						X			1. U101 and associated circuitry in 1A2A4. 2. Short on +12 V line in Transceiver.	1. Replace 1A2A4assembly. 2. Use normal trouble shooting procedures to locate and repair short.

Table 5.5.1 DC to DC and AC Power Supply Troubleshooting.

5.6 TEST EQUIPMENT REQUIRED OR EQUIVALENT

Multimeter	Simpson 260
Wattmeter, thruline with 250 Watt, 2-30 MHz element	Bird Model 43
Power Supply 0-40 Volt @ 30 Amp	HP-6269
Oscilloscope, 100 MHz bandwidth	Tektronix Model 2235
RF Signal Generator	Wavetek 3000
Coaxial Resistor, 50 ohm, 150 Watt (3 each)	Bird Model 8135
Audio Generator	Leader Model LAG-120B
Audio Voltmeter	Leader Model LMV-181A
Frequency Counter	Systron-Donner Model 6050 with option 12
RF Voltmeter	Boonton 92EA
100/1 Voltage Divider	Boonton 91-7
Tee Adapter	Boonton 91-14A
Digital Multimeter	Leader LDM-853A
Microphone	P/N 8076000602
CW Key	P/N 5024000994
Coaxial Cable (4 each)	RG-58/U with BNC Connectors
Adaptor, N to BNC (3 each)	UG-201/U
Adaptor, UHF to BNC (2 each)	UG-273/U
'T' Connector BNC (2 each)	UG-274/U
Microphone Connector	1003300014

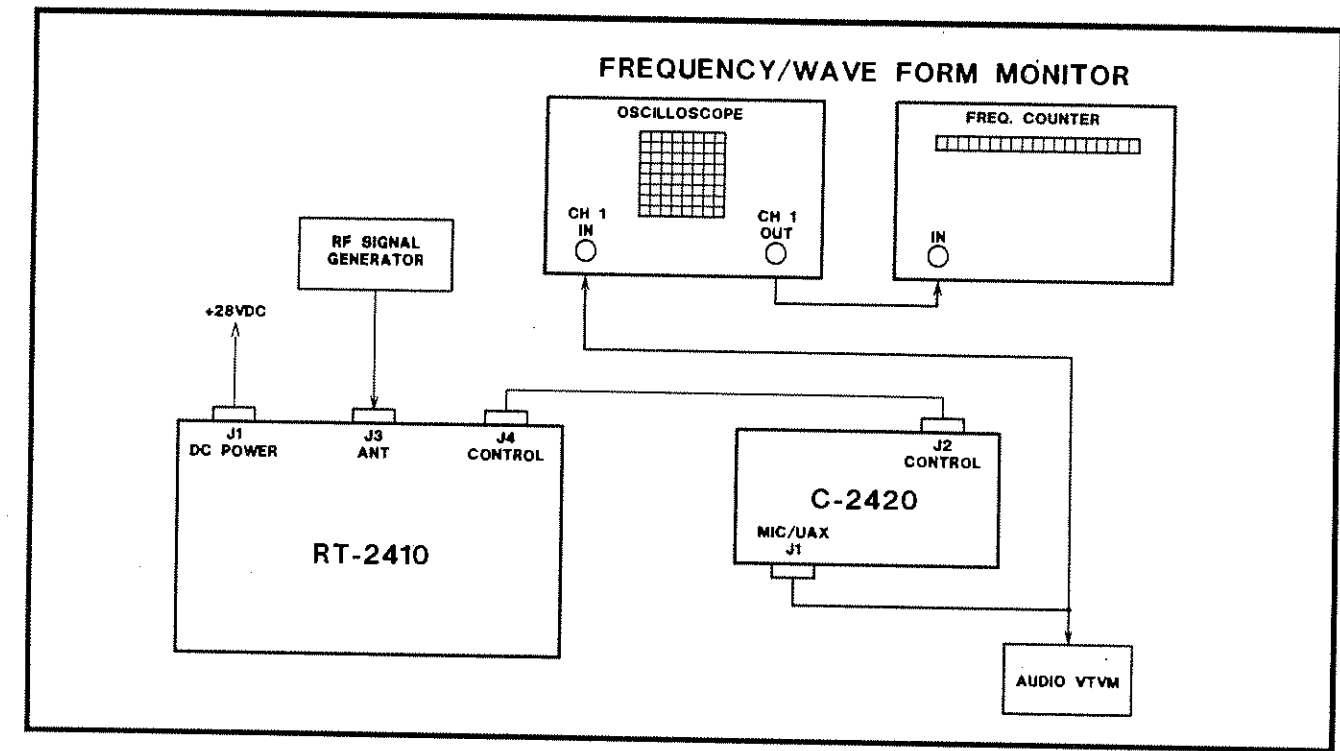


Figure 5.6.1 Receiver Alignment Test Equipment Connections.

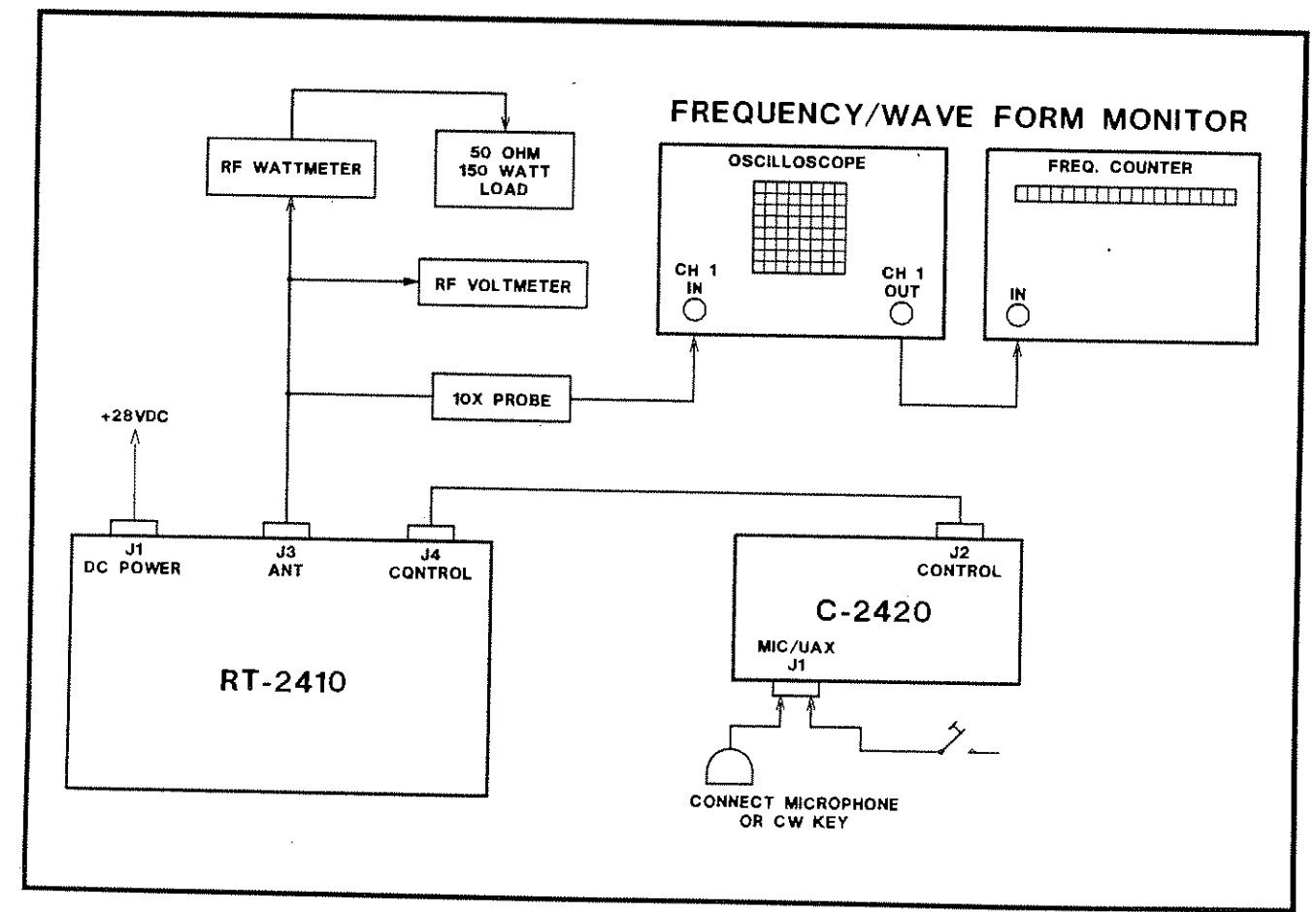


Figure 5.6.2 Transmitter Alignment Test Equipment Connections.

<u>VRMS</u>	<u>Vpeak</u>	<u>Vp-to-p</u>	<u>WATTS</u> <u>ACROSS 50</u> <u>OHMS</u>
32.00	45.25	90.50	20.48
33.00	46.66	93.32	21.78
34.00	48.08	96.15	23.12
35.00	49.49	98.98	24.50
36.00	50.90	101.81	25.92
37.00	52.32	104.64	27.38
38.00	53.73	107.46	28.88
39.00	55.15	110.29	30.42
40.00	56.56	113.12	32.00
41.00	57.97	115.95	33.62
42.00	59.39	118.78	35.28
43.00	60.80	121.60	36.98
44.00	62.22	124.43	38.72
45.00	63.63	127.26	40.50
46.00	65.04	130.09	42.32
47.00	66.46	132.92	44.18
48.00	67.87	135.74	46.08
49.00	69.29	138.57	48.02
50.00	70.70	141.40	50.00
51.00	72.11	144.23	52.02
52.00	73.53	147.06	54.08
53.00	74.94	149.88	56.18
54.00	76.36	152.71	58.32
55.00	77.77	155.54	60.50
56.00	79.18	158.37	62.72
57.00	80.60	161.20	64.98
58.00	82.01	164.02	67.28
59.00	83.43	166.85	69.62
60.00	84.84	169.68	72.00
61.00	86.25	172.51	74.42
62.00	87.67	175.34	76.88
63.00	89.08	178.16	79.38
64.00	90.50	180.99	81.92
65.00	91.91	183.82	84.50
66.00	93.32	186.65	87.12
67.00	94.74	189.48	89.78
68.00	96.15	192.30	92.48
69.00	97.57	195.13	95.22
70.00	98.98	197.96	98.00
71.00	100.39	200.79	100.82
72.00	101.81	203.62	103.68
73.00	103.22	206.44	106.58
74.00	104.64	209.27	109.52
75.00	106.05	212.10	112.50
76.00	107.46	214.93	115.52
77.00	108.88	217.76	118.58
78.00	110.29	220.58	121.68
79.00	111.71	223.41	124.82
80.00	113.12	226.24	128.00
81.00	114.53	229.07	131.22
82.00	115.95	231.90	134.48
83.00	117.36	234.72	137.78
84.00	118.78	237.55	141.12
85.00	120.19	240.38	144.50
86.00	121.60	243.21	147.92
87.00	123.02	246.04	151.38
88.00	124.43	248.86	154.88
89.00	125.85	251.69	158.42
90.00	127.26	254.52	162.00

Table 5.6.1 Power vs Voltage.

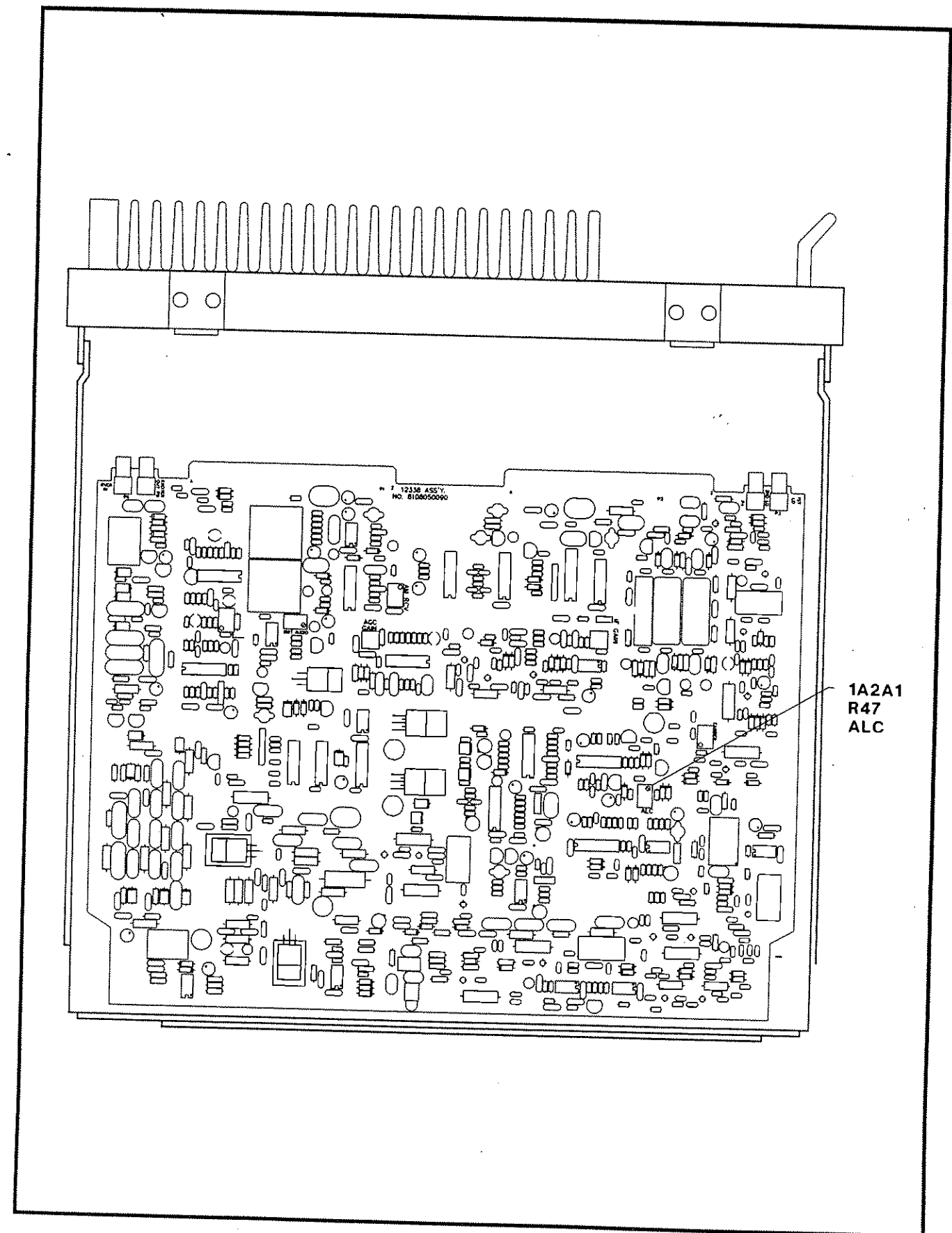


Figure 5.6.3 RT-2410 Alignment Adjustment Locations (TOP).

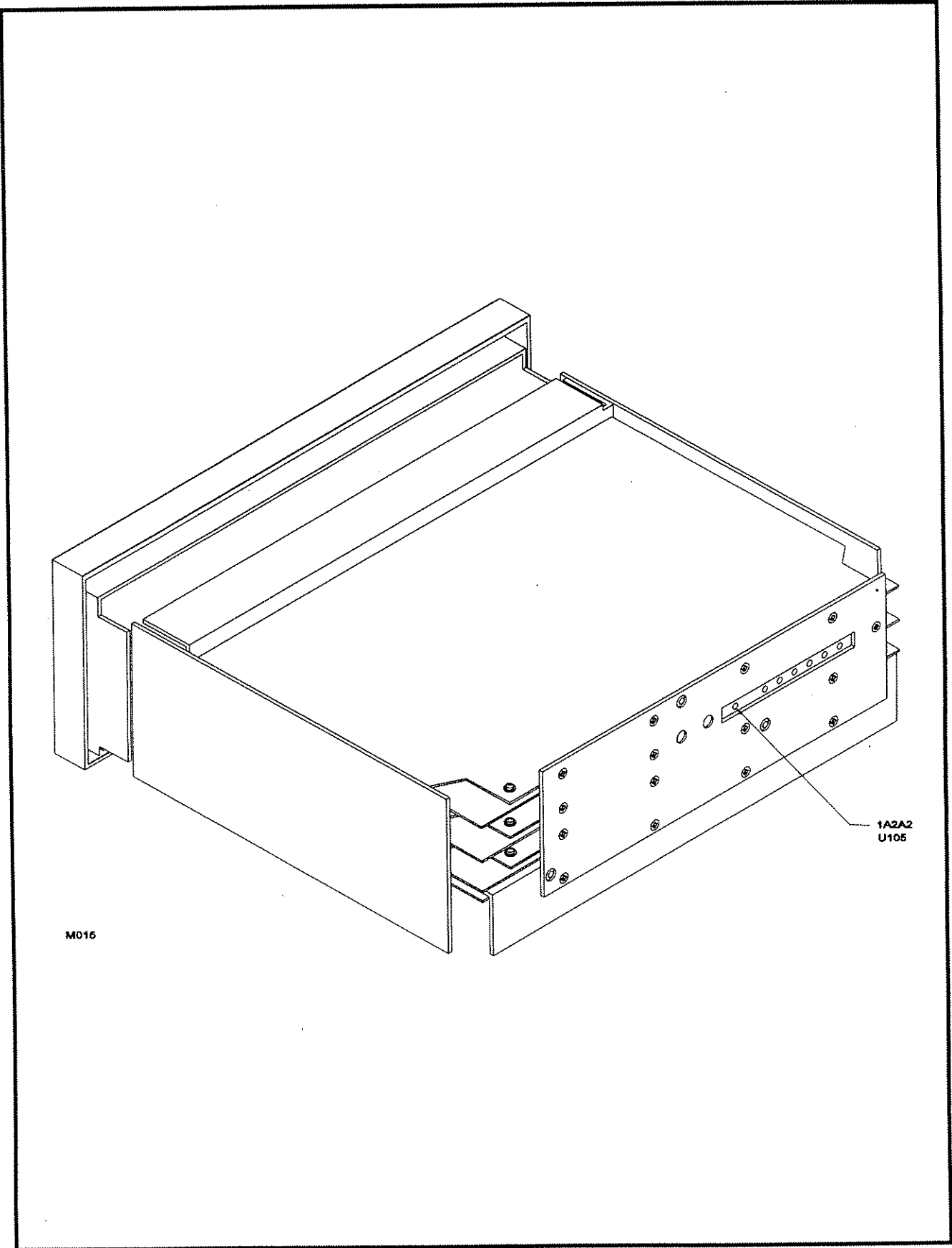


Figure 5.6.4 RT-2410 Alignment Adjustment Locations (BACK).

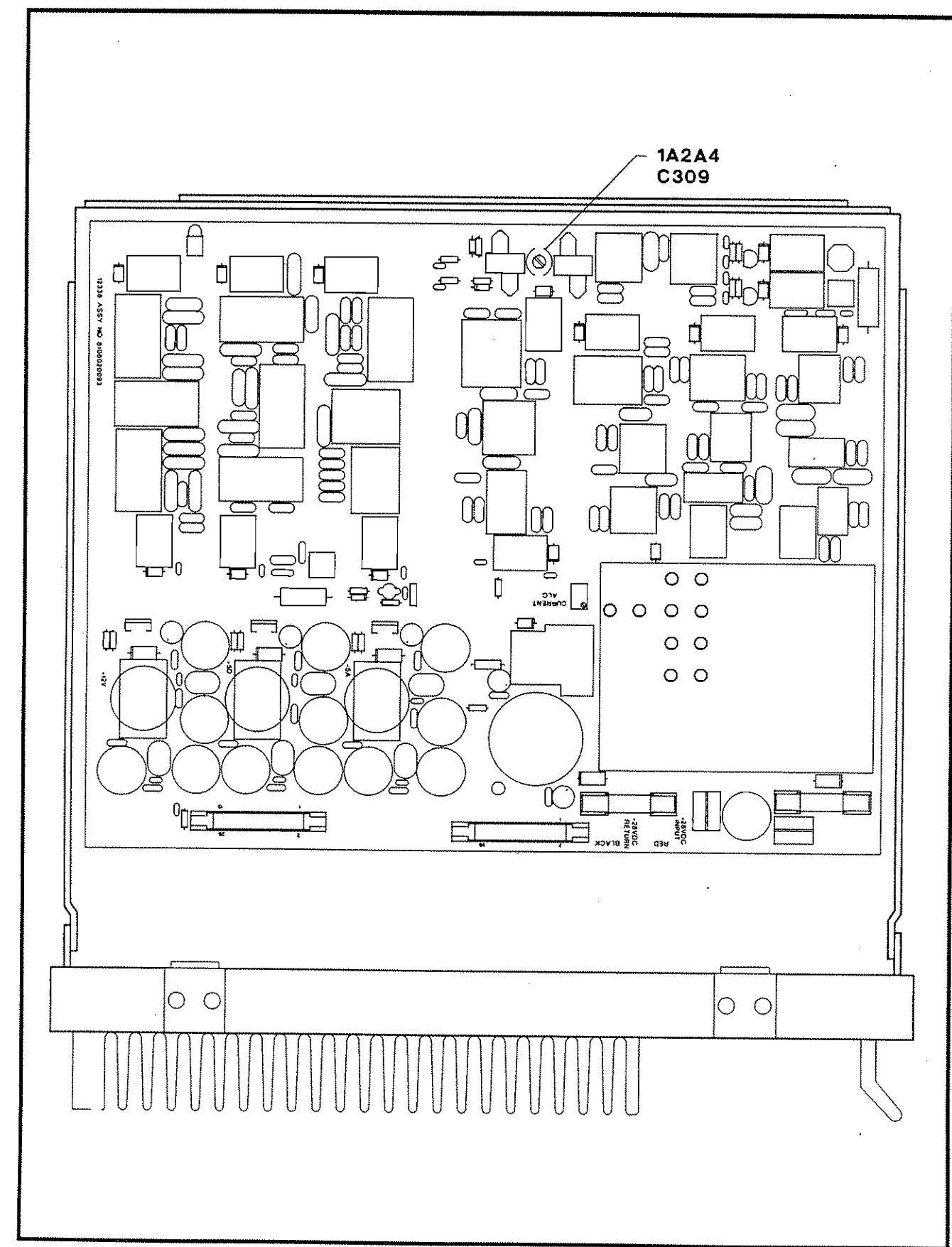


Figure 5.6.5 RT-2410 Alignment Adjustment Locations (BOTTOM).

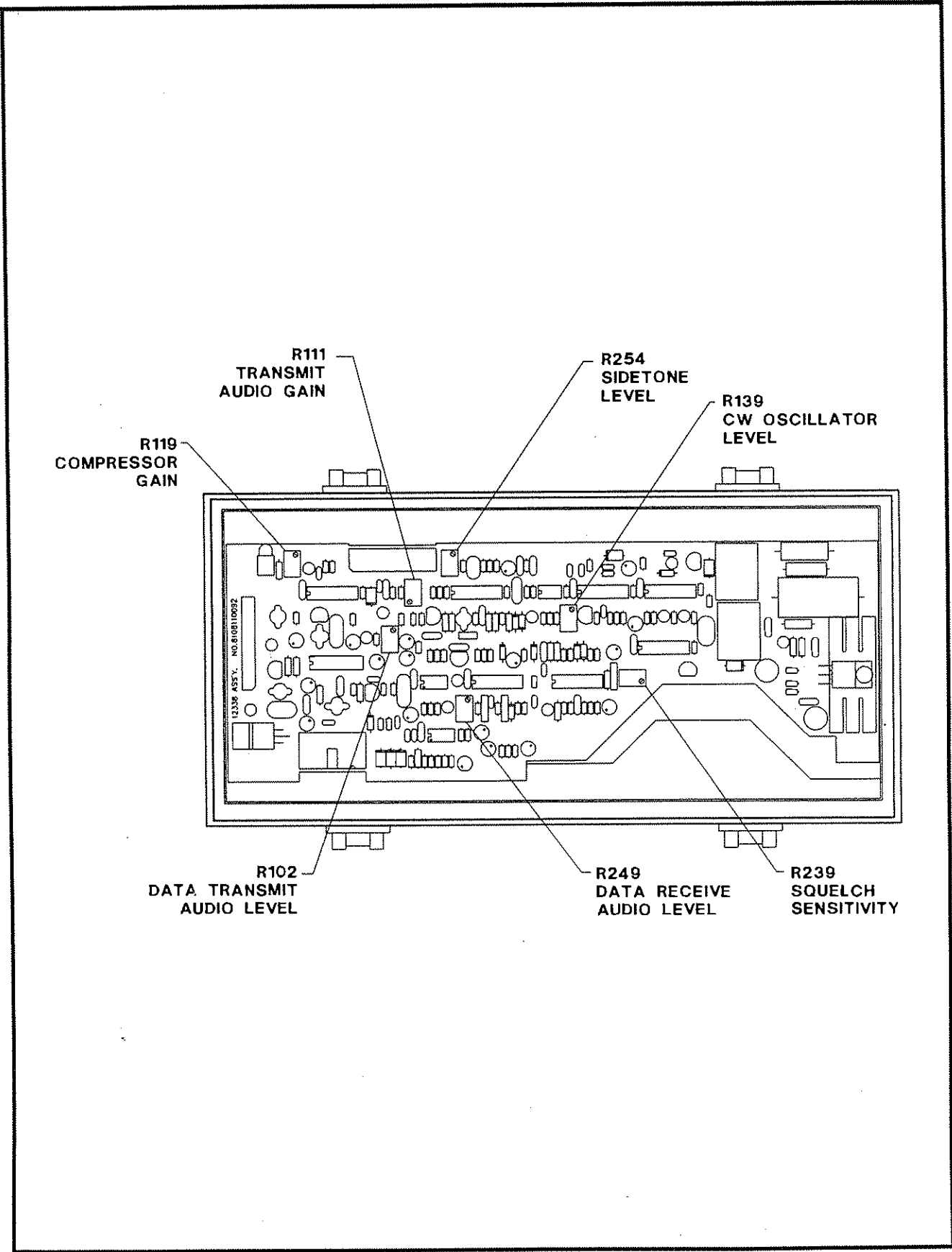


Figure 5.6.6 C-2420 Alignment Adjustment Locations.

5.7 RECEIVE ALIGNMENT AND CHECKS

See Figure 5.6.1 for Test Equipment Connections.

5.7.1 REFERENCE OSCILLATOR (TCXO)

- a) Turn the radio set on. Connect the frequency counter to 'CH1 VERT SIGNAL OUT' on the oscilloscope. Connect oscilloscope Channel 1 input to Synthesizer (1A2A2) TP101. The frequency must be 5.0 MHz ± 5.0 Hz.

NOTE: If it is necessary to adjust the TCXO, remove the cover screw on U105 on the 1A2A2 Synthesizer. Adjust the trimmer in U105 to the frequency stamped on the cover. This adjustment should only be done when the TCXO is at room temperature (25° C / 75° F).

5.7.2 SENSITIVITY

NOTE: 99.5% of available frequencies are free from spurious response at or above .5 micro volts equivalent at the antenna terminal. If you encounter a "spur" on the frequency you are checking, change the frequency a couple 100 kHz above or below to get away from the "spur".

- a) Connect the RF Signal Generator to the 'ANT' connector (J3 on the RT-2410). Set the generator to 2.601 MHz, CW mode, .5 microvolts output.
- b) Set the **FUNCTION** knob to **MNL**. Set the **MODE** knob to **USB**. Set the radio frequency to 2600.00 kHz. Set the **SQUELCH** switch to "OFF". A 1000 Hz tone should be heard in the speaker.
- c) Connect the Audio Voltmeter to the handset audio on the MIC/AUX connector on the C-2420 front panel (J1). J1-B is the handset audio line. J1-A is the ground. Connect oscilloscope Channel 1 input to audio voltmeter input. (See Figure 5.6.1)
- d) Set the RF Signal Generator to 3.601 MHz and adjust the **VOLUME** control for a -10 dB level on a convenient Audio Voltmeter scale. Adjust the oscilloscope gain to a convenient level.
- e) Reset the RF Signal Generator to 2.606 MHz and adjust the output of the RF Signal Generator until the Audio Voltmeter level is 10 dB above it's setting is step d). The output level of the RF Signal Generator should not be more than 0.5 microvolts.

NORMAL: Go on to step f).
ABNORMAL: Remove and replace the following LRUs, one at a time, and reaccomplish steps a) through e) each time:

Receiver/Exciter	1A2A1
Audio Board	2A3

- f) Measure the sensitivity from 2600.00 kHz to 29600.00 kHz in 1 MHz intervals in USB mode. At all frequencies the signal to noise measurement should be 10 dB or greater for an input of .5 microvolts.

NORMAL: Go on to step 5.7.3.
ABNORMAL: Remove and replace the following LRUs, one at a time, and reaccomplish steps a) through f) each time:

Receiver/Exciter	1A2A1
Audio Board	2A3

5.7.3 SPEAKER AUDIO OUTPUT

Set the radio frequency to 29600.00 kHz, and the mode to USB. Set the RF Signal Generator to 100 microvolts, CW mode, 29.601 MHz. Adjust the **VOLUME** control clockwise until the audio displayed on the oscilloscope begins to clip or flattop. The audio level must not be less than 6.3 VRMS as measured on the Audio Voltmeter.

NORMAL: Go on to step 5.7.4.

ABNORMAL: Remove and replace Audio board 2A3 and reaccomplish step 5.7.3.

5.7.4 AUTOMATIC GAIN CONTROL

a) Reduce the RF Signal Generator output to .7 microvolts. Adjust the **VOLUME** control so that the audio level is -6 dB on a convenient scale of the Audio Voltmeter. Increase the RF Signal Generator output by 10 dB. The Audio Voltmeter must not increase by more than 6 dB.

b) Readjust the audio level to indicate -6 dB on the Audio Voltmeter. Increase the output of the RF Signal Generator to 220 millivolts. The Audio Voltmeter must not increase by more than 6 dB.

NORMAL: Go on to step 5.7.5.

ABNORMAL: Remove and replace Receiver/Exciter 1A2A1 and reaccomplish step 5.7.4.

5.7.5 SQUELCH

a) Set the Radio frequency to 29600.00 kHz, and the mode to USB. Set the RF Signal Generator to 29.601 MHz, CW mode, 100 microvolt output. Audio should be heard from the speaker.

b) Set the **SQUELCH** switch "ON". After a short delay the audio from the speaker will quiet. Change the 1 kHz setting on the generator to 3 kHz and then back to 1 kHz. The radio should output audio from the speaker for a short time and then quiet again.

NORMAL: This completes the Receive alignments and checks. Go on to section 5.8, Transmit alignment and checks.

ABNORMAL: If after setting the **SQUELCH** switch to "ON", the audio tone is still heard in the speaker, adjust 2A3 R239 (Squelch Detector Level) (see Figure 5.6.6) until the Receiver squelches (no audio heard from speaker). Reaccomplish step b). If still unable to accomplish step b), remove and replace Audio board 2A3 and retest steps a) and b).

5.8 TRANSMIT ALIGNMENT AND CHECKS

See Figure 5.6.2 for Test Equipment Connections.

General: Disconnect the coaxial cable from the RF Signal Generator and connect it to the Thruline Wattmeter. Connect the output of the wattmeter to the 50 ohm load. Connect the RF Voltmeter and oscilloscope to the input of the 50 ohm load. Connect a CW key to the CW keyline on the MIC/AUX connector on the

C-2420 front panel (J1). The CW Keyline is J1-E. The ground is J1-A.

5.8.1 AUTOMATIC LEVEL CONTROL (ALC)

28V Version:

- a) Set the **FUNCTION** switch to **MNL**. Set the radio frequency to 29999.00 kHz. Set the **MODE** switch to CW.
- b) Depress the CW key and adjust 1A2A4 C309 on the power supply/RF Filter Assembly for maximum power output. Release the CW key. Change the radio frequency to 2000.00 kHz.
- c) Depress the CW key and adjust 1A2A1 R47 (ALC) on the Receiver/Exciter until output power is 125 Watts/79 VRMS or 223 V peak to peak (See Table 5.6.1 and Figure 5.6.3), release CW key.
- d) Change the radio frequency to 29999.00 kHz and depress the CW key. Adjust 1A2A4 C309 on the Power Supply/RF Filter assembly for output power of 125 Watts/79 VRMS or 223 V peak to peak (see Table 5.6.1 and Figure 5.6.5). Release CW key.
- e) Check the output power of the radio at 1 MHz increments from 2600.00 kHz to 29600.00 kHz in 1000 kHz increments. The output at all frequencies should be between 100 Watts/71 VRMS and 150 Watts/86.6 VRMS (see table 5.6.1).

NORMAL: Go on to test 5.8.2
ABNORMAL: Remove and replace the following LRUs one at a time and reaccomplish step d) each time:

Audio Board	2A3
Receiver/Exciter	1A2A1
Power Supply/RF Filter	1A2A4
Power Amplifier/Front Panel	1A1

12V Version:

- a) Set the **FUNCTION** switch to **MNL**. Set the radio frequency to 29999.00 kHz. Set the **MODE** switch to CW.
- b) Depress the CW key and adjust 1A2A4 C309 on the power supply/RF Filter Assembly for maximum power output. Release the CW key. Change the radio frequency to 2000.00 kHz.
- c) Depress the CW key and adjust 1A2A1 R47 (ALC) on the Receiver/Exciter until output power is 100 Watts/71 VRMS or 201 V peak to peak (See Table 5.6.1 and Figure 5.6.3), release CW key.
- d) Change the radio frequency to 29999.00 kHz and depress the CW key. Adjust 1A2A4 C309 on the Power Supply/RF Filter assembly for output power of 100 Watts/71 VRMS or 201 V peak to peak (see Table 5.6.1 and Figure 5.6.5). Release CW key.
- e) Check the output power of the radio at 1 MHz increments from 2600.00 kHz to 29600.00 kHz in 1000 kHz increments. The output at all frequencies should be between 80 Watts/63 VRMS and 120 Watts/77 VRMS (see table 5.6.1).

NORMAL: Go on to test 5.8.2

ABNORMAL: Remove and replace the following LRUs one at a time and reaccomplish step d) each time:

Audio Board	2A3
Receiver/Exciter	1A2A1
Power Supply/RF Filter	1A2A4
Power Amplifier/Front Panel	1A1

5.8.2 VSWR AUTOMATIC LEVEL CONTROL (VSWR ALC)

NOTE: This is an operational check. The VSWR ALC is not adjustable.

a) Set the **FUNCTION** knob to **MNL**. Set the radio frequency to 2000.00 kHz. Set the **MODE** knob to **CW**. Connect test equipment as in 5.6.2.

b) Depress the CW key and verify that the output power is between 100 and 150 watts. Unkey the radio.

c) Using a 'T' connector, connect a second 50 ohm load in parallel with the original 50 ohm load (see Figure 5.6.2). Depress the CW key. The Wattmeter should read within 10 watts of the reading obtained in step b). Unkey the radio.

NOTE: Due to the two (2) 50 ohm loads in parallel, the impedance that the test equipment and the radio sees is no longer 50 ohms, therefore, the wattmeter readings are approximate. This test simulates transmitting into a VSWR of 2.0:1.

d) Using a second 'T' connector, connect a third 50 ohm load in parallel with the other two loads. Key the radio. The Wattmeter should read less than 80 Watts. Unkey the radio.

NOTE: With three (3) 50 ohm loads in parallel, the impedance that the test equipment and the radio sees is no longer 50 ohms, therefore, the wattmeter readings are approximate. This test simulates transmitting into a VSWR of 3.0:1.

e) Disconnect all three (3) 50 ohm loads from the Wattmeter, causing the radio to transmit into an open termination. Key the radio. The Wattmeter should stabilize at less than 25 Watts.

NORMAL: Go on to 5.8.3.

ABNORMAL: Remove and replace the 1A2A1 Receiver/Exciter and reaccomplish steps b) through e).

5.8.3 AM MODULATION

NOTE: This is an operational check. The AM modulation is factory set.

a) Set the **FUNCTION** knob to **MNL**. Set the radio frequency to 2000.00 kHz. Set the **MODE** knob to **AM**. Disconnect the CW key from the MIC/AUX connector and connect a microphone. Key the radio with the microphone Push-to-Talk (PTT) switch and speak in a normal tone of voice. Amplitude Modulation of the RF envelope should be displayed on the oscilloscope with a varying peak to peak voltage of up to 220 V while speaking.

NORMAL: Go on to 5.8.4.

ABNORMAL: Remove and replace the following LRUs one at a time and reaccomplish step a) each time:

Receiver/Exciter	1A2A1
Audio Board	2A3

5.8.4 USB MODULATION

a) Set the **FUNCTION** knob to **MNL**. Set the radio frequency to 2000.00 kHz. Set the **MODE** knob to **USB**. Key the radio with the microphone Push-to-Talk (PTT) switch and speak in a normal tone of voice. RF should be displayed on the oscilloscope with a varying peak to peak voltage of up to 220 V while speaking.

NORMAL: Go on to 5.8.5.
ABNORMAL: Remove and replace the following LRUs one at a time and reaccomplish step a) each time:

Receiver/Exciter	1A2A1
Audio Board	2A3

5.8.5 RADIO SET OUTPUT FREQUENCY

a) Set the **FUNCTION** knob to **MNL**. Set the radio frequency to 2000.00 kHz. Set the **MODE** knob to **AM**. Key the radio with the microphone Push-to-Talk (PTT) switch but do not speak into the microphone. Observe the frequency of the output. It should be within one (1) part per million of the frequency displayed on the front panel.

b) Repeat step a) at the following the frequencies:

- 10000.00 kHz
- 20000.00 kHz
- 29999.99 kHz

NORMAL: If the above frequencies are all within tolerance stated in step b) go on to 5.8.6.

ABNORMAL: Perform TCXO check in section 5.7.1. If this frequency checks good, remove and replace Synthesizer board 1A2A2. and reaccomplish steps a) and b).

5.8.6 SOFTWARE SWITCH SETTINGS

S101 SECTION	LABEL	FUNCTION
8		Not used.
7		Not used.
6		When this switch is down toward the "6", the AGC is set to slow in Data Mode. Otherwise, the AGC is set to fast in Data Mode.
5		Not used.
4	CPLR	Not used.
3	SQLCH	When switch is down toward the SQLCH label, it indicates that the transmit squelch circuit should be enabled on the 2A3 Audio board. This circuit squelches the transmit audio unless it is above a threshold, and may be useful in environments where a lot of background noise is picked up by the microphone.
2	AM	When switch is down toward the AM label, it indicates that the optional AM filter has been installed at FL103 on the 1A2A1 Receiver/Exciter.
1	CW	When switch is down toward the CW label, it indicates that the optional CW filter has been installed at FL102 on the 1A2A1 Receiver/Exciter.

Table 5.8.6.1 Shows the software switch settings on the 1A2A3 CPU assembly for RT-2400 options.

5.9 SCHEMATICS and PARTS LISTS

The following pages contain schematics and parts lists for the RT-2400, see Table 5.9 below

DESIGNATOR		DESCRIPTION	SUNAIR PART NUMBER
ASSEMBLY	SUBASSEMBLY		
1A1	1A1A1 1A1A2	POWERAMPLIFIER/FRONT PANEL ASSY PC ASSEMBLY, PANEL CONNECTOR PC ASSEMBLY, POWER AMPLIFIER	8108060095 8108011094 8108061091
1A2	1A2A1 1A2A2 1A2A3 1A2A4 1A2A4A1 1A2A5	CHASSIS ASSEMBLY PC ASSEMBLY, RECEIVER/EXCITER PC ASSEMBLY, SYNTHESIZER PC ASSEMBLY, CPU PCASSEMBLY, POWERSUPPLY/RFFILTER PC ASSEMBLY, CONTROL LOGIC PC ASSEMBLY, MOTHER BOARD	8108050090 8108030099 8108040094 8108020093 8076024099 8108015090
2A1	2A1A1 2A1A2 2A1A3	FRONT PANEL ASSY, CONTROL HEAD PC ASSY, FRONT PANEL INTERFACE PC ASSEMBLY, DISPLAY BOARD MICROPHONE INTERFACE	8108140099 8108141192 8108130093 8108160090
2A2		PC ASSEMBLY, CONTROL HEAD CPU	8108120098
2A3		PC ASSEMBLY, AUDIO BOARD	8108110092
2A4		COVER ASSY, CONTROL HEAD	8108105099
	2A4A1	PCASSEMBLY, CONNECTOR, REMOTE	8108150094

Table 5.9 RT-2400 Table of Assemblies.

REV A	CONNECTOR KIT, RT-2400	8108000491
1A1P1	CONNECTOR, POWER, 2 PIN FEM.	1011080001
1A1P3	CONNECTOR, RF, BNC UG-88/U	0744030005
1A1P4	CONNECTOR, POWER, 19 PIN MALE	1011140004
1A1XP1	CABLE CLAMP, MS3057-12	0754270009
1A1XP4	CABLE CLAMP, MS3057-8A	1000200001
2A1P2	CONNECTOR, POWER, 19 PIN MALE	1011140004
2A1XP2	CABLE CLAMP, MS3057-8A	1000200001
	BUSHING, TELESCOPING, .56 ID	0700550054
	BUSHING, TELESCOPING, .62 ID	0700550062
	BUSHING, TELESCOPING, .44 ID	0700550046
	SILICONE COMPOUND, PILLOW PAK	1013130006

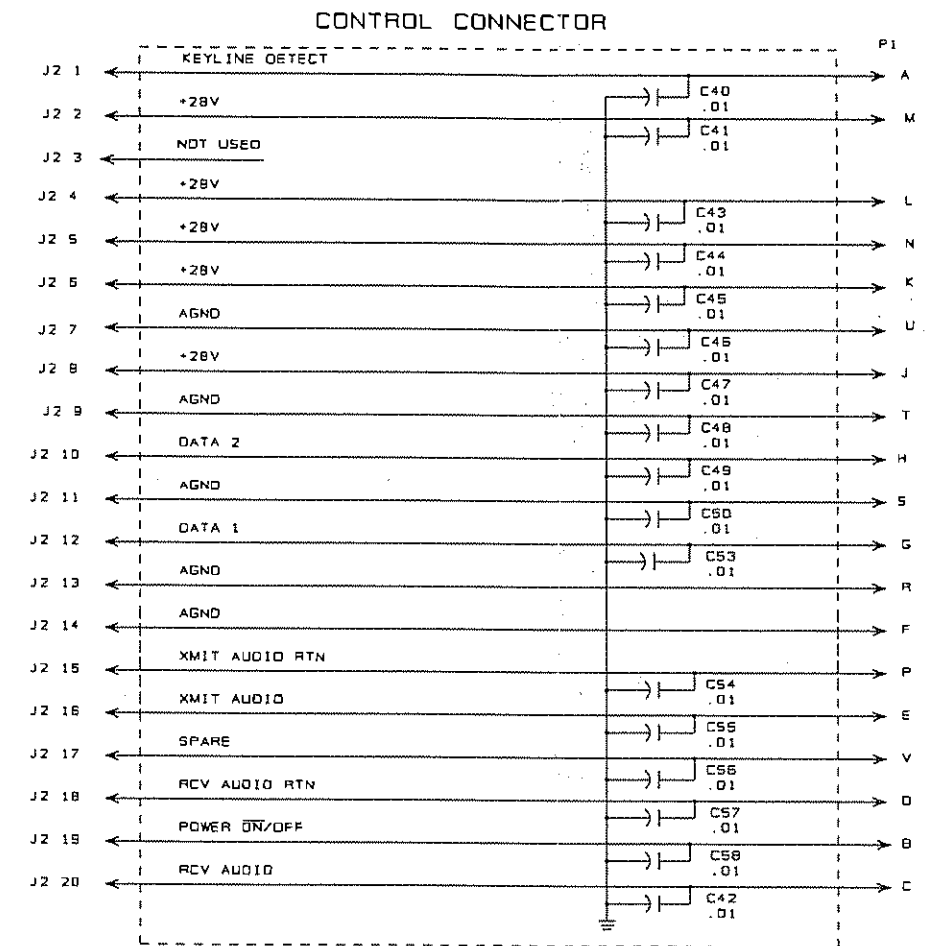
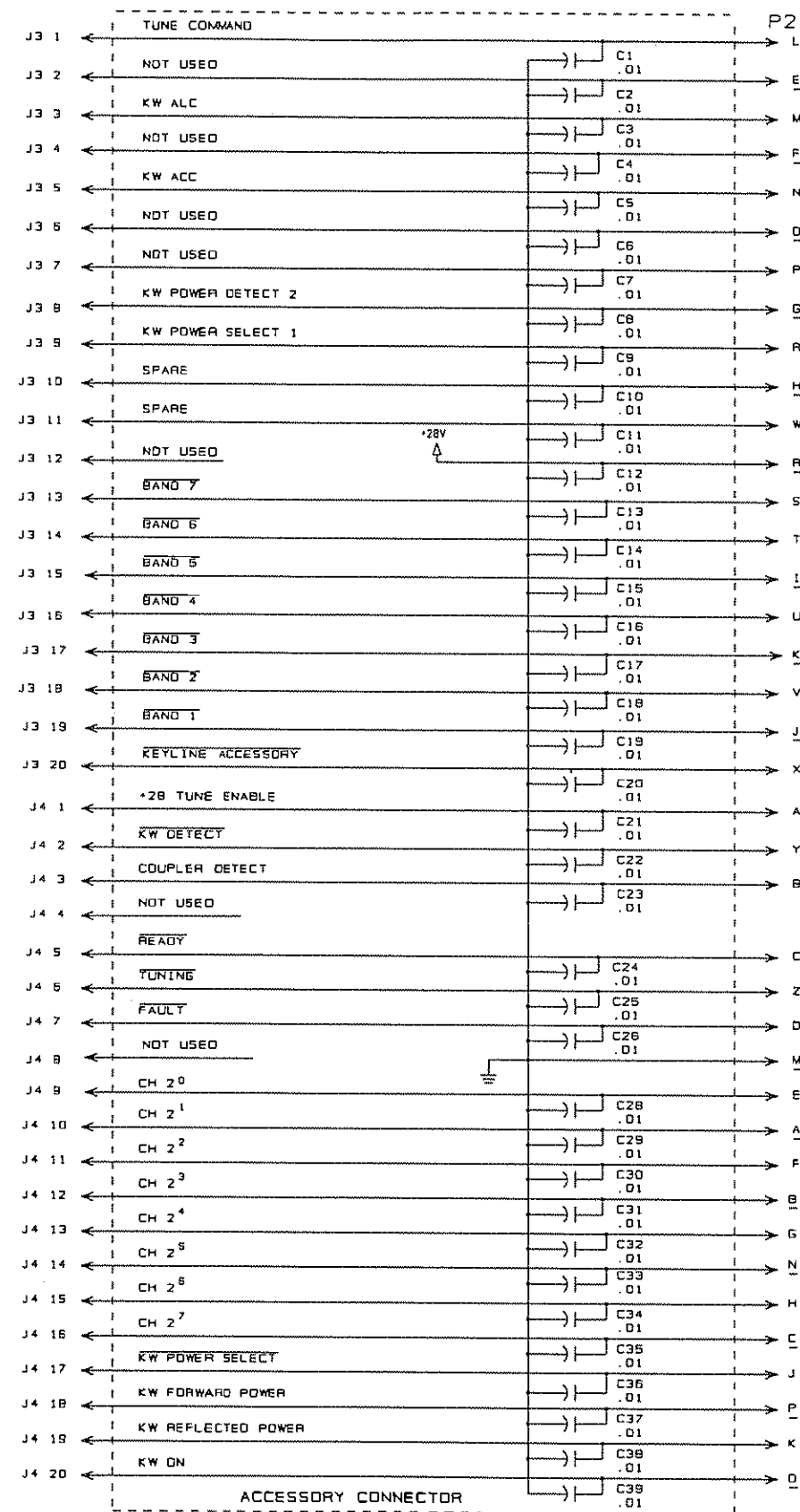
Figure 5.9.1 Final Tested RT-2400, Connector Kit, and Chassis Assembly page 1/1.

REV A	PC ASSY, PANEL CONNECTOR	8108011094
C1	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C2	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C3	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C4	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C5	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C6	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C7	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C8	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C9	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C10	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C11	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C12	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C13	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C14	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C15	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C16	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C17	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C18	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C19	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C20	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C21	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C22	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C23	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C24	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C25	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C26	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C28	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C29	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C30	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C31	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C32	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C33	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C34	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C35	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C36	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C37	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C38	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C39	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C40	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C41	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C42	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C43	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C44	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C45	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C46	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C47	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C48	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C49	CAP. 0.01UF, 50V, X7R, 20%	0281730008

C50	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C53	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C54	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C55	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C56	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C57	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C58	CAP. 0.01UF, 50V, X7R, 20%	0281730008
J2	CONNECTOR, HEADER, 20 PIN MALE	1011210207
J3	CONNECTOR, HEADER, 20 PIN MALE	1011210207
J4	CONNECTOR, HEADER, 20 PIN MALE	1011210207
P1	CONNECTOR, POWER, 19 PIN FEM.	1011110008
P2	CONNECTOR, POWER, 39 PIN FEM.	1011100002
	KEY, POLARIZING	1008070033

Figure 5.9.2 PC Assembly, RT-2410 Panel Connector, 1A1A1, page 1/2.

A2038A



NOTE:
UNDERLINED CHARACTERS
DENOTE LOWER CASE.
COMPONENT NOT USED.
C27, C51, C52, J1

Figure 5.9.2 PC Assembly, RT-2410 Panel Connector, 1A1A1, page 2/2.

REV F	PA/FRONT PANEL ASSY, 28VDC	8108060095
	LABEL, 28V	0841610002
	HOOK, FRONT, BLK	0870840011
	TERMINAL, CRIMP NO. 6	1006390031
	CONNECTOR, RF, BNC, BULKHEAD	1008290033
	CONNECTOR, RF, RIGHT ANGLE	1010890018
	TERMINAL, FLAG, 1/4" FEMALE	1010940015
	TERMINAL, FLAG, 3/16" FEMALE	1010950011
	CONNECTOR, POWER, 2 PIN MALE	1011070006
	CONNECTOR, POWER, 2 PIN ROUND	1011230011
	HANDLE, OFFSET, 3X1.5, 1/4D	1011870037
	STRIKE, BLACK, LONG	1011910039
	GASKET, 19 PIN CONNECTOR	1011920034
	GASKET, 39 PIN CONNECTOR	1011930030
	SEELSKREW, 8-32, 1/2 LG	1012320031
	NUT, CAP 4-40 X 1/4 AF	1012340031
	STANDOFF, F-F, 6-32, .562L	1012380033
	PC ASSY, PANEL CONNECTOR	8108011094
	SPACER, CLAMP	8108013101
	PC ASSY, POWER AMP, 28VDC	8108061091
	HEATSINK W/FRONT PANEL, 28VDC	8108062594

Figure 5.9.3 PA/Front Panel Assembly, 1A1, 28 V Version, page 1/2.

21181A

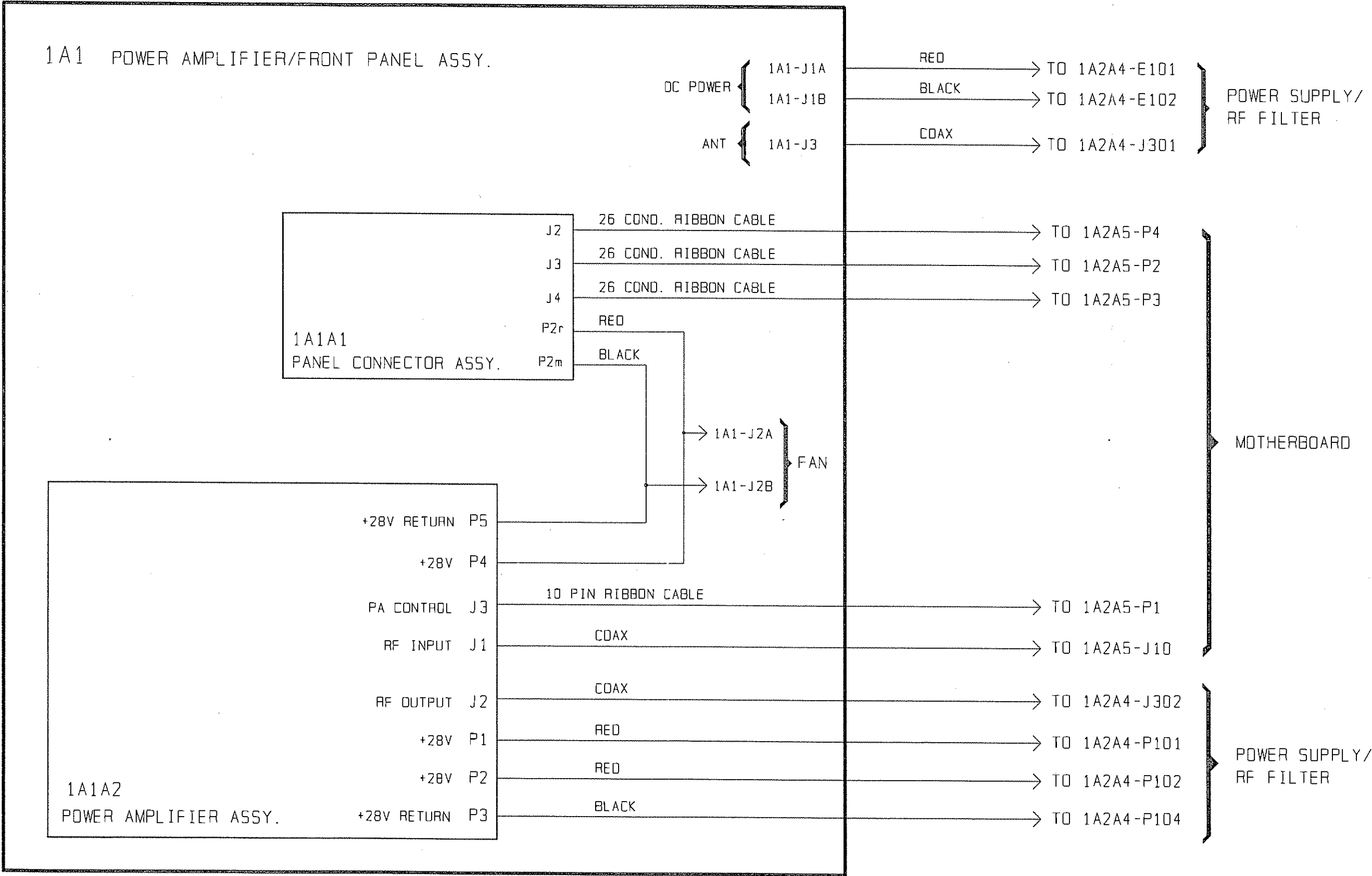


Figure 5.9.3 PA/Front Panel Assembly, 1A1, 28 V Version, page 2/2.

REV 06	PC ASSY, POWER AMP, 28VDC	8108061091
C1	CAP. 62PF, 500V, DM15, 2%	0282400001
C2	CAP. 270PF, 500V, DM15, 5%	0275030008
C3	CAP. 1800PF, 500V, DM19, 2%	0281300003
C4	CAP. 1800PF, 500V, DM19, 2%	0281300003
C5	CAP. 910PF, 100V, CD7, 5%	0288660005
C6	CAP. 0.1UF, 50V, X7R	1011180014
C7	CAP. 0.1UF, 50V, X7R	1011180014
C8	CAP. 510PF, 500V, DM15, 5%	0289610001
C9	CAP. 510PF, 500V, DM15, 5%	0289610001
C10	CAP. 1800PF, 500V, DM19, 2%	0281300003
C11	CAP. 1800PF, 500V, DM19, 2%	0281300003
C12	CAP. 1800PF, 500V, DM19, 2%	0281300003
C13	CAP. 1800PF, 500V, DM19, 2%	0281300003
C14	CAP. 0.1UF, 50V, X7R	1011180014
C15	CAP. 0.1UF, 50V, X7R	1011180014
C16	CAP. 0.1UF, 50V, X7R	1011180014
C17	CAP. 0.1UF, 50V, X7R	1011180014
C18	CAP. 0.1UF, 50V, X7R	1011180014
C20	CAP. 47PF, 500V, DM15, 2%	0282420002
C21	CAP. 0.1UF, 100V, Z5U, 20%	1008420026
C22	CAP. 0.1UF, 100V, Z5U, 20%	1008420026
C23	CAP. 0.1UF, 50V, X7R	1011180014
C24	CAP. 1000UF, 10V	1007160012
C25	CAP. 0.1UF, 50V, X7R	1011180014
C26	CAP. 0.1UF, 50V, X7R	1011180014
C27	CAP. 47UF, 20V	0281700001
C28	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C29	CAP. 1000UF, 10V	1007160012
C30	CAP. 0.1UF, 50V, X7R	1011180014
C31	CAP. 47UF, 35V	0282190007
C32	CAP. 47UF, 20V	0281700001
C33	CAP. 910PF, 100V, CD7, 5%	0288660005
C34	CAP. 0.1UF, 50V, X7R	1011180014
C35	CAP. 0.1UF, 50V, X7R	1011180014
C36	CAP. 0.1UF, 50V, X7R	1011180014
C37	CAP. 1000UF, 35V, 105C	1011420031
C38	CAP. 1000UF, 35V, 105C	1011420031
CR1	DIODE, RECTIFIER 1N4004	0405180004
CR2	DIODE, LED, RED MV5754A	1004350023
CR3	DIODE, RECTIFIER 1N5400	0403970008
J1	CONNECTOR, RF, SNAP-ON	1000170012
J3	CONNECTOR, HEADER, 10 PIN MALE	1010800027
L1	INDUCTOR, MOLDED, 0.15UH, 5%	0648620000
L2	INDUCTOR, MOLDED, 0.15UH, 5%	0648620000
L3	INDUCTOR, VK 200.10	1008310018
L4	INDUCTOR, AIRWOUND, 2 TURNS	8076032091
L5	INDUCTOR, AIRWOUND, 2 TURNS	8076032091
L6	INDUCTOR, AIRWOUND, 2 TURNS	8076032091

L7	INDUCTOR, AIRWOUND, 2 TURNS	8076032091
L8	INDUCTOR, L8,9	8076038090
L9	INDUCTOR, L8,9	8076038090
L10	INDUCTOR, VK 200.10	1008310018
L11	INDUCTOR, VK 200.10	1008310018
L12	INDUCTOR, VK 200.10	1008310018
L13	INDUCTOR, VK 200.10	1008310018
L14	INDUCTOR, VK 200.10	1008310018
L15	INDUCTOR, VK 200.10	1008310018
P1	TERMINAL, PC MOUNT, 3/16" MALE	1008550027
P2	TERMINAL, PC MOUNT, 3/16" MALE	1008550027
P3	TERMINAL, PC MOUNT, 1/4" MALE	1008330035
P4	TERMINAL, PC MOUNT, 3/16" MALE	1008550027
P5	TERMINAL, PC MOUNT, 1/4" MALE	1008330035
Q1	TRANSISTOR, NPN, SI. MRF485	1010240030
Q2	TRANSISTOR, NPN, SI. MRF485	1010240030
Q3	TRANSISTOR, NPN, SI.	0448170001
Q4	TRANSISTOR, NPN, SI.	0448170001
Q5	TRANSISTOR, NPN, SI.	0448170001
Q6	TRANSISTOR, NPN, SI.	0448170001
Q7	TRANSISTOR, PNP, SI. MJE370	1010140035
Q8	TRANSISTOR, NPN, SI. 2N4921	0448040000
Q9	TRANSISTOR, NPN, SI. MPSA42	1010250035
Q10	TRANSISTOR, NPN, SI. MJE13002	1010260031
R1	RESISTOR 12, 10%, 1/2W	0187080003
R2	RESISTOR 10, 10%, 1/2W	0185380000
R3	RESISTOR 10, 10%, 1/2W	0185380000
R4	RESISTOR 12, 10%, 1/2W	0187080003
R5	RESISTOR 82, 10%, 1/2W	1010200038
R6	RESISTOR 82, 10%, 1/2W	1010200038
R7	RESISTOR 3.9, 10%, 1W	1010210033
R8	RESISTOR 4.7, 10%, 1W	1010220039
R9	RESISTOR 4.7, 10%, 1W	1010220039
R10	RESISTOR 3.9, 10%, 1W	1010210033
R11	RESISTOR 3.9, 10%, 1W	1010210033
R12	RESISTOR 4.7, 10%, 1W	1010220039
R13	RESISTOR 4.7, 10%, 1W	1010220039
R14	RESISTOR 3.9, 10%, 1W	1010210033
R15	RESISTOR 6.8, 10%, 1W	1010230034
R16	RESISTOR 6.8, 10%, 1W	1010230034
R17	RESISTOR 6.8, 10%, 1W	1010230034
R18	RESISTOR 6.8, 10%, 1W	1010230034
R19	RESISTOR 18, 1%, 20W	1010150031
R20	RESISTOR 18, 1%, 20W	1010150031
R21	RESISTOR 100, 5%, 1/4W	0171180003
R22	POT. 100, 10%, 1/2W, PC MOUNT	0346350000
R23	RESISTOR 47, 10%, 1W	0164990003
R24A	RESISTOR 1, 10%, 1/2W	0194770001
R24B	RESISTOR 1, 10%, 1/2W	0194770001

Figure 5.9.4 PC Assembly, RT-2410 Power Amplifier, 1A1A2, 28 V Version, page 1/4.

R25	RESISTOR 1K, 10%, 1/4W	0171560001
R26	RESISTOR 18K, 10%, 1/4W	0175720002
R27	RESISTOR 6.8K, 5%, 1/4W	0174810008
R28	POT. 100, 10%, 1/2W, PC MOUNT	0346350000
R29	RESISTOR 470, 5%, 1/4W	0184110009
R30	RESISTOR 10, 10%, 1/2W	0185380000
R31	RESISTOR 10, 10%, 1/2W	0185380000
R32	RESISTOR 10, 10%, 1/2W	0185380000
R33	RESISTOR 10, 10%, 1/2W	0185380000
R35	RESISTOR 3.9K, 10%, 1/4W	0178830003
R36	RESISTOR 270, 10%, 1/4W	0178450006
R37	RESISTOR 120, 10%, 1/2W	0186430001
R38	RESISTOR 3.9K, 10%, 1/4W	0178830003
T1	TRANSFORMER, T1	8076033098
T2	TRANSFORMER, T2	8076034094
T3	TRANSFORMER, T3,4	8076035091
T4	TRANSFORMER, T3,4	8076035091
T5	TRANSFORMER, T5	8076036097
T6	TRANSFORMER, T6	8076037093
U1	IC. LINEAR MC1723L	1010270036
U2	IC. LINEAR LM35DZ	1012070026
	INSULATOR, MICA TO-220AB	0448670003
	KEY, POLARIZING	1008070033
	BUSHING, INSULATING, TO-220AB	1008380024
	CLIP, SPRING, PA	8076030803
	CONNECTOR, RF, RIGHT ANGLE	1010890018

Figure 5.9.4 PC Assembly, RT-2410 Power Amplifier, 1A1A2, 28 V Version, page 2/4.

2032BP

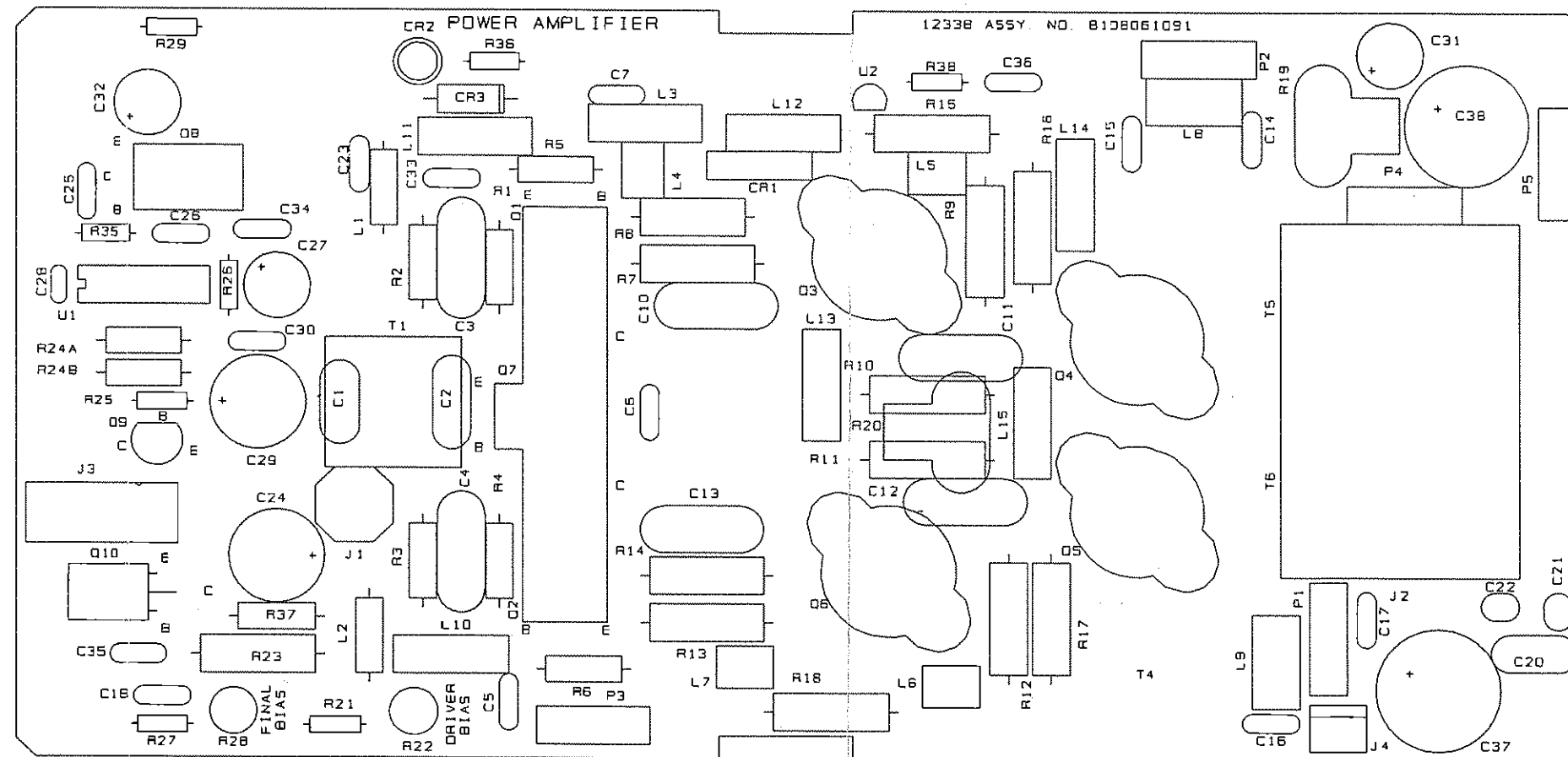
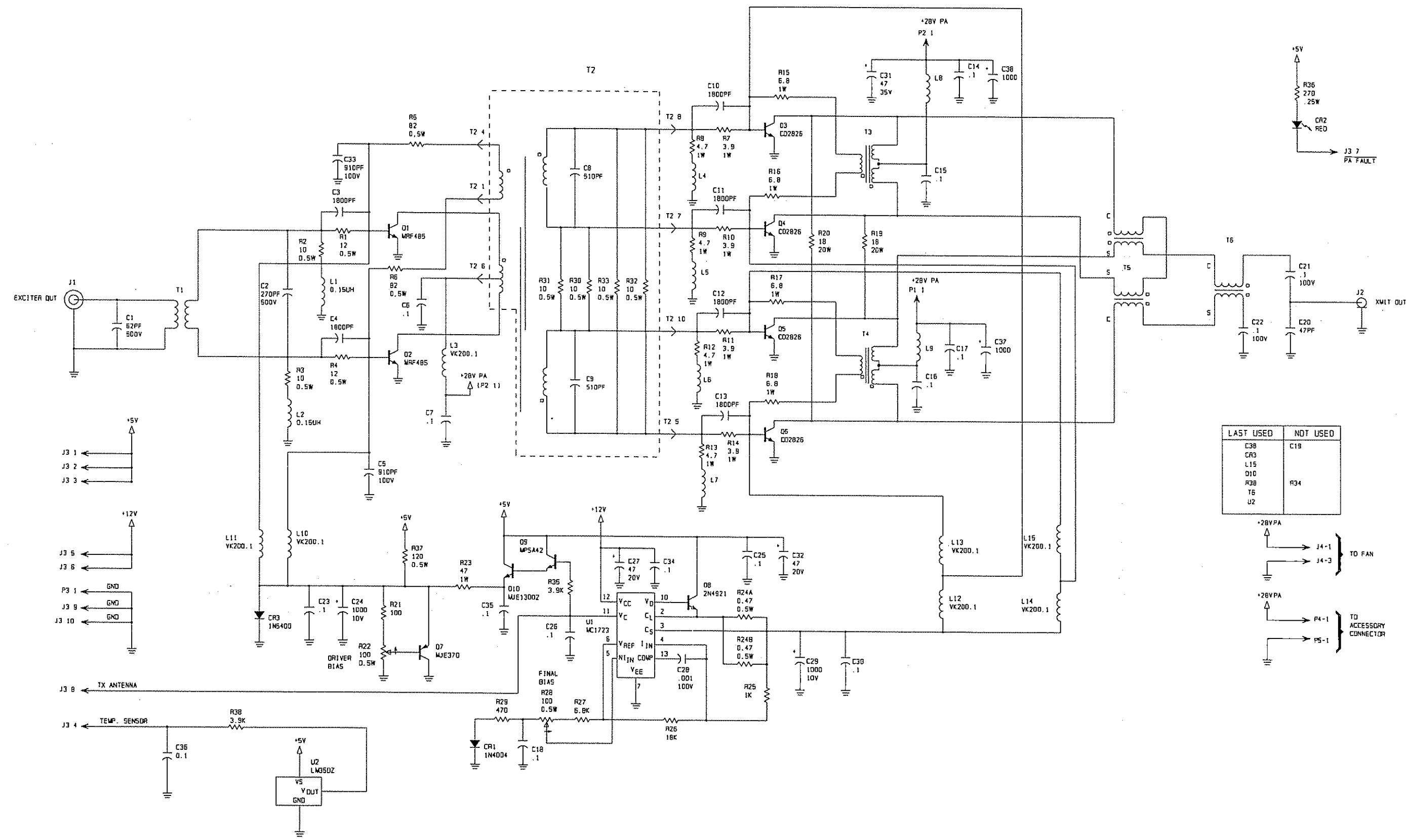


Figure 5.9.4 PC Assembly, RT-2410 Power Amplifier, 1A1A2, 28 V Version, page 3/4.

2032BA



LAST USED	NOT USED
C38	C19
CR3	
L15	
D10	
R38	R34
T6	
U2	

REV A	PC ASSY, POWER AMPLIFIER,12VDC LABEL, 14V HOOK, FRONT, BLK TERMINAL, CRIMP NO. 6 CONNECTOR, RF, BNC, BULKHEAD CONNECTOR, RF, RIGHT ANGLE TERMINAL, FLAG, 1/4" FEMALE TERMINAL, FLAG, 3/16" FEMALE CONNECTOR, POWER, 2 PIN MALE CONNECTOR, POWER, 2 PIN ROUND HANDLE, OFFSET, 3X1.5, 1/4D STRIKE, BLACK, LONG GASKET, 19 PIN CONNECTOR GASKET, 39 PIN CONNECTOR SEELSKREW, 8-32, 1/2 LG NUT, CAP 4-40 X 1/4 AF STANDOFF, F-F, 6-32, .562L INDUCTOR, POWER, 20 UH PC ASSY, PANEL CONNECTOR SPACER, CLAMP PA/FRONT PANEL ASSY, 12VDC HEATSINK,W/FRONT PANEL, 12VDC PCB. HASH CHOKE W/HDWE	8108261091 0841590001 0870840011 1006390031 1008290033 1010890018 1010940015 1010950011 1011070006 1011230011 1011870037 1011910039 1011920034 1011930030 1012320031 1012340031 1012380033 1013100000 8108011094 8108013101 8108260094 8108262593 8108265291

Figure 5.9.5 PA/Front Panel Assembly, 1A1, 12 V Version, page 1/2.

21171A

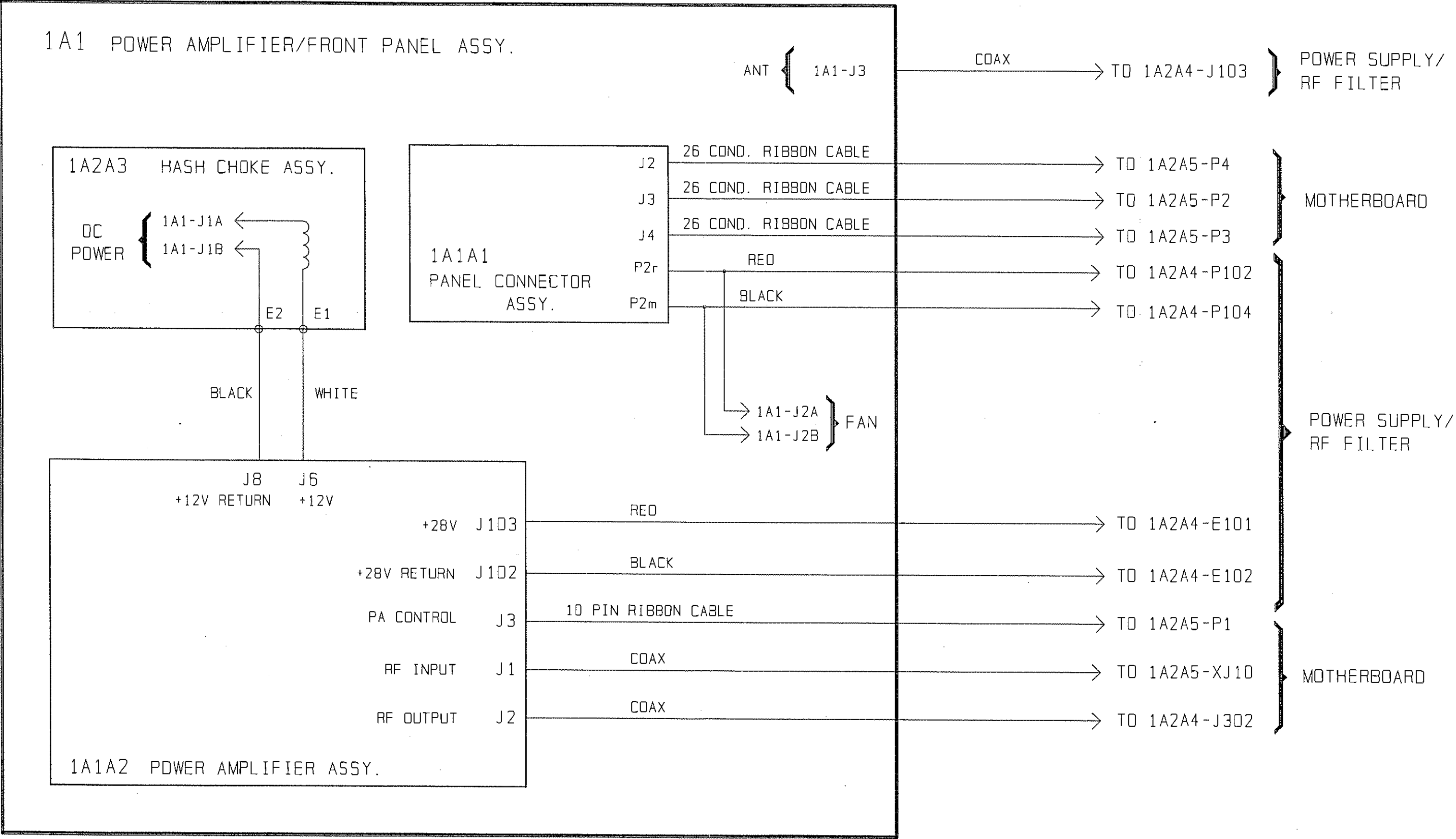


Figure 5.9.5 PA/Front Panel Assembly, 1A1, 12 V Version, page 2/2.

REV A	PC ASSY, POWER AMPLIFIER, 12VDC	8108261091
C1	CAP. 0.1UF, 50V, X7R	1011180014
C2	CAP. 1000UF, 10V	1007160012
C3	CAP. 0.1UF, 50V, X7R	1011180014
C4	CAP. 0.1UF, 50V, X7R	1011180014
C5	CAP. 0.1UF, 50V, X7R	1011180014
C6	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C7	CAP. 47UF, 20V	0281700001
C8	CAP. 0.1UF, 50V, X7R	1011180014
C9	CAP. 0.1UF, 50V, X7R	1011180014
C10	CAP. 47UF, 20V	0281700001
C11	CAP. 1000UF, 10V	1007160012
C12	CAP. 0.1UF, 50V, X7R	1011180014
C13	CAP. 62PF, 500V, DM15, 2%	0282400001
C14	CAP. 270PF, 500V, DM15, 5%	0275030008
C15	CAP. 820PF, 300V, DM15, 5%	0288750004
C16	CAP. 820PF, 300V, DM15, 5%	0288750004
C18	CAP. 15UF, 35V	0282240004
C19	CAP. 0.1UF, 50V, X7R	1011180014
C22	CAP. 390PF, 500V, DM15, 2%	0281040001
C23	CAP. 300PF, 500V, DM15, 5%	0276320000
C24	CAP. 300PF, 500V, DM15, 5%	0276320000
C25	CAP. 220PF, 200V, CHIP	1012980006
C26	CAP. 470PF, 200V, CHIP	1012990001
C27	CAP. 390PF, 500V, DM19, 2%	0282640002
C28	CAP. 0.1UF, 50V, CHIP	1012970001
C29	CAP. 0.1UF, 50V, CHIP	1012970001
C30	CAP. 0.1UF, 50V, X7R	1011180014
C31	CAP. 0.1UF, 50V, X7R	1011180014
C32	CAP. 0.1UF, 50V, CHIP	1012970001
C33	CAP. 0.1UF, 50V, CHIP	1012970001
C34	CAP. 0.1UF, 50V, X7R	1011180014
C35	CAP. 0.1UF, 50V, X7R	1011180014
C37	CAP. 0.1UF, 50V, X7R	1011180014
C38	CAP. 2200UF, 35V	1010970038
C38	CAP. 1000UF, 63V, 105C	1011350009
C101	CAP. 0.0056UF, 100V, NPO, 5%	1010770004
C102	CAP. 0.1UF, 50V, X7R	1011180014
C103	CAP. 10UF, 20V	1007290005
C104	CAP. 2200UF, 35V	1010970038
C104	CAP. 1000UF, 63V, 105C	1011350009
C105	CAP. 47UF, 35V	0282190007
C106	CAP. 0.1UF, 50V, X7R	1011180014
C107	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C108	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C109	CAP. 1000UF, 63V, 105C	1011350009
C110	CAP. 47UF, 35V	0282190007
C111	CAP. 0.1UF, 50V, X7R	1011180014
C112	CAP. 0.01UF, 50V, X7R, 20%	0281730008

C113	CAP. 47UF, 35V	0282190007
C114	CAP. 0.1UF, 50V, X7R	1011180014
C115	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C116	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C117	CAP. 47UF, 20V	0281700001
C118	CAP. 0.0027UF, 200V, NPO, 5%	1010760009
C119	CAP. 0.0027UF, 200V, NPO, 5%	1010760009
CR1	DIODE, RECTIFIER 1N5400	0403970008
CR101	DIODE, TRANSIENT SUP. 1.5KA18A	1010960032
CR103	DIODE, RECTIFIER SR1605C	1010550039
CR2	DIODE, RECTIFIER 1N4004	0405180004
F1	FUSE, 3AG, 30 AMP, 32V,	1012850005
F101	FUSE, MDL, 15 AMP, 32V	0848500008
FB1	SLEEVE, .125 ID, .37 OD, .500L	1008390038
FB2A	SLEEVE, .125 ID, .37 OD, .500L	1008390038
FB2B	SLEEVE, .125 ID, .37 OD, .500L	1008390038
FB3A	SLEEVE, .125 ID, .37 OD, .500L	1008390038
FB3B	SLEEVE, .125 ID, .37 OD, .500L	1008390038
FB101	SLEEVE, .125 ID, .37 OD, .500L	1008390038
J1	CONNECTOR, RF, SNAP-ON	1000170012
J2	CONNECTOR, RF, RIGHT ANGLE	1010890018
J3	CONNECTOR, HEADER, 10 PIN MALE	1010800027
L1	INDUCTOR, VK 200.10	1008310018
L2	INDUCTOR, VK 200.10	1008310018
L3	INDUCTOR, MOLDED, 1.0UH, 5%	0648360008
L4	INDUCTOR, MOLDED, 1.0UH, 5%	0648360008
L5	INDUCTOR, MOLDED, 5.6UH, 5%	0651390001
L8	INDUCTOR, MOLDED, 0.47UH, 5%	0649410009
L101	INDUCTOR, POWER, 5 UH	1012810003
Q1	TRANSISTOR, PNP, SI. MJE370	1010140035
Q2	TRANSISTOR, NPN, SI. MJE13002	1010260031
Q3	TRANSISTOR, NPN, SI. MPSA42	1010250035
Q4	TRANSISTOR, NPN, SI. 2N4921	0448040000
Q5	TRANSISTOR, NPN, SI. MRF485	1010240030
Q6	TRANSISTOR, NPN, SI. MRF485	1010240030
Q7	TRANSISTOR, NPN, SI. SD1405	1012800008
Q8	TRANSISTOR, NPN, SI. SD1405	1012800008
Q101	TRANSISTOR, N-CH, FET IRFZ240	1010540033
Q102	TRANSISTOR, N-CH, FET IRFZ240	1010540033
R1	RESISTOR 12, 10%, 1/2W	0187080003
R2	POT. 100, 10%, 1/2W, PC MOUNT	0346350000
R3	RESISTOR 120, 10%, 1/2W	0186430001
R4	RESISTOR 47, 10%, 1W	0164990003
R5	RESISTOR 3.9K, 5%, 1/8W	1010803921
R6	RESISTOR 470, 5%, 1/8W	1010804715
R7	POT. 100, 10%, 1/2W, PC MOUNT	0346350000
R8	RESISTOR 6.8K, 5%, 1/8W	1010806823
R9	RESISTOR 18K, 5%, 1/8W	1010801830
R10	RESISTOR 1, 10%, 1/2W	0194770001

Figure 5.9.6 PC Assembly, RT-2410 Power Amplifier, 1A1A2, 12 V Version, page 1/5.

R11	RESISTOR	1, 10%, 1/2W	0194770001
R12	RESISTOR	1K, 5%, 1/8W	1010801023
R13	RESISTOR	12, 10%, 1/4W	0187600007
R14	RESISTOR	12, 10%, 1/4W	0187600007
R15	RESISTOR	56, 10%, 1/2W	0168890003
R16	RESISTOR	56, 10%, 1/2W	0168890003
R17	RESISTOR	10, 10%, 1W	0187720002
R18	RESISTOR	10, 10%, 1W	0187720002
R19	RESISTOR	100, 10%, 2W	0163600007
R20	RESISTOR	27, 10%, 1/4W	0172590001
R21	RESISTOR	100, 10%, 2W	0163600007
R101	RESISTOR	33K, 5%, 1/8W	1010803336
R102	RESISTOR	6040, 1%, 1/8W	1010580019
R103	RESISTOR	866, 1%, 1/8W	0195440005
R104	RESISTOR	3.3K, 5%, 1/8W	1010803328
R105	RESISTOR	27, 10%, 1W	0191420000
R106	RESISTOR	33, 5%, 1/8W	1010803301
R107	RESISTOR	10K, 5%, 1/8W	1010801031
R108	RESISTOR	33, 5%, 1/8W	1010803301
R109	RESISTOR	10K, 5%, 1/8W	1010801031
R110	RESISTOR	27, 10%, 1W	0191420000
R111	RESISTOR	49.9K, 1%, 1/8W	1004080026
R112	RESISTOR	10.7K, 1%, 1/8W	1004070012
R113	RESISTOR	22, 5%, 1/8W	1010802208
R114	RESISTOR	10, 5%, 1/4W	0177160004
R115	RESISTOR	10, 5%, 1/4W	0177160004
T1	TRANSFORMER	T1	8076033098
T2	TRANSFORMER	ASSY	1012960005
U1	IC. LINEAR	MC1723L	1010270036
U101	IC. LINEAR, VOL REG	LM2941T	1010950037
U102	IC. LINEAR	SG2526J	1010560034
XF101	FUSECLIP, PC MOUNT		0534610005
	INSULATOR, MICA	TO-220AB	0448670003
	KEY, POLARIZING		1008070033
	BUSHING, INSULATING, TO-220AB		1008380024
	SLEEVE, .125 ID, .37 OD, .500L		1008390038
	BALUN, 2 HOLES, .268DIA,61MATL		1012880001

Figure 5.9.6 PC Assembly, RT-2410 Power Amplifier, 1A1A2, 12 V Version, page 2/5.

2094BP

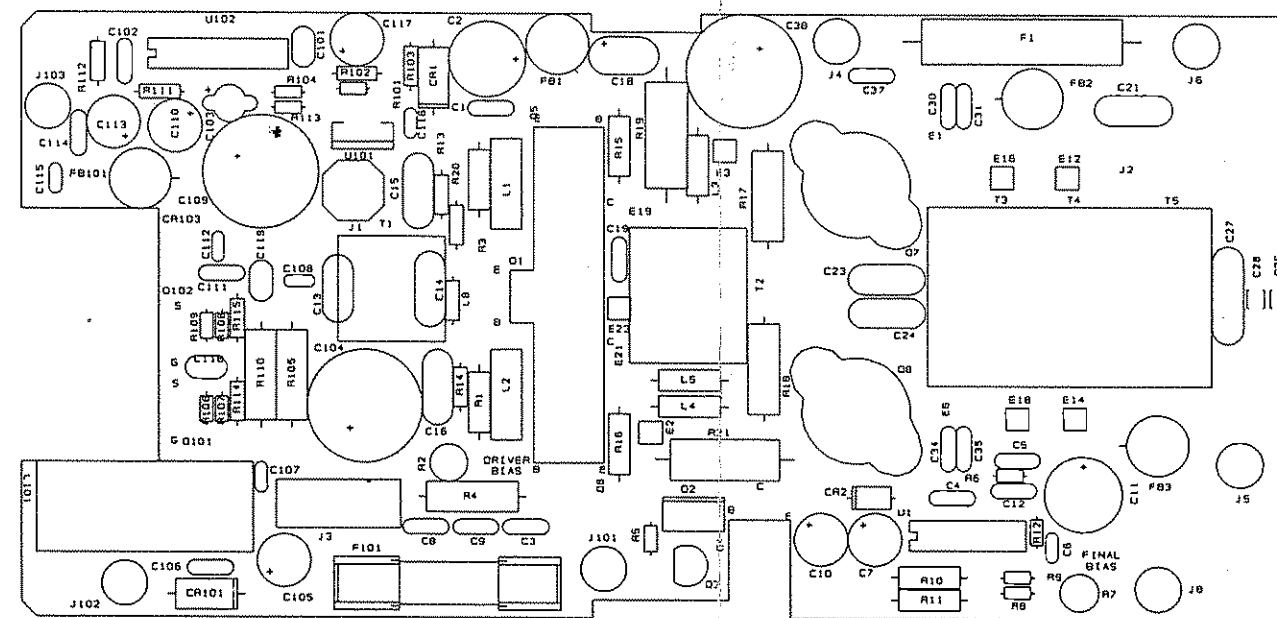
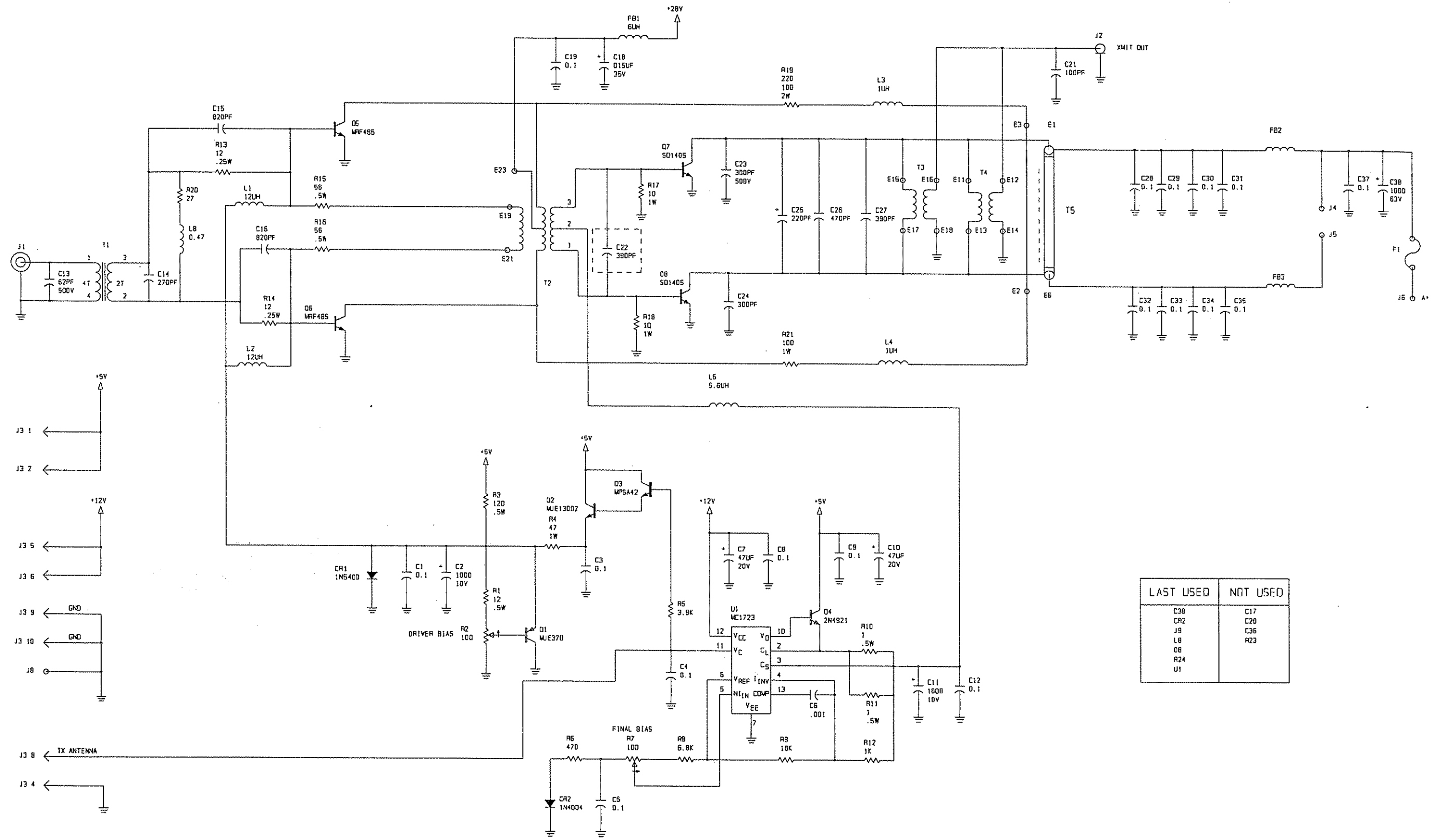


Figure 5.9.6 PC Assembly, RT-2410 Power Amplifier, 1A1A2, 12 V Version, page 3/5.

A20948



LAST USED	NOT USED
C38	C17
CR2	C20
J8	C36
L8	R23
Q8	
R24	
U1	

Figure 5.9.6 PC Assembly, RT-2410 Power Amplifier, 1A1A2, 12 V Version, page 4/5.

B2094B

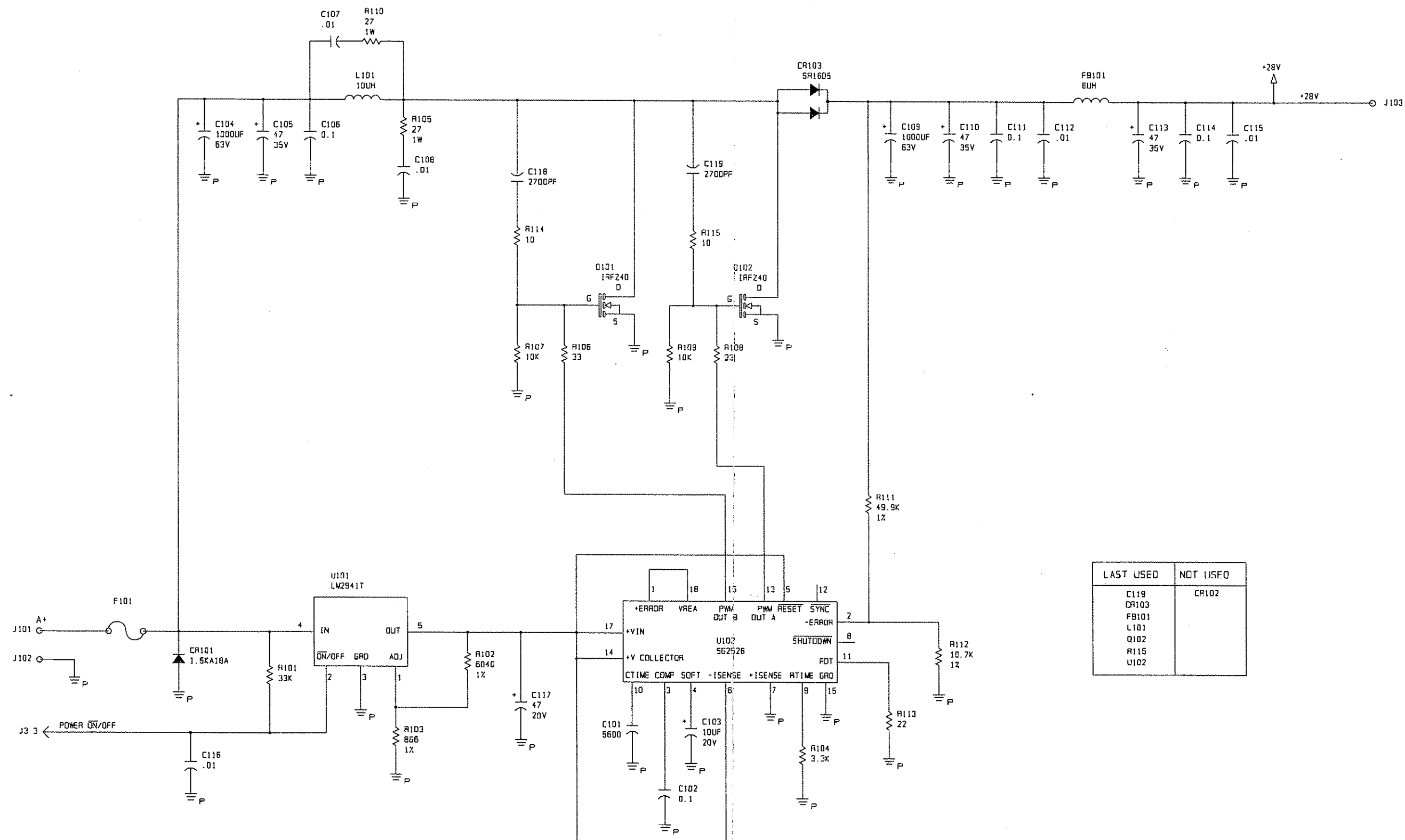


Figure 5.9.6 PC Assembly, RT-2410 Power Amplifier, 1A1A2, 12 V Version, page 5/5.

REV B	PC ASSY, REC/EXC	8108050090
C1	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C2	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C3	CAP. 15PF, 500V, DM10, 5%	0259950009
C4	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C5	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C6	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C7	CAP. 15PF, 500V, DM10, 5%	0259950009
C8	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C9	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C10	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C11	CAP. 6.8UF, 20V	0296780006
C12	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C13	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C14	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C15	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C16	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C17	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C18	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C19	CAP. 15UF, 15V	0281720002
C20	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C21	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C22	CAP. 1UF, 35V	0281660000
C23	CAP. 0.1UF, 50V, X7R	1011180014
C24	CAP. 0.1UF, 50V, X7R	1011180014
C25	CAP. 0.1UF, 50V, X7R	1011180014
C26	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C27	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C29	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C30	CAP. 0.1UF, 50V, X7R	1011180014
C31	CAP. 6.8UF, 20V	0296780006
C32	CAP. 0.1UF, 50V, X7R	1011180014
C33	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C34	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C35	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C36	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C37	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C38	CAP. 22UF, 15V	0296660001
C39	CAP. 0.1UF, 50V, X7R	1011180014
C40	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C41	CAP. 110PF, 500V, DM10, 5%	0257750002
C42	CAP. 180PF, 500V, DM10, 5%	0294100008
C43	CAP. 110PF, 500V, DM10, 5%	0257750002
C44	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C45	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C46	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C47	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C48	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C49	CAP. 22UF, 15V	0296660001

C50	CAP. 10UF, 20V	1007290005
C51	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C52	CAP. 2.2UF, 35V	0273950002
C53	CAP. 22UF, 15V	0296660001
C54	CAP. 6.8UF, 20V	0296780006
C55	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C56	CAP. 0.1UF, 50V, X7R	1011180014
C57	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C58	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C59	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C60	CAP. 0.1UF, 50V, X7R	1011180014
C64	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C65	CAP. 0.1UF, 50V, X7R	1011180014
C66	CAP. 0.1UF, 50V, X7R	1011180014
C67	CAP. 0.1UF, 50V, X7R	1011180014
C68	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C69	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C70	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C71	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C72	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C73	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C74	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C101	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C102	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C103	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C104	CAP. 0.1UF, 50V, X7R	1011180014
C105	CAP. 1UF, 35V	0281660000
C106	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C107	CAP. 10PF, 500V, DM10	0259830003
C108	CAP. 10PF, 500V, DM10	0259830003
C109	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C110	CAP. 0.1UF, 50V, X7R	1011180014
C111	CAP. 1UF, 35V	0281660000
C112	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C113	CAP. 10PF, 500V, DM10	0259830003
C114	CAP. 10PF, 500V, DM10	0259830003
C115	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C116	CAP. 0.1UF, 50V, X7R	1011180014
C117	CAP. 1UF, 35V	0281660000
C118	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C119	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C120	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C121	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C122	CAP. 47UF, 20V	0281700001
C123	CAP. 0.1UF, 50V, X7R	1011180014
C124	CAP. 0.1UF, 50V, X7R	1011180014
C125	CAP. 0.1UF, 50V, X7R	1011180014
C126	CAP. 15UF, 35V	0282240004
C127	CAP. 0.1UF, 50V, X7R	1011180014

Figure 5.9.7 PC Assembly, RT-2410 Receiver/Exciter, 1A2A1, page 1/20.

C128	CAP.	22UF,	15V	0296660001
C129	CAP.	0.1UF,	50V, X7R	1011180014
C130	CAP.	22UF,	15V	0296660001
C133	CAP.	15UF,	35V	0282240004
C134	CAP.	10UF,	20V	1007290005
C135	CAP.	0.1UF,	50V, X7R	1011180014
C136	CAP.	0.1UF,	50V, X7R	1011180014
C137	CAP.	0.1UF,	50V, X7R	1011180014
C201	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C202	CAP.	0.1UF,	50V, X7R	1011180014
C203	CAP.	6.8UF,	20V	0296780006
C204	CAP.	0.1UF,	50V, X7R	1011180014
C205	CAP.	0.1UF,	50V, X7R	1011180014
C206	CAP.	0.1UF,	50V, X7R	1011180014
C207	CAP.	1UF,	35V	0281660000
C208	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C209	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C210	CAP.	0.1UF,	50V, X7R	1011180014
C211	CAP.	0.1UF,	50V, X7R	1011180014
C212	CAP.	0.1UF,	50V, X7R	1011180014
C213	CAP.	1UF,	35V	0281660000
C214	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C215	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C216	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C217	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C218	CAP.	0.1UF,	50V, X7R	1011180014
C219	CAP.	0.1UF,	50V, X7R	1011180014
C220	CAP.	0.1UF,	50V, X7R	1011180014
C221	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C222	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C223	CAP.	0.1UF,	50V, X7R	1011180014
C224	CAP.	1UF,	35V	0281660000
C225	CAP.	10UF,	20V	1007290005
C226	CAP.	10UF,	20V	1007290005
C227	CAP.	0.1UF,	50V, X7R	1011180014
C228	CAP.	0.1UF,	50V, X7R	1011180014
C229	CAP.	0.1UF,	50V, X7R	1011180014
C301	CAP.	22UF,	15V	0296660001
C302	CAP.	22UF,	15V	0296660001
C303	CAP.	1UF,	35V	0281660000
C304	CAP.	10UF,	20V	1007290005
C305	CAP.	1UF,	35V	0281660000
C306	CAP.	1UF,	35V	0281660000
C307	CAP.	6.8UF,	20V	0296780006
C308	CAP.	0.1UF,	50V, X7R	1011180014
C309	CAP.	22UF,	15V	0296660001
C310	CAP.	820PF,	300V, DM15, 5%	0288750004
C311	CAP.	22UF,	15V	0296660001
C312	CAP.	15UF,	35V	0282240004

C313	CAP.	1UF,	35V	0281660000
C314	CAP.	0.47UF,	50V, X7R, 20%	0283377771
C315	CAP.	15UF,	15V	0281720002
C316	CAP.	0.1UF,	50V, X7R	1011180014
C317	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C318	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C319	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C320	CAP.	15UF,	15V	0281720002
C321	CAP.	15UF,	15V	0281720002
C322	CAP.	0.1UF,	50V, X7R	1011180014
C323	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C324	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C325	CAP.	0.1UF,	50V, X7R	1011180014
C326	CAP.	0.1UF,	50V, X7R	1011180014
C327	CAP.	0.1UF,	50V, X7R	1011180014
C328	CAP.	220PF,	500V, DM10, 2%	1010870009
C329	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C330	CAP.	1UF,	35V	0281660000
C331	CAP.	0.1UF,	50V, X7R	1011180014
C332	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C333	CAP.	0.0047UF,	50V, 5/10%	0281540004
C334	CAP.	0.1UF,	50V, X7R	1011180014
C335	CAP.	6.8UF,	20V	0296780006
C336	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C337	CAP.	0.1UF,	50V, X7R	1011180014
C338	CAP.	10UF,	20V	1007290005
C339	CAP.	1UF,	35V	0281660000
C340	CAP.	1UF,	35V	0281660000
C341	CAP.	0.1UF,	50V, X7R	1011180014
C342	CAP.	0.1UF,	50V, X7R	1011180014
C343	CAP.	0.1UF,	50V, X7R	1011180014
C344	CAP.	0.1UF,	50V, X7R	1011180014
C345	CAP.	0.0033UF,	100V, NPO, 10%	0282580000
C401	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C402	CAP.	15UF,	15V	0281720002
C403	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C404	CAP.	0.1UF,	50V, X7R	1011180014
C405	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C406	CAP.	0.1UF,	50V, X7R	1011180014
C407	CAP.	0.02UF,	25V, Y5U/Y5P	0269130004
C408	CAP.	0.1UF,	50V, X7R	1011180014
C409	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C410	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C411	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C412	CAP.	110PF,	500V, DM10, 5%	0257750002
C413	CAP.	0.02UF,	25V, Y5U/Y5P	0269130004
C414	CAP.	22UF,	15V	0296660001
C415	CAP.	68UF,	15V	0296547778
C416	CAP.	0.001UF,	100V, X7R, 20%	0281630003

Figure 5.9.7 PC Assembly, RT-2410 Receiver/Exciter, 1A2A1, page 2/20.

C417	CAP.	0.1UF,	50V, X7R	1011180014
C418	CAP.	10UF,	20V	1007290005
C419	CAP.	2.2UF,	35V	0273950002
C420	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C421	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C422	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C423	CAP.	1UF,	35V	0281660000
C424	CAP.	1UF,	35V	0281660000
C425	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C426	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C427	CAP.	0.1UF,	50V, X7R	1011180014
C428	CAP.	0.1UF,	50V, X7R	1011180014
C429	CAP.	0.1UF,	50V, X7R	1011180014
C430	CAP.	0.1UF,	50V, X7R	1011180014
C501	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C502	CAP.	18PF,	500V, DM10, 5%	0260300004
C503	CAP.	10PF,	500V, DM10	0259830003
C504	CAP.	2.2UF,	35V	0273950002
C505	CAP.	0.1UF,	50V, X7R	1011180014
C506	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C507	CAP.	0.1UF,	50V, X7R	1011180014
C508	CAP.	1800PF,	500V, DM19, 2%	0281300003
C509	CAP.	5600PF,	300V, DM19, 5%	0299530001
C510	CAP.	1200PF,	500V, DM19, 2%	0281030006
C511	CAP.	3000PF,	500V, DM19, 2%	0281320004
C512	CAP.	2200PF,	500V, DM19, 2%	0281360006
C513	CAP.	0.1UF,	50V, X7R	1011180014
C514	CAP.	22UF,	15V	0296660001
C515	CAP.	270PF,	500V, DM15, 2%	0280970005
C516	CAP.	33PF,	500V, DM15, 2%	0281020001
C517	CAP.	470PF,	500V, DM15, 2%	0281440000
C518	CAP.	100PF,	500V, DM15, 2%	0281190003
C519	CAP.	220PF,	500V, DM15, 2%	0281420009
C520	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C521	CAP.	0.1UF,	50V, X7R	1011180014
C522	CAP.	0.1UF,	50V, X7R	1011180014
C523	CAP.	180PF,	500V, DM15, 2%	0281090009
C524	CAP.	330PF,	500V, DM15, 2%	0281070008
C525	CAP.	22PF,	500V, CD15, 2%	1000050025
C526	CAP.	180PF,	500V, DM15, 2%	0281090009
C527	CAP.	0.1UF,	50V, X7R	1011180014
C528	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C529	CAP.	0.1UF,	50V, X7R	1011180014
C530	CAP.	0.1UF,	50V, X7R	1011180014
C531	CAP.	200PF,	500V, DM15, 2%	1010430025
C532	CAP.	1800PF,	500V, DM19, 2%	0281300003
C533	CAP.	110PF,	500V, DM15, 2%	0281460001
C534	CAP.	680PF,	500V, DM19, 2%	0282290001
C535	CAP.	240PF,	500V, DM15, 2%	0281140006

C536	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C537	CAP.	0.1UF,	50V, X7R	1011180014
C538	CAP.	0.1UF,	50V, X7R	1011180014
C539	CAP.	0.1UF,	50V, X7R	1011180014
C540	CAP.	22UF,	15V	0296660001
C601	CAP.	0.1UF,	50V, X7R	1011180014
C602	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C603	CAP.	0.1UF,	50V, X7R	1011180014
C604	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C605	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C606	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C607	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C608	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C609	CAP.	0.1UF,	50V, X7R	1011180014
C610	CAP.	91PF,	500V, DM15, 5%	0298740001
C611	CAP.	180PF,	500V, DM15, 2%	0281090009
C612	CAP.	180PF,	500V, DM15, 2%	0281090009
C613	CAP.	91PF,	500V, DM15, 5%	0298740001
C614	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C615	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C616	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C617	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C618	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C619	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C620	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C621	CAP.	0.1UF,	50V, X7R	1011180014
C622	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C623	CAP.	1UF,	35V	0281660000
C624	CAP.	1UF,	35V	0281660000
C625	CAP.	680PF,	300V, DM15, 5%	0286240009
C626	CAP.	0.1UF,	50V, X7R	1011180014
C627	CAP.	15UF,	15V	0281720002
C628	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C629	CAP.	0.1UF,	50V, X7R	1011180014
C630	CAP.	0.1UF,	50V, X7R	1011180014
C631	CAP.	0.1UF,	50V, X7R	1011180014
C632	CAP.	0.1UF,	50V, X7R	1011180014
C633	CAP.	0.1UF,	50V, X7R	1011180014
C634	CAP.	91PF,	500V, DM15, 5%	0298740001
C635	CAP.	180PF,	500V, DM15, 2%	0281090009
C636	CAP.	180PF,	500V, DM15, 2%	0281090009
C637	CAP.	91PF,	500V, DM15, 5%	0298740001
C638	CAP.	0.1UF,	50V, X7R	1011180014
C639	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C640	CAP.	0.1UF,	50V, X7R	1011180014
C641	CAP.	0.1UF,	50V, X7R	1011180014
C642	CAP.	0.1UF,	50V, X7R	1011180014
C643	CAP.	0.1UF,	50V, X7R	1011180014
C644	CAP.	0.1UF,	50V, X7R	1011180014

Figure 5.9.7 PC Assembly, RT-2410 Receiver/Exciter, 1A2A1, page 3/20.

C645	CAP.	1UF,	35V	0281660000
C646	CAP.	0.1UF,	50V, X7R	1011180014
C647	CAP.	0.1UF,	50V, X7R	1011180014
C648	CAP.	0.1UF,	50V, X7R	1011180014
C649	CAP.	47UF,	20V	0281700001
C650	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C651	CAP.	0.1UF,	50V, X7R	1011180014
C652	CAP.	1UF,	35V	0281660000
C654	CAP.	47UF,	20V	0281700001
C655	CAP.	0.1UF,	50V, X7R	1011180014
C656	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C657	CAP.	470PF,	500V, DM15, 2%	0281440000
C658	CAP.	0.1UF,	50V, X7R	1011180014
C659	CAP.	0.1UF,	50V, X7R	1011180014
C661	CAP.	0.1UF,	50V, X7R	1011180014
C662	CAP.	2.2UF,	35V	0273950002
C664	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C665	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C666	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C667	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C668	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C669	CAP.	22PF,	500V, DM10, 5%	0260540005
C670	CAP.	100PF,	500V, DM10, 5%	0274740001
C671	CAP.	22PF,	500V, DM10, 5%	0260540005
C701	CAP.	6.8UF,	20V	0296780006
C702	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C703	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C704	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C705	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C706	CAP.	47UF,	20V	0281700001
C707	CAP.	47UF,	20V	0281700001
C708	CAP.	0.1UF,	50V, X7R	1011180014
C709	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C710	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C711	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C712	CAP.	0.1UF,	50V, X7R	1011180014
C713	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C801	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C802	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C803	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C804	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C805	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C806	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C807	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C808	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C809	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C810	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C811	CAP.	0.1UF,	50V, X7R	1011180014
C812	CAP.	0.001UF,	100V, X7R, 20%	0281630003

C813	CAP.	0.1UF,	50V, X7R	1011180014
C814	CAP.	0.1UF,	50V, X7R	1011180014
C816	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C817	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C818	CAP.	0.1UF,	50V, X7R	1011180014
C819	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C820	CAP.	1UF,	35V	0281660000
C821	CAP.	0.1UF,	50V, X7R	1011180014
C822	CAP.	0.1UF,	50V, X7R	1011180014
C823	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C824	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C825	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C826	CAP.	0.1UF,	50V, X7R	1011180014
CR1	DIODE, PIN		1N5767	0405570007
CR2	DIODE, PIN		1N5767	0405570007
CR3	DIODE, PIN		1N5767	0405570007
CR4	DIODE, PIN		1N5767	0405570007
CR5	DIODE, PIN		1N5767	0405570007
CR6	DIODE, PIN		1N5767	0405570007
CR7	DIODE, PIN		1N5767	0405570007
CR8	DIODE, PIN		1N5767	0405570007
CR9	DIODE, PIN		1N5767	0405570007
CR10	DIODE, PIN		1N5767	0405570007
CR11	DIODE, PIN		1N5767	0405570007
CR12	DIODE, PIN		1N5767	0405570007
CR13	DIODE, HOT CARRIER		1N6263	0405610009
CR14	DIODE, HOT CARRIER		1N6263	0405610009
CR15	DIODE, HOT CARRIER		1N6263	0405610009
CR16	DIODE, HOT CARRIER		1N6263	0405610009
CR17	DIODE, HOT CARRIER		1N6263	0405610009
CR18	DIODE, HOT CARRIER		1N6263	0405610009
CR19	DIODE, HOT CARRIER		1N6263	0405610009
CR20	DIODE, HOT CARRIER		1N6263	0405610009
CR21	DIODE, PIN		1N5767	0405570007
CR22	DIODE, PIN		1N5767	0405570007
CR23	DIODE, SIGNAL, SIL.		1N4454	0405270003
CR24	DIODE, SIGNAL, SIL.		1N4454	0405270003
CR101	DIODE, SIGNAL, SIL.		1N4454	0405270003
CR102	DIODE, SIGNAL, SIL.		1N4454	0405270003
CR103	DIODE, PIN		1N5767	0405570007
CR104	DIODE, PIN		1N5767	0405570007
CR105	DIODE, PIN		1N5767	0405570007
CR106	DIODE, PIN		1N5767	0405570007
CR107	DIODE, PIN		1N5767	0405570007
CR108	DIODE, PIN		1N5767	0405570007
CR109	DIODE, PIN		1N5767	0405570007
CR110	DIODE, PIN		1N5767	0405570007
CR111	DIODE, PIN		1N5767	0405570007
CR112	DIODE, PIN		1N5767	0405570007

Figure 5.9.7 PC Assembly, RT-2410 Receiver/Exciter, 1A2A1, page 4/20.

CR113	DIODE, LED, RED	550-2405	1008480029
CR201	DIODE, PIN	1N5767	0405570007
CR202	DIODE, PIN	1N5767	0405570007
CR203	DIODE, PIN	1N5767	0405570007
CR204	DIODE, PIN	1N5767	0405570007
CR205	DIODE, PIN	1N5767	0405570007
CR206	DIODE, PIN	1N5767	0405570007
CR301	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR302	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR303	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR304	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR305	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR306	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR401	DIODE, HOT CARRIER	1N6263	0405610009
CR402	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR403	DIODE, ZENER	1N5237B	0405240007
CR404	DIODE, ZENER	1N5237B	0405240007
CR501	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR502	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR503	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR504	DIODE, PIN	KS1002	1008210013
CR505	DIODE, PIN	KS1002	1008210013
CR506	DIODE, RECTIFIER	1N4004	0405180004
CR507	DIODE, RECTIFIER	1N4004	0405180004
CR508	DIODE, RECTIFIER	1N4004	0405180004
CR509	DIODE, RECTIFIER	1N4004	0405180004
CR510	DIODE, RECTIFIER	1N4004	0405180004
CR511	DIODE, RECTIFIER	1N4004	0405180004
CR512	DIODE, RECTIFIER	1N4004	0405180004
CR520	DIODE, RECTIFIER	1N4004	0405180004
CR601	DIODE, PIN	1N5767	0405570007
CR602	DIODE, PIN	1N5767	0405570007
CR604	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR607	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR608	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR609	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR610	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR612	DIODE, PIN	1N5767	0405570007
CR613	DIODE, PIN	1N5767	0405570007
CR614	DIODE, PIN	1N5767	0405570007
CR615	DIODE, PIN	1N5767	0405570007
CR701	DIODE, RECTIFIER	1N4004	0405180004
CR702	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR703	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR704	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR705	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR706	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR707	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR708	DIODE, RECTIFIER	1N4004	0405180004

CR709	DIODE, RECTIFIER	1N4004	0405180004
CR801	DIODE, PIN	1N5767	0405570007
CR802	DIODE, PIN	1N5767	0405570007
CR803	DIODE, HOT CARRIER	1N6263	0405610009
CR804	DIODE, HOT CARRIER	1N6263	0405610009
CR805	DIODE, HOT CARRIER	1N6263	0405610009
CR806	DIODE, HOT CARRIER	1N6263	0405610009
FB101	FERRITE BEAD, .400L		1010900013
FB102	FERRITE BEAD, .400L		1010900013
FB201	FERRITE BEAD, 5000 PERM		1010980017
FB202	FERRITE BEAD, 5000 PERM		1010980017
FB601	FERRITE BEAD, .400L		1010900013
FL1	FILTER, CRYSTAL, 48.305 MHZ		1012170039
FL101	FILTER, SIDEBAND, 455KHZ		8108051100
K501	RELAY, SPST, 24VDC, PC MOUNT		1010310038
L1	INDUCTOR, MOLDED, 0.68UH, 5%		0649030001
L2	INDUCTOR, MOLDED, 0.68UH, 5%		0649030001
L3	INDUCTOR, MOLDED, 15UH, 5%		0659070006
L5	INDUCTOR, MOLDED, 8.2UH, 5%		0652060005
L6	INDUCTOR, MOLDED, 150UH, 5%		0659190001
L7	INDUCTOR, MOLDED, 8.2UH, 5%		0652060005
L8	INDUCTOR, MOLDED, 0.18UH, 5%		0648740005
L9	INDUCTOR, MOLDED, 0.18UH, 5%		0648740005
L10	INDUCTOR, MOLDED, 8.2UH, 5%		0652060005
L13	INDUCTOR, MOLDED, 15UH, 5%		0659070006
L101	INDUCTOR, MOLDED, 1000UH, 10%		0664940005
L102	INDUCTOR, MOLDED, 1000UH, 10%		0664940005
L103	INDUCTOR, MOLDED, 1000UH, 10%		0664940005
L104	INDUCTOR, MOLDED, 1000UH, 10%		0664940005
L105	INDUCTOR, MOLDED, 1000UH, 10%		0664940005
L107	INDUCTOR, MOLDED, 47UH, 5%		0646420003
L201	INDUCTOR, MOLDED, 150UH, 5%		0659190001
L401	INDUCTOR, MOLDED, 1000UH, 10%		0664940005
L402	INDUCTOR, MOLDED, 1000UH, 10%		0664940005
L501	INDUCTOR, MOLDED, 220UH, 5%		0650500008
L502	INDUCTOR, MOLDED, 220UH, 5%		0650500008
L503	INDUCTOR, MOLDED, 220UH, 5%		0650500008
L504	INDUCTOR, MOLDED, 220UH, 5%		0650500008
L505	INDUCTOR, MOLDED, 5.6UH, 5%		0650360001
L506	INDUCTOR, MOLDED, 6.8UH, 5%		0659210002
L507	INDUCTOR, MOLDED, 47UH, 5%		0646420003
L508	INDUCTOR, MOLDED, 1.0UH, 5%		0648360008
L509	INDUCTOR, MOLDED, 0.82UH, 5%		0651030005
L510	INDUCTOR, MOLDED, 47UH, 5%		0652680003
L511	INDUCTOR, MOLDED, 47UH, 5%		0652680003
L512	INDUCTOR, MOLDED, 47UH, 5%		0652680003
L513	INDUCTOR, MOLDED, 0.82UH, 5%		0651030005
L514	INDUCTOR, MOLDED, 6.8UH, 10%		0646040006
L515	INDUCTOR, MOLDED, 0.47UH, 5%		0648500004

Figure 5.9.7 PC Assembly, RT-2410 Receiver/Exciter, 1A2A1, page 5/20.

L516	INDUCTOR, MOLDED, 0.82UH, 5%	0651030005
L517	INDUCTOR, MOLDED, 47UH, 5%	0652680003
L518	INDUCTOR, MOLDED, 47UH, 5%	0652680003
L519	INDUCTOR, MOLDED, 0.39UH, 5%	0649770005
L520	INDUCTOR, MOLDED, 0.47UH, 5%	0648500004
L521	INDUCTOR, MOLDED, 47UH, 5%	0652680003
L601	INDUCTOR, MOLDED, 0.33UH, 20%	0659600005
L602	INDUCTOR, MOLDED, 0.39UH, 5%	0649770005
L603	INDUCTOR, MOLDED, 0.33UH, 20%	0659600005
L605	INDUCTOR, MOLDED, 22UH, 5%	0650000005
L606	INDUCTOR, MOLDED, 22UH, 5%	0650000005
L607	INDUCTOR, MOLDED, 6.8UH, 10%	0646040006
L608	INDUCTOR, MOLDED, 220UH, 5%	0650500008
L609	INDUCTOR, MOLDED, 220UH, 5%	0650500008
L610	INDUCTOR, MOLDED, 220UH, 5%	0650500008
L611	INDUCTOR, MOLDED, 0.33UH, 20%	0659600005
L612	INDUCTOR, MOLDED, 0.39UH, 5%	0649770005
L613	INDUCTOR, MOLDED, 0.33UH, 20%	0659600005
L614	INDUCTOR, MOLDED, 0.47UH, 5%	0648500004
L615	INDUCTOR, MOLDED, 22UH, 5%	0650000005
L616	INDUCTOR, MOLDED, 22UH, 10%	0643290001
L617	INDUCTOR, MOLDED, 1.2UH, 5%	0648860001
L618	INDUCTOR, MOLDED, 0.39UH, 5%	0649770005
L619	INDUCTOR, MOLDED, 22UH, 5%	0650000005
L620	INDUCTOR, MOLDED, 0.33UH, 5%	1010490028
L621	INDUCTOR, FIXED, 0.064UH, 5%	1012180034
L622	INDUCTOR, MOLDED, 0.33UH, 5%	1010490028
P3	CONNECTOR, RF, RIGHT ANGLE	1010730002
P4	CONNECTOR, RF, RIGHT ANGLE	1010730002
P5	CONNECTOR, RF, RIGHT ANGLE	1010730002
P6	CONNECTOR, RF, RIGHT ANGLE	1010730002
Q1	TRANSISTOR, NPN, SI. 2N2222A	0448580004
Q2	TRANSISTOR, NPN, SI. MJE200	1011450038
Q3	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q4	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q5	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q101	TRANSISTOR, N-CH, FET 2N5457	1010120026
Q102	TRANSISTOR, N-CH, FET 2N5457	1010120026
Q301	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q302	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q303	TRANSISTOR, N-CH, FET 2N5457	1010120026
Q401	TRANSISTOR, NPN, SI. 2N2222A	0448580004
Q402	TRANSISTOR, NPN, SI. 2N2222A	0448580004
Q403	TRANSISTOR, NPN, SI. MJE200	1011450038
Q404	TRANSISTOR, NPN, SI. 2N2222A	0448580004
Q405	TRANSISTOR, NPN, SI. MJE200	1011450038
Q406	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q407	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q408	TRANSISTOR, NPN, SI. 2N2222A	0448580004

Q409	TRANSISTOR, NPN, SI. 2N2222A	0448580004
Q501	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q502	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q503	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q504	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q505	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q506	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q601	TRANSISTOR, NPN, SI. 2N2222A	0448580004
Q604	TRANSISTOR, NPN, SI. MRF476	1012160033
Q605	TRANSISTOR, NPN, SI. MRF476	1012160033
Q701	TRANSISTOR, N-CH, FET MTP3055E	1010750011
Q702	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q802	TRANSISTOR, NPN, SI. 2N4124	0448010003
R1	RESISTOR 820, 5%, 1/8W	1010808214
R2	RESISTOR 820, 5%, 1/8W	1010808214
R3	RESISTOR 820, 5%, 1/8W	1010808214
R4	RESISTOR 680, 5%, 1/8W	1010806815
R5	RESISTOR 820, 5%, 1/8W	1010808214
R6	RESISTOR 820, 5%, 1/8W	1010808214
R7	RESISTOR 47, 5%, 1/8W	1010804707
R8	RESISTOR 1.5K, 5%, 1/8W	1010801520
R9	RESISTOR 1.8K, 5%, 1/8W	1010801821
R10	RESISTOR 2.2K, 5%, 1/8W	1010802224
R11	RESISTOR 2.2K, 5%, 1/8W	1010802224
R12	RESISTOR 100, 5%, 1/8W	1010801015
R13	RESISTOR 100, 10%, 1W	0165540001
R14	RESISTOR 47, 5%, 1/8W	1010804707
R15	RESISTOR 1.5K, 5%, 1/8W	1010801520
R16	RESISTOR 1.8K, 5%, 1/8W	1010801821
R17	RESISTOR 2.2K, 5%, 1/8W	1010802224
R18	RESISTOR 2.2K, 5%, 1/8W	1010802224
R19	RESISTOR 220, 10%, 1/2W	0172850002
R20	RESISTOR 330, 10%, 1/2W	0173380000
R21	RESISTOR 33, 5%, 1/8W	1010803301
R22	RESISTOR 270, 5%, 1/8W	1010802712
R23	RESISTOR 18, 5%, 1/8W	1010801805
R24	RESISTOR 270, 5%, 1/8W	1010802712
R25	RESISTOR 10K, 5%, 1/8W	1010801031
R26	RESISTOR 10K, 5%, 1/8W	1010801031
R27	RESISTOR 2.2K, 5%, 1/8W	1010802224
R28	POT. 10K, 10%, 1/2W, 25 TURNS	1004880014
R29	RESISTOR 820, 5%, 1/8W	1010808214
R30	RESISTOR 820, 5%, 1/8W	1010808214
R31	RESISTOR 820, 5%, 1/8W	1010808214
R32	RESISTOR 2.2K, 5%, 1/8W	1010802224
R33	RESISTOR 1.8K, 5%, 1/8W	1010801821
R34	RESISTOR 10K, 5%, 1/8W	1010801031
R35	RESISTOR 12K, 5%, 1/8W	1010801236
R36	RESISTOR 12K, 5%, 1/8W	1010801236

Figure 5.9.7 PC Assembly, RT-2410 Receiver/Exciter, 1A2A1, page 6/20.

R37	RESISTOR	39K,	5%,	1/8W	1010803930
R38	RESISTOR	2.7K,	5%,	1/8W	1010802721
R39	RESISTOR	1.5K,	5%,	1/8W	1010801520
R40	RESISTOR	100,	5%,	1/8W	1010801015
R41	RESISTOR	4.7K,	5%,	1/8W	1010804723
R42	RESISTOR	560K,	5%,	1/8W	1010805649
R43	RESISTOR	8.2K,	5%,	1/8W	1010808222
R44	RESISTOR	5.6K,	5%,	1/8W	1010805622
R45	RESISTOR	10K,	5%,	1/8W	1010801031
R46	RESISTOR	10K,	5%,	1/8W	1010801031
R47	POT.	2K,	10%,	1/2W, 25 TURNS	1012030024
R48	RESISTOR	1K,	5%,	1/8W	1010801023
R49	RESISTOR	82K,	5%,	1/8W	1010808231
R50	RESISTOR	10,	5%,	1/8W	1010801007
R51	RESISTOR	1.8K,	5%,	1/8W	1010801821
R52	RESISTOR	10K,	5%,	1/8W	1010801031
R53	RESISTOR	10K,	5%,	1/8W	1010801031
R55	RESISTOR	12K,	5%,	1/8W	1010801236
R56	RESISTOR	120K,	5%,	1/8W	1010801244
R57	RESISTOR	100K,	5%,	1/8W	1010801040
R58	RESISTOR	100K,	5%,	1/8W	1010801040
R59	RESISTOR	4.7K,	5%,	1/8W	1010804723
R60	RESISTOR	4.7K,	5%,	1/8W	1010804723
R61	RESISTOR	56K,	5%,	1/8W	1010805631
R62	RESISTOR	5.6K,	5%,	1/8W	1010805622
R63	RESISTOR	10K,	5%,	1/8W	1010801031
R64	RESISTOR	270K,	5%,	1/8W	1010802747
R65	RESISTOR	100,	5%,	1/8W	1010801015
R66	RESISTOR	68,	5%,	1/8W	1010806807
R67	RESISTOR	100,	10%,	1W	0165540001
R68	RESISTOR	1.5K,	5%,	1/8W	1010801520
R69	RESISTOR	150,	5%,	1/8W	1010801511
R70	RESISTOR	10K,	5%,	1/8W	1010801031
R71	RESISTOR	47K,	5%,	1/8W	1010804731
R101	RESISTOR	10K,	5%,	1/8W	1010801031
R102	RESISTOR	10K,	5%,	1/8W	1010801031
R103	RESISTOR	47K,	5%,	1/8W	1010804731
R104	RESISTOR	1.91K,	1%,	1/8W	1008530018
R105	RESISTOR	6040,	1%,	1/8W	1010580019
R106	RESISTOR	1.91K,	1%,	1/8W	1008530018
R107	RESISTOR	6040,	1%,	1/8W	1010580019
R108	RESISTOR	1.5K,	5%,	1/8W	1010801520
R109	RESISTOR	3010,	1%,	1/8W	1010570013
R110	RESISTOR	1K,	5%,	1/8W	1010801023
R111	RESISTOR	10K,	5%,	1/8W	1010801031
R112	RESISTOR	270,	5%,	1/8W	1010802712
R113	RESISTOR	6040,	1%,	1/8W	1010580019
R114	RESISTOR	6040,	1%,	1/8W	1010580019
R115	RESISTOR	270,	5%,	1/8W	1010802712

R116	RESISTOR	1K,	5%,	1/8W	1010801023
R117	RESISTOR	1K,	5%,	1/8W	1010801023
R118	RESISTOR	220,	5%,	1/8W	1010802216
R119	RESISTOR	3.3K,	10%,	1/4W	0170890007
R120	RESISTOR	1.5K,	10%,	1/4W	0172470005
R121	RESISTOR	100,	5%,	1/8W	1010801015
R201	RESISTOR	10K,	5%,	1/8W	1010801031
R202	RESISTOR	10K,	5%,	1/8W	1010801031
R203	RESISTOR	270,	5%,	1/8W	1010802712
R204	POT.	200,	10%,	1/2W, 4 TURNS	1010190024
R205	RESISTOR	47,	5%,	1/8W	1010804707
R206	RESISTOR	1.8K,	5%,	1/8W	1010801821
R207	RESISTOR	47,	5%,	1/8W	1010804707
R208	RESISTOR	1.5K,	5%,	1/8W	1010801520
R209	RESISTOR	2.2K,	5%,	1/8W	1010802224
R210	RESISTOR	2.2K,	5%,	1/8W	1010802224
R211	RESISTOR	100,	5%,	1/8W	1010801015
R212	RESISTOR	220,	10%,	1/2W	0172850002
R213	RESISTOR	47,	5%,	1/8W	1010804707
R214	RESISTOR	1.8K,	5%,	1/8W	1010801821
R215	RESISTOR	1.8K,	5%,	1/8W	1010801821
R216	RESISTOR	2.2K,	5%,	1/8W	1010802224
R217	RESISTOR	2.2K,	5%,	1/8W	1010802224
R218	RESISTOR	100,	5%,	1/8W	1010801015
R219	RESISTOR	220,	10%,	1/2W	0172850002
R220	RESISTOR	220,	10%,	1/2W	0172850002
R221	RESISTOR	47,	5%,	1/8W	1010804707
R222	RESISTOR	2100,	1%,	1/8W	1011790009
R223	RESISTOR	243,	1%,	1/8W	1011800004
R224	THERMISTOR	500	AT 25C		1012520005
R225	RESISTOR	680,	5%,	1/8W	1010806815
R226	RESISTOR	10,	5%,	1/8W	1010801007
R227	RESISTOR	22,	5%,	1/8W	1010802208
R301	RESISTOR	10K,	5%,	1/8W	1010801031
R302	RESISTOR	560,	5%,	1/8W	1010805614
R303	RESISTOR	10K,	5%,	1/8W	1010801031
R304	RESISTOR	2100,	1%,	1/8W	1011790009
R305	RESISTOR	243,	1%,	1/8W	1011800004
R306	RESISTOR	47K,	5%,	1/8W	1010804731
R307	RESISTOR	47K,	5%,	1/8W	1010804731
R308	RESISTOR	100,	5%,	1/8W	1010801015
R309	RESISTOR	47K,	5%,	1/8W	1010804731
R310	RESISTOR	10K,	5%,	1/8W	1010801031
R311	RESISTOR	10K,	5%,	1/8W	1010801031
R312	RESISTOR	10K,	5%,	1/8W	1010801031
R313	RESISTOR	47K,	5%,	1/8W	1010804731
R314	RESISTOR	56K,	5%,	1/8W	1010805631
R315	RESISTOR	15K,	5%,	1/8W	1010801538
R316	RESISTOR	22,	5%,	1/8W	1010802208

Figure 5.9.7 PC Assembly, RT-2410 Receiver/Exciter, 1A2A1, page 7/20.

R317	RESISTOR	100,	5%, 1/8W	1010801015
R318	POT.	500,	10%, 1/2W, 25 TURNS	1012330028
R319	RESISTOR	10K,	5%, 1/8W	1010801031
R320	RESISTOR	10K,	5%, 1/8W	1010801031
R321	RESISTOR	4.7K,	5%, 1/8W	1010804723
R322	RESISTOR	10K,	5%, 1/8W	1010801031
R323	RESISTOR	10K,	5%, 1/8W	1010801031
R324	RESISTOR	4.7K,	5%, 1/8W	1010804723
R325	RESISTOR	1K,	5%, 1/8W	1010801023
R326	RESISTOR	47K,	5%, 1/8W	1010804731
R327	RESISTOR	100K,	5%, 1/8W	1010801040
R328	RESISTOR	2.7K,	5%, 1/8W	1010802721
R329	RESISTOR	10K,	5%, 1/8W	1010801031
R330	RESISTOR	22K,	5%, 1/8W	1010802232
R331	RESISTOR	10K,	5%, 1/8W	1010801031
R332	RESISTOR	31.6K,	1%, 1/8W	1004050020
R333	POT.	10K,	10%, 1/2W, 25 TURNS	1004880014
R334	RESISTOR	31.6K,	1%, 1/8W	1004050020
R335	RESISTOR	100,	5%, 1/8W	1010801015
R336	RESISTOR	100,	5%, 1/8W	1010801015
R337	RESISTOR	820,	5%, 1/8W	1010808214
R338	RESISTOR	1K,	5%, 1/8W	1010801023
R339	RESISTOR	100,	5%, 1/8W	1010801015
R340	RESISTOR	1.2K,	5%, 1/8W	1010801228
R341	RESISTOR	1K,	5%, 1/8W	1010801023
R342	RESISTOR	68,	5%, 1/8W	1010806807
R343	RESISTOR	68,	5%, 1/8W	1010806807
R344	RESISTOR	39,	5%, 1/8W	1010803905
R345	RESISTOR	2.7K,	5%, 1/8W	1010802721
R346	RESISTOR	2.7K,	5%, 1/8W	1010802721
R347	RESISTOR	10K,	5%, 1/8W	1010801031
R348	RESISTOR	68K,	5%, 1/8W	1010806831
R349	RESISTOR	10K,	5%, 1/8W	1010801031
R350	RESISTOR	270,	5%, 1/8W	1010802712
R351	RESISTOR	1K,	5%, 1/8W	1010801023
R352	RESISTOR	47K,	5%, 1/8W	1010804731
R353	RESISTOR	120K,	5%, 1/8W	1010801244
R354	POT.	10K,	10%, 1/2W, 25 TURNS	1004880014
R355	RESISTOR	10K,	5%, 1/8W	1010801031
R356	RESISTOR	10K,	5%, 1/8W	1010801031
R357	RESISTOR	4.7K,	5%, 1/8W	1010804723
R358	RESISTOR	27K,	5%, 1/8W	1010802739
R359	RESISTOR	1K,	5%, 1/8W	1010801023
R360	RESISTOR	1K,	5%, 1/8W	1010801023
R361	RESISTOR	1K,	5%, 1/8W	1010801023
R362	RESISTOR	820,	5%, 1/8W	1010808214
R363	RESISTOR	1.2K,	5%, 1/8W	1010801228
R364	RESISTOR	10K,	5%, 1/8W	1010801031
R365	RESISTOR	100,	5%, 1/8W	1010801015

R366	RESISTOR	2.7K,	5%, 1/8W	1010802721
R367	RESISTOR	2.7K,	5%, 1/8W	1010802721
R368	RESISTOR	1.2K,	5%, 1/8W	1010801228
R369	RESISTOR	47K,	5%, 1/8W	1010804731
R370	RESISTOR	47K,	5%, 1/8W	1010804731
R371	RESISTOR	3.3K,	10%, 1/4W	0170890007
R372	RESISTOR	10K,	5%, 1/8W	1010801031
R373	RESISTOR	4.7K,	5%, 1/8W	1010804723
R374	RESISTOR	47K,	5%, 1/8W	1010804731
R375	RESISTOR	10K,	5%, 1/8W	1010801031
R376	RESISTOR	100,	5%, 1/8W	1010801015
R377	RESISTOR	4.7K,	5%, 1/8W	1010804723
R401	RESISTOR	12K,	5%, 1/8W	1010801236
R402	RESISTOR	3.3K,	10%, 1/4W	0170890007
R403	RESISTOR	470,	5%, 1/8W	1010804715
R404	RESISTOR	270,	5%, 1/8W	1010802712
R405	RESISTOR	270,	5%, 1/8W	1010802712
R406	RESISTOR	22,	5%, 1/8W	1010802208
R407	POT.	200,	10%, 1/2W, 4 TURNS	1010190024
R408	RESISTOR	8.2K,	5%, 1/8W	1010808222
R409	RESISTOR	1K,	5%, 1/8W	1010801023
R410	RESISTOR	22K,	5%, 1/8W	1010802232
R411	RESISTOR	47K,	5%, 1/8W	1010804731
R412	RESISTOR	100,	5%, 1/8W	1010801015
R413	RESISTOR	1.5K,	5%, 1/8W	1010801520
R414	RESISTOR	10K,	5%, 1/8W	1010801031
R415	RESISTOR	1.5K,	5%, 1/8W	1010801520
R416	RESISTOR	10K,	5%, 1/8W	1010801031
R417	RESISTOR	10K,	5%, 1/8W	1010801031
R418	RESISTOR	100K,	5%, 1/8W	1010801040
R419	RESISTOR	10K,	5%, 1/8W	1010801031
R420	RESISTOR	1.5K,	5%, 1/8W	1010801520
R421	RESISTOR	1.5K,	5%, 1/8W	1010801520
R422	RESISTOR	1.5K,	5%, 1/8W	1010801520
R423	RESISTOR	100,	5%, 1/8W	1010801015
R424	RESISTOR	6.8M,	5%, 1/4W	1010910001
R425	RESISTOR	47,	5%, 1/8W	1010804707
R426	RESISTOR	68,	5%, 1/8W	1010806807
R427	RESISTOR	1.5K,	5%, 1/8W	1010801520
R428	RESISTOR	1.5K,	5%, 1/8W	1010801520
R429	RESISTOR	100,	5%, 1/8W	1010801015
R430	RESISTOR	470K,	5%, 1/8W	1010804740
R431	RESISTOR	1K,	5%, 1/8W	1010801023
R432	RESISTOR	680K,	5%, 1/8W	1010806840
R433	RESISTOR	680K,	5%, 1/8W	1010806840
R434	RESISTOR	22K,	5%, 1/8W	1010802232
R435	RESISTOR	1K,	5%, 1/8W	1010801023
R436	RESISTOR	5.6K,	5%, 1/8W	1010805622
R437	RESISTOR	18K,	5%, 1/8W	1010801830

Figure 5.9.7 PC Assembly, RT-2410 Receiver/Exciter, 1A2A1, page 8/20.

R438	RESISTOR	2.2K,	5%,	1/8W	1010802224
R439	RESISTOR	8.2K,	5%,	1/8W	1010808222
R440	RESISTOR	47K,	5%,	1/8W	1010804731
R441	RESISTOR	10K,	5%,	1/8W	1010801031
R442	RESISTOR	10K,	5%,	1/8W	1010801031
R443	RESISTOR	10K,	5%,	1/8W	1010801031
R444	RESISTOR	10K,	5%,	1/8W	1010801031
R445	RESISTOR	10K,	5%,	1/8W	1010801031
R446	RESISTOR	10K,	5%,	1/8W	1010801031
R447	RESISTOR	1K,	5%,	1/8W	1010801023
R448	RESISTOR	47K,	5%,	1/8W	1010804731
R449	RESISTOR	1K,	5%,	1/8W	1010801023
R450	RESISTOR	47K,	5%,	1/8W	1010804731
R451	RESISTOR	1K,	5%,	1/8W	1010801023
R452	RESISTOR	1K,	5%,	1/8W	1010801023
R453	RESISTOR	10K,	5%,	1/8W	1010801031
R454	RESISTOR	4.7K,	5%,	1/8W	1010804723
R501	RESISTOR	10K,	5%,	1/8W	1010801031
R502	RESISTOR	1M,	10%,	1/4W	0170650006
R503	RESISTOR	4.7M,	10%,	1/4W	1011330008
R504	RESISTOR	2.2K,	5%,	1/8W	1010802224
R505	RESISTOR	4.7K,	5%,	1/4W	0170770001
R506	RESISTOR	1K,	5%,	1/8W	1010801023
R507	RESISTOR	10K,	10%,	1/4W	0170410005
R508	RESISTOR	82,	10%,	1/2W	1010200038
R509	RESISTOR	82,	10%,	1/2W	1010200038
R510	RESISTOR	10K,	5%,	1/8W	1010801031
R511	RESISTOR	4.7K,	5%,	1/4W	0170770001
R512	RESISTOR	10K,	5%,	1/8W	1010801031
R513	RESISTOR	4.7K,	5%,	1/4W	0170770001
R514	RESISTOR	10K,	5%,	1/8W	1010801031
R515	RESISTOR	4.7K,	5%,	1/4W	0170770001
R516	RESISTOR	47K,	5%,	1/8W	1010804731
R601	RESISTOR	51,	5%,	1/4W	0197020003
R602	RESISTOR	51,	5%,	1/4W	0197020003
R603	RESISTOR	100,	10%,	1W	0165540001
R604	RESISTOR	39,	10%,	1/4W	0182890007
R605	RESISTOR	150,	10%,	1/4W	0172730007
R606	RESISTOR	150,	10%,	1/4W	0172730007
R607	RESISTOR	820,	10%,	1/4W	0178210005
R608	RESISTOR	820,	10%,	1/4W	0178210005
R609	RESISTOR	820,	10%,	1/4W	0178210005
R610	RESISTOR	100,	10%,	1W	0165540001
R611	RESISTOR	100,	10%,	1W	0165540001
R612	RESISTOR	100,	10%,	1W	0165540001
R613	RESISTOR	220,	10%,	1/2W	0172850002
R614	RESISTOR	100,	10%,	1W	0165540001
R615	RESISTOR	3.3K,	10%,	1/4W	0170890007
R616	RESISTOR	5.6K,	5%,	1/8W	1010805622

R617	RESISTOR	4.7K,	5%,	1/8W	1010804723
R618	RESISTOR	4.7K,	5%,	1/4W	0170770001
R619	RESISTOR	4.7K,	5%,	1/4W	0170770001
R620	RESISTOR	3.3K,	10%,	1/4W	0170890007
R621	RESISTOR	330,	10%,	1/2W	0173380000
R622	RESISTOR	18,	5%,	1/8W	1010801805
R625	RESISTOR	100,	10%,	1W	0165540001
R626	RESISTOR	180,	10%,	1W	1000850030
R627	RESISTOR	22,	10%,	1/4W	0192690001
R628	RESISTOR	1.5,	10%,	1/2W	1010350021
R629	RESISTOR	1.5,	10%,	1/2W	1010350021
R630	RESISTOR	120,	10%,	2W	0194530001
R631	RESISTOR	22,	10%,	1/2W	0186930003
R632	RESISTOR	150,	10%,	1/4W	0172730007
R633	RESISTOR	68,	10%,	1/4W	0187960003
R635	RESISTOR	1.5,	10%,	1/2W	1010350021
R636	RESISTOR	1.5,	10%,	1/2W	1010350021
R637	RESISTOR	150,	10%,	1/2W	1010400037
R642	RESISTOR	1K,	10%,	1/4W	0171560001
R643	RESISTOR	100K,	10%,	1/4W	0170390004
R644	RESISTOR	12K,	10%,	1/4W	0183180003
R645	RESISTOR	1K,	10%,	1/4W	0171560001
R646	RESISTOR	10K,	10%,	1/4W	0170410005
R647	RESISTOR	220,	5%,	1/8W	1010802216
R701	RESISTOR	100K,	5%,	1/8W	1010801040
R702	RESISTOR	10K,	5%,	1/8W	1010801031
R703	RESISTOR	2.2K,	5%,	1/8W	1010802224
R704	RESISTOR	10K,	5%,	1/8W	1010801031
R705	RESISTOR	2.2K,	5%,	1/8W	1010802224
R801	RESISTOR	100,	5%,	1/8W	1010801015
R802	RESISTOR	100,	5%,	1/8W	1010801015
R803	RESISTOR	390,	10%,	1/2W	0173260004
R804	RESISTOR	180,	10%,	1/2W	0173640001
R805	RESISTOR	47,	5%,	1/8W	1010804707
R806	RESISTOR	10K,	5%,	1/8W	1010801031
R807	RESISTOR	5.6K,	5%,	1/8W	1010805622
R808	RESISTOR	270,	5%,	1/8W	1010802712
R809	RESISTOR	5.6K,	5%,	1/8W	1010805622
R810	RESISTOR	4.7K,	5%,	1/8W	1010804723
R811	RESISTOR	270,	5%,	1/8W	1010802712
R813	RESISTOR	10K,	5%,	1/8W	1010801031
R814	RESISTOR	10K,	5%,	1/8W	1010801031
R815	RESISTOR	5.6K,	5%,	1/8W	1010805622
R816	RESISTOR	100,	5%,	1/8W	1010801015
R817	RESISTOR	5.6K,	5%,	1/8W	1010805622
R818	RESISTOR	4.7K,	5%,	1/8W	1010804723
R819	RESISTOR	470,	5%,	1/8W	1010804715
R820	RESISTOR	470K,	5%,	1/8W	1010804740
R821	RESISTOR	1K,	5%,	1/8W	1010801023

Figure 5.9.7 PC Assembly, RT-2410 Receiver/Exciter, 1A2A1, page 9/20.

C419	CAP.	22UF,	15V	0296660001
C420	CAP.	10PF,	500V, DM10	0259830003
C421	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C422	CAP.	36PF,	500V, DM10, 5%	0293550000
C423	CAP.	200PF,	500V, DM10, 5%	0293050007
C424	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C425	CAP.	15PF,	500V, DM10, 5%	0259950009
C426	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C427	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C428	CAP.	0.1UF,	50V, X7R	1011180014
C430	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C431	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C432	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C433	CAP.	430PF,	500V, DM15, 2%	0282370005
C434	CAP.	22UF,	15V	0296660001
C435	CAP.	50PF,	500V, DM10, 2%	0260040002
C436	CAP.	120PF,	500V, DM10, 2%	0292880006
C437	CAP.	390PF,	500V, DM15, 2%	0281040001
C438	CAP.	120PF,	500V, DM10, 2%	0292880006
C439	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C440	CAP.	0.1UF,	50V, X7R	1011180014
C441	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C443	CAP.	0.1UF,	50V, X7R	1011180014
C444	CAP.	0.1UF,	50V, X7R	1011180014
C445	CAP.	0.1UF,	50V, X7R	1011180014
C446	CAP.	200PF,	500V, DM10, 5%	0293050007
C447	CAP.	620PF,	300V, DM15, 2%	0282280006
C448	CAP.	0.47UF,	50V, X7R, 20%	0283377771
C449	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C450	CAP.	0.1UF,	50V, X7R	1011180014
C451	CAP.	200PF,	500V, DM10, 5%	0293050007
C452	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C453	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C454	CAP.	27PF,	500V, DM10, 5%	0260660001
C455	CAP.	0.1UF,	50V, X7R	1011180014
C456	CAP.	0.1UF,	50V, X7R	1011180014
C457	CAP.	0.1UF,	50V, X7R	1011180014
C458	CAP.	24PF,	500V, DM10, 5%	0290060001
C459	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C460	CAP.	68PF,	500V, DM10, 5%	0261070002
C461	CAP.	68PF,	500V, DM10, 5%	0261070002
C465	CAP.	0.1UF,	50V, X7R	1011180014
C466	CAP.	0.1UF,	50V, X7R	1011180014
C467	CAP.	0.1UF,	50V, X7R	1011180014
C468	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C469	CAP.	0.1UF,	50V, X7R	1011180014
C470	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C471	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C472	CAP.	0.01UF,	50V, X7R, 20%	0281730008

C473	CAP.	0.1UF,	50V, X7R	1011180014
C474	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C475	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C476	CAP.	100PF,	500V, DM10, 5%	0274747774
C477	CAP.	0.47UF,	50V, X7R, 20%	0283377771
C478	CAP.	0.47UF,	50V, X7R, 20%	0283377771
C601	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C602	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C603	CAP.	22UF,	15V	0296660001
C604	CAP.	15PF,	500V, DM10, 5%	0259950009
C605	CAP.	12PF,	500V, DM10, 5%	0260280003
C606	CAP.	0.1UF,	50V, X7R	1011180014
C607	CAP.	27PF,	500V, DM10, 5%	0260660001
C608	CAP.	0.1UF,	50V, X7R	1011180014
C609	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C610	CAP.	20PF,	500V, DM10, 5%	0260420000
C611	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C612	CAP.	22UF,	15V	0296660001
C613	CAP.	27PF,	1000V, N750	0250620006
C614	CAP.	0.1UF,	50V, X7R	1011180014
C615	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C616	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C617	CAP.	27PF,	500V, DM10, 5%	0260660001
C618	CAP.	22UF,	15V	0296660001
C619	CAP.	0.1UF,	50V, X7R	1011180014
C620	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C621	CAP.	0.47UF,	50V, X7R, 20%	0283377771
C622	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C623	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C624	CAP.	0.0056UF,	100V, NPO, 5%	1010770004
C625	CAP.	110PF,	500V, DM10, 5%	0257750002
C626	CAP.	0.0027UF,	200V, NPO, 5%	1010760009
C627	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C628	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C629	CAP.	15PF,	500V, DM10, 5%	0259950009
C630	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C631	CAP.	0.1UF,	50V, X7R	1011180014
C632	CAP.	0.1UF,	50V, X7R	1011180014
C635	CAP.	22PF,	500V, DM10, 5%	0260540005
C636	CAP.	1UF,	35V	0283630001
C637	CAP.	10UF,	20V	1007290005
C638	CAP.	47UF,	20V	0281700001
C639	CAP.	0.47UF,	50V, X7R, 20%	0283377771
C801	CAP.	68PF,	1000V, N750, 5%	0291610005
C802	CAP.	33PF,	500V, DM10, 5%	0260780006
C803	CAP.	0.1UF,	50V, X7R	1011180014
C804	CAP.	0.1UF,	50V, X7R	1011180014
C805	CAP.	0.1UF,	50V, X7R	1011180014
C806	CAP.	0.001UF,	100V, X7R, 20%	0281630003

Figure 5.9.8 PC Assembly, RT-2410 Synthesizer, 1A2A2, page 2/14.

C807	CAP.	68PF,	500V, DM10, 5%	0261070002
C808	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C809	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C810	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C811	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C812	CAP.	15UF,	35V	0282240004
C813	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C814	CAP.	0.47UF,	50V, X7R, 20%	0283377771
C815	CAP.	180PF,	500V, DM10, 5%	0294100008
C816	CAP.	50PF,	500V, DM10, 2%	0260040002
C817	CAP.	0.1UF,	50V, X7R	1011180014
C818	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C820	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C821	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C822	CAP.	3PF,	300V, CD6	0288560001
C823	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C824	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C825	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C826	CAP.	18PF,	500V, DM10, 5%	0260300004
C827	CAP.	3.3UF,	35V	0281680001
C828	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C829	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C830	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C831	CAP.	56PF,	500V, DM10, 5%	0293170002
C832	CAP.	18PF,	500V, DM10, 5%	0260300004
C833	CAP.	56PF,	500V, DM10, 5%	0293170002
C834	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C835	CAP.	0.1UF,	50V, X7R	1011180014
C836	CAP.	0.1UF,	50V, X7R	1011180014
C837	CAP.	0.47UF,	50V, X7R, 20%	0283377771
C838	CAP.	0.47UF,	50V, X7R, 20%	0283377771
C839	CAP.	0.47UF,	50V, X7R, 20%	0283377771
CR202	DIODE, VARICAP		MV409	1007060018
CR203	DIODE, VARICAP		MV409	1007060018
CR204	DIODE, HOT CARRIER		5082-2835	0405280009
CR205	DIODE, PIN		5082-3168	1005260001
CR206	DIODE, HOT CARRIER		5082-2835	0405280009
CR207	DIODE, PIN		5082-3168	1005260001
CR208	DIODE, VARICAP		MV409	1007060018
CR209	DIODE, VARICAP		MV409	1007060018
CR210	DIODE, VARICAP		MV409	1007060018
CR211	DIODE, VARICAP		MV409	1007060018
CR212	DIODE, HOT CARRIER		5082-2835	0405280009
CR213	DIODE, PIN		5082-3168	1005260001
CR214	DIODE, PIN		5082-3168	1005260001
CR215	DIODE, HOT CARRIER		5082-2835	0405280009
CR216	DIODE, VARICAP		MV409	1007060018
CR217	DIODE, VARICAP		MV409	1007060018
CR218	DIODE, SIGNAL, SIL.		1N4454	0405270003

CR219	DIODE, LED, RED	550-2405	1008480029
CR220	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR401	DIODE, VARICAP	MV2109	0405290004
CR402	DIODE, VARICAP	MV2109	0405290004
CR404	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR405	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR406	DIODE, VARICAP	MV2109	0405290004
CR407	DIODE, VARICAP	MV2109	0405290004
CR408	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR409	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR410	DIODE, LED, RED	550-2405	1008480029
CR411	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR412	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR413	DIODE, LED, RED	550-2405	1008480029
CR601	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR602	DIODE, VARICAP	MV2109	0405290004
CR603	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR604	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR605	DIODE, LED, RED	550-2405	1008480029
CR801	DIODE, ZENER	1N5245B	0405210001
CR802	DIODE, VARICAP	MV409	1007060018
CR803	DIODE, VARICAP	MV409	1007060018
CR804	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR805	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR806	DIODE, HOT CARRIER	5082-2835	0405280009
CR807	DIODE, HOT CARRIER	5082-2835	0405280009
CR808	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR809	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR810	DIODE, LED, RED	550-2405	1008480029
CR811	DIODE, LED, RED	550-2405	1008480029
L101	INDUCTOR, MOLDED,	47UH, 5%	0646420003
L103	INDUCTOR, MOLDED,	680UH, 10%	0664320007
L104	INDUCTOR, MOLDED,	680UH, 10%	0664320007
L105	INDUCTOR, MOLDED,	47UH, 5%	0646420003
L201	INDUCTOR, MOLDED,	82UH, 5%	0646540009
L203	INDUCTOR, MOLDED,	0.82UH, 5%	0652320007
L204	INDUCTOR, MOLDED,	0.39UH, 5%	0649770005
L205	INDUCTOR, VAR,	43-50NH	1012420035
L207	INDUCTOR, MOLDED,	82UH, 5%	0659450003
L208	INDUCTOR, MOLDED,	0.82UH, 5%	0652320007
L210	INDUCTOR, MOLDED,	22UH, 5%	0650000005
L211	INDUCTOR, VAR,	21-25NH	1012400034
L212	INDUCTOR, MOLDED,	0.39UH, 5%	0649770005
L215	INDUCTOR, MOLDED,	0.39UH, 5%	0649770005
L216	INDUCTOR, VAR,	53-71NH	1012430031
L219	INDUCTOR, MOLDED,	0.82UH, 5%	0652320007
L220	INDUCTOR, MOLDED,	0.82UH, 5%	0652320007
L223	INDUCTOR, VAR,	28-33NH	1012410030
L224	INDUCTOR, MOLDED,	0.39UH, 5%	0649770005

Figure 5.9.8 PC Assembly, RT-2410 Synthesizer, 1A2A2, page 3/14.

L231	INDUCTOR, MOLDED, 1.5UH, 5%	0649270002
L232	INDUCTOR, MOLDED, 0.12UH, 5%	1011500027
L233	INDUCTOR, MOLDED, 0.12UH, 5%	1011500027
L234	INDUCTOR, MOLDED, 0.12UH, 5%	1011500027
L235	INDUCTOR, MOLDED, 68UH, 5%	0651650003
L402	INDUCTOR, VAR, .062-.078UH	1007070030
L403	INDUCTOR, MOLDED, .33UH, 10%	0664200001
L404	INDUCTOR, MOLDED, 1.2UH, 5%	0649910001
L405	INDUCTOR, MOLDED, 1.2UH, 5%	0649910001
L407	INDUCTOR, MOLDED, 0.15UH, 5%	1009470001
L408	INDUCTOR, MOLDED, 22UH, 5%	0650000005
L409	INDUCTOR, MOLDED, 2.7UH, 5%	0652180001
L410	INDUCTOR, MOLDED, .33UH, 10%	0664200001
L412	INDUCTOR, MOLDED, 22UH, 5%	0650000005
L413	INDUCTOR, MOLDED, 1.2UH, 5%	0649910001
L415	INDUCTOR, MOLDED, 1.2UH, 5%	0649910001
L417	INDUCTOR, MOLDED, 0.22UH, 5%	0650620003
L418	INDUCTOR, VAR, .082-.114UH	1007080027
L419	INDUCTOR, MOLDED, 4.7UH, 10%	0564250007
L420	INDUCTOR, MOLDED, 3.9UH, 5%	0650480007
L421	INDUCTOR, MOLDED, 10UH, 5%	0659570009
L601	INDUCTOR, MOLDED, 1.0UH, 5%	0649150007
L602	INDUCTOR, MOLDED, 120UH, 10%	0659330008
L603	INDUCTOR, VAR, .502-.620UH	1007080001
L604	INDUCTOR, MOLDED, 10UH, 5%	0659570009
L605	INDUCTOR, MOLDED, 68UH, 5%	0651650003
L606	INDUCTOR, MOLDED, 150UH, 5%	0659190001
L607	INDUCTOR, MOLDED, 82UH, 5%	0659450003
L608	INDUCTOR, MOLDED, 82UH, 5%	0659450003
L609	INDUCTOR, MOLDED, 10UH, 5%	0659570009
L610	INDUCTOR, MOLDED, 1.0UH, 5%	0649150007
L611	INDUCTOR, MOLDED, 1000UH, 10%	0664940005
L801	INDUCTOR, VAR, 1.25-2.75UH	1012330036
L802	INDUCTOR, MOLDED, 15UH, 5%	0659070006
L803	INDUCTOR, MOLDED, 15UH, 5%	0659070006
L804	INDUCTOR, MOLDED, 0.39UH, 5%	0649770005
L805	INDUCTOR, MOLDED, 12UH, 5%	0652700004
L806	INDUCTOR, MOLDED, 1.0UH, 5%	0649150007
L807	INDUCTOR, MOLDED, 3.9UH, 5%	0650480007
L808	INDUCTOR, MOLDED, 0.22UH, 5%	0650620003
L809	INDUCTOR, MOLDED, 0.22UH, 5%	0650620003
L810	INDUCTOR, MOLDED, 1.0UH, 5%	0649150007
L811	INDUCTOR, MOLDED, 1.2UH, 5%	0649910001
P3	CONNECTOR, RF, RIGHT ANGLE	1010730002
P4	CONNECTOR, RF, RIGHT ANGLE	1010730002
Q202	TRANSISTOR, PNP, SI. 2N4126	0448020009
Q204	TRANSISTOR, N-CH, FET U310	1007050039
Q205	TRANSISTOR, N-CH, FET U310	1007050039
Q207	TRANSISTOR, PNP, SI. 2N4126	0448020009

Q208	TRANSISTOR, PNP, SI. 2N4126	0448020009
Q210	TRANSISTOR, N-CH, FET U310	1007050039
Q211	TRANSISTOR, N-CH, FET U310	1007050039
Q213	TRANSISTOR, PNP, SI. 2N4126	0448020009
Q401	TRANSISTOR, N-CH, FET U310	1007050039
Q402	TRANSISTOR, NPN, SI. 2N5179	0445130008
Q404	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q405	TRANSISTOR, NPN, SI. 2N5179	0445130008
Q406	TRANSISTOR, N-CH, FET U310	1007050039
Q407	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q408	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q601	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q602	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q603	TRANSISTOR, N-CH, FET U310	1007050039
Q604	TRANSISTOR, N-CH, FET MFE209	1007090014
Q801	TRANSISTOR, NPN, SI. 2N5179	0445130008
Q802	TRANSISTOR, NPN, SI. 2N5179	0445130008
Q803	TRANSISTOR, NPN, SI. 2N4124	0448010003
R101	RESISTOR 2100, 1%, 1/8W	1011790009
R102	RESISTOR 243, 1%, 1/8W	1011800004
R103	RESISTOR 15K, 1%, 1/8W	1004050003
R104	RESISTOR 1K, 1%, 1/8W	1011380005
R201	RESISTOR 100K, 5%, 1/8W	1010801040
R202	RESISTOR 47, 10%, 1/4W	0179360001
R203	RESISTOR 82, 10%, 1/4W	0184610001
R204	RESISTOR 82, 10%, 1/4W	0184610001
R205	RESISTOR 5.6K, 10%, 1/4W	0183060008
R206	RESISTOR 390, 10%, 1/4W	0178330001
R207	RESISTOR 82, 10%, 1/4W	0184610001
R208	RESISTOR 100, 5%, 1/4W	0171180003
R209	RESISTOR 82, 10%, 1/4W	0184610001
R210	RESISTOR 390, 10%, 1/4W	0178330001
R211	RESISTOR 2.7K, 10%, 1/4W	0186670001
R213	RESISTOR 27K, 10%, 1/4W	0171200004
R214	RESISTOR 100, 5%, 1/4W	0171180003
R215	RESISTOR 100, 5%, 1/4W	0171180003
R216	RESISTOR 180, 10%, 1/4W	0175220000
R217	RESISTOR 47, 10%, 1/4W	0179360001
R218	RESISTOR 1.8K, 10%, 1/4W	0178190004
R219	RESISTOR 6.8K, 5%, 1/4W	0174810008
R220	RESISTOR 10K, 10%, 1/4W	0170410005
R221	RESISTOR 1K, 10%, 1/4W	0171560001
R222	RESISTOR 47K, 10%, 1/4W	0171060008
R223	RESISTOR 4.7K, 5%, 1/4W	0170770001
R224	RESISTOR 10K, 10%, 1/4W	0170410005
R225	RESISTOR 10K, 10%, 1/4W	0170410005
R226	RESISTOR 10K, 10%, 1/4W	0170410005
R227	RESISTOR 1K, 10%, 1/4W	0171560001
R228	RESISTOR 47, 10%, 1/4W	0179360001

Figure 5.9.8 PC Assembly, RT-2410 Synthesizer, 1A2A2, page 4/14.

R229	RESISTOR	47K, 10%, 1/4W	0171060008
R230	RESISTOR	100, 5%, 1/4W	0171180003
R231	RESISTOR	1.8K, 10%, 1/4W	0178190004
R232	RESISTOR	100, 5%, 1/4W	0171180003
R233	RESISTOR	47, 10%, 1/4W	0179360001
R234	RESISTOR	1K, 10%, 1/4W	0171560001
R235	RESISTOR	10K, 10%, 1/4W	0170410005
R236	RESISTOR	1.8K, 10%, 1/4W	0178190004
R237	RESISTOR	47K, 10%, 1/4W	0171060008
R238	RESISTOR	10K, 10%, 1/4W	0170410005
R239	RESISTOR	10K, 10%, 1/4W	0170410005
R240	RESISTOR	47K, 10%, 1/4W	0171060008
R241	RESISTOR	1.8K, 10%, 1/4W	0178190004
R242	RESISTOR	10K, 10%, 1/4W	0170410005
R243	RESISTOR	1K, 10%, 1/4W	0171560001
R244	RESISTOR	47, 10%, 1/4W	0179360001
R245	RESISTOR	1K, 10%, 1/4W	0171560001
R246	RESISTOR	100, 5%, 1/4W	0171180003
R247	RESISTOR	270, 10%, 1/4W	0178450006
R254	RESISTOR	4.7K, 5%, 1/4W	0170770001
R255	RESISTOR	4.7K, 5%, 1/4W	0170770001
R256	RESISTOR	4.7K, 5%, 1/4W	0170770001
R257	RESISTOR	4.7K, 5%, 1/4W	0170770001
R258	RESISTOR	4.7K, 5%, 1/4W	0170770001
R259	RESISTOR	4.7K, 5%, 1/4W	0170770001
R260	RESISTOR	4.7K, 5%, 1/4W	0170770001
R261	RESISTOR	4.7K, 5%, 1/4W	0170770001
R262	RESISTOR	47, 10%, 1/4W	0179360001
R263	RESISTOR	10K, 10%, 1/4W	0170410005
R401	RESISTOR	4.7K, 5%, 1/8W	1010804723
R402	RESISTOR	5.6K, 5%, 1/8W	1010805622
R403	RESISTOR	10K, 5%, 1/8W	1010801031
R404	RESISTOR	68K, 5%, 1/8W	1010806831
R405	RESISTOR	270, 5%, 1/8W	1010802712
R406	RESISTOR	270, 5%, 1/8W	1010802712
R407	RESISTOR	18, 5%, 1/8W	1010801805
R408	RESISTOR	270, 5%, 1/8W	1010802712
R409	RESISTOR	220, 5%, 1/8W	1010802216
R410	RESISTOR	100, 5%, 1/8W	1010801015
R411	RESISTOR	100, 5%, 1/8W	1010801015
R412	RESISTOR	220, 5%, 1/8W	1010802216
R414	RESISTOR	18, 5%, 1/8W	1010801805
R415	RESISTOR	270, 5%, 1/8W	1010802712
R416	RESISTOR	10K, 5%, 1/8W	1010801031
R417	RESISTOR	3.3K, 5%, 1/8W	1010803328
R418	RESISTOR	100, 5%, 1/8W	1010801015
R419	RESISTOR	10, 5%, 1/8W	1010801007
R420	RESISTOR	18, 5%, 1/8W	1010801805
R421	RESISTOR	270, 5%, 1/8W	1010802712

R422	RESISTOR	100, 5%, 1/8W	1010801015
R424	RESISTOR	680, 5%, 1/8W	1010806815
R425	RESISTOR	270, 5%, 1/8W	1010802712
R426	RESISTOR	100, 5%, 1/8W	1010801015
R427	RESISTOR	100K, 5%, 1/8W	1010801040
R428	RESISTOR	18, 5%, 1/8W	1010801805
R429	RESISTOR	100, 5%, 1/8W	1010801015
R430	RESISTOR	270, 5%, 1/8W	1010802712
R431	RESISTOR	180, 5%, 1/8W	1010801813
R432	RESISTOR	270, 5%, 1/8W	1010802712
R433	RESISTOR	6.8K, 5%, 1/8W	1010806823
R434	RESISTOR	270, 5%, 1/8W	1010802712
R435	RESISTOR	4.7K, 5%, 1/8W	1010804723
R436	RESISTOR	3.3K, 5%, 1/8W	1010803328
R437	RESISTOR	3.3K, 5%, 1/8W	1010803328
R438	RESISTOR	100, 5%, 1/4W	0171180003
R439	RESISTOR	18, 5%, 1/8W	1010801805
R440	RESISTOR	270, 5%, 1/8W	1010802712
R441	RESISTOR	270, 5%, 1/8W	1010802712
R442	RESISTOR	100, 5%, 1/8W	1010801015
R443	RESISTOR	470, 5%, 1/8W	1010804715
R444	RESISTOR	3.3K, 5%, 1/8W	1010803328
R445	RESISTOR	2.7K, 5%, 1/8W	1010802721
R446	RESISTOR	10K, 5%, 1/8W	1010801031
R447	RESISTOR	3.3K, 5%, 1/8W	1010803328
R448	RESISTOR	5.6K, 5%, 1/8W	1010805622
R449	RESISTOR	2.7K, 5%, 1/8W	1010802721
R450	RESISTOR	470, 5%, 1/8W	1010804715
R451	RESISTOR	2.7K, 5%, 1/8W	1010802721
R452	RESISTOR	390, 5%, 1/8W	1010803913
R453	RESISTOR	270, 5%, 1/8W	1010802712
R454	RESISTOR	18, 5%, 1/8W	1010801805
R455	RESISTOR	4.7K, 5%, 1/8W	1010804723
R456	RESISTOR	270, 5%, 1/8W	1010802712
R457	RESISTOR	390, 5%, 1/8W	1010803913
R458	RESISTOR	10, 5%, 1/8W	1010801007
R459	RESISTOR	10, 5%, 1/8W	1010801007
R460	RESISTOR	220, 5%, 1/8W	1010802216
R461	RESISTOR	390, 5%, 1/8W	1010803913
R462	RESISTOR	220, 5%, 1/8W	1010802216
R463	RESISTOR	6.8K, 5%, 1/8W	1010806823
R464	RESISTOR	6.8K, 5%, 1/8W	1010806823
R465	RESISTOR	10, 5%, 1/8W	1010801007
R466	RESISTOR	4.7K, 5%, 1/8W	1010804723
R467	RESISTOR	4.7K, 5%, 1/8W	1010804723
R468	RESISTOR	150, 5%, 1/8W	1010801511
R469	RESISTOR	6.8K, 5%, 1/8W	1010806823
R470	RESISTOR	18K, 5%, 1/8W	1010801830
R471	RESISTOR	470, 5%, 1/8W	1010804715

Figure 5.9.8 PC Assembly, RT-2410 Synthesizer, 1A2A2, page 5/14.

R472	RESISTOR	100,	5%,	1/8W	1010801015
R473	RESISTOR	1.2K,	5%,	1/8W	1010801228
R474	RESISTOR	270,	5%,	1/8W	1010802712
R475	RESISTOR	270,	10%,	1/4W	0178450006
R478	RESISTOR	270,	10%,	1/4W	0178450006
R481	RESISTOR	0.0,	0%,	1/4W	1011600021
R482	RESISTOR	0.0,	0%,	1/4W	1011600021
R483	RESISTOR	4.7K,	5%,	1/8W	1010804723
R484	RESISTOR	4.7K,	5%,	1/8W	1010804723
R601	RESISTOR	10K,	5%,	1/8W	1010801031
R602	RESISTOR	5.6K,	5%,	1/8W	1010805622
R603	RESISTOR	1.2K,	5%,	1/8W	1010801228
R604	RESISTOR	1.2K,	5%,	1/8W	1010801228
R605	RESISTOR	4.7K,	5%,	1/8W	1010804723
R606	RESISTOR	3.3K,	5%,	1/8W	1010803328
R607	RESISTOR	100,	5%,	1/8W	1010801015
R608	RESISTOR	10K,	5%,	1/8W	1010801031
R609	RESISTOR	100K,	5%,	1/8W	1010801040
R610	RESISTOR	100,	5%,	1/8W	1010801015
R611	RESISTOR	470,	5%,	1/8W	1010804715
R612	RESISTOR	470,	5%,	1/8W	1010804715
R613	RESISTOR	18K,	5%,	1/8W	1010801830
R614	RESISTOR	2.2K,	5%,	1/8W	1010802224
R615	RESISTOR	10,	5%,	1/8W	1010801007
R616	RESISTOR	2.2K,	5%,	1/8W	1010802224
R617	RESISTOR	4.7K,	5%,	1/8W	1010804723
R618	RESISTOR	10K,	5%,	1/8W	1010801031
R619	RESISTOR	12K,	5%,	1/8W	1010801236
R620	RESISTOR	10K,	5%,	1/8W	1010801031
R621	RESISTOR	120,	5%,	1/8W	1010801210
R622	RESISTOR	10K,	5%,	1/8W	1010801031
R623	RESISTOR	100K,	5%,	1/8W	1010801040
R624	RESISTOR	12K,	5%,	1/8W	1010801236
R625	RESISTOR	10K,	5%,	1/8W	1010801031
R626	RESISTOR	4.7K,	5%,	1/8W	1010804723
R627	RESISTOR	33,	5%,	1/8W	1010803301
R628	RESISTOR	560,	5%,	1/8W	1010805614
R629	RESISTOR	180,	5%,	1/8W	1010801813
R630	RESISTOR	560,	5%,	1/8W	1010805614
R631	RESISTOR	560,	5%,	1/8W	1010805614
R632	RESISTOR	33,	5%,	1/8W	1010803301
R633	RESISTOR	560,	5%,	1/8W	1010805614
R634	RESISTOR	100,	5%,	1/8W	1010801015
R635	RESISTOR	2100,	1%,	1/8W	1011790009
R636	RESISTOR	243,	1%,	1/8W	1011800004
R637	RESISTOR	270,	10%,	1/4W	0178450006
R801	RESISTOR	270,	5%,	1/8W	1010802712
R802	RESISTOR	560,	5%,	1/8W	1010805614
R803	RESISTOR	5.6K,	5%,	1/8W	1010805622

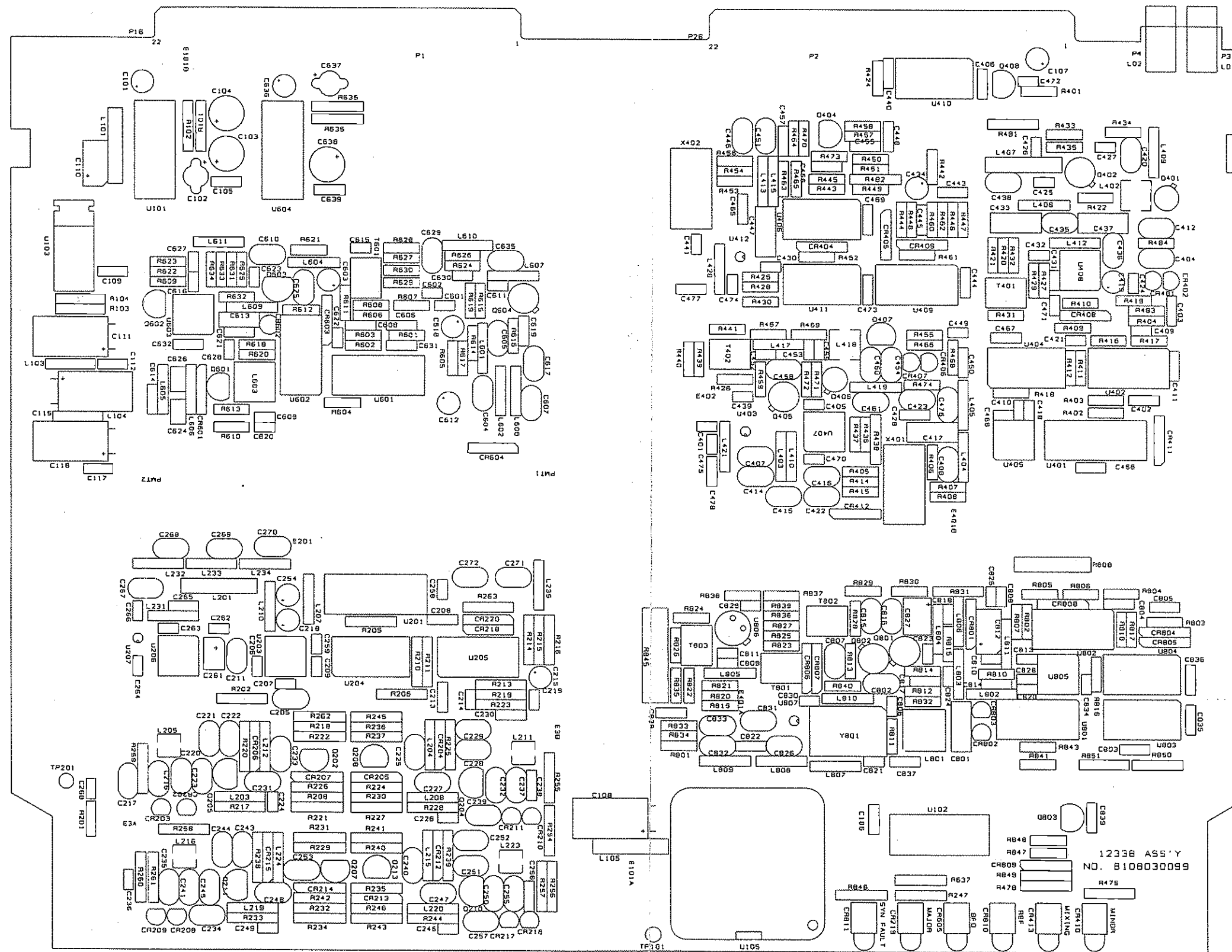
R804	RESISTOR	1.8K,	5%,	1/8W	1010801821
R805	RESISTOR	560,	5%,	1/8W	1010805614
R806	RESISTOR	10K,	5%,	1/8W	1010801031
R807	RESISTOR	10,	5%,	1/8W	1010801007
R808	RESISTOR	820,	10%,	1/2W	0175600007
R810	RESISTOR	2.7K,	5%,	1/8W	1010802721
R811	RESISTOR	2.7K,	5%,	1/8W	1010802721
R812	RESISTOR	5.6K,	5%,	1/8W	1010805622
R813	RESISTOR	330,	5%,	1/8W	1010803310
R814	RESISTOR	47,	5%,	1/8W	1010804707
R815	RESISTOR	5.6K,	5%,	1/8W	1010805622
R816	RESISTOR	3.3K,	5%,	1/8W	1010803328
R817	RESISTOR	1.8K,	5%,	1/8W	1010801821
R818	RESISTOR	1.8K,	5%,	1/8W	1010801821
R819	RESISTOR	560,	5%,	1/8W	1010805614
R820	RESISTOR	33,	5%,	1/8W	1010803301
R821	RESISTOR	560,	5%,	1/8W	1010805614
R822	RESISTOR	150,	5%,	1/8W	1010801511
R823	RESISTOR	560,	5%,	1/8W	1010805614
R824	RESISTOR	560,	5%,	1/8W	1010805614
R825	RESISTOR	33,	5%,	1/8W	1010803301
R826	RESISTOR	33,	5%,	1/8W	1010803301
R827	RESISTOR	560,	5%,	1/8W	1010805614
R828	RESISTOR	270,	5%,	1/8W	1010802712
R829	RESISTOR	18,	5%,	1/8W	1010801805
R830	RESISTOR	270,	5%,	1/8W	1010802712
R831	RESISTOR	47,	10%,	1/4W	0179360001
R832	RESISTOR	5.6K,	5%,	1/8W	1010805622
R833	RESISTOR	270,	5%,	1/8W	1010802712
R834	RESISTOR	18,	5%,	1/8W	1010801805
R835	RESISTOR	560,	5%,	1/8W	1010805614
R836	RESISTOR	150,	5%,	1/8W	1010801511
R837	RESISTOR	68,	5%,	1/8W	1010806807
R838	RESISTOR	270,	5%,	1/8W	1010802712
R839	RESISTOR	270,	5%,	1/8W	1010802712
R840	RESISTOR	68,	5%,	1/8W	1010806807
R841	RESISTOR	10K,	5%,	1/8W	1010801031
R843	RESISTOR	10K,	5%,	1/8W	1010801031
R845	RESISTOR	120,	10%,	1W	0197600000
R846	RESISTOR	270,	10%,	1/4W	0178450006
R847	RESISTOR	10K,	5%,	1/8W	1010801031
R848	RESISTOR	47K,	5%,	1/8W	1010804731
R849	RESISTOR	270,	10%,	1/4W	0178450006
R850	RESISTOR	0.0,	0%,	1/4W	1011600021
R851	RESISTOR	0.0,	0%,	1/4W	1011600021
T401	TRANSFORMER, RF,	4:1			1010860003
T402	TRANSFORMER, RF,	4:1			1010860003
T601	TRANSFORMER, RF,	4:1			1010860003
T801	TRANSFORMER, RF,	4:1			1010860003

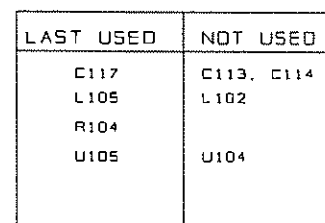
Figure 5.9.8 PC Assembly, RT-2410 Synthesizer, 1A2A2, page 6/14.

T802	TRANSFORMER, RF, 4:1	1010860003
T803	TRANSFORMER, RF, 4:1	1010860003
TP101	TEST POINT, RED	1011130033
TP102	TEST POINT, RED	1011130033
U101	IC. LINEAR LM317T	1006920013
U102	IC. LINEAR LM340T5	0448600005
U103	IC. LINEAR, VOL REG LM2941T	1010950037
U105	TCXO, 5MHZ	8108031001
U201	IC. DIGITAL MC145146P	1007070005
U203	IC. DIGITAL SP8716	1010890000
U204	IC. DIGITAL 7404	1003950001
U205	IC. LINEAR CA3096	1005860033
U206	IC. DIGITAL UPB582C	1011110032
U207	IC. LINEAR MAR-4	1010900005
U401	IC. DIGITAL MC145146P	1007070005
U402	IC. LINEAR CA3096	1005860033
U403	IC. LINEAR MAR-3	1012310019
U404	IC. DIGITAL 74HC04	1010280023
U405	IC. DIGITAL SP8793	1007090031
U406	IC. DIGITAL 74LS00	1005500029
U407	IC. DIGITAL SP8660	1010790013
U408	IC. DIGITAL SP8629	1007090022
U409	IC. LINEAR CA3096	1005860033
U410	IC. DIGITAL 4047B	1012190030
U411	IC. DIGITAL 74LS74A	1003323600
U412	IC. LINEAR MAR-4	1010900005
U601	IC. DIGITAL MC145145	1007100001
U602	IC. LINEAR CA3096	1005860033
U603	IC. DIGITAL SP8792A	1007100028
U604	IC. LINEAR LM317T	1006920013
U801	IC. DIGITAL 74LS192	1010770012
U802	IC. LINEAR CA3096	1005860033
U803	IC. DIGITAL 74LS00	1005500029
U804	IC. DIGITAL 74LS74A	1003323600
U805	IC. DIGITAL SP8793	1007090031
U806	IC. LINEAR MWA130	1010380036
U807	IC. LINEAR MAR-3	1012310019
X401	MIXER, BROADBAND SBL-1	1003300006
X402	MIXER, BROADBAND SBL-1	1003300006
Y801	CRYSTAL, 40MHZ, HC-18/U	1007100036
	EXTRACTOR, PC ASSY	8108051703
	MOUNTING PLATE, SYNTHESIZER	8108030803

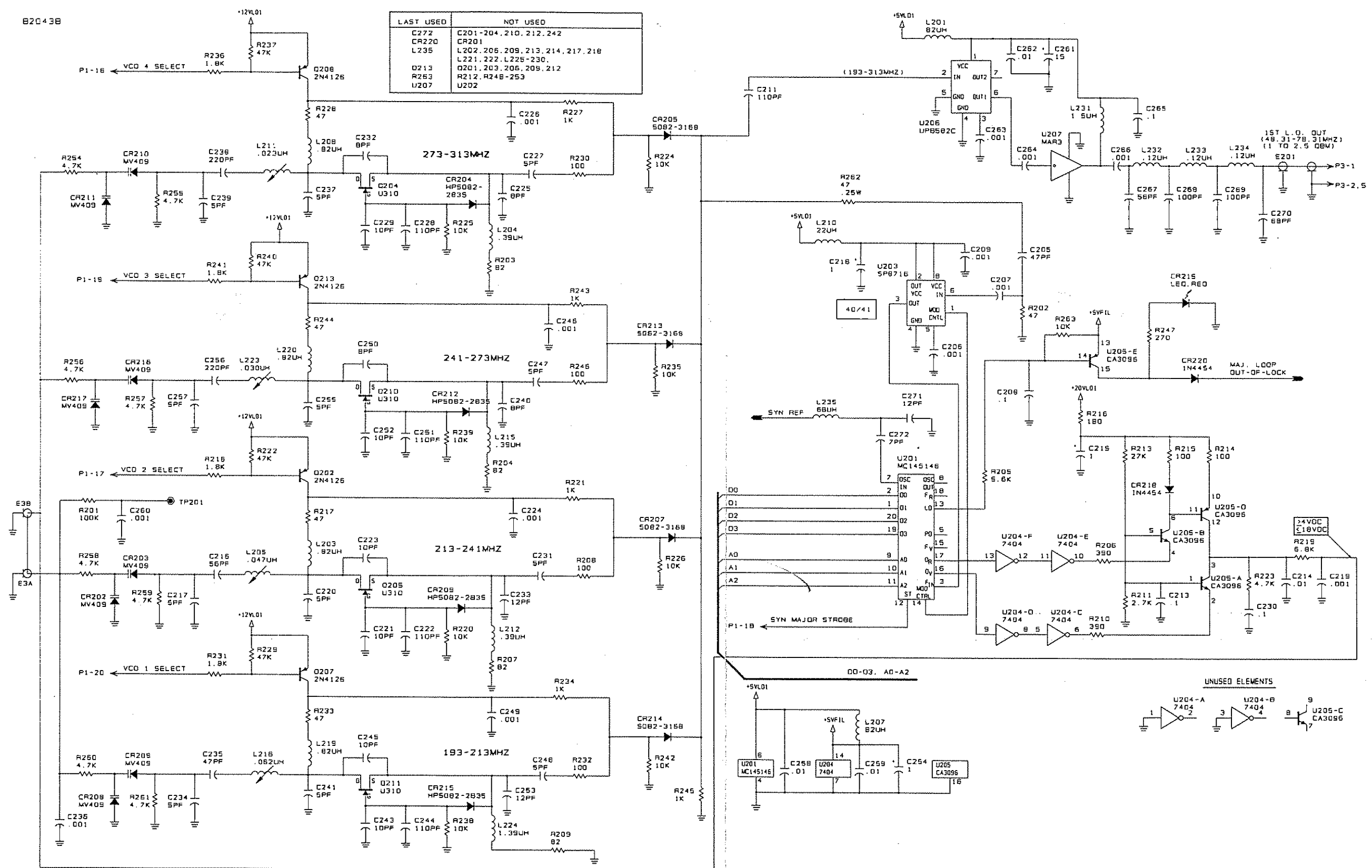
Figure 5.9.8 PC Assembly, RT-2410 Synthesizer, 1A2A2, page 7/14.

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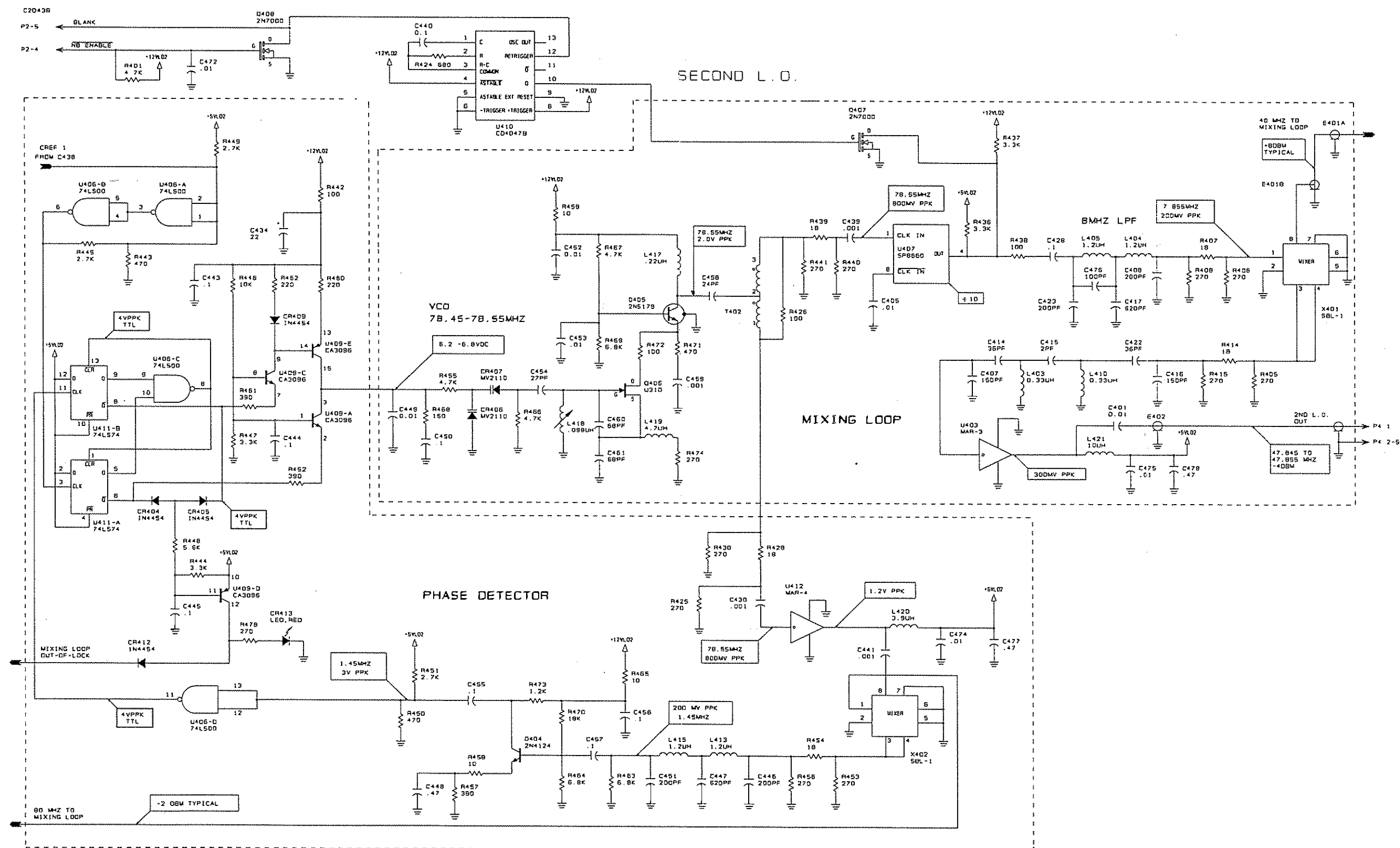


Figure 5.9.8 PC Assembly, RT-2410 Synthesizer, 1A2A2, page 11/14.

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SECOND L.O.

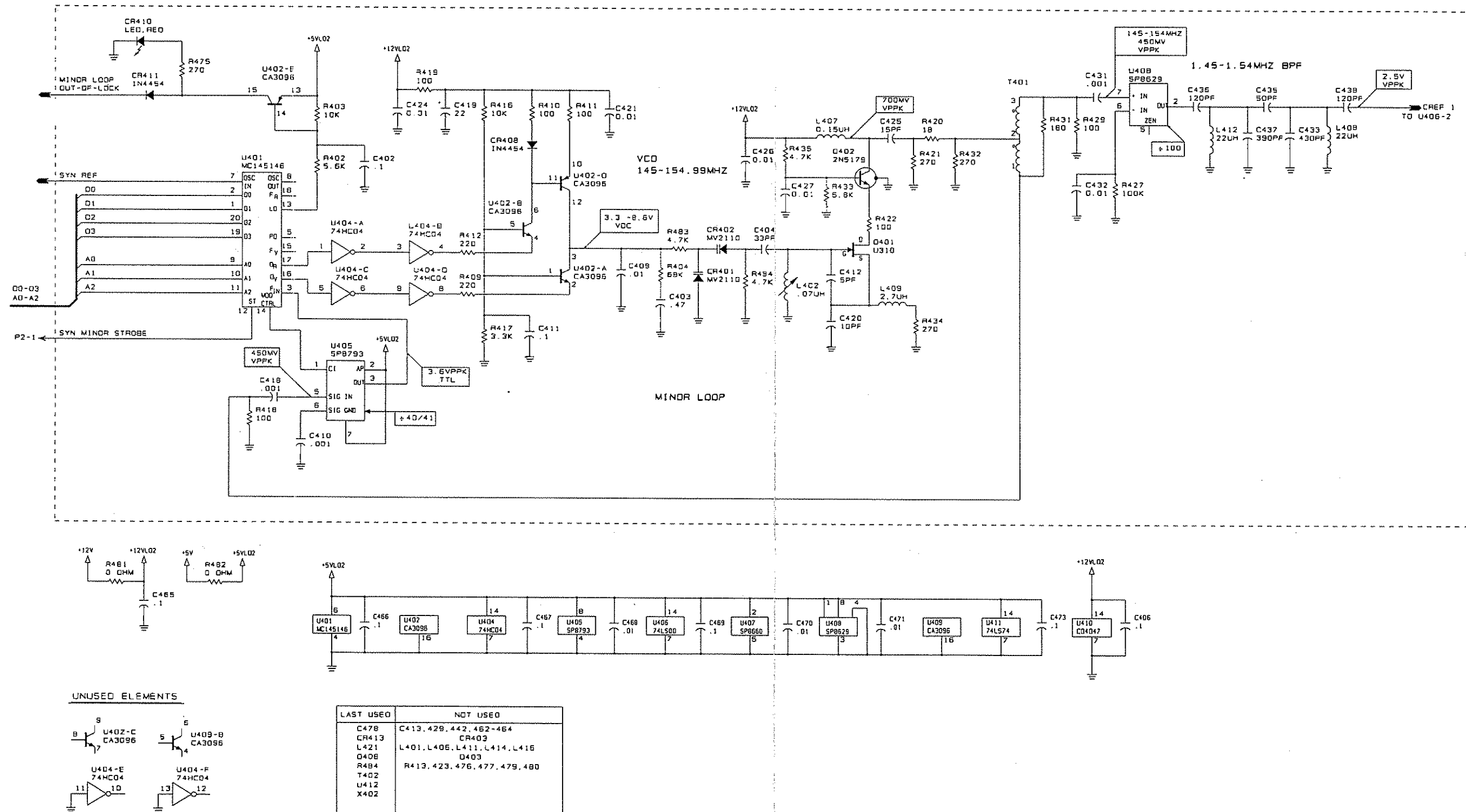


Figure 5.9.8 PC Assembly, RT-2410 Synthesizer, 1A2A2, page 12/14.

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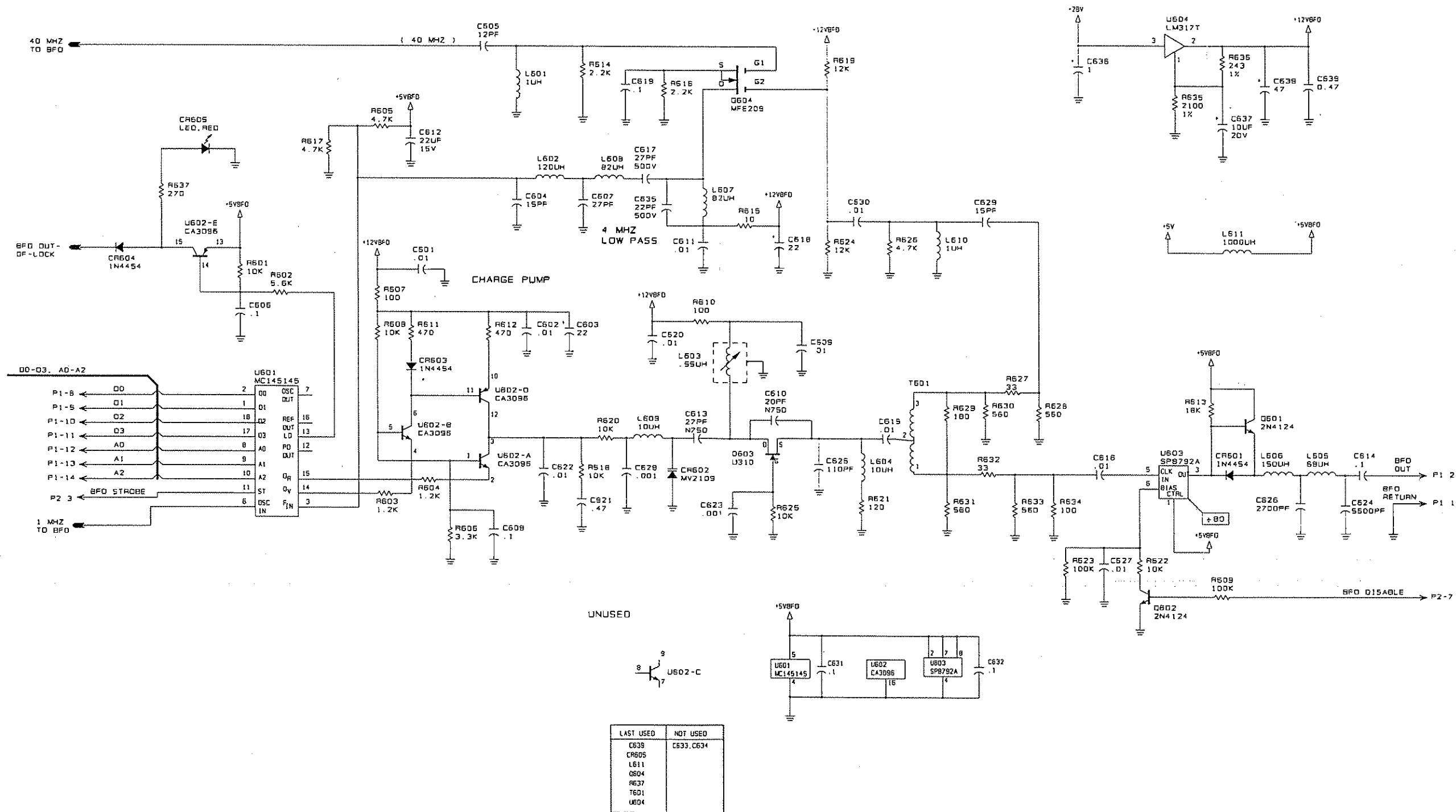
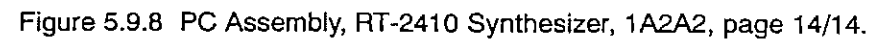


Figure --- PC Assembly, RT-2410 Synthesizer, 1A2A2, page 13/14.



C405	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C406	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C407	CAP.	3.3UF,	35V	0281680001
C408	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C409	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C410	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C411	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C412	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C413	CAP.	0.001UF,	100V, X7R, 20%	0281630003
C414	CAP.	47UF,	20V	0281700001
C415	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C416	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C417	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C418	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C419	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C420	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C421	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C422	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C423	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C424	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C425	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C426	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C427	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C428	CAP.	10UF,	20V	1007290005
C429	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C430	CAP.	10UF,	20V	1007290005
C431	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C432	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C433	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C434	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C435	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C436	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C437	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C438	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C439	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C440	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C441	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C442	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C443	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C444	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C445	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C446	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C447	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C448	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C449	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C450	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C451	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C452	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C453	CAP.	0.01UF,	50V, X7R, 20%	0281730008

C454	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C455	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C456	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C457	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C458	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C459	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C460	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C461	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C462	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C463	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C464	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C465	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C466	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C467	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C468	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C469	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C470	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C471	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C601	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C602	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C603	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C604	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C605	CAP.	22UF,	15V	0281690006
C606	CAP.	47UF,	20V	0281700001
C607	CAP.	10UF,	20V	1007290005
C608	CAP.	22UF,	15V	0281690006
C609	CAP.	47UF,	20V	0281700001
C610	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C611	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C612	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C613	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C614	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C615	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C616	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C617	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C618	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C619	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C620	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C621	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C622	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C623	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C624	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C625	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C626	CAP.	0.01UF,	50V, X7R, 20%	0281730008
C627	CAP.	0.47UF,	50V, X7R, 20%	0283377771
C628	CAP.	1UF,	35V	0283630001
C629	CAP.	0.01UF,	50V, X7R, 20%	0281730008
CR301	DIODE, SIGNAL, GERM.	1N270		0405510004
CR302	DIODE, SIGNAL, SIL.	1N4454		0405270003

Figure 5.9.9 PC Assembly, RT-2410 CPU, 1A2A3, page 2/12.

CR303	DIODE, LED, RED	550-2405	1008480029
CR304	DIODE, RECTIFIER	1N4004	0405180004
CR401	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR402	DIODE, TRANSIENT SUPR.	TVS505	1010720007
CR403	DIODE, ZENER	1N5227B	0405250002
FB401	BEAD, FERRITE .200OD,.437LG		1010910019
FB402	FERRITE BEAD, 5000 PERM		1010980017
FB601	FERRITE BEAD, 850 PERM		1010410032
FB602	FERRITE BEAD, 850 PERM		1010410032
FB603	FERRITE BEAD, 850 PERM		1010410032
FB604	FERRITE BEAD, 850 PERM		1010410032
J1	CONNECTOR, HEADER, 26 PIN MALE		1010810022
L201	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L202	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L203	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L204	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L205	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L206	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L207	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L208	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L209	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L210	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L401	INDUCTOR, MOLDED, 33UH, 5%		0646300008
L402	INDUCTOR, MOLDED, 33UH, 5%		0646300008
L403	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L404	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L405	INDUCTOR, MOLDED, 33UH, 5%		0659690004
L601	INDUCTOR, MOLDED, 8.2UH, 5%		0652060005
L602	INDUCTOR, MOLDED, 8.2UH, 5%		0652060005
Q301	TRANSISTOR, NPN, SI.	2N4124	0448010003
Q302	TRANSISTOR, NPN, SI.	2N4124	0448010003
R101	RESISTOR 10K, 10%, 1/4W		0170410005
R102	RESISTOR 470, 5%, 1/4W		0184110009
R103	RESISTOR 10K, 10%, 1/4W		0170410005
R104	RESISTOR 15, 10%, 1/4W		0181740001
R105	RESISTOR 1K, 10%, 1/4W		0171560001
R301	RESISTOR 2.2K, 5%, 1/4W		0178070009
R302	RESISTOR 2.2K, 5%, 1/4W		0178070009
R303	RESISTOR 2.2K, 5%, 1/4W		0178070009
R304	RESISTOR 2.2K, 5%, 1/4W		0178070009
R305	RESISTOR 2.2K, 5%, 1/4W		0178070009
R306	RESISTOR 2.2K, 5%, 1/4W		0178070009
R307	RESISTOR 2.2K, 5%, 1/4W		0178070009
R308	RESISTOR 680, 10%, 1/4W		0176630007
R309	RESISTOR 10K, 10%, 1/4W		0170410005
R310	RESISTOR 10K, 10%, 1/4W		0170410005
R311	RESISTOR 22K, 5%, 1/4W		0172230004
R312	RESISTOR 10K, 10%, 1/4W		0170410005
R313	RESISTOR 220, 10%, 1/4W		0171320000

R314	RESISTOR 470, 5%, 1/4W		0184110009
R315	RESISTOR 22K, 5%, 1/4W		0172230004
R316	RESISTOR 10K, 10%, 1/4W		0170410005
R317	RESISTOR 10K, 10%, 1/4W		0170410005
R318	RESISTOR 10, 5%, 1/4W		0177160004
R319	RESISTOR 1M, 10%, 1/4W		0170650006
R320	RESISTOR 4.7K, 5%, 1/4W		0170770001
R321	RESISTOR 3.9K, 10%, 1/4W		0178830003
R401	RESISTOR 5.11K, 1%, 1/8W		1003120016
R402	RESISTOR 28K, 1%, 1/8W		1004050038
R403	RESISTOR 22K, 5%, 1/4W		0172230004
R404	RESISTOR 1.91K, 1%, 1/8W		1008530018
R405	RESISTOR 6.81K, 1%, 1/8W		0196350000
R406	RESISTOR 1.91K, 1%, 1/8W		1008530018
R407	RESISTOR 6.81K, 1%, 1/8W		0196350000
R408	RESISTOR 10K, 1%, 1/8W		1003050026
R409	RESISTOR 10K, 1%, 1/8W		1003050026
R410	RESISTOR 1.91K, 1%, 1/8W		1008530018
R411	RESISTOR 6.81K, 1%, 1/8W		0196350000
R412	RESISTOR 1K, 10%, 1/4W		0171560001
R413	RESISTOR 7.87K, 1%, 1/8W		1004090021
R414	RESISTOR 6.81K, 1%, 1/8W		0196350000
R501	RESISTOR 100K, 10%, 1/4W		0170390004
R502	RESISTOR 100K, 10%, 1/4W		0170390004
R503	RESISTOR 10K, 10%, 1/4W		0170410005
R505	RESISTOR 10K, 10%, 1/4W		0170410005
R601	RESISTOR 10K, 10%, 1/4W		0170410005
R602	RESISTOR 560, 5%, 1/8W		1010805614
R605	RESISTOR 0.0, 0%, 1/4W		1011600021
R607	RESISTOR 0.0, 0%, 1/4W		1011600021
R609	RESISTOR 0.0, 0%, 1/4W		1011600021
RP101	RES NTWK 10 PIN SIP 10K COM		1006130021
RP102	RES NTWK 10 PIN SIP 10K COM		1006130021
RP103	RES NTWK 10 PIN SIP 10K COM		1006130021
RP104	RES NTWK 10 PIN SIP 10K COM		1006130021
RP105	RES NTWK 10 PIN SIP 10K COM		1006130021
RP106	RES NTWK 10 PIN SIP 10K COM		1006130021
RP107	RES NTWK 10 PIN SIP 22K COM		1006570012
RP108	RES NTWK 10 PIN SIP 680 COM		1010640003
RP201	RES NTWK 10 PIN SIP 680 COM		1010640003
RP202	RES NTWK 10 PIN SIP 680 COM		1010640003
RP203	RES NTWK 10 PIN SIP 680 COM		1010640003
RP204	RES NTWK 10 PIN SIP 10K COM		1006130021
RP205	RES NTWK 10 PIN SIP 680 COM		1010640003
RP206	RES NTWK 10 PIN SIP 680 COM		1010640003
RP207	RES NTWK 10 PIN SIP 680 COM		1010640003
RP301	RES NTWK 10 PIN SIP 10K COM		1006130021
RP301	RES NTWK 10 PIN SIP 10K COM		1006130021
RP302	RES NTWK 10 PIN SIP 10K COM		1006130021

Figure 5.9.9 PC Assembly, RT-2410 CPU, 1A2A3, page 3/12.

RP303	RES NTKW 10 PIN SIP 10K COM	1006130021
RP304	RES NTKW 10 PIN SIP 680 COM	1010640003
RP501	RES NTKW 10 PIN SIP 10K COM	1006130021
RP502	RES NTKW 10 PIN SIP 10K COM	1006130021
S101	SWITCH, SPST, ROCKER DIP	1010210025
U101	IC. DIGITAL 80C85A	1007400013
U102	IC. DIGITAL 74HC244	1006460039
U103	IC. DIGITAL 74HC244	1006460039
U104	IC. DIGITAL 74HC139	1006770038
U105	IC. DIGITAL 74HC139	1006770038
U106	IC. DIGITAL 74HC08	1006490019
U107	IC. DIGITAL 74HC374	1006450033
U108	IC. DIGITAL 74HC245	1006470034
U109	IC. DIGITAL 74HC373	1006480030
U110	IC. DIGITAL 74HC244	1006460039
U111	IC. DIGITAL ADC0804	1010670000
U112	IC. DIGITAL 74HC244	1006460039
U113	IC. LINEAR MC34072	1011440032
U114	IC. DIGITAL 74HC245	1006470034
U115	IC. DIGITAL, RAM 6264	1010650009
U116	IC. DIGITAL 28C64	1010660004
U118	EPROM W/RT-2400 SOFTWARE, #1	8108042291
U119	IC. DIGITAL 74HC244	1006460039
U120	IC. DIGITAL 74HC374	1006450033
U121	IC. DIGITAL 4067B	1006800034
U122	IC. DIGITAL 2501-4	1010630008
U123	IC. DIGITAL 2501-4	1010630008
U201	IC. DIGITAL 74HC154	1010160028
U202	IC. DIGITAL 74HC154	1010160028
U203	IC. DIGITAL 74HC138	1006480013
U204	IC. DIGITAL 74HC374	1006450033
U205	IC. DIGITAL 74HC374	1006450033
U206	IC. DIGITAL 74HC374	1006450033
U207	IC. DIGITAL 74HC374	1006450033
U208	IC. DIGITAL 74HC374	1006450033
U209	IC. DIGITAL 74HC374	1006450033
U210	IC. DIGITAL 74HC374	1006450033
U211	IC. DIGITAL 74HC374	1006450033
U212	IC. DIGITAL 2501-4	1010630008
U213	IC. DIGITAL 2501-4	1010630008
U214	IC. DIGITAL 2501-4	1010630008
U215	IC. DIGITAL 74HC08	1006490019
U216	IC. DIGITAL 2501-4	1010630008
U217	IC. DIGITAL 2501-4	1010630008
U218	IC. DIGITAL UDN-2981	1006330038
U219	IC. DIGITAL 2501-4	1010630008
U220	IC. DIGITAL 2501-4	1010630008
U221	IC. DIGITAL 2501-4	1010630008
U222	IC. DIGITAL 2501-4	1010630008

U223	IC. DIGITAL 2501-4	1010630008
U224	IC. DIGITAL 2501-4	1010630008
U225	IC. DIGITAL 2501-4	1010630008
U226	IC. DIGITAL 74HC14	1006490027
U227	IC. DIGITAL 74HC00	1008190004
U228	IC. DIGITAL ULN2003A	1005630038
U301	IC. DIGITAL 2501-4	1010630008
U302	IC. DIGITAL 2501-4	1010630008
U303	IC. DIGITAL 74HC14	1006490027
U304	IC. DIGITAL 74HC14	1006490027
U305	IC. DIGITAL 74HC244	1006460039
U306	IC. DIGITAL 74HC14	1006490027
U307	IC. DIGITAL 8259A	1006800018
U308	IC. DIGITAL 74HC244	1006460039
U309	IC. DIGITAL 74HC244	1006460039
U310	IC. DIGITAL 74HC244	1006460039
U311	IC. DIGITAL 74HC244	1006460039
U312	IC. LINEAR 555	8043095329
U313	IC. DIGITAL 7417	1003870007
U314	IC. DIGITAL 74HC192	1010690001
U315	IC. DIGITAL 74HC74	1008000019
U316	IC. DIGITAL 74HC374	1006450033
U317	IC. DIGITAL 74HC4020	1012250032
U318	IC. DIGITAL 2501-4	1010630008
U319	IC. DIGITAL 2501-4	1010630008
U320	IC. DIGITAL 74HC4020	1012250032
U501	IC. DIGITAL 74HC04	1010280023
U502	IC. DIGITAL 74HC00	1008190004
U503	IC. DIGITAL 4078B	1010460030
U504	IC. DIGITAL 74HC32	1006470026
U505	IC. DIGITAL 74HC125	1008810011
U506	IC. DIGITAL 74HC32	1006470026
U507	IC. DIGITAL 74HC00	1008190004
U508	IC. DIGITAL 74HC374	1006450033
U509	IC. DIGITAL 74HC374	1006450033
U510	IC. DIGITAL 80C85A	1007400013
U511	IC. DIGITAL 74HC373	1006480030
U512	EPROM W/RT-2400 I/O SOFTWARE	8108044294
U513	IC. DIGITAL, RAM UPD446D	1006430008
U514	IC. DIGITAL 74HC138	1006480013
U515	CRYSTAL OSCILLATOR, 7.3728MHZ	1008850012
U601	IC. DIGITAL 2681	1008790010
U602	IC. DIGITAL ICL232	1010510011
U603	IC. LINEAR LM340T5	0448600005
U604	IC. DIGITAL 75176	1011100011
XU101	SOCKET, IC, 40 PIN TAILLESS	1006620010
XU115	SOCKET, IC, 28 PIN TAILLESS	1006620001
XU116	SOCKET, IC, 28 PIN TAILLESS	1006620001
XU118	SOCKET, IC, 28 PIN TAILLESS	1006620001

Figure 5.9.9 PC Assembly, RT-2410 CPU, 1A2A3, page 4/12.

XU510	SOCKET, IC, 40 PIN TAILLESS	1006620010
XU512	SOCKET, IC, 28 PIN TAILLESS	1006620001
	MOUNTING PLATE, CPU	8108040507
	EXTRACTOR, PC ASSY	8108051703
	KEY, POLARIZING	1008070033

Figure 5.9.9 PC Assembly, RT-2410 CPU, 1A2A3, page 5/12.

2042BP

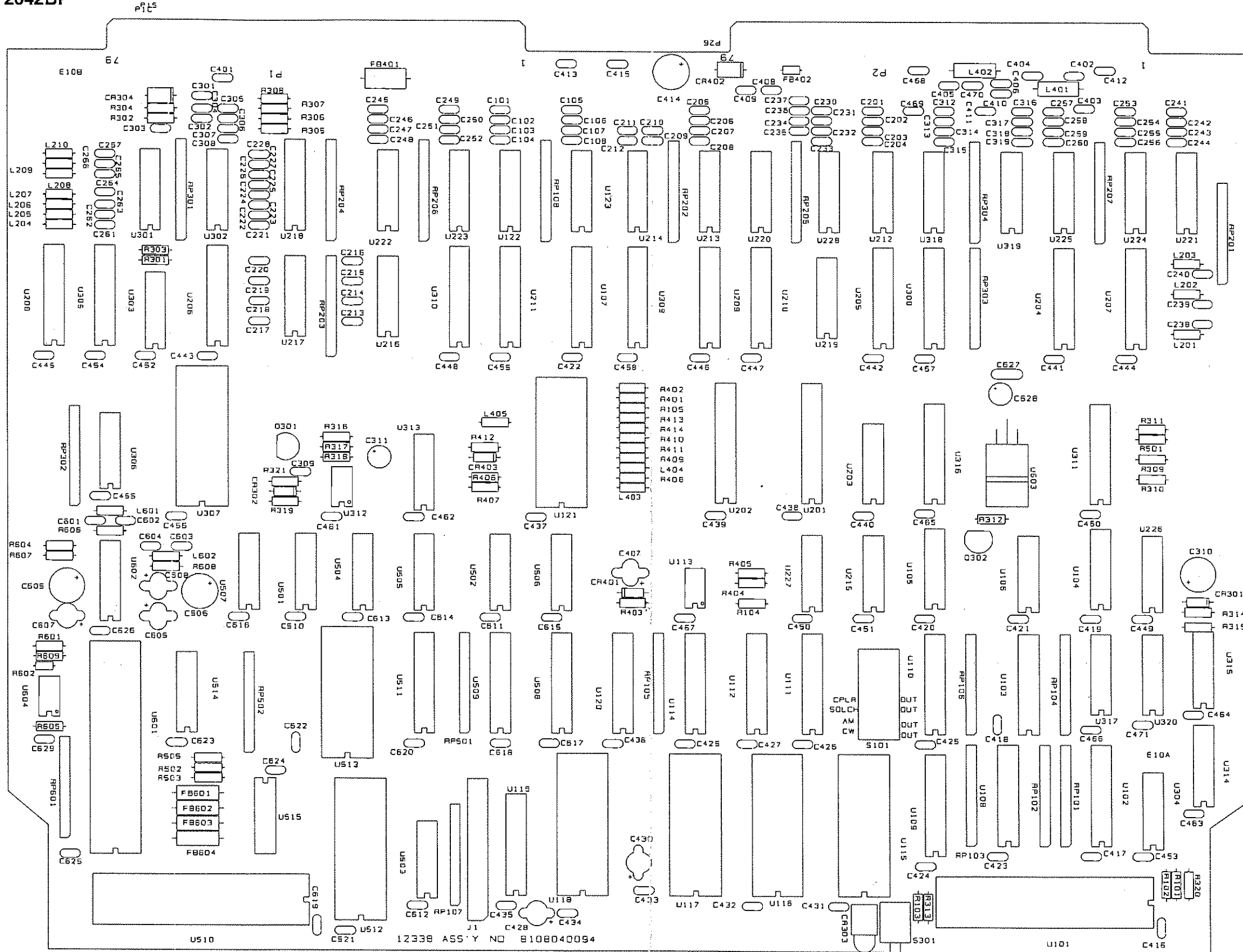


Figure 5.9.9 PC Assembly, RT-2410 CPU, 1A2A3, page 6/12.

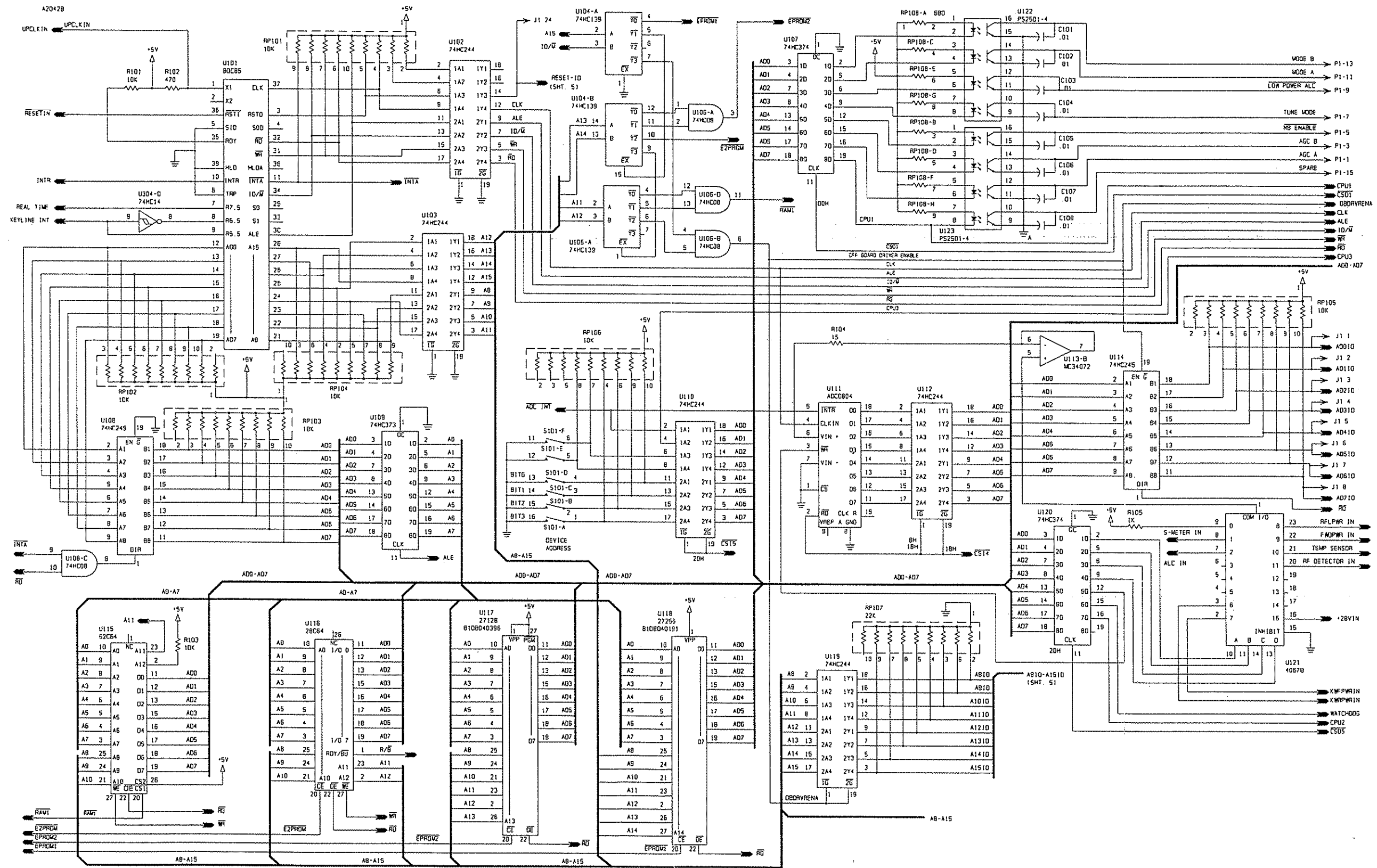


Figure 5.9.9 PC Assembly, RT-2410 CPU, 1A2A3, page 7/12.

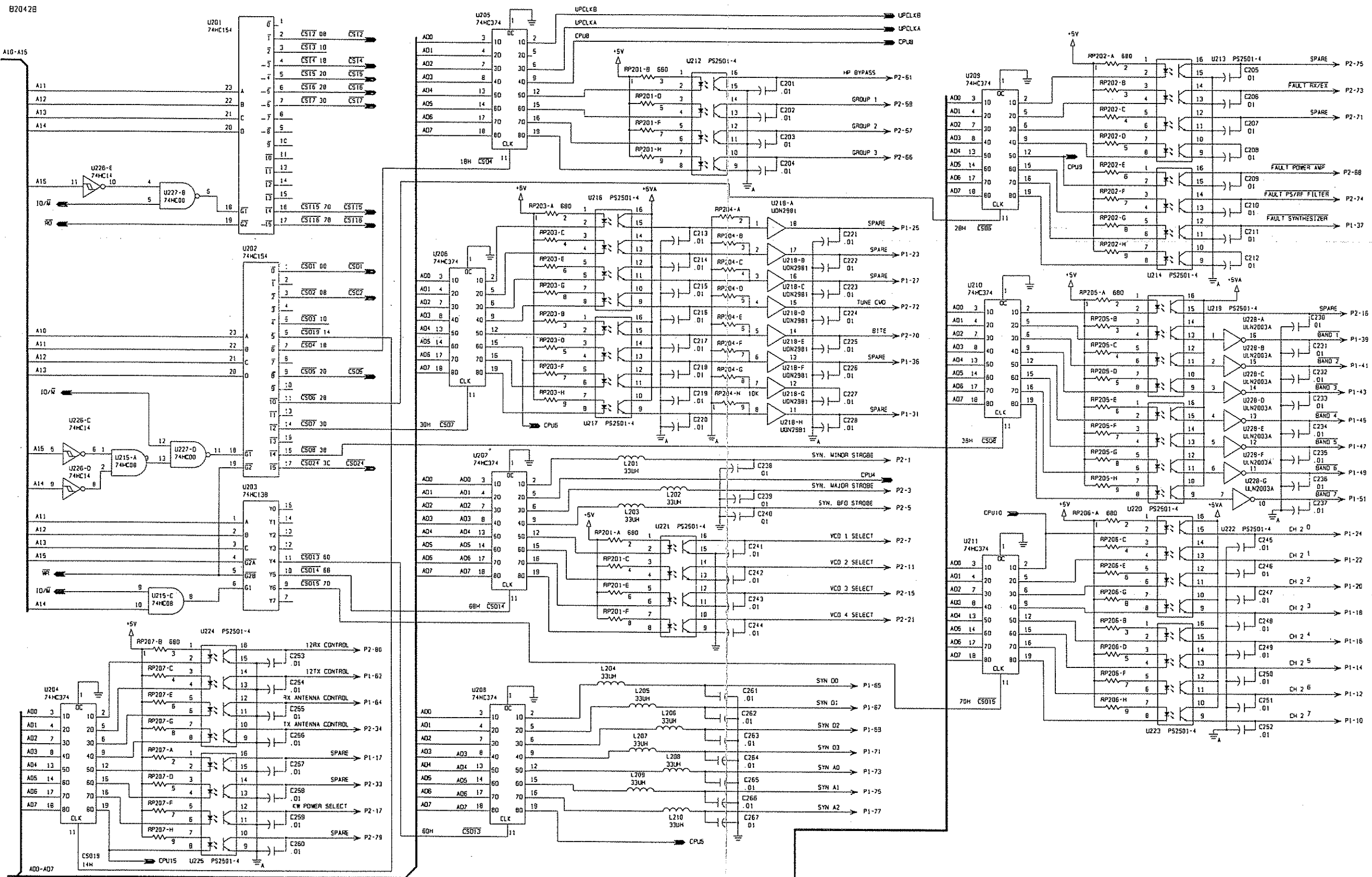


Figure 5.9.9 PC Assembly, RT-2410 CPU, 1A2A3, page 8/12.

C2D428

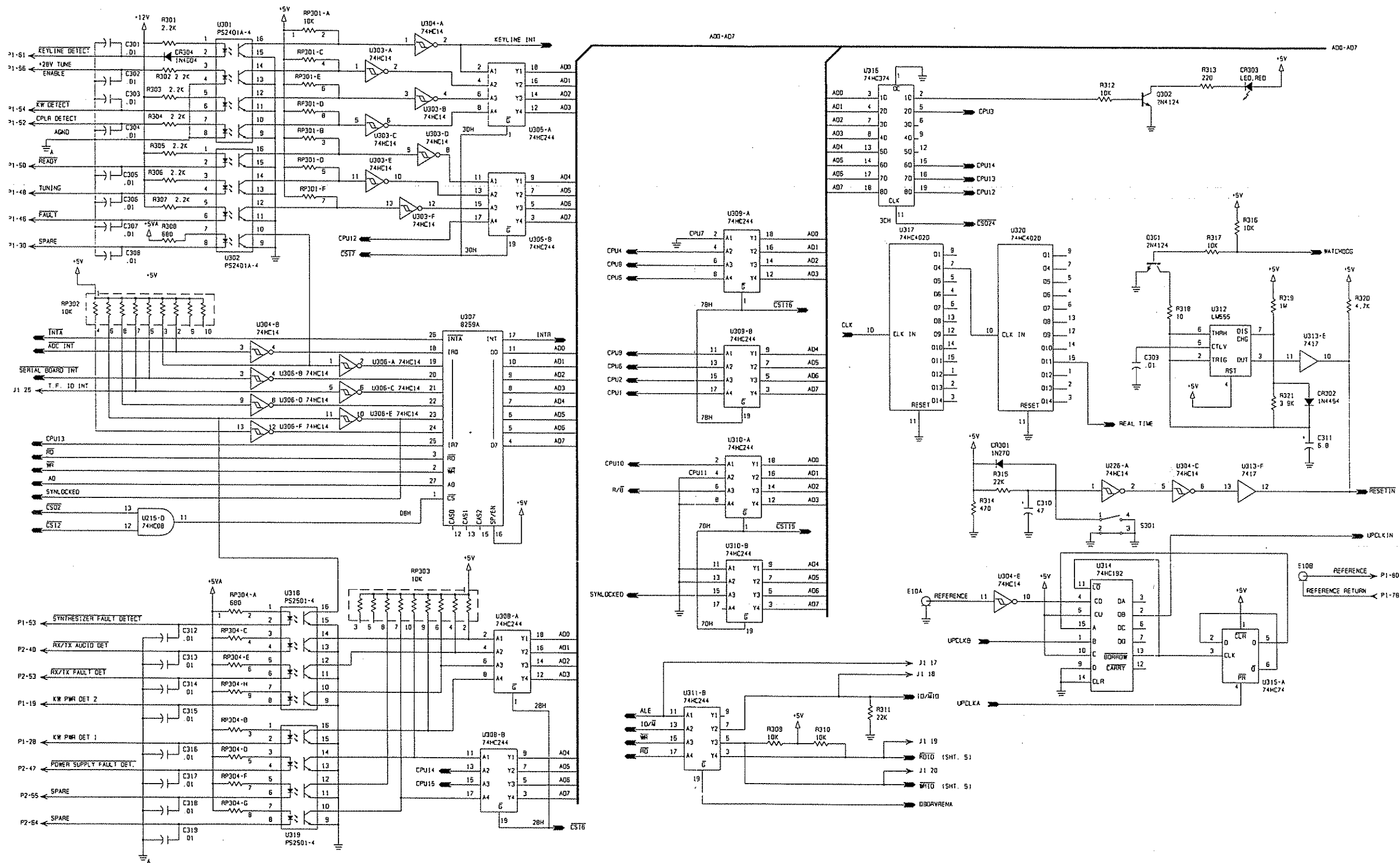


Figure 5.9.9 PC Assembly, RT-2410 CPU, 1A2A3, page 9/12.

F20428

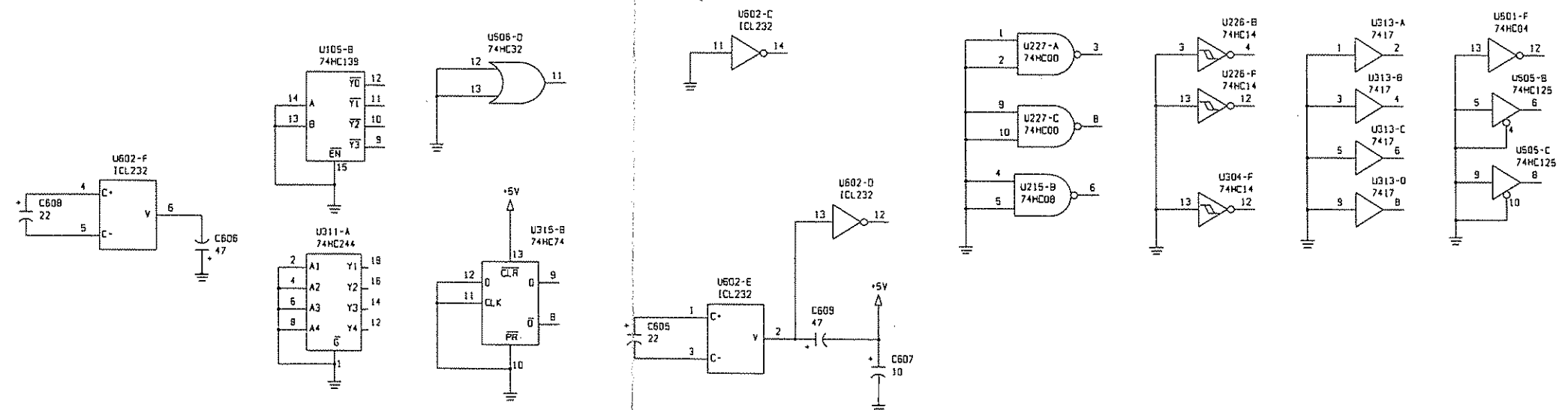
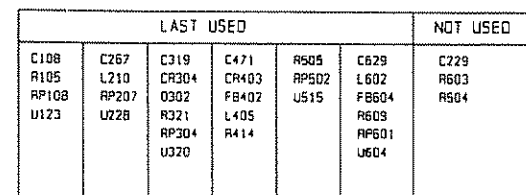
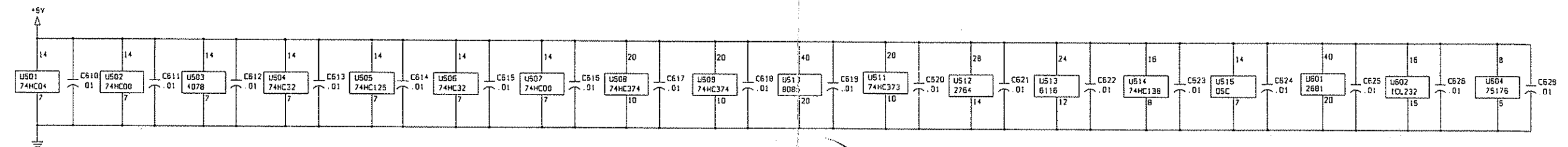
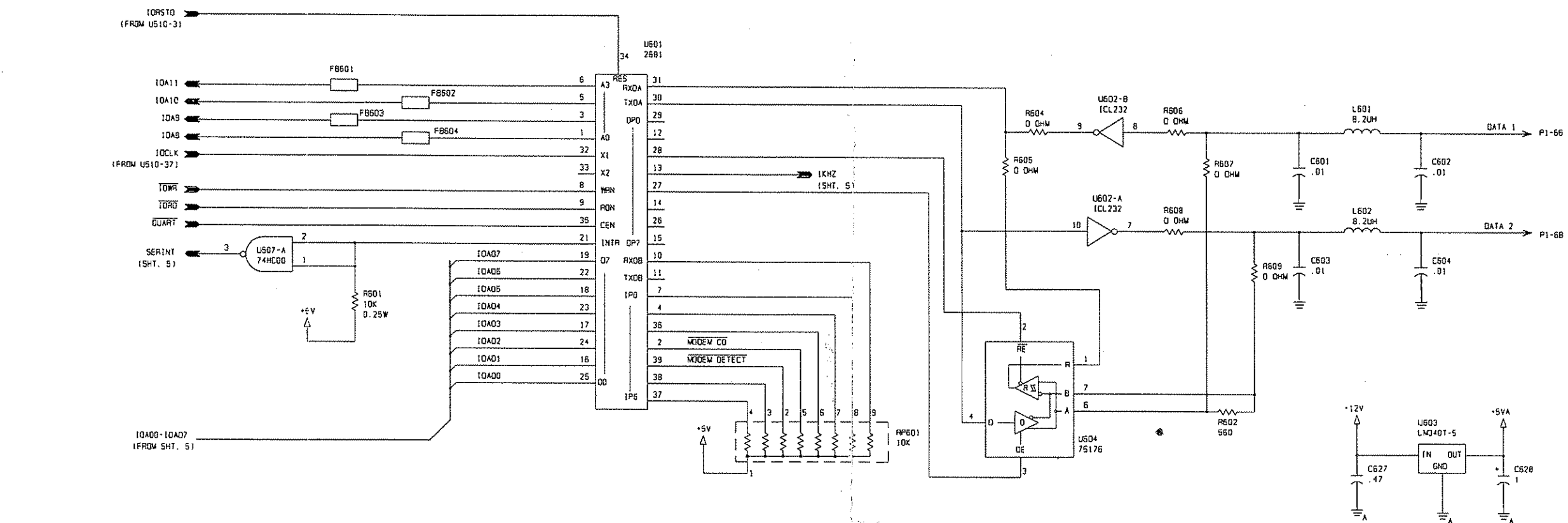


Figure 5.9.9 PC Assembly, RT-2410 CPU, 1A2A3, page 12/12.

REV D	PC ASSY, PS/RF FILTER	8108020093
C101	CAP. 0.1UF, 50V, X7R	1011180014
C102	CAP. 6.8UF, 50V	1008980013
C103	CAP. 6.8UF, 50V	1008980013
C104	CAP. 0.1UF, 50V, X7R	1011180014
C105	CAP. 6.8UF, 50V	1008980013
C106	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C107	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C108	CAP. 0.22UF, 35V	0283510005
C109	CAP. 0.1UF, 50V, X7R	1011180014
C110	CAP. 1000UF, 63V, 105C	1011350009
C111	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C112	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C113	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C114	CAP. 1000UF, 63V, 105C	1011350009
C115	CAP. 6.8UF, 50V	1008980013
C116	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C117	CAP. 1000UF, 63V, 105C	1011350009
C118	CAP. 1000UF, 63V, 105C	1011350009
C119	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C120	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C121	CAP. 1000UF, 63V, 105C	1011350009
C122	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C123	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C124	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C125	CAP. 1000UF, 63V, 105C	1011350009
C126	CAP. 6.8UF, 50V	1008980013
C127	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C128	CAP. 1000UF, 63V, 105C	1011350009
C129	CAP. 1000UF, 63V, 105C	1011350009
C130	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C131	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C132	CAP. 0.1UF, 50V, X7R	1011180014
C133	CAP. 0.1UF, 50V, X7R	1011180014
C134	CAP. 1000UF, 63V, 105C	1011350009
C135	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C136	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C137	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C138	CAP. 1000UF, 63V, 105C	1011350009
C139	CAP. 6.8UF, 50V	1008980013
C140	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C141	CAP. 1000UF, 63V, 105C	1011350009
C142	CAP. 1000UF, 63V, 105C	1011350009
C143	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C144	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C145	CAP. 0.1UF, 50V, X7R	1011180014
C146	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C147	CAP. 47UF, 35V	0282190007
C148	CAP. 0.47UF, 50V, X7R, 20%	0283377771

C149	CAP. 0.1UF, 50V, X7R	1011180014
C150	CAP. 2200UF, 35V	1010970038
C301	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C302	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C303	CAP. 56PF, 2KV, N750, 5%	1008240028
C304	CAP. 20PF, 2KV, N750, 5%	1008220027
C305	CAP. 20PF, 2KV, N750, 5%	1008220027
C306	CAP. 100PF, 2KV, N750, 5%	1008250031
C307	CAP. 27PF, 2KV, N750, 5%	1008230006
C308	CAP. 27PF, 2KV, N750, 5%	1008230006
C309	CAP. 15-60PF, 200V, N1500	0252680006
C310	CAP. 56PF, 2KV, N750, 5%	1008240028
C311	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C312	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C313	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C314	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C315	CAP. 0.1UF, 200V, X7R	1011190001
C316	CAP. 0.1UF, 200V, X7R	1011190001
C317	CAP. 1UF, 50V	0280910002
C318	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C320	CAP. 0.1UF, 200V, X7R	1011190001
C321	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C322	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C323	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C324	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C325	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C326	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C327	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C328	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C329	CAP. 0.1UF, 50V, X7R	1011180014
C330	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C403	CAP. 68PF, 2KV, N750, 5%	1008250007
C404	CAP. 110PF, 2KV, N750, 5%	1008260002
C405	CAP. 100PF, 2KV, N750, 5%	1008250031
C406	CAP. 100PF, 2KV, N750, 5%	1008250031
C407	CAP. 56PF, 2KV, N750, 5%	1008240028
C408	CAP. 56PF, 2KV, N750, 5%	1008240028
C409	CAP. 100PF, 2KV, N750, 5%	1008250031
C410	CAP. 130PF, 2KV, N750, 5%	1008260029
C411	CAP. 10PF, 2KV, N750, 5%	1008210021
C412	CAP. 15PF, 2KV, N750, 5%	1008220001
C413	CAP. 62PF, 2KV, N750, 5%	1008240036
C414	CAP. 62PF, 2KV, N750, 5%	1008240036
C415	CAP. 4.7PF, 3KV, NPO	1007150025
C416	CAP. 4.7PF, 3KV, NPO	1007150025
C417	CAP. 75PF, 2KV, N750, 5%	1008250015
C418	CAP. 75PF, 2KV, N750, 5%	1008250015
C419	CAP. 110PF, 2KV, N750, 5%	1008260002
C420	CAP. 110PF, 2KV, N750, 5%	1008260002

Figure 5.9.10 PC Assembly, RT-2410 Power Supply/RF Filter, 1A2A4, page 1/9.

C421	CAP.	68PF,	2KV,	N750,	5%	1008250007
C422	CAP.	75PF,	2KV,	N750,	5%	1008250015
C423	CAP.	62PF,	2KV,	N750,	5%	1008240036
C424	CAP.	150PF,	2KV,	N750,	5%	1008260037
C425	CAP.	15PF,	2KV,	N750,	5%	1008220001
C426	CAP.	15PF,	2KV,	N750,	5%	1008220001
C427	CAP.	36PF,	2KV,	N750,	5%	1008230031
C428	CAP.	56PF,	2KV,	N750,	5%	1008240028
C431	CAP.	100PF,	2KV,	N750,	5%	1008250031
C432	CAP.	56PF,	2KV,	N750,	5%	1008240028
C433	CAP.	56PF,	2KV,	N750,	5%	1008240028
C434	CAP.	270PF,	2KV,	N750,	5%	1008280020
C435	CAP.	27PF,	2KV,	N750,	5%	1008230006
C436	CAP.	200PF,	2KV,	N750,	5%	1008270016
C437	CAP.	56PF,	2KV,	N750,	5%	1008240028
C438	CAP.	270PF,	2KV,	N750,	5%	1008280020
C439	CAP.	10PF,	2KV,	N750,	5%	1008210021
C440	CAP.	30PF,	2KV,	N750,	5%	1008230014
C441	CAP.	56PF,	2KV,	N750,	5%	1008240028
C442	CAP.	130PF,	2KV,	N750,	5%	1008260029
C443	CAP.	30PF,	2KV,	N750,	5%	1008230014
C444	CAP.	75PF,	2KV,	N750,	5%	1008250015
C445	CAP.	91PF,	2KV,	N750,	5%	1008250023
C446	CAP.	150PF,	2KV,	N750,	5%	1008260037
C447	CAP.	160PF,	2KV,	N750,	5%	1008270032
C448	CAP.	330PF,	2KV,	N750,	5%	1008280038
C449	CAP.	330PF,	2KV,	N750,	5%	1008280038
C450	CAP.	27PF,	2KV,	N750,	5%	1008230006
C451	CAP.	160PF,	2KV,	N750,	5%	1008270032
C452	CAP.	330PF,	2KV,	N750,	5%	1008280038
C453	CAP.	30PF,	2KV,	N750,	5%	1008230014
C454	CAP.	30PF,	2KV,	N750,	5%	1008230014
C455	CAP.	160PF,	2KV,	N750,	5%	1008270032
C456	CAP.	120PF,	2KV,	N750,	5%	1008260011
C457	CAP.	82PF,	2KV,	N750,	5%	1008270024
C458	CAP.	82PF,	2KV,	N750,	5%	1008270024
C459	CAP.	91PF,	2KV,	N750,	5%	1008250023
C460	CAP.	300PF,	2KV,	N750,	5%	1008470015
C461	CAP.	27PF,	2KV,	N750,	5%	1008230006
C462	CAP.	700PF,	500V,	DM19,	5%	0249410001
C463	CAP.	120PF,	2KV,	N750,	5%	1008260011
C464	CAP.	390PF,	500V,	DM19,	2%	0282640002
C465	CAP.	33PF,	2KV,	N750,	5%	1008230022
C466	CAP.	700PF,	500V,	DM19,	5%	0249410001
C467	CAP.	56PF,	2KV,	N750,	5%	1008240028
C468	CAP.	33PF,	2KV,	N750,	5%	1008230022
C469	CAP.	300PF,	2KV,	N750,	5%	1008470015
C470	CAP.	130PF,	2KV,	N750,	5%	1008260029
C471	CAP.	300PF,	2KV,	N750,	5%	1008470015

C472	CAP.	300PF,	2KV,	N750,	5%	1008470015
C473	CAP.	27PF,	2KV,	N750,	5%	1008230006
C474	CAP.	560PF,	500V,	DM19,	2%	0281060002
C475	CAP.	800PF,	500V,	DM19,	5%	0249530007
C476	CAP.	300PF,	2KV,	N750,	5%	1008470015
C478	CAP.	430PF,	500V,	DM19,	5%	0254900003
C479	CAP.	330PF,	2KV,	N750,	5%	1008280038
C480	CAP.	800PF,	500V,	DM19,	5%	0249530007
C481	CAP.	300PF,	2KV,	N750,	5%	1008470015
C482	CAP.	91PF,	2KV,	N750,	5%	1008250023
C483	CAP.	43PF,	2KV,	N750,	5%	1008470023
C484	CAP.	330PF,	2KV,	N750,	5%	1008280038
C486	CAP.	150PF,	2KV,	N750,	5%	1008260037
C487	CAP.	180PF,	2KV,	N750,	5%	1008270008
C488	CAP.	430PF,	500V,	DM19,	5%	0254900003
C489	CAP.	300PF,	2KV,	N750,	5%	1008470015
C490	CAP.	910PF,	500V,	DM19,	2%	0281450005
C491	CAP.	620PF,	500V,	DM19,	5%	0299150003
C492	CAP.	430PF,	500V,	DM19,	5%	0254900003
C493	CAP.	620PF,	500V,	DM19,	5%	0299150003
C494	CAP.	910PF,	500V,	DM19,	2%	0281450005
C495	CAP.	620PF,	500V,	DM19,	5%	0299150003
C496	CAP.	91PF,	2KV,	N750,	5%	1008250023
C497	CAP.	91PF,	2KV,	N750,	5%	1008250023
C498	CAP.	330PF,	2KV,	N750,	5%	1008280038
C499	CAP.	600PF,	500V,	DM19,	5%	0241850002
CR101	DIODE,	TRANZORB	1N6283A			1011260000
CR102	DIODE,	RECTIFIER	1N4004			0405180004
CR103	DIODE,	RECTIFIER	1N5822			1010630032
CR104	DIODE,	RECTIFIER	1N5822			1010630032
CR105	DIODE,	RECTIFIER	1N5822			1010630032
CR106	DIODE,	RECTIFIER	1N5400			0403970008
CR107	DIODE,	RECTIFIER	1N4004			0405180004
CR108	DIODE,	TRANZORB	1N6283A			1011260000
CR301	DIODE,	SIGNAL, SIL.	1N4454			0405270003
CR302	DIODE,	SIGNAL, SIL.	1N4454			0405270003
CR303	DIODE,	LED, RED	550-2405			1008480029
CR304	DIODE,	RECTIFIER	1N4004			0405180004
CR305	DIODE,	RECTIFIER	1N4004			0405180004
CR308	DIODE,	SIGNAL, SIL.	1N4454			0405270003
CR309	DIODE,	ZENER	1N5242B			0400120003
CR401	DIODE,	RECTIFIER	1N4004			0405180004
CR402	DIODE,	RECTIFIER	1N4004			0405180004
CR403	DIODE,	RECTIFIER	1N4004			0405180004
CR404	DIODE,	RECTIFIER	1N4004			0405180004
CR405	DIODE,	RECTIFIER	1N4004			0405180004
CR406	DIODE,	RECTIFIER	1N4004			0405180004
CR407	DIODE,	RECTIFIER	1N4004			0405180004
CR408	DIODE,	RECTIFIER	1N4004			0405180004

Figure 5.9.10 PC Assembly, RT-2410 Power Supply/RF Filter, 1A2A4, page 2/9.

CR409	DIODE, RECTIFIER	1N4004	0405180004
CR410	DIODE, RECTIFIER	1N4004	0405180004
CR411	DIODE, RECTIFIER	1N4004	0405180004
CR412	DIODE, RECTIFIER	1N4004	0405180004
CR413	DIODE, RECTIFIER	1N4004	0405180004
CR414	DIODE, RECTIFIER	1N4004	0405180004
F101	FUSE, 3AB, 20AMP, 250V		1010690035
F102	FUSE, MDL, 3 AMP, 32V		0896660001
J1	CONNECTOR, HEADER, 26 PIN MALE		1011200261
J2	CONNECTOR, HEADER, 26 PIN MALE		1011200261
J102	CONNECTOR, HEADER, 14 PIN MALE		1011210142
J301	CONNECTOR, RF, JCM		0753600005
J302	CONNECTOR, RF, JCM		0753600005
J303	CONNECTOR, RF, SNAP-ON		1000170012
K101	RELAY, SPST, 24V		1008590029
K301	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K302	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K401	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K402	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K403	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K404	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K405	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K406	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K407	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K408	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K409	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K410	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K411	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K412	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K413	RELAY, SPST, 24VDC, PC MOUNT		1010310038
K414	RELAY, SPST, 24VDC, PC MOUNT		1010310038
L101	INDUCTOR, CHOKE, 47UH		1008990019
L102	FERRITE BEAD, .400L		1010900013
L103	INDUCTOR, POWER, 220 UH		1011100037
L104	FERRITE BEAD, .400L		1010900013
L105	FERRITE BEAD, .400L		1010900013
L106	INDUCTOR, TOROID, 150UH		1010650033
L107	FERRITE BEAD, .400L		1010900013
L108	FERRITE BEAD, .400L		1010900013
L109	INDUCTOR, TOROID, 150UH		1010650033
L110	FERRITE BEAD, .400L		1010900013
L301	INDUCTOR, AIR WOUND, 324NH		8076056101
L302	INDUCTOR, AIR WOUND, 303NH		8076053501
L401	INDUCTOR, AIR WOUND, 102NH		8076055504
L402	INDUCTOR, AIR WOUND, 147NH		8076055601
L403	INDUCTOR, AIR WOUND, 221NH		8076055709
L404	INDUCTOR, AIR WOUND, 153NH		8076055806
L405	INDUCTOR, AIR WOUND, 221NH		8076055709
L406	INDUCTOR, AIR WOUND, 384NH		8076055903

L407	INDUCTOR, AIR WOUND, 282NH	8076056004
L408	INDUCTOR, AIR WOUND, 324NH	8076056101
L409	INDUCTOR, AIR WOUND, 577NH	8076056209
L410	INDUCTOR, AIR WOUND, 423NH	8076056306
L411	INDUCTOR, AIR WOUND, 486NH	8076056403
L412	INDUCTOR, AIR WOUND, 866NH	8076056501
L413	INDUCTOR, AIR WOUND, 634NH	8076057507
L414	INDUCTOR, AIR WOUND, 729NH	8076057604
L415	INDUCTOR, TOROID, 1.43UH	8076057701
L416	INDUCTOR, TOROID, 0.95UH	8076057809
L417	INDUCTOR, TOROID, 1.18UH	8076057906
L418	INDUCTOR, TOROID, 2.00UH	8076058007
L419	INDUCTOR, TOROID, 1.47UH	8076058104
L420	INDUCTOR, TOROID, 1.70UH	8076058201
L421	INDUCTOR, TOROID, 2.74UH	8076058309
P101	TERMINAL, PC MOUNT, 3/16" MALE	1008550027
P102	TERMINAL, PC MOUNT, 3/16" MALE	1008550027
P103	TERMINAL, PC MOUNT, 1/4" MALE	1008330035
P104	TERMINAL, PC MOUNT, 1/4" MALE	1008330035
Q101	TRANSISTOR, P-CH, FET MTP23P06	1010960008
Q102	DIODE, SCR C106A2	0447070002
Q103	DIODE, SCR C106A2	0447070002
Q104	DIODE, SCR C106A2	0447070002
Q301	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q302	TRANSISTOR, NPN, SI. 2N4124	0448010003
R101	RESISTOR 56.2K, 1%, 1/8W	1008910015
R102	RESISTOR 6040, 1%, 1/8W	1010580019
R103	RESISTOR 3320, 1%, 1/8W	1003050000
R104	RESISTOR 1K, 1%, 1/8W	1011380005
R105	RESISTOR 3320, 1%, 1/8W	1003050000
R106	RESISTOR 1K, 1%, 1/8W	1011380005
R107	POT. 5K, 10%, 1/2W, 25 TURNS	1004720025
R108	RESISTOR 220K, 10%, 1/4W	0177780002
R109	RESISTOR 220K, 10%, 1/4W	0177780002
R110	RESISTOR 220K, 10%, 1/4W	0177780002
R111	RESISTOR 220K, 10%, 1/4W	0177780002
R112	RESISTOR 10K, 10%, 1/4W	0170410005
R113	RESISTOR 1K, 10%, 1/4W	0171560001
R114	RESISTOR 10K, 10%, 1/4W	0170410005
R115	RESISTOR 470, 5%, 1/4W	0184110009
R116	RESISTOR 2.7K, 10%, 1/4W	0186670001
R117	RESISTOR 3, 5%, 3W	1004600003
R118	RESISTOR 5.6K, 10%, 1/4W	0183060008
R119	RESISTOR 1K, 10%, 1/4W	0171560001
R120	RESISTOR 1.2, 10%, 2W	0186290004
R121	RESISTOR 1.8K, 10%, 1/4W	0178190004
R122	RESISTOR 1K, 10%, 1/4W	0171560001
R123	RESISTOR 1.2, 10%, 2W	0186290004
R124	RESISTOR 1.8K, 10%, 1/4W	0178190004

Figure 5.9.10 PC Assembly, RT-2410 Power Supply/RF Filter, 1A2A4, page 3/9.

2026AC

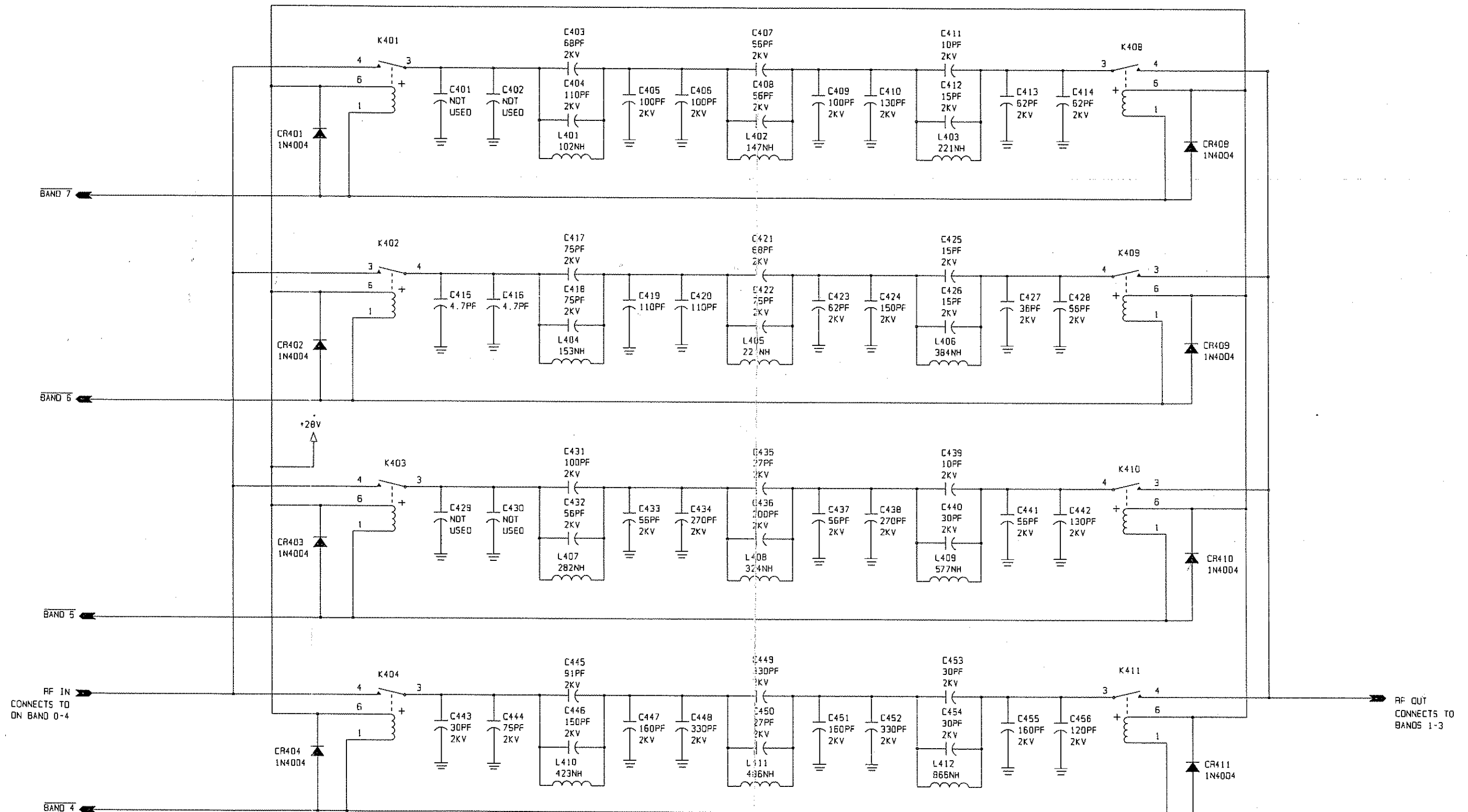


Figure 5.9.10 PC Assembly, RT-2410 Power Supply/RF Filter, 1A2A4, page 8/9.

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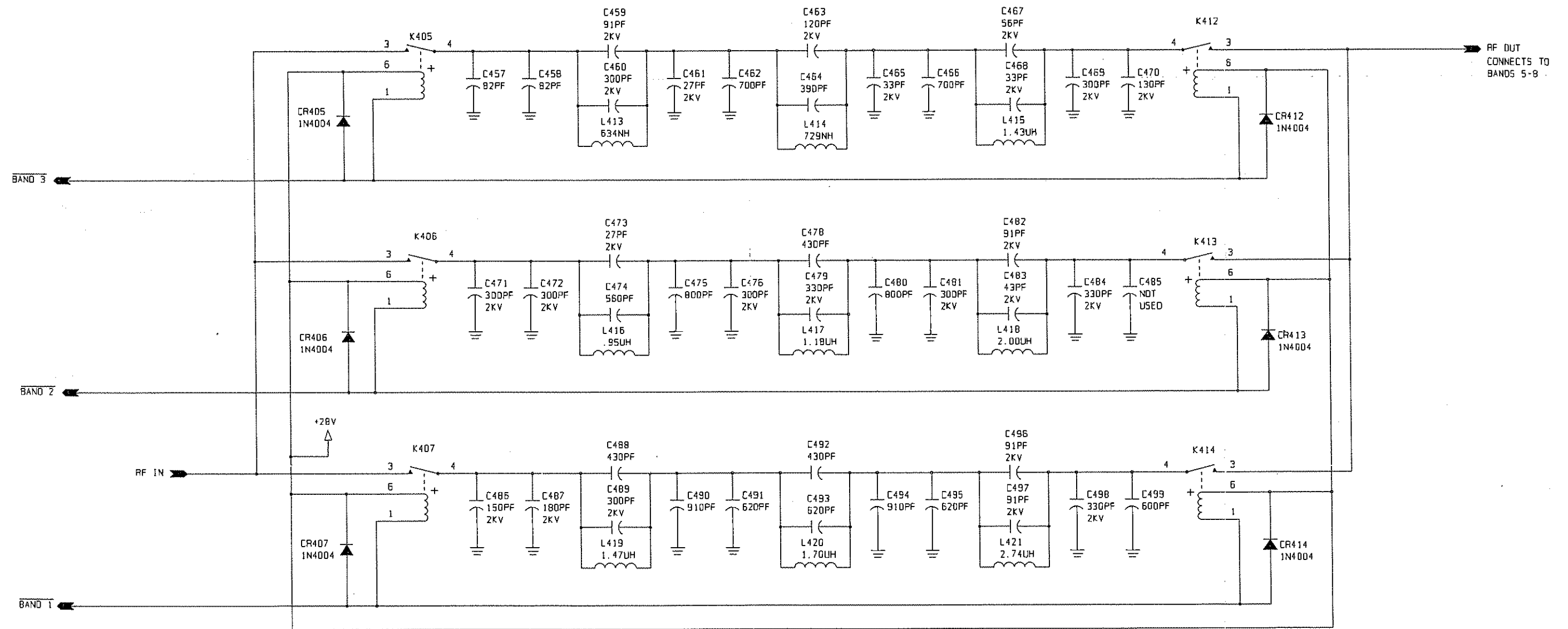


Figure 5.9.10 PC Assembly, RT-2410 Power Supply/RF Filter, 1A2A4, page 9/9.

REV A	PC ASSY, MOTHER BOARD	8108015090
C5	CAP. 0.1UF, 50V, X7R	1011180014
C6	CAP. 0.1UF, 50V, X7R	1011180014
C7	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C8	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C9	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C10	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C11	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C12	CAP. 0.1UF, 50V, X7R	1011180014
C13	CAP. 0.1UF, 50V, X7R	1011180014
C14	CAP. 0.1UF, 50V, X7R	1011180014
C15	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C16	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C17	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C18	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C19	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C20	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C21	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C22	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C23	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C24	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C25	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C26	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C27	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C28	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C29	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C30	CAP. 15UF, 15V	0281720002
C31	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C32	CAP. 15UF, 15V	0281720002
C33	CAP. 15UF, 15V	0281720002
C34	CAP. 15UF, 15V	0281720002
C35	CAP. 0.01UF, 50V, X7R, 20%	0281730008
CR1	DIODE, RECTIFIER 1N4004	0405180004
FB1	FERRITE BEAD, .400L	1010900013
FB2	FERRITE BEAD, .400L	1010900013
FB3	FERRITE BEAD, .400L	1010900013
FB4	FERRITE BEAD, .400L	1010900013
FB5	FERRITE BEAD, .400L	1010900013
FB6	FERRITE BEAD, .400L	1010900013
J1	CONNECTOR, PC, 40 PIN DUAL	1010920006
J2	CONNECTOR, PC, 40 PIN DUAL	1010920006
J3	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J4	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J7	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J8	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J9	CONNECTOR, RF, JACK	1010810006
J10	CONNECTOR, RF, JACK	1010810006
J11	CONNECTOR, RF, JACK	1010810006
J12	CONNECTOR, RF, JACK	1010810006

J13	CONNECTOR, RF, JACK	1010810006
J14	CONNECTOR, RF, JACK	1010810006
P1	CONNECTOR, RIBBON, 10 PIN, FEM	1012050033
P2	CONNECTOR, RIBBON, 20 PIN, FEM	1012070034
P3	CONNECTOR, RIBBON, 20 PIN, FEM	1012070034
P4	CONNECTOR, RIBBON, 20 PIN, FEM	1012070034
P5	CONNECTOR, RIBBON, 26 PIN, FEM	1012080030
P6	CONNECTOR, RIBBON, 26 PIN, FEM	1012080030
R1	RESISTOR 0.0, 0%, 1/4W	1011600021
R2	RESISTOR 220, 10%, 1/4W	0171320000
XJ9	CONNECTOR, RF, SUBMINIATURE	0753700000
XJ10	CONNECTOR, RF, SUBMINIATURE	0753700000
XP1	CONNECTOR,PCB,TRANSITION,10PIN	1012000036
XP2	CONNECTOR,PCB,TRANSITION,20PIN	1012020037
XP3	CONNECTOR,PCB,TRANSITION,20PIN	1012020037
XP4	CONNECTOR,PCB,TRANSITION,20PIN	1012020037
XP5	CONNECTOR,PCB,TRANSITION,26PIN	1012030032
XP6	CONNECTOR,PCB,TRANSITION,26PIN	1012030032
	BEAD, FERRITE .200OD,.437LG	1010910019
	CABLE, RIBBON, 10 CONDUCTOR	1008340014
	CABLE, RIBBON, 20 CONDUCTOR	1008080004
	CABLE, RIBBON, 26 CONDUCTOR	1011180006

Figure 5.9.11 PC Assembly, RT-2410 Mother Board, 1A2A5, page 1/5.

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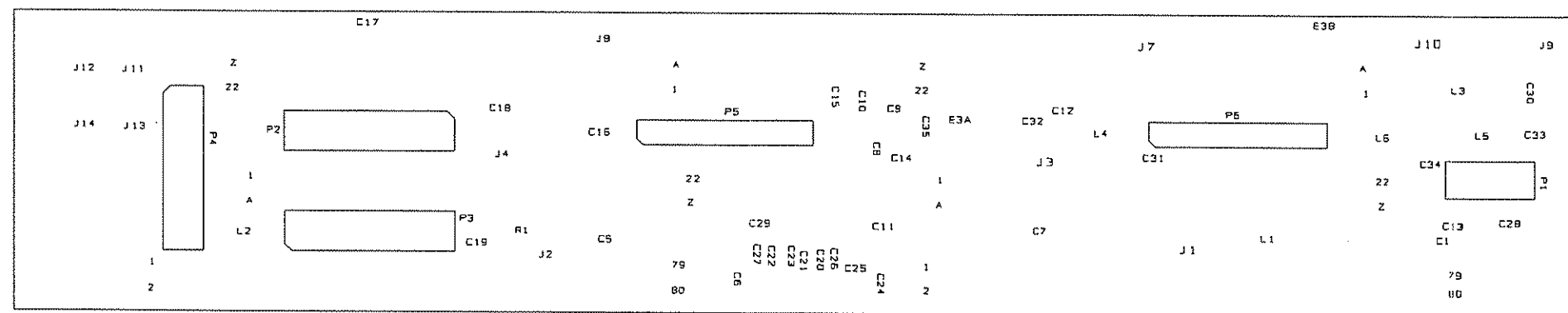
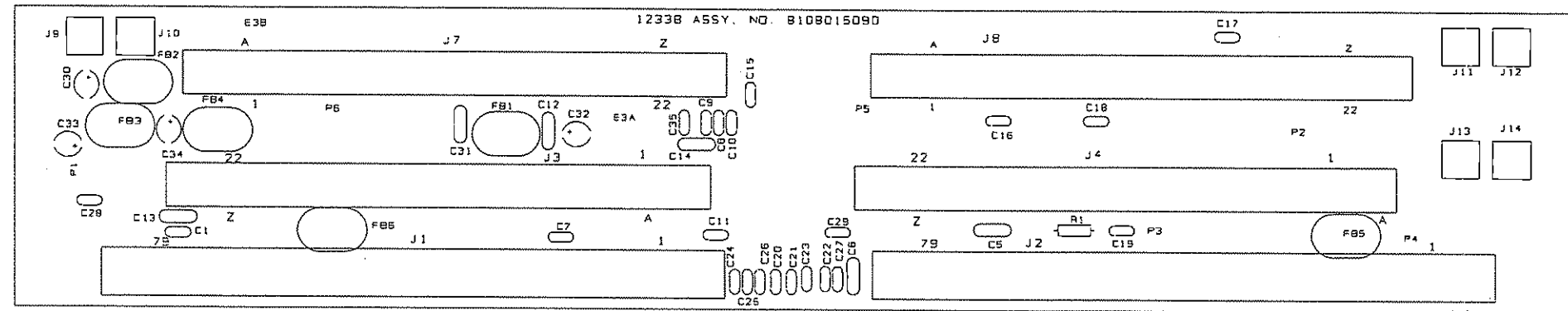
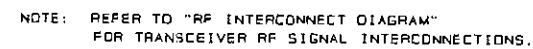


Figure 5.9.11 PC Assembly, RT-2410 Mother Board, 1A2A5, page 2/5.



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2031BB

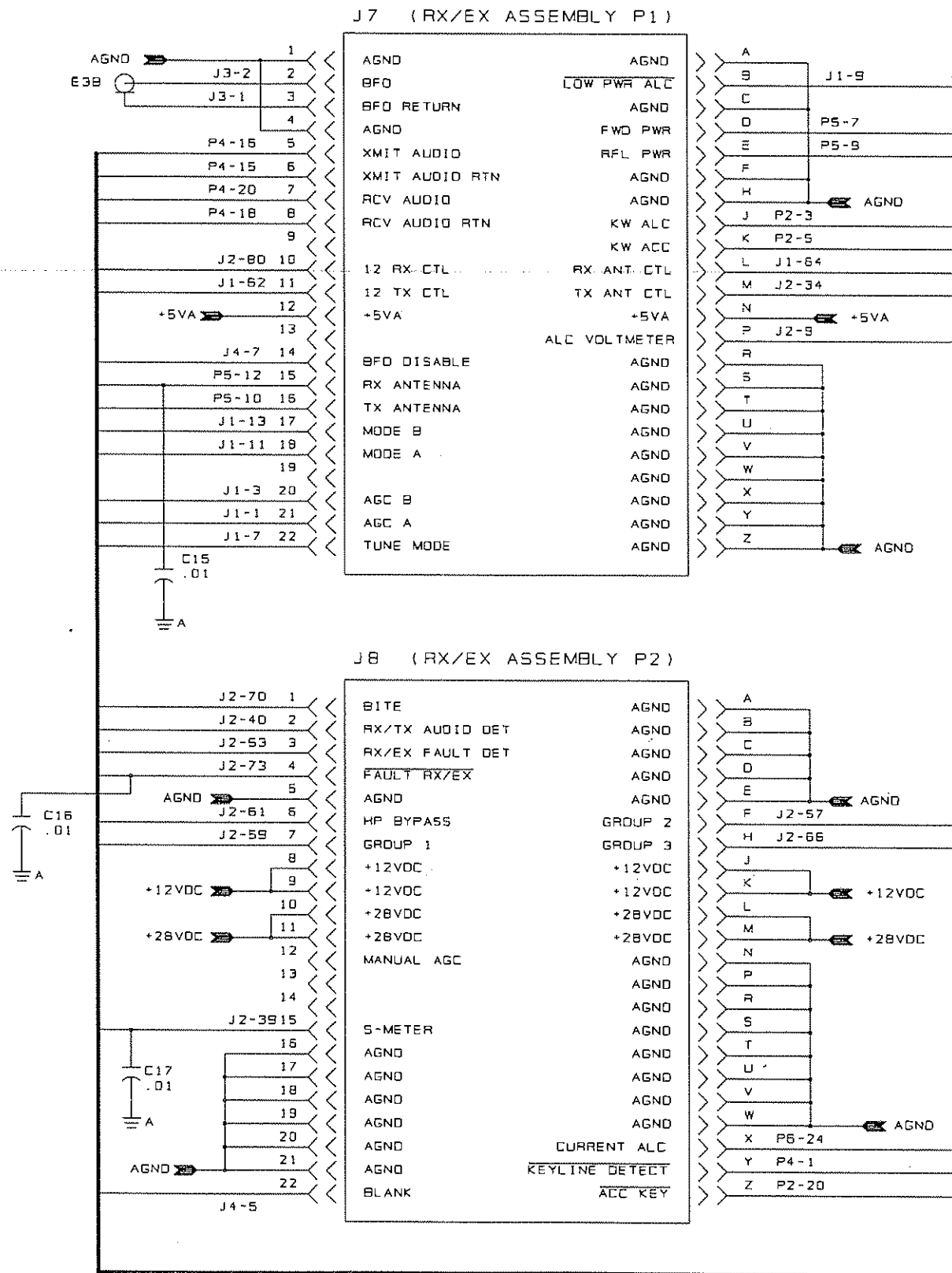


Figure 5.9.11 PC Assembly, RT-2410 Mother Board, 1A2A5, page 4/5.

2031CC

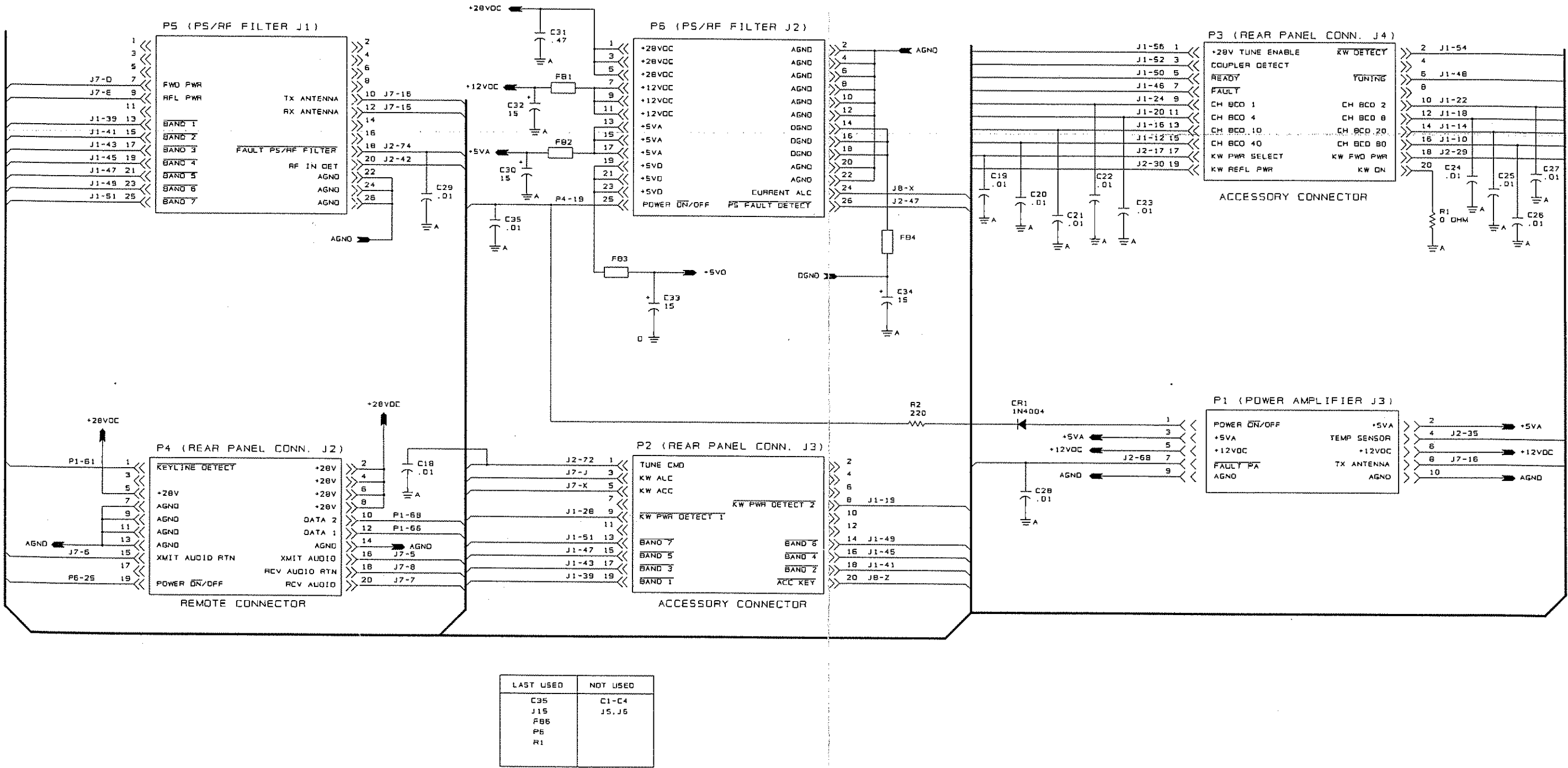


Figure 5.9.11 PC Assembly, RT-2410 Mother Board, 1A2A5, page 5/5.

	FINAL TESTED C-2420	
2A1	FRONT PANEL ASSEMBLY, CTL HEAD	8108140099
2A2	PC ASSY, CPU, CONTROL HEAD	8108120098
2A3	PC ASSY, AUDIO BOARD	8108110092
2A4	COVER ASSY, CONTROL HEAD	8108105099
	KNOB, 1.25D, BLACK	1012260038
	MOUNTING BRACKET, CONTROL HEAD	8108102103

Figure 5.9.12 Final Tested C-2420.

REV 03	PC ASSY, FRONT PANEL INTERFACE	8108141192
P1	CONNECTOR, RIBBON, 34 PIN, FEM	1012090035
P2	CONNECTOR, RIBBON, 14 PIN, FEM	1012060039
P3	SOCKET, 9 PIN, FEMALE	1012490025
P4	CONNECTOR, RIBBON, 14 PIN, FEM	1012060039
Q1	TRANSISTOR, N-CH, FET MTP3055E	1010750011
Q2	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q3	TRANSISTOR, N-CH, FET MTP3055E	1010750011
R1	RESISTOR 10K, 5%, 1/8W	1010801031
R2	RESISTOR 1.5, 5%, 3W	0162430001
R3	RESISTOR 10, 10%, 1/2W	0185380000
R4	RESISTOR 10K, 5%, 1/8W	1010801031
R5	RESISTOR 10K, 5%, 1/8W	1010801031
R6	RESISTOR 220, 10%, 1/4W	0171320000
R7	RESISTOR 3.9, 10%, 1W	1010210033
XP1	CONNECTOR,PCB,TRANSITION,34PIN	1012040038
XP2	CONNECTOR,PCB,TRANSITION,14PIN	1012010031
XP4	CONNECTOR,PCB,TRANSITION,14PIN	1012010031
	INSULATOR, MICA TO-220AB	0448670003
	BUSHING, INSULATING, TO-220AB	1008380024
	CABLE, RIBBON, 14 COND. 28AWG	1011170001
	CABLE, RIBBON, 34 COND, 28AWG	1011900025

2052BP

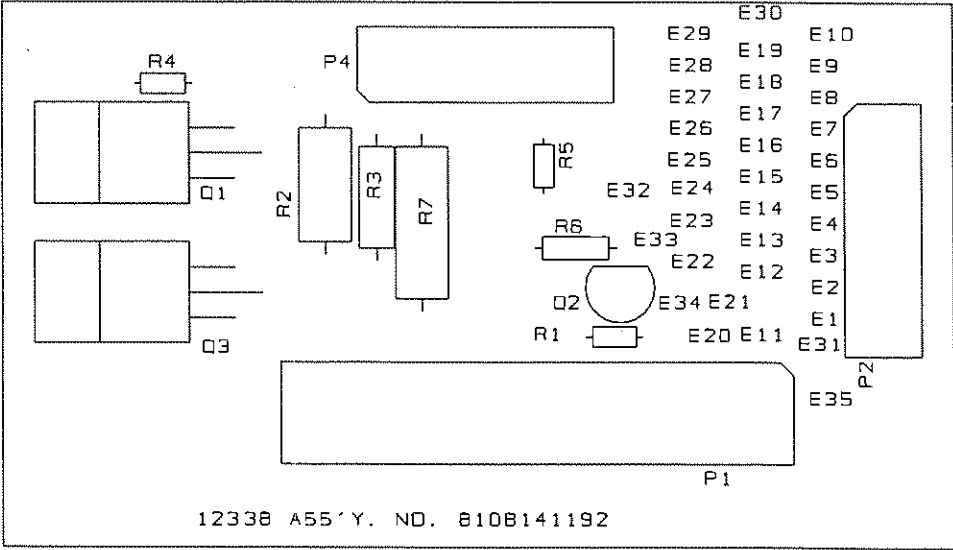


Figure 5.9.13 PC Assembly, C-2420 Front Panel Interface, 2A1A1, page 1/2.

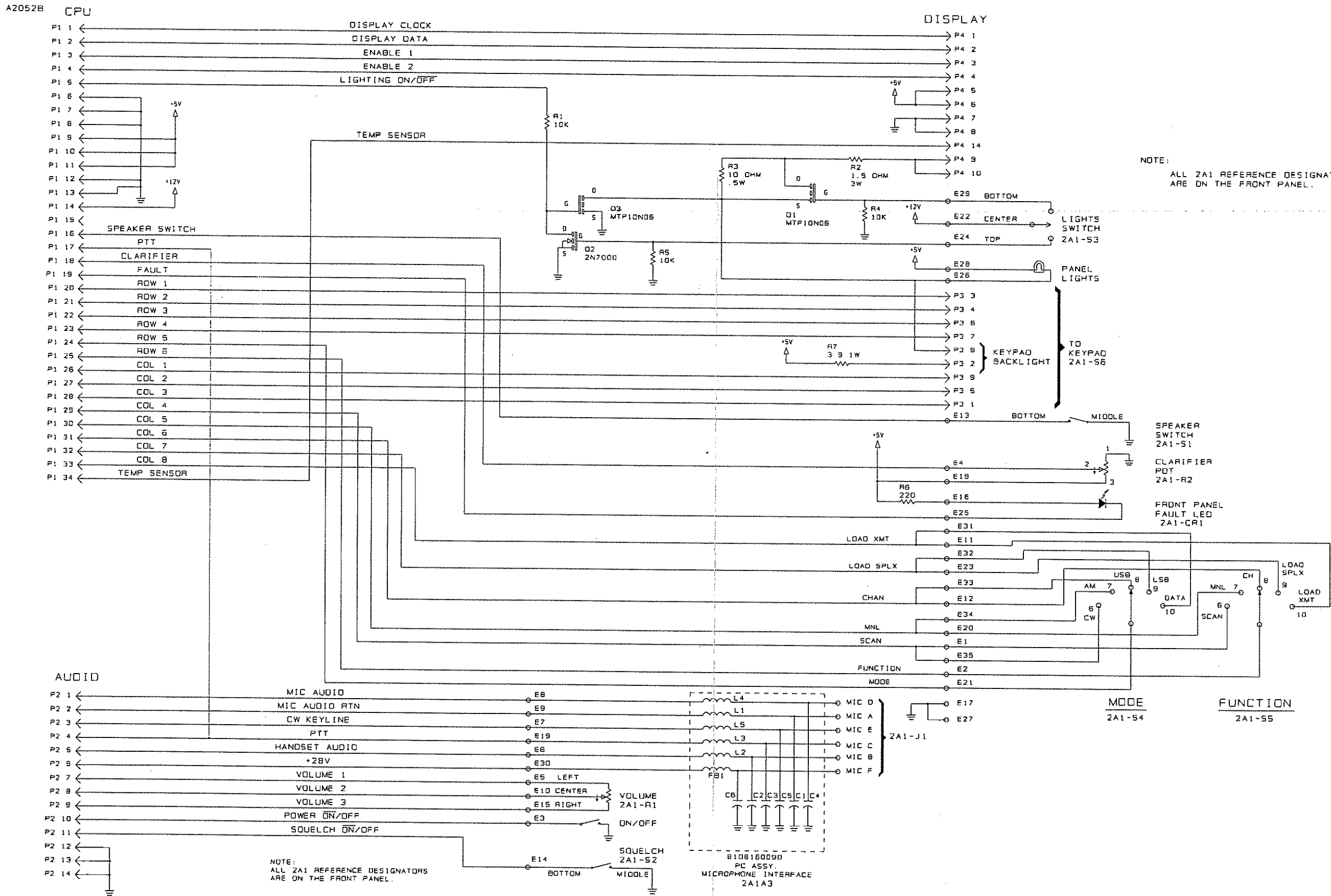


Figure 5.9.13 PC Assembly, C-2420 Front Panel Interface, 2A1A1, page 2/2.

REV 01	PC ASSY, DISPLAY BOARD	8108130093
C1	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C2	CAP. 0.001UF, 100V, X7R, 20%	0281630003
C3	CAP. 0.01UF, 50V, X7R, 20%	0281730008
CR1	DIODE, LED, RED, WIDE ANGLE	1012480020
CR2	DIODE, LED, RED, WIDE ANGLE	1012480020
CR3	DIODE, LED, RED, WIDE ANGLE	1012480020
CR4	DIODE, LED, RED, WIDE ANGLE	1012480020
CR5	DIODE, LED, RED, WIDE ANGLE	1012480020
CR6	DIODE, LED, RED, WIDE ANGLE	1012480020
CR7	DIODE, LED, RED, WIDE ANGLE	1012480020
CR8	DIODE, LED, RED, WIDE ANGLE	1012480020
CR9	DIODE, LED, RED, WIDE ANGLE	1012480020
CR10	DIODE, LED, RED, WIDE ANGLE	1012480020
CR11	DIODE, LED, RED, WIDE ANGLE	1012480020
CR12	DIODE, LED, RED, WIDE ANGLE	1012480020
CR13	DIODE, LED, RED, WIDE ANGLE	1012480020
CR14	DIODE, LED, RED, WIDE ANGLE	1012480020
CR15	DIODE, LED, RED, WIDE ANGLE	1012480020
CR16	DIODE, LED, RED, WIDE ANGLE	1012480020
CR17	DIODE, LED, RED, WIDE ANGLE	1012480020
CR18	DIODE, LED, RED, WIDE ANGLE	1012480020
CR19	DIODE, LED, RED, WIDE ANGLE	1012480020
CR20	DIODE, LED, RED, WIDE ANGLE	1012480020
CR21	DIODE, LED, RED, WIDE ANGLE	1012480020
CR22	DIODE, LED, RED, WIDE ANGLE	1012480020
CR23	DIODE, LED, RED, WIDE ANGLE	1012480020
CR24	DIODE, LED, RED, WIDE ANGLE	1012480020
CR25	DIODE, LED, RED, WIDE ANGLE	1012480020
CR26	DIODE, LED, RED, WIDE ANGLE	1012480020
CR27	DIODE, LED, RED, WIDE ANGLE	1012480020
CR28	DIODE, LED, RED, WIDE ANGLE	1012480020
CR29	DIODE, LED, RED, WIDE ANGLE	1012480020
CR30	DIODE, LED, RED, WIDE ANGLE	1012480020
CR31	DIODE, LED, RED, WIDE ANGLE	1012480020
CR32	DIODE, LED, RED, WIDE ANGLE	1012480020
CR33	DIODE, LED, RED, WIDE ANGLE	1012480020
CR34	DIODE, LED, RED, WIDE ANGLE	1012480020
CR35	DIODE, LED, RED, WIDE ANGLE	1012480020
CR36	DIODE, LED, RED, WIDE ANGLE	1012480020
CR37	DIODE, LED, RED, WIDE ANGLE	1012480020
CR38	DIODE, LED, RED, WIDE ANGLE	1012480020
CR39	DIODE, LED, RED, WIDE ANGLE	1012480020
CR40	DIODE, LED, RED, WIDE ANGLE	1012480020
CR41	DIODE, LED, RED, WIDE ANGLE	1012480020
CR42	DIODE, LED, RED, WIDE ANGLE	1012480020
CR43	DIODE, LED, RED, WIDE ANGLE	1012480020
CR44	DIODE, LED, RED, WIDE ANGLE	1012480020
CR45	DIODE, LED, RED, WIDE ANGLE	1012480020

CR46	DIODE, LED, RED, WIDE ANGLE	1012480020
CR47	DIODE, LED, RED, WIDE ANGLE	1012480020
CR48	DIODE, LED, RED, WIDE ANGLE	1012480020
CR49	DIODE, LED, RED, WIDE ANGLE	1012480020
CR50	DIODE, LED, RED, WIDE ANGLE	1012480020
CR51	DIODE, LED, RED, WIDE ANGLE	1012480020
CR52	DIODE, LED, RED, WIDE ANGLE	1012480020
CR53	DIODE, LED, RED, WIDE ANGLE	1012480020
CR54	DIODE, LED, RED, WIDE ANGLE	1012480020
CR55	DIODE, LED, RED, WIDE ANGLE	1012480020
CR56	DIODE, LED, RED, WIDE ANGLE	1012480020
CR57	DIODE, LED, RED, WIDE ANGLE	1012480020
CR58	DIODE, LED, RED, WIDE ANGLE	1012480020
CR59	DIODE, LED, RED, WIDE ANGLE	1012480020
CR60	DIODE, LED, RED, WIDE ANGLE	1012480020
CR61	DIODE, LED, RED, WIDE ANGLE	1012480020
CR62	DIODE, LED, RED, WIDE ANGLE	1012480020
CR63	DIODE, LED, RED, WIDE ANGLE	1012480020
CR64	DIODE, LED, RED, WIDE ANGLE	1012480020
CR65	DIODE, LED, RED, WIDE ANGLE	1012480020
CR66	DIODE, LED, RED, WIDE ANGLE	1012480020
CR67	DIODE, LED, RED, WIDE ANGLE	1012480020
CR68	DIODE, LED, RED, WIDE ANGLE	1012480020
CR69	DIODE, LED, RED, WIDE ANGLE	1012480020
CR70	DIODE, LED, RED, WIDE ANGLE	1012480020
CR71	DIODE, LED, RED, WIDE ANGLE	1012480020
CR72	DIODE, LED, RED, WIDE ANGLE	1012480020
J1	CONNECTOR, HEADER, 14 PIN MALE	1011210142
R1	RESISTOR 1M, 10%, 1/4W	0170650006
R2	RESISTOR 2.7K, 5%, 1/8W	1010802721
R4	RESISTOR 0.0, 0%, 1/4W	1011600021
R6	RESISTOR 0.0, 0%, 1/4W	1011600021
U1	IC. DIGITAL PCF2112	1011920026
U2	IC. DIGITAL PCF2112	1011920026
U3	LCD DISPLAY, RT-2400	8108131201
U4	IC. LINEAR LM35DZ	1012070026
XU1A	SOCKET, STRIP, 64 PIN	1011600030
XU1B	SOCKET, STRIP, 64 PIN	1011600030
XU2A	SOCKET, STRIP, 64 PIN	1011600030
XU2B	SOCKET, STRIP, 64 PIN	1011600030
XU3A	SOCKET, STRIP, 38 PIN	1011850036
XU3B	SOCKET, STRIP, 38 PIN	1011850036
	DIFFUSER, LCD BACKLIGHT	8108131405
	GASKET, DIFFUSER	8108131502
	KEY, POLARIZING	1008070033

Figure 5.9.14 PC Assembly, C-2420 Display Board, 2A1A2, page 1/3.

2053BP

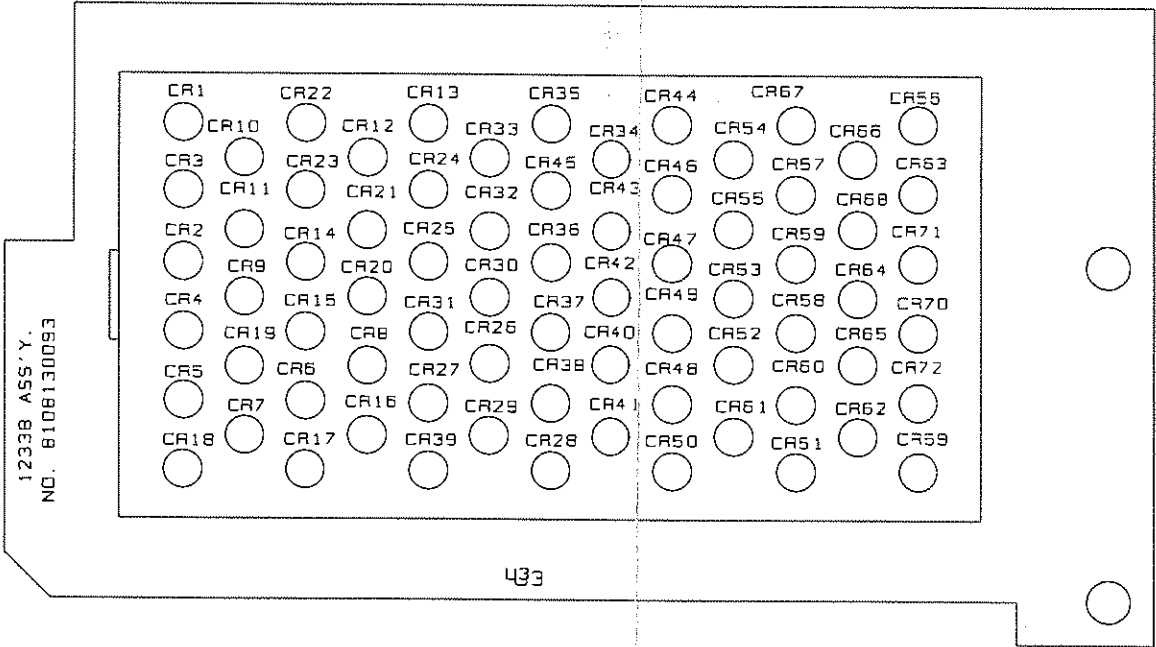


Figure 5.9.14 PC Assembly, C-2420 Display Board, 2A1A2, page 2/3.

A20538

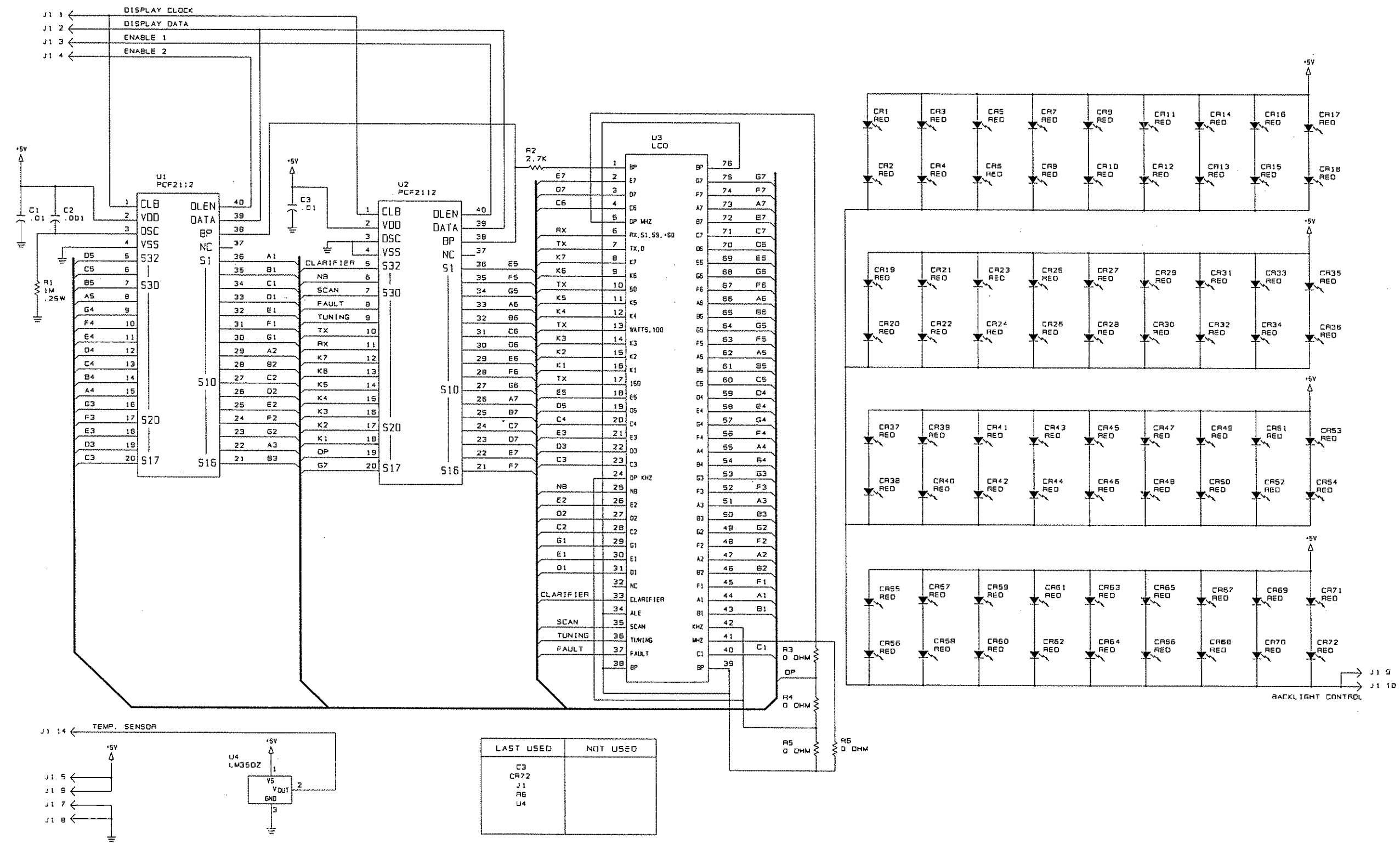


Figure 5.9.14 PC Assembly, C-2420 Display Board, 2A1A2, page 3/3.

REV 01	PC ASSY, MICROPHONE INTERFACE	8108160090
C1	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C2	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C3	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C4	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C5	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C6	CAP. 0.01UF, 50V, X7R, 20%	0281730008
FB1	FERRITE BEAD, .400L	1010900013
L1	INDUCTOR, MOLDED, 22UH, 10%	0664060005
L2	INDUCTOR, MOLDED, 22UH, 10%	0664060005
L3	INDUCTOR, MOLDED, 22UH, 10%	0664060005
L4	INDUCTOR, MOLDED, 22UH, 10%	0664060005
L5	INDUCTOR, MOLDED, 22UH, 10%	0664060005

20951A

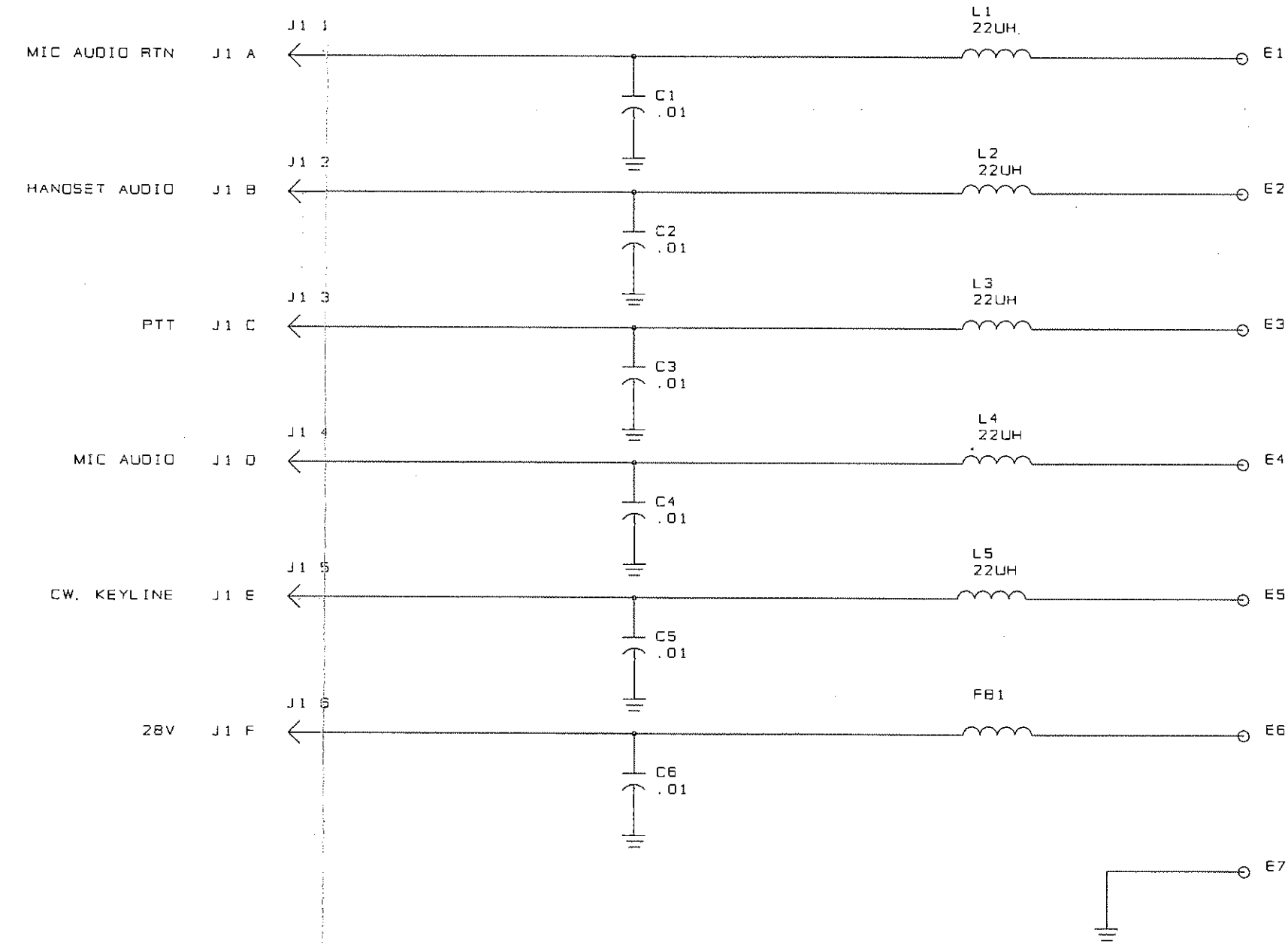


Figure 5.9.15 PC Assembly, C-2420 Microphone Interface, 2A1A3, page 1/1.

REV 03	PC ASSY, CPU, CONTROL HEAD	8108120098
C101	CAP. 47UF, 20V	0281700001
C102	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C103	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C104	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C105	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C201	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C202	CAP. 0.1UF, 50V, X7R	1011180014
C203	CAP. 150PF, 500V, DM10, 5%	0293430004
C301	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C302	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C303	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C304	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C305	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C306	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C307	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C308	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C309	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C310	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C311	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C312	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C313	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C314	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C315	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C316	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C317	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C318	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C319	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C322	CAP. 47UF, 35V	0282190007
C323	CAP. 0.1UF, 50V, X7R	1011180014
C324	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C325	CAP. 1000UF, 6.3V	1012020029
C331	CAP. 10UF, 20V	1007290005
C332	CAP. 10UF, 20V	1007290005
C333	CAP. 1UF, 35V	0283630001
C334	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C335	CAP. 0.1UF, 50V, X7R	1011180014
C336	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C337	CAP. 47UF, 35V	0282190007
CR101	DIODE, SIGNAL, GERM. 1N270	0405510004
CR201	DIODE, RECTIFIER 1N4004	0405180004
CR202	DIODE, RECTIFIER 1N4004	0405180004
CR203	DIODE, LED, RED 550-2405	1008480029
CR204	DIODE, HOT CARRIER 1N6263	0405610009
CR205	DIODE, HOT CARRIER 1N6263	0405610009
CR206	DIODE, HOT CARRIER 1N6263	0405610009
CR207	DIODE, HOT CARRIER 1N6263	0405610009
CR208	DIODE, HOT CARRIER 1N6263	0405610009
CR209	DIODE, HOT CARRIER 1N6263	0405610009

CR301	DIODE, RECTIFIER 1N5822	1010630032
CR302	DIODE, ZENER 1N5343B	1003060005
J1	CONNECTOR, HEADER, 34 PIN MALE	1011880024
J2	CONNECTOR, HEADER, 20 PIN MALE	1011870029
L101	INDUCTOR, MOLDED, 8.2UH, 5%	0652060005
L102	INDUCTOR, MOLDED, 8.2UH, 5%	0652060005
L301	INDUCTOR, TOROID, 150UH	1010650033
L302	FERRITE BEAD, .400L	1010900013
Q201	TRANSISTOR, N-CH, FET 2N7000	1011050013
R101	RESISTOR 22K, 5%, 1/8W	1010802232
R102	RESISTOR 10K, 5%, 1/8W	1010801031
R103	RESISTOR 10K, 5%, 1/8W	1010801031
R104	RESISTOR 10K, 5%, 1/8W	1010801031
R105	RESISTOR 10K, 5%, 1/8W	1010801031
R106	RESISTOR 10K, 5%, 1/8W	1010801031
R107	RESISTOR 10K, 5%, 1/8W	1010801031
R108	RESISTOR 560, 5%, 1/8W	1010805614
R201	RESISTOR 470, 5%, 1/8W	1010804715
R202	RESISTOR 470, 5%, 1/8W	1010804715
R203	RESISTOR 10K, 5%, 1/8W	1010801031
R204	RESISTOR 220, 5%, 1/8W	1010802216
R205	RESISTOR 10K, 5%, 1/8W	1010801031
R206	RESISTOR 10K, 5%, 1/8W	1010801031
R207	RESISTOR 10K, 5%, 1/8W	1010801031
R208	RESISTOR 10K, 5%, 1/8W	1010801031
R209	RESISTOR 10K, 5%, 1/8W	1010801031
R304	RESISTOR 3320, 1%, 1/8W	1003050000
R305	RESISTOR 1K, 1%, 1/8W	1011380005
RP101	RES NTWK 10 PIN SIP 10K COM	1006130021
RP201	RES NTWK 10 PIN SIP 10K COM	1006130021
RP202	RES NTWK 10 PIN SIP 10K COM	1006130021
U101	CRYSTAL OSCILLATOR, 7.3728MHZ	1008850012
U102	IC. DIGITAL 80C85A	1007400013
U103	IC. DIGITAL 74HC138	1006480013
U104	IC. DIGITAL 74HC245	1006470034
U105	IC. DIGITAL 74HC373	1006480030
U106	EPROM, W/CONTROL HEAD SOFTWARE	8108123291
U107	IC. DIGITAL, RAM 6264	1010650009
U108	IC. DIGITAL 2681	1008790010
U109	IC. DIGITAL 74HC10	1008010006
U110	IC. DIGITAL 74HC14	1006490027
U111	IC. DIGITAL 74HC00	1008190004
U112	IC. DIGITAL 75176	1011100011
U201	IC. DIGITAL UCN-5801A	1011800021
U202	IC. DIGITAL UCN-5801A	1011800021
U203	IC. DIGITAL 74HC374	1006450033
U204	IC. DIGITAL 74HC244	1006460039
U205	IC. DIGITAL 74HC374	1006450033
U206	IC. DIGITAL 74HC244	1006460039

Figure 5.9.16 PC Assembly, C-2420 Control Head CPU, 2A2, page 1/6.

U207	IC. DIGITAL	ADC0804	1010670000
U208	IC. DIGITAL	4066BC	1004460023
U209	IC. DIGITAL	4584B	1005190011
U302	IC. LINEAR	LM2576-ADJ	1010610031
XU102	SOCKET, IC, 40 PIN	TAILESS	1006620010
XU106	SOCKET, IC, 28 PIN	TAILESS	1006620001
XU107	SOCKET, IC, 28 PIN	TAILESS	1006620001
	KEY, POLARIZING		1008070033

Figure 5.9.16 PC Assembly, C-2420 Control Head CPU, 2A2, page 2/6.

2029BP

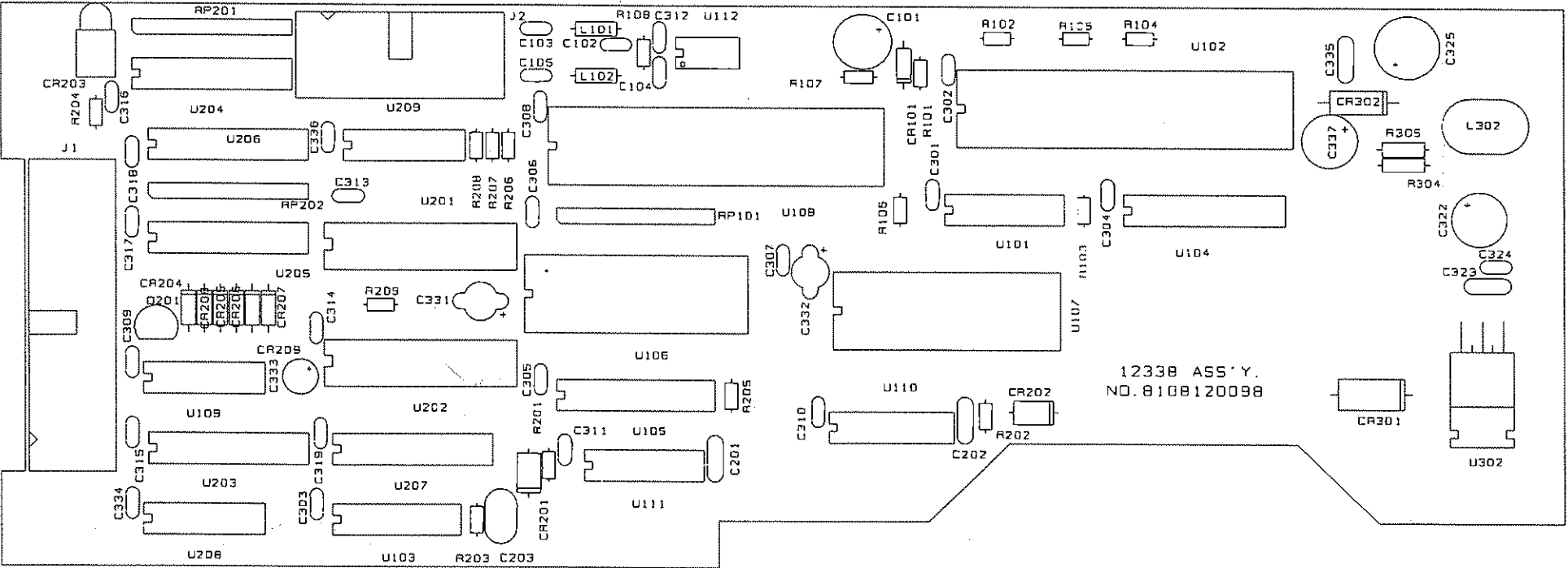


Figure 5.9.16 PC Assembly, C-2420 Control Head CPU, 2A2, page 3/6.

A2029B

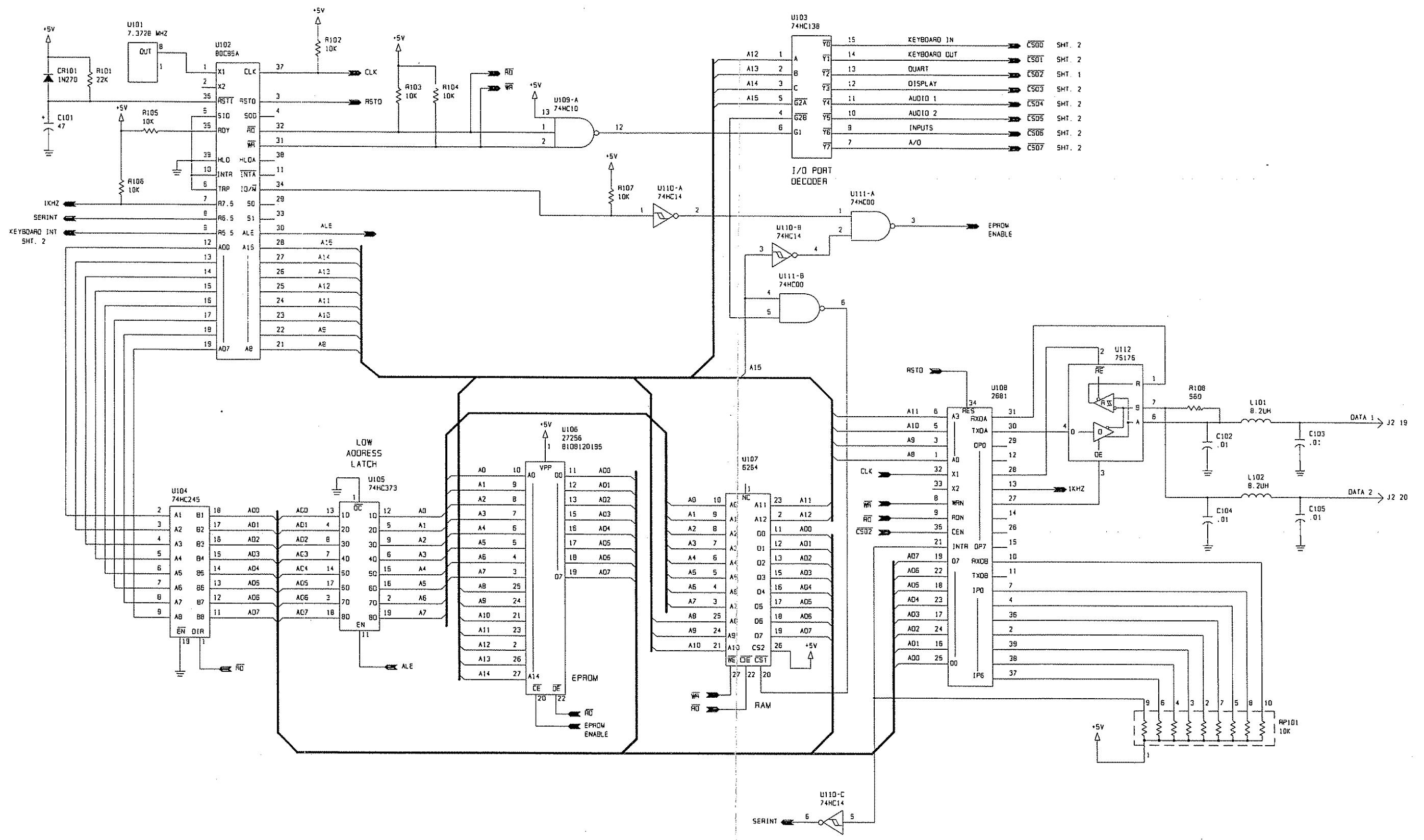


Figure 5.9.16 PC Assembly, C-2420 Control Head CPU, 2A2, page 4/6.

B2029B

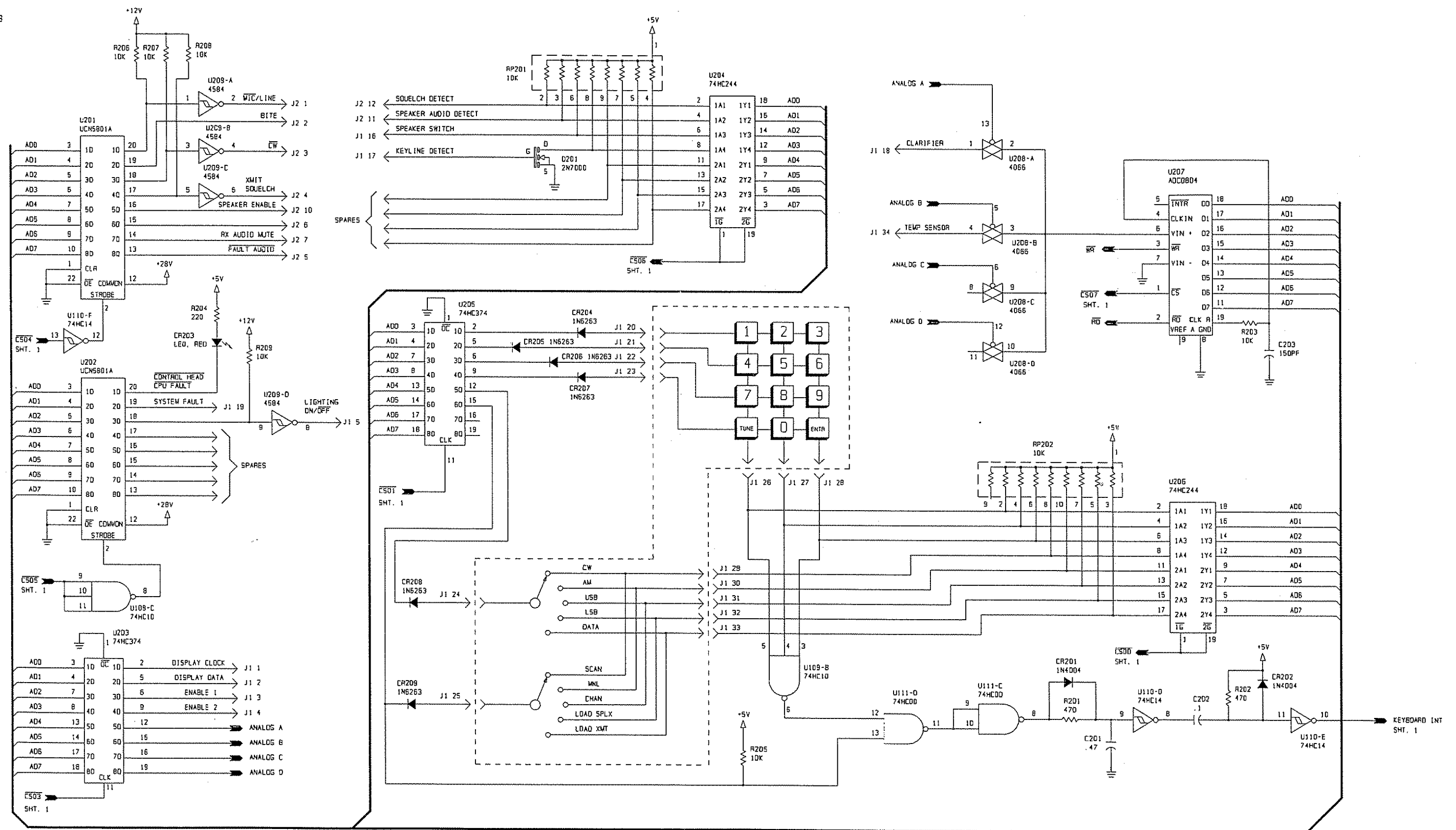
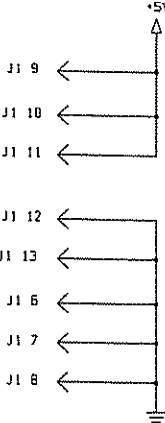
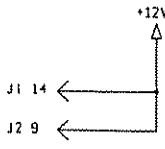
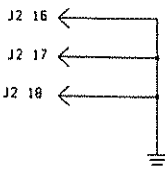
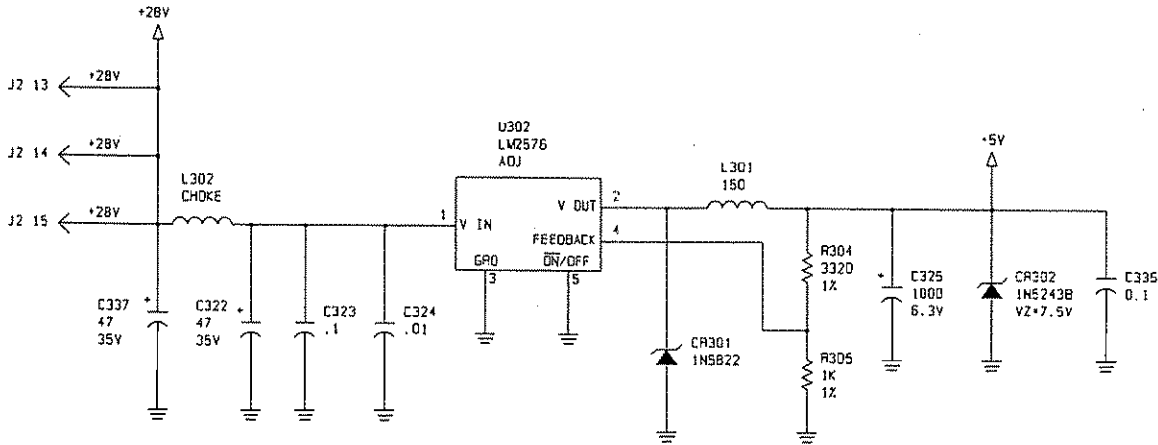
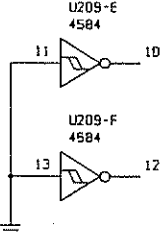


Figure 5.9.16 PC Assembly, C-2420 Control Head CPU, 2A2, page 5/6.

2029BC



UNUSED ELEMENTS



LAST USED			NOT USED
C105	C203	C337	R301-303
CR101	CR209	CR302	C320, 321
L102	Q201	L302	C326-C330
R108	R209		
RP101	RP202	R305	
U112	U209	U302	U301

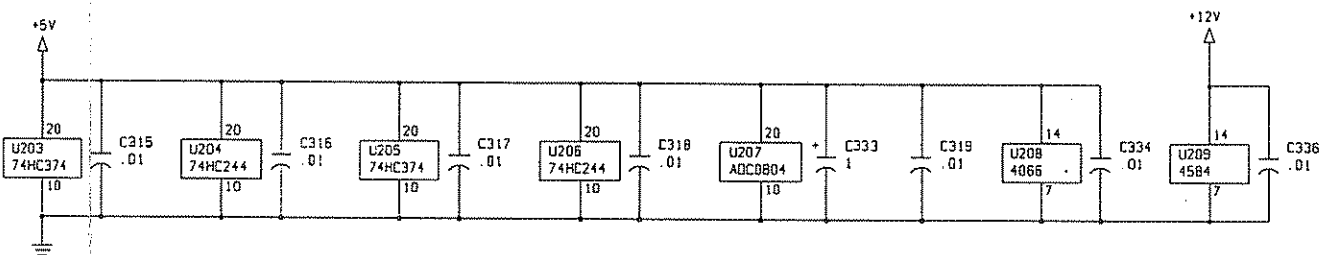
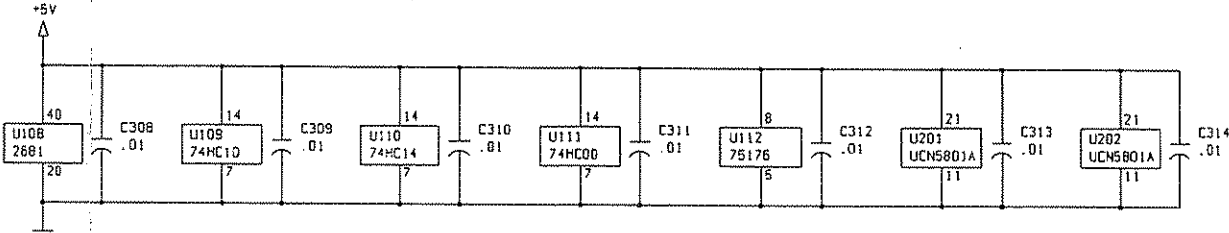
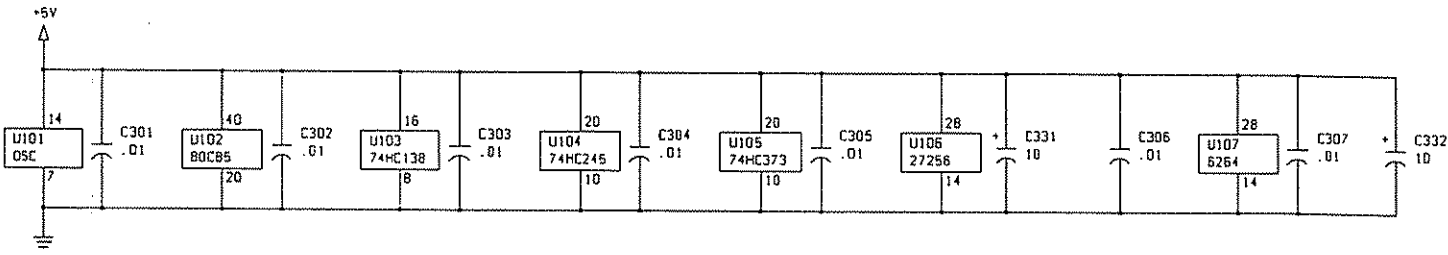


Figure 5.9.16 PC Assembly, C-2420 Control Head CPU, 2A2, page 6/6.

REV A	PC ASSY, AUDIO BOARD	8108110092
C101	CAP. 1UF, 35V	0281660000
C102	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C103	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C104	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C105	CAP. 1UF, 35V	0281660000
C106	CAP. 10UF, 20V	1007290005
C107	CAP. 22UF, 15V	0296660001
C108	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C109	CAP. 3.3UF, 35V	0281680001
C110	CAP. 1UF, 35V	0281660000
C111	CAP. 2.2UF, 35V	0273950002
C112	CAP. 6.8UF, 20V	0296780006
C113	CAP. 6.8UF, 20V	0296780006
C114	CAP. 3.3UF, 35V	0281680001
C115	CAP. 150PF, 500V, DM15, 5%	0274980002
C116	CAP. 1UF, 35V	0281660000
C117	CAP. 1UF, 35V	0281660000
C118	CAP. 0.001UF, 100V, X5E, 10%	0282080007
C119	CAP. 15UF, 35V	0282240004
C120	CAP. 22UF, 15V	0296660001
C121	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C122	CAP. 22UF, 15V	0296660001
C123	CAP. 0.0068UF, 100V, NPO, 5%	1011450020
C124	CAP. 0.0068UF, 100V, NPO, 5%	1011450020
C125	CAP. 1UF, 35V	0281660000
C126	CAP. 0.02UF, 25V, Y5U/Y5P	0269130004
C127	CAP. 0.1UF, 50V, X7R	1011180014
C128	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C129	CAP. 22UF, 15V	0296660001
C130	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C131	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C132	CAP. 2.2UF, 35V	0273950002
C133	CAP. 0.1UF, 50V, X7R	1011180014
C134	CAP. 470PF, 100V, CD7, 5%	0285570005
C135	CAP. 22UF, 15V	0296660001
C136	CAP. 0.1UF, 50V, X7R	1011180014
C137	CAP. 0.1UF, 50V, X7R	1011180014
C138	CAP. 0.1UF, 50V, X7R	1011180014
C139	CAP. 0.1UF, 50V, X7R	1011180014
C140	CAP. 0.1UF, 50V, X7R	1011180014
C141	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C142	CAP. 10UF, 20V	1007290005
C143	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C201	CAP. 1UF, 35V	0281660000
C202	CAP. 1UF, 35V	0281660000
C203	CAP. 15UF, 35V	0282240004
C204	CAP. 47UF, 20V	0281700001
C205	CAP. 0.1UF, 50V, X7R	1011180014

C206	CAP. 47UF, 35V	0282190007
C207	CAP. 1UF, 35V	0281660000
C208	CAP. 470UF, 50V	0280890001
C209	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C210	CAP. 1UF, 35V	0281660000
C211	CAP. 6.8UF, 20V	0296780006
C212	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C213	CAP. 1UF, 35V	0281660000
C214	CAP. 6.8UF, 20V	0296780006
C215	CAP. 1UF, 35V	0281660000
C216	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C217	CAP. 0.033UF, 50V, 10/20%	0281770000
C218	CAP. 0.033UF, 50V, 10/20%	0281770000
C219	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C220	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C221	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C222	CAP. 0.033UF, 50V, 10/20%	0281770000
C223	CAP. 2.2UF, 35V	0273950002
C224	CAP. 22UF, 15V	0296660001
C225	CAP. 22UF, 15V	0296660001
C226	CAP. 22UF, 15V	0296660001
C227	CAP. 22UF, 15V	0296660001
C228	CAP. 1UF, 35V	0281660000
C229	CAP. 22UF, 15V	0296660001
C230	CAP. 0.1UF, 50V, X7R	1011180014
C231	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C232	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C233	CAP. 0.1UF, 50V, X7R	1011180014
C234	CAP. 0.1UF, 50V, X7R	1011180014
C235	CAP. 0.1UF, 50V, X7R	1011180014
C236	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C237	CAP. 0.1UF, 50V, X7R	1011180014
C238	CAP. 22UF, 15V	0296660001
C239	CAP. 10UF, 20V	1007290005
C240	CAP. 0.01UF, 50V, X7R, 20%	0281730008
CR101	DIODE, RECTIFIER 1N4004	0405180004
CR102	DIODE, RECTIFIER 1N4004	0405180004
CR103	DIODE, RECTIFIER 1N4004	0405180004
CR104	DIODE, RECTIFIER 1N4004	0405180004
CR105	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR106	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR107	DIODE, LED, RED 550-2405	1008480029
CR201	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR206	DIODE, RECTIFIER 1N4004	0405180004
CR207	DIODE, RECTIFIER 1N4004	0405180004
CR208	DIODE, RECTIFIER 1N4004	0405180004
CR209	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR210	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR211	DIODE, SIGNAL, SIL. 1N4454	0405270003

Figure 5.9.17 PC Assembly, C-2420 Audio Board, 2A3, page 1/6.

CR212	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR213	DIODE, SIGNAL, SIL.	1N4454	0405270003
CR214	DIODE, SIGNAL, SIL.	1N4454	0405270003
J1	CONNECTOR, HEADER, 26 PIN MALE		1010810022
J2	CONNECTOR, HEADER, 14 PIN MALE		1011860023
K201	RELAY, SPDT, 24V, 10AMP		1011760037
K202	RELAY, SPDT, 24V, 10AMP		1011760037
P1	CONNECTOR, RIBBON, 20 PIN, FEM		1012070034
Q101	TRANSISTOR, N-CH, FET	2N7000	1011050013
Q102	TRANSISTOR, NPN, SI.	2N4124	0448010003
Q103	TRANSISTOR, N-CH, FET	2N7000	1011050013
Q104	TRANSISTOR, NPN, SI.	2N4124	0448010003
Q201	TRANSISTOR, N-CH, FET	2N7000	1011050013
Q202	TRANSISTOR, N-CH, FET	2N7000	1011050013
Q204	TRANSISTOR, NPN, SI.	2N4124	0448010003
R101	RESISTOR	100, 5%, 1/8W	1010801015
R102	POT.	500, 10%, 1/2W, 25 TURNS	1012330028
R103	RESISTOR	47K, 5%, 1/8W	1010804731
R105	RESISTOR	10K, 5%, 1/8W	1010801031
R106	RESISTOR	47K, 5%, 1/8W	1010804731
R107	RESISTOR	68K, 5%, 1/8W	1010806831
R108	RESISTOR	10K, 5%, 1/8W	1010801031
R109	RESISTOR	68K, 5%, 1/8W	1010806831
R110	RESISTOR	12K, 5%, 1/8W	1010801236
R111	POT.	1K, 10%, 1/2W, 25 TURNS	1011560038
R112	RESISTOR	2100, 1%, 1/8W	1011790009
R113	RESISTOR	243, 1%, 1/8W	1011800004
R114	RESISTOR	6.8M, 5%, 1/4W	1010910001
R115	RESISTOR	10, 5%, 1/8W	1010801007
R116	RESISTOR	1M, 10%, 1/4W	0170650006
R117	RESISTOR	100K, 5%, 1/8W	1010801040
R118	RESISTOR	100, 5%, 1/8W	1010801015
R119	POT.	500, 10%, 1/2W, 25 TURNS	1012330028
R120	RESISTOR	47K, 5%, 1/8W	1010804731
R121	RESISTOR	10K, 5%, 1/8W	1010801031
R122	RESISTOR	47K, 5%, 1/8W	1010804731
R123	RESISTOR	47K, 5%, 1/8W	1010804731
R124	RESISTOR	10K, 5%, 1/8W	1010801031
R125	RESISTOR	2.2K, 5%, 1/8W	1010802224
R126	RESISTOR	4.7K, 5%, 1/8W	1010804723
R128	RESISTOR	10K, 5%, 1/8W	1010801031
R129	RESISTOR	2.2K, 5%, 1/8W	1010802224
R130	RESISTOR	10K, 5%, 1/8W	1010801031
R131	RESISTOR	10K, 5%, 1/8W	1010801031
R132	THERMISTOR	1K AT 25C	0196110009
R133	RESISTOR	390, 5%, 1/8W	1010803913
R134	RESISTOR	4.99K, 1%, 1/8W	1005510032
R135	RESISTOR	28.7K, 1%, 1/8W	1004090005
R136	RESISTOR	56.2K, 1%, 1/8W	1008910015

R137	RESISTOR	12.1K, 1%, 1/8W	1008900010
R138	RESISTOR	28.7K, 1%, 1/8W	1004090005
R139	POT.	10K, 10%, 1/2W, 25 TURNS	1004880014
R140	RESISTOR	10K, 5%, 1/8W	1010801031
R141	RESISTOR	10K, 5%, 1/8W	1010801031
R142	RESISTOR	6.8K, 5%, 1/8W	1010806823
R143	RESISTOR	3.3K, 5%, 1/8W	1010803328
R144	RESISTOR	10K, 5%, 1/8W	1010801031
R145	RESISTOR	1M, 10%, 1/4W	0170650006
R146	RESISTOR	10K, 5%, 1/8W	1010801031
R147	RESISTOR	10K, 5%, 1/8W	1010801031
R148	RESISTOR	10K, 5%, 1/8W	1010801031
R149	RESISTOR	10K, 5%, 1/8W	1010801031
R150	RESISTOR	1K, 5%, 1/8W	1010801023
R151	RESISTOR	10K, 5%, 1/8W	1010801031
R152	RESISTOR	100K, 5%, 1/8W	1010801040
R153	RESISTOR	4.7K, 5%, 1/8W	1010804723
R154	RESISTOR	4.7K, 5%, 1/8W	1010804723
R155	RESISTOR	1.5K, 5%, 1/8W	1010801520
R156	RESISTOR	1K, 5%, 1/8W	1010801023
R157	RESISTOR	10K, 5%, 1/8W	1010801031
R158	RESISTOR	10K, 5%, 1/8W	1010801031
R159	RESISTOR	10K, 5%, 1/8W	1010801031
R160	RESISTOR	10K, 5%, 1/8W	1010801031
R161	RESISTOR	560K, 5%, 1/8W	1010805649
R162	RESISTOR	330, 5%, 1/8W	1010803310
R164	RESISTOR	1K, 10%, 1/4W	0171560001
R165	RESISTOR	4.7K, 5%, 1/8W	1010804723
R166	RESISTOR	10K, 5%, 1/8W	1010801031
R201	RESISTOR	560, 5%, 1/8W	1010805614
R202	RESISTOR	10K, 5%, 1/8W	1010801031
R203	RESISTOR	2.2K, 5%, 1/8W	1010802224
R204	RESISTOR	47K, 5%, 1/8W	1010804731
R205	RESISTOR	560, 5%, 1/8W	1010805614
R206	RESISTOR	47K, 5%, 1/8W	1010804731
R207	RESISTOR	47K, 5%, 1/8W	1010804731
R208	RESISTOR	2.7K, 5%, 1/8W	1010802721
R209	RESISTOR	1K, 5%, 1/8W	1010801023
R210	RESISTOR	120K, 10%, 1/4W	0175100004
R211	RESISTOR	10K, 10%, 1/4W	0170410005
R212	RESISTOR	1, 10%, 1/2W	0194770001
R213	RESISTOR	33, 10%, 1W	0165660007
R214	RESISTOR	47, 10%, 2W	0163720002
R215	RESISTOR	47K, 5%, 1/8W	1010804731
R216	RESISTOR	100, 5%, 1/8W	1010801015
R217	RESISTOR	47K, 5%, 1/8W	1010804731
R218	RESISTOR	390, 5%, 1/8W	1010803913
R219	RESISTOR	47K, 5%, 1/8W	1010804731
R220	RESISTOR	560, 5%, 1/8W	1010805614

Figure 5.9.17 PC Assembly, C-2420 Audio Board, 2A3, page 2/6.

R221	RESISTOR	100K,	5%,	1/8W	1010801040
R222	RESISTOR	10K,	5%,	1/8W	1010801031
R223	RESISTOR	3.3K,	5%,	1/8W	1010803328
R224	RESISTOR	3.3M,	5%,	1/4W	1010820001
R225	RESISTOR	3.3K,	5%,	1/8W	1010803328
R226	RESISTOR	330K,	5%,	1/8W	1010803344
R227	RESISTOR	1K,	5%,	1/8W	1010801023
R228	RESISTOR	1K,	5%,	1/8W	1010801023
R229	RESISTOR	100K,	5%,	1/8W	1010801040
R230	RESISTOR	10K,	5%,	1/8W	1010801031
R231	RESISTOR	47K,	5%,	1/8W	1010804731
R232	RESISTOR	100K,	5%,	1/8W	1010801040
R233	RESISTOR	100K,	5%,	1/8W	1010801040
R234	RESISTOR	100K,	5%,	1/8W	1010801040
R235	RESISTOR	100K,	5%,	1/8W	1010801040
R236	RESISTOR	330K,	5%,	1/8W	1010803344
R237	RESISTOR	3.3M,	5%,	1/4W	1010820001
R238	RESISTOR	270K,	5%,	1/8W	1010802747
R239	POT.	10K,	10%,	1/2W, 25 TURNS	1004880014
R240	RESISTOR	10K,	5%,	1/8W	1010801031
R241	RESISTOR	10K,	5%,	1/8W	1010801031
R242	RESISTOR	1M,	10%,	1/4W	0170650006
R243	RESISTOR	1M,	10%,	1/4W	0170650006
R244	RESISTOR	330K,	5%,	1/8W	1010803344
R245	RESISTOR	22K,	5%,	1/8W	1010802232
R246	RESISTOR	10K,	5%,	1/8W	1010801031
R247	RESISTOR	100,	5%,	1/8W	1010801015
R248	RESISTOR	10K,	5%,	1/8W	1010801031
R249	POT.	1K,	10%,	1/2W, 25 TURNS	1011560038
R250	RESISTOR	100K,	5%,	1/8W	1010801040
R251	RESISTOR	22K,	5%,	1/8W	1010802232
R252	RESISTOR	22K,	5%,	1/8W	1010802232
R253	RESISTOR	22K,	5%,	1/8W	1010802232
R254	POT.	1K,	10%,	1/2W, 25 TURNS	1011560038
U101	IC. LINEAR	MC34074			1011430037
U102	IC. LINEAR	LM317L			1010550012
U103	IC. LINEAR	LC403			1010850008
U104	IC. LINEAR	5532			1006270019
U105	IC. LINEAR	LM2903			1011410036
U106	IC. DIGITAL	4066BC			1004460023
U107	IC. DIGITAL	4584B			1005190011
U108	IC. LINEAR	H11F1			1011640023
U201	IC. LINEAR	MC34074			1011430037
U202	IC. LINEAR	LM1875T			1012120031
U203	IC. LINEAR	MC34074			1011430037
U204	IC. DIGITAL	4001B			1004660022
U206	IC. DIGITAL	4066BC			1004460023
U207	IC. LINEAR	LM340/7812			1003410022
XP1	CONNECTOR,PCB,TRANSITION,20PIN				1012020037

	KEY, POLARIZING	1008070033
	CABLE, FLAT, 20 COND. 28AWG	1008080004
	HEATSINK, TO-220, BOTTOM	1011570033
	HEATSINK, TO-220, TOP	1011580039

Figure 5.9.17 PC Assembly, C-2420 Audio Board, 2A3, page 3/6.

2035BP

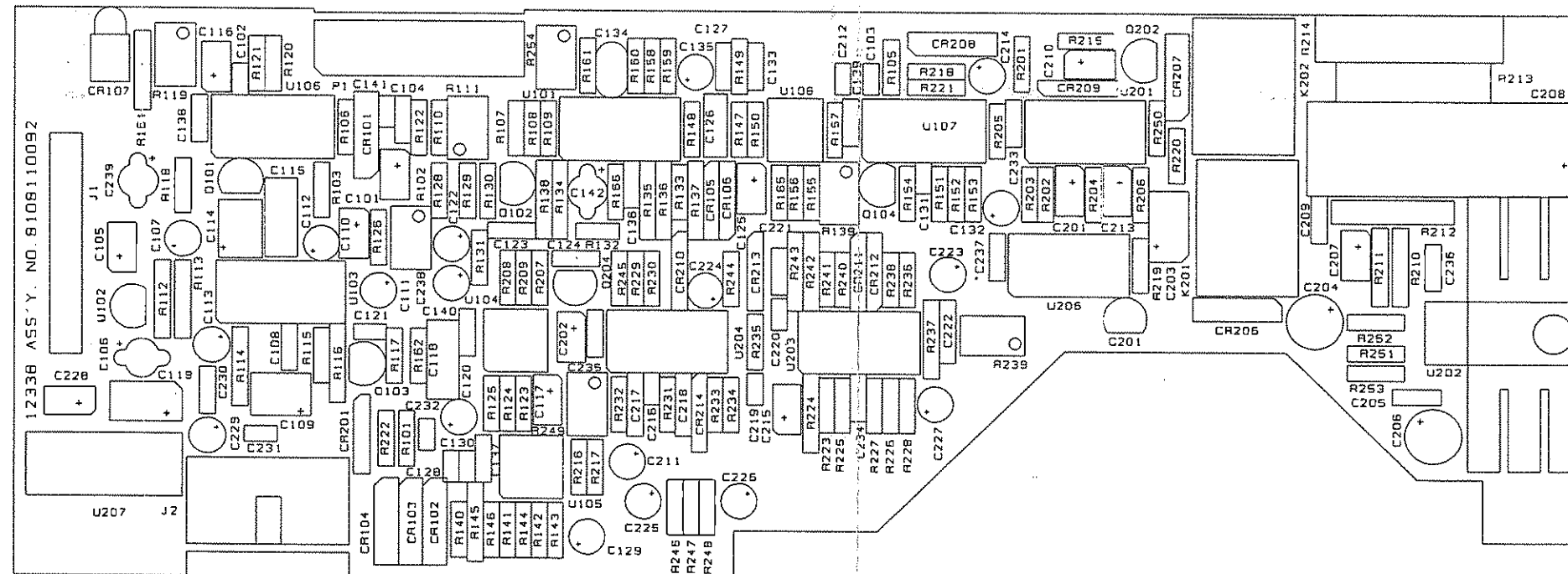


Figure 5.9.17 PC Assembly, C-2420 Audio Board, 2A3, page 4/6.

A20358

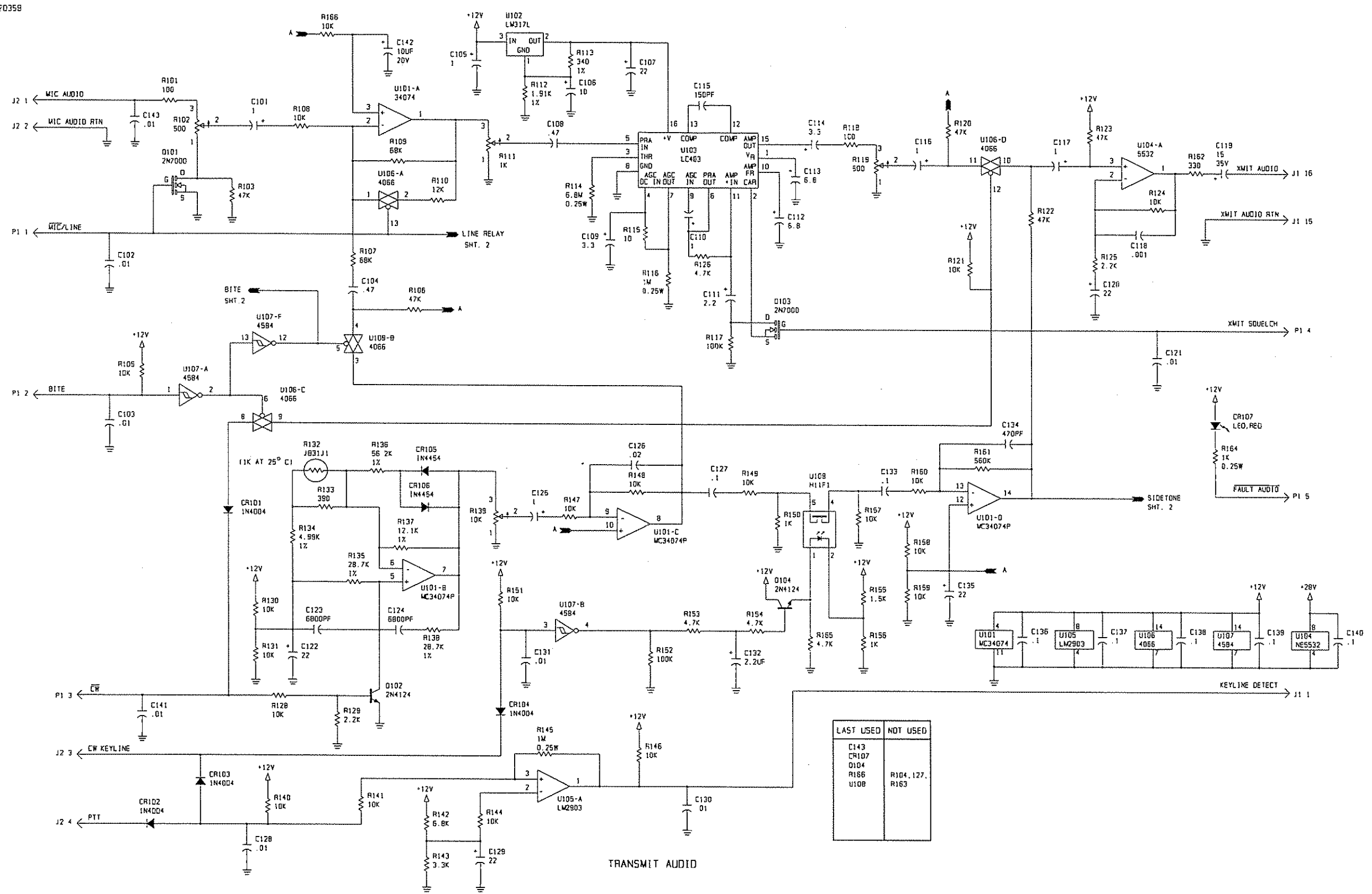


Figure 5.9.17 PC Assembly, C-2420 Audio Board, 2A3, page 5/6.

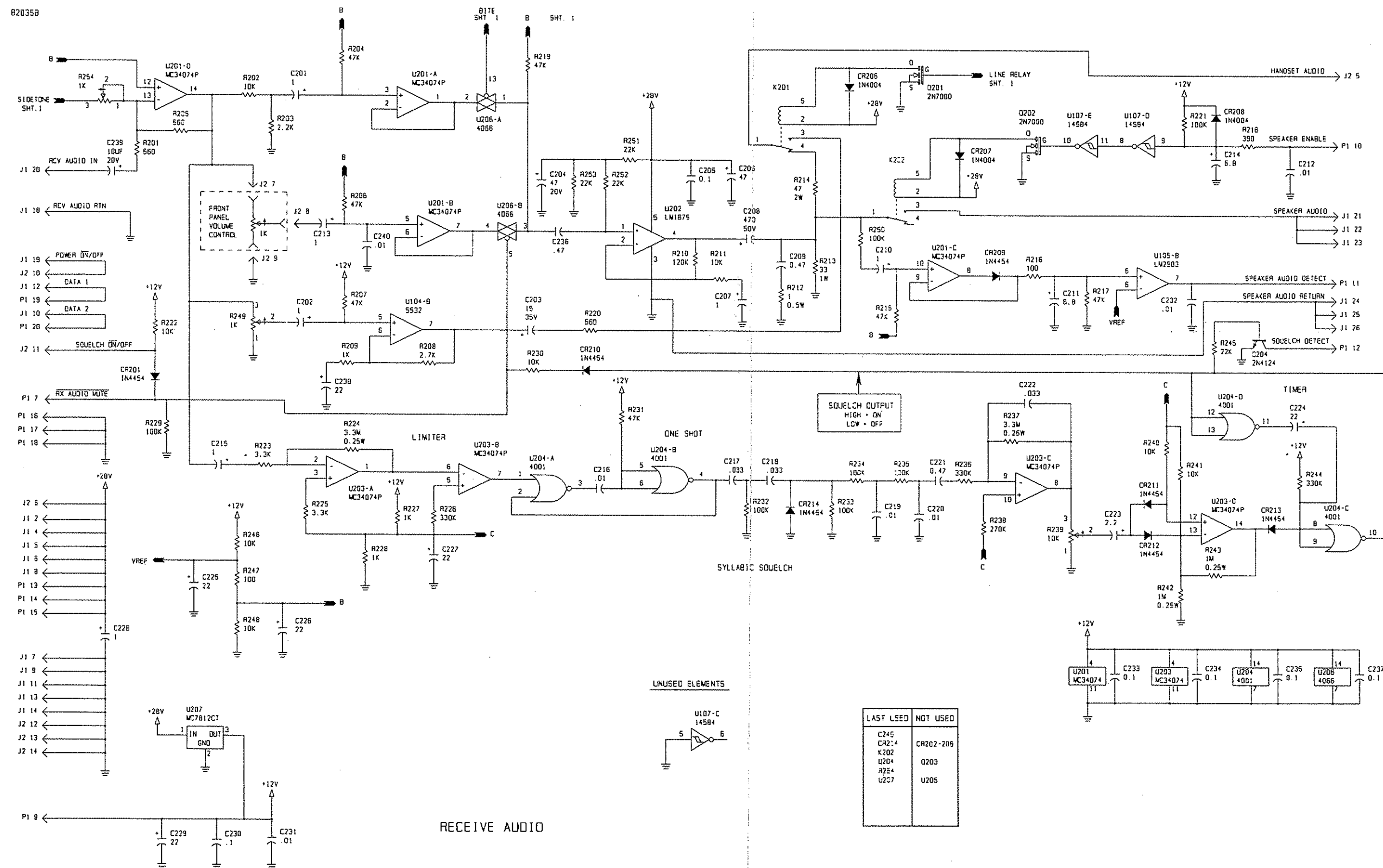


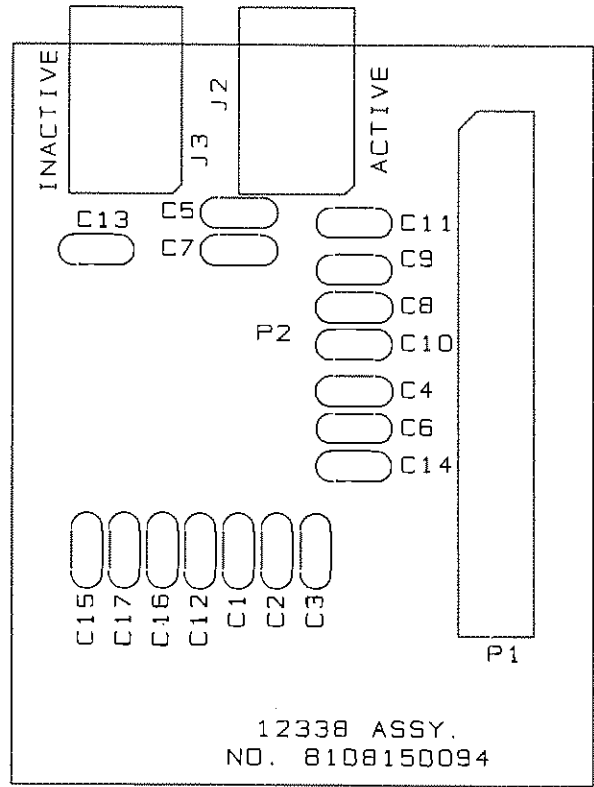
Figure 5.9.17 PC Assembly, C-2420 Audio Board, 2A3, page 6/6.

REV C	COVER ASSY, CONTROL HEAD	8108105099
	CATCH, HOLD DOWN BLACK	0526370017
	SPEAKER, 3X5 OVAL, 8 OHM, 5W	0877970009
	CONNECTOR, HOUSING, 3 PIN FEM	1008050016
	CONNECTOR, POWER, 2 PIN ROUND	1011230011
	GASKET, 19 PIN CONNECTOR	1011920034
	STANDOFF, F-F, 6-32 .500 L	1012770001
	CASE, CONTROL HEAD	8108101603
	PC ASSY, CONNECTOR, REMOTE	8108150094
2A4A1		

Figure 5.9.18 Cover Assy, Control Head, 2A4, page 1/1.

REV 01	PC ASSY, CONNECTOR, REMOTE	8108150094
C1	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C2	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C3	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C4	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C5	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C6	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C7	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C8	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C9	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C10	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C11	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C12	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C13	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C14	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C15	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C16	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C17	CAP. 0.01UF, 50V, X7R, 20%	0281730008
J2	CONNECTOR, PC, 3 PIN	1008050008
J3	CONNECTOR, PC, 3 PIN	1008050008
P1	CONNECTOR, RIBBON, 26 PIN FEM	1008340031
P2	CONNECTOR, POWER, 19 PIN FEM.	1011110008
XP1	CONNECTOR,PCB,TRANSITION,26PIN	1011090261
	CABLE, RIBBON, 26 COND.	1011180006

2040AP



2040AA

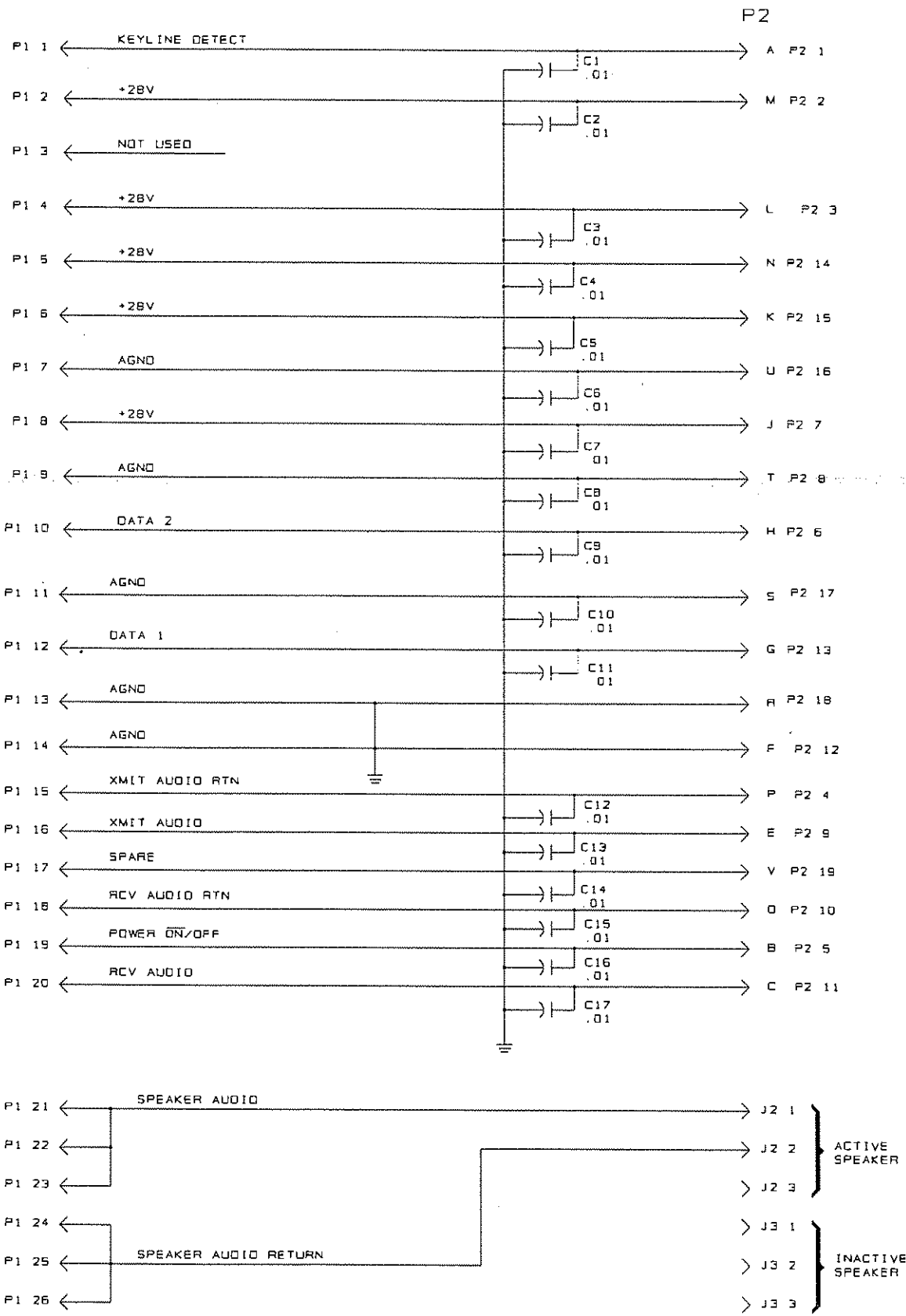


Figure 5.9.19 PC Assembly, C-2420 Remote Connector, 2A4A1, page 1/1.