RF-3200 SERIES

PRODUCT LINE

SERVICE MANUAL

HARRIS

PUBLICATION NUMBER: 10212-0300C
NOVEMBER 1992

RF-3200 SERIES
PRODUCT LINE

SERVICE MANUAL

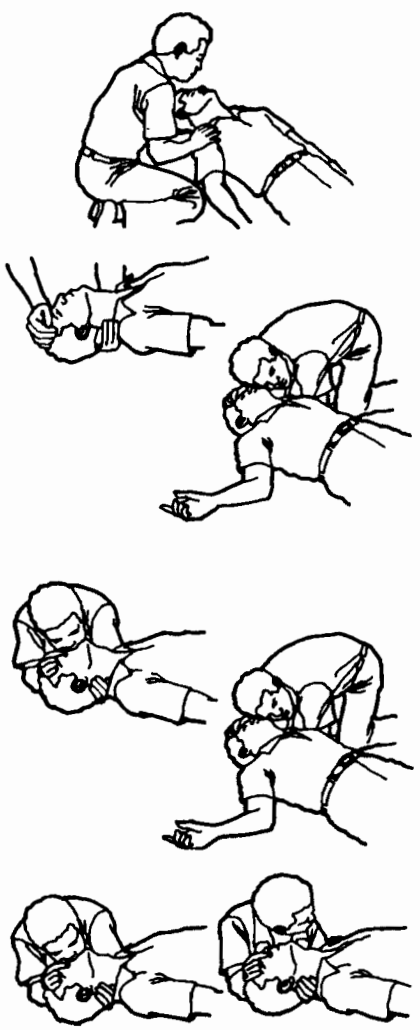
HARRIS

Equipment manufactured by Harris Corporation, RF Communications Group meets stringent quality and safety standards. However, high voltages are present in many radio products, and only a skilled technician should attempt to remove outer covers and make adjustments or repairs. All personnel who operate and maintain the equipment should be familiar with this page as a safety preparedness measure. Although this procedure is reproduced as a service to the personnel involved with this equipment, Harris Corporation assumes no liability regarding any injuries incurred during the operation and repair of such equipment, or the administration of this suggested procedure.

ELECTRICAL SHOCK: EMERGENCY PROCEDURE

The victim will appear unconscious and may not be breathing. If the victim is still in contact with the voltage source, disconnect the power source in a manner safe to you, or remove the victim from the source with an insulated aid (wooden pole or rope). Next, determine if the victim is breathing and has a pulse. If there is a pulse but no breathing, administer artificial respiration. If there is no pulse and no breathing, perform CPR (if you have been trained to do so). If you have not been trained to perform CPR, administer artificial respiration anyway. Never give fluids to an unconscious person.

WHEN BREATHING STOPS



FIRST, send someone to get a **DOCTOR.**
THEN, administer first aid to restore breathing (artificial respiration):

1 IF A VICTIM APPEARS TO BE UNCONSCIOUS
TAP VICTIM ON THE SHOULDER AND SHOUT, "ARE YOU OKAY?"

2 IF THERE IS NO RESPONSE
TILT THE VICTIM'S HEAD, CHIN POINTING UP. Place one hand under the victim's neck and gently lift. At the same time, push with the other hand on the victim's forehead. This will move the tongue away from the back of the throat to open the airway.

IMMEDIATELY LOOK, LISTEN, AND FEEL FOR AIR.
While maintaining the backward head tilt position, place your cheek and ear close to the victim's mouth and nose. Look for the chest to rise and fall while you listen and feel for the return of air. Check for about five seconds.

3 IF THE VICTIM IS NOT BREATHING
GIVE FOUR QUICK BREATHS.
Maintain the backward head tilt, pinch the victim's nose with the hand that is on the victim's forehead to prevent leakage of air, open your mouth wide, take a deep breath, seal your mouth around the victim's mouth, and blow into the victim's mouth with four quick but full breaths just as fast as you can. When blowing, use only enough time between breaths to lift your head slightly for better inhalation.

If you do not get an air exchange when you blow, it may help to reposition the head and try again.
AGAIN, LOOK, LISTEN, AND FEEL FOR AIR EXCHANGE.

4 IF THERE IS STILL NO BREATHING
CHANGE RATE TO ONE BREATH EVERY FIVE SECONDS.

For more information about these and other life–saving techniques, contact your Red Cross chapter for training.
"When Breathing Stops" reproduced with permission from an American Red Cross Poster.

ADDENDUM

ADDENDUM NO:	APPLIES TO (RF Model or Product Name):	DATE:
L850	RF-3200 Transceiver	June 1993

ADDENDUM TO (Publication Number/Revision):	FOR (Specific Application):
RF-3200 Service Manual (10212-0300C)	All Manuals

The following revised pages have been incorporated into the manual:

- Pages 3-7 and 3-8
- A5 Heatsink Assembly section

HARRIS CORPORATION RF COMMUNICATIONS GROUP ROCHESTER, NEW YORK 14610 USA

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABOUT THIS MANUAL

This instruction manual includes information regarding all aspects of maintenance and operation of the RF-3200 Radio Transceiver. The manual is structured as follows:

General Information (section 1) provides reference and descriptive information: a description of the RF-3200 User's Guide, the top level assembly parts list, the ancillary kit parts list, a general description of the major assemblies, a family tree of the component assemblies, and a simplified block diagram of the transceiver.

Configuration Programming (section 2) provides information on technician-level configuration programming.

Major Assembly Location and Interconnection (section 3) provides major assembly locations, interconnection, and assembly removal information.

Maintenance and Repair (section 4) provides maintenance, troubleshooting, and alignment information.

Additional tab sections provide functional descriptions, interface connections, parts lists, component location diagrams, and schematic diagrams for each repairable assembly.

Appendix A documents control signals between the A7 Logic PWB Assembly and the rest of the transceiver. Appendix B is a glossary, and appendix C includes pinouts and logic diagrams of integrated circuits used in the transceiver. An Options tab section is for documentation on installed radio options.

RF-3200 SERIES
PRODUCT LINE

SERVICE MANUAL

3200-015P

RF-3200 HF-SSB Transceiver

SECTION 1

GENERAL INFORMATION

1.1 INTRODUCTION

This service manual provides information required to maintain and repair the RF-3200 HF-SSB Transceiver. Users of this manual should have an understanding of radio and electronics circuit concepts. The manual is organized as follows:

- General Information (section 1) provides reference and descriptive information: a description of the RF-3200 User's Guide, the top level assembly parts list (table 1-1), the ancillary kit parts list (table 1-2), a general description of the major assemblies, and a family tree of the component assemblies (figure 1-1). Figure 1-2 is a simplified block diagram of the RF-3200 Transceiver.
- Configuration Programming (section 2) provides information on technician-level configuration programming.
- Major Assembly Location and Interconnection (section 3) provides major assembly locations, interconnection, and assembly removal information.
- Maintenance and Repair (section 4) provides maintenance, troubleshooting, and alignment information.
- Additional tab sections provide functional descriptions, interface connections, parts lists, component location diagrams, and schematic diagrams for each repairable assembly.
- Appendix A documents control signals between the A7 Logic PWB Assembly and the rest of the transceiver. Appendix B is a glossary, and appendix C includes pinouts and logic diagrams of integrated circuits used in the transceiver. An Options tab section is for documentation on installed radio options.

1.2 RF-3200 USER'S GUIDE

See the RF-3200 User's Guide (part number 10212-0050) supplied with the radio for the following information:

- General Information and Installation (including emergency procedure, options, radio installation, front and rear panel connector pin assignment, antenna coupler installation, and safety precautions)
- Operation (including CW operation, channel/group programming, and channel scanning)
- Programming and Configuration (including programming, storing, and deleting channels)
- Display Messages (error messages, normal operating messages, and antenna coupler status messages)
- Care and Troubleshooting (including preventive maintenance and troubleshooting table)
- Reference Information (including specifications, propagation considerations, and antenna considerations)
- Options and Available Accessories

1.3 EQUIPMENT PARTS LISTS

Table 1-1 is the top level assembly parts list for the RF-3200.

Table 1-2 lists the part numbers and descriptions for items included in the RF-3200 Ancillary Kit.

Figure 1-1 shows the Family Tree of assemblies for the RF-3200 Transceiver. Figure NO TAG is the simplified block diagram of the transceiver.

Figure 1-2 is a simplified block diagram which shows the functional relationships among the RF-3200 assemblies.

The transceiver comprises the following assemblies:

a. The A1 Front Panel Assembly contains all operator controls and indicators which are described in detail in the RF-3200 User's Guide supplied with the transceiver. The A1 Assembly also contains the A1A1 Front Panel (FP) Display PWB Assembly which is the major subassembly containing the interface circuitry between the operator and the CPU on the A7 Logic PWB Assembly.

b. The A2 Audio PWB Assembly amplifies the transmit microphone audio and the receive audio driving the front panel speaker.

c. The A3 Receiver/Exciter Assembly contains most of the transmit and receive signal processing circuitry. The mixers and filters are common to the receive and transmit functions; separate amplifiers are used for receive and transmit operations.

d. The A4 Harmonic Filter Assembly includes RF filters used in both the transmit and receive directions when the radio is in the 1.6-30 MHz band. It also includes forward and reverse power detector circuits.

e. The A5 Heatsink Assembly consists of two subassemblies:

   1. The A5A1 Power Amplifier (PA) PWB Assembly amplifies the RF input signal from the A3 RX/EX PWB Assembly and provides the amplified signal to the A4 HF PWB Assembly.

   2. The A5A2 Power Distribution PWB Assembly provides filtering, regulation, and distribution of all dc voltages to the other subassemblies in the radio.

f. The A8 Synthesizer Assembly generates the three local oscillator signals: LO1 in the 70-100 MHz range, LO2 with a frequency of 70 MHz and LO3 at 455 kHz. The frequencies of the latter two signals vary slightly depending on the communications mode.

CAUTION

The ROMs supplied in the A7 Logic PWB Assembly are specifically programmed for this transceiver only. Do not attempt to interchange the ROMs in any RF-3200/RF-3201 with the ROMs from another RF-3200/RF-3201 Transceiver. Doing so will make necessary the re-programming of the Logic PWB Assembly by the Harris Product Service Department.

Table 1-1. RF-3200 Top Level Assembly Parts List (10212-0100 Rev. G)

Part Number	Description
10212-1000	CHASSIS ASSY, WIRED
10212-0500	ANCILLARY KIT
10212-0050	USERS GUIDE
10212-0400	TRUNNION MOUNT KIT
10212-0051	OPERATORS CARD
10212-0210	MICROPHONE
10212-0600	CABLE KIT, POWER

Table 1-2. RF-3200 Ancillary Kit Parts List (10212-0500 Rev. D)

Qty.	Part Number	Description
2	F-0017	FUSE, 8A QUICK ACTING
1	J-0002	UHF CONNECTOR PLUG
1	J22-0070-115	CONN PLUG, 15 PIN
1	J22-0070-514	CONN HOOD, 15 POS
1	J40-0002-002	HOUSING CONN 2 PIN
1	J45-0011-003	PIN CRIMP 18-24 AWG

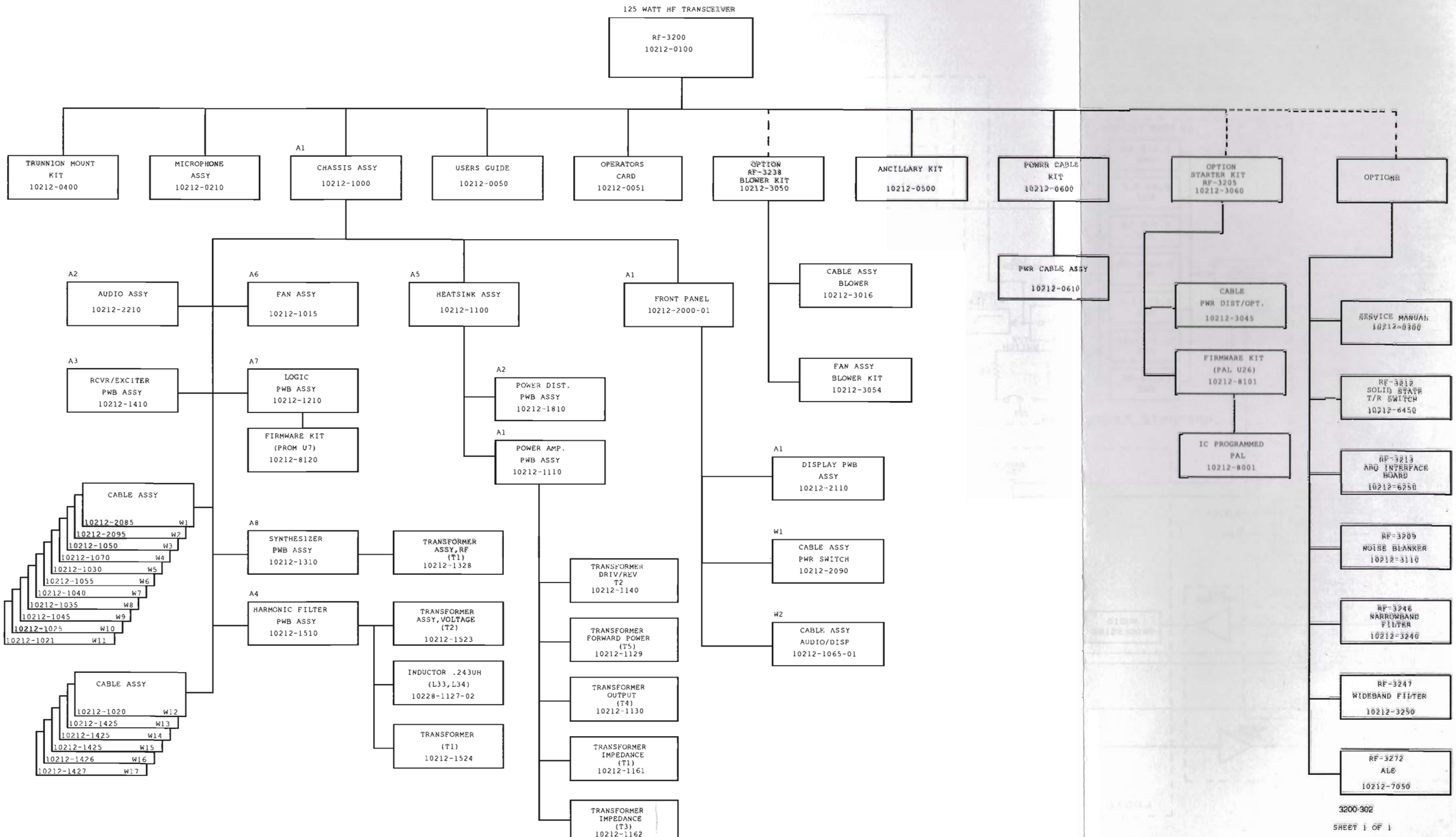


Figure 1-1. RF-3200 Transceiver Family Tree

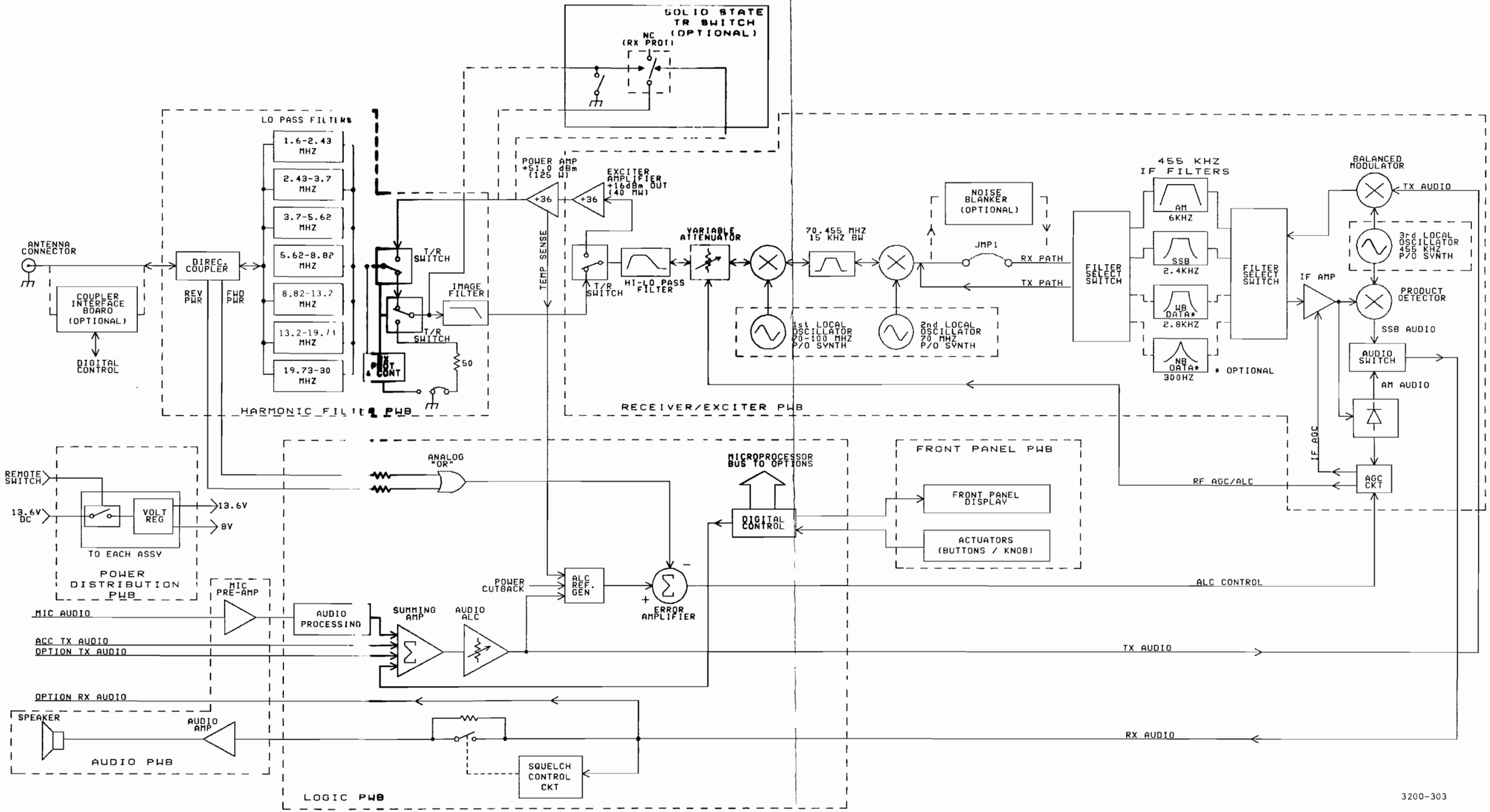


Figure 1-2. RF-3200 Transceiver Simplified Block Diagram

SECTION 2

CONFIGURATION PROGRAMMING

2.1 INTRODUCTION

This section provides information on how to configure the operational characteristics of the RF-3200 radio. The configuration of the radio determines several of the radio's capabilities and the operator's control of those capabilities.

2.2 STORAGE OF CONFIGURATION INFORMATION

The radio is configured by installing any necessary hardware options and by programming the necessary parameters. These configuration parameters are stored in the unit's non-volatile RAM (Random Access Memory). If the RAM is replaced, or if a different version of firmware is installed in the radio, the parameters are set to the default values and reprogramming of the parameters may be required.

2.3 PASSWORD LEVELS

When entering the configuration programming sequence, two levels of access are available: level 2 (technician) and level 3 (user). Each level of access has its own password. The choice of password determines what configuration parameters are accessible. Only one level of access can be active at any one time. However, some of the configuration parameters are accessible from both level 2 and level 3 (see configuration parameters summary table).

NOTE

Store the password information in a secure place to prevent unauthorized personnel from changing the configuration of the radio. Ensure that the radio configuration does not violate any applicable government regulating authorities (e.g. FCC, DOC).

The passwords are set during manufacture and are programmed into RAM at the factory.

2.4 CONFIGURATION PROGRAMMING PROCEDURE

To enter the configuration programming mode, perform the following procedure:

a. Press the PGM key until "CF PASS" appears in the display. The Program (PGM) indicator lights.

b. Enter the user password supplied with your radio, using the numeric keypad. Push the enter (ENT) button.

NOTE

If the password entered is valid, a configuration parameter appears in the display. If the password is not valid, an error tone sounds and "CF PASS" reappears in the display; enter the correct password.

c. Press the * key repeatedly to select the desired parameter, or rotate the tuning knob to scroll through the parameters.

NOTE

The direction of scrolling may differ among various versions of the internal software.

d. Press the # key to display the current parameter value.

e. Enter the new parameter value using the numeric keypad, followed by the enter [ENT] key. Use the [CLR] key to clear mistakes.

f. Press the # key to display the new parameter value.

g. If more parameters are to be changed, return to step c.

h. Exit from the configuration procedure. Press the PGM key repeatedly until PGM indicator turns off.

2.5 CONFIGURATION PARAMETERS

The programmable configuration parameters are categorized as follows:

- Parameters Subject to Regulatory Control

NOTE

In order to program the parameters which may be subject to regulatory control, a programming jumper must be installed in the radio. This jumper is located on the A7 Logic PWB Assembly (labeled JMP6). Refer to the logic assembly component location diagram in the A7 tab section to locate this jumper.

- Hardware Dependent Parameters
- Password
- Operational Parameters

Table 2-1 lists all the configuration parameters. The following list explains the meanings of each column of the table.

- The "Code" column contains each parameter's abbreviation as it appears on the front panel display.
- The "Name" column lists the name of each parameter.
- The "Input Required" column has the range of valid values for each parameter.
- The "Hardware Option Required" column lists any optional hardware that must be installed in the radio, for a particular parameter to have effect.
- The "Reference Paragraph" column lists the paragraph with a detailed description of each parameter.
- Parameter default values are in *italic* type. Those parameters which do not include a highlighted value are hardware dependent.

Table 2-1. Configuration Parameters

Code	Name	Input Range	Hardware Option Required	Reference Paragraph
FP PRg*	Front Panel Chan. Prog.	0=No *1=Yes*	None	2.6.1.1
RF HI*	RX Freq. Upper Limit	50000 - *3000000*	None	2.6.1.2
RF Lo*	RX Freq. Lower Limit	*50000* - 3000000	None	2.6.1.2
tF HI*	TX Freq. Upper Limit	160000 - *3000000*	None	2.6.1.3
tF Lo*	TX Freq. Lower Limit	*160000* - 3000000	None	2.6.1.3
OPER L*	Operational Level	1, 2, 3, 4	None	2.6.1.4
ItU CH*	ITU Channels Enabled	0=No *1=Yes*	None	2.6.1.5
gROUP A*	Group A Enable	0=No *1=Yes*	None	2.6.1.6
dFLt Sb*	Default Sideband Emissions Mode	*0=USB* 1=LSB	None	2.6.1.7
Lo Pr 4*	Low TX Power below 4.0 MHz (Used only with 1 kW PAs)	*0=No* 1=Yes	None	2.6.1.8
nb	Noise Blanker Installed	0=No, 1=Yes	Noise Blanker	2.6.2.1
ALAR	Alarm Option Installed	0=No 1=Yes	Two-Tone Alarm	2.6.2.2
dt FILt	Wide Band Data Filter Installed	0=No 1=Yes	Data Filter Option	2.6.2.3
C FILt	Narrow Band (CW or Data) Filter Installed	0=No 1=Yes	Narrow Band Filter	2.6.2.4
LPA-CPL	LPA and/or Coupler Selection	0 - 7	Coupler and/or LPA System Selected	2.6.2.5
USr PAS**	User Level Password	1 - 9999999	None	2.6.3.1
SCAN t**	Channel Scan Time	1=0.1 sec *20=2.0 sec* 99=9.9 sec	None	2.6.4.1
SCAN dt**	Channel Dwell Time	0=Off *20=2.0 sec* 99=9.9 sec	None	2.6.4.2
tUN RES**	Tuning Knob Channel Res.	0 - 99 *4*	None	2.6.4.3

* The programming jumper (JMP6 on the A7 Logic PWB Assembly) must be installed to change these parameter settings. These parameters may be disabled by the manufacturer to meet certain regulatory or contractual requirements.

** These parameters may be accessed with the user level password.

Table 2-1. Configuration Parameters (Cont.)

Code	Name	Input Range	Hardware Option Required	Reference Paragraph
C OFFSt	CW Emissions Mode	*0=A2A* 1=A1A	None	2.6.4.4
d AgC**	Data AGC Speed	0=Slow *1=Fast*	None	2.6.4.5
C AgC**	CW AGC Speed	*0=Slow* 1=Fast	None	2.6.4.6
A AgC**	ARQ AGC Speed	0=Slow *1=Fast*	None	2.6.4.7
dAtA Pr**	Data Mode Output Power Level (for use with RF-3281)	*0=Low* 1=Full	RF-3281 Coupler or RF-3282 Coupler	2.6.4.8
C Pr**	CW Mode Output Power Level (for use with RF-3281)	*0=Low* 1=Full	RF-3281 Coupler or RF-3282 Coupler	2.6.4.9
Lo Pr**	Low Power Output Selected	*0=No* 1=Yes	None	2.6.4.10
d-C dt**	Data, CW, and ARQ Key Dwell Time	0=Off *6000=10 Min*	None	2.6.4.11

** These parameters may be accessed with the user level password.

2.6 PARAMETERS DEFINED

2.6.1 Regulatory Controlled Parameters

2.6.1.1 Front Panel Channel Programming (FP PRg)

This parameter enables or disables the programming of channels or groups through the front panel. When disabled, the programming password prompt "Pg PASS" does not appear in the display (0 = Disable, 1 = Enable).

2.6.1.2 Receive Frequency Limits (RF HI or RF Lo)

The RX Frequency limits set the upper and lower receive frequency limits to values other than those of which the radio is capable. The units are increments of 10 Hz. The minimum and maximum value spans a contiguous range of frequencies; no provision for the banding of frequencies is available. Input = 50000 to 3000000 (.500 - 30.0 MHz) for RF HI or RF Lo. If the two values are set equal, reception can only occur on the one frequency corresponding to that value.

2.6.1.3 Transmit Frequency Limits (tF HI or tF Lo)

The TX Frequency limits set the upper and lower transmit frequency limits to values other than those of which the radio is capable. The units are increments of 10 Hz. The minimum and maximum value spans a contiguous range of frequencies; no provision for the banding of frequencies is available. Valid inputs are in the range of 160000 to 3000000 (1.600 - 30.0 MHz) for tF HI and tF Lo; tF HI must be set to a higher value than tF Lo. If the two values are equal, transmission can only occur on the one frequency corresponding to that value.

2.6.1.4 Operational Level (OPER L)

This parameter sets the operational level of the radio. The meanings of the valid parameters are given below.

- 1 or 3 = allows transmission and reception in both channelized (using pre-programmed channels) and full frequency access (group "F") modes of operation
- 2 = allows transmission and reception in channelized mode of operation, and general coverage reception when in full frequency (group "F") mode of operation
- 4 = allows transmission and reception only in channelized mode of operation using pre-programmed channels

2.6.1.5 ITU Channels Enable (ItU CH)

When enabled, the radio allows the non-alterable channels (in ROM) to be used. These channels are normally programmed with the ITU maritime channels (0 = Disable, 1 = Enable).

2.6.1.6 Group A Enable (gROUP A)

When enabled, the radio allows the radio operator to access Group A (all channels). All user-programmed channels must be entered into Group A first, then may be assigned into one of the other sub-groups 1-9. Allowing operator access to Group A will allow operation on any of the user-programmed channels, without restriction. Group A is always accessible while programming channels regardless of the setting of this parameter. (0 = Disable, 1 = Enable).

2.6.1.7 CW Emissions Mode (C OFFSt)

This parameter selects the method of generating the CW signal.

- The value 0 selects A2A communications mode. In this mode, the CW signal is 1 kHz higher than the displayed frequency if the default sideband is USB. If the default sideband is LSB, then the CW signal is 1 kHz signal below the displayed frequency. Refer to the parameter described in sub-section 2.6.1.8. The value 0 (zero) is the default value.
- The value 1 selects A1A communications mode. In this mode, the CW signal is transmitted on the displayed frequency.

2.6.1.8 Default Sideband Emissions Mode (dFLt Sb)

The default emissions mode selects USB or LSB for CW, ARQ, and DATA modes of operation (0 = USB, 1 = LSB, Default = USB).

2.6.1.9 Low Transmit Power Below 4.0 MHz for 1 kW LPA (Lo Pr 4)

When enabled, the control software instructs the external linear power amplifier (LPA) option to limit the output to 400 Watts (max) when transmitting below 4.0 MHz. This may be required for FCC type acceptance (0 = Disable, 1 = Enable).

2.6.2 Hardware Dependent Parameters

2.6.2.1 Noise Blanker Installed (nb)

This parameter enables/disables the optional internal noise blanker and its front panel indicator, if installed. (0 = Disable, 1 = Enable)

2.6.2.2 Alarm Option Installed (ALAR)

This parameter configures the radio to use the optional two-tone alarm option if installed (0 = No, 1 = Yes).

2.6.2.3 Wide Band Data Filter Installed (dt FILt)

This parameter configures the radio to use the optional wide band data filter, if installed. If this parameter is set to zero, the radio uses the standard SSB filter (0 = No, 1 = Yes). If the parameter is set to one, and no filter is installed, transmit modulation and receive audio will be absent in modes using this filter.

2.6.2.4 Narrow Band (CW or Data) Filter Installed (C FILt)

This parameter configures the radio to use the optional narrow band (CW or Data) filter, if installed. If this parameter is set to zero, the radio uses the standard SSB filter (0 = No, 1 = Yes). If the parameter is set to one, and no filter is installed, transmit modulation and receive audio will be absent in modes using this filter.

2.6.2.5 LPA/Coupler Selection (LPA-CPL)

This parameter notifies the radio of its external power amplifier and antenna couplers. After this item is changed, the user must cycle the radio's power switch, with one of the following options, to use the new setting.

- 0=No antenna coupler or external power amplifier
- 1=RF-3282 antenna coupler and no external power amplifier
- 2=RF-382 antenna coupler and no external power amplifier
- 3=RF-601 antenna coupler and no external power amplifier
- 4=RF-2601 antenna coupler and no external power amplifier
- 5=RF-3230 external power amplifier and RF-601 antenna coupler
- 6=RF-3230 external power amplifier and RF-2601 antenna coupler
- 7=RF-3230 external power amplifier without an antenna coupler

2.6.3 User Level (Level 3) Password (USr PAS)

The password parameter allows the user level (level 3) password to be changed. The current level 3 password can be viewed by pressing the "#" key on the front panel keypad. Input = 1 - 9999999.

NOTE

Keep a record of the password in a safe location. If this password is lost, future configuration and programming can be done only by a factory authorized technician.

The security level password (level 1) is permanently set at the time of manufacture and cannot be changed.

2.6.4 Operational Parameters

2.6.4.1 Channel Scan Time (SCAN t)

Channel scan time is the length of time that the radio stays on a channel, while scanning, before going to the next channel. The increments are 0.1 seconds. Valid input = 1-99 (.1-9.9 seconds). Default = 2 seconds.

2.6.4.2 Channel Dwell Time (SCAN dt)

Channel dwell time is the length of time that the radio stays on a channel, while scanning, after the received signal is gone. The increments are 0.1 seconds. Input = 0-99 (off-9.9 seconds). If set to zero, the radio continues scanning even when a received signal is detected. Default = 2 seconds.

2.6.4.3 Data, CW, and ARQ Key Dwell Time (d-C dt)

This parameter determines the time, in seconds, after which scanning resumes after the keyline remains inactive. If this parameter is set to zero, scanning is halted once the keyline has been activated. Valid entries range from 0 to 6000 where 0 = disabled, 6000 = 600 seconds or 10 minutes. The default value is 6000, or 10 minutes.

2.6.4.4 Tuning Knob Channel Resolution (tUN RES)

Tuning Knob Channel Resolution is defined as the response of the tuning knob, in channels per revolution, while operating in channelized mode. Valid Input = 1-99, where 1 = 50 channels per revolution and 99 = 1 channel per two revolutions. Default = 4, approximately 12 channels per revolution.

2.6.4.5 Data AGC Speed (d AgC)

This parameter selects AGC speed when using the DATA communications mode. Valid entries are 0 and 1 (0 = slow, 1 = fast, Default = 1).

2.6.4.6 CW AGC Speed (C AgC)

This parameter selects AGC speed when using the CW communications mode. Valid entries are 0 and 1 (0 = slow, 1 = fast, Default = 0).

2.6.4.7 ARQ AGC Speed (A AgC)

This parameter selects AGC speed when using the (optional) ARQ communications mode. Valid entries are 0 and 1 (0 = slow, 1 = fast, Default =1).

2.6.4.8 Data Mode Output Power Level (dAtA Pr)

Reduced power output in Data communications mode need only be forced for stations using the RF-3281 or RF-3282 Antenna Couplers. This parameter allows the user to select the full output power level when operating in a continuous duty data communications mode and using one of these antenna couplers. Since the RF-3281 and RF-3282 are voice duty couplers, low output power is automatically selected while in Data mode when either of these couplers is used. The user can override this setting by changing this parameter. Inputs are 0 and 1 (0 = low, 1 = full power, Default = 0).

CAUTION

When transmitting with a high average power, such as in FSK, this parameter should be set to low (0) to prevent damage to the coupler.

2.6.4.9 CW Mode Output Power Level (C Pr)

Reduced power output in CW communications mode need only be forced for stations employing the RF-3281 or RF-3282 Antenna Couplers. This parameter allows the user to select the full output power level when operating in CW communications mode and using one of these antenna couplers. Since the RF-3281 and RF-3282 are voice duty couplers, low output power is automatically selected while in CW mode. The user can override this setting by changing this parameter. Inputs are 0 and 1 (0 = low, 1 = full power, Default =0).

CAUTION

When transmitting in CW communications mode, this parameter should be set to low (0) to prevent damage to the RF-3281 or RF-3282 Antenna Couplers.

2.6.4.10 Low Power Output Selected (Lo Pr)

This parameter disables full output power, allowing only low power transmissions. This is useful in applications where full output power is not required or where the radio is powered from a battery. Inputs are 0 and 1 (0 = full output power, 1 = low output power). Default = full power.

2.7 OPTION CONFIGURATION ITEMS

An optional PWB assembly may add configuration parameters to the list. The additional parameters for the option are explained in the manual for the option.

NOTE

If the address of an option board is changed, an option's software is changed, or other options are added, the option configuration parameters should be reestablished. Refer to the instruction manual of the option.

SECTION 3

MAJOR ASSEMBLY LOCATION AND INTERCONNECTION

3.1 INTRODUCTION

This section contains the chassis level assembly location drawings, information on how to access the assemblies, the chassis assembly parts list, and the RF-3200 overall interconnect diagram.

3.2 CHASSIS LEVEL ASSEMBLIES

The RF-3200 Chassis (10212-1000) contains eight major subassemblies (A1-A8) interconnected by cables W1-W17. Figures 3-1 through 3-6 show the locations of the subassemblies, cables, and assembly components.

3.3 ACCESSING ASSEMBLIES

To access the assemblies in the radio, the top cover and/or the bottom cover must first be removed.

CAUTION

Most assemblies within the system are sensitive to electrostatic discharge. Use electrostatic discharge (ESD) precautions when touching, removing, or inserting parts and assemblies within units in this equipment. Paragraph 4.8 provides details on safe ESD handling.

3.3.1 Removing Radio Top Cover

Perform the following procedure to remove the top cover (refer to figure 3-2):

a. Place unit on the work bench with top up.

b. Use a No. 1 Phillips screwdriver to loosen and remove the four captive screws securing cover to the sides of radio (two on each side), and the two screws securing the cover to A5 Heatsink Assembly (see figure 3-2) at rear of radio.

c. Lift the cover directly up.

Reinstall the cover by reversing the above procedure.

3.3.2 Removing Radio Bottom Cover

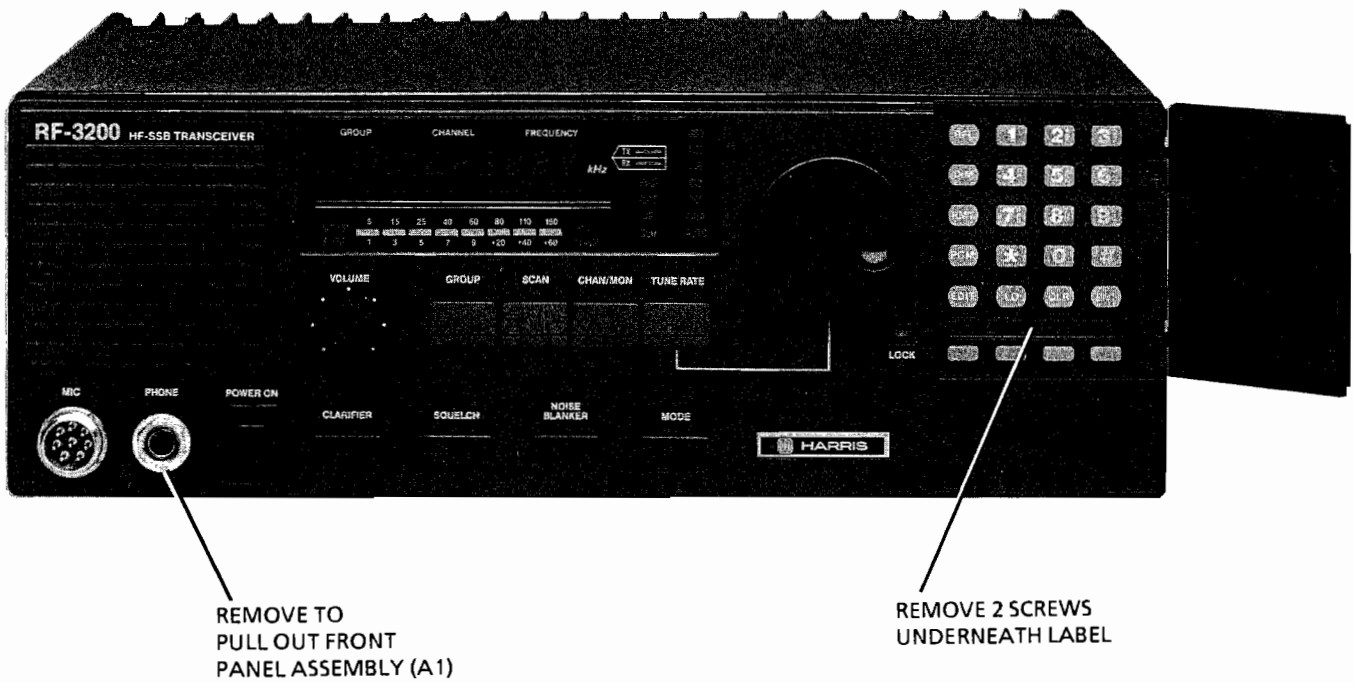
Perform the following procedure to remove the bottom cover:

a. Place unit on the workbench with the bottom facing up.

b. Remove the four Phillips-head screws securing the cover to bottom of radio.

c. Lift the cover directly up.

Reinstall the cover by reversing the above procedure.



3200-016P(A)

Figure 3-1. RF-3200 Front Panel View

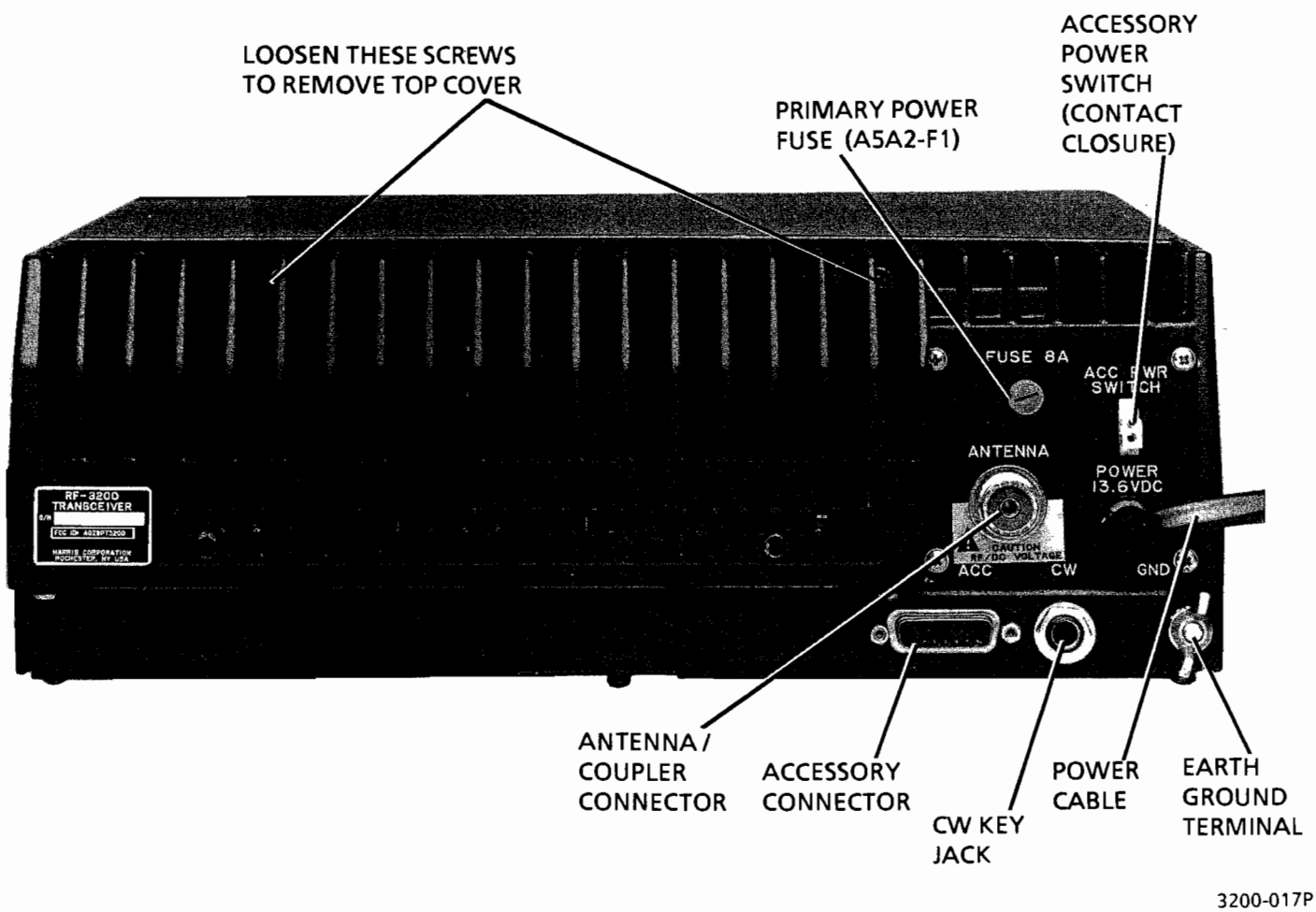


Figure 3-2. RF-3200 Rear Panel View

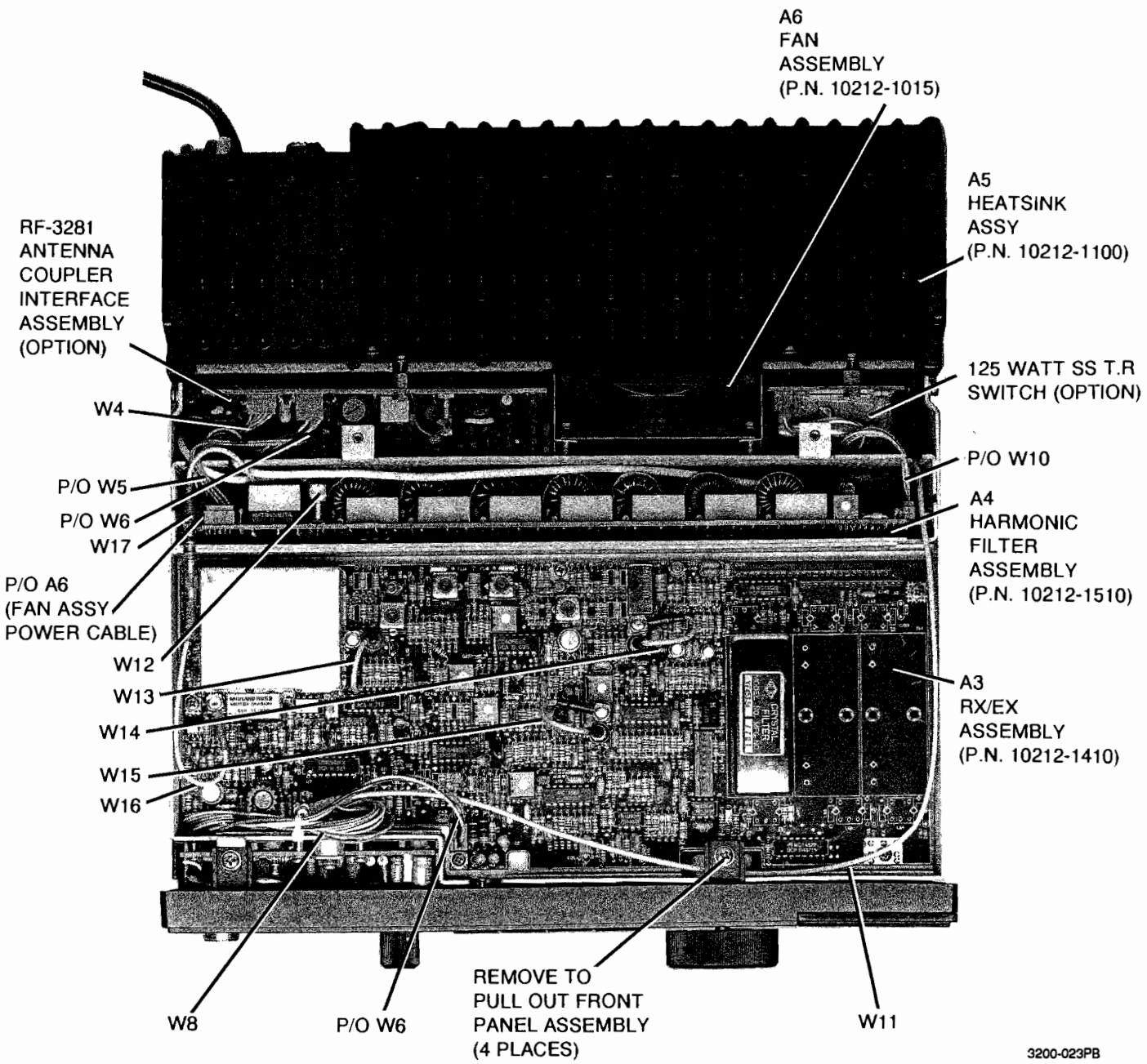


Figure 3-3. RF-3200 Top View (Cover and Harmonic Filter Shield Removed)

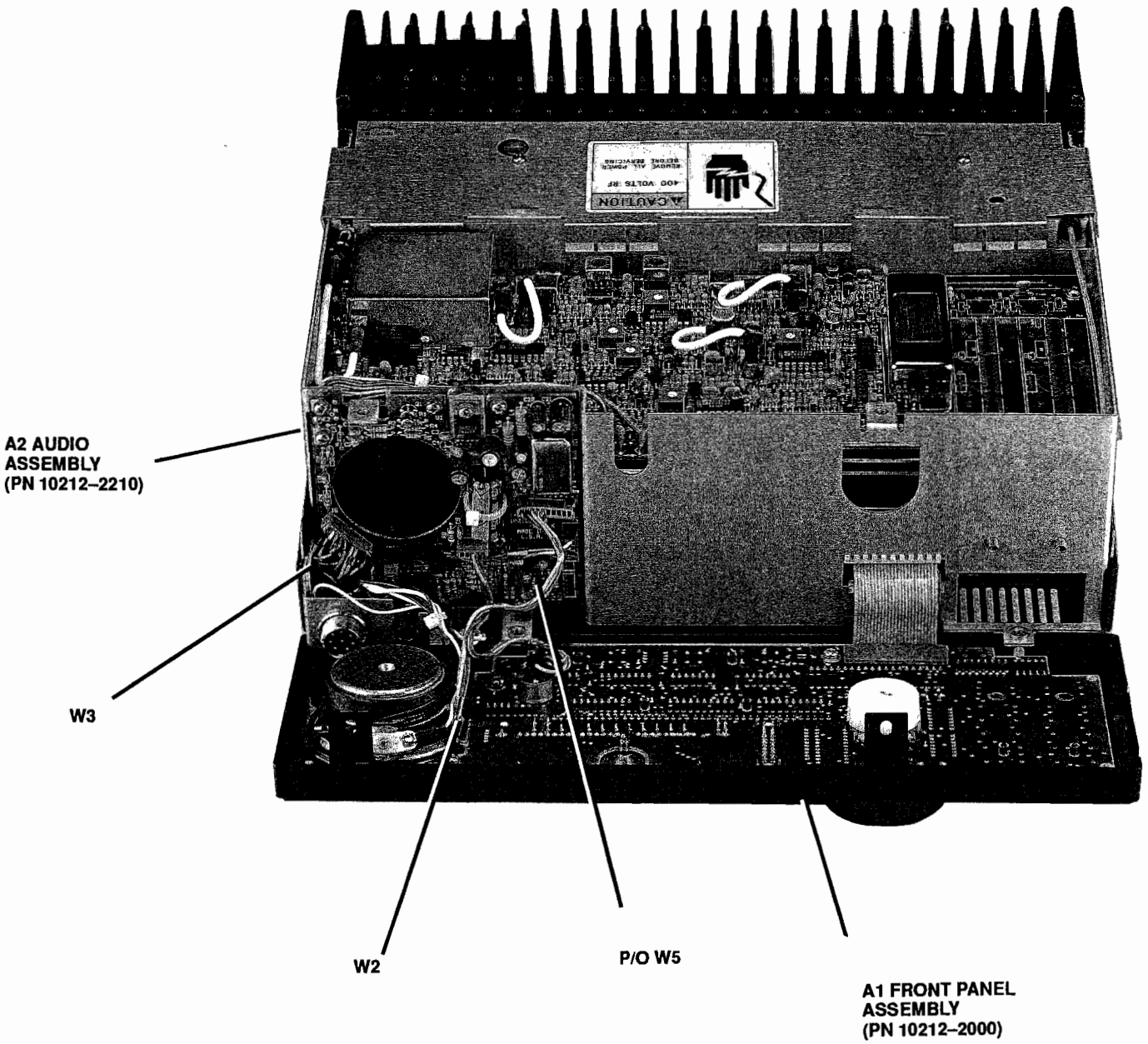


Figure 3-4. RF-3200 Front View with Panel Down

3200–301P

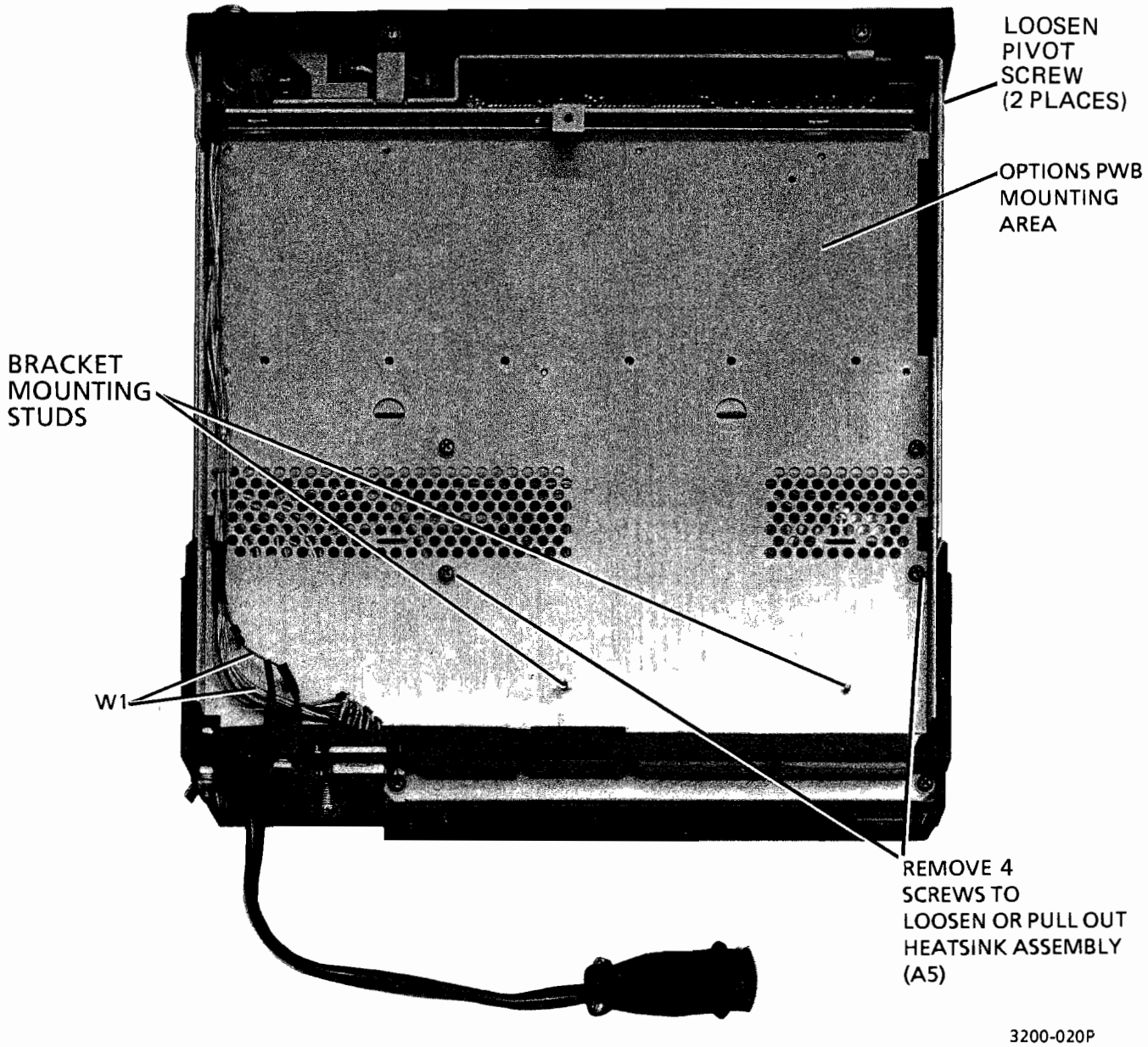


Figure 3-5. RF-3200 Bottom View (Cover Removed)

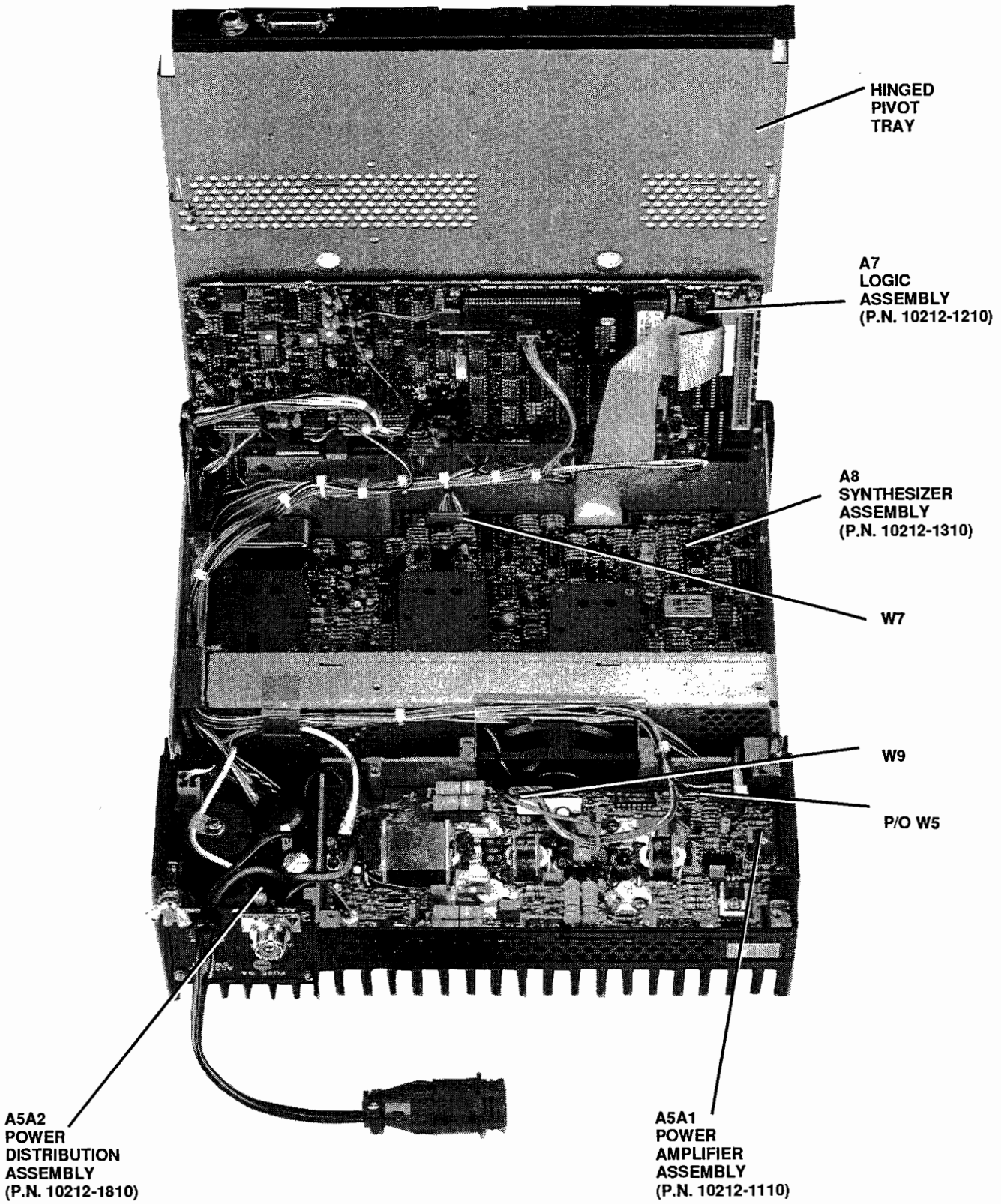


Figure 3-6. RF-3200 Bottom View (Cover Removed, Pivot Tray Up)

3.3.3 Assemblies Removable from Top Side of Radio

The following assemblies are accessible from the top side of the radio (see figures 3-3 and 3-4).

- A1 Front Panel Assembly
- A2 Audio PWB Assembly
- A3 Receiver/Exciter (RX/EX) PWB Assembly
- A4 Harmonic Filter (HF) PWB Assembly
- Antenna Coupler Interface PWB (Option)
- 125 Watt Solid State T/R Switch (Option)
- A6 Fan Assembly

3.3.3.1 A1 Front Panel Assembly Removal

Perform the following procedure to remove the A1 Front Panel Assembly (refer to figures 3-1, 3-3, and 3-4):

a. Ensure that dc power is removed from the transceiver.

b. Remove the retaining nut and washer from the front panel phone jack (see figure 3-1).

c. Disconnect the audio cable from the 10212-2130 front panel volume assembly.

d. Remove the four screws (two on top side and two on bottom side of radio) which secure the front panel assembly to the chassis (see figure 3-3).

e. Remove option label from the keypad area (see figure 3-1). Remove the two screws securing front panel assembly to chassis (see figure 3-3).

f. Slowly pull the front panel assembly away from the radio, and set assembly down on work bench.

g. Disconnect the ribbon cable from the A7 Logic PWB Assembly on bottom side of radio (see paragraph 3.3.4.3), speaker wires, and the A1W2 cable from the A2 Audio PWB Assembly.

Reinstall the assembly by reversing the above procedure.

3.3.3.2 A2 Audio PWB Assembly Removal

Perform the following procedure to remove the A2 Audio PWB Assembly (refer to figure 3-4):

a. Ensure that dc power is removed from the transceiver.

b. Pull the front panel assembly away from radio chassis as described in paragraph 3.3.3.1.

c. Disconnect all interconnecting cables from audio PWB.

d. Remove all PWB mounting screws.

e. Slowly pull the PWB out of the radio.

Reinstall the assembly by reversing the above procedure.

3.3.3.3 A3 RX/EX PWB Assembly Removal

Perform the following procedure to remove the A3 RX/EX PWB Assembly (refer to figure 3-3):

a. Ensure that dc power is removed from the transceiver.

b. Remove the transceiver top cover (see paragraph 3.3.1).

c. Disconnect all interconnecting cables from RX/EX PWB.

d. Remove all PWB mounting screws.

e. Lift the PWB out of the radio.

Reinstall the assembly by reversing the above procedure.

3.3.3.4 A4 HF PWB Assembly Removal

Perform the following procedure to remove the A4 HF PWB Assembly (refer to figure 3-3):

a. Ensure that dc power is removed from the transceiver.

b. Remove the transceiver top cover (see paragraph 3.3.1).

c. Remove the shield covering A4 HF PWB.

d. Remove the securing nut on W16/W17 bulkhead connector from the chassis bracket, and disconnect W16 from W17.

e. While slowly pulling out PWB from radio, disconnect interconnecting cables from PWB.

Reinstall the assembly by reversing the above procedure.

3.3.3.5 Antenna Coupler Interface PWB (Option) Removal

Perform the following procedure to remove the Antenna Coupler Interface PWB (if installed), refer to figure 3-3:

a. Ensure that dc power is removed from transceiver.

b. Remove the transceiver top cover (see paragraph 3.3.1).

c. Remove the harmonic filter shield covering the PWB.

d. Loosen screw holding coupler interface PWB to rear of A5 Heatsink Assembly.

e. While slowly pulling out PWB from radio, disconnect two multiconductor cables (W4 and W6) and the A5W1 coax cable from PWB.

NOTE

One coax cable must be disconnected from the A4 HF PWB Assembly before completely pulling out the coupler interface PWB.

Reinstall the assembly by reversing the above procedure.

3.3.3.6 A6 Fan Assembly Removal

Perform the following procedure to remove the A6 Fan Assembly (refer to figure 3-3):

a. Ensure that dc power is removed from transceiver.

b. Remove the transceiver top cover (see paragraph 3.3.1) and bottom cover (see paragraph 3.3.2).

c. Open the hinged pivot tray (see paragraph 3.3.4.1).

d. Remove the shield covering the fan assembly.

e. Disconnect the fan's power cable connector from the A4 HF PWB Assembly (see figure 3-3).

NOTE

The HF PWB assembly must be lifted out of the radio (see paragraph 3.3.3.4) to disconnect the fan's power cable connector.

f. Place radio on its side.

g. Remove the two screws holding fan to chassis at top side of radio.

NOTE

A right-angle Phillips screwdriver or a long, thin screwdriver may be required to slide between the fan's access holes and the heatsink's fins.

h. While slowly pulling fan out of radio, carefully pull fan's power cable from wire harness located on bottom side of radio.

Reinstall the assembly by reversing the above procedure.

3.3.4 Assemblies Removable from Bottom Side of Radio

The following assemblies are accessible from the bottom side of the radio (see figures 3-5 and 3-6).

- A5 Heatsink Assembly and associated A5A1 and A5A2 PWBs
- A7 Logic PWB Assembly
- A8 Synthesizer PWB Assembly
- Option PWBs (mounted on bottom side of hinged pivot tray)

3.3.4.1 Lifting Hinged Pivot Tray to Access Assemblies

Perform the following procedure to lift the hinged pivot tray (located on the bottom side of the radio) and allow access to the A5A1, A5A2, A7, and A8 PWB Assemblies (refer to figure 3-5):

a. Ensure that dc power is removed from transceiver.

b. Remove the transceiver top cover (see paragraph 3.3.1) and bottom cover (see paragraph 3.3.2).

c. Use a No. 1 Phillips screwdriver to remove the four screws securing the bottom of tray to the radio.

d. Loosen the two pivot screws located next to front panel, one on each side of the radio (see figure 3-5).

e. Carefully pull up tray at hinged end and at front of radio. When the tray has been raised at hinged end, it can be swung open.

f. Re-tighten the tray's pivot screws to hold tray in open position.

Reinstall the assembly by reversing the above procedure.

3.3.4.2 A5 Heatsink Assembly Removal

Perform the following procedure to remove the Heatsink Assembly (refer to figures 3-3 and 3-6):

a. Ensure that dc power is removed from transceiver.

b. Remove the transceiver top cover (see paragraph 3.3.1) and bottom cover (see paragraph 3.3.2).

c. Disconnect all interconnecting cables from the assembly (on bottom side of radio).

d. Loosen screws holding Antenna Coupler Interface PWB (option) and 125 Watt Solid State T/R Switch (option) to Heatsink Assembly (on top side of radio; see figure 3-3).

e. Remove the four screws (two on each side of radio) securing the Heatsink Assembly to the radio chassis, and remove the assembly.

Reinstall the assembly by reversing the above procedure.

3.3.4.3 A7 Logic PWB Assembly Removal

Perform the following procedure to remove the A7 Logic PWB Assembly (refer to figure 3-6):

a. Ensure that dc power is removed from transceiver.

b. Remove the transceiver top cover (see paragraph 3.3.1) and bottom cover (see paragraph 3.3.2).

c. Lift hinged pivot tray (see paragraph 3.3.4.1).

d. Disconnect all interconnecting cables from PWB.

e. Remove all PWB mounting screws.

f. Lift the PWB out of radio.

Reinstall the assembly by reversing the above procedure.

3.3.4.4 A8 Synthesizer PWB Assembly Removal

Perform the following procedure to remove the A8 Synthesizer PWB Assembly (refer to figures 3-3 and 3-6):

a. Ensure that dc power is removed from transceiver.

b. Remove the transceiver top cover (see paragraph 3.3.1) and bottom cover (see paragraph 3.3.2).

c. Remove the shield covering the PWB.

d. Turn radio over. On top side of the radio, disconnect cables W13, W14, and W15 from the A3 RX/EX PWB Assembly (see figure 3-3).

e. Disconnect all other interconnecting cables from PWB.

f. Remove all PWB mounting screws. (It is not necessary to remove the screws holding down the individual shields.)

g. Lift the PWB out of radio.

Reinstall the assembly by reversing the above procedure.

3.3.4.5 Option PWB Removal

To remove any option PWB accessible from the bottom side of the hinged pivot tray, refer to the removal procedure described in the manual provided with the option.

3.4 PARTS LIST AND INTERCONNECT DIAGRAM

Table 3-1 is the parts list for the chassis level components, and figure 3-7 is the RF-3200 interconnect diagram.

Table 3-1. A1 Chassis Assembly Parts List (10212-1000, Rev. R)

Ref. Desig.	Part Number	Description
	10212-0028	SHIELD, SYNTHESIZER
	10212-0026	COVER,TOP
	10212-0025	COVER,BOTTOM
	10212-1012	COVER,HF BAY
	Z17-0011-001	FOOT VINYL BLACK
	MP-4323	BUMPER BUTTON GRAY
	10212-1023	SHIELD,EMI
A1	10212-2000-01	ASSY FRONT PANEL
A2	10212-2210	ASSY AUDIO
A3	10212-1410	ASSY RX/EX
A4	10212-1510	ASSY FILTER
A5	10212-1100	ASSY HEATSINK
A6	10212-1015	ASSY FAN
A7	10212-1210	ASSY LOGIC
A8	10212-1310	ASSY SYNTHESIZER PWB
W1	10212-2085	CABLE ASSY, ACC/CW
W2	10212-2095	CABLE ASSY,MIC CONNECTOR
W3	10212-1050	CABLE ASSY,LOGIC/AUDIO
W4	10212-1070	CABLE ASSY,LOGIC/COUPLER
W5	10212-1030	CABLE ASSY, PWR DIST
W6	10212-1055	CABLE ASSY,PWR DIST.
W7	10212-1040	CABLE ASSY, LOGIC/SY
W8	10212-1035	CABLE ASSY, LOGIC/RE
W9	10212-1045	CABLE ASSY, LOGIC/PA
W10	10212-1025	CABLE ASSY, LOGIC/HF
W11	10212-1021	COAX ASSY,PA/RE
W12	10212-1020	COAX ASSY,PA/HF
W13	10212-1425	COAX ASSY,RE/SYNTH
W14	10212-1425	COAX ASSY,RE/SYNTH
W15	10212-1425	COAX ASSY,RE/SYNTH
W16	10212-1426	COAX ASSY,RE/BULKHEAD
W17	10212-1427	COAX ASSY,HF/BULKHEAD

NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.

W5 POWER DISTRIBUTION HARNESS (10212-1030)

W6 POWER DISTRIBUTION HARNESS (10212-1055)

P/O REAR PANEL POWER CABLE
3 N/C
2 GND
1 13.6VDC

REAR PANEL ACC PWR SWITCH CONN

A1W1
1
2
4
3

S1

FRONT PANEL POWER SWITCH

P2 IN LINE CONN

A5W2

GND
13.6VDC (10AWG)
13.6VDC (14AWG)

J3
E1
E2
P1-1
J2
J4-1
J4-5
A5A2 POWER DIST
P2-4
P2-3
J1

J8
J2
J1
J11
J3 (ACC)
J9 (CW)
J13

A7 LOGIC

J7
W7
J5
W8
J4
W9
J6
W10
J10
TO 1KW (OPTION)
J12
OPTION BUS

W4

J2
J3
COUPLER INTERFACE (OPTION)
E1
E2
J1
P1

P1 CONNECTS TO A4J5 WHEN COUPLER INTERFACE OPTION IS NOT INSTALLED

FRONT PANEL SPEAKER
LS1

FRONT PANEL MIC CONN
W2

J3
FRONT PANEL PHONE JACK
J1
J5
W3
J4
J2
A2 AUDIO
J7

ACCESSORY CONNECTOR
REAR PANEL
W1

CW JACK
REAR PANEL

VOLUME CONTROL ASSY

A1W2

A1A1 FRONT PANEL DISPLAY
J1
P1
E4
E5
E6

TWO-TONE ALARM (OPTION)

REAR PANEL ANTENNA CONN
A5W1

P6
J6
J9
A8 SWITCH
J1
P4
P3
P1
W13
W14
W15
J2
A3 DRIVER
J9
TEST POINTS
J3
P3
J16
J8
MANUAL GAIN CONTROL (OPTION)
43.5KHZ TO OUT
W16
W11
J1
P1
J2
A5A1 PA
J3
P3
J1
(10 AWG)
(14 AWG)
J4
P4
W17
W12
J7
J1
J3
J6
A4 HARMONIC FILTER
J10
J7
J9
J5
J8
J4
EXTERNAL ALARM ASSY (OPTION)
A6 FAN ASSY

Figure 3-7. RF-3200 Interconnect Diagram

SECTION 4

MAINTENANCE AND REPAIR

4.1 INTRODUCTION

This section provides information on maintenance, troubleshooting, and repair of the RF-3200.

4.2 PREVENTIVE MAINTENANCE

Refer to the Care and Troubleshooting section in the supplied User's Guide for the preventive maintenance tips suggested to keep the RF-3200 operating within specifications.

4.3 PROTECTION OF STATIC-SENSITIVE DEVICES

Maintenance and repair of this equipment requires the handling of devices based on CMOS technology. Practice standard CMOS precautions.

Diode input-protection is provided on all modern CMOS devices. This protection is designed to guard against electrostatic discharges. Despite the existence of the internal protective circuitry, some precautionary steps should be taken to reduce the risk of inducing potentially damaging voltages to the device. To protect static-sensitive devices from damage, the following practices should be observed:

a. Keep all static-sensitive devices in their protective packaging until needed. This packaging is conductive and protects the device. Storing or transporting these devices in conventional plastic containers could be destructive to the device.

b. Disconnect power before inserting or removing any CMOS device. This also applies to PWBs containing CMOS devices.

c. Double-check test equipment voltages and polarities prior to conducting any tests.

d. Use only soldering pencils that are properly grounded. Ungrounded soldering tips can destroy CMOS devices. *SOLDERING GUNS MUST NEVER BE USED.*

e. Avoid touching the leads of the device. The component should be handled carefully by the ends or side opposite the leads.

f. Avoid contact between PWB circuits or component leads and synthetic clothing.

4.4 ROUTINE MAINTENANCE

The only routine maintenance required for the radio is to check the A8 Synthesizer PWB Assembly's reference oscillator (A8Y1) frequency, at intervals of approximately four months. This procedure is to verify the frequency of the radio; do not make any adjustments unless the test equipment shows that the radio is off frequency by more than 15 Hertz when the front panel displays an operating frequency of 30.000000 MHz. Connect the transceiver RF output as shown in figure 4-1, and perform the following procedure:

a. Remove the transceiver's top (see paragraph 3.2.1) and bottom cover (see paragraph 3.2.2).

b. With transceiver bottom side up, use a No. 1 Phillips screwdriver to remove the two screws holding the option tray to chassis. Remove the four screws holding option tray to rear chassis. Lift front of option tray slightly, and swing rear up so the cover of synthesizer shield is exposed.

c. Apply power to the transceiver. Set the operating frequency to 30.0000 MHz and the communications mode to AM. Allow the transceiver to warm up for approximately 30 minutes.

d. Key the radio by grounding pin 5 of the rear panel accessory connector (ACC). Refer to figure 4-2 for the rear panel accessory connector pin assignments.

e. Adjust the potentiometer on A8Y1 until frequency at output of radio is 30.0000 MHz ±15 Hz.

NOTE

If the potentiometer on A8Y1 cannot be made to put the radio frequency within ±15 Hz, perform the procedure in sub-section 4.8.1.

f. Release the keyline of the radio, and disconnect the attenuator and the frequency counter. Return the transceiver option tray to its normal position, and reinstall the transceiver's bottom cover. Return the transceiver to service.

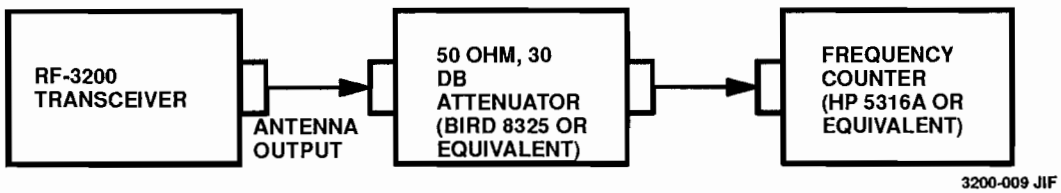
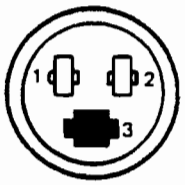


Figure 4-1. A8Y1 Reference Oscillator Test Setup

POWER CONNECTOR PINS (WHEN VIEWED FROM REAR OF RADIO)

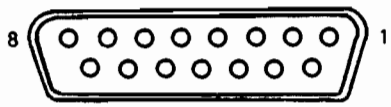


1—13.6 VDC
2—GROUND
3—NOT USED

ACCESSORY POWERSWITCH: PROVIDES CONTACT CLOSURE WHEN RADIO IS TURNED ON.

NOTE: MATING CONNECTOR AND PINS ARE SUPPLIED WITH THE RADIO.

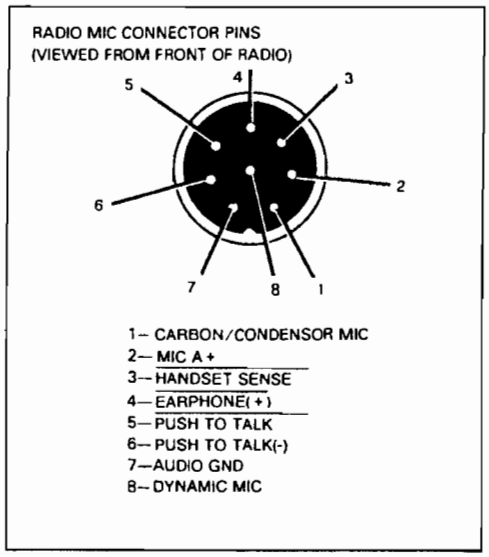
ACCESSORY CONNECTOR PINS
(WHEN VIEWED FROM REAR OF RADIO)



PIN	NAME	I/O	NOTES
1	SPKR +	Output	4 ohm minimum impedance, level-controlled to 11 Vp-p by VOLUME knob.
2	SPKR-	Output	
3	ACRXOUT	Output	600 ohm source - 0 dBm nominal without optional level adjustment (A7R50).
4	ACCTXIN	Input	600 ohm load - 0 dBm nominal without optional level adjustment (A7R158).
5	$\overline{\text{ACCKRQ}}$	Input	1.25 V maximum to initiate key or 3.3K maximum pulldown; 2.5 V minimum to release key or open (10K maximum to ground).
6	GNDAUD	Audio Ground	
7	ACCTGC	Input	0-8.5 Vdc, 10K load impedance, 8.5 Vdc = minimum power.
8	ACCTR +	I/O	Relay contacts closed for TX; 1 ampere @ + 28 Vdc, 0.5 ampere @ 120 Vac (resistive)
9	ACCTR -		
10	$\overline{\text{RMTSW}}$	Input	Used to remotely switch the transceiver on. >12 Vdc = power off, <0.3 Vdc (60 mA sink) = power on.
11	SW A +	Output	Switched 13.6 Vdc, internally fused. DO NOT exceed 800 mA max.
12	TSTRTS	Test	Factory use only
13	GNDLOG	Logic Ground	Factory use only
14	TSTTXD	Test	Factory use only
15	TSTRXD	Test	Factory use only

3200-027B

Figure 4-2. Rear Panel/Power Cable Connector Pin Assignments (Sheet 1 of 2)



Microphone Connector Pin Assignment

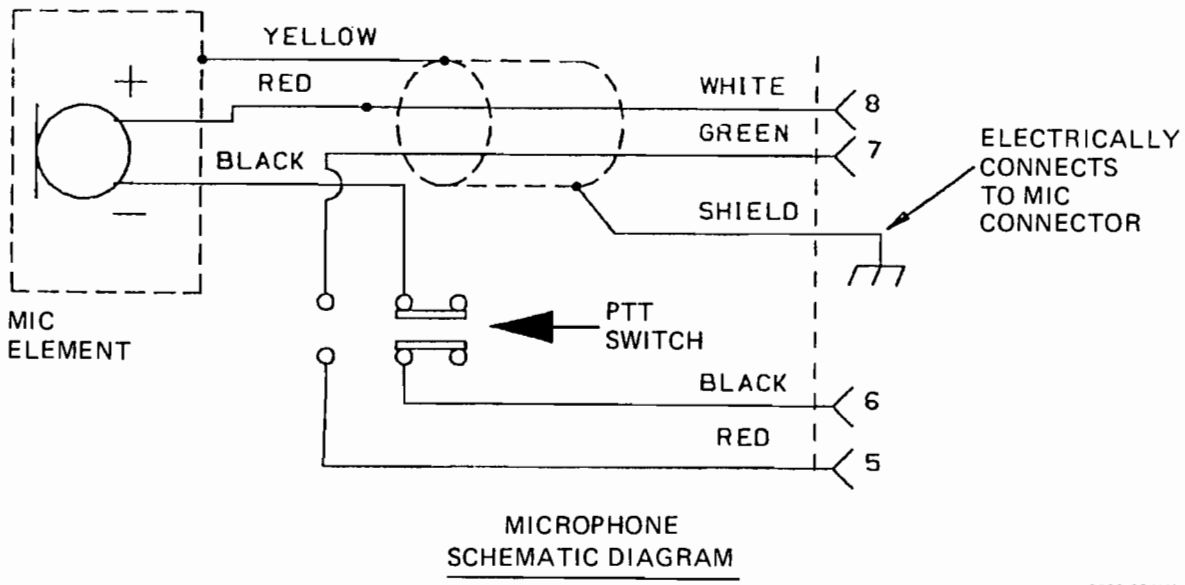


Figure 4-2. Rear Panel/Power Cable Connector Pin Assignments (Sheet 2 of 2)

4.5 TROUBLESHOOTING

To aid in troubleshooting general faults in the RF-3200, use the troubleshooting charts (figures 4-3, 4-4, and 4-5) to identify faults and solutions. Figures 4-6 and 4-7 are aids for isolating a signal problem in the transmit or receive path.

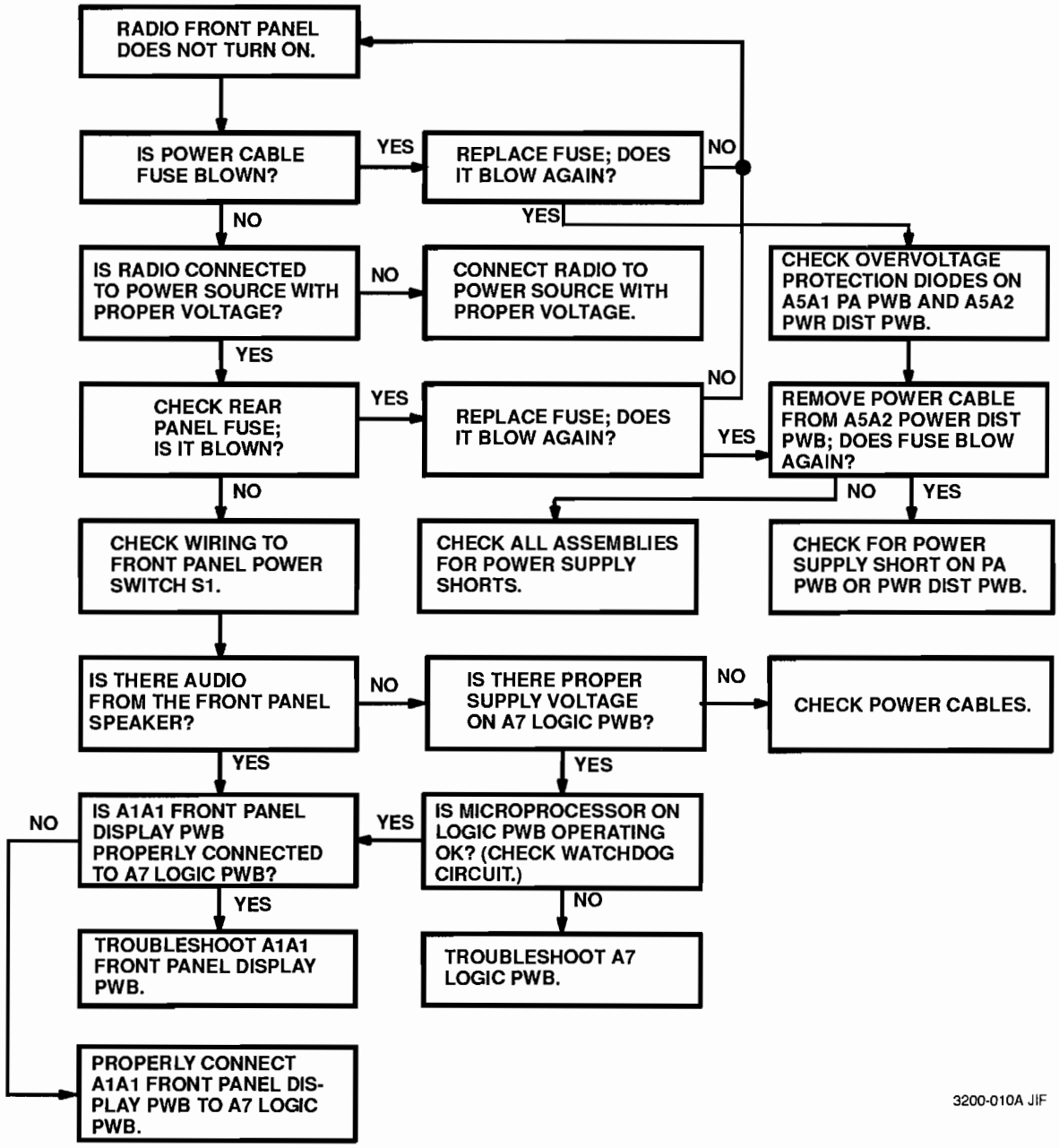


Figure 4-3. RF-3200 General Troubleshooting Chart

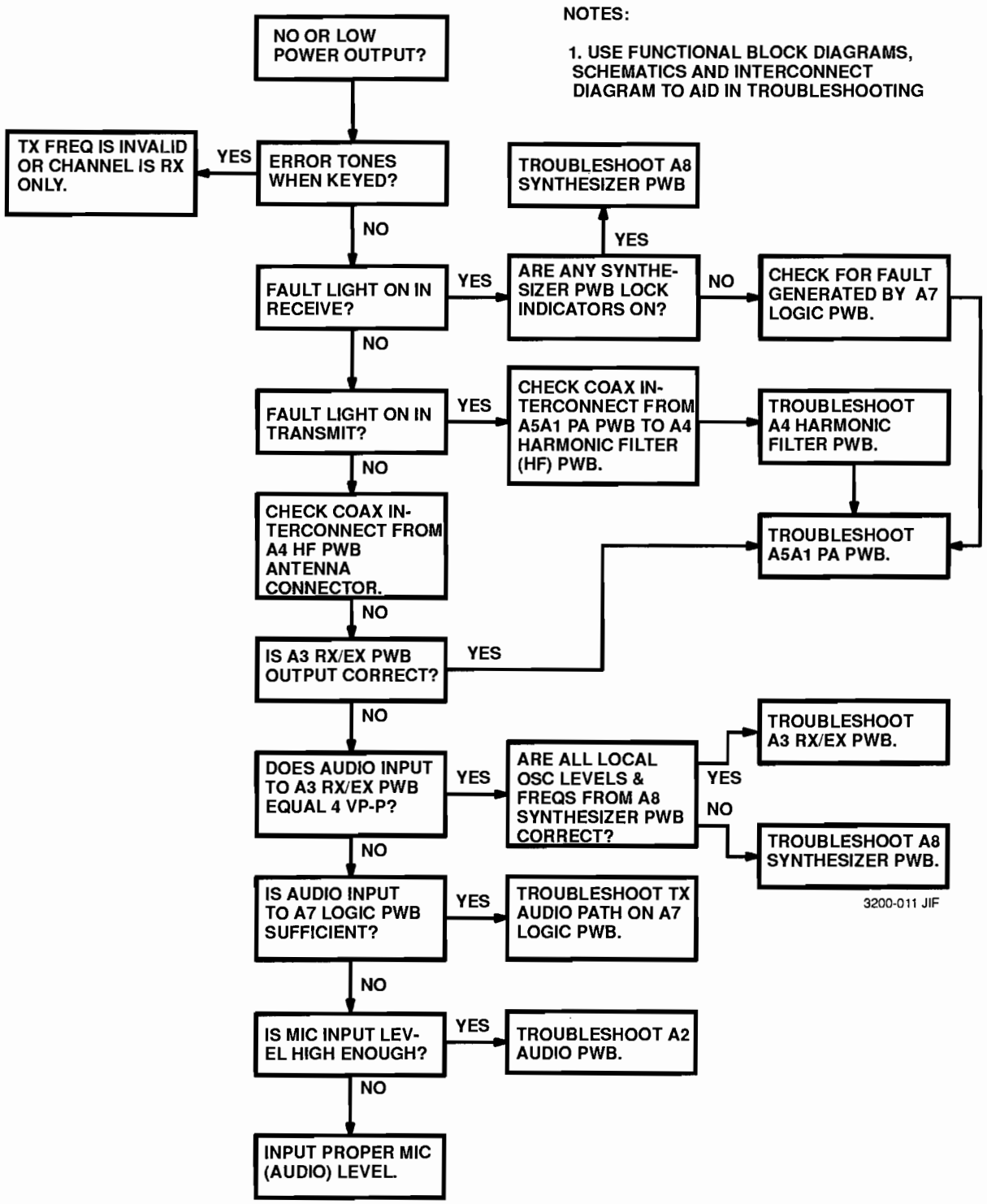


Figure 4-4. RF-3200 Transmitter Troubleshooting Chart

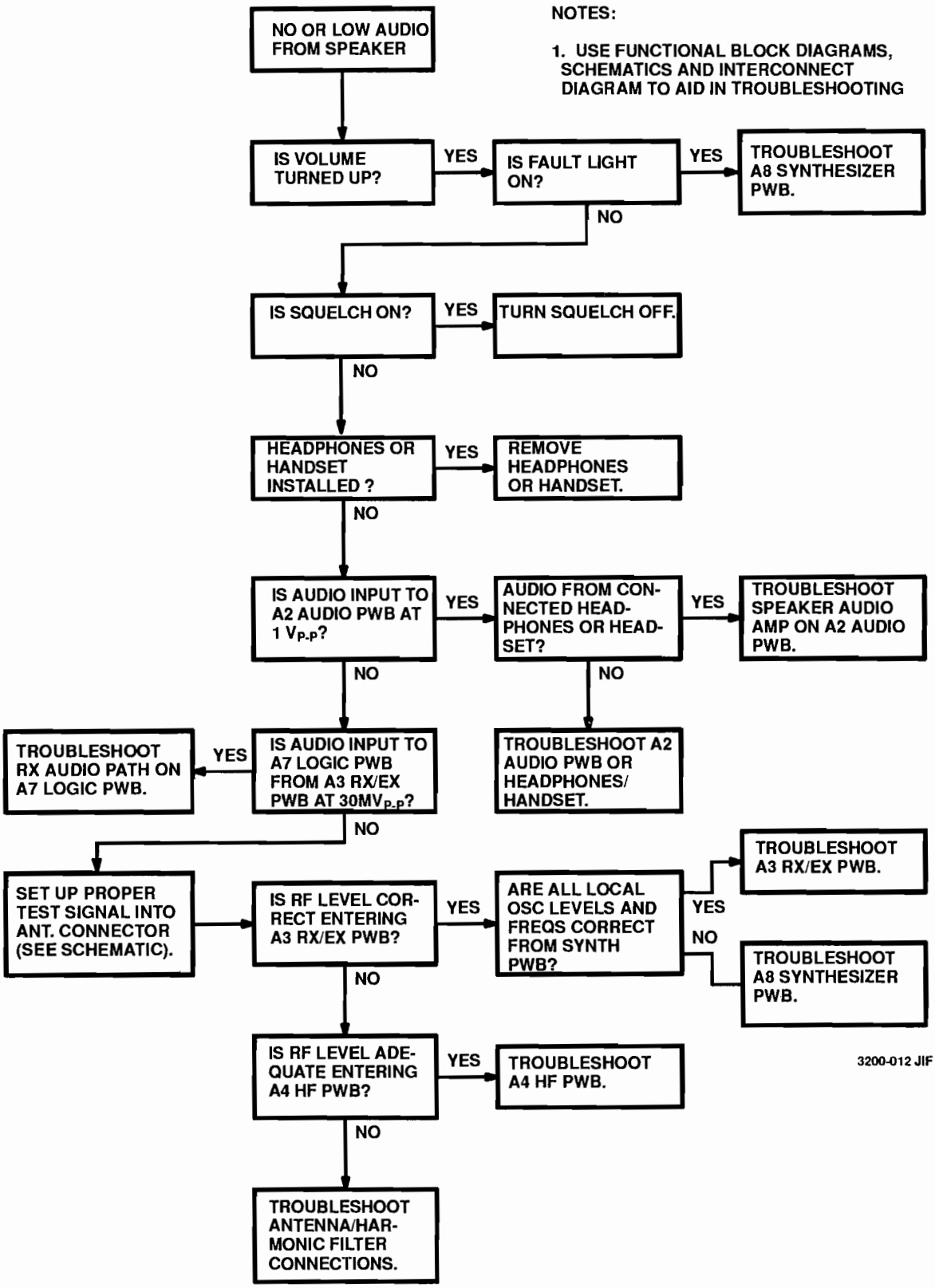


Figure 4-5. RF-3200 Receiver Troubleshooting Chart

dBV	V_{p-p}
+ 20	28.28 V
+ 10	8.94 V
0	2.83 V
-10	894 mV
-20	283 mV
-30	89.4 mV
-40	28.3 mV
-50	8.9 mV

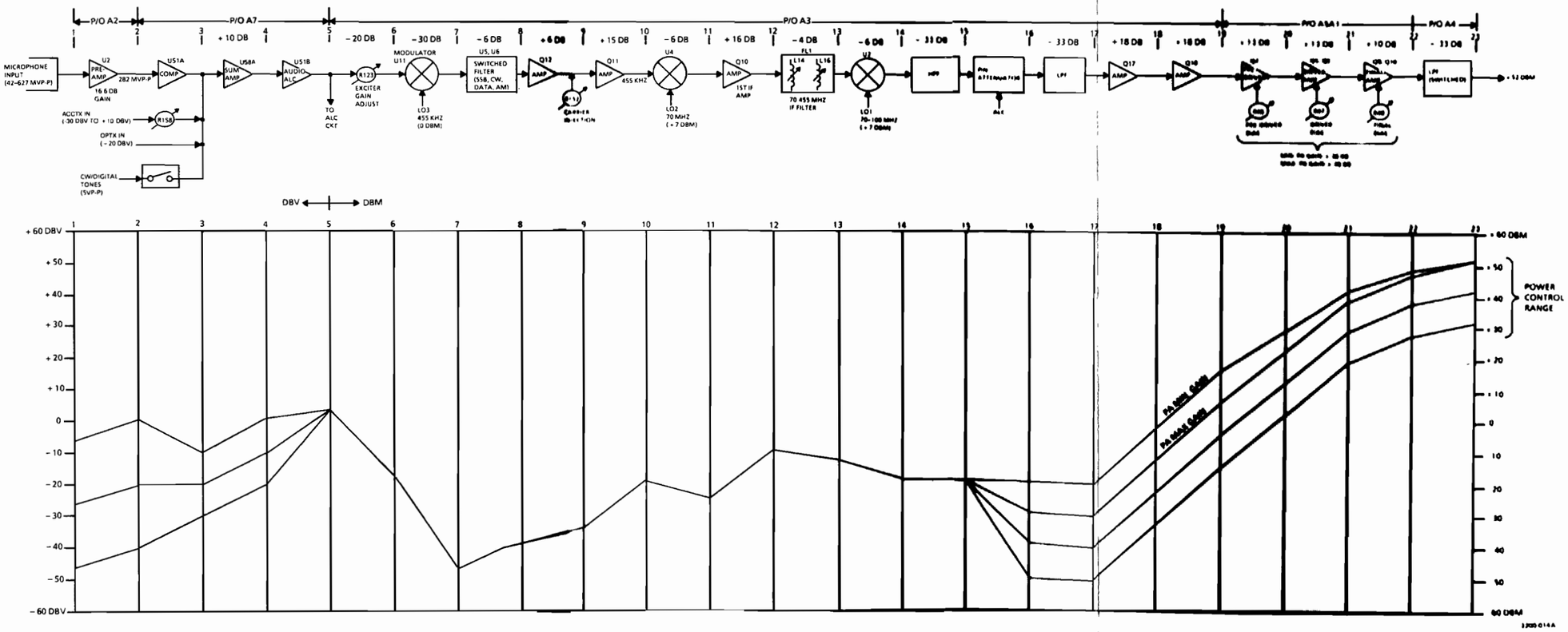
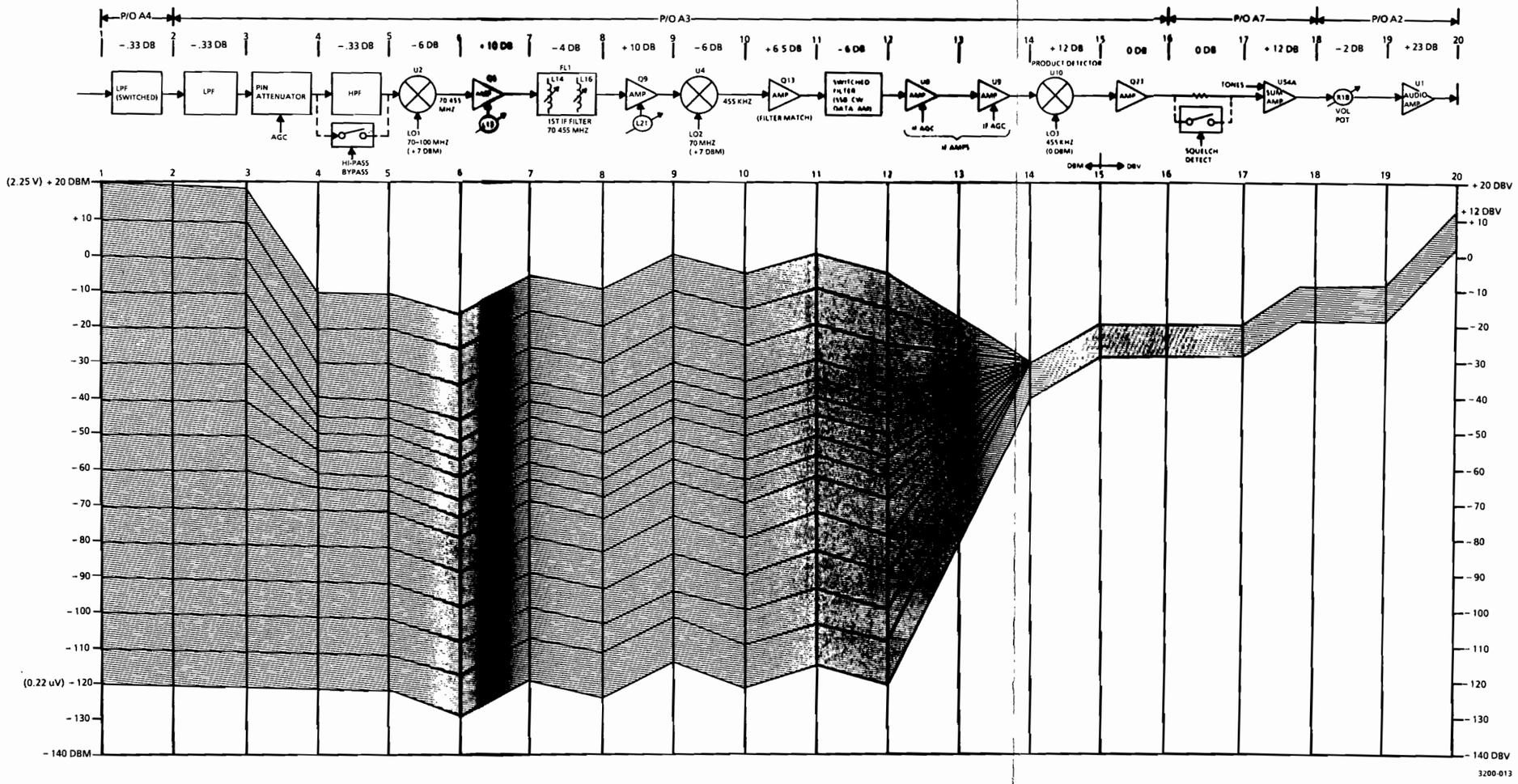


Figure 4-6. RF-3200 Transmit Path Gain Distribution



dBV	V_{p-p}
+ 20	28.28 V
+ 10	8.94 V
0	2.83 V
-10	894 mV
-20	283 mV
-30	89.4 mV
-40	28.3 mV
-50	8.9 mV

Figure 4-7. RF-3200 Receive Path Gain Distribution

4.6 ALIGNMENTS AND ADJUSTMENTS

The adjustments listed in this section have been preset at the factory and do not require periodic readjustment. However, if readjustment becomes necessary, the alignments must be performed in the following order:

- A8 Synthesizer PWB Assembly
- A3 Receiver/Exciter PWB Assembly
- A7 Logic PWB Assembly
- A5A1 Power Amplifier PWB Assembly
- A4 Harmonic Filter PWB Assembly

4.7 REQUIRED TEST EQUIPMENT

Table 4-1 lists the test equipment required to perform alignment procedures.

Table 4-1. Required Test Equipment

Equipment	Type (Model Number)
Oscilloscope	Tektronix 465 or equivalent
Audio Signal Generator	Hewlett-Packard 204D or equivalent
RF/IF Signal Generator	Hewlett-Packard 8640 or equivalent
RF Voltmeter	Hewlett-Packard 410B with "T" voltage sensor
Volt-Ohm-Milliammeter	Simpson 260 or equivalent
Frequency Counter	Hewlett-Packard 5316A or equivalent
Attenuator, 50 ohm, 30 dB	Bird 8325 or equivalent
Dc Milliammeter, Clip-on	Hewlett-Packard 428B or equivalent

4.8 ASSEMBLY ADJUSTMENT PROCEDURES

Refer to the following assembly tab sections and corresponding component location diagrams in this manual when performing the assembly adjustment procedures described in the following paragraphs.

- A8 Synthesizer Assembly tab section - figure 2
- A3 Receiver/Exciter Assembly tab section - figure 2
- A7 Logic Assembly tab section - figure 4 (2 Sheets)
- A5 Heatsink Assembly tab section - figure 3 (A5A1 PA PWB)
- A4 Harmonic Filter Assembly tab section - figure 2

4.8.1 A8 Synthesizer PWB Assembly Adjustments

Make the following adjustments on the A8 Synthesizer PWB Assembly. The abbreviation TPx means "Test Point number x".

4.8.1.1 LO1

Perform the adjustment of the Local Oscillator 1 PLL as follows:

a. Tune the radio to 7500 kHz, and put it in USB communications mode.

b. Monitor the DC voltage at A8TP1 with a voltmeter; use a 5 volt or similar full scale setting.

c. Adjust A8L6 for 4 volts at A8TP1.

d. Tune radio to 22500 kHz, and put it in USB communications mode.

e. Adjust A8L5 for 4 volts at A8TP1.

4.8.1.2 LO2

Perform the adjustment of the Local Oscillator 2 PLL as follows:

a. Tune the radio to 14997.8 kHz, and put it in USB communications mode.

b. Monitor the DC voltage at A8TP2 with a voltmeter; use a 5 volt or similar full scale setting.

c. Adjust A8L15 for 4 volts at A8TP2.

4.8.1.3 LO3

Perform the adjustment of the Local Oscillator 3 PLL as follows:

a. Tune the radio to 15000 kHz, and put it in USB communications mode.

b. Monitor the DC voltage at A8TP4 with a voltmeter; use a 5 volt or similar full scale setting.

c. Adjust A8L33 for 4 volts at A8TP4.

4.8.2 A3 Receiver/Exciter PWB Assembly Adjustments

Before making the following adjustments on the A3 RX/EX PWB Assembly, ensure that the four phase-lock-loop circuits on the A8 Synthesizer PWB Assembly are locked by checking that LEDs A8DS1 through A8DS4 are off.

Use the test setup shown in figure 4-8 to make receiver adjustments as indicated in the following procedures.

NOTE

Perform all of the Receiver adjustments to the Receiver/Exciter Assembly at the same time, and follow the order in which they are given below.

NOTE

Perform all of the Transmitter adjustments to the Receiver/Exciter Assembly at the same time, and follow the order in which they are given below.

CAUTION

Ensure that the transceiver cannot be keyed when the signal generator is connected to the transceiver; permanent damage to the signal generator could result.

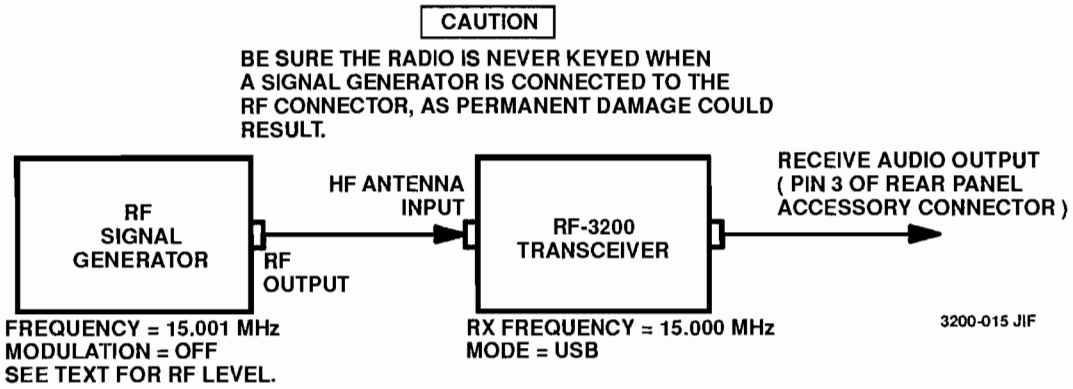


Figure 4-8. Receiver and Accessory Receive Level Adjustment Test Setup

4.8.2.1 Receiver RF Path Alignment

Perform the following procedure:

a. Set the signal generator for 0 dBm output at the operating frequency of the transceiver.

b. Monitor the voltage at the anode of A3CR17 with an oscilloscope or RF voltmeter.

c. Adjust A3L21 for maximum amplitude on the oscilloscope or RF voltmeter.

4.8.2.2 Hang Time

Adjust A3R92 fully counterclockwise.

4.8.2.3 IF Gain

Perform the following procedure:

a. Set the signal generator to -70 dBm output at the operating frequency of the transceiver.

b. Monitor the voltage at the anode of A3J9-4 with an oscilloscope or RF voltmeter.

c. Adjust A3R147 for -20 dBV (280 mVp-p) on the oscilloscope or RF voltmeter.

4.8.2.4 Signal Strength Meter Calibration

Perform the following procedure:

a. Set the signal generator to -70 dBm output at the operating frequency of the transceiver.

b. Adjust A3R124 fully clockwise (Rev. A PWBs fully counterclockwise).

c. Monitor the DC voltage at the anode of A3J9-4 with a voltmeter.

d. Adjust A3R124 to the point at which the reading of the voltmeter starts to change.

4.8.2.5 Transmitter Power Level

Use the test setup shown in figure 4-9 to make the following exciter adjustment, as indicated in the following procedure. Note that the voltmeter shown in figure 4-9 may be replaced by an oscilloscope or a spectrum analyzer.

a. Put the transceiver in USB communications mode.

b. Key the radio by grounding pin 5 of the rear panel accessory connector (ACC). Refer to figure 4-2 for the rear panel accessory connector pin assignments.

c. Adjust A3R123 until the output power is +16 dBm (1.41 V Pk).

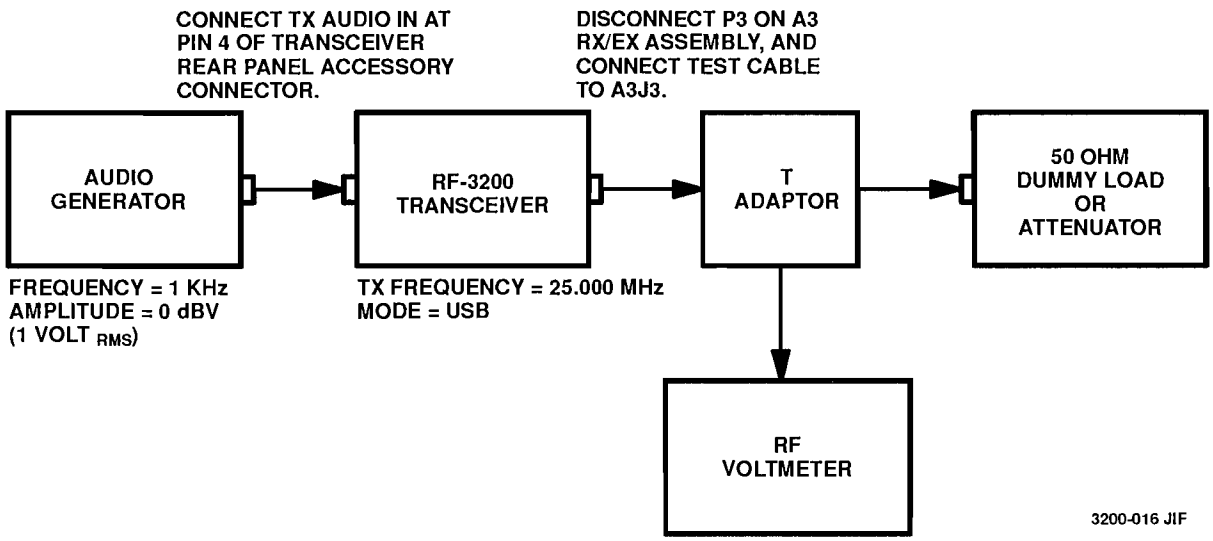


Figure 4-9. Exciter and Accessory Transmit Level Adjustment Test Setup

4.8.2.6 Carrier Injection Level

There are two ways to adjust the Carrier Injection Level. One way is to use a spectrum analyzer, another is to use an oscilloscope. Both ways are described below.

a. Use the test equipment setup shown in figure 4-10 to adjust the exciter carrier injection level with a spectrum analyzer as indicated in the following procedure.

1. Adjust the Harmonic Filter PWB Assembly A4R13 to 125 watts (79 Vrms).
2. Put the transceiver in AM communications mode.
3. Disconnect audio signal generator.
4. Key the transceiver, and note the carrier level on spectrum analyzer.
5. Reconnect the audio signal generator.
6. Adjust A3R152 until the carrier level is the same as it was in step 4.

b. Use the test equipment setup shown in figure 4-11 to adjust the exciter carrier injection level with an oscilloscope as indicated in the following procedure.

1. Set the power level by adjusting R13 of A4 Harmonic Filter PWB Assembly to 125 watts (79 Vrms).
2. Place radio in AM mode.
3. Remove audio, and key radio.
4. Attenuate output by 30 dB, and apply attenuated output to oscilloscope.
5. Refer to figure 4-12. Adjust scope so that peak voltage of waveform is at centerline.
6. Connect audio, and adjust R152 until both sides of tops of waveforms are symmetrical around oscilloscope centerline, as shown in figure 4-12.

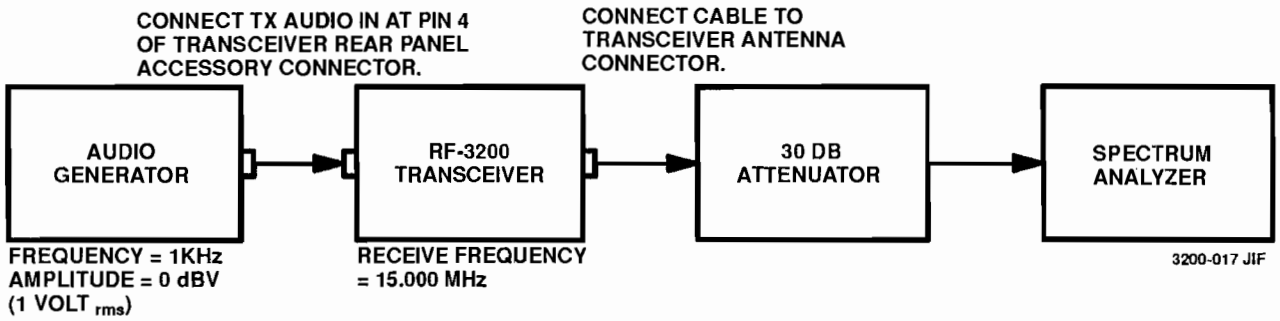


Figure 4-10. Exciter Adjustments (Using Spectrum Analyzer) Test Setup

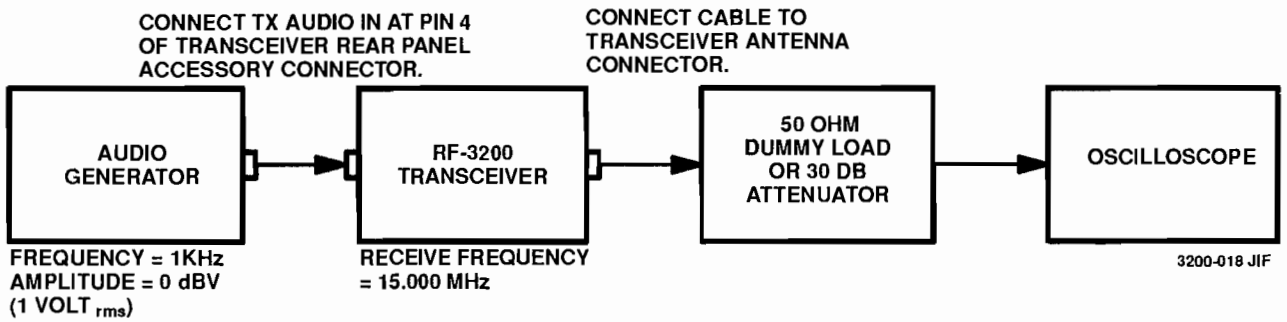


Figure 4-11. Exciter Adjustments (Using Oscilloscope) Test Setup

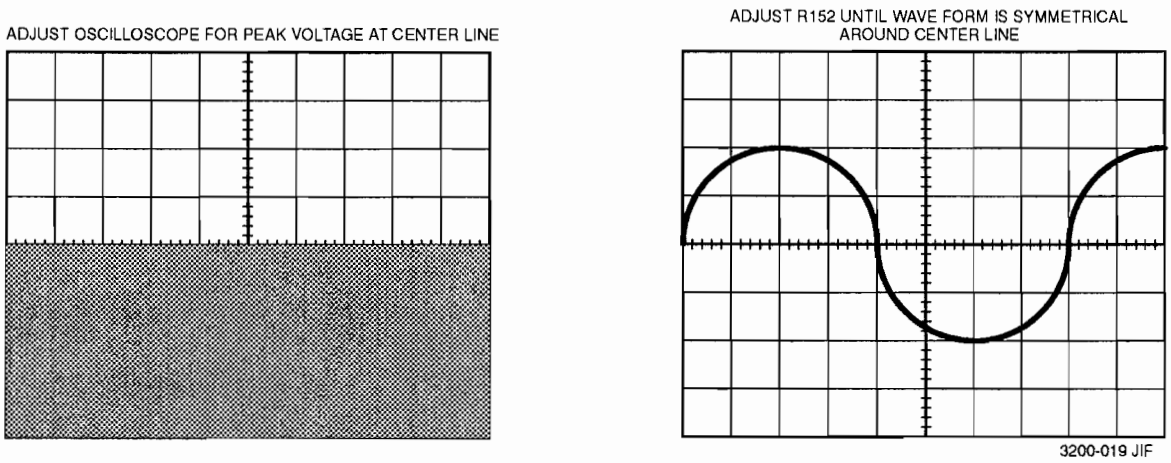


Figure 4-12. Exciter Adjustment Oscilloscope Indications

4.8.3 A7 Logic PWB Assembly Adjustments

4.8.3.1 Squelch Adjustment

To adjust the squelch, turn A7R78 fully counterclockwise.

4.8.3.2 Cutback Power Adjustment

To adjust cutback power, turn A7R113 ten turns fully counterclockwise.

4.8.3.3 Transmit Accessory Audio Sensitivity Adjustment

Use the test equipment setup shown in figure 4-9, and adjust the accessory TX level as follows:

NOTE

The accessory level may be adjusted for any peripheral device attached to the radio. The resultant audio should meet these requirements for the audio level which the peripheral device delivers.

a. Key radio through rear panel accessory connector (ground pin 5 to chassis).

b. Turn on external peripheral device and adjust A7R158 for -10 dBV (280 mVp-p) measured at pin 1 of U58.

4.8.3.4 Receive Accessory Audio Level Adjustment

Use the test equipment setup shown in figure 4-8. Adjust A7R50 so that accessory receive audio output is at the desired level for the option being used.

4.8.4 A5A1 Power Amplifier PWB Assembly Adjustments

Before making adjustments on the A5A1 Power Amplifier PWB Assembly, do the following:

a. Disconnect the RF input cable to A5A1 PA PWB Assembly connector P3.

b. Key the radio from rear panel accessory connector (ground pin 5 to chassis).

4.8.4.1 Pre-driver Bias Adjustment

Adjust the pre-driver bias as follows:

a. Use voltmeter to measure dc voltage at test point E3.

b. Adjust R46 until dc voltage measures 1.65 volts.

4.8.4.2 Driver Bias Adjustment

Adjust the driver bias as follows:

a. Place "clip-on" dc current meter clamp onto jumper wire going from E1 to E2, with current clamp arrow towards E2.

b. Adjust R47 for 300 mA of dc current. Ensure that current clamp is completely closed when measuring current to avoid an erroneous reading.

4.8.4.3 Final Amplifier Bias Adjustment

Adjust the final bias as follows:

a. Place "clip-on" dc current meter clamp onto red wire soldered to E11, with current clamp arrow towards E11.

b. Adjust R48 for 150 mA of dc current. Ensure that current clamp is completely closed when measuring current to avoid an erroneous reading.

4.8.5 A4 Harmonic Filter PWB Assembly Adjustment

Use the test setup shown in figure 4-13, and adjust the power output as follows:

a. In USB mode, key radio from rear panel accessory connector (ground pin 5 to chassis).

b. Adjust R13 for 125 watts (79 Vrms) measured at 50-ohm load.

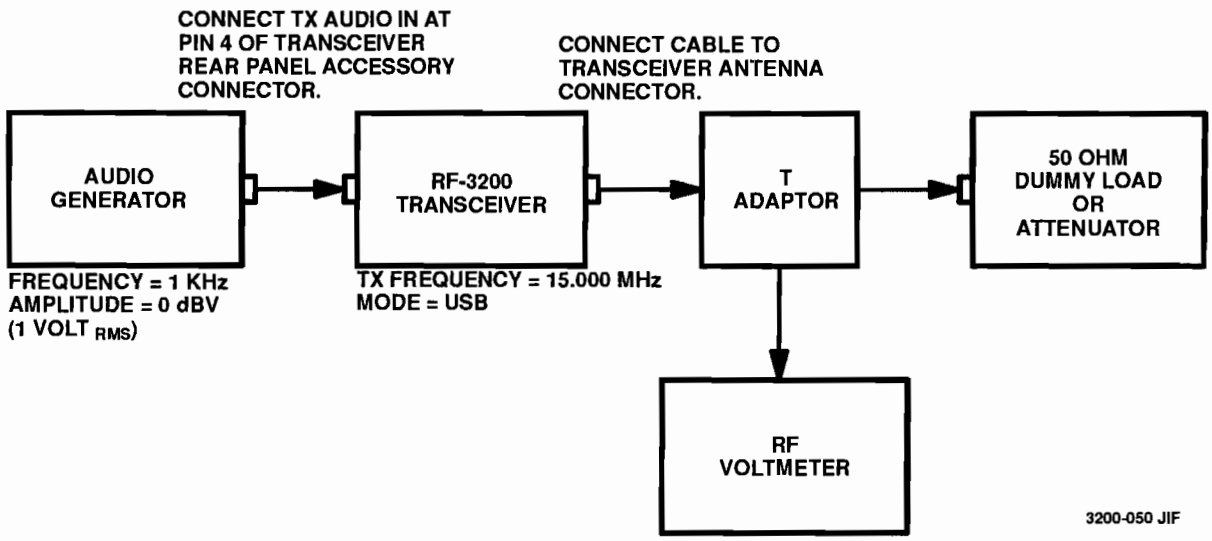


Figure 4-13. Power Output Adjustment Test Setup

A1
FRONT PANEL ASSEMBLY

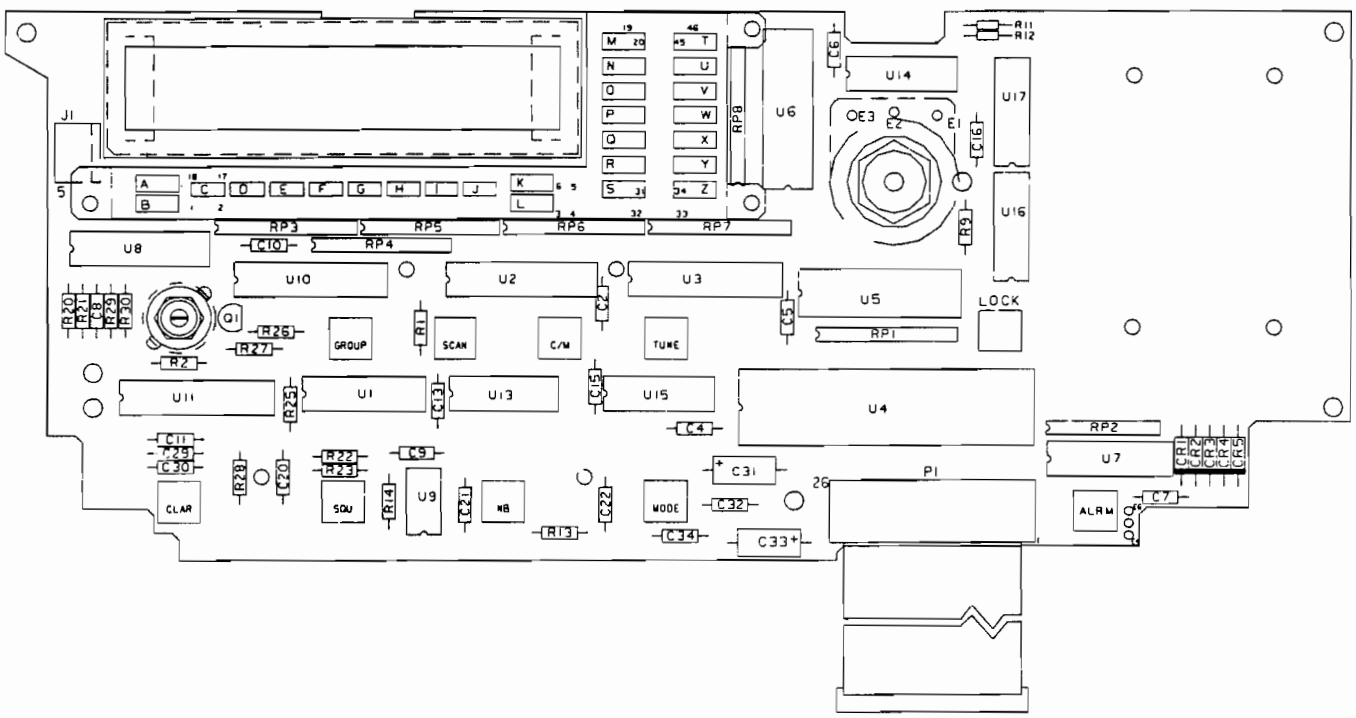


TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

A1 FRONT PANEL ASSEMBLY
PART NUMBER 10212-2000

1. GENERAL DESCRIPTION

The A1 Front Panel Assembly includes all the operator controls (mode selection, channel/frequency selection, special functions selection, etc.) accessible from the front panel. The details of the controls and indicators are described in the RF-3200 User's Guide supplied with the transceiver.

The A1A1 Front Panel (FP) Display PWB Assembly contains the interface circuitry between the front panel controls and indicators and the controlling circuitry on the A7 Logic PWB Assembly.

2. A1A1 FRONT PANEL DISPLAY PWB ASSEMBLY FUNCTIONAL DESCRIPTION

Refer to figure 1, the functional block diagram of the front panel assembly.

The U4 display/keyboard processor is the communication link between the operator controls, CPU, and front panel vacuum fluorescent display (VFD) and indicators. U4 performs two main functions:

- It looks to the keypad matrix for operator commands.
- It drives the front panel VFD and LED indicators.

All data and commands between U4 and the logic PWB assembly CPU are sent over the buffered data bus (BD0-BD7).

3. INTERCONNECTIONS

Table 1 lists the input/output connectors on the front panel display PWB. The table can be used as an aid for tracing signals to and from the PWB. See the interconnect diagram in section 3 for complete details.

Table 1. A1A1 Front Panel Display PWB Assembly Interface Connections

Connector	Signal Name(s)	Connects To
J1	VFD power	Audio PWB Assembly A2J4
P1	Data, address, power, and control signals	Logic PWB Assembly A7J11
E4, E5, E6	Two-tone alarm (option) interface signals	Alarm (option) panel

4. PARTS LISTS, COMPONENT LOCATION DIAGRAMS, AND SCHEMATIC DIAGRAM

The following reference information is provided in this subsection:

- Table 2 - A1 Front Panel Assembly Major Parts List (10212-2000)
- Figure 2 - A1 Front Panel Assembly Component Locations (10212-2000)
- Table 3 - A1A1 Front Panel Display PWB Assembly Parts List (10212-2110)
- Figure 3 - A1A1 Front Panel Display PWB Assembly Component Location Diagram (10212-2110)
- Figure 4 - A1A1 Front Panel Display PWB Assembly Schematic Diagram (10212-2111)

Table 2. A1 Front Panel Assembly Major Parts List (10212-2000-01 Rev. C)

Ref. Desig.	Part Number	Description
	10212-2033	KEYPAD
	10212-2035	KNOB, CH/FREQ
	10212-2072	SPRING, DOOR
	10212-2042	DISPLAY WINDOW
	10212-2020	SPEAKER ASSY
	10212-2036-02	KNOB, VOLUME
	10212-2030	FILTER, SPEAKER
A1	10212-2110	PWB ASSY, DISPLAY
W1	10212-2090	CABLE ASSY, PWR SWITCH
W2	10212-1065-01	CABLE ASSY,AUDIO/DISPLAY

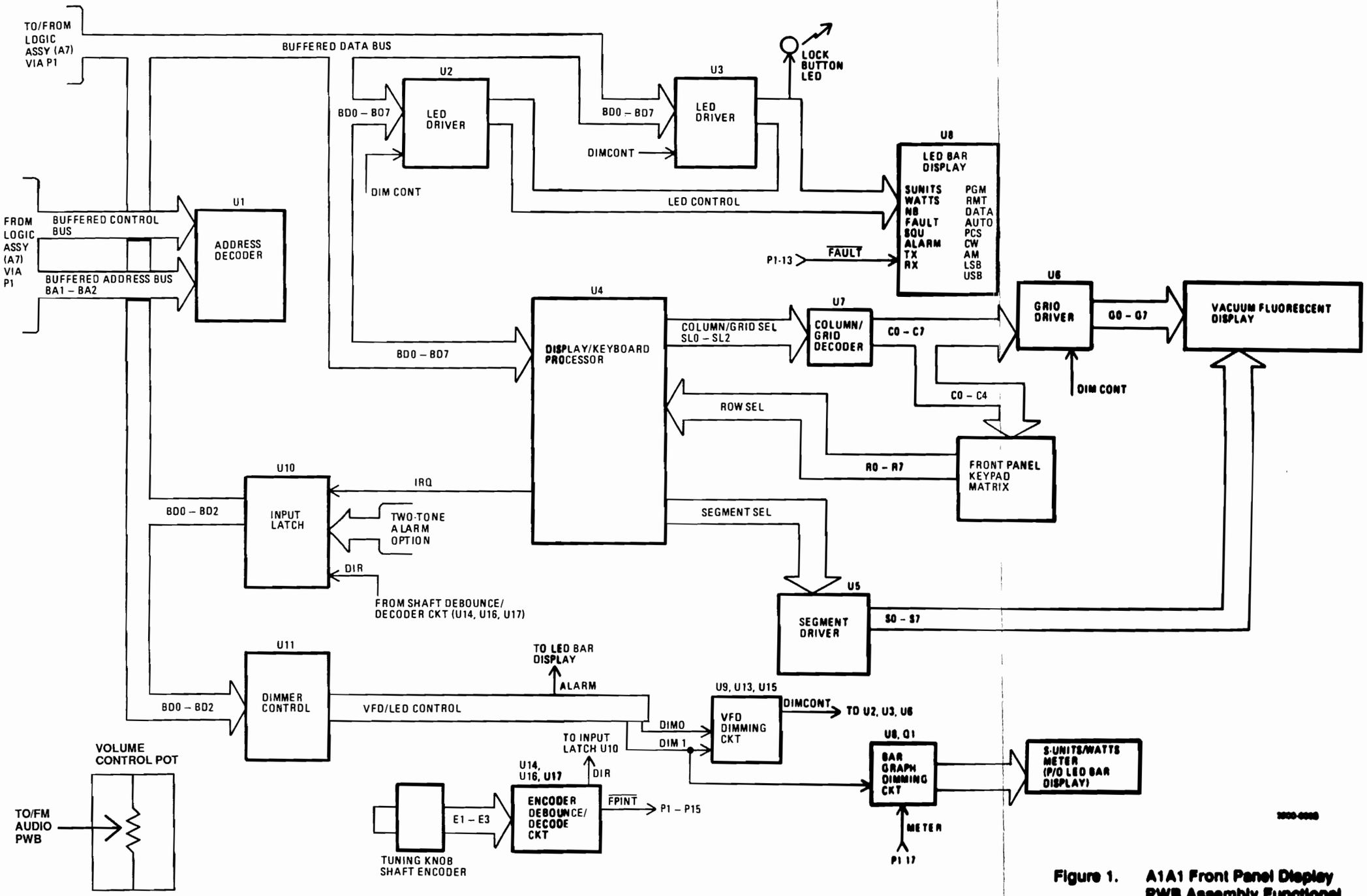


Figure 1. A1A1 Front Panel Display PWB Assembly Functional Block Diagram

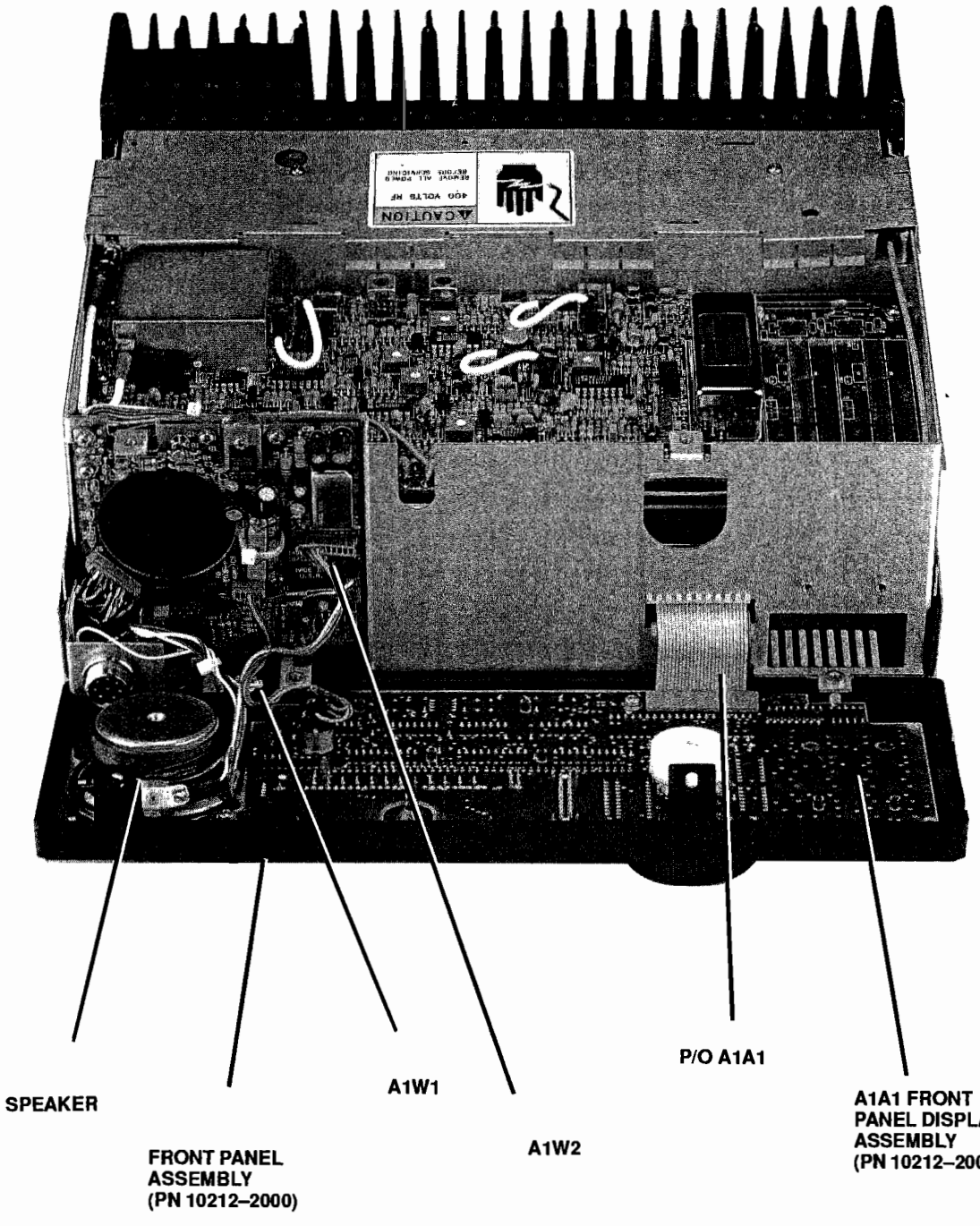


Figure 2. A1 Front Panel Assembly Component Locations

Table 3. A1A1 Front Panel Display PWB Assembly Parts List (10212-2110 Rev. G)

Ref. Desig.	Part Number	Description
	10075-1029	SW DPST 50MA 50V PCMNT
	10212-2047	FILTER, POLARIZED WINDOW
	10212-2121	LED ARRAY
	10212-2052	RES VARIABLE
	S05-0008-001	SW DPST 50mA 12V GRN LED
	10212-2123	DISPLAY VAC FLUORESCENT
	10212-2048	BRACKET,VFD,SUPPORT
	S05-0008-901	KEYTOP FOR SWITCH
	10212-2130	FRONT PANEL VOLUME ASSY
C2	C12-0001-056	CAP .01UF 30% 25V CER
C4	C12-0001-056	CAP .01UF 30% 25V CER
C5	C12-0001-056	CAP .01UF 30% 25V CER
C6	C12-0001-056	CAP .01UF 30% 25V CER
C7	C12-0001-056	CAP .01UF 30% 25V CER
C8	C12-0001-056	CAP .01UF 30% 25V CER
C9	C12-0001-056	CAP .01UF 30% 25V CER
C10	C12-0001-056	CAP .01UF 30% 25V CER
C11	C12-0001-056	CAP .01UF 30% 25V CER
C13	C12-0001-056	CAP .01UF 30% 25V CER
C15	C12-0001-056	CAP .01UF 30% 25V CER
C16	C12-0001-056	CAP .01UF 30% 25V CER
C20	C12-0001-056	CAP .01UF 30% 25V CER
C21	C12-0001-056	CAP .01UF 30% 25V CER
C22	C12-0001-056	CAP .01UF 30% 25V CER
C29	C12-0001-056	CAP .01UF 30% 25V CER
C30	C12-0001-056	CAP .01UF 30% 25V CER
C31	C-6738	CAP 10.0UF 20% 20V TANT
C32	C12-0001-056	CAP .01UF 30% 25V CER
C33	C-6738	CAP 10.0UF 20% 20V TANT
C34	C12-0001-056	CAP .01UF 30% 25V CER
CR1	1N270	DIODE 80mW 100V GER
CR2	1N270	DIODE 80mW 100V GER
CR3	1N270	DIODE 80mW 100V GER
CR4	1N270	DIODE 80mW 100V GER
CR5	1N270	DIODE 80mW 100V GER
J1	J46-0086-105	HDR 5 PIN 2MM SR RTANG
P1	10212-2125	CABLE RIBBON ASSY
Q1	2N4124	XSTR SS/GP NPN TO-92
R1	R65-0003-103	RES 10K 5% 1/4W CAR FILM

Table 3. A1A1 Front Panel Display PWB Assembly Parts List (10212-2110 Rev. G) (Cont.)

Ref. Desig.	Part Number	Description
R2	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R9	R65-0003-201	RES 200 5% 1/4W CAR FILM
R11	R65-0002-104	RES 100K 5% 1/8W CAR FILM
R12	R65-0002-104	RES 100K 5% 1/8W CAR FILM
R13	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R14	R65-0003-473	RES 47K 5% 1/4W CAR FILM
R20	R65-0004-221	RES 220 5% 1/2W CAR FILM
R21	R65-0004-221	RES 220 5% 1/2W CAR FILM
R22	R65-0003-473	RES 47K 5% 1/4W CAR FILM
R23	R65-0003-473	RES 47K 5% 1/4W CAR FILM
R25	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R26	R65-0003-182	RES 1.8K 5% 1/4W CAR FILM
R27	R65-0003-182	RES 1.8K 5% 1/4W CAR FILM
R28	R65-0003-201	RES 200 5% 1/4W CAR FILM
R29	R65-0004-221	RES 220 5% 1/2W CAR FILM
R30	R65-0004-221	RES 220 5% 1/2W CAR FILM
RP1	R50-0010-103	RES 10K 2% 10SIP 9RES
RP2	R50-0008-103	RES 10K 2% 8SIP 7RES
RP3	10212-2124	RESISTOR SIP PACK
RP4	10212-2124	RESISTOR SIP PACK
RP5	10212-2124	RESISTOR SIP PACK
RP6	10212-2124	RESISTOR SIP PACK
RP7	10212-2124	RESISTOR SIP PACK
RP8	10212-2124	RESISTOR SIP PACK
U1	I15-0000-155	IC 74HC155 PLASTIC CMOS
U2	I15-0000-374	IC 74HC374 PLASTIC CMOS
U3	I15-0000-374	IC 74HC374 PLASTIC CMOS
U4	I59-0006-001	IC PROG INTERFACE 8279
U5, U6	I08-0009-001	IC UCN5815 8BIT DRVR 60V
U7	I15-0000-138	IC 74HC138 PLASTIC CMOS
U8	I46-0003-001	IC DSPL DRVR 3914
U9	I35-0004-000	IC TIMER 555
U10	I15-0000-373	IC 74HC373 PLASTIC CMOS
U11	I15-0000-374	IC 74HC374 PLASTIC CMOS
U13	I15-0000-000	IC 74HC00 PLASTIC CMOS
U14	I15-0000-004	IC 74HC04 PLASTIC CMOS
U15	I15-0000-004	IC 74HC04 PLASTIC CMOS
U16	I15-0000-002	IC 74HC02 PLASTIC CMOS
U17	I15-0000-074	IC 74HC74 PLASTIC CMOS

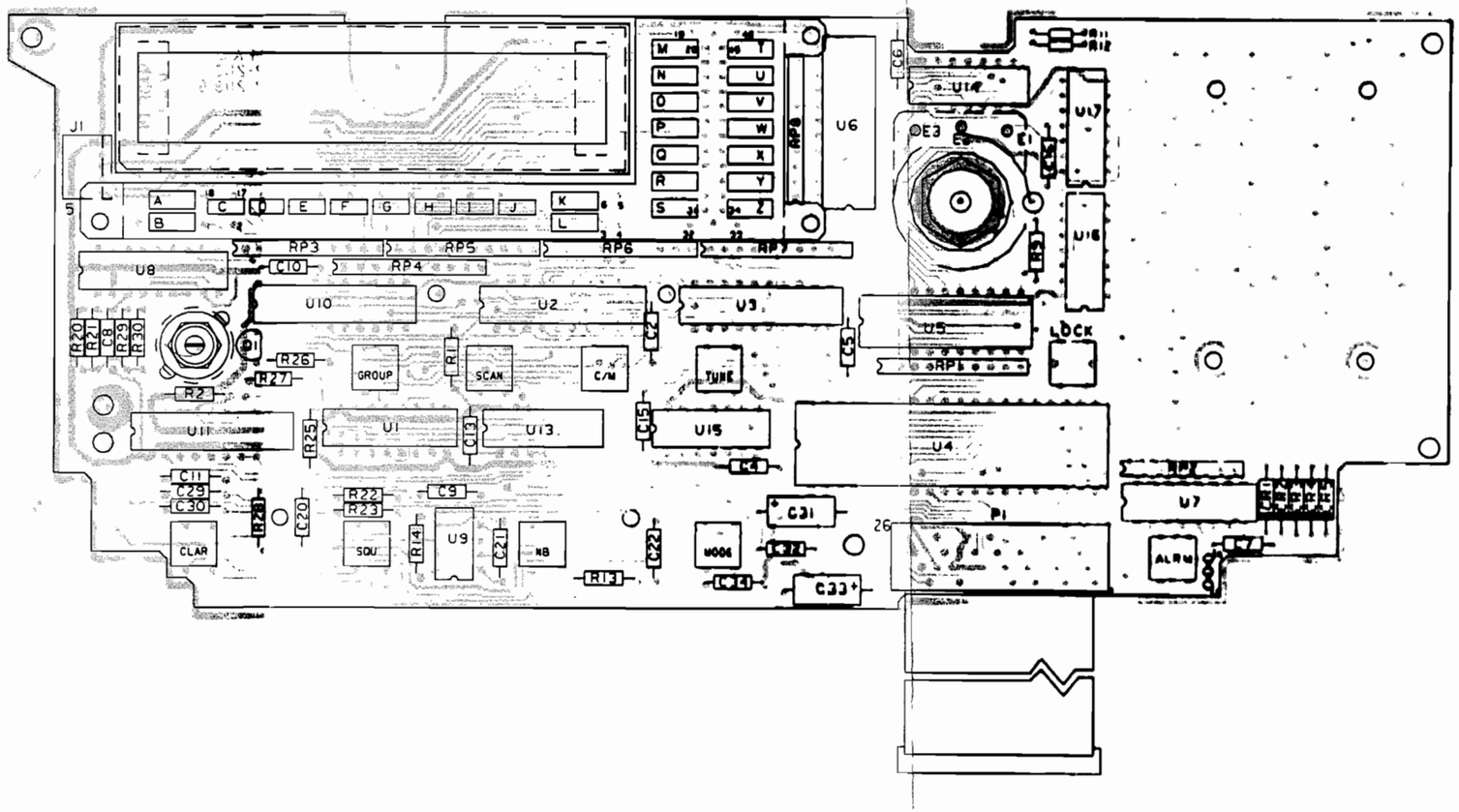
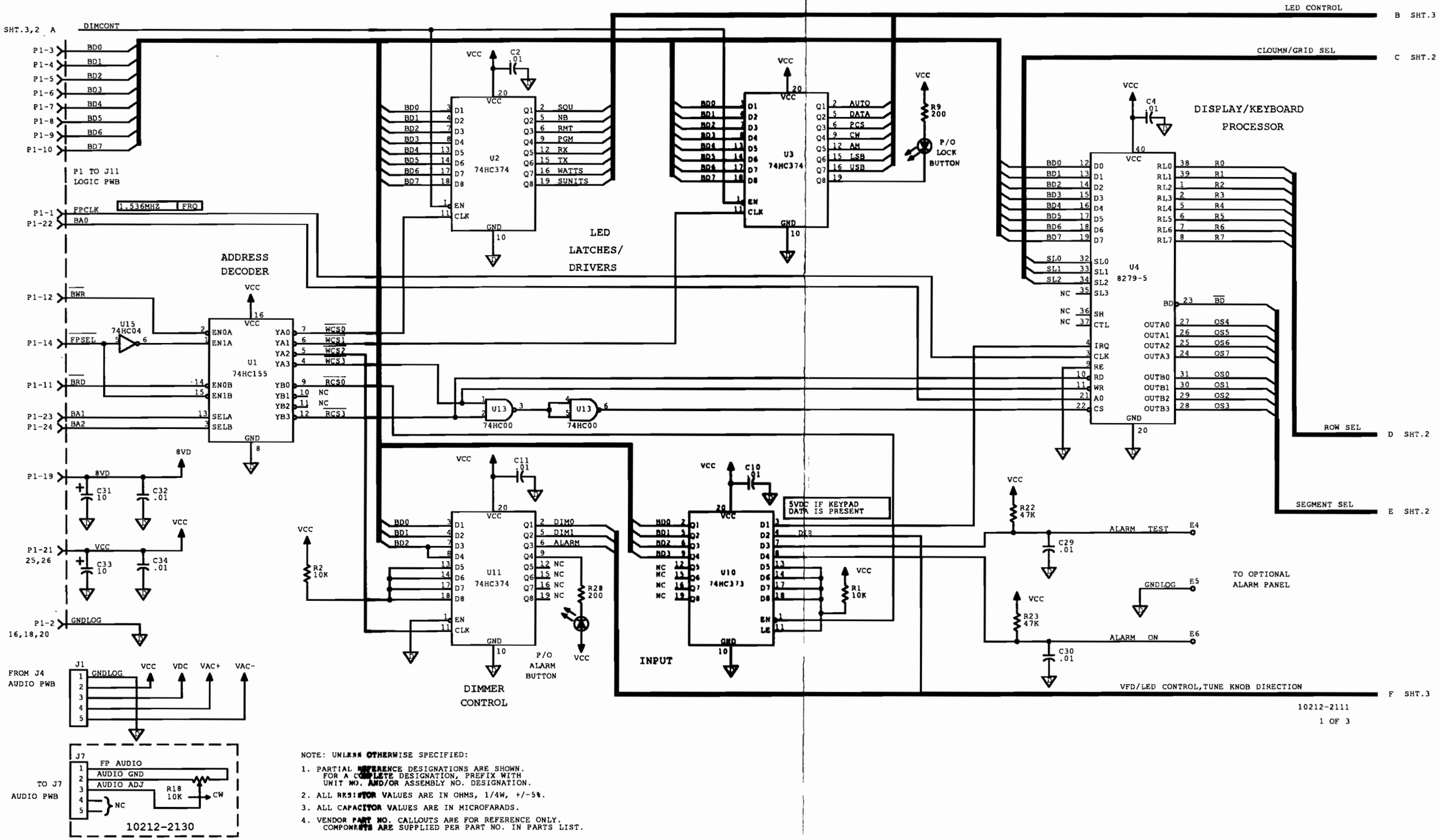


Figure 3. **A1A1 Front Panel Display PWB Assembly Component Location Diagram (10212-2110 Rev. G)**



NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, +/-5%.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY. COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.

Figure 4. A1A1 Front Panel Display PWB Assembly Schematic Diagram (10212-2111 Rev. E) (Sheet 1 of 3)

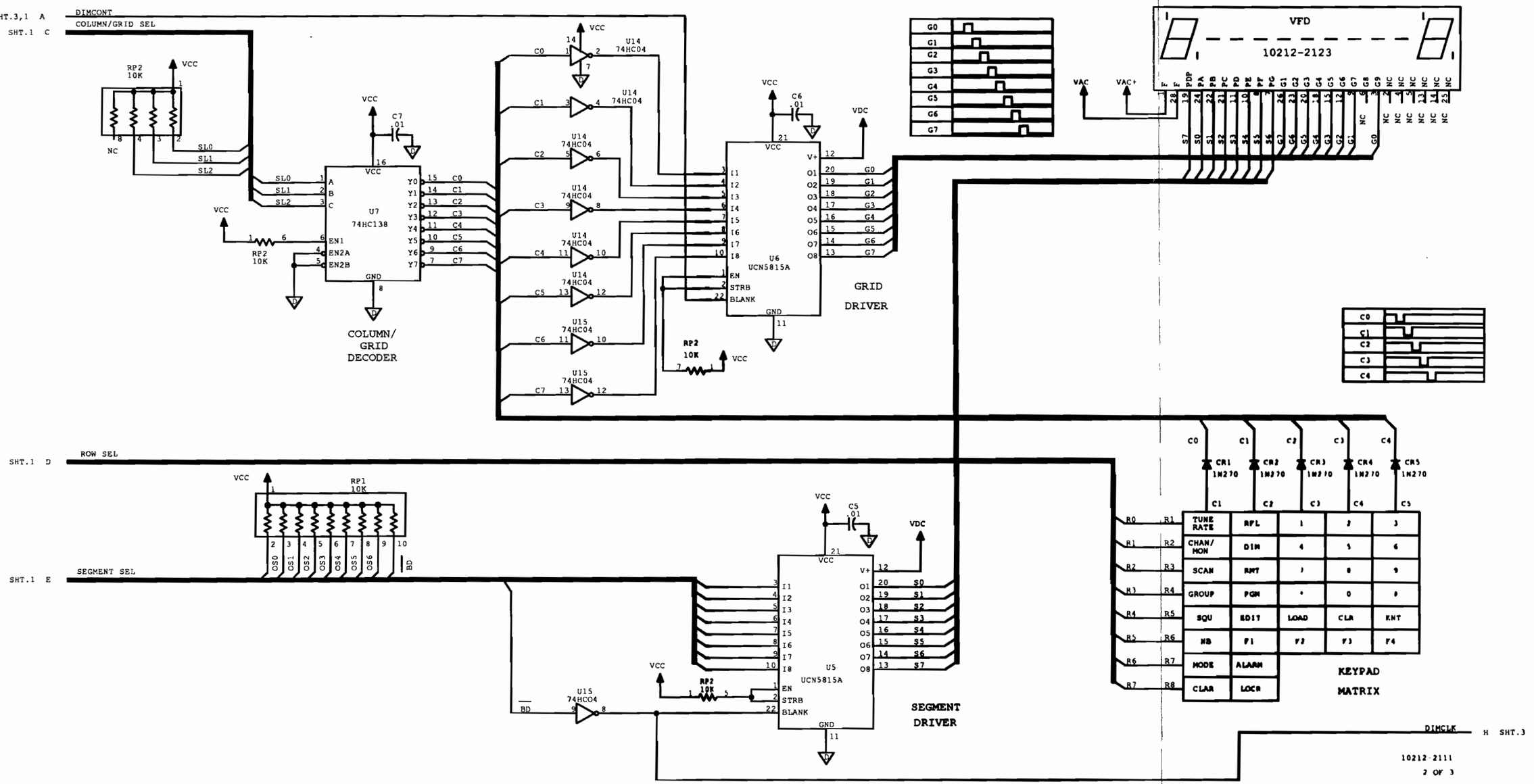


Figure 4. A1A1 Front Panel Display PWB Assembly Schematic Diagram (10212-2111 Rev. E) (Sheet 2 of 3)

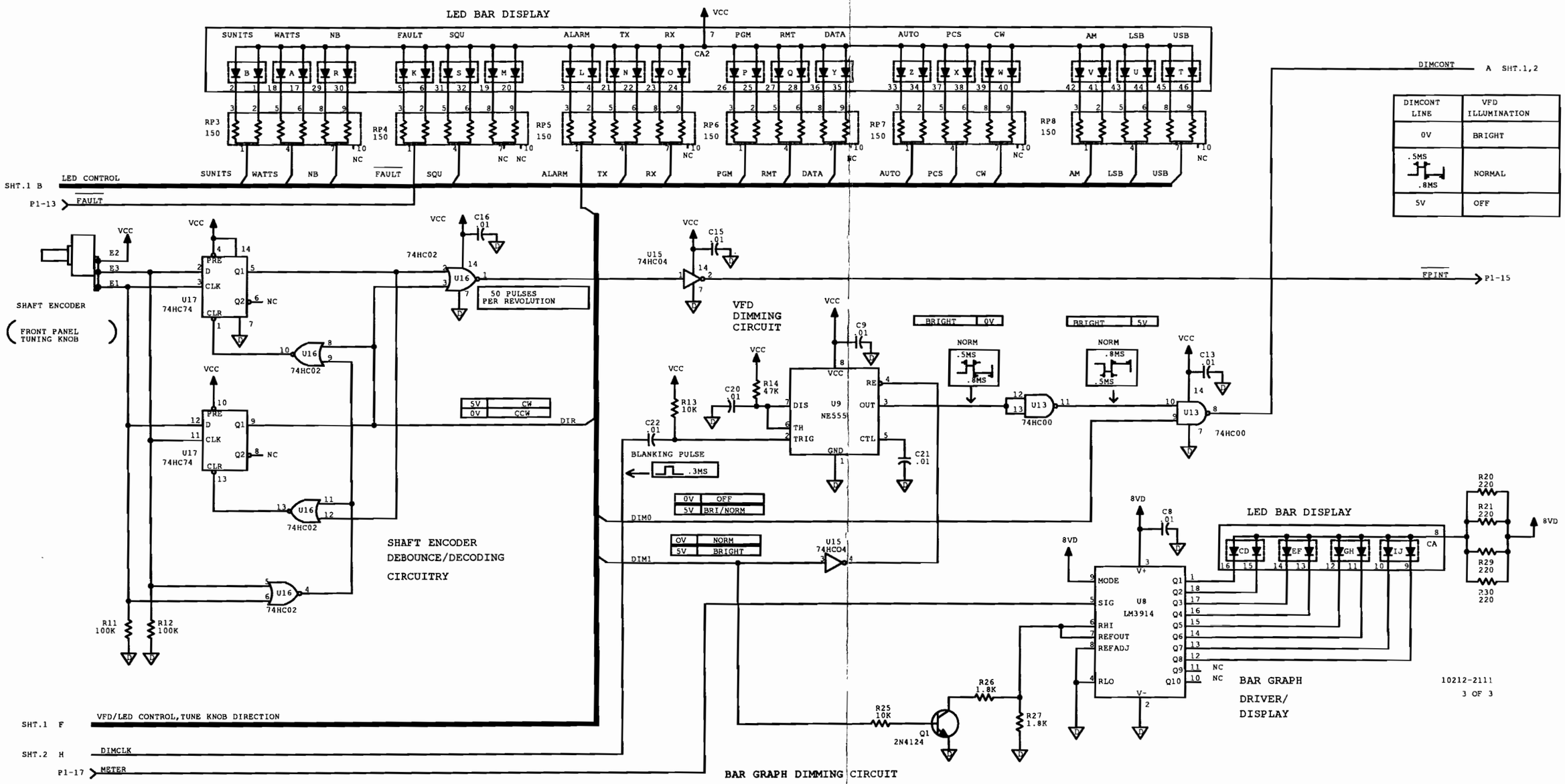


Figure 4. A1A1 Front Panel Display PWB Assembly Schematic Diagram (10212-2111 Rev. E) (Sheet 3 of 3)

A2
AUDIO PWB ASSEMBLY

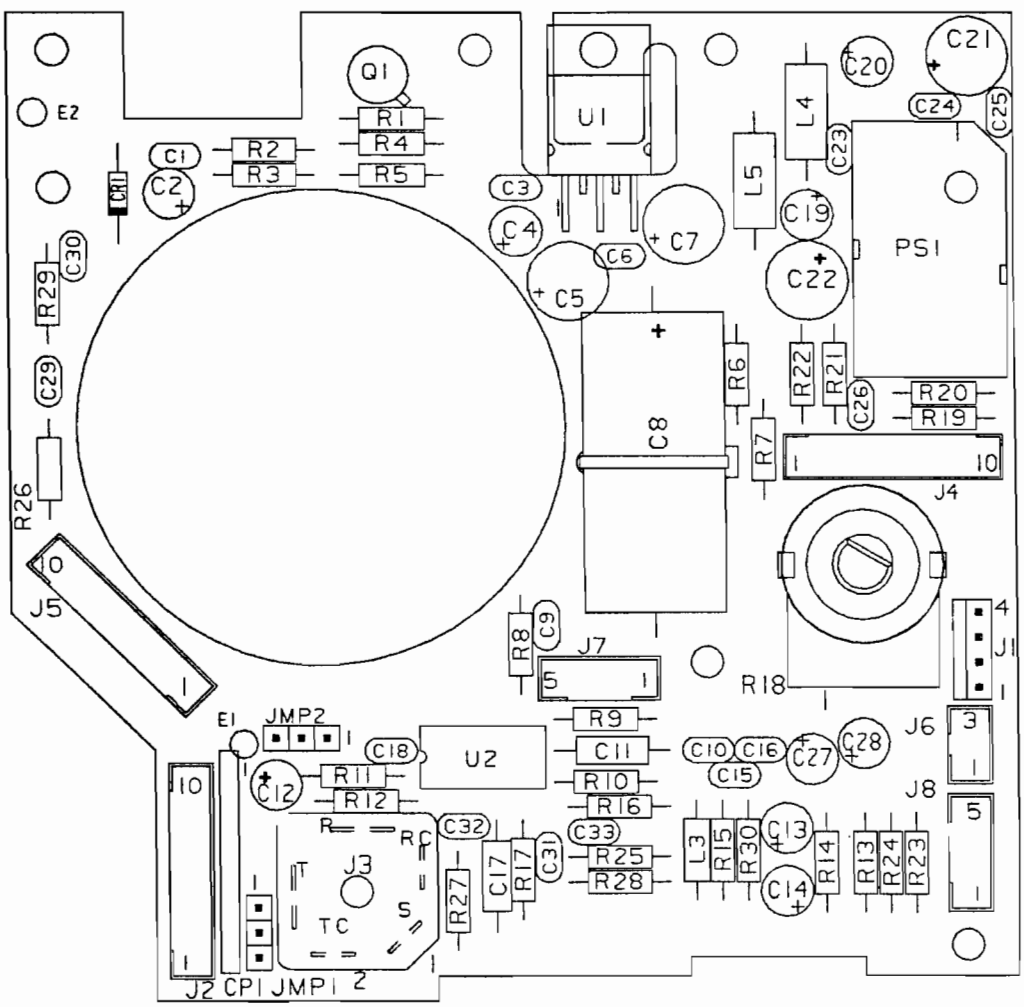


TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

A2 AUDIO PWB ASSEMBLY
PART NUMBER 10212-2210

1. GENERAL DESCRIPTION

The A2 Audio PWB Assembly:

- Amplifies receive audio signals to a level sufficient to drive the radio's front panel speaker and headphones
- Amplifies the modulating audio signals from the microphone
- Generates the switching power supply voltage required to drive the front panel vacuum fluorescent display (VFD)

2. FUNCTIONAL DESCRIPTION

Refer to figure 1, a functional block diagram of the Audio PWB Assembly. Receive audio enters the audio assembly from the A7 Logic PWB Assembly and is routed to speaker audio switch Q1 and headset driver U2B. Q1 is controlled by the Speaker control line from the logic PWB assembly, and its output is routed to speaker driver amplifier U1. Front panel volume potentiometer R18 provides input audio to U1 and headset amplifier U2B. The output of U1 is routed to the front panel speaker and to remote monitoring equipment via the logic PWB assembly. Integrated circuit U2A provides amplification required for the microphone audio before it is routed to the logic PWB assembly via J5.

The connection with the front panel microphone connectors includes the following:

- Earphone/headset audio output (EAR+)
- Power outputs for powering carbon and amplified dynamic microphones (C MIC + and FIL + AP)
- Microphone audio input (MIC +)
- $\overline{\text{Push-to-Talk}}$ ($\overline{\text{PTT}}$) keyline from the microphone

The signal $\overline{\text{CWKRQ}}$ is routed from the microphone connector to the A7 Logic PWB assembly. This signal, not $\overline{\text{PTT}}$, is used to key the transmitter in CW mode.

Power supply PS1 accepts an input of +5 Vdc and provides power to the front panel vacuum fluorescent display; a 4.5 Volt_{rms} AC on a +5 Vdc bias, and +27 Vdc.

3. INTERCONNECTIONS

Table 1 lists the interconnections of the audio assembly. The table can be used as an aid to troubleshooting. For complete details, refer to the radio interconnect diagram.

4. PARTS LIST, COMPONENT LOCATION DIAGRAM, AND SCHEMATIC DIAGRAM

Table 2 is the parts list for the audio PWB assembly. Figure 2 is the component location diagram, and figure 3 is the schematic diagram.

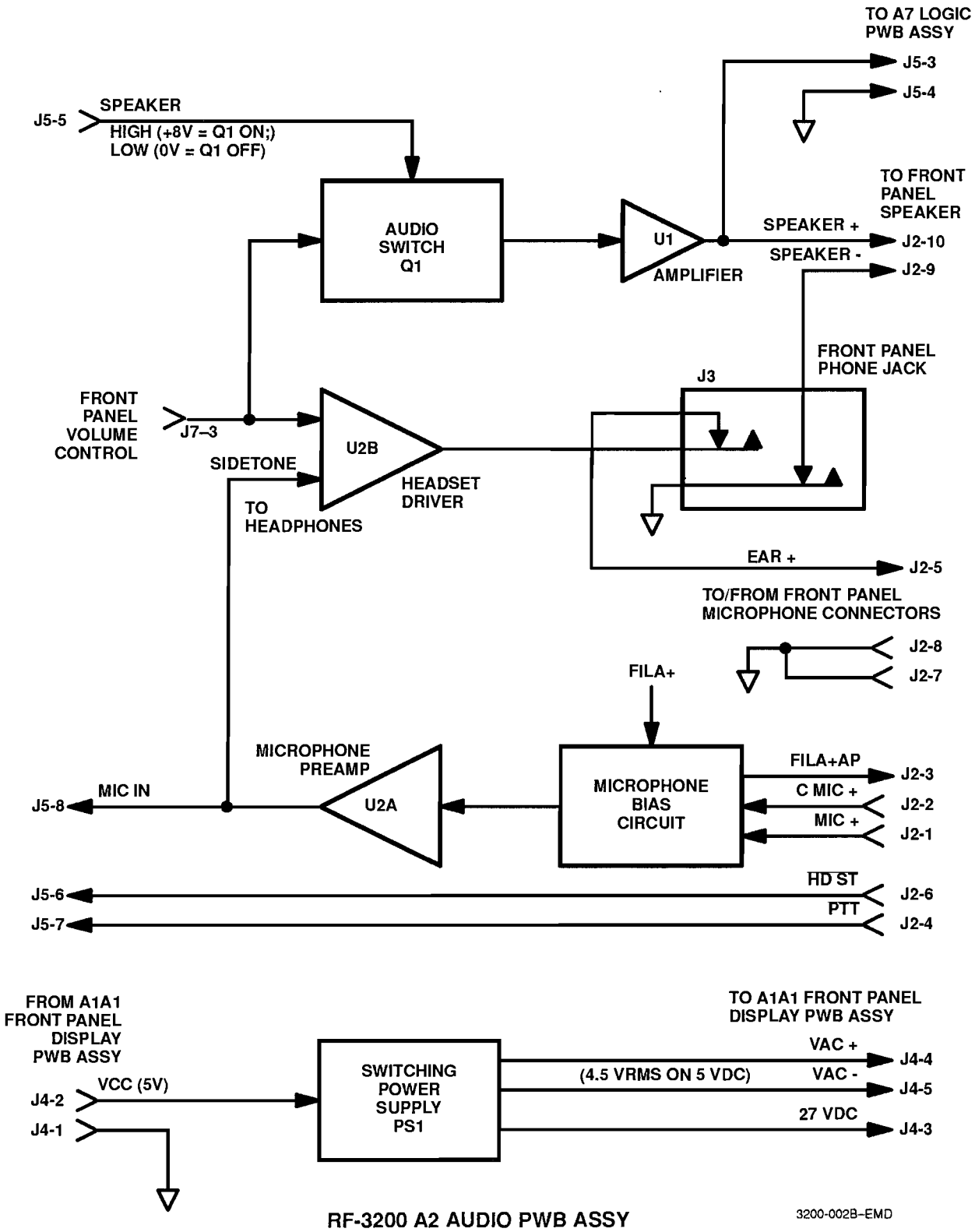


Figure 1. RF-3200 A2 Audio PWB Assembly Functional Block Diagram

Table 1. A2 Audio PWB Assembly Interconnections

Connector	Signal Name	Connects To
J1	Power	Power Distribution PWB A5A2J2 via Cable W5
J2	Speaker/Mic. Audio	Speaker LS1 and MIC connector via W2
J3	Front Panel Phone Jack	Headphones (optional equipment)
J4	VFD Power	Front Panel Display PWB A1A1J1 via A1W2
J5	Audio Control	Logic PWB A7J1 via W2
J7	Audio Level Control	Volume Assembly

Table 2. A2 Audio PWB Assembly Parts List (10212-2210 Rev. H)

Ref. Desig.	Part Number	Description
	J41-0002-003	HEADER 3 POS
C1	C11-0009-104	CAP .1UF 20% 50V CER
C2	C26-0010-100	CAP 10UF 20% 10V TANT
C3	C11-0009-472	CAP 4700PF 20% 50V CER
C4	C26-0010-100	CAP 10UF 20% 10V TANT
C5	C24-1025-107	CAP 100UF RDL 25V ELEC
C6	C11-0009-104	CAP .1UF 20% 50V CER
C7	C24-1025-107	CAP 100UF RDL 25V ELEC
C8	C24-2025-108	CAP 1000UF AXL 25V ELEC
C9	C11-0009-104	CAP .1UF 20% 50V CER
C10	C11-0009-473	CAP .047UF 20% 50V CER
C11	C12-0001-041	CAP 220PF 10% 25V CER
C12	C24-1050-106	CAP 10UF RDL 50V ELEC
C13	C24-1050-106	CAP 10UF RDL 50V ELEC
C14	C24-1050-106	CAP 10UF RDL 50V ELEC
C15	C11-0009-104	CAP .1UF 20% 50V CER
C16	C11-0009-102	CAP 1000PF 20% 50V CER
C17	C12-0001-049	CAP 1000PF 20% 25V CER
C18	C11-0009-103	CAP .01UF 20% 50V CER
C19	C24-1010-476	CAP 47UF RDL 10V ELEC
C20	C24-1010-476	CAP 47UF RDL 10V ELEC
C21	C24-1050-476	CAP 47UF RDL 50V ELEC
C22	C24-1050-476	CAP 47UF RDL 50V ELEC
C23	C11-0009-103	CAP .01UF 20% 50V CER
C24	C11-0009-103	CAP .01UF 20% 50V CER
C25	C11-0009-103	CAP .01UF 20% 50V CER
C26	C11-0009-103	CAP .01UF 20% 50V CER
C27	C24-1010-476	CAP 47UF RDL 10V ELEC
C28	C26-0010-100	CAP 10UF 20% 10V TANT

Table 2. A2 Audio PWB Assembly Parts List (10212-2210 Rev. H) (Cont.)

Ref. Desig.	Part Number	Description
C29	C11-0009-103	CAP .01UF 20% 50V CER
C30	C11-0009-103	CAP .01UF 20% 50V CER
C31	C11-0009-103	CAP .01UF 20% 50V CER
C32	C11-0009-472	CAP 4700PF 20% 50V CER
C33	C11-0009-472	CAP 4700PF 20% 50V CER
CP1	10212-3757	CAP SIP PACK
CR1	1N4454	DIODE 200MA 75V SW
J1	J46-0085-004	HDR STRAIGHT 4 POS
J2	J46-0086-010	HDR 10 PIN 2MM SR SHRD
J3	J62-0005-001	JK STEREO HEADPHONE
J4	J46-0086-010	HDR 10 PIN 2MM SR SHRD
J5	J46-0086-010	HDR 10 PIN 2MM SR SHRD
J6	J46-0086-003	HDR 3 PIN 2MM SR SHRD
J7	J46-0086-005	HDR 5 PIN 2MM SR SHRD
J8	J46-0086-005	HDR 5 PIN 2MM SR SHRD
JMP1	J65-0008-103	JMPR 2P FEM .10CNTR
JMP2	J65-0008-103	JMPR 2P FEM .10CNTR
L3	L-0652	COIL 1KUH 10% FXD RF
L4	MS90538-16	COIL 150UH 5% FXD RF
L5	MS90538-16	COIL 150UH 5% FXD RF
PS1	10212-2122	POWER SUPPLY
Q1	2N4393	XSTR JFET N-CH TO-18
R1	R65-0003-105	RES 1.0M 5% 1/4W CAR FILM
R2	R65-0003-104	RES 100K 5% 1/4W CAR FILM
R3	R65-0003-104	RES 100K 5% 1/4W CAR FILM
R4	R65-0003-822	RES 8.2K 5% 1/4W CAR FILM
R5	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R6	R65-0003-229	RES 2.2 5% 1/4W CAR FILM
R7	R65-0003-221	RES 220 5% 1/4W CAR FILM
R8	R65-0003-119	RES 1.1 5% 1/4W CAR FILM
R9	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R10	R65-0003-224	RES 220K 5% 1/4W CAR FILM
R11	R65-0003-221	RES 220 5% 1/4W CAR FILM
R12	R65-0003-473	RES 47K 5% 1/4W CAR FILM
R13	R65-0003-471	RES 470 5% 1/4W CAR FILM
R14	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R15	R65-0003-683	RES 68K 5% 1/4W CAR FILM
R16	R65-0003-103	RES 10K 5% 1/4W CAR FILM

Table 2. A2 Audio PWB Assembly Parts List (10212-2210 Rev. H) (Cont.)

Ref. Desig.	Part Number	Description
R17	R65-0003-333	RES 33K 5% 1/4W CAR FILM
R19	R65-0003-120	RES 12 5% 1/4W CAR FILM
R20	R65-0003-120	RES 12 5% 1/4W CAR FILM
R21	R65-0003-821	RES 820 5% 1/4W CAR FILM
R22	R65-0003-822	RES 8.2K 5% 1/4W CAR FILM
R23	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R24	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R25	R65-0003-273	RES 27K 5% 1/4W CAR FILM
R26	R65-0003-471	RES 470 5% 1/4W CAR FILM
R27	R65-0003-621	RES 620 5% 1/4W CAR FILM
R28	R65-0003-100	RES 10 5% 1/4W CAR FILM
R29	R65-0003-471	RES 470 5% 1/4W CAR FILM
U1	I32-0005-001	IC 2003 AUDIO AMP 10W HOR
U2	I30-0026-000	IC OP AMP DUAL 3358

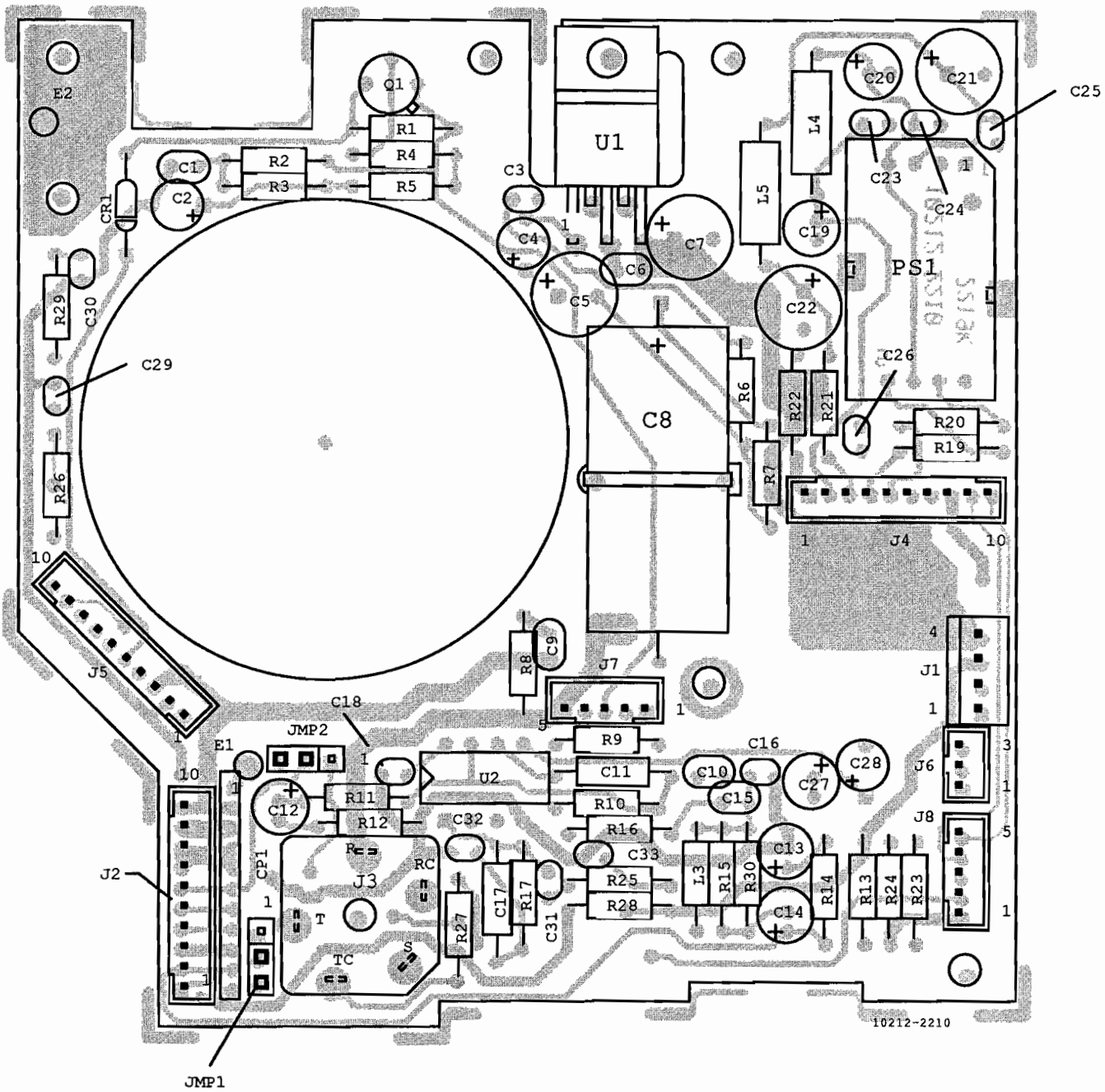


Figure 2. A2 Audio PWB Assembly Component Location Diagram (10212-2210 Rev. G)

NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, +/-5%.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY. COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.
5. ALL INDUCTOR VALUES ARE IN MICROHENRIES.

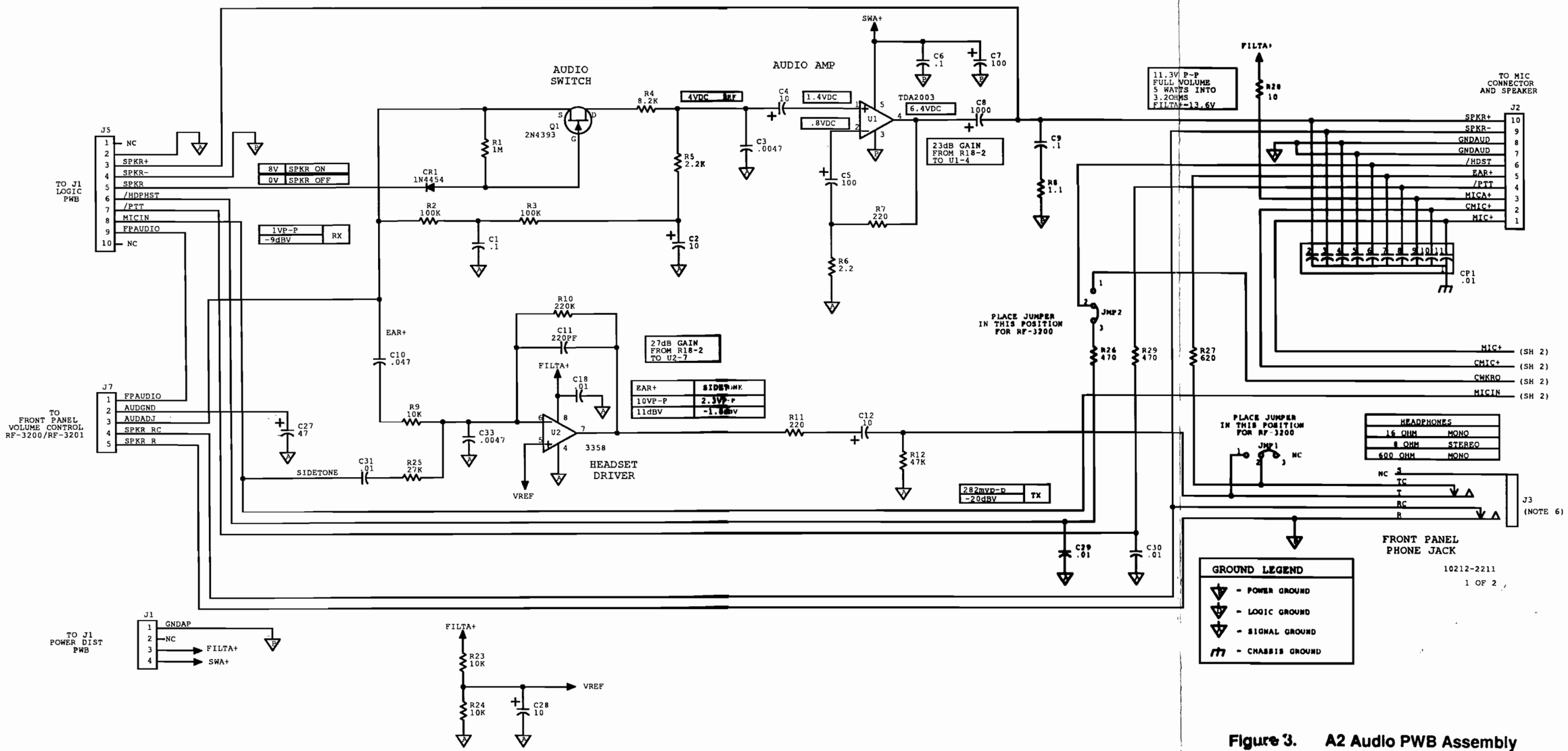


Figure 3. A2 Audio PWB Assembly Schematic Diagram (10212-2211 Rev. F) (Sheet 1 of 2)

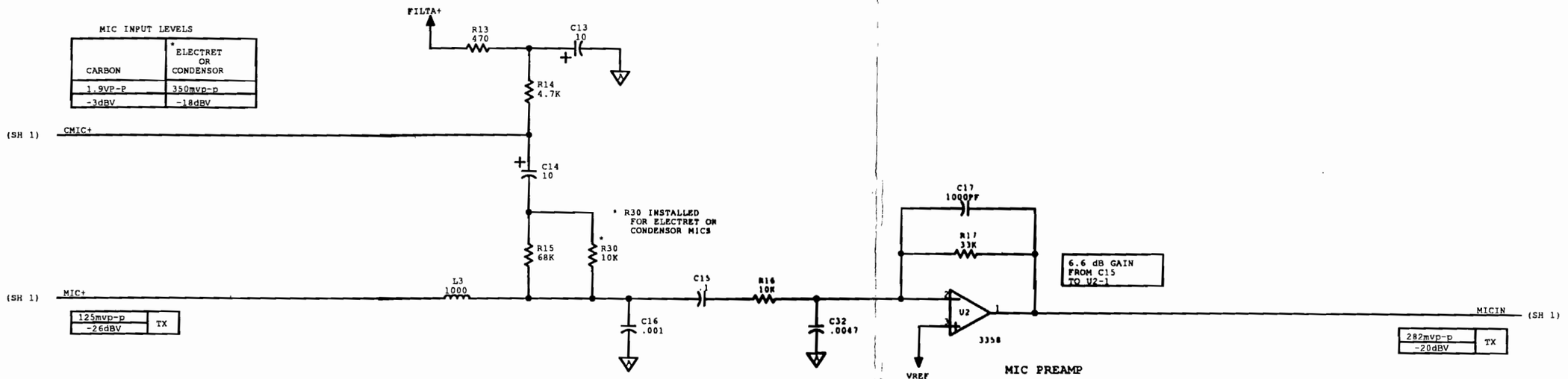


Figure 3. A2 Audio PWB Assembly Schematic Diagram (10212-2211 Rev. F) (Sheet 2 of 2)

A3
RECEIVER/EXCITER PWB ASSEMBLY

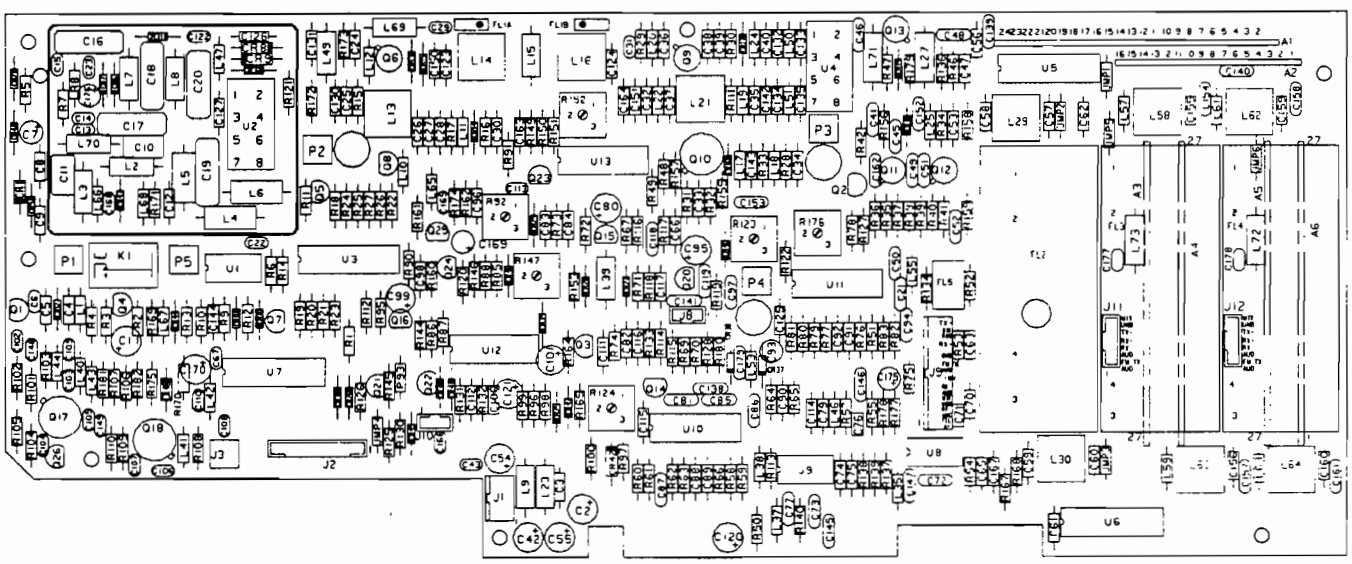


TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

A3 RECEIVER/EXCITER PWB ASSEMBLY
PART NUMBER 10212-1410

1. GENERAL DESCRIPTION

The A3 Receiver/Exciter (RX/EX) PWB Assembly provides:

- Receiver audio to the A7 Logic PWB Assembly from the detector
- RF drive from the exciter to the A5 Heatsink Assembly A5A1 PA PWB Assembly

Many of the stages on the assembly are common to the receive and transmit paths. The assembly comprises the IF (intermediate frequency) stage, the audio detection stage, the Automatic Gain Control (AGC) for the receiver, the Automatic Level Control (ALC) for the transmitter, the optional receiver noise blanker (if installed), and the audio amplifier.

2. FUNCTIONAL DESCRIPTION

2.1 Introduction

Refer to figure 1, the functional block diagram of the Receiver/Exciter PWB Assembly.

The A7 Logic circuity controls the Receiver/Exciter circuits using the serial data bus and control register U7. Integrated circuit U7 uses the serial clock (SERCLK) signal to time the input of serial data (SERDAT) bits. After every eight bits, the RCVRLD signal is pulsed, which latches the data on the eight parallel output lines. These lines directly control other circuits on the printed wiring board.

The transmit and receive signal paths have the following circuits in common:

- The LO3, LO2, and LO1 mixers, which perform frequency conversions
- 455 kHz and 70.455 MHz bandpass filters
- A pin diode attenuator (1 to 25 dB) controlled by the ALC circuit in the transmitter path and by the AGC circuit in the receiver path
- A 1.5 MHz high pass filter (HPF) and a 37 MHz low pass filter (LPF)

Most amplifier circuits are unique to either the transmit or receive path.

2.2 Receiver Signal Flow

NOTE

Refer to the A8 Synthesizer PWB Assembly tab section for the exact local oscillator frequencies in various modes.

In the receive audio path, an overload protection circuit (K1, controlled by Q1 and Q4) interrupts the RF input when its level exceeds 1.4 V_{rms}. CR43 and CR44 are pin diodes which route the receive signal from K1 to the 37 MHz low pass filter (L2, L3, L70, C10, C11), and the transmit signal to the exciter amplifier consisting of Q17, Q18, and their associated components.

From K1, the receive signal is routed through the 37 MHz low pass filter (C10-C12, L2, and L3), a variable attenuator with a range of 1 to 25 dB (C14, C15, pin diodes CR6 and CR7, R7, and R8), and a 1.5 MHz high pass filter (C16-C20, L7, and L8). The attenuation level is controlled by the receiver AGC voltage. When the receiver frequency is set to below 1.5 MHz, CR31 bypasses the high pass filter. The output is routed to mixer U2.

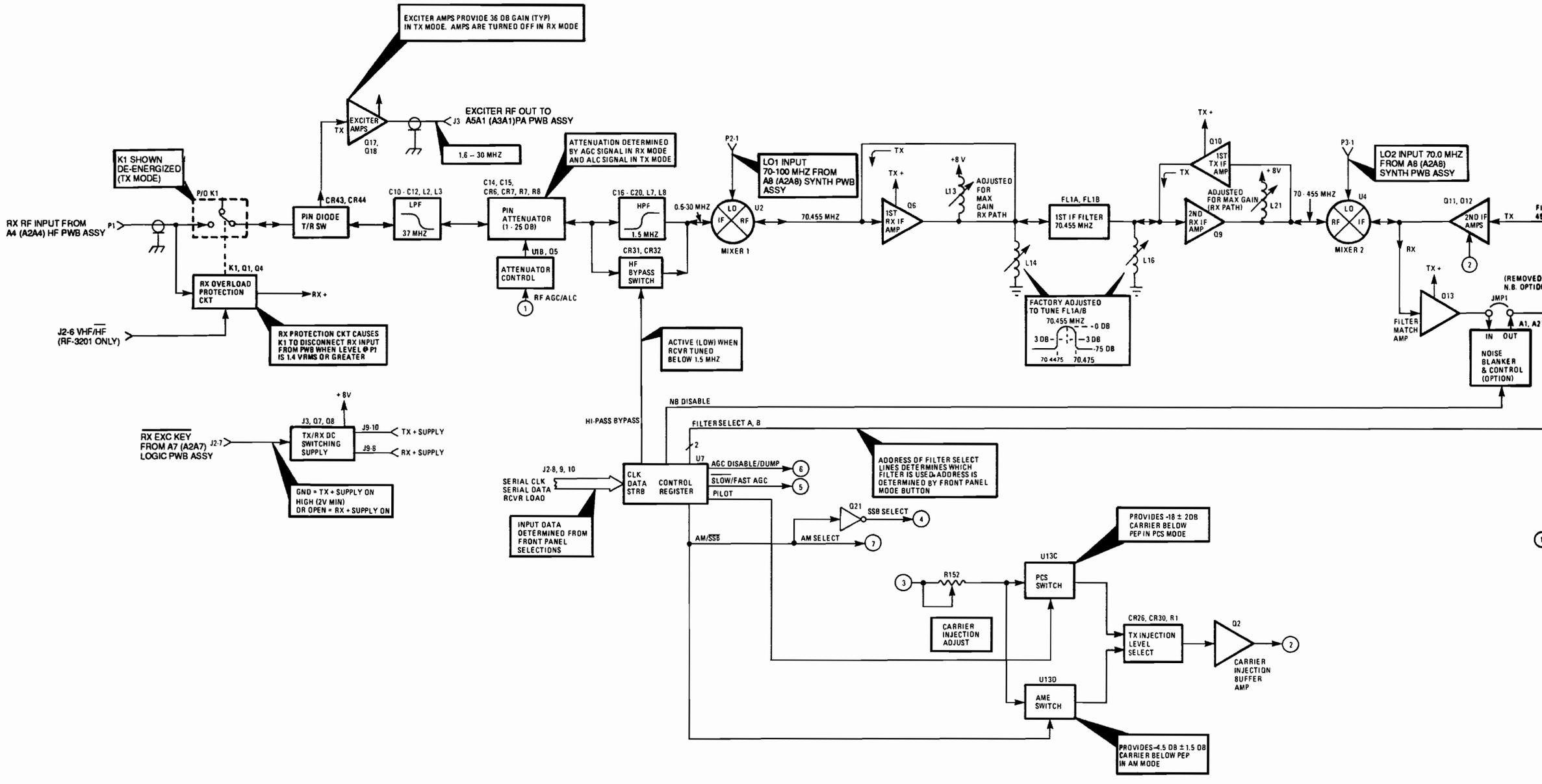
The RX signal path first intermediate frequency (IF) signal (70.455 MHz) is generated by mixing the output of the high pass filter with the output of LO1 (70 to 100 MHz nominal) from the A8 Synthesizer PWB. As with all mixers, the output of U2 comprises the two original input signals, and their arithmetic sum and difference frequencies. This composite signal is routed through an IF amplifier, Q6, and a filter (C123, L14, FL1A, L15, FL1B, C124, and L16). The filter has a passband wide enough to pass both sidebands, but narrow enough to remove the mixer inputs and the difference signal. The output of the filter is routed through another amplifier, Q9, to another mixer, U4.

U4 has two inputs: the 70.455 MHz receive IF input and the 70.0 MHz (nominal) signal LO2 from the synthesizer PWB assembly. The resultant 455 kHz difference signal (as well as original inputs and sum signal), is routed through Q13, an impedance matching amplifier, and an optional noise blanker circuit to the filter select switch (U5) preceding the input of the mode filters.

Two mode filters are standard: the SSB filter with a passband from 452.3 kHz to 454.7 kHz, and an AM filter with a passband of 452 kHz to 458 kHz. The SSB filter can be used to select either LSB or USB by altering the frequencies of the LO2 and LO3 inputs so that the proper sideband falls within the filter passband. (The transceiver does this automatically when the respective mode is selected.) The same filter is used in CW mode and/or Data mode if an optional filter for either of these modes is not installed. The CW filter provides a narrow passband (453.8 kHz to 455.15 kHz) which improves the effective signal to noise ratio in that mode. The data filter has a 2.8 kHz passband which allows higher data speeds than permitted by the narrow passband of the CW filter. The outputs of the mode filters are routed through another filter select switch (U6) to the two amplifiers, U8 and U9.

The 455 kHz output of U9 is routed in parallel to an SSB product detector (U10), a detector pre-amplifier (Q14), and an AM detector (Q15). The output of the pre-amplifier also is routed, via amplifier Q20, externally as a filtered IF output. The SSB detector, which also requires a 455 kHz (nominal) LO3 input from the synthesizer PWB assembly, is used in all modes except AM. The AM detector is used as such only in AM mode, but it generates the AGC signal in all modes. Parts of U13, controlled by the transceiver mode, switch one detector's output to audio buffer Q23. The output of Q23 is routed to the A7 Logic PWB Assembly via J2-4.

U12, Q3, Q16, Q22, Q24, and Q25 comprise the receiver AGC circuit which controls the attenuation level of the 1 to 25 dB attenuator, near the beginning of the receive signal path, and of U8 and U9 in the 455 kHz IF path. The AGC timing constants reduce receiver gain within 5 msec (attack time) after the introduction of a stronger signal, while its decay time (to increase receiver gain after the signal becomes weaker) can be either 200 msec (fast AGC), or an adjustable value normally set to 1.5 sec (slow AGC). A provision is also made for manual gain control which can reduce the receiver's gain below what the AGC permits. The AGC circuit also provides the drive signal for the front panel receive S-meter.


EXCITER AMPS PROVIDE 36 DB GAIN (TYP) IN TX MODE. AMPS ARE TURNED OFF IN RX MODE
EXCITER AMPS
TX
Q17, Q18
EXCITER RF OUT TO A5A1 (A3A1)PA PWB ASSY
J3
1.6 – 30 MHZ
K1 SHOWN DE-ENERGIZED (TX MODE)
P/O K1
RX RF INPUT FROM A4 (A2A4) HF PWB ASSY
P1
CR43, CR44
PIN DIODE T/R SW
C10 - C12, L2, L3
LPF
37 MHZ
C14, C15, CR6, CR7, R7, R8
PIN ATTENUATOR (1 - 25 DB)
ATTENUATION DETERMINED BY AGC SIGNAL IN RX MODE AND ALC SIGNAL IN TX MODE
U1B, Q5
ATTENUATOR CONTROL
RF AGC/ALC
1
C16 - C20, L7, L8
HPF
1.5 MHZ
CR31, CR32
HF BYPASS SWITCH
0.5-30 MHZ
P2-1
LO1 INPUT 70-100 MHZ FROM A8 (A2A8) SYNTH PWB ASSY
LO
IF
RF
U2
MIXER 1
70.455 MHZ
TX
TX +
Q6
1ST RX IF AMP
+8 V
L13
ADJUSTED FOR MAX GAIN RX PATH
FL1A, FL1B
1ST IF FILTER 70.455 MHZ
L14
L16
FACTORY ADJUSTED TO TUNE FL1A/B
70.455 MHZ
-0 DB
3 DB
-3 DB
-75 DB
70.4475
70.475
TX +
Q10
1ST TX IF AMP
TX
ADJUSTED FOR MAX GAIN (RX PATH)
+8V
L21
2ND RX IF AMP
Q9
70.455 MHZ
P3-1
LO2 INPUT 70.0 MHZ FROM A8 (A2A8) SYNTH PWB ASSY
U4
LO
RF
IF
MIXER 2
Q11, Q12
2ND IF AMPS
TX
RX
2
TX +
Q13
FILTER MATCH AMP
JMP1
A1, A2
IN OUT
NOISE BLANKER & CONTROL (OPTION)
(REMOVED N.B. OPTION)
RX OVERLOAD PROTECTION CKT
K1, Q1, Q4
RX +
RX PROTECTION CKT CAUSES K1 TO DISCONNECT RX INPUT FROM PWB WHEN LEVEL @ P1 IS 1.4 VRMS OR GREATER
J2-6 VHF/HF (RF-3201 ONLY)
ACTIVE (LOW) WHEN RCVR TUNED BELOW 1.5 MHZ
NB DISABLE
HI-PASS BYPASS
FILTER SELECT A, B
2
U7
ADDRESS OF FILTER SELECT LINES DETERMINES WHICH FILTER IS USED& ADDRESS IS DETERMINED BY FRONT PANEL MODE BUTTON
J2-8, 9, 10
SERIAL CLK
SERIAL DATA
RCVR LOAD
CLK
DATA
STRB
CONTROL REGISTER
AGC DISABLE/DUMP
6
SLOW/FAST AGC
5
PILOT
INPUT DATA DETERMINED FROM FRONT PANEL SELECTIONS
Q21
SSB SELECT
4
AM/SSB
AM SELECT
7
+8V
J3, Q7, Q8
TX/RX DC SWITCHING SUPPLY
J9-10
TX + SUPPLY
J9-8
RX + SUPPLY
RX EXC KEY FROM A7 (A2A7) LOGIC PWB ASSY
J2-7
GND = TX + SUPPLY ON
HIGH (2V MIN) OR OPEN = RX + SUPPLY ON
3
R152
CARRIER INJECTION ADJUST
U13C
PCS SWITCH
PROVIDES -18 ± 2DB CARRIER BELOW PEP IN PCS MODE
CR26, CR30, R1
TX INJECTION LEVEL SELECT
Q2
CARRIER INJECTION BUFFER AMP
2
U13D
AME SWITCH
PROVIDES -4.5 DB ± 1.5 DB CARRIER BELOW PEP IN AM MODE

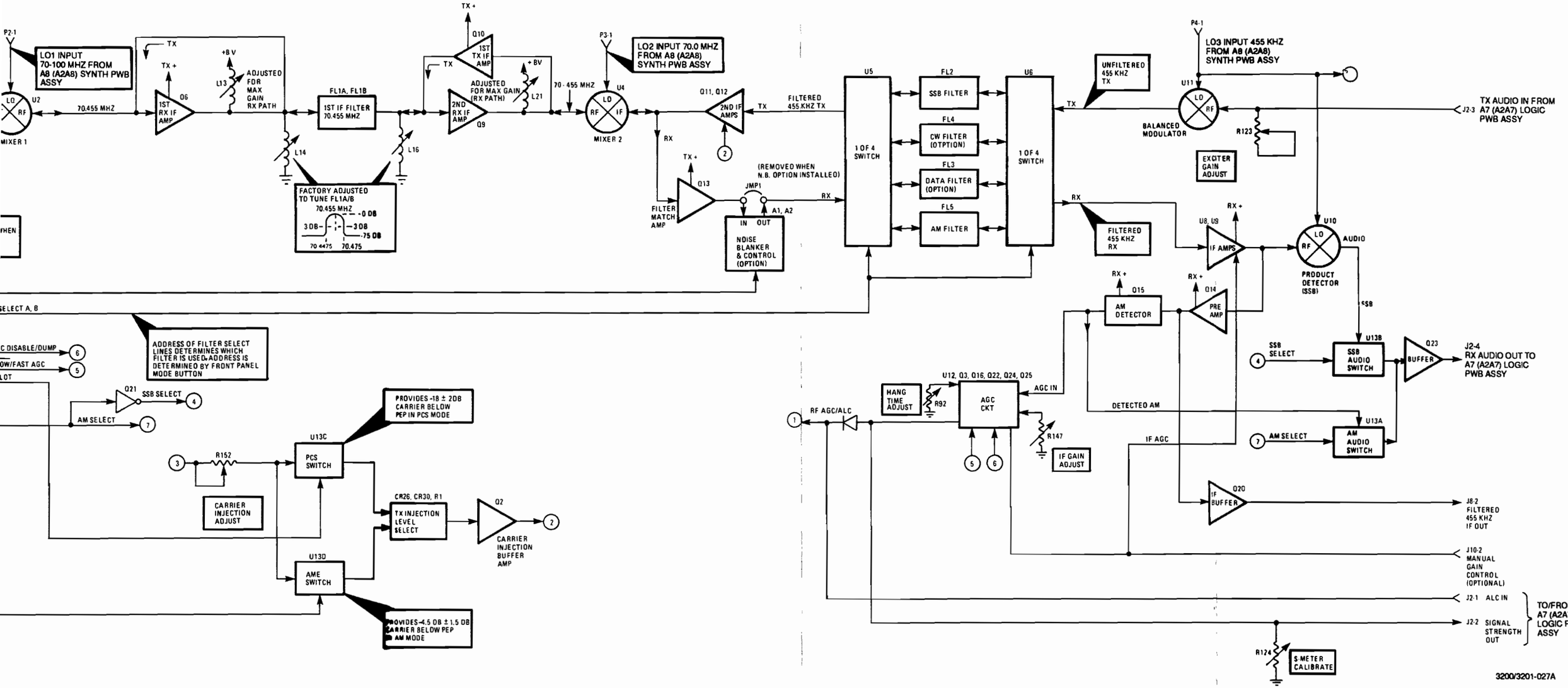


Figure 1. Receiver/Exciter PWB Assembly Functional Block Diagram

2.3 Exciter Signal Flow

The audio signal, which ultimately modulates the transmitted RF output, enters the PWB at J2-3 from the logic PWB assembly, and its level is controlled by R123. The signal is routed to the balanced modulator U11, which also accepts the 455 kHz (nominal) LO3 signal from the synthesizer PWB assembly. The resultant output is a double sideband (DSB) sum and difference signal, representing both upper and lower sidebands. No 455 kHz carrier is at the output, as the carrier frequency is cancelled out in a balanced modulator. This DSB signal is routed, via parts of mode switches U6 and U5, to the mode filters, FL2 through FL5. FL2 through FL4 remove one sideband, while FL5 passes both sidebands. The output of the selected filter is routed to the transmit IF amplifiers Q12 and Q11. In AM mode, a carrier of 455 kHz is added to the sideband signal at the input of Q11. The output of Q11 is routed to the balanced mixer U4.

The other input to U4 is LO2 with a frequency of approximately 70 MHz. The output of U4 is an SSB signal (with carrier if AM mode is selected) at approximately 70.455 MHz. This signal is routed, via transmit IF amplifier Q10, to bandpass filters FL1A and FL1B (with L16, C124, L15, L14, and C123). The output of the filter is routed directly to mixer U2.

The other input to U2 is the signal from LO1; its frequency varies from 70 to 100 MHz depending on the ultimate frequency of transmission. The useful component of the output from U2 is the difference signal in the range of 1.6 to 30 MHz; the undesired component is removed by the 37 MHz low pass filter. These two filters are separated by the 1 to 25 dB attenuator which, while in transmit mode, is controlled by the ALC signal from the A7 Logic PWB Assembly. In transmit mode, T/R (transmit/receive) switches CR43 and CR44 route the signal to exciter amplifiers Q17 and Q18, then to the A5A1 Power Amplifier PWB Assembly.

3. INTERCONNECTIONS

Table 1 lists the interconnection of the A3 Receiver/Exciter PWB Assembly. The table can be used as an aid for tracing signals to and from the PWB. For complete details, refer to the radio interconnect diagram.

Table 1. A3 Receiver/Exciter PWB Assembly Interconnections

Connector	Signal Function	Connection
J1	DC Power	Power Distribution PWB A5A2J2 via A2W6
J2	Control, TX and RX Audio	Logic PWB Assy A2A7J5 via A2W8
J3	Exciter RF Output	PA PWB A5A1J3 via A2W11
J8	455 kHz IF Output	Not used
J9	Various Test Points	Not used
J10	Manual RX Gain Control	Gain Control (option)
P2	LO1 Input	Synthesizer PWB A2A8P2 via A2W13
P3	LO2 Input	Synthesizer PWB A2A8P3 via A2W14
P4	LO3 Input	Synthesizer PWB A2A8P4 via A2W15

4. PARTS LIST, COMPONENT LOCATION DIAGRAM, AND SCHEMATIC DIAGRAM

Table 2 is the parts list of the A3 Receiver/Exciter PWB Assembly. Figure 2 is the component location diagram, and figure 3 is the schematic diagram.

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL)

Ref. Desig	Part Number	Description
	10212-1415	SHIELD
C1	C26-0025-100	CAP 10UF 20% 25V TANT
C2	C26-0025-100	CAP 10UF 20% 25V TANT
C3	C12-0001-056	CAP .01UF 30% 25V CER
C4	C12-0001-056	CAP .01UF 30% 25V CER
C5	C12-0001-056	CAP .01UF 30% 25V CER
C6	C11-0005-104	CAP .1UF 20% 50V CER
C7	C26-0025-100	CAP 10UF 20% 25V TANT
C8	C12-0001-013	CAP 10PF 5% 25V CER
C9	C12-0001-019	CAP 18PF 5% 25V CER
C10	C-0128	CAP 120PF 5% 500V MICA
C11	C-0128	CAP 120PF 5% 500V MICA
C13	C11-0005-104	CAP .1UF 20% 50V CER
C14	C11-0005-104	CAP .1UF 20% 50V CER
C15	C11-0005-104	CAP .1UF 20% 50V CER
C16	C-0156	CAP 1500PF 5% 500V MICA
C17	C-0171	CAP,5100PF 5% 500V
C18	C-0152	CAP 1000PF 5% 500V MICA
C19	C-0165	CAP 3300PF 5% 500V MICA
C20	C-0163	CAP 2700PF 5% 500V MICA
C21	C11-0005-474	CAP .47UF 20% 50V CER
C22	C11-0005-104	CAP .1UF 20% 50V CER
C23	C11-0005-104	CAP .1UF 20% 50V CER
C24	C12-0001-025	CAP 33PF 5% 25V CER
C25	C12-0001-049	CAP 1000PF 20% 25V CER
C26	C12-0001-049	CAP 1000PF 20% 25V CER
C27	C12-0001-007	CAP 3.3PF 10% 25V CER
C28	C12-0001-017	CAP 15PF 5% 25V CER
C29	C11-0015-056	CAP 5.6PF 5% 63V CER
C30	C12-0001-049	CAP 1000PF 20% 25V CER
C31	C11-0015-056	CAP 5.6PF 5% 63V CER
C32	C12-0001-049	CAP 1000PF 20% 25V CER
C33	C12-0001-049	CAP 1000PF 20% 25V CER
C34	C12-0001-049	CAP 1000PF 20% 25V CER
C35	C12-0001-049	CAP 1000PF 20% 25V CER
C36	C12-0001-049	CAP 1000PF 20% 25V CER
C37	C12-0001-049	CAP 1000PF 20% 25V CER
C38	C12-0001-007	CAP 3.3PF 10% 25V CER
C39	C12-0001-023	CAP 27PF 5% 25V CER

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL) (Cont.)

Ref. Desig	Part Number	Description
C40	C12-0001-049	CAP 1000PF 20% 25V CER
C41	C11-0005-474	CAP .47UF 20% 50V CER
C42	C26-0025-100	CAP 10UF 20% 25V TANT
C43	C11-0005-104	CAP .1UF 20% 50V CER
C45	C11-0005-474	CAP .47UF 20% 50V CER
C46	C11-0005-474	CAP .47UF 20% 50V CER
C47	C12-0001-039	CAP 150PF 10% 25V CER
C48	C11-0005-474	CAP .47UF 20% 50V CER
C49	C11-0005-474	CAP .47UF 20% 50V CER
C50	C11-0005-474	CAP .47UF 20% 50V CER
C51	C11-0005-474	CAP .47UF 20% 50V CER
C52	C11-0005-474	CAP .47UF 20% 50V CER
C53	C12-0001-056	CAP .01UF 30% 25V CER
C54	C26-0025-100	CAP 10UF 20% 25V TANT
C55	C26-0025-100	CAP 10UF 20% 25V TANT
C56	C12-0001-056	CAP .01UF 30% 25V CER
C57	C12-0001-023	CAP 27PF 5% 25V CER
C58	C12-0001-056	CAP .01UF 30% 25V CER
C59	C12-0001-056	CAP .01UF 30% 25V CER
C60	C12-0001-023	CAP 27PF 5% 25V CER
C61	C12-0001-056	CAP .01UF 30% 25V CER
C62	C12-0001-056	CAP .01UF 30% 25V CER
C63	C12-0001-056	CAP .01UF 30% 25V CER
C65	C12-0001-013	CAP 10PF 5% 25V CER
C66	C12-0001-056	CAP .01UF 30% 25V CER
C67	C11-0005-104	CAP .1UF 20% 50V CER
C70	C12-0001-056	CAP .01UF 30% 25V CER
C71	M39014/01-1317V	CAP,1000PF,10% 200VC
C72	C11-0005-474	CAP .47UF 20% 50V CER
C73	C11-0005-474	CAP .47UF 20% 50V CER
C74	C12-0001-056	CAP .01UF 30% 25V CER
C75	C12-0001-056	CAP .01UF 30% 25V CER
C76	M39014/01-1317V	CAP,1000PF,10% 200VC
C77	C11-0005-474	CAP .47UF 20% 50V CER
C79	C12-0001-043	CAP 330PF 10% 25V CER
C80	C26-0025-100	CAP 10UF 20% 25V TANT
C81	C11-0005-474	CAP .47UF 20% 50V CER
C82	C12-0001-056	CAP .01UF 30% 25V CER
C83	C12-0001-056	CAP .01UF 30% 25V CER

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL) (Cont.)

Ref. Desig	Part Number	Description
C84	C12-0001-056	CAP .01UF 30% 25V CER
C85	C11-0005-474	CAP .47UF 20% 50V CER
C86	C11-0005-474	CAP .47UF 20% 50V CER
C87	C11-0005-474	CAP .47UF 20% 50V CER
C88	C12-0001-056	CAP .01UF 30% 25V CER
C89	C12-0001-056	CAP .01UF 30% 25V CER
C90	C12-0001-056	CAP .01UF 30% 25V CER
C91	C12-0001-056	CAP .01UF 30% 25V CER
C92	C12-0001-056	CAP .01UF 30% 25V CER
C93	C26-0010-100	CAP 10UF 20% 10V TANT
C94	C11-0005-474	CAP .47UF 20% 50V CER
C95	C26-0010-100	CAP 10UF 20% 10V TANT
C96	C12-0001-056	CAP .01UF 30% 25V CER
C97	C11-0005-474	CAP .47UF 20% 50V CER
C98	C12-0001-037	CAP 100PF 5% 25V CER
C99	C26-0050-109	CAP 1.0UF 20% 50V TANT
C100	C12-0001-056	CAP .01UF 30% 25V CER
C101	C26-0016-150	CAP 15UF 20% 16V TANT
C102	C11-0005-104	CAP .1UF 20% 50V CER
C103	C11-0005-104	CAP .1UF 20% 50V CER
C104	C11-0005-104	CAP .1UF 20% 50V CER
C105	C11-0005-104	CAP .1UF 20% 50V CER
C106	C11-0005-104	CAP .1UF 20% 50V CER
C107	C11-0005-104	CAP .1UF 20% 50V CER
C108	C11-0005-104	CAP .1UF 20% 50V CER
C109	C11-0005-104	CAP .1UF 20% 50V CER
C110	C11-0005-104	CAP .1UF 20% 50V CER
C111	C12-0001-056	CAP .01UF 30% 25V CER
C112	C12-0001-056	CAP .01UF 30% 25V CER
C113	C11-0005-104	CAP .1UF 20% 50V CER
C114	C12-0001-039	CAP 150PF 10% 25V CER
C115	C12-0001-056	CAP .01UF 30% 25V CER
C116	C12-0001-045	CAP 470PF 10% 25V CER
C118	C11-0005-474	CAP .47UF 20% 50V CER
C119	C11-0005-474	CAP .47UF 20% 50V CER
C120	C26-0025-100	CAP 10UF 20% 25V TANT
C121	C26-0050-109	CAP 1.0UF 20% 50V TANT
C122	C11-0005-104	CAP .1UF 20% 50V CER
C123	C12-0001-017	CAP 15PF 5% 25V CER

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL) (Cont.)

Ref. Desig	Part Number	Description
C124	C12-0001-017	CAP 15PF 5% 25V CER
C125	C12-0001-056	CAP .01UF 30% 25V CER
C130	C12-0001-023	CAP 27PF 5% 25V CER
C131	C12-0001-023	CAP 27PF 5% 25V CER
C138	C11-0005-474	CAP .47UF 20% 50V CER
C139	C11-0005-474	CAP .47UF 20% 50V CER
C140	C11-0005-474	CAP .47UF 20% 50V CER
C141	C11-0005-474	CAP .47UF 20% 50V CER
C142	C12-0001-056	CAP .01UF 30% 25V CER
C143	C12-0001-056	CAP .01UF 30% 25V CER
C144	C12-0001-023	CAP 27PF 5% 25V CER
C145	C11-0005-474	CAP .47UF 20% 50V CER
C146	C11-0005-474	CAP .47UF 20% 50V CER
C147	C11-0005-474	CAP .47UF 20% 50V CER
C148	C11-0005-104	CAP .1UF 20% 50V CER
C149	C11-0005-104	CAP .1UF 20% 50V CER
C150	C12-0001-025	CAP 33PF 5% 25V CER
C151	C12-0001-025	CAP 33PF 5% 25V CER
C152	C11-0005-474	CAP .47UF 20% 50V CER
C153	C11-0005-474	CAP .47UF 20% 50V CER
C162	C11-0005-474	CAP .47UF 20% 50V CER
C163	C12-0001-049	CAP 1000PF 20% 25V CER
C164	C12-0001-049	CAP 1000PF 20% 25V CER
C165	C11-0005-104	CAP .1UF 20% 50V CER
C166	C11-0005-104	CAP .1UF 20% 50V CER
C167	C12-0001-056	CAP .01UF 30% 25V CER
C168	C11-0005-104	CAP .1UF 20% 50V CER
C169	C26-0016-150	CAP 15UF 20% 16V TANT
C176	C26-0025-100	CAP 10UF 20% 25V TANT
C179	C11-0005-474	CAP .47UF 20% 50V CER
CR1	1N4004	DIODE 1A 400V RECT GP
CR2	1N4454	DIODE 200MA 75V SW
CR4	1N4454	DIODE 200MA 75V SW
CR5	1N4454	DIODE 200MA 75V SW
CR6	CR-0294	DIODE .25W 100V PIN CCR
CR7	CR-0294	DIODE .25W 100V PIN CCR
CR8	1N4150	DIODE
CR9	1N4150	DIODE
CR10	CR-0294	DIODE .25W 100V PIN CCR

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL) (Cont.)

Ref. Desig	Part Number	Description
CR11	CR-0294	DIODE .25W 100V PIN CCR
CR12	1N4454	DIODE 200MA 75V SW
CR13	D10-3500-000	DIODE .25W 35V PIN BSW
CR14	1N4454	DIODE 200MA 75V SW
CR15	D10-3500-000	DIODE .25W 35V PIN BSW
CR16	1N4454	DIODE 200MA 75V SW
CR17	D10-3500-000	DIODE .25W 35V PIN BSW
CR18	1N4454	DIODE 200MA 75V SW
CR19	1N4454	DIODE 200MA 75V SW
CR25	1N4454	DIODE 200MA 75V SW
CR26	1N4454	DIODE 200MA 75V SW
CR27	1N4454	DIODE 200MA 75V SW
CR28	1N4454	DIODE 200MA 75V SW
CR29	1N4454	DIODE 200MA 75V SW
CR30	1N4454	DIODE 200MA 75V SW
CR31	1N4454	DIODE 200MA 75V SW
CR32	1N4454	DIODE 200MA 75V SW
CR35	1N4454	DIODE 200MA 75V SW
CR37	1N4454	DIODE 200MA 75V SW
CR38	1N4454	DIODE 200MA 75V SW
CR40	1N4454	DIODE 200MA 75V SW
CR42	1N5226B	DIODE 3.3V 5% .5W ZENER
CR43	1N5767	PIN DIODE
CR44	1N5767	PIN DIODE
CR45	1N4454	DIODE 200MA 75V SW
CR46	1N4454	DIODE 200MA 75V SW
CR47	1N4454	DIODE 200MA 75V SW
CR48	1N4004	DIODE 1A 400V RECT GP
FL1	10212-1422	FILTER IF 70.455 MHZ
FL2	10212-1423	FILTER IF 455 KHZ
FL5	10212-1421	FILTER AM
J1	J46-0085-004	HDR STRAIGHT 4 POS
J2	J46-0086-010	HDR 10 PIN 2MM SR SHRD
J3	J-0031	CONN SMB VERT PCB F
J8	J46-0086-003	HDR 3 PIN 2MM SR SHRD
J9	J46-0085-010	HDR STRAIGHT 10 POS
JMP1	MP-1142	RES ZERO OHM (CKT JMPR)
JMP2	MP-1142	RES ZERO OHM (CKT JMPR)
JMP3	MP-1142	RES ZERO OHM (CKT JMPR)

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL) (Cont.)

Ref. Desig	Part Number	Description
JMP4	MP-1142	RES ZERO OHM (CKT JMPR)
K1	K28-0002-001	RELAY SPDT PCMNT 12VDC
L1	MS75085-7	COIL 100UH 10% FXD RF
L2	MS18130-2	COIL .22UH 20% FXD RF
L3	MS18130-4	COIL .47UH 10% FXD RF
L4	MS90539-07	COIL 470UH 5% FXD RF
L5	MS90539-07	COIL 470UH 5% FXD RF
L6	MS90539-07	COIL 470UH 5% FXD RF
L7	10212-1441	INDUCTOR MOLDED, 8.2UH
L8	10212-1441	INDUCTOR MOLDED, 8.2UH
L9	MS18130-8	COIL 1.0UH 10% FXD RF
L10	MS75084-12	COIL 10UH 10% FXD RF
L11	L-0608	COIL .22UH 10% FXD RF
L12	L-0608	COIL .22UH 10% FXD RF
L13	L11-0006-007	COIL VARIABLE PCB .68UH
L14	L11-0006-004	COIL VARIABLE PCB .22UH
L15	MS18130-11	COIL 1.8UH 10% FXD RF
L16	L11-0006-004	COIL VARIABLE PCB .22UH
L17	MS75084-12	COIL 10UH 10% FXD RF
L18	MS75083-12	COIL .82UH 10% FXD RF
L19	MS75084-12	COIL 10UH 10% FXD RF
L20	L-0608	COIL .22UH 10% FXD RF
L21	L11-0006-007	COIL VARIABLE PCB .68UH
L22	MS75084-12	COIL 10UH 10% FXD RF
L23	MS18130-8	COIL 1.0UH 10% FXD RF
L24	MS75084-12	COIL 10UH 10% FXD RF
L25	L-0652	COIL 1KUH 10% FXD RF
L35	L-0652	COIL 1KUH 10% FXD RF
L37	L-0652	COIL 1KUH 10% FXD RF
L38	L-0652	COIL 1KUH 10% FXD RF
L39	L-0652	COIL 1KUH 10% FXD RF
L40	MS75085-16	COIL 560UH 10% FXD RF
L41	MS75084-3	COIL 1.8UH 10% FXD RF
L42	MS75085-16	COIL 560UH 10% FXD RF
L43	MS75085-16	COIL 560UH 10% FXD RF
L44	MS75084-1	COIL 1.2UH 10% FXD RF
L46	MS75085-12	COIL 270UH 10% FXD RF
L47	MP-1142	RES ZERO OHM (CKT JMPR)
L49	MS75087-4	COIL .18UH 10% FXD RF

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL) (Cont.)

Ref. Desig	Part Number	Description
L50	MP-1142	RES ZERO OHM (CKT JMPR)
L51	MP-1142	RES ZERO OHM (CKT JMPR)
L53	L-0652	COIL 1KUH 10% FXD RF
L55	L-0652	COIL 1KUH 10% FXD RF
L65	MS75085-7	COIL 100UH 10% FXD RF
L66	MS75085-7	COIL 100UH 10% FXD RF
L67	MS75085-7	COIL 100UH 10% FXD RF
L68	MS75085-7	COIL 100UH 10% FXD RF
L69	MS75087-4	COIL .18UH 10% FXD RF
L70	MS18130-2	COIL .22UH 20% FXD RF
L71	MS75089-23	COIL 1000UH 10% FXD RF
P1	J-0031	CONN SMB VERT PCB F
P2	J-0031	CONN SMB VERT PCB F
P3	J-0031	CONN SMB VERT PCB F
P4	J-0031	CONN SMB VERT PCB F
P5	J-0031	CONN SMB VERT PCB F
Q1	2N4124	XSTR SS/GP NPN TO-92
Q2	2N4124	XSTR SS/GP NPN TO-92
Q3	2N4124	XSTR SS/GP NPN TO-92
Q4	Q-0076	XSTR DARL NPN MPS-A13
Q5	2N4124	XSTR SS/GP NPN TO-92
Q6	Q35-0003-000	XSTR N-CH JFET U310
Q7	2N4126	XSTR SS/GP PNP TO-92
Q8	2N4126	XSTR SS/GP PNP TO-92
Q9	Q35-0003-000	XSTR N-CH JFET U310
Q10	2N5109	XSTR RF PWR NPN TO-39
Q11	2N2222A	XSTR SS/GP NPN TO-18
Q12	Q35-0003-000	XSTR N-CH JFET U310
Q13	Q35-0003-000	XSTR N-CH JFET U310
Q14	2N4124	XSTR SS/GP NPN TO-92
Q15	2N4124	XSTR SS/GP NPN TO-92
Q16	2N4124	XSTR SS/GP NPN TO-92
Q17	2N5109	XSTR RF PWR NPN TO-39
Q18	Q25-0014-000	XSTR RF VHF 4W MRF237
Q20	Q-0076	XSTR DARL NPN MPS-A13
Q21	2N4124	XSTR SS/GP NPN TO-92
Q22	Q-0076	XSTR DARL NPN MPS-A13
Q23	2N4124	XSTR SS/GP NPN TO-92
Q24	2N4124	XSTR SS/GP NPN TO-92

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL) (Cont.)

Ref. Desig	Part Number	Description
Q25	2N4126	XSTR SS/GP PNP TO-92
Q26	2N4401	XSTR SS/GP NPN TO-92
R1	R65-0003-752	RES 7.5K 5% 1/4W CAR FILM
R2	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R3	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R4	R65-0003-104	RES 100K 5% 1/4W CAR FILM
R5	R65-0003-104	RES 100K 5% 1/4W CAR FILM
R6	RN55D1301F	RES 1300 1% 1/8W MET FLM
R7	R65-0003-510	RES 51 5% 1/4W CAR FILM
R8	R65-0003-510	RES 51 5% 1/4W CAR FILM
R9	R65-0003-392	RES 3.9K 5% 1/4W CAR FILM
R10	R65-0003-331	RES 330 5% 1/4W CAR FILM
R11	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R12	RN55D4321F	RES 4320 1% 1/8W MET FLM
R13	RN55D1271F	RES 1270 1% 1/8W MET FLM
R14	RN55D7501F	RES 7500 1% 1/8W MET FLM
R15	R65-0003-331	RES 330 5% 1/4W CAR FILM
R16	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R17	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R18	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R19	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R20	R65-0003-473	RES 47K 5% 1/4W CAR FILM
R21	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R22	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R23	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R24	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R25	R65-0003-473	RES 47K 5% 1/4W CAR FILM
R26	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R27	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R28	R65-0003-821	RES 820 5% 1/4W CAR FILM
R29	R65-0003-331	RES 330 5% 1/4W CAR FILM
R30	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R31	R65-0003-339	RES 3.3 5% 1/4W CAR FILM
R32	R65-0003-910	RES 91 5% 1/4W CAR FILM
R33	R65-0003-511	RES 510 5% 1/4W CAR FILM
R34	R65-0003-301	RES 300 5% 1/4W CAR FILM
R35	R65-0003-689	RES 6.8 5% 1/4W CAR FILM
R36	R65-0003-101	RES 100 5% 1/4W CAR FILM
R37	R65-0003-431	RES 430 5% 1/4W CAR FILM

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL) (Cont.)

Ref. Desig	Part Number	Description
R38	R65-0003-681	RES 680 5% 1/4W CAR FILM
R39	R65-0003-510	RES 51 5% 1/4W CAR FILM
R40	R65-0003-221	RES 220 5% 1/4W CAR FILM
R41	R65-0003-512	RES 5.1K 5% 1/4W CAR FILM
R42	R65-0003-121	RES 120 5% 1/4W CAR FILM
R46	R65-0003-682	RES 6.8K 5% 1/4W CAR FILM
R47	R65-0003-224	RES 220K 5% 1/4W CAR FILM
R48	RN55D6492F	RES 64.9K 1% 1/8W MET FLM
R49	RN55D4321F	RES 4320 1% 1/8W MET FLM
R50	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R51	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R52	R65-0003-362	RES 3.6K 5% 1/4W CAR FILM
R53	R65-0003-362	RES 3.6K 5% 1/4W CAR FILM
R54	R65-0003-122	RES 1.2K 5% 1/4W CAR FILM
R55	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R57	R65-0003-153	RES 15K 5% 1/4W CAR FILM
R58	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R59	R65-0003-821	RES 820 5% 1/4W CAR FILM
R60	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R61	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R62	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R63	R65-0003-331	RES 330 5% 1/4W CAR FILM
R64	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R65	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R66	R65-0003-682	RES 6.8K 5% 1/4W CAR FILM
R67	R65-0003-101	RES 100 5% 1/4W CAR FILM
R69	R65-0003-330	RES 33 5% 1/4W CAR FILM
R70	R65-0003-331	RES 330 5% 1/4W CAR FILM
R71	R65-0003-822	RES 8.2K 5% 1/4W CAR FILM
R72	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R73	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R74	R65-0003-223	RES 22K 5% 1/4W CAR FILM
R75	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R76	R65-0003-223	RES 22K 5% 1/4W CAR FILM
R77	R65-0003-682	RES 6.8K 5% 1/4W CAR FILM
R78	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R79	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R80	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R81	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL) (Cont.)

Ref. Desig	Part Number	Description
R82	R65-0003-821	RES 820 5% 1/4W CAR FILM
R83	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R85	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R86	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R87	R65-0003-184	RES 180K 5% 1/4W CAR FILM
R88	R65-0003-122	RES 1.2K 5% 1/4W CAR FILM
R90	R65-0003-225	RES 2.2M 5% 1/4W CAR FILM
R91	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R92	R-2209	RES VAR 10K 10% .5W HOR.
R93	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R95	R65-0003-684	RES 680K 5% 1/4W CAR FILM
R96	R65-0003-561	RES 560 5% 1/4W CAR FILM
R97	R65-0003-561	RES 560 5% 1/4W CAR FILM
R98	RN55D8251F	RES 8250 1% 1/8W MET FLM
R99	RN55D3012F	RES 30.1K 1% 1/8W MET FLM
R100	RN55D6041F	RES 6040 1% 1/8W MET FLM
R101	R65-0003-821	RES 820 5% 1/4W CAR FILM
R102	R65-0003-511	RES 510 5% 1/4W CAR FILM
R103	R65-0003-561	RES 560 5% 1/4W CAR FILM
R104	R65-0003-339	RES 3.3 5% 1/4W CAR FILM
R105	R65-0003-820	RES 82 5% 1/4W CAR FILM
R106	R65-0003-181	RES 180 5% 1/4W CAR FILM
R107	R65-0003-111	RES 110 5% 1/4W CAR FILM
R108	R65-0003-561	RES 560 5% 1/4W CAR FILM
R109	R65-0003-399	RES 3.9 5% 1/4W CAR FILM
R110	R65-0003-270	RES 27 5% 1/4W CAR FILM
R111	R65-0003-821	RES 820 5% 1/4W CAR FILM
R112	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R113	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R114	R65-0003-123	RES 12K 5% 1/4W CAR FILM
R115	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R116	R65-0003-101	RES 100 5% 1/4W CAR FILM
R117	R65-0003-393	RES 39K 5% 1/4W CAR FILM
R118	R65-0003-273	RES 27K 5% 1/4W CAR FILM
R119	R65-0003-510	RES 51 5% 1/4W CAR FILM
R120	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R121	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R122	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R123	R-2209	RES VAR 10K 10% .5W HOR.

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL) (Cont.)

Ref. Desig	Part Number	Description
R124	R-2204	RES VAR 200 10% .5W HOR.
R125	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R126	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R127	R65-0003-471	RES 470 5% 1/4W CAR FILM
R128	R65-0003-331	RES 330 5% 1/4W CAR FILM
R132	R65-0003-223	RES 22K 5% 1/4W CAR FILM
R133	R65-0003-561	RES 560 5% 1/4W CAR FILM
R134	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R136	R65-0003-101	RES 100 5% 1/4W CAR FILM
R137	R65-0003-510	RES 51 5% 1/4W CAR FILM
R138	R65-0003-471	RES 470 5% 1/4W CAR FILM
R139	R65-0003-471	RES 470 5% 1/4W CAR FILM
R140	R65-0003-510	RES 51 5% 1/4W CAR FILM
R144	R65-0003-473	RES 47K 5% 1/4W CAR FILM
R145	R65-0003-223	RES 22K 5% 1/4W CAR FILM
R146	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R147	R-2204	RES VAR 200 10% .5W HOR.
R149	R65-0003-223	RES 22K 5% 1/4W CAR FILM
R150	R65-0003-183	RES 18K 5% 1/4W CAR FILM
R151	R65-0003-332	RES 3.3K 5% 1/4W CAR FILM
R152	R-2209	RES VAR 10K 10% .5W HOR.
R153	R65-0003-471	RES 470 5% 1/4W CAR FILM
R155	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R156	R65-0003-162	RES 1.6K 5% 1/4W CAR FILM
R157	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R158	R65-0003-134	RES 130K 5% 1/4W CAR FILM
R159	R65-0003-183	RES 18K 5% 1/4W CAR FILM
R160	R65-0003-473	RES 47K 5% 1/4W CAR FILM
R161	R65-0003-101	RES 100 5% 1/4W CAR FILM
R162	R65-0003-822	RES 8.2K 5% 1/4W CAR FILM
R164	R65-0003-515	RES 5.1M 5% 1/4W CAR FILM
R165	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R167	R65-0003-183	RES 18K 5% 1/4W CAR FILM
R168	R65-0003-683	RES 68K 5% 1/4W CAR FILM
R169	R65-0003-101	RES 100 5% 1/4W CAR FILM
R170	R65-0003-331	RES 330 5% 1/4W CAR FILM
R171	R65-0003-101	RES 100 5% 1/4W CAR FILM
R172	R65-0003-510	RES 51 5% 1/4W CAR FILM
R173	R65-0003-510	RES 51 5% 1/4W CAR FILM

Table 2. A3 Receiver/Exciter PWB Assembly Parts List (10212-1410 Rev. AL) (Cont.)

Ref. Desig	Part Number	Description
R174	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R176	R-2208	RES VAR 5K 10% .5W HOR.
R177	R65-0003-822	RES 8.2K 5% 1/4W CAR FILM
R178	R65-0003-223	RES 22K 5% 1/4W CAR FILM
R179	R65-0003-331	RES 330 5% 1/4W CAR FILM
R180	R65-0003-510	RES 51 5% 1/4W CAR FILM
R181	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R182	R65-0003-103	RES 10K 5% 1/4W CAR FILM
U1	I30-0020-004	IC OP AMP DUAL 2904
U2	I51-0003-001	MIXER DB SBL-1
U3	I90-0001-000	IC XSTR ARRAY 3083
U4	I51-0003-001	MIXER DB SBL-1
U5	I01-0000-254	IC 4529B PLASTIC CMOS
U6	I01-0000-254	IC 4529B PLASTIC CMOS
U7	I01-0000-156	IC 4094B PLASTIC CMOS
U8	IC-0056	IC MC1350 RF/IF AMP
U9	IC-0056	IC MC1350 RF/IF AMP
U10	I62-0001-000	IC 1496 BAL MODULATOR
U11	I62-0001-000	IC 1496 BAL MODULATOR
U12	I30-0003-000	IC OP AMP QUAD 324
U13	I01-0000-253	IC 4066B PLASTIC CMOS

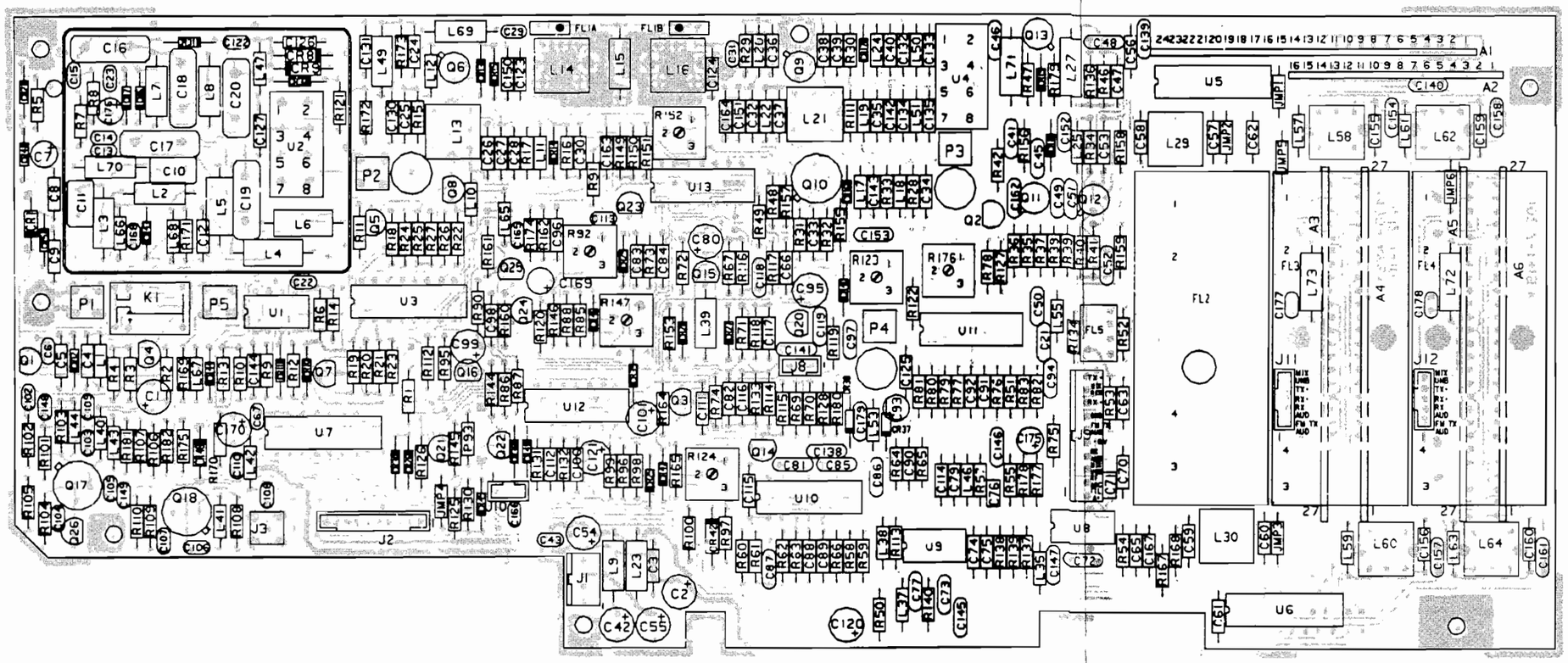


Figure 2. **A3 Receiver/Exciter PWB Assembly Component Location Diagram (10212-1410 Rev. K)**

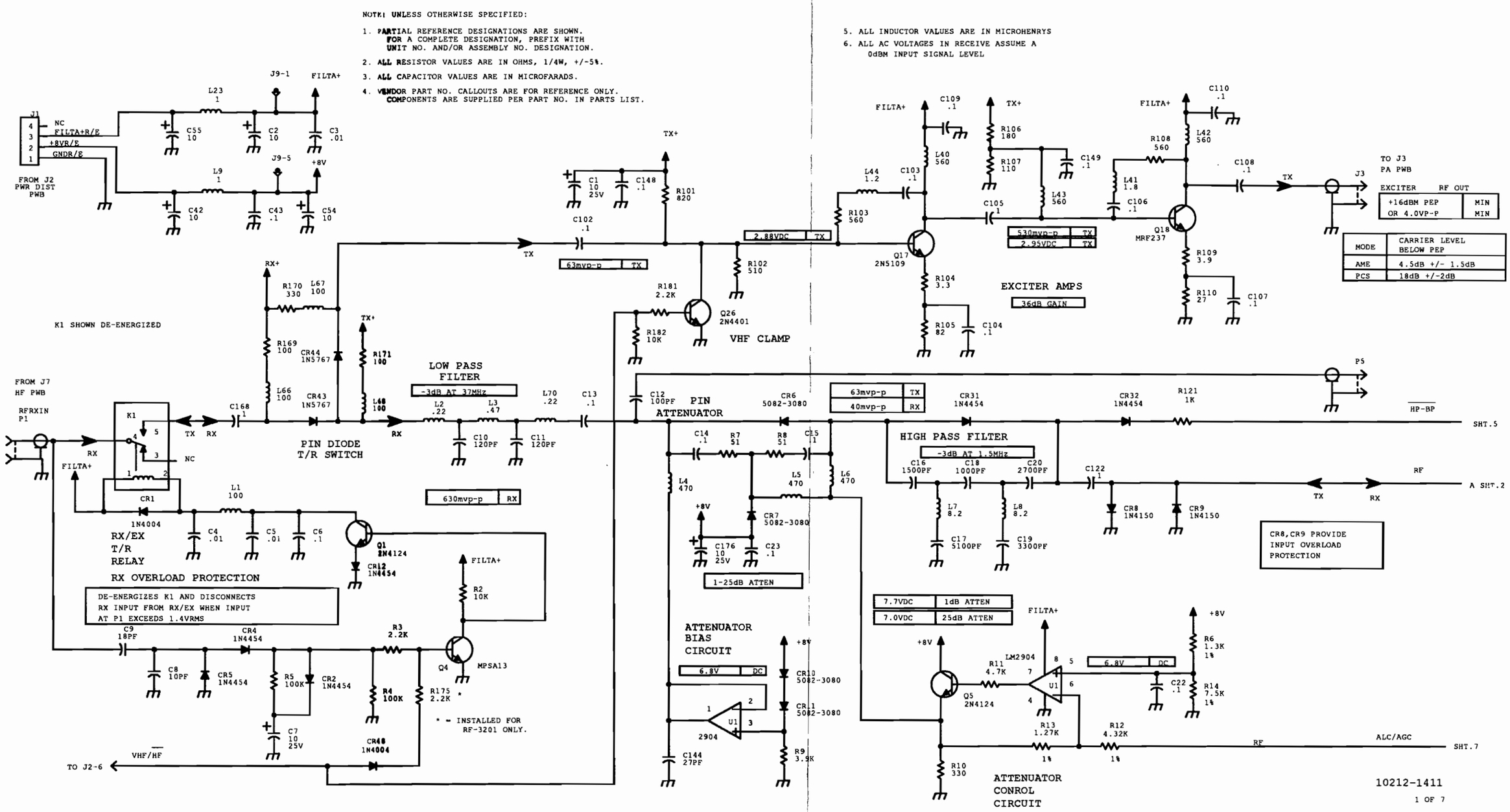


Figure 3. A3 Receiver/Exciter PWB Assembly Schematic Diagram (10212-1411 Rev. AA) (Sheet 1 of 7)

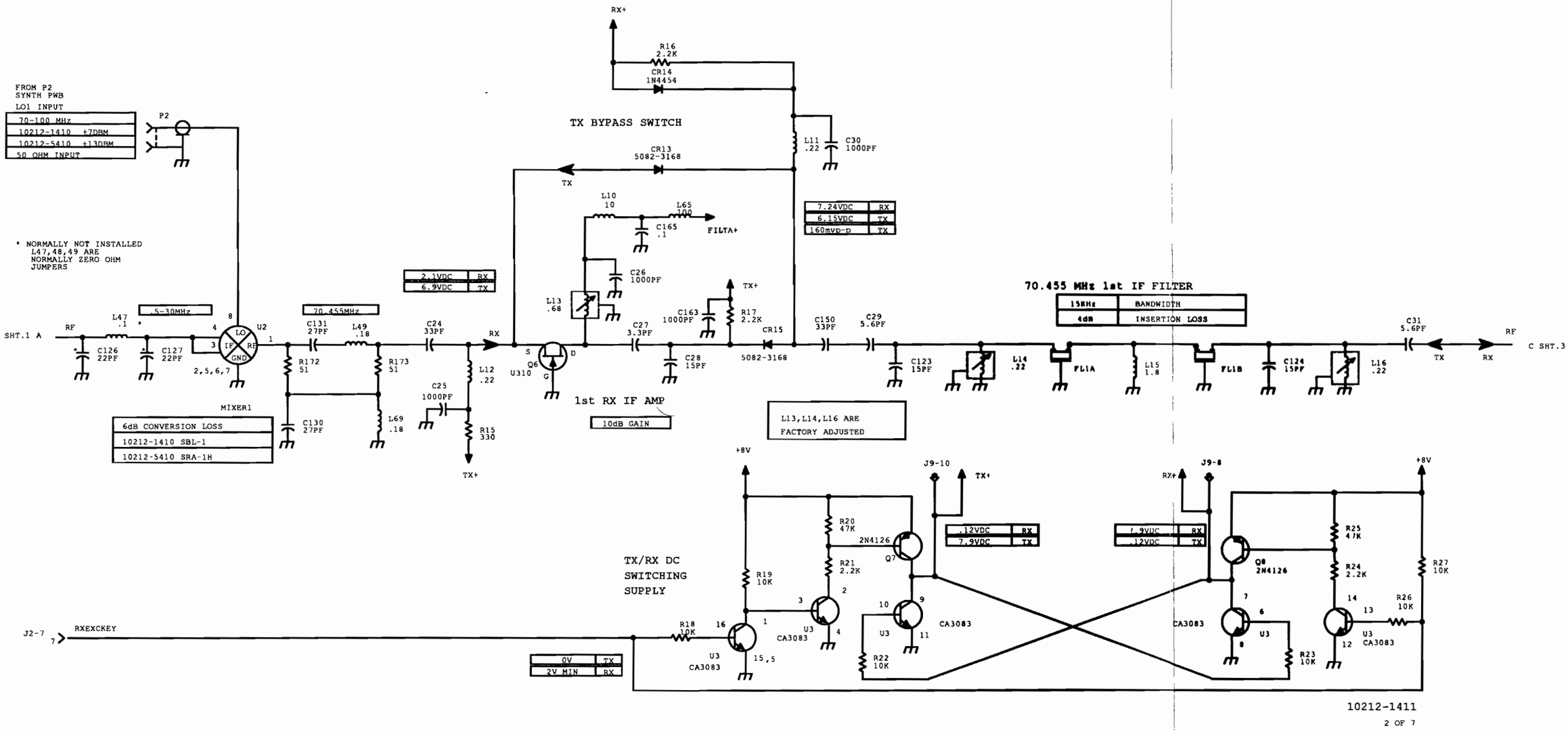


Figure 3. A3 Receiver/Exciter PWB Assembly Schematic Diagram (10212-1411 Rev. AA) (Sheet 2 of 7)

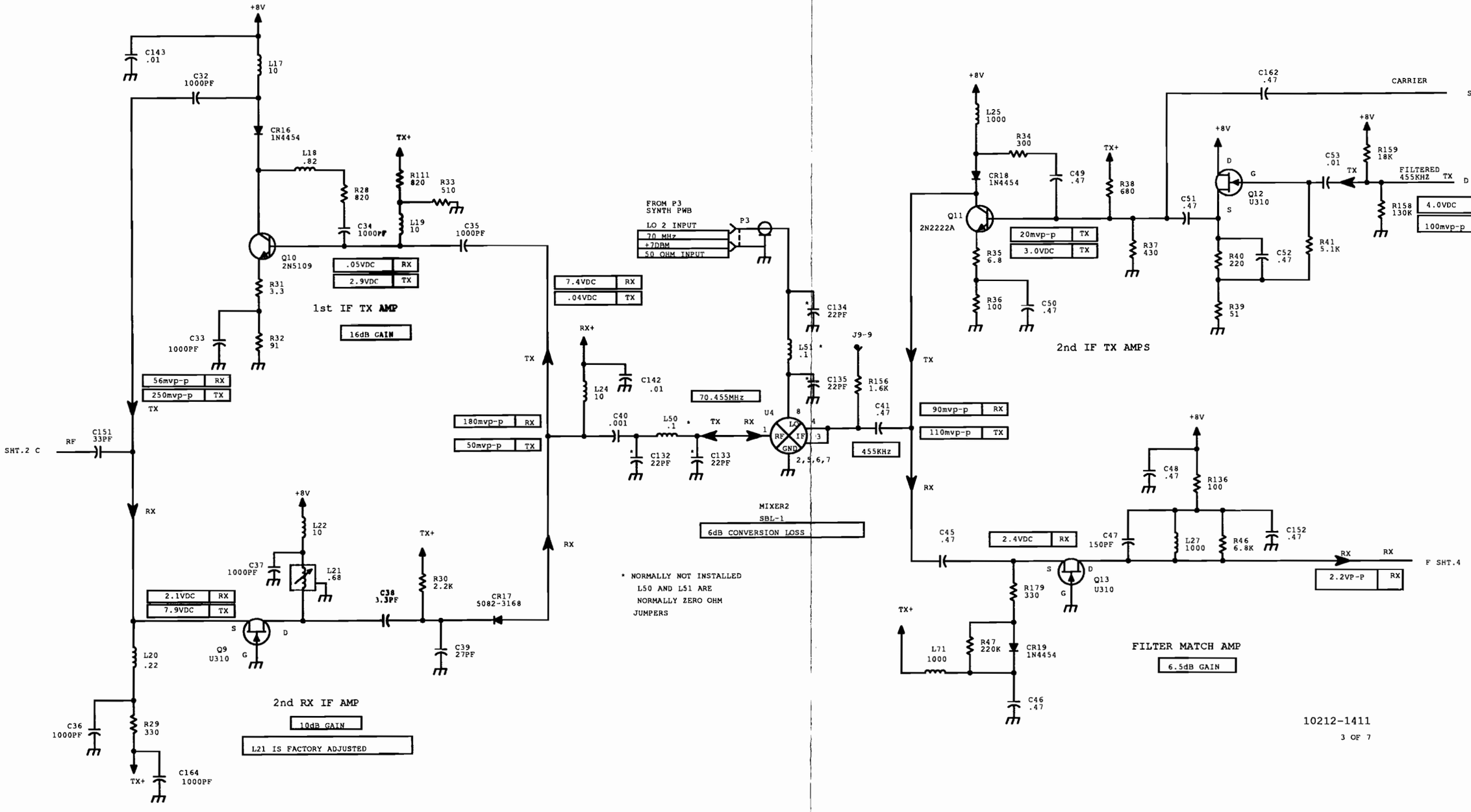


Figure 3. A3 Receiver/Exciter PWB Assembly Schematic Diagram (10212-1411 Rev. AA) (Sheet 3 of 7)

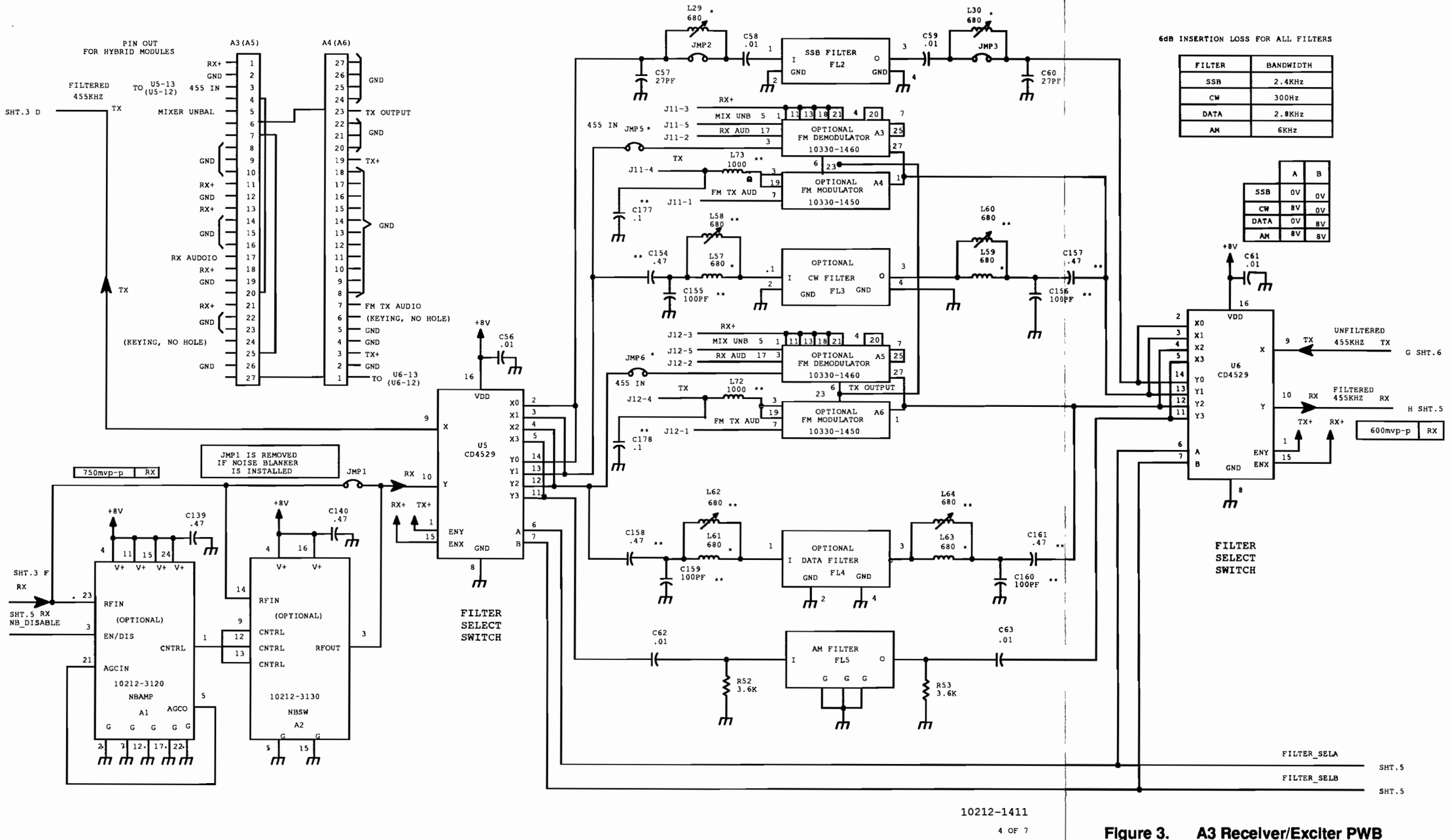


Figure 3. A3 Receiver/Exciter PWB Assembly Schematic Diagram (10212-1411 Rev. AA) (Sheet 4 of 7)

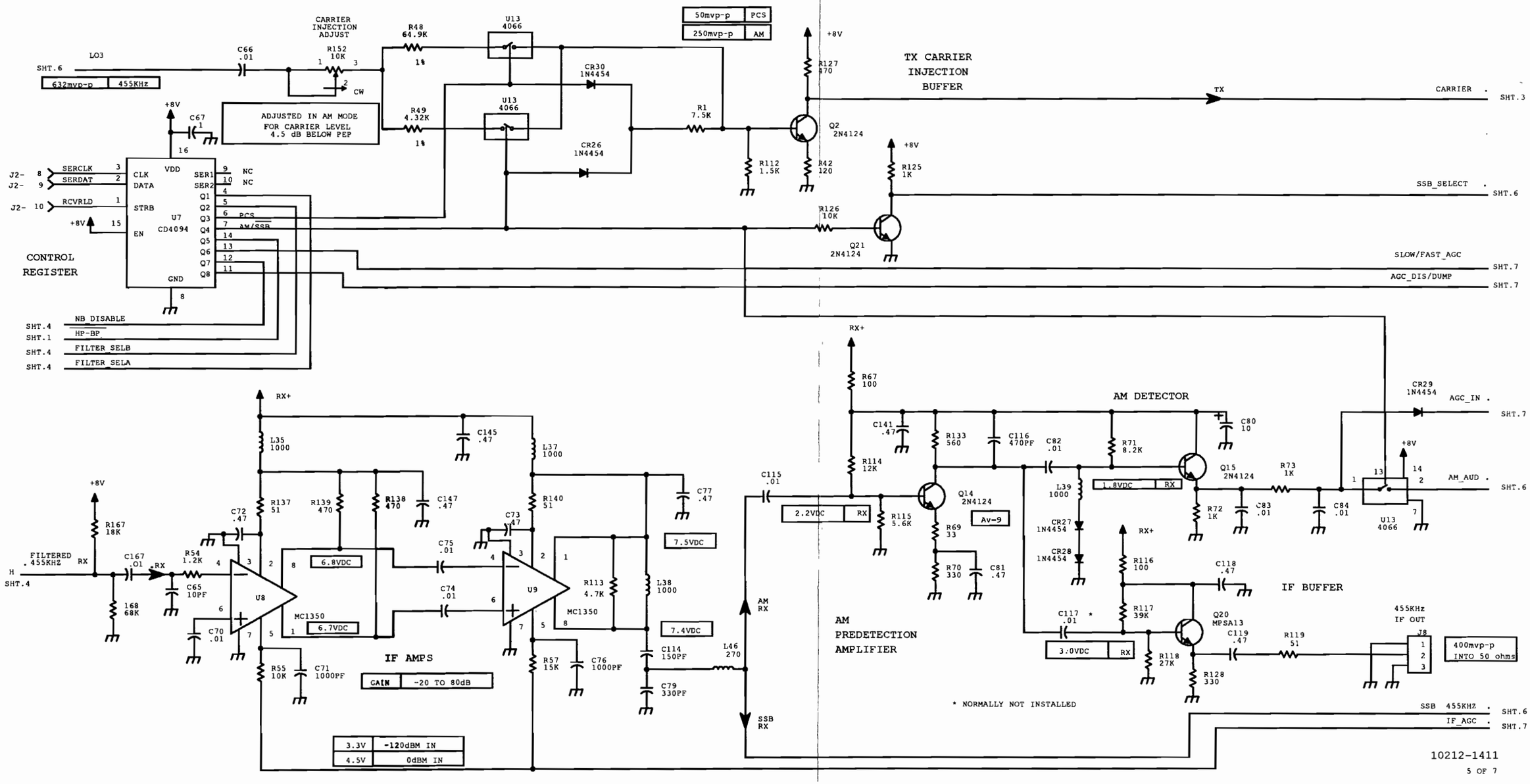


Figure 3. A3 Receiver/Exciter PWB Assembly Schematic Diagram (10212-1411 Rev. AA) (Sheet 5 of 7)

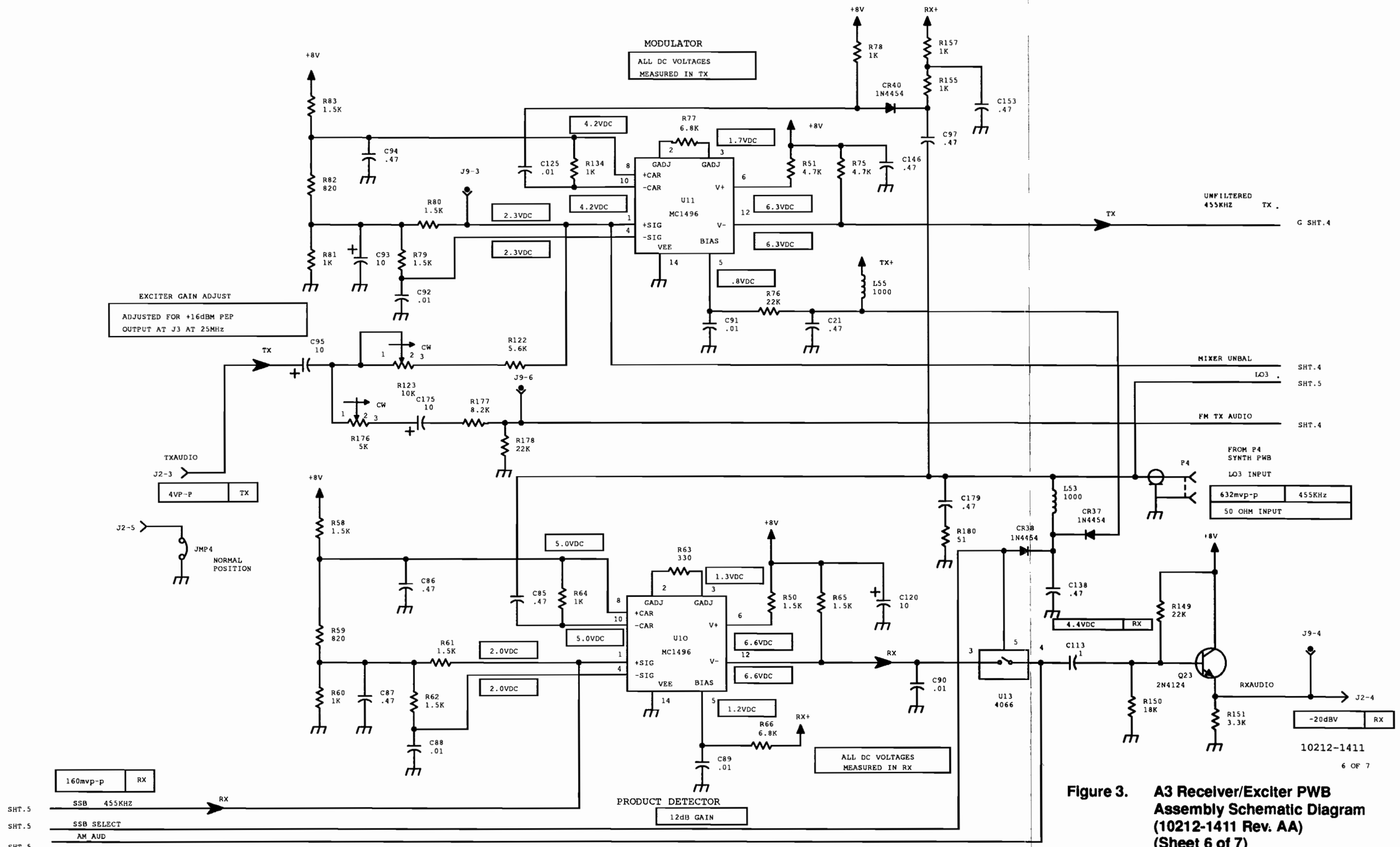


Figure 3. A3 Receiver/Exciter PWB Assembly Schematic Diagram (10212-1411 Rev. AA) (Sheet 6 of 7)

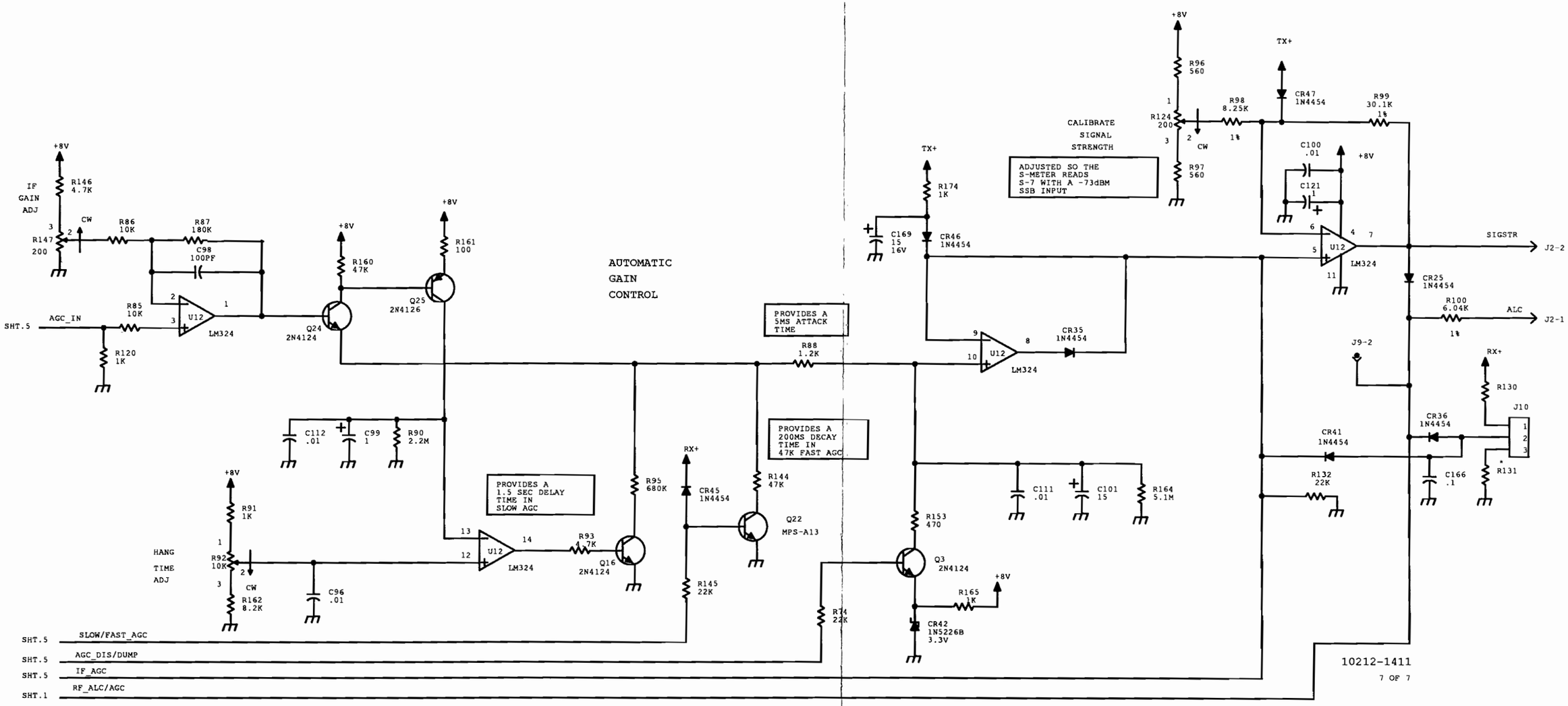


Figure 3. A3 Receiver/Exciter PWB Assembly Schematic Diagram (10212-1411 Rev. AA) (Sheet 7 of 7)

A4
HARMONIC FILTER PWB ASSEMBLY

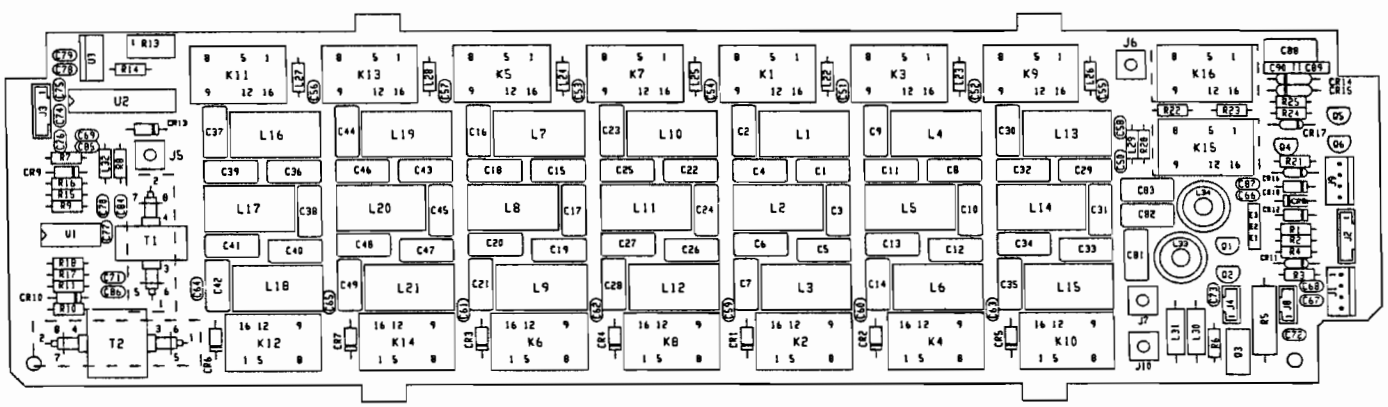


TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

A4 HARMONIC FILTER PWB ASSEMBLY
PART NUMBER 10212-1510

1. GENERAL DESCRIPTION

The A4 Harmonic Filter PWB Assembly is a low pass filter which works in both the transmit and receive signal paths. When the transceiver is receiving, the A4 Assembly filters the signal, then routes it to the A3 Receiver/Exciter PWB Assembly. When the transceiver is transmitting, the A4 Assembly filters the output of the Power Amplifier, then routes the signal to the antenna connector or antenna coupler interface PWB (if it is installed). The A4 assembly includes forward and reverse power detectors which provide signals used by the A7 Logic PWB Assembly for power metering and to generate automatic level control (ALC) signal for transmitter power control.

2. FUNCTIONAL DESCRIPTION

Refer to figure 1 which shows the functional block diagram of the Harmonic Filter PWB assembly.

The Harmonic Filter PWB comprises the following:

- Seven independent low pass filters with different cutoff frequencies
- The associated circuity required to select the correct filter for the operating frequency of the radio
- A directional RF coupler for forward power and reverse power measurements
- Transmit/Receive relay control and receiver protection circuitry
- Fan control switch
- A low pass filter for the receiver signal path to reduce the susceptibility to images

The low pass filters are selected using the band select lines (Band1 through Band7) from the A7 Logic PWB Assembly. The band select lines BNDADD0 through BNDADD2 (active low) drive addressable latch U2, which controls the relays K1 through K14. Transmit/Receive relays K15 and K16 route the RF signal in the proper direction through the filters, dependent on whether the transceiver is transmitting or receiving.

When transmitting, the directional coupler consisting of T1, T2, and associated components, samples the forward and reverse power. The forward power is routed to detector diode CR9 and amplifier U1-5/6/7 which produce a dc voltage proportional to the amplitude of the forward power. Detector diode CR10 and amplifier U1A produce a dc voltage proportional to the amplitude of the reflected power. Both signals are routed to the A7 Logic PWB Assembly.

A fan switch circuit (Q2 and Q3) provides the drive level needed to turn on the Fan Assembly A6 (and the optional external blower assembly, if installed). The fan switch circuit is controlled by thermistor RT1 on the A5A1 Power Amplifier PWB Assembly and comparator circuit U61 on the logic PWB assembly.

3. INTERCONNECTIONS

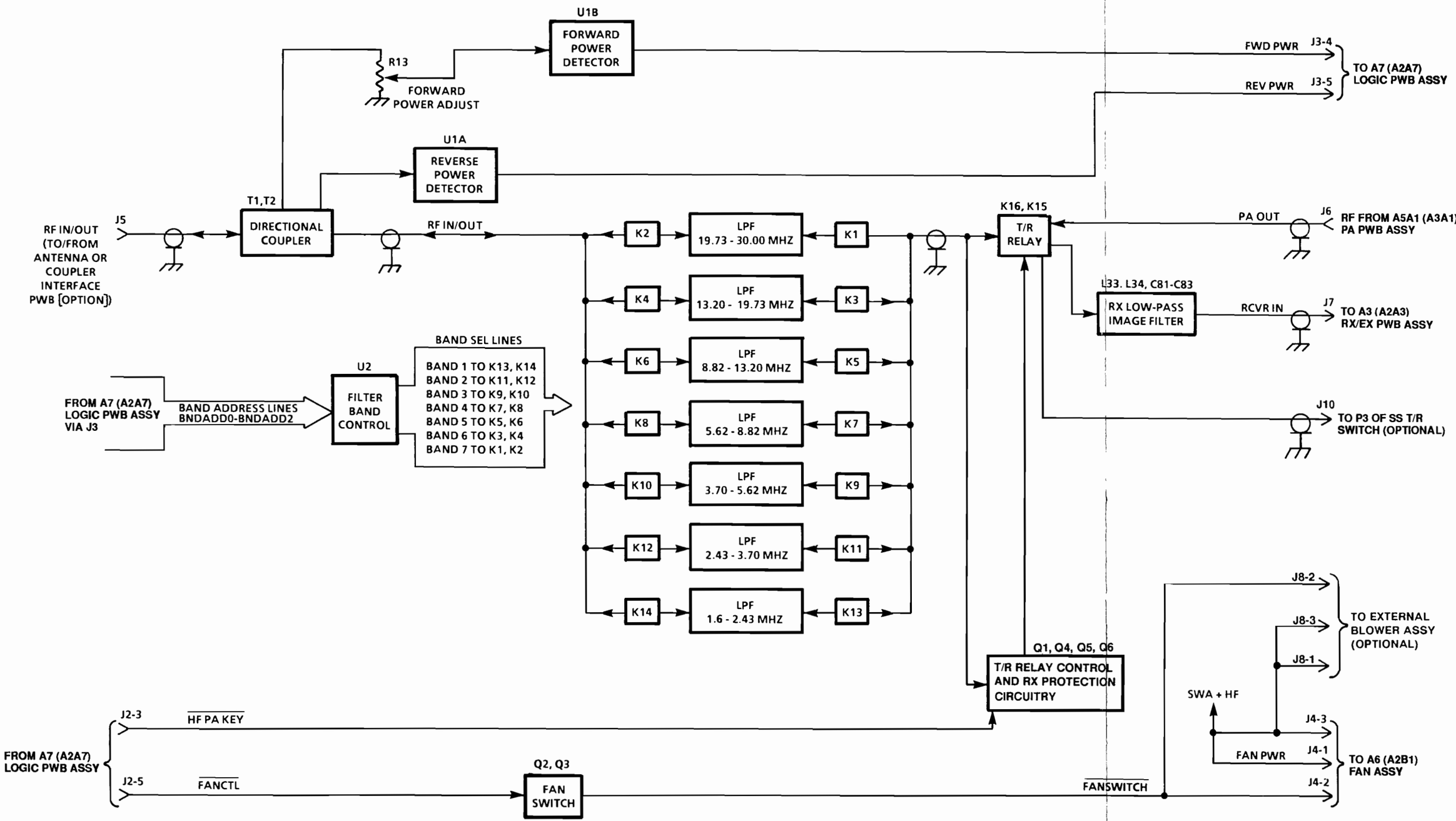
Table 1 lists the interconnections of the Harmonic Filter PWB assembly. Use the table as an aid when troubleshooting. For complete details, see the radio interconnect diagram.

NOTE

When the optional 125 Watt Solid State Transmit/Receiver switch is installed, A4J6 is attached to P1 of the T/R Switch, and W12 is attached to P2 of the T/R switch.

Table 1. A4 Harmonic Filter PWB Assembly Interconnections

Connector	Signal Function	Interconnection
J1	Power	Power Distribution PWB A5A2J1 via A2W5
J2	Control	Logic PWB A7J6 via W10
J3	Control	Logic PWB A7J6 via W10
J4	Fan DC Power	Fan Assy A6
J5	RF In/Out	Antenna OR Optional Antenna Coupler Interface PWB E1/E2
J6	Power Amp OUT	Power Amp PWB A5A1P4 via W12 (see Note)
J7	Rcvr In	Receiver/Exciter PWB A3P1 via A2W16 and A2W17
J8	Ext. Blower Cont.	Optional external blower assembly
J9	Power/Keyline	Optional 125-Watt solid-state Transmit/Receive switch J1
J10	RX to Solid State T/R	Optional 125-Watt solid-state Transmit/Receive switch P3



3200/3201-007B

Figure 1. A4 Harmonic Filter PWB Assembly Functional Block Diagram

4. PARTS LIST, COMPONENT LOCATION DIAGRAM, AND SCHEMATIC DIAGRAM

Table 2 is the parts list of the A4 Harmonic Filter PWB Assembly. Figure 2 is the component location diagram, and figure 3 is the schematic diagram.

Table 2. A4 Harmonic Filter PWB Assembly Parts List (10212-1510 Rev. V)

Ref. Desig.	Part Number	Description
	W-0944	COAX CABLE 50 OHM DBLSHLD
C1	C-2458	CAP 12PF +-.5PF 500V MICA
C2	CM05ED680G03	CAP 68PF 2% 500V MICA
C3	CM05ED680G03	CAP 68PF 2% 500V MICA
C4	CM05FD151G03	CAP 150PF 2% 500V MICA
C5	CM05ED390G03	CAP 39PF 2% 500V MICA
C6	CM05FD131G03	CAP 130PF 2% 500V MICA
C7	CM05ED620G03	CAP 62PF 2% 500V MICA
C8	C-2463	CAP 24PF +-.5PF 500V MICA
C9	CM05FD111G03	CAP 110PF 2% 500V MICA
C10	CM05FD121G03	CAP 120PF 2% 500V MICA
C11	CM05FD241G03	CAP 240PF 2% 500V MICA
C12	CM05ED620G03	CAP 62PF 2% 500V MICA
C13	CM05FD221G03	CAP 220PF 2% 500V MICA
C14	CM05ED820G03	CAP 82PF 2% 500V MICA
C15	CM05ED360G03	CAP 36PF 2% 500V MICA
C16	CM05FD181G03	CAP 180PF 2% 500V MICA
C17	CM05FD181G03	CAP 180PF 2% 500V MICA
C18	CM05FD361G03	CAP 360PF 2% 500V MICA
C19	CM05FD910G03	CAP 91PF 2% 500V MICA
C20	CM05FD331G03	CAP 330PF 2% 500V MICA
C21	CM05FD131G03	CAP 130PF 2% 500V MICA
C22	CM05ED620G03	CAP 62PF 2% 500V MICA
C23	CM05FD331G03	CAP 330PF 2% 500V MICA
C24	CM05FD331G03	CAP 330PF 2% 500V MICA
C25	C-2499	CAP 560PF 2% 300V MICA
C26	CM05FD161G03	CAP 160PF 2% 500V MICA
C27	C-2498	CAP 510PF 2% 500V MICA
C28	CM05FD241G03	CAP 240PF 2% 500V MICA
C29	CM05ED820G03	CAP 82PF 2% 500V MICA
C30	C-2496	CAP 470PF 2% 500V MICA
C31	C-2495	CAP 430PF 2% 500V MICA
C32	C-2503	CAP 820PF 2% 300V MICA
C33	CM05FD221G03	CAP 220PF 2% 500V MICA
C34	C-2502	CAP 750PF 2% 300V MICA
C35	CM05FD361G03	CAP 360PF 2% 500V MICA

Table 2. A4 Harmonic Filter PWB Assembly Parts List (10212-1510 Rev. V) (Cont.)

Ref. Desig.	Part Number	Description
C36	CM05FD131G03	CAP 130PF 2% 500V MICA
C37	C-2501	CAP 680PF 2% 300V MICA
C38	C-2500	CAP 620PF 2% 300V MICA
C39	C40-0300-132	CAP 1300PF 300V MICA
C40	CM05FD331G03	CAP 330PF 2% 500V MICA
C41	C40-0300-132	CAP 1300PF 300V MICA
C42	C-2500	CAP 620PF 2% 300V MICA
C43	CM05FD201G03	CAP 200PF 2% 500V MICA
C44	C40-0300-112	CAP 1100PF 300V MICA
C45	C40-0300-102	CAP 1000PF 300V MICA
C46	C40-0300-202	CAP 2000PF 300V MICA
C47	C-2498	CAP 510PF 2% 500V MICA
C48	C40-0300-182	CAP 1800PF 300V MICA
C49	C-2503	CAP 820PF 2% 300V MICA
C50	C11-0009-223	CAP .022UF 20% 50V CER
C51	C11-0009-223	CAP .022UF 20% 50V CER
C52	C11-0009-223	CAP .022UF 20% 50V CER
C53	C11-0009-223	CAP .022UF 20% 50V CER
C54	C11-0009-223	CAP .022UF 20% 50V CER
C55	C11-0009-223	CAP .022UF 20% 50V CER
C56	C11-0009-223	CAP .022UF 20% 50V CER
C57	C11-0009-223	CAP .022UF 20% 50V CER
C58	C11-0009-223	CAP .022UF 20% 50V CER
C59	C11-0009-223	CAP .022UF 20% 50V CER
C60	C11-0009-223	CAP .022UF 20% 50V CER
C61	C11-0009-223	CAP .022UF 20% 50V CER
C62	C11-0009-223	CAP .022UF 20% 50V CER
C63	C11-0009-223	CAP .022UF 20% 50V CER
C64	C11-0009-223	CAP .022UF 20% 50V CER
C65	C11-0009-223	CAP .022UF 20% 50V CER
C66	C11-0009-103	CAP .01UF 20% 50V CER
C67	C11-0009-103	CAP .01UF 20% 50V CER
C68	C11-0009-103	CAP .01UF 20% 50V CER
C69	C11-0009-103	CAP .01UF 20% 50V CER
C70	C11-0009-103	CAP .01UF 20% 50V CER
C71	C11-0009-103	CAP .01UF 20% 50V CER
C74	C11-0009-103	CAP .01UF 20% 50V CER
C75	C11-0009-103	CAP .01UF 20% 50V CER
C76	C11-0009-103	CAP .01UF 20% 50V CER

Table 2. A4 Harmonic Filter PWB Assembly Parts List (10212-1510 Rev. V) (Cont.)

Ref. Desig.	Part Number	Description
C77	C11-0009-103	CAP .01UF 20% 50V CER
C78	C11-0009-103	CAP .01UF 20% 50V CER
C79	C11-0009-103	CAP .01UF 20% 50V CER
C81	CM05ED750G03	CAP 75PF 2% 500V MICA
C82	CM05FD151G03	CAP 150PF 2% 500V MICA
C83	CM05ED750G03	CAP 75PF 2% 500V MICA
C84	C11-0009-104	CAP .1UF 20% 50V CER
C85	C11-0009-104	CAP .1UF 20% 50V CER
C86	C11-0009-104	CAP .1UF 20% 50V CER
C87	C11-0009-103	CAP .01UF 20% 50V CER
C88	CM05CD010D03	CAP 1PF+-.5PF 500V MICA
C89	M39014/01-1287V	CAP 22PF 10% 200V CER-R
C90	M39014/01-1317V	CAP,1000PF,10% 200VC
CR1	1N4004	DIODE 1A 400V RECT GP
CR2	1N4004	DIODE 1A 400V RECT GP
CR3	1N4004	DIODE 1A 400V RECT GP
CR4	1N4004	DIODE 1A 400V RECT GP
CR5	1N4004	DIODE 1A 400V RECT GP
CR6	1N4004	DIODE 1A 400V RECT GP
CR7	1N4004	DIODE 1A 400V RECT GP
CR8	1N4004	DIODE 1A 400V RECT GP
CR9	JANTX1N5711	DIODE
CR10	JANTX1N5711	DIODE
CR11	1N4454	DIODE 200MA 75V SW
CR12	1N4454	DIODE 200MA 75V SW
CR13	JANTX1N5711	DIODE
CR14	1N3070	DIODE 150MA 200V RECT FR
CR15	1N3070	DIODE 150MA 200V RECT FR
CR16	1N4454	DIODE 200MA 75V SW
CR17	1N4454	DIODE 200MA 75V SW
CR18	1N4004	DIODE 1A 400V RECT GP
K1	K28-0001-001	RLY DPST 12VDC SEALED DIP
K2	K28-0001-001	RLY DPST 12VDC SEALED DIP
K3	K28-0001-001	RLY DPST 12VDC SEALED DIP
K4	K28-0001-001	RLY DPST 12VDC SEALED DIP
K5	K28-0001-001	RLY DPST 12VDC SEALED DIP
K6	K28-0001-001	RLY DPST 12VDC SEALED DIP
K7	K28-0001-001	RLY DPST 12VDC SEALED DIP
K8	K28-0001-001	RLY DPST 12VDC SEALED DIP

Table 2. A4 Harmonic Filter PWB Assembly Parts List (10212-1510 Rev. V) (Cont.)

Ref. Desig.	Part Number	Description
K9	K28-0001-001	RLY DPST 12VDC SEALED DIP
K10	K28-0001-001	RLY DPST 12VDC SEALED DIP
K11	K28-0001-001	RLY DPST 12VDC SEALED DIP
K12	K28-0001-001	RLY DPST 12VDC SEALED DIP
K13	K28-0001-001	RLY DPST 12VDC SEALED DIP
K14	K28-0001-001	RLY DPST 12VDC SEALED DIP
K15	K28-0001-001	RLY DPST 12VDC SEALED DIP
K16	K28-0001-001	RLY DPST 12VDC SEALED DIP
L1	10212-1543	INDUCTOR TOROID 0.29 UH
L2	10212-1544	INDUCTOR TOROID 0.20 UH
L3	10212-1545	INDUCTOR TOROID 0.23 UH
L4	10212-1540	INDUCTOR TOROID 0.43 UH
L5	10212-1541	INDUCTOR TOROID 0.30 UH
L6	10212-1542	INDUCTOR TOROID 0.35 UH
L7	10212-1537	INDUCTOR TOROID 0.65 UH
L8	10212-1538	INDUCTOR TOROID 0.45 UH
L9	10212-1539	INDUCTOR TOROID 0.52 UH
L10	10212-1534	INDUCTOR TOROID 0.98 UH
L11	10212-1535	INDUCTOR TOROID 0.62 UH
L12	10212-1536	INDUCTOR TOROID 0.78 UH
L13	10212-1531	INDUCTOR TOROİD 1.53 UH
L14	10212-1532	INDUCTOR TOROID 1.08 UH
L15	10212-1533	INDUCTOR TOROID 1.24 UH
L16	10212-1528	INDUCTOR TOROID 2.28 UH
L17	10212-1529	INDUCTOR TOROID 1.63 UH
L18	10212-1530	INDUCTOR TOROID 1.93 UH
L19	10212-1525	INDUCTOR TOROID 3.53 UH
L20	10212-1526	INDUCTOR TOROID 2.46 UH
L21	10212-1527	INDUCTOR TOROID 2.83 UH
L22	MS75085-11	COIL 220UH 10% FXD RF
L23	MS75085-11	COIL 220UH 10% FXD RF
L24	MS75085-11	COIL 220UH 10% FXD RF
L25	MS75085-11	COIL 220UH 10% FXD RF
L26	MS75085-11	COIL 220UH 10% FXD RF
L27	MS75085-11	COIL 220UH 10% FXD RF
L28	MS75085-11	COIL 220UH 10% FXD RF
L29	MS75085-11	COIL 220UH 10% FXD RF
L30	MS14046-4	COIL 10UH 10% FXD RF
L31	MS14046-4	COIL 10UH 10% FXD RF

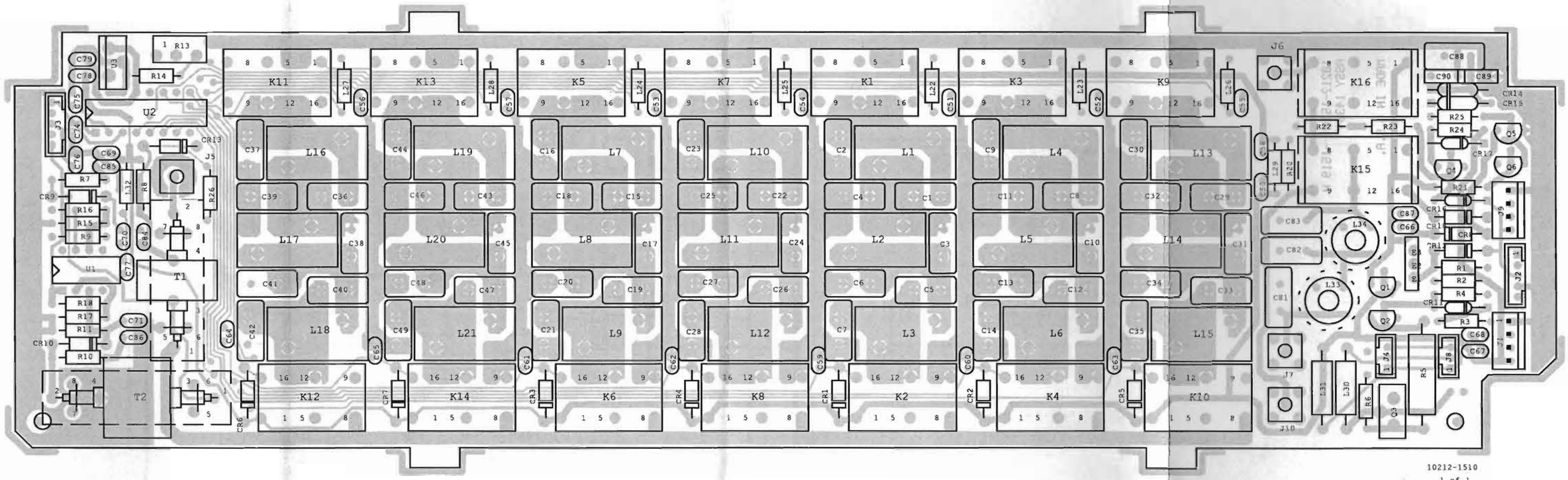


Figure 2. **A4 Harmonic Filter PWB Assembly Component Location Diagram (10212-1510 Rev. G)**

Table 2. A4 Harmonic Filter PWB Assembly Parts List (10212-1510 Rev. V) (Cont.)

Ref. Desig.	Part Number	Description
L32	MS75085-14	COIL 390UH 10% FXD RF
L33	10228-1127-02	INDUCTOR .243UH
L34	10228-1127-02	INDUCTOR .243UH
P1	J90-0011-001	CONN AND FERRULE
Q1	2N4126	XSTR SS/GP PNP TO-92
Q2	2N4126	XSTR SS/GP PNP TO-92
Q3	2N5190	XSTR POWER NPN TO-205AA
Q4	Q-0076	XSTR DARL NPN MPS-A13
Q5	2N4124	XSTR SS/GP NPN TO-92
Q6	2N4126	XSTR SS/GP PNP TO-92
R1	R65-0003-392	RES 3.9K 5% 1/4W CAR FILM
R2	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R3	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R4	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R5	RCR32G131JM	RES 130 5% 1W CAR COMP
R6	R65-0003-122	RES 1.2K 5% 1/4W CAR FILM
R7	R65-0003-470	RES 47 5% 1/4W CAR FILM
R8	R65-0003-223	RES 22K 5% 1/4W CAR FILM
R9	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R10	R65-0003-470	RES 47 5% 1/4W CAR FILM
R11	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R13	R-2226	RES VAR 2K 10% .5W VER.
R14	R65-0003-822	RES 8.2K 5% 1/4W CAR FILM
R15	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R16	R65-0003-751	RES 750 5% 1/4W CAR FILM
R17	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R18	R65-0003-331	RES 330 5% 1/4W CAR FILM
R20	R65-0003-510	RES 51 5% 1/4W CAR FILM
R21	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R22	R65-0003-104	RES 100K 5% 1/4W CAR FILM
R23	R65-0003-104	RES 100K 5% 1/4W CAR FILM
R24	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R25	R65-0003-223	RES 22K 5% 1/4W CAR FILM
R26	R65-0003-221	RES 220 5% 1/4W CAR FILM
T1	10212-1524	XFMR
T2	10212-1523	TRANSFORMER,VOLTAGE ASSY
U1	I30-0026-000	IC OP AMP DUAL 3358
U2	I16-0011-000	IC NE5090 RELAY DRVR PLAS
U3	I11-0001-001	IC VR 7805 +5V 1.5A 4%

NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, +/-5%.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY. COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.

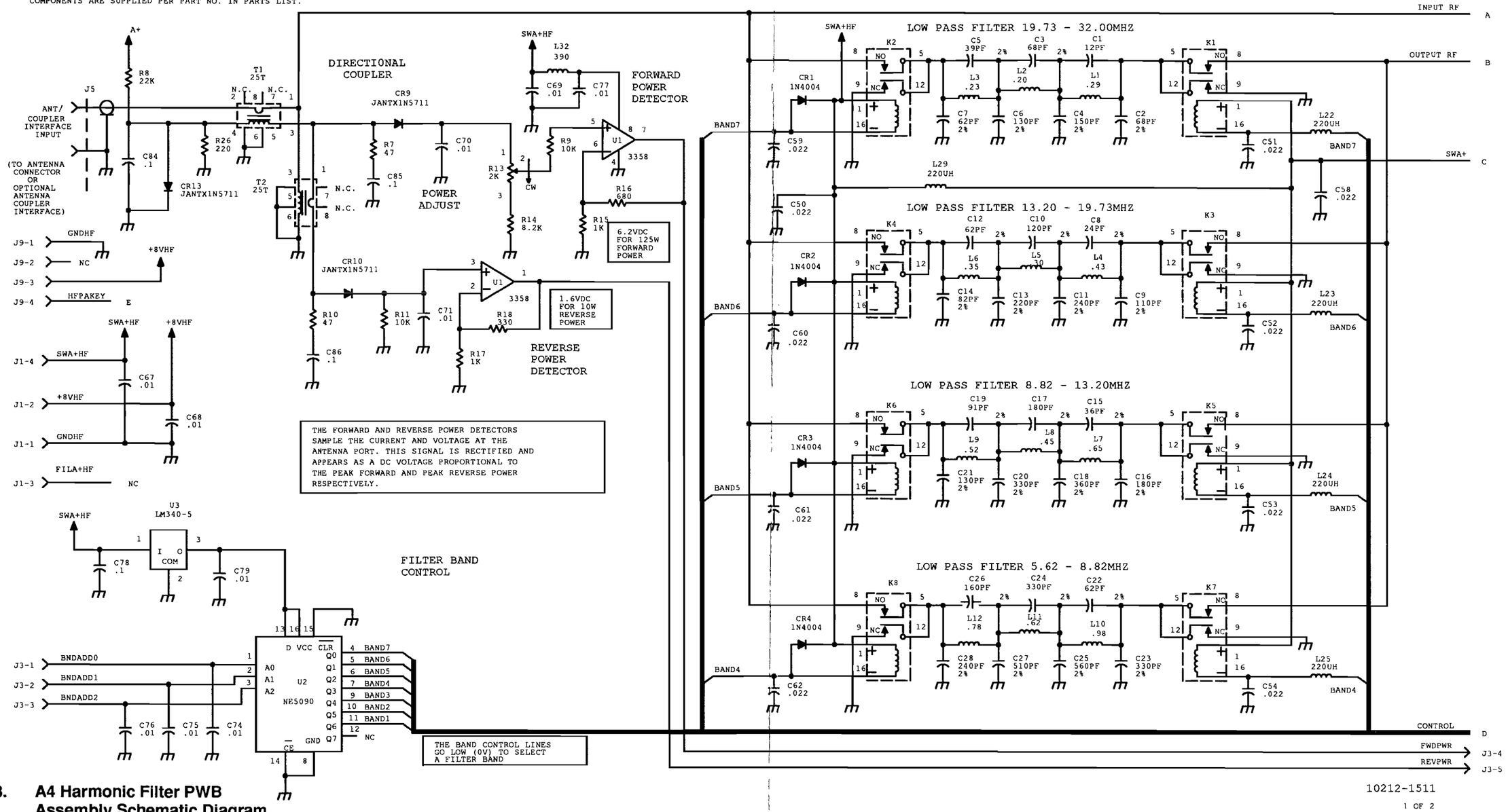


Figure 3. A4 Harmonic Filter PWB Assembly Schematic Diagram (10212-1511 Rev. L) (Sheet 1 of 2)

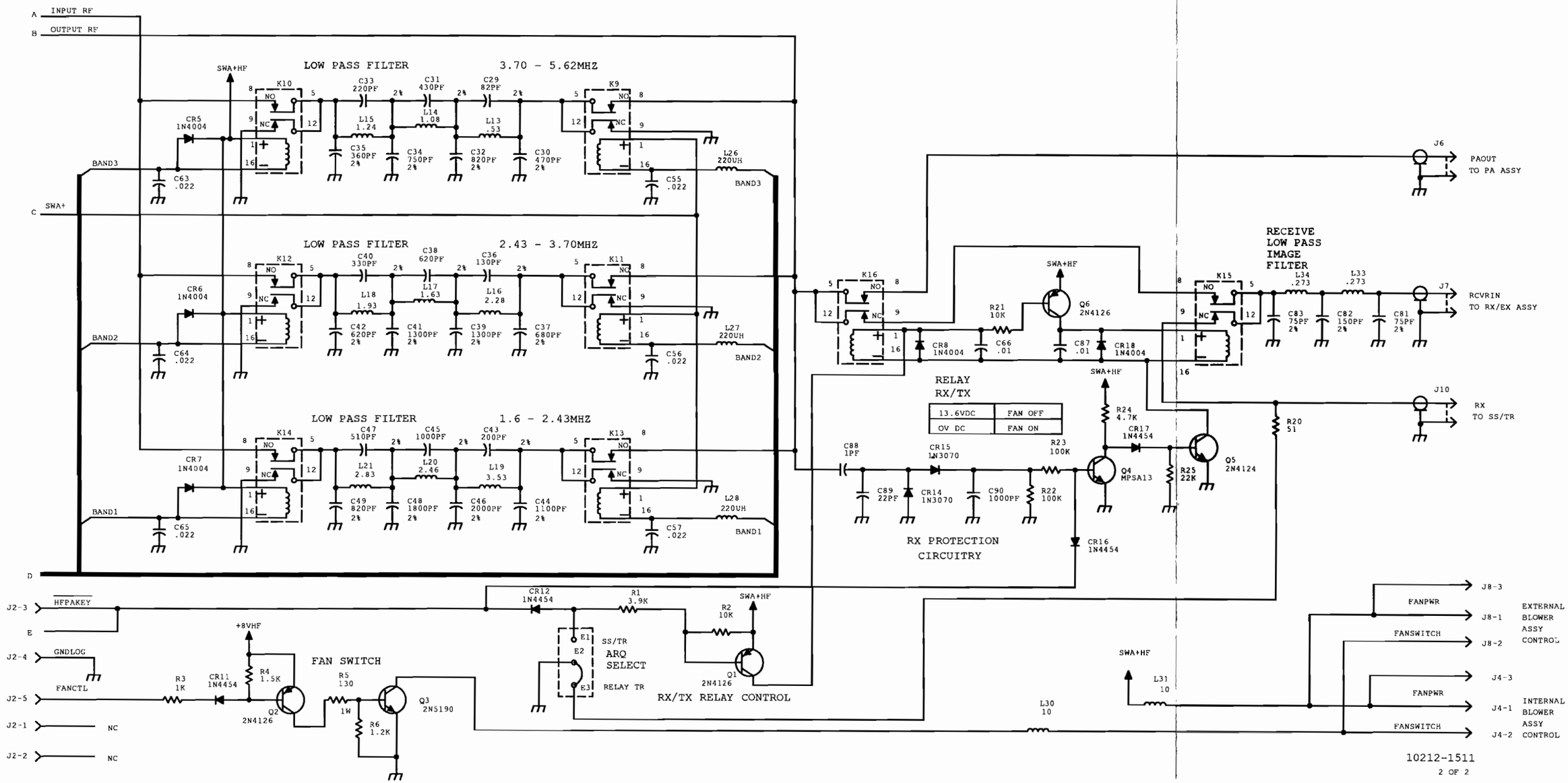


Figure 3. A4 Harmonic Filter PWB Assembly Schematic Diagram (10212-1511 Rev. L) (Sheet 2 of 2)

A5
HEATSINK ASSEMBLY

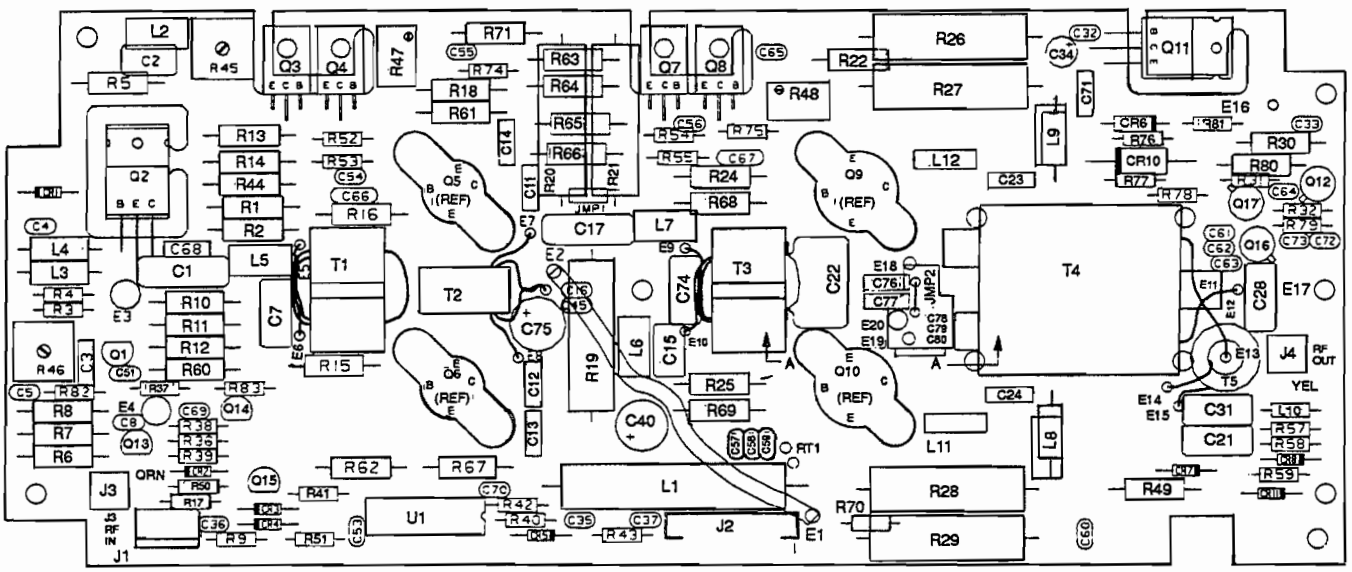


TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

A5 HEATSINK ASSEMBLY

PART NUMBER 10212-1100

1. GENERAL DESCRIPTION

The Heatsink Assembly comprises two subassemblies:

- A5A1 Power Amplifier (PA) PWB Assembly, Part Number 10212-1110
- A5A2 Power Distribution PWB Assembly, Part Number 10212-1810

The A5A1 PA PWB Assembly amplifies the RF transmitter signal from the A3 Receiver/Exciter (RX/EX) PWB Assembly to the final output power level. The signal is then routed to the A4 Harmonic Filter PWB Assembly.

The A5A2 Power Distribution PWB Assembly provides filtering, regulation, and distribution of all dc voltages to the various subassemblies of the radio.

2. FUNCTIONAL DESCRIPTION

2.1 A5A1 PA PWB Assembly

Refer to figure 1, which shows the major functions of the PA PWB.

The final Power Amplifier PWB comprises three cascaded stages of amplification: a pre-driver stage (Q2), a driver stage (Q5 and Q6), and a final amplifier stage (Q9 and Q10). The overall gain is approximately 35 dB. Regulation of the bias voltages is accomplished by Q11. Independent bias adjustments for the pre-driver, driver, and final amplifier are provided by R46, R47, and R48, respectively.

A fault latch circuit (Q13-Q15) controls the cut-off transistor (Q1) when a fault is detected on the assembly. The fault latch circuit is activated when the final amplifier temperature rises above the reference level (detected by thermistor RT1 and comparator U1-1/2/3), or when a forward power error occurs (determined by comparator U1-8/9/10).

2.2 A5A2 Power Distribution PWB Assembly

Refer to the power distribution schematic diagram at the end of this section.

Power from the assembly is distributed to the various subassemblies via J1, J2, J3, and power interconnect cables W5 and W6. The assembly distributes:

- Switched +13.6 Vdc (SWA+)
- Filtered +13.6 Vdc (FILA+)
- Regulated +8Vdc (+8 V)
- Power Return Ground (GND)

High current +13.6 Vdc and ground lines are supplied directly (unswitched) to the PA PWB.

Power to the radio subassemblies, except for the PA PWB Assembly, is switched on the Power Distribution PWB (using K1) when the front panel primary power switch is turned on. The radio can also be turned on from a remote location by grounding the RMTSW line (J2-1). This line is distributed to the rear panel accessory connector (ACC) and the option bus via the A7 Logic PWB Assembly.

2.3 A5A3 Capacitor Panel PWB Assembly

The A5A3 Assembly is a small daughter board mounted on the A5A1 Assembly near output transistors A5Q9 and A5Q10. The A5A3 Assembly contains three capacitors which are connected in parallel between the collectors of the these transistors.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

A5 HEATSINK ASSEMBLY

PART NUMBER 10212-1100

1. GENERAL DESCRIPTION

The Heatsink Assembly comprises two subassemblies:

- A5A1 Power Amplifier (PA) PWB Assembly, Part Number 10212-1110
- A5A2 Power Distribution PWB Assembly, Part Number 10212-1810

The A5A1 PA PWB Assembly amplifies the RF transmitter signal from the A3 Receiver/Exciter (RX/EX) PWB Assembly to the final output power level. The signal is then routed to the A4 Harmonic Filter PWB Assembly.

The A5A2 Power Distribution PWB Assembly provides filtering, regulation, and distribution of all dc voltages to the various subassemblies of the radio.

2. FUNCTIONAL DESCRIPTION

2.1 A5A1 PA PWB Assembly

Refer to figure 1, which shows the major functions of the PA PWB.

The final Power Amplifier PWB comprises three cascaded stages of amplification: a pre-driver stage (Q2), a driver stage (Q5 and Q6), and a final amplifier stage (Q9 and Q10). The overall gain is approximately 35 dB. Regulation of the bias voltages is accomplished by Q11. Independent bias adjustments for the pre-driver, driver, and final amplifier are provided by R46, R47, and R48, respectively.

A fault latch circuit (Q13-Q15) controls the cut-off transistor (Q1) when a fault is detected on the assembly. The fault latch circuit is activated when the final amplifier temperature rises above the reference level (detected by thermistor RT1 and comparator U1-1/2/3), or when a forward power error occurs (determined by comparator U1-8/9/10).

2.2 A5A2 Power Distribution PWB Assembly

Refer to the power distribution schematic diagram at the end of this section.

Power from the assembly is distributed to the various subassemblies via J1, J2, J3, and power interconnect cables W5 and W6. The assembly distributes:

- Switched +13.6 Vdc (SWA+)
- Filtered +13.6 Vdc (FILA+)
- Regulated +8Vdc (+8 V)
- Power Return Ground (GND)

High current +13.6 Vdc and ground lines are supplied directly (unswitched) to the PA PWB.

Power to the radio subassemblies, except for the PA PWB Assembly, is switched on the Power Distribution PWB (using K1) when the front panel primary power switch is turned on. The radio can also be turned on from a remote location by grounding the RMTSW line (J2-1). This line is distributed to the rear panel accessory connector (ACC) and the option bus via the A7 Logic PWB Assembly.

2.3 A5A3 Capacitor Panel PWB Assembly

The A5A3 Assembly is a small daughter board mounted on the A5A1 Assembly near output transistors A5Q9 and A5Q10. The A5A3 Assembly contains three capacitors which are connected in parallel between the collectors of the these transistors.

3. INTERCONNECTIONS

3.1 A5A1 PA PWB Assembly

Table 1 lists the input/output connectors on the PA PWB and their destinations. The table can be used as an aid for signal tracing. See the interconnect diagram in section 3 for complete details.

Table 1. A5A1 PA PWB Assembly Interface Connections

Connector	Signal Name(s)	Connects To
E11, E16, GND	High Current Power Lines	A5A2 Power Distribution PWB
J1	+8 Vdc, GND	Power Dist. PWB A5A2J1 via cable W5
J2	Control/Status	Logic PWB Assembly A7J4 via W9
J3	RF Input	RX/EX PWB Assembly A3J3 via W11
J4	RF Output	HF PWB Assembly A4J6 via W12

3.2 A5A2 Power Distribution PWB Assembly

Table 2 lists the input/output connectors on the Power Distribution PWB, and their destinations. The table can be used as an aid for signal tracing. See the interconnect diagram in section 3 for complete details.

Table 2. A5A2 Power Distribution PWB Assembly Interface Connections

Connector/ Terminal	Signal Name(s)	Connects To
E1, E2, P1-1	High Current Power Lines	A5A1 PA PWB
J1	DC Power (Outputs)	Power Distribution cable W5
J2	DC Power (Outputs)	Power Distribution cable W6
J3	DC Power (Outputs)	Options Power Bus
J4-1, J4-5	DC Power (Input)	DC Power (part of rear panel power cable) via A5W2
P2-3, P2-4	DC Power Switch	Front Panel Power Switch A1S1 via A1W1

NOTES:
1. COMPONENTS ARE PHYSICALLY MOUNTED ON THE A5 HEATSINK ASSEMBLY (P.N. 10212–1100)
2. THERMISTOR RT1 IS ATTACHED TO Q10 WITH THERMAL EPOXY

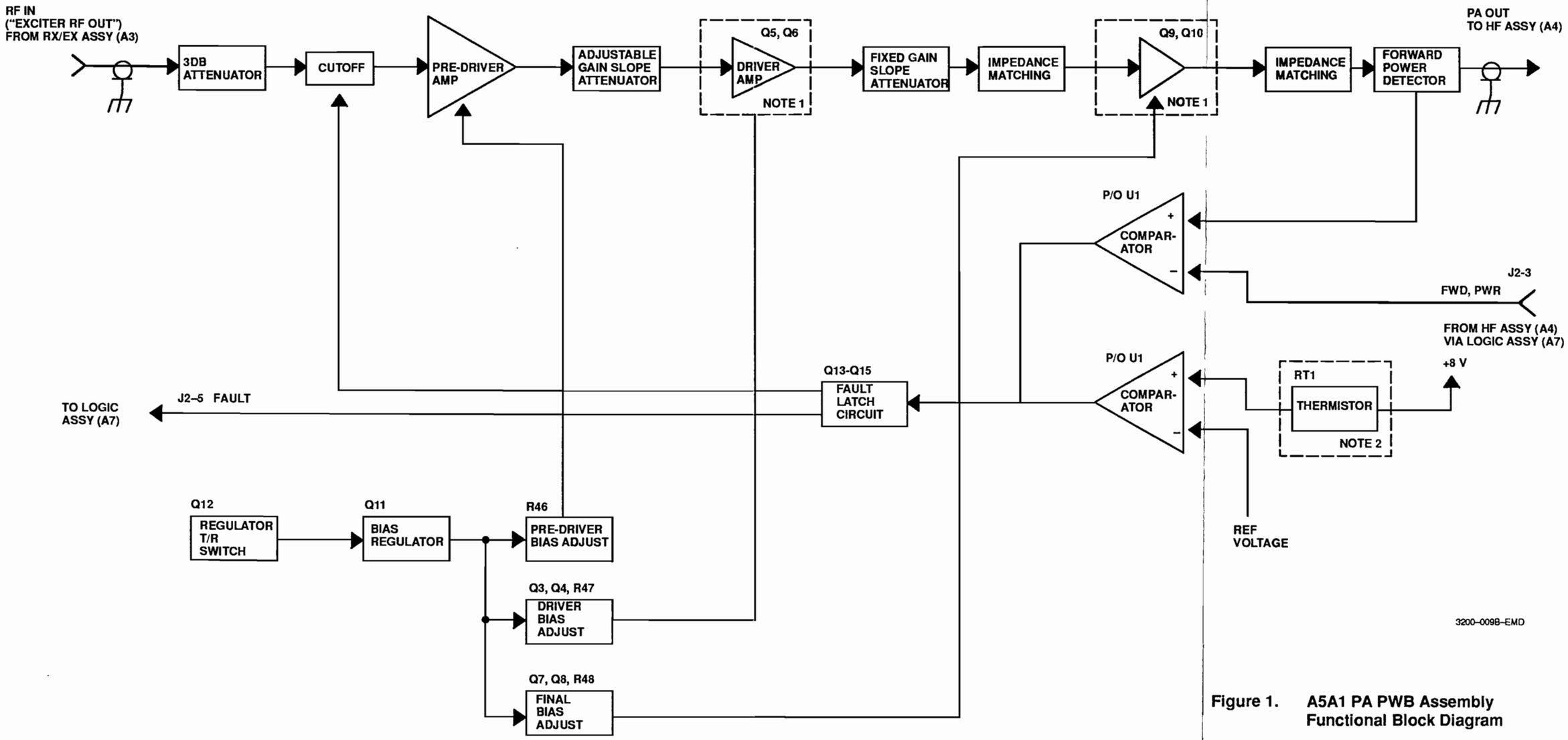


Figure 1. A5A1 PA PWB Assembly Functional Block Diagram

4. PARTS LISTS, COMPONENT LOCATION DIAGRAMS, AND SCHEMATIC DIAGRAMS

The following reference information is provided in this subsection:

- Table 3 - A5 Heatsink Assembly Parts List (10212-1100)
- Figure 2 - A5 Heatsink Assembly Component Locations
- Table 4 - A5A1 PA PWB Assembly Parts List (10212-1110)
- Figure 3 - A5A1 PA PWB Assembly Component Location Diagram (10212-1110)
- Figure 4 - A5A1 PA PWB Assembly Schematic Diagram (10212-1111)
- Table 5 - A5A2 Power Distribution PWB Assembly Parts List (10212-1810)
- Figure 5 - A5A2 Power Distribution PWB Assembly Component Location Diagram (10212-1810)
- Figure 6 - A5A2 Power Distribution PWB Assembly Schematic Diagram (10212-1811)
- Table 6 – A5A3 Capacitor Panel PWB Assembly Parts List (10212-1150)
- Figure 7 – A5A3 Capacitor Panel PWB Assembly Component Location Diagram (10212-1150)

Table 3. A5 Heatsink Assembly Parts List (10212-1100 Rev. R)

Ref. Desig.	Part Number	Description
	10212-1428	COAX ASSY, ANT/HF
A1	10212-1110	ASSY PWR AMP PWB
A2	10212-1810	ASSY PWR DIST PWB
A3	10212-1150	PWB ASSY, CAPACITOR PANEL
CR2	CR-0449	DIODE 50A 50V RECT GP
CR3	D16-0002-350	ARRESTOR SURGE 145V
J4	10212-1830	CABLE ASSY POWER
Q56	Q25-0022-001	XSTR RF HF 50W MRF450MP
Q910	Q25-0023-001	XSTR RF HF 100W MRF421MP
RT1	10212-1137	THERM ASSY 100K

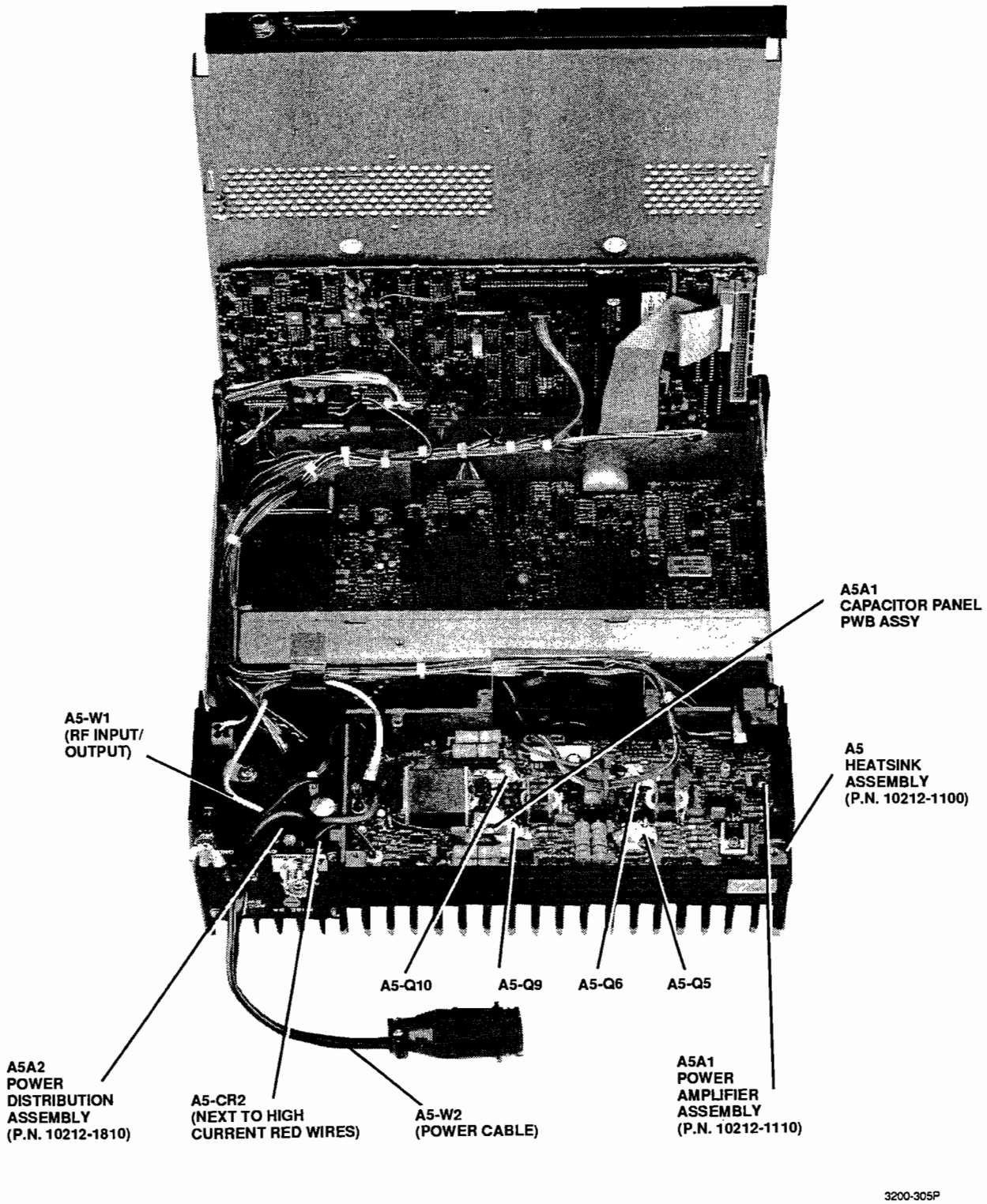


Figure 2. A5 Heatsink Assembly Component Locations

Table 4. A5A1 Power Amplifier (PA) PWB Assembly Parts List (10212-1110 Rev. W)

Ref. Desig.	Part Number	Description
C1	CM06FD561J03	CAP 560PF 5% 500V MICA
C2	CM05FD271J03	CAP 270PF 5% 500V MICA
C3	M39014/02-1310V	CAP .1UF 10% 100V CER-R
C4	C11-0009-104	CAP .1UF 20% 50V CER
C5	C11-0009-104	CAP .1UF 20% 50V CER
C7	CM05ED820J03	CAP 82PF 5% 500V MICA
C8	C11-0009-102	CAP 1000PF 20% 50V CER
C11	M39014/02-1298V	CAP .01UF 10% 200V CER-R
C12	M39014/02-1298V	CAP .01UF 10% 200V CER-R
C13	M39014/02-1310V	CAP .1UF 10% 100V CER-R
C14	M39014/02-1310V	CAP .1UF 10% 100V CER-R
C15	CM05FD271J03	CAP 270PF 5% 500V MICA
C16	C11-0009-104	CAP .1UF 20% 50V CER
C17	CM06FD561J03	CAP 560PF 5% 500V MICA
C21	CM05ED330J03	CAP 33PF 5% 500V MICA
C22	CM06FD122J03	CAP 1200PF 5% 500V MICA
C23	M39014/02-1302V	CAP .022UF 10% 100V CER-R
C24	M39014/02-1302V	CAP .022UF 10% 100V CER-R
C28	CM05ED220J03	CAP 22PF 5% 500V MICA
C31	CM05CD010D03	CAP 1PF+-.5PF 500V MICA
C32	C11-0009-104	CAP .1UF 20% 50V CER
C33	C11-0009-104	CAP .1UF 20% 50V CER
C34	C26-0050-109	CAP 1.0UF 20% 50V TANT
C35	C11-0009-104	CAP .1UF 20% 50V CER
C36	C11-0009-104	CAP .1UF 20% 50V CER
C37	C11-0009-104	CAP .1UF 20% 50V CER
C40	C24-1050-476	CAP 47UF RDL 50V ELEC
C45	C11-0009-104	CAP .1UF 20% 50V CER
C51	C11-0009-102	CAP 1000PF 20% 50V CER
C53	C11-0009-104	CAP .1UF 20% 50V CER
C54	C11-0009-473	CAP .047UF 20% 50V CER
C55	C11-0009-104	CAP .1UF 20% 50V CER
C56	C11-0009-473	CAP .047UF 20% 50V CER
C57	C11-0009-104	CAP .1UF 20% 50V CER
C58	C11-0009-104	CAP .1UF 20% 50V CER
C59	C11-0009-104	CAP .1UF 20% 50V CER
C60	C11-0009-102	CAP 1000PF 20% 50V CER

Table 4. A5A1 Power Amplifier (PA) PWB Assembly Parts List (10212-1110 Rev. W) (Cont.)

Ref. Desig.	Part Number	Description
C61	C11-0009-104	CAP .1UF 20% 50V CER
C62	C11-0009-104	CAP .1UF 20% 50V CER
C63	C11-0009-104	CAP .1UF 20% 50V CER
C64	C11-0009-104	CAP .1UF 20% 50V CER
C65	C11-0009-104	CAP .1UF 20% 50V CER
C66	C11-0005-474	CAP .47UF 20% 50V CER
C67	C11-0005-474	CAP .47UF 20% 50V CER
C68	M39014/02-1310V	CAP .1UF 10% 100V CER-R
C69	C11-0009-104	CAP .1UF 20% 50V CER
C70	C11-0009-103	CAP .01UF 20% 50V CER
C71	M39014/02-1320V	CAP .47UF 10% 50V CER-R
C72	C11-0009-104	CAP .1UF 20% 50V CER
C73	C11-0009-104	CAP .1UF 20% 50V CER
C76	CM05FD331J03	CAP 330PF 5% 500V MICA
C77	CM05FD331J03	CAP 330PF 5% 500V MICA
C78	CM05FD331J03	CAP 330PF 5% 500V MICA
C79	CM05FD331J03	CAP 330PF 5% 500V MICA
C80	C45-0002-561	CAP, 560PF 2%,METAL CLAD
CR1	1N4454	DIODE 200MA 75V SW
CR2	1N4454	DIODE 200MA 75V SW
CR3	1N4454	DIODE 200MA 75V SW
CR4	1N4454	DIODE 200MA 75V SW
CR5	1N4454	DIODE 200MA 75V SW
CR6	1N5237B	DIODE 8.2V 5% .5W ZENER
CR7	1N5711	DIODE SCHOTTKY 70V .25W
CR8	1N4454	DIODE 200MA 75V SW
CR10	10075-1054	DIODE TRANSIENT SUPPR
CR11	1N5711	DIODE SCHOTTKY 70V .25W
E3	J-0069	TP PWB ORN TOP ACCS .080"
E4	J-0070	TP PWB YEL TOP ACCS .080"
J1	J46-0085-004	HDR STRAIGHT 4 POS
J2	J46-0086-010	HDR 10 PIN 2MM SR SHRD
J3	J-0031	CONN SMB VERT PCB F
J4	J-0031	CONN SMB VERT PCB F
JMP1	MP-1142	RES ZERO OHM (CKT JMPR)
L1	10212-1146	INDUCTOR 100 UH
L2	L05-0001-010	INDUCT MOLD .110 UH 5%
L3	MS90538-12	COIL 100UH 5% FXD RF
L4	MS18130-5	COIL .56UH 10% FXD RF

Table 4. A5A1 Power Amplifier (PA) PWB Assembly Parts List (10212-1110 Rev. W) (Cont.)

Ref. Desig.	Part Number	Description
L5	L05-0001-005	INDUCT MOLD .054 UH 5%
L6	L05-0001-010	INDUCT MOLD .110 UH 5%
L7	L05-0001-005	INDUCT MOLD .054 UH 5%
L8	L05-0001-010	INDUCT MOLD .110 UH 5%
L9	L05-0001-010	INDUCT MOLD .110 UH 5%
L10	L-0652	COIL 1KUH 10% FXD RF
Q1	2N4401	XSTR SS/GP NPN TO-92
Q2	Q25-0016-000	XSTR RF VHF 8W MRF340
Q3	2N6037	XSTR DARL NPN 40V 4A
Q4	2N4921	XSTR POWER
Q7	2N6037	XSTR DARL NPN 40V 4A
Q8	2N4921	XSTR POWER
Q11	Q-0071	XSTR TIP120 NPN 60V 5A
Q12	2N2907A	XSTR SS/GP PNP TO-18
Q12	2N4126	XSTR SS/GP PNP TO-92
Q13	2N4401	XSTR SS/GP NPN TO-92
Q14	2N4126	XSTR SS/GP PNP TO-92
Q15	2N4401	XSTR SS/GP NPN TO-92
Q16	2N6430	XSTR SS/GP NPN 200V .05A
Q17	2N6430	XSTR SS/GP NPN 200V .05A
R1	R65-0004-100	RES 10 5% 1/2W CAR FILM
R2	R65-0004-270	RES 27 5% 1/2W CAR FILM
R3	R65-0003-390	RES 39 5% 1/4W CAR FILM
R4	R65-0003-101	RES 100 5% 1/4W CAR FILM
R5	R65-0004-331	RES 330 5% 1/2W CAR FILM
R6	R65-0004-829	RES 8.2 5% 1/2W CAR FILM
R7	R65-0004-151	RES 150 5% 1/2W CAR FILM
R8	R65-0004-829	RES 8.2 5% 1/2W CAR FILM
R9	R65-0003-123	RES 12K 5% 1/4W CAR FILM
R10	R65-0004-220	RES 22 5% 1/2W CAR FILM
R11	R65-0004-220	RES 22 5% 1/2W CAR FILM
R12	R65-0004-220	RES 22 5% 1/2W CAR FILM
R13	R65-0004-100	RES 10 5% 1/2W CAR FILM
R14	R65-0004-100	RES 10 5% 1/2W CAR FILM
R15	R65-0004-100	RES 10 5% 1/2W CAR FILM
R16	R65-0004-100	RES 10 5% 1/2W CAR FILM
R17	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R18	R65-0004-560	RES 56 5% 1/2W CAR FILM

Table 4. A5A1 Power Amplifier (PA) PWB Assembly Parts List (10212-1110 Rev. W) (Cont.)

Ref. Desig.	Part Number	Description
R19	R15-0003-270	RES 27 5% 5W FILM
R20	R15-0003-519	RES 5.1 5% 5W FILM
R21	R15-0003-519	RES 5.1 5% 5W FILM
R22	R65-0004-101	RES 100 5% 1/2W CAR FILM
R24	R65-0004-100	RES 10 5% 1/2W CAR FILM
R25	R65-0004-100	RES 10 5% 1/2W CAR FILM
R26	R15-0003-390	RES 39 5% 5W FILM
R27	R15-0003-390	RES 39 5% 5W FILM
R28	R15-0003-390	RES 39 5% 5W FILM
R29	R15-0003-390	RES 39 5% 5W FILM
R30	R65-0004-181	RES 180 5% 1/2W CAR FILM
R31	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R32	R65-0003-272	RES 2.7K 5% 1/4W CAR FILM
R36	R65-0003-331	RES 330 5% 1/4W CAR FILM
R37	R65-0003-271	RES 270 5% 1/4W CAR FILM
R38	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R39	R65-0003-561	RES 560 5% 1/4W CAR FILM
R40	R65-0003-123	RES 12K 5% 1/4W CAR FILM
R41	R65-0003-123	RES 12K 5% 1/4W CAR FILM
R42	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R43	R65-0003-273	RES 27K 5% 1/4W CAR FILM
R44	R65-0004-270	RES 27 5% 1/2W CAR FILM
R45	R-2202	RES VAR 50 10% .5W HOR.
R46	R-2206	RES VAR 1K 10% .5W HOR.
R47	R30-0008-202	RES VAR PCB 2K 1/2W 10%
R48	R30-0008-202	RES VAR PCB 2K 1/2W 10%
R49	R65-0004-180	RES 18 5% 1/2W CAR FILM
R50	R65-0003-272	RES 2.7K 5% 1/4W CAR FILM
R51	R65-0003-823	RES 82K 5% 1/4W CAR FILM
R52	R65-0003-279	RES 2.7 5% 1/4W CAR FILM
R53	R65-0003-101	RES 100 5% 1/4W CAR FILM
R54	R65-0003-339	RES 3.3 5% 1/4W CAR FILM
R55	R65-0003-101	RES 100 5% 1/4W CAR FILM
R57	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R58	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R59	R65-0003-104	RES 100K 5% 1/4W CAR FILM
R60	R65-0004-220	RES 22 5% 1/2W CAR FILM
R61	R65-0004-560	RES 56 5% 1/2W CAR FILM

Table 4. A5A1 Power Amplifier (PA) PWB Assembly Parts List (10212-1110 Rev. W) (Cont.)

Ref. Desig.	Part Number	Description
R62	R65-0004-560	RES 56 5% 1/2W CAR FILM
R63	R65-0004-100	RES 10 5% 1/2W CAR FILM
R64	R65-0004-100	RES 10 5% 1/2W CAR FILM
R65	R65-0004-100	RES 10 5% 1/2W CAR FILM
R66	R65-0004-100	RES 10 5% 1/2W CAR FILM
R67	R65-0004-560	RES 56 5% 1/2W CAR FILM
R68	R65-0004-100	RES 10 5% 1/2W CAR FILM
R69	R65-0004-100	RES 10 5% 1/2W CAR FILM
R70	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R71	R65-0004-101	RES 100 5% 1/2W CAR FILM
R74	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R75	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R76	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R77	R65-0003-272	RES 2.7K 5% 1/4W CAR FILM
R78	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R79	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R80	R65-0004-222	RES 2.2K 5% 1/2W CAR FILM
R81	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R82	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R83	R65-0003-103	RES 10K 5% 1/4W CAR FILM
T1	10212-1161	TRANSFORMER ASSY, IMPEDENCE
T2	10212-1140	XFMR DRIVER REVERSING
T3	10212-1162	TRANSFORMER ASSY, IMPEDENCE
T4	10212-1138	TRANSFORMER ASSEMBLY
T5	10212-1129	XFMR FORWARD POWER
T6	10212-1142-01	DC FEED CHOKE
U1	I30-0025-001	IC OP AMP QUAD 2902

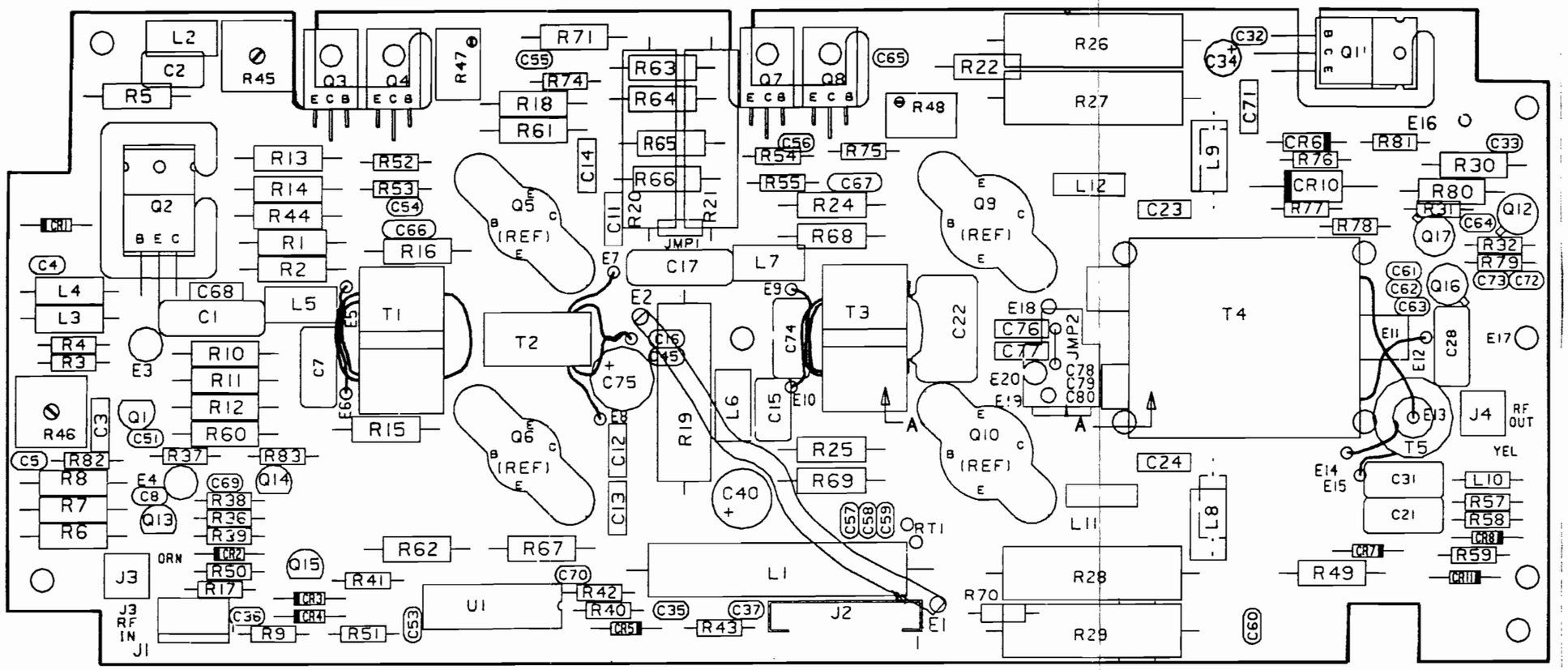
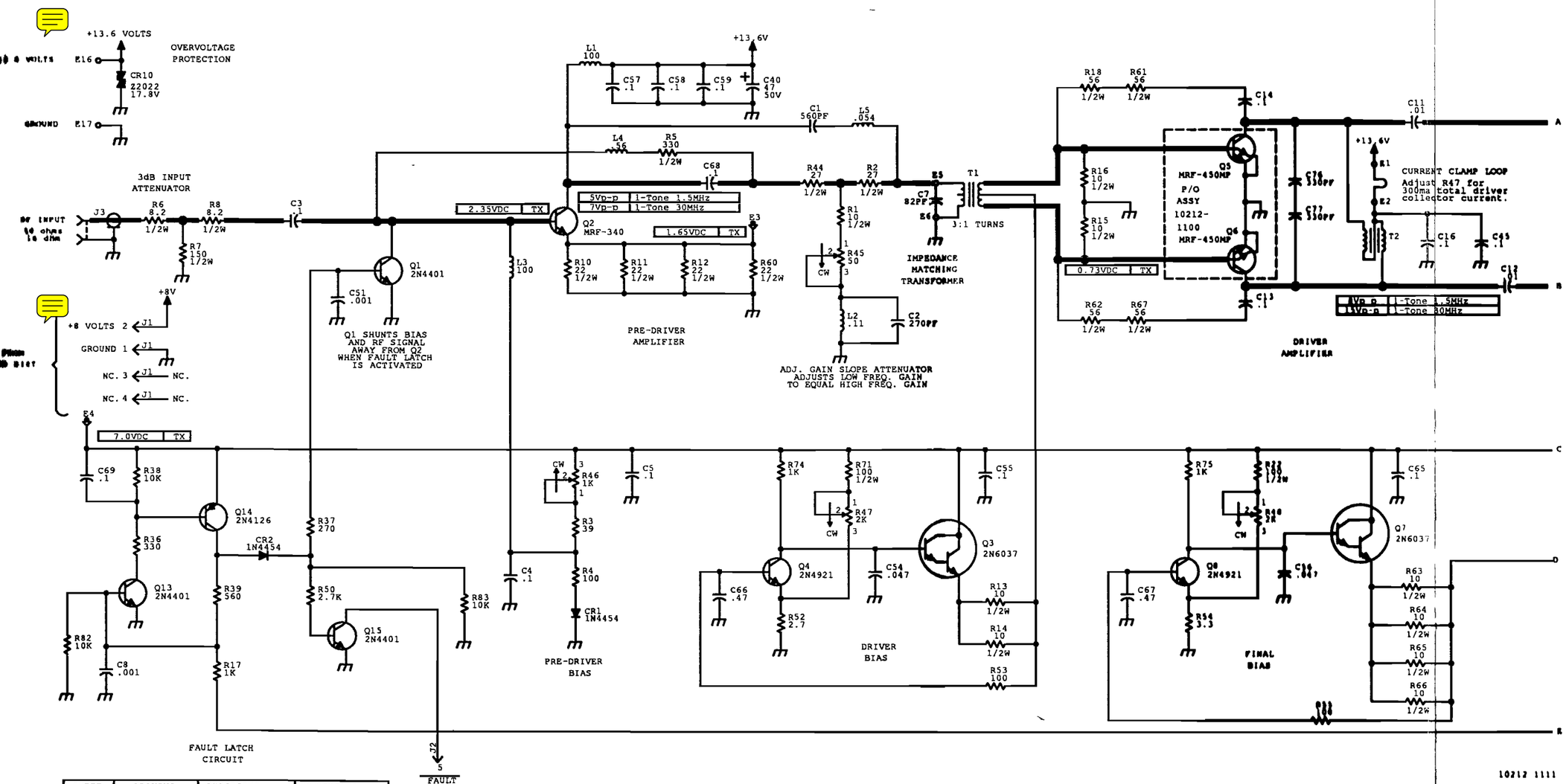


Figure 3. **A5A1 PA PWB Assembly Component Location Diagram (10212-1110 Rev. L)**

UNLESS OTHERWISE SPECIFIED:

1. ALL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH ASSY NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. RESISTOR VALUES ARE IN OHMS, 1/4W, +/-5%.
3. CAPACITOR VALUES ARE IN MICROFARADS.
4. [illegible] PART NO. CALLOUTS ARE FOR REFERENCE ONLY.
5. INDUCTOR VALUES ARE IN MICROHENRIES.



SHEET	DRAWING	DEPICTING	DESCRIPTION
1 & 2	10212-1111	10212-1110	12V DC PA
3 & 4	10212-1111	10212-1110-02	24V DC PA

Figure 4. A5A1 PA PWB Assembly Schematic Diagram (10212-1111 Rev. N) (Sheet 1 of 2)

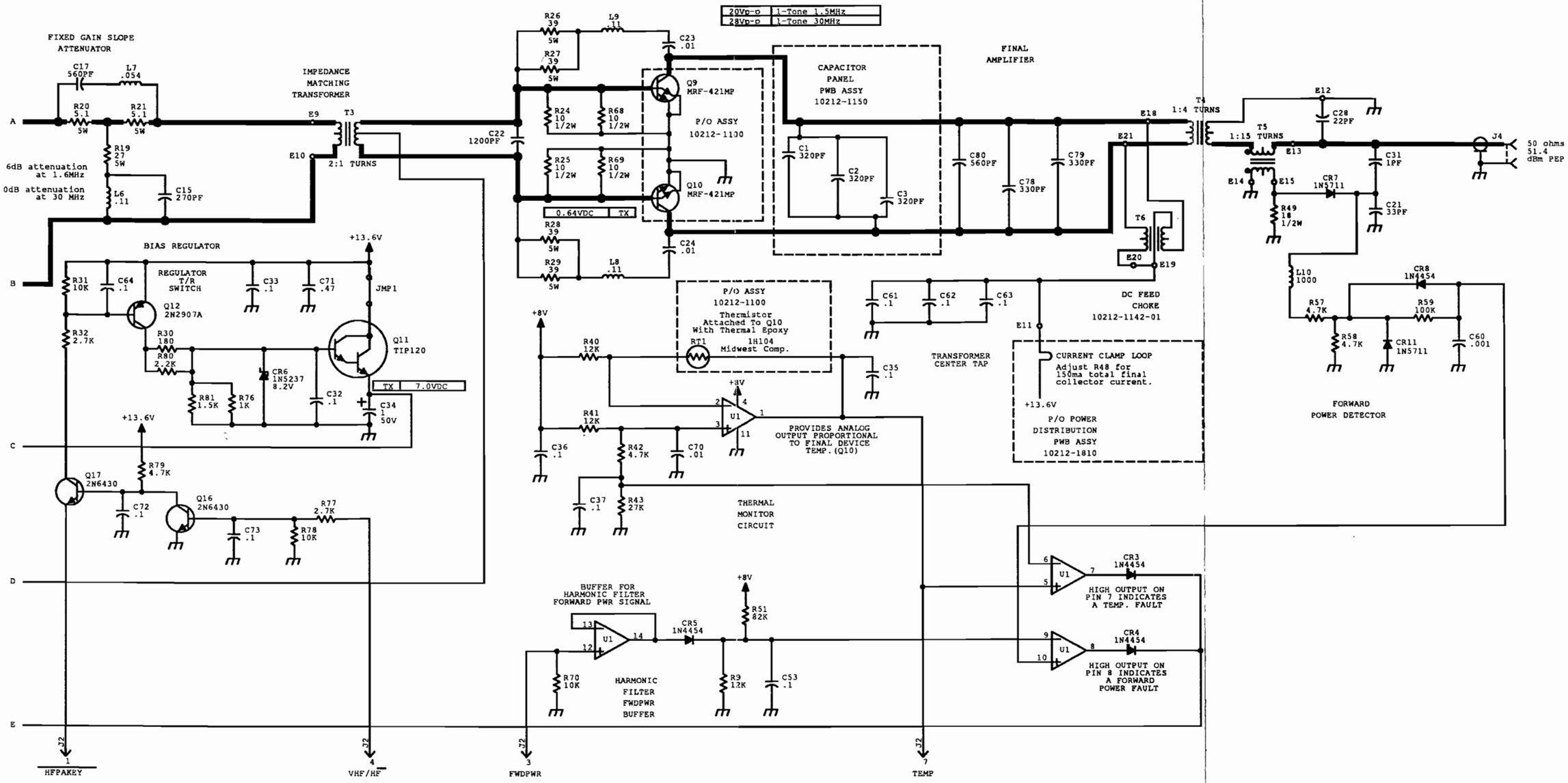


Figure 4. A5A1 PA PWB Assembly Schematic Diagram (10212-1111 Rev. N) (Sheet 2 of 2)

Table 5. A5A2 Power Distribution PWB Assembly Parts List (10212-1810 Rev. H)

Ref. Desig.	Part Number	Description
	J50-0005-001	HOLDER FUSE HORIZONTAL PC MNT
	MP-4236	PIN MALE
C2	C11-0009-104	CAP .1UF 20% 50V CER
C3	C19-0010-103	CAP 10000UF 25V ELEC
C4	C11-0009-104	CAP .1UF 20% 50V CER
C5	C11-0009-104	CAP .1UF 20% 50V CER
C6	C24-1016-478	CAP 4700UF RADIAL 16V ELEC
C7	C26-0016-151	CAP 150UF 20% 16V TANT
C8	C11-0009-104	CAP .1UF 20% 50V CER
CR1	1N4004	DIODE 1A 400V RECT GP
CR3	10075-1054	DIODE TRANSIENT SUPPRESSOR
E1	MS20659-165	LUG RING #6 12-10GA COPPER
F1	F-0017	FUSE 8.0A QA 125V 3AG
J1	J46-0085-010	HDR STRAIGHT 10 POS
J2	J46-0085-015	HDR STRAIGHT 15 POS
J3	J46-0085-004	HDR STRAIGHT 4 POS
J5	J40-0005-002	CONN FEMALE 2CIR
K1	K28-0003-001	RELAY SPDT PCMNT 12VDC
L1	10212-1145	INDUCTOR 1.5 MH
P2	J40-0009-004	CONN PLUG 4 CKT HOUSING
Q1	Q-0502	XSTR POWER TIP-36
Q2	Q-0049	XSTR TIP29A NPN PWR
R1	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R2	R65-0004-180	RES 18 5% 1/2W CAR FILM
R6	R65-0003-331	RES 330 5% 1/4W CAR FILM
R7	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R8	RN55D1740F	RES 174 1% 1/8W MET FLM
R9	RN55D3010F	RES 301 1% 1/8W MET FLM
R10	RCR32G180JM	RES 18 5% 1W CAR COMP
R11	MP-1142	RES ZERO OHM (CKT JMPR)
U1	I12-0006-005	IC VR 78L05A +5V .10A 4%
U2	I30-0020-004	IC OP AMP DUAL 2904

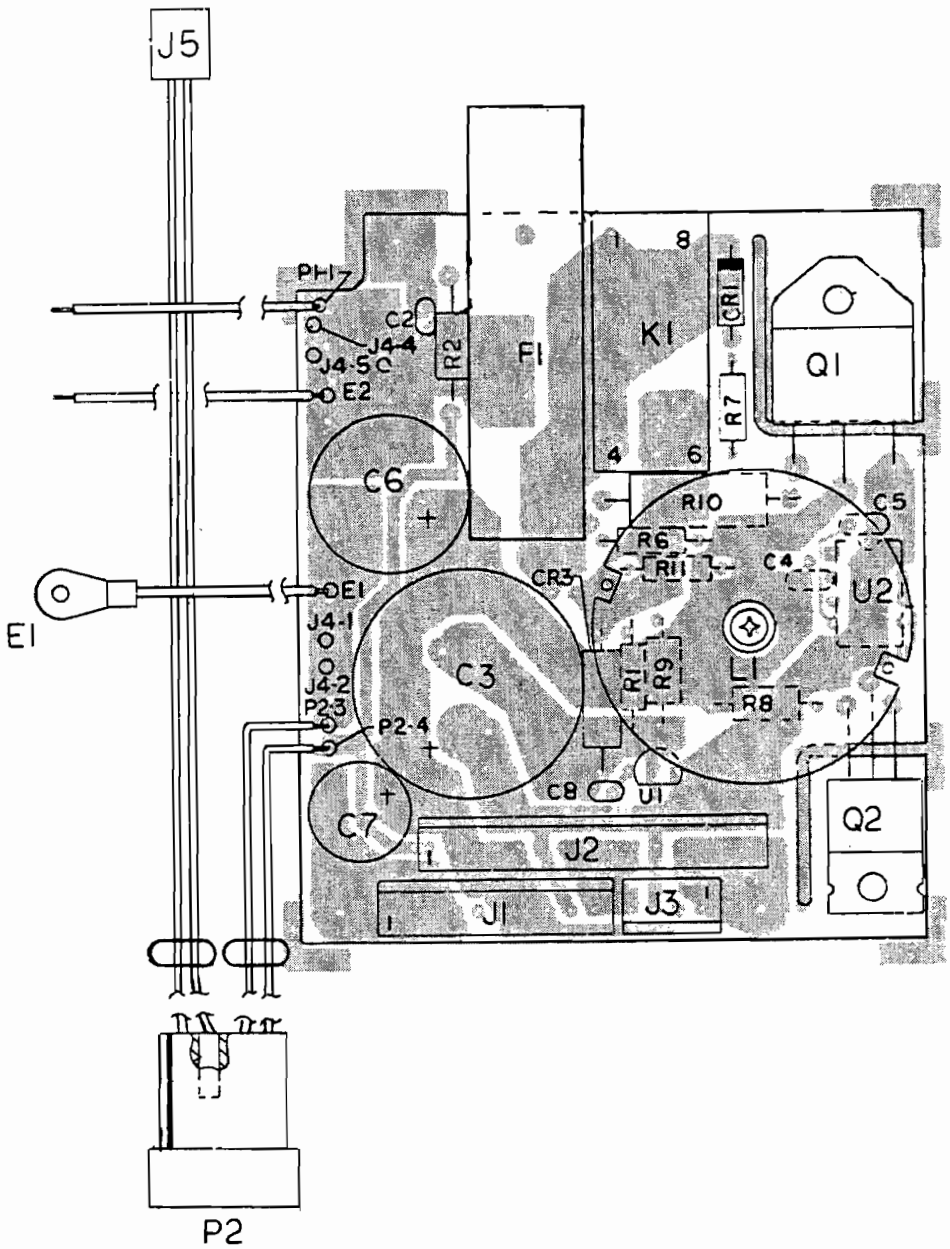


Figure 5. A5A2 Power Distribution PWB Assembly Component Location Diagram (10212-1810 Rev. C)

NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, +/-5%.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY. COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.
5. BOARD GROUND CONNECTED TO CHASSIS GROUND VIA BOARD MOUNTING SCREWS.

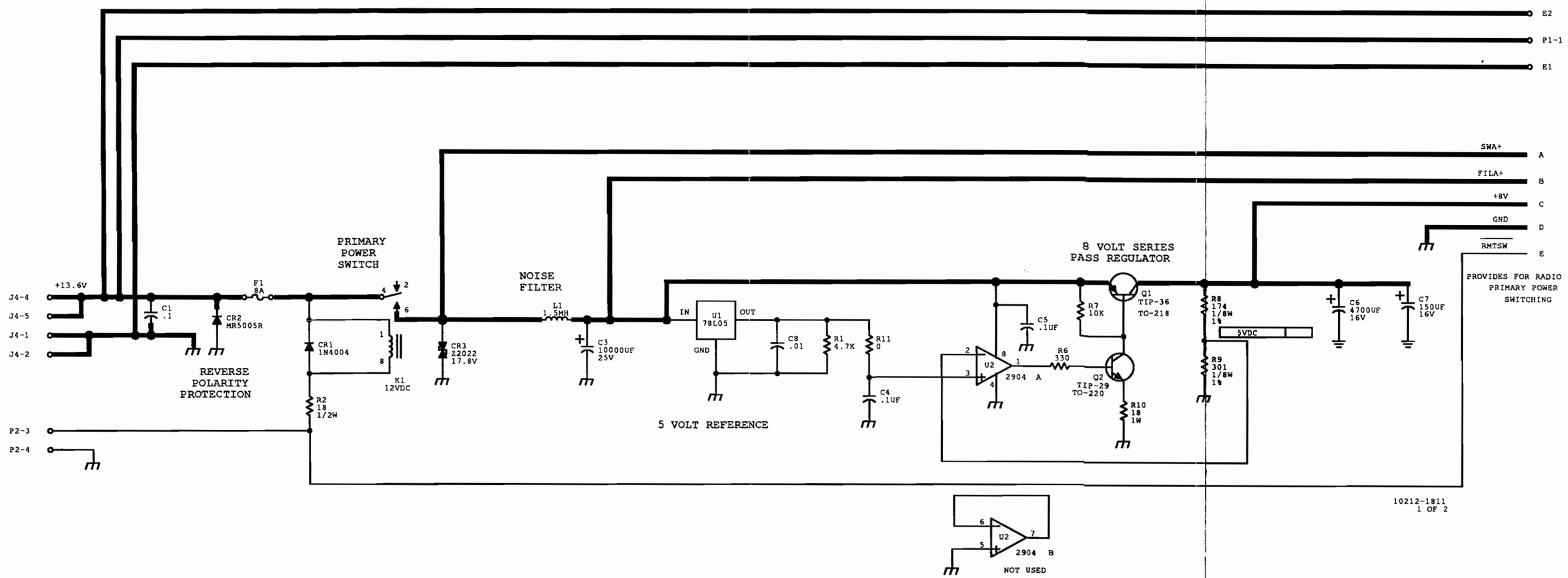


Figure 6. A5A2 Power Distribution PWB Assembly Schematic Diagram (10212-1811 Rev. A) (Sheet 1 of 2)

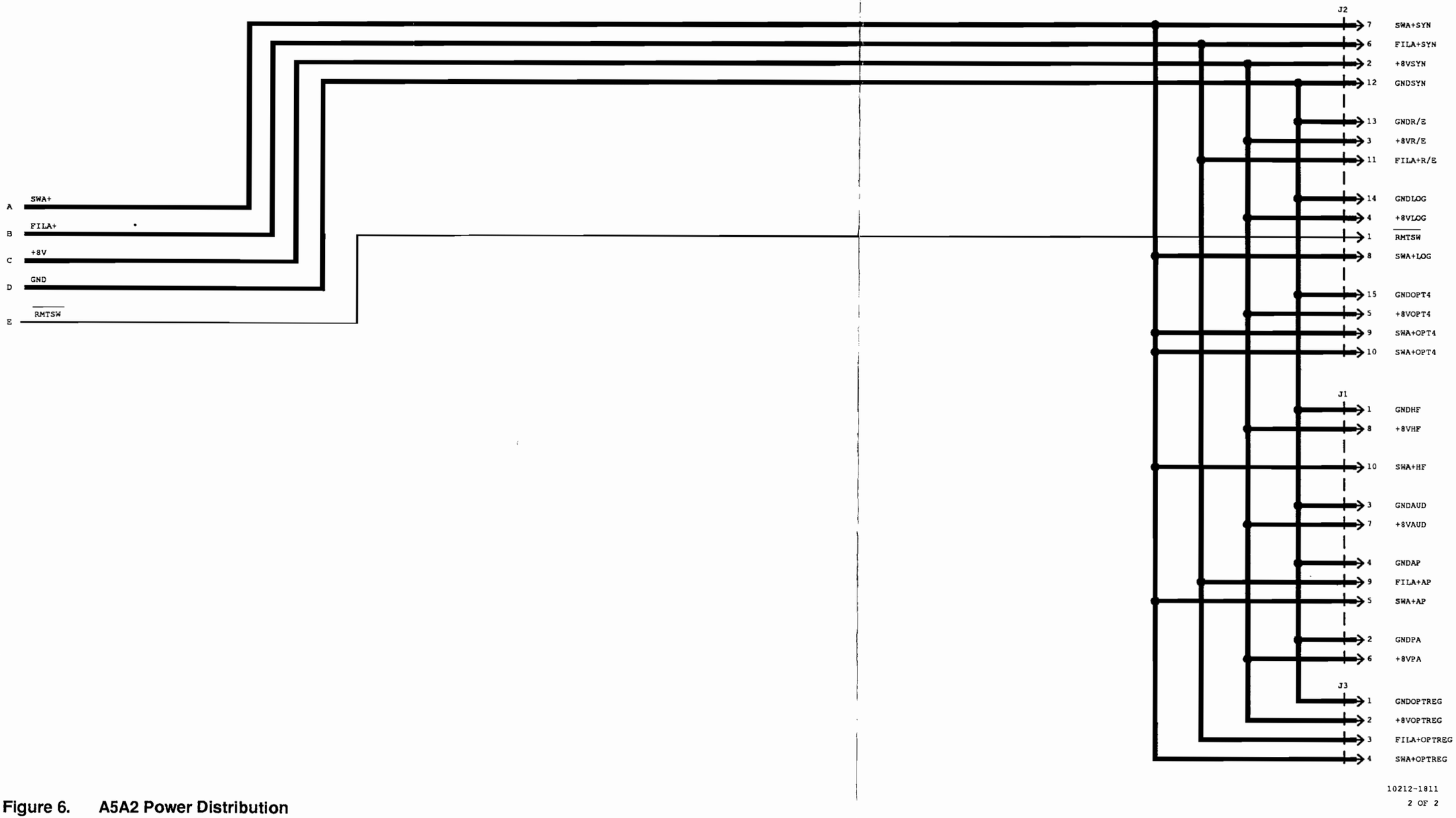


Figure 6. **A5A2 Power Distribution PWB Assembly Schematic Diagram (10212-1811 Rev. A) (Sheet 2 of 2)**

Table 6. A5A3 Capacitor Panel PWB Assembly Parts List (10212-1150 Rev. –)

Ref. Desig.	Part Number	Description
C1	C45-0002-321	CAP SILVERED MICA 300V 2%
C2	C45-0002-321	CAP SILVERED MICA 300V 2%
C3	C45-0002-321	CAP SILVERED MICA 300V 2%

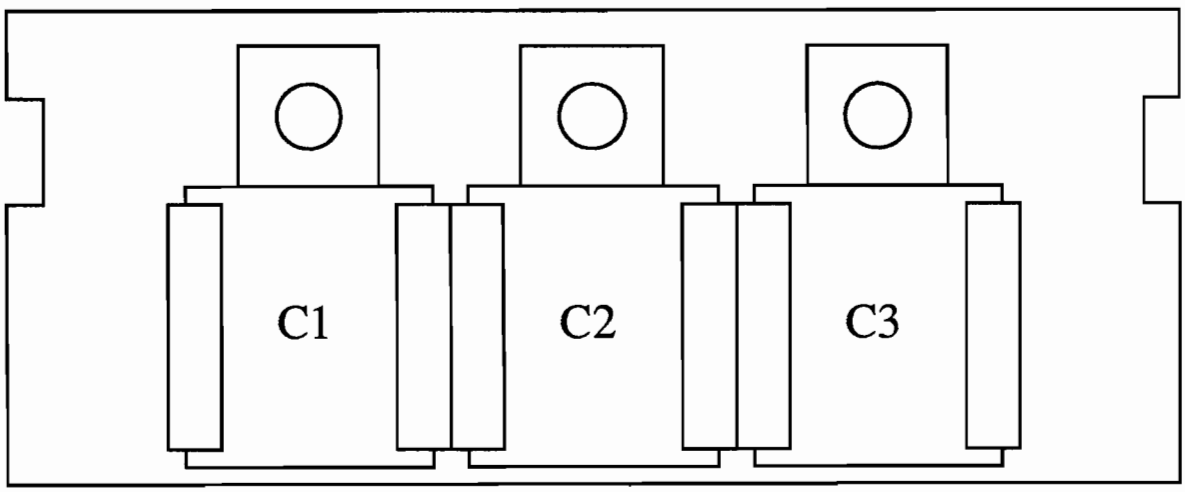


Figure 7. A5A3 Capacitor Panel PWB Assembly Component Location Diagram (10212-1150 Rev. –)

A7
LOGIC PWB ASSEMBLY

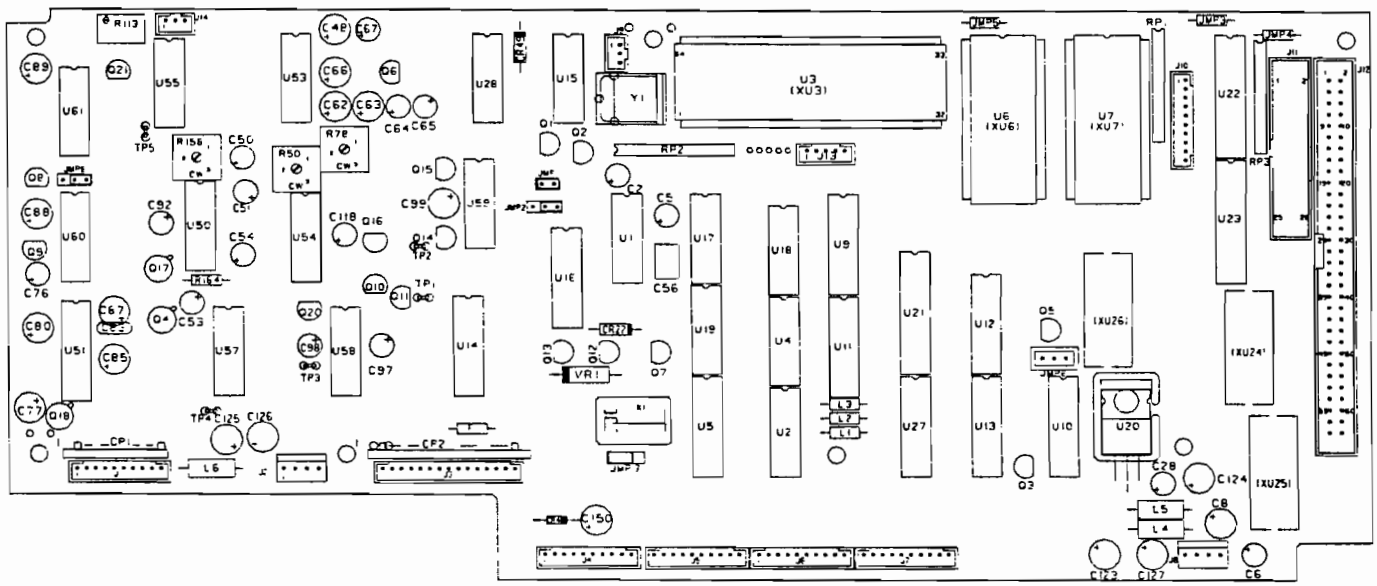


TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

A7 LOGIC PWB ASSEMBLY
PART NUMBER 10212-1210

1. GENERAL DESCRIPTION

The A7 Logic PWB Assembly processes and executes all operator commands through its microprocessor control program. The microprocessor controls all the other subassemblies of the transceiver.

CAUTION

The ROM supplied as U7 in this PWB assembly is specifically programmed for each transceiver. Do not attempt to interchange U7 ROMs among different transceivers or else extensive reprogramming of the Logic PWB Assembly by factory technicians will be necessary.

2. FUNCTIONAL DESCRIPTION

2.1 Introduction

The logic PWB assembly comprises three main circuits:

- Digital control circuit
- Audio processing circuit
- Automatic level control (ALC) circuit

2.2 Digital Control Circuit

The digital control circuit (see figure 1) contains the microprocessor, U3, and its associated support circuitry. It controls the activities of the logic PWB assembly, and ultimately all functions of the radio. Specifically, this section comprises:

- An 8-bit microprocessor (U3) which also includes on-board serial data ports and timers
- 8 kbytes of random access read-write memory (RAM) (U6)
- Random access read-only memory (ROM) (U7)
- Memory decoding circuitry (U4 and part of U19) for addressing RAM and ROM
- Data, address, control, and interrupt buffers (U22 through U26) for interfacing (via J11) with boards located in the option tray
- A serial data output latch and driver (U9, U11, U12, U21) to control the A3 Receiver/Exciter (RX/EX) PWB Assembly and A8 Synthesizer PWB Assembly
- Additional serial control circuits and serial-to-parallel shift registers (U27) to control audio circuits, the A4 Harmonic Filter (HF) PWB Assembly, and ALC (automatic level control)
- An output data latch (U10) which interfaces between the microprocessor D0 data line and up to eight control lines
- An input data latch (U13) which interfaces up to eight status lines to the microprocessor data line D0
- Input/output (I/O) decoding circuitry (U5) for selecting the various circuits

2.3 Audio Processing Circuit

The audio processing circuit (see figure 2) switches, buffers, filters, and amplifies the receive and transmit audio signals.

Receive audio from the A3 RCVR/EXTR PWB Assembly passes through Switch U50D which is controlled by a signal from an installed optional board. If installed, the option board provides an alternate source of audio.

Audio from either the A3 RCVR/EXTR PWB Assembly, or an installed optional assembly is routed to the following three places:

- Receiver audio goes to the accessory audio output connection (ACC) on the radio rear panel via level control potentiometer R50 and buffer amplifier U54B.

- When receive audio is not squelched, it follows the main audio path to the front panel A2 Audio PWB Assembly. Any tones (CW, error, and rounding) which are heard from the front panel speaker are added to the audio signal before being sent to the audio PWB assembly.

- Receiver audio is routed to the syllabic squelch circuitry. This circuit detects signals in the receiver audio which approximate the human voice. When no voice signals are detected, and squelch is enabled, audio is not passed to the audio output device (speaker, headphones, handset).

Transmitter modulating audio can come from one of four different sources. Each input is processed differently and then routed to the summing amplifier U58A. The inputs are as follows:

- Microphone audio enters from the front panel audio board and is routed through a pre-emphasis network (C75, R137), speech compression circuit (U41A), and de-emphasis network (C81, R141). The path between the de-emphasis network output and summing network input is switched at U50B.

- Accessory transmit audio enters from the rear panel, and is routed through a level control potentiometer (R158) and switch U50A.

- Transmit audio from any optional assemblies (if installed) is routed directly to summing amplifier U58A.

- A 300 to 2800 Hz square-wave signal (DTONE) from the microprocessor is routed through a low pass filter (R161-R162, C94-C95) and transistor switches controlled by the CW key enable (CWKEY) and transmit tone enable (TXTONEN) control signals.

Audio outputs are routed as follows:

- The output of the summing amplifier (U58A) is routed to the audio ALC circuit (U51B, U60A/B, and U61A) which results in a 4-volt$_{p-p}$ signal riding on a 4 Vdc level (TXREF).

- The ALC circuit output is routed to the A3 Receiver/Exciter PWB Assembly via switch Q18 which is controlled by a transmit tone enable signal and a CW key signal via Q9.

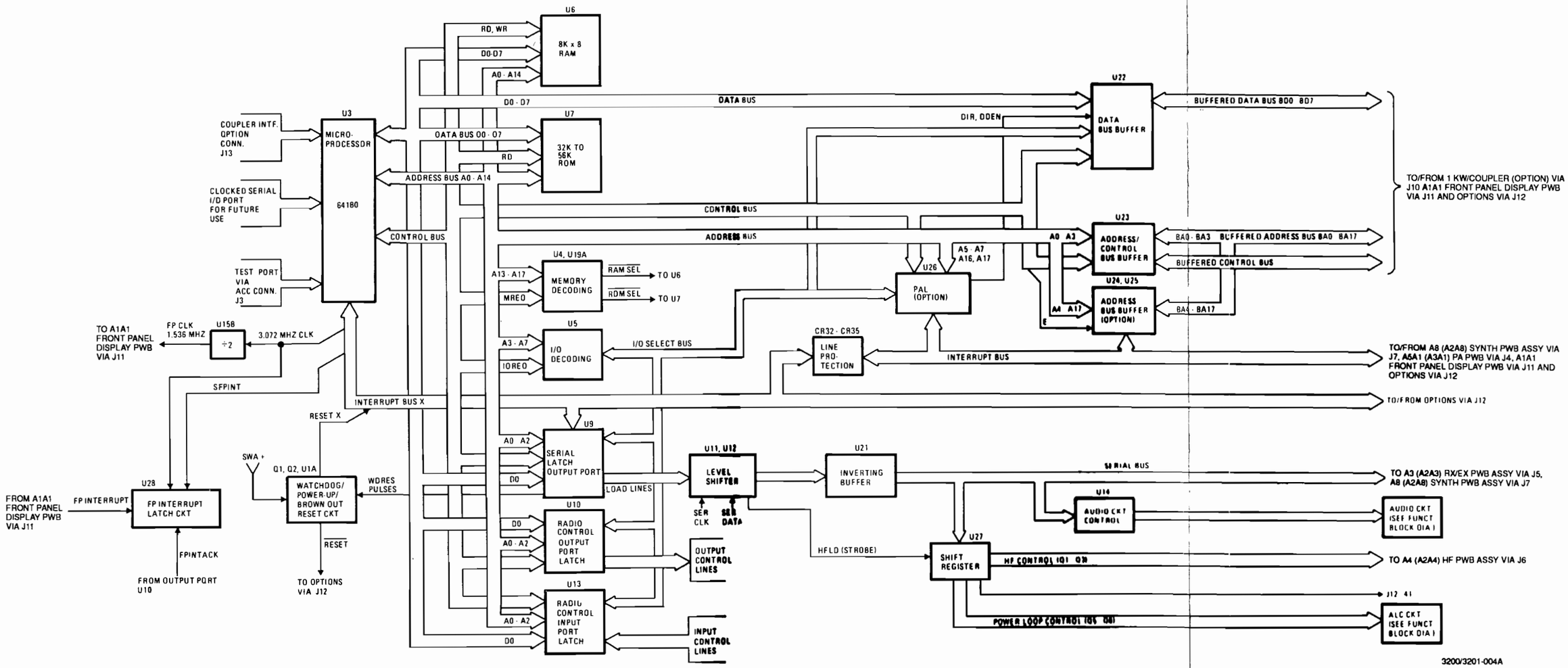


Figure 1. A7 Logic PWB Assembly Digital Control Section Functional Block Diagram

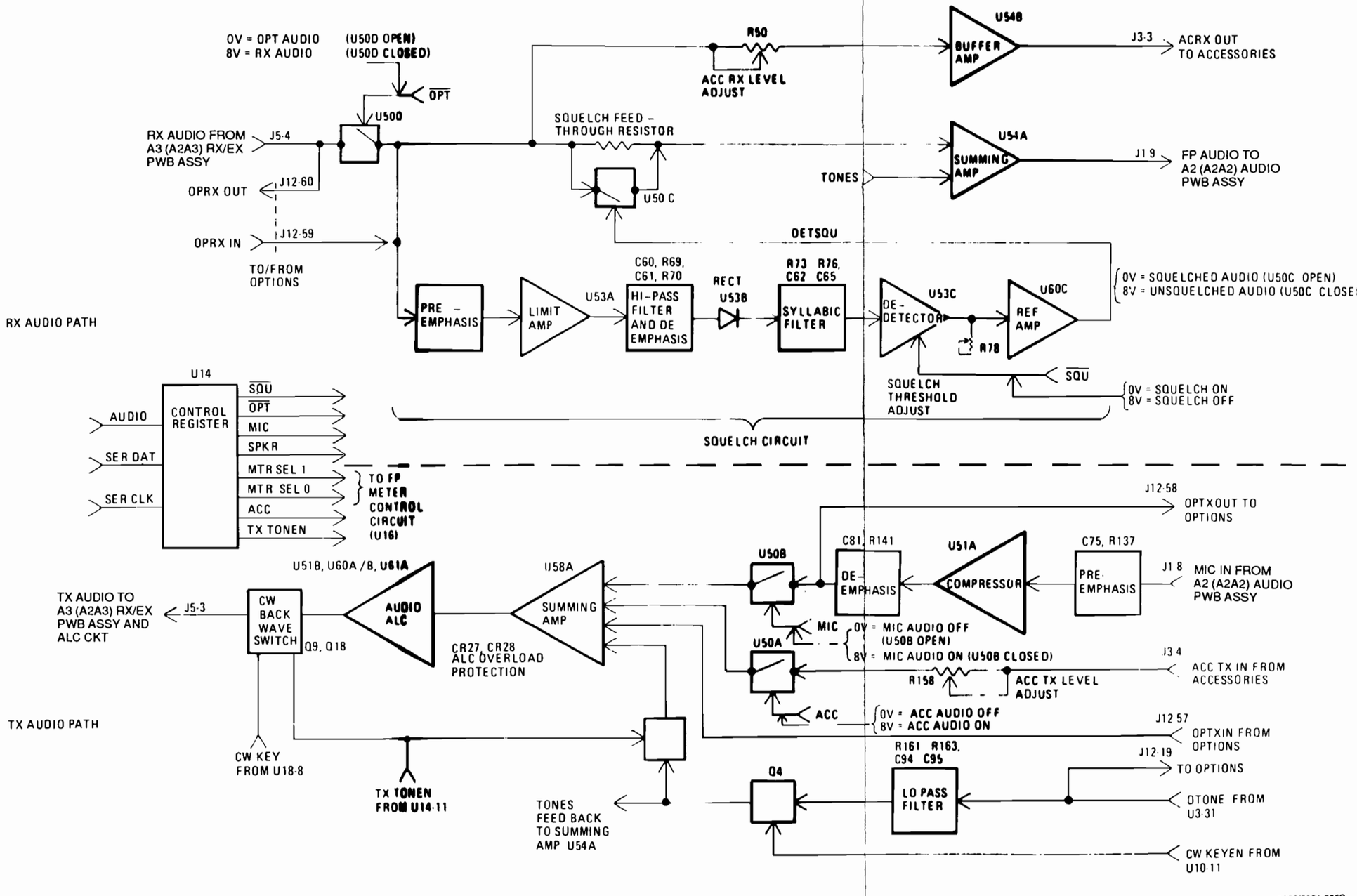


Figure 2. A7 Logic PWB Assembly, Audio Processing Section, Functional Block Diagram

2.4 Automatic Level Control Circuit

The automatic level control (ALC) circuit (see figure 3) receives inputs from various points in the radio and derives a single control voltage output used to regulate transmit RF output power. The ALC circuit comprises several stages of analog signal processors and signal combiners. These include the following circuits:

- Audio Reference Generator comprises rectifier U58D, peak detector U59D, and level shifter U60D. The rectifier derives a voltage from 0 to 5 Vdc from the TXREF signal which originates in the transmit audio processing section. The output of the rectifier U58D is proportional to the modulating audio. The absence of an $\overline{\text{ALCKEY}}$ signal (as when the transmitter is not keyed), or TUNEPWR signal, deactivates this circuit so that it behaves as if no audio were applied.

- Carrier/Tune Reference Generator (U58C) – processes the PWRCNTRL0 and PWRCNTRL1 digital signals (where logical high is +8 volts) from the digital control portion of this PWB whose levels are controlled by the transmitter mode and the tune-power status. The function is to control transmitter carrier power. A higher output voltage causes a higher carrier level. Refer to the schematic diagram (figure 5, sheet 8) for the table of Transceiver Modes versus voltages at the inputs and output of U58C.

- Reference Processor (U58B) – combines the output of the audio reference generator with the output of the carrier/tune power reference generator. The input from the audio reference generator is applied to the inverting input, so a higher signal from the audio reference generator causes a lower output level of the composite output reference voltage, and a lower transmitter RF output level.

- Analog OR (U55A-D) – merges power control inputs from several sources and provides a unified power controlling voltage applied to the Reference Adjust Amplifier. A more positive voltage at any input to U55 causes a higher voltage at the output circuit and ultimately lower transmitter output power. One of the inputs to U55 is from the power cutback circuit which is adjustable. See the schematic diagram (figure 5, sheet 8), for information on reducing the maximum transmitter output power to 60 watts. The other inputs to U55 are as follows:

  - The TEMP input from the power amplifier is proportional to the temperature of the heatsink; power reduction begins to take effect at 4 Vdc.
  - The supply /SWA+ input reduces transmitter power if either the PWB LVP (low voltage protection) signal or the PWB SWA+ power line drops below 12 Vdc.
  - The ACCTGC (accessory transmit gain control) input is connected to a rear panel connector pin; it causes no power cutback for a level of 0 Vdc and full power cutback for a level of 8.5 Vdc.
  - The LOW PWR signal, from the digital control section of this PWB, sets the maximum power of the radio to 28 watts when at 8 Vdc, and full power at zero volts.

- Reference Adjustment Amplifier (U59C) – combines the composite reference voltage output from the reference processor and the cutback voltage from U55A-D. Its output is designated Ref In. Since the cutback voltage is applied to the circuit's inverting input, a higher cutback voltage ultimately causes a lower transmitter power output.

- Analog OR (U57) – combines the forward power and reverse (reflected) power samples from the A4 Harmonic Filter PWB Assembly with the Opt TGC (option total gain control) signal from an optional assembly installed in the transceiver's option tray. In all cases, a higher dc input voltage causes a higher dc output level and, ultimately, a lower transmitter output power level.

- Peak Detect Attack Amplifier (U54C) – prevents the power attack amplifier that follows from responding instantaneously on high modulation peaks. A higher input to U54C causes a higher output which charges C118 through CR23 and R206. When the output of U54C falls below 0.6 volts, C118 discharges through R207/R206, maintaining the voltage on the positive input to the Power Attack Amplifier U54D, corresponding to the time constant of C118/R206+R207. This higher dc voltage to the Power Attack Amplifier, which is applied by way of buffer U57, prevents the Power Attack Amplifier from forcing the transmit power level higher. Refer to the schematic diagram (figure 5, sheet 9). Transistor Q16 discharges C118 when either the TXTONEN (transmit tone enable) signal or the $\overline{\text{ALCKEY}}$ signal goes high, such as when the transmitter is not keyed.

- Power Decay Amplifier (U59B) – forces a decrease in transmitter power level in response to inputs from the Reference Adjust Amplifier (Ref In) and from the analog outputs of U57 which precede it. Because Ref In is applied to the inverting input of U59B, as Ref In increases, the output of U59B decreases. An increase in any of the outputs of U57 causes a higher output level. When the output voltage of U59B is greater than 0.6 volts, CR14 conducts and ultimately reduces the transmitter power by way of the ALC Buffer Amplifier U59A. This circuit is disabled when the transmitter is not keyed ($\overline{\text{ALCKEY}}$ is high).

- Power Attack Amplifier (U54D) – forces an increase in transmitter power level in response to inputs from the Reference Adjust Amplifier and the Peak Detect Attack Amplifier. As the Ref In voltage increases, and/or as C118 discharges, the Power Attack Amplifier output voltage decreases. Under these circumstances, CR15 conducts and forces the positive input of U59A to decrease. The voltage at the output of U59A, the signal ALC, decreases and ultimately causes an increase in transmitter output power. Note that if the output voltage of the Power Attack Amplifier increases, it cannot directly decrease the transmitter power due to diode CR15.

- ALC Buffer Amplifier (U59A) – uses the input from the junction of R106 and R107 to provide a composite power control voltage, ALC. C99 minimizes power control circuit hunting, which causes low frequency modulation of the transmitter output. As with other ALC circuits, the $\overline{\text{ALCKEY}}$ disables the U59A when the transmitter is not keyed.

3. INTERCONNECTION

Table 1 lists the interconnections of the A7 Logic PWB Assembly. This table can aid in troubleshooting. See the Radio Interconnect Diagram for complete details.

4. PARTS LIST, COMPONENT LOCATION DIAGRAM, AND SCHEMATIC DIAGRAM

Table 2 is the parts list of the A7 Logic PWB Assembly. Figure 4 is the component location diagram, and figure 5 is the schematic diagram.

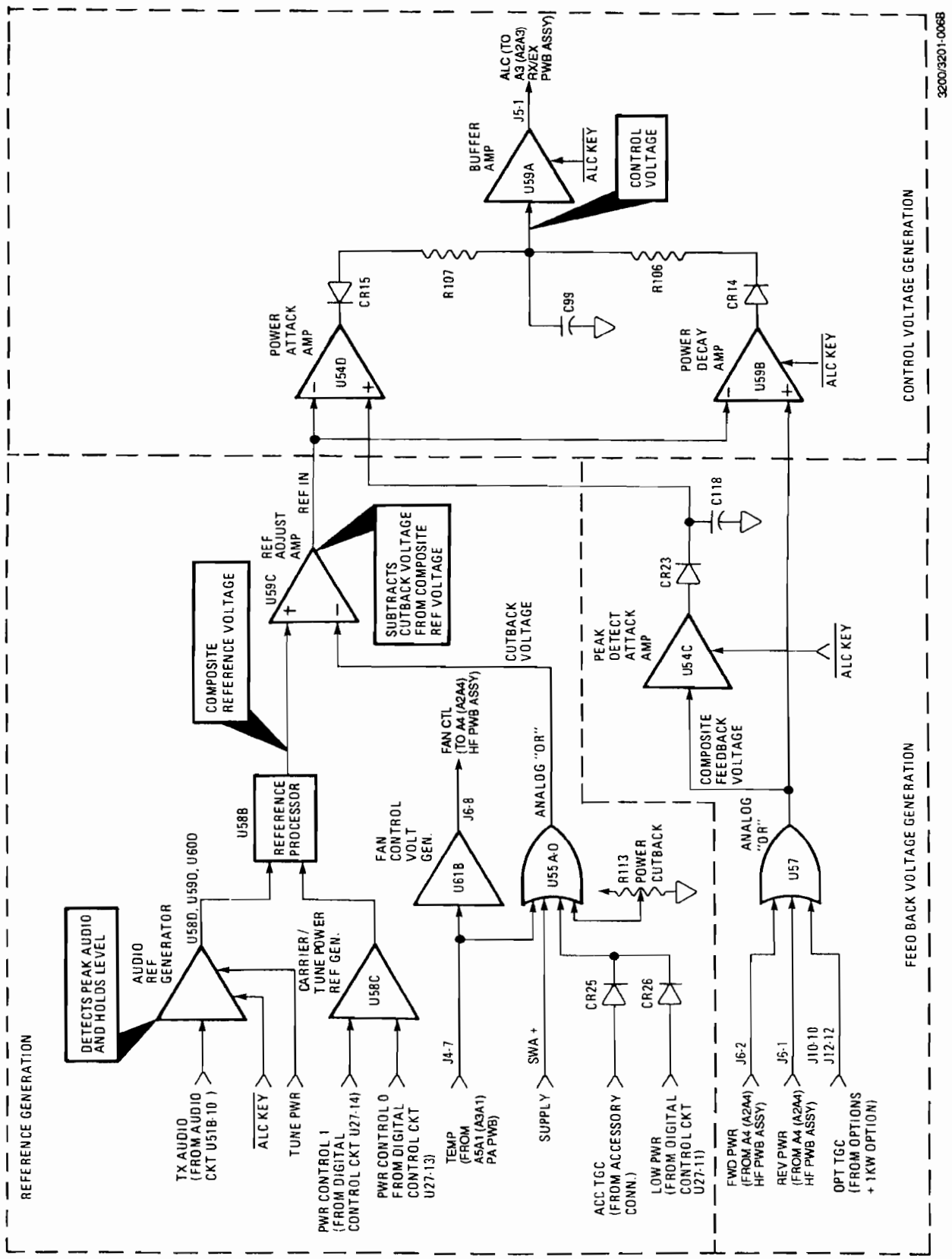


Figure 3. A7 Logic PWB Assembly, ALC Section, Functional Block Diagram

Table 1. A7 Logic PWB Assembly Interface Connections

Connector	Signal	Interconnection
J1	Audio Control	Audio PWB Assy A2J5 via W3
J2	DC Power (Audio Section)	Power Distribution PWB A5A2J1 via W5
J3	Accessory Control/Status	Rear Panel Accessory (ACC) Connector via A2W1
J4	Power Amplifier Control/ Status	PA PWB A5A1J2 via A2W9
J5	Receiver/Exciter Control	RX/EX PWB Assy A2A3J2 via A2W8
J6	HF Control/Status	HF PWB Assy A2A4J2 and A2A4J3 via A2W10
J7	Synthesizer Control	Synthesizer PWB Assy A2A8J5 via A2W7
J8	DC Power (Digital)	Power Distribution PWB A5A2J2 via A2W6
J9	CW Keying	Rear Panel CW Key Jack
J10	1 KW Control/Status	1 KW RF Amplifier (optional)
J11	Front Panel Control/Status	Front Panel Display PWB A1A1P1
J12	Options Control/Status	Option Bus A2A10J1
J13	Coupler Control/Status	Optional Antenna Coupler Interface PWB J2 via W4

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT)

Ref. Desig.	Part Number	Description
C1	C13-0103-103	CAP .01UF 10% 100V SMD
C3	C13-0103-103	CAP .01UF 10% 100V SMD
C4	C35-0050-104	CAP .1UF 10% 50V TANT
C5	C26-0035-109	CAP 1.0UF 20% 35V TANT
C6	C26-0035-109	CAP 1.0UF 20% 35V TANT
C7	C13-0103-473	CAP .047UF 10% 100V SMD
C8	C26-0025-100	CAP 10UF 20% 25V TANT
C10	C13-0103-103	CAP .01UF 10% 100V SMD
C11	C13-0103-473	CAP .047UF 10% 100V SMD
C12	C13-0103-103	CAP .01UF 10% 100V SMD
C13	C13-0103-103	CAP .01UF 10% 100V SMD
C14	C13-0103-473	CAP .047UF 10% 100V SMD
C15	C13-0103-473	CAP .047UF 10% 100V SMD
C16	C13-0103-103	CAP .01UF 10% 100V SMD
C17	C13-0103-103	CAP .01UF 10% 100V SMD
C18	C13-0103-103	CAP .01UF 10% 100V SMD
C19	C13-0103-103	CAP .01UF 10% 100V SMD
C20	C13-0103-103	CAP .01UF 10% 100V SMD
C21	C13-0103-103	CAP .01UF 10% 100V SMD
C22	C13-0103-103	CAP .01UF 10% 100V SMD
C23	C13-0103-103	CAP .01UF 10% 100V SMD
C24	C13-0103-103	CAP .01UF 10% 100V SMD
C25	C13-0103-103	CAP .01UF 10% 100V SMD
C26	C13-0103-473	CAP .047UF 10% 100V SMD
C27	C13-0103-103	CAP .01UF 10% 100V SMD
C28	C26-0035-109	CAP 1.0UF 20% 35V TANT
C29	C13-0103-102	CAP 1000PF 10% 100V SMD
C30	C13-0103-103	CAP .01UF 10% 100V SMD
C31	C13-0103-103	CAP .01UF 10% 100V SMD
C32	C13-0103-103	CAP .01UF 10% 100V SMD
C33	C13-0103-103	CAP .01UF 10% 100V SMD
C34	C13-0103-103	CAP .01UF 10% 100V SMD
C35	C13-0103-103	CAP .01UF 10% 100V SMD
C36	C13-0103-103	CAP .01UF 10% 100V SMD
C37	C13-0103-103	CAP .01UF 10% 100V SMD
C38	C13-0103-103	CAP .01UF 10% 100V SMD
C39	C13-0103-103	CAP .01UF 10% 100V SMD
C40	C13-0103-103	CAP .01UF 10% 100V SMD
C41	C13-0103-103	CAP .01UF 10% 100V SMD

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT) (Cont.)

Ref. Desig.	Part Number	Description
C42	C13-0103-473	CAP .047UF 10% 100V SMD
C43	C13-0103-473	CAP .047UF 10% 100V SMD
C44	C13-0103-473	CAP .047UF 10% 100V SMD
C45	C13-0103-473	CAP .047UF 10% 100V SMD
C46	C13-0103-103	CAP .01UF 10% 100V SMD
C47	C13-0103-473	CAP .047UF 10% 100V SMD
C48	C26-0025-100	CAP 10UF 20% 25V TANT
C49	C13-0103-103	CAP .01UF 10% 100V SMD
C50	C26-0035-109	CAP 1.0UF 20% 35V TANT
C51	C26-0035-109	CAP 1.0UF 20% 35V TANT
C53	C26-0035-109	CAP 1.0UF 20% 35V TANT
C54	C26-0035-109	CAP 1.0UF 20% 35V TANT
C55	C13-0103-472	CAP 4700PF 10% 100V SMD
C56	C80-0009-474	CAP .47UF 5% 63V POLYE
C57	C13-0103-103	CAP .01UF 10% 100V SMD
C58	C35-0050-104	CAP .1UF 10% 50V TANT
C59	C13-0103-473	CAP .047UF 10% 100V SMD
C60	C13-0103-682	CAP 6800PF 10% 100V SMD
C61	C13-0103-333	CAP .033UF 10% 100V SMD
C62	C26-0025-100	CAP 10UF 20% 25V TANT
C63	C26-0025-100	CAP 10UF 20% 25V TANT
C64	C26-0035-109	CAP 1.0UF 20% 35V TANT
C65	C26-0035-109	CAP 1.0UF 20% 35V TANT
C66	C26-0025-100	CAP 10UF 20% 25V TANT
C67	C26-0035-109	CAP 1.0UF 20% 35V TANT
C75	C13-0103-182	CAP 1800PF 10% 100V SMD
C76	C26-0035-109	CAP 1.0UF 20% 35V TANT
C77	C26-0025-100	CAP 10UF 20% 25V TANT
C78	C13-0101-330	CAP 33PF 10% 100V SMD
C79	C13-0103-473	CAP .047UF 10% 100V SMD
C80	C26-0025-100	CAP 10UF 20% 25V TANT
C81	C13-0103-223	CAP .022UF 10% 100V SMD
C82	C13-0103-681	CAP 680PF 10% 100V SMD
C83	C11-0009-474	CAP .47UF 20% 50V CER
C85	C26-0025-100	CAP 10UF 20% 25V TANT
C86	C13-0103-473	CAP .047UF 10% 100V SMD
C87	C26-0025-100	CAP 10UF 20% 25V TANT
C88	C26-0025-100	CAP 10UF 20% 25V TANT
C89	C26-0035-109	CAP 1.0UF 20% 35V TANT

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT) (Cont.)

Ref. Desig.	Part Number	Description
C90	C35-0050-104	CAP .1UF 10% 50V TANT
C91	C35-0050-104	CAP .1UF 10% 50V TANT
C92	C26-0035-109	CAP 1.0UF 20% 35V TANT
C93	C13-0103-223	CAP .022UF 10% 100V SMD
C94	C13-0103-103	CAP .01UF 10% 100V SMD
C95	C35-0050-104	CAP .1UF 10% 50V TANT
C96	C35-0050-104	CAP .1UF 10% 50V TANT
C97	C26-0025-100	CAP 10UF 20% 25V TANT
C98	C26-0025-100	CAP 10UF 20% 25V TANT
C99	C26-0025-100	CAP 10UF 20% 25V TANT
C111	C13-0103-681	CAP 680PF 10% 100V SMD
C112	C13-0103-472	CAP 4700PF 10% 100V SMD
C113	C13-0103-103	CAP .01UF 10% 100V SMD
C114	C13-0103-102	CAP 1000PF 10% 100V SMD
C116	C13-0103-103	CAP .01UF 10% 100V SMD
C117	C13-0103-103	CAP .01UF 10% 100V SMD
C118	C26-0025-100	CAP 10UF 20% 25V TANT
C119	C13-0103-473	CAP .047UF 10% 100V SMD
C120	C13-0103-103	CAP .01UF 10% 100V SMD
C121	C35-0050-104	CAP .1UF 10% 50V TANT
C123	C26-0025-100	CAP 10UF 20% 25V TANT
C124	C26-0025-100	CAP 10UF 20% 25V TANT
C125	C26-0025-100	CAP 10UF 20% 25V TANT
C126	C26-0025-100	CAP 10UF 20% 25V TANT
C127	C26-0025-100	CAP 10UF 20% 25V TANT
C128	C13-0103-103	CAP .01UF 10% 100V SMD
C129	C13-0103-103	CAP .01UF 10% 100V SMD
C130	C13-0103-103	CAP .01UF 10% 100V SMD
C134	C13-0101-470	CAP 47PF 10% 50V CER
C135	C13-0101-470	CAP 47PF 10% 50V CER
C140	C13-0103-103	CAP .01UF 10% 100V SMD
C141	C13-0103-103	CAP .01UF 10% 100V SMD
C142	C13-0103-103	CAP .01UF 10% 100V SMD
C143	C13-0103-681	CAP 680PF 10% 100V SMD
C144	C13-0103-472	CAP 4700PF 10% 100V SMD
C145	C13-0103-473	CAP .047UF 10% 100V SMD
C146	C13-0103-103	CAP .01UF 10% 100V SMD
C147	C13-0103-103	CAP .01UF 10% 100V SMD
C148	C13-0103-103	CAP .01UF 10% 100V SMD

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT) (Cont.)

Ref. Desig.	Part Number	Description
C150	C26-0035-109	CAP 1.0UF 20% 35V TANT
C151	C35-0050-104	CAP .1UF 10% 50V TANT
C152	C13-0103-102	CAP 1000PF 10% 100V SMD
CP1	10212-3757	CAP SIP PACK
CP2	10212-3757	CAP SIP PACK
CR2	D15-0914-101	DIODE HI-SPD SWITCHING
CR3	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR4	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR5	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR6	D15-0914-101	DIODE HI-SPD SWITCHING
CR7	D15-0914-101	DIODE HI-SPD SWITCHING
CR8	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR10	D15-0914-101	DIODE HI-SPD SWITCHING
CR11	D15-0914-101	DIODE HI-SPD SWITCHING
CR12	D15-0914-101	DIODE HI-SPD SWITCHING
CR14	D15-0914-101	DIODE HI-SPD SWITCHING
CR15	D15-0914-101	DIODE HI-SPD SWITCHING
CR16	D15-0914-101	DIODE HI-SPD SWITCHING
CR17	D15-0914-101	DIODE HI-SPD SWITCHING
CR18	D15-0914-101	DIODE HI-SPD SWITCHING
CR19	D15-0914-101	DIODE HI-SPD SWITCHING
CR20	D15-0914-101	DIODE HI-SPD SWITCHING
CR21	D15-0914-101	DIODE HI-SPD SWITCHING
CR22	1N5228B	DIODE 3.9V 5% .5W ZENER
CR23	D15-0914-101	DIODE HI-SPD SWITCHING
CR24	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR25	D15-0914-101	DIODE HI-SPD SWITCHING
CR26	D15-0914-101	DIODE HI-SPD SWITCHING
CR27	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR28	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR29	D15-0914-101	DIODE HI-SPD SWITCHING
CR32	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR33	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR34	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR35	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR36	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR37	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR38	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR39	D15-0099-001	DIODE GP SW 70V DUAL SOT

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT) (Cont.)

Ref. Desig.	Part Number	Description
CR40	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR41	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR44	D15-0099-001	DIODE GP SW 70V DUAL SOT
CR45	D15-0914-101	DIODE HI-SPD SWITCHING
CR46	D15-0914-101	DIODE HI-SPD SWITCHING
CR47	D15-0914-101	DIODE HI-SPD SWITCHING
CR48	1N6263	DIODE .40W 60V HOT CARR
CR50	D15-0914-101	DIODE HI-SPD SWITCHING
F1	F15-0001-008	FUSE 1.5A QA 125V PICO
JMP3	MP-1142	RES ZERO OHM (CKT JMPR)
JMP4	MP-1142	RES ZERO OHM (CKT JMPR)
JMP5	MP-1142	RES ZERO OHM (CKT JMPR)
K1	K28-0002-001	RELAY SPDT PCMNT 12VDC
L1	MS75085-14	COIL 390UH 10% FXD RF
L2	MS75085-14	COIL 390UH 10% FXD RF
L3	MS75085-14	COIL 390UH 10% FXD RF
L4	MS18130-3	COIL .33UH 10% FXD RF
L5	MS18130-3	COIL .33UH 10% FXD RF
L6	MS18130-3	COIL .33UH 10% FXD RF
Q3	2N4124	XSTR SS/GP NPN TO-92
Q4	2N4393	XSTR JFET N-CH TO-18
Q5	2N4124	XSTR SS/GP NPN TO-92
Q6	2N4124	XSTR SS/GP NPN TO-92
Q7	2N4124	XSTR SS/GP NPN TO-92
Q8	2N4126	XSTR SS/GP PNP TO-92
Q9	2N4124	XSTR SS/GP NPN TO-92
Q10	2N4124	XSTR SS/GP NPN TO-92
Q11	2N4124	XSTR SS/GP NPN TO-92
Q12	2N4124	XSTR SS/GP NPN TO-92
Q13	2N2222A	XSTR SS/GP NPN TO-18
Q14	2N4126	XSTR SS/GP PNP TO-92
Q15	2N4126	XSTR SS/GP PNP TO-92
Q16	2N4124	XSTR SS/GP NPN TO-92
Q17	2N4393	XSTR JFET N-CH TO-18
Q18	2N4393	XSTR JFET N-CH TO-18
Q20	2N4126	XSTR SS/GP PNP TO-92
Q21	2N4124	XSTR SS/GP NPN TO-92
R1	R85-0125-103	RES 10K 5% 1/8W FILM
R2	R85-0125-103	RES 10K 5% 1/8W FILM

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT) (Cont.)

Ref. Desig.	Part Number	Description
R6	R85-0125-103	RES 10K 5% 1/8W FILM
R7	R85-0125-103	RES 10K 5% 1/8W FILM
R8	R85-0125-473	RES 47K 5% 1/8W FILM
R10	R85-0125-152	RES 1.5K 5% 1/8W FILM
R11	R85-0125-471	RES 470 5% 1/8W FILM
R12	R85-0125-101	RES 100 5% 1/8W FILM
R13	R85-0125-471	RES 470 5% 1/8W FILM
R14	R85-0125-103	RES 10K 5% 1/8W FILM
R15	R85-0125-101	RES 100 5% 1/8W FILM
R17	R85-0125-102	RES 1.0K 5% 1/8W FILM
R18	R85-0125-103	RES 10K 5% 1/8W FILM
R23	R85-0125-103	RES 10K 5% 1/8W FILM
R24	R85-0125-152	RES 1.5K 5% 1/8W FILM
R25	R85-0125-154	RES 150K 5% 1/8W FILM
R26	R85-0125-103	RES 10K 5% 1/8W FILM
R27	R85-0125-684	RES 680K 5% 1/8W FILM
R28	R85-0125-103	RES 10K 5% 1/8W FILM
R29	R85-0125-103	RES 10K 5% 1/8W FILM
R30	R85-0125-103	RES 10K 5% 1/8W FILM
R31	R85-0125-103	RES 10K 5% 1/8W FILM
R32	R85-0125-103	RES 10K 5% 1/8W FILM
R33	R85-0125-103	RES 10K 5% 1/8W FILM
R34	R85-0125-103	RES 10K 5% 1/8W FILM
R36	R85-0125-152	RES 1.5K 5% 1/8W FILM
R37	R85-0125-152	RES 1.5K 5% 1/8W FILM
R38	R85-0125-152	RES 1.5K 5% 1/8W FILM
R40	R85-0125-392	RES 3.9K 5% 1/8W FILM
R50	R-2213	RES VAR 100K 10% .5W HOR.
R51	R85-0004-289	RES 8250 1% 1/8W FILM
R52	R85-0004-403	RES 105K 1% 1/8W FILM
R53	R85-0125-201	RES 200 5% 1/8W FILM
R54	R85-0125-473	RES 47K 5% 1/8W FILM
R59	R85-0125-222	RES 2.2K 5% 1/8W FILM
R61	R85-0125-392	RES 3.9K 5% 1/8W FILM
R62	R85-0125-103	RES 10K 5% 1/8W FILM
R67	R85-0125-471	RES 470 5% 1/8W FILM
R68	R85-0125-154	RES 150K 5% 1/8W FILM
R69	R85-0125-823	RES 82K 5% 1/8W FILM
R70	R85-0125-153	RES 15K 5% 1/8W FILM

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT) (Cont.)

Ref. Desig.	Part Number	Description
R71	R85-0125-103	RES 10K 5% 1/8W FILM
R72	R85-0004-421	RES 162K 1% 1/8W FILM
R73	R85-0125-562	RES 5.6K 5% 1/8W FILM
R74	R85-0125-113	RES 11K 5% 1/8W FILM
R75	R85-0004-371	RES 53.6K 1% 1/8W FILM
R76	R85-0004-403	RES 105K 1% 1/8W FILM
R77	R85-0125-182	RES 1.8K 5% 1/8W FILM
R78	R-2216	RES VAR 500K 10% .5W HOR.
R79	R85-0125-184	RES 180K 5% 1/8W FILM
R80	R85-0125-101	RES 100 5% 1/8W FILM
R81	R85-0004-401	RES 100K 1% 1/8W FILM
R82	R85-0125-163	RES 16K 5% 1/8W FILM
R83	R85-0125-103	RES 10K 5% 1/8W FILM
R84	R85-0125-473	RES 47K 5% 1/8W FILM
R85	R85-0125-473	RES 47K 5% 1/8W FILM
R86	R85-0004-401	RES 100K 1% 1/8W FILM
R87	R85-0004-401	RES 100K 1% 1/8W FILM
R88	R85-0125-473	RES 47K 5% 1/8W FILM
R90	R85-0125-103	RES 10K 5% 1/8W FILM
R91	R85-0125-102	RES 1.0K 5% 1/8W FILM
R92	R85-0125-103	RES 10K 5% 1/8W FILM
R93	R85-0125-153	RES 15K 5% 1/8W FILM
R94	R85-0004-247	RES 3010 1% 1/8W FILM
R95	R85-0125-103	RES 10K 5% 1/8W FILM
R96	R85-0125-103	RES 10K 5% 1/8W FILM
R97	R85-0125-102	RES 1.0K 5% 1/8W FILM
R99	R85-0125-684	RES 680K 5% 1/8W FILM
R100	R85-0004-301	RES 10K 1% 1/8W FILM
R101	R85-0004-330	RES 20.0K 1% 1/8W FILM
R102	R85-0004-401	RES 100K 1% 1/8W FILM
R103	R85-0004-401	RES 100K 1% 1/8W FILM
R104	R85-0004-249	RES 3160 1% 1/8W FILM
R105	R85-0004-401	RES 100K 1% 1/8W FILM
R106	R85-0125-221	RES 220 5% 1/8W FILM
R107	R85-0125-201	RES 200 5% 1/8W FILM
R108	R85-0125-103	RES 10K 5% 1/8W FILM
R110	R85-0125-562	RES 5.6K 5% 1/8W FILM
R111	R85-0125-103	RES 10K 5% 1/8W FILM
R112	R85-0125-103	RES 10K 5% 1/8W FILM

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT) (Cont.)

Ref. Desig.	Part Number	Description
R113	R30-0008-503	RES VAR PCB 50K 1/2W 10%
R114	R85-0125-102	RES 1.0K 5% 1/8W FILM
R115	R85-0004-383	RES 71.5K 1% 1/8W FILM
R116	R85-0004-301	RES 10K 1% 1/8W FILM
R117	R85-0004-356	RES 37.4K 1% 1/8W FILM
R118	R85-0004-301	RES 10K 1% 1/8W FILM
R119	R85-0004-249	RES 3160 1% 1/8W FILM
R121	R85-0125-103	RES 10K 5% 1/8W FILM
R122	R85-0125-103	RES 10K 5% 1/8W FILM
R133	R85-0125-101	RES 100 5% 1/8W FILM
R134	R85-0125-103	RES 10K 5% 1/8W FILM
R135	R85-0125-103	RES 10K 5% 1/8W FILM
R137	R85-0125-823	RES 82K 5% 1/8W FILM
R138	R85-0125-914	RES 910K 5% 1/8W FILM
R139	R85-0125-183	RES 18K 5% 1/8W FILM
R140	R85-0125-183	RES 18K 5% 1/8W FILM
R141	R85-0125-622	RES 6.2K 5% 1/8W FILM
R142	R85-0004-249	RES 3160 1% 1/8W FILM
R143	R85-0125-623	RES 62K 5% 1/8W FILM
R144	R85-0125-103	RES 10K 5% 1/8W FILM
R145	R85-0004-351	RES 33.2K 1% 1/8W FILM
R146	R85-0125-182	RES 1.8K 5% 1/8W FILM
R147	R85-0125-163	RES 16K 5% 1/8W FILM
R150	R85-0125-103	RES 10K 5% 1/8W FILM
R151	R85-0004-301	RES 10K 1% 1/8W FILM
R152	R85-0004-301	RES 10K 1% 1/8W FILM
R153	R85-0004-301	RES 10K 1% 1/8W FILM
R154	R85-0004-301	RES 10K 1% 1/8W FILM
R155	R85-0125-391	RES 390 5% 1/8W FILM
R156	R85-0004-401	RES 100K 1% 1/8W FILM
R157	R85-0125-621	RES 620 5% 1/8W FILM
R158	R-2213	RES VAR 100K 10% .5W HOR.
R159	R85-0125-334	RES 330K 5% 1/8W FILM
R160	R85-0125-473	RES 47K 5% 1/8W FILM
R161	R85-0125-562	RES 5.6K 5% 1/8W FILM
R162	R85-0125-561	RES 560 5% 1/8W FILM
R163	R85-0125-103	RES 10K 5% 1/8W FILM
R164	R85-0004-401	RES 100K 1% 1/8W FILM
R165	R85-0004-401	RES 100K 1% 1/8W FILM

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT) (Cont.)

Ref. Desig.	Part Number	Description
R166	R85-0004-359	RES 40.2K 1% 1/8W FILM
R167	R85-0004-351	RES 33.2K 1% 1/8W FILM
R168	R85-0004-385	RES 75.0K 1% 1/8W FILM
R169	R85-0004-403	RES 105K 1% 1/8W FILM
R170	R85-0004-301	RES 10K 1% 1/8W FILM
R171	R85-0004-301	RES 10K 1% 1/8W FILM
R172	R85-0004-421	RES 162K 1% 1/8W FILM
R173	R85-0004-301	RES 10K 1% 1/8W FILM
R174	R85-0004-366	RES 47.5K 1% 1/8W FILM
R175	R85-0004-343	RES 27.4K 1% 1/8W FILM
R176	R85-0004-371	RES 53.6K 1% 1/8W FILM
R177	R85-0125-182	RES 1.8K 5% 1/8W FILM
R178	R85-0125-122	RES 1.2K 5% 1/8W FILM
R179	R85-0125-511	RES 510 5% 1/8W FILM
R180	R85-0004-359	RES 40.2K 1% 1/8W FILM
R181	R85-0004-301	RES 10K 1% 1/8W FILM
R182	R85-0004-269	RES 5110 1% 1/8W FILM
R183	R85-0004-196	RES 976 1% 1/8W FILM
R184	R65-0003-104	RES 100K 5% 1/4W CAR FILM
R185	R85-0125-103	RES 10K 5% 1/8W FILM
R186	R85-0125-101	RES 100 5% 1/8W FILM
R187	R85-0125-101	RES 100 5% 1/8W FILM
R188	R85-0004-289	RES 8250 1% 1/8W FILM
R189	R85-0004-301	RES 10K 1% 1/8W FILM
R190	R85-0125-102	RES 1.0K 5% 1/8W FILM
R191	R85-0004-330	RES 20.0K 1% 1/8W FILM
R192	R85-0125-102	RES 1.0K 5% 1/8W FILM
R193	R85-0125-101	RES 100 5% 1/8W FILM
R195	R85-0125-102	RES 1.0K 5% 1/8W FILM
R197	R85-0125-103	RES 10K 5% 1/8W FILM
R198	R85-0125-102	RES 1.0K 5% 1/8W FILM
R199	R85-0125-103	RES 10K 5% 1/8W FILM
R200	R85-0125-103	RES 10K 5% 1/8W FILM
R201	R85-0125-681	RES 680 5% 1/8W FILM
R202	R85-0125-103	RES 10K 5% 1/8W FILM
R203	R85-0125-103	RES 10K 5% 1/8W FILM
R204	R85-0125-103	RES 10K 5% 1/8W FILM
R205	R85-0125-103	RES 10K 5% 1/8W FILM
R206	R85-0125-331	RES 330 5% 1/8W FILM

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT) (Cont.)

Ref. Desig.	Part Number	Description
R207	R85-0125-515	RES 5.1M 5% 1/8W FILM
R208	R85-0125-103	RES 10K 5% 1/8W FILM
R209	R85-0125-184	RES 180K 5% 1/8W FILM
R210	R85-0125-103	RES 10K 5% 1/8W FILM
R211	R85-0125-914	RES 910K 5% 1/8W FILM
R212	R85-0125-101	RES 100 5% 1/8W FILM
R213	R85-0125-473	RES 47K 5% 1/8W FILM
R214	R85-0125-101	RES 100 5% 1/8W FILM
R215	R85-0125-103	RES 10K 5% 1/8W FILM
R216	R85-0125-152	RES 1.5K 5% 1/8W FILM
R217	R85-0125-103	RES 10K 5% 1/8W FILM
R220	R85-0125-103	RES 10K 5% 1/8W FILM
R221	R85-0125-101	RES 100 5% 1/8W FILM
R222	R85-0004-324	RES 17.4K 1% 1/8W
R223	R85-0125-103	RES 10K 5% 1/8W FILM
R224	R85-0125-103	RES 10K 5% 1/8W FILM
R225	R85-0125-103	RES 10K 5% 1/8W FILM
R226	R85-0125-101	RES 100 5% 1/8W FILM
R227	R85-0004-401	RES 100K 1% 1/8W FILM
R230	R85-0125-103	RES 10K 5% 1/8W FILM
R232	R85-0125-183	RES 18K 5% 1/8W FILM
R237	R85-0125-102	RES 1.0K 5% 1/8W FILM
R239	R85-0125-101	RES 100 5% 1/8W FILM
R240	R85-0125-101	RES 100 5% 1/8W FILM
R241	R85-0125-101	RES 100 5% 1/8W FILM
R242	R85-0125-103	RES 10K 5% 1/8W FILM
R243	R85-0125-103	RES 10K 5% 1/8W FILM
R244	R85-0125-103	RES 10K 5% 1/8W FILM
R246	R85-0125-103	RES 10K 5% 1/8W FILM
R247	R85-0125-102	RES 1.0K 5% 1/8W FILM
R248	R85-0125-102	RES 1.0K 5% 1/8W FILM
R249	R85-0125-102	RES 1.0K 5% 1/8W FILM
R250	R85-0125-103	RES 10K 5% 1/8W FILM
R251	R85-0125-473	RES 47K 5% 1/8W FILM
R252	R85-0125-103	RES 10K 5% 1/8W FILM
R253	R85-0125-103	RES 10K 5% 1/8W FILM
R254	R85-0125-152	RES 1.5K 5% 1/8W FILM
R255	R85-0125-152	RES 1.5K 5% 1/8W FILM
R256	R85-0125-152	RES 1.5K 5% 1/8W FILM

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT) (Cont.)

Ref. Desig.	Part Number	Description
R257	R85-0125-152	RES 1.5K 5% 1/8W FILM
R258	R85-0125-152	RES 1.5K 5% 1/8W FILM
R259	R85-0125-152	RES 1.5K 5% 1/8W FILM
R260	R85-0125-103	RES 10K 5% 1/8W FILM
R261	R85-0125-103	RES 10K 5% 1/8W FILM
R262	R85-0125-103	RES 10K 5% 1/8W FILM
R265	R85-0125-103	RES 10K 5% 1/8W FILM
R266	R85-0125-103	RES 10K 5% 1/8W FILM
R267	R85-0125-392	RES 3.9K 5% 1/8W FILM
R268	R85-0125-102	RES 1.0K 5% 1/8W FILM
R269	R85-0004-196	RES 976 1% 1/8W FILM
R270	R85-0125-473	RES 47K 5% 1/8W FILM
R271	R85-0125-102	RES 1.0K 5% 1/8W FILM
R272	R85-0125-102	RES 1.0K 5% 1/8W FILM
R273	R85-0125-103	RES 10K 5% 1/8W FILM
R274	R85-0125-334	RES 330K 5% 1/8W FILM
R275	R85-0125-103	RES 10K 5% 1/8W FILM
R276	R85-0125-102	RES 1.0K 5% 1/8W FILM
R277	R85-0125-121	RES 120 5% 1/8W FILM
R278	R85-0125-103	RES 10K 5% 1/8W FILM
R279	R85-0004-330	RES 20.0K 1% 1/8W FILM
R280	R85-0004-401	RES 100K 1% 1/8W FILM
R281	R85-0004-343	RES 27.4K 1% 1/8W FILM
R282	R85-0125-103	RES 10K 5% 1/8W FILM
R283	R85-0125-472	RES 4.7K 5% 1/8W FILM
R284	R85-0125-184	RES 180K 5% 1/8W FILM
R285	R85-0125-101	RES 100 5% 1/8W FILM
R287	R85-0125-102	RES 1.0K 5% 1/8W FILM
R288	R85-0125-511	RES 510 5% 1/8W FILM
R289	R85-0125-471	RES 470 5% 1/8W FILM
RP1	R50-0010-103	RES 10K 2% 10SIP 9RES
RP2	R50-0010-103	RES 10K 2% 10SIP 9RES
RP3	R50-0010-103	RES 10K 2% 10SIP 9RES
U1	I15-0000-014	IC 74HC14 PLASTIC CMOS
U2	I15-0000-032	IC 74HC32 PLASTIC CMOS
U3	I27-0018-001	IC MIPRCS 8-BIT 64180
U4	I15-0000-475	IC 74HC4075 PLASTIC CMOS
U5	I15-0000-138	IC 74HC138 PLASTIC CMOS
U6	I26-0022-005	IC 8KX8 NOVRAM 1225

Table 2. A7 Logic PWB Assembly Parts List (10212-1210 Rev. AT) (Cont.)

Ref. Desig.	Part Number	Description
U7	10330-8121	FIRMWARE KIT (PROM V7)
U9	I15-0000-259	IC 74HC259 PLASTIC CMOS
U10	I15-0000-259	IC 74HC259 PLASTIC CMOS
U11	I01-0000-039	IC 4504B PLASTIC CMOS
U12	I01-0000-039	IC 4504B PLASTIC CMOS
U13	I15-0000-251	IC 74HC251 PLASTIC CMOS
U14	I01-0000-156	IC 4094B PLASTIC CMOS
U15	I15-0000-074	IC 74HC74 PLASTIC CMOS
U16	I01-0000-252	IC 4053B PLASTIC CMOS
U17	I15-0000-002	IC 74HC02 PLASTIC CMOS
U18	I15-0000-132	IC 74HC132 PLASTIC CMOS
U19	I15-0000-011	IC 74HC11 PLASTIC CMOS
U20	I11-0001-001	IC VR 7805 +5V 1.5A 4%
U21	I16-0051-001	IC 74C240 LINE DRVR PLA
U22	I15-0000-245	IC 74HC245 PLASTIC CMOS
U23	I15-0000-245	IC 74HC245 PLASTIC CMOS
U27	I01-0000-156	IC 4094B PLASTIC CMOS
U28	I15-0000-074	IC 74HC74 PLASTIC CMOS
U50	I01-0000-253	IC 4066B PLASTIC CMOS
U51	10029-8804	IC NE570 COMPANDOR
U53	I30-0027-000	IC OP AMP QUAD 3303
U54	I30-0027-000	IC OP AMP QUAD 3303
U55	I30-0003-000	IC OP AMP QUAD 324
U57	I30-0003-000	IC OP AMP QUAD 324
U58	I30-0027-000	IC OP AMP QUAD 3303
U59	I30-0003-000	IC OP AMP QUAD 324
U60	I20-0006-000	IC LM339 COMPARATOR PL
U61	I30-0003-000	IC OP AMP QUAD 324
U62	I14-0017-001	IP SUPERVISORY 1232
VR1	D50-0007-004	TRANSORB,36V
Y1	Y15-0004-761	XTAL 6.144 MHZ

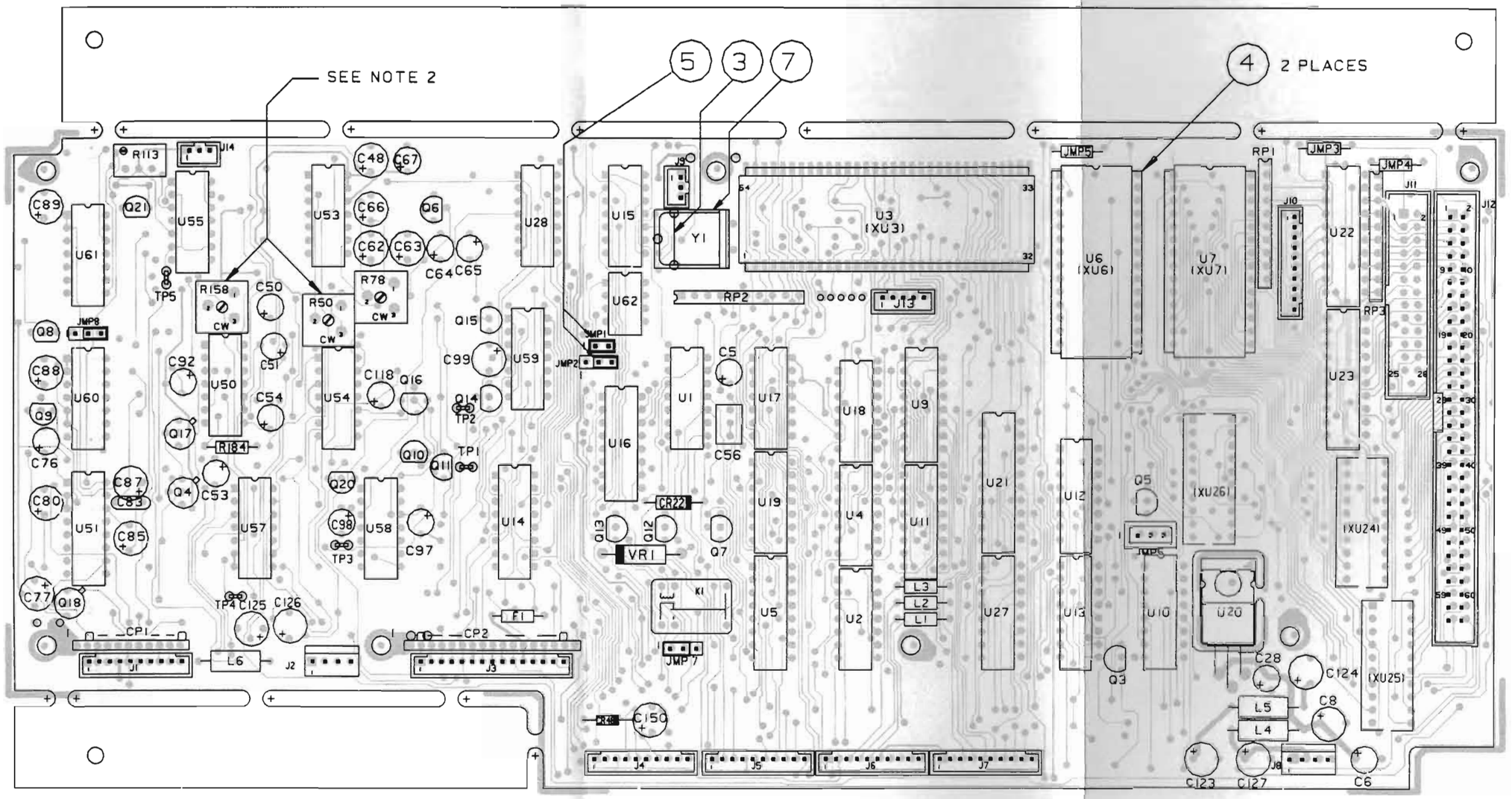


Figure 4. A7 Logic PWB Assembly Component Location Diagram (10212-1210 Rev. M) (Sheet 1 of 2)

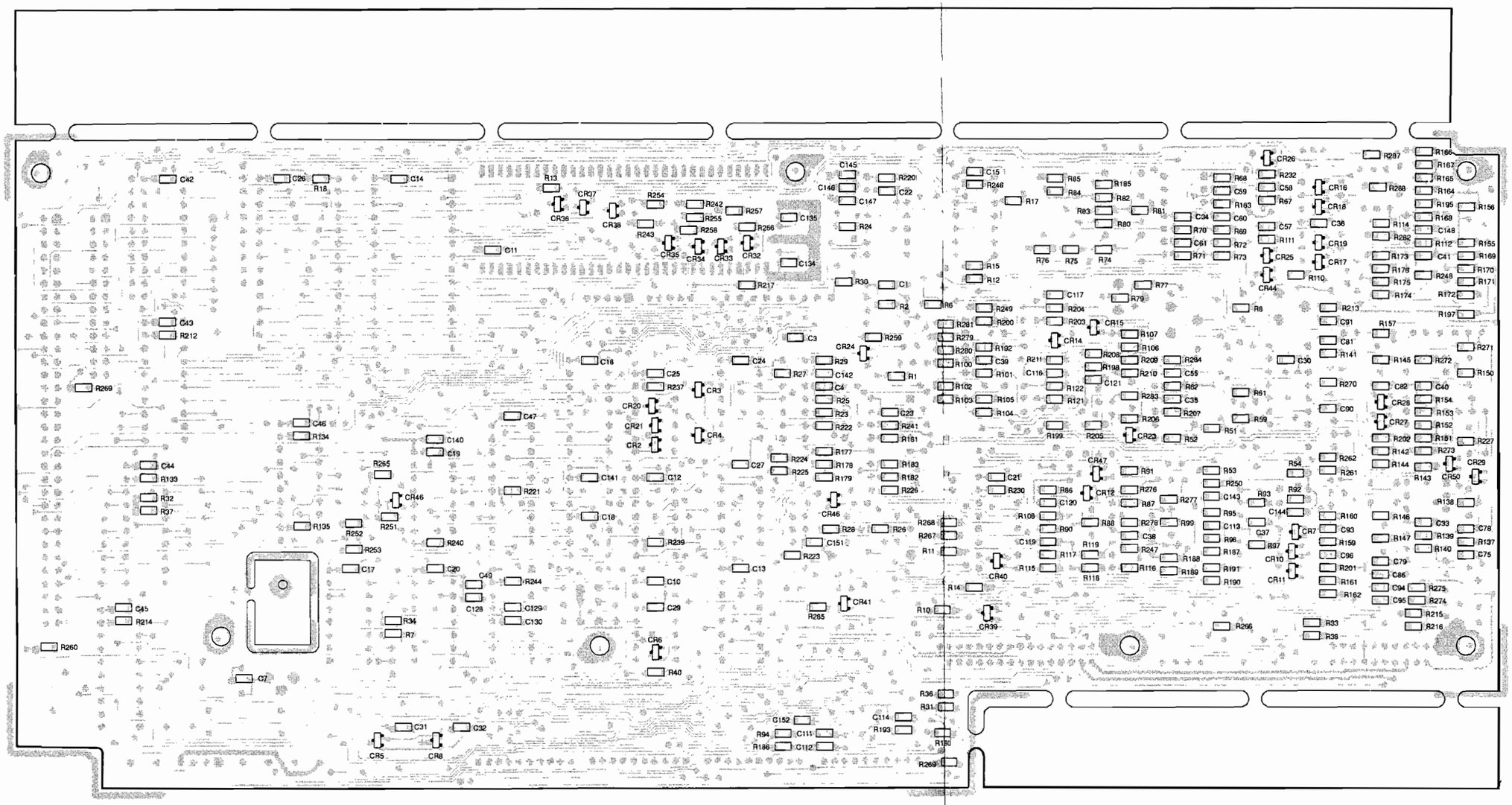
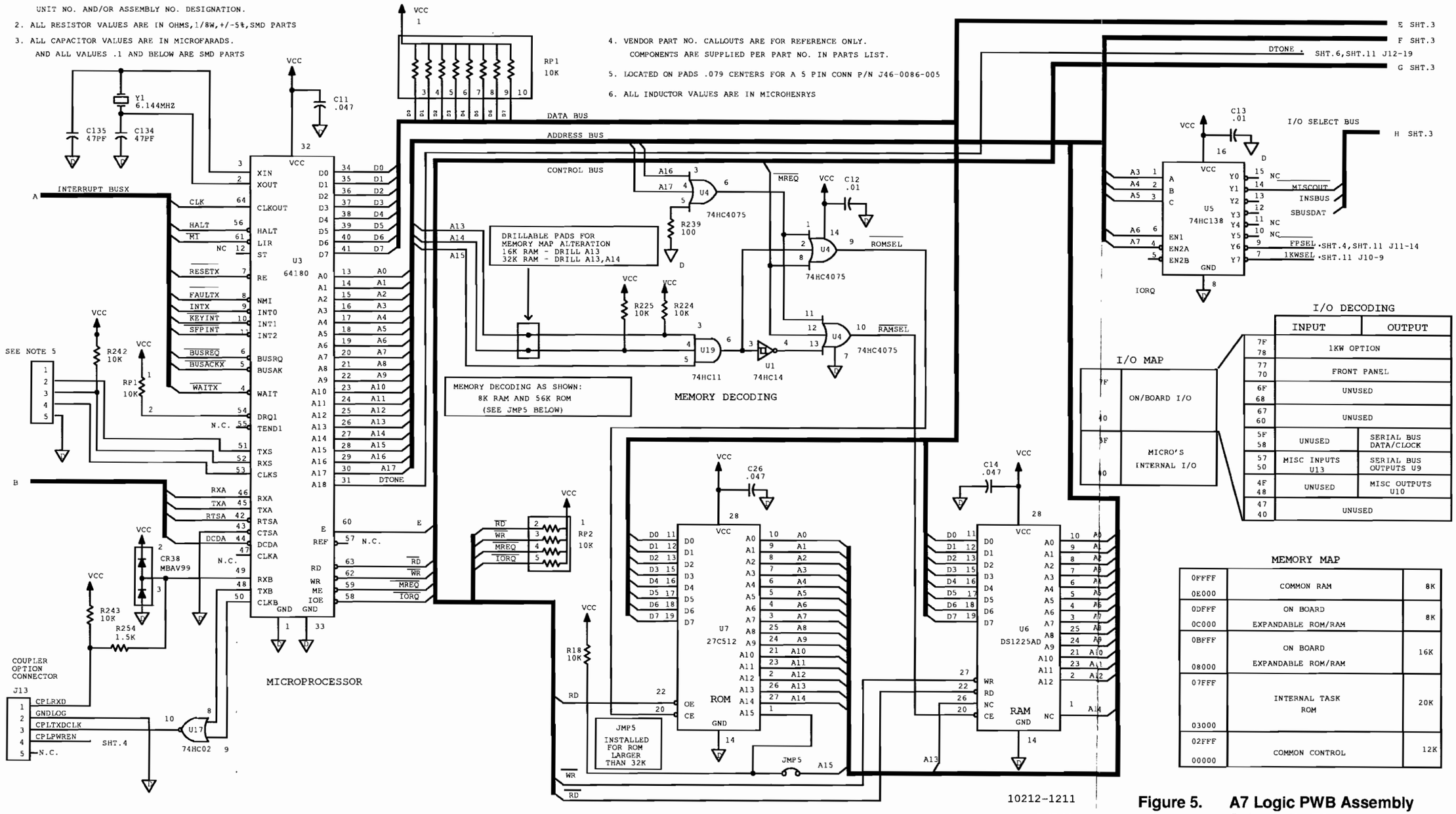


Figure 4. A7 Logic PWB Assembly Component Location Diagram (10212-1210 Rev. M) (Sheet 2 of 2)

NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS,1/8W,+/-5%,SMD PARTS
3. ALL CAPACITOR VALUES ARE IN MICROFARADS. AND ALL VALUES .1 AND BELOW ARE SMD PARTS
4. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY. COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.
5. LOCATED ON PADS .079 CENTERS FOR A 5 PIN CONN P/N J46-0086-005
6. ALL INDUCTOR VALUES ARE IN MICROHENRYS



I/O DECODING		
INPUT	OUTPUT	
7F 78	1KW OPTION	
77 70	FRONT PANEL	
6F 68	UNUSED	
67 60	UNUSED	
5F 58	UNUSED	SERIAL BUS DATA/CLOCK
57 50	MISC INPUTS U13	SERIAL BUS OUTPUTS U9
4F 48	UNUSED	MISC OUTPUTS U10
47 40	UNUSED	

MEMORY MAP		
0FFFF 0E000	COMMON RAM	8K
0DFFF 0C000	ON BOARD EXPANDABLE ROM/RAM	8K
0BFFF 08000	ON BOARD EXPANDABLE ROM/RAM	16K
07FFF 03000	INTERNAL TASK ROM	20K
02FFF 00000	COMMON CONTROL	12K

Figure 5. A7 Logic PWB Assembly Schematic Diagram (10212-1211 Rev. AC) (Sheet 1 of 11)

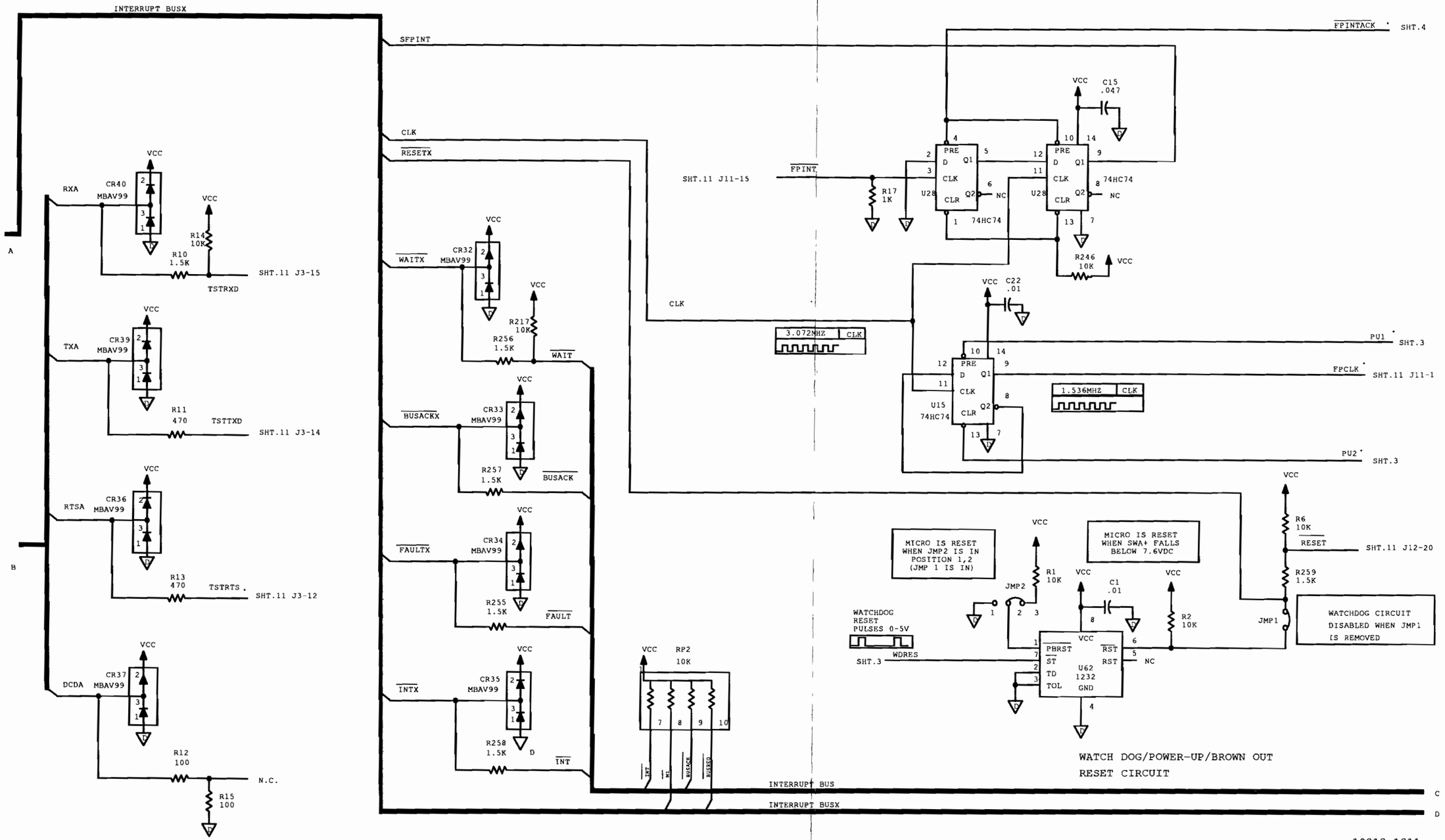
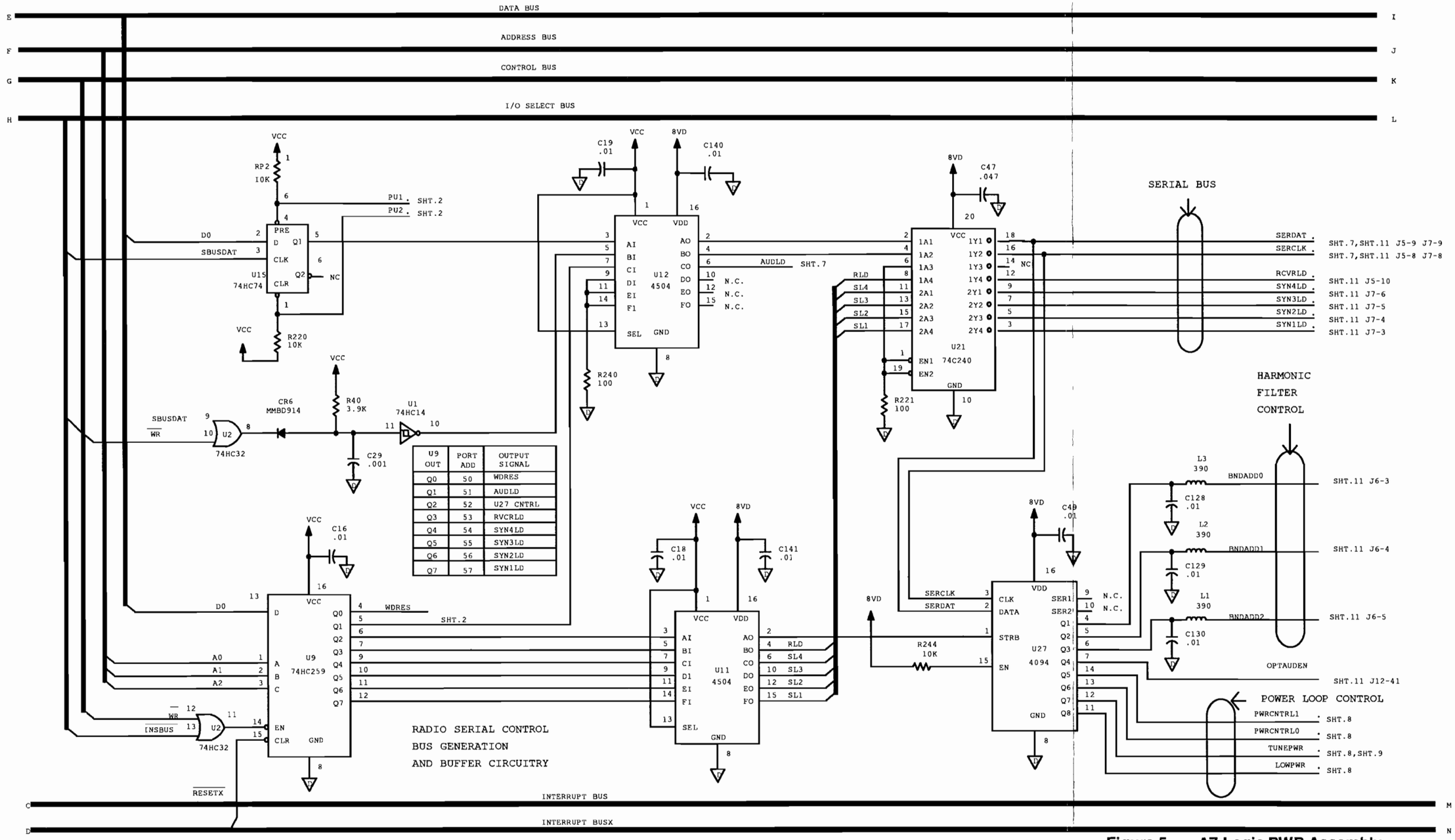


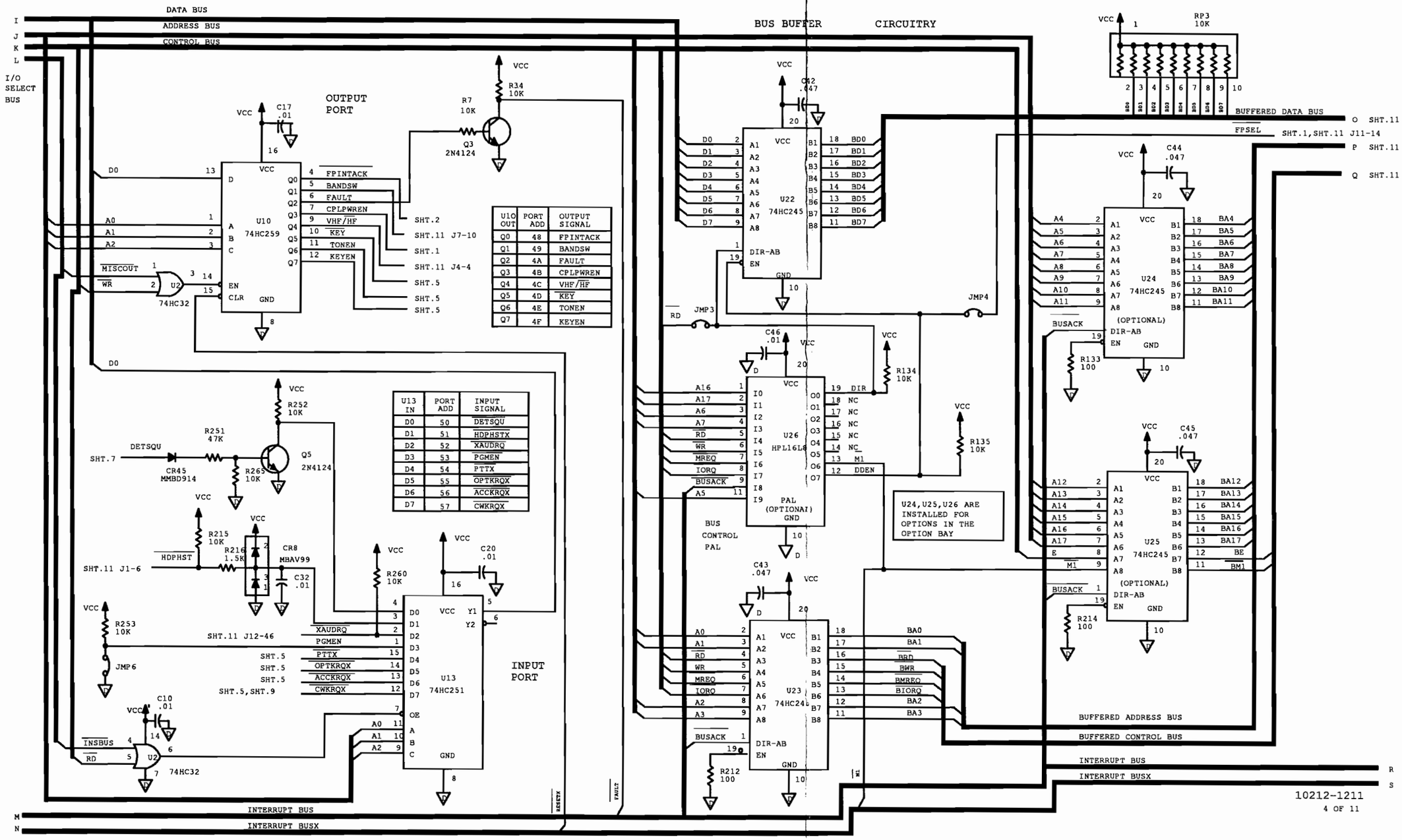
Figure 5. A7 Logic PWB Assembly Schematic Diagram (10212-1211 Rev. AC) (Sheet 2 of 11)

10212-1211
2 OF 11



10212-1211
3 OF 11

Figure 5. A7 Logic PWB Assembly Schematic Diagram (10212-1211 Rev. AC) (Sheet 3 of 11)



U10 OUT	PORT ADD	OUTPUT SIGNAL
Q0	48	FPINTACK
Q1	49	BANDSW
Q2	4A	FAULT
Q3	4B	CPLPWREN
Q4	4C	VHF/HF
Q5	4D	KEY
Q6	4E	TONEN
Q7	4F	KEYEN

U13 IN	PORT ADD	INPUT SIGNAL
D0	50	DETSQU
D1	51	HDPHSTX
D2	52	XAUDRQ
D3	53	PGMEN
D4	54	PTTX
D5	55	OPTKRQX
D6	56	ACCKRQX
D7	57	CWKRQX

Figure 5. A7 Logic PWB Assembly Schematic Diagram (10212-1211 Rev. AC) (Sheet 4 of 11)

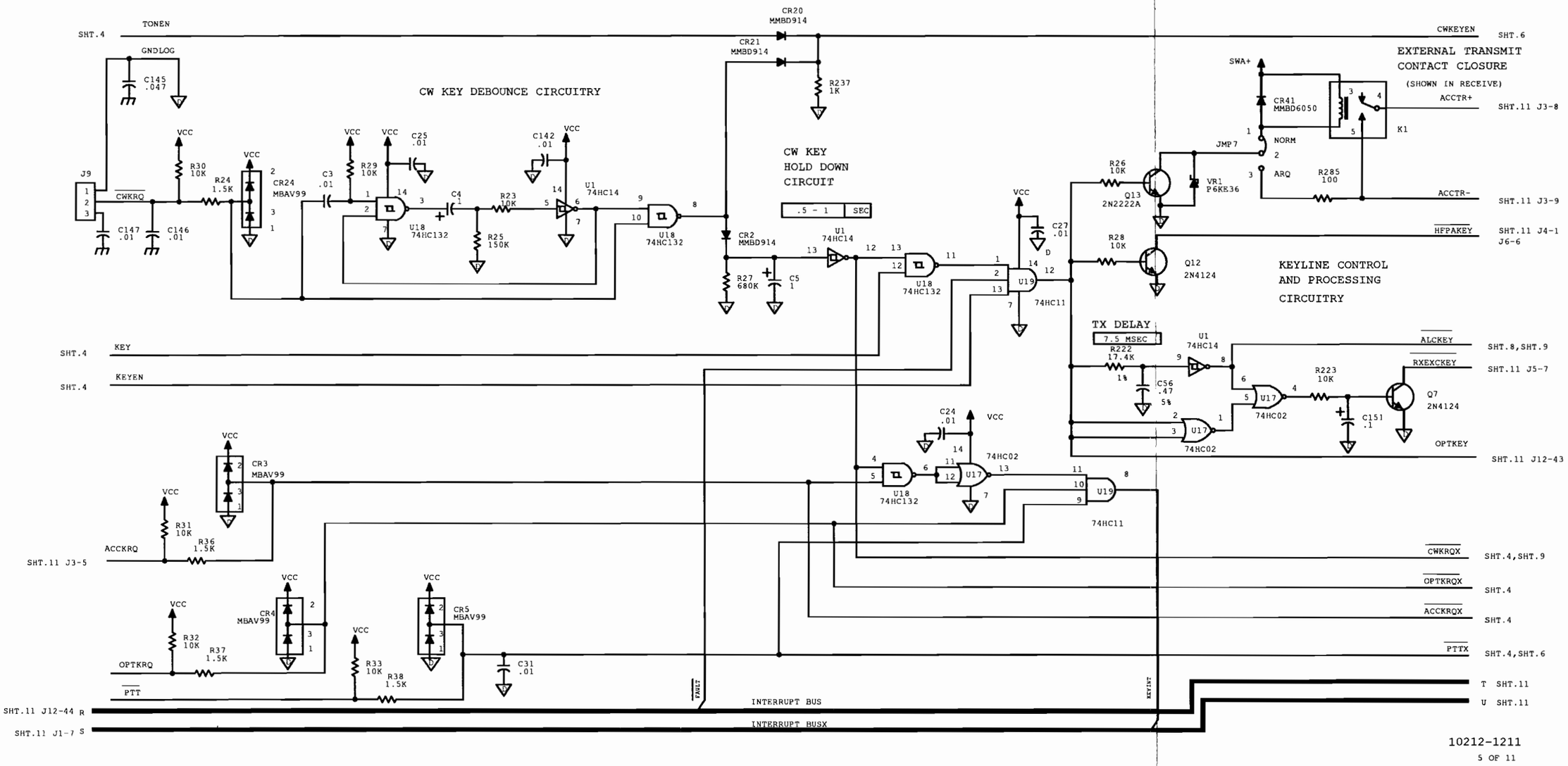


Figure 5. A7 Logic PWB Assembly Schematic Diagram (10212-1211 Rev. AC) (Sheet 5 of 11)

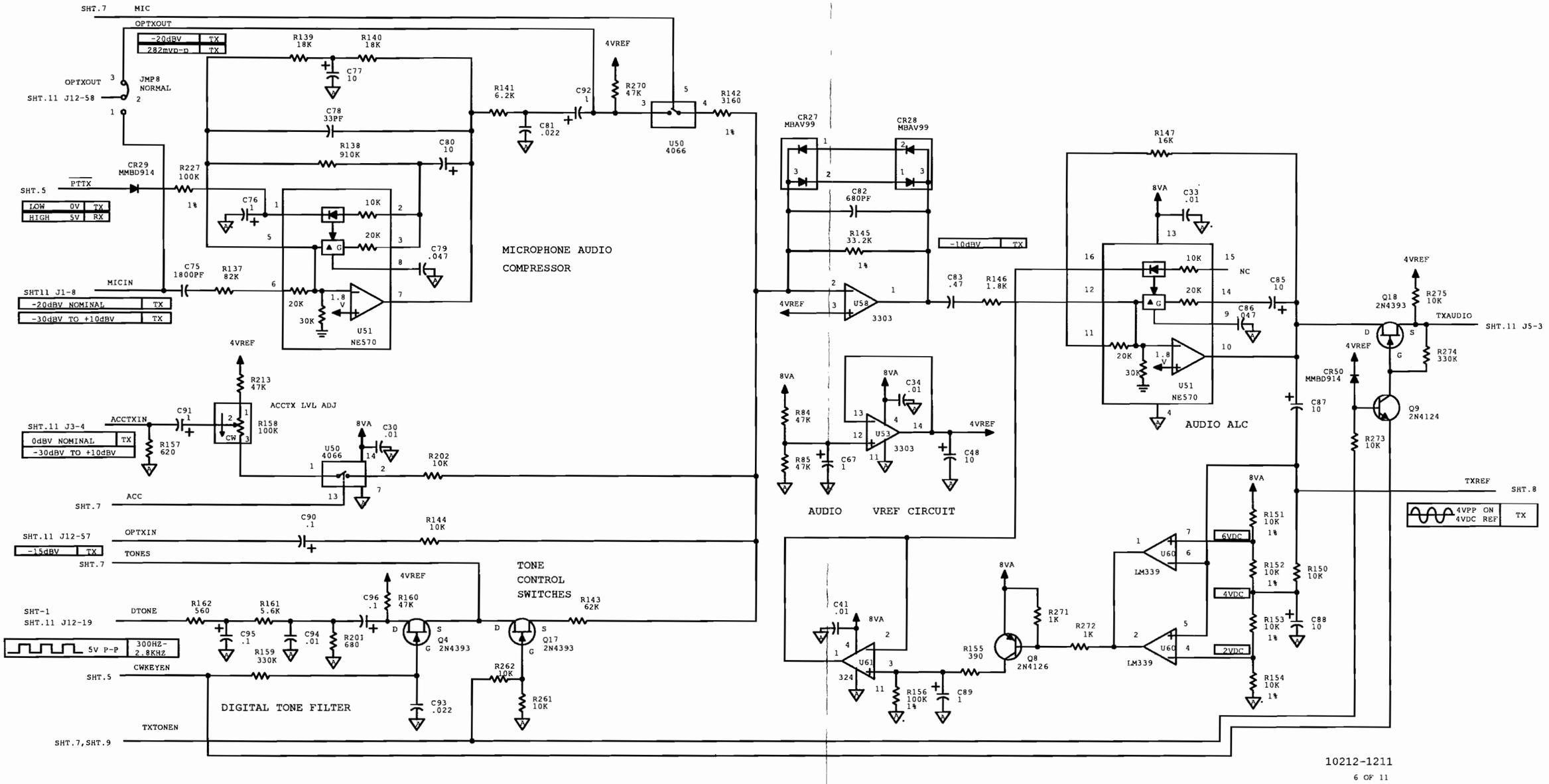
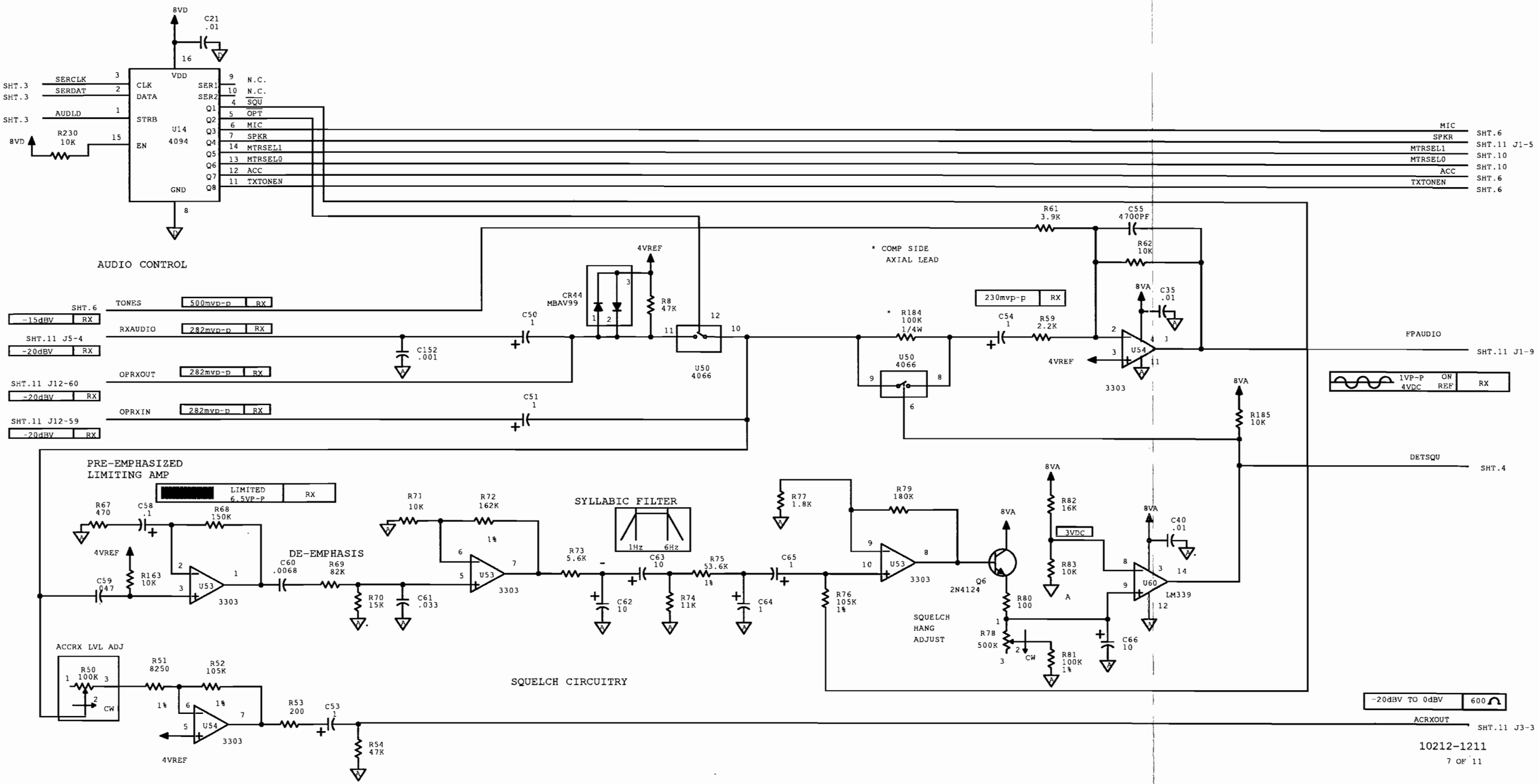


Figure 5. A7 Logic PWB Assembly Schematic Diagram (10212-1211 Rev. AC) (Sheet 6 of 11)



10212-1211
7 OF 11

Figure 5. A7 Logic PWB Assembly Schematic Diagram (10212-1211 Rev. AC) (Sheet 7 of 11)

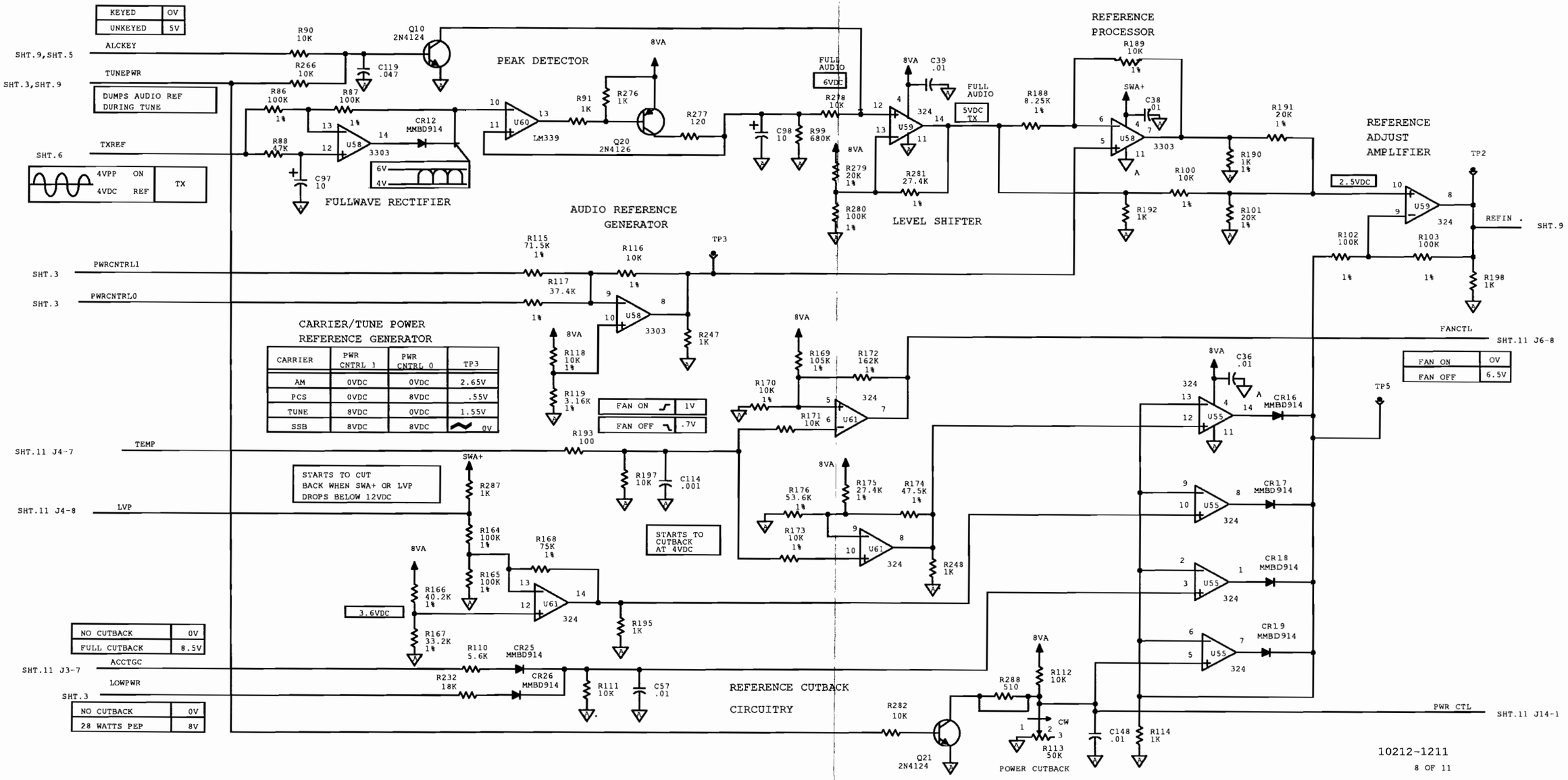


Figure 5. A7 Logic PWB Assembly Schematic Diagram (10212-1211 Rev. AC) (Sheet 8 of 11)

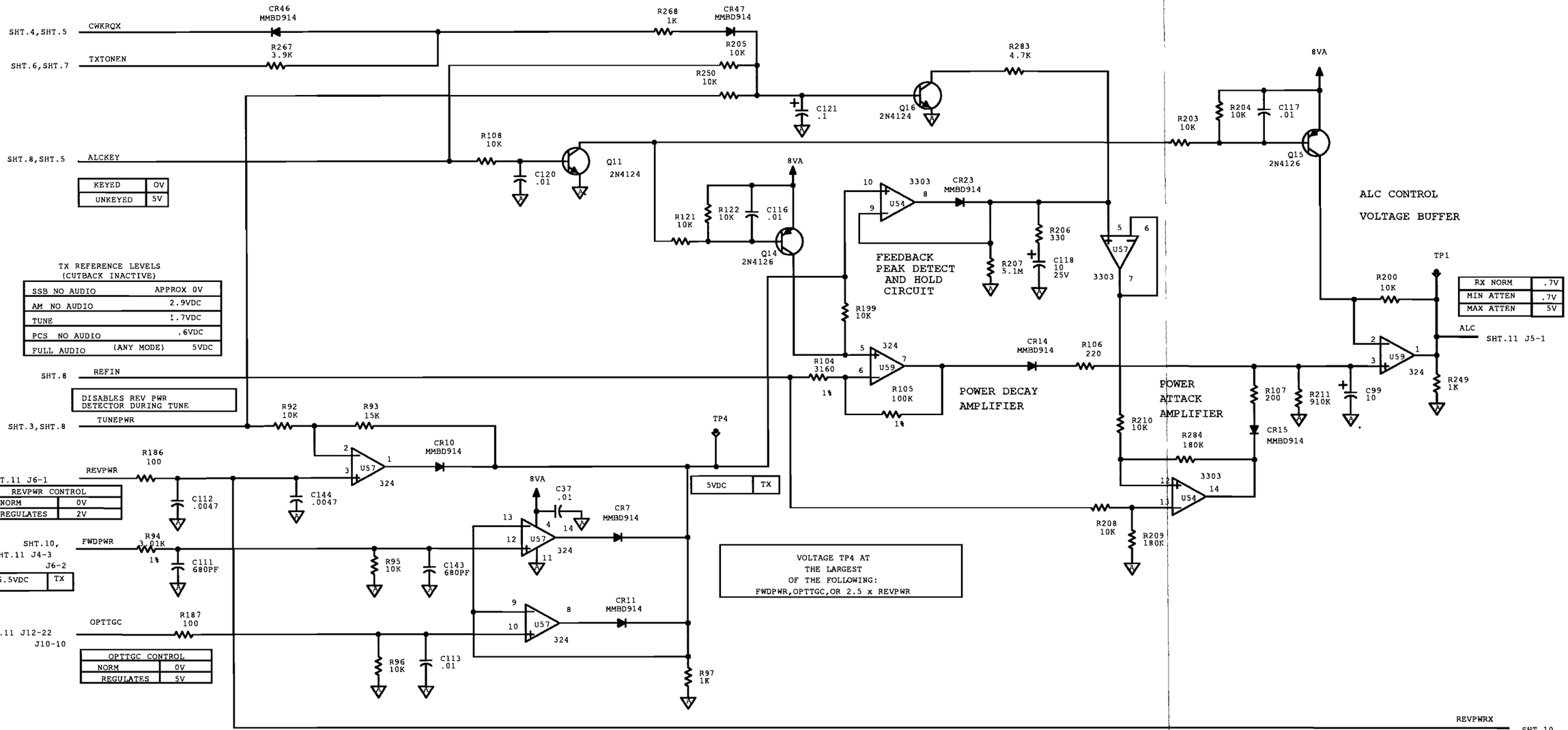


Figure 5. A7 Logic PWB Assembly Schematic Diagram (10212-1211 Rev. AC) (Sheet 9 of 11)

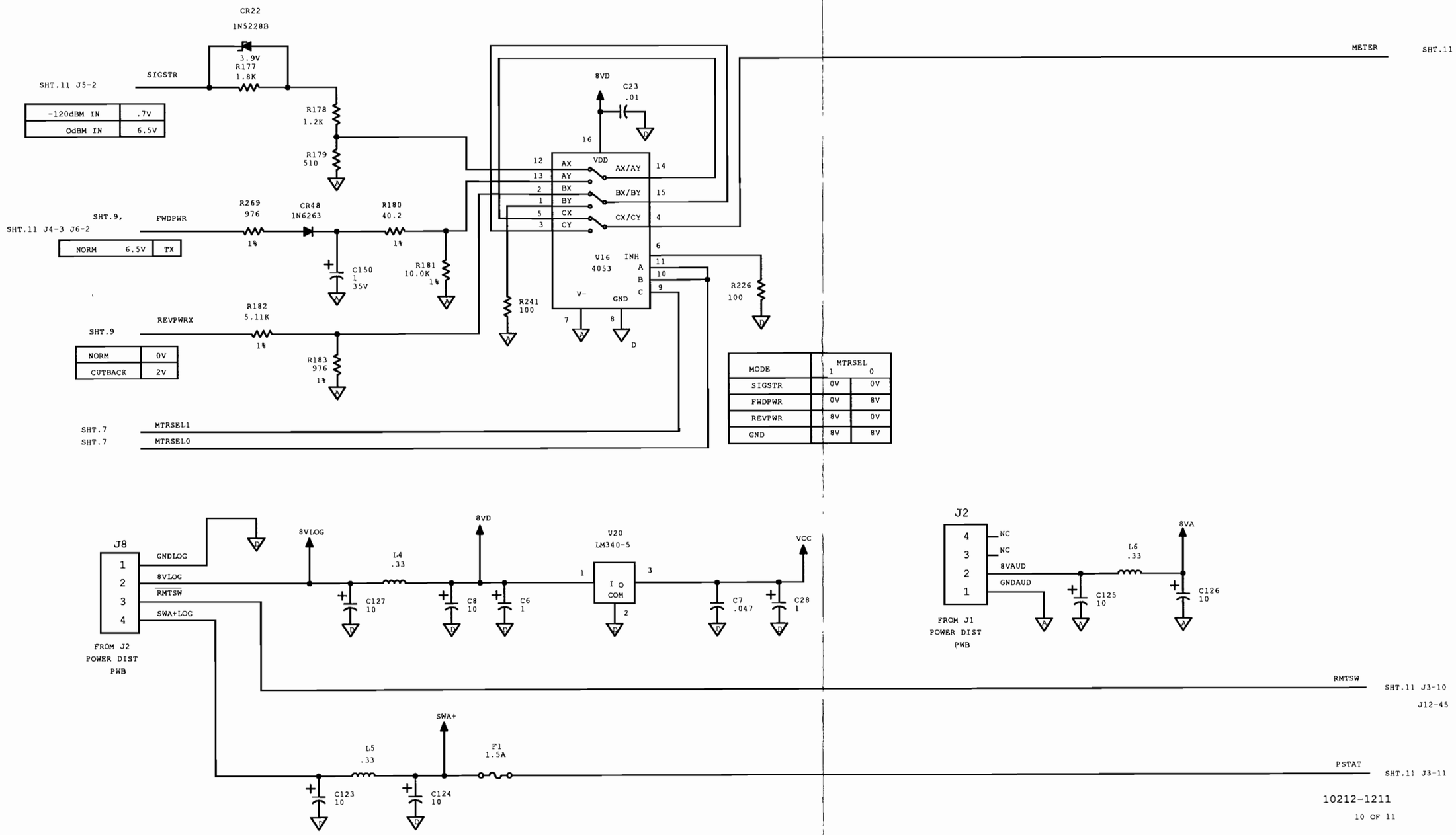


Figure 5. A7 Logic PWB Assembly Schematic Diagram (10212-1211 Rev. AC) (Sheet 10 of 11)

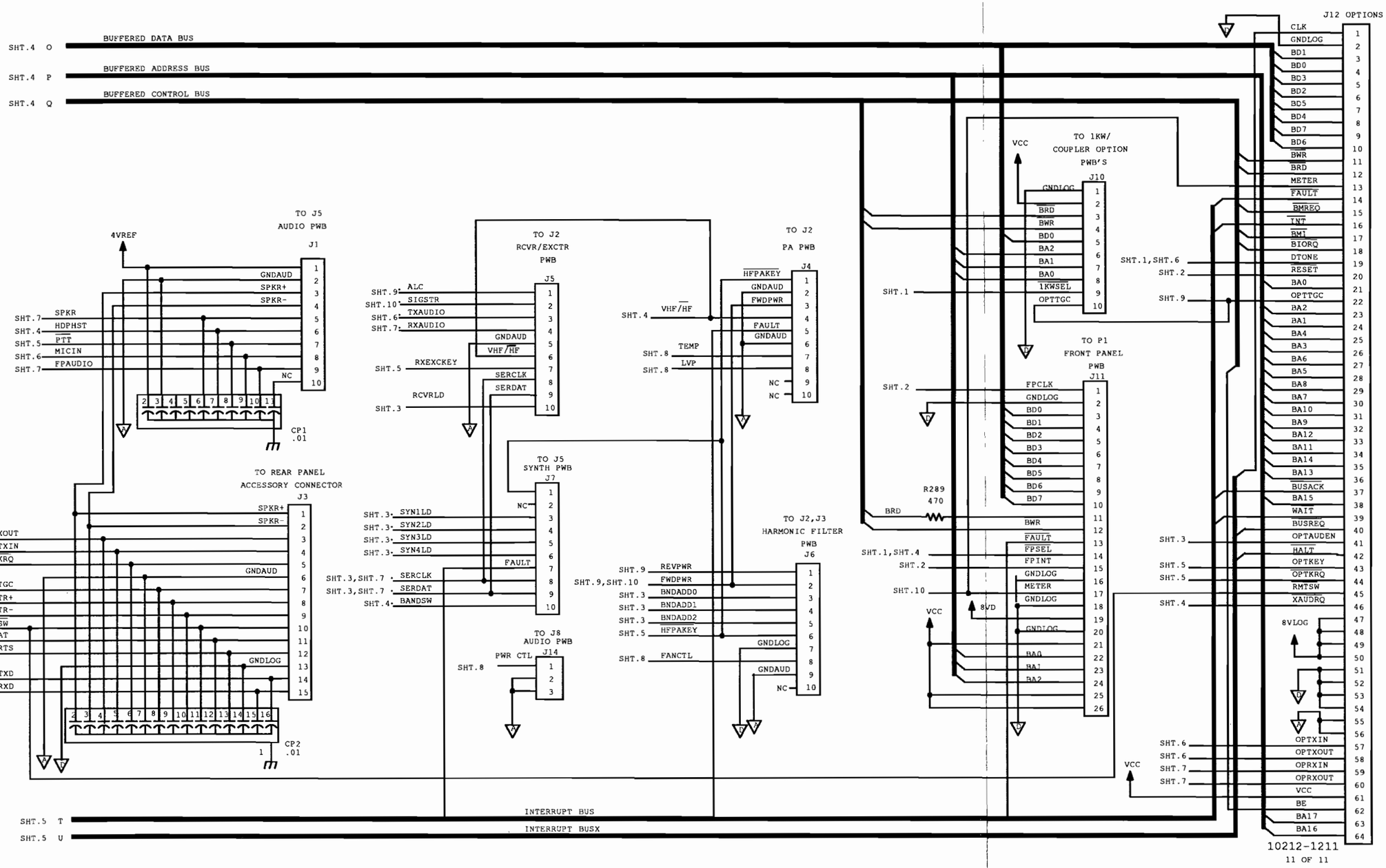


Figure 5. A7 Logic PWB Assembly Schematic Diagram (10212-1211 Rev. AC) (Sheet 11 of 11)

A8
SYNTHESIZER PWB ASSEMBLY

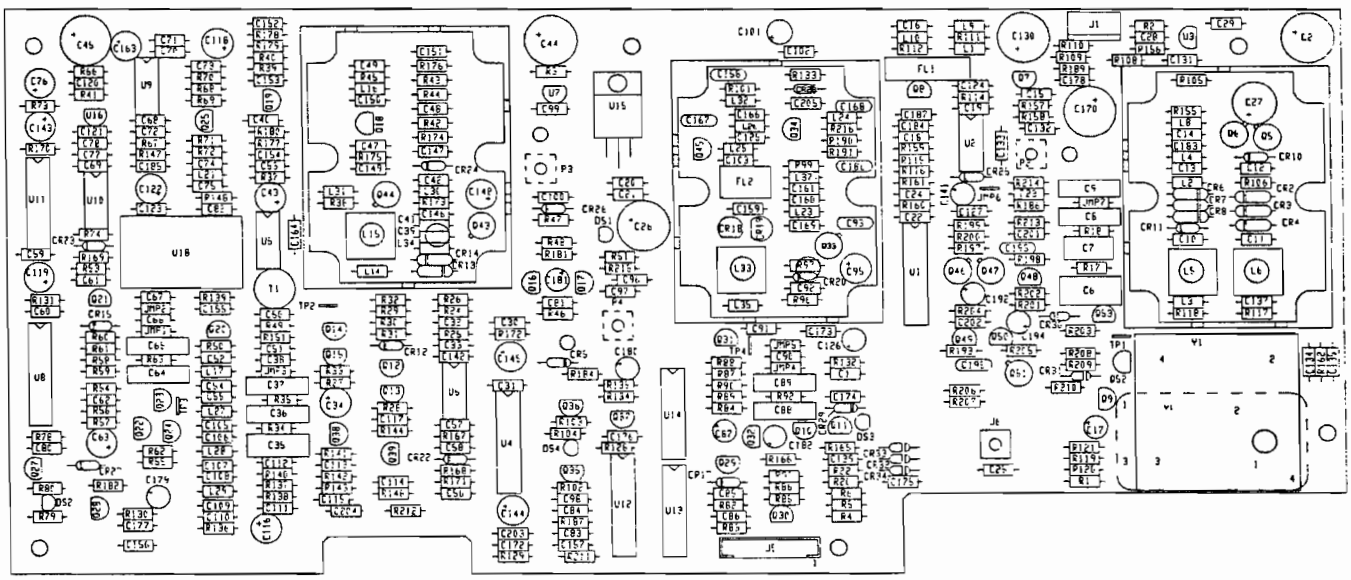


TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

A8 SYNTHESIZER PWB ASSEMBLY
PART NUMBER 10212-1310

1. GENERAL DESCRIPTION

The Synthesizer PWB Assembly generates signals of various frequencies for internal use of the Transceiver. The Synthesizer PWB Assembly includes four phase-lock loop (PLL) circuits to generate local oscillator signals LO1, LO2, and LO3. These signals are routed to the A3 Receiver/Exciter (RCVR/EXTR) PWB Assembly.

The local oscillator (LO) signals LO1, LO2, and LO3 are provided directly to the A3 (RCVR/EXTR) PWB Assembly at P2, P3, and P4, respectively. Indicator LEDs DS1 through DS4 light to indicate a PLL circuit is out of lock. When any of the PLLs become unlocked, the fault line at J5-7 is activated and radio transmission is disabled.

The local oscillator frequencies are determined by the radio frequency and the communications mode. The Local Oscillator frequencies are calculated using the following formulas:

NOTE

Data and ARQ communications modes may use either upper sideband or lower sideband, depending on the configuration programming of the radio.

NOTE

All frequencies are in Hertz.

- For USB, CW, and AM communication modes:

$$F_{LO1} = (\text{TRUNCATE}\ [\ (F_0 + 70.455 \times 10^6 + 3200)/6400\ ]\ ) \times 6400$$
$$F_{LO2} = F_{LO1} - F_0 - 455 \times 10^3$$
$$F_{LO3} = (455 \times 10^3) - F_{OFF}$$

- For LSB mode:

$$F_{LO1} = (\text{TRUNCATE}\ [\ (F_0 + 70.455 \times 10^6 + 400)/6400\ ]\ ) \times 6400$$
$$F_{LO2} = F_{LO1} - F_0 - 452.2 \times 10^3$$
$$F_{LO3} = (452.2 \times 10^3) - F_{OFF}$$

Where:

F_{LO1} = the first local oscillator frequency in Hertz,
F_{LO2} = the second local oscillator frequency in Hertz,
F_{LO3} = the third local oscillator frequency in Hertz,
F_0 = the radio operating frequency rounded to the nearest 100 Hz,
F_{OFF} = the radio operating frequency minus F_0,
TRUNCATE means convert the number to an integer by cutting off any part less than 1 (start with the number in floating point form [for example, 14360.98], not scientific notation form [1.436098×10^4] - in this example, the truncated result would be 14360).

NOTE

When calculating the frequencies, it is best to perform the calculations in this order: F_0, F_{OFF}, F_{LO3}, F_{LO1}, F_{LO2}.

2. FUNCTIONAL DESCRIPTION

2.1 Local Oscillator 1 (LO1) Circuit Description

Refer to figure 1, a block diagram of the LO1 section of the synthesizer. The output of LO1 has a frequency range of 70 to 100 MHz. LO1 comprises the following sub-circuits:

- Divider/Phase Comparator (U1) - contains the programmable divider chain, the phase comparator, and the necessary circuitry to accept serial data from the A7 Logic Assembly for the control of the frequency dividers. The phase detector outputs two signals, designated ΦR and ΦV, which reflect the phase relationship between the frequency standard signal and the VCO (voltage-controlled oscillator) frequencies (after division by the internal dividers). When the two signals are in phase, they are at the same frequency, and the PLL is locked, indicated when both ΦR and ΦV signals are narrow negative-going pulses every 156 microseconds.

- Charge Pump (Q46-Q53) - uses the phase relationship between ΦR and ΦV signals to generate the dc voltage required to control the voltage-controlled oscillator

- Loop Filter (R17-R18, C6-C8) - a low pass filter which slows the PLL response time and reduces the tendency for the local oscillator to hunt for the correct frequency

- Voltage-Controlled Oscillator (Q5, L5-L6, CR2-CR4, CR6-CR8) - operates in one of two ranges: 70 to 85 MHz or 85 to 100 MHz, depending on the radio operating frequency. Bandswitch transistor Q9 causes inductor L5 to be added in parallel with L6 when the oscillator is operating between 85 and 100 MHz. Varactor diodes CR2-CR4 and CR6-CR8 are the variable capacitance elements for the frequency-determining tuned circuit; the capacitance varies with the dc level from the loop filter.

- Bandswitch Control (Q9) - switches L5 in/out of the VCO circuit, depending on the frequency range of operation

- Buffer Amplifiers (Q6-Q8) - amplify the VCO output level and isolate the VCO from following circuitry

- Bandpass Filter (FL1) - reduces VCO harmonics and other undesired signals from the output

- 5.6 dB Matching Pad - matches the output impedance of the the bandpass filter with the input impedance of the destination circuit on the A3 RCVR/EXTR PWB assembly

- Programmable Prescaler (U2) - divides the VCO frequency before application to U1. When the modulus line from U1 is at logic high (+5 volts), U2 divides the signal frequency by 16; at logic low (0 volts), U2 divides by 17.

- Out-of-Lock Detector (Q10, Q11) - lights LED DS3 and provides a $\overline{\text{FAULT}}$ signal whenever the LD (lock detect) output of U1 is a logic low

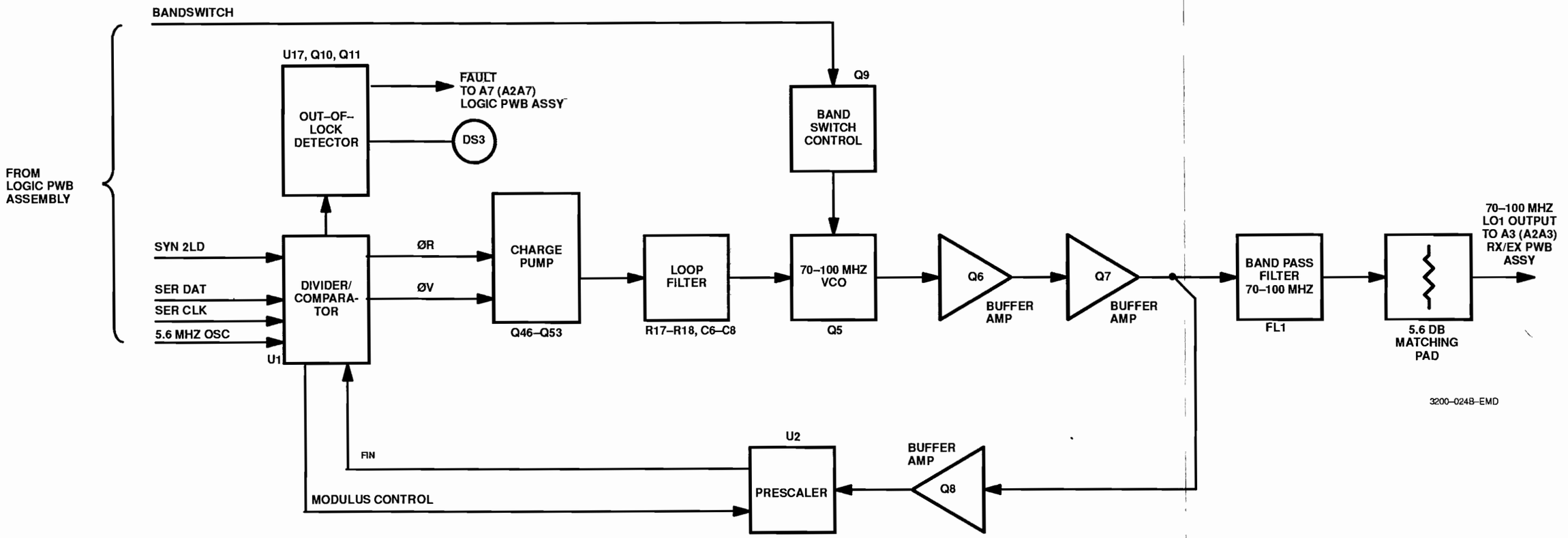


Figure 1. A8 Synthesizer PWB Assembly LO1 Block Diagram

2.2 Local Oscillator 2 (LO2) Circuit Description

Refer to figure 2 for the block diagram of the circuitry comprising Local Oscillator 2. Two separate, but interrelated, phase-locked loops are used to produce an output frequency in the range of 69.9968 to 70.0032 MHz.

The PLL which contains the divider/comparator U4 and the 70 MHz VCO U43 is called the Main PLL, since it provides the final output signal via buffer Q18. The PLL which contains the divider/comparator U8 and the 925 MHz VCO is called the Offset PLL, since it provides a variable frequency for use as a reference by the Main PLL.

The Main PLL and the Offset PLL are interrelated by Offset Mixer U5. Note that the Main PLL does not contain a frequency divider following the VCO. Without the divider, the output frequency can only be that to which the VCO is tuned; there is no provision for making a change in frequency. The Offset PLL, which is variable in frequency, is mixed with the output of the Main PLL for use as a reference by the divider/comparator U4, after prescaling division performed by frequency divider U6.

The Offset PLL produces a signal ranging in frequency from 7.2320 to 7.2384 MHz. The Main PLL maintains the output of the Offset Mixer U5 at 62.7648 MHz. It follows that the VCO U43 produces a signal with the same frequency range as the Offset PLL (6.4kHz), centered at 70 MHz.

The offset synthesizer comprises the following sub-circuits:

- Divider/Comparator Integrated Circuit (U8) - performs the frequency division, phase detection, and synthesizer control functions (in response to command on the serial data SER DAT line from the A7 Logic PWB). When the two signals are the same frequency (a phase difference of zero degrees), both ΦR and ΦV are narrow negative-going pulses every 156 microseconds.

- Charge Pump (Q21-Q24) - uses the phase relationship between ΦR and ΦV signals to generate a slowly varying dc voltage required to control the voltage-controlled oscillator

- Loop Filter (R63, C64, C65) - a low pass filter which slows the PLL response time and reduces the tendency for the local oscillator to hunt for the correct frequency

- 925 MHz (Nominal) Voltage-Controlled Oscillator (U18) - a monolithic integrated circuit; the output frequency is a function of the dc control voltage. The frequency range of this VCO is 925.6960 MHz to 926.5152 MHz

- +8 Volt Regulator (U16) - provides a stabilized and regulated voltage source for the VCO

- Prescaler Programmable Divider by 256/258 (U10, U11) - reduces the frequency of the input to U8 by a factor of approximately 256. It divides the VCO frequency by 256 or 258, depending on the status of the MOD CTRL line from U8. The output is approximately 3.615 MHz

- Frequency Divider by 128 (U9) - divides the VCO frequency by 128 to produce an output frequency range of 7.2320 MHz to 7.2384 MHz

- Buffer Amplifier (Q25) - provides isolation between the divider output and filter input

- Low Pass Filter (L21, C74, C75) - converts the square-wave output of the frequency divider U9 and the buffer amplifier into a near sine-wave by filtering components of the signal above 7.2384 MHz

- Out-of-Lock Detector (Q27, Q28) - lights LED DS2, and provides a $\overline{\text{FAULT}}$ signal, whenever the LD (lock detect) output of U8 is low

The output of the Offset PLL is applied to the subtractive input of the Offset Mixer U5. The output of U5 is fixed at 62.7648 MHz. The frequency of the 70 MHz VCO changes to track the frequency changes of the Offset PLL. The following are the sub-circuits of the Main PLL:

- Divider/Comparator Integrated Circuit (U4) - performs the frequency division, phase detection, and synthesizer control functions (in response to command on the serial data SER DAT line from the A7 Logic PWB). When the two signals are the same frequency (a phase difference of zero degrees), both ΦR and ΦV are narrow negative-going pulses every 22.3 microseconds.

- Charge Pump (Q12, Q15) - uses the phase relationship between ΦR and ΦV signals to generate a slowly varying dc voltage, required to control the voltage-controlled oscillator

- Loop Filter (R34, R35, C35-C37) - a low pass filter which slows the response time of the local oscillator and reduces the tendency for the local oscillator to hunt for the correct frequency

- 70 MHz Voltage-Controlled Oscillator (Q43, CR13, CR14, L15) - generates a signal in the range of 69.9968 MHz to 70.0032 MHz. The exact frequency depends on the frequency of the Offset PLL signal applied to the Offset Mixer U5.

- Buffer Amplifiers (Q44, Q18, Q19) - amplify the 70 MHz (nominal) VCO output signal and isolate the VCO from following circuitry

- Buffer Amplifier (Q20) - amplifies the mixer output signal and isolates the mixer from the Elliptical Low Pass Filter

- Elliptical Low Pass Filter (L17, L27-L29, C52, C54, C55, C105-C110) - removes the mixer's 70 MHz (nominal) input, the 7.2352 MHz (nominal) input, and the sum output, leaving only the 62.7648 MHz difference output

- Buffer Amplifiers (Q38, Q39) - amplify the 62.7648 MHz signal and isolate the filter output from the input to the frequency divider U6

- Prescaler Programmable Divider by 16/17 (U6) - reduces the frequency of the input to U4 by a factor of approximately 16. It divides the VCO frequency by 16 or 17, depending on the status of the MOD CTRL line from U8. The output is at approximately 3.923 MHz.

- Out-of-Lock Detector (Q16, Q17) - lights LED DS1, and provides a $\overline{\text{FAULT}}$ signal, whenever the LD (lock detect) output of U8 is low

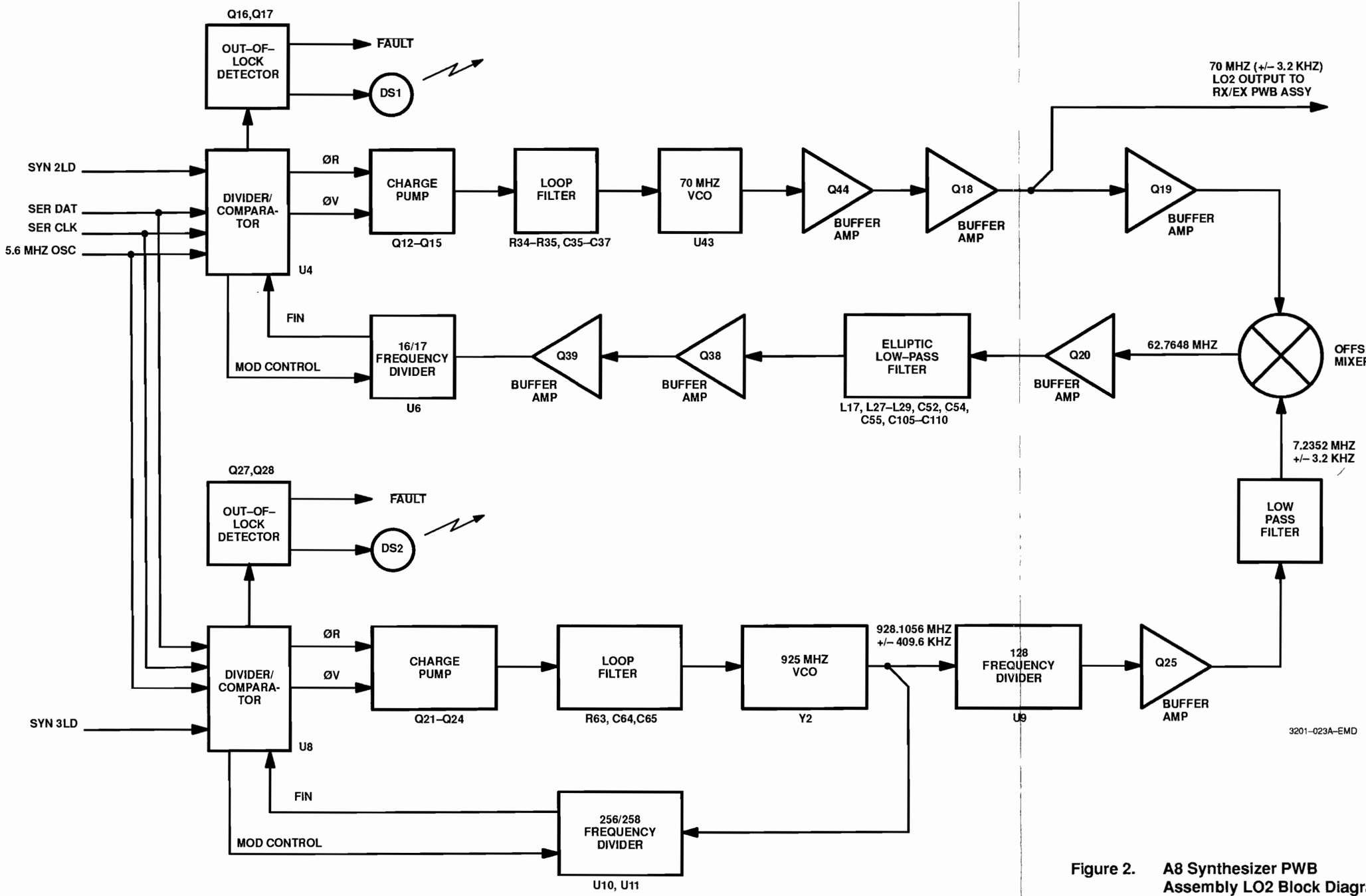


Figure 2. A8 Synthesizer PWB Assembly LO2 Block Diagram

2.3 Local Oscillator 3 (LO3) Circuit Description

Refer to figure 3, the block diagram of the LO3 PLL. The frequency of the output signal of LO3 is dependent on the radio operating frequency and the communications mode selected. When in USB or AM communications modes, the range of frequencies from LO3 is 454.91 to 455.00 kHz. When in LSB communications mode, the range of frequencies from LO3 is 451.91 to 452.00 kHz. The exact frequency within each range is determined by the setting of the digit representing the 10 Hz position of the radio operating frequency.

NOTE

Data and ARQ communications modes may use either upper sideband or lower sideband, depending on the configuration programming of the radio.

- Divider/Comparator Integrated Circuit (U12) - performs the frequency division, phase detection, and synthesizer control functions (in response to command on the serial data line SER DAT from the A7 Logic PWB). When the two signals are the same frequency (a phase difference of zero degrees), both ΦR and ΦV are narrow negative-going pulses with a period of approximately 543 µsec (varies with the radio operating frequency).

- Charge Pump (Q29-Q32) - uses the phase relationship between ΦR and ΦV signals to generate a slowly varying dc voltage required to control the voltage-controlled oscillator

- Charge Pump Hold-Off Circuit (U13, U14) - disables the 5.6 MHz oscillator input and charge pump operation during serial data loading to U12

- Loop Filter (R92, C88, C89) - a low pass filter which slows the local oscillator's response time and reduces the tendency for the local oscillator to hunt for the correct frequency

- Voltage-Controlled Oscillator (Q33, CR18, CR19, L33) - generates the 451.91 to 452.00 kHz or 454.91 to 455.00 kHz signal, depending on the dc level from the loop filter

- Buffer Amplifier (Q34) - amplifies the VCO output signal and isolates the VCO from the output filter

- Output Filter (FL2) - removes spurious signals and provides a nearly pure sine-wave output

- Output Disabling Circuit (Q45, CR28) - reduces the LO3 output by approximately 60 dB when a 0.0 Vdc signal is applied by the A3 RCVR/EXTR PWB Assembly via the connecting coaxial cable

- Squaring Circuit (Q37) - turns the buffer amplifier's near sine-wave output to a 0 to 8 volt square wave for use by the digital circuitry which follows

3. INTERFACE CONNECTIONS

Table 1 lists the A8 Synthesizer PWB Assembly input and output connections and their destinations. Use the table as an aid in signal tracing. Refer to the chassis interconnect diagram for more detail.

4. PARTS LIST, COMPONENT LOCATION DIAGRAM, AND SCHEMATIC DIAGRAM

Table 2 is the parts list of the A8 Synthesizer PWB Assembly. Figure 4 is the component location diagram, and figure 5 is the schematic diagram.

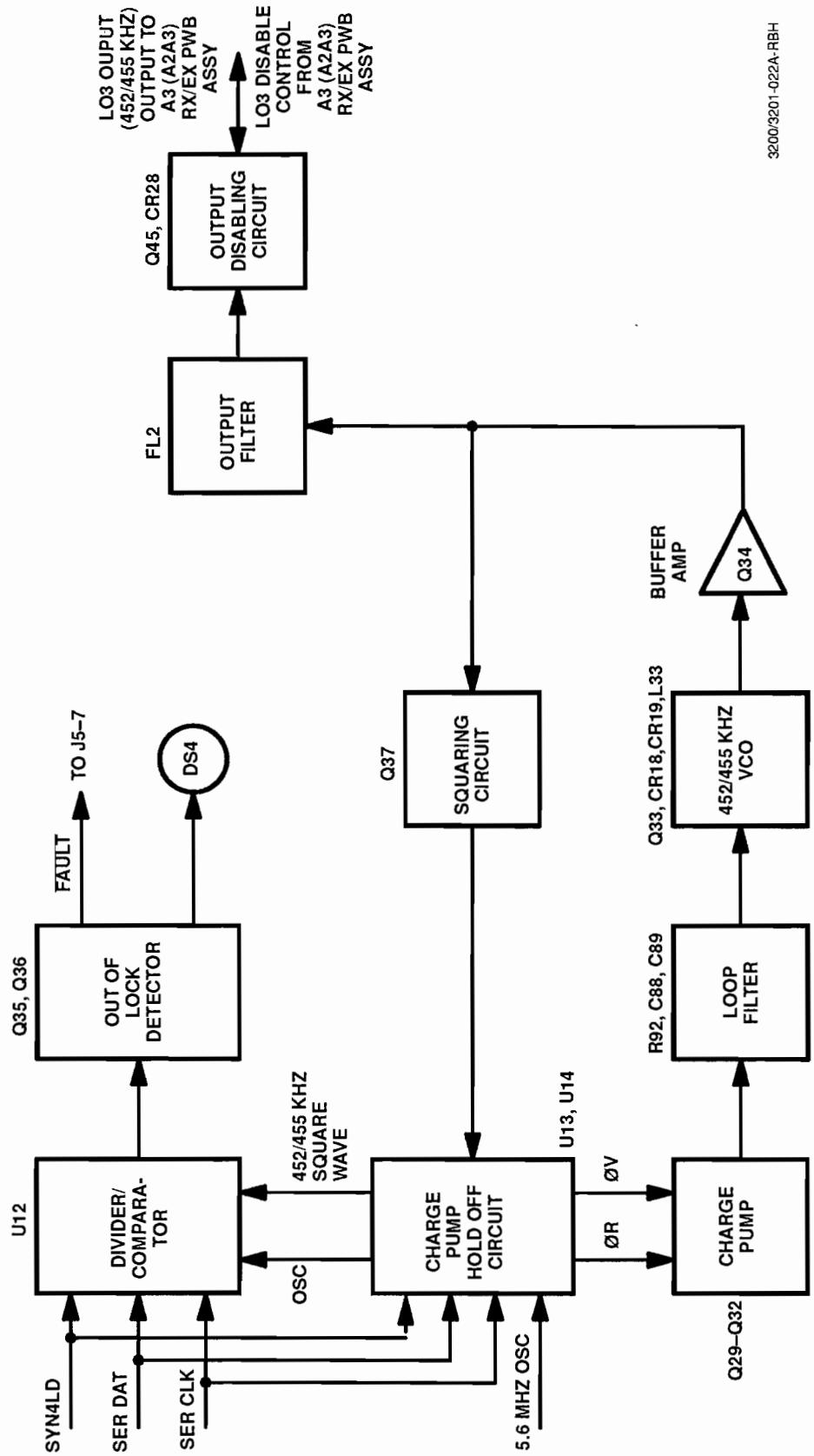


Figure 3. A8 Synthesizer PWB Assembly LO3 Block Diagram

Table 1. A8 Synthesizer PWB Assembly Interconnections

Connector	Signal	Interconnection
J1	DC Power	Power Distribution PWB A5A2J2 via W6
J5	Control	Logic PWB Assy A7J7 via W7
J6	External Oscillator Reference	Optional OCXO PWB J3
P2	LO1 output	Rcvr/Extr PWB Assy A3P2 via W13
P3	LO2 output	Rcvr/Extr PWB Assy A3P3 via W14
P4	LO3 output	Rcvr/Extr PWB Assy A3P4 via W15

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK)

Ref. Desig.	Part Number	Description
	10212-1345	VCO CASTING, TOP
	10212-1346	VCO CASTING, BOTTOM
C1	C12-0001-056	CAP .01UF 30% 25V CER
C2	C26-0016-151	CAP 150UF 20% 16V TANT
C6	C26-0025-339	CAP 3.3UF 20% 25V TANT
C7	C61-0001-506	CAP,.47UF,10%,63V POLYE
C8	C61-0001-504	CAP,.22UF,10%,63V POLYE
C10	C12-0001-056	CAP .01UF 30% 25V CER
C11	C12-0001-056	CAP .01UF 30% 25V CER
C12	C12-0001-045	CAP 470PF 10% 25V CER
C13	C12-0001-037	CAP 100PF 5% 25V CER
C14	C12-0001-056	CAP .01UF 30% 25V CER
C15	C12-0001-056	CAP .01UF 30% 25V CER
C16	C12-0001-017	CAP 15PF 5% 25V CER
C17	C26-0016-150	CAP 15UF 20% 16V TANT
C18	C12-0001-056	CAP .01UF 30% 25V CER
C19	C12-0001-056	CAP .01UF 30% 25V CER
C20	C12-0001-056	CAP .01UF 30% 25V CER
C21	C12-0001-056	CAP .01UF 30% 25V CER
C22	C12-0001-056	CAP .01UF 30% 25V CER
C23	C12-0001-056	CAP .01UF 30% 25V CER
C24	C12-0001-056	CAP .01UF 30% 25V CER
C25	C12-0001-056	CAP .01UF 30% 25V CER
C26	C26-0016-151	CAP 150UF 20% 16V TANT
C27	C26-0016-330	CAP 33UF 20% 16V TANT
C28	C12-0001-056	CAP .01UF 30% 25V CER
C29	C12-0001-056	CAP .01UF 30% 25V CER
C30	C12-0001-056	CAP .01UF 30% 25V CER

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
C31	C12-0001-056	CAP .01UF 30% 25V CER
C32	C12-0001-056	CAP .01UF 30% 25V CER
C33	C12-0001-056	CAP .01UF 30% 25V CER
C34	C26-0016-150	CAP 15UF 20% 16V TANT
C35	C61-0001-506	CAP,.47UF,10%,63V POLYE
C36	C61-0001-502	CAP,.1UF,10%,63V POLYE
C37	C61-0001-503	CAP, .15UF,10%,63V POLYE
C39	C12-0008-680	CAP 68PF 5% 100V CER,AXIA
C40	C12-0001-056	CAP .01UF 30% 25V CER
C41	C12-0008-820	CAP 82PF 5% 100V CER,AXIA
C42	C12-0008-820	CAP 82PF 5% 100V CER,AXIA
C43	C26-0016-150	CAP 15UF 20% 16V TANT
C44	C26-0016-151	CAP 150UF 20% 16V TANT
C45	C26-0016-151	CAP 150UF 20% 16V TANT
C47	C12-0001-021	CAP 22PF 5% 25V CER
C48	C12-0001-056	CAP .01UF 30% 25V CER
C49	C12-0001-017	CAP 15PF 5% 25V CER
C50	C12-0001-013	CAP 10PF 5% 25V CER
C51	C12-0001-056	CAP .01UF 30% 25V CER
C52	C12-0001-035	CAP 82PF 5% 25V CER
C53	C12-0001-056	CAP .01UF 30% 25V CER
C54	C12-0001-025	CAP 33PF 5% 25V CER
C55	C12-0001-025	CAP 33PF 5% 25V CER
C56	C12-0001-056	CAP .01UF 30% 25V CER
C57	C12-0001-056	CAP .01UF 30% 25V CER
C58	C12-0001-056	CAP .01UF 30% 25V CER
C59	C12-0001-056	CAP .01UF 30% 25V CER
C60	C12-0001-056	CAP .01UF 30% 25V CER
C61	C12-0001-056	CAP .01UF 30% 25V CER
C62	C12-0001-056	CAP .01UF 30% 25V CER
C63	C26-0016-150	CAP 15UF 20% 16V TANT
C64	C61-0001-503	CAP,-15UF,10%,63V POLYE
C65	C61-0001-609	CAP,.022UF,10%,200WVDC
C68	C12-0001-037	CAP 100PF 5% 25V CER
C69	C12-0001-037	CAP 100PF 5% 25V CER
C70	C12-0001-056	CAP .01UF 30% 25V CER
C71	C12-0001-021	CAP 22PF 5% 25V CER
C72	C12-0001-056	CAP .01UF 30% 25V CER
C73	C12-0001-056	CAP .01UF 30% 25V CER

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
C74	C12-0001-045	CAP 470PF 10% 25V CER
C75	C12-0001-045	CAP 470PF 10% 25V CER
C76	C26-0016-150	CAP 15UF 20% 16V TANT
C77	C12-0001-056	CAP .01UF 30% 25V CER
C78	C12-0001-021	CAP 22PF 5% 25V CER
C80	C12-0001-049	CAP 1000PF 20% 25V CER
C81	C12-0001-049	CAP 1000PF 20% 25V CER
C82	C12-0001-056	CAP .01UF 30% 25V CER
C83	C12-0001-056	CAP .01UF 30% 25V CER
C84	C12-0001-056	CAP .01UF 30% 25V CER
C85	C12-0001-056	CAP .01UF 30% 25V CER
C86	C12-0001-056	CAP .01UF 30% 25V CER
C87	C26-0016-150	CAP 15UF 20% 16V TANT
C88	C61-0001-611	MET POLYESTER 10% 200V
C89	C61-0001-608	CAP,.015UF,10%,200WVDC
C92	C12-0001-047	CAP 680PF 10% 25V CER
C93	C11-0005-474	CAP .47UF 20% 50V CER
C95	C26-0016-150	CAP 15UF 20% 16V TANT
C96	C12-0001-056	CAP .01UF 30% 25V CER
C97	C12-0001-049	CAP 1000PF 20% 25V CER
C98	C12-0001-049	CAP 1000PF 20% 25V CER
C99	C12-0001-056	CAP .01UF 30% 25V CER
C100	C12-0001-056	CAP .01UF 30% 25V CER
C101	C18-0125-479	CAP 4.7UF 25V ELEC
C102	C12-0001-056	CAP .01UF 30% 25V CER
C103	C12-0001-045	CAP 470PF 10% 25V CER
C105	C12-0001-011	CAP 6.8PF 10% 25V CER
C106	C12-0001-025	CAP 33PF 5% 25V CER
C107	C12-0001-029	CAP 47PF 5% 25V CER
C108	C12-0001-023	CAP 27PF 5% 25V CER
C109	C12-0001-023	CAP 27PF 5% 25V CER
C110	C12-0001-019	CAP 18PF 5% 25V CER
C111	C12-0001-056	CAP .01UF 30% 25V CER
C112	C12-0001-056	CAP .01UF 30% 25V CER
C113	C12-0001-056	CAP .01UF 30% 25V CER
C114	C12-0001-056	CAP .01UF 30% 25V CER
C115	C12-0001-056	CAP .01UF 30% 25V CER
C116	C26-0016-150	CAP 15UF 20% 16V TANT
C117	C12-0001-056	CAP .01UF 30% 25V CER

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
C118	C26-0016-150	CAP 15UF 20% 16V TANT
C119	C26-0016-150	CAP 15UF 20% 16V TANT
C120	C12-0001-056	CAP .01UF 30% 25V CER
C121	C12-0001-056	CAP .01UF 30% 25V CER
C122	C26-0016-150	CAP 15UF 20% 16V TANT
C123	C12-0001-056	CAP .01UF 30% 25V CER
C124	C12-0001-056	CAP .01UF 30% 25V CER
C125	C12-0001-052	CAP 2200PF 30% 25V CER
C126	C26-0016-150	CAP 15UF 20% 16V TANT
C127	C12-0001-056	CAP .01UF 30% 25V CER
C130	C26-0016-151	CAP 150UF 20% 16V TANT
C131	C12-0001-056	CAP .01UF 30% 25V CER
C132	C12-0001-056	CAP .01UF 30% 25V CER
C133	C12-0001-056	CAP .01UF 30% 25V CER
C134	C12-0001-056	CAP .01UF 30% 25V CER
C135	C12-0001-056	CAP .01UF 30% 25V CER
C137	C12-0001-056	CAP .01UF 30% 25V CER
C139	C12-0001-049	CAP 1000PF 20% 25V CER
C141	C26-0016-150	CAP 15UF 20% 16V TANT
C142	C12-0001-056	CAP .01UF 30% 25V CER
C143	C26-0016-150	CAP 15UF 20% 16V TANT
C144	C26-0016-150	CAP 15UF 20% 16V TANT
C145	C26-0016-150	CAP 15UF 20% 16V TANT
C146	C12-0001-045	CAP 470PF 10% 25V CER
C147	C12-0001-056	CAP .01UF 30% 25V CER
C148	C26-0016-150	CAP 15UF 20% 16V TANT
C149	C12-0001-056	CAP .01UF 30% 25V CER
C150	C12-0001-023	CAP 27PF 5% 25V CER
C151	C12-0001-056	CAP .01UF 30% 25V CER
C152	C12-0001-056	CAP .01UF 30% 25V CER
C153	C12-0001-056	CAP .01UF 30% 25V CER
C154	C12-0001-056	CAP .01UF 30% 25V CER
C155	C12-0001-056	CAP .01UF 30% 25V CER
C156	C12-0001-056	CAP .01UF 30% 25V CER
C157	C12-0001-056	CAP .01UF 30% 25V CER
C158	C11-0005-474	CAP .47UF 20% 50V CER
C159	C12-0001-049	CAP 1000PF 20% 25V CER
C160	C12-0001-049	CAP 1000PF 20% 25V CER
C161	C12-0001-054	CAP 4700PF 30% 25V CER

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
C163	C26-0016-150	CAP 15UF 20% 16V TANT
C164	C12-0001-056	CAP .01UF 30% 25V CER
C166	C12-0001-056	CAP .01UF 30% 25V CER
C167	C11-0005-474	CAP .47UF 20% 50V CER
C168	C11-0005-474	CAP .47UF 20% 50V CER
C169	C12-0001-056	CAP .01UF 30% 25V CER
C170	C26-0016-151	CAP 150UF 20% 16V TANT
C172	C12-0001-049	CAP 1000PF 20% 25V CER
C173	C12-0001-037	CAP 100PF 5% 25V CER
C174	C12-0001-049	CAP 1000PF 20% 25V CER
C175	C12-0001-049	CAP 1000PF 20% 25V CER
C176	C12-0001-049	CAP 1000PF 20% 25V CER
C177	C12-0001-049	CAP 1000PF 20% 25V CER
C178	C12-0001-035	CAP 82PF 5% 25V CER
C179	C26-0010-100	CAP 10UF 20% 10V TANT
C180	C26-0010-100	CAP 10UF 20% 10V TANT
C181	C26-0010-100	CAP 10UF 20% 10V TANT
C182	C26-0010-100	CAP 10UF 20% 10V TANT
C183	C12-0001-017	CAP 15PF 5% 25V CER
C184	C12-0001-039	CAP 150PF 10% 25V CER
C185	C12-0001-017	CAP 15PF 5% 25V CER
C186	C11-0005-474	CAP .47UF 20% 50V CER
C187	C12-0001-039	CAP 150PF 10% 25V CER
C189	C26-0016-150	CAP 15UF 20% 16V TANT
C192	C26-0016-150	CAP 15UF 20% 16V TANT
C193	C11-0005-474	CAP .47UF 20% 50V CER
C194	C26-0016-150	CAP 15UF 20% 16V TANT
C195	C11-0005-474	CAP .47UF 20% 50V CER
C201	C12-0001-037	CAP 100PF 5% 25V CER
C202	C12-0001-037	CAP 100PF 5% 25V CER
C203	C12-0001-049	CAP 1000PF 20% 25V CER
C204	C12-0001-037	CAP 100PF 5% 25V CER
C205	C12-0001-045	CAP 470PF 10% 25V CER
C206	C12-0001-056	CAP .01UF 30% 25V CER
CR2	D25-0002-001	DIODE TUNING MV309
CR3	D25-0002-001	DIODE TUNING MV309
CR4	D25-0002-001	DIODE TUNING MV309
CR5	1N4148	DIODE 200mA 100V SW
CR6	D25-0002-001	DIODE TUNING MV309

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
CR7	D25-0002-001	DIODE TUNING MV309
CR8	D25-0002-001	DIODE TUNING MV309
CR10	1N5711	DIODE SCHOTTKY 70V .25W
CR11	D10-3500-000	DIODE .25W 35V PIN BSW
CR12	1N5711	DIODE SCHOTTKY 70V .25W
CR13	D25-0002-001	DIODE TUNING MV309
CR14	D25-0002-001	DIODE TUNING MV309
CR15	1N5711	DIODE SCHOTTKY 70V .25W
CR17	1N5711	DIODE SCHOTTKY 70V .25W
CR18	D25-0005-001	DIODE TUNING MVAM108
CR19	D25-0005-001	DIODE TUNING MVAM108
CR20	1N5711	DIODE SCHOTTKY 70V .25W
CR22	1N4148	DIODE 200mA 100V SW
CR23	1N4148	DIODE 200mA 100V SW
CR24	1N5711	DIODE SCHOTTKY 70V .25W
CR25	1N4148	DIODE 200mA 100V SW
CR26	1N4148	DIODE 200mA 100V SW
CR27	1N4148	DIODE 200mA 100V SW
CR28	1N4454	DIODE 200MA 75V SW
CR29	1N4148	DIODE 200mA 100V SW
CR30	1N5711	DIODE SCHOTTKY 70V .25W
CR31	1N5711	DIODE SCHOTTKY 70V .25W
CR32	1N5711	DIODE SCHOTTKY 70V .25W
CR33	1N5711	DIODE SCHOTTKY 70V .25W
CR34	1N5711	DIODE SCHOTTKY 70V .25W
DS1	N21-0023-002	LED GRN T-1 8MCD
DS2	N21-0023-002	LED GRN T-1 8MCD
DS3	N21-0023-002	LED GRN T-1 8MCD
DS4	N21-0023-002	LED GRN T-1 8MCD
FL1	G20-0006-001	FILTER BANDPASS 64-108MHZ
FL2	10212-1321	FILTER 455 KHZ CER
JMP1	MP-1142	RES ZERO OHM (CKT JMPR)
JMP2	MP-1142	RES ZERO OHM (CKT JMPR)
JMP3	MP-1142	RES ZERO OHM (CKT JMPR)
JMP4	MP-1142	RES ZERO OHM (CKT JMPR)
JMP5	MP-1142	RES ZERO OHM (CKT JMPR)
JMP7	MP-1142	RES ZERO OHM (CKT JMPR)
L1	MS75084-9	COIL 5.6UH 10% FXD RF
L2	MS75084-9	COIL 5.6UH 10% FXD RF

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
L3	MS75084-9	COIL 5.6UH 10% FXD RF
L4	L-0608	COIL .22UH 10% FXD RF
L5	L11-0006-003	COIL VARIABLE PCB .15NH
L6	L11-0006-001	COIL VARIABLE PCB .08UH
L8	MS75084-9	COIL 5.6UH 10% FXD RF
L9	MS75083-11	COIL .68UH 10% FXD RF
L10	L-0608	COIL .22UH 10% FXD RF
L14	MS75084-9	COIL 5.6UH 10% FXD RF
L15	L11-0006-001	COIL VARIABLE PCB .08UH
L16	MS75083-2	COIL .12UH 10% FXD RF
L17	MS75083-7	COIL .33UH 10% FXD RF
L21	MS75084-4	COIL 2.2UH 10% FXD RF
L23	L-0652	COIL 1KUH 10% FXD RF
L24	MS75085-11	COIL 220UH 10% FXD RF
L25	MS75085-11	COIL 220UH 10% FXD RF
L26	MS75085-4	COIL 56UH 10% FXD RF
L27	MS75083-6	COIL .27UH 10% FXD RF
L28	MS75083-2	COIL .12UH 10% FXD RF
L29	MS75083-3	COIL .15UH 10% FXD RF
L30	MS75084-9	COIL 5.6UH 10% FXD RF
L31	L-0607	COIL .18UH 10% FXD RF
L32	L-0652	COIL 1KUH 10% FXD RF
L33	L11-0007-023	IND 330 UH SH VAR PCMNT
L34	MS75084-9	COIL 5.6UH 10% FXD RF
L35	L-0652	COIL 1KUH 10% FXD RF
L37	L-0636	COIL 47UH 10% FXD RF
Q5	Q35-0003-000	XSTR N-CH JFET U310
Q6	Q35-0003-000	XSTR N-CH JFET U310
Q7	Q02-4917-000	XSTR PN4917 SS/GP PNP 30V
Q8	Q-0019	XSTR SS/GP MPS-6507
Q9	2N4124	XSTR SS/GP NPN TO-92
Q10	Q-0076	XSTR DARL NPN MPS-A13
Q11	2N4126	XSTR SS/GP PNP TO-92
Q12	2N4124	XSTR SS/GP NPN TO-92
Q13	2N4124	XSTR SS/GP NPN TO-92
Q14	2N4126	XSTR SS/GP PNP TO-92
Q15	2N4124	XSTR SS/GP NPN TO-92
Q16	2N4126	XSTR SS/GP PNP TO-92
Q17	Q-0076	XSTR DARL NPN MPS-A13

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
Q18	Q-0019	XSTR SS/GP MPS-6507
Q19	Q-0019	XSTR SS/GP MPS-6507
Q20	Q-0019	XSTR SS/GP MPS-6507
Q21	2N4124	XSTR SS/GP NPN TO-92
Q22	2N4124	XSTR SS/GP NPN TO-92
Q23	2N4126	XSTR SS/GP PNP TO-92
Q24	2N4124	XSTR SS/GP NPN TO-92
Q25	2N4124	XSTR SS/GP NPN TO-92
Q27	2N4126	XSTR SS/GP PNP TO-92
Q28	Q-0076	XSTR DARL NPN MPS-A13
Q29	2N4124	XSTR SS/GP NPN TO-92
Q30	2N4124	XSTR SS/GP NPN TO-92
Q31	2N4126	XSTR SS/GP PNP TO-92
Q32	2N4124	XSTR SS/GP NPN TO-92
Q33	Q35-0003-000	XSTR N-CH JFET U310
Q34	2N4124	XSTR SS/GP NPN TO-92
Q35	2N4126	XSTR SS/GP PNP TO-92
Q36	Q-0076	XSTR DARL NPN MPS-A13
Q37	2N4124	XSTR SS/GP NPN TO-92
Q38	Q-0019	XSTR SS/GP MPS-6507
Q39	Q-0019	XSTR SS/GP MPS-6507
Q43	Q35-0003-000	XSTR N-CH JFET U310
Q44	Q35-0003-000	XSTR N-CH JFET U310
Q45	Q26-0013-213	XSTR P-CH MOSFET 30V .4W
Q46	2N2369A	XSTR SS/RF NPN TO-52
Q47	2N2369A	XSTR SS/RF NPN TO-52
Q48	Q-0153	XSTR SS/RF PN4258
Q49	Q-0153	XSTR SS/RF PN4258
Q50	Q-0153	XSTR SS/RF PN4258
Q51	2N2369A	XSTR SS/RF NPN TO-52
Q52	2N4401	XSTR SS/GP NPN TO-92
Q53	Q-0153	XSTR SS/RF PN4258
R1	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R2	R65-0003-220	RES 22 5% 1/4W CAR FILM
R3	R65-0003-220	RES 22 5% 1/4W CAR FILM
R4	R65-0003-151	RES 150 5% 1/4W CAR FILM
R5	R65-0003-151	RES 150 5% 1/4W CAR FILM
R6	R65-0003-821	RES 820 5% 1/4W CAR FILM
R17	R65-0003-331	RES 330 5% 1/4W CAR FILM

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
R18	R65-0003-121	RES 120 5% 1/4W CAR FILM
R20	R65-0003-822	RES 8.2K 5% 1/4W CAR FILM
R22	R65-0003-331	RES 330 5% 1/4W CAR FILM
R24	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R25	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R26	R65-0003-180	RES 18 5% 1/4W CAR FILM
R27	RN55D4020F	RES 402 1% 1/8W MET FILM
R28	RN55D1740F	RES 174 1% 1/8W MET FILM
R29	RN55D1740F	RES 174 1% 1/8W MET FILM
R30	RN55D4020F	RES 402 1% 1/8W MET FILM
R31	R65-0003-471	RES 470 5% 1/4W CAR FILM
R32	RN55D2430F	RES 243 1% 1/8W MET FILM
R33	RN55D2430F	RES 243 1% 1/8W MET FILM
R34	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R35	R65-0003-331	RES 330 5% 1/4W CAR FILM
R37	R65-0003-180	RES 18 5% 1/4W CAR FILM
R38	R65-0003-101	RES 100 5% 1/4W CAR FILM
R39	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R40	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R41	R65-0003-220	RES 22 5% 1/4W CAR FILM
R42	R65-0003-391	RES 390 5% 1/4W CAR FILM
R43	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R44	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R45	R65-0003-471	RES 470 5% 1/4W CAR FILM
R46	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R47	R65-0003-331	RES 330 5% 1/4W CAR FILM
R48	R65-0003-822	RES 8.2K 5% 1/4W CAR FILM
R49	R65-0003-511	RES 510 5% 1/4W CAR FILM
R50	R65-0003-221	RES 220 5% 1/4W CAR FILM
R51	R65-0003-220	RES 22 5% 1/4W CAR FILM
R53	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R54	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R55	R65-0003-180	RES 18 5% 1/4W CAR FILM
R56	RN55D4020F	RES 402 1% 1/8W MET FILM
R57	RN55D1740F	RES 174 1% 1/8W MET FILM
R58	RN55D1740F	RES 174 1% 1/8W MET FILM
R59	RN55D4020F	RES 402 1% 1/8W MET FILM
R60	R65-0003-471	RES 470 5% 1/4W CAR FILM
R61	RN55D2430F	RES 243 1% 1/8W MET FILM

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
R62	RN55D2430F	RES 243 1% 1/8W MET FILM
R63	R65-0003-183	RES 18K 5% 1/4W CAR FILM
R66	R65-0003-180	RES 18 5% 1/4W CAR FILM
R67	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R68	R65-0003-332	RES 3.3K 5% 1/4W CAR FILM
R69	R65-0003-332	RES 3.3K 5% 1/4W CAR FILM
R70	R65-0003-180	RES 18 5% 1/4W CAR FILM
R71	R65-0003-561	RES 560 5% 1/4W CAR FILM
R72	R65-0003-560	RES 56 5% 1/4W CAR FILM
R73	R65-0003-180	RES 18 5% 1/4W CAR FILM
R74	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R78	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R79	R65-0003-331	RES 330 5% 1/4W CAR FILM
R80	R65-0003-822	RES 8.2K 5% 1/4W CAR FILM
R82	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R83	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R84	R65-0003-180	RES 18 5% 1/4W CAR FILM
R85	R65-0003-132	RES 1.3K 5% 1/4W CAR FILM
R86	R65-0003-331	RES 330 5% 1/4W CAR FILM
R87	R65-0003-331	RES 330 5% 1/4W CAR FILM
R88	R65-0003-132	RES 1.3K 5% 1/4W CAR FILM
R89	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R90	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R91	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R92	R65-0003-563	RES 56K 5% 1/4W CAR FILM
R96	R65-0003-180	RES 18 5% 1/4W CAR FILM
R97	R65-0003-223	RES 22K 5% 1/4W CAR FILM
R99	R65-0003-751	RES 750 5% 1/4W CAR FILM
R101	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R102	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R103	R65-0003-331	RES 330 5% 1/4W CAR FILM
R104	R65-0003-822	RES 8.2K 5% 1/4W CAR FILM
R105	R65-0003-100	RES 10 5% 1/4W CAR FILM
R106	R65-0003-223	RES 22K 5% 1/4W CAR FILM
R108	R65-0003-241	RES 240 5% 1/4W CAR FILM
R109	R65-0003-471	RES 470 5% 1/4W CAR FILM
R110	R65-0003-511	RES 510 5% 1/4W CAR FILM
R111	R65-0003-821	RES 820 5% 1/4W CAR FILM
R112	R65-0003-681	RES 680 5% 1/4W CAR FILM

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
R114	R65-0003-331	RES 330 5% 1/4W CAR FILM
R115	R65-0003-182	RES 1.8K 5% 1/4W CAR FILM
R116	R65-0003-332	RES 3.3K 5% 1/4W CAR FILM
R117	R65-0003-391	RES 390 5% 1/4W CAR FILM
R118	R65-0003-131	RES 130 5% 1/4W CAR FILM
R119	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R120	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R121	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R128	R65-0003-151	RES 150 5% 1/4W CAR FILM
R129	R65-0003-151	RES 150 5% 1/4W CAR FILM
R130	R65-0003-151	RES 150 5% 1/4W CAR FILM
R131	R65-0003-180	RES 18 5% 1/4W CAR FILM
R132	R65-0003-180	RES 18 5% 1/4W CAR FILM
R133	R65-0003-681	RES 680 5% 1/4W CAR FILM
R134	R65-0003-332	RES 3.3K 5% 1/4W CAR FILM
R135	R65-0003-104	RES 100K 5% 1/4W CAR FILM
R137	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R138	R65-0003-911	RES 910 5% 1/4W CAR FILM
R139	R65-0003-221	RES 220 5% 1/4W CAR FILM
R140	R65-0003-221	RES 220 5% 1/4W CAR FILM
R141	R65-0003-331	RES 330 5% 1/4W CAR FILM
R142	R65-0003-152	RES 1.5K 5% 1/4W CAR FILM
R143	R65-0003-911	RES 910 5% 1/4W CAR FILM
R144	R65-0003-331	RES 330 5% 1/4W CAR FILM
R146	R65-0003-221	RES 220 5% 1/4W CAR FILM
R147	R65-0003-180	RES 18 5% 1/4W CAR FILM
R148	R65-0003-560	RES 56 5% 1/4W CAR FILM
R151	R65-0003-331	RES 330 5% 1/4W CAR FILM
R155	R65-0003-180	RES 18 5% 1/4W CAR FILM
R156	R65-0003-220	RES 22 5% 1/4W CAR FILM
R157	R65-0003-390	RES 39 5% 1/4W CAR FILM
R158	R65-0003-820	RES 82 5% 1/4W CAR FILM
R159	R65-0003-180	RES 18 5% 1/4W CAR FILM
R160	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R161	R65-0003-180	RES 18 5% 1/4W CAR FILM
R162	R65-0003-180	RES 18 5% 1/4W CAR FILM
R165	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R166	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R167	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
R168	R65-0003-181	RES 180 5% 1/4W CAR FILM
R169	R65-0003-181	RES 180 5% 1/4W CAR FILM
R170	R65-0003-180	RES 18 5% 1/4W CAR FILM
R171	R65-0003-180	RES 18 5% 1/4W CAR FILM
R172	R65-0003-180	RES 18 5% 1/4W CAR FILM
R173	R65-0003-223	RES 22K 5% 1/4W CAR FILM
R174	R65-0003-180	RES 18 5% 1/4W CAR FILM
R175	R65-0003-180	RES 18 5% 1/4W CAR FILM
R176	R65-0003-180	RES 18 5% 1/4W CAR FILM
R177	R65-0003-180	RES 18 5% 1/4W CAR FILM
R178	R65-0003-511	RES 510 5% 1/4W CAR FILM
R179	R65-0003-271	RES 270 5% 1/4W CAR FILM
R180	R65-0003-301	RES 300 5% 1/4W CAR FILM
R181	R65-0003-682	RES 6.8K 5% 1/4W CAR FILM
R182	R65-0003-682	RES 6.8K 5% 1/4W CAR FILM
R184	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R186	R65-0003-181	RES 180 5% 1/4W CAR FILM
R187	R65-0003-180	RES 18 5% 1/4W CAR FILM
R189	R65-0003-220	RES 22 5% 1/4W CAR FILM
R190	R65-0003-562	RES 5.6K 5% 1/4W CAR FILM
R191	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R193	R65-0003-101	RES 100 5% 1/4W CAR FILM
R197	R65-0003-271	RES 270 5% 1/4W CAR FILM
R198	R65-0003-201	RES 200 5% 1/4W CAR FILM
R199	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R200	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R201	R65-0003-471	RES 470 5% 1/4W CAR FILM
R202	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R203	R65-0003-680	RES 68 5% 1/4W CAR FILM
R204	R65-0003-271	RES 270 5% 1/4W CAR FILM
R205	R65-0003-201	RES 200 5% 1/4W CAR FILM
R206	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R207	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R208	R65-0003-102	RES 1.0K 5% 1/4W CAR FILM
R209	R65-0003-471	RES 470 5% 1/4W CAR FILM
R210	R65-0003-680	RES 68 5% 1/4W CAR FILM
R211	R65-0003-151	RES 150 5% 1/4W CAR FILM
R212	R65-0003-821	RES 820 5% 1/4W CAR FILM
R213	R65-0003-101	RES 100 5% 1/4W CAR FILM

Table 2. A8 Synthesizer PWB Assembly Parts List (10212-1310 Rev. AK) (Cont.)

Ref. Desig.	Part Number	Description
R214	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R215	R65-0003-222	RES 2.2K 5% 1/4W CAR FILM
R216	R65-0003-470	RES 47 5% 1/4W CAR FILM
R217	R65-0003-100	RES 10 5% 1/4W CAR FILM
T1	10212-1328	ASSY XFMR RF
U1	I70-0005-001	IC FREQ SYNTH 145158
U2	I70-0014-003	IC PRESCALER 16/17 503
U3	I12-0006-008	IC VR 78L08A +8V .10A 4%
U4	I70-0005-001	IC FREQ SYNTH 145158
U5	I51-0004-002	IC MIXER DB 602
U6	I70-0014-003	IC PRESCALER 16/17 503
U7	I12-0006-008	IC VR 78L08A +8V .10A 4%
U8	I70-0005-001	IC FREQ SYNTH 145158
U9	I70-0014-002	IC PRESCALER 64/65 501
U10	I70-0014-002	IC PRESCALER 64/65 501
U11	I15-0000-074	IC 74HC74 PLASTIC CMOS
U12	I70-0013-003	IC,PLL,FREQ SYNTHESIZER
U13	I01-0000-023	IC 4071B PLASTIC CMOS
U14	I01-0000-050	IC 4013B PLASTIC CMOS
U15	I11-0001-001	IC VR 7805 +5V 1.5A 4%
U16	I12-0006-008	IC VR 78L08A +8V .10A 4%
U18	10212-1324	ASSY VCO PWB
Y1	10212-1320	ASSY REF OSC 5.6 MHZ

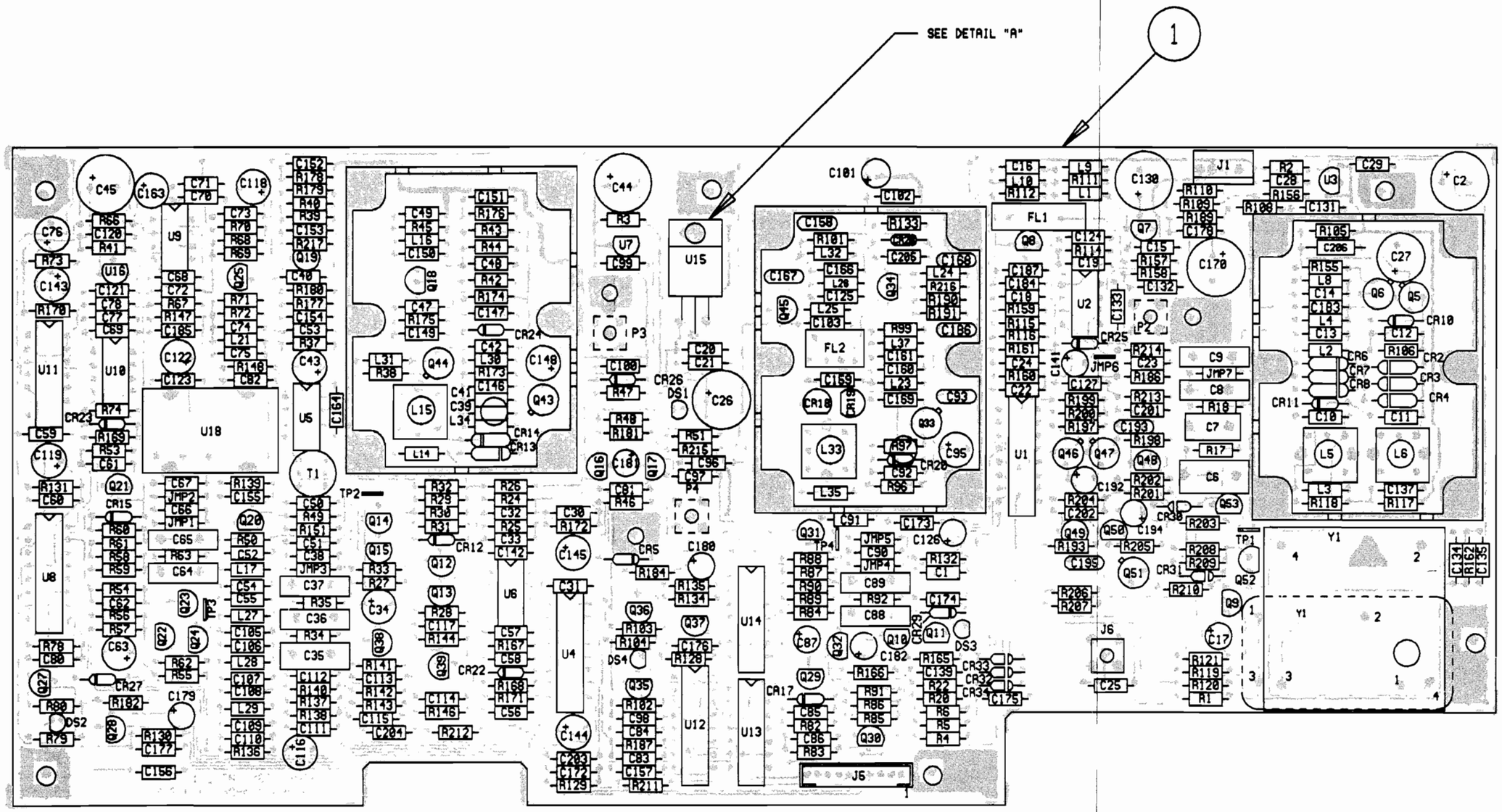


Figure 4. A8 Synthesizer PWB Assembly Component Location Diagram (10212-1310 Rev. M)

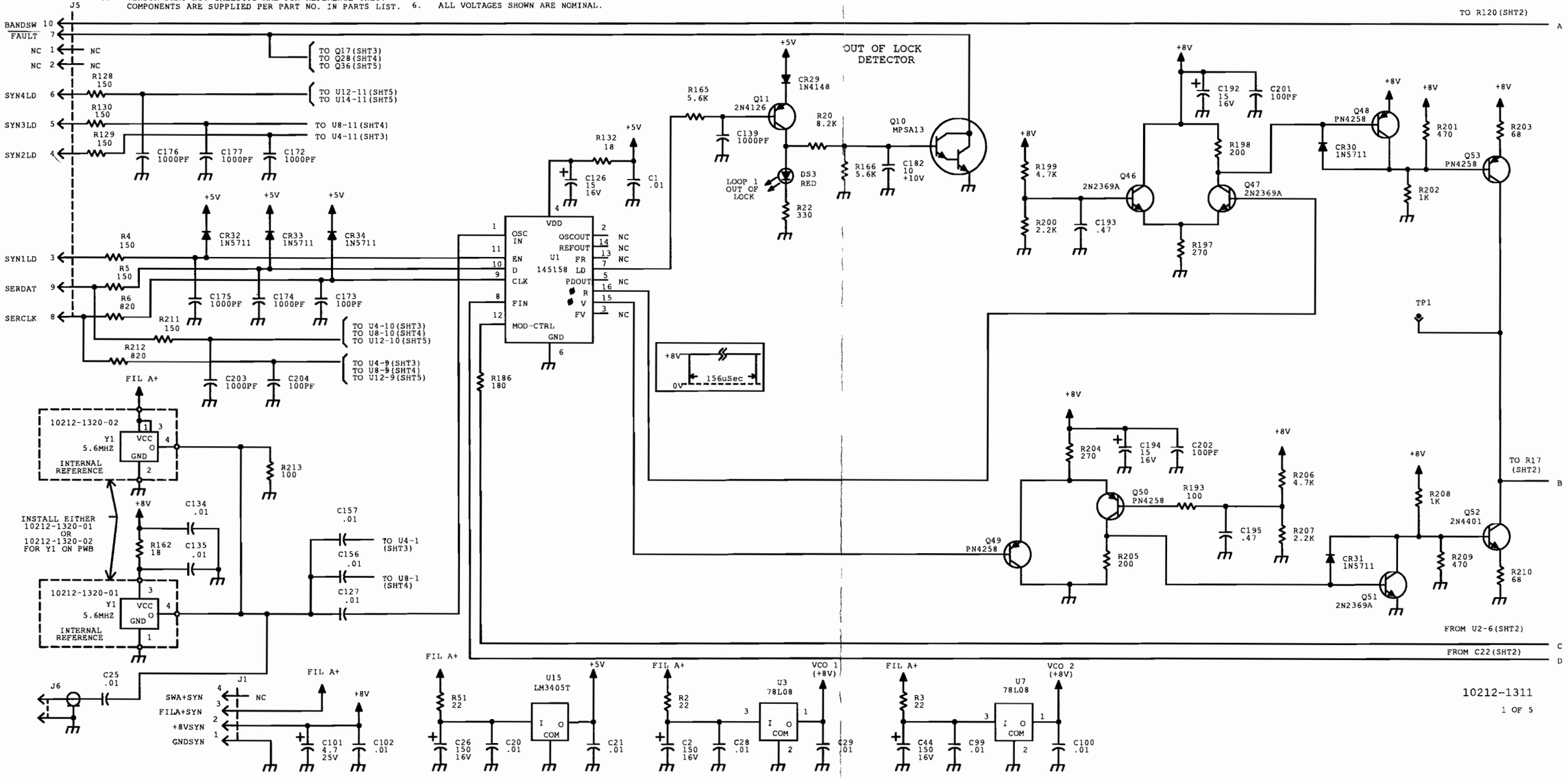
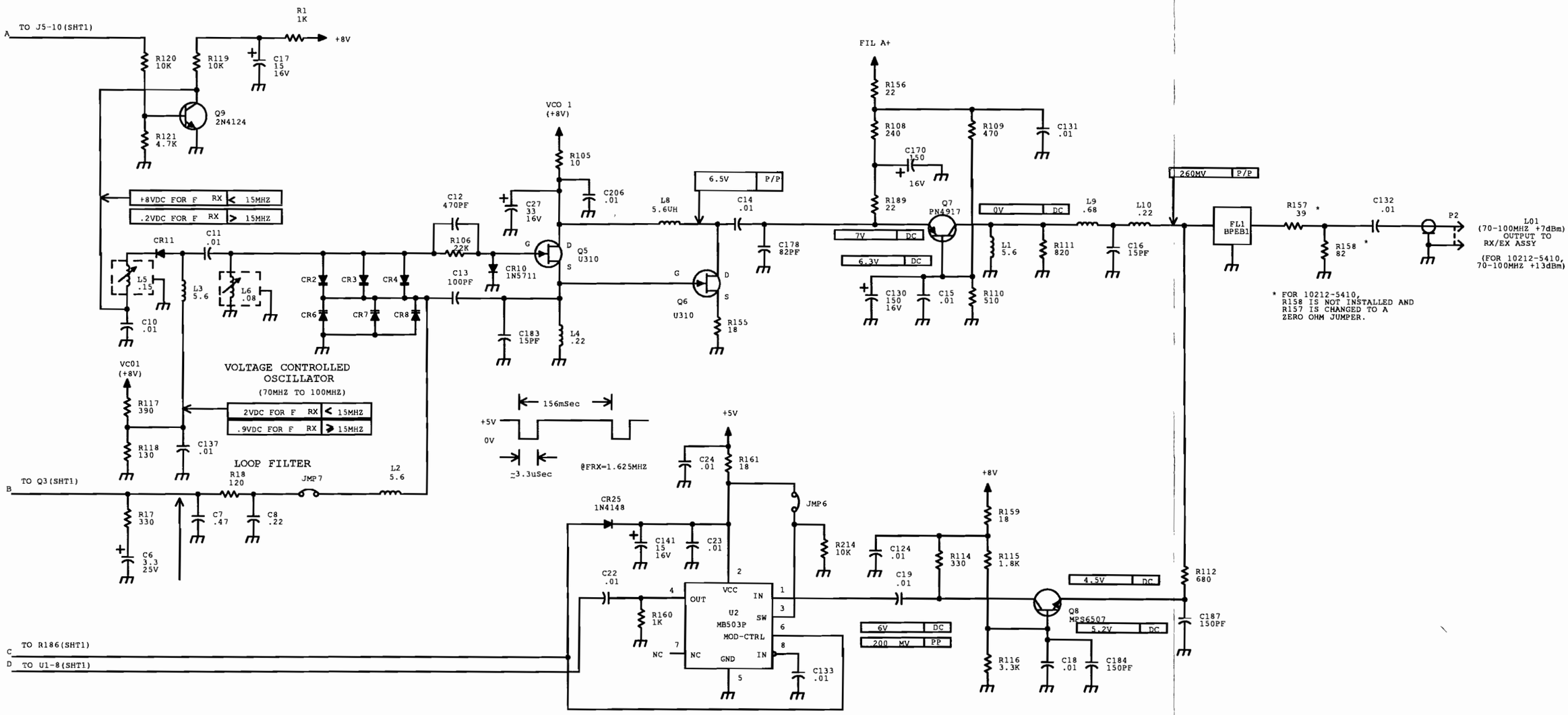
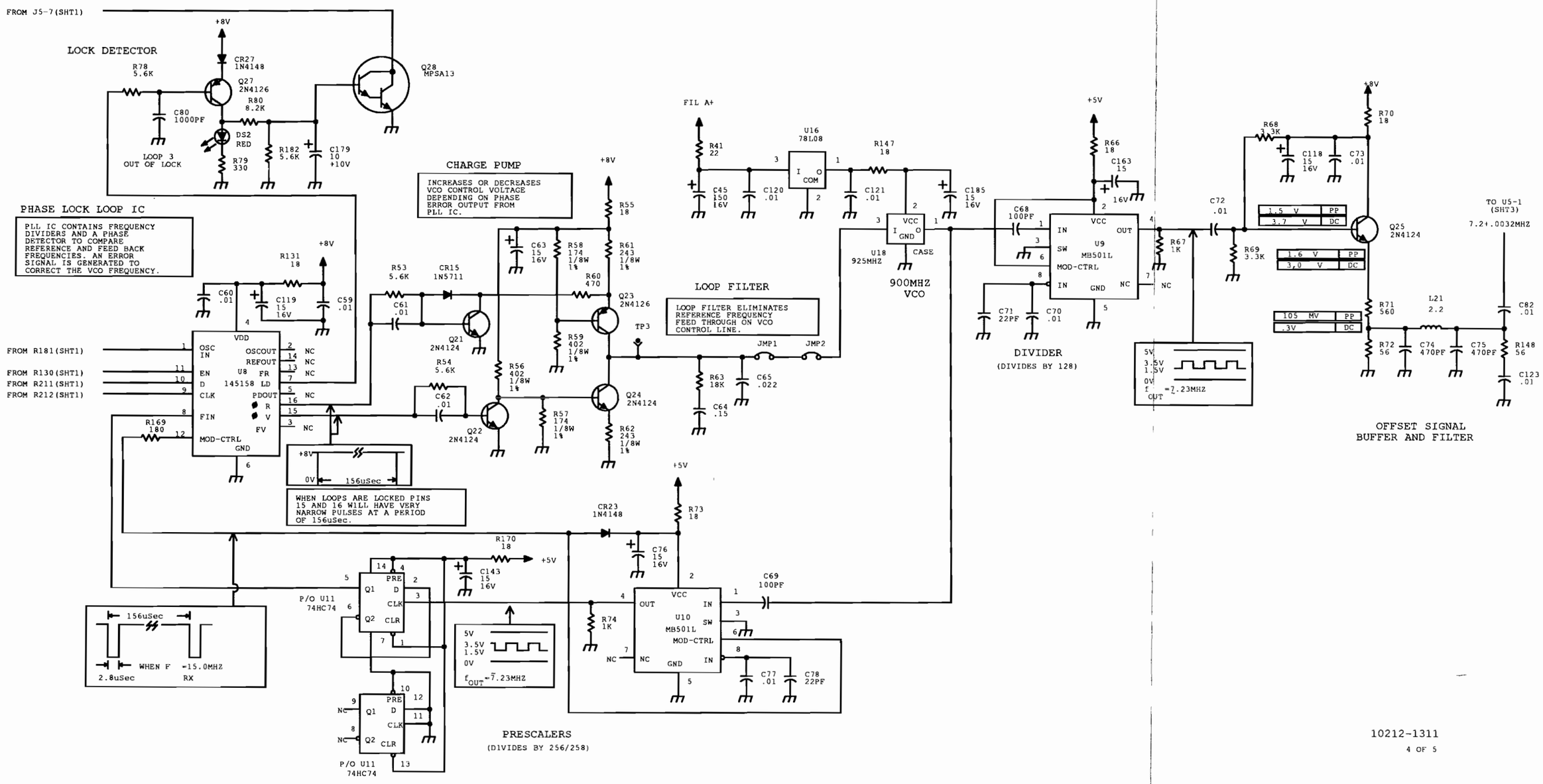


Figure 5. A8 Synthesizer PWB Assembly Schematic Diagram (10212-1311 Rev. AA) (Sheet 1 of 5)



10212-1311
2 OF 5

Figure 5. A8 Synthesizer PWB Assembly Schematic Diagram (10212-1311 Rev. AA) (Sheet 2 of 5)



10212-1311
4 OF 5

Figure 5. A8 Synthesizer PWB Assembly Schematic Diagram (10212-1311 Rev. AA) (Sheet 4 of 5)

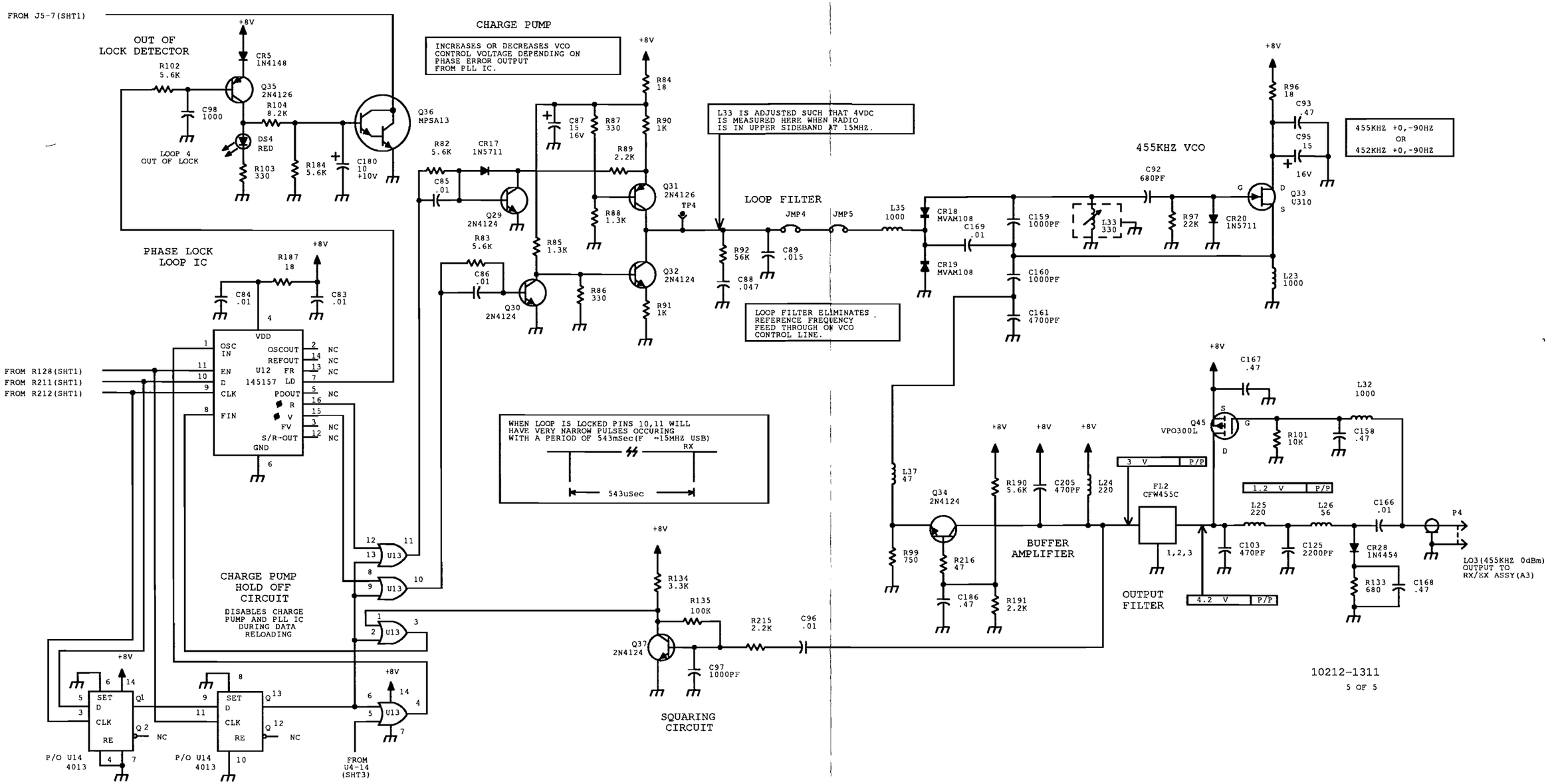


Figure 5. A8 Synthesizer PWB Assembly Schematic Diagram (10212-1311 Rev. AA) (Sheet 5 of 5)

APPENDIX A

APPENDIX A

INTERFACE SIGNALS NAMES AND DESCRIPTIONS

Table A-1 is an alphabetical listing of the abbreviated signal names, with descriptions, which interface between the A7 Logic PWB Assembly and other assemblies in the radio.

Table A-1. A7 Logic PWB Assembly Interface Signal Descriptions

Signal Name (Abbreviation)	Description
ACCKRQ	Accessory keyline request. Input from accessory equipment used to activate keyline control/interrupt circuit.
ACRXOUT	Accessory receive audio output. Receive audio output to accessory equipment.
ACCTGC	Accessory transmit gain control. Input from accessory equipment to ALC circuit on A7 Logic PWB Assembly.
ACCTR (+/-)	Accessory transmit/receive keyline. When radio is keyed, ACCTR+ and ACCTR- lines are connected using relay contacts.
ACCTXIN	Accessory transmit audio input. Transmit audio input from accessory equipment.
ALC	Automatic level control. Dc control voltage used on A3 Receiver/Exciter PWB Assembly to control RF transmit path attenuation.
BANDSW	Bandswitch. Digital control voltage used on A8 Synthesizer PWB Assembly to control operating band of local oscillator one (LO1).
BA0 thru BA17	Buffered address lines 0 through 17, originally from logic PWB assembly CPU.
BD0 thru BD7	Bidirectional buffered address lines 0 through 7.
BE	Buffered enable line, part of buffered control bus.
BIORQ	Buffered input/output request line, originally from logic PWB assembly CPU; part of buffered control bus.
BMREQ	Buffered memory request line, originally from logic PWB assembly CPU; part of buffered control bus.
BM1	Buffered memory control line one, part of buffered control bus.
BNDADD0 thru BNDADD2	Band address lines 0 through 2. Used to switch filters on A4 Harmonic Filter PWB Assembly.
BRD	Buffered read line, part of buffered control bus.
BUSACK	Bus acknowledge line, part of CPU interrupt bus.
BUSREQ	Bus request line, part of CPU interrupt bus.
BWR	Buffered write line, part of buffered control bus.
CWKRQ	CW key request line. Originates at CW key.
DTONE	Digital tone line. Input to audio processing circuitry on the A7 Logic PWB Assembly.
FANCTL	Fan control line. Used to control the A4 Harmonic Filter PWB Assembly switch controlling the continuous blower kit.

Table A-1. A7 Logic PWB Assembly Interface Signal Descriptions (Cont.)

Signal Name (Abbreviation)	Description
FAULT	Fault line. Active when radio senses a fault condition, such as power amplifier overtemperature, synthesizer out-of-lock or microprocessor power-up.
FPAUDIO	Front panel audio. Front panel receive audio signal on the A2 Audio PWB Assembly.
FPCLK	Front panel clock. 1.536 MHz clock signal used by processor on A1A1 Front Panel Display PWB Assembly.
FPINT	Front panel interrupt line. Initiated by operator and generated by A1A1 Front Panel Display PWB Assembly shaft encoder circuit.
FPSEL	Front panel select line. Used by logic PWB assembly input/output decoder to select A1A1 Front Panel Display PWB Assembly circuit.
FWDPWR	Forward power, analog voltage from A4 Harmonic Filter PWB Assembly. Used by logic PWB assembly automatic level control and LED meter circuitry and by the A5A1 Power Amplifier PWB Assembly fault circuitry.
HALT	CPU halt line. Part of interrupt bus.
HDPHST	Handset sense line. Used to disable front panel loudspeaker when optional handset is off-hook.
HFPAKEY	Harmonic filter and power amplifier assembly keyline from logic PWB assembly.
METER	Forward or reverse power signal to LED meter driver circuit on A1A1 Front Panel Display PWB Assembly.
MICIN	Microphone audio input (from microphone preamplifier on A2 Audio PWB Assembly) to logic PWB assembly transmit audio processing circuitry.
OPRXIN	Options receive input. Receive audio input from transceiver options.
OPRXOUT	Options receive output. Receive audio output to transceiver options.
OPTAUDEN	Options audio enable. Audio enable to transceiver options.
OPTKEY	Options keyline. Transmit keyline to transceiver options.
OPTKRQ	Options keyline request. Input from transceiver options to activate logic PWB assembly keyline control/interrupt circuit.
OPTTGC	Options total gain control. Input from transceiver options to logic PWB assembly ALC circuit.
OPTTXIN	Options transmit input. Transmit audio input from transceiver options.
OPTTXOUT	Options transmit output. Transmit audio output to transceiver options.
PTT	Push-to-talk. Activates transmit audio processing and keyline circuits.
PSTAT	Power status. Switched +13.6 volt fused output; load must not exceed 860 ma.
RCVRLD	Receiver load. Loads control information into data latch on the A3 Receiver/Exciter PWB Assembly.

Table A-1. A7 Logic PWB Assembly Interface Signal Descriptions (Cont.)

Signal Name (Abbreviation)	Description
REVPWR	Reverse power, analog voltage from A4 Harmonic Filter PWB Assembly. Used by logic PWB assembly automatic level control and LED meter circuitry.
RMTSW	Remote switch. Allows accessory equipment or transceiver options to remotely switch transceiver on or off.
RXAUDIO	Receive audio. Detected receive audio from A3 Receiver/Exciter PWB Assembly to logic PWB assembly.
RXEXCKEY	A3 Receiver/Exciter PWB Assembly transmit keyline. Output from logic PWB assembly.
SERCLK	Serial clock. Output from logic PWB assembly to A8 Synthesizer PWB Assembly and A3 Receiver/Exciter PWB Assembly.
SERDAT	Serial data. Output from logic PWB assembly to A8 Synthesizer PWB Assembly and A3 Receiver/Exciter PWB Assembly.
SIGSTR	Signal strength. Analog voltage input (from A3 Receiver Exciter PWB Assembly) proportional to receive signal strength and used by logic PWB assembly LED meter circuit.
SPKR (+/-)	Speaker audio lines from A2 Audio PWB Assembly. Also available at rear panel accessory connector.
SPKR	Speaker enable line. Enables audio amplifier on A2 Audio PWB Assembly.
SWA+	Switched 13.6 Vdc supply.
SYN(1-4)LD	Synthesizer load lines 1-4. Enable lines for phase lock loop integrated circuits on A8 Synthesizer PWB Assembly.
TEMP	Temperature. Analog voltage proportional from thermistor attached to final amplifier transistor on A5A1 Power Amplifier PWB Assembly.
TXAUDIO	Transmit audio. Processed audio from logic PWB assembly to A3 Receiver/Exciter PWB Assembly.
WAIT	CPU wait line; part of interrupt bus.
XAUDRQ	External audio request from transceiver options.

APPENDIX B

APPENDIX B

GLOSSARY

AFSK	Audio frequency shift keying
AGC	Automatic gain control
ALC	Automatic level control
AM	Amplitude modulation
AME	Amplitude modulation equivalent (only one sideband sent)
ARQ	Automatic repeat on request
BAUD	Data bits per second
BPF	Band pass filter
CLK	Clock
CPU	Central processing unit
CW	Continuous wave or carrier wave
DSB	Double sideband
FM	Frequency modulation
FSK	Frequency shift keying
Half-Duplex	Receiver and transmittter operate on separate frequencies using one antenna, and simultaneous receive and transmit operation is not possible.
HPF	High pass filter
IC	Integrated circuit
I/O	Input/output
LED	Light emitting diode
LPA	Linear power amplifier or log periodic antenna
LPF	Low pass filter
LSB	Lower sideband
Mic	Microphone
PA	Power amplifier
PCS	Partial carrier suppression
PEP	Peak envelope power
PLL	Phase locked loop
PTT	Push to talk

APPENDIX B (Cont.)

GLOSSARY

PWB	Printed wiring board
RX	Receive
Simplex	Receiver and transmitter operate on the same frequency
SINAD	Measurement of signal quality
S/N	Signal-to-noise ratio
SSB	Single sideband
S-UNITS	Received signal strength measurement units
SWR	Standing wave ratio
T/R	Transmit/Receive
TX	Transmit
USB	Upper sideband
VCO	Voltage-controlled oscillator
VFD	Vacuum fluorescent display
VSWR	Voltage standing wave ratio

APPENDIX C

APPENDIX C

INTEGRATED CIRCUIT DATA SHEETS

Table C-1 lists data sheets of several of the integrated circuits used in the RF-3200, in alphanumeric order.

Table C-1. Integrated Circuit Data Sheets

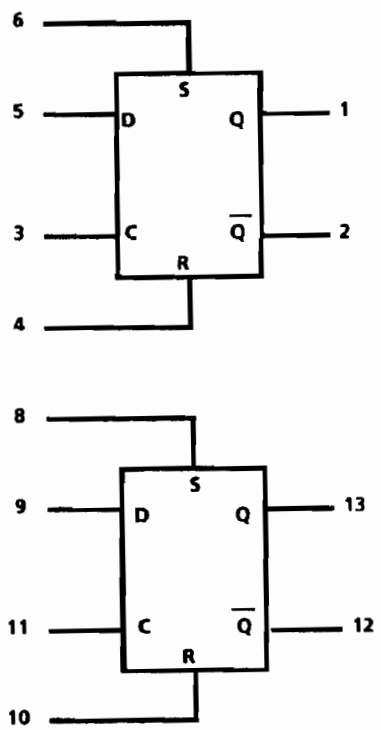
Type	Description
CD4013/MC14013	Dual Type-D Flip-Flop
CD4066/MC14066	Quad Analog Switch
CD4094/MC14094	8-Stage Shift/Store Register
DS1225AB/DS1225AD	64K Non-Volatile Static RAM
HD64180	High Integration CMOS CPU
LM455/MC1455	Timing Circuit
LM2902	Low Power Quad Operational Amplifier
LM2904	Differential Input (Low Power Dual) Operational Amplifier
LM3914	Dot/Bar Display Driver
MB503/MB504	Two Modulus Prescalers (Selectable)
MC1496N	Balanced Modulator/Demodulator
MC14051B/MC14053B	Analog Multiplexers/Demultiplexers
MC14504B	CMOS/TTL-to-CMOS Hex Level Shifter
MC14529B	Dual 4-channel or 8-channel Analog Data Selector
MC145157-1/MC145158-1	Serial Input PLL Frequency Synthesizer
NE571	Compander
NE602	Double Balanced Mixer and Oscillator
NE5090	Addressable Relay Driver
UCN-5815A	8-bit Latched Source Driver
ULN-2003L	High Voltage, High Current Darlington Array
27256	UV Erasable Prom
54/74XX251	8-input Data Selector/Multiplexer
54/74XX259	8-bit Addressable Latch/1-of-8 Decoder

Table C-1. Integrated Circuit Data Sheets (Cont.)

Type	Description
74HC74	Dual D-type Flip-Flop
74XX00	Quad 2-input NAND Gates
74XX138	1-of-8 Decoder/Demultiplexer
74XX155	Dual 2-line-to-4-line Decoder/Multiplexer
74XX245	Octal 3-state Transceiver
74XX373	Octal 3-state D-type latch
74XX374	Octal D Flip-Flop With 3-state Outputs
78LXX	Three-terminal low power positive voltage regulators
78XX	Three-terminal positive voltage regulators
8279/8279-5	Programmable Keyboard/Display Interface

CD4013/MC14013
DUAL TYPE-D FLIP-FLOP

BLOCK DIAGRAM



V_{CC} = Pin 14
V_{SS} = Pin 7

TRUTH TABLE

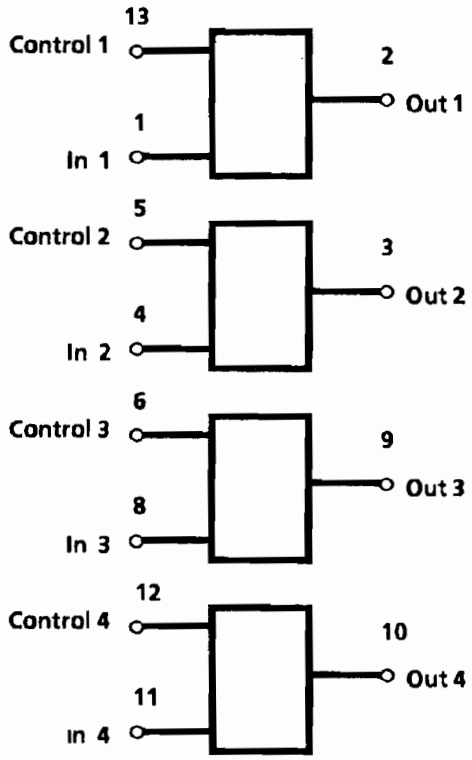
INPUTS				OUTPUTS	
CLOCK*	DATA	RESET	SET	Q	$\overline{Q}$
⌐‾	0	0	0	0	1
⌐‾	1	0	0	1	0
‾⌐	X	0	0	Q	$\overline{Q}$
X	X	1	0	0	1
X	X	0	1	1	0
X	X	1	1	1	1

No Change

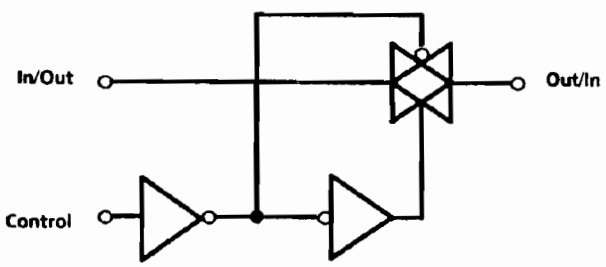
X = Don't Care
* = Level Change

**IC-102

CD4066/MC14066
QUAD ANALOG SWITCH



LOGIC DIAGRAM AND TRUTH TABLE
(1/4 OF DEVICE SHOWN)

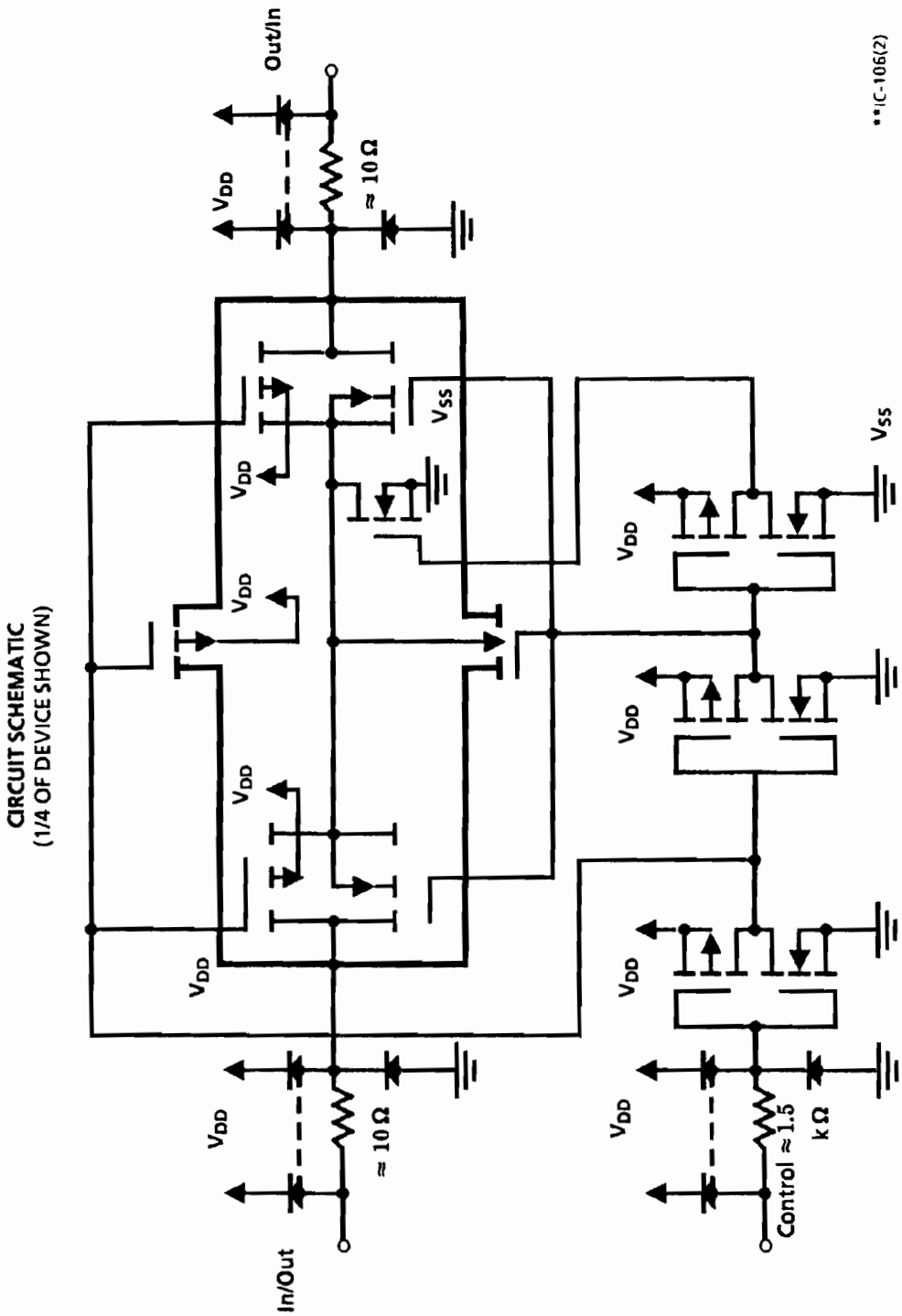


Control	Switch
0 = V_{SS}	OFF
1 = V_{DD}	ON

Logic Diagram Restrictions

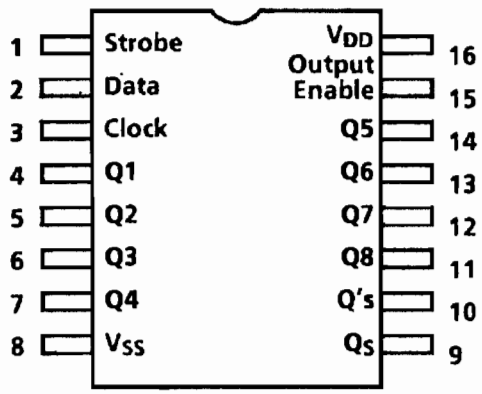
$V_{SS} \leq V_{in} \leq V_{DD}$
$V_{SS} \leq V_{out} \leq V_{DD}$

**IC-106(1)


CIRCUIT SCHEMATIC
(1/4 OF DEVICE SHOWN)
Out/In
In/Out
Control ≈1.5 kΩ
≈ 10 Ω
≈ 10 Ω
VDD
VSS
IC-106(2)

CD4094/MC14094 8-STAGE SHIFT/STORE REGISTER

PIN ASSIGNMENT

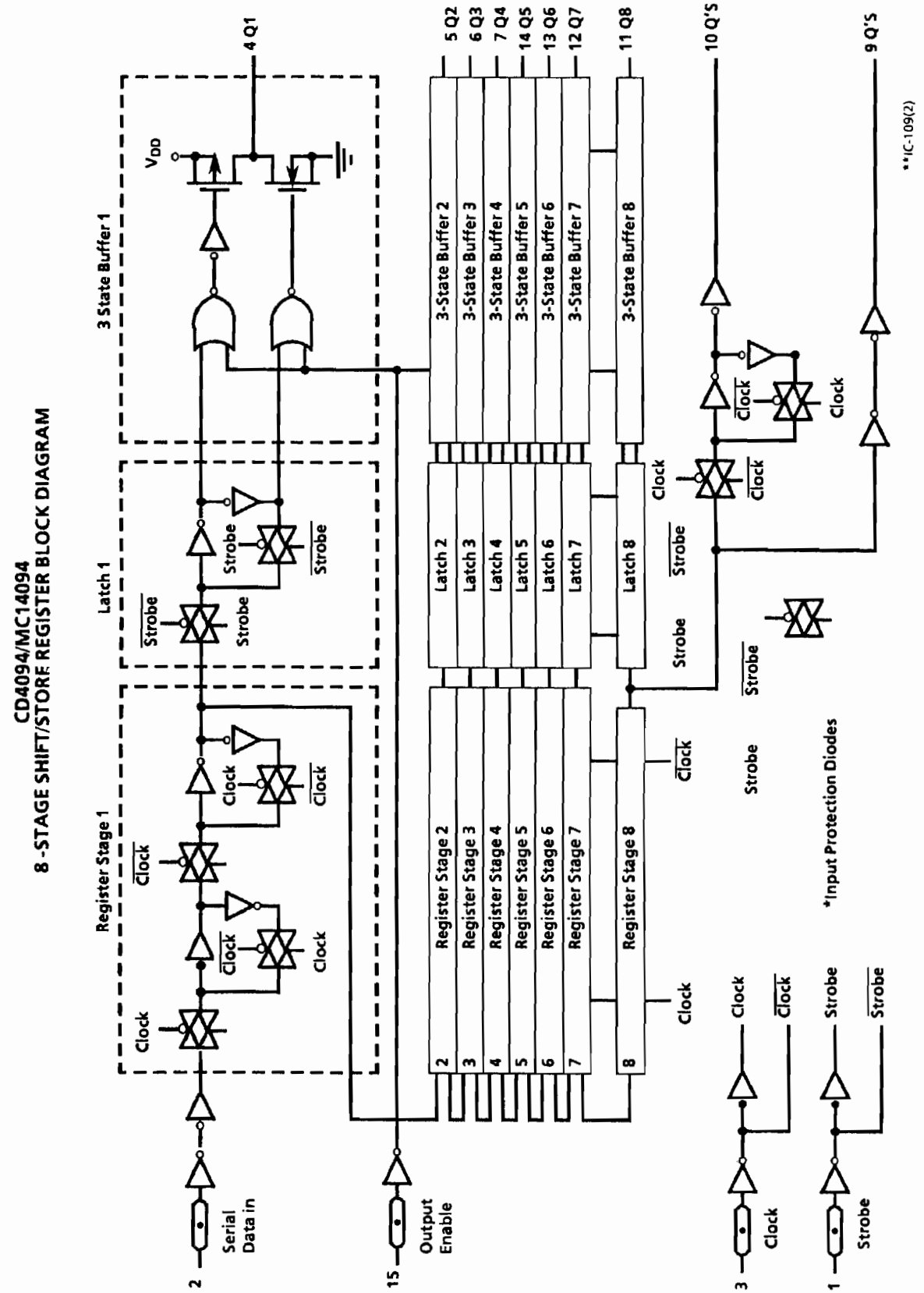


Clock	Output Enable	Strobe	Data	Parallel Outputs		Serial Outputs	
				Q1	Q_N	Q_S*	Q'S
⌐	0	X	X	Z	Z	Q7	No. Chg.
¬	0	X	X	Z	Z	No. Chg.	Q7
⌐	1	0	X	No. Chg.	No. Chg.	Q7	No. Chg.
⌐	1	1	0	0	Q_N-1	Q7	No. Chg.
⌐	1	1	1	1	Q_N-1	Q7	No. Chg.
¬	1	1	1	No. Chg.	No. Chg.	No. Chg.	Q7

Z = High Impedance
X = Don't Care
* At the positive clock edge, information in the 7th shift register stage is transferred to Q8 and QS.

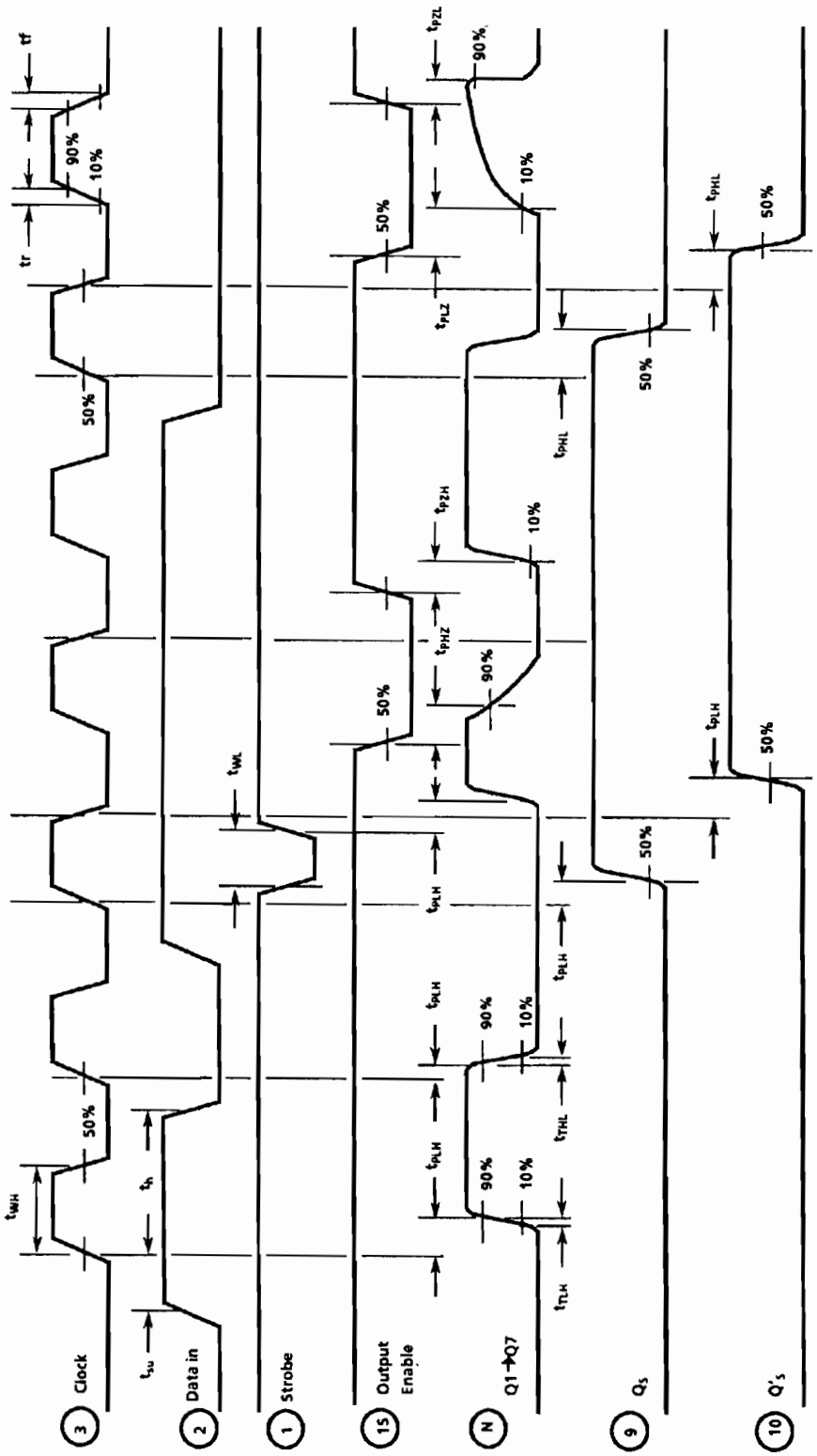
**IC-109(1)

CD4094/MC14094
8 -STAGE SHIFT/STORE REGISTER BLOCK DIAGRAM



CD4094/MC14094 8-STAGE SHIFT/STORE REGISTER

DYNAMIC TIMING DIAGRAM

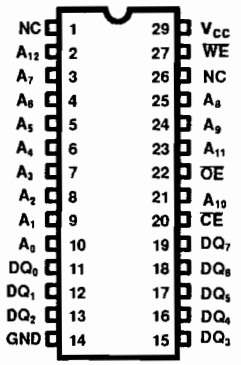


**(C-109(3)

DS1225AB/DS1225AD

64K NONVOLATILE STATIC RANDOM ACCESS MEMORY

PIN CONNECTIONS



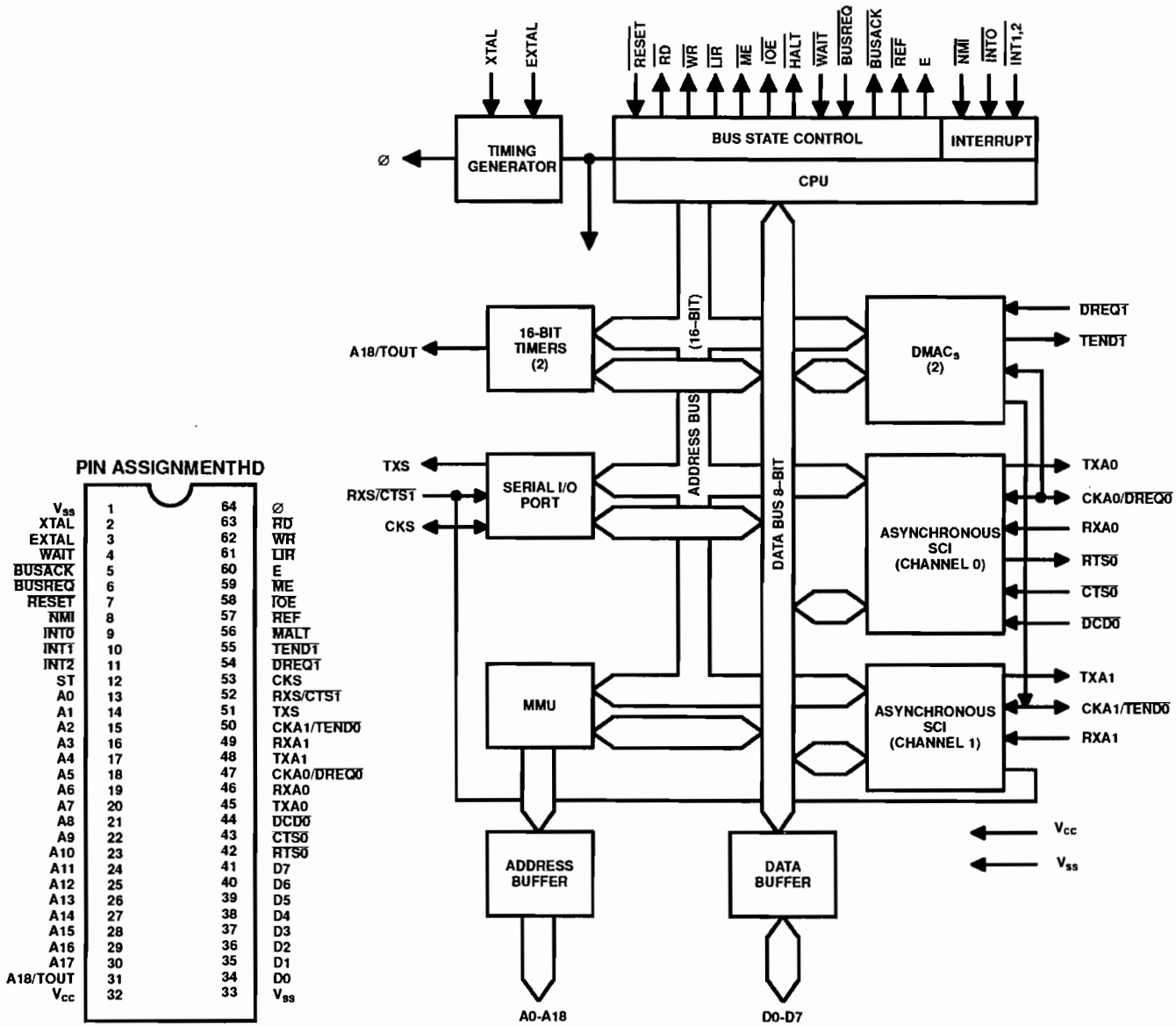
PIN NAMES

A_0-A_{12}	-ADDRESS INPUT
$\overline{CE}$	-CHIP ENABLE
GND	-GROUND
DQ_0-DQ_7	-DATA IN/DATA OUT
V_{CC}	-POWER (+5V)
$\overline{WE}$	-WRITE ENABLE
$\overline{OE}$	-OUTPUT ENABLE
NC	-NO CONNECT

IC-241-CB

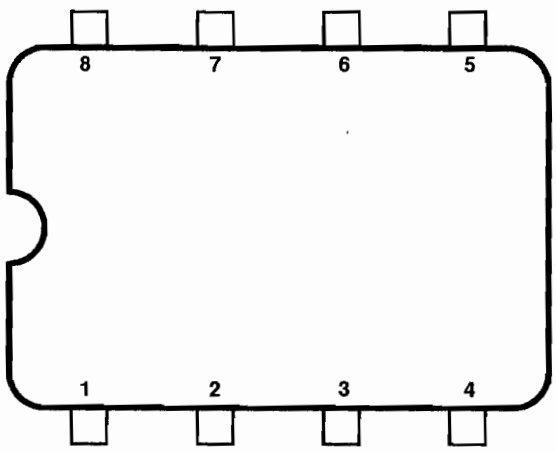
HD64180

HIGH INTEGRATION CMOS CPU

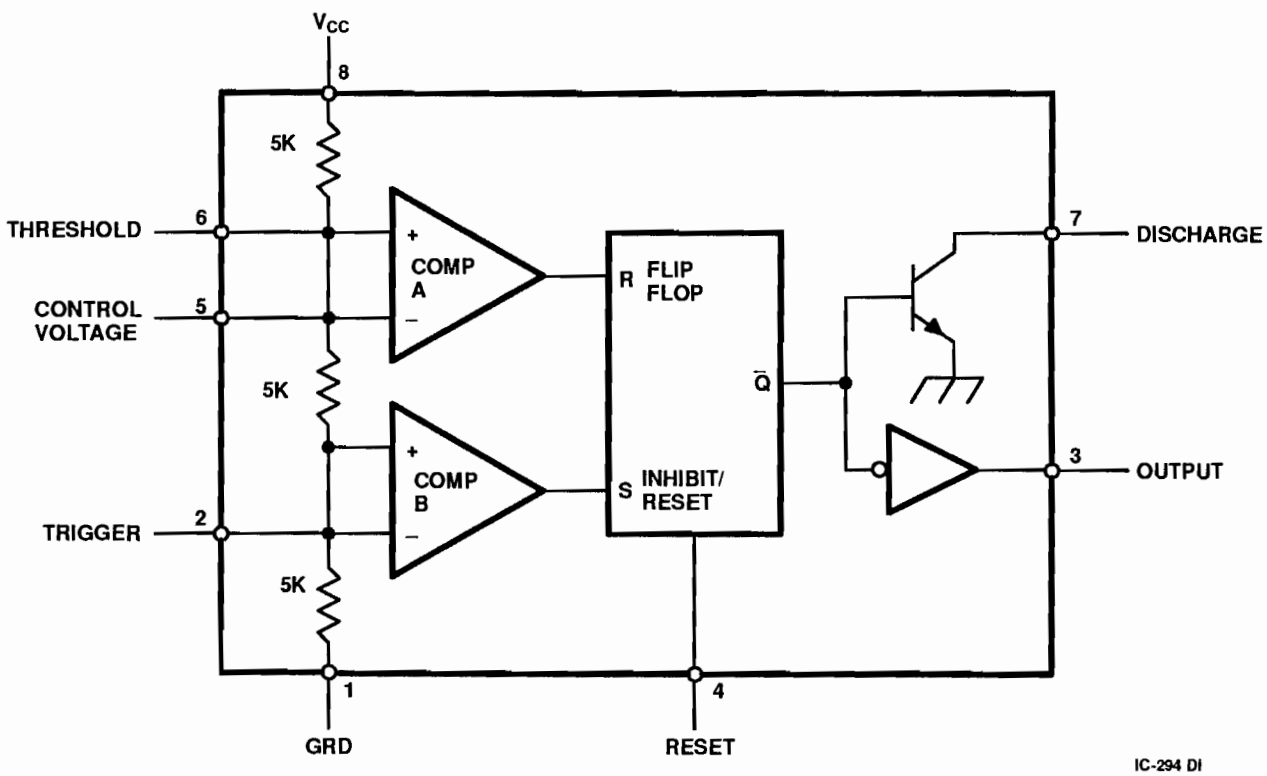


IC-240-CB

LM455/MC1455 TIMING CIRCUIT



1. GROUND
2. TRIGGER
3. OUTPUT
4. RESET
5. CONTROL VOLTAGE
6. THRESHOLD
7. DISCHARGE
8. V_{CC}



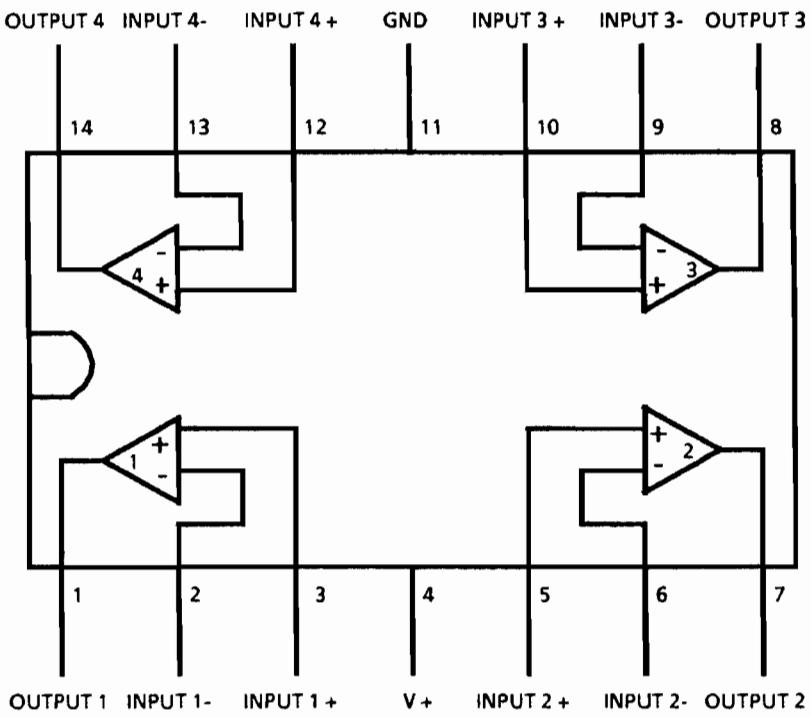
IC-294 DI

LM2902 LOW POWER QUAD OPERATIONAL AMPLIFIERS

The LM2902 consists of four independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltage. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

Connection Diagram

Dual-In-Line and Flat Package



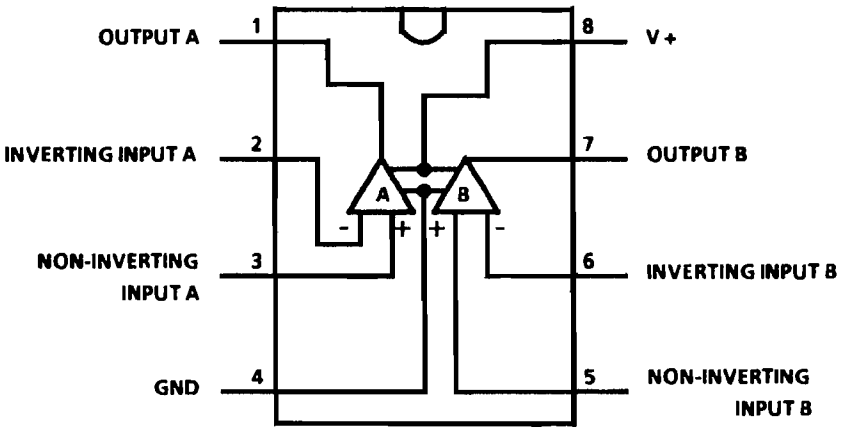
TOP VIEW

**IC-255

LM2904 LOW POWER DUAL OPERATIONAL AMPLIFIERS

General Description

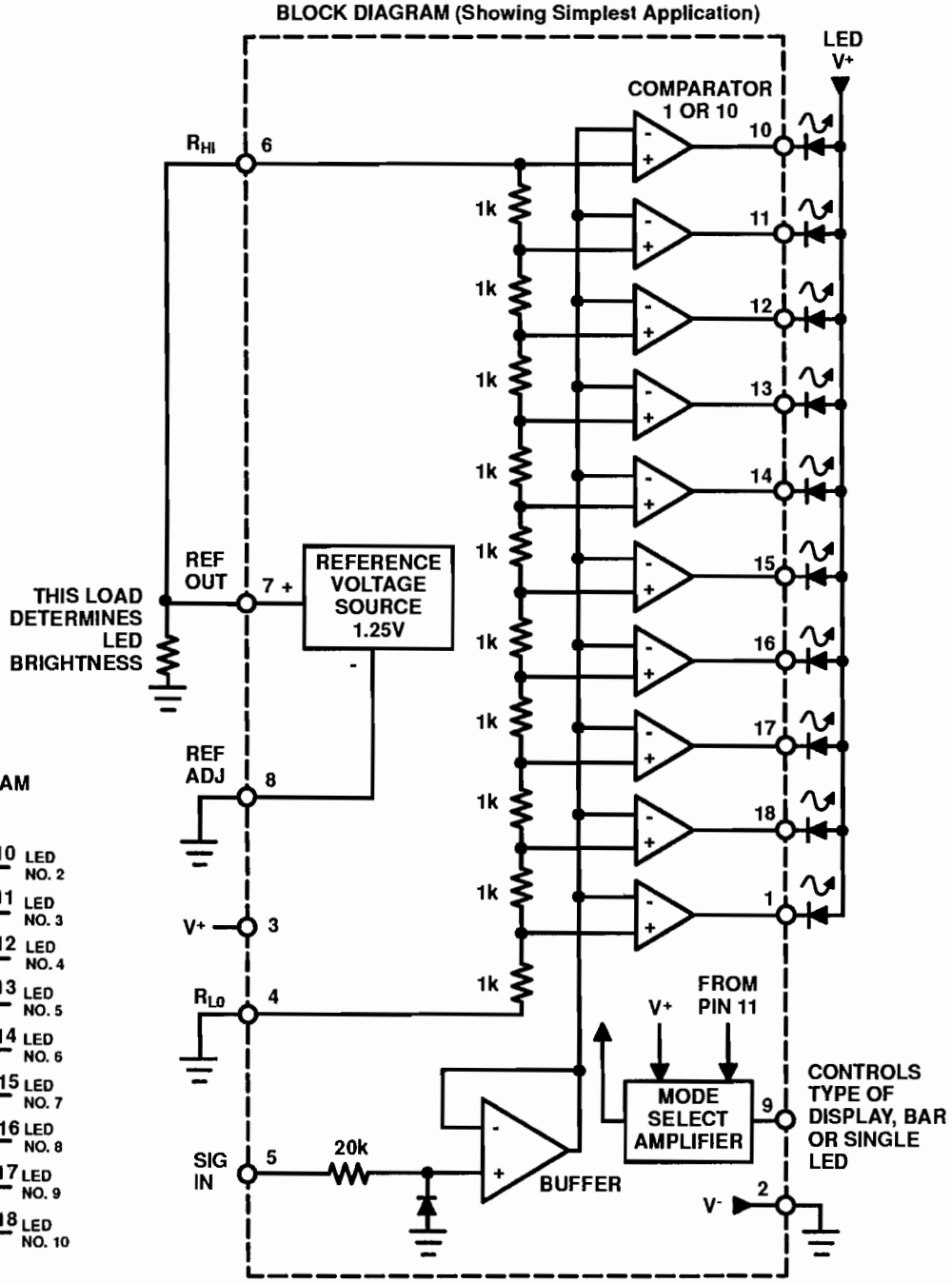
The LM2904 consists of two independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.



**IC-254

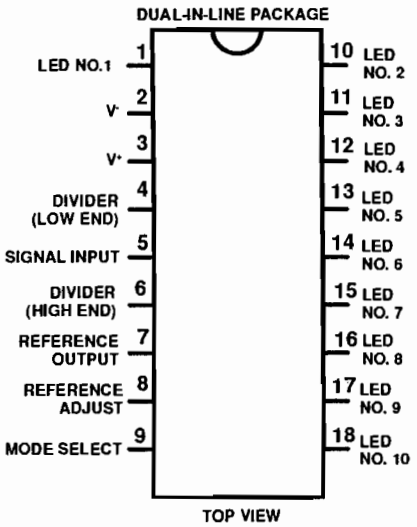
LM3914 DOT/BAR DISPLAY DRIVER

BLOCK DIAGRAM (Showing Simplest Application)



CONNECTION DIAGRAM

DUAL-IN-LINE PACKAGE

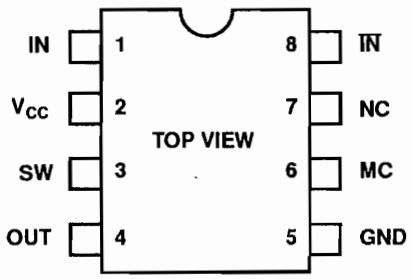


TOP VIEW

IC-288-CB

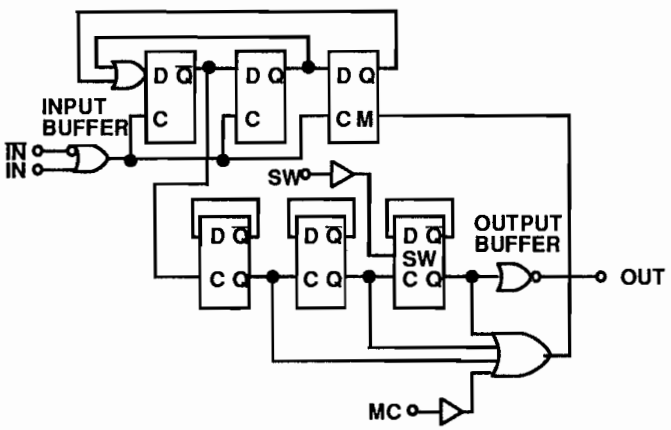
MB503
TWO MODULUS PRESCALER

PIN ASSIGNMENT



PIN DESCRIPTION

Pin Number	Symbol	Function
1	IN	Input
2	V_{CC}	DC Supply Voltage
3	SW	Divide Ratio Control Input Selecting Divide Ratio (See Divide Ratio Table)
4	Out	Output
5	GND	Ground
6	MC	Modulus Control Input (See Divide Ratio Table)
7	NC	Non Connection
8	$\overline{IN}$	Complementary Input



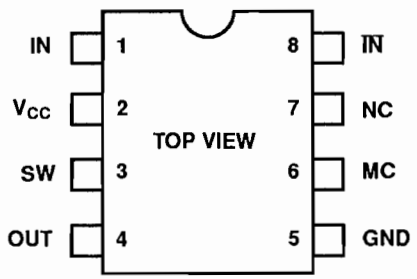
	SW	MC	DIVIDE RATIO
MB 503	H	H	1/16
	H	L	1/17
	L	H	1/32
	L	L	1/33

NOTE: SW: H=V_{CC}, L=OPEN
MC: H=2.0V TO V_{CC}.
L= GND TO 0.8V

IC-285VP

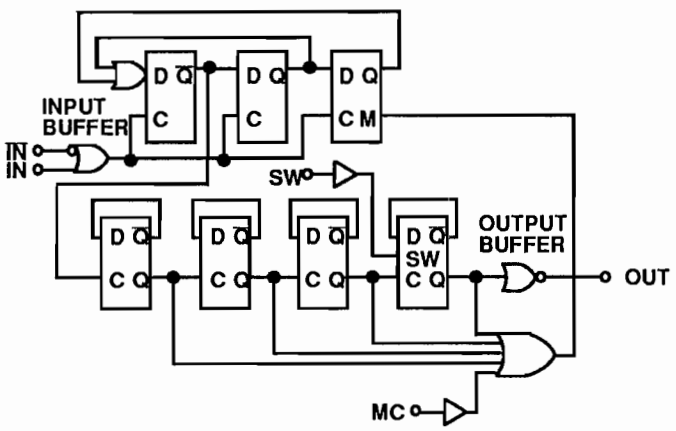
MB504
TWO MODULUS PRESCALER

PIN ASSIGNMENT



PIN DESCRIPTION

Pin Number	Symbol	Function
1	IN	Input
2	V_{CC}	DC Supply Voltage
3	SW	Divide Ratio Control Input Selecting Divide Ratio (See Divide Ratio Table)
4	Out	Output
5	GND	Ground
6	MC	Modulus Control Input (See Divide Ratio Table)
7	NC	Non Connection
8	IN	Complementary Input



	SW	MC	DIVIDE RATIO
MB 504	H	H	1/32
	H	L	1/33
	L	H	1/64
	L	L	1/65

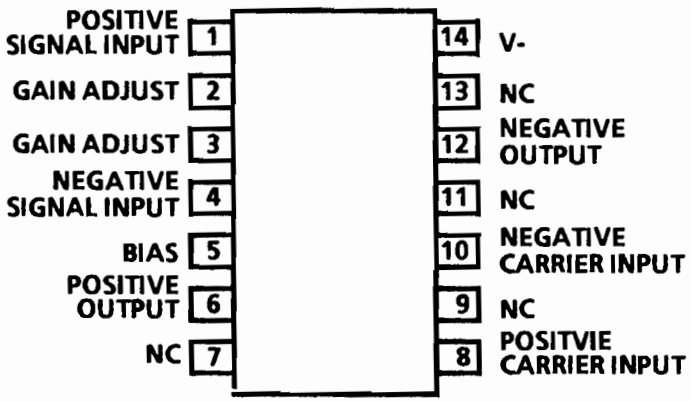
NOTES: SW: H=V_{CC}, L=OPEN
MC: H=2.0V TO V_{CC}.
L= GND TO 0.8V

IC-286VP

MC1496N
BALANCED MODULATOR/DEMODULATOR

DESCRIPTION

The MC1496N is a monolithic Double-Balanced Modulator/Demodulator designed for use where the output voltage is a product of an input voltage (signal) and a switched function (carrier).



ABSOLUTE MAXIMUM RATINGS

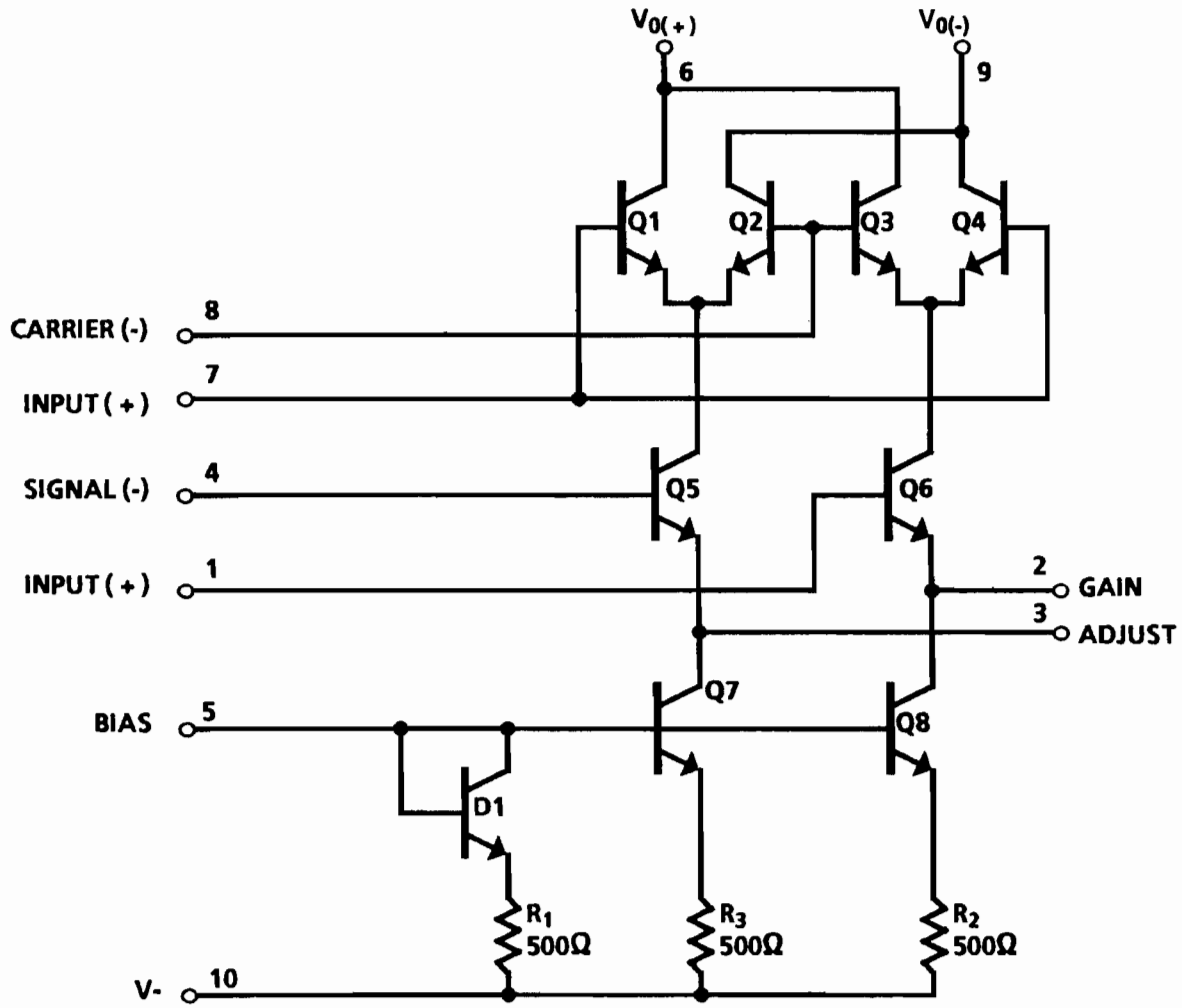
PARAMETERS	RATING	UNIT
Applied voltage 1,2	30	V
Differential input signal (V_7-V_8)	+/- 5.0	V
Differential input signal (V_4-V_1)	(5 +/- I_5 Re)	V
Input signal (V_2-V_1, V_3-V_4)	5.0	V
Bias current (I_5)	10	mA
Power dissipation (pkg. limitation)		
K package	680	mW
Derate above 25°C	5.4	mW/°C
A package (T0-116)	900	mW
Derate above 25oC	7.2	mW/°C
Operating temperature range	-55 to +125	°C
Storage temperature range	-65 to +150	°C

NOTES

1. Voltage applied between pins 6-7, 8-1, 9-7, 9-8, 7-4, 7-1, 8-4, 6-8, 2-5, 3-5.
2. Pin number references pertain to K package pinout only.

**IC-297(1)

MC1496N
BALANCED MODULATOR/DEMODULATOR

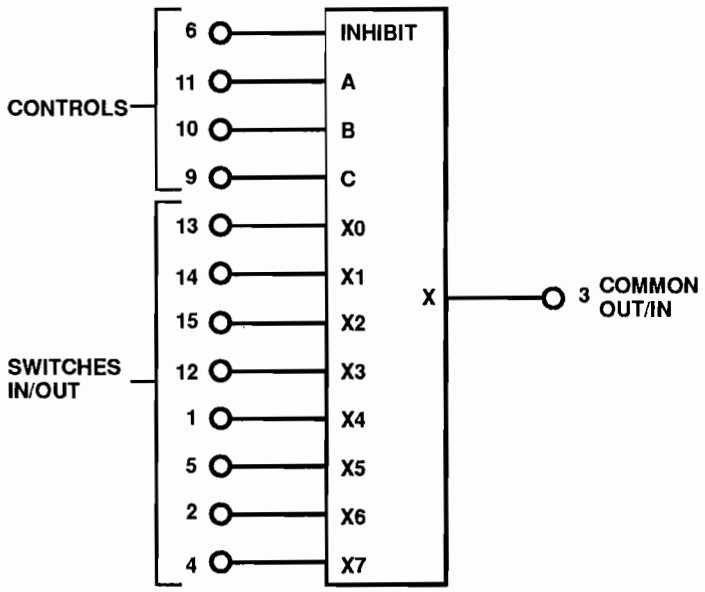


EQUIVALENT SCHEMATIC

**IC-297(2)

MC14051B/CD4051B

8-CHANNEL ANALOG
MULTIPLEXER/DEMULITIPLEXER

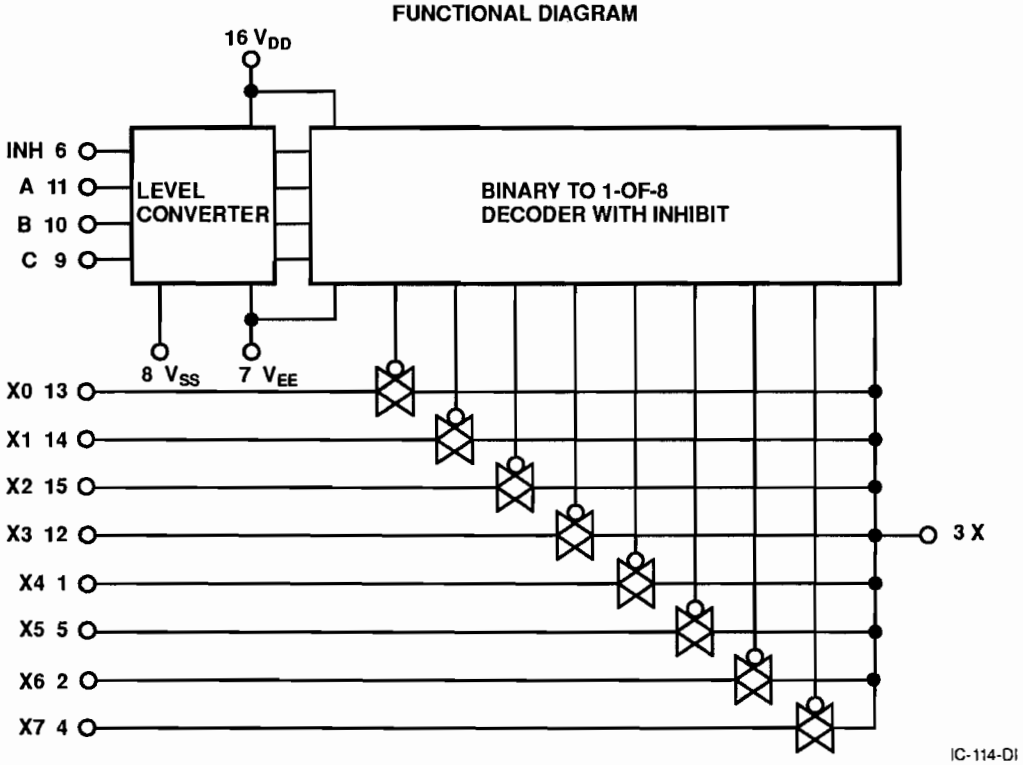


TRUTH TABLE

CONTROL INPUTS				ON SWITCHES
	SELECT			
INHIBIT	C	B	A	MC14051
0	0	0	0	XO
0	0	0	1	X1
0	0	1	0	X2
0	0	1	1	X3
0	1	0	0	X4
0	1	0	1	X5
0	1	1	0	X6
0	1	1	1	X7
1	X	X	X	NONE

V_{DD} = PIN 16
V_{SS} = PIN 8
V_{EE} = PIN 7

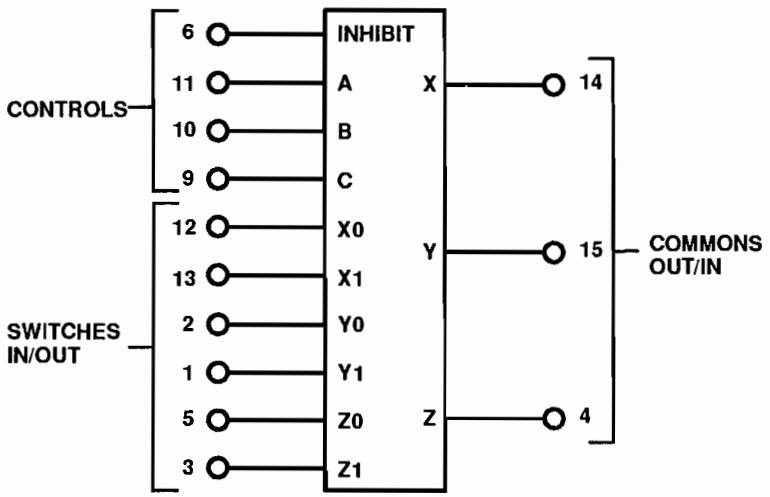
FUNCTIONAL DIAGRAM



IC-114-DI

MC14053B/CD4053B

TRIPLE 2-CHANNEL ANALOG
MULTIPLEXER/DEMULITIPLEXER

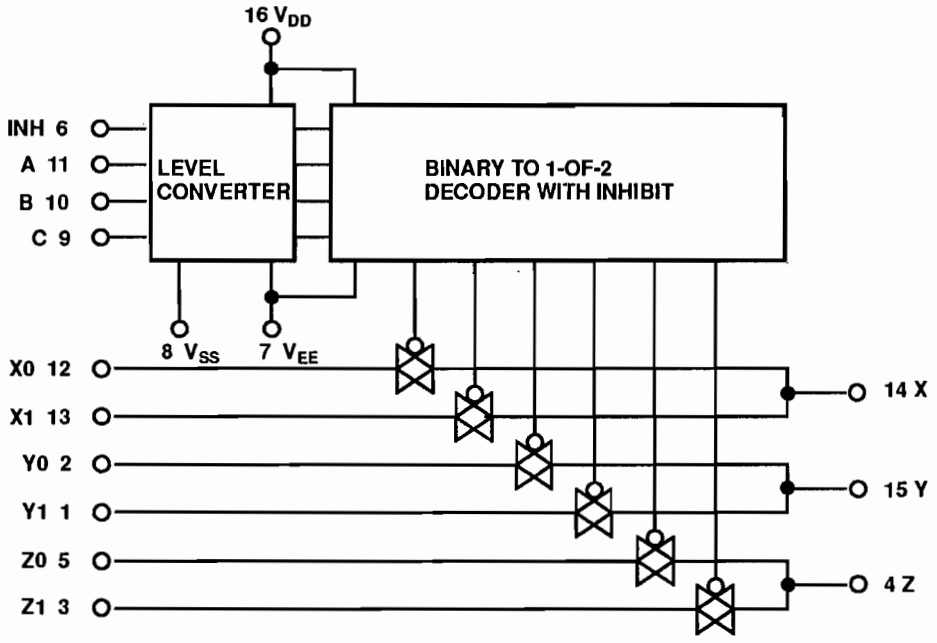


V_{DD} = PIN 16
V_{SS} = PIN 8
V_{EE} = PIN 7

TRUTH TABLE

CONTROL INPUTS				ON SWITCHES		
	SELECT					
INHIBIT	C	B	A	MC14053		
0	0	0	0	Z0	Y0	XO
0	0	0	1	Z0	Y0	X1
0	0	1	0	Z0	Z1	X0
0	0	1	1	ZO	Y1	X1
0	1	0	0	Z1	Y0	X0
0	1	0	1	Z1	Y0	X1
0	1	1	0	Z1	Y1	X0
0	1	1	1	Z1	Y1	X1
1	X	X	X	NONE		

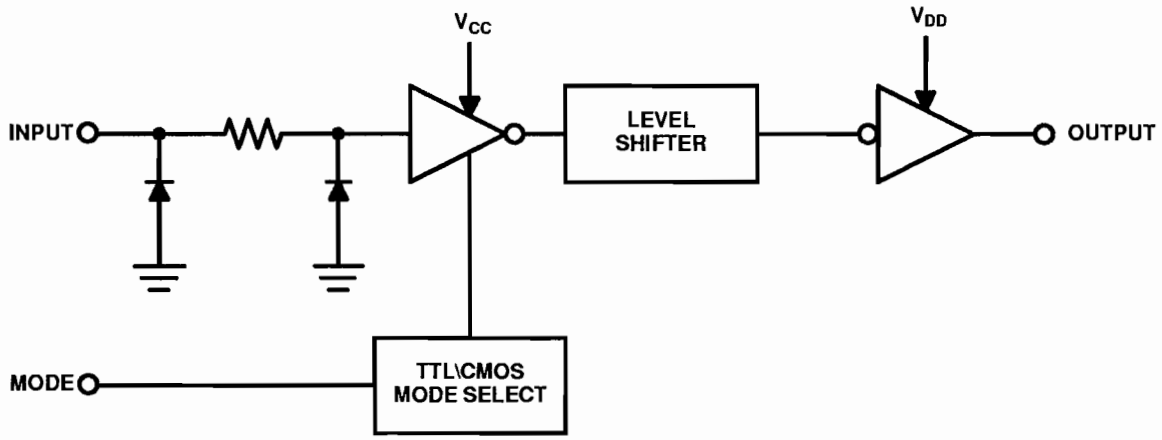
FUNCTIONAL DIAGRAM



IC-115-DI

MC14504B
TTL/CMOS TO CMOS HEX LEVEL SHIFTER

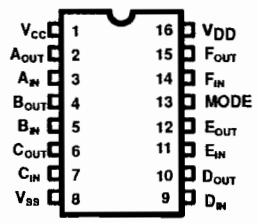
LOGIC DIAGRAM



MODE SELECT	INPUT LOGIC LEVELS	OUTPUT LOGIC LEVELS
1 (V_{CC})	TTL	CMOS
0 (V_{SS})	CMOS	CMOS

1/6 OF PACKAGE SHOWN.

PIN ASSIGNMENT

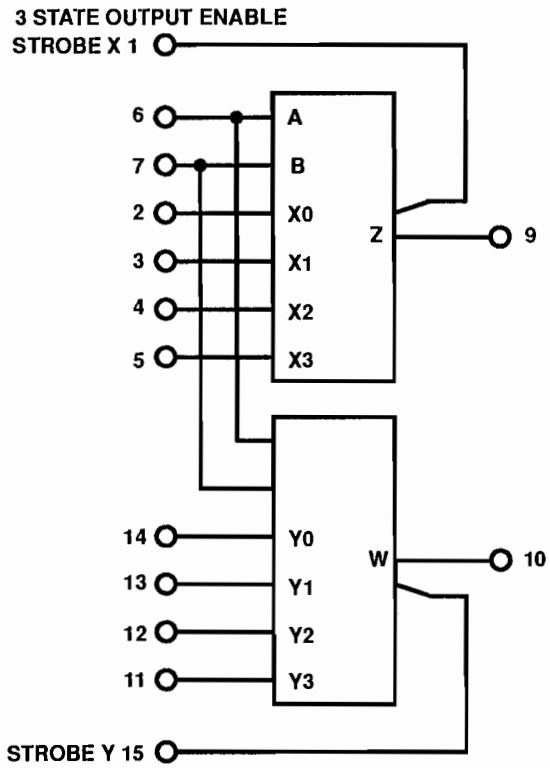


IC-141-CB

MC14529B

DUAL 4-CHANNEL ANALOG DATA SELECTOR
8-CHANNEL ANALOG DATA SELECTOR

BLOCK DIAGRAM



V_{DD} = PIN 16
V_{SS} = PIN 8

TRUTH TABLE

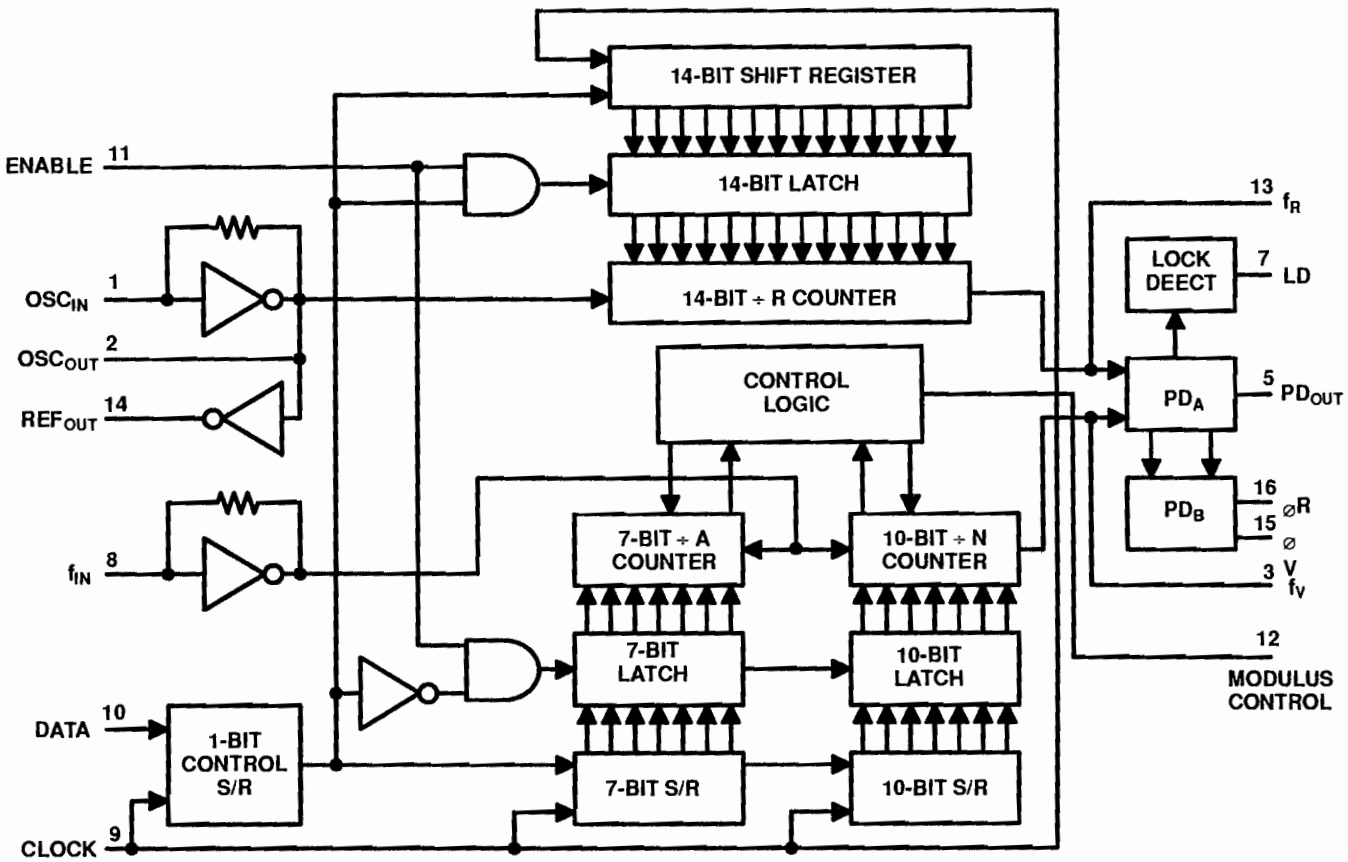
ST_X	ST_Y	B	A	Z	W	
1	1	0	0	X0	Y0	DUAL 4-CHANNEL MODE 2 OUTPUTS
1	1	0	1	X1	Y1	
1	1	1	0	X2	Y2	
1	1	1	1	X3	Y3	
1	0	0	0	X0		SINGLE 8-CHANNEL MODE 1 OUTPUT (Z AND W TIED TOGETHER)
1	0	0	1	X1		
1	0	1	0	X2		
1	0	1	1	X3		
0	1	0	0	Y0		
0	1	0	1	Y1		
0	1	1	0	Y2		
0	1	1	1	Y3		
0	0	X	X	HIGH IMPEDANCE		

X = DON'T CARE

IC-142-CB

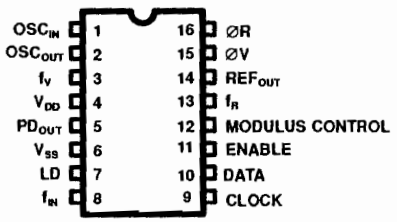
MC145158-1

SERIAL INPUT PLL FREQUENCY SYNTHESIZER



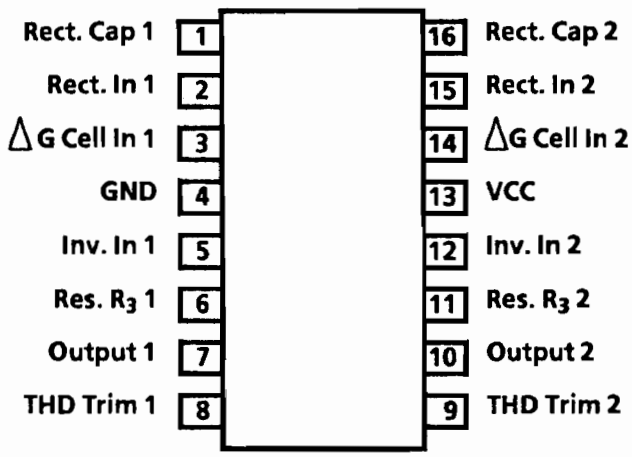
V_{DD} = PIN 4
V_{SS} = PIN 6

PIN ASSIGNMENT

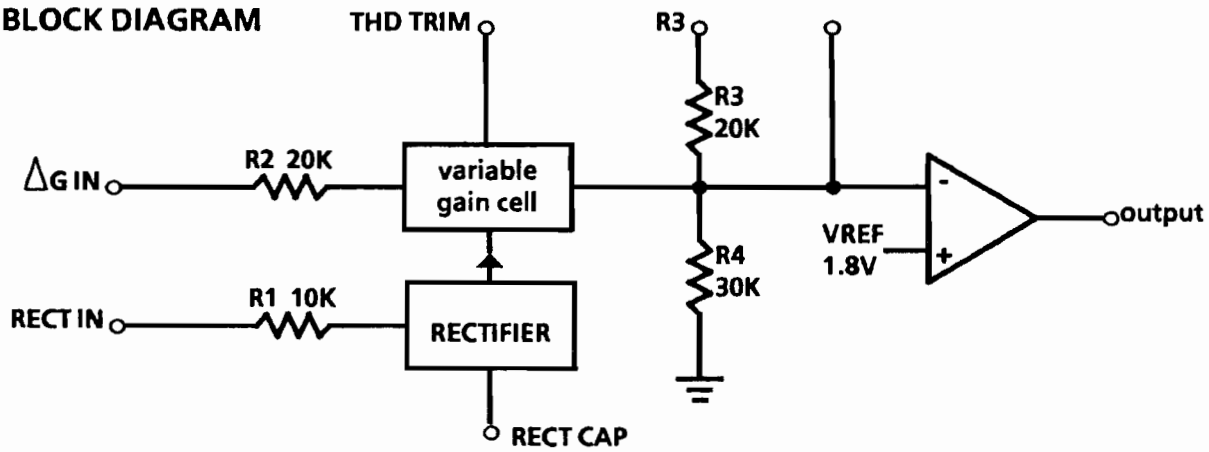


IC-143-CB

NE571
COMPANDER



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

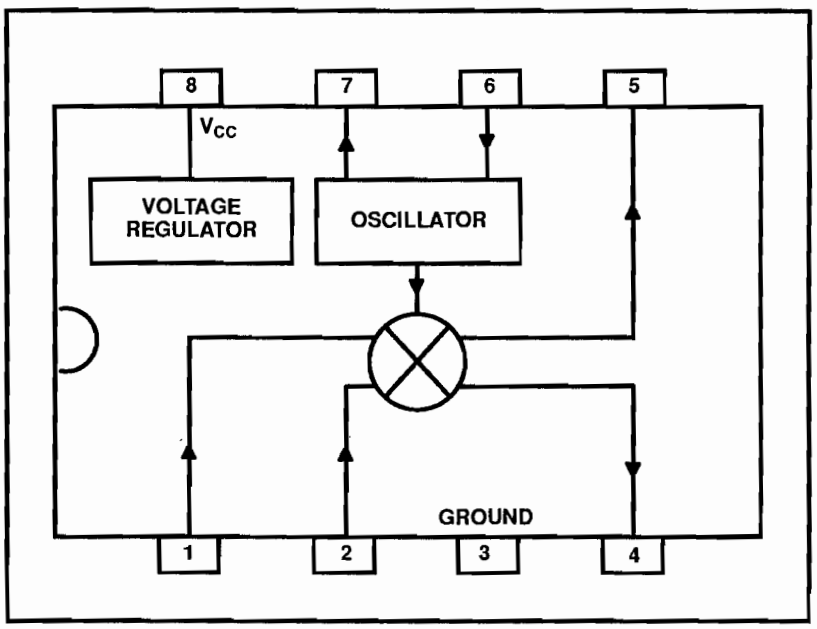
	PARAMETERS	RATING	UNIT
	Positive supply		Vdc
	570	24	
	571	18	
T_A	Operating temperature range	-40 TO +70	°C
P_D	Power dissipation	400	mW

**IC-298

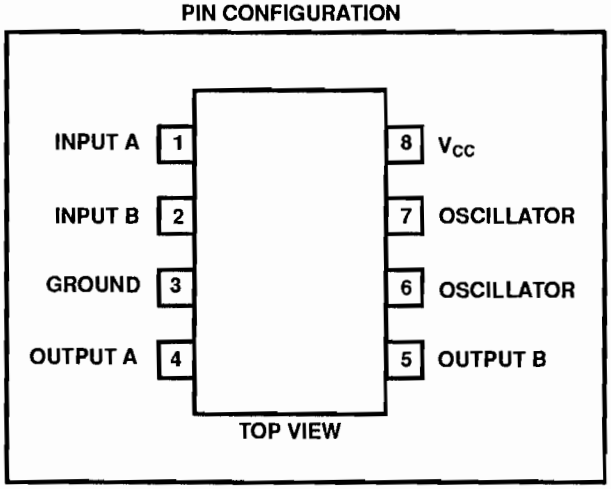
NE602

DOUBLE BALANCED MIXER AND OSCILLATOR

BLOCK DIAGRAM



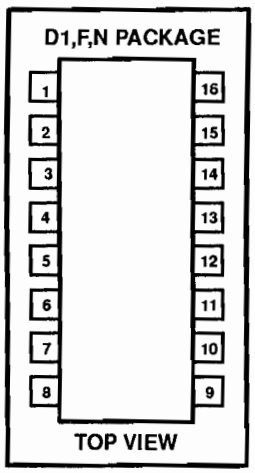
PIN CONFIGURATION



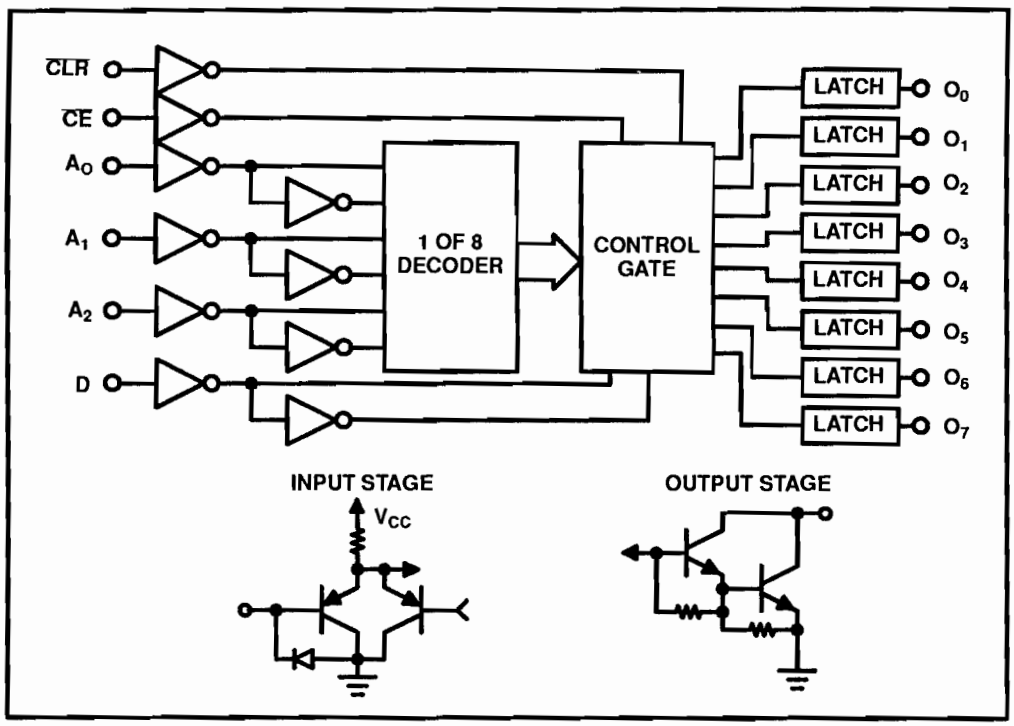
IC-284-CB

NE5090 ADDRESSABLE RELAY DRIVER

PIN CONFIGURATION



BLOCK DIAGRAM



PIN DESIGNATION

PIN NO.	SYMBOL	NAME AND FUNCTION
1-3	A0-A2	A 3-bit binary address on these pins define switch of the 8 output latches is to receive the data.
4-7,9-12	Q0-Q7	The 8 device outputs.
13	D	The data input. When the chip is enabled, this data bit is transferred to the defined output such that: "1" turns output switch "ON" "0" turns output switch "OFF"
14	CE	The chip enable. When this input is low, the output latches will accept data. When CE goes high, all outputs will retain their existing state, regardless of address of data input conditions.
15	CLR	The clear input. When CLR goes low all output switches are turned "OFF". The high data input will override the clear function on the addressed latch.

TRUTH TABLE

INPUTS						OUTPUTS								MODE
$\overline{CLR}$	$\overline{CE}$	D	A_0	A_1	A_2	Q_0	Q_1	Q_2	Q_3	Q_4	Q_5	Q_6	Q_7	
L	H	X	X	X	X	H	H	H	H	H	H	H	H	CLEAR
L	L	L	L	L	L	H	H	H	H	H	H	H	H	DEMULTIPLEX
L	L	H	L	L	L	L	H	H	H	H	H	H	H	
L	L	L	H	L	L	H	H	H	H	H	H	H	H	
L	L	H	H	L	L	H	L	H	H	H	H	H	H	
L	L	L	H	H	H	H	H	H	H	H	H	H	H	
L	L	H	H	H	H	H	H	H	H	H	H	H	L	
H	H	X	X	X	X	Q_{N-1} →								MENORY
H	L	L	L	L	L	H Q_{N-1} →								ADDRESSABLE LATCH
H	L	H	L	L	L	L Q_{N-1} →								
H	L	L	H	L	L	Q_{N-1}	H	Q_{N-1} →						
H	L	H	H	L	L	Q_{N-1}	H	Q_{N-1} →						
H	L	L	H	H	H	Q_{N-1} →							H	
H	L	H	H	H	H	Q_{N-1} →							L	

X = DON'T CARE CONDITION

Q_{N-1} = PREVIOUS OUTPUT STATE

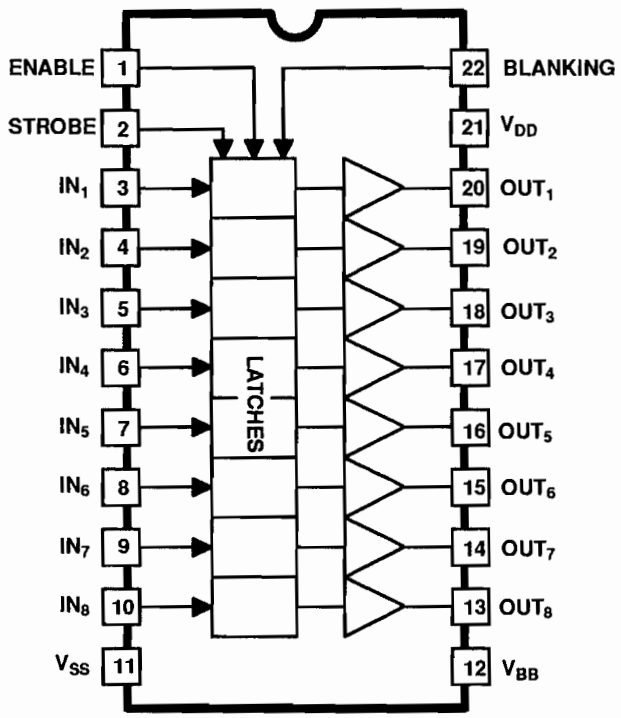
L = LOW VOLTAGE LEVEL/"ON" OUTPUT STATE

H = HIGH VOLTAGE LEVEL/"OFF" OUTPUT STATE

IC-283-CB

UCN-5815A

8-BIT LATCHED SOURCE DRIVER



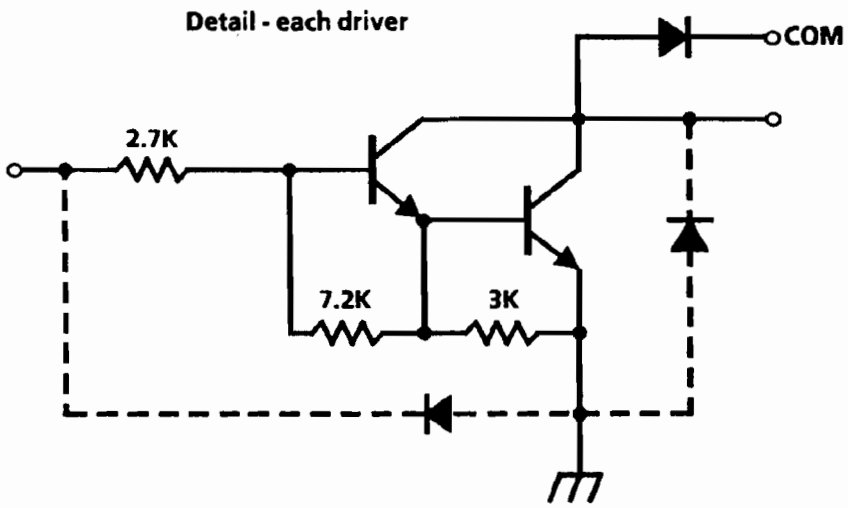
TRUTH TABLE

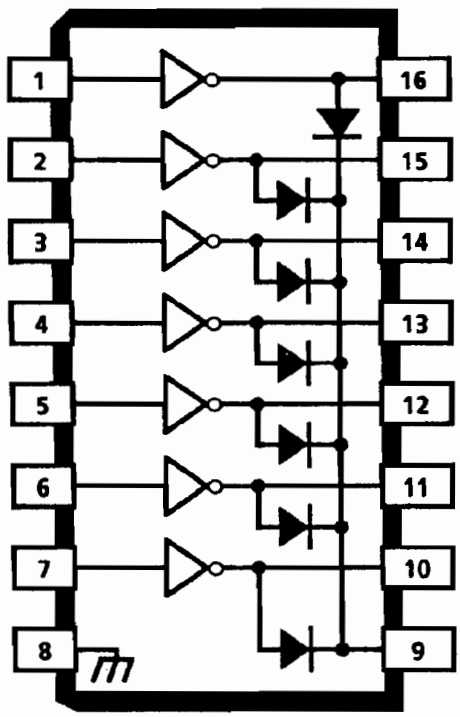
INPUTS				OUT_N	
IN_N	STROBE	ENABLE	BLANK	T-1	T
0	1	1	0	X	0
1	1	1	0	X	1
X	X	X	1	X	0
X	0	X	0	1	1
X	0	X	0	0	0
X	X	0	0	1	1
X	X	0	0	0	0

X = IRRELEVANT
T-1 = PREVIOUS OUTPUT STATE
T = PRESENT OUTPUT STATE

IC-282-CB

ULN-2003L High Voltage High Current Darlington Array

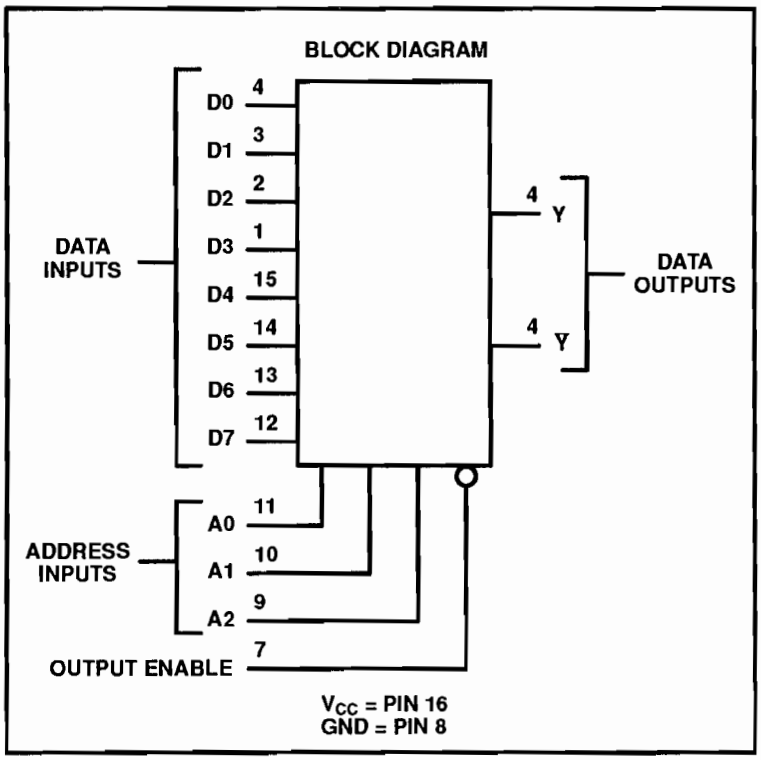


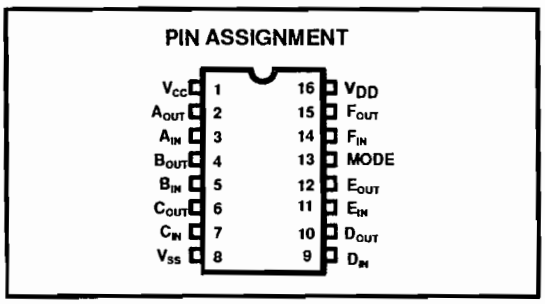


SOIC PACKAGE

**IC-290

54/74XX251
8-INPUT DATA SELECTOR/MULTIPLEXER WITH 3-STATE OUTPUTS





FUNCTION TABLE

INPUTS				OUTPUTS	
A1	A2	A0	OUTPUT ENABLE	Y	$\overline{Y}$
X	X	X	H	Z	Z
L	L	L	L	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

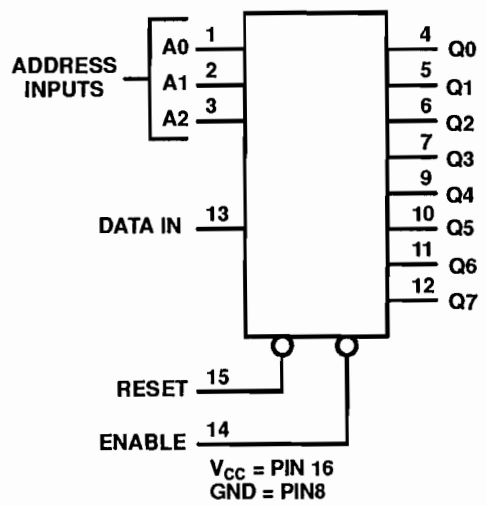
Z = HIGH IMPEDANCE STATE
D0, D1. . . THE LEVEL OF THE RESPECTIVE D INPUT

IC-042-CB

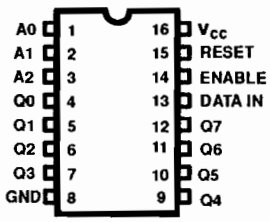
54/74XX259

8-BIT ADDRESSABLE LATCH
1-OF-8 DECODER

BLOCK DIAGRAM



PIN ASSIGNMENT



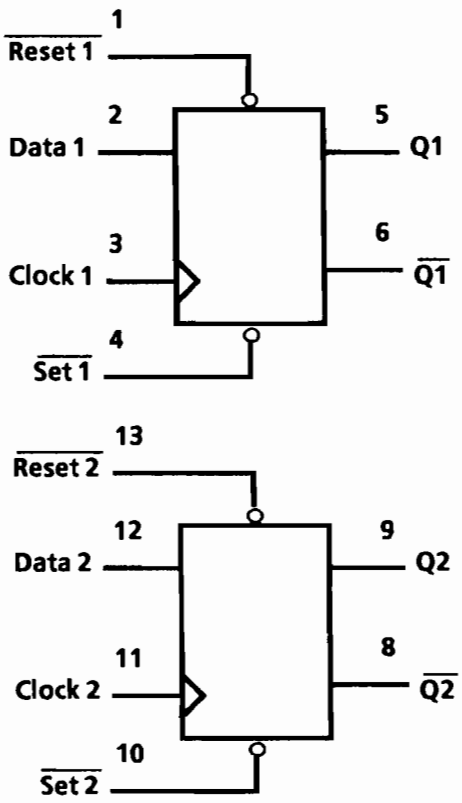
FUNCTION TABLE

ENABLE	RESET	FUNCTION
L	H	ADDRESSABLE LATCH
H	H	MEMORY
L	L	8-LINE DEMULTIPLEXER
H	L	RESET

IC-041-CB

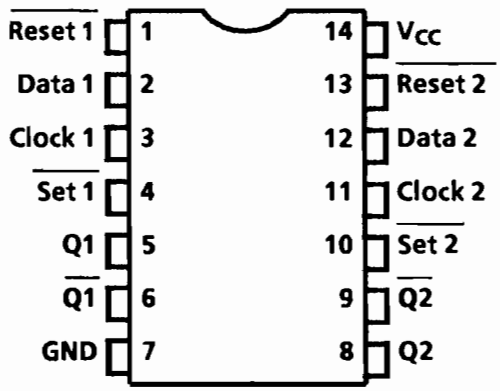
74HC74
DUAL D-TYPE FLIP FLOP

BLOCK DIAGRAM



V_{CC} = Pin 14
GND = Pin 7

PIN ASSIGNMENT



FUNCTION TABLE

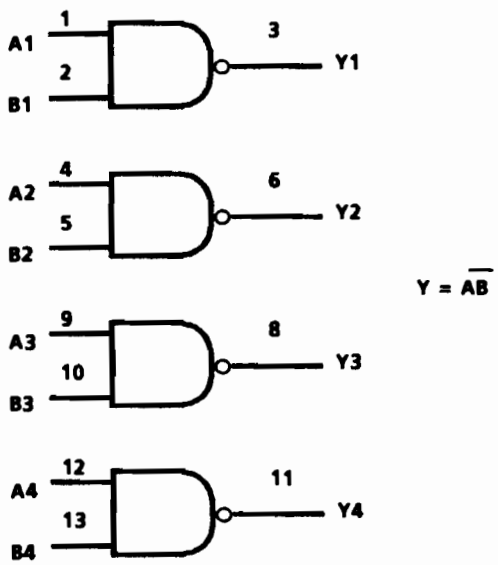
Inputs				Outputs	
Set	Reset	Clock	Data	Q	$\overline{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H*	H*
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	No Change	
H	H	H	X	No Change	
H	H	↓	X	No Change	

* Both outputs will remain high as long as Set and Reset are low, but the output states are unpredictable if Set and Reset go high simultaneously.

**IC-027

74XX00
QUAD 2-INPUT NAND

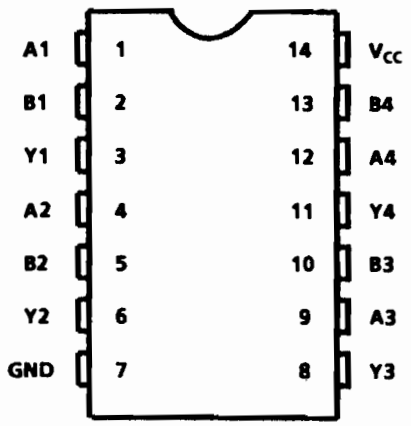
LOGIC DIAGRAM



$Y = \overline{AB}$

V_{CC} = Pin 14
GND = Pin 7

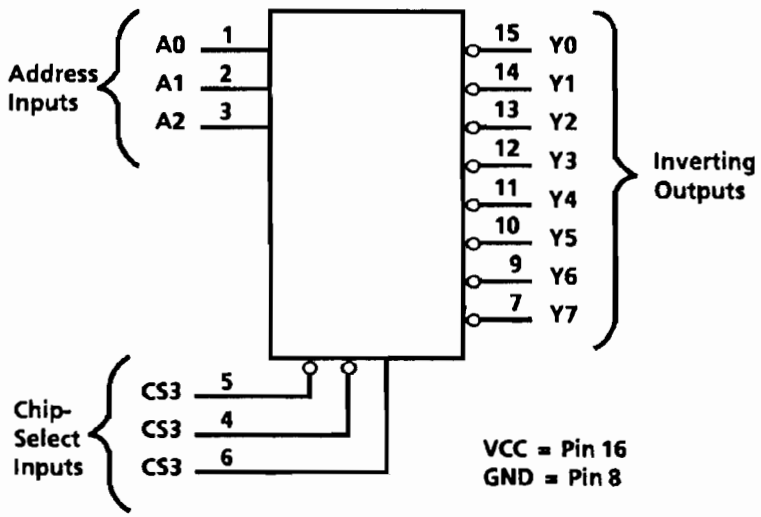
PIN ASSIGNMENT



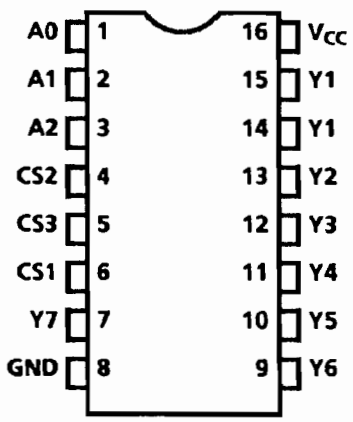
**IC-003

74XX138
1-OF-8 DECODER/DEMULTIPLEXER

BLOCK DIAGRAM



PIN ASSIGNMENT



TRUTH TABLE												
Inputs						Outputs						
CS1	CS2	CS3	A2	A1	A0	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	X	H	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	L	H	H	H	H	H	L	H	H	H	H
H	L	L	H	L	L	H	H	H	H	L	H	H	H
H	L	L	H	L	H	H	H	H	H	H	L	H	H
H	L	L	H	H	L	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L

H = high level (steady state)
L = low level (steady state)
X = don't care

**IC-009

74XX155 DUAL 2-LINE TO 4-LINE DECODER/DEMULTIPLEXER

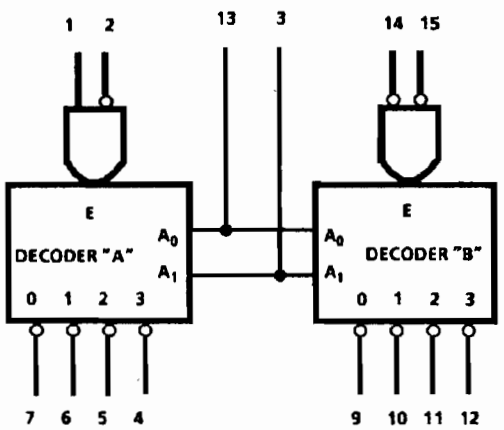
The 74XX155 is a dual 1-of-4 decoder/demultiplexer with common address inputs and separate gated enable inputs. Each decoder section, when enabled, will accept the binary weighted address input (A_0 and A_1) and provide four mutually exclusive active LOW outputs (0-3). When the enable requirements of each decoder are not met, all outputs of that decoder are HIGH.

Both decoder sections have a 2-input enable gate. For decoder a, the enable gate requires one active HIGH input and one active LOW input ($\underline{Ea} \cdot \overline{Ea}$). Decoder a can accept either true or complemented data in demultiplexing applications by using the $\overline{Ea}$ or Ea inputs respectively. The decoder b enable gate requires two active LOW inputs ($\overline{Eb} \cdot \overline{Eb}$). The device can be used as a 1-or-8 decoder /demultiplexer by trying Ea or Eb and relabeling the common conection address as A2, forming the common enable by connecting the remaining $\overline{Eb}$ and $\overline{Ea}$.

Truth Table

ADDRESS		ENABLE "a"		OUTPUT "a"				ENABLE "b"		OUTPUT "b"			
A_0	A_1	E_a	$\overline{E_a}$	$\overline{0}$	$\overline{1}$	$\overline{2}$	$\overline{3}$	$\overline{E_b}$	$\overline{E_b}$	$\overline{0}$	$\overline{1}$	$\overline{2}$	$\overline{3}$
X	X	L	X	H	H	H	H	H	X	H	H	H	H
X	X	X	H	H	H	H	H	X	H	H	H	H	H
L	L	H	L	L	H	H	H	L	L	L	H	H	H
H	L	H	L	H	L	H	H	L	L	H	L	H	H
L	H	H	L	H	H	L	H	L	L	H	H	L	H
H	H	H	L	H	H	H	L	L	L	H	H	H	L

H = HIGH voltage level
L = LOW voltage level
X = Don't care

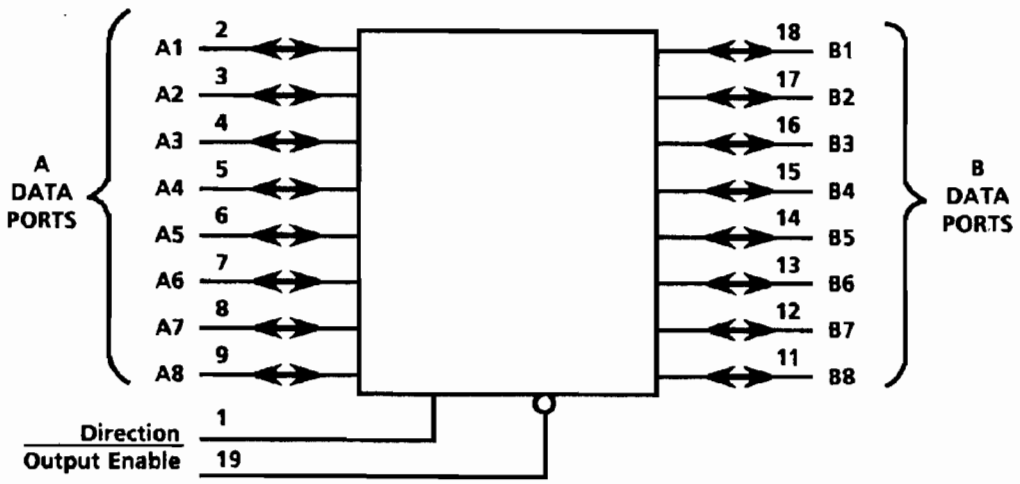


VCC = Pin 16
GND = Pin 8

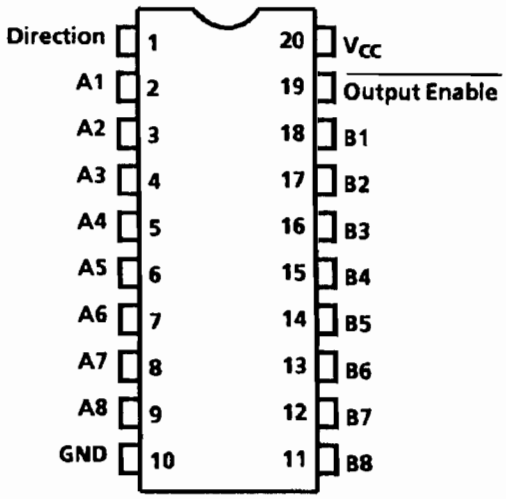
**IC-012

74XX245
OCTAL 3-STATE TRANSCEIVER

BLOCK DIAGRAM



PIN ASSIGNMENT

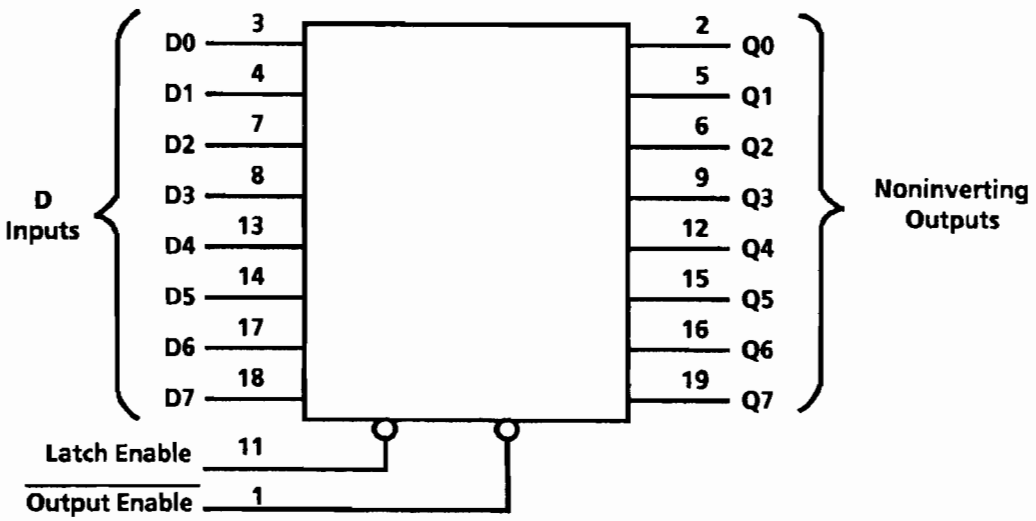


FUNCTION TABLE		
Control Inputs		
Output Enable	Direction	Operation
L	L	Data transmitted from Bus B to Bus A
L	H	Data transmitted from Bus A to Bus B
H	X	Buses Isolated (High-Impedance State)

**IC-017

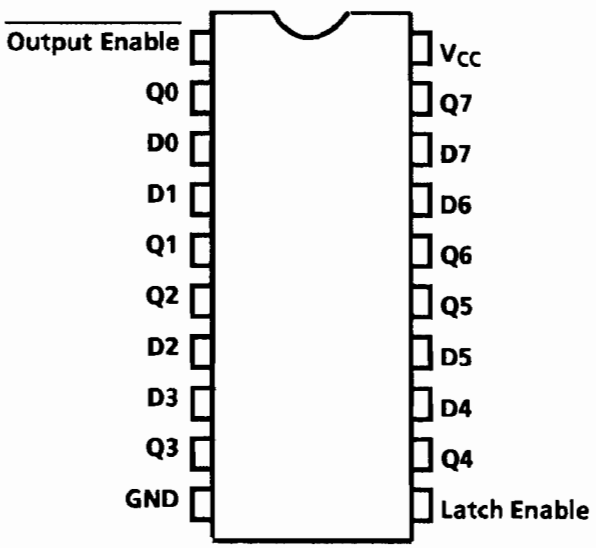
74XX373
OCTAL 3-STATE D-TYPE LATCH

BLOCK DIAGRAM



Pin 20 = V_{CC}
Pin 10 = GND

PIN ASSIGNMENT



FUNCTION TABLE

Output Enable	Latch Enable	D	Q
L	H	H	H
L	H	L	L
L	L	X	no change
H	X	X	Z

X = don't care
Z = high impedance

**IC-022

74XX374 OCTAL D FLIP-FLOP WITH 3-STATE OUTPUTS

The 74XX374 is an 8-bit edge-triggered register coupled to eight 3-state output buffers. The two sections of the device are controlled independently by the clock (CP) and output enable (OE) control gates.

The register is fully edge-triggered. The state of each D input, one setup time before the LOW-to-HIGH clock transition, is transferred to the corresponding Q output of the flip-flop. The clock buffer has about 400 mV of hysteresis built in to help minimize problems that signal and ground noise can cause in the clocking operation.

The 3-state output buffers are designed to drive heavily loaded 3-state buses, MOS memories, or MOS microprocessors. The active LOW output enable (OE) controls all eight 3-state buffers independent of the register operation. When OE is LOW, the data in the register appears at the outputs. When OE is HIGH, the outputs are in the high-impedance off state, which means they will neither drive nor load the bus.

MODE SELECT - FUNCTION TABLE

OPERATING MODES	INPUTS			INTERNAL REGISTER	OUTPUTS
	$\overline{OE}$	CP	D_N		Q_0-Q_7
Load & read register	L	↑	l	L	L
	L	↑	h	H	H
Load register & disable outputs	H	↑	l	L	(Z)
	H	↑	h	H	(Z)

H = HIGH voltage level

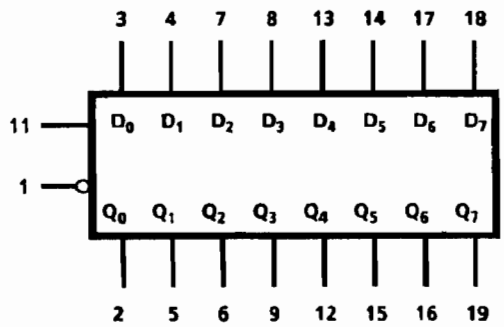
h = HIGH voltage level one setup time prior to the LOW-to-HIGH clock transition

L = LOW voltage level

l = LOW voltage level one setup time prior to the LOW-to-HIGH clock transition

(Z) = HIGH impedance "off" state

↑ = LOW-to-HIGH clock transition

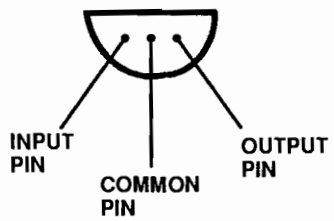


V_{CC} = Pin 20
GND = Pin 10

**IC-023

78LXX 3-TERMINAL POSITIVE DC VOLTAGE REGULATORS

TOP VIEW

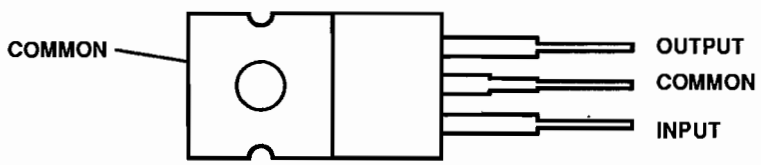


PART NUMBER	OUTPUT VOLTAGE
LM/MC78L05	5.0 VOLTS DC
LM/MC78L08	8.0 VOLTS DC
LM/MC78L12	12.0 VOLTS DC
LM/MC78L15	15.0 VOLTS DC
LM/MC78L24	24.0 VOLTS DC

IC-203(A)-RBH

78XX 3-TERMINAL
POSITIVE DC VOLTAGE REGULATOR

(TOP VIEW)

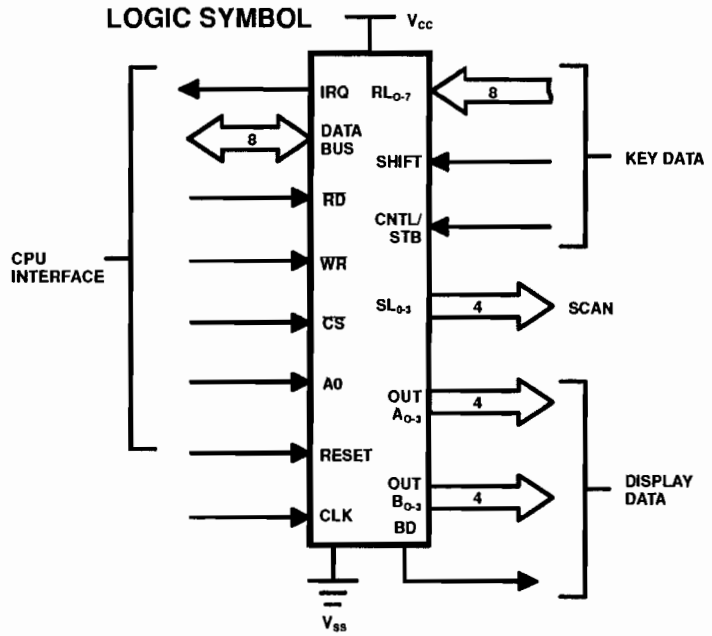


PART NUMBER	OUTPUT VOLTAGE
MC/LM7805	5.0 VOLTS DC
MC/LM7806	6.0 VOLTS DC
MC/LM7808	8.0 VOLTS DC
MC/LM7812	12.0 VOLTS DC
MC/LM7818	18.0 VOLTS DC
MC/LM7824	24.0 VOLTS DC

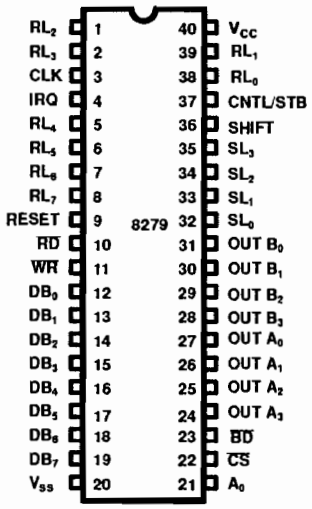
IC-201(A)sp

8279/8279-5
PROGRAMMABLE KEYBOARD/DISPLAY INTERFACE

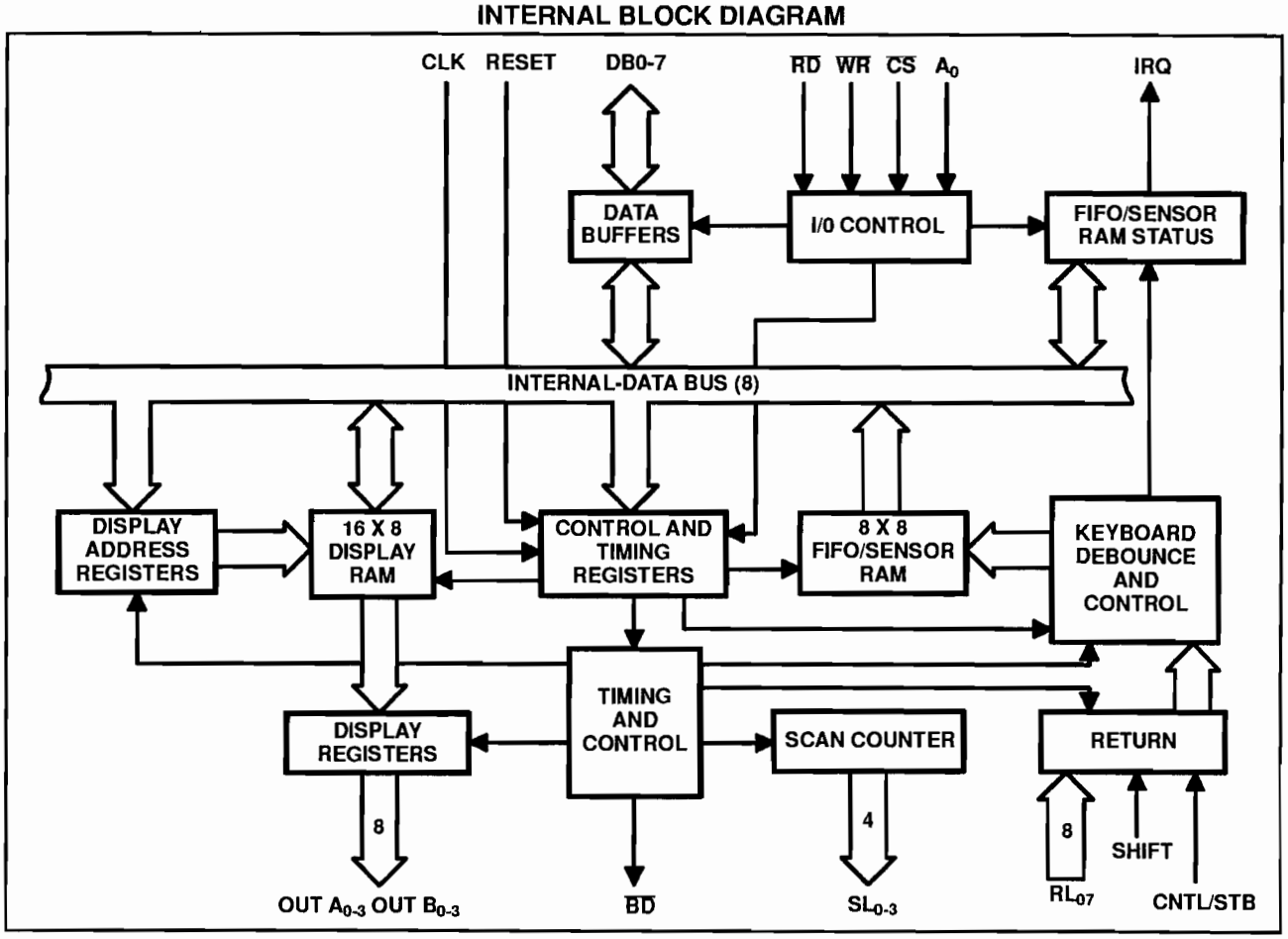
LOGIC SYMBOL



PIN CONFIGURATION



INTERNAL BLOCK DIAGRAM



IC-238-CB

OPTIONS

OPTIONS

1. INTRODUCTION

This section documents information on options that is not found elsewhere. Any manuals for installed options should be inserted into this manual in this section.

2. RF-3205 OPTIONS STARTER KIT

The RF-3205 Options Starter Kit must be installed in the RF-3200 Transceiver to enable the transceiver to accept other internal optional assemblies. See the RF-3205 Service Guide for complete information. Insert the RF-3205 Service Guide into this section of this manual.

TECHNICAL PUBLICATION EVALUATION FORM

To the User of This Instruction Manual:

HARRIS Corporation, RF Communications Group continually evaluates its technical publications for completeness, technical accuracy, and organization. You can assist in this process by completing and returning this form. Please specify section, page number, figure or table number where applicable.

MANUAL TITLE: _____

MANUAL NUMBER: _____ REVISION: ____ COVER DATE: _____

GENERAL	EXCELLENT	GOOD	FAIR	POOR
TEXT	[ ]	[ ]	[ ]	[ ]
SETUP/ALIGNMENT INST.	[ ]	[ ]	[ ]	[ ]
TROUBLESHOOTING INST.	[ ]	[ ]	[ ]	[ ]
TABLES	[ ]	[ ]	[ ]	[ ]
ILLUSTRATIONS	[ ]	[ ]	[ ]	[ ]
PARTS LISTS	[ ]	[ ]	[ ]	[ ]
SCHEMATIC DIAGRAMS	[ ]	[ ]	[ ]	[ ]

GENERAL COMMENTS: Please include your suggestions for improvements to the manual. Specify section, page, paragraph, figure number, or table number as applicable. Attach examples or extra pages if more space is needed.

_____
_____
_____
_____

TEAR HERE

INTRODUCTION SECTION:
COMMENT _____
_____
_____

INSTALLATION SECTION:
COMMENT _____
_____
_____

OPERATION SECTION:
COMMENT _____
_____
_____

THEORY OF OPERATION SECTION (Technical Descriptions):
COMMENT _____
_____
_____

MAINTENANCE SECTION:
COMMENT _____
_____
_____

SUB-ASSEMBLY SECTIONS:
COMMENT _____
_____
_____

NAME: _____ DATE: _____

COMPANY: _____

ADDRESS: _____

CITY: _____ STATE: _____

ZIP: _____ COUNTRY: _____

PHONE NUMBER (INCLUDE AREA CODE): _____

NOTE

U.S. POSTAL REGULATIONS NO LONGER PERMIT THE USE OF STAPLES. PLEASE SEAL THIS FORM WITH TAPE.

MAKE FIRST FOLD HERE

MAKE LAST FOLD HERE

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 4033 ROCHESTER, N.Y.

POSTAGE WILL BE PAID BY ADDRESSEE

HARRIS CORPORATION
RF Communications Group
1680 University Avenue
Rochester, New York 14610 U.S.A.

ATTN: Publications Department

TAPE HERE

TEAR HERE

RF-P-671D