TM-8121000505

DIGITAL HF/ISB TRANSCEIVER

RT-9000C

OPERATION AND MAINTENANCE MANUAL

SUNAIR 3005 Southwest Third Avenue, Fort Lauderdale, Florida 33315-3312

WARRANTY POLICY

GROUND AND MARINE PRODUCTS

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

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

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

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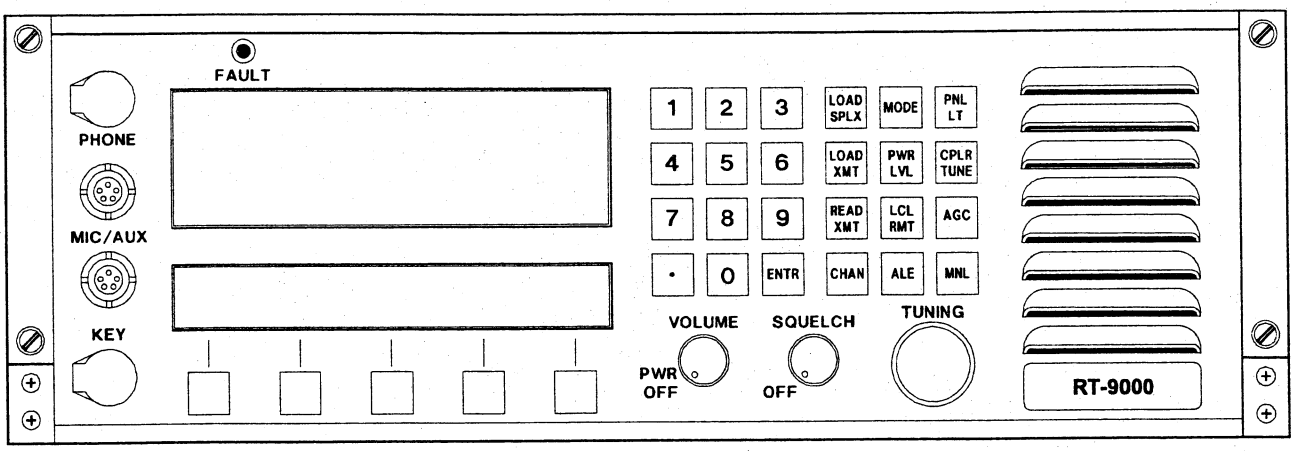

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FOURTH REVISION, FEBRUARY, 1997
Page change: 05/08/97
Page change: 07/02/97
Page change: 01/25/02

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

TABLE of CONTENTS

TABLE of CONTENTS (Cont...)

TABLE of CONTENTS (Cont...)

TABLE of CONTENTS (Cont...)

TABLE of CONTENTS (Cont...)

TABLE of ABBREVIATIONS

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

LISTING of FIGURES

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LISTING of TABLES

SECTION I

GENERAL INFORMATION

1.1 SCOPE OF MANUAL

This manual contains information necessary to install, operate, and maintain the RT-9000 HF/SSB Digital Transceiver. 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. Information exclusive to RT-9000A is contained in Section VI.

1.2 PURPOSE OF EQUIPMENT

The RT-9000 is a 125 Watt HF/SSB Digital Transceiver capable of providing communications from 1.6 to 29.99999 MHz (receive 100 kHz to 29.99999 MHz). Modes of operation include USB, LSB, AME, and CW (FSK, FAX, High Speed DATA, ARQ and FEC are available with optional external modems). The RT-9000 is designed to be used in fixed station or mobile environments and can be computer or remotely controlled via RS232/422/485/FSK tones. The standard features along with the available options make the RT-9000 the most versatile and expandable HF system on the market today.

Features of the RT-9000 include: simplex or half-duplex operation, manual or memory frequency selection in 10 Hz steps, 128 programmable channels, AC/DC operation with auto changeover, keyboard entry, nonvolatile memory using EEPROM (no batteries required), BITE to LRU (Lowest Repairable Unit), receive scanning, computer control, and high speed data capability.

1.3 GENERAL DESCRIPTION

The RT-9000 can be used in base station 19 inch rack installations, on table tops, in mobile installations and transportable cases. Its rugged package makes the RT-9000 ideal for all environments. Internally, the RT-9000 is designed with the service technician in mind. Descriptive readouts on the front panel (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 pin-point the faulty module immediately. The RT-9000 is lightweight for its capability, only thirty-six pounds (36 lbs.) when used on DC only and forty-nine pounds (49 lbs.) with AC supply installed. Available in Olive Drab (OD) or Gray, the RT-9000 is compatible with most radio station color schemes. If a particular color other than OD or Gray is required, contact the Sunair Marketing Department for information concerning changes to the standard colors.

The RT-9000 has a simple, easily understood front panel. First time users can operate the radio without extensive training. The wide screen LCD is continuously updated by the microprocessor with operational status such as Frequency, Channel, Mode, BFO, AGC, Power, Local or Remote Control. The LCD also contains a bar graph meter which selectively indicates signal strength, forward RF power, reverse RF power and remote transmit and receive audio levels. The built-in-test routines include power amplifier and antenna coupler status in plain English messages which appear in the display. Softkeys, and a softkey menu LCD, display selected options such as Time, CW Filter, etc. The softkeys also provide access to remote control configuration, meter selection, speaker control and other operating features not found on the front panel keyboard.

1.4 TECHNICAL SPECIFICATIONS

1.4.1 GENERAL

FREQUENCY RANGE: Transmit - 1.6 to 29.99999 MHz; Receive - 100 kHz to 29.99999 MHz in 10 Hz steps.

PROGRAMMABLE CHANNELS: 128 Simplex or Half-Duplex.

FREQUENCY STABILITY: 1 X 10^6 (Optional + 1 part in 10^8).

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

MEMORY RETENTION: Non-Volatile.

SCAN/SWEEP: Manual or automatic Rate/Dwell programmable.

BFO: ± 1.99 kHz, 10 Hz Resolution.

SYNTHESIZER LOCK: 10 ms.

T/R SWITCHING TIME: 10 ms.

REMOTE INTERFACE: RS232/422/485 (FSK Tone Optional).

RF INPUT/OUTPUT IMPEDANCE: 50 Ohm nominal, unbalanced.

BITE: Fault isolated to module level (LRU), descriptive readout on front panel and individual module indication.

INPUT POWER: 115/230 VAC ± 15%, 50/60 Hz; +26 VDC ± 15%; With both input powers connected unit operates AC/DC Auto Changeover.

SIZE - INCHES (CM): 5.96H (15.2) X 17.83W (45.4) X 17.66L (44.9).

WEIGHT - LBS (KG): DC - 36 (16.3); AC - 49 (22.3).

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 1 kHz (Optional); AM - ± 300 Hz @ 6 dB; (Optional Phase Delay Compensated Filters Available).

SENSITIVITY: SSB - 0.5μV for 10 dB (S+N)/N; AM - 3.0μV for 10 dB (S+N)/N; CW - 0.3μV for 10 dB (S+N)/N; (Degradation below 2.0 MHz).

AUDIO OUTPUT: 5 Watts into internal speaker < 5% THD; Two selectable lines, at -20 dBm to +10 dBm into 600 Ohms; Headset, low impedance.

IMAGE & IF REJECTION: 80 dB minimum.

SPURIOUS REJECTION: 80 dB minimum.

AGC CHARACTERISTICS: Attack Time - 10 ms nominal; Release Time -23 ms fast, -200 ± 100 ms medium, 1 ± 200 sec slow.

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 0.5µV equivalent input at the antenna terminal.

1.4.3 TRANSMITTER SECTION

OUTPUT POWER: Normal Operation - 125 Watts PEP and Average for SSB; 125 Watts CW; 40 Watts Carrier in AM. Low Power Operation - 65 Watts (Adj) SSB; 65 Watts (Adj) CW.

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

INTERMODULATION DISTORTION: 36 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, aux. connector, and two selectable 600 Ohm lines at -20 dBm to +10 dBm.

AUTOMATIC LEVEL CONTROL: 125 Watts ±1 dB.

AUDIO COMPRESSION: 10 dB nominal (Internal Disable).

1.4.4 ENVIRONMENTAL

TEMPERATURE: -30°C to +50°C.

HUMIDITY: 100% at 50°C.

RAIN: MIL-STD-810D, Method 506.2.

SHOCK: MIL-STD-810D, Method 516.3.

VIBRATION: MIL-STD-810D, Method 514.6.

1.5 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 effect on radio waves.
b) Select the proper frequency to work in conjunction with the condition of the ionosphere.
c) Ensure 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. For example, a high frequency at night, when the ionosphere is at its weakest, would be too strong and the signal would go completely through the ionosphere and out into space. Too low a frequency during the day, when the ionosphere is the most dense, would create a situation where the signal is so weak the ionosphere would totally absorb the radio waves and nothing would return to earth. The general rule of thumb, then is; higher frequencies in 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 of the signal 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.

1.6 ALE (Automatic Link Establishment) MODEMS

HF radio can provide reliable communication where all other means of communication fail. The key is to know how HF skywave propagation works and to observe the basic rules for its use.

ALE Modems provide a good deal of simplification to the operational scenario. Proper selection of antennas and viable frequencies must still be made at the time of system commissioning, but the daily routine of selecting proper frequencies is accomplished automatically, thus allowing the radio in an ALE network to function much like a telephone.

All of the control functions for operating the Sunair ALE Modems are built-in to the RT-9000 software. Adding such a modem at a later date is easily facilitated. A discussion of 'ALE' operating routines is presented later in this manual.

1.7 EQUIPMENT SUPPLIED

The following is a list of equipment, with appropriate Sunair part numbers, supplied with the RT-9000 or RT-9000A Transceiver.

Supplied Equipment:	Sunair Part Numbers:
Transceiver, RT-9000 Transceiver, RT-9000A	8076001056 GRAY 8112001057 GRAY
Hand Held Microphone Assembly	8076000602
Manual	8076000505
Mating Connector Kit (RT-9000) Mating Connector Kit (RT-9000A)	8076000491 8112000492
Power Cord Assembly, 115VAC or Power Cord Assembly, 230VAC	8076002095 8076002192

1.8 OPTIONS AVAILABLE

The following is a list of optional equipment or accessories available for use with the RT-9000 or RT-9000A Transceiver.

Optional Equipment/Accessories:	Sunair Model /Part Numbers:
Internal Lyncompex Module	8076097096
High Stability Reference Oscillator	5024013701
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	8105001055 GRAY
Automatic Link Establishment (ALE) Modem, MD-9188A	8101001051 GRAY
Automatic Link Establishment (ALE), Embedded Processor Assembly (RT-9000A only)	8112010099
Remote Control Unit (Computer Control), RPC-9286D	8078201001
Remote Control Unit, RCU-9310	8078001053 GRAY

Optional Equipment/Accessories:	Sunair Model /Part Numbers:
Headset	0840200005
Headset, Lightweight	1010690027
CW Key with Phone Plug	5024000994
Clock	1011190010
Handset Assembly	8076000793
Desktop Microphone	8076000891
Shockmount Assembly (Mobile Application)	8076002591
Rackmount Kit with Slides	8076004853 GRAY
Blower Kit	8076006091
Power Cord Assembly, DC	8076002290
Audio Interface Cable	8076004594
Tone Modem (PC Assembly FSK Modem, 300 baud)	8076115094
Running Spares Kit (Fuses)	8076904099
Field Module Kit	8076905095
Service Kit 9000 Series Contains: Repair Alignment Tools 1011480034 PC Assembly, Card Extender 8076003091 Puller, PCB 8076003105	8076003393

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-9000 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: (954) 525-1505, FACSIMILE: (954) 765-1322.

If the original shipping carton is not available, be sure to carefully pack each unit separately, using suitable cushioning material where necessary. Very special attention should be given to providing enough packing material around connectors and other protrusions from the Transceiver. 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-9000 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.

Connection of the RT-9000 to power sources, antennas, antenna couplers and other equipment may be accomplished as follows:

NOTE: Refer to Section VI for RT-9000A.

TO ADD	CONNECT	NOTE
AC Power	AC source to J1 on rear panel.	See Figure 2.4.1.1.
DC Power (DC Power Cable Optional)	DC source to J3 on rear panel.	See Figure 2.4.1.1.
Antenna	Antenna to J4 on rear panel.	Only if antenna coupler not required.
Microphone	Microphone to J3 on front panel.	See Figure 2.4.1.1.
CW Key	Key to J1 on front panel.	See Figure 2.4.1.1.
Headphones	Headphones to J2 on front panel.	See Figure 2.4.1.1.
Antenna Coupler (CU-9125)	Antenna coupler control line from J1 (CU-9125) to accessory connector J6 on rear panel of the RT-9000. Coaxial signal line from J2 (CU-9125) to antenna connector J4 on rear panel of the RT-9000.	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 J6 on the rear panel of the RT-9000. Coaxial signal line from J2 (LPA-9600) to antenna connector J4 on rear panel of the RT-9000.	See Figure 2.4.1.1 and consult LPA-9600 Manual (Figure 2.1).
"ALE" Modem (MD-9188A)	Control lines from J4 (MD-9188A) to remote connector J8 on the rear panel of the RT-9000. Modem audio lines from J1 (MD-9188A) to audio connector J5 on the rear panel of the RT-9000.	See Figure 2.4.1.1 and consult MD-9188A Manual (Figure 2.4.1.2).
External Data Modems (Direct Connection RT-9000)	Connect modem audio and keyline to RT-9000 through audio connector J5 on the rear panel of the RT-9000.	See Figures 2.4.1.1 and 2.4.1.2.
External Data Modems (Direct Connection MD-9188A)	Connect modem audio and keyline to MD-9188A through audio connector(s) J2 and J3 on the rear panel of the MD-9188A.	See Figure 2.4.1.3 and consult MD-9188A Manual.

TO ADD	CONNECT	NOTE
Remote Control (RCU-9310)	Control lines from J6 (RCU-9310) to remote connector J8 on the rear panel of the RT-9000. Remote Audio from J4 (RCU-9310) to audio connector J5 on rear panel of RT-9000.	See Figure 2.4.1.1 and consult RCU-9310 Manual.
Remote Control (RPC-9286D)	Control lines from J2 (RPC-9286) to remote connector J8 on the rear panel of the RT-9000. Signal line from J3 (RPC-9286) to audio connector J5 on rear panel of the RT-9000.	See Figure 2.4.1.1 and consult RPC-9286 Manual.
Blower Kit	Connect Fan Plug to J2 on rear panel of RT-9000.	See Figure 2.4.1.1.
5 MHz Output	Connect external 5 MHz user to J7 and change jumper plug on 1A2A6.	See Figure 2.4.1.1 and Figure 5.9.16.
5 MHz Input	Connect external 5 MHz source to J7 and change jumper plug on 1A2A6.	See Figure 2.4.1.1 and Figure 5.9.16.

2.4.2 BASE STATION INSTALLATION

The RT-9000 is equipped with rubber feet so that it can be placed directly on a table, desk or similar flat surface. The front feet are taller than the rear feet to tilt the Transceiver at a convenient operating angle. Minimum clearances of one (1) inch at the sides and two (2) inches at the rear and top should be allowed to provide for adequate cooling of the rear panel heat sinks. If extended periods of RTTY transmission are anticipated, forced air cooling of the heat sinks is recommended. Figure 2.4.1.1 shows the applicable outline dimensions of the equipment and the location of inputs and outputs for microphones, antennas, antenna couplers, remote controls, signal lines, and modems.

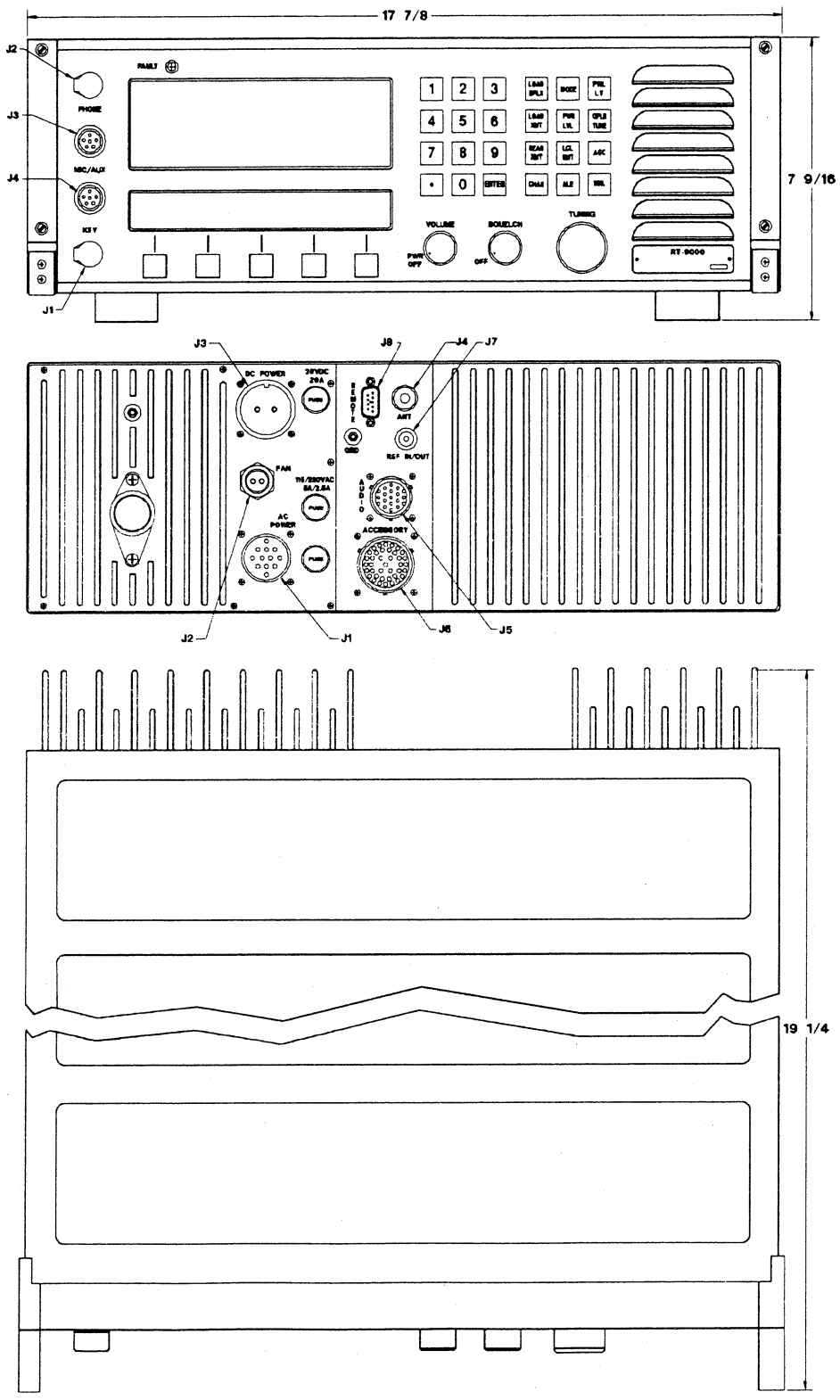

Figure 2.4.1.1 RT-9000 Outline Dimensions and Connector Locations. See Section VI for RT-9000A.

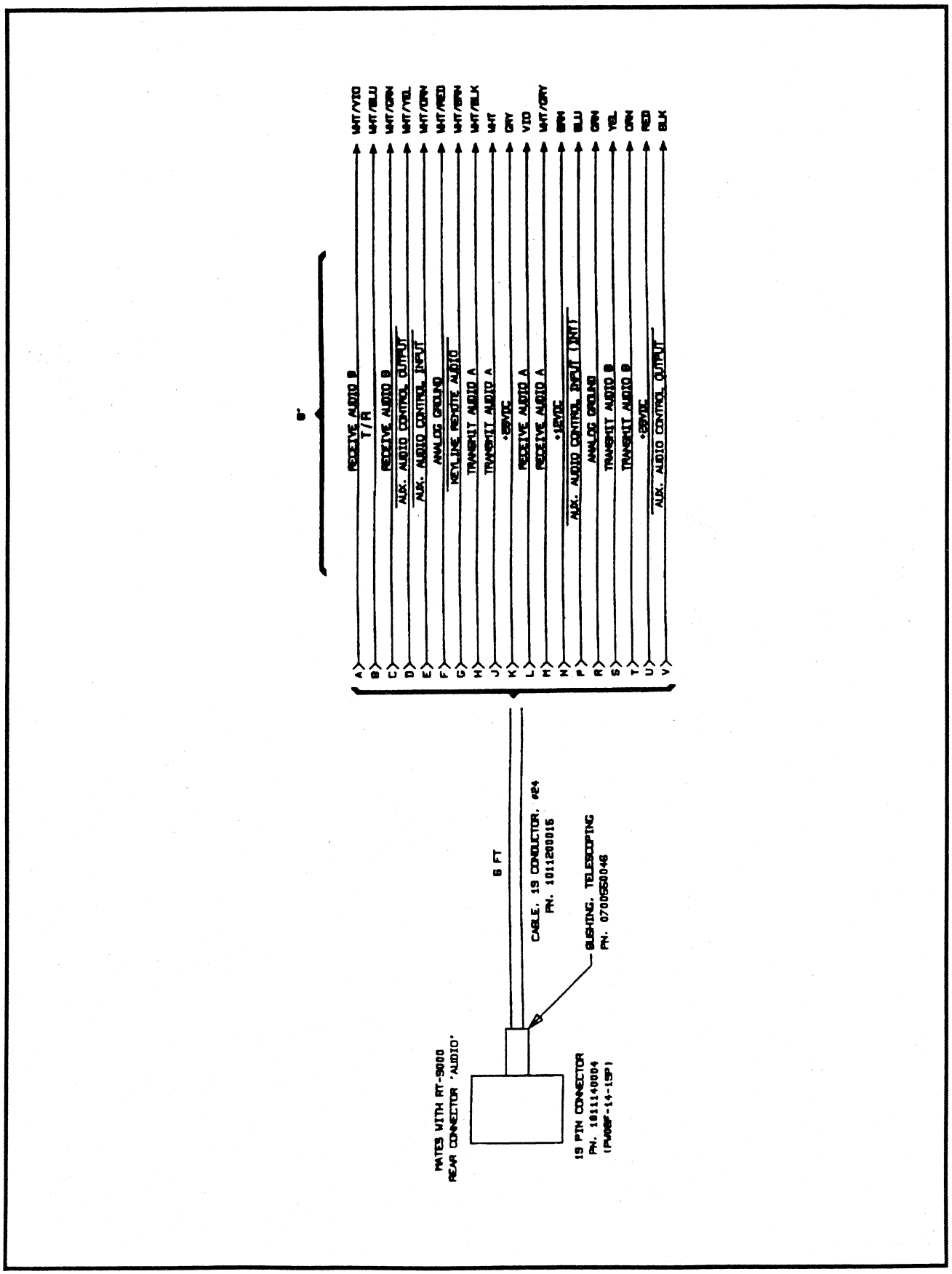

Figure 2.4.1.2 Cable Assembly, RT-9000 Audio Interface.

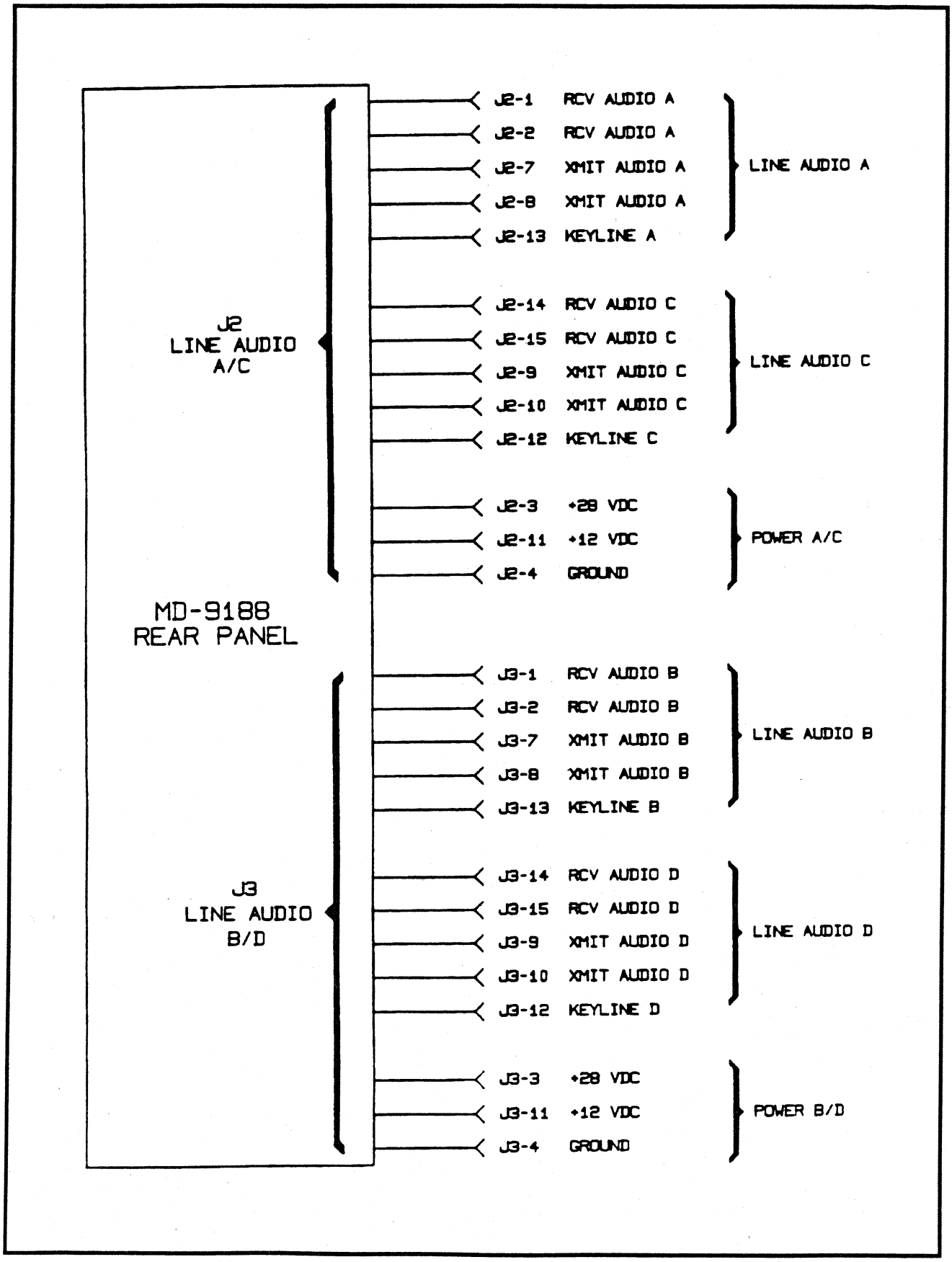

Figure 2.4.1.3 MD-9188A RCV/XMT Line Audio Interface.

2.4.3 VEHICULAR INSTALLATIONS

The RT-9000 Shockmount Assembly (Sunair p/n 8076002591) is designed to mount the transceiver in vehicular/mobile installations. Figure 2.4.3.1 gives the applicable outline dimensions for the RT-9000 coupled with the shockmount.

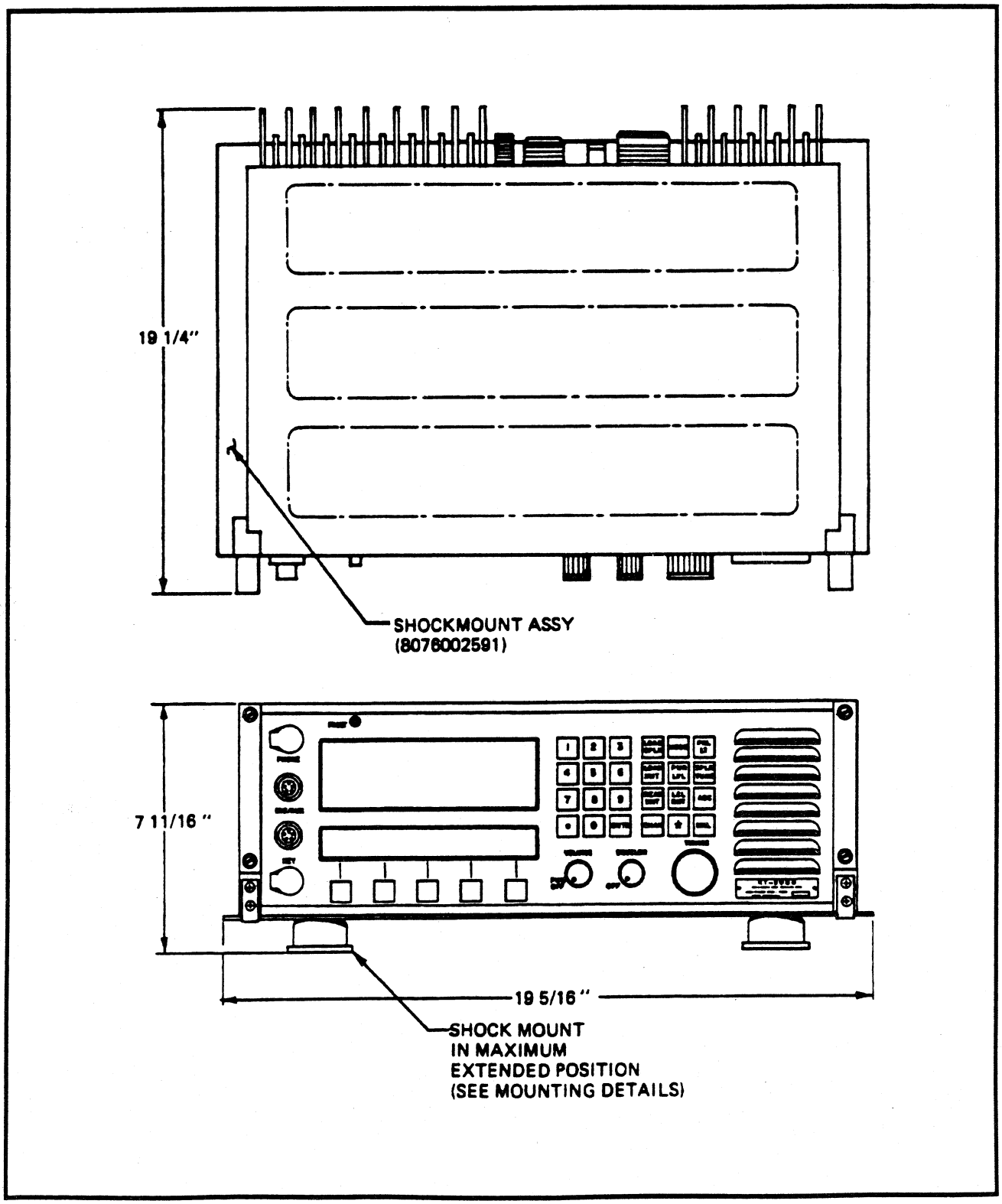

Figure 2.4.3.1 Outline Dimensions of RT-9000 with Shockmount.

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.

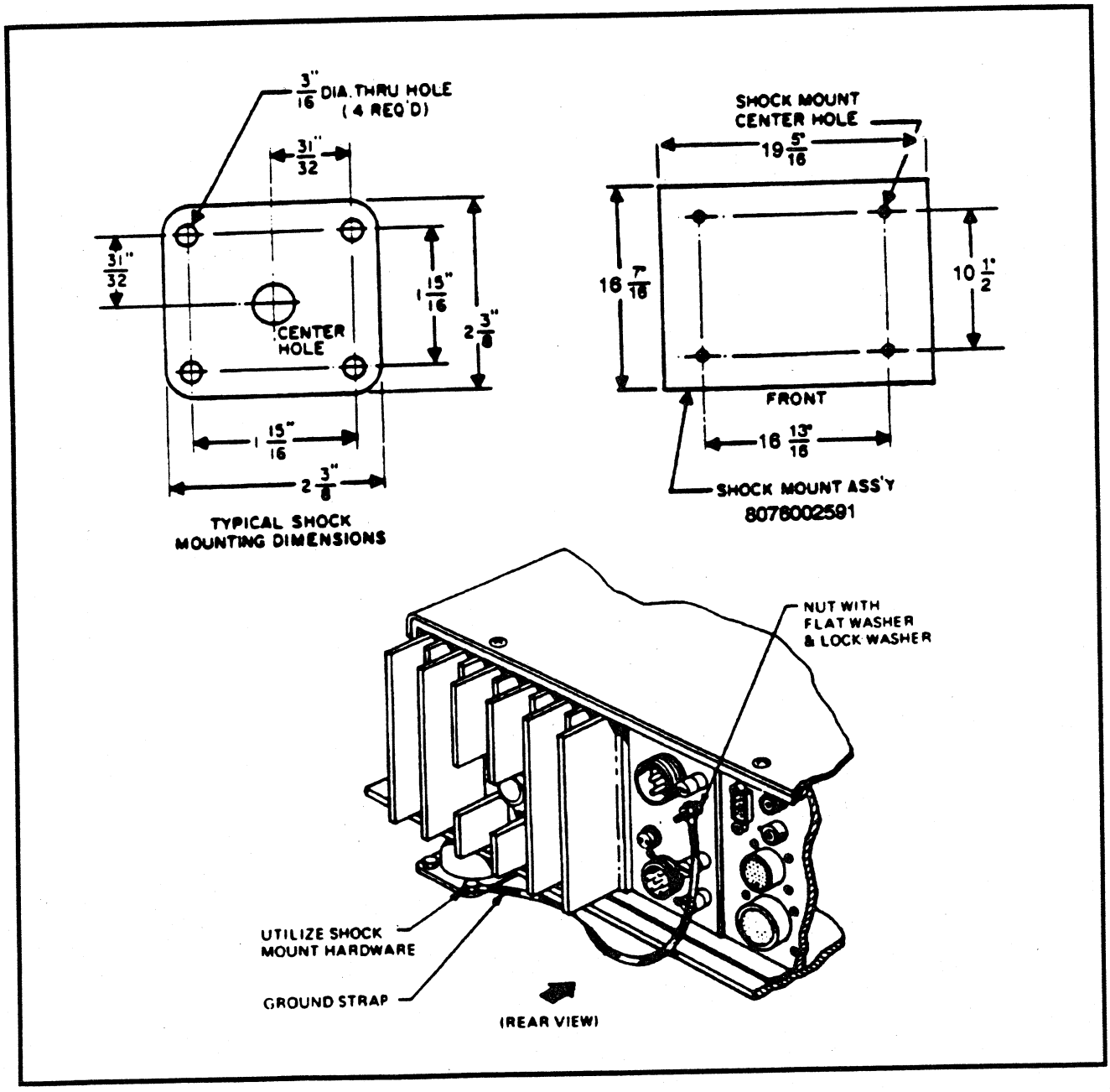

Figure 2.4.3.2 Grounding of RT-9000 to Shockmount.

2.4.4 MARINE INSTALLATIONS

In marine installations, follow the same recommendations as outlined in paragraph 2.4.3. If the transceiver 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 transceiver and the ground plate. The length of this ground lead should be held to an absolute minimum commensurate with a neat installation.

2.4.5 RACK INSTALLATIONS

The transceiver may be conveniently mounted in a standard nineteen inch (19") rack using the Rackmount Kit (Sunair p/n 8076004853[GRAY]. The kit includes rack slides, associated hardware and filler panels. The transceiver, in the rack mounted configuration, requires a standard panel space of seven inches (7") high. Refer to Figure 2.4.5.1 for assembly details.

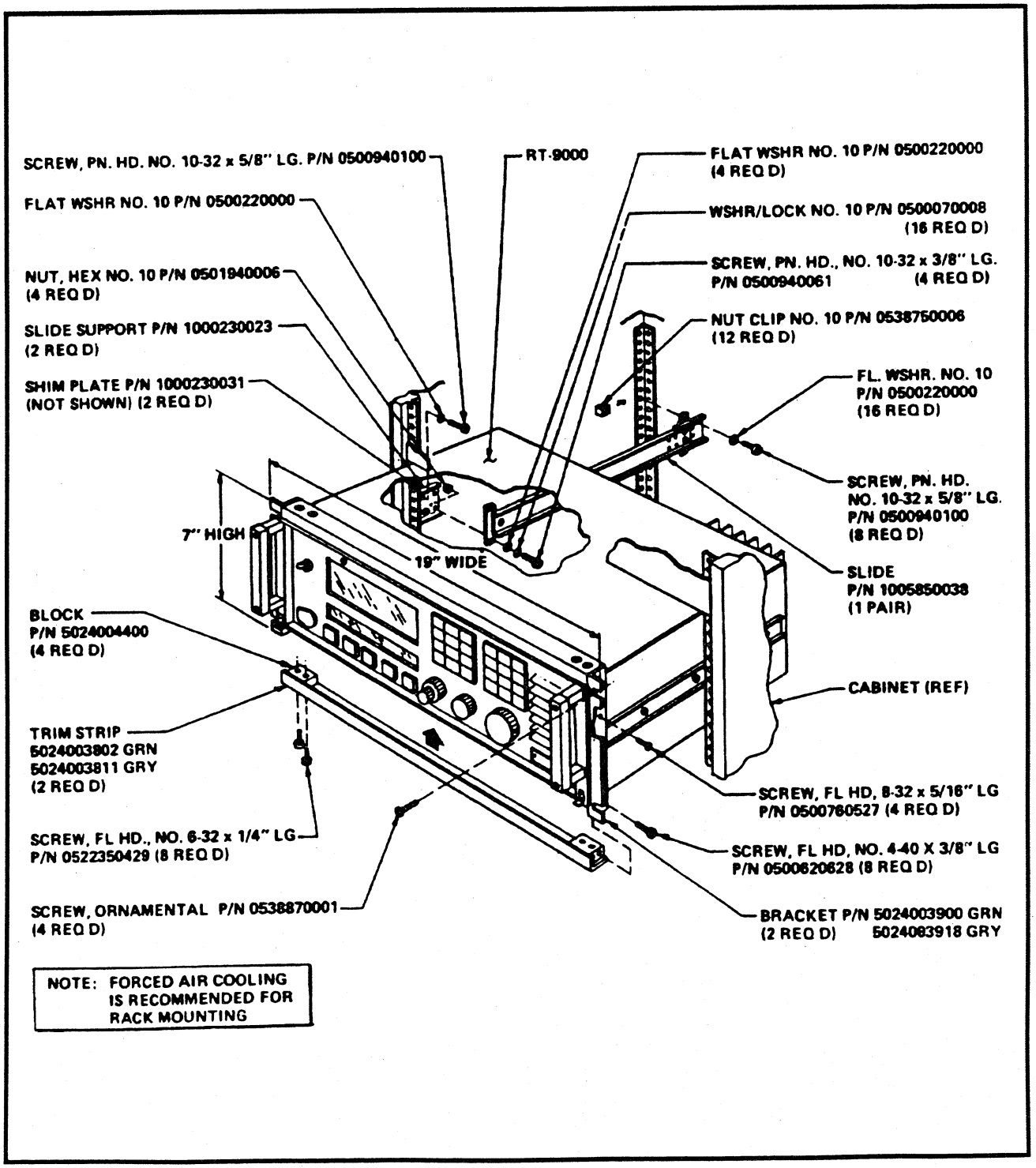

Figure 2.4.5.1 Installation of RT-9000 in Equipment Rack.

2.5 ANTENNAS AND GROUND SYSTEMS

2.5.1 GENERAL

The RT-9000 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 1.6 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/Ns 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.

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RT-9000C
HF/ISB Transceiver

Please refer to Section VII Supplement of this manual for RT-9000B Operating Instructions. These instructions also apply to the RT-9000C ISB Transceiver.

SECTION IV

THEORY OF OPERATION

4.1 GENERAL

The theory of operation of the RT-9000 Transceiver is presented in nine (9) parts:

(1) Front Panel Assembly.
(2) Microprocessor/Optocoupler Assembly.
(3) Synthesizer Assembly.
(4) I/O Assembly.
(5) Receiver/Exciter Assembly.
(6) Filter Assembly.
(7) Select/Distribution Reference Driver Assembly.
(8) Power Amplifier Assembly.
(9) AC and DC Power Supply Assemblies.

Figure 4.1.1 is the overall block diagram of the RT-9000 Transceiver referred to in the discussion.

4.2 COMMON SECTION

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

4.2.1 FRONT PANEL ASSEMBLY 1A1

The Front Panel Assembly contains the circuitry necessary to provide analog and control interfacing with the appropriate sub-assemblies. It also provides and accepts digital information through the Transceiver control/data bus via the microprocessor assembly with the various other assemblies. A wide screen Liquid Crystal Display (LCD) indicates operating status such as frequency, channel, mode, BFO, AGC release time, RF power level and local/remote control as selected by front panel keypad. The LCD contains a bar graph display which can selectively indicate received signal strength, transmit forward/reflected power, and 600 Ohm transmit/receive audio levels. The Transceiver's Built-In-Test Equipment (BITE) circuitry monitors status of all Transceiver plug-in assemblies, as well as external LPA-9600 Solid State Kilowatt Amplifier and CU-9100 (1000 Watt) or CU-9125 (125 Watt) Digital Antenna Coupler equipment. Plain language messages are displayed on the LCD, providing assurance of continuing functionality of the RT-9000 Transceiver or HF system. Selecting the Transceiver BITE function, exercises a comprehensive test routine (contained in the microprocessor software) which checks all plug-in sub-assemblies to the Lowest Repairable Unit (LRU). Should a fault be detected, the 'FAULT' Light Emitting Diode (LED) in the upper left hand corner will illuminate and the LCD will display what LRU(s) is (are) inoperative. A soft key menu LCD located directly below the primary LCD permits the selection of enhanced functions not found on the keyboard entry keypad, such as Sweep, Scan, BITE, Time-of-Day, etc... The soft keys also provide access to remote control configuration, meter selections, remote audio, and speaker control.

4.2.2 MICROPROCESSOR ASSEMBLY 1A2A1

4.2.2.1 GENERAL

The Microprocessor Assembly provides overall control of the RT-9000 functions. It enables most front panel controls, status indications, and storage or operation on any frequency. By means of external interfacing, it also controls the LPA-9600 Solid State Kilowatt Amplifier and the CU-9100 (1000 Watt) or CU-9125 (125 Watt) Digital Antenna Coupler. The information exhibited on the front panel LCD is furnished by the Microprocessor Assembly. It has complete control of all frequency information routed to the Synthesizer Assembly 1A2A2 via Control/Data Bus. The Microprocessor Assembly acquires BITE information from the Transceiver's assemblies via Control/Data Bus. The Microprocessor Assembly, via the Control/Data Bus, selects the proper band pass filter within the Front End Assembly 1A2A5 and the appropriate low pass filter in the Filter Module 1A3. The Microprocessor Assembly is referenced to the 5 MHz Temperature Compensated Crystal Oscillator (TCXO) 1A2A9, by means of the Select/Distribution Reference Driver Assembly 1A2A6 for its clock signal.

4.2.2.2 MICROPROCESSOR U2

The Microprocessor Assembly contains the 80C85 (8-bit) microprocessor U2. U2 is the prime control for all of the RT-9000's functions. It executes instructions (software) contained in EPROMs U13 and U14. U2 controls circuits on the Microprocessor Assembly by three (3) busses:

a) AD0 thru AD7, a multiplexed address/data bus containing either data or address information.

b) A8 thru A15, which always contains address information.

c) The Control/Status bus which contains signals:

$\overline{RD}$ = READ Control
$\overline{WR}$ = WRITE Control
IO/$\overline{M}$ = I/O Write, I/O Read, Memory Write or Memory Read
ALE = Address Latch Enable

4.2.2.3 ERASABLE PROGRAMMABLE READ ONLY MEMORY (EPROMs) U13 and U14

The EPROMs U13 and U14, contain the necessary data bits which make up the program, or software, which Microprocessor U2 uses to control the RT-9000 functions.

4.2.2.4 STATIC RANDOM ACCESS MEMORY (SRAM) U3

The SRAM provides an area of temporary storage which U2 uses as a 'scratch pad' during the execution of its program with U13 and U14.

4.2.2.5 ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) U8

Long term storage of the RT-9000's functions is handled by the non-volatile memory in U8. The frequency information for each of the 128 channels, mode, AGC, power level, etc. is placed in U8 to be used by U2 during the execution of its program with U13. U8 is an 8K X 8 bit CMOS EEPROM in which each byte may be reliably written 10,000 times without degrading device operation. The data in the byte will remain valid after its last write operation for ten (10) years with or without power applied.

4.2.2.6 OPTIONAL SMART WATCH U14(A)

Smart Watch is an optional IC that is piggy backed into U14's socket. It keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months and years. An embedded lithium energy cell maintains watch information whenever the Transceiver is turned off. The above information is available to U2 microprocessor on the multiplexed address/data bus to be displayed on the front panel LCD as time-of-day clock.

4.2.3 OPTOCOUPLER ASSEMBLY 1A2A1A1

The Optocoupler is a sub-assembly containing (PS2401A-4) optically coupled isolators that plugs onto the Microprocessor Assembly 1A2A1. The Optocoupler Assembly electronically isolates the Microprocessor busses from the Transceiver Control/Data Bus to prevent transfer of Transceiver noise to Microprocessor Assembly or the transfer of Microprocessor bus noise to Transceiver circuits.

4.2.4 SYNTHESIZER ASSEMBLY 1A2A2

The Synthesizer Assembly consists of one (1) printed circuit motherboard (1A2A2A5) and four (4) plug in assemblies: 1A2A2A1 - First Local Oscillator, 1A2A2A2 - Second Local Oscillator, 1A2A2A3 - Third Local Oscillator/Beat Frequency Oscillator, and the 1A2A2A4 - Reference Loop and Doubler.

4.2.4.1 GENERAL

The Synthesizer assembly generates the three (3) Local Oscillator (L.O.) injection frequencies necessary to determine the operating frequency of the RT-9000 Transceiver. The synthesizer input is a 5 MHz reference signal from the internal Temperature Compensated Crystal Oscillator (TCXO) 1A2A9 or an external reference signal via the 1A2A6 Reference Select/Distribution Reference Driver Assembly. The three L.O. injection frequencies are produced from the 5 MHz reference by digital phase lock techniques. The frequency accuracy of the Transceiver is, therefore, solely determined by the accuracy of the frequency standard employed.

4.2.4.2 THIRD L.O./BFO ASSEMBLY 1A2A2A3

The 455 kHz Third L.O./BFO reference is produced by a bus controlled Phase-Locked Loop (PLL) operating on a Voltage-Controlled Oscillator (VCO). The output of the (455 kHz) Third L.O. is used for product detection injection frequency in receive and as a carrier generating frequency in transmit.

4.2.4.3 SECOND L.O. ASSEMBLY 1A2A2A2

The 47.850 MHz Second L.O. varied ±5 kHz in 10 Hz steps by means of two (2) bus controlled PLL VCOs. The Second L.O. output is used in the 1A2A4 IF/Filter Assembly to down convert the 48.305 MHz received First IF frequency to the 455 kHz Second IF frequency. In the transmit mode the Second L.O. frequency is used to convert the 455 kHz First IF frequency to the Second IF frequency of 48.305 MHz in the 1A2A4 IF/Filter Assembly.

4.2.4.4 FIRST L.O. ASSEMBLY 1A2A2A1

The First L.O. Assembly consists of four (4) individual bus controlled PLL VCOs, covering the frequency range of 48.31 to 78.31 MHz in 1 kHz steps. Only one (1) of the PLL VCOs is activated at any given time, and is determined by the HF frequency selected, through the Microprocessor Assembly, and via the Transceiver's Controlled Data Bus. The frequency output of the first L.O. assembly is given by:

F1 = 48.305 MHz + F0 MHz

where F1 = First L.O. output frequency.
F0 = Selected RT-9000 operating frequency (i.e. 1.60000 MHz).

Example: 48.305 MHz + 1.60000 MHz = 49.905 MHz

The First L.O. frequency is used in the 1A2A5 Front End Assembly during receive to up convert the selected incoming RF signal to the receive First IF of 48.305 MHz. During transmit the First L.O. 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 ASSEMBLY 1A2A2A4

The Reference Loop and Doubler Assembly 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 L.O. Assembly and the 40 MHz and 80 MHz used by the Second L.O. Assembly in synthesizing their outputs.

4.2.5 I/O ASSEMBLY 1A2A8

The I/O Assembly contains two independent I/O ports, designated 'A' and 'B'. Port B is a dedicated RS-232 port at 9600 baud used for specific external modems such as ALE and Preselector/Postselector. Port A provides the control interface between the receiver and its companion remote control I.E. RCU-9310R or RPC-9286D. This port is configurable from the control panel for RS-232, RS-422, or RS-485 formats at speeds of 300, 600, 1200, 2400, 4800, 9600 and 19200 baud. With optional Tone Modem 1A2A8A1, FSK tones at 300 baud only may be used to transmit control information to and from the RCU-9310.

I/O Port functions are implemented by a Dual Universal Asynchronous Receiver/Transmitter (DUART) (U9) under control of the I/O Assembly's microprocessor (U10). The microprocessor executes special instructions contained in EPROM's (U20) software in response to messages from the Front Panel or 1A2A1 microprocessor. When under remote control by either the RCU-9310 or RPC-9286D their messages cause the EPROM's (U20) software to respond.

The organization of the I/O Assembly hardware and software is such that 'A' and 'B' ports may be active simultaneously.

4.3 RECEIVER SECTION

The Receive Section of the RT-9000 utilizes two (2) assemblies:

(1) The Filter Assembly 1A3 containing:
- 1A3A1 - Detector Assembly.
- 1A3A2 - Assembly Bands 1 thru 4.
- 1A3A3 - Assembly Bands 5 thru 8.

(2) The Receiver/Exciter Assembly - 1A2 containing:
- 1A2A3 - Audio Assembly.
- 1A2A4 - IF Assembly.
- 1A2A5 - Front End Assembly.

These two (2) assemblies are interconnected by means of the 1A2A7 Receiver/Exciter Motherboard.

4.3.1 GENERAL SIGNAL FLOW

Received RF signals from the antenna are routed through a VHF Filter and a Low Pass Filter network on the 1A3 Filter Module. The desired Low Pass Filter is selected via the Band Information Decimal Lines controlled by the frequency information stored in the 1A2A1 CPU Assembly. These eight (8) filters are switched in one at a time by high speed relays (K1 thru K16). The filters operate in the following frequency ranges:

Band Selected:			
0 or 1	100 kHz	to	1.99999 MHz
2	2.0 MHz	to	2.99999 MHz
3	3.0 MHz	to	3.99999 MHz
4	4.0 MHz	to	5.99999 MHz
5	6.0 MHz	to	8.99999 MHz
6	9.0 MHz	to	12.99999 MHz
7	13.0 MHz	to	19.99999 MHz
8	20.0 MHz	to	29.99999 MHz

The filtered RF signal is sent through the receiver protection circuit (1A3A1 CR4 and 5), an instant shunt peak power limiter circuit, which prevents damage to the sensitive receiver 'Front End' when extremely high levels of RF are picked up by the antenna. The filtered RF signal exits the 1A3 filter module at 1A3A1 J3 and is routed via coaxial cable to motherboard 1A2A7 J13 Receive In. Front End Assembly 1A2A5 receives the RF signal at P7 and routes the signal to nine (9) Band Pass Filters. The desired Band Pass Filter is selected by the Band Information Decimal Lines from the CPU Assembly 1A2A1 by forward biasing the proper input and output diode gates (CR3 through CR20). The frequency range of Band Pass Filters are the same as Low Pass filters except as follows:

Band Selected:			
0	100 kHz	to	1.59999 MHz
1	1.6 MHz	to	1.99999 MHz

The filtered RF signal is routed through diode gate CR21 forward biased by +12R. The filtered RF signal is amplified by Low-Noise-Amplifier Q5 and Q6, which drives the High Level Balanced Mixer X2. The mixing of the received RF signal and selected First Local Oscillator (L.O.) frequency of 48.31 thru 78.31 MHz produces the receiver's First Intermediate Frequency (IF) of 48.305 MHz. The First IF signal is amplified, by Low Noise Post Mixer amplifier Q7 and Q8, and sent out thru 1A2A5 P4 to 1A2A7 J16. Then via coaxial cable to 1A2A7 J19 into the IF Assembly 1A2A4 at P4.

In addition to 48.305 MHz, the mixer output contains several other significant mixing products, but because of the high frequencies involved they are separated in frequency from 48.305 MHz by a relatively large amount. The unwanted products are removed by passing the signal through a Narrow Band 48.305 MHz Crystal Filter FL1. The resulting 48.305 MHz is amplified in two (2) Monolithic IF Amplifiers (U30 and U31) and mixed again in Balanced Mixer (X1) with the Second L.O. frequency of 47.845 thru 47.855 MHz, which yields an output of 455 kHz. This signal is then amplified in the Mixer Postamplifier (Q18). The 455 kHz Second IF signal is fed to a Diode Gating Network (CR26, CR28, CR30 or CR32) which selects (via control signals ($\overline{\text{Mode A}}$ and $\overline{\text{Mode B}}$) from the 1A2A1 Microprocessor Assembly) the Upper Sideband Filter (USB) FL2, Lower Sideband Filter (LSB) FL3, Amplitude Modulation Filter (AM) FL4, or an Optional Data Filter FL5. These filters determine the receiver's bandwidth and attenuate interference from adjacent channels. The filtered Second IF signal is then passed through another Diode Gate (CR27, CR29, CR31 or CR33), and is buffer amplified and amplified in three (3) Monolithic IF stages (U32, U33, U34, and U35). The output of the Second IF Amplifier is coupled to a product detector (U13) and to a fixed amplifier (U4-A and B, AGC Gain is adjusted by R45) and envelope detector (U4-C and D). Amplifier (U4-A) also feeds into the AGC Detector (C254, L59 and CR60) and Time Constant Circuit (U36-A and B, CR62, CR63, Q21, Q22 and Q23) which develops a DC voltage proportional to the received signal amplitude. The AGC voltage is amplified (U9-D, U36-B, C and D, U37-A) and used to control the voltage gain of the First IF Monolithic Amplifiers (U30 and U31, AGC1) and the two (2) Second IF Monolithic Amplifiers (U33 and U34). The AGC voltage is also used to give a visual indication on the bar graph of the Front Panel LCD of relative signal strength of the received signal through the adjustment of R305.

The Product Detector (U13) combines the Second IF signal with the Third L.O. (455 kHz), yielding an audio signal consistent with the original SSB transmitted audio. This audio signal is routed through an electronic switch (U10-B) to fixed gain audio amplifier (U9-C) and then to the 1A2A3 Audio Assembly at P1-H (RCV AUDIO). The Envelope Detector (U4-C and D) detects the amplitude of the received signal reproducing the audio of the transmitted AM signal. This audio is also routed through an electronic switch (U10-A) through the fixed gain audio amplifier (U9-C) and on to the 1A2A3 Audio Assembly same as SSB Audio.

On the 1A2A3 Audio Assembly the received audio is amplified (U16-A) and routed through energized electronic switch (U23-A) adjusted by R119 (for 0 dBm remote audio A or B output at J5 rear panel) to the 600 Ohm Line Drivers (U21-A and B) to provide remote 600 Ohm audio output. The amplified signal can be electronically switched (U23-A, B and C) thru a CW Narrow Band Audio Filter circuit (U14-A, B and C). The received amplified audio is also applied to Electronic Volume Control (U17). U17's output is controlled by the Front Panel Volume Control (R2). U17's output is amplified by U16-B and C, switched by U20-A (controlled by MUTE or Squelch ON/OFF), and routed to Speaker Driver IC amplifier (U18) (capable of 5 Watts of audio power). The output is dropped through R111 and routed to 1A1 Front Panel for headphone audio. Full power audio signal is routed through energized K3 Speaker Disable Relay to the 1A1 Front Panel speaker.

The RT-9000 Squelch Circuit (U15, U19, CR14, CR15, CR24, CR25, and R89) 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, will turn on the Receive Audio switch, (U20A) allowing receive audio to pass through to the Front Panel speaker. The Syllabic Squelch circuit is designed to remain unsquelched during voice pauses or short fades, minimizing the effects of nuisance interruptions.

Miscellaneous 1A2A3 Audio Assembly circuits include:

a) Receive Audio BITE and Meter circuits (U12-E, U13, U24, U25, U26, U29-B, CR31 and meter adjustment R162) that samples the speaker audio BITE or the receive 600 Ohm audio and produce output that is sent to the 1A2A1 Microprocessor Assembly and on to the Front Panel LCD to be displayed on the bar graph meter as selected.

b) The +12 VDC High Current Driver and +12 Receive Antenna Relay Driver. These circuits are turned on by the 1A2A1 Microprocessor Assembly and they in turn control the various receiver circuits during receive mode of operation.

4.4 EXCITER SECTION

The Exciter Section of the RT-9000 is found on three (3) assemblies:

(1) The Power Amplifier Assembly - 1A4.

(2) The Filter Assembly - 1A3, containing:
1A3A1 - Detector Assembly.
1A3A2 - Assembly Bands 1 thru 4.
1A3A3 - Filter Assembly Bands 5 thru 8.

(3) The Receiver/Exciter Assembly - 1A2, containing:
1A2A3 - Audio Assembly.
1A2A4 - IF Assembly.
1A2A5 - Front End Assembly.

These three assemblies are interconnected by means of the 1A2A7 Receiver/Exciter Motherboard. A number of the same circuits and components are used in both the receive and transmit modes.

4.4.1 GENERAL SIGNAL FLOW

Input to the Exciter is available from three (3) sources:

a) Microphone.
b) 600 Ohm balanced lines.
c) CW key.

The microphone input signal from the 1A1 Front Panel is routed to the 1A2A3 Audio Assembly at P1-1. It is amplified (U7-A and U30-C) and electronically switched (U31-B) to the microphone/600 Ohm audio circuits (U9-A and B; electronic switch U13-D). The microphone output is level controlled by an internal adjustment (R8). The output is fed through the Transmit Audio Compressor circuitry (U8) or switched (S1-1 is factory set to Mic Compressor 'ON') to bypass these circuits. The microphone audio leaves the 1A2A3 Audio Assembly at P1-E as TX Audio. The 600 Ohm balanced audio input from rear panel J5 as audio A or B is transformer coupled (T1) and level controlled by an internal adjustment (XMIT LINE LEVEL R58) set for 0 dBm then buffered (U30-A and B) and electronically switched by U31A (note when U31-A is on U31-B is off therefore microphone audio will not interfere with 600 ohm audio and when microphone is keyed U31-A is off and U31-B is on so the 600 ohm audio will not interfere with microphone audio).

The 600 ohm audio is switched by S1-3 (factory set to Line Audio Compressor 'ON') through U8 and switched by S1-1 causing the 600 ohm audio to leave the Audio Assembly at P1-E as TX AUDIO. With S1-3 set to Line Audio Compressor 'OFF' the 600 ohm audio bypasses U8 and S1-1. It is now amplified by U7-B and sent to pin 2 of U9-A where it follows the same output path as Microphone Audio to become TX AUDIO at P1-E.

If the RT-9000 is in the CW mode, the CW sidetone oscillator circuit (Q1, U10-A and B) is enabled. Keying with a CW key connected to Front Panel at J1, enables the CW sidetone switch (Q2) allowing the CW tone to be amplified by U11-B and C and level adjusted by R29 prior to being sent to speaker driver U18. The CW sidetone is also sent from U11B to pin 5 of U9-B to become TX AUDIO at P1-E. The TX AUDIO from any of the three sources (microphone, 600 Ohm balanced lines or CW key) is sent into the 1A2A4 IF/FILTER Assembly at P1-5 where it is amplified by U11-A and B and applied to balanced modulator (U12) along with the Third Local Oscillator (455 kHz). The balanced modulator suppresses the carrier and produces two (2) outputs:

a) 455 kHz plus the audio frequencies (Upper Sideband, USB).
b) 455 kHz minus the audio frequencies (Lower Sideband, LSB).

Hence, the output of the balanced modulator is Double Sideband Suppressed Carrier, (DSBSC). After amplification, the DSBSC signal is diode gated (CR26, CR28, or CR32) into the USB Filter (FL2), LSB Filter (FL3), or the optional Data Filter (FL5) as selected via controls from 1A2A1 Microprocessor Assembly. AM operation 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 the output is fed through another diode gate (CR27, CR29 or CR33) into the mixer preamplifier (U1). At this point, if the AM mode of operation has been selected, the AM carrier (455 kHz) is level adjusted with R25 and injected into the mixer preamplifier. The balanced mixer (X2) mixes the SSB signal and the selected Second L.O. frequency of 47.845 thru 47.855 MHz and produces the desired transmit Second IF of 48.305 MHz and the unwanted mixer products. These frequencies are amplified in a Fixed Gain Monolithic Amplifier (U25) and routed through the narrowband 48.305 MHz crystal filter (FL1) to remove the unwanted mixer products. The output of 48.305 MHz is amplified in another fixed gain Second IF monolithic amplifier (U20). The amplified signal is passed thru the VHF transmit gain control circuit to a fixed gain Transmit Second IF amplifier (U27) and then routed to the 1A2A5 Front End Assembly through P3.

The VHF transmit gain control circuit (U24-C) is internally adjusted (R186) for static operation. During dynamic operation this circuit is electronically controlled by the Automatic Level Control/Automatic Carrier Control (ALC/ACC) circuits (ALC is used in CW, Sideband operation. ACC is used in AM operation). The ALC/ACC circuits (U23, U24, Q12, Q13, Q19) sample the forward and reflected power in the 1A3 Filter Assembly and produce the voltage to control the gain of the Transmit Second IF output signal. When the RT-9000 is used with the external LPA-9600 the ALC and ACC voltage from the LPA-9600 are also sampled in the ALC/ACC control circuits to control the gain of the Transmit Second IF output signal at 1A2A4 P3. The 48.305 MHz Transmit Second IF is brought into the 1A2A5 Front End Assembly through the ALC current circuit (Q4 and CR26) into the mixer (X1). The mixer mixes the 48.305 MHz and the selected First L.O. frequency (48.31 to 78.31 MHz) to provide the desired frequency output between 1.6 and 30 MHz. The mixer output is low pass filtered to remove undesired mixer products and the output is amplified in predrivers Q11, Q12, and Q13. The RF signal is again amplified in Drivers Q9 and Q10 to a level of 0.5 Watts PEP. The RF signal is then band pass filtered in one of eight filters (same filters used in receive) and exits the Front End 1A2A5 at P6 to the 1A4, Power Amplifier Assembly input at J1.

The ALC current circuit is controlled by the 1A5A1 DC Power Supply Assembly current ALC detector circuit (U5) which monitors the +28 VDC current supplied to the 1A4 Power Amplifier Assembly. Whenever the power amplifier transistors draw excessive current, this circuit sends a signal to the 1A2A5 ALC (I) circuit causing it to attenuate the Transmit Second IF signal input to the Mixer, reducing the output from the 1A2A5 Front End Assembly and thereby limiting the Power Amplifier transistors current to a safe level.

The 0.5 Watts of Transmit RF power is amplified in 1A4 Push-Pull Drivers Q1 and Q2. The amplified RF is transformer coupled into two (2) sets of Push-Pull Power Amplifiers (Q3, Q4, and Q5, Q6) whose output is coupled to an output combiner circuit to produce the normal 125 Watt PEP RF output. The PA output is sent to the 1A3 Filter Assembly Detector 1A3A1 at J2. The RF is sent through energized K1 to the two Filter Assemblies. (Bands 1-4 are on 1A3A2 and Bands 5-8 are on 1A3A3). These eight filters are relay selected by band information from frequency selected from memory or Front Panel of the RT-9000. The filters are used in receive and transmit and are half-octave low pass filters. The output from the selected filter is sent through the VHF filter (C1 through C7, L1, and L2) and exits at 1A3A1 J1 through coax cable to rear panel assembly 1A6J4.

The 1A5 Power Supply Assembly of the RT-9000 is capable of operating from 115/230 Volts AC or +28 Volts DC battery. With AC and DC battery connected, the assembly will automatically switch to DC battery whenever the AC power fails. The assembly will switch back to AC upon AC restoration.

The 1A5A2 AC Power Supply Assembly is a linear design, reducing the undesirable effects of Radio Frequency Interference (RFI) and Electromagnetic Radiation Interference (EMI) from the transceiver. The AC at J1 is fuse protected by F1 and F2 (5 amp fuses) and transient/surge protected by varistors (ZS1 and ZS2) in the primary of toroid transformer T1. The secondary of T1 steps the voltage down to approximately 35 VAC and diode bridge CR1 rectifies the voltage and sends to filter assembly 1A5A2A1 to be filtered by C1 through C6. The duration of conduction of CR1 is varied by TRIAC Q1 driven by Opto TRIAC Driver U1. Two outputs

are taken from the filter assembly at E5 (AC Pilot Supply Voltage Sense) and at E7 (35 VDC at 17 amps with 115 VAC input). Fuse F3, a 20 amp fuse protects the input to the +28 VDC Regulator Assembly 1A5A2A2 at J1. This input powers voltage regulator U1, supplying +12 VDC to assembly circuits including voltage regulator U7 that supplies +5 VDC to assembly circuits.

The RT-9000 Front Panel ON/OFF Volume Control (S2) sends a ground to E1 which through U2 turns OFF Q1 (+28 Volt Regulating Transistor). With Q1 OFF, U6 (Over/Under Detector) will output a Low on pin 7 causing Under Voltage LED (CR6) to light and K1 to be de-energized.

When S2 is switched ON, the ground is removed U2 turns on Q1 outputting +28 VDC through T1, a voltage sense sample of this voltage is sent to voltage divider R5, R6, R7 and to pin 4 of U2. Resistor R7 is factory adjusted causing U2 to regulate Q1's output to +28 VDC. The +28 VDC is sent to K1's coil and contact. Over/ Under Detector U6 samples the voltage at pins 2 and 3 and output highs on pins 1 and 7, turning OFF CR6 and turning ON Q3. Q3 outputs a ground energizing K1 and turns ON Ready LED (CR8). The output current is sensed by Hall-Effect Current Sensor (U5) in T1 and is pin 3 input to Voltage Comparator (U4) pin 2 has an adjusted input from R15 so that an output current above 20 amps will cause U4 to output a low. This low makes Opto Isolator (U3) to output a high to the gate of SCR Q2. Q2 will output a ground and over current LED CR3 will light and +28V Regulated output will turn OFF.

The 1A5A1 DC to DC Power Supply Assembly is made up of 1A5A1A1 Switching Regulators and 1A5A1A2 Control Logic printed circuit (PC) assemblies.

AC Pilot Supply Voltage from 1A5A2 is sent to the PC Assembly Switching Regulators, providing power to regulator U1. U1 supplies power to +12 V regulator U2 that supplies the sense circuit U3 with power when the RT-9000 is connected to AC power. U3 senses the voltage at pins 2 and 3 and outputs a low that cuts off Q5, keeping K2 de-energized. With K2 de-energized and the Front Panel Volume Control in the OFF position, the sense voltage at base of Q1 causes it to conduct and send a ground from Q1 emitter out P1 pin 5 causing the 1A5A2A2 +28V Regulator to be OFF. When the Front Panel Volume Control is turned ON. A ground is sent to 1A5A1A1 J1 pin 25 through the de-energized contacts of K2 causing Q1 to cut off, removing the ground at P1 pin 5. This turns ON, the 1A5A2A2 +28 V regulator, supplying +28 VDC to 1A5A1A1 P1 pins 6 through 8.

The +28 VDC goes through T-1, part of a Hall-Effect Circuit (which will be explained later), to on board +28 V connection out J3 pin 1 through 3 which goes to 1A4 Power Amplifier Assembly. It also goes through F1 and out to 1A2A7 Motherboard Assembly at J1 pins 1, 3 and 5 and out J2 pin 2 as +28 V sample to PC Assembly Control Logic 1A5A1A2 to U12. The +28 V on board connection goes through CR-13 to pin 1 of U9 a +5 V regulator, which supplies on board +5 V and leaves at J2-14 to 1A5A1A2 to supply +5 V to its on board circuits. At E19 of 1A5A1A1 the applied +28 V is fed through R23 to Source of P-CH Power FET (Q2) +28 V is also fed through R24 to Gate of Q2 and out the assembly at J2 pin 13 to P1 pin 13 of 1A5A1A2 through R2 to pin 10 of U4-G. With And Gate U13C having highs on pins 9 and 10, it outputs a high which causes U4-G to turn ON causing current flow through R2 and R24 at Gate of Q2. Q2 conducts sending +28 V to pins 1 of U6, U7 and U8, which produce the +12 V, +5 V Digital and +5 Analog voltage used in the RT-9000 receive and transmit circuits. As U6, U7 and U8 (LM2576) are similar in design, U6 the +12 V circuitry will be used in explanation.

The LM2576 is a 52 kHz adjustable output 3 Amp Buck Voltage Regulator used as a fixed output. +28 V is applied across input filter C10 through C15 and L2 to pin 1 of U6. The output pin 2 applied across L3, C16 through C20 and L4. R11 and R12 a voltage divider that fixes U6 output to +12 V through FEEDBACK pin 4. The regulated +12 V is sent out J1 pins 7, 9 and 11 to the Motherboard for distribution to all the RT-9000 assemblies requiring +12 V. The regulated voltage is also sent to 1A5A1A2 J2 to P1 pin 1 as +12 V Sample for U5 the Under/Over Voltage Dectector.

With the regulated +12 V between 11.4 and 13.99 VDC, pins 1 and 7 of Detector U5 are high and sent to U4-A, C and E, U9-A, U10-A, U13-A, U14-A and C and U16-D to turn ON Green LED CR8 (Power Supply Ready) and turn OFF RED LED's CR2 (+12 V Under Voltage), CR5 (+12 V Over Voltage), and CR18 (Power Supply Fault). If the regulated +12 V decreases to 11.3 V, U5 pin 7 will go low ($\overline{\text{Under Voltage}}$). U16-D pin 13 will output a low turning ON CR2 (+12 V Under Voltage LED). U13-A pin 3 will go low causing U14-A to output a low on

pin 12. The low at U14-C will output a low on pin 12. The low at U14-C will output a low at pin 8, U4-E will output a high turning OFF CR8 (Power Supply Ready). U4-A will output a low on pin 12. The low at U14-C will output a low at pin 8, U4-E will output a high turning OFF CR8 (Power Supply Ready). U4-A will output a low at pin 16 turning ON CR18 (Power Supply Fault) and sending Power Supply Fault Detect out P1 pin 4 to Microprocessor Assembly 1A2A1 which in turn outputs to Front Panel assembly signals to turn ON FAULT LED and display on Operational Display 'POWER SUPPLY FAULT'. If the regulated +12 V increases to 14 V, U5 pin 1 will go low, U10-A will output a high and U9-A will change states, pin 5 will go high and pin 6 will go low. The high from U10-A pin 5 causes U4-C to output a low turning ON CR5 (+12 V Over Voltage) and sends a low out pin 3 at P1 (+12 V SCR Control) to the Switching Regulators PC Assembly 1A5A1A1 causing Optocoupler U10-A pin 15 to go high causing Q3 to conduct, placing a ground at the output of +12 V regulator U6.

The low at U9-A pin 6 will cause U14-B pin 6 to go low, in turn U-13C pin 8 will go low and output at U4-G will go to +28 VDC. The +28 V Enable going to +28 V will turn OFF 1A5A1A2 Q2 removing +28 V from inputs to regulators Q6, Q7 and Q8. On the 1A5A1A2 the following RED LEDs will be ON: CR3, CR4, CR5 and CR18; on the Front Panel. The FAULT LED will be OFF and Operational/Feature Menu Displays will be blank. This is because the +12 V, +5 V Digital and +5 Analog voltage to RT-9000 have been turned OFF.

On the 1A5A1A1 T-1, U4 and U5 make up the Hall-Effect Current Sensing circuit for the +28 VDC that powers the Power Amplifier Assembly 1A4. R29 is factory set for 17 amps of current into RF Power Amplifier 1A4. When the Hall-Effect circuit senses current greater than 17 amps the DC voltage at J1 pin 24 will increase. This voltage is sent to the Front End Assembly 1A2A5 at P1 pin H, where Q4 and CR26 will decrease the IF signal into mixer X1. This decreases the exciter output to the RF Power Amplifier. The RF Power Amplifier will decrease its output bringing the current down and protecting the Power Amplifier transistors (Q3, 4, 5 and 6).

The 1A2A6 Select/Distribution Reference Amplifier Assembly amplifies, and TTL conditions, the Transceiver TCXO 5 MHz and routes it to the 1A2A2 Synthesizer and 1A2A2 Microprocessor assemblies. By internal switches (S1A and S1B) the TCXO amplified signal may be connected to the Transceiver's rear panel (J7) to external peripheral equipment. Also an external frequency standard can be applied to the rear panel and (J7) switched into the assembly in place of the Transceiver TCXO.

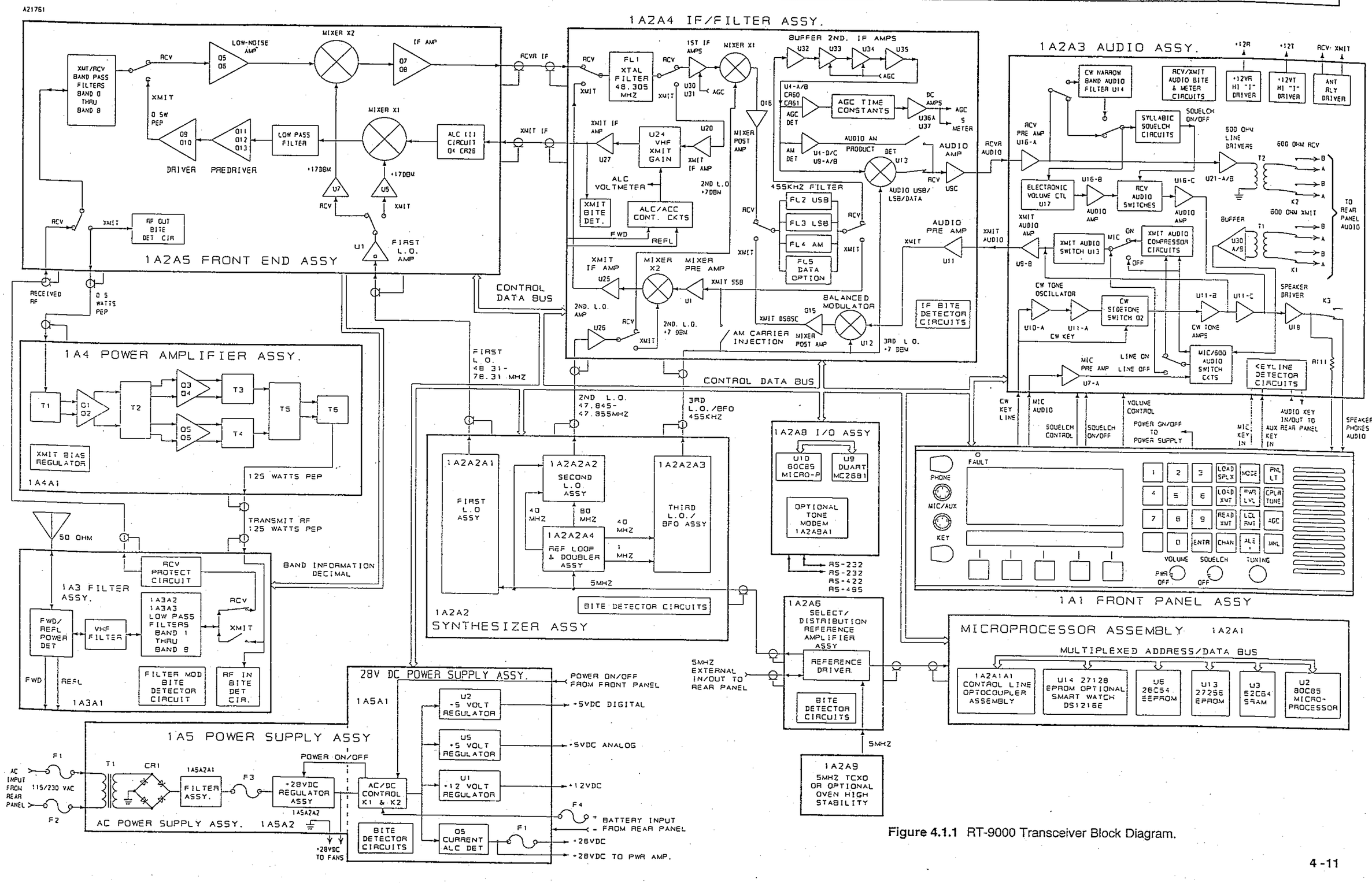

Figure 4.1.1 RT-9000 Transceiver Block Diagram.

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SECTION V

FAULT ISOLATION/MAINTENANCE AND REPAIR

5.1 GENERAL

This section provides the procedures for fault isolation and 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 TOP OR BOTTOM TRANSCEIVER COVER REMOVAL

Refer to Figure 5.2.1.1.

a) Remove the three (3) screws at the rear of the cover.
b) Release cover latches.
c) Pull cover up and back from the front panel (1A1).

5.3 TEST SET-UP

5.3.1 PRELIMINARY

Connect RT-9000 and test equipment as shown in Figure 5.3.1.1.

WARNING: For personal safety and to prevent damage to voltage sensitive components in the Transceiver, always turn 'OFF' the RT-9000 whenever reseating printed circuit cards (PC), LRU's, and when replacing fuses.

5.4 BITE

5.4.1 PRELIMINARY

The BITE of the RT-9000 Transceiver provides immediate LRU faults. The Surveillance BITE is controlled by the microprocessor on CPU Assembly 1A2A1. It checks the operational status of the LRU's with the exception of the DC to DC Power Supply 1A5A1, AC Power Supply 1A5A2, and the Select/Distribution Reference Amplifier 1A2A6. These LRU's have self-surveillance BITE non-dependent upon CPU Assembly 1A2A1.

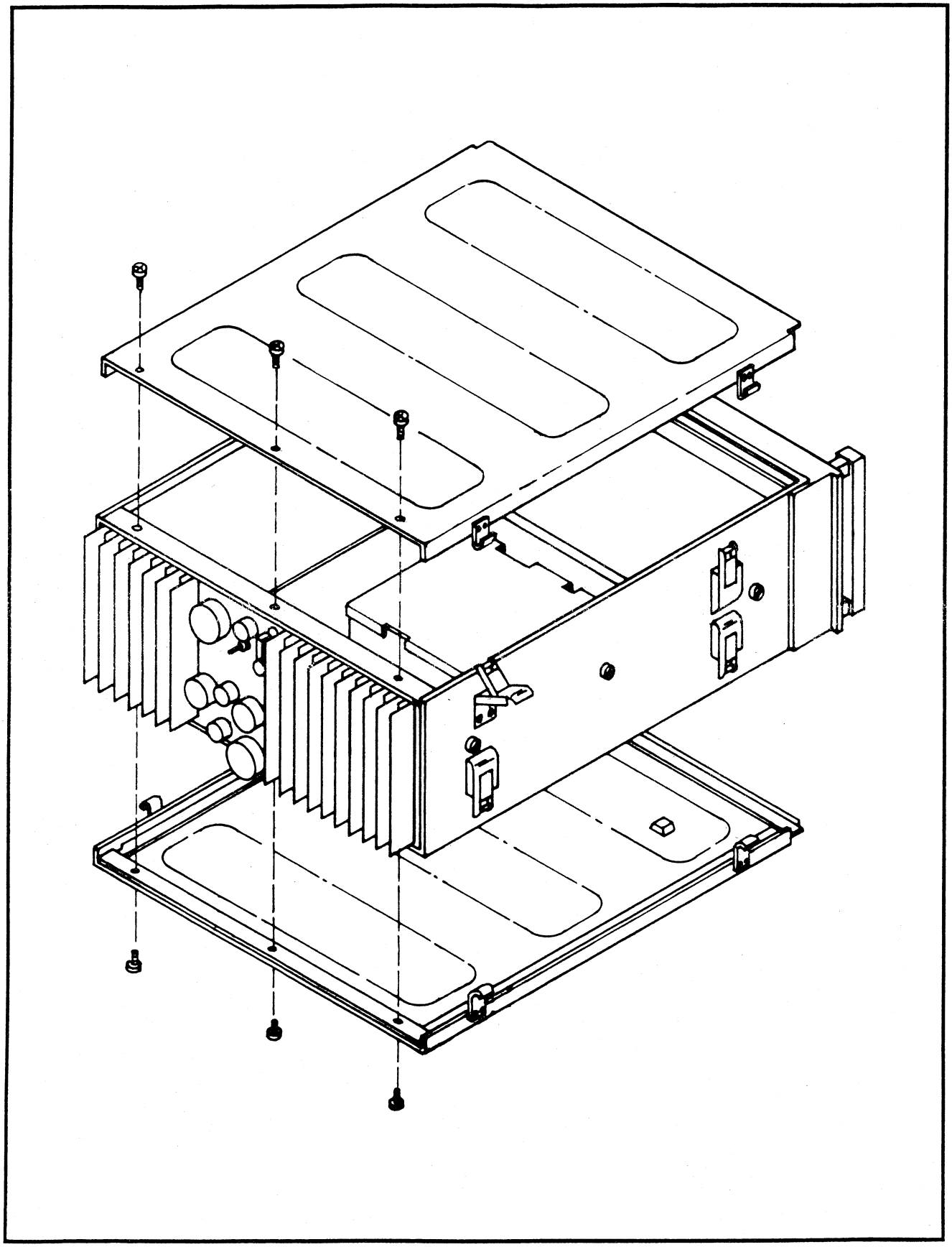


Figure 5.2.1.1 Top or Bottom Transceiver Cover Removal.

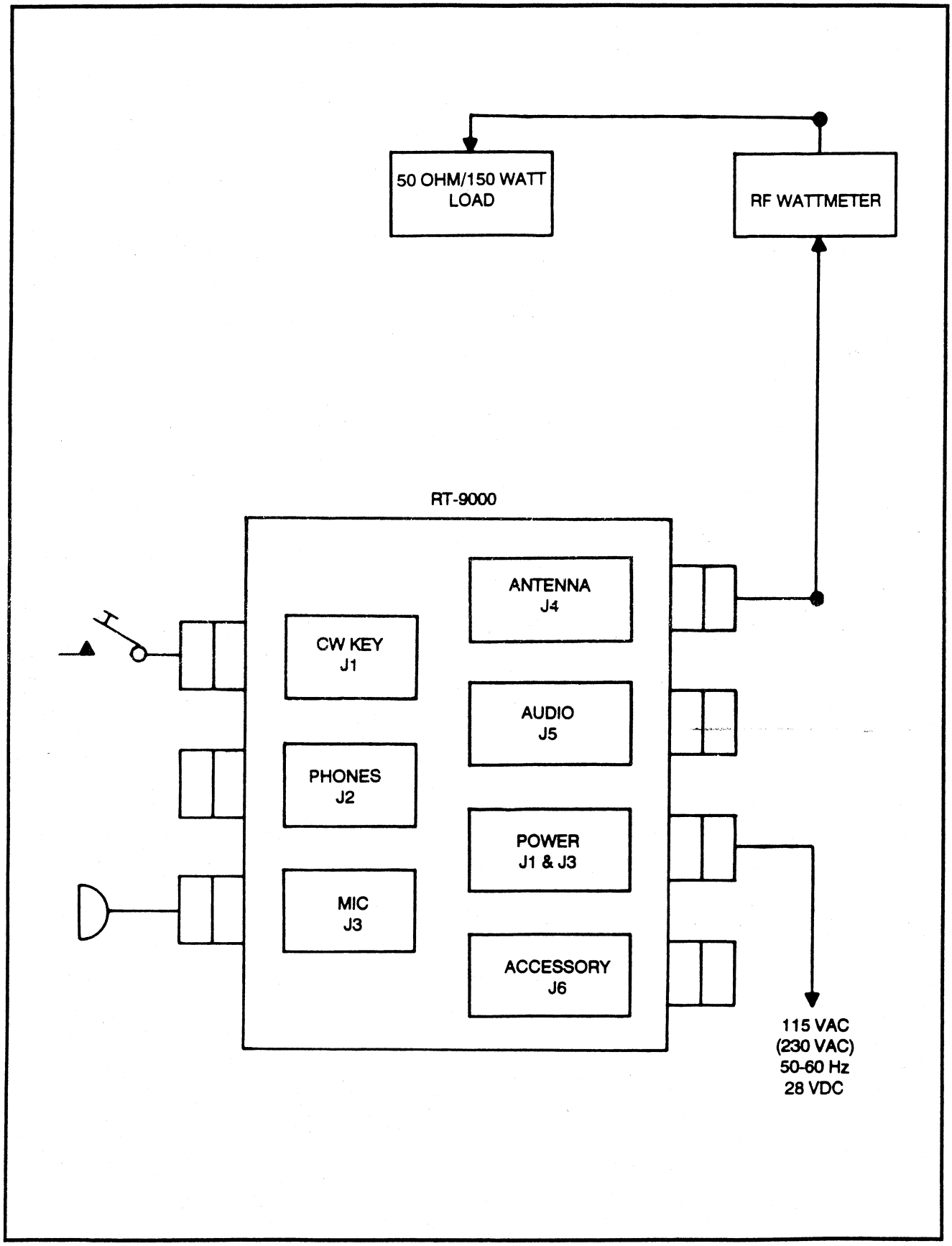


Figure 5.3.1.1 Transmitter BITE Test Set-Up.

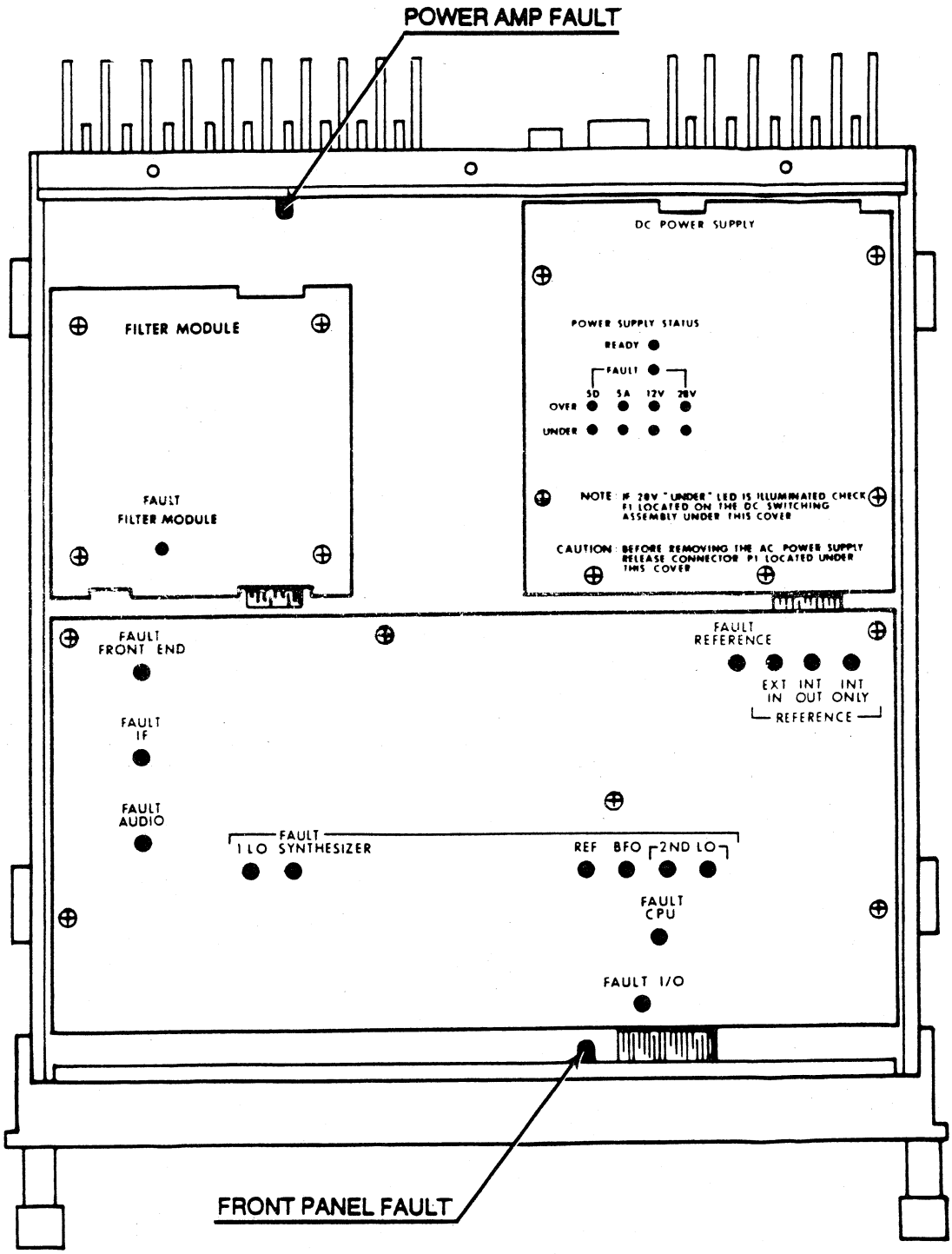


Figure 5.4.1.1 Top View of RT-9000 LRU 'Fault Indicators'.

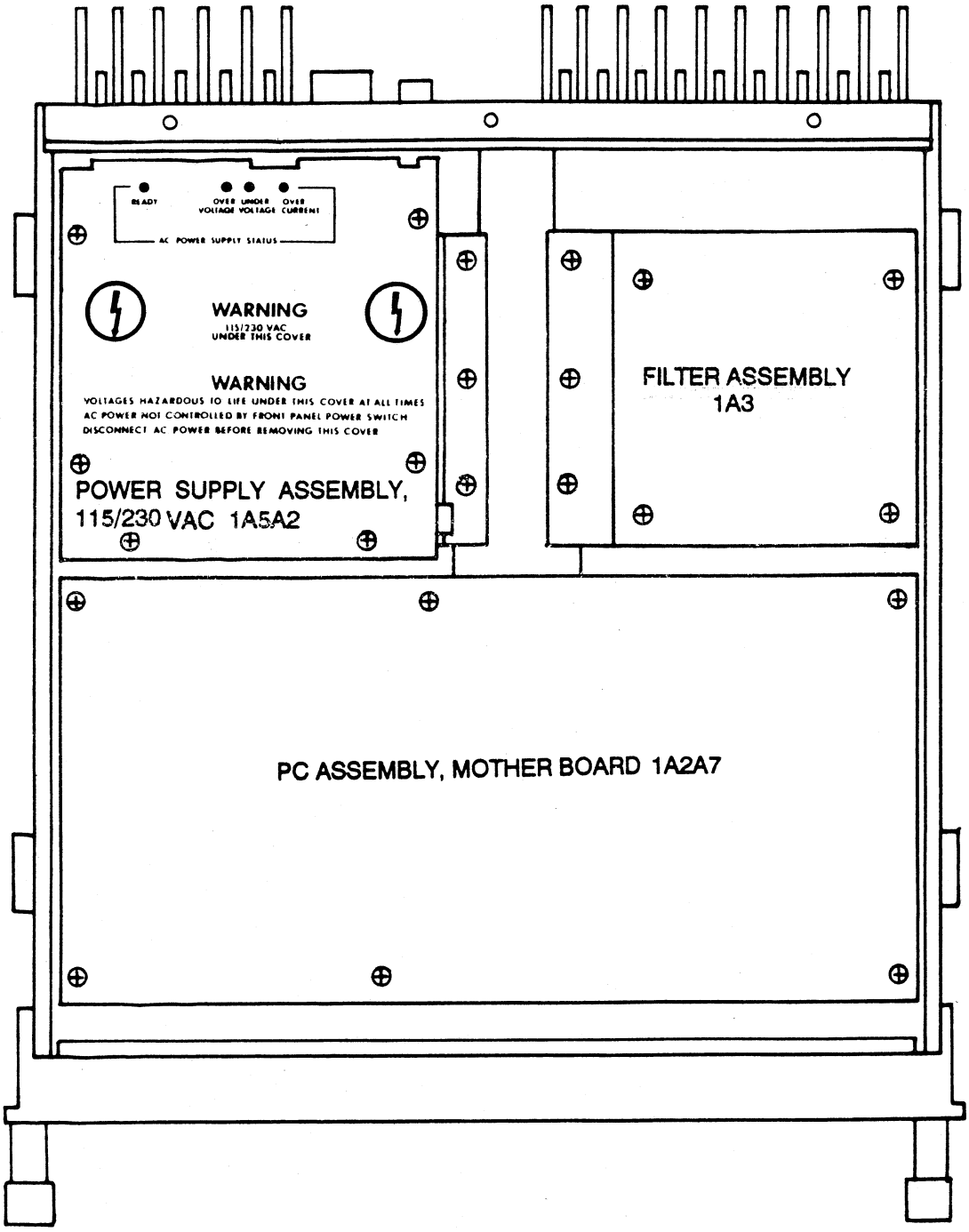


Figure 5.4.1.2 Bottom View of RT-9000 AC Power LRU 'Fault Indicators' Location.

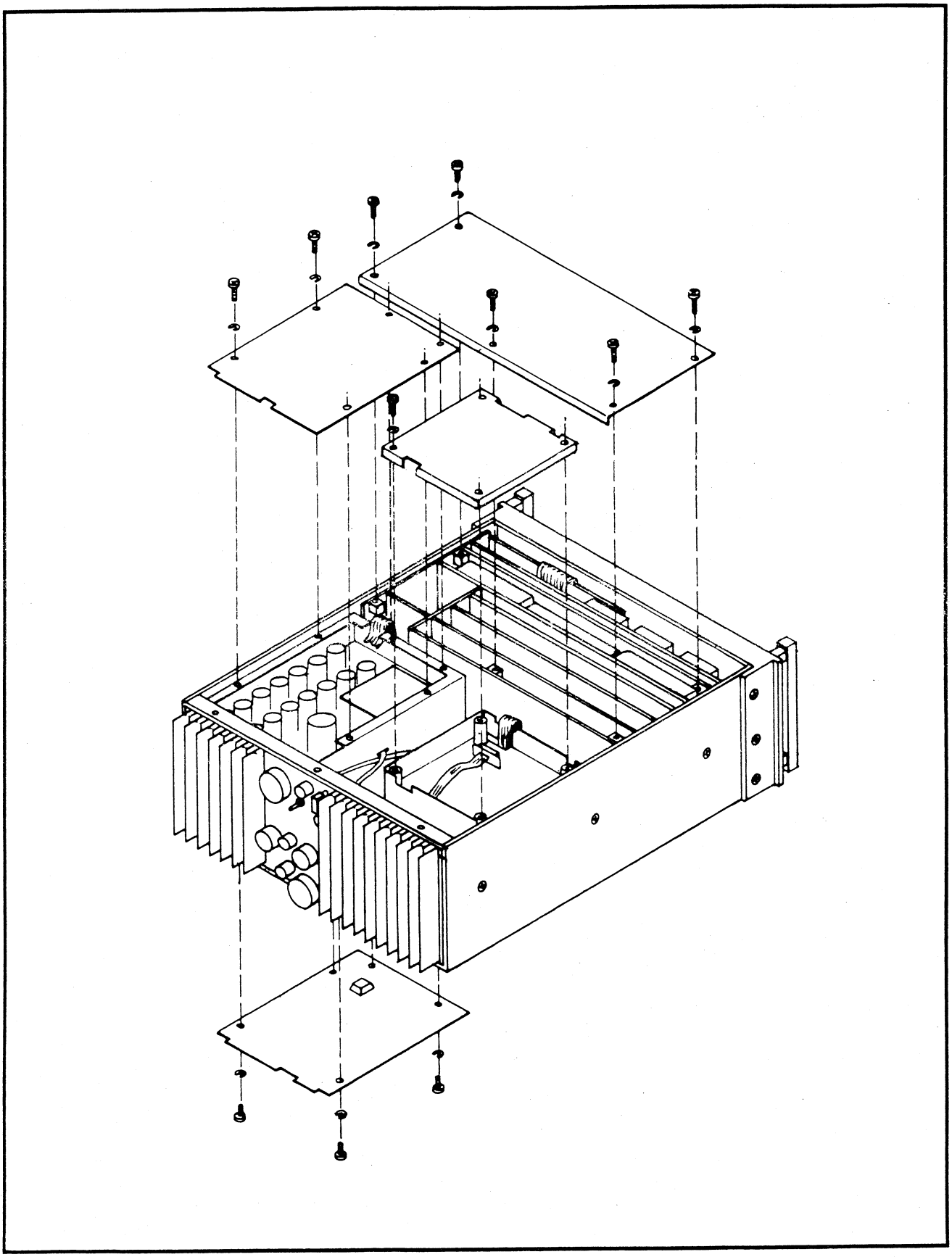


Figure 5.4.1.3 Module Cover Removal.

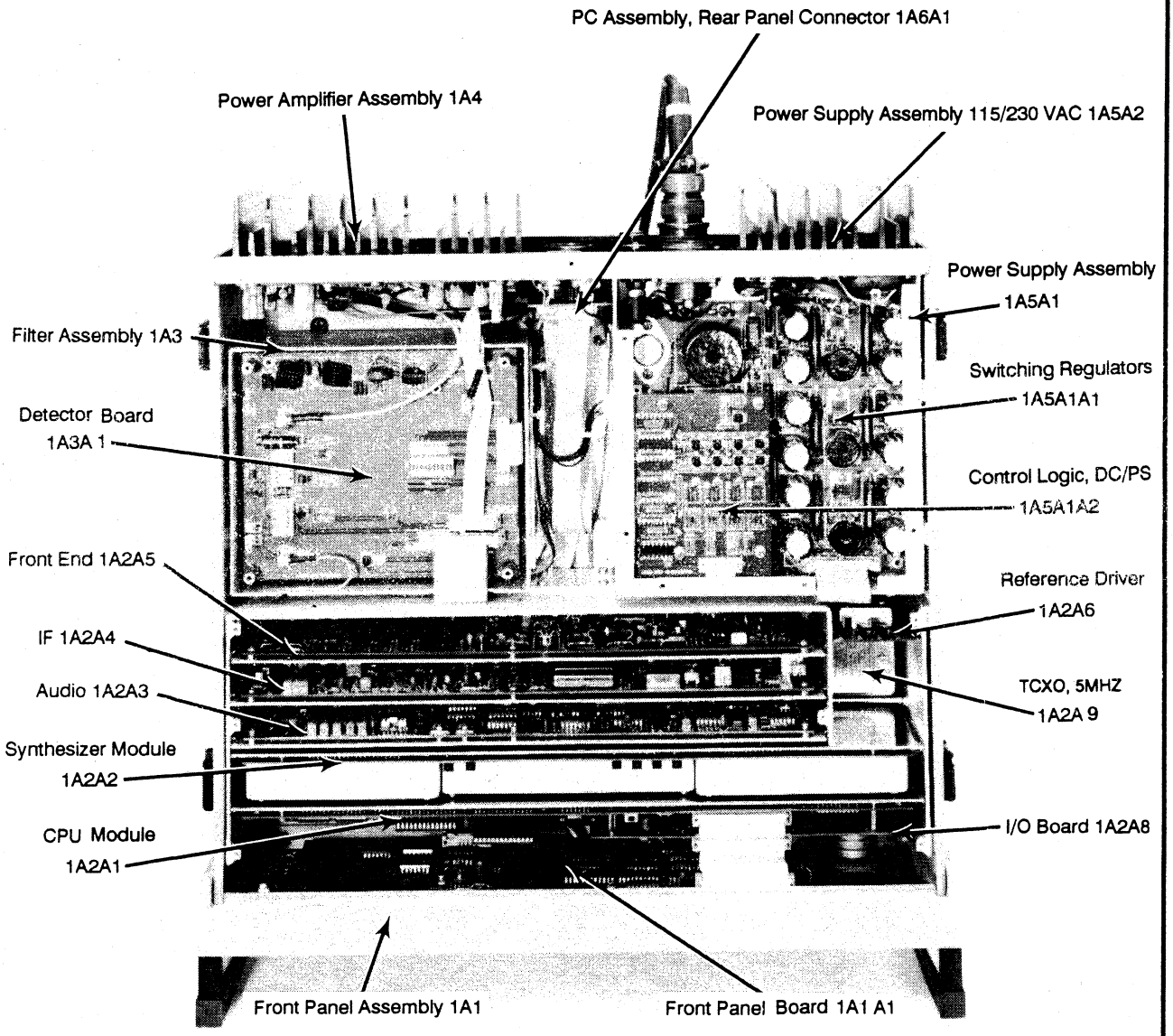


Figure 5.4.1.4 Major Assembly Locations.

The front panel 'LCD' will display a plain language 'FAULT MESSAGE', the 'FAULT' Red LED will illuminate on the Front Panel Figure 5.4.1.5 and on the faulty LRU. (See Figures 5.4.1.1 and 5.4.1.2).

With RT-9000 Transceiver connected as in Figure 5.3.1.1. Turn 'ON' Transceiver and perform the following:

Depress the feature menu select key (1) successively until the feature menu shown in Figure 5.4.1.5 is indicated on the 'Feature' display (2).

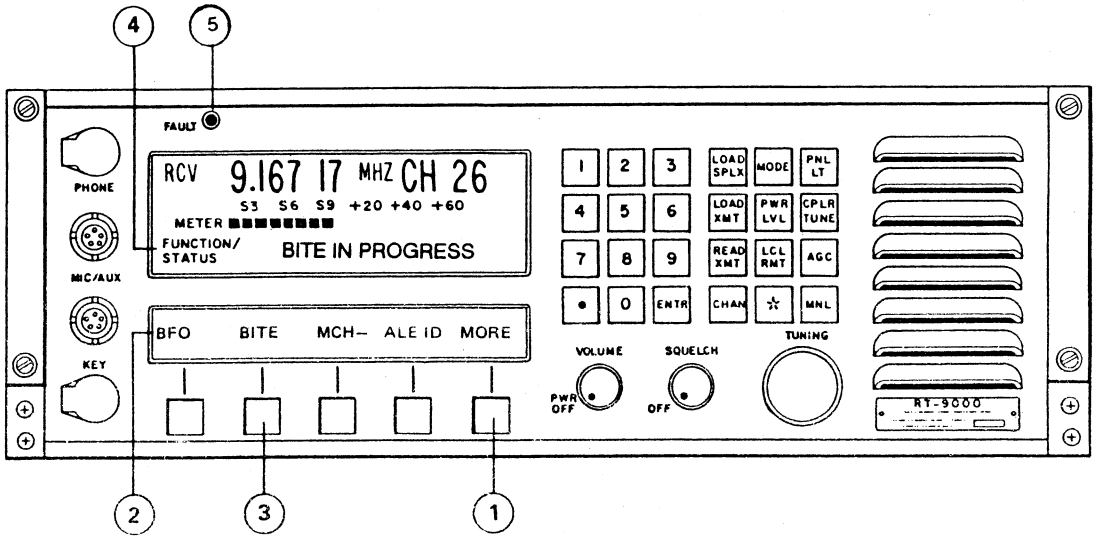


Figure 5.4.1.5 The RT-9000's 'Operational' Display Screen.

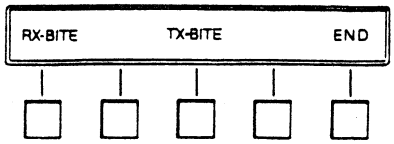
Depress the 'BITE' key (3). The equipment will initiate a self test routine and will display the results in the function/status screen (4) of the 'Operational' display. The initial message will be:

'BITE IN PROGRESS'.

As each module is tested, a corresponding message will appear briefly on the display in the following order:

	'FRONT PANEL O.K.'	or	'FRONT PANEL FAULT'
	'CPU O.K.'	or	'CPU FAULT'"
	'SYNTHESIZER O.K.'	or	'SYNTHESIZER FAULT'
	'POWER SUPPLY O.K.'	or	'POWER SUPPLY FAULT'
NOTE:	'I/O O.K.'	or	'I/O FAULT' (Displayed ONLY when I/O is selected.)
	'SELECT RX'	or	'TX BITE'

The Feature Menu will display:



Depress the feature key 'RX--BITE'. The equipment will initiate Receive self-test routine. You will momentarily hear 1000 Hz tone from speaker and 'Operational' display will read:

'RX BITE IN PROGRESS'

As each module is tested, a corresponding message will appear briefly on the display in the following order:

'AUDIO O.K.'	or	'AUDIO FAULT'
'IF O.K.'	or	'IF FAULT'
'FRONT END O.K.'	or	'FRONT END FAULT'

If all modules check O.K., the 'Operational' display will read:

'TEST COMPLETE'.

Depress the feature key 'TX--BITE'. 'Operational' display will read:

'CONNECT ANTENNA LOAD'.

Depress the feature key TX--BITE once more. The equipment will initiate Transmit self-test routine. Frequency on 'Operational' display will change to 1.75000 MHz.

As each module is tested, a corresponding message will appear briefly in the following order:

'AUDIO O.K.'	or	'AUDIO FAULT'
'IF O.K.'	or	'IF FAULT'
'FRONT END O.K.'	or	'FRONT END FAULT'
'POWER AMP O.K.'	or	'POWER AMP FAULT'

After the Power Amplifier check, the Filter Module is checked at 1.75000 MHz and then stepped through and checked in each of its bands with a test frequency of 2.75000 MHz, 3.75000 MHz, 4.75000 MHz, 5.75000 MHz, 7.75000 MHz, 10.75000 MHz, 16.75000 MHz, and 25.75000 MHz. As this is being accomplished, the frequency being displayed will change accordingly, and RF output power should be indicated by a varing 90 to 110 Watt output on RF Wattmeter. At the end of the test it will briefly display:

'FILTER MOD O.K.' or 'FILTER MOD FAULT'.

At the conclusion of the 'TX BITE TEST', if all modules check O.K., the message:

'TEST COMPLETED'

will appear on the display and by depressing the 'END' features key 3 , the RT-9000 will revert to operational status.

NOTE: In any of the above tests, if a 'FAULT' 5 is detected, the test will stop at that particular fault. By depressing the appropriate features key, you are able to re-run that particular test again to double-check the fault.

5.4.2 COMMON MODULES

NOTE: Refer to Figures 5.4.1.3 and 5.4.1.4 for module cover removal and assembly locations.

5.4.2.1 FRONT PANEL FAULT

This is an indication of a failure on the Front Panel P.C. Board Assembly 1A1A1.

a) Turn Transceiver 'OFF' and remove Front Panel Module 1A1. See Figure 5.4.2.1.1 on the following page.

b) Remove and replace Front Panel P.C. Board Assembly 1A1A1. See Figure 5.4.2.1.1.

c) Reinstall Front Panel Module 1A1. Turn Transceiver 'ON'.

d) Repeat 'BITE TEST'. Upon completion of successful test, return Transceiver to operational status and return failed 1A1A1 P.C. Assembly to factory for repair.

e) If in step d) above, test fails the Front Panel test again, turn 'OFF' Transceiver and remove 1A1 Module; replace with original 1A1A1 P.C. Assembly. Return the failed 1A1 Module to factory for repair.

5.4.2.2 CPU FAULT

This is an indication of a failure on the P.C. Assembly CPU 1A2A1.

a) Turn the Transceiver 'OFF' and remove and replace P.C. Assembly 1A2A1. See Figures 5.4.1.3, 5.4.1.4, and 5.4.2.2.1 through 5.4.2.2.2.

b) Turn 'ON' Transceiver and repeat 'BITE TEST'. Upon completion of a successful test, return Transceiver to operational status.

c) Return failed P.C. Assembly 1A2A1 to factory for repair.

5.4.2.3 I/O FAULT

This is an indication of a failure on P.C. Assembly I/O 1A2A8.

a) Turn the Transceiver 'OFF' and remove and replace P.C. Assembly 1A2A8. See Figures 5.4.1.3, 5.4.1.4, and 5.4.2.2.1 through 5.4.2.2.2.

b) Turn 'ON' Transceiver and repeat 'BITE TEST'. Upon completion of a successful test return Transceiver to operational status.

c) Return failed P.C. Assembly 1A2A8 to factory for repair.

5.4.2.4 SYNTHESIZER FAULT

This is an indication of a failure on the Synthesizer Module 1A2A2.

a) Turn the Transceiver 'OFF' and remove and replace Module. See Figure 5.4.1.3 and 5.4.1.4.

b) Turn 'ON' Transceiver and repeat 'BITE TEST'. upon completion of a successful test, return Transceiver to operational status.

c) Return failed Module 1A2A2 to factory for repair.

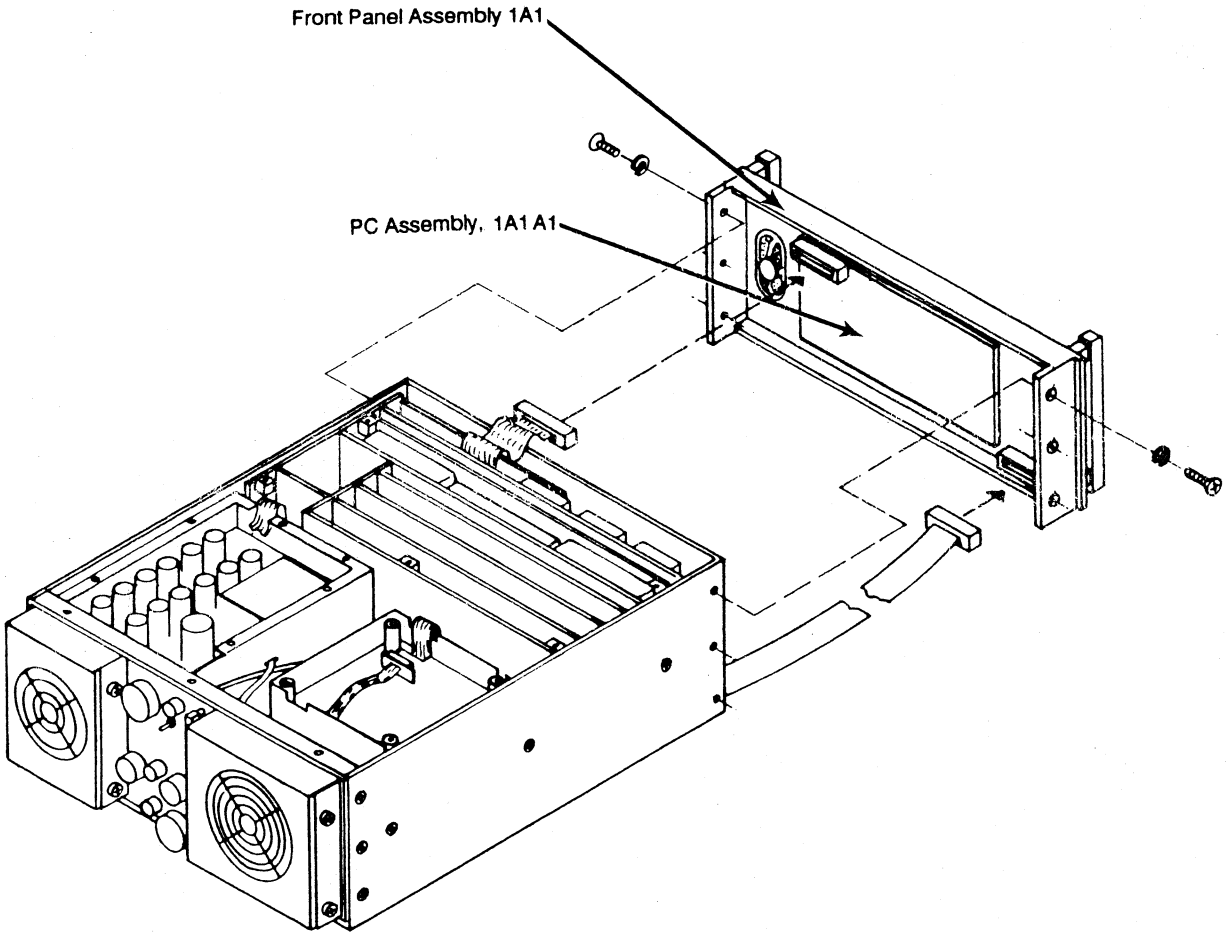


Figure 5.4.2.1.1 Front Panel (1A1) Removal.

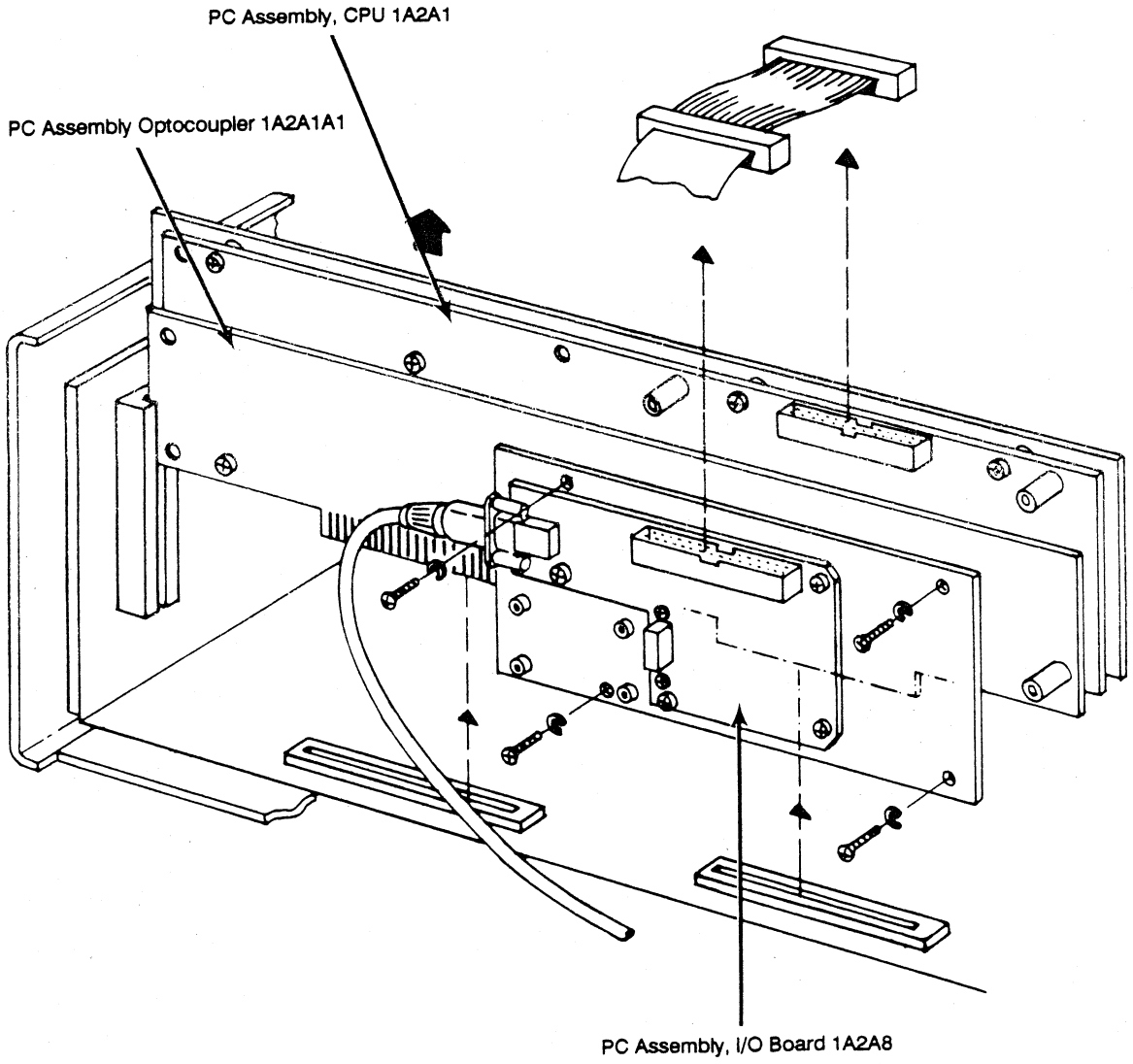


Figure 5.4.2.2.1 Removal/Replacement of CPU 1A2A1 and I/O 1A2A8.

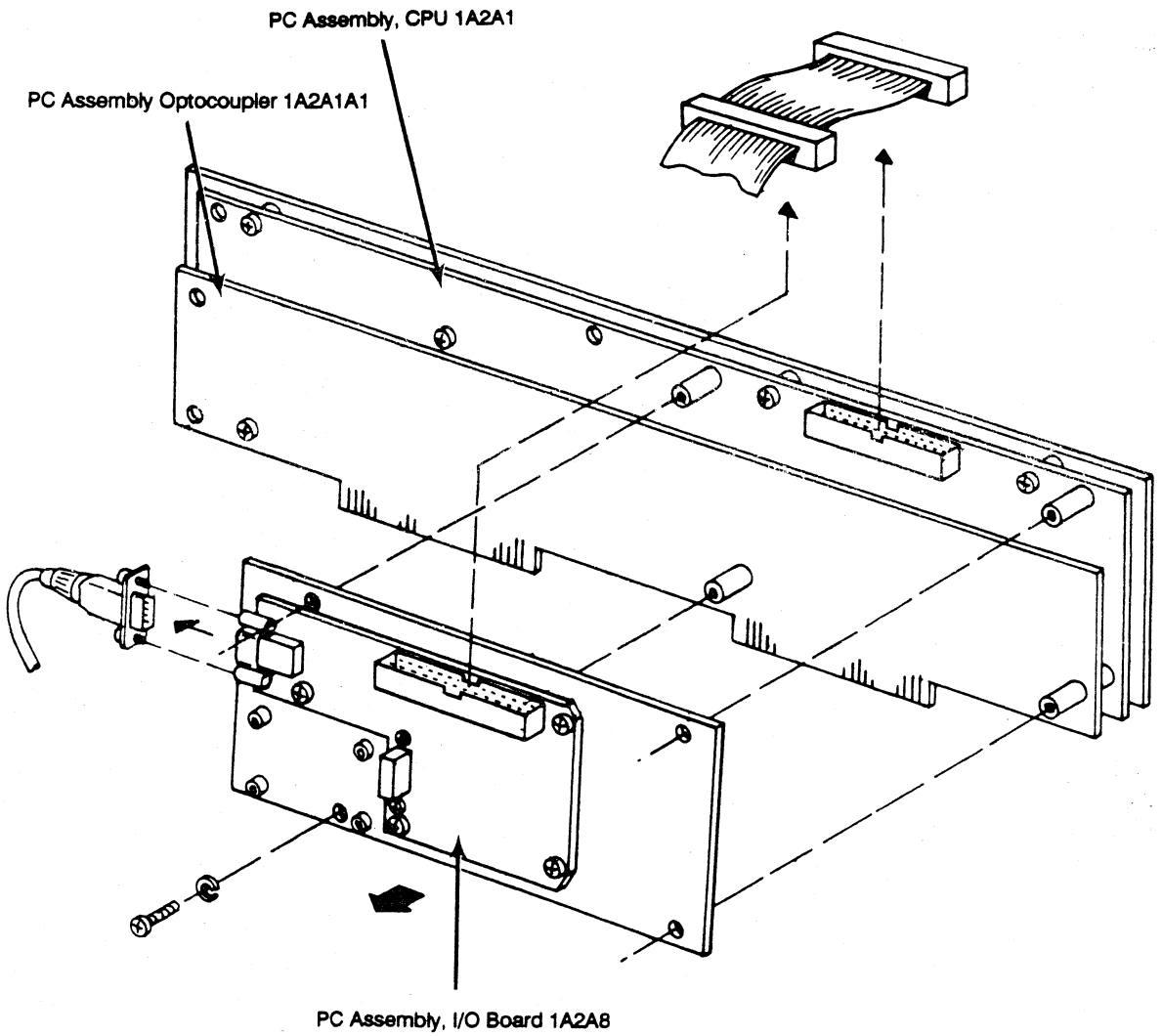


Figure 5.4.2.2.2 Removal/Replacement of I/O 1A2A8 Only.

5.4.2.5 POWER SUPPLY FAULT

This indicates a failure of the 1A5A1 +5 VDC analog circuit. The failures are:

a) +5 VDC analog 'OVER' voltage.
b) +5 VDC analog 'UNDER' voltage.

a) +5 VDC Analog 'OVER' Voltage.

1) Turn 'OFF' Transceiver and remove and replace P.C. Assembly 1A5A1A1 (switching regulator board). See Figures 5.4.1.3, 5.4.1.4, and 5.4.2.4.1 thru 5.4.2.4.4.

2) Turn 'ON' Transceiver; observe Power Supply Fault LED's (should be 'OFF'); run 'BITE TEST'. Upon completion of successful test, return Transceiver to operational status. Return P.C. Assembly 1A5A1A1 to factory for repair. If above power supply LED's are 'ON', turn 'OFF' Transceiver and remove and replace P.C. Assembly 1A5A1A2 (Control Logic Board). See Figure 5.4.2.4.3.

3) Turn 'ON' Transceiver; observe Power Supply Fault LED's (should be 'OFF'); run 'BITE TEST'. Upon completion of successful test, return Transceiver to operational status. Return P.C. Assembly 1A5A1A2 to factory for repair.

b) +5 VDC Analog 'UNDER' Voltage.

1) Turn 'OFF' Transceiver and remove ribbon connector to Filter Module 1A3J4.

2) Turn 'ON' Transceiver and observe Power Supply Fault LED's. If LED's are 'OFF', a short is indicated in the 1A3 Filter Module assembly on the +5 VDC analog line. Remove and replace 1A3 Module. See Figure 5.4.2.4.4. If LED's are 'ON', trouble is indicated in other circuitry. Turn 'OFF' Transceiver and reinstall connector to 1A3J4. Go on to step 3.

3) Remove Front End P.C. Assembly 1A2A5. Turn 'ON' Transceiver and observe Power Supply Fault LED's. If LED's are 'OFF', a short is indicated in the 1A2A5 +5 VDC analog circuitry; replace 1A2A5. If LED's are 'ON', trouble is indicated in other circuitry. Turn 'OFF' Transceiver and reinstall 1A2A5. Go on to step 4.

4) Remove IF P.C. Board Assembly 1A2A4. Turn 'ON' Transceiver and observe Power Supply Fault LED's. If LED's are 'OFF', a short is indicated in the 1A2A4 +5 VDC analog circuitry; replace 1A2A4. If LED's are 'ON', trouble is indicated in other circuitry. Turn 'OFF' Transceiver and reinstall 1A2A4. Go on to step 5.

5) Remove Audio P.C. Board Assembly 1A2A3. Turn 'ON' Transceiver and observe Power Supply Fault LED's. If LED's are 'OFF', a short is indicated in the 1A2A3 +5 VDC analog circuitry; replace 1A2A3. If LED's are 'ON', trouble is indicated in other circuitry. Turn 'OFF' Transceiver and reinstall 1A2A3. Go on to step 6.

6) Remove and replace D.C. Power Supply Switching Regulator Board 1A5A1A1. Turn 'ON' Transceiver and observe Power Supply Fault LED's. If LED's are 'OFF', 1A5A1A1 should be sent to factory for repair. If LED's are 'ON', trouble is indicated in other circuitry. Turn 'OFF' Transceiver and go to step 7.

7) Remove and replace Control Logic P.C. Board Assembly 1A5A1A2. Turn 'ON' Transceiver and observe Power Supply Fault LED's. If LED's are 'OFF', 1A5A1A2 should be set to factory for repair. If LED's are 'ON', it indicates trouble could be on Mother Board 1A2A7 or in the interconnecting ribbon cables. Turn Transceiver 'OFF' and use normal troubleshooting procedures to locate the short on the +5 VDC line throughout the Transceiver.

Other Power Supply Fault LED's are discussed in section 5.5.

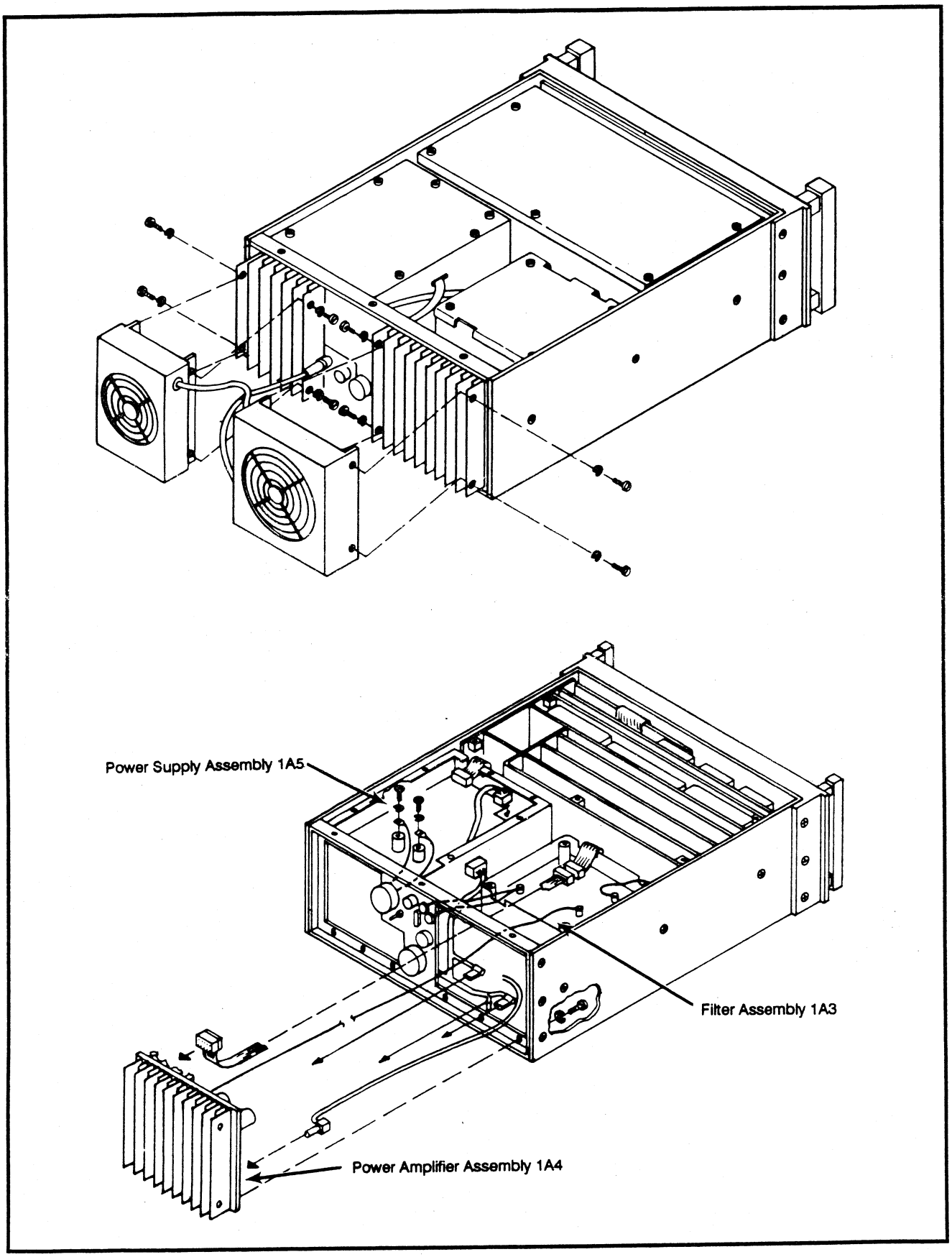


Figure 5.4.2.4.1 Removal/Installation of Modules 1A4, 1A5, and Optional Fans.

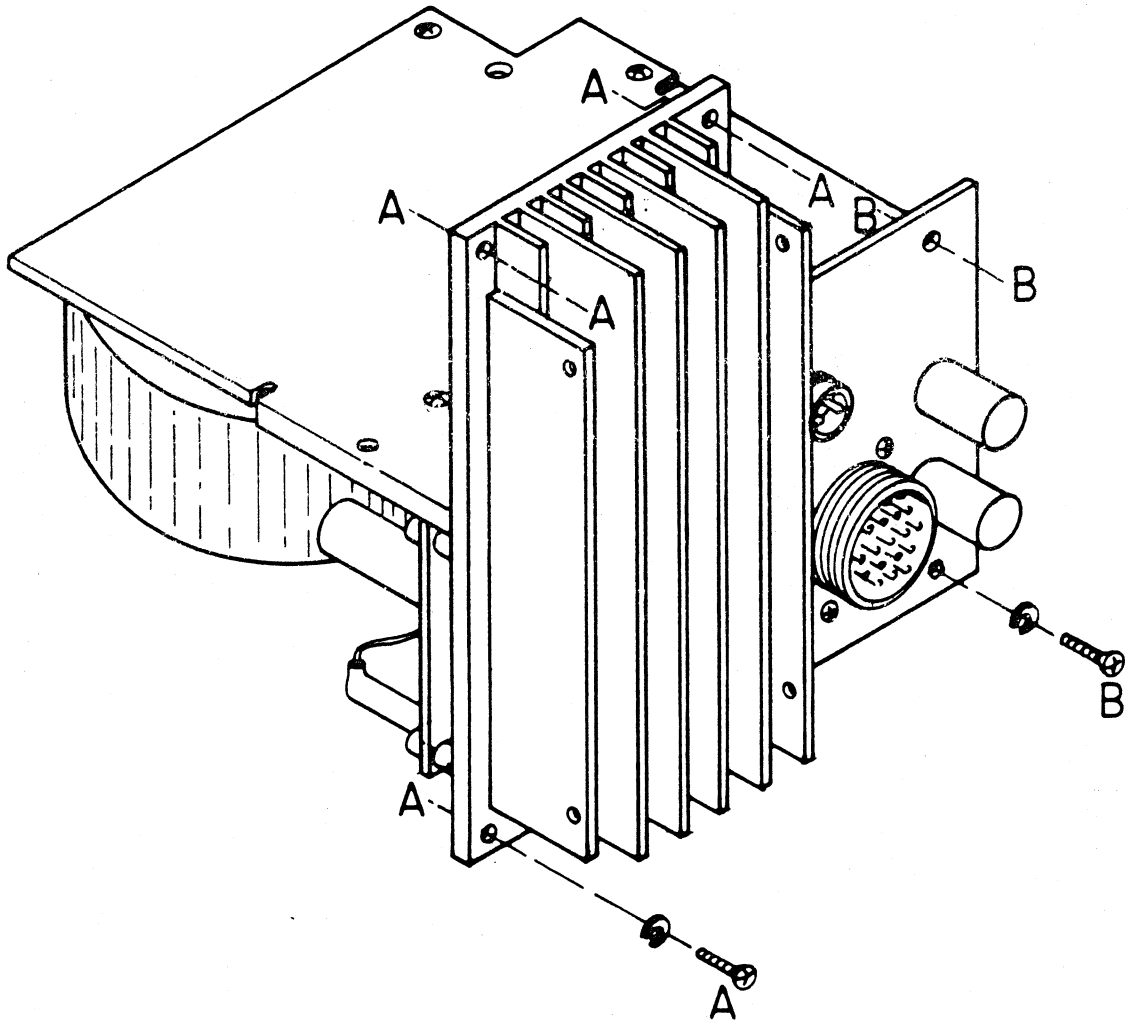


Figure 5.4.2.4.2 Removal/Installation of AC Power Supply Module 1A5A2.

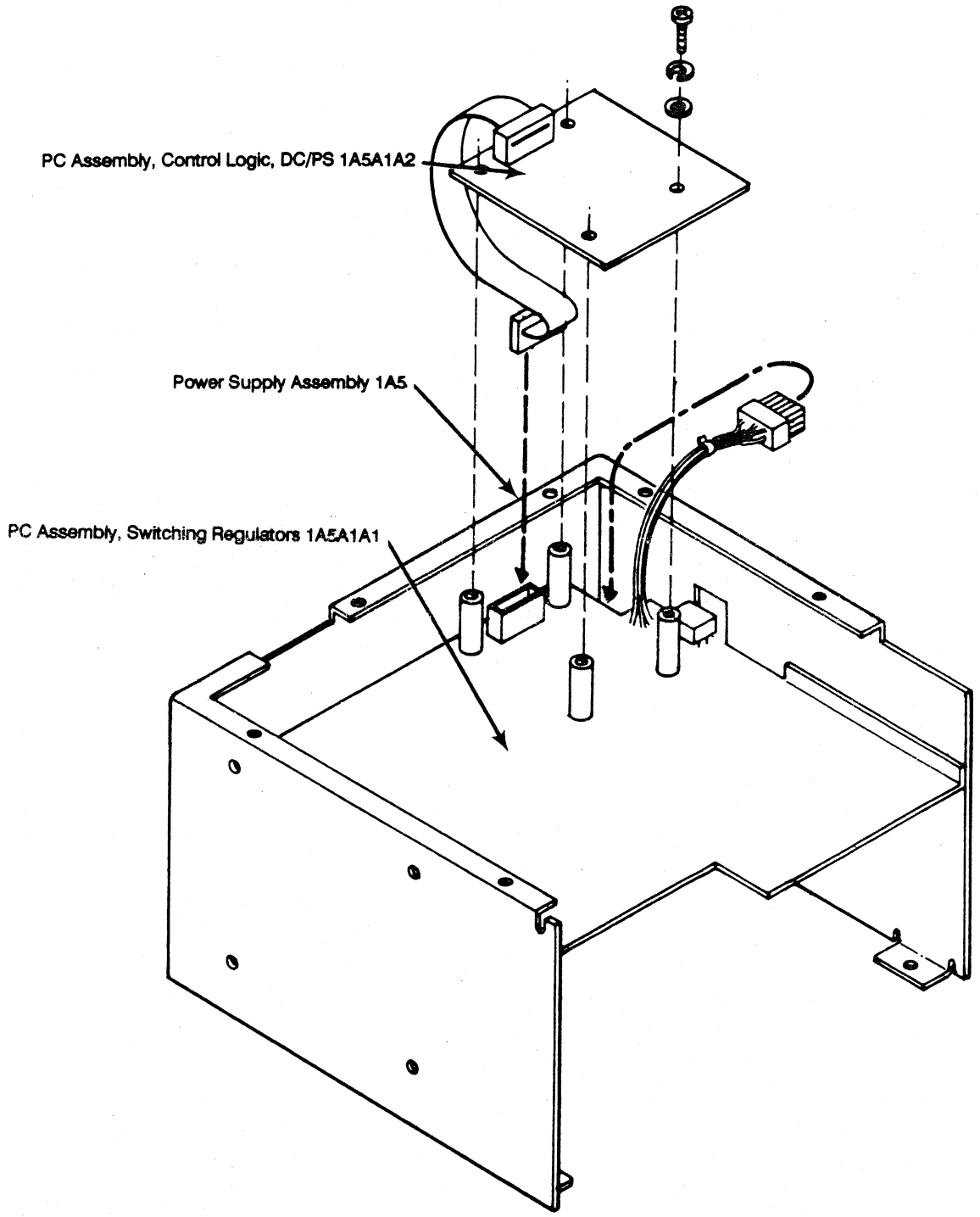


Figure 5.4.2.4.3 Removal/Installation of DC Power Supply PC Board 1A5A1A2.

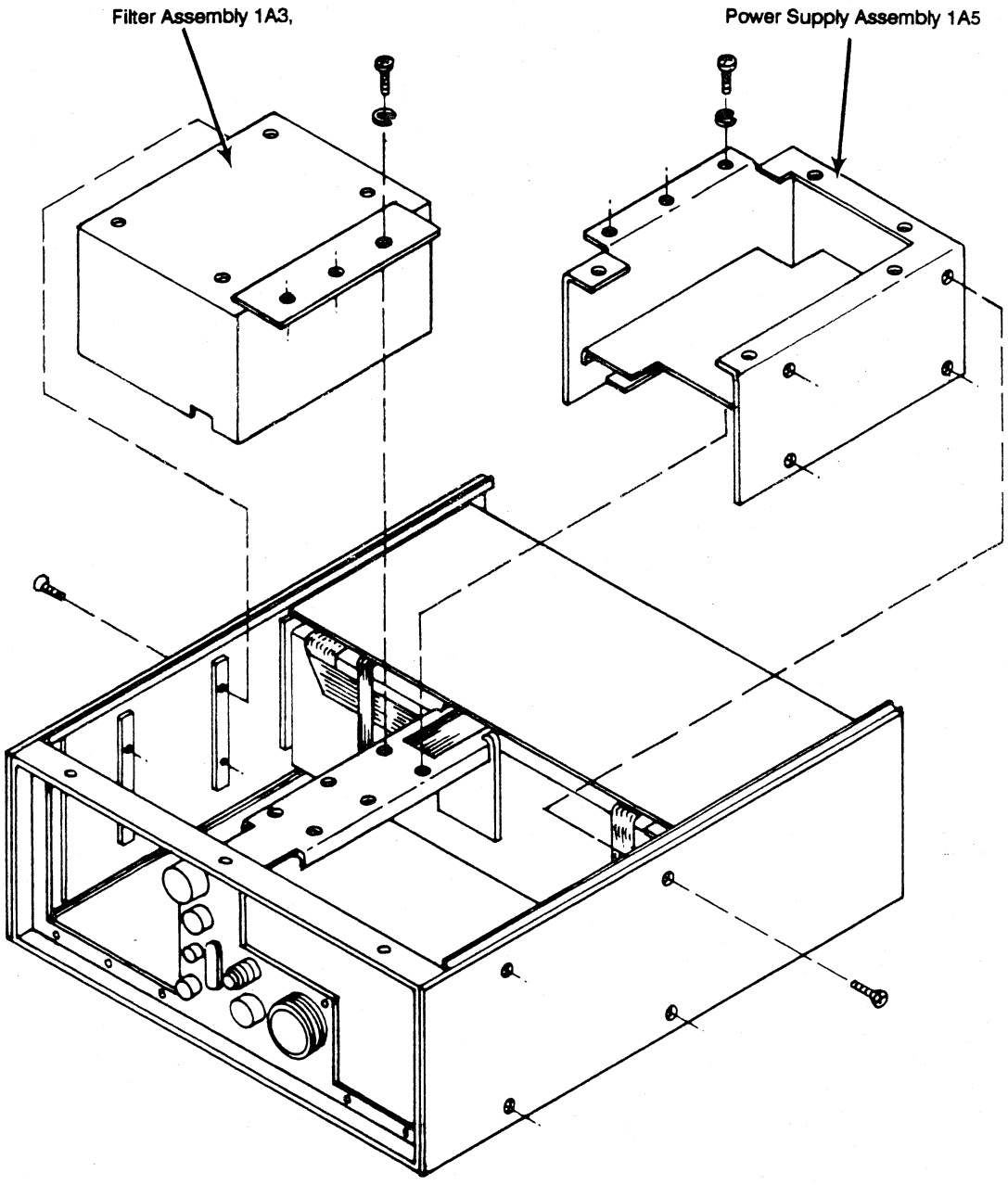


Figure 5.4.2.4.4 Removal/Installation of Module 1A3 and 1A5.

5.4.3 RECEIVER MODULES

5.4.3.1 AUDIO FAULT

This is an indication of a failure on the Audio P.C. Board Assembly 1A2A3.

a) Turn Transceiver 'OFF' and remove and replace 1A2A3. See Figures 5.4.1.3 and 5.4.1.4.

b) Turn Transceiver 'ON'. Repeat 'BITE TEST'. Upon completion of successful test, return Transceiver to operational status. Return failed 1A2A3 to factory for repair.

5.4.3.2 IF FAULT

This is an indication of a failure on the IF P.C. Board Assembly 1A2A4.

a) Turn Transceiver 'OFF' and remove and replace 1A2A4. See Figures 5.4.1.3 and 5.4.1.4.

b) Turn Transceiver 'ON'. Repeat 'BITE TEST'. Upon completion of successful test, return Transceiver to operational status. Return failed 1A2A4 to factory for repair.

5.4.3.3 FRONT END FAULT

This is an indication of a failure on the Front End P.C. Assembly 1A2A5.

a) Turn Transceiver 'OFF' and remove and replace 1A2A5. See Figures 5.4.1.3 and 5.4.1.4.

b) Turn Transceiver 'ON'. Repeat 'BITE TEST'. Upon completion of successful test, return Transceiver to operational status. Return failed 1A2A5 to factory for repair.

5.4.4 TRANSMITTER MODULES

5.4.4.1 AUDIO FAULT

This indicates a failure on the Audio P.C. Assembly 1A2A3.

a) Turn Transceiver 'OFF' and remove and replace 1A2A3. See Figures 5.4.1.3 and 5.4.1.4.

b) Turn Transceiver 'ON'. Repeat 'BITE TEST'. Upon completion of successful test, return Transceiver to operational status. Return failed 1A2A3 to factory for repair.

5.4.4.2 IF FAULT

This indicates a failure on the IF P.C. Assembly 1A2A4.

a) Turn Transceiver 'OFF' and remove and replace 1A2A4. See Figures 5.4.1.3 and 5.4.1.4.

b) Turn Transceiver 'ON'. Repeat 'BITE TEST'. Upon completion of successful test, return Transceiver to operational status. Return failed 1A2A4 to factory for repair.

5.4.4.3 FRONT END FAULT

This indicates a failure on the Front End P.C. Assembly 1A2A5.

a) Turn Transceiver 'OFF' and remove and replace 1A2A5. See Figures 5.4.1.3 and 5.4.1.4.

b) Turn Transceiver 'ON'. Repeat 'BITE TEST'. Upon completion of successful test, return Transceiver to operational status. Return failed 1A2A5 to factory for repair.

5.4.4.4 POWER AMP FAULT

This indicates a failure on the Power Amplifier Module 1A4.

a) Turn Transceiver 'OFF' and remove and replace 1A4. See Figures 5.4.1.3, 5.4.1.4 and 5.4.2.4.1.

b) Turn Transceiver 'ON'. Repeat 'BITE TEST'. Upon completion of successful test, return Transceiver to operational status. Return failed 1A4 to factory for repair.

5.4.4.5 FILTER MODULE FAULT

This indicates a failure on the Filter Module Assembly 1A3.

a) Turn Transceiver 'OFF' and remove and replace 1A3. See Figures 5.4.1.3, 5.4.1.4, 5.4.2.4.1, and 5.4.2.4.4.

b) Turn Transceiver 'ON'. Repeat 'BITE TEST'. Upon completion of successful test, return Transceiver to operational status. Return failed 1A3 to factory for repair.

5.5 TROUBLE SHOOTING WITH SELF-SURVEILLANCE BITE

5.5.1 DC TO DC POWER SUPPLY 1A5A1 / 1A5A1A1 / 1A5A1A2

Reference Table 5.5.1.

5.5.2 AC POWER SUPPLY 1A5A2 / 1A5A2A1 / 1A5A2A2

Reference Table 5.5.1

5.5.3 SELECT/DISTRIBUTION REFERENCE AMPLIFIER 1A2A6

Reference Table 5.5.2

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	DC TO DC POWER SUPPLY 1A5A1										AC POWER SUPPLY				POSSIBLE TROUBLE	CORRECTIVE ACTION
LED's X=ON BLANK=OFF	READY	FAULT	5D		5A		12 V		28 V		READY	OVER VOLTAGE	UNDER VOLTAGE	OVER CURRENT		
			OVER	UNDER	OVER	UNDER	OVER	UNDER	OVER	UNDER						
1	X										X				No Trouble	No Action Required
2		X								X	X				1. 1A5A1A1 F1 Open. 2. Short in the Transceiver on +28 V line.	Replace fuse as required. If fuse opens again, use normal trouble shooting procedures and locate and repair short.
3															1. No AC power. 2. Open AC Fuses 1A5A2 F1 and F2. 3. Open 1A5A2 F3.	1. Check for AC input. 2. Replace F1 and F2. If fuses open again, remove and replace 1A5A2 power supply. 3. Replace F3. If it opens again, replace power supply.
4											No AC power supply installed or using only DC to DC supply.				1. No DC power. 2. 1A6 F1 open.	1. Check for +28 VDC input. 2. Replace F1. If it opens again, remove and replace 1A5A1 power supply.
5												X			1A5A2 AC power supply.	Replace 1A5A2 assembly.
6													X		1A5A2 AC power supply.	Replace 1A5A2 assembly.
7														X	1. 1A5A2 AC power supply. 2. Short on +28 V line in DC power supply or Radio.	1. Remove 1A5A1 F1 and P3 to radio and check. Use normal trouble shooting procedures to locate and repair short. 2. Replace 1A5A2 assembly.
8		X		X	X			X			X				U5 and associated circuitry in 1A5A1.	Replace 1A5A1 assembly.
9		X	X			X		X			X				U2 and associated circuitry in 1A5A1.	Replace 1A5A1 assembly.
10		X		X		X	X				X				U1 and associated circuitry in 1A5A1.	Replace 1A5A1 assembly.
11		X						X		X	No AC power supply installed or using only DC to DC supply.				DC power input low.	Correct DC input voltage.
12		X							X		No AC power supply installed or using only DC to DC supply.				DC power input high.	Correct DC input voltage.
13		X				X					X				1. U5 and associated circuitry in 1A5A1. 2. Short on +5 V analog line in Transceiver.	1. Replace 1A5A1 assembly. 2. Use normal trouble shooting procedures, locate and repair short.
14		X		X							X				1. U2 and associated circuitry in 1A5A1. 2. Short on +5 V digital line in Transceiver.	1. Replace 1A5A2 assembly. 2. Use normal trouble shooting procedures to locate and repair short.
15		X						X			X				1. U1 and associated circuitry in 1A5A1. 2. Short on +12 V line in Transceiver.	1. Replace 1A5A2 assembly. 2. Use normal trouble shooting procedures to locate and repair short.

Table 5.5.1 DC to DC and AC Power Supply Troubleshooting.

SELECT/DISTRIBUTION REFERENCE AMPLIFIER
1A2A6

NOTE: S1A, S1B, and S1C are accomplished by a jumper plug. Normal factory setting is INTERNAL ONLY. However, this value can be changed by the user to INTERNAL OUT or EXTERNAL IN.

LED's X=ON BLANK=OFF	INT ONLY	INT OUT	EXT IN	FAULT	POSSIBLE TROUBLE	CORRECTIVE ACTION
1	X				Normal indication for factory setting.	No action required.
2	X			X	1. No input to 1A2A6. 2. No output from 1A2A6.	1. Use oscilloscope and check input and output on 1A2A7 Mother board J11 pins 5 and 2. Replace as required 1A2A9 or 1A2A6.
3		X			Normal indication for this setting.	No action required.
4		X		X	1. No input to 1A2A6. 2. No output from 1A2A6.	1. Use oscilloscope and check input and output on 1A2A7 Mother board J11 pins 5, 4, and 2. Replace as required 1A2A9 or 1A2A6.
5			X		Normal indication for this setting. Input is from an external frequency standard.	No action required.
6			X	X	1. No input from external frequency standard. 2. No output from 1A2A6.	1. Use oscilloscope and check input from External Standard at J11 pin 4 and check output at J11 pin 2. Replace as required External Standard or 1A2A6.

Table 5.5.2 Select/Distribution Reference Amplifier 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 (optional for DC only), 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
Audio Interface Cable	P/N 8076004594
Remote Key Switch	Any model one (1) pole toggle switch
Headset	P/N 0840200005

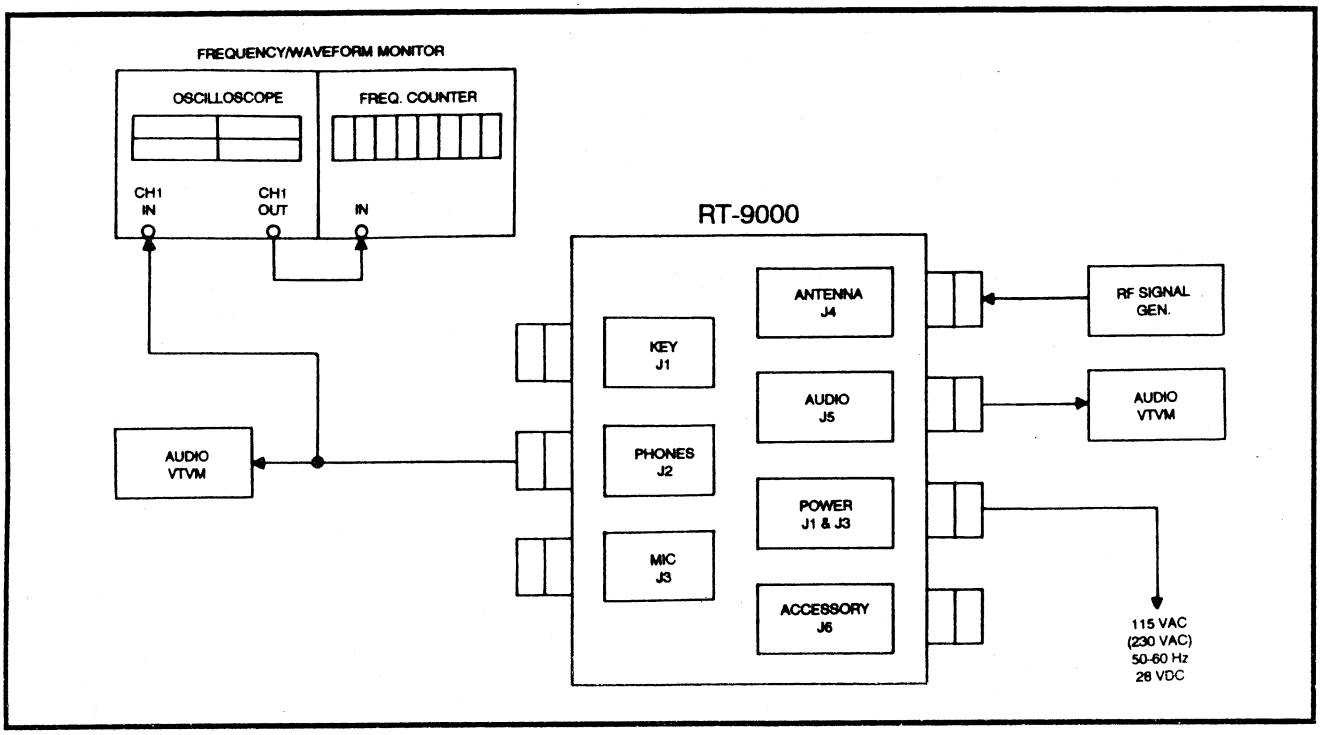

Figure 5.6.1 Receiver Alignment Test Equipment Connections.

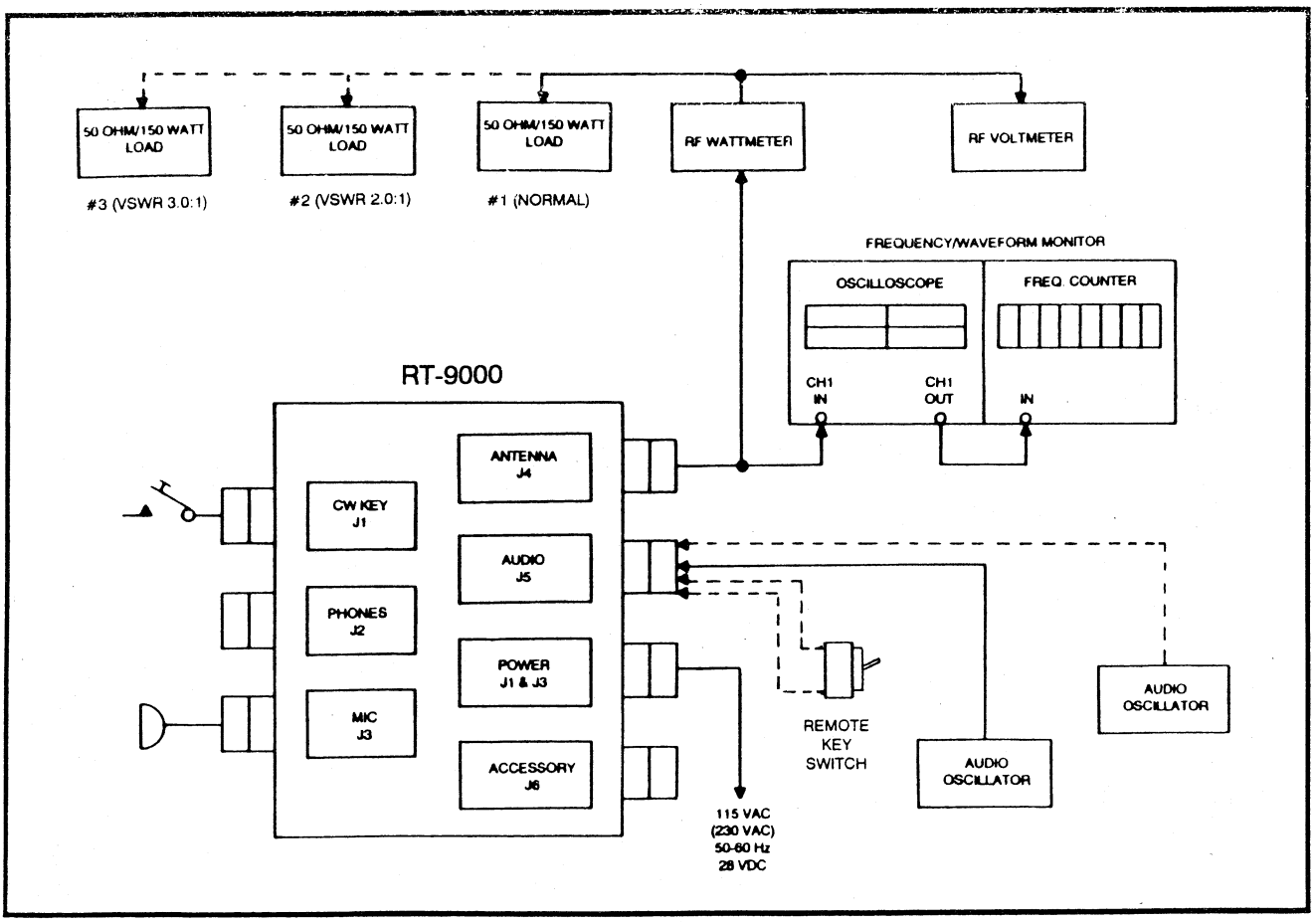

Figure 5.6.2 Transmitter Alignment Test Equipment Connections.

VRMS	Vpeak	Vp-to-p	WATTS ACROSS 50 OHMS
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.

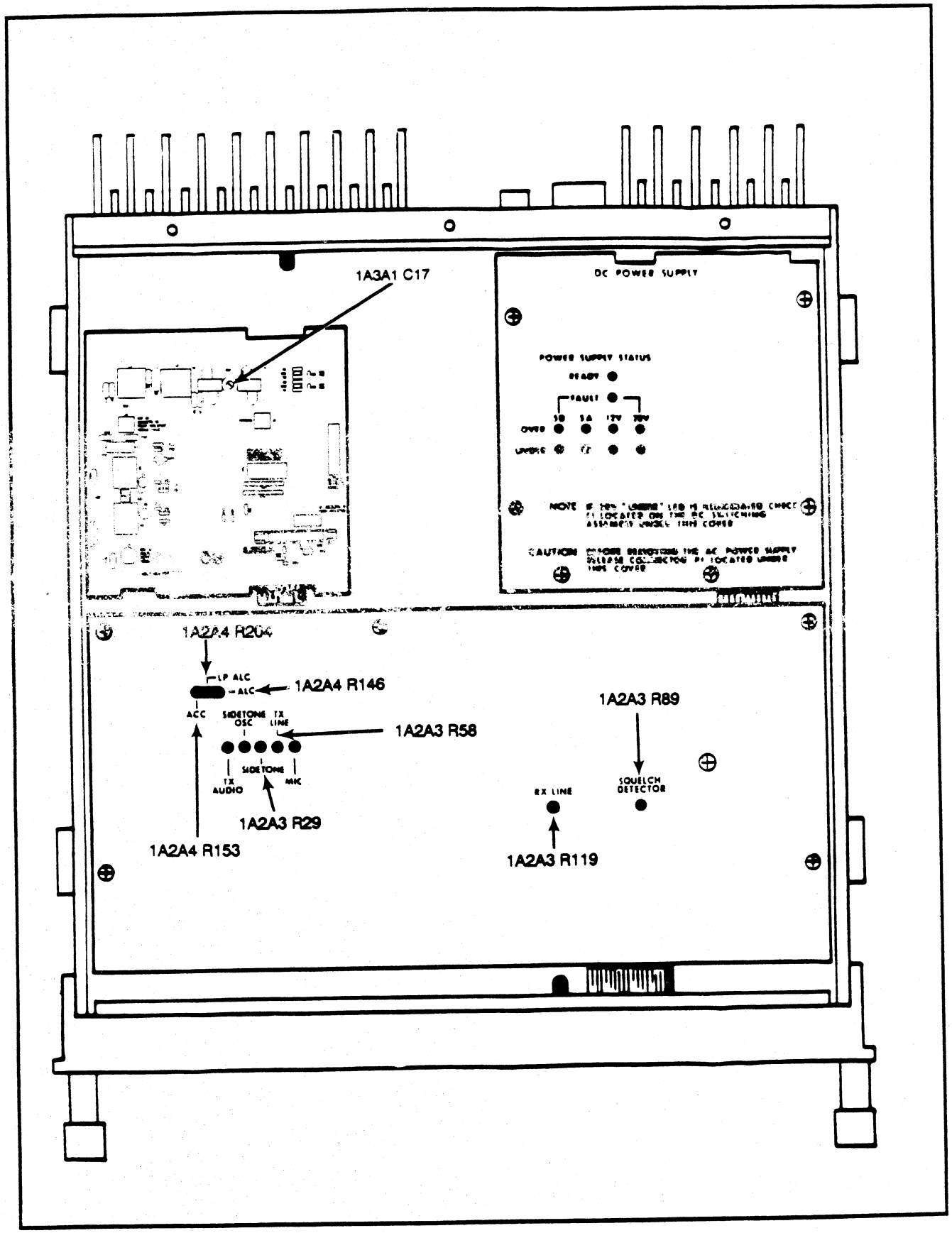

Figure 5.6.3 Alignment Adjustment Locations.

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 Transceiver. See Figure 5.6.1 for test equipment connections.

5.7 RECEIVE ALIGNMENT and CHECKS

See Figure 5.6.1 for Test Equipment Connections (Remove top and bottom covers per section 5.2.1.)

General: Connect coaxial cable from J4 (Antenna) to RF Signal Generator.

5.7.1 REFERENCE OSCILLATOR (TCXO)

a) Turn 'ON' Transceiver by turning 'VOLUME' control clockwise until noise is heard in speaker.

Connect the frequency counter to 'VERT OUT' of oscilloscope. Connect oscilloscope Channel 1 input to Motherboard (1A2A7) J12 pin 6 (TCXO OUT). The frequency must be 5.0 MHz ± 5.0 Hz.

NOTE: If it is necessary to adjust the TCXO, remove the top cover screw (see Figures 5.4.1.3 and 5.4.1.4) and adjust trimmer in the TCXO to the frequency stamped on the cover. This adjustment should only be done with TCXO at room temperature (25°C / 75°F). If unable to adjust or TCXO drifts more than 10 Hz, remove and replace the TCXO (1A2A9).

5.7.2 SENSITIVITY USB

NOTE: Internally generated spurious signals on 99.5% of the available frequencies (100 kHz to 30 MHz) will be at or below 0.5 microvolt equivalent input at antenna terminal. If you encounter a 'SPUR' on the frequency you are checking change, change the frequency a couple 100 kHz above or below to get away from the 'SPUR'.

a) Connect RF Signal Generator to 'ANTENNA' connector (J4). Set RF Signal Generator to 2.606 MHz, CW mode, 0.5 microvolts output.

b) Set RT-9000 to 'MANUAL' operation, 2.605 MHz, USB mode. A 1000 Hz tone should be heard in the speaker.

c) Connect Audio Voltmeter to 'PHONE' jack (J2) using a phone plug terminated coaxial cable. The speaker should be 'OFF' when phone plug is connected to J2. Connect oscilloscope Channel 1 input to Audio Voltmeter input. (See Figure 5.6.1.)

d) Detune RF Signal Generator by at least 1 MHz and adjust 'VOLUME' control for a -10 dB level on a convenient Audio Voltmeter scale and adjust the oscilloscope gain to a convenient level.

e) Retune the RF Signal Generator to 2.606 MHz and adjust the output of the RF Signal Generator until Audio Voltmeter level is 10 dB above step d). The output level of RF Signal Generator should not be more than 0.5 microvolts.

NORMAL: Go on to Step f).
ABNORMAL: Remove and replace the following LRU's, one at a time, and reaccomplish steps a) through e) each time:

IF/FILTER ASSEMBLY 1A2A4
FRONT END ASSEMBLY 1A2A5
FILTER MODULE 1A3
AUDIO ASSEMBLY 1A2A3

f) Measure sensitivity at 1 MHz intervals from 2.605 to 29.605 MHz in USB mode. At all frequencies the sensitivity should be +10 dB for an input of 0.5 microvolts or less.

NORMAL: Go on to step g).
ABNORMAL: Remove and replace the following LRU's, one at a time, and reaccomplish steps a) through f) each time:

IF/FILTER ASSEMBLY 1A2A4
FRONT END ASSEMBLY 1A2A5
FILTER MODULE 1A3
AUDIO ASSEMBLY 1A2A3

g) Set Transceiver mode to LSB and set RF Signal Generator to 29.604 MHz. Measure sensitivity at 1 MHz intervals from 29.605 to 2.605 MHz. At all frequencies the sensitivity should be +10 dB for an input of 0.5 microvolts or less.

NORMAL: Go on to step h).
ABNORMAL: Remove and replace the following LRU's, one at a time, and reaccomplish steps a) through g) each time:

IF/FILTER ASSEMBLY 1A2A4
FRONT END ASSEMBLY 1A2A5
FILTER MODULE 1A3
AUDIO ASSEMBLY 1A2A3

h) Set Transceiver mode to CW and selectivity to narrow. Adjust audio output to -10 dB reference level. Set RF Signal Generator to 2.606 MHz, CW mode. Adjust Signal Generator output for a 10 dB increase on the Audio Voltmeter. The RF Signal Generator output should not exceed 0.3 microvolts. Measure sensitivity at 1 MHz intervals from 2.605 to 29.605. Sensitivity should be +10 dB for an input of 0.3 microvolts or less.

NORMAL: Go on to step i).
ABNORMAL: Remove and replace the following LRU's, one at a time, and reaccomplish steps a) through h) each time:

IF/FILTER ASSEMBLY 1A2A4
FRONT END ASSEMBLY 1A2A5
FILTER MODULE 1A3
AUDIO ASSEMBLY 1A2A3

i) Set Transceiver mode to AM. Set RF Signal Generator to 29.605 MHz, 3.0 microvolts, AM modulation at 30%. Adjust volume control for 0 dB reading on Audio Voltmeter. Remove modulation from Signal Generator. The Audio Voltmeter reading must decrease at least 10 dB. Check sensitivity in 1 MHz intervals from 29.605 to 2.605 MHz, should be +10 dB for an input of 3.0 microvolts or less.

NORMAL: Go on to step j).
ABNORMAL: Remove and replace the following LRU's, one at a time, and reaccomplish step i) each time:

IF/FILTER ASSEMBLY 1A2A4
FRONT END ASSEMBLY 1A2A5
FILTER MODULE 1A3
AUDIO ASSEMBLY 1A2A3

j) Measure the sensitivity in USB, LSB, and AM at 1.000 MHz in the same manner as previous steps. Sensitivity should be +10 dB at 10 microvolts RF input in USB and LSB mode, and 30 microvolts RF input in AM mode.

NORMAL: Go to step 5.7.3
ABNORMAL: Remove and replace the following LRU's, one at a time, and reaccomplish step j) each time:

IF/FILTER ASSEMBLY 1A2A4
FRONT END ASSEMBLY 1A2A5
FILTER MODULE 1A3
AUDIO ASSEMBLY 1A2A3

k) Measure the sensitivity in USB, LSB, and AM at 1.605 MHz in the same manner as previous steps. Sensitivity should be +10 dB at 1.0 microvolts RF input in USB and LSB mode, and 6.0 microvolts in AM mode.

NORMAL: Go to step 5.7.3
ABNORMAL: Remove and replace the following LRU's, one at a time, and reaccomplish step k) each time:

IF/FILTER ASSEMBLY 1A2A4
FRONT END ASSEMBLY 1A2A5
FILTER MODULE 1A3
AUDIO ASSEMBLY 1A2A3

5.7.3 SPEAKER AUDIO OUTPUT

Set Transceiver to 29.605 USB mode. Set RF Signal Generator to 3.0 microvolts, CW mode, 29.606 MHz. Adjust 'VOLUME' control clockwise until audio displayed on 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 1A2A3 and reaccomplish above test.

5.7.4 AUTOMATIC GAIN CONTROL

a) Reduce the RF Signal Generator output to 0.7 microvolts. Adjust the 'VOLUME' control so that the audio level is -10 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, if desired, to indicate -5 dB on 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: Restore RF Signal Generator to 3.0 microvolts and go to step 5.7.5.
ABNORMAL: Remove and replace IF/FILTER Assembly 1A2A4 and reaccomplish step 5.7.4.

5.7.5 A/B LINE AUDIO OUT

a) Set Transceiver to 3.515 USB mode and select 'AUDIO A' (see section 3.3.11). Set RF Signal Generator to 3.516 MHz, CW mode and 100 microvolt output. Connect Audio Voltmeter to Transceiver J5 pins M and L.

b) Adjust 1A2A3 R119 'RX LINE' (see Figures 5.6.3 and 5.9.12) for a 0 dBm ±2 dB on Audio Voltmeter. (This can be user adjusted for a level of -20 dBm to +10 dBm to accommodate varied peripheral requirements.)

NORMAL: Go on to step c).
ABNORMAL: Remove and replace Audio Board 1A2A3 and reaccomplish steps a) and b).

c) Change the Audio Voltmeter to J5 pins A and C. Select 'AUDIO B' on Transceiver. The output measured on the Audio Voltmeter should be within 0.5 dB of level in step b).

NORMAL: Go on to step d).
ABNORMAL: This is not an alignment problem as there is only one (1) alignment for each pair of output lines and the Transceiver passed test b). Accomplish the following to isolate and correct the problem:

1) Signal trace A and B Receive Audio Lines from J5 to Audio Board inputs on the Mother Board (see Figure 5.9.3).

a) If signal tracing indicates audio is at the Audio Board inputs, remove and replace Audio Board 1A2A3 and re-accomplish step c). If step d) is now 'NORMAL', go on to section 5.7.6. If step c) is 'ABNORMAL' go on to step 2) below.

2) Signal trace the control signal 'A/B AUDIO SELECT' from CPU Assembly 1A2A1 to Audio Board Assembly 1A2A3 on Mother Board (see Figure 5.9.3).

NORMAL: Observe control signal level changes as the following are selected on the Transceiver Front Panel:
'AUDIO A' then 'AUDIO B'.
ABNORMAL: Remove and replace the following LRU's one (1) at a time until the problem is corrected:
CPU ASSEMBLY 1A2A1
FRONT PANEL ASSEMBLY 1A1

d) With RF Signal Generator set to 3.516, CW mode 30 microvolt output, set receiver to 3.515 MHz USB mode. Set Receiver to 3.515 MHz USB mode. Select feature menu for 'METER' and depress 'METER' key. Select 'SMTR'. The bar meter on the operational display should indicate S9.

NORMAL: Go on to step e).
ABNORMAL: Remove and replace Audio Assembly 1A2A3 and reaccomplish step d).

e) With same set up as in step d)select 'LINE' meter on features menu. The bar meter should display 0 dB plus or minus one (1) bar segment.

NORMAL: Go on to section 5.7.6.
ABNORMAL: Remove and replace Audio Assembly 1A2A3 and reaccomplish step e).

5.7.6 SQUELCH

a) Set Transceiver to 3.515 MHz, USB mode. Set RF Signal Generator to 3.516, CW mode, 30 microvolt output. Audio should be heard from speaker.

b) Turn Transceiver Front Panel Squelch Control fully clockwise. After a short delay the audio from speaker will quiet. Change the 1 KHz on RF Signal Generator to 8 KHz and then back to 6 KHz. Squelch should break, Receiver will output audio from speaker for a short time and then should quiet again.

NORMAL: This completes Receive alignments and checks. Go on to section 5.8, Transmit alignment and checks.
ABNORMAL: With Transceiver Squelch Control fully clockwise, and audio heard from speaker, adjust 1A2A3 R32 (Squelch Detector Level) until Receiver squelches (no audio from speaker). Re-accomplish step b). If still unable to accomplish step b), remove and replace Audio Assembly 1A2A3 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 RF Signal Generator and connect it to Thruline Wattmeter and 50 Ohm load. Connect RF Voltmeter and oscilloscope to 50 Ohm load. Connect microphone to J3 and CW key to J1.

NOTE: When keying the Transceiver in CW a 1000 Hz tone will be heard in the speaker. This loudness of this tone is not controlled by 'VOLUME' control. The loudness of this CW tone is factory adjusted for a comfortable level. This level may be adjusted by 1A2A3 R29 'SIDETONE' on the Audio board (see Figures 5.6.3 and 5.9.12) for your personal preference without interfering with Transceiver alignment.

5.8.1 AUTOMATIC LEVEL CONTROL (ALC)

a) Set Transceiver to 1.6 MHz, CW mode, 125 Watt level.

b) Depress the CW key and adjust 1A2A4 R146 ALC 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.

c) Change Transceiver to 29.999 MHz and depress CW Key. Adjust C17 on 1A3A1 (Filter Module) for output power of 125 Watts/79 VRMS or 223 V peak to peak (see Table 5.6.1 and Figure 5.6.3), release CW Key.

NORMAL: Go on to step d).
ABNORMAL: Remove and replace the following LRUs one at a time and reaccomplish steps a) through c) each time:

AUDIO ASSEMBLY 1A2A3.
IF/FILTER ASSEMBLY 1A2A4
FRONT END ASSEMBLY 1A2A5
POWER AMPLIFIER MODULE 1A4
FILTER MODULE 1A3

d) Check the output power of the Transceiver at 1 MHz increments from 1.6 to 29.6 MHz, and at 29.9999 MHz. The output at all frequencies should be between 112.5 Watts/75 VRMS and 137.7 Watts/83 VRMS (see Table 5.7.1). Set Transceiver frequency to 1.6 MHz. Select FWD meter on Front Panel. Depress CW Key and note that Operation Display indicates 100 to 150 Watts on Bar Graph. Unkey and select ALC meter. Depress CW Key and meter should display approximately 120 on the Bar Graph. Unkey and select RFLD meter. Depress CW Key and meter should display zero (0) on the Bar Graph. Unkey and select FWD meter.

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 ASSEMBLY 1A2A3.
FRONT END ASSEMBLY 1A2A5
POWER AMPLIFIER MODULE 1A4
FILTER MODULE 1A3

5.8.2 LOW POWER AUTOMATIC LEVEL CONTROL (ALC)

a) Set Transceiver power level to 65 Watts and mode to CW.

b) Depress the CW key and adjust 1A2A4 R204 LOW ALC until output power is 65 Watts/57 VRMS or 161 V peak to peak (see Table 5.6.1 and Figure 5.6.3).

NORMAL: Go on to step c).
ABNORMAL: Remove and replace the IF/FILTER Assembly 1A2A4 and reaccomplish steps a) and b).

c) Check the output power of the Transceiver at 1 MHz increments from 1.6 to 29.6 MHz, and at 29.9999 MHz. The output at all frequencies should be between 55 and 59 VRMS (see Table 5.6.1).

NORMAL: Go on to test 5.8.3.
ABNORMAL: Remove and replace the following LRUs one at a time and reaccomplish step c) each time:

FRONT END ASSEMBLY 1A2A5
POWER AMPLIFIER MODULE 1A4
FILTER MODULE 1A3

5.8.3 AUTOMATIC CARRIER CONTROL (ACC)

a) Set Transceiver power to 125 Watts, mode to AM and frequency to 1.6 MHz.

b) Key the Transceiver with microphone PTT switch and adjust 1A2A4 R153 ACC until output power is 44 Watts/42 VRMs or 119 V peak to peak (see Table 5.6.1 and Figures 5.6.3 and 5.9.14).

NORMAL: Go on to step c).
ABNORMAL: Remove and replace the IF/FILTER Assembly 1A2A4 and reaccomplish steps a) and b).

c) Check the output power of the Transceiver at 1 MHz increments to 29.6 MHz and 29.9999 MHz. The output at all frequencies should be between 40 and 48 VRMs (see Table 5.6.1).

NORMAL: Go on to test 5.8.4.
ABNORMAL: Remove and replace the following LRU's one at a time and reaccomplish step c) each time:

FRONT END ASSEMBLY 1A2A5.
POWER AMPLIFIER MODULE 1A4.
FILTER MODULE 1A3.

5.8.4 VSWR AUTOMATIC LEVEL CONTROL (ALC)

NOTE: This is a Transceiver operational check. The ALC Level is factory set.

a) Set Transceiver to 1.6 MHz, CW Mode, 125 Watt level. Connect test equipment as in 5.6.2.

b) Depress CW Key and verify that output power is between 112.5 and 137.7 Watts measured on Wattmeter. Unkey Transceiver.

c) Using a 'T' Connector, connect a second 50 ohm load in parallel with the original 50 ohm load (see Figure 5.6.1). Key the Transceiver, the Wattmeter should read within 10 Watts of the reading obtained in step b). Unkey the Transceiver.

NOTE: Due to the two (2) 50 ohm loads in parallel, the impedance that the test equipment and the Transceiver see 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 Transceiver. The Wattmeter should read less than 80 Watts. Unkey the Transceiver.

NOTE: With three (3) 50 ohm loads in parallel the impedance that the test equipment and the Transceiver see is no longer 50 ohms, therefore, the Wattmeter readings are approximate. This test simulates the Transceiver transmitting into a VSWR of 3.0:1.

e) Disconnect all three (3) 50 ohm loads from the Wattmeter causing the Transceiver to transmit into an open termination. Key the Transceiver. The Wattmeter stabilizes at less than 25 Watts.

NORMAL: Go on to 5.8.5. The Transceiver VSWR ACC circuitry is working properly.
ABNORMAL: Remove and replace the IF Board Assembly 1A2A4 and reaccomplish steps b) through e).

5.8.5 AM MODULATION

NOTE: This is a Transceiver operational check. The AM modulation is factory set.

a) Set Transceiver to 1.6 MHz, AM mode, and power to 125 Watt level. Connect test equipment per section 5.8.

b) Key the Transceiver with 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 of up to 220 V while speaking.

NORMAL: Go on to 5.8.6. The AM Modulation circuitry is operating properly.
ABNORMAL: Use the Oscilloscope to check the microphone input to Audio Board Assembly 1A2A3.

1) While speaking into the microphone check for a varying audio signal of up to 200 mV peak-to-peak on the Mother Board 1A2A7 P9 pin 4 and J5 pin 1. If there is no audio signal at these points use normal trouble shooting techniques, and check for faulty microphone or circuit path from Front Panel Microphone Connector J3.

2) If preceding checks are normal remove and replace Audio Board 1A2A3 and reaccomplish step b).

5.8.6 USB/LSB MODULATION

NOTE: This is an Transceiver operational check. The modulation level is factory set.

a) Set Transceiver to 1.6 MHz, USB mode, and power to 125 Watt level. Connect test equipment per section 5.8.

b) Key the Transceiver with microphone 'PTT' switch and speak in a normal tone of voice. RF should be displayed on Oscilloscope with a varying peak-to-peak up to 220 V while speaking into microphone. Unkey Transceiver.

c) Set Transceiver mode to LSB, depress microphone 'PTT' switch and speak in a normal tone of voice. Oscilloscope should have same display as in step b). Unkey Transceiver.

NORMAL: Go on to 5.8.7.
ABNORMAL: Use the same procedure as in ABNORMAL AM Modulation, section 5.8.5.

5.8.7 TRANSCEIVER OUTPUT FREQUENCY

a) Set Transceiver to 1.6 MHz, AM mode, and power to 125 Watt level. Connect test equipment per section 5.8. Connect frequency counter to vertical output connector on Oscilloscope.

b) Key the Transceiver with microphone 'PTT' and observe the frequency of the output. This should be within one (1) part per million of that selected on the Front Panel of the Transceiver. Unkey Transceiver.

c) Repeat step b) at the following frequencies:

2.22222	8.88888
3.33333	9.99999
4.44444	10.00000
5.55555	11.11111
6.66666	20.00000
7.77777	

NORMAL: If the above frequencies are all within tolerance stated in step b) go on to 5.8.8.
ABNORMAL: Connect Oscilloscope and Frequency Counter to Transceiver Mother Board, 1A2A7 J12 pin 6 ('TCXO' out). The frequency must be 5.0 MHz +-5.0 Hz.

1) If this frequency checks good, remove and replace Synthesizer assembly 1A2A2 and re-accomplish steps b) and c).

2) If 'TCXO' frequency is out of tolerance: first remove the Receiver/ Exciter module cover, then remove the 'TCXO' top cover screw (see Figures 5.4.1.3 and 5.4.1.4) and adjust trimmer in the 'TCXO' to the frequency stamped on the cover. This adjustment should only be done with 'TCXO' at room temperature (25°C / 75°F). If unable to adjust, or 'TCXO' drifts more than 10 Hz, remove and replace the 'TCXO' (1A2A9) and re-accomplish steps b) and c).

5.8.8 A/B TRANSMIT LINE LEVEL

NOTE: This 600 ohm remote audio level has been factory aligned to allow the Transceiver to provide rated RF output power via the Audio Board (1A2A3) Compressor Circuit for a 0 dBm 1.5 kHz audio input. This circuit nominally operates ±10 dB for rated RF output power.

a) Set Transceiver to 1.6 MHz, LSB mode and power to 125 Watt level. Connect Audio Generator to remote audio connector J5 pins H and J (Transmit AUDIO A). Adjust Audio Generator to 1.5 kHz, 0 dBm output. Connect J5 pins G and F to remote key switch (see Figure 5.6.2). On Transceiver Front Panel select 'LINE AUDIO' menu and select 'AUDIO A' key.

b) Key the Transceiver with remote key switch and check RF LSB output power. It should read between 112.5 Watts/75 VRMS and 125 Watts/83 VRMS. Ideally it should be 125 Watts/79 VRMS (see Table 5.6.1). Unkey the Transceiver and set mode to USB. Key the Transceiver and check RF USB output power. It should read the same as LSB RF power above. Vary the Audio Generator to -10 dB and +10 dB. RF output power should remain constant as Audio Generator is varied. Return Audio Generator to 0 dBm and unkey Transceiver.

NORMAL: Go on to step c). Transmit line level and compressor circuits are operating properly.

ABNORMAL: Set Transceiver and test equipment as in 5.8.8 a). Remove Receiver/Exciter module cover and set 1A2A3 S1-3 to 'OFF' position (see Figure 5.9.12). Key the Transceiver and adjust 1A2A3 R58 for 125 Watts/79 VRMS. Unkey Transceiver. After accomplishing above alignments, reset S1-3 to 'ON' and reaccomplish step b).

1) If unable to accomplish above alignment use normal troubleshooting procedures to check audio lines A and B from J5 to Audio Board by signal tracing on the PC Assembly Mother Board 1A2A7 (see Figure 5.9.3).

2) If this checks good remove and replace Audio Board Assembly (1A2A3) making sure that the replacement 1A2A3's S1 is properly set (see Figure 5.9.12). Re-accomplish step b).

c) Disconnect Audio Generator and reconnect to J5 pins S and T (Transmit AUDIO B). On Transceiver Front Panel select 'LINE AUD' menu and then select 'AUDIO B' key. Select LSB mode.

d) Key the Transceiver with remote key switch and verify that Transceiver is still producing full power as in step b). Unkey Transceiver, select USB mode. Key Transceiver and verify full power as in step b).

NORMAL: Return Transceiver to operational status, this is the end of Transmit Alignment and checks.

ABNORMAL: This is not an alignment problem as there is only one (1) alignment for each pair of audio input lines and the Transceiver passed test b). Accomplish the following to isolate and correct the problem:

1) Signal trace the A and B Transmit audio lines from J5 to Audio Board inputs on the Mother Board (see Figure 5.9.3).

a) If signal tracing indicates Audio is at the Audio Board inputs remove and replace Audio Board 1A2A3 and re-accomplish step d). If step d) is 'NORMAL' return equipment to normal operation. If step d) is 'ABNORMAL', go on to step 2) below.

2) Signal trace the control signals (A/B AUDIO SELECT) from CPU Assembly 1A2A1 to Audio Board 1A2A3 on the Mother Board 1A2A7 (see Figure 5.9.3).

NORMAL: Observe control signal level changes as each of the following is selected on the Transceiver Front Panel: 'AUDIO A', then 'AUDIO B'.

ABNORMAL: Remove and replace the following LRU's one (1) at a time until the problem is corrected:

CPU ASSEMBLY 1A2A1
FRONT PANEL ASSEMBLY 1A1

5.8.9 SOFTWARE SWITCH SETTING CHECKS

Table 5.8.9.1 shows the software switch settings on CPU PC Assembly 1A2A1 for RT-9000 options.

SOFTWARE SWITCH SETTINGS ON CPU PC ASSEMBLY 1A2A1 for RT-9000 OPTIONS.

NOTE: S1 Sections 1 through 8 are normally set to OPEN position (all rocker switches are raised at open side, see Figure 5.9.4). If while performing maintenance on the RT-9000 the 1A2A1 is replaced, make sure 1A2A1 S1 is configured for non-optionized or for the applicable options installed in the Transceiver.

S1 SECTION	SELECTION		OPTION/FUNCTION
	RAISED AT OPEN	RAISED AT NUMBER	
1	OPEN		Normal 1A2A9 TCXO installed.
		1	Optional High Stability 1A2A9 TCXO installed.
2	OPEN		Normal 1A2A3A1 Lincompex not installed.
		2	Optional 1A2A3A1 Lincompex installed.
3	OPEN		Normal
		3	Not Used.
4	OPEN		Spare Function / Not used at this time.
5	OPEN		Normal No 1A2A4 FL5 installed.
		5	Optional 1A2A4 FL5 installed.
6	OPEN		Normal F-9800 Preselector/Postselector not installed.
		6	Optional F-9800 Preselector/Postselector installed.
7	OPEN		Not Connected / Not used at this time.
8	OPEN		Not Connected / Not used at this time.

Table 5.8.9.1 Switch Settings for 1A2A1 S1.

5.9 SCHEMATICS and PARTS LISTS

The following pages contain schematics and parts lists for the RT-9000, see Table 5.9 below

DESIGNATOR		DESCRIPTION	SUNAIR PART NUMBER
ASSEMBLY	SUBASSEMBLY		
1A1		FRONT PANEL ASSEMBLY	80760400XX
	1A1A1	PC ASSEMBLY FRONT PANEL	8076045096
	1A1A2	KEYBOARD, 6X4	8076046807
	1A1A3	CUSTOM LCD, FULL FUNCTION	8076040604
	1A1A3A1	EL BACKLIGHT	8076040809
	1A1A4	CUSTOM LCD, 1X40 CHARA	8076041601
	1A1A4A1	EL BACKLIGHT	8076041708
	1A1A5	KEYBOARD, 1X5	8076046505
1A2		TRANSMITTER/RECEIVER	
	1A2A1	PC ASSEMBLY, CPU	8076070091
	1A2A1A1	OPTOCOUPLER	8076075092
	1A2A2	SYNTHESIZER MODULE	8076060095
	1A2A2A1	PC ASSEMBLY, FIRST L.O.	8076068096
	1A2A2A2	PC ASSEMBLY, SECOND L.O.	8076066093
	1A2A2A3	PC ASSEMBLY, BFO	8076062098
	1A2A2A4	PC ASSEMBLY, REF LOOP AND DOUBLER	8076064091
	1A2A2A5	PC ASSEMBLY, MOTHER BOARD (SYN)	8076061091
	1A2A3	PC ASSEMBLY, AUDIO	8076090091
	1A2A3A1	PC ASSEMBLY, LINCOMPEX (OPTION)	8076097096
	1A2A4	PC ASSEMBLY, IF/FILTER	See Table 5-10 for OPTIONS
	1A2A5	PC ASSEMBLY, FRONT END	8076100097
	1A2A6	PC ASSEMBLY, REFERENCE DRIVER	8076120098
	1A2A7	PC ASSEMBLY, MOTHER BD (REC/EXC)	8076017092
	1A2A8	PC ASSEMBLY, I/O BOARD	8076110092
	1A2A8A1	PC ASSEMBLY, FSK MODEM (OPTION)	8076115094
	1A2A9	TCXO, 5 MHz	5024012704
1A3		FILTER ASSEMBLY	8076050090
	1A3A1	PC ASSEMBLY, DETECTOR	8076053099
	1A3A2	PC ASSEMBLY, BANDS 1-4	8076057094
	1A3A3	PC ASSEMBLY, BANDS 5-8	8076055091
1A4		POWER AMPLIFIER ASSEMBLY	8076030099
1A5		POWER SUPPLY MODULE	
	1A5A1	POWER SUPPLY ASSEMBLY, 28 VDC	8103020095
	1A5A1A1	PC ASSEMBLY, SWITCHING REGULATORS	8103022098
	1A5A1A2	PC ASSEMBLY, CONTROL LOGIC	8076024099
	1A5A2	POWER SUPPLY ASSEMBLY, 115/230 VAC	8103021091
	1A5A2A1	PC ASSEMBLY, FILTER AC/PS	8076021197
	1A5A2A2	PC ASSEMBLY, 28 V REGULATOR 17 AMP	8076021391

Table 5.9 RT-9000 Table of Assemblies.

DESIGNATOR		DESCRIPTION	SUNAIR PART NUMBER
ASSEMBLY	SUBASSEMBLY		
1A6	1A6A1	REAR PANEL PC ASSEMBLY, REAR PANEL CONNECTOR	8076011094
1A7		CHASSIS ASSEMBLY	80760100XX

Table 5.9 RT-9000 Table of Assemblies, continued.

USB FL2	LSB FL3	DATA FL5	1A2A4, PC ASSEMBLY, IF/FILTER SUNAIR PART NUMBER
STANDARD	STANDARD	NOT USED	8076080096
STANDARD	STANDARD	DATA/USB	
STANDARD	STANDARD	DATA/LSB	
DATA	STANDARD	NOT USED	
STANDARD	DATA	NOT USED	
DATA	DATA	NOT USED	8076080088

Table 5.10 RT-9000 Optional IF/Filter Assemblies..

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CONNECTOR KIT

	CONNECTOR KIT	8076000491
P4	CONNECTOR, RF, UHF PL-259	0742190005
	ADAPTER, RF, FOR PL-259	0742070000
P5	CONNECTOR, POWER, 19 PIN MALE	1011140004
	CABLE CLAMP, MS3057-8A	1000200001
P6	CONNECTOR, POWER, 39 PIN MALE	1011130009
	ADAPTER, CONNECTOR, 20 SHELL	1012230007
P7	CONNECTOR, RF, BNC UG-88/U	0744030005
P8	CONNECTOR,POWER,DB-9,9PINFEMALE	1011960010
	HOOD, W/SCREW LOCK, DB-9	1011970015

FINAL TESTED RT-9000

	FINAL TESTED RT-9000	80760012XX
1A2A1	PC ASSY, CPU	8076070091
1A2A2	SYNTHESIZER ASSY	8076060095
1A2A3	PC ASSY, AUDIO	8076090091
1A2A4	PC ASSY,IF	See Table 5-10
1A2A5	PC ASSY, FRONT END	8076100097
1A2A6	PC ASSY, REFERENCE DRIVER	8076120098
1A2A8	PC ASSY. I/O BOARD	8076110092
1A5A2	POWER SUPPLY ASSY, 115/230VAC	8103021091
1A7	CHASSIS ASSY	80760100XX
U13	EPROM W/RT-9000 SOFTWARE	8076073294
U14	EPROM W/RT-9000 SOFTWARE	8076072298
U20	EPROM, W/IO SOFTWARE	8076113296
	BUMPER 13/16 OD 13/16 LG	0508140005
	BUMPER 1/4-20 X 1 3/8 DIA.	0508150001
	BUMP-ONS, SELF ADHESIVE	9187040239
	CATCH, HOLD DOWN BLACK	0526370017
	STRIKE, BLACK	0526520001
	COVER, REC/EXC	8076011906
	COVER, TOP	80760123XX
	COVER, BOTTOM	80760125XX
	COVER, TOP, DC/PS	8103020907
	COVER, AC POWER SUPPLY	8103021407
	COVER, FILTER MODULE	8076050600
	GASKET KIT, TOP/BOTTOM COVERS	8076012201

CHASSIS ASSEMBLY 1A7

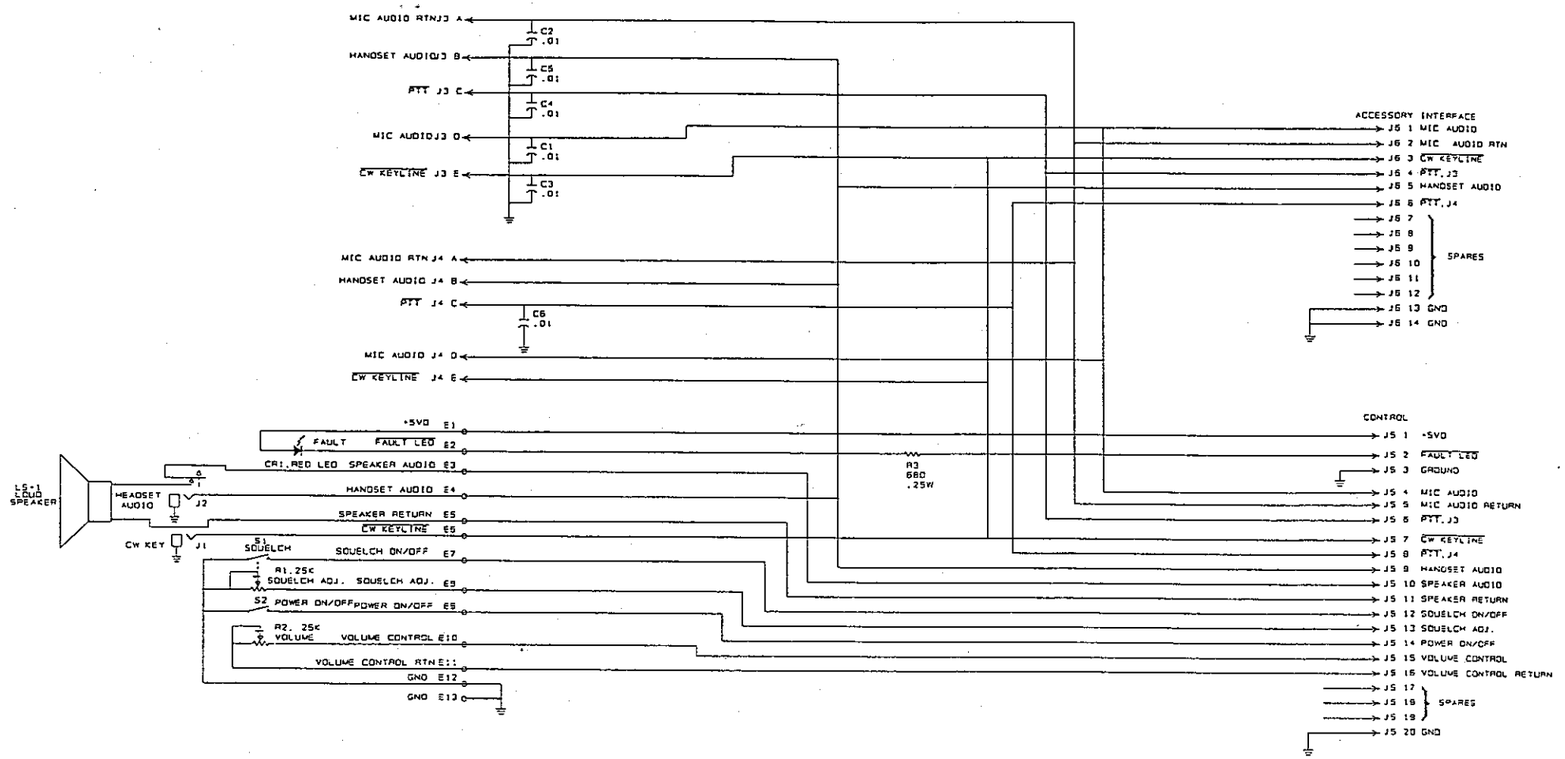
	CHASSIS ASSEMBLY 1A7	80760100XX
1A1	FRONT PANEL ASSY	80760400XX
1A2A7	PC ASSY, MOTHER BOARD	8076017092
1A2A9	TCXO, 5MHZ GROUND EQPT.	5024012704
1A3	FILTER ASSY	8076050090
1A4	POWER AMPLIFIER ASSY	8076030099
1A5A1	POWER SUPPLY ASSY, 28VDC	8103020095
1A6A1	PC ASSY, REAR PANEL CONNECTOR	8076011094
1A6J4	CONNECTOR, RF, UHF	0753300001
1A6J7	CONNECTOR, RF, BNC UG-1094/U	0743740009
1A6J8	CONNECTOR, DB-9, 9 PIN MALE	1012380025
	JUNCTION SHELL, DB-9	1011130017
1A7P1	CONNECTOR, RF, RIGHT ANGLE	1010890018
1A7P3	CONNECTOR, HOUSING, 6PIN, FEM	1010840011
	BRACKET, CENTER CHANNEL	8076015201
	CABLE, RIBBON, 9 COND, 28 AWG	1011150018
	CHASSIS, CARD CAGE, REC/EXC	8076011507
	FAN, DC, 24V, 19 CFM	1011690012
	REAR PANEL	8103015105
	RH SIDE PLATE	80760102XX
	LH SIDE PLATE	80760103XX
	STANDOFF, F-F, 6-32 .625L	1005880018

Figure 5.9.1 Final Tested RT-9000, Connector Kit, and Chassis Assembly 1A7.

FRONT PANEL ASSEMBLY 1A1

	FRONT PANEL ASSEMBLY 1A1	80760400XX
1A1A1	PC ASSY, FRONT PANEL	8076045096
1A1A2	KEYBOARD, 6X4	8076046807
1A1A3	CUSTOM LCD, FULL FUNCTION	8076040604
1A1A3A1	EL BACKLIGHT	8076040809
1A1A4	CUSTOM LCD, 1 X 40 CHARA	8076041601
1A1A4A1	EL BACKLIGHT	8076041708
1A1A5	KEYBOARD, 1X5	8076046505
C1	CAP. .01µF, 50V, X7R 20%	0281730008
C2	CAP. .01µF, 50V, X7R 20%	0281730008
C3	CAP. .01µF, 50V, X7R 20%	0281730008
C4	CAP. .01µF, 50V, X7R 20%	0281730008
C5	CAP. .01µF, 50V, X7R 20%	0281730008
C6	CAP. .01µF, 50V, X7R 20%	0281730008
CR1	DIODE, LED, RED	1006710001
J1	CONNECTOR, 1/4 IN JACK, 2 COND	0840850000
J2	CONNECTOR, PHONE JACK, 2 COND.	0754430006
J3	CONNECTOR, AUDIO, 5 PIN	1003300022
J4	CONNECTOR, AUDIO, 5 PIN	1003300022
J5	CONNECTOR, HEADER, 20 PIN MALE	1011210207
J6	CONNECTOR, HEADER, 14 PIN MALE	1011210142
LS1	SPEAKER, 3X5 OVAL, 8 OHM, 5W	0877970009
R3	RESISTOR 680, 10%, 1/4W	0176630007
R1/S1	POT. 25K W/SPST SW.	1008790028
R2/S2	POT. 25K W/SPST SW.	1008790028
	MOUNTING BRACKET, KEYBOARD	8076040507
	BRACKET, SPEAKER	8076041309
	CABLE, RIBBON, 40 COND.	1008080012
	CONNECTOR, RIBBON, 10 PIN FEM	1008070017
	CONNECTOR, RIBBON, 40 PIN FEM	1008110035
	JACK COVER, CONNECTOR	0840860005
	PROTECTIVE COVER, LCD MODULE	8076042500
	GASKET KIT, FRONT PANEL	8076042305
	HANDLE	5024043600
	KEY, POLARIZING	1008070033
	KNOB, .70 D, BLK, WHT DOT,SKRT	0346060001
	KNOB, 1.25D, BLK, SKIRTED	1011490005
	MTG RAIL, RH, LCD MODULE	8076042607
	MTG RAIL, LH, LCD MODULE	8076042704
	PANEL, FRONT	80760402XX
	SHAFT ENCODER	1008810029
	SPACER, HANDLE	5024043502
	STANDOFF, F-F, 4-40 X.437LG	1011240009
	STANDOFF, M-F, 4-40 X.312LG	1011250004

A1150C



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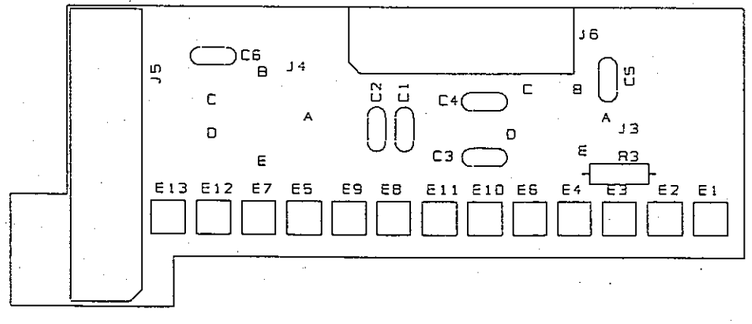
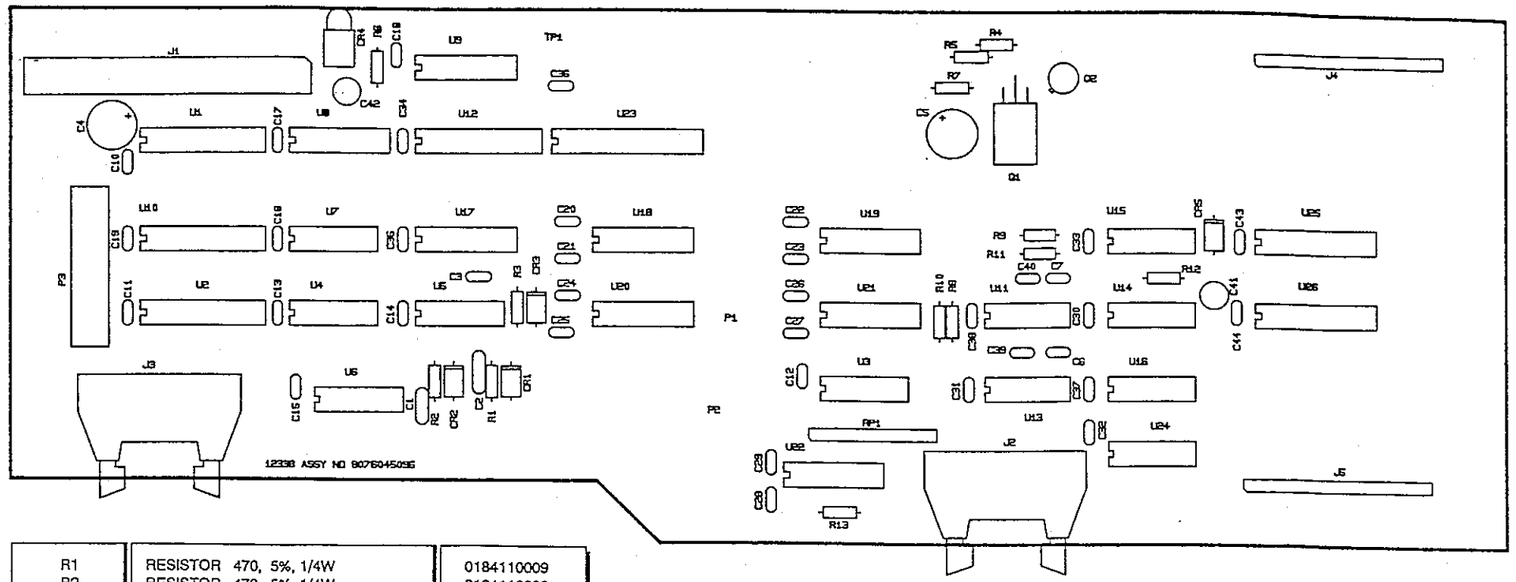


Figure 5.9.2 Front Panel Assembly 1A1, page 1 of 4.

PC ASSY, FRONT PANEL 1A1A1

	PC ASSY, FRONT PANEL 1A1A1	8076045096
C1	CAP. .47µF, 50V, X7R 20%	0283377771
C2	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C3	CAP. 0.047 µF, 50V, X7R, 10%	1010740008
C4	CAP. 100µF 20V 20%	1005120030
C5	CAP. 47µF, 35V	0282190007
C6	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C7	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C10	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. .01µF, 50V, X7R 20%	0281730008
C12	CAP. .01µF, 50V, X7R 20%	0281730008
C13	CAP. .01µF, 50V, X7R 20%	0281730008
C14	CAP. .01µF, 50V, X7R 20%	0281730008
C15	CAP. .01µF, 50V, X7R 20%	0281730008
C16	CAP. .01µF, 50V, X7R 20%	0281730008
C17	CAP. .01µF, 50V, X7R 20%	0281730008
C18	CAP. .01µF, 50V, X7R 20%	0281730008
C19	CAP. .01µF, 50V, X7R 20%	0281730008
C20	CAP. .01µF, 50V, X7R 20%	0281730008
C21	CAP. .01µF, 50V, X7R 20%	0281730008
C22	CAP. .01µF, 50V, X7R 20%	0281730008
C23	CAP. .01µF, 50V, X7R 20%	0281730008
C24	CAP. .01µF, 50V, X7R 20%	0281730008
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. .01µF, 50V, X7R 20%	0281730008
C34	CAP. .01µF, 50V, X7R 20%	0281730008
C35	CAP. .01µF, 50V, X7R 20%	0281730008
C36	CAP. .01µF, 50V, X7R 20%	0281730008
C37	CAP. .01µF, 50V, X7R 20%	0281730008
C38	CAP. .01µF, 50V, X7R 20%	0281730008
C39	CAP. .01µF, 50V, X7R 20%	0281730008
C40	CAP. .01µF, 50V, X7R 20%	0281730008
C41	CAP. 1µF, 35V, T368	0283630001
C42	CAP. 22µF, 15V, T368	0296660001
C43	CAP. .01µF, 50V, X7R 20%	0281730008
C44	CAP. .01µF, 50V, X7R 20%	0281730008
CR1	DIODE, RECTIFIER 1N4004	0405180004
CR2	DIODE, RECTIFIER 1N4004	0405180004
CR3	DIODE, RECTIFIER 1N4004	0405180004
CR4	DIODE, LED, RED, PC MOUNT	1008480029
CR5	DIODE, RECTIFIER 1N4004	0405180004
J1	CONNECTOR, HEADER, 40PIN	1010740016
J2	CONNECTOR, PC, 10 PIN HEADER	1008070009
J3	CONNECTOR, PC, 10 PIN HEADER	1008070009
J4	SOCKET, BOARDMOUNT, 15 PIN	1011010151
J5	SOCKET, BOARDMOUNT, 15 PIN	1011010151
P1	CONNECTOR, MOLEX 26 PIN	1008720020
P2	CONNECTOR, MOLEX 14 PIN	1008730025
P3	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
Q1	TRANSISTOR, NPN, SI. 2N4922	0445490004
Q2	TRANSISTOR, NPN, SI. 2N2222A	0448580004



R1	RESISTOR 470, 5%, 1/4W	0184110009
R2	RESISTOR 470, 5%, 1/4W	0184110009
R3	RESISTOR 10K, 10%, 1/4W	0170410005
R4	RESISTOR 10K, 10%, 1/4W	0170410005
R5	RESISTOR 2.2K, 5%, 1/4W	0178070009
R6	RESISTOR 220, 10%, 1/4W	0171320000
R7	RESISTOR 47K, 10%, 1/4W	0171060008
R8	RESISTOR 330, 5%, 1/4W	0170910008
R9	RESISTOR 330, 5%, 1/4W	0170910008
R10	RESISTOR 6.8K, 5%, 1/4W	0174810008
R11	RESISTOR 6.8K, 5%, 1/4W	0174810008
R12	RESISTOR 22K, 5%, 1/4W	0172230004
R13	RESISTOR 100K, 10%, 1/4W	0170390004
RP1	RES NTWK 10 PIN SIP 10K COM	1006130021
U1	IC. DIGITAL 74HC374	1006450033
U2	IC. DIGITAL 74HC244	1006460039
U3	IC. DIGITAL 74HC30	1010240021
U4	IC, DIGITAL 74HC74	1008000019
U5	IC. DIGITAL 74HC14	1006490027
U6	IC. DIGITAL 74HC14	1006490027
U7	IC. DIGITAL 74HC10	1008010006
U8	IC. DIGITAL 74HC138	1006480013
U9	IC. DIGITAL 74HC138	1006480013
U10	IC. DIGITAL 74HC373	1006480030
U11	IC, LINEAR LM556	1011170019
U12	IC. DIGITAL 74HC374	1006450033
U13	IC. DIGITAL 74HC08	1006490019
U14	IC. DIGITAL 74HC14	1006490027
U15	IC, DIGITAL 74HC74	1008000019
U16	IC, DIGITAL 74HC74	1008000019
U17	IC. DIGITAL 74HC165	1008710016
U18	IC. DIGITAL CD40109	1008720011
U19	IC. DIGITAL CD40109	1008720011
U20	IC. DIGITAL CD40109	1008720011
U21	IC. DIGITAL CD40109	1008720011
U22	IC. DIGITAL CD40109	1008720011
U23	IC DIGITAL 74HC154	1010160028
U24	IC. DIGITAL 74HC02	1010290029
U25	IC. DIGITAL 74HC244	1006460039
U26	IC. DIGITAL 74HC374	1006450033
	CABLE, FLAT, 20 COND. 28AWG	1008080004
	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
	KEY, POLARIZING	1008070033

Figure 5.9.2 Front Panel Assembly 1A1, page 2/4.

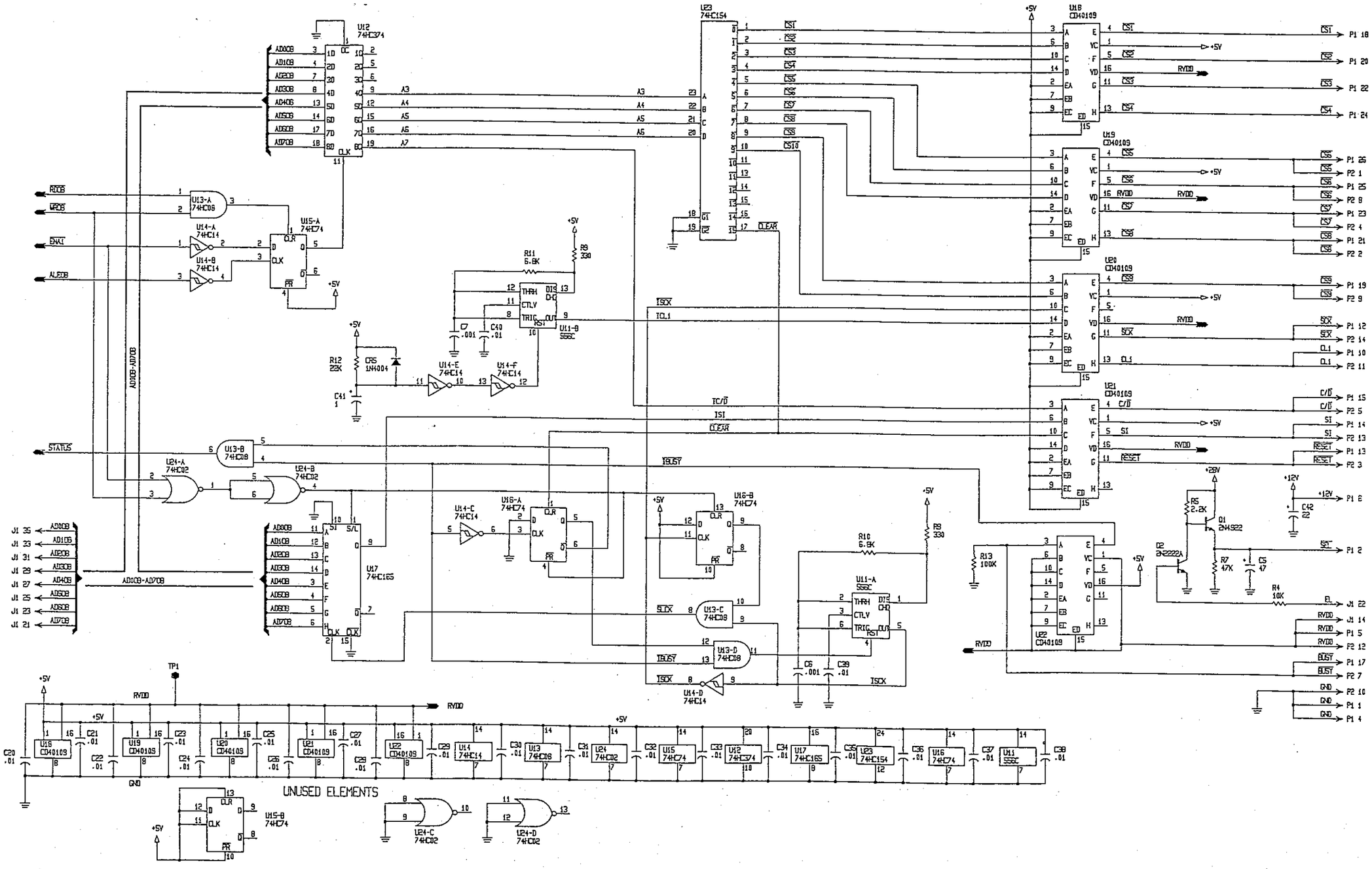


Figure 5.9.2 Front Panel Assembly 1A1, page 3/4.

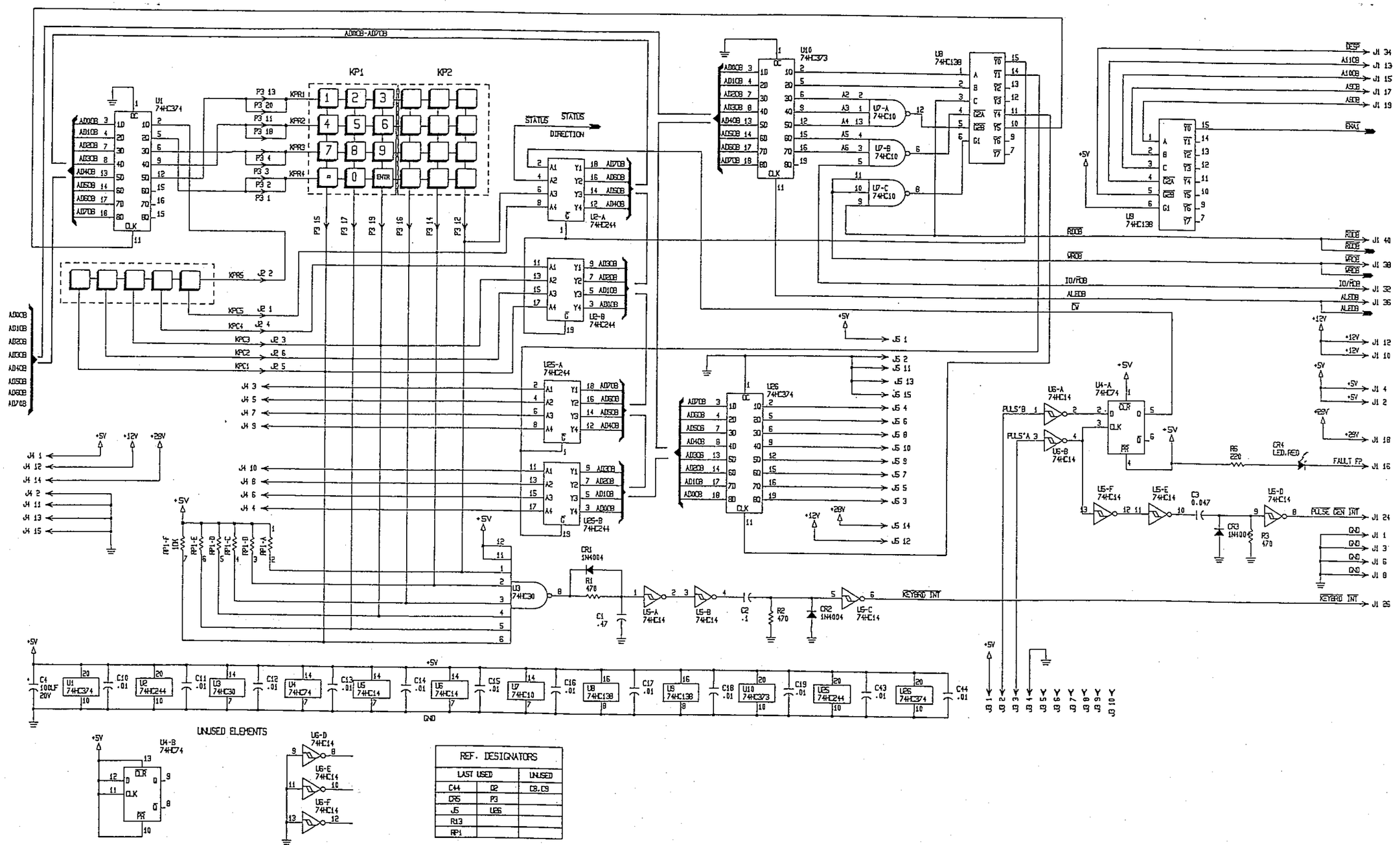
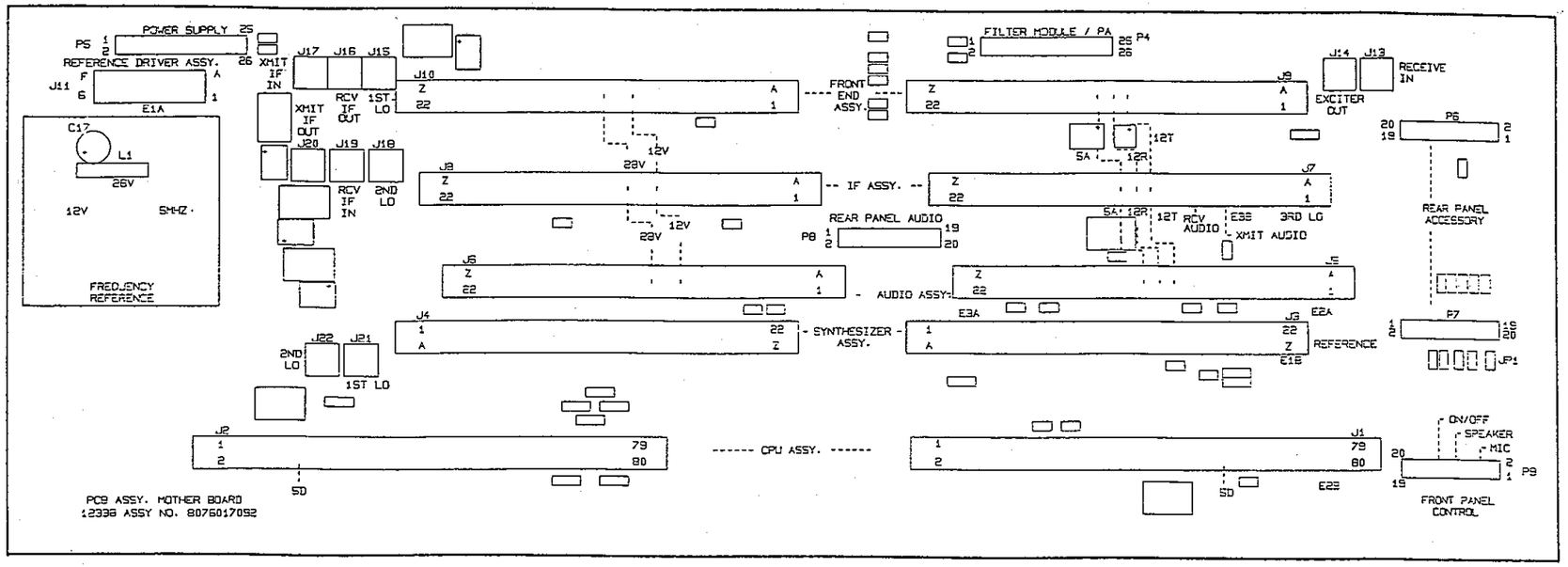


Figure 5.9.2 Front Panel Assembly 1A1, page 4/4.

PC ASSY, MOTHER BOARD 1A2A7

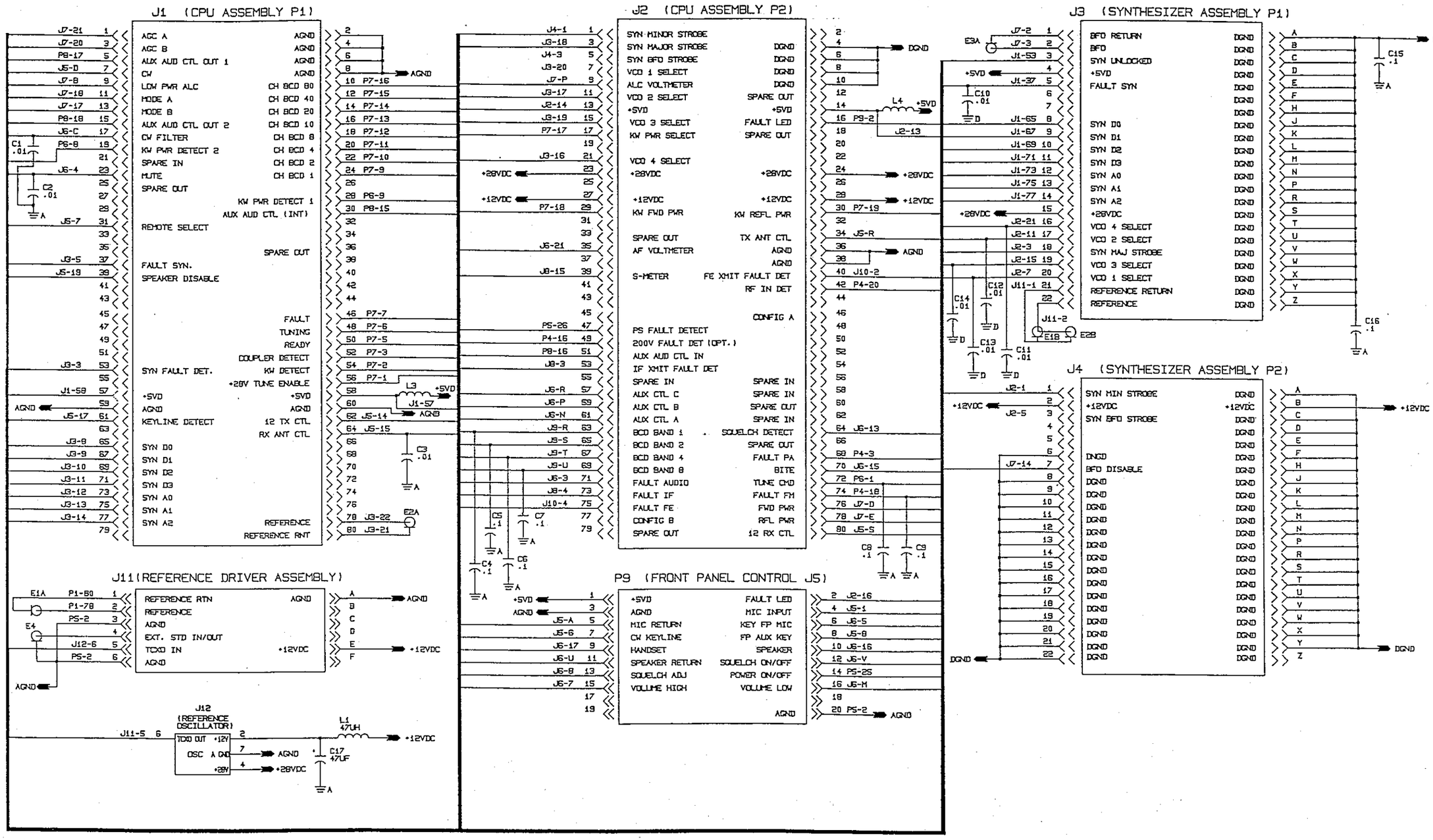
	PC ASSY, MOTHER BOARD 1A2A7	8076017092
C1	CAP. .01µF, 50V, X7R 20%	0281730008
C2	CAP. .01µF, 50V, X7R 20%	0281730008
C3	CAP. .01µF, 50V, X7R 20%	0281730008
C4	CAPACITOR 0.1µF, 50V, X7R	1011180014
C5	CAPACITOR 0.1µF, 50V, X7R	1011180014
C6	CAPACITOR 0.1µF, 50V, X7R	1011180014
C7	CAPACITOR 0.1µF, 50V, X7R	1011180014
C8	CAPACITOR 0.1µF, 50V, X7R	1011180014
C9	CAPACITOR 0.1µF, 50V, X7R	1011180014
C10	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. .01µF, 50V, X7R 20%	0281730008
C12	CAP. .01µF, 50V, X7R 20%	0281730008
C13	CAP. .01µF, 50V, X7R 20%	0281730008
C14	CAP. .01µF, 50V, X7R 20%	0281730008
C15	CAPACITOR 0.1µF, 50V, X7R	1011180014
C16	CAPACITOR 0.1µF, 50V, X7R	1011180014
C17	CAP. 47µF, 20V, 196D	0281700001
C18	CAP. .01µF, 50V, X7R 20%	0281730008
C19	CAP. .01µF, 50V, X7R 20%	0281730008
C20	CAP. .01µF, 50V, X7R 20%	0281730008
C21	CAP. .01µF, 50V, X7R 20%	0281730008
C22	CAP. .01µF, 50V, X7R 20%	0281730008
C23	CAP. .01µF, 50V, X7R 20%	0281730008
C24	CAP. .01µF, 50V, X7R 20%	0281730008
C25	CAP. 2.2µF, 35V, T368	0273950002
C26	CAP. .47µF, 50V, X7R 20%	0283377771
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. .01µF, 50V, X7R 20%	0281730008
C34	CAP. .01µF, 50V, X7R 20%	0281730008
C35	CAP. .01µF, 50V, X7R 20%	0281730008
C36	CAP. .47µF, 50V, X7R 20%	0283377771
C37	CAP. 15µF, 15V, 196D	0281720002
C38	CAP. 15µF, 15V, 196D	0281720002
C39	CAP. 15µF, 15V, 196D	0281720002
C40	CAP. .01µF, 50V, X7R 20%	0281730008
C41	CAP. 15µF, 15V, 196D	0281720002
C42	CAP. .01µF, 50V, X7R 20%	0281730008
C43	CAP. .01µF, 50V, X7R 20%	0281730008
C44	CAP. .01µF, 50V, X7R 20%	0281730008
C45	CAP. .01µF, 50V, X7R 20%	0281730008
C46	CAP. .01µF, 50V, X7R 20%	0281730008
C47	CAP. .01µF, 50V, X7R 20%	0281730008
C48	CAP. .01µF, 50V, X7R 20%	0281730008
C49	CAP. .01µF, 50V, X7R 20%	0281730008
C50	CAP. .01µF, 50V, X7R 20%	0281730008
C51	CAP. .01µF, 50V, X7R 20%	0281730008
C52	CAP. .01µF, 50V, X7R 20%	0281730008
C53	CAPACITOR 0.1µF, 50V, X7R	1011180014
C54	CAPACITOR 0.1µF, 50V, X7R	1011180014
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
J5	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J6	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J7	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J8	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J9	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J10	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J11	CONNECTOR, PC, 6 PIN DUAL, FEM	1011160005
J13	CONNECTOR, RF, JACK	1010810006
J14	CONNECTOR, RF, JACK	1010810006
J15	CONNECTOR, RF, JACK	1010810006
J16	CONNECTOR, RF, JACK	1010810006
J17	CONNECTOR, RF, JACK	1010810006
J18	CONNECTOR, RF, JACK	1010810006
J19	CONNECTOR, RF, JACK	1010810006
J20	CONNECTOR, RF, JACK	1010810006
J21	CONNECTOR, RF, JACK	1010810006
J22	CONNECTOR, RF, JACK	1010810006
L1	INDUCTOR, MOLDED, 47µH, 5%	0646420003
L2	CHOKE, POWER	8076104700
L3	CHOKE, POWER	8076104700
L4	CHOKE, POWER	8076104700

L5	CHOKE, POWER	8076104700
L6	CHOKE, POWER	8076104700
L7	CHOKE, POWER	8076104700
L8	CHOKE, POWER	8076104700
P4	CONNECTOR, RIBBON, 26 PIN FEM	1008340031
P5	CONNECTOR, RIBBON, 26 PIN FEM	1008340031
P6	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
P7	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
P8	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
P9	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
XP4	CONNECTOR,PCB,TRANSITION,26PIN	1011090261
XP5	CONNECTOR,PCB,TRANSITION,26PIN	1011090261
XP6	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
XP7	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
XP8	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
XP9	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
	BEAD, FERRITE .200OD,.437LG	1010910019
	CABLE, FLAT, 20 COND. 28AWG	1008080004
	CABLE, FLAT, 26 COND. 28AWG	1011180006
	CONNECTOR, RF, SUBMINIATURE	0753700000
	JACK, PCB, SOLDER MOUNT	1008920002

Figure 5.9.3 PC Assembly, Mother Board 1A2A7, page 1/4.



NOTE: REFER TO 'RF INTERCONNECT DIAGRAM' FOR TRANSCEIVER RF SIGNAL INTERCONNECTIONS.

Figure 5.9.3 PC Assembly, Mother Board 1A2A7, page 2/4.

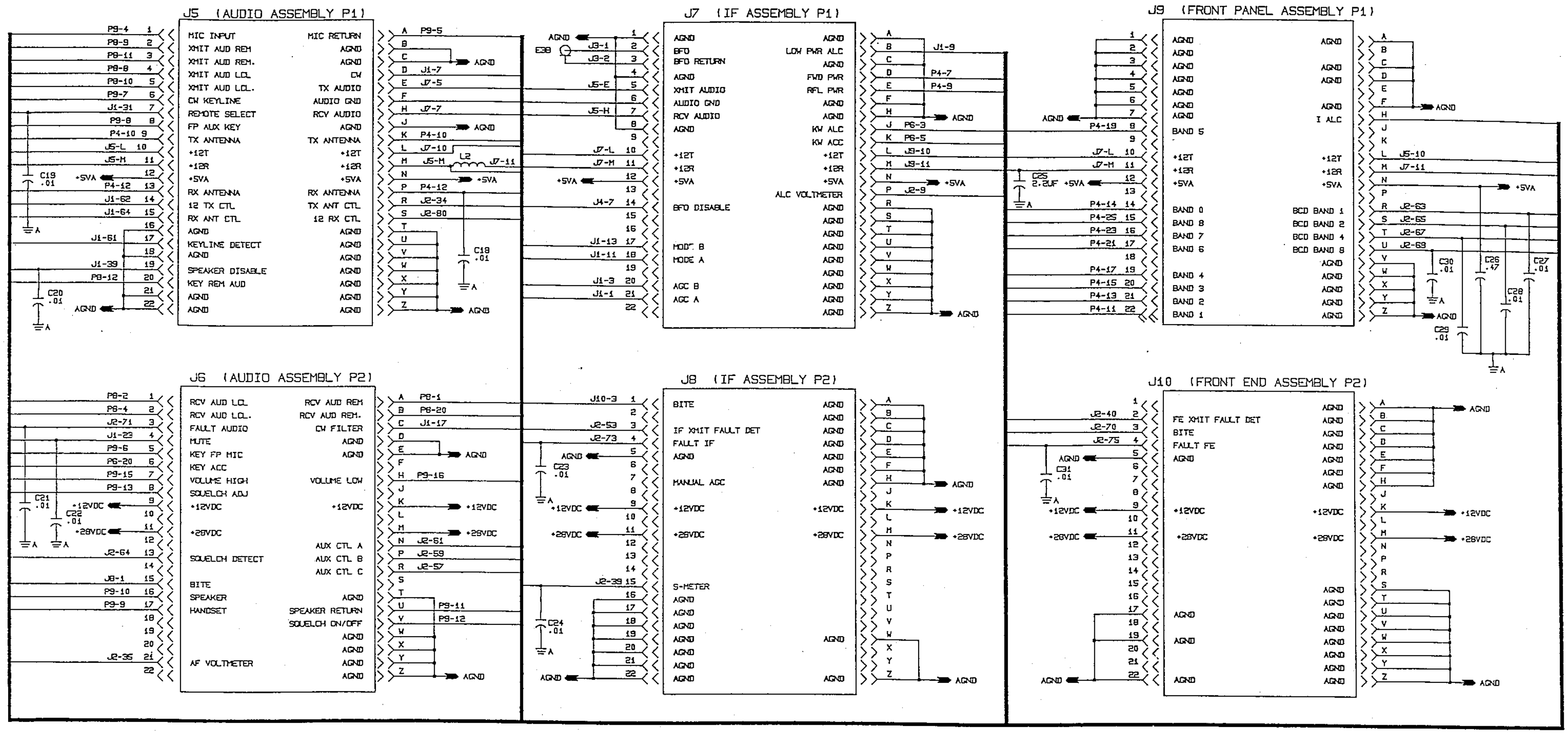


Figure 5.9.3 PC Assembly, Mother Board 1A2A7, page 3/4.

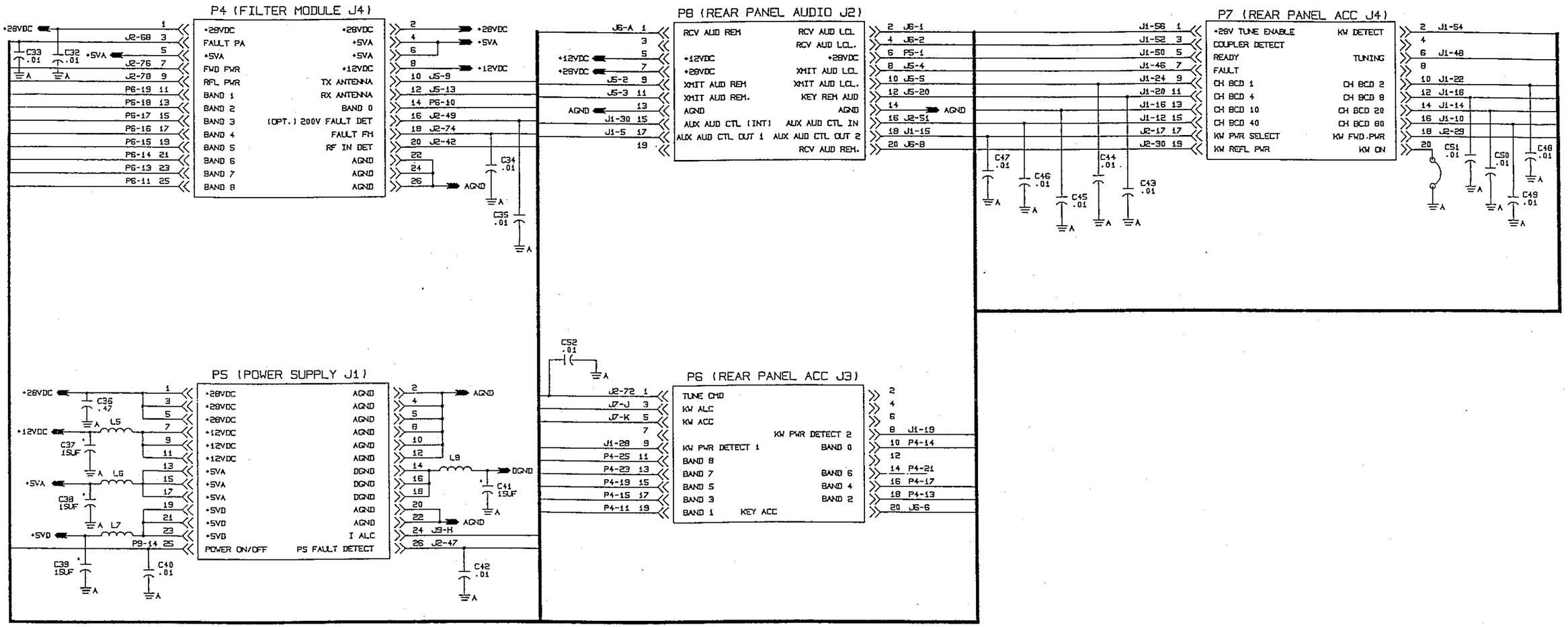


Figure 5.9.3 PC Assembly, Mother Board 1A2A7, page 4/4.

PC ASSY, CPU 1A2A1

	PC ASSY, CPU 1A2A1	8076070091
C3	CAP. .01µF, 50V, X7R 20%	0281730008
C5	CAP. 47µF, 20V, 196D	0281700001
C8	CAP. 6.8µF, 20V, T368	0296780006
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C12	CAP. 68µF, 15V,	0296547778
C13	CAP. .01µF, 50V, X7R 20%	0281730008
C14	CAP. .01µF, 50V, X7R 20%	0281730008
C15	CAP. .01µF, 50V, X7R 20%	0281730008
C16	CAP. .01µF, 50V, X7R 20%	0281730008
C17	CAP. .01µF, 50V, X7R 20%	0281730008
C18	CAP. .01µF, 50V, X7R 20%	0281730008
C19	CAP. .01µF, 50V, X7R 20%	0281730008
C20	CAP. .01µF, 50V, X7R 20%	0281730008
C21	CAP. .01µF, 50V, X7R 20%	0281730008
C22	CAP. .01µF, 50V, X7R 20%	0281730008
C23	CAP. .01µF, 50V, X7R 20%	0281730008
C24	CAP. .01µF, 50V, X7R 20%	0281730008
C25	CAP. .01µF, 50V, X7R 20%	0281730008
C26	CAP. .01µF, 50V, X7R 20%	0281730008
C27	CAP. 10µF, 20V	1007290005
C28	CAP. .01µF, 50V, X7R 20%	0281730008
C29	CAP. 10µF, 20V	1007290005
C31	CAP. .01µF, 50V, X7R 20%	0281730008
C32	CAP. .01µF, 50V, X7R 20%	0281730008
C33	CAP. .01µF, 50V, X7R 20%	0281730008
C34	CAP. .01µF, 50V, X7R 20%	0281730008
C35	CAP. .01µF, 50V, X7R 20%	0281730008
C36	CAP. .01µF, 50V, X7R 20%	0281730008
C39	CAP. .01µF, 50V, X7R 20%	0281730008
C40	CAP. .01µF, 50V, X7R 20%	0281730008
C41	CAP. .01µF, 50V, X7R 20%	0281730008
C42	CAP. .01µF, 50V, X7R 20%	0281730008
C43	CAP. .01µF, 50V, X7R 20%	0281730008
C44	CAP. .01µF, 50V, X7R 20%	0281730008
C45	CAP. .01µF, 50V, X7R 20%	0281730008
C47	CAP. .01µF, 50V, X7R 20%	0281730008
C48	CAP. .01µF, 50V, X7R 20%	0281730008
C49	CAP. .01µF, 50V, X7R 20%	0281730008
C50	CAP. .01µF, 50V, X7R 20%	0281730008
C51	CAP. .01µF, 50V, X7R 20%	0281730008
C52	CAP. .01µF, 50V, X7R 20%	0281730008
C54	CAP. .01µF, 50V, X7R 20%	0281730008
C55	CAP. .01µF, 50V, X7R 20%	0281730008
C56	CAP. .01µF, 50V, X7R 20%	0281730008
C57	CAP. .01µF, 50V, X7R 20%	0281730008
C60	CAP. .01µF, 50V, X7R 20%	0281730008
C62	CAP. .01µF, 50V, X7R 20%	0281730008
C68	CAP. .01µF, 50V, X7R 20%	0281730008
C69	CAP. .01µF, 50V, X7R 20%	0281730008
C92	CAP. .01µF, 50V, X7R 20%	0281730008
C93	CAP. .01µF, 50V, X7R 20%	0281730008
C94	CAP. .01µF, 50V, X7R 20%	0281730008
C95	CAP. .01µF, 50V, X7R 20%	0281730008
C96	CAP. .01µF, 50V, X7R 20%	0281730008
C98	CAP. .01µF, 50V, X7R 20%	0281730008
C99	CAP. .01µF, 50V, X7R 20%	0281730008
C100	CAP. .01µF, 50V, X7R 20%	0281730008
C101	CAP. .01µF, 50V, X7R 20%	0281730008
C102	CAP. .01µF, 50V, X7R 20%	0281730008
C103	CAP. .01µF, 50V, X7R 20%	0281730008
C104	CAP. .01µF, 50V, X7R 20%	0281730008
C105	CAP. .01µF, 50V, X7R 20%	0281730008
C106	CAP. .01µF, 50V, X7R 20%	0281730008
C107	CAP. .01µF, 50V, X7R 20%	0281730008
C108	CAP. .01µF, 50V, X7R 20%	0281730008
C109	CAP. .01µF, 50V, X7R 20%	0281730008
C111	CAP. .01µF, 50V, X7R 20%	0281730008
C112	CAP. .01µF, 50V, X7R 20%	0281730008
C113	CAP. .01µF, 50V, X7R 20%	0281730008
C114	CAP. .01µF, 50V, X7R 20%	0281730008
C123	CAP. .01µF, 50V, X7R 20%	0281730008
C124	CAP. .01µF, 50V, X7R 20%	0281730008
C125	CAP. .01µF, 50V, X7R 20%	0281730008
C131	CAP. .01µF, 50V, X7R 20%	0281730008
C132	CAP. .01µF, 50V, X7R 20%	0281730008
C133	CAP. .01µF, 50V, X7R 20%	0281730008
C134	CAP. .01µF, 50V, X7R 20%	0281730008
C135	CAP. .01µF, 50V, X7R 20%	0281730008
C136	CAP. .01µF, 50V, X7R 20%	0281730008
C137	CAP. .01µF, 50V, X7R 20%	0281730008
C138	CAP. .01µF, 50V, X7R 20%	0281730008
C139	CAP. .01µF, 50V, X7R 20%	0281730008
C140	CAP. .01µF, 50V, X7R 20%	0281730008
C141	CAP. .01µF, 50V, X7R 20%	0281730008
C142	CAP. .01µF, 50V, X7R 20%	0281730008
C143	CAP. .01µF, 50V, X7R 20%	0281730008
C144	CAP. .01µF, 50V, X7R 20%	0281730008
C145	CAP. .01µF, 50V, X7R 20%	0281730008
C146	CAP. 3.3µF, 35V, 196D	0281680001
CR1	DIODE, SIGNAL, GERM. 1N270	0405510004
CR2	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR5	DIODE, RECTIFIER 1N4004	0405180004
CR7	DIODE, LED, RED, PC MOUNT	1008480029
CR9	DIODE, TRANSIENT SUPR.TVS505	1010720007
CR10	DIODE, ZENER 1N5227B	0405250002
CR11	DIODE, SIGNAL, SIL. 1N4454	0405270003
FB1	BEAD, FERRITE .200OD,.437LG	1010910019
FB2	FERRITE BEAD, 5000 PERM	1010980017
J1	SOCKET, BOARDMOUNT, 11 PIN	1011010119
J2	SOCKET, BOARDMOUNT, 11 PIN	1011010119
J3	SOCKET, BOARDMOUNT, 11 PIN	1011010119
J4	SOCKET, BOARDMOUNT, 11 PIN	1011010119
J5	SOCKET, BOARDMOUNT, 11 PIN	1011010119
J6	SOCKET, BOARDMOUNT, 11 PIN	1011010119
J7	SOCKET, BOARDMOUNT, 11 PIN	1011010119
L1	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L2	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L3	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L4	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L5	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L6	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L7	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L8	INDUCTOR, MOLDED, 33µH, 5%	0646300008
L9	INDUCTOR, MOLDED, 33µH, 5%	0646300008
L12	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L13	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L15	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L16	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L17	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L18	INDUCTOR, MOLDED, 33µH, 5%	0646300008
P3	CONNECTOR,HEADER 40 PIN	1010780000
Q1	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q2	TRANSISTOR, NPN, SI. 2N4124	0448010003
R3	RESISTOR 1K, 10%, 1/4W	0171560001
R5	RESISTOR 470, 5%, 1/4W	0184110009
R6	RESISTOR 10K, 10%, 1/4W	0170410005
R12	RESISTOR 10K, 10%, 1/4W	0170410005
R13	RESISTOR 10K, 10%, 1/4W	0170410005
R14	RESISTOR 10, 5%, 1/4W	0177160004
R15	RESISTOR 1M, 10%, 1/4W	0170650006
R16	RESISTOR 3.9K, 10%, 1/4W	0178830003
R18	RESISTOR 220, 10%, 1/4W	0171320000
R21	RESISTOR 4.7K, 5%, 1/4W	0170770001
R22	RESISTOR 5.11K, 1%, 1/8W	1003120016
R23	RESISTOR 28K 1%, 1/8W	1004050038
R40	RESISTOR 1.91K 1%, 1/8W	1008530018
R41	RESISTOR 6.81K, 1%, 1/8W	0196350000
R42	RESISTOR 1.91K 1%, 1/8W	1008530018
R43	RESISTOR 6.81K, 1%, 1/8W	0196350000
R46	RESISTOR 10K, 1%, 1/8W	1003050026
R47	RESISTOR 10K, 1%, 1/8W	1003050026
R54	RESISTOR 10K, 10%, 1/4W	0170410005
R55	RESISTOR 470, 5%, 1/4W	0184110009
R56	RESISTOR 15, 10%, 1/4W	0181740001
R79	RESISTOR 10K, 10%, 1/4W	0170410005
R80	RESISTOR 10K, 10%, 1/4W	0170410005
R81	RESISTOR 22K, 5%, 1/4W	0172230004
R88	RESISTOR 5.11K, 1%, 1/8W	1003120016
R89	RESISTOR 5.11K, 1%, 1/8W	1003120016
R90	RESISTOR 2.2K, 5%, 1/4W	0178070009
R91	RESISTOR 2.2K, 5%, 1/4W	0178070009
R92	RESISTOR 2.2K, 5%, 1/4W	0178070009
R93	RESISTOR 2.2K, 5%, 1/4W	0178070009
R94	RESISTOR 2.2K, 5%, 1/4W	0178070009
R95	RESISTOR 2.2K, 5%, 1/4W	0178070009
R96	RESISTOR 2.2K, 5%, 1/4W	0178070009
R97	RESISTOR 10K, 10%, 1/4W	0170410005
R98	RESISTOR 680, 10%, 1/4W	0176630007
R99	RESISTOR 10K, 10%, 1/4W	0170410005
R100	RESISTOR 1.91K 1%, 1/8W	1008530018
R101	RESISTOR 6.81K, 1%, 1/8W	0196350000
R102	RESISTOR 7.87K 1%, 1/8W	1004090021
R103	RESISTOR 6.81K, 1%, 1/8W	0196350000
R104	RESISTOR 1K, 10%, 1/4W	0171560001
R105	RESISTOR 22K, 5%, 1/4W	0172230004
RP1	RES NTWK 10 PIN SIP 10K COM	1006130021
RP2	RES NTWK 10 PIN SIP 10K COM	1006130021
RP3	RES NTWK 10 PIN SIP 10K COM	1006130021
RP4	RES NTWK 10 PIN SIP 10K COM	1006130021
RP5	RES NTWK 10 PIN SIP 10K COM	1006130021
RP7	RES NTWK 10 PIN SIP 10K COM	1006130021
RP8	RES NTWK 10 PIN SIP 10K COM	1006130021
RP9	RES NTWK 10 PIN SIP 22K COM	1006570012
RP13	RES NTWK 10 PIN SIP 10K COM	1006130021
RP18	RES NTWK 10 PIN SIP 10K COM	1006130021
RP19	RES NTWK 10 PIN SIP 10K COM	1006130021
S1	SWITCH, SPST, ROCKER DIP	1010210025
S2	SWITCH, PUSHBUTTON,SPST	1010710001
U2	IC. DIGITAL 80C85A	1007400013
U3	I.C. DIGITAL RAM 6264	1010650009
U4	IC. DIGITAL 74HC244	1006460039
U5	IC. DIGITAL 74HC245	1006470034
U6	IC. DIGITAL 74HC244	1006460039
U7	IC. DIGITAL 74HC373	1006480030
U8	IC. DIGITAL 28C64	1010660004
U9	IC. DIGITAL 74HC139	1006770038
U10	IC. DIGITAL 74HC244	1006460039
U11	IC. DIGITAL 74HC244	1006460039
U12	IC. DIGITAL 74HC374	1006450033
U13	EPROM W/RT-9000 SOFTWARE, #1	8076073294
U14	EPROM W/RT-9000 SOFTWARE, #2	8076072298
U15	IC, DIGITAL 74HC00	1008190004
U16	IC. DIGITAL 74HC08	1006490019
U17	IC. DIGITAL ADC0804	1010670000
U18	IC. DIGITAL 74HC374	1006450033
U19	IC. LINEAR LM358	1010680005
U22	IC. DIGITAL 74HC245	1006470034
U23	IC. DIGITAL 74HC244	1006460039
U24	IC. DIGITAL 4067B	1006800034
U25	IC. DIGITAL 74HC244	1006460039
U28	IC DIGITAL 74HC154	1010160028
U29	IC DIGITAL 74HC154	1010160028
U30	IC. DIGITAL 74HC138	1006480013
U32	IC. DIGITAL 74HC374	1006450033
U33	IC. DIGITAL 74HC374	1006450033
U34	IC. DIGITAL 7417	1003670007
U35	IC. DIGITAL 74HC374	1006450033
U36	IC. DIGITAL 74HC374	1006450033
U39	IC. DIGITAL 74HC374	1006450033
U41	IC. DIGITAL 74HC374	1006450033
U42	IC. DIGITAL 74HC374	1006450033
U45	IC. DIGITAL 74HC14	1006490027
U46	IC. DIGITAL 74HC244	1006460039
U47	IC. DIGITAL 74HC14	1006490027
U48	IC. LINEAR 556C/3456	1005620032
U49	IC. DIGITAL 74HC14	1006490027
U50	IC, DIGITAL 8259A	1006800018
U51	IC. DIGITAL 74HC244	1006460039
U53	IC. DIGITAL 74HC244	1006460039
U54	IC. DIGITAL 74HC374	1006450033
U55	IC. DIGITAL 74HC244	1006460039
U56	IC. DIGITAL 74HC08	1006490019
U58	IC. DIGITAL 74HC14	1006490027
U59	IC. DIGITAL 74HC374	1006450033
U60	IC. DIGITAL 74HC192	1010690001
U61	IC, DIGITAL 74HC74	1008000019
U67	IC. DIGITAL 74HC139	1006770038
U75	IC. DIGITAL MM5369EST	1010700006
U77	IC. DIGITAL 2501-4	1010630008
U100	IC. DIGITAL 2501-4	1010630008
U107	IC. DIGITAL 74HC244	1006460039
XU2	SOCKET, IC, 40 PIN TAILLESS	1006620010
XU3	SOCKET, IC, 28 PIN TAILLESS	1006620001
XU8	SOCKET, IC, 28 PIN TAILLESS	1006620001
XU13	SOCKET, IC, 28 PIN TAILLESS	1006620001
XU14	SOCKET, IC, 28 PIN TAILLESS	1006620001
	MOUNTING PLATE, CPU	8076070805
1A2A1A1	PC ASSY, OPTOCOUPLER	8076075092

Figure 5.9.4 PC Assembly, CPU 1A2A1, page 1/6.

NOTE: NORMAL SETTINGS FOR S1: SEGMENTS 1 THROUGH 8, ALL SEGMENTS DEPRESSED TO NUMBERED END. SEE TABLE 5.7.8.1 FOR OPTIONS.

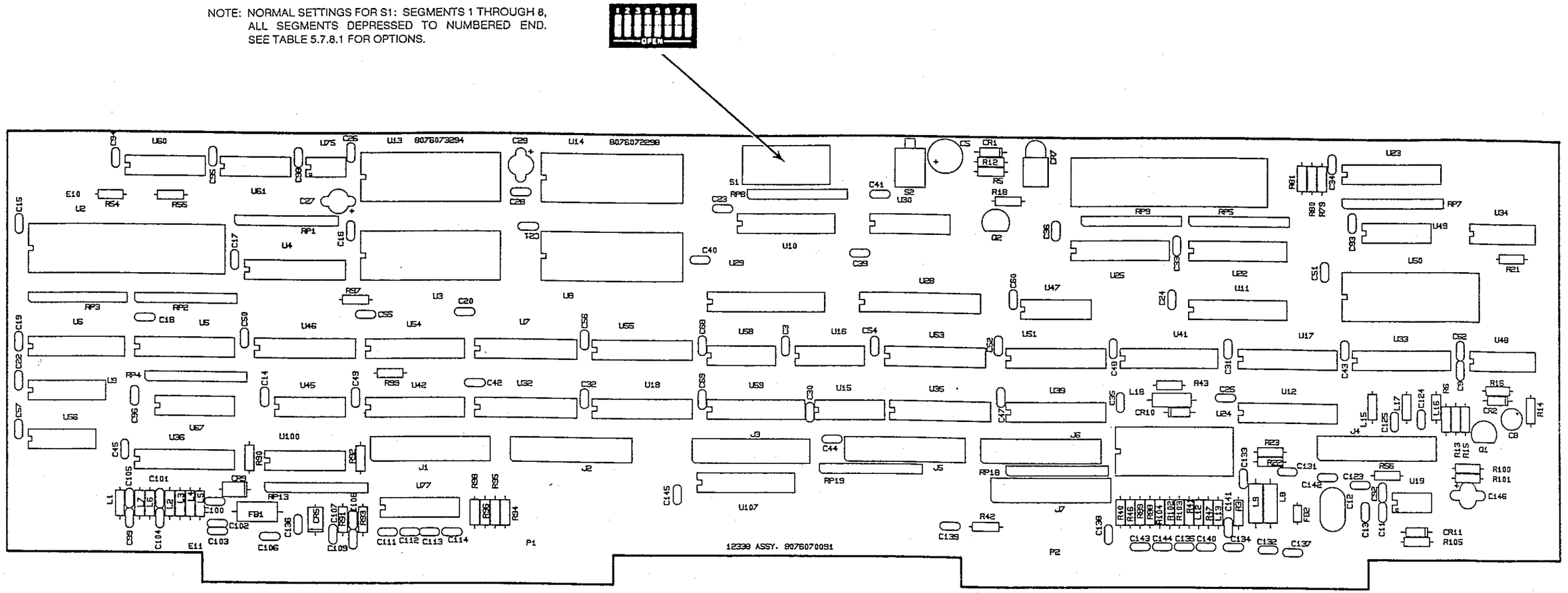


Figure 5.9.4 PC Assembly, CPU 1A2A1, page 2/6.

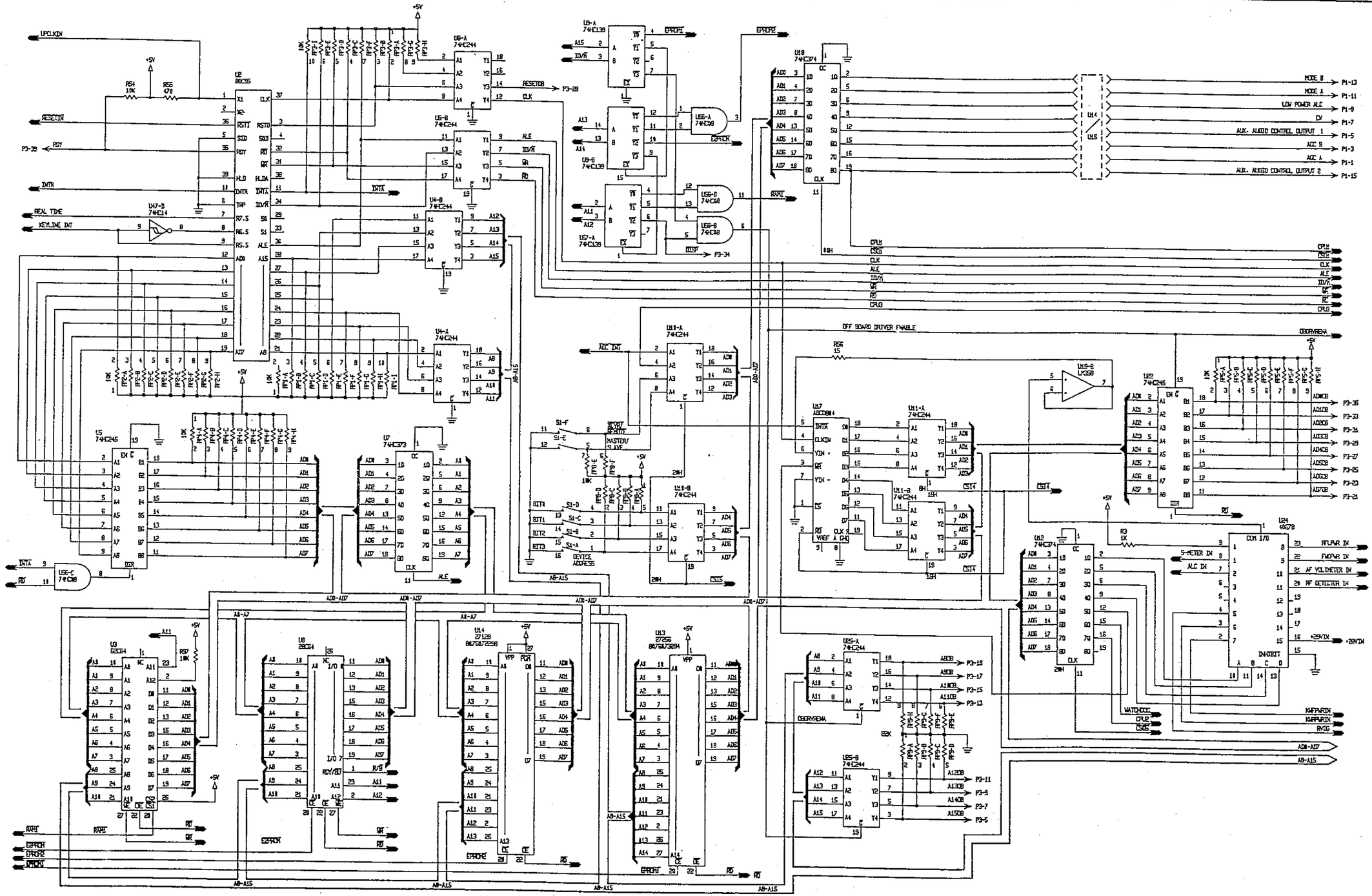


Figure 5.9.4 PC Assembly, CPU 1A2A1, page 3/6.

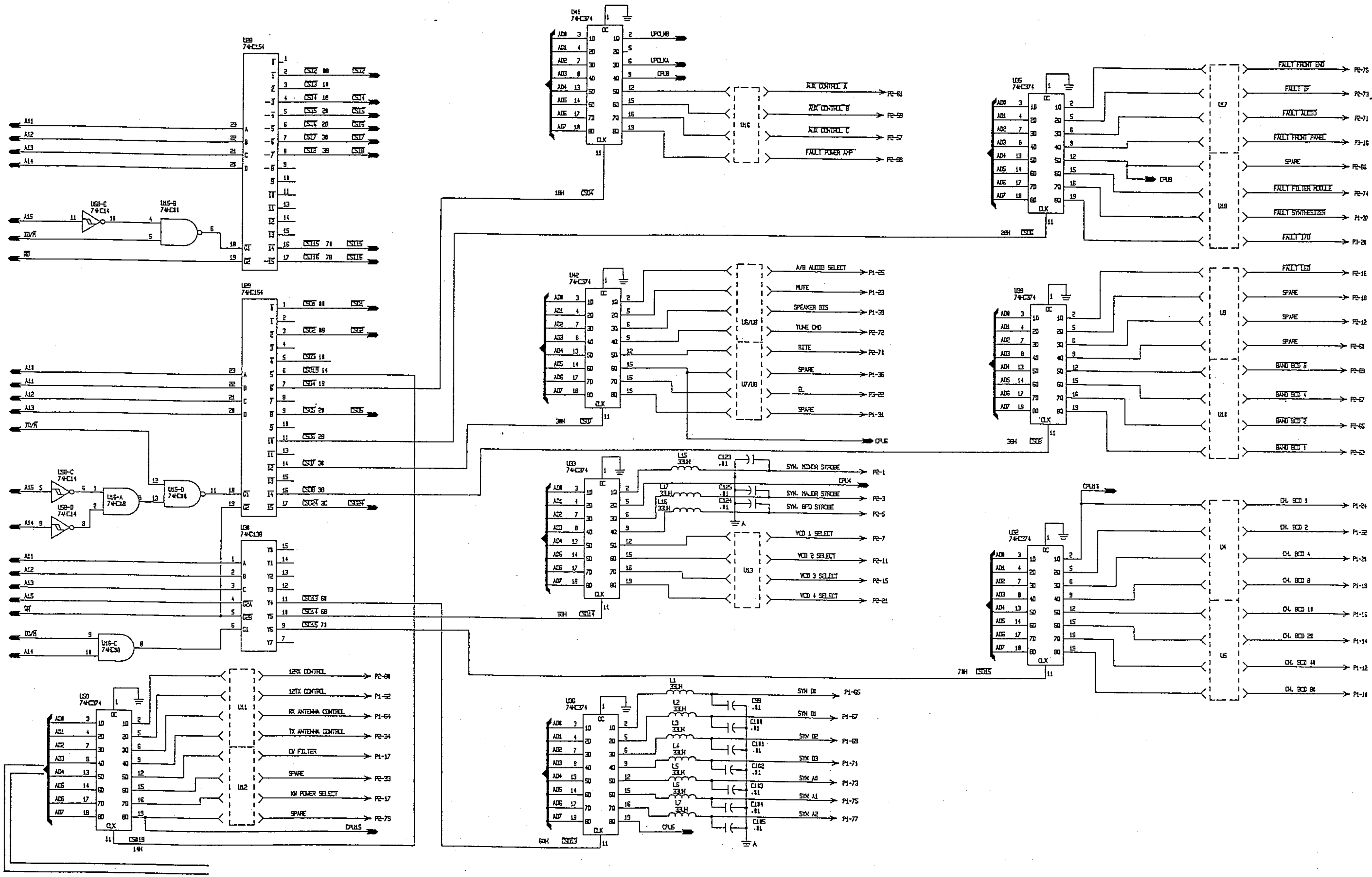


Figure 5.9.4 PC Assembly, CPU 1A2A1, page 4/6.

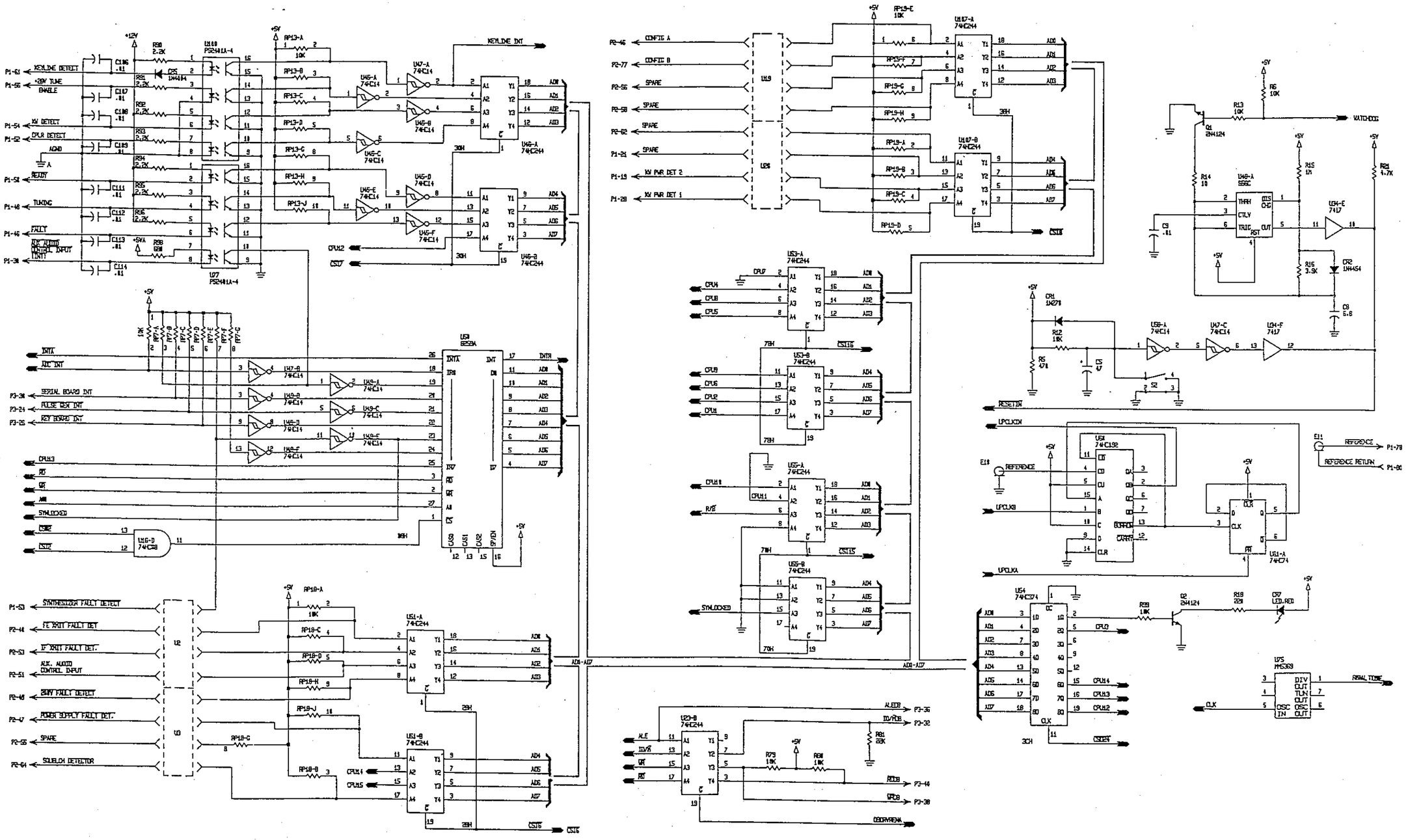


Figure 5.9.4 PC Assembly, CPU 1A2A1, page 5/6.

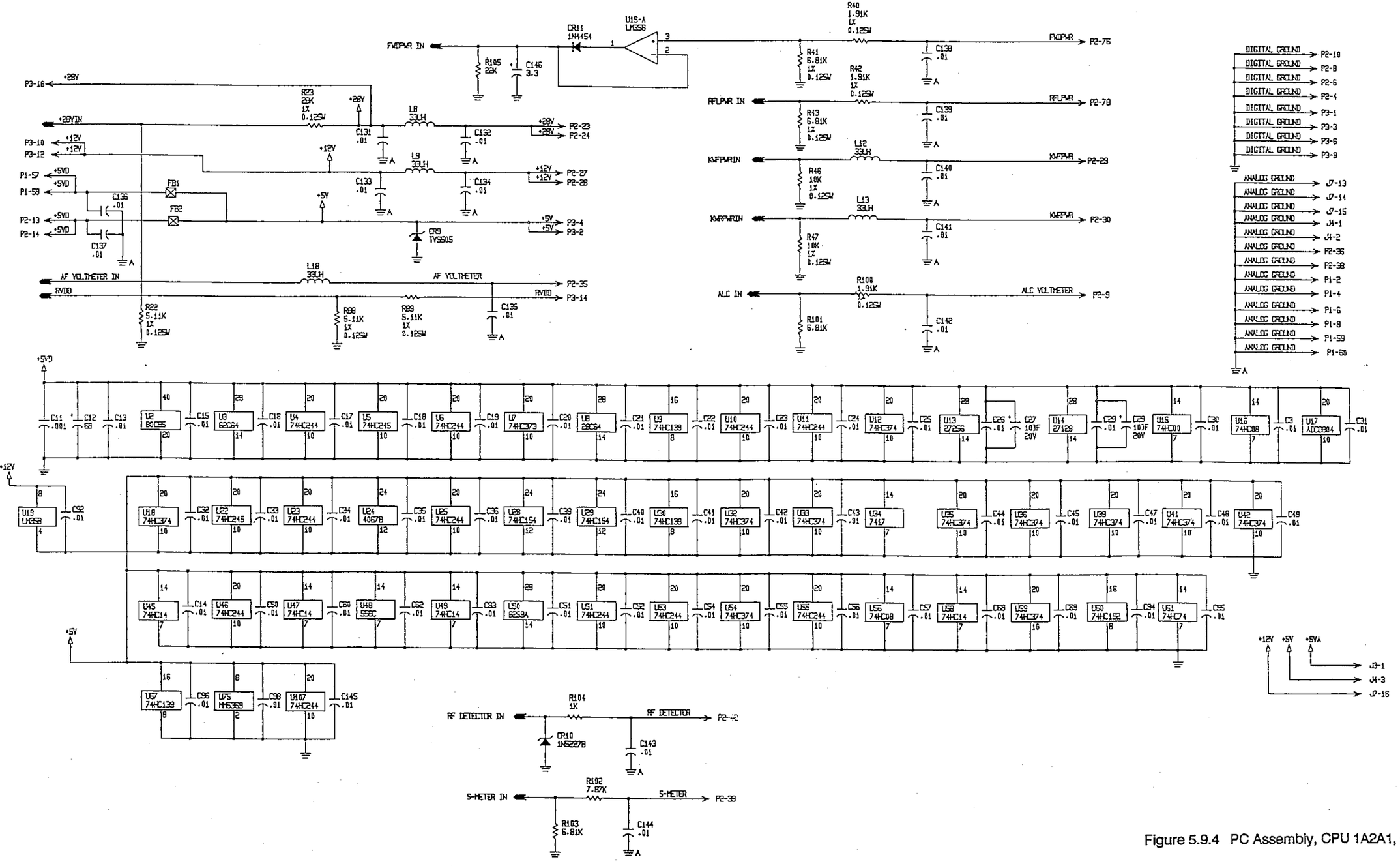
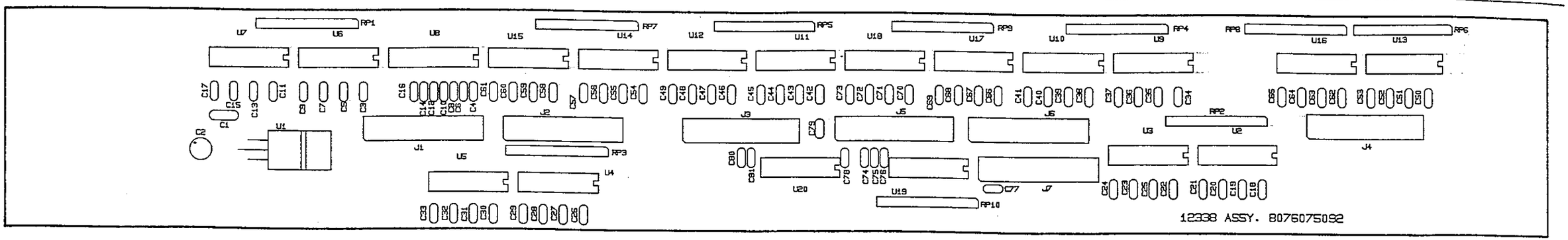


Figure 5.9.4 PC Assembly, CPU 1A2A1, page 6/6.



PC ASSY, OPTOCOUPLER 1A2A1A1

	PC ASSY, OPTOCOUPLER 1A2A1A1	8076075092
C1	CAP. .47µF, 50V, X7R 20%	0283377771
C2	CAP. 1µF, 35V, T368	0283630001
C3	CAP. .01µF, 50V, X7R 20%	0281730008
C4	CAP. .01µF, 50V, X7R 20%	0281730008
C5	CAP. .01µF, 50V, X7R 20%	0281730008
C6	CAP. .01µF, 50V, X7R 20%	0281730008
C7	CAP. .01µF, 50V, X7R 20%	0281730008
C8	CAP. .01µF, 50V, X7R 20%	0281730008
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C10	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. .01µF, 50V, X7R 20%	0281730008
C12	CAP. .01µF, 50V, X7R 20%	0281730008
C13	CAP. .01µF, 50V, X7R 20%	0281730008
C14	CAP. .01µF, 50V, X7R 20%	0281730008
C15	CAP. .01µF, 50V, X7R 20%	0281730008
C16	CAP. .01µF, 50V, X7R 20%	0281730008
C17	CAP. .01µF, 50V, X7R 20%	0281730008
C18	CAP. .01µF, 50V, X7R 20%	0281730008
C19	CAP. .01µF, 50V, X7R 20%	0281730008
C20	CAP. .01µF, 50V, X7R 20%	0281730008
C21	CAP. .01µF, 50V, X7R 20%	0281730008
C22	CAP. .01µF, 50V, X7R 20%	0281730008
C23	CAP. .01µF, 50V, X7R 20%	0281730008
C24	CAP. .01µF, 50V, X7R 20%	0281730008
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. .01µF, 50V, X7R 20%	0281730008
C34	CAP. .01µF, 50V, X7R 20%	0281730008
C35	CAP. .01µF, 50V, X7R 20%	0281730008
C36	CAP. .01µF, 50V, X7R 20%	0281730008
C37	CAP. .01µF, 50V, X7R 20%	0281730008
C38	CAP. .01µF, 50V, X7R 20%	0281730008
C39	CAP. .01µF, 50V, X7R 20%	0281730008
C40	CAP. .01µF, 50V, X7R 20%	0281730008
C41	CAP. .01µF, 50V, X7R 20%	0281730008
C42	CAP. .01µF, 50V, X7R 20%	0281730008
C43	CAP. .01µF, 50V, X7R 20%	0281730008
C44	CAP. .01µF, 50V, X7R 20%	0281730008
C45	CAP. .01µF, 50V, X7R 20%	0281730008
C46	CAP. .01µF, 50V, X7R 20%	0281730008
C47	CAP. .01µF, 50V, X7R 20%	0281730008
C48	CAP. .01µF, 50V, X7R 20%	0281730008
C49	CAP. .01µF, 50V, X7R 20%	0281730008
C50	CAP. .01µF, 50V, X7R 20%	0281730008
C51	CAP. .01µF, 50V, X7R 20%	0281730008
C52	CAP. .01µF, 50V, X7R 20%	0281730008
C53	CAP. .01µF, 50V, X7R 20%	0281730008
C54	CAP. .01µF, 50V, X7R 20%	0281730008
C55	CAP. .01µF, 50V, X7R 20%	0281730008
C56	CAP. .01µF, 50V, X7R 20%	0281730008
C57	CAP. .01µF, 50V, X7R 20%	0281730008
C58	CAP. .01µF, 50V, X7R 20%	0281730008
C59	CAP. .01µF, 50V, X7R 20%	0281730008
C60	CAP. .01µF, 50V, X7R 20%	0281730008
C61	CAP. .01µF, 50V, X7R 20%	0281730008
C62	CAP. .01µF, 50V, X7R 20%	0281730008
C63	CAP. .01µF, 50V, X7R 20%	0281730008
C64	CAP. .01µF, 50V, X7R 20%	0281730008
C65	CAP. .01µF, 50V, X7R 20%	0281730008
C66	CAP. .01µF, 50V, X7R 20%	0281730008
C67	CAP. .01µF, 50V, X7R 20%	0281730008
C68	CAP. .01µF, 50V, X7R 20%	0281730008
C69	CAP. .01µF, 50V, X7R 20%	0281730008
C70	CAP. .01µF, 50V, X7R 20%	0281730008
C71	CAP. .01µF, 50V, X7R 20%	0281730008
C72	CAP. .01µF, 50V, X7R 20%	0281730008
C73	CAP. .01µF, 50V, X7R 20%	0281730008
C74	CAP. .01µF, 50V, X7R 20%	0281730008
C75	CAP. .01µF, 50V, X7R 20%	0281730008
C76	CAP. .01µF, 50V, X7R 20%	0281730008
C77	CAP. .01µF, 50V, X7R 20%	0281730008
C78	CAP. .01µF, 50V, X7R 20%	0281730008
C79	CAP. .01µF, 50V, X7R 20%	0281730008
C80	CAP. .01µF, 50V, X7R 20%	0281730008
C81	CAP. .01µF, 50V, X7R 20%	0281730008
J1	HEADER, PIN STRIP, 22 PIN	1010930010
J2	HEADER, PIN STRIP, 22 PIN	1010930010
J3	HEADER, PIN STRIP, 22 PIN	1010930010
J4	HEADER, PIN STRIP, 22 PIN	1010930010
J5	HEADER, PIN STRIP, 22 PIN	1010930010
J6	HEADER, PIN STRIP, 22 PIN	1010930010
J7	HEADER, PIN STRIP, 22 PIN	1010930010
RP1	RES NTWK 10 PIN SIP 680 COM	1010640003
RP2	RES NTWK 10 PIN SIP 680 COM	1010640003
RP3	RES NTWK 10 PIN SIP 680 COM	1010640003
RP4	RES NTWK 10 PIN SIP 680 COM	1010640003
RP5	RES NTWK 10 PIN SIP 680 COM	1010640003
RP6	RES NTWK 10 PIN SIP 680 COM	1010640003
RP7	RES NTWK 10 PIN SIP 680 COM	1010640003
RP8	RES NTWK 10 PIN SIP 680 COM	1010640003
RP9	RES NTWK 10 PIN SIP 680 COM	1010640003
RP10	RES NTWK 10 PIN SIP 680 COM	1010640003
U1	IC. LINEAR LM340T5	0448600005
U2	IC. DIGITAL 2501-4	1010630008
U3	IC. DIGITAL 2501-4	1010630008
U4	IC. DIGITAL 2501-4	1010630008
U5	IC. DIGITAL 2501-4	1010630008
U6	IC. DIGITAL 2501-4	1010630008
U7	IC. DIGITAL 2501-4	1010630008
U8	IC. DIGITAL UDN-2981	1006330038
U9	IC. DIGITAL 2501-4	1010630008
U10	IC. DIGITAL 2501-4	1010630008
U11	IC. DIGITAL 2501-4	1010630008
U12	IC. DIGITAL 2501-4	1010630008
U13	IC. DIGITAL 2501-4	1010630008
U14	IC. DIGITAL 2501-4	1010630008
U15	IC. DIGITAL 2501-4	1010630008
U16	IC. DIGITAL 2501-4	1010630008
U17	IC. DIGITAL 2501-4	1010630008
U18	IC. DIGITAL 2501-4	1010630008
U19	IC. DIGITAL 2501-4	1010630008
U20	IC. DIGITAL 2501-4	1010630008

Figure 5.9.5 PC Assembly Optocoupler 1A2A1A1, page 1/2.

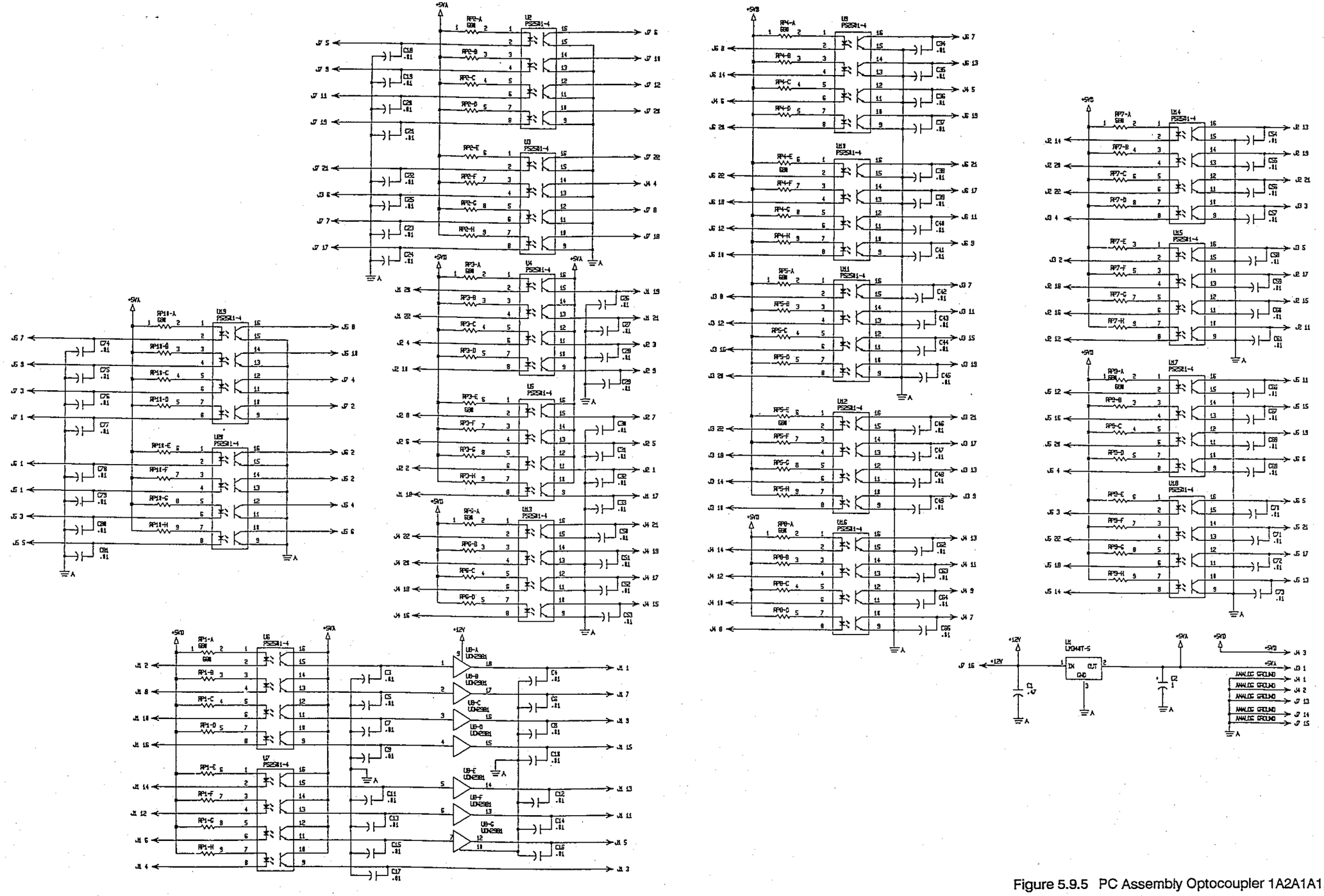


Figure 5.9.5 PC Assembly Optocoupler 1A2A1A1, page 2/2.

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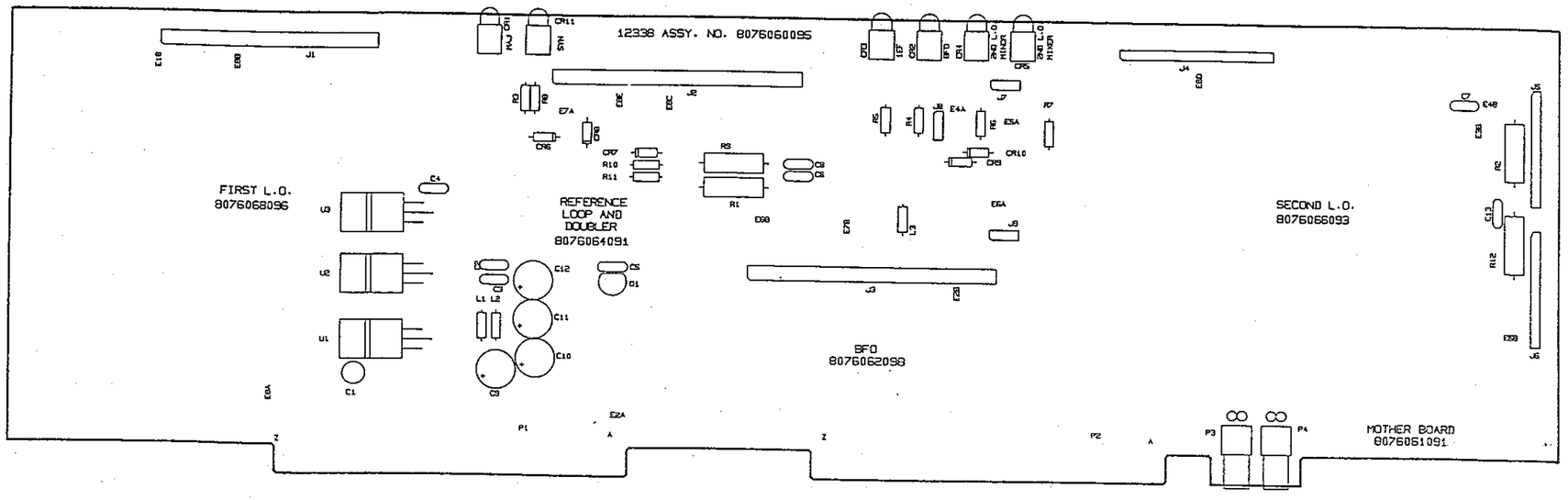
SYNTHESIZER MODULE 1A2A2

	SYNTHESIZER MODULE 1A2A2	8076060095
	COVER, BFO ASSY	8076062501
	COVER, REFERENCE LOOP ASSY	8076064503
	COVER, SECOND L.O. ASSY	8076066506
	COVER, FIRST L.O. ASSY	8076068509
	MOUNTING PLATE, SYNTHESIZER	8076060800
1A2A2A5	PC ASSY, SYN MOTHER BOARD	8076061091
1A2A2A3	PC ASSY. BFO	8076062098
1A2A2A4	PC ASSY. REF LOOP AND DOUBLER	8076064091
1A2A2A2	PC ASSY. SECOND L.O.	8076066093
1A2A2A1	PC ASSY. FIRST L.O.	8076068096
	STANDOFF, M-F, 4-40 X. 500L	1011000008

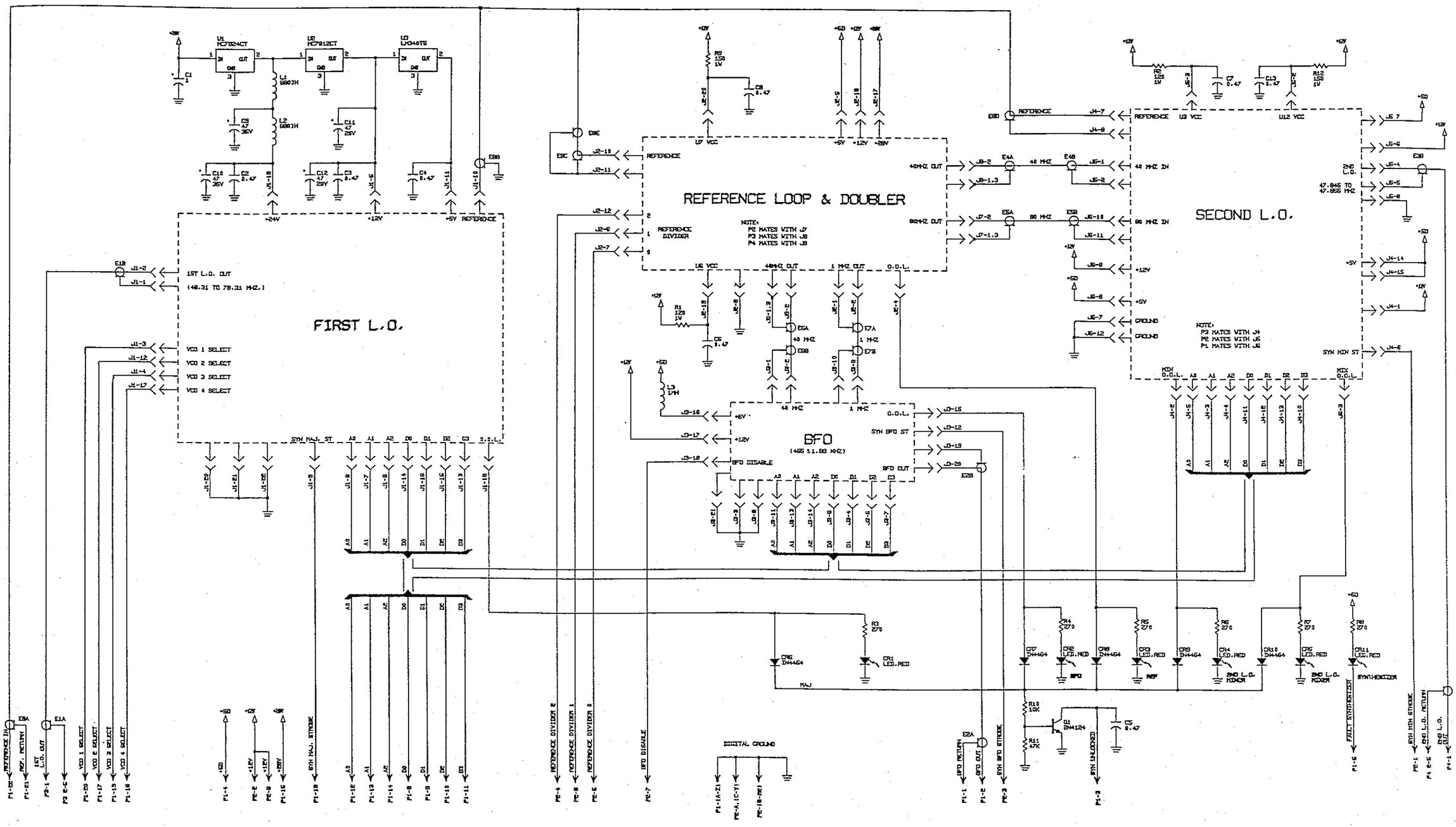
Figure 5.9.6 Synthesizer Module 1A2A2 PC Assembly, page 1/1.



PC ASSY, SYNTHESIZER MOTHER BOARD 1A2A2A5

	PC ASSY, SYN MOTHER BOARD 1A2A2A5	8076061091
C1	CAP. 1μF, 35V, T368	0283630001
C2	CAP. .47μF, 50V, X7R 20%	0283377771
C3	CAP. .47μF, 50V, X7R 20%	0283377771
C4	CAP. .47μF, 50V, X7R 20%	0283377771
C5	CAP. .47μF, 50V, X7R 20%	0283377771
C6	CAP. .47μF, 50V, X7R 20%	0283377771
C7	CAP. .47μF, 50V, X7R 20%	0283377771
C8	CAP. .47μF, 50V, X7R 20%	0283377771
C9	CAP. 47μF, 35V	0282190007
C10	CAP. 47μF, 35V	0282190007
C11	CAP. 47μF, 20V, 196D	0281700001
C12	CAP. 47μF, 20V, 196D	0281700001
C13	CAP. .47μF, 50V, X7R 20%	0283377771
CR1	DIODE, LED, RED, PC MOUNT	1008480029
CR2	DIODE, LED, RED, PC MOUNT	1008480029
CR3	DIODE, LED, RED, PC MOUNT	1008480029
CR4	DIODE, LED, RED, PC MOUNT	1008480029
CR5	DIODE, LED, RED, PC MOUNT	1008480029
CR6	DIODE, SIGNAL, SIL 1N4454	0405270003
CR7	DIODE, SIGNAL, SIL 1N4454	0405270003
CR8	DIODE, SIGNAL, SIL 1N4454	0405270003
CR9	DIODE, SIGNAL, SIL 1N4454	0405270003
CR10	DIODE, SIGNAL, SIL 1N4454	0405270003
CR11	DIODE, LED, RED, PC MOUNT	1008480029
J1	SOCKET, BOARDMOUNT, 22 PIN	1011010224
J2	SOCKET, BOARDMOUNT, 25 PIN	1011010259
J3	SOCKET, BOARDMOUNT, 25 PIN	1011010259
J4	SOCKET, BOARDMOUNT, 15 PIN	1011010151
J5	SOCKET, BOARDMOUNT, 12 PIN	1011010127
J6	SOCKET, BOARDMOUNT, 12 PIN	1011010127
J7	SOCKET, BOARDMOUNT, 3 PIN	1011010038
J8	SOCKET, BOARDMOUNT, 3 PIN	1011010038
J9	SOCKET, BOARDMOUNT, 3 PIN	1011010038
L1	INDUCTOR, MOLDED, 680μH, 10%	0664320007
L2	INDUCTOR, MOLDED, 680μH, 10%	0664320007
L3	INDUCTOR, MOLDED, 1000μH, 10%	0664940005
Q1	TRANSISTOR, NPN, SI. 2N4124	0448010003
R1	RESISTOR, 120, 10%, 1W	0197600000
R2	RESISTOR, 120, 10%, 1W	0197600000
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 270, 10%, 1/4W	0178450006
R8	RESISTOR 270, 10%, 1/4W	0178450006
R9	RESISTOR 150, 10%, 1W	0187840008
R10	RESISTOR 10K, 10%, 1/4W	0170410005
R11	RESISTOR 47K, 10%, 1/4W	0171060008
R12	RESISTOR 150, 10%, 1W	0187840008
U1	IC. LINEAR MC7824CT	0448480000
U2	IC. LINEAR LM340/7812	1003410022
U3	IC. LINEAR LM340T5	0448600005
	CONNECTOR, RF,RIGHT ANGLE	1010730002
J4	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J5	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J6	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J7	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J8	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J9	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J10	CONNECTOR, PC, 22PIN DUAL,FEM	1008830003
J11	CONNECTOR, PC, 6 PIN DUAL, FEM	1011160005
J13	CONNECTOR, RF, JACK	1010810006
J14	CONNECTOR, RF, JACK	1010810006
J15	CONNECTOR, RF, JACK	1010810006
J16	CONNECTOR, RF, JACK	1010810006
J17	CONNECTOR, RF, JACK	1010810006
J18	CONNECTOR, RF, JACK	1010810006
J19	CONNECTOR, RF, JACK	1010810006
J20	CONNECTOR, RF, JACK	1010810006
J21	CONNECTOR, RF, JACK	1010810006
J22	CONNECTOR, RF, JACK	1010810006
L1	INDUCTOR, MOLDED, 47μH, 5%	0646420003
L2	CHOKE, POWER	8076104700
L3	CHOKE, POWER	8076104700
L4	CHOKE, POWER	8076104700
L5	CHOKE, POWER	8076104700
L6	CHOKE, POWER	8076104700
L7	CHOKE, POWER	8076104700
L8	CHOKE, POWER	8076104700
P4	CONNECTOR, RIBBON, 26 PIN FEM	1008340031
P5	CONNECTOR, RIBBON, 26 PIN FEM	1008340031
P6	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
P7	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
P8	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
P9	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
XP4	CONNECTOR,PCB,TRANSITION,26PIN	1011090261
XP5	CONNECTOR,PCB,TRANSITION,26PIN	1011090261
XP6	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
XP7	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
XP8	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
XP9	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
	BEAD, FERRITE .200OD,.437LG	1010910019
	CABLE, FLAT, 20 COND. 28AWG	1008080004
	CABLE, FLAT, 26 COND. 28AWG	1011180006
	CONNECTOR, RF, SUBMINIATURE	0753700000
	JACK, PCB, SOLDER MOUNT	1008920002

Figure 5.9.7 Synthesizer Mother Board 1A2A2A5, page 1/2.



LAST USED REFERENCE DESIGNATORS	
R12	L3
C13	E8
J8	P4
CR11	L3
Q1	

Figure 5.9.7 Synthesizer Mother Board 1A2A2A5, page 2/2.

PC ASSY, FIRST L.O. 1A2A2A1

	PC ASSY, FIRST L.O. 1A2A2A1	8076068096
C1	CAP. 22µF, 15V, T368	0296660001
C2	CAP. .01µF, 50V, X7R 20%	0281730008
C3	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C4	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C5	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C6	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C7	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C8	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C10	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C11	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C12	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C13	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C14	CAP. .01µF, 50V, X7R 20%	0281730008
C15	CAP. .01µF, 50V, X7R 20%	0281730008
C16	CAP. 220PF, 500V, DM10, 2%	1010870009
C17	CAP. 7PF, 500V, DM10	0292400004
C18	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C19	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C20	CAP. 5PF, 500V, DM10	0261190008
C21	CAP. 10PF, 500V, DM10	0259830003
C22	CAP. 110PF, 500V, DM10, 5%	0257750002
C23	CAP. 10PF, 500V, DM10	0259830003
C24	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C25	CAP. 8PF, 500V, DM10	0293310009
C26	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C27	CAP. 18PF, 500V, DM10, 5%	0260300004
C28	CAP. 110PF, 500V, DM10, 5%	0257750002
C29	CAP. 10PF, 500V, DM10	0259830003
C30	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C31	CAP. 18PF, 500V, DM10, 5%	0260300004
C32	CAP. 8PF, 500V, DM10	0293310009
C33	CAP. 12PF, 500V, DM10, 5%	0260280003
C34	CAP. 7PF, 500V, DM10	0292400004
C35	CAP. 220PF, 500V, DM10, 2%	1010870009
C36	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C37	CAP. 5PF, 500V, DM10	0261190008
C38	CAP. 220PF, 500V, DM10, 2%	1010870009
C39	CAP. 7PF, 500V, DM10	0292400004
C40	CAP. 8PF, 500V, DM10	0293310009
C41	CAP. 5PF, 500V, DM10	0261190008
C42	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C43	CAP. 10PF, 500V, DM10	0259830003
C44	CAP. 110PF, 500V, DM10, 5%	0257750002
C45	CAP. 10PF, 500V, DM10	0259830003
C46	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C47	CAP. 18PF, 500V, DM10, 5%	0260300004
C48	CAP. 18PF, 500V, DM10, 5%	0260300004
C49	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C50	CAP. 8PF, 500V, DM10	0293310009
C51	CAP. 110PF, 500V, DM10, 5%	0257750002
C52	CAP. 10PF, 500V, DM10	0259830003
C53	CAP. 12PF, 500V, DM10, 5%	0260280003
C54	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C55	CAP. 5PF, 500V, DM10	0261190008
C56	CAP. 220PF, 500V, DM10, 2%	1010870009
C57	CAP. 7PF, 500V, DM10	0292400004
C58	CAP. .01µF, 50V, X7R 20%	0281730008
C59	CAP. .01µF, 50V, X7R 20%	0281730008
C60	CAP. .01µF, 50V, X7R 20%	0281730008
CR1	DIODE, ZENER 1N5235B	0405200005
CR2	DIODE, VARICAP MV409	1007060018
CR3	DIODE, VARICAP MV409	1007060018
CR4	DIODE, HCT CARRIER 5082-2835	0405280009
CR5	DIODE, PIN 5082-3168	1005260001
CR6	DIODE, HCT CARRIER 5082-2835	0405280009
CR7	DIODE, PIN 5082-3168	1005260001
CR8	DIODE, VARICAP MV409	1007060018
CR9	DIODE, VARICAP MV409	1007060018
CR10	DIODE, VARICAP MV409	1007060018
CR11	DIODE, VARICAP MV409	1007060018
CR12	DIODE, HCT CARRIER 5082-2835	0405280009
CR13	DIODE, PIN 5082-3168	1005260001
CR14	DIODE, PIN 5082-3168	1005260001
CR15	DIODE, HCT CARRIER 5082-2835	0405280009
CR16	DIODE, VARICAP MV409	1007060018
CR17	DIODE, VARICAP MV409	1007060018
CR18	DIODE, SIGNAL, SIL 1N4454	0405270003
L1	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L2	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L3	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L4	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L6	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L7	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L8	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L9	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L10	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L12	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L13	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L14	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L15	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L17	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L18	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L19	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L20	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L21	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L22	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L24	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L25	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L26	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L27	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L28	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L29	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L30	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
P1	HEADER, PIN STRIP, 22 PIN	1011020220
Q1	TRANSISTOR, N-CH. FET U310	1007050039
Q2	TRANSISTOR, PNP, SI 2N4126	0448020009
Q3	TRANSISTOR, N-CH. FET U310	1007050039
Q4	TRANSISTOR, N-CH. FET U310	1007050039
Q5	TRANSISTOR, N-CH. FET U310	1007050039
Q6	TRANSISTOR, N-CH. FET U310	1007050039
Q7	TRANSISTOR, PNP, SI 2N4126	0448020009
Q8	TRANSISTOR, PNP, SI 2N4126	0448020009
Q9	TRANSISTOR, N-CH. FET U310	1007050039
Q10	TRANSISTOR, N-CH. FET U310	1007050039
Q11	TRANSISTOR, N-CH. FET U310	1007050039
Q12	TRANSISTOR, N-CH. FET U310	1007050039
Q13	TRANSISTOR, PNP, SI 2N4126	0448020009
R1	RESISTOR 82, 10%, 1/2W	1010200038
R2	RESISTOR 47, 10%, 1/4W	0179360001
R3	RESISTOR 47, 10%, 1/4W	0179360001
R4	RESISTOR 47, 10%, 1/4W	0179360001
R5	RESISTOR 5.6K, 10%, 1/4W	0183060008
R6	RESISTOR 390, 10%, 1/4W	0178330001
R7	RESISTOR 47, 10%, 1/4W	0179360001
R8	RESISTOR 120, 10%, 1/4W	0186550006
R10	RESISTOR 390, 10%, 1/4W	0178330001
R11	RESISTOR 2.7K, 10%, 1/4W	0186670001
R12	RESISTOR 120, 10%, 1/4W	0186550006
R13	RESISTOR 27K, 10%, 1/4W	0171200004
R14	RESISTOR 100, 5%, 1/4W	0171180003
R15	RESISTOR 100, 5%, 1/4W	0171180003
R16	RESISTOR 10, 5%, 1/4W	0177160004
R17	RESISTOR 47, 10%, 1/4W	0179360001
R18	RESISTOR 1.8K, 10%, 1/4W	0178190004
R19	RESISTOR 6.8K, 5%, 1/4W	0174810008
R20	RESISTOR 10K, 10%, 1/4W	0170410005
R21	RESISTOR 47, 10%, 1/4W	0179360001
R22	RESISTOR 47K, 10%, 1/4W	0171060008
R23	RESISTOR 4.7K, 5%, 1/4W	0170770001
R24	RESISTOR 10K, 10%, 1/4W	0170410005
R25	RESISTOR 10K, 10%, 1/4W	0170410005
R26	RESISTOR 10K, 10%, 1/4W	0170410005
R27	RESISTOR 47, 10%, 1/4W	0179360001
R28	RESISTOR 47, 10%, 1/4W	0179360001
R29	RESISTOR 47K, 10%, 1/4W	0171060008
R30	RESISTOR 120, 10%, 1/4W	0186550006
R31	RESISTOR 1.8K, 10%, 1/4W	0178190004
R32	RESISTOR 120, 10%, 1/4W	0186550006
R33	RESISTOR 47, 10%, 1/4W	0179360001
R34	RESISTOR 47, 10%, 1/4W	0179360001
R35	RESISTOR 10K, 10%, 1/4W	0170410005
R36	RESISTOR 1.8K, 10%, 1/4W	0178190004
R37	RESISTOR 47K, 10%, 1/4W	0171060008
R38	RESISTOR 10K, 10%, 1/4W	0170410005
R39	RESISTOR 10K, 10%, 1/4W	0170410005
R40	RESISTOR 47K, 10%, 1/4W	0171060008
R41	RESISTOR 1.8K, 10%, 1/4W	0178190004
R42	RESISTOR 10K, 10%, 1/4W	0170410005
R43	RESISTOR 47, 10%, 1/4W	0179360001
R44	RESISTOR 47, 10%, 1/4W	0179360001
R45	RESISTOR 820, 10%, 1/4W	0178210005
R46	RESISTOR 120, 10%, 1/4W	0186550006
R47	RESISTOR 390, 10%, 1/4W	0178330001
T1	TRANSFORMER,POWER SPLITTER,1LO	8076068801
U1	IC. DIGITAL MC145146P	1007070005
U2	IC. DIGITAL MC1697	1010370022
U3	IC, DIGITAL SP8716	1010890000
U4	IC. DIGITAL 7404	1003950001
U5	IC. LINEAR CA3096	1005860033

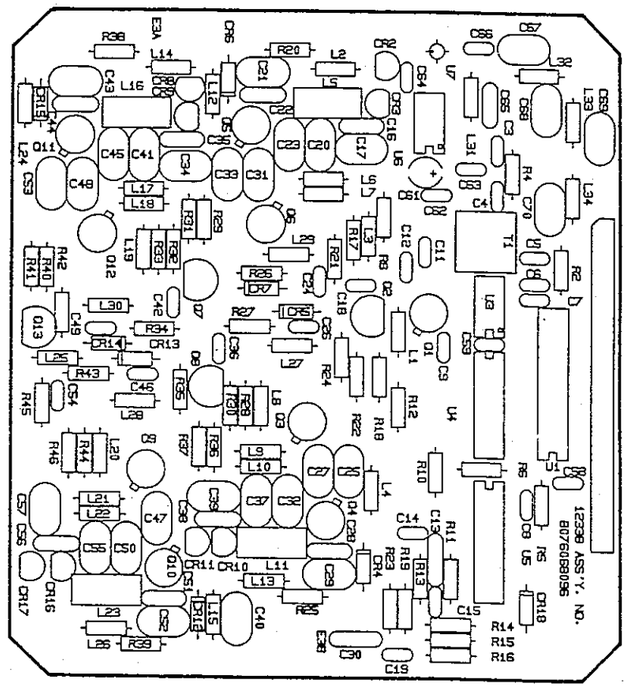


Figure 5.9.8 PC Assembly, First L.O. 1A2A2A1, page 1/2.

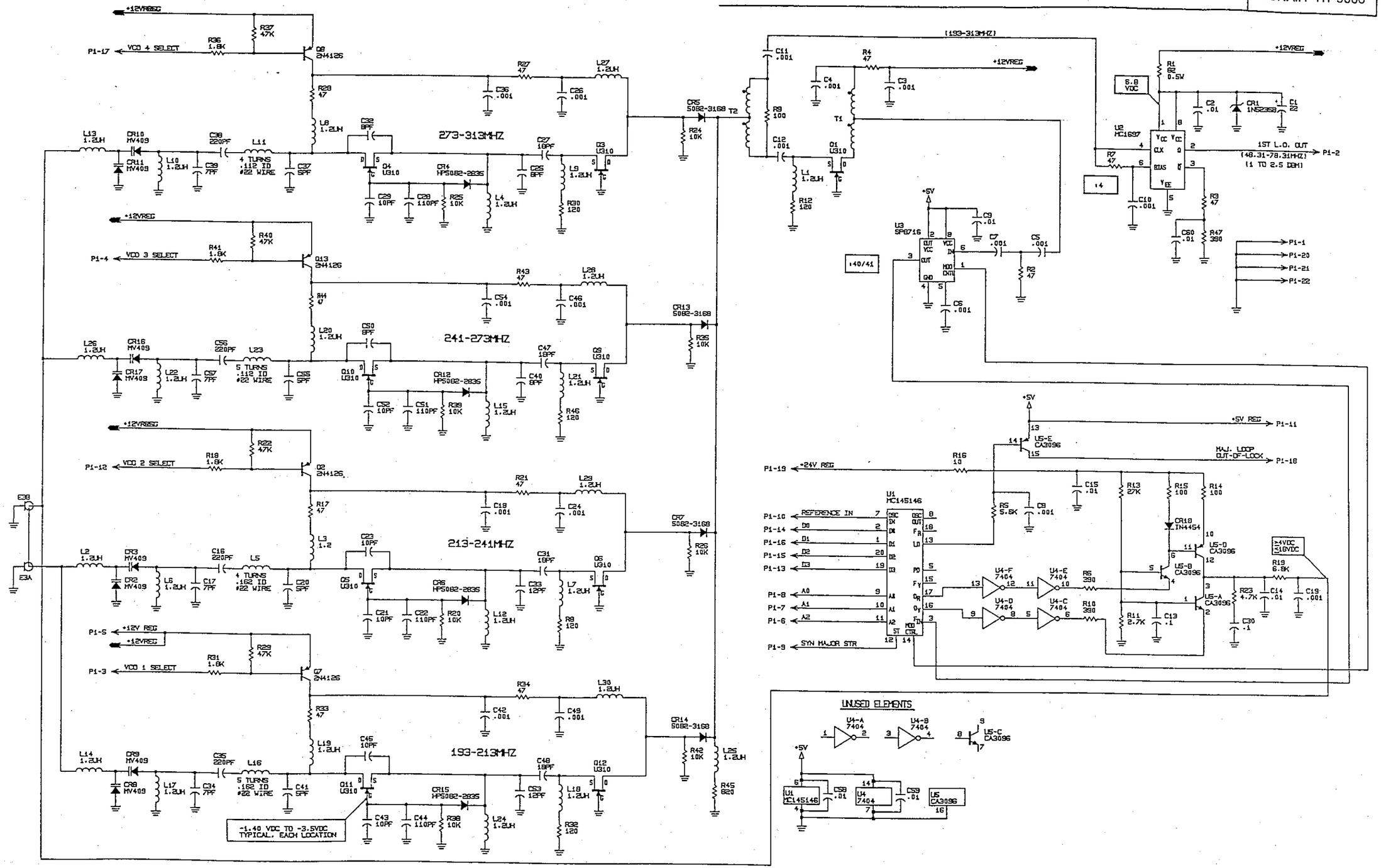


Figure 5.9.8 PC Assembly, First L.O. 1A2A2A1, page 2/2.

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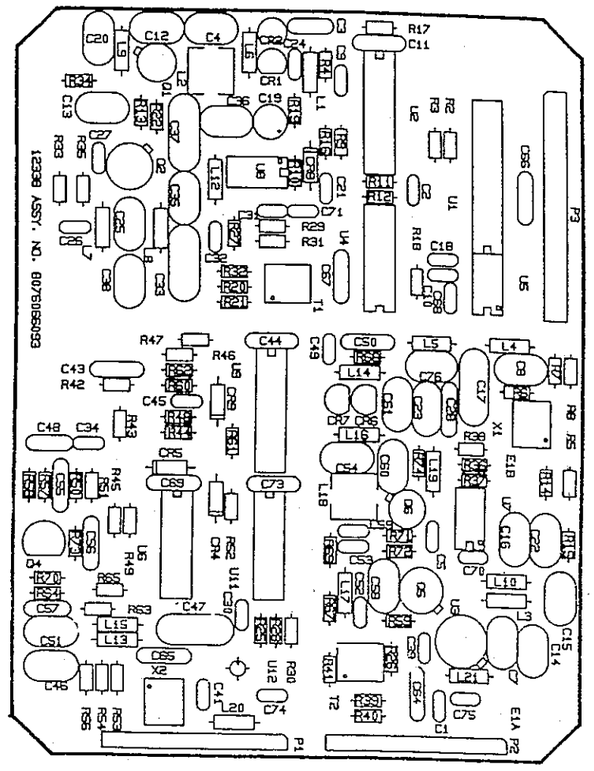
PC ASSY, SECOND L.O. 1A2A2A2

	PC ASSY, SECOND L.O. 1A2A2A2	8076066093
C1	CAP. .01µF, 50V, X7R 20%	0281730008
C2	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C3	CAP. .47µF, 50V, X7R 20%	0283377771
C4	CAP. 33PF, 500V, DM10, 5%	0260780006
C5	CAP. .01µF, 50V, X7R 20%	0281730008
C7	CAP. 150PF, 500V, DM10, 5%	0293430004
C8	CAP. 200PF, 500V, DM10, 5%	0293050007
C9	CAP. 0.047 µF, 50V, X7R, 10%	1010740008
C10	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C11	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C12	CAP. 5PF, 500V, DM10	0261190008
C13	CAP. 20PF, 500V, DM10, 5%	0260420000
C14	CAP. 36PF, 500V, DM10, 5%	0293550000
C15	CAP. 2PF, 500V, DM10	0259710008
C16	CAP. 150PF, 500V, DM10, 5%	0293430004
C17	CAP. 620PF, 300V, DM15, 2%	0282280006
C18	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C19	CAP. 22µF, 15V, T368	0296660001
C20	CAP. 10PF, 500V, DM10	0259830003
C21	CAP. .01µF, 50V, X7R 20%	0281730008
C22	CAP. 36PF, 500V, DM10, 5%	0293550000
C23	CAP. 200PF, 500V, DM10, 5%	0293050007
C24	CAP. .01µF, 50V, X7R 20%	0281730008
C25	CAP. 5PF, 500V, DM10	0261190008
C26	CAP. .01µF, 50V, X7R 20%	0281730008
C27	CAP. .01µF, 50V, X7R 20%	0281730008
C28	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C30	CAP. .01µF, 50V, X7R 20%	0281730008
C31	CAP. .01µF, 50V, X7R 20%	0281730008
C32	CAP. .01µF, 50V, X7R 20%	0281730008
C33	CAP. 430PF, 500V, DM15, 2%	0282370005
C34	CAP. .01µF, .50V, X7R 20%	0281730008
C35	CAP. 50PF, 500V, DM10, 2%	0260040002
C36	CAP. 120PF, 500V, DM10, 2%	0292880006
C37	CAP. 430PF, 500V, DM15, 2%	0282370005
C38	CAP. 120PF, 500V, DM10, 2%	0292880006
C39	CAP. .01µF, 50V, X7R 20%	0281730008
C41	CAP. .01µF, 50V, X7R 20%	0281730008
C43	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C44	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C45	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C46	CAP. 200PF, 500V, DM10, 5%	0293050007
C47	CAP. 620PF, 300V, DM15, 2%	0282280006
C48	CAP. .47µF, 50V, X7R 20%	0283377771
C49	CAP. .01µF, 50V, X7R 20%	0281730008
C50	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C51	CAP. 200PF, 500V, DM10, 5%	0293050007
C52	CAP. .01µF, 50V, X7R 20%	0281730008
C53	CAP. .01µF, 50V, X7R 20%	0281730008
C54	CAP. 27PF, 500V, DM10, 5%	0260660001
C55	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C56	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C57	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C58	CAP. 24PF, 500V, DM10, 5%	0290060001
C59	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C60	CAP. 68PF, 500V, DM10, 5%	0261070002
C61	CAP. 68PF, 500V, DM10, 5%	0261070002
C64	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C65	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C66	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C67	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C68	CAP. .01µF, 50V, X7R 20%	0281730008
C69	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C70	CAP. .01µF, 50V, X7R 20%	0281730008
C71	CAP. .01µF, 50V, X7R 20%	0281730008
C73	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C74	CAP. .01µF, 50V, X7R 20%	0281730008
C75	CAP. .01µF, 50V, X7R 20%	0281730008
C76	CAP. 100PF, 500V, DM10, 5%	0274747774
CR1	DIODE, VARICAP MV2110	0405290004
CR2	DIODE, VARICAP MV2110	0405290004
CR4	DIODE, SIGNAL, SIL 1N4454	0405270003
CR5	DIODE, SIGNAL, SIL 1N4454	0405270003
CR6	DIODE, VARICAP MV2110	0405290004
CR7	DIODE, VARICAP MV2110	0405290004
CR8	DIODE, SIGNAL, SIL 1N4454	0405270003
CR9	DIODE, SIGNAL, SIL 1N4454	0405270003
L1	INDUCTOR, MOLDED, 4.7µH, 10%	0564250007
L2	INDUCTOR, VAR. .062-.078 µH	1007070030
L3	INDUCTOR, MOLDED, .33µH, 10%	0664200001
L4	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L5	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L6	INDUCTOR, MOLDED, 4.7µH, 10%	0564250007
L7	INDUCTOR, MOLDED 0.15 µH	1009470001
L8	INDUCTOR, MOLDED, 22µH, 5%	0650000005
L9	INDUCTOR, MOLDED, 4.7µH, 10%	0564250007
L10	INDUCTOR, MOLDED, .33µH, 10%	0664200001
L12	INDUCTOR, MOLDED, 22µH, 5%	0650000005
L13	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L14	INDUCTOR, MOLDED, 10µH, 5%	0659570009
L15	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L16	INDUCTOR, MOLDED, 10µH, 5%	0659570009
L17	INDUCTOR, MOLDED, 0.22µH, 5%	0650620003
L18	INDUCTOR, VAR. .082-.114 µH	1007080027
L19	INDUCTOR, MOLDED, 4.7µH, 10%	0564250007
L20	INDUCTOR, MOLDED, 3.9µH, 5%	0650480007
L21	INDUCTOR, MOLDED, 10µH, 5%	0659570009
P1	HEADER, PIN STRIP, 12 PIN	1011020122
P2	HEADER, PIN STRIP, 12 PIN	1011020122
P3	HEADER, PIN STRIP, 15 PIN	1011020157
Q1	TRANSISTOR, N-CH. FET U310	1007050039
Q2	TRANSISTOR, NPN, SI 2N5179	0445130008
Q4	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q5	TRANSISTOR, NPN, SI 2N5179	0445130008
Q6	TRANSISTOR, N-CH. FET U310	1007050039
R2	RESISTOR 5.6K, 5%, 1/8W	1010805622
R3	RESISTOR 10K, 5%, 1/8W	1010801031
R4	RESISTOR 2.7K, 5%, 1/8W	1010802721
R5	RESISTOR 270, 5%, 1/8W	1010802712
R6	RESISTOR 270, 5%, 1/8W	1010802712
R7	RESISTOR 18, 5%, 1/8W	1010801805
R8	RESISTOR 270, 5%, 1/8W	1010802712
R9	RESISTOR 220, 5%, 1/8W	1010802216
R10	RESISTOR 100, 5%, 1/8W	1010801015
R11	RESISTOR 100, 5%, 1/8W	1010801015
R12	RESISTOR 220, 5%, 1/8W	1010802216
R13	RESISTOR 1K, 5%, 1/8W	1010801023
R14	RESISTOR 18, 5%, 1/8W	1010801805
R15	RESISTOR 270, 5%, 1/8W	1010802712
R16	RESISTOR 10K, 5%, 1/8W	1010801031
R17	RESISTOR 3.3K, 5%, 1/8W	1010803328
R18	RESISTOR 100, 5%, 1/8W	1010801015
R19	RESISTOR 10, 5%, 1/8W	1010801007
R20	RESISTOR 18, 5%, 1/8W	1010801805
R21	RESISTOR 270, 5%, 1/8W	1010802712
R22	RESISTOR 100, 5%, 1/8W	1010801015
R25	RESISTOR 270, 5%, 1/8W	1010802712
R26	RESISTOR 100, 5%, 1/8W	1010801015
R27	RESISTOR 100K, 5%, 1/8W	1010801040
R28	RESISTOR 18, 5%, 1/8W	1010801805
R29	RESISTOR 100, 5%, 1/8W	1010801015
R30	RESISTOR 270, 5%, 1/8W	1010802712
R31	RESISTOR 180, 5%, 1/8W	1010801813
R32	RESISTOR 270, 5%, 1/8W	1010802712
R33	RESISTOR 6.8K, 5%, 1/8W	1010806823
R34	RESISTOR 470, 5%, 1/8W	1010804715
R35	RESISTOR 4.7K, 5%, 1/8W	1010804723
R36	RESISTOR 3.3K, 5%, 1/8W	1010803328
R37	RESISTOR 3.3K, 5%, 1/8W	1010803328
R38	RESISTOR 100, 5%, 1/8W	1010801015
R39	RESISTOR 18, 5%, 1/8W	1010801805
R40	RESISTOR 270, 5%, 1/8W	1010802712
R41	RESISTOR 270, 5%, 1/8W	1010802712
R42	RESISTOR 10, 5%, 1/8W	1010801007
R43	RESISTOR 470, 5%, 1/8W	1010804715
R44	RESISTOR 3.3K, 5%, 1/8W	1010803328
R45	RESISTOR 2.7K, 5%, 1/8W	1010802721
R46	RESISTOR 10K, 5%, 1/8W	1010801031
R47	RESISTOR 3.3K, 5%, 1/8W	1010803328
R48	RESISTOR 5.6K, 5%, 1/8W	1010805622
R49	RESISTOR 2.7K, 5%, 1/8W	1010802721
R50	RESISTOR 470, 5%, 1/8W	1010804715
R51	RESISTOR 2.7K, 5%, 1/8W	1010802721
R52	RESISTOR 390, 5%, 1/8W	1010803913
R53	RESISTOR 270, 5%, 1/8W	1010802712
R54	RESISTOR 18, 5%, 1/8W	1010801805
R56	RESISTOR 270, 5%, 1/8W	1010802712
R57	RESISTOR 390, 5%, 1/8W	1010803913
R58	RESISTOR 10, 5%, 1/8W	1010801007
R59	RESISTOR 10, 5%, 1/8W	1010801007
R60	RESISTOR 220, 5%, 1/8W	1010802216
R61	RESISTOR 390, 5%, 1/8W	1010803913
R62	RESISTOR 220, 5%, 1/8W	1010802216
R63	RESISTOR 6.8K, 5%, 1/8W	1010806823
R64	RESISTOR 6.8K, 5%, 1/8W	1010806823
R65	RESISTOR 10, 5%, 1/8W	1010801007
R67	RESISTOR 4.7K, 5%, 1/8W	1010804723
R68	RESISTOR 150, 5%, 1/8W	1010801511
R69	RESISTOR 6.8K, 5%, 1/8W	1010806823
R70	RESISTOR 18K, 5%, 1/8W	1010801830
R71	RESISTOR 470, 5%, 1/8W	1010804715
R72	RESISTOR 100, 5%, 1/8W	1010801015
R73	RESISTOR 1.2K, 5%, 1/8W	1010801228
R74	RESISTOR 270, 5%, 1/8W	1010802712
T1	TRANSFORMER, RF, 4:1	1010860003
T2	TRANSFORMER, RF, 4:1	1010860003
U1	IC. DIGITAL MC145146P	1007070005
U2	IC. LINEAR CA3096	1005860033
U3	IC. LINEAR MWA130	1010380036



U4	IC. DIGITAL 74HC04	1010280023
U5	IC.DIGITAL SP8793	1007090031
U6	IC. DIGITAL 74LS00	1005500029
U7	IC. DIGITAL SP8660	1010790013
U8	IC. DIGITAL SP8629	1007090022
U9	IC. LINEAR CA3096	1005860033
U11	IC. DIGITAL 74LS74A	1003323600
U12	IC LINEAR MAR-4	1010900005
X1	MIXER, +7DBM ASK-1	1010580001
X2	MIXER, +7DBM ASK-1	1010580001

Figure 5.9.9 PC Assembly, Second L.O. 1A2A2A2, page 1/3.

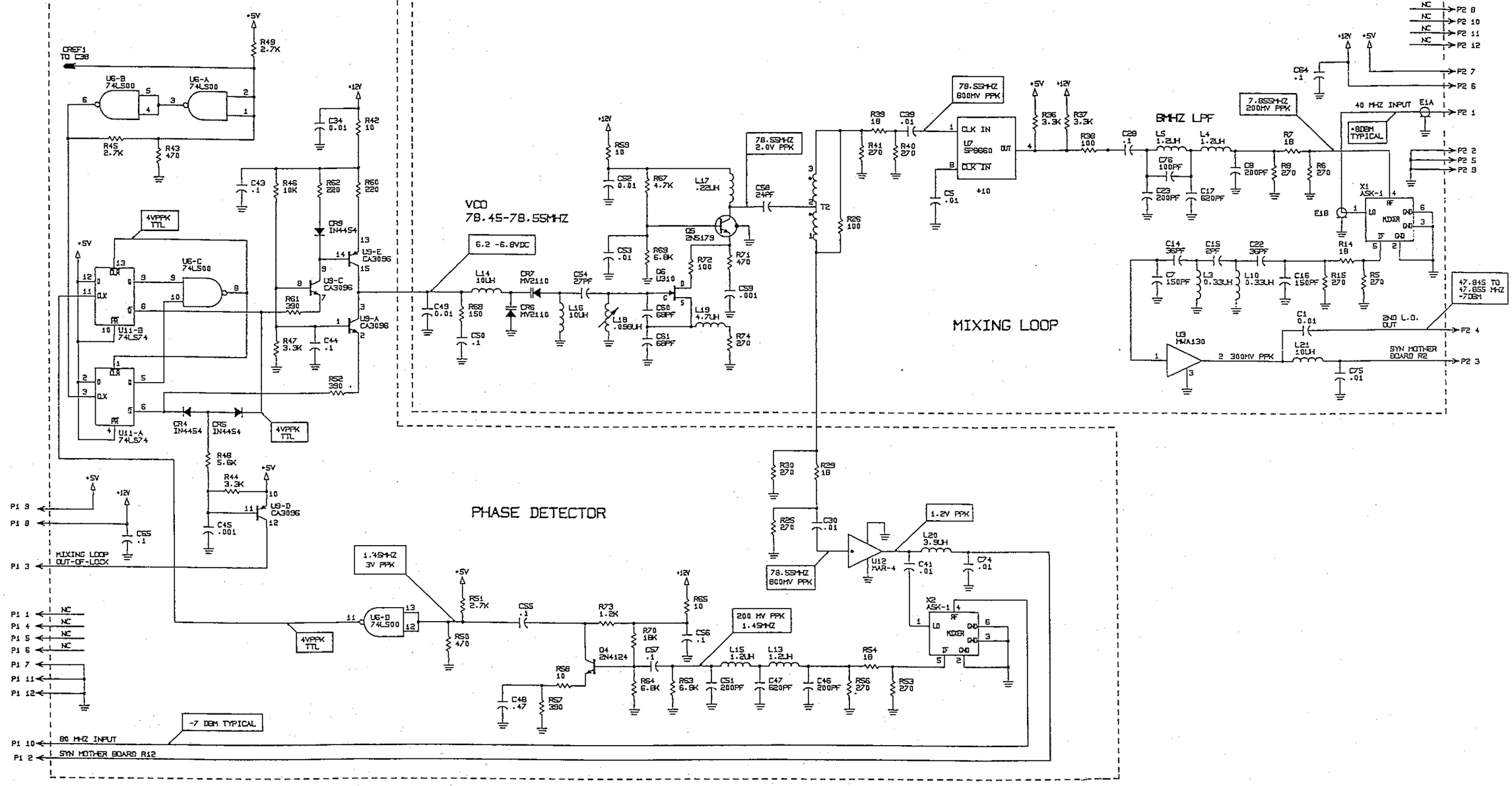
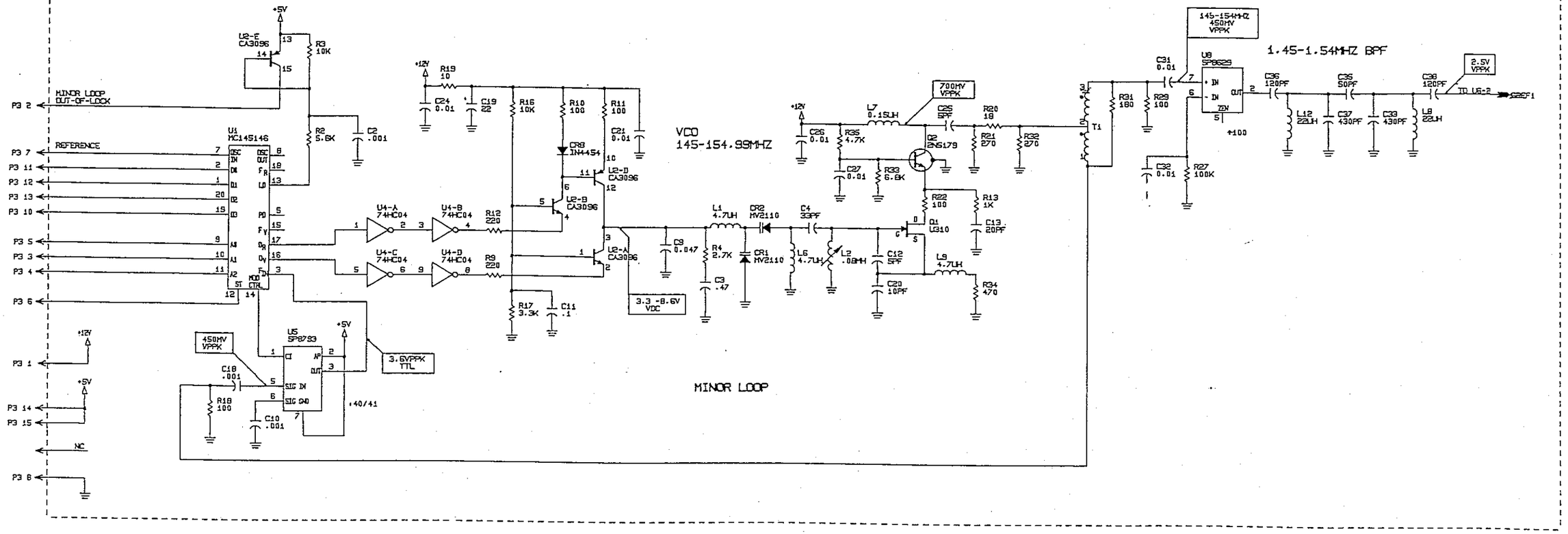
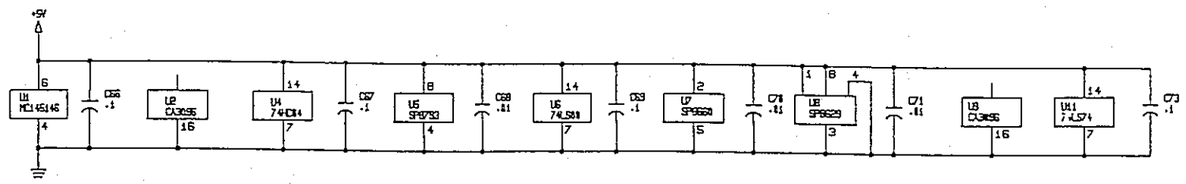
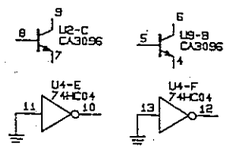


Figure 5.9.9 PC Assembly, Second L.O. 1A2A2A2, page 2/3.





UNUSED ELEMENTS



LAST USED
C76
CR9
L21
Q5
R74
T2
U12
X-2

NOT USED
C5,40,42,62,63,72
CR3
L11
Q3
R23,24,40,55,66
U10

Figure 5.9.9 PC Assembly, Second L.O. 1A2A2A2, page 3/3.

PC ASSY, BFO 1A2A2A3

	PC ASSY, BFO 1A2A2A3	8076062098
C1	CAP. .01µF, 50V, X7R 20%	0281730008
C2	CAP. .01µF, 50V, X7R 20%	0281730008
C3	CAP. 22µF, 15V, T368	0296660001
C4	CAP. 15PF, 500V, DM10, 5%	0259950009
C5	CAP. 12PF, 500V, DM10, 5%	0260280003
C6	CAP. .01µF, 50V, X7R 20%	0281730008
C7	CAP. 27PF, 500V, DM10, 5%	0260660001
C8	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C10	CAP. 20PF, 500V, DM10, 5%	0260420000
C11	CAP. .01µF, 50V, X7R 20%	0281730008
C12	CAP. 22µF, 15V, T368	0296660001
C13	CAP. 27PF, 1000V, N750	0250620006
C14	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C15	CAP. .01µF, 50V, X7R 20%	0281730008
C16	CAP. .01µF, 50V, X7R 20%	0281730008
C17	CAP. 27PF, 500V, DM10, 5%	0260660001
C18	CAP. 22µF, 15V, T368	0296660001
C19	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C20	CAP. .01µF, 50V, X7R 20%	0281730008
C21	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C22	CAP. .01µF, 50V, X7R 20%	0281730008
C23	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C24	CAP. 0.0056µF, 100V, NPO, 5%	1010770004
C25	CAP. 110PF, 500V, DM10, 5%	0257750002
C26	CAP. 0.0027µF, 200V, NPO, 5%	1010760009
C27	CAP. .01µF, 50V, X7R 20%	0281730008
C28	CAP. .01µF, 50V, X7R 20%	0281730008
C29	CAP. 15PF, 500V, DM10, 5%	0259950009
C30	CAP. .01µF, 50V, X7R 20%	0281730008
C31	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C32	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C35	CAP. 22PF, 500V, DM10, 5%	0260540005
CR1	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR2	DIODE, VARICAP MV2110	0405290004
CR3	DIODE, SIGNAL, SIL. 1N4454	0405270003
L1	INDUCTOR, MOLDED, 1.0µH, 5%	0649150007
L2	INDUCTOR, MOLDED, 120µH, 10%	0659330008
L3	INDUCTOR, VAR. .502-.620µH	1007080001
L4	INDUCTOR, MOLDED, 10µH, 5%	0659570009
L5	INDUCTOR, MOLDED, 68µH, 5%	0651650003
L6	INDUCTOR, MOLDED, 150µH, 5%	0659190001
L7	INDUCTOR, MOLDED, 82µH, 5%	0659450003
L8	INDUCTOR, MOLDED, 82µH, 5%	0659450003
L9	INDUCTOR, MOLDED, 10µH, 5%	0659570009
L10	INDUCTOR, MOLDED, 1.0µH, 5%	0649150007
P1	HEADER, PIN STRIP, 25 PIN	1011020254
Q1	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q2	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q3	TRANSISTOR, N-CH. FET U310	1007050039
Q4	TRANSISTOR, N-CH, FET MFE209	1007090014
R1	RESISTOR 10K, 5%, 1/8W	1010801031
R2	RESISTOR 5.6K, 5%, 1/8W	1010805622
R3	RESISTOR 1.2K, 5%, 1/8W	1010801228
R4	RESISTOR 1.2K, 5%, 1/8W	1010801228
R5	RESISTOR 4.7K, 5%, 1/8W	1010804723
R6	RESISTOR 3.3K, 5%, 1/8W	1010803328
R7	RESISTOR 100, 5%, 1/8W	1010801015
R8	RESISTOR 10K, 5%, 1/8W	1010801031
R9	RESISTOR 100K, 5%, 1/8W	1010801040
R10	RESISTOR 100, 5%, 1/8W	1010801015
R11	RESISTOR 470, 5%, 1/8W	1010804715
R12	RESISTOR 470, 5%, 1/8W	1010804715
R13	RESISTOR 18K, 5%, 1/8W	1010801830
R14	RESISTOR 2.2K, 5%, 1/8W	1010802224
R15	RESISTOR 10, 5%, 1/8W	1010801007
R16	RESISTOR 2.2K, 5%, 1/8W	1010802224
R17	RESISTOR 4.7K, 5%, 1/8W	1010804723
R18	RESISTOR 10K, 5%, 1/8W	1010801031
R19	RESISTOR 12K, 5%, 1/8W	1010801236
R20	RESISTOR 10K, 5%, 1/8W	1010801031
R21	RESISTOR 120, 5%, 1/8W	1010801210
R22	RESISTOR 10K, 5%, 1/8W	1010801031
R23	RESISTOR 100K, 5%, 1/8W	1010801040
R24	RESISTOR 12K, 5%, 1/8W	1010801236
R25	RESISTOR 10K, 5%, 1/8W	1010801031
R26	RESISTOR 4.7K, 5%, 1/8W	1010804723
R27	RESISTOR 33, 5%, 1/8W	1010803301
R28	RESISTOR 560, 5%, 1/8W	1010805614
R29	RESISTOR 180, 5%, 1/8W	1010801813
R30	RESISTOR 560, 5%, 1/8W	1010805614
R31	RESISTOR 560, 5%, 1/8W	1010805614
R32	RESISTOR 33, 5%, 1/8W	1010803301
R33	RESISTOR 560, 5%, 1/8W	1010805614
R34	RESISTOR 100, 5%, 1/8W	1010801015
T1	TRANSFORMER, RF, 4:1	1010860003
U1	I.C. DIGITAL MC145145	1007100001
U2	IC. LINEAR. CA3096	1005860033
U3	IC. DIGITAL SP8792A	1007100028

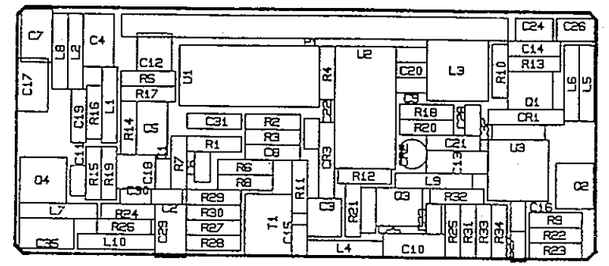
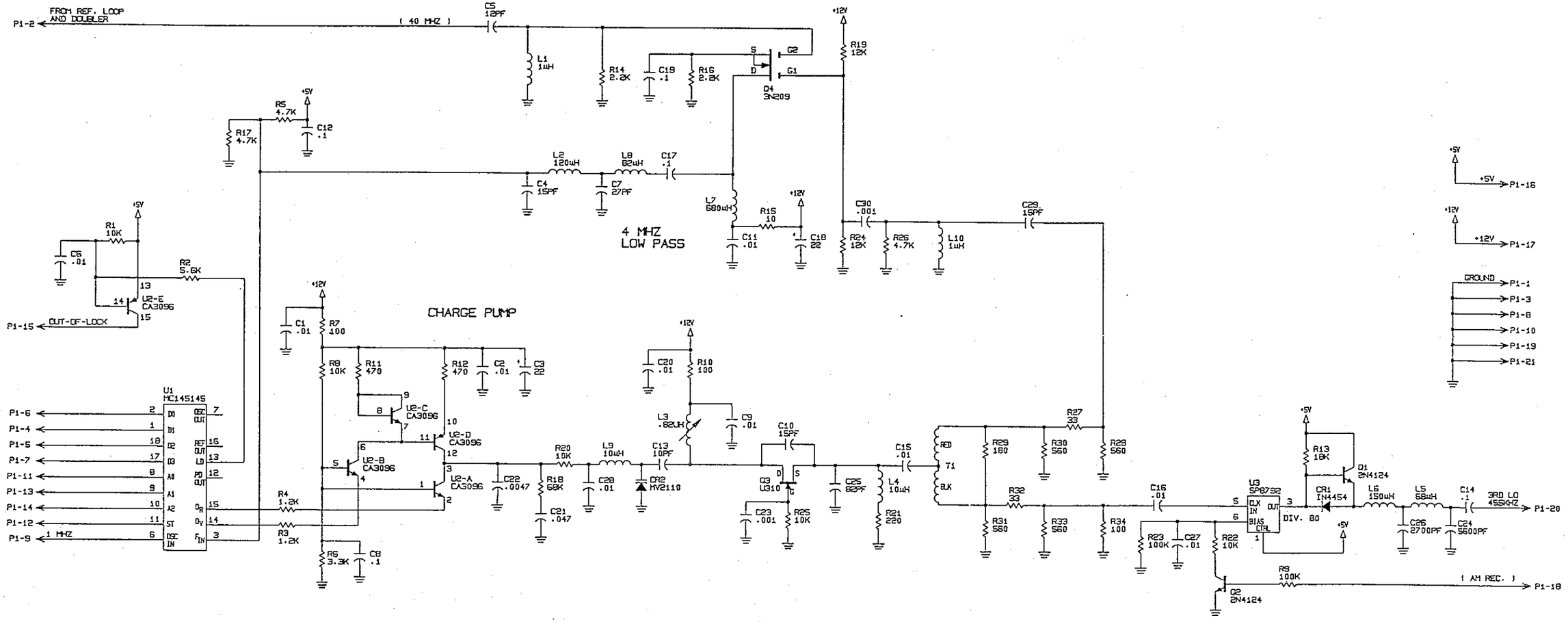


Figure 5.9.10 PC Assembly, BFO 1A2A2A3, page 1/2.



NOTE: ALL RESISTORS 1/8W UNLESS OTHERWISE SPECIFIED

Figure 5.9.10 PC Assembly, BFO 1A2A2A3, page 2/2.

PC ASSY, REF LOOP AND DOUBLER 1A2A2A4

	PC ASSY, REF LOOP AND DBLR 1A2A2A4	8076064091
C1	CAP. 10PF, 1000V, N750	0250480000
C2	CAP. 33PF, 500V, DM10, 5%	0260780006
C3	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C4	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C5	CAP. 200PF, 500V, DM10, 5%	0293050007
C6	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C7	CAP. 68PF, 500V, DM10, 5%	0261070002
C8	CAP. .01µF, 50V, X7R 20%	0281730008
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C10	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. .01µF, 50V, X7R 20%	0281730008
C12	CAP. 15µF, 35V	0282240004
C13	CAP. .01µF, 50V, X7R 20%	0281730008
C14	CAP. .47µF, 50V, X7R 20%	0283377771
C15	CAP. 180PF, 500V, DM10, 5%	0294100008
C16	CAP. 50PF, 500V, DM10, 2%	0260040002
C17	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C18	CAP. .01µF, 50V, X7R 20%	0281730008
C20	CAP. .01µF, 50V, X7R 20%	0281730008
C21	CAP. .01µF, 50V, X7R 20%	0281730008
C22	CAP. 3PF, 300V, CD6	0288560001
C23	CAP. .01µF, 50V, X7R 20%	0281730008
C24	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C25	CAP. .01µF, 50V, X7R 20%	0281730008
C26	CAP. 18PF, 500V, DM10, 5%	0260300004
C27	CAP. 3.3µF, 35V, 196D	0281680001
C28	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C29	CAP. .01µF, 50V, X7R 20%	0281730008
C30	CAP. .01µF, 50V, X7R 20%	0281730008
C31	CAP. 56PF, 500V, DM10, 5%	0293170002
C32	CAP. 18PF, 500V, DM10, 5%	0260300004
C33	CAP. 56PF, 500V, DM10, 5%	0293170002
C34	CAP. .01µF, 50V, X7R 20%	0281730008
C35	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C36	CAP. 0.1µF, 50V, X7R, 20%	0281610002
CR1	DIODE, ZENER 1N5245B	0405210001
CR2	DIODE, VARICAP MV409	1007060018
CR3	DIODE, VARICAP MV409	1007060018
CR4	DIODE, SIGNAL, SIL 1N4454	0405270003
CR5	DIODE, SIGNAL, SIL 1N4454	0405270003
CR6	DIODE, HOT CARRIER 5082-2835	0405280009
CR7	DIODE, HOT CARRIER 5082-2835	0405280009
CR8	DIODE, SIGNAL, SIL 1N4454	0405270003
L1	INDUCTOR, VAR, 3.30µH	0647930005
L2	INDUCTOR, MOLDED, 15µH, 5%	0659070006
L3	INDUCTOR, MOLDED, 15µH, 5%	0659070006
L4	INDUCTOR, MOLDED, 0.39µH, 5%	0649770005
L5	INDUCTOR, MOLDED, 12µH, 5%	0652700004
L6	INDUCTOR, MOLDED, 1.0µH, 5%	0649150007
L7	INDUCTOR, MOLDED, 3.9µH, 5%	0650480007
L8	INDUCTOR, MOLDED, 0.22µH, 5%	0650620003
L9	INDUCTOR, MOLDED, 0.22µH, 5%	0650620003
L10	INDUCTOR, MOLDED, 68µH, 5%	0651650003
L11	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
P1	HEADER, PIN STRIP, 25 PIN	1011020254
P2	HEADER, PIN STRIP, 3 PIN	1011020033
P3	HEADER, PIN STRIP, 3 PIN	1011020033
P4	HEADER, PIN STRIP, 3 PIN	1011020033
Q1	TRANSISTOR, NPN, SI 2N5179	0445130008
Q2	TRANSISTOR, NPN, SI 2N5179	0445130008
R1	RESISTOR 270, 5%, 1/8W	1010802712
R2	RESISTOR 560, 5%, 1/8W	1010805614
R3	RESISTOR 5.6K, 5%, 1/8W	1010805622
R4	RESISTOR 1.8K, 5%, 1/8W	1010801821
R5	RESISTOR 560, 5%, 1/8W	1010805614
R6	RESISTOR 10K, 5%, 1/8W	1010801031
R7	RESISTOR 10, 5%, 1/8W	1010801007
R8	RESISTOR 820, 5%, 1/8W	1010808214
R10	RESISTOR 27K, 5%, 1/8W	1010802739
R11	RESISTOR 2.7K, 5%, 1/8W	1010802721
R12	RESISTOR 5.6K, 5%, 1/8W	1010805622
R13	RESISTOR 330, 5%, 1/8W	1010803310
R14	RESISTOR 47, 5%, 1/8W	1010804707
R15	RESISTOR 5.6K, 5%, 1/8W	1010805622
R16	RESISTOR 3.3K, 5%, 1/8W	1010803328
R17	RESISTOR 1.8K, 5%, 1/8W	1010801821
R18	RESISTOR 1.8K, 5%, 1/8W	1010801821
R19	RESISTOR 560, 5%, 1/8W	1010805614
R20	RESISTOR 33, 5%, 1/8W	1010803301
R21	RESISTOR 560, 5%, 1/8W	1010805614
R22	RESISTOR 150, 5%, 1/8W	1010801511
R23	RESISTOR 560, 5%, 1/8W	1010805614
R24	RESISTOR 560, 5%, 1/8W	1010805614
R25	RESISTOR 33, 5%, 1/8W	1010803301
R26	RESISTOR 33, 5%, 1/8W	1010803301
R27	RESISTOR 560, 5%, 1/8W	1010805614
R28	RESISTOR 270, 5%, 1/8W	1010802712
R29	RESISTOR 18, 5%, 1/8W	1010801805
R30	RESISTOR 270, 5%, 1/8W	1010802712
R31	RESISTOR 10, 5%, 1/8W	1010801007
R32	RESISTOR 5.6K, 5%, 1/8W	1010805622
R33	RESISTOR 270, 5%, 1/8W	1010802712
R34	RESISTOR 18, 5%, 1/8W	1010801805
R35	RESISTOR 560, 5%, 1/8W	1010805614
R36	RESISTOR 150, 5%, 1/8W	1010801511
R37	RESISTOR 68, 5%, 1/8W	1010806807
R38	RESISTOR 270, 5%, 1/8W	1010802712
R39	RESISTOR 270, 5%, 1/8W	1010802712
R40	RESISTOR 68, 5%, 1/8W	1010806807
R41	RESISTOR 10K, 5%, 1/8W	1010801031
R42	RESISTOR 10K, 5%, 1/8W	1010801031
R43	RESISTOR 10K, 5%, 1/8W	1010801031
T1	TRANSFORMER, RF, 4:1	1010860003
T2	TRANSFORMER, RF, 4:1	1010860003
T3	TRANSFORMER, RF, 4:1	1010860003
U1	IC. DIGITAL 74LS192	1010770012
U2	IC. LINEAR CA3096	1005860033
U3	IC. DIGITAL 74LS00	1005500029
U4	IC. DIGITAL 74LS74A	1003323600
U5	IC.DIGITAL SP8793	1007090031
U6	IC. LINEAR MWA130	1010380036
U7	IC LINEAR MAR-4	1010900005
Y1	CRYSTAL, 40 MHZ HC-18/U	1007100036
	MOUNTING PAD, TRANSISTOR	0502710004

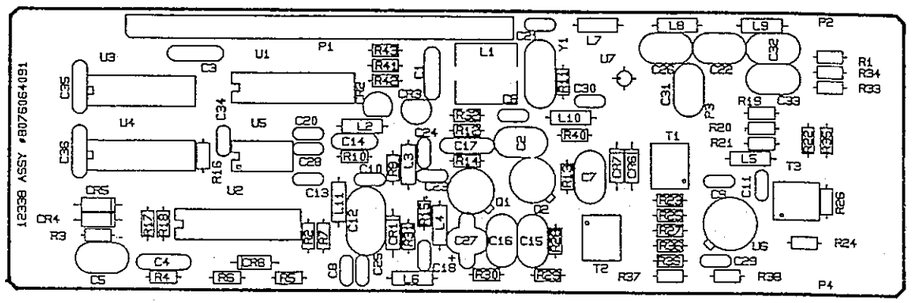


Figure 5.9.11 PC Assembly, Reference Loop and Doubler 1A2A2A4, page 1/2.

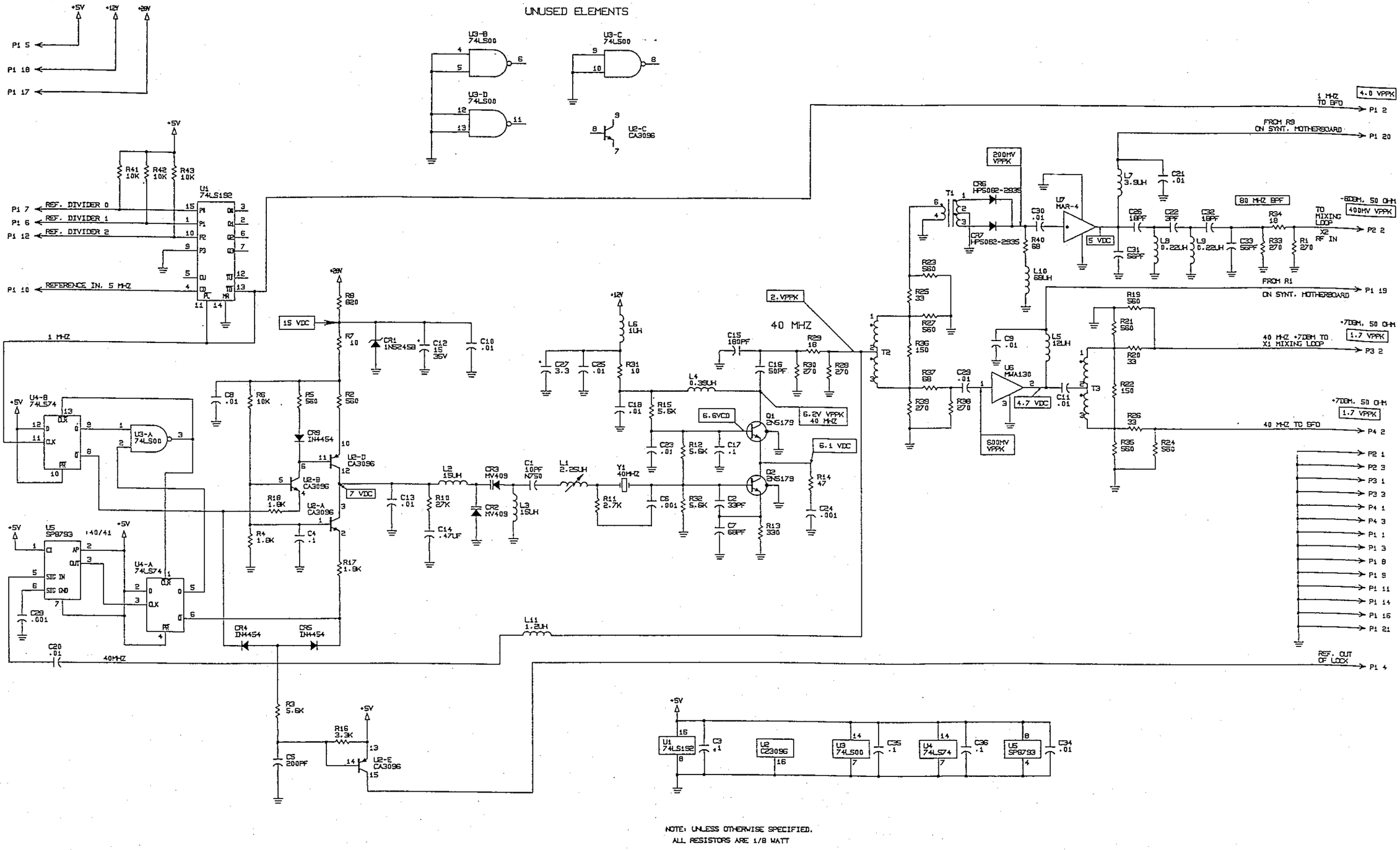


Figure 5.9.11 PC Assembly, Reference Loop and Doubler 1A2A2A4, page 2/2.

PC ASSY, AUDIO 1A2A3

	PC ASSY, AUDIO 1A2A3	8076090091
C1	CAP. 6.8µF, 20V, T368	0296780006
C2	CAP. .01µF, 50V, X7R 20%	0281730008
C3	CAP. .01µF, 50V, X7R 20%	0281730008
C4	CAP. .01µF, 50V, X7R 20%	0281730008
C5	CAP. .01µF, 50V, X7R 20%	0281730008
C6	CAP. 1µF, 35V, 196D	0281660000
C7	CAP. 1µF, 35V, 196D	0281660000
C8	CAP. 1µF, 35V, 196D	0281660000
C9	CAP. 1µF, 35V, 196D	0281660000
C10	CAP. 1µF, 35V, 196D	0281660000
C11	CAP. 1µF, 35V, 196D	0281660000
C12	CAP. 22µF, 15V, T368	0296660001
C13	CAP. 3.3µF, 35V, 196D	0281680001
C14	CAP. 1µF, 35V, 196D	0281660000
C15	CAP. 2.2µF, 35V, T368	0273950002
C16	CAP. 6.8µF, 20V, T368	0296780006
C17	CAP. 22µF, 15V, T368	0296660001
C18	CAP. 150PF, 500V, DM15, 5%	0274980002
C19	CAP. 3.3µF, 35V, 196D	0281680001
C20	CAP. 1µF, 35V, 196D	0281660000
C21	CAP. 2.2µF, 35V, T368	0273950002
C23	CAP. 1µF, 35V, 196D	0281660000
C26	CAP. .47µF, 50V, X7R 20%	0283377771
C27	CAP. 1µF, 35V, 196D	0281660000
C28	CAP. 0.0068µF, 100V, NPO, 5%	1011450020
C29	CAP. 0.0068µF, 100V, NPO, 5%	1011450020
C30	CAP. 22µF, 15V, T368	0296660001
C32	CAP. .01µF, 50V, X7R 20%	0281730008
C34	CAP. 2.2µF, 35V, T368	0273950002
C35	CAP. .01µF, 50V, X7R 20%	0281730008
C36	CAP. .01µF, 50V, X7R 20%	0281730008
C37	CAP. 2.2µF, 35V, T368	0273950002
C38	CAP. .01µF, 50V, X7R 20%	0281730008
C39	CAP. .01µF, 50V, X7R 20%	0281730008
C40	CAP. 2.2µF, 35V, T368	0273950002
C41	CAP. .01µF, 50V, X7R 20%	0281730008
C42	CAP. .01µF, 50V, X7R 20%	0281730008
C43	CAP. 22µF, 15V, T368	0296660001
C44	CAP. 1µF, 35V, 196D	0281660000
C45	CAP. .47µF, 50V, X7R 20%	0283377771
C46	CAP. 22µF, 15V, T368	0296660001
C47	CAP. .01µF, 50V, X7R 20%	0281730008
C48	CAP. .033µF, 50V,10/20%	0281770000
C49	CAP. .033µF, 50V,10/20%	0281770000
C50	CAP. .01µF, 50V, X7R 20%	0281730008
C51	CAP. .47µF, 50V, X7R 20%	0283377771
C52	CAP. .033µF, 50V,10/20%	0281770000
C53	CAP. 2.2µF, 35V, T368	0273950002
C54	CAP. 22µF, 15V, T368	0296660001
C55	CAP. .47µF, 50V, X7R 20%	0283377771
C56	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C57	CAP. 22µF, 15V, T368	0296660001
C58	CAP. .47µF, 50V, X7R 20%	0283377771
C60	CAP. 47µF, 35V	0282190007
C61	CAPACITOR 0.1µF, 50V, X7R	1011180014
C62	CAP. .47µF, 50V, X7R 20%	0283377771
C64	CAP. 470µF, 50V, TAL	0280890001
C65	CAP. 1µF, 35V, 196D	0281660000
C66	CAP. 22µF, 15V, T368	0296660001
C67	CAP. 22µF, 15V, T368	0296660001
C68	CAP. 820PF, 300V, DM15, 5%	0288750004
C69	CAP. .01µF, 50V, X7R 20%	0281730008
C70	CAP. 22µF, 15V, T368	0296660001
C71	CAPACITOR 0.1µF, 50V, X7R	1011180014
C72	CAP. 22µF, 15V, T368	0296660001
C73	CAP. 22µF, 15V, T368	0296660001
C74	CAPACITOR 0.1µF, 50V, X7R	1011180014
C75	CAPACITOR 0.1µF, 50V, X7R	1011180014
C76	CAPACITOR 0.1µF, 50V, X7R	1011180014
C77	CAPACITOR 0.1µF, 50V, X7R	1011180014
C78	CAPACITOR 0.1µF, 50V, X7R	1011180014
C79	CAPACITOR 0.1µF, 50V, X7R	1011180014
C80	CAPACITOR 0.1µF, 50V, X7R	1011180014
C81	CAPACITOR 0.1µF, 50V, X7R	1011180014
C82	CAP. 22µF, 15V, T368	0296660001
C85	CAP. .01µF, 50V, X7R 20%	0281730008
C86	CAP. .01µF, 50V, X7R 20%	0281730008
C87	CAP. .01µF, 50V, X7R 20%	0281730008
C88	CAP. .01µF, 50V, X7R 20%	0281730008
C89	CAPACITOR 0.1µF, 50V, X7R	1011180014
C90	CAP. .01µF, 50V, X7R 20%	0281730008
C91	CAPACITOR 0.1µF, 50V, X7R	1011180014
C92	CAPACITOR 0.1µF, 50V, X7R	1011180014
C93	CAPACITOR 0.1µF, 50V, X7R	1011180014
C94	CAP. .01µF, 50V, X7R 20%	0281730008
C95	CAP. .01µF, 50V, X7R 20%	0281730008
C96	CAPACITOR 0.1µF, 50V, X7R	1011180014
C97	CAPACITOR 0.1µF, 50V, X7R	1011180014
C98	CAPACITOR 0.1µF, 50V, X7R	1011180014
C99	CAPACITOR 0.1µF, 50V, X7R	1011180014
C100	CAP. .01µF, 50V, X7R 20%	0281730008
C101	CAP. .01µF, 50V, X7R 20%	0281730008
C102	CAPACITOR 0.1µF, 50V, X7R	1011180014
C103	CAPACITOR 0.1µF, 50V, X7R	1011180014
C104	CAP. .01µF, 50V, X7R 20%	0281730008
C105	CAP. .01µF, 50V, X7R 20%	0281730008
C106	CAP. .01µF, 50V, X7R 20%	0281730008
C107	CAP. .01µF, 50V, X7R 20%	0281730008
C108	CAP. 6.8µF, 20V, T368	0296780006
C109	CAP. .47µF, 50V, X7R 20%	0283377771
C110	CAP. 6.8µF, 20V, T368	0296780006
C111	CAP. .01µF, 50V, X7R 20%	0281730008
C112	CAP. .01µF, 50V, X7R 20%	0281730008
C113	CAP. 15µF, 35V	0282240004
C114	CAPACITOR 0.1µF, 50V, X7R	1011180014
C115	CAPACITOR 0.1µF, 50V, X7R	1011180014
C116	CAPACITOR 0.1µF, 50V, X7R	1011180014
C117	CAPACITOR 0.1µF, 50V, X7R	1011180014
C118	CAP. 1µF, 35V, 196D	0281660000
C119	CAP. 1µF, 35V, 196D	0281660000
C120	CAP. 6.8µF, 20V, T368	0296780006
C121	CAPACITOR 0.1µF, 50V, X7R	1011180014
C122	CAP. 6.8µF, 20V, T368	0296780006
C123	CAP. 6.8µF, 20V, T368	0296780006
C124	CAPACITOR 0.1µF, 50V, X7R	1011180014
C125	CAPACITOR 0.1µF, 50V, X7R	1011180014
C126	CAPACITOR 0.1µF, 50V, X7R	1011180014
C127	CAP. .47µF, 50V, X7R 20%	0283377771
C128	CAPACITOR 0.1µF, 50V, X7R	1011180014
C129	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C130	CAP. .02µF, 25V, Y5U/Y5P	0269130004
C131	CAP. .47µF, 50V, X7R 20%	0283377771
C132	CAP. 47µF, 35V	0282190007
C133	CAP. 15µF, 35V	0282240004
C134	CAP. 2.2µF, 35V, T368	0273950002
C135	CAP. .01µF, 50V, X7R 20%	0281730008
C136	CAP. .01µF, 50V, X7R 20%	0281730008
C137	CAP. .01µF, 50V, X7R 20%	0281730008
C138	CAP. .01µF, 50V, X7R 20%	0281730008
C139	CAP. 390PF, 500V, DM15, 2%	0281040001
C140	CAP. .01µF, 50V, X7R 20%	0281730008
C141	CAP. .01µF, 50V, X7R 20%	0281730008
C142	CAP. .01µF, 50V, X7R 20%	0281730008
C143	CAP. 22µF, 15V, T368	0296660001
C144	CAP. .01µF, 50V, X7R 20%	0281730008
CR1	DIODE, RECTIFIER 1N4004	0405180004
CR2	DIODE, SIGNAL, SIL 1N4454	0405270003
CR3	DIODE, SIGNAL, SIL 1N4454	0405270003
CR4	DIODE, SIGNAL, SIL 1N4454	0405270003
CR5	DIODE, RECTIFIER 1N4004	0405180004
CR6	DIODE, SIGNAL, SIL 1N4454	0405270003
CR7	DIODE, SIGNAL, SIL 1N4454	0405270003
CR8	DIODE, SIGNAL, SIL 1N4454	0405270003
CR9	DIODE, SIGNAL, SIL 1N4454	0405270003
CR10	DIODE, RECTIFIER 1N4004	0405180004
CR11	DIODE, RECTIFIER 1N4004	0405180004
CR12	DIODE, RECTIFIER 1N4004	0405180004
CR13	DIODE, RECTIFIER 1N4004	0405180004
CR14	DIODE, SIGNAL, SIL 1N4454	0405270003
CR15	DIODE, SIGNAL, SIL 1N4454	0405270003
CR16	DIODE, RECTIFIER 1N4004	0405180004
CR17	DIODE, LED, RED, PC MOUNT	1008480029
CR18	DIODE, RECTIFIER 1N4004	0405180004
CR19	DIODE, RECTIFIER 1N4004	0405180004
CR20	DIODE, RECTIFIER 1N4004	0405180004
CR21	DIODE, RECTIFIER 1N4004	0405180004
CR22	DIODE, RECTIFIER 1N4004	0405180004
CR23	DIODE, RECTIFIER 1N4004	0405180004
CR24	DIODE, SIGNAL, SIL 1N4454	0405270003
CR25	DIODE, SIGNAL, SIL 1N4454	0405270003
CR28	DIODE, RECTIFIER 1N4004	0405180004
CR29	DIODE, SIGNAL, SIL 1N4454	0405270003
CR30	DIODE, RECTIFIER 1N4004	0405180004
CR31	DIODE, SIGNAL, SIL 1N4454	0405270003
CR32	DIODE, RECTIFIER 1N4004	0405180004
CR33	DIODE, RECTIFIER 1N4004	0405180004
CR34	DIODE, RECTIFIER 1N4004	0405180004
CR35	DIODE, SIGNAL, SIL 1N4454	0405270003
CR36	DIODE, SIGNAL, SIL 1N4454	0405270003
J1	SOCKET, BOARDMOUNT, 12 PIN	1011010127
K1	RELAY, DPDT, 12VDC	1005090009
K2	RELAY, DPDT, 12VDC	1005090009
K3	RELAY, DPDT, 12VDC	1005090009
Q1	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q2	TRANSISTOR, P-CH, FET J175	1010840002
Q3	TRANSISTOR, N-CH, FET MTP10N06	1010750011
Q4	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q5	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q6	TRANSISTOR, NPN, SI. 2N2222A	0448580004

Figure 5.9.12 PC Assembly, Audio 1A2A3, page 1/8.

Q7	TRANSISTOR, NPN, SI. 2N2222A	0448580004
R1	RESISTOR 100K, 5%, 1/8W	1010801040
R2	RESISTOR 10K, 5%, 1/8W	1010801031
R3	RESISTOR 47K, 5%, 1/8W	1010804731
R4	RESISTOR 10K, 5%, 1/8W	1010801031
R5	RESISTOR 47K, 5%, 1/8W	1010804731
R6	RESISTOR 10K, 5%, 1/8W	1010801031
R7	RESISTOR 68K, 5%, 1/8W	1010806831
R8	POT. 1K, 10% 3/4W, 15 TURNS	0338490019
R9	RESISTOR 4.7K, 5%, 1/8W	1010804723
R10	RESISTOR 10K, 5%, 1/8W	1010801031
R11	RESISTOR 10K, 5%, 1/8W	1010801031
R12	RESISTOR 10K, 5%, 1/8W	1010801031
R13	RESISTOR 4.7K, 5%, 1/8W	1010804723
R14	RESISTOR 1K, 5%, 1/8W	1010801023
R15	RESISTOR, 6.8M, 5%, 1/4W	1010910001
R16	RESISTOR 10, 5%, 1/8W	1010801007
R17	RESISTOR 1M, 10%, 1/4W	0170650006
R18	RESISTOR 4.7K, 5%, 1/8W	1010804723
R19	RESISTOR 100K, 5%, 1/8W	1010801040
R20	RESISTOR 100, 5%, 1/8W	1010801015
R21	POT. 500, 10% 3/4W, 15 TURNS	0338490078
R22	RESISTOR 10K, 5%, 1/8W	1010801031
R23	RESISTOR 10K, 5%, 1/8W	1010801031
R24	RESISTOR 1K, 5%, 1/8W	1010801023
R25	RESISTOR 10K, 5%, 1/8W	1010801031
R26	RESISTOR 1.8K, 5%, 1/8W	1010801821
R27	RESISTOR 4.7K, 5%, 1/8W	1010804723
R28	RESISTOR 10K, 5%, 1/8W	1010801031
R29	POT. 10K, 10% 3/4W, 15 TURNS	0338490043
R30	RESISTOR 10K, 5%, 1/8W	1010801031
R31	RESISTOR 100K, 5%, 1/8W	1010801040
R32	RESISTOR 15K, 5%, 1/8W	1010801538
R33	RESISTOR 270K, 5%, 1/8W	1010802747
R34	RESISTOR 10K, 5%, 1/8W	1010801031
R35	RESISTOR 10K, 5%, 1/8W	1010801031
R36	RESISTOR 470K, 5%, 1/8W	1010804740
R37	RESISTOR 470K, 5%, 1/8W	1010804740
R38	RESISTOR 1K, 5%, 1/8W	1010801023
R39	RESISTOR 1K, 5%, 1/8W	1010801023
R40	RESISTOR 10K, 5%, 1/8W	1010801031
R41	RESISTOR 10K, 5%, 1/8W	1010801031
R42	POT. 10K, 10% 3/4W, 15 TURNS	0338490043
R43	RESISTOR 56K, 5%, 1/8W	1010805631
R44	RESISTOR 10K, 5%, 1/8W	1010801031
R45	RESISTOR 10K, 5%, 1/8W	1010801031
R46	RESISTOR, 56.2K, 1%, 1/8W	1008910015
R47	RESISTOR 12.1K, 1%, 1/8W	1008900010
R48	RESISTOR 1K AT 25C	0196110009
R49	RESISTOR 390, 5%, 1/8W	1010803913
R50	RESISTOR, 4.99K, 1%, 1/8W	1005510032
R51	RESISTOR 10K, 5%, 1/8W	1010801031
R52	RESISTOR 28.7K 1%, 1/8W	1004090005
R53	RESISTOR 28.7K 1%, 1/8W	1004090005
R54	RESISTOR 10K, 5%, 1/8W	1010801031
R55	RESISTOR 2.2K, 5%, 1/8W	1010802224
R56	RESISTOR 10K, 5%, 1/8W	1010801031
R57	RESISTOR 100, 5%, 1/8W	1010801015
R58	POT. 500, 10% 3/4W, 15 TURNS	0338490078
R59	RESISTOR 1K, 5%, 1/8W	1010801023
R60	RESISTOR 1K, 5%, 1/8W	1010801023

R61	RESISTOR 47K, 5%, 1/8W	1010804731
R62	RESISTOR 47K, 5%, 1/8W	1010804731
R63	RESISTOR 1.5K, 5%, 1/8W	1010801520
R64	RESISTOR 180K, 5%, 1/8W	1010801848
R65	RESISTOR 47K, 5%, 1/8W	1010804731
R66	RESISTOR 3.3K, 5%, 1/8W	1010803328
R67	RESISTOR 180K, 5%, 1/8W	1010801848
R68	RESISTOR 180K, 5%, 1/8W	1010801848
R69	RESISTOR 2.2K, 5%, 1/8W	1010802224
R70	RESISTOR 10K, 5%, 1/8W	1010801031
R71	RESISTOR 10K, 5%, 1/8W	1010801031
R72	RESISTOR 10K, 5%, 1/8W	1010801031
R73	RESISTOR 10K, 5%, 1/8W	1010801031
R74	RESISTOR 10K, 5%, 1/8W	1010801031
R75	RESISTOR 3.3K, 5%, 1/8W	1010803328
R76	RESISTOR, 3.3M, 5%, 1/4U	1010820001
R77	RESISTOR 3.3K, 5%, 1/8W	1010803328
R78	RESISTOR 330K, 5%, 1/8W	1010803344
R79	RESISTOR 47K, 5%, 1/8W	1010804731
R80	RESISTOR 100K, 5%, 1/8W	1010801040
R81	RESISTOR 100K, 5%, 1/8W	1010801040
R82	RESISTOR 100K, 5%, 1/8W	1010801040
R83	RESISTOR 100K, 5%, 1/8W	1010801040
R84	RESISTOR 1K, 5%, 1/8W	1010801023
R85	RESISTOR 1K, 5%, 1/8W	1010801023
R86	RESISTOR 270K, 5%, 1/8W	1010802747
R87	RESISTOR 330K, 5%, 1/8W	1010803344
R88	RESISTOR, 3.3M, 5%, 1/4U	1010820001
R89	POT. 10K, 10% 3/4W, 15 TURNS	0338490043
R90	RESISTOR 10K, 5%, 1/8W	1010801031
R91	RESISTOR 10K, 5%, 1/8W	1010801031
R92	RESISTOR 1M, 10%, 1/4W	0170650006
R93	RESISTOR 1M, 10%, 1/4W	0170650006
R94	RESISTOR 330K, 5%, 1/8W	1010803344
R95	RESISTOR 22K, 5%, 1/8W	1010802232
R96	RESISTOR 10K, 10%, 1/4W	0170410005
R97	RESISTOR 22K, 5%, 1/8W	1010802232
R98	RESISTOR 10K, 5%, 1/8W	1010801031
R99	RESISTOR 10K, 5%, 1/8W	1010801031
R100	RESISTOR 100K, 5%, 1/8W	1010801040
R101	RESISTOR 10K, 5%, 1/8W	1010801031
R102	RESISTOR 10K, 5%, 1/8W	1010801031
R103	POT. 25K, 10% 3/4W, 15 TURNS	0338490094
R107	RESISTOR 10K, 5%, 1/8W	1010801031
R108	RESISTOR 470, 10%, 1/2W	0173900003
R109	RESISTOR 18, 5%, 1/2W	0184730007
R110	RESISTOR 33, 10%, 1W	0165660007
R111	RESISTOR 47, 10%, 2W	0163720002
R112	RESISTOR 10K, 5%, 1/8W	1010801031
R113	RESISTOR 1M, 10%, 1/4W	0170650006
R114	RESISTOR 10K, 5%, 1/8W	1010801031
R115	RESISTOR 10K, 5%, 1/8W	1010801031
R116	RESISTOR 10K, 5%, 1/8W	1010801031
R117	RESISTOR 6.8K, 5%, 1/8W	1010806823
R118	RESISTOR 3.3K, 5%, 1/8W	1010803328
R119	POT. 10K, 10% 3/4W, 15 TURNS	0338490043
R120	RESISTOR 10K, 5%, 1/8W	1010801031
R121	RESISTOR 33K, 5%, 1/8W	1010803336
R122	RESISTOR 10K, 5%, 1/8W	1010801031
R123	RESISTOR 10K, 5%, 1/8W	1010801031
R124	RESISTOR 22, 5%, 1/8W	1010802208

R125	RESISTOR 2.2K, 5%, 1/8W	1010802224
R126	RESISTOR 56K, 5%, 1/8W	1010805631
R127	RESISTOR 1K, 5%, 1/8W	1010801023
R128	RESISTOR 10K, 5%, 1/8W	1010801031
R129	RESISTOR 10K, 5%, 1/8W	1010801031
R130	RESISTOR 100K, 5%, 1/8W	1010801040
R131	RESISTOR 100K, 5%, 1/8W	1010801040
R132	RESISTOR 10K, 5%, 1/8W	1010801031
R133	RESISTOR 100K, 5%, 1/8W	1010801040
R134	RESISTOR 100K, 5%, 1/8W	1010801040
R135	RESISTOR 10K, 5%, 1/8W	1010801031
R136	RESISTOR 100K, 5%, 1/8W	1010801040
R137	RESISTOR 10K, 5%, 1/8W	1010801031
R138	RESISTOR 100K, 5%, 1/8W	1010801040
R139	RESISTOR 10K, 5%, 1/8W	1010801031
R140	RESISTOR 1K, 5%, 1/8W	1010801023
R141	RESISTOR 1K, 5%, 1/8W	1010801023
R142	RESISTOR 1K, 5%, 1/8W	1010801023
R144	RESISTOR 68K, 5%, 1/8W	1010806831
R145	RESISTOR 10K, 5%, 1/8W	1010801031
R146	RESISTOR 47K, 5%, 1/8W	1010804731
R148	RESISTOR 3.3K, 5%, 1/8W	1010803328
R149	RESISTOR 2.7K, 5%, 1/8W	1010802721
R150	RESISTOR 10K, 5%, 1/8W	1010801031
R151	RESISTOR 10K, 5%, 1/8W	1010801031
R152	RESISTOR 39K, 5%, 1/8W	1010803930
R153	RESISTOR 1, 10%, 1/2W	0194770001
R154	RESISTOR 10K, 5%, 1/8W	1010801031
R155	RESISTOR 39K, 5%, 1/8W	1010803930
R156	RESISTOR 10K, 5%, 1/8W	1010801031
R157	RESISTOR 10K, 5%, 1/8W	1010801031
R158	RESISTOR 4.7K, 5%, 1/8W	1010804723
R159	RESISTOR 18K, 5%, 1/8W	1010801830
R160	RESISTOR 1K, 5%, 1/8W	1010801023
R161	RESISTOR 47K, 5%, 1/8W	1010804731
R162	POT. 1K, 10% 1/2, 4 TURNS	1000850021
R163	RESISTOR 22K, 5%, 1/8W	1010802232
R164	RESISTOR 100K, 5%, 1/8W	1010801040
R165	RESISTOR 100K, 5%, 1/8W	1010801040
R166	RESISTOR 4.7K, 5%, 1/8W	1010804723
R167	RESISTOR 22K, 5%, 1/8W	1010802232
R168	RESISTOR 22K, 5%, 1/8W	1010802232
R169	RESISTOR 22K, 5%, 1/8W	1010802232
R170	RESISTOR 150, 5%, 1/8W	1010801511
R171	RESISTOR 4.7K, 5%, 1/8W	1010804723
R172	RESISTOR 10K, 5%, 1/8W	1010801031
R173	RESISTOR 4.7K, 5%, 1/8W	1010804723
R174	RESISTOR 10K, 5%, 1/8W	1010801031
R175	POT. 5K, 10% 1/2W, 25 TURNS	1004720025
R176	RESISTOR 10K, 5%, 1/8W	1010801031
R177	RESISTOR 1K, 5%, 1/8W	1010801023
R178	RESISTOR 4.7K, 5%, 1/8W	1010804723
R179	RESISTOR 4.7K, 5%, 1/8W	1010804723
R180	RESISTOR 47K, 5%, 1/8W	1010804731
RP1	RES NTWK 6 PIN SIP 10K COM	1006130004
S1A	SWITCH, DPST,DIP, 3 SECTION	1010880004
S1B	SWITCH, DPST,DIP, 3 SECTION	1010880004
T1	TRANSFORMER, AUDIO, PC MOUNT	0491650001
T2	TRANSFORMER, AUDIO, PC MOUNT	0491650001
TP1	TERMINAL, TURRET SWGD .071 MTG	0525580000
TP2	TERMINAL, TURRET SWGD .071 MTG	0525580000

Figure 5.9.12 PC Assembly, Audio 1A2A3, page 2/8.

TP3	TERMINAL, TURRET SWGD .071 MTG	0525580000
TP4	TERMINAL, TURRET SWGD .071 MTG	0525580000
TP5	TERMINAL, TURRET SWGD .071 MTG	0525580000
TP6	TERMINAL, TURRET SWGD .071 MTG	0525580000
U1	IC, DIGITAL 74HC14	1006490027
U2	IC, DIGITAL 74HC14	1006490027
U3	IC, DIGITAL 74HC00	1008190004
U4	IC, DIGITAL 74HC08	1006490019
U5	IC, LINEAR UDN2935Z	1010830007
U6	IC, LINEAR UDN2935Z	1010830007
U7	IC,LINEAR MC3358P1	1010110012
U8	IC, LINEAR LC403	1010850008
U9	IC,LINEAR MC3358P1	1010110012
U10	IC,LINEAR MC3358P1	1010110012
U11	IC, LINEAR LF-347	1007500026
U12	IC, DIGITAL 4584B	1005190011
U13	IC, DIGITAL 4066BC	1004460023
U14	IC, LINEAR LF-347	1007500026
U15	IC, LINEAR LF-347	1007500026
U16	IC, LINEAR LF-347	1007500026
U17	IC, LINEAR TDA1524A	1010780026
U18	IC, LINEAR TDA2008	1003140025
U19	IC, DIGITAL 4001B	1004660022
U20	IC, DIGITAL 4066BC	1004460023
U21	IC, LINEAR 5532	1006270019
U22	IC, LINEAR LM311N	1005760021
U23	IC, DIGITAL 4066BC	1004460023
U24	IC, DIGITAL 4081B	1006280031
U25	IC, DIGITAL 4066BC	1004460023
U26	IC,LINEAR MC3358P1	1010110012
U28	IC, DIGITAL 75372	1010760017
U29	IC, LINEAR NE570	1011500001
U30	IC, LINEAR LF-347	1007500026
U31	IC, DIGITAL 4066BC	1004460023
	HEATSINK, SPEAKER DRIVER	8076092205
	INSULATOR, MICA TO-220AB	0448670003
	MOUNTING PLATE, AUDIO BOARD	8076091608

Figure 5.9.12 PC Assembly, Audio 1A2A3, page 3/8.

TOP VIEW

S1-1 MIC COMPRESSOR ON OR OFF
S1-2 XMIT SQUELCH ON OR OFF
S1-3 LINE AUDIO COMPRESSOR ON OR OFF

NORMAL SETTINGS FOR S1-1 THROUGH 3 SHOWN

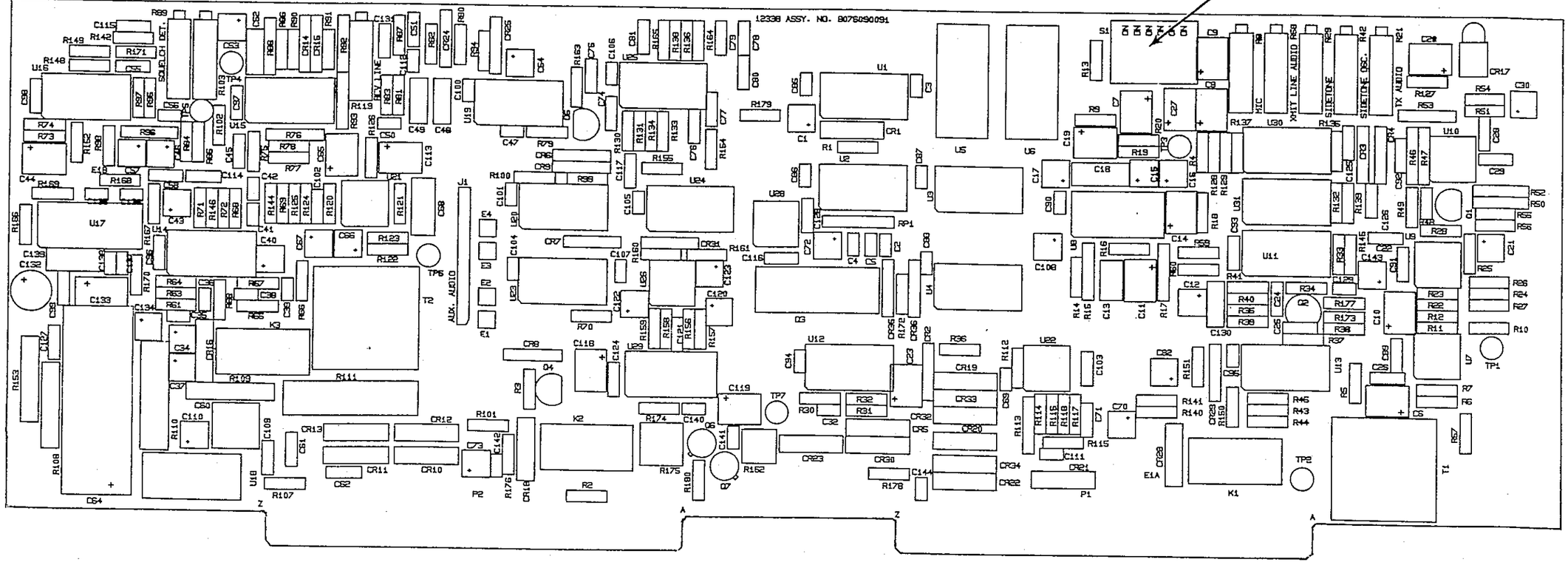


Figure 5.9.12 PC Assembly, Audio 1A2A3, page 4/8.

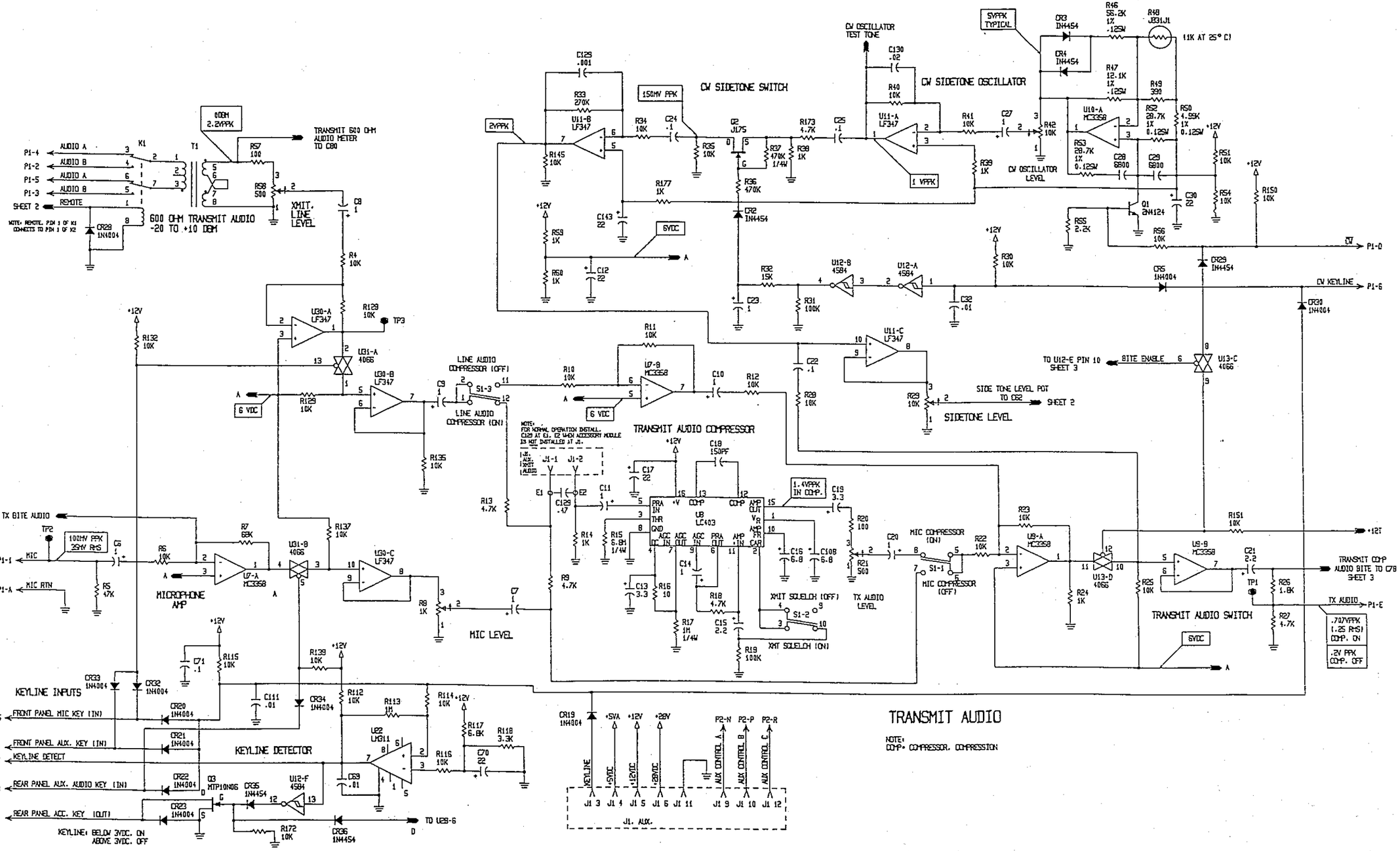


Figure 5.9.12 PC Assembly, Audio 1A2A3, page 5/8.

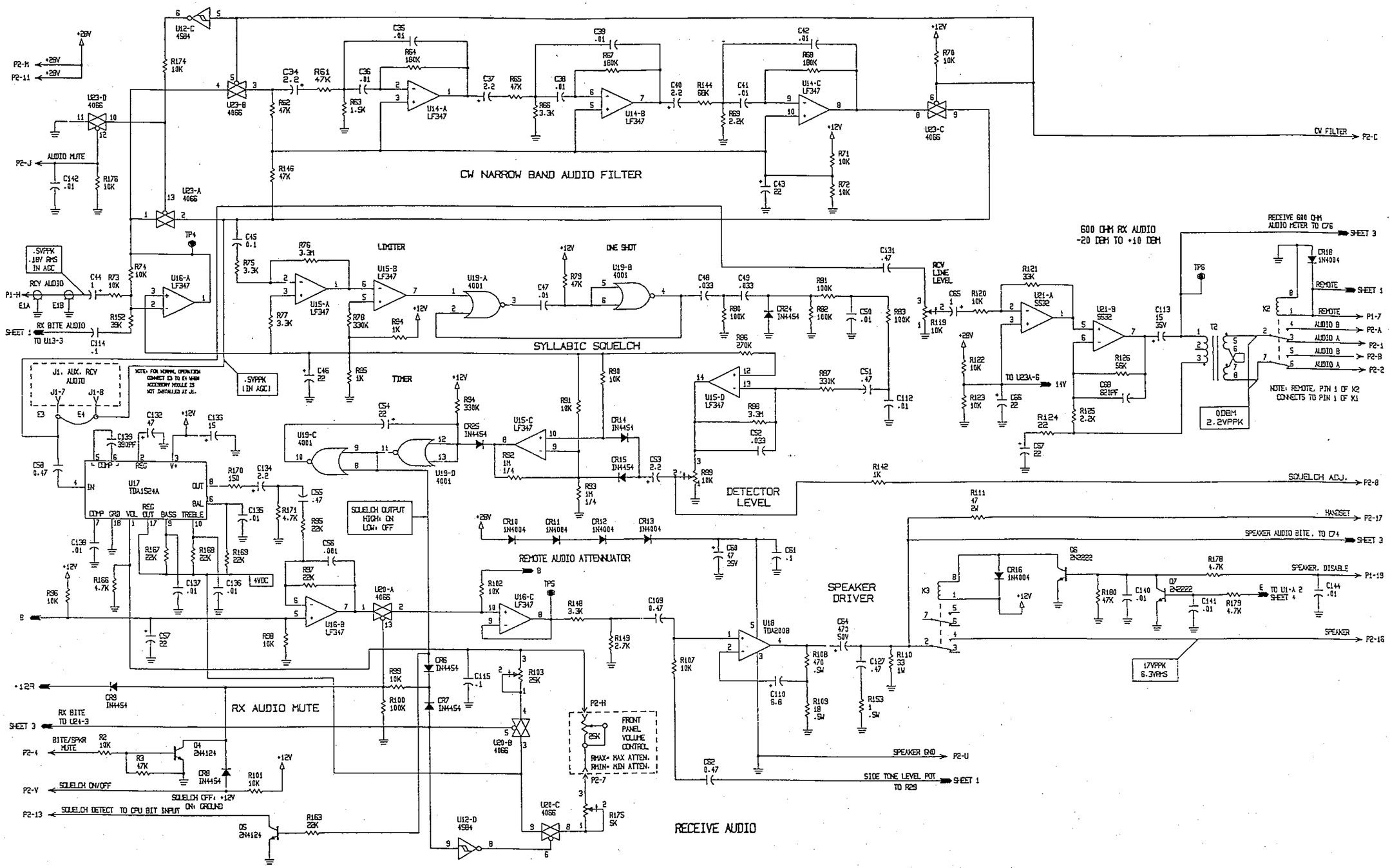
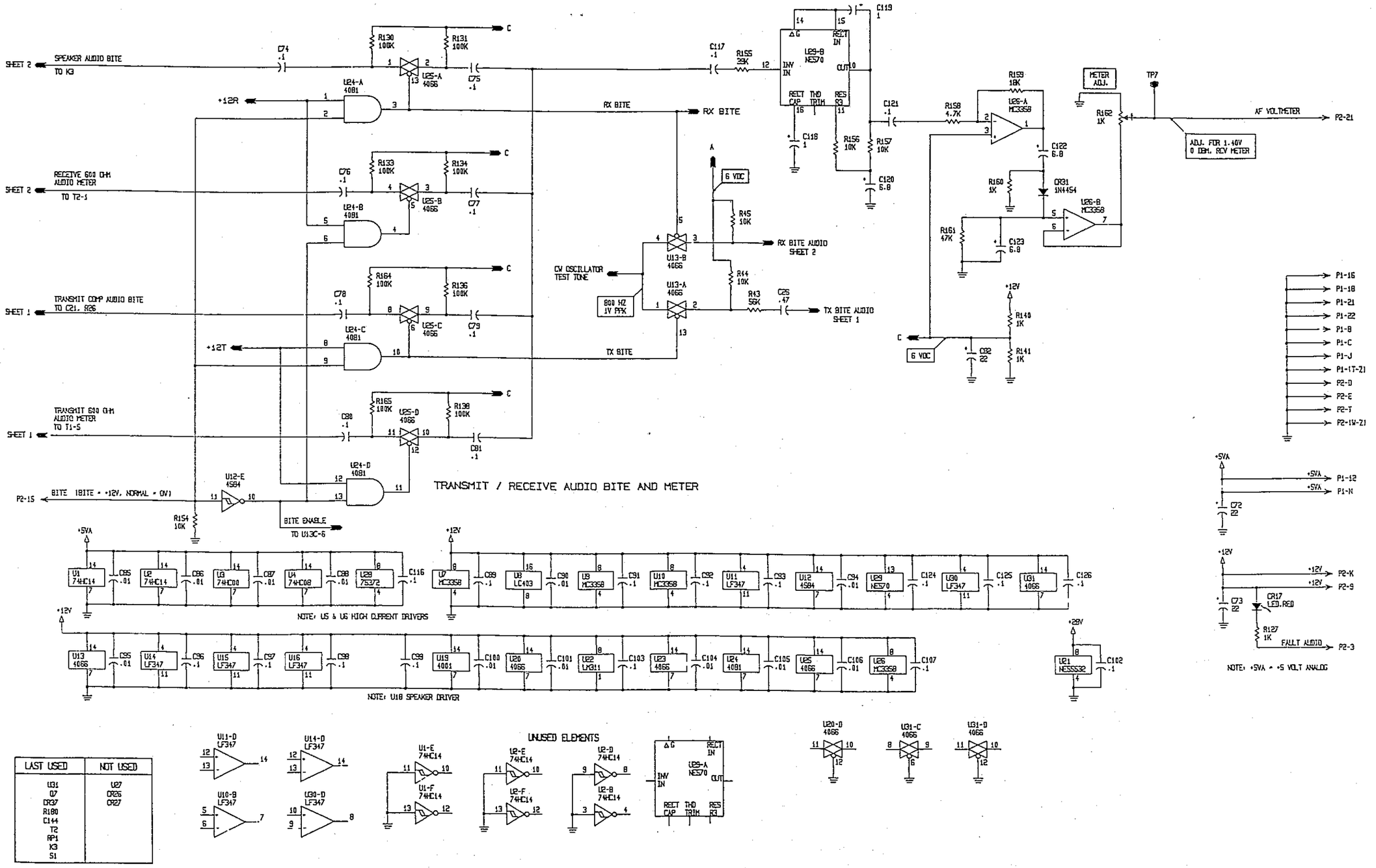


Figure 5.9.12 PC Assembly, Audio 1A2A3, page 6/8.



LAST USED	NOT USED
U31	U27
Q7	CR26
CR37	CR27
R180	
C144	
T2	
RP1	
K3	
S1	

Figure 5.9.12 PC Assembly, Audio 1A2A3, page 7/8.

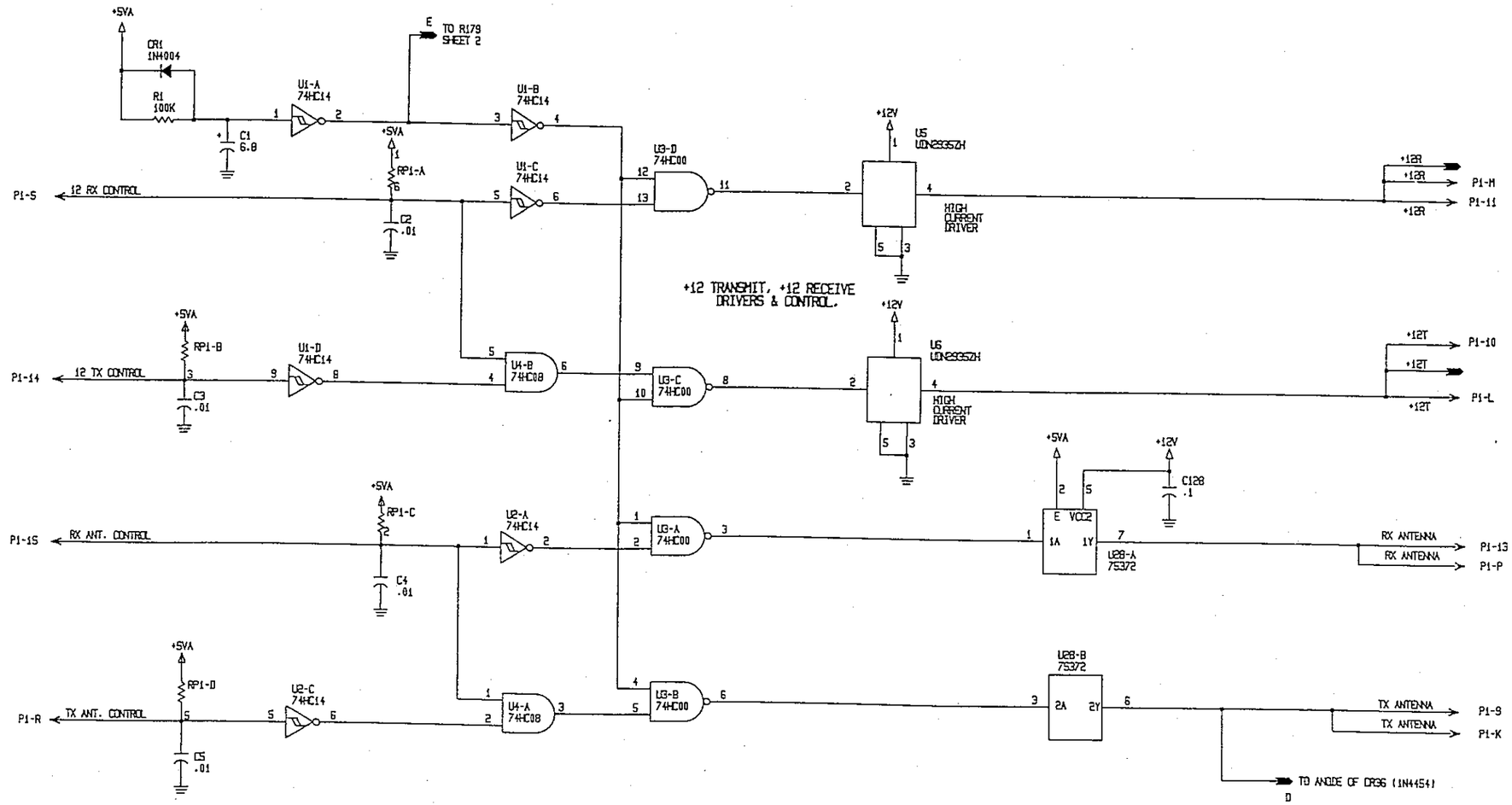


Figure 5.9.12 PC Assembly, Audio 1A2A3, page 8/8.

PC ASSY, LINCOMPEX 1A2A3A1

	PC ASSY, LINCOMPEX 1A2A3A1	8076097096
C1	CAP. .47µF, 50V, X7R 20%	0283377771
C2	CAP. 1µF, 35V, 196D	0281660000
C3	CAP. 1µF, 35V, 196D	0281660000
C4	CAP. 1µF, 35V, 196D	0281660000
C5	CAP. 1µF, 35V, 196D	0281660000
C6	CAP. .01µF, 50V, X7R 20%	0281730008
C7	CAP. 1µF, 35V, 196D	0281660000
C8	CAP. .01µF, 50V, X7R 20%	0281730008
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C10	CAP. 1µF, 35V, 196D	0281660000
C11	CAP. .01µF, 50V, X7R 20%	0281730008
C12	CAP. 1µF, 35V, 196D	0281660000
C13	CAP. 1µF, 35V, 196D	0281660000
C14	CAP. 1µF, 35V, 196D	0281660000
C15	CAP. .01µF, 50V, X7R 20%	0281730008
C16	CAP. .01µF, 50V, X7R 20%	0281730008
C17	CAP. 1µF, 35V, 196D	0281660000
C18	CAP. .01µF, 50V, X7R 20%	0281730008
C19	CAP. .01µF, 50V, X7R 20%	0281730008
C20	CAP. 1µF, 35V, 196D	0281660000
C21	CAP. 1µF, 35V, 196D	0281660000
C22	CAP. 1µF, 35V, 196D	0281660000
C23	CAP. 1µF, 35V, 196D	0281660000
C24	CAP. 1µF, 35V, 196D	0281660000
C25	CAP. 1µF, 35V, 196D	0281660000
C26	CAP. 1µF, 35V, 196D	0281660000
C27	CAP. .01µF, 50V, X7R 20%	0281730008
C28	CAP. 6.8µF, 20V, T368	0296780006
C29	CAPACITOR 0.1µF, 50V, X7R	1011180014
C30	CAP. 1µF, 35V, 196D	0281660000
C31	CAP. 1µF, 35V, 196D	0281660000
C32	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C33	CAP. 1µF, 35V, 196D	0281660000
C34	CAP. .01µF, 50V, X7R 20%	0281730008
C35	CAP. .01µF, 50V, X7R 20%	0281730008
C36	CAP. .01µF, 50V, X7R 20%	0281730008
C37	CAP. 6.8µF, 20V, T368	0296780006
C38	CAP. 6.8µF, 20V, T368	0296780006
C39	CAPACITOR 0.1µF, 50V, X7R	1011180014
C40	CAPACITOR 0.1µF, 50V, X7R	1011180014
C41	CAPACITOR 0.1µF, 50V, X7R	1011180014
C42	CAPACITOR 0.1µF, 50V, X7R	1011180014
C43	CAPACITOR 0.1µF, 50V, X7R	1011180014
CR1	DIODE, ZENER LVA43	1011400022
CR2	DIODE, ZENER LVA43	1011400022
CR3	DIODE, ZENER LVA43	1011400022
CR4	DIODE, ZENER LVA43	1011400022
CR5	DIODE, RECTIFIER 1N4004	0405180004
CR6	DIODE, LED, AMBER PC MOUNT	1011480000
CR7	DIODE, LED, AMBER PC MOUNT	1011480000
K1	RELAY, DPDT, 12VDC	1005090009
P1	HEADER, PIN STRIP, 12 PIN	1011020122
Q1	TRANSISTOR, PNP, SI. 2N2907A	0448390001
Q2	TRANSISTOR, PNP, SI. 2N2907A	0448390001
Q3	TRANSISTOR, PNP, SI. 2N2907A	0448390001
R1	RESISTOR 10K, 5%, 1/8W	1010801031
R2	RESISTOR 33K, 5%, 1/8W	1010803336
R3	POT. 10K, 10% 3/4W, 15 TURNS	0338490043
R4	RESISTOR 10K, 5%, 1/8W	1010801031
R5	RESISTOR 33K, 5%, 1/8W	1010803336
R6	RESISTOR 47K, 5%, 1/8W	1010804731
R7	RESISTOR 8.66K, 1%, 1/8W	1003120008
R8	RESISTOR 2490, 1%, 1/8W	1011420023
R9	RESISTOR 10K, 5%, 1/8W	1010801031
R10	RESISTOR 4.7K, 5%, 1/8W	1010804723
R11	RESISTOR 3570, 1%, 1/8W	1011410028
R12	RESISTOR 10.7K 1%, 1/8W	1004070012
R13	RESISTOR 10K, 5%, 1/8W	1010801031
R14	RESISTOR 4.7K, 5%, 1/8W	1010804723
R15	RESISTOR 10K, 5%, 1/8W	1010801031
R16	RESISTOR 47K, 5%, 1/8W	1010804731
R17	RESISTOR 8.66K, 1%, 1/8W	1003120008
R18	RESISTOR 2490, 1%, 1/8W	1011420023
R19	RESISTOR 10K, 5%, 1/8W	1010801031
R20	RESISTOR 4.7K, 5%, 1/8W	1010804723
R21	RESISTOR 3570, 1%, 1/8W	1011410028
R22	RESISTOR 10.7K 1%, 1/8W	1004070012
R23	RESISTOR 10K, 5%, 1/8W	1010801031
R24	RESISTOR 4.7K, 5%, 1/8W	1010804723
R25	POT. 10K, 10% 3/4W, 15 TURNS	0338490043
R26	RESISTOR 10K, 5%, 1/8W	1010801031
R27	RESISTOR 22K, 5%, 1/8W	1010802232
R28	RESISTOR 10K, 5%, 1/8W	1010801031
R29	RESISTOR 10K, 5%, 1/8W	1010801031
R30	POT. 10K, 10% 3/4W, 15 TURNS	0338490043
R31	RESISTOR 10K, 5%, 1/8W	1010801031
R32	RESISTOR 47K, 5%, 1/8W	1010804731
R33	RESISTOR 10K, 5%, 1/8W	1010801031
R34	RESISTOR 2.7K, 5%, 1/8W	1010802721
R35	RESISTOR 330, 5%, 1/8W	1010803310
R36	RESISTOR 1K, 5%, 1/8W	1010801023
R37	RESISTOR 1K, 5%, 1/8W	1010801023
R38	RESISTOR 560, 5%, 1/8W	1010805614
R39	RESISTOR 2.7K, 5%, 1/8W	1010802721
R40	RESISTOR 820, 5%, 1/8W	1010808214
R41	RESISTOR 820, 5%, 1/8W	1010808214
R42	RESISTOR 2.7K, 5%, 1/8W	1010802721
R43	RESISTOR 560, 5%, 1/8W	1010805614
R44	POT. 10K, 10% 3/4W, 15 TURNS	0338490043
R45	RESISTOR 47K, 5%, 1/8W	1010804731
R46	RESISTOR 10K, 5%, 1/8W	1010801031
R47	RESISTOR 680, 5%, 1/8W	1010806815
U1	IC. LINEAR 5532	1006270019
U2	IC. LINEAR 5532	1006270019
U3	IC. LINEAR 5532	1006270019
U4	IC. LINEAR 5532	1006270019
U5	IC. LINEAR 5532	1006270019
U6	LINK PLUS MODULE, MODEL 2200	8076097703
U7	IC. DIGITAL 2501-1	1011000016

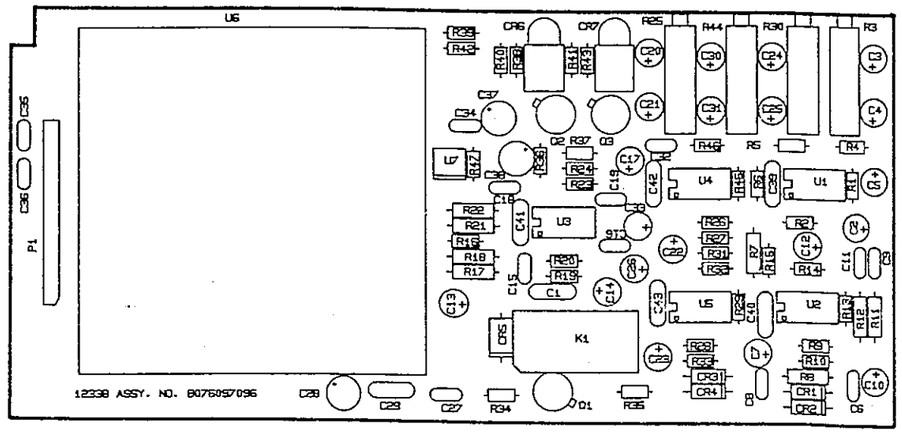
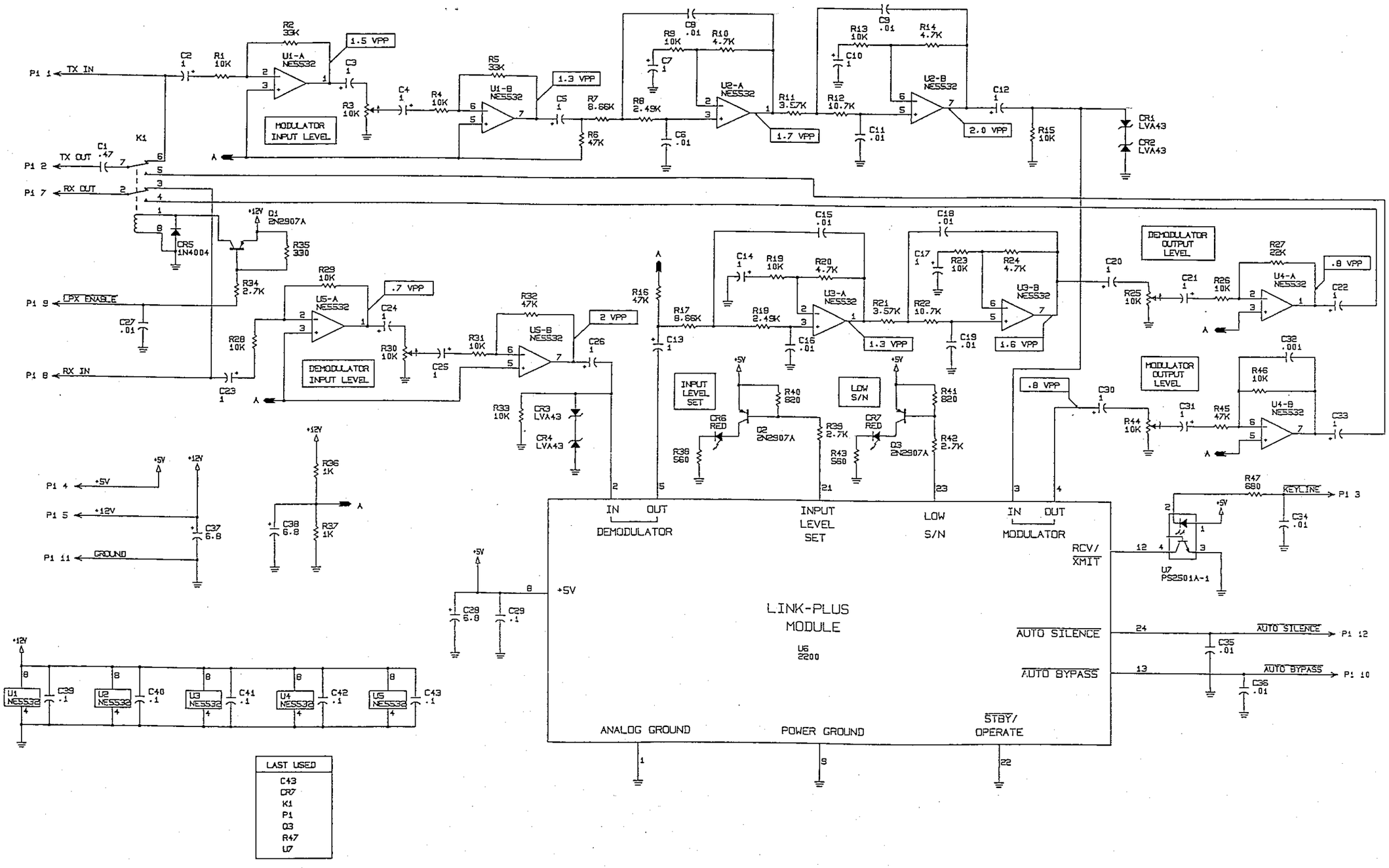


Figure 5.9.13 PC Assembly, Lincompex 1A2A3A1, page 1/2.



LAST USED
C43
CR7
K1
P1
Q3
R47
U7

Figure 5.9.13 PC Assembly, Lincompex 1A2A3A1, page 2/2.

PC ASSY, IF 1A2A4

	PC ASSY, IF 1A2A4	8076080096
C1	CAP. .01µF, 50V, X7R 20%	0281730008
C2	CAP. .01µF, 50V, X7R 20%	0281730008
C4	CAPACITOR 0.1µF, 50V, X7R	1011180014
C5	CAP. 15PF, 500V, DM10, 5%	0259950009
C6	CAP. .01µF, 50V, X7R 20%	0281730008
C7	CAP. .01µF, 50V, X7R 20%	0281730008
C8	CAP. 15PF, 500V, DM10, 5%	0259950009
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C10	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. 6.8µF, 20V, T368	0296780006
C13	CAP. .01µF, 50V, X7R 20%	0281730008
C18	CAPACITOR 0.1µF, 50V, X7R	1011180014
C22	CAP. .01µF, 50V, X7R 20%	0281730008
C23	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C25	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C26	CAPACITOR 0.1µF, 50V, X7R	1011180014
C27	CAP. 6.8µF, 20V, T368	0296780006
C28	CAPACITOR 0.1µF, 50V, X7R	1011180014
C31	CAP. .01µF, 50V, X7R 20%	0281730008
C32	CAP. .01µF, 50V, X7R 20%	0281730008
C33	CAP. .01µF, 50V, X7R 20%	0281730008
C34	CAP. .01µF, 50V, X7R 20%	0281730008
C35	CAP. .01µF, 50V, X7R 20%	0281730008
C38	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C39	CAP. .01µF, 50V, X7R 20%	0281730008
C41	CAPACITOR 0.1µF, 50V, X7R	1011180014
C43	CAP. 220PF, 500V, DM10, 2%	1010870009
C45	CAP. 220PF, 500V, DM10, 2%	1010870009
C46	CAP. .01µF, 50V, X7R 20%	0281730008
C47	CAP. .01µF, 50V, X7R 20%	0281730008
C48	CAPACITOR 0.1µF, 50V, X7R	1011180014
C49	CAP. 2.2UF, 35V, T368	0273950002
C50	CAPACITOR 0.1µF, 50V, X7R	1011180014
C52	CAP. 15µF, 15V, 196D	0281720002
C53	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C54	CAPACITOR 0.1µF, 50V, X7R	1011180014
C55	CAP. .01µF, 50V, X7R 20%	0281730008
C56	CAP. .02µF, 25V, Y5U/Y5P	0269130004
C65	CAP. .01µF, 50V, X7R 20%	0281730008
C66	CAP. .01µF, 50V, X7R 20%	0281730008
C67	CAP. .01µF, 50V, X7R 20%	0281730008
C68	CAP. .01µF, 50V, X7R 20%	0281730008
C69	CAP. 6.8µF, 20V, T368	0296780006
C70	CAP. .02µF, 25V, Y5U/Y5P	0269130004
C71	CAP. 15µF, 15V, 196D	0281720002
C72	CAPACITOR 0.1µF, 50V, X7R	1011180014
C73	CAP. .01µF, 50V, X7R 20%	0281730008
C75	CAP. .01µF, 50V, X7R 20%	0281730008
C76	CAP. 220PF, 500V, DM10, 2%	1010870009
C77	CAPACITOR 0.1µF, 50V, X7R	1011180014
C78	CAP. 1µF, 35V, 196D	0281660000
C79	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C80	CAP. .01µF, 50V, X7R 20%	0281730008
C81	CAP.0.0047µF, 50V,5/10%	0281540004
C82	CAPACITOR 0.1µF, 50V, X7R	1011180014
C83	CAP. 6.8µF, 20V, T368	0296780006
C91	CAPACITOR 0.1µF, 50V, X7R	1011180014
C92	CAPACITOR 0.1µF, 50V, X7R	1011180014
C93	CAP. .01µF, 50V, X7R 20%	0281730008
C113	CAPACITOR 0.1µF, 50V, X7R	1011180014
C114	CAP. 15µF, 15V, 196D	0281720002
C115	CAP. .01µF, 50V, X7R 20%	0281730008
C116	CAP. .01µF, 50V, X7R 20%	0281730008
C117	CAP. 2.2µF, 35V, T368	0273950002
C118	CAPACITOR 0.1µF, 50V, X7R	1011180014
C122	CAPACITOR 0.1µF, 50V, X7R	1011180014
C123	CAPACITOR 0.1µF, 50V, X7R	1011180014
C124	CAP. 0.0033µF, 100V, NPO, 10%	0282580000
C127	CAPACITOR 0.1µF, 50V, X7R	1011180014
C128	CAPACITOR 0.1µF, 50V, X7R	1011180014
C129	CAPACITOR 0.1µF, 50V, X7R	1011180014
C130	CAPACITOR 0.1µF, 50V, X7R	1011180014
C132	CAPACITOR 0.1µF, 50V, X7R	1011180014
C133	CAP. 15µF, 35V	0282240004
C134	CAPACITOR 0.1µF, 50V, X7R	1011180014
C135	CAP. 22µF, 15V, T368	0296660001
C136	CAPACITOR 0.1µF, 50V, X7R	1011180014
C137	CAP. 22µF, 15V, T368	0296660001
C138	CAPACITOR 0.1µF, 50V, X7R	1011180014
C140	CAPACITOR 0.1µF, 50V, X7R	1011180014
C145	CAPACITOR 0.1µF, 50V, X7R	1011180014
C146	CAP. .01µF, 50V, X7R 20%	0281730008
C150	CAPACITOR 0.1µF, 50V, X7R	1011180014
C152	CAPACITOR 0.1µF, 50V, X7R	1011180014
C157	CAP. .01µF, 50V, X7R 20%	0281730008
C158	CAP. 10PF, 500V, DM10	0259830003
C159	CAP. 10PF, 500V, DM10	0259830003
C160	CAP. .01µF, 50V, X7R 20%	0281730008
C161	CAPACITOR 0.1µF, 50V, X7R	1011180014
C162	CAP. 1µF, 35V, 196D	0281660000
C163	CAPACITOR 0.1µF, 50V, X7R	1011180014
C164	CAP. .01µF, 50V, X7R 20%	0281730008
C165	CAP. 10PF, 500V, DM10	0259830003
C166	CAP. 1µF, 35V, 196D	0281660000
C167	CAP. .01µF, 50V, X7R 20%	0281730008
C168	CAP. 10PF, 500V, DM10	0259830003
C169	CAPACITOR 0.1µF, 50V, X7R	1011180014
C170	CAP. .01µF, 50V, X7R 20%	0281730008
C171	CAP. 15µF, 35V	0282240004
C182	CAP. .01µF, 50V, X7R 20%	0281730008
C183	CAP. 1µF, 35V, 196D	0281660000
C184	CAPACITOR 0.1µF, 50V, X7R	1011180014
C185	CAP. .01µF, 50V, X7R 20%	0281730008
C186	CAP. 10PF, 500V, DM10	0259830003
C187	CAP. 10PF, 500V, DM10	0259830003
C188	CAP. .01µF, 50V, X7R 20%	0281730008
C189	CAP. 1µF, 35V, 196D	0281660000
C190	CAP. 110PF, 500V, DM10, 5%	0257750002
C191	CAP. 110PF, 500V, DM10, 5%	0257750002
C192	CAP. .01µF, 50V, X7R 20%	0281730008
C193	CAPACITOR 0.1µF, 50V, X7R	1011180014
C194	CAPACITOR 0.1µF, 50V, X7R	1011180014
C195	CAP. 22µF, 15V, T368	0296660001
C196	CAPACITOR 0.1µF, 50V, X7R	1011180014
C197	CAP. 22µF, 15V, T368	0296660001
C198	CAP. .01µF, 50V, X7R 20%	0281730008
C199	CAP. .01µF, 50V, X7R 20%	0281730008
C200	CAPACITOR 0.1µF, 50V, X7R	1011180014
C201	CAP. 22µF, 15V, T368	0296660001
C202	CAPACITOR 0.1µF, 50V, X7R	1011180014
C203	CAP. .01µF, 50V, X7R 20%	0281730008
C206	CAP. .01µF, 50V, X7R 20%	0281730008
C207	CAP. .01µF, 50V, X7R 20%	0281730008
C208	CAPACITOR 0.1µF, 50V, X7R	1011180014
C209	CAP. 10µF, 20V	1007290005
C215	CAP. .01µF, 50V, X7R 20%	0281730008
C216	CAP. .01µF, 50V, X7R 20%	0281730008
C217	CAP. .01µF, 50V, X7R 20%	0281730008
C218	CAP. .01µF, 50V, X7R 20%	0281730008
C219	CAP. 6.8µF, 20V, T368	0296780006
C220	CAP. .01µF, 50V, X7R 20%	0281730008
C221	CAP. .01µF, 50V, X7R 20%	0281730008
C222	CAP. .01µF, 50V, X7R 20%	0281730008
C223	CAP. .01µF, 50V, X7R 20%	0281730008
C224	CAP. .01µF, 50V, X7R 20%	0281730008
C225	CAP. .01µF, 50V, X7R 20%	0281730008
C226	CAP. 15µF, 15V, 196D	0281720002
C227	CAP. .01µF, 50V, X7R 20%	0281730008
C229	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C230	CAPACITOR 0.1µF, 50V, X7R	1011180014
C231	CAPACITOR 0.1µF, 50V, X7R	1011180014
C232	CAPACITOR 0.1µF, 50V, X7R	1011180014
C233	CAPACITOR 0.1µF, 50V, X7R	1011180014
C234	CAPACITOR 0.1µF, 50V, X7R	1011180014
C235	CAPACITOR 0.1µF, 50V, X7R	1011180014
C236	CAPACITOR 0.1µF, 50V, X7R	1011180014
C237	CAPACITOR 0.1µF, 50V, X7R	1011180014
C238	CAPACITOR 0.1µF, 50V, X7R	1011180014
C239	CAPACITOR 0.1µF, 50V, X7R	1011180014
C240	CAPACITOR 0.1µF, 50V, X7R	1011180014
C241	CAPACITOR 0.1µF, 50V, X7R	1011180014
C242	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C243	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C244	CAPACITOR 0.1µF, 50V, X7R	1011180014
C245	CAPACITOR 0.1µF, 50V, X7R	1011180014
C246	CAPACITOR 0.1µF, 50V, X7R	1011180014
C247	CAPACITOR 0.1µF, 50V, X7R	1011180014
C248	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C249	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C250	CAPACITOR 0.1µF, 50V, X7R	1011180014
C253	CAP. 6.8µF, 20V, T368	0296780006
C254	CAPACITOR 0.1µF, 50V, X7R	1011180014
C255	CAP. .01µF, 50V, X7R 20%	0281730008
C256	CAP. .02µF, 25V, Y5U/Y5P	0269130004
C257	CAP. 15µF, 15V, 196D	0281720002
C258	CAP. 22µF, 15V, T368	0296660001
C260	CAP. .01µF, 50V, X7R 20%	0281730008
C261	CAPACITOR 0.1µF, 50V, X7R	1011180014
C263	CAPACITOR 0.1µF, 50V, X7R	1011180014
C264	CAPACITOR 0.1µF, 50V, X7R	1011180014
C265	CAP. .47µF, 50V, X7R 20%	0283377771
C266	CAP. .47µF, 50V, X7R 20%	0283377771
C267	CAP. .47µF, 50V, X7R 20%	0283377771
C268	CAPACITOR 0.1µF, 50V, X7R	1011180014
C269	CAP. .01µF, 50V, X7R 20%	0281730008
C270	CAP. .01µF, 50V, X7R 20%	0281730008
C271	CAPACITOR 0.1µF, 50V, X7R	1011180014
C273	CAP. .01µF, 50V, X7R 20%	0281730008
C274	CAP. 1µF, 35V, 196D	0281660000

Figure 5.9.14 PC Assembly, IF 1A2A4, page 1/8.

C275	CAP. .01µF, 50V, X7R 20%	0281730008
C276	CAP. 110PF, 500V, DM10, 5%	0257750002
C277	CAP. 180PF, 500V, DM10, 5%	0294100008
C278	CAP. 110PF, 500V, DM10, 5%	0257750002
C279	CAP. 110PF, 500V, DM10, 5%	0257750002
C280	CAP. 180PF, 500V, DM10, 5%	0294100008
C281	CAP. 110PF, 500V, DM10, 5%	0257750002
C282	CAP. .01µF, 50V, X7R 20%	0281730008
C283	CAP. .01µF, 50V, X7R 20%	0281730008
C284	CAP. .01µF, 50V, X7R 20%	0281730008
C286	CAP. 10µF, 20V	1007290005
C288	CAP. 110PF, 500V, DM10, 5%	0257750002
C289	CAP. 2.2µF, 35V, T368	0273950002
CR1	DIODE, PIN 1N5767	0405570007
CR2	DIODE, PIN 1N5767	0405570007
CR3	DIODE, PIN 1N5767	0405570007
CR4	DIODE, PIN 1N5767	0405570007
CR6	DIODE, PIN 1N5767	0405570007
CR7	DIODE, PIN 1N5767	0405570007
CR9	DIODE, SIGNAL, SIL 1N4454	0405270003
CR10	DIODE, SIGNAL, SIL 1N4454	0405270003
CR14	DIODE, PIN 1N5767	0405570007
CR16	DIODE, PIN 1N5767	0405570007
CR17	DIODE, SIGNAL, SIL 1N4454	0405270003
CR18	DIODE, SIGNAL, SIL 1N4454	0405270003
CR19	DIODE, LED, RED, PC MOUNT	1008480029
CR20	DIODE, HOT CARRIER 1N6263	0405610009
CR22	DIODE, HOT CARRIER 1N6263	0405610009
CR23	DIODE, HOT CARRIER 1N6263	0405610009
CR24	DIODE, HOT CARRIER 1N6263	0405610009
CR25	DIODE, SIGNAL, SIL 1N4454	0405270003
CR26	DIODE, PIN 1N5767	0405570007
CR27	DIODE, PIN 1N5767	0405570007
CR28	DIODE, PIN 1N5767	0405570007
CR29	DIODE, PIN 1N5767	0405570007
CR30	DIODE, PIN 1N5767	0405570007
CR31	DIODE, PIN 1N5767	0405570007
CR32	DIODE, PIN 1N5767	0405570007
CR33	DIODE, PIN 1N5767	0405570007
CR34	DIODE, PIN 1N5767	0405570007
CR35	DIODE, PIN 1N5767	0405570007
CR39	DIODE, PIN 1N5767	0405570007
CR40	DIODE, PIN 1N5767	0405570007
CR41	DIODE, HOT CARRIER 1N6263	0405610009
CR42	DIODE, HOT CARRIER 1N6263	0405610009
CR43	DIODE, HOT CARRIER 1N6263	0405610009
CR44	DIODE, PIN 1N5767	0405570007
CR48	DIODE, PIN 1N5767	0405570007
CR49	DIODE, PIN 1N5767	0405570007
CR50	DIODE, PIN 1N5767	0405570007
CR51	DIODE, PIN 1N5767	0405570007
CR52	DIODE, PIN 1N5767	0405570007
CR53	DIODE, PIN 1N5767	0405570007
CR54	DIODE, PIN 1N5767	0405570007
CR55	DIODE, PIN 1N5767	0405570007
CR56	DIODE, PIN 1N5767	0405570007
CR57	DIODE, PIN 1N5767	0405570007
CR58	DIODE, PIN 1N5767	0405570007
CR59	DIODE, PIN 1N5767	0405570007
CR60	DIODE, SIGNAL, SIL 1N4454	0405270003
CR61	DIODE, SIGNAL, SIL 1N4454	0405270003
CR62	DIODE, SIGNAL, SIL 1N4454	0405270003
CR63	DIODE, SIGNAL, SIL 1N4454	0405270003
CR64	DIODE, SIGNAL, SIL 1N4454	0405270003
CR66	DIODE, SIGNAL, SIL 1N4454	0405270003
CR67	DIODE, HOT CARRIER 1N6263	0405610009
CR68	DIODE, SIGNAL, SIL 1N4454	0405270003
CR69	DIODE, SIGNAL, SIL 1N4454	0405270003
FB1	FERRITE BEAD, 5000 PERM	1010980017
FB2	FERRITE BEAD, 5000 PERM	1010980017
FL1	FILTER,CRYSTAL 48.305 MHZ	1010430017
FL2	FILTER, LSB (USB OPERATION)	8076082501
FL3	FILTER, USB (LSB OPERATION)	8076083303
FL4	FILTER,CERAMIC, AM 455KHZ	1010380010
L1	INDUCTOR, MOLDED, 8.2µH, 5%	0652060005
L2	INDUCTOR, MOLDED, 0.68µH, 5%	0649030001
L4	INDUCTOR, MOLDED, 150µH, 5%	0659190001
L5	INDUCTOR, MOLDED, 0.68µH, 5%	0649030001
L19	INDUCTOR, MOLDED, 8.2µH, 5%	0652060005
L20	INDUCTOR, MOLDED, 6.8µH, 5%	0659210002
L32	INDUCTOR, MOLDED, 1000µH, 10%	0664940005
L33	INDUCTOR, MOLDED, 47µH, 5%	0646420003
L34	CHOKE, POWER	8076104700
L35	CHOKE, POWER	8076104700
L36	CHOKE, POWER	8076104700
L37	INDUCTOR, MOLDED, 47µH, 5%	0646420003
L38	INDUCTOR, MOLDED, 15µH, 5%	0659070006
L39	INDUCTOR, MOLDED, 15µH, 5%	0659070006
L40	INDUCTOR, MOLDED, 15µH, 5%	0659070006
L42	INDUCTOR, MOLDED, 1000µH, 10%	0664940005
L43	INDUCTOR, MOLDED, 1000µH, 10%	0664940005
L47	INDUCTOR, MOLDED, 8.2µH, 5%	0652060005
L49	INDUCTOR, MOLDED, 1000µH, 10%	0664940005
L50	INDUCTOR, MOLDED, 1000µH, 10%	0664940005
L51	INDUCTOR, MOLDED, 1000µH, 10%	0664940005
L52	INDUCTOR, MOLDED, 1000µH, 10%	0664940005
L53	INDUCTOR, MOLDED, 8.2µH, 5%	0652060005
L58	INDUCTOR, MOLDED, 150µH, 5%	0659190001
L59	INDUCTOR, MOLDED, 1000µH, 10%	0664940005
L60	INDUCTOR, MOLDED, 1000µH, 10%	0664940005
L61	INDUCTOR, MOLDED, 0.18µH, 5%	0648740005
L62	INDUCTOR, MOLDED, 0.18µH, 5%	0648740005
L63	INDUCTOR, MOLDED, 0.18µH, 5%	0648740005
L64	INDUCTOR, MOLDED, 0.18µH, 5%	0648740005
P3	CONNECTOR, RF,RIGHT ANGLE	1010730002
P4	CONNECTOR, RF,RIGHT ANGLE	1010730002
P5	CONNECTOR, RF,RIGHT ANGLE	1010730002
Q4	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q10	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q12	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q13	TRANSISTOR, N-CH. FET 2N5457	1010120026
Q15	TRANSISTOR, N-CH. FET 2N5457	1010120026
Q16	TRANSISTOR, N-CH. FET 2N5457	1010120026
Q17	TRANSISTOR, N-CH. FET 2N5457	1010120026
Q18	TRANSISTOR, N-CH. FET U310	1007050039
Q19	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q20	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q21	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q22	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q23	TRANSISTOR, N-CH, FET 2N7000	1011050013
Q24	TRANSISTOR, NPN, SI. 2N2222A	0448580004
Q25	TRANSISTOR, NPN, SI. 2N2222A	0448580004
R1	RESISTOR 820, 5%, 1/8W	1010808214
R2	RESISTOR 820, 5%, 1/8W	1010808214
R3	RESISTOR 820, 5%, 1/8W	1010808214
R4	RESISTOR 820, 5%, 1/8W	1010808214
R5	RESISTOR 820, 5%, 1/8W	1010808214
R6	RESISTOR 820, 5%, 1/8W	1010808214
R13	RESISTOR 270, 5%, 1/8W	1010802712
R14	RESISTOR 18, 5%, 1/8W	1010801805
R15	RESISTOR 270, 5%, 1/8W	1010802712
R18	RESISTOR 10K, 5%, 1/8W	1010801031
R19	RESISTOR 10K, 5%, 1/8W	1010801031
R20	RESISTOR 2.2K, 5%, 1/8W	1010802224
R22	RESISTOR 820, 5%, 1/8W	1010808214
R23	RESISTOR 820, 5%, 1/8W	1010808214
R24	RESISTOR 820, 5%, 1/8W	1010808214
R25	POT. 10K, 10% 1/2W, 25 TURNS	1004880014
R33	RESISTOR 12K, 5%, 1/8W	1010801236
R34	RESISTOR 12K, 5%, 1/8W	1010801236
R35	RESISTOR 1.2K, 5%, 1/8W	1010801228
R36	RESISTOR 100K, 5%, 1/8W	1010801040
R37	RESISTOR 12K, 5%, 1/8W	1010801236
R38	RESISTOR 390, 5%, 1/8W	1010803913
R39	RESISTOR 10K, 5%, 1/8W	1010801031
R42	RESISTOR 12K, 5%, 1/8W	1010801236
R43	RESISTOR 3.3K, 5%, 1/8W	1010803328
R44	RESISTOR 560, 5%, 1/8W	1010805614
R45	RESISTOR 22, 5%, 1/8W	1010802208
R46	POT., 200, 10%, 1/2W, 4T	1010190024
R47	RESISTOR 12K, 5%, 1/8W	1010801236
R48	RESISTOR 1K, 5%, 1/8W	1010801023
R49	RESISTOR 1.5K, 5%, 1/8W	1010801520
R50	RESISTOR 100, 5%, 1/8W	1010801015
R62	RESISTOR 10K, 5%, 1/8W	1010801031
R85	RESISTOR 1.5K, 5%, 1/8W	1010801520
R86	POT. 10K, 10% 1/2W, 25 TURNS	1004880014
R87	RESISTOR 10K, 5%, 1/8W	1010801031
R89	RESISTOR 10K, 5%, 1/8W	1010801031
R90	POT. 10K, 10% 1/2W, 25 TURNS	1004880014
R91	RESISTOR 10K, 5%, 1/8W	1010801031
R92	RESISTOR 31.6K 1%, 1/8W	1004050020
R93	POT. 10K, 10% 1/2W, 25 TURNS	1004880014
R94	RESISTOR 31.6K 1%, 1/8W	1004050020
R95	RESISTOR 100, 5%, 1/8W	1010801015
R96	RESISTOR 100, 5%, 1/8W	1010801015
R97	RESISTOR 820, 5%, 1/8W	1010808214
R98	RESISTOR 1K, 5%, 1/8W	1010801023
R99	RESISTOR 68, 5%, 1/8W	1010806807
R100	RESISTOR 100, 5%, 1/8W	1010801015
R101	RESISTOR 1.2K, 5%, 1/8W	1010801228
R102	RESISTOR 1K, 5%, 1/8W	1010801023
R103	RESISTOR 2.7K, 5%, 1/8W	1010802721
R104	RESISTOR 2.7K, 5%, 1/8W	1010802721
R105	RESISTOR 10K, 5%, 1/8W	1010801031
R106	RESISTOR 68, 5%, 1/8W	1010806807
R107	RESISTOR 39, 5% 1/8W	1010803905
R110	RESISTOR 1K, 5%, 1/8W	1010801023
R111	RESISTOR 1K, 5%, 1/8W	1010801023
R112	RESISTOR 1K, 5%, 1/8W	1010801023
R113	RESISTOR 820, 5%, 1/8W	1010808214
R114	RESISTOR 100, 5%, 1/8W	1010801015
R115	RESISTOR 1.2K, 5%, 1/8W	1010801228

Figure 5.9.14 PC Assembly, IF 1A2A4, page 2/8.

R116	RESISTOR 10K, 5%, 1/8W	1010801031
R117	RESISTOR 2.7K, 5%, 1/8W	1010802721
R118	RESISTOR 1.2K, 5%, 1/8W	1010801228
R119	RESISTOR 2.7K, 5%, 1/8W	1010802721
R120	RESISTOR 100, 5%, 1/8W	1010801015
R121	RESISTOR 10K, 5%, 1/8W	1010801031
R122	RESISTOR 10K, 5%, 1/8W	1010801031
R123	RESISTOR 47K, 5%, 1/8W	1010804731
R124	RESISTOR 120K, 5%, 1/8W	1010801244
R139	RESISTOR 1.5K, 10%, 1/4W	0172470005
R140	RESISTOR 10K, 5%, 1/8W	1010801031
R142	POT. 10K, 10% 1/2W, 25 TURNS	1004880014
R143	RESISTOR 12K, 5%, 1/8W	1010801236
R144	RESISTOR 120K, 5%, 1/8W	1010801244
R145	POT. 100K, 10% 1/2W, 25 TURNS	1004820011
R146	POT. 2K, 10% 3/4W, 15 TURNS	0338490060
R147	RESISTOR 10K, 5%, 1/8W	1010801031
R148	RESISTOR 1K, 5%, 1/8W	1010801023
R149	RESISTOR 270, 5%, 1/8W	1010802712
R152	RESISTOR 1K, 5%, 1/8W	1010801023
R153	POT. 100K, 10% 3/4W, 15 TURNS	0338490051
R154	RESISTOR 10K, 5%, 1/8W	1010801031
R155	RESISTOR 10K, 5%, 1/8W	1010801031
R156	RESISTOR 12K, 5%, 1/8W	1010801236
R157	RESISTOR 120K, 5%, 1/8W	1010801244
R158	RESISTOR 100K, 5%, 1/8W	1010801040
R159	RESISTOR 10, 5%, 1/8W	1010801007
R160	RESISTOR 1.8K, 5%, 1/8W	1010801821
R161	RESISTOR 10K, 5%, 1/8W	1010801031
R162	RESISTOR 22K, 5%, 1/8W	1010802232
R163	RESISTOR 6040, 1%, 1/8W	1010580019
R164	RESISTOR 1M, 10%, 1/4W	0170650006
R165	RESISTOR 270, 5%, 1/8W	1010802712
R166	RESISTOR 1K, 5%, 1/8W	1010801023
R167	RESISTOR 1K, 5%, 1/8W	1010801023
R171	RESISTOR 1K, 5%, 1/8W	1010801023
R172	RESISTOR 1M, 10%, 1/4W	0170650006
R173	RESISTOR 270, 5%, 1/8W	1010802712
R174	RESISTOR 220, 5%, 1/8W	1010802216
R175	RESISTOR 3.3K, 5%, 1/8W	1010803328
R176	RESISTOR, 3010, 1%, 1/8W	1010570013
R177	RESISTOR, 6040, 1%, 1/8W	1010580019
R178	RESISTOR, 3010, 1%, 1/8W	1010570013
R179	RESISTOR, 6040, 1%, 1/8W	1010580019
R181	RESISTOR 1.5K, 5%, 1/8W	1010801520
R182	RESISTOR 1.91K 1%, 1/8W	1008530018
R183	RESISTOR, 3010, 1%, 1/8W	1010570013
R184	RESISTOR, 6040, 1%, 1/8W	1010580019
R185	RESISTOR 1K, 5%, 1/8W	1010801023
R186	POT. 100K, 10% 1/2W, 25 TURNS	1004820011
R187	RESISTOR 5.6K, 5%, 1/8W	1010805622
R188	RESISTOR 10K, 5%, 1/8W	1010801031
R189	RESISTOR 10K, 5%, 1/8W	1010801031
R190	RESISTOR 10K, 5%, 1/8W	1010801031
R191	RESISTOR 10K, 5%, 1/8W	1010801031
R192	RESISTOR 10K, 5%, 1/8W	1010801031
R193	RESISTOR 10K, 5%, 1/8W	1010801031
R198	RESISTOR 1K, 5%, 1/8W	1010801023
R199	RESISTOR 1K, 5%, 1/8W	1010801023
R200	RESISTOR 4.7K, 5%, 1/8W	1010804723
R201	RESISTOR 4.7K, 5%, 1/8W	1010804723

R202	RESISTOR 10K, 5%, 1/8W	1010801031
R203	RESISTOR 10K, 5%, 1/8W	1010801031
R204	POT. 2K, 10% 3/4W, 15 TURNS	0338490060
R211	RESISTOR 150, 5%, 1/8W	1010801511
R212	RESISTOR 150, 5%, 1/8W	1010801511
R213	RESISTOR 4.7K, 5%, 1/8W	1010804723
R214	RESISTOR 4.7K, 5%, 1/8W	1010804723
R215	RESISTOR 47K, 5%, 1/8W	1010804731
R217	RESISTOR 100, 5%, 1/8W	1010801015
R218	RESISTOR 100, 5%, 1/8W	1010801015
R221	RESISTOR 560K, 5%, 1/8W	1010805649
R222	RESISTOR 5.6K, 5%, 1/8W	1010805622
R223	RESISTOR 5.6K, 5%, 1/8W	1010805622
R224	RESISTOR 10, 5%, 1/8W	1010801007
R225	RESISTOR 1.8K, 5%, 1/8W	1010801821
R226	RESISTOR 47K, 5%, 1/8W	1010804731
R227	RESISTOR 47K, 5%, 1/8W	1010804731
R228	RESISTOR 27K, 5%, 1/8W	1010802739
R229	RESISTOR 47K, 5%, 1/8W	1010804731
R230	RESISTOR 68K, 5%, 1/8W	1010806831
R231	RESISTOR 3.3K, 5%, 1/8W	1010803328
R232	RESISTOR 4.7K, 5%, 1/8W	1010804723
R235	RESISTOR 47, 5%, 1/8W	1010804707
R236	RESISTOR 1.5K, 5%, 1/8W	1010801520
R237	RESISTOR 1.8K, 5%, 1/8W	1010801821
R238	RESISTOR 2.2K, 5%, 1/8W	1010802224
R239	RESISTOR 2.2K, 5%, 1/8W	1010802224
R240	RESISTOR 100, 5%, 1/8W	1010801015
R241	RESISTOR 100, 10%, 1W	0165540001
R242	RESISTOR 47, 5%, 1/8W	1010804707
R243	RESISTOR 1.5K, 5%, 1/8W	1010801520
R244	RESISTOR 1.8K, 5%, 1/8W	1010801821
R245	RESISTOR 2.2K, 5%, 1/8W	1010802224
R246	RESISTOR 2.2K, 5%, 1/8W	1010802224
R247	RESISTOR 220, 10%, 1/2W	0172850002
R248	RESISTOR 10K, 5%, 1/8W	1010801031
R249	RESISTOR 10K, 5%, 1/8W	1010801031
R250	RESISTOR 270, 5%, 1/8W	1010802712
R251	POT., 200, 10%, 1/2W, 4T	1010190024
R252	RESISTOR 47, 5%, 1/8W	1010804707
R253	RESISTOR 47, 5%, 1/8W	1010804707
R254	RESISTOR 1.8K, 5%, 1/8W	1010801821
R255	RESISTOR 1.5K, 5%, 1/8W	1010801520
R256	RESISTOR 2.2K, 5%, 1/8W	1010802224
R257	RESISTOR 2.2K, 5%, 1/8W	1010802224
R258	RESISTOR 100, 5%, 1/8W	1010801015
R259	RESISTOR 220, 10%, 1/2W	0172850002
R260	RESISTOR 47, 5%, 1/8W	1010804707
R261	RESISTOR 1.8K, 5%, 1/8W	1010801821
R262	RESISTOR 1.8K, 5%, 1/8W	1010801821
R263	RESISTOR 2.2K, 5%, 1/8W	1010802224
R264	RESISTOR 2.2K, 5%, 1/8W	1010802224
R265	RESISTOR 100, 5%, 1/8W	1010801015
R266	RESISTOR 220, 10%, 1/2W	0172850002
R267	RESISTOR 220, 10%, 1/2W	0172850002
R268	RESISTOR 47, 5%, 1/8W	1010804707
R269	RESISTOR 100K, 5%, 1/8W	1010801040
R270	RESISTOR 1K, 5%, 1/8W	1010801023
R271	RESISTOR 1M, 10%, 1/4W	0170650006
R272	RESISTOR 1K, 5%, 1/8W	1010801023
R273	RESISTOR 8.2K, 5%, 1/8W	1010808222

R274	RESISTOR, 3.9K, 5%, 1/8W	1010803921
R275	RESISTOR 18K, 5%, 1/8W	1010801830
R276	RESISTOR 18K, 5%, 1/8W	1010801830
R277	RESISTOR 22K, 5%, 1/8W	1010802232
R278	RESISTOR 33K, 5%, 1/8W	1010803336
R279	RESISTOR 47K, 5%, 1/8W	1010804731
R280	RESISTOR 2.2M, 10%, 1/4W	0176870008
R281	RESISTOR 10, 5%, 1/8W	1010801007
R282	RESISTOR 10K, 5%, 1/8W	1010801031
R283	RESISTOR 1K, 5%, 1/8W	1010801023
R284	RESISTOR 10K, 5%, 1/8W	1010801031
R285	RESISTOR 4.7K, 5%, 1/8W	1010804723
R286	RESISTOR 1K, 5%, 1/8W	1010801023
R287	RESISTOR 10K, 5%, 1/8W	1010801031
R288	RESISTOR 2.7K, 5%, 1/8W	1010802721
R289	RESISTOR 22K, 5%, 1/8W	1010802232
R290	RESISTOR 10K, 5%, 1/8W	1010801031
R291	RESISTOR 4.7K, 5%, 1/8W	1010804723
R292	RESISTOR 15K, 5%, 1/8W	1010801538
R296	RESISTOR 47K, 5%, 1/8W	1010804731
R297	RESISTOR 10K, 5%, 1/8W	1010801031
R299	RESISTOR 4.7K, 5%, 1/8W	1010804723
R300	RESISTOR 1M, 10%, 1/4W	0170650006
RP1	RES NTWK 6 PIN SIP 4.7K COM	1006200037
U1	IC, LINEAR LM6321	1010710010
U2	IC. LINEAR LM311N	1005760021
U4	IC. LINEAR CA3086	0447950002
U9	IC. LINEAR LM324N	1003970001
U10	IC. DIGITAL IH5041	1010130013
U11	IC. LINEAR LF-347	1007500026
U12	IC.LINEAR MC1596L	1010050028
U13	IC.LINEAR MC1596L	1010050028
U15	IC. DIGITAL 4081B	1006280031
U16	IC. DIGITAL UDN-2981	1006330038
U17	IC. DIGITAL 4555B	1010560018
U18	IC. LINEAR LM317L	1010550012
U20	IC LINEAR MAR-4	1010900005
U23	IC. LINEAR LM324N	1003970001
U24	IC. LINEAR LM324N	1003970001
U25	IC LINEAR MAR-4	1010900005
U26	IC. LINEAR MWA130	1010380036
U27	IC. LINEAR MWA130	1010380036
U30	IC, LINEAR MSA1104	1010960016
U31	IC, LINEAR MAR-6	1010970011
U32	IC, LINEAR LM6321	1010710010
U33	IC, LINEAR MAR-6	1010970011
U34	IC, LINEAR MAR-6	1010970011
U35	IC, LINEAR MAR-6	1010970011
U36	IC. LINEAR LM324N	1003970001
U37	IC.LINEAR MC3358P1	1010110012
X1	MIXER, BROADBAND, BALANCED	1003300006
X2	MIXER, BROADBAND, BALANCED	1003300006
	COVER, TRANSMIT MIXER	8076081700
	COVER, SECOND IF AMP.	8076081807
	MOUNTING PLATE, IF ASSY	8076081602
	STANDOFF, F-F, 4-40 .500L	1003323901

Figure 5.9.14 PC Assembly, IF 1A2A4, page 3/8.

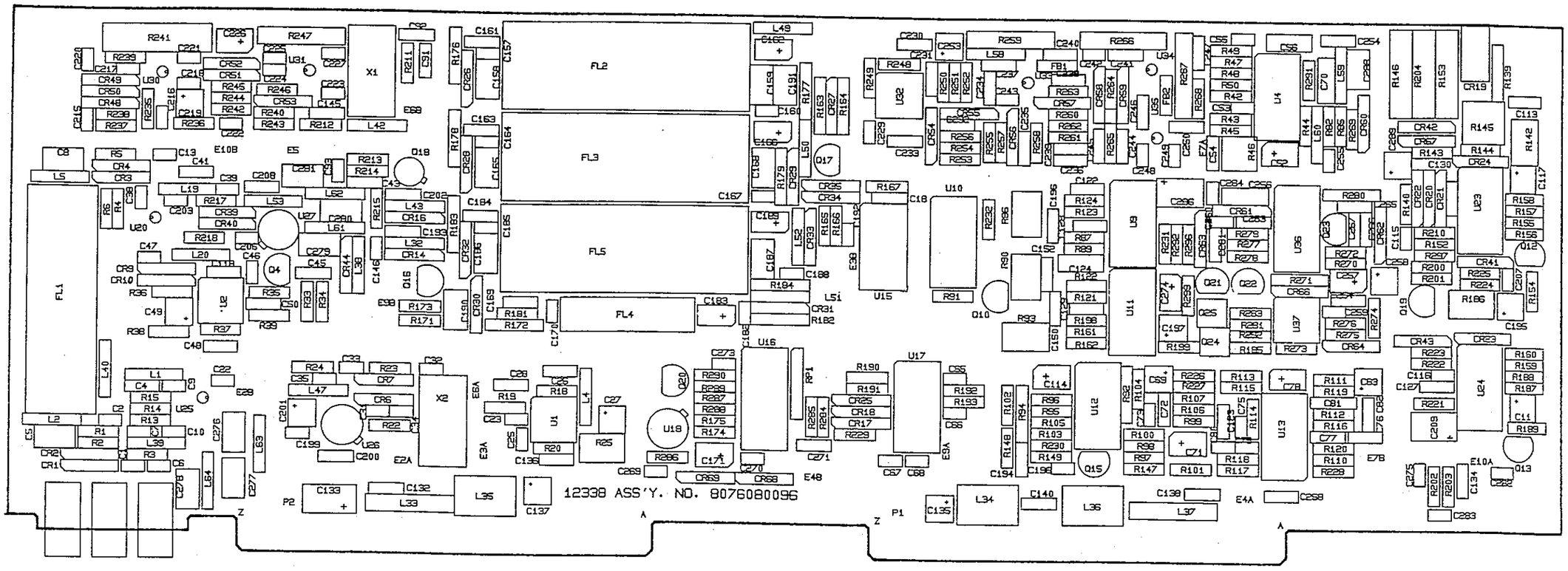
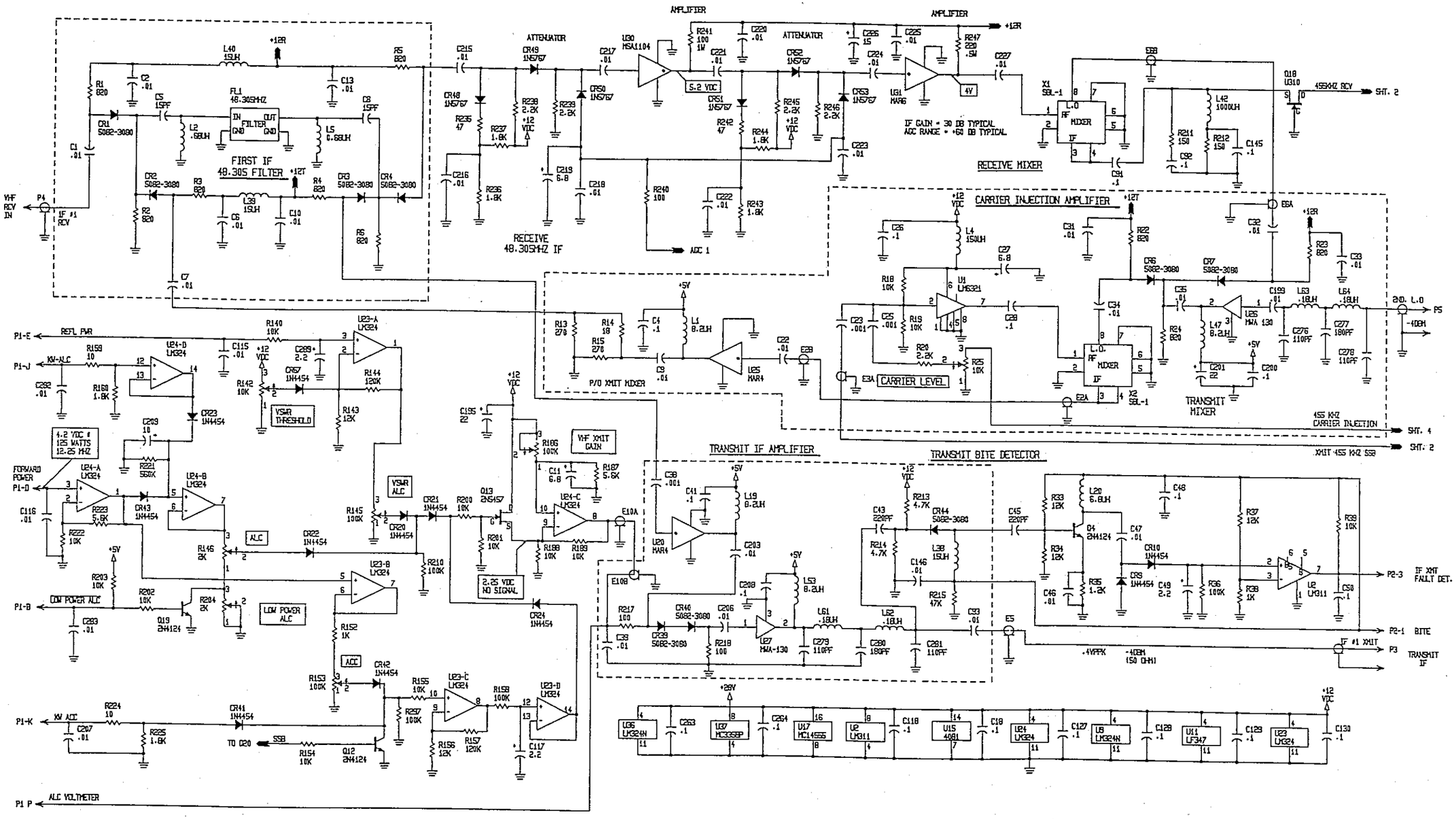


Figure 5.9.14 PC Assembly, IF 1A2A4, page 4/8.



NOTES:
1. UNLESS OTHERWISE SPECIFIED,
   A. RESISTOR VALUES ARE IN OHMS 1/4 WATT.
   B. CAPACITOR VALUES ARE IN MICRO-FARADS.
   C. COIL VALUES ARE IN MICRO-HENRIES.

Figure 5.9.14 PC Assembly, IF 1A2A4, page 5/8.

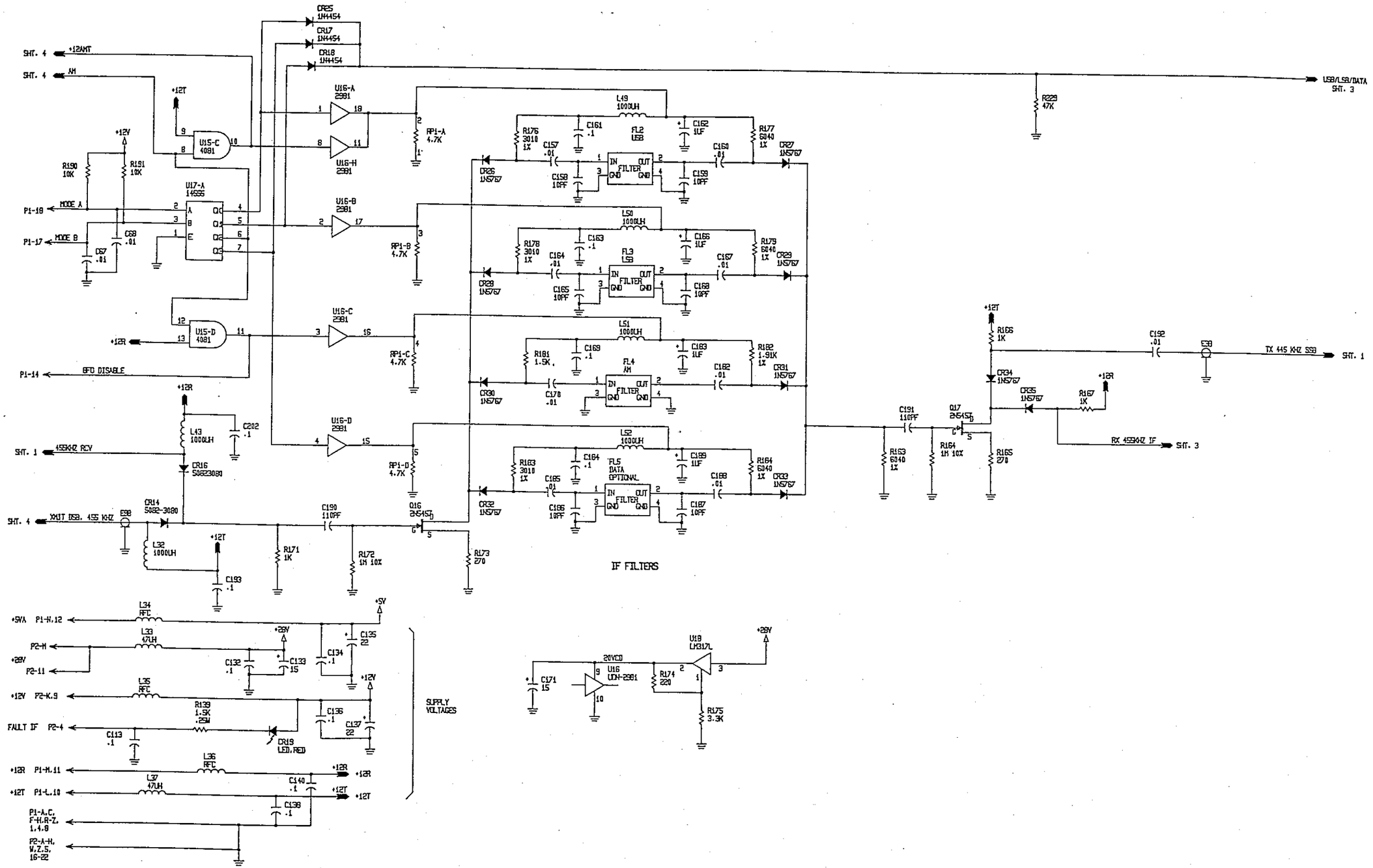


Figure 5.9.14 PC Assembly, IF 1A2A4, page 6/8.

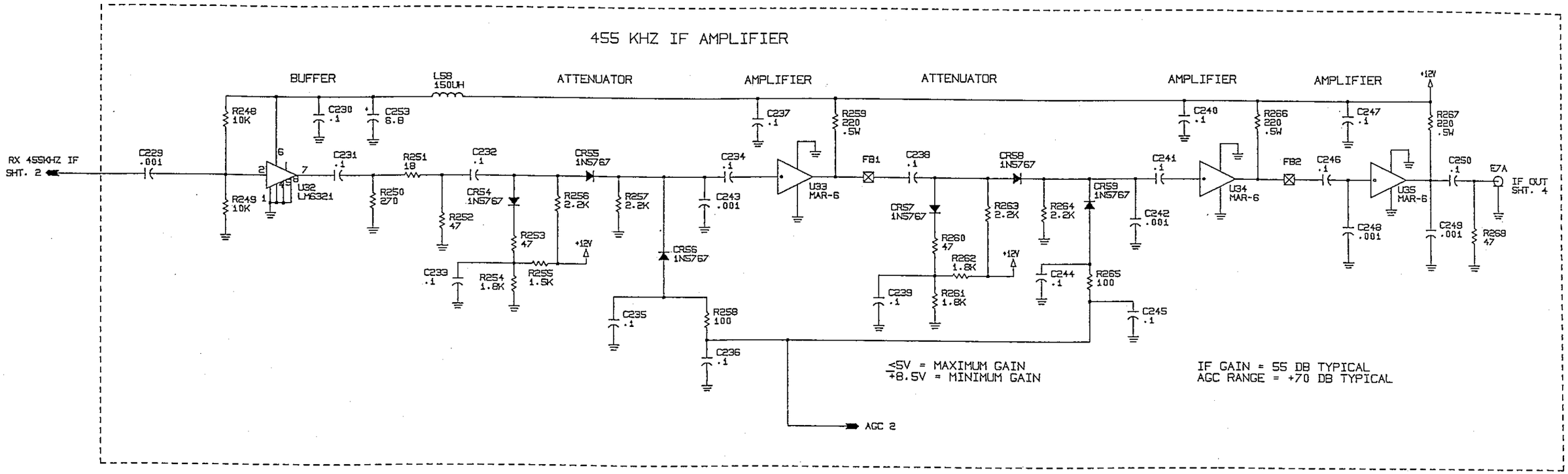


Figure 5.9.14 PC Assembly, IF 1A2A4, page 7/8.

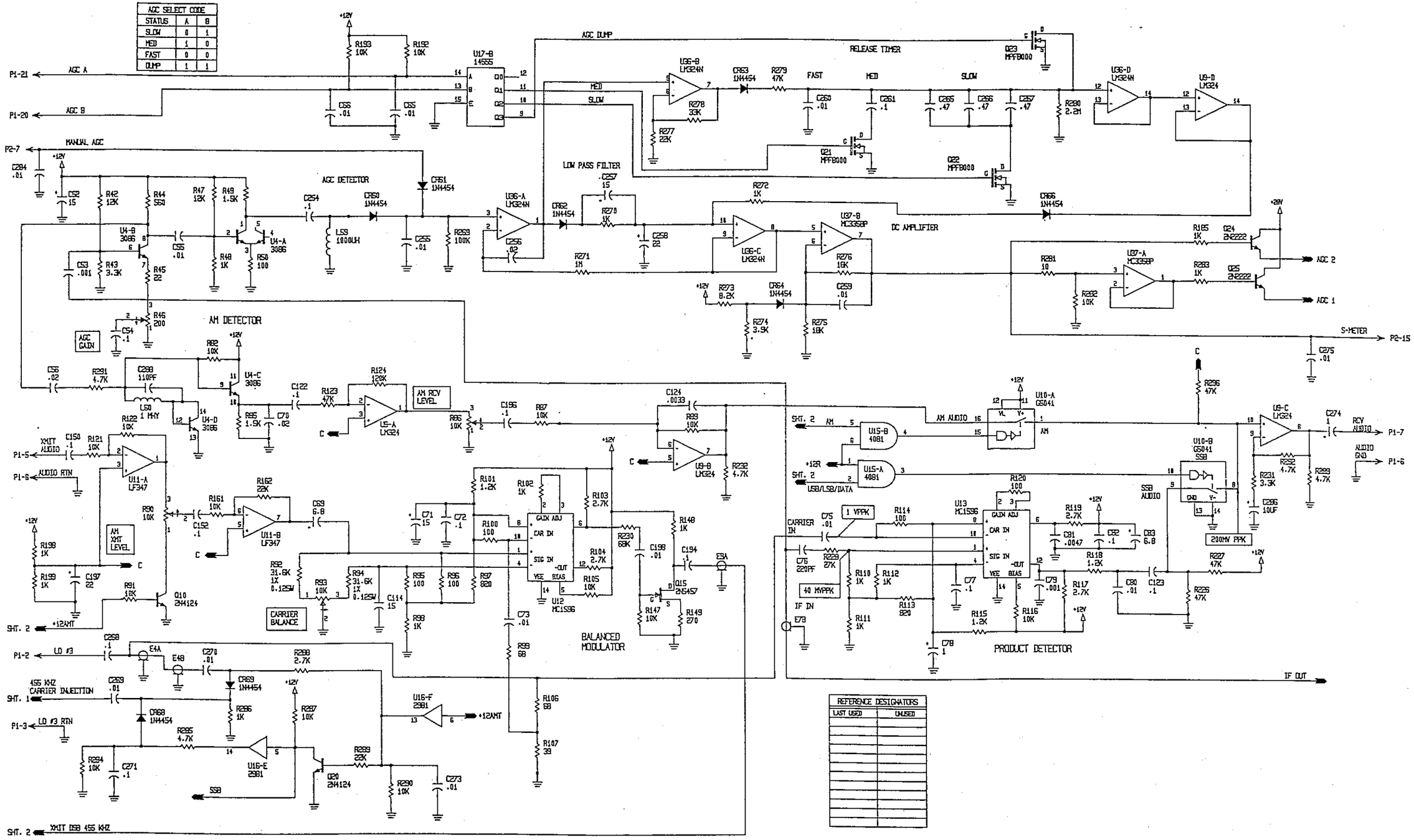
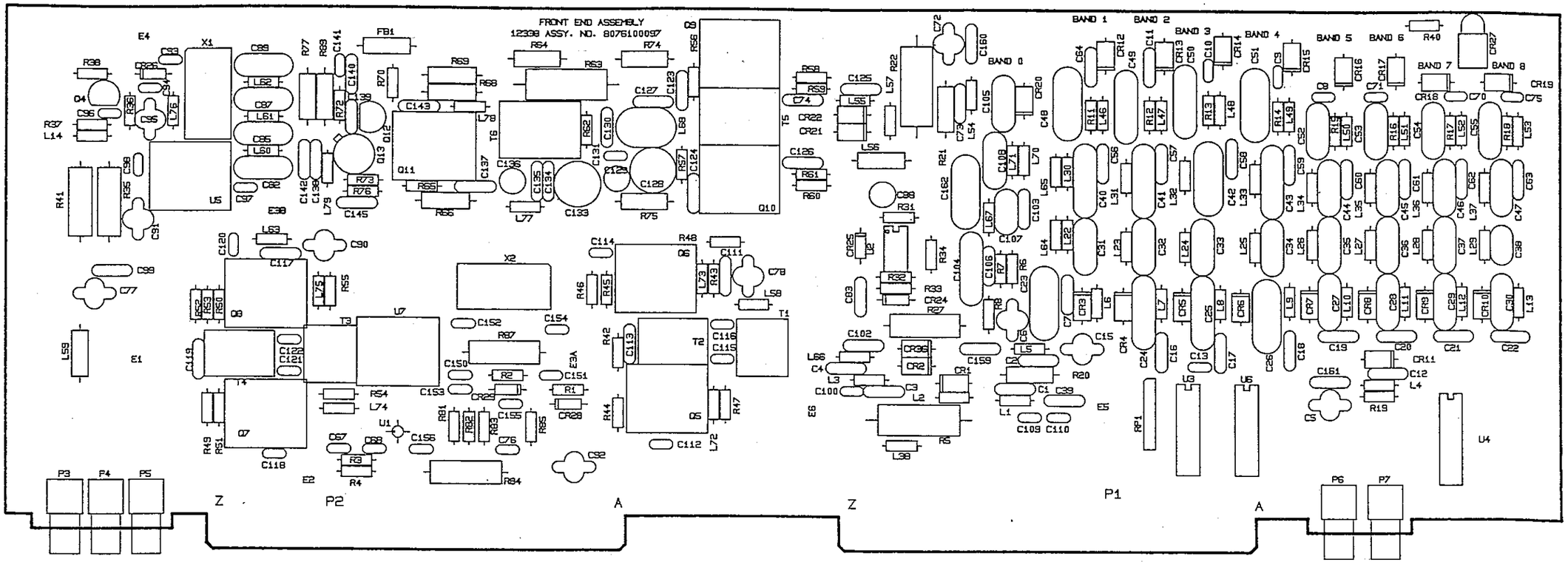


Figure 5.9.14 PC Assembly, IF 1A2A4, page 8/8.

PC ASSY, FRONT END 1A2A5

	PC ASSY, FRONT END 1A2A5	8076100097
C1	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C2	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C3	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C4	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C5	CAP. 1µF, 35V, 196D	0281660000
C6	CAP. 1µF, 35V, 196D	0281660000
C7	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C8	CAP. .01µF, 50V, X7R 20%	0281730008
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C10	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C12	CAP. .47µF, 50V, X7R 20%	0283377771
C13	CAP. .01µF, 50V, X7R 20%	0281730008
C15	CAP. 1µF, 35V, 196D	0281660000
C16	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C17	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C18	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C19	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C20	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C21	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C22	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C23	CAP. 1800PF, 500V, DM19, 2%	0281300003
C24	CAP. 1300PF, 500V, DM19, 2%	0281380007
C25	CAP. 910PF, 500V, DM19, 2%	0281450005
C26	CAP. 680PF, 500V, DM19, 2%	0282290001
C27	CAP. 430PF, 500V, DM15, 2%	0282370005
C28	CAP. 270PF, 500V, DM15, 2%	0280970005
C29	CAP. 200PF, 500V, DM15, 2%	1010430025
C30	CAP. 130PF, 500V, DM15, 2%	0281010005
C31	CAP. 230PF, 500V, DM15, 5%	0276200004
C32	CAP. 130PF, 500V, DM15, 2%	0281010005
C33	CAP. 120PF, 500V, DM15, 2%	0281180008
C34	CAP. 68PF, 500V, DM15, 2%	1000050041
C35	CAP. 43PF, 500V, DM15, 2%	1001240031
C36	CAP. 30PF, 500V, DM15, 2%	1010440021
C37	CAP. 22PF, 500V, CD15, 2%	1000050025
C38	CAP. 12PF, 500V, DM10, 5%	0260280003
C39	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C40	CAP. 1300PF, 500V, DM19, 2%	0281380007
C41	CAP. 1100PF, 500V, DM19, 2%	0281000000
C42	CAP. 680PF, 500V, DM19, 2%	0282290001
C43	CAP. 560PF, 500V, DM19, 2%	0281060002
C44	CAP. 360PF, 500V, DM15, 2%	0281160007
C45	CAP. 240PF, 500V, DM15, 2%	0281140006
C46	CAP. 160PF, 500V, DM15, 2%	1010460021
C47	CAP. 110PF, 500V, DM15, 2%	0281460001
C48	CAP. 1800PF, 500V, DM19, 2%	0281300003
C49	CAP. 1300PF, 500V, DM19, 2%	0281380007
C50	CAP. 910PF, 500V, DM19, 2%	0281450005
C51	CAP. 680PF, 500V, DM19, 2%	0282290001
C52	CAP. 430PF, 500V, DM15, 2%	0282370005
C53	CAP. 270PF, 500V, DM15, 2%	0280970005
C54	CAP. 200PF, 500V, DM15, 2%	1010430025
C55	CAP. 130PF, 500V, DM15, 2%	0281010005
C56	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C57	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C58	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C59	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C60	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C61	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C62	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C63	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C64	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C67	CAP. .01µF, 50V, X7R 20%	0281730008
C70	CAP. .01µF, 50V, X7R 20%	0281730008
C71	CAP. .01µF, 50V, X7R 20%	0281730008
C72	CAP. 22µF, 15V, 196D	0281690006
C73	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C74	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C75	CAP. .01µF, 50V, X7R 20%	0281730008
C76	CAP. .01µF, 50V, X7R 20%	0281730008
C77	CAP. 15µF, 35V	0282240004
C78	CAP. 1µF, 35V, 196D	0281660000
C82	CAP. 30PF, 500V, DM15, 2%	1010440021
C83	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C85	CAP. 130PF, 500V, DM15, 2%	0281010005
C87	CAP. 130PF, 500V, DM15, 2%	0281010005
C88	CAP. 2.2µF, 35V, T368	0273950002
C89	CAP. 30PF, 500V, DM15, 2%	1010440021
C90	CAP. 1µF, 35V, 196D	0281660000
C91	CAP. 22µF, 15V, 196D	0281690006
C92	CAP. 22µF, 15V, 196D	0281690006
C93	CAP. .01µF, 50V, X7R 20%	0281730008
C94	CAP. .01µF, 50V, X7R 20%	0281730008
C95	CAP. 22µF, 15V, 196D	0281690006
C96	CAP. .01µF, 50V, X7R 20%	0281730008
C97	CAP. .01µF, 50V, X7R 20%	0281730008
C98	CAP. .01µF, 50V, X7R 20%	0281730008
C99	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C100	CAP. .01µF, 50V, X7R 20%	0281730008
C102	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C103	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C104	CAP. 1000PF, 500V, DM19, 5%	0249270005
C105	CAP. 750PF, 300V, DM15, 5%	0275410005
C106	CAP. .47µF, 50V, X7R 20%	0283377771
C107	CAP. 220PF, 500V, DM15, 5%	0285957775
C108	CAP. 680PF, 300V, DM15, 5%	0286240009
C109	CAP. .01µF, 50V, X7R 20%	0281730008
C110	CAP. .01µF, 50V, X7R 20%	0281730008
C111	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C112	CAP. .01µF, 50V, X7R 20%	0281730008
C113	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C114	CAP. .01µF, 50V, X7R 20%	0281730008
C115	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C116	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C117	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C118	CAP. .01µF, 50V, X7R 20%	0281730008
C119	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C120	CAP. .01µF, 50V, X7R 20%	0281730008
C121	CAP. .01µF, 50V, X7R 20%	0281730008
C122	CAP. .01µF, 50V, X7R 20%	0281730008
C123	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C124	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C125	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C126	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C127	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C128	CAP. 47µF, 20V, 196D	0281700001
C129	CAP. 1µF, 35V, 196D	0281660000
C130	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C131	CAP. .01µF, 50V, X7R 20%	0281730008
C133	CAP. 47µF, 20V, 196D	0281700001
C134	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C135	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C136	CAP. 1µF, 35V, 196D	0281660000
C137	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C138	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C139	CAP. 150PF, 500V, DM10, 5%	0293430004
C140	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C141	CAP. .01µF, 50V, X7R 20%	0281730008
C142	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C143	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C145	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C150	CAP. .01µF, 50V, X7R 20%	0281730008
C151	CAP. .01µF, 50V, X7R 20%	0281730008
C152	CAP. .01µF, 50V, X7R 20%	0281730008
C153	CAP. .01µF, 50V, X7R 20%	0281730008
C154	CAP. .01µF, 50V, X7R 20%	0281730008
C155	CAP. .01µF, 50V, X7R 20%	0281730008
C156	CAP. .01µF, 50V, X7R 20%	0281730008
C159	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C160	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C161	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C162	CAP. 2200PF, 500V, DM19, 5%	0299650006
C163	CAP. 10PF, 500V, DM10	0259830003
C164	CAP. 220PF, 500V, DM10, 2%	1010870009
C165	CAP. .01µF, 50V, X7R 20%	0281730008
C166	CAP. .01µF, 50V, X7R 20%	0281730008
C167	CAP. .01µF, 50V, X7R 20%	0281730008
C168	CAP. .01µF, 50V, X7R 20%	0281730008
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
CR13	DIODE, RECTIFIER 1N4004	0405180004
CR14	DIODE, RECTIFIER 1N4004	0405180004
CR15	DIODE, RECTIFIER 1N4004	0405180004
CR16	DIODE, RECTIFIER 1N4004	0405180004
CR17	DIODE, RECTIFIER 1N4004	0405180004
CR18	DIODE, RECTIFIER 1N4004	0405180004
CR19	DIODE, RECTIFIER 1N4004	0405180004
CR20	DIODE, RECTIFIER 1N4004	0405180004
CR21	DIODE, RECTIFIER 1N4004	0405180004
CR22	DIODE, RECTIFIER 1N4004	0405180004
CR24	DIODE, SIGNAL, SIL 1N4454	0405270003
CR25	DIODE, SIGNAL, SIL 1N4454	0405270003
CR26	DIODE, PIN 1N5767	0405570007
CR27	DIODE, LED, RED, PC MOUNT	1008480029
CR28	DIODE, PIN 1N5767	0405570007
CR29	DIODE, PIN 1N5767	0405570007
CR36	DIODE, SIGNAL, SIL 1N4454	0405270003
FB1	FERRITE BEAD, .400L	1010900013
L1	INDUCTOR, MOLDED, 68µH, 5%	0651650003
L2	INDUCTOR, MOLDED, 47µH, 5%	0652680003
L3	INDUCTOR, MOLDED, 47µH, 5%	0652680003
L4	INDUCTOR, MOLDED, 120µH, 10%	0659330008
L5	INDUCTOR, MOLDED, 47µH, 5%	0652680003
L6	INDUCTOR, MOLDED, 47µH, 5%	0652680003
L7	INDUCTOR, MOLDED, 3.3µH, 5%	0658920006
L8	INDUCTOR, MOLDED, 2.2µH, 5%	0649890001
L9	INDUCTOR, MOLDED, 1.5µH, 5%	0649270002
L10	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L11	INDUCTOR, MOLDED, 0.75µH, 5%	1010480022
L12	INDUCTOR, MOLDED, 0.47µH, 5%	0649410009
L13	INDUCTOR, MOLDED, 0.33µH, 5%	1010490028
L14	INDUCTOR, MOLDED, 22µH, 5%	0650000005
L22	INDUCTOR, MOLDED, 5.6µH, 5%	0650360001
L23	INDUCTOR, MOLDED, 3.9µH, 5%	0650480007
L24	INDUCTOR, MOLDED, 3.0µH, 5%	1010500023
L25	INDUCTOR, MOLDED, 2.0µH, 5%	1010000039
L26	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L27	INDUCTOR, MOLDED, 0.82µH, 5%	0652320007
L28	INDUCTOR, MOLDED, 0.56µH, 5%	0649530004
L29	INDUCTOR, MOLDED, 0.39µH, 5%	0649770005
L30	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L31	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L32	INDUCTOR, MOLDED, 18µH, 5%	1010040031
L33	INDUCTOR, MOLDED, 15µH, 5%	0659070006
L34	INDUCTOR, MOLDED, 12µH, 5%	0652700004
L35	INDUCTOR, MOLDED, 7.5µH, 5%	1010050036
L36	INDUCTOR, MOLDED, 4.7µH, 5%	0651910005
L37	INDUCTOR, MOLDED, 3.3µH, 5%	0658920006
L38	INDUCTOR, MOLDED, 22µH, 5%	0650000005
L46	INDUCTOR, MOLDED, 47µH, 5%	0652680003
L47	INDUCTOR, MOLDED, 3.3µH, 5%	0658920006
L48	INDUCTOR, MOLDED, 2.2µH, 5%	0649890001
L49	INDUCTOR, MOLDED, 1.5µH, 5%	0649270002
L50	INDUCTOR, MOLDED, 1.2µH, 5%	0649910001
L51	INDUCTOR, MOLDED, 0.75µH, 5%	1010480022
L52	INDUCTOR, MOLDED, 0.47µH, 5%	0649410009
L53	INDUCTOR, MOLDED, 0.33µH, 5%	1010490028
L54	INDUCTOR, MOLDED, 47µH, 5%	0652680003
L55	INDUCTOR, MOLDED, 47µH, 5%	0652680003
L56	INDUCTOR, MOLDED, 120µH, 5%	0646660004
L57	INDUCTOR, MOLDED, 47µH, 5%	0652680003
L58	INDUCTOR, MOLDED, 22µH, 5%	0650000005
L59	INDUCTOR, MOLDED, 6.8µH, 10%	0646040006
L60	INDUCTOR, MOLDED, 0.27µH, 5%	0649390008
L61	INDUCTOR, MOLDED, 0.39µH, 5%	0649770005
L62	INDUCTOR, MOLDED, 0.27µH, 5%	0649390008
L63	INDUCTOR, MOLDED, 22µH, 5%	0650000005
L64	INDUCTOR, MOLDED, 3.9µH, 5%	0650480007
L65	INDUCTOR, MOLDED, 3.9µH, 5%	0650480007
L66	INDUCTOR, MOLDED, 47µH, 5%	0652680003
L67	INDUCTOR, MOLDED, 4.7µH, 5%	0651910005
L68	CHOKE, POWER	8076104700
L70	INDUCTOR, MOLDED, 120µH, 10%	0659330008
L71	INDUCTOR, MOLDED, 2.7µH, 5%	0652180001
L76	INDUCTOR, MOLDED, 3.9µH, 5%	0650480007
L77	INDUCTOR, MOLDED, 22µH, 5%	0650000005
L78	INDUCTOR, MOLDED, 220µH, 5%	0650500008
L79	INDUCTOR, MOLDED, 430µH, 5%	0659100002
L80	FERRITE BEAD, 850 PERM	1010410032

Figure 5.9.15 PC Assembly, Front End 1A2A5, page 1/4.



L81	FERRITE BEAD, 850 PERM	1010410032
L82	FERRITE BEAD, 850 PERM	1010410032
L83	FERRITE BEAD, 850 PERM	1010410032
L84	FERRITE BEAD, 850 PERM	1010410032
L85	FERRITE BEAD, 850 PERM	1010410032
L86	FERRITE BEAD, 850 PERM	1010410032
L87	FERRITE BEAD, 850 PERM	1010410032
P3	CONNECTOR, RF,RIGHT ANGLE	1010730002
P4	CONNECTOR, RF,RIGHT ANGLE	1010730002
P5	CONNECTOR, RF,RIGHT ANGLE	1010730002
P6	CONNECTOR, RF,RIGHT ANGLE	1010730002
P7	CONNECTOR, RF,RIGHT ANGLE	1010730002
Q4	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q5	TRANSISTOR, NPN, SI. 2N3866	0448140004
Q6	TRANSISTOR, NPN, SI. 2N3866	0448140004
Q7	TRANSISTOR, NPN, SI. 2N3866	0448140004
Q8	TRANSISTOR, NPN, SI. 2N3866	0448140004
Q9	TRANSISTOR 2N3553	1010320025
Q10	TRANSISTOR 2N3553	1010320025
Q11	TRANSISTOR, NPN, SI. 2N3866	0448140004
Q12	TRANSISTOR, PNP, SI. 2N2907A	0448390001
Q13	TRANSISTOR, NPN, SI. 2N3866	0448140004
R1	RESISTOR 820, 10%, 1/4W	0178210005
R2	RESISTOR 820, 10%, 1/4W	0178210005
R3	RESISTOR 47, 10%, 1/4W	0179360001
R4	RESISTOR 390, 10%, 1/4W	0178330001
R5	RESISTOR, 220, 2W	1008150029
R6	RESISTOR 270, 10%, 1/4W	0178450006
R7	RESISTOR 18, 10%, 1/4W	0184590001
R8	RESISTOR 270, 10%, 1/4W	0178450006

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
R18	RESISTOR 10K, 10%, 1/4W	0170410005
R19	RESISTOR 10K, 10%, 1/4W	0170410005
R20	RESISTOR 82, 10%, 1/2W	1010200038
R21	RESISTOR 82, 10%, 1/2W	1010200038
R22	RESISTOR, 220, 2W	1008150029
R27	RESISTOR 47, 10%, 1W	0164990003
R31	RESISTOR 100K, 10%, 1/4W	0170390004
R32	RESISTOR 12K, 10%, 1/4W	0183180003
R33	RESISTOR 1K, 10%, 1/4W	0171560001
R34	RESISTOR 10K, 10%, 1/4W	0170410005
R35	RESISTOR 150, 10%, 1W	0187840008
R36	RESISTOR 10K, 10%, 1/4W	0170410005
R37	RESISTOR 1K, 10%, 1/4W	0171560001
R38	RESISTOR 18, 10%, 1/4W	0184590001
R40	RESISTOR 1K, 10%, 1/4W	0171560001
R41	RESISTOR 100, 10%, 1W	0165540001
R42	RESISTOR 1K, 10%, 1/4W	0171560001
R43	RESISTOR 10, 5%, 1/4W	0177160004
R44	RESISTOR 270, 10%, 1/4W	0178450006
R45	RESISTOR 1K, 10%, 1/4W	0171560001
R46	RESISTOR 270, 10%, 1/4W	0178450006
R47	RESISTOR 47, 10%, 1/4W	0179360001
R48	RESISTOR 47, 10%, 1/4W	0179360001

R49	RESISTOR 1K, 10%, 1/4W	0171560001
R50	RESISTOR 10, 5%, 1/4W	0177160004
R51	RESISTOR 270, 10%, 1/4W	0178450006
R52	RESISTOR 1K, 10%, 1/4W	0171560001
R53	RESISTOR 270, 10%, 1/4W	0178450006
R54	RESISTOR 47, 10%, 1/4W	0179360001
R55	RESISTOR 47, 10%, 1/4W	0179360001
R56	RESISTOR 560, 5%, 1/4W	0183200004
R57	RESISTOR 560, 5%, 1/4W	0183200004
R58	RESISTOR, 4.7, 5%, 1/4W	1001060024
R59	RES,2.7, 10%, 1/4W	1010040022
R60	RESISTOR, 4.7, 5%, 1/4W	1001060024
R61	RES,2.7, 10%, 1/4W	1010040022
R62	RESISTOR 68, 10%, 1/4W	0187960003
R63	RESISTOR 120, 10%, 2W	0194530001
R64	RESISTOR 18, 5%, 1/2W	0184730007
R65	RESISTOR 22, 10%, 1/4W	0192690001
R66	RESISTOR 39, 10%, 1/2W	0165920009
R68	RESISTOR 180, 10%, 1/2W	0173640001
R69	RESISTOR 120, 10%, 1/2W	0186430001
R70	RESISTOR 270, 10%, 1/4W	0178450006
R72	RESISTOR 56, 10%, 1/4W	0174290004
R73	RESISTOR 180, 10%, 1/4W	0175220000
R74	RESISTOR, 1.5, 10%, 1/2W	1010350021
R75	RESISTOR, 1.5, 10%, 1/2W	1010350021
R76	RESISTOR 560, 5%, 1/4W	0183200004
R77	RESISTOR 680, 10%, 1/2W	0167500007
R84	RESISTOR 100, 10%, 1W	0165540001
R85	RESISTOR 820, 10%, 1/4W	0178210005
R87	RESISTOR 100, 10%, 1W	0165540001

R89	RESISTOR 150, 10% 1/2W	1010400037
R90	RESISTOR 470, 5%, 1/8W	1010804715
RP1	RES NTWK 6 PIN SIP 4.7K COM	1006200037
T1	TRANSFORMER, INPUT, RF AMP	8076108705
T2	TRANSFORMER, FEEDBACK,RF AMP	8076108900
T3	TRANSFORMER, INPUT, RF AMP	8076108705
T4	TRANSFORMER, FEEDBACK,RF AMP	8076108900
T5	TRANSFORMER,OUTPUT,PREDR	8076104904
T6	TRANSFORMER,INTERSTAGE,PREDR	8076104807
U1	IC LINEAR MAR-4	1010900005
U2	IC. LINEAR LM311N	1005760021
U3	IC DIGITAL 74HC238	1011430002
U4	IC. DIGITAL ULN2003A	1005630038
U5	IC. LINEAR MWA130	1010380036
U6	IC. DIGITAL ULN2003A	1005630038
U7	IC. LINEAR MWA130	1010380036
X1	MIXER, TAK-1H	1010400029
X2	MIXER, TAK-1H	1010400029
XQ5	HEATSINK, CUP CLIP, TO-5	1011440008
XQ6	HEATSINK, CUP CLIP, TO-5	1011440008
XQ7	HEATSINK, CUP CLIP, TO-5	1011440008
XQ8	HEATSINK, CUP CLIP, TO-5	1011440008
XQ9	HEATSINK, CUP CLIP, TO-5	1011440008
XQ10	HEATSINK, CUP CLIP, TO-5	1011440008
XQ11	HEATSINK, CUP CLIP, TO-5	1011440008
XU5	HEATSINK, CUP CLIP, TO-5	1011070014
XU7	HEATSINK, CUP CLIP, TO-5	1011070014
	MTG PLATE, FRONT END BD	8076101603
	SOCKET, LEAD	1011060019

Figure 5.9.15 PC Assembly, Front End 1A2A5, page 2/4.

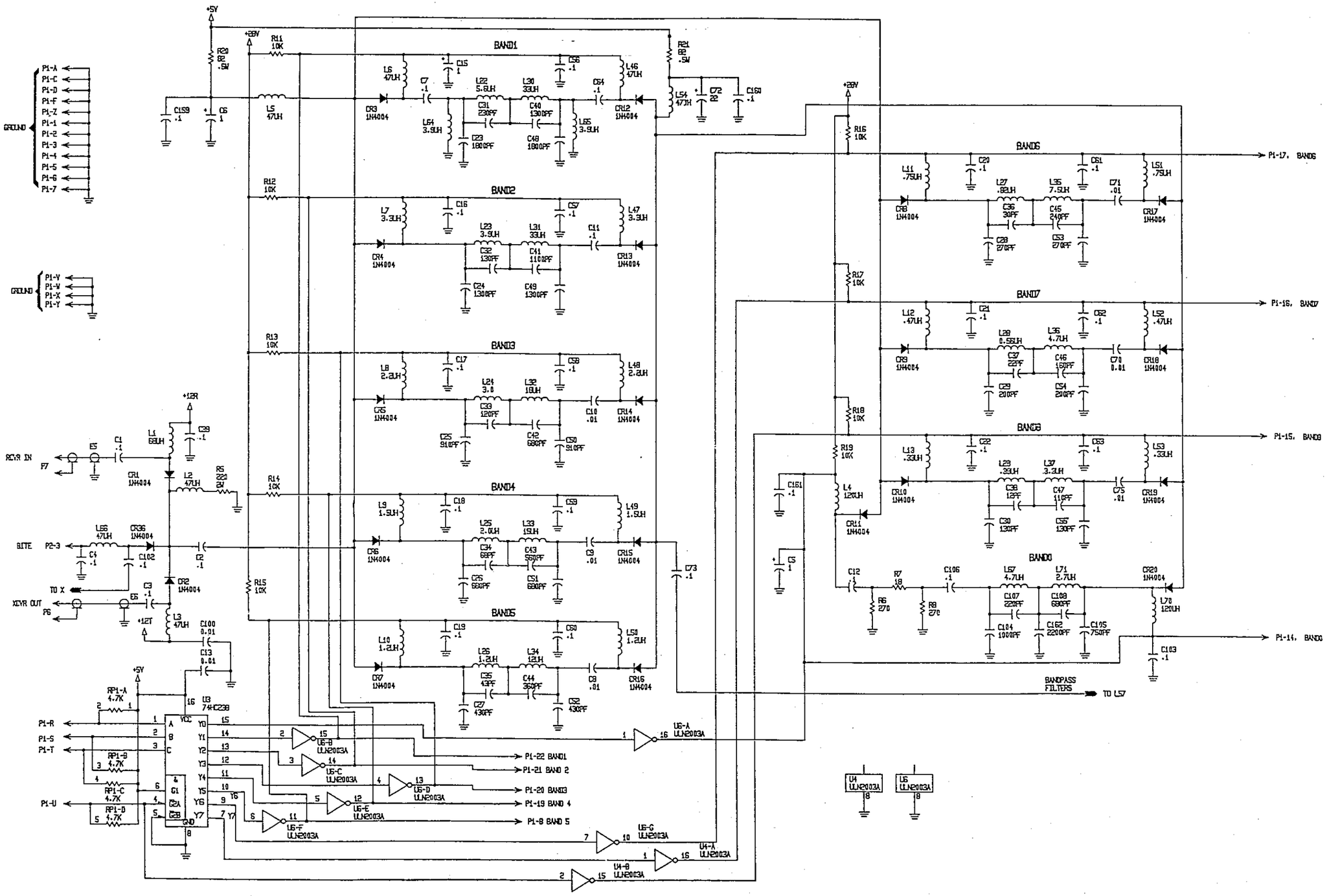


Figure 5.9.15 PC Assembly, Front End 1A2A5, page 3/4.

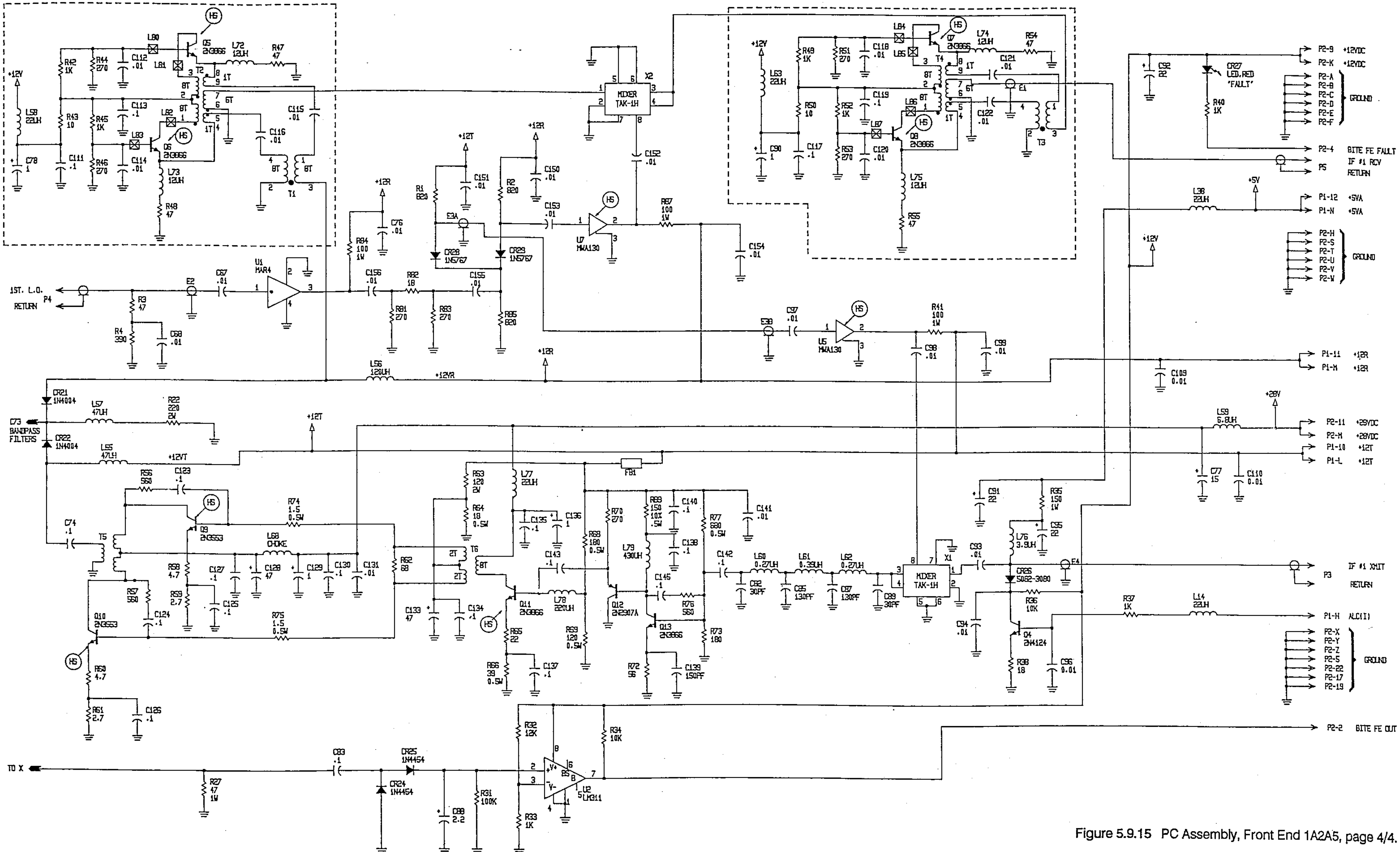


Figure 5.9.15 PC Assembly, Front End 1A2A5, page 4/4.

PC ASSY, REFERENCE DRIVER 1A2A6

	PC ASSY, REFERENCE DRIVER 1A2A6	8076120098
C1	CAP. .47µF, 50V, X7R 20%	0283377771
C2	CAP. .47µF, 50V, X7R 20%	0283377771
C3	CAP. .47µF, 50V, X7R 20%	0283377771
C4	CAP. .47µF, 50V, X7R 20%	0283377771
C5	CAP. .01µF, 50V, X7R 20%	0281730008
C6	CAP. .01µF, 50V, X7R 20%	0281730008
C7	CAP. .01µF, 50V, X7R 20%	0281730008
C8	CAP. .01µF, 50V, X7R 20%	0281730008
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C10	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C12	CAP. 22µF, 15V, T368	0296660001
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, LED, AMBER PC MOUNT	1011480000
CR6	DIODE, LED, AMBER PC MOUNT	1011480000
CR7	DIODE, LED, AMBER PC MOUNT	1011480000
CR8	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR9	DIODE, LED, RED, PC MOUNT	1008480029
L1	INDUCTOR, MOLDED, 47µH, 5%	0652680003
L2	INDUCTOR, MOLDED, 47µH, 5%	0652680003
Q1	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q2	TRANSISTOR, PNP, SI 2N4126	0448020009
Q3	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q4	TRANSISTOR, PNP, SI 2N4126	0448020009
R1	RESISTOR 47, 5%, 1/8W	1010804707
R2	RESISTOR 47, 5%, 1/8W	1010804707
R3	RESISTOR 1.8K, 5%, 1/8W	1010801821
R4	RESISTOR 22, 5%, 1/8W	1010802208
R5	RESISTOR 1.8K, 5%, 1/8W	1010801821
R6	RESISTOR 22, 5%, 1/8W	1010802208
R7	RESISTOR 2.2K, 5%, 1/8W	1010802224
R8	RESISTOR 10, 5%, 1/8W	1010801007
R9	RESISTOR 10, 5%, 1/8W	1010801007
R10	RESISTOR 2.2K, 5%, 1/8W	1010802224
R11	RESISTOR 390, 5%, 1/8W	1010803913
R12	RESISTOR 3.3K, 5%, 1/8W	1010803328
R13	RESISTOR 6.8K, 5%, 1/8W	1010806823
R14	RESISTOR 390, 5%, 1/8W	1010803913
R15	RESISTOR 1K, 5%, 1/8W	1010801023
R16	RESISTOR 560, 10%, 1/2W	0185900003
R17	RESISTOR 270, 10%, 1/4W	0178450006
R18	RESISTOR 4.7K, 5%, 1/8W	1010804723
R19	RESISTOR 5.6K, 5%, 1/8W	1010805622
R20	RESISTOR 10K, 5%, 1/8W	1010801031
U1	IC. LINEAR LM340T5	0448600005
U2	IC. DIGITAL 74HC14	1006490027
	HEADER, PIN STRIP, 8 PIN	1010700014
	SHIELD, CAN	8040051509
	SHUNT, 8 PIN, .100 SPACING	1010720015
	STANDOFF, M-F, 4-40 X. 500L	1011000008

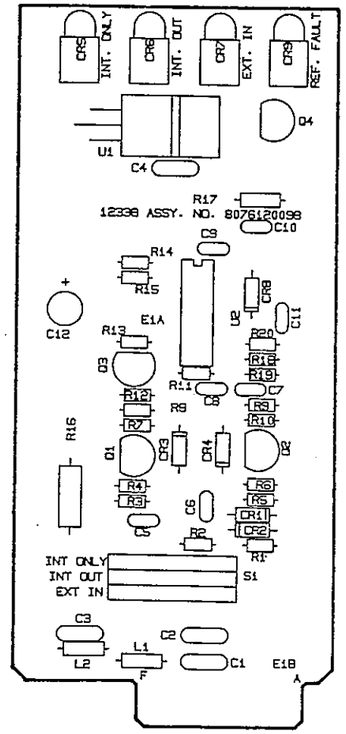


Figure 5.9.16 PC Assembly, Reference Driver 1A2A6, page 1/2.

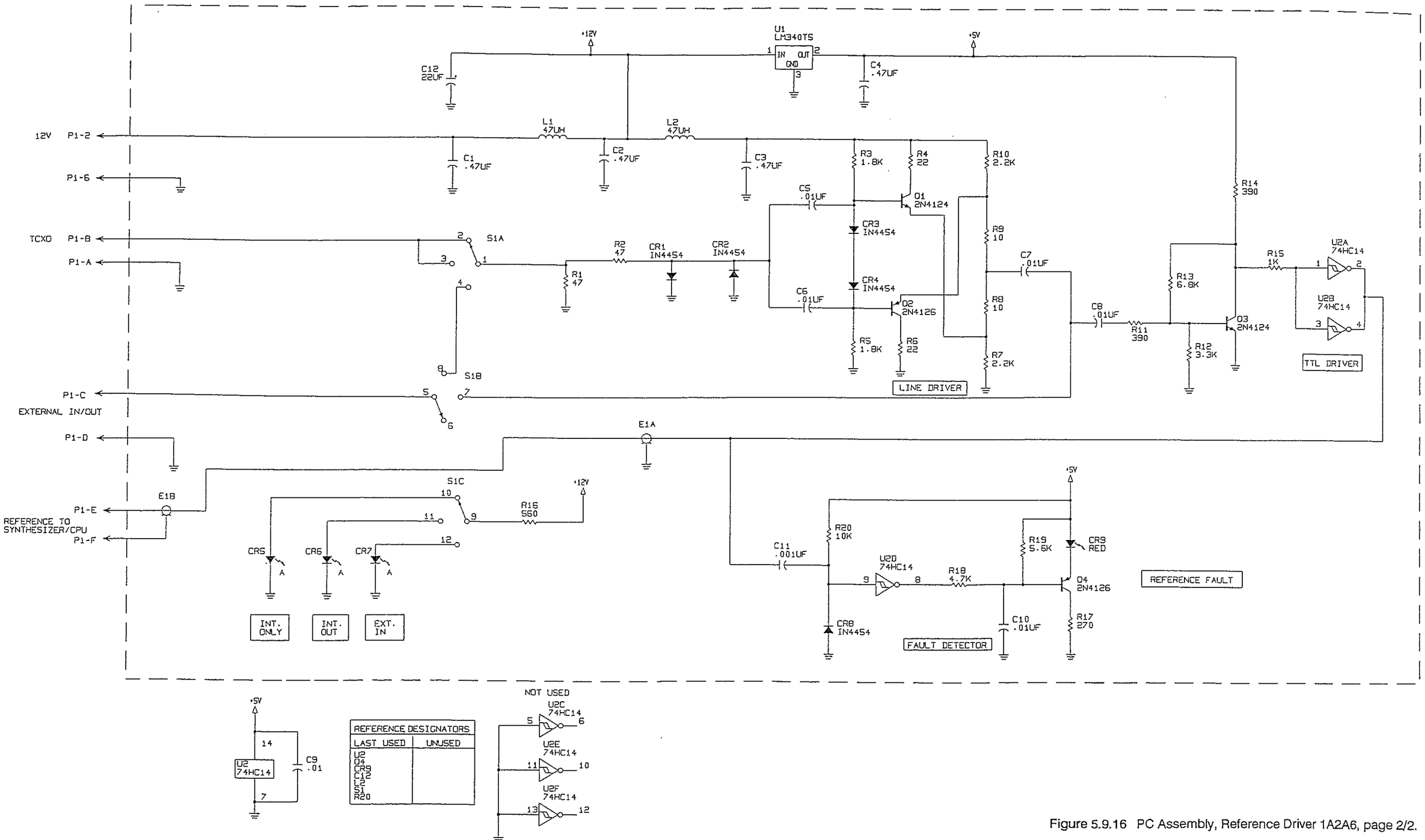


Figure 5.9.16 PC Assembly, Reference Driver 1A2A6, page 2/2.

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PC ASSY, I/O BOARD 1A2A8

	PC ASSY, I/O BOARD 1A2A8	8076110092
C1	CAP. .01µF, 50V, X7R 20%	0281730008
C2	CAP. 6.8µF, 20V, T368	0296780006
C3	CAP. .01µF, 50V, X7R 20%	0281730008
C4	CAP. .01µF, 50V, X7R 20%	0281730008
C5	CAP. .01µF, 50V, X7R 20%	0281730008
C6	CAP. .01µF, 50V, X7R 20%	0281730008
C7	CAP. .01µF, 50V, X7R 20%	0281730008
C8	CAP. .01µF, 50V, X7R 20%	0281730008
C9	CAP. 22µF, 15V, 196D	0281690006
C10	CAP. 22µF, 15V, 196D	0281690006
C11	CAP. 47µF, 20V, 196D	0281700001
C12	CAP. .01µF, 50V, X7R 20%	0281730008
C13	CAP. .01µF, 50V, X7R 20%	0281730008
C14	CAP. .01µF, 50V, X7R 20%	0281730008
C15	CAP. 10µF, 20V	1007290005
C16	CAP. 22µF, 15V, 196D	0281690006
C17	CAP. 22µF, 15V, 196D	0281690006
C18	CAP. .01µF, 50V, X7R 20%	0281730008
C19	CAP. 47µF, 20V, 196D	0281700001
C20	CAP. .01µF, 50V, X7R 20%	0281730008
C21	CAP. .01µF, 50V, X7R 20%	0281730008
C22	CAP. .01µF, 50V, X7R 20%	0281730008
C23	CAP. .01µF, 50V, X7R 20%	0281730008
C24	CAP. .01µF, 50V, X7R 20%	0281730008
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. .01µF, 50V, X7R 20%	0281730008
C34	CAP. .01µF, 50V, X7R 20%	0281730008
C35	CAP. .01µF, 50V, X7R 20%	0281730008
CR1	DIODE, LED, RED, PC MOUNT	1008480029
CR2	DIODE, RECTIFIER 1N4004	0405180004
CR3	DIODE, RECTIFIER 1N4004	0405180004
J1	CONNECTOR, POWER, 9 PIN FEMALE	1011090015
K1	RELAY, DPDT, 12VDC	1005090009
K2	RELAY, DPDT, 12VDC	1005090009
L1	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L2	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L3	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L4	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L5	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L6	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L7	INDUCTOR, MOLDED, 33µH, 5%	0659690004
L8	INDUCTOR, MOLDED, 33µH, 5%	0659690004
P1	CONNECTOR,HEADER 40 PIN	1010780000
P2	CONNECTOR, HEADER, 14 PIN MALE	1011210142
Q1	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q2	TRANSISTOR, NPN, SI. 2N4124	0448010003
R1	RESISTOR 680, 10%, 1/4W	0176630007
R2	RESISTOR 100K, 10%, 1/4W	0170390004
R3	RESISTOR 10K, 10%, 1/4W	0170410005
R4	RESISTOR 10K, 10%, 1/4W	0170410005
R5	RESISTOR 10K, 10%, 1/4W	0170410005
R6	RESISTOR 100K, 10%, 1/4W	0170390004
R7	RESISTOR 10K, 10%, 1/4W	0170410005
R8	RESISTOR 10K, 5%, 1/8W	1010801031
R9	RESISTOR 10K, 5%, 1/8W	1010801031
R10	RESISTOR 82, 10%, 1/4W	0184610001
R11	RESISTOR 10K, 5%, 1/8W	1010801031
R12	RESISTOR 68, 5%, 1/8W	1010806807
R13	RESISTOR 68, 5%, 1/8W	1010806807
R14	RESISTOR 68, 5%, 1/8W	1010806807
R15	RESISTOR 68, 5%, 1/8W	1010806807
RP1	RES NTWK 10 PIN SIP 10K COM	1006130021
RP2	RES NTWK 10 PIN SIP 10K COM	1006130021
RP3	RES NTWK 10 PIN SIP 10K COM	1006130021
U1	CRYSTAL OSCILLATOR, 7.3728MHZ	1008850012
U2	IC, DIGITAL 74HC00	1008190004
U3	IC, DIGITAL 74HC00	1008190004
U4	IC. DIGITAL 4078B	1010460030
U5	IC. DIGITAL 74HC374	1006450033
U6	IC. DIGITAL 74HC374	1006450033
U7	IC. DIGITAL 74HC04	1010280023
U8	IC. DIGITAL 74HC32	1006470026
U9	IC. DIGITAL 2681	1008790010
U10	IC. DIGITAL 80C85A	1007400013
U11	IC. DIGITAL 74HC138	1006480013
U12	IC. DIGITAL 74HC125	1008810011
U13	IC. DIGITAL 74HC373	1006480030
U14	IC. DIGITAL 74HC32	1006470026
U15	IC. DIGITAL RAM UPD446D	1006430008
U16	IC. DIGITAL ICL232	1010510011
U17	IC. DIGITAL ICL232	1010510011
U18	IC. DIGITAL 75176	1011100011
U19	IC. DIGITAL 75176	1011100011
U20	EPROM, W/IO SOFTWARE RT9000	8076113296
XU9	SOCKET, IC, 40 PIN TAILLESS	1006620010
XU10	SOCKET, IC, 40 PIN TAILLESS	1006620010
XU20	SOCKET, IC, 28 PIN TAILLESS	1006620001
	FERRITE BEAD, 850 PERM	1010410032
	MOUNTING PLATE, I/O BOARD	8076111200

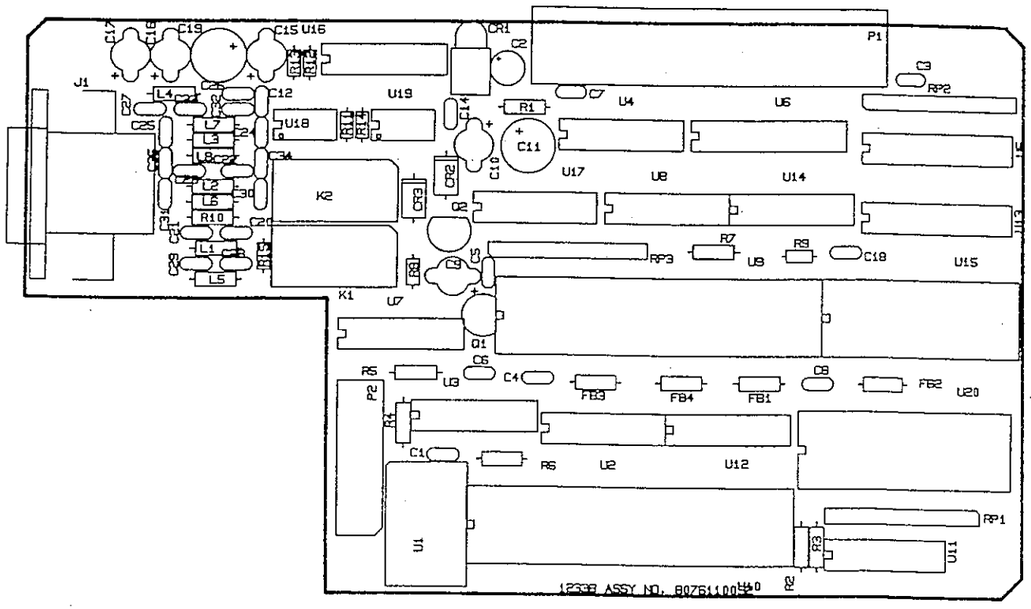


Figure 5.9.17 PC Assembly, I/O Board 1A2A8, page 1/3.

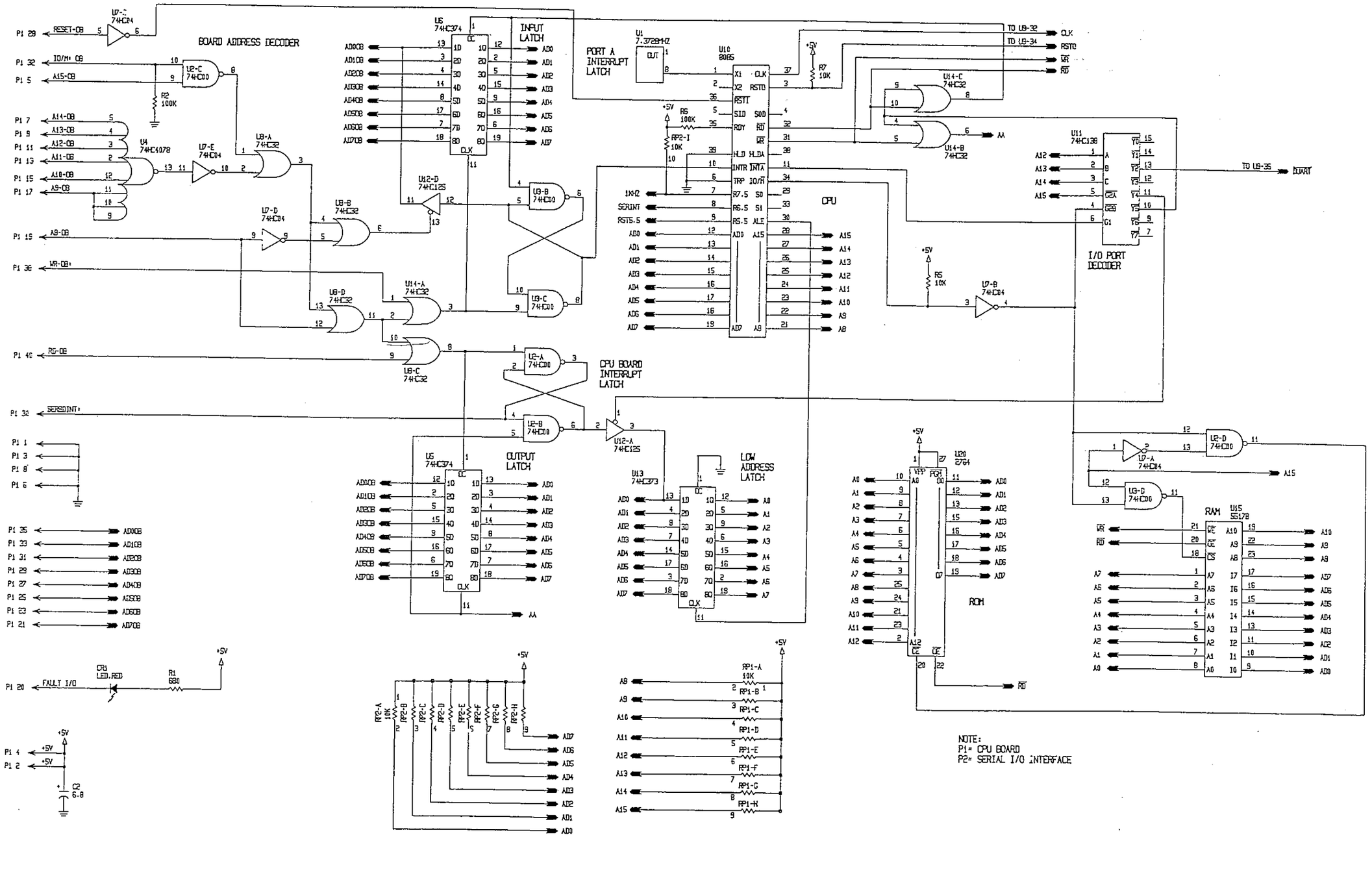
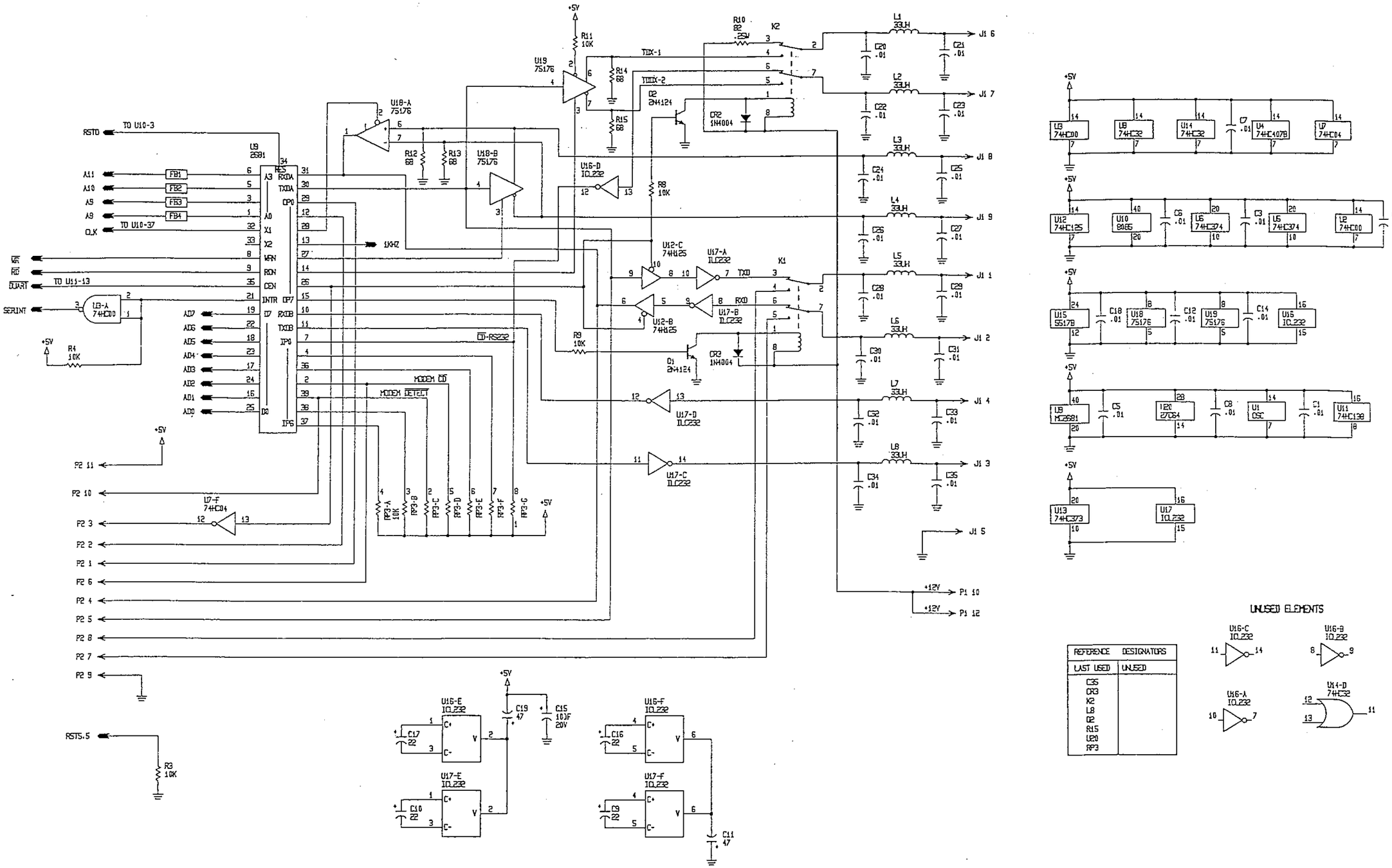


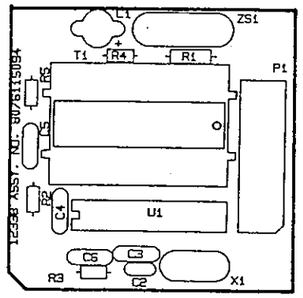
Figure 5.9.17 PC Assembly, I/O Board 1A2A8, page 2/3.



UNUSED ELEMENTS

REFERENCE DESIGNATORS	
LAST USED	UNUSED
C35	
DR3	
K2	
L8	
Q2	
R15	
U20	
RP3	

Figure 5.9.17 PC Assembly, I/O Board 1A2A8, page 3/3.



PC ASSY, FSK MODEM 1A2A8A1

	PC ASSY, FSK MODEM 1A2A8A1	8076115094
C1	CAP. 10μF, 20V	1007290005
C2	CAP. 0.001μF, 100V, X7R, 20%	0281630003
C3	CAPACITOR 0.1μF, 50V, X7R	1011180014
C4	CAPACITOR 0.1μF, 50V, X7R	1011180014
C5	CAPACITOR 0.1μF, 50V, X7R	1011180014
C6	CAPACITOR 0.1μF, 50V, X7R	1011180014
P1	CONNECTOR, RIBBON, 14 PIN FEM	1008350001
R1	RESISTOR 604, 1%, 1/8W	0193980002
R2	RESISTOR 5.6K, 5%, 1/8W	1010805622
R3	RESISTOR 10K, 5%, 1/8W	1010801031
R4	RESISTOR 10K, 5%, 1/8W	1010801031
R5	RESISTOR 10K, 5%, 1/8W	1010801031
T1	TRANSFORMER, MODEM	1011340011
U1	IC. DIGITAL MC145443	1011330016
X1	CRYSTAL, 3.579545 MHZ	1006270001
XP1	CONNECTOR,PCB,TRANSITION,14PIN	1011090147
ZS1	VARISTOR, MOV V230LA20A	1010720023
	CABLE, FLAT, 14 COND. 28AWG	1011170001

Figure 5.9.18 PC Assembly, FSK Modem 1A2A8A1, page 1/2.

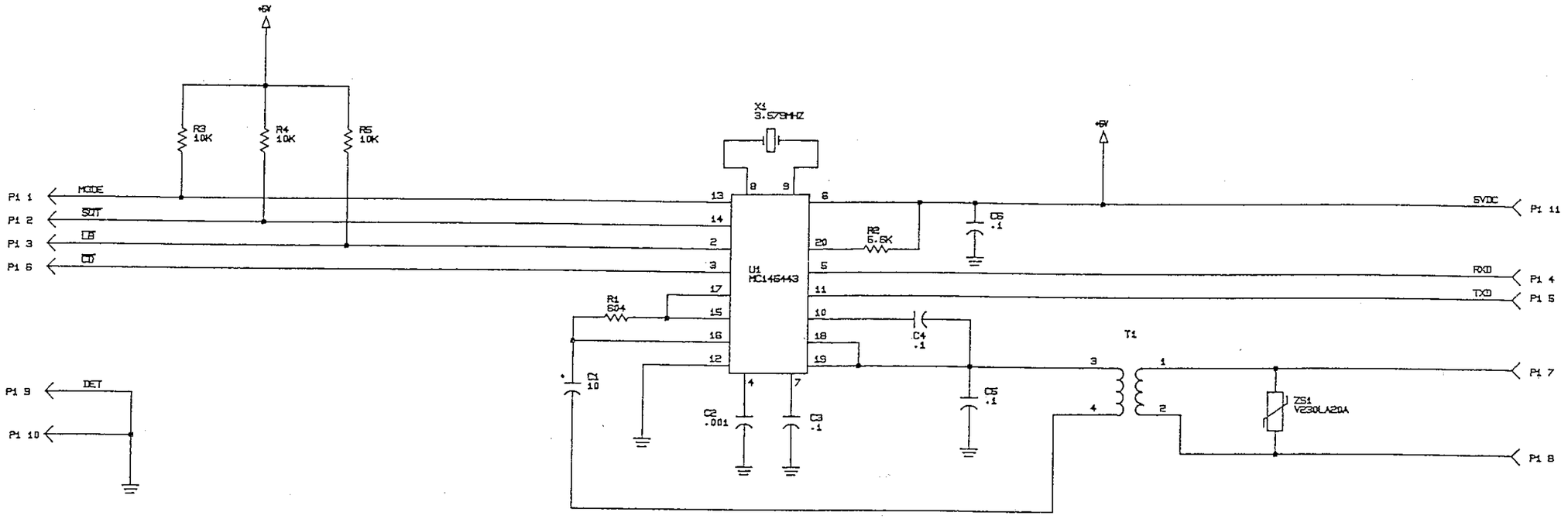


Figure 5.9.18 PC Assembly, FSK Modem 1A2A8A1, page 2/2.

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FILTER ASSY 1A3

	FILTER ASSY 1A3	8076050090
1A3A1	PC ASSY. DETECTOR	8076053099
1A3A2	PC ASSY. BANDS 1-4	8076057094
1A3A3	PC ASSY. BANDS 5-8	8076055091
	ENCLOSURE, FILTER MODULE	8076050502

Figure 5.9.19 Filter Assembly 1A3, page 1/1.

PC ASSY, DETECTOR 1A3A1

	PC ASSY, DETECTOR 1A3A1	8076053099
C1	CAP. 30 PF, 2KV, N750	1008230014
C2	CAP. 100PF 2KV N750	1008250031
C3	CAP. .01µF, 50V, X7R 20%	0281730008
C4	CAP. 30 PF, 2KV, N750	1008230014
C5	CAP. 30 PF, 2KV, N750	1008230014
C6	CAP. 30 PF, 2KV, N750	1008230014
C7	CAP. 30 PF, 2KV, N750	1008230014
C8	CAP. .01µF, 50V, X7R 20%	0281730008
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C10	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. .01µF, 50V, X7R 20%	0281730008
C12	CAPACITOR, 0.1µF, 200V, X7R	1011190001
C13	CAPACITOR, 0.1µF, 200V, X7R	1011190001
C14	CAP. 1µF, 50V, 198D	0280910002
C15	CAP. 56 PF, 2KV, N750	1008240028
C16	CAP. 56 PF, 2KV; N750	1008240028
C17	CAP. 15-60PF, 200V, N1500	0252680006
C18	CAP. .01µF, 50V, X7R 20%	0281730008
C19	CAP. .01µF, 50V, X7R 20%	0281730008
C20	CAP. .01µF, 50V, X7R 20%	0281730008
CP1	CAPACITOR, NTWK, 10 PIN, .01µF	1006540016
CR1	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR2	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR3	DIODE, RECTIFIER 1N4004	0405180004
CR4	DIODE, PIN UM4001CR	0405440006
CR5	DIODE, PIN UM4001C	0405430001
CR6	DIODE, RECTIFIER 1N4004	0405180004
CR7	DIODE, RECTIFIER 1N4004	0405180004
CR8	DIODE, RECTIFIER 1N4004	0405180004
CR9	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR10	DIODE, LED, RED	1004350023
DSP1	DIODE, LED, RED, BAR GRAPH	1010690019
J1	CONNECTOR, RF, JCM	0753600005
J2	CONNECTOR, RF, JCM	0753600005
J3	CONNECTOR, RF, SNAP-ON	1000170012
J5	CONNECTOR, HEADER, 26 PIN MALE	1011200261
K1	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K2	RELAY, SPST, 24VDC, PC MOUNT	1010310038
L1	INDUCTOR, AIR WOUND, 303 NH	8076053501
L2	INDUCTOR, AIR WOUND, 303 NH	8076053501
P1A	CONNECTOR, RIBBON, 10 PIN FEM	1008070017
P1B	CONNECTOR, RIBBON, 10 PIN FEM	1008070017
P2	CONNECTOR, RIBBON, 10 PIN FEM	1008070017
Q1	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q2	TRANSISTOR, NPN, SI. 2N4124	0448010003
R1	RESISTOR, 51, 5%, 1/4W	0197020003
R2	RESISTOR 10K, 10%, 1/4W	0170410005
R3	RESISTOR, 51, 5%, 1/4W	0197020003
R4	RESISTOR 10K, 10%, 1/4W	0170410005
R5	RESISTOR 4.7K, 5%, 1/4W	0170770001
R6	RESISTOR 10K, 10%, 1/4W	0170410005
R7	RESISTOR 4.7K, 5%, 1/4W	0170770001
R8	RESISTOR 10K, 10%, 1/4W	0170410005
R9	RESISTOR 12K, 10%, 1/4W	0183180003
R10	RESISTOR 4.7K, 10%, 2W	0164130004
R11	RESISTOR 1K, 10%, 1/4W	0171560001
R12	RESISTOR 180, 10%, 1/4W	0175220000

RP1	RES NTWK 10 PIN SIP 680 COM	1010640003
T1	TRANSFORMER, 20:1, DETECTOR	8076053706
T2	TRANSFORMER, 20:1, DETECTOR	8076053706
	CABLE, FLAT, 20 COND. 28AWG	1008080004
	CABLE, RIBBON, 10 CONDUCTOR	1008340014
	CONNECTOR,PCB,TRANSITION,10PIN	1011090104
	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
	KEY, POLARIZING	1008070033

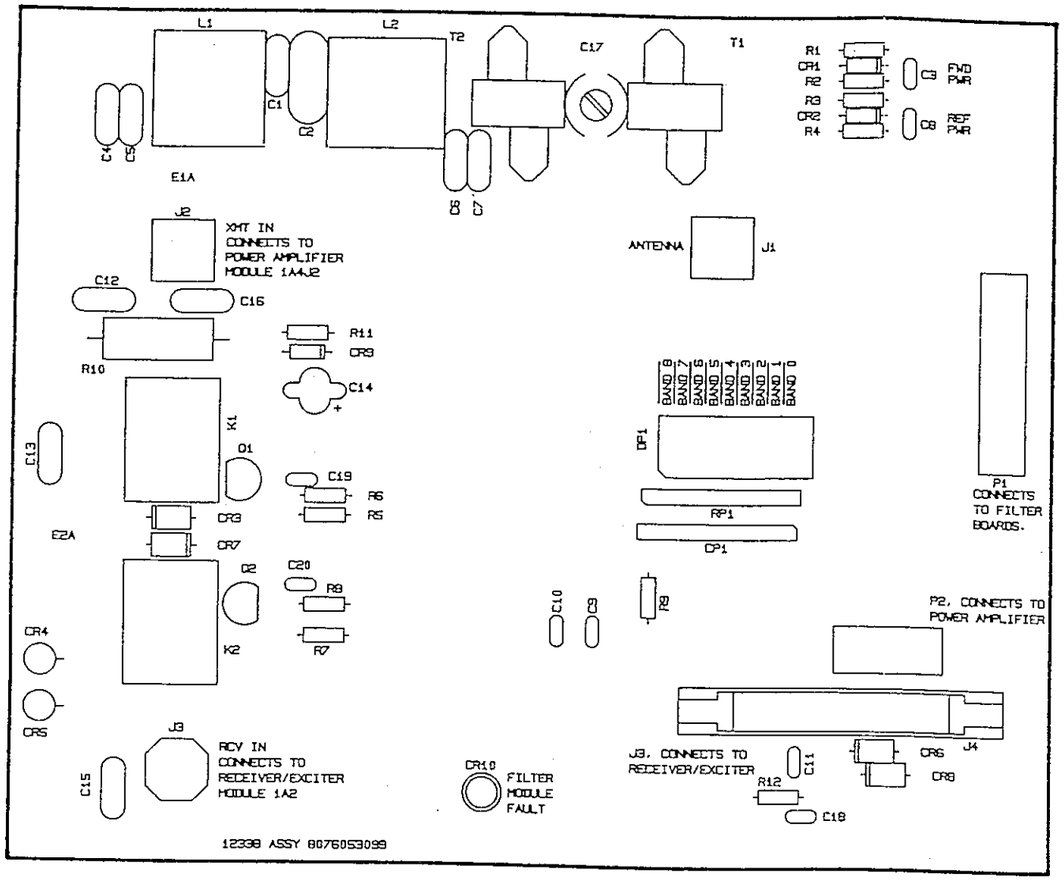


Figure 5.9.20 PC Assembly, Detector 1A3A1, page 1/2.

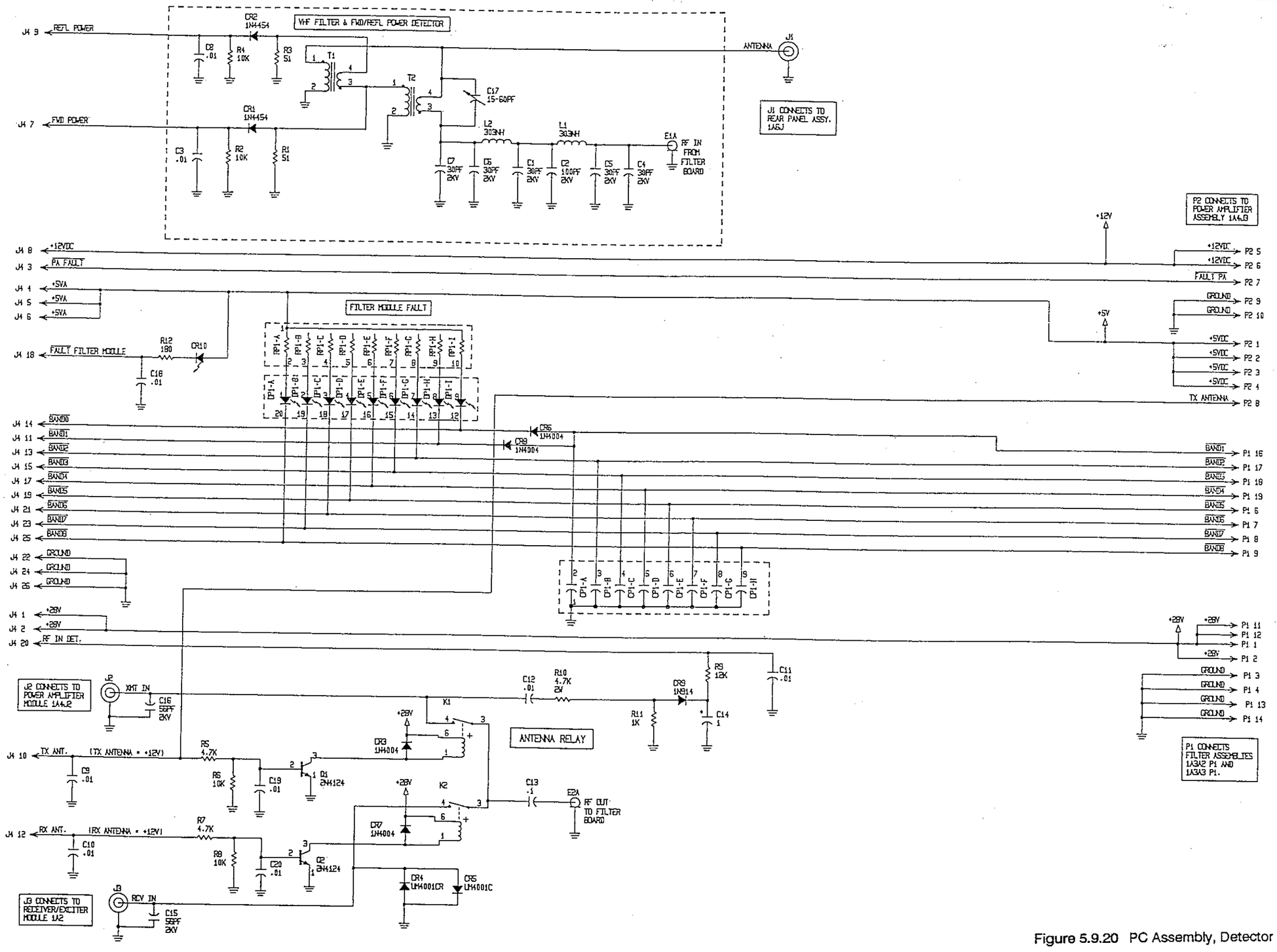


Figure 5.9.20 PC Assembly, Detector 1A3A1, page 2/2.

A1053E

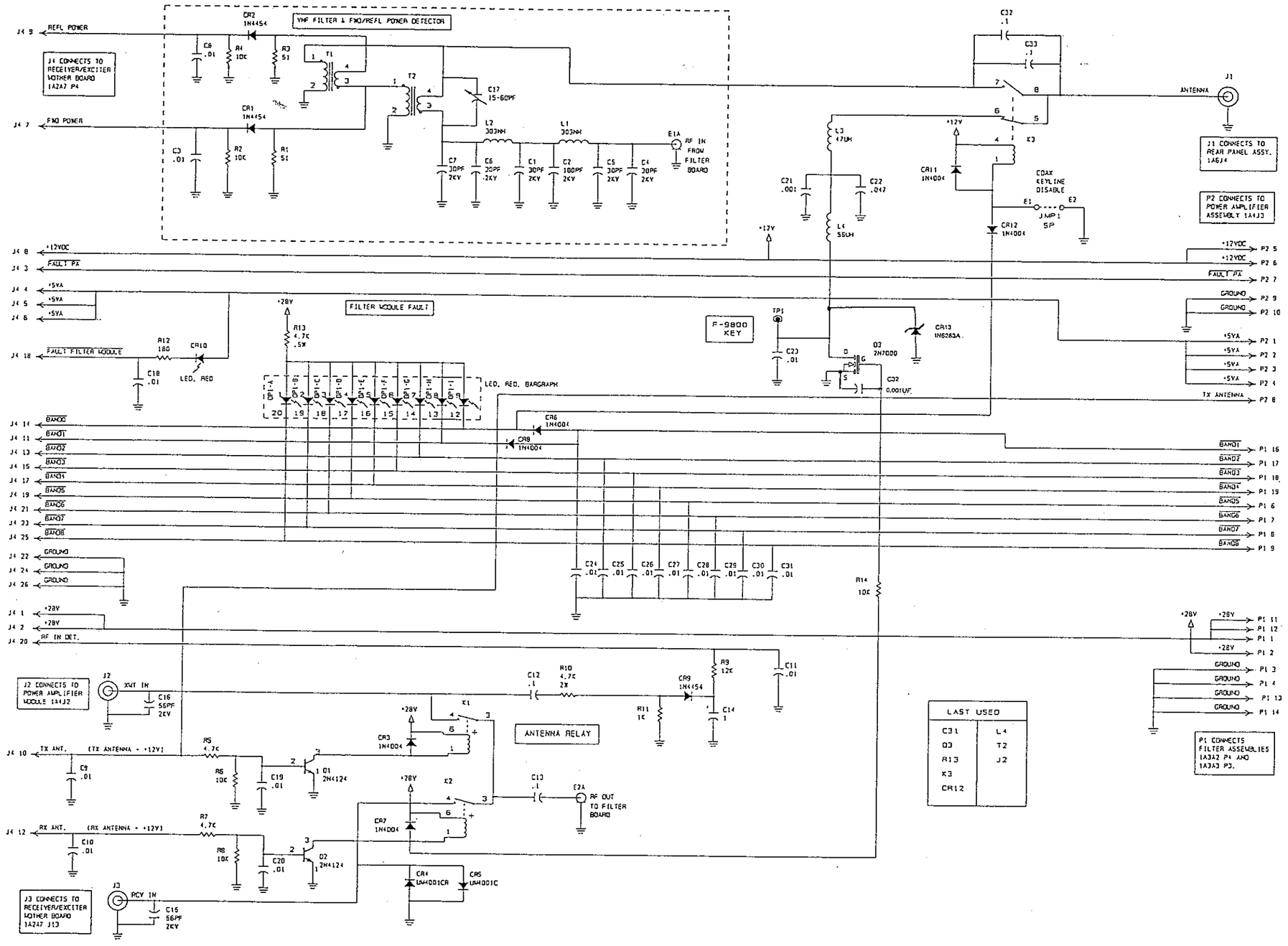
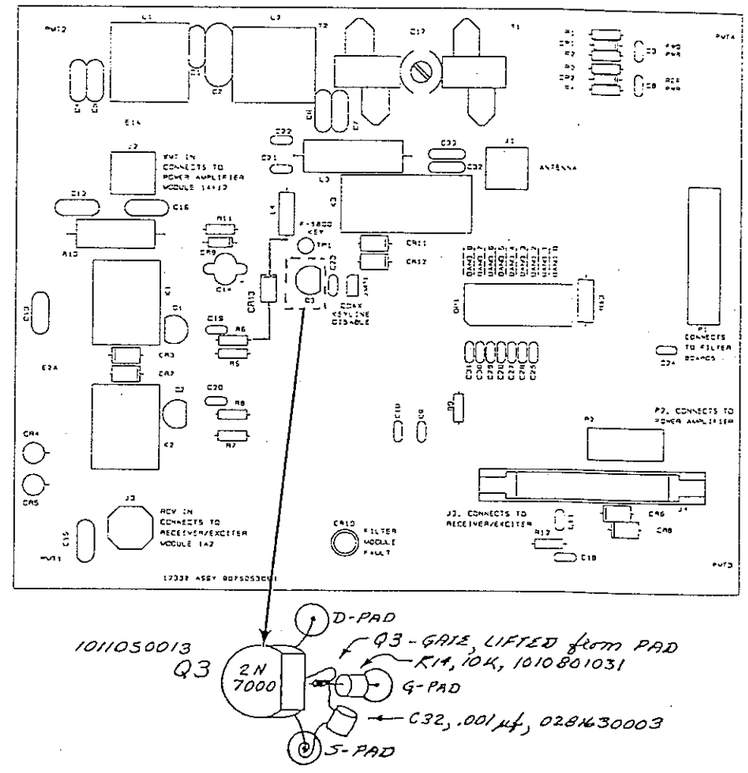


Figure 5.9.20A PC Assembly RF Detector / Coax Keyline.

REV B	PC ASSY, RF DETECTOR/COAX KEY	8076052092
C1	CAP. 30PF, 2KV, N750, 5%	1008230014
C2	CAP. 100PF, 2KV, N750, 5%	1008250031
C3	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C4	CAP. 30PF, 2KV, N750, 5%	1008230014
C5	CAP. 30PF, 2KV, N750, 5%	1008230014
C6	CAP. 30PF, 2KV, N750, 5%	1008230014
C7	CAP. 30PF, 2KV, N750, 5%	1008230014
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, 200V, X7R	1011190001
C13	CAP. 0.1UF, 200V, X7R	1011190001
C14	CAP. 1UF, 50V	0280910002
C15	CAP. 56PF, 2KV, N750, 5%	1008240028
C16	CAP. 56PF, 2KV, N750, 5%	1008240028
C17	CAP. 15-60PF, 200V, N1500	0252680006
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. 0.001UF, 100V, X7R, 20%	0281630003
C22	CAP. 0.047UF, 50V, X7R, 10%	1010740008
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. 0.01UF, 50V, X7R, 20%	0281730008
C31	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C32	CAP. 0.1UF, 200V, X7R	1011190001
C33	CAP. 0.1UF, 200V, X7R	1011190001
CR1	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR2	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR3	DIODE, RECTIFIER 1N4004	0405180004
CR4	DIODE, PIN UM4001CR	0405440006
CR5	DIODE, PIN UM4001C	0405430001
CR6	DIODE, RECTIFIER 1N4004	0405180004
CR7	DIODE, RECTIFIER 1N4004	0405180004
CR8	DIODE, RECTIFIER 1N4004	0405180004
CR9	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR10	DIODE, LED, RED MV5754A	1004350023
CR11	DIODE, RECTIFIER 1N4004	0405180004
CR12	DIODE, RECTIFIER 1N4004	0405180004
DSP1	DIODE, LED, RED, BAR GRAPH	1010690019
J1	CONNECTOR, RF, JCM	0753600005
J2	CONNECTOR, RF, JCM	0753600005
J3	CONNECTOR, RF, SNAP-ON	1000170012
J4	CONNECTOR, HEADER, 26 PIN MALE	1011200261
K1	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K2	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K3	RELAY, DPST, 12V, FORM A/B	1012950000
L1	INDUCTOR, AIR WOUND, 303NH	8076053501
L2	INDUCTOR, AIR WOUND, 303NH	8076053501
L3	INDUCTOR, MOLDED, 47UH, 10%	1012440036
L4	INDUCTOR, MOLDED, 56UH, 10%	0639110002
P1A	CONNECTOR, RIBBON, 10 PIN FEM	1008070017
P1B	CONNECTOR, RIBBON, 10 PIN FEM	1008070017
P2	CONNECTOR, RIBBON, 10 PIN FEM	1008070017
Q1	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q2	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q3	TRANSISTOR, N-CH, FET 2N7000	1011050013
R1	RESISTOR 51, 5%, 1/4W	0197020003
R2	RESISTOR 10K, 10%, 1/4W	0170410005
R3	RESISTOR 51, 5%, 1/4W	0197020003
R4	RESISTOR 10K, 10%, 1/4W	0170410005
R5	RESISTOR 4.7K, 5%, 1/4W	0170770001
R6	RESISTOR 10K, 10%, 1/4W	0170410005
R7	RESISTOR 4.7K, 5%, 1/4W	0170770001
R8	RESISTOR 10K, 10%, 1/4W	0170410005
R9	RESISTOR 12K, 10%, 1/4W	0183180003
R10	RESISTOR 4.7K, 10%, 2W	0164130004
R11	RESISTOR 1K, 10%, 1/4W	0171560001
R12	RESISTOR 180, 10%, 1/4W	0175220000
R13	RESISTOR 4.7K, 10%, 1/2W	0169200001
T1	TRANSFORMER, 20:1, DETECTOR	8076053706
T2	TRANSFORMER, 20:1, DETECTOR	8076053706
TP1	TEST POINT, RED	1011130033
XP1	CONNECTOR, TRANSITION, 20PIN	1011090201
XP2	CONNECTOR, TRANSITION, 10PIN	1011090104
	KEY, POLARIZING	1008070033
	CABLE, RIBBON, 20 COND. 28AWG	1008080004
	CABLE, RIBBON, 10 COND. 28AWG	1008340014



C32 CR13 R14	CAP. 0.001UF, 100V, X7R, 20% Diode, Tranzorb, IN6283A Resistor, 10K, 5%, 1/8W	0281630003 1011260000 1010801031

Figure 5.9.20A PC Assembly RF Detector / Coax Keyline.

PC ASSY, BANDS 1-4 1A3A2

	PC ASSY, BANDS 1-4 1A3A2	8076057094
C57	CAP. 82 PF 2KV N750	1008270024
C58	CAP. 82 PF 2KV N750	1008270024
C59	CAP. 91 PF, 2KV N750	1008250023
C60	CAP. 300PF 2KV N750	1008470015
C61	CAP. 27 PF, 2KV, N750	1008230006
C62	CAP. 700PF, 500V, DM19, 5%	0249410001
C63	CAP. 120PF 2KV N750	1008260011
C64	CAP. 390PF, 500V, DM19, 2%	0282640002
C65	CAP. 33 PF, 2KV, N750	1008230022
C66	CAP. 700PF, 500V, DM19, 5%	0249410001
C67	CAP. 56 PF, 2KV, N750	1008240028
C68	CAP. 33 PF, 2KV, N750	1008230022
C69	CAP. 300PF 2KV N750	1008470015
C70	CAP. 130PF 2KV N750	1008260029
C71	CAP. 68 PF, 2KV N750	1008250007
C72	CAP. 180PF 2KV N750	1008270008
C73	CAP. 27 PF, 2KV, N750	1008230006
C74	CAP. 560PF, 500V, DM19, 2%	0281060002
C75	CAP. 800PF, 500V, DM19, 5%	0249530007
C76	CAP. 300PF 2KV N750	1008470015
C78	CAP. 430PF, 500V, DM19, 5%	0254900003
C79	CAP. 330PF 2KV N750	1008280038
C80	CAP. 800PF, 500V, DM19, 5%	0249530007
C81	CAP. 300PF 2KV N750	1008470015
C82	CAP. 91 PF, 2KV N750	1008250023
C83	CAP. 43PF 2KV N750	1008470023
C84	CAP. 330PF 2KV N750	1008280038
C85	CAP. 360PF, 500V, DM19, 2%	0282550008
C86	CAP. 150PF 2KV N750	1008260037
C87	CAP. 180PF 2KV N750	1008270008
C88	CAP. 430PF, 500V, DM19, 5%	0254900003
C89	CAP. 300PF 2KV N750	1008470015
C90	CAP. 910PF, 500V, DM19, 2%	0281450005
C91	CAP. 620PF, 500V, DM19, 5%	0299150003
C92	CAP. 430PF, 500V, DM19, 5%	0254900003
C93	CAP. 620PF, 500V, DM19, 5%	0299150003
C94	CAP. 910PF, 500V, DM19, 2%	0281450005
C95	CAP. 620PF, 500V, DM19, 5%	0299150003
C96	CAP. 130PF 2KV N750	1008260029
C97	CAP. 50 PF, 2KV, N750	1008240010
C98	CAP. 330PF 2KV N750	1008280038
C99	CAP. 600PF, 500V, DM19, 5%	0241850002
C100	CAP. 27 PF, 2KV, N750	1008230006
C101	CAP. 470PF, 500V, DM19, 5%	0255050003
C102	CAP. 390PF, 500V, DM19, 2%	0282640002
C103	CAP. 750PF, 500V, DM19, 2%	0280990006
C104	CAP. 270PF 2KV N750	1008280020
C105	CAP. 2000PF, 500V, DM19, 5%	0298500001
C106	CAP. 820PF, 500V, DM19, 2%	0281280002
C107	CAP. 750PF, 500V, DM19, 2%	0280990006
C108	CAP. 620PF, 500V, DM19, 5%	0299150003
C109	CAP. 1600PF, 500V, DM19, 2%	0281220000
C110	CAP. 200PF 2KV N750	1008270016
C111	CAP. 75 PF, 2KV N750	1008250015
C112	CAP. 820PF, 500V, DM19, 2%	0281280002
C113	CAP. 510PF, 500V, DM19, 2%	0282630007
CR5	DIODE, RECTIFIER 1N4004	0405180004
CR6	DIODE, RECTIFIER 1N4004	0405180004
CR7	DIODE, RECTIFIER 1N4004	0405180004
CR8	DIODE, RECTIFIER 1N4004	0405180004
CR15	DIODE, RECTIFIER 1N4004	0405180004
CR16	DIODE, RECTIFIER 1N4004	0405180004
CR17	DIODE, RECTIFIER 1N4004	0405180004
CR18	DIODE, RECTIFIER 1N4004	0405180004
K5	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K6	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K7	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K8	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K13	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K14	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K15	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K16	RELAY, SPST, 24VDC, PC MOUNT	1010310038
L13	INDUCTOR, AIR WOUND, 634 NH	8076057507
L14	INDUCTOR, AIR WOUND, 729NH	8076057604
L15	INDUCTOR, TOROID, 1.43 µH	8076057701
L16	INDUCTOR, TOROID, 0.95 µH	8076057809
L17	INDUCTOR, TOROID, 1.18 µH	8076057906
L18	INDUCTOR, TOROID, 2.00 µH	8076058007
L19	INDUCTOR, TOROID, 1.47 µH	8076058104
L20	INDUCTOR, TOROID, 1.70 µH	8076058201
L21	INDUCTOR, TOROID, 2.74 µH	8076058309
L22	INDUCTOR, TOROID, 2.22 µH	8076058406
L23	INDUCTOR, TOROID, 2.52 µH	8076058503
L24	INDUCTOR, TOROID, 4.30 µH	8076058601
P4	CONNECTOR, HEADER, 10 PIN MALE	1011200104
	KEY, POLARIZING	1008070033

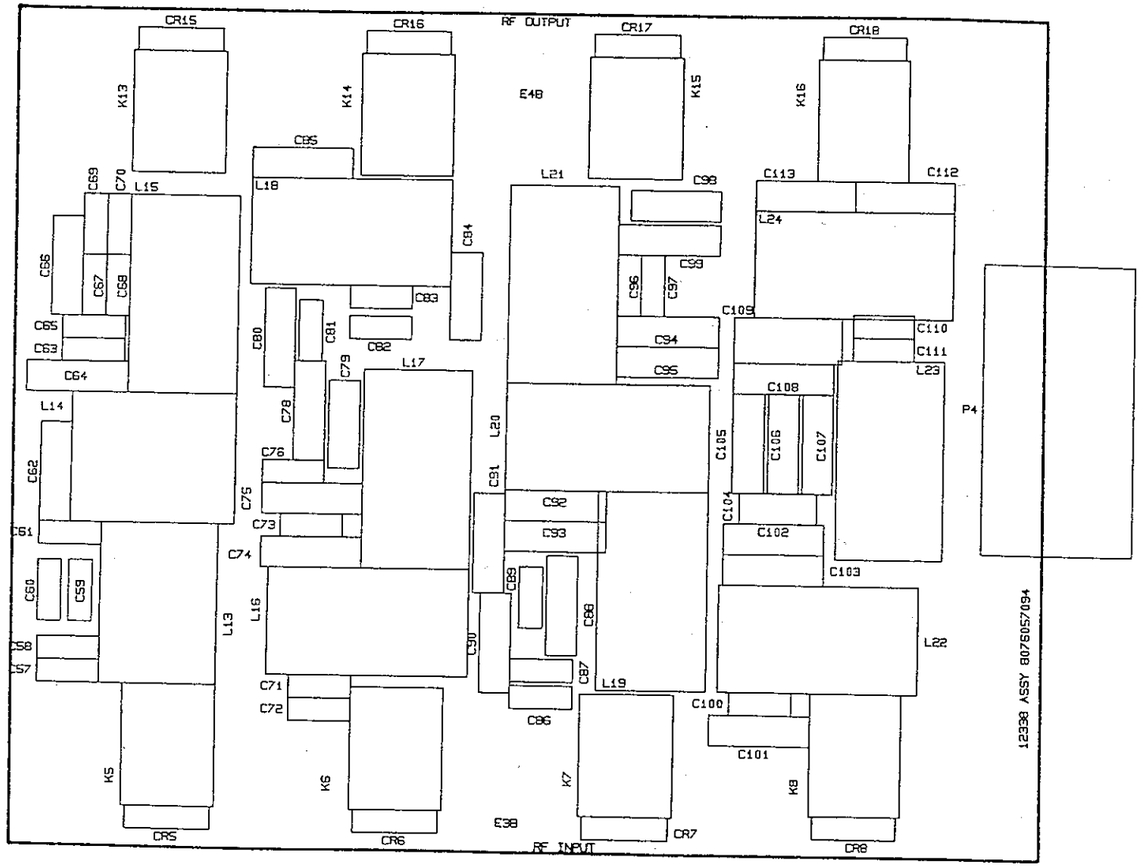
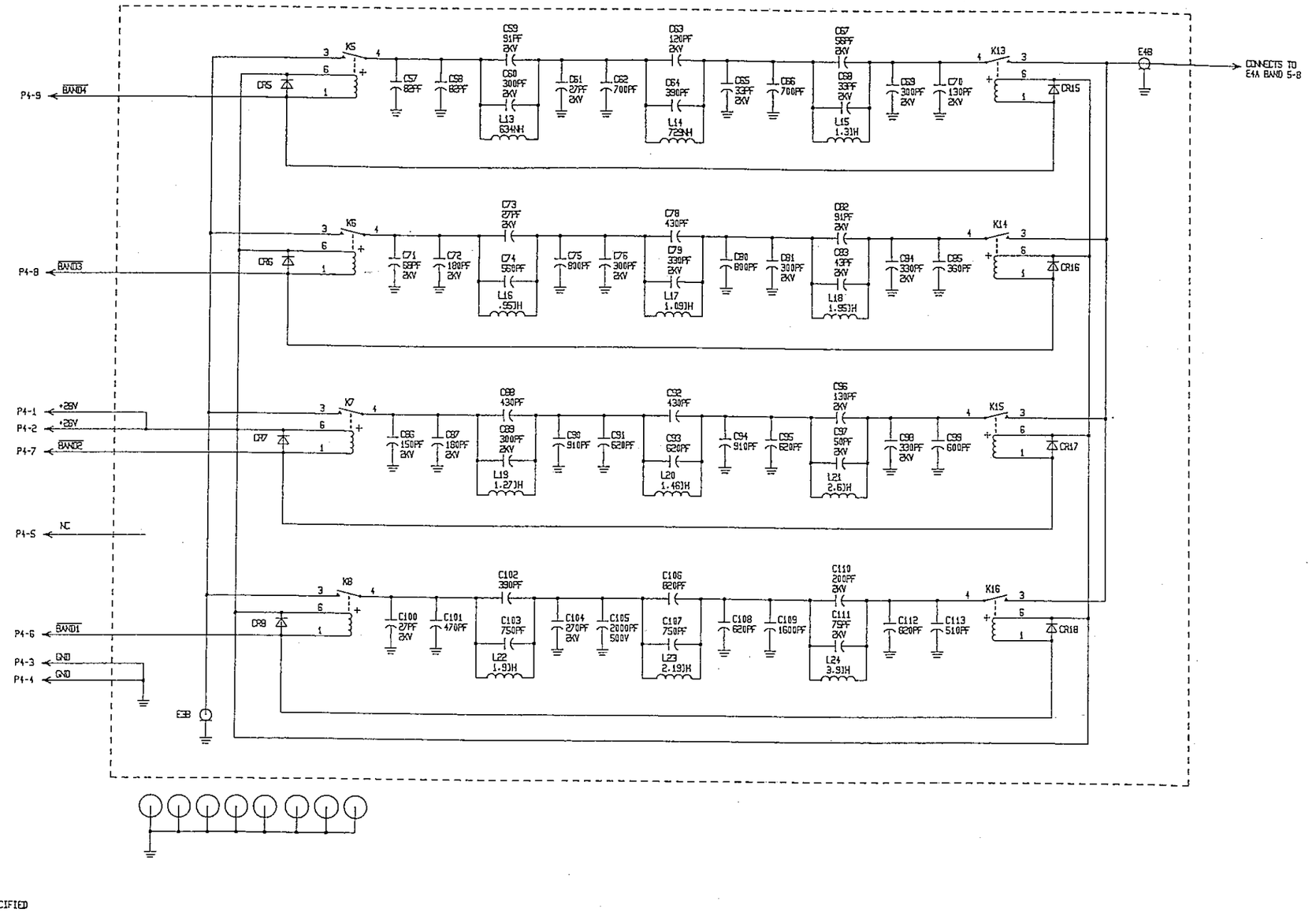


Figure 5.9.21 PC Assembly, Bands 1-4 1A3A2, page 1/2.



NOTE:
DIODES ARE 1N4004 UNLESS SPECIFIED

Figure 5.9.21 PC Assembly, Bands 1-4 1A3A2, page 2/2.

PC ASSY, BANDS 5-8 1A3A3

	PC ASSY, BANDS 5-8 1A3A3	8076055091
C2	CAP. 20 PF, 2KV, N750	1008220027
C3	CAP. 56 PF, 2KV, N750	1008240028
C4	CAP. 62 PF, 2KV, N750	1008240036
C5	CAP. 100PF 2KV N750	1008250031
C6	CAP. 100PF 2KV N750	1008250031
C7	CAP. 50 PF, 2KV, N750	1008240010
C8	CAP. 62 PF, 2KV, N750	1008240036
C9	CAP. 100PF 2KV N750	1008250031
C10	CAP. 100PF 2KV N750	1008250031
C11	CAP. 10 PF, 2KV, N750	1008210021
C12	CAP. 15 PF, 2KV, N750	1008220001
C13	CAP. 68 PF, 2KV N750	1008250007
C17	CAP. 50 PF, 2KV, N750	1008240010
C18	CAP. 100PF 2KV N750	1008250031
C19	CAP. 110PF 2KV N750	1008260002
C20	CAP. 110PF 2KV N750	1008260002
C21	CAP. 50 PF, 2KV, N750	1008240010
C22	CAP. 91 PF, 2KV N750	1008250023
C23	CAP. 62 PF, 2KV, N750	1008240036
C24	CAP. 150PF 2KV N750	1008260037
C25	CAP. 15 PF, 2KV, N750	1008220001
C26	CAP. 15 PF, 2KV, N750	1008220001
C28	CAP. 56 PF, 2KV, N750	1008240028
C31	CAP. 100PF 2KV N750	1008250031
C32	CAP. 56 PF, 2KV, N750	1008240028
C33	CAP. 56 PF, 2KV, N750	1008240028
C34	CAP. 270PF 2KV N750	1008280020
C35	CAP. 27 PF, 2KV, N750	1008230006
C36	CAP. 200PF 2KV N750	1008270016
C37	CAP. 56 PF, 2KV, N750	1008240028
C38	CAP. 270PF 2KV N750	1008280020
C39	CAP. 10 PF, 2KV, N750	1008210021
C40	CAP. 30 PF, 2KV, N750	1008230014
C42	CAP. 130PF 2KV N750	1008260029
C43	CAP. 30 PF, 2KV, N750	1008230014
C44	CAP. 75 PF, 2KV N750	1008250015
C45	CAP. 91 PF, 2KV N750	1008250023
C46	CAP. 150PF 2KV N750	1008260037
C47	CAP. 160PF 2KV N750	1008270032
C48	CAP. 330PF 2KV N750	1008280038
C49	CAP. 330PF 2KV N750	1008280038
C50	CAP. 27 PF, 2KV, N750	1008230006
C51	CAP. 160PF 2KV N750	1008270032
C52	CAP. 330PF 2KV N750	1008280038
C53	CAP. 30 PF, 2KV, N750	1008230014
C54	CAP. 30 PF, 2KV, N750	1008230014
C55	CAP. 160PF 2KV N750	1008270032
C56	CAP. 120PF 2KV N750	1008260011
CR1	DIODE, RECTIFIER 1N4004	0405180004
CR2	DIODE, RECTIFIER 1N4004	0405180004
CR3	DIODE, RECTIFIER 1N4004	0405180004
CR4	DIODE, RECTIFIER 1N4004	0405180004
CR11	DIODE, RECTIFIER 1N4004	0405180004
CR12	DIODE, RECTIFIER 1N4004	0405180004
CR13	DIODE, RECTIFIER 1N4004	0405180004
CR14	DIODE, RECTIFIER 1N4004	0405180004
K1	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K2	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K3	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K4	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K9	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K10	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K11	RELAY, SPST, 24VDC, PC MOUNT	1010310038
K12	RELAY, SPST, 24VDC, PC MOUNT	1010310038
L1	INDUCTOR, AIR WOUND, 102 NH	8076055504
L2	INDUCTOR, AIR WOUND, 147 NH	8076055601
L3	INDUCTOR, AIR WOUND, 221 NH	8076055709
L4	INDUCTOR, AIR WOUND, 153 NH	8076055806
L5	INDUCTOR, AIR WOUND, 221 NH	8076055709
L6	INDUCTOR, AIR WOUND, 384 NH	8076055903
L7	INDUCTOR, AIR WOUND, 282 NH	8076056004
L8	INDUCTOR, AIR WOUND, 324 NH	8076056101
L9	INDUCTOR, AIR WOUND, 577 NH	8076056209
L10	INDUCTOR, AIR WOUND, 423 NH	8076056306
L11	INDUCTOR, AIR WOUND, 486 NH	8076056403
L12	INDUCTOR, AIR WOUND, 866 NH	8076056501
P3	CONNECTOR, HEADER, 10 PIN MALE	1011200104
	KEY, POLARIZING	1008070033

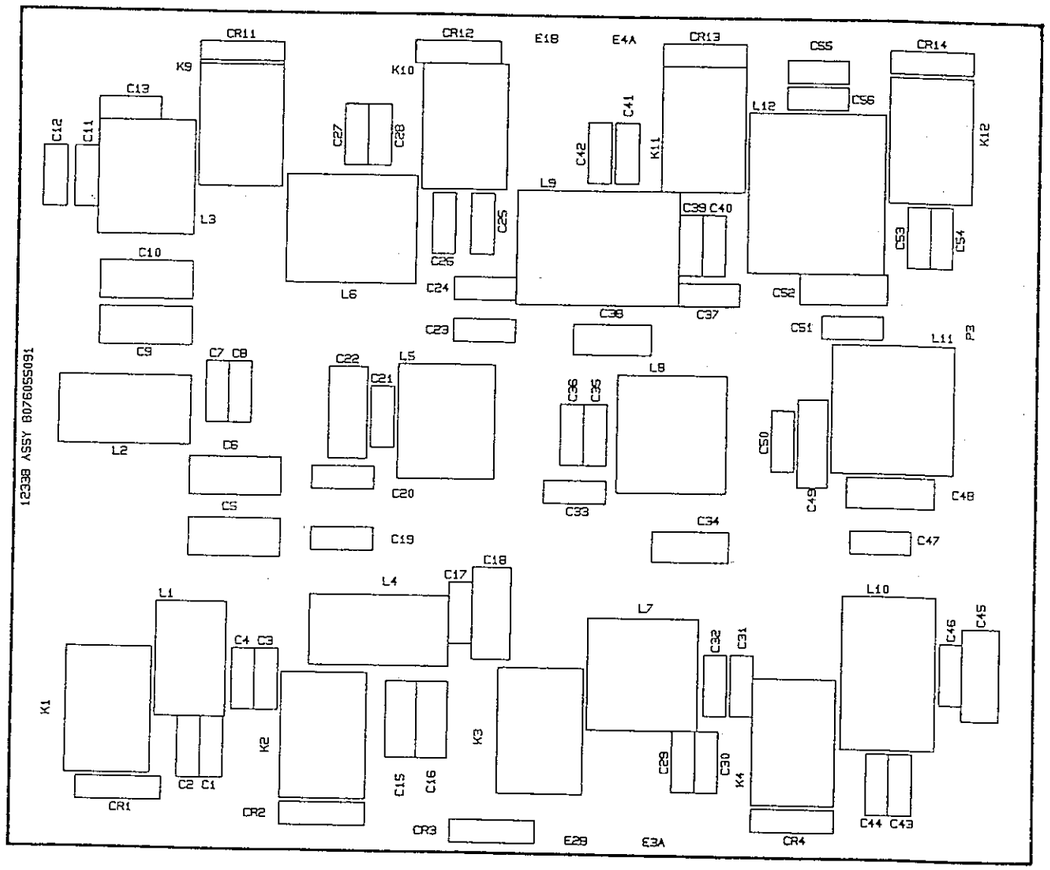
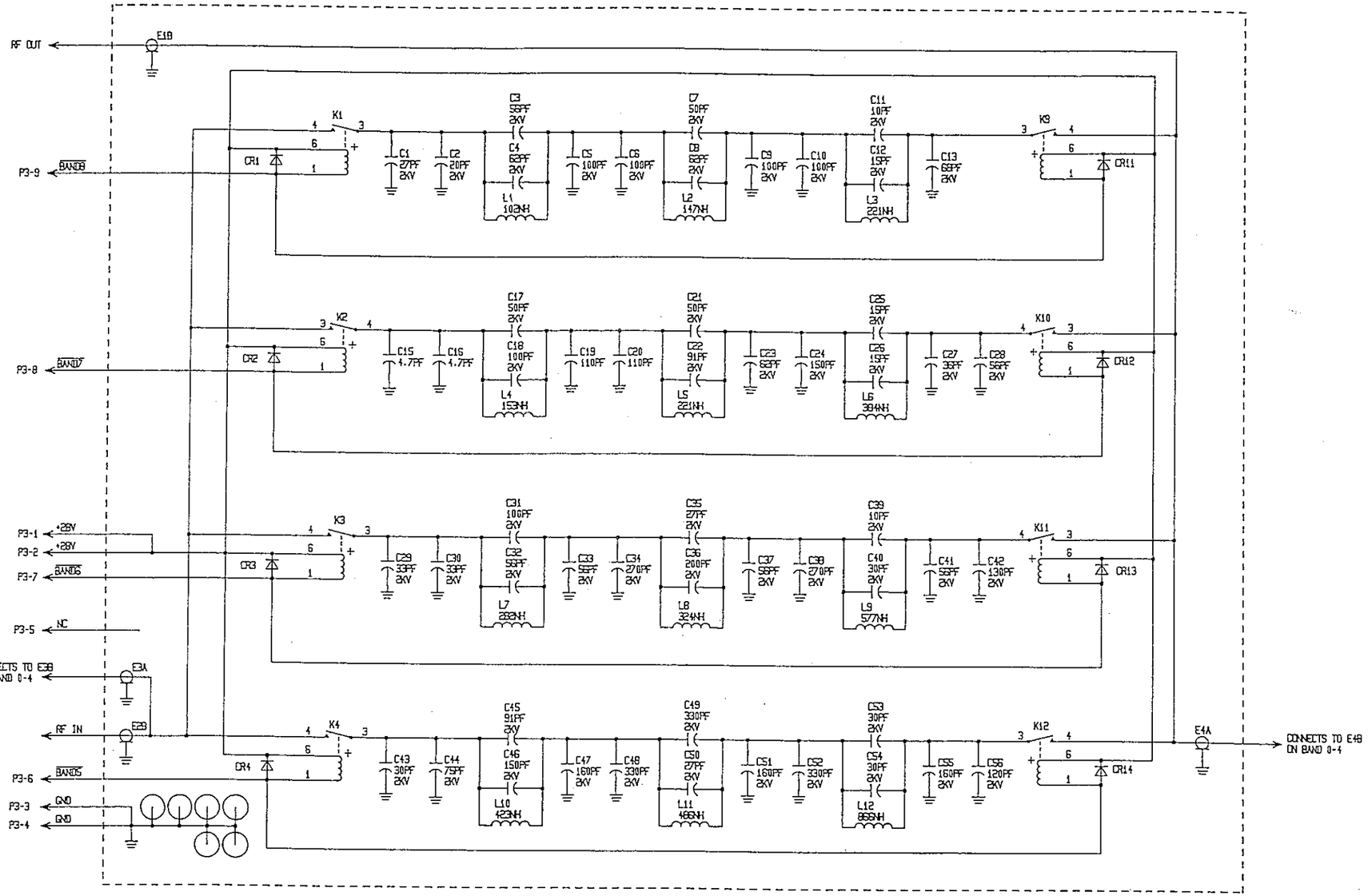


Figure 5.9.22 PC Assembly, Bands 5-8 1A3A3, page 1/2.



NOTE:
DIODES ARE 1N4004 UNLESS SPECIFIED

Figure 5.9.22 PC Assembly, Bands 5-8 1A3A3, page 2/2.

POWER AMPLIFIER ASSEMBLY 1A4

	POWER AMPLIFIER ASSEMBLY 1A4	8076030099
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. 0.1µF, 50V, X7R, 20%	0281610002
C7	CAP. 0.1µF, 50V, X7R, 20%	0281610002
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. 0.1µF, 50V, X7R, 20%	0281610002
C15	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C16	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C17	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C18	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C20	CAP. 47PF, 500V, DM15, 2%	0282420002
C21	CAP. 0.1µF, 100V, Z5U, 20%	1008420026
C22	CAP. 0.1µF, 100V, Z5U, 20%	1008420026
C23	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C24	CAPACITOR, 1000µF, 10V	1007160012
C25	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C26	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C27	CAP. 47µF, 35V	0282190007
C28	CAP. 0.001µF, 100V, X7R, 20%	0281630003
C29	CAPACITOR, 1000UF, 10V	1007160012
C30	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C31	CAP. 47µF, 35V	0282190007
C32	CAP. 47µF, 35V	0282190007
C33	CAP. 910PF, 100V, CD7, 5%	0288660005
C34	CAP. 0.1µF, 50V, X7R, 20%	0281610002
C35	CAP. 0.1µF, 50V, X7R, 20%	0281610002
CR1	DIODE, RECTIFIER 1N4004	0405180004
CR2	DIODE, LED, RED	1004350023
J1	CONNECTOR, RF, SNAP-ON	1000170012
J3	CONNECTOR, HEADER, 10 PIN MALE	1011200104
L1	INDUCTOR, MOLDED, 0.15µH, 5%	0648620000
L2	INDUCTOR, MOLDED, 0.15µH, 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
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, STRIPLINE, 18, 20W	1010150031
R20	RESISTOR, STRIPLINE, 18, 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, 0.47, 10%, 1/2W	1010390031
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
R35	RESISTOR 3.9K, 10%, 1/4W	0178830003
R36	RESISTOR 270, 10%, 1/4W	0178450006
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
	BUSHING/INSULATING,TO-220AB P/O Q8	1008380024
	CLIP, SPRING, PA	8076030803
	CONNECTOR, RF, RIGHT ANGLE	1010890018
	HEATSINK, MACHINED, PA	8076031401
	INSULATOR/MICA,TO-220AB P/OQ1,Q2,Q8	0448670003
	LUG, SOLDER, PLAIN NO. 6	0532890001
	SPACER, .171 ID,.250 OD, .375L	0509030009

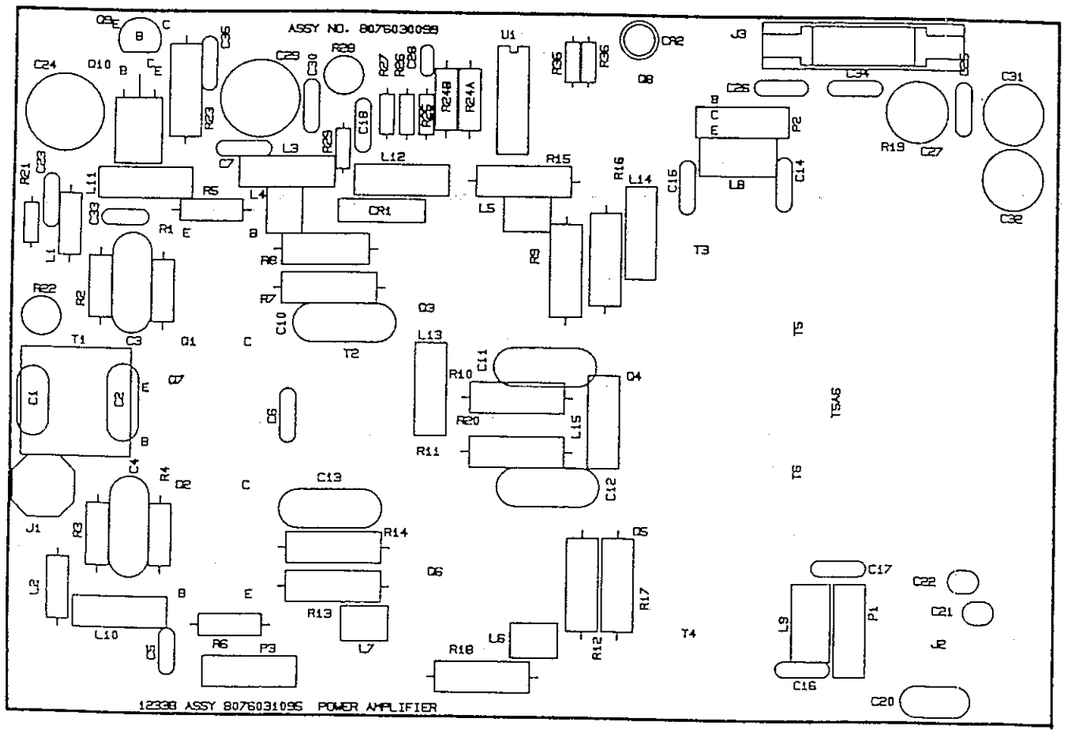


Figure 5.9.23 Power Amplifier Assembly 1A4, page 1/2.

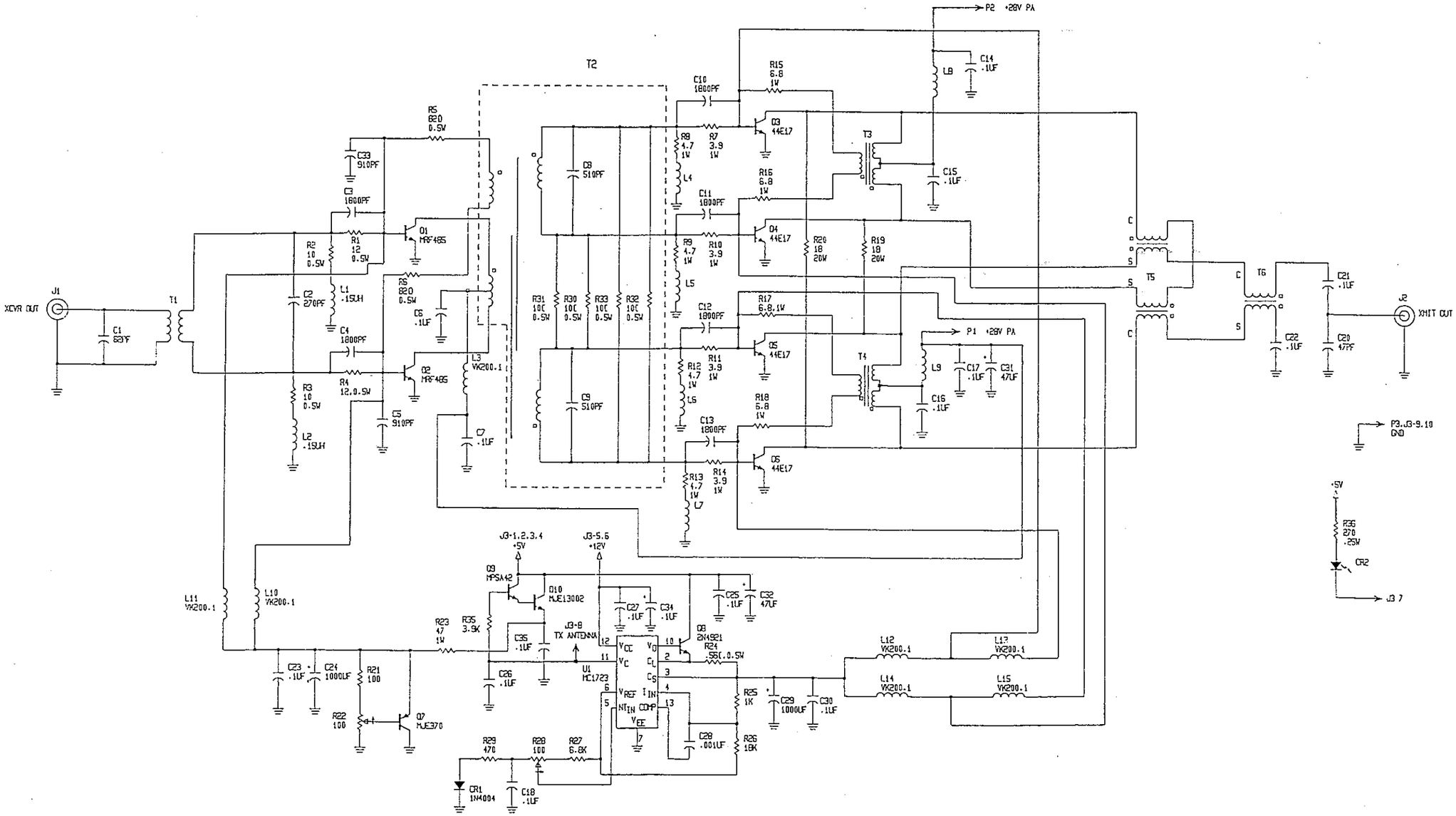


Figure 5.9.23 Power Amplifier Assembly 1A4, page 2/2.

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POWER SUPPLY ASSEMBLY, 28VDC 1A5A1

	POWER SUPPLY ASSY, 28VDC 1A5A1	8103020095
	CHASSIS,. POWER SUPPLY	8103020702
1A5A1A1	PC ASSY. SWITCHING REGULATORS	8103022098
1A5A1A2	PC ASSY CONTROL LOGIC, DC/PS	8076024099

Figure 5.9.24 Power Supply Assembly 1A5A1, page 1 of 1.

REV C	PC ASSY. SWITCHING REGULATORS	8103022098
C1	CAP. 0.1UF, 50V, X7R	1011180014
C2	CAP. 6.8UF, 50V	1008980013
C3	CAP. 6.8UF, 50V	1008980013
C4	CAP. 0.1UF, 50V, X7R	1011180014
C5	CAP. 1UF, 35V	0281660000
C6	CAP. 1UF, 35V	0281660000
C7	CAP. 68UF, 15V	0296540005
C8	CAP. 6.8UF, 50V	1008980013
C9	CAP. 0.1UF, 50V, X7R	1011180014
C10	CAP. 1000UF, 63V, 105C	1011350009
C11	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C12	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C13	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C14	CAP. 1000UF, 63V, 105C	1011350009
C15	CAP. 6.8UF, 50V	1008980013
C16	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C17	CAP. 1000UF, 63V, 105C	1011350009
C18	CAP. 1000UF, 63V, 105C	1011350009
C19	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C20	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C21	CAP. 1000UF, 63V, 105C	1011350009
C22	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C23	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C24	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C25	CAP. 1000UF, 63V, 105C	1011350009
C26	CAP. 6.8UF, 50V	1008980013
C27	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C28	CAP. 1000UF, 63V, 105C	1011350009
C29	CAP. 1000UF, 63V, 105C	1011350009
C30	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C31	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C32	CAP. 0.1UF, 50V, X7R	1011180014
C33	CAP. 0.1UF, 50V, X7R	1011180014
C34	CAP. 1000UF, 63V, 105C	1011350009
C35	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C36	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C37	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C38	CAP. 1000UF, 63V, 105C	1011350009
C39	CAP. 6.8UF, 50V	1008980013
C40	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C41	CAP. 1000UF, 63V, 105C	1011350009
C42	CAP. 1000UF, 63V, 105C	1011350009
C43	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C44	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C45	CAP. 0.1UF, 50V, X7R	1011180014
C46	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C47	CAP. 1000UF, 35V, 105C	1011420031
C48	CAP. 0.47UF, 50V, X7R, 20%	0283377771
C49	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C50	CAP. 0.22UF, 35V	0283510005
C51	CAP. 6.8UF, 50V	1008980013
C52	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C53	CAP. 0.1UF, 50V, X7R	1011180014
C54	CAP. 0.01UF, 50V, X7R, 20%	0281730008
C55	CAP. 0.01UF, 50V, X7R, 20%	0281730008
CR1	DIODE, TRANZORB 1N6283A	1011260000
CR2	DIODE, RECTIFIER 1N4004	0405180004
CR3	DIODE, RECTIFIER 1N4004	0405180004
CR5	DIODE, ZENER 1N5237B	0405240007
CR6	DIODE, RECTIFIER 1N5822	1010630032
CR7	DIODE, RECTIFIER 1N5822	1010630032
CR8	DIODE, RECTIFIER 1N5822	1010630032
CR9	DIODE, RECTIFIER 1N4004	0405180004
CR11	DIODE, TRANZORB 1N6283A	1011260000
CR12	DIODE, ZENER 1N5237B	0405240007
CR13	DIODE, RECTIFIER 1N5400	0403970008
CR14	DIODE, RECTIFIER 1N4004	0405180004
CR15	DIODE, RECTIFIER 1N4004	0405180004
F1	FUSE, MDL, 1 AMP, 250V	0841100004
J1	CONNECTOR, HEADER, 26 PIN MALE	1011200261
J2	CONNECTOR, HEADER 14 PIN MALE	1011200147
J3	CONNECTOR, PC, 6 PIN HEADER	1010830015
K1	RELAY, SPST, 24V	1008590029
K2	RELAY, SPDT, 24 VDC	1010760025
L1	INDUCTOR, CHOKE, 47UH	1008990019
L2	FERRITE BEAD, .400L	1010900013
L3	INDUCTOR, POWER, 220 UH	1011100037
L4	FERRITE BEAD, .400L	1010900013
L5	FERRITE BEAD, .400L	1010900013
L6	INDUCTOR, TOROID, 150UH	1010650033
L7	FERRITE BEAD, .400L	1010900013
L8	FERRITE BEAD, .400L	1010900013
L9	INDUCTOR, TOROID, 150UH	1010650033
L10	FERRITE BEAD, .400L	1010900013
P1	CONNECTOR, HOUSING, 10 PIN,FEM	1010850016
Q1	TRANSISTOR, NPN, SI. 2N3700	1008500038
Q2	TRANSISTOR, P-CH, FET MTP23P06	1010960008
Q3	DIODE, SCR C106A2	0447070002
Q4	DIODE, SCR C106A2	0447070002
Q5	DIODE, SCR C106A2	0447070002
Q6	TRANSISTOR, N-CH, FET 2N7000	1011050013
R1	RESISTOR 220, 10%, 1/4W	0171320000
R2	RESISTOR 4.7K, 5%, 1/4W	0170770001
R3	RESISTOR 4.7K, 5%, 1/4W	0170770001
R4	RESISTOR 2.2K, 5%, 1/4W	0178070009
R5	RESISTOR 10K, 10%, 1/4W	0170410005
R6	RESISTOR 47K, 10%, 1/4W	0171060008

Figure 5.9.25 PC Assembly, Switching Regulators 1A5A1A1, page 1 of 3.

R7	RESISTOR 3.3K, 10%, 1/4W	0170890007
R8	RESISTOR 10K, 10%, 1/4W	0170410005
R9	RESISTOR 2.2K, 5%, 1/4W	0178070009
R10	RESISTOR 1M, 10%, 1/4W	0170650006
R11	RESISTOR 56.2K, 1%, 1/8W	1008910015
R12	RESISTOR 6040, 1%, 1/8W	1010580019
R13	RESISTOR 3, 5%, 3W	1004600003
R14	RESISTOR 5.6K, 10%, 1/4W	0183060008
R15	RESISTOR 1K, 10%, 1/4W	0171560001
R16	RESISTOR 3320, 1%, 1/8W	1003050000
R17	RESISTOR 1K, 1%, 1/8W	1011380005
R18	RESISTOR 1.2, 10%, 2W	0186290004
R19	RESISTOR 1.8K, 10%, 1/4W	0178190004
R20	RESISTOR 1K, 10%, 1/4W	0171560001
R21	RESISTOR 3320, 1%, 1/8W	1003050000
R22	RESISTOR 1K, 1%, 1/8W	1011380005
R23	RESISTOR 1, 5%, 10W	0169680002
R24	RESISTOR 10K, 10%, 1/4W	0170410005
R25	RESISTOR 150, 5%, 3W	0160110009
R26	RESISTOR 1.2, 10%, 2W	0186290004
R27	RESISTOR 1.8K, 10%, 1/4W	0178190004
R28	RESISTOR 1K, 10%, 1/4W	0171560001
R29	POT. 5K, 10%, 1/2W, 25 TURNS	1004720025
R30	RESISTOR 220K, 10%, 1/4W	0177780002
R31	RESISTOR 220K, 10%, 1/4W	0177780002
R32	RESISTOR 220K, 10%, 1/4W	0177780002
R33	RESISTOR 220K, 10%, 1/4W	0177780002
R34	RESISTOR 10K, 10%, 1/4W	0170410005
R35	RESISTOR 1K, 10%, 1/4W	0171560001
R36	RESISTOR 10K, 10%, 1/4W	0170410005
R37	RESISTOR 470, 5%, 1/4W	0184110009
R38	RESISTOR 2.7K, 10%, 1/4W	0186670001
R39	RESISTOR 100, 10%, 1/2W	0174790007
R40	RESISTOR 10K, 10%, 1/4W	0170410005
T1	TOROID, SLOTTED, HALL EFFECT	1011040018
TP1	TEST POINT, RED	1011130033
U1	IC. LINEAR LM317T	1006920013
U2	IC. LINEAR 78L12	1010840029
U3	IC. LINEAR LM311N	1005760021
U4	IC. LINEAR UGS3503	1011020017
U5	IC. LINEAR LM324N	1003970001
U6	IC. LINEAR LM2576-ADJ	1010610031
U7	IC. LINEAR LM2576-ADJ	1010610031
U8	IC. LINEAR LM2576-ADJ	1010610031
U9	IC. LINEAR LM340T5	0448600005
U10	IC. DIGITAL 2501-4	1010630008
XF1	FUSECLIP, PC MOUNT	0534610005
	KEY, POLARIZING	1008070033
	HEATSINK PLATE, SWITCHING REG	8103022501

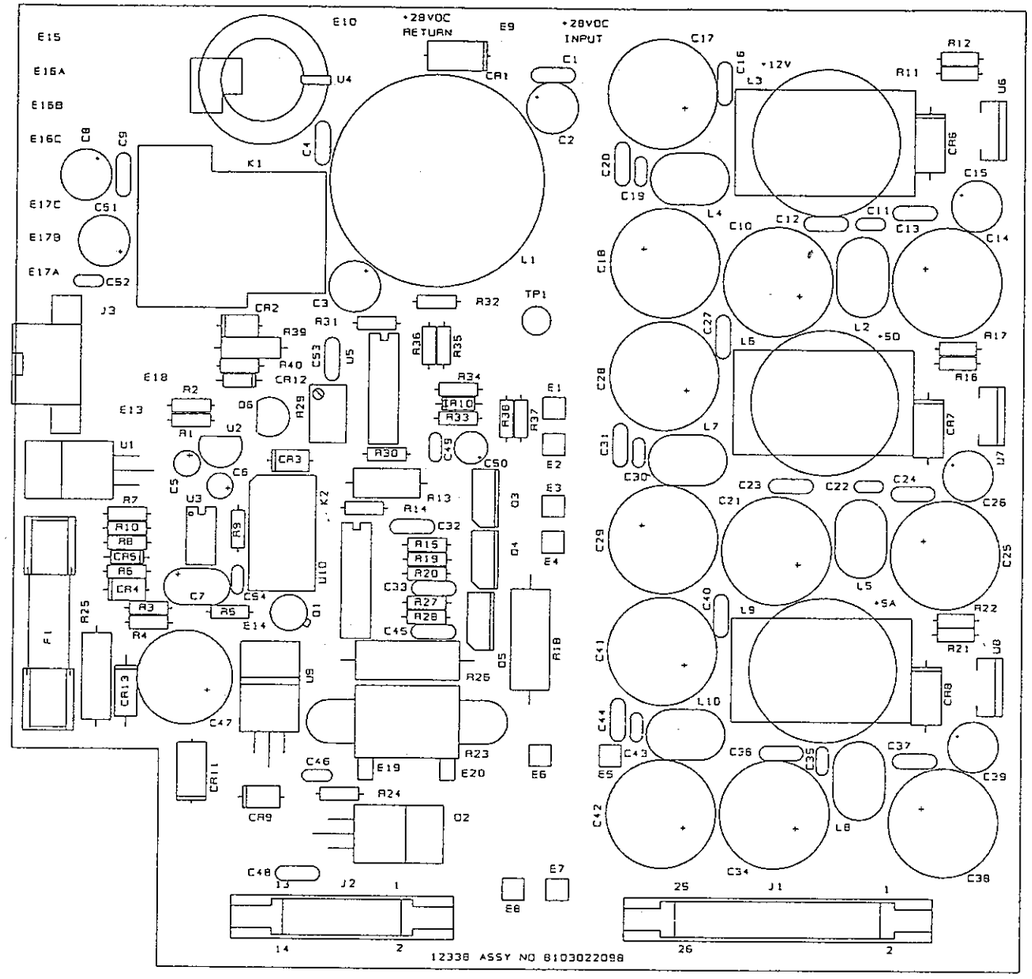

Figure 5.9.25 PC Assembly, Switching Regulators 1A5A1A1, page 2 of 3.

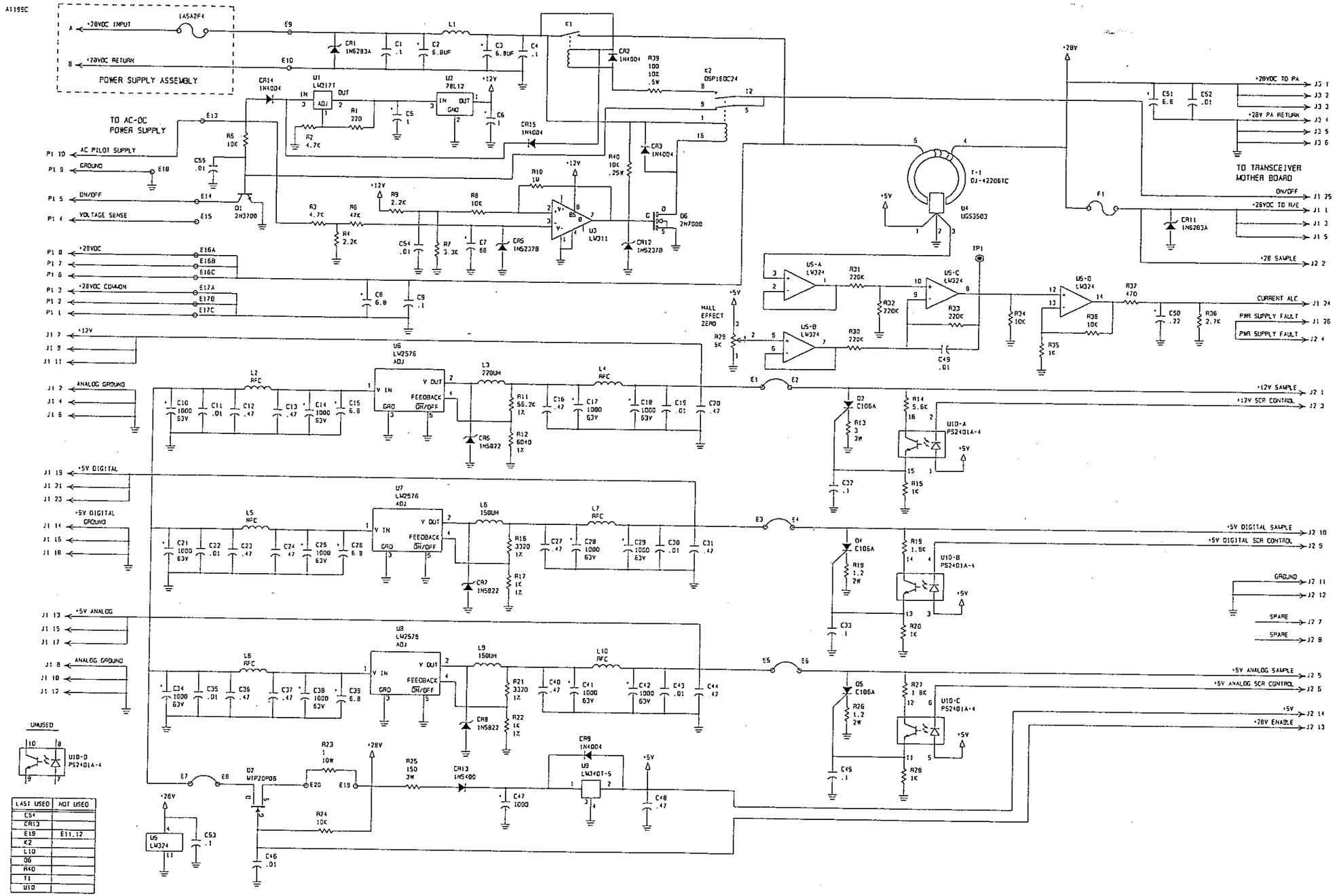

Figure 5.9.25 PC Assembly, Switching Regulators 1A5A1A1, page 3 of 3.

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PC ASSY, CONTROL LOGIC, DC/PS 1A5A1A2

	PC ASSY, CTRL LOGIC, DC/PS 1A5A1A2	8076024099
C1	CAP. .01µF, 50V, X7R 20%	0281730008
C2	CAP. .01µF, 50V, X7R 20%	0281730008
C14	CAP. .01µF, 50V, X7R 20%	0296780006
C37	CAP. 6.8µF, 20V, T368	0281730008
C38	CAP. .01µF, 50V, X7R 20%	0281730008
C39	CAP. .01µF, 50V, X7R 20%	0281730008
C51	CAP. .01µF, 50V, X7R 20%	0281730008
C52	CAP. .01µF, 50V, X7R 20%	0281730008
C53	CAP. .01µF, 50V, X7R 20%	0281730008
C54	CAP. .01µF, 50V, X7R 20%	0281730008
C55	CAP. .01µF, 50V, X7R 20%	0281730008
CR1	CAP. .01µF, 50V, X7R 20%	0405180004
CR2	DIODE, RECTIFIER 1N4004	1004350023
CR3	DIODE, LED, RED	1004350023
CR4	DIODE, LED, RED	1004350023
CR5	DIODE, LED, RED	1004350023
CR6	DIODE, LED, RED	1004350023
CR7	DIODE, LED, RED	1004350023
CR8	DIODE, LED, RED	1004350015
CR14	DIODE, LED, GREEN	1004350023
CR15	DIODE, LED, RED	1004350023
CR16	DIODE, LED, RED	0405270003
CR17	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR18	DIODE, SIGNAL, SIL. 1N4454	1004350023
P1	DIODE, LED, RED	1008350001
R2	CONNECTOR, RIBBON, 14 PIN FEM	0170410005
R3	RESISTOR 10K, 10%, 1/4W	1011310007
R4	RESISTOR, 237K, 1%, 1/8W	0175220000
R9	RESISTOR 180, 10%, 1/4W	1001030036
R10	RESISTOR, 100K, 1/8W, 1%	1011300001
R11	RESISTOR, 1.8M, 10%, 1/4W	1003050026
R12	RESISTOR 10K, 1%, 1/8W	1011290006
R13	RESISTOR, 80.6K, 1%, 1/8W	0174930003
R14	RESISTOR 1.2M, 10%, 1/4W	1003050026
R15	RESISTOR 10K, 1%, 1/8W	0178450006
R16	RESISTOR 270, 10%, 1/4W	0178330001
R17	RESISTOR 390, 10%, 1/4W	0170390004
R18	RESISTOR 100K, 10%, 1/4W	0175220000
R19	RESISTOR 180, 10%, 1/4W	1011330008
R20	RESISTOR, 4.7M, 10 %, 1/4W	0175220000
R21	RESISTOR 180, 10%, 1/4W	1003050026
R22	RESISTOR 10K, 1%, 1/8W	0175220000
R23	RESISTOR 180, 10%, 1/4W	1011410001
R24	RESISTOR, 143K, 1%, 1/8W	0178450006
R26	RESISTOR 270, 10%, 1/4W	0181480000
R27	RESISTOR 680K, 10%, 1/4W	1004050011
R28	RESISTOR 36.5K, 1%, 1/8W	1003050026
R29	RESISTOR 10K, 1%, 1/8W	0180570005
R30	RESISTOR 470K, 10%, 1/4W	1011280001
R31	RESISTOR, 26.1K, 1%, 1/8W	1003050026
R35	RESISTOR 10K, 1%, 1/8W	0178450006
R36	RESISTOR 270, 10%, 1/4W	0181480000
R37	RESISTOR 36.5K, 1%, 1/8W	1004050011
R38	RESISTOR 10K, 1%, 1/8W	1003050026
R39	RESISTOR 470K, 10%, 1/4W	0180570005
R40	RESISTOR, 26.1K, 1%, 1/8W	1011280001
R41	RESISTOR 10K, 1%, 1/8W	1003050026
R46	RESISTOR 390, 10%, 1/4W	0178330001
R47	RESISTOR 2.7M, 5%, 1/4W	1004900007
R48	RESISTOR 10K, 1%, 1/8W	1003050026
R49	RESISTOR 270, 10%, 1/4W	0178450006
R50	RESISTOR 270, 10%, 1/4W	0178450006
R51	RESISTOR 10K, 10%, 1/4W	0170410005
R52	RESISTOR 10K, 10%, 1/4W	0170410005
R61	RESISTOR 180, 10%, 1/4W	0175220000
R62	RESISTOR 10K, 10%, 1/4W	0170410005
R64	RESISTOR 390, 10%, 1/4W	0178330001
RP1	RES NTWK 8 PIN SIP 10K COM	1005200009
U4	IC. DIGITAL ULN2003A	1005630038
U5	IC. DIGITAL ICL7665S	1010940007
U6	IC. DIGITAL ICL7665S	1010940007
U7	IC. DIGITAL ICL7665S	1010940007
U8	IC, DIGITAL 74HC74	1008000019
U9	IC, DIGITAL 74HC74	1008000019
U10	IC. DIGITAL 74HC14	1006490027
U12	IC. DIGITAL ICL7665S	1010940007
U13	IC. DIGITAL 74HC08	1006490019
U14	IC. DIGITAL 74HC11	1010950002
U16	IC. DIGITAL UDN5703A	1011030004
XP1	CONNECTOR,PCB,TRANSITION,14PIN	1011090147
	CABLE, FLAT, 14 COND. 28AWG	1011170001

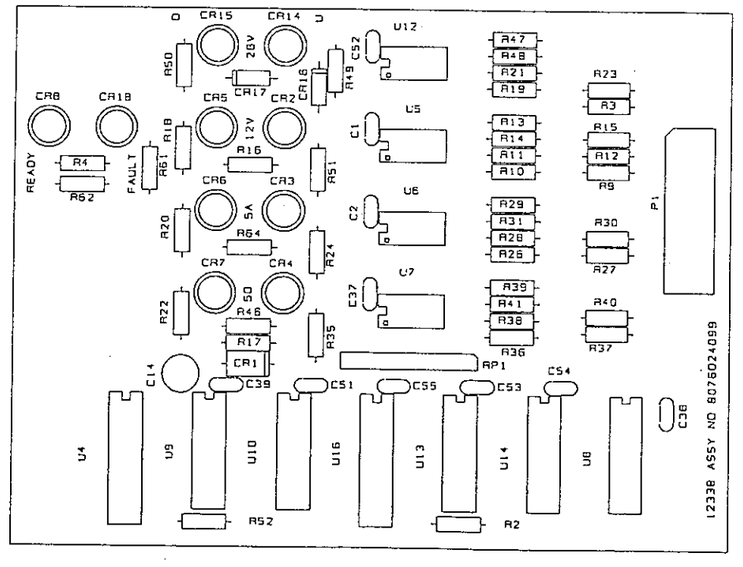

Figure 5.9.26 PC Assembly, Control Logic, DC/PS 1A5A1A2, page 1 of 2.

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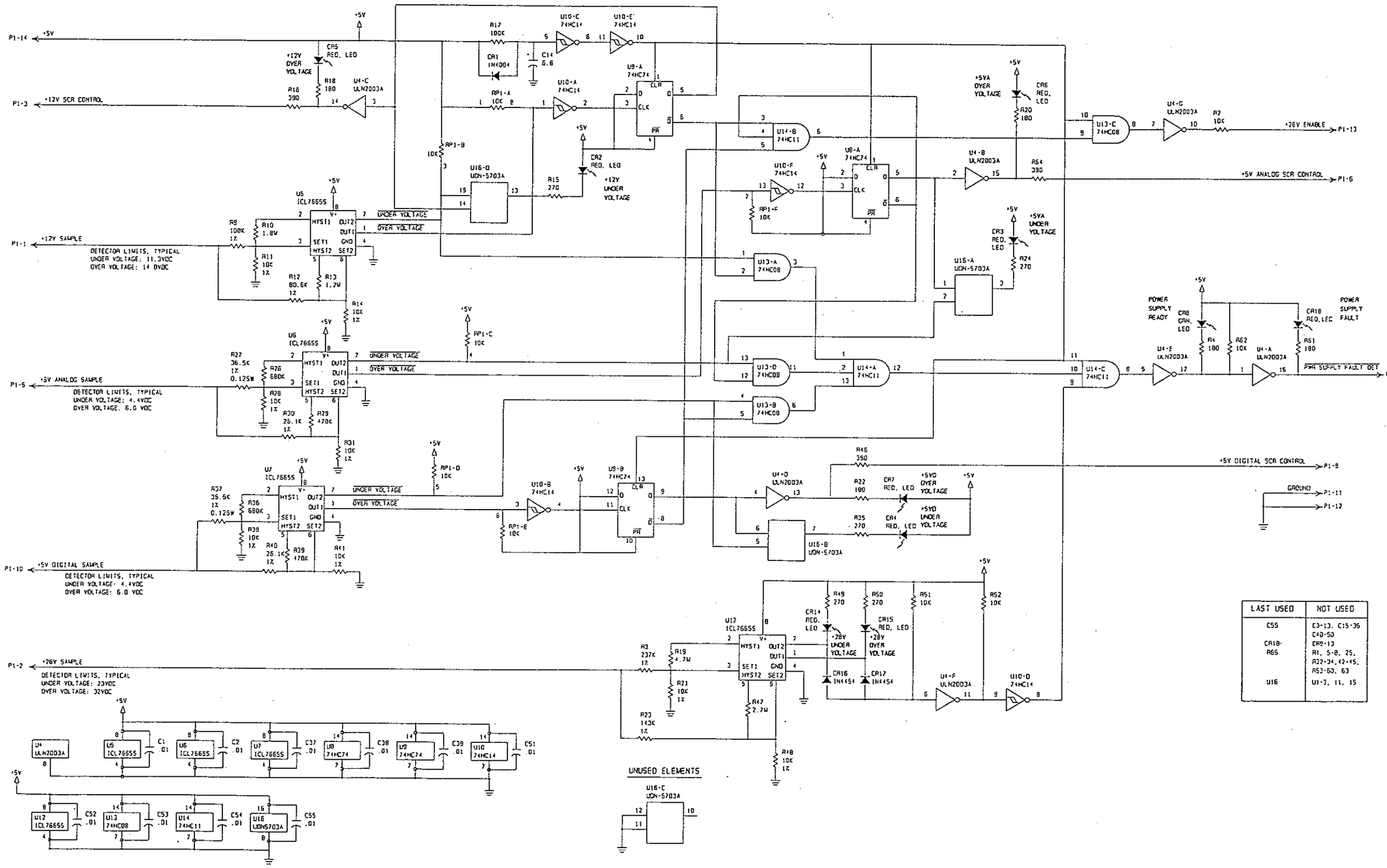

LAST USED	NOT USED
C55	C3-13, C15-36 C40-50
CR18	CR9-13
R65	R1, 5-8, 25, R32-34, 42-45, R53-60, 63
U16	U1-3, 11, 15

Figure 5.9.26 PC Assembly, Control Logic, DC/PS 1A5A1A2, page 2 of 2.

POWER SUPPLY ASSEMBLY, 115/230 VAC 1A5A2

	PWR SUPPLY ASSY, 115/230 VAC 1A5A2	8103021091
CR1	DIODE, BRIDGE, 35A, 400V	1010600010
J1	CONNECTOR, POWER, 10 PIN, MALE	1011050005
J2	CONNECTOR, POWER, 2 PIN ROUND	1011230011
J3	CONNECTOR, POWER, 2 PIN, MALE	1011070006
F1	FUSE, MDQ, 5 AMP, 250V	0858660008
F2	FUSE, MDQ, 5 AMP, 250V	0858660008
F3	FUSE, SFE, 20 AMP, 32V	1011290014
F4	FUSE, 3AB, 20 AMP, 250V	1010690035
R1	RESISTOR 30, 5%, 15W	1000860019
T1	TRANSFORMER, POWER, HD, 600VA	1011140039
XF1	FUSEHOLDER, PANEL MOUNT	0849030005
XF2	FUSEHOLDER, PANEL MOUNT	0849030005
XF3	FUSEMOUNT, 1 POLE W/TERMINALS	0842490001
XF4	FUSEHOLDER, PANEL MOUNT	0849030005
ZS1	VARISTOR, MOV V140LA5	1011300010
ZS2	VARISTOR, MOV V140LA5	1011300010
1A5A2A1	PC ASSY, FILTER, AC/PS	8076021197
1A5A2A2	PC ASSY, 28V REGULATOR, 17 AMP	8076021391
1A5A2A2Q1	TRANSISTOR, NPN, SI, MJ11031	1010990012

Figure 5.9.27 Power Supply Assembly 115/230 VAC 1A5A2, page 1 of 2.

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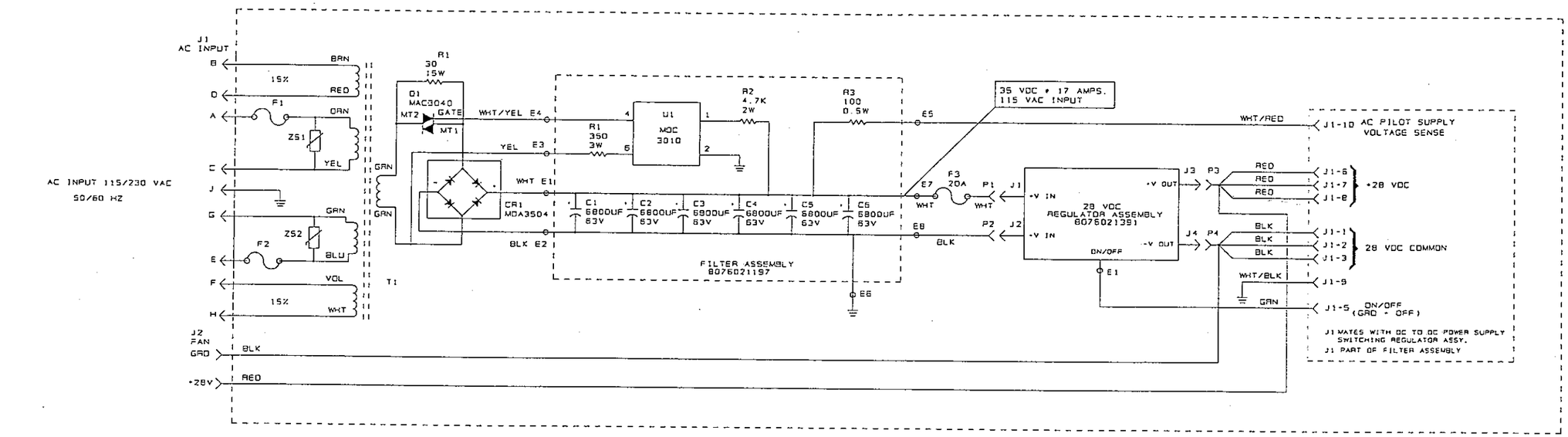

FUSE SELECTION
115 VAC:5A
230 VAC:5A

Figure 5.9.27 Power Supply Assembly 115/230 VAC 1A5A2, page 2 of 2.

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PC ASSY, FILTER, AC/PS 1A5A2A1

	PC ASSY, FILTER, AC/PS 1A5A2A1	8076021197
C1	CAP. 6800 µF, 63V, 20%, 105C	1010800019
C2	CAP. 6800 µF, 63V, 20%, 105C	1010800019
C3	CAP. 6800 µF, 63V, 20%, 105C	1010800019
C4	CAP. 6800 µF, 63V, 20%, 105C	1010800019
C5	CAP. 6800 µF, 63V, 20%, 105C	1010800019
C6	CAP. 6800 µF, 63V, 20%, 105C	1010800019
R1	RESISTOR 350, 5%, 3W	0162930003
R2	RESISTOR 4.7K, 10%, 2W	0164130004
R3	RESISTOR 100, 10%, 1/2W	0174790007
U1	IC LINEAR MOC3010	1010620011

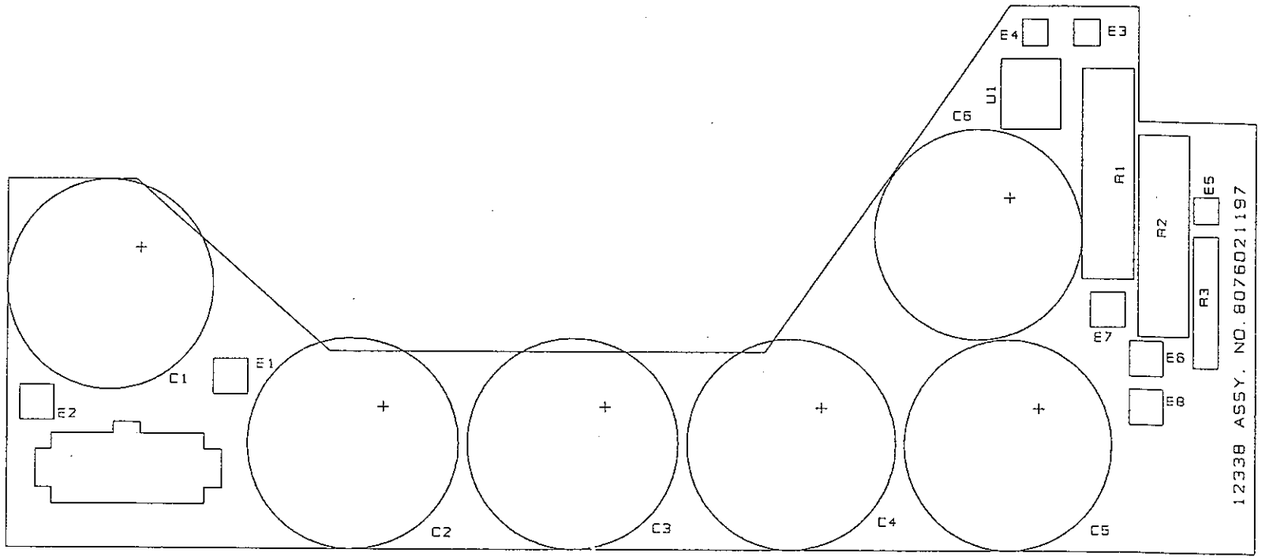

Figure 5.9.28 PC Assembly, Filter, AC/PS 1A5A2A1, page 1 of 1.

PC ASSY, 28V REGULATOR, 17 AMP 1A5A2A2

	PC ASSY,28V REG, 17 AMP 1A5A2A2	8076021391
C1	CAP. .47µF, 50V, X7R 20%	0283377771
C2	CAPACITOR 0.1µF, 50V, X7R	1011180014
C3	CAP. 0.047 µF, 50V, X7R, 10%	1010740008
C4	CAP. 2.2µF, 35V, T368	0273950002
C5	CAP. .01µF, 50V, X7R 20%	0281730008
C6	CAP. 1µF, 35V, 196D	0281660000
C7	CAPACITOR 0.1µF, 50V, X7R	1011180014
C8	CAP. .47µF, 50V, X7R 20%	0283377771
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C10	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. 1µF, 35V, 196D	0281660000
C12	CAP. 0.1µF, 50V, X7R	1011180014
C13	CAP. .47µF, 50V, X7R 20%	0283377771
C15	CAP. 1000µF, 63V, 20%, 105C	1011350009
C16	CAP. 22µF, 15V, T368	0296660001
CR1	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR2	DIODE, ZENER 1N5358B	0404900003
CR3	DIODE, LED, RED, PC MOUNT	1008480029
CR4	DIODE, ZENER 1N5364B	0405230001
CR5	DIODE, RECTIFIER 1N4004	0405180004
CR6	DIODE, LED, RED, PC MOUNT	1008480029
CR7	DIODE, LED, RED, PC MOUNT	1008480029
CR8	DIODE, LED, GREEN PC MOUNT	1011030012
CR9	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR10	DIODE, SIGNAL, SIL. 1N4454	0405270003
CR11	DIODE, RECTIFIER 1N4004	0405180004
J1	TERMINAL, PC MOUNT, 3/16" MALE	1008550027
J2	TERMINAL, PC MOUNT, 1/4" MALE	1008330035
J3	TERMINAL, PC MOUNT, 3/16" MALE	1008550027
J4	TERMINAL, PC MOUNT, 1/4" MALE	1008330035
K1	RELAY, SPST, 24V	1008590029
*Q1	TRANSISTOR, PNP, MJ11031	1010990012
Q2	DIODE, SCR 2N5062	1011010011
Q3	TRANSISTOR, NPN, SI. 2N2222A	0448580004
R1	RESISTOR 470, 10%, 1W	0165280000
R2	RESISTOR 560, 5%, 1/4W	0183200004
R3	RESISTOR, 3.9K, 5%, 1/8W	1010803921
R4	RESISTOR 4.7K, 5%, 1/8W	1010804723
R5	RESISTOR 6.8K, 5%, 1/8W	1010806823
R6	RESISTOR 2.2K, 5%, 1/8W	1010802224
R7	POT. 500, 10% 3/4W, 15 TURNS	0338490078
R8	RESISTOR 2.7K, 10%, 1/4W	0186670001
R9	RESISTOR 1K, 10%, 1/4W	0171560001
R10	RESISTOR 4.7K, 5%, 1/4W	0170770001
R11	RESISTOR 2.7K, 10%, 1/2W	0165780002
R12	RESISTOR 10K, 5%, 1/8W	1010801031
R13	RESISTOR 10K, 5%, 1/8W	1010801031
R14	RESISTOR 1.8K, 5%, 1/8W	1010801821
R15	POT. 500, 10% 3/4W, 15 TURNS	0338490078
R16	RESISTOR 680, 5%, 1/8W	1010806815
R17	RESISTOR 220, 10%, 1/4W	0171320000
R18	RESISTOR 180K, 5%, 1/8W	1010801848
R19	RESISTOR, 237K, 1%, 1/8W	1011310007
R20	RESISTOR, 4.7M, 10 %, 1/4W	1011330008
R21	RESISTOR 10K, 5%, 1/8W	1010801031
R22	RESISTOR 2.7M, 5%, 1/4W	1004900007
R23	RESISTOR 10K, 5%, 1/8W	1010801031
R24	RESISTOR 680, 10%, 1/4W	0176630007
R25	RESISTOR, 3.9K, 5%, 1/8W	1010803921
R27	RESISTOR 390, 10%, 1/2W	0173260004
R28	RESISTOR 680, 10%, 1/4W	0176630007
R29	RESISTOR 2.2K, 10%, 1W	0164510001
R30	RESISTOR 5.6K, 5%, 1/8W	1010805622
R31	RESISTOR 4.7K, 5%, 1/8W	1010804723
R32	RESISTOR 2.2K, 5%, 1/4W	0178070009
T1	TOROID, SLOTTED, HALL EFFECT	1011040018
U1	IC. LINEAR LM340/7812	1003410022
U2	IC. LINEAR MC1723L	1010270036
U3	IC. DIGITAL 2501-1	1011000016
U4	IC. LINEAR LM311N	1005760021
U5	IC. LINEAR UGS3503	1011020017
U6	IC. DIGITAL ICL7665S	1010940007
U7	IC. LINEAR UA78L05 AWC	1010150014
XQ1	SOCKET, XSISTOR, TO-3, HI-PWR	1011220016

* Installed on rear panel heat sink.

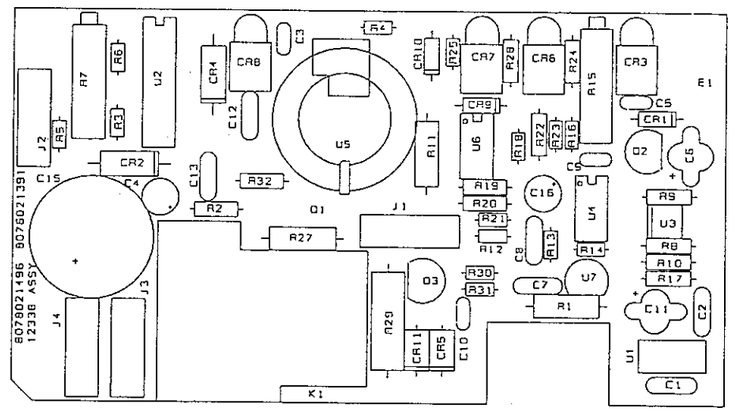

Figure 5.9.29 PC Assembly, 28V Regulator, 17 AMP 1A5A2A2, page 1 of 2.

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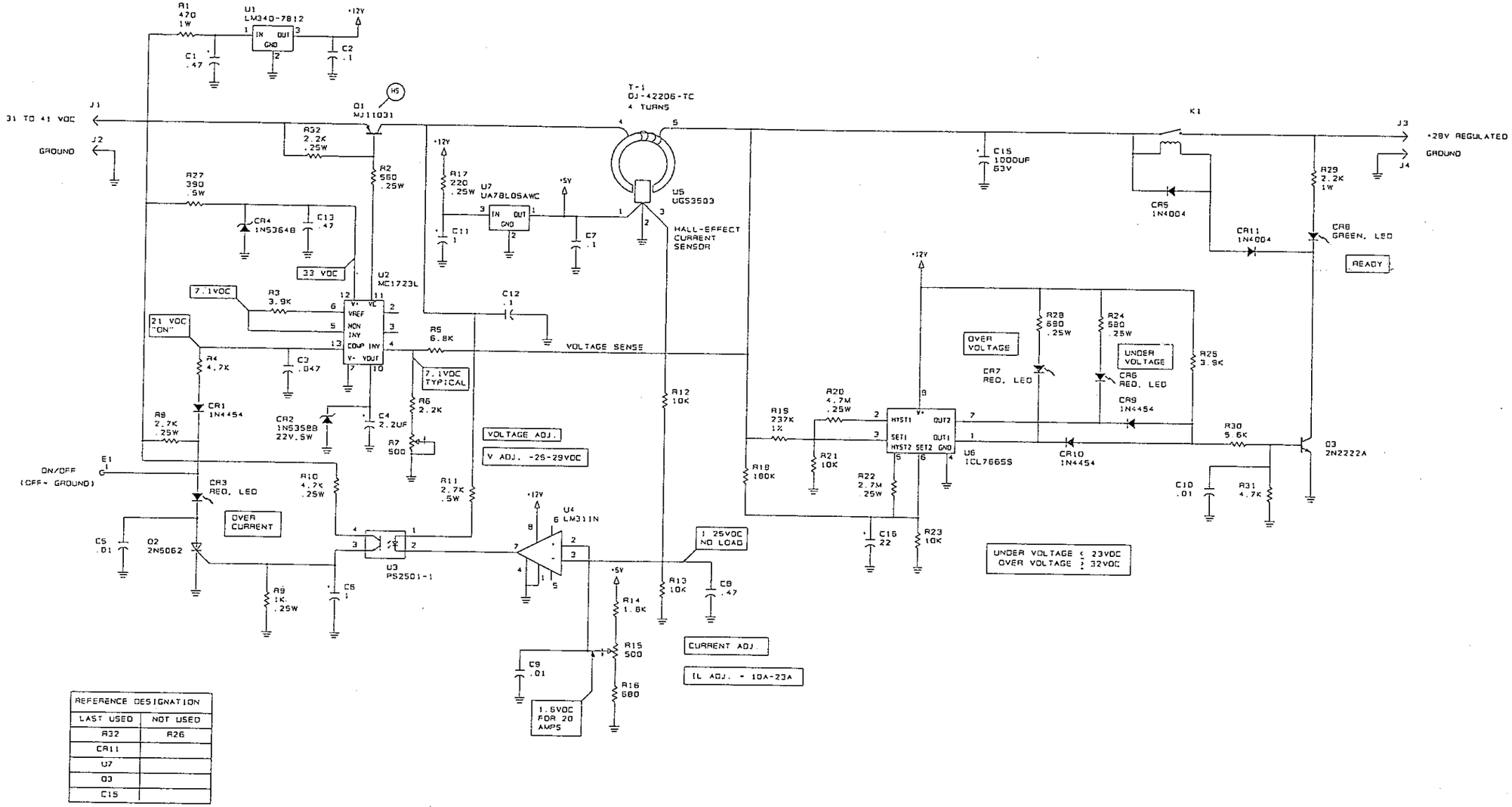


REFERENCE DESIGNATION	
LAST USED	NOT USED
R32	R26
CR11	
U7	
Q3	
C15	

Figure 5.9.29 PC Assembly, 28V Regulator, 17 AMP 1A5A2A2, page 2 of 2.

PC ASSY, REAR PANEL CONNECTOR 1A6A1

	PC ASSY, REAR PANEL CONN. 1A6A1	8076011094
C1	CAP. .01µF, 50V, X7R 20%	0281730008
C2	CAP. .01µF, 50V, X7R 20%	0281730008
C3	CAP. .01µF, 50V, X7R 20%	0281730008
C4	CAP. .01µF, 50V, X7R 20%	0281730008
C5	CAP. .01µF, 50V, X7R 20%	0281730008
C6	CAP. .01µF, 50V, X7R 20%	0281730008
C7	CAP. .01µF, 50V, X7R 20%	0281730008
C8	CAP. .01µF, 50V, X7R 20%	0281730008
C9	CAP. .01µF, 50V, X7R 20%	0281730008
C10	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. .01µF, 50V, X7R 20%	0281730008
C12	CAP. .01µF, 50V, X7R 20%	0281730008
C13	CAP. .01µF, 50V, X7R 20%	0281730008
C14	CAP. .01µF, 50V, X7R 20%	0281730008
C15	CAP. .01µF, 50V, X7R 20%	0281730008
C16	CAP. .01µF, 50V, X7R 20%	0281730008
C17	CAP. .01µF, 50V, X7R 20%	0281730008
C18	CAP. .01µF, 50V, X7R 20%	0281730008
C19	CAP. .01µF, 50V, X7R 20%	0281730008
C20	CAP. .01µF, 50V, X7R 20%	0281730008
C21	CAP. .01µF, 50V, X7R 20%	0281730008
C22	CAP. .01µF, 50V, X7R 20%	0281730008
C23	CAP. .01µF, 50V, X7R 20%	0281730008
C24	CAP. .01µF, 50V, X7R 20%	0281730008
C25	CAP. .01µF, 50V, X7R 20%	0281730008
C26	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. .01µF, 50V, X7R 20%	0281730008
C34	CAP. .01µF, 50V, X7R 20%	0281730008
C35	CAP. .01µF, 50V, X7R 20%	0281730008
C36	CAP. .01µF, 50V, X7R 20%	0281730008
C37	CAP. .01µF, 50V, X7R 20%	0281730008
C38	CAP. .01µF, 50V, X7R 20%	0281730008
C39	CAP. .01µF, 50V, X7R 20%	0281730008
C40	CAP. .01µF, 50V, X7R 20%	0281730008
C41	CAP. .01µF, 50V, X7R 20%	0281730008
C42	CAP. .01µF, 50V, X7R 20%	0281730008
C43	CAP. .01µF, 50V, X7R 20%	0281730008
C44	CAP. .01µF, 50V, X7R 20%	0281730008
C45	CAP. .01µF, 50V, X7R 20%	0281730008
C46	CAP. .01µF, 50V, X7R 20%	0281730008
C47	CAP. .01µF, 50V, X7R 20%	0281730008
C48	CAP. .01µF, 50V, X7R 20%	0281730008
C49	CAP. .01µF, 50V, X7R 20%	0281730008
C50	CAP. .01µF, 50V, X7R 20%	0281730008
C53	CAP. .01µF, 50V, X7R 20%	0281730008
C54	CAP. .01µF, 50V, X7R 20%	0281730008
C55	CAP. .01µF, 50V, X7R 20%	0281730008
C56	CAP. .01µF, 50V, X7R 20%	0281730008
C57	CAP. .01µF, 50V, X7R 20%	0281730008
C58	CAP. .01µF, 50V, X7R 20%	0281730008
	CONNECTOR,POWER,39PIN,FEMALE	1011100002
	CONNECTOR, POWER, 19 PIN, FEM	1011110008
	CONNECTOR, HEADER, 20 PIN MALE	1011210207
	KEY, POLARIZING	1008070033

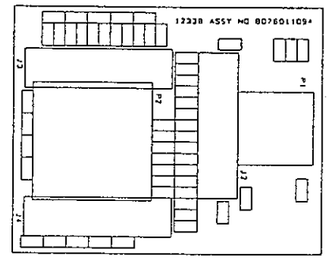
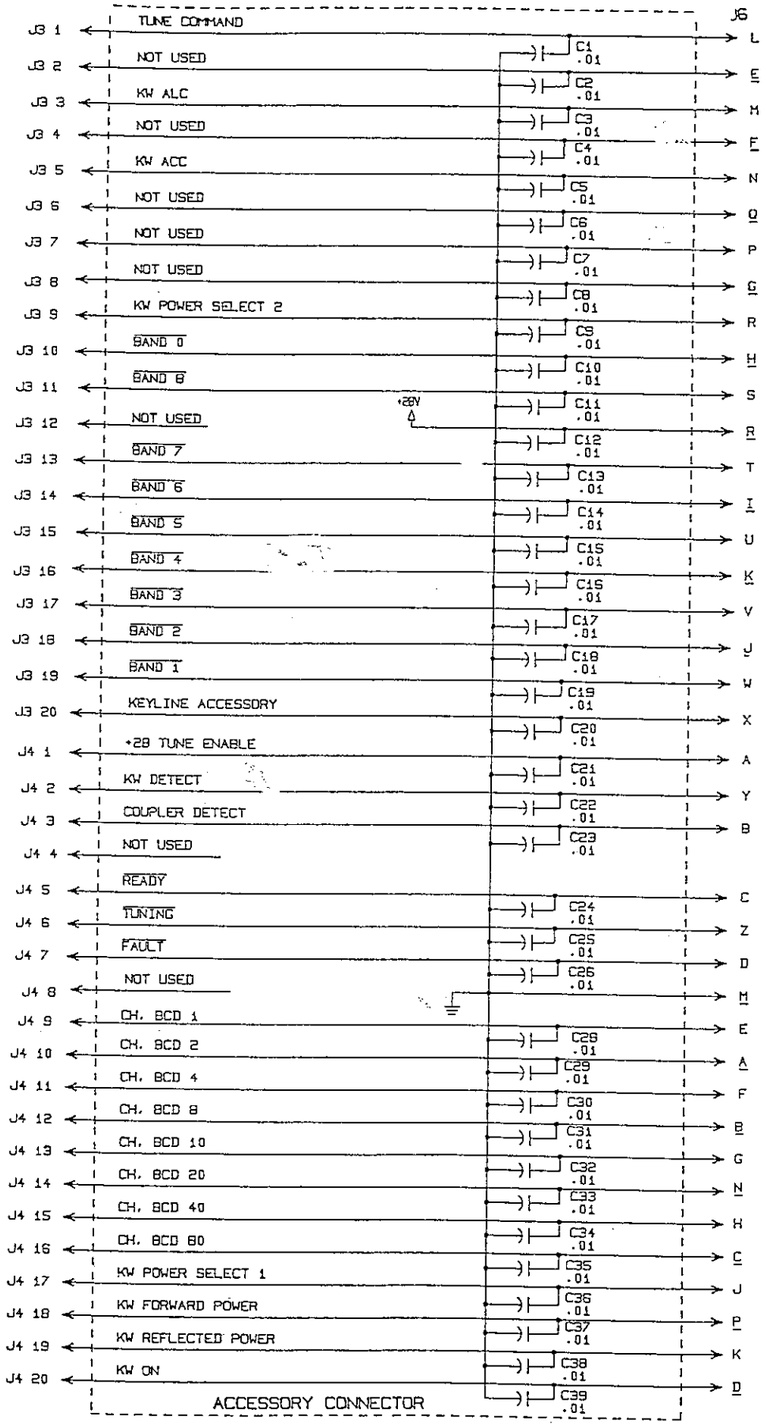
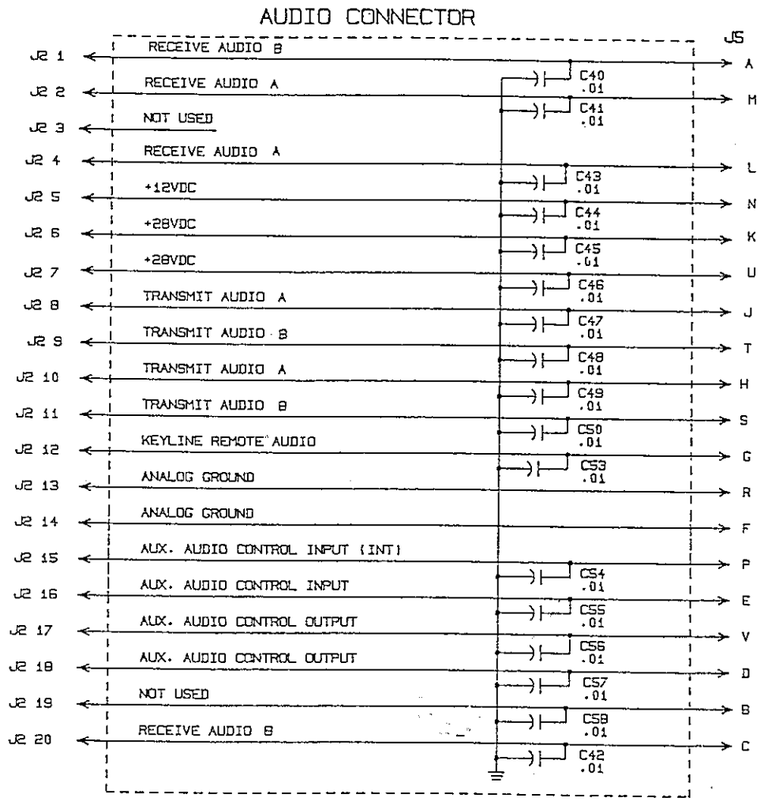


Figure 5.9.30 PC Assembly, Rear Panel Connector, 1A6A1, page 1 of 2.





NOTE:
UNDERLINED CHARACTERS
DENOTE LOWER CASE.

COMPONENT NOT USED.
C27, C51, C52, J1

Figure 5.9.30 PC Assembly, Rear Panel Connector 1A6A1, page 2/2.

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TM-8076000505

DIGITAL HF/SSB TRANSCEIVER

RT-9000 A

OPERATION and MAINTENANCE MANUAL ALE OPTION

SUNAIR® 3101 SW Third Avenue, Ft. Lauderdale, FL 33315-3389

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TABLE of CONTENTS

TABLE of CONTENTS (Cont...)

LISTING of FIGURES

LISTING of TABLES

SECTION VI

GENERAL INFORMATION

6.1 EMBEDDED ALE - I/O OPTION

6.1.1 PURPOSE OF EQUIPMENT

The embedded ALE modem - I/O board (1A2A10) is an internal radio modem and I/O interface designed to operate with the Sunair RT-9000A transceiver to provide HF radio automatic link establishment (ALE). Designed for use in fixed-station or mobile environments, the modem complies with the signaling and link establishment requirements of MIL-STD-188-141A (Interoperability and Performance Standards for Medium and High Frequency Radio Equipment) and FED-STD-1045 (Telecommunications: HF Radio Automatic Link Establishment).

6.1.2 GENERAL DESCRIPTION

The embedded ALE modem is a practical, flexible, easy-to-use solution for the basic requirements of automatic link establishment for the RT-9000A Transceiver.

The embedded ALE modem features include: robust MIL-STD-188-141A waveform, operational simplicity, link quality analysis (LQA), use of digital signal processing (DSP) technology, Golay-encoded forward error correction (FEC), rapid station connectivity, and selective calling.

The modem performs real-time near optimum channel selection at the time of link establishment. Individual-call link establishment is the functional goal of the modem, making it a practical solution to the needs of HF interoperability requirements.

The embedded ALE modem is based on state-of-the-art microcomputer and digital signal processing (DSP) technologies. DSP techniques enable the generation and detection of signals in a manner that is significantly more efficient and reliable than traditional analog processing. Maximum system flexibility is maintained by using software to implement all modem operations. This makes the modem adaptable to existing and future signaling schemes with no changes required to the hardware.

Operational simplicity is achieved by placing all ALE modem control functions on the front panel of the RT-9000A transceiver. The equipment operator can program and activate ALE operations through the use of a small number of option menus, entry fields, and "soft" keys. Once activated, all transceiver and modem operations necessary for link establishment are performed automatically. See pages 3-31 through 3-43 for Transceiver ALE Operations. See pages 3-24 through 3-27 for I/O Port Set Up.

6.2 TECHNICAL SPECIFICATIONS

6.2.1 SIGNALING

MODULATION: 8-ary FSK.

SYMBOL RATE: 125 Baud.

BIT RATE: 375 bits/sec.

CODING: Golay forward error correction (FEC) Mode;
3/4 and 2/3 majority vote.

REDUNDANT WORD LENGTH: 49 symbols (147 bits).

DATA THROUGHPUT: 61.22 bits/sec.

CALLING CYCLE: 9016 ms (3 Character ID Only).

RESPONSE/ACKNOWLEDGE CYCLE: 2,352 ms (3 Character ID Only).

SCAN RATE: 500 ms/channel.

6.2.2 SELECTIVE CALLING

ADDRESS FORMAT: 15 Characters Maximum, alphanumeric ALE basic 38-character set, excluding wildcard character.

HANDSHAKE: 3-way, station-to-station and net call, 1-way all call and sounding.

NETWORK MANAGEMENT: 1 network 100 station addresses, 100 slot positions available for net call.

6.2.3 LINK QUALITY ANALYSIS

MEASUREMENTS: S+N/N (SINAD) and Bit Error Rate (BER).

6.2.4 AMD PROTOCOL

CHARACTER SET: 64 character ASCII subset.

MESSAGE SIZE: 90 characters, maximum.

SUPPORTING PROTOCOL: Single station link, all call and net call (net control station acknowledge only).

6.3 GENERAL INSTALLATION

For installation with other peripherals. Use this manual in conjunction with their respective manuals for complete installation information.

Refer to Figures 6.3.1 and 6.3.2 for interconnection of optional remote unit and Aux Terminal.

TO ADD	CONNECT	NOTE
RCU-9310	Control lines from J6 (RCU-9310) to Remote Control connector J8 on rear panel of RT-9000A.	See Figure 6.3.1, 6.3.2 and consult RCU-9310 Manual.
	Audio lines from J4 (RCU-9310) to Audio connector J5 on rear panel of MD-9188A.	See Figure 6.3.1, 6.3.2 and consult RCU-9310 Manual.
Aux Terminal	Control lines from Aux Terminal to remote control connector J8 on rear panel of RT-9000A.	See Figure 6.3.1, 6.3.2, and section 6.4.

The pinout for the auxiliary terminal RS-232 interface RT-9000A J8 is as follows:

Pin#	Signal
10	TD (O)
11	RD (I)
12	RTS (O)
13	CTS (I)
14	DCD (I)
15	DTR (O)

Note:
1) I = Input to RT-9000A, O = output from RT-9000A.
2) Pin 5 is ground.

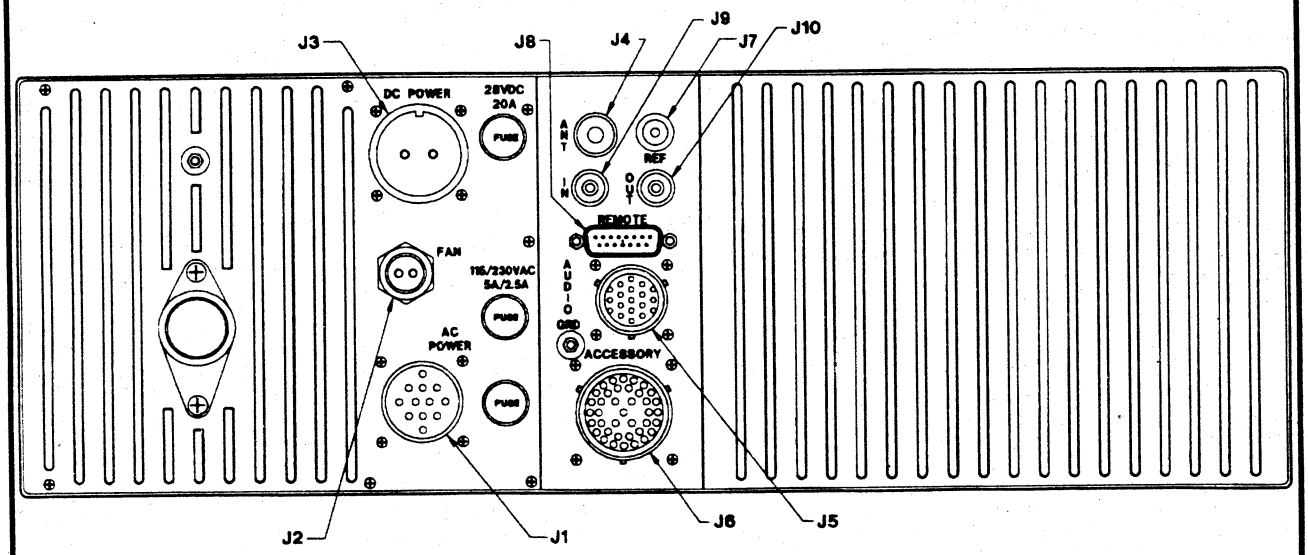

Figure 6.3.1 RT-9000A Rear Panel Connection Locations.

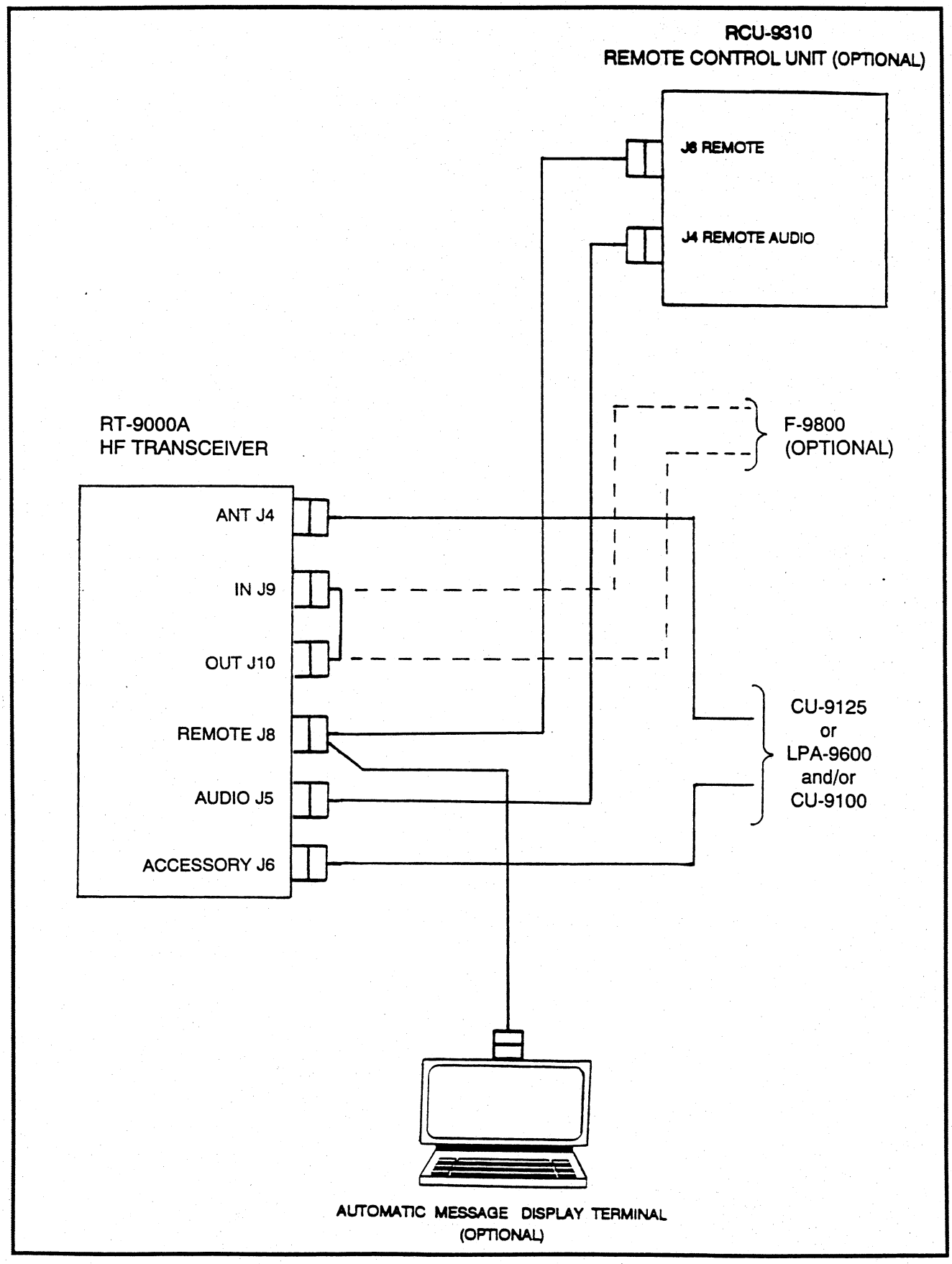

Figure 6.3.2 RT-9000A System Interconnect Diagram.

6.4 AUXILIARY TERMINAL USE

The embedded ALE supports the Automatic Message Display (AMD) protocol of FED-STD-1045 through the use of an auxiliary terminal to display, generate, and edit ALE messages. A DEC VT-100-compatible terminal, or a computer that supports VT-100 emulation, must be used.

6.4.1 TERMINAL SET UP

The terminal is connected to the remote connector J8 on the rear panel of the RT-9000A (refer to Section 6.3). Set up the terminal as follows:

Data Interface - RS-232 (without 20ma current loop)
Transmission Speed - 9600 bits/second
No Parity
Seven Data Bits
Two (2) Stop Bits

6.4.2 TERMINAL OPERATION

Turn on the terminal's power; then turn on the RT-9000A. This allows the terminal to stabilize, with a refreshed screen, prior to the modem's power up sequence.

NOTE: When the modem is in the 'STANDBY' mode, the terminal screen may be refreshed by holding down the 'Ctrl' key while pressing 'R.'

Once the terminal and modem are powered up, the following heading will be displayed:

"AMD MESSAGE TRAFFIC"

The modem/terminal will be in one of four (4) AMD modes, as indicated by the display at the bottom of the screen:

[1] "MESSAGE EDIT ..... "EDITING DISABLED"
[2] "MESSAGE SEND ..... "EDITING DISABLED"
[3] "MESSAGE EDIT ..... "EDITING ENABLED"
[4] "MESSAGE SEND ..... "EDITING ENABLED"

The 'Return' ('Enter') key toggles the "MESSAGE EDIT/SEND" function, while the 'Esc' key toggles the "EDITING DISABLED/ENABLED" function.

The cursor movement (arrow) and 'Del(ete)' keys are not supported; the 'Backspace' key is used to correct errors.

NOTE: The keyboard 'Caps Lock' (or 'Shift Lock') must be on during message creation or editing. FED-STD-1045 AMD protocol supports UPPER-CASE characters only.

Messages may be up to 90 alphanumeric characters in length. If the character buffer is overrun, a 'beep' will occur, signifying an error. An error beep will also be heard if the operator presses the 'Backspace' key when the cursor is in the first character position.

NOTE: Prior to sending a message, the EDITING function must be DISABLED, otherwise, the message will not be sent.

The following FED-STD-1045 ALE protocols permit the embedding of messages:

Single-Station Link
All Call
Net Call

Unless the MESSAGE EDIT function is enabled, messages will always be embedded and sent when these protocols are invoked.

Each time a message is sent, the terminal at the transmitting station will display:

"AMD MESSAGE TRANSMITTED: (MESSAGE .....)"

Each time a message is received, the terminal at the receiving station will display:

"AMD MESSAGE RECEIVED: (MESSAGE .....)"

The embedded ALE with the linking protection option supports the linking protection and time acquisition protocols of FED-STD-1049 and MIL-STD-188-141A. Operator control of these capabilities is achieved through the auxiliary terminal link protection menu located at the bottom of the auxiliary terminal screen.

The date is changed by holding down the 'Ctrl' key while pressing 'D'. When this action is performed, the old date is cleared and the cursor is shown at the date field of the link protection menu.

The date must be entered in the following format:

DD MMM YYYY

where	DD	=	day (2 digits: 01 - 31)
	MMM	=	month abbreviation (JAN, FEB, MAR etc.)
	YYYY	=	year (4 digits)

The DD, MMM, and YYYY fields must be separated by pressing the SPACE bar. Date entry is terminated by pressing the 'Return' key. The 'Backspace' key is used to correct typing errors.

The time is changed by holding down the 'Ctrl' key while pressing 'T'. This action clears the old time and places the cursor at the time field of the link protection menu.

The time must be entered as Greenwich Mean Time in the following format:

HHMM.SS

where:	HH	=	hour (01 - 24)
	MM	=	minute (00 - 59)
	SS	=	second (00 - 59)

Time entry is terminated by pressing the 'Return' key. The 'Backspace' key is used to correct typing errors.

The time quality code that is displayed indicates the accuracy of the embedded ALE system time. Time accuracy is quantified as the width of the time uncertainty window. For example, if the time is accurate within +/-5 seconds, the width of the time uncertainty window is 10 seconds.

The time quality code vs. time uncertainty window width is tabulated below:

Time Quality Code	Time Uncertainty Window
0	none
1	20 ms
2	100 ms
3	500 ms
4	2 s
5	10 s
6	60 s
7	unbounded

Note: ms = milliseconds, s = seconds

The time quality can be changed by holding down the 'Ctrl' key while pressing 'U'. This action should be repeated until the desired time quality is displayed. Only time qualities of 1 - 7 are supported by the embedded ALE. The time quality should be set by the terminal operator whenever the time is changed.

The linking protection level is selected by holding down the 'Ctrl' key and repeatedly pressing 'P' until the desired linking protection level is displayed.

The supported linking protection levels and their characteristics are listed below:

Protection Level	PI Length	Algorithm Source	Class	Red/Black Separation
DISABLED (AL-0)				
3 (AL-1)	2 s	Johnson/NIST	unclassified	no
4 (AL-2)	60 s	Johnson/NIST	unclassified	no

Level 3 provides the highest security; however, the other levels may be selected for interoperability reasons.

More accurate time can be acquired from another station by holding down the 'Ctrl' key and pressing 'A'. Once this action is performed, the ACQUIRE TIME field of the link protection menu changes from IDLE to WAITING. The next time a single-station call is performed, the embedded ALE acquires the time from the called station. If the quality of the time received from the other station is better (i.e., lower time quality code), the embedded ALE changes its time to that of the called station, and the menu indicator is changed to IDLE. In this case, the embedded ALE also sets its time quality code to one higher than that of the called station. On the other hand, if the obtained time is not better, the time response is discarded, and the menu indicator is not changed.

A time acquisition request can be cancelled by holding down the 'Ctrl' key and pressing 'A'. Once this action is performed, the ACQUIRE TIME field of the link protection menu should indicate IDLE.

In order to perform a time acquisition request, the date and time must be accurate to within one minute.

THEORY OF OPERATION

6.5 ALE MODEM - I/O ASSEMBLY (1A2A10) See pages 6-19 through 6-30 for parts list and schematics.

This assembly replaces the original 1A2A8 and 1A2A8A1 in RT-9000. See pages 6-23 through 6-31 for parts list and schematics.

6.5.1 GENERAL

The ALE MODEM - I/O Assembly (1A2A10) provides control of the RT-9000A ALE modem functions. It also manages the remote control I/O port for the main CPU of the RT-9000A residing on the Microprocessor Assembly. An optional Automatic Message Display (AMD) terminal is supported by means of an external interface.

The ALE MODEM - I/O Assembly contains two general-purpose microprocessors and one digital signal processor. Microprocessor U22 is the primary controller for the ALE modem. It directly controls the digital signal processor U36 used to implement the low-level modulator/demodulator functions for the ALE modem. U22 is also responsible for higher-level ALE functions such as ALE message encoding/decoding, protocol management, and link quality analysis. Microprocessor U10 manages serial I/O communications for the main CPU of the RT-9000A between the remote control I/O interface and the ALE modem control microprocessor U22.

6.5.2 I/O SECTION

The I/O section of the ALE MODEM Assembly consists of microprocessor U10 and its associated components.

6.5.3 MICROPROCESSOR U10

The ALE MODEM Assembly contains the 80C85 (8-bit) microprocessor U10 operating at a clock speed of 3.6864 MHz. Its operating firmware program is contained in EPROM U20. Program variables and other temporary data are contained in SRAM U15. Microprocessor U10 directly controls the bi-directional parallel communications port between the main CPU of the RT-9000A. U10 also controls the dual-UART U9 and the 2400 baud modem U49.

U10 controls its associated memory and peripherals using three busses:

a) AD0 through AD7 form a multiplexed address/data bus containing either data or low-order address information.

b) A8 through A15 form the high-order address bus.

c) The control/status bus contains the following signals:

ALE = address latch enable
IO/M* = memory or I/O cycle type indicator
RD* = read control
WR* = write control

6.5.4 ERASABLE PROGRAMMABLE READ ONLY MEMORY (EPROM) U20

The EPROM U20, contains the operating firmware program for microprocessor U10. 8K byte and 32K byte EPROM devices are supported.

6.5.5 STATIC RANDOM ACCESS MEMORY (SRAM) U15

The SRAM U15, contains the program stack and variable data used by U10 during execution of the firmware program contained in U20. 8K byte and 32K byte devices are supported.

6.5.6 DUAL UNIVERSAL ASYNCHRONOUS RECEIVER/TRANSMITTER (DUART) U9

The Duart U9, contains two asynchronous serial I/O channels with independent baud rate generators. Channel A provides remote control I/O capability for the RT-9000A when RS-232, RS-422 or RS-485 remote I/O operation is selected. Channel B is used for communications with the on-board ALE control CPU U22 (TTL) and communications with external pre-selectors (RS-232).

6.5.7 2400 BAUD MODEM U49

The 2400 baud modem U49 provides remote control I/O capability using leased lines or twisted-pair. U49 is a complete V.22 bis data modem and UART in a single chip. It is controlled using the industry standard AT command set and is capable of operating at 300, 1200, or 2400 baud.

6.5.8 BI-DIRECTIONAL PARALLEL I/O PORT

The bi-directional parallel I/O port allows microprocessor U10 to communicate with the main CPU of the RT-9000A. The parallel I/O port is implemented using discrete logic components. The major components are the 8-bit input latch U6 and the 8-bit output latch U5.

Messages that are sent from the main CPU to microprocessor U10 are ultimately directed to the remote control I/O port or the ALE control microprocessor U22 as follows. First, U10 receives a message with destination information from the main CPU over the parallel I/O port. Then, U10 sends the message to the indicated destination using the DUART U9, or the 2400 baud modem, U49.

Messages to the main CPU are handled in a similar manner. First U10 receives a message over one of the channels of the DUART U9, or the modem U49. Then, U10 sends the message, including source information, to the main CPU using the parallel I/O port.

6.5.9 ALE MODEM SECTION

The ALE Modem section of the ALE MODEM Assembly consists of microprocessor U22, digital signal processor U36, and their associated components.

6.5.10 MICROPROCESSOR U22

The ALE MODEM Assembly contains the 80C188EB (16-bit internal/8-bit external) microprocessor U22 operating at a clock speed of 7.3728 MHz. U22 contains internal chip-select logic, 3 hardware timers, parallel I/O, and two asynchronous serial I/O channels in a single package. Its operating firmware is contained in EPROM U26. SRAM U27 is used to hold program variables and temporary data such as network addresses and link quality analysis (LQA) information. The two internal serial I/O channels are used to communicate with microprocessor U10 and the optional external AMD terminal. Microprocessor U22 directly controls the digital signal processor (DSP) U36 and the real-time clock (RTC) U29. U22 also controls the operation of the radio during ALE operations.

U22 controls its associated memory and peripherals using three busses:

a) AD0 through AD7 form a multiplexed address/data bus containing either data or low-order address information. These lines are buffered by U25 to form the data bus (XD0-XD7) and latched by U24 to form the low-order address lines (XA0-XA7).

b) A8 through A18 form the high-order address bus. A16 through A19 are latched by U23 to form the high order address lines (XA16-XA18). A8 through A15 are renamed XA8 through XA15 to avoid confusion with the address lines of U10.

c) The control/status bus contains the following signals:

ALE = address latch enable
DEN* = data bus enable
DT/R* = data bus direction control
RD* = read control (rename XRD*)
WR* = write control (rename XWR*)

The internal chip-select controller is used to generate chip enable signals for all external memory and peripheral devices.

6.5.11 ERASABLE PROGRAMMABLE READ ONLY MEMORY (EPROM) U26

The EPROM U26, contains the operating firmware program for microprocessor U22. 128K byte and 512K byte EPROM devices are supported.

6.5.12 STATIC RANDOM ACCESS MEMORY (SRAM) U15

The SRAM U27, contains the program stack and variable data used by U22 during execution of the firmware program contained in U26. 128K byte and 512K byte devices are supported.

6.5.13 SERIAL I/O CONTROL UNIT (SCU)

The internal serial I/O control unit of microprocessor U22 contains two asynchronous serial I/O channels. Channel 0 is used to communicate with microprocessor U10. Channel 1 is used to communicate with an external RS-232 terminal to provide AMD capability for the ALE modem.

6.5.14 REAL-TIME CLOCK (RTC) U29

The RTC U29, provides the current date and time for the ALE modem. U29 contains an internal 32.768 KHz oscillator and battery to allow device operation to continue during power failure. Typical battery life is 10 years. U29 is socketed to allow easy replacement after the battery is discharged.

6.5.15 RADIO CONTROL

Two optically isolated outputs are used to control operation of the radio transceiver. These lines, SCANINT* and KEYTX* line originate from U22 and are buffered by a 74HC244 U33. The resulting outputs of U33 are optically isolated using PS2501-1 optocouplers.

The SCANNINT* line is used to interrupt the radio receive scan when ALE activity is detected on a channel. The KEYTX* line is used to key the radio transmitter.

6.5.16 DIGITAL SIGNAL PROCESSOR (DSP) U36

The AT&T DSP32C (32-bit) digital signal processor U36 is used to implement the 8-ary modulator and demodulator for the ALE modem. Its operating program and data are stored in high-speed static RAM (SRAM) devices U37-U40. DSP U36 interfaces to microprocessor U22 through an 8 bit parallel I/O port contained in U36. This port allows U22 to download the DSP operating program, modify the contents of DSP memory, and control execution of the DSP operating program. U36 also controls the PCM CODEC U45 included among the radio audio interface circuitry using the internal serial I/O port of U36.

U36 controls its external high-speed SRAM using three busses:

a) LD00 through LD31 form the data bus.

b) LA00 through LA14 form the address bus.

c) The control/status bus contains the following signals:
MSNO* - MSN3* = data byte enable lines
MGN* = read control
MWN* = write control

6.5.17 PCM CODEC U45

An AT&T T7525 PCM CODEC U45 provides voiceband analog-to-digital and digital-to-analog conversion for the audio interface between DSP U36 and the radio. Sigma-delta technology is used to obtain 15-bit resolution with 12-bits of linearity at a sampling rate of 8 KHz.

U36 controls the PCM CODEC U45 using the following signals:

DI = serial data input to DSP
DO = serial data output from DSP
OLD* = 8 KHZ output load strobe
ILD* = 8 KHZ input load strobe
OCK = 2.048 MHz serial data output clock
ICK = 2.048 MHz serial data input clock

Operational amplifiers are used to buffer and filter the audio signals between the radio and the CODEC U45.

The nominal audio input level from the radio is 0.5 Vp-p. The first input stage, inverting amplifier U44-A, is configured for a gain of 3.16. The second input stage, consisting of the CODEC internal amplifier, is configured by R34 and R33 to attenuate the signal by a factor of 2.26. These two stages provide an overall gain of 1.40. This results in a nominal signal level of 0.7 Vp-p or -10 dBm at the TGS pin of CODEC U45.

The differential output of the CODEC is nominally 3.16 Vp-p. The first output stage, differential amplifier U44-B, is configured for an attenuation factor of 1.43. The second output stage, consisting of attenuation network, R40 and R41, and voltage follower U46 further attenuates the signal by a factor of 3.12. This overall attenuation factor of 4.46 results in a nominal signal level of 0.7 Vp-p or -10 dBm at the output of U46.

6.5.18 AUDIO INTERFACE BUFFERS

Operational amplifiers are used to buffer and filter the audio signals between the radio and the CODEC U45.

The nominal audio input level from the radio is 0.5 Vp-p. The first input stage, inverting amplifier U44-A, is configured for a gain of 3.16. The second input stage, consisting of the CODEC internal amplifier, is configured by R34 and R33 to attenuate the signal by a factor of 2.26. These two stages provide an overall gain of 1.40. This results in a nominal signal level of 0.7 Vp-p or -10 dBm at the TGS pinof CODEC U45.

The differential output of the CODEC is nominally 3.16 Vp-p. The first output stage, differential amplifier U44-B, is configured for an attenuation factor of 1.43. The second output stage, consisting of attenuation network, R40 and R41, and voltage follower U46 further attenuates the signal by a factor of 3.12. This overall attenuation factor of 4.46 results in a nominal signal level of 0.7 Vp-p or -10 dBm at the output of U46.

6.6 MOTHER BOARD ASSEMBLY (1A2A7)

This assembly replaces the original 1A2A7 in the RT-9000. See pages 6-19 though 6-22 for part list and schematics.

6.7 SOFTWARE SWITCH SETTINGS ON CPU PC ASSEMBLY 1A2A1 for RT-9000A OPTIONS.

NOTE: S1 Sections 1 through 8 are normally set to OPEN position (all rocker switches are raised at open side, see Figure 5.9.4). If while performing maintenance on the RT-9000A the 1A2A1 is replaced, make sure 1A2A1 S1 is configured for non-optionized or for the applicable options installed in the Transceiver.

S1 SECTION	SELECTION		OPTION/FUNCTION
	RAISED AT OPEN	RAISED AT NUMBER	
1	OPEN		Normal 1A2A9 TCXO installed.
		1	Optional High Stability 1A2A9 TCXO installed.
2	OPEN		Normal 1A2A3A1 Lincompex not installed.
		2	Optional 1A2A3A1 Lincompex installed.
3	OPEN		Normal 1A2A10 Embedded ALE/I/O not installed.
		3	Optional 1A2A10 Embedded ALE/I/O installed.
4	OPEN		Spare Function / Not used at this time.
5	OPEN		Normal No 1A2A4 FL5 installed.
		5	Optional 1A2A4 FL5 installed.
6	OPEN		Normal F-9800 Preselector/Postselector not installed.
		6	Optional F-9800 Preselector/Postselector installed.
7	OPEN		Not Connected / Not used at this time.
8	OPEN		Not Connected / Not used at this time.

Table 6.7.1 Switch Settings for 1A2A1 S1.

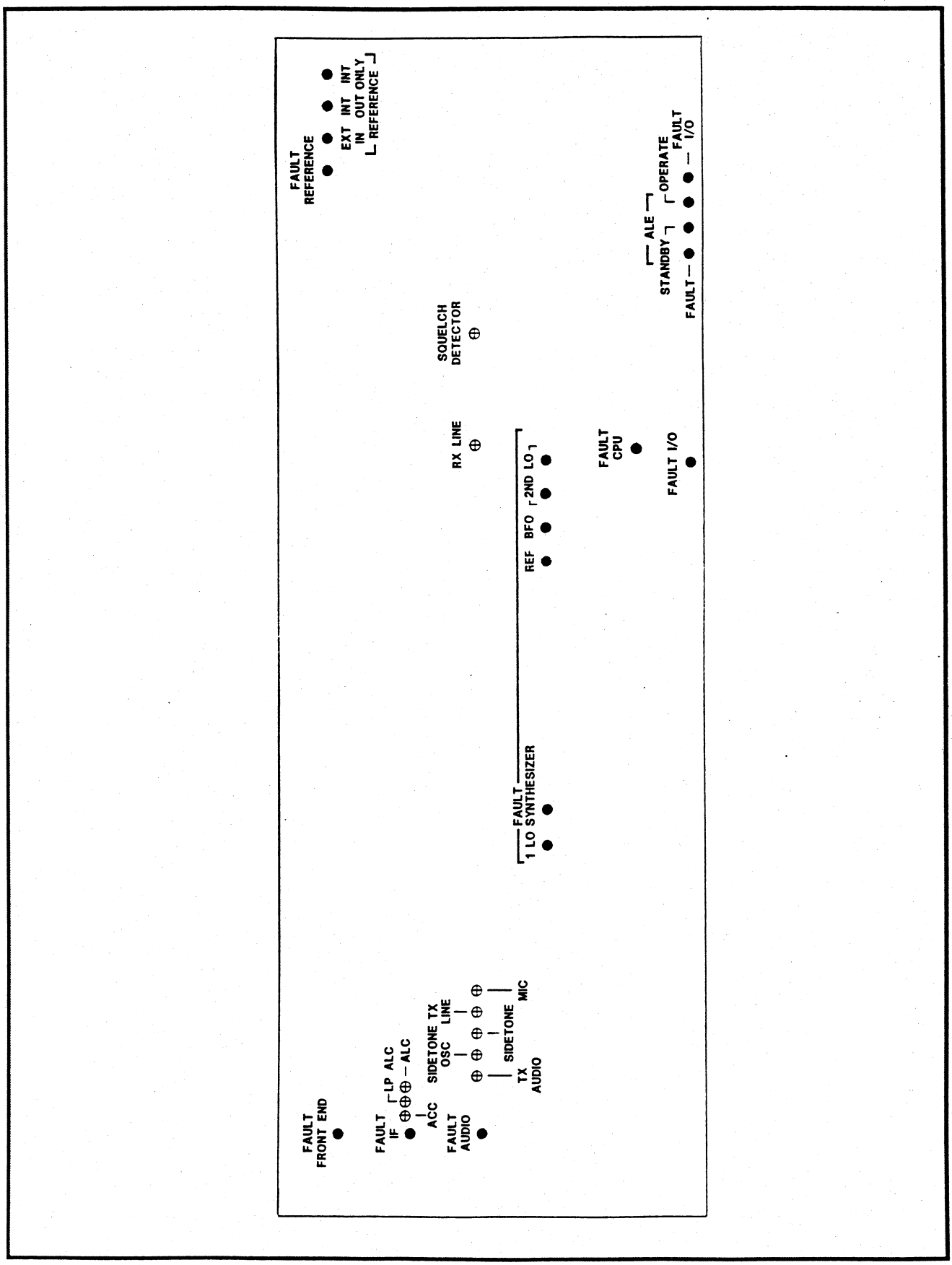

Figure 6.8.1 RT-9000A Fault LED Locations.

6.8 EMBEDDED ALE - I/O FAULT ISOLATION GUIDE

NOTE: Refer to Figure 6.8.1 for LED locations and 5.4.1.3 and 5.4.1.4 for module cover removal and assembly locations.

6.8.1 Front Panel Displays 'NO ALE INSTALLED'

a) Turn transceiver 'OFF' check 1A2A1 S1. See Figure 5.9.4 and Table 6.7.1 Reset S1.

b) Turn 'ON' transceiver and check Front Panel display if 'NO ALE INSTALLED' is no longer displayed, return transceiver to operational status. If 'NO ALE INSTALLED' is still displayed go on to c).

c) Conflict with external RS-232 device could cause this display. Check external RS-232 devices connections and cable. If this checks good and still have display, go on to d).

d) Display is caused by failure of PC Assembly 1A2A10. Turn 'OFF' transceiver and remove and replace 1A2A10. Turn 'ON' transceiver and check display for fault display. Should be normal. Return failed PC Assembly 1A2A10 to factory for repair.

6.8.2 Normal Operation of PC Assembly 1A2A10 with top cover removed & observing Fault LED's See Figure 6.8.1

a) When transceiver is turned 'ON', the three ALE status LED's light according to the following sequence.

1. All 'ON'
2. Fault 'ON' then 'OFF'
3. STANDBY 'ON' then 'OFF'
4. OPERATE 'ON' then 'OFF'
5. STANDBY 'ON' until ALE function is selected on RT-9000A front panel. Then OPERATE 'ON' until ALE function is unselected on front panel which will cause STANDBY to come 'ON' again.

6.8.3 Symptoms, Possible Troubles and Corrective Action

a) Transceiver turned 'ON', the FAULT LED is ON and OPERATE LED is flashing.

1) Failure of EPROM U26 on 1A2A10, Replace the Eprom U26 or PC Assembly 1A2A10. Return failed PC Assembly 1A2A10 to factory for repair.

b) Transceiver turned 'ON', the FAULT LED is 'ON' and STANDBY LED is flashing.

1) Failure of U25 on 1A2A10. Replace PC Assembly 1A2A10 and return failed PC Assembly to factory for repair.

c) Transceiver turned 'ON', the status LED's do not light in correct sequence.

1) Disconnected or failed ribbon cable interconnect at 40 Pin P1 on 1A2A10 PC Assembly. Check connections, cable and test again, if still have the trouble remove and replace PC Assembly 1A2A10. Return failed 1A2A10 assembly to factory for repair.

d) When performing a receive scan, the ALE modem doesn't respond to ALE messages that are being received.

1) Check for failed or disconnected ribbon cable and connector at 1A2A10 P2. Check in receive scan, if still have trouble remove and replace PC Assembly 1A2A10. Return failed 1A2A10 assembly to factory for repair.

e) When performing a transmit scan, the ALE modem doesn't key the RT-9000A transmitter and /or doesn't appear to be generating tones. I.E. no forward power indicated on Front Panel or indicated on a Bird through line Watt meter connected to the RT-9000A J4.

1) Same procedure as for d) 1).

6.8.4 No Display or Garbled Display on AMD Terminal (Auxiliary Terminal)

a) Display terminal baud rate or data format set incorrectly. See Section 6.4.1.

b) Faulty or disconnected AMD terminal cable. Check and repair as required.

c) Faulty external AMD terminal, check and repair or replace as required.

d) Faulty PC Assembly 1A2A10 in RT-9000A. Replace 1A2A10 assembly and return failed 1A2A10 assembly to factory for repair.

6.8.5 Time And Date Are Not Updated Correctly While RT-9000A Power Is Turned 'OFF'.

a) Faulty IC U29 on 1A2A10 PC Assembly. Replace U29 and recheck.

b) Faulty PC Assembly 1A2A10. Replace 1A2A10 Assembly and return failed 1A2A10 Assembly to factory for repair.

6.8.6 RT-9000A BITE Test for I/O

NOTE: If I/O ports are NOT being utilized NO I/O function should be selected. Any selection could cause:

'I/O FAULT'
or
'NO REPLY FROM REMOTE'

to be displayed after BITE test or intermittently during normal operations because of I/O port activity.

a) If above conditions are met and an 'I/O FAULT' is displayed.

1) Depress 'MORE' key until REV is displayed on menu. Depress 'REV' key and check display. If display shows 'REV CPU-XX IO-! That is IO is blank, turn RT-9000A 'OFF' and then 'ON'. Depress 'REV' key and check display. Should display 'REV CPU-XX IO-XX'. If is correct rerun 'BITE', upon completion of a valid test return transceiver to operational status. If I/O still fails go on to 2).

2) Turn transceiver 'OFF' and replace EPROM 1A2A10 U20. Turn transceiver 'ON'. Rerun 'BITE' upon completion of a valid test return transceiver to operational status. If 'BITE' still fails I/O go to 3).

3) Turn transceiver 'OFF' and replace 1A2A10 PC Assembly. Turn transceiver 'ON'. Rerun 'BITE' upon completion of a valid test return transceiver to operational status. Return failed 1A2A10 PC Assembly to factory for repair.

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The following pages contain schematics and parts lists for the 1A2A7 PC Assembly, Mother Board (REC/EXC) RT-9000A P/N 8112020094 and the 1A2A10 PC Assembly ALE MODEM/I/O BOARD RT-9000A P/N 8112010099.

6.9 SCHEMATICS and PARTS LISTS

The following pages contain schematics and parts lists for the RT-9000A, see Table 6.9 below

DESIGNATOR		DESCRIPTION	SUNAIR PART NUMBER
ASSEMBLY	SUBASSEMBLY		
1A1		FRONT PANEL ASSEMBLY	80760400XX
	1A1A1	PC ASSEMBLY FRONT PANEL	8076045096
	1A1A2	KEYBOARD, 6X4	8076046807
	1A1A3	CUSTOM LCD, FULL FUNCTION	8076040604
	1A1A3A1	EL BACKLIGHT	8076040809
	1A1A4	CUSTOM LCD, 1X40 CHARA	8076041601
	1A1A4A1	EL BACKLIGHT	8076041708
	1A1A5	KEYBOARD, 1X5	8076046505
1A2		TRANSMITTER/RECEIVER	
	1A2A1	PC ASSEMBLY, CPU	8076070091
	1A2A1A1	OPTOCOUPLER	8076075092
	1A2A2	SYNTHESIZER MODULE	8076060095
	1A2A2A1	PC ASSEMBLY, FIRST L.O.	8076068096
	1A2A2A2	PC ASSEMBLY, SECOND L.O.	8076066093
	1A2A2A3	PC ASSEMBLY, BFO	8076062098
	1A2A2A4	PC ASSEMBLY, REF LOOP AND DOUBLER	8076064091
	1A2A2A5	PC ASSEMBLY, MOTHER BOARD (SYN)	8076061091
	1A2A3	PC ASSEMBLY, AUDIO	8076090091
	1A2A3A1	PC ASSEMBLY, LINCOMPEX (OPTION)	8076097096
	1A2A4	PC ASSEMBLY, IF/FILTER	See Table 6.10 for OPTIONS
	1A2A5	PC ASSEMBLY, FRONT END	8076100097
	1A2A6	PC ASSEMBLY, REFERENCE DRIVER	8076120098
	1A2A7	PC ASSEMBLY, MOTHER BD (REC/EXC)	8112020094
	1A2A8	NOT USED	
	1A2A8A1	NOT USED	
	1A2A9	TCXO, 5 MHz	5024012704
	1A2A10	PC ASSEMBLY, ALE MODEM/I/O BOARD	8112010099
1A3		FILTER ASSEMBLY	8076050090
	1A3A1	PC ASSEMBLY, DETECTOR	8076053099
	1A3A2	PC ASSEMBLY, BANDS 1-4	8076057094
	1A3A3	PC ASSEMBLY, BANDS 5-8	8076055091
1A4		POWER AMPLIFIER ASSEMBLY	8076030099
1A5		POWER SUPPLY MODULE	
	1A5A1	POWER SUPPLY ASSEMBLY, 28 VDC	8103020095
	1A5A1A1	PC ASSEMBLY, SWITCHING REGULATORS	8103022098
	1A5A1A2	PC ASSEMBLY, CONTROL LOGIC	8076024099
	1A5A2	POWER SUPPLY ASSEMBLY, 115/230 VAC	8103021091
	1A5A2A1	PC ASSEMBLY, FILTER AC/PS	8076021197
	1A5A2A2	PC ASSEMBLY, 28 V REGULATOR 17 AMP	8076021391

Table 6.9 RT-9000A Table of Assemblies.

DESIGNATOR		DESCRIPTION	SUNAIR PART NUMBER
ASSEMBLY	SUBASSEMBLY		
1A6	1A6A1	REAR PANEL PC ASSEMBLY, REAR PANEL CONNECTOR	8076011094
1A7		CHASSIS ASSEMBLY	81120080XX

Table 6.9 RT-9000A Table of Assemblies, continued.

USB FL2	LSB FL3	DATA FL5	1A2A4, PC ASSEMBLY, IF/FILTER SUNAIR PART NUMBER
STANDARD	STANDARD	NOT USED	8076080096
STANDARD	STANDARD	DATA/USB	
STANDARD	STANDARD	DATA/LSB	
DATA	STANDARD	NOT USED	
STANDARD	DATA	NOT USED	
DATA	DATA	NOT USED	8076080088

Table 6.10 RT-9000A Optional IF/Filter Assemblies.

FINAL TESTED RT-9000A

	FINAL TESTED RT-9000A	81120012XX
1A2A1	PC ASSY, CPU	8076070091
1A2A2	SYNTHESIZER ASSY	8076060095
1A2A3	PC ASSY, AUDIO	8076090091
1A2A4	PC ASSY, IF	See Table 6.10
1A2A5	PC ASSY, FRONT END	8076100097
1A2A6	PC ASSY, REFERENCE DRIVER	8076120098
1A2A10	PC ASSY, ALE MODEM/I/O BOARD	8112010099
1A5A2	POWER SUPPLY ASSY, 115/230VAC	8103021091
1A7	CHASSIS ASSY	81120080XX
U13	EPROM W/RT-9000A SOFTWARE	8076073294
U14	EPROM W/RT-9000A SOFTWARE	8076072298
U20	EPROM, W/IO SOFTWARE	8076113296
	BUMPER 13/16 OD 13/16 LG	0508140005
	BUMPER 1/4-20 X 1 3/8 DIA.	0508150001
	BUMP-ONS, SELF ADHESIVE	9187040239
	CATCH, HOLD DOWN BLACK	0526370017
	STRIKE, BLACK	0526520001
	COVER, REC/EXC	8076011906
	COVER, TOP	80760123XX
	COVER, BOTTOM	80760125XX
	COVER, TOP, DC/PS	8103020907
	COVER, AC POWER SUPPLY	8103021407
	COVER, FILTER MODULE	8076050600
	GASKET KIT, TOP/BOTTOM COVERS	8076012201

CONNECTOR KIT

	CONNECTOR KIT	8112000492
P4	CONNECTOR, RF, UHF PL-259	0742190005
	ADAPTER, RF, FOR PL-259	0742070000
P5	CONNECTOR, POWER, 19 PIN MALE	1011140004
	CABLE CLAMP, MS3057-8A	1000200001
P6	CONNECTOR, POWER, 39 PIN MALE	1011130009
	ADAPTER, CONNECTOR, 20 SHELL	1012230007
P7	CONNECTOR, RF, BNC UG-88/U	0744030005
P8	CONNECTOR, DB-15, 15 PIN FEM	1012720004
	HOOD, W/SCREW LOCK, DB-15	1012740005
P9	CONNECTOR, RF, BNC UG-88/U	0744030005
P10	CONNECTOR, RF, BNC UG-88/U	0744030005

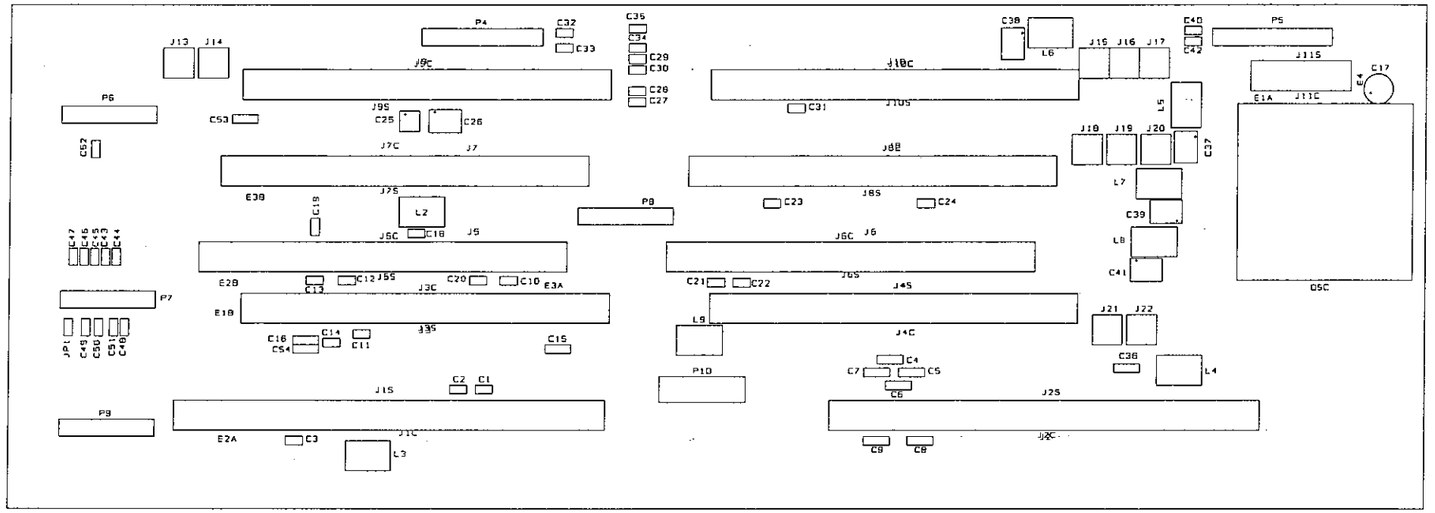
CHASSIS ASSEMBLY 1A7

	CHASSIS ASSEMBLY 1A7	81120080XX
1A1	FRONT PANEL ASSY	80760400XX
1A2A7	PC ASSY, MOTHER BOARD	8112020094
1A2A9	TCXO, 5MHZ GROUND EQPT.	5024012704
1A3	FILTER ASSY	8076050090
1A4	POWER AMPLIFIER ASSY	8076030099
1A5A1	POWER SUPPLY ASSY, 28VDC	8103020095
1A6	PC ASSY, REAR PANEL CONNECTOR	8076011094
1A6J4	CONNECTOR, RF, UHF	0753300001
1A6J7	CONNECTOR, RF, BNC UG-1094/U	0743740009
1A6J8	CONNECTOR, DB-15, 15 PIN MALE	1012410021
	JUNCTION SHELL, DB-15	1012450023
1A6J9	CONNECTOR, RF, BNC UG-1094/U	0743740009
1A6J10	CONNECTOR, RF, BNC UG-1094/U	0743740009
1A7P1	CONNECTOR, RF, RIGHT ANGLE	1010890018
	CONNECTOR, RF, SUBMINATURE	0753700000
1A7P3	CONNECTOR, HOUSING, 6PIN, FEM	1010840011
	BRACKET, CENTER CHANNEL	8076015201
	CABLE, RIBBON, 15 COND, 28 AWG	1012460029
	CABLE, COAX, RG 178 B/U	0596090005
	CABLE ASSY, RG-58, 6IN, BNC-BNC	8107808894
	CHASSIS, CARD CAGE, REC/EXC	8076011507
	FAN, DC, 24V, 19 CFM	1011690012
	REAR PANEL	8112015503
	RH SIDE PLATE	80760102XX
	LH SIDE PLATE	80760103XX
	STANDOFF, F-F, 6-32 .625L	1005880018
	STANDOFF, SWAGE 4-40 .531L	1011210011

Figure 6.9.1 Final Tested RT-9000A, Connector Kit, and Chassis Assembly 1A7.

PC ASSY, MOTHER BOARD RT-9000A

	PC ASSY, MOTHER BOARD 9000A	8112020094
C1	CAP. .01µF, 50V, X7R 20%	0281730008
C2	CAP. .01µF, 50V, X7R 20%	0281730008
C3	CAP. .01µF, 50V, X7R 20%	0281730008
C4	CAPACITOR 0.1µF, 50V, X7R	1011180014
C5	CAPACITOR 0.1µF, 50V, X7R	1011180014
C6	CAPACITOR 0.1µF, 50V, X7R	1011180014
C7	CAPACITOR 0.1µF, 50V, X7R	1011180014
C8	CAPACITOR 0.1µF, 50V, X7R	1011180014
C9	CAPACITOR 0.1µF, 50V, X7R	1011180014
C10	CAP. .01µF, 50V, X7R 20%	0281730008
C11	CAP. .01µF, 50V, X7R 20%	0281730008
C12	CAP. .01µF, 50V, X7R 20%	0281730008
C13	CAP. .01µF, 50V, X7R 20%	0281730008
C14	CAP. .01µF, 50V, X7R 20%	0281730008
C15	CAPACITOR 0.1µF, 50V, X7R	1011180014
C16	CAPACITOR 0.1µF, 50V, X7R	1011180014
C17	CAP. 47µF, 20V, 196D	0281700001
C18	CAP. .01µF, 50V, X7R 20%	0281730008
C19	CAP. .01µF, 50V, X7R 20%	0281730008
C20	CAP. .01µF, 50V, X7R 20%	0281730008
C21	CAP. .01µF, 50V, X7R 20%	0281730008
C22	CAP. .01µF, 50V, X7R 20%	0281730008
C23	CAP. .01µF, 50V, X7R 20%	0281730008
C24	CAP. .01µF, 50V, X7R 20%	0281730008
C25	CAP. 2.2µF, 35V, T368	0273950002
C26	CAP. .47µF, 50V, X7R 20%	0283377771
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. .01µF, 50V, X7R 20%	0281730008
C34	CAP. .01µF, 50V, X7R 20%	0281730008
C35	CAP. .01µF, 50V, X7R 20%	0281730008
C36	CAP. .47µF, 50V, X7R 20%	0283377771
C37	CAP. 15µF, 15V, 196D	0281720002
C38	CAP. 15µF, 15V, 196D	0281720002
C39	CAP. 15µF, 15V, 196D	0281720002
C40	CAP. .01µF, 50V, X7R 20%	0281730008
C41	CAP. 15µF, 15V, 196D	0281720002
C42	CAP. .01µF, 50V, X7R 20%	0281730008
C43	CAP. .01µF, 50V, X7R 20%	0281730008
C44	CAP. .01µF, 50V, X7R 20%	0281730008
C45	CAP. .01µF, 50V, X7R 20%	0281730008
C46	CAP. .01µF, 50V, X7R 20%	0281730008
C47	CAP. .01µF, 50V, X7R 20%	0281730008
C48	CAP. .01µF, 50V, X7R 20%	0281730008
C49	CAP. .01µF, 50V, X7R 20%	0281730008
C50	CAP. .01µF, 50V, X7R 20%	0281730008
C51	CAP. .01µF, 50V, X7R 20%	0281730008
C52	CAP. .01µF, 50V, X7R 20%	0281730008
C53	CAPACITOR 0.1µF, 50V, X7R	1011180014
C54	CAPACITOR 0.1µF, 50V, X7R	1011180014
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
J5	CONNECTOR, PC, 22PIN DUAL, FEM	1008830003
J6	CONNECTOR, PC, 22PIN DUAL, FEM	1008830003
J7	CONNECTOR, PC, 22PIN DUAL, FEM	1008830003
J8	CONNECTOR, PC, 22PIN DUAL, FEM	1008830003
J9	CONNECTOR, PC, 22PIN DUAL, FEM	1008830003
J10	CONNECTOR, PC, 22PIN DUAL, FEM	1008830003
J11	CONNECTOR, PC, 6 PIN DUAL, FEM	1011160005
J13	CONNECTOR, RF, JACK	1010810006
J14	CONNECTOR, RF, JACK	1010810006
J15	CONNECTOR, RF, JACK	1010810006
J16	CONNECTOR, RF, JACK	1010810006
J17	CONNECTOR, RF, JACK	1010810006
J18	CONNECTOR, RF, JACK	1010810006
J19	CONNECTOR, RF, JACK	1010810006
J20	CONNECTOR, RF, JACK	1010810006
J21	CONNECTOR, RF, JACK	1010810006
J22	CONNECTOR, RF, JACK	1010810006
L1	INDUCTOR, MOLDED, 47µH, 5%	0646420003
L2	CHOKE, POWER	8076104700
L3	CHOKE, POWER	8076104700
L4	CHOKE, POWER	8076104700
L5	CHOKE, POWER	8076104700

L6	CHOKE, POWER	8076104700
L7	CHOKE, POWER	8076104700
L8	CHOKE, POWER	8076104700
L9	CHOKE, POWER	8076104700
P4	CONNECTOR, RIBBON, 26 PIN FEM	1008340031
P5	CONNECTOR, RIBBON, 26 PIN FEM	1008340031
P6	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
P7	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
P8	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
P9	CONNECTOR, RIBBON, 20 PIN FEM	1008120031
P10	CONNECTOR, RIBBON, 14 PIN FEM	1008350001
R1	RESISTOR 0.0, 1/4W	1011600021
XP4	CONNECTOR,PCB,TRANSITION,26PIN	1011090261
XP5	CONNECTOR,PCB,TRANSITION,26PIN	1011090261
XP6	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
XP7	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
XP8	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
XP9	CONNECTOR,PCB,TRANSITION,20PIN	1011090201
	BEAD, FERRITE .200OD,.437LG	1010910019
	CABLE, FLAT, 20 COND. 28AWG	1008080004
	CABLE, FLAT, 26 COND. 28AWG	1011180006
	CONNECTOR, RF, SUBMINIATURE	0753700000
	JACK, PCB, SOLDER MOUNT	1008920002

Figure 6.9.2 PC Assembly Mother Board 1A2A7, page 1 of 4.

A2086A

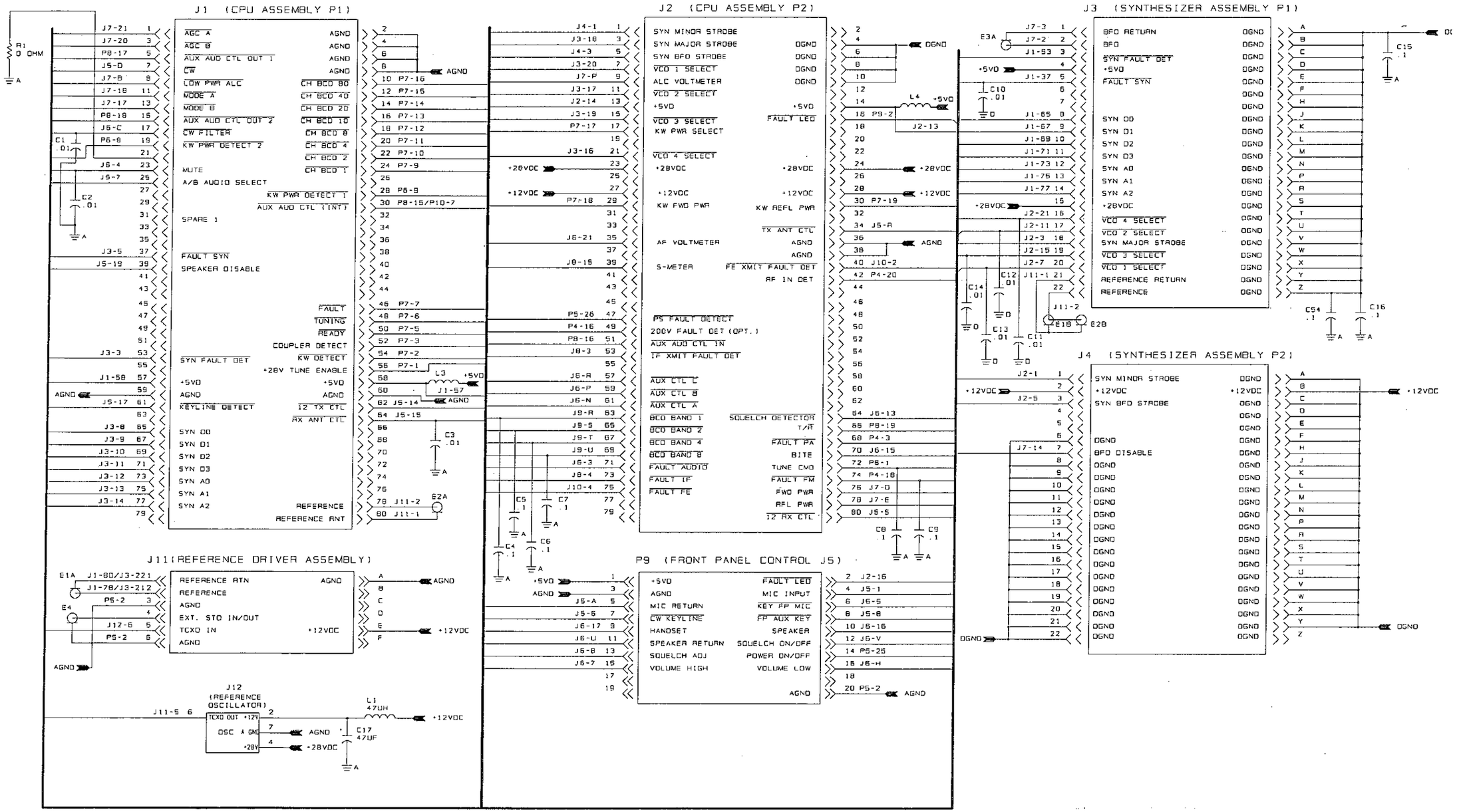


Figure 6.9.2 PC Assembly Mother Board 1A2A7, page 2 of 4.

82086A

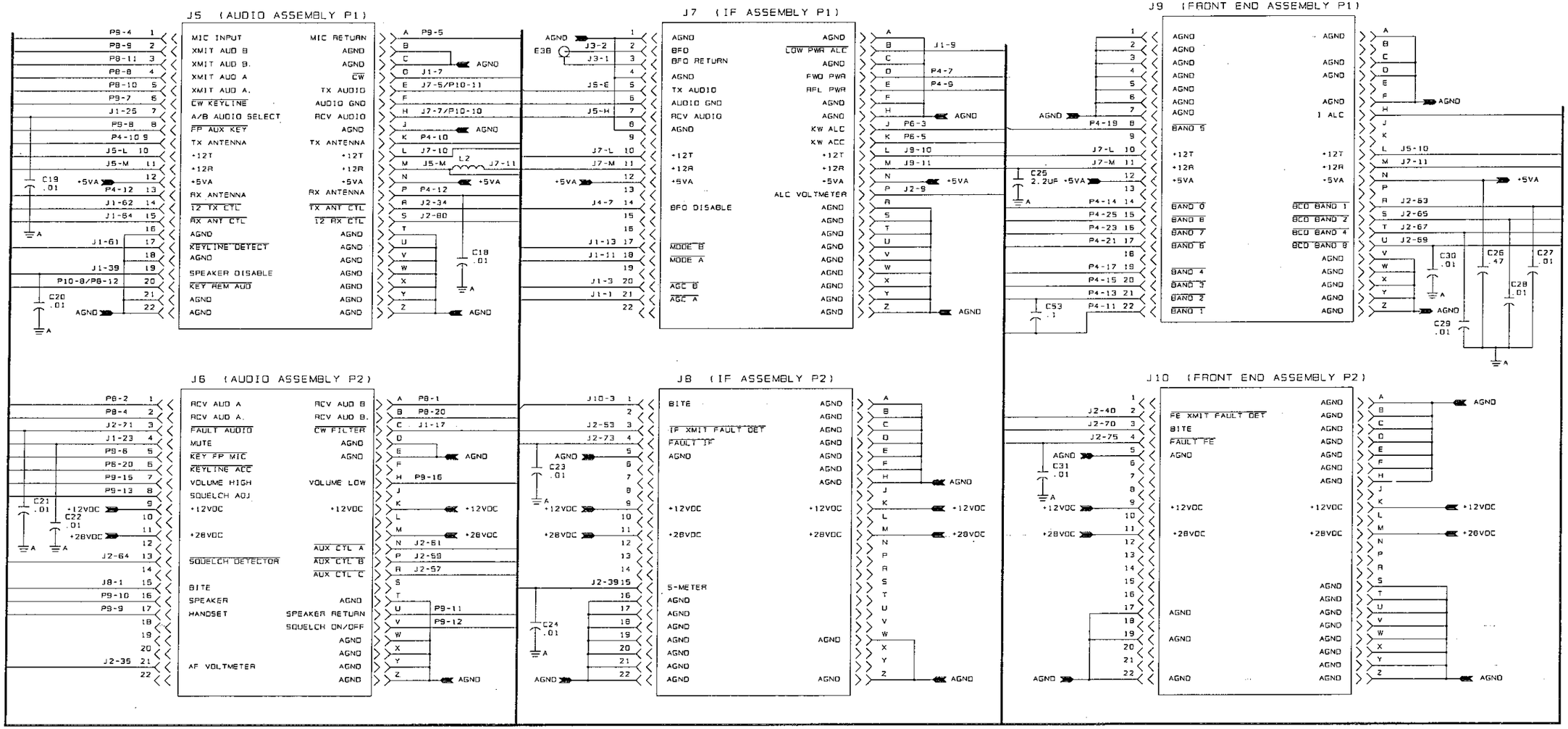


Figure 6.9.2 PC Assembly Mother Board 1A2A7, page 3 of 4.

C2086A

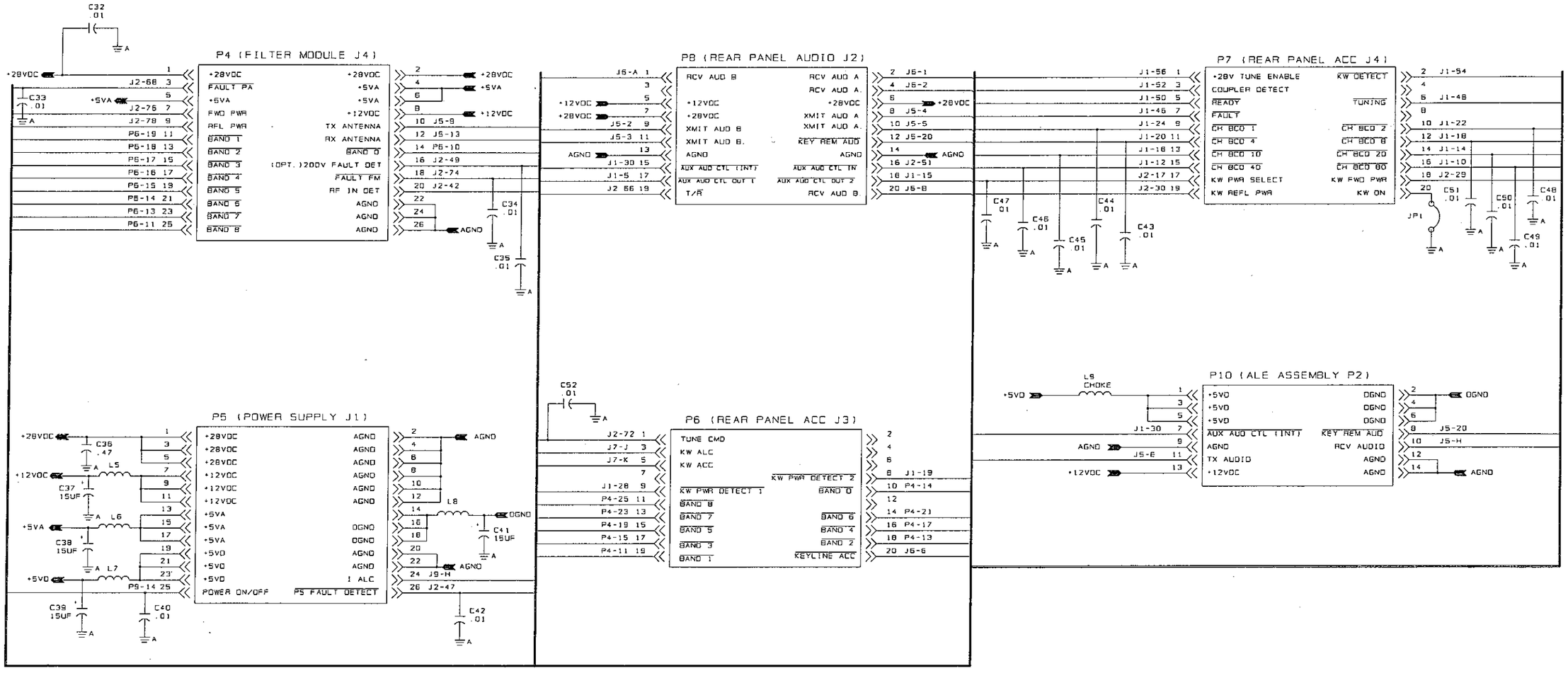


Figure 6.9.2 PC Assembly Mother Board 1A2A7, page 4 of 4.

PC ASSY, ALE MODEM BOARD

	PC BOARD, ALE MODEM	8112010099
	MOUNTING PLATE, ALE MODEM	8112011206
C1	CAP. .01 UF, 50V, X7R 20%	0281730008
C2	CAP. 6.8 UF, 20V, T368	0296780006
C3	CAP. .01 UF, 50V, X7R 20%	0281730008
C4	CAP. .01 UF, 50V, X7R 20%	0281730008
C5	CAP. .01 UF, 50V, X7R 20%	0281730008
C6	CAP. .01 UF, 50V, X7R 20%	0281730008
C7	CAP. .01 UF, 50V, X7R 20%	0281730008
C8	CAP. .01 UF, 50V, X7R 20%	0281730008
C9	CAP. 22 UF, 15V, 196D	0281690006
C10	CAP. 22 UF, 15V, 196D	0281690006
C11	CAP. 47 UF, 20V, 196D	0281700001
C12	CAP. .01 UF, 50V, X7R 20%	0281730008
C14	CAP. .01 UF, 50V, X7R 20%	0281730008
C15	CAP. 10 UF, 20V	1007290005
C16	CAP. 22 UF, 15V, 196D	0281690006
C17	CAP. 22 UF, 15V, 196D	0281690006
C18	CAP. .01 UF, 50V, X7R 20%	0281730008
C19	CAP. 47 UF, 20V, 196D	0281700001
C20	CAP. .01 UF, 50V, X7R 20%	0281730008
C21	CAP. .01 UF, 50V, X7R 20%	0281730008
C22	CAP. .01 UF, 50V, X7R 20%	0281730008
C23	CAP. .01 UF, 50V, X7R 20%	0281730008
C24	CAP. .01 UF, 50V, X7R 20%	0281730008
C25	CAP. .01 UF, 50V, X7R 20%	0281730008
C26	CAP. .01 UF, 50V, X7R 20%	0281730008
C27	CAP. .01 UF, 50V, X7R 20%	0281730008
C28	CAP. .01 UF, 50V, X7R 20%	0281730008
C29	CAP. .01 UF, 50V, X7R 20%	0281730008
C30	CAP. .01 UF, 50V, X7R 20%	0281730008
C31	CAP. .01 UF, 50V, X7R 20%	0281730008
C32	CAP. .01 UF, 50V, X7R 20%	0281730008
C33	CAP. .01 UF, 50V, X7R 20%	0281730008
C34	CAP. .01 UF, 50V, X7R 20%	0281730008
C35	CAP. .01 UF, 50V, X7R 20%	0281730008
C36	CAP. 10 UF, 20V	1007290005
C37	CAP. .01 UF, 50V, X7R 20%	0281730008
C38	CAP. .01 UF, 50V, X7R 20%	0281730008
C39	CAP. 10 UF, 20V	1007290005
C40	CAP. .1 UF, 50V, X7R	1011180014
C41	CAP. .01 UF, 50V, X7R 20%	0281730008
C42	CAP. .1 UF, 50V, X7R	1011180014
C43	CAP. .01 UF, 50V, X7R 20%	0281730008
C44	CAP. .01 UF, 50V, X7R 20%	0281730008
C45	CAP. .01 UF, 50V, X7R 20%	0281730008
C46	CAP. .01 UF, 50V, X7R 20%	0281730008
C47	CAP. .01 UF, 50V, X7R 20%	0281730008
C48	CAP. .01 UF, 50V, X7R 20%	0281730008
C49	CAP. .01 UF, 50V, X7R 20%	0281730008
C50	CAP. .01 UF, 50V, X7R 20%	0281730008
C51	CAP. .01 UF, 50V, X7R 20%	0281730008
C52	CAP. .01 UF, 50V, X7R 20%	0281730008
C53	CAP. .01 UF, 50V, X7R 20%	0281730008
C54	CAP. .01 UF, 50V, X7R 20%	0281730008
C55	CAP. .01 UF, 50V, X7R 20%	0281730008
C56	CAP. .01 UF, 50V, X7R 20%	0281730008
C57	CAP. .01 UF, 50V, X7R 20%	0281730008
C58	CAP. .01 UF, 50V, X7R 20%	0281730008
C59	CAP. .01 UF, 50V, X7R 20%	0281730008
C60	CAP. .01 UF, 50V, X7R 20%	0281730008
C61	CAP. .01 UF, 50V, X7R 20%	0281730008
C62	CAP. .01 UF, 50V, X7R 20%	0281730008
C63	CAP. .01 UF, 50V, X7R 20%	0281730008
C64	CAP. 3.3 UF, 35V, 196D	0281680001
C65	CAP. .01 UF, 50V, X7R 20%	0281730008
C66	CAP. .01 UF, 50V, X7R 20%	0281730008
C67	CAP. .01 UF, 50V, X7R 20%	0281730008
C68	CAP. .01 UF, 50V, X7R 20%	0281730008
C69	CAP. .01 UF, 50V, X7R 20%	0281730008
C70	CAP. .01 UF, 50V, X7R 20%	0281730008
C71	CAP. .01 UF, 50V, X7R 20%	0281730008
C72	CAP. 10 UF, 20V	1007290005
C73	CAP. .1 UF, 50V, X7R	1011180014
C74	CAP. 22 UF, 15V, 196D	0281690006
C75	CAP. .1 UF, 50V, X7R	1011180014
C76	CAP. 1 UF, 35V, 196D	0281660000
C77	CAP. 22 UF, 15V, 196D	0281690006
C78	CAP. .1 UF, 50V, X7R	1011180014
C79	CAP. 220 PF, 500V, DM10, 2%	1010870009
C80	CAP. .1 UF, 50V, X7R	1011180014
C81	CAP. .1 UF, 50V, X7R	1011180014
C82	CAP. 1 UF, 35V, 196D	0281660000
C83	CAP. 1 UF, 35V, 196D	0281660000
C84	CAP. 1 UF, 35V, 196D	0281660000
C85	CAP. 22 UF, 15V, 196D	0281690006
C86	CAP. .1 UF, 50V, X7R	1011180014
C87	CAP. .01 UF, 50V, X7R 20%	0281730008
C88	CAP. .01 UF, 50V, X7R 20%	0281730008
C89	CAP. .01 UF, 50V, X7R 20%	0281730008
C90	CAP. .01 UF, 50V, X7R 20%	0281730008
C91	CAP. .01 UF, 50V, X7R 20%	0281730008
C92	CAP. .01 UF, 50V, X7R 20%	0281730008
C93	CAP. 22 UF, 15V, 196D	0281690006
C94	CAP. 22 UF, 15V, 196D	0281690006
C95	CAP. 22 UF, 15V, 196D	0281690006

Figure 6.9.3 PC Assembly ALE MODEM/I/O 1A2A10, page 1 of 11.

C96	CAP. 22 UF, 15V, 196D	0281690006
C97	CAP. .01 UF, 50V, X7R 20%	0281730008
C98	CAP. .01 UF, 50V, X7R 20%	0281730008
C99	CAP. .01 UF, 50V, X7R 20%	0281730008
C100	CAP. .01 UF, 50V, X7R 20%	0281730008
C101	CAP. .01 UF, 50V, X7R 20%	0281730008
C102	CAP. .01 UF, 50V, X7R 20%	0281730008
C103	CAP. .01 UF, 50V, X7R 20%	0281730008
C104	CAP. 22 UF, 15V, 196D	0281690006
C105	CAP. .1 UF, 50V, X7R	1011180014
C106	CAP. .1 UF, 50V, X7R	1011180014
C107	CAP. .1 UF, 50V, X7R	1011180014
C108	CAP. .1 UF, 50V, X7R	1011180014
C109	CAP. .1 UF, 50V, X7R	1011180014
C110	CAP. .001 UF, 100V, X7R 20%	0281630003
C111	CAP. .047 UF, 50V, X7R 10%	1010740008
C112	CAP. .01 UF, 50V, X7R 20%	0281730008
CR1	DIODE, LED, RED, PC MOUNT	1008480029
CR2	DIODE, RECTIFIER, 1N4004	0405180004
CR3	DIODE, RECTIFIER, 1N4004	0405180004
CR4	DIODE, LED, RED, PC MOUNT	1008480029
CR5	DIODE, LED, AMBER, PC MOUNT	1011480000
CR6	DIODE, LED, GREEN, PC MOUNT	1011030012
CR7	DIODE, ZENER 1N5228B, 3.9V, 5%	1004320027
CR8	DIODE, ZENER 1N5228B, 3.9V, 5%	1004320027
J1	CONNECTOR, DB-15, FEM, PC MOUNT	1012540006
K1	RELAY, DPDT, 12VDC	1005090009
K2	RELAY, DPDT, 12VDC	1005090009
L1	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L2	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L3	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L4	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L5	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L6	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L7	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L8	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L9	INDUCTOR, MOLDED, 33 UH, 5%	0659690004
L10	INDUCTOR, MOLDED, 33 UH, 5%	0659690004
L11	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L12	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L13	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L14	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L15	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
L16	INDUCTOR, MOLDED, 8.2 UH, 5%	0652060005
P1	CONNECTOR, HEADER, 40 PIN MALE	1010780000
P2	CONNECTOR, HEADER, 14 PIN MALE	1011210142
Q1	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q2	TRANSISTOR, NPN, SI. 2N4124	0448010003
Q3	TRANSISTOR, N-CH, FET 2N7000	1011050013
R1	RESISTOR 680, 5%, 1/8W	1010806815
R2	RESISTOR 100K, 5%, 1/8W	1010801040
R3	RESISTOR 10K, 5%, 1/8W	1010801031
R4	RESISTOR 10K, 5%, 1/8W	1010801031
R5	RESISTOR 10K, 5%, 1/8W	1010801031
R6	RESISTOR 100K, 5%, 1/8W	1010801040
R7	RESISTOR 10K, 5%, 1/8W	1010801031
R8	RESISTOR 10K, 5%, 1/8W	1010801031
R9	RESISTOR 10K, 5%, 1/8W	1010801031
R10	RESISTOR 82, 10%, 1/4W	0184610001
R11	RESISTOR 10K, 5%, 1/8W	1010801031
R12	RESISTOR 68, 5%, 1/8W	1010806807
R13	RESISTOR 68, 5%, 1/8W	1010806807
R14	RESISTOR 68, 5%, 1/8W	1010806807
R15	RESISTOR 68, 5%, 1/8W	1010806807
R16	RESISTOR 0.0, 1/4W	1011600021
R17	RESISTOR 0.0, 1/4W	1011600021
R18	RESISTOR 2.7K, 5%, 1/8W	1010802721
R19	RESISTOR 10K, 5%, 1/8W	1010801031
R20	RESISTOR 680, 5%, 1/8W	1010806815
R21	RESISTOR 680, 5%, 1/8W	1010806815
R22	RESISTOR 330, 5%, 1/8W	1010803310
R23	RESISTOR 330, 5%, 1/8W	1010803310
R24	RESISTOR 330, 5%, 1/8W	1010803310
R25	RESISTOR 0.0, 1/4W	1011600021
R26	RESISTOR 0.0, 1/4W	1011600021
R27	RESISTOR 270, 5%, 1/8W	1010802712
R28	RESISTOR 390, 5%, 1/8W	1010803913
R29	RESISTOR 10K, 1%, 1/8W	1003050026
R30	RESISTOR 31.6K, 1%, 1/8W	1004050020
R31	RESISTOR 10K, 5%, 1/8W	1010801031
R32	RESISTOR 10K, 5%, 1/8W	1010801031
R33	RESISTOR 71.5K, 1%, 1/8W	1008200018
R34	RESISTOR 31.6K, 1%, 1/8W	1004050020
R35	RESISTOR 26.1K, 1%, 1/8W	1011280001
R36	RESISTOR 15.4K, 1%, 1/8W	1004060033
R37	RESISTOR 18.2K, 1%, 1/8W	1004060025
R38	RESISTOR 21.5K, 1%, 1/8W	1004060017
R39	RESISTOR 21.5K, 1%, 1/8W	1004060017
R40	RESISTOR 24.3K, 1%, 1/8W	1004060009
R41	RESISTOR 15K, 1%, 1/8W	1004050003
R42	RESISTOR 1K, 5%, 1/8W	1010801031
R43	RESISTOR 4.7K, 5%, 1/8W	1010804723
R44	RESISTOR 604, 1%, 1/8W	0193980002
R45	RESISTOR 0.0, 1/4W	1011600021
R46	RESISTOR 10, 5%, 1/8W	1010801007
R47	RESISTOR 10, 5%, 1/8W	1010801007
R48	RESISTOR 0.0, 1/4W	1011600021
R49	RESISTOR 0.0, 1/4W	1011600021
R50	RESISTOR 0.0, 1/4W	1011600021

Figure 6.9.3 PC Assembly ALE MODEM/I/O 1A2A10, page 2 of 11.

R51	RESISTOR 100K, 1%, 1/8W	1001030036
R52	RESISTOR 100K, 1%, 1/8W	1001030036
R53	RESISTOR 33K, 5%, 1/8W	1010803301
R54	RESISTOR 10K, 5%, 1/8W	1010801031
RP1	RES NTWK 10 PIN SIP 10K COM	1006130021
RP2	RES NTWK 10 PIN SIP 10K COM	1006130021
T1	TRANSFORMER, MODEM	1011340011
U1	OSC. 14.5476 MHZ	1012550001
U2	IC, DIGITAL 74HC00	1008190004
U3	IC, DIGITAL 74HC00	1008190004
U4	IC, DIGITAL 4078B	1010460030
U5	IC, DIGITAL 74HC374	1006450033
U6	IC, DIGITAL 74HC374	1006450033
U7	IC, DIGITAL 74HC04	1010280023
U8	IC, DIGITAL 74HC32	1006470026
U9	IC, DIGITAL 2681	1008790010
U10	IC, DIGITAL 80C85A	1007400013
U11	IC, DIGITAL 74HC138	1006480013
U12	IC, DIGITAL 74HC125	1008810011
U13	IC, DIGITAL 74HC373	1006480030
U14	IC, DIGITAL 74HC32	1006470026
U15	IC, DIGITAL RAM 6264	1010650009
U16	IC, DIGITAL ICL232	1010510011
U17	IC, DIGITAL ICL232	1010510011
U18	IC, DIGITAL 75176	1011100011
U19	IC, DIGITAL 75176	1011100011
U20	EPROM, W/IO SOFTWARE	8076113296
U21	IC, LINEAR TL7705B	1012210006
U22	IC, DIGITAL CPU 80C188EB-8	1012580008
U23	IC, DIGITAL 74HC373	1006480030
U24	IC, DIGITAL 74HC373	1006480030
U25	IC, DIGITAL 74HC245	1006470034
U26	IC, DIGITAL EPROM W/ALE SOFTWARE	8112013292
U27	IC, DIGITAL RAM 551001	1012600009
U28	IC, DIGITAL EEPROM 28C64	1010660004
U29	IC, DIGITAL REAL-TIME CLOCK	1012620000
U30	IC, DIGITAL 74HC04	1010280023
U31	IC, DIGITAL 74HC32	1006470026
U32	IC, DIGITAL 74HC02	1010290029
U33	IC, DIGITAL 74HC244	1006460039
U34	IC, DIGITAL 2501-1	1011000016
U35	IC, DIGITAL 2501-1	1011000016
U36	IC, DIGITAL CPU DSP32CR33-080	1012040003
U37	IC, DIGITAL RAM 7C185	1012590003
U38	IC, DIGITAL RAM 7C185	1012590003
U39	IC, DIGITAL RAM 7C185	1012590003
U40	IC, DIGITAL RAM 7C185	1012590003
U41	IC, DIGITAL 74F32	1012610004
U42	OSC. 49.152 MHZ	1012560007
U43	IC, LINEAR UA78L05AWC	1010150014
U44	IC, LINEAR MC34072	1011440032
U45	IC, DIGITAL T7525-PC	1012460002
U46	IC, LINEAR CLC430	1012510000
U47	IC, DIGITAL ICL232	1010510011
U48	OSC. 16.000312 MHZ	1012570002
U49	IC, DIGITAL MODEM RC224ATL	1012660001
U50	IC, DIGITAL 74HC244	1006460039
XU10	SOCKET, IC, 40 PIN TAILLESS	1006620010
XU20	SOCKET, IC, 28 PIN TAILLESS	1006620001
XU22	SOCKET, IC, 84 PIN PLCC	1012640001
XU26	SOCKET, IC, 32 PIN TAILLESS	1012530001
XU28	SOCKET, IC, 28 PIN TAILLESS	1006620001
XU29	SOCKET, IC, 24 PIN TAILLESS	1006240021
XU36	SOCKET, IC, 133 PIN PGA	1012650006
XU49	SOCKET, IC, 68 PIN PLCC	1012630005
ZS1	VARISTOR, MOV V230LA20A	1010720023

Figure 6.9.3 PC Assembly ALE MODEM/I/O 1A2A10, page 3 of 11.

8112010200 REV. A 01/21/94 (P2060A)

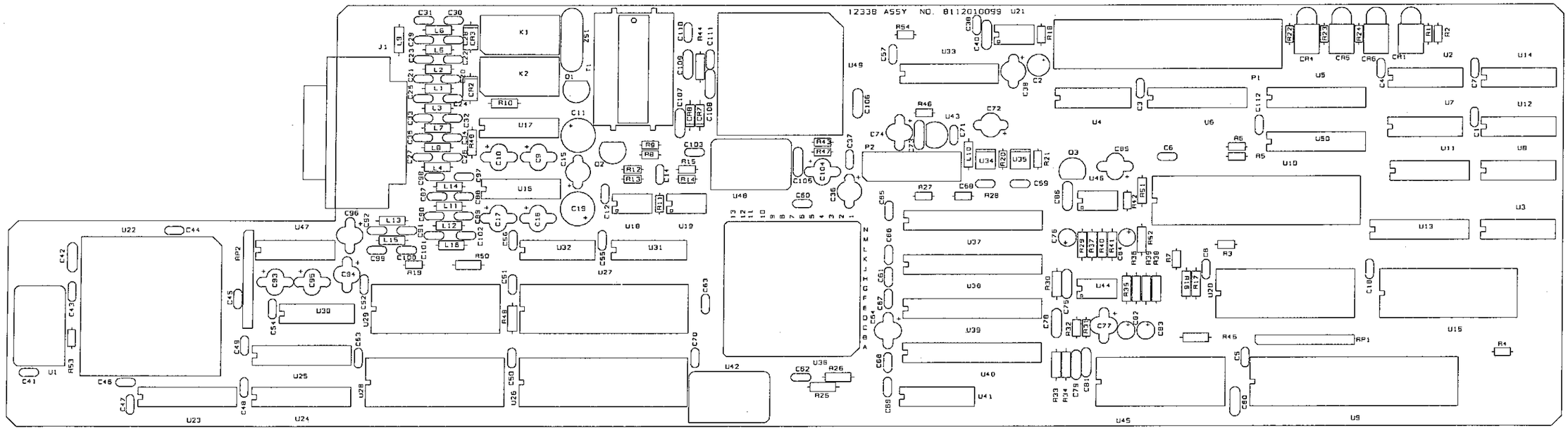


Figure 6.9.3 PC Assembly ALE MODEM/I/O 1A2A10, page 4 of 11.

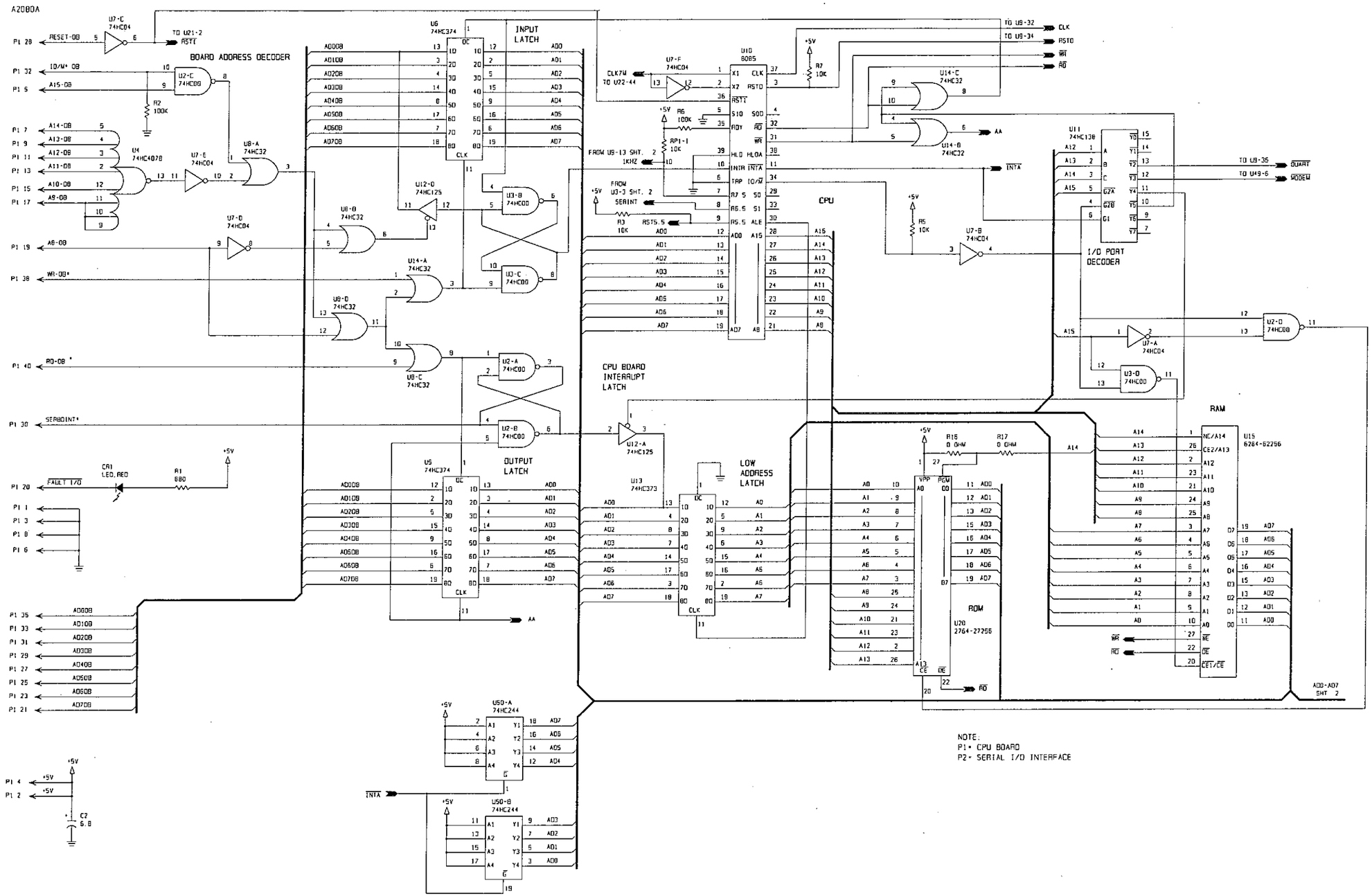


Figure 6.9.3 PC Assembly ALE MODEM/I/O 1A2A10, page 5 of 11.

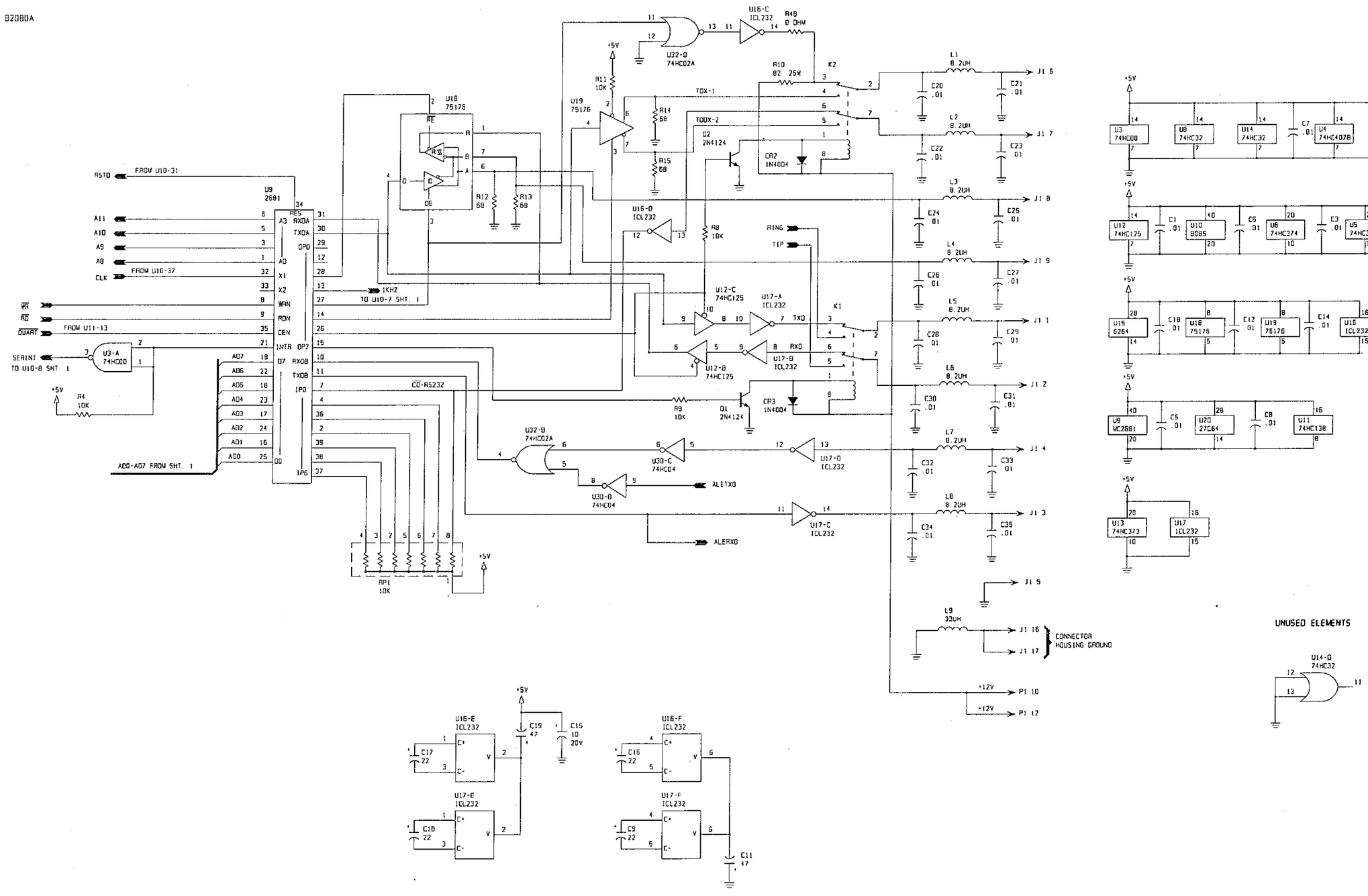


Figure 6.9.3 PC Assembly ALE MODEM/I/O 1A2A10, page 6 of 11.

C2080A

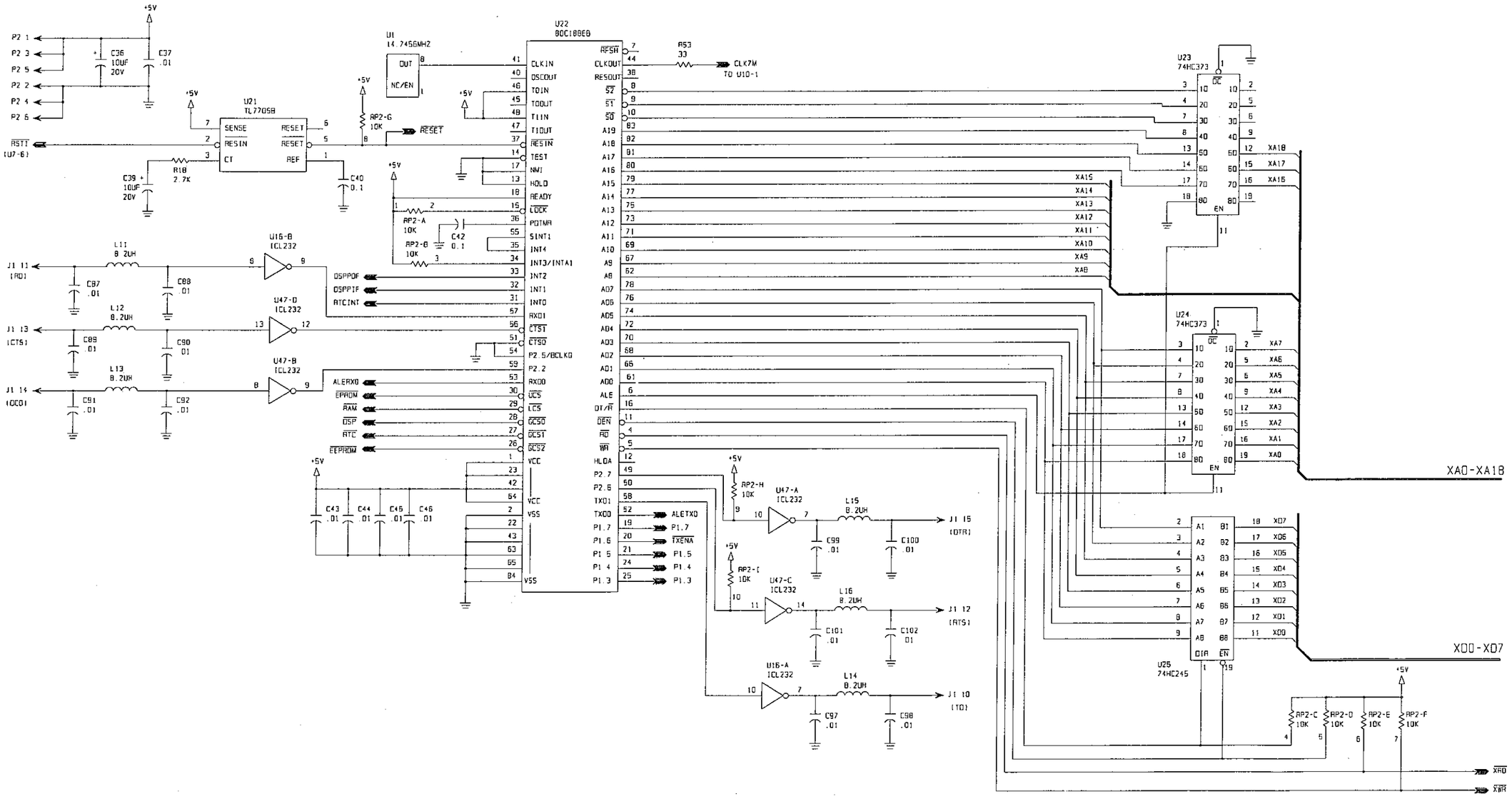


Figure 6.9.3 PC Assembly ALE MODEM/I/O 1A2A10, page 7 of 11.

D2080A

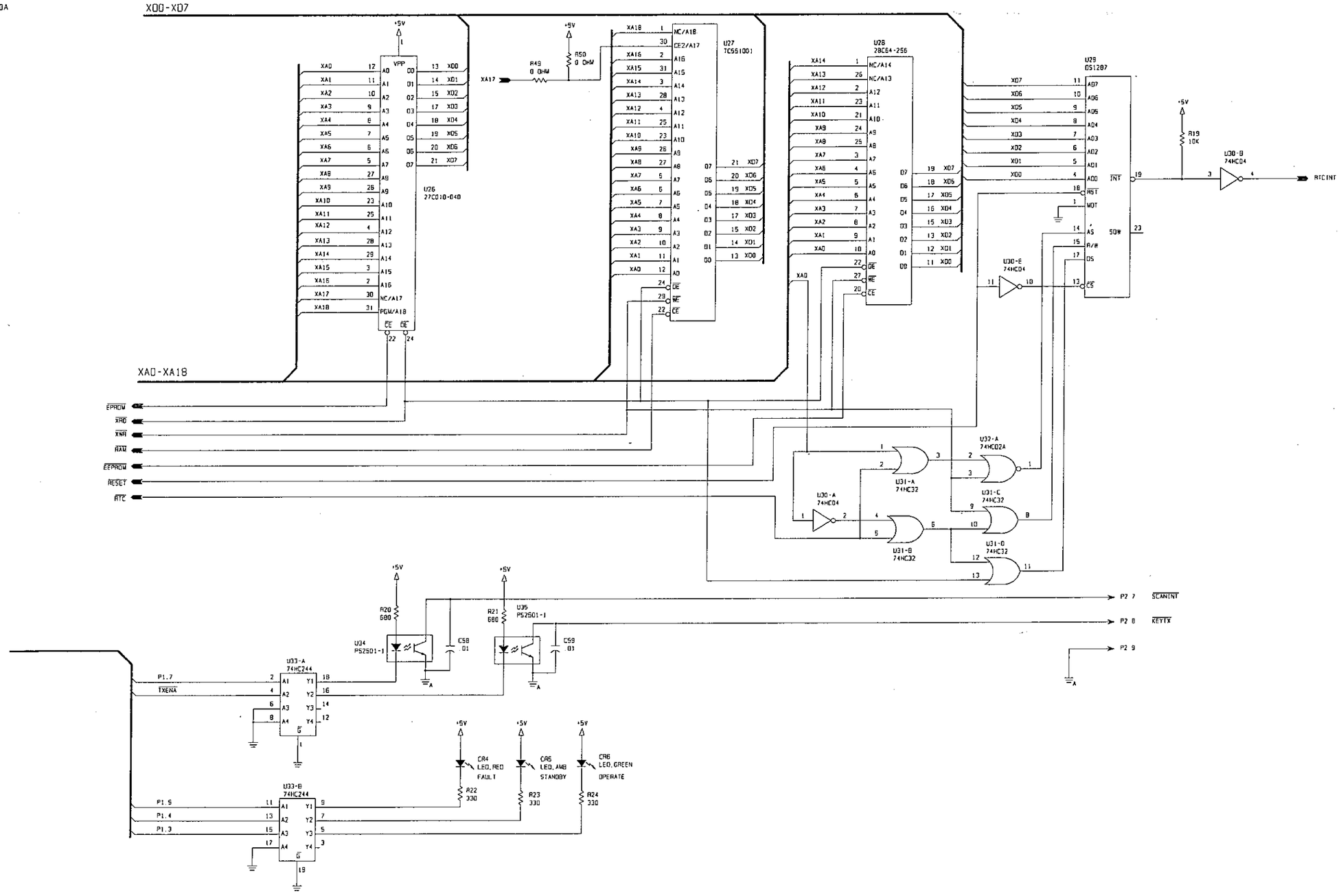


Figure 6.9.3 PC Assembly ALE MODEM/I/O 1A2A10, page 8 of 11.

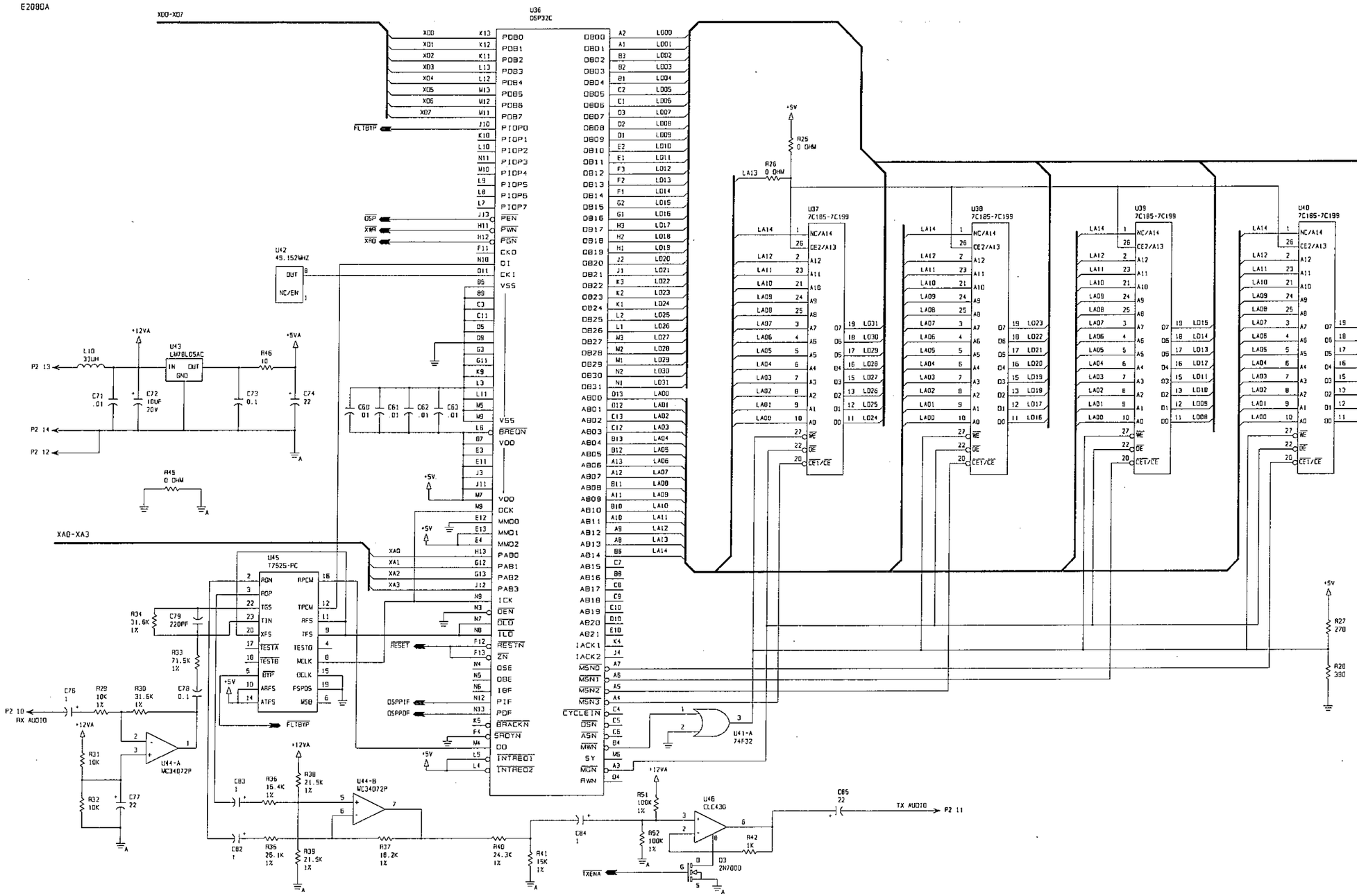


Figure 6.9.3 PC Assembly ALE MODEM/I/O 1A2A10, page 9 of 11.

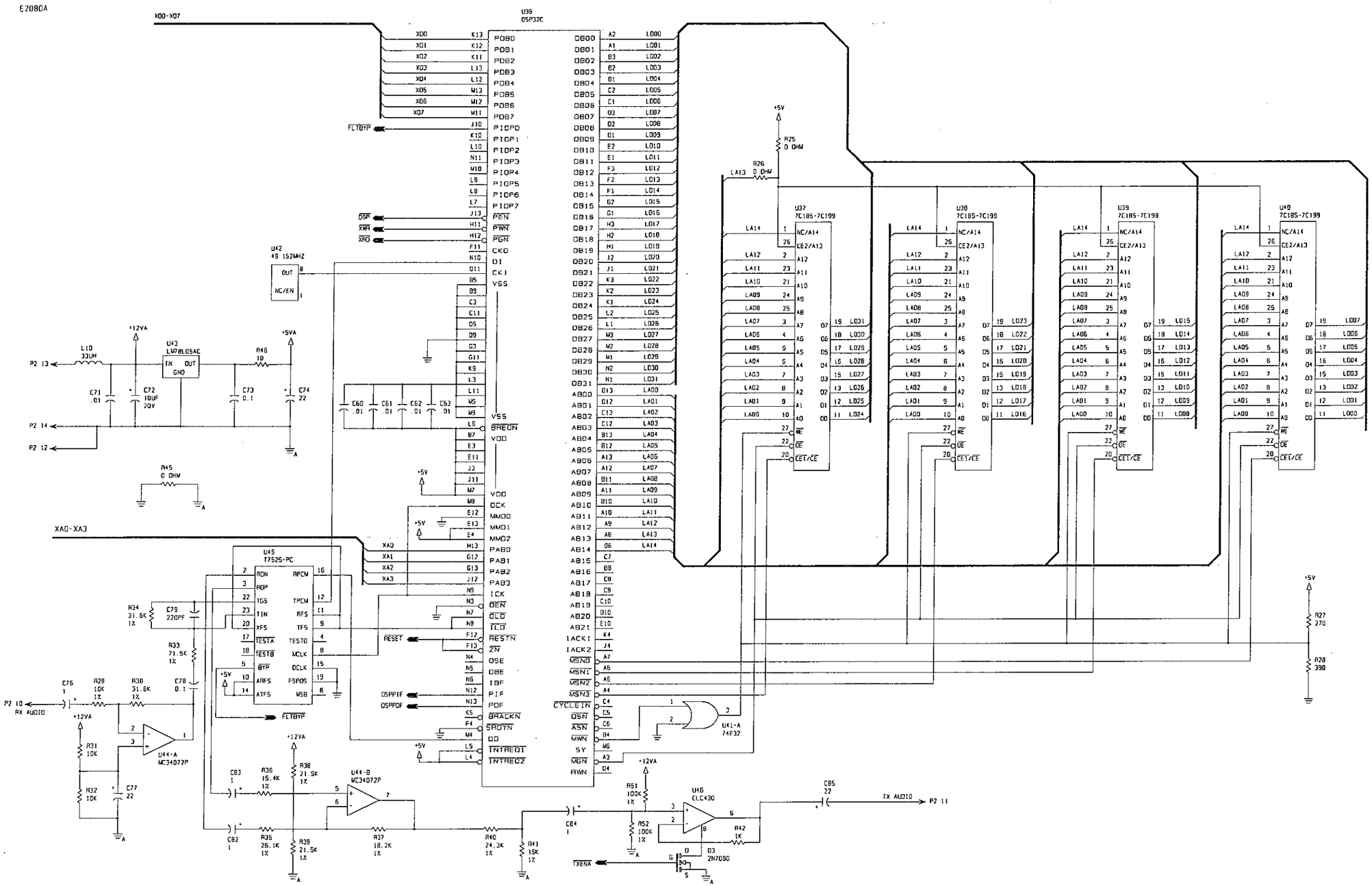
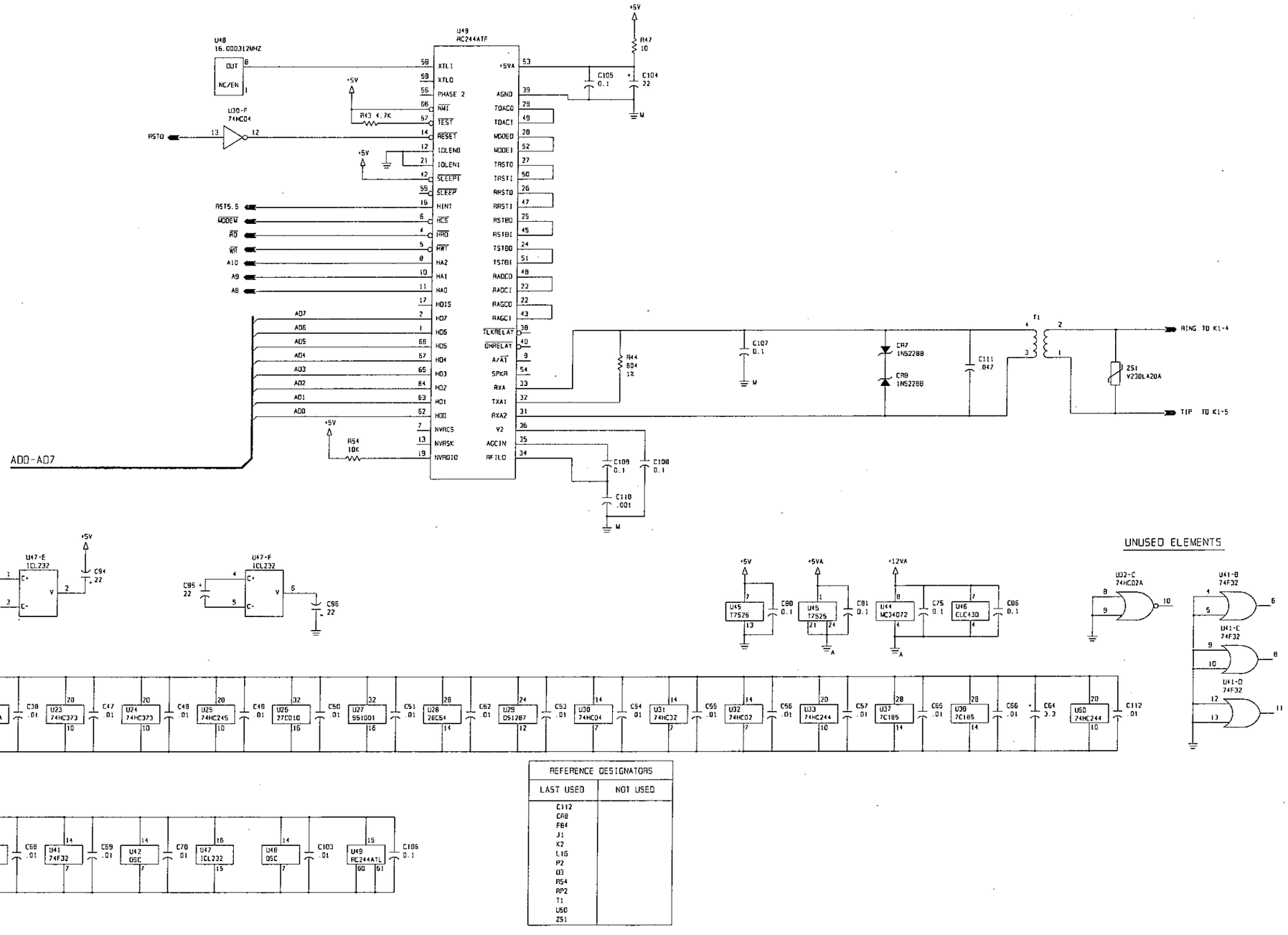


Figure 6.9.3 PC Assembly ALE MODEM/I/O 1A2A10, page 10 of 11.

F2080A



REFERENCE DESIGNATORS	
LAST USED	NOT USED
C112	
CR8	
FB4	
J1	
K2	
L16	
P2	
Q3	
R54	
RP2	
T1	
U50	
ZS1	

Figure 6.9.3 PC Assembly ALE MODEM/I/O 1A2A10, page 11 of 11.

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TM - 8128000560

DIGITAL HF/SSB
TRANSCEIVER

RT-9000B

SPECIFICATIONS and OPERATION SUPPLEMENT

SUNAIR 3005 Southwest Third Avenue, Fort Lauderdale, Florida 33315-3312

Revision Record

Revision	Date	ECN	Description
N1B	30 Sep 04	8128-003	Preliminary Release
	07 Oct 04	8128-012	Final Release

Printed in the United States of America

TABLE of CONTENTS

TABLE of CONTENTS (Cont…)

TABLE of CONTENTS (Cont…)

LISTING of FIGURES

LISTING of FIGURES (Cont…)

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SECTION 7.I

GENERAL INFORMATION

7.1.1 PURPOSE OF EQUIPMENT

The RT-9000B is a 125 Watt HF/SSB Digital Transceiver that provides communications from 1.6 to 29.99999 MHz (receive 100 kHz to 29.99999 MHz). Modes of operation include USB, LSB, AM equivalent, CW, and DATA (with external modems). The RT-9000B is designed to be used in fixed station or mobile environments and may be computer or remotely controlled using RS232, RS422, or FSK tones communications formats.

7.1.2 GENERAL DESCRIPTION

The RT-9000B can be used in base station 19-inch equipment rack installations, on tabletops, in mobile installations or transportable cases. Its rugged package makes the RT-9000B ideal for all environments. Internally, the RT-9000B is designed with the service technician in mind. The Built-In-Test-Equipment (BITE) capability provides descriptive front panel readouts about the operating status of modularized plug-in assemblies. LED indicators located on the each module permits helps the technician rapidly identify a faulty module.

The RT-9000B has a simple, easily understood front panel. First time users may operate the RT-9000B without extensive training. A large LCD display provides continuous status of major operating parameters such as Operating Frequency, Channel, Emission Mode, Power Output, Local/Remote control status and Receiver AGC and BFO settings. Extensive metering functions allow the operator to monitor Transmit functions such as Forward and Reverse power, ALC action, and Line Audio input levels and Receive functions such as Signal Strength and Line Audio Output Levels. Metering is displayed as a bar graph. Internal test routines handle and display easily understood status messages about external equipment, when present, such as a Linear Power Amplifier and/or Antenna Coupler.

The front panel contains two (2) keypads. A function-oriented keypad provides ready access to basic operating functions such as mode and setup selection. A numeric keypad provides convenient entry of channel numbers, operating frequencies, and other numeric data. In addition to the Main Display and keypads, a set of five (5) variable function keys with a dedicated display, together comprises an effective system of additional operating controls. The set of function keys and its display are referred to as “Feature Keys” and “Feature Menu”, respectively. The RT-9000B’s Feature Key And Menu system offers a flexible means of presenting the operator with additional control and feature selections and is under software control. This arrangement also permits context related feature choices and eases new feature implementation.

Gray is the standard color. If a particular color other than Gray is required, contact the Sunair Marketing Department for information about changes to the standard color.

7.1.3 TECHNICAL SPECIFICATIONS

7.1.3.1 GENERAL

FREQUENCY RANGE: Transmit: 1.6 to 29.99999 MHz
Receive - 100 kHz to 29.99999 MHz
(Transmit and Receive frequencies selectable in 10 Hz steps)

PROGRAMMABLE CHANNELS: 128 Simplex or Half-Duplex channels

FREQUENCY STABILITY: Standard: ± 1 part in 10^6

High Stability Option: ± 1 part in 10^8 Unit must be continuously energized to maintain specified Frequency Stability performance.

Warmup Time: After 1 hour = ± 1 part in 10^7
4 hours = ± 4 parts in 10^8
72 hours = ± 1 part in 10^8

MEMORY RETENTION: Non-Volatile

WEIGHT - Lbs (Kg): 49 lbs (22.3)

CONSTRUCTION: Modular plug-in assemblies

SCAN/SWEEP: Manual or automatic Rate/Dwell programmable

MODES OF OPERATION: USB, LSB, CW, AM equivalent, DATA (with external modems)

RF INPUT/OUTPUT IMPEDANCE: 50-Ohms nominal, unbalanced

BITE (Built-In-Test-Equipment): Fault isolated to Lowest Replaceable Unit (LRU) module, descriptive readout on front panel and individual module indication

INPUT POWER: 115/230 VAC ± 15%, 50/60 Hz; +26 VDC ± 15%; With both input power types connected, unit will execute AC/DC Auto Changeover

BFO: ± 1.99 kHz, 10 Hz Resolution

SYNTHESIZER LOCK TIME: 10 ms

T/R SWITCHING TIME: 10 ms

REMOTE INTERFACE: RS232, RS422, and 300-Baud FSK Tone

SIZE - Inches (cm): High: 5.96" (15.2) X Wide: 17.83" (45.4) X Deep: (See below)

(Rack mounting plane – to - rearward extreme)	(Front panel protrusion – controls & handles)
Without optional blower kit: 17.66" (44.9)	
With optional blower kit: 19.5" (49.5)	1.56" (4.0)

All rack-mounted installations must provide 1.5" (3.8) minimum additional clearance for air circulation and cable clearance.

7.1.3.2 RECEIVER SECTION

SELECTIVITY: SSB: 300 to 3300 Hz at 6 dB points
CW: 500 Hz at 3 dB points, centered at 1 kHz (Optional)
AM: ± 3000 Hz at 6 dB points

SENSITIVITY: SSB: 0.5µV for 10 dB (S+N)/N
AM: 3.0µV for 10 dB (S+N)/N
CW: 0.3µV for 10 dB (S+N)/N; (Degradation below 2.0 MHz).

AUDIO OUTPUT: Internal Speaker - 5 Watts less than 5% THD
Headset – Low impedance
Two (2) selectable 600-Ohm lines at -20 dBm to +10 dBm

IMAGE & IF REJECTION: 80 dB Minimum

SPURIOUS REJECTION: 80 dB Minimum

AGC CHARACTERISTICS: Attack Time: 10 ms Nominal

Release Time: Fast 23 ms
Medium 200 ms ±100 ms
Slow 3 sec ±1 sec

SQUELCH: Syllabic

ANTENNA INPUT PROTECTION: 100 V_{RMS}, Self-resetting

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

7.1.3.3 TRANSMITTER SECTION

OUTPUT POWER: Normal Power Operation

- SSB: 125 Watts PEP (Peak Envelope Power) and Average
- CW: 125 Watts
- AM: 40 Watts Carrier

Low Power Operation

- SSB: 65 Watts (adjustable)
- CW: 65 Watts (adjustable)

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

INTERMODULATION DISTORTION: 36 dB below PEP

CARRIER SUPPRESSION: 50 dB below PEP

UNDESIRED SIDEBAND: 50 dB below PEP at 1 kHz

HUM & NOISE LEVEL: 50 dB below PEP

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

AUDIO INPUTS: Microphone
Aux. Connector
Two (2) selectable 600-Ohm lines at -20 dBm to +10 dBm

AUTOMATIC LEVEL CONTROL: 125 Watts ±1 dB

AUDIO COMPRESSION: 10 dB Nominal (Internal Disable)

7.1.3.4 ALE Subsystem

SIGNALING

MODULATION: 8-ary FSK

SYMBOL RATE: 125-Baud

BIT RATE: 375 bits/sec

CODING: Golay forward error correction (FEC) Mode; 3/4 and 2/3 majority vote

REDUNDANT WORD LENGTH: 49 symbols (147 bits)

DATA THROUGHPUT: 61.22 bits/sec

CALLING CYCLE: 9016 ms (3 Character ID Only)

RESPONSE/ACKNOWLEDGE CYCLE: 2,352 ms (3 Character ID Only)

SCAN RATE: 500 ms/channel

SELECTIVE CALLING

ADDRESS FORMAT: 15 Characters, Maximum
Alphanumeric ALE basic 38-character set
(excluding Wildcard character)

HANDSHAKE: 3-way - Point-to-Point Call and NET CALL
1-way - Sounding and ALL CALL

NETWORK MANAGEMENT: 20 networks; 10 station addresses/network

LINK QUALITY ANALYSIS (LQA)

MEASUREMENTS: SINAD (Signal + Noise + Distortion / Noise + Distortion) and Bit Error Rate (BER)

AUTOMATIC MESSAGE DISPLAY (AMD) PROTOCOL

CHARACTER SET: 64 character ASCII subset

MESSAGE SIZE: 90 characters, Maximum

SUPPORTING PROTOCOL: Point-to-Point Call, ALL CALL, and NET CALL (net control station acknowledge only)

7.1.3.5 ENVIRONMENTAL

TEMPERATURE: -30^{O}C to +50^{O}C

HUMIDITY: 100% at 50^{O}C

RAIN: MIL-STD-810F, Method 506.4

SHOCK: MIL-STD-810F, Method 516.5, Procedure 1

VIBRATION: MIL-STD-810F, Method 514.5

MTBF / MTTR: 6500 hours / 15 minutes

7.1.4 EQUIPMENT SUPPLIED & AVAILABLE OPTIONS

The following charts list the supplied items and available options for the RT-9000 B Transceiver.

Supplied Items		Sunair Part No.
Transceiver, RT-9000 B , Gray		8128001281
Microphone Assembly, Handheld		8076000602
Manual, RT-9000 B Transceiver		8128000501
Manual Supplement, RT-9000 B Specifications and Operation (Software Rev. N1B)		8128000560 (Section VII)
Mating Connector Kit, RT-9000 A /B		8112000492
Power Cord Assembly	115 VAC	8076002095
	230 VAC	8076002192

Available Options	Sunair Part No.
High Stability Reference Oscillator	5024013701

7.1.5 OPTIONAL ACCESSORIES

The following chart lists optional accessories available for use with the RT-9000 B Transceiver.

Description	Sunair Part No.	Remarks
Desktop Kit	8076000009	Color - Gray
Headset	0840200005	
Headset, Lightweight	1011190010	
CW Key with Phone Plug	5024000994	
Handset Assembly	8076000793	
Microphone, Desktop	8076000891	
Rackmount Kit with Slides	8076004853	Color - Gray
DC Power Cord Assembly	8101002294	
Interface Cable	8076004594	
Running Spares Kit (Fuses)	8076904099	
Service Kit, 9000 Series	8076003393	Contains the following Items: Repair Alignment Tools -1011480034 PCB Extender Assy ------ 8076003091 PCB Card Puller ---------- 8076003105
Field Module Kit, RT-9000 B	8128905091	

7.1.6 OPTIONAL EQUIPMENT

The following chart lists optional equipment available for use with the RT-9000B Transceiver.

Model No.	Description	Remarks
F-9800	Pre/Postselector	
CU-9125	Automatic Antenna Coupler	Color – Gray (Standard) Olive Drab (Available) 150 Watt Power Capability
LPA-9500	500 W Solid-State Linear Power Amplifier	
LPA-9600	1 kW Solid-State Linear Power Amplifier	
CU-9150	Automatic Antenna Coupler	Color - Gray 1 kW Power Capability
RCU-9310B	Remote Control Unit	

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SECTION 7.3

OPERATION

7.3.1 GENERAL

This section provides the operator with the location and use of the RT-9000B front panel controls for proper utilization of the equipment. For convenience of discussion, functions are addressed in normal sequence. However, it is not necessary to observe this order once the user becomes familiar with the equipment. Any setting may be changed independently by referring to the appropriate section in this chapter pertaining to the function in question. Reference to Figure 7.3.1.1 below, shows the location of the control groups, displays, and their general purpose.

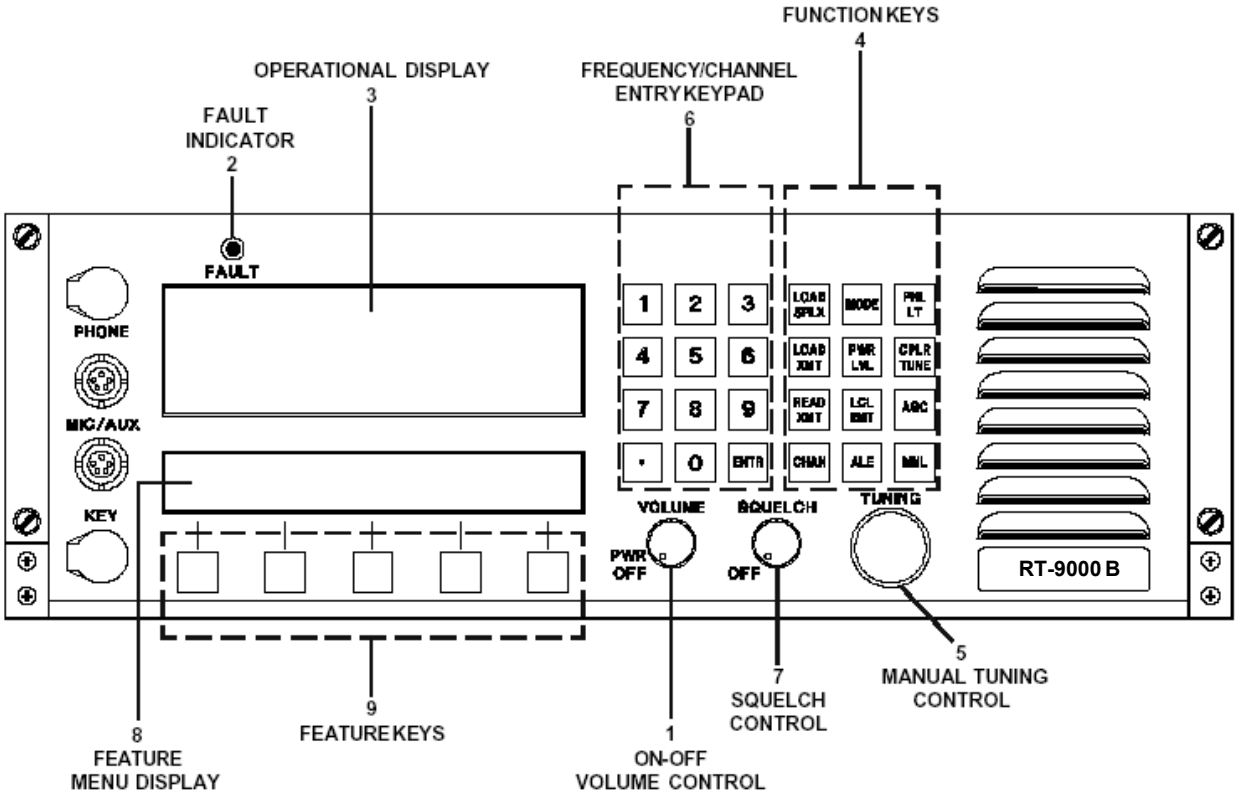


Figure 7.3.1.1 RT-9000B Front Panel Controls

1 ON/OFF VOLUME CONTROL

When this control is in the full counter clockwise position, the equipment is OFF. To power-up the unit, rotate the control clock-wise. Once on, the internal speaker audio output level is initially at minimum. Rotating the volume control clock-wise increases the speaker audio output level.

NOTE: The setting of this control does not affect the level of the Remote Audio Line outputs from the equipment rear panel.

2 FAULT INDICATOR

This Red indicator is lit if a 'FAULT' condition is detected in the RT-9000B Transceiver. Check the installation and proceed to the section on BITE (Built-In-Test-Equipment), located in section 7.3.3.1 of this manual.

3 OPERATIONAL DISPLAY

This Liquid Crystal Display (LCD), provides a variety of information required to operate the equipment. Information is displayed in four primary areas of the display as indicated in Figure 7.3.1.2.

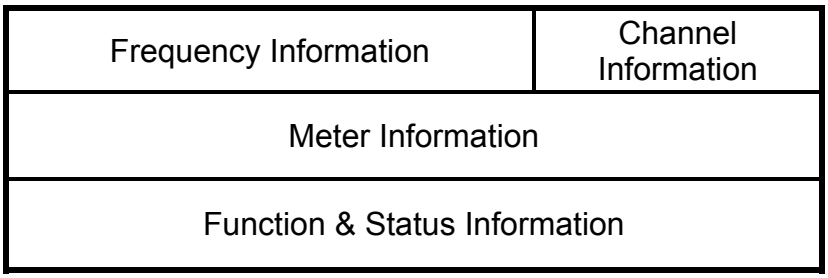


FIG 7.3.1.2 RT-9000B Operational Display - Information Location

4 FUNCTION KEYS

This group of twelve (12) keys is used to control the primary operating functions of the RT-9000B Transceiver such as Mode selection, Channel selection, Channel loading, AGC characteristic selection, Local/Remote operation, Power Output level selection, Panel Illumination, Coupler Tune command, and manual tuning.

5 MANUAL TUNING CONTROL

This control is used to control manual tuning of the RT-9000B Transceiver frequency or channel selection. Actual frequency setting or channel selection is indicated in the Operational Display.

6 FREQUENCY/CHANNEL ENTRY KEYS

This group of twelve (12) numeric keys is primarily used for frequency information entry. This keypad may be used to enter, select, or load a specific operating frequency or Channel Number. This keypad may also be used to enter other numerical settings and parameters.

7 SQUELCH CONTROL

This control is used to set the silencing threshold for the squelch circuit. When this control is set to the full counter-clockwise position, the squelch circuit is disabled and the equipment is unsquelched (fully unsilenced).

Rotating the control clock-wise enables the squelch circuit and sets its silencing threshold. When the control is initially moved, a click will be felt indicting the Squelch switch has been actuated. Clock-wise control rotation is continued until the RT-9000B's Receiver noise just silences (or is "Squelched").

When set as described above, the squelch circuit is active but maximum Receiver sensitivity has been maintained. Further clock-wise Squelch control rotation increases the signal strength required to "open" the squelch and allow an incoming signal to be heard. This action also effectively decreases Receiver sensitivity.

8 FEATURE KEY MENU DISPLAY

This display provides names of functions or selections for the five (5) keys located directly below the display. In most cases, this display automatically indicates the appropriate selections based upon the condition of other equipment settings. The menu may be changed by depressing the fifth key under 'MORE'.

9 FEATURE KEYS

This group of five (5) "Soft" keys enables various functions as indicated in the display located directly above these keys.

NOTE: An asterisk (*) appearing at the right-hand side of a function in the display indicates that the feature preceding it is enabled, selected, or 'ON'.

The RT-9000B Transceiver controls can be divided into three categories:

A. Primary Operations (Section 7.3.2)

B. Equipment Set-Up (Section 7.3.3)

C. Advanced Operations (Section 7.3.4)

7.3.2 PRIMARY OPERATIONS

The RT-9000 B operations described in this manual section cover the most basic and common operations.

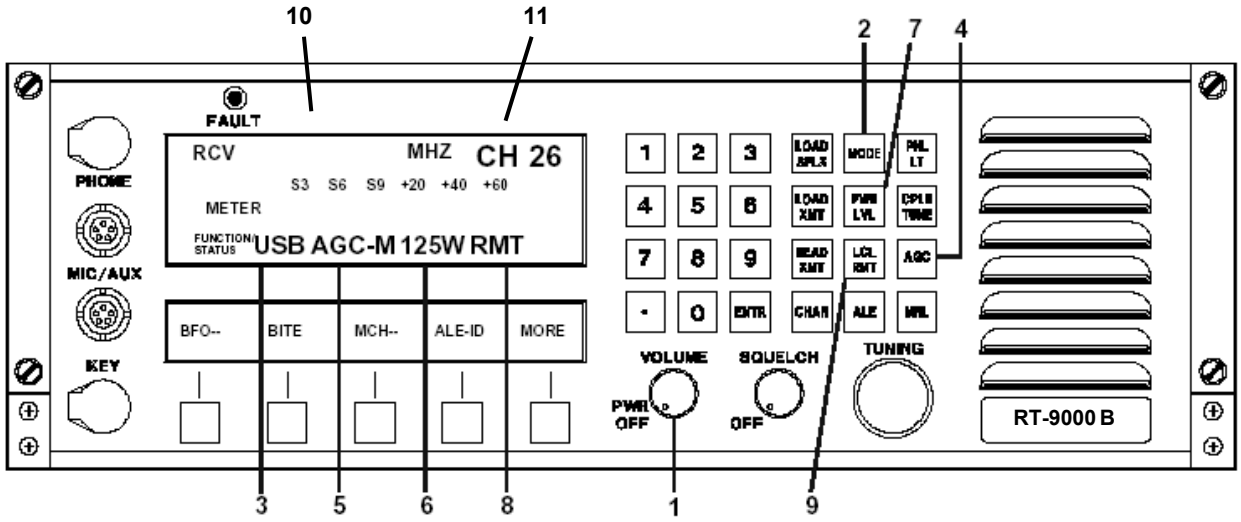


Figure 7.3.2.1 RT-9000 B Basic Set Up Controls

7.3.2.1 TRANSCEIVER MODE, AGC, AND TRANSMIT POWER SET UP

These settings determine the basic operating characteristics for the Receiver and Transmitter sections of the RT-9000 B Transceiver. These settings are Transceiver Emission Mode, Receiver AGC speed characteristic, and Transmitter RF Power Output level.

Unless otherwise noted, refer to Figure 7.3.2.1 for the location of controls and features.

Transceiver Emission Mode Selection

To select the Emission Mode, depress 'MODE' key successively at **2** until the desired selection appears in Operational Display segment at **3.** This selection applies to both Receive and Transmit operation. The choices are 'USB', 'LSB', 'CW', and 'AM'. If the Data filter option has been installed in the RT-9000 B Transceiver, a 'DATA' choice will also be displayed and be available.

Receiver AGC Speed Characteristic

To select the Receiver AGC speed characteristic, depress 'AGC' key successively at **4** until the desired selection appears in the Operational Display segment at **5.** The choices are 'AGC-S' (Slow), 'AGC-M'(Medium), and 'AGC- F'(Fast). The 'Slow' AGC characteristic is generally desirable with speech transmission. The Fast AGC characteristic is desirable for data transmission.

Transmitter Power Output Selection

Transmitter RF power output is indicated in the Operational Display segment at **7.** Normally, this setting will be set to the '125W' (Watts) power output level by default. If the '65W' (Watts) RF power output level is desired, depress the 'PWR LVL' (Power Level) Key at **7**. The indicated power level output will change accordingly.

NOTE: An external Linear Power Amplifier is frequently used with the RT-9000B Transceiver. The system will automatically detect when this optional equipment is present and automatically adjust the available Power Output Level choices. Depending on the specific amplifier model, the additional Power Output Level choices will be '500W (500 Watts) or '1000W' (1000 Watts).

THE BASIC OPERATING SETTINGS OF THE REMOTE TRANSCEIVER HAVE NOW BEEN ESTABLISHED.

7.3.2.2 ESTABLISHING AN OPERATING FREQUENCY

To establish an operating frequency, place the system in the Manual Tuning mode. Refer to Figure 7.3.2.2. If the RT-9000B Operational Display does not indicate an 'M' (Manual Tuning mode) at **1** , depress the Manual ('MNL') key at **2**. The display will change to the 'M' at **1**. The Feature Menu Display also will change to the "Frequency Step Feature Menu" shown at **7**. The Manual Tuning mode operates only in "Simplex" operating mode (alternate receive and transmit using the same frequency).

Depressing the Load Simplex ('LOAD SPLX') key at **3** will cause the "Frequency Display" at **4** of the Operational Display to go blank. The Numeric Keypad at **5** , may now be used to key in the desired operating frequency up to seven (7) digits long. As each frequency digit is keyed in , the digits will appear in order of entry (left to right) on the Operational Display at **4** . After the complete operating frequency has been keyed in, depress the Enter ('ENTR') key at **6** to enter the selection into the RT-9000B Transceiver's memory.

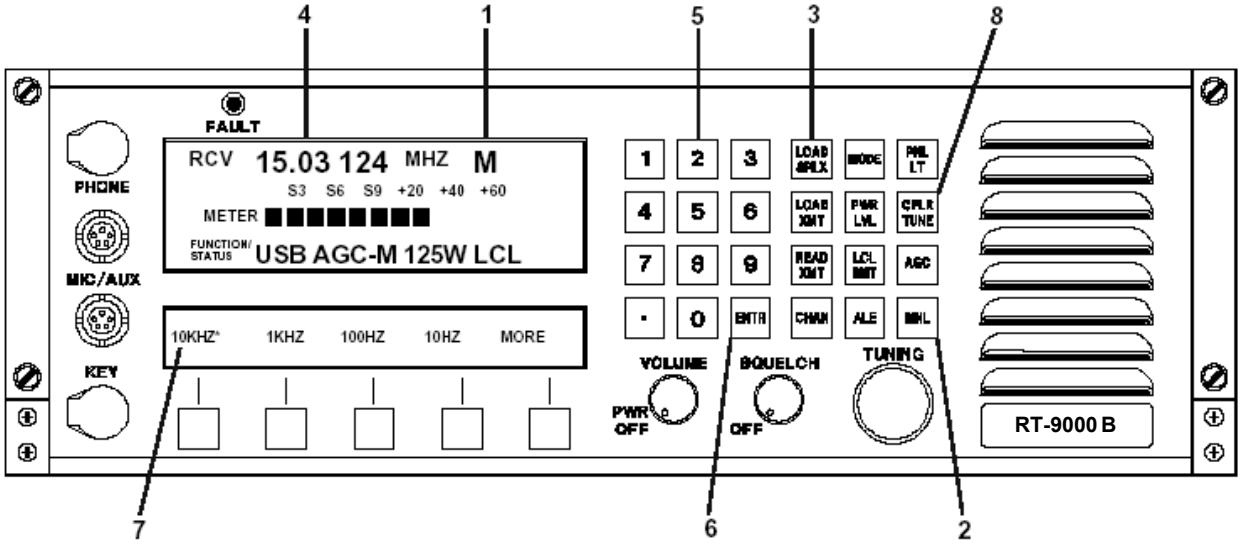


Figure 7.3.2.2 Operating Frequency Controls

THE TRANSCEIVER IS NOW OPERATIONAL ON THE ENTERED FREQUENCY

Because the system is in Manual Tuning mode, the User may change the above-entered frequency with the 'TUNING' dial. The rate (or "steps") that the dial movement changes the operating frequency and other details are covered later in section 7.3.2.5 Manual Tuning.

NOTE: After the Load Simplex ('LOAD SPLX') key is depressed; the Feature Menu Display shown in Figure 7.3.2.3 will appear. An 'ERASE' selection at **10** will be present. Depressing this key allows the user to erase an in-progress frequency entry, one digit at a time, beginning with the last digit entered (most right-hand). When the desired digits are erased, simply resume frequency entry using the Numeric Keypad. DO NOT depress the 'END' key at **20**.

Depressing the 'END' key at **20** will abort frequency selection and cause the channel to revert to the frequency currently stored.

NOTE: RT-9000B Transceiver Operating Frequency entries between 100 kHz and 1.59999 MHz will be accepted and its Receiver will function normally. However, when its Transmitter is keyed, the frequency display will flash at **4** . An 'ILLEGAL XMT FREQ' message will briefly appear in the Operational Display.

NOTE: Frequency entries below 100 kHz will not be accepted and the frequency display will flash at **4** .

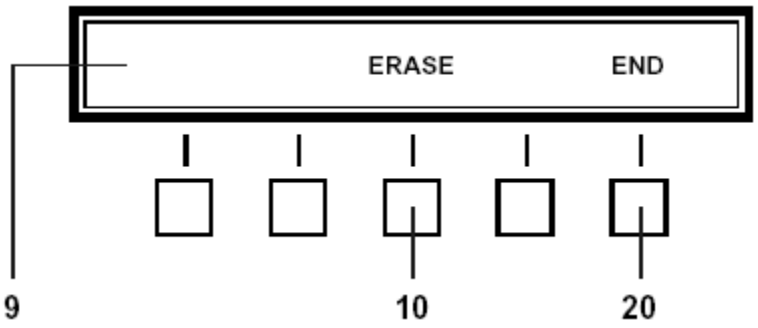


Figure 7.3.2.3 Erase Feature Menu

7.3.2.3 TRANSMIT TUNING

After an operating frequency has been entered as described in section 7.3.2.2, the Transmitter portion of the RT-9000B will automatically be tuned to the entered frequency. The RT-9000B will operate in "Simplex" mode. If the RT-9000B Transceiver output is feeding a Broadband Antenna directly, the Transmitter will automatically be tuned. Similarly, if the RT-9000B Transceiver is driving a broadband Linear Power Amplifier (such as the LPA-9600) that is also feeding a Broadband Antenna directly, the entire Transmitter equipment chain will automatically be tuned.

THE TRANSCEIVER IS NOW FULLY OPERATIONAL

7.3.2.4 ANTENNA COUPLER TUNING

When the RT-9000B is using a Non-resonant Antenna, an Antenna Coupler must be installed between the RT-9000B and Antenna. When the RT-9000B is driving an external Linear Power Amplifier (such as the LPA-9600) that uses a Non-resonant Antenna; an Antenna Coupler must be installed between the LPA-9600 and Antenna. In both cases, the Antenna Coupler becomes the feed point for the Antenna. Transmitter RF Output Power capability is a primary factor in determining which Antenna Coupler model must be used. Typically, the RT-9000B Transceiver and the LPA-9600 Linear Power Amplifier will use models CU-9125 and CU-9150 Antenna Couplers, respectively.

Refer to Figure 7.3.2.2. When an Antenna Coupler is present in the system, depressing the Coupler Tune ('CPLR TUNE') key at **8** , will initiate an Antenna Coupler "Tune Cycle". During the Tune Cycle, the RT-9000B Operational Display will display the following message:

'COUPLER TUNING'

After the Antenna Coupler Tune Cycle finishes and successfully tunes the Antenna, a message will appear in the RT-9000B Operational Display and tell the operator the system is ready for use. This message will appear for about three (3) seconds and then automatically return to the normal channel information display. This message is as follows:

'SYSTEM READY'

If the Antenna Coupler is not able to tune the Antenna within 20 seconds, a message will be displayed informing the operator of that result. This message will appear for about three (3) seconds and then automatically return to the normal channel information display. If this result occurs, the Antenna Coupler and Antenna should be checked for any obvious problem. If all appears to be in order, consult the troubleshooting section of the Antenna Coupler manual.

'SYSTEM FAULT'

If the Antenna Coupler develops a Fault or the remote RT-9000B does not receive the expected handshake signals from the Antenna Coupler, the following message will be displayed. This message will appear for about three (3) seconds and then automatically return to the normal channel information display. If this result occurs, consult the troubleshoot section of the Antenna Coupler manual. This message is as follows:

'COUPLER FAULT'

7.3.2.5 MANUAL TUNING

The manual tuning function permits the RT-9000B Transceiver's operating frequency to be changed by rotating the 'TUNING' control. After an operating frequency has been established as described in section 7.3.2.2, rotating the 'TUNING' control clockwise increases frequency; counter-clockwise rotation decreases it. The rate of operating frequency change for a given amount of 'TUNING' control rotation is selectable. Four (4) different Tuning Rates (or "steps") are available.

To manually tune the RT-9000 B Transceiver, the unit must be in Manual mode and have an operating frequency established according to section 7.3.2.2. Refer to Figure 7.3.2.4.

The rate the operating frequency is changed is indicated in the Feature Menu Display at **3**. Four (4) different Frequency Step choices are available and are selected using the Feature keys directly below the Frequency Step values shown in the Feature Menu Display. An asterisk (*) will appear immediately to the right of the selected Frequency Step value.

As an example, in Figure 7.3.2.4, the asterisk beside '10KHZ' shown at **4** indicates this is the current Frequency Step value. Selecting any of the other values immediately enables that value. By using the "TUNING" dial and the available Frequency Step values, the operator may easily and rapidly train in on a specific frequency or range of frequencies.

If the user wishes to make large changes in operating frequency which would not be practical using the 'TUNING' control, the Load Simplex ('LOAD SPLX') key may also be used to enter the new operating frequency. To do this, depress the 'LOAD SPLX' key. Key in the new frequency with the Numeric Keypad and depress the Enter ('ENTR') key. The operator may then continue to operate the system as previously described on the newly entered frequency.

All operating frequency entries in the Manual Tuning mode operate exclusively as Simplex frequencies. If the User attempts to load a different Transmit frequency using the 'LOAD XMT' key, the following message will briefly appear in the Operational Display and then automatically clear.

'DISALLOWED IN MANUAL'

NOTE: Systems having an Antenna Coupler present and operating in 'Manual Tuning' must be re-tuned whenever the current operating frequency is changed before Transmitting. Refer to the previous section 7.3.2.4 for details.

To exit Manual Tuning ('MNL') mode, depress the 'CHAN' key at **7** . Refer to section 7.3.2.7 for details about operating with Pre-set Channels.

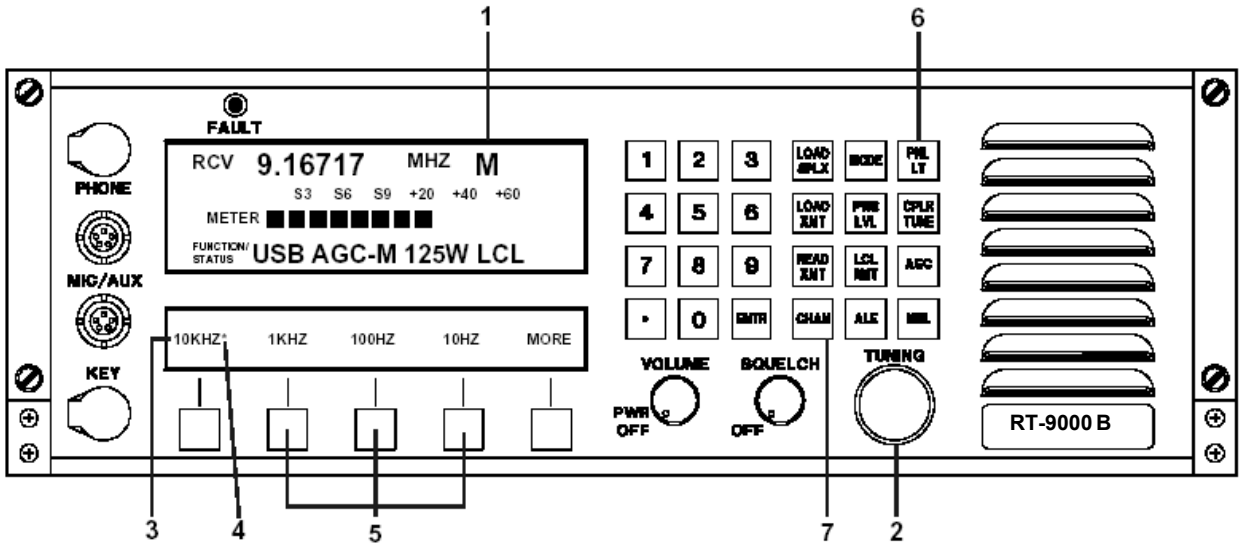


Figure 7.3.2.4 Manual Tuning Controls

Document No. 8128000560
Software Revision – N1B (07 Oct 04)

7.3.2.6 DISPLAY ILLUMINATION

The Front Panel display will illuminate when the RT-9000B is first powered up. If no keyboard activity is detected for about 30 minutes, the display illumination will automatically turn OFF. Depressing the 'PNL LT' key will cause both the Operational and Feature Menu Display illumination to turn back ON. A second depression turns it OFF. The user may also turn OFF the display illumination immediately at power up.

NOTE: The backlighting components for both the Operational and Feature Menu Display LCD displays gradually lose luminescence over time. If the display illumination is not needed, the display illumination Panel Light ('PNL LT') should be turned OFF to prolong the life of the backlighting components. See Section V for replacement of backlighting components.

7.3.2.7 OPERATING WITH PRE-SET CHANNELS

Operation using Pre-set Channels requires that the desired operating frequencies and their related settings have been previously entered into the RT-9000B Transceiver's memory. If this has not been previously done, refer to section 7.3.2.9 ahead before continuing.

Refer to Figure 7.3.2.5. Depress the Channel ('CHAN') key at **2**. The numerical portion of the Channel Number at **3** will go blank. Key in desired Channel Number from '0' to '127' using the Numeric Keypad at **4** . The Channel Number may be one, two, or three digits long; no leading zeros are required. The keyed in Channel Number will appear on the display at **3** .

Depress the Enter ('ENTR') key at **5**. The operating frequency stored for the Channel Number entered will now appear on the display at **6** .

NOTE: If the entered Channel Number has been set up for Half-Duplex operation (different Transmit and Receive frequencies), the Receive frequency will be displayed when using these steps. To confirm the Transmit frequency, depress the Read Transmit ('READ XMT') key at **7** . The Transmit frequency will display at **6** for about four (4) seconds and then revert back to the Receive frequency.

If an Antenna Coupler is present in the system, an Antenna Coupler "Tune Cycle" may now be started by depressing the Coupler Tune ('CPLR TUNE') key at **8** . If the Antenna Coupler successfully tunes the Antenna, a 'SYSTEM READY' message will briefly appear and automatically clear. If any other messages appear, the User should refer back to section 7.3.2.4 for guidance.

If the Antenna Coupler has Pre-set Channel capability, the coupler will record into its memory its internal settings for a successful "Tune Point". This permits the coupler to quickly return to this "Tune Point" when this particular Channel Number is selected in the future.

If the user has reason to believe the Antenna is no longer properly tuned or Antenna conditions materially change, the User may depress the Coupler Tune ('CPLR TUNE') and start a new "Tune Cycle". Every new "Tune Cycle" is treated as an update to any tuning information currently stored in the Antenna Coupler's memory for any given Channel Number.

THE SYSTEM IS NOW FULLY OPERATIONAL ON THE SELECTED CHANNEL

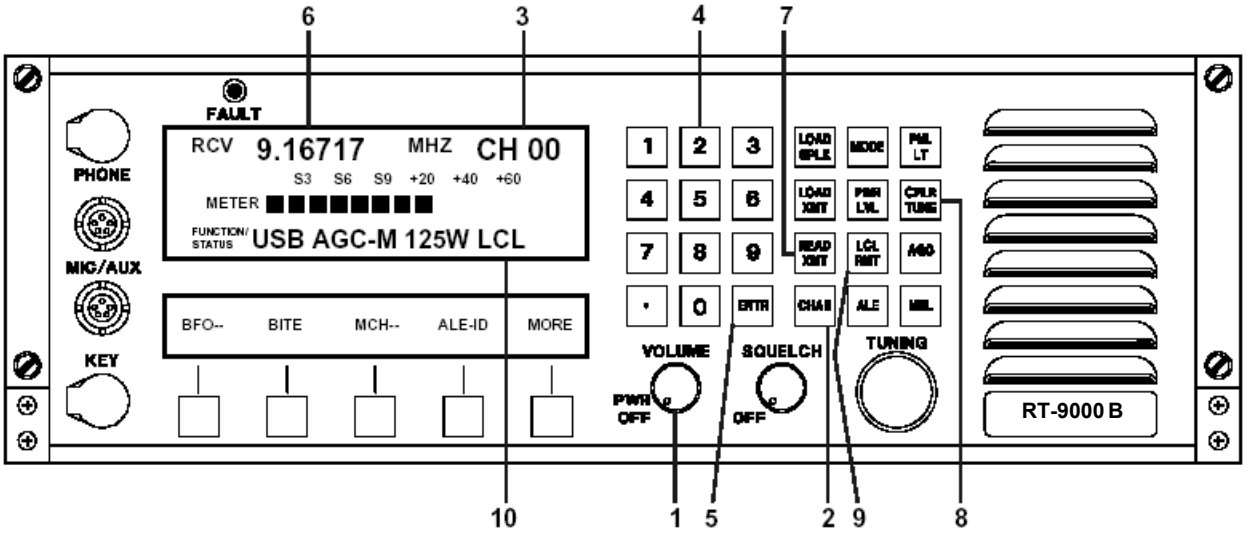


Figure 7.3.2.5 Pre-set Channel Operating Controls

7.3.2.8 MANUAL CHANNEL SELECTION

Manual Channel Selection is a type of Pre-set Channel operation. This type of operation allows Pre-set Channel selection using the 'TUNING' control instead of the Numeric Keypad.

Refer to Figure 7.3.2.6. If not already in Pre-set Channel operation, select it now by depressing the 'CHAN' key. Depress the Feature Menu 'MORE' key successively at **1** until the Feature Menu Display at **2** appears.

Depress Manual Channel key ('M CH-') at **3** . The Channel designator, 'CH' immediately preceding the Channel Number on the Operational Display at **4** will change to the Manual Channel designator, 'MC'. An asterisk (*****) will appear next to 'MCH -' in the Feature Menu Display to indicate this selection has been enabled.

Rotating the 'TUNING' control at **5** increases or decreases the selected Channel Number in numerical order. The Channel Number is displayed at **6** and its Pre-set operating frequency will appear in the Operational Display at **7** .

NOTE: Transceiver operating 'MODE', Receiver 'AGC' Characteristic', and Transmitter RF Output 'Power Level' settings are pre-set and stored for each channel. As the 'TUNING' control is rotated, these settings will change to reflect the settings for the currently selected Channel Number.

Systems using an Antenna Coupler operate in the same manner as previously discussed in section 7.3.2.7. The only operational difference between these modes is the operator's ability to more rapidly change Channels and its possible effect on an Antenna Coupler. Modern Antenna Couplers with Pre-set Channel capability typically re-tune a Pre-set Channel from memory between 10 to 30 milliseconds and should be able to track RT-9000 B Manual Channel Selection.

NOTE: This Channel selection method provides a convenient, rapid means of verifying current Pre-set Channels or logging unknown Channel information.

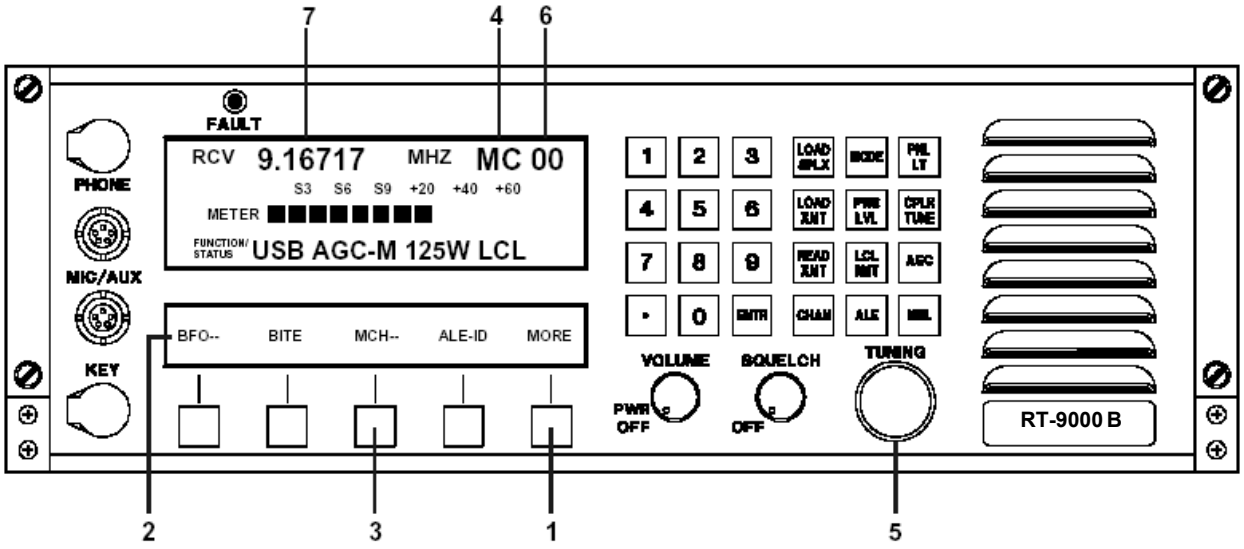


Figure 7.3.2.6 Manual Channel Operating Controls

To exit Manual Channel Selection operation, depress the 'M CH-' Feature Menu key at **3** again. The asterisk (*) beside 'M CH-' in the Feature Menu Display will disappear. The 'MC' designator at **4** will revert back to the 'CH' designator. The Channel Number selected immediately before leaving Manual Channel Selection will continue to be selected.

7.3.2.9 ESTABLISHING OR MODIFYING PRE-SET CHANNELS

The RT-9000 B can store up to 128 Pre-set Channels (in Channels 0 through 127). The operations described in this section describe how to establish or modify Pre-set Channels.

These operations allow the user to create, enter and store a Pre-set Channel into the RT-9000 B Transceiver's memory. Once a Pre-set Channel has been properly set up, the RT-9000 B will be able to recall all settings whenever that particular Channel Number is selected. Pre-set Channel information is stored in non-volatile memory.

Modifying a setting, in actuality, merely repeats the original entry steps used when establishing a Pre-set Channel except using different setting information.

The RT-9000 B Transceiver also automatically provides Channel Number information, as an output, for use by external peripheral equipment. This information allows external equipment having Pre-set Channel capability to operate properly and efficiently. Typical examples might include Pre-selectors, Linear Power Amplifiers, and Antenna Couplers. No operator action associated with this capability is required during normal operation.

The following headings listed below appear later in this section and describe how to enter settings for new or existing Pre-set Channels. Unless otherwise noted, refer to Figure 7.3.2.7 for the location of controls and displays.

- Operating Frequency

Simplex Operation	Alternate Receive & Transmit using ***same*** frequency
Half-Duplex Operation	Alternate Receive & Transmit using ***different*** frequencies

- Transceiver Emission Mode
- Receiver AGC Speed Characteristic
- Transmitter Power Output Level
- External Equipment Set up and Initialization

7.3.2.9.1 Channel Number Selection

The steps in this section form a selection process, which must be performed for either new or existing Channels. This process establishes the Pre-set Channel Number where later setting choices will be stored. User actions after this step will depend on whether an existing Channel is being selected for modification or a new Channel is being established.

If the user is modifying an existing Pre-set Channel setting, proceed as follows: Complete the selection process described in this heading. Proceed directly to the heading that covers the setting to be modified.

If the user is establishing a new Pre-set Channel, complete the selection process described in this heading. Complete ALL remaining headings in this section.

Channel Selection Process

Depress the Channel key ('CHAN') at **2**. The Operational Display will display 'CH' at **3** and Channel Digits at **4** will go blank.

Using the Numeric Keypad at **5**, key in the desired Channel Number to be selected. The keyed in Channel Number now will appear at **4**. Depress the Enter ('ENTR') key at **6** to select the keyed in Channel Number. All later settings entry and storage steps will be associated with this Channel Number.

Proceed to the next step as previously described.

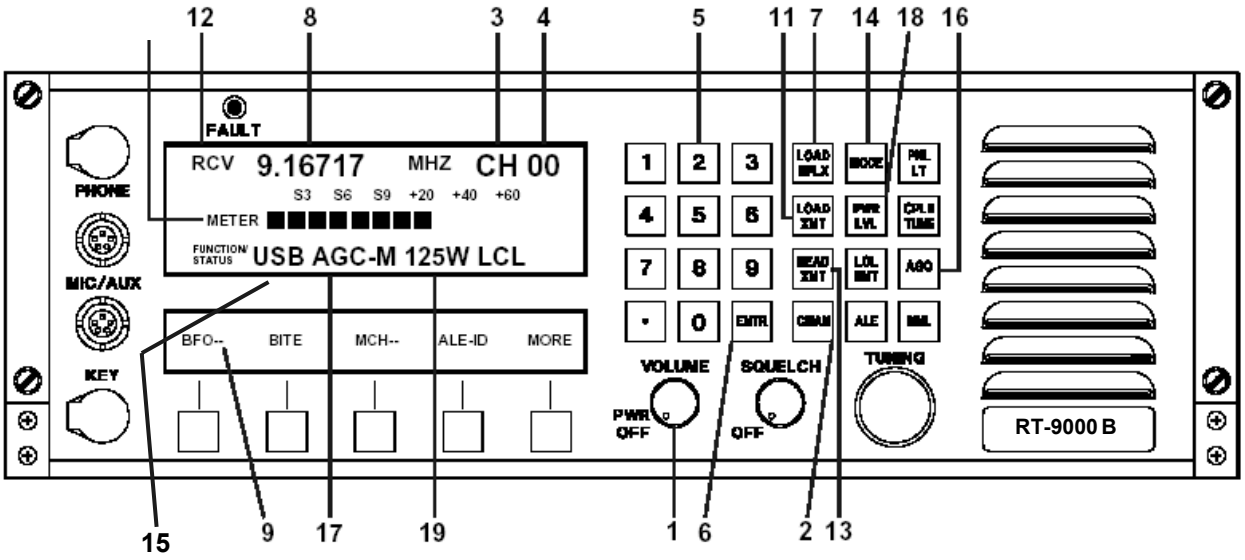


Figure 7.3.2.7 Pre-set Channel Entry Controls

7.3.2.9.2 Operating Frequency Entry

Simplex Operation

Depress the Load Simplex ('LOAD SPLX') key at **7**. The frequency display at **8** will go blank and the "Receive/Transmit" mode designator at **12** will continue to display the Receive 'RCV' indication.

Using the Numeric Keypad at **5**, key in the desired Operating Frequency (between 100 kHz and 29.99999 MHz). As each digit is keyed in, it will appear in the Operational Display at **8** in order of entry (left to right).

After the Operating Frequency has been completely keyed in, depress the Enter ('ENTR') key at **6** to store it in the currently selected Channel Number. Immediately after depressing the 'ENTR' key, the frequency display in the Operational Display will momentarily blink but remain on the entered frequency.

NOTE: After the 'LOAD SPLX' key is depressed, the Feature Menu Display shown in Figure 7.3.2.8 will appear and provide an Erase ('ERASE') choice at **10** . This allows the user to erase a frequency just entered, one digit at a time, beginning with the last digit entered (most right-hand). After the desired digit(s) are erased, simply resume the frequency entry process using the Numeric Keypad. DO NOT depress the End ('END') key at **20**.

The 'END' key aborts the frequency entry process and causes the currently selected Pre-Channel to revert to its original settings.

Completing the "Simplex Operation" process prepares the RT-9000B Transceiver to Receive and Transmit using the *SAME* operating frequency for the currently selected Pre-set Channel. If this type of operation desired, skip over the following "Half-Duplex Operation" heading and proceed directly to the later headings dealing with entering or modifying the required Pre-set Channel settings.

If Half-Duplex operation is desired, continue to next heading, "Half-Duplex Operation" and complete the described steps before proceeding.

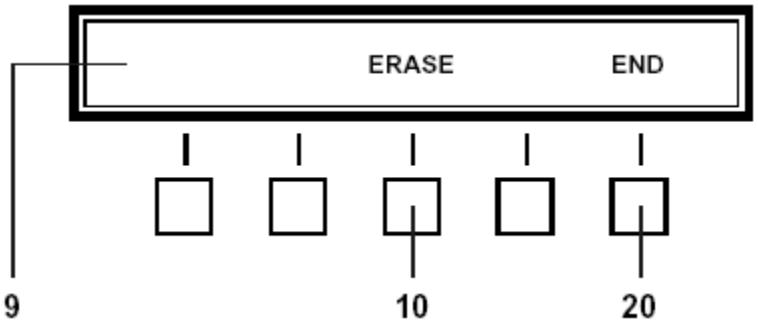


Figure 7.3.2.8 Erase Feature Menu

Half-Duplex Operation

Complete all previously outlined steps for Simplex Operation. This process enters the Receive Operating Frequency.

Depress the Load Transmit ('LOAD XMT') key at **11**. The frequency display at **8** will go blank and the "Receive/Transmit" mode designator at **12** will change from the Receive ('RCV') to Transmit ('XMT') indication.

Using the Numeric Keypad at **5**, key in the desired Transmit frequency (between 1.6 MHz and 29.99999 MHz). As each digit is keyed in, it will appear in the Operational Display at **8** in order of entry (left to right).

After the desired Transmit frequency has been completely keyed in, depress the Enter ('ENTR') key at **6** to enter it into the currently selected Channel Number. Immediately after depressing the 'ENTR' key, the frequency display in the Operational Display will momentarily blank and return to the stored Receive frequency. Additionally, the "Receive/Transmit" mode designator at **12** also will revert back to the Receive ('RCV') indication.

NOTE: After the 'LOAD XMT' key is depressed, the Feature Menu Display shown in Figure 7.3.2.8 will appear and provide an Erase ('ERASE') choice at **10** . This allows the user to erase a frequency just entered, one digit at a time, beginning with the last digit entered (most right-hand). After the desired digit(s) are erased, simply resume the frequency entry process using the Numeric Keypad. DO NOT depress the End ('END') key at **20**.

Completing the "Half-Duplex Operation" process prepares the RT-9000B Transceiver to Transmit and Receive using *DIFFERENT* Operating Frequencies (but not simultaneously) for the currently selected Pre-set Channel.

NOTE: The Transmit frequency for currently selected Pre-set Channel may be viewed by depressing the Read Transmit ('READ XMT') key at **13**. The stored Transmit frequency will be displayed for about three (3) seconds before reverting back displaying the stored Receive frequency.

If this type of operation is desired and the required Operating Frequencies have been entered for the currently selected Pre-set Channel, proceed now to the next Heading. Continue entering or modifying the required Pre-set Channel settings.

7.3.2.9.3 Transceiver Emission Mode Entry

Depress the 'MODE' key at **14** successively until the desired Emission Mode appears on the Operational Display at **15** . The displayed Mode indicates the current RT-9000B Emission Mode selection. Four (4) choices are available: 'USB', 'LSB', 'CW', or 'AM'. Depress the Enter ('ENTR') key at **6** to store this selection into the currently selected Pre-set Channel .

NOTE: A fifth Mode choice, 'DATA', will be displayed only if the optional Data filter is installed in the RT-9000B Transceiver. The RT-9000B Transceiver CPU Software DIP switch settings must also be properly set for this option. (Refer to Section V of this Operation and Maintenance Manual).

NOTE: When Continuous Wave ('CW') Emission Mode is selected, CW Key Release Time and Filter settings automatically default to 'Medium' and 'Normal' settings, respectively. Other choices are available and are covered later in section 7.3.3.10 of this manual.

After the desired Emission Mode setting has been entered for the currently selected Pre-set Channel, proceed to the next Heading. Continue entering or modifying the required Pre-set Channel settings.

7.3.2.9.4 Receiver AGC Speed Characteristic Entry

Depress the 'AGC' key at **16** successively until the desired Receiver AGC Speed Characteristic appears on the Operational Display at **17** . The displayed AGC Speed indicates the current Receiver AGC Speed selection. Three (3) choices are available: Slow ('AGC-S'), Medium ('AGC-M'), or Fast ('AGC-F'). Depress the Enter ('ENTR') key at **6** to store this selection into the currently selected Pre-set Channel.

After the desired AGC Speed Characteristic setting has been entered for the currently selected Pre-set Channel, proceed to the next Heading. Continue entering or modifying the required Pre-set Channel settings.

7.3.2.9.5 Transmitter Power Output Level Entry

Depress the Power Level ('PWR LVL') key at **18** successively until desired Power Level appears on the Operational Display at **19**. The available choices depend on whether an external Linear Power Amplifier is present in the system and its power output capability. The available choices are: '65W' or '125W' when an external amplifier IS NOT present. When an external amplifier IS present, the additional choices will be: '500W' for the LPA-9500 Amplifier or '500W' and '1000W' for the LPA-9600 Amplifier. Depress the Enter key ('ENTR') at **6** to permanently store a new Power Level selection into the currently selected Pre-set Channel.

After the desired Power Level setting has been entered for the currently selected Pre-set Channel, proceed to the next heading if other equipment is being used in conjunction with the RT-9000B Transceiver. If no other equipment is being used, skip the next heading and go directly to the end of this section.

7.3.2.9.6 External Equipment Set up and initialization

If the RT-9000B Transceiver is part of a system with external equipment having Pre-set Channel capability, this equipment should now be set up and initialized as described in the appropriate equipment manuals.

The most common type of external equipment will be an Antenna Coupler. The User should refer to section 7.3.2.4 for guidance.

After completing entry of all settings in this section, the RT-9000B Transceiver is now ready for control on this Pre-set Channel. Additional Pre-set Channels may be set up by repeating the preceding steps 7.3.2.9.1 through 7.3.2.9.5 for each new Channel Number.

7.3.2.10 BFO OPERATION

A Beat Frequency Oscillator (BFO) originally was required to receive Continuous Wave (CW) and later, various suppressed-carrier mode signals such as Single Sideband (SSB). Modern Receiving equipment, like the RT-9000B, instead uses a Product Detector circuit to perform the detection (or demodulation) for these signal types.

Even though the BFO function is no longer used for its original purpose, it still performs a useful function in today's equipment. The BFO function is a receive-only feature that provides fine frequency adjustment or compensation for incoming signals. This permits the RT-9000B to faithfully receive off-frequency signals without affecting the RT-9000B's transmitting frequency. Up to a ± 1.99 kHz frequency deviation from the indicated or nominal receive frequency can be handled.

A common use of the BFO is to use it in voice modes as a "Clarifier" to correct unpleasant speech output caused by a frequency offset. Other possible uses might include improving the operation of external tone operated devices or modems.

To use the BFO function, depress the 'MORE' key from the main menu successively until the Feature Menu Display shown in Figure 7.3.2.9 appears.

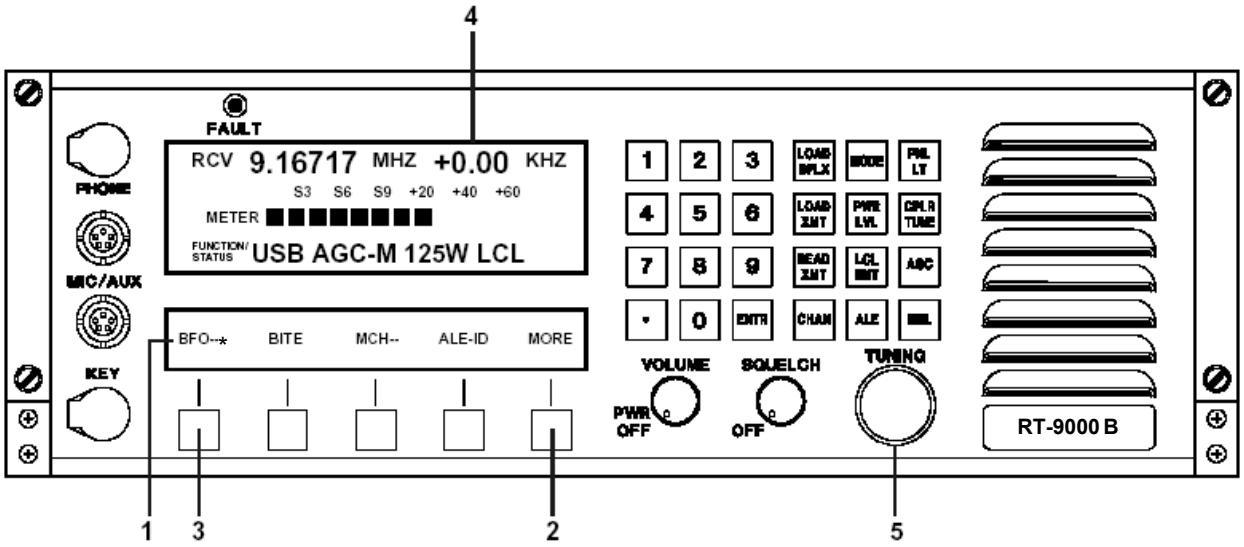


Figure 7.3.2.9 RT-9000 B Displays with BFO Enabled

Depress the 'BFO' feature key at **3** . An asterisk (*) will appear next to 'BFO' in the Feature Menu Display indicating this function is now enabled. The Channel Number information (Channel designator, 'CH' and Number) shown at **4** in the Operational Display will be replaced with the BFO Offset Frequency and "± Polarity Indicator" (initially: + 0.00 kHz).

The BFO Offset Frequency may now be set at any point within a ± 1.99 kHz range by rotating the 'TUNING' control at **5**. The BFO Offset Frequency increases in 10 Hz steps with clockwise rotation of the control and decreases with counter-clockwise rotation.

The BFO is disabled by depressing the 'BFO' feature key at **3** once again.

NOTE: The BFO feature is Receive-only function and can only be selected if USB, LSB, CW, or Data Emission Modes are selected. Transmitter frequency and operation is not affected by BFO operation.

NOTE: The BFO feature operates only in the Channel-oriented operating modes. If 'Manual' Tuning mode is currently selected, any attempt to enable the BFO feature will be rejected and cause the following message to briefly appear in the Operational Display:

'DISALLOWED IN MANUAL'

NOTE: If the BFO feature is currently selected and 'Manual' Tuning mode is then selected, 'Manual mode will be selected but the BFO feature will automatically be disabled.

7.3.3 EQUIPMENT SET-UP

This section addresses those features and functions that are either of secondary operational importance or need be accomplished only infrequently, usually at the time of commissioning.

7.3.3.1 BITE (Built-In-Test-Equipment)

The RT-9000 B is equipped with self-diagnostic routines that allow the operator to verify that all Modules are functioning correctly. If a fault is found, these test routines will help identify which Module is faulty. The BITE function operates independently of any mode in which the equipment was operating before the BITE function was enabled.

The RT-9000 B BITE function has two (2) levels of test routines. The first level checks the operation of RT-9000 B Primary Modules that provide basic service functions to the rest of the unit (Power Supply, CPU, etc.) This test routine is called General BITE. The second level is composed of specialized test routines that check either the Receiver or Transmitter modules. If the system contains an Antenna Coupler, a separate test routine to verify Antenna Coupler operation is included. These specialized second level BITE tests are called Receive BITE ('RX-BITE'), Transmit BITE ('TX-BITE') and Coupler BITE ('CU-BITE').

When entering BITE mode from the main menu, the User will first encounter the General BITE test routine. General BITE must be executed and passed before the second level BITE tests will become available. After General BITE is passed, the Feature Menu Display will change and provide Receive BITE ('RX-BITE') and Transmit BITE ('TX-BITE') choices. If the system has an Antenna Coupler, a Coupler BITE ('CU-BITE') choice will be available. An 'END' choice is present If the User wishes to exit BITE mode at this point. This allows the User to return to the main menu and resume normal operation.

Transmit BITE primarily tests RT-9000 B Transmitter modules but also briefly tests the Antenna System. Antenna System condition is an important part of the overall radio system performance. If faulty, the Antenna can adversely other station equipment and performance. This is particularly true for Transmit related operations. More detailed information about Antenna related testing is covered later in section 7.3.3.1.3 Transmit BITE.

7.3.3.1.1 General BITE

Depress the Feature Menu 'MORE' key from the main menu successively until the Feature Menu shown in Figure 7.3.3.1 appears. Unless otherwise noted, all text in section 7.3.3.1 refers to Figure 7.3.3.1.

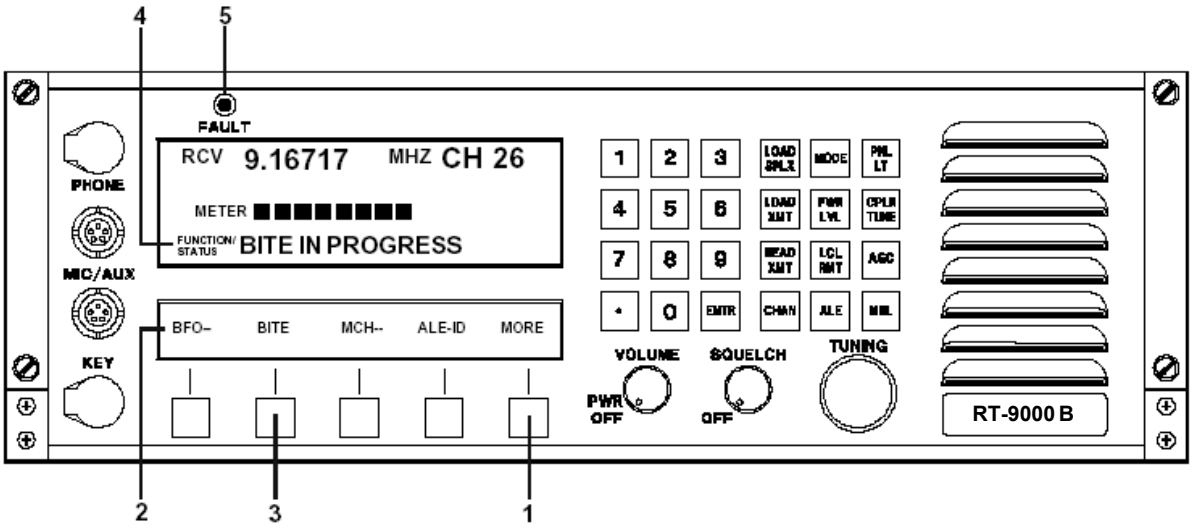


Figure 7.3.3.1 Main Menu containing BITE Selection

Depress the 'BITE' key at **3** to start executing the General BITE test routine.

After depressing the 'BITE' key, a 'BITE IN PROGRESS' message will briefly appear in the Operational Display. This message will automatically clear and test result messages will begin appearing as individual tests are completed for each of the five (5) Modules tested.

As the General BITE test runs, it will stop on the first Fault found. This Fault must be corrected before proceeding. If additional Faults are present, the General BITE test routine must be repeated until no further Faults are found.

Refer to the following chart for General BITE test routine details.

RT-9000B Transceiver
General BITE – Test Details

Test Order	Module Under Test	Test Result Messages	
		No **Fault** found	**Fault** found
1	Front Panel	'FRONT PANEL OK'	'FRONT PANEL FAULT'
2	CPU Assembly	'CPU OK'	'CPU FAULT'
3	Frequency Synthesizer	'SYNTHESIZER OK'	'SYNTHESIZER FAULT'
4	Power Supply	'POWER SUPPLY OK'	'POWER SUPPLY FAULT'
5	I/O PCB	'I/O OK'	'I/O FAULT'

NOTE: If a Frequency Synthesizer Fault occurs, the initial 'BITE IN PROGRESS' message will not display and the General BITE test routine will not operate correctly. Proceed to Section V of this manual for fault isolation and repair.

If the General BITE test routine is passed, a 'SELECT BITE TYPE' Message will appear at **4** in the Operational Display. This message informs the User that the General BITE test was passed and draws the User's attention to the new BITE Select Sub-menu. This menu will be covered shortly.

If a General BITE FAULT is found

The following actions will typically occur when a Fault is found:

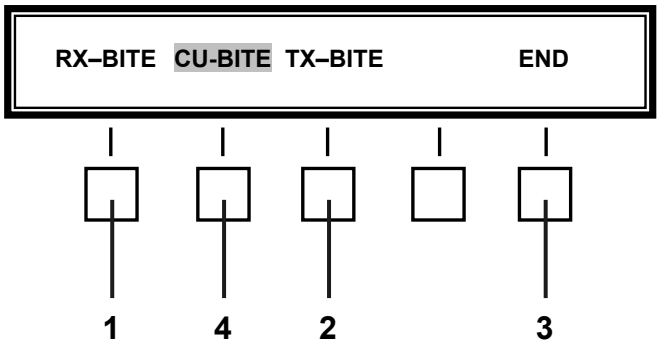
1. The General BITE test routine will halt.
2. A Module Fault message will be displayed at **4** in the Operational Display .
3. The Red Front Panel 'FAULT' lamp at **5** will be lit.
4. No second level BITE tests will be available.

Proceed to Section V of this manual for fault isolation and repair procedures.

After the displaying the 'SELECT BITE TYPE' message, the Feature Menu Display will change to that shown in Figure 7.3.3.2. This BITE Sub-Menu provides the second level BITE test choices for Receive BITE ('RX-BITE'), Transmit BITE ('TX-BITE'), and, when applicable, Coupler BITE ('CU-BITE'). These choices are covered in the next sections.

After the General BITE test routine is finished, the User may do the following:

- Repeat the General BITE test routine. Depressing the 'END' key at **3** will cause the Feature Menu Display to revert to that shown in Figure 7.3.3.1. Depressing the 'BITE' key again will repeat the test.
- Exit BITE mode. Depressing the 'END' key at **3** will return the User to the main menu and resume normal operation.
- Proceed to the Receive BITE ('RX BITE'), Transmit BITE ('TX BITE'), or Coupler BITE ('CU-BITE') test routines as covered in the following sections.



Note: The 'CU-BITE' selection will appear only if an Antenna Coupler is present in the system.

Figure 7.3.3.2 BITE Sub-Menu

7.3.3.1.2 Receive BITE ('RX-BITE')

From the BITE Sub-Menu shown in Figure 7.3.3.2, depress the 'RX–BITE' key at **1** . The RT-9000 B will start executing the Receive BITE test routine.

After depressing the 'RX-BITE' key, a 'RX BITE IN PROGRESS' message will briefly appear in the Operational Display and a loud but brief audio tone will be heard from the Front Panel speaker. The audio tone will be heard regardless of the Speaker On/Off ('SPKR') setting (covered later in section 7.3.3.3).

The 'RX BITE IN PROGRESS' message will automatically clear and test result messages will begin appearing as individual tests are completed for each of the three (3) Modules tested.

As the Receive BITE test runs, it will stop on the first Fault found. This Fault must be corrected before proceeding. If additional Faults are present, the Receive BITE test routine must be repeated until no further Faults are found.

Refer to the following chart for Receive BITE test routine details.

RT-9000B Transceiver Receive BITE ('RX-BITE) – Test Details			
Test Order	Module Under Test	Test Result Messages	
		No **Fault** found	**Fault** found
1	Audio PCB	'RX BITE IN PROGRESS' (Accompanied by brief loud speaker tone)	
2		'AUDIO OK'	'AUDIO FAULT'
3	IF PCB	'IF OK'	'IF FAULT'
4	Front End PCB	'FRONT END OK'	'FRONT END FAULT'

If a Receive BITE (RX-BITE) FAULT is found

The following actions will typically occur when a Fault is found:

1. The Receiver BITE ('RX - BITE') test routine will halt.
2. A Module Fault message will be displayed at **4** in the Operational Display .
3. The Red 'FAULT' lamp on the Front Panel at **5** will be lit.

Proceed to Section V of this manual for fault isolation and repair procedures.

After this test is completed, the User may do the following:

- Repeat the Receive BITE test. Depressing the 'RX-BITE' key again at **1** as shown in Figure 7.3.3.2 will cause the Receive BITE test routine to repeat.
- Exit BITE mode. Depressing the 'END' key at **3** will return to the main menu and resume normal operation.
- Proceed to the Transmit BITE ('TX-BITE') or Coupler BITE ('CU-BITE') test routines covered in the following sections.

7.3.3.1.3 Transmit BITE ('TX BITE')

Overview

Transmit BITE primarily tests the RT-9000B Transmitter modules but also performs a brief Antenna System test. An improperly operating Antenna System can cause false Transmit BITE test results. This is the primary reason Antenna System testing is included in the Transmit BITE test routine. In addition to internal test use, this same valuable Antenna status information is also passed directly to the User.

Certain Transmit BITE tests are performed at eight (8) selected test frequencies. These test frequencies were selected to thoroughly exercise all RT-9000B Transmitter modules as well as the station Antenna System. These test frequencies are listed in the following chart.

Transmit BITE Test Frequencies (MHz)	
1.75	7.75
2.75	10.75
3.75	16.75
5.75	25.75

The type of Antenna tests performed will depend on the type of Antenna the station is using. Antennas are generally either Broadband or Non-Resonant types. The following is a brief discussion of these antenna types and testing.

A Broadband Antenna operates over a wide frequency range and is usually designed for a 50-Ohm input impedance. This allows the Antenna to be directly fed from the Transmitter using 50-Ohm coaxial cable. This Antenna type does not require an Antenna Coupler. Antenna testing consists of performing a VSWR test at all eight (8) test frequencies.

A Non-Resonant Antenna may also operate over a wide frequency range but will have large input impedance variations. These variations prevent the Antenna from being directly fed from the Transmitter using coaxial cable. An Antenna Coupler must be used to match the Antenna's impedance to the Antenna Coupler's 50-Ohm input impedance. 50-Ohm coaxial cable can then be used to connect the Transmitter to the Antenna Coupler's input. Antenna testing consists of performing a "Tuning Test" at all eight (8) test frequencies.

When a system contains an external Linear Power Amplifier and is using a Broadband Antenna, the same tests are performed as without the Linear Power Amplifier. The external Linear Power Amplifier is always switched it out of the system (or bypassed) during Transmit BITE testing. This effectively connects the RT-9000B Transceiver directly to the station Antenna. In this way, the external Amplifier is never involved in the Transmit BITE test process.

Systems equipped with an external Linear Power Amplifier but using a Non-Resonant Antenna, of course, must use an Antenna Coupler. With this system configuration, the Linear Power Amplifier is also switched out during Transmit BITE. This effectively connects the RT-9000B Transceiver to the Antenna Coupler input that normally is connected to the Linear Power Amplifier output.

The following two (2) procedures describe how the Transmit BITE ('TX-BITE') test routine operates when using either Broadband or Non-Resonant types of Antennas.

Procedure - Systems using a Broadband Antenna

From the BITE Sub-Menu shown in Figure 7.3.3.2, depress the 'TX – BITE' key at **2** . The RT-9000 B will start executing the Transmit BITE test routine.

After starting the test, a 'TX BITE IN PROGRESS' message will appear in the Operational Display until this test section is finished. During this time, the RT-9000 B will rapidly key and unkey the Transmitter as it steps through all eight (8) test frequencies. These individual tests together form the Antenna VSWR test.

Specific test frequencies where high VSWR conditions are found are excluded from the 'Filter Module' tests later in the test routine. When high VSWR condition(s) are found, these findings will be displayed after the Transmit BITE test routine completely finishes.

After the Antenna VSWR section finishes, test result messages will begin appearing as the next four (4) Transmitter Modules are tested.

The Transmit BITE test routine concludes by testing the Filter Module. Of the eight (8) possible frequencies, only those will be used that where earlier a high VSWR was NOT found. During this test, the RT-9000 B will key and unkey the Transmitter as it steps through these test frequencies.

As the Transmit BITE test runs, it will stop on the first Fault found. This Fault must be corrected before proceeding. If additional Faults are present, the Transmit BITE test routine must be repeated until no further Faults are found.

Refer to the following chart for Transmit BITE test routine details.

RT-9000 B Transceiver
Transmit BITE ('TX-BITE') – Test Details – Broadband Antenna

Test Order		Module Under Test	Test Frequency (MHz)	Test Result Messages	
				No **Fault** found	**Fault** found
1	a.	Antenna VSWR Test	1.75	'TX BITE IN PROGRESS'	
	b.		2.75		
	c.		3.75		
	d.		5.75		
	e.		7.75		
	f.		10.75		
	g.		16.75		
	h.		25.75		
2		Audio PCB		'AUDIO OK'	'AUDIO FAULT'
3		IF PCB		'IF OK'	'IF FAULT'
4		Front End PCB		'FRONT END OK'	'FRONT END FAULT'
5		Power Amplifier Assembly		'POWER AMPL OK'	'POWER AMPL FAULT'
6	a.	Filter Module Assembly	1.75	'FILTER MODULE OK'	'FILTER MODULE FAULT'
	b.		2.75	↓	↓
	c.		3.75		
	d.		5.75		
	e.		7.75		
	f.		10.75		
	g.		16.75		
	h.		25.75		

If a Transmitter Module BITE Fault is found

The following actions will typically occur when a Fault is found:

1. The Transmit BITE ('TX - BITE') test routine will halt.
2. A Module Fault message will be displayed at **4** in the Operational Display .
3. The Red 'FAULT' lamp on the Front Panel at **5** will be lit.

Proceed to Section V of this manual for fault isolation and repair procedures.

If the Transmit BITE test routine finishes without displaying a Fault message, one of the following messages will appear in the Operational Display. The following summarizes these messages and their meaning.

- 'TEST COMPLETED'. This message means all Transmitter Modules passed the Transmit BITE test routine. It also means that the VSWR test results for all eight (8) test frequencies were within acceptable limits.

- 'VSWR HI AT *XX XX* MHZ'. This message means all Transmitter Modules passed the Transmit BITE test routine but a high VSWR condition was found on one test frequency. In this case, *XX XX* indicates the specific test frequency. The decimal point is not displayed.

- 'VSWR HI AT MULT MHZ'. This message means all Transmitter Modules passed the Transmit BITE test routine but a high VSWR condition was found on two (2) or more of the test frequencies.

If either of the preceding VSWR-related messages appears, proceed to Section V of this manual for fault isolation and repair procedures.

After this test is completed, the User may do the following:

- Repeat this Transmit BITE test. Depressing the 'TX-BITE' key again at **2** as shown in Figure 7.3.3.2 will cause the Transmit BITE test routine to repeat.

- Repeat the Receive BITE test, as previously covered.

- Exit BITE mode. Depressing the 'END' key at **3** will return to the main menu and resume normal operation.

Procedure - Systems using a Non-Resonant Antenna

From the BITE Sub-Menu shown in Figure 7.3.3.2, depress the 'TX – BITE' key at **2** . The RT-9000 B will start executing the Transmit BITE test routine.

The Antenna Coupler will begin a "Tuning Cycle" using the first test frequency. While the Antenna Coupler tuning cycle is in progress, a 'COUPLER TUNING' message will appear in the Operational Display. After the Antenna Coupler finishes tuning (or the maximum allotted tuning time expires), a test result message will be displayed. A 'SYSTEM READY' or 'SYSTEM FAULT' message will be displayed. If the Antenna Coupler is totally inoperative, a 'COUPLER FAULT' message will instead be displayed. In both above cases, the Transmit BITE test routine will not stop if either of these Faults is found.

After the first test frequency tuning cycle is finished, the test routine will then step to the second test frequency and repeat this process. This sequence will repeat until all eight (8) test frequencies have been tuned by the Antenna Coupler. These individual tests together form the Antenna Coupler tuning test section.

Test frequencies that result in 'SYSTEM FAULT' test outcome will be excluded from the 'Filter Module' tests later in the Transmit BITE test routine. When these "No Tune" condition(s) are found, the findings will be displayed after the Transmit BITE test routine completely finishes.

After the Antenna Coupler tuning tests are completed, test result messages will begin appearing as the next four (4) Transmitter Modules are tested.

The Transmit BITE test routine concludes by testing the Filter Module. Of the eight (8) possible frequencies, only those that successfully tuned and resulted in 'SYSTEM READY' message will be used. During this test, the RT-9000 B will key and unkey the Transmitter as it steps through these test frequencies.

As the Transmit BITE test runs, it will stop on the first Transmitter Module Fault found. This Fault must be corrected before proceeding. If additional Faults are present, the Transmit BITE test routine must be repeated until no further Faults are found.

Refer to the following chart for Transmit BITE test routine details.

RT-9000B Transceiver Transmit BITE ('TX-BITE') – Test Details - Non-Resonant Antenna					
Test Order		Module Under Test	Test Frequency (MHz)	Test Result Messages No **Fault** found	 **Fault** found
1	a.	Antenna Coupler Tuning Test	1.75	'COUPLER TUNING' 'SYSTEM READY'	 'SYSTEM FAULT'
	b.		2.75		
	c.		3.75		
	d.		5.75		
	e.		7.75		
	f.		10.75		
	g.		16.75		
	h.		25.75		
2		Audio PCB		'AUDIO OK'	'AUDIO FAULT'
3		IF PCB		'IF OK'	'IF FAULT'
4		Front End PCB		'FRONT END OK'	'FRONT END FAULT'
5		Power Amplifier Assembly		'POWER AMPL OK'	'POWER AMPL FAULT'
6	a.	Filter Module Assembly	1.75	'FILTER MODULE OK'	'FILTER MODULE FAULT'
	b.		2.75		
	c.		3.75		
	d.		5.75		
	e.		7.75		
	f.		10.75		
	g.		16.75		
	h.		25.75		

If a Transmitter Module BITE Fault is found

The following actions will typically occur when a Fault is found:

1. The Transmit BITE ('TX - BITE') test routine will halt.
2. A Module Fault message will be displayed at **4** in the Operational Display .
3. The Red 'FAULT' lamp on the Front Panel at **5** will be lit.

Proceed to Section V of this manual for fault isolation and repair procedures.

If the Transmit BITE test routine finishes without displaying a Fault message, one of the following messages will appear in the Operational Display. The following summarizes these messages and their meaning.

- 'TEST COMPLETED'. This message means all Transmitter Modules passed the Transmit BITE test routine. It also means that the Antenna Coupler successfully tuned all eight (8) test frequencies.

- 'NO TUNE AT *XX XX* MHZ'. This message means all Transmitter Modules passed the Transmit BITE test routine but a "No Tune" condition was found on one test frequency. In this case, *XX XX* indicates the specific test frequency. The decimal point is not displayed.

- 'NO TUNE AT MULT MHZ'. This message means all Transmitter Modules passed the Transmit BITE test routine but a "No Tune" condition was found on two (2) or more of the test frequencies

If either of the "No Tune"-related messages appears, proceed to Section V of this manual AND the Antenna Coupler manual for fault isolation and repair procedures.

After this test is completed, the User may do the following:

- Repeat this Transmit BITE test. Depressing the 'TX-BITE' key again at **2** as shown in Figure 7.3.3.2 will cause the Transmit BITE test routine to repeat.

- Repeat the Receive BITE test, as previously covered.

- Exit BITE mode. Depressing the 'END' key at **3** will return to the main menu and resume normal operation.

- Proceed to the Coupler BITE ('CU-BITE') test routine covered in the following section.

7.3.3.1.4 Coupler BITE ('CU BITE')

Overview

The Coupler BITE ('CU BITE') test routine performs a brief Antenna Coupler "Tuning Test" using three (3) test frequencies. No RT-9000B modules are tested. The test frequencies used for this test are listed in the following chart.

Coupler BITE Test Frequencies (MHz)
5.75
16.75
29.75

Procedure

From the BITE Sub-Menu shown in Figure 7.3.3.2, depress the 'CU – BITE' key at **4** . The RT-9000B will start executing the Coupler BITE test routine.

The Antenna Coupler will start a "Tuning Cycle" using the first test frequency. While the tuning cycle is in progress, a 'CU BITE IN PROGRESS' message will briefly appear in the Operational Display.

After the tuning cycle finishes or the maximum allotted tuning time expires, a test result message will be displayed. A 'SYSTEM READY' or 'SYSTEM FAULT' message will indicate these results. If the Antenna Coupler is totally inoperative, a 'COUPLER FAULT' message will instead be displayed.

In both above cases where a Fault is found, the Coupler BITE test will stop. The BITE test will stop at the first Fault found and must be corrected before proceeding. If additional Faults are present, the Coupler BITE test routine must be repeated until no further Faults are found.

Refer to the following chart for Coupler BITE test routine details

RT-9000B Transceiver
Coupler BITE ('CU-BITE') – Test Details

Test Order	Module Under Test	Test Frequency (MHz)	Test Result Messages	
			No **Fault** found	**Fault** found
1	Antenna Coupler	5.75	'COUPLER TUNING'	
			'SYSTEM READY'	'SYSTEM FAULT'
2		16.75	↓	↓
3		29.75	↓	↓

When the Coupler BITE test routine finishes, one of the following messages will appear in the Operational Display. The following summarizes these messages and their meaning.

- 'SELECT BITE TYPE'. This message means the Antenna Coupler successfully tuned all three (3) test frequencies.

- 'NO TUNE AT *XX XX* MHZ'. This message means the Antenna Coupler tuned all test frequencies successfully prior to the one currently indicated as "No Tune". In this case, *XX XX* indicates the specific test frequency. The decimal point is not displayed.

If a "No Tune" message appears, proceed to Section V of this manual AND the Antenna Coupler manual for fault isolation and repair procedures.

After this test is completed, the User may do the following:

- Repeat the Coupler BITE test. Depressing the 'CU-BITE' key again at **4** as shown in Figure 7.3.3.2 will cause the Coupler BITE test routine to repeat.

- Repeat the Transmit BITE or Receive BITE tests, as previously covered.

- Exit BITE mode. Depressing the 'END' key at **3** will return to the main menu and resume normal operation.

7.3.3.2 METER FUNCTIONS

Several metering functions are available for both Receive-state and Transmit-state conditions. These Meter choices appear in the Operational Display at **1** as shown in Figure 7.3.3.3.

The available Meter functions are as follows:

RECEIVE:

- 'LINE' - 600-Ohm Line Audio Output
- 'S MTR' - Signal Strength Meter (shown in Figure 7.3.3.3)

TRANSMIT:

- 'LINE' - 600 Ohm Line Audio Input
- 'ALC' - Automatic Level Control voltage
- 'FWD' - Forward RF Power Output
- 'RFLD' - Reflected RF Power

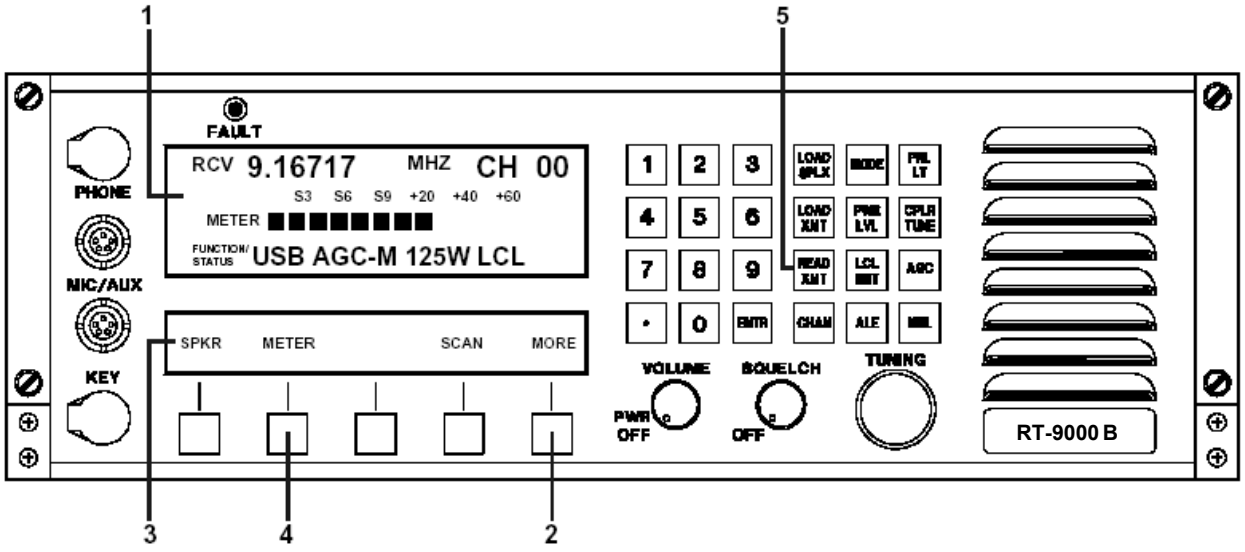


Figure 7.3.3.3 Main Menu containing Meter Selection

To select the desired meter choices, depress the Feature Menu 'MORE' key successively at **2** until the Feature Menu shown in Figure 7.3.3.3 appears. Depressing the 'METER' function key at **4** will cause the Feature Menu shown in Figure 7.3.3.4 to appear.

Depressing the Receive Meter ('MTR RCV') key at **4** or Transmit Meter (MTR-XMT') key at **6** will cause new and appropriate Feature Menus to appear. The User may make Receive or Transmit Meter selections as described in following sections 7.3.3.2.1 or 7.3.3.2.2, respectively. After completing these selections, the User will be returned back to this same Feature Menu.

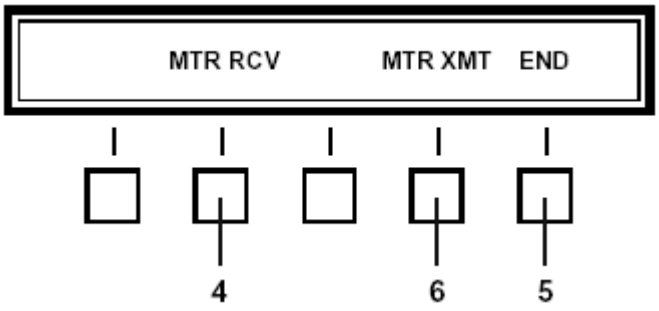


Figure 7.3.3.4 Meter Select Sub-Menu

After completing the Receive and Transmit Meter selections, the User is returned to the Feature Menu shown in Figure 7.3.3.4.

Depressing the 'END' key at **5** will cause the Meter selection to end and return the User back to the main menu.

7.3.3.2.1 Receive Meter Selection

To select Receive-state Meter functions, depress the 'MTR RCV' (Meter Receive) key at **4**. The Feature Menu shown in Figure 7.3.3.5 will appear.

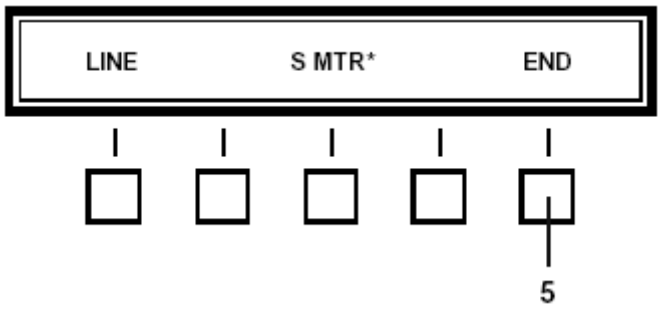


Figure 7.3.3.5 Receive Meter Feature Menu

Depress the Function key beneath the desired selection to select it. An asterisk (*) will appear next to the selected choice to indicate it has been chosen.

When the RT-9000B is displaying Receive-state activity, the selected Receive Meter will now display the desired output type and values as shown at **1** in Figure 7.3.3.3.

Once the Receive Meter selection is made, depress the 'END' key at **5**. The Feature Menu Display will revert to that shown in Figure 7.3.3.4.

7.3.3.2.2 Transmit Meter Selection

To select Transmit-state Meter functions, depress the 'MTR XMT' (Meter Transmit) at **6**. The Feature Menu shown in Figure 7.3.3.6 will appear.

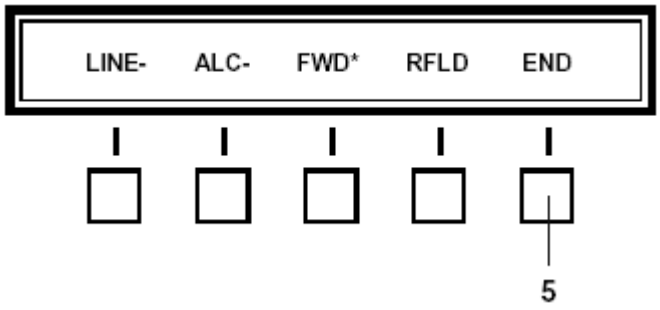


Figure 7.3.3.6 Transmit Meter Feature Menu

Depress the Function key beneath the desired selection to select it. An asterisk (*) will appear next to the selected choice to indicate it has been chosen.

When the RT-9000B is displaying Transmit-state activity, the selected Transmit Meter will now display the desired output type and values as shown at **1** in Figure 7.3.3.3.

In addition to displaying the Transmit Meter readings while the Transmitter is keyed, the Transmit Meter readings may also be viewed another way. Depressing the Read Transmit ('READ XMT') key at **5** in Figure 7.3.3.3 will cause all Transmit related Operational Display readings to briefly display without actually keying the Transmitter. The Transmit-state readings will appear for about four (4) seconds after the 'READ XMT' key is depressed before reverting back to Receive-state readings.

Once the Transmit Meter selection has been made, depress the 'END' key at **5**. The Feature Menu Display will revert to that shown in Figure 7.3.3.4.

7.3.3.3 SPEAKER ON/OFF FUNCTION

The front panel speaker in the RT-9000B is by default normally enabled at power-up. An asterisk present at the right-hand side of the 'SPKR' Feature Menu selection indicates the speaker is enabled. To disable the speaker, depress the Feature Menu 'MORE' key at **1** successively until the display shown in Figure 7.3.3.7 appears.

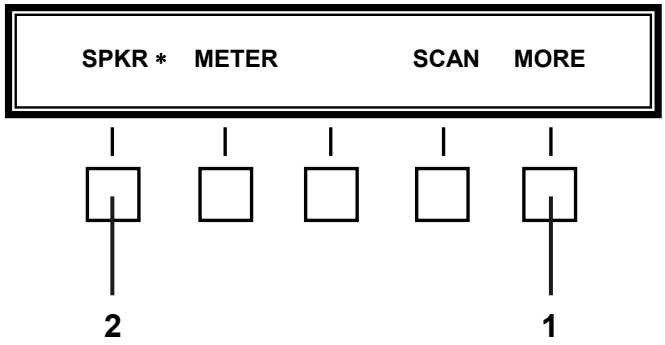


Figure 7.3.3.7 Main Menu containing Speaker ON/OFF Selection

Depress the Feature Menu 'SPKR' key at **2** . The asterisk next to the 'SPKR' selection will disappear. The RT-9000B speaker will be disabled. Depressing the feature menu 'SPKR' key once again will re-enable the speaker.

NOTE: After the RT-9000B has been powered-down or primary power has been interrupted, the Speaker ON/OFF Selection function will automatically revert back to its default state.

7.3.3.4 'MHz' or 'kHz' FREQUENCY DISPLAY

The Operating Frequency display may be selected to display the frequency units expressed in Megahertz (MHz) or Kilohertz (kHz).

Depress the Feature Menu 'MORE' key at **1** successively until the Feature Menu shown in Figure 7.3.3.8 appears.

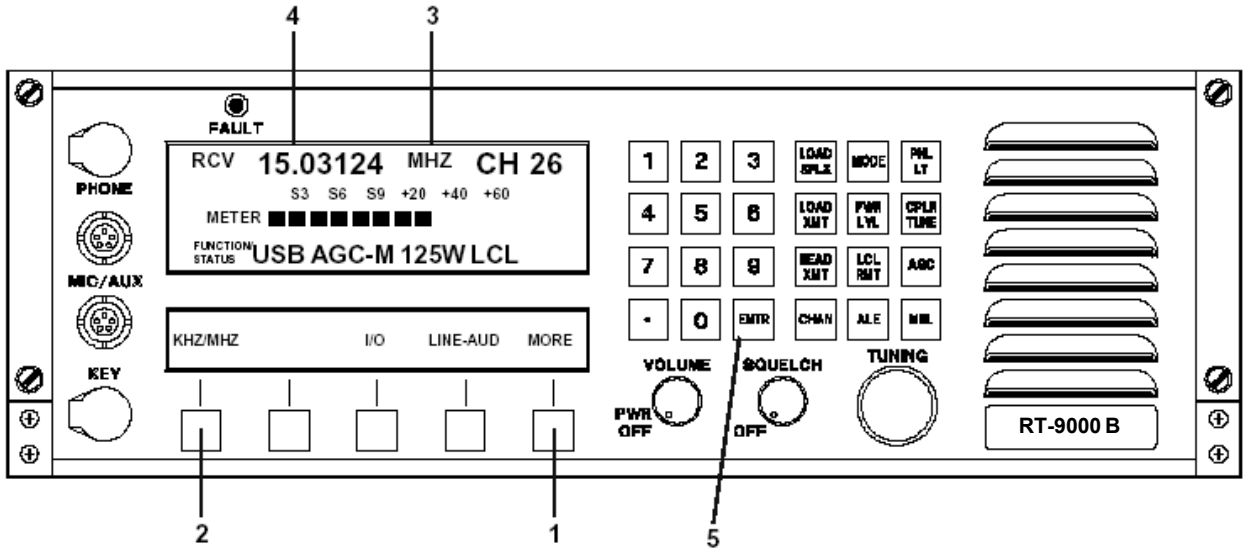


Figure 7.3.3.8 Main Menu containing MHz – kHz Frequency Display Selection

Depressing the 'kHz/MHz' Feature key at **2** will cause the Operating Frequency units in the Operational Display at **3** to toggle between 'MHz' (MegaHertz) and 'kHz' (kilohertz). As an example, in Figure 7.3.3.8 note if 'KHZ' units is selected that the decimal point at **4** will move three (3) digits to the right and the 'MHZ' indication shown at **3** will change to 'KHZ'.

Depressing the 'ENTER' key at **5** will cause this selection to be stored in memory for the currently selected Channel Number. This Frequency Display MHz/kHz selection is made and stored separately for each Pre-set Channel. Each Channel may be programmed to display Operating Frequency in the units selected as described.

7.3.3.5 REMOTE OPERATION

The RT-9000 B Transceiver may be controlled from a remote location using an RCU-9310B Remote Control Unit.

The control passing relationship between these two units is that the distant unit "takes control" from the other unit. Thus, if the RT-9000 B Transceiver is currently being controlled by an RCU-9310 B, depressing the RT-9000 B Local/Remote ('LCL-RMT') key will restore Local control to the RT-9000 B. On the other hand, depressing the RCU-9310 B's Local/Remote ('LCL-RMT') key will cause it to take back control of the RT-9000 B.

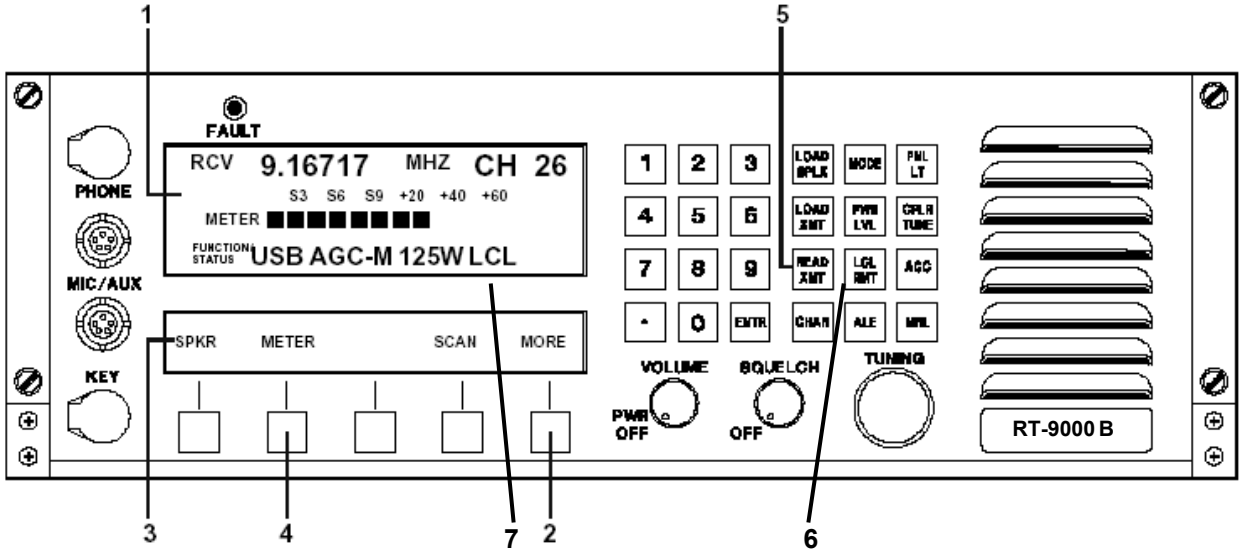


Figure 7.3.3.9 Local/Remote Controls

Refer to Figure 7.3.3.9. If the RT-9000B is currently under remote control, depressing the RT-9000B's Local/Remote ('LCL-RMT') key at **6** will cause it to take back control. If the RT-9000B was already in Local control, depressing this key will have no effect. Local/Remote control status is indicated at **7** in the Operational Display.

When the RT-9000B is in Remote control ('RMT') operation, all keys in Function Keypad will be disabled except for the 'Local/Remote' or Display Illumination ('PNL LT') keys. Any attempt to use these keys will cause the following two (2) messages to be displayed, 'FUNCTION DISALLOWED' followed by 'UNIT IN REMOTE MODE'. These messages will automatically clear.

If the RT-9000B I/O port "A" is not enabled, depressing the 'LCL-RMT' key will cause a 'NO REMOTE SYSTEM' message to briefly be displayed. If the I/O port is enabled, depressing this key will be completely ignored by the system and have no reaction.

7.3.3.6 SOFTWARE REVISION LEVEL

To view the installed Software Revision Level, depress the 'MORE' key from the main menu successively until the Feature Menu shown in Figure 7.3.3.10 appears. To view the installed Software Revision Level, depress the 'REV' key at **6** . The Software Revision Levels will appear at **3** in the Operational Display and are formed as follows:

'REV CPU-*XXX* IO-*XXX*'

NOTES: 1. *XXX* = Installed Software Revision Levels.

2. Software Revision Levels are alphanumeric and may be two (2) or three (3) characters long.

Depressing the 'REV' key at **6** again will cause the Operational Display to return to normal.

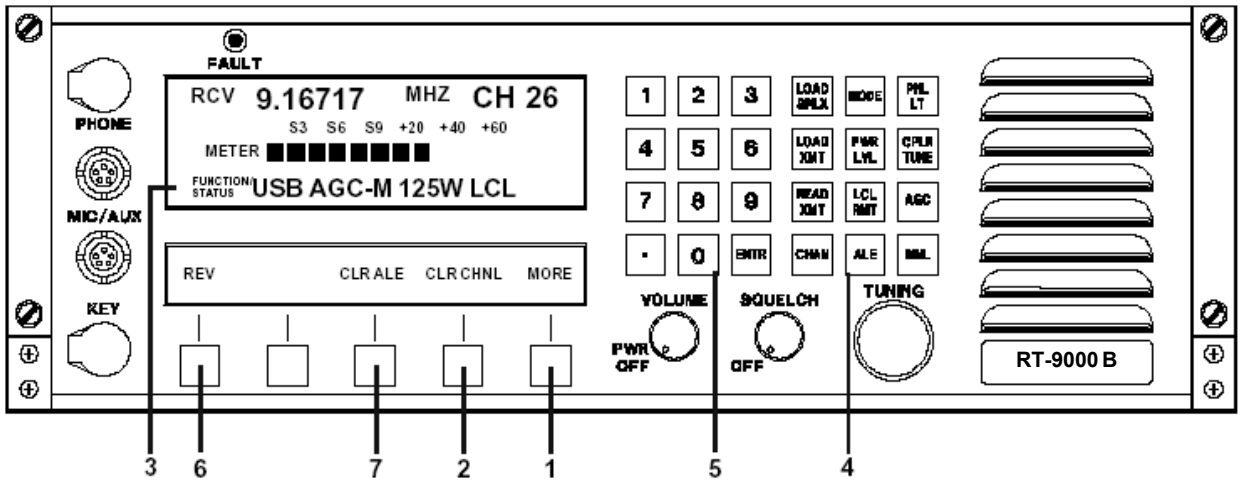


Figure 7.3.3.10 Main Menu containing Software Revision Level and Channel & ALE Clearing Selections

7.3.3.7 CHANNEL and ALE IDENTITY CLEARING

7.3.3.7.1 Channel Clearing

To clear ALL RT-9000B Pre-set Channels, depress the main menu 'MORE' key at **1** until Feature Menu Display shown in Figure 7.3.3.10 appears.

Depress the Clear Channel ('CLR-CHNL') key at **2** . The Operational Display at **3** will blank and the Feature Menu Display will change to that shown in Figure 7.3.3.11.

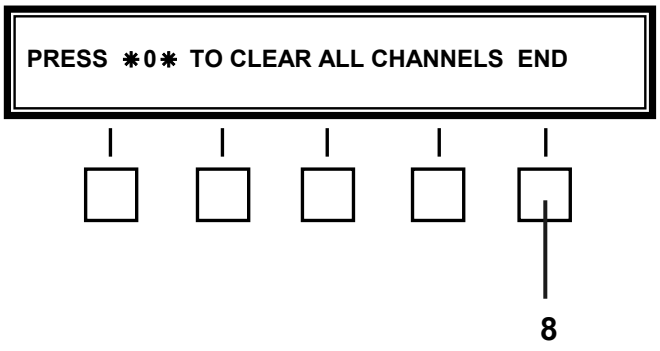


Figure 7.3.3.11 Channel Clearing Feature Menu

If you DO NOT wish to clear ALL RT-9000B Pre-set Channels, depress the 'END' key at **8** NOW. All front panel displays will revert to their normal state.

If you wish to continue clearing ALL RT-9000B Pre-set Channels, proceed as follows. Using the appropriate keys in the Numeric and Function Keypads, key in the following three (3) keystroke sequence:

As each character of the sequence is keyed in, it will appear in the Operational Display. After the last character has been entered, a 'WRITING CHAN XXX' message will appear. While this message is displaying, there will be a rapid counting from 000 to 127 in the XXX portion of the message. The message will clear automatically. After it clears, all Pre-set Channels will now be cleared.

NOTE: The User is strongly advised to become fully familiar with this "Clearing" function and its effect before using. Once activated, its action is permanent and cannot be reversed. If used mistakenly, substantial time may be required to re-enter deleted settings.

7.3.3.7.2 ALE Identity Clearing

To clear ALL RT-9000B ALE Identity information, depress the main menu 'MORE' key at **1** until Feature Menu Display shown in Figure 7.3.3.10 appears.

Depress the Clear ALE ('CLR ALE') key at **7** . The Operational Display at **3** will blank and the Feature Menu Display will change to that shown in Figure 7.3.3.12.

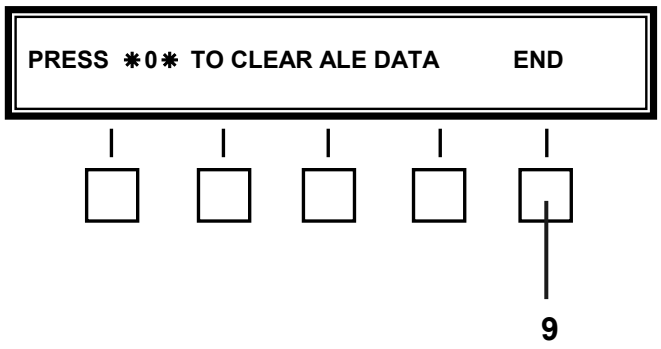


Figure 7.3.3.12 ALE Identity Clearing Feature Menu

If you DO NOT wish to clear ALL RT-9000B ALE Identity information, depress the 'END' key at **9** NOW. All front panel displays will revert to their normal state.

If you wish to continue clearing ALL RT-9000B ALE Identity information, proceed as follows. Using the appropriate keys in the Numeric and Function Keypads, key in the following three (3) keystroke sequence:

As each character of the sequence is keyed in, it will appear in the Operational Display. After the last character has been entered, a 'CLEARING ALE DATA' message will appear. After this message clears, all ALE Identity information will now be cleared.

NOTE: The User is strongly advised to become fully familiar with this "Clearing" function and its effect before using. Once activated, its action is permanent and cannot be reversed. If used mistakenly, substantial time may be required to re-enter deleted settings.

7.3.3.8 'I/O' PORT SET-UP

This section describes how to set up the RT-9000B to automatically communicate with external modems and remote lines. The RT-9000B Transceiver has two (2) data ports. These data ports are designated "Port" A and "Port" B and may be used simultaneously. Both ports physically terminate in the same DB-15 male connector mounted on the rear panel. This connector is designated as 'REMOTE' and is shown in Figure 7.3.3.13.

While unrelated to this I/O Port function, a third port also terminates in this connector. This port is a dedicated port for the AMD "Auxillary Terminal" and is part of the ALE function. Refer to section VI of this manual for details.

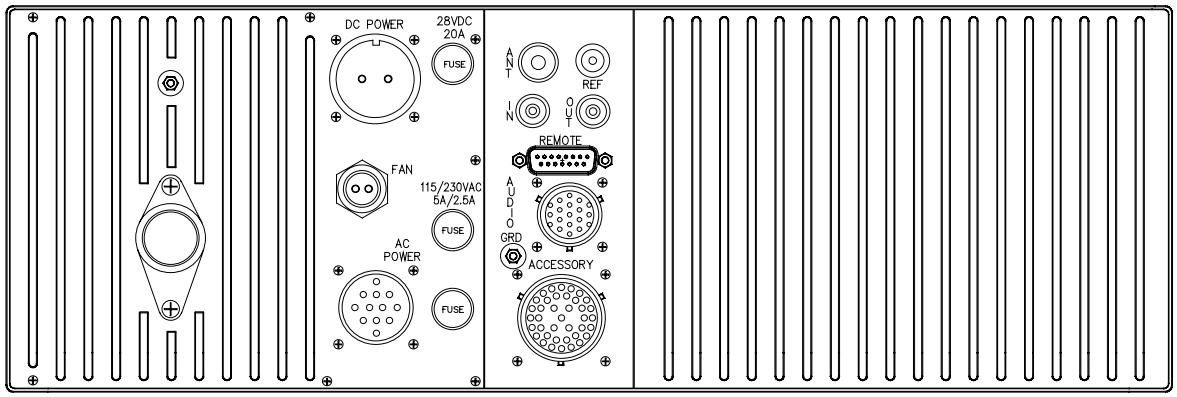


Figure 7.3.3.13 RT-9000B Rear Panel Connectors

Port A is a general-purpose data port that allows the RT-9000B to communicate with User external accessory equipment. All required operating settings may be selected by the User from the RT-9000B Front Panel. These settings will be primarily be dictated by the external equipment and the data handling capability of the interconnection wiring. Details about the available selections are given in Figure 7.3.3.19 Communication Format Parameters, at the end of this section.

Port B is a dedicated RS232, 9600-baud port and is used for specific system operations, such as 'ALE' modems, Preselectors, etc. Port B is not available to the User and none of its operating settings can be changed.

Port A Set Up

To set up Port A, perform the following steps. Determine the desired communications format. Depress the Feature Menu 'MORE' key successively at **1** until the display shown in Figure 7.3.3.14 appears.

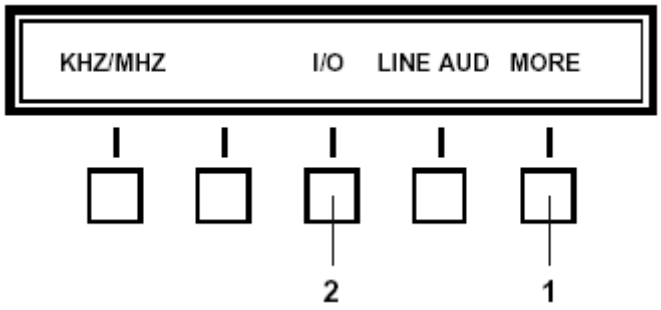


Figure 7.3.3.14 Port 'A' Selection Feature Menu

Depress the 'I/O' key at **2** . The Operational Display will display an 'ENTER CODE NUMBER' message. Key in the four-digit code '2580' using the Numeric Keypad. As each code digit is entered, a small square block along the extreme right-hand side of the Operational Display will appear for each entered digit. After entering the last code digit, the Feature Menu will change to that shown in Figure 7.3.3.15.

NOTE: If any four-digit code other than '2580' is entered, an 'INVALID CODE NUMBER' message will be displayed. This message will clear automatically within a few seconds and the Operational Display will revert to that shown in Figure 7.3.3.14. Code entry may now be repeated.

NOTE: This code entry routine is designed solely to help prevent inadvertent changing of I/O settings. The code is not intended to be an access security measure and cannot be changed.

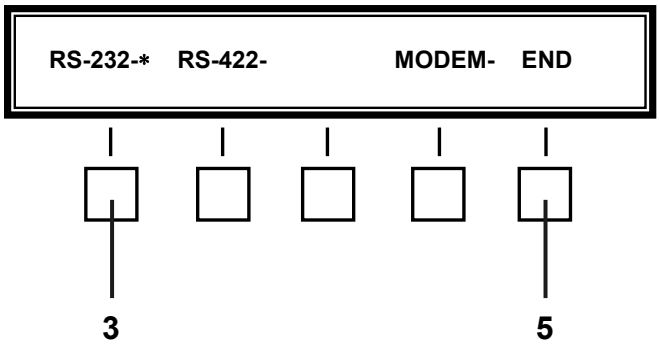
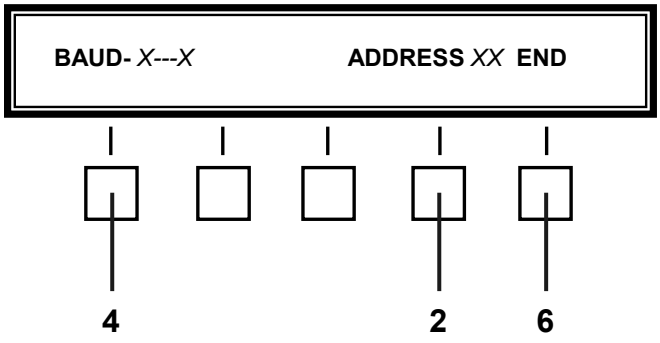


Figure 7.3.3.15 Port 'A' Set Up Menu

Select the desired communications format by depressing the key beneath the indicated format. After a selection is made, the Feature Menu display will change to that shown in Figure 7.3.3.16.

If the User is only changing the Baud Rate setting (as opposed to selecting a different communication format), the currently selected communication format must be first deselected and then immediately reselected. These steps must be done before the Feature Menu display shown in Figure 7.3.3.16 will appear.



NOTES: *X---X* = Currently selected I/O Port Baud Rate Setting
XX = Current RT-9000 B Control Address Setting

Figure 7.3.3.16 Baud Rate Feature Menu

The Feature Menu shown in Figure 7.3.3.16 displays the current RT-9000 B I/O Port Baud-Rate setting and the RT-9000 B Control Address setting (covered next in section 7.3.3.9).

If the Baud Rate shown is NOT the desired selection, depress the feature key at **4** beneath the 'BAUD-*X*---*X*' indication. The current Baud Rate setting indicated in Figure 7.3.3.16 will be shown as selected in one of the following Baud Rate Selection menus shown in either Figures 7.3.3.17 or 7.3.3.18.

The first Baud Rate Selection Menu as shown in Figure 7.3.3.17 will appear and present the operator with four (4) Baud Rate choices. If the desired choice is not present, depress the feature key beneath 'MORE' indication.

A second Baud Rate Selection Menu as shown in Figure 7.3.3.18 will appear and present the User with three (3) additional Baud Rate choices. Depressing the 'MORE' key again causes Baud Rate Selection Menu 1 to reappear.

> As an example, in Figure 7.3.3.17 '2400' Baud is shown as currently selected. This selection would have been indicated as 'BAUD-2400' in the Feature Menu shown in Figure 7.3.3.16. Depressing any other Baud Rate key will select that Baud Rate and deselect the 2400 Baud selection.

As these Baud Rate Selection Menus appear, depressing the desired Baud Rate setting feature key will select that Baud Rate. The Feature Menu shown in Figure 7.3.3.16 will reappear. The newly selected Baud Rate will be reflected in this Feature Menu display. Press 'END' to exit this menu and return to the main menu.

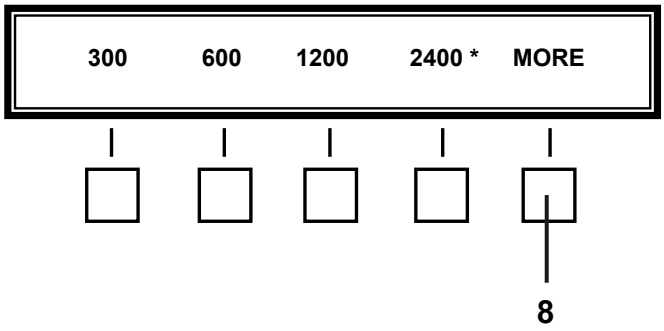


Figure 7.3.3.17 Baud Rate Selection Menu 1

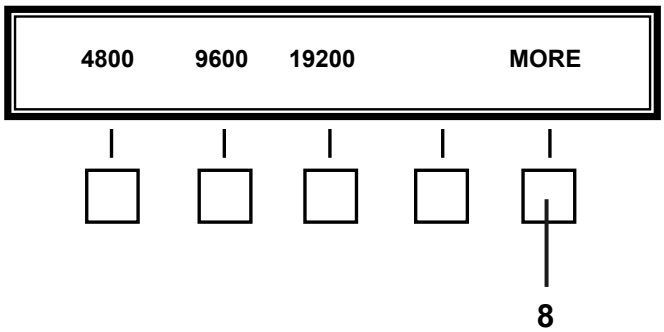


Figure 7.3.3.18 Baud Rate Selection Menu 2

Communications Format	Maximum Baud Rate	Maximum Distance (Feet)
RS-232	19200	50
RS-422	19200	4000
'MODEM' (FSK Tones)	300 (fixed)	N/A

Figure 7.3.3.19 Communication Format Parameters

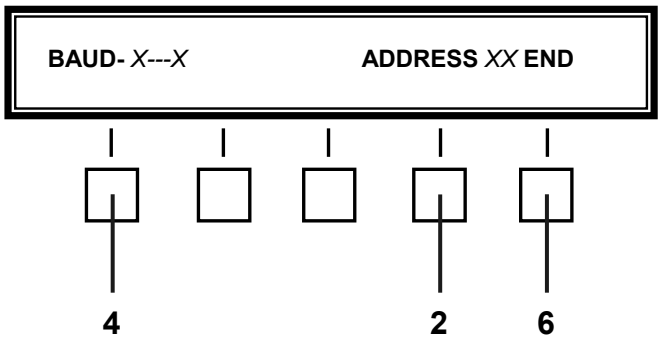
7.3.3.9 CONTROL ADDRESS

The RT-9000 B can be controlled from an RCU-9310 B Remote Control Unit. The RCU-9310 B can control multiple RT-9000 B Transceivers, but only one at any one time. This system capability requires each RT-9000 B I/O Port be setup with a unique address. This Control Address is then used by the RCU-9310 B is controlling that particular RT-9000 B Transceiver.

Remote control is implemented using RS-422 communications and a switchable audio matrix. RS-422 communications systems are specified to operate with up to ten (10) units total. The RT-9000 B Control Address can be set to any address between '00' and '99'. An RS-422 communications network with more than ten units, however, requires additional external line amplification.

The RT-9000 B Control Address setup will normally be part of the initial I/O Port setup process. The Control Address Feature Menu is accessed from the Baud Rate Feature Menu. Both, initial Control Address setup or changing the Control Address afterward use the same procedure.

To setup or change a Control Address, perform the following procedure. Complete the steps outlined in section 7.3.3.8 to setup I/O "Port A" until the Baud Rate Feature menu shown in Figure 7.3.3.16 appears. For the reader's convenience, Figure 7.3.3.16 has been reproduced below in Figure 7.3.3.20.



NOTES: *X*---*X* = Currently selected I/O Port Baud Rate Setting
XX = Current RT-9000 B Control Address Setting

Figure 7.3.3.20 Baud Rate Feature Menu

When the Baud Rate Feature Menu first appears, a two-digit number appearing immediately to the right of 'ADDRESS' is the current Control Address of the RT-9000 B. This is the Control Address an RCU-9310 B Remote Control Unit must use to communicate with and control this specific RT-9000 B Transceiver.

If this is the desired Control Address of your RT-9000 B Transceiver, no further action is required and normal operations may continue. If the User wishes to change the Control Address of the RT-9000 B, depress the key at **2** directly beneath the 'ADDRESS-*XX*' selection on the Feature Menu display. The Control Address Feature Menu Display shown in Figure 7.3.3.21 will appear.

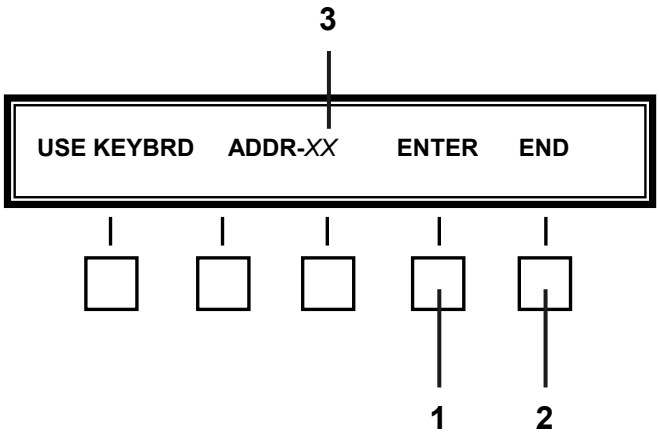


Figure 7.3.3.21 Control Address Entry Menu

Using the Numeric Keypad, key in the new two-digit Control Address. As the digits are entered, they will appear at **3** in the Feature Menu display. Depress the 'ENTER' Key at **1** to enter and store this new Control Address into the RT-9000B's memory. The Feature Menu display will revert to Figure 7.3.3.20 and display the new Control Address.

NOTE: In systems where only one (1) RT-9000B Transceiver is being controlled by an RCU-9310B, the Control Addresses must be set to the SAME Control Address to function properly. Control Address '00' is usually used.

NOTE: Refer to RCU-9310B Remote Control Unit manual for further details.

7.3.3.10 'CW' FILTER AND KEY BREAK-TIME OPTIONS

To select or change CW Filter and/or Key Break-Time Options, the CW-Mode must first be selected. To do this, depress the 'MODE' Function key successively until 'CW' Mode appears in the Operational Display. The Feature Menu shown in Figure 7.3.3.22 will appear.

If the CW-Mode was already selected, momentarily leave 'CW-Mode' and immediately re-select it by successively depressing the 'MODE' key until 'CW-Mode' re-appears in the Operational Display. The Feature Menu shown in Figure 7.3.3.22 will appear. This menu will appear only after CW-Mode is selected.

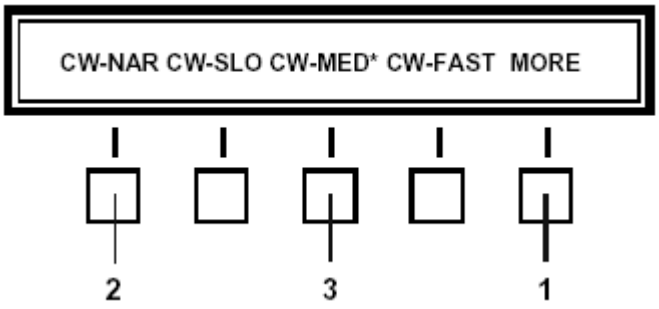


Figure 7.3.3.22 CW-Mode Filter Selection Feature Menu

The RT-9000B is equipped with a Narrow-Band Audio CW filter. If this filtering function is desired, depress the key beneath 'CW-NAR' on Feature Menu to switch in this filter. An asterisk (*) will appear next to the Feature Menu 'CW-NAR' choice indicating it has been enabled.

CW Key Break-Time is a system setting that controls the amount of time the RT-9000B Transceiver remains in Transmit mode after an operator stops sending Morse code. Three (3) CW Key Break-Time choices are available to the operator and are described in the following chart.

CW Key Break-Time Settings		
RT-9000B Feature Menu Choice	Description	Operator Sending Speed (wpm)
'CW-SLO'	CW-Slow	Less than 10
'CW-MED'	CW-Medium	Between 10 and 20
'CW-FAST'	CW-Fast	Greater than 20
Note: wpm = words per minute		

The CW Key Break-Time setting is normally set to "CW-Medium" when the equipment is shipped from the factory. This setting will normally meet most operator sending speeds. If the operator wishes to change this setting, perform the following steps.

Select CW-Mode as previously described for CW Filter. The Feature Menu described in Figure 7.3.3.22 will appear. Depress the key beneath desired Feature Menu choices as described in the above table. An asterisk (*) will appear next to the Feature Menu choice indicating it has been enabled.

Depress the 'MORE' key to leave the CW-Mode Options menu and return to the main menu.

To change CW Filter and/or Key Break-Time settings if currently in CW mode, depress the 'MODE' key successively until 'CW' Mode reappears in the Operational Display. This action will cause the Feature Menu shown in Figure 7.3.3.22 to reappear and allow the operator a new choice as previously described.

7.3.3.11 LINE AUDIO SELECTION

The rear panel 'AUDIO' connector provides two sets of 600-Ohm input and output lines and connects one of two external audio devices to the RT-9000B. A typical use of this capability might be to allow convenient switching in or out specialized terminal equipment such as audio processors, encryption equipment, etc.

To select either External Audio Line, depress the Feature Menu 'MORE' key successively until the display shown in Figure 7.3.3.23 appears.

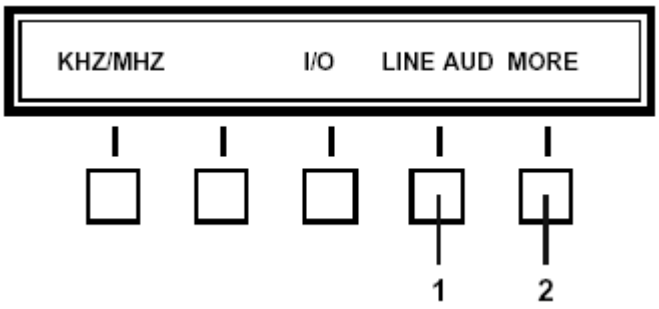


Figure 7.3.3.23 Line Audio Selection Feature Menu

Depress the 'LINE-AUD' key at **1** , the Line Audio Selection Sub-Menu shown in Figure 7.3.3.24 will appear.

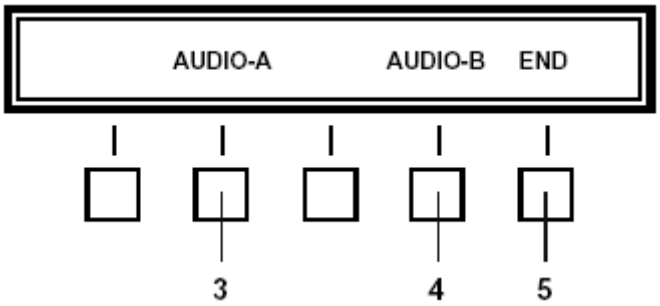


Figure 7.3.3.24 Line Audio Selection Sub-Menu

Depress the 'AUDIO-A' Feature key at **3** to connect the external device on Line A to the RT-9000B. Similarly, depressing 'AUDIO-B' Feature key at **4** connects the device on line B to the RT-9000B. Connection occurs as soon as the selection key is depressed. An asterisk (*) will appear next to the selected Line Feature Menu choice indicating it has been enabled.

NOTE: Only one external device may be selected at any one time. If only ONE (1) device is used, it should be connected to Line 'A'.

Depress the 'END' key at **5** to leave the Line Audio selection menu and return to the main menu shown in Figure 7.3.3.23.

7.3.4 ADVANCED OPERATIONS

This section addresses those features and functions that are specialized or invoke unique features of the RT-9000 B Transceiver. These operations build on operating details presented earlier in this manual and require an understanding of the referenced modems and/or peripherals.

7.3.4.1 RECEIVER SCANNING

The RT-9000 B has the ability to perform a rudimentary Receiver scanning function of all valid Pre-set Channels or any block of Pre-set Channels between '0' and '127'. The Operating Frequencies and other essential settings are stored in Pre-set Channels as described in section 7.3.2.9 of this manual.

The RT-9000 B will scan all properly set up Pre-set Channels between the entered Start and Stop Channel limits. If there is no currently Pre-set Channels set up between those limits, scanning will not start. If this occurs, the User should inspect the Channel limits and Pre-set Channels and make appropriate changes.

Starting the Scan Process

To start scanning a block of Channels, the RT-9000 B must be in the Pre-set Channel operating mode (refer to section 7.3.2.7). The displays will appear as shown in Figure 7.3.4.1.

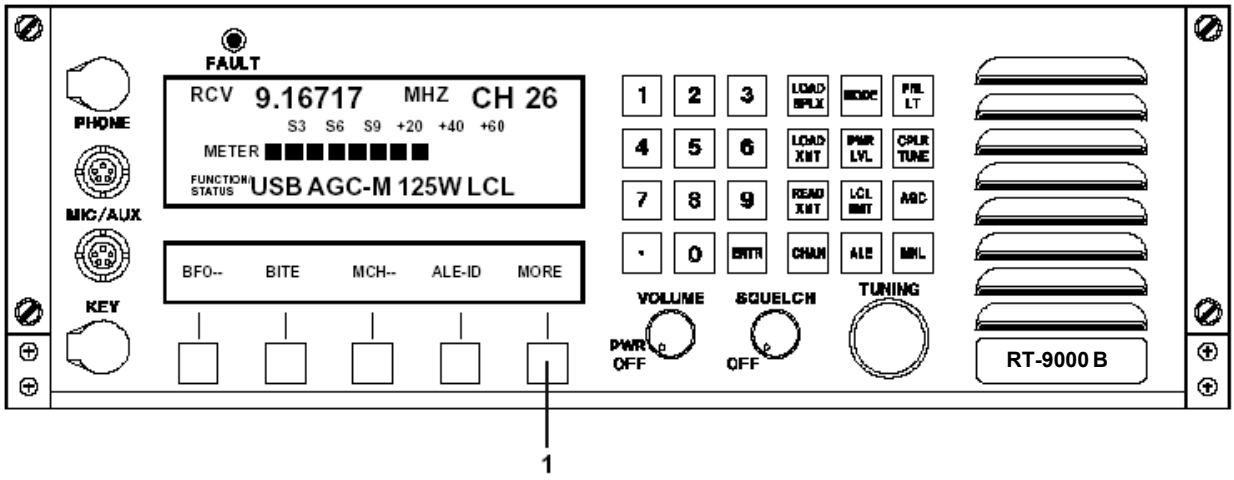


Figure 7.3.4.1 Pre-set Channel Mode Displays

Depress the Feature Menu 'MORE' key at **1** successively until the Feature Menu Display appears as shown in Figure 7.3.4.2.

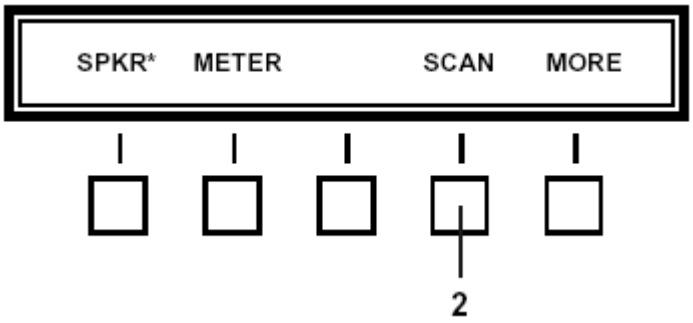


Figure 7.3.4.2 Main Menu containing Scan Selection

Depressing the 'SCAN' key at **2** will cause the Operational and Feature Menu displays to change to those shown in Figure 7.3.4.3.

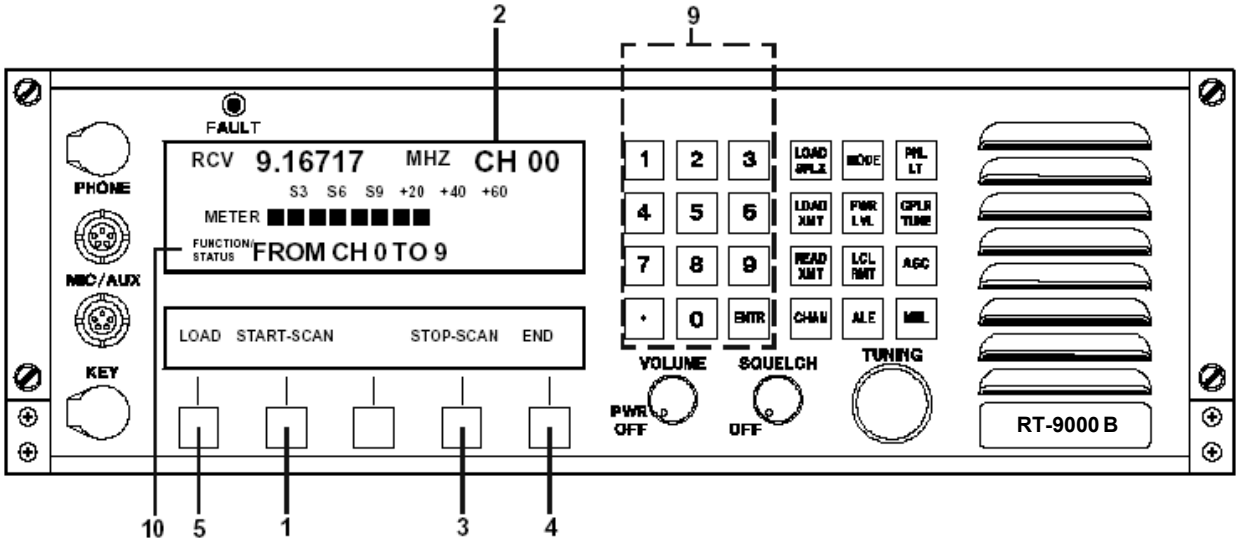


Figure 7.3.4.3 Scan function Feature Menu

Depress the 'START SCAN' key at **1** to actually begin scanning. As scanning proceeds, the instantaneous operating frequency and Channel number will appear at **2** in the Operational Display. To stop the scanning process, simply depress the 'STOP SCAN' key at **3** . To leave the Receiver Scanning function, depress the 'END' key at **4** . The User will be returned to Pre-set Channel operation.

NOTE: The dwell time on any given frequency has been kept to a minimum, about 2 sec., consistent with recognizing the presence or absence of a signal in order that a relatively continuous monitoring occurs. If for some reason, longer or shorter dwell times are required, please contact Sunair.

Loading Start and Stop Channel Numbers

To Load a block of desired channels, depress the 'LOAD' key at **5** . The Feature Menu Display will change to that shown in Figure 7.3.4.4.

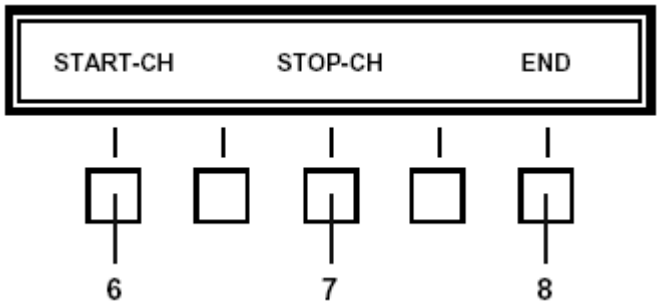


Figure 7.3.4.4 Scan function 'LOAD' Feature Menu

The Operational Display will briefly display a 'USE KEYB FOR NUMBERS' message and then change to a 'FROM CH *XXX* TO *YYY*" message. The *XXX* and *YYY* represent 'Start' and 'Stop' Channel Numbers. Any Channel Numbers appearing in the 'Start' and 'Stop' positions when entering this set up process will be those entered from the 'SCAN' feature's previous use. Channel Number entries may be one, two, or three digits long, as appropriate to the Channel Number's digits. No leading zeros are required.

To select or change a Start Channel, depress the 'START-CH' Feature key at **6** . Key in the desired Channel Number (0-127) using the Numeric Keypad at **9** . The newly selected Start Channel will be displayed in the 'XXX' position of the 'FROM CH *XXX* TO *YYY*" message at **10 .** If a Stop Channel entry is going to be also made, depress the 'STOP-CH' key. This action both enters the keyed-in Start Channel Number into memory and also moves to Stop Channel selection process. Selection may proceed as described later.

If the Start Channel is only being changed, depress the 'END' at **8** to leave this Feature Menu and return to that shown in Figure 7.3.4.3.

To select or change a Stop Channel, depress the 'STOP-CH' key at **7** . Key in the desired Channel Number (0-127) using the Numeric Keypad at **9** . The newly selected Stop Channel will be displayed in the 'YYY' position of the 'FROM CH *XXX* TO *YYY*" message at **10** . If the user wishes to also change the Start Channel, depress the 'STOP-CH' key. This action both enters the keyed-in Stop Channel Number into memory and also moves back to Start Channel selection process. Selection may proceed as previously described.

If the Stop Channel is only being changed, depress the 'END' at **8** to leave this Feature Menu and return to that shown in Figure 7.3.4.3.

After Start Channel or Stop Channel selections are complete, the Start Channel must be lower than the Stop Channel. If this is not requirement is not observed, a 'START MUST BE LESS' message will be displayed briefly when using the 'END' key to exit this Feature Menu. This situation must be corrected before the system will allow the User to proceed.

7.3.4.2 AUTOMATIC LINK ESTABLISHMENT (ALE) SET UP

7.3.4.2.1 GENERAL

All of the control functions to perform Automatic Link Establishment (ALE) to FED-STD 1045 interoperability requirements are contained within the RT-9000B Transceiver.

The ALE subsystem requires all ALE Network Operating Frequencies be entered and stored in Pre-set Channel positions as described in Section 7.3.2.9. The Operating Frequencies may be stored in any order. As a general rule, entering frequencies in order of most probable use may shorten ALE Linking times.

It is beyond the scope of this manual to define network structures and operating disciplines.

The ALE subsystem uses multiple frequencies stored in Pre-set Channels during normal operation and selects the best one when communicating with other Network stations. These Channels are organized in Channel Groups. A Channel Group is a group of frequencies that can be enabled under ALE Subsystem control and have a common relationship.

A Channel Group may have up to ten (10) Channels. There can be up to ten (10) separate Channel Groups. Channel Groups are identified by their Group Number, which is determined by first digit of the Channel Numbers it contains. The following table illustrates how these groups are organized.

Channel Group Organization

Group Number	Channel Number	
	Lowest	Highest
0	00	09
1	10	19
2	20	29
3	30	39
4	40	49
5	50	59
6	60	69
7	70	79
8	80	89
9	90	99

Channel Groups are formed simply by setting up the appropriate Pre-set Channel frequencies into the RT-9000B's memory using the procedures described in section 7.3.2.9. However, the Channel numbering in these groups must comply with organization described in this section. ALE systems require at least two (2) or more frequencies for effective operation.

If ten (10) or fewer frequencies are available, they would normally all be set up in the same Channel Group (usually Group 0). If more than ten (10) frequencies are available, they could be arranged in groups with some meaningful order and grouping. For example, 'Daytime' frequencies could be stored in Group 0 and 'Nighttime' frequencies in Group 1.

NOTE: Remember, ALE operation and scanning can use only one (1) Channel Group at a time.

7.3.4.2.2 ESTABLISHING ALE-IDs

The RT-9000B ALE Subsystem is capable of operating with multiple ALE Networks. The ALE system can support a Network structure of up to twenty (20) separate ALE Networks. Each Network may contain a station SELF ID for the RT-9000B Transceiver plus station "CALL IDs" for up to nine (9) other Network stations. When entering ALE IDs into the RT-9000B, the user must follow a prescribed order to avoid confusion and ensure correct entry.

Section 7.3.4.2.2 is divided into four (4) parts and describes entry of four (4) different types of ALE ID information into the RT-9000B's memory. When establishing a new ALE Network, the order of entry of this ALE ID information will be as follows:

1. Establish and Enter Network ID (NET ID) Name
2. Select and Enter (SELF ID) Time Slot Position
3. Enter SELF ID Name
4. Enter Network Station CALL IDs (Time Slot Position and Name)

Additionally, this same sequence of operations must be repeated for EACH separate ALE Network (including SELF & CALL ID entries). If the User will be using more than one Network, all entry steps should be completed for the Network-at-hand before proceeding to and setting up the next Network.

While the steps in this section are primarily used to establish ALE Networks and enter ALE ID information, the Network ID (NET ID) and CALL ID entry steps are also used as Selection steps for certain ALE operating functions described later. The procedures used for both entry and Selection and are flagged when they occur during the appropriate ALE operations.

NOTE: In the remainder of the ALE sections of this manual, 'TUNING' knob, TUNING' control and DIAL, all refer to the RT-9000B front panel "TUNING" knob.

To establish a new ALE Network and enter all required ALE IDs, complete the following steps and sections 7.3.4.2.2.1 through 7.3.4.2.2.4.

Depress the Feature Menu select key 'MORE' at **1** successively until the Feature Menu Display at **2** appears as shown in Figure 7.3.4.5. Depressing the 'ALE-ID' select key at **3** will cause the Feature Menu shown in Figure 7.3.4.6 to appear.

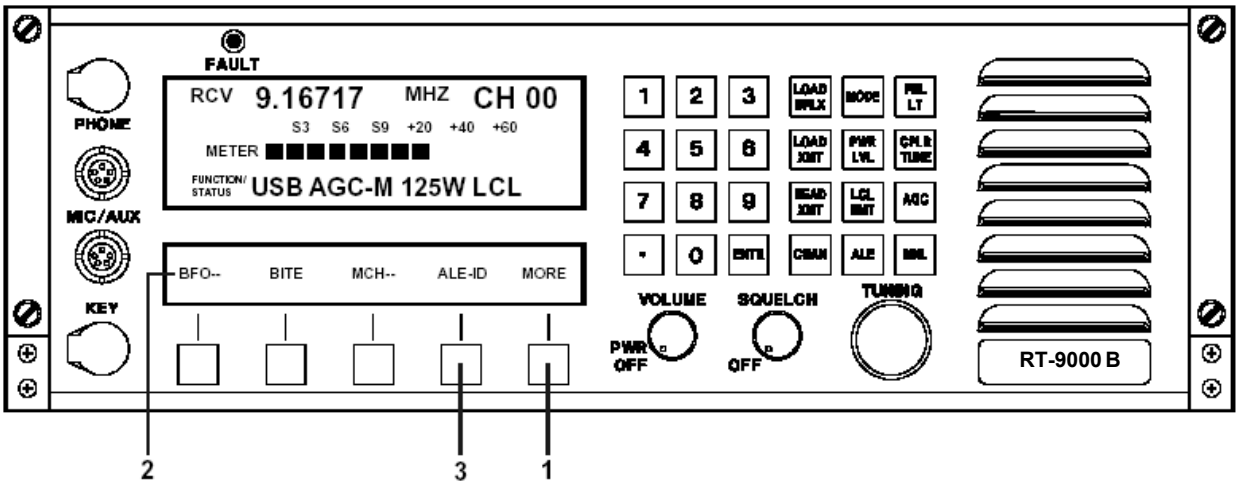


Figure 7.3.4.5 Main Menu containing ALE-ID Selection

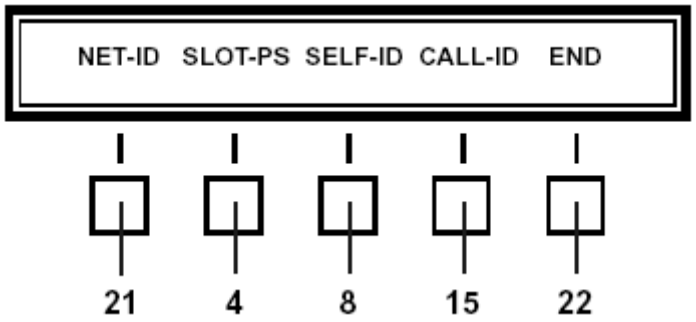


Figure 7.3.4.6 'ALE-ID' Select Feature Menu

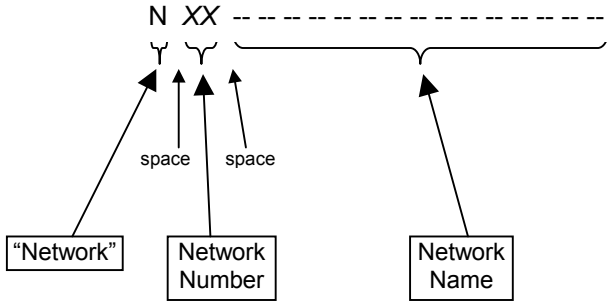
Document No. 8128000560
Software Revision – N1B (07 Oct 04)

7.3.4.2.2.1 Establishing and Entering Network ID (NET ID) Name

Referring to Figure 7.3.4.6, depress the 'NET ID' key at **21** . The Feature Menu and Operational Display will change to that shown in Figure 7.3.4.8 and briefly display an 'ENTER CODE WITH DIAL' message at **9** . This message will automatically clear and be replaced with the following display.

'N *XX* -- -- -- -- -- -- -- -- -- -- -- -- -- -- --'

A sequence of fifteen dashes (-- --) or alphanumeric characters, representing the "Network Name" will appear following 'N *XX*'. Any combination of up to fifteen alphanumeric characters may be used.



For new, unestablished ALE Networks *XX* = 01

For a presently used ALE Network *XX* = Network Number of ***Current Network***

Figure 7.3.4.7 Network ID Display Detail

In this display the "N" indicates "Network", "*XX*" indicates the "Network Number", and the sequence of fifteen (15) dashes serves as placeholders for the corresponding "Network Name".

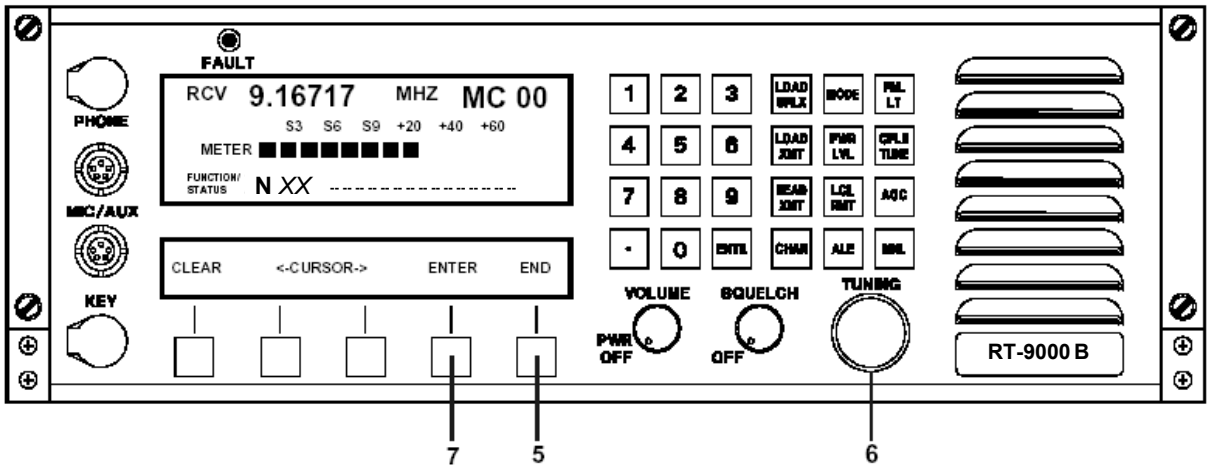


Figure 7.3.4.8 Network ID Selection Displays

NOTE: The Network Number associated with the ALE Network setup procedures in this section is strictly a local RT-9000 B reference number. This “Network Number” has no meaning in the ALE Network environment or to other ALE Network Stations.

When the above information initially appears in the Operational Display, the blinking cursor will be positioned in “Network Number” portion of the above displayed information. The User should now rotate the ‘TUNING’ knob until the desired “Network Number” appears. Using the cursor right arrow (→), the user now should move the cursor to the first character position of the “Network Name” portion of the above displayed information.

If there is information other than dashes (-- --) in the Network Name positions or the user is changing an established Network Name, depress the 'CLEAR' feature select key at **10** to clear the positions and ease new name entry.

The first character position, or dash (--) will flash to indicate the specific position where a user selected character is to be entered. If the first character is satisfactory as is, depressing the right arrow (—>) key at **11** will move the flashing cursor one position to the right. Alternately, depressing the left arrow (<—) key at **12** will move the cursor one position to the left.

As each character position is selected, characters '0' through '9' and 'A' through 'Z' may be selected by rotating the 'TUNING' knob at **6** either clockwise or counter-clockwise. Once the desired character appears in view, depress the right arrow key (—>) at **11** . The flashing cursor will move to the next character position. This character selection process is repeated until the desired NET ID “Network Name” has been formed.

Once all characters for the “Network Name” have been selected, depress the Enter (‘ENTR’) key at **13** to enter the selected ‘NET ID’ information (“Network Number” and “Network Name”) into the RT-9000 B ’s memory. Depress the ‘END’ key at **14** to exit the Network ID entry process and return to the Feature Menu shown in Figure 7.3.4.6.

Depressing the ‘END’ key at **14** without first depressing the Enter (‘ENTR’) key at **13** will also cause the Feature Menu to revert to that shown in Figure 7.3.4.6 except any changes made during this process will NOT be entered into the RT-9000 B ’s memory.

The Network selected and entered using the Enter (‘ENTR’) key at **13** becomes the active ALE Network for all RT-9000 B ALE operations that requiring Network selection. This Network is referred to as the ***Current Network*** and is primarily associated with ALE Transmit functions. This selection remains in force until changed and will be retained both, after leaving ALE modes and, during power-off periods. The User may now proceed to paragraph 7.3.4.2.2.2 Entering (SELF ID) Time Slot Position.

If the user is only changing the ***Current Network*** to a different Network for use in ALE operating mode, perform following actions. Navigate to the ‘ALE-ID’ Select Feature Menu and depress the ‘NET ID’ key as described earlier in this section. Rotate the ‘TUNING’ knob and stop when the desired Network Name and Number appears in the Operational Display. Depress the Enter (‘ENTR’) key at **13** , then the ‘END’ key at **14** . The newly selected Network is now the ***Current Network*** and will remain so, as previously described. These steps will cause the Feature Menu to revert to the display shown in Figure 7.3.4.6.

Depress the ‘END’ key at **22** to return to the display shown in Figure 7.3.4.5. The user may now enter ALE operating mode using the new ***Current Network.***

7.3.4.2.2.2 Selecting and Entering (SELF ID Time) Slot Position

Referring to Figure 7.3.4.6, depress the 'SLOT-PS' Key at **4** . The Feature Menu and Operational Display shown in Figure 7.3.4.9 will appear and briefly display an 'ENTER CODE WITH DIAL' message. This message will automatically clear and be replaced with the following indication:

'*XX* SLOT POSITION'

For new, unestablished ALE Networks *XX* = 01

For a presently used ALE Network *XX* = Present (SELF ID Time) Slot Position setting

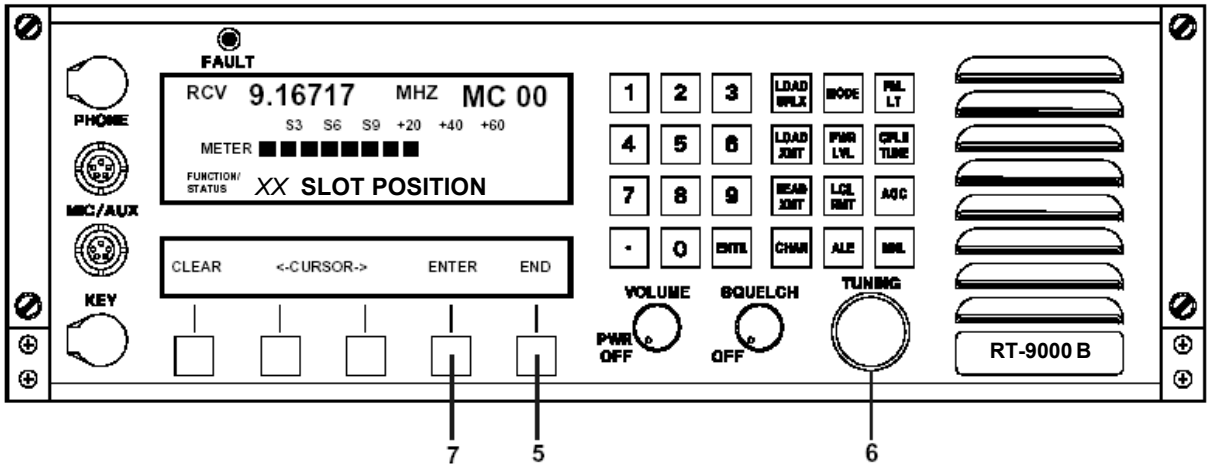


Figure 7.3.4.9 Slot Position Selection Displays

Rotate the 'TUNING' knob at **6** until the required (SELF ID Time) SLOT POSITION appears. Only numbers '01' through '10' are valid selections.

NOTE: Under certain conditions, it is possible to display numbers from '11' through '19'. These numbers are NOT VALID selections and should not be used.

Depress the Enter ('ENTR') key at **7** to enter this selection into the RT-9000B's memory. The Feature Menu Display will revert to that shown in Figure 7.3.4.6. The user may now proceed to paragraph 7.3.4.2.2.3 Entering a SELF ID Name.

Depressing the 'END' key at **5** without first depressing the Enter ('ENTR') will also cause the Feature Menu Display will revert to that shown in Figure 7.3.4.6 except any changes made during this process will NOT be entered into the RT-9000B's memory.

7.3.4.2.2.3 Entering SELF ID Name

Referring to Figure 7.3.4.6, depress the 'SELF ID' key at **8** . The Feature Menu and Operational Display shown in Figure 7.3.4.10 will appear and briefly display an 'ENTER CODE WITH DIAL' message at **9** . This message will automatically clear and be replaced with the following display.

'S ID -- -- -- -- -- -- -- -- -- -- -- -- -- -- --'

A sequence of fifteen dashes (-- --) or alphanumeric characters, representing the SELF ID ('S ID') Name will appear following 'S ID'. Any combination of up to fifteen alphanumeric characters may be used.

If there is information other than dashes (--) in SELF ID Name positions or the user is changing a current SELF ID Name, depress the 'CLEAR' feature select key at **10** to clear the positions and ease new name entry.

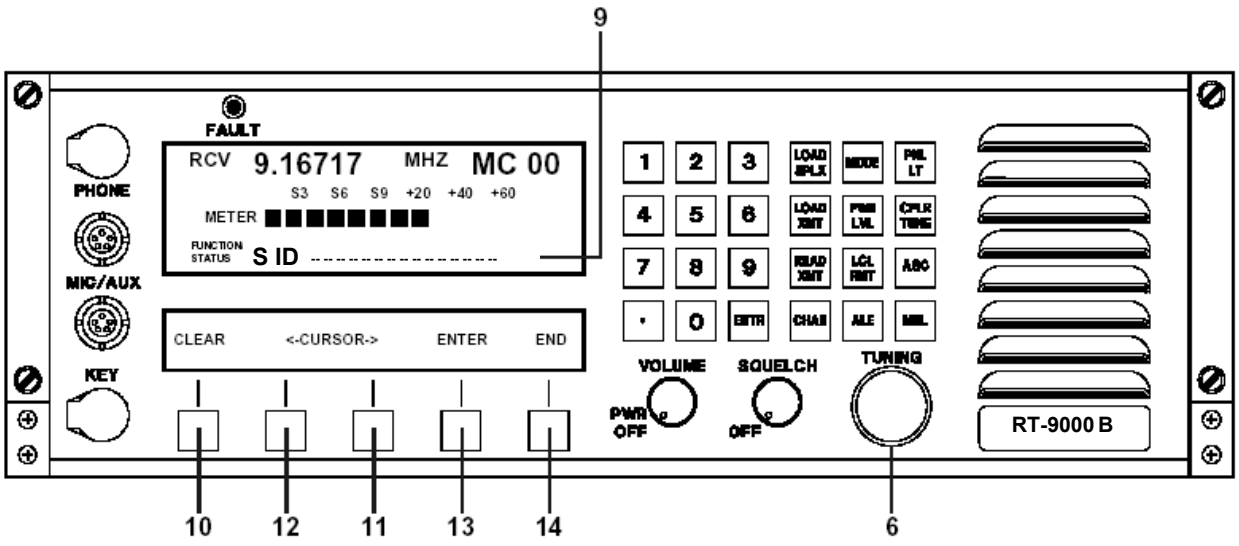


Figure 7.3.4.10 SELF ID Selection Displays

The first character position, or dash (--), will flash to indicate the specific position where a user selected character is to be entered. If the first character is satisfactory as is, depressing the right arrow (—>) key at **11** will move the flashing cursor one position to the right. Alternately, depressing the left arrow (<—) key at **12** will move the cursor one position to the left.

As each character position is selected , characters '0' through '9' and 'A' through 'Z' may be selected by rotating the 'TUNING' knob at **6** either clockwise or counter-clockwise. Once the desired character appears in view, depress the right arrow key (—>) at **11** . The flashing cursor will move to the next character position. This character selection process is repeated until the desired SELF ID ('S ID') "Name" has been formed.

Once all characters for the SELF ID ('SID') "Name" have been selected, depress the Enter ('ENTR') key at **13** to enter the SELF ID ('S ID') "Name" into the RT-9000 B 's memory. Depress the 'END' key at **14** to exit the SELF ID ('S ID') Name entry process and return to the Feature Menu shown in Figure 7.3.4.6. The user may now proceed to paragraph 7.3.4.2.2.4 Entering Network Station CALL IDs (Time Slot Position and Name)

Depressing the 'END' key at **14** without first depressing the Enter ('ENTR') key at **13** will also cause the Feature Menu to revert to that shown in Figure 7.3.4.6 except any changes made during this process will NOT be entered into the RT-9000 B 's memory

7.3.4.2.2.4 Entering Network Station CALL IDs (Time Slot Position and Name)

Referring to Figure 7.3.4.6, depress the 'CALL ID' key at **15** . The Feature Menu and Operational Display will change to that shown in Figure 7.3.4.12 and briefly display an 'ENTER CODE WITH DIAL' message at **18**. This message will automatically clear and be replaced with the following display.

'C *XX* -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --'

For new, unestablished ALE Networks *XX* = 01

For a presently set up ALE Network *XX* = Currently Selected CALL ID (Time Slot Postion) Number

A sequence of fifteen dashes (-- --) or alphanumeric characters, representing a Network Station CALL ID Name will appear following 'C *XX*'. Any combination of up to fifteen alphanumeric characters may be used.

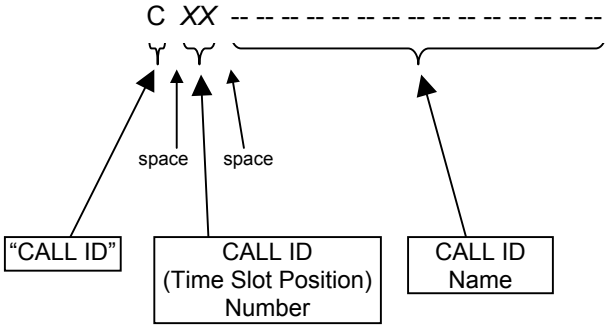


Figure 7.3.4.11 CALL ID Display Detail

Figure 7.3.4.11 indicates In this display the "C" indicates "CALL ID", "*XX*" indicates a "CALL ID (Time Slot Position) Number", and the sequence of fifteen (15) dashes serves as placeholders for the corresponding station CALL ID Name.

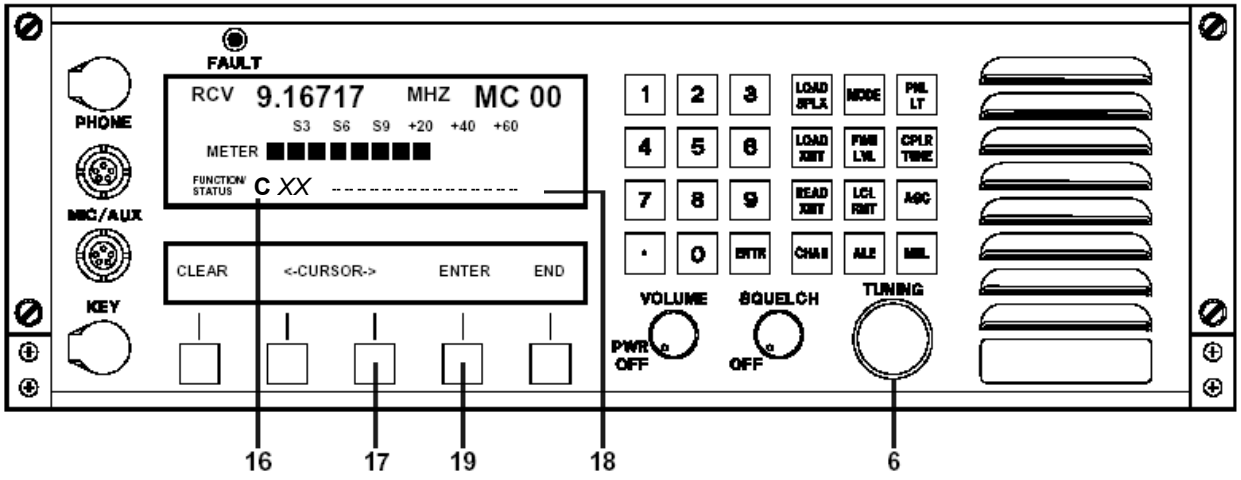


Figure 7.3.4.12 CALL ID Selection Displays

When the above information initially appears in the Operational Display, the blinking cursor will be positioned in “CALL ID (Time Slot Position) Number” portion of the above displayed information. The user should now rotate the ‘TUNING’ knob at **6** until the desired “CALL ID (Time Slot Position) Number” appears. Using the cursor right arrow (→) at **17** , the user now should move the cursor to the first character position of the CALL ID “Name” portion of the above displayed information. Only the numbers ’01’ through ‘10’ are valid selections.

NOTE: Under certain conditions, it is possible to display numbers from “11” to “19”. These numbers are not valid selections and should not be used.

NOTE: When setting up an ALE Network, the Network Time Slot Position assignments should first use Time Slot One, then Time Slot Two next and so on until all Time Slot Assignments have been completed. There should be no unused Time Slots between the SELF ID and any of the CALL IDs. Failure to observe this precaution may result in incorrect operation.

If there is information other than dashes (-- --) in the CALL ID Name positions or the user is changing the current CALL ID Name, depress the 'CLEAR' feature select key to clear the positions and ease new name entry.

The first position, or dash (--) will flash to indicate the specific position where a user selected character is to be entered. If the first character is satisfactory as is, depressing the right arrow (—>) key at **17** will move the flashing cursor one position to the right. Alternately, depressing the left arrow (<—) key at **17** will move the cursor one position to the left.

As each character position is selected, characters '0' through '9' and 'A' through 'Z' may be selected by rotating the 'TUNING' knob at **6** either clockwise or counter-clockwise. Once the desired character appears in view, depress the right arrow key (—>) at **17** . The flashing cursor will move to the next character position. The character selection process is repeated until the desired Network Station CALL ID Name has been formed.

Once all characters for the CALL ID Name have been selected, depress the Enter ('ENTR') key at **19** to enter the CALL ID information (Time Slot Position Number and Name) into the RT-9000B's memory. Depress the 'END' key to exit the CALL ID entry process and return to the Feature Menu shown in Figure 7.3.4.6.

If additional Network Station CALL IDs will be entered, depress the CALL ID key at **15** again and repeat the above steps to enter the additional CALL ID information. Repeat the process as required to enter all CALL IDs for the ***Current Network***. Up to nine (9) CALL IDs, in addition to the Station's SELF ID, may be entered in each of the 20 separate ALE Networks.

When selecting CALL ID (Time Slot Position) Numbers with the 'TUNING' knob and the previously selected SELF ID (Time) Slot Position Number is reached, a 'THIS IS OUR SELF ID' message will appear in the Operational Display. This alerts the user that this is the SELF ID Time Slot Position for the ***Current Network.***

Depressing the 'END' key without first depressing the Enter ('ENTR') key will also cause the Feature Menu to revert to that shown in Figure 7.3.4.6 except any entries or changes made during this process will NOT be entered into the RT-9000B's memory.

If the user is only selecting a Network Station 'CALL ID' for use later in a Point-to-Point ALE call, rotate the 'TUNING' knob until the desired station 'CALL ID' (Time) Slot Number and Name appears in the Operational Display. Depress the Enter ('ENTR') key, and then depress the 'END' key. This procedure selects a 'CALL ID" and causes the Feature Menu to revert to the display shown in Figure 7.3.4.6. Depress the 'END' Key once again to return to the display shown in Figure 7.3.4.5. The user may now enter ALE Operating mode and transmit a Point-to-Point ALE Call using the newly selected 'CALL ID'.

7.3.4.3 AUTOMATIC LINK ESTABLISHMENT (ALE) OPERATION

After all required ALE Network and identity information has been entered as described in previous section 7.3.4.2, the system is ready for operation. Operation is not difficult. The operator need only confirm (or select) the correct operating frequency Channel Group (used for both ALE Receive and Transmit operations) and confirm (or select) the correct ALE Network (used for ALE Transmit operations).

The RT-9000B ALE system supports four (4) different ALE calling methods used to communicate with other Network Stations. Each method has a specific purpose, station calling selectivity, and response requirements. These ALE calling methods are:

1.) Point-to-Point Calling
2.) Sounding
3.) NET CALL Calling
4.) ALL CALL Calling

The RT-9000B Transceiver and internal ALE modem combination both Receives (and initiates an appropriate Answer, if required) and Originates (Transmits) ALE calls for the above calling methods. Specific procedures, requirements, and indications are covered in detail later in this section when each type of calling method is used to Transmit or Receive a call.

7.3.4.3.1 Channel Group Selection

When initially entering ALE mode, the operator must confirm or select the correct operating frequency Channel Group that ALE system will use to communicate with other Network stations. This is essential for proper ALE system operation. Channel Group selection is solely an operator responsibility. Perform the following steps to confirm or change Channel Groups:

1. Depress the '*'/'ALE' key at **1** as shown in Figure 7.3.4.13. The Feature Menu shown in this figure will appear.

2. Observe the Operational Display shown at **3** and note the first digit following 'MC'. This is the currently selected Channel Group.

3. If the currently selected Channel Group IS the desired one, no action is required. The user may continue operations and skip steps 4, 5 and 6.

4. If the currently selected Channel Group IS NOT the desired one, depress the 'MORE' key at **10** . The Feature Menu Display shown in Figure 7.3.4.14 will appear.

5. Depress the Select Group ('SEL-GRP') key. The Feature Menu Display shown in Figure 7.3.4.15 will appear and display the message 'SELECT GROUP 0-9'. (Depressing the 'END' key aborts the Channel Group selection process and causes the Feature Menu Display to revert to that shown in Figure 7.3.4.14).

6. Enter the desired Channel Group number using the Numeric Keypad shown at **8** in Figure 7.3.4.13. The newly entered Channel Group will appear as described in step 2 . The Feature Menu Display will revert to that shown in Figure 7.3.4.13.

   NOTE: If the Channel Group Number entered does NOT have at least one (1) valid Channel entered into the RT-9000 B's memory, a 'THIS GROUP NOT SETUP' message will appear in the Operational Display.

7. The user may continue with all other ALE operations.

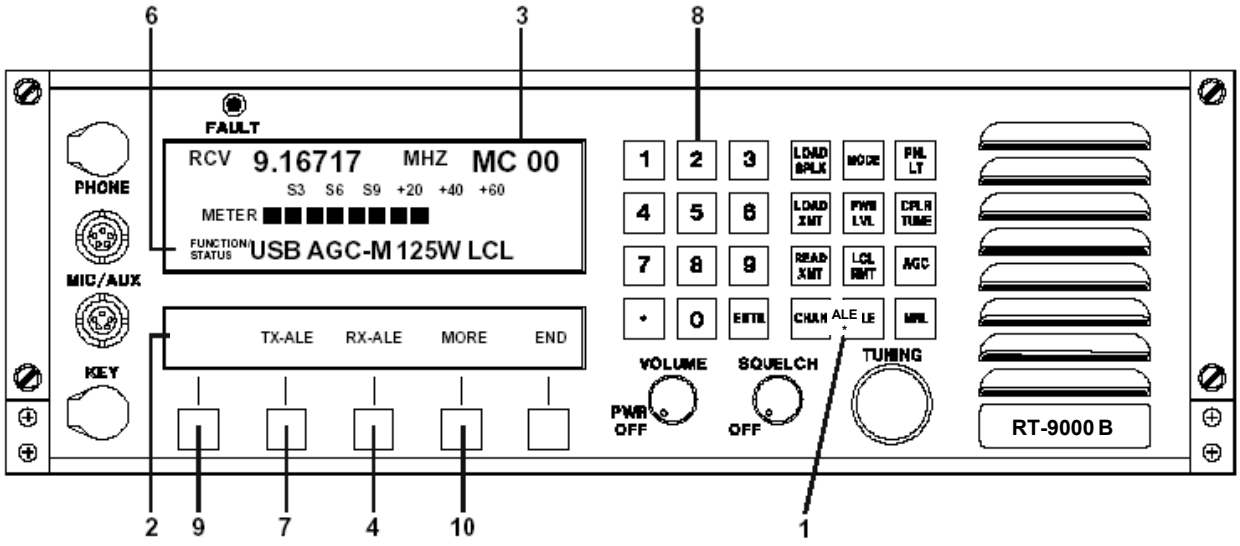


Figure 7.3.4.13 ALE Operation Feature Menu

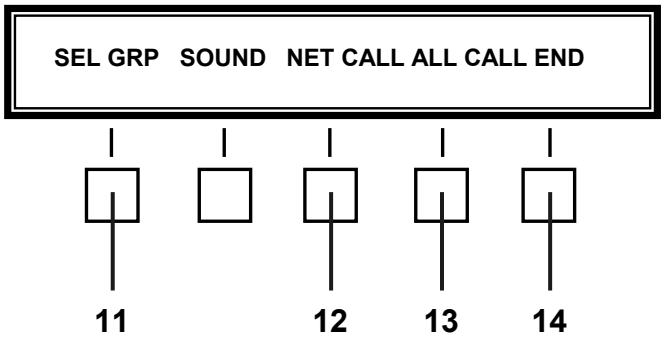


Figure 7.3.4.14 ALE Calling Feature Menu

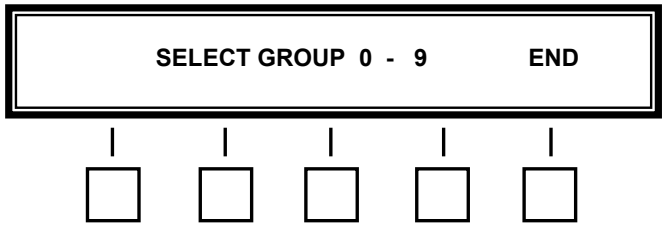


Figure 7.3.4.15 ALE Channel Group 'Select Group' Feature Menu

7.3.4.3.2 ALE Receive Operation

ALE Receive operation places the RT-9000B's Receiver and ALE system in a mode that permits the RT-9000B to monitor and automatically respond to ALE calls from other Network Stations. The RT-9000B MUST BE set in Receive scan ('RX-ALE') mode for these capabilities to function. Perform the following steps to enable ALE Receive scanning and operation:

1. Depress the '*'/'ALE' key at **1** as shown in Figure 7.3.4.13. The Feature Menu shown in this same figure will appear after the key is depressed.

2. Confirm or select the correct Channel Group as described in the previous section (7.3.4.3.1).

3. Depress the 'RX –ALE' key at **4** to start the ALE Receive scanning process. The Operational Display may initially display a 'PLEASE WAIT' message for approximately 7-10 seconds immediately following 'RX-ALE' key depression. This message will automatically clear and change to 'ALE RECEIVE' with all other normal Receive information disappearing. After Receiver scanning begins, the 'TX-ALE' and 'RX-ALE' selections in the Feature Menu Display will also disappear.

4. After the 'ALE RECEIVE' message appears in the Operational Display, the Receiver will begin scanning. The operating frequency and Channel information sections of the Operational Display will begin changing approximately every 1/2 second to indicate the instantaneous Receiver settings during Receiver scanning.

RT-9000B ALE Receive operation is designed to receive and to appropriately react to ALE calls from other Network stations. The RT-9000B will respond to the four (4) supported calling methods previously specified.

The ALE system automatically monitors all incoming ALE calls that are addressed, or apply, to any of your station SELF IDs for each established ALE Network. This capability DOES NOT require any ALE Network selection nor operation action for proper operation.

RT-9000B responses to received ALE calls are covered in detail for each supported calling method later in this section.

To cause Receiver scanning to stop, depress either the 'END' key or the 'MORE' key on the Feature Menu. No other choices appear on the Feature Menu Display.

- Depressing the 'END' key causes Receiver scanning to stop and immediately leave ALE mode and return to the Main Menu.

- Depressing the 'MORE' key causes Receiver scanning to also stop but the Feature Menu will revert to that shown in Figure 7.3.4.14.

After returning to Feature Menu shown in Figure 7.3.4.14, the user may choose any of the following actions:

a) Perform any of the ALE functions appearing on the Feature Menu shown in Figure 7.3.4.14.

b) Return to ALE Receive operation and resume scanning. Depressing the 'ALE/*' key at **1** as shown in Figure 7.3.4.13 will cause the Feature Menu shown in Figure 7.3.4.13 to reappear. Depress 'RX-ALE' to resume ALE Receive scanning.

c) Leave ALE Operating mode and return to the Main Menu. Depressing the 'END' key at **14** will cause the Feature Menu shown in Figure 7.3.4.13 to reappear. Depress 'END' again to return to the Main Menu.

7.3.4.3.3 ALE Transmit Operation

The RT-9000B ALE system supports four (4) different ALE calling methods used to communicate with other Network Stations. The following supported calling methods are covered in detail later in this section.

A) Point-to-Point Calling
B) Sounding
C) NET CALL Calling
D) ALL CALL Calling

Before initiating any ALE call, the operator must confirm or select the following: 1.) operating frequency Channel Group and 2.) the ***Current Network*** ALE Network

Unless the operator is changing to new operating frequencies, the Channel Group selection used for ALE Transmit operations will be the same Channel Group used for ALE Receive operation. No operator action will be required.

Confirmation or selection of the correct ALE ***Current Network*** is absolutely essential for proper ALE system function. Perform the following steps to confirm or change the ALE ***Current Network***.

1. Navigate to the RT-9000B front panel display shown in Figure 7.3.4.5.

2. Depress the 'ALE-ID' key. The Feature Menu Display shown in Figure 7.3.4.6 will appear.

3. Depress the 'NET-ID' key. The Feature Menu Display will change to that shown in Figure 7.3.4.8 as described in the beginning of the paragraph dealing with Network ID Entry. Inspect the appropriate area of the Operational Display and note the Network Number and Name when it first appears.

4. If the indicated Network (which is the ***Current Network***) IS the desired Network, depress the 'END' key. The Feature Menu Display shown in Figure 7.3.4.6 will re-appear. Depress the 'END' key again. The RT-9000B front panel display shown in Figure 7.3.4.5 will reappear. The user may continue operations and skip steps 5, 6 and 7.

5. If the indicated Network (which is the ***Current Network***) IS NOT the desired Network, select the desired Network by rotating the 'TUNING" knob until the desired appears and stop..

6. Depress the Enter ('ENTR') key, then the 'END' key. The Feature Menu Display shown in Figure 7.3.4.6 will re-appear.

7. Depress the 'END' key again. The RT-9000B front panel display shown in Figure 7.3.4.5 will reappear. The user may return to ALE Operation and continue ALE Transmit calling operations.

Once the operating frequency Channel Group and the ALE ***Current Network*** is confirmed, the operator may proceed to detailed operating instructions that follow for each calling method.

7.3.4.4 Point-to-Point Calling

The Point-to-Point Calling method is used to call a specific Network Station on all frequencies (or Channels) in the currently selected Channel Group. A Point-to-Point Call expects a response from the Called Station.

When the RT-9000B initiates a Point-to-Point Call, it will transmit its call on the first frequency in the Channel Group and then listen for a response before it moves to the next frequency and repeats the process. Calling will continue until a response is received or the Point-to-Point Calling sequence ends. The initiating station of a Point-to-Point Call will proceed through the selected Channel Group (calling and listening on each frequency, in sequence) up to two (2) complete times if a response is NOT received.

7.3.4.4.1 Transmitting a Point-to-Point Call

To transmit a Point-to-Point ALE call to another Network station, perform the following steps:

1. Select the CALL ID of the Called Station for a Point-to-Point Call using the process described at the end of section 7.3.4.2.2.4 Entering Network Station CALL IDs.

2. Depress the '*'/'ALE' key. The front panel display shown in Figure 7.3.4.13 will appear.

3. Depress the 'TX-ALE' (Transmit ALE) key at **7** to initiate the call to the selected station on the frequencies in the selected Channel Group.

4. While the calling process is underway, the Operational Display will indicate the CALL ID of the station being called and the frequency & Channel Number being used at that instant to transmit the call. Transmission on each channel continues for approximately 3 seconds before changing to the next channel in the Channel Group.

5. ALE signaling tones may also be heard during the Initiating Station's Receive period as they being transmitted back from the from the Called Station.

6. Figure 7.3.4.16 shows an example of how the Operational Display appears during the calling process.

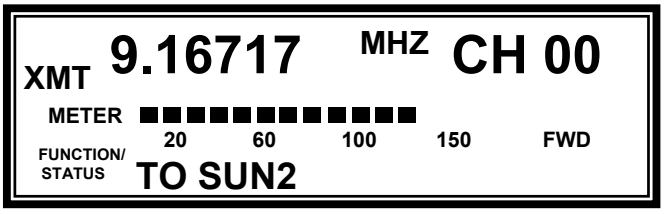


Figure 7.3.4.16 ALE Point-to-Point Call - Initiating Station Display

When Linking occurs, ALE Transmit calling (TX-SCAN) will cease and the message shown in Figure 7.3.4.17 will appear. Immediately after Linking, four (4) loud tones approximately 1/2 second long, in an On-Off sequence, will be emitted from the Front Panel Speaker and signify Linking has occurred. The audio output level of these alerting tones is fixed and not affected by the Front Panel 'VOLUME' control setting. Disabling the Front Panel Speaker, however (as described earlier in 7.3.3.3), will silence the tones.

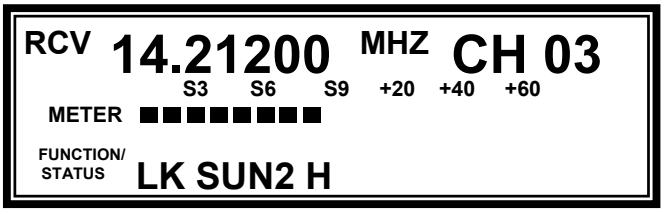


Figure 7.3.4.17 ALE Point-to-Point Call - Initiating Station - After Linking

The Operational Display shown in Figure 7.3.4.17 indicates the following information: 1) Operating frequency and Channel Number used for Link, 2) 'LK' = a Link has been completed, 3) 'SUN2' = station CALL ID of the station "Linking back" to the Initiating Station, and 4) 'H' = Link Quality Analysis (LQA) value of the received frequency. The table shown in Figure 7.3.4.18 gives Displayed Link Quality Analysis (LQA) Value vs. SINAD conversion values.

Selecting or depressing any Feature Menu key while a Link is intact will cause a "Link Terminate" message to be transmitted and the "Break Link Process" to occur. A 'LINK TERMINATE' message will briefly appear in the Operational Display and then automatically clear. This "Break Link Process" provides a means for the Initiating Station to abandon an existing Link and perform other tasks.

If the Initiating Station calls and attempts to Link with the Called Station two (2) times on each frequency and is unable to complete a Link, Calling (Transmit scanning) will cease and the following message will appear in the Operational Display.

'TX-SCAN TERMINATED'

At this point, the Initiating Station originating the call may do the following:

a) Repeat the Point-to-Point Call. Depressing the 'ALE/*' key at **1** as shown in Figure 7.3.4.13 will cause the Feature Menu shown in Figure 7.3.4.13 to reappear. Depress 'TX-ALE' to repeat the Point-to-Point call.

b) Repeat the Point-to-Point Call using a different Channel Group with different operating frequencies, if available.

c) Place the RT-9000B in ALE Receive scan and try to Link later. The Called station may be busy or propagation unfavorable at this time.

d) Perform other ALE operations.

e) Leave ALE Operating mode and return to the Main Menu. Depressing the 'END' key will cause the RT-9000B to immediately leave ALE mode, return to the Main Menu, and resume normal operation.

Displayed LQA Value
vs
SINAD Measurement

Displayed LQA Value	dB SINAD	Displayed LQA Value	dB SINAD	Displayed LQA Value	dB SINAD
1	1	B	11	L	21
2	2	C	12	M	22
3	3	D	13	N	23
4	4	E	14	O	24
5	5	F	15	P	25
6	6	G	16	Q	26
7	7	H	17	R	27
8	8	I	18	S	28
9	9	J	19	T	29
A	10	K	20	U	30

Notes:
1. LQA = Link Quality Analysis
2. SINAD = Signal + Noise + Distortion - to - Noise + Distortion Ratio

Figure 7.3.4.18 Link Quality Analysis Values vs. SINAD Values

7.3.4.4.2 Receiving a Point-to-Point Call

To receive an ALE Point-to-Point, the RT-9000B must currently be in ALE Receive ('RX-ALE') mode and scanning. The Channel Group currently selected should include all or most of the same frequencies being used by the Initiating Station.

The following describes the sequence of events when receiving a Point-to-Point Call:

1. With the RT-9000B-equipped Distant Station in ALE Receive ('RX-ALE') mode and scanning, the RT-9000B will stop scanning on the received frequency when it receives an ALE transmission. Non-ALE transmissions on any frequency(s) in the Channel Group will only pass through during the brief 1/2 second scan interval but NOT cause the Receiver to stop scanning.

2. If the ALE transmission DOES NOT contain the station CALL ID of the RT-9000B-equipped station hearing the call, the RT-9000B will pass through the ALE signaling tones but NOT transmit an ALE response.

3. If the ALE transmission DOES contain the station CALL ID of the RT-9000B-equipped station hearing the call, the RT-9000B will pass through the ALE signaling tones, determine the appropriate action, and transmit an ALE response.

4. The Initiating Station will normally transmit the ALE Point-to-Point call on every frequency (Channel) in the selected Channel Group and measure the received responses BEFORE Linking. In this way, both Initiating and Called stations acquire the data needed to calculate Link Quality Analysis (LQA) values for each frequency and its current condition. For large Channel Groups with many frequencies, this step and its actions may occupy more time than the user might expect without an apparent result.

5. After working through the Channel Group once, the Initiating Station will normally proceed directly to the frequency (Channel) with the best LQA value and attempt to Link with the Called Station.

NOTE: If the Initiating and Called stations were previously Linked within approximately the last two (2) hours but not currently Linked, a new attempt to re-establish the Link will usually proceed directly to the last used Linking frequency. If either station's equipment was been powered down or the previous Link was terminated more than two (2) hour ago, Linking attempts will likely execute the entire calling process without any shortcuts.

6. Figure 7.3.4.19 shows an example of how the Called Station's Operational Display appears after the Linking process is finished.

7. Once the Link is established, the same alerting tones as those used for "Transmitting a Point-to-Point Call" are sounded to alert the operator that a call was received and a Link established. This alerting feature is particularly useful in operating environments where to operators are doing many different things at the same time and need an effective notification mechanism..

8. This Link will remain intact for up to approximately two (2) hours. If no activity occurs with this time period, the RT-9000B will transmit a "Link Terminate" message and abandon the Link. Any activity within the two (2) hour interval resets the timer to its original time limit. The transmission information displayed in Figure 7.3.4.19 will remain intact until more recent ALE activity overwrites it or the operator leaves ALE mode.

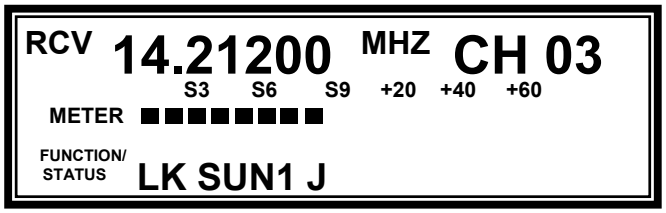


Figure 7.3.4.19 ALE Point-to-Point Call - Called Station Display - After Linking

The Operational Display shown in Figure 7.3.4.19 indicates the following information: 1) Operating frequency and Channel Number, 2) 'LK' = Link established, 3) 'SUN1' = station CALL ID this station is Linked with, and 4) 'J' = Link Quality Analysis (LQA) value of the Linking frequency. The table shown in Figure 7.3.4.18 gives Displayed Link Quality Analysis (LQA) Value vs. SINAD conversion values.

Selecting or depressing any Feature Menu key while a Link is intact will cause a “Link Terminate” message to be Transmitted and the “Break Link Process” to occur. A ‘LINK TERMINATE’ message will briefly appear in the Operational Display and then automatically clear.

If the Initiating Station terminates the link, this station (the Called Station) will automatically revert to ALE Receive (‘RX-ALE’) mode and resume scanning.

7.3.4.5 SOUNDING

Sounding is a calling method that transmits a one-way signal on each frequency in the currently selected Channel Group to all Network stations. Sounding, of course, does not expect a response.

Sounding transmissions are used to update the signal propagation information stored in each Network Station’s equipment. This information allows Network Stations to establish ALE links more quickly by choosing frequencies with the best current conditions. The Sounding process is not required for contact with other stations employing SUNAIR ALE Modems, since Link Quality Analysis (LQA) exchanges are always performed as part of the Linking process and retained in memory for approximately 2 hours.

7.3.4.5.1 Manually Transmitting a SOUND

To manually transmit a Sound, depress the ‘*’/'ALE' key at **1** as shown in Figure 7.3.4.13. Depressing the ‘MORE’ key at **10** will cause the Feature Menu display shown in Figure 7.3.4.20 to appear.

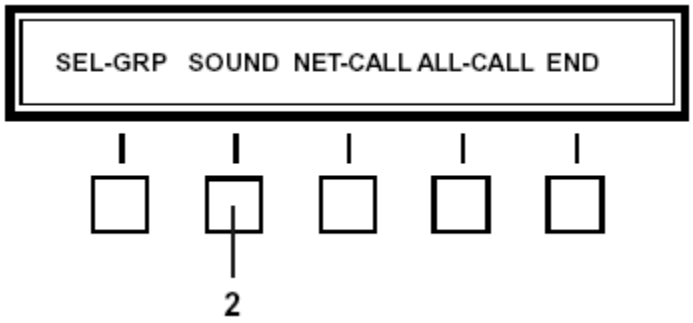


Figure 7.3.4.20 ALE Calling Feature Menu

Depressing the ‘SOUND’ key at **2** will cause the Feature Menu shown in Figure 7.3.4.21 to appear.

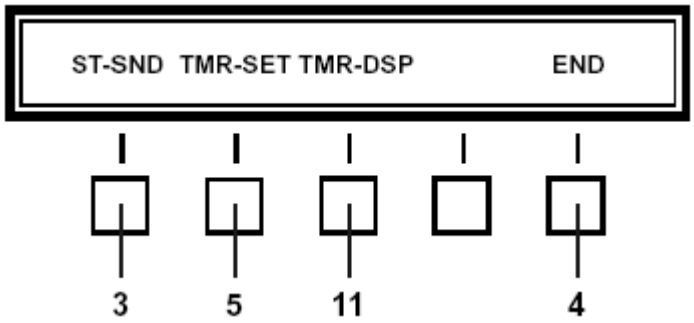


Figure 7.3.4.21 ALE Sounding Feature Menu

Depressing the 'ST-SND' (Start Sound) key at **3** will initiate the Sounding process and transmit on every frequency (Channel) in the currently selected Channel Group. The Operational Display shown in Figure 7.3.4.22 will appear and indicate the following information: 1) Transmitter operation ('XMT'), 2) Operating frequency and Channel Number, and 3) 'SOUNDING' = Sounding transmission is being transmitted.

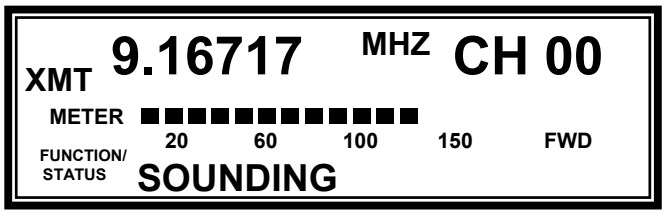


Figure 7.3.4.22 ALE Sounding – Initiating Station Display

After the Sounding process has finished, the Operational Display will continuously display a 'TX-SCAN TERMINATED' message. The Feature Menu will remain unchanged from that shown in Figure 7.3.4.21.

At this point, the station Transmitting the Sounding call may do the following:

a) Repeat the Sounding transmission. Depressing the 'ST-SND' (Start Sound) key again will re-transmit the Sounding transmission.

b) Leave the 'Sounding' Menu and return to the ALE Transmit ('TX-ALE') and Receive ('RX-ALE') menu. Depressing the 'END' key at **4** will cause the Feature Menu shown in Figure 7.3.4.13 to reappear. Normal ALE operation may continue.

c) Leave ALE Operating mode and return to the Main Menu. After returning to ALE Transmit ('TX-ALE') and Receive ('RX-ALE') menu as described in step b) above, depressing the 'END' key once again will cause the RT-9000B to immediately leave ALE mode, return to the Main Menu, and resume normal operation.

NOTE: From time to time, the sounding process may skip certain channels and not sound on those frequencies. This is a normal occurrence; the system monitors each channel before Sounding. Depending on the channel activity, the RT-9000B may or may not transmit if the Channel is busy.

7.3.4.5.2 Receiving a SOUND

To receive an ALE Sounding transmission, the RT-9000B must currently be in ALE Receive ('RX-ALE') mode and scanning. The Channel Group currently selected should include all or most of the same frequencies being used by the Initiating Station. When the RT-9000B receives a Sounding transmission, Receiver scanning will stop on the frequency of the Sounding transmission.

The Operational Display shown in Figure 7.3.4.23 will indicate the following information: 1) Operating frequency and Channel Number, 2) 'SO' = Sounding transmission is being received, 3) 'SUN1' = station CALL ID of the station transmitting the Sound, and 4) 'F' = Link Quality Analysis (LQA) value of the received Sounding frequency.

As each Sounding transmission is received, the Receiver will stop scanning and display the received signal characteristics. When the Sounding station briefly stops transmitting to change to the next Sounding frequency, the Receiving station will momentarily resume scanning until receiving the new frequency and then stop scanning again. If the Sounding station transmits using any transmitting frequency(s) the Receiver does not have, the Receiver will merely revert to scanning while those transmissions are occurring but stop again when receiving the remaining Sounding transmissions. Due to signal processing delays, the displayed LQA value is actually that of the previous Sounding frequency immediately preceding the current one.

When the Sounding transmission concludes, the Receiver Operational Display will continue to display the last received Sounding transmission information until more recent ALE activity overwrites it or the operator leaves ALE mode.

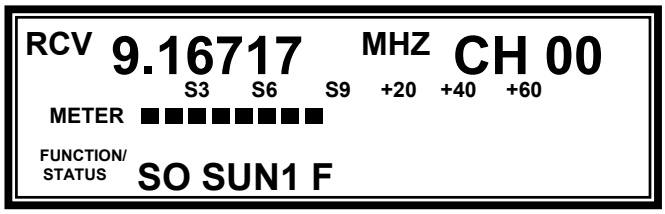


Figure 7.3.4.23 ALE Sounding – Receiving Station Display

7.3.4.5.3 Automatically Transmitting a SOUND

Automatic Sounding capability is available and automates the Sounding process. Depressing the 'TMR-SET' (Timer Setting) key at **5** as shown in Figure 7.3.4.21 will cause the Feature Menu shown in Figure 7.3.4.24 to appear. Automatic Sounding may be programmed to occur from 1 to 90 minutes in one-minute steps.

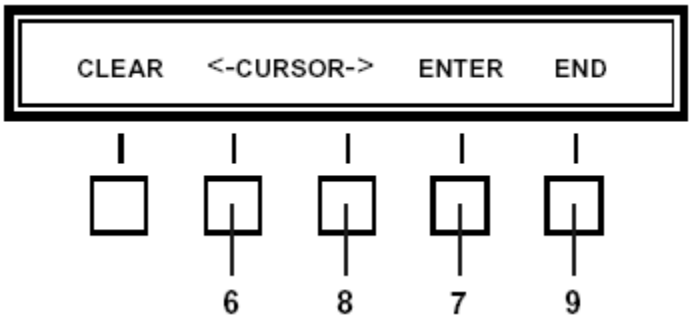


Figure 7.3.4.24 ALE Sounding - ALE Automatic Sounding Timer Feature Menu

The Operational Display will briefly display an 'ENTER CODE WITH DIAL' message and will automatically change to:

'*XX* TIME INTERVAL'

Where, *XX* = Current Sounding Timer Setting

When the Sounding Timer Display first appears, the blinking cursor will be positioned in the minute units (or right-hand most digit). Rotate the 'TUNING' dial to select any digit between '0' and '9'. Once the desired digit appears in the first position, depress the '<-- CURSOR' key at **6** to move the blinking cursor to the minute tens position (or left-hand most digit).

Once the time interval has been selected, depressing the 'ENTER' key at **9** , will return the display to that shown in Figure 7.3.4.21. Depressing 'END' once again returns the display to that shown in Figure 7.3.4.13.

Depress the 'RX-ALE' key at **4** to enter ALE RECEIVE mode. The RT-9000B must be in ALE RECEIVE mode for the Automatic Sounding capability to operate. Sounding signals will now be automatically transmitted on each frequency in order, unless the equipment is in the process of linking or is already linked.

Once a Sounding transmission has been completed, it will automatically repeat at intervals determined by the preceding Sounding Timer entry. Automatic Sounding may be disabled by entering a Sounding interval of '00 Minutes' in the Sounding Timer. The length of time until the next Sounding transmission may be checked as follows:

1. While the RT-9000B is in ALE RECEIVE mode, depress the 'MORE' key at **10**. The Feature Menu Display will change to that shown in Figure 7.3.4.20.

2. Depressing the 'SOUND' key at **2** will cause the Feature Menu Display to change to that shown in Figure 7.3.4.21.

3. Depress the 'TMR-DSP key at **11**. The time to next Sound will be given in a message that appears in the Operational Display. This message will appear as follows:

   '*XX* TIME INTERVAL'

   Where, *XX* = Current Sounding Timer Setting

4. Depressing the 'END' key at **4** will cause the Feature Menu Display to revert to that shown in Figure 7.3.4.13.

7.3.4.6 NET CALL

The NET CALL calling method calls all Network stations on a single frequency (or Channel) during the same call. A NET CALL expects responses from all Network Stations that hear the call.

7.3.4.6.1 Transmitting a NET CALL

Depressing the '*'/'ALE' key will cause the Feature Menu shown in Figure 7.3.4.13 to appear. Select the desired Calling frequency (Channel) by rotating 'TUNING' knob until the desired is viewed.

Depress the 'MORE' key at **10** as shown in Figure 7.3.4.13. The Feature Menu Display will change to that shown in Figure 7.3.4.14. Depress the 'NET-CALL' key at **12**. The system will begin calling all Network stations. The Operational Display will change to that shown in Figure 7.3.4.25.

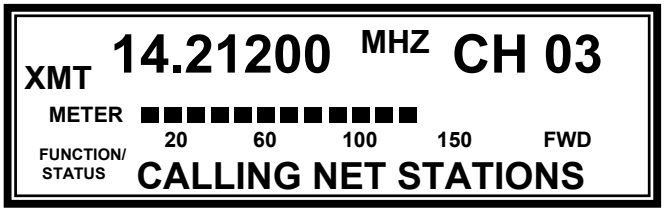
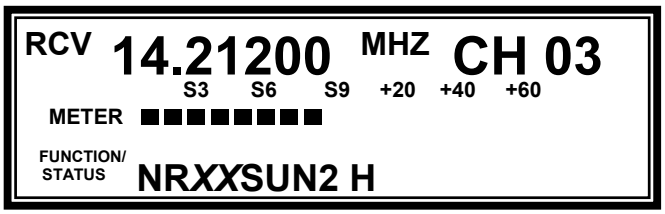


Figure 7.3.4.25 ALE 'NET CALL' - Initiating Station Display

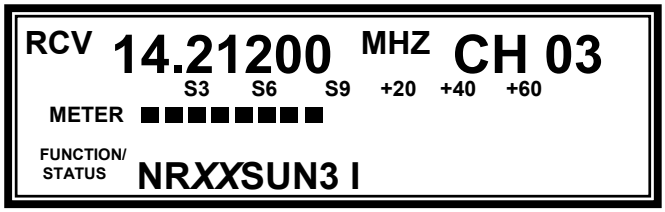
At the end of the NET CALL Transmission, the RT-9000B will revert to Receive scanning and listen for Network responses. If the NET CALL transmission was heard by other stations in the Network, their responses will begin to appear on the Operational Display as shown in Figures 7.3.4.26 and 7.3.4.27 and in their pre-determined time slots (approximately 2 seconds apart). The RT-9000B supports multiple-network capability and will append the RT-9000B's local ALE Network Number where the responding station's CALL ID resides to the "NR" Operation Indicator.



In this example, **NR*XX*SUN2 H** *XX* = The RT-9000B Network Number in which the Responding station's CALL ID, **SUN2** is contained.

Figure 7.3.4.26 ALE 'NET CALL' – Initiating Station - Response Display (from SUN2)

Figure 7.3.4.27 shows the same type of "Net Response" (NR) information as shown in Figure 7.3.4.26, except that it shows a different Station is responding to the same NET CALL transmission.



In this example, **NR*XX*SUN3 I** *XX* = The RT-9000B Network Number in which the Responding station's CALL ID, **SUN3** is contained.

Figure 7.3.4.27 ALE 'NET CALL' – Initiating Station - Response Display (from SUN3)

All responses and associated Link Quality Analysis (LQA) values will automatically be stored in memory for future use. After all responses (if any) are finished, the RT-9000B will broadcast an acknowledgement and establish a Link. General traffic may be passed at this time.

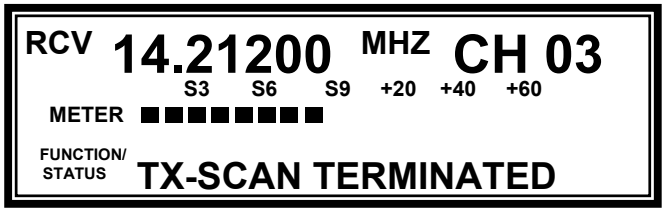


Figure 7.3.4.28 ALE 'NET CALL' – Initiating Station – 'Transmit Scan Terminated' Display

After the NET CALL process is finished, the Operational Display will appear as shown in Figure 7.3.4.28. The RT-9000B will remain on the same frequency (Channel) used for the NET CALL but the ALE system in an inactive state. The following message will appear in the Operational Display:

'TX-SCAN TERMINATED'

The Feature Menu will appear as shown in Figure 7.3.4.14. At this point, the Initiating Station originating the NET CALL may do the following:

a) Repeat the NET CALL. Depressing the 'NET CALL' key at **12** will re-transmit the NET CALL on the same frequency (Channel).

b) Repeat the NET CALL on a different frequency (Channel). Manually select a new Channel by rotating the 'TUNING' knob. Depress the 'NET CALL' key again to repeat the NET CALL.

c) Perform other ALE operations.

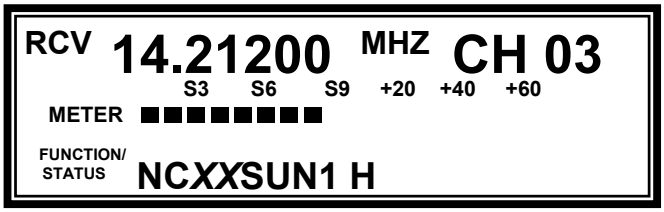
d) Leave ALE Operating mode and return to the Main Menu. Depressing the 'END' key will cause the RT-9000B to immediately leave ALE mode, return to the Main Menu, and resume normal operation.

7.3.4.6.2 Receiving a NET CALL

To receive an ALE NET CALL, the RT-9000B must currently be in ALE Receive ('RX-ALE') mode and scanning. The Channel Group currently selected must contain, as a minimum, the same frequency being used by the Initiating Station to transmit the NET CALL.

A better practice would be to have the selected Channel Group contain all of the same frequencies being used by the other Network stations. This suggestion is based on the fact that prevailing signal propagation conditions might require the NET CALL be re-transmitted on more than one frequency to reach the intended Network stations. Network stations must be prepared to use alternate frequencies.

Figure 7.3.4.29 shows the RT-9000B response when initially receiving a NET CALL. The RT-9000 supports multiple-network capability and will append the RT-9000B's local ALE Network Number where the Initiating station's CALL ID resides to the "NC" Operation Indicator.



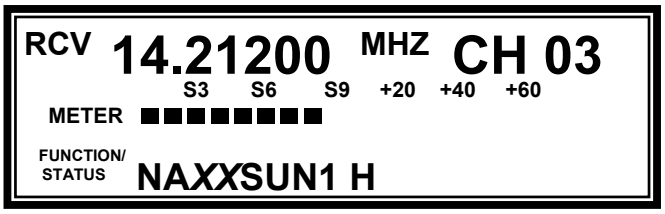
In this example, **NC*XX*SUN1 H** *XX* = The RT-9000B Network Number in which the Initiating station's CALL ID, **SUN1** is contained.

Figure 7.3.4.29 ALE 'NET CALL' – Receiving Station Display

After listening for responses from Network stations, the Initiating station will broadcast a "Net Acknowledgement" ('NA') message to all Network stations. After general traffic has been passed, the RT-9000B-equipped station will continue to listen. If no additional traffic is heard for approximately 30 seconds, the RT-9000B-equipped station will automatically resume Receive scanning.

Figure 7.3.4.30 shows the "Net Acknowledgement" message received and displayed by the RT-9000B-equipped station. The RT-9000B will append the RT-9000B's local ALE Network Number where the Initiating station's SELF ID resides to the "NA" Operation Indicator.

After the NET CALL process is finished, the RT-9000B will resume Receiver scanning but continue to display the last NET CALL transmission information until more recent ALE activity overwrites it or the operator leaves ALE mode.



In this example, **NA*XX*SUN1 H** *XX* = The RT-9000B Network Number in which the Initiating station's CALL ID, **SUN1** is contained.

Figure 7.3.4.30 ALE 'NET CALL' – Receiving Station – 'Net Acknowledgement' Display

7.3.4.7 ALL CALL

The ALL CALL calling method calls all Network Stations on a single frequency (or Channel) during the same call. An ALL CALL does not expect a response.

The ALL CALL calling method can be used to broadcast a message, usually an Automatic Message Display (AMD) message to all stations. Using the AMD capability requires use of an external terminal for message composition and reception. Refer to Section VI of the RT-9000A Operation and Maintenance manual for details.

7.3.4.7.1 Transmitting an ALL CALL

Depressing the '*'/'ALE' key will cause the Feature Menu shown in Figure 7.3.4.13 to appear. Select the desired Calling frequency (Channel) by rotating 'TUNING' knob until the desired is viewed.

Depress the 'MORE' key at **10** as shown in Figure 7.3.4.13. The Feature Menu Display will change to that shown in Figure 7.3.4.14. Depress the 'ALL-CALL' key at **13**. The system will begin calling all Network stations and the Operational Display will change to that shown in Figure 7.3.4.31.

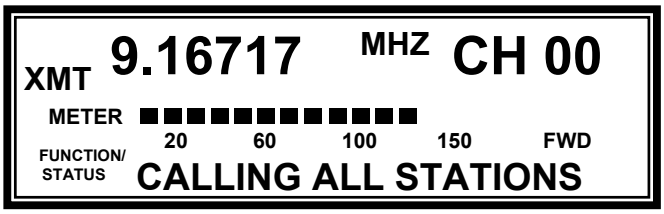


Figure 7.3.4.31 ALE 'ALL CALL' - Initiating Station Display

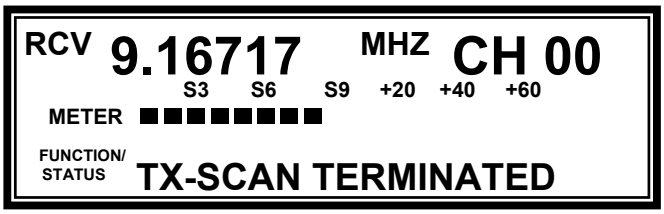


Figure 7.3.4.32 ALE 'ALL CALL' – Initiating Station – 'Transmit Scan Terminated' Display

After the ALL CALL process is finished, the Operational Display will appear as shown in Figure 7.3.4.32. The RT-9000B will remain on the same frequency (Channel) used for the ALL CALL but the ALE system will be inactive and displaying a 'TX-SCAN TERMINATED' message. The Feature Menu Display will appear as shown in Figure 7.3.4.14. At this point, the Initiating Station may do the following:

a) Repeat the ALL CALL. Depressing the 'ALL CALL' key at **13** will re-transmit the ALL CALL on the original frequency (Channel).

b) Repeat the ALL CALL on a different frequency (Channel). Manually select a new Channel by rotating the 'TUNING' knob. Depress the 'ALL CALL' key again to re-transmit the ALL CALL on the new Channel.

c) Perform other ALE operations.

d) Leave ALE Operating mode and return to the Main Menu. Depressing the 'END' key will cause the RT-9000B to immediately leave ALE mode, return to the Main Menu, and resume normal operation.

7.3.4.7.2 Receiving an ALL CALL

To receive an ALE ALL CALL, the RT-9000B must currently be in ALE Receive ('RX-ALE') mode and scanning. The Channel Group currently selected must contain, as a minimum, the same frequency being used by the Initiating Station to transmit the ALL CALL.

A better practice would be to have the selected Channel Group contain all of the same frequencies being used by the other Network stations. This suggestion is based on the fact that prevailing signal propagation conditions might require the ALL CALL be re-transmitted on more than one frequency to reach all intended Network stations. Network stations must be prepared to use alternate frequencies.

The Operational Display shown in Figure 7.3.4.33 indicates the following information: 1) Operating frequency and Channel Number, 2) 'AC' = an ALL CALL is being received, 3) 'SUN1' = station CALL ID of station transmitting the ALL CALL, and 4) 'E' = Link Quality Analysis (LQA) value of the received frequency. The table shown in Figure 7.3.4.18 gives Displayed Link Quality Analysis (LQA) Value vs. SINAD conversion values.

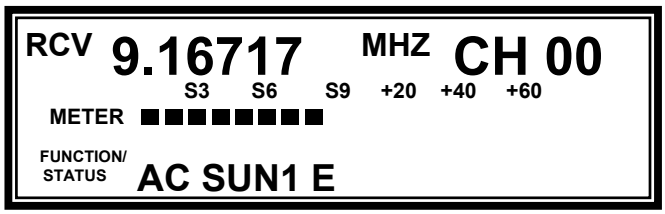


Figure 7.3.4.33 ALE 'ALL CALL' – Receiving Station Display

At the conclusion of the ALL CALL broadcast, the RT-9000B will remain on the frequency (Channel) and allow the Initiating Station to send further messages. If no message is received within 30 seconds, the RT-9000B will resume Receiver scanning. The Operational Display will continue to indicate the last ALL CALL transmission information until more recent ALE activity overwrites it or the operator leaves ALE mode.

7.3.4.8 BREAK LINK PROCESS

From time to time it may be necessary to break a Link with another station, particularly if it is unmanned. This allows both stations to abandon the current Link and resume other operations. Either linked station may initiate the Break Link action.

Depressing any key selection on the Feature Menu Display shown in Figure 7.3.4.34 will cause the RT-9000B to transmit a "Link Terminate" message and achieve this result.

If an RT-9000B-equipped station receives a "Link Terminate" message, it will take the appropriate action and resume Receiver scanning.

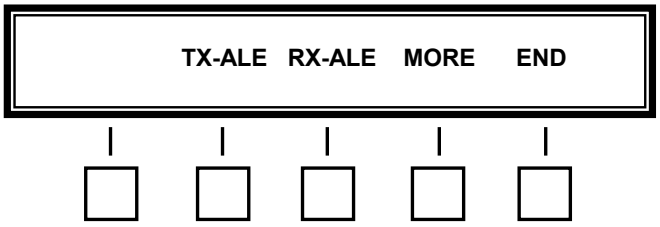


Figure 7.3.4.34 ALE Break Link Keys

Document No. 8128000560
Software Revision – N1B (07 Oct 04)

7.3.4.9 OPTIONS

7.3.4.9.1 High-Stability Reference Oscillator & Oven

If the High-Stability Reference Oscillator option is installed, additional warm-up time will be required for both initial operation and full-specification accuracy. This option uses an Ovenized Frequency Standard. The Frequency Standard must reach a specific internal temperature to achieve its frequency accuracy and stability specifications. Warm-up time requirements will be influenced by both storage conditions and recent operating history. Units stored near the low temperature specification limit or shutdown for prolonged time periods will require considerably more warm-up time.

The operator must consider these requirements and their effect on initial performance when using this equipment. This condition can be avoided by keeping the RT-9000B continuously powered-up. This practice is considered normal for equipment with High-Stability Frequency Standards. The benefits offered by this option are available and convenient only if the unit is kept continuously powered-up.

Besides frequency accuracy and stability considerations, there are a few temporary effects that are uniquely related to RT-9000B Transceiver and its operation during the warm-up period. The following statements summarize this behavior.

1. Units stored at low temperatures or powered-down for prolonged periods of time may intermittently display 'OVEN WARM UP' messages for up to sixty (60) minutes after initial power-up.

2. During initial power-up, RT-9000B operation will be inhibited and its I/O capability locked out between two (2) and thirty (30) minutes, depending on the unit's last use and storage conditions.

3. Inhibited and Normal operation indications will depend on the whether the optional F-9800 Preselector is present in the system and the RT-9000B has been properly configured for its use. The following describes these indications:

   a) F-9800 Preselector Present

      Immediately after power-up, and for at least two (2) minutes, all RT-9000B operations will be inhibited. During this period, no Front Panel control keys should be depressed or any use attempted. After this period elapses, the Feature Menu will automatically change to the Pre-selector Selection Menu shown in Figure 7.3.4.37. Operation at reduced accuracy will now be possible until the Oven stabilization period elapses.

      If the Front Panel 'FAULT' lamp is lit or warning messages are still appearing, more time warm-up time is required. This period should not exceed 30 minutes.

   b) F-9800 Preselector NOT Present

      Immediately after power-up, and for at least two (2) minutes, all RT-9000B operations will be inhibited. During this period, no Front Panel control keys should be depressed or any use attempted.

      After this period, operation will be possible even if the 'FAULT' lamp is lit or warning messages are still appearing. Operation will be possible at reduced accuracy until the specified Oven stabilization period elapses.

4. During the first 60 minutes of operation while the Frequency Standard Oven is stabilizing, using the Built-In-Test-Equipment (BITE) function may produce erroneous failures. After this time, all BITE test failures should be considered genuine and appropriately addressed.

5. Any Power interruption will cause of the normal start-up I/O lockout period previously described to occur. An AC Power Mains failure or using the Front Panel switch will have the same effect.

7.3.4.9.2 DATA Filter

Depress 'MODE' key and mode selected will be displayed on Operational Display. Choices are 'USB', 'LSB', 'CW', 'AM', and 'DATA' (see section 7.3.2.1).

If the software selection switch S1-section V on CPU PC Assembly 1A2A1 is improperly set, an erroneous indication may result and indicate that data filters are present. Consult Section V for the correct switch settings.

7.3.4.9.3 Radio Security

The RT-9000B Remote Control Unit may be equipped with a selectable security feature that prevents unauthorized personnel from 1.) viewing the remote RT-9000B Transceiver's frequency settings from the RT-9000B's Operational Display or 2.) changing the remote RT-9000B Transceiver's frequency settings. This feature is particularity useful if the RT-9000B Remote Control Unit is to be left unattended but operational.

To enable the security feature and set access Code Number, navigate to the main menu Feature Menu Display shown in Figure 7.3.4.35. If the optional Radio Security feature has been installed, 'SECURE' will appear on the Main Menu Feature Menu Display between the 'REV' and 'SELCAL' selections.

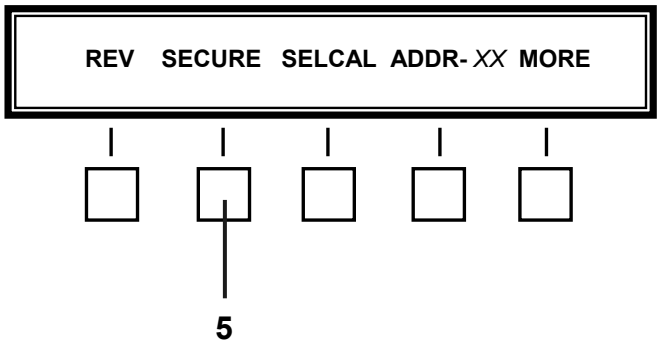


Figure 7.3.4.35 Main Menu containing Radio Security Selection

Depress the 'SECURE' key at **5** . The following message will appear in the Operational Display:

'ENTER CODE NUMBER'

A four-digit Code Number is then entered using the Numeric Keypad. The starting Code Number, as shipped from the factory, is 0000. As each Code Number digit is entered, a black square will appear on the right hand side of the Function/Status screen for each digit entered. After the last digit of the Code Number is entered, the Feature Menu will change to that indicated in Figure 7.3.4.36. If the Code Number entry is not completed within sixteen (16) seconds or an incorrect Code Number is entered, the following message will appear in the operational display:

'INVALID CODE NUMBER'

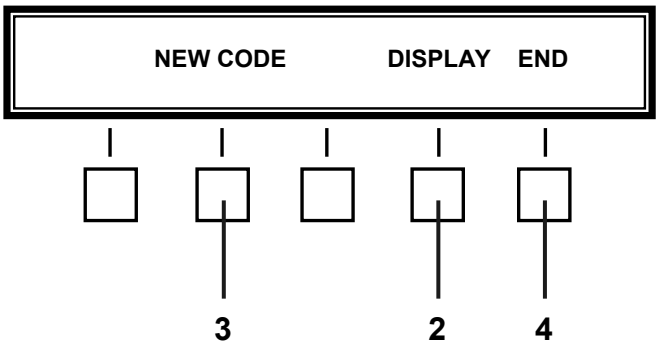


Figure 7.3.4.36 Radio Security Feature Menu

Depressing the 'DISPLAY' key at **2** will cause the front panel to return to that shown in Figure 7.3.2.7 except now the frequency portion of the Operational Display will be blank. Additionally, the three (3) Frequency-related keypad keys will be become inoperative. These keys are as follows:

'LOAD SPLX'
'LOAD XMT'
'READ XMT'

To restore the keypad keys back to operation and the Operational Display back to its normal state, depress the 'SECURE' key at **1** . The message following message will again appear in the Operational Display:

'ENTER CODE NUMBER'

Entering the four-digit Code Number will cause the Feature Menu display to change to that shown in Figure 7.3.4.36. Depressing the 'DISPLAY' key at **2** will return the Operational Display and the three (3) disabled keypad keys back to normal operation.

NOTE: If the wrong Code Number is entered or entry is not completed within twelve (12) seconds, the Operational Display will briefly display the following message:

'INVALID CODE NUMBER'

To change the Code Number to another four-digit number, perform the following procedure. This procedure also applies to initial operation and setting up a new Code Number from the initial factory setting of 0000. Depress the 'SECURE' key at **1** . The following message will appear:

'ENTER CODE NUMBER'

Enter the current four-digit Code Number, the Feature Menu will change to that shown in Figure 7.3.4.36. Depressing the ‘NEW CODE’ key **3** will cause the following message to appear:

‘ENTER CODE NUMBER’

Enter the NEW four-digit Code Number using the Numeric Keypad. The display will then revert back to that shown in Figure 7.3.4.35 and only the NEW Code Number will permit access.

Before changing the Code Number, make sure that the NEW Code Number is written down in a safe place. Once entered, it becomes the ONLY means of accessing this function to either engage or disengage radio controls.

7.3.4.9.4 Pre/Postselector

Depress the ‘MORE’ key successively at **1** until the Feature Menu display shown in Figure 7.3.4.37 appears.

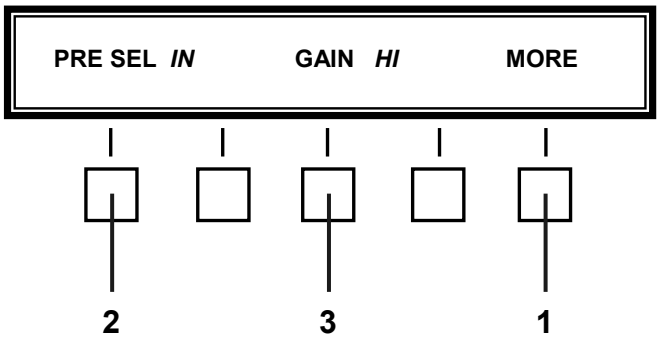


Figure 7.3.4.37 Pre/Postselector Feature Menu

Depressing the 'PRE SEL', key at **2** causes the optional Pre/Postselector to alternately switch between ‘IN’ and ‘OUT’ of operation in the System. Depressing the 'GAIN' key at **3** causes the Pre/Postselector ‘GAIN’ setting to alternately switch between the ‘HI’ and ‘LO’ setting (‘HI’ = 0 dB or ‘LO’ = -10 dB).

NOTE: When the optional Pre/Postselector is present in the system, the ‘IN/OUT’ and ‘GAIN’ Feature Menu selections will default to the following settings: 1) ‘PRE SEL’ = IN and 2) ‘GAIN’ = HI. Both selections will assume these default settings at Power-up, regardless of their settings when the RT-9000 B was last powered-down.

If the software selection switch, S1– 6, on CPU PC Assembly 1A2A1 is improperly set, an erroneous indication may result about the presence or absence of a Pre/Postselector. Consult Section V for the correct switch settings.

- End of Specifications and Operation Supplement -

TM – 8121000602

DIGITAL
HF/ISB
TRANSCEIVER

RT-9000C

INSTALLATION and HARDWARE SUPPLEMENT

SUNAIR 3005 Southwest Third Avenue, Fort Lauderdale, Florida 33315-3312

Revision Record

Revision	Date	ECN	Description
A	19 Mar 2007		Release

Printed in the United States of America

TABLE of CONTENTS

LIST of FIGURES

LIST of FIGURES (Cont…)

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SECTION 8

INSTALLATION AND HARDWARE SUPPLEMENT

8.1 Purpose

This supplement provides installation and maintenance information associated with the RT-9000C ISB Transceiver. ISB stands for Independent Sideband. ISB capability in the RT-9000C is implemented through the use completely re-designed IF and Audio Assemblies functioning together as a two board set. The re-designed assemblies rely on Digital Signal Processing (DSP) techniques to generally improve existing performance and, at the same time, implement ISB capability.

This supplement provides specific installation, maintenance, and repair information concerning the RT-9000C Transceiver model. Additional updated information is also provided for subject areas covered in the original manual to which this supplement is attached. Since the RT-9000C is based on earlier RT-9000A and RT-9000B models, this updated information also applies to those models.

While unrelated to the RT-9000C, a replacement Frequency Synthesizer was introduced approximately six years ago. The same assembly is used by the RT-9000A and RT-9000B Transceivers, T-9400 Transmitter/Exciter, and R-9200 Receiver models. This supplement provides maintenance information about this synthesizer replacement assembly.

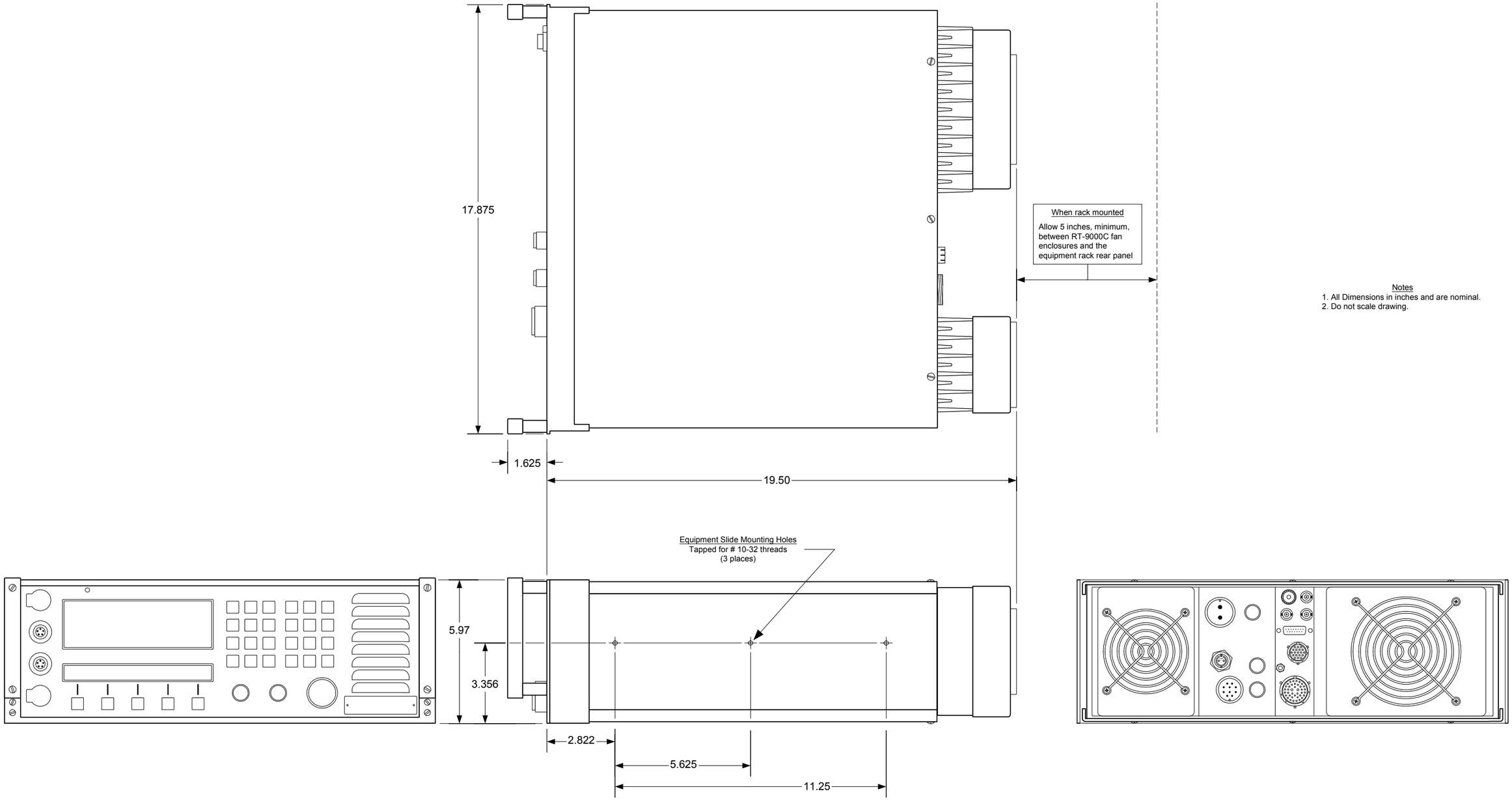
8.2 Installation

This section provides new or improved drawings used in the installation process. With noted exceptions, this information applies to all RT-9000 transceiver models (RT-9000A, RT-9000B, and RT-9000C).

Note that the connections for Audio connector J5 are unique to the ISB-capable *RT-9000C model* and must be observed. The internal audio signal routing used in the RT-9000C has been altered to accommodate ISB operation and is different from all previous RT-9000-series Transceivers. This connection scheme must be used regardless whether ISB mode is used or not.

Refer to the following chart to indicate the application of these drawings.

RT-9000-Series Installation Drawing Application				
Figure No.	Subject	Page	Application	Remarks
8.1	RT-9000C Outline Dimensions	8-3	- All models -	
8.2	RT-9000C Rack Mounting Details	8-4	- All models -	
8.3	RT-9000C Rear Panel Connector Locations	8-5	- All models -	
8.4	RT-9000C J5 AUDIO Connector Details	8-6	**RT-9000C unique**	Unique Audio connections, ISB-specific
8.5	RT-9000C J6 ACCESSORY Connector Details	8-7	- All models -	
8.6	RT-9000C J8 REMOTE Connector Details	8-8	RT-9000B and later	RS-485 no longer supported



Notes
1. All Dimensions in inches and are nominal.
2. Do not scale drawing.

Figure 8.1 *RT-9000C Outline Dimensions*

NOTE

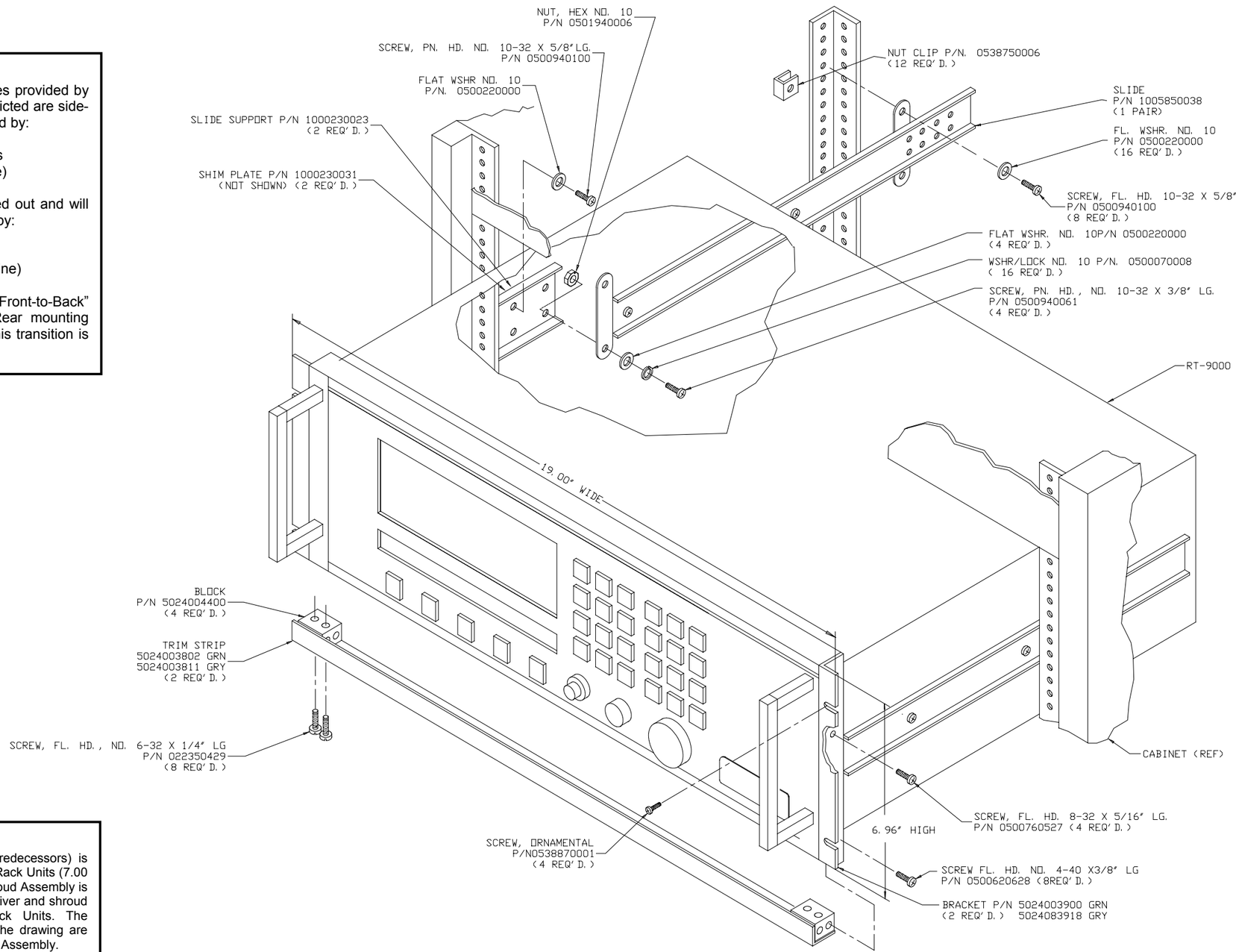
This drawing is based on rack slides provided by our current supplier. The slides depicted are side-mounted units and are manufactured by:

Crenlo, Inc. – Emcor Products
"SLIM – SLIDE®" (Product Line)

The current slides are being phased out and will be replaced by units manufactured by:

General Devices Co., Inc.
"**CHASSIS TRAK®**" (Product Line)

The new slides, however, mount "Front-to-Back" and use the Rack's Front and Rear mounting flanges instead of the side rails. This transition is pending.



NOTE

The RT-9000C Transceiver (and its predecessors) is approximately 1 inch less than four (4) Rack Units (7.00 inches) high. When the Front Panel Shroud Assembly is installed, the combination of the transceiver and shroud assembly occupies exactly four Rack Units. The "brackets, trim strips, etc." shown in the drawing are components associated with the Shroud Assembly.

Figure 8.2 *RT-9000C Rack Mounting Details*

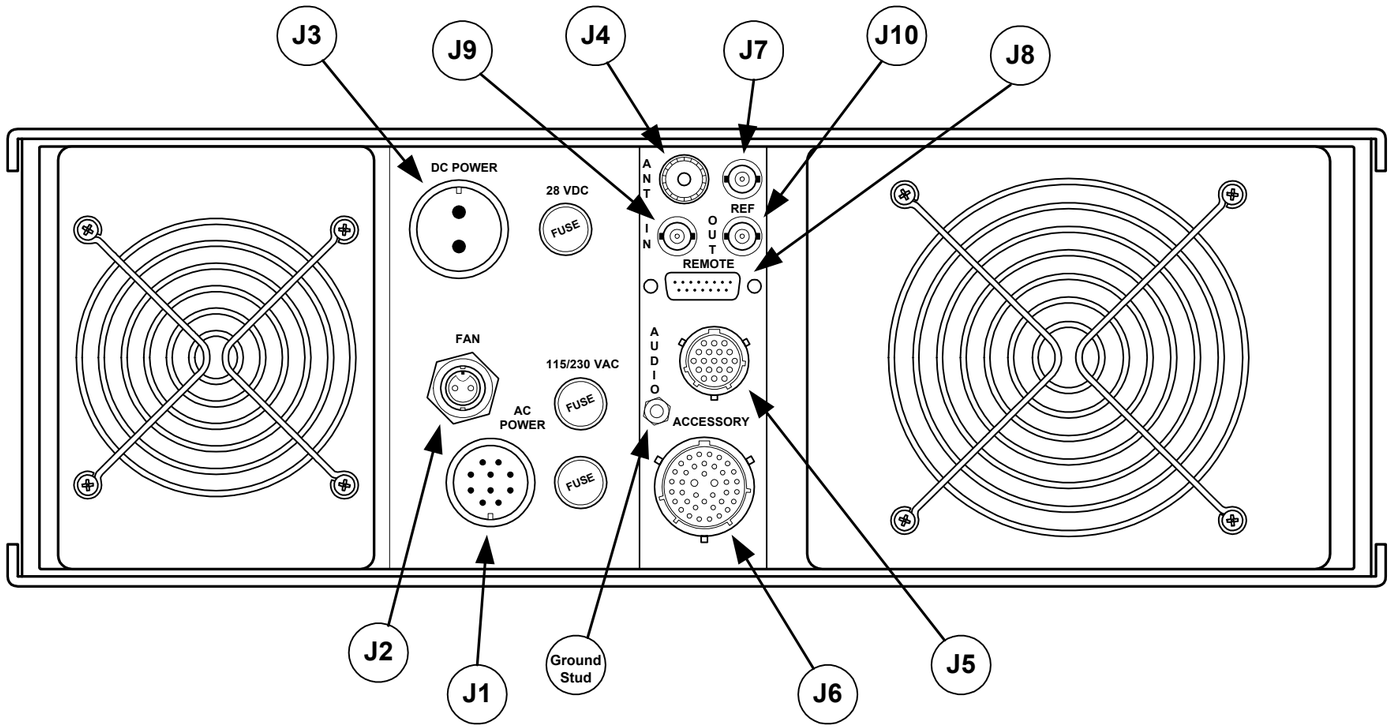


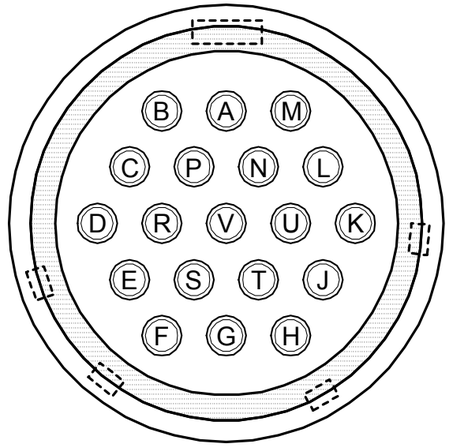
Figure 8.3 *RT-9000C Rear Panel Connector Locations*

RT-9000C AUDIO (J5) Connector Signals

Organized by Pin No.			Organized by Signal Name		
Pin No.	Signal Name	Notes	Signal Name	Pin No.	Notes
A	Receive Audio Out - LSB (Lower Sideband)	1	Receive Audio Out - USB (Upper Sideband)	L	1
B	Firmware Defined Digital Output No. 1	6	Receive Audio Out - USB (return)	M	
C	Receive Audio Out - LSB (return)		Receive Audio Out - LSB (Lower Sideband)	A	1
D	Firmware Defined Digital Output No. 2	6	Receive Audio Out - LSB (return)	C	
E	Firmware Defined Digital Input No. 1	6	Transmit Audio In - USB (Upper Sideband)	H	2
F	Analog Ground		Transmit Audio In - USB (return)	J	
G	Remote Keyline In	3	Transmit Audio In - LSB (Lower Sideband)	S	2
H	Transmit Audio In - USB (Upper Sideband)	2	Transmit Audio In - LSB (return)	T	
J	Transmit Audio In - USB (return)		Remote Keyline In	G	3
K	+28 VDC Output	5	Analog Ground	F	
L	Receive Audio Out - USB (Upper Sideband)	1	Analog Ground	R	
M	Receive Audio Out - USB (return)		+12 VDC Output	N	4
N	+12 VDC Output	4	+28 VDC Output	K	5
P	Firmware Defined Digital Input No. 2	6	+28 VDC Output	U	5
R	Analog Ground		Firmware Defined Digital Input No. 1	E	6
S	Transmit Audio In - LSB (Upper Sideband)	2	Firmware Defined Digital Input No. 2	P	6
T	Transmit Audio In - LSB (return)		Firmware Defined Digital Output No. 1	B	6
U	+28 VDC Output	5	Firmware Defined Digital Output No. 2	D	6
V	Firmware Defined Digital Output No. 3	6	Firmware Defined Digital Output No. 3	V	6

Notes

1. Receive Audio Out – USB & LSB (600-Ohms – 0 dBm level)
2. Transmit Audio In - USB & LSB (600-Ohms – 0 dBm Level)
3. Remote Keyline In - Low true signal (i.e. Connect to Ground to key)
4. Pin N (+12 VDC) - Output current limited to 50 mA, maximum
5. Pins K & U (+28 VDC) - Output current limited to 50 mA, maximum per pin

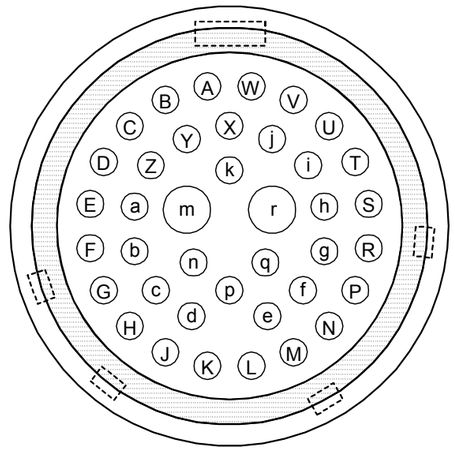


Notes:

1. Figure shows the mating connector that connects to **AUDIO** connector (J5) located on RT-9000 C rear panel.
2. Figure shows termination end (or backside) of this mating connector.

Figure 8.4 *RT-9000C J5 AUDIO Connector Details*

RT-9000 C **ACCESSORY** (J6) Connector Signals									
Organized by Connector Pin No.					Organized by Signal Name				
Pin No.	Signal Name	Input	Output	Notes	Signal Name	Input	Output	Pin No.	Notes
A	+ 28 V Tune Enable	X			Accessory Keyline Out		X	X	
B	Coupler Detect	X			Band 0		X	h	Low True
C	Ready	X		Low True	Band 1		X	W	Low True
D	Fault	X		Low True	Band 2		X	j	Low True
E	Chan. bit 1 (2^0) / Freq. (Ones) BCD 1		X	Low True LSB	Band 3		X	V	Low True
F	Chan. bit 3 (2^2) / Freq. (Ones) BCD 4		X	Low True	Band 4		X	k	Low True
G	Chan. bit 5 (2^4) / Freq. (Tens) BCD 1		X	Low True	Band 5		X	U	Low True
H	Chan. bit 7 (2^6) / Freq. (Tens) BCD 4		X	Low True	Band 6		X	I	Low True
J	LPA Power Select		X	Low True	Band 7		X	T	Low True
K	LPA Reflected Power	X			Band 8		X	S	Low True
L	Tune Command		X		Chan. bit 1 (2^0) / Freq. (Ones) BCD 1		X	E	Low True LSB
M	LPA ALC	X			Chan. bit 2 (2^1) / Freq. (Ones) BCD 2		X	a	Low True
N	LPA ACC	X			Chan. bit 3 (2^2) / Freq. (Ones) BCD 4		X	F	Low True
P	- Not Used -				Chan. bit 4 (2^3) / Freq. (Ones) BCD 8		X	b	Low True
R	LPA Power Detect 1	X			Chan. bit 5 (2^4) / Freq. (Tens) BCD 1		X	G	Low True
S	Band 8		X	Low True	Chan. bit 6 (2^5) / Freq. (Tens) BCD 2		X	n	Low True
T	Band 7		X	Low True	Chan. bit 7 (2^6) / Freq. (Tens) BCD 4		X	H	Low True
U	Band 5		X	Low True	Chan. bit 8 (2^7) / Freq. (Tens) BCD 8		X	c	Low True MSB
V	Band 3		X	Low True	Coupler Detect	X		B	
W	Band 1		X	Low True	Fault	X		D	Low True
X	Accessory Keyline Out		X		LPA ACC	X		N	
Y	LPA Detect	X			LPA ALC	X		M	
Z	Tuning	X		Low True	LPA Detect	X		Y	
a	Chan. bit 2 (2^1) / Freq. (Ones) BCD 2		X	Low True	LPA Forward Power	X		p	
b	Chan. bit 4 (2^3) / Freq. (Ones) BCD 8		X	Low True	LPA On		X	d	
c	Chan. bit 8 (2^7) / Freq. (Tens) BCD 8		X	Low True MSB	LPA Power Select	X		J	
d	LPA On		X		LPA Power Detect 1	X		R	
e	- Not Used -				LPA Reflected Power	X		K	
f	- Not Used -				Ready	X		C	Low True
g	LPA Power Detect 2	X			Tune Command		X	L	
h	Band 0		X	Low True	Tuning	X		Z	Low True
i	Band 6		X	Low True	+ 28 V Tune Enable	X		A	
j	Band 2		X	Low True	+ 28 V		X	r	
k	Band 4		X	Low True	- Not Used -			e	
m	Ground				- Not Used -			f	
n	Chan. bit 6 (2^5) / Freq. (Tens) BCD 2		X		LPA Power Detect 2	X		g	
p	LPA Forward Power	X			Ground			m	
q	- Not Used -				- Not Used -			q	
r	+ 28 V		X		- Not Used -			P	



Notes:

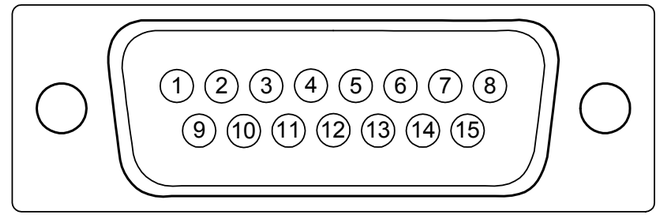
1. Figure shows the mating connector that connects to **ACCESSORY** connector (J6) located on RT-9000 C rear panel.
2. Termination end (or backside) of this mating connector is shown.

Figure 8.5 *RT-9000C J6 ACCESSORY Connector Details*

RT-9000C **REMOTE** (J8) Signals												
	Port A						Port B		ALE AMD Port		Pin No.
Format ⇨	Modem	RS-232		RS-422			RS-232		RS-232		
Baud Rate ⇨	300 to 56 K	300 to 19200		300 to 19200			9600		9600		
Notes ⇨	1, 2, 4	2, 4, 8		2, 4, 8			3, 5		3, 6, 7, 8		
	Ring	TD	(Output)								1
	Tip	RD	(Input)								2
							TD	(Output)			3
							RD	(Input)			4
	Ground	Ground		Ground			Ground		Ground		5
				TxA - High		(Output)					6
				TxB - Low		(Output)					7
				RxA - High		(Input)					8
				RxB - Low		(Input)					9
									TD	(Output)	10
									RD	(Input)	11
									RTS	(Output)	12
									CTS	(Input)	13
									DCD	(Input)	14
									DTR	(Output)	15

Notes

1. Requires optional Line Modem assembly be installed.
2. This Communications Format must be selected from the I/O set-up menu.
3. Baud Rate and Format for this port is fixed and cannot be changed.
4. Baud Rate is selected from the I/O set-up menu.
5. Port B is for Sunair system & accessory use only; configuration cannot be changed.
6. AMD Port operates only when optional ALE Modem is installed.
7. RTS, CTS, DTR, & DCD signals (Pins 12 through 15) used only if hardware flow control is enabled at AMD Terminal.
8. RS-232/422 Software Configuration - Data Bits = 7; Stop Bits = 2; Parity = None



Mating Connector for
REMOTE (J8)

- Termination or backside view -

"Port A"
Signaling Standards & Signal Names
(At Remote End)

Line Modem: Ring, Tip

or

RS 232: RD (Input), TD (Output)

"Port B"

Signal Ground

RS 422: RxA - High (Input), RxB - Low (Input), TxA - High (Output), TxB - Low (Output)

"Port A"

Standard RS-232 Pinouts			
Connector Type		Signal Name	
DB 25	DB 9		
3	2	RD	(Input)
2	3	TD	(Output)
5	8	CTS	(Input)
4	7	RTS	(Output)
20	4	DTR	(Output)
6	6	DSR	(Input)
8	1	DCD	(Input)
7	5	Signal Ground	

"AMD" Port

Connector Shell

Connector Shell

Connects to:
RT-9000 C
REMOTE (J8)

DB-15 Female

Connects to :
IBM PC
Serial Port

Submin D - Male
(See Chart)

Figure 8.6 *RT-9000C J8 REMOTE Connector Details*

8.3 Hardware Update

This section contains detailed information to support RT-9000C maintenance, repair, and adjustment operations. The Frequency Synthesizer Assembly information is NOT specific to the RT-9000C and applies to all RT-9000 series Transceivers. The following assemblies are covered in this section:

- Frequency Synthesizer 1A2A2 Assembly
- Digital IF 1A2A4 Assembly
- Digital Audio 1A2A3 Assembly

8.3.1 Frequency Synthesizer 1A2A2

8.3.1.1 Description

This section describes a Direct Digital Synthesis (DDS) Frequency Synthesizer design, which replaces an earlier "all Phase-Locked-Loop" design. This replacement design was created in response to component part obsolescence and availability issues. The DDS synthesizer design has been in production since approximately 2001. This replacement assembly and its creation was not related to the RT-9000C product.

This DDS synthesizer was designed to be fully backward compatible with all Sunair 9000-series radios. No adjustments or alignment whatsoever is required for proper operation. Both synthesizers retain the same Sunair Part Number (8076060095, in this case) but are distinguished from each other by their Revision Level. The earlier now-obsolete assembly was Revision A, whereas the new DDS assembly is now Revision B or higher.

8.3.1.2 Theory of Operation

5 MHz Reference Signal Input

A 5 MHz square wave input reference signal enters the 1A2A2 Frequency Synthesizer at card edge connector P1-pin 22 from the radio's frequency standard. This signal is band-pass filtered and amplified. This reference signal determines the ultimate accuracy and stability of all synthesizer output frequencies. Buffered outputs of this signal are sent to the 25 MHz Generator, the Second Local Oscillator PLL Controller U301, and the BITE CLOCK input of U202.

25 MHz Signal Generation

Selecting the fifth harmonic of the 5 MHz square wave reference signal using filtering techniques generates a 25 MHz signal. A filter network composed of passive components is inserted between U402-C & D and U409. A similar network is also present between U409 and U406-A to finish the required filtering. Normal operation of these filters causes the 25 MHz signal output to be a sinusoidal waveform. U406-A converts the sine wave output back to a square wave waveform.

First Local Oscillator Reference Generation

Using the 25 MHz signal, U1 generates a reference frequency used primarily for the First Local Oscillator generation (LO1). This reference frequency is approximately 10.7 MHz. U1 generates the 10.7 MHz signal by dividing down the 25 MHz signal input at U1-pin 9.

Besides the desired 10.7 MHz signal, U1 also creates undesired signals at other frequencies. The output from U1 passes through a low-pass filter composed of inductors L1, L2, and L3 and their related parts. The signal is finally band-pass filtered by filters FL1A and FL1B. The filtered 10.7 MHz reference frequency is amplified by U2 and U3. The 10.7 MHz Reference signal is then routed to First Local Oscillator PLL Control U101.

First Local Oscillator Signal Generation

The First Local Oscillator is a phase-locked loop (PLL) design and contains four (4) voltage-controlled oscillators (VCOs). Each VCO is built around a U310 JFET transistor with appropriate parts for the frequency output segment it covers. Only one VCO is active at any given time. The radio enables the proper VCO using the VCO SELECT lines at card edge connector P1-pins 20, 17, 19, or 16. VCO selection is based on the radio's selected operating frequency.

U106 and U104 amplify the signal output from the active VCO. The signal is then routed to power divider T101, which sends half the applied power to PLL Control U101 as a feedback signal. The other half of the signal power is sent to coaxial connector P3 located on the card edge as the First Local Oscillator output.

The feedback signal from the power divider enters PLL Control U101-pin 4 where it is internally routed to a programmable frequency divider. The division ratio is directly related to the radio's selected operating frequency and is such that the divider output is approximately 100 kHz. The 10.7 MHz Reference signal enters U101-pin 1 where it is internally routed to another frequency divider. This divider has a fixed division ratio of 107 to produce an internal 100 kHz reference signal. An internal frequency/phase detector in U101 compares these two 100 kHz signals and determines if the VCO frequency is correct. The detector error signal output appears on U101-pins 14 & 15 depending on whether the VCO frequency is above or below its nominal frequency.

If the frequency is incorrect, the error output from U101 will cause Charge Pump U103 to change the voltage applied to the VCO varactor diodes. This causes the VCO to change its frequency output until it is correct. U101 also produces lock-detect status signals the BITE circuit (Built-In-Test-Equipment) uses to determine Fault status.

Second Local Oscillator Signal Generation

The Second Local Oscillator (LO2) is similar to the First Local Oscillator except it operates at a fixed frequency of 47.85 MHz. The single frequency-operating mode of LO2 requires only one voltage-controlled oscillator (VCO). This VCO circuit is virtually identical to those used for the LO1 function.

U308 and U307 amplify the VCO signal output. The signal is then routed to power divider T301, which sends half the applied power to PLL Control U301 as a feedback signal. The other signal half is sent to mixer X301 where the signal can be gated on and off by a control signal from noise blanker multivibrator U306. The resulting signal is then routed to coaxial connector P4 located on the card edge as the Second Local Oscillator output.

Feedback signal processing and use is the same as for the LO1 circuit except with the following differences. PLL Control U301 controls LO2 but instead divides the feedback signal by a fixed ratio of 957 to produce approximately 50 kHz. U301 accepts buffered 5 MHz Reference signal from the earlier reference section but divides it by a fixed ratio of 100 to produce an internal 50 kHz reference signal. These signals are compared and the resulting error signal is passed to charge pump U303 and causes it to lock the VCO at 47.850 MHz.

U301 also produces lock-detect status signals for BITE circuit Fault status determination.

Third Local Oscillator / BFO Signal Generation

The Third Local Oscillator (or BFO) signal is generated by U202 and U201. U202 accepts buffered 5 MHz Reference signal from the earlier reference section, divides it by two, and produces the BFO CLOCK signal. U201 further divides the 2.5 MHz BFO CLOCK signal down to 455 kHz and where it passes to Q202. The signal is amplified by Q202 and sent to a low pass filter. It finally is band-pass filtered by FL201 and routed to card edge connector P1-pin 2 as BFO OUT. U205-E provides a buffered sample of the BFO output for BITE status monitoring.

Synthesizer Control

This synthesizer design replaces an earlier design and must be a form, fit, and function equivalent. Accordingly, this newer design must be fully compatible with all earlier radio CPU assemblies. To achieve this interchangeability this synthesizer design must translate all original commands to those required for this new design. This task is handled by micro-controller U401. U401 is an 80C51 micro-controller family variation and has internal program and data memory. A buffered output of the 25 MHz Reference signal is supplied to U403, which divides it by two and sends to U401 as its clock signal.

BITE (Built-In-Test-Equipment)

The BITE function is a monitoring function that runs continuously in the background and checks all three local oscillator frequency outputs. Programmable logic part U202 performs the BITE function.

The PLL Controller used for both the First and Second Local Oscillator circuits produce lock-detect signals when their respective control loops are locked. Under locked conditions, this signal will be normally a High logic level with short (0.1 μs) low-going pulses. U202 checks the lock-detect signals from both PLL Controllers to sense if either is Low for more than 0.8 μs, which would indicate a Fault condition.

The Third Local Oscillator / BFO output frequency is checked by a frequency counter function built in U202. If the frequency counter finds the 455 kHz signal out of limits, this indicates a Fault condition.

U202 OR ties all three Fault status signals to produce a single SYN UNLOCKED signal. This Synthesizer Unlocked signal passes to the radio CPU through card edge connector P1-pin 3.

8.3.1.3 Assembly Documentation

Synthesizer Assembly 1A2A2		
Figure	Document	Page(s)
8.7	Parts List	8-13 & 8-14
8.8	Component Location Diagram	8-15
8.9	Schematic Diagram	8-16 through 8-21

PC ASSEMBLY, SYNTHESIZER , 1A2A2		Panel 1 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
	PC Assembly, Synthesizer, Rev. H	8076060095	
C1	CAP. .1UF, 50V, X7R, 20%	1013040031	
C2	CAP. .1UF, 50V, X7R, 20%	1013040031	
C3	CAP. .1UF, 50V, X7R, 20%	1013040031	
C4	CAP. .1UF, 50V, X7R, 20%	1013040031	
C5	CAP. 390PF, NPO, 5%, 200V	1013903919	
C6	CAP. 82PF, NPO, 5%, 200V	1013908201	
C7	CAP. 470PF, NPO, 5%, 200V	1013904711	
C8	CAP. 270PF, NPO, 5%, 200V	1013902718	
C9	CAP. 390PF, NPO, 5%, 200V	1013903919	
C10	CAP. 560PF, NPO, 5%, 200V	1013905610	
C11	CAP. 270PF, NPO, 5%, 200V	1013902718	
C12	CAP. 560PF, NPO, 5%, 200V	1013905610	
C13	CAP. 56PF, NPO, 5%, 200V	1013905601	
C15	CAP. 56PF, NPO, 5%, 200V	1013905601	
C16	CAP. 560PF, NPO, 5%, 200V	1013905610	
C17	CAP. .01UF, 50V, X7R, 20%	1013030036	
C18	CAP. .01UF, 50V, X7R, 20%	1013030036	
C19	CAP. .1UF, 50V, X7R, 20%	1013040031	
C20	CAP. .01UF, 50V, X7R, 20%	1013030036	
C21	CAP. .01UF, 50V, X7R, 20%	1013030036	
C22	CAP. .01UF, 50V, X7R, 20%	1013030036	
C23	CAP. 10UF, 20V TANT	1007290005	
C24	CAP. 56PF, NPO, 5%, 200V	1013905601	
C25	CAP. 390PF, NPO, 5%, 200V	1013903919	
C26	CAP. 10UF, 20V TANT	1007290005	
C102	CAP. 6.8UF, 25V TANT	1005050031	
C103	CAP. .1UF, 50V, X7R, 20%	1013040031	
C104	CAP. .01UF, 50V, X7R, 20%	1013030036	
C105	CAP. 6.8UF, 25V TANT	1005050031	
C106	CAP. .1UF, 50V, X7R, 20%	1013040031	
C107	CAP. .1UF, 50V, X7R, 20%	1013040031	
C108	CAP. 0.1UF, 50V, X7R	1011180014	
C109	CAP. 0.01UF, 50V, X7R, 20%	0281730008	
C110	CAP. 0.001UF, 100V, X7R, 20%	0281630003	
C111	CAP. 10PF, 1000V, N750 5%	0250480000	
C112	CAP. 7PF, 500V, N1500	0295250003	
C113	CAP. 7PF, 500V, N1500	0295250003	
C114	CAP. 7PF, 500V, N1500	0295250003	
C115	CAP. 470PF, NPO, 5%, 200V	1013904711	
C116	CAP. 470PF, NPO, 5%, 200V	1013904711	
C117	CAP. 470PF, NPO, 5%, 200V	1013904711	
C118	CAP. 470PF, NPO, 5%, 200V	1013904711	
C119	CAP. .001UF, 50V, X7R, 20%	1013020031	
C120	CAP. .001UF, 50V, X7R, 20%	1013020031	
C121	CAP. .001UF, 50V, X7R, 20%	1013020031	
C122	CAP. .001UF, 50V, X7R, 20%	1013020031	
C123	CAP. 47PF, NPO, 5%, 200V	1013904702	
C124	CAP. 33PF, NPO, 5%, 200V	1013903307	C
C125	CAP. 68PF, NPO, 5%, 200V	1013906802	
C126	CAP. 39PF, NPO, 5%, 200V	1013903901	
C127	CAP. 68PF, NPO, 5%, 200V	1013906802	
C128	CAP. 56PF, NPO, 5%, 200V	1013905601	
C129	CAP. 47PF, NPO, 5%, 200V	1013904702	C
C130	CAP. 27PF, NPO, 5%, 200V	1013902700	C
C131	CAP. 100PF, NPO, 5%, 200V	1013901011	
C132	CAP. 100PF, NPO, 5%, 200V	1013901011	
C133	CAP. 100PF, NPO, 5%, 200V	1013901011	
C134	CAP. 100PF, NPO, 5%, 200V	1013901011	
C135	CAP. .001UF, 50V, X7R, 20%	1013020031	
C136	CAP. .001UF, 50V, X7R, 20%	1013020031	
C137	CAP. .001UF, 50V, X7R, 20%	1013020031	
C138	CAP. .001UF, 50V, X7R, 20%	1013020031	
C139	CAP. 10PF, NPO, 5%, 200V	1013901002	
C140	CAP. 10PF, NPO, 5%, 200V	1013901002	
C141	CAP. 10PF, NPO, 5%, 200V	1013901002	
C142	CAP. 10PF, NPO, 5%, 200V	1013901002	
C143	CAP. 100PF, NPO, 5%, 200V	1013901011	
C144	CAP. 100PF, NPO, 5%, 200V	1013901011	
C145	CAP. 100PF, NPO, 5%, 200V	1013901011	

PC ASSEMBLY, SYNTHESIZER , 1A2A2		Panel 2 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
C146	CAP. 100PF, NPO, 5%, 200V	1013901011	
C147	CAP. .001UF, 50V, X7R, 20%	1013020031	
C148	CAP. .001UF, 50V, X7R, 20%	1013020031	
C149	CAP. .001UF, 50V, X7R, 20%	1013020031	
C150	CAP. 470PF, NPO, 5%, 200V	1013904711	
C151	CAP. 470PF, NPO, 5%, 200V	1013904711	
C152	CAP. .001UF, 50V, X7R, 20%	1013020031	
C153	CAP. 470PF, NPO, 5%, 200V	1013904711	
C154	CAP. 470PF, NPO, 5%, 200V	1013904711	
C155	CAP. .1UF, 50V, X7R, 20%	1013040031	
C156	CAP. .1UF, 50V, X7R, 20%	1013040031	
C157	CAP. .001UF, 50V, X7R, 20%	1013020031	
C158	CAP. 33PF, NPO, 5%, 200V	1013903307	
C159	CAP. 7PF, 500V, N1500	0295250003	
C160	CAP. 7PF, 500V, N1500	0295250003	
C161	CAP. 10UF, 20V TANT	1007290005	
C162	CAP. .01UF, 50V, X7R, 20%	1013030036	
C163	CAP. .001UF, 50V, X7R, 20%	1013020031	
C164	CAP. .001UF, 50V, X7R, 20%	1013020031	
C165	CAP. .001UF, 50V, X7R, 20%	1013020031	
C166	CAP. .001UF, 50V, X7R, 20%	1013020031	
C167	CAP. 1UF, 35V TANT	0281660000	
C168	CAP. 1UF, 35V TANT	0281660000	
C169	CAP. 1UF, 35V TANT	0281660000	
C170	CAP. 1UF, 35V TANT	0281660000	
C171	CAP. .001UF, 50V, X7R, 20%	1013020031	
C172	CAP. .001UF, 50V, X7R, 20%	1013020031	
C173	CAP. 0.01UF, 50V, X7R, 20%	0281730008	
C174	CAP. 15UF, 35V TANT	0282240004	
C176	CAP. 39PF, NPO, 5%, 200V	1013903901	
C177	CAP. 22PF, NPO, 5%, 200V	1013902203	
C179	CAP. 10PF, NPO, 5%, 200V	1013901002	
C180	CAP. 56PF, NPO, 5%, 200V	1013905601	C
C181	CAP. 39PF, NPO, 5%, 200V	1013903901	C
C182	CAP. 33PF, NPO, 5%, 200V	1013903307	
C183	CAP. 33PF, NPO, 5%, 200V	1013903307	C
C184	CAP. 10UF, 20V TANT	1007290005	
C203	CAP. .1UF, 50V, X7R, 20%	1013040031	
C204	CAP. .1UF, 50V, X7R, 20%	1013040031	
C205	CAP. .1UF, 50V, X7R, 20%	1013040031	
C206	CAP. .1UF, 50V, X7R, 20%	1013040031	
C207	CAP. .1UF, 50V, X7R, 20%	1013040031	
C208	CAP. .1UF, 50V, X7R, 20%	1013040031	
C209	CAP. .1UF, 50V, X7R, 20%	1013040031	
C210	CAP. 560PF, NPO, 5%, 200V	1013905610	
C211	CAP. 5600PF, 200V, NPO, 5%	1012905624	
C212	CAP. 5600PF, 200V, NPO, 5%	1012905624	
C213	CAP. 5600PF, 200V, NPO, 5%	1012905624	
C214	CAP. 5600PF, 200V, NPO, 5%	1012905624	
C215	CAP. .1UF, 50V, X7R, 20%	1013040031	
C217	CAP. .1UF, 50V, X7R, 20%	1013040031	
C218	CAP. .01UF, 50V, X7R, 20%	1013030036	
C219	CAP. .01UF, 50V, X7R, 20%	1013030036	
C220	CAP. 270PF, NPO, 5%, 200V	1013902718	
C221	CAP. 1000PF, NPO, 5%, 200V	1013901029	
C222	CAP. 1000PF, NPO, 5%, 200V	1013901029	
C223	CAP. 10UF, 20V TANT	1007290005	
C224	CAP. .01UF, 50V, X7R, 20%	1013030036	
C225	CAP. .01UF, 50V, X7R, 20%	1013030036	
C226	CAP. 10UF, 20V TANT	1007290005	
C304	CAP. .001UF, 50V, X7R, 20%	1013020031	
C305	CAP. .1UF, 50V, X7R, 20%	1013040031	
C306	CAP. 100PF, NPO, 5%, 200V	1013901011	
C307	CAP. .1UF, 50V, X7R, 20%	1013040031	
C308	CAP. 0.01UF, 50V, X7R, 20%	0281730008	
C309	CAP. 0.1UF, 50V, X7R	1011180014	
C310	CAP. 560PF, NPO, 5%, 200V	1013905610	D
C311	CAP. .001UF, 50V, X7R, 20%	1013020031	
C312	CAP. 27PF, 500V, N220, 5%	0295130008	
C313	CAP. 100PF, NPO, 5%, 200V	1013901011	

PC ASSEMBLY, SYNTHESIZER , 1A2A2		Panel 3 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
C314	CAP. 33PF, NPO, 5%, 200V	1013903307	C,D
C315	CAP. 0.001UF, 100V, X7R, 20%	0281630003	
C316	CAP. 470PF, NPO, 5%, 200V	1013904711	
C317	CAP. .001UF, 50V, X7R, 20%	1013020031	
C318	CAP. .01UF, 50V, X7R, 20%	1013030036	
C319	CAP. 10UF, 20V TANT	1007290005	
C320	CAP. 100PF, NPO, 5%, 200V	1013901011	
C321	CAP. 10PF, NPO, 5%, 200V	1013901002	
C322	CAP. 0.01UF, 50V, X7R, 20%	0281730008	
C323	CAP. .001UF, 50V, X7R, 20%	1013020031	
C324	CAP. .01UF, 50V, X7R, 20%	1013030036	
C325	CAP. 15UF, 35V TANT	0282240004	
C328	CAP. .1UF, 50V, X7R, 20%	1013040031	
C329	CAP. .1UF, 50V, X7R, 20%	1013040031	
C330	CAP. .1UF, 50V, X7R, 20%	1013040031	
C331	CAP. .1UF, 50V, X7R, 20%	1013040031	
C332	CAP. 10UF, 20V TANT	1007290005	
C333	CAP. .1UF, 50V, X7R, 20%	1013040031	
C334	CAP. .1UF, 50V, X7R, 20%	1013040031	
C336	CAP. .1UF, 50V, X7R, 20%	1013040031	
C337	CAP. .1UF, 50V, X7R, 20%	1013040031	
C338	CAP. 6.8UF, 25V TANT	1005050031	
C339	CAP. 33PF, NPO, 5%, 200V	1013903307	D
C340	CAP. .001UF, 50V, X7R, 20%	1013020031	
C341	CAP. .001UF, 50V, X7R, 20%	1013020031	
C342	CAP. .001UF, 50V, X7R, 20%	1013020031	
C343	CAP. .001UF, 50V, X7R, 20%	1013020031	
C344	CAP. .001UF, 50V, X7R, 20%	1013020031	
C346	CAP. 10UF, 20V TANT	1007290005	
C401	CAP. 10UF, 20V TANT	1007290005	
C402	CAP. .1UF, 50V, X7R, 20%	1013040031	
C403	CAP. .01UF, 50V, X7R, 20%	1013030036	
C404	CAP. 1UF, 35V TANT	0281660000	
C405	CAP. 10UF, 20V TANT	1007290005	
C407	CAP. 15UF, 35V TANT	0282240004	
C408	CAP. 6.8UF, 25V TANT	1005050031	
C409	CAP. 6.8UF, 25V TANT	1005050031	
C410	CAP. .1UF, 50V, X7R, 20%	1013040031	
C411	CAP. .01UF, 50V, X7R, 20%	1013030036	
C412	CAP. 6.8UF, 25V TANT	1005050031	
C413	CAP. .1UF, 50V, X7R, 20%	1013040031	
C414	CAP. 39PF, NPO, 5%, 200V	1013903901	
C415	CAP. 100PF, NPO, 5%, 200V	1013901011	
C416	CAP. 680PF, NPO, 5%, 200V	1013906811	
C417	CAP. 39PF, NPO, 5%, 200V	1013903901	
C418	CAP. .01UF, 50V, X7R, 20%	1013030036	
C419	CAP. 39PF, NPO, 5%, 200V	1013903901	
C420	CAP. 100PF, NPO, 5%, 200V	1013901011	
C421	CAP. 680PF, NPO, 5%, 200V	1013906811	
C422	CAP. 39PF, NPO, 5%, 200V	1013903901	
C423	CAP. .01UF, 50V, X7R, 20%	1013030036	
C424	CAP. 15PF, NPO, 5%, 200V	1013901509	
C425	CAP. 15PF, NPO, 5%, 200V	1013901509	
C426	CAP. .01UF, 50V, X7R, 20%	1013030036	
C427	CAP. 100PF, NPO, 5%, 200V	1013901011	
C428	CAP. 68PF, NPO, 5%, 200V	1013906802	
C429	CAP. 100PF, NPO, 5%, 200V	1013901011	
C430	CAP. 68PF, NPO, 5%, 200V	1013906802	
C431	CAP. .01UF, 50V, X7R, 20%	1013030036	
C432	CAP. 12PF, 200V NPO 5%	1012901203	E
C433	CAP. 6.8PF, 200V, NPO,+/- .5PF	1012906892	E
CR104	DIODE, VARICAP MV209	1007060018	
CR105	DIODE, VARICAP MV209	1007060018	
CR106	DIODE, VARICAP MV209	1007060018	
CR107	DIODE, VARICAP MV209	1007060018	
CR108	DIODE, VARICAP MV209	1007060018	
CR109	DIODE, VARICAP MV209	1007060018	
CR110	DIODE, VARICAP MV209	1007060018	
CR111	DIODE, VARICAP MV209	1007060018	
CR113	DIODE, VARICAP MV209	1007060018	

PC ASSEMBLY, SYNTHESIZER , 1A2A2		Panel 4 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
CR114	DIODE, VARICAP MV209	1007060018	
CR116	DIODE, VARICAP MV209	1007060018	
CR117	DIODE, VARICAP MV209	1007060018	
CR118	DIODE, VARICAP MV209	1007060018	
CR119	DIODE, VARICAP MV209	1007060018	
CR120	DIODE, VARICAP MV209	1007060018	
CR121	DIODE, VARICAP MV209	1007060018	
CR122	DIODE, SCHOTTKY HSMS-2820	1013160037	
CR123	DIODE, SCHOTTKY HSMS-2820	1013160037	
CR124	DIODE, SCHOTTKY HSMS-2820	1013160037	
CR125	DIODE, SCHOTTKY HSMS-2820	1013160037	
CR126	DIODE, PIN HSMP-3820	1013170032	
CR127	DIODE, PIN HSMP-3820	1013170032	
CR128	DIODE, PIN HSMP-3820	1013170032	
CR129	DIODE, PIN HSMP-3820	1013170032	
CR130	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR201	DIODE, LED, RED 550-2405	1008480029	
CR202	DIODE, LED, RED 550-2405	1008480029	
CR203	DIODE, LED, RED 550-2405	1008480029	
CR204	DIODE, LED, RED 550-2405	1008480029	
CR205	DIODE, LED, RED 550-2405	1008480029	
CR303	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR304	DIODE, VARICAP MV209	1007060018	
CR305	DIODE, VARICAP MV209	1007060018	
CR306	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR308	DIODE, SCHOTTKY HSMS-2820	1013160037	
FL1	FILTER, CRYSTAL, 10.7MHZ	1012950018	
FL1	FILTER, CRYSTAL, 10.7MHZ	1012950018	
FL201	FILTER, CERAMIC, 455KHZ	1012590020	
J201	CONNECTOR, HEADER, 10 PIN MALE	1010800027	
L1	INDUCTOR, MOLDED, 0.68UH, 5%	0651770009	
L2	INDUCTOR, MOLDED, 0.39UH, 5%	0649770005	
L3	INDUCTOR, MOLDED, 0.47UH, 5%	0648500004	
L4	INDUCTOR, VAR, 2.6-3.8UH	1012560023	
L5	INDUCTOR, VAR, 2.6-3.8UH	1012560023	
L6	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L7	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L101	INDUCTOR, VAR, .38-.42UH	1013000013	
L102	INDUCTOR, VAR, .38-.42UH	1013000013	
L103	INDUCTOR, VAR, .38-.42UH	1013000013	
L104	INDUCTOR, VAR, .38-.42UH	1013000013	
L105	INDUCTOR, VAR, .38-.42UH	1013000013	
L106	INDUCTOR, VAR, .38-.42UH	1013000013	
L107	INDUCTOR, MOLDED, 8.2UH, 5%	0648240002	
L108	INDUCTOR, MOLDED, 8.2UH, 5%	0648240002	
L109	INDUCTOR, MOLDED, 8.2UH, 5%	0648240002	
L110	INDUCTOR, MOLDED, 8.2UH, 5%	0648240002	
L111	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L112	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L113	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L114	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L201	INDUCTOR, SMT, 150UH, 5%	1013701518	
L202	INDUCTOR, SMT, 15UH, 5%	1013701500	
L203	INDUCTOR, SMT, 15UH, 5%	1013701500	
L206	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L207	INDUCTOR, SMT, 150UH, 5%	1013701518	
L208	INDUCTOR, SMT, 150UH, 5%	1013701518	
L209	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L301	INDUCTOR, VAR, .38-.42UH	1013000013	
L302	INDUCTOR, VAR, .38-.42UH	1013000013	
L303	INDUCTOR, MOLDED, 8.2UH, 5%	0648240002	
L304	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L306	INDUCTOR, MOLDED, 1.0UH, 5%	0648360008	G
L307	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L308	INDUCTOR, MOLDED, 0.68UH, 5%	0651770009	
L401	INDUCTOR, SMT, 150UH, 5%	1013701518	
L403	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L404	INDUCTOR, SMT, .10UH, 5%	1013701089	
L405	INDUCTOR, SMT, .15UH, 5%	1013701585	
L406	INDUCTOR, SMT, 1.0UH, 5%	1013701097	

Figure 8.7 *1A2A2 Synthesizer Assembly - DDS Version – Parts List (Sheet 1 of 2)*

PC ASSEMBLY, SYNTHESIZER , 1A2A2		Panel 5 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
L407	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L408	INDUCTOR, SMT, .10UH, 5%	1013701089	
L409	INDUCTOR, SMT, .15UH, 5%	1013701585	
L410	INDUCTOR, SMT, 1.0UH, 5%	1013701097	
L411	INDUCTOR, SMT, 150UH, 5%	1013701518	
L412	INDUCTOR, MOLDED, 68UH, 5%	0651650003	E
P3	CONNECTOR, RF, RIGHT ANGLE	1010730002	
P4	CONNECTOR, RF, RIGHT ANGLE	1010730002	
Q101	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q107	TRANSISTOR, PNP MMBT4126	1013100034	
Q108	TRANSISTOR, PNP MMBT4126	1013100034	
Q109	TRANSISTOR, PNP MMBT4126	1013100034	
Q110	TRANSISTOR, PNP MMBT4126	1013100034	
Q111	TRANSISTOR, N-CH, FET U310	1007050039	
Q112	TRANSISTOR, N-CH, FET U310	1007050039	
Q113	TRANSISTOR, N-CH, FET U310	1007050039	
Q114	TRANSISTOR, N-CH, FET U310	1007050039	
Q202	TRANSISTOR, NPN MMBT4124	1013090039	
Q204	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q302	TRANSISTOR, N-CH, FET U310	1007050039	
Q304	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q305	TRANSISTOR, N-CH, FET 2N7002	1013080033	G
R1	RESISTOR 3.9K, 5%, 1/8W	1013803922	
R2	RESISTOR 3.9K, 5%, 1/8W	1013803922	
R3	RESISTOR 51, 5%, 1/8W SMT 1206	1013805101	
R4	RESISTOR 51, 5%, 1/8W SMT 1206	1013805101	
R5	RESISTOR 220, 10%, 1/2W CF	0172850002	
R6	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R7	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R8	RESISTOR 220, 10%, 1/2W CF	0172850002	
R104	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R105	RESISTOR 1K, 5%, 1/8W SMT 1206	1013801024	
R106	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R107	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R108	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	
R109	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R110	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
R111	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
R112	RESISTOR 680, 5%, 1/8W SMT 1206	1013806816	C
R113	RESISTOR 680, 5%, 1/8W SMT 1206	1013806816	C
R114	RESISTOR 1.5K, 5%, 1/8W SMT 1206	1013801521	C
R115	RESISTOR 6.8K, 5%, 1/8W	1013806824	
R116	RESISTOR 6.8K, 5%, 1/8W	1013806824	
R117	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	
R118	RESISTOR 47K, 5%, 1/8W	1013804732	
R119	RESISTOR 47K, 5%, 1/8W	1013804732	
R120	RESISTOR 47K, 5%, 1/8W	1013804732	
R121	RESISTOR 47K, 5%, 1/8W	1013804732	
R122	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	
R123	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	
R124	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	
R125	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	
R126	RESISTOR 1.8K, 5%, 1/8W	1013801822	
R127	RESISTOR 1.8K, 5%, 1/8W	1013801822	
R128	RESISTOR 1.8K, 5%, 1/8W	1013801822	
R129	RESISTOR 1.8K, 5%, 1/8W	1013801822	
R130	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R131	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R132	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R133	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R134	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R135	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R136	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R137	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R138	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
R139	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
R140	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
R141	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
R142	RESISTOR 1K, 5%, 1/8W SMT 1206	1013801024	
R143	RESISTOR 1K, 5%, 1/8W SMT 1206	1013801024	

PC ASSEMBLY, SYNTHESIZER , 1A2A2		Panel 6 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
R144	RESISTOR 1K, 5%, 1/8W SMT 1206	1013801024	
R145	RESISTOR 1K, 5%, 1/8W SMT 1206	1013801024	
R146	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R147	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R148	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R149	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R150	RESISTOR 1K, 5%, 1/8W SMT 1206	1013801024	
R151	RESISTOR 220, 10%, 1/2W CF	0172850002	
R152	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R153	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R154	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R155	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R156	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R157	RESISTOR 150, 10%, 1/2W CF	1010400037	
R158	RESISTOR 51, 5%, 1/8W SMT 1206	1013805101	
R159	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
R160	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R201	RESISTOR 51, 5%, 1/8W SMT 1206	1013805101	
R202	RESISTOR 51, 5%, 1/8W SMT 1206	1013805101	
R203	RESISTOR 3.3K, 5%, 1/8W	1013803329	
R204	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R205	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R206	RESISTOR 51, 5%, 1/8W SMT 1206	1013805101	
R207	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R208	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R209	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R210	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R211	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R212	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	
R219	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R220	RESISTOR 330, 5%, 1/8W SMT 1206	1013803311	
R221	RESISTOR 3.9K, 5%, 1/8W	1013803922	
R222	RESISTOR 3.9K, 5%, 1/8W	1013803922	
R225	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R226	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R227	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R228	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R229	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R230	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R231	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R232	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R233	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R305	RESISTOR 330, 5%, 1/8W SMT 1206	1013803311	
R306	RESISTOR 330, 5%, 1/8W SMT 1206	1013803311	
R307	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R308	RESISTOR 2.7K, 5%, 1/8W SMT 1206	1013802721	D
R309	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
R310	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
R311	RESISTOR 6.8K, 5%, 1/8W	1013806824	
R312	RESISTOR 47K, 5%, 1/8W	1013804732	
R313	RESISTOR 51, 5%, 1/8W SMT 1206	1013805101	
R314	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	
R315	RESISTOR 6.8K, 5%, 1/8W	1013806824	
R316	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R317	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
R318	RESISTOR 220, 10%, 1/2W CF	0172850002	
R319	RESISTOR 150, 10%, 1/2W CF	1010400037	
R320	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	
R321	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	
R322	RESISTOR 51, 5%, 1/8W SMT 1206	1013805101	
R324	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R325	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R326	RESISTOR 1K, 5%, 1/8W SMT 1206	1013801024	
R327	RESISTOR 470, 10%, 1/2W CF	0173900003	
R329	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R330	RESISTOR 18, 5%, 1/8W SMT 1206	1013801806	
R331	RESISTOR 270, 5%, 1/8W SMT1206	1013802713	
R333	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
R401	RESISTOR 1.8K, 5%, 1/8W	1013801822	
R402	RESISTOR 15K, 1%, 1/8W MF	1004050003	

PC ASSEMBLY, SYNTHESIZER , 1A2A2		Panel 7 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
R403	RESISTOR 3320, 1%, 1/8W	1003050000	
R404	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	E
R405	RESISTOR 10K, 5%, 1/8W SMT 1206	1013801032	
R406	RESISTOR 10, 5%, 1/8W SMT 1206	1013801008	
R407	RESISTOR 220, 10%, 1/2W CF	0172850002	
R408	RESISTOR 100K, 5%, 1/8W SMT 1206	1013801041	
R409	RESISTOR 100, 5%, 1/8W SMT 1206	1013801016	
T101	TRANSFORMER, RF, 4:1 T4-1X65 MINIC	1010860003	
T301	TRANSFORMER, RF, 4:1 T4-1X65 MINIC	1010860003	
TP1	TEST POINT, RED	1011130033	
TP2	TEST POINT, RED	1011130033	
TP21	TEST POINT, RED	1011130033	
TP101	TEST POINT, RED	1011130033	
TP301	TEST POINT, RED	1011130033	
TP302	TEST POINT, RED	1011130033	
U1	IC. DIGITAL, DDS AD9850BRS	1013000030	
U2	IC. LINEAR MAR-3 MINI CIRCUITS	1012310019	
U3	IC. LINEAR MAR-4 MINI CIRCUITS	1010900005	
U101	IC. DIGITAL, PLL MC145170D2	1013010035	
U102	IC. DIGITAL, HEX INV. 74AC04SC	1013110030	
U103	IC. LINEAR, XSTR ARRAY CA3096M	1013120035	
U104	IC. LINEAR MAR-4 MINI CIRCUITS	1010900005	
U105	IC. LINEAR LM340/7812	1003410022	
U106	IC. LINEAR MAR-4 MINI CIRCUITS	1010900005	
U107	IC. LINEAR LM340/7812	1003410022	
U201	IC. DIGITAL, DDS AD9850BRS	1013000030	
U202	IC. DIGITAL, CPLD CY7C37064	1013900006	I
U204	IC. DIGITAL MC74HC04AD	1013190033	
U205	IC. DIGITAL MC74HC04AD	1013190033	
U301	IC. DIGITAL, PLL MC145170D2	1013010035	
U302	IC. LINEAR LM340/7812	1003410022	
U303	IC. LINEAR, XSTR ARRAY CA3096M	1013120035	
U304	IC. DIGITAL, HEX INV. 74AC04SC	1013110030	
U305	IC. LINEAR UA78L05ACLP	1010150014	
U306	IC. DIGITAL CD4047BE	1012190030	
U307	IC. LINEAR MAR-4 MINI CIRCUITS	1010900005	
U308	IC. LINEAR MAR-4 MINI CIRCUITS	1010900005	
U401	SYNTHESIZER CPU W/SOFTWARE	8076060494	
U402	IC. DIGITAL, HEX INV. 74AC04SC	1013110030	
U403	I.C. DIGITAL MC74HC74AD	1013210034	
U404	IC. DIGITAL, SUPERVISOR TL7705ACD	1013130031	
U405	IC. LINEAR LT1129IT	1012840034	
U406	IC. DIGITAL, HEX INV. 74AC04SC	1013110030	
U408	IC. LINEAR LM340T5	0448600005	
U409	IC. LINEAR MAR-3 MINI CIRCUITS	1012310019	
X301	MIXER, BROADBAND SBL-1	1003300006	
XU401	SOCKET, IC, 24PIN, .300W	1012570029	
(none)	GROMMET, CATERPILLAR	0500590001	H

PC ASSY, REFERENCE MODIFICATION		Panel 1 of 1	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
	PC Assembly, Ref. Mod.	8076069092	
C1	CAP. 6.8PF, 200V, NPO,+/- .5PF	1012906892	
C2	CAP. 12PF, 200V NPO 5%	1012901203	
C3	CAP. 0.01UF, 50V, X7R, 20%	0281730008	
C4	CAP. 1UF, 35V TANT	0281660000	
L1	INDUCTOR, MOLDED, 68UH, 5%	0651650003	
R1	RESISTOR 100K, 5%, 1/8W CF	1010801040	
U1	IC, DIGITAL, HEX INV. MC74AC04N	1013100018	

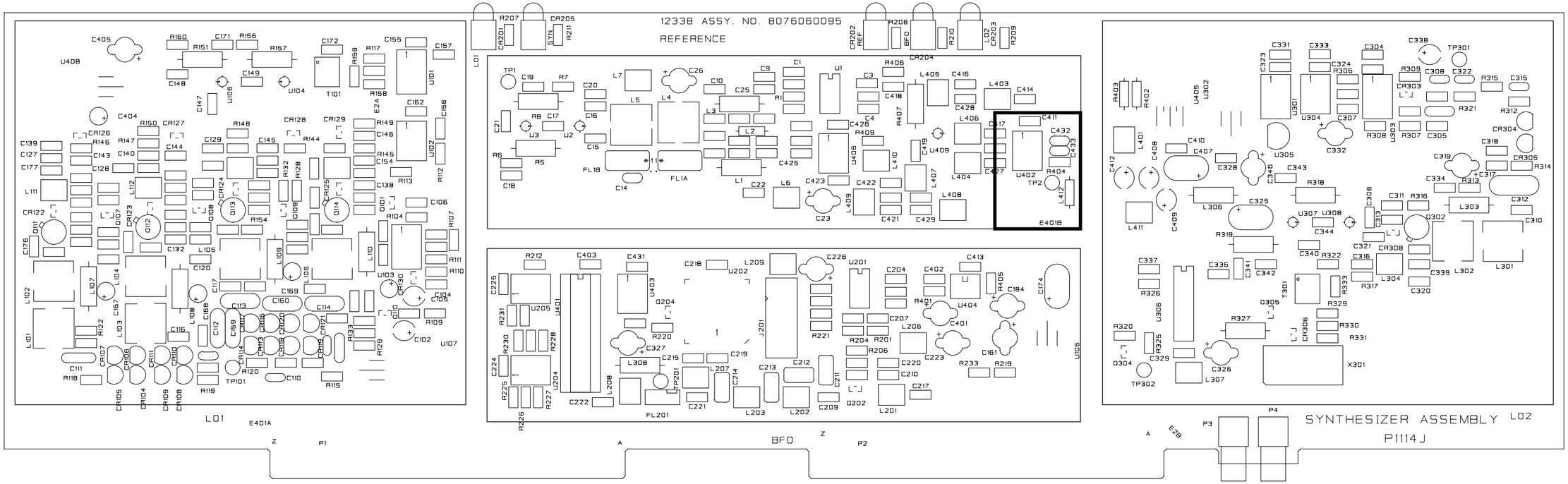
PC ASSEMBLY, SYNTHESIZER , 1A2A2			Panel 1 of 1
Revision Related Component Changes			
Ref Symbol		Description	Sunair Part No.
Revision B changes:			
N/A		Release of redesigned Synthesizer module using Direct Digital Synthesis	8076060095
Revision C changes:			
C124	From	CAP, 27 PF, NPO, 5 %, 50 V	1013902700
	To	CAP, 33 PF, NPO, 5 %, 50 V	1013903307
C129	From	CAP, 82 PF, NPO, 5 %, 50 V	1013908201
	To	CAP, 47 PF, NPO, 5 %, 50 V	1013904702
C130	From	CAP, 56 PF, NPO, 5 %, 50 V	1013905601
	To	CAP, 27 PF, NPO, 5 %, 50 V	1013902700
C180	From	CAP, 47 PF, NPO, 5 %, 50 V	1013904702
	To	CAP, 56 PF, NPO, 5 %, 50 V	1013905601
C181	From	CAP, 27 PF, NPO, 5 %, 50 V	1013902700
	To	CAP, 39 PF, NPO, 5 %, 50 V	1013903901
C183	From	CAP, 18 PF, NPO, 5 %, 50 V	1013901801
	To	CAP, 33 PF, NPO, 5 %, 50 V	1013903307
C314	From	CAP, 22 PF, NPO, 5 %, 50 V	1013902203
	To	CAP, 27 PF, NPO, 5 %, 50 V	1013902700
R112	From:	RESISTOR, 1K, 5%, 1/8W	1013801024
	To	RESISTOR, 680, 5%, 1/8W	1013806816
R113	From	RESISTOR, 1K, 5%, 1/8W	1013801024
	To	RESISTOR, 680, 5%, 1/8W	1013806816
R114	From	RESISTOR, 1K, 5%, 1/8W	1013801024
	To	RESISTOR, 1.5K, 5%, 1/8W	1013801521
Revision D changes:			
C310	From	CAP, 470 PF, NPO, 200V	1013904711
	To	CAP, 560 PF, NPO, 200V	1013905610
C314	From	CAP, 27 PF, NPO, 5 %, 50 V	1013902700
	To	CAP, 33 PF, NPO, 5 %, 50 V	1013903307
C339	From	CAP, 10PF, NPO, 5 %, 200 V	1013902700
	To	CAP, 33 PF, NPO, 5 %, 50 V	1013903307
R308	From	RESISTOR, 1K, 5%, 1/8W	1013801822
	To	RESISTOR, 2.7K, 5%, 1/8W	1013802721
Revision E changes:			
C432	Add	CAP, 12PF, NPO, 5%, 200V	1012901203
C433	Add	CAP, 6.8PF, NPO, +/- 0.5PF, 200V	1012906892
L412	Add	INDUCTOR, MOLDED, 68UH, 5%	0651650003
R404	Add	RESISTOR, 100K, 5%, 1/8W	1013801041
OR			
(none)	Add	PC Assembly, Reference Modification (This assembly adds above listed four (4) components & circuitry as an interim addition.	8076069092
Revision F changes:			
(none)	Add	Add Humiseal® 1B31sealant to 1st and 2nd LO areas of top side of synthesizer PC Board. Components in above treated areas require spot reapplication of after component replacement.	
Revision G changes:			
L306	From	INDUCTOR, SMT, 1.0UH, 5%	1013902700
	To	INDUCTOR, MOLDED, 1.0UH, 5%	0648360008
Q305	Delete	TRANSISTOR, N-CH FET, 2N7002	1013080033
Revision H changes:			
(none)	Add	Add Caterpillar Grommet 1/8" long to each end of the top of synthesizer assembly metal backplane.	0500590001
Revision I changes:			
U202	From	IC. DIGITAL, CPLD CY7C372I-66JC	1012950034
	To	IC. DIGITAL, CPLD CY7C37064	1013900006

Notes

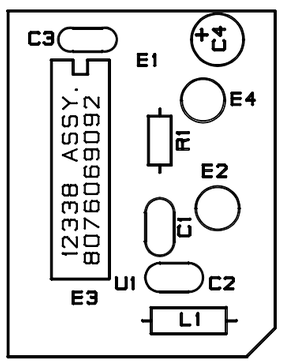
1. The above Revision-related component change information is provided to help end-users perform proper component replacement.
2. Unless otherwise directed by Sunair, all field-replaced components should be replaced with those specified for your specific Synthesizer Revision level.
3. The Synthesizer Assembly Revision Level is marked with an alphabetic character and is located along the top front edge of the PC Board in the center.

Figure 8.7 *1A2A2 Synthesizer Assembly – DDS Version – Parts List (Sheet 2 of 2)*

8076060206.hgl



P24272

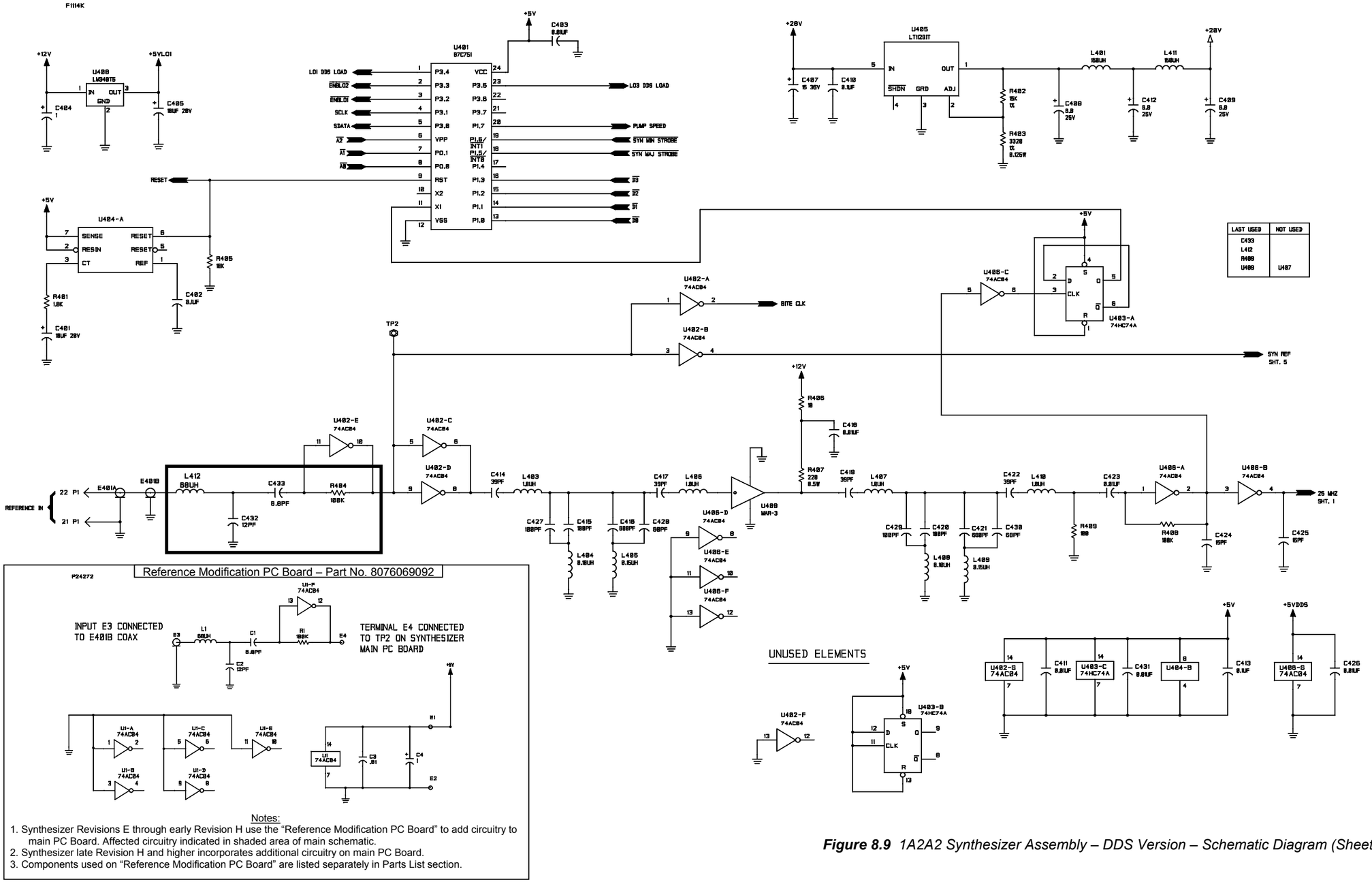


Reference Modification PC Assy
Component Location Diagram

Synthesizer PC Assembly
(DDS type)

Note:
Shaded area indicates location of Reference Modification PC Assembly (if used and present)

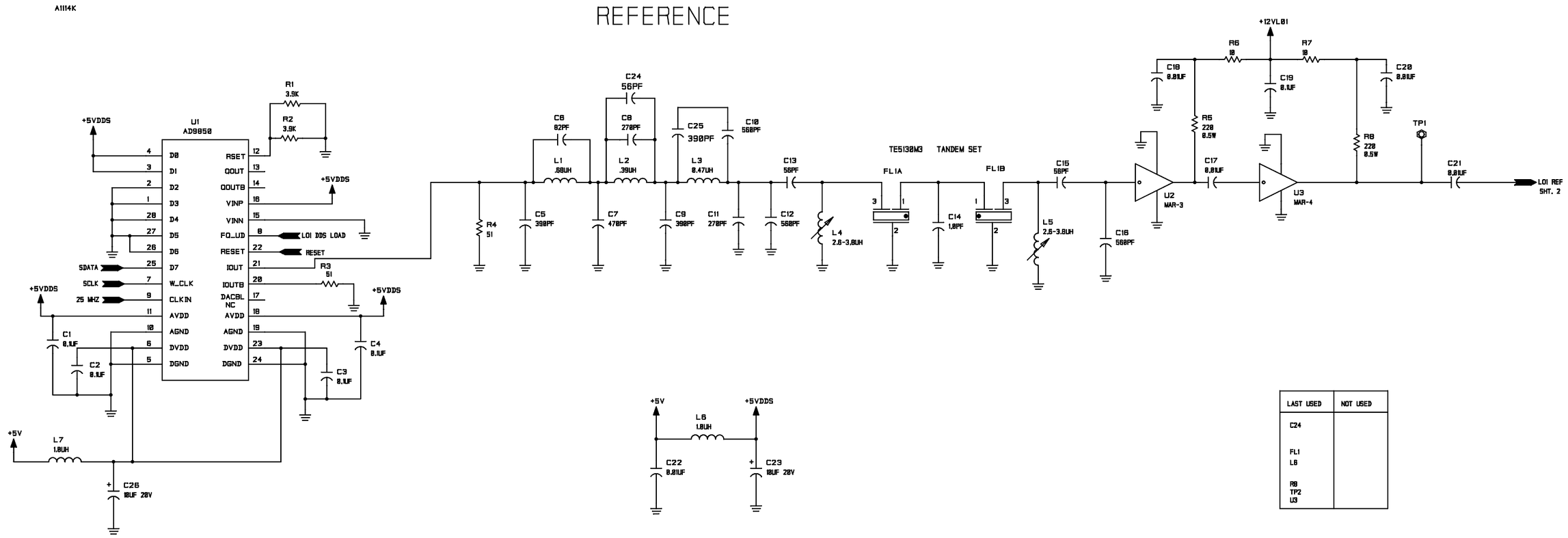
Figure 8.8 *1A2A2 Synthesizer Assembly - DDS Version - Component Location Diagram*



Reference Modification PC Board – Part No. 8076069092

Notes:
1. Synthesizer Revisions E through early Revision H use the “Reference Modification PC Board” to add circuitry to main PC Board. Affected circuitry indicated in shaded area of main schematic.
2. Synthesizer late Revision H and higher incorporates additional circuitry on main PC Board.
3. Components used on “Reference Modification PC Board” are listed separately in Parts List section.

Figure 8.9 *1A2A2 Synthesizer Assembly – DDS Version – Schematic Diagram (Sheet 1 of 6)*



LAST USED	NOT USED
C24	
FL1	
L6	
R8	
TP2	
U3	

Figure 8.9 *1A2A2 Synthesizer Assembly - DDS Version - Schematic Diagram (Sheet 2 of 6)*

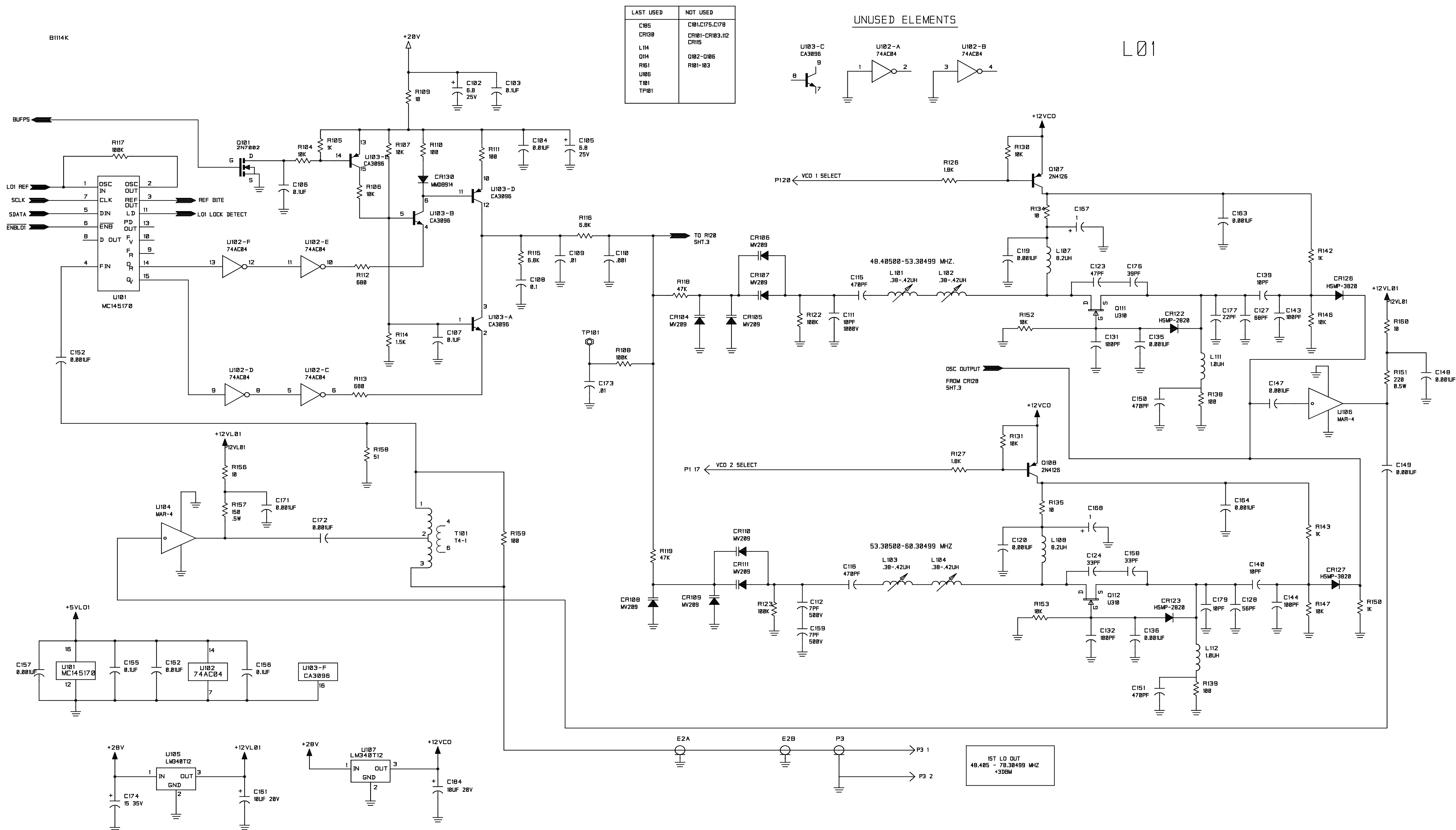


Figure 8.9 1A2A2 Synthesizer Assembly – DDS Version – Schematic Diagram (Sheet 3 of 6)

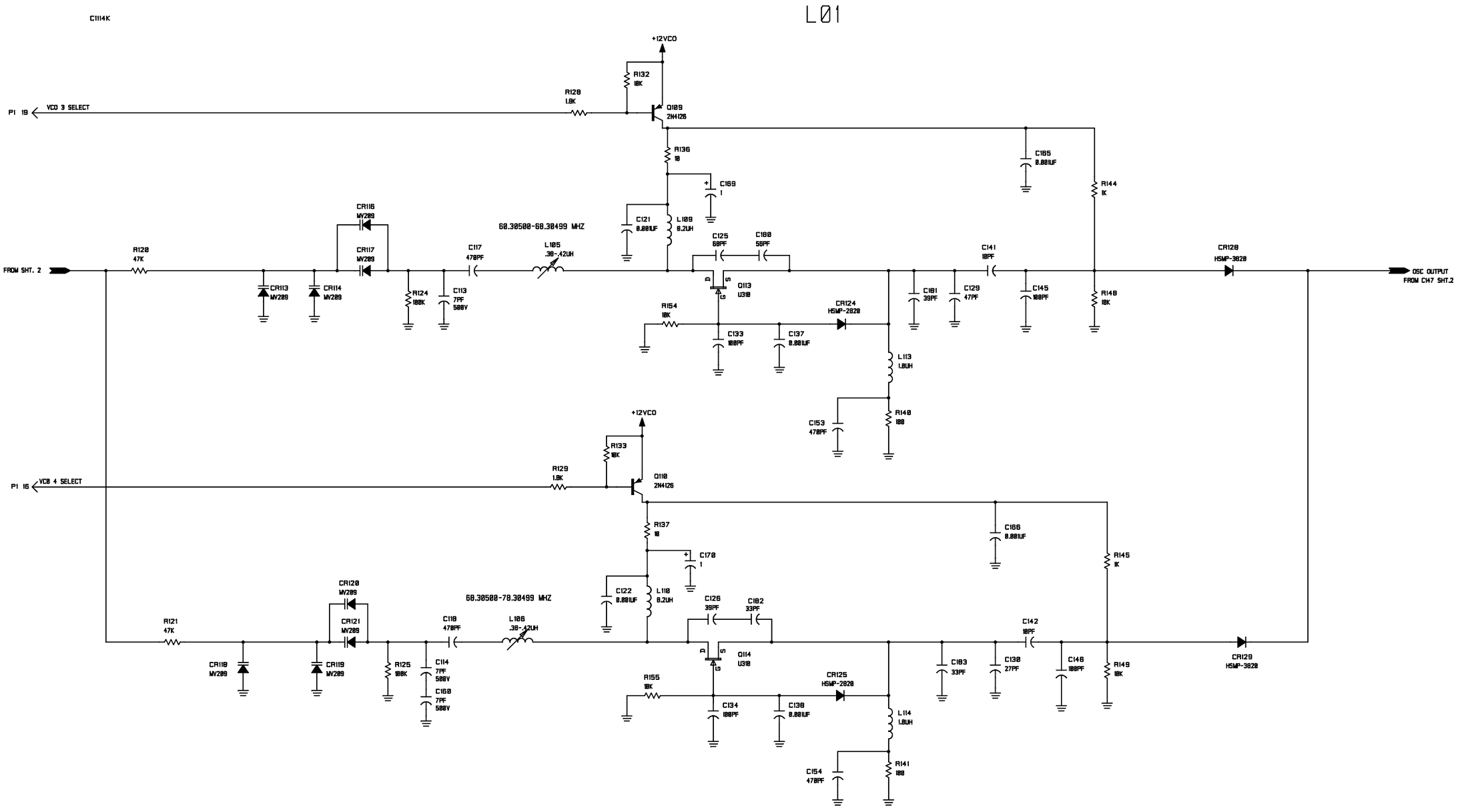


Figure 8.9 *1A2A2 Synthesizer Assembly - DDS Version - Schematic Diagram (Sheet 4 of 6)*

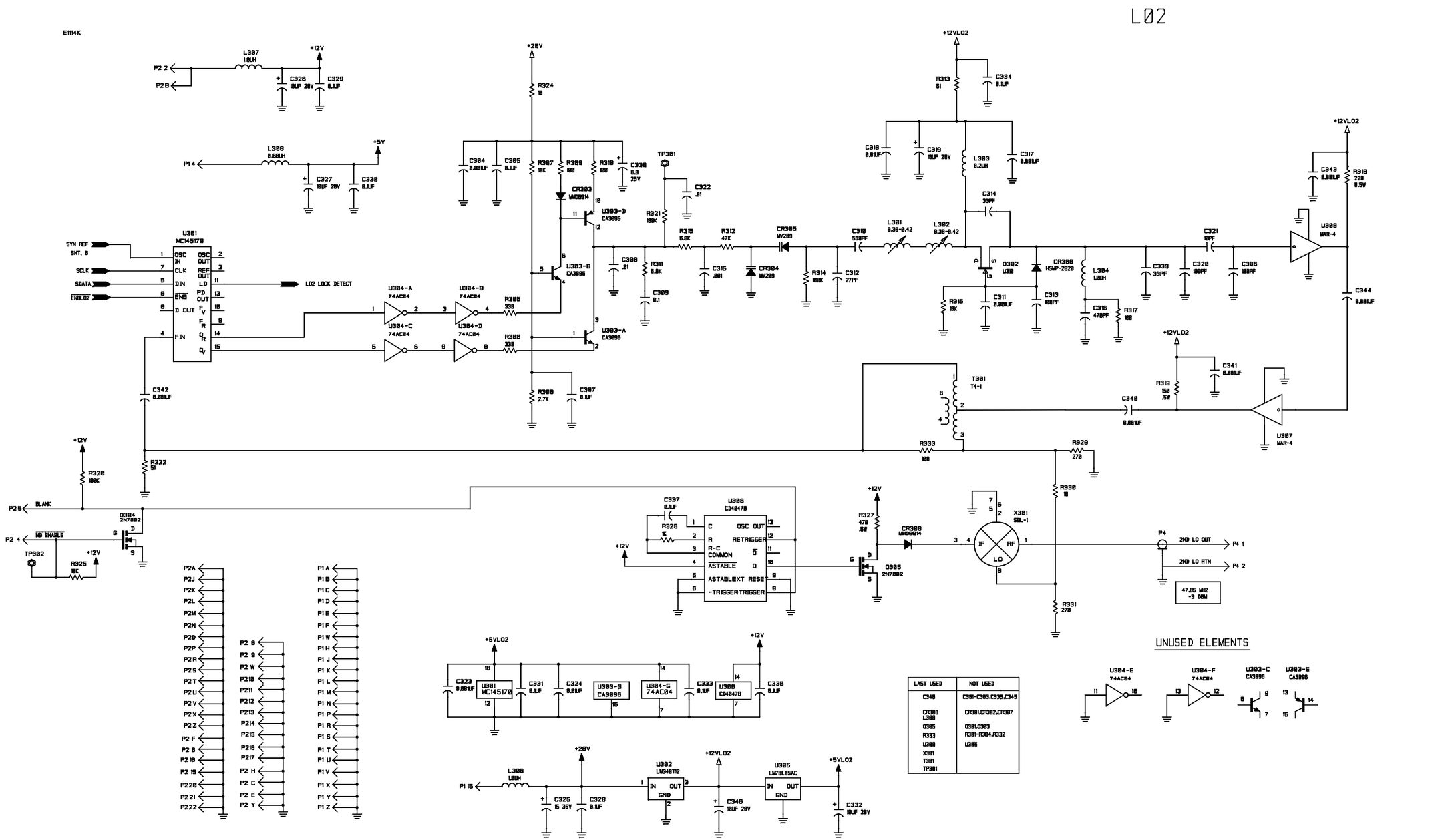


Figure 8.9 *1A2A2 Synthesizer Assembly – DDS Version – Schematic Diagram (Sheet 5 of 6)*

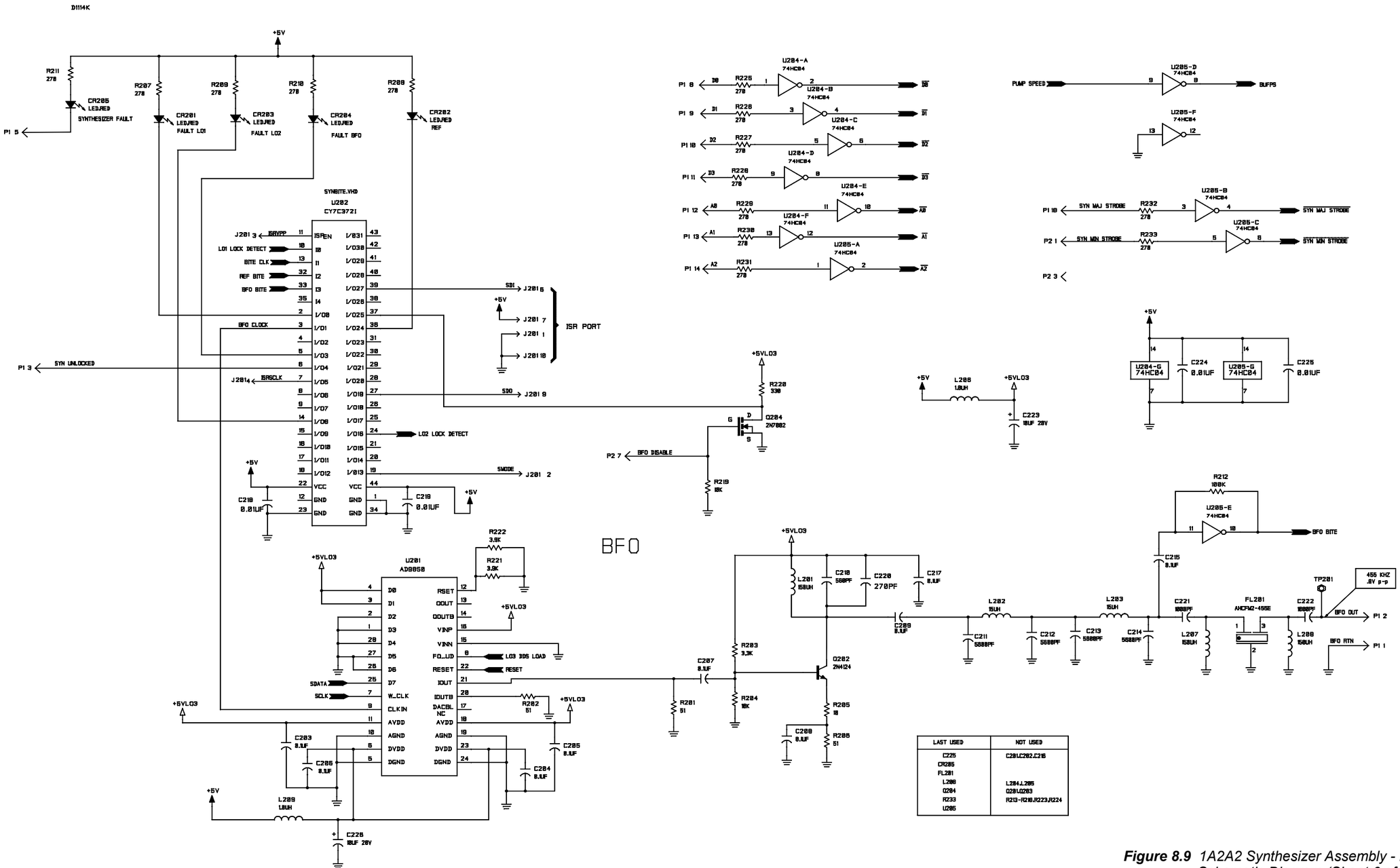


Figure 8.9 *1A2A2 Synthesizer Assembly - DDS Version - Schematic Diagram (Sheet 6 of 6)*

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8.3.2 Digital IF & Audio Board Set

8.3.2.1 Description

The RT-9000C Transceiver uses redesigned versions of earlier analog IF 1A2A4 and Audio 1A2A3 assemblies. The new assemblies are digital designs and are, in fact, what sets the RT-9000C transceiver apart from its predecessors. These new assemblies are designed to be backward compatible with previously produced RT-9000 transceiver models. Due to the design implementation, however, these two assemblies can ONLY operate as a pair. Each new digital assembly type CANNOT replace its earlier analog counterpart by itself. The new two-board set together, however, fully replaces the combined functions of the original analog IF and Audio assemblies.

This qualified interchangeability situation will never be a problem with the RT-9000C Transceivers since they will always use the new digital two-board set. Use and application of the new two-board set in earlier models has not been fully defined or implemented as of this writing.

8.3.2.2 Theory of Operation

This section describes the theory of operation of the new digital two-board set in the RT-9000C Transceiver. This explanation supplements the theory of operation described in Section 4 of the RT-9000 Operation & Maintenance manual to which this supplement is attached. The theory of operation is described for receive-state and transmit-state and supplements original manual sections 4.3 and 4.4, respectively. The theory of operation explanation begins and ends at the Front End Assembly (1A2A5) – to - IF Assembly (1A2A4) interconnection point.

8.3.2.2.1 Receive-State Operation

1A2A4 Digital IF Assembly

The 48.305 MHz First IF output from the 1A2A5 Front End Assembly enters the 1A2A4 Digital IF Assembly at coaxial connector P4. The signal is switched through diode gate CR1 and routed to 48.305 MHz crystal filter FL1. The band-pass filtered signal is switched through diode gate CR4 and passes to low-noise amplifier U1. The amplified signal from U1 is switched through diode gate CR5 and routed to mixer X1. The signal is mixed with the Second Local Oscillator, which has a frequency of 47.85 MHz. This produces the 455 kHz Second IF receive signal.

The 455 kHz signal is switched through diode gate CR23 and again amplified by U10. The signal is switched by diode gate CR28 to transformer T4. The signal passes to T1, which splits it into two equal amplitude signals. One signal is filtered by FL2, which is an LSB filter but used for *USB reception*. The other signal is filtered by FL3 or FL4. While FL3 is an USB filter it is used for *LSB reception*. The USB and LSB signal frequencies are transposed due to the frequency conversion scheme used in this design.

Refer to following table, which shows how these filter(s) are used when receiving various emission mode signals. Note that this filter usage is somewhat different during transmit-state operation covered later.

Receive-State Emission Mode vs. Filter Usage

Mode	455 kHz Filters		
	FL2	FL3	FL4
USB	X		
LSB		X	
AME			X
CW	X		
ISB	X	X	

Solid-state SPDT switches U4 and U5 control the selection of filters FL3 or FL4. These switches operate together but operate only for specific combinations of Mode and Receive-state or Transmit-states.

The filtered signals from filters FL2 and/or FL3 or FL4 pass through solid-state SPDT switches U3 and U6 for further processing. The operation of switches U3 and U6 is related to receive or transmit states. In receive-state, both switches always use the “common-to-normally connected” signal path. In transmit-state, each switch’s operation is dependant upon the selected emission mode and is covered later.

The USB signal leaving solid-state switch U3 is routed to low-noise amplifier U7 and then low-pass filtered by U17. The signal is then converted to a serial digital stream by analog-to-digital converter U301 and sent to digital signal processor U401.

The LSB or AM signal leaving solid-state switch U6 is similarly processed as the USB signal. In this case, the signal passes to low-noise amplifier U8 then low-pass filtered by U18. Analog-to-digital converter U302 converts the signal to a serial digital stream. This signal is also sent to digital signal processor U401.

Digital signal processor (DSP) U401 evaluates the signal characteristics of these two signal streams and determines the required gain settings for each signal path. U401 generates appropriate feedback signals in digital serial format to control the gain of earlier amplifier stages for both signal paths. These digital signals are sent to digital-to-analog converters U315, U306, and U307. The feedback signals, now converted to analog equivalents, are applied to pin 10 of low-noise amplifiers U1, U7, and U8, respectively.

The USB and LSB/AM signal input streams continue their progress in U401 and are digitally filtered. This filtering process ultimately establishes the receiver bandwidth characteristics.

In receive-state, U401 produces three main digital output signal streams. These are: USB, LSB, and Speaker Audio. The USB and LSB serial signal streams are converted back to analog signals by digital-to-analog converters U308 and U309, respectively. These analog output signals are routed through top connector 1A2A4J1 to the 1A2A3 Audio Assembly and ultimately become Line Output signals.

U401 also develops processed audio for the radio front-panel speaker and produces this signal as a separate serial digital output. Setting information from front-panel Volume and Squelch controls enter channel 0 and 1 inputs of multiplexer/analog-to-digital converter U314. These signals are converted to digital values and enter U401. U401 produces a Speaker Audio digital signal stream output, which passes to digital-to-analog converter U301. U301 generates the Speaker Audio analog output signal in accordance to the original Volume control setting sent as part of digital stream. The analog Speaker Audio signal is routed through top connector 1A2A4J1 to the 1A2A3 Audio Assembly.

When the Squelch feature is enabled by the front-panel control & switch, U401 controls this function. The squelch function uses both received signal strength and syllabic content to determine its operating threshold. The front-panel Squelch control sets the signal strength section of the threshold. The syllabic portion is fixed and a true syllabic type. Its operation uses a special algorithm, which operates on voice characteristics and rejects unwanted signals such as noise or data. The Speaker Audio digital signal stream output to U310 is enabled whenever the received signal strength and syllabic content exceed both threshold sections.

1A2A3 Digital Audio Assembly

USB, LSB, and Speaker Audio signals enter the 1A2A3 Digital Audio Assembly through top connector A2A3J1. Each receive-state audio signal path is low-pass filtered to remove undesired high frequency resulting from digital-to-analog conversion process on the Digital IF Assembly. These filters consist of U13-D, U14-C, and U14-D for the USB path. The LSB filters consist of U13-A, U14-B, and U14-A. The Speaker Audio filters consist of U15-D, U3-C, and U3-D. The filtered USB and LSB audio signals pass to the rear-panel 600-Ohm audio drivers, U16-A and U16-B, respectively. Filtered Speaker Audio is routed to speaker driver U12.

The Audio Assembly also contains circuitry that supports other radio operations. The following describes these additional functions:

- Keyline signals from front and rear panels, CW key, and specialized internal sources are combined for integrated keyline control. Regenerated keyline signal outputs are also created for companion equipment control.
- Audio metering circuits provide the capability to measure audio levels at USB and LSB receive and transmit 600-Ohm Line Audio points.
- Receive BITE audio circuitry switches signals during BITE operation.
- High-current drivers supply switched +12 V Receive and +12 V Transmit voltages. Drivers for RX Antenna and TX Antenna relays are also included. The 1A2A1 CPU Assembly controls all these functions.
- The Audio Assembly also provides digital communication with its companion Digital IF Assembly. This interface point allows Audio Assembly to pass control signals to and from the Digital IF Assembly. This is necessary to support backward compatibility of this Digital Audio and IF board set with earlier radio equipment.

8.3.2.2.2 Transmit-State Operation

1A2A3 Digital Audio Assembly

Operator microphone audio or CW key input signals enter the transmitter circuitry from the front panel. Audio can also originate from the 600-Ohm Line Audio inputs on the rear panel. These signals enter the 1A2A3 Digital Audio Assembly through card edge connector P1. Each signal source enters the circuitry at different points and has separate signal paths.

Microphone audio is routed to internal adjustment potentiometer R152, which sets its level. The microphone signal is amplified by U3-A and is then low-pass filtered by U3-B, U15-A, and U15-B.

Two rear-panel 600-Ohm transmit Line Audio inputs are used to introduce audio signals into dedicated USB and LSB signal paths. USB audio is coupled through transformer T1 to amplifier U37-A and then low-pass filtered by U1-D, U2-A, and U2-D. LSB audio similarly is coupled through transformer T2 to amplifier U37-B and then low-pass filtered by U1-C, U2-B, and U2-C.

When the radio is used in CW Mode, the CW key signal is detected by U5-F. This CW signal and all three main audio signals are routed through top connector 1A2A3J1 to the Digital IF Assembly.

1A2A4 Digital IF Assembly

USB and LSB Line Audio, microphone audio, and the detected CW signal enter the Digital IF Assembly through top connector 1A2A3J1. The USB, LSB, and microphone audio signal paths are directed to analog-to-digital converters U303, U304, and U305, respectively. This process converts each audio signal path into a serial digital output stream, which then passes to digital signal processor U401 and is digitally filtered. U401 also selects and combines these input signal streams according selected emission mode. The transmit output signal of U401 is a 14-bit parallel-formatted digital signal, which is routed to direct digital synthesizer U201.

Direct Digital Synthesizer U201 produces a 455 kHz suppressed-carrier analog signal, which can contain both USB and LSB signals. The USB and LSB signal sidebands are transposed due to the frequency conversion scheme used by this design. For example, the *USB transmit audio* input signal will leave U201 as an LSB signal. This signal becomes an *USB signal* after the last frequency conversion to the selected radio operating frequency.

When the radio is used in CW Mode, the detected CW signal routed from the 1A2A3 Audio Assembly enters digital signal processor U401. U401 and direct digital synthesizer U201 generate a shaped CW output signal directly at 454 kHz.

The 455 kHz Third Local Oscillator is not used in this design to generate IF signals but instead is used to create a 5.005 MHz clock source. PLL clock generator U202 and 5.005 MHz VCXO U203 are locked to a frequency 11 times the 455 kHz Third Local Oscillator input signal. Buffered outputs are routed to U201 and IF clock generator U408, which generates and distributes clock signals to the analog, digital, and data converters.

The output of U201 is sent to low-pass filter consisting of C217, L202, C218, C219, L203, and C220 to remove undesirable high frequency content. The filtered 455 kHz signal is then switched to the appropriate 455 kHz filter according to the selected emission mode.

The 455 kHz signal is routed to solid-state switches U3 and U6 whose operation is tied to receive or transmit-states. In transmit-state, the operation of each switch is dependant upon the selected emission mode. Signals passing through switch U3 are switched to filter FL2 and used for USB, AME, and CW transmission.

Signals passing through switch U6 are further switched to filters FL3 or FL4 by solid-state switches U4 and U5. These switches operate together but operate only for specific combinations of emission mode and Transmit or Receive-states. Filter FL3 is used for LSB and FL4 is used for ISB transmission.

Refer to following table showing how these filter are used when transmitting various emission mode signals. Note that this filter usage is somewhat different than for receive-state operation.

Transmit-State Emission Mode vs. Filter Usage

Mode	455 kHz Filters		
	FL2	FL3	FL4
USB	X		
LSB		X	
AME	X		
CW	X		
ISB			X

The signals passing from FL2 and through U4 are combined in transformer T1 and passes to T4. The signal is then switched through diode gates CR29 and CR24 to mixer X1. The 455 kHz signal is mixed with the Second Local Oscillator, which has a fixed frequency of 47.850 MHz. This produces the 48.305 MHz transmit IF signal.

The signal is switched by diode gate CR6, amplified by U12, and switched again by diode gate CR3. The signal next is band-pass filtered and switched by diode gate CR2 to amplifier U13. The amplified signal is passed to an attenuator consisting diodes CR9 and CR10. This attenuator can be controlled by ALC or TGC feedback signals that control transmitter power output based on RF load conditions or emission mode. The signal from the attenuator is amplified by U14 and finally routed to the 1A2A5 Front End Assembly through coaxial connector P3.

Automatic Level Control (ALC) sets transmit power level based on forward and reflected power signals routed from the 1A3 Filter Assembly. U9, U19, and U20 produce a control voltage sent to attenuator diodes CR9 and CR10.

Transmitter Gain Control (TGC) is a special ISB Mode-related feedback signal. This signal is based on the power of the USB and LSB audio input and the power indicated by the TGC Power Detect signal. This signal is developed by digital signal processor U401 and allows it to set a lower output power than the ALC circuit would set. The ALC function remains active but is not the dominant control.

8.3.2.3 Alignment and Adjustment

8.3.2.3.1 Receive and Transmit Audio Level Adjustments

This procedure describes how to set the Receive Audio Output and Transmit Audio Input levels. All adjustments, except for the Microphone Audio adjustment, can be performed with the equipment in receive-state. These adjustments will normally not be necessary unless one of the following is true: 1.) Operation using audio levels other than the factory settings is required. 2.) There is reason to believe that the factory settings have been disturbed. Merely replacing the Digital Audio Assembly should not require readjustment.

All adjustments are performed on the Digital Audio 1A2A3 Assembly. Refer to Figure 8.10 to locate the applicable adjustment points.

Preliminary

1. If the RT-9000C was powered-up, power it down now.

2. Observe proper Electrostatic Discharge damage prevention practices during this entire procedure.

3. Remove the RT-9000C top cover. Refer to Section 5.2.1 in the RT-9000 Operation and Maintenance manual.

4. Remove card cage top cover. Refer to Figure 5.4.1.3. This cover extends the full width of the RT-9000C and is closest to the front panel.

   Note: The RT-9000C uses loose hardware. When removing the card cage cover fasteners, account for any lost hardware items to prevent accidental short circuits later.

5. Unplug the small 6-pin connector entering the internal Power Supply enclosure. This connector is about 2 inches behind the internal circulating fan. To unplug, squeeze the top tab on the connector shell and pull the connector out from its chassis-mounted mate.

   Note: This step temporarily disables the RT-9000C Transmitter Power Amplifier. This prevents probable damage to the RF Signal Generator if the transmitter is accidentally keyed while performing receive-state adjustments.

6. Power up the RT-9000C.

7. Locate all Receive Audio adjustment points. Refer to Figure 8.10.

Receive Audio Output Adjustment

8. Set the RT-9000C as follows; Frequency: 8.000 MHz, Mode: ISB, AGC: Slow

9. Connect a 50-Ohm RF signal generator to RT-9000C ANT connector J4. Adjust the generator output as follows; Frequency: 8.001 MHz, Output level: -70 dBm (70.7 μV), Modulation: none.

10. Connect a 600-Ohm load resistor (non-inductive) to RT-9000C Receive Audio USB Output at rear-panel AUDIO connector J5, pins L and M. Connect an audio voltmeter to monitor the voltage across the load resistor.

11. Adjust potentiometer 1A2A3 R84 (USB RX) until the audio voltmeter indicates the desired reading. The factory setting is 0 dBm.

12. Disconnect the load resistor and voltmeter and re-connect them to RT-9000C Receive Audio LSB Output at rear-panel AUDIO connector J5, pins A and C.

13. Re-adjust the RF signal generator output frequency to 7.999 MHz.

14. Adjust potentiometer 1A2A3 R85 (LSB RX) until the audio voltmeter indicates the desired reading. The factory setting is 0 dBm.

15. Disconnect the RF signal generator, audio voltmeter, and 600-Ohm load resistor. Re-connect the small 6-pin connector disconnected in step 5.

Transmit Audio Input Adjustment

16. Connect 150 Watt 50-Ohm dummy load to RT-9000C ANT connector J4.

17. Connect a 600-Ohm output audio signal generator to RT-9000C Transmit Audio USB Input at rear-panel AUDIO connector J5, pins H and J.

18. Connect an audio voltmeter as follows: Connect the positive input lead to test point 1A2A3 TP1. Connect the negative lead to the radio chassis.

19. Adjust the audio signal generator output as follows; Frequency: 1.0 kHz, Output level: Set to the desired transmit audio level. The factory setting is 0 dBm. The RT-9000C transmit audio input range is –20 dBm to +10 dBm.

20. Adjust potentiometer 1A2A3 R2 (USB TX) until the audio voltmeter indicates 0.230 Vrms (This is equivalent to 0.65 V p-p).

21. Disconnect the audio voltmeter positive lead and reconnect it to test point 1A2A3 TP2. Disconnect the audio signal generator and re-connect it to Transmit Audio LSB Input at rear-panel AUDIO connector J5, pins S and T.

22. Adjust potentiometer 1A2A3 R10 (LSB TX) until the audio voltmeter indicates 0.230 Vrms (this is equivalent to 0.65 V p-p).

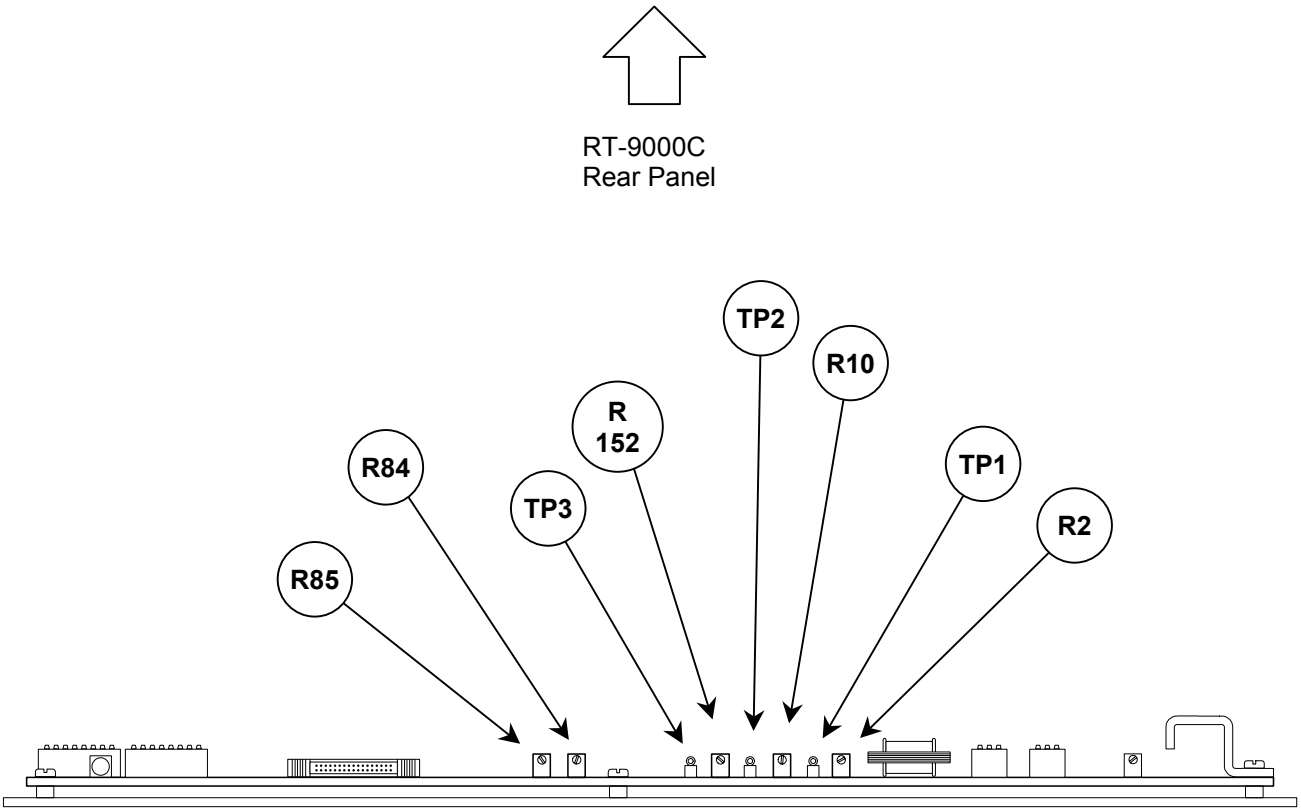
23. Disconnect the audio voltmeter and audio signal generator.

24. Connect a microphone intended for use with RT-9000C to front-panel MIC connector. Connect an oscilloscope to test point 1A2A3 TP3.

25. Key the RT-9000C Transmitter from microphone and speak into it at a normal level. Adjust potentiometer 1A2A3 R152 until 0.32 V p-p is indicated on the oscilloscope.

26. Disconnect all test equipment. This completes all receive and transmit audio level adjustments

27. Re-install card cage top cover and RT-9000C top cover.



Top Edge View

1A2A3 Digital Audio Assembly
(as installed in radio)

Figure 8.10 *1A2A3 Digital Audio Assembly – Adjustment Points*

8.3.2.3.2 ALC, Low Power ALC, and ACC Adjustments

This procedure describes how to set the both ALC (Automatic Level Control) controls. It also describes how to adjust of the Automatic Carrier Control (ACC), an AM-only control. All adjustments are all transmit-state adjustments. These adjustments should be performed after the Digital IF 1A2A4 Assembly is replaced.

All adjustments are performed on the Digital IF 1A2A4 Assembly. Refer to Figure 8.11 to locate the applicable adjustment points.

Preliminary

1. If the RT-9000C was powered-up, power it down now.

2. Observe proper Electrostatic Discharge damage prevention practices during this entire procedure.

3. Remove the RT-9000C top cover. Refer to Section 5.2.1 in the RT-9000 Operation and Maintenance manual.

4. Remove card cage top cover. Refer to Figure 5.4.1.3. This cover extends the full width of the RT-9000C and is closest to the front panel.

   Note: The RT-9000C uses loose hardware. When removing the card cage cover fasteners, account for any lost hardware items to prevent accidental short circuits later.

5. Power up the RT-9000C.

6. Locate the Digital IF Transmit adjustment points. Refer to Figure 8.11.

Adjustments

7. Connect 150 Watt 50-Ohm dummy load to RT-9000C ANT connector J4. Connect an RF voltmeter to monitor the voltage across the dummy load.

8. Connect a CW key to the RT-9000C front-panel CW jack.

9. Set the RT-9000C as follows; Frequency: 8.000 MHz, Mode: CW, Power Setting: 125 Watts

10. Key the RT-9000C using the CW key. Adjust ALC potentiometer 1A2A4 R77 until the RF voltmeter indicates 79 Vrms. Unkey the RT-9000C.

11. Reset the Power Setting to 65 Watts.

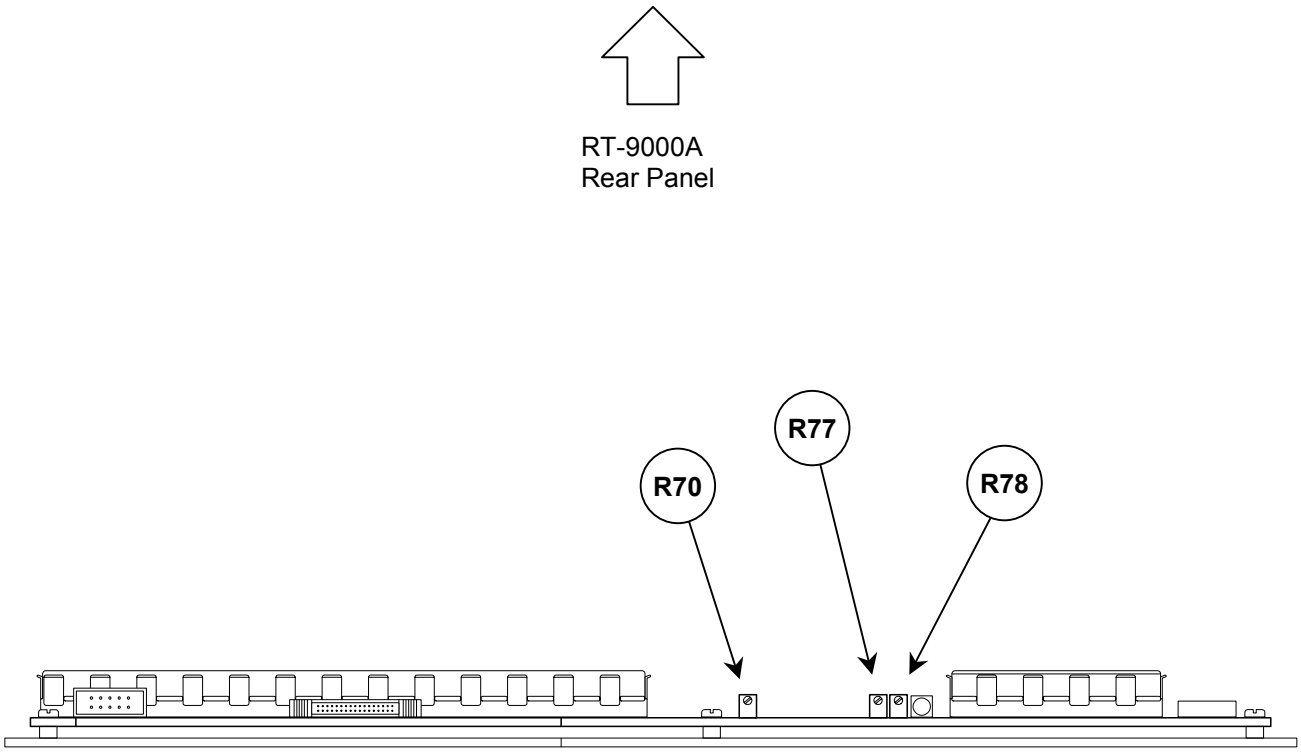
12. Key the RT-9000C using the CW key. Adjust LOW POWER ALC potentiometer 1A2A4 R78 until the RF voltmeter indicates 57 Vrms. Unkey the RT-9000C.

13. Reset the RT-9000C as follows; Mode: AM, Power Setting: 125 Watts.

14. Key the RT-9000C using the CW key. Adjust ACC potentiometer 1A2A4 R70 until the RF voltmeter indicates 47 Vrms. Unkey the RT-9000C.

15. Disconnect all test equipment. This completes the ALC and ACC adjustments.

16. Re-install card cage top cover and RT-9000C top cover.



Top Edge View

1A2A4 Digital IF Assembly
(as installed in radio)

Figure 8.11 *1A2A4 Digital IF Assembly – Adjustment Points*

8.3.2.4 Assembly Documentation

Digital IF Assembly 1A2A4		
Figure	Document	Page(s)
8.12	Parts List	8-33 through 8-35
8.13	Component Location Diagram	8-36
8.14	Schematic Diagram	8-37 through 8-45

Digital Audio Assembly 1A2A3		
Figure	Document	Page(s)
8.15	Parts List	8-47 & 8-48
8.16	Component Location Diagram	8-49
8.17	Schematic Diagram	8-50 through 8-56

Digital IF Assembly Variations		
Description	Sunair Part No.	Notes/ Rev
Standard Digital IF Assembly	8121090091	1, 3
TADIL A / Link 11 Option	8109080090	2, 3

Notes

1. Implements all standard RT-9000C features.
2. Implements TADIL A / Link 11 operation per MIL-STD-188-203-1A.
3. These features and options are implemented via firmware residing in memory device U403. This firmware is factory installed and CANNOT be installed in the field.

PC ASSEMBLY, Digital IF Board		Panel 1 of 10	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
	PC Assembly, Digital IF Board	8121080096	A
C1	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C2	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C3	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C4	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C5	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C6	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C7	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C8	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C9	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C10	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C11	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C12	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C13	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C14	CAP. 10UF, 16V, 10%	1016410000	
C15	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C16	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C17	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C18	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C19	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C20	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C21	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C22	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C23	CAP. 18PF, NPO, 5%, 200V	1013901801	
C24	CAP. 18PF, NPO, 5%, 200V	1013901801	
C25	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C26	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C27	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C28	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C29	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C31	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C32	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C35	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C36	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C39	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C40	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C41	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C45	CAP. 100PF, NPO, 5%, 200V	1013901011	
C46	CAP. 82PF, NPO, 5%, 200V	1013908201	
C47	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C48	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C49	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C50	CAP. 82PF, NPO, 5%, 200V	1013908201	
C51	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C52	CAP. 47PF, NPO, 5%, 200V	1013904702	
C53	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C54	CAP. 82PF, NPO, 5%, 200V	1013908201	
C55	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C56	CAP. 47PF, NPO, 5%, 200V	1013904702	
C57	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C58	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C59	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C60	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C61	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C63	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C64	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C65	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C66	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C67	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C68	CAP. 10PF, NPO, 5%, 200V	1013901002	
C69	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C70	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C71	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C72	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C73	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C74	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C75	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C76	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C77	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C78	CAP. 0.1UF, 16V, X7R, 10%	1016400004	

PC ASSEMBLY, Digital IF Board		Panel 2 of 10	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
C79	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C80	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C81	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C82	CAP. 10PF, NPO, 5%, 200V	1013901002	
C83	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C84	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C85	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C86	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C87	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C88	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C89	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C90	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C91	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C92	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C93	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C94	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C95	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C96	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C97	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C98	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C99	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C100	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C101	CAP. 100PF, NPO, 5%, 200V	1013901011	
C102	CAP. 180PF, NPO, 5%, 200V	1013901819	
C103	CAP. 100PF, NPO, 5%, 200V	1013901011	
C104	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C105	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C106	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C107	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C108	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C109	CAP. 1UF, 16V, 20%	1013050037	
C110	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C111	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C112	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C113	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C116	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C117	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C118	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C125	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C126	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C127	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C129	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C130	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C131	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C132	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C133	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C134	CAP. 10UF, 16V, 10%	1016410000	
C135	CAP. 10UF, 16V, 10%	1016410000	
C136	CAP. 10UF, 16V, 10%	1016410000	
C137	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C138	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C139	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C140	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C141	CAP. 1UF, 16V, 20%	1013050037	
C142	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C143	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C144	CAP. 10UF, 16V, 10%	1016410000	
C145	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C146	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C147	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C148	CAP. 10UF, 16V, 10%	1016410000	
C149	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C150	CAP. 10UF, 16V, 10%	1016410000	
C151	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C152	CAP. 10UF, 16V, 10%	1016410000	
C153	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C154	CAP. 10UF, 16V, 10%	1016410000	
C155	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C156	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C157	CAP. 0.01UF, 16V, X7R, 10%	1016390009	

PC ASSEMBLY, Digital IF Board		Panel 3 of 10	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
C158	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C159	CAP. 47UF, 10V, 10%	1016460007	
C160	CAP. 47UF, 10V, 10%	1016460007	
C161	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C162	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C163	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C164	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C165	CAP. 10UF, 16V, 10%	1016410000	
C201	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C202	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C203	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C204	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C205	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C206	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C207	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C208	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C209	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C210	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C211	CAP. 10UF, 16V, 10%	1016410000	
C212	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C213	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C214	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C215	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C216	CAP. 10UF, 16V, 10%	1016410000	
C217	CAP. 1800PF, NPO, 5%, 200V	1013901827	
C218	CAP. 5600PF, NPO, 5%, 200V	1013905628	
C219	CAP. 390PF, NPO, 5%, 200V	1013903919	
C220	CAP. 1800PF, NPO, 5%, 200V	1013901827	
C221	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C222	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C223	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C224	CAP. 10UF, 16V, 10%	1016410000	
C225	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C226	CAP. 2200PF, NPO, 5%, 200V	1013902220	
C227	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C228	CAP. 0.47UF, 16V, 20%	1016790007	
C229	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C230	CAP. 0.001UF, 50V X7R, 10%	1016380003	
C231	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C232	CAP. 0.1UF, 16V, 20%	1016780001	
C252	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C301	CAP. 10UF, 16V, 10%	1016410000	
C302	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C303	CAP. 10UF, 16V, 10%	1016410000	
C304	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C305	CAP. 10UF, 16V, 10%	1016410000	
C306	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C307	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C308	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C309	CAP. 10UF, 16V, 10%	1016410000	
C310	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C311	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C312	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C313	CAP. 10UF, 16V, 10%	1016410000	
C314	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C315	CAP. 10UF, 16V, 10%	1016410000	
C316	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C317	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C318	CAP. 10UF, 16V, 10%	1016410000	
C319	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C320	CAP. 10UF, 16V, 10%	1016410000	
C321	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C322	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C323	CAP. 10UF, 16V, 10%	1016410000	
C324	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C326	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C328	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C330	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C331	CAP. 10UF, 16V, 10%	1016410000	
C332	CAP. 0.1UF, 16V, X7R, 10%	1016400004	

Figure 8.12 *1A2A4 Digital IF Assembly Parts List (Sheet 1 of 3)*

PC ASSEMBLY, Digital IF Board		Panel 4 of 10	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
C334	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C336	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C337	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C338	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C340	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C342	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C343	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C344	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C345	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C346	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C347	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C348	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C349	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C350	CAP. 10UF, 16V, 10%	1016410000	
C351	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C352	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C353	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C354	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C401	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C402	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C403	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C404	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C405	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C406	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C407	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C408	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C409	CAP. 10UF, 16V, 10%	1016410000	
C410	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C411	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C412	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C413	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C414	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C415	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C416	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C417	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C418	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C419	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C420	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C421	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C422	CAP. 47UF, 10V, 10%	1016460007	
C423	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C424	CAP. 10PF, 50V, NPO, 5%	1016480008	
C425	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C426	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C427	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C428	CAP. 33PF, NPO, 5%, 200V	1013903307	
C429	CAP. 33PF, NPO, 5%, 200V	1013903307	
C430	CAP. 10UF, 16V, 10%	1016410000	
C431	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C432	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C433	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C434	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C435	CAP. 10UF, 16V, 10%	1016410000	
C436	CAP. 10UF, 16V, 10%	1016410000	
C437	CAP. 47UF, 10V, 10%	1016460007	
C438	CAP. 47UF, 10V, 10%	1016460007	
C439	CAP. 47UF, 10V, 10%	1016460007	
C440	CAP. 10UF, 16V, 10%	1016410000	
C441	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C442	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C443	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C444	CAP. 47UF, 10V, 10%	1016460007	
C445	CAP. 47UF, 10V, 10%	1016460007	
C446	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C447	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C448	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C449	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
CR1	DIODE, PIN HSMP-3820	1013170032	
CR2	DIODE, PIN HSMP-3820	1013170032	
CR3	DIODE, PIN HSMP-3820	1013170032	

PC ASSEMBLY, Digital IF Board		Panel 5 of 10	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
CR4	DIODE, PIN HSMP-3820	1013170032	
CR5	DIODE, PIN HSMP-3820	1013170032	
CR6	DIODE, PIN HSMP-3820	1013170032	
CR7	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR9	DIODE, PIN, HSMP-3810	1015830005	
CR10	DIODE, PIN, HSMP-3810	1015830005	
CR11	DIODE, SCHOTTKY BAS70	1015910009	
CR12	DIODE, SCHOTTKY BAS70	1015910009	
CR13	DIODE, SCHOTTKY BAS70	1015910009	
CR14	DIODE, SCHOTTKY BAS70	1015910009	
CR15	DIODE, SCHOTTKY BAS70	1015910009	
CR16	DIODE, SCHOTTKY BAS70	1015910009	
CR17	DIODE, PIN HSMP-3820	1013170032	
CR18	DIODE, LED, RED 550-2405	1008480029	
CR19	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR20	DIODE, SCHOTTKY BAS70	1015910009	
CR21	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR22	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR23	DIODE, PIN, HSMP-3810	1015830005	
CR24	DIODE, PIN, HSMP-3810	1015830005	
CR25	DIODE, SCHOTTKY BAS70	1015910009	
CR26	DIODE, SCHOTTKY BAS70	1015910009	
CR27	DIODE, SCHOTTKY BAS70	1015910009	
CR28	DIODE, PIN, HSMP-3810	1015830005	
CR29	DIODE, PIN, HSMP-3810	1015830005	
CR30	DIODE, SCHOTTKY BAS70	1015910009	
CR301	DIODE, SCHOTTKY HSMS-2820	1013160037	
CR302	DIODE, SCHOTTKY HSMS-2820	1013160037	
CR303	DIODE, SCHOTTKY HSMS-2820	1013160037	
CR401	DIODE, SCHOTTKY, MBRS-320	1015710000	
FB1	FERRITE BEAD, EXCML32A680U	1015880002	
FB2	FERRITE BEAD, EXCML32A680U	1015880002	
FB3	FERRITE BEAD, EXCML32A680U	1015880002	
FB4	FERRITE BEAD 2773021447	1016350007	
FB5	FERRITE BEAD 2773021447	1016350007	
FB6	FERRITE BEAD, EXCML32A680U	1015880002	
FB7	FERRITE BEAD, EXCML32A680U	1015880002	
FB8	FERRITE BEAD, EXCML32A680U	1015880002	
FB9	COMMON MODE CHOKE 2744051447	1016360002	
FB10	FERRITE BEAD 2773021447	1016350007	
FB11	FERRITE BEAD, EXCML32A680U	1015880002	
FB12	FERRITE BEAD, EXCML32A680U	1015880002	
FB13	FERRITE BEAD, EXCML32A680U	1015880002	
FB14	FERRITE BEAD, EXCML32A680U	1015880002	
FB15	FERRITE BEAD, EXCML32A680U	1015880002	
FB16	FERRITE BEAD 2512066017YO	1016680007	
FB18	FERRITE BEAD, EXCML32A680U	1015880002	
FB19	FERRITE BEAD, EXCML32A680U	1015880002	
FB20	FERRITE BEAD, EXCML32A680U	1015880002	
FB21	FERRITE BEAD 2773021447	1016350007	
FB22	FERRITE BEAD 2773021447	1016350007	
FB23	FERRITE BEAD 2773021447	1016350007	
FB24	FERRITE BEAD 2773021447	1016350007	
FB25	FERRITE BEAD 2773021447	1016350007	
FB26	FERRITE BEAD, EXCML32A680U	1015880002	
FB27	FERRITE BEAD, EXCML32A680U	1015880002	
FB28	FERRITE BEAD, EXCML32A680U	1015880002	
FB29	FERRITE BEAD, EXCML32A680U	1015880002	
FB30	FERRITE BEAD, EXCML32A680U	1015880002	
FB201	FERRITE BEAD, EXCML32A680U	1015880002	
FB202	FERRITE BEAD 2512066017YO	1016680007	
FB203	FERRITE BEAD 2512066017YO	1016680007	
FB301	FERRITE BEAD, EXCML32A680U	1015880002	
FB302	FERRITE BEAD, EXCML32A680U	1015880002	
FB303	FERRITE BEAD, EXCML32A680U	1015880002	
FB304	FERRITE BEAD, EXCML32A680U	1015880002	
FB305	FERRITE BEAD, EXCML32A680U	1015880002	
FB401	FERRITE BEAD, EXCML32A680U	1015880002	
FB402	FERRITE BEAD, EXCML32A680U	1015880002	
FL1	FILTER, 48.305MHZ, FN-3538	1016710003	

PC ASSEMBLY, Digital IF Board		Panel 6 of 10	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
FL2	FILTER USB OPERATION	1015540007	
FL3	FILTER LSB OPERATION	1015550002	
FL4	FILTER ISB/AM OPERATION	1015560008	
J1	CONNECTOR HEADER 34PIN MALE	1016840004	
J2	CONNECTOR HEADER 12PIN MALE	1016890001	
J3	CONNECTOR HEADER 10PIN MALE	1016830009	
J401	HEADER, PC, 14 PIN DUAL	1008180009	
J402	CONNECTOR HEADER 10 PIN MALE	1016450001	
J403	CONNECTOR, HEADER, 10 PIN MALE	1010800027	
L1	INDUCTOR, SMT, 390UH, 5%	1013703910	
L3	INDUCTOR, SMT, 2.7UH, 5%	1013702794	
L4	INDUCTOR, SMT, 2.7UH, 5%	1013702794	
L5	INDUCTOR, SMT, 2.7UH, 5%	1013702794	
L6	INDUCTOR, SMT, 2.7UH, 5%	1013702794	
L7	INDUCTOR, SMT, 220UH, 5%	1013702212	
L8	INDUCTOR, SMT, 220UH, 5%	1013702212	
L9	INDUCTOR, SMT, 220UH, 5%	1013702212	
L10	INDUCTOR, SMT, 220UH, 5%	1013702212	
L11	INDUCTOR, SMT, 2.7UH, 5%	1013702794	
L12	INDUCTOR, SMT, 2.7UH, 5%	1013702794	
L13	INDUCTOR, SMT, 2.7UH, 5%	1013702794	
L17	INDUCTOR, SMT, 2.7UH, 5%	1013702794	
L20	INDUCTOR, SMT, .18UH, 5%	1013701887	
L21	INDUCTOR, SMT, .18UH, 5%	1013701887	
L22	INDUCTOR, SMT, 2.7UH, 5%	1013702794	
L23	INDUCTOR, SMT, 390UH, 5%	1013703910	
L24	INDUCTOR, SMT, 390UH, 5%	1013703910	
L202	INDUCTOR, SMT, 12UH, 5%	1013701208	
L203	INDUCTOR, SMT, 12UH, 5%	1013701208	
P3	CONNECTOR, RF, RIGHT ANGLE	1010730002	
P4	CONNECTOR, RF, RIGHT ANGLE	1010730002	
P5	CONNECTOR, RF, RIGHT ANGLE	1010730002	
P6	HEADER, PIN STRIP, 3 PIN	1011230020	
P201	HEADER, PIN STRIP, 3 PIN	1011230020	
Q3	TRANSISTOR, P-CH, FET 25P03L	1016810008	
Q4	TRANSISTOR, P-CH, FET 25P03L	1016810008	
Q5	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q6	TRANSISTOR, NPN MMBT4124	1013090039	
Q7	TRANSISTOR, NPN SI. MJD200	1016640005	
Q8	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q9	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q10	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q11	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q12	TRANSISTOR, NPN MMBT4124	1013090039	
Q13	TRANSISTOR, NPN MMBT4124	1013090039	
Q14	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q15	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q16	TRANSISTOR, N-CH, FET 2N7002	1013080033	
R1	RESISTOR 820, 5%, 1/8W	1013808215	
R2	RESISTOR 2.00K, 1% 1/8W	1014680000	
R3	RESISTOR 820, 5%, 1/8W	1013808215	
R4	RESISTOR 820, 5%, 1/8W	1013808215	
R5	RESISTOR 2.00K, 1% 1/8W	1014680000	
R6	RESISTOR 820, 5%, 1/8W	1013808215	
R7	RESISTOR 27, 5%, 1/8W	1013802705	
R8	RESISTOR 820, 5%, 1/8W	1013808215	
R9	RESISTOR 820, 5%, 1/8W	1013808215	
R10	RESISTOR 820, 5%, 1/8W	1013808215	
R11	RESISTOR 470, 5%, 1/8W	1013804716	
R12	RESISTOR 470, 5%, 1/8W	1013804716	
R13	RESISTOR 470, 5%, 1/8W	1013804716	
R14	RESISTOR 120, 5%, 1/8W	1013801211	
R15	RESISTOR 27, 5%, 1/8W	1013802705	
R17	RESISTOR 470, 5%, 1/8W	1013804716	
R18	RESISTOR 470, 5%, 1/8W	1013804716	
R19	RESISTOR 470, 5%, 1/8W	1013804716	
R20	RESISTOR 100, 5%, 1/8W	1013801016	
R21	RESISTOR 100, 5%, 1/8W	1013801016	
R22	RESISTOR 100, 5%, 1/8W	1013801016	
R24	RESISTOR 100, 5%, 1/8W	1013801016	

PC ASSEMBLY, Digital IF Board		Panel 7 of 10	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
R25	RESISTOR 100K, 5%, 1/8W	1013801041	
R26	RESISTOR 100, 5%, 1/8W	1013801016	
R27	RESISTOR 100K, 5%, 1/8W	1013801041	
R28	RESISTOR 100, 5%, 1/8W	1013801016	
R29	RESISTOR 100K, 5%, 1/8W	1013801041	
R30	RESISTOR 100K, 5%, 1/8W	1013801041	
R31	RESISTOR 47K, 5%, 1/8W	1013804732	
R32	RESISTOR 47K, 5%, 1/8W	1013804732	
R33	RESISTOR 100K, 5%, 1/8W	1013801041	
R34	RESISTOR 47K, 5%, 1/8W	1013804732	
R35	RESISTOR 47K, 5%, 1/8W	1013804732	
R36	RESISTOR 100K, 5%, 1/8W	1013801041	
R37	RESISTOR 100K, 5%, 1/8W	1013801041	
R38	RESISTOR, 274, 1%, 1/8W	1016010001	
R39	RESISTOR, 274, 1%, 1/8W	1016010001	
R40	RESISTOR 100, 5%, 1/8W	1013801016	
R41	RESISTOR 22, 5%, 1/8W	1013802209	
R45	RESISTOR 27, 5%, 1/8W	1013802705	
R46	RESISTOR 100, 5%, 1/8W	1013801016	
R47	RESISTOR 27, 5%, 1/8W	1013802705	
R51	RESISTOR 27, 5%, 1/8W	1013802705	
R55	RESISTOR 2.7K, 5%, 1/8W	1013802721	
R56	RESISTOR 2.2K, 5%, 1/8W	1013802225	
R57	RESISTOR 1.8K, 5%, 1/8W	1013801822	
R58	RESISTOR 8.2K, 5%, 1/8W	1013808223	
R59	RESISTOR 6.8K, 5%, 1/8W	1013806824	
R60	RESISTOR, 10K, 1% 1/10W	1016420005	
R61	RESISTOR 22K, 5%, 1/8W	1013802233	
R63	RESISTOR 1.5K, 5%, 1/8W	1013801521	
R64	RESISTOR 100, 5%, 1/8W	1013801016	
R65	RESISTOR 560K, 5%, 1/8W	1013805640	
R67	RESISTOR 1.5K, 5%, 1/8W	1013801521	
R68	RESISTOR 100K, 5%, 1/8W	1013801041	
R69	RESISTOR, 1K, 1%, 1/8W	1013801041	
R70	POT. 100K, 10%, 3/4W, 15 TURNS	0338490051	
R71	RESISTOR, 10K, 1% 1/10W	1016420005	
R72	RESISTOR 100K, 5%, 1/8W	1013801041	
R73	RESISTOR, 10K, 1% 1/10W	1016420005	
R74	RESISTOR 47K, 5%, 1/8W	1013804732	
R75	RESISTOR 8.2K, 5%, 1/8W	1013808223	
R76	RESISTOR 5.6K, 5%, 1/8W	1013805623	
R77	POT. 2K, 10%, 3/4W, 15 TURNS	0338490060	
R78	POT. 2K, 10%, 3/4W, 15 TURNS	0338490060	
R80	RESISTOR, 1K, 1%, 1/10W	1016850000	
R81	RESISTOR 22, 5%, 1/8W	1013802209	
R82	RESISTOR 10, 5%, 1/8W	1013801008	
R83	RESISTOR 1.8K, 5%, 1/8W	1013801822	
R84	RESISTOR 100K, 5%, 1/8W	1013801041	
R85	RESISTOR 4.7K, 5%, 1/8W	1013804724	
R86	RESISTOR 4.7K, 5%, 1/8W	1013804724	
R87	RESISTOR, 10K, 1% 1/10W	1016420005	
R88	RESISTOR 120K, 5%, 1/8W	1013801245	
R89	RESISTOR, 10K, 1% 1/10W	1016420005	
R90	RESISTOR 100K, 5%, 1/8W	1013801041	
R91	RESISTOR, 10K, 1% 1/10W	1016420005	
R92	RESISTOR, 10K, 1% 1/10W	1016420005	
R93	RESISTOR 1.2K, 5%, 1/8W	1013801229	
R94	RESISTOR 12K, 5%, 1/8W	1013801237	
R95	RESISTOR 390, 5%, 1/8W	1013803914	
R96	RESISTOR, 10K, 1% 1/10W	1016420005	
R97	RESISTOR, 1K, 1%, 1/10W	1016850000	
R101	RESISTOR 26.1K, 1% 1/8W	1014790000	
R102	RESISTOR 8.66K, 1% 1/8W	1014730007	
R103	RESISTOR 1.00K, 1% 1/8W	1014670004	
R104	RESISTOR, 68.1K, 1%, 1/10W	1017080003	
R105	RESISTOR, 10K, 1% 1/10W	1016420005	
R106	RESISTOR 330, 5%, 1/8W	1013803311	
R107	RESISTOR 4.7K, 5%, 1/8W	1013804724	
R108	RESISTOR 4.7K, 5%, 1/8W	1013804724	
R109	RESISTOR, 1K, 1%, 1/10W	1016850000	

Figure 8.12 *1A2A4 Digital IF Assembly – Parts List (Sheet 2 of 3)*

PC ASSEMBLY, Digital IF Board		Panel 8 of 10	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
R110	RESISTOR 560, 5%, 1/8W	1013805615	
R111	RESISTOR 2.7K, 5%, 1/8W	1013802721	
R112	RESISTOR 12K, 5%, 1/8W	1013801237	
R113	RESISTOR 100K, 5%, 1/8W	1013801041	
R114	RESISTOR 100K, 5%, 1/8W	1013801041	
R115	RESISTOR, 10K, 1% 1/10W	1016420005	
R116	RESISTOR, 1K, 1%, 1/10W	1016850000	
R117	RESISTOR 5.76K, 1% 1/8W	1014710006	
R118	RESISTOR 26.1K, 1% 1/8W	1014790000	
R119	RESISTOR 2.2K, 5%, 1/8W	1013802225	
R121	RESISTOR, 68.1K, 1%, 1/10W	1017080003	
R201	RESISTOR 4.7K, 5%, 1/8W	1013804724	
R202	RESISTOR 5.6K, 5%, 1/8W	1013805623	
R203	RESISTOR 51.1K, 1% 1/8W	1014810001	
R204	RESISTOR 49.9 1% 1/8W	1014640008	
R205	RESISTOR 2.00K, 1% 1/8W	1014680000	
R206	RESISTOR 1.00K, 1% 1/8W	1014670004	
R207	RESISTOR 49.9 1% 1/8W	1014640008	
R208	RESISTOR 49.9 1% 1/8W	1014640008	
R209	RESISTOR, 10K, 1% 1/10W	1016420005	
R210	RESISTOR 49.9 1% 1/8W	1014640008	
R211	RESISTOR, 10K, 1% 1/10W	1016420005	
R212	RESISTOR, 10K, 1% 1/10W	1016420005	
R213	RESISTOR, 10K, 1% 1/10W	1016420005	
R214	RESISTOR, 1K, 1%, 1/10W	1016850000	
R215	RESISTOR, 1K, 1%, 1/10W	1016850000	
R216	RESISTOR, 1K, 1%, 1/10W	1016850000	
R217	RESISTOR, 1K, 1%, 1/10W	1016850000	
R218	RESISTOR 49.9 1% 1/8W	1014640008	
R219	RESISTOR 470, 5%, 1/8W	1013804716	
R301	RESISTOR 3.74K, 1%, 1/8W	1014690005	
R302	RESISTOR 3.74K, 1%, 1/8W	1014690005	
R303	RESISTOR, 30.1K, 1% 1/10W	1016860005	
R304	RESISTOR, 30.1K, 1% 1/10W	1016860005	
R305	RESISTOR, 30.1K, 1% 1/10W	1016860005	
R306	RESISTOR, 10K, 1% 1/10W	1016420005	
R307	RESISTOR, 30.1K, 1% 1/10W	1016860005	
R308	RESISTOR, 10K, 1% 1/10W	1016420005	
R309	RESISTOR 100, 5%, 1/8W	1013801016	
R310	RESISTOR 100, 5%, 1/8W	1013801016	
R311	RESISTOR, 10K, 1% 1/10W	1016420005	
R312	RESISTOR 100, 5%, 1/8W	1013801016	
R401	RESISTOR, 10K, 1% 1/10W	1016420005	
R402	RESISTOR, 10K, 1% 1/10W	1016420005	
R403	RESISTOR, 10K, 1% 1/10W	1016420005	
R404	RESISTOR 1M, 5%, 1/8W	1013801059	
R405	RESISTOR 4.7K, 5%, 1/8W	1013804724	
R406	RESISTOR, 10K, 1% 1/10W	1016420005	
R407	RESISTOR, 1K, 1%, 1/10W	1016850000	
R408	RESISTOR, 10K, 1% 1/10W	1016420005	
R409	RESISTOR, 10K, 1% 1/10W	1016420005	
R410	RESISTOR, 10K, 1% 1/10W	1016420005	
R411	RESISTOR, 10K, 1% 1/10W	1016420005	
R412	RESISTOR, 10K, 1% 1/10W	1016420005	
R413	RESISTOR, 10K, 1% 1/10W	1016420005	
R414	RESISTOR 2.00K, 1% 1/8W	1014680000	
R415	RESISTOR 10, 5%, 1/8W	1013801008	
R416	RESISTOR, 10K, 1% 1/10W	1016420005	
R417	RESISTOR, 10K, 1% 1/10W	1016420005	
R418	RESISTOR, 10K, 1% 1/10W	1016420005	
R419	RESISTOR, 10K, 1% 1/10W	1016420005	
R420	RESISTOR, 10K, 1% 1/10W	1016420005	
R421	RESISTOR, 10K, 1% 1/10W	1016420005	
R422	RESISTOR, 10K, 1% 1/10W	1016420005	
R423	RESISTOR, 10K, 1% 1/10W	1016420005	
R424	RESISTOR, 10K, 1% 1/10W	1016420005	
R425	RESISTOR, 10K, 1% 1/10W	1016420005	
R426	RESISTOR, 10K, 1% 1/10W	1016420005	
R427	RESISTOR, 10K, 1% 1/10W	1016420005	
R428	RESISTOR, 10K, 1% 1/10W	1016420005	

PC ASSEMBLY, Digital IF Board		Panel 9 of 10	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
R429	RESISTOR, 10K, 1% 1/10W	1016420005	
R430	RESISTOR 0.0, 0%, 1/4W	1011600021	
R431	RESISTOR, 1K, 1%, 1/10W	1016850000	
R432	RESISTOR, 1K, 1%, 1/10W	1016850000	
R433	RESISTOR, 1K, 1%, 1/10W	1016850000	
R434	RESISTOR, 10K, 1% 1/10W	1016420005	
R435	RESISTOR, 1K, 1%, 1/10W	1016850000	
R436	RESISTOR, 1K, 1%, 1/10W	1016850000	
R437	RESISTOR, 10K, 1% 1/10W	1016420005	
R438	RESISTOR, 10K, 1% 1/10W	1016420005	
R439	RESISTOR, 10K, 1% 1/10W	1016420005	
R440	RESISTOR, 10K, 1% 1/10W	1016420005	
R441	RESISTOR, 10K, 1% 1/10W	1016420005	
R442	RESISTOR, 10K, 1% 1/10W	1016420005	
R443	RESISTOR 4.7K, 5%, 1/8W	1013804724	
R444	RESISTOR, 10K, 1% 1/10W	1016420005	
R445	RESISTOR, 1K, 1%, 1/10W	1016850000	
R446	RESISTOR, 10K, 1% 1/10W	1016420005	
R447	RESISTOR, 10K, 1% 1/10W	1016420005	
R448	RESISTOR, 10K, 1% 1/10W	1016420005	
T1	TRANSFORMER, RF 1:1 ADT1-6T	1016670001	
T2	TRANSFORMER, RF, 4:1 TCM4-1W	1015780008	
T3	TRANSFORMER, RF, 4:1 TCM4-1W	1015780008	
T4	TRANSFORMER, RF, 2.5:1 T2.5-6	1016690002	
T6	TRANSFORMER, RF, 36:1 T36-1	1015860001	
T7	TRANSFORMER, RF, 36:1 T36-1	1015860001	
T8	TRANSFORMER, RF, 36:1 T36-1	1015860001	
T9	TRANSFORMER, RF, 36:1 T36-1	1015860001	
T11	TRANSFORMER, RF, 16:1 T16-6T	1015820000	
T12	TRANSFORMER, RF, 16:1 T16-6T	1015820000	
T201	TRANSFORMER, RF 4:1 T4-6T	1015650007	
T202	COMMON MODE CHOKE, PE-68624	1015660002	
T203	TRANSFORMER, RF 1:1 ADT1-6T	1016670001	
T301	COMMON MODE CHOKE, PE-68624	1015660002	
T302	COMMON MODE CHOKE, PE-68624	1015660002	
T303	COMMON MODE CHOKE 23Z104SM	1016430001	
T305	COMMON MODE CHOKE 23Z104SM	1016430001	
T306	COMMON MODE CHOKE 23Z104SM	1016430001	
T307	COMMON MODE CHOKE 23Z104SM	1016430001	
T308	COMMON MODE CHOKE 23Z104SM	1016430001	
T309	COMMON MODE CHOKE 23Z104SM	1016430001	
T310	COMMON MODE CHOKE 23Z104SM	1016430001	
T401	COMMON MODE CHOKE 23Z104SM	1016430001	
TP1	TEST POINT, RED	1011130033	
TP201	TEST POINT, RED	1011130033	
U1	IC. LINEAR, VGA AD8331ARQ	1015590004	
U2	IC. LINEAR, RF3378	1016600003	
U3	IC. LINEAR PI5A4624	1015850006	
U4	IC. LINEAR PI5A4624	1015850006	
U5	IC. LINEAR PI5A4624	1015850006	
U6	IC. LINEAR PI5A4624	1015850006	
U7	IC. LINEAR, VGA AD8331ARQ	1015590004	
U8	IC. LINEAR, VGA AD8331ARQ	1015590004	
U9	IC LINEAR MC34074	1014100003	
U10	IC. LINEAR, RF3378	1016600003	
U11	IC. DIGITAL, 4584	1016060009	
U12	IC. LINEAR, RF3378	1016600003	
U13	IC. LINEAR, RF3378	1016600003	
U14	IC. LINEAR, RF3378	1016600003	
U15	IC LINEAR MC34072	1014090008	
U17	IC. LINEAR, LTC1565-31CS8	1015890008	
U18	IC. LINEAR, LTC1565-31CS8	1015890008	
U19	IC LINEAR MC34074	1014100003	
U20	IC LINEAR MC34074	1014100003	
U21	IC. LINEAR LM2903D	1015940005	
U201	IC. DIGITAL, DDS AD9857AST	1015570003	
U202	IC. DIGITAL, ADF4001	1016660006	
U203	OSCILLATOR, VCXO 5.005MHZ	1015950001	
U204	IC. DIGITAL 74LVC374A	1015970001	
U205	IC. DIGITAL 74LVC374A	1015970001	

PC ASSEMBLY, Digital IF Board		Panel 10 of 10	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
U206	IC. DIGITAL 74LVC374A	1015970001	
U207	IC. DIGITAL, PS2801-4	1016030002	
U208	IC. LINEAR, LT1713CMS8	1015770002	
U209	IC. DIGITAL, HEX INV. 74AC04	1013110030	
U301	IC. DIGITAL, A/D LTC1402CGN	1015690009	
U302	IC. DIGITAL, A/D LTC1402CGN	1015690009	
U303	IC. DIGITAL, A/D LTC1401CS8	1015600000	
U304	IC. DIGITAL, A/D LTC1401CS8	1015600000	
U305	IC. DIGITAL, A/D LTC1401CS8	1015600000	
U306	IC. DIGITAL, D/A LTC2601CDD	1015610005	
U307	IC. DIGITAL, D/A LTC2601CDD	1015610005	
U308	IC. DIGITAL, D/A LTC2621CDD	1015620001	
U309	IC. DIGITAL, D/A LTC2621CDD	1015620001	
U310	IC. DIGITAL, D/A LTC2621CDD	1015620001	
U311	IC. LINEAR, REF3212	1016760001	
U312	IC. LINEAR, REF3230	1016770006	
U313	IC. DIGITAL, D/A LTC2621CDD	1015620001	
U314	IC. DIGITAL, A/D LTC1598LCG	1015740006	
U315	IC. DIGITAL, D/A LTC2601CDD	1015610005	
U316	IC. LINEAR, REF3230	1016770006	
U317	IC. DIGITAL, SN65LVDS047	1016750005	
U318	IC. DIGITAL, SN65LVDT2	1016740000	
U401	IC. DIGITAL, DSP ADSP-21262	1015520006	
U402	IC. DIGITAL, 74LVC373A	1015960006	
U403	IC. DIGITAL, AT25F2048N	1015700004	
U404	IC. DIGITAL, 74LVC157A	1016470002	
U405	IC. DIGITAL, 74LVC138A	1015990002	
U406	IC. DIGITAL 74LVC32A	1016000006	
U407	IC. DIGITAL, TL7733BCD	1016370008	
U408	IC. DIGITAL EPM3064	1017070008	
U409	IC. DIGITAL, PS2801-4	1016030002	
U410	IC. DIGITAL, 74LVC244A	1015980007	
U411	IC. DIGITAL 74LVC374A	1015970001	
U412	IC. DIGITAL, PS2801-4	1016030002	
U413	IC LINEAR, VOLT REG,LT1521-3.3	1015330002	
U414	IC. LINEAR LT1963AEQ	1015750001	
U415	IC. DIGITAL, 74LVC244A	1015980007	
U416	IC. DIGITAL, PS2801-4	1016030002	
U417	IC. DIGITAL, PS2801-1	1016020007	
U418	IC. DIGITAL, PS2801-4	1016030002	
U419	IC. DIGITAL, SN65LVDS047	1016750005	
U420	IC. DIGITAL, SN65LVDT2	1016740000	
U421	IC. DIGITAL, PS2801-1	1016020007	
X1	MIXER, ADE-2	1016700008	
X401	CRYSTAL, 12.500MHZ	1015760007	
	SHIELD 6.5X3.25X.5	1017190003	
	SHIELD 2.25X1.5X.5	1017200009	
	MOUNTING PLATE, DIGITAL IF	8121081602	

Figure 8.12 *1A2A4 Digital IF Assembly Parts List (Sheet 3 of 3)*

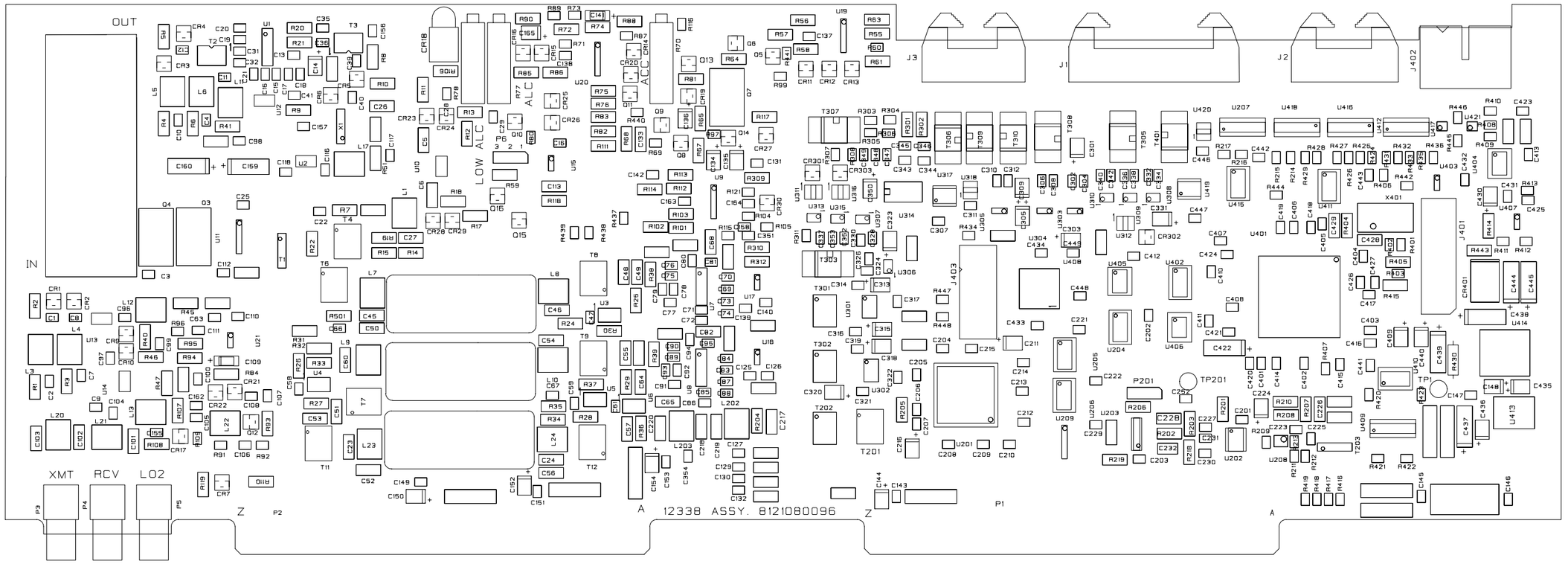


Figure 8.13 *1A2A4 Digital IF Assembly – Component Location Diagram*

8121080070 SHEET 1
REV A

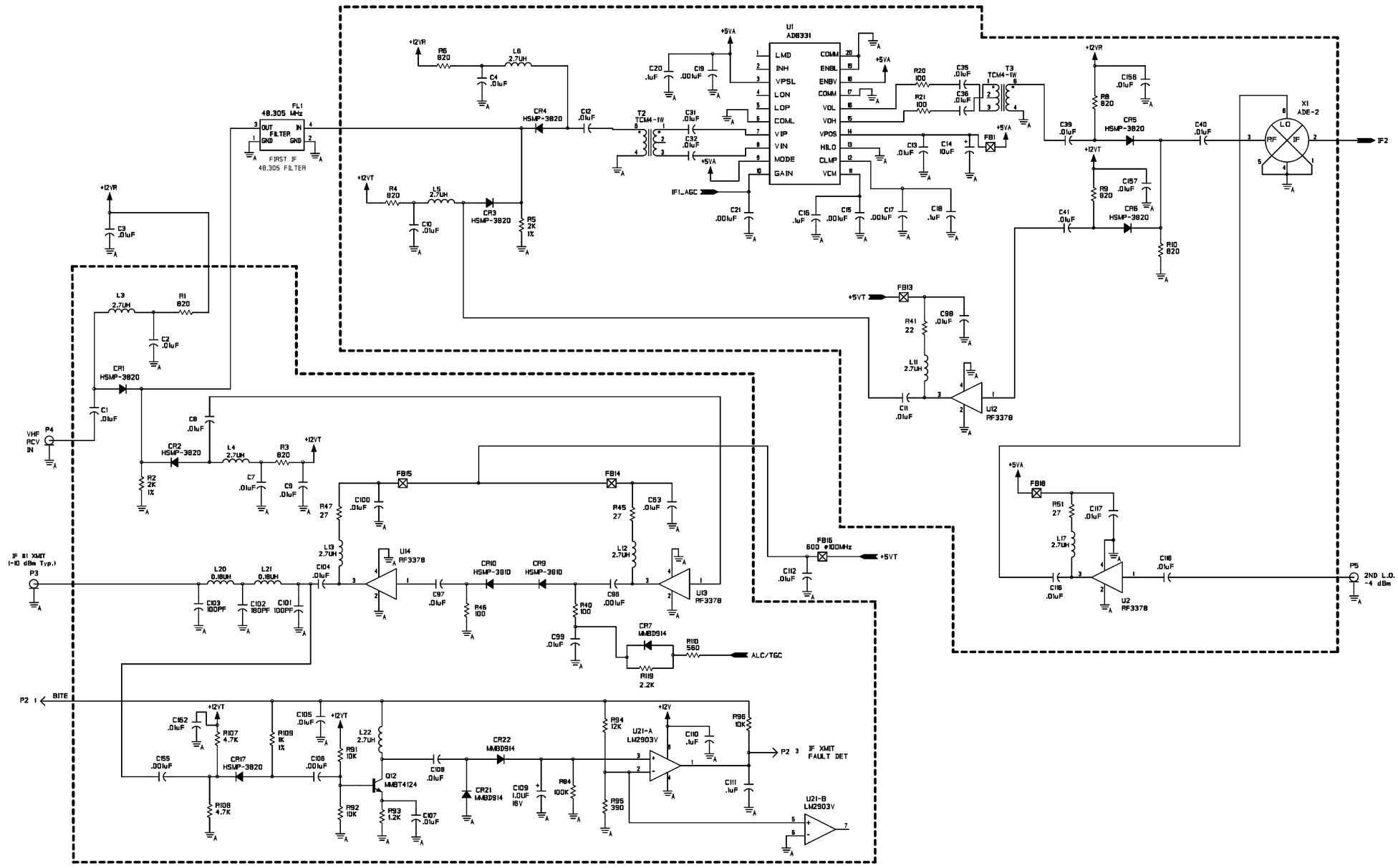


Figure 8.14 *1A2A4 Digital IF Assembly - Schematic Diagram (Sheet 1 of 9)*

8121080070 SHEET 2
REV A

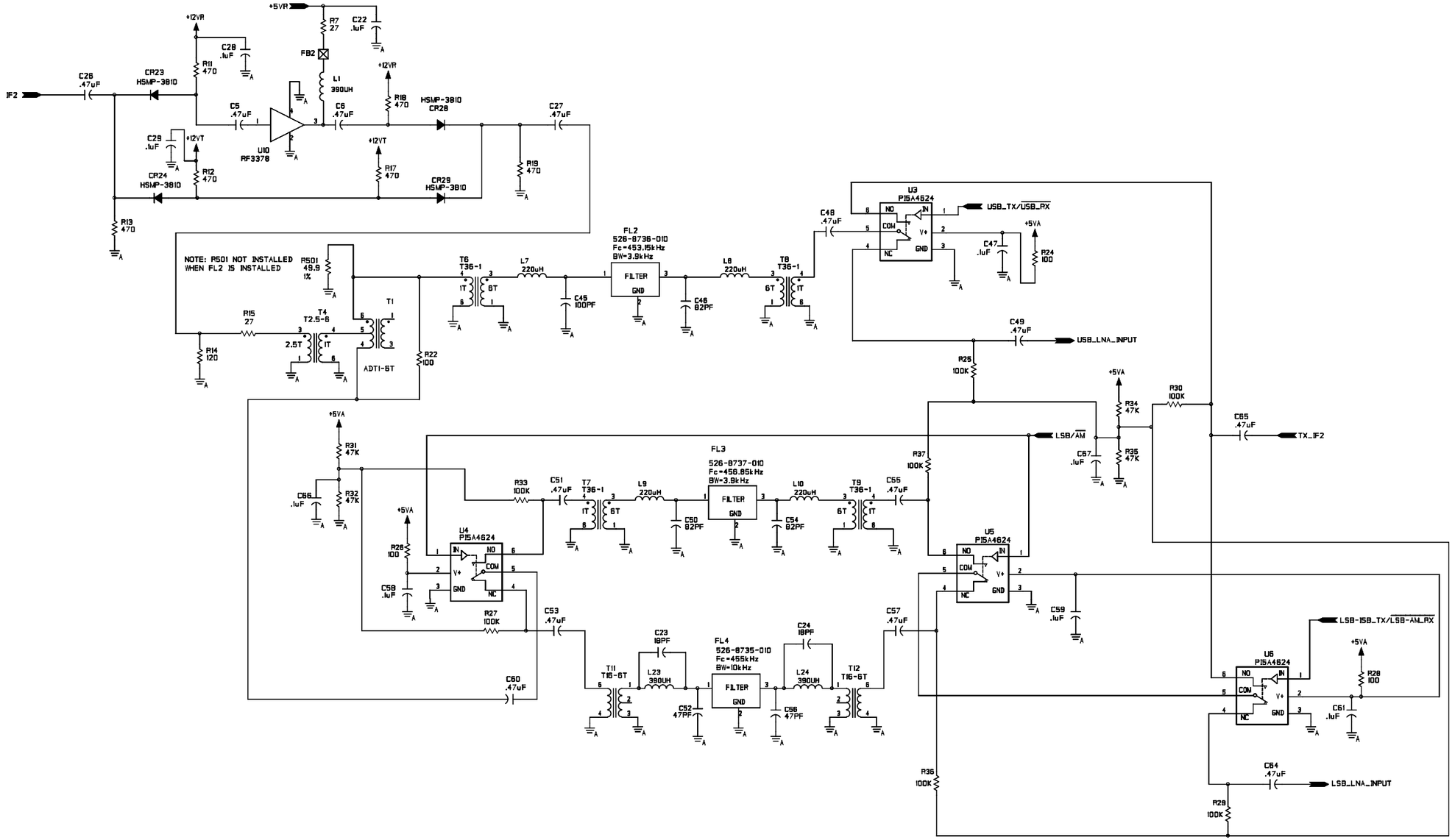
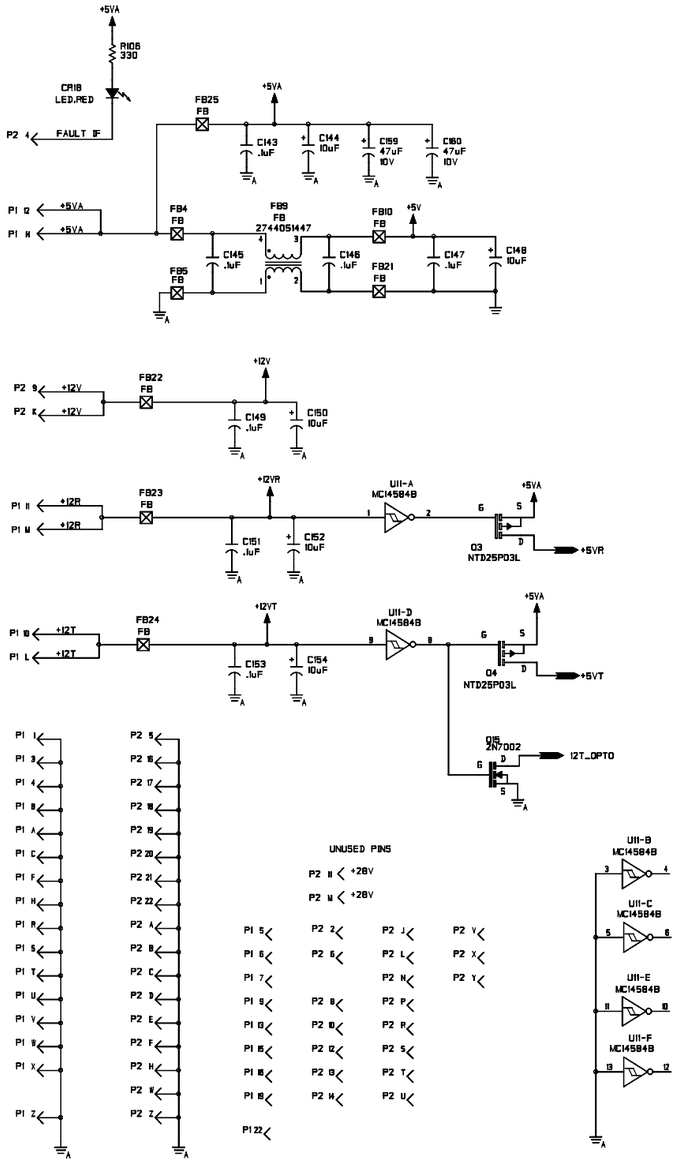


Figure 8.14 *1A2A4 Digital IF Assembly – Schematic Diagram (Sheet 2 of 9)*

8121080070 SHEET 3
REV A



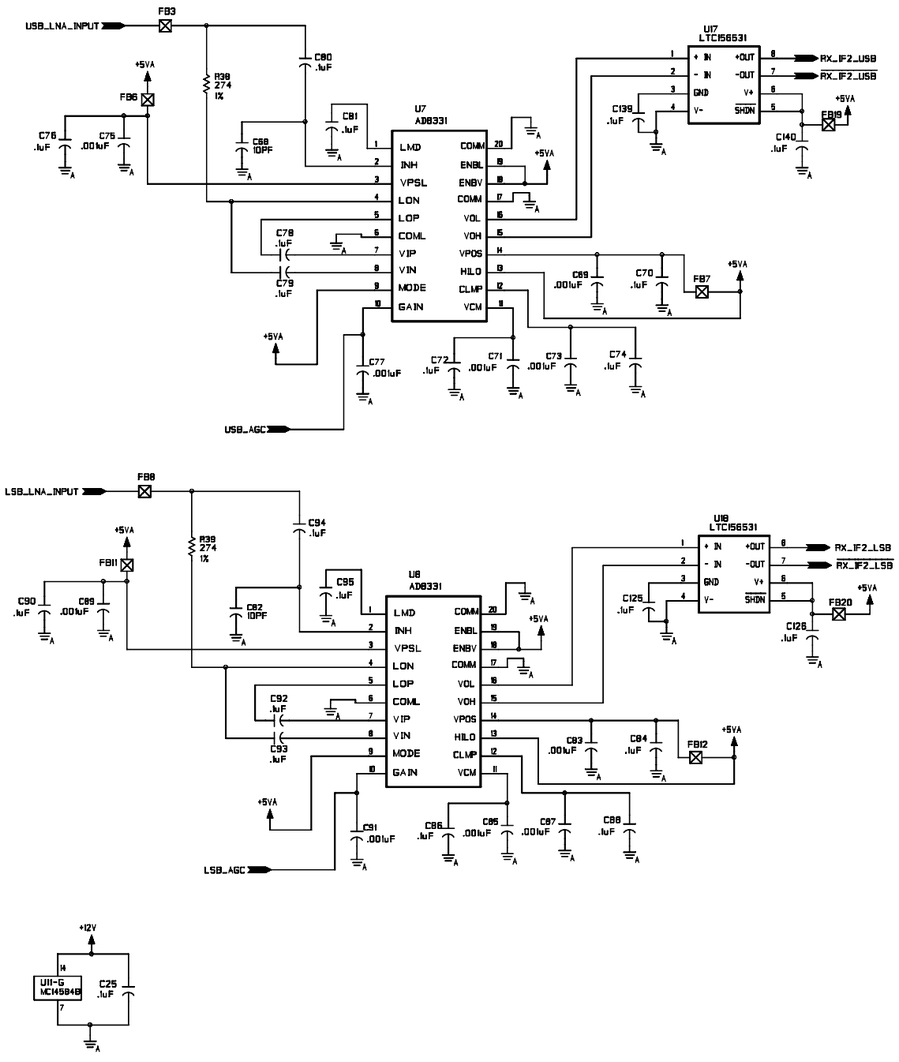


Figure 8.14 *1A2A4 Digital IF Assembly - Schematic Diagram (Sheet 3 of 9)*

8121080070 SHEET 4
REV A

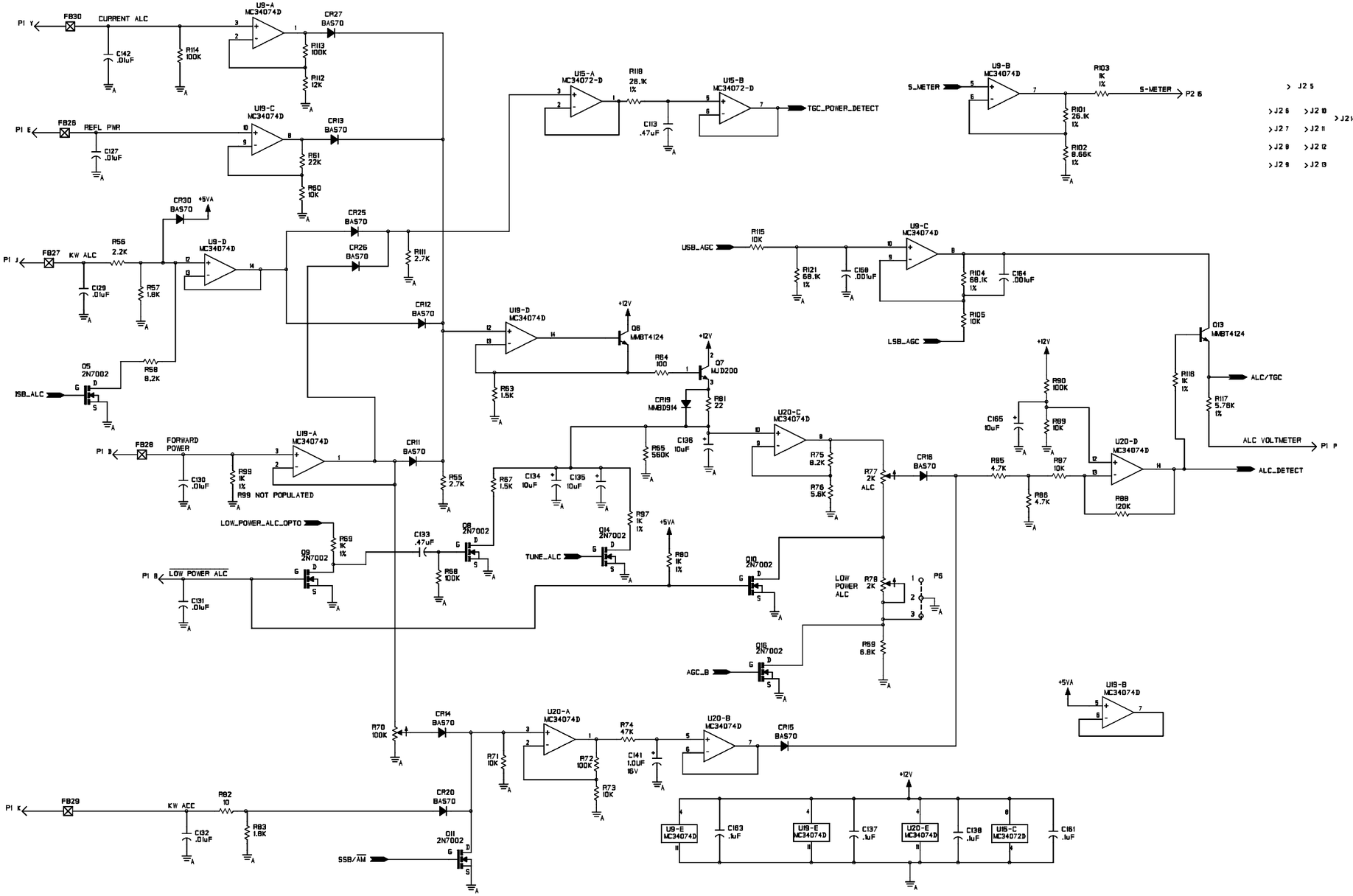


Figure 8.14 *1A2A4 Digital IF Assembly – Schematic Diagram (Sheet 4 of 9)*

8121080070 SHEET 5
REV A

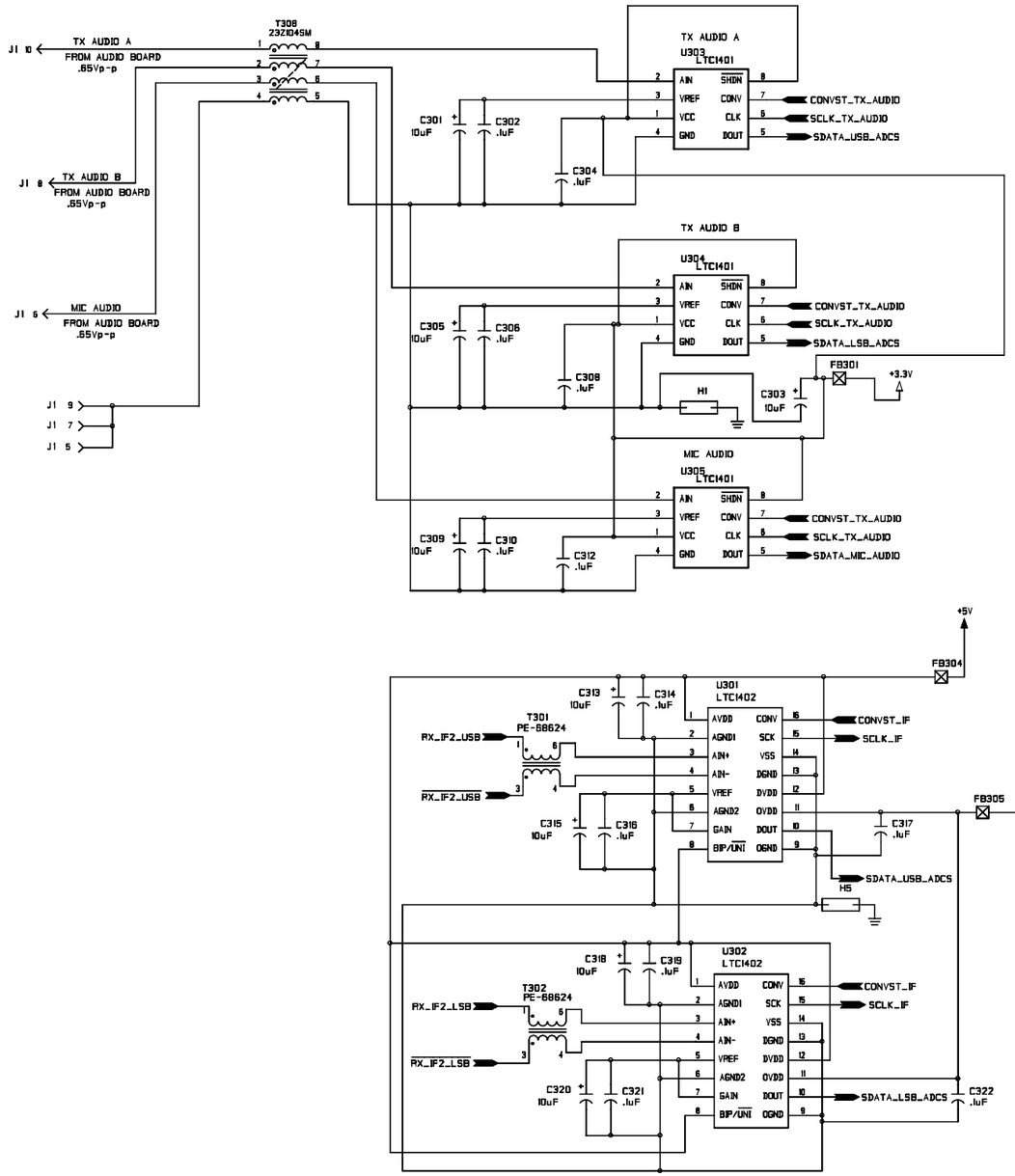


Figure 8.14 *1A2A4 Digital IF Assembly - Schematic Diagram (Sheet 5 of 9)*

8121080070 SHEET 6
REV A

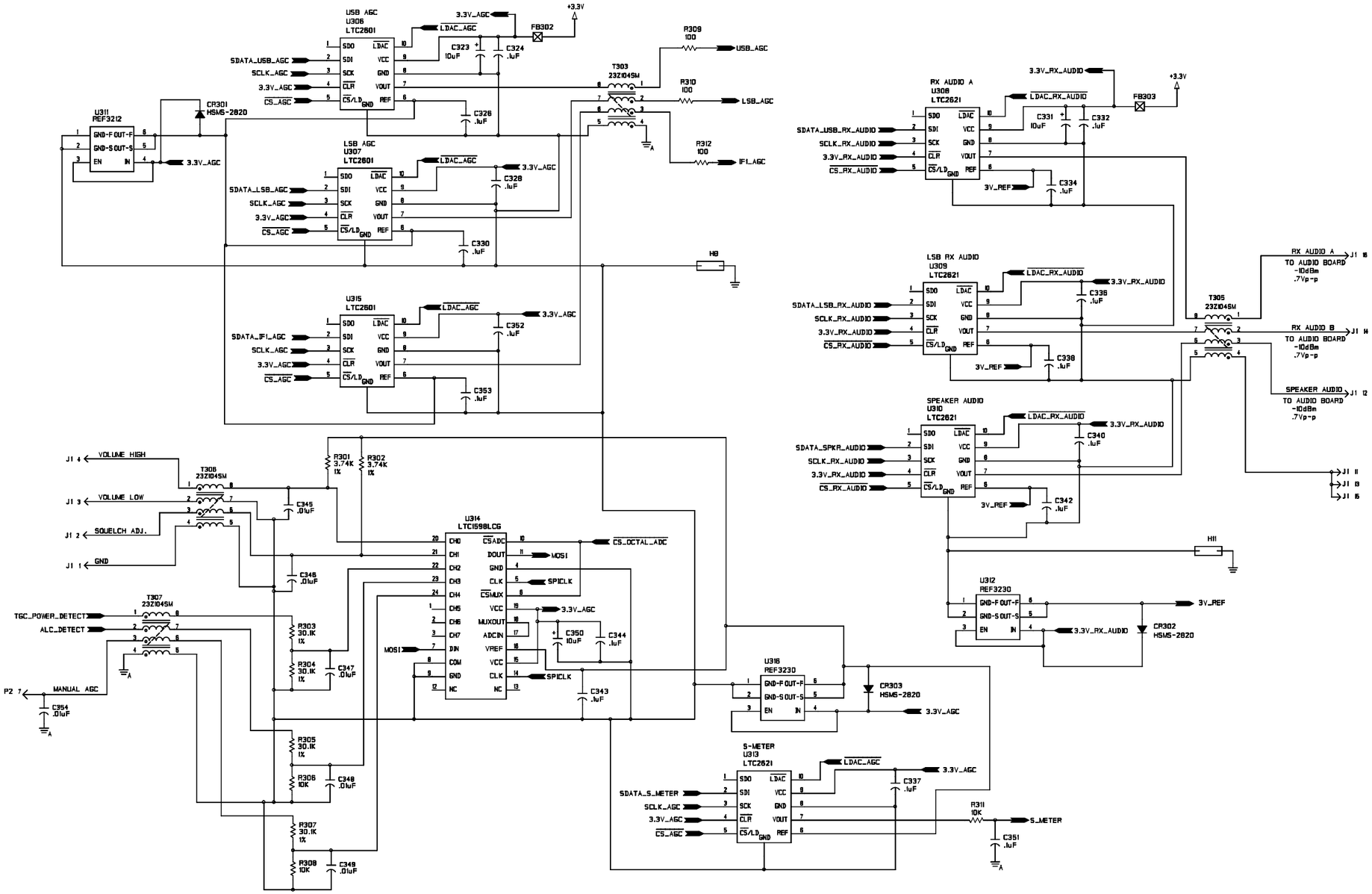


Figure 8.14 *1A2A4 Digital IF Assembly – Schematic Diagram (Sheet 6 of 9)*

8121080070 SHEET 7
REV A

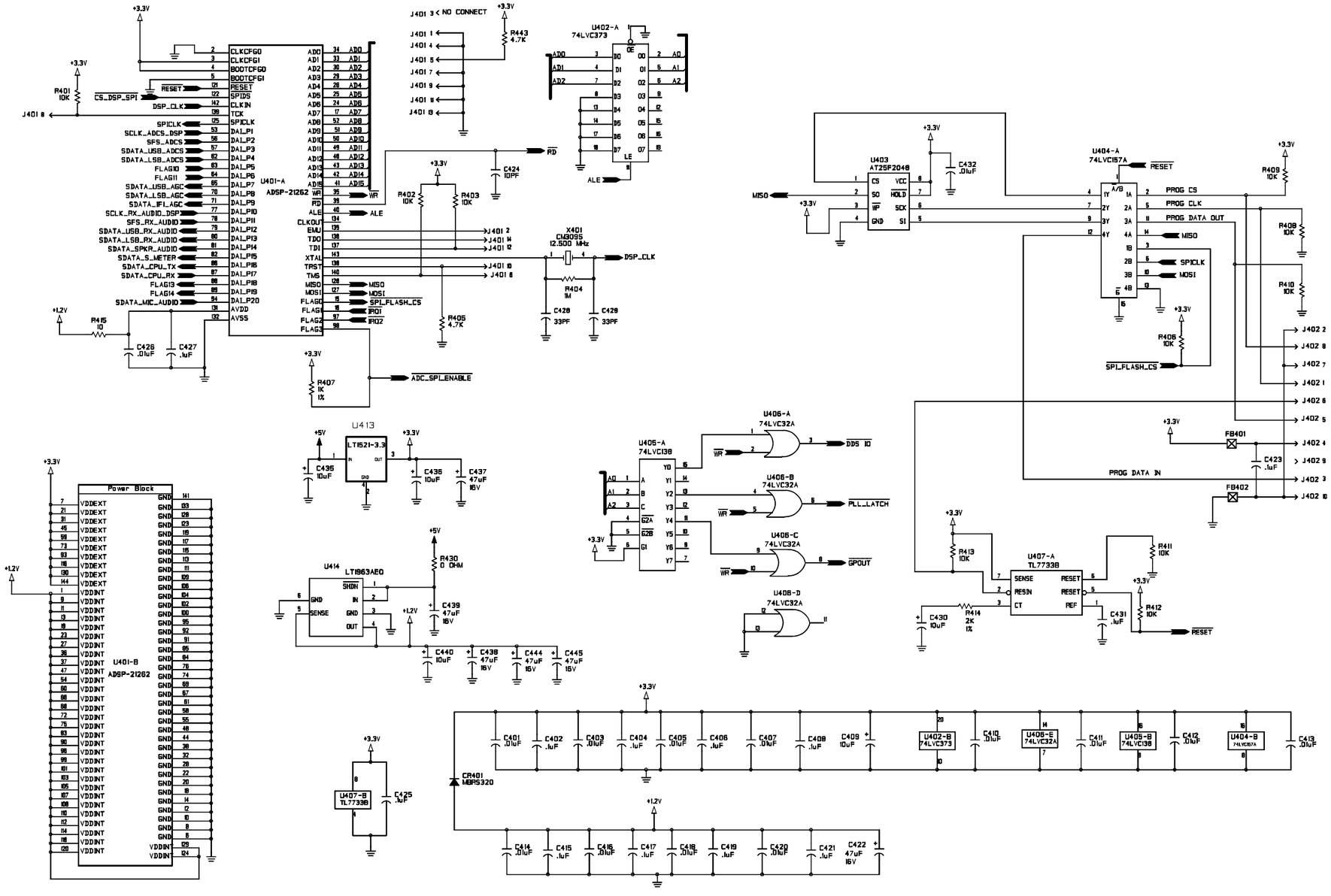


Figure 8.14 *1A2A4 Digital IF Assembly - Schematic Diagram (Sheet 7 of 9)*

8121080070 SHEET 8
REV A

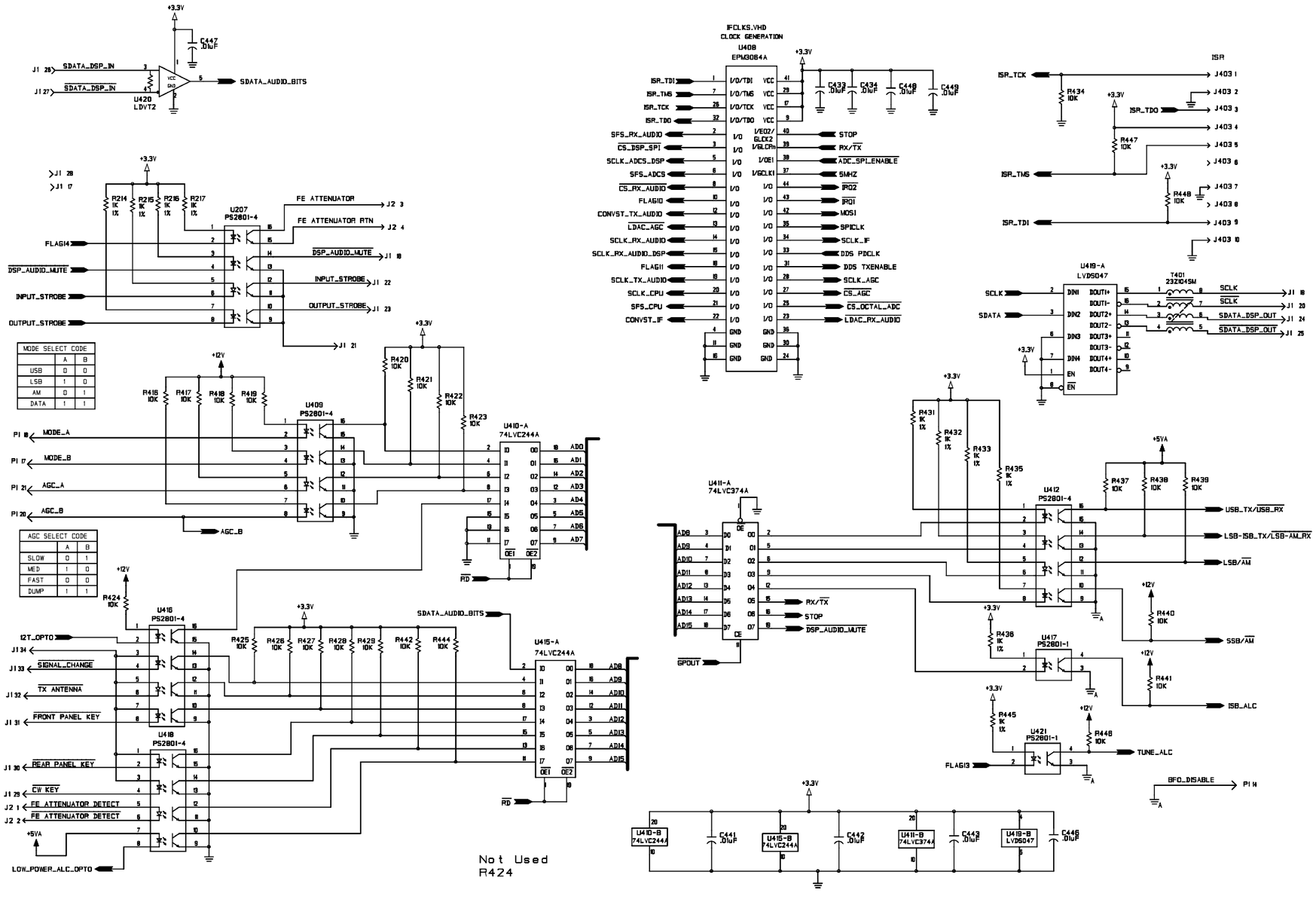


Figure 8.14 *1A2A4 Digital IF Assembly – Schematic Diagram (Sheet 8 of 9)*

8121080070 SHEET 9
REV A

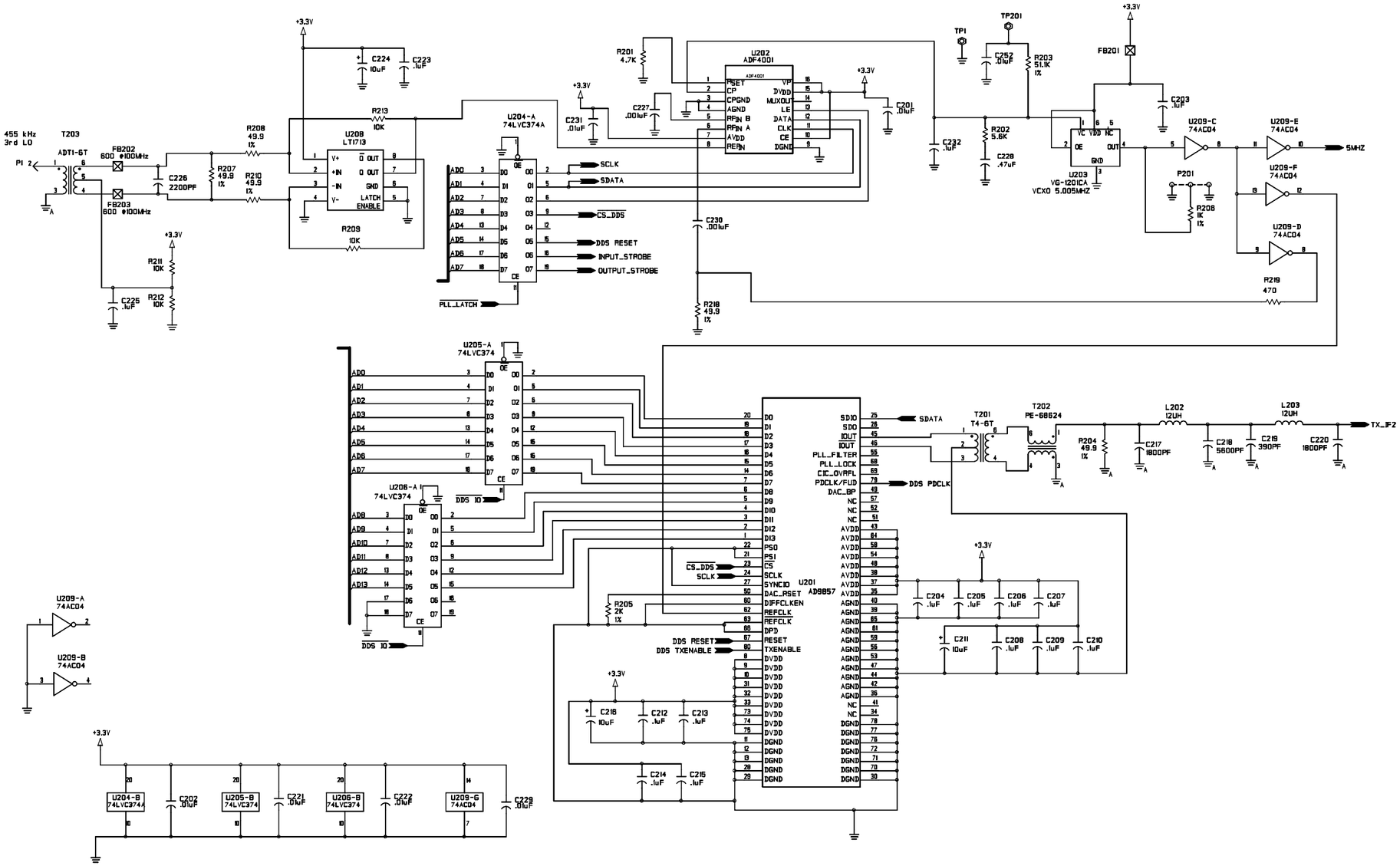


Figure 8.14 *1A2A4 Digital IF Assembly - Schematic Diagram (Sheet 9 of 9)*

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PC ASSEMBLY, Digital Audio Board		Panel 1 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
	PC Assembly, Digital Audio Board	8121090091	A
C1	CAP. 1800PF, 200V, NPO,2%	1017130001	
C2	CAP. 4700PF, 200V, NPO, 2%	1017140006	
C3	CAP. 8200PF, 200V, NPO, 2%	1017150001	
C4	CAP. 1800PF, 200V, NPO,2%	1017130001	
C5	CAP. 4700PF, 200V, NPO, 2%	1017140006	
C6	CAP. 8200PF, 200V, NPO, 2%	1017150001	
C7	CAP. 1800PF, 200V, NPO,2%	1017130001	
C8	CAP. 4700PF, 200V, NPO, 2%	1017140006	
C9	CAP. 8200PF, 200V, NPO, 2%	1017150001	
C10	CAP. 1UF, 16V, 20%	1013050037	
C11	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C12	CAP. 1UF, 16V, 20%	1013050037	
C13	CAP. 1UF, 16V, 20%	1013050037	
C14	CAP. 10UF, 16V, 20%	1013060032	
C15	CAP. 47UF, 10V, 10%	1016460007	
C16	CAP. 1UF, 16V, 20%	1013050037	
C17	CAP. 1UF, 16V, 20%	1013050037	
C18	CAP. 1UF, 16V, 20%	1013050037	
C19	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C20	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C21	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C22	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C23	CAP. 10UF, 16V, 20%	1013060032	
C24	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C25	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C26	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C27	CAP. 10UF, 16V, 20%	1013060032	
C28	CAP. 10UF, 16V, 20%	1013060032	
C29	CAP. 10UF, 16V, 20%	1013060032	
C30	CAP. 10UF, 16V, 20%	1013060032	
C31	CAP. 10UF, 16V, 20%	1013060032	
C32	CAP. 10UF, 35V, 10%	1016540001	
C33	CAP. 10UF, 35V, 10%	1016540001	
C34	CAP. .1UF, 50V, X7R, 20%	1013040031	
C35	CAP. 470UF, 50V	0280890001	
C36	CAP. 10UF, 35V, 10%	1016540001	
C37	CAP. 0.47UF, 50V, X7R, 20%	0283377771	
C38	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C39	CAP. 1800PF, 200V, NPO,2%	1017130001	
C40	CAP. 4700PF, 200V, NPO, 2%	1017140006	
C41	CAP. 8200PF, 200V, NPO, 2%	1017150001	
C42	CAP. 1UF, 16V, 20%	1013050037	
C43	CAP. 1800PF, 200V, NPO,2%	1017130001	
C44	CAP. 4700PF, 200V, NPO, 2%	1017140006	
C45	CAP. 8200PF, 200V, NPO, 2%	1017150001	
C46	CAP. 1UF, 16V, 20%	1013050037	
C47	CAP. 1800PF, 200V, NPO,2%	1017130001	
C48	CAP. 4700PF, 200V, NPO, 2%	1017140006	
C49	CAP. 8200PF, 200V, NPO, 2%	1017150001	
C50	CAP. 1UF, 16V, 20%	1013050037	
C51	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C52	CAP. 10UF, 35V, 10%	1016540001	
C53	CAP. 10UF, 35V, 10%	1016540001	
C54	CAP. 10UF, 35V, 10%	1016540001	
C55	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C56	CAP. 10UF, 35V, 10%	1016540001	
C57	CAP. 10UF, 35V, 10%	1016540001	
C58	CAP. .1UF, 50V, X7R, 20%	1013040031	
C59	CAP. 10UF, 16V, 20%	1013060032	
C60	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C61	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C62	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C63	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C64	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C65	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C66	CAP. 10UF, 16V, 20%	1013060032	
C67	CAP. 10UF, 16V, 20%	1013060032	
C68	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C69	CAP. 1UF, 16V, 20%	1013050037	

PC ASSEMBLY, Digital Audio Board		Panel 2 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
C70	CAP. 10UF, 16V, 20%	1013060032	
C71	CAP. 1UF, 16V, 20%	1013050037	
C72	CAP. 1UF, 16V, 20%	1013050037	
C73	CAP. 10UF, 16V, 20%	1013060032	
C74	CAP. 10UF, 16V, 20%	1013060032	
C75	CAP. .1UF, 50V, X7R, 20%	1013040031	
C76	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C77	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C78	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C79	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C80	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C81	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C82	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C83	CAP. 330PF, 200V NPO, 2%	1017110000	
C84	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C85	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C86	CAP. 330PF, 200V NPO, 2%	1017110000	
C87	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C88	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C89	CAP. 330PF, 200V NPO, 2%	1017110000	
C90	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C91	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C92	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C93	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C94	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C95	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C96	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C97	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C98	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C99	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C100	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C101	CAP. 330PF, 200V NPO, 2%	1017110000	
C102	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C103	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C104	CAP. 330PF, 200V NPO, 2%	1017110000	
C105	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C106	CAP. 1500PF, 200V, NPO, 2%	1017120005	
C107	CAP. 330PF, 200V NPO, 2%	1017110000	
C108	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C109	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C110	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C111	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C112	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C113	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C114	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C115	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C116	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C117	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C118	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C119	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C120	CAP. .1UF, 50V, X7R, 20%	1013040031	
C121	CAP. 0.47UF, 16V, X7R, 20%	1015870007	
C122	CAP. .1UF, 50V, X7R, 20%	1013040031	
C123	CAP. 1UF, 16V, 20%	1013050037	
C124	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C125	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C126	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C127	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C128	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C129	CAP. 10UF, 16V, 20%	1013060032	
C130	CAP. 10UF, 16V, 20%	1013060032	
C131	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C132	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C133	CAP. 0.01UF, 16V, X7R, 10%	1016390009	
C134	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C135	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C136	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C137	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C138	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
C139	CAP. 0.1UF, 16V, X7R, 10%	1016400004	

PC ASSEMBLY, Digital Audio Board		Panel 3 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
C140	CAP. 0.1UF, 16V, X7R, 10%	1016400004	
CR1	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR2	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR3	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR4	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR5	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR6	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR7	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR8	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR9	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR10	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR11	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR12	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR13	DIODE, LED, RED 550-2405	1008480029	
CR14	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR15	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR16	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR17	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR18	DIODE, SIGNAL, SIL MMBD914	1013150031	
CR19	DIODE, SIGNAL, SIL MMBD914	1013150031	
FB1	FERRITE BEAD 2773021447	1016350007	
FB2	FERRITE BEAD 2773021447	1016350007	
FB3	FERRITE BEAD 2773021447	1016350007	
J1	CONNECTOR HEADER 34PIN MALE	1016840004	
K1	RELAY, DPDT, 28V, .3A	1013120001	
K2	RELAY, DPDT, 12V, PC MOUNT	1014040001	
K3	RELAY, DPDT, 12V, PC MOUNT	1014040001	
K4	RELAY, DPDT, 12V, PC MOUNT	1014040001	
P3	HEADER, PIN STRIP, 3 PIN	1011230020	
P4	HEADER, PIN STRIP, 3 PIN	1011230020	
P5	HEADER, PIN STRIP, 3 PIN	1011230020	
P6	HEADER, PIN STRIP, 3 PIN	1011230020	
Q1	TRANSISTOR, N-CH, FET 12NF06	1016560001	
Q2	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q3	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q4	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q5	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q6	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q7	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q9	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q10	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q11	TRANSISTOR, N-CH, FET 2N7002	1013080033	
Q12	TRANSISTOR, N-CH, FET 2N7002	1013080033	
R1	RESISTOR 68, 5%, 1/8W	1013806808	
R2	POT. 500, 10%, 3/4W, 15 TURNS	0338490078	
R3	RESISTOR 8.66K, 1% 1/8W	1014730007	
R4	RESISTOR 16.9K, 1% 1/8W	1014760003	
R5	RESISTOR 3.74K, 1% 1/8W	1014690005	
R6	RESISTOR 15.0K, 1% 1/8W	1014750008	
R7	RESISTOR 5.76K, 1% 1/8W	1014710006	
R8	RESISTOR 25.5K, 1% 1/8W	1014780004	
R9	RESISTOR 68, 5%, 1/8W	1013806808	
R10	POT. 500, 10%, 3/4W, 15 TURNS	0338490078	
R11	RESISTOR 8.66K, 1% 1/8W	1014730007	
R12	RESISTOR 16.9K, 1% 1/8W	1014760003	
R13	RESISTOR 3.74K, 1% 1/8W	1014690005	
R14	RESISTOR 15.0K, 1% 1/8W	1014750008	
R15	RESISTOR 5.76K, 1% 1/8W	1014710006	
R16	RESISTOR 25.5K, 1% 1/8W	1014780004	
R17	RESISTOR, 10K, 1% 1/10W	1016420005	
R18	RESISTOR 120K, 5%, 1/8W	1013801245	
R19	RESISTOR 8.66K, 1% 1/8W	1014730007	
R20	RESISTOR 16.9K, 1% 1/8W	1014760003	
R21	RESISTOR 3.74K, 1% 1/8W	1014690005	
R22	RESISTOR 15.0K, 1% 1/8W	1014750008	
R23	RESISTOR 5.76K, 1% 1/8W	1014710006	
R24	RESISTOR 25.5K, 1% 1/8W	1014780004	
R25	RESISTOR 100K, 5%, 1/8W	1013801041	
R26	RESISTOR, 10K, 1% 1/10W	1016420005	
R27	RESISTOR, 10K, 1% 1/10W	1016420005	

PC ASSEMBLY, Digital Audio Board		Panel 4 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
R28	RESISTOR, 10K, 1% 1/10W	1016420005	
R29	RESISTOR, 10K, 1% 1/10W	1016420005	
R30	RESISTOR 39K, 5%, 1/8W	1013803931	
R31	RESISTOR, 10K, 1% 1/10W	1016420005	
R32	RESISTOR 39K, 5%, 1/8W	1013803931	
R33	RESISTOR, 10K, 1% 1/10W	1016420005	
R34	RESISTOR, 10K, 1% 1/10W	1016420005	
R35	RESISTOR, 10K, 1% 1/10W	1016420005	
R36	RESISTOR, 10K, 1% 1/10W	1016420005	
R37	RESISTOR 1M, 5%, 1/8W	1013801059	
R38	RESISTOR, 10K, 1% 1/10W	1016420005	
R39	RESISTOR, 10K, 1% 1/10W	1016420005	
R40	RESISTOR 2.00K, 1% 1/8W	1014680000	
R41	RESISTOR 8.66K, 1% 1/8W	1014730007	
R42	RESISTOR, 10K, 1% 1/10W	1016420005	
R43	RESISTOR, 10K, 1% 1/10W	1016420005	
R44	RESISTOR, 10K, 1% 1/10W	1016420005	
R45	RESISTOR 100K, 5%, 1/8W	1013801041	
R46	RESISTOR, 10K, 1% 1/10W	1016420005	
R47	RESISTOR, 10K, 1% 1/10W	1016420005	
R48	RESISTOR, 10K, 1% 1/10W	1016420005	
R49	RESISTOR, 10K, 1% 1/10W	1016420005	
R50	RESISTOR 330, 5%, 1/8W	1013803311	
R51	RESISTOR 56K, 5%, 1/8W	1013805631	
R52	RESISTOR, 10K, 1% 1/10W	1016420005	
R53	RESISTOR, 10K, 1% 1/10W	1016420005	
R54	RESISTOR, 10K, 1% 1/10W	1016420005	
R55	RESISTOR, 10K, 1% 1/10W	1016420005	
R56	RESISTOR 33, 10%, 2W	0191800007	
R57	RESISTOR 47, 10%, 2W	0163720002	
R58	RESISTOR, 10K, 1% 1/10W	1016420005	
R59	RESISTOR 100K, 5%, 1/8W	1013801041	
R60	RESISTOR 8.66K, 1% 1/8W	1014730007	
R61	RESISTOR 16.9K, 1% 1/8W	1014760003	
R62	RESISTOR 3.74K, 1% 1/8W	1014690005	
R63	RESISTOR 15.0K, 1% 1/8W	1014750008	
R64	RESISTOR 5.76K, 1% 1/8W	1014710006	
R65	RESISTOR 25.5K, 1% 1/8W	1014780004	
R66	RESISTOR, 10K, 1% 1/10W	1016420005	
R67	RESISTOR 33K, 5%, 1/8W	1013803337	
R68	RESISTOR 8.66K, 1% 1/8W	1014730007	
R69	RESISTOR 16.9K, 1% 1/8W	1014760003	
R70	RESISTOR 3.74K, 1% 1/8W	1014690005	
R71	RESISTOR 15.0K, 1% 1/8W	1014750008	
R72	RESISTOR 5.76K, 1% 1/8W	1014710006	
R73	RESISTOR 25.5K, 1% 1/8W	1014780004	
R74	RESISTOR, 10K, 1% 1/10W	1016420005	
R75	RESISTOR 33K, 5%, 1/8W	1013803337	
R76	RESISTOR 8.66K, 1% 1/8W	1014730007	
R77	RESISTOR 16.9K, 1% 1/8W	1014760003	
R78	RESISTOR 3.74K, 1% 1/8W	1014690005	
R79	RESISTOR 15.0K, 1% 1/8W	1014750008	
R80	RESISTOR 5.76K, 1% 1/8W	1014710006	
R81	RESISTOR 25.5K, 1% 1/8W	1014780004	
R82	RESISTOR, 10K, 1% 1/10W	1016420005	
R83	RESISTOR 15.0K, 1% 1/8W	1014750008	
R84	POT. 10K, 10%, 3/4W, 15 TURNS	0338490043	
R85	POT. 10K, 10%, 3/4W, 15 TURNS	0338490043	
R86	RESISTOR, 10K, 1% 1/10W	1016420005	
R87	RESISTOR 68K, 5%, 1/8W	1013806832	
R88	RESISTOR, 10K, 1% 1/10W	1016420005	
R89	RESISTOR, 10K, 1% 1/10W	1016420005	
R90	RESISTOR 68K, 5%, 1/8W	1013806832	
R91	RESISTOR, 10K, 1% 1/10W	1016420005	
R92	RESISTOR 68K, 5%, 1/8W	1013806832	
R93	RESISTOR 16.9K, 1% 1/8W	1014760003	
R94	RESISTOR 8.66K, 1% 1/8W	1014730007	
R95	RESISTOR, 10K, 1% 1/10W	1016420005	
R96	RESISTOR 47K, 5%, 1/8W	1013804732	
R97	RESISTOR 100K, 5%, 1/8W	1013801041	

Figure 8.15 *1A2A3 Digital Audio Assembly Parts List (Sheet 1 of 2)*

PC ASSEMBLY, Digital Audio Board		Panel 5 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
R98	RESISTOR, 10K, 1% 1/10W	1016420005	
R99	RESISTOR, 10K, 1% 1/10W	1016420005	
R100	RESISTOR 100K, 5%, 1/8W	1013801041	
R101	RESISTOR 100K, 5%, 1/8W	1013801041	
R102	RESISTOR 100K, 5%, 1/8W	1013801041	
R103	RESISTOR 100K, 5%, 1/8W	1013801041	
R104	RESISTOR 15.0K, 1% 1/8W	1014750008	
R105	RESISTOR 100K, 5%, 1/8W	1013801041	
R106	RESISTOR, 10K, 1% 1/10W	1016420005	
R107	RESISTOR 100K, 5%, 1/8W	1013801041	
R108	RESISTOR 100K, 5%, 1/8W	1013801041	
R109	RESISTOR, 10K, 1% 1/10W	1016420005	
R110	RESISTOR, 10K, 1% 1/10W	1016420005	
R111	RESISTOR, 10K, 1% 1/10W	1016420005	
R112	RESISTOR, 10K, 1% 1/10W	1016420005	
R113	RESISTOR, 10K, 1% 1/10W	1016420005	
R114	RESISTOR, 10K, 1% 1/10W	1016420005	
R115	RESISTOR 39K, 5%, 1/8W	1013803931	
R116	RESISTOR 1K, 5%, 1/8W	1013801024	
R117	RESISTOR 47K, 5%, 1/8W	1013804732	
R118	POT. 1K, 10%, 3/4W, 15 TURNS	0338490019	
R119	RESISTOR, 10K, 1% 1/10W	1016420005	
R120	RESISTOR, 10K, 1% 1/10W	1016420005	
R121	RESISTOR, 10K, 1% 1/10W	1016420005	
R122	RESISTOR, 10K, 1% 1/10W	1016420005	
R123	RESISTOR, 10K, 1% 1/10W	1016420005	
R124	RESISTOR, 10K, 1% 1/10W	1016420005	
R125	RESISTOR 1K, 5%, 1/8W	1013801024	
R126	RESISTOR 1K, 5%, 1/8W	1013801024	
R127	RESISTOR 1K, 5%, 1/8W	1013801024	
R128	RESISTOR 1K, 5%, 1/8W	1013801024	
R129	RESISTOR, 10K, 1% 1/10W	1016420005	
R130	RESISTOR 1K, 5%, 1/8W	1013801024	
R131	RESISTOR, 10K, 1% 1/10W	1016420005	
R132	RESISTOR, 10K, 1% 1/10W	1016420005	
R133	RESISTOR, 10K, 1% 1/10W	1016420005	
R135	RESISTOR, 10K, 1% 1/10W	1016420005	
R136	RESISTOR, 10K, 1% 1/10W	1016420005	
R137	RESISTOR, 10K, 1% 1/10W	1016420005	
R138	RESISTOR, 10K, 1% 1/10W	1016420005	
R139	RESISTOR, 10K, 1% 1/10W	1016420005	
R140	RESISTOR, 10K, 1% 1/10W	1016420005	
R141	RESISTOR, 10K, 1% 1/10W	1016420005	
R142	RESISTOR, 10K, 1% 1/10W	1016420005	
R143	RESISTOR, 10K, 1% 1/10W	1016420005	
R144	RESISTOR, 10K, 1% 1/10W	1016420005	
R145	RESISTOR, 10K, 1% 1/10W	1016420005	
R146	RESISTOR, 10K, 1% 1/10W	1016420005	
R147	RESISTOR, 10K, 1% 1/10W	1016420005	
R148	RESISTOR, 10K, 1% 1/10W	1016420005	
R149	RESISTOR 560, 5%, 1/8W	1013805615	
R150	RESISTOR 560, 5%, 1/8W	1013805615	
R151	RESISTOR, 10K, 1% 1/10W	1016420005	
R152	POT. 100K, 10%, 3/4W, 15 TURNS	0338490051	
R153	RESISTOR 1, 10%, 1/2W	0194770001	
R154	RESISTOR 47K, 5%, 1/8W	1013804732	
R155	RESISTOR 47K, 5%, 1/8W	1013804732	
R156	RESISTOR 47K, 5%, 1/8W	1013804732	
R157	RESISTOR 47K, 5%, 1/8W	1013804732	
R158	RESISTOR 5.11K, 1% 1/8W	1014700001	
R159	RESISTOR 16.9K, 1% 1/8W	1014760003	
R160	RESISTOR 1M, 5%, 1/8W	1013801059	
R161	RESISTOR 560K, 5%, 1/8W	1013805640	
R162	RESISTOR 560K, 5%, 1/8W	1013805640	
R163	RESISTOR 3.74K, 1% 1/8W	1014690005	
R164	RESISTOR 2.00K, 1% 1/8W	1014680000	
R165	RESISTOR 3.74K, 1% 1/8W	1014690005	
R166	RESISTOR 2.00K, 1% 1/8W	1014680000	
R167	RESISTOR 3.74K, 1% 1/8W	1014690005	
R168	RESISTOR 2.00K, 1% 1/8W	1014680000	

PC ASSEMBLY, Digital Audio Board		Panel 6 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
R169	RESISTOR 1.5K, 5%, 1/8W	1013801521	
R170	RESISTOR 470, 5%, 1/8W	1013804716	
R171	RESISTOR, 10K, 1% 1/10W	1016420005	
R172	RESISTOR, 10K, 1% 1/10W	1016420005	
R173	RESISTOR, 10K, 1% 1/10W	1016420005	
R174	RESISTOR 5.11K, 1% 1/8W	1014700001	
R175	RESISTOR 2.00K, 1% 1/8W	1014680000	
R176	RESISTOR 5.11K, 1% 1/8W	1014700001	
R177	RESISTOR 2.00K, 1% 1/8W	1014680000	
R178	RESISTOR, 10K, 1% 1/10W	1016420005	
R179	RESISTOR, 10K, 1% 1/10W	1016420005	
R180	RESISTOR, 10K, 1% 1/10W	1016420005	
R181	RESISTOR, 10K, 1% 1/10W	1016420005	
R182	RESISTOR, 10K, 1% 1/10W	1016420005	
R183	RESISTOR, 10K, 1% 1/10W	1016420005	
R184	RESISTOR, 10K, 1% 1/10W	1016420005	
R185	RESISTOR, 10K, 1% 1/10W	1016420005	
S1	SWITCH, SPST, DIP, 3 POSITION	1016870001	
S2	SWITCH, SPST, DIP, 3 POSITION	1016870001	
S3	SWITCH, SPST, DIP 8 POSITION	1017160007	
S4	SWITCH, SPST, DIP 8 POSITION	1017160007	
T1	TRANSFORMER, MODEM V.90	1013280032	
T2	TRANSFORMER, MODEM V.90	1013280032	
T3	TRANSFORMER, MODEM V.90	1013280032	
T4	TRANSFORMER, MODEM V.90	1013280032	
T5	COMMON MODE CHOKE 23Z104SM	1016430001	
TP1	TEST POINT, RED	1011130033	
TP2	TEST POINT, RED	1011130033	
TP3	TEST POINT, RED	1011130033	
TP7	TEST POINT, RED	1011130033	
U1	IC LINEAR MC34074	1014100003	
U2	IC LINEAR MC34074	1014100003	
U3	IC LINEAR MC34074	1014100003	
U4	IC. LINEAR LM2903D	1015940005	
U5	IC. DIGITAL, 4584	1016060009	
U6	IC. DIGITAL, 74HC14	1016090005	
U7	IC. DIGITAL, 74HC00	1016070004	
U8	IC. DIGITAL, 74HC08	1016080000	
U9	IC. LINEAR UDN2935Z	1010830007	
U10	IC. LINEAR UDN2935Z	1010830007	
U11	IC. DIGITAL, 75372D	1016300000	
U12	IC. LINEAR LM1875T	1012120031	
U13	IC LINEAR MC34074	1014100003	
U14	IC LINEAR MC34074	1014100003	
U15	IC LINEAR MC34074	1014100003	
U16	IC. LINEAR, NE5532D	1016310005	
U17	IC. DIGITAL, 4094	1016330006	
U18	IC. DIGITAL, 4081	1016040008	
U19	IC. DIGITAL, 4066	1016050003	
U20	IC. LINEAR, SA571D	1016110006	
U21	IC. DIGITAL, 4066	1016050003	
U22	IC LINEAR MC34072	1014090008	
U23	IC. DIGITAL, 4066	1016050003	
U24	IC. DIGITAL, 4066	1016050003	
U25	IC. DIGITAL, 4094	1016330006	
U26	IC. DIGITAL, 4014	1016320001	
U27	IC. DIGITAL, 4014	1016320001	
U28	IC. DIGITAL, 4585	1016340001	
U29	IC. DIGITAL, 4585	1016340001	
U30	IC. DIGITAL, 4585	1016340001	
U31	IC. DIGITAL, 4066	1016050003	
U32	IC. DIGITAL, 4584	1016060009	
U33	IC. DIGITAL, 4584	1016060009	
U34	IC. DIGITAL, 4014	1016320001	
U35	IC. LINEAR, REF3212	1016760001	
U36	IC. LINEAR LM2903D	1015940005	
U37	IC LINEAR MC34072	1014090008	
U38	IC LINEAR MC34072	1014090008	
U39	IC. DIGITAL, 4585	1016340001	
U40	IC. DIGITAL, 4094	1016330006	

PC ASSEMBLY, Digital Audio Board		Panel 7 of 7	
Ref Symbol	Description	Sunair Part No.	Notes/ Rev
U41	IC. DIGITAL, SN65LVDT2	1016740000	
U42	IC. DIGITAL, SN65LVDT2	1016740000	
U43	IC LINEAR, VOLT REG,LT1521-3.3	1015330002	
U44	IC. DIGITAL, SN65LVDS047	1016750005	
U45	IC LINEAR MC34072	1014090008	
U46	IC. DIGITAL, 4081	1016040008	
U47	IC. DIGITAL, 4504	1016880006	
U48	IC. DIGITAL, 4504	1016880006	
U49	IC. DIGITAL, 4081	1016040008	
U50	IC. DIGITAL, 4014	1016320001	
	HEATSINK, SPEAKER DRIVER	8076092205	
	MOUNTING PLATE, DIGITAL AUDIO	8121091608	

Figure 8.15 *1A2A3 Digital Audio Assembly – Parts List (Sheet 2 of 2)*

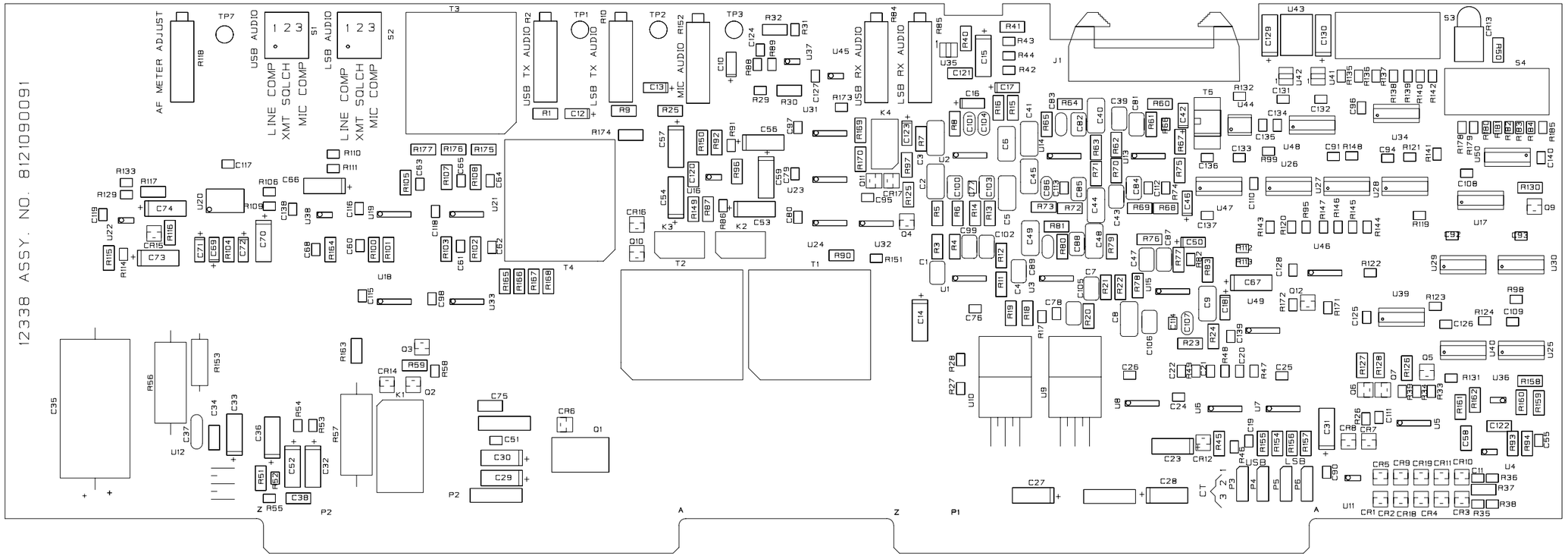


Figure 8.16 *1A2A3 Digital Audio Assembly – Component Location Diagram*

8121090075 SHEET 1
REV A

TRANSMIT AUDIO

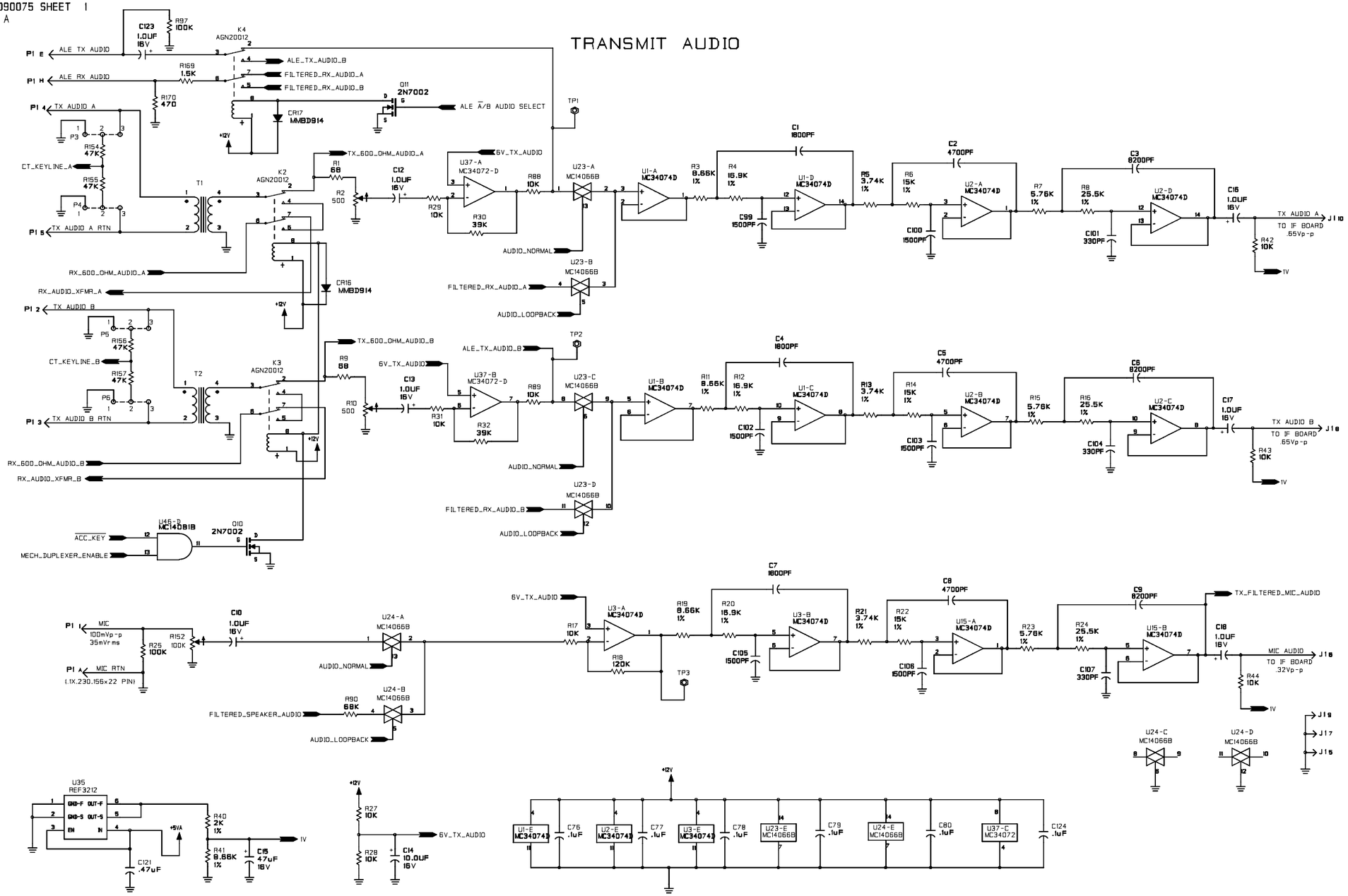


Figure 8.17 *1A2A3 Digital Audio Assembly – Schematic Diagram (Sheet 1 of 7)*

8121090075 SHEET 2
REV A

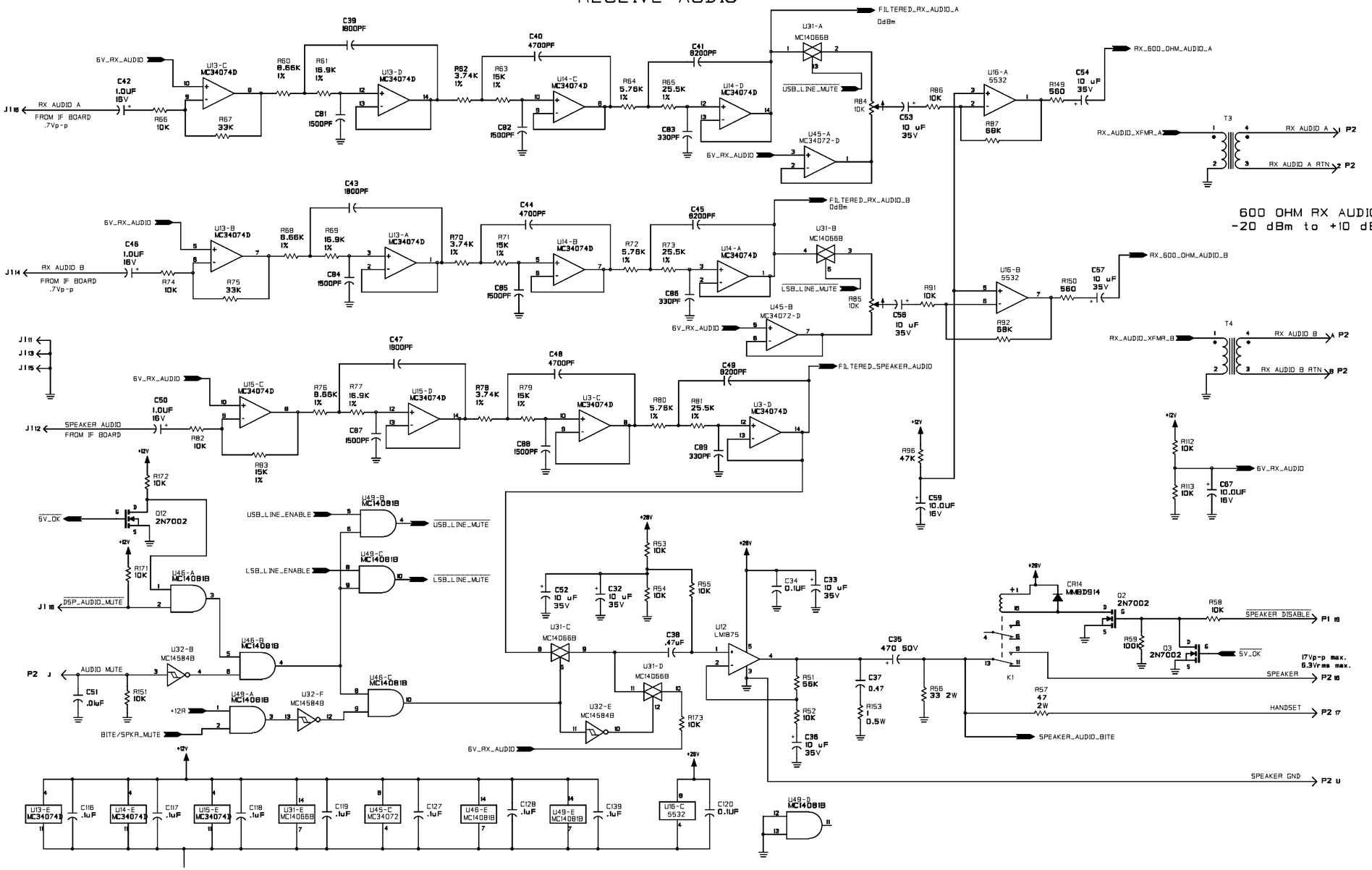


Figure 8.17 *1A2A3 Digital Audio Assembly - Schematic Diagram (Sheet 2 of 7)*

8121090075 SHEET 3
REV A

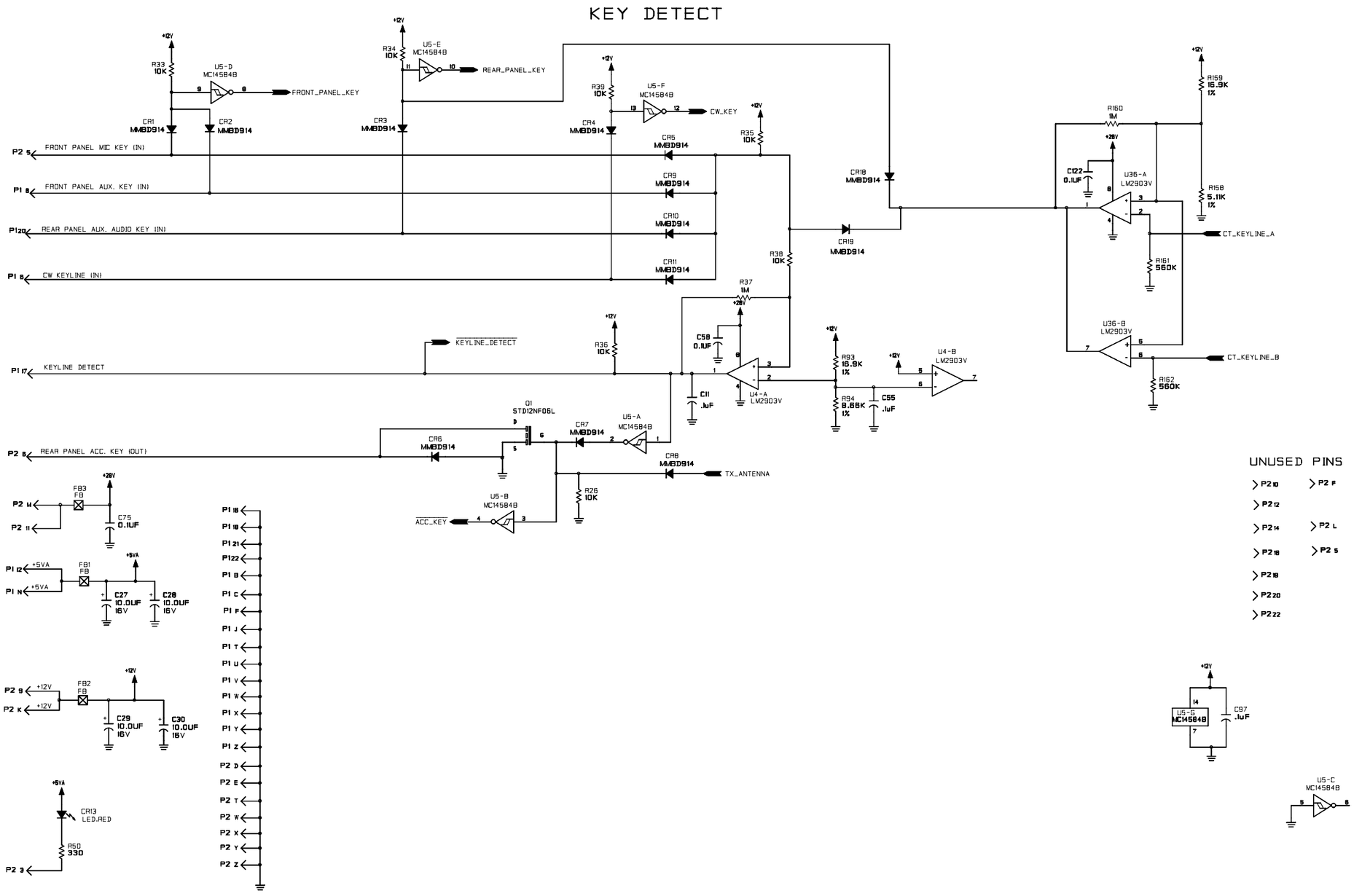


Figure 8.17 *1A2A3 Digital Audio Assembly – Schematic Diagram (Sheet 3 of 7)*

8121090075 SHEET 4
REV A

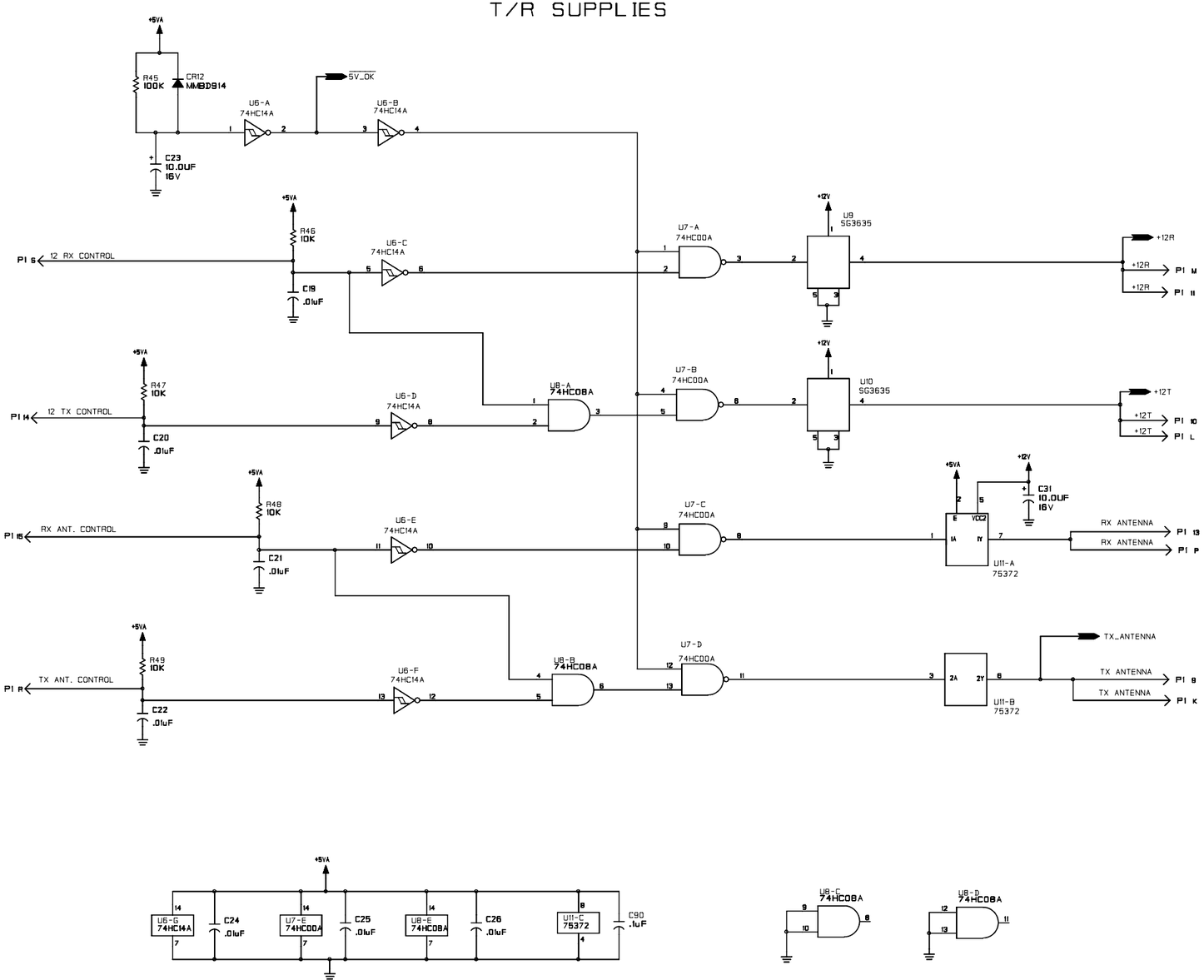


Figure 8.17 *1A2A3 Digital Audio Assembly - Schematic Diagram (Sheet 4 of 7)*

8121090075 SHEET 5
REV A

BITE AND METER

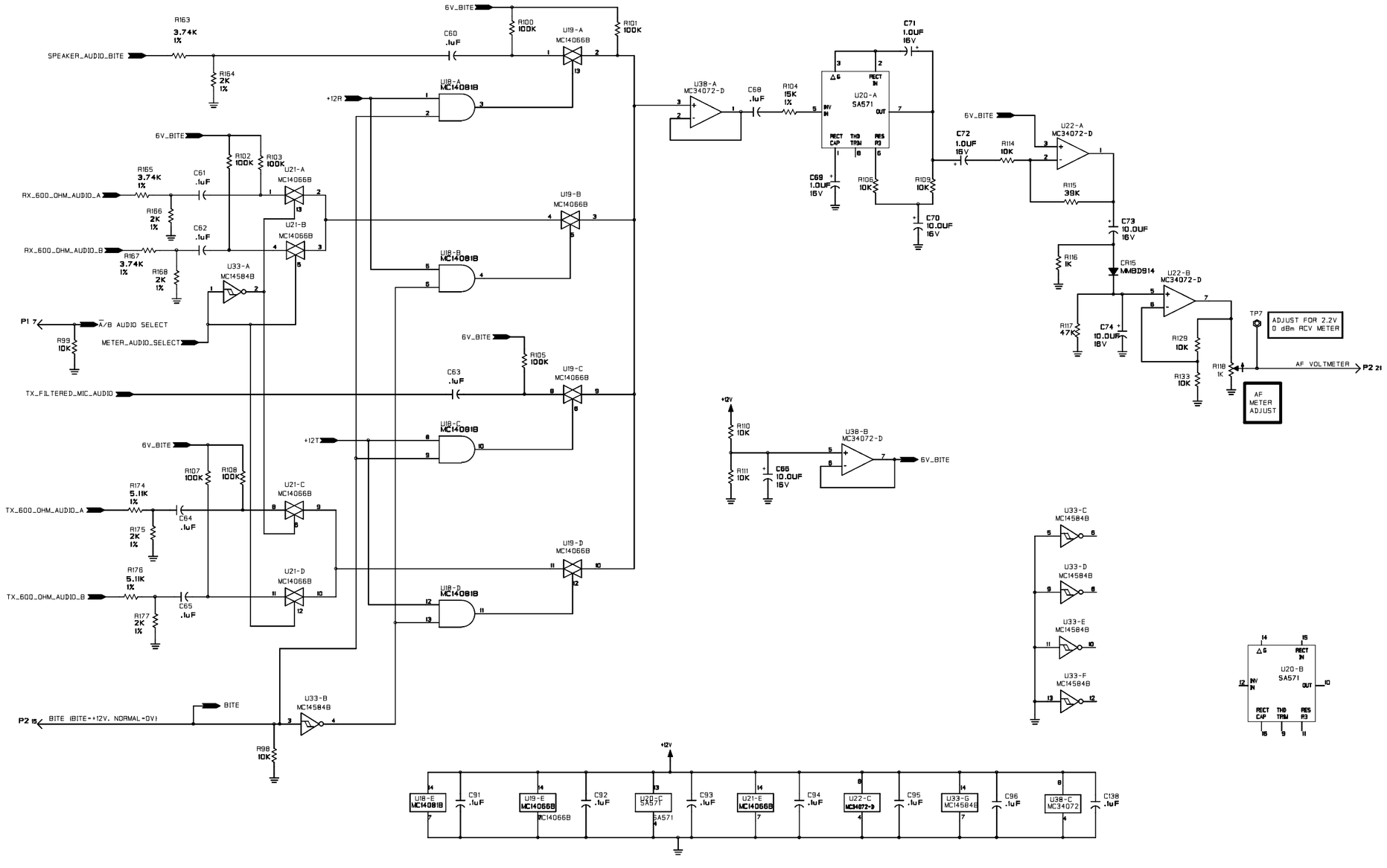


Figure 8.17 *1A2A3 Digital Audio Assembly – Schematic Diagram (Sheet 5 of 7)*

8121090075 SHEET 6
REV A

DIGITAL IF INTERFACE

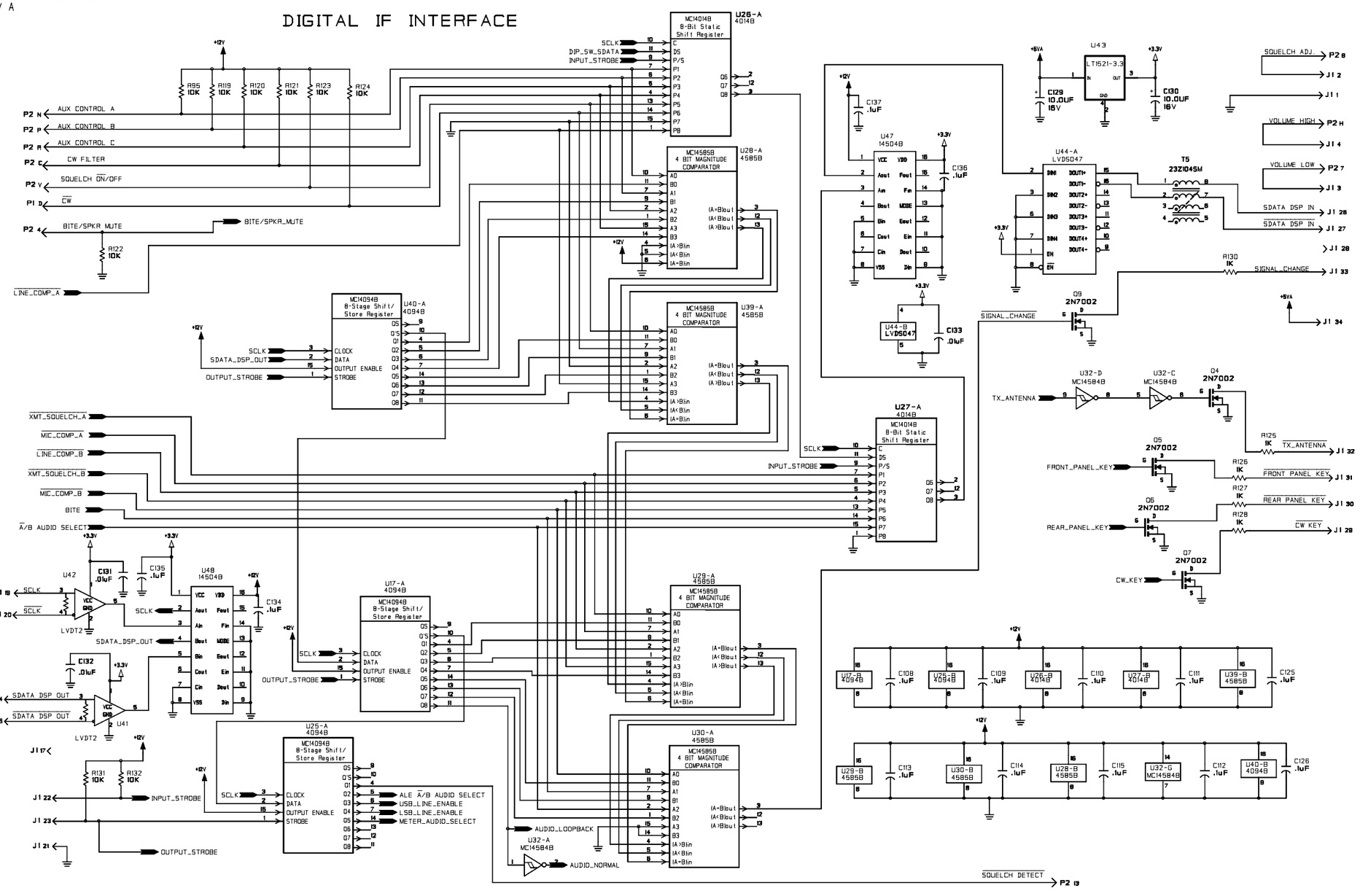
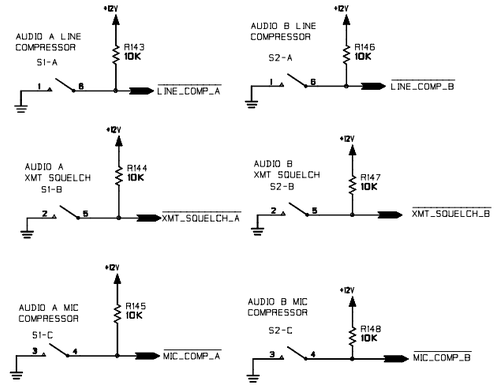
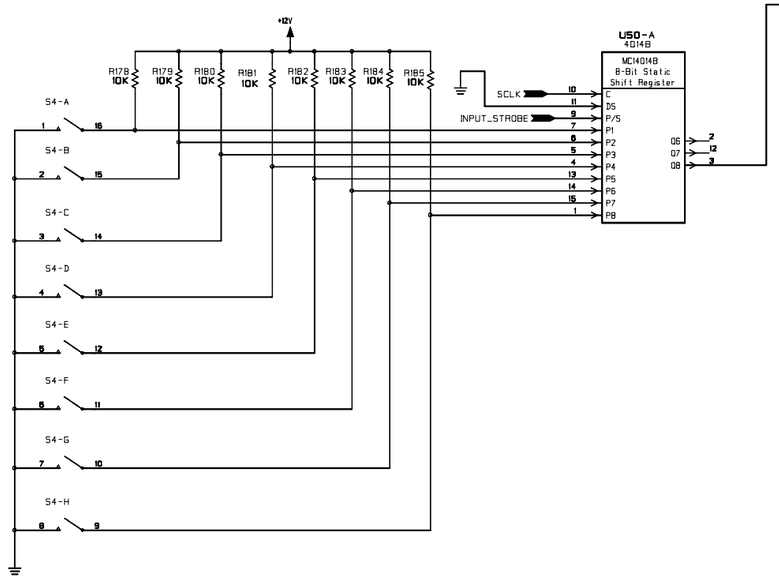


Figure 8.17 *1A2A3 Digital Audio Assembly - Schematic Diagram (Sheet 6 of 7)*

8121090075 SHEET 7
REV A





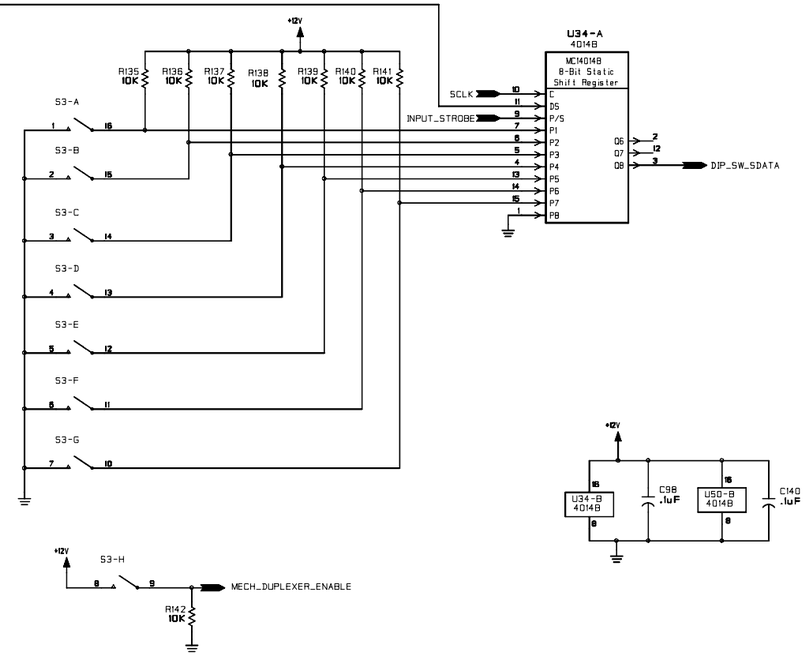


Figure 8.17 *1A2A3 Digital Audio Assembly – Schematic Diagram (Sheet 7 of 7)*

SERVICE BULLETIN

Sunair Electronics, Inc.
3101 S.W. Third Avenue
Ft. Lauderdale, FL 33315-3389 U.S.A.

Product Support Department
Telephone: (954) 525-1505
Fax: (954) 765-1322
Email: techsupport@sunairhf.com

NUMBER: 9000-004 / REV 1

DATE: 30 November 1992 / Revised 14 June 1999

ATTENTION: All Dealers and Customers

EQUIPMENT: RT-9000, T-9400, R-9200 and RCU-9310.

SUBJECT: Replacement of Front Panel Liquid Crystal Display's (LCD's) Back Lighting Devices.

REFERENCE: Applicable Operations and Maintenance Manuals and Diagrams 1 through 3 of this Service Bulletin.

PURPOSE: Installation of new Back Lighting devices for Front Panel LCD'S.

TEXT: The Back Lighting devices for the two (2) Front Panel LCD's P/N 8076041791 and P/N 8076040892 will gradually lose their luminescence with time. For this reason operating personnel should turn OFF the panel light when ever it is not needed to give the Back Lighting devices the longest possible life. This is accomplished by depressing the 'PNL LT' push button on the Front Panel to turn OFF the Back lighting and depressing it again to turn the Back Lighting ON again when needed. Once the Back lighting devices have lost their luminescence, the back light may be renewed by ordering replacement Back Lighting devices for the applicable LCD and installing per inclosed instructions.

1. Custom LCD, Full Function, P/N 8076040604.
   Replacement Back Light, Assembly P/N 8076040892.

2. Custom LCD, 1 x 40 Character, P/N 8076041601.
   Replacement Back Light, Assembly P/N 8076041791.

Replacement of LCD Back Lighting Devices

1. Refer to Section V of applicable Operations and Maintenance Manual.

    a. Remove equipment top and bottom covers.

    b. Remove Front Panel 1A1 assembly.

2. Use enclosed diagrams 1 through 3 to install new back lights in the LCD's.

3. Replace Front Panel 1A1 assembly, and top and bottom covers. Return equipment to operational status.

4. Insert this Service Bulletin into Section V of applicable Operations and Maintenance Manual.

NOTE: Once the Back Lights have been replaced initially, they can be replaced again as needed. When the luminescence has decreased remove the installed Back Light and insert a new one in its place.

CUSTOMER SERVICES
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SERVICE BULLETIN

Sunair Electronics, Inc.
3101 S.W. Third Avenue
Ft. Lauderdale, FL 33315-3389 U.S.A.

Product Support Department
Telephone: (954) 525-1505
Fax: (954) 765-1322

NUMBER: 9000-006

DATE: 3 July 1996

ATTENTION: All Customers using the following 9000 Series HF/SSB equipment.

EQUIPMENT: RT-9000, RT-9000A, R-9200 and T-9400.

SUBJECT: Front Panel LCD, Operational Display P/N 8076040604.

REFERENCE:
1. RT-9000 Manual P/N 8076000505 pages 5-2, 5-12 and 5-44.
2. R-9200 Manual P/N 8102000503 pages 5-2, 5-9 and 5-34.
3. T-9400 Manual P/N 8103000507 pages 5-2, 5-11 and 5-36.
4. Diagram 1 of this Service Bulletin.

PURPOSE: Eliminate the separation of E.L. Inverter from Front Panel LCD, Operational Display.

TEXT: A small percentage of the LCD, Operational Displays, are experiencing separation of E.L. Inverter from the printed circuit board of the display. This is due to an interference condition between the E.L. Inverter and I/O connector whenever the 1A2A1 CPU and 1A2A8 I/O assembly are removed and replaced. To preclude the possibility of continued separation of E.L. Inverter, Sunair is installing Inverter Cover P/N 8076042801 and Insulator P/N 8076042909 on current production equipment.

For field modification of the Operational Displays, Sunair is providing Kit E.L. Inverter cover P/N 8076043000, containing the following parts:

E.L. Inverter Cover P/N 8076042801
Insulator, E.L. Cover P/N 8076042909
Drawing, Inverter Cover Installation P/N 8076043107

1. See page 5-2 of applicable manual.
   a) Remove top and bottom covers (6 screws and 8 latches).

2. See applicable page in manual.
   a) Remove Front Panel Assembly. (6 screws with split washers and disconnect 2 ribbon cables).

3. Using steps on Diagram 1 install the E.L. Inverter Cover in the Front Panel Assembly.

4. Reassemble in reverse and return unit to operational status.

This Service Bulletin should be placed in applicable manual. At the front of Maintenance Section V or Bulletins section.

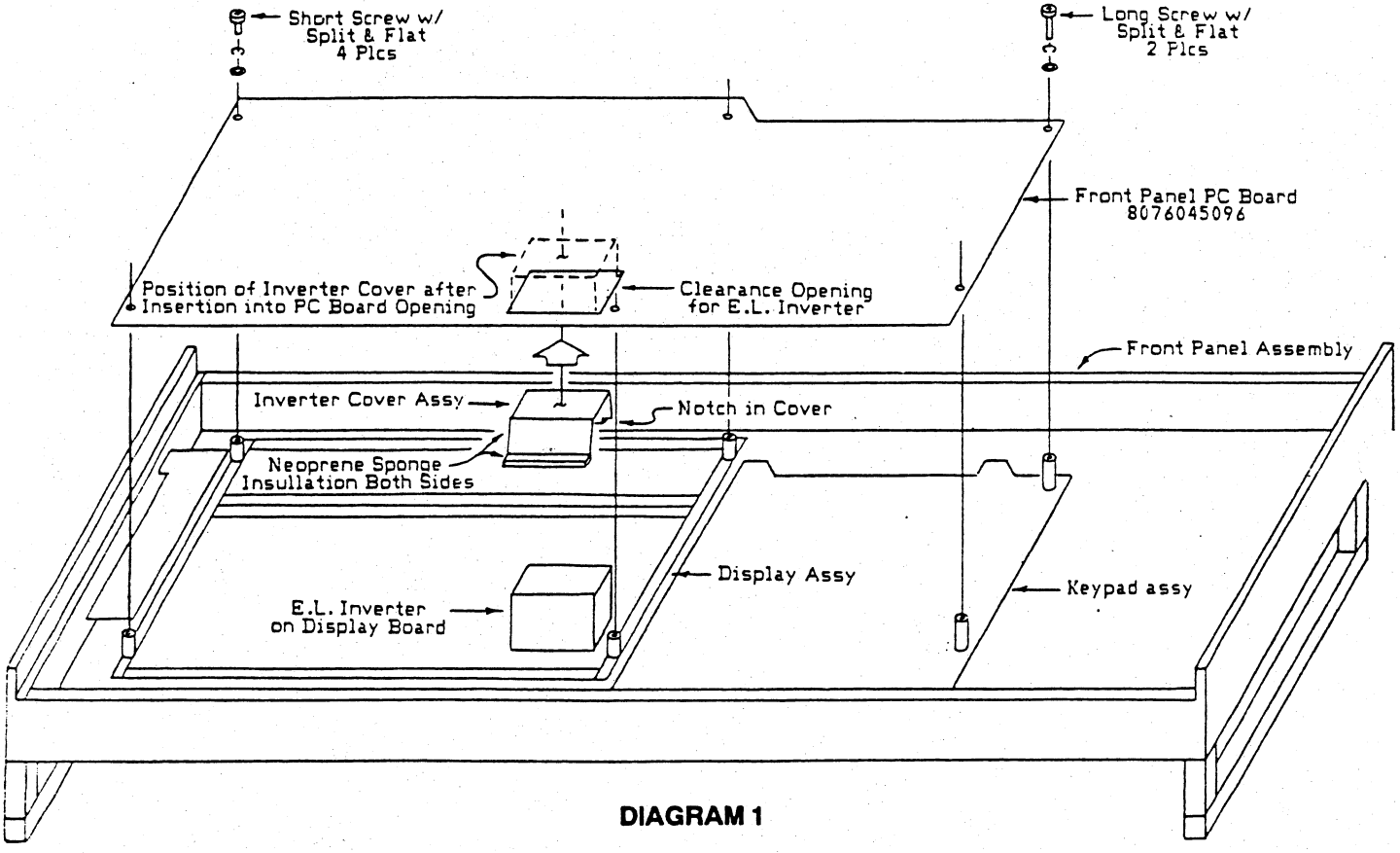

DIAGRAM 1

1. Remove Front Panel PC Board 8076045096 from Front Panel Assembly (6 screws with split and flat washers).

2. Insert E.L. Inverter Cover Assembly into inverter clearance opening in Front Panel PC Board (notch in cover toward center of board).

3. Reinstall Front Panel PC Board on Front Panel Assembly. Being careful to properly align P1 and P2 with J2 and J3 on Front Panel LCD, Operational Display. Connectors should mate smoothly, DO NOT FORCE.

SERVICE BULLETIN

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3101 S.W. Third Avenue
Ft. Lauderdale, FL 33315-3389 U.S.A.

Product Support Department
Telephone: (954) 525-1505
Fax: (954) 765-1322

NUMBER: 9000-007 Reference ECN: 8076-182/182A

DATE: 13 Nov 1996

ATTENTION: All Customers with RT-9000(A) HF/SSB equipment containing PC assembly RF Detector/ Coax Keyline in Filter Module assembly 1A3, P/N 8076050090.

EQUIPMENT: RT-9000, RT-9000A supplied with 1A3A1 PC assembly RF Detector/Coax Keyline. P/N 8076052092.

REFERENCE: Manual P/N 8076000505 Section V, pages 5-105 through 5-107.

PURPOSE: Product improvement by providing High-Voltage transient protection for 1A3A1 Q3.
A. CR13 protects Q3 Drain-to-Source.
B. R14 and C32 protects Q3 Gate-to-Source.

TEXT: To improve equipment reliability, Sunair is installing transient protection for Q1 on PC assembly RF Detector/Coax Key used in current production equipment.

For field modification of the PC assembly, Sunair is providing the following Kit and instructions for upgrading your equipment.

1ea	CR13	IN6283A, Diode Tranzorb	1011260000
1ea	R14	10K, 1/8watt, Resistor	1010801031
1ea	C32	0.001 UF Capacitor, 100V, X7R, 20%	0281630003
1ea	Q3	2N7000, Transistor, N-CH, FET	1011050013

Installation instructions:

1. See pages 5-2 and 5-6 of RT-9000(A) manual.
   a) Remove top cover.
   b) Remove top cover of 1A3 Filter Module.

2. Referring to supplied page 5-107B.
   a) Add Diode CR13, by soldering cathode lead to L4 lead connected to TP1. Solder Anode lead of CR13 to R6 lead.
   b) Desolder Q3's Gate lead (center lead) from PC pad. Using an ohm meter compare installed Q3 with new Q3 supplied. If installed Q3 is damaged, replace with Q3 supplied. Add resistor R14 between Q3 Gate lead and PC pad where the Gate lead was removed.
   c) Add capacitor C32 from Q3 Gate lead to Q3 Source lead (Bottom lead). Solder all the above connections.

3. Power up RT-9000, select any frequency between 1.6 and 29 MHz, MODE USB. Remove P1 connector at J1 on PC Assembly.
   a) Using VOM set to RX1 measure J1 on PC Assembly to ground.
   Should read ∞ .
   b) Depress PTT on microphone. **DO NOT SPEAK INTO MICROPHONE.** J1 to ground should read 10 ohms or less. Release PTT on microphone. Reconnect P1 connector.

4. Replace covers and return equipment to operation. Place new pages 5-107, 5-107A, 5-107B, and 5-108 in your manuals. Place Service Bulletin in Maintenance or Bulletin section.

1. REMOVE RIBBON CABLE CONNECTORS.
2. REMOVE SIX (6) 4-40 SCREWS, LIFT P.C. BOARD.
3. REMOVE RIBBON CABLE UNDER P.C. BOARD.
4. GO TO DIAGRAM 2 TO REMOVE LCD ASSEMBLY.
5. INSTALL IN REVERSE ORDER.

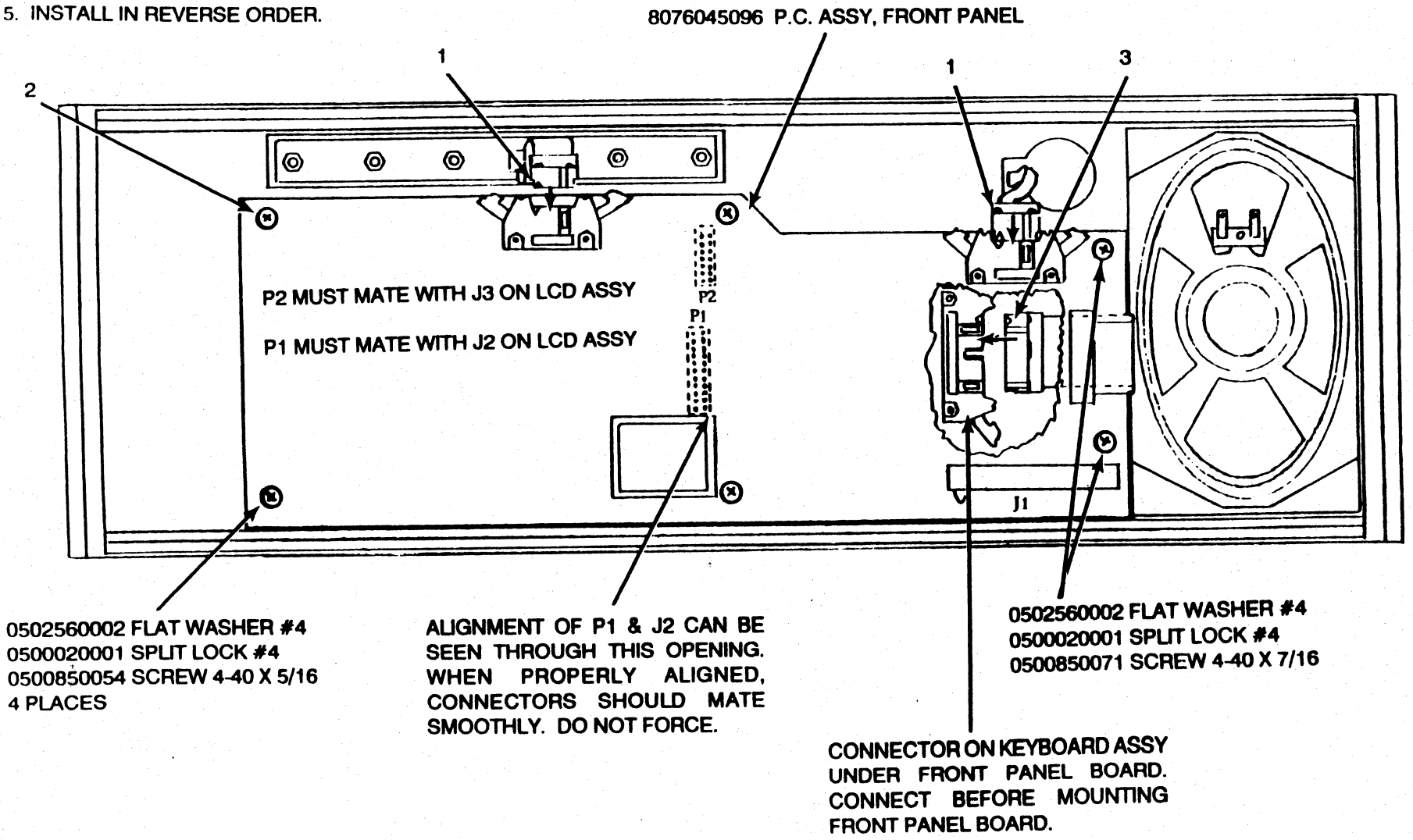

Diagram 1: Removal and Installation of Front Panel P.C. Assembly.

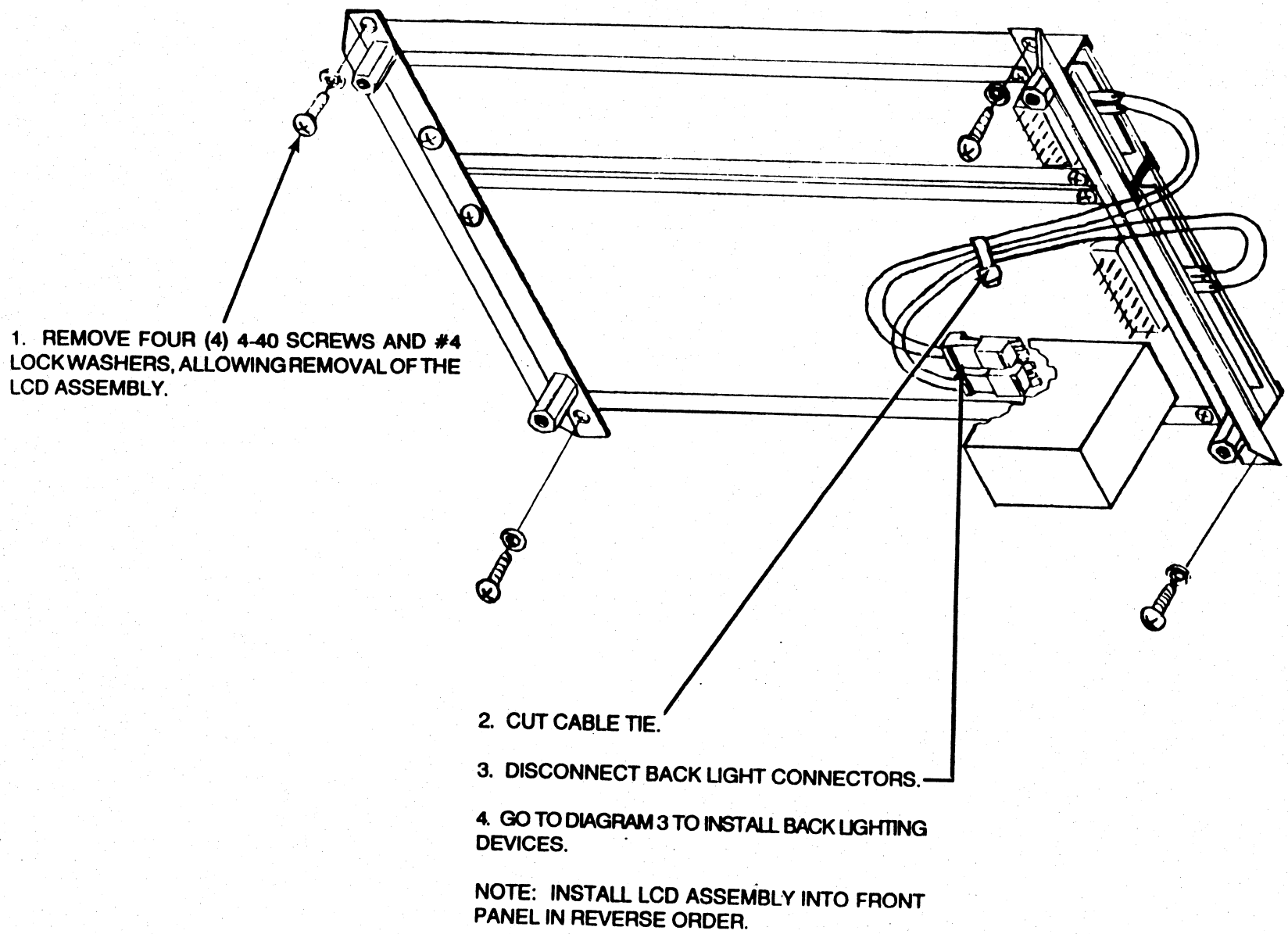

Diagram 2: Removal and Installation of LCD Assembly.

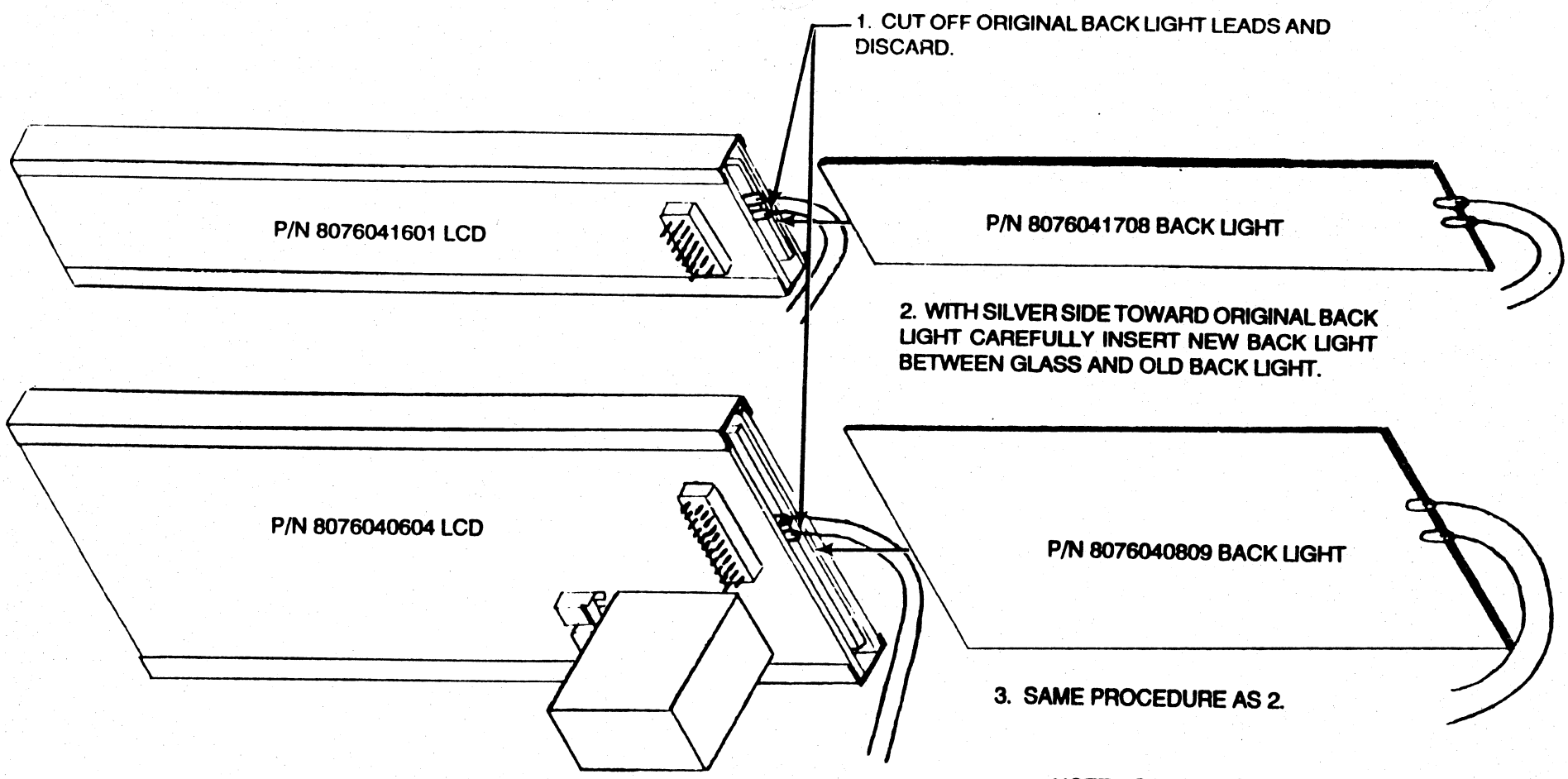

Diagram 3: Installation of Back Lighting Devices.

SERVICE BULLETIN

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3005 S.W. Third Avenue
Ft. Lauderdale, FL 33315-3389 U.S.A.

Product Support Department
Telephone: (954) 525-1505
Fax: (954) 765-1322

NUMBER: 9000-008/ECN Reference 8076-0241

DATE: 22 June, 2001

ATTENTION: All Customers using the following 9000 Series HF/SSB Equipment.

EQUIPMENT: RT-9000, RT-9000A, T-9400, T-9410, R-9200 and R-9210.

SUBJECT: 1A2A2 Synthesizer Module P/N 8076060095 Revision A used in the above equipment. Consisting of the following:

1. PC Assembly 1A2A2A1, First L.O. P/N 8076068096.
2. PC Assembly 1A2A2A2, Second L.O. P/N 8076066093.
3. PC Assembly 1A2A2A3, BFO P/N 8076062098.
4. PC Assembly 1A2A2A4, Ref. Loop and Doubler P/N 8076064091.
5. PC Assembly 1A2A2A5, Mother Board (SYN) P/N 8076061091.

TEXT: This Module and PC Assemblies are no longer manufactured as various parts are unavailable for manufacturing the 1A2A2 Synthesizer Module Revision A. See Figure 1. These replacement spares will be available until inventories are exhausted.

The replacement 1A2A2 Synthesizer PC Assembly P/N 8076060095 Revision B is now being manufactured. See Figure 2. This new release Revision B is a direct replacement, Hybrid Direct-Digital Synthesis (DDS)-Phase Lock Loop single unit structure, which is a form, fit and function backward and forward compatible direct replacement for the 1A2A2 Synthesizer Module and PC Assemblies. All new equipment manufactured after June 2001 will incorporate the new 1A2A2 Synthesizer PC Assembly Revision B.

This PC Assembly is manufactured using Surface Mount Technology (SMT). If future repairs are required and you do not have SMT repair capabilities, the 1A2A2 Synthesizer PC Assembly should be returned to the Sunair Factory for repair in accordance with established procedures for the handling of returned equipment.

If you have Surface Mount Technology repair facilities and require the parts list and schematics, please send your request to:

CUSTOMER SERVICES
PRODUCT SERVICE DEPARTMENT
SUNAIR ELECTRONICS, INC.

Telephone: (954) 525-1505

Fax: (954) 765-1322

Email: techsupport@sunairhf.com

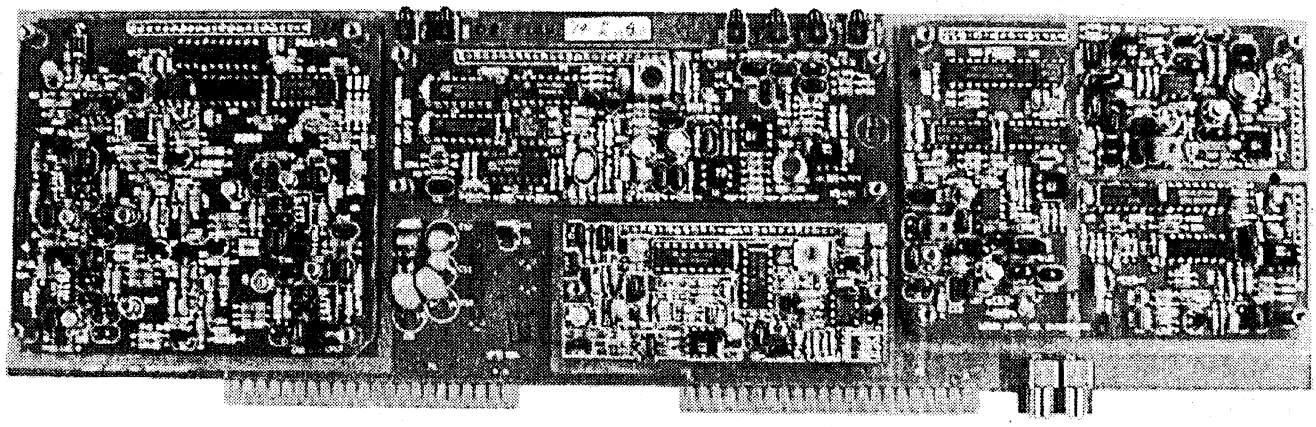

Figure 1 P/N 8076060095 Revision A Synthesizer Module Assembly
(Old Revision)

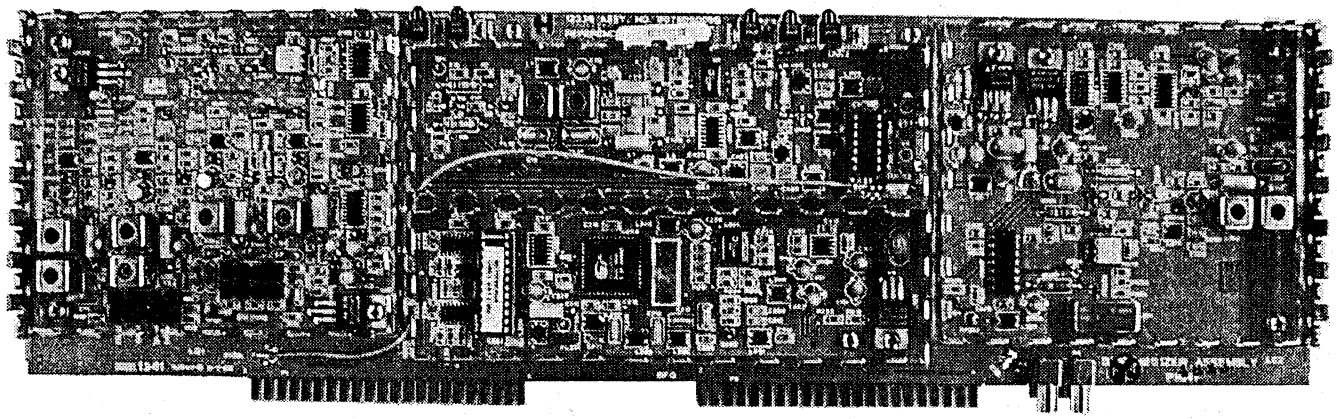

Figure 2 P/N 8076060095 Revision B Synthesizer Printed Circuit Assembly

ADDENDUM

Title : High Stability Reference Oscillator start-up characteristics

Number : 8076-0287

Date : 09 April 03

Equipment(s) Affected : RT-9000A & RT-9000B HF/SSB Transceivers
R-9200 & R-9210 HF/ SSB Receivers
T-9400 & T-9410 HF/SSB Transmitter/Exciters

Applicability : Units with High Stability Reference Oscillator option installed

Effectivity : (not applicable)

The following operating provisions apply to units that have the HIGH STABILITY REFERENCE OSCILLATOR option installed. This option utilizes an Ovenized Frequency Standard and requires additional time to attain specified frequency accuracy and stability performance at initial power-up or after prolonged system shutdown. The operator must consider these requirements and their effect on initial performance when operating this equipment. This condition can be avoided by keeping the radio continuously powered-up. This practice is considered normal for equipment with High Stability Frequency Standards. The following statements summarize behavior of a properly configured radio immediately after the initial power-on event:

1. If the unit has just been installed at the customer site or has not been powered-up for a prolonged time, after power-up the unit may intermittently display "Oven Warm Up" messages.

2. If the unit does not display the message described above, it still inhibits the unit's I/O communication facilities from being used for a short time. The I/O capability is required for operation with remote control units, preselectors, or embedded ALE modules.

3. Unit I/O lockout time is directly related to the unit's internal oven temperature at power-up and the ambient operating temperature. This time typically will be between two (2) minutes and 30 minutes under low temperature conditions.

4. After the above I/O lockout time elapses, the unit becomes fully functional but at reduced Frequency Accuracy.

5. During the first hour of operation while the oven is stabilizing at its design temperature, invoking the Built In Test Equipment (BITE) function may produce erroneous failures. After this time, all BITE test failures should be considered genuine and appropriately addressed.

6. Frequency Accuracy is specified to be within one (1) part in 10^7 within one (1) hour after power-up.

7. Frequency Accuracy is specified to be within one (1) part in 10^8 within 72 hours after power-up.

8. The unit must be maintained in a continuous "power on" state to achieve the specified frequency accuracy and stability specifications. The benefits offered by the HIGH STABILITY REFERENCE OSCILLATOR option are available only if this condition is satisfied.

9. Any power interruptions will cause the unit to execute its normal start-up I/O lockout interval as previously described.