TECHNICAL MANUAL
TYPE RG-5540
VHF/UHF RECEIVER

WARNING

This RG-5540 VHF/UHF Receiver employs voltages which are dangerous and may be fatal if contacted. Extreme caution should be exercised in working with the protective covers removed.

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SECTION I

GENERAL DESCRIPTION

1-1. SCOPE OF MANUAL

1-2. This manual contains general information, operation, principles of operation, maintenance and a replacement parts list for the VHF/UHF Receiver, Type RG-5540 manufactured by the R. E. Grimm Company (REGCO) of Rockville, Maryland.

1-3. EQUIPMENT DESCRIPTION

1-4. PURPOSE OF EQUIPMENT. The RG-5540 VHF/UHF Receiver (hereinafter referred to as the Receiver) has reception capabilities between 20 and 500 MHz for AM, FM, CW, LSB, USB and ISB. The unit is a fully synthesized, solid state, microcomputer controlled Receiver, with scan capabilities, that can be operated from its front panel or from a remote location. A rear panel selector converts the VHF/UHF (20-500 MHz) Receiver to a VHF (20-100 MHz) Receiver; thus, narrowing its frequency range when desired. The Receiver can be tuned over either of its frequency ranges through a numeric keyboard, a rate selectable tuning lever, a rate selectable tuning knob or through scan controls (pushbuttons), all located on the front panel. Detection mode, IF bandwidth, AGC, RF gain, internal/external frequency mode and remote/local mode are also controlled from the front panel of the Receiver. Figure 1-1 shows an overall view of the Receiver.

1-5. Numeric keyboard frequency tuning is accomplished by entering the desired frequency on the 10 digit (0 to 9) keyboard with decimal point. The Receiver automatically tunes to the frequency entered to a resolution of 10 Hz when the ENTER FREQ pushbutton is pressed. Both the TUNING lever and knob can be activated for tuning the Receiver, either up or down in frequency, at three different rates; FAST (100 kHz increments) MED (1 kHz increments) and SLOW (10 Hz increments).

1-6. In the scan mode the Receiver will scan up (20 to 100/500 MHz) or down (100/500 to 20 MHz) at selectable rates from 10 Hz per second to 100 MHz per second. The Receiver frequency band is scanned from one limit to the other continuously repeating in one direction only (up or down) until the scan is either reversed or stopped.

1-7. Remote operation of the Receiver functions through an IEEE-488 interface circuit card which permits the Receiver to receive commands from or send status information to a remote controller. Functions controlled from a remote location include; frequency tuning, detection mode, IF bandwidth, AGC and internal/external reference. Receiver status may be requested by a remote controller with the Receiver in either remote or local mode. Scanning control of the Receiver can be accomplished using the RG-1340 Surveillance Controller interfaced through a rear panel connector. This unit provides rate selectable band scanning with selectable band limits and discrete frequency scanning with selectable thresholds, dwells and IF bandwidths.

1-8. An optional RG-1320A Spectrum Display Unit can be plugged into the

Figure 1-1. RG-5540 VHF/UHF Receiver, Overall View.

front panel of the Receiver which provides the operator with a visual display of signal activity from 0 to 400 kHz around the Receiver tuned frequency.

1-9. TYPICAL APPLICATION. Figure 1-2 is a typical system application block diagram. As shown, such a system could also include a type RG-1340 Spectrum Surveillance Controller and an HP-1311A Spectrum Surveillance Display as well as the optional RG-1320A Narrow Band Spectrum Display Unit which is designed as a plug-in module for the Receiver. This spectrum surveillance system allows three modes of surveillance: bandscan mode, discrete scan mode and the receiver tuning mode. As a result, an operator can view a wideband frequency spectrum within the 20 MHz to 500 MHz range of the Receiver. A display of this received transmitter activity is provided by the HP-1311A Spectrum Surveillance Display. The RG-1340 Spectrum Surveillance Controller enables the spectrum surveillance system to be controlled remotely from a computer position controller and provides communications between the Receiver and the computer position controller.

1-10. The optional RG-1320A Narrow Band Spectrum Display accepts a 21.4 MHz IF signal from the Receiver and displays the input signal spectrum over an adjustable sweep width of 0 to 400 kHz about the tuned frequency.

1-11. FUNCTIONAL DESCRIPTION

1-12. Figure 1-3 is a simplified functional block diagram of the Receiver. As shown in Figure 1-3, the Receiver can logically be divided into four major circuit groups. An RF Control Circuit Group which processes the RF input signal to produce the desired FM video, video, audio and headphone outputs. A Synthesizer Circuit Group that combines digiphase processing and voltage controlled oscillators to obtain the tuning accuracy desired as well as a programmable divider that enables the synthesizer group to be controlled by the microcomputer in the Digital Control Group. The Digital Control Group includes the microcomputer which under program control, determines the Receiver's operational parameters as directed by either the front panel controls or through an IEEE-488 interface by a remote controller. The Power Supply Circuit Group provides the necessary regulated and unregulated DC voltages required by the Receiver circuits from either a 115-volt or 230-volt AC power source.

1-13. The RF input signal (20 MHz to 500 MHz) enters the RF Control Circuit Group and is combined with the synthesizer first local oscillator frequency (681.4 MHz to 1161.4 MHz) in the first mixer. The first mixer, which is an up converter, produces a 661.4 MHz first IF signal. The first IF signal and the 640 MHz second local oscillator output are then combined in the second mixer (down converter) to produce the desired 21.4 MHz IF output. In accordance with the IF bandwidth selection signals, the IF output is processed by the bandwidth filters and associated amplifiers to provide a passband of 10 kHz, 20 kHz, 50 kHz, or 100 kHz. After filtering, the signal is amplified by a variable gain amplifier that is controlled by the Digital Control Circuit Group to provide the desired gain for all modes of detection.

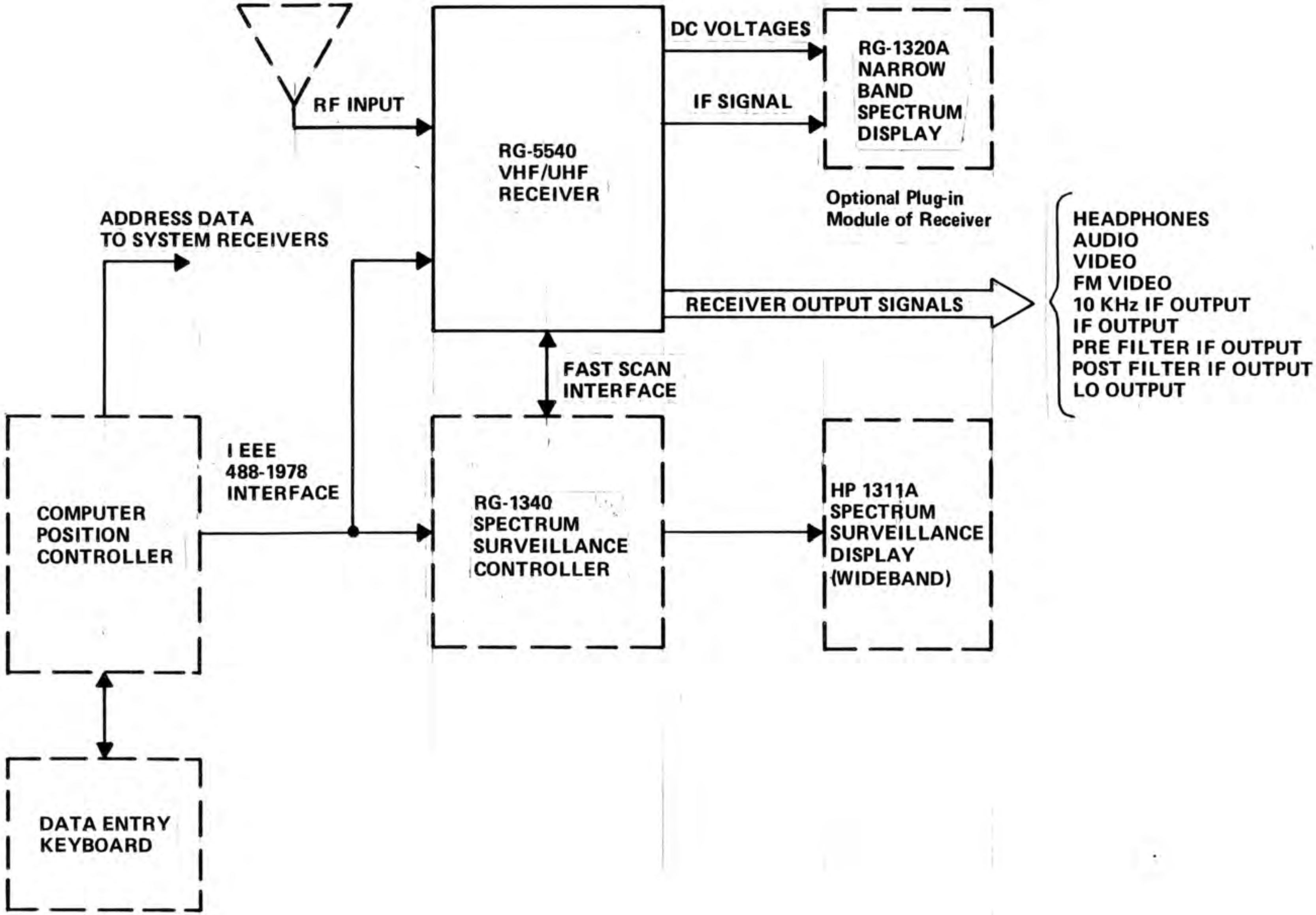


Figure 1-2. RG-5540 Receiver, Typical Application

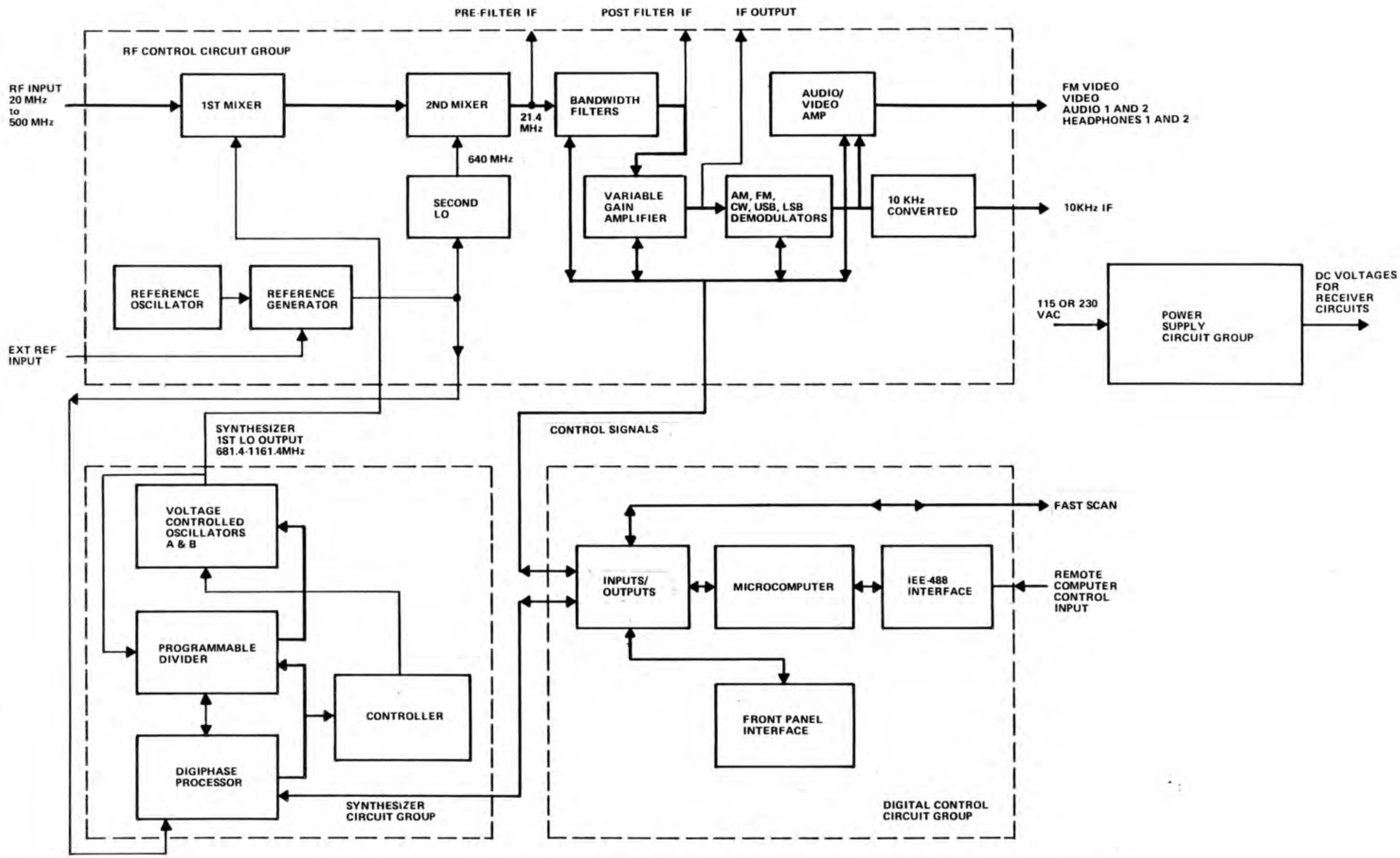


Figure 1-3. Functional Block Diagram, RG-5540 VHF/UHF Receiver

1-14. The RF Control Circuit Group also contains the demodulator and mode selection circuits that allow selection of AM, FM, CW, ISB, LSB and USB operation. Detection modes are also selected by inputs from the front panel or remote controller inputs to the microcomputer of the Digital Control Circuit Group. The selected detection mode demodulator output is connected through the audio/video amplifier to the output connectors (FM VIDEO, VIDEO, AUDIO 1 and AUDIO 2) on the rear panel. In addition, the front panel headphone outputs, HEADPHONES 1 (USB) and HEADPHONES 2 (LSB), are provided by the audio/video amplifier.

1-15. The overall operation of the Receiver is controlled by the microcomputer of the Digital Control Circuit Group. The microcomputer receives inputs from either the front panel or the remote controller and controls the Receiver parameters; such as frequency, detection mode, gain control and audio level control. The control signals to and from the Digital Control Circuit Group are distributed by the I/O circuit connections.

1-16. The Power Supply Circuit Group provides the various negative and positive DC voltages required by the receiver circuits from either a 115 volt or 230 volt AC power source.

1-17. PHYSICAL DESCRIPTION

1-18. The Receiver's physical description is presented in the following paragraphs.

1-19. RECEIVER ASSEMBLY. The Receiver's electronics and power supply circuits consist of several modular subassemblies that are integrated into a 19 x 20 x 5.22 inch chassis assembly. The 19-inch front panel is slotted to allow the unit to be installed in a standard 19-inch equipment rack.

1-20. Refer to Figures 1-4 and 1-5 for the identification and location of the major assemblies of the Receiver and its overall mechanical construction.

1-21. MAJOR ASSEMBLIES. The circuit card assemblies, and modules of the Receiver are listed in Table 1-1.

Table 1-1. Major Assemblies

REFERENCE DESIGNATION	MODULE NAME	REFERENCE DESIGNATION	MODULE NAME
A1	Power Supply	A3	Tuner Assembly
A1A1	Rectifier Board	A3A1	Up Converter
		A3A2	Down Converter
A2	Front Panel	A3A3	IF Amplifier
A2A1	Keyboard		
A2A2	Keyboard Decoder	A4	2nd LO Assembly
A2A3	Frequency Display	A4A1	2nd LO PWB

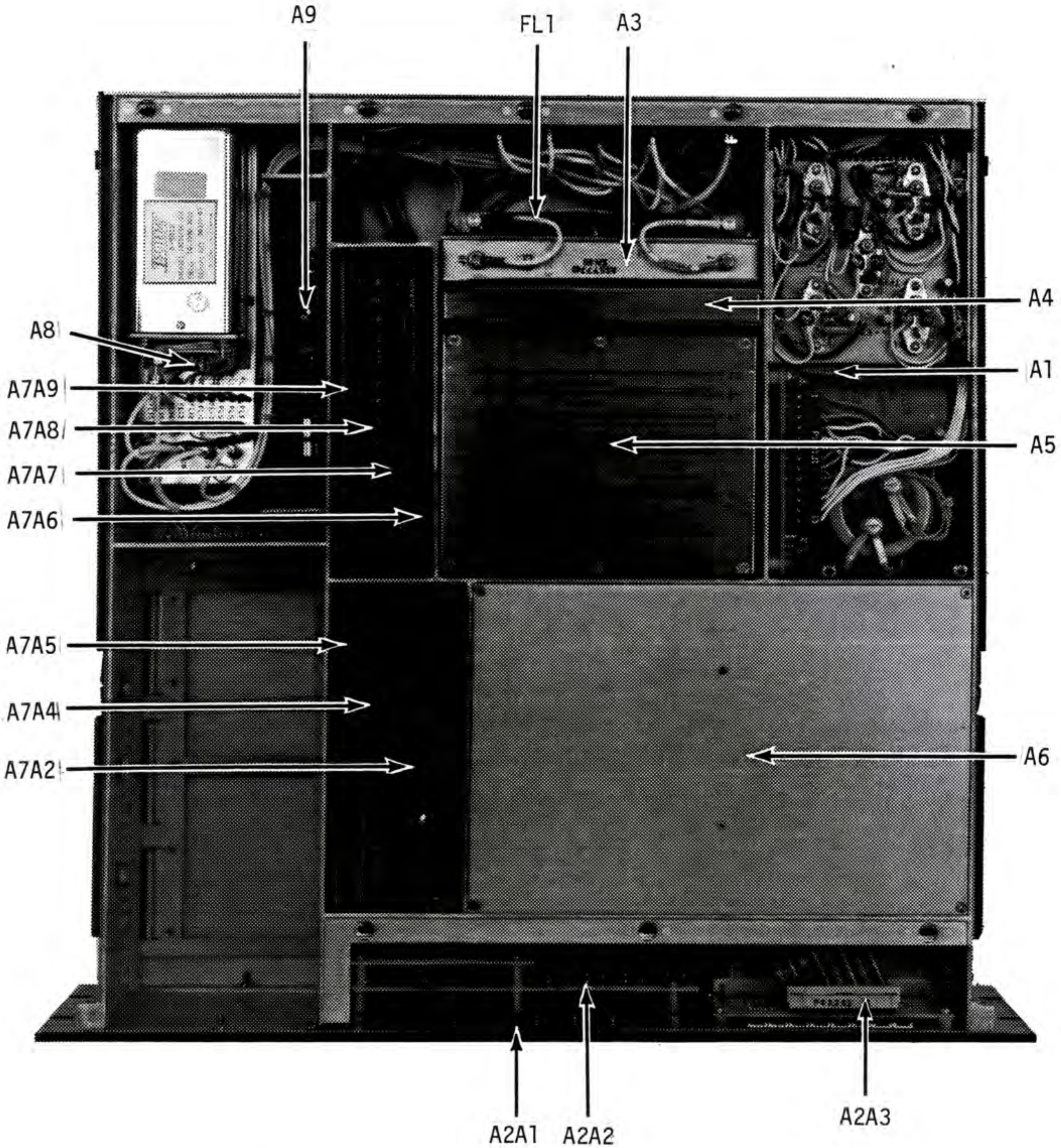


Figure 1-4. Location of Major Assemblies, Top View

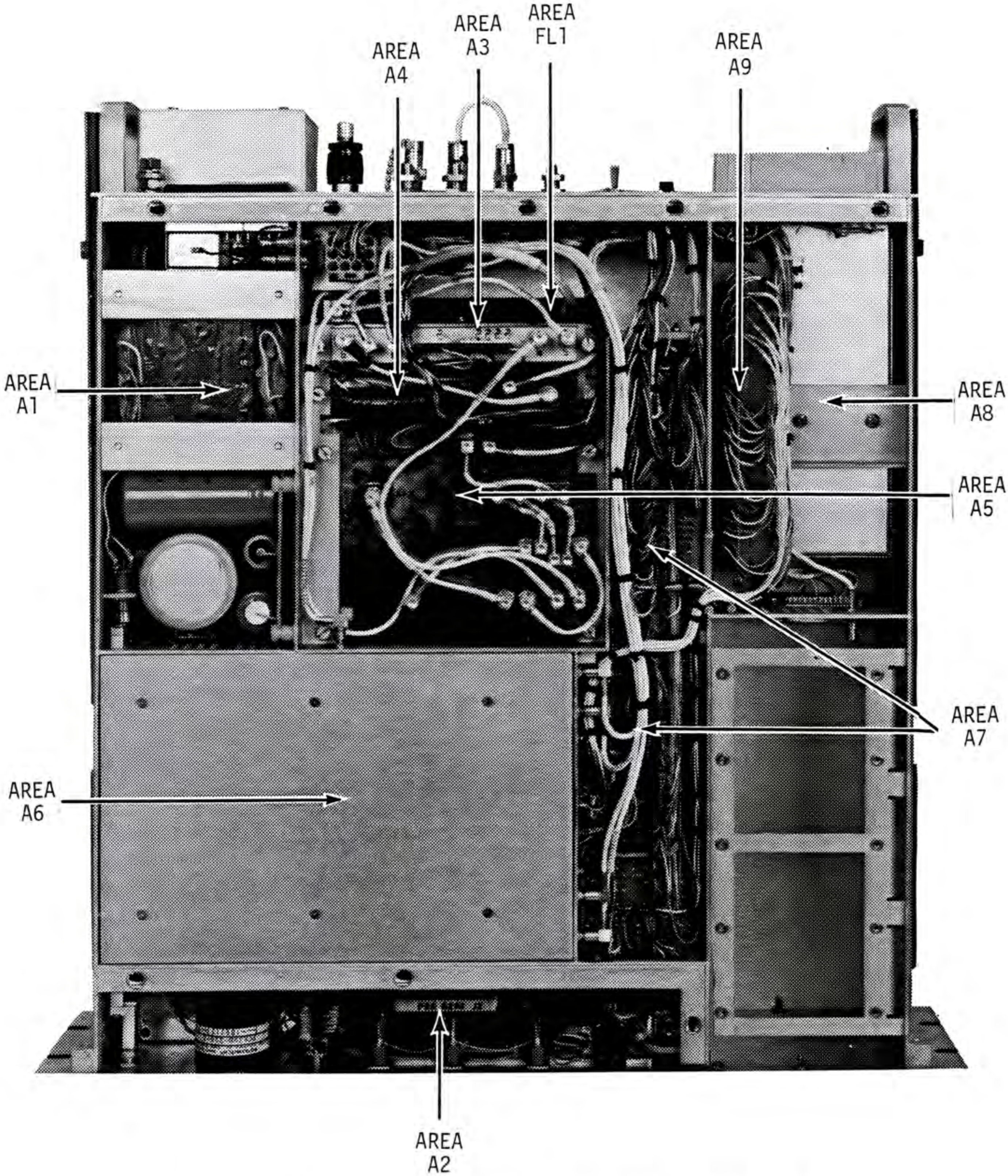


Figure 1-5. Location of Major Assemblies, Bottom View

Table 1-1. Major Assemblies (Cont.)

REFERENCE DESIGNATION	MODULE NAME	REFERENCE DESIGNATION	MODULE NAME
A5	Synthesizer	A6A8	USB Demodulator
A5A1	VCO A	A6A9	LSB Demodulator
A5A1A1	+20 V Regulator	A6A10	10 kHz Converter
A5A1A2	VCO-846.4-926.4 MHz		
A5A1A3	VCO-766.4-846.4 MHz	A7	Controller
A5A1A4	VCO-681.4-766.4 MHz	A7A1	Controller Mother Board
A5A2	Controller	A7A2	CPU
A5A3	Digiphase Processor	A7A3	Not Used
A5A4	Programmable Divider Assembly	A7A4	I/O Panel
A5A5	VCO B	A7A5	Display Driver
A5A5A1	+20 V Regulator	A7A6	Address Decoder
A5A5A2	VCO-1086.4-1161.4 MHz	A7A7	Control Output
A5A5A3	VCO-1006.4-1086.4 MHz	A7A8	Converter
A5A5A4	VCO 926.4-1006.4 MHz	A7A9	IEEE-488 Interface
A5A5A5	VCO Switch		
A6	IF Assembly	A8	Reference Generator
A6A1	IF Mother Board	A8A1	Reference Oscillator
A6A2	Variable Gain Amplifier	A8A2	Reference Generator PWA
A6A3	100 kHz IF		
A6A4	50 kHz IF	A9	Audio/Video/Amplifier Assembly
A6A5	20 kHz IF	A9A1	Audio/Video Interface
A6A6	10 kHz IF	A9A2	Audio/Video Amplifier
A6A7	CW Demodulator		

1-22. EQUIPMENT REQUIRED BUT NOT SUPPLIED

1-23. All equipment required for normal installation and operation of the Receiver is supplied as listed in Table 1-1. No other equipment is required to place the Receiver in operation.

1-24. CHARACTERISTICS

1-25. Table 1-2 lists the most significant receiver characteristics and their specified range, limits, and/or tolerances as applicable.

Table 1-2. Receiver Characteristics

CHARACTERISTIC	SPECIFICATION
Frequency Range	20 to 100 MHz or 20 to 500 MHz
Frequency Resolution	10 Hz
RF Input Impedance	50 ohms, unbalanced

Table 1-2. Receiver Characteristics (Cont.)

CHARACTERISTIC	SPECIFICATION
RF Input VSWR	3:1, maximum from 20 to 500 MHz
RF Input Noise Figure	12 dB maximum
Intermodulation Distortion	50 dB nominal
Detection Modes	AM, FM, CW, ISB, USB and LSB
Tuning Scheme	Frequency synthesized local oscillators locked to internal or external frequency standard.
Internal Frequency Standard	10 MHz, adjustable $\pm$ 1 Hz
External Frequency Standard	1, 5, or 10 MHz, at input level of 50 mV 5V across 50 ohms
Gain Control Mode	Manual and automatic
Manual RF Gain	100 dB range minimum in 1 dB steps $\pm$ 0.5 dB
Hold Time	Between 1 and 10 dB per second
0.5 to 3 seconds	Between 5 and 50 dB per second
Greater than 3 seconds	Maximum range of 6 dB for audio, video and IF output levels in reference to a 100 dB RF input range.
Automatic Gain Control (AGC)	AGC response for a 20 dB change in the RF input between -57 dBm and -37 dBm
AGC Time Constants	
Attack Time	10 msec maximum
Decay Time	200 msec $\pm$ 50 msec
Image Rejection	70 dB minimum for 10 kHz BW
IF Rejection	60 dB minimum for 10 kHz BW
Spurious Rejection	60 dB minimum for 10 kHz BW
Internal Spurious	Maximum of 17 dB above the noise floor for 10 kHz BW

Table 1-2. Receiver Characteristics (Cont.)

CHARACTERISTIC	SPECIFICATION
IF Bandwidths	Four IF bandwidths standard: 10 kHz, 20 kHz, 50 kHz, and 100 kHz.
Receiver Sensitivity in -dBm at Standard IF Bandwidths (20-500 MHz NF = db):	
10 kHz	-107 dBm
20 kHz	-104 dBm
50 kHz	-100 dBm
100 kHz	-97 dBm
AM - modulated 30% at a 1000 Hz rate	A minimum 10 dB (S+N)/N ratio at the IF Output.
AM - Modulated at 1000 Hz rate with deviation equal to 30% of IF bandwidth (400 Hz modulation is used for 10kHz IF bandwidth)	A minimum 17 dB (S+N)/N ratio at the IF output.
IF Output	21.4 MHz, between 20 and 30 dB greater than an input level between -50 and -87 dBm.

SECTION 2

INSTALLATION

2-1. INTRODUCTION

2-2. This section contains the procedures for unpacking, installing and initially checking the operational condition of the Receiver.

2-3. PREPARATION FOR USE

2-4. Preparation for use includes instructions for unpacking the Receiver as well as an input power selection and an initial checkout procedure. These procedures should be performed on initial receipt of a Receiver and prior to its installation.

2-5. UNPACKING AND INSPECTION. Each Receiver should be unpacked and inspected using the handling procedures normally employed for electronic equipment. Although no special procedures are required, refer to Figure 2-1 and perform the following:

1. Remove the Receiver from the shipping carton using caution normally associated with unpacking electronic equipment.

2. Remove packing slip from shipping container and ensure that all items listed on packing slip are received.

3. Inspect entire Receiver for dents, scratches or other structural damage.

4. Inspect all rear panel connectors to ensure that they have not been damaged during shipping.

5. When inspection has satisfactorily been completed, ensure that input power selection and initial check-out procedures are performed.

2-6. INPUT POWER SELECTION. The Receiver can be operated from either a 115 volt or 230 volt AC input power source. The unit is factory strapped for 115-volt operation as shown in Figure 2-2. To use the Receiver with a 230 volt AC power source, perform steps 1 through 8.

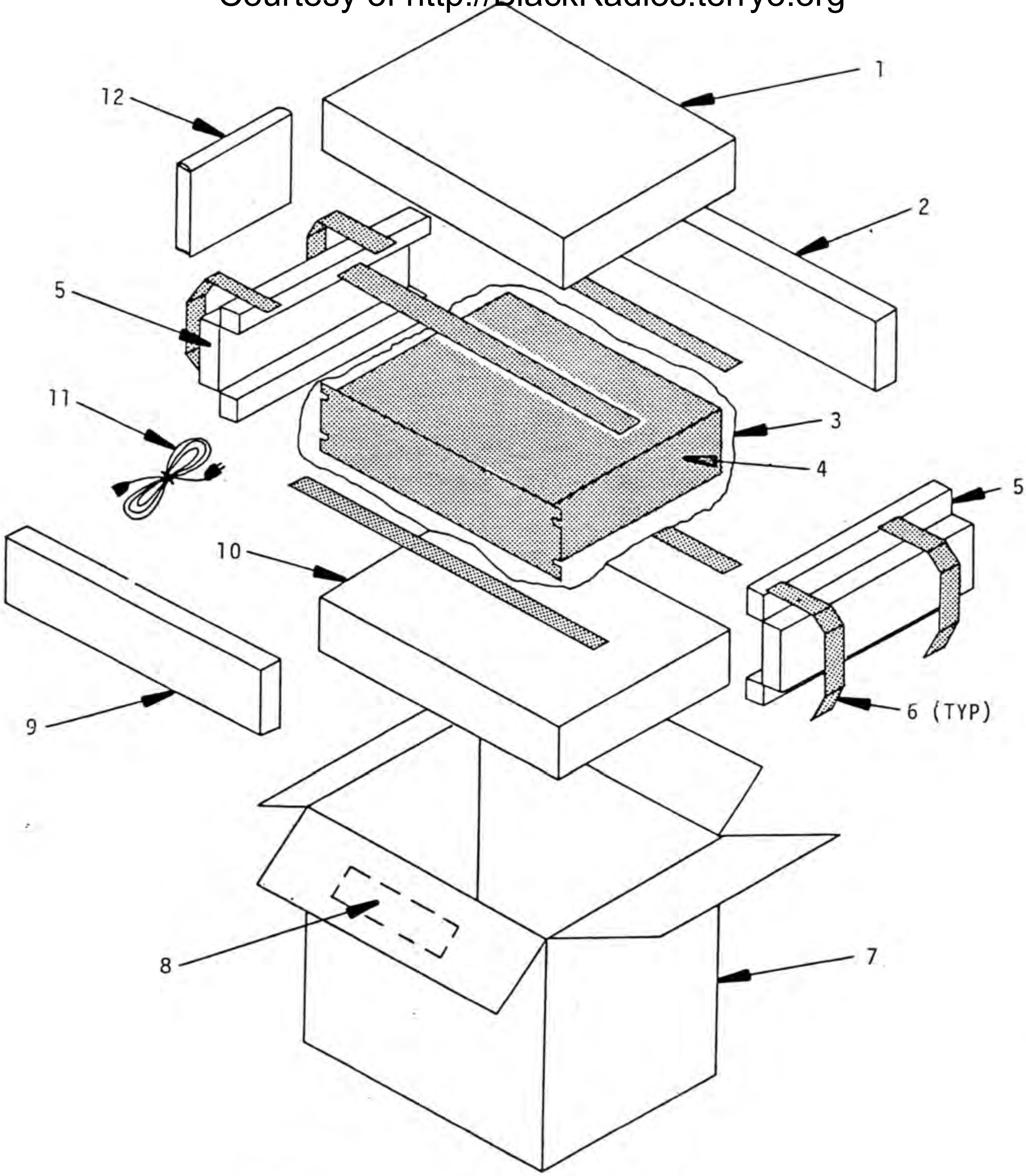
1. Locate power filter assembly (Figure 2-4) on Receiver rear panel.

2. Slide plastic cover (Figure 2-2) all the way to the left.

3. Push FUSE PULL lever to the left.

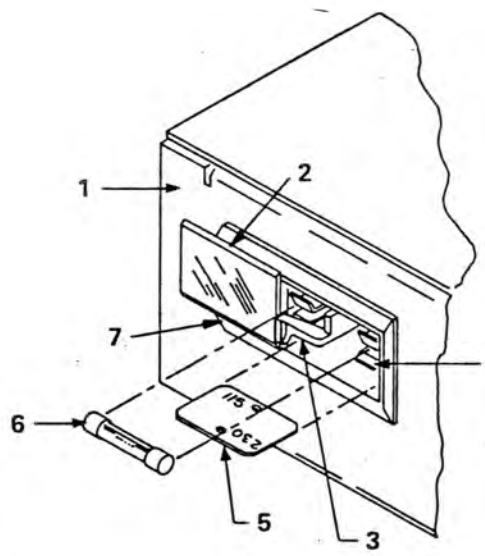
4. Remove fuse from fuse holder.

5. Insert pointed instrument into hole on circuit card and pull card from slot.



1. Top Piece
2. Rear Panel Piece
3. Plastic Bag
4. Receiver
5. Side Piece (2)
6. Packing Tape
7. Shipping Carton
8. Packing Slip
9. Front Panel Piece
10. Bottom Piece
11. Power Cord
12. Technical Manual

Figure 2-1. Typical Packaging Details



1. Rear Panel
2. Plastic Cover
3. FUSE PULL Lever
4. Fuse Holder
5. Circuit Card (115/230)
6. Fuse
7. Power Filter Assembly

Figure 2-2. Input Power Selection

6. Orient circuit card with desired voltage to left of card and readable (left to right) then insert card fully into slot.

7. Insert correct fuse (3/4 amp for 230 volt and 1 1/2 amp for 115 volt) into fuse holder allowing clearance for FUSE PULL lever to return to right position as fuse is installed.

8. Slide plastic cover fully to the right.

2-7. INITIAL CHECKOUT PROCEDURE. Prior to installing the Receiver, the following procedure should be performed to ensure that the unit has not been damaged in shipping and that it is operational.

1. Ensure that PUSH/ON POWER switch is set to off. (Refer to Figure 3-1 and Table 3-1 for location and function of front panel controls).

2. Connect power cord between AC POWER filter assembly FL1 on rear panel (Figure 2-4) and a correct AC power source as selected in Paragraph 2-6.

3. Press PUSH/ON POWER switch, and ensure that the front panel indicators light and that a receiver frequency (20 to 500 MHz) is displayed.

4. Set REMOTE LOCAL lever switch to LOCAL.

5. Press TUNING mode OFF pushbutton.

6. Press AM detection mode pushbutton.

7. Press 10 kHz IF bandwidth pushbutton.

8. Press AGC FAST pushbutton.

9. Connect a 600-ohm impedance headset to the front panel HEADPHONES jack.

10. Connect a suitable antenna to the ANTENNA connector J1 on the rear panel. Refer to Figure 2-4.

11. Press FAST TUNING rate pushbutton.

12. Hold TUNING control lever in either the up or down position to tune the Receiver to the frequency of a local AM station.

13. Monitor the output on the headphones and ensure that the audio level can be controlled by the audio gain control.

14. Press SLOW TUNING rate pushbutton.

15. Rotate TUNING knob in each direction and ensure that the frequency 10 Hz digit changes and that TUNING meter indicates 0 as station is tuned to center.

16. Enter 100.0 using numerical pushbuttons.

17. Press ENTER FREQ pushbutton, and ensure that Receiver tunes to 100.0 MHz as indicated by the frequency display.

18. Press POWER/ON pushbutton to off.

19. Disconnect power cord from power receptacle, antenna from ANTENNA connector and proceed with instructions.

2-8. INSTALLATION INSTRUCTIONS

2-9. These paragraphs include a physical installation procedure, identification of all rear panel controls, connectors and adjustments, and interconnection cabling information.

2-10. INSTALLATION PROCEDURES. The Receiver is designed for rack mounting and is equipped with a standard 19-inch wide, slotted front panel. The unit may be installed within a rack on angle supports or with slides, at the option of the user. Perform the procedures in paragraph 2-11 or 2-12, as applicable, to install the Receiver.

2-11. Angle Support Installation. Ensure that angle supports are installed in the rack before proceeding. (See Detail A, Figure 2-3.)

1. Ensure that cables will not interfere with Receiver installation.

CAUTION

When installing Receiver, be careful not to damage rear panel connectors or terminal board TB1.

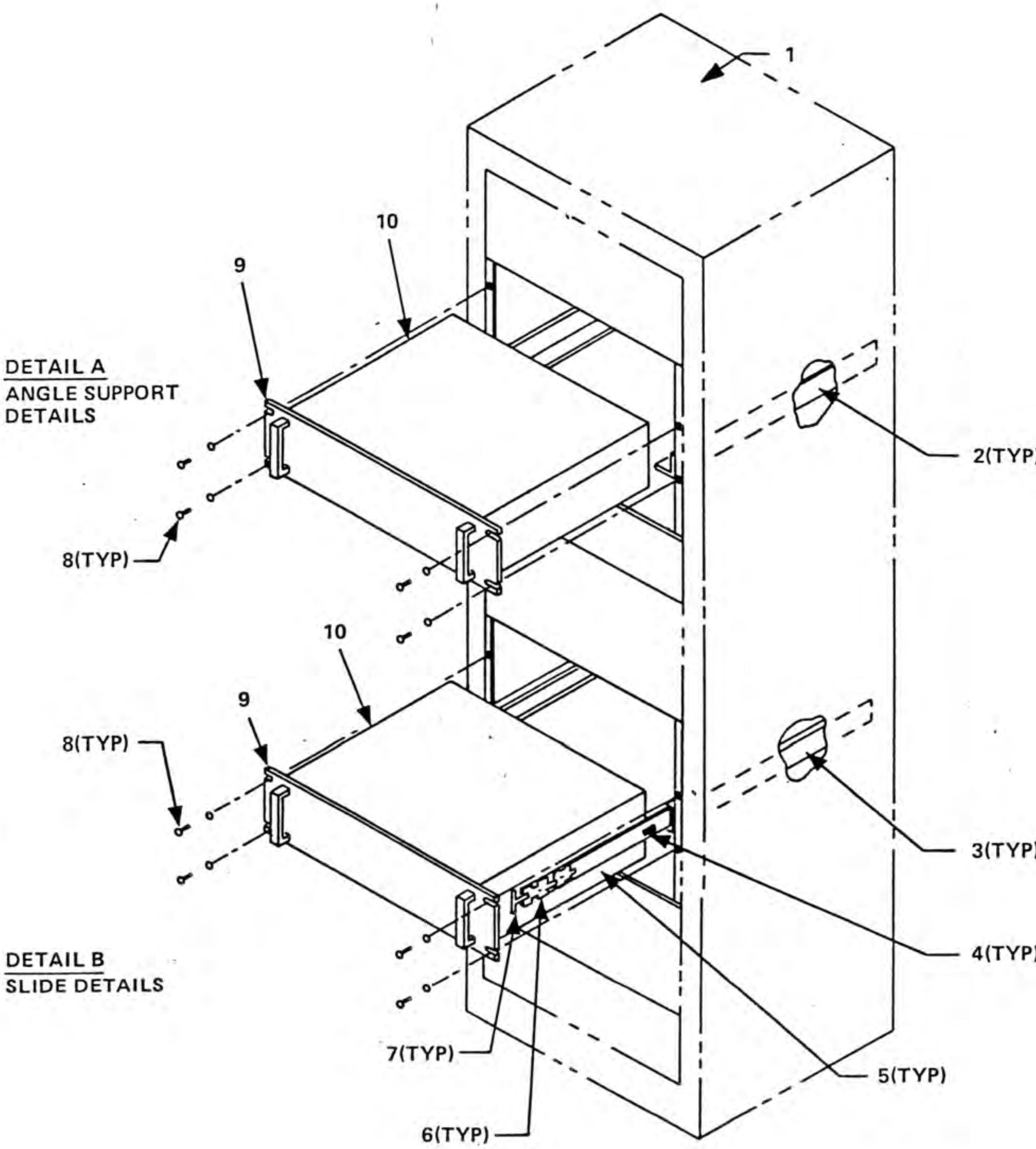
2. Set lower rear panel of Receiver squarely on angle supports and keeping the unit straight, gently push Receiver into rack.

3. Align front panel slots with threaded mounting holes on both sides of rack and install four large-head screws with nylon washers.

2-12. Slide Installation. This procedure is based on the use of standard three section extension rack slides with tilt and lock up or down features which can be attached to the Receiver via universal type EIA hole spacings.

1. Attach chassis section or rack slide to the Receiver and ensure that the stationary sections of the rack slide are installed in the rack. (See detail B, Figure 2-3.)

2. Open rear door of rack and ensure that cables will not interfere with Receiver installation.



1. Rack
2. Angle Support (2)
3. Slide, Stationary Section (2)
4. Spring Retainer (2)
5. Slide, Intermediate Section (2)
6. Slide, Chassis Section (2)
7. Detent (2)
8. Screw and Washer (4)
9. Front Panel Slots
10. Receiver

Figure 2-3. Rack Installation Options

CAUTION

When installing Receiver, be careful not to damage rear panel connectors or terminal board TB1.

3. Align and insert both intermediate sections of slide into stationary sections and gently push Receiver into rack until slides catch on spring retainers.

4. Pull detents and rotate Receiver 90 degrees with rear panel up, release detents and ensure that Receiver is held securely in place.

5. Pull detents and rotate Receiver 180 degrees with rear panel down, release detents and ensure that Receiver is held securely in place.

6. Pull detents and rotate Receiver 90 degrees with rear panel facing rack, release detents and push Receiver into rack.

7. Align front panel slots with threaded mounting holes on both sides of rack and install four large-head screws with nylon washers.

2-13. INTERCONNECTION REQUIREMENTS

2-14. The information required to interconnect the Receiver is provided by the location and description of each rear panel connector and terminal board, the interconnecting wiring diagram and the connector pin designation table.

2-15. REAR PANEL CONNECTORS. The rear panel connectors, terminal board and adjustments are shown on Figure 2-4 and described in Table 2-1.

Table 2-1. Rear Panel Components

DESIGNATION	FUNCTION
ANTENNA (J1)	Provides the RF input connection for the antenna.
LO (J3)	Provides a 1st LO output from the synthesizer module (A5).
IF OUT (J4)	Provides an IF output of 21.4 MHz.
POST-FL IF (J7)	Provides an IF output of 21.4 MHz. The impedance is 50 ohms. The output is from the variable gain amplifier of the IF assembly (A6).
VIDEO (J8)	Provides a video output signal in all detection modes. It is a 93-ohm unbalanced output.

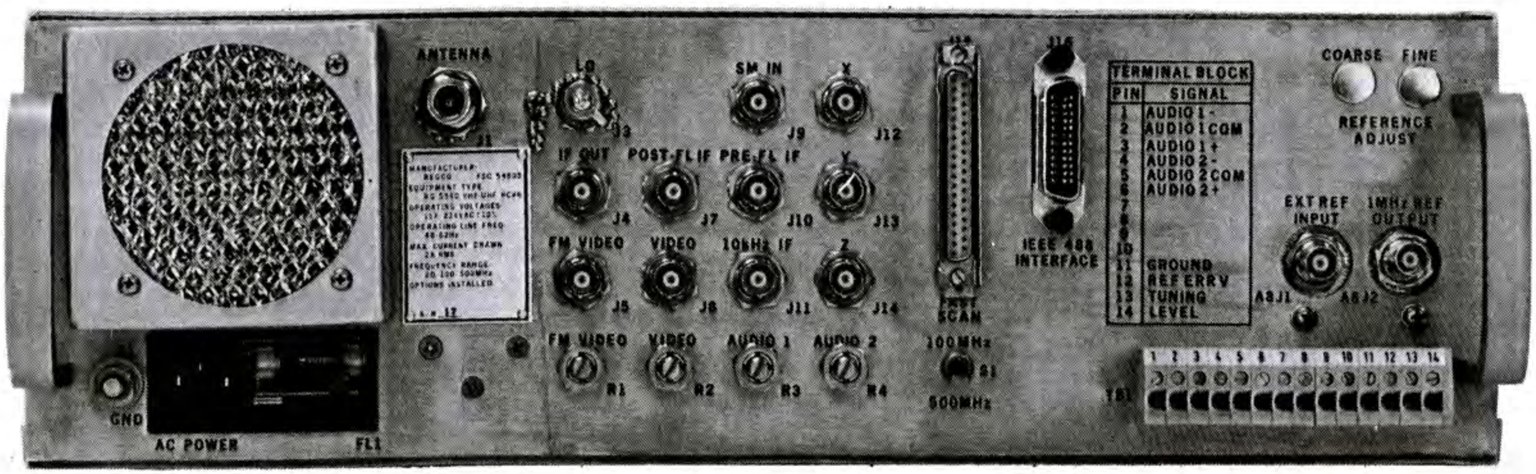


Figure 2-4. Rear Panel Connector Locations

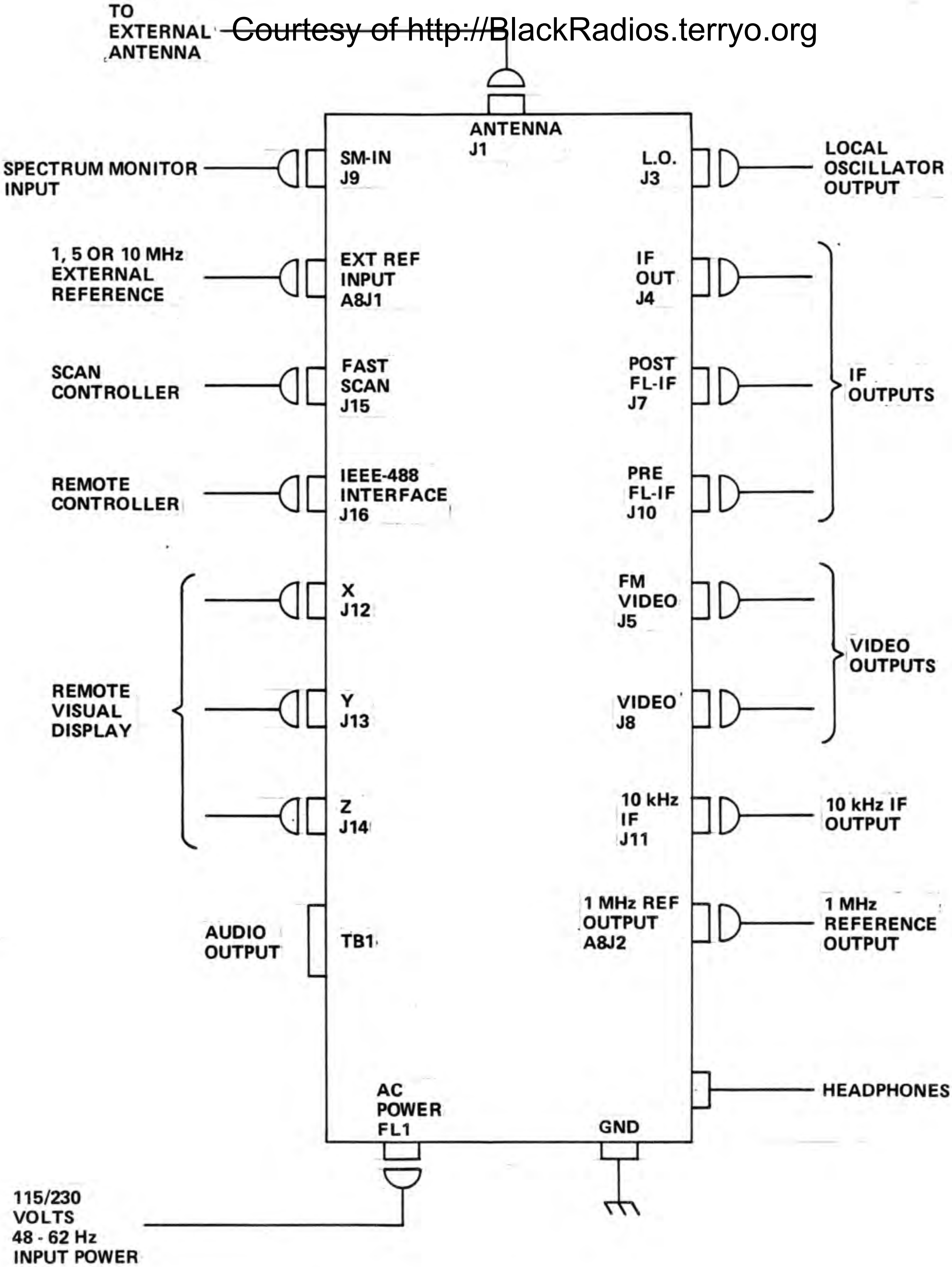


Figure 2-5. Interconnecting Diagrams

Table 2-1. Rear Panel Components (Cont.)

DESIGNATION	FUNCTION
SM IN (J9)	Provides a signal monitor input for the optional spectrum display unit. The 21.4 MHz IF output of connector J7 is normally jumpered to this input.
PRE FL IN (J10)	Provides a pre-filter IF output signal of 21.4 MHz from the tuner (A3).
10 kHz IF (J11)	Provides a 10 kHz IF output from the IF Assembly (A6). The level of this signal is 0 dBm across 600 ohms.
X (J12)	Horizontal deflection output for an optional Spectrum Display Unit.
Y (J13)	Vertical deflection output for an optional Spectrum Display Unit.
Z (J14)	Blanking output (brightness) for an optional Spectrum Display Unit.
FAST SCAN (J15)	Provides the interconnections required to enable a remote controller to operate the Receiver in the fast scan mode.
IEEE-488 INTERFACE (J16)	Provides the interconnection required to enable a remote controller to control the Receiver through use of digital command words.
TERMINAL BLOCK (TB)	Provides two balanced audio outputs, a reference error voltage, tuning and level connections.
EXT REF INPUT (A8J1)	Enables an external reference frequency standard (1 or 5 MHz) to be used in place of the Reference Generator (A8).
1 MHz REF OUTPUT (A8J2)	Provides a 1 MHz reference output from the Reference Generator (A8).
FM VIDEO (R1)	Used to adjust the level of the FM Video output at connector J5.
VIDEO (R2)	Used to adjust the output level of the video signal which is output at connector J8.
AUDIO 1 (R3)	Used to adjust the level of the audio 1 (USB) signal output on terminals 1, 2 and 3 of terminal board (TB1).

Table 2-1. Rear Panel Components (Cont.)

DESIGNATION	FUNCTION
AUDIO 2 (R4)	Used to adjust the level of the audio 2 (LSB) signal which is output at terminals 4, 5 and 6 of terminal board (TB1).
REFERENCE ADJUST	
COARSE FINE	Factory adjustments for the reference generator output frequency.
100 MHz - 500 MHz (S1)	Selects the VHF range of the Receiver in the 100 MHz position and the VHF/UHF range in the 500 MHz position.

SECTION 3

OPERATION

3-1. INTRODUCTION

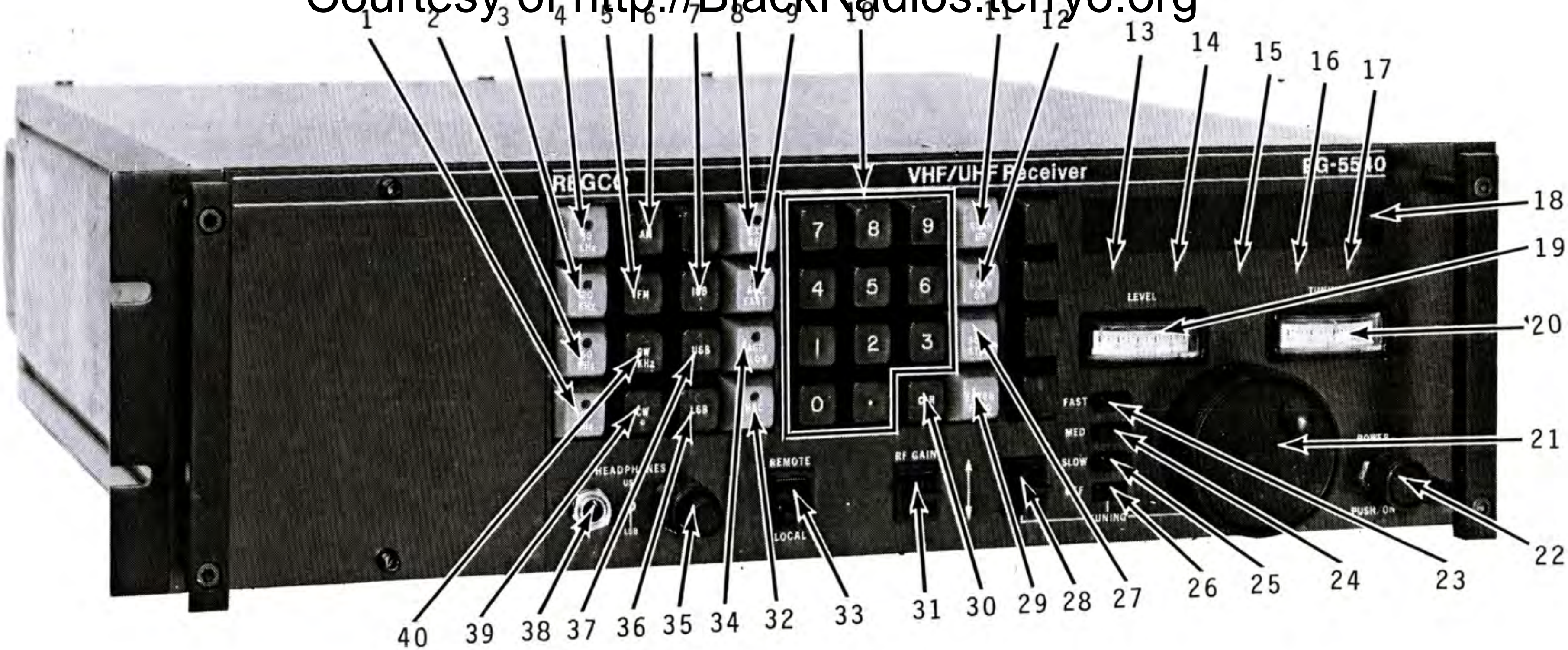
3-2. This section provides an operational overview of the Receiver and identifies and describes the functions of the Receiver's controls, indicators and operator's adjustments. In addition, instructions are included for both normal and special operational applications.

3-3. CONTROLS AND INDICATORS

3-4. Front panel controls and indicators are identified on Figure 3-1 and their operational functions are described in Table 3-1. Controls that are located on the rear panel are shown on Figure 2-4; however, they are also described in Table 3-1.

Table 3-1. Controls and Indicators

INDEX NO.	CONTROL/INDICATOR	FUNCTION
1	100 kHz Pushbutton switch and indicator	Selects an IF bandwidth of 100 kHz and indicates when this bandwidth has been selected.
2	50 kHz Pushbutton switch and indicator	Selects an IF bandwidh of 50 kHz and indicates when this bandwidth has been selected.
3	20 kHz Pushbutton switch and indicator	Selects an IF bandwidth of 20 kHz and indicates when this bandwidth has been selected.
4	10 kHz Pushbutton switch and indicator	Selects an IF bandwidth of 10 kHz and indicates when this bandwidth has been selected.
5	FM Pushbutton	Selects the frequency modulated detection mode.
6	AM Pushbutton	Selects the amplitude modulated detection mode.
7	ISB Pushbutton	Selects the independent sideband detection mode.
8	EXT REFERENCE Pushbutton Indicator	Selects and indicates the external reference mode and is functional when a 1 MHz or 5 MHz input frequency is connected to the Receiver rear panel. The external reference mode locks the Receiver's internal frequency standard to the external reference.



1. 100 KHz Pushbutton
2. 50 KHz Pushbutton
3. 20 KHz Pushbutton
4. 10 KHz Pushbutton
5. FM Pushbutton
6. AM Pushbutton
7. ISB Pushbutton
8. EXT REF Pushbutton
9. OFF Pushbutton
10. Numeric Keyboard
11. SCAN UP Pushbutton
12. SCAN ON Pushbutton
13. MEMORY DISPLAY*
14. CDR THRESH Annunciator*
15. CDR Annunciator*
16. FAST SCAN Annunciator
17. REFERENCE UNLOCKED Annun.
18. Frequency Display
19. LEVEL Meter
20. TUNING Meter
21. TUNING Knob
22. POWER Switch
23. FAST Pushbutton
24. MED Pushbutton
25. SLOW Pushbutton
26. OFF Pushbutton
27. SCAN STOP Pushbutton
28. TUNING Lever
29. ENTER FREQ Pushbutton
30. CLR Pushbutton
31. RF GAIN Lever
32. MGC Pushbutton
33. REMOTE-LOCAL Switch
34. AGC SLOW Pushbutton
35. AUDIO Control
36. LSB Pushbutton
37. USB Pushbutton
38. HEADPHONES Jack
39. CW 0 Pushbutton
40. CW 1 KHz Pushbutton

*Not implemented for this application

Figure 3-1. RG-5540 Receiver, Front Panel Controls and Indicators

Table 3-1. Controls and Indicators (Cont.)

INDEX NO.	CONTROL/INDICATOR	FUNCTION
9	AGC FAST Pushbutton Indicator	Selects and indicates the automatic RF gain mode. It provides a fast rate of gain adjustment and is the gain mode recommended for most receiver operations.
10	Numeric Keyboard	Contains the digits, zero through nine, and the decimal point. They are used to enter a frequency on the display.
11	SCAN UP Pushbutton Indicator	This control is used to select the scan tuning mode and increments the tuning frequency in accordance with a rate selected on the numerical keyboard by depressing a single digit (0 through 9) pushbutton. The rate is selected after the SCAN UP pushbutton is pressed and can be changed by pressing a second rate selection.
12	SCAN DN Pushbutton Indicator	Decrements the tuning frequency in accordance with the selected rate.
13	MEMORY Display	Not used in this application.
14	CDR THRESH Display	Not used in this application.
15	CDR Display	Not used in this application.
16	FAST SCAN ANNUNCIATOR	This indicator is illuminated when the RG-1340 Spectrum Surveillance Controller has control of the Receiver.
17	REFERENCE UNLOCKED ANNUNCIATOR	Provides a flashing visual indication in the external reference mode when the internal standard cannot lock to the external reference input.
18	Frequency Display	An eight digit LED display indicates Receiver frequency to a resolution of 10 Hz with a decimal point indicating MHz. Thus, the digits to the left of the decimal point indicate MHz.
19	LEVEL Meter	Provides a visual indication of the RF power level at the antenna input.

Table 3-1. Controls and Indicators (Cont.)

INDEX NO.	CONTROL/INDICATOR	FUNCTION
20	TUNING Meter	This meter provides a visual indication of relative signal to which the Receiver is tuned and enables the operator to precisely tune the Receiver.
21	TUNING Knob	This rotating control is used to tune the Receiver in accordance with a rate determined by the tuning rate selection.
22	POWER Switch	Depressing this control will apply power for the Receiver.
23	FAST Pushbutton	This tuning rate control provides tuning in 100 kHz units (increments or decrements) in accordance with the TUNING controls.
24	MED Pushbutton	This tuning rate control provides tuning in 1 kHz units (increments or decrements) in accordance with the TUNING controls.
25	SLOW Pushbutton	This tuning rate control provides tuning in 10 Hz units (increments or decrements) in accordance with the TUNING controls.
26	OFF Pushbutton	Provides a tuning lock mechanism which prevents an accidental frequency tuning change due to rotation of the TUNING dial or activation of the TUNING lever. Depressing this control will disable the TUNING lever, the TUNING dial and the TUNING rate pushbuttons FAST, MED and SLOW.
27	SCAN STOP	Stops the scan tuning mode and returns the Receiver to one of the other tuning modes.
28	TUNING Lever	A three-position momentary contact lever control which is utilized to tune the Receiver in accordance with a rate determined by the tuning rate selection (see FAST, MED or SLOW above). The Receiver is tuned at the rate selected when control is held in the up (increase frequency) or down (decrease frequency) position.
29	ENTER FREQ Pushbutton	Used to activate numerical digits (frequency) entered on the keyboard.

Table 3-1. Controls and Indicators (Cont.)

INDEX NO.	CONTROL/INDICATOR	FUNCTION
30	CLR Pushbutton	This control is used to clear incorrect numerical keyboard selections from the frequency display. The correct keyboard frequency selections must be re-entered after the CLR pushbutton is pressed.
31	RF GAIN Lever	A three-position momentary contact lever control which is used to adjust RF gain in the manual mode. RF gain is adjusted to obtain a satisfactory Receiver output level. Pushing the switch up or down will provide a corresponding step up or down in gain.
32	MGC Pushbutton Indicator	Selects and indicates manual RF gain. The manual RF gain mode can be used to control Receiver sensitivity and output amplitude; however, an AGC gain rate is recommended for most Receiver operations.
33	REMOTE LOCAL Switch	This two-position lever control is used to select REMOTE or LOCAL operational modes of the Receiver.
34	AGC SLOW Pushbutton Indicator	Selects and indicates the slow rate of AGC mode.
35	HEADPHONES Control	This dual control is used to adjust the audio output of the headphones for all modes of detection. In the ISB detection mode the center or smaller control is used to adjust the USB level and the larger control is used to adjust the LSB level.
36	LSB Pushbutton	Selects the lower sideband detection mode.
37	USB Pushbutton	Selects the upper sideband detection mode.
38	HEADPHONES Jack	Provides dual (USB and LSB) output to headphones.
39	CW 0 Pushbutton	Selects the fixed continuous wave mode.
40	CW 1 kHz Pushbutton	Selects the 1 kHz offset continuous wave detection mode.
*	FM VIDEO (R1)	This control is used to adjust the FM video output level.

* = Rear Panel Controls

Table 3-1. Controls and Indicators (Cont.)

INDEX NO.	CONTROLS/INDICATOR	FUNCTION
*	VIDEO (R2)	This control is used to adjust the video output level.
*	AUDIO 1 (R3)	This control is used to adjust the audio 1 output level.
*	AUDIO 2 (R4)	This control is used to adjust the audio 2 output level.
*	COARSE REFERENCE ADJUST	Used as a coarse frequency adjustment for the internal reference oscillator.
*	FINE REFERENCE ADJUST	Used as a fine frequency adjustment for the internal reference oscillator.
*	100 MHz 500 MHz (S1)	This two position toggle switch selects either VHF coverage over a frequency range of 20 to 100 MHz and the 500 MHz position provides a VHF/UHF coverage of 20 to 500 MHz.

* = Rear Panel Controls

3-5. OPERATING INSTRUCTIONS

3-6. The Receiver can be operated in three different operational modes: local, remote and fast scan. Because of the many different operating options associated with the Receiver, the basic operating parameters are discussed under local operational modes and then described in a typical local operating procedure. In addition, typical operating procedures are also included for remote and fast scan operation.

3-7. LOCAL OPERATIONAL MODES. Paragraphs 3-8 through 3-12 describe basic operating parameters for the Receiver. Because of the various modes and conditions that these parameters may be used the procedures are not intended as Receiver operating procedures but to familiarize the operator with the various parameters. If they are used in conjunction with the Receiver its power must be turned on. For typical LOCAL and REMOTE operating procedures refer to Paragraph 3-13 and 3-15 respectively.

3-8. Mode Selection. The Receiver provides several detection modes: AM, FM, CW, ISB, USB and LSB. The detection modes are selected by indicating pushbuttons on the front panel keyboard and the active mode is indicated by the illuminated pushbutton.

a. AM Mode

1. Press AM pushbutton to select AM mode.

2. Select desired IF bandwidth by pressing 10 kHz, 20 kHz, 50 kHz or 100 kHz pushbutton.

3. Select desired gain control mode by pressing MGC, AGC SLOW or AGC FAST pushbutton.

b. FM Mode

1. Press FM pushbutton to select FM mode.

2. Select desired IF bandwidth by pressing 10 kHz, 20 kHz, 50 kHz or 100 kHz pushbutton. Although any bandwidth can be selected, an IF bandwidth slightly greater than the maximum carrier deviation should be used to ensure near full scale output without distorting the signal.

3. Select the desired gain control by pressing either AGC FAST or MGC pushbutton. AGC SLOW is not recommended for FM operation.

c. CW Mode

1. Press CW 0 or CW 1 kHz pushbutton to select desired CW operation. The CW 0 pushbutton selects a fixed CW detection mode and the CW 1 kHz pushbutton selects a 1 kHz offset CW detection mode.

2. Select an IF bandwidth that will permit sufficient offset to produce a tone frequency from the HEADPHONES output jack.

3. Monitor audio output from HEADPHONES jack and tune the Receiver to a frequency slightly offset from the carrier frequency to produce an audio tone.

d. ISB, USB and LSB Single Sideband Modes

1. Press ISB pushbutton to select ISB detection mode.

2. Press 10 kHz pushbutton to select the required 10 kHz bandwidth.

3. Press AGC FAST pushbutton to select the required AGC mode.

4. Ensure that the LSB and USB 600-ohm balanced outputs are available at the rear panel AUDIO 1 and AUDIO 2 output terminal on terminal block TB1.

5. Ensure that unbalanced 600-ohm USB and LSB outputs are available at the front panel HEADPHONES jack and that their level can be controlled by the front panel USB and LSB level controls.

3-9. Frequency Tuning. Tuning the Receiver is accomplished by using one of four methods: TUNING lever switch, TUNING control knob, ENTER FREQUENCY pushbutton and associated numeric keyboard, and the SCAN UP and SCAN DN pushbuttons.

a. TUNING Lever Switch

1. Select desired tuning rate by pressing FAST, MED, or SLOW tuning rate pushbuttons.

2. Hold TUNING lever switch up to increase frequency or down to decrease frequency and observe frequency change on frequency display.

3. Release TUNING lever switch when frequency display indicates the desired frequency.

4. Press TUNING rate OFF pushbutton to lock Receiver at the desired frequency and disable the TUNING controls.

b. TUNING Knob

1. Select desired tuning rate by pressing FAST, MED or SLOW tuning rate pushbuttons.

2. Turn TUNING knob clockwise to increase frequency or counterclockwise to decrease frequency and observe that frequency changes on frequency display.

3. Stop turning TUNING knob when frequency display indicates desired frequency.

4. Press TUNING rate OFF pushbutton to disable TUNING knob and lock Receiver at the desired frequency.

c. Keyboard Tuning

1. Enter the desired frequency by pressing pushbuttons for the most significant to the least significant digits. For example, for a frequency of 204.06088, press 2, 0, 4,. (period), 0, 6, 0, 8 and 8 in that order.

NOTE

If an incorrect digit is selected during keyboard entry, press CLR pushbutton to erase entries, then reselect the desired frequency.

2. After the desired frequency has been entered, press ENTER FREQ pushbutton to tune Receiver.

d. Scan Tuning

1. Press SCAN UP switch to increase frequency of Receiver.

2. Select slow scan rate by pressing pushbutton number 1.

3. Observe that first digit on right of display increases very slowly.

4. Press digits 2 through 9 sequentially and observe that digital frequency display increases at progressively more rapid rates.

5. Press SCAN STOP to stop scanning at desired frequency.

6. Press SCAN DN pushbutton to decrease Receiver frequency.

7. Select desired scan rate by pressing 1 through 9.

8. Press SCAN STOP pushbutton to stop scanning at desired frequency.

NOTE

When Receiver frequency reaches the upper or lower limit, it will skip to opposite limit and continue scanning until the SCAN STOP pushbutton is pressed.

3-10. AGC Modes. The Receiver may be operated in either manual or automatic gain control modes.

a. Manual Gain Control

1. Press MGC pushbutton to place Receiver in manual gain control mode.

2. Use RF GAIN three-position lever switch to set desired level as indicated on the front panel LEVEL meter.

b. Automatic Gain Control

1. Select desired AGC time constant by pressing either AGC FAST or AGC SLOW pushbutton.

2. Ensure pushbutton lamp indicates correct AGC mode.

3-11. IF Bandwidth. Four different bandwidths can be selected for Receiver operation. The narrowest bandwidth possible should be used to avoid interference from adjacent stations. Consequently a 10 kHz IF bandwidth is recommended for all modes; however, the bandwidth selected for FM reception depends on maximum carrier deviation.

1. Select desired bandwidth by pressing 10 kHz, 20 kHz, 50 kHz or 100 kHz pushbutton.

2. Ensure that corresponding pushbutton lamp indicates that the correct bandwidth has been selected.

3-12. LOCAL REMOTE. The front panel LOCAL REMOTE switch is used to place the Receiver in LOCAL operation so that it can be operated from the front panel or in REMOTE so that it can be controlled remotely by a computer position controller.

3-13. TYPICAL LOCAL OPERATING PROCEDURE

3-14. Because of the different operating options associated with the Receiver, and the different applications for the Receiver, the detailed operating procedures may be different for each site. The following procedure describes a typical operating sequence for AM operation.

1. Press POWER PUSH/ON switch and observe that a frequency display is present and that various front panel indicators are illuminated.

2. Place REMOTE local switch to LOCAL.

3. Press 10 kHz pushbutton to select a narrow IF Bandwidth and note that 10 kHz pushbutton indicator comes on and all other bandwidth indicators are off.

4. Press AM pushbutton to place Receiver in AM detection mode and note that AM pushbutton comes on and all other detection mode indicators are off.

5. Press TUNING rate MED switch.

6. Use TUNING lever and TUNING meter to tune Receiver to the frequency of a local AM station. TUNING meter will indicate 0 when center frequency of the transmitted signal is reached.

7. Use LEVEL meter (and gain mode pushbutton if MGC is used) (MGC, AGC FAST or AGC SLOW) to select the desired output level. LEVEL meter indicates in dB approximately.

8. Insert headphone in front panel HEADPHONES jack and verify that audio is present and its level can be adjusted by the audio controls.

9. Press TUNING rate OFF pushbutton and note that tuning knob and tuning lever are disabled.

3-15. REMOTE/AUTOMATIC OPERATION

3-16. During remote control the remote computer initializes Receiver operation, provides setup instructions and requests Receiver status reports from preprogrammed instructions. Follow the procedure below to initiate remote Receiver automatic operation.

1. Ensure IEEE-488 interface cable from remote computer is connected to IEEE-488 INTERFACE connector J16 on rear panel of Receiver (See Figure 2-4).

2. Ensure fast scan cable from surveillance controller is connected to FAST SCAN connector J15 on Receiver rear panel. (See Figure 2-4).

3. Place Receiver REMOTE LOCAL lever switch to REMOTE.

4. Press Receiver front panel POWER PUSH/ON switch.

5. Ensure that FAST SCAN indicator flashes when Receiver is operated in fast scan mode and that frequency readout is blank.

SECTION 4

THEORY OF OPERATION

4-1. INTRODUCTION

4-2. This section contains the theory of operation for the RG-5540 VHF/UHF Receiver. The theory is divided into two main sections to best describe the Receiver function. The first section describes the overall functional operation of each main stage and the primary signal flow through those main stages as related to the functional operation of the Receiver. The second section describes in detail the circuit operation of each main stage. Simplified functional block diagrams are used throughout the text to aid the technician in understanding the various functions.

4-3. OVERALL FUNCTIONAL OPERATION

4-4. Figure 4-1 shows a functional block diagram of the overall functions of the Receiver. The unit is a microcomputer controlled VHF/UHF Receiver with reception capabilities between 20 and 500 MHz and provides AM, FM, CW, USB, LSB and ISB demodulation. Operation is controlled from either the front panel, a remote terminal or from a RG-1340 surveillance controller. The Receiver tuner translates the 20 to 500 MHz signal, received from an antenna, to a 21.4 MHz IF signal. This is accomplished by separately mixing the signal with two local oscillators. The first local oscillator synthesizer provides a tune controlled frequency between 681.4 and 1161.4 MHz to the first mixer. The resultant 661.4 MHz (681.4 to 1161.4 minus 20-500 MHz) is then mixed in the second mixer with the 640 MHz from the second local oscillator which provides the 21.4 MHz (661.4 minus 640 MHz) IF signal.

4-5. The 21.4 MHz signal is further processed through the IF assembly which provides three primary functions; bandwidth control and selection, manual or automatic gain control and demodulation. The signal is first routed to four selectable bandwidth filters of 10, 20, 50 and 100 kHz (contained on four separate circuit cards) which are selected through Receiver control. This bandwidth controlled signal is then provided gain control, either manual or automatic, which is selectable and microcomputer controlled. The gain controlled signal is then routed to five separate demodulators (AM, FM, CW, USB and LSB) and to a 10 kHz converter. The AM and FM demodulators each consist of four demodulators, designed for the specific bandwidth of 10, 20, 40, or 100 kHz. These demodulators are contained on their respective bandwidth filter circuit cards and are automatically selected with the bandwidth. The CW demodulator also provides a selectable 1 kHz offset to the CW signal. The 10 kHz converter provides a 10 kHz IF signal for output on the rear panel.

4-6. The output of all five demodulators are routed to an Audio/Video Amplifier. Separate Audio/Video amplifiers are contained on the module for FM Video, Video, Audio 1, Audio 2, headphones tip and headphones ring with the five demodulated signals selected and switched to the various amplifiers through Receiver control. Level controls for these amplifiers are provided on either the front or rear panel.

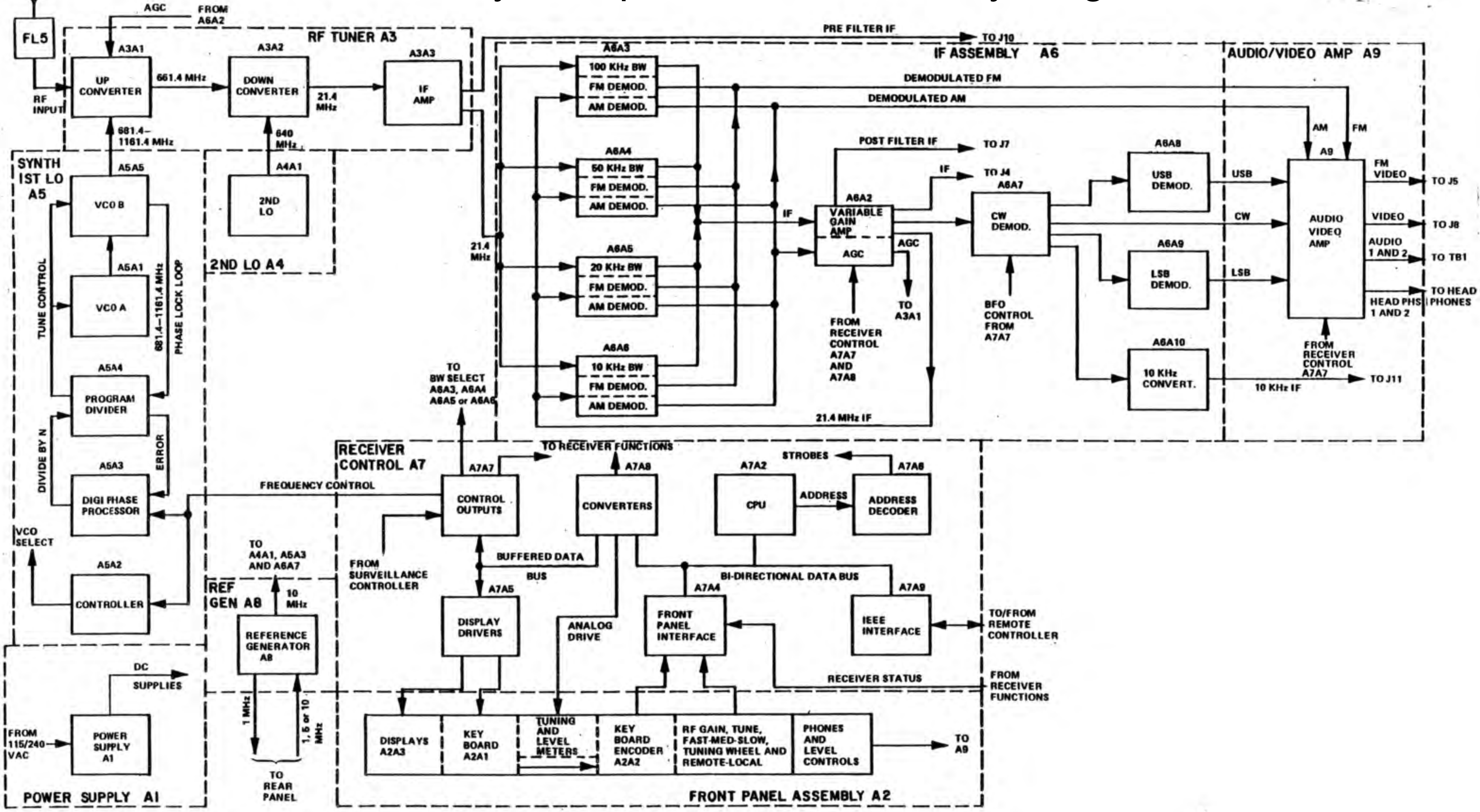


Figure 4-1. RG-5540 Receiver Overall Functional Block Diagram

4-7. A reference generator is contained within the Receiver to provide an accurate 10 MHz reference frequency to various Receiver circuits. The 10 MHz reference signal is generated by an internal oven temperature controlled oscillator and may be further stabilized by an external reference of 1 MHz, 5 MHz, or 10 MHz through rear panel connector A8J1. A 1 MHz reference monitor signal which is derived from the 10 MHz reference frequency is also available at rear panel connector A8J2.

4-8. The synthesizer circuit supplies the 1st LO input to the 1st mixer in the tuner. The circuitry, which is contained on five sub-assembly modules, makes use of six separate VCOs (Voltage Controlled Oscillators) to synthesize the 1st LO in the frequency range 681.4 to 1161.4 MHz. The 1st LO output is synthesized in 10 Hz increments. The synthesizer frequency is determined by a digital frequency control word from Receiver control. The digital word is derived by the control module which in turn is controlled by the frequency selection input from the front panel, or the remote controller. The 1st LO frequency generated by the synthesizer is F+661.4 MHz, where F is the receiver tuned frequency. As indicated in Figure 4-1, the synthesizer receives a 10 MHz reference frequency from the Reference Generator which is used as a reference to the oscillator phase locked loop. The 1st LO monitor output from the synthesizer is provided through rear panel connector J3.

4-9. The second LO supplies the 640 MHz to the second mixer in the RF tuner. This signal is generated through a phase locked loop VCO. The phase locked loop using the 10 MHz reference frequency keeps the oscillator locked to its 640 MHz.

4-10. Receiver operating parameters may be controlled through the front panel controls, from a Remote Controller with an IEEE-488 interface, or from the FAST SCAN interface for spectrum surveillance applications. All control inputs are routed through the Receiver Control Circuit Group which contains the microcomputer. The microcomputer receives control settings from the front panel in LOCAL or control commands from the remote controller in REMOTE. As directed by these controls (or commands) the microcomputer, in programmed sequence, computes and then sends the digital control signals to the appropriate Receiver circuits. The microcomputer, also in programmed sequence, drives the displays on the front panel and sends status data to the remote controller upon request. Through the FAST SCAN interface an external spectrum surveillance controller (such as the RG-1340) may take complete control of the Receiver operation, directing the Receiver microcomputer into a stand-by state.

4-11. The Receiver power supply operates from either 115 or 230 volts AC and supplies Receiver circuits with various DC voltages, both regulated and unregulated, from negative 22 volts to positive 28 volts.

4-12. DETAILED CIRCUIT DESCRIPTION

4-13. The detailed circuit description is divided into eight main divisions to best describe the Receiver circuits. The eight divisions and the modules to which each division is associated are listed below in the order that they are described.

CIRCUIT DIVISION	MODULE	PARAGRAPH
Tuner Assembly	A3	4-14
IF Assembly	A6	4-18
Audio/Video Amplifier	A9	4-33
Reference Generator	A8	4-35
First LO Synthesizer	A5	4-37
Second LO Synthesizer	A4	4-49
Receiver Control	A2 and A7	4-51
Power Supply	A1	4-70

4-14. TUNER ASSEMBLY (A3). Figure 4-2 shows a functional block diagram of the tuner assembly. The tuner contains an up converter (A3A1), a down converter (A3A2) and an IF amplifier (A3A3). The up converter translates the RF and first LO inputs to a frequency band around 661.4 MHz. The down converter translates the 661.4 MHz and second LO inputs to a frequency band around 21.4 MHz. The IF amplifier provides filtering and amplification to the IF signal.

4-15. Up Converter (A3A1). Figure 7-6, sheet 1 is the schematic diagram for the up converter. The 20 to 500 MHz receiver input signal (from the rear panel ANTENNA jack J1), is filtered by the 550 MHz, low-pass filter (FL5) and applied to the attenuator through an amplifier (U2). The output from this RF amplifier is input to variable attenuator (U3) which is controlled by the AGC signal. The AGC signal from AGC control on module A6, is applied to the attenuator through an amplifier (U7B, U7A and U7D), and a linearizing circuit consisting of diodes CR3-CR5. The output signal from the attenuator is supplied as one input to the 1st Mixer (U4). The other input to the mixer is the 1st LO input from the synthesizer after it has been amplified by amplifier (U1). The 661.4 MHz output from the 1st mixer is then amplified by RF amplifier (U5). The output from the Up converter is routed through a band pass filter (FL6) to the down converter (A3A2).

4-16. Down Converter (A3A2). Figure 7-6, sheet 2 is the schematic diagram for the down converter. The 661.4 MHz 1st IF signal from the up converter is applied through a low pass filter network (C1-C2-L1)as one input to the 2nd mixer (U2). The other input to the 2nd mixer is the 640 MHz local oscillator signal from the 2nd LO module applied to the mixer through amplifier stage (U1). The 2nd mixer output of 21.4 MHz is routed through coil L5 to IF amplifier (A3A3). Coil L5 in conjunction with capacitors C7 and C8 acts as a low pass filter.

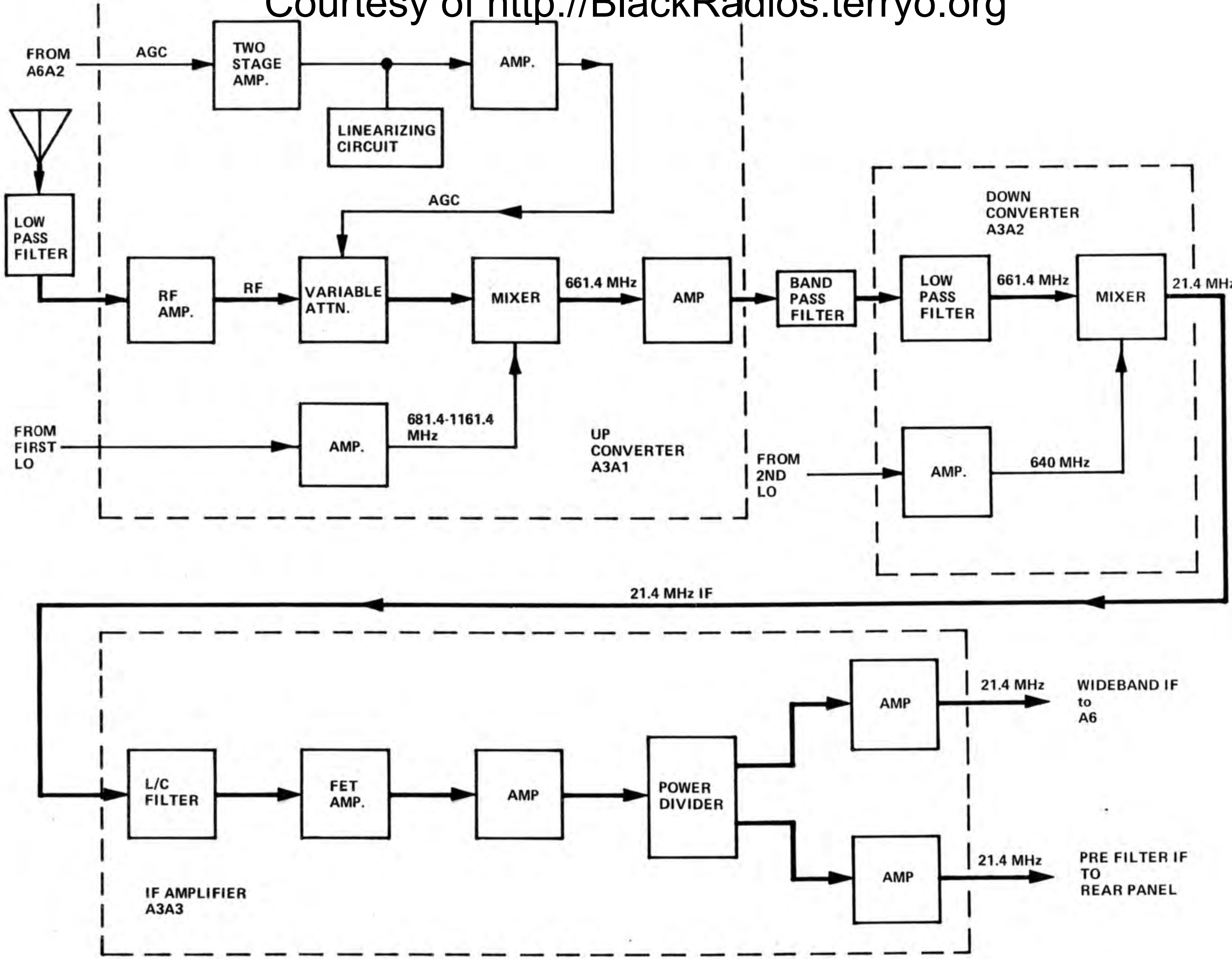


Figure 4-2. 20-500 MHz Tuner (A3), Functional Block Diagram

4-17. IF Amplifier (A3A3). The 21.4 MHz IF signal is routed through a high pass filter network (L7, C8-C10 and R6) to FET amplifier (Q1). The amplified signal is further filtered through a low pass filter network (L8 and C12-C13) and routed to drive amplifier Q2. Amplifier Q2 provides the drive for two way power divider U3. The two wideband signals from the power divider are routed to the rear panel connector J10 as PRE FL IF and to the A6 module through amplifiers Q4 and Q3 respectively.

4-18. IF ASSEMBLY (A6). Figure 4-1 shows the signal flow through the various A6 modules. The IF assembly contains nine sub-assembly modules A6A2 through A6A10. These nine modules provide for IF bandwidth selection (A6A3-A6A6), automatic or manual gain control (A6A2), AM and FM demodulation (A6A3-A6A6), CW demodulation (A6A7), USB demodulation (A6A8), LSB demodulation (A6A9) and a 10 kHz IF (A6A10). Modules A6A3 through A6A6 are identical except for the bandwidth filter and frequency dependent components in the AM and FM demodulators. The bandwidth filter is selected through Receiver control which selects the appropriate module for the bandwidth selected.

4-19. IF Filter Amplifiers (A6A3-A6A6). Figure 4-3 shows a functional block diagram of one of the IF filter amplifier modules. The four modules provide the four selectable bandwidths of the Receiver and bandwidth sensitive AM and FM demodulation. Each module contains one of the four selectable bandwidth filters and its respective AM and FM demodulators (A6A3-100 kHz, A6A4-50 kHz, A6A5-20 kHz and A6A6-10 kHz). Three of the modules will be kept isolated from signal flow while the appropriate module is switched into the signal flow as directed by the bandwidth selected through Receiver control. This is accomplished through the diode switching logic contained on each module.

4-20. Figure 7-16 shows a schematic diagram of an IF amplifier module. The 21.4 MHz signal from the tuner is coupled to the bandwidth filter circuits on each of the four modules. The filters on all four modules are isolated from the IF signal by diode switch CR1-CR2 while the output of the filter is isolated by diode switch CR3-CR4. The diode switches of only one module will be biased on as directed by Receiver control, allowing the signal to flow through the bandwidth filter selected. This bandwidth controlled signal is then routed to the variable gain amplifier module (see paragraph 4-25).

4-21. The gain controlled IF signal from the A6A2 module is routed back to all four IF filter amplifier modules. The AM and FM demodulators (on all four modules) are isolated from the IF signal by diode switch CR1-CR2. The diode switch (located on the same module as the selected bandwidth filter) will be biased on, connecting the signal to the appropriate AM and FM demodulators. Power to the AM detector bias control and to the FM limiter will be turned on by transistor switch Q1. The switched IF signal is coupled to amplifier Q1 which divides the signal and routes it to both the AM detector and FM limiter-discriminator.

4-22. The AM component of a signal is detected by a detector circuit consisting of diodes CR3-CR7 whose bias is controlled through bias control amplifier (U1A). The detected AM is then routed through audio amplifiers (U1B, U2A, U2C and U2D) to a CMOS switch (U3). This switch, inhibited by the same select signal as for bandwidth, couples the signal to the A9 module as AM Video and to the A6A2 module for AGC drive.

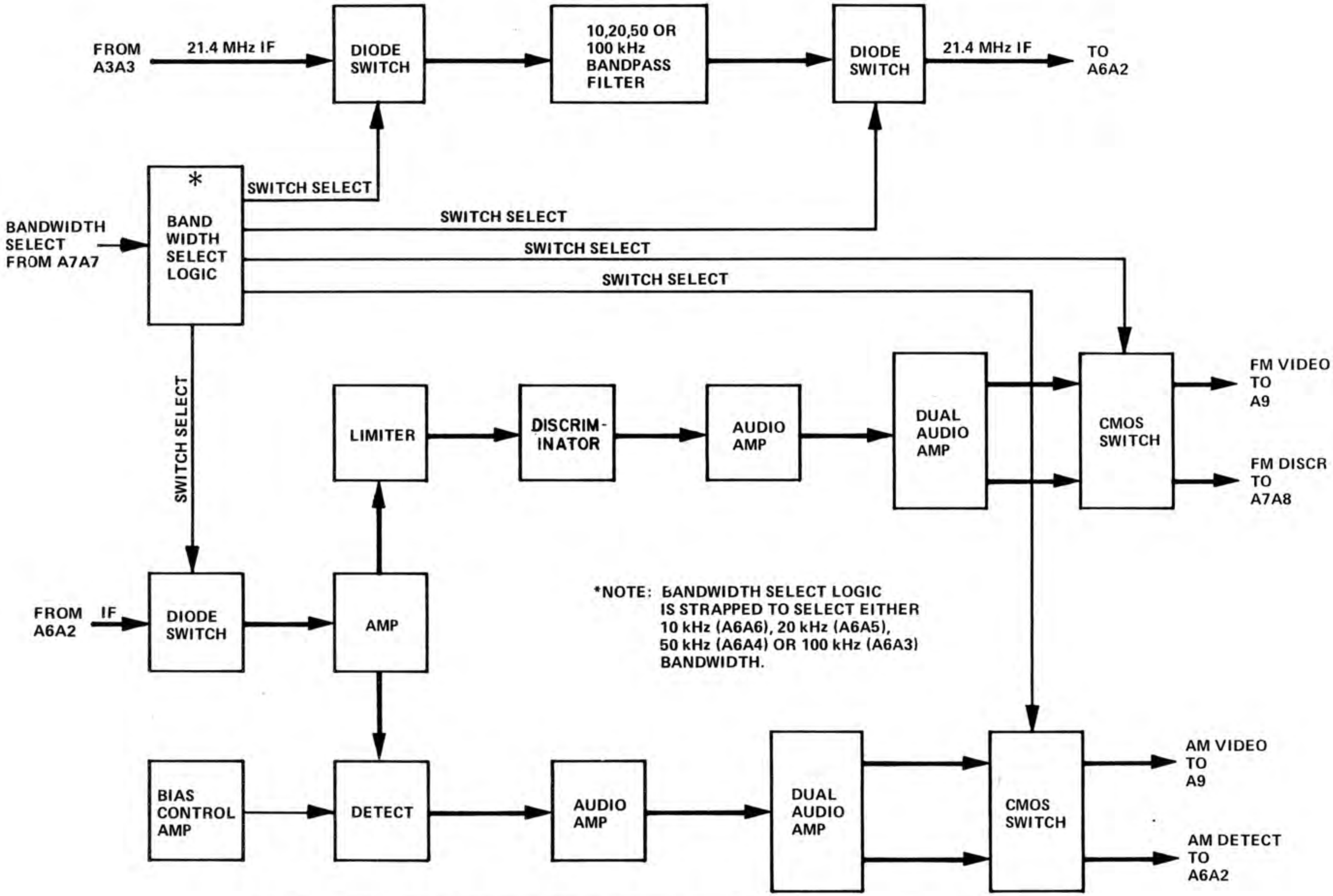


Figure 4-3. IF Filter Amplifier (A6A3-A6A6), Functional Block Diagram

4-23. Demodulation of an FM component of a signal is accomplished by passing the signal first through a limiter then a discriminator. The audio output of the discriminator is then amplified through U8B, U8A, and U8D and routed to CMOS switch (U4). This switch is inhibited in the same manner as the other select switches and routes the signal to the A9 module as FM Video and to the A7 module for Receiver control.

4-24. The IF select signal selects diode and CMOS switches that control the signal, into and out of the four IF amplifier modules (A6A3-A6A6). Each module's select signal is connected separately from Receiver control which routes a select signal to only the module corresponding to the bandwidth selected. This IF select signal is level controlled through level translators U5C, U5E and U5F and then routed to drive amplifiers U6A-U6D. The output of U6A and U6D control the diode switch that controls the signal to the AM and FM demodulators. The output of U6B drives a transistor switch (Q1), which controls a voltage regulator supplying voltage to the AM bias control amplifier and to the FM limiter. Level translators U5A and U5B control the CMOS switches which controls the output of the AM and FM demodulated signal. The IF select signal is also routed to a diode arrangement (arranged differently on each module), which forms a code for Receiver control. This code tells Receiver control which bandwidth has been selected.

4-25. Variable Gain Amplifier (A6A2) - Figure 4-4 shows a functional block diagram of the variable gain amplifier. This module provides manual or automatic controlled gain to the IF signal and supplies gain control to the tuner. The 21.4 MHz IF is routed through various IF amplifiers on this module with AGC controlling the gain of several stages of amplification. The AGC operates from the AM detected signal when in the automatic mode and from an analog signal from Receiver control when in the manual mode. Three modes of gain control are provided for in the AGC circuits; AGC FAST, AGC SLOW and MGC (manual gain control). These modes are controlled by Receiver control which also controls an AGC dump circuit used to speed up the AGC signal for large changes in amplitude.

4-26. The schematic diagram for the variable gain amplifier is shown in Figure 7-15. The input signal from the selected IF filter amplifier drives amplifier Q1 and FET amplifier Q2. The output of Q1 is the POST FL IF available at rear panel connector J7. The output from Q2 is coupled to a three stage IC amplifier (U1, U2 and U3). Each IC contains a differential amplifier which modifies the signal gain in accordance with the gain control input from the gain control circuits. The gain controlled signal is routed through coupling transformer T1 to buffer-drive amplifier (U10). This amplifier is used to drive the signal through a high pass filter (C57-C63 and coils L18-20) to a three way power output divider (U4). The three outputs from U4 are routed to; (1) the AM and FM demodulators on the selected IF filter amplifier module, (2) the CW demodulator and (3) rear panel connector J4 as the IF OUTPUT.

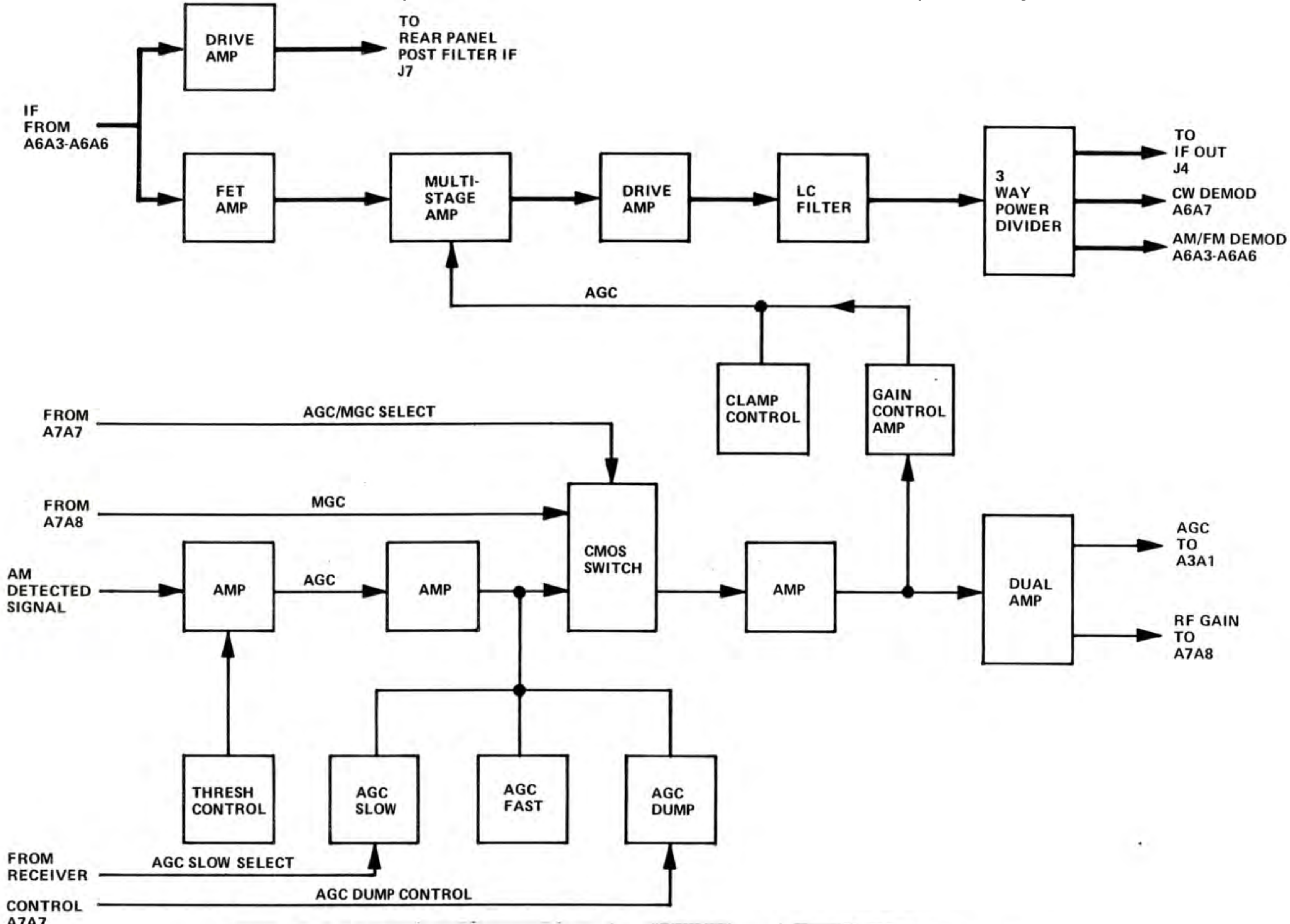


Figure 4-4. Variable Gain Amplifier (A6A2), Functional Block Diagram

4-27. The gain control circuits mode of operation; AGC FAST, AGC SLOW or MGC is controlled from Receiver control. When either of the AGC modes are selected, gain mode C from Receiver control is low, causing the switch between pins 5 and 6 of U7 to close. This closed switch routes the AM detector signal through amplifier U6C, part of IC U9 and diode CR4 to amplifier U6B. In MGC mode, gain mode C is high and the MGC analog signal from Receiver control is routed through the switch between pins 9 and 10 of U7 to U6B. Capacitor C28 is connected to the cathode of diode CR4 and with the constant current source provided by the circuit of U8B is charged or discharged to a level in relation to the gain signal appearing at diode CR4. This gain compensated signal is coupled through amplifier U6B and gain control amplifier U8A to the three stage IF amplifier (described in paragraph 4-26) for gain control of the IF signal. In AGC FAST, gain mode 2 (applied to transistor Q7) is low and capacitor C28 is discharged at a fast rate through diode CR5 and the circuit of U8C. In AGC SLOW, gain mode 2 is high, transistor Q7 is cut off and the discharge time constant is slow. When the gain mode is changed from manual to automatic, capacitor C28 which may be charged to a high level is discharged to a starting level by the DMP signal from the Receiver control. This input through transistor Q5 and Q6, operational amplifier U8D and transistors Q3 and Q4 causes capacitor C28 to rapidly discharge through transistor Q3. The output of amplifier U6B is also routed to the tuner through amplifier U6A and to Receiver control through U6D.

4-28. CW Demodulator (A6A7). Figure 4-5 shows a functional block diagram of the CW demodulator. This module provides a demodulated CW output with zero beat (CW mode) or an output with 1 kHz offset from zero beat (CW 1 kHz mode). In addition the module generates 2 MHz and 80 kHz reference frequencies from the 10 MHz reference for use on the USB, LSB and 10 kHz converter modules. The 21.4 MHz input to the module is mixed with a 19.4 MHz signal from a phase locked voltage controlled oscillator. The 2 MHz difference frequency from this mixer is routed through a four way power divider to the USB and LSB demodulators, the 10 kHz converter and to a second mixer on the module. The second input to this mixer is from a phase locked oscillator (controlled by CW offset data from Receiver control) that is either 2.000 MHz or 2.001 MHz. This then results in the CW signal without offset or with 1 kHz offset.

4-29. Figure 7-17 shows the schematic diagram of the CW demodulator. The 21.4 MHz IF from the variable gain amplifier (A6A2) is routed through an R, L, C filter, for removing frequencies outside the bandwidth, to mixer (U1). The second input to this mixer is the 19.4 MHz derived from the VCO (Q6-Y1). This VCO is controlled by a closed phase lock loop which is referenced to the 10 MHz reference from the reference generator (A8) and counted down to 100 kHz by the divide-by-100 (U10) circuitry. The mixer output is the 2 MHz IF (difference between 21.4 MHz IF and 19.4 MHz). This 2 MHz signal drives the four way power divider (U2). Three of the 2 MHz outputs are routed to the USB and LSB demodulators and the 10 kHz converter. The fourth output is one input to mixer U13. The second input to mixer U13 is either the 2.000 MHz (for CW 0 mode) or 2.001 MHz (for CW 1 kHz mode) derived from the VCO (Q8-Y2). This VCO is controlled by the phase lock loop which is referenced to an 8 kHz reference, counted down from the 2 MHz reference by a divide-by-25 circuit (U11) and a divide-by-10 circuit (U23). The phase lock loop contains a counter which is counted down by either 2000 or 2001 (U18, U19, U20) dependent

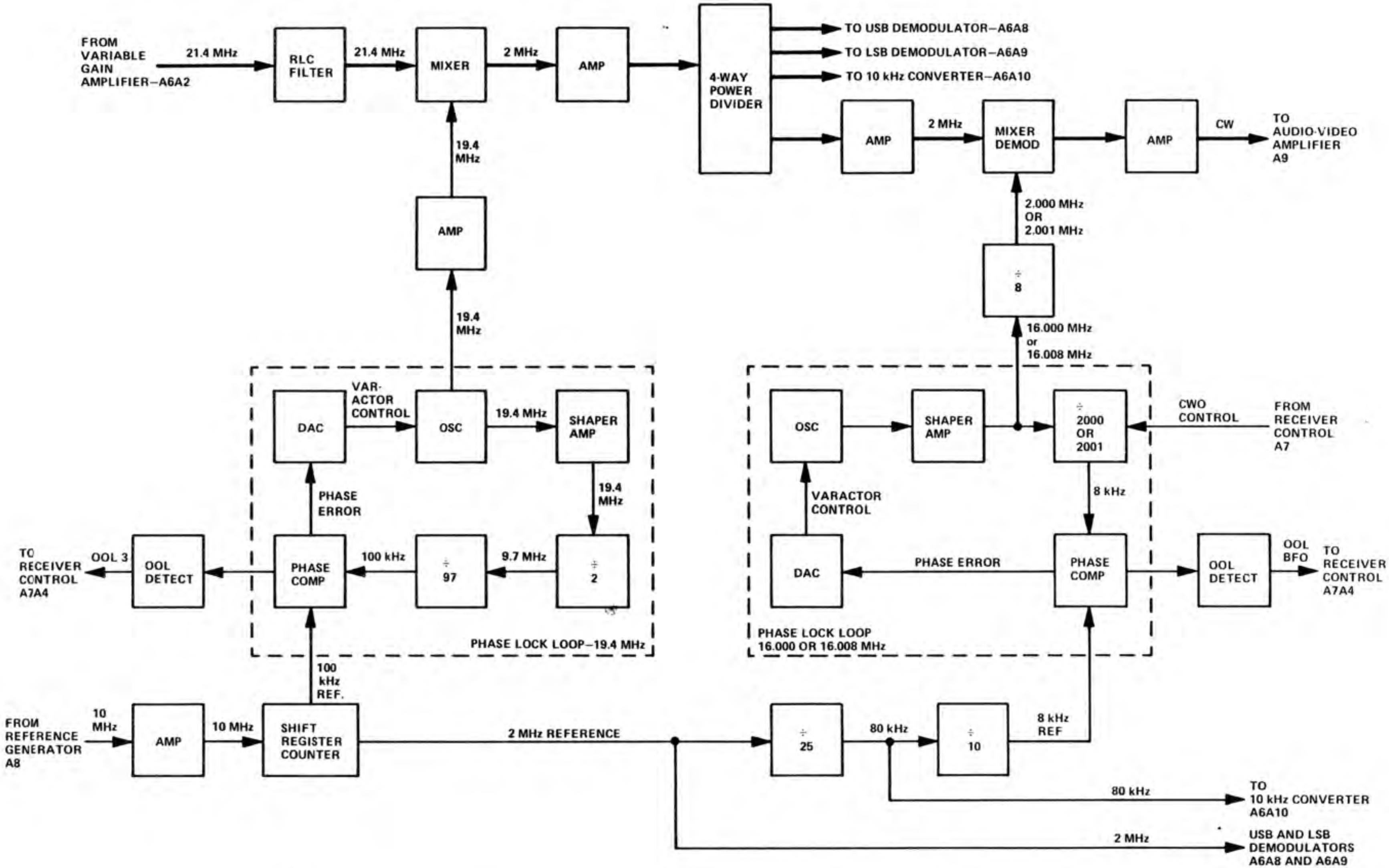


Figure 4-5. CW Demodulator (A6A7), Functional Block Diagram

on the CW 0 signal from Receiver control. This CW 0 selects either the CW 0 or the CW 1 kHz mode. The difference is output from mixer U13 as the CW video signal which is routed to the Audio/Video Amplifier (A9). The 2 MHz reference frequency is routed to the USB and LSB demodulators (A6A8 and A6A9). The 80 kHz reference from divide-by-25 counter (U11) is routed to the 10 kHz Converter (A6A10).

4-30. USB Demodulator (A6A8). Figure 4-6 shows a functional block diagram of the USB demodulator while Figure 7-18 shows the schematic diagram. The 2 MHz input from the CW demodulator is connected to amplifier stage (Q1). The amplifier's output signal is routed to filter FL1 which eliminates signals below 2 MHz. The filtered output, through amplifier stage Q2, is one input to the mixer U1. The second input to this mixer is the 2 MHz reference from the CW demodulator and is applied through amplifier stage (Q3). The mixer output signal, containing the demodulated upper sideband, drives operational amplifier stages U2A and U2B which provide the USB AUDIO output. This output is then routed to module A9.

4-31. LSB Demodulator (A6A9). Figure 4-6 shows a functional block diagram of the LSB demodulator while Figure 7-19 shows the schematic diagram. The LSB demodulator is identical to the USB demodulator except that filter FL1 in the LSB demodulator eliminates the upper sideband (frequency above 2 MHz) so that its output is the LSB audio which is also routed to module A9.

4-32. 10 kHz Converter (A6A10). Figure 4-7 shows a functional block diagram of the 10 kHz converter while Figure 7-20 shows the schematic diagram. The 10 kHz converter translates the signal to a band around 10 kHz. The 2 MHz IF from the CW demodulator module is connected through amplifier stage Q1 to drive one input of mixer U1. The second input to this mixer is the 2.01 MHz from the divide-by-8 circuit (U5). This counter is driven by the 16.080 MHz phase locked oscillator (Q2-Y1). The output from mixer U1 is then amplified by operational amplifiers U2A and U2B which supply the 10 kHz IF output to rear panel connector J11. The output of the oscillator through transistor Q3 and U6A drives the divide-by-201 counters (U7 and U8). This 80 kHz counter output is used as one input of the phase detector (dual flip-flop U9). The 80 kHz REF input from the CW demodulator is the second input to the phase detector (U9). The error signal from the phase detector is applied, through DAC U11 to the varactor CR1 to lock the oscillator (Q2-Y1) at 16.080 MHz. The error signal is also applied to gate U4B and drives OOL detector U10A whenever the error is large, indicating an out of lock condition. The output signal from the OOL detector drives indicating LED (DS1) and is also routed to Receiver control.

4-33. AUDIO/VIDEO AMPLIFIER (A9). Figure 4-8 shows a functional block diagram of the audio/video amplifier. The audio/video amplifier receives the AM, FM, CW, USB and LSB components of the demodulated IF signal, selects these signals and applies them through amplifiers to headphones, jacks or terminals for monitoring. The module contains six sets of amplifiers, for FM Video, Video, Audio 1, Audio 2, headphones tip and headphones ring, two 4-circuit CMOS switches and a decoding circuit used to control the CMOS switches which in turn control the input of the demodulated signals.

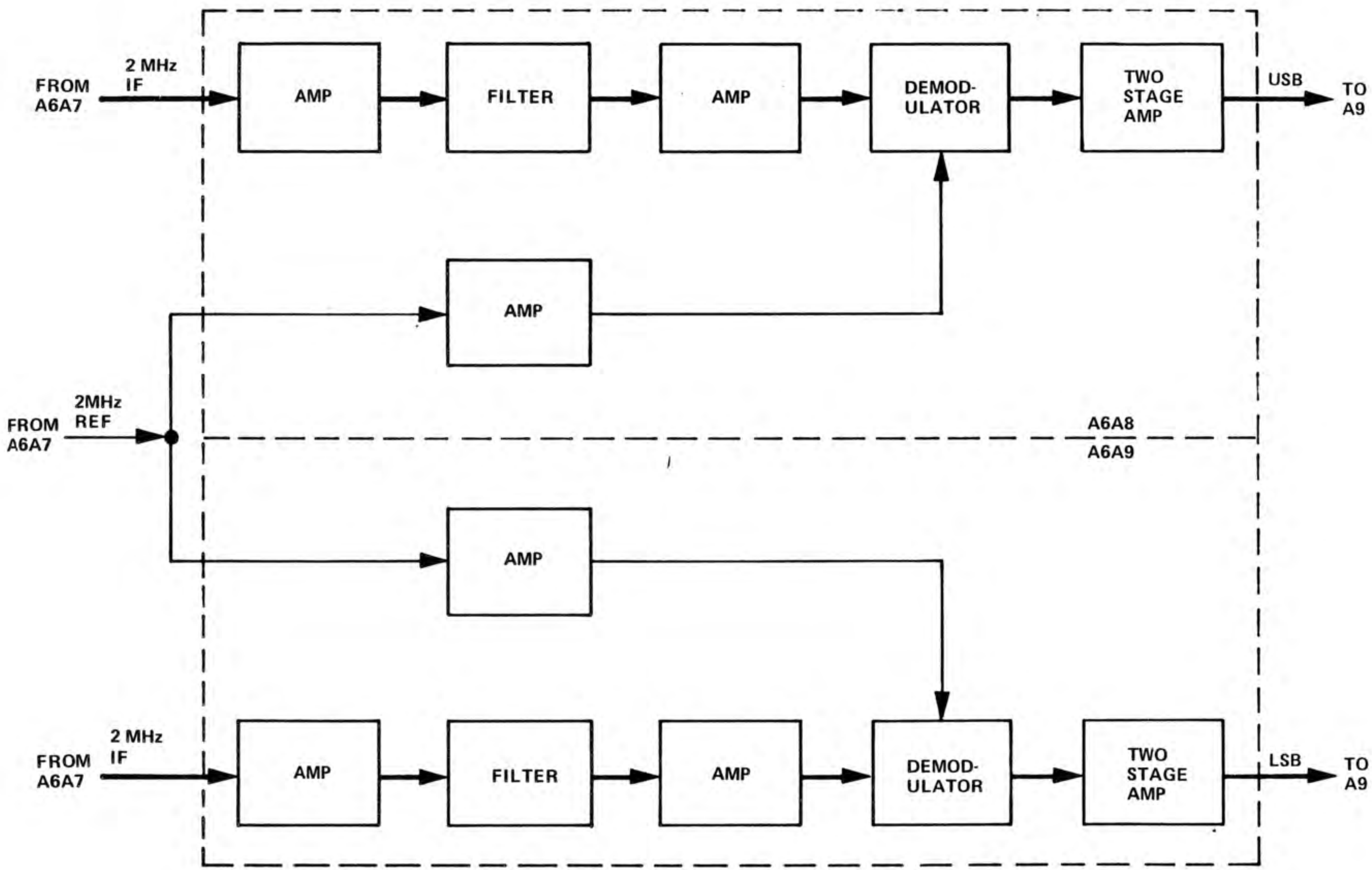


Figure 4-6. USB and LSB Demodulators (A6A8 and A6A9), Functional Block Diagram

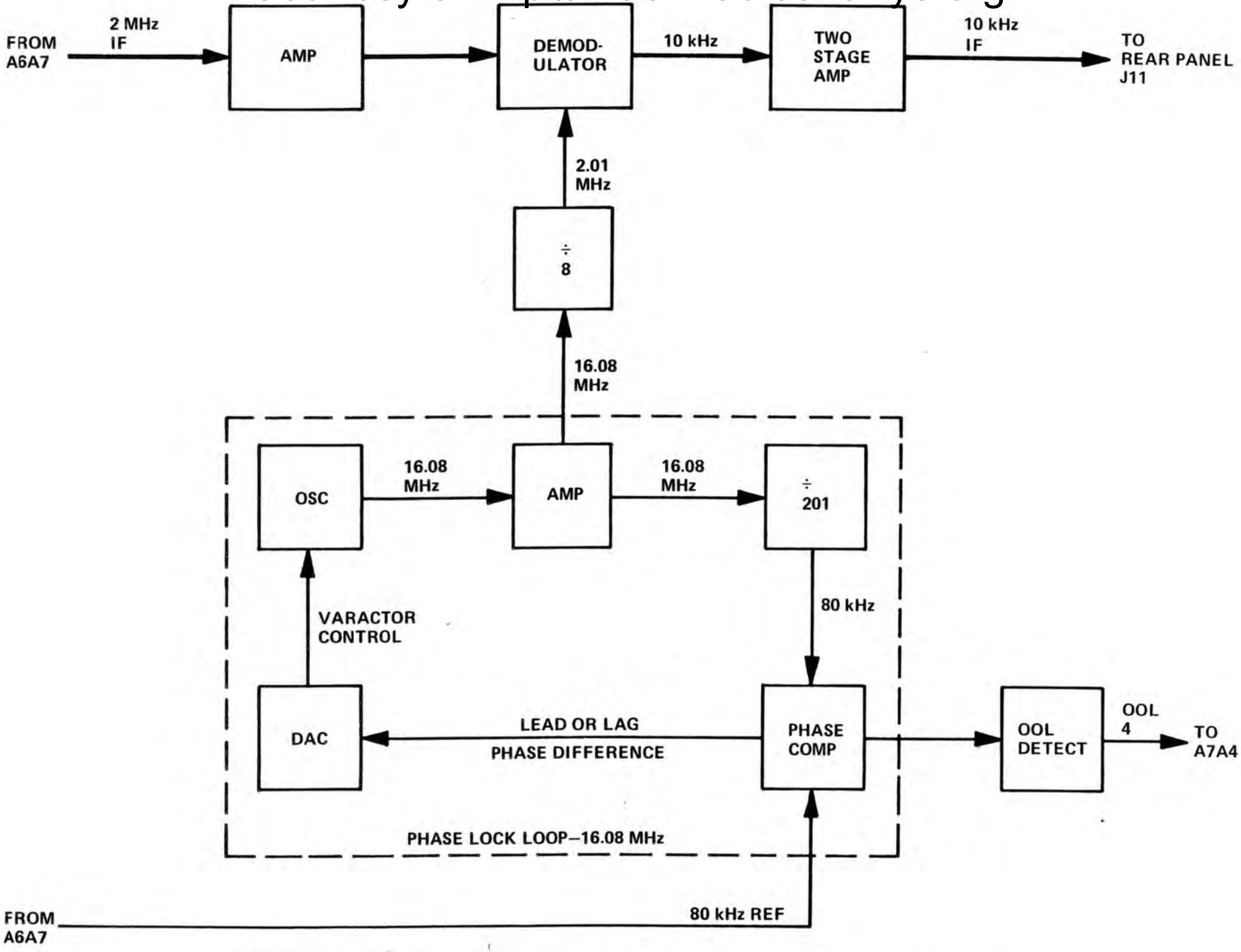


Figure 4-7. 10 kHz Converter (A6A10), Functional Block Diagram

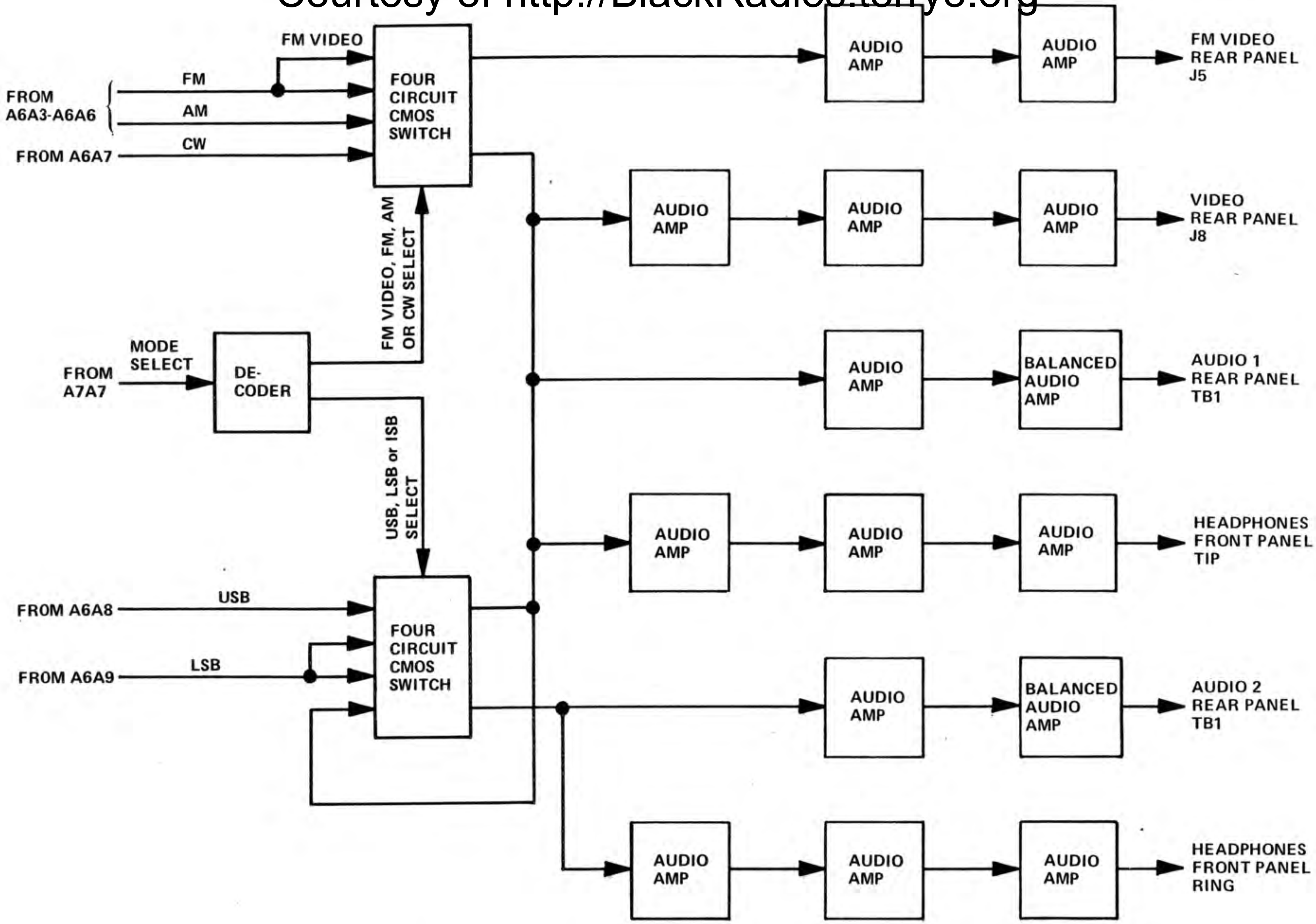


Figure 4-8. Audio/Video Amplifier (A9), Functional Block Diagram

4-34. Figure 7-30 shows the schematic diagram of the Audio/Video Amplifier. The FM, AM, CW, USB and LSB inputs from the IF Assembly are connected to switches U23 and U24. The switch outputs are controlled by signals from Receiver control. The mode signals (2^0, 2^1, 2^2, and 2^3) are connected to decoder U2. Depending on the receiver output mode selected, the control signal A, B, or C is input to decoder U2 and one of the outputs from the decoder actuates the appropriate output switch. The SCAN signal from the digital control circuits is applied during FAST SCAN operations through gate U4B and controls the FM VIDEO output through switch U23. This FM VIDEO output is blocked during FAST SCAN operations. The SCAN signal is routed through gates U4B, U5A and U5B, to deactivate the decoder (U2). Thus, all outputs are blocked during FAST SCAN operations. The A, B and C outputs from switches U23 and U24 connect to the output amplifiers. The A output is applied through operational amplifiers (U8 and U9). The gain of amplifier U8 is controlled by the 10 K FM VIDEO adjustment located on the main chassis. The U9 amplifier output is routed to the FM VIDEO output at rear panel connector J5. The B output is applied to the three separate amplifier chains to provide the VIDEO, AUDIO 1 and HEADPHONES 1 outputs. The VIDEO output amplifier chain consists of operational amplifiers U10, U11, and U12. The gain of amplifier U10 is controlled by the 10 K VIDEO adjust located on the main chassis. The U12 amplifier output is available at the receiver rear panel connector J8 as the VIDEO output. The AUDIO 1 output amplifier chain receives the B input into operational amplifier U13. The gain of U13 is controlled by the 10 K AUDIO 1 (USB) adjustment located on the chassis. The output of U13 drives both operational amplifiers U14A and U14B. These two amplifiers provide the drive for the balanced AUDIO 1 (USB) outputs. These signals are connected to receiver panel TB1 terminals 1, 2 and 3. The HEADPHONES 1 output amplifier chain consists of operational amplifiers U17, U18, and U19. The gain of amplifier U17 is controlled by the HEADPHONE 1 (USB) adjustment located on the front panel. The U19 amplifier output is connected to the HEADPHONE 1 (tip) on the receiver front panel. The C output from switch U24 is applied to the two separate amplifier chains which provide the AUDIO 2 and HEADPHONES 2 outputs. The AUDIO 2 output amplifier chain receives the C input which is routed to operational amplifier U15. The gain of the operational amplifier is controlled by the 10 K AUDIO 1 (LSB) adjustment located on the main chassis. The output of the operational amplifier drives both operational amplifiers U16A and U16B. These two amplifiers provide the drive for the balanced AUDIO 2 outputs. These are connected to receiver rear panel TB1 terminals 4, 5 and 6. The HEADPHONES 2 output amplifier chain consists of operational amplifiers U20, U21 and U22. The gain of amplifier U20 is controlled by the HEADPHONES 2 (LSB) adjustment, located on the main chassis. The U22 amplifier output is connected to HEADPHONES 2 (ring) on the Receiver front panel.

4-35. REFERENCE GENERATOR (A8). Figure 4-9 shows a functional block diagram of the reference generator. The reference generator provides a 10 MHz reference frequency used by modules A4, A5 and A6 as references to oscillator phase lock loops. The reference generator contains an oven temperature controlled crystal oscillator which can operate independently or be further stabilized through an external reference to a phase lock loop for the internal oscillator.

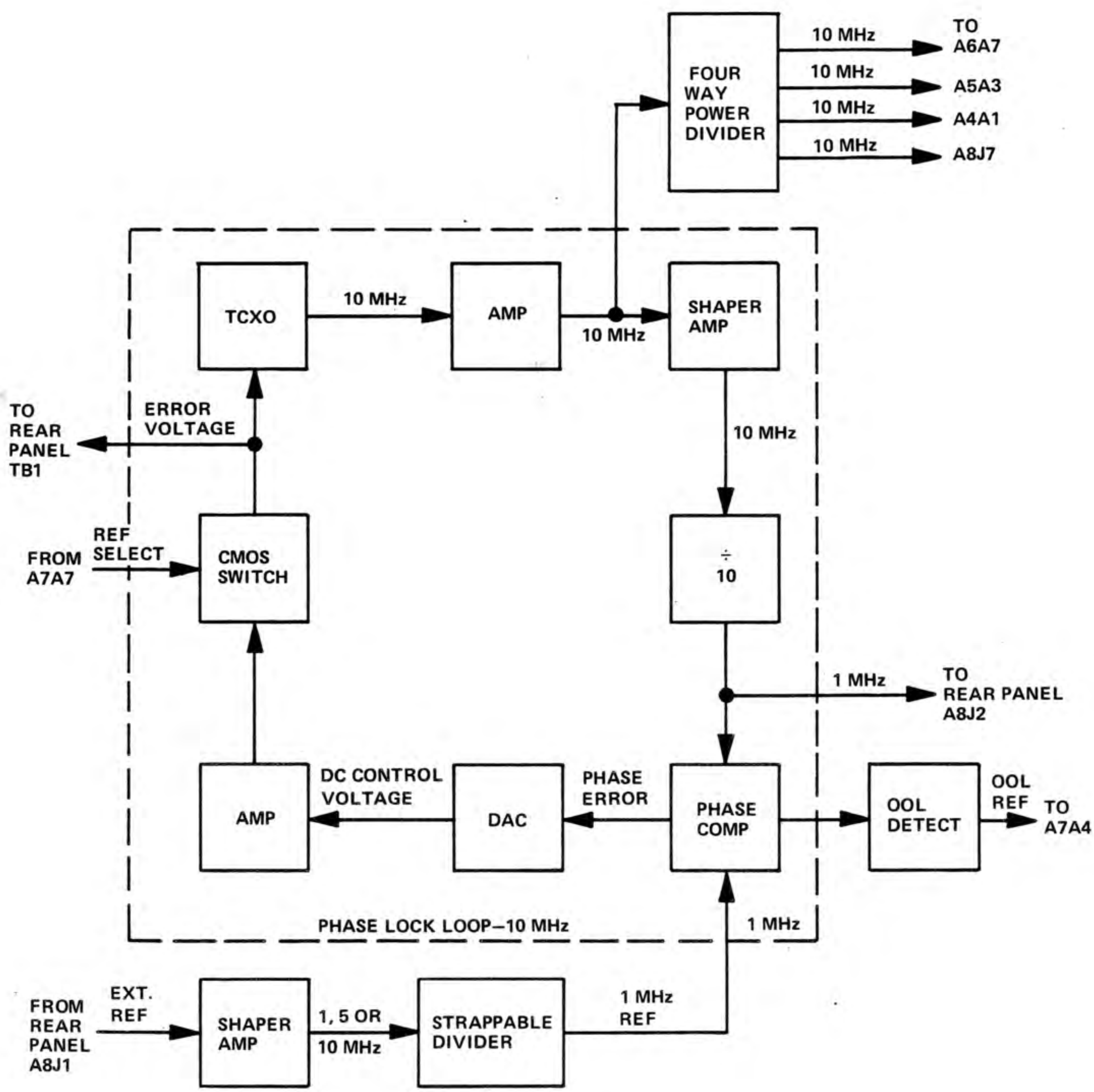


Figure 4-9. Reference Generator (A8), Functional Block Diagram

4-36. Figure 7-29 shows the reference generator schematic diagram. The 10 MHz reference oscillator output is coupled to drive amplifier Q9 which drives a four way power divider (U10). The four outputs of this power divider are routed to modules A4A1, A5A3, A6A7 and to a 56 ohm termination from J7. A portion of the signal from amplifier Q9 is also routed to shaper amplifier Q3-Q4 and connected through inverter U1A to divide-by-10 circuit (U5). The resultant 1 MHz signal is then routed to rear panel connector A8J2 as the 1 MHz REF OUTPUT. If no external reference is used no other circuitry on the module is used except DC supply voltages. When an external reference is used, Receiver control selects and connects the crystal oscillator into a phase lock loop circuit. The external reference, either 1, 5 or 10 MHz is coupled through shaper amplifier Q1-Q2 and inverter U1C to a strappable divider circuit (U2). This circuit must be strapped to provide either a divide-by-10 for a 10 MHz input, a divide-by-5 for a 5 MHz input or the circuit bypassed for a 1 MHz input. The 1 MHz signal is coupled to one clock of the phase comparator (U3) while the divided-by-10 oscillator frequency (1 MHz) is coupled as the second clock input. The phase comparator detects phase error between the two signals and routes it to a digital to analog converter (DAC) Q6, Q7, and Q8. The analog output of the DAC is routed through amplifiers U8A and U8B and CMOS switch U9 to control the frequency of the oscillator. A portion of the phase difference signal from the phase comparator is used to drive an OOL detector (U4C, U1B and U6). The output of this detector drives a LED indicator DSI and is also routed to Receiver control.

4-37. SYNTHESIZER (A5). Figure 4-10 shows an overall functional block diagram of the synthesizer. The synthesizer provides the first LO signal (681.4 to 1161.4 MHz) to the tuner. The module contains five sub modules A5A1-A5A5 which consist of VCO A (A5A1), VCO B(A5A5), controller (A5A2), digiphase processor (A5A3) and programmable divider (A5A4). Each VCO module contains three separate oscillators (total of six) with each covering a different range of frequencies within the 681.4 to 1161.4 MHz range (refer to Table 4-1). The controller module contains the VCO select circuitry that automatically, through Receiver control, selects the appropriate VCO for the required frequency range. A coarse tuning circuit for the surveillance controller is also contained on module A5A2. The digiphase processor module contains circuitry for computing the divide-by-N control word (see paragraph 4-39) and the code for the VCO select circuits. The programmable divider contains the phase lock loop circuits that keep the selected VCO locked on frequency (see paragraph 4-38).

4-38. Frequency Control-Phase Lock Loop. The six VCO's cover a frequency range of 480 MHz between 681.4 and 1161.4 MHz with each VCO covering a 75, 80, or 85 MHz range (refer to Table 4-1). Each VCO can be further controlled to operate in 20, or 25 MHz increments over its range through a band selection technique, then the 20 or 25 MHz range is still further controlled to a resolution of 10 Hz through a phase lock loop that provides a tuning voltage to the varactor of the selected VCO.

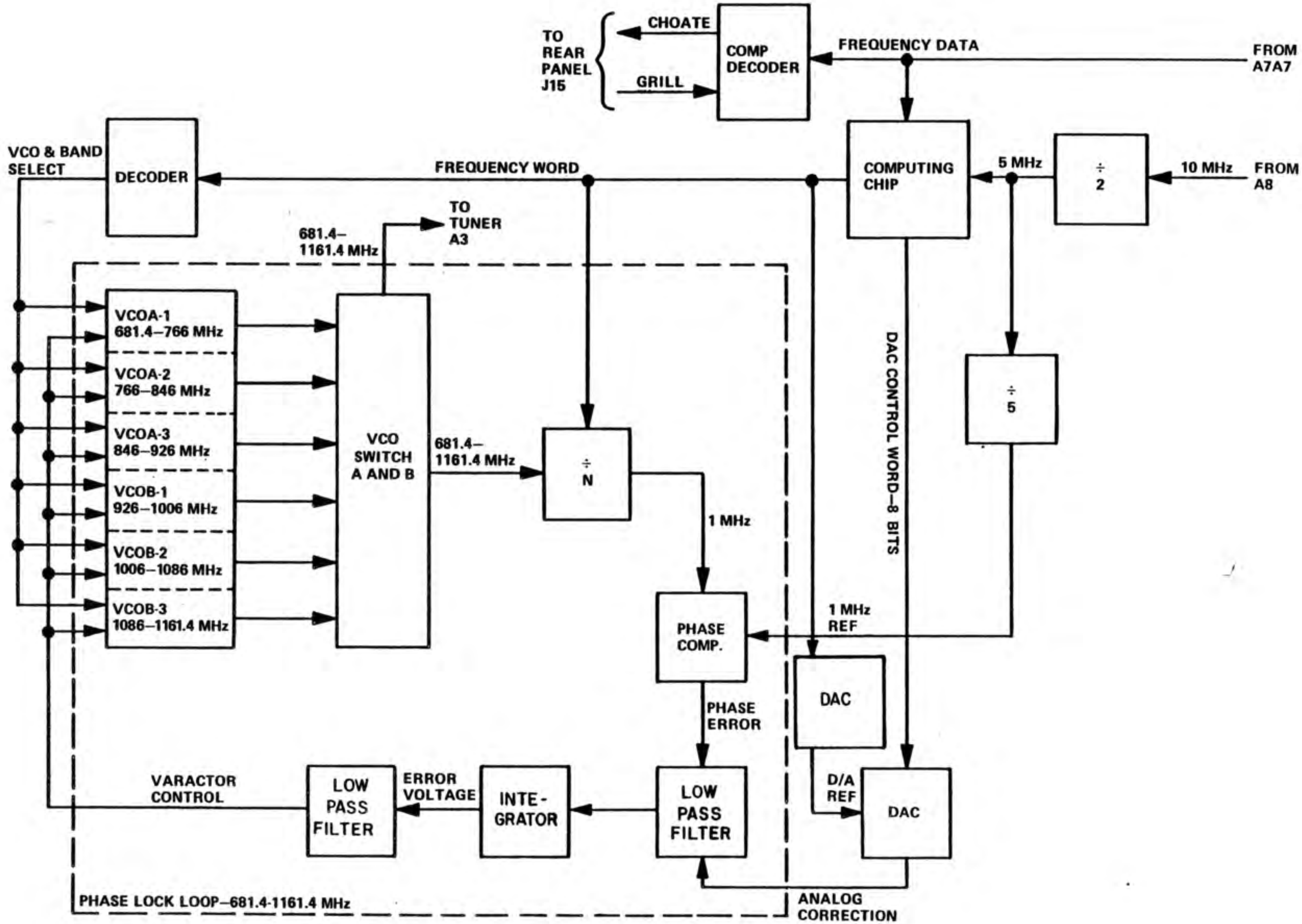


Figure 4-10. Synthesizer (A5), Overall Functional Block Diagram

Table 4-1. VCO Truth Table

	Controller Output								"N" Input		
Band (MHz)	VCO 1	VCO 2	VCO 3	VCO 4	VCO 5	VCO 6	SW1	SW2	VCO A&B	200 MHz	20 MHz
682.4-701.4	1	0	0	0	0	0	0	0	1	4	2
701.4-721.4	1	0	0	0	0	0	0	1	1	4	3
721.4-741.4	1	0	0	0	0	0	1	0	1	4	4
741.4-761.4	1	0	0	0	0	0	1	1	1	4	5
761.4-781.4	0	1	0	0	0	0	0	0	1	4	6
781.4-801.4	0	1	0	0	0	0	0	1	1	4	7
801.4-821.4	0	1	0	0	0	0	1	0	1	4	8
821.4-841.4	0	1	0	0	0	0	1	1	1	4	9
841.4-861.4	0	0	1	0	0	0	0	0	1	5	0
861.4-881.4	0	0	1	0	0	0	0	1	1	5	1
881.4-901.4	0	0	1	0	0	0	1	0	1	5	2
901.4-921.4	0	0	1	0	0	0	1	1	1	5	3
921.4-941.4	0	0	0	1	0	0	0	0	0	5	4
941.4-961.4	0	0	0	1	0	0	0	1	0	5	5
961.4-981.4	0	0	0	1	0	0	1	0	0	5	6
981.4-1001.4	0	0	0	1	0	0	1	1	0	5	7
1001.4-1021.4	0	0	0	0	1	0	0	0	0	5	8
1021.4-1041.4	0	0	0	0	1	0	0	1	0	5	9
1041.4-1061.4	0	0	0	0	1	0	1	0	0	6	0
1061.4-1081.4	0	0	0	0	1	0	1	1	0	6	1
1081.4-1101.4	0	0	0	0	0	1	0	0	0	6	2
1101.4-1121.4	0	0	0	0	0	1	0	1	0	6	3
1121.4-1141.4	0	0	0	0	0	1	1	0	0	6	4
1141.4-1161.4	0	0	0	0	0	1	1	1	0	6	5

NOTES:
1. VCO 1 through VCO 6, +15V @ 5 ma = 1, –15V @ 5 ma = 0
2. SW1 and SW2, +15V @ 60 ma = 1, –15V @ 60 ma = 0
3. VCO A & B, +15V @ 5 ma = 1, –15V @ 5 ma = 0

4-39. The phase lock loop that tunes the selected VCO to a resolution of 10 Hz is accomplished by comparing the oscillator output frequency to an accurate stable reference frequency, developing an error voltage from any phase difference and then driving the oscillator varactor with that error voltage to correct oscillator frequency. To accomplish this a reference from the temperature controlled crystal oscillator is used and divided by ten to provide a 1 MHz reference for better sensitivity to phase difference. The oscillator output frequency must then be divided to correspond to this 1 MHz reference. Since the oscillator frequency can vary between 681.4 and 1161.4 MHz the divide-by number must be variable and to accomplish a resolution of 10 Hz it must be fractional. This can be more clearly demonstrated by using the formula N=Fo divided by Fr; where N is the divide-by number, Fo the oscillator frequency and Fr the reference frequency. Assume that Fo is 701.234670 MHz and the reference frequency is 1.0 MHz, then using the above formula the result is: 701.234670(Fo) divided by 1.0(Fr) = 701.234670(N). If we split this number into its integer part and its decimal part, the result is a three-decade integer and a six-decade decimal number. Generating the non-integer part as an actual frequency is done by considering a portion of the frequency spectrum of interest, between 701 MHz and 702 MHz, where this finally generated frequency will occur. Thus, it is possible to generate any signal between these two frequencies by an averaging technique; that is to say if the signal at 702 MHz is sampled 234,670 times and the signal at 701 MHz is sampled 765,330 times (1,000,000-234,670) then the average or apparent signal produced by this sampling would occur at the frequency of interest at 701.234670 MHz. This type of sampling produces a large number of sampling sidebands on the main output frequency. These can be removed, however, by a correction signal equal and opposite to these predictable sidebands and adding this to the oscillator control signal, effectively nullifying the production of these sidebands. Since the synthesizer generates frequencies to within 10 Hz, the decimal part need only contain five decades.

4-40. As shown in Figure 4-10 the computing chip provides the frequency word to the divide-by-N circuit which varies the N number to produce 1 MHz from the oscillator frequency. If the oscillator drifts off frequency or the frequency is changed through Receiver control, the output of the divide-by-N will be either 1 MHz plus or minus, depending on direction of change. The phase error between this divided oscillator frequency and the reference frequency will be detected by the phase comparator and applied to an integrator. The computing chip also provides a digital correction for nullifying the unwanted sidebands and applies it to a digital to analog converter (DAC). The analog correction signals from the DAC is also applied to the integrator which integrates the signals to produce an error voltage. This error voltage is routed to the oscillator's varactor. The frequency word from the computing chip is also coupled to a binary decoder which supplies the VCO and band select signals which selects the appropriate oscillator and its band to within 20 MHz of the selected frequency. The phase lock loop, with its divide-by-N controlled by the frequency word, then causes the oscillator to adjust to the frequency selected.

4-41. VCO A and VCO B (A5A1 and A5A5). Figure 4-11 shows a functional block diagram of both modules while Figures 7-9 and 7-13 show the schematic diagram of each module. Each VCO contains an oscillator Q1, with a tuned tank circuit consisting primarily of inductors Z1, Z2 and Z3 and varactor CR3. Inductors Z2 and Z3 can be switched in and out of the tuned tank by band 1 and band 2 selection through diode switches CR1 and CR2 respectively. The band selection can select neither band (VCO low frequency), band 2 (VCO low frequency +20 MHz), band 1 (VCO low frequency +40 MHz) or both band 1 and band 2 (VCO low frequency +60 MHz). The varactor, receiving its control voltage from the phase lock loop, provides for tuning the oscillator between the 20 MHz bands as described in paragraph 4-40. Refer to Table 4-1 for a list of frequencies from each band of all six VCOs. The VCO selection controls the bias of diode switches that select the appropriate VCO for the frequency range selected. Since the six VCOs are contained on two modules (three on each module) a module select signal (VCO A or VCO B) selects the appropriate module by biasing a diode switch located on the LO output module (A5A5). The LO output is then coupled through a buffer amplifier and direction coupler to the A3 module.

4-42. Controller (A5A2). Figure 4-12 shows a functional block diagram of the controller while Figure 7-10 shows its schematic diagram. The seven most significant bits (DIV5-DIV11) of the control word N, from the digiphase processor module, are applied to a binary decoder (U1). The decoder outputs are the control signals for the selection of the VOC "A" or "B" module, the selection of the VCO 1, 2 or 3 oscillator within each module and the selection of the required 20 MHz band (Band 1, Band 2). The outputs from decoder U1 are applied through driver amplifiers U2-U5 and are routed to the appropriate VCO "A" and/or VCO "B" modules.

4-43. The A5A2 module also contains a coarse tune circuit that alerts the RG-1340 Surveillance Controller (when being used with the Receiver) to abrupt tuning changes in the VCO. This output is generated when there is an abrupt change in tuning data (in the 200 or 20 MHz digit, see Table 4-1). This will cause the RG-1340 to discard the Receiver outputs until the active VCO is stabilized. Counter U7, which is clocked by strobe W, counts the D0-D4 bytes in a control word string. Decoder U6A resets counter U7 at the start of each control word string. Gates U10A and U10B recognize the particular 200 and 20 MHz bytes in a string and activate latches U12 and U15. When subsequent readings of these particular bytes indicate a change, comparators U11 and U14 will reset flip-flops U8A and U8B. The outputs of U8A and U8B drive effective OR gate U12A which produces the CHOATE output to the RG-1340 controller. After waiting sufficient time for stabilization, the RG-1340 will send the GRILL signal which will set flip-flops (8A and 8B).

4-44. Digiphase Processor (A5A3). Figure 4-13 shows a functional block diagram of the digiphase processor. This module receives frequency data from Receiver control and generates the frequency word (divide-by-N control word) which is routed to the controller and to the programmable divider. This module also generates the analog correction signal and a 1 MHz reference signal used by the programmable divider.

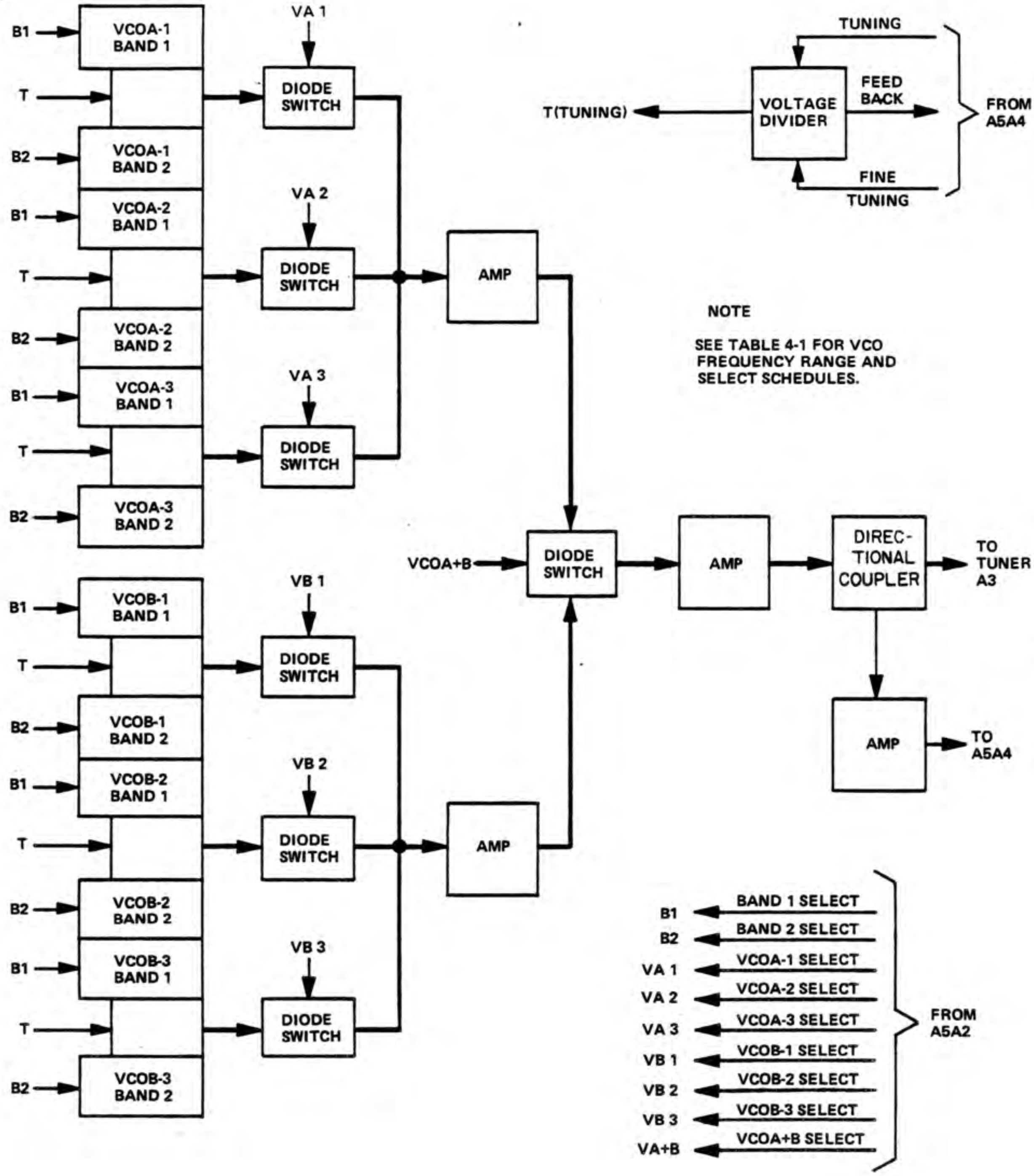


Figure 4-11. VCO A A5A1) and VCO B (A5A5) Functional Block Diagram

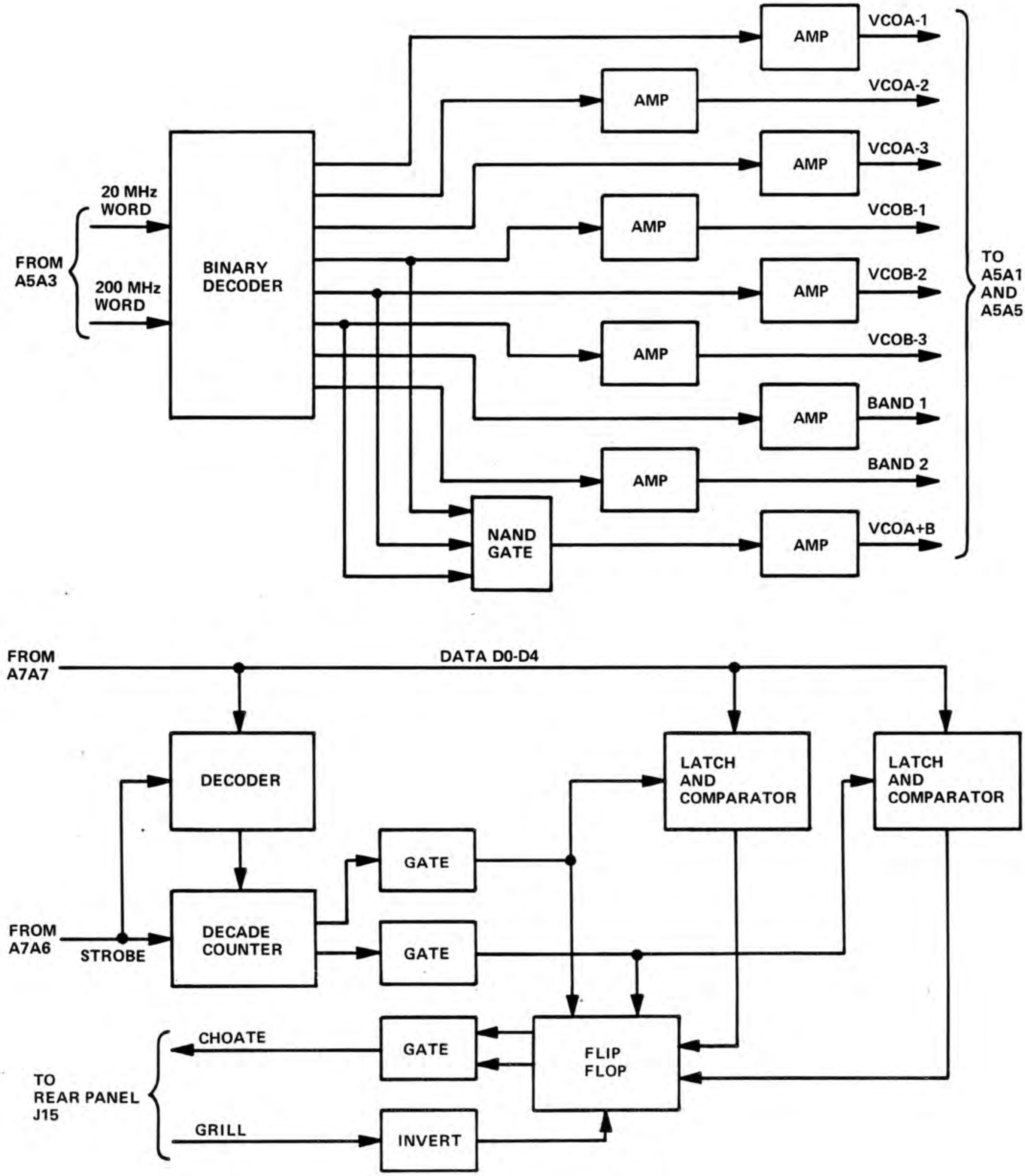


Figure 4-12. Controller (A5A2), Functional Block Diagram

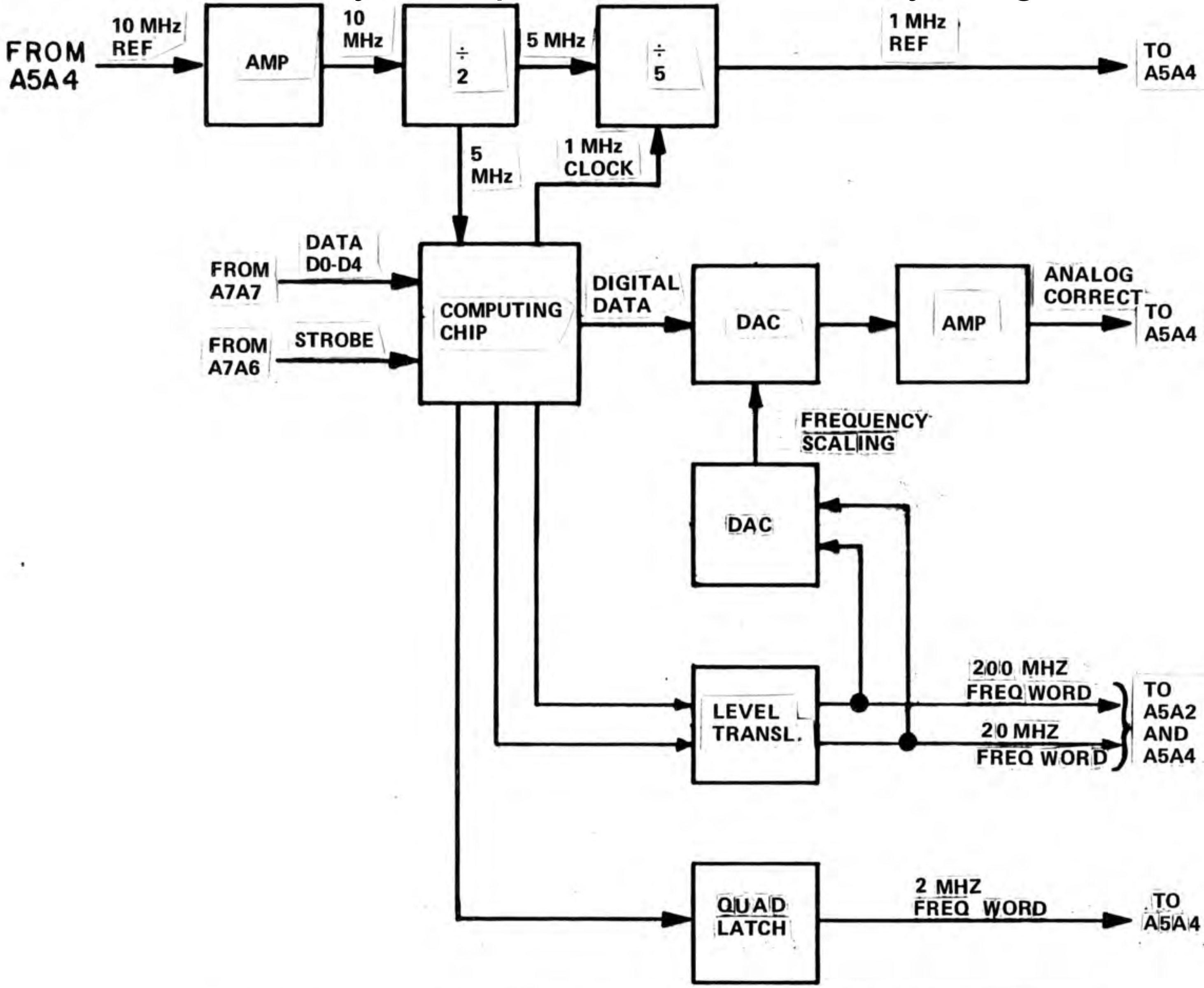


Figure 4-13. Digiphase Processor (A5A3), Functional Block Diagram

4-45. Figure 7-11 shows the schematic diagram of the digiphase processor. The frequency data from Receiver control is processed by computing chip (U7). The frequency data (DO-D4) is a string of ten 5-bit characters and are strobed into U7 by strobe W from Receiver control. The computing chip computes the digital BCD value of N and outputs this data as the DIV 1 - DIV 11 outputs. The DIV 1 - DIV 4 outputs are routed through quad latch U3 to the programmable divider as divide-by-N control word 2 MHz. The DIV 5 - DIV 11 outputs are routed through level translators U5 to the programmable divider as divide-by-N control words 20 MHz (DIV 5 - DIV 8) and 200 MHz (DIV 9 - DIV 11) and to digital to analog converter (U6). The computing chip also supplies an eight bit digital word (DA 1 - DA 8) to digital to analog converter U8 for an analog correction signal used in the programmable divider. Digital to analog converter U8 also receives an analog reference signal from U6 through operational amplifier U10B. This signal was derived from the divide-by-N control words routed to and converted by U6. The analog correction signal from U8 is routed to the programmable divider through operational amplifier (U10A). The computing chip (U7) requires a clock signal which is derived from the 10 MHz reference frequency. The 10 MHz reference frequency routed from A5A4, is coupled through a low pass filter (C1-C3 and L1), transistor amplifier Q1 and buffer amplifiers U1A, U1B and U1C to the clock input of flip flop U4A. The 5 MHz output from U4A is routed through transistor Q2 to the clock input of U7. The 5 MHz output of U4A also drives the clock of flip flop U4B while the 1 MHz clock output of U7 drives its D input. The output of U4B is a 1 MHz reference and is routed to A5A4.

4-46. Programmable Divider (A5A4). Figure 4-14 shows a functional block diagram of the programmable divider. This module provides the phase lock loop for the VCO frequency. The VCO frequency received by the module is divided as directed by the divide-by-N control word from the digiphase processor, phase compared to a reference frequency and then integrated into an error voltage for tuning the VCO.

4-47. Figure 7-12 shows a schematic diagram of the programmable divider. The 1st LO signal from the selected VCO drives amplifier U1 which in turn drives the prescaler (U2) which divides by either 20 or 22. The prescaler contains a divide-by-2 counter followed by a divide-by-10 or 11 counter. The counter control input to the prescaler determines whether the counter divides by 10 or 11. A binary coded decimal (BCD) counter is formed by U3, U4 and U5 with U3 containing unit digits, U4 the tens digits and U5 the hundreds digits. The preset inputs to this counter are the N value DIV1-DIV11 from the digiphase processor module. These inputs are labeled 2 MHz, 20 MHz and 200 MHz because of the divide-by-2 in prescaler U2.

4-48. The prescaler U2 drives (for countdown) the units counter (U3) and the interconnected tens and hundreds counter (U4 and U5) separately; that is, the output of the units counter (U3) does not connect to the input of the tens counter (U4). Thus, during countdown, while there are values greater than zero in the units counter, the counter control zero detect circuit (flip-flop U6A) sets prescaler U2 to count by 11. Each output of the prescaler decrements both the units section and tens and greater section of the programmable counter by 1. This effectively subtracts 11 from the programmable counter. When the units section counts down to zero, the counter

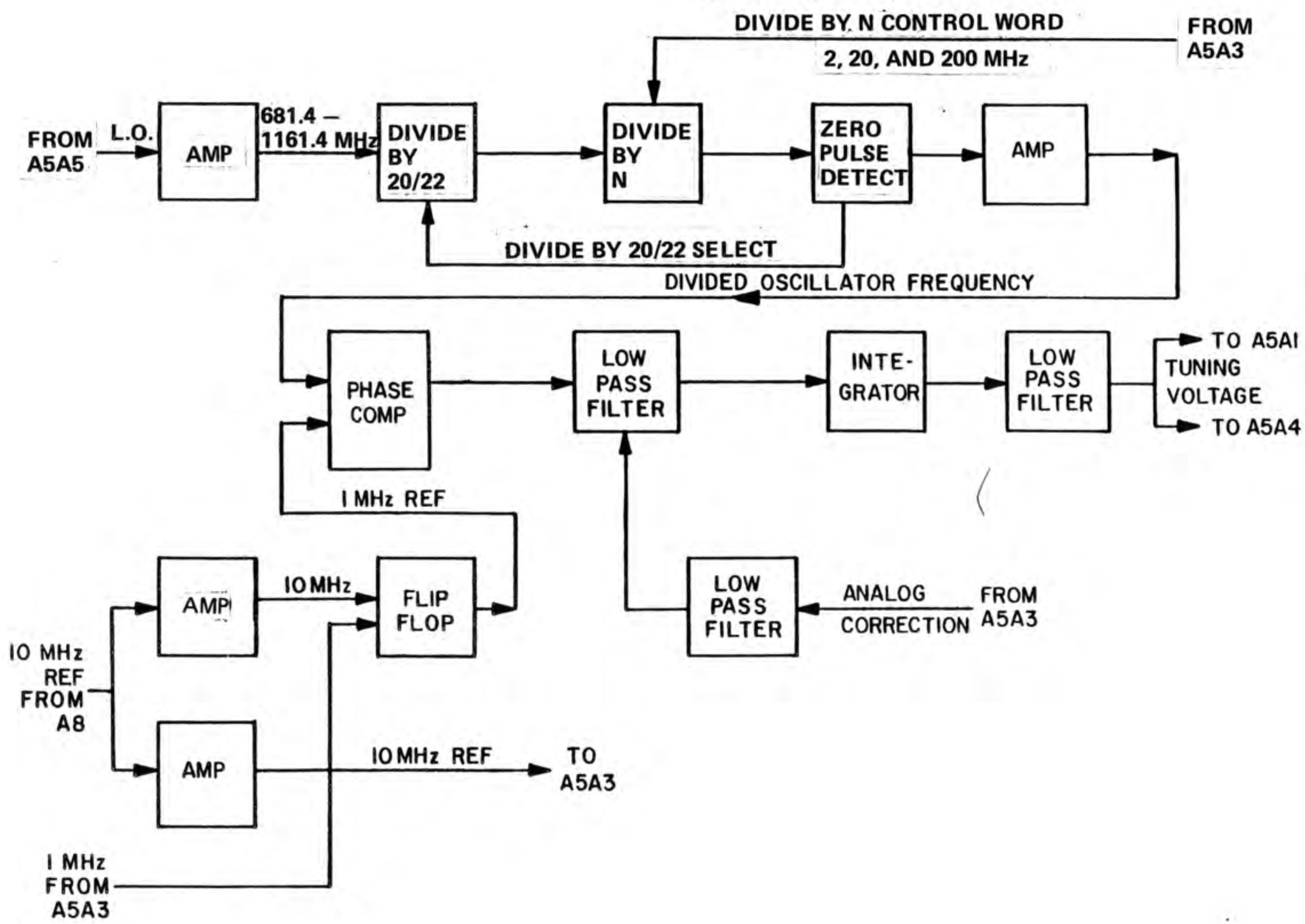


Figure 4-14. Programmable Divider (A5A4), Functional Block Diagram

control zero detector (U6A) sets the prescaler to count by 10 (after divide-by-2). Each output now decrements the tens and greater sections of the programmable counter by one, effectively subtracting 10 from the counter. When the counter has counted down to zero (N counts), the flip-flop U6B is set. At the next input pulse (from the prescaler) the programmable counter is loaded to start another count cycle and flip-flop U6B is reset. Thus, Q and Q outputs produce a pulse for each N count. The Q output of U6B drives the clock input of phase detector flip-flop U7A through transistor Q1. Phase detector flip-flop U7B is driven by the 1 MHz reference (described later). The Q outputs from phase detector flip-flop (U7A and U7B) drive NAND gate flip-flops (U8A - U8D). Thus, pulses will be obtained from the Q outputs of U7A and U7B whose relative phase and widths will indicate the phase error between the VCO output and the reference signal. The phase error pulse signal from the phase comparator is then coupled through a low pass filter (C22-C25, L3-L6 and R18-R24) to an integrator network (C26, C27, CR1-CR4, R25, R26 and U10). This circuit also receives the analog correction signal from A5A3 and integrates this signal with the phase error signal and provides a DC error voltage output. This error voltage is then routed through a low pass filter (C30, C31, L7, R30 and R73) to the voltage controlled oscillators for tuning. The 1 MHz reference used by the phase comparator is derived from the 10 MHz reference generator and the 1 MHz reference from the digiphase processor. The 10 MHz reference is routed through transistor amplifier Q2 to the clock input of flip flop U9A. The 1 MHz reference from the digiphase processor is coupled to the data input of this same flip flop so that it is clocked through the flip flop every tenth pulse of the 10 MHz reference. This technique provides a clean 1 MHz reference which is then routed to the phase comparator. The 10 MHz reference signal is also routed through FET amplifier Q3 to the digiphase processor.

4-49. SECOND LOCAL OSCILLATOR (A4). Figure 4-15 shows a functional block diagram of the second local oscillator. The module generates the 640 MHz signal used in the tuner's second mixer. The circuit consists of a voltage controlled oscillator and a phase lock loop circuit to maintain oscillator stability.

4-50. Figure 7-7 shows the schematic diagram of the second LO. Oscillator stage Q3 generates the second LO frequency of 640 MHz. This 640 MHz signal, through buffer amplifier U8, is the 640 MHz second LO to the down converter in the tuner. The 640 MHz output from the oscillator is also coupled through shaper amplifier U7 to a divide-by-4 circuit (U6) and a divide-by-16 circuit (U5). The 10 MHz output of U5 (640 MHz divided by 64=10 MHz) is one input of the mixer (U2) while the other input is the 10 MHz reference (from Reference Generator A8). The output of the mixer (the phase detector error signal) drives the differential amplifier Q1-Q2. The output from this amplifier is applied through switch U3 as the error signal to varactor CR1, thereby locking the oscillator at 640 MHz. The error signal from the collector of Q1 drives amplifier stages U4A, B, C and D. The output from U4B through FL8 is the Out Of Lock (OOL) signal. When a small phase error exists, U3 connects input pin 15 (not pin 3) to pin 14. This allows the error signal from the collector of Q2 to be smoothed by the R8, R9, C8, C7, C42 filter before being applied to CR1. However, when the phase error signal is very large, U3 connects pin 3 to pin 14. This allows the error signal from the collector to by-pass the delaying filter, thereby allowing a rapid correction in the oscillator frequency.

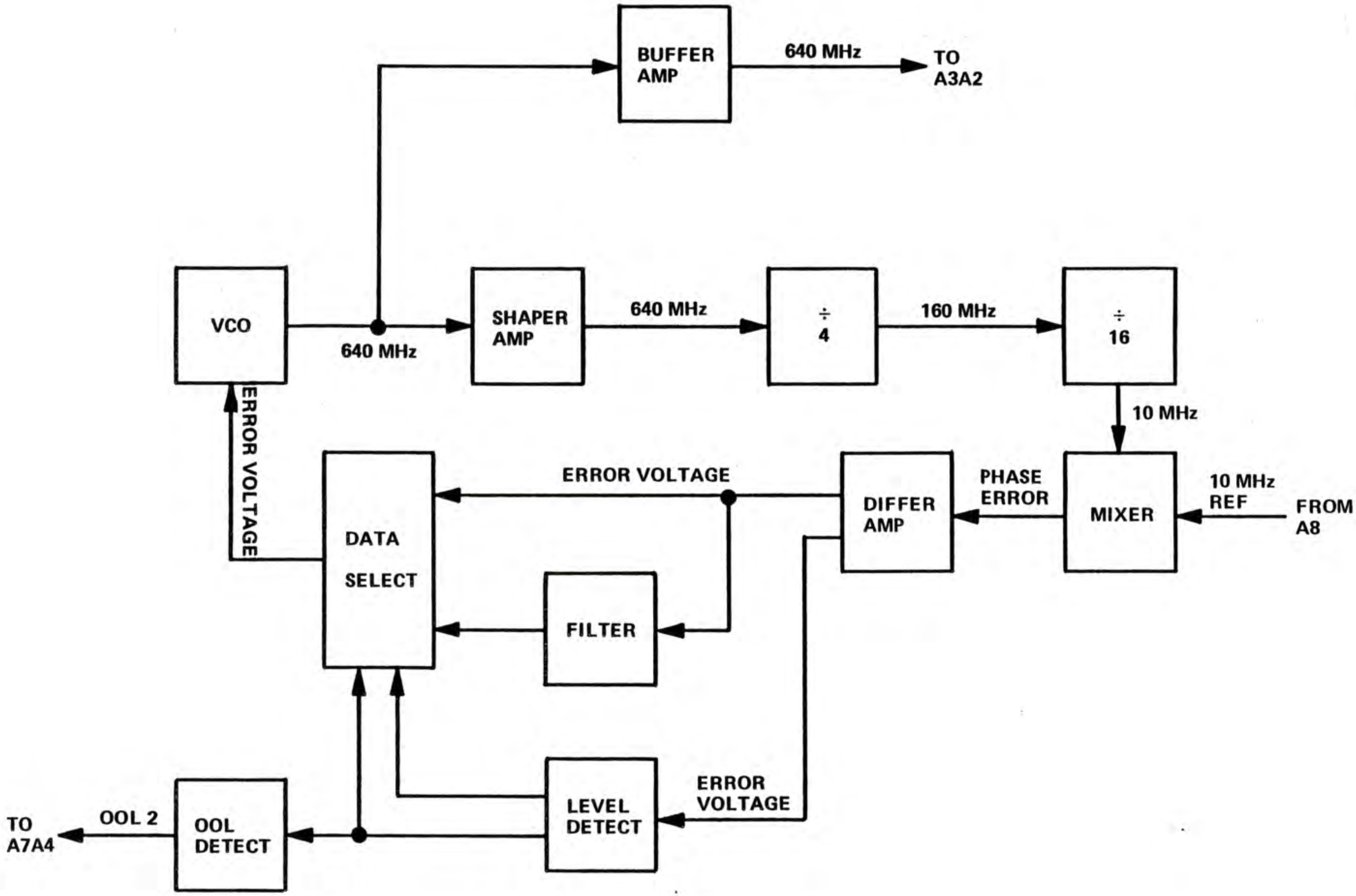


Figure 4-15. Second L.O. (A4), Functional Block Diagram

4-51. RECEIVER CONTROL (A2 and A7). Figure 4-16 shows an overall functional block diagram of Receiver Control. The circuits of Receiver control are contained in two modules: front panel assembly A2 and Receiver control module A7. The front panel assembly contains; tune and RF gain controls, remote/local select, phones jack and its level controls, tuning and level meters, power switch, keyboard and its decoder and displays. The Receiver control module contains; the CPU (A7A2), front panel interface (A7A4), display drivers (A7A5), address decoder (A7A6), control outputs (A7A7), converters (A7A8) and IEEE interface (A7A9).

4-52. Receiver control is a microcomputer based control distribution center for all Receiver functions. This control can be initiated from and through the front panel (LOCAL), from a remote controller through the Receiver IEEE interface module (REMOTE) or from a surveillance controller through the control outputs module (FAST SCAN). Control direction entered at the front panel (LOCAL) is directed through the front panel interface module to the microcomputer data bus. This data flow is controlled by strobes from the CPU address decoder. Information on the data bus is processed by the CPU and strobed through the converter, the control outputs and display drivers to the appropriate Receiver functions. When the Receiver is operated in the REMOTE mode, control data is routed through the IEEE interface to the microcomputer which processes the data and routes it to Receiver functions in the same manner as data received from the front panel. Receiver status is sent to the Remote Controller through the same interface upon request. When the Receiver is operated in the FAST SCAN mode through a surveillance controller, control is effected through the control outputs module. A FAST SCAN strobe from the surveillance controller is routed to the microcomputer through the front panel interface module to override REMOTE or LOCAL operation during this mode.

4-53. The microcomputer in conjunction with the address decoder performs the following functions:

a. Initializes circuits upon application of power.

b. Retains Receiver operating parameters in memory during power off.

c. Determines priorities of command request.

d. Reads front panel commands in LOCAL mode.

e. Reads remote controller commands in REMOTE mode.

f. Overrides REMOTE/LOCAL mode in FAST SCAN mode.

g. Computes and directs Receiver operating parameters.

h. Updates front panel displays in both REMOTE and LOCAL modes.

i. Sends remote controller Receiver status upon request.

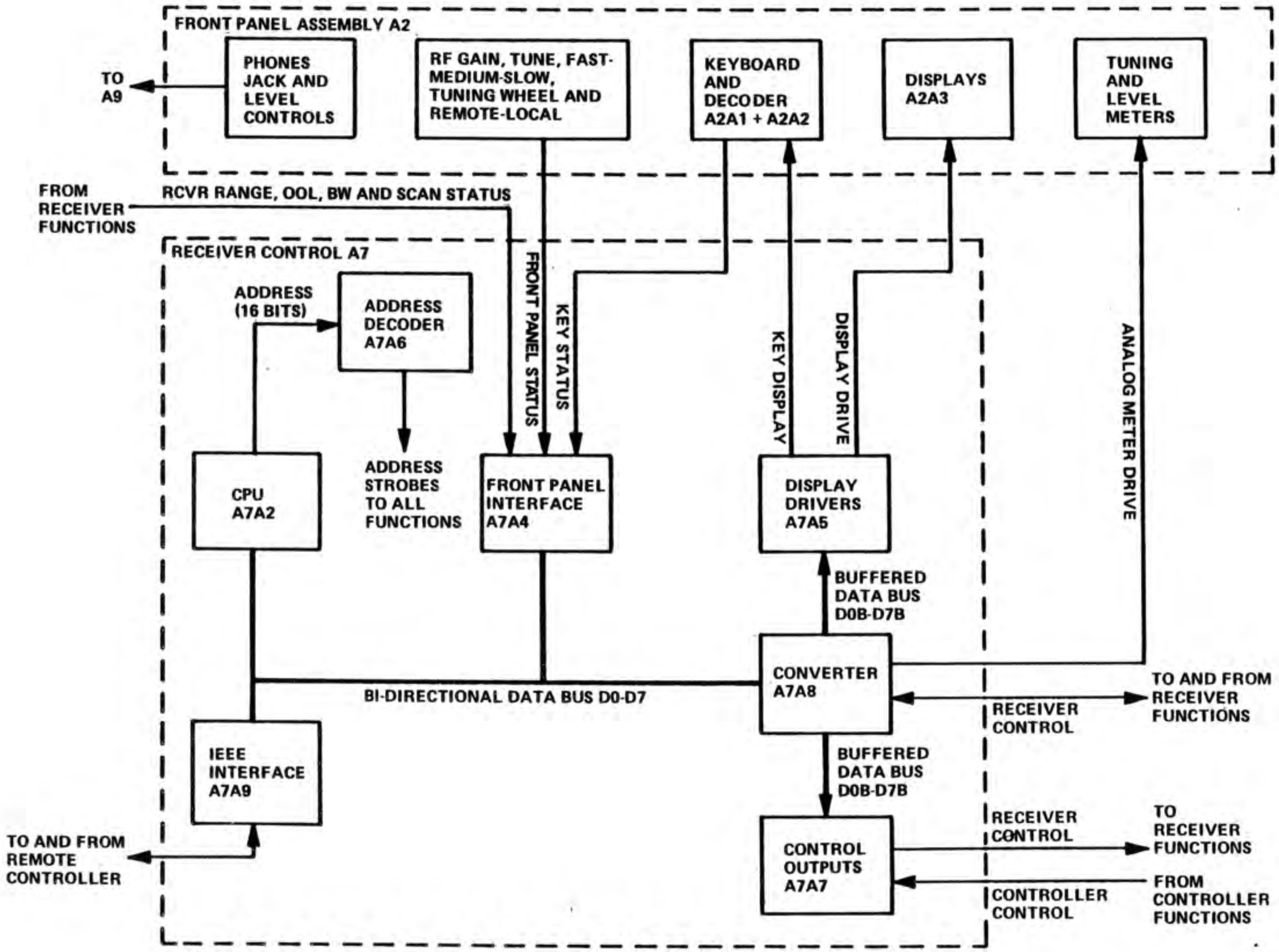


Figure 4-16. Receiver Control, Overall Functional Block Diagram

When power is turned on, the microcomputer starts the initialization process executing the stored program memory location zero. Initialization includes setting all circuitry to starting conditions and setting receiver controls and displays to values retained in memory. After initialization, the microcomputer operates a continuous background program to monitor for out of lock conditions. During this background program, the microcomputer will respond to interrupt requests. The interrupt will request the microcomputer to stop the background program and service the interrupt. For example, for a change in a front panel setting in LOCAL operation, the interrupt service program reads the front panel settings, stores the latest settings in memory, computes the new Receiver parameter control data and sends this data to the appropriate Receiver circuits. After completion of the service program, the microprocessor returns to the background program or responds to the next interrupt. The interrupt requests (IRQ) serviced by the microprocessor, in their order of priority, are:

a. IRQ 6. Front Panel display update is requested automatically at approximately 2 millisecond intervals.

b. IRQ 5. Remote Control in REMOTE mode upon command or request from remote controller.

c. IRQ 4. REMOTE/LOCAL mode as directed by front panel control.

d. IRQ 3. FAST SCAN as requested by the surveillance controller.

e. IRQ 2. Keyboard, upon request from front panel keyboard.

f. IRQ 1. RF Gain or Tuning, as directed by front panel controls.

g. IRQ 0. Tuning wheel as directed by front panel control.

4-54. Microcomputer (A7A2). Figure 4-17 shows a functional block diagram of the microcomputer. The module contains a Central Processing Unit (CPU), Read Only Memory (ROM), Random Access Memory (RAM), Priority Interrupt Controller (PIC), memory retention and reset circuitry, a clock, and in and out gates. The CPU directs operations in accordance with the program sequences permanently stored in the ROM while the RAM is used for temporary data storage during processing. The CPU reads from, or writes to, the other units of the digital control in the programmed sequences. This is done through the bidirectional 8-bit data bus (D0-D7) by addressing the appropriate units through the 16-bit address bus (A0-A15) and the address decoded strobes from the address decoder module (A7A6). At power turn on, a RESET is applied to the CPU. This causes the CPU to go to zero or the starting address in the ROM where the initialization program sequence starts. The ROM supplies instructions to the CPU to carry out the initialization sequence. When the sequence is completed, the CPU then goes to its background program and will now respond to the interrupt request (IRQ) received from the PIC. The PIC receives the seven interrupt requests IRQ 0-6, as shown in Figure 4-17. When any of these requests are made, the PIC sends the IRQ to the CPU. When the CPU

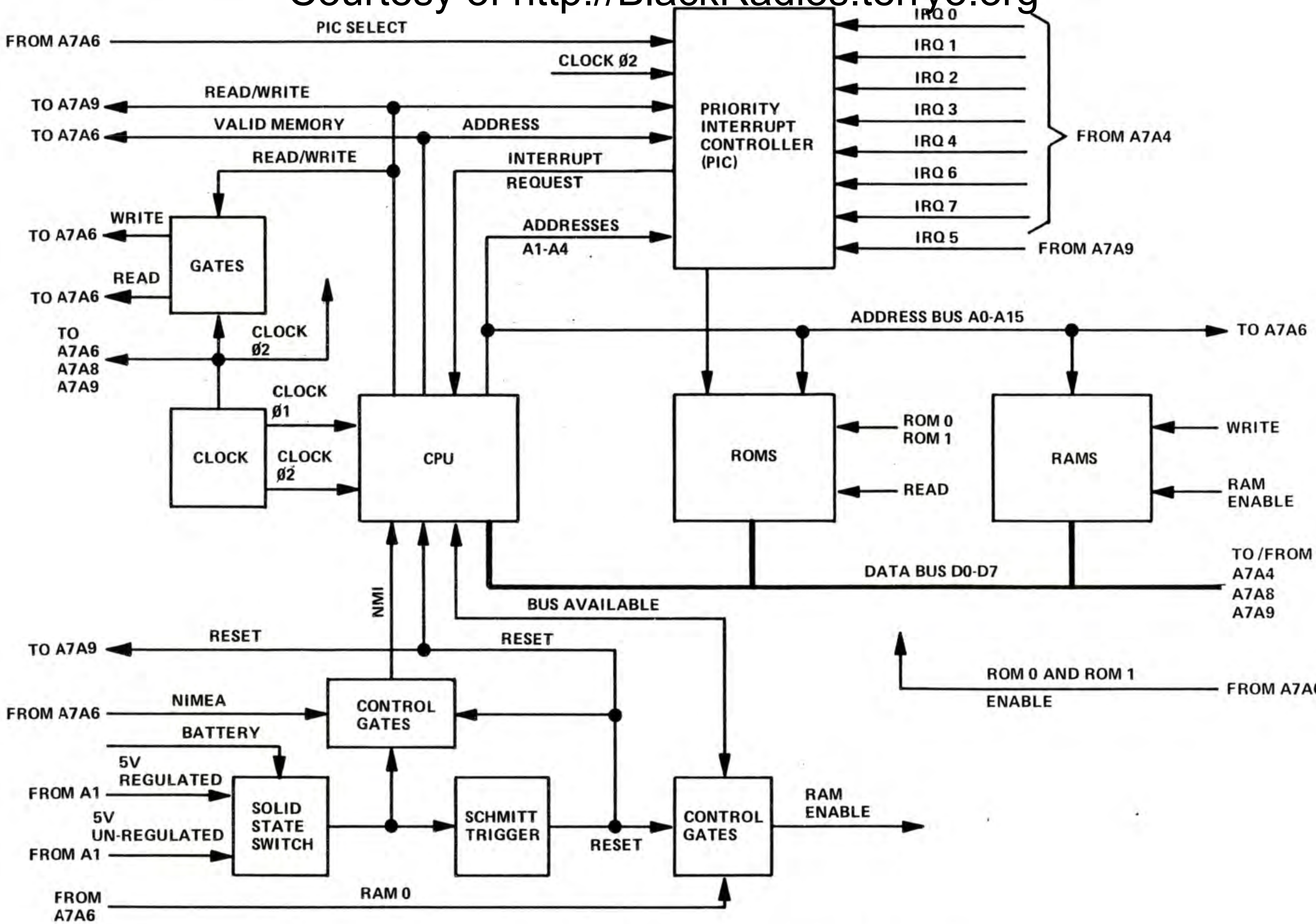


Figure 4-17. CPU (A7A2), Functional Block Diagram

is ready to receive the interrupt request, the PIC is allowed to place the starting program address of the highest priority interrupt request on the address bus. This address is the starting address of the interrupt servicing sequence stored in ROM. Thus, the CPU receives the instructions from the ROM to carry out the interrupt service routine. At power turn-off, the Non Maskable Interrupt (NMI) is sent to the CPU which causes it to go into its power down sequence. This also causes the RAM to operate in a very low power drain state (still capable of retaining memory). The stand-by battery supplies power to the RAM while external power is off and is charged when external power is supplied.

4-55. Figure 7-22 shows the schematic diagram of the CPU. Data flow in and out of the CPU (U2) is accomplished through the 8 bit bi-directional data bus (D0-D7) while CPU commands to all functions are accomplished through the 16 bit-address bus (A0-A15), read write (R/W) strobe, valid memory address (VMA) strobe and bus available (BA) strobe. CPU timing is achieved through clock signals (Ø1 and Ø2) from clock U1. The CPU receives an interrupt request from the PIC (U5) which determines priorities from its seven interrupt requests. PIC is selected in program sequence from CPU addresses through the address decoder. The PIC also routes address lines A1 to A4 to the appropriate ROM area which then outputs its stored data onto the data bus. Other address lines are connected directly from the CPU to other areas of the ROM and to the RAM. The ROM (U3 and U4) holds up to 2K 8-bit words and contains the program memory while the RAM (U10 and U11) can contain up to 1K 8-bit words of working memory. Both the ROM and RAM are enabled from decoded addresses and read and write strobes. VMA from the CPU strobes both the PIC and memory enable in timed sequence with the CPU clock Ø2. The read strobe is obtained from the CPU/RW strobe timed through NAND gate (U7C) by clock Ø2 and is used to enable the ROM output. The write strobe is obtained in the same manner as the read strobe except the R/W strobe is inverted by U9A before being clocked through its NAND gate (U7B). This strobe is used to enable the RAM. The read and write strobes are also routed to the address decoder while the CPU R/W strobe is routed to the IEEE interface. Data from the CPU, ROMS, RAMS, modules A7A4, A7A8 and A7A9 are strobed onto the data bus in program sequence by the decoded address signals, while data on the data bus is strobed, also in program sequence, to the CPU, RAM and modules A7A8 and A7A9. This data is further processed by the modules and routed to the appropriate Receiver functions.

4-56. The microcomputer also contains a memory retention and reset circuit to retain memory in the otherwise volatile memory of the RAM and to provide a reset signal to the CPU and to the IEEE interface when power is turned on. At power on, the +5V unregulated input voltage turns on transistor Q2. The signal from Q2 through inverting Schmidt trigger U8, begins to charge capacitor C1. The charge time of capacitor C1 assures that the +5V supply will stabilize throughout the microcomputer circuitry. After capacitor C1 has charged sufficiently, Schmidt triggers U8 are triggered supplying the RESET to the CPU. This causes the microprocessor to complete the initialization routine and start program operations. At power on, flip-flop

U13A, flip-flop U7D-U7A and flip-flop U6B-U6C are set. Flip-flop U6B-U6C allows the RAM to be selected by RAM 0, from the Address Decoder, through gate U6D. When power is interrupted (either power turn-off or failure) the +5V unregulated supply decreases slightly to where zener diode CR2 is cut off, transistor Q2 is cut off and the flip-flop is reset. The Q output of U13 (through OR gate U14B) supplies the non-maskable interrupt (NMI) signal to the CPU. This causes the CPU to go into its power down program, as described previously. During this program, BA (bus available) is output from the CPU to reset flip-flop U6B-U6C, such that RAM cannot be addressed, thereby preventing transients (during power drop-off) from changing the memory. The RAM and power-up circuitry U6, U8 and U13 are powered by the stand-by battery BT1, as indicated. This battery is charged through CR3 and R7 when external power is applied. Flip-flop U7A-U7D is utilized to prevent hang-up of the microcomputer when the power is rapidly turned on and off. Its output, after power turn-on through the effective AND gate U14B will only allow a NMI through after the NMIENA (non-maskable interrupt enable) from the address decoder has been received (after the microcomputer is stabilized).

4-57. Address Decoder (A7A6). Figure 4-18 shows a functional block diagram of the address decoder while Figure 7-25 shows its schematic diagram. The address decoder receives addresses from the CPU on the 16-bit address bus, and a valid memory address (VMA), read and write strobes and clock Ø2 signal. The module decodes and times these addresses to provide timed strobes for ROM and RAM enable, PIC select and non-maskable interrupt enable (NMIENA) to the microcomputer, an analog to digital converter select (ADCST) strobe to module A7A8, a remote select (REMSL) to module A7A9, write strobes to modules A7A4, A7A5, A7A7, and A7A8 and read strobes to modules A7A4 and A7A8. All strobes are generated through decoder demultiplexers and gates that output the CPU addresses in timed sequence with VMA enable and clock Ø 2 from the CPU.

4-58. Front Panel Interface (A7A4) and Assembly (A2). Figure 4-19 shows a functional block diagram of the front panel interface module and front panel assembly. All inputs from the front panel assembly except the phones jack and its level controls are routed through the front panel interface to the microcomputer data bus. The only data routed to the front panel assembly is the analog drive from A7A8 for the tuning and level meters and display drives for the front panel displays (see paragraph 4-62).

4-59. The front panel keyboard (Figure 7-3) contains 36 keys (5 not used) which are routed to five 8-input priority encoders U1 through U5 (See Figure 7-4). The three normal outputs of these five encoders are connected in parallel to form the coded key outputs K0 to K2. The G5 output of each of the five encoders are routed to five inputs of the sixth priority encoder whose three normal outputs form the coded key outputs K3 to K5. The G5 output of this encoder forms an interrupt request (IRQ) which is routed to the interface (Figure 7-23), and used to clock data flip-flop U8A. When this flip-flop is set with the keyboard strobe (KBDIAK) from the address decoder the IRQ is routed to the PIC as IRQ2. The binary coded key data is also routed to the interface and strobed through three state buffer U3 in program sequence by the keyboard read (KBDRD) strobe.

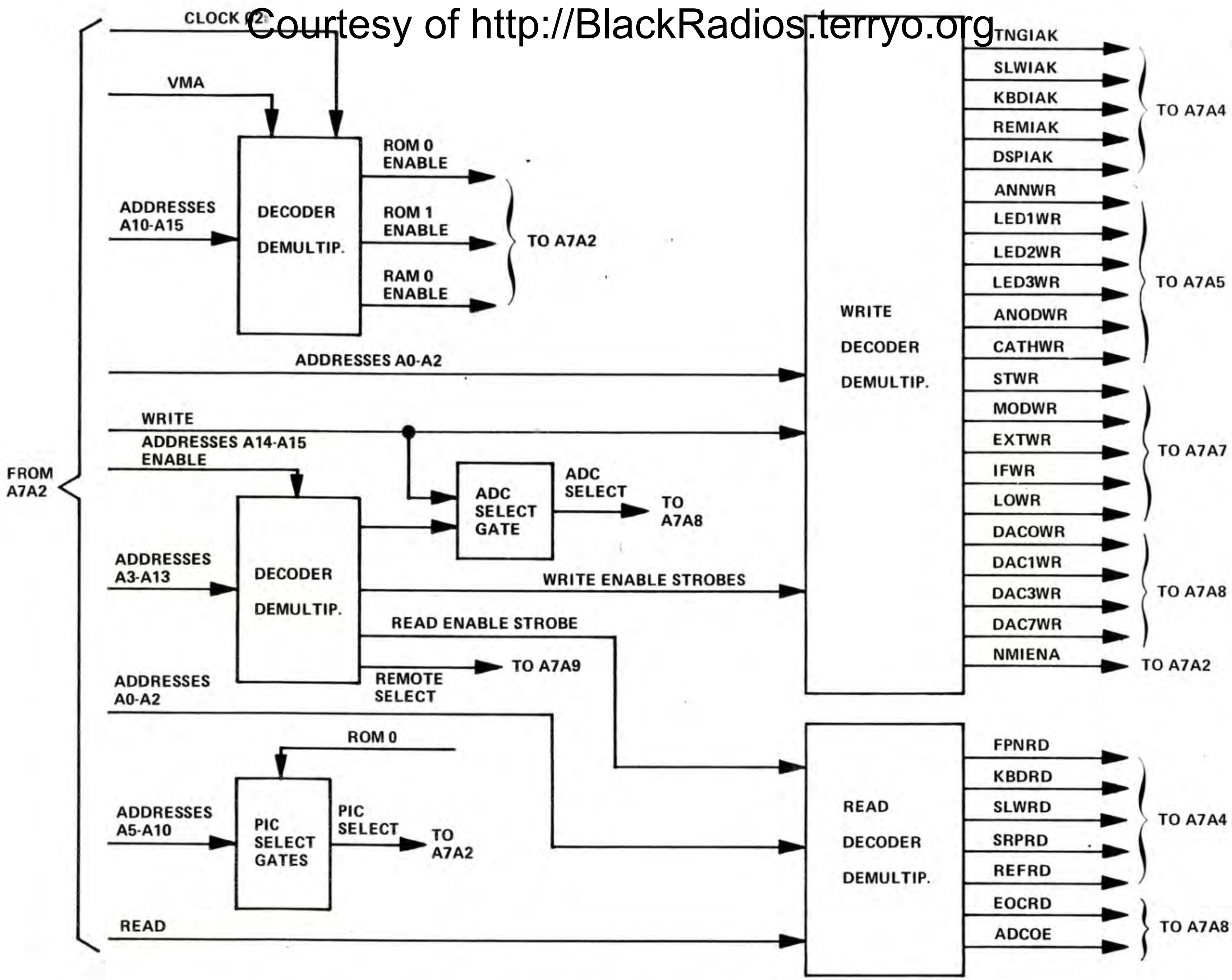


Figure 4-18. Address Decoder (A7A6), Functional Block Diagram

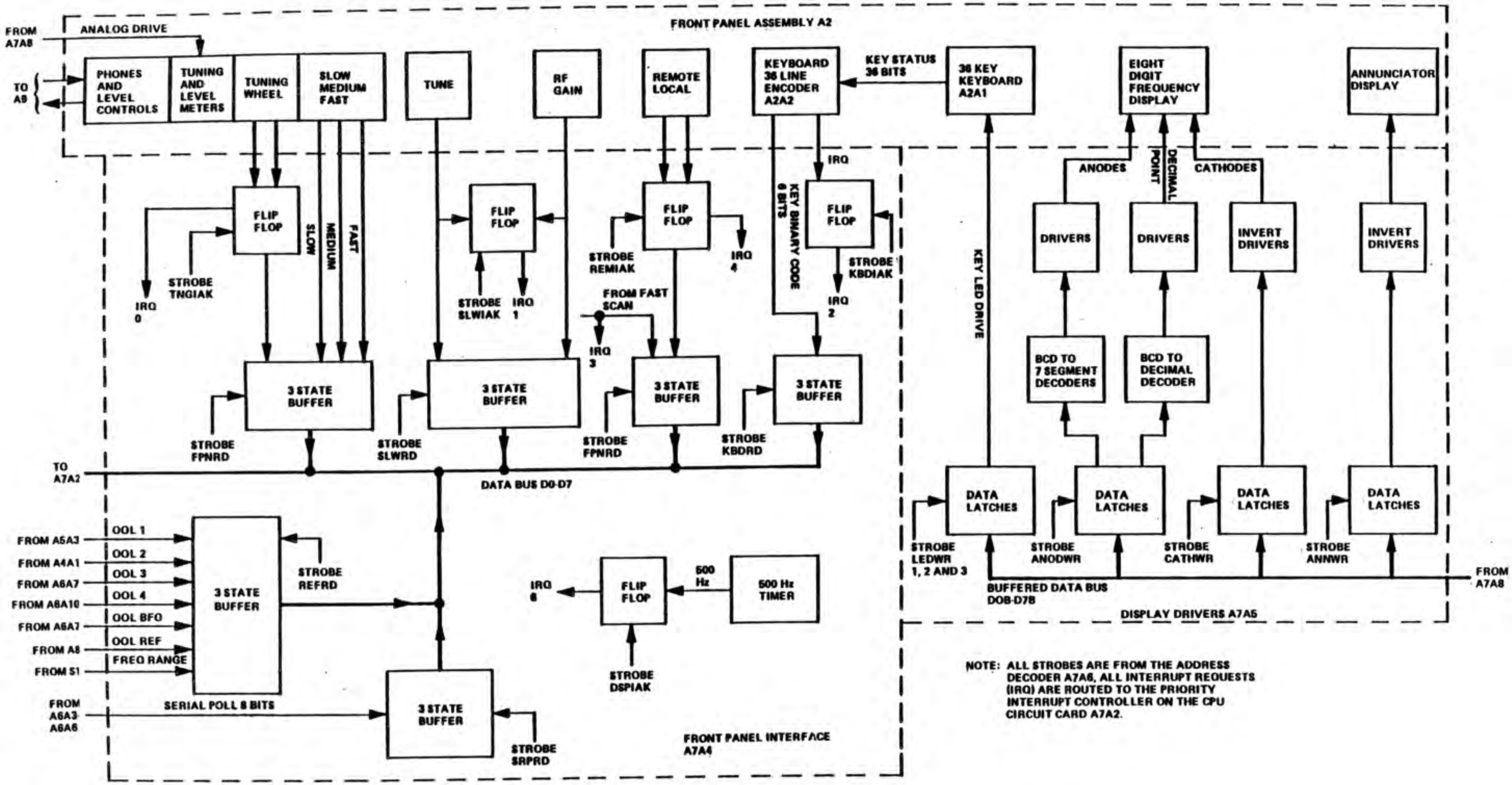


Figure 4-19. Front Panel Assembly (A2) and Interface (A7A4) and Display Drivers (A7A5), Functional Block Diagram

4-60. The REMOTE or LOCAL mode is determined by flip flop U9C-U9D (Figure 7-23) which routes the REMOTE status (U9C) to a three state buffer and to the clock of one data flip flop U10B. The LOCAL status (U9D) is routed to the clock input of data flip flop U10A. The resets of both data flip flops are strobed by REMIAK and outputs either REMOTE or LOCAL to the PIC as IRQ 4. A fast scan (FSTSCN) strobe from the surveillance controller is also input to the three state buffer while at the same time routed to the PIC as IRQ 3. The data at the input of the buffer (remote status and fast scan) is strobed through to the data line by FPNRD.

4-61. The TUNE and RF GAIN controls status is strobed onto the data bus through buffers U1 and U2B (Figure 7-23) by strobe SLWRD while its IRQ 1 is developed through AND gates U12B and U12C and flip flop U7-U9A which is strobed by SLWIAK. The tuning wheel status is routed to buffer U5A through data flip flop U6A with the status of SLOW-MEDIUM and FAST routed to the same buffer. Data at the input of this buffer is strobed onto the data bus by strobe FPNRD. One output of the tuning wheel is also routed to data flip flop U6B and strobed through to the PIC as IRQ 0 by strobe TNGIAK. Two separate analog drive signals are routed from digital to analog converters on the A7A8 modules to drive the tuning and level meters. Audio signals are routed for the A9 module through level controls to the tip and ring of the PHONES jack.

4-62. Display Drivers (A7A5). Figure 4-19 shows a functional block diagram of the display drivers and the front panel displays. The display drivers are used to drive the front panel displays which consist of an eight digit, seven segment LED frequency readout, five annunciators and LED indicators in the keyboard switches. Data from the buffered data bus D0B and D7B (Figure 7-24) is latched through three data latches (U15-U17) in program sequence by LED write strobes LEDWR1, LEDWR2 and LEDWR3. The output of the latch is routed through an inverter driver to drive the appropriate key LED. The buffered data bus is also strobed through data latch U1 by ANODWR and routed to two 7-segment decoders (U2 and U3) and to decimal point decoder (U4) through NAND gates U27A and U27D. The seven segment decoders drive the frequency display LED anodes through transistor drivers Q1 to Q14. The decimal point decoder drives the display decimal points through transistor drivers Q15 to Q23. Another data latch U11, strobed by CATHWR, routes the latched data through inverter drivers U12 and U13 to the cathodes of the display. The five annunciators are driven from data on the buffered data bus latched through data latch U18 by strobe ANNWR. The latched data is routed through inverter drivers on integrated chip U22.

4-63. Converters (A7A8). Figure 4-20 shows a functional block diagram for the converters. This module contains an analog-to-digital converter (ADC), to convert analog gain information from the Receiver to digital inputs for the microcomputer and eight digital-to-analog converters (DAC), to convert digital gain data from the microcomputer to analog signals for Receiver circuits. The ADC selects various analog inputs (as directed by the microprocessor addresses and strobes), converts them to digital words and places the digital words on the data bus at the appropriate times, by the strobes from the Address Decoder. Figure 7-27 shows the schematic diagram for the converters. The data bus D0 to D7 is clocked through data latch U5 by

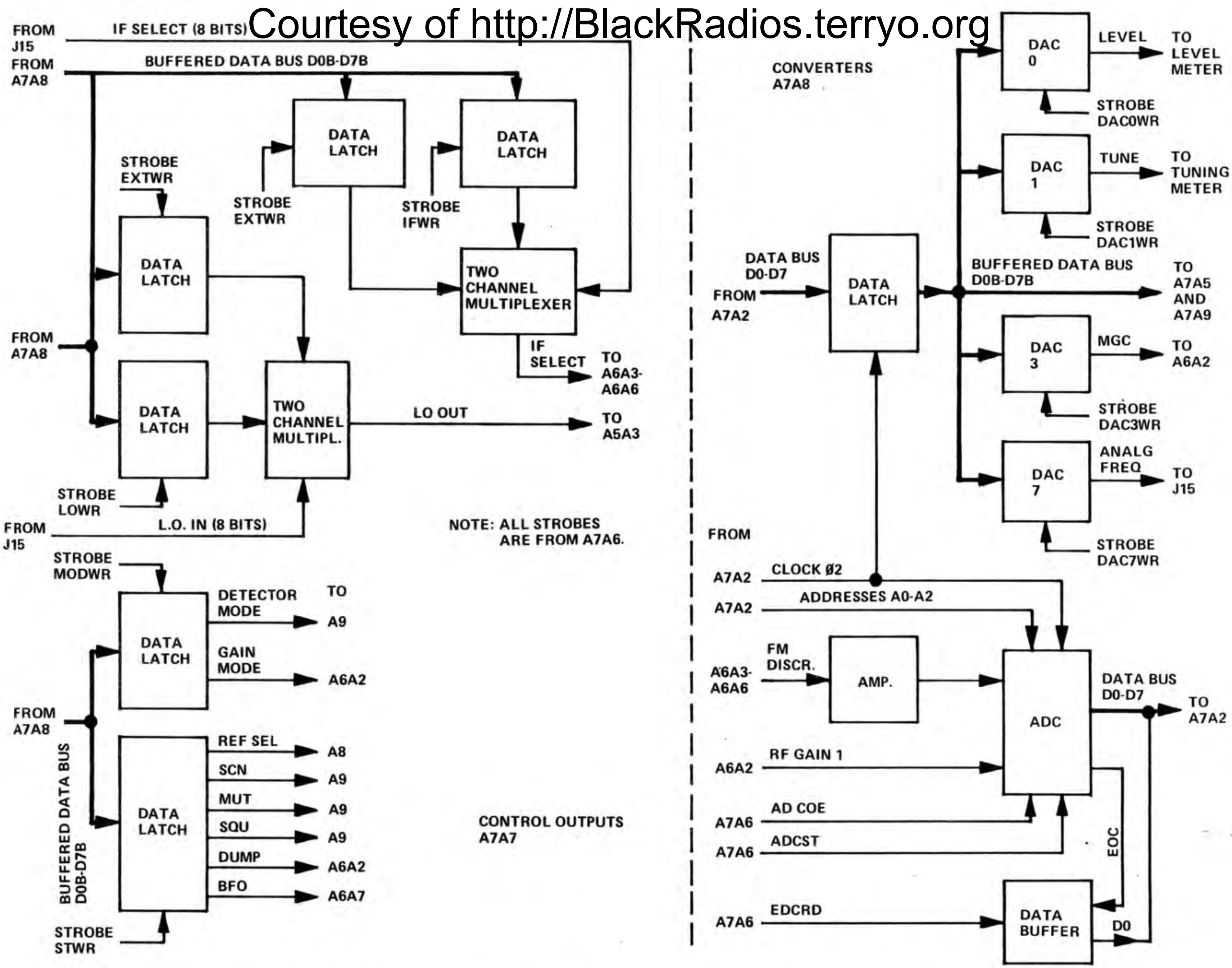


Figure 4-20. Control Outputs (A7A7) and Converters (A7A8), Functional Block Diagram

inverted CPU clock Ø 2 and becomes the buffered data bus D0B to D7B. This buffered data is used to drive the DAC's on this module and is also routed to the A7A5 and A7A7 modules. Only four of the DACs are used which outputs DAC 0 (U7) to the level meter, DAC 1 (U8) to the tuning meter, DAC 3 (U10) to manual gain control (MGC) on module A6A2 and DAC 7 (U15) to the surveillance controller through rear panel connector J15. Each DAC receives its eight bit digital data from the buffered data bus in program sequence through strobes DAC 0 WR, DAC 1 WR, DAC 3 WR and DAC 7 WR respective to the DAC outputs. The output of each DAC is routed through a driver amplifier which drives the ciruits as described above.

4-64. The Converter Module also contains the ADC U2. This converter receives eight separate analog inputs (ADC0-ADC7) and converts the selected inputs (one at a time in the program) to an 8-bit digital word which is output on the data bus. The input to be converted is selected through the address lines A1-A2. The strobe signals ADCOE (enable), ADCST (conversion start) and EOCRD (end of conversion read) come from the Address Decoder module. The conversion start signal (ADCST) initiates the conversion of the selected inputs. The EOCRD strobe places the End of Conversion (EOC) signal to be placed on the data bus (D0), through three state buffer U4. The microcomputer will thus read the digital output after the conversion by asserting the enable ADCOE. Only the ADC1 and ADC0 inputs to the ADC are used by the Receiver. The ADC1 input is applied through amplifier stages U17A and U17B which is the FM discriminator monitor output from the IF Filter Assembly module. The ADC0 input receives the RF Gain output from the IF variable gain amplifier module. The digital data is then processed by the microcomputer and used for gain applications.

4-65. CONTROL OUTPUTS (A7A7). Figure 4-20 shows a functional block diagram of the Control outputs. The control outputs module receives the processed data from the Receiver microcomputer and/or from the surveillance controller, then is multiplexed or latched to Receiver circuits through program timed strobes. The outputs of this module select Receiver bandwidth (IF select), tune the synthesizer (LO OUT), select the CW or CW1 kHz mode (BFO) and reference select mode (REF SEL), provides scan (SCN), mute (MUT), and squelch (SQU) signals to the A9 module and dump (DMP) control to the AGC on the A6A2 module.

4-66. Figure 7-26 shows the control outputs schematic diagram. The buffered data bus D0B-D7B (from the Converter's module)is connected to each of the latches U1 through U5. The data on the bus is strobed through each of the latches at the appropriate program times by the strobes from the address decoder module (LOWR, IFWR, EXTWR, MODWR and STWR). The outputs from U1, which are the LO (synthesizers) control word bits (from the Receiver microcomputer), are routed to one set of inputs on the analog multiplexers (U13, U14 and U15). Similarly, the outputs from U2, which are the IF filter select control word bits (from the Receiver microcomputer), are one set of inputs to the analog multiplexers (U10, U11 and U12). The second set of inputs to these analog multiplexers is the LO control word and IF select control word from the FAST SCAN input (from the surveillance controller). The

U3 outputs are routed to the multiplexers (U10 through U15) and control the selection of either the Receiver microprocessor inputs or the surveillance controller inputs. The multiplexer U10 through U15 outputs are then routed as the LO and IF select control words to the synthesizer and IF Filter Assembly modules. Latch U4 relays the detector and gain mode control signals to the Receiver circuits. Latch U5 relays the REF (external reference to Reference Generator), BFO (CWO or 1 kHz offset), DMP (dump to AGC) and SCN (at FAST SCAN, inhibiting of Audio/Video outputs) signals to the receiver circuits.

4-67. IEEE Interface (A7A9). Figure 4-21 shows a functional block diagram of the IEEE interface. This module interfaces the microcomputer to the Remote Controller through the IEEE-488 bus. The module contains a General Purpose Interface Adapter (GPIA) which is connected directly to the microprocessor data bus and to the bi-directional IEEE-488 bus through the transceivers. When the GPIA is addressed (according to its preset address on the address switch) by the remote controller, it sends an interrupt request (IRQ-5) to the PIC for servicing of the remote controller command. When the microcomputer services the request, it receives and carries out the remote controller command. The GPIA then relays any status data sent from the microcomputer to the Remote Controller. The GPIA is also reset at power on and is set up at initilization by the microcomputer.

4-68. Figure 7-28 shows the IEEE interface schematic diagram. The sixteen IEEE-488 signal bus lines to and from the remote controller are connected via the receiver rear panel IEEE-488 Interface connector (J16). These lines consist of the eight data lines DIO1 through DIO8 and the bus management and handshaking lines (REN, ATN, NRFD, SRQ, DAV, NDAC, EOI and IFC). These inputs are routed to the two 8-line transceivers U6 and U7. Signal flow direction through the transceivers is controlled by the T/R lines. For transceivers U6 and U7 each line has its own T/R control, except that lines 1 through 4 (B1-B4) are all controlled by the S/R 1-4 input. The T/R inputs are either hand wired for one direction flow or driven by T/R1 or T/R2 outputs from the GPIA (U4). For U3 and U5, direction of signal flow is controlled by the T/R2 outputs from the GPIA into the TE inputs of U3 and U5. The IEEE-488 signal bus lines, through the transceivers, are connected to their corresponding terminals on the GPIA. Microcomputer connections (from the CPU module) to the GPIA are made through connector P1. These connections include the data bus lines D0-D7, clock Ø 2, Read Write (R/W) address lines (A0, A1 and A2), RESET, chip select (REMSEL) and interrupt request (IRQ). Initialization for the GPIA is activated through the RESET line. GPIA operation is controlled through 14 internal registers which are written to and read from by the microcomputer, being addressed through REMSEL, A0, A1, and A2. At initialization, the microcomputer sets the appropriate GPIA registers to the start states required for operation.

4-69. The Remote Controller will address the Receiver as a listener or talker. When the GPIA is addressed, it asserts an interrupt request IRQ5. The microprocessor receives the interrupt through the Priority Interrupt Controller and initiates the interrupt service routine. When addressed as a listener, the GPIA generates T/R1 and T/R2 and the interface circuit accepts remote controller commands and data from the IEEE-488 bus. Data on lines DIO

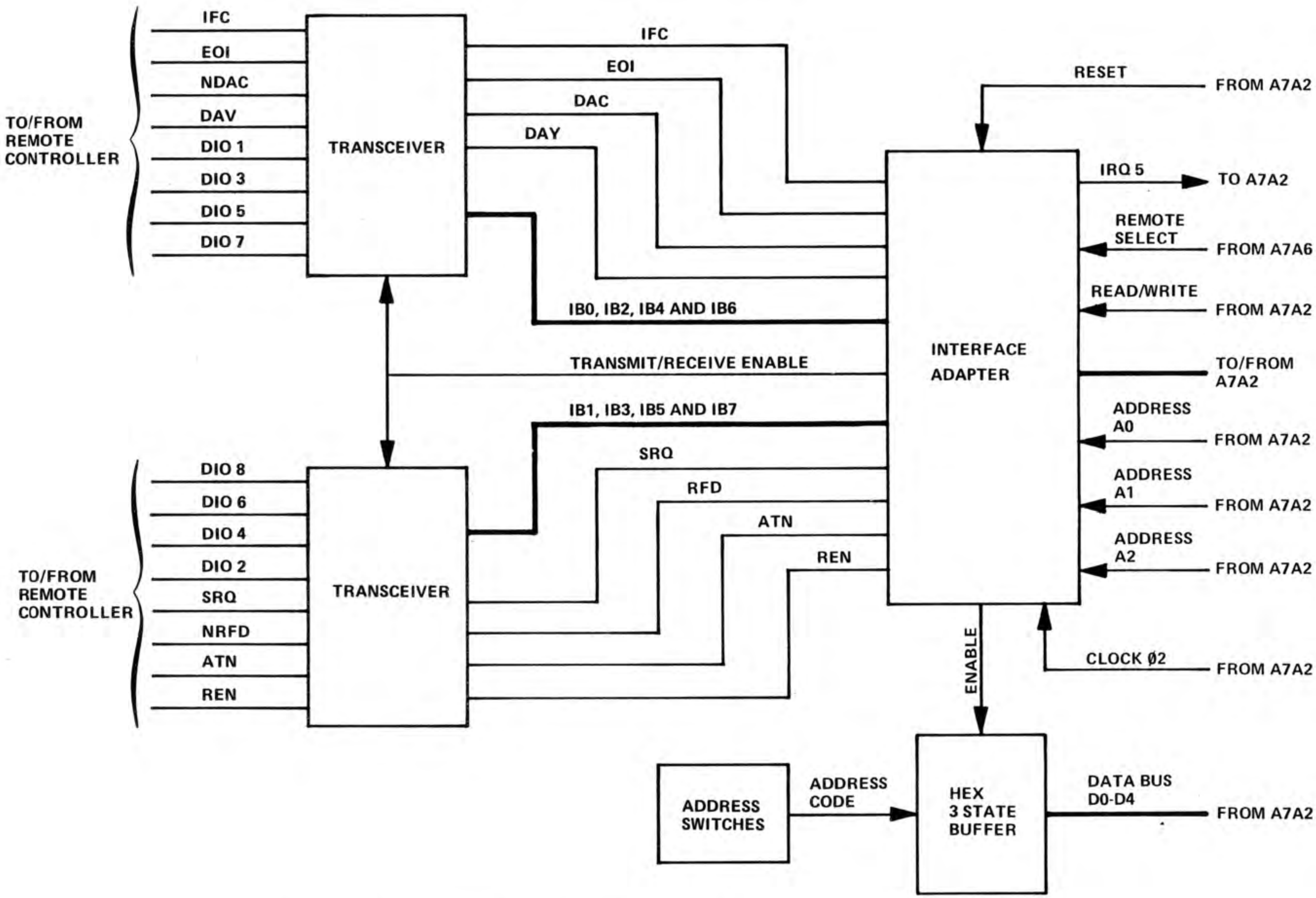


Figure 4-21. IEEE Interface (A7A9), Functional Block Diagram

1 to DIO 8 goes from the Remote Controller to GPIA. The handshaking lines are set up accordingly; the GPIA transfers all subsequent data (in the message) from the Remote Controller to the microcomputer under program control. When addressed as a talker, the GPIA generates T/R1 and T/R2 and the interface circuit sends data from the GPIA to the IEEE-488 bus and the remote controller. Data on lines DIO 1 to DIO 8 is routed from the GPIA to the IEEE-488 bus. The handshaking lines are set up accordingly. The GPIA transfers subsequent data from the microcomputer to the Remote Controller under program control.

4-70. POWER SUPPLY (A1). Figure 7-1 shows the schematic diagram of the power supply. The unit operates from an AC supply of 115 or 230 volts which is card selectable from the rear panel. This rear panel arrangement also contains the fuse which is selected for the power source. The power supply contains a multi-secondary step down transformer, rectifiers, filters and regulators used to supply the various DC voltages from -22 volts to +28 volts used by the Receiver. One secondary tap (terminals 17 and 18) of the transformer is used to drive a blower motor which supplies cooling air to the Receiver. Four other secondary taps are routed through diode rectifiers to provide the DC voltages.

4-71. A rectifier containing diodes CR9 and CR10 in conjunction with main chassis regulator U1 provides a regulated DC output of +28 V via main chassis filter FL3. Diodes CR1 and CR2 provide a full wave rectified output of +22V which is distributed by main chassis filter FL5 as a +22V unregulated output. Main chassis regulator U3 converts the +22 V unregulated input to a +15V regulated output. Two +15V regulated outputs are provided through FL2 and FL6. The -22V unregulated and -15V regulated DC output voltages are routed through FL7, FL4 and FL8. Regulator circuit U2 converts the -22V input to the -15V output. Rectifiers CR5 and CR6 provide a +5 volt analog output via regulator U4 and filters FL12-13. The +10 volt unregulated and +5 volt regulated digital outputs are supplied by rectifiers CR7-CR8. Regulator circuit U5 converts the +10 volt unregulated to the +5 volt regulated output. The +10 volt unregulated is output through FL10 while the +5 volt regulated is output through FL11.

SECTION 5

MAINTENANCE INSTRUCTIONS

5-1. INTRODUCTION

5-2. This section contains maintenance instructions for the RG-5540 VHF/UHF Receiver. These instructions include: maintenance schedules, list of test equipment, preventive maintenance instructions, performance tests, troubleshooting procedures and adjustment procedures.

5-3. MAINTENANCE SCHEDULE

5-4. The preventive maintenance schedule in Table 5-1 shows the frequency that the instructions in this section should be performed. A number of the instructions, such as alignment, should be performed only when it is required to re-establish performance through adjustments. This would be shown in the Maintenance Schedule, under the "as required only" column.

Table 5-1. Maintenance Schedule

MAINTENANCE	AS REQUIRED ONLY	DAILY	WEEKLY	MONTHLY	SEMI-ANNUALLY	ANNUALLY
Cleaning	x				x	
Damage Inspection	x				x	
Performance Test					x	
Troubleshooting Procedure	X					
Adjustment Procedure	X					
Disassembly/ Reassembly	X					

5-5. TEST EQUIPMENT

5-6. The test equipment required for performing maintenance and alignment of the Receiver is shown in Table 5-2.

Table 5-2. Test Equipment Required

ITEM	EQUIPMENT	MODEL NO.	MANUFACTURER
1.	Digital Voltmeter	8010A	Fluke .
2.	Oscilloscope	565B	Tektronix
3.	Signal Generator (2)	864BOPT02	Hewlett-Packard
4.	Frequency Doubler	FK-5	Mini-circuits
5.	Computer/Controller	4051	Tektronix
6.	Synthesizer/Function Generator	3325A	Hewlett-Packard
7.	Tracking Generator	8444A	Hewlett-Packard
8.	Spectrum Analyzer	141T/8554B/8552B	Hewlett-Packard
9.	RMS Voltmeter	8920A	Fluke
10.	Synthesized Signal Generator	8662A	Hewlett-Packard
11.	Spectrum Analyzer	3585A	Hewlett-Packard
12.	Frequency Counter	9919	Racal-Dana
13.	Variac	GR-W5MT3AW	General Radio
14.	Power Converter (Invertron)	251TCA	California Instruments
15.	Power Divider/Combiner	PD-1000-2SMA	American Microwave
16.	Stopwatch	H-1595	Heuer
17.	Low Pass Filter, 3400 Hz	JW33-1910A	Sprague
18.	Distortion Analyzer	339A	Hewlett-Packard
19.	Pre-amp/Filter	75052/77025	REGCO
20.	Headset, Stereo		
21.	PC Card Extractor	5851	REGCO
22.	Resistor, Termination	50 ohm	-
23.	Resistor, Termination	91 ohm	-
24.	Resistor, Termination	600 ohm	-
25.	Isolation Transformer	LL-010	Torotel
26.	Controller	RG-1340	REGCO
27.	Spectrum Display	HP1311A	Hewlett-Packard
28.	Test Plug*	227	M. M. Smith

*Attach two 6-inch lengths of RG-55/U cable, terminated with UG-88/U BNC Connectors.

5-7. PREVENTIVE MAINTENANCE

5-8. Preventive maintenance procedures for the Receiver consist of maintenance tasks to detect potential malfunction or failure of components. In addition, preventive maintenance defines the necessary cleaning, operational checks and minor calibration required to maintain operational performance standards.

5-9. CLEANING. The Receiver should be inspected and cleaned to maintain cleanliness and good general appearance. The maintenance schedule in Table 5-1 shows the frequency that the following inspection and cleaning procedures should be accomplished.

1. Remove dust and dirt from front and rear panel using a lint free cloth moistened in tap water.

NOTE

If cleaning requires removal of oil or grease, use isopropyl alcohol, specification TT-1-1735, grade A instead of tap water.

2. Clean the blower motor assembly filter by performing the following procedures.

WARNING

Rotating blades of the blower motor can cause injury. Always disconnect the Receiver power cord to clean the blower motor filter.

a. Remove four Phillips head screws securing the filter and filter cover to the rear panel.

b. Remove filter from cover by lifting out.

c. Clean filter and cover in a solution of mild detergent and tap water.

d. Dry filter with low pressure (5 to 10 psi) compressed air.

e. Install clean filter into its cover.

f. Install filter and cover to rear panel with four Phillips head screws.

3. Remove top and bottom covers from the Receiver by loosening eight (8) quarter turn fasteners and lifting the covers off.

CAUTION

Do not use bristle brushes or cloths to clean circuit cards. This material may create static electricity which can damage CMOS integrated circuits.

4. Inspect the interior for dust and dirt collection.

5. Use a vacuum device to remove dust and other loose matter.

WARNING

The filter capacitors used in the power supply will retain an electrical charge after power is removed. The capacitors should be discharged slowly by shorting the terminals through a protected resistive device.

6. Inspect and clean the power supply in the same manner as described in steps 4 and 5.

5-10. DAMAGE INSPECTION. The Receiver should be inspected for damage, missing parts and general deterioration. The maintenance schedule in Table 5-1 shows the frequency that the following procedures should be accomplished.

1. Inspect knobs, switches, controls and indicators on front panel for damage, tightness, freedom to operate, etc. Replace damaged or missing items as required.

2. Inspect connectors on the rear panel for bent or broken pins, damaged shells, etc. Replace or repair as required.

3. To inspect the interior of the Receiver, remove top and bottom cover by loosening eight (8) quarter turn fasteners.

4. Inspect internal circuit boards and components for signs of excessive heat, corrosion, damaged circuits, loose connections or other signs of damage. Repair or replace as required.

5. Inspect the tuning knob assembly for freedom of operation and general appearance.

6. Tuning knob should operate and spin freely. The encoder disk should be tight on the shaft and free of wobble as it is rotated.

7. Inspect the fuse and circuit card switch in the power supply, located on the rear panel.

8. Make sure fuse is not blown or the circuit card switch is not damaged. Replace as required.

9. Inspect the nickle cadmium battery, located on circuit card A7A2.

10. The battery should be replaced if there is any sign of damage, corrosion or loss of electrolyte.

5-11. LUBRICATION. No lubrication is required for the Receiver.

5-12. PERFORMANCE TESTS. The performance tests should be performed to determine that overall performance of the Receiver is satisfactory. Any substandard conditions found through these tests, should be corrected before placing the unit in normal operation. If discrepancies or malfunctions cannot be corrected, the troubleshooting procedures in paragraph 5-23 should be performed to isolate and correct the problem. Table 5-1 shows the frequency at which the performance tests should be conducted.

5-13. Power Supply Test. This procedure checks the DC output voltages of the Receiver power supply for correct levels and filtering.

1. Check fuse and circuit card switch for proper voltage input (see paragraph 2-6).

2. Connect female end of power cable to power input connector on the rear panel.

3. Connect male end of power cable to power source.

4. Remove top cover of Receiver and power supply plastic cover to gain access to the power supply.

5. Turn Receiver power on.

6. Using the digital voltmeter, measure the unregulated DC power output at the test points indicted below. The test points for all unregulated DC power are located on PWB A1 accessed from the top of the Power Supply. Use chassis as ground in measuring all DC Power.

TEST POINT	NOMINAL VOLTAGE	VOLTAGE RANGE
A1-TP1	+22 volts DC	+18 to +30 volts DC
A1-TP2	-22 volts DC	-18 to -30 volts DC
A1-TP3	+10 volts DC	+8 to +18 volts DC

7. Using the digital voltmeter, measure the regulated DC power output at the test points indicated below. The test points for regulated power are located on the top of the power supply. Use chassis as ground in measuring all DC power.

TEST POINT	NOMINAL VOLTAGE	VOLTAGE RANGE
TP1	+28 volts DC	+27 to +29 volts DC
TP2	-15 volts DC	-14.5 to -15.5 volts DC
TP3	+15 volts DC	+14.5 to +15.5 volts DC
TP4	+5 volts DC (analog)	+4.75 to +5.25 volts DC
TP5	+5 volts DC (digital)	+4.75 to +5.25 volts DC

8. Using the oscilloscope, measure the AC ripple levels peak to peak at the test points listed in step 7.

9. The AC ripple at any test point should be no greater than 10 millivolts peak to peak.

10. This concludes the power supply test. Turn power off and disconnect all test equipment.

5-14. Receiver Tuning Test. This procedure checks the operation of the Receiver through operation of the front panel controls and monitoring from the front panel indicators.

1. Connect the signal generator to ANTENNA-J1 connector on the rear panel as shown in Figure 5-1.

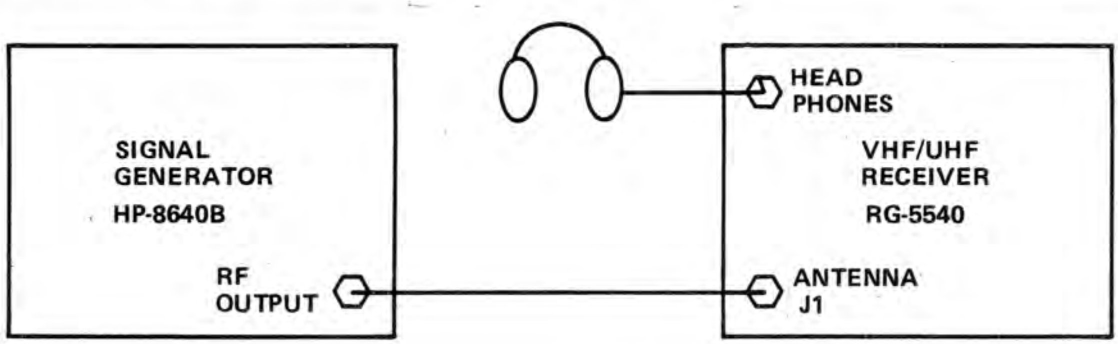


Figure 5-1. Receiver Tuning Test Set-up

2. Adjust signal generator output for 204.061 MHz, -60 dBm, with 1 kHz AM modulation at 30 percent.

3. Set REMOTE-LOCAL switch to LOCAL position and set switch S1 (on rear panel) to 500 MHz position and set power switch off and back on when position of S1 is changed.

4. Press AM pushbutton (indicator on).

5. Press 10 kHz pushbutton (indicator on).

6. Press AGC FAST pushbutton (indicator on).

NOTE

If any other pushbutton indicators are on, press applicable indicator and observe that indicator goes out.

7. Press numeric keys 2, 0, 4,. (decimal point), 0, 6, 0, 8, and 8 in the order given.

NOTE

If an incorrect digit is selected during frequency entry, press the CLR pushbutton to erase the digits entered and re-select the desired digits.

8. Press the ENTER FREQ pushbutton and note that frequency display changes to 204.06088 MHz and level meter deflects.

9. Connect the headphones into the HEADPHONES jack and don the headphones.

10. Rotate audio level controls and note that level of 1 kHz tone changes. Set control for comfortable audio level. Remove headphones.

11. Press the SLOW TUNING pushbutton, then momentarily press the TUNING slew switch upward.

12. Note that tens digit on frequency display increments to numeral 9 from previous setting of 8.

13. Momentarily press the TUNING slew switch downward and note that tens digit decrements to 8.

14. Press the MED TUNING pushbutton then press and hold the TUNING slew switch upward until 204.09988 is reached.

15. Note that the 1 kHz digit changes and that each time it cycles through nine that it increments its total to the 10 kHz digit. The tens and hundreds digits will not change.

16. Press the FAST TUNING pushbutton, then press and hold the TUNING slew switch upward until 204.99988 is reached.

17. Note that the 100 kHz digit changes while all other digits remain unchanged.

18. Press MED TUNING pushbutton and rotate TUNING knob counter clockwise to tune Receiver to 204.06088 MHz.

19. Note that 1 kHz digit decrements its total to the next lesser digit until the frequency is reached.

20. Note also that the TUNING meter gradually indicates 0 as signal generator frequency is reached.

21. Press TUNING-OFF pushbutton and rotate TUNING knob in both directions. Note that frequency display does not change.

22. Press TUNING slew switch in both directions and note that frequency display remains unchanged.

23. Press SCAN UP pushbutton then press numeral key 1.

24. Note that tens digits begins to increment very slowly.

25. Select faster scan rates by pressing pushbuttons 2 through 9 sequentially.

26. Note that frequency display increments at progressively more rapid rates as pushbuttons 2 through 9 are sequentially pressed and that its scan range is from 20 to 499.99999 MHz.

27. Press SCAN STOP pushbutton and note that frequency display stops incrementing.

28. Set switch S1 (on the rear panel) to the 100 MHz position and cycle power off and back on. Press SCAN DN pushbutton then press numeral key 8.

29. Note that frequency display decrements at a rapid rate and that its scan range is from 99.99999 MHz to 20 MHz.

30. Select slower scan rates by pressing pushbuttons 7 through 0 sequentially.

31. Note that frequency display decrements at progressively slower rates as pushbuttons 7 through 1 are pressed then stops when pushbutton 0 is pressed.

32. Press SCAN STOP pushbutton to terminate scan mode of operation. Set switch S1 (on rear panel) to 500 MHz position and recycle power off and back on.

33. This concludes the Receiver tuning test. Disconnect all test equipment and turn Receiver power off.

5-15. RF Gain Level Test. This procedure checks that the RF/IF gain can be incremented in approximately 0.5 dB steps, over a 100 dB range, from the front panel.

1. Connect the 50 ohm termination and RMS voltmeter to the IF OUT-J4 connector on the rear panel of the Receiver as shown in Figure 5-2.

2. Connect the signal generator to the ANTENNA-J1 connector on the Receiver rear panel.

3. Turn Receiver power on. Press AM, 10 kHz and MGC pushbuttons.

4. Press numeric keys 6, 0, . (decimal point), 0, 0 and 0, then press ENTER FREQ pushbutton.

5. Press RF GAIN switch up and hold until LEVEL meter indicates 0.

6. Adjust signal generator output to 60.000 MHz, and -90 dBm CW.

7. Decrement RF GAIN control down until RMS voltmeter reads approximately -10 dBm.

8. Note reading on RMS voltmeter and press its REL dB key.

9. Decrement RF GAIN control down 20 times, noting decrease in relative level of RMS voltmeter.

10. Decrease in relative dB on RMS voltmeter shall be between 5 and 15 dB.

11. Adjust signal generator output to -20 dBm.

12. Press RF GAIN control until RMS voltmeter reads 0 dB relative.

13. Decrement RF GAIN control down 20 times, noting decrease in relative level RMS voltmeter.

14. Decrease in relative dB on RMS voltmeter shall be between 5 and 15 dB.

15. Decrement RF GAIN control down until RMS voltmeter reads -30 dB relative.

16. This concludes the RF gain level test. Disconnect all test equipment and turn Receiver power off.

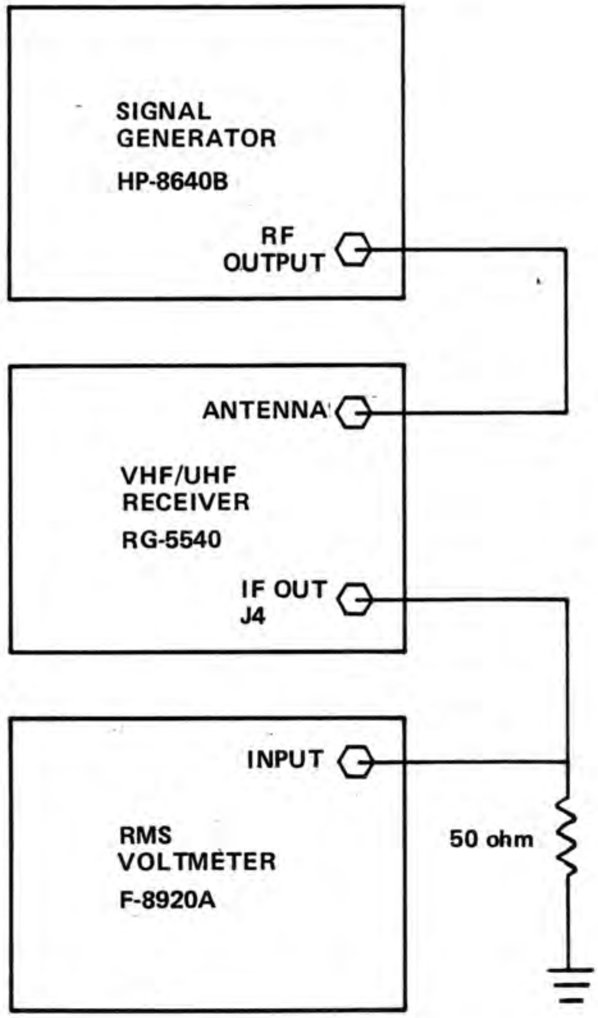


Figure 5-2. RF Gain Level Test

5-16. IF Output Test. This procedure checks the IF outputs available at the rear panel. This includes the IF OUT at J4, POST FL-IF at J7, PRE FL-IF at J10 and 10 kHz IF at J11.

1. Connect the spectrum analyzer and signal generator as shown in Figure 5-3 with spectrum analyzer connected to IF OUT-J4.

2. Turn Receiver on. Press CW, 10 kHz and AGC-FAST pushbuttons.

3. Press numeric keys 9, 0,. (decimal point), 0, 0 and 0, then press ENTER FREQ pushbutton.

4. Adjust signal generator for 90.000 MHz and -107 dBm output.

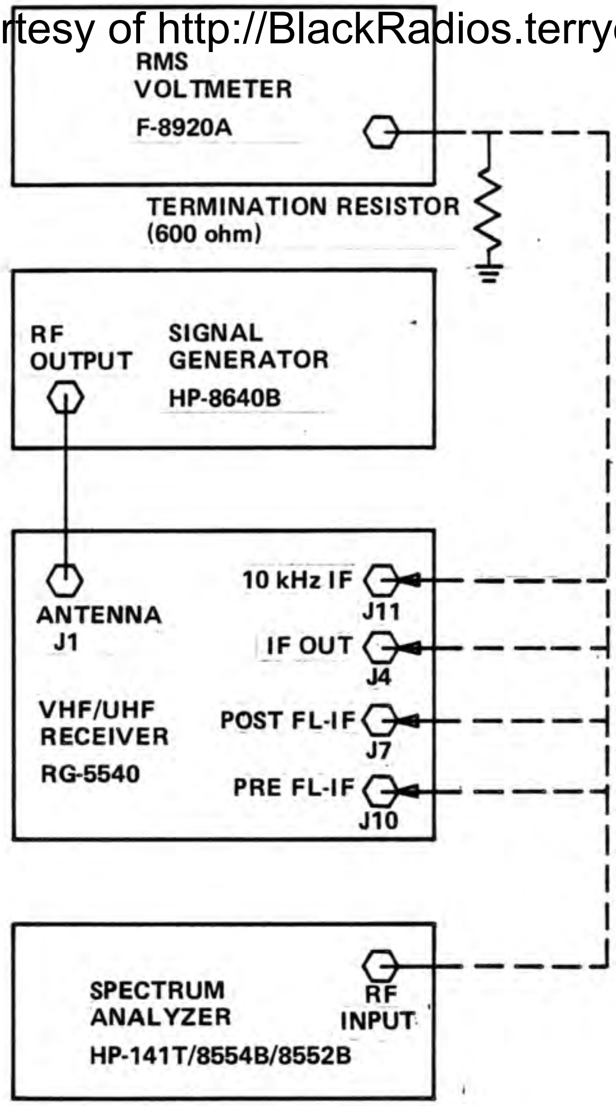


Figure 5-3. IF Output Test

5. Adjust spectrum analyzer as follows:

RF Section: Center frequency 21.4 MHz

Scan width 20 kHz per division

Bandwidth 3 kHz

Input attenuation 20 dB.

IF Section: Video filter 10 kHz

Scan time 5 msec per division

Log reference level 0 dBm

6. Note spectrum analyzer indicates a level between -20 dBm and 0 dBm.

7. Repeat steps 4 through 6 for 20, 50 and 100 kHz bandwidths except adjust signal generator output level in step 4 for each bandwidth selected as follows:

20 kHz BW = -104 dBm
50 kHz BW = -100 dBm
100 kHz BW = -97 dBm

8. Reconnect spectrum analyzer to POST FL-IF-J7.

9. Adjust signal generator output level to -50 dBm.

10. Note that spectrum analyzer indicates a level between -20 dBm and -30 dBm.

11. Reconnect spectrum analyzer to PRE FL-IF-J10.

12. Note that spectrum analyzer indicates a level between -20 dBm and -30 dBm.

13. Connect RMS voltmeter with 600 ohm termination to 10 kHz IF-J11 as shown in Figure 5-3.

14. Note that RMS voltmeter reads a minimum of 0 dBm.

15. This concludes the IF Output Test. Disconnect all test equipment and turn Receiver power off.

5-17. Video Output Test. This procedure checks the FM Video, and Video outputs available at the rear panel.

1. Connect signal generator and RMS voltmeter as shown in Figure 5-4 with RMS voltmeter connected to FM VIDEO-J5.

2. Turn Receiver power on. Press FM, 10 kHz and AGC FAST pushbuttons.

3. Press numeric keys 2,5,. (decimal point), 0, 0 and 0, then press ENTER FREQ key.

4. Adjust signal generator for 25.000 MHz, -97 dBm with 400 Hz FM modulation at 5 kHz deviation.

5. Set RMS voltmeter for 93 ohm dBm reference.

6. Rotate FM VIDEO-R1 control on Receiver rear panel fully CCW and note that RMS voltmeter indicates less than -45 dBm.

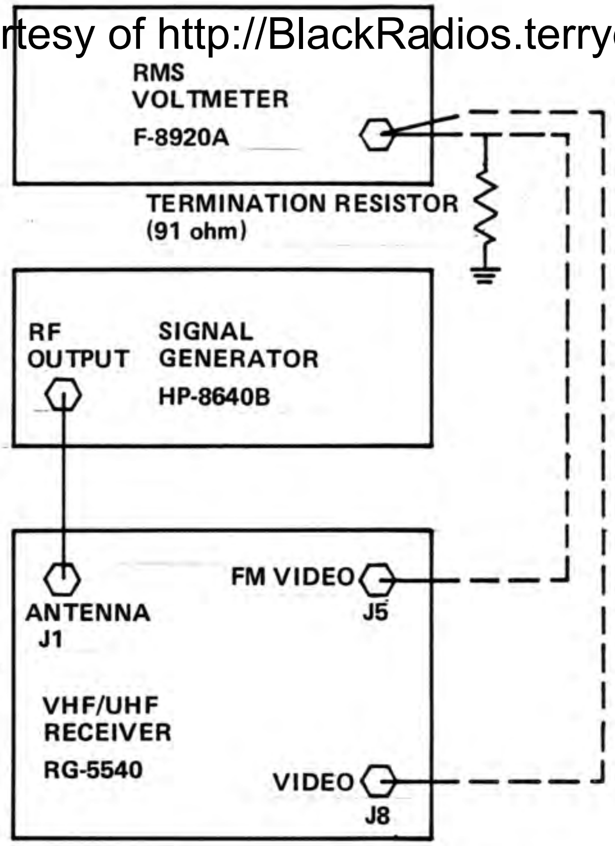


Figure 5-4. Video Output Test

7. Rotate FM VIDEO-R1 control clockwise until RMS voltmeter reads +5dBm.

8. Disconnect RMS voltmeter from FM-VIDEO-J5 and connect it to VIDEO-J8.

9. Rotate VIDEO-R2 control fully CCW and note that RMS voltmeter indicates less than -45 dBm.

10. Rotate VIDEO-R2 control clockwise until RMS voltmeter indicates +5 dBm.

11. This concludes the Video Output Test. Disconnect all test equipment and turn Receiver power off.

NOTE

FM VIDEO (R1) and VIDEO (R2) may require readjustment when unit is installed in system.

5-18. Audio Output Test. This procedure checks the audio outputs available at the rear panel terminal block TB1 and the front panel HEADPHONES jack.

1. Connect the test equipment as shown in Figure 5-5 with oscilloscope connected to HEADPHONES jack with tip to channel 1 and ring to channel 2 and signal generator number 1 connected directly to Antenna J1.

2. Turn Receiver power on. Press AM, 10 kHz, and AGC FAST pushbuttons.

3. Rotate both HEADPHONES level controls fully CCW.

4. Press numeric keys 2, 0, 4,. (decimal point), 0, 6, 0, 8 and 8, then press ENTER FREQ pushbutton.

5. Adjust signal generator output to 204.061 MHz, -60 dBm with 1 kHz AM modulation at 30 percent.

6. Rotate the USB HEADPHONES level control clockwise while observing channel 1 oscilloscope trace.

7. Note that 1 kHz signal on channel 1 changes amplitude as USB level control is rotated.

8. Rotate LSB HEADPHONES level control while observing channel 2 oscilloscope trace.

9. Note that 1 kHz signal on channel 2 changes amplitude as LSB control is rotated.

10. Adjust signal generator output to 60.000 MHz, -60 dBm, with 1 kHz FM modulation and 3 kHz deviation.

11. Press FM pushbutton on Receiver, press numeric keys 6, 0,. (decimal point), 0, 0 and 0, then press ENTER FREQ pushbutton.

12. Note that 1 kHz signal is displayed on both channels of oscilloscope.

13. Remove modulation from signal generator.

14. Press CW-1 kHz pushbutton and note that 1 kHz is displayed on both channels of oscilloscope.

15. Press CW-0 pushbutton and note that 1 kHz signal disappears from both channels of oscilloscope.

16. Press TUNING-SLOW pushbutton, then rotate TUNING knob clockwise until frequency display on Receiver indicates 60.00100 MHz.

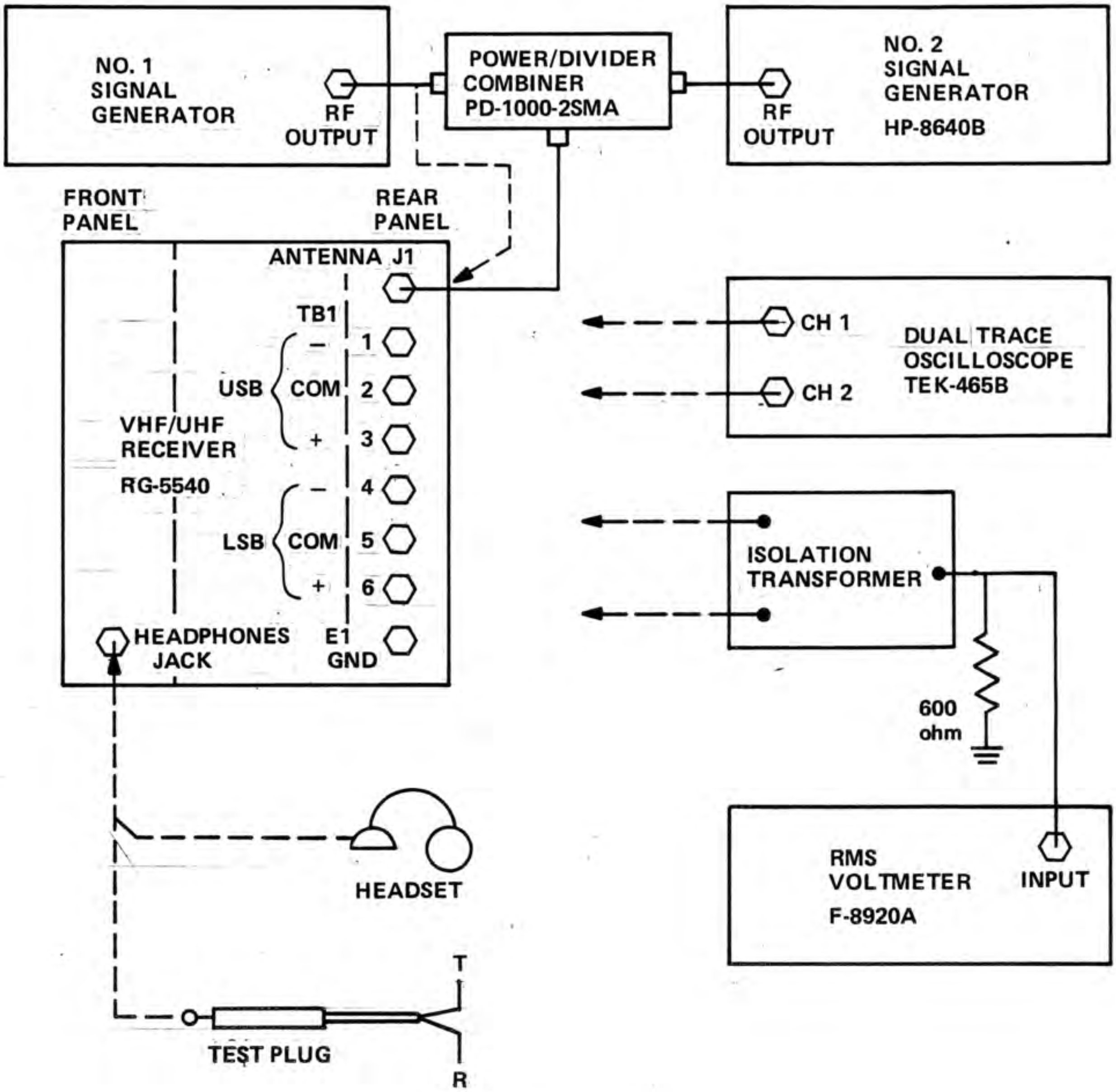


Figure 5-5. Audio Output Test

17. Note that 1 kHz signal again is displayed on both channels of oscilloscope.

18. Refer to Figure 5-5 and connect the two signal generators through the power combiner to ANTENNA-J1 on the Receiver and tune Receiver to 60.00000 MHz.

19. Adjust signal generator number 1 to 60.00200 MHz at -60 dBm.

20. Adjust signal generator number 2 to 59.99900 MHz at -60 dBm.

21. Press AGC SLOW pushbutton then press LSB pushbutton.

22. Note that 1 kHz signal is displayed on both channels of oscilloscope.

23. Press USB pushbutton and note that 2 kHz signal is displayed on oscilloscope.

24. Press ISB pushbutton and note that 2 kHz signal is displayed on channel 1 and 1 kHz signal is displayed on channel 2.

25. Rotate USB level control and note that amplitude of channel 1 changes but channel 2 does not.

26. Rotate LSB level control and note that amplitude of channel 2 changes but channel 1 does not.

27. Disconnect oscilloscope and connect single signal generator to ANTENNA J1. Connect RMS voltmeter between TB1 and TB3 through isolation transformer as shown in Figure 5-5.

28. Press CW 1 kHz, 10 kHz and AGC SLOW pushbuttons.

29. Press numeric keys 2, 5,. (decimal point), 0, 0 and 0, then press ENTER FREQ pushbutton.

30. Adjust signal generator output for 25.000 MHz, -97 dBm and modulation off.

31. Set RMS voltmeter for 600 ohm dBm reference.

32. Rotate AUDIO 1-R3 control fully CCW and note that RMS voltmeter indicates less than -45 dBm.

33. Rotate AUDIO 1-R3 control clockwise until RMS voltmeter indicates +5 dBm.

34. Disconnect RMS voltmeter from between TB1 and TB3 and reconnect between TB4 and TB6.

35. Rotate AUDIO 2-R4 control fully CCW and note that RMS voltmeter indicates less than -45 dBm.

36. Rotate AUDIO 2-R4 control clockwise until RMS voltmeter indicates +5 dBm.

37. Disconnect RMS voltmeter from between TB4 and TB6 and reconnect to the HEADPHONE tip without the isolation transformer.

38. Rotate USB headphone level control to the full clockwise position and note that RMS voltmeter indicates at least +20 dBm. Reset control fully counter-clockwise.

39. Reconnect RMS voltmeter to the HEADPHONE ring without the isolation transformer.

40. Rotate LSB headphone level control to the full clockwise position and note that RMS voltmeter indicates at least +20 dBm. Reset control fully counter-clockwise.

41. This concludes the Audio Output Test. Disconnect all test equipment and turn Receiver power off.

NOTE

Audio 1 (R3) and AUDIO 2 (R4) may require re-adjustment when unit is installed in system.

5-19. Reference Frequency Test. This procedure checks the ability of the Receiver to switch-select an external reference frequency.

CAUTION

The receiver is equipped with an extremely accurate (10^{-10}) internal reference frequency that is factory calibrated beyond the tolerance range of ordinary frequency counters. Do not attempt to measure or adjust this 1 MHz REF OUTPUT frequency, output to the rear panel on connector A8J2.

1. Connect test equipment as shown in Figure 5-6. Turn synthesizer/function generator on and allow at least 30 minute warm up time.

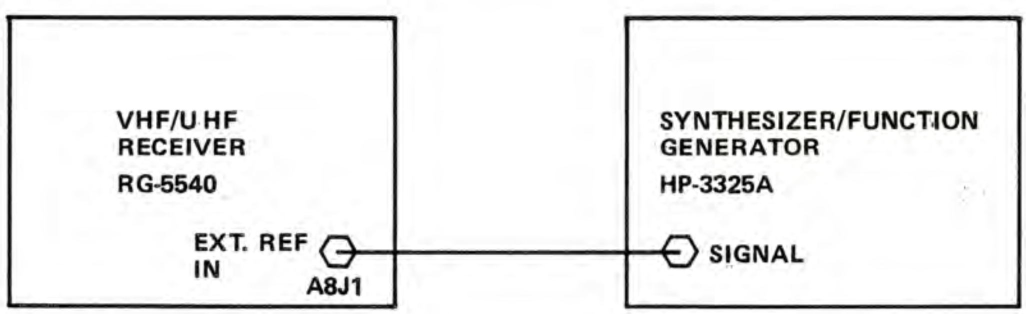


Figure 5-6. Reference Frequency Test Set-up

2. Turn Receiver power on. Press EXT REF pushbutton and note that pushbutton indicator and REFERENCE UNLOCKED display flashes on and off.

3. Set the function generator to 1 MHz at 5 volts peak to peak and adjust the frequency in 0.1 Hz steps until indicators quit flashing and extinguish.

4. Reduce function generator output level to 50 millivolts peak to peak and note that FREQUENCY UNLOCKED indicators remain off.

5. This concludes the Reference Frequency Test. Disconnect all test equipment and turn Receiver power off.

5-20. Remote Operation Test. This procedure checks the operation of the Receiver from a remote location using the 4051 computer controller.

1. Connect the computer controller and signal generator to the Receiver as shown in Figure 5-7.

2. Set REMOTE-LOCAL switch on Receiver to the REMOTE position and the 100 MHz/500 MHz switch (S1) on the rear panel to the 500 MHz position and cycle power off and back on. Set primary address switch (S1 of IEEE-488 interface card A7A9) address to 32 (all five positions off.)

3. Initialize controller and enter set-up program in controller (as shown in chart below), checking and editing entry as required, then execute.

LINE NO.	STATEMENT	INSTRUCTION
100	WBYTE	@32,96: 1,2,3,4,5,6,7,8, 3, 10, 0, 0, 125, -10
110	PRINT	"FREQUENCY MHz= 123.45678"
120	PRINT	"SCAN UP RATE = 3"
130	PRINT	"DETECTION MODE = 10"
140	PRINT	"BFO MODE kHz = 0"
150	PRINT	"GAIN MODE = 0"
160	PRINT	"GAIN dB = 125"
170	PRINT	"IFBW kHz= 10"
180	END	

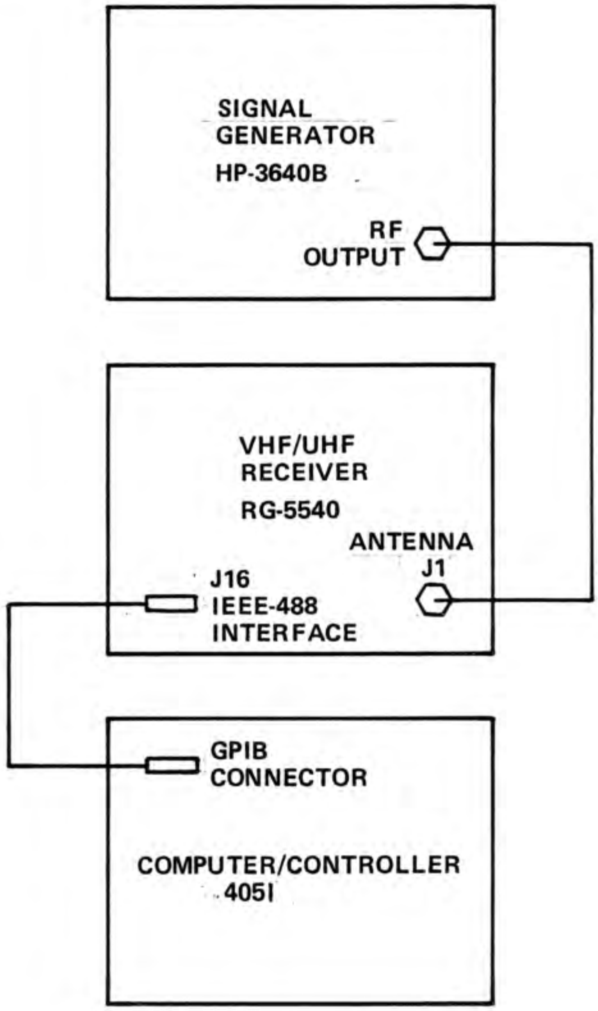


Figure 5-7. Remote Control Set-up

4. Receiver should be set to the settings entered above.

5. Adjust the signal generator for 499.99999 MHz, -80 dBm with 1 kHz AM modulation at 50 percent.

6. Set REMOTE-LOCAL switch on Receiver to the LOCAL position.

7. Press SCAN STOP, AM, AGC FAST and 50 kHz pushbuttons.

8. Press numeric keys 4, 9, 9, . (decimal point), 9, 9, 9, 9 and 9, then press ENTER FREQ pushbutton. Set the reference source to internal.

9. Enter status program at computer terminal as shown below. Edit entry as necessary and execute program.

LINE NO.	STATEMENT	INSTRUCTION
100	DIM	S(24)
110	WBYTE	@64, 96:
120	FOR I	=1 TO 24
130	RBYTE	S(I)
140	NEXT	I
150	PRINT	S
(Refer to note below before proceeding)		
160	END	

NOTE

After execution of line 150 PRINT S, compare the computer's CRT display with the content shown in the status display chart below. If the CRT display does not agree with that shown in the status display chart, check program instructions setup in step 3 and make corrections as required. If status program has been properly executed, proceed with line entry 160 and END statement.

STATUS DISPLAY CHART

0 (RCVR ADDRESS)	0 (DATA ID)	4 (RCVR FREQ)	9 (RCVR FREQ)
9 (RCVR FREQ)	9 (RCVR FREQ)	9 (RCVR FREQ)	9 (RCVR FREQ)
9 (RCVR FREQ)	9 (RCVR FREQ)	0 (SCAN MODE/RATE)	15 (DETECTION MODE)
0 (BFO MODE)	6 (GAIN MODE)	125 aprox (GAIN)	17 (IFBW)
1 (REF SOURCE)	0 (CONTROL MODE)	108 aprox (SIGNAL STRENGTH)	20 (IF SLOT 1)
17 (IF SLOT 2)	13 (IF SLOT 3)	10 (IF (SLOT 4)	-59 (STATUS)

10. Recall status display chart for observation and compare contents of chart with CRT display and ascertain that the two agree with each other.

11. This concludes the Remote Operation Test. Disconnect all test equipment and turn Receiver power off. Primary address switch (S1) must be reset for system application.

5-21. Fast Scan Test. This procedure checks the operation of the Receiver in the Fast Scan mode while directed by the Spectrum Surveillance Controller RG-1340.

1. Connect the test setup with the Spectrum Surveillance Controller RG-1340, Spectrum Display HP-1311A, Signal Generator and the Receiver as shown in Figure 5-8.

2. Set up Signal Generator front panel controls as follows:

Output Level	-60 dBm
Range	256-128
Frequency	250.000 MHz
FM	Off
AM	Off

3. On Controller front panel, set LOCAL/REMOTE switch to LOCAL position.

4. Adjust the DISPLAY INTENSITY control in conjunction with the Controller BRIGHTNESS CONTROL as desired.

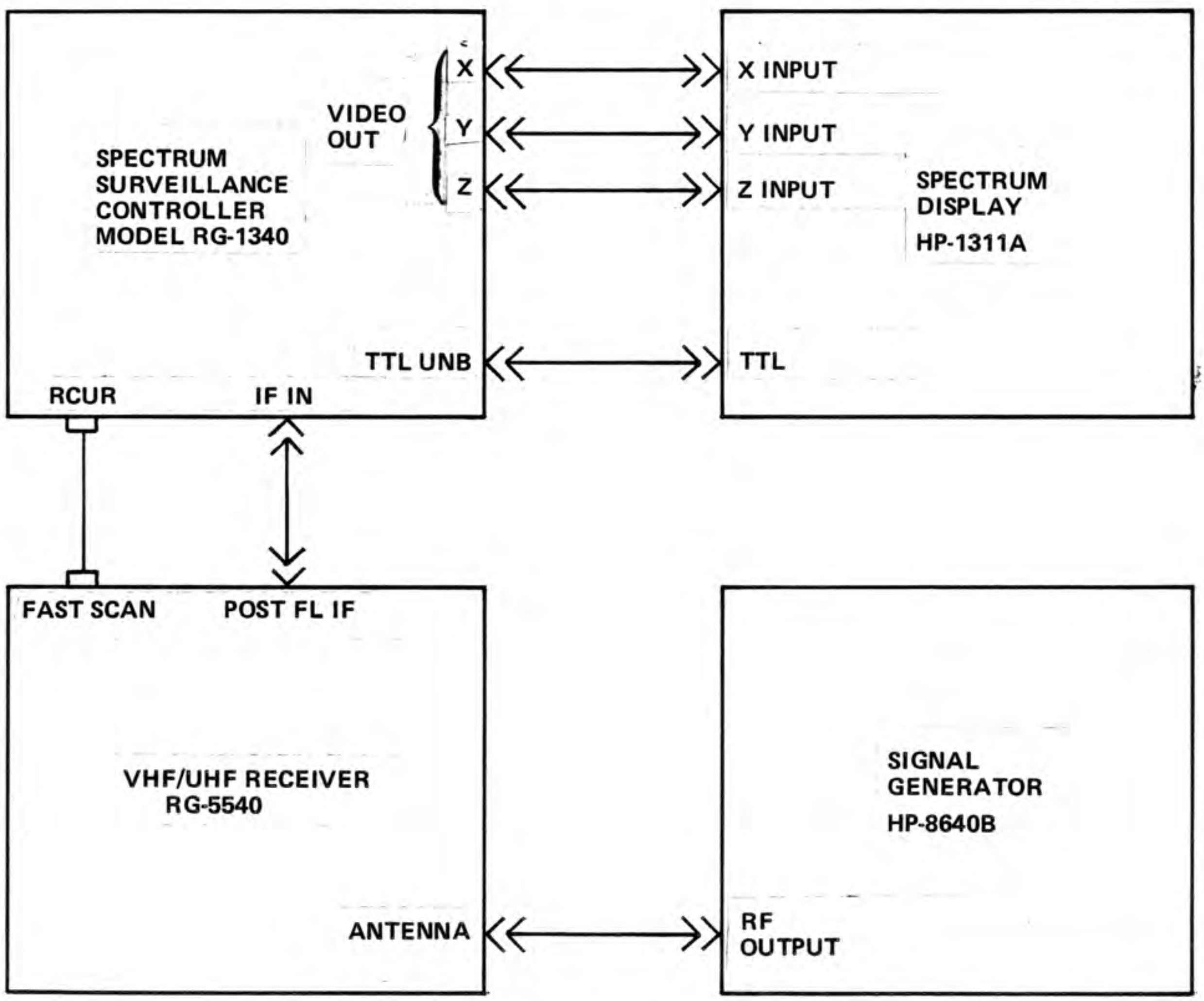


Figure 5-8. Fast Scan Mode Test Set-up

5. On Controller front panel press BAND SCAN mode key to obtain BAND SCAN mode of operation on Display CRT. The display shown in Figure 5-9 should be obtained by setting the Controller controls for the following parameters:

AVERAGING	Off
Scan time	80 msec
IFBW	100 kHz
Start Frequency	245.00000 MHz
Stop Frequency	255.00000 MHz

6. The Receiver frequency should be blank and the FAST SCAN annunciator should be illuminated. Actuation of any control on the Receiver front panel should not have any effect on displays.

7. This concludes the Fast Scan Test. Disconnect all test equipment.

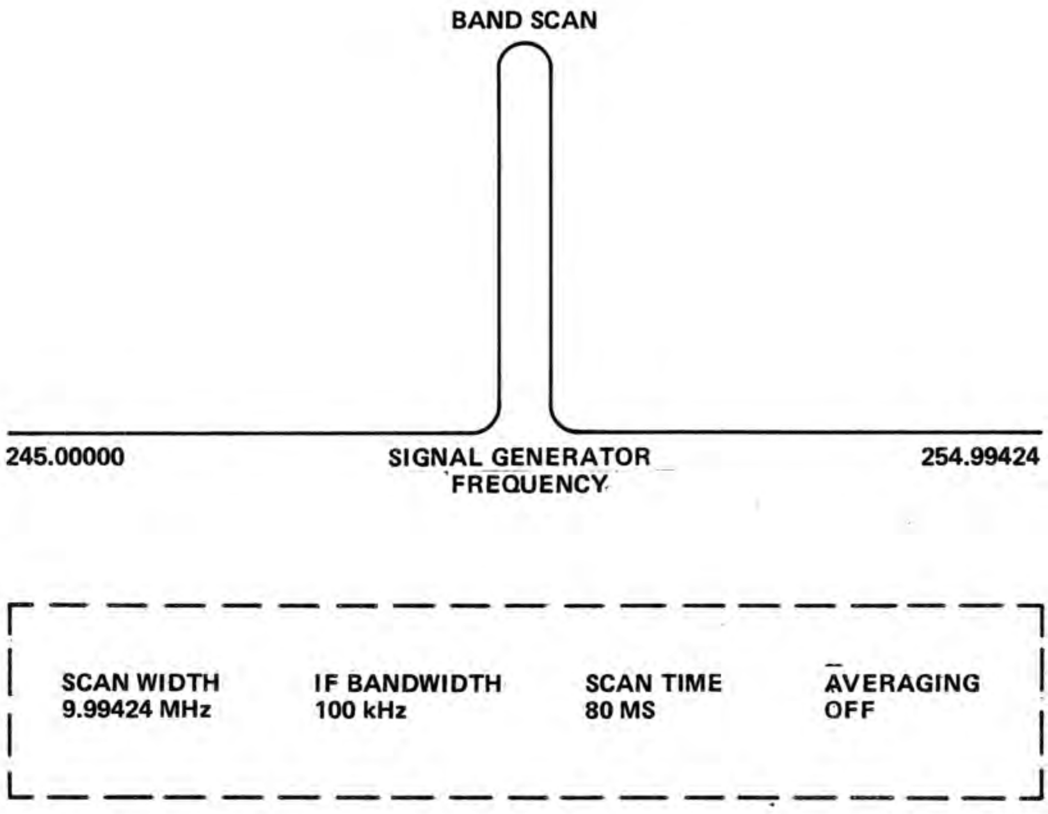


Figure 5-9. Band Scan Display

5-22. Receiver Parameter Settings Memory Retention Test. This tests the ability of the Receiver to retain its parameter settings after power interruption or power turn-off and on.

1. Connect Receiver to power source and turn Power switch ON.

2. Set Receiver parameters as follows:

Frequency	450.00000 MHz
IF Bandwidth	10 kHz
Detection	AM
Gain	MGC

Front panel indicators should indicate settings.

3. Rapidly turn Power switch OFF and ON several times, ending with switch ON.

4. With Power switch ON, settings should remain as set in Step 2 above.

5. This concludes the Memory Retention Test. Disconnect all equipment.

5-23. TROUBLESHOOTING

The following paragraphs contain troubleshooting procedures designed to isolate a malfunction to a replaceable module (or card) or to a power supply or front panel component. The basic philosophy is to replace an entire module (or card) or an easily replaceable power supply or front panel component when malfunction occurs, thereby minimizing the system down time.

The recommended procedure when a malfunction occurs is as follows:

1. Assure that the incoming and outgoing cable connectors are securely connected to their correct mating connectors on the Receiver's rear panel (see Figure 2-4).

2. Assure that all Receiver internal cables are correctly and securely connected (see Figure 7-31).

3. Assure that the power supply output voltages are correct (see paragraph 5-13).

4. Refer to the Troubleshooting Table (Table 5-3) for the possible causes and remedial action to be taken for the listed trouble symptoms.

5. If Steps 1 through 4 above do not correct the malfunction, conduct the Performance Tests given in paragraphs 5-12 through 5-22, as needed, to more systematically determine the trouble symptoms.

Table 5-3. Troubleshooting

ITEM	SYMPTOM	POSSIBLE CAUSE	REMEDY
1.	No FM VIDEO output (from J5 on rear panel) when Receiver is tuned to frequency of input.	1. Cabling between power supply, audio video amp. (A9), J5, J7, J4 and J10 of rear panel, IF assembly (A6), tuner assembly (A3), synthesizer assembly (A5), 2nd LO (A4), reference generator (A8) and digital control (A7).	1. Check connections and continuity of cabling between units (see Figure 7-31) listed under Possible Cause.
		2. Audio/video amp. (A9).	2. If tuning meter on front panel does not indicate reading, go to next step. If tuning meter indicates reading, replace audio/video amp. (A9).
		3. IF amp. (A6A3, A6A4, A6A5 or A6A6).	3. Switch to another IF bandwidth (thereby switching to a different IF amp.). If there is still no FM VIDEO output, go to next step. If FM VIDEO output appears, replace IF amp. card which was originally connected.
		4. No IF OUTPUT.	4. Measure IF OUTPUT at J4 of rear panel (use RMS voltmeter, Item 9 of Table 5-2). This should be approximately 0 dBm. If no or an improper signal is obtained, go to Item 2 of this Table. If there is a proper signal, replace each IF amp. module, one at a time, until FM VIDEO output appears. If, after all four IF amps. have been replaced, the FM VIDEO still does not appear, go to next step.

Table 5-3. Troubleshooting (Cont.)

ITEM	SYMPTOM	POSSIBLE CAUSE	REMEDY
1.	Continued	5. Control Outputs (A7A7).	5. Replace Control Outputs Card (A7A7).
		6. Microcomputer Operation.	6. If (5) above does not clear fault, in turn, replace CPU card (A7A2), Address Decoder card (A7A6) and Converters Card (A7A8) until fault is cleared.
2.	No IF OUTPUT (from J4 on rear panel) when Receiver tuned to frequency of input signal.	1. Variable Gain Amp. (A6A2).	1. Measure post-filter IF output at J7 of rear panel (use RMS voltmeter, Item 9 of Table 5-2). This should be approximately o dBm. If there is a correct signal, replace the Variable Gain Amplifier card (A6A2). If there is no correct signal, go to next step.
		2. IF amp. (A6A3, A6A4, A6A5, A6A6).	2. Measure pre-filter IF output at J10 at rear panel (use RMS voltmeter, Item 9 of Table 5-2). This should be approximately 0 dBm. If there is a correct pre-filter IF output, replace the IF amp. containing the switched in bandwidth filter.
3.	No pre-filter IF output (from J10 on rear panel) when Receiver tuned to frequency of input signal.	1. Reference Generator (A8).	1. Check that the Reference is at INT or, if at EXT, assure that an external Reference is connected. Check for correct Reference Generator operation. Measure the Reference error voltage, using the digital voltmeter (Item 1 of Table 5-2), at terminal 12 of TB1 (on rear panel). This should be 0 ± 5.0 volts. If this is correct, replace Reference Generator Card (A8).

Table 5-3. Troubleshooting (Cont.)

ITEM	SYMPTOM	POSSIBLE CAUSE	REMEDY
3.	Continued	2. 2nd LO (A4).	2. Measure 2nd LO signal into Tuner (A3) terminal J3(see Figure 7-31). Disconnect W2P3 from tuner (A3) terminal J3 and measure signal from this cable connector. Use the counter and RMS voltmeter (Items 12 and 9 of Table 5-2) to measure the frequency and amplitude. The frequency should be 640 MHz and the amplitude approximately 0 to + 5 dBm. If this signal is correct, reconnect W2P3 and go on to next step. If this signal is not correct, replace the 2nd LO card (A4).
		3. Synthesizer Assembly (A5).	3. Measure synthesizer 1st LO output at J3 at rear panel. Use the frequency counter and RMS voltmeter (Items 12 and 9 of Table 5-2) to measure the frequency and amplitude of this output. This should be a frequency equal to the tuned frequency plus 661.4 MHz with amplitude approximately 0 to +5 dBm. If the correct signal is present, go to next step. If the correct signal is not present, replace the synthesizer assembly (A5).
		4. Tuner Assembly (A3).	4. If Steps (1) (2) and (3) do not clear fault, replace Tuner Assembly (A3).
		5. Control Outputs (A7A7).	5. If Step (4) does not clear fault, replace the Control Outputs card (A7A7).
		6. Microcomputer Operation.	6. If Step (5) does not clear fault, replace CPU card (A7A2), Address Decoder card (A7A6) and Converters card (A7A8) until the fault is cleared.

Table 5-3. Troubleshooting (Cont.)

ITEM	SYMPTOM	POSSIBLE CAUSE	REMEDY
4.	No VIDEO output (from J8 on rear panel) when Receiver in FM mode and tuned to frequency of input signal.	1. Audio/Video amp. (A9).	1. Check for output from FM VIDEO (J5 on rear panel). If output is obtained replace Audio/Video amp. (A9). If output is not obtained go to Item 1 of this Table.
5.	No VIDEO OUTPUT (from J8 on rear panel) when Receiver in AM mode and tuned to frequency of input signal.	1. No IF Output.	1. Measure output at J4 at rear panel (use RMS voltmeter, Item 9 of Table 5-2). This should be approximately 0 dBm. If no, or an improper signal is obtained, go to Item 2 of this Table. If the correct signal is obtained, go to next step.
		2. Cabling between power supply, audio/video amp. (A9), IF assembly (A6) and digital control (A7).	2. Check connections and continuity of cabling between units (see Figure 7-31) listed in Possible Causes.
		3. Audio/Video amp. (A9).	3. If (2) above does not clear fault, replace Audio/Video amp. (A9).
		4. IF amp. (A6A3, A6A4, A6A5, A6A6).	4. Switch to another IF bandwidth (thereby switching to a different IF amp.). If there is now a VIDEO output, replace IF amp. card which was originally connected. If there is still no VIDEO output, go to next step.
		5. Control Outputs (A7A7).	5. Replace Control Outputs card (A7A7).
		6. Microcomputer Operation.	6. If (5) above does not clear fault, replace CPU card (A7A2), Address Decoder (A7A6)and Converters card (A7A8) until fault is cleared.

Table 5-3. Troubleshooting (Cont.)

ITEM	SYMPTOM	POSSIBLE CAUSE	REMEDY
6.	No VIDEO output (from J8 at rear panel) when Receiver is in CW mode and tuned to frequency of input signal.	1. No IF output.	1. Measure IF output at J4 at rear panel (use RMS voltmeter, Item 9 of Table 5-2). This should be approximately 0 dBm. If no or improper signal is obtained, go to Item 2 of this Table. If there is a proper signal go to next step.
		2. Cabling between power supply (A1), Audio/Video amp. (A9) and IF assembly (A6).	2. Check connections and continuity of cabling between units (see Figure 7-31) listed under Possible Causes.
		3. CW Demodulator (A6A7).	3. If Steps 1 and 2 do not clear fault, replace CW Demodulator (A6A7).
		4. Audio/Video Amp. (A9).	4. Replace Audio/Video amp. (A9).
		5. Control Outputs (A7A7).	5. If Step (4) above does not clear fault, replace Control Outputs card (A7A7).
		6. Microcomputer Operation.	6. If Step (5) does not clear fault, in turn replace CPU card (A7A2), Address Decoder card (A7A6), and Converters card (A7A8) until fault is cleared.
7.	No 10 kHz IF Output (from J11 of rear panel) when Receiver tuned to input signal.	1. 10 kHz Converter (A6A10).	1. Check for VIDEO output (from J8 at rear panel) with Receiver in CW mode and tuned to a CW input signal. If there is no output, go to item 6 of this Table. If there is an output, replace the 10 kHz Converter card (A6A10).

Table 5-3. Troubleshooting (Cont.)

ITEM	SYMPTOM	POSSIBLE CAUSE	REMEDY
8.	No VIDEO output (from J11 of rear panel) when Receiver tuned to input signal.	1. USB Demodulator (A6A8).	1. Check for VIDEO output (from J8 at rear panel) with Receiver in CW mode and tuned to a CW input signal. If there is no output go to Step 6 of this Table. If there is an output replace USB Demodulator (A6A8).
9.	No VIDEO output (from J8 at rear panel) when Receiver is in LSB mode and tuned to frequency of input signal.	1. LSB Demodulator (A6A9).	1. Check for VIDEO output (from J8 of rear panel) with Receiver in CW mode and tuned to a CW input signal. If there is no output, go to item 6 of this Table. If there is an output replace LSB Demodulator Card (A6A9).
10.	Proper VIDEO output (from J8 of rear Panel) but no or improper outputs from Audio 1 or Audio 2 (TB1) or Headphones 1 or 2 (tip or ring) when Receiver is tuned to frequency of input signal.	1. Audio/Video Amp. (A9).	1. Replace Audio/Video amp. (A9).
11.	No or incorrect Key LED display when a front panel key switch is pressed	1. Cabling between power supply, front panel assembly (A2) and digital control (A7).	1. Check connections and continuity of cabling between units (see Figure 7-31) listed in Possible Causes.
	(Slew and knob tuning indicates correctly	2. Keyboard (A2A1).	2. Replace Keyboard (A2A1).
	on frequency display).	3. Keyboard Decoder (A2A2).	3. If (2) above does not clear fault, replace Keyboard Decoder card (A2A2).
		4. Display Driver (A7A5).	4. If (3) above does not clear fault, replace Display Driver (A7A5).

Table 5-3. Troubleshooting (Cont.)

ITEM	SYMPTOM	POSSIBLE CAUSE	REMEDY
12.	Incorrect frequency display during slew tuning (keyswitches and knob tuning indicators operate correctly).	1. Cabling between front panel assembly (A2) and digital control (A7).	1. Check connections and continuity of cabling within panel assembly A2 (see Figure 7-2) and between panel assembly A2 and digital control A7 (see Figure 7-31).
		2. Switches S2 and S3.	2. Replace Switch S2 or S3 if faulty.
13.	Incorrect frequency display during knob tuning (keyswitches and slew tuning indicators operate correctly).	1. Cabling between front panel assembly (A2) and digital control (A7).	1. Check connections and continuity of cabling within panel assembly A2 (see Figure 7-2) and between panel assembly A2 and digital control A7 (see Figure 7-31).
		2. Tuning Knob Shaft Encoder.	2. Replace tuning knob shaft encoder if faulty.
14.	No frequency display or annunciators display operation (keyswitches and LED displays operate correctly).	1. Cabling between front panel assembly (A2) and digital control (A7).	1. Check connections and continuity of cabling within panel assembly A2 (see Figure 7-2) and between panel assembly A2 and digital control A7 (see Figure 7-31).
		2. Display (A2A3).	2. Replace Display card (A2A3).
		3. Display Driver (A7A5).	3. If (2) above does not clear fault, replace Display Driver card (A7A5).
15.	Incorrect operation of front panel keyswitches and slew tuning and knob tuning indicators.	1. Cabling between power supply, front panel assembly (A2) and digital control (A7).	1. Check connections and continuity of cabling between units (see Figure 7-31) listed in Possible Causes.
		2. Front Panel Interface (A7A4).	2. Replace Front Panel Interface card (A7A4).
		3. CPU (A7A2).	3. If (2) above does not clear fault, replace CPU card (A7A2).

Table 5-3. Troubleshooting (Cont.)

ITEM	SYMPTOM	POSSIBLE CAUSE	REMEDY
15.	Continued	4. Address Decoder (A7A6).	4. If (3) above does not clear fault, replace Address Decoder card (A7A6).
		5. Converters (A7A8).	5. If (4) above does not clear fault, replace Converters card (A7A8).
		6. Display Driver (A7A5).	6. If (5) above does not clear fault, replace Display Driver card (A7A5).
16.	Faulty remote computer control operation.	1. Remote Computer.	1. Perform remote computer control performance test as described in Paragraph 5-20 of the Performance Test. If this test is satisfactory, fault lies in remote computer or in cabling from remote computer to IEEE-488 interface connector J16 on Receiver rear panel. Assure sound connections and that remote computer is operating satisfactorily. If remote computer control performance test is unsatisfactory, go to next step.

Table 5-3. Troubleshooting (Cont.)

ITEM	SYMPTOM	POSSIBLE CAUSE	REMEDY
16.	Continued	2. Cabling within Receiver between J16 (rear panel), digital control (A7) and power supply and connections within digital control (A7).	2. Check connections and continuity of cabling between J16, digital control A7 and the power supply (see Figure 7-31). Check connections between cards in digital control A7 (see Figure 7-21).
		3. Remote Interface (A7A9).	3. Replace Remote Interface card (A7A9).
		4. CPU (A7A2).	4. If (3) above does not clear fault, replace CPU card (A7A2).
		5. Address Decoder (A7A6).	5. If (4) above does not clear fault, replace Address Decoder card (A7A6).
17.	Faulty FAST SCAN operation (with RG-1340).	1. Cabling within Receiver between J15 (rear panel), power supply and digital control (A7) and connections within digital control (A7).	1. Check connections and continuity of cabling between J15, digital control A7 and power supply (see Figure 7-31).
		2. IF Output.	2. Measure IF output from J4 at rear panel (with Receiver tuned to input signal). If no signal, go to Item 2 of this Table. If there is a signal go to next step.
		3. Front Panel Interface (A7A4).	3. Replace Front Panel Interface card (A7A4).
		4. CPU (A7A2).	4. If (3) above does not clear fault, replace CPU card (A7A2).

Table 5-3. Troubleshooting (Cont.)

ITEM	SYMPTOM	POSSIBLE CAUSE	REMEDY
20.	+28V supply faulty (see Paragraph 5-13 Performance Tests).	1. Power Rectifiers CR9, CR10. 2. Regulator U1. 3. Filter Capacitors C2 (in A1), C1, C2, C3.	1-3. Replace faulty components as needed (see Figure 7-1).
21.	+22V (UNREG) supply faulty (see Paragraph 5-13, Performance Tests).	1. Fuse F1. 2. Power Rectifiers CR1-CR2. 3. Filter Capacitors C3 (in A1), C6.	1-3. Replace faulty components as needed (see Figure 7-1).
22.	+15V supply faulty (see paragraph 5-13 Performance Tests).	1. +22 V (UNREG).	1. If +22V (UNREG) is also faulty, go to item 21 of this Table. If +22V (UNREG) is satisfactory, go to next step.
		2. Regulator U3. 3. Filter Capacitors C7 and C8. 4. Diodes CR5, CR6, CR7.	2-4. Replace faulty components as needed (see Figure 7-1).
23.	-22V (UNREG) supply faulty (see paragraph 5-13 Performance Tests).	1. Fuse F2. 2. Power Rectifier CR3-CR4. 3. Filter Capacitors C4 (in A1), C1.	1-3. Replace faulty components as needed (see Figure 7-1).
24.	-15 V supply faulty (see Paragraph 5-13 Performance Tests).	1. -22V (UNREG).	1. If -22V (UNREG) is also faulty, go to Item 23 of this Table. If -22V (UNREG) is satisfactory go to next step.
		2. Regulator U2. 3. Filter Capacitor C5. 4. Diodes CR3, CR4.	2-4. Replace faulty components as needed (see Figure 7-1).

Table 5-3. Troubleshooting (Cont.)

ITEM	SYMPTOM	POSSIBLE CAUSE	REMEDY
25.	+5 ANALOG supply faulty (see paragraph 5-13, Performance Tests).	1. Power Rectifiers CR5-CR6. 2. Regulator U4. 3. Filter Capacitors C5 (in A1), C9, C10, C11. 4. Diodes CR8, CR9 and CR10.	1. If -22V (UNREG) is also faulty, go to Item 23 of this Table. If -22V (UNREG) is satisfactory go to next step. 2-4. Replace faulty components as needed.
26.	+10V (UNREG) supply faulty (see paragraph 5-13, Performance Tests).	1. Fuse F3. 2. Power Rectifiers CR7, CR8. 3. Filter Capacitors C14, C12.	1-3. Replace faulty components as needed, (see Figure 7-1).
27.	+5 (DIGITAL) supply faulty (see Paragraph 5-13, Performance Tests).	1. +10V (UNREG). 2. Regulator U5. 3. Filter Capacitor C13. 4. Diodes CR11, CR12.	1. If +10V (UNREG) is also faulty, go to item 26 of this table. If +10V (UNREG) is satisfactory, go to next step. 2-4. Replace faulty components as needed (see Figure 7-1).

5-24 MODULE AND COMPONENT ACCESS

5-25. The Receiver circuits are contained on modules or circuit cards within an aluminium chassis with top and bottom covers. Access to the circuit cards or modules is achieved by removing the top and/or bottom cover then performing the procedure for the module to be accessed as described below.

a. Power Supply A1. The power supply is housed in its own compartment in the Receiver chassis. To gain access to the power supply circuits, remove six screws securing the top plastic cover and remove the cover. If component boards or other components are to be removed from the compartment, their leads must be disconnected or unsoldered and the screws holding the component to the chassis removed.

b. Front Panel Assembly A2. In addition to front panel controls and indicators, a keyboard decoder, tuning encoder, and display are contained on the rear of the front panel assembly. To gain access to circuits on the rear of the assembly or to remove any components perform the procedures that follow:

1. Remove the spectrum display from its compartment by loosening the two captive screws securing the unit and sliding it forward out of its compartment.

2. Remove two screws, located behind the spectrum display front panel, from the front panel of the Receiver.

3. Remove four Allen-head screws securing the two handles and front panel to the Receiver chassis then disconnect P1 from J10, P3 from J9 and P5 from J12.

4. Disconnect the component to be removed, then remove the screws and/or nuts securing the component to the front panel and remove the component.

c. RF Tuner Module A3. The RF tuner is contained in a module with removable cover and secured to the Receiver chassis with two knurled screws. To gain access to the module, perform the following procedure.

NOTE

The Receiver must be positioned so that connectors and screws can be removed from the bottom while the module is removed from the top.

1. Unscrew plugs P1 and P3 from J1 and J3, disconnect P17 and P5 from J4 and J5 then disconnect A3P23 from the module.

CAUTION

When re-connecting the screw-on plugs, be careful not to cross-thread the plugs or damage to the connector may result.

2. Remove the two knurled screws securing the module to the chassis and move the module out from the top of the Receiver just far enough to gain access to plug P16, unscrew this plug from FL5-J1 then remove the module.

NOTE

If adjustment or voltage measurements are to be made with the module connected in the system proceed with steps 3 through 5.

3. Remove six screws securing the cover on the module and remove the cover.

4. Turn the Receiver bottom side up. Place the module on the Receiver near the module copartment with insulating pad between the module and Receiver.

5. Re-connect the plugs removed in steps 1 and 2 being careful not to cross threads with screw-on connectors.

d. Second LO Module A4. The second LO is contained in a module with removable covers and secured to the Receiver chassis with two knurled screws. To gain access to this module perform the following procedure.

1. Unscrew plug P4 from J2, disconnect plug P10 from J1 and plug 24 from the module.

2. Remove two knurled screws from the bottom of the module and remove the module form the top of the Receiver.

NOTE

If adjustment or voltage meaurements are to be made with the module connected in the system, proceed with steps 3 through 5.

3. Remove six screws securing either cover to the module and remove the cover, being careful not to mis-place the floating standoffs.

4. Turn the Receiver bottom side up. Place the module on the Receiver near its compartment with insulating pad between the Receiver and module.

CAUTION

When re-connecting the screw-on plug, be careful not to cross-thread the plug or damge to the connector may result.

5. Re-connect the plugs removed in step 1.

e. Synthesizer Module A5. The synthesizer is contained in a module with a sealed cover and secured to the Receiver chassis with four knurled screws. The sealed cover should not be removed for any type of field maintenance. The module should be removed from the Receiver and returned to the factory for service. To remove the module from the Receiver, perform the followng procedures.

1. Disconnect P4 from J1, P25 from J2, P2 from J3 and P12 from J4.

2. Remove four knurled screws from the bottom of the module and remove the module from the top of the Receiver.

CAUTION

Do not attempt to remove the sealed cover. The unit must be returned to the factory for all servicing.

f. IF module assembly A6. The IF module assembly A6 consists of an IF mother board A6A1 and nine plug-in circuit cards A6A2 through A6A10. The mother board (A6A1) is accessed from the bottom of the Receiver by removing a cover over the board secured with six screws. The circuit cards are accessed from the top of the Receiver by removing a cover secured by four screws. The cards may be removed by using a circuit card puller to pull them from the Receiver and may be serviced in-circuit using a circuit card extender.

g. Receiver Control Module Assembly A7. The Receiver control module assemlby A7 consists of seven plug-in circuit cards, A7A2 and A7A4 through A7A9. The circuit cards are accessed from the top of the Receiver and may be removed by using a circuit card puller. The cards may be serviced in-circuit by using a circuit card extender.

h. Reference Generator Assembly A8. The reference generator is contained in a compartment at the rear of the Receiver. To remove this module disconnect P7 from J4, P9 from J5 and P11 from J6 then remove the screws securing the unit to the chassis and remove the unit.

i. Audio/Video Amplifier A9. The audio/video amplifier is contained on a plug-in circuit card that is accessed from the top of the Receiver. The circuit card may be removed by using a circuit card puller and may be serviced in-circuit by using a circuit card extender.

5-26. ALIGNMENT PROCEDURES

5-27. The alignment procedures are designed to permit alignment of any one or all of the various functions in the Receiver; however, the adjustment in some functions interact with other functions so that care must be taken when any one function alone is aligned. The alignment procedures require that external power be connected to the Receiver, the Receiver POWER switch pressed on and that the mode, bandwidth, AGC and frequency be set as described in each procedure. Except where noted in each procedure, the circuit card being adjusted must be extended for access to the adjusting control. The extender card is listed in Table 5-2 under test equipment.

5-28. RF TUNER ADJUSTMENTS. The RF Tuner must be extended and its covers removed to perform these adjustment procedures.

1. Ensure that first LO cable W1 is connected to J1 and that second LO cable W2 is connected to J3.

2. Connect the signal generator to ANTENNA (J1) input.

3. Set Receiver frequency to 30.000 MHz, mode to CW and AGC to FAST.

4. Adjust signal generator to 30.000 MHz with -105 dBm output level.

5. Connect spectrum analyzer to PRE FIL IF output (J10).

6. Adjust spectrum analyzer to display 21.4 MHz IF output.

7. Spectrum analyzer should display the 21.4 MHz IF signal at -79 dBm ± 2 dB level.

8. Connect the digital multimeter to pin 3 of P23.

9. Adjust A3A1 R6 for 12 ± 0.05 volts.

10. Connect a jumper between pin 2 of P23 and ground.

11. Adjust signal generator output level to -50 dBm.

12. Spectrum analyzer should indicate IF signal level of -24 ±2 dBm.

13. Adjust signal generator output level to -25 dBm.

14. Adjust power supply to 10 volts DC and remove jumper between pin 2 and ground. Connect power supply to pin 2.

15. Adjust A3A1R23 until spectrum analyzer indicates -25 dBm.

16. This concludes the RF tuner adjustments, disconnect all test equipment, install its covers and install the tuner into the Receiver.

5-29. SECOND LO ADJUSTMENTS. The second LO must be extended from the Receiver and cover removed to perform these adjustment procedures.

1. Be sure that 10 MHz reference is not connected to J1.

2. Connect the digital multimeter at the junction of C12 and R10.

3. Adjust R26 for a 7.5 $\pm$ 0.1 Volt indication on the multimeter.

4. Connect the 10 MHz reference to J1 and adjust C11 for 9.0 $\pm$ 0.1 Volt indication on the multimeter..

5. Connect the frequency counter to J2, using the Receiver EXT REF output to frequency counter EXT REF input, verify that the second LO frequency is 640.000000 MHz $\pm$ 1 Hz.

6. Disconnect the frequency counter and connect the spectrum analyzer to J2.

7. Spectrum analyzer should indicate between -1 and + 4 dBm output power level.

8. This concludes the second LO adjustments, disconnect all test equipment and install the second LO into the Receiver.

5-30. VARIABLE GAIN AMPLIFIER ADJUSTMENTS. The variable gain amplifier must be adjusted in place. Do not extend the unit from the Receiver.

1. Adjust R95 to the full clockwise position and R81 to the full counter-clockwise position.

2. Connect the signal generator to ANTENNA Connector J1 on the rear panel and adjust for 21.4 MHz at -105 dBm level.

3. Adjust Receiver frequency to 21.400 MHz, mode to CW and MGC with zero attenuation.

4. Connect the spectrum analyzer to IF OUTPUT connector J4 on the Receiver rear panel.

5. Set spectrum analyzer controls to display 21.4 MHz signal at approximately -10 dBm.

6. Adjust R76 fully clockwise, then counter clockwise until gain just begins to drop.

7. Adjust signal generator output level to -75 dBm.

8. Select AGC FAST and adjust R37 for a -10 dBm display on the spectrum analyzer.

9. Adjust signal generator output level to -50 dBm.

10. Disconnect spectrum analyzer from IF OUTPUT connector J4 and connect to PRE FL IF connector J10 on the Receiver rear panel.

11. Adjust R81 for -25dBm ±1 dB then adjust R95 until gain just begins to drop.

12. Disconnect spectrum analyzer from PRE FIL IF J10 and reconnect to IF OUT J4.

13. Adjust signal generator from 0 dBm to -100 dBm and verify that output level remains at approximately -10 dBm. Readjust signal generator to -105 dBm and verify that output is at least -16 dBm.

14. This concludes the variable gain amplifier adjustments, disconnect all test equipment.

5-31. IF AMPLIFIER ADJUSTMENTS. The IF amplifier being adjusted must be extended from the Receiver for these adjustment procedures.

1. Select the appropriate bandwidth on the Receiver front panel for the IF amplifier being adjusted. Push MGC pushbutton and set RF GAIN until level meter reads full scale.

2. Connect the digital multimeter to A2TP1.

3. Adjust A2R12 for a 155 ±1 millivolt indication on the multimeter.

4. Connect the signal generator to ANTENNA J1 and adjust for 21.40 MHz CW signal at -60 dBm.

5. Set Receiver frequency to 21.40 MHz, and mode to CW.

6. Connect spectrum analyzer to IF OUT (J4) and adjust RF GAIN for -10 dBm reading on spectrum analyzer.

7. Connect the digital multimeter to pin 27/67 on the IF amplifier and set for DC volts.

8. Adjust R2 fully clockwise.

9. Adjust A2L3 for maximum DC indication on the multimeter, then adjust A2L2 for maximum DC indication on the multimeter.

10. Repeat step 9 as required to obtain maximum DC indication on the multimeter.

11. Reconnect multimeter to pin 26/66 and adjust A2R2 for a 750 ±7 millivolt indication on the multimeter.

12. Disconnect the multimeter from pin 26/66 and connect it to pin 5 of U8.

13. Select FM mode and AG slow from the Receiver front panel.

14. Adjust the OFF-CENTERED tuning screw, located in the FM discriminator housing for a minimum multimeter indication.

15. Connect oscillator output of distortion analyzer to EXT FM input of the signal generator.

16. Set output amplitude of distortion analyzer to 1 Volt rms and signal generator to FM AC.

17. Adjust distortion analyzer frequency and signal generator peak deviation for the amplifier being adjusted as shown below.

IF BANDWIDTH	OSCILLATOR FREQUENCY	GENERATOR DEVIATION
10 kHz	400 kHz	4 kHz
20 kHz	1 kHz	8 kHz
50 kHz	1 kHz	20 kHz
100 kHz	1 kHz	40 kHz

18. Connect FM VIDEO (pin 22-P1) to distortion analyzer input.

19. Adjust the CENTER tuning screw, located on the discriminator housing, for minimum distortion indication.

20. Set distortion analyzer to input level. Adjust A3L2 for maximum voltage indication.

21. Adjust R40 for a 400 millivolt rms indication on the distortion analyzer.

22. Set signal generator to CW. Disconnect distortion analyzer from FM Video.

23. Connect digital multimeter to pin 23 of P1 and adjust for DC volts.

24. Adjust R53 for minimum DC indication on the multimeter (0 Volts DC should be obtainable).

25. This concludes the IF Amplifier adjustments, disconnect all test equipment and install the IF Amplifier into the Receiver.

5-32. CW DEMODULATOR ADJUSTMENTS. The CW Demodulator must be extended from the Receiver to perform these adjustment procedures.

1. Connect the oscilloscope to pin 7/8 of U6 on the CW Demodulator.

2. Adjust L3 for a plus 5 to 10 Volts DC indication on the oscilloscope.

3. Disconnect oscilloscope from pin 8 of U6 and connect it to TP1.

4. Adjust L7 for maximum amplitude of the displayed 19.400 MHz signal.

5. Disconnect oscilloscope from TP1 and connect it to pin 8 of U21.

6. While selecting CW from the Receiver front panel, adjust L15 for 5.0 volts DC. Select CW 1 kHz and verify that voltage reading is less than 12 volts DC.

7. Connect signal generator to the ANTENNA connector J1 on the Receiver rear panel and adjust for 21.400 MHz, CW at -50 dBm output level.

8. Set Receiver frequency to 21.400 MHz, mode to CW 1 kHz and AGC to FAST.

9. Disconnect oscilloscope from pin 8 of U21 and connect it to pin 7 of P1.

10. Alternately adjust C2 and C6 for maximum amplitude of the 2 MHz signal.

11. Disconnect oscilloscope from pin 7 of P1 and connect it to pin 14 of P1.

12. Adjust R107 for 1.75 Volt indication on the oscilloscope.

13. This concludes the CW Demodulator adjustments, disconnect all test equipment and install the CW Demodulator into the Receiver.

5-33. LSB DEMODULATOR ADJUSTMENTS. The LSB Demodulator must be extended from the Receiver to perform these adjustment procedures.

1. Set Receiver frequency to 30.000 MHz, mode to LSB, AGC to FAST and IF bandwidth to 20 kHz.

2. Connect the signal generator to the ANTENNA connector J1 on the Receiver rear panel.

3. Adjust signal generator for 29.9990 MHz at -50 dBm output level.

4. Using the oscilloscope monitor pin 37 of P1 for 2.000 MHz TTL waveform and pin 7 of P1 for 2.001 MHz at 200 millivolts peak to peak.

5. Connect the oscilloscope to pin 26 of P1 and adjust R26 for a 1.75 Volt peak to peak sine wave. Verify that frequency is 1 kHz.

6. Connect the RMS voltmeter to LSB (ring) on the HEADPHONES jack.

7. Set signal generator to 30.0 MHz at - 50 dBm.

8. Set Receiver frequency to 29.99900 mHz.

9. Adjust USB HEADPHONES control for +10dBm reading on the RMS voltmeter with 600 ohm reference.

10. Press dBm REL pushbutton on RMS voltmeter and note that the meter indicates 0.00 dB relative.

11. Slowly tune Receiver between 29.99980 and 299660 MHz while observing RMS voltmeter indication.

12. Set the Receiver frequency where peak indication occurs, then reset the dBm/REL pushbutton to set the peak for new reference.

13. Slowly tune the Receiver between 29.99980 and 29.99660 MHz and assure that dB level is not more than 3 dB down (from peak in step 12) over the tuned range.

14. This concludes the LSB Demodulator adjustments, disconnect all test equipment and install the LSB Demodulator into the Receiver.

5-34. USB DEMODULATOR ADJUSTMENTS. The USB Demodulator must be extended from the Receiver to perform these adjustment procedures.

1. Set Receiver frequency to 30.000 MHz, mode to USB, AGC to FAST and IF bandwidth to 20 kHz.

2. Connect signal generator to ANTENNA Connector J1 on Receiver rear panel.

3. Adjust signal generator for 30.0010 MHz at -50 dBm output level.

4. Using the oscilloscope monitor pin 37 of P1 for 2.000 MHz TTL waveform and pin 9 of P1 for 1.999 MHz at 200 millivolts peak to peak.

5. Connect the oscilloscope to pin 22 and adjust R26 for a 1.75 volt peak to peak sine wave. Verify that frequency is 1 kHz.

6. Connect the RM5 voltmeter to USB (tip) on the HEADPHONES jack.

7. Set signal generator to 30.0 MHz at -50 dBm.

8. Set Receiver frequency to 30.00100 MHz.

9. Adjust LSB HEADPHONES control for +10 dBm reading on the RMS voltmeter with 600 ohm reference.

10. Press dBm REL pushbutton on RMS voltmeter and note that the meter indicates 0.00 dB relative.

11. Slowly Tune Receiver between 30.00020 and 30.00340 MHz while observing RMS voltmeter indication.

12. Set the Receiver frequency where peak indication occurs, then reset the dBm/REL pushbutton to set the peak for new refrence.

13. Slowly tune Receiver between 30.00020 and 30.00340 MHz and assure that dB level is not more than 3 dB down (from peak in step 12) over the tuned range.

14. This concludes the USB Demodulator adjustments, disconnect all test equipment and install the USB Demodulator into the Receiver.

5-35. 10 kHz CONVERTER ADJUSTMENTS. The 10 kHz converter must be extended from the Receiver to perform these adjustment procedures.

1. Connect the oscilloscope to pin 8 of U11 on the Converter and connect 600 ohm load to 10 KHz IF connector J11.

2. Adjust L6 for an indication of 10 $\pm$ 0.1 Volts on the oscilloscope.

3. Connect signal generator to ANTENNA connector J1 on the Receiver rear panel and adjust for 21.400 MHz, CW at - 5dBm output level.

4. Set Receiver frequency to 21.400 MHz, mode to CW and AGC to FAST.

5. Disconnect oscilloscope from pin 8 of U11 and connect it to pin 24 of P1.

6. Adjust R12 for an indication of 3.0 Volts peak to peak on the oscilloscope.

7. This concludes the 10 kHz Converter adjustments, disconnect all test equipment and install the 10 kHz Converter into the Receiver.

5-36. Converter Card Adjustments. The converter card must be extended from the Receiver to perform these adjustments.

1. Connect the signal generator to ANTENNA J1 on the rear panel.

2. Connect digital multimeter to Pin 30 of P1 on the converter card.

3. Set Receiver frequency to 21.4 MHz, 50 kHz bandwidth, CW 1 kHz and AGC FAST.

4. Adjust signal generator for 21.4000 MHz at -20 dBm and slowly increase Receiver frequency (approxmately 21.7 MHz) until digital meter reads 1.35 volts.

5. Disconnect digital voltmeter from pin 30 of P1 and connect it to pin 7 of U17B.

6. Adjust R22 (sixth potentiometer from rear of Receiver) for 3.4 $\pm$ 0.2 volt indication on the multimeter.

7. Disconnect digital meter from pin 7 of U7B.

8. Select MGC and set RF GAIN control on Receiver to minimum, then adjust R5 (third potentiometer from back of Receiver) for full scale deflection on the LEVEL meter.

9. Connect digital multimeter to pin 2 of P23 on the RF tuner (A3).

10. Adjust R8 (fifth Potentiometer from rear of Receiver) for 12.8 ± 0.1 volt indication on the digital voltmeter.

11. Disconnect multimeter from pin 2 of P23 and select AGC SLOW.

12. Ascertain that signal generator frequency and Receiver frequency are the same, then adjust R6 (second potentiometer from rear of Receiver) for center on the TUNING meter.

NOTE

Potentiometers R7, R9, R10, R11, R12 and R15 control DAC's that are not used in this Receiver application.

13. This concludes the converter card adjustment. Disconnect all test equipment and install the converter card in the Receiver.

SECTION 6

PARTS LIST

6-1. UNIT NUMBERING METHOD

6-2. The unit numbering method of assigning reference designations (electrical identification symbol numbers) has been employed to denote assemblies, subassemblies, and component parts. An example (A1A2R1) of the unit method is illustrated below.

A1	A2	R1
Assembly Designation	Subassembly Designation	Class and Number of Component

6-3. As indicated on the main chasiss schematic, component parts which are considered to be an integral part of the main chassis assembly carry no prefix designations.

6-4. REPLACEMENT PARTS

6-5. The original manufacturer, vendor or specifier and their component designation is listed for the convenience of the user. It is suggested that replacement parts for all types be ordered from the R. E. Grimm Company, and we will make them available from more than one source. As a result, components actually used may be of a different manufacture than the one listed, but will be equivalent in performance. Regardless of the component actually used, the type and brand listed in the accompanying parts list is an acceptable replacement.

When ordering replacement parts:

(a) Specify type and serial number of the equipment.

(b) Specify assembly and reference designation and description of the part ordered.

(c) Specify quantity to be shipped.

6-6. LIST OF MANUFACTURERS

Code	Name and Address
00656	Aerovox Corporation 740 Bellevile Avenue New Bedford, MA 02741
00779	AMP, Incorporated P.O. Box 3608 Harrisburg, PA 17105
01121	Allen-Bradley Company 1201 South 2nd. Street Milwaukee, WI 53204
01281	TRW Semiconductors, Inc. 14520 Aviation Blvd. Lawndale, CA 90260
01295	Texas Instruments, Inc. Semiconductor-Components Div. 13500 North Central Expressway Dallas, TX 75321
01561	Chassis Trak Div of General Devices P.O. Box 39100 Indianapolis, IN 46239
02660	Bunker-Ramo Corporation Amphenol Connector Divison 2801 South 25th Avenue Broadview, IL 60153
02735	RCA Corporation Solid State Division Route 202 Somerville, NJ 08876
03888	Pyrofilm 600 South Jefferson Road Whippany, NJ 07981
04009	Arrow-Hart, Inc. 103 Hawthorne Street Hartford, CT 06106
04713	Motorola Inc. Semiconductor Products Div. 5005 East McDowell Road Phoenix, AZ 85008
05245	Components Corporation 2857 N Halsted Street Chicago, IL 60657
05972	Loctite 705 N. Mountain Road Newington, CT 06111
06090	Raychem Corportion 300 Constitution Drive Menlo Park, CA 94025
06540	Amatom Electronic Hardware Division of Mite Corp. 446 Blake Street New Haven, CN 06515
06776	Robinson Nugent 800 E. Eight Street New Albany, IN 47150
06865	Thomas and Betts Ansley Div. 3208 Humbolt Avenue Los Angeles, CA 90031
07263	Fairchild Camera and Instrument Corporation Semiconductor Division 464 Ellis Street Mt. View, CA 94040
09353	C & K Components, Inc. 103 Morse Street Watertown, MA 02172
11711	General Instrument Corp. Rectifier Division 600 W. John Street Hicksville, NY 11802
12515	Teledyne Thermatics P.O. Drawer 505 Elm City, NC 27822
13103	Thermalloy Company 2021 W. Valley View Lane Dallas, TX 75234

6-6. LIST OF MANUFACTURERS (Cont.)

Code	Name and Address
14009	Semtech Corporation 652 Mitchell Road Newbury Park, CA 91320
14752	Electro Cube, Inc. 1710 S. Del Mar Avenue San Gabriel, CA 91776
15542	Mini-Circuits Laboratory Division of Scientific Components Corporation 2913 Quentin Road Brooklyn, NY 11229
15873	Motorola, Incorporated 406 West Main Street Arcade, NY 14009
15912	T & B Ansley Corporation 3208 Humbolt Street Los Angeles, CA 90031
16179	Omni-Spectra Inc. 24600 Hallwood Court Farmington, MI 48024
16428	Belden Corporation P.O. Box 1101 Richmond, IN 47374
17856	Siliconix, Incorporated 2201 Laurelwood Road Santa Clara, CA 95050
18324	Signetics Corporation 811 East Arques Avenue Sunnyvale, CA 94086
18915	The Birtcher Corporation Industrial Division 4391 Valley Boulevard Los Angeles, CA 90032
19701	Mepco/Electra Incorporated Electra Division P.O. Box 760 Mineral Wells, TX 76067

Code	Name and Address
22536	Berg Electronic Inc. Youk Expressway New Cumberland, PA 17070
23924	Power Mate Corporation 514 S. River Street Hackensack, NJ 07601
24355	Analog Devices, Inc. Post Office Box 280 Norwood, MA 02062
24446	General Electric Company 1 River Road Schenectady, NY 12305
24539	Avantek, Incorporated 3175 Bowers Avenue Santa Clara, CA 95051
25088	Siemens America, Inc. 186 Wood Avenue S. Isclin, NJ 08830
27014	National Semi-Cond. Corp. 2950 San Ysidro Way Santa Clara, CA 95051
27264	Molex 2222 Wellington Ct. Lisle, IL 60532
28480	Hewlett-Packard Corporation Corporate Headquarters 1501 Page Mill Road Palo Alto, CA 94304
29990	American Tech. Ceramics Division of Phase Ind. 1 Norden Lane Huntington Sta., NY 11746
30817	Instrument Specialities P.O. Box A Delaware Water Gap, PA 18227

6-6. LIST OF MANUFACTURERS (Cont.)

Code	Name and Address
31443	KEMET Union Carbide Corp. Highway 276, S.E. Greenville, SC 29606
32559	Bivar Inc. 1617 E. Endinger Avenue Santa Anna, CA 92705
32897	Erie Technological Prod., Inc. Erie Frequency Control Division 453 Lincoln Street Carlisle, PA 17013
33062	Ferronics, Inc. 66 N. Main Street Fairport, NY 14450
50364	Monolithic Memories 1165 E. Arques Sunnyvale, CA 94086
50721	Datel Systems, Inc. 1020 Turnpike Street Canton MA 02021
51114	Frequency Sources, Inc. 9036 Winnetka Avenue Northridge, CA 91324
52673	KSW Electronics Corp. South Bedford St Burlington, MA 01803
52769	Sprague Goodman 134 Fulton Avenue Garden City Park, NY 11040
53623	Standard Pneumatic 4980 Energy Way Reno, NV 89562
54805	R. E. Grimm Co. 2351 Research Blvd. Rockville, MD 20850
56289	Sprague Electric Company Marshall Street North Adams, MA 01247
57771	Stimpson 900 Sylvan Avenue Rayport, NY 11705
71279	Cambridge Thermionic Corp. 445 Concord Avenue Cambridge, MA 02138
71400	Bussman Manufacturing Division of McGraw-Edison 2536 W. University Street St. Louis, MO 63107
71468	ITT Cannon Electric 666 East Dyer Road Santa Ana, CA 92702
71590	Centralab Electronics Div. of Globe-Union Inc. 5757 North Green Bay Ave. Milwaukee, WI 53201
71785	TRW Electronic Components Cinch Connector Operations 1501 Morse Avenue Elk Grove Village, IL 60007
71984	Dow Corning Corportion S. Saginaw Road Midland, MI 48640
72962	Elastic Stop Nut Division Amerace Corporation 2330 Vauxhaull Road Union, NJ 07083
72982	Erie Technological Products Incorporated 644 West 12th Street Erie, PA 16512

6-6. LIST OF MANUFACTURERS (Cont.)

Code	Name and Address
74306	Piezo Crystal Company 100 K Street Carlisle, PA 17013
74970	E. F. Johnson Company 299 Tenth Avenue, S W. Waseca, MI 56093
75037	Minnesota Mining and Manufacturing Company Electro Products Division 3 M Center St. Paul, MI 55101
78277	Sigma Instruments, Inc. 170 Pearl Street South Braintree, MA 02185
79136	Waldes Kohinoor, Inc. 47-16 Austel Place Long Island City, NY 11101
80131	Electronic Industries Assoc. 2001 Eye Street, N.W. Washington, D. C. 20006
80205	National Aerospace Standards Committee Aerospace Industries Association of America 1725 De Sales, N.W. Washington, D. C. 20036
80294	Bourns, Incorporated Instrument Division 6135 Magnolia Avenue Riverside, CA 92506
81349	Military Specifications Defense Standardization Manual 41203-M
82389	Switchcraft, Inc. 5555 North Elston Avenue Chicago, IL 60630
84830	Lee Spring Co., Inc. 30 Main Street Brooklyn, NY 11201
90201	Mallory Capacitor Company 3029 East Washington St. P.O. Box 372 Indianapolis, IN 46206
91293	Johanson Mfg. Co. P.O. Box 329 Boonton, NJ 07005
91506	Augat, Incorporated 33 Perry Avenue Attleboro, MA 02703
92194	Alpha Wire Corporation 711 Lidgerwood Avenue Elizabeth, NJ 07207
95121	Quality Components, Inc. P.O. Box 113 St. Mary's, PA 15857
95987	Weckesser Company, Inc 4444 West Irving Park Road Chicago, IL 60641
96906	Military Standards Defense Standardization Manual 41203-M
98159	Rubber Teck Inc. 19115 S. Hamilton St. Gardens, CA 90247
98278	Microdot, Incorporated 220 Pasadena Avenue South Pasadena, CA 91030
98291	Sealectro Corporation 225 Hoyt Mamaroneck, NY 10544
98911	Armstrong Products P.O. Box 657 Warsaw, IN 46560

6-6. LIST OF MANUFACTURERS (Cont.)

Advanced Input Devices, Box 1818, Couer D'Alene, ID 83814

Amplifonix, 220 Route 13, Bristol, PA 19007

Atlantic Copper and Brass, 301 Kennedy St. N.E., Washington, D.C. 20011

Citromerics, 77 Dragon St., Woburn, MA 01888

Craft House Corp., 2100 Auburn St., Toledo, OH 48696

Disc, 1777 Walton Road., Suite 300, Dublin Hall, Blue Bell, PA 19462

Fujitsi-America, Inc. 910 Sherwood Dr., Lake Bluff, IL 60014

GHZ Devices, 16 Maple Road, South Chelmsford, MA 01824

Hitachi-Ameria LT., 1800 Bering Dr., San Jose, CA 95112

JBT Div., Eaton Corp., 424 Citadel St., PO. Box 1904, New Haven, CT 06509

K & W Inc., 2804 W. 92nd St. Leawood, KS 66206

NEC, California Eastern Labs, 3005 Democracy Way, Santa Clara, CA 95050

Racal Communications, LTD, Western Road, Brocknel, Berkshire, RG121RG England

Southco, Concordville, PA 19331

VRN, Div. of Vernitron Corp., 2801 72nd N., P.O. Box 44000, St. Petersburg, FL 33743

W. H. Brady, 2221 W. Common Road, PO. Box 2131, Milwaukee, WIS 53201

Weidmuller Terminations Inc., 821 S. Lake Blvd., Richmond, VA 23235

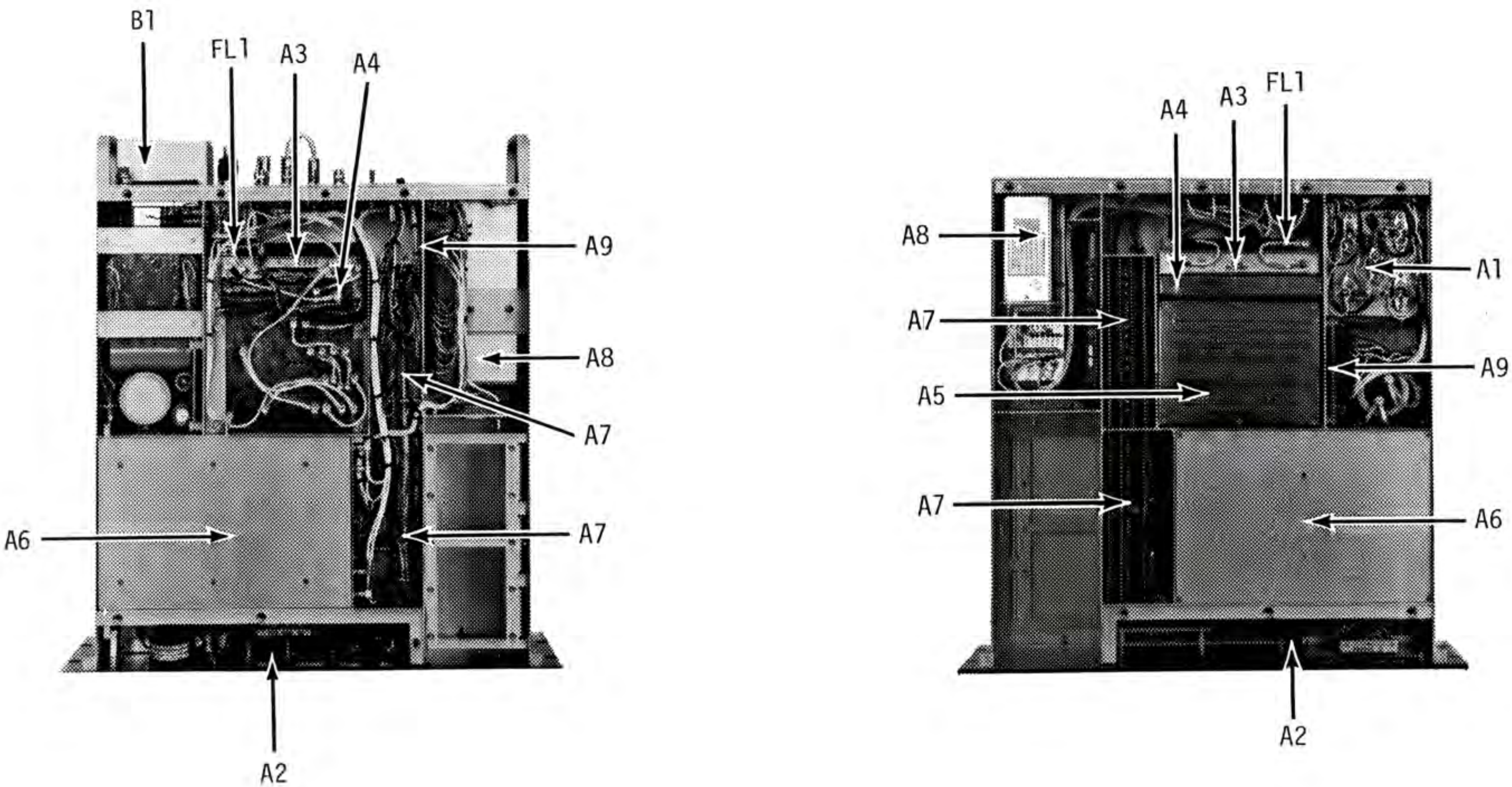


Figure 6-1. Main Chassis Assembly, Subassembly Locations

Replacement Parts List, Main Chassis, RG-5540

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	Power Supply	54805	5847
A2	Front Panel Assembly	54805	7747
A3	Tuner (20-500 MHz)	54805	7743
A4	Second LO Assembly	54805	7722
A5	Synthesizer	54805	7735
A6	IF Assembly	54805	7728
A7	Receiver Control/Digital Assembly	54805	7790
A8	Reference Generator	54805	7740
A9	Audio/Video Amplifier	54805	5719
AT1	BNC Termination	02660	35650-75
B1	Fan	PAMotor	8500D
E1-2	Terminal, ground	71279	170-2345-03-01-00
F1	Fuse, Cartridge	71400	MDX1½
FL1-12	Filter	00779	859619-1
J1	Connector, Amphenol	02660	74868UG556-B/U
J2,6,13,17,18	Not Used		
J3-5,7-10,14	Connector, BNC	02660	31-318
J9B	Connector, 40 Pin	15912	609-4016
J10B	Connector, 50 Pin	15912	609-5016
J11	Connector, 50 Pin	22526	6587-024
J12	Connector, 34 Pin	22526	65817-018
J15	Connector	71468	DC-37S
J16	Connector	02660	57-20240-2
J19	Connector, OMQ	16179	3033-53
J20	Connector	71468	DBR-25S
R1-4	Potentiometer, 10K ohms	01121	70AIL4085103U
S1	Switch, Toggle, 100/500 MHz	JBT	LFH-123
S2	Switch, Pushbutton (Push On)	04009	82403
TB1	Terminal, Modular	Weid-muller	3010-6
W7	Cable	54805	5896

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
W8	Cable	54805	7827-8
W9	Cable	54805	7827-8
W10	Cable	54805	7827-10
W11	Cable	54805	5894
W12	Cable	54805	7827-12
W13	Cable	54805	7827-13
W14	Cable	54805	7827-14
W15	Cable	54805	7827-15
W16	Cable	54805	5895-1
W17	Cable	54805	5897

Replacement Parts List, Power Supply, Type 5847, A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1A1	Power Rectifier	54805	5756
C1	Capacitor, Ceramic, 0.1 uF, ±10%, 100V	81349	CK06BX104K
C2-3	Capacitor, Electrolytic, Tantalum 6.8 uF, ±20%, 35 WVDC	81349	CSR13F685M
C4,6,9,12	Capacitor, Electrolytic, 1.0 uF, 20%, 50 WVDC	81349	CSR13G105ML
C5,7-8	Capacitor, Electrolytic, 15 uF, 20% 20V	81349	CSR13E156ML
C10-11,13	Capacitor, Electrolytic, 33 uF, 20%, 10V	81349	CSR13C336ML
C14	Capacitor, Electrolytic, 30,000 uF, 25V	90201	CGS303U025V4C
CR1-12	Diode, Silicon Rectifier	80131	IN4003
E1,E2,E3A,E3B, E4A,E4B	Terminal, Solder, insulated	71279	572-4814-01-05-16
J1	Connector (26 Positions)	22526	65113-013
R1,3,5	Resistor, Precision 121 ohms, ±1%, 1/10W	81349	RN55C1210F
R2	Resistor, Precision, 2.61K, ±1%, 1/4W	81349	RN60C2611F
R4	Resistor, Precision, 1.33K, ±1%, 1/10W	81349	RN55C1331F
R6	Resistor, Precision, 383 ohms, ±1%, 1/10W	81349	RN55C3830F
T1	Transformer	54805	5690-1
TP1-5	Terminal Solder	71279	170-2345-03-01-00
U1	Integrated Circuit, Voltage Regulator	27014	LM317HVK
U2	Integrated Circuit, Voltage Regulator	27014	LM320K-15
U3,4	Integrated Circuit, Voltage Regulator	27014	LM350K
U5	Integrated Circuit, Voltage Regulator	27014	LM323K

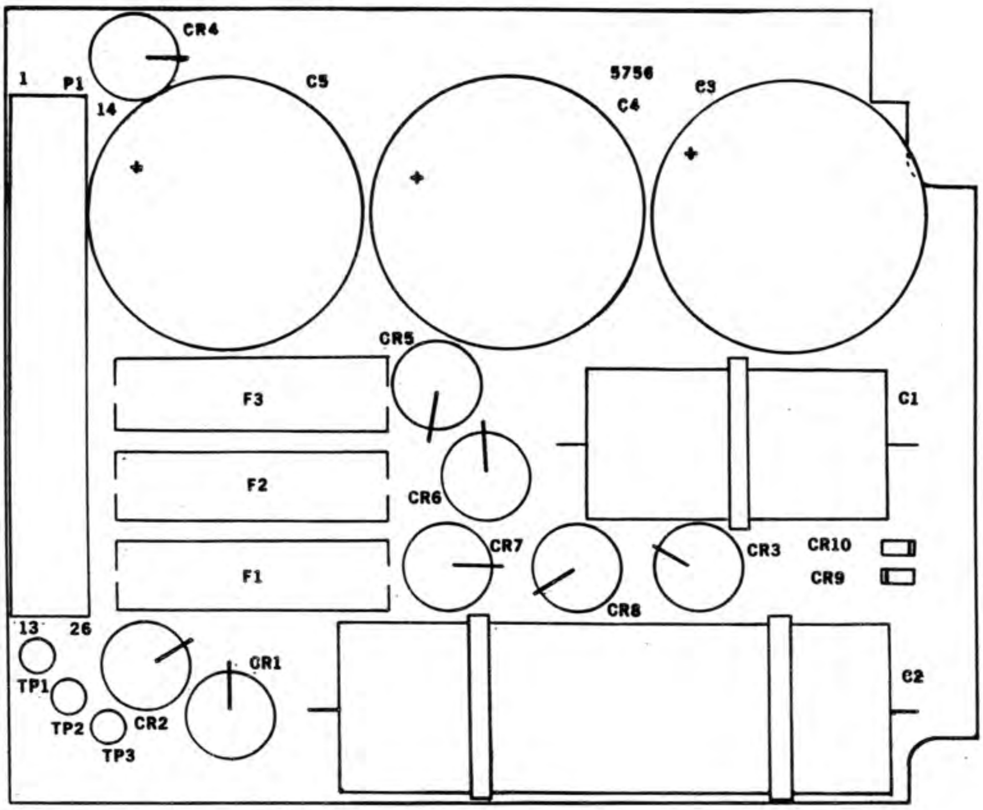


Figure 6-2. Power Supply Rectifier Board (A1A1), Component Location

Replacement Parts List, Power Rectifier, Type 5756, A1A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1	Capacitor, Electrolytic 340 uF, 75 V	56289	3050GG341U075
C2	Capacitor, Electrolytic, 700 uF, 75V	56289	39D707G075HP4
C3,4	Capacitor, Electrolytic, 5800 uF, 40 V	56289	36DX582G040AB-2A
C5	Capacitor, Electrolytic, 9000 uF, 25V	56289	36DX902G025AB-2A
CR1-8	Diode, Silicon Rectifier	04713	MR752
CR9-10	Diode, Silicon Rectifier	80131	IN4003
F1	Fuse, Slow-Blow, 3/4 amp. AGC 3	71400	MDL 3/4
F2-3	Fuse, Slow-Blow, 3/8 amp, AGC 3	71400	MDL 3/8
P1	Connector	27264	08-50-0410
TP1-3	Test Point	71279	160-1026-03-05-00

Replacement Parts List, Front Panel Assembly, Type 7747, A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	Keyboard Assembly	54805	5755-01
A2	Keyboard Decoder Assembly	54805	5786-1
A3	Display Assembly	54805	5800-1
J1	Jack, Headphones	82389	L-112B
M1	Meter Edgewise	78277	1122ML/0-100mA
M2	Meter Edgewise	78277	1122MC/100-0-100mA
P5	Connector	22526	G5-817-018
R1	Resistor, Variable	54805	3683-1
S1	Switch, SPDT	09353	7101-J61-ZQ
S2	Switch, Assembly	54805	5797-1
S3-4	Switch, SPDT	09353	7105-J61-ZQ
U1	Shaft Encoder	Disc	PC62NB-256-5
W1	Cable Assembly	54805	7821-1
W2	Cable Assembly	54805	7822-1

Replacement Parts List, Keyboard Assembly, Type 5755-01, A2A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
J1-2	Header	22526	65611-40
S0	Key-Top/Lighted (100 kHz)	54805	5796-005
S1	Key-Top/Lighted (50 kHz)	54805	5796-004
S2	Key-Top/Lighted (20 kHz)	54805	5796-003
S3	Key-Top/Lighted (10 khz)	54805	5796-002
S4	Key-Top/Lighted (CW-0)	54805	5796-038
S5	Key-Top/Lighted (CW-1 kHz)	54805	5796-037
S6	Key-Top/Lighted (FM)	54805	5796-036
S7	Key-Top/Lighted (AM)	54805	5796-035
S8	Key-Top/Lighted (LSB)	54805	5796-041
S9	Key-Top/Lighted (USB)	54805	5796-040
S10	Key-Top/Lighted (ISB)	54805	5796-039
S11	Key-Top/Lighted (MAN)	54805	5796-34
S12	Key-Top/Lighted (MGC)	54805	5796-020
S13	Key-Top/Lighted (AGC-SLOW)	54805	5796-019
S14	Key-Top/Lighted (AGC-FAST)	54805	5796-018
S15	Key-Top/Lighted (EXT-REF)	54805	5796-017
S16	Key-Top (0)	54805	5795-002
S17	Key-Top (1)	54805	5795-003
S18	Key-Top (2)	54805	5795-004
S19	Key-Top (3)	54805	5795-005
S20	Key-Top (4)	54805	5795-006
S21	Key-Top (5)	54805	5795-007
S22	Key-Top (6)	54805	5795-008
S23	Key-Top (7)	54805	5795-009
S24	Key-Top (8)	54805	5795-010
S25	Key-Top (9)	54805	5795-011
S26	Key-Top (.)	54805	5795-012
S27	Key-Top (CLR)	54805	5795-013
S28	Key-Top (ENTR FREQ)	54805	5795-015

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
S29	Key-Top (SCAN STOP)	54805	5795-014
S30	Key-Top (SCAN DN)	54805	5795-025
S31	Key-Top (SCAN UP)	54805	5796-024
S32	Key-Top, lighted	54805	5796-034
S33	Key-Top	54805	5795-001
S34	Key-Top	54805	5795-001
S35	Key-Top	54805	5795-001

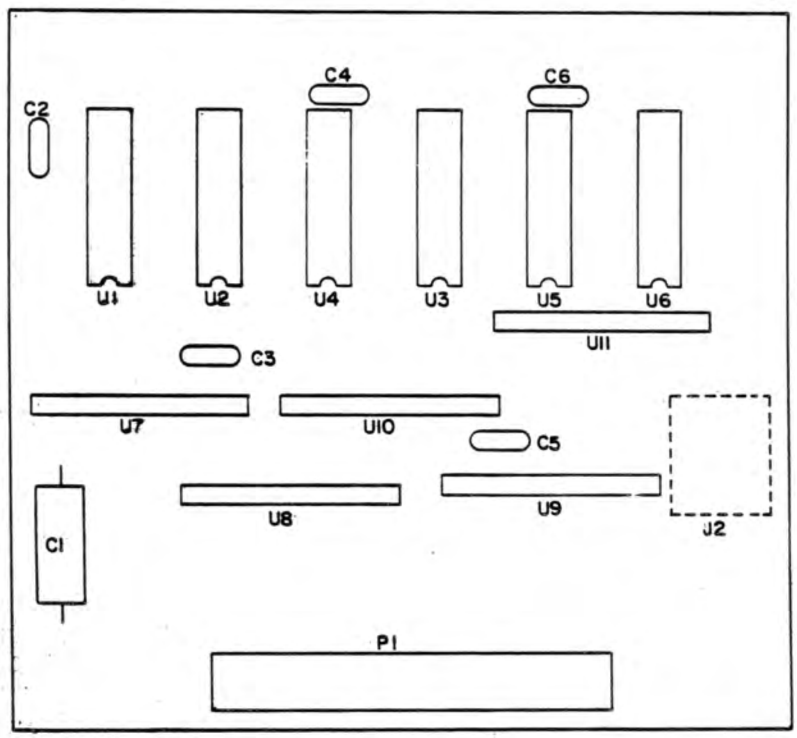


Figure 6-3. Keyboard Decoder (A2A2), Component Location

Replacement Parts List, Keyboard Decoder, Type 5786, A2A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1	Capacitor, Electrolytic, 15 uF, 10%, 20 V	81349	CSR13BE156K
C2-6	Capacitor, Ceramic, Disc, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
P1	Connector, 40 Pin	22526	65781-056
J1	Part of Keyboard		
J2	Connector, 10 Pin	22526	65624-110
U1-6	Integrated Circuit, 8- to 3-Line Decoder	01295	SN74LS348N
U7-11	Resistor, Network	80294	4310R-101-472
XU1-6	Socket, IC, 16 Pin dip	06776	ICL-163-S6-T

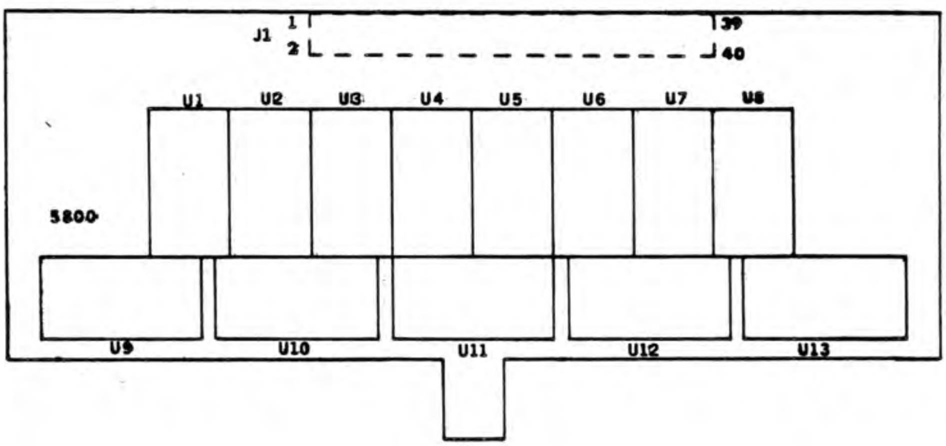


Figure 6-4. Frequency Display (A2A3), Component Location

Replacement Parts List, Display Assembly, Type 5800, A2A3

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
J1	Header Connector, 20 Pin	22526	65507-420
U1-8	Display, LED	11711	MAN4640A
U9-13	Integrated Circuit	28480	HLMP-2685
XU1-8	Socket, LED	91506	314-AG39D
XU9-13	Socket, IC	06726	ICL-163-S6-T

Replacement Parts List, Tuner, 20-500 MHz, Type 7743, A3

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	Up Converter	54805	7688
A2	Down Converter	54805	7689
A3	IF Amplifier	54805	5901
E1-E2	Terminal	27264	08-50-0410
FL1-4, 7-8	Filter, EMI	00779	85-9616-1
FL5	Filter, Low Pass (550 MHz Cutoff)	50140	X9L120-550-EO-EO
FL6	Filter, Bandpass	50140	X6B120-661 4/10-EO-EO
J1-3	Jack (SMA)	98291	50-643-0000-31
J4-5	Jack (SMB)	98291	51-043-0000
J6-7	Jack (OSQ)	16179	5758-0000-10
L1-L4	Coil, Fixed, 18 uH	81349	MS75084-14
L5	Coil, Fixed, 0.15 uH	81349	MS75083-03
P1-2, 6	Plug (SMA)	16179	531-3SF
P3, 4, 5	Plug (OSQ)	16179	5737-7188-10
R1	Resistor, Fixed, Composition, 1K, 5%, 1/4 W	81349	RCR07G102JS
W1	Cable Assembly	54805	5840
W2	Cable Assembly	54805	5841-1
W3	Cable Assembly	54805	5841-2

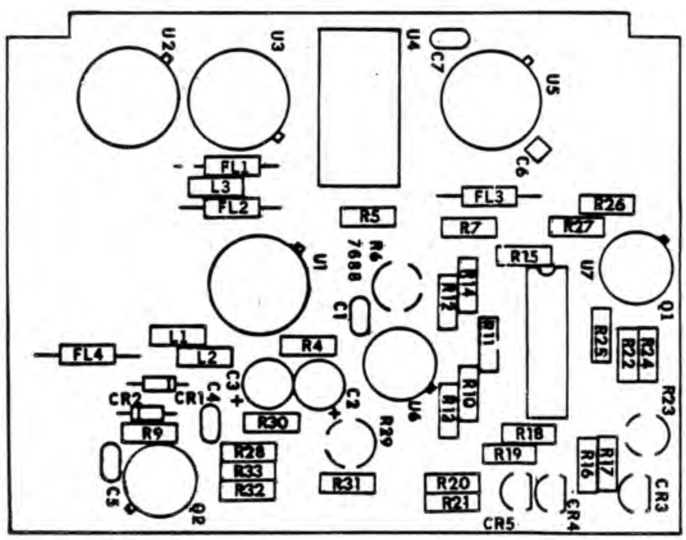


Figure 6-5. Up Converter (A3A1), Component Location

Replacement Parts List, UP Converter, Type 7688, A3A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1, 7	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C2, 3	Capacitor, Electrolytic, 15 uF, 20%, 20 V	81349	CSR13E156ML
C4,5	Capacitor, Monolithic, 1000 pF, 10%, 100V	72982	8121-100-X7RO-102K
C6	Capacitor, Chip, 2.2, 3.3, or 4.7 uF, 10%, 500 V	29990	ATC100B____-FPX-500
CR1, 2	Diode	80131	1N4446
CR3-5	Diode, Dual	04713	MSD6150
E1-E4	Terminal, solder	27264	08-50-0410
FL1-4	Filter, EMI	00779	859612-1
L1-3	Coil, Fixed, 18 uH, 10%	81349	MS75084-15
Q1, 2	Transistor, NPN	80131	2N2222A
R1-3, R8	Not Used		
R4	Resistor, Fixed, Composition, 15 ohms, 5%, 1/4 W	81349	RCR07G150JS
R5	Resistor, Fixed, Film, 237 ohms, 1%, 1/10W	81349	RN55C2370F
R6	Resistor, Variable, 500 ohms, 20%, 1/2W	19701	8014EMB501E1
R7, 22	Resistor, Fixed, Film, 1.82K, 1%, 1/10W	81349	RN55C1821F
R9, 10	Resistor, Fixed, Composition, 47K, 5%, 1/4W	81349	RCR07G473JS
R11, 12, 24, 30	Resistor, Fixed, Film, 10K, 1%, 1/10 W	81349	RN55C1002F
R13, 14	Resistor, Fixed, Film, 13K, 1%, 1/10W	81349	RN55C1302F
R15, 20	Resistor, Fixed, Film, 12.1K, 1%, 1/10W	81349	RN55C1212F
R16	Resistor, Fixed, Film, 750 ohms, 1%, 1/10W	81349	RN55C7500F

Replacement Parts List, UP Converter, Type 7688, A3A1 (Cont.)

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R17	Resistor, Fixed, Film, 1.21K, 1%, 1/10W	81349	RN55C1211F
R18	Resistor, Fixed, Film, 3.32K, 1%, 1/10W	81349	RN55C3321F
R19,	Resistor, Fixed, Film, 5.62K, 1%, 1/10W	81349	RN55C5621F
R21	Resistor, Fixed, Film, 26.7K, 1%, 1/10 W	81349	RN55C2672F
R23, 29	Resistor, Variable, 1K, 1K, 20%, 1/2W	19701	8014EMB102E1
R25, 31	Resistor, Fixed, Film, 46.4K, 1%, 1/10W	81349	RN55C4642F
R26, 32	Resistor, Fixed, Film, 100K, 1%, 1/10W	81349	RN55C1003F
R27, 33	Resistor, Fixed, Composition, 1K, 5%, 1/4W	81349	RCR07G102JS
R28	Resistor, Fixed, Film, 2.61K, 1%, 1/10W	81349	RN55C2611F
U1	Integrated Circuit, RF Amplifier	24539	UT01502
U2	Integrated Circuit, RF Amplifier	24539	U50544
U3	Integrated Circuit, Variable Attenuator	24539	UTF025
U4	Integrated Circuit, Double-Balanced, Mixer	15542	SRA-212
U5	Integrated Circuit, RF Amplifier	24539	UTO-545
U6	Integrated Circuit, Voltage Regulator	27014	LM317LH
U7	Integrated Circuit, Quad, Operational, Amplifier	27014	LM324N
W1-15	Wire bus, #24 AWG, as required	92914	#24AWG
XU7	Socket, 14 Pin Dip	06776	ICL-143-5C-T

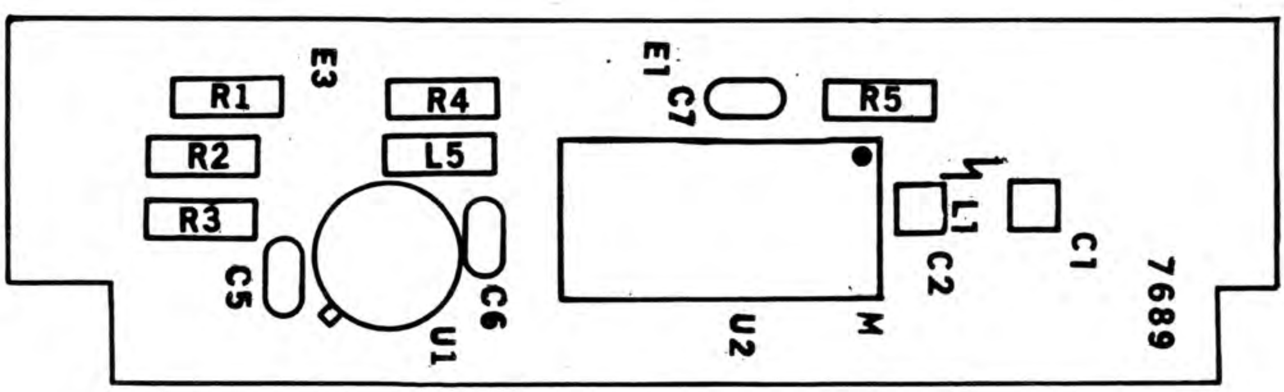


Figure 6-6. Down Converter (A3A2), Component Location

Replacement Parts List, Down Converter, Type 7689, A3A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1, 2	Capacitor, Chip, 2.2 pF, 500 WVDC	29990	ATC100B2R2CPX-500
C3, 4	Not Used		
C5, 6	Capacitor, Ceramic, Monolithic, 330 pF, ±10%, 100 WVDC	72982	8101-100-X7R0-331K
C7	Capacitor, Ceramic, Monolithic, 18 pF, ±5%, 100 WVDC	72982	8121-100-C0G0-180J
E1, E3	Terminal, Solder	27264	08-50-0410
E2	Not Used		
L1	Coil, Fixed, 1 Turn, 8.6 pH	54805	3733-2
R1-3	Not Used		
R4, 5	Resistor, Fixed, Composition, 220 ohms, ±5%, 1/4W	81349	RCR07G221JS
U1	Integrated Circuit, RF Amplifier	04713	MWA-120
U2	Integrated Circuit, Double-Balanced Mixer	15542	SRA-212

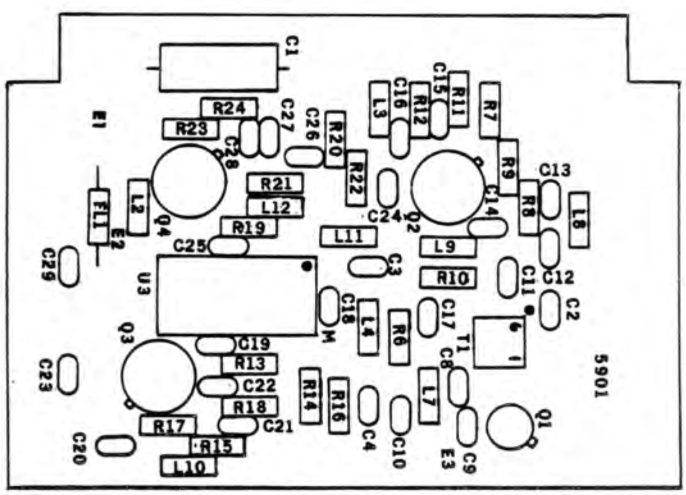


Figure 6-7. IF Amplifier (A3A3), Component Location

Replacement Parts List, IF Amplifier, Type 5901, A3A3

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1	Capacitor, Electrolytic, 15 uF, 20%, 20V	81349	CSR13B156ML
C2-4, 10, 11, 14, 16, 17, 19, 20, 22-26, 28, 29	Capacitor, Ceramic, Monolithic, 0.01 uF, 10%, 100V	72982	8121-100-X7R0-103K
C5-7	Not Used		
C8, 12	Capacitor, Ceramic, Monolithic, 33 pF, 10%, 100V	72982	8101-100-COGO-330J
C9	Capacitor, Ceramic, Monolithic, 330 pF, 5%, 100V	72982	8121-100-X7R0-331K
C13	Capacitor, Ceramic, Monolithic, 47 pF, 5%, 100 WVDC	72982	8121-100-COGO-470J
C15, 21, 27	Capacitor, Ceramic, Monolithic, 1000 pF, 10%, 100V	72982	8121-100-X7R0-102K
C18	Capacitor, Ceramic, Monolithic, 10 pF, 5%, 100V	72982	8101-100-COGO-100D
E1-3	Terminal, solder	27264	08-50-0410
FL1	Filter, EMI, 2000 pF	00779	859612-1
L1,L5, L6	Not Used		
L2-4,11	Coil, Fixed, 18 uH, 10%	81349	MS75084-15
L7	Coil, Fixed, 2.2 uH, 10%	81349	MS75084-04
L8	Coil, Fixed, 0.22 uH, 10%	81349	MS75083-05
L9, 10, 12	Coil, Fixed, 6.8 uH, 10%	81349	MS75084-10
Q1	Transistor, JFET	17856	U310
Q2-4	Transistor, NPN	17856	2N5109
R1-5	Not Used		
R6	Resistor, Fixed, Composition, 75 ohms, 5%, 1/8W	81349	RCR07G750JS
R7, 13, 19	Resistor, Fixed, Composition, 1 K ohms, 5%, 1/8W	81349	RCR07G102JS
R8, 14, 20	Resistor, Fixed, Composition, 2.7 K ohms, 5%, 1/4 W	81349	RCR07G272JS

Replacement Parts List, IF Amplifier, Type 5901, A3A3 (Cont.)

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R9, 15, 21	Resistor, Fixed, Composition, 240 ohms, 5%, 1/4W	81349	RCR07G241JS
R10, 16, 22	Resistor, Fixed, Composition 18 ohms, 5%, 1/4W	81349	RCR07G180JS
R11, 17, 23	Resistor, Fixed, Composition, 10 ohms, 5%, 1/4%	81349	RCR07G100JS
R12, 18, 24	Resistor, Fixed, Composition, 68 ohms, 5%, 1/4W	81349	RCR07G680JS
T1	Transformer	15542	T16-1
U1, 2	Not Used		
U3	Integrated Circuit, Power Divider, Two-Way	15542	PSC2-1

Replacement Parts List, Second LO Assembly, Type 7722, A4

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	Second LO	54805	5739
J1	Jack	98291	51-027-0000
J2	Jack	98291	50-643-0000-31
L1-3	Coil, Fixed, 18 uH, 10%	81349	MS75084-15
FL1, 5	Not Used		
FL2-4, 6-8	Filter, EMI	00779	859616-1
W1	Cable, Coax	54805	3754

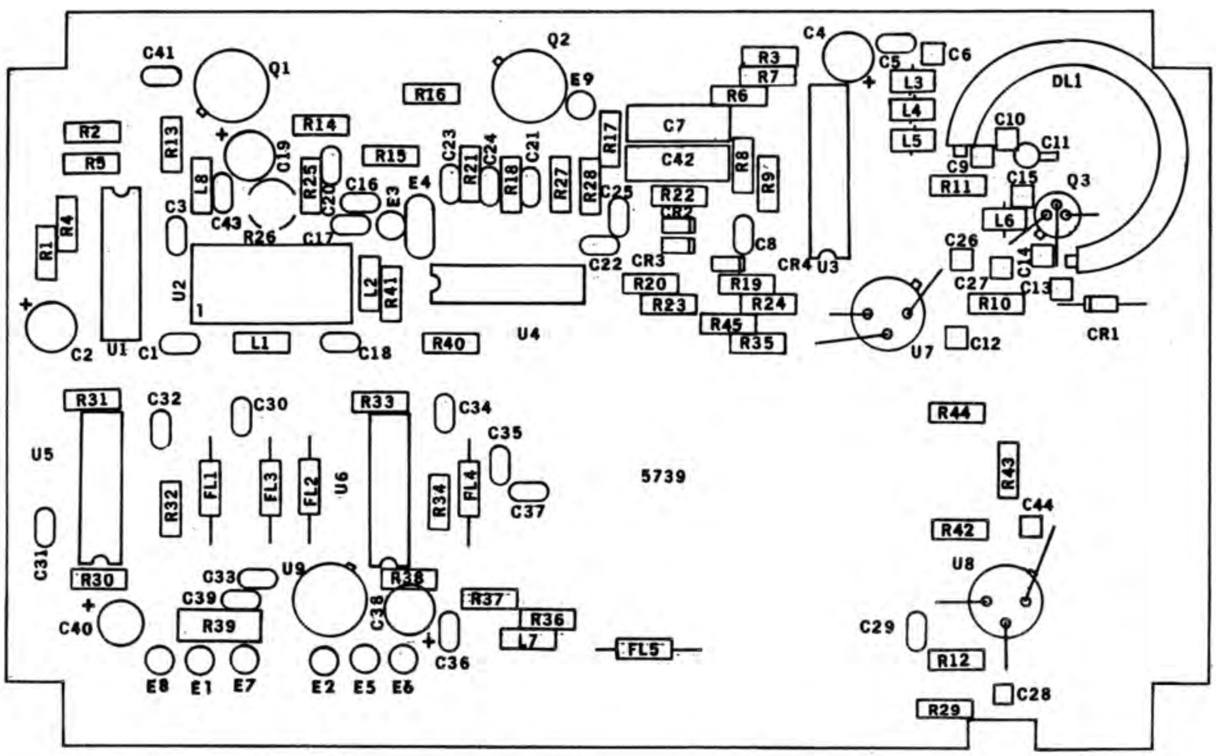


Figure 6-8. Second LO (A4A1), Component Location

Replacement Parts List, Second LO PWB, Type 5739, A4A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1, 16, 21, 22, 25, 36, 39	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C2, 19, 38, 40	Capacitor, Electrolytic, 15 uF, 10%, 20V	31433	T368B156K020AS
C3	Capacitor, Ceramic, Monolithic, 100 pF, 10%, 100V	72982	8121-100-X7R0-
C4	Capacitor, Electrolytic, 6.8 uF, 20%, 35V	31433	T358B685M035AS
C5, 8, 20, 30	Capacitor, Ceramic, Monolithic, 0.01 uF, 20%, 100V	72982	8121-100-X7R0-103K
C6, 12, 15	Capacitor, 200 pF, 5%, 500V	29990	ATC100B201JC-500X
C7, 42	Capacitor, Polycarbonate, 0.1 uF, 100V	19701	C280MCH/A100K
C9	Capacitor, 5.1 pF, ±.25 pF, 500V	29990	ATC100B5R1CC-500X
C10	Capacitor, 4.7 pF, ±.25 pF, 500V	29990	ATC100B4R7CC-500X
C11	Capacitor, Variable, 0.6-4.5 pF	91293	27273
C13	Capacitor, 4.3 pF, ±.25 pF, 500V	29990	ATC100B4R3CC-500K
C14	Capacitor, 1.5 pF, ±.25 pF, 500V	29990	ATC100B1R5CC-500X
C17, 18	Capacitor, Ceramic, Monolithic, 150 pF, 5%, 100V	72982	8121-100-COGO-151J
C23	Capacitor, Ceramic, Monolithic, 0.047 uF, 20%, 100V	72982	8121-100-651-473M
C24, 29	Capacitor, Ceramic, Monolithic, 1000 pF, 10%, 100V	72982	8121-100-X7R0-102K
C26, 27	Capacitor, 0.4 pF, ±.1 pF, 500V	29990	ATC100BGR4BC-500X
C28	Capacitor, 68 pF, 5%, 500V	29990	ATC100B680JC-500X

Replacement Parts List, Second LO PWB, Type 5739, A4A1 (Cont.)

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C31-35, 37	Capacitor, Ceramic, Disc, 330 pF, 10%, 100V	00656	3418-100C-331K
C41	Capacitor, Ceramic, Monolithic, 10 pF, 10%, 100V	72982	8121-100-COGO-221K
C43	Capacitor, Ceramic, Monolithic, 10 pF, 10%, 100V	72982	8101-100-COGO-100K
C44	Capacitor, Chip, 100 pF, ±5%, 500 WVDC	29990	ATC100B101JC-500X
CR1	Diode Varactor	51114	1511-15
CR2-4	Diode, Silicon	80131	1N4449
DL1	Delay Line	54805	5740
E9	Terminal	71279	2100-2
FL1-5	Filter, EMI	00779	859612-1
L1,7	Coil, Fixed, 18 uH, 10%	81349	MS75084-15
L2	Coil, Fixed, 0.22 uH, 10%	81349	MS75083-05
L3-6	Coil, Fixed	54805	3657
L8	Coil, Fixed, 5.6 uH, 10%	81349	MS75084-09
Q1, 2	Transistor, NPN	80131	2N4104
Q3	Transistor, JFET		U310
R1	Resistor, Fixed, Film, 6.19K, 1%, 1/10W	81349	RN55C6191F
R2	Resistor, Fixed, Film, 10 ohms, 1%, 1/10W	81349	RN55C10R1F
R3, 14, 16	Resistor, Fixed, Film, 100 ohms, 1%, 1/10W	81349	RN55C1000F
R4	Resistor, Fixed, Film, 17.8K, 1%, 1/10W	81349	RN55C1782F
R5, 6-8, 17, 19, 20, 22, 28, 31	Resistor, Fixed, Film, 10K, 1%, 1/10W	81349	RN55C1002F
R9	Resistor, Fixed, Film, 825 ohms, 1%, 1/10W	81349	RN55C8250F

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R10	Resistor, Fixed Film, 5.6K, 5%, 1/8W	81349	RCR05G562JS
R11	Resistor, Fixed Composition, 100 ohms, 5%, 1/8W	81349	RCR05G101JS
R12	Resistor, Fixed, Composition, 100 ohms, 5%, 1/4W	81349	RCR07G101JS
R13	Resistor, Fixed Film, 1K, 1%, 1/10W	81349	RN55C1001F
R15	Resistor, Fixed, Film, 1.62K, 1%, 1/10W	81349	RN55C1621F
R18, 41	Resistor, Fixed Film, 4.64K, 1%, 1/10W	81349	RN55C4641F
R21	Resistor, Fixed, Composition, 150K, 5%, 1/8W	81349	RCR05G154JS
R23, 24	Resistor, Fixed, Film, 8.25K, 1%, 1/10W	81349	RN55C8251F
R25	Resistor, Fixed, Film, 681 ohms, 1%, 1/10W	81349	RN55C6810F
R26	Resistor, Variable, 1K	80294	3329P-1-102
R27	Resistor, Fixed, Film, 2.15K, 1%, 1/10W	81349	RN55C2151F
R29, 34	Resistor, Fixed, Composition, 10K, 5%, 1/8W	81349	RCR05G103JS
R30, 32, 33	Resistor, Fixed, Composition, 620 ohms, 5%, 1/4W	81349	RCR07G621JS
R35	Resistor, Fixed, Composition, 51 ohms, 5%, 1/8W	81349	RCR05G510JS
R36, 37	Resistor, Fixed, Film, 287 ohms, 1%, 1/10 W	81349	RN55C2870F
R38	Resistor, Fixed, Film, 121 ohms, 1%, 1/10W	81349	RN55C1210F
R39	Resistor, Fixed, Composition, 51 ohms, 5%, 1/2W	81349	RCR20G510JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R40	Resistor, Fixed, Film, 100K, 1%, 1/10W	81349	RN55C1003F
R42, 44	Resistor, Fixed, Composition, 150 ohms, 5%, 1/4W	81349	RCR07G151JS
R43	Resistor, Fixed, Composition, 36 ohms, 5%, 1/4W	81349	RCR07G360JS
R45	Resistor, Fixed, Composition, 10K, 5%, 1/4W	81349	RCR07G103JS
U1	Integrated Circuit	18324	UA723DC
U2	Integrated Circuit	15542	SRA-1
U3	Integrated Circuit		DG-201
U4	Integrated Circuit	27014	LM339N
U5	Integrated Circuit	18324	SP8650B
U6	Integrated Circuit	18324	SP8615B
U7, 8	Integrated Circuit	04713	MWA120
U9	Integrated Circuit	27014	LM337H
XU1, 4	Socket IC, 14 Pin	06776	ICL-143-S6-T
XU2	Not Used		
XU3	Socket IC, 16 Pin	06776	ICL-1653-S6-T

Replacement Parts List, Synthesizer, Type 7735, A5

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	VCO A	54805	5751
A2	Controller	54805	5754
A3	Digiphase Processor	54805	5753
A4	Programmable Divider	54805	7796
A5	VCO B	54805	5837
E1, 2	Terminal	98291	229-4035-31-0
FL1-9, 17-21	Filter	00779	859616-1
FL10	Not Used		
FL11-16	Filter	00779	859656-1
P1, 2, 3	Connector, 40 Pin	75037	3417-6000
P4, 6, 7	Connector, 20 Pin	75037	3421-6000
P5, 8	Connector, 20 Pin	75037	3421-7000
P9, 10-12	Connector, Right Angle, SMB	98291	50-628-9188-31
P13-22	Connector, Right Angle, SMB	54805	51-328-3188
W1	Cable Assembly	54805	7829
W2-15	Not Used		
W16	Cable Assembly	54805	7827-16
W17	Cable Assembly	54805	7827-17
W18	Cable Assembly	54805	7827-18
W19	Cable Assembly	54805	7827-19
W20	Cable Assembly	54805	7827-20
W21	Cable Assembly	54805	7827-21
W22	Cable Assembly	54805	7827-22
XFL1, 2, 6, 7, 11-19	Receptacle, PV	22526	75186-005
XFL3, 4, 8-10	Not Used		
XFL5, 20	Receptacle, PV	22526	75187-006

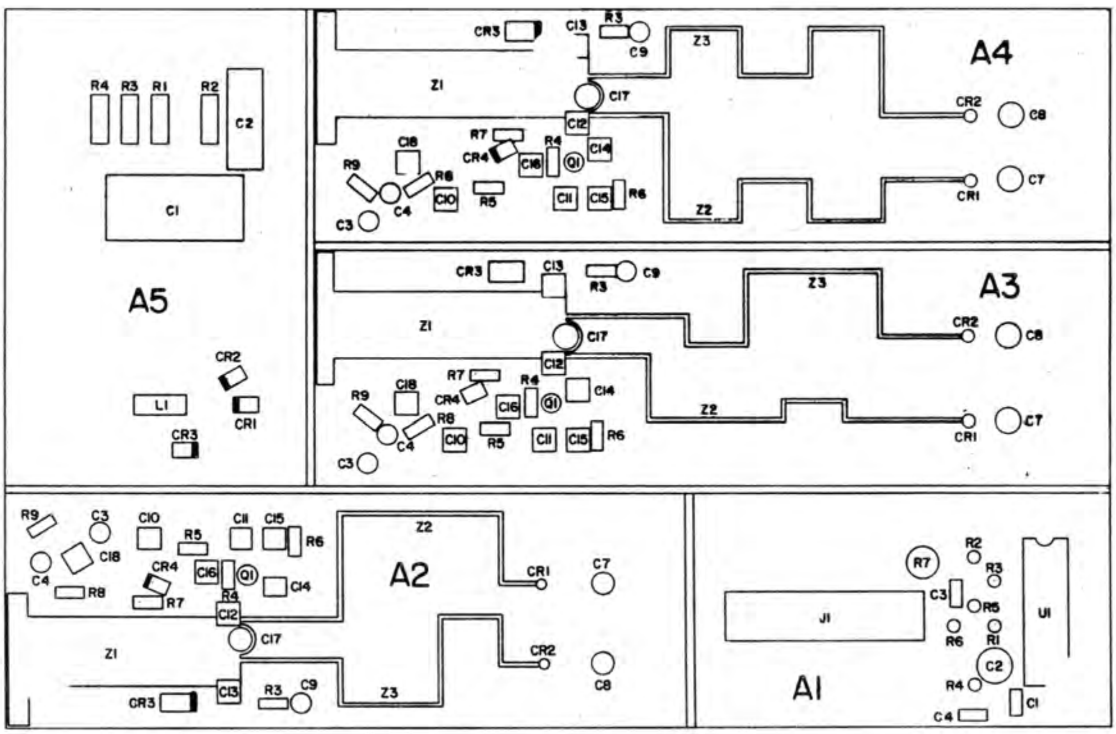


Figure 6-9. VCO 'A' (A5A1), Component Location

Replacement Parts List, VCO A, Type 5751, A5A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	+20V Regulator	54805	5828
A2	VCO, 846-926 MHz	54805	5829
A3	VCO, 766-846 MHz	54805	5830
A4	VCO, 681.4-766 MHz	54805	5831
A5	VCO Switch	54805	5832
C1-5, 7-13, 15-20	EMI Filter	00779	859616-1
C6, 14	Not Used		
J1-4	Connector SMC	98291	51-043-0000
J5	Connector SMA	98291	50-6430000-31
A2R1, A2R2, A3R1, A3R2,A4R1,A4R2	Resistor, Fixed, Composition, 680 ohms, 5%, 1/8W	81349	RCR05G681JS

Replacement Parts List, +20 Volt Regulator A, Type 5828, A5A1A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1, 4	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C2	Capacitor, Electrolytic, 6.8 uF, 20%, 35V	81349	CSR13F685M
C3	Capacitor, Ceramic, Monolithic, 100 pF, 10%, 100V	72983	8121-100-COGO-101K
E1-11	Terminal	71279	160-2100-2-05
J1	Connector, 20 Pin	22526	65461-003
R1	Resistor, Fixed, Film, 4.64K, 1%, 1/10W	81349	RN55C4641F
R2	Resistor, Fixed, Composition, 5.6 ohm, 5%, 1/8W	81349	RCR05G5R6JS
R3	Resistor, Fixed, Film, 12.7K, 1%, 1/10W	81349	RN55C1272F
R4	Resistor, Fixed, Film, 1K, 1%, 1/10W	81349	RN55C1001F
R5	Resistor, Fixed, Film, 7.15K, 1%, 1/10W	81349	RN55C7151F
R6	Resistor, Fixed, Film, 18.2K, 1%, 1/10W	81349	RN55C1822F
R7	Resistor, Fixed, Composition, 180 ohms, 5%, 1/2W	81349	RCR20G181JS
U1	Integrated Circuit, Regulator	07263	UA723DC
U2	Integrated Circuit, Regulator	04713	LM317T

Replacement Parts List, VCO, 846-926 MHz, Type 5829, A5A1A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1	Not Used		
C2	Not Used		
C3, 4, 9	EMI Filter	000779	859616-1
C5, 6, 10, 11, 18	Capacitor, Ceramic, Chip, 100 pF, 10%, 100 WVDC	29990	ATC100B101KP-500X
C7, 8, 17	Capacitor, Variable, .6-4.5 pF	91293	27275
C12, 16	Capacitor, Ceramic, Chip, 0.6 pF, ±.1 pF, 500V	29990	ATC100B0RG-B-PX-500
C13	Capacitor, Ceramic, Chip, 1.4 pF, ±.1 pF, 500V	29990	ATC100BIR4-B-PX-500
C14	Capacitor, Ceramic, Chip, 2.0 pF, ±.1 pF, 500V	29990	ATC100B2R0-B-PX-500
C15	Capacitor, Ceramic, Chip, 3.0 pF, ±.1 pF, 500V	29990	ATC100B3R0-B-PX-500
CR1, 2	Diode	GHZ Devices	GC4315-30
CR3	Diode, Varactor	52673	KV3101
CR4	Diode, Pin	52673	KS3542
Q1	Transistor	NEC	NE02135
R1, 2	Resistor, Fixed, Composition, 680 ohms, 5%, 1/8W	81349	RCR05G681JS
R3	Resistor, Fixed, Composition, 1.2K, 5%, 1/8W	81349	RCR05G122JS
R4, 7	Resistor, Fixed, Composition, 5.6K, 5%, 1/8W	81349	RCR05G562JS
R5	Resistor, Fixed, Composition, 51 ohms, 5%, 1/8W	81349	RCR05G510JS
R6	Resistor, Fixed, Composition, 680 ohms, 5%, 1/8W	81349	RCR05G681JS
R8, 9	Resistor, Fixed, Composition, 1.5K, 5%, 1/8W	81349	RCR05G152JS
Z1,2,3	Inductor, Part of Printed Circuit Board		

Replacement Parts List, VCO, 766-846 MHz, Type 5830, A5A1A3

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1, 2	Not Used		
C3, 4, 9	EMI Filter	00779	859616-1
C5, 6, 10, 11, 18	Capacitor, Ceramic, Chip, 100 pF, 10%, 100V	29990	ATC100B101KP-500X
C7, 8, 17	Capacitor, Variable, 0.6-4.5 pF	91293	27275
C12	Capacitor, Ceramic, Chip, 0.8 pF, ±.1 pF, 500V	29990	ATC100B0R8-B-PX-500
C13	Capacitor, Ceramic, Chip, 1.6 pF, ±.1 pF, 500V	29990	ATC100B1R6-B-PX-500
C14	Capacitor, Ceramic, Chip, 2.0 pF, ±.1 pF, 500V	29990	ATC100B2R0-B-PX-500
C15	Capacitor, Ceramic, Chip, 3.3 pF, ±.25 pF, 500V	29990	ATC100B3R3-C-PX-500
C16	Capacitor, Ceramic, Chip, 0.4 pF, ±.1 pF, 500V	29990	ATC100B0R4-B-
CR1, 2	Diode	GHZ Devices	GC4315-30
CR3	Diode, Varactor	52673	KV3101
CR4	Diode, Pin	52673	KS3542
Q1	Transistor	NEC	NE02135
R1, 2	Not Used		
R3	Resistor, Fixed, Composition, 1.2K, 5%, 1/8W	81349	RCR05G122JS
R4, 7	Resistor, Fixed, Composition, 5.6K, 5%, 1/8W	81349	RCR05G562JS
R5	Resistor, Fixed, Composition, 51 ohms, 5%, 1/8W	81349	RCR05G510JS
R6	Resistor, Fixed, Composition, 680 ohms, 5%, 1/8W	81349	RCR05G681JS
R8, 9	Resistor, Fixed, Composition, 1.5K, 5%, 1/8W	81349	RCR05G152JS
Z1, 2, 3	Inductor, Part of Printed Circuit Board		

Replacement Parts List, VCO, 681.4-766 MHz, Type 5831, A5A1A4

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1	Not Used		
C2	Not Used		
C3, 4, 9	EMI Filter	00779	859616-1
C5, 6, 10, 11, 18	Capacitor, Ceramic, Chip, 100 pF, 10%, 100V	29990	ATC100B101KP-500X
C7, 8, 17	Capacitor, Variable	91293	27275
C12	Capacitor, Ceramic, Chip, 1.7 pF, ±0.1 pF, 500 V	29990	ATC100B1R7-B-PX-500
C13	Capacitor, Ceramic, Chip, 2.4 pF, ±.1 pF, 500V	29990	ATC100B2R4-B-PX-500
C14	Capacitor, Ceramic, Chip, 2.0 pF, ±.1 pF, 500V	29990	ATC100B2R0-B-PX-500
C15	Capacitor, Ceramic, Chip, 3.0 pF, ±.1 pF, 500V	29990	ATC100B3R0-B-PX-500
C16	Capacitor, Ceramic, Chip, 0.5 pF, ±.1 pF, 500V	29990	ATC100B0R5-B-PX-500
CR1, 2	Diode	GHZ Devices	GC4315-30
CR3	Diode, Varactor	52673	KV3101
CR4	Diode, Pin	52673	KS3542
Q1	Transistor	NEC	NE02135
R1, 2	Not Used		
R3	Resistor, Fixed, Composition, 1.2K, 5%, 1/8W	81349	RCR05G122JS
R4, 7	Resistor, Fixed, Composition, 5.6K, 5%, 1/8W	81349	RCR05G562JS
R5	Not Used		
R6	Resistor, Fixed, Composition, 680 ohms, 5%, 1/8W	81349	RCR05G681JS
R8, 9	Resistor, Fixed, Composition, 1.5K, 5%, 1/8W	81349	RCR05G152JS
Z1-3	Inductor, Part of Printed Circuit Board		

Replacement Parts List, VCO Switch, Type 5832, A5A1A5

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1	Capacitor, Polycarbonate, 1.0 uF, 10%, 100V	19701	719B1GG105PK-101SB
C2	Capacitor, Polycarbonate, .022 uF, 10%, 400V	19701	719B1CA223PK-401SA
C3	EMI Filter	00779	859616-1
CR1-3	Diode, Pin	52673	KS3542
L1	Coil, Fixed, 0.12 uH, 10%	81349	MS75083-02
R1, 2	Resistor, Fixed, Film, 82.5K, 1%, 1/10W	81349	RN55C8252F
R3, 4	Resistor, Fixed, Film, 1.21K, 1%, 1/10W	81349	RN55C1211F
U1	Integrated Circuit	07263	UT01502

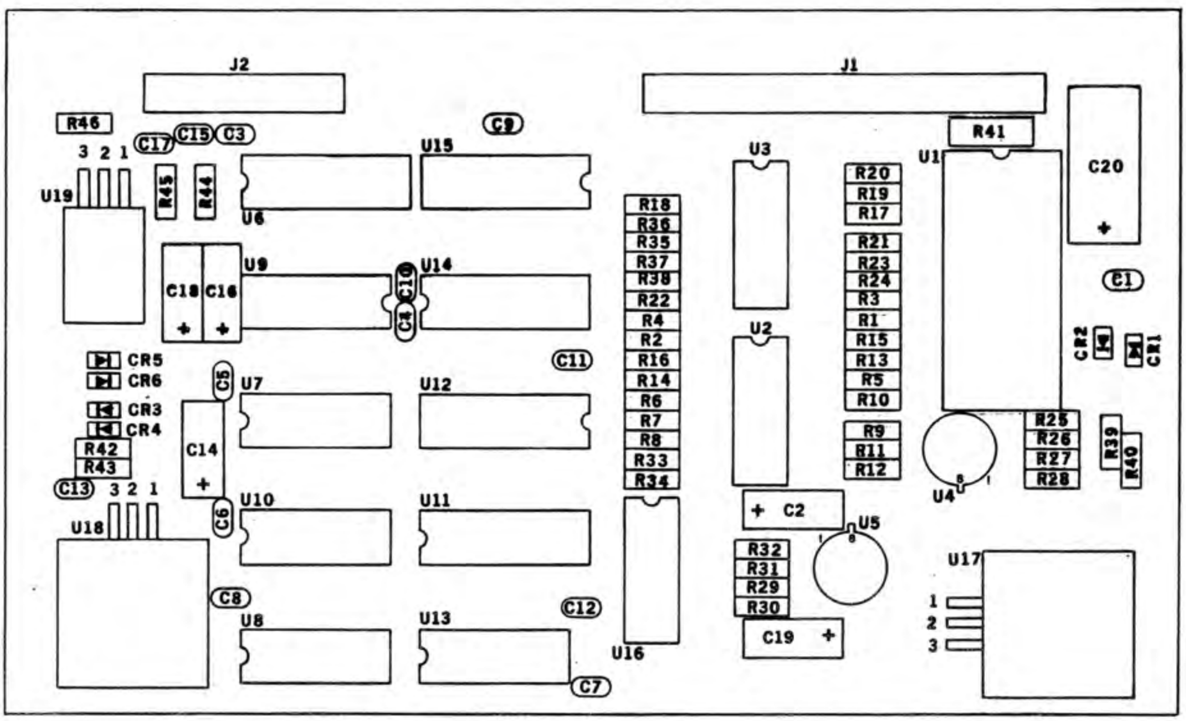


Figure 6-10. Controller (A5A2), Component Location

Replacement Parts List, Controller, Type 5754, A5A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1, 3-13, 15, 17	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C2	Capacitor, Electrolytic, 33 uF, 20%, 10V	81349	CSR13C336M
C14, 16, 18, 19	Capacitor, Electrolytic, 15 uF, 20%, 20V	81349	CSR13E156M
C20	Capacitor, Electrolytic, 100 uF, 20%, 15V	81349	CSR13E107M
CR1-6	Diode	80131	IN4001
J1	Connector, 40 Pin	22526	65820-003
J2	Connector, 20 Pin	22526	65820-009
R1, 2, 5, 6, 9, 10, 13, 14, 17, 18, 21, 22, 25, 26, 29, 30, 35, 36	Resistor, Fixed, Film, 10K, 1%, 1/10W	81349	RN55C1002F
R3, 7, 11, 15, 19 23, 27, 31, 37	Resistor, Fixed, Film, 100K, 1% 1/10W	81349	RN55C1003F
R4, 8, 12, 16, 20, 24, 38	Resistor, Fixed, Composition, 220 ohms, 5%, 1/4W	81349	RCR07G221JS
R28, 32	Resistor, Fixed, Composition, 10 ohms, 5%, 1/4W	81349	RCR07G100JS
R33	Resistor, Fixed, Film, 11K, 1%, 1/10W	81349	RN55C1102F
R34	Resistor, Fixed, Film, 1K, 1%, 1/10W	81349	RN55C1001F
R39, 42, 44	Resistor, Fixed, Film, 261 ohms, 1%, 1/10W	81349	RN55C2610F
R40	Resistor, Fixed, Film, 750 ohms, 1%, 1/10W	81349	RN55C7500F
R41	Resistor, Fixed, Composition, 110 ohms, 5%, 1/4W	81349	RCR20G111JS
R43	Resistor, Fixed, Film, 3.83K, 1%, 1/10W	81349	RN55C3831F

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R45	Resistor, Fixed, Film, 2.15K, 1%, 1/10W	81349	RN55C2151F
R46	Resistor, Fixed, Composition, 22 ohms, 5%, 1/4W	81349	RCR07G220JS
U1	Integrated Circuit	Hitachi	HN462716
U2, 3	Integrated Circuit	01295	TL074CP
U4, 5	Integrated Circuit	27014	LH0002CN
U6	Integrated Circuit	01295	SN74LS139N
U7	Integrated Circuit	01295	SN74lS90N
U8	Integrated Circuit	01295	SN74LS74AN
U9	Integrated Circuit	01295	SN74LS04N
U10	Integrated Circuit	01295	SN74LS21N
U11, 14	Integrated Circuit	01295	SN74LS85N
U12, 15	Integrated Circuit	01295	SN74LS75N
U13	Integrated Circuit	01295	SN74LS08N
U16	Integrated Circuit	04713	MC14023BCP
U17, 18	Integated Circuit, Regulator	27014	LM317T
U19	Integrated Circuit, Regulator	27014	LM337T
XU1	Socket, IC	06776	ICL-246-S7-T
XU2, 3,7-10, 13, 16	Socket, IC	06776	ICL-143-S6-T
XU4, 5	Socket, IC	06776	ICL-83-S6-T
XU6, 11, 12, 14,	Socket, IC	06776	ICL-163-S6-T
XU17, 18	Power Cooler	13013	6073B

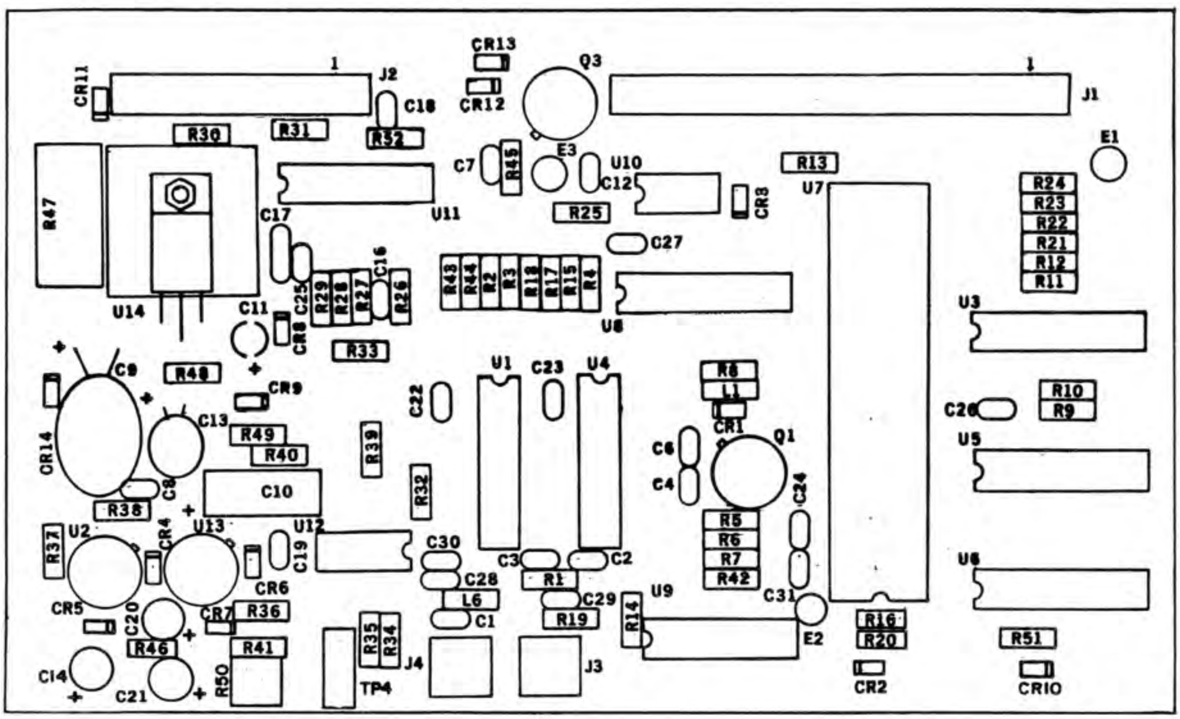


Figure 6-11. Digiphase Processor (A5A3), Component Location

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,4-7,10,11, 13-16,19,20, 24-27,29,32	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C2,3	Capacitor, Ceramic, Monolithic, 680 pF, 5%, 100V	72982	8121-100-COGO-681J
C8,31	Not Used		
C9,17,18,21 28,30	Capacitor, Electrolytic, 15 uF, 20%, 20V	81349	T3681B156M020AS
C12	Capacitor, Ceramic, Monolithic, 120 pF, 10%, 100V	72982	8111-100-COGO-121K
C22,23	Capacitor, Electrolytic, 33 uF, 20%, 10V	81349	T36B336M010AS
CR1,4	Diode	80131	IN5711
CR2,6,8,9	Diode	80131	IN4001
CR3	Diode	80131	IN4446
CR5	Diode	80131	IN5235
CR7	Diode	80131	IN5230
J1	Connector, 40 Pin	22526	65461-007
J2	Connector, 20 Pin	22526	65461-003
J3,J4	Connector	98291	51-053-000
L1	Coil, 0.82 uH	81349	MS75083-12
L2,L3	Coil, 100 uH	81349	MS75085-07
L4	Coil, 22 uH	81349	MS75084-16
Q1	Transistor	80131	2N2222A
Q2	Transistor	80131	2N2369
R1	Resistor, Fixed, Composition, 820 ohms, 5%, 1/4W	81349	RCR07G821JS
R2	Resistor, Fixed, Composition, 3.9K, 5%, 1/4W	81349	RCR07G392JS
R3	Resistor, Fixed, Composition, 270 ohms, 5%, 1/4W	81349	RCR07G271JS
R4	Resistor, Fixed, Composition, 10 ohms, 5%, 1/4W	81349	RCR07G100JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R5,10,13,14,21	Resistor, Fixed, Composition, 2.2K, 5%, 1/4W	81349	RCR07G222JS
R6,23	Resistor, Fixed, Composition, 1.2K, 5%, 1/4W	81349	RCR07G122JS
R7	Resistor, Fixed, Film, 1.47K, 1%, 1/10W	81349	RN55C1471F
R8,28	Resistor, Fixed, Composition, 100 ohms, 5%, 1/4W	81349	RCR07G101JS
R9,12,15,16	Resistor, Fixed, Composition, 10K, 5%, 1/4W	81349	RCR07G103JS
R11	Resistor, Fixed, Composition, 1K, 5%, 1/4W	81349	RCR07G102JS
R17-20	Resistor, Fixed, Composition, 620 ohms, 5%, 1/4W	81349	RCR07G621JS
R22	Resistor, Fixed, Composition, 560 ohms, 5%, 1/4W	81349	RCR07G561JS
R24-27	Resistor, Fixed, Composition, 4.7K, 5%, 1/4W	81349	RCR07G472JS
R29	Resistor, Fixed, Film, 16.9K, 1%, 1/4W	81349	RN55C1692F
R30,34	Resistor, Fixed, Film, 261 ohms, 1%, 1/4W	81349	RN55C2610F
R31,R32	Not Used		
R33	Resistor, Fixed, Composition, 27 ohms, 5%, 2W	81349	RCR42G270JS
R35	Resistor, Fixed, Film 681 ohms, 1%, 1/10W	81349	RN55C6681OF
R36,37,40	Resistor, Fixed, Film, 2.15K, 1%, 1/10W	81349	RN55C2151F
R38	Resistor, Fixed, Film, 1.78K, 1%, 1/10W	81349	RN55C1781F
R39,42	Resistor, Variable, 1K	19701	RJ24FX102
R41	Resistor, Fixed, Film, 1000 ohms, 1%, 1/10W	81349	RN55C1001F
R43	Resistor, Fixed, Film, 4.64K, 1%, 1/10W	81349	RN55C4641F
R44	Resistor, Fixed, Film 2.15K, 1%, 1/10W	81349	RN55C2151F

Replacement Parts List, Digiphase Processor, Type 5753, A5A3 (Cont.)

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
U1	Integrated Circuit	01295	74LS14
U2	Integrated Circuit	27014	. LM317H
U3	Integrated Circuit	04713	MC10133
U4	Integrated Circuit	01295	74LS74
U5	Integrated Circuit	01295	74LS244
U6	Integrated Circuit	17856	DAC20
U7	Integrated Circuit	23386	RMSL019A
U8	Integrated Circuit	24355	AD7524
U9	Integrated Circuit	02735	LF4013
U10	Integrated Circuit	27014	LF353
U11	Integrated Circuit	27014	LM317T
XU1,4,9	Socket, IC, 14 Pin Dip	06776	ICL-143-S6T
XU2,10,11	Not Used		
XU3,5,6,8	Socket, IC, 16 Pin Dip	06776	ICL-163-S6T
XU7	Socket, IC, 40 Pin Dip	91506	84DAG11D

Replacement Parts List, Programmable Divider Assembly, Type 7796, A5A4

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A5A4A1	Programmable Divider	54805	5752
J1,2	Not Used		
J3	Receptacle, SMA	98291	50-643-0000-31
J4-7	Receptacle, Snap-on, SMB	98291	51-043-0000

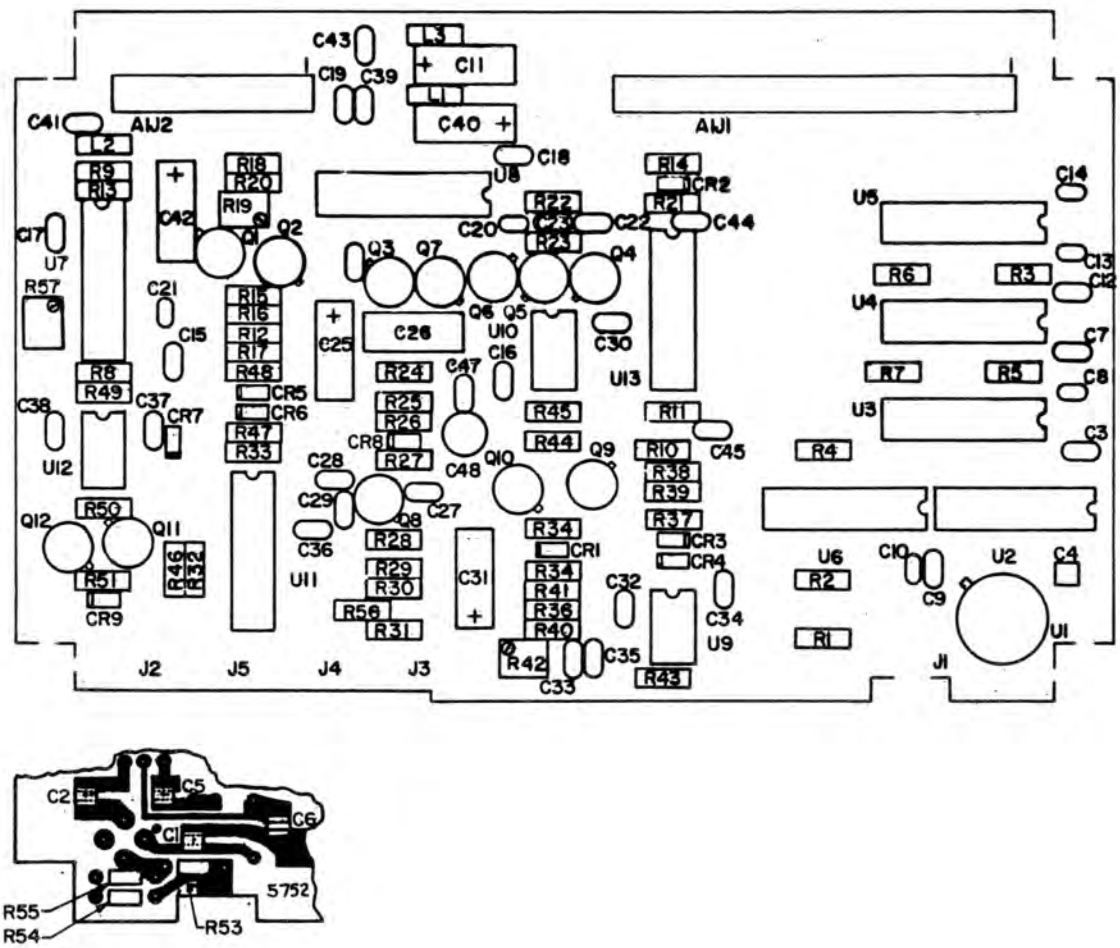


Figure 6-12. Programmable Divider (A5A4), Component Location

Replacement Parts List, Programmable Divider PWA, Type 5752, A5A4A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,2,4-6	Capacitor, Ceramic 56 pF, ±2%, 500 WVDC	29990	ATC100B560GC-500X
C3,7,9,12,21,34,35 37-39,42,51,54,77	Capacitor, Ceramic, Monolithic 0.1 uF, ±20%, 50 WVDC	72982	8121-050-651-104M
C8,10,13-14	Capacitor, Ceramic, Monolithic 330 pF, ±10%, 100 WVDC	72982	8101-100-X7R0-331K
C11,15-18,31,49,55-70, 74	Not Used		
C19,22,32,33,44,46, 48,55,72	Capacitor, Ceramic, Monolithic 0.01 uF, ±10%, 100 WVDC	72982	8121-100-X7R0-103K
C20,23,36,41,45,47 52	Capacitor, Electrolytic, 22 uF, 20%, 10 WVDC	71984	MML-010-226-R-20
C24	Capacitor, Polycarbonate, 0.01 uF, 10%, 50 WVDC	14752	652A1A103K
C25,26,27	Capacitor, Polycarbonate, 0.1 uF, 10%, 50 WVDC	14752	652A1A104K
C28,29	Capacitor, Polycarbonate, 0.47 uF, 10%, 50 WVDC	14752	650D1A474J
C30	Capacitor, Ceramic, 0.047 uF, ±10%, 50 WVDC	72982	8121-050-25--0-473M
C40	Capacitor, Electroytic, Tantalum 15 uF, ±20%, 20 WVDC	81349	CSR13E156M
C43	Capacitor, Tantalum, 33 uF, 20%, 10 WVDC	81349	CSR13C336M
C50,71,75	Capacitor, Ceramic, 27 pF, 10%, 100 WVDC	72982	8121-100-C0G0-270K
C53	Capacitor Tantalum 6.8 uF, ±20%, 35 WVDC	81349	CR13F685M
C73	Capacitor, Ceramic, 15 pF, 10%, 100 WVDC	72982	8111-100-C0G0-150K
C76	Capacitor, Ceramic, 1000 pF, 10%, 100 WVDC	72982	8121-100-X7R0-102K
CR1-4	Diode, Shottky	80131	IN5711
CR5-6	Diode, Silicon	80131	IN4001
J1	Receptacle, SMA	22526	65461-007

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
J2,5-8	Receptacle, Snap-on, SMB	22526	65461-003
J3	Receptacle, SMA	98291	50-643-0000-31
J4	Connector, SMB	98291	51-043-0000
L1	Coil, Fixed, 0.1 uH, 10%	81349	MS75083-01
L2	Not Used		
L3-6,11-13	Coil, Fixed, 100 uH, 10%	81349	MS75085-07
L7,10	Coil, Fixed, 270 uH, 10%	81349	MS75084-05
L8,9	Coil, Fixed, 18 uH, 10%	81349	MS75084-15
L14	Coil, Fixed, 820 uH, 10%	81349	MS75085-18
Q1	Tansistor, Bipolar	04713	2N2369A
Q2	Transistor, Bipolar	04713	2N5179
Q3	Transistor, JFET	04713	U310
R1,16,20,35,38	Resistor, Fixed, Composition, 22 ohms, ±5%, 1/4W	81349	RCR07G220JS
R2	Resistor, Fixed, Film, 10K, ±1%, 1/10W	81349	RN55C1002F
R3-7,11,12	Resistor, Fixed, Composition, 620 ohms, ±5%, 1/4W	81349	RCR07G621JS
R8,10	Resistor, Fixed, Composition, 220 ohms, ±5%, 1/8W	81349	RCR05G221JS
R9	Resistor, Fixed, Composition, 22 ohms, ±5%, 1/8W	81349	RCR05G220JS
R13,33,43,44	Resistor, Fixed, Film, 287 ohms, ±1%, 1/10W	81349	RN55C2870F
R14,15,31,32	Resistor, Fixed, Film, 4.64K, 1%, 1/10W	81349	RN55C4641F
R17,27,72	Resistor, Fixed, Composition, 2.2K, ±5%, 1/4W	81349	RCR07G222JS
R18,19	Resistor, Fixed, Film, 200 ohms, ±1%, 1/10W	81349	RN55C2000F
R21,22,24,36,70	Resistor, Fixed, Film, 1K, ±1%, 1/10W	81349	RN55C1001F

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R23,28,29	Resistor, Fixed, Film 750 ohms, ±1%, 1/10W	81349	RN55C7500F
R25,26,73	Resistor, Fixed, Film, 511 ohms, ±1%, 1/10W	81349	RN55C5110F
R30	Resistor, Fixed, Composition, 220 ohms, ±5%, 1/4W	81349	RCR07G221JS
R34	Resistor, Fixed, Film, 10.0 ohms, ±1%, 1/10W	81349	RN55C10R0F
R37	Resistor, Fixed, Film, 215 ohms, ±1%, 1/10W	81349	RN55C2150F
R39	Resistor, Fixed, Film, 301 ohms, ±1%, 1/10W	81349	RN55C3010F
R40	Resistor, Fixed, Film, 909 ohms, ±1%, 1/10W	81349	RN55C9090F
R41	Resistor, Fixed, Film, 100 ohms, ±1%, 1/10W	81349	RN55C1000F
R42,45-69,71	Not Used		
U1	Integrated Circuit, RF Amplifier	24539	UTD-1502
U2	Integrated Circuit, Prescaler	94375	SP8786kB
U3,5	Integrated Circuit, Program Divider	04713	MC10136L
U4	Integrated Circuit, Program Divider	04713	MC10137L
U6	Integrated Circuit, Dual Flip-Flop	04713	MC10231L
U7,9	Integrated Circuit, Dual Flip-Flop	01295	SN74S74
U8	Integrated Circuit Quad, 2 input, NAND gate	01295	SN74S00
U10	Integrated Circuit, Op. Amp.	07263	OP27GZ
U11	Integrated Circuit, Voltage Regulator	27014	LM-317H
U12	Integrated Circuit, Resistor Array, 5.6K	80294	4308R-101-562
XU1-6,11,12	Not Used		

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
XU7,8,9	Socket, IC, 14 Pin Dip	06776	ICL-143-S6-T
XU10	Socket, IC, 8 Pin Dip	06776	ICL-083-S6-T

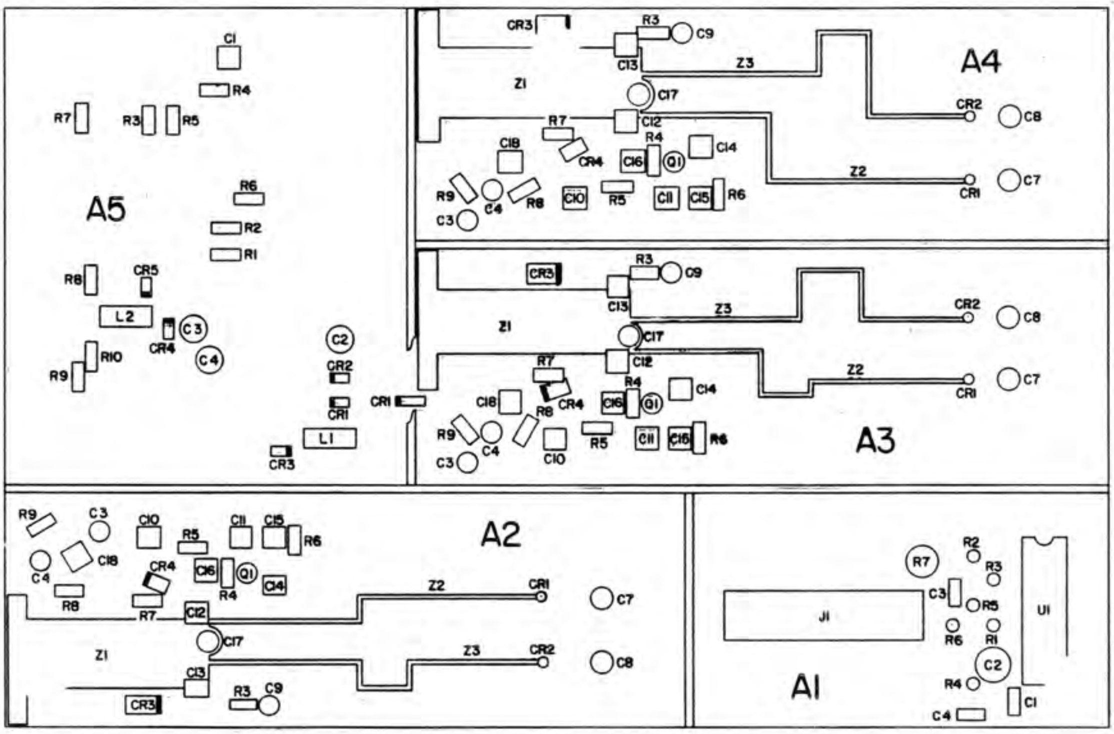


Figure 6-13. VCO 'B' (A5A5), Component Location

Replacement Parts List, VCO B, Type 5837, A5A5

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	Regulator	54805	5850
A2	VCO,1086-1161 MHz	54805	5833
A3	VCO,1006-1086 MHz	54805	5834
A4	VCO,926-1006 MHz	54805	5835
A5	VCO Switch	54805	5836
C1-12,14-20	EMF Filter	00779	859616-1
C13	Not Used		
CR1	Diode, Pin	52673	KS3542
J1	Connector, SMC	98291	51-043-0000
J2-5	Connector, SMA	98291	3735
A2R1,A2R2,A3R1 A3R2,A4R1,A4R2	Resistor, Fixed, Composition, 680 ohms, $\pm5\%$, 1/8W	81349	RCR05G681JS

Replacement Parts List, VCO B, Regulator, 5850, A5A5A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-4	Capacitor, Ceramic, 0.1 uF, ±20%, 50 WVDC	72982	8121-050-651-104M
C2	Capacitor, Electrolytic 6.8 uF, ±20%, 35 WVDC	81349	CSR13F685M
C3	Capacitor, Ceramic, 100 pF, ±10%, 100 WVDC	72982	8121-100-CDGO-101K
E1-11	Terminal	71279	160-2100-2-05
J1	Connector, 20 Pin	22526	65461-003
R1	Resistor, Fixed, Film 4.64K, ±1%, 1/10W	81349	RN55C4641F
R2	Resistor, Fixed, Composition, 5.6 ohms, ±5%, 1/8W	81349	RCR05G5R6JS
R3	Resistor, Fixed, Film, 12.7K, ±1%, 1/10W	81349	RN55C1272F
R4	Resistor, Fixed, Film, 1K, ±1%, 1/10W	81349	RN55C1001F
R5	Resistor, Fixed, Film, 7.15K, ±1%, 1/10W	81349	RN55C7151F
R6	Resistor, Fixed, Film, 18.2K, ±1%, 1/10W	81349	RN55C1822F
R7	Resistor, Fixed, Composition, 62 ohms, ±5%, 1/2W	81349	RCR20G620JS
U1	Integrated Circuit, Regulator	07263	UA723DC
U2	Integrated Circuit, Regulator	04713	LM317T

Replacement Parts List, VCO, 1086-1161 MHz, Type 5833, A5A5A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-2	Not Used		
C3,4,9	EMI Filter	00779	859616-1
C5,6,10,11,18, 19,20	Capacitor, Ceramic, Chip, 100 pF, ±10%, 100 WVDC	29990	ATC100B101KP-500X
C7,8,17	Capacitor, Variable, 0.6-4.5 pF	91293	27275
C12	Capacitor, Ceramic, Chip, 4 pF, ±0.1 pF, 500 WVDC	29990	ATC100BOR4-B-PX-500
C13	Capacitor, Ceramic, Chip, 0.9 pF, ±0.1 pF, 500 WVDC	29990	ATC100BOR9-B-PX-500
C14,15	Capacitor, Ceramic, Chip, 3.3 pF, ±.25 pF, 500 WVDC	29990	ATC100B-3RC-C-PX-500
C16	Capacitor, Ceramic, Chip, 0.3 pF, ±0.1 pF, 500 WVDC	29990	ATC100BOR3-B-PX-500
CR1-2	Diode	GHZ Devices	GC4315-30
CR3	Diode, Varactor	52673	KV3101
CR4	Diode, Pin	52673	KS3542
Q1	Transistor	27014	NE02135
R1,26	Resistor, Fixed, Composition, 680 ohms, ±5%, 1/8W	81349	RCR05G681JS
R3	Resistor, Fixed, Composition, 1.2K, ±5%, 1/8W	81349	RCR05G122JS
R4,7	Resistor, Fixed, Composition, 5.6K, ±5%, 1/8W	81349	RCR05G562JS
R5	Resistor, Fixed, Composition, 51 ohms, ±5%, 1/8W	81349	RCR05G510JS
R8,9	Resistor, Fixed, Composition, 1.5K, ±5%, 1/8W	81349	RCR05G152JS
Z1-3	Inductor, Part of Printed Circuit Board		

Replacement Parts List, VCO, 1006-1086 MHz, Type 5834, A5A5A3

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-2	Not Used		
C3,4,9	EMI Filter	00779	859616-1
C5,6,10,11, 18,19,20	Capacitor, Ceramic, Chip, 100 pF, ±10%, 100 WVDC	29990	ATC100B101KP-500X
C7,8,17	Capacitor, Variable, 0.6-4.5 pF	91293	27275
C12	Capacitor, Ceramic, Chip, 0.7 pF, ±0.1 pF, 500 WVDC	29990	ATC100B0R7-B-PX-500
C13	Capacitor, Ceramic, Chip, 0.9 pF, ±0.1 pF, 500 WVDC	29990	ATC100B0R9-B-PX-500
C14	Capacitor, Ceramic, Chip, 1.4 pF, ±0.1 pF, 500 WVDC	29990	ATC100B1R4-B-PX-500
C15	Capacitor, Ceramic, Chip, 3.0 pF, ±0.1 pF, 500 WVDC	29990	ATC100 B3R0-B-PX-500
C16	Capacitor, Ceramic, Chip, 0.3 pF, ± 0.1 pF, 500 WVDC	29990	ATC100B0R3-B-PX-500
CR1,2	Diode	GHZ Devices	GC4315-30
CR3	Diode, Varactor	52673	KV3101
CR4	Diode, Pin	52673	KS3542
Q1	Transistor	27014	NE02135
R1,2,6	Resistor, Fixed, Composition, 680 ohms, ±5%, 1/8W	81349	RCR05G681JS
R3	Resistor, Fixed, Composition, 1.2K, ±5%, 1/8W	81349	RCR05G122JS
R4,7	Resistor, Fixed, Composition, 5.6K, ±5%, 1/8W	81349	RCR05G562JS
R5	Resistor, Fixed, Composition, 51 ohms, ±5%, 1/8W	81349	RCR05G510JS
R8-9	Resistor, Fixed, Composition, 1.5K, ±5%, 1/8W	81349	RCR05G152JS
Z1-3	Inductor, Part of Printed Circuit Board		

Replacement Parts List, VCO, 926-1006 MHz, Type 5835, A5A5A4

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-2	Not Used		
C3,4,9	EMI Filter	00779	859616-1
C5,6,10,11,18, 19,20	Capacitor, Ceramic, Chip, 100 pF, ±10%, 100 WVDC	29990	ATC100B101KP-500X
C7,8,17	Capacitor, Variable 0.6-4.5 pF	91293	27275
C12,14	Capacitor, Ceramic, Chip, 0.7 pF, ±0.1 pF, 500 WVDC	29990	ATC100B0R7-B-PX-500
C13	Capacitor, Ceramic, Chip, 1.3 pF, ±0.1 pF, 500 WVDC	29990	ATC100B1R3-B-PX-500
C15	Capacitor, Ceramic, Chip, 3.9 pF, ±0.25 pF, 500 WVDC	29990	ATC100B3R9-C-PX-500
C16	Capacitor, Ceramic, Chip, 0.4 pF, ±0.1 pF, 500 WVDC	29990	ATC100B0R4-B-PX-500
CR1,2	Diode	GHZ Devices	GC4315-30
CR3	Diode, Varactor	52673	KV3101
CR4	Diode, Pin	52673	KS3542
R1,2,6	Resistor, Fixed, Composition, 680 ohms ±5%, 1/8W	81349	RCR05G681JS
R3	Resistor, Fixed, Composition, 1.2K, ±5%, 1/8W	81349	RCR05G122JS
R4,7	Resistor, Fixed, Composition, 5.6K, ±5%, 1/8W	81349	RCR05G562JS
R5	Resistor, Fixed, Composition, 51 ohms, ±5%, 1/8W	81349	RCR05G510JS
R8-9	Resistor, Fixed, Composition, 1.5K, ±5%, 1/8W	81349	RCR05G152JS
Z1-3	Inductor, Part of Printed Circuit Board		

Replacement Parts List, VCO Switch, Type 5836, A5A5A5

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1	Capacitor, Ceramic, Chip, 100 pF, ±10%, 500 WVDC	29990	ATC100B101KP-500X
C2-4	EMI Filter	00779	859616-1
CR1-5	Diode Pin	52673	KS3542
L1,2	Coil, Fixed 0.12 uH, ±10%	81349	MS75083-02
R1,2	Resistor, Fixed, Composition, 1.5K, ±5%, 1/8W	81349	RCR05G152JS
R3,5-7	Resistor, Fixed, Composition, 51 ohms, ±5%, 1/8W	81349	RCR05G510JS
R4,8,10	Resistor, Fixed, Composition, 150 ohms, ±5%, 1/8W	81349	RCR05G151JS
R9	Resistor, Fixed, Composition, 33 ohms, ±5%, 1/8W	81349	RCR05G330JS
U1-3	Integrated Circuit	24539	UT01502
Z1,2	Coupler	54805	5861-1

Replacement Parts List, IF Mother Board, Type 7786, A6A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-3	Capacitor, Tantalum, 15 uF, ±20%, 20 WVDC	31433	T368B156M020AS
C4(A-G),C5(A-G)	Capacitor, Sip, 1000 pF, ±20%, 100 WVDC	56289	460CH102X0PD
C4(H),C5(H),C6-9	Capacitor, Monolithic, 1000 pF, ±10%, 100 WVDC	72982	8121-100-X7R0-102K
C10-12	Capacitor, Monolithic, 0.1 uF, ±20%, 50 WVDC	72982	8121-050-651-104M
J1-9	Connector, 20 Pin, Single Row	22526	65566-420
J10	Not Used		
J11	Cable	54805	5890-1
J12	Cable	54805	5890-2
J13	Cable	54805	5890-3
J14	Cable	54805	5890-4
J15	Cable	54805	5890-5
L1,3	Choke, RF, Ferrite, 8 Turns	54805	3728-1
L2	Not Used		
L4-6	Choke, RF, Ferrite, 2-1/2 Turns	02114	VK200-10/3B
P1	Plug, 50 Position	22526	65817-024
W1	Cable	54805	5890-6
W2	Cable	54805	5890-7

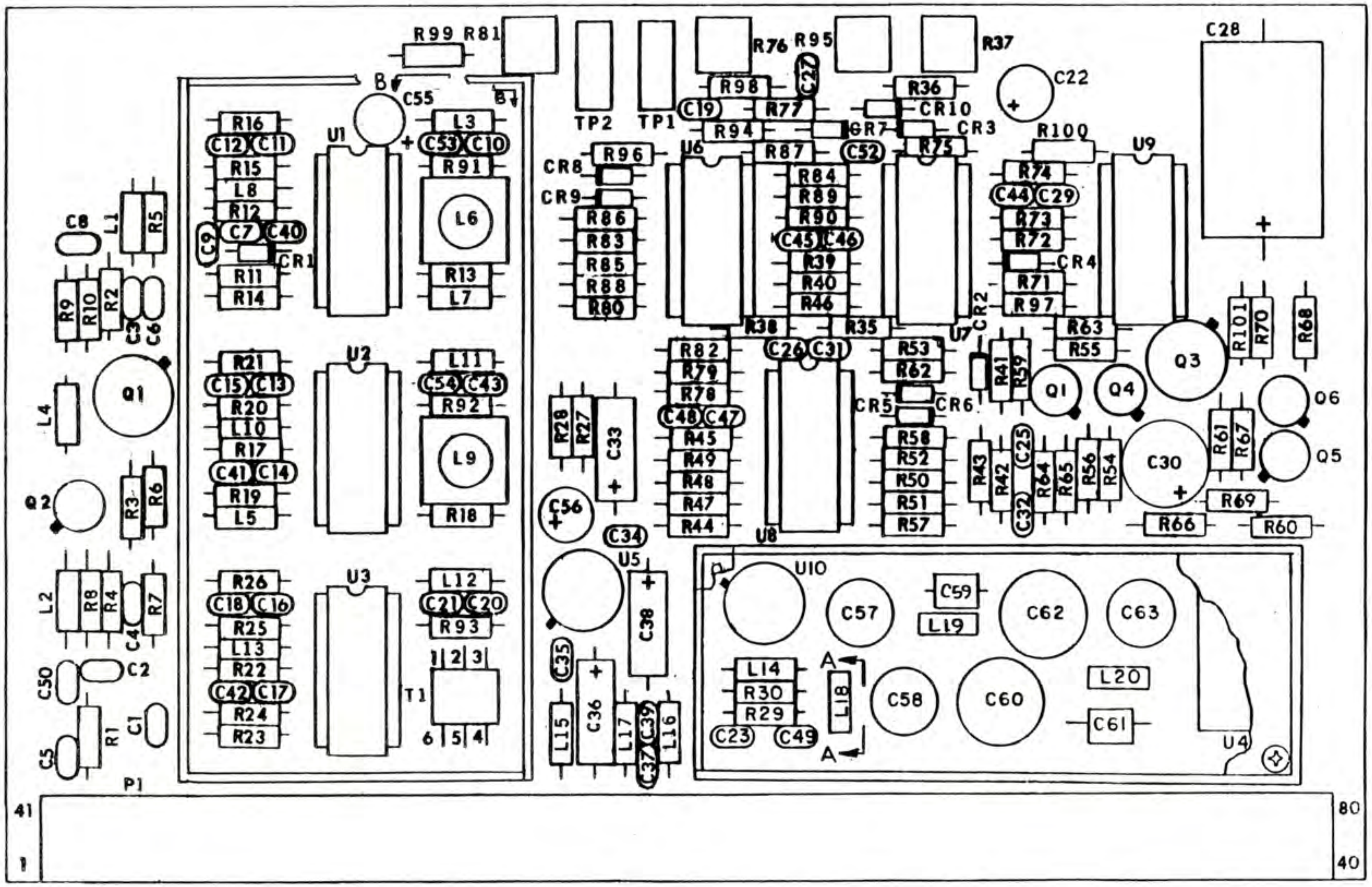


Figure 6-14. Variable Gain Amplifier(A6A2)Component Location

Replacement Parts List, Variable Gain Amplifier, Type 5741, A6A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-21,23,29,31,32,34 35,37,39-43, 49,50,52	Capacitor, Ceramic, 0.01 uF, ±10%, 100 WVDC	72982	8121-100-X7RO-103K
C22,55,56	Capacitor, Tantalum, 15 uF, ±20%, 20 WVDC	56289	196D156X90-20KAI
C24	Not Used		
C25,27,44-48	Capacitor, Ceramic, 0.1 uF, ±20%, 50 WVDC	72982	8121-050-651-104M
C26	Capacitor, Ceramic, 0.047 uF, ±20%, 50 WVDC	72982	8121-050-X7RO-473M
C28	Capacitor, Mylar, 10 uF, ±10%, 35 WVDC	14752	23B12106K
C30	Capacitor, Tantalum, 100 uF, ±20%, 20 WVDC	31433	T368D107M020AS
C33,36,38	Capacitor, Tantalum, 15 uF, ± 20%, 20 WVDC	81349	CSR13E156M
C51	Not Used		
C53,54	Capacitor, Ceramic, 5.6 pF, ±0.5 pF, 100 WVDC	72982	8121-100-COHO-479D
C57,58,63	Capacitor, Ceramic, Variable 2.5-27 pF	56289	GXA27000
C59,61	Capacitor, Fixed, 2.2 uF, ±5%, 100 WVDC	95121	QC2299
C60,62	Capacitor, Variable, 5.0-60 pF	56289	GXA60000
CR1	Diode	80131	IN5767
CR2,3,10	Diode, Zener, 4.7 Volts	80131	IN5230
CR4-6,8-9	Diode	80131	IN4446
CR7	Diode	80131	IN5711
L1,12	Coil, Fixed, 6.8 uH	81349	MS75084-10
L2	Coil, Fixed, 2.2 uH	81349	MS75084-04
L3,11	Ferrite Bead	33062	21-031-J
L4	Coil, Fixed, 5.6 uH	81349	MS75084-9
L5,7,8,10,13,15-17	Coil, Fixed, 18 uH	81349	MS75084-15

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
L6,9	Coil, Variable, 3.9 uH	71279	558-7107-20
L14	Coil, Fixed, 56 uH	81349	MS75085-04
L18,19,20	Coil, Variable, 1.2uH, Nominal	54805	5652-4
P1	Connector	22526	65002-240
Q1	Transistor	80131	2N5109
Q2	Transistor	80131	U310
Q3	Transistor	80131	2N5859
Q4,5,6	Transistor	80131	2N2222A
Q7	Transistor	80131	2N2907
R1	Resistor, Fixed, Composition, 200 ohms, ±5%, 1/4W	81349	RCR07G201JS
R2,92	Resistor, Fixed, Composition, 2.7K, ±5%, 1/4W	81349	RCR07G272JS
R3,55,61,64,69,98	Resistor, Fixed, Composition, 2.2K, ±5%, 1/4W	81349	RCR07G222JS
R4,10,42,43,77, 84,87,99	Resistor, Fixed, Composition, 1K, ±5%, 1/4W	81349	RCR07G102JS
R5	Resistor, Fixed, Composition, 18 ohms, ±5%, 1/4W	81349	RCR07G180JS
R6	Resistor, Fixed, Composition, 6.8 ohms, ±5%, 1/4W	81349	RCR07G6R8JS
R7	Resistor, Fixed, Composition, 56 ohms, ±5%, 1/4W	81349	RCR07G560JS
R8	Resistor, Fixed, Composition, 75 ohms, ±5%, 1/4W	81349	RCR07G750JS
R9	Resistor, Fixed, Composition, 150 ohms, ±1%, 1/4W	81349	RCR07G331JS
R11	Resistor, Fixed, Film, 150 ohms, ±1%, 1/10W	81349	RN55C1500F
R12	Resistor, Fixed, Composition, 5.6K, ±5%, 1/4W	81349	RCR07G562JS
R13,18,23	Resistor, Fixed, Composition, 100 ohms, ±5%, 1/4W	81349	RCR07G101JS
R14,19,24	Resistor, Fixed, Film, 3.83K, ±1%, 1/10W	81349	RN55C3831F

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R15,20,25	Resistor, Fixed, Film, 4.22K ±1%, 1/10W	81349	RN55C4221F
R16,21,26,54	Resistor, Fixed, Composition, 820 ohms, ±5%, 1/4W	81349	RCR07G821JS
R17,22,36,63,66, 67,78,80,88,93, 100	Resistor, Fixed, Composition, 4.7K, ±5%, 1/4W	81349	RCR07G472JS
R27	Resistor, Fixed, Film, 237 ohms, ±1%, 1/10W	81349	RN55C2370F
R28	Resistor, Fixed, Film, 1.96K, ±1%, 1/10W	81349	RN55C1961F
R29	Resistor, Fixed, Composition 82 ohms, 5%, 1/4W	81349	RCR07G820JS
R30	Resistor, Fixed, Compositon, 150 ohms, ±5%, 1/4W	81349	RCR07G151JS
R31-34	Not Used		
R35,38,59	Resistor, Fixed, Composition, 22K, ±5%, 1/4W	81349	RCR07G223JS
R37, 81	Resistor, Variable, 10K	81349	RJ26CP103
R39,65,68,70, 96,101	Resistor, Fixed, Composition, 10K, ±5%, 1/4W	81349	RCR07G103JS
R40	Resistor, Fixed, Film, 16.2K, ±1%, 1/10W	81349	RN55C1622F
R41	Resistor, Fixed, Composition, 470 ohms ±5%, 1/4W	81349	RCR07G471JS
R44,45	Resistor, Fixed, Composition, 220 K, ±5%, 1/4W	81349	RCR07G224JS
R46	Resistor, Fixed, Film, 24.3K, ±1%, 1/10W	81349	RN55C2432F
R47,49	Resistor, Fixed, Composition, 470K, ±5%, 1/4W	81349	RCR07G474JS
R48,75,82	Resistor, Fixed, Composition, 8.2K, ±5%, 1/4W	81349	RCR07G822JS
R50	Resistor, Fixed, Film, 46.4K, ±1%, 1/10W	81349	RN55C4642F
R51	Resistor, Fixed, Film, 511K, ±1%, 1/10W	81349	RN55C5113F

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R52	Resistor, Fixed, Film, 464 K, ±1%, 1/10W	81349	RN55C4643F
R53,74,83	Resistor, Fixed, Composition, 33K, ±5%, 1/4W	81349	RCR07G333JS
R56	Resistor, Fixed, Composition, 47 ohms, ±5%, 1/4W	81349	RCR07G470JS
R57,58	Resistor, Fixed, Film 215K, ±1%, 1/10W	81349	RN55C2153F
R60	Resistor, Fixed, Composition, 390 ohms, ±5%, 1/4W	81349	RCR07G391JS
R62	Resistor, Fixed, Composition, 100 K, ±5%, 1/4W	81349	RCR07G104JS
R71,72	Resistor, Fixed, Film, 4.64K, ±1%, 1/10W	81349	RN55C4641F
R73	Resistor, Fixed, Film 3010 ohms, ±1%, 1/10W	81349	RN55C3011F
R76	Resistor, Variable 1K, 10 Turn, 1/4W	80294	RJ26CP102
R79	Resistor, Fixed, Composition, 18K, ±5%, 1/4W	81349	RCR07G183JS
R85	Resistor, Fixed, Film, 178K, ±1%, 1/10W	81349	RN55C1783F
R86	Resistor, Fixed, Film, 56.2K, ±1%, 1/10W	81349	RN55C5622F
R89	Resistor, Fixed, Film, 12.1 K, ±1%, 1/10W	81349	RN55C1212JS
R90	Resistor, Fixed, Film, 17.8K, ±1%, 1/10W	81349	RN55C1782F
R91	Resistor, Fixed, Composition, 1.5K, ±5%, 1/4W	81349	RCR07G152JS
R94	Resistor, Fixed, Composition, 220 ohms, ±5%, 1/4W	81349	RCR07G221JS
R95	Resistor, Variable, 100 ohms	81349	RJ26CP101
R97	Resistor, Fixed, Composition, 180 ohms, ±5%, 1/14W	81349	RCR07G181JS
T1	Transformer	15542	T16-1
TP1	Test Point, White	74970	105-0751-001

Replacement Parts List, Variable Gain Amplifier, Type 5741, A6A2 (Cont.)

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
TP2	Test Point, Green	74976	105-0754-001
U1,2,3,9	Integrated Circuit, Transistor Array	02735	CA3086
U4	Integrated Circuit, 3-Way Power Divider	15542	PSC-3-1
U5	Integrated Circuit, Adjustable Regulator	27014	LM317H
U6,8	Integrated Circuit, Quad Op. Amp.	01295	TL074CN
U7	Integrated Circit, Dual MOSFET Switch	17856	DG200CJ
U10	RF Amplifier	Ampli-fonics	CZ-8130
XU1-9	Socket, 14 Pin, Dip	06776	ICL-143-S6-T

Replacement Parts List, IF Filter Amplifier, 100 kHz, Type 5742-20, A6A3

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	IF Filter, PWB	54805	5910-20
A2	AM Detector, PWB	54805	5911
A3	FM Limiter, PWB	54805	5912-20
C1,6,8,11,13,15, 16,21,22	Capacitor, Ceramic, Monolithic, 0.1uF, 20%, 50V	72982	8121-050-651-104M
C2,9,17,24,26	Capacitor, Ceramic, Monolithic, 1000 pF, 10%, 100V	72982	8121-100-X7R0-102K
C3,18	Capacitor, Ceramic, Monolithic, 330 pF, 10%, 100V	72982	8101-100-X7R0-331K
C4,10,12,19	Capacitor, Ceramic, Monolithic, 0.01uF, 10%, 100V	72982	8121-100-X7R0-103K
C5,20	Capacitor, Ceramic, Monolithic, 3300 pF, 10%, 100V	72982	8121-100-X7R0-332K
C7,14,23,25	Capacitor, Electrolytic, 15 uF, ±20%, 20V	31433	T368B156M020A5
CR1-3,6,8	Diode	81349	IN4446
CR4,5,7	Not Used		
CR9	Diode, Dual	04713	MSD6100
E1-14	Terminal, Pin Connector	71279	460-2946-02-03-00
L1-3	Coil, Fixed, 18 uH	81349	MS75084-15
P1	Connector, 80 pin	22526	65002-240
Q1	Transistor, PNP	81349	2N2907
R1,3-5,16,18-20,22, 24,26,28,31,37,39	Resistor, Fixed, Composition, 10K, 5%, 1/8W	81349	RCR05G103JS
R2,40,53	Resistor, Variable, 10K	19701	8014EMB103E1
R6,44	Resistor, Fixed, Composition, 6.8K,5%, 1/8W	81349	RCR05G682JS
R7	Resistor, Fixed, Film, 1.47K, 1%, 1/10W	81349	RN55C1471F
R8	Resistor, Fixed, Film, 5.62K, 1%, 1/10W	81349	RN55C5621F
R9,13,45	Resistor, Fixed, Composition, 47 ohms, 5%, 1/8W	81349	RCR05G470JS
R10, 47	Resistor, Fixed, Composition, 68K, 5%, 1/8W	81349	RCR05G683JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R11,48	Resistor, Fixed, Composition, 15K, 5%, 1/8W	81349	RCR05G153JS
R12,17,49	Resistor, Fixed, Composition, 56K, 5%, 1/8W	81349	RCR05G563JS
R14	Resistor, Fixed, Composition, 2.2K, 5%, 1/8W	81349	RCR05G222JS
R15	Resistor, Fixed, Composition, 100K, 5%, 1/8W	81349	RCR05G104JS
R21,25,29	Resistor, Fixed, Composition, 47K, 5%, 1/8W	81349	RCR05G473JS
R23,27,32	Resistor, Fixed, Composition, 1K, 5%, 1/8W	81349	RCR05G102JS
R30	Resistor, Fixed, Composition, 1.5K, 5%, 1/8W	81349	RCR05G152JS
R33,50	Resistor, Fixed, Composition, 33K, 5%, 1/8W	81349	RCR05G333JS
R34	Resistor, Fixed, Film, 2.61K, 1%, 1/10W	81349	RN55C2611F
R35	Resistor, Fixed, Film, 237 ohms, 1%, 1/10W	81349	RN55C2370F
R36	Resistor, Fixed, Film, 1.96 K, 1%, 1/10W	81349	RN55C1961F
R38	Resistor, Fixed, Composition, 470K, 5%, 1/8W	81349	RCR05G474JS
R41	Resistor, Fixed, Composition, 39K, 5%, 1/8W	81349	RCR05G393JS
R42	Resistor, Fixed, Film, 1.82K, 1%, 1/10W	81349	RN55C1821F
R43	Resistor, Fixed, Film, 6.81K, 1%, 1/10W	81349	RN55C6811F
R46	Resistor, Fixed, Composition, 22K, 5%, 1/8W	81349	RCR05G223JS
R51	Resistor, Fixed, Composition, 12K, 5%, 1/8W	81349	RCR05G123JS
R52	Resistor, Fixed, Composition, 3.9K, 5%, 1/8W	81349	RCR05G392JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
U1	Integrated Circuit, Discriminator	54805	3629-20
U2,6,8	Integrated Circuit, Quad Op Amp	01295	TL074CP
U3,4	Integrated Circuit, Dual MOSFET switch	17856	DG-200CJ
U5	Integrated Circuit, Hex Inverter	02735	CD4049UB
U7	Integrated Circuit, Adjustable regulator	27014	LM317H
XU1	Not Used		
XU2-4,6,8	Socket, IC, 14 Pin	06776	ICL-143-S6-T
XU5	Socket, IC, 16 Pin	06776	ICL-163-S6-T
XU7	Transipad	13103	7717-22DAP

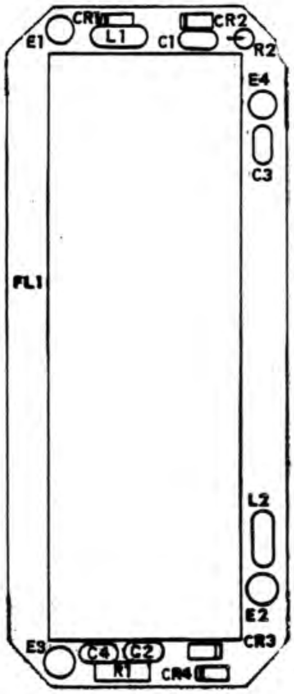


Figure 6-16. Bandwidth Filter (A6A3A1-A6A6A1), Component Location

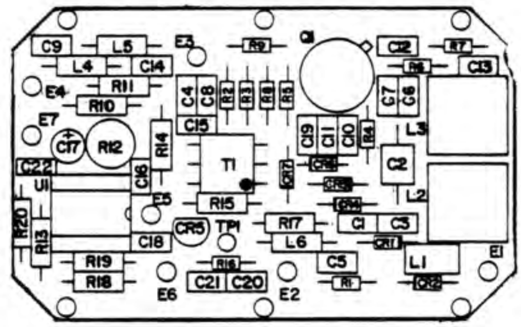


Figure 6-17. AM Demodulator (A6A3A2-A6A6A2), Component Location

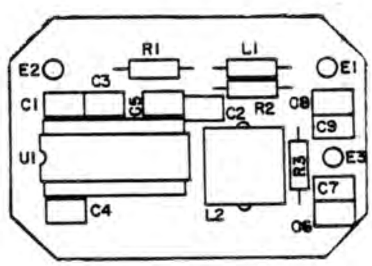


Figure 6-18. FM Demodulator (A6A3A3-A6A6A3), Component Location

Replacement Parts List, IF Filter PWB, Type 5910-20, A6A3A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,2	Capacitor, Ceramic, Monolithic, 0.01uF, 10%, 100V	72982	8121-100-X7R0-103K
C3,4	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 100V	72982	8121-050-651-104M
CR1-4	Diode, Pin	80131	IN5767
E1-4	Terminal, Entry,guided	71279	450-3760-01-03-00
FL1	Filter, Bandwidth, 100 kHz	54805	3628-20
L1,2	Coil, Fixed, 180 uH	54805	3728-1
R1,2	Resistor, Fixed, Composition, 1K, 5%, 1/4W	81349	RCR07G102JS

Replacement Parts List, AM Detector PCB, Type 5911, A6A3A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,7	Capacitor, Ceramic, Monolithic, 12 pF, 5%, 100V	72982	8101-100-C0G0-120J
C2	Capacitor, Composition, Tubular, 1 pF, 10%, 500V	95121	QC1.0PFK
C3,6	Capacitor, Ceramic, Monolithic, 47pF, 10%, 100V	72982	8111-100-C0G0-470K
C4,10-12,16	Capacitor, Ceramic, Monolithic, 0.01uF, 10%, 100V	72982	8121-100-X7R0-103K
C5,8,9,13-15,18,22	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C17	Capacitor, Electrolytic, Tantalum, 1.0 uF, 20%, 50V	31433	T368A105M050AS
C19	Capacitor, Ceramic, Monolithic, 56 pF, 10%, 100V	72982	8121-100-C0G0-560K
C20,21	Capacitor, Ceramic, Monolithic, 100 pF, 10%, 100V	72982	8121-100-C0G0-101K
CR1,2	Diode, Pin	81349	IN5767
CR3,4,6,7	Diode, Schottky, Matched	28480	5082-2836
CR5	Diode, Dual	04713	MSD6100
E1-7	Terminal, Entry, guided	71279	450-3760-01-03-00
L1	Coil, Fixed, 180 uH	54805	3728-1
L2,3	Coil, Variable, 1.0 uH	71279	558-7107-13
L4,5	Coil, Fixed, 18 uH	81349	MS75084-15
L6	Coil, Fixed, 560 uH	81349	MS75085-16
Q1	Transistor, NPN	81349	2N5109
R1,4,5,16	Resistor, Fixed, Composition, 1K, 5%, 1/8W	81349	RCR05G102JS
R2	Resistor, Fixed, Composition, 18 ohms, 5%, 1/8W	81349	RCR05G180JS
R3	Resistor, Fixed, Composition, 2.7K, 5%, 1/8W	81349	RCR05G272JS
R6	Resistor, Fixed, Composition, 5.6 ohms, 5%, 1/8W	81349	RCR05G5R6JS
R7	Resistor, Fixed, Composition, 56 ohms, 5%, 1/8W	81349	RCR05G560JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R8,9	Resistor, Fixed, Composition, 100 ohms, 5%, 1/8W	81349	RCR05G101JS
R10	Resistor, Fixed, Film, 10.0 K, 1%, 1/10W	81349	RN55C1002F
R11	Resistor, Fixed, Film, 58.3K, 1%, 1/10W	81349	RN55C5832F
R12	Resistor, Variable, 50K	19701	8014EMB503E1
R13	Resistor, Fixed, Film, 21.5K, 1%, 1/10W	81349	RN55C2151F
R14	Resistor, Fixed, Film, 30.1K, 1%, 1/10W	81349	RN55C3012F
R15	Resistor, Fixed, Film, 562 ohms, 1%, 1/10W	81349	RN55C5620F
R17,18	Resistor, Fixed, Film 3010 ohms, 1%, 1/10W	81349	RN55C3011F
R19, 20	Resistor, Fixed, Film 4750 ohms, 1%, 1/10W	81349	RN55C4751F
T1	Transformer, 50-200 ohms	15542	T4-1
TP1	Test Point	71279	450-3289-01-03-00
U1	Integrated Circuit, Dual Op amp	01295	TL072CP
XU1	Socket, IC, 8 Pin	06776	ICL-083-S6-T

Replacement Parts List, FM Limiter, Type 5912-20, A6A3A3

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,3-5	Capacitor, Ceramic, 0.01 uF, 10%, 100V	72982	8121-100-X7R0-103K
C2	Capacitor, Ceramic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C6	Capacitor, Ceramic, 68 pF, 10%, 100V	72982	8121-100-COGO-680K
C7,9	Not Used		
C8	Capacitor, Ceramic, 1000 pF, 10%, 100V	72982	8121-100-X7R0-102K
E1-3	Terminal, Entry, guided	71279	450-3760-01-03-00
L1	Coil, Fixed, 18 uH	81349	MS75084-15
L2	Coil, Variable, 0.82 uH	71279	558-7107-12
R1	Resistor, Fixed, Composition, 560 ohms, 5%, 1/4W	81349	RCR07G561JS
R2	Resistor, Fixed, Composition, 100 ohms, 5%, 1/4W	81349	RCR07G101JS
R3	Resistor, Fixed, Composition, 1.8K, 5%, 1/4W	81349	RCR07G182JS
U1	Integrated Circuit, FM Limiter	81349	MC1355P

Replacement Parts List, IF Filter Amplifier, 50 kHz, Type 5742-17, A6A4

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	IF Filter, PWB	54805	5910-17
A2	AM Detector, PWB	54805	5911
A3	FM Limiter, PWB	54805	5912-17
C1,6,8,11,13,15, 16,21,22	Capacitor, Ceramic, Monolithic, 0.1UF, 20%, 50V	72982	8121-050-651-104M
C2,9,17,24,26	Capacitor, Ceramic, Monolithic, 1000 pF, 10%, 100V	72982	8121-100-X7RO-102K
C3,18	Capacitor, Ceramic, Monolithic, 330 pF, 10%, 100V	72982	8101-100-X7RO-331K
C4,10,12,19	Capacitor, Ceramic, Monolithic, 0.01uF, 10%, 100V	72982	8121-100-X7RO-103K
C5,20	Capacitor, Ceramic, Monolithic, 3300 pF, 10%, 100V	72982	8121-100-X7RO-332K
C7,14,23,25	Capacitor, Electrolytic, 15 uF, ±20%, 20V	31433	T368B156M020A5
CR1-3,5	Diode	81349	IN4446
CR4,6,7,8	Not Used		
CR9	Diode, dual	04713	MSD6100
E1-14	Terminal, Pin connector	71279	460-2946-02-03-00
L1-3	Coil, Fixed, 18 uH	81349	MS75084-15
P-1	Connector, 80 Pin	22526	65002-240
Q-1	Transistor, PNP	81349	2N2907
R1,3-5,16,18-20 22,24,26,28,31,37	Resistor, Fixed, Composition, 10K, 5%, 1/8W	81349	RCR05G103JS
R2,40,53	Resistor, Variable, 10K	19701	8014EMB103E1
R6,44	Resistor, Fixed, Composition, 12K, 5%, 1/8W	81349	RCR05G123JS
R7	Resistor, Fixed, Film, 2.87K, 1%, 1/10W	81349	RN55C2871F
R8,43	Resistor, Fixed, Film, 11.0K, 1%, 1/10W	81349	RN55C1102F
R9,13,45	Resistor, Fixed, Composition, 47 ohms, 5%, 1/8W	81349	RCR05G470JS
R10,47	Resistor, Fixed, Composition, 68K, 5%, 1/8W	81349	RCR05G683JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R11,48	Resistor, Fixed, Composition, 15K, 5%, 1/8W	81349	RCR05G153JS
R12,17,49	Resistor, Fixed, Composition, 56K, 5%, 1/8W	81349	RCR05G563JS
R14	Resistor, Fixed, Composition, 2.2K, 5%, 1/8W	81349	RCR05G222JS
R15	Resistor, Fixed, Composition, 100K, 5%, 1/8W	81349	RCR05G104JS
R21,25,29	Resistor, Fixed, Composition, 47K, 5%, 1/8W	81349	RCR05G473JS
R23,27,32	Resistor, Fixed, Composition, 1K, 5%, 1/8W	81349	RCR05G102JS
R30	Resistor, Fixed, Composition, 1.5K, 5%, 1/8W	81349	RCR05G152JS
R33,50	Resistor, Fixed, Composition, 33K, 5%, 1/8W	81349	RCR05G333JS
R34	Resistor, Fixed, Film, 2.61K,1%, 1/10W	81349	RN55C2611F
R35	Resistor, Fixed, Film, 237 ohms, 1%, 1/10W	81349	RN55C2370F
R36	Resistor, Fixed, Film, 1.96K, 1%, 1/10W	81349	RN55C1961F
R38	Resistor, Fixed, Composition, 470K, 5%, 1/8W	81349	RCR05G474JS
R39	Resistor, Fixed, Composition, 4.7K, 5%, 1/8W	81349	RCR05G472JS
R41	Resistor, Fixed, Composition, 39K, 5%, 1/8W	81349	RCR05G393JS
R42	Resistor, Fixed, Film, 2.87K, 1%, 1/10W	81349	RN55C2871F
R46	Resistor, Fixed, Composition, 22K, 5%, 1/8W	81349	RCR05G223JS
R51	Resistor, Fixed, Composition, 12K, 5%, 1/8W	81349	RCR05G123JS
R52	Resistor, Fixed, Composition, 3.9K, 5%, 1/8W	81349	RCR05G392JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
U1	Integrated Circuit, Discriminator	54805	3629-20
U2,6,8	Integrated Circit, Quad Op. Amp.	01295	TL074CP
U3,4	Integrated Circuit, Dual MOSFET switch	17856	DG-200CJ
U5	Integrated Circuit, Hex Inverter	02735	CD4049UB
U7	Integrated Circuit, Adjustable regulator	27014	LM317H
XU1	Not Used		
XU2-4,6,8	Socket, IC, 14 Pin	06776	ICL-143-S6-T
XU5	Socket, IC, 16 Pin	06776	ICL-163-S6-T
XU7	Transipad	13103	7717-22DAP

Replacement Parts List, IF Filter PWB, Type 5910-17, A6A4A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,2	Capacitor, Ceramic, Monolithic, 0.01 uF, 10%, 100V	72982	8121-100-X7RO-103K
C3,4	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 100V	72982	8121-050-651-104M
CR1-4	Diode, Pin	80131	IN5767
E1-4	Terminal, Entry, guided	71279	450-3760-01-03-00
FL1	Filter, Bandwidth, 50 kHz	54805	3628-17
L1,2	Coil, Fixed, 180 uH	54805	3728-1
R1,2	Resistor, Fixed, Composition, 1K, 5%, 1/4W	81349	RCR07G102JS

Replacement Parts List, AM Detector PCB, Type 5911, A6A4A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,7	Capacitor, Ceramic, Monolithic, 12 pF, 5%, 100V	72982	8101-100-C0G0-120J
C2	Capacitor, Composition, Tubular, 1 pF, 10%, 500V	95121	QC1.0PFK
C3,6	Capacitor, Ceramic, Monolithic, 47 pF, 10%, 100V	72982	8111-100-C0G0-470K
C4,10-12,16	Capacitor, Ceramic, Monolithic, 0.01uF, 10%, 100V	72982	8121-100-X7R0-103K
C5,8,9,13-15, 18,22	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C17	Capacitor, Electrolytic, Tantalum, 0.1 uF, 20%, 50V	31433	T368A105M050AS
C19	Capacitor, Ceramic, Monolithic, 56 pF, 10%, 100V	72982	8121-100-C0G0-560K
C20,21	Capacitor, Ceramic, Monolithic, 100 pF, 10%, 100V	72982	8121-100-C0G0-101K
CR1,2	Diode, Pin	81349	IN5767
CR3,4,6,7	Diode, Schottky, Matched	28480	5082-2836
CR5	Diode, Dual	04713	MSD6100
E1-7	Terminal, Entry, guided	71279	450-3760-01-03-00
L1	Coil, Fixed, 180 uF	54805	3728-1
L2,3	Coil, Variable, 1.0 uH	71279	558-7107-13
L4,5	Coil, Fixed, 18 uH	81349	MS75084-15
L6	Coil, Fixed, 560 uH	81349	MS75085-16
Q1	Transistor, NPN	81349	2N5109
R1,4,5,16	Resistor, Fixed, Composition, 1K, 5%, 1/8W	81349	RCR05G102JS
R2	Resistor, Fixed, Composition, 18 ohms, 5%, 1/8W	81349	RCR05G180JS
R3	Resistor, Fixed, Composition, 2.7K, 5%, 1/8W	81349	RCR05G272JS
R6	Resistor, Fixed, Composition, 5.6 ohms, 5%, 1/8W	81349	RCR05G5R6JS
R7	Resistor, Fixed, Composition, 56 ohms, 5%, 1/8W	81349	RCR05G560JS

Replacement Parts List, AM Detector PCB, Type 5911, A6A4A2 (Cont.)

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R8,9	Resistor, Fixed, Composition, 100 ohms, 5%, 1/8W	81349	RCR05G101JS
R10	Resistor, Fixed, Film, 10.0K, 1%, 1/10W	81349	RN55C1002F
R11	Resistor, Fixed, Film, 58.3K, 1%, 1/10W	81349	RN55C5832F
R12	Resistor, Variable, 50K	19701	8014EMB503E1
R13	Resistor, Fixed, Film, 21.5K, 1%, 1/10W	81349	RN55C2152F
R14	Resistor, Fixed, Film, 30.1K, 1%, 1/10W	81349	RN55C3012F
R15	Resistor, Fixed, Film, 562 ohms, 1%, 1/10W	81349	RN55C5620F
R17,18	Resistor, Fixed, Film, 3010 ohms, 1%, 1/10W	81349	RN55C3011F
R19, 20	Resistor, Fixed, Film, 4750 ohms, 1%, 1/10W	81349	RN55C4751F
T1	Transformer, 50-200 ohms	15542	T4-1
TP1	Test Point	71279	450-3289-01-03-00
U1	Integrated Circuit Dual Op Amp.	01295	TL072CP
XU1	Socket, IC, 8 Pin	06776	ICL-083-S6-T

Replacement Parts List, FM Limiter, Type 5912-17, A6A4A3

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1, 3-5	Capacitor, Ceramic, 0.01 uF, 10%, 100V	72982	8121-100-X7R0-103K
C2	Capacitor, Ceramic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C6	Capacitor, Ceramic, 68 pF, 10%, 100V	72982	8121-100-C0G0-680K
C7, 9	Not Used		
C8	Capacitor, Ceramic, 1000 pF, 10%, 100V	72982	8121-100-X7R0-102K
E1-3	Terminal, Entry, guided	71279	450-3760-01-03-00
L1	Coil, Fixed, 18 uH	81349	MS75084-15
L2	Coil, Variable, 0.82 uH	71279	558-7107-12
R1	Resistor, Fixed, Composition, 560 ohms, 5%, 1/4W	81349	RCR07G561JS
R2	Resistor, Fixed, Composition, 100 ohms, 5%, 1/4W	81349	RCR07G101JS
R3	Resistor, Fixed, Composition, 1.8K, 5%, 1/4W	81349	RCR07G182JS
U1	Integrated Circuit, FM Limiter	81349	MC1355P

Replacement Parts List, IF Filter Amplifier, 20 kHz, Type 5742-13, A6A5

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	IF Filter, PWB	54805	5910-13
A2	AM Detector, PWB	54805	5911
A3	FM Limiter, PWB	54805	5912-13
C1, 6, 8, 11, 13, 15, 16, 21, 22	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C2, 5, 17, 20	Capacitor, Ceramic, Monolithic, 3300 pF, 10%, 100V	72982	8121-100-X7RO-332K
C3, 18	Capacitor, Ceramic, Monolithic, 1000 pF, 10%, 100V	72982	8101-100-X7RO-102K
C4, 10, 12, 19	Capacitor, Ceramic, Monolithic, 0.01 uF, 10%, 100V	72982	8121-100-X7RO-103K
C7, 14, 23, 25	Capacitor, Electrolytic, 15 uF, ±20%, 20V	31433	T368B156MO20A5
CR1-3, 5, 6	Diode	81349	1N4446
CR4, 7, 8	Not Used		
CR9	Diode, dual	04713	MSD6100
E1-14	Terminal, Pin Connector	71279	460-2946-02-03-00
L1-3	Coil, Fixed, 18 uH	81349	MS74084-15
P1	Connector, 80 Pin	22526	65002-240
Q1	Transistor, PNP	81349	2N2907
R1, 3-5, 16, 18-20, 22, 24, 26, 28, 31, 37, 39	Resistor, Fixed, Composition, 10K, 5%, 1/8W	81349	RCR05G103JS
R2, 40, 53	Resistor, Variable	19701	8014EMB103E1
R6, 44, 51	Resistor, Fixed, Composition, 12K,5%, 1/8W	81349	RCR05G123JS
R7	Resistor, Fixed, Film, 2.15K, 1%, 1/10W	81349	RN55C2151F
R8	Resistor, Fixed, Film, 9.09K, 1%, 1/10W	81349	RN55C9091F
R9, 13, 45	Resistor, Fixed, Composition, 47 ohms, 5%, 1/8W	81349	RCR05G470JS
R10, 41, 47	Resistor, Fixed, Composition, 68K, 5%, 1/8W	81349	RCR05G683JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R11, 48	Resistor, Fixed, Composition, 15K, 5%, 1/8W	81349	RCR05G153JS
R12, 17, 49	Resistor, Fixed, Composition, 56K, 5%, 1/8W	81349	RCR05G563JS
R14	Resistor, Fixed, Composition, 2.2K, 5%, 1/8W	81349	RCR05G222JS
R15	Resistor, Fixed, Composition, 100K, 5%, 1/8W	81349	RCR05G104JS
R21, 25, 29	Resistor, Fixed, Composition, 47K, 5%, 1/8W	81349	RCR05G473JS
R23, 27, 32	Resistor, Fixed, Composition, 1K, 5%, 1/8W	81349	RCR05G102JS
R30	Resistor, Fixed, Composition, 1.5K, 5%, 1/8W	81349	RCR05G152JS
R33, 50	Resistor, Fixed, Composition, 33K, 5%, 1/8W	81349	RCR05G333JS
R34	Resistor, Fixed, Composition, 2.61K, 1%, 1/10W	81349	RN55C2611F
R35	Resistor, Fixed, Film, 237 ohms, 1%, 1/10W	81349	RN55C2370F
R36	Resistor, Fixed, Film, 1.96K, 1%, 1/10W	81349	RN55C1961F
R38	Resistor, Fixed, Composition, 470K, 5%, 1/8W	81349	RCR05G474JS
R42	Resistor, Fixed, Film, 1.82K, 1%, 1/10W	81349	RN55C1821F
R43	Resistor, Fixed, Film, 6.81K, 1%, 1/10W	81349	RN55C6811F
R46	Resistor, Fixed, Composition, 22K, 5%, 1/8W	81349	RCR05G223JS
R52	Resistor, Fixed, Composition, 3.9K, 5%, 1/8W	81349	RCR05G392JS
U1	Integrated Circuit, Discriminator	54805	3629-13
U2, 6, 8	Integrated Circuit, Quad Op Amp	01295	TL074CP
U3, 4	Integrated Circuit, Dual MOSFET Switch	17856	DG-200CJ

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
U5	Integrated Circuit, Hex Inverter	02735	CD4049UB
U7	Integrated Circuit, Adjustable Regulator	27014	LM317H
XU1	Not Used		
XU2-4, 6, 8	Socket, IC, 14 Pin	06776	ICL-143-S6-T
XU5	Socket, IC, 16 Pin	06776	ICL-163-S6-T
XU7	Transipad	13103	7717-22DAP

Replacement Parts List, IF Filter PWB, Type 5910-13, A6A5A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1, 2	Capacitor, Ceramic, Monolithic, 0.01 uF, 10%, 100V	72982	8121-100-X7R0-103K
C3, 4	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 100V	72982	8121-050-651-104M
CR1-4	Diode, Pin	80131	1N5767
E1-4	Terminal, Entry, guided	71279	450-3760-01-03-00
FL1	Filter, Bandwidth, 20 kHz	54805	3628-13
L1, 2	Coil, Fixed, 180 uH	54805	3728-1
R1, 2	Resistor, Fixed, Composition, 1K, 5%, 1/4W	81349	RCR07G102JS

Replacement Parts List, AM Detector PCB, Type 5911, A6A5A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1, 7	Capacitor, Ceramic, Monolithic, 12 pF, 5%, 100V	72982	8101-100-COGO-120J
C2	Capacitor, Composition, Tubular, 1 pF, 10%, 500V	95121	QC1.0PFK
C3, 6	Capacitor, Ceramic, Monolithic, 47 pF, 10%, 100V	72982	8111-100-COGO-470K
C4, 10-12, 16	Capacitor, Ceramic, Monolithic, 0.01 uF, 10%, 100V	72982	8121-100-X7RO-103K
C5, 8, 9, 13-15, 18,22	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C17	Capacitor, Electrolytic, Tantalum, 1.0 uF, 20%, 50V	31433	T368A105M050AS
C19	Capacitor, Ceramic, Monolithic, 56 pF, 10%, 100V	72982	8121-100-COGO-560K
C20, 21	Capacitor, Ceramic, Monolithic, 100 pF, 10%, 100V	72982	8121-100-COGO-101K
CR1, 2	Diode, Pin	81349	IN5767
CR3, 4, 6, 7	Diode, Schottky, Matched	28480	5082-2836
CR5	Diode, Dual	04713	MSD6100
E1-7	Terminal, Entry, guided	71279	450-3760-01-03-00
L1	Coil, Fixed, 180 uH	54805	3728-1
L2, 3	Coil, Variable, 1.0 uH	71279	558-7107-13
L4, 5	Coil, Fixed, 18 uH	81349	MS75084-15
L6	Coil, Fixed, 560 uH	81349	MS75085-16
Q1	Transistor, NPN	81349	2N5109
R1, 4, 5, 16	Resistor, Fixed, Composition, 1K, 5%, 1/8W	81349	RCR05G102JS
R2	Resistor, Fixed, Composition, 18 ohms, 5%, 1/8W	81349	RCR05G180JS
R3	Resistor, Fixed, Composition, 2.7K, 5%, 1/8W	81349	RCR05G272JS
R6	Resistor, Fixed, Composition, 5.6 ohms, 5%, 1/8W	81349	RCR05G5R6JS
R7	Resistor, Fixed, Composition, 56 ohms, 5%, 1/8W	81349	RCR05G560JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R8, 9	Resistor, Fixed, Composition, 100 ohms, 5%, 1/8W	81349	RCR05G101JS
R10	Resistor, Fixed, Film, 10.0K, 1%, 1/10W	81349	RN55C1002F
R11	Resistor, Fixed, Film, 58.3K, 1%, 1/10W	81349	RN55C5832F
R12	Resistor, Variable, 50K	19701	8014EMB503E1
R13	Resistor, Fixed, Film, 21.5K, 1%, 1/10W	81349	RN55C2152F
R14	Resistor, Fixed, Film, 30.1K, 1%, 1/10W	81349	RN55C3012F
R15	Resistor, Fixed, Film, 562 ohms, 1%, 1/10W	81349	RN55C5620F
R17, 18	Resistor, Fixed, Film, 3010 ohms, 1%, 1/10W	81349	RN55C3011F
R19, 20	Resistor, Fixed, Film, 4750 ohms, 1%, 1/10W	81349	RN55C4751F
T1	Transformer, 50-200 ohms	15542	T4-1
TP1	Test Point	71279	450-3289-01-03-00
U1	Integrated Circuit, Dual Op Amp	01295	TL072CP
XU1	Socket, IC, 8 Pin	06776	ICL-083-S6-T

Replacement Parts List, FM Limiter, Type 5912-13, A6A5A3

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1, 3-5	Capacitor, Ceramic, 0.01 uF, 10%, 100V	72982	8121-100-X7RO-103K
C2	Capacitor, Ceramic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C6	Capacitor, Ceramic, 68 pF, 10%, 100V	72982	8121-100-COGO-680K
C7	Capacitor, Ceramic, 18 pF, 10%, 100V	72982	8121-100-COGO-180K
C8	Capacitor, Ceramic, 1000 pF, 10%, 100V	72982	8121-100-X7RO-102K
C9	Not Used		
E1-3	Terminal, Entry, guided	71279	450-3760-01-03-00
L1	Coil, Fixed, 18 uH	81349	MS75084-15
L2	Coil, Variable, 0.82 uH	71279	558-7107-12
R1	Resistor, Fixed, Composition, 560 ohms, 5%, 1/4W	81349	RCR07G561JS
R2	Resistor, Fixed, Composition, 100 ohms, 5%, 1/4W	81349	RCR07G101JS
R3	Resistor, Fixed, Composition, 1.8K, 5%, 1/4W	81349	RCR07G182JS
U1	Integrated Circuit, FM Limiter	81349	MC1355P

Replacement Parts List, IF Filter Amplifier, 10 kHz, Type 5742-10, A6A6

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	IF Filter, PWB	54805	5910-10
A2	AM Detector, PWB	54805	5911
A3	FM Limiter, PWB	54805	5912-10
C1, 6, 8, 11, 13, 15, 16, 21, 22	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C2, 5, 9, 17, 20, 24, 26	Capacitor, Ceramic, Monolithic, 3300 pF, 10%, 100V	72982	8121-100-X7R0-332K
C3, 9, 18, 24, 26	Capacitor, Ceramic, Monolithic, 1000 pF, 10%, 100V	72982	8101-100-X7R0-102K
C4, 10, 12, 19	Capacitor, Ceramic, Monolithic, 0.01 uF, 10%, 100V	72982	8121-100-X7R0-103K
C7, 14, 23, 25	Capacitor, Electrolytic, 15 uF, ±20%, 20V	31433	T368B156M020A5
CR1-3, 5-8	Diode	81349	1N4446
CR4	Not Used		
CR9	Diode, dual	04713	MSD6100
E1-14	Terminal, Pin Connector	71279	460-2946-02-03-00
L1-3	Coil, Fixed, 18 uH	81349	MS75084-15
P1	Connector, 80 Pin	22526	65002-240
Q1	Transistor, PNP	81349	2N2907
R1, 3-5, 16, 18-20, 22, 24, 26, 28, 31, 37, 39	Resistor, Fixed, Composition, 10K, 5%, 1/8W	81349	RCR05G103JS
R2, 40, 53	Resistor, Variable, 10K	19701	8014EMB103E1
R6, 44, 46	Resistor, Fixed, Composition, 22K, 5%, 1/8W	81349	RCR05G223JS
R7	Resistor, Fixed, Film, 4.22K, 1%, 1/10W	81349	RN55C4221F
R8	Resistor, Fixed, Film, 17.8K, 1%, 1/10W	81349	RN55C1782F
R9, 13, 45	Resistor, Fixed, Composition, 47 ohms, 5%, 1/8W	81349	RCR05G470JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R10, 41, 47	Resistor, Fixed, Composition, 68K, 5%, 1/8W	81349	RCR05G683JS
R11, 48	Resistor, Fixed, Composition, 15K, 5%, 1/8W	81349	RCR05G153JS
R12, 17, 49	Resistor, Fixed, Composition, 56K, 5%, 1/8W	81349	RCR05G563JS
R14	Resistor, Fixed, Composition, 2.2K, 5%, 1/8W	81349	RCR05G222JS
R15	Resistor, Fixed, Composition, 100K, 5%, 1/8W	81349	RCR05G104JS
R21, 25, 29	Resistor, Fixed, Composition, 47K, 5%, 1/8W	81349	RCR05G473JS
R23, 27, 32	Resistor, Fixed, Composition, 1K, 5%, 1/8W	81349	RCR05G102JS
R30	Resistor, Fixed, Composition, 1.5K, 5%, 1/8W	81349	RCR05G152JS
R33, 50	Resistor, Fixed, Composition, 33K, 5%, 1/8W	81349	RCR05G333JS
R34	Resistor, Fixed, Film, 2.61K, 1%, 1/10W	81349	RN55C2611F
R35	Resistor, Fixed, Film, 237 ohms, 1%, 1/10W	81349	RN55C2370F
R36	Resistor, Fixed, Film, 1.96K, 1%, 1/10W	81349	RN55C1961F
R38	Resistor, Fixed, Composition, 470K, 5%, 1/8W	81349	RCR05G474JS
R39	Resistor, Fixed, Composition, 4.7K, 5%, 1/8W	81349	RCR05G472JS
R42	Resistor, Fixed, Film, 4.22K, 1%, 1/10W	81349	RN55C4221F
R43	Resistor, Fixed, Film, 17.8K, 1%, 1/10W	81349	RN55C1782F
R51	Resistor, Fixed, Composition, 12K, 5%, 1/8W	81349	RCR05G123JS
R52	Resistor, Fixed, Composition, 3.9K, 5%, 1/8W	81349	RCR05G392JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
U1	Integrated Circuit, Discriminator	54805	3629-13
U2, 6, 8	Integrated Circuit, Quad Op Amp	01295	TL074CP
U3, 4	Integrated Circuit, Dual MOSFET Switch	17856	DG-200CJ
U5	Integrated Circuit, Hex Inverter	02735	CD4049UB
U7	Integrated Circuit, Adjustable Regulator	27014	LM317H
XU1	Not Used		
XU2-4, 6, 8	Socket, IC, 14 Pin	06776	ICL-143-S6-T
XU5	Socket, IC, 16 Pin	06776	ICL-163-S6-T
XU7	Transipad	13103	7717-22DAP

Replacement Parts List, IF Filter PWB, Type 5910-10, A6A6A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,2	Capacitor, Ceramic, Monolithic, 0.01 uF, 10%, 100V	72982	8121-100-X7RO-103K
C3,4	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 100V	72982	8121-050-651-104M
CR1-4	Diode, Pin	80131	IN5767
E1-4	Terminal, Entry, guided	71279	450-3760-01-03-00
FL1	Filter, Bandwidth, 10 kHz	54805	3628-10
L1,2	Coil, Fixed, 180 uH	54805	3728-1
R1,2	Resistor, Fixed, Composition, 1K, 5%, 1/4W	81349	RCR07G102JS

Replacement Parts List, AM Detector PCB, Type 5911, A6A6A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,7	Capacitor, Ceramic, Monolithic 12 pF, 5%, 100V	72982	8101-100-COGO-120J
C2	Capacitor, Composition, Tubular 1 pF, 10%, 500V	95121	QCI.OPFK
C3,6	Capacitor, Ceramic, Monolithic, 47 pF, 10%, 100V	72982	8111-100-COGO-470K
C4,10-12,16	Capacitor, Ceramic, Monolithic, 0.01uF, 10%, 100V	72982	8121-100-X7RO-103K
C5,8,9,13-15, 18,22	Capacitor, Ceramic, Monolithic, 0.1uF, 20%, 50V	72982	8121-050-651-104M
C17	Capacitor, Electrolytic, Tantalum, 1.0 uF, 20%, 50V	31433	T368A105M050AS
C19	Capacitor, Ceramic, Monolithic, 56 pF, 10%, 100V	72982	8121-100-COGO-560K
C20,21	Capacitor, Ceramic, Monolithic, 100 pF, 10%, 100V	72982	8121-100-COGO-101K
CR1,2	Diode, Pin	81349	IN5767
CR3,4,6,7	Diode, Schottky, Matched	28480	5082-2836
CR5	Diode, Dual	04713	MSD6100
E1-7	Terminal, Entry, guided	71279	450-3760-01-03-00
L1	Coil, Fixed, 180 uH	54805	3728-1
L2,3	Coil, Variable, 1.0 uH	71279	558-7107-13
L4,5	Coil, Fixed, 18 uH	81349	MS75084-15
L6	Coil, Fixed, 560 uH	81349	MS75085-16
Q1	Transistor, NPN	81349	2N5109
R1,4,5,16	Resistor, Fixed, Composition, 1K, 5%, 1/8W	81349	RCR05G102JS
R2	Resistor, Fixed, Composition, 18 ohms, 5%, 1/8W	81349	RCR05G180JS
R3	Resistor, Fixed, Composition, 2.7K, 5%, 1/8W	81349	RCR05G272JS
R6	Resistor, Fixed, Composition, 5.6 ohms, 5%, 1/8W	81349	RCR05G5R6JS
R7	Resistor, Fixed, Composition, 56 ohms, 5%, 1/8W	81349	RCR05G560JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R8,9	Resistor, Fixed, Composition, 100 ohms, 5%, 1/8W	81349	RCR05G101JS
R10	Resistor, Fixed, Film 10.0K, 1%, 1/10W	81349	RN55C1002F
R11	Resistor, Fixed, Composition, 58.3K, 1%, 1/10W	81349	RN55C5832F
R12	Resistor, Variable, 50K	19701	8014EMB503E1
R13	Resistor, Fixed, Film, 21.5K, 1%, 1/10W	81349	RN55C2152F
R14	Resistor, Fixed, Film, 30.1K, 1%, 1/10W	81349	RN55C3012F
R15	Resistor, Fixed, Film, 562 ohms, 1%, 1/10W	81349	RN55C5620F
R17,18	Resistor, Fixed, Film, 3010 ohms, 1%, 1/10W	81349	RN55C3011F
R19,20	Resistor, Fixed, Film, 4750 ohms, 1%, 1/10W	81349	RN55C4751F
T1	Transformer, 50-200 ohms	15542	T4-1
TP1	Test Point	71279	450-3289-01-03-00
U1	Integrated Circuit, Dual Op Amp	01295	TL072CP
XU1	Socket, IC, 8 Pin	06776	ICL-083-S6-T

Replacement Parts List, FM Limiter, Type 5912-10, A6A6A3

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,3-5	Capacitor, Ceramic, 0.01 uF, 10%, 100V	72982	8121-100-X7R0-103K
C2	Capacitor, Ceramic, 0.1 uF, 20%, 50V	72982	8121-050-651-104M
C6	Capacitor, Ceramic, 68 pF, 10%, 100V	72982	8121-100-C0G0-680K
C7	Capacitor, Ceramic, 18 pF, 10%, 100V	72982	8121-100-C0G0-180K
C8	Capacitor, Ceramic, 1000 pF, 10%, 100V	72982	8121-100-X7R0-102K
C9	Not Used		
E1-3	Terminal, Entry, guided	71279	450-3760-01-03-00
L1	Coil, Fixed, 18 uH	81349	MS75084-15
L2	Coil, Variable, 0.82 uH	71279	558-7107-12
R1	Resistor, Fixed, Composition, 560 ohms, 5%, 1/4W	81349	RCR07G561JS
R2	Resistor, Fixed, Composition, 100 ohms, 5%, 1/4W	81349	RCR07G101JS
R3	Resistor, Fixed, Composition, 1.8 K, 5%, 1/4W	81349	RCR07G182JS
U1	Integrated Circuit, FM Limiter	81349	MC1355P

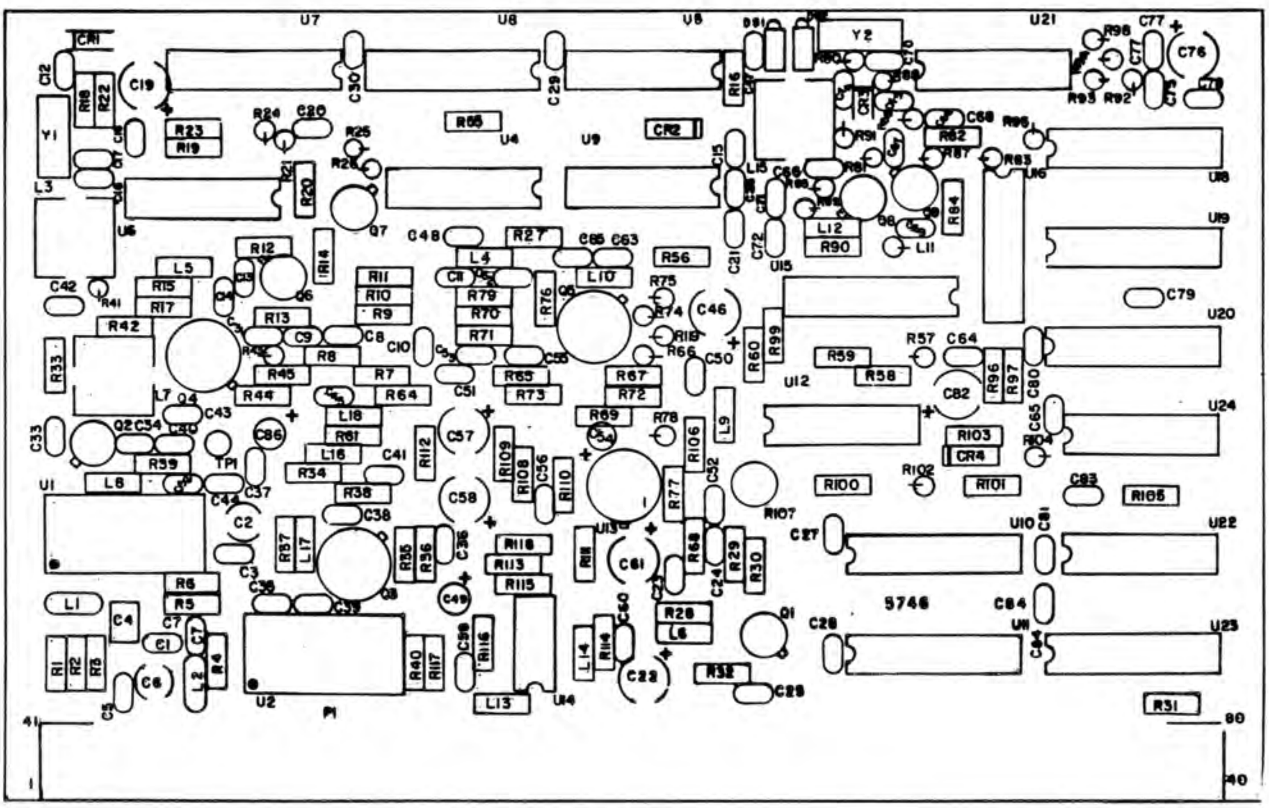


Figure 6-19. CW Demodulator (A6A7), Component Location

Replacement Parts List, CW Demodulator, Type 5746, A6A7

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,7	Capacitor, Ceramic, Monolithic, 12 pF, 5%, WVDC	72982	8111-100-COGO-120J
C2,6	Capacitor, Variable, 5-25 pF	91293	9374
C3,5,85	Capacitor, Ceramic, Monolithic 33 pF, 5%, 100 WVDC	72982	8121-100-COGO-330J
C4	Capacitor, Composition, 1.5 pF, 10%, 500 WVDC	95121	QC 1.5pFK
C8-11,15,20,21,23-25,27-31,42,45, 48,64-68,77-81,84	Capacitor, Ceramic, Monolithic 0.01 uF, 10%, 100 WVDC	72982	8121-100-X7RO-103K
C12,44,70	Capacitor, Ceramic, Monolithic, 1000 pf, 10%, 100 WVDC	72982	8121-100-X7RO-102K
C13,14,62,63,71,72	Capacitor, Ceramic, Monolithic, 220 pF, 10%, 100 WVDC	72982	8121-100-COGO-221K
C16	Capacitor, Ceramic, Monolithic, 0.068 uF, 20%, 100 WVDC	72982	8121-100-651-683K
C17,60	Capacitor, Ceramic, Monolithic, 0.47 uF, 20%, 100 WVDC	72982	8131-100-651-474M
C18,32-39,47,50, 51-53,55,69,73,75	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 100 WVDC	72982	8121-050-651-104M
C19,22,46,57,58 61,76,82	Capacitor, Electrolytic,Tantalum, 15 uF, 20%, 20 WVDC	31433	T368B156M020AS
C26,43,83	Capacitor, Ceramic, Monolithic, 100 pF, 10%, 100 WVDC	72982	8121-100-COGO-101K
C40	Capacitor, Ceramic, Monolithic, 150 pF, 10%, 100 WVDC	72982	8121-100-COGO-151K
C41	Capacitor, Ceramic, Monolithic, 330 pF, 10%, 100 WVDC	72982	8101-100-X7RO-102K
C49,86	Capacitor, Ceramic, Tantalum, 2.2 uF, 20%, 20 WVDC	31433	T368A225M020AS
C54	Capacitor,Electrolytic,Tantalum, 1 uF, 20%, 50 WVDC	31433	T368A105M050AS
C56	Capacitor, Ceramic, Monolithic, 47 pF, 5%, 100 WVDC	72982	8121-100-COGO-470J
C59	Capacitor, Ceramic, Monolithic, 22 pF, 5%, 100 WVDC	72982	8111-100-COGO-220J

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C74	Capacitor, Ceramic, Monolithic, 1500 pF, 10%, 100 WVDC	72982	8121-100-7R07-152K
CR1,3	Diode	25088	BB109
CR2,4	Diode	80131	IN4446
DS1,2	LED Indicator	72619	555-2007
L1,2	Inductor, Toroid	54805	5652-2
L3	Coil, Variable, 4.7 uH	71279	558-7107-21
L4,6	Coil, Fixed, 470 uH, 10%	81349	MS75085-15
L5,12	Coil, Fixed, 22 uH, 10%	81349	MS75084-16
L7	Coil, Variable, 0.68 uH	71279	558-7107-11
L8,17,18	Coil, Variable, 39 uH	71279	558-7107-32
L9,11,13,14	Coil, Fixed, 220 uH, 10%	81349	MS75085-11
L10	Coil, Fixed, 47 uH, 10%	81349	MS75085-03
L15	Coil, Variable, 10 uH	71279	558-7107-25
L16	Coil, Fixed, 100 uH, 10%	81349	MS75085-07
Q1,6-9	Transistor, NPN	80131	2N2369
Q2	Transistor, JFET	17856	U310
Q3	Transistor, NPN	80131	2N5109
Q4,5	Transistor, NPN	80131	2N5179
R1,20,41,98	Resistor, Fixed, Composition, 100 ohms, 5%, 1/4W	81349	RCR07G101JS
R2,33	Resistor, Fixed, Composition, 75 ohm, 5%, 1/4W	81349	RCR07G750JS
R3,4,6,94,112	Resistor, Fixed, Composition, 330 ohms, 5%, 1/4W	81349	RCR07G331JS
R5	Resistor, Fixed, Composition, 18 ohms, 5%, 1/4W	81349	RCR07G180JS
R7,8,10,14,16,29, 37-39,60,69,73, 80,81,83,87,90, 99,106	Resistor, Fixed, Composition, 1K, 5%, 1/4W	81349	RCR07G102JS
R9,30,43,56,72, 82,103	Resistor, Fixed, Composition, 4.7 K ohms, 5%, 1/4W	81349	RCR07G472JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R11,28,44,84	Resistor, Fixed, Composition, 270 ohms, 5%, 1/4W	81349	RCR07G271JS
R12,15,42,85,89	Resistor, Fixed, Composition, 22 K, 5%, 1/4W	81349	RCR07G223JS
R13,32,86	Resistor, Fixed, Composition, 6.8K, 5%, 1/4W	81349	RCR07G682JS
R17,68,77	Resistor, Fixed, Composition, 1.5K, 5%, 1/4W	81349	RCR07G152JS
R18,88	Resistor, Fixed, Composition, 33 K, 5%, 1/4W	81349	RCR07G333JS
R19,58,64,71,102, 115,116,118	Resistor, Fixed, Composition, 10K, 5%, 1/4W	81349	RCR07G103JS
R21,25,26	Resistor, Fixed, Composition, 560 ohms, 5%, 1/4W	81349	RCR07G561JS
R22	Resistor, Fixed Composition, 20 K, 5%, 1/4W	81349	RCR07G203JS
R23	Resistor, Fixed, Composition, 2.2K, 5%, 1/4W	81349	RCR07G222JS
R24	Resistor, Fixed, Composition, 750 ohms, 5%, 1/4W	81349	RCR07G751JS
R27,105	Resistor, Fixed, Composition, 47 ohms, 5%, 1/4W	81349	RCR07G470JS
R31	Resistor, Fixed, Composition, 56 ohms, 5%, 1/4W	81349	RCR07G560JS
R34	Resistor, Fixed, Composition, 2.7K, 5%, 1/4W	81349	RCR07G272JS
R35,36	Resistor, Fixed, Composition, 15 ohms, 5%, 1/4W	81349	RCR07G150JS
R40,117	Resistor, Fixed Composition, 68 ohms, 5%, 1/4W	81349	RCR07G680JS
R45,61	Resistor, Fixed, Composition, 10 ohms, 5%, 1/4W	81349	RCR07G100JS
R46-54,62,63	Not Used		
R55-104	Resistor Fixed, Composition, 470 ohms, 5%, 1/4W	81349	RCR07G471JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R57,101	Resistor, Fixed, Composition, 27K, 5%, 1/4W	81349	RCR07G273JS
R59,100	Resistor, Fixed, Composition, 68 K, 5%, 1/4W	81349	RCR07G683JS
R65	Resistor, Fixed, Composition, 3.3K 5%, 1/4W	81349	RCR07G332JS
R66,93,96,97	Resistor, Fixed, Composition, 220 ohms, 5%, 1/4W	81349	RCR07G221JS
R67	Resistor, Fixed, Composition, 5.6K, 5%, 1/4W	81349	RCR07G562JS
R70	Resistor, Fixed, Composition, 680 ohms, 5%, 1/4W	81349	RCR07G681JS
R74,76	Resistor, Fixed, Composition, 1.8K, 5%, 1/4W	81349	RCR07G182JS
R75,79	Resistor, Fixed, Composition, 820 ohms, 5%, 1/4W	81349	RCR07G821JS
R78,92	Resistor, Fixed, Composition, 12K, 5%, 1/4W	81349	RCR07G123JS
R91	Resistor, Fixed, Composition, 270K, 5%, 1/4W	81349	RCR07G274JS
R95	Resistor, Fixed, Composition, 2K, 5%, 1/4W	81349	RCR07G202JS
R107	Resistor, Variable, 1K, 20%, 1/2W	19701	8014EMF102E1
R108,109	Resistor, Fixed, Composition, 3.9K, 5%, 1/4W	81349	RCR07G392JS
R110,111,113,114	Resistor, Fixed, Composition, 47 K, 5%, 1/4W	81349	RCR07G473JS
R119	Resistor, Fixed, Composition, 15K, 5%, 1/4W	8349	RCR07G153JS
TP1	Terminal, Test Point	71279	160-1026-02-01
U1	Integrated Circuit, Mixer	15542	SRA-1
U2	Integrated Circuit, 4-Way Power Divider	15542	PSC-4-3
U3,17	Not Used		

Replacement Parts List, CW Demodulator, Type 5746, A6A7 (Cont.)

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
U4,16,24	Integrated Circuit, Quad 2 Input NAND Gate	01295	SN74LS00N
U5,9,22	Integrated Circuit, Dual D Flip-flop	01295	SN74S74N
U6,21	Integrated Circuit, Transistor Array	04713	MPQ6002
U7,8,15,18,19,20	Integrated Circuit, Synchronous Counter	01295	SN74LS161N
U10,11,13	Integrated Circuit, Dual Decade Counter	01295	SN74LS390N
U12	Integrated Circuit, Quad Comparator	27014	LM339N
U13	Integrated Circuit, Integrated Modulator/Demodulator	04713	MC1596G
U14	Integrated Circuit, Dual Operational Amplifier	01295	TL072CP
Y1	Crystal, 19.400 MHz	72982	CR-60 A/U
Y2	Crystal, 16.008 MHz	72982	CR-60 A/U
XU1-3,17	Not Used		
XU4-6,9,12,16,21, 22,24	Socket, IC, 14 Pin Dip	06776	ICL-143-S6-T
XU7,8,10,11,15, 18,19,20,23	Socket, IC, 16 Pin Dip	06776	ICL-163-S6-T
XU13	Socket, IC, 10 Pin Round	06776	SD-51710-23
XU14	Socket, IC, 8 Pin Dip	06776	ICL-083-S6-T

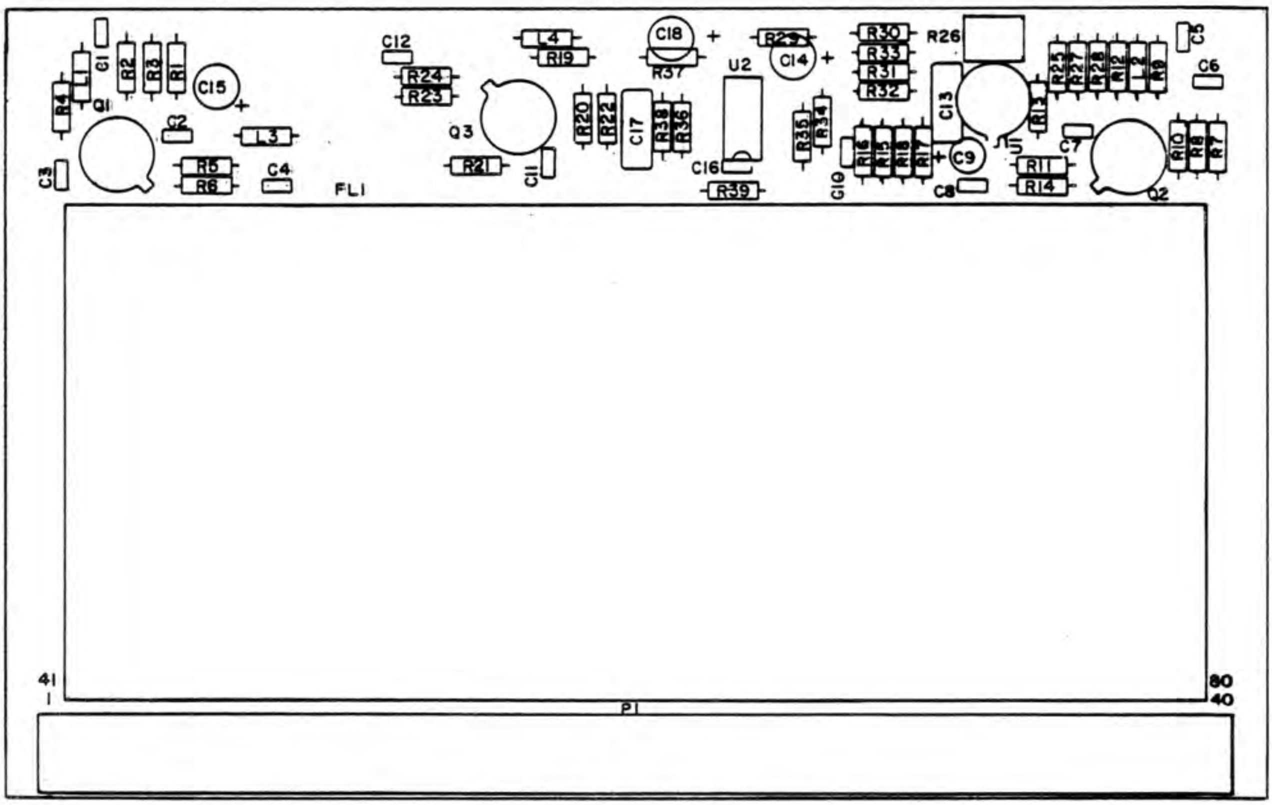


Figure 6-20. USB Demodulator (A6A8), Component Location

Replacement Parts List, USB Demodulator, Type 5748, A6A8

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-8,10-12	Capacitor, Ceramic, Monolithic 0.1 uF, 20%, 50 WVDC	72982	8121-050-651-104M
C9	Capacitor,Electrolytic,Tantalum, 1 uF, 20%, 50 WVDC	31433	T368A105M050A9
C13	Capacitor, Mica, Dipped, 680 pF, 5%, 500 WVDC	81349	CM06FD681J03
C14,15,18	Capacitor,Electrolytic,Tantalum, 15 uF, 20%, 20 WVDC	31433	T368B156M020AS
C16	Capacitor, Ceramic, Monolithic, 0.47 uF, 20%, 50 WVDC	72982	8121-050-651-474M
C17	Capacitor, Mica, Dipped, 47 pF, 5%, 500 WVDC	81349	CM05FD470J03
FL1	Filter, USB, Equalized	54805	9810
L1-4	Coil, Fixed, 220 uH, 10%	81349	MS75085-11
P1	Connector, 80 Pin	22526	65002-240
Q1,2	Transistor, NPN	80131	2N5179
Q3	Transistor, NPN	80131	2N2369
R1	Resistor, Fixed, Composition, 100 ohms, 5%, 1/4W	81349	RCR07G101JS
R2,6,14	Resistor, Fixed, Composition, 10K, 5%, 1/4W	81349	RCR07G103JS
R3,10	Resistor, Fixed, Composition, 3.3K, 5%, 1/4W	81349	RCR07G332JS
R4,8,17-19,22,23, 25	Resistor, Fixed, Composition, 1K, 5%, 1/4W	81349	RCR07G102JS
R5,29	Resistor, Fixed, Composition, 330 ohms, 5%, 1/4W	81349	RCR07G331JS
R7,12,24	Resistor, Fixed, Composition, 220 ohms, 5%, 1/4W	81349	RCR07G221JS
R9	Resistor, Fixed, Composition, 15K, 5%, 1/4W	81349	RCR07G153JS
R11	Resistor, Fixed, Composition, 680 ohms, 5%, 1/4W	81349	RCR07G681JS
R13,27	Resistor, Fixed, Composition, 1.5K, 5%, 1/4W	81349	RCR07G152JS

Replacement Parts List, USB Demodulator, Type 5748, A6A8 (Cont.)

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R15	Resistor, Fixed, Composition, 5.6K, 5%, 1/4W	81349	RCR07G562JS
R16	Resistor, Fixed, Composition, 22K, 5%, 1/4W	81349	RCR07G472JS
R20,21	Resistor, Fixed, Composition, 22 K, 5%, 1/4W	81349	RCR07G223JS
R26	Resistor, Variable, 1K, 20%, 1/2W	19701	8014EMU1102E1
R28	Resistor, Fixed, Composition, 12K, 5%, 1/4W	81349	RCR07G123JS
R30,31	Resistor, Fixed, Composition, 3.9K, 5%, 1/4W	81349	RCR07G392JS
R32-35,37,38	Resistor, Fixed, Composition, 47 K, 5%, 1/4W	81349	RCR07G473JS
R36	Resistor, Fixed, Composition, 18K, 5%, 1/4W	81349	RCR07G183JS
R39	Resistor, Fixed, Composition, 68 ohms, 5%, 1/4W	81349	RCR07G680JS
U1	Integrated Circuit, Balanced Modulator/Demodulator	04713	MC1596G
U2	Integrated Circuit, Dual Operational Amplifier	01295	TL072CP
XU1	Socket, 10 Pin, Round	91506	805-9-2G10
XU2	Socket, 8 Pin, Dip	06776	ICL-083-S6-T

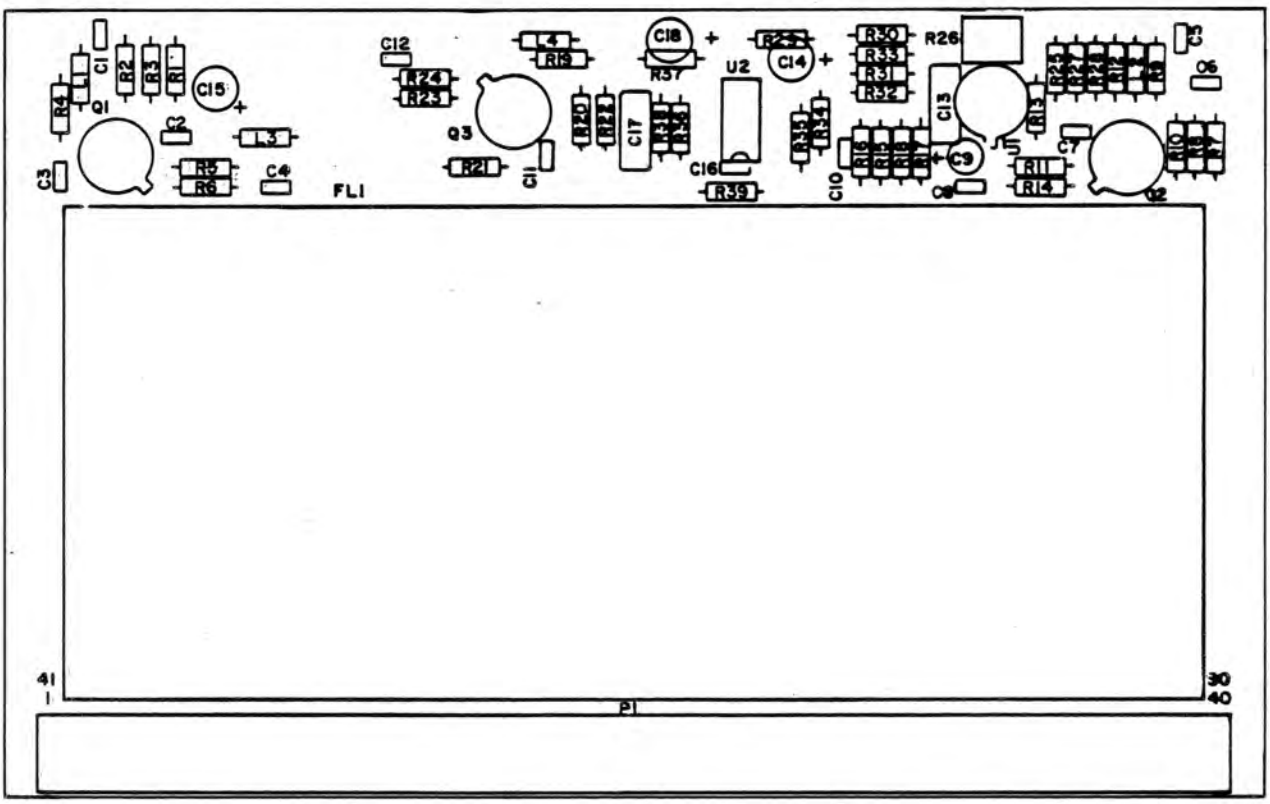


Figure 6-21. LSB Demodulator (A6A9), Component Location

Replacement Parts List, LSB Demodulator, Type 5749, A6A9

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-8,10-12	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50 WVDC	72982	8121-050-651-104M
C9	Capacitor, Electrolytic, Tantalum, 1 uF, 20%, 50 WVDC	31433	T368A105M050AS
C13	Capacitor, Mica, Dipped, 680 pF, 5%, 500 WVDC	81349	CM06FD681J03
C14,15,18	Capacitor, Electrolytic, Tantalum, 15 uF, 20%, 20 WVDC	31433	T368B156M020AS
C16	Capacitor, Ceramic, Monolithic, 0.47 uF, 20%, 50 WVDC	72982	8131-050-651-474M
C17	Capacitor, Mica, Dipped, 47 pF, 5%, 500 WVDC	81349	CM05FD470J03
FL1	Filter, LSB, Equalized	54805	9810
L1-4	Coil, Fixed, 220 uH, 10%	81349	MS75085-11
P1	Connector, 80 Pin	22526	65002-240
Q1-2	Transistor, NPN	80131	2N5179
Q3	Transistor, NPN	80131	2N2369
R1	Resistor, Fixed, Composition, 100 ohms	81349	RCR07G101JS
R2,6,14	Resistor, Fixed, Composition, 10K, 5%, 1/4W	81349	RCR07G101JS
R3,10	Resistor, Fixed, Composition, 3.3K, 5%, 1/4W	81349	RCR07G103JS
R4,8,17-19,22, 23,25	Resistor, Fixed, Composition, 1K, 5%, 1/4W	81349	RCR07G332JS
R5,29	Resistor, Fixed, Composition, 330 ohms, 5%, 1/4W	81349	RCR07G102JS
R7,12,24	Resistor, Fixed, Composition, 220 ohms, 5%, 1/4W	81349	RCR07G331JS
R9	Resistor, Fixed, Composition, 15K, 5%, 1/4W	81349	RCR07G221JS
R11	Resistor, Fixed, Composition, 680 ohms, 5%, 1/4W	81349	RCR07G153JS
R13,27	Resistor, Fixed, Composition, 1.5K, 5%, 1/4W	81349	RCR07G681JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R15	Resistor, Fixed, Composition, 5.6K, 5%, 1/4W	81349	RCR07G562JS
R16	Resistor, Fixed, Composition, 4.7K, 5%, 1/4W	81349	RCR07G472JS
R20,21	Resistor, Fixed, Composition, 22K, 5%, 1/4W	81349	RCR07G223JS
R26	Resistor, Variable 1K, 20%, 1/2W	19701	8014EMU1102E1
R28	Resistor, Fixed, Composition, 12K, 5%, 1/4W	81349	RCR07G123JS
R30,31	Resistor, Fixed, Composition, 3.9K, 5%, 1/4W	81349	RCR07G392JS
R32-35,37,38	Resistor, Fixed Composition, 47 K, 5%, 1/4W	81349	RCR07G473JS
R36	Resistor, Fixed, Composition, 18K, 5%, 1/4W	81349	RCR07G183JS
R39	Resistor, Fixed, Composition, 68 ohms, 5%, 1/4W	81349	RCR07G680JS
U1	Integrated Circuit, Balanced Modulator/Demodulator	04713	MC1596G
U2	Integrated Circuit, Dual Operational Amplifier	01295	TL072CP
XU1	Socket, 10 Pin, Round	91506	805-9-2G10
XU2	Socket, 8 Pin, Dip	06776	ICL-083-S6-T

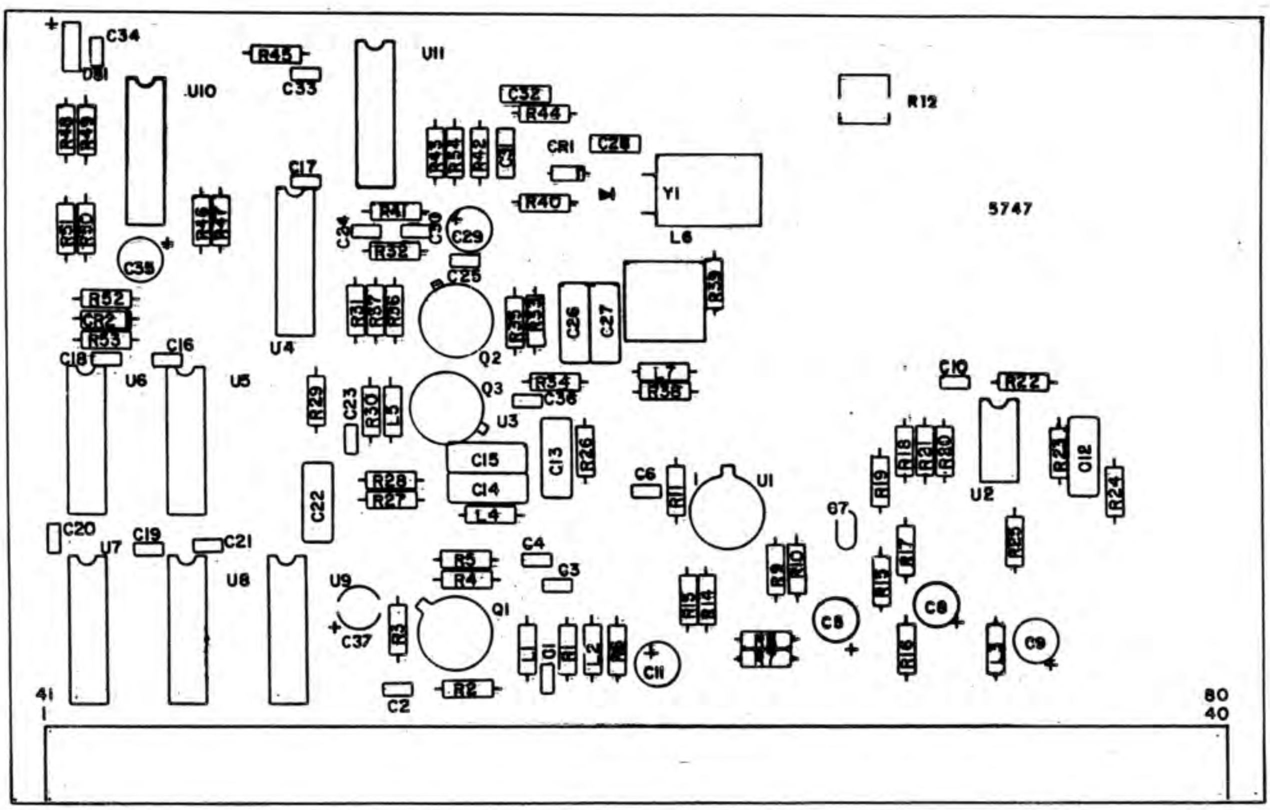


Figure 6-22. 10 kHz Converter (A6A10), Component Location

Replacement Parts List, 10 kHz Converter, Type 5747, A6A10

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-4,6,10,17-21, 23,31,33,34	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50 WVDC	72982	8121-050-651-104M
C5	Capacitor, Electrolytic, Tantalum, 1 uF, 20%, 50 WVDC	31433	T368A105M050A9
C7,28	Capacitor, Mica, Dipped, 1000 pF, 10%, 500 WVDC	72982	8121-100-X7RO-102K
C8,9,11,29,35, 37	Capacitor,Electrolytic,Tantalum, 15 uF, 20%, 20 WVDC	31433	T368B156M020AS
C12	Capacitor, Mica, Dipped, 47 pF, 5%, 500 WVDC	81349	CM05FD470J03
C13,15	Capacitor, Mica, Dipped, 180 pF, 5%, 500 WVDC	81349	CM05FD181J03
C14	Capacitor, Mica, Dipped 33 pF, 5%, 500 WVDC	81349	CM05ED330J03
C16,24,25,30,36	Capacitor, Ceramic, Monolithic, 0.01 pF, 10%, 100 WVDC	72982	8121-100-X7RO-103K
C22	Capacitor, Mica, Dipped, 100 pF, 5%, 500 WVDC	81349	CM05FD101J03
C26,27	Capacitor, Mica, Dipped, 220 pF, 5%, 500 WVDC	81349	CM05FD221J03
C32	Capacitor, Ceramic, Monolithic, 0.01 uF, 10%, 100 WVDC	72982	8121-100-X7RO-153K
CR1	Diode, Varicap	25088	BB109
CR2	Diode	80131	IN4446
DS1	LED Indicator	72619	555-2007
L1-3,5	Coil, Fixed, 220 uH, 10%	81349	MS75085-11
L4	Coil, Fixed, 47 uH, 10%	81349	MS75085-03
L6	Coil, Variable, 10 uH	71279	558-7107-25
L7	Coil, Fixed, 18 uH, 10%	81349	MS75084-15
P1	Connector, Dual Row, 80 Pin	22526	65002-240
Q1	Transistor, NPN	80131	2N5179
Q2,3	Transistor, NPN	80131	2N2369
R1,43,46,47	Resistor, Fixed, Composition, 220 ohms, 5%, 1/4W	81349	RCR07G221JS

Replacement Parts List, 10 kHz Converter, Type 5747, A6A10 (Cont.)

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R2	Resistor, Fixed, Composition, 15K, 5%, 1/4W	81349	RCR07G153JS
R3	Resistor, Fixed, Composition, 3.3K, 5%, 1/4W	81349	RCR07G332JS
R4	Resistor, Fixed, Composition, 680 ohms, 5%, 1/4W	81349	RCR07G681JS
R5,22,51	Resistor, Fixed, Composition, 10K, 5%, 1/4W	81349	RCR07G103JS
R6,13	Resistor, Fixed, Composition, 1.5K, 5%, 1/4W	81349	RCR07G152JS
R7	Resistor, Fixed, Composition, 5.6K, 5%, 1/4W	81349	RCR07G562JS
R8,32	Resistor, Fixed, Composition, 4.7K, 5%, 1/4W	81349	RCR07G472JS
R9-11,31,33,34, 36,38,48	Resistor, Fixed, Composition, 1K, 5%, 1/4W	81349	RCR07G102JS
R12	Resistor, Variable, 1K, 20%, 1/2W	19701	8014EMU102E1
R14,41	Resistor, Fixed, Composition, 12K, 5%, 1/4W	81349	RCR07G123JS
R15,17	Resistor, Fixed, Composition, 3.9K, 5%, 1/4W	81349	RCR07G392JS
R16,54	Resistor, Fixed, Composition, 330 ohms, 5%, 1/4W	81349	RCR07G331JS
R18-21,23,25,52	Resistor, Fixed, Composition, 47K, 5%, 1/4W	81349	RCR07G473JS
R24	Resistor, Fixed, Composition, 560 ohms, 5%, 1/4W	81349	RCR07G561JS
R26,27	Resistor, Fixed, Composition, 820 ohms, 5%, 1/4W	81349	RCR07G821JS
R28	Resistor, Fixed, Composition, 1.8K, 5%, 1/4W	81349	RCR07G182JS
R29	Resistor, Fixed, Composition, 47 ohms, 5%, 1/4W	81349	RCR07G470JS
R30	Resistor, Fixed, Composition, 270 ohms, 5%, 1/4W	81349	RCR07G271JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R35,39	Resistor, Fixed, Composition, 22K, 5%, 1/4W	81349	RCR07G223JS
R37	Resistor, Fixed, Composition, 6.8K, 5%, 1/4W	81349	RCR07G682JS
R40	Resistor, Fixed, Composition, 33K, 5%, 1/4W	81349	RCR07G333JS
R42	Resistor, Fixed, Composition, 100 ohms, 5%, 1/4W	81349	RCR07G101JS
R44,50	Resistor, Fixed, Composition, 27K, 5%, 1/4W	81349	RCR07G273JS
R45	Resistor, Fixed, Composition, 2.2K, 5%, 1/4W	81349	RCR07G222JS
R49	Resistor, Fixed, Composition, 68K, 5%, 1/4W	81349	RCR07G683JS
R53	Resistor, Fixed, Composition, 470 ohms, 5%, 1/4W	81349	RCR07G471JS
U1	Integrated Circuit, Balanced Modulator/Demodulator	04713	MC1596G
U2	Integrated Circuit, Dual Operational Amplifier	01295	TL072CP
U3	Not Used		
U4	Integrated Circuit, Quad 2 Input NAND Gate	01295	SN74LS00N
U5,7,8	Integrated Circuit, Program Divider	01295	SN74LS161AN
U6	Integrated Circuit, Triple 3-Input NAND Gate	01295	SN74LS10N
U9	Integrated Circuit, Dual D Flip-Flop	01295	SN74LS74N
U10	Integrated Circuit, Quad Comparator	27014	LM339N
U11	Integrated Circuit, NPN/PNP Transistor Array	04713	MPQ6002
XU1	Socket, IC, 10 Pin, Round	91506	8059-2G10
XU2	Socket, IC, 8 Pin, Dip	06776	ICL-083-S6-T
XU3	Not Used		

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
XU4,6,9,10,11	Socket, IC, 14 Pin, Dip	06776	ICL-143-S6-T
XU5,7,8	Socket, IC, 16 Pin, Dip	06776	ICL-163-S6-T
Y1	Crystal, Quartz, 16.080 MHz	72982	CR-60 A/U

Replacement Parts List, Digital Control Mother Board, Type 7788, A7A1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
E1	Terminal, Square	22526	65574-401
E2,5,6	Terminal	71279	160-1026-04-01-00
E3	Connector, 40 Position, Paddle	02660	88214-8
E4	Connector, 50 Position, Paddle	02660	1-88217-1
E7-22	Terminal, Square	22526	65574-408
E23	Shield Cable	92194	2168
J1-8	Terminal, Square	22526	65574-420
J9	Connector, 40 Position	15912	609-4016
J10	Connector, 50 Position	15912	609-5016
J11	Connector, 50 Position	22526	6517-024
J12	Connector, 34 Position	22526	65817-018
J13	Connector, 12 Position	02660	1-480708-0
J14	Not Used		
J15	Connector, 37 Position	71468	DC-37S
J16	Connector, 24 Position	02660	57-20240-2
P1A	Connector, 8 Position	22526	65057-028
P1B	Connector, 16 Position	22526	65057-024
P2	Connector, 6 Position	22526	65057-029
P3	Connector, 10 Position	22526	65057-027
P4	Connector, 12 Position	22526	65112-012

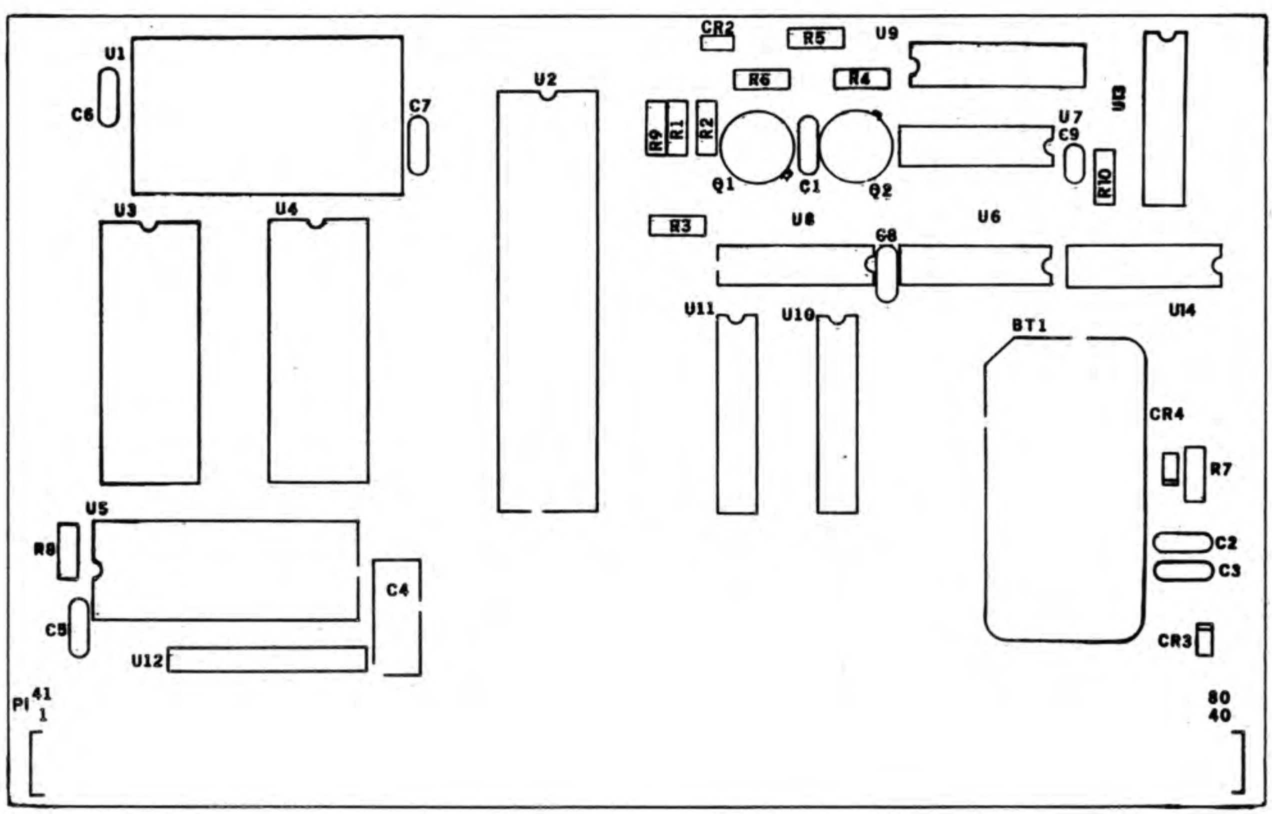


Figure 6-23. CPU (A7A2), Component Location

Replacement Parts List, CPU, Type 5730, A7A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
BT1	Battery, 3.6V	24446	DS3SD
C1-3,5-8	Capacitor, Ceramic, Disc, 0.1 uF, 20%, 50 WVDC	72982	8121-050-651-104M
C4	Capacitor,Electrolytic,Tantalum, 15 uF, 10%, 20 WVDC	81349	CSR13BE156K
C9	Capacitor, Ceramic, Disc, 1000 pF, 10%, 100 WVDC	72982	8121-100-X7R0-102K
CR1	Not Used		
CR2	Diode, Zener, 6.8 Volts	80131	IN754A
CR3,4	Diode, Silicon	80131	IN4446
P1	Connector, 80 Pin	00779	3-85927-2
Q1,2	Transistor, NPN	80131	2N2369A
R1	Resistor, Fixed, Composition, 1K, 5%, 1/4W	81349	RCR07G102JS
R2,5,6	Resistor, Fixed, Composition, 10K, 5%, 1/4W	81349	RCR07G103JS
R3	Resistor, Fixed, Composition, 1 meg, 5%, 1/4W	81349	RCR07G105JS
R4,8	Resistor, Fixed, Composition, 4.7K, 5%, 1/4W	81349	RCR07G472JS
R7	Resistor, Fixed, Composition, 200 ohms, 5%, 1/4W	81349	RCR07G201JS
R9	Resistor, Fixed, Composition, 300 ohms, 5%, 1/4W	81349	RCR07G301JS
R10	Resistor, Fixed, Composition, 2K, 5%, 1/4W	81349	RCR07G202JS
U1	Integrated Circuit Dual Clock Frequency	04713	MC6870A
U2	Integrated Circuit, CPU	04713	MC6800P
U3,4	Integrated Circuit, ROM	Fujitsu	MBM2716C
U5	Integrated Circuit, Priority Interrupt Controller	04713	MC6828P
U6,7	Integrated Circuit, Quad 2-Input NAND Gate	02735	CD4011BE

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
U8	Integrated Circuit	02735	CD40106BE
U9	Integrated Circuit, Hex Inverter	02735	CD4049UBE
U10,11	Integrated Circuit, RAM	NEC	HM4334-3
U12	Integrated Circuit, Resistor Array, 10K ohms	80294	4310R-101-103
U13	Integrated Circuit, Dual D Flip Flop	02735	CD4013B
U14	Integrated Circuit, Quad 2 Input OR Gate	02735	CD4071B
XU1,3-5	Socket, IC	06776	ICL-246-S7-T
XU2	Socket, IC	06776	ICL-406-S7-T
XU6-8,13,14	Socket, IC	06776	ICL-143-56-T
XU9	Socket, IC	06776	ICL-163-S6-T
XU10,11	Socket, IC	06776	ICL-183-S6-T
XU12	Not Used		

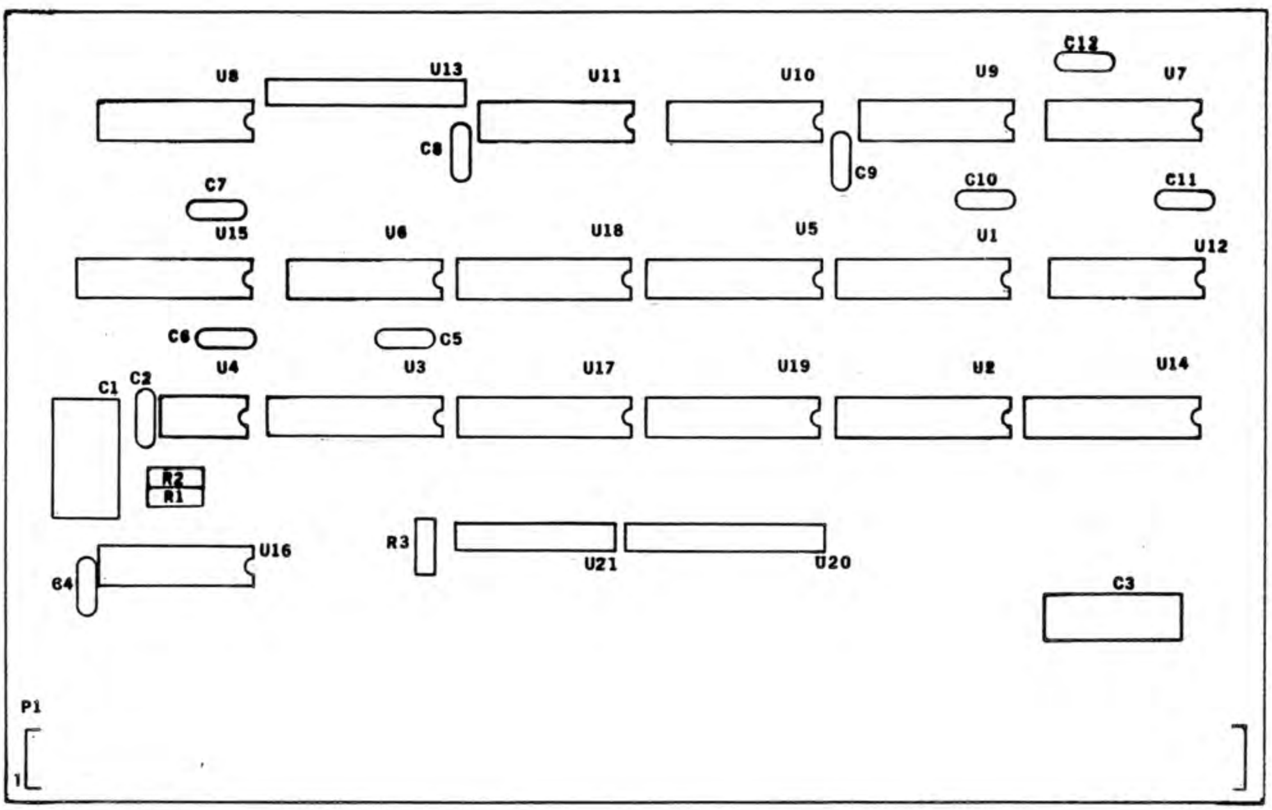


Figure 6-24. Front Panel Interface (A7A4), Component Location

Replacement Parts List, Front Panel Interface, Type 5738, A7A4

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1	Capacitor, Tubular, 0.1 uF, 10%, 80 WVDC	19701	708DIHP104J800AX
C2,4-12	Capacitor, Ceramic, Disc, 0.1 uF, 20%, 50 WVDC	72982	8121-050-651-104M
C3	Capacitor, Electrolytic, Tantalum, 15 uF, 10%, 20 WVDC	81349	CSR13BE156K
P1	Connector, 80 Pin	00779	3-85927-2
R1	Resistor, Fixed, Film, 30K, 1%, 1/10W	81349	RN55C3002F
R2	Resistor, Fixed, Composition, 15 ohms, 5%, 1/4W	81349	RCR07G150JS
R3	Resistor, Fixed, Composition, 10K, 5%, 1/4W	81349	RCR07G103JS
U1-3,5,17-19	Integrated Circuit, Hex, 3-State Buffer	04713	MC1450BP
U4	Integrated Circuit, Precision Timer	18324	NE555P
U6,8,10	Integrated Circuit, Dual D Flip Flop	02735	CD4013BE
U7	Integrated Circuit, 8 Input NAND Gate	02735	CD4068BE
U9,16	Integrated Circuit, Quad, 2 Input NAND Gate	02735	CD4011BE
U11	Integrated Circuit, Quad, 2 Input NOR Gate	02735	CD4001BE
U12	Integrated, Circuit, Quad, 2 Input AND Gate	02735	CD4081BE
U13	Integrated Circuit, Resistor Array, 4.7 K ohms	80294	4310R-101-472
U14	Integrated Circuit, Resistor Array, 10K ohms	80294	4116R-002-103
U15	Integrated Circuit, Hex Inverter	02735	CD4049BE
U20	Integrated Circuit, Resistor Array, 10 K ohms	80284	4310R-101-103
U21	Integrated Circuit, Resistor Array, 100K ohms	80294	4308R-101-104

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
XU1-3,5,15,17-19	Socket, IC, 16 Pin Dip	06776	ICL-163-S6-T
XU4	Socket, IC, 8 Pin Dip	06776	ICL-083-S6-T
XU6-12,16	Socket, IC, 14 Pin Dip	06776	ICL-143-S6-T
XU13-14	Not Used		

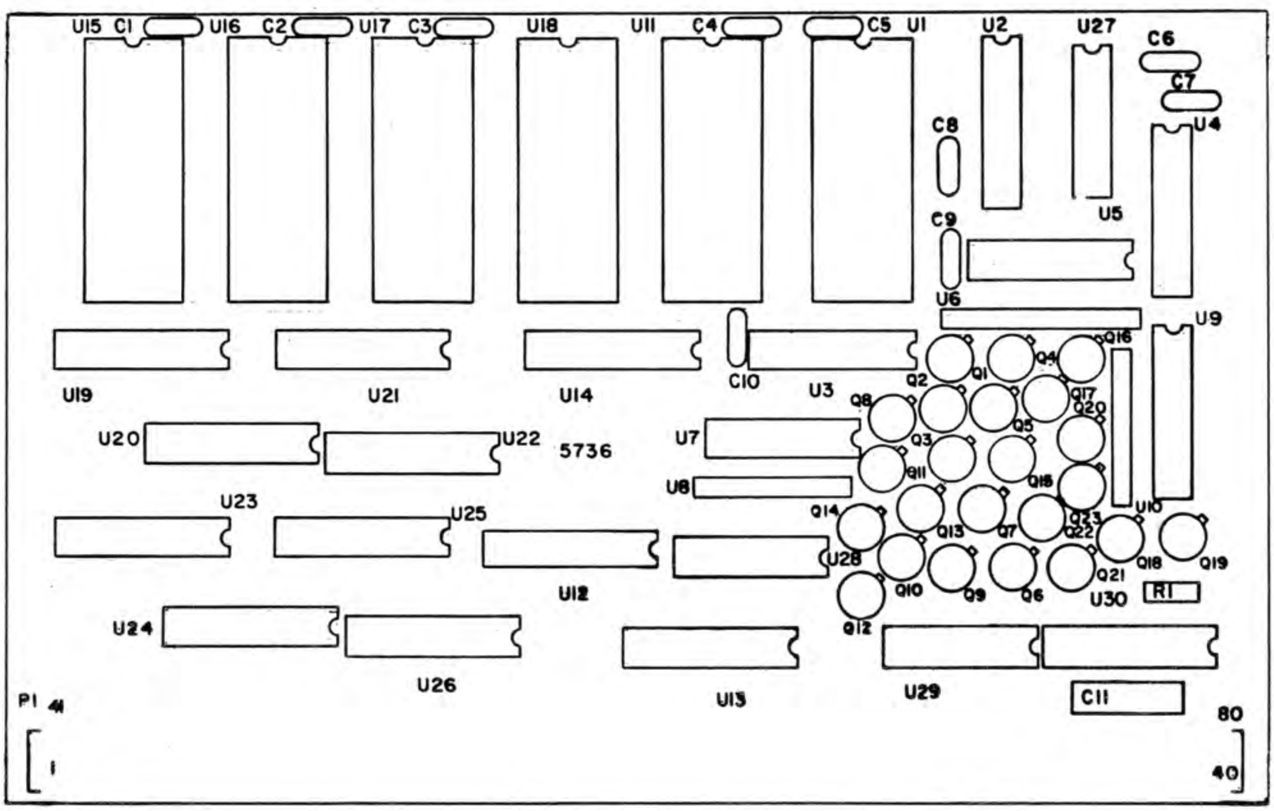


Figure 6-25. Display Driver (A7A5), Component Location

Replacement Parts List, Display Drivers, Type 5736, A7A5

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-10	Capacitor, Ceramic, Disc, 0.1 uF, 20%, 50 WVDC	72982	8121-050-651-104M
C11	Capacitor, Electrolytic, Tantalum, 15 uF, 10%, 20 WVDC	81349	CSR13BE156K
P1	Connector, 80 Pin	00779	3-85927-2
Q1-23	Transistor, PNP	80131	2N2907
R1	Resistor, Fixed, Composition, 150 ohms, 5%, 1/4W	81349	RCR07G151JS
U1,11,15-18	Integrated Circuit, Dual 4-Bit Latch	04713	MC14508BP
U2,3	Integrated Circuit, BCD to 7-Segment Decoder	01295	SN74LS247N
U4	Integrated Circuit, BCD to Decimal Decoder/Driver	01295	SN74LS145N
U5,9	Integrated Circuit, Resistor Array, 1 K ohms	80294	4116R-001-102
U6,10	Integrated Circuit, Resistor Array, 10 K ohms	80294	4310R-101-103
U7	Integrated Circuit, Resistor Array, 1 K ohms	80294	4114R-001-102
U8	Integrated Circuit, Resistor Array, 10 K ohms	80294	4308R-101-103
U12,13,19-22	Integrated Circuit, Hex Inverter	04713	MC1413P
U14	Integrated Circuit, Level Shifter	02735	CD4049UBE
U23-25	Integrated Circuit, Resistor Array, 120 ohms	80294	4116R-001-121
U26	Integrated Circuit, Resistor Array, 330 ohms	80294	4116R-001-331
U27	Integrated Circuit, Quad, 2 Input NAND Gate	02735	CD4011BE
U28,29	Integrated Circuit, Resistor Array, 47 ohms	80294	4114R-001-470
U30	Integrated Circuit, Resistor Array, 150 ohms	80294	4116R-001-151

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
XU1,11,15-18	Socket, IC, 24 Pin Round	06776	ICL-246-S7-T
XU2-4,12-14,19-22	Socket, IC, 16 Pin Round	06776	ICL-163-S6-T
XU5-10,23-26	Not Used		
XU27	Socket, IC, 14 Pin Dip	06776	ICL-143-S6-T

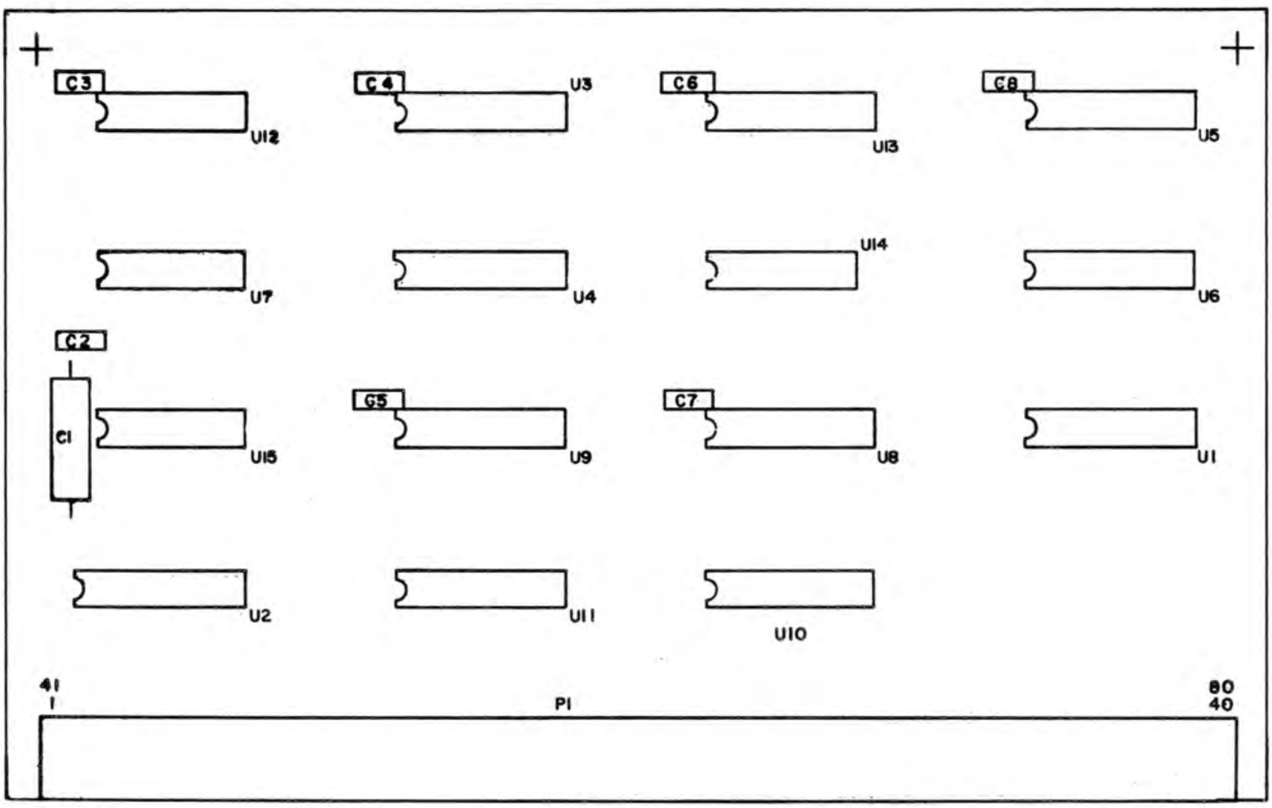


Figure 6-26. Address Decoder (A7A6), Component Location

Replacement Parts List, Address Decoder, Type 5734, A7A6

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1	Capacitor, Electrolytic, Tantalum, 15 uF, 10%, 20 WVDC	81349	CSR13BE156K
C2-8	Capacitor, Ceramic, Disc, 0.1 uF, 20%, 50 WVDC	72982	8121-050-651-104M
P1	Connector, 80 Pin	22526	65002-240
U1,2,4,5,8-11,13	Integrated Circuit, 1 of 8 Decoder/Demultiplexer	01295	SN74LS138N
U3,6	Integrated Circuit, Dual, 1 of 4 Decoder/Demultiplexer	01295	SN74LS139N
U7	Integrated Circuit, Hex Buffer	02735	CD4050BE
U12	Integrated Circuit, Triple, 3-Input, NAND Gate	01295	SN74LS10N
U14	Integrated Circuit, Quad, 2-Input, OR Gate	01295	SN74LS32
U15	Integrated Circuit, Dual, 4-Input AND Gate	01295	SN74LS21N
XU1-11,13	Socket, IC, 16 Pin Dip	06776	ICL-163-S6-T
U12,14,15	Socket, IC, 14 Pin Dip	06776	ICL-143-S6-T

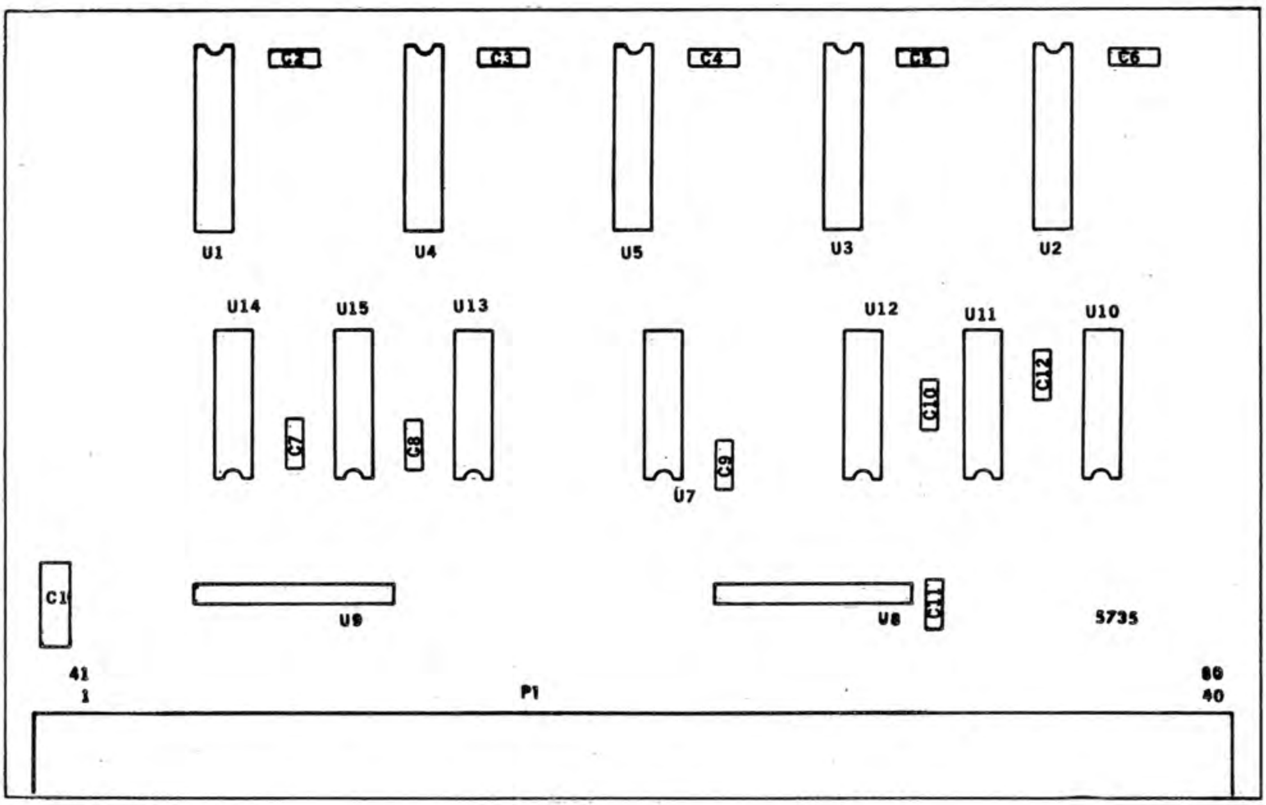


Figure 6-27. Control Outputs (A7A7), Component Location

Replacement Parts List, Control Output, Type 5735, A7A7

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1	Capacitor, Electrolytic, Tantalum, 15 uF, 10%, 20 WVDC	81349	CSR13BE156K
C2-12	Capacitor, Ceramic, Disc, 0.1 uF, 20%, 50 WVDC	72982	8121-050-651-104M
P1	Connector	00779	3-86018-2
U1-5	Integrated Circuit, Octal D Type Flip-Flop	01295	SN74LS374N
U6	Not Used		
U7	Integrated Circuit, Hex Buffer	02735	CD4050BE
U8,9	Integrated Circuit, Resistor Array, 10K ohms	80294	4310R-101-103
U10-15	Integrated Circuit, Triple, 2 Channel Analog Multiplexer	04713	MC14053BP
XU1-5	Socket, IC	06776	ICL-203-S6-T
XU6-15	Socket, IC	06776	ICL-163-S6-T

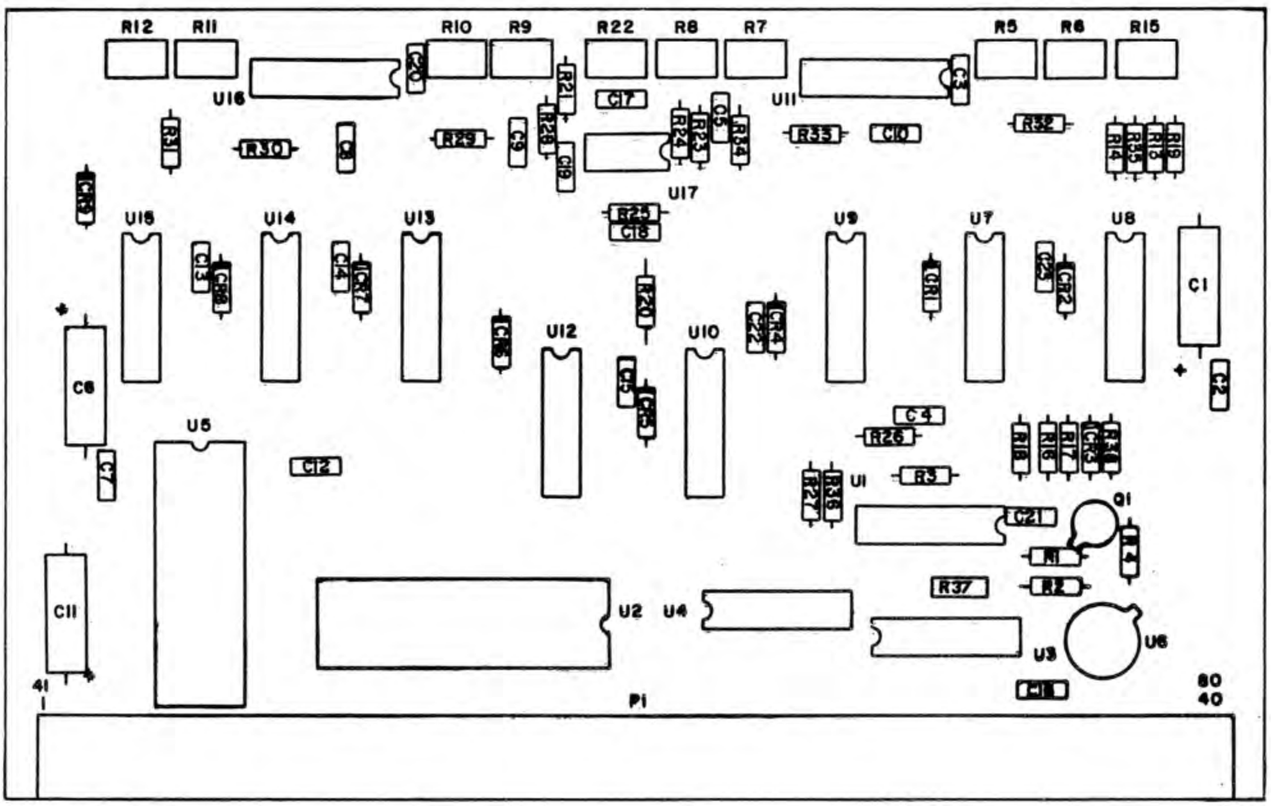


Figure 6-28. Converter (A7A8), Component Location

Replacement Parts List, Converter, Type 5731, A7A8

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,6,11	Capacitor,Electrolytic,Tantalum, 15 uf, 10%, 20 WVDC	81349	CSR13BE156K
C2-5,7-10,12-15 17-23	Capacitor, Ceramic, Disc, 0.01 uF, 20%, 50 WVDC	72982	8121-050-651-104M
C16	Capacitor, Ceramic, Disc, 0.01 uF, 10%, 100 WVDC	72982	8121-100X7RO-103K
CR1-9	Diode	80131	IN6263
P1	Connector, 80 Pin	00779	3-85927-2
Q1	Transistor, PNP	80131	2N907
R1	Resistor, Fixed, Film, 10K, 1%, 1/10W	81349	RN55C1002F
R2,21,24,25	Resistor, Fixed, Film, 20K, 1%, 1/10W	81349	RN55C2002F
R3	Resistor, Fixed, Film, 6.8K, 5%, 1/4W	81349	RCR07G682J
R4	Resistor, Fixed, Composition, 1.2K, 5%, 1/4W	81349	RCR07G122JS
R5-12	Resistor, Variable, 5 K ohms, 1/2W	19701	8014EMU502E1
R13	Resistor, Fixed, Composition, 1 meg, 5%, 1/4W	81349	RCR07G105JS
R14	Resistor, Fixed, Composition, 100 K, 5%, 1/4W	81349	RCR07G104JS
R15	Resistor, Variable, 10 K ohms, 1/2W	19701	8014EMU103E1
R16,17	Resistor, Fixed, Film, 5.11 K, 1%, 1/10W	81349	RN55C5111F
R18	Resistor, Fixed, Composition, 120K, 5%, 1/4W	81349	RCR07G124JS
R19	Resistor, Fixed, Composition, 39K, 5%, 1/4W	81349	RCR07G393JS
R20	Resistor, Fixed, Film, 39.2K, 1%, 1/10W	81349	RN55C3922F
R22	Resistor, Variable, 20 K ohms, 1/2W	81349	8014EMU203E1

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R23	Resistor, Fixed, Composition 4.7K, 5%, 1/4W	81349	RCR07G472JS
R26	Resistor, Fixed, Film, 2.43 K, 1%, 1/10W	81349	RN55C2431F
R27	Resistor, Fixed, Film, 7.5 K, 1%, 1/10W	81349	RN55C7501F
R28-35,38	Resistor, Fixed, Composition, 100 ohms, 5%, 1/4W	81349	RCR07G101JS
R36	Resistor, Fixed, Composition, 10 ohms, 5%, 1/4W	81349	RCR07G100JS
R37	Resistor, Fixed, Composition, 1 K, 5%, 1/4W	81349	RCR07G102JS
U1,11,16	Integrated Circuit	01295	TL074CP
U2	Integrated Circuit	24355	ADC0808CCN
U3	Integrated Circuit	04713	MC14049BP
U4	Integrated Circuit	04713	MC14503BP
U5	Integrated Circuit	01245	SN74116N
U6	Integrated Circuit	24355	AD581J
U7-10,12-15	Integrated Circuit	24355	AD7524JN
U17	Integrated Circuit	01295	TL072CP
XU1,11,16	Socket, IC	06776	ICL-143-S6-T
XU2	Socket, IC	06776	ICL-286-S7-T
XU3,4,7-10,12-15	Socket, IC	06776	ICL-163-S6-T
XU5	Socket, IC	06776	ICL-246-S7-T
XU6	Transipad	13103	7717-22-DAP
XU17	Socket, IC	06776	ICL-083-S6-T

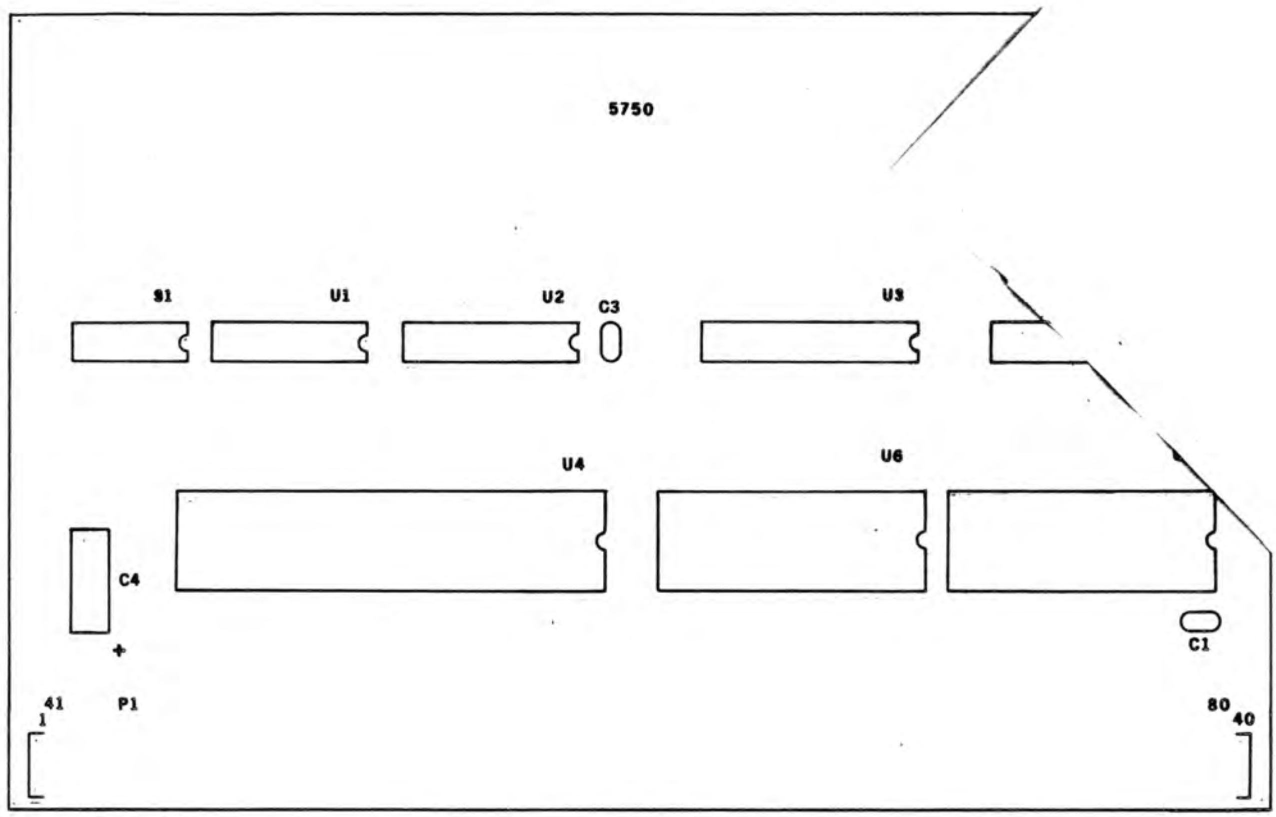


Figure 6-29. IEEE-488 Interface (A7A9), Component Location

Replacement Parts List, IEEE-488 Remote Interface, Type 5750, A7A9

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-3	Capacitor, Ceramic, Disc, 0.1uF, 20%, 100 WVDC	72982	8121-050-651-104M
C4	Capacitor,Electrolytic,Tantalum, 15 uF, 10%, 20 WVDC	81349	CSR13BE156K
P1	Connector, 80 Pin	00779	3-85927-2
R1	Resistor, Fixed, Composition, 3K, 5%, 1/4W	81349	RCR07G302JS
S1	Switch, Dip	00779	435626-2
U1	Integrated Circuit, Resistor Array, 4.7 K ohms	80294	4114R-002-472
U2	Integrated Circuit	04713	MC14503BCP
U3	Integrated Circuit	01295	SN75160N
U4	Integrated Circuit	04713	MC68488P
U5	Integrated Circuit	01295	SN75161N
U6,7	Integrated Circuit	04713	MC3447P
XU1	Not Used		
XU2	Socket, IC	06776	ICL-163-S6-T
XU3,5	Socket, IC	06776	ICL-203-S6-T
XU4	Socket, IC	06776	ICL-406-S7-T
XU6,7	Socket, IC	06776	ICL-246-S7-T

Replacement Parts List, Reference Generator, Type 7740, A8

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
A1	Oscillator, 10 MHz	54805	9812-1
A2	Reference Oscillator, PWA Control Loop	54805	5722-1
C1	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50 WVDC	32897	8121-050-651-104M
DS1	LED, Indicator Lamp	28480	HLMP-3105
E1	Terminal, Ground	98281	229-4019
FL1-12	Filter	00779	859616-1
J1,2	Connector, BNC	Amphenol	31-318
J3-7	Connector, SMB, Rear Mount	98291	51-043-0000
P1	Socket, Minature	71785	7EM
RT1	Termination, SMB, 56 ohms	54805	3715
W1	Cable Assembly	54805	3697-1
W1P1-2	Cable Double Shielded	98278	250-421

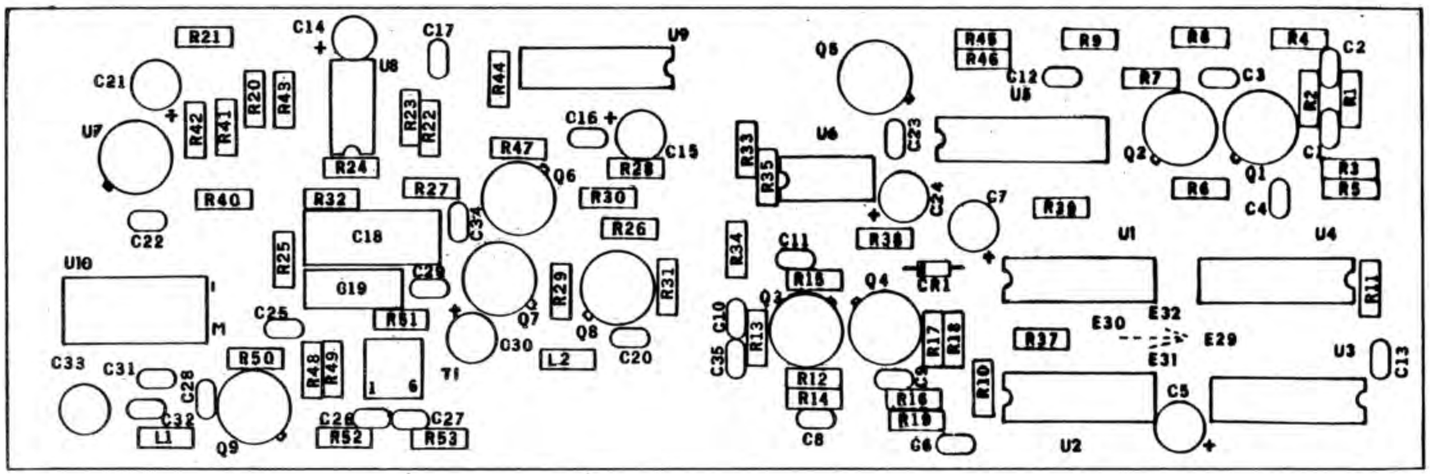


Figure 6-30. Reference Generator (A8A2), Component Location

Replacement Parts List, Reference Generator PWA, Type 5722, A8A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1-4,6,8-12,16,17, 20,22,23,25-29,34	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 50 WVDC	32987	8121-050-651-104M
C5,7	Capacitor, Electrolytic,Tantalum, 33 uF, 20%, 10 WVDC	31433	T368B336M010AS
C13	Capacitor, Ceramic, Monolithic, 100 pF, 10%, 100 WVDC	32897	8121-100-C0G0-101K
C14,15,21,24,30	Capacitor, Electrolytic,Tantalum, 15 uF, 20%, 20 WVDC	31433	T368B156M020AS
C18	Capacitor, Polycarbonate, 0.47 uF, 10%, 100 WVDC	19701	719BIGE474PK-1015B
C19	Capacitor, Polycarbonate, 0.068 uF, 10%, 100 WVDC	19701	719BICB683PK-2515A
C31	Capacitor, Ceramic, Monolithic, 15 pF, 10%, 100 WVDC	32897	8111-100-C0G0-150J
C32	Capacitor, Ceramic, Monolithic, 18 pF, 5%, 100 WVDC	32897	8111-100-C0G0-180J
C33	Capacitor, Variable 2.5-18 pF	56289	GXA-18000
C35	Capacitor, Ceramic, Monolithic, 150 pF, 10%, 100 WVDC	72982	8121-100-C0G0-151K
CR1	Diode, Silicon	81349	IN4446
L1	Coil, Fixed, 12 uH, 10%	81349	MS75084-13
L2	Coil, Fixed, 1.5 uH, 10%	81349	MS75084-02
Q1,3	Transistor, NPN	81349	2N5179
Q2,4,5	Transistor, NPN	81349	2N2369
Q6	Transistor, PNP	81349	2N2907
Q7,8	Transistor, NPN	81349	2N2222
Q9	Transistor, NPN	81349	2N5109
R1,51	Resistor,Fixed, Composition, 56 ohms, 5%, 1/4W	81349	RCR07G560JS
R2,12	Resistor, Fixed, Composition, 3.3K, 5%, 1/4W	81349	RCR07G332JS
R3,13	Resistor, Fixed, Composition, 1.8K, 5%, 1/4W	81349	RCR07G182JS
R4,14	Resistor, Fixed, Composition, 820 ohms, 5%, 1/4W	81349	RCR07G821JS

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R5,10,15,48	Resistor, Fixed, Composition, 1 K, 5%, 1/4W	81349	RCR07G102JS
R6,7,16,17,37,45	Resistor, Fixed, Composition, 4.7K, 5%, 1/4W	81349	RCR07G472JS
R8,18	Resistor, Fixed, Composition, 270 ohms, 5%, 1/4W	81349	RCR07G271JS
R9,19,40,52	Resistor, Fixed, Composition, 10 ohms, 5%, 1/4W	81349	RCR07G100JS
R11	Resistor, Fixed, Composition, 47 ohms, 5%, 1/4W	81349	RCR07G470JS
R20	Resistor, Fixed, Composition, 15 K, 5%, 1/4W	81349	RCR07G153JS
R21,28	Resistor, Fixed, Composition, 12 K, 5%, 1/4W	81349	RCR07G123JS
R22,24,34,39,43, 46,47	Resistor, Fixed, Composition, 10K, 5%, 1/4W	81349	RCR07G103JS
R23	Resistor, Fixed, Composition, 22 K, 5%, 1/4W	81349	RCR07G223JS
R25	Resistor, Fixed, Composition, 330K, 5%, 1/4W	81349	RCR07G334JS
R26,27,31,50	Resistor, Fixed, Composition, 330 ohms, 5%, 1/4W	81349	RCR07G331JS
R29, 49	Resistor, Fixed, Composition, 2.2K, 5%, 1/4W	81349	RCR07G222JS
R30	Resistor, Fixed, Composition, 330K, 5%, 1/4W	81349	RCR07G334JS
R32,44	Resistor, Fixed, Composition, 330 ohms, 5%, 1/4W	81349	RCR07G331JS
R33	Resistor, Fixed, Composition, 27K, 5%, 1/4W	81349	RCR07G273JS
R35	Resistor, Fixed, Composition, 68K, 5%, 1/4W	81349	RCR07G683JS
R36	Not Used		
R38	Resistor, Fixed, Composition, 47 K, 5%, 1/4W	81349	RCR07G473JS
R41	Resistor, Fixed, Film, 237 ohms, 1%, 1/10W	81349	RN55C2370F
R42	Resistor, Fixed, Film, 1.96 K, 1%, 1/10W	81349	RN55C1961F

Replacement Parts List, Reference Generator PWA, Type 5722, A8A2 (Cont.)

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R53	Resistor, Fixed, Composition, 33 ohms, 5%, 1/4W	81349	RCR07G330JS
RT1	Termination, SMB, 56 ohms	54805	3715
T1	Transformer, 50-200 ohms	15542	T4-1
U1	Integrated Circuit, Quad, 2-Input NOR Gate	01295	SN74LS02N
U2	Integrated Circuit, Decade Counter	18324	N8290AN
U3	Integrated Circuit, Dual D Flip Flop	01295	SN74LS74N
U4	Integrated Circuit, Quad, 2-Input AND Gate	01295	SN74LS08N
U5	Integrated Circuit, Up/Down Counter	01295	SN74LS190N
U6	Integrated Circuit,Comparator	01295	LM311CP
U7	Integrated Circuit, Regulator	27014	LM317H
U8	Integrated Circuit, Dual Operational Amplifier	27014	TL072CP
U9	Integrated Circuit, Dual CMOS Switch	17856	DG200CJ
U10	Integrated Circuit, 4-Way Power Divider	15542	PSC4-3
XU1-4,9	Sockt, IC, 14 Pin Dip	06776	ICL-143-S6-T
XU5	Socket, IC, 16 Pin Dip	06776	ICL-163-S6-T
XU6,8	Socket, IC, 8 Pin Dip	06776	ICL-083-S6-T
XU7,10	Not Used		

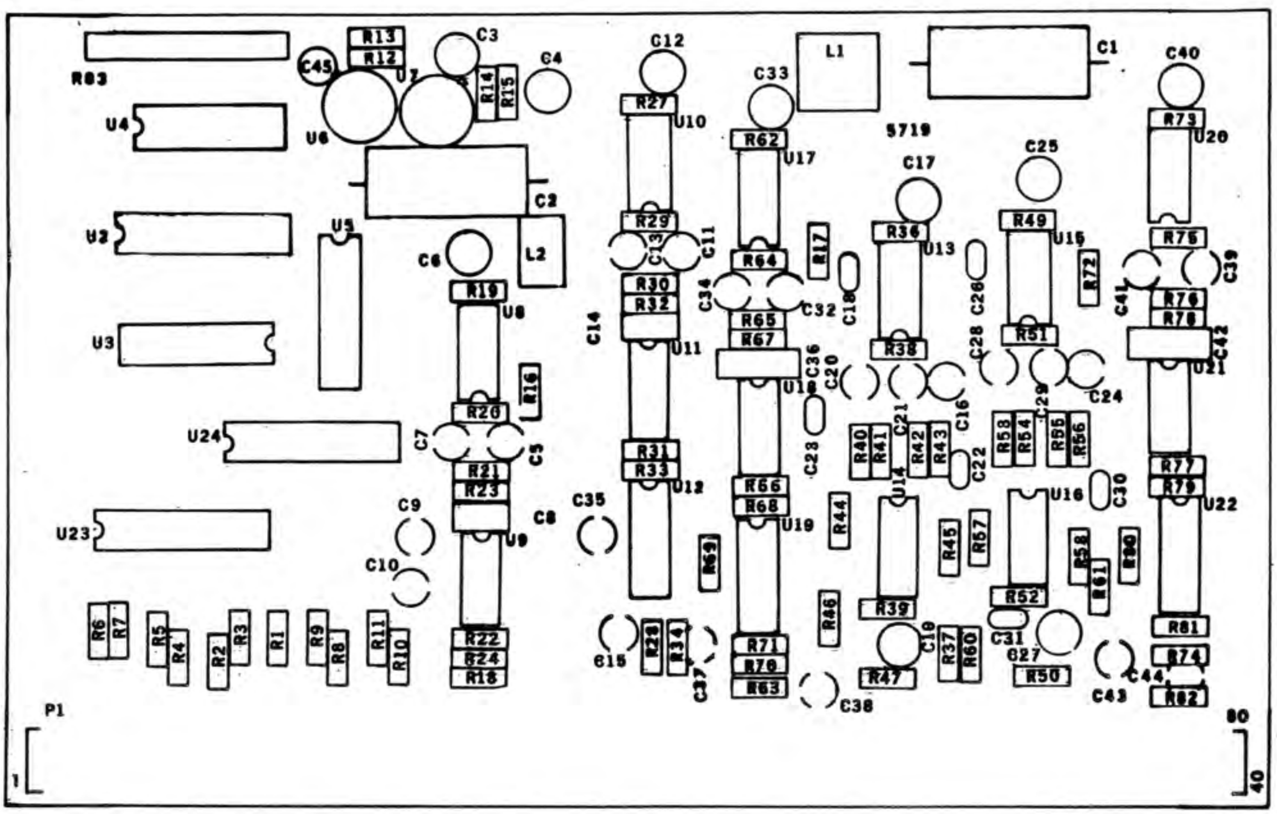


Figure 6-31. Audio/Video (A9A2), Component Location

Replacement Parts List, Audio/Video Amplifier, Type 5719, A9A2

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
C1,2	Capacitor,Electrolytic,Tantalum, 100 uF, 20%, 20 WVDC	81349	CSR13E107M
C3-7,9,10,12,15-17,19-21,24-25,27-29,32-35,37-41,43-45	Capacitor, Tantalum, 15 uF, 20%, 20 WVDC	31433	T368B156M020AS
C8,14	Capacitor, Ceramic,Monolithic, 4.7 pF, ± 0.5 pF, 100 WVDC	72982	8101-100-COHO-479D
C11,13	Capacitor,Electrolytic,Tantalum, 2.2 uF, 20%, 20 WVDC	31433	T368A225M020AS
C18,26	Capacitor,Cermamic,Monolithic, 1000 pF, 10%, 100 WVDC	72987	8121-100-X7RO-102K
C22,23,30,31	Capacitor, Ceramic, Monolithic, 0.1 uF, 20%, 500 WVDC	72987	8121-050-651-104M
C36,42	Capacitor, Mica, Dipped, 47 pf, 5%, 500 WVDC	81349	CM04ED470J03
L1,2	Inductor, Fixed, Shielded, 18 uH, 10%,	71279	553-3635-16
P1	Connector, 80 Pin	22526	65002-420
R1	Resistor, Fixed, Composition, 2.2K, 5%, 1/4W	81349	RCR07G222JS
R2	Resistor, Fixed, Composition, 750 ohms, 5%, 1/4W	81349	RCR07G751JS
R3	Resistor, Fixed, Composition, 270 ohms, 5%, 1/4W	81349	RCR07G271JS
R4,46,47,60,61	Resistor, Fixed, Composition, 220 ohms, 5%, 1/4W	81349	RCR07G221JS
R5	Resistor, Fixed, Composition, 390 ohms, 5%, 1/4W	81349	RCR07G391JS
R6,8,10,18,28,37 50,63,74	Resistor, Fixed, Composition, 470 ohms, 5%, 1/4W	81349	RCR07G471JS
R7,9,11	Resistor, Fixed, Composition, 100 ohms, 5%, 1/4W	81349	RCR07G101JS
R12,14	Resistor, Fixed, Film, 237 ohms, 1%, 1/10W	81349	RN55C2370F

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
R13	Resistor, Fixed, Film, 2 K, 1%, 1/10W	81349	RN55C2001F
R15	Resistor, Fixed, Film, 750 ohms, 1%, 1/10W	81349	RN55C7500F
R16	Resistor, Fixed, Composition, 560 ohms, 5%, 1/4W	81349	RCR07G561JS
R17,33,68,72,79	Resistor, Fixed, Composition, 1 K, 5%, 1/4W	81349	RCR07G102JS
R19,27,36,49,62,73	Resistor, Fixed, Composition, 10 K, 5%, 1/4W	81349	RCR07G103JS
R20,29,38,51,64,75	Resistor, Fixed, Composition, 560 K, 5%, 1/4W	81349	RCR07G564JS
R21,30	Resistor, Fixed, Composition, 4.7K, 5%, 1/4W	81349	RCR07G472JS
R22,23,31,32	Resistor, Fixed, Composition, 56K, 5%, 1/4W	81349	RCR07G563JS
R24,34	Resistor, Fixed, Composition, 82 ohms, 5%, 1/4W	81349	RCR07G820JS
R25,26,35,48,59	Not Used		
R39,40,42,52,53,55	Resistor, Fixed, Film, 4.64 K 1%, 1/10W	81349	RN55C4641F
R41,44,45,54,57,58	Resistor, Fixed, Film, 68.1 K, 1%, 1/10W	81349	RN55C6812F
R43,56	Resistor, Fixed, Composition, 68K, 5%, 1/4W	81349	RCR07G683JS
R65,76	Resistor, Fixed, Film, 2.43 K, 5%, 1/4W	81349	RN55C2431F
R66,77	Resistor, Fixed, Composition, 180K, 5%, 1/4W	81349	RCR07G184JS
R67,78	Resistor, Fixed, Film, 150 K, 1%, 1/10W	81349	RN55C1503F
R69-71,80-82	Resistor, Fixed, Composition, 47 ohms, 5%, 1/4W	81349	RCR07G470JS
R83	Resistor, Pak, 100K ohms	80294	431R-101-104
U1	Not Used		

Reference Designation	Description	FSCM	Manufacturer/MIL Part Number
U2	Integrated Circuit, BCD to Decimal Decoder	15873	MC14028BCP
U3	Integrated Circuit, Hex Inverter	15873	MC14069UBCP
U4	Integrated Circuit, Quad,2-Input NAND Gate	15873	MC14011BCP
U5	Integrated Circuit, Quad, 2-Input NOR Gate	15873	MC14001BCP
U6,7	Integrated Circuit, Voltage Regulator	15873	LM317LH
U8,10,13,15,17,20	Integrated Circuit, Operational Amplifier	15873	MC3340P
U9,11,18,21	Integrated Circuit, Operational Amplifier	27014	LF356N
U12,19,22	Integrated Circuit, Operational Amplifier	27014	LH0002CN
U14,16	Integrated Circuit, Dual Operational Amplifier	01275	TL072CP
U23,24	Integrated Circuit, Quad CMOS Switch	17856	DG201CJ
XU1,6,7	Not Used		
XU2,5,23,24	Socket, IC, 16 Pin Dip	06776	ICL-163-S6-T
XU3,4	Socket, IC, 14 Pin Dip	06776	ICL-143-S6-T
XU8-11,13-18,20-21	Socket, IC, 8 Pin Dip	06776	ICL-083-S6-T
XU12,19,22	Socket, IC, 10 Pin Dip	06776	ICL-103-S6-T

SECTION 7

DIAGRAMS

7-1. GENERAL

This section contains all schematic diagrams associated with the RG-5540 VHF/UHF Receiver.

APPENDIX A

RG-5540 REMOTE PROTOCOL

```
100 INIT
110 DIM S(24),A$(11),B$(11),C$(11),D$(11),E$(11),F$(11),G$(11),H$(11)
120 DIM I$(11),J$(11),K$(11),L$(11),M$(11),N$(11),O$(11),P$(11),Q$(11)
130 DIM R$(11),S$(11)
140 A$="RCVR ADDRS="
150 B$="DATA ID="
160 C$="FREQUENCY="
170 D$="SCAN MODE="
180 E$="DET MODE="
190 F$="BFO MODE="
200 G$="GAIN MODE="
210 H$="GAIN="
220 I$="IFBW="
230 J$="REF SOURCE="
240 K$="CTRL MODE="
250 L$="SIGNAL STR="
260 M$="IF SLOT 1="
270 N$="IF SLOT 2="
280 O$="IF SLOT 3="
290 P$="IF SLOT 4="
300 Q$="STATUS="
310 R$=" X HZ"
320 S$="JJ"
330 GO TO 3130
340 PAGE
350 DIM S(24)
360 PRINT "                                   F U L L   S T A T U SJJJG"
370 WBYTE @64,96:
380 FOR I=1 TO 24
390 RBYTE S(I)
400 NEXT I
410 PRINT @37,26:1
420 PRINT @41:"                                  F U L L   S T A T U SJJJG"
430 PRINT A$;S(1),B$;S(2),D$;S(11),E$;S(12),S$
440 PRINT @41:A$;S(1),B$;S(2),D$;S(11),E$;S(12),S$
450 PRINT C$;S(3);S(4);S(5);S(6);S(7);S(8);S(9);S(10);R$,S$
460 PRINT @41:C$;S(3),S(4),S(5),S(6),S(7),S(8),S(9),S(10);R$,S$
470 PRINT F$;S(13),G$;S(14),H$;S(15),I$;S(16),S$
480 PRINT @41:F$;S(13),G$;S(14),H$;S(15),I$;S(16),S$
490 PRINT J$;S(17),K$;S(18),L$;S(19),M$;S(20),S$
500 PRINT @41:J$;S(17),K$;S(18),L$;S(19),M$;S(20),S$
510 PRINT N$;S(21),O$;S(22),P$;S(23),Q$;S(24)
520 PRINT @41:N$;S(21),O$;S(22),P$;S(23),Q$;S(24),S$
530 PRINT @37,26:0
540 GOSUB 3560
550 PAGE
560 DIM S(10)
570 PRINT "JJJJ                             F R E Q U E N C Y   S T A T U SJJJJG"
580 WBYTE @64,97:
590 FOR I=1 TO 10
600 RBYTE S(I)
610 NEXT I
620 PRINT @37,26:1
630 PRINT @41:"                          F R E Q U E N C Y   S T A T U SJJJJJG"
640 PRINT A$;S(1),B$;S(2),S$
650 PRINT C$;S(3);S(4);S(5);S(6);S(7);S(8);S(9);S(10);R$,S$
660 PRINT @41:A$;S(1),B$;S(2),S$
670 PRINT @41:C$;S(3);S(4);S(5);S(6);S(7);S(8);S(9);S(10);R$,S$
680 PRINT @37,26:0
690 GOSUB 3560
700 PAGE
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710 PRINT "JJJJ                    S C A N   M O D E   S T A T U SJJJJJJ"
720 DIM S(3)
730 WBYTE @64,98:
740 GOSUB 3090
750 PRINT @37,26:1
760 PRINT @41:"                         S C A N   M O D E   S T A T U SJJJJG"
770 PRINT "JJJJJ",A$;S(1),B$;S(2),D$;S(3),S$
780 PRINT @41:"JJJJJ",A$;S(1),B$;S(2),D$;S(3),S$
790 PRINT @37,26:0
800 GOSUB 3560
810 PAGE
820 PRINT "JJJJ                           D E T   M O D E   S T A T U SJJJJJG"
830 DIM S(3)
840 WBYTE @64,99:
850 GOSUB 3090
860 PRINT @37,26:1
870 PRINT @41:"                        D E T   M O D E   S T A T U SJJJJJG"
880 PRINT "JJJJJJ",A$;S(1),B$;S(2),E$;S(3),S$
890 PRINT @41:"JJJJJ",A$;S(1),B$;S(2),E$;S(3),S$
900 PRINT @37,26:0
910 GOSUB 3560
920 PAGE
930 PRINT "JJJJ                           B F O   M O D E   S T A T U SJJJJJG"
940 DIM S(3)
950 WBYTE @64,100:
960 GOSUB 3090
970 PRINT @37,26:1
980 PRINT @41:"                           B F O   M O D E   S T A T U SJJJJG"
990 PRINT "JJJJJ",A$;S(1),B$;S(2),F$;S(3),S$
1000 PRINT @41:"JJJJJ",A$;S(1),B$;S(2),F$;S(3),S$
1010 PRINT @37,26:0
1020 GOSUB 3560
1030 PAGE
1040 PRINT "JJJJJ                    G A I N   M O D E   S T A T U SJJJJJG"
1050 DIM S(3)
1060 WBYTE @64,101:
1070 GOSUB 3090
1080 PRINT @37,26:1
1090 PRINT @41:"                    G A I N   M O D E   S T A T U SJJJJG"
1100 PRINT "JJJJJ",A$;S(1),B$;S(2),G$;S(3),S$
1110 PRINT @41:"JJJJJ",A$;S(1),B$;S(2),G$;S(3),S$
1120 PRINT @37,26:0
1130 GOSUB 3560
1140 PAGE
1150 PRINT "JJJJJ                          G A I N   S T A T U SJJJJJG"
1160 DIM S(3)
1170 WBYTE @64,102:
1180 GOSUB 3090
1190 PRINT @37,26:1
1200 PRINT @41:"                          G A I N   S T A T U SJJJJJG"
1210 PRINT "JJJJJ",A$;S(1),B$;S(2),H$;S(3),S$
1220 PRINT @41:"JJJJJ",A$;S(1),B$;S(2),H$;S(3),S$
1230 PRINT @37,26:0
1240 GOSUB 3560
1250 PAGE
1260 PRINT "JJJJJ                          I F B W   S T A T U SJJJJJG"
1270 DIM S(3)
1280 WBYTE @64,103:
1290 GOSUB 3090
1300 PRINT @37,26:1
1310 PRINT @41:"                            I F B W   S T A T U SJJJJJG"
1320 PRINT "JJJJJ",A$;S(1),B$;S(2),I$;S(3),S$
1330 PRINT @41:"JJJJJ",A$;S(1),B$;S(2),I$;S(3),S$
1340 PRINT @37,26:0
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1360 PAGE
1370 PRINT "JJJJJ          C O N T R O L   M O D E   S T A T U SJJJJJG"
1380 DIM S(3)
1390 WBYTE @64,104:
1400 GOSUB 3090
1410 PRINT @37,26:1
1420 PRINT @41:"          C O N T R O L   M O D E   S T A T U SJJJJJG"
1430 PRINT "JJJJJ",A$;S(1),B$;S(2),K$;S(3),S$
1440 PRINT @41:"JJJJ",A$;S(1),B$;S(2),K$;S(3)
1450 PRINT @37,26:0
1460 GOSUB 3560
1470 PAGE
1480 PRINT "JJJJJ     S I G N A L   S T R E N G T H   S T A T U SJJJJJG"
1490 DIM S(3)
1500 WBYTE @64,105:
1510 GOSUB 3090
1520 PRINT @37,26:1
1530 PRINT @41:"        S I G N A L   S T R E N G T H   S T A T U SJJJJG"
1540 PRINT "JJJJJ",A$;S(1),B$;S(2),L$;S(3),S$
1550 PRINT @41:"JJJJJ",A$;S(1),B$;S(2),L$;S(3),S$
1560 PRINT @37,26:0
1570 GOSUB 3560
1580 PAGE
1590 PRI "JJJJJ      R E F E R E N C E   S O U R C E   S T A T U SJJJJG"
1600 DIM S(3)
1610 WBYTE @64,106:
1620 GOSUB 3090
1630 PRINT @37,26:1
1640 PRINT @41:"      R E F E R E N C E   S O U R C E   S T A T U SJJJJG"
1650 PRINT "JJJJJ",A$;S(1),B$;S(2),J$;S(3),S$
1660 PRINT @41:"JJJJJ",A$;S(1),B$;S(2),J$;S(3),S$
1670 PRINT @37,26:0
1680 GOSUB 3560
1690 PAGE
1700 PRINT "JJJJJ                        S T A T U S   P O L LJJJJJG"
1710 DIM S(3)
1720 WBYTE @64,108:
1730 GOSUB 3090
1740 PRINT @37,26:1
1750 PRINT @41:"                         S T A T U S   P O L LJJJJJG"
1760 PRINT "JJJJJ",A$;S(1),B$;S(2),Q$;S(3),S$
1770 PRINT @41:"JJJJJ",A$;S(1),B$;S(2),Q$;S(3),S$
1780 PRINT @37,26:0
1790 GOSUB 3560
1800 PAGE
1810 PRINT "JJJJJ                      I F   P O L LJJG"
1820 DIM S(6)
1830 WBYTE @64,107:
1840 FOR I=1 TO 6
1850 RBYTE S(I)
1860 NEXT I
1870 PRINT @37,26:1
1880 PRINT @41:"                         I F   P O L LJJG"
1890 PRINT "JJJJJ",A$;S(1),B$;S(2),M$;S(3),N$;S(4),S$
1900 PRINT O$;S(5),P$;S(6),S$
1910 PRINT @41:"JJJJJ",A$;S(1),B$;S(2),M$;S(3),N$;S(4),S$
1920 PRINT @41:O$;S(5),P$;S(6),S$
1930 PRINT @37,26:0
1940 GOSUB 3560
1950 GO TO 4060
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1960 PAGE
1970 PRINT "                         F U L L   S E T - U PJJJJG"
1980 PRI "DOES THE TF-1003/RG-5540 FRONT PANEL REFLECT THE FOLLOWING?J"
1990 PRINT "FREQUENCY=123.45678 MHZJ"
2000 PRINT "SCAN MODE=OFFJ"
2010 PRINT "GAIN MODE=MGCJ"
2020 PRINT "DETECTION MODE=ISBJ"
2030 PRINT "I.F. BAND WIDTH=10 KHZJ"
2040 PRINT "R.F. GAIN=R.F. GAIN METER 1/2 SCALEJ"
2050 WBYTE @32,96:1,2,3,4,5,6,7,8,0,10,0,0,125,-10
2060 GOSUB 4380
2070 PAGE
2080 PRINT "                         F R E Q U E N C Y   S E T - U PJJJJJG"
2090 PRINT "DOES THE TF-1003/RG-5540 FREQUENCY DISPLAY CYCLE FROM "
2100 PRINT "111.11111 MHZ TO 499.99999 MHZ AT A `1' SECOND INTERVAL?J"
2110 DIM A(8)
2120 X=1
2130 A(1)=1
2140 A(2)=X
2150 A(3)=X
2160 A(4)=X
2170 A(5)=X
2180 A(6)=X
2190 A(7)=X
2200 A(8)=-X
2210 WBYTE @32,97:
2220 FOR I=1 TO 8
2230 WBYTE A(I)
2240 NEXT I
2250 X=X+1
2260 CALL "WAIT",0.5
2270 IF X<=9 THEN 2140
2280 X=1
2290 A(1)=A(1)+1
2300 IF A(1)<=4 THEN 2140
2310 GOSUB 4380
2320 PAGE
2330 PRINT "                         S E T - U P   S C A N   M O D E SJJG"
2340 PRI "  DO THE TF-1003/RG-5540 SCAN MODES STEP FROM MAX SPEED DOWN"
2350 PRINT "THROUGH SPEED ZERO TO MAX SPEED UP?J"
2360 X=247
2370 WBYTE @32,98:-X
2380 CALL "WAIT",2
2390 X=X+1
2400 IF X<257 THEN 2370
2410 X=1
2420 WBYTE @32,98:-X
2430 CALL "WAIT",2
2440 X=X+1
2450 IF X<>10 THEN 2420
2460 WBYTE @32,98:-256
2470 GOSUB 4380
2480 PAGE
2490 PRINT "                  D E T E C T I O N   M O D E   S E T - U PJJG"
2500 PRI "DOES THE TF-1003/RG-5540 STEP THROUGH ALL DETECTION MODES AT"
2510 PRINT "A `1' SECOND INTERVAL?J"
2520 X=10
2530 WBYTE @32,99:-X
2540 CALL "WAIT",1
2550 X=X+1
2560 IF X<>16 THEN 2530
2570 GOSUB 4380
```
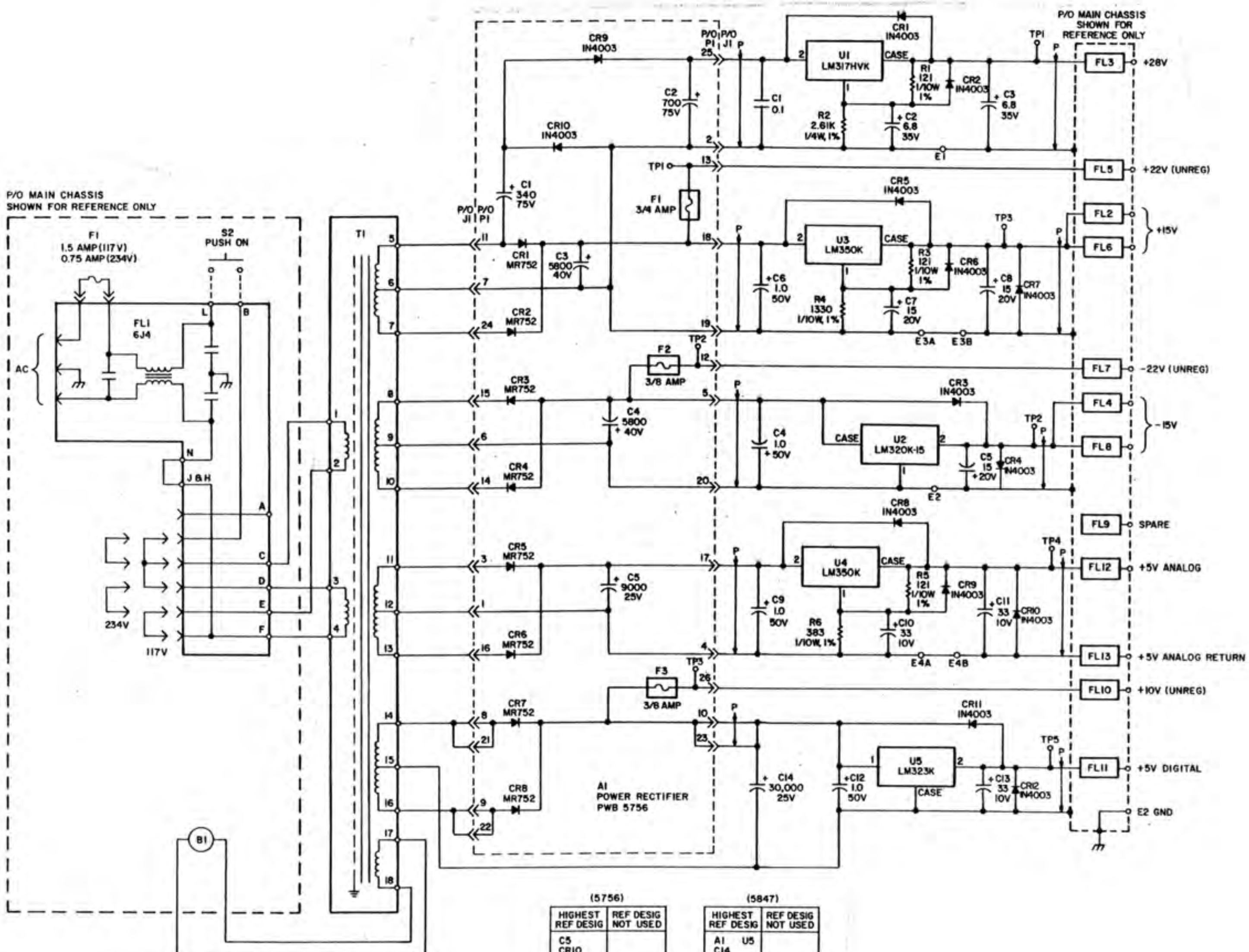

```
2580 PAGE
2590 PRINT "                          [illegible] E T - U PJJG"
2600 PRINT " DOES THE TF-1003/RG-5540 STEP THROUGH ALL BFO MODES AT A"
2610 PRINT "A `1' SECOND INTERVAL?J"
2620 WBYTE @32,99:-13
2630 WBYTE @32,100:-256
2640 CALL "WAIT",1
2650 WBYTE @32,100:-1
2660 GOSUB 4380
2670 PAGE
2680 PRINT "                         G A I N   M O D E   S E T - U PJJG"
2690 PRINT "DOES THE TF-1003/RG-5540 STEP THROUGH ALL GAIN MODES AT A"
2700 PRINT "`1' SECOND INTERVAL?J"
2710 WBYTE @32,101:-256
2720 CALL "WAIT",1
2730 WBYTE @32,101:-5
2740 CALL "WAIT",1
2750 WBYTE @32,101:-6
2760 GOSUB 4380
2770 PAGE
2780 PRINT "                           R. F.   G A I N   S E T - U PJJG"
2790 PRINT "DOES THE TF-1003/RG-5540 R. F. LEVEL METER MOVE SLOWLY FROM"
2800 PRINT "ZERO TO FULL SCALE AND THEN DROPS BACK TO ZERO?J"
2810 WBYTE @32,101:-256
2820 FOR X=1 TO 256
2830 WBYTE @32,102:-X
2840 CALL "WAIT",0.1
2850 NEXT X
2860 GOSUB 4380
2870 PAGE
2880 PRINT "                                  I F B W   S E T - U PJJG"
2890 PRINT "DOES THE TF-1003/RG-5540 STEP THROUGH ALL THE BAND WIDTH"
2900 PRINT "MODES AT A `1' SECOND INTERVAL?J"
2910 WBYTE @32,103:-10
2920 CALL "WAIT",1
2930 WBYTE @32,103:-13
2940 CALL "WAIT",1
2950 WBYTE @32,103:-17
2960 CALL "WAIT",1
2970 WBYTE @32,103:-20
2980 GOSUB 4380
2990 PAGE
3000 PRI "              R E F E R E N C E   S O U R C E   S E T - U PJJG"
3010 PRINT "DOES THE TF-1003/RG-5540 STEP THROUGH ALL THE REFERENCE"
3020 PRINT "SOURCE MODES AT A `1' SECOND INTERVAL?J"
3030 WBYTE @32,106:-256
3040 CALL "WAIT",1
3050 WBYTE @32,106:-1
3060 GOSUB 4380
3070 GO TO 3710
3080 PAGE
3090 FOR I=1 TO 3
3100 RBYTE S(I)
3110 NEXT I
3120 RETURN
3130 PAGE
3140 PRINT "JJJJJJJJJJJ"
3150 PRINT "              R G 5 5 4 0   G P I B   T E S T   P R O G R A MJJ"
3160 PRINT "                                  9 - 2 - 8 0JJ"
3170 PRINT "                                    V 1 . 0"
3180 CALL "WAIT",10
```

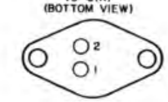
```
3200 PRINT "                    S T A T U S   M E N UJJ"
3210 PRINT "A=Full StatusJ"
3220 PRINT "B=Frequency StatusJ"
3230 PRINT "C=Scan Mode StatusJ"
3240 PRINT "D=Det. Mode StatusJ"
3250 PRINT "E=BFO Mode StatusJ"
3260 PRINT "F=Gain Mode StatusJ"
3270 PRINT "G=Gain StatusJ"
3280 PRINT "H=IFBW StatusJ"
3290 PRINT "I=Control Mode StatusJ"
3300 PRINT "J=Signal Strength StatusJ"
3310 PRINT "K=Reference Source StatusJ"
3320 PRINT "L=Status PollJ"
3330 PRINT "M=IF PollJ"
3340 PRINT "N=Set-up MenueJ"
3350 PRINT "ENTER A LETTER FROM ONE ITEM ABOVE AND TYPE RETURN. "
3360 INPUT Z$
3370 X=ASC(Z$)
3380 LET Y=X
3390 IF X=65 THEN 340
3400 IF X=66 THEN 550
3410 IF X=67 THEN 700
3420 IF X=68 THEN 810
3430 IF X=69 THEN 920
3440 IF X=70 THEN 1030
3450 IF X=71 THEN 1140
3460 IF X=72 THEN 1250
3470 IF X=73 THEN 1360
3480 IF X=74 THEN 1470
3490 IF X=75 THEN 1580
3500 IF X=76 THEN 1690
3510 IF X=77 THEN 1800
3520 IF X=78 THEN 4060
3530 PRINT "ILLEGAL ENTRY, TRY AGAIN!"
3540 CALL "WAIT",1
3550 GO TO 3190
3560 PRINT "Do you wish to review the menu?"
3570 PRINT "Enter `YES' to review, `NO' to continue."
3580 PRINT "Enter `REPEAT' if you wish to repeat."
3590 INPUT Z$
3600 X=ASC(Z$)
3610 IF X=89 THEN 3190
3620 IF X=78 THEN 3690
3630 IF X<>82 THEN 3660
3640 LET X=Y
3650 GO TO 3390
3660 PAGE
3670 PRINT "INCORRECT ANSWER, TRY AGAIN!JJJ"
3680 GO TO 3560
3690 Y=Y+1
3700 RETURN
3710 PAGE
3720 GOSUB 4030
3730 PRINT "SET 488 SWITCH TO ADDR 33, (CYCLE THE RG-5540 POWER)."
3740 GOSUB 4030
3750 WBYTE @33,97:0,3,3,0,0,0,0,-256
3760 PRINT "FREQ=33 MHZ?J"
3770 GOSUB 4030
3780 PRINT "SET 488 SWITCH TO ADDR 34, (CYCLE THE RG-5540 POWER)."
3790 GOSUB 4030
3800 WBYTE @34,97:0,3,4,0,0,0,0,-256
3810 PRINT "FREQ=34 MHZ?J"
3820 GOSUB 4030
3830 PRINT "SET 488 SWITCH TO ADDR 36, (CYCLE THE RG-5540 POWER)."
```

```
3850 PAGE
3860 WBYTE @36,97:0,3,6,0,0,0,0,-256
3870 PRINT "FREQ=36 MHZ?J"
3880 GOSUB 4030
3890 PRINT "SET 488 SWITCH TO ADDRS 40, (CYCLE THE RG-5540 POWER)."
3900 GOSUB 4030
3910 WBYTE @40,97:0,4,0,0,0,0,0,-256
3920 PRINT "FREQ=40 MHZ?J"
3930 GOSUB 4030
3940 PRINT "SET 488 SWITCH TO ADDR 48, (CYCLE THE RG-5540 POWER)."
3950 GOSUB 4030
3960 WBYTE @48,97:0,4,8,0,0,0,0,-256
3970 PRINT "FREQ=48 MHZ?J"
3980 GOSUB 4380
3990 PAGE
4000 PRINT "JJJJJJJJJJJJJJJ"
4010 PRINT "                    RGGG-G5G5G4G0   TGEGSGTG   CGOGMGPGLGEGTGE!!!"
4020 END
4030 PRINT "ENTER CR TO CONTINUEG"
4040 INPUT Z$
4050 RETURN
4060 PAGE
4070 PRINT "                    S E T - U P   M E N U EJJ"
4080 PRINT "A=Full Set-upJ"
4090 PRINT "B=Frequency Set-upJ"
4100 PRINT "C=Scan Mode Set-upJ"
4110 PRINT "D=Detection Mode Set-upJ"
4120 PRINT "E=BFO Mode Set-upJ"
4130 PRINT "F=Gain Mode Set-upJ"
4140 PRINT "G=R.F. Gain Mode Set-upJ"
4150 PRINT "H=IFBW Set-upJ"
4160 PRINT "I=Reference Source Set-upJ"
4170 PRINT "J=488 Address Switch TestJ"
4180 PRINT "K=Status MenueJ"
4190 PRINT "Select `REMOTE and FREQ. RANGE (500)'.J"
4200 PRINT "ENTER A LETTER FROM ONE ITEM ABOVE AND TYPE RETURN."
4210 INPUT Z$
4220 X=ASC(Z$)
4230 LET Y=X
4240 IF X=65 THEN 1960
4250 IF X=66 THEN 2070
4260 IF X=67 THEN 2320
4270 IF X=68 THEN 2480
4280 IF X=69 THEN 2580
4290 IF X=70 THEN 2670
4300 IF X=71 THEN 2770
4310 IF X=72 THEN 2870
4320 IF X=73 THEN 2990
4330 IF X=74 THEN 3710
4340 IF X=75 THEN 3190
4350 PRINT "ILLEGAL ENTRY, TRY AGAIN!"
4360 CALL "WAIT",1
4370 GO TO 4070
4380 PRINT "Do you wish to review the menu?"
4390 PRINT "Enter `YES' to review, `NO' to continue."
4400 PRINT "Enter `REPEAT' if you wish to repeat."
4410 INPUT Z$
4420 X=ASC(Z$)
```

```
4430 IF X=89 THEN 4060
4440 IF X=78 THEN 4510
4450 IF X<>82 THEN 4480
4460 LET X=Y
4470 GO TO 4240
4480 PAGE
4490 PRINT "INCORRECT ANSWER, TRY AGAIN!JJ"
4500 GO TO 4380
4510 Y=Y+1
4520 RETURN
```



TO-3(K)
(BOTTOM VIEW)



(5756) HIGHEST REF DESIG	REF DESIG NOT USED
C5	
CR10	
F3	
P1	
TP3	

(5847) HIGHEST REF DESIG	REF DESIG NOT USED
A1 U5	
C14	
CR12	
J1	
R6	
T1	
TP5	

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS.
   b) CAPACITANCE IS IN µF.
2. REFER TO REGULATOR DIAGRAM FOR PIN LAYOUT.

Figure 7-1. Power Supply (A1), Schemat
Diagram

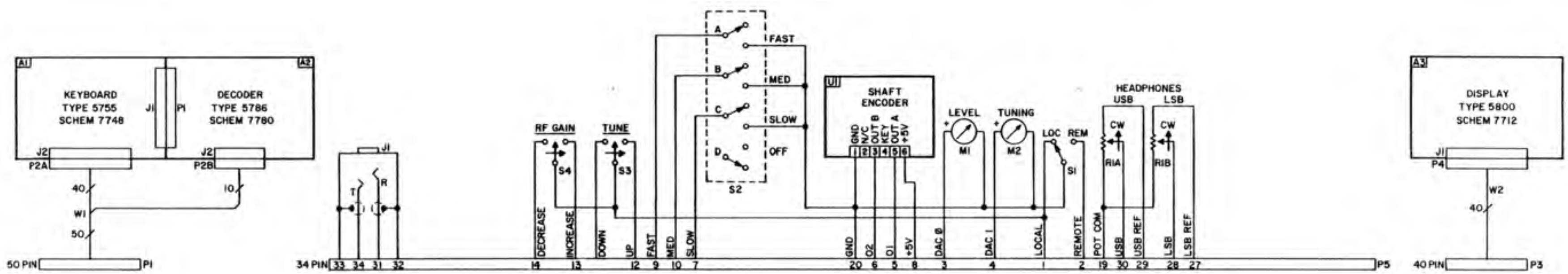
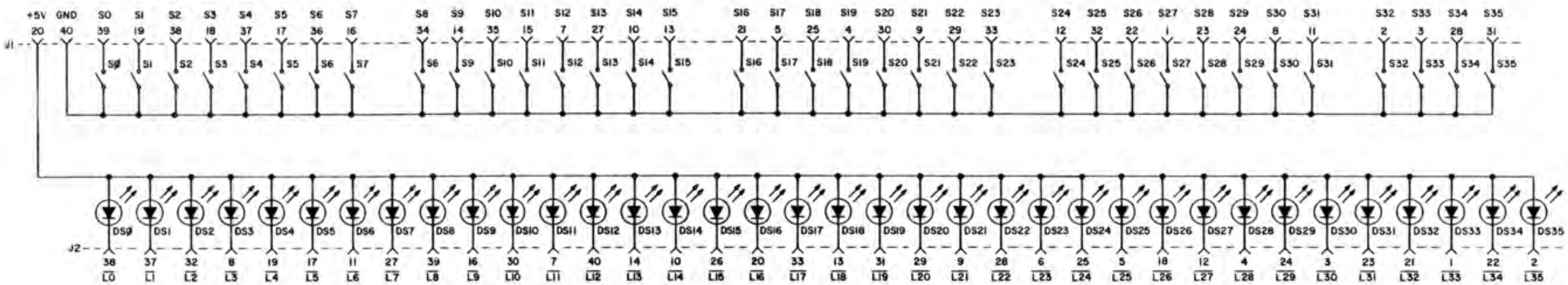


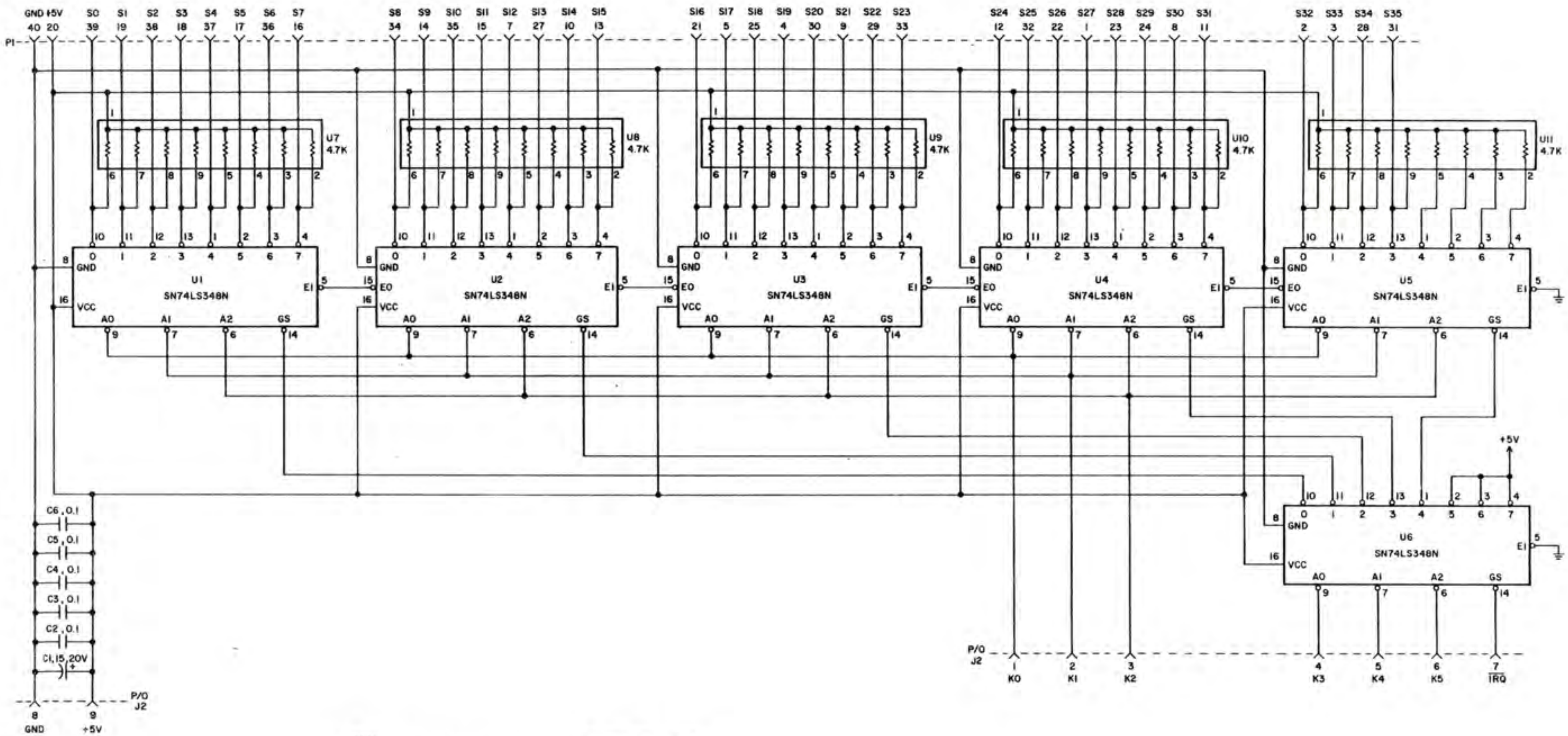
Figure 7-2. Front Panel Assembly (A2) Schematic Diagram

Courtesy of http://BlackRadios.terryo.org



HIGHEST REF DESIG	REF DESIG NOT USED
DS35	
J2	
S35	

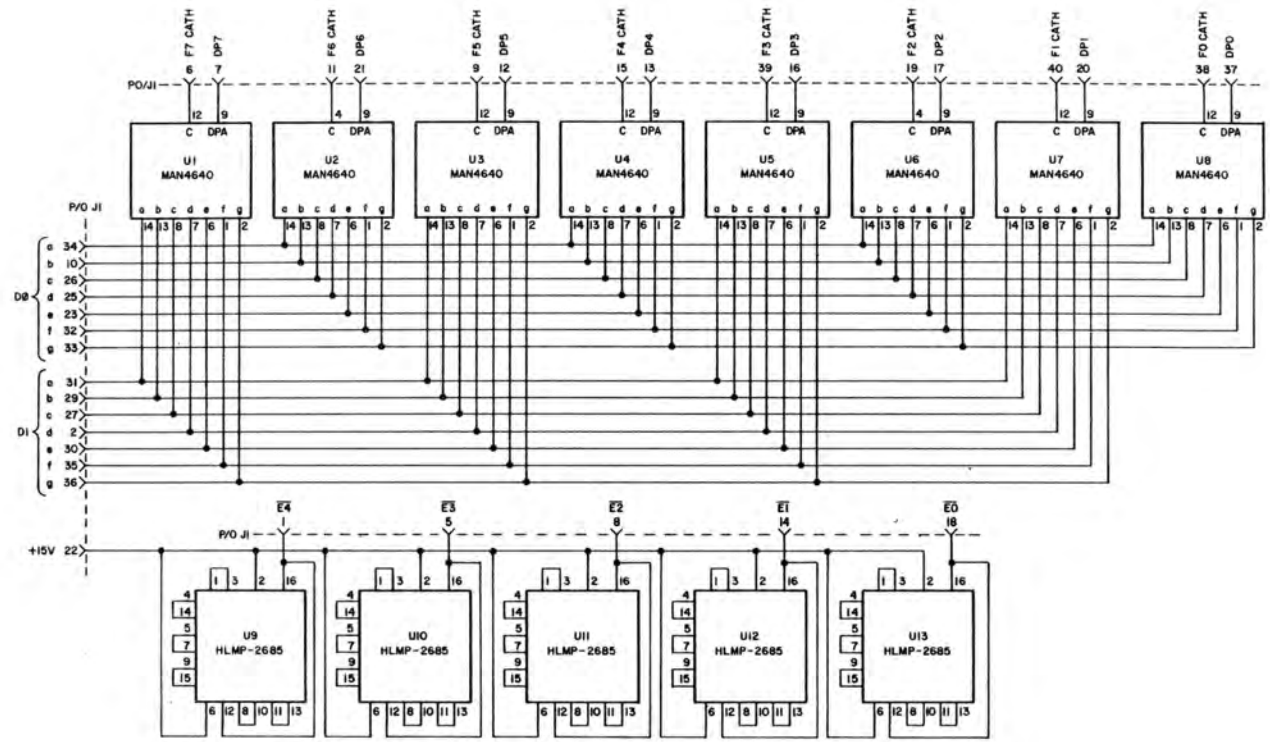
Figure 7-3. Keyboard (A2A1) Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN µF.
2. J1 IS P/O KEYBOARD (5755).

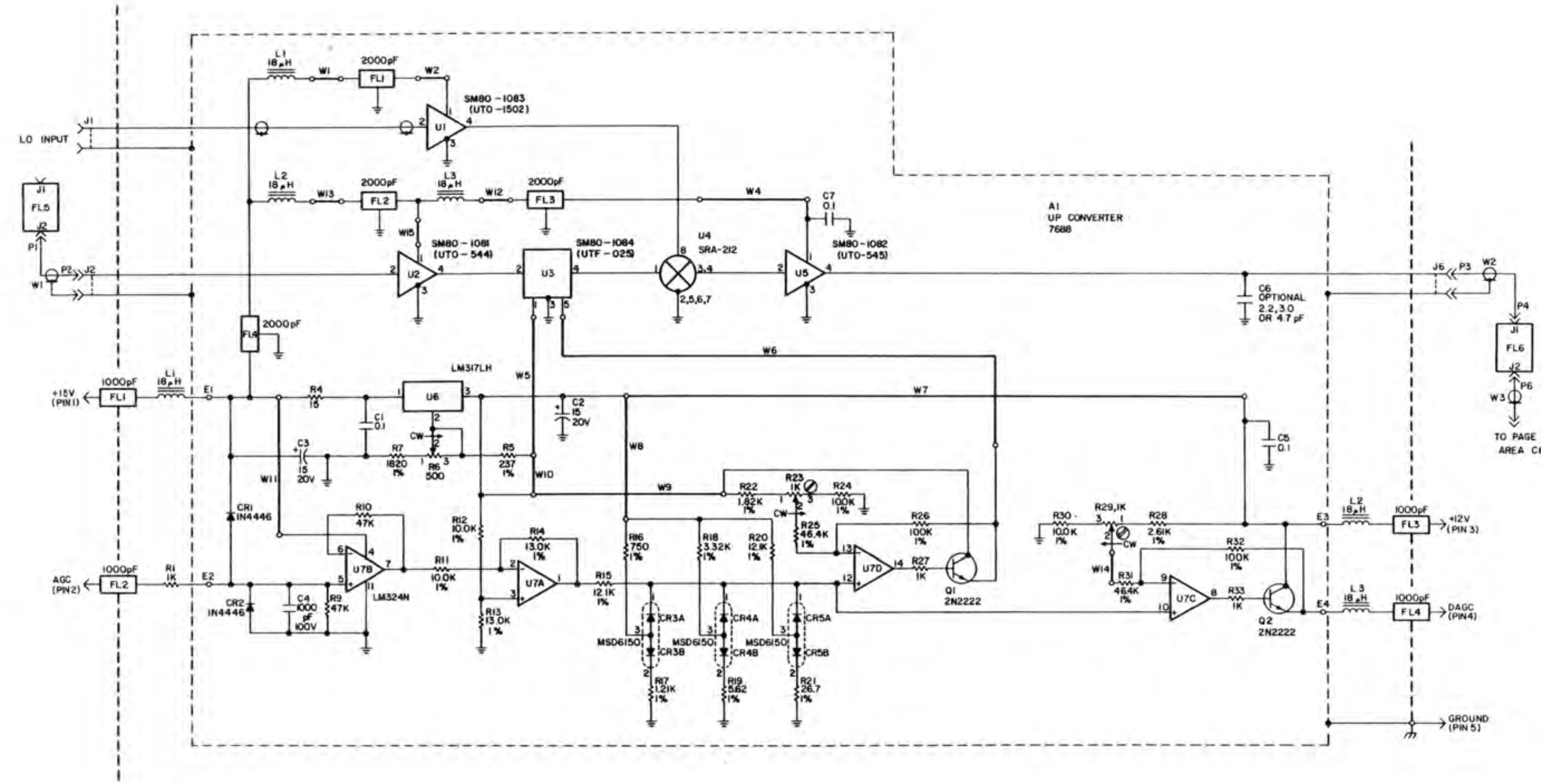
HIGHEST REF DESIG	REF DESIG NOT USED
C6	J1
J2	
P1	
U11	

Figure 7-4. Keyboard Decoder (A2A2) Schematic Diagram



HIGHEST REF. DESIG. USED	REF. DESIG. NOT USED
U13 J1	

Figure 7-5. Display (A2A3), Schematic Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED;
   a) RESISTANCE IS IN OHMS, 1/4 W, ±5%.
   b) CAPACITANCE IS IN μF.

7743
20-500 MHZ TUNER

HIGHEST REF DESIG	REF DESIG NOT USED
A3 R1 FL8 E2 J7 P6 W3 L5	

7688
UP CONVERTER

HIGHEST REF DESIG	REF DESIG NOT USED
C7 W15 CR5 FL4 L3 Q2 R33 U7	R8

7689
DOWN CONVERTER

HIGHEST REF DESIG	REF DESIG NOT USED
C7 L5 U2 R5 E3	E2 R1 C4 R2 L3 R3 C3 L2 L4

5901
IF AMPLIFIER

HIGHEST REF DESIG	REF DESIG NOT USED
C29 FL1 L12 Q4 R24 T1 U3	C7 L1 C6 C5 R2 R1 R4 R3 U2 U1 L5 R5 L6

Figure 7-6. 20-500 MHz Tuner (A3) Schematic Diagram (sheet 1)

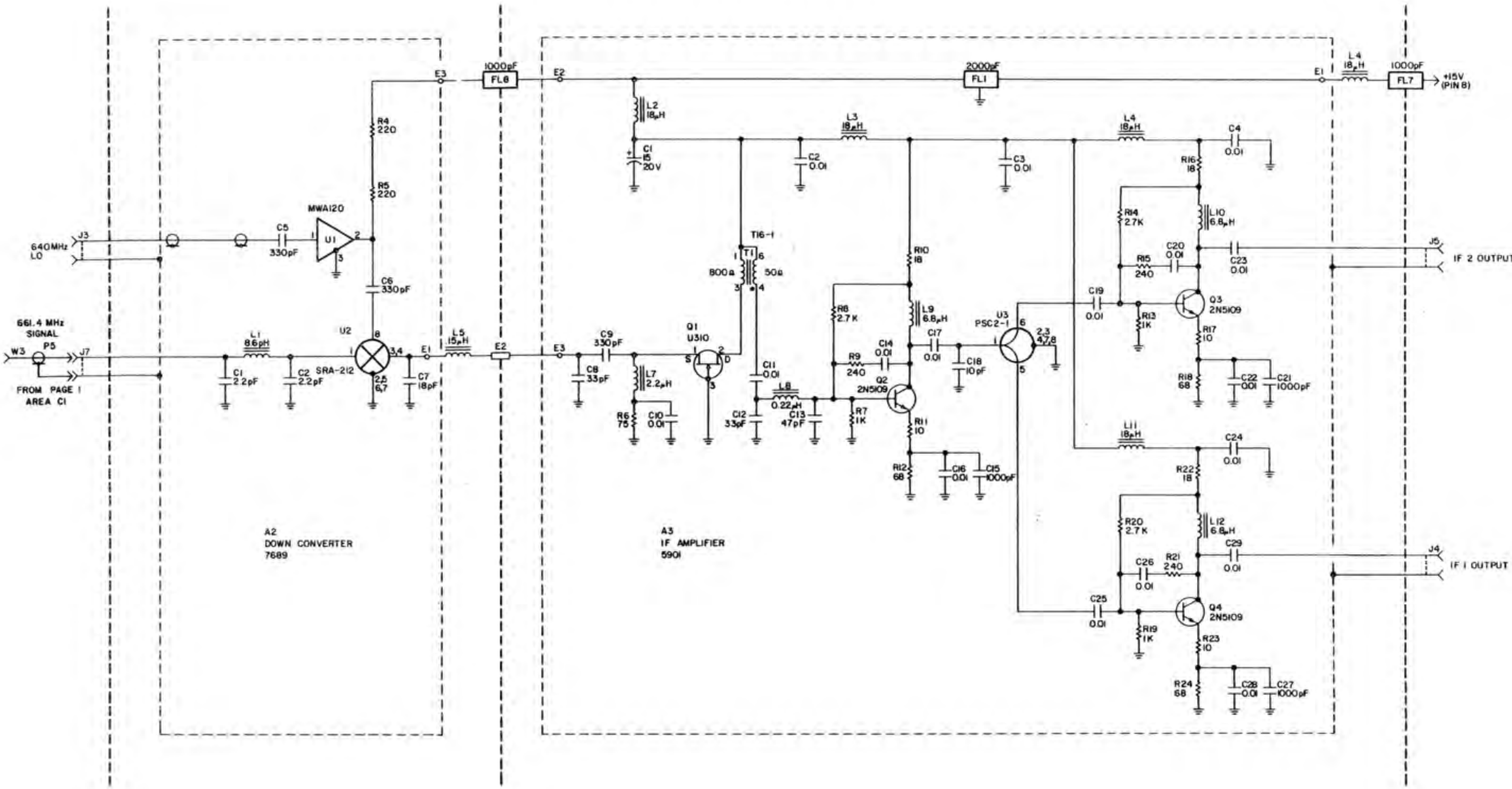
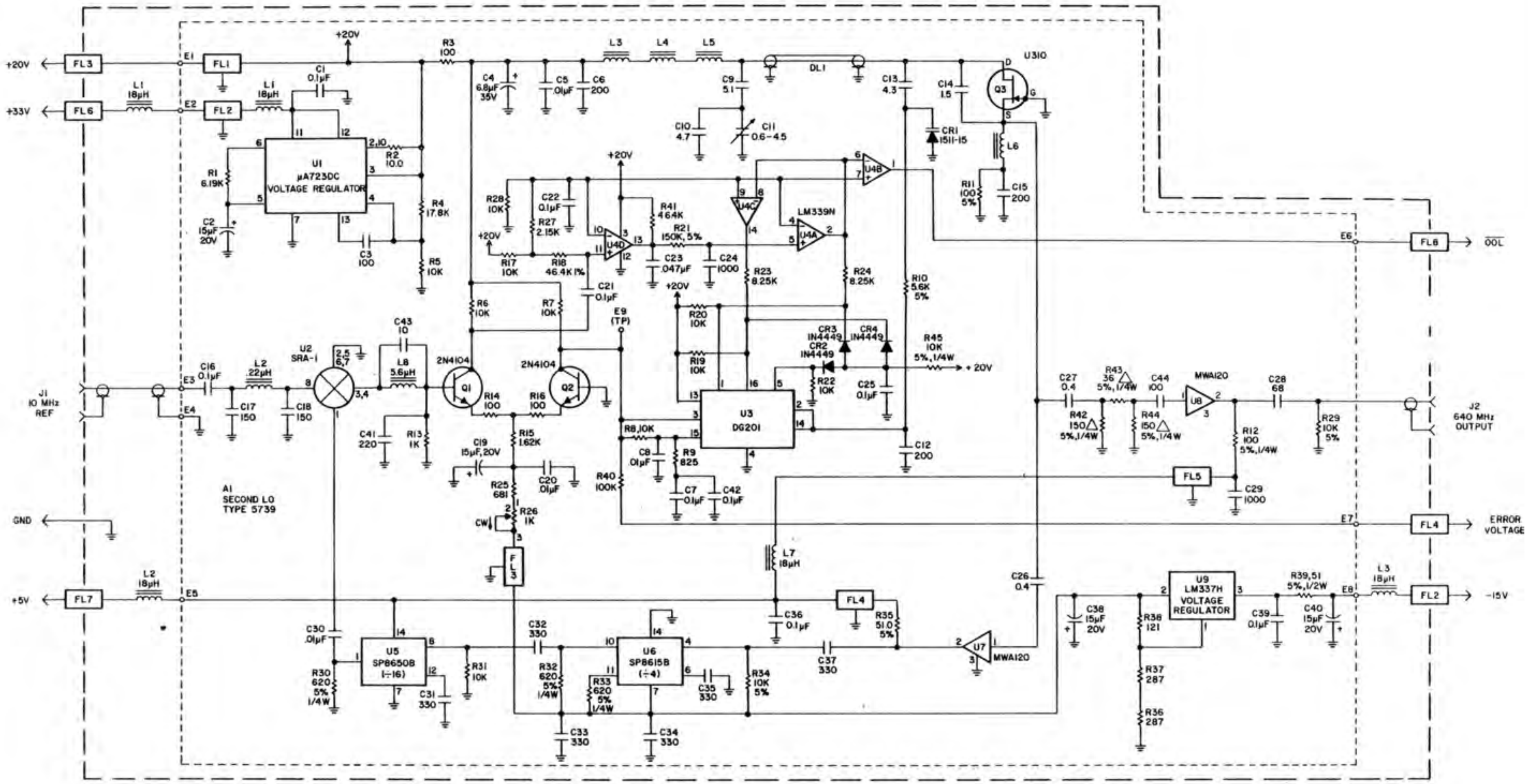


Figure 7-6. 20-500 MHz Tuner (A3) Schematic Diagram (sheet 2)



NOTES

1. UNLESS OTHERWISE SPECIFIED:
   a.) RESISTANCE IS IN OHMS, 1%, 1/10W
   b.) 5% RESISTORS ARE 1/8W
   c.) CAPACITANCE IS IN pF.
2. △ DENOTES SELECTABLE VALUE.

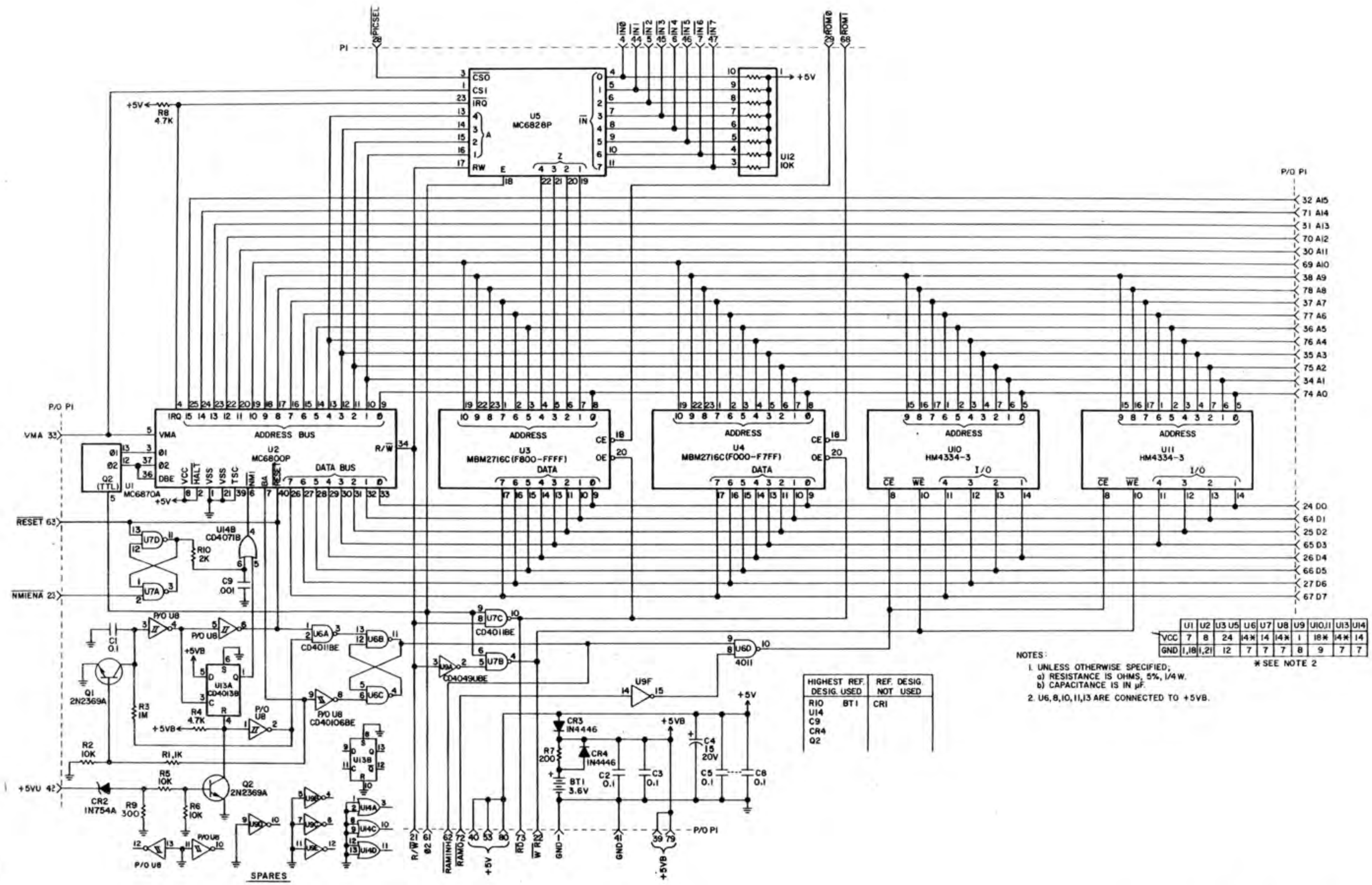
(7722)

HIGHEST REF DESIG	REF DESIG NOT USED
L3	FL1
J2	FL5
FL10	

(5739)

HIGHEST REF DESIG		REF DESIG NOT USED
C43	L8	
CR4	Q3	
DL1	R45	
E9	U9	
FL5		

Figure 7-7. Second LO (A4), Schematic Diagram



	U1	U2	U3 U5	U6	U7	U8	U9	U10,11	U13	U14
VCC	7	8	24	14*	14	14*	1	18*	14*	14
GND	1,18	1,21	12	7	7	7	8	9	7	7

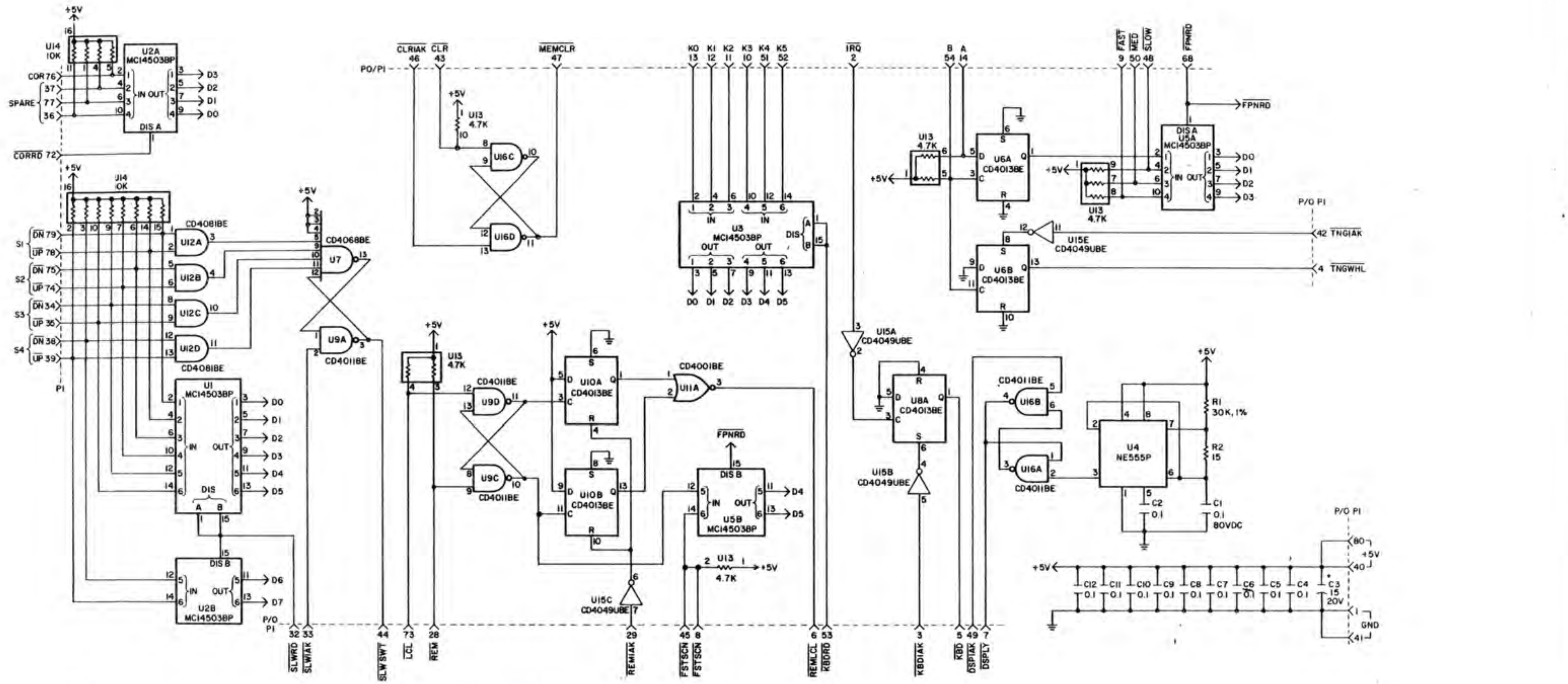
*SEE NOTE 2

HIGHEST REF. DESIG. USED	REF. DESIG. NOT USED
R10 BT1	CR1
U14	
C9	
CR4	
Q2	

NOTES:

1. UNLESS OTHERWISE SPECIFIED;
   a) RESISTANCE IS OHMS, 5%, 1/4 W.
   b) CAPACITANCE IS IN µF.
2. U6, 8, 10, 11, 13 ARE CONNECTED TO +5VB.

Figure 7-22. CPU (A7A2), Schematic Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, 5%, 1/4W.
   b) CAPACITANCE IS IN µF.
2. ALL 1% RESISTORS ARE .10W

	U1-U3	U4	U5	U6-U12	U15	U16	U17-U19
VCC	16	8	16	14	1	14	16
GND	8	1	8	7	8	7	8

HIGHEST REF DESIG	REF DESIG NOT USED
C12	
R3	
U20	

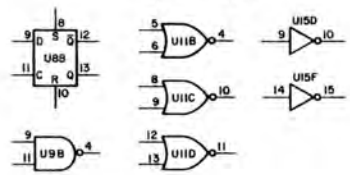


Figure 7-23. Front Panel Interface (A7A4), Schematic Diagram (sheet 1)

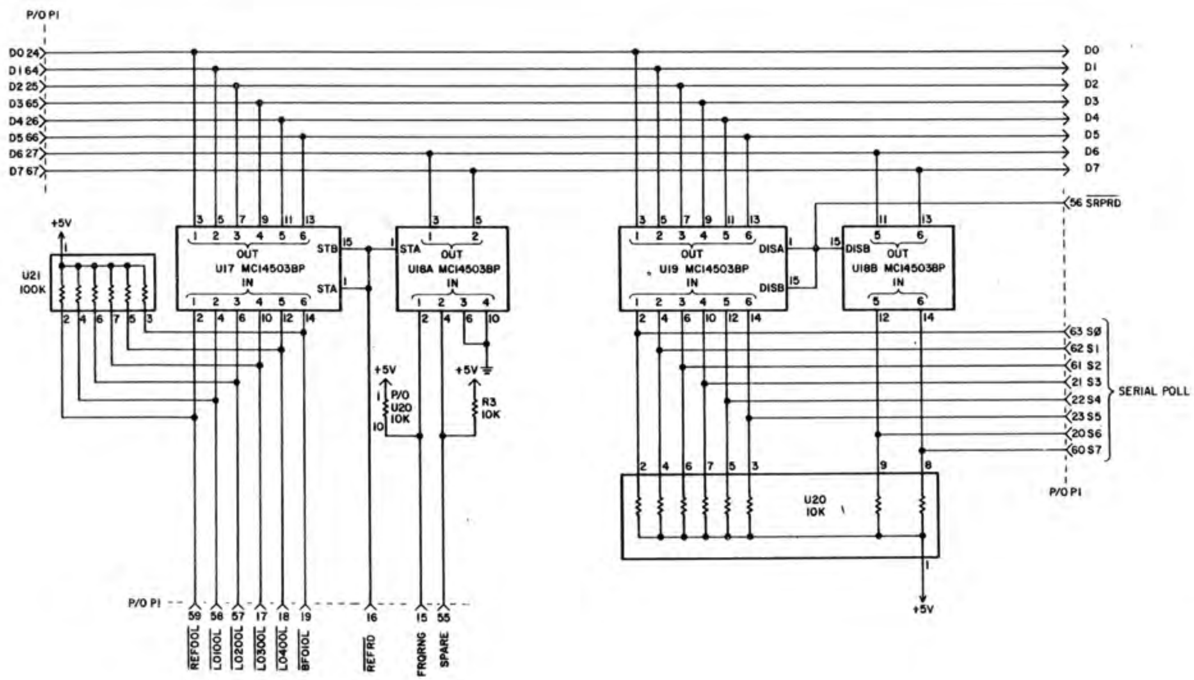
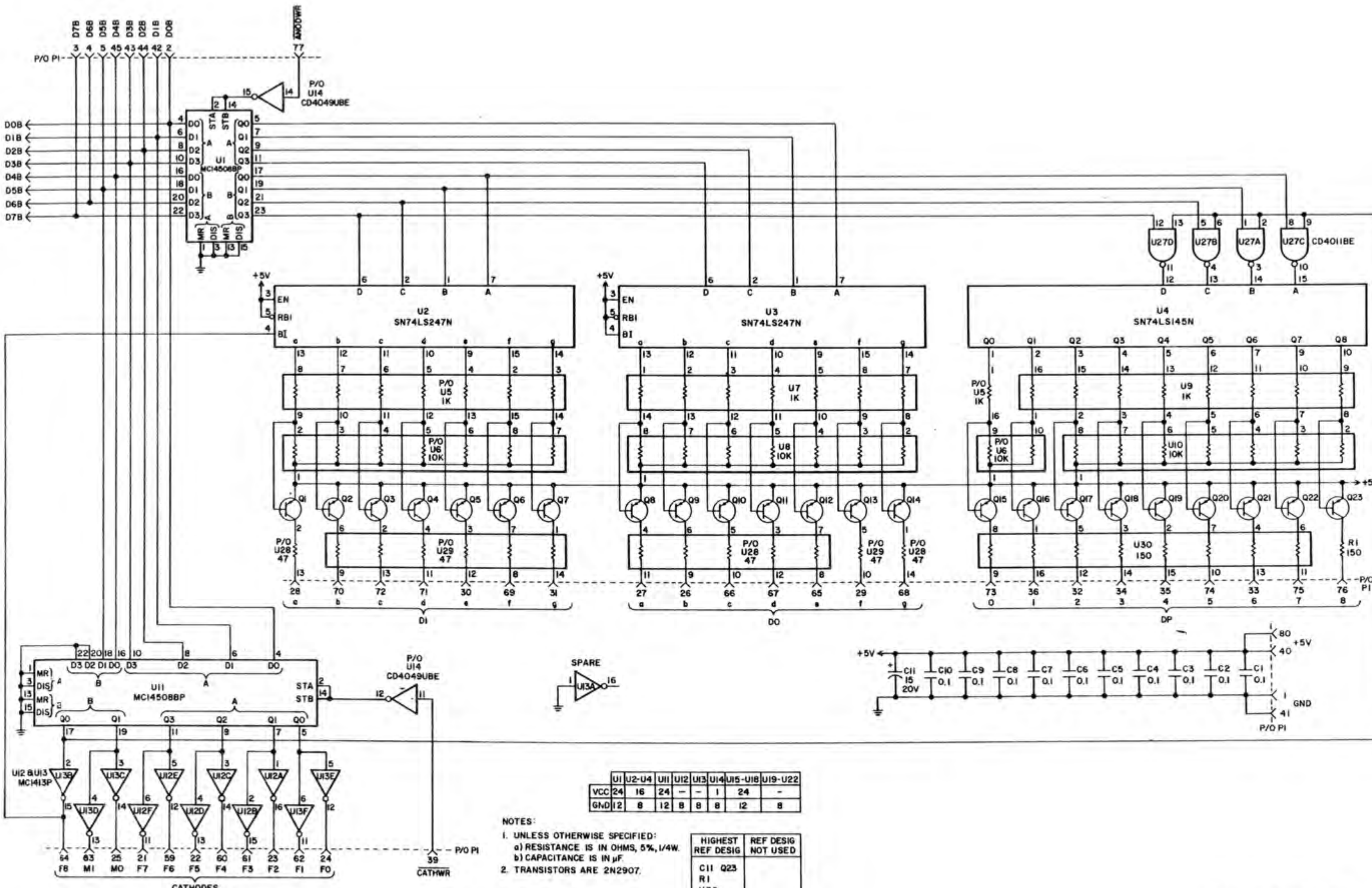


Figure 7-23. Front Panel Interface (A7A4), Schematic Diagram (sheet 2)



	U1	U2-U4	U11	U12	U13	U14	U15-U18	U19-U22
VCC	24	16	24	–	–	1	24	-
GND	12	8	12	8	8	8	12	8

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, 5%, 1/4W.
   b) CAPACITANCE IS IN μF.
2. TRANSISTORS ARE 2N2907.

HIGHEST REF DESIG	REF DESIG NOT USED
C11 Q23 R1 U30	

Figure 7-24. Display Drivers (A7A5) Schematic Diagram (sheet 1)

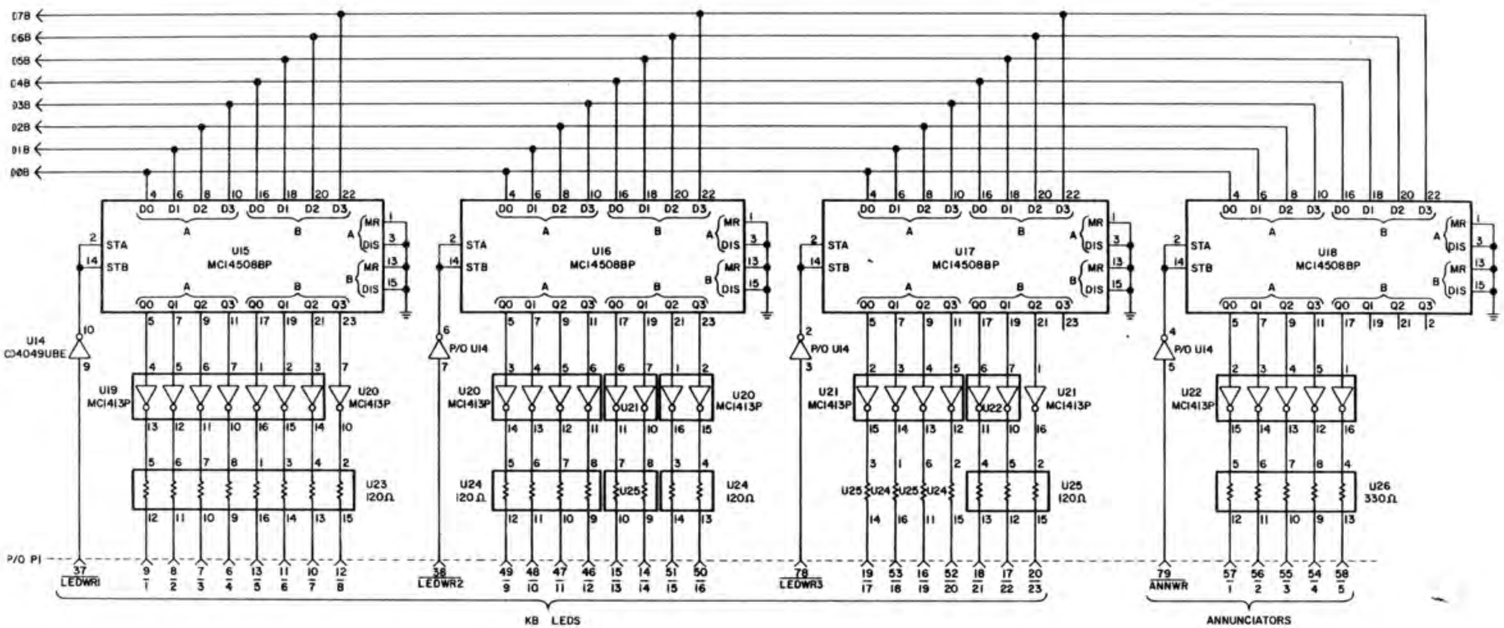
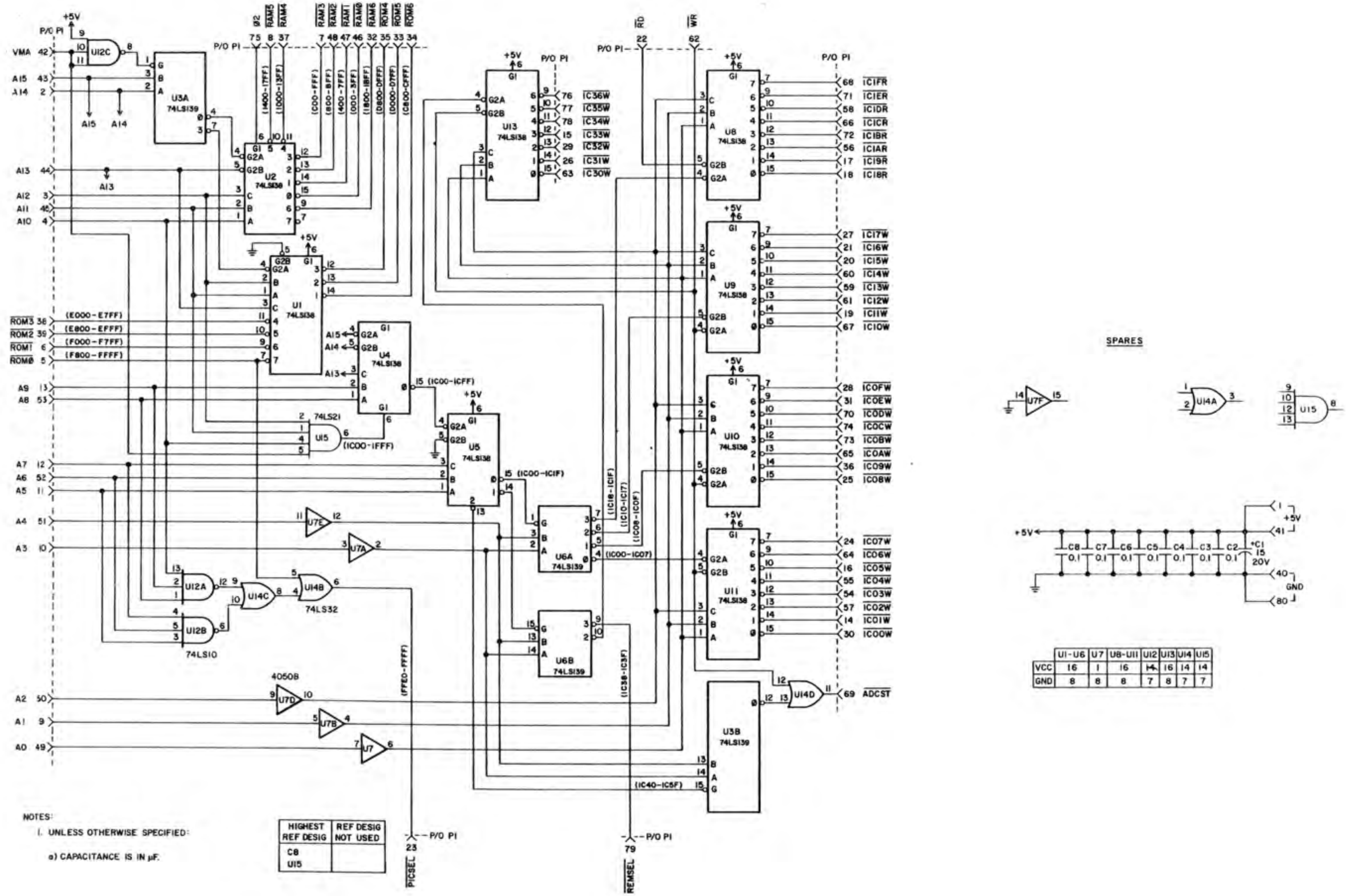


Figure 7-24. Display Drivers (A7A5) Schematic Diagram (sheet 2)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:

a) CAPACITANCE IS IN μF.

HIGHEST REF DESIG	REF DESIG NOT USED
C8 U15	

	U1-U6	U7	U8-U11	U12	U13	U14	U15
VCC	16	1	16	14	16	14	14
GND	8	8	8	7	8	7	7

Figure 7-25. Address Decoder (A7A6) Schematic Diagram

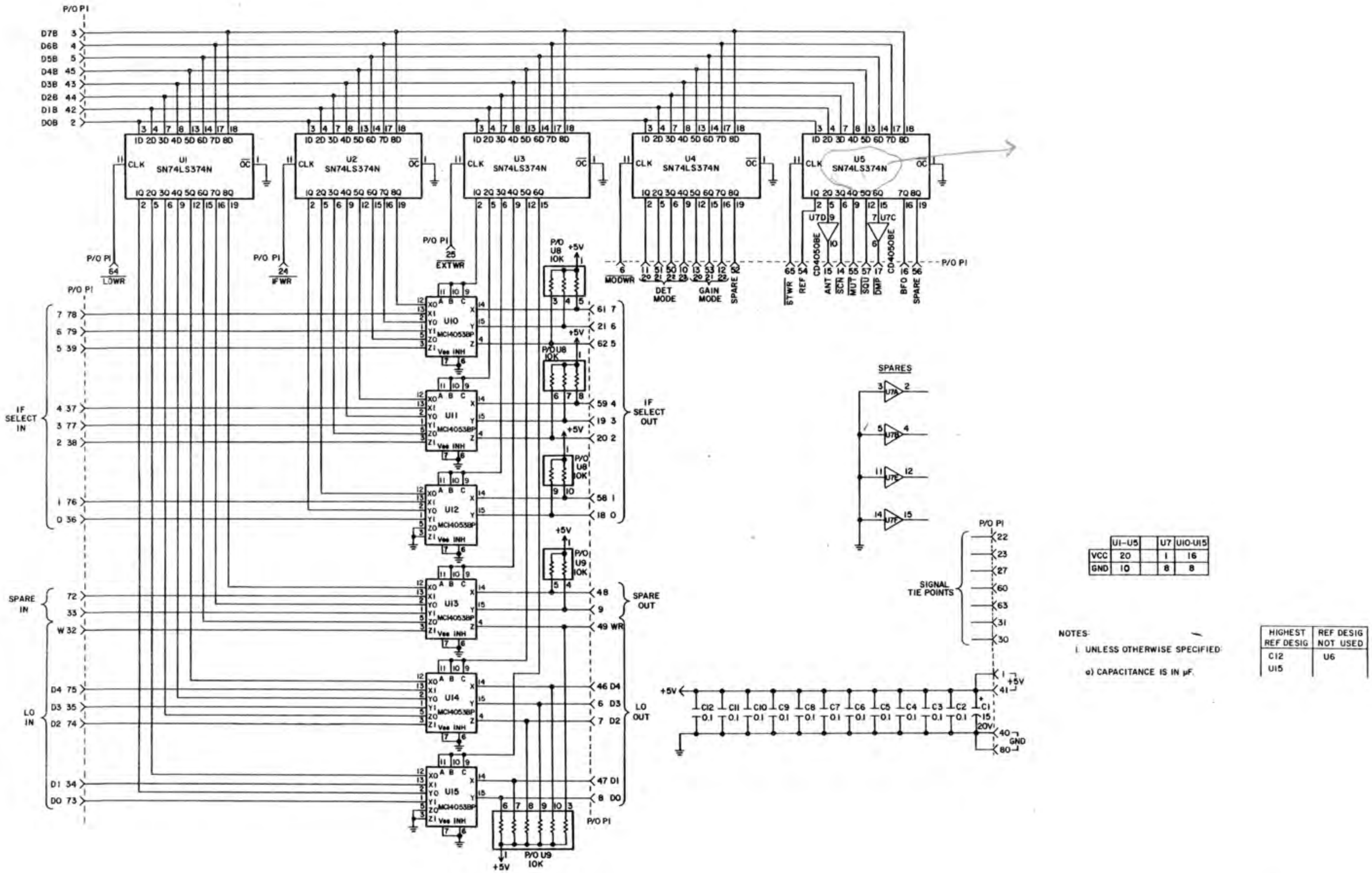
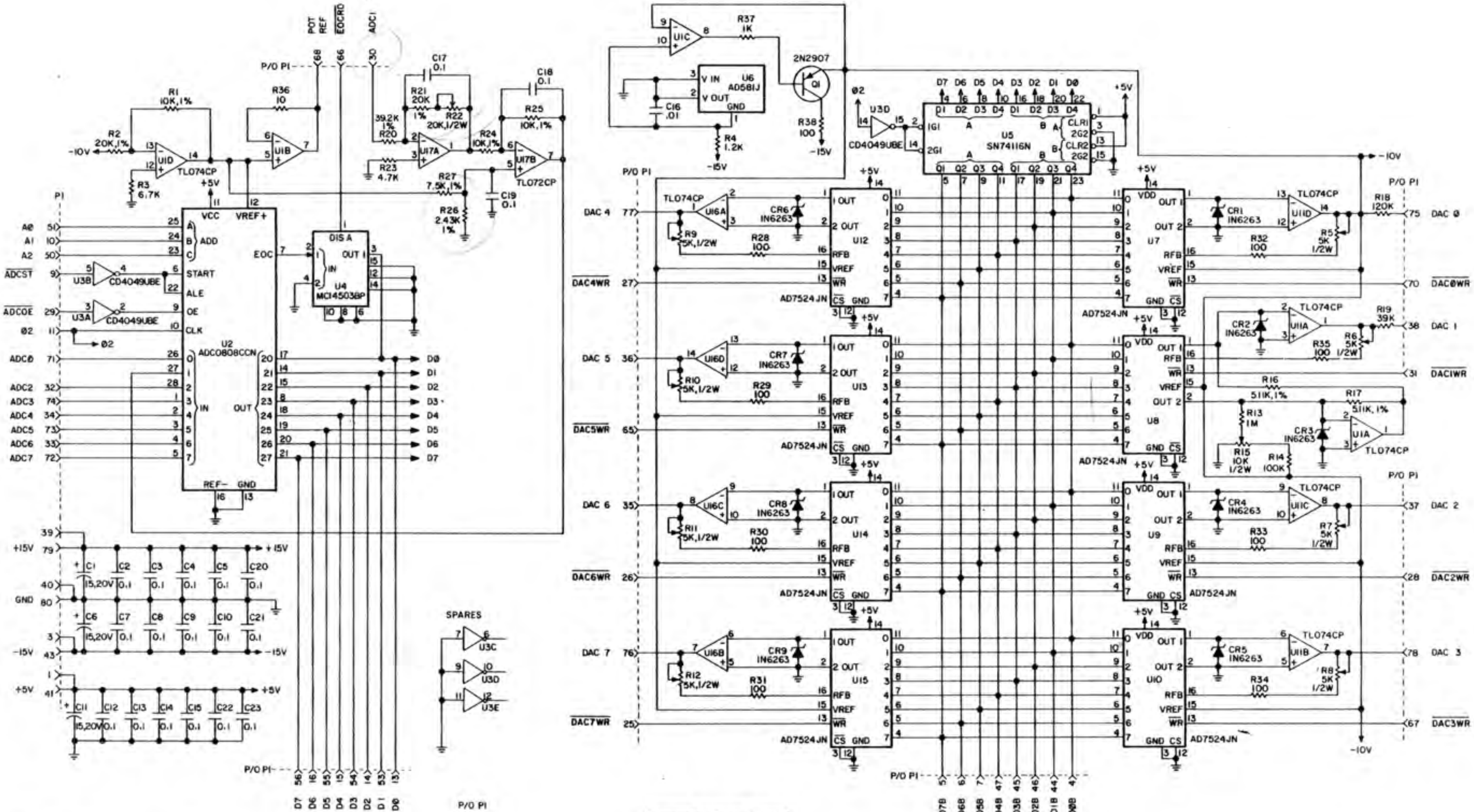


Figure 7-26. Control Outputs (A7A7) Schematic Diagram



P/O P1

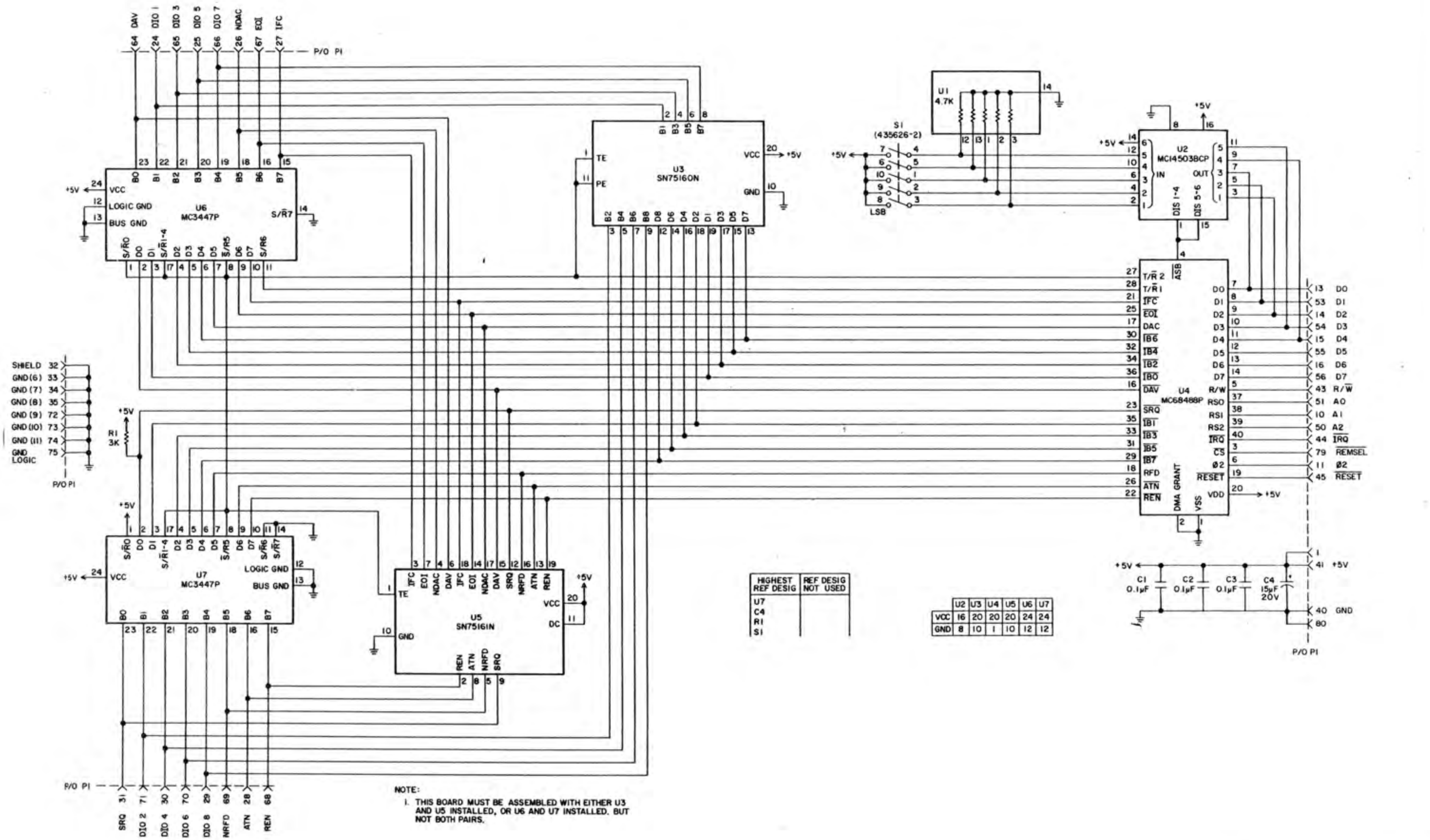
SIGNAL TIE POINTS 42 69

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, 5%, 1/4W.
   b) CAPACITANCE IS IN µF.
2. ALL 1% RESISTORS ARE .10W
3. 573I-I IS OMITTING U9, U12, U13, U14, U15, & U16

HIGHEST REF DESIG USED	REF DESIG NOT USED
R38	
C23	
CR9	
U17	
Q1	

Figure 7-27. Converters (A7A8) Schematic Diagram



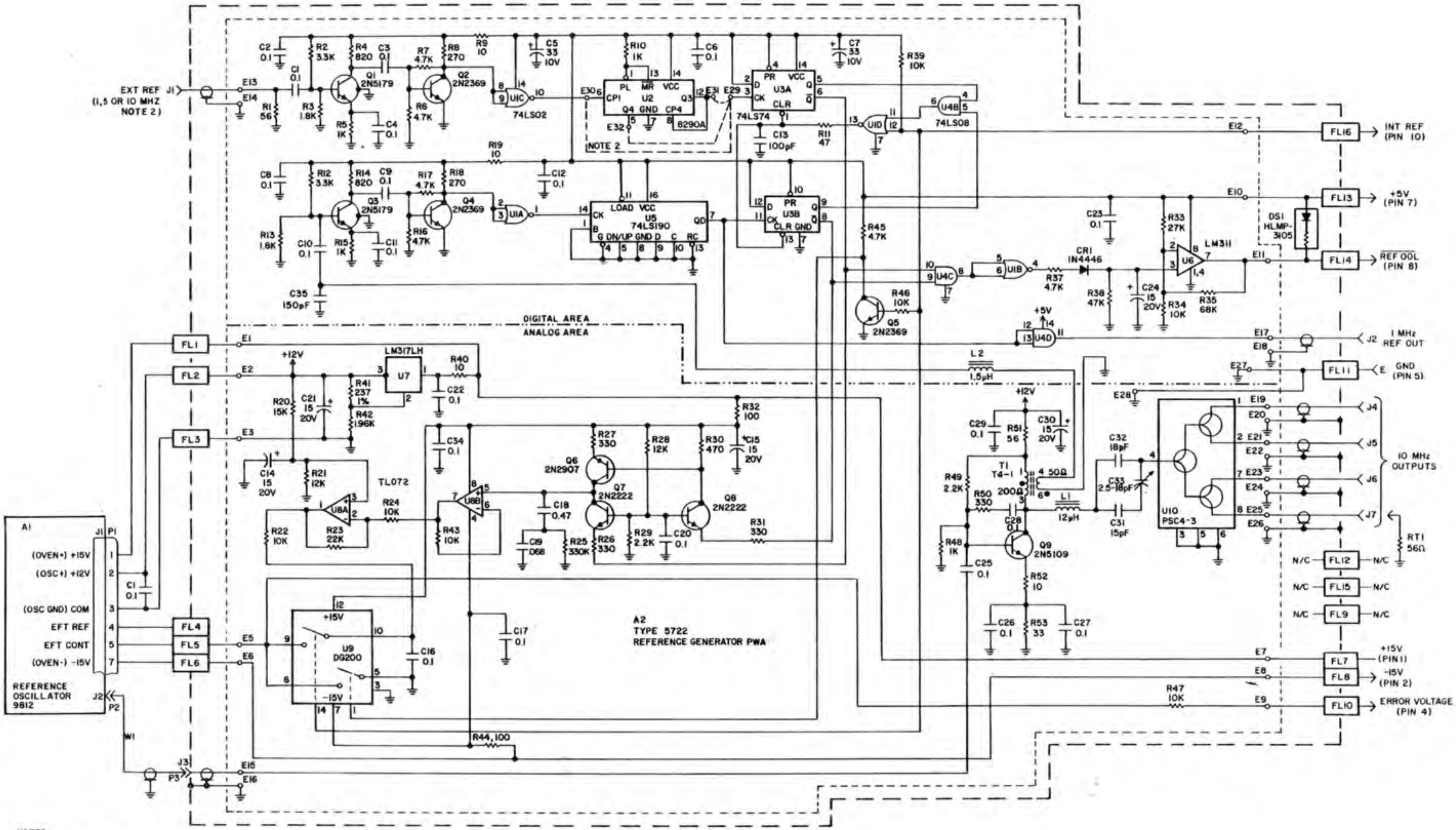
HIGHEST REF DESIG	REF DESIG NOT USED
U7	
C4	
R1	
S1	

	U2	U3	U4	U5	U6	U7
VCC	16	20	20	20	24	24
GND	8	10	1	10	12	12

NOTE:

1. THIS BOARD MUST BE ASSEMBLED WITH EITHER U3 AND U5 INSTALLED, OR U6 AND U7 INSTALLED, BUT NOT BOTH PAIRS.

Figure 7-28. IEEE-488 Interface (A7A9) Schematic Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, 1/4W ±5%.
   b) CAPACITANCE IS IN µF.

2. STRAP AS FOLLOWS:

EXT REF FREQ	U2 INSTALLED	JUMPER
1MHZ	NO	E29-E30
5MHZ	YES	E29-E31
10MHZ	YES	E29-E32

SPARE

U4A

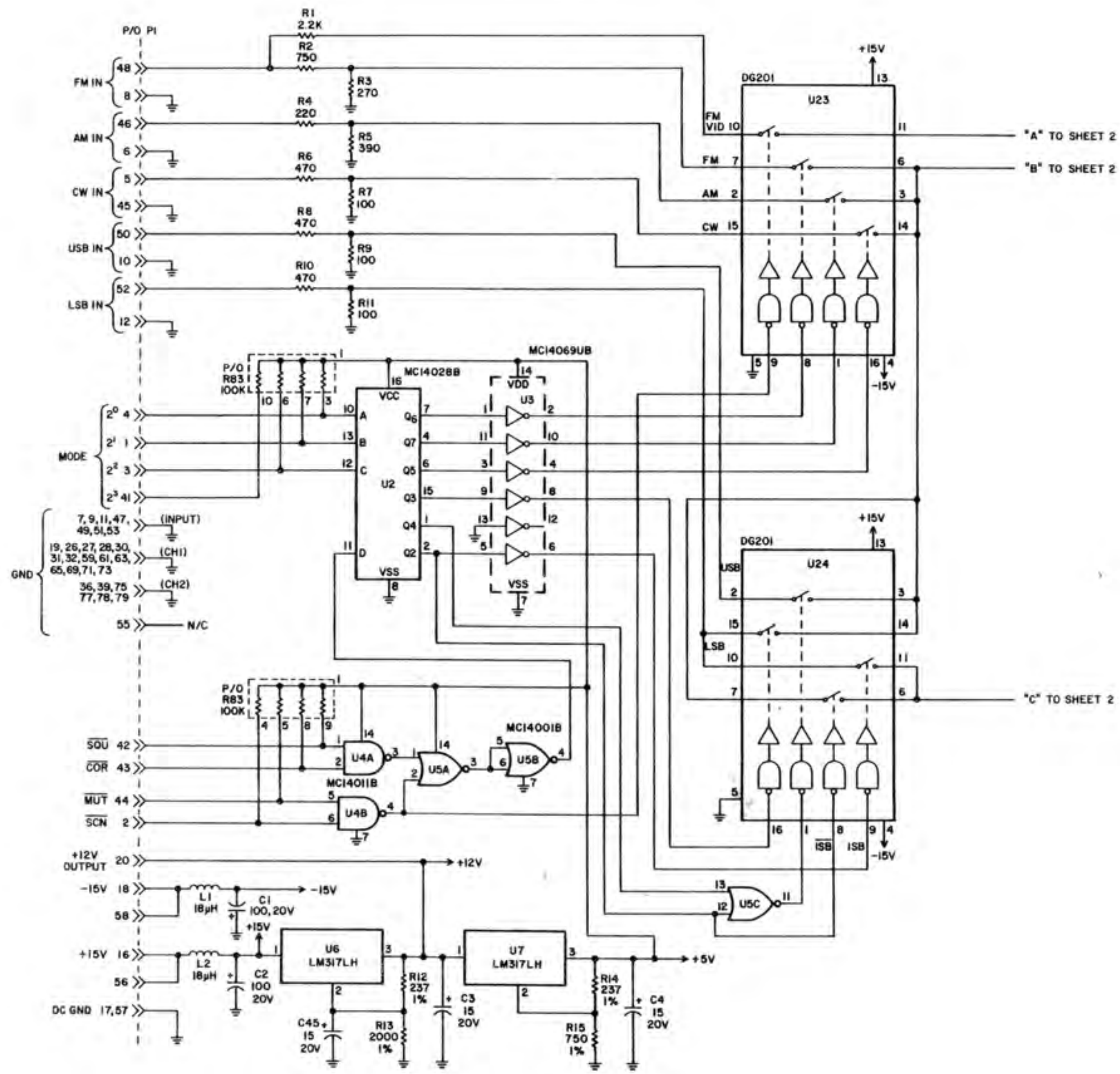
(7740)

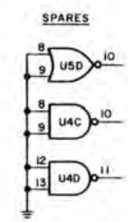
HIGHEST REF DESIG	REF DESIG NOT USED
A1 C1 DS1 FL12 J7	

(5722)

HIGHEST REF DESIG	REF DESIG NOT USED
C35 R53 CR1 T1 E30 U10 L2 Q9	E4 R36

Figure 7-29. Reference Generator (A8) Schematic Diagram





NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, 1/4W ± 5%.
b) CAPACITANCE IS IN µF.
c) 1% RESISTORS ARE 1/10W

HIGHEST REF DESIG	REF DESIG NOT USED
R83	R25 R26
C45	R35 R48
U24	R59
L2	U1

Figure 7-30. Audio/Video Amplifier (A9) Schematic Diagram (sheet 1)

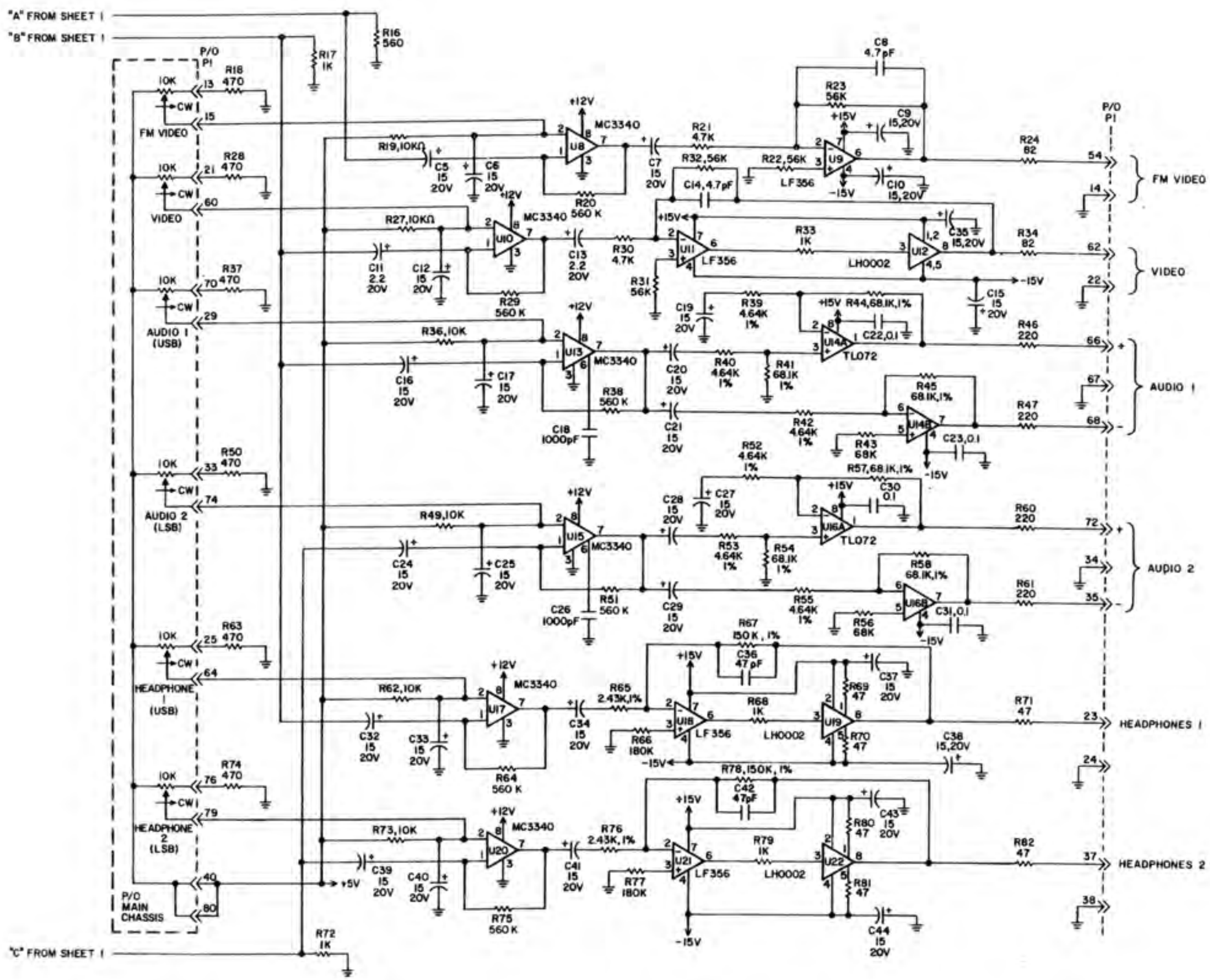


Figure 7-30. Audio/Video Amplifier (A9) Schematic Diagram (sheet 2)

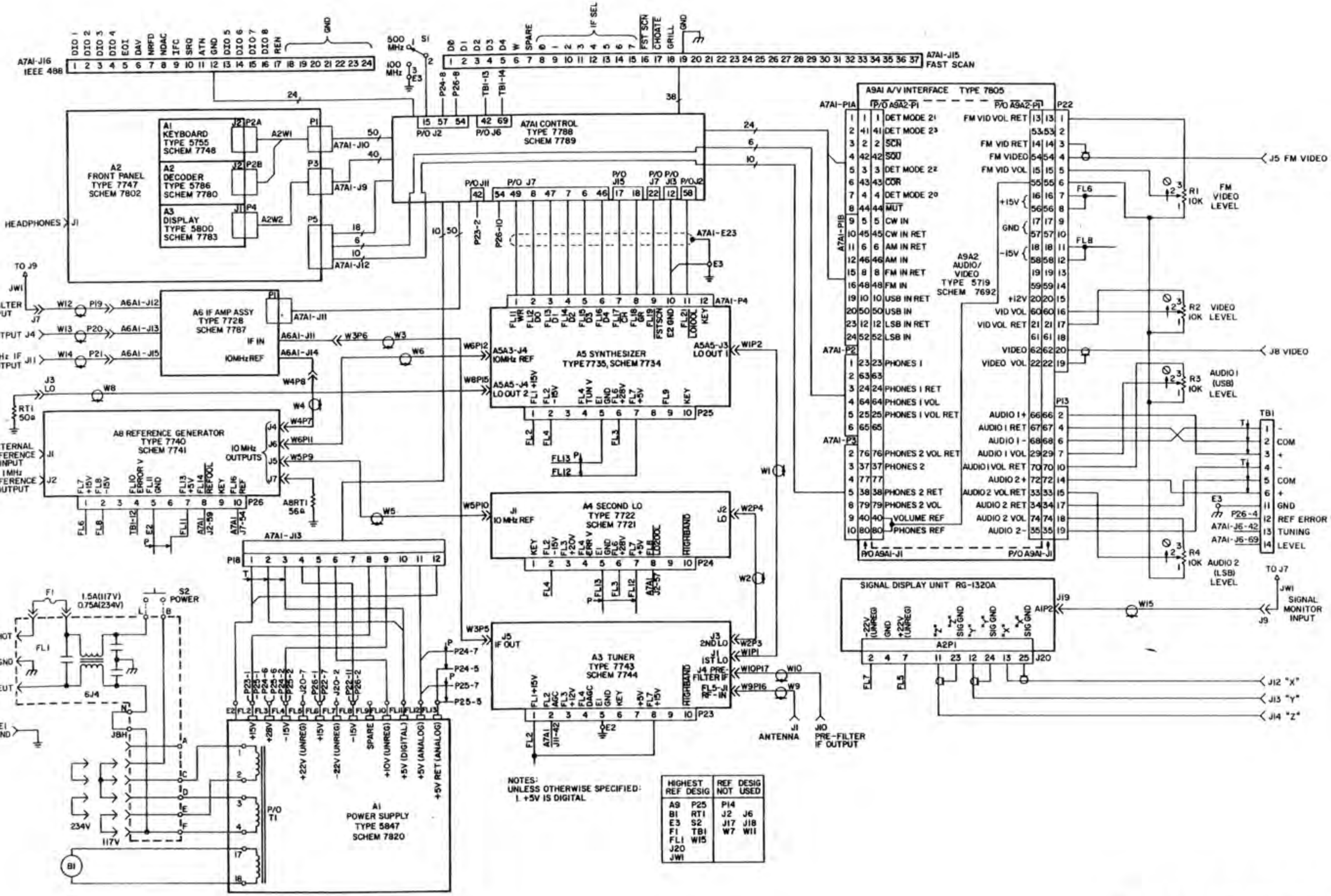
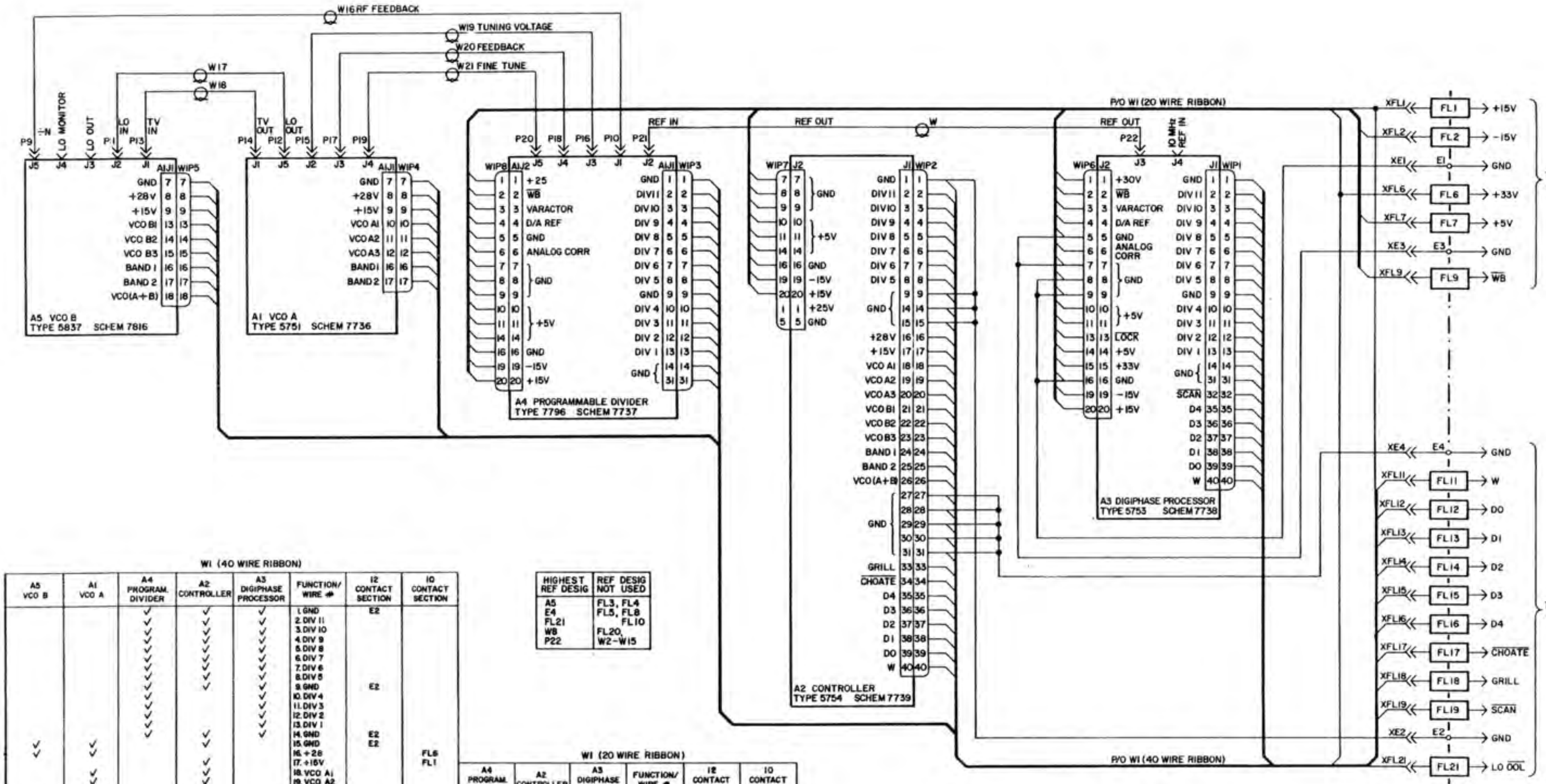


Figure 7-31. RG-5540 VHF/UHF Surveillance Receiver, Main Chassis Assembly Schematic Diagram



HIGHEST REF DESIG	REF DESIG NOT USED
A5 E4 FL21 W8 P22	FL3, FL4 FL5, FL8 FL10 FL20, W2-W15

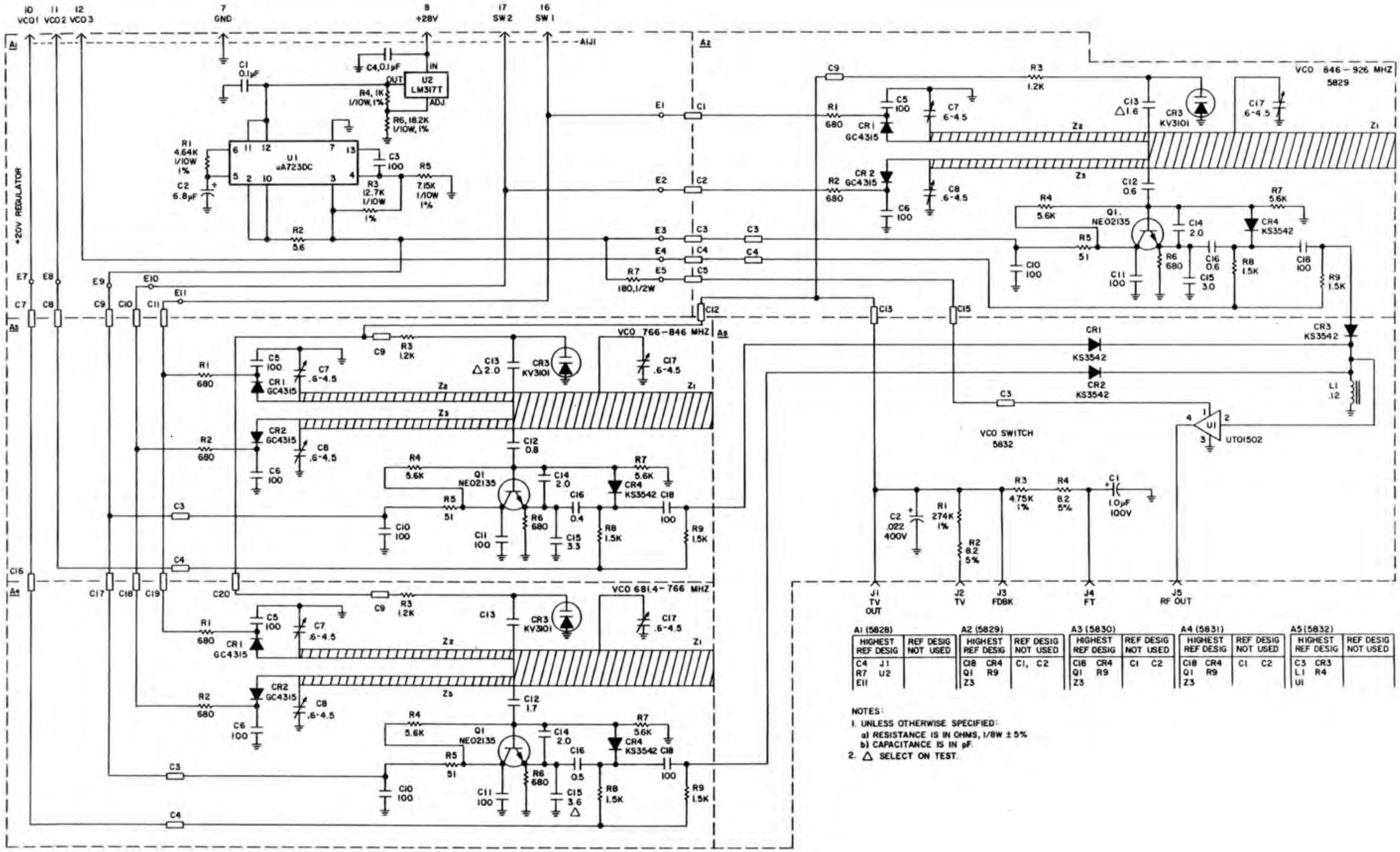
W1 (40 WIRE RIBBON)

A5 VCO B	A1 VCO A	A4 PROGRAM. DIVIDER	A2 CONTROLLER	A3 DIGIPHASE PROCESSOR	FUNCTION/ WIRE #	I2 CONTACT SECTION	I0 CONTACT SECTION
		✓	✓	✓	1. GND	E2	
		✓	✓	✓	2. DIV 11		
		✓	✓	✓	3. DIV 10		
		✓	✓	✓	4. DIV 9		
		✓	✓	✓	5. DIV 8		
		✓	✓	✓	6. DIV 7		
		✓	✓	✓	7. DIV 6		
		✓	✓	✓	8. DIV 5		
		✓	✓	✓	9. GND	E2	
		✓		✓	10. DIV 4		
		✓		✓	11. DIV 3		
		✓		✓	12. DIV 2		
		✓		✓	13. DIV 1		
		✓	✓	✓	14. GND	E2	
✓	✓		✓		15. GND	E2	
✓	✓				16. +28		FL6
			✓		17. +15V		FL1
	✓		✓		18. VCO A1		
	✓		✓		19. VCO A2		
	✓		✓		20. VCO A3		
✓			✓		21. VCO B1		
✓			✓		22. VCO B2		
✓			✓		23. VCO B3		
✓	✓		✓		24. BAND 1		
✓	✓		✓		25. BAND 2		
✓			✓		26. VCO (A+B)		
			✓		27. GND	E4	
			✓		28. GND	E4	
			✓		29. GND	E4	
			✓		30. GND	E4	
		✓	✓	✓	31. GND	E4	
				✓	32. SCAN	FL19	
			✓		33. GRILL	FL18	
			✓		34. CHOATE	FL17	
			✓	✓	35. D4	FL16	
			✓	✓	36. D3	FL15	
			✓	✓	37. D2	FL14	
			✓	✓	38. D1	FL13	
			✓	✓	39. D0	FL12	
			✓	✓	40. W	FL11	

W1 (20 WIRE RIBBON)

A4 PROGRAM. DIVIDER	A2 CONTROLLER	A3 DIGIPHASE PROCESSOR	FUNCTION/ WIRE #	I2 CONTACT SECTION	I0 CONTACT SECTION
✓	✓	✓	1. +25V		
✓		✓	2. WB		FL9
✓		✓	3. VARACTOR		
✓		✓	4. D/A REF		
✓	✓	✓	5. GND		E3
✓		✓	6. ANLG CORR		
✓	✓	✓	7. GND		E3
✓	✓	✓	8. GND		E1
✓	✓	✓	9. GND		E1
✓	✓	✓	10. +5V		
✓	✓	✓	11. +5V		
			12. N/U		
		✓	13. LOCK	FL21	
✓	✓	✓	14. +5V		FL7
		✓	15. + 28V		FL6
✓	✓	✓	16. GND		E1
			17. N/U		
			18. N/U		
✓	✓	✓	19. -15V		FL2
✓	✓	✓	20. +15V		FL1

Figure 7-8. Synthesizer (A5), Schematic Diagram



Assembly	Highest Ref Desig	Ref Desig Not Used
A1 (5828)	C4, J1, R7, U2, E11	
A2 (5829)	C18, CR4, Q1, R9, Z3	C1, C2
A3 (5830)	C18, CR4, Q1, R9, Z3	C1, C2
A4 (5831)	C18, CR4, Q1, R9, Z3	C1, C2
A5 (5832)	C3, CR3, L1, R4, U1	
VCO "A" (5751)	C20, J5	C6, C14

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, 1/8W ± 5%
   b) CAPACITANCE IS IN pF.
2. △ SELECT ON TEST.

Figure 7-9. VCO A (A5A1), Schematic Diagram

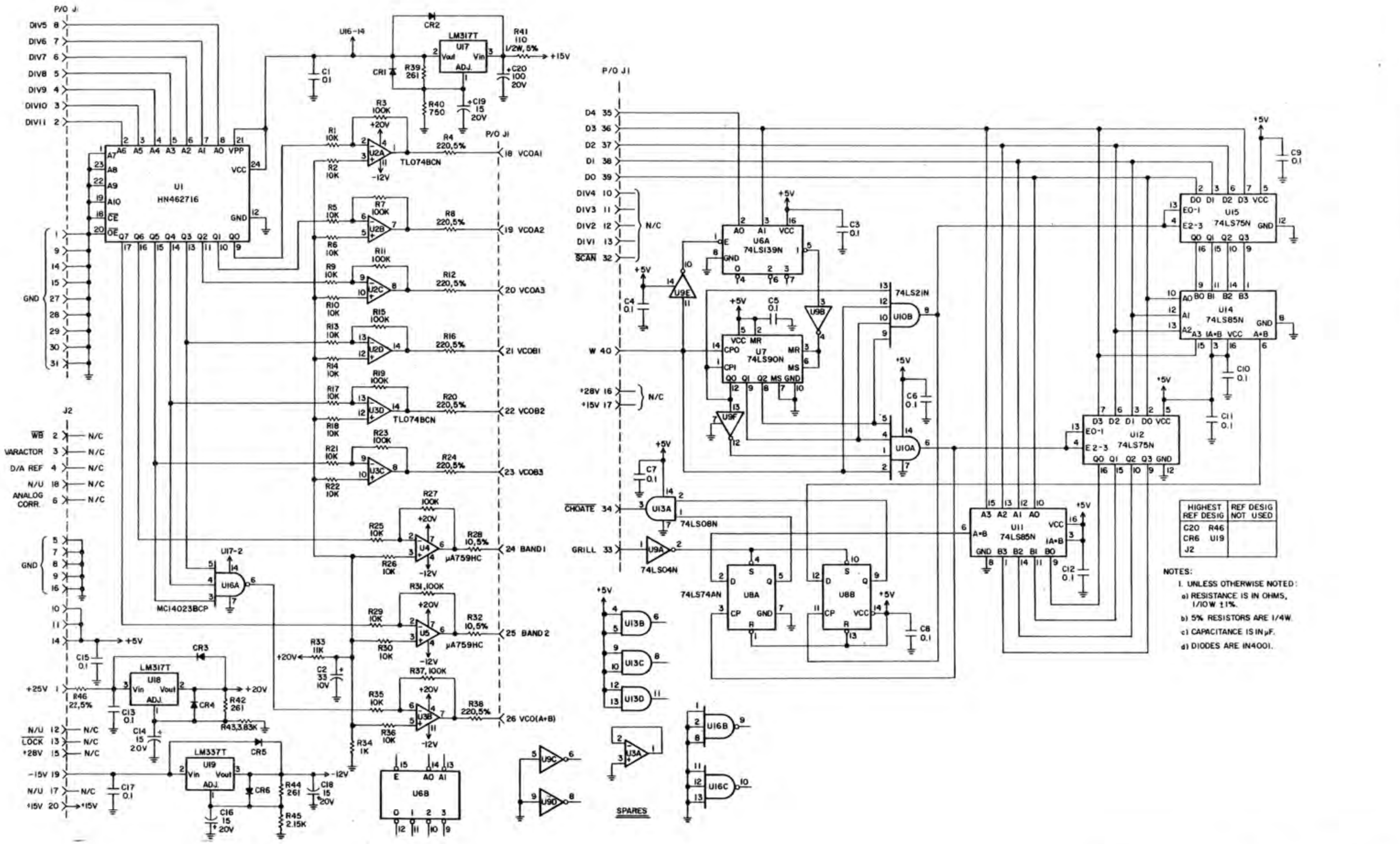


Figure 7-10. Controller (A5A2), Schematic Diagram

Courtesy of http://BlackRadios.terryo.org

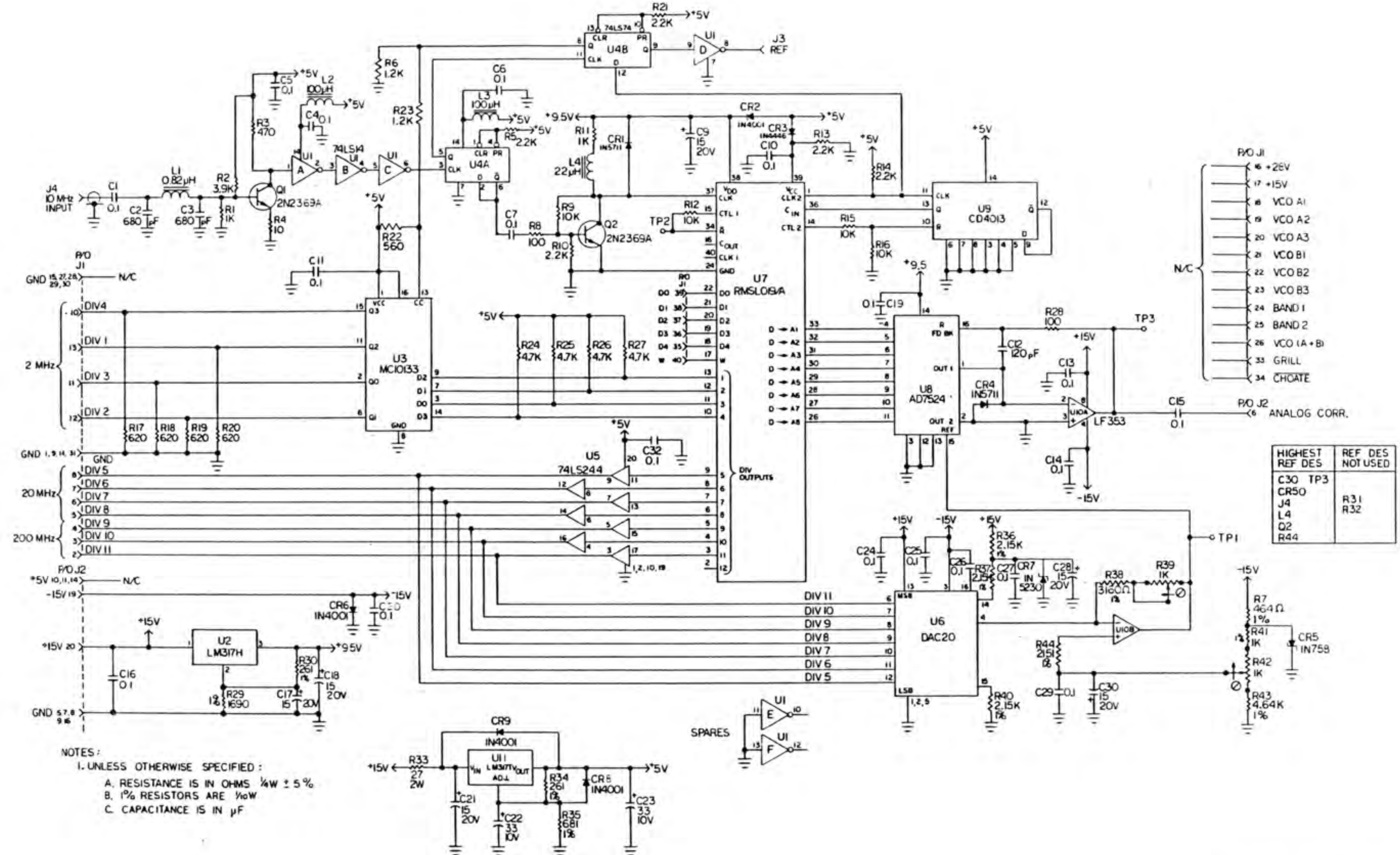


Figure 7-11. Digiphase Processor (A5A3) Schematic Diagram

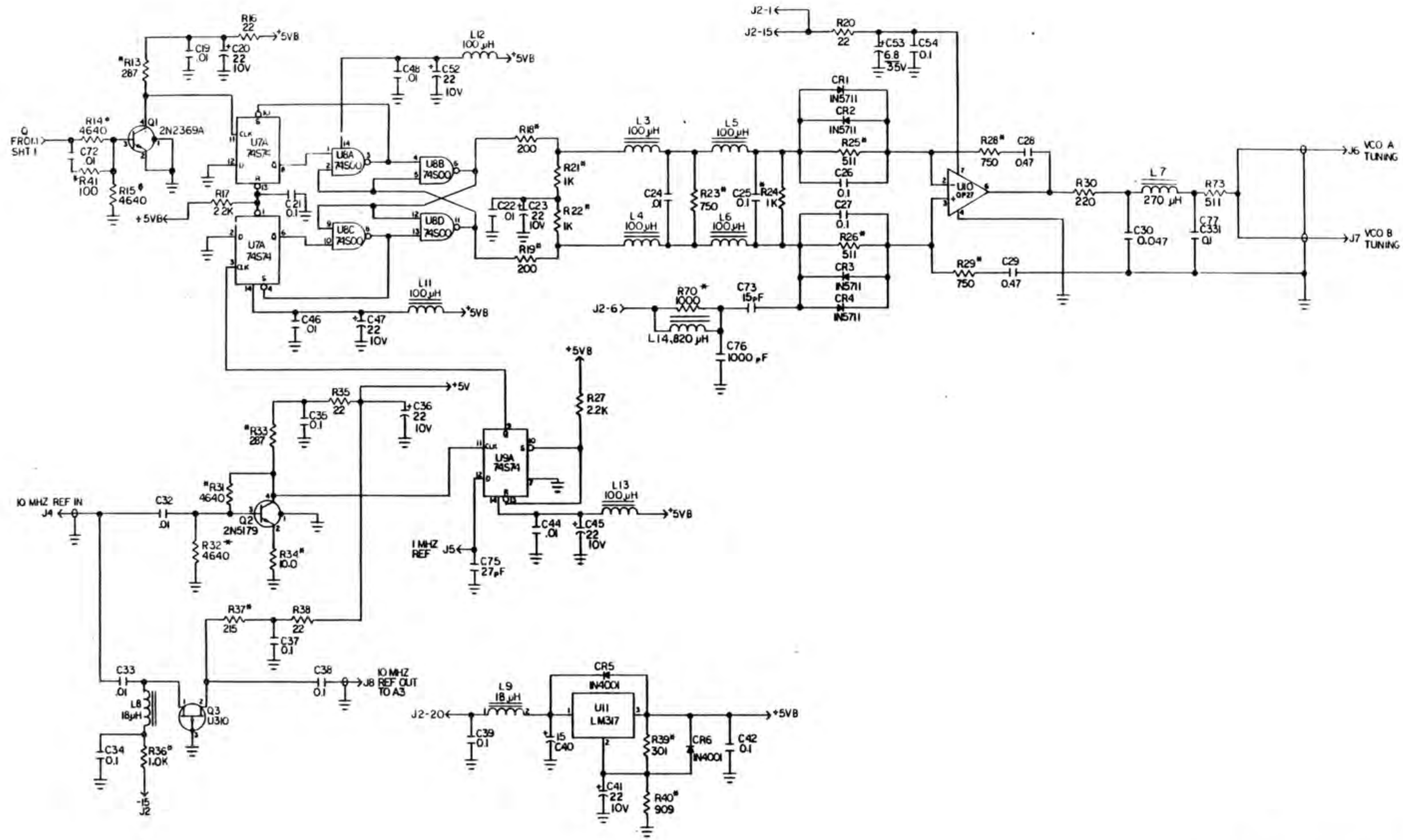
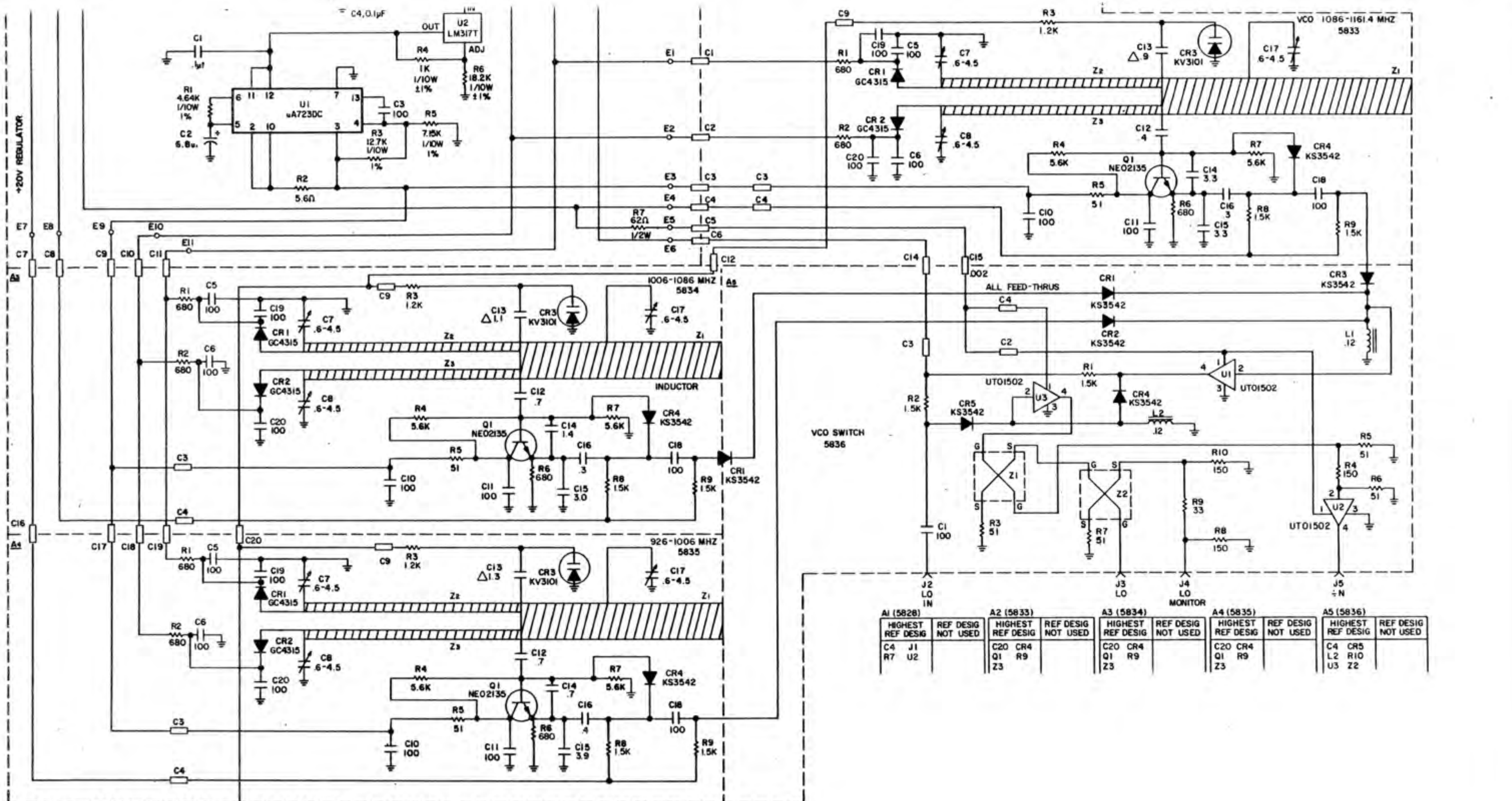


Figure 7-12. Programmable Divider (A5A4) Schematic Diagram (sheet 2)



A1 (5828)

HIGHEST REF DESIG	REF DESIG NOT USED
C4 J1 R7 U2	

A2 (5833)

HIGHEST REF DESIG	REF DESIG NOT USED
C20 CR4 Q1 R9 Z3	

A3 (5834)

HIGHEST REF DESIG	REF DESIG NOT USED
C20 CR4 Q1 R9 Z3	

A4 (5835)

HIGHEST REF DESIG	REF DESIG NOT USED
C20 CR4 Q1 R9 Z3	

A5 (5836)

HIGHEST REF DESIG	REF DESIG NOT USED
C4 CR5 L2 R10 U3 Z2	

NOTES:
4. △ FACTORY SELECTED NOMINAL VALUE.

NOTES:
1. ALL RESISTORS 1/8W ±5% UNLESS NOTED
2. ALL CAPACITOR VALUES IN PICOFARADS UNLESS NOTED.
3. ALL INDUCTOR VALUES IN MICROHENRYS UNLESS NOTED.

VCO "B" (5837)

HIGHEST REF DESIG	REF DESIG NOT USED
C20 CR1 J5 A5	

Figure 7-13. VCO B (A5A5), Schematic Diagram

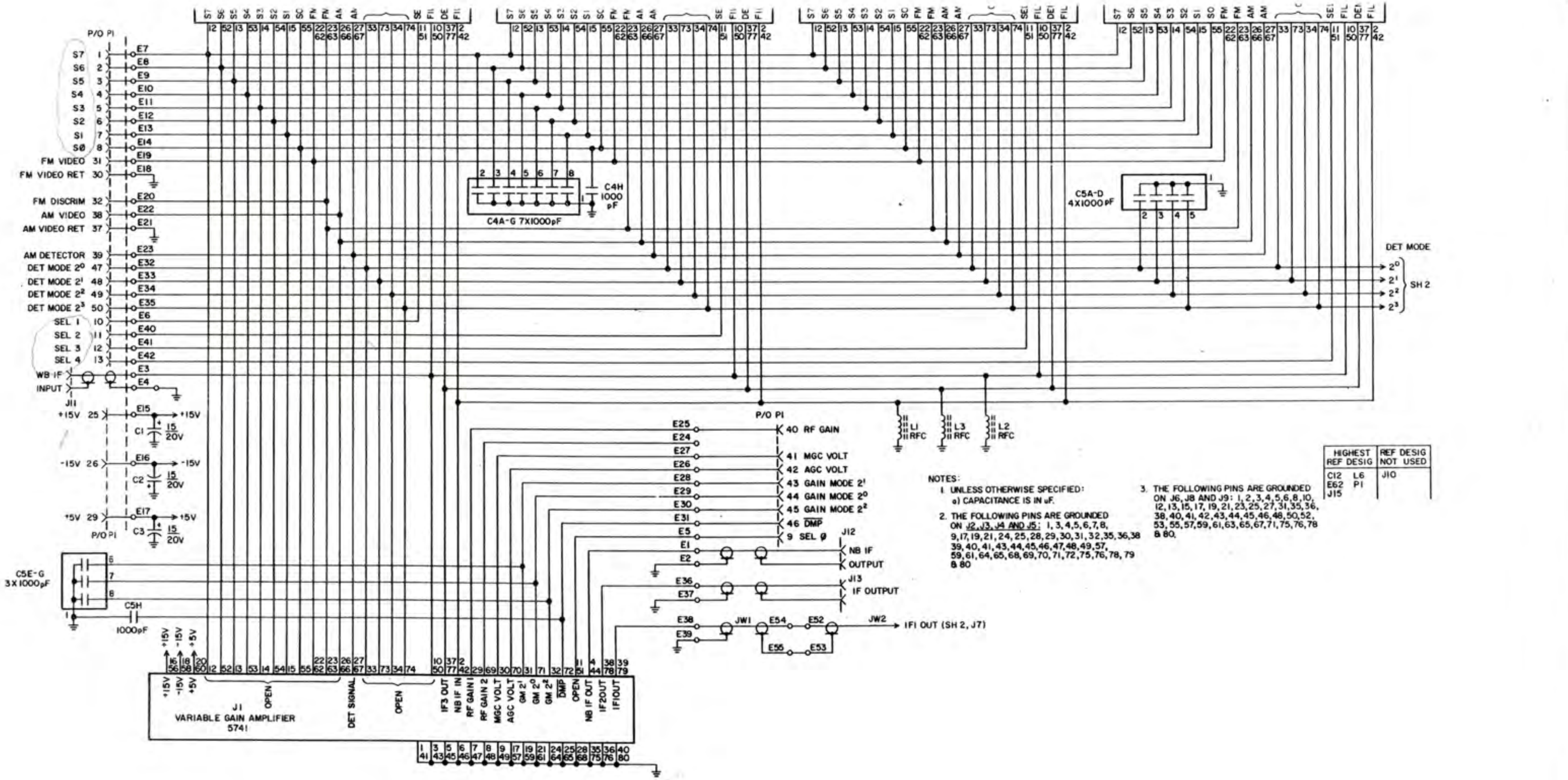


Figure 7-14. IF Mother Board Assembly (A6A1) Schematic Diagram (sheet 1)

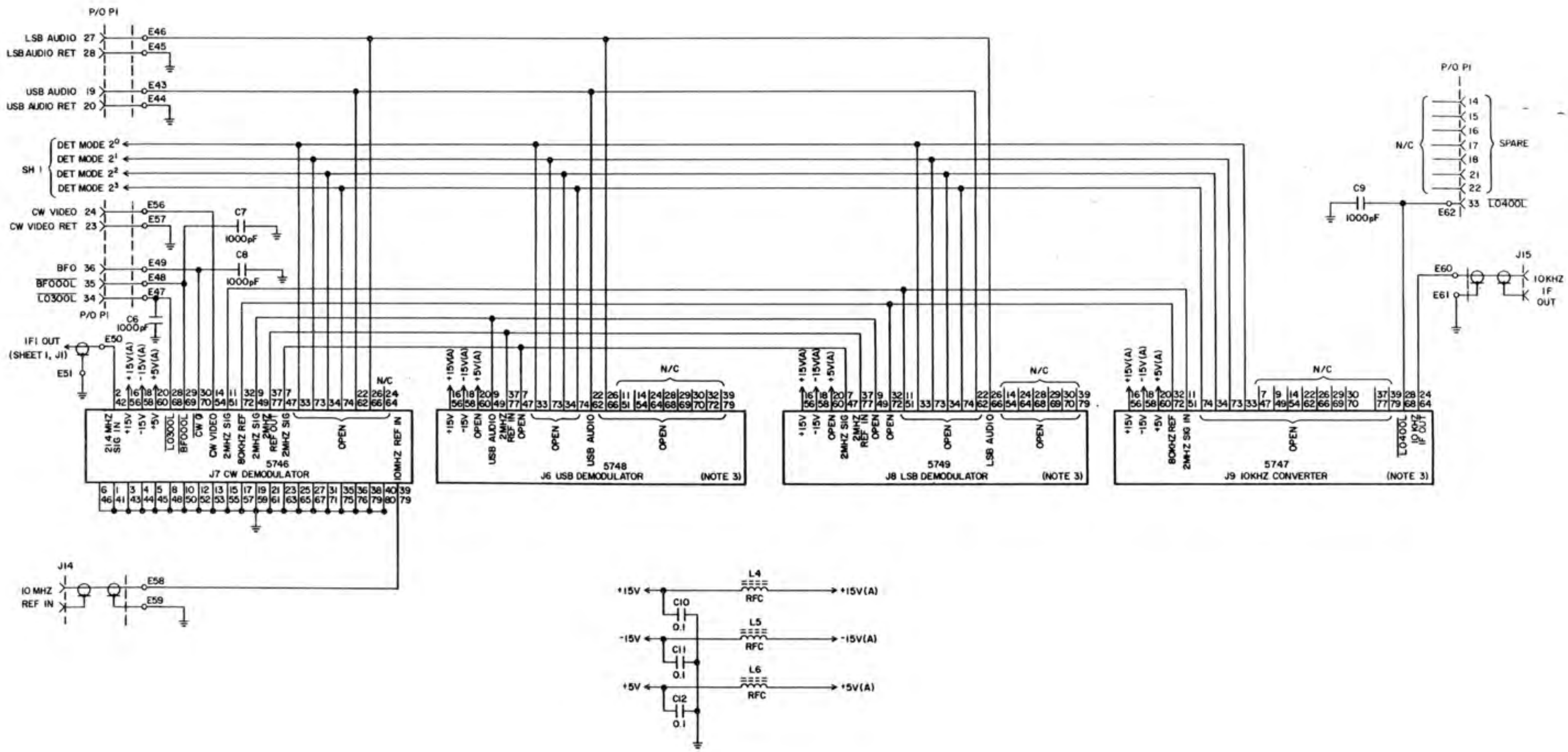


Figure 7-14. IF Mother Board Assembly (A6A1) Schematic Diagram (sheet 2)

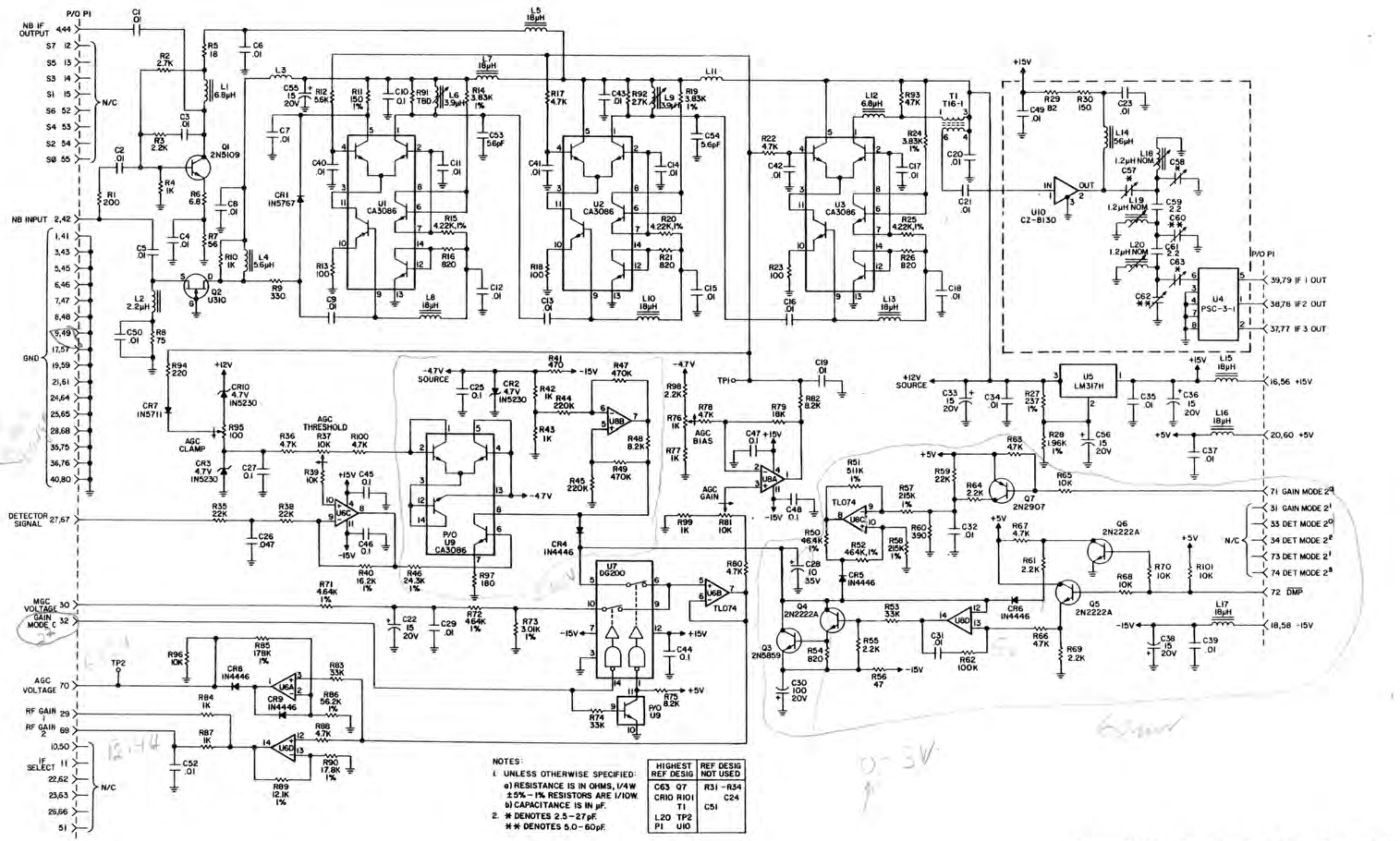
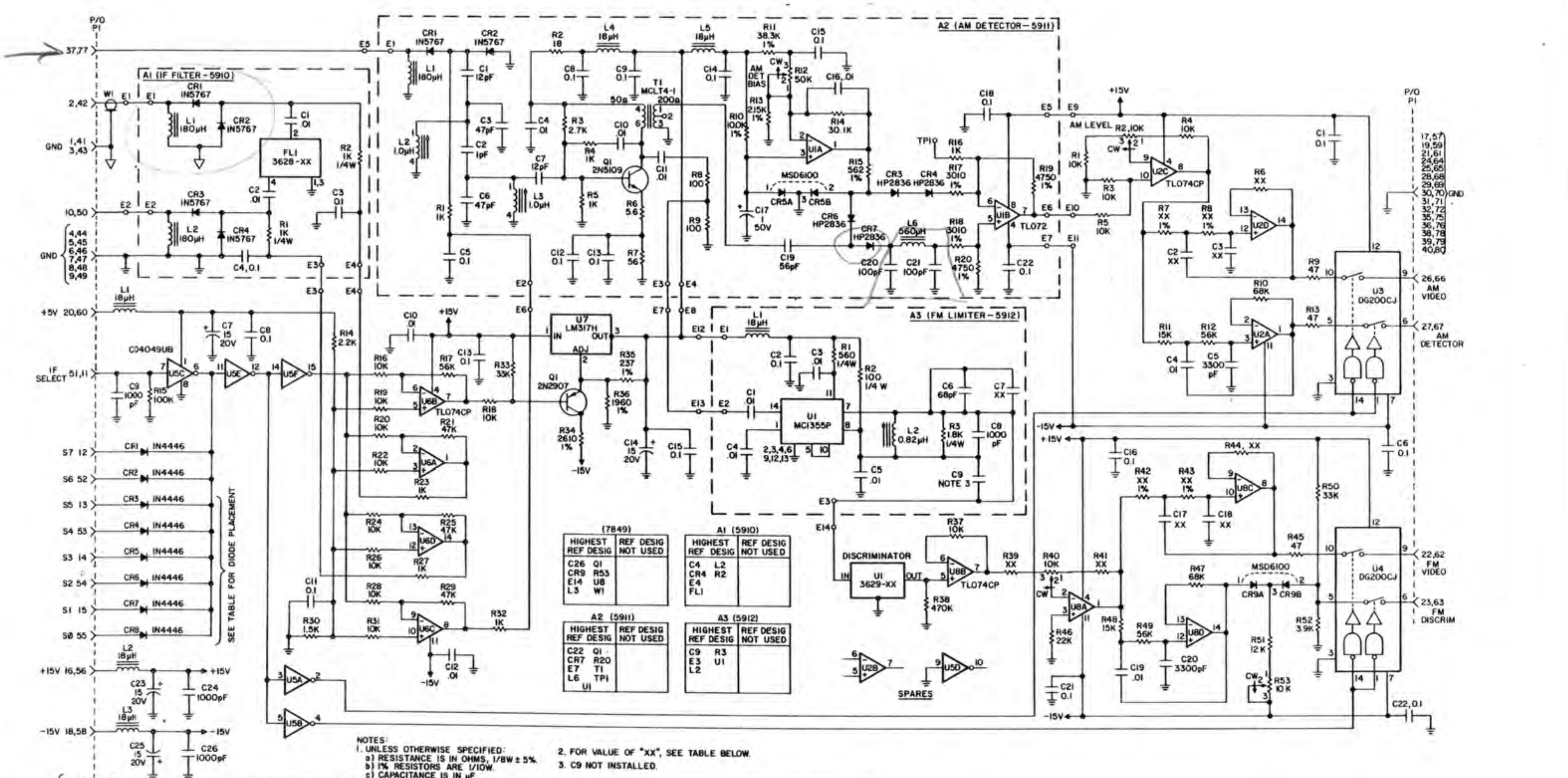


Figure 7-15. Variable Gain Amplifier (A6A2) Schematic Diagram

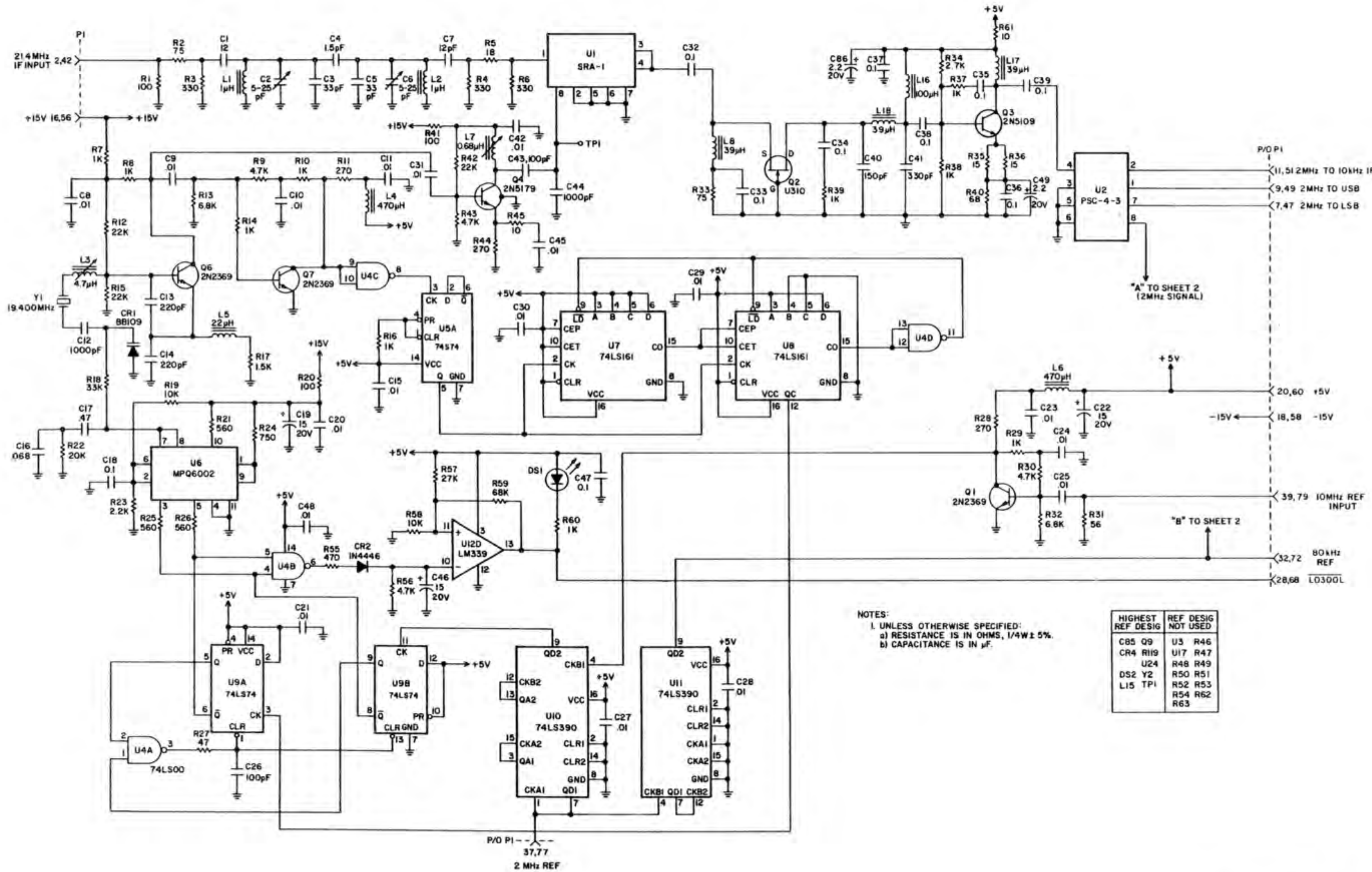


NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, 1/8W ± 5%.
   b) 1% RESISTORS ARE 1/10W.
   c) CAPACITANCE IS IN μF.
2. FOR VALUE OF "XX", SEE TABLE BELOW.
3. C9 NOT INSTALLED.

DASH #	BAND-WIDTH	C2	C3	C17	C18	CR3	CR4	CR5	CR6	CR7	CR8	R6	R7	R8	R39	R41	R42	R43	R44	U1	A1FL1	A3C7	
-10	10kHz	3300 pF	1000 pF	3300 pF	1000 pF	√	N/U	√	√	√	√	22K	4220	17.8K	4.7K	68K	4220	17.8K	22K	-13	-10	18pF	
-13	20kHz	3300 pF	1000 pF	3300 pF	1000 pF	√	N/U	√	√	N/U	N/U	12K	2150	9090	10K	68K	2150	9090	12K	-13	-13	18pF	
-17	50kHz	1000 pF	330 pF	1000 pF	330 pF	√	N/U	√	N/U	N/U	N/U	12K	2870	11.0K	4.7K	39K	2870	11.0K	12K	-20	-17	N/U	
-20	100kHz	1000 pF	330 pF	1000 pF	330 pF	√	N/U	N/U	√	N/U	√	6.8K	1470	5620	10K	39K	1820	6810	6.8K	-20	-20	N/U	

Figure 7-16. IF Filter Amplifer (A6A3-A6A6) Schematic Diagram

Courtesy of http://BlackRadios.terryo.org



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, 1/4W ± 5%.
b) CAPACITANCE IS IN µF.

HIGHEST REF DESIG		REF DESIG NOT USED	
C85	Q9	U3	R46
CR4	R119	U17	R47
	U24	R48	R49
DS2	Y2	R50	R51
L15	TP1	R52	R53
		R54	R62
		R63	

Figure 7-17. CW Demodulator (A6A7) Schematic Diagram (sheet 1)

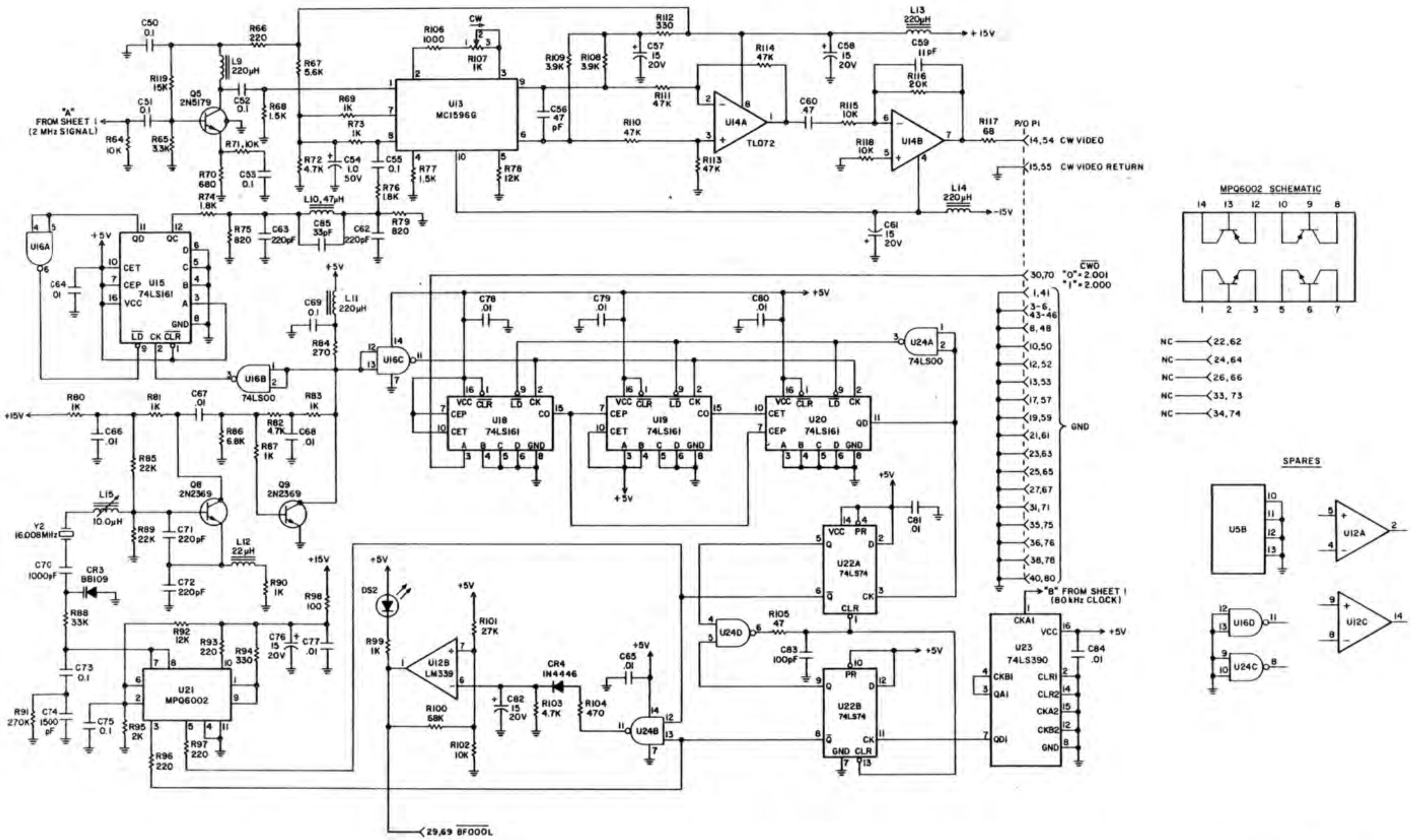
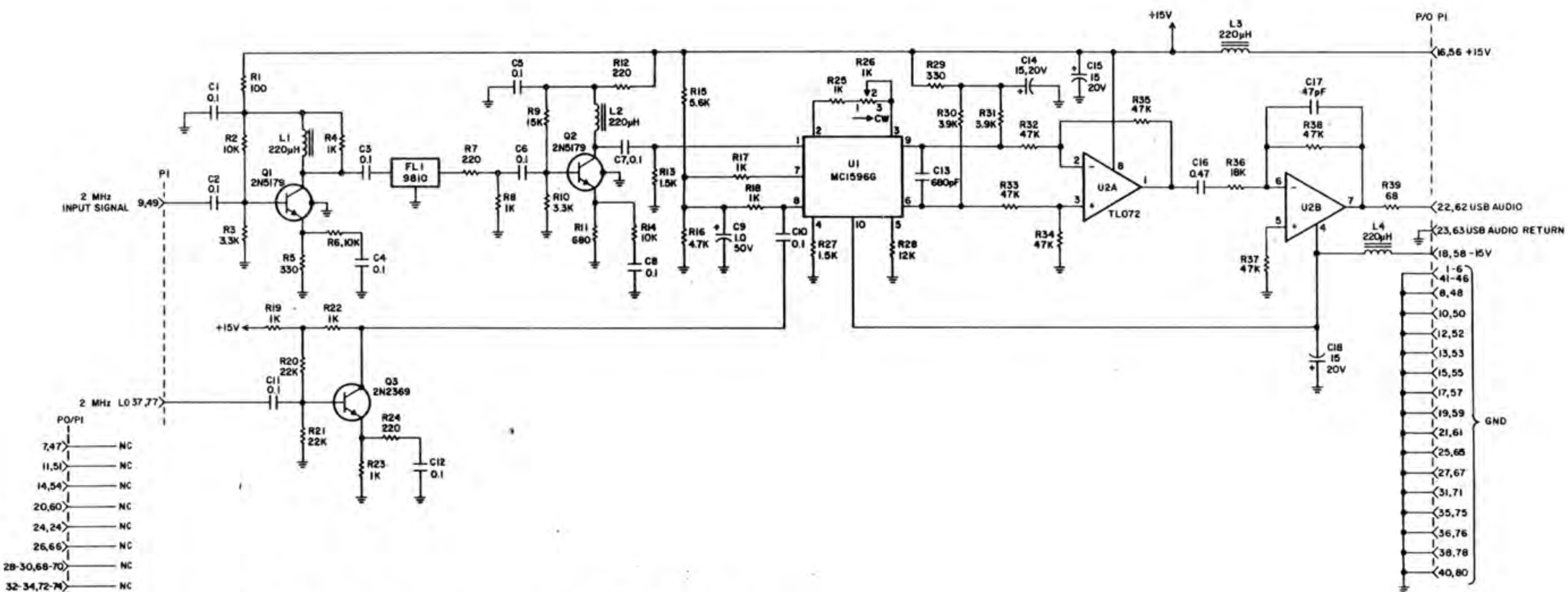


Figure 7-17. CW Demodulator (A6A7) Schematic Diagram (sheet 2)

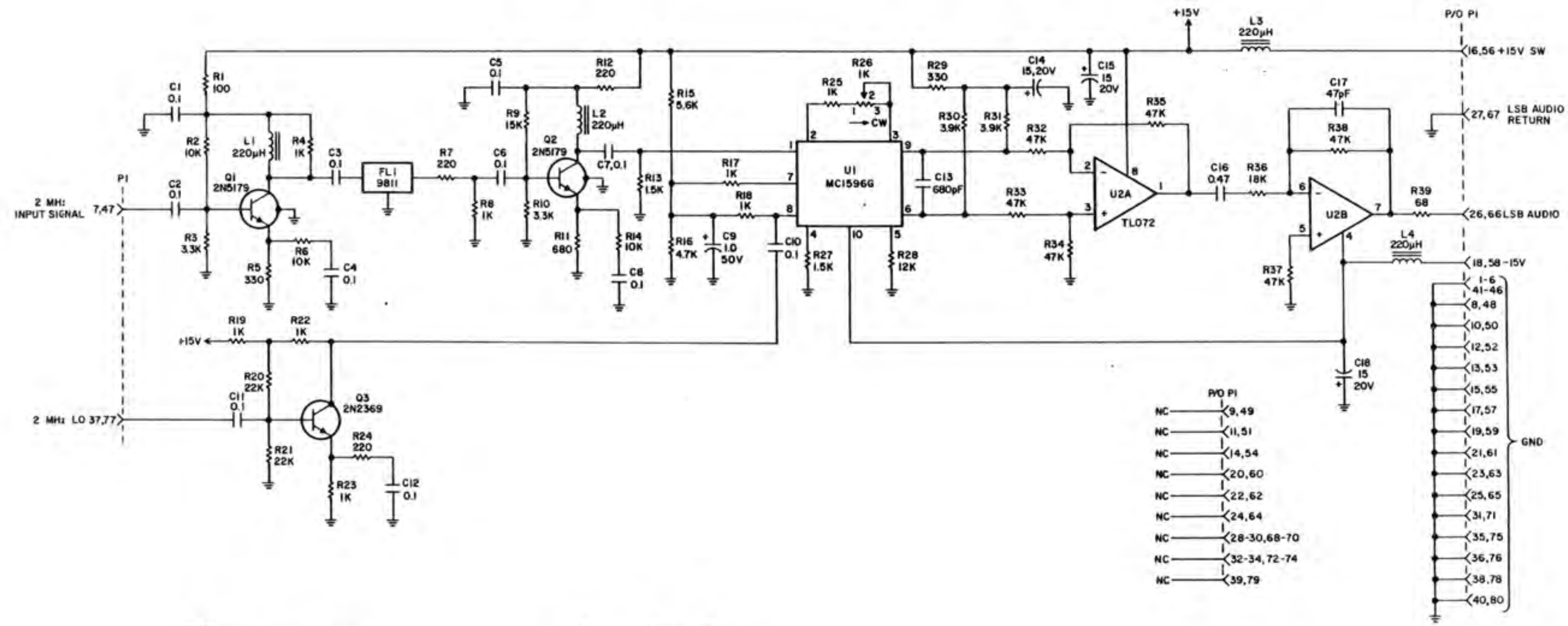


NOTES:

1. UNLESS OTHERWISE SPECIFIED;
   a) RESISTANCE IS IN OHMS, 1/4W ± 5%.
   b) CAPACITANCE IS IN μF.

HIGHEST REF DESIG	REF DESIG NOT USED
C18 Q3	
FL1 R39	
L4 U2	

Figure 7-18. USB Demodulator (A6A8) Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED;
a) RESISTANCE IS IN OHMS, 1/4W ±5%.
b) CAPACITANCE IS IN µF.

HIGHEST REF DESIG		REF DESIG NOT USED
C18	Q3	
FL1	R39	
L4	U2	

Figure 7-19. LSB Demodulator (A6A9) Schematic Diagram

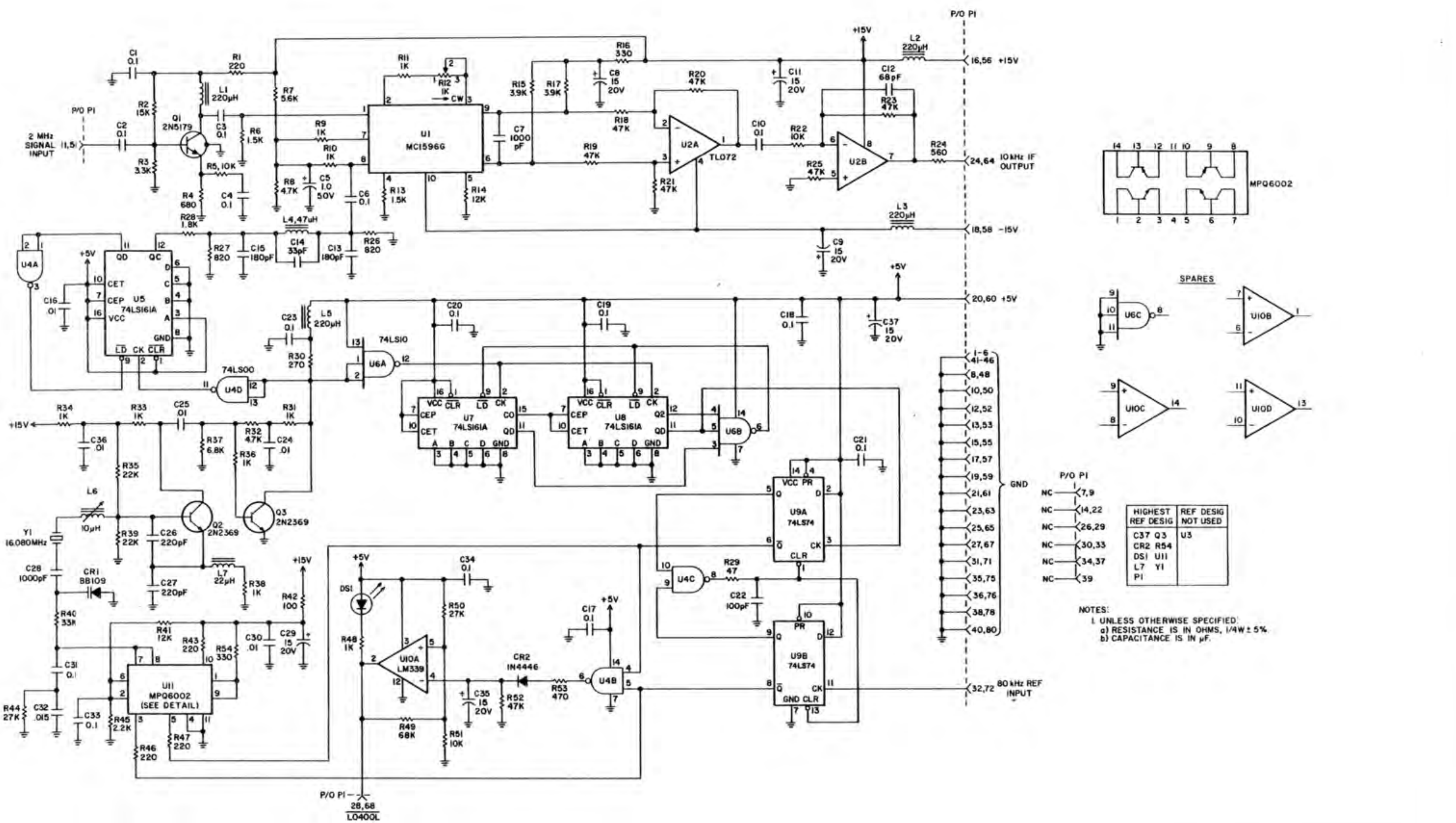


Figure 7-20. 10 kHz Converter (A6A10) Schematic Diagram

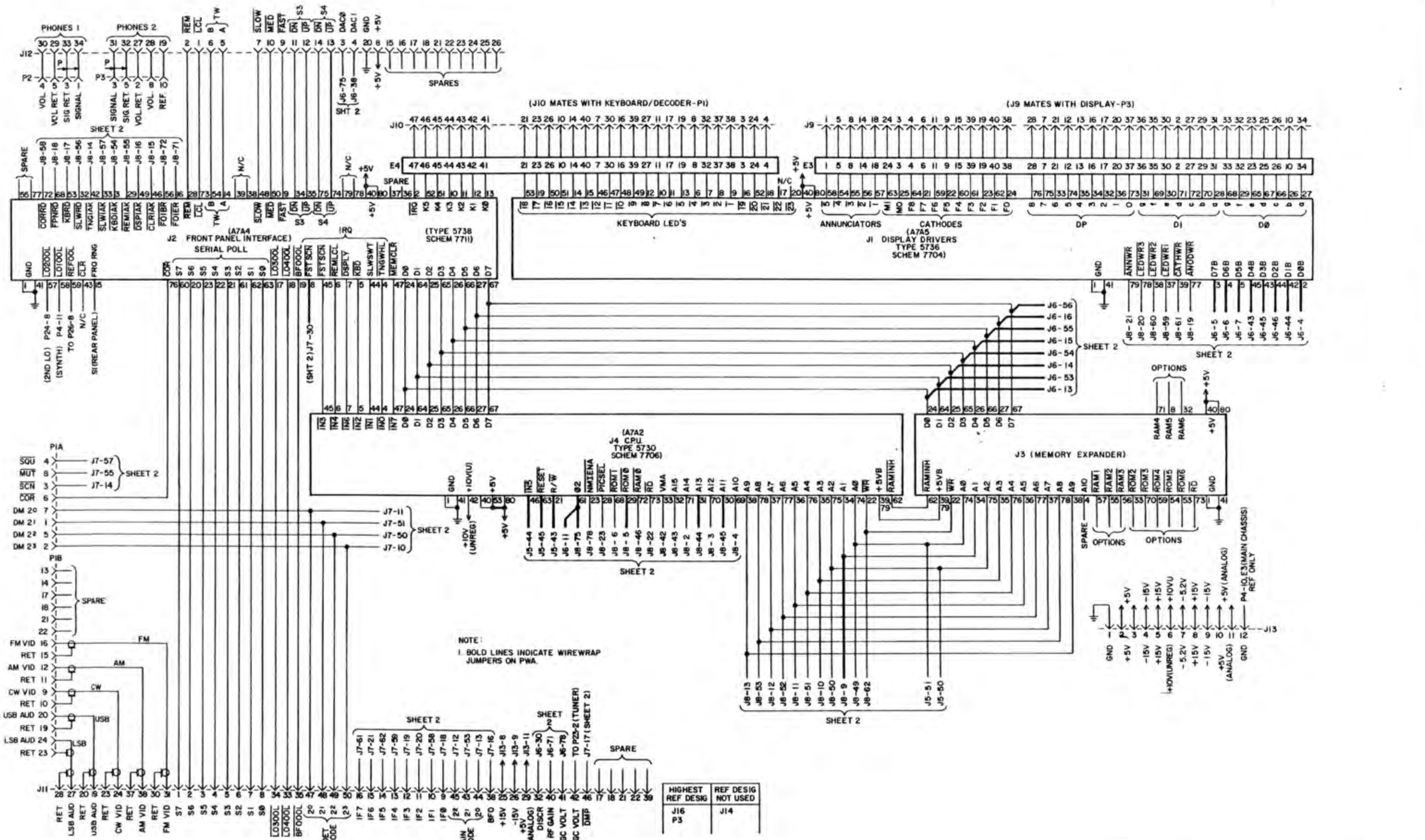


Figure 7-21. Receiver Control Mother Board (A7), Schematic Diagram (sheet 1)

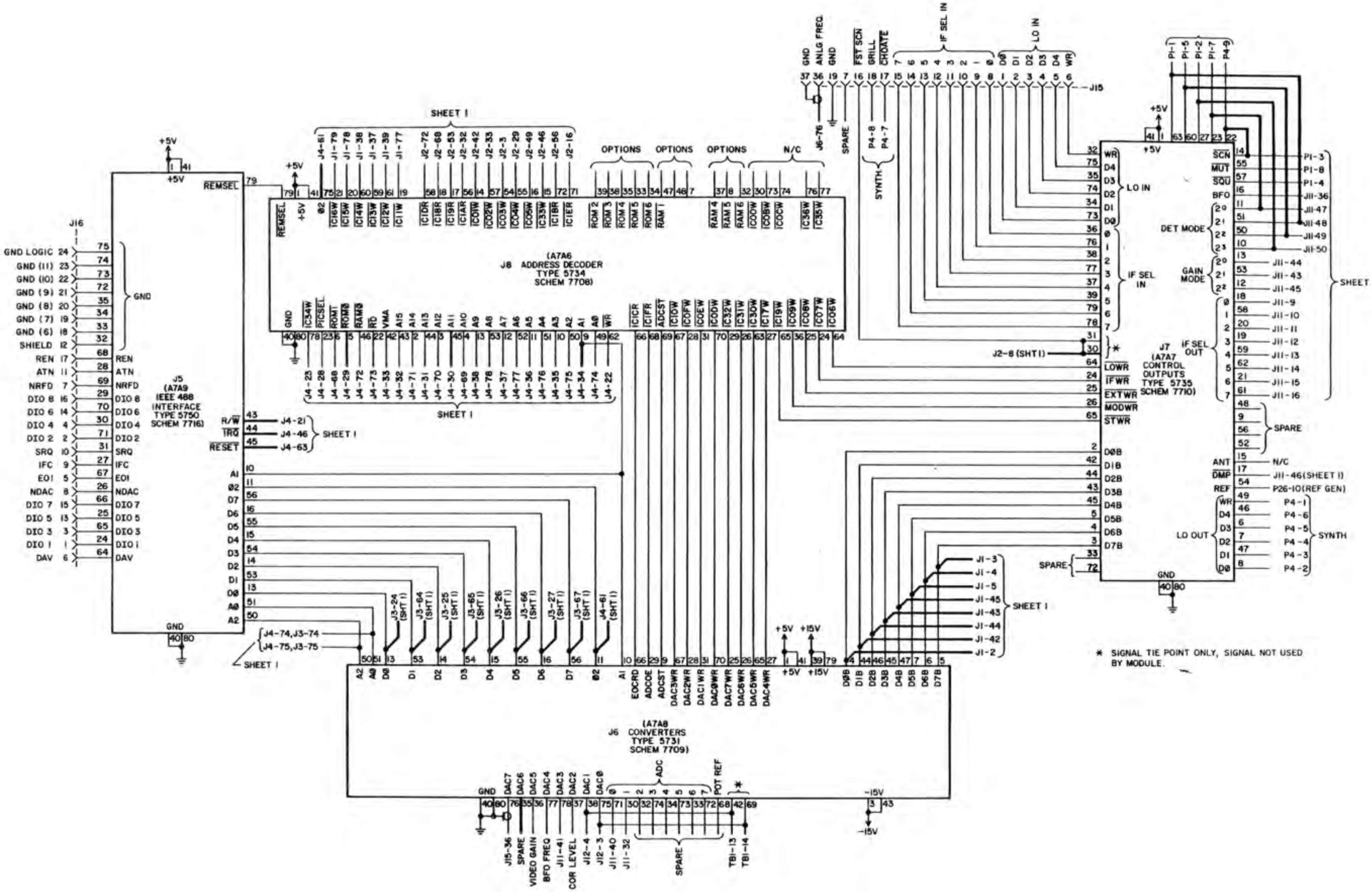


Figure 7-21. Receiver Control Mother Board (A7), Schematic Diagram (sheet 2)