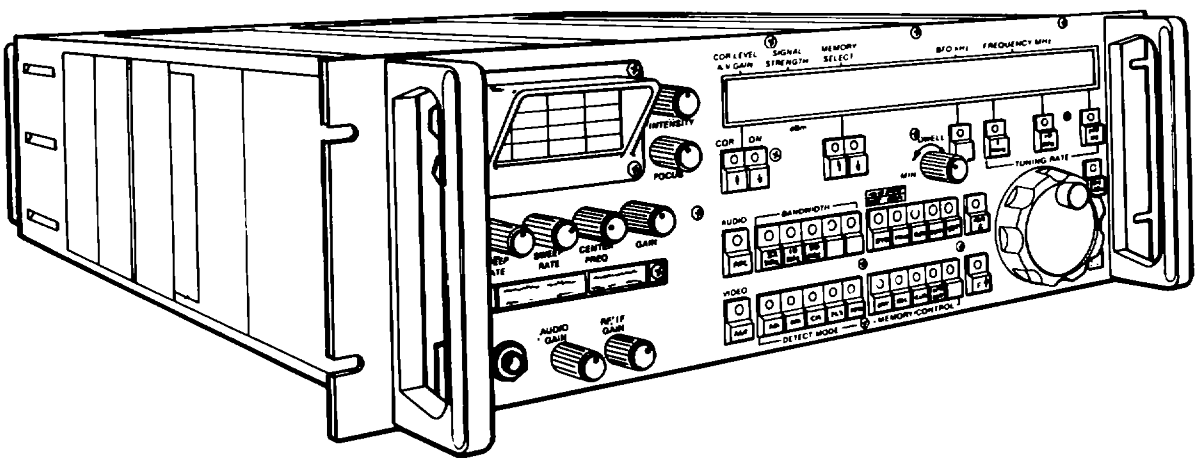
TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL



RECEIVER, RADIO R-231 1/G (NSN 5820-01-204-0283)

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HEADQUARTERS, DEPARTMENT OF THE ARMY

1 MARCH 1988

SAFETY SUMMARY

The Receiver uses voltages which may be fatal if contacted. Do not be misled by the term “Low Voltage”. Potentials as low as 50 volts may cause death under adverse conditions. Extreme caution should be exercised when working with this equipment. Death on contact may result if personnel fail to observe safety precautions.

1. Do not work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

2. Whenever possible, turn off the power supply to the equipment before beginning maintenance on the equipment.

3. Do not remove the protective covers to the equipment unless you are authorized to do so.

4. When the technicians are aided by operators, they must be warned about dangerous areas. A periodic review of safety precautions in TB 3854, Safety Precautions for Maintenance of Electrical/Electronic Equipment, is recommended.

5. Seek advice from your supervisor whenever you are in doubt about electrical safety conditions.

6. For Artificial Respiration, refer to FM 21-11.

This equipment utilizes voltages which are potentially dangerous and may be fatal if contacted. Exercise extreme caution when working with the equipment with any protective cover removed.

PROPRIETARY STATEMENT

Technical Manual

No. 11-5820-936-14-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 1 March 1988

Operator's, Organizational,
Direct Support and General Support
Maintenance Manual

RECEIVER, RADIO R-2311/G
(NSN 5820-01-204-0283)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, NJ 07703-5000. A reply will be furnished direct to you.

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SECTION 0

INTRODUCTION

0.1 SCOPE

0.1.1 TYPE OF MANUAL

This Receiver manual is an Operator's, Organizational, Direct Support and General Support Maintenance commercial manual.

0.1.2 MODEL NUMBERS AND EQUIPMENT NAMES

The Receiver, Radio R-2311/G, is part of the Receiver Set, Radio AN/TRQ-37. In this manual, the receiver will be referred to as the receiver, or by its manufacturer's model number, WJ-8617B-5 or WJ-861XB. A complete cross reference of common equipment names and nomenclatures used in this manual is provided in paragraph 0.7.

0.1.3 PURPOSE OF EQUIPMENT

As part of the radio receiving set, the receiver tunes in rf signals from the direction finder antenna in the AM, FM, and CW modes. It also provides a digital readout of the tuned frequency and provides audio output for a headset, speaker assembly or recorder. The receiver contains a signal monitor which provides a visual waveform display of the tuned frequency and aids in fine tuning the signal. The receiver also provides an input signal to the df processor for determination of the line-of-bearing (LOB) of the tuned signal.

0.2 CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS

Refer to the latest issue of DA Pam 25-30 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

0.3 MAINTENANCE FORMS, RECORDS, AND REPORTS

0.3.1 REPORTS OF MAINTENANCE AND UNSATISFACTORY EQUIPMENT

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in Maintenance Management Update.

0.3.2 REPORT OF PACKAGING AND HANDLING DEFICIENCIES

Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/ NAVMATINST 4355.73B/AFR 400-54/MCO 4430.3H.

0.3.3 DISCREPANCY IN SHIPMENT REPORT (DISREPXSF 361)

Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/ NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

0.4 DESTRUCTION OF ARMY ELECTRONICS MATERIEL

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

0.5 ADMINISTRATIVE STORAGE

Administrative storage of equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness. Preparation of equipment for shipment or limited storage is covered in paragraph 2.4.

0.6 TOOLS AND TEST EQUIPMENT

Refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit for tools used in the maintenance of the receiver. Test equipment required for troubleshooting and maintenance of the receiver is listed in paragraph 4.4.

0.7 OFFICIAL NOMENCLATURE, NAMES, AND DESIGNATIONS

The list below will help you identify the official nomenclature of the major equipment items used with the receiver. It also provides the common name used in the manual when it is different from the official nomenclature. Official nomenclature must be used when completing forms or when looking up technical manuals.

Common Name	Official Nomenclature
Antenna, WJ-9880-4	Antenna, AS-3778/G
Direction Finder, WJ-8971A-6 ID-2380/G	Direction Finder - Indicator
Headset	Headset, Type H-251/U
Receiver, WJ-8617B-5 or WJ-861XB	Receiver, Radio R-2311/G
Signal Monitor, WJ-794103-1	N/A
Radio Receiving Set	Receiver Set, Radio AN/TRQ-37

0.8 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS

If your receiver needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communication-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, NJ 07703-5000. We'll send you a reply.

0.9 WARRANTY INFORMATION

The receiver is warranted by Watkins-Johnson Company for a period of 1 year following delivery. It starts on the date found in block 23, DA Form 2408-9, in the logbook. This warranty may contain repair restrictions. Report all defects in material or workmanship to your supervisor.

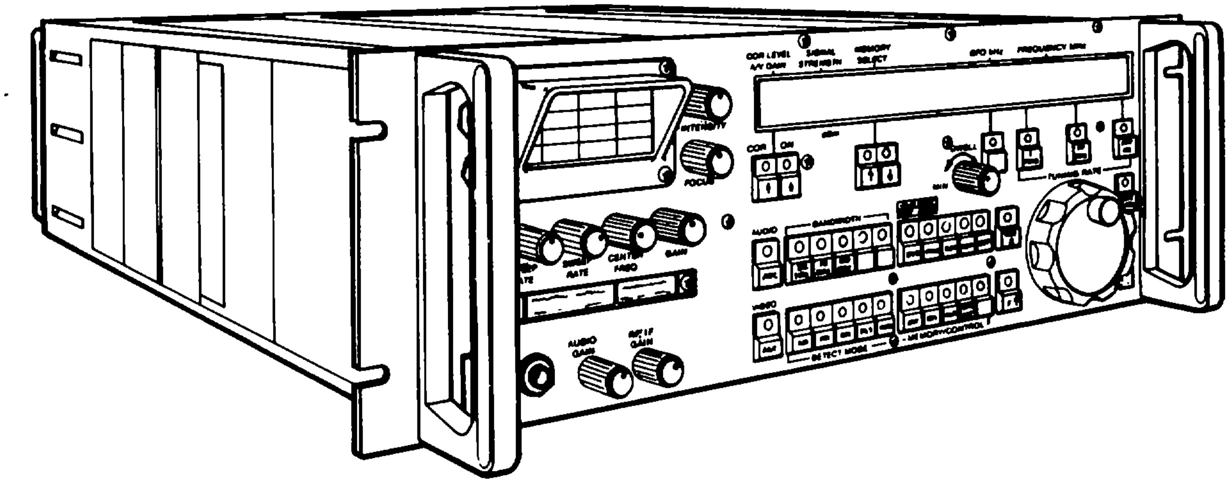


Figure 1-1. Type WJ-8617B-5 VHF/UHF Receiver

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL CHARACTERISTICS

The WJ-8617B-5 VHF/UHF Receiver is a fully synthesized, digitally controlled receiver, designed to operate in the VHF/UHF frequency range. It receives AM, FM, and PULSE emissions over a frequency of .9 to 500 MHz. The receiver is capable of manual operation, utilizing the front panel controls and automatic operation, utilizing the built-in microprocessor and 16 channel memory. Remote control capabilities can also be incorporated utilizing an optional IEEE-488 bus. During the manual operating mode, all receiver functions are controlled by the front panel controls. The operating parameters are selected by pressing the appropriate front panel pushbutton. When pressed, an illuminated LED on the button indicates the selection.

A built-in memory provides 96 operator-programmable memory channels in the Manual and Step modes or 48 programmable frequency search bands in the Scan mode. The memory controls all receiver functions including Tuned Frequency, Antenna Selection, IF Bandwidth, Detection Mode, COR level, AGC ON/OFF, and AFC ON/OFF. In the manual mode, the operator has full control of all receiver functions. In the step mode, the built-in microprocessor directs the receiver to step to each frequency stored in the memory channels in search of signal activity. In the scan mode, the microprocessor directs the receiver to search the operator-programmed bands for signal activity.

Internal frequency tuning circuitry of the WJ-8617B-5 receiver includes the first and second LO synthesizers. The synthesizers determine the tuned frequency to a resolution of 100 Hz. A tuning knob on the front panel and three tuning rate pushbuttons provide tuning capability. Tuning can be performed in 1 MHz, 10 kHz, or 100 Hz steps by selecting the appropriate tuning rate button. Pressing the Disable button locks the receiver to the selected frequency and disables the tuning knob, to prevent accidental frequency changes.

A 150 Hz recognition circuit is contained in the Digital Control Section (A5) for activation of the receiver's audio and COR circuitry. The 150 Hz recognition circuit operates only in the FM detection mode. Direction Finder control provides a control line alerting the WJ-8917A-6 Direction Finder that the receiver has switched phase sense due to a band change.

Ease of maintenance and flexibility is provided by the modular design concept. Nearly all functional modules plug directly into the motherboards and the connections are accessible from the bottom of the receiver, with the bottom panel removed.

1.2 MECHANICAL CHARACTERISTICS

The receiver is mounted in a standard 19-inch equipment rack, occupies 5.25 inches of vertical space and extends 19.9 inches into the rack. The main chassis top, bottom, front, rear, and internal compartment panels are constructed of aluminum. Except for the Line Audio control, which mounts on the rear panel, all operating controls are mounted on the front panel, while all input and output cables (except for the phone jack and optional tuning connector) connect to the rear panel.

A black bezel, etched with control markings, is mounted to the front panel. The pushbuttons, Display LEDs, dwell control, and Optional Tuning connector are mounted on a printed circuit board, positioned behind the front panel, and extend through cutouts in the front panel and bezel. All other controls (except for the ON/OFF Power Button) mount to the front panel. The power ON/OFF button mounts to the chassis and extends through the front panel and bezel.

The rear panel mounts all input and output connectors, except for the phone jack and Optional Tuning connector, mentioned above. N-type connectors provide the ANT 1 and ANT 2 inputs and a TNC connector is provided for the switched IF OUTPUT. All other connectors are BNC type. The REF SEL switch for selecting an internal or external timebase is mounted immediately above the 1 MHz reference input/output connector. Line Audio control, R3, which controls the rear panel audio output is mounted on the rear panel alongside the audio output connector. Two rear mounted fuse holders are provided. The rectangular holder mounts the operational line fuse while the circular holder is used to house the alternate line voltage fuse. Also mounted on the rear panel are four heat-sinked voltage regulators (for +15 V, -15 V and +5 V) and two rectifiers (for +9 V unregulated).

The top cover is held in place using quarter-turn fasteners. Loosening these fasteners permits removal of the top cover, exposing the five main compartments. The power distribution circuit, signal monitor assembly compartment, RF/IF modules, Digital I/O modules, and synthesizer modules are in separate compartments for mechanical support and shielding purposes. Removal of the top cover permits access to all plug-in modules. Removal of the bottom cover, held in place using quarter-turn fasteners, exposes the wideband IF amplifier and the three motherboards that mount plug-in modules. All connections to the motherboards are made with push-on plugs so that replacement of a motherboard consists of removal of mounting screws and the plugs.

1.3 EQUIPMENT SUPPLIED

The equipment supplied consists of the receiver, detachable line cord, and sub-assembly extender cards.

1.4 EQUIPMENT REQUIRED BUT NOT SUPPLIED

To obtain full use of the receiver, equipment from the following list should be selected:

1) Direction Finder Antenna
2) Two antennas, 50-ohm
3) Audio monitoring equipment
   - speaker panel, 600-ohm
   - headphones set, 600-ohm
   - tape recorder
4) Direction Finder Processor

Table 1-1. WJ-8617B-5 VHF/UHF Receiver, Specifications

Frequency Range

WJ-8617B-5	5 - 500 MHz
Detection Modes	AM FM, CW and Pulse standard; Variable BFO and SSB optional (other modes are available on special order)
Tuning Scheme	Frequency synthesized local oscillators locked to internal reference
Reference Accuracy	1 part in 107 or external 1 MHz reference input
Tuning Resolution	100 Hz
Synthesizer Tuning Speed	3 msec typical, 10 msec maximum
Input Impedance	50 ohms
Input VSWR	2.5:1 Typical; 3.0:1 Maximum
Noise Figure	9.5 dB typical, 11 dB maximum
Third Order Intercept Point	+8 dBm typical +3 dBm minimum (20-500 MHz) 0 dBm typical, -5 dBm minimum (500-1100 MHz)
Second Order Intercept Point	+50 dBm, minimum
Ultimate FM (S+N)/N	40 dBm minimum in 50 kHz BW
Oscillator Phase Noise	-105 dBm typical (20 kHz from the carrier)
Preselection	Automatically switched, suboctave (1.66:1) bandpass filters
LO Radiation	-100 dBm typical
Image Rejection	90 dB minimum
IF Rejection	90 dB minimum
Internal Spurious	Equivalent to -115 dBm maximum at the RF input
Reciprocal Mixing	With an input signal at a rated sensitivity level; an out-of-band signal removed 350 kHz in the 20 kHz IF bandwidth at a level of 70 dB above rated sensitivity will not degrade the desired output signal ratio (S-N)/N by more than 3 dB
IF Bandwidths	3 IF Bandwidths (to be selected from Table 1)
IF Shape Factor	See Table 1
Final IF	21.4 MHz, -30 dBm Nominal Output Level

Available Bandwidths and Rated Sensitivity

Bandwidth (kHz)	Max Shape Factor 3:60 Db	Sensitivity (dBm)
3.2	3:1	
10	3:1	-104
50	3:1	-97

Table 1-1. WJ-8617B-5 VHF/UHF Receiver, Specifications (Continued)

AM Stability	6 dB maximum from AGC threshold to a level 100 dB above AGC threshold maximum input -5 dBm)
Switched Video Output	1 volt peak-to-peak; nominal, into 91 ohm load for FM with peak frequency deviation at 30% of the IF Bandwidth and AM with 50% modulation. DC coupled for FM and AM
FM Monitor	DC coupled FM output, 1 volt peak-to-peak minimum, into 91 ohm load
Video Amplifier Frequency Response	DC to 1/2 IF Bandwidth for FM monitor; DC to 1/2 IF Bandwidth for AM/FM switched video output
Line Audio Output	10 mW, minimum, into 600 ohms for 50 % AM or FM peak frequency deviation equivalent to 30% of the IF bandwidth
Audio Amplifier Distortion	2.5% typical, 3% maximum
COR/Squelch	Adjustable threshold from noise level to approximately 40 dB above noise. COR provides 100 mA current "sink-to-ground" for switching; +24 Vdc maximum external voltage (external current limiting must be provided)
Signal Monitor (Optional)	
Sweep Width	0-4 MHz continuously adjustable
Resolution...	10 kHz
Sweep Rate	Adjustable to 15-25 Hz
Marker	Center frequency (locked to receiver frequency standard)
Display	Lin/Log
CRT	1 x 3 inches nominal dimensions
PAN	Provides pan display during SCAN mode with optional digitally refreshed display (DRD)
Temperature Range:	
Operating...	0°C to 500C
Non-Operating	-200C to 800C
Power Requirement	110, 120/220, 24 Vac, 47-400 Hz,
nominal..	100 Watts
Dimensions	19-inch rack mount, 18 inch depth, excluding connectors and handles, and 5.25 inch panel height
Weight	50 pounds, approximately

SECTION II

INSTALLATION AND OPERATION

2.1 UNPACKING AND INSPECTION

Examine the shipping carton for damage before the equipment is unpacked. If the carton's exterior appears to be damaged, try to have the carriers agent present when the equipment is unpacked. If this is not possible, retain all packing material and shipping containers for the carrier's inspection if damage to the equipment is evident after it has been unpacked. Also, verify that the equipment is complete as listed on the packing slip. Contact the Watkins-Johnson Company or your Watkins-Johnson representative for any discrepancies or shortages.

2.2 INSTALLATION

The receiver is designed for mounting in a standard 19-inch equipment rack. It occupies 5.25 inches of vertical rack space and extends approximately 19.5 inches into the rack to the tips of the rear protective handles. Do not rely solely on front panel mountings to support the receiver. The use of Jonathan Type QD110 slides, mounted to the sides of the receiver, is preferred and acceptance mounting holes are provided. The rack should allow a free flow of air through the top and bottom covers and the side panels, as well as around the outer surfaces of the receiver. A 1.75 inch space above and below the unit is recommended for rack mount configuration, along with forced air convection.

Prior to installing the receiver at its final location, DIP switch S1 on the Synthesizer Interface (A5A2) should be inspected for proper switch configuration. This switch is located at the upper edge of the Synthesizer Interface subassembly and is accessible by removing the top cover of the receiver. The switch settings listed in Table 2-1 are used to configure the receiver software to automatically switch between the ANT 1 and ANT 2 inputs at specific frequencies and to recognize the installation of the FE Option (500-1100 MHz frequency extender). Refer to Table 2-1 as a guide to setting this switch.

Access to the rear panel should be allowed so that input and output connections can be made or changed conveniently, if desired.

The front and rear panel connections are described in Table 2-2. As a reference for the panel connectors, refer to Figure 2-1.

NOTE

Before power is applied to the unit be sure that the selected line voltage for the receiver matches the line voltage being used.

Table 2-1. Synthesizer Interface Switch Configurations

Switch S1 on A5A2

6 5 4 3 2 1	Description
1- - - - - *	Frequency Range 20-1100 MHz
0 - - - - *	Frequency Range 20-500 MHz
- 1-- -	Single Sideband
- 0 - - --	Not Used
- -0000 0 0	Antenna Switches only by Front Panel Button
- - 0 0 0 1	Antenna Switches at upperband of 1st Preselector 30 MHz
- - 0 0 1.0	Antenna Switches at upperband of 2nd Preselector 47 MHz
- - 0 0 11	Antenna Switches at upperband of 3rd Preselector 75 MHz
- - 0 1 0 0	Antenna Switches at upperband of 4th Preselector 120 MHz
- - 0 1 0 1	Antenna Switches at upperband of 5th Preselector 187 MHz
- - 0 11 0	Antenna Switches at upperband of 6th Preselector 292 MHz
- - 0 111	Antenna Switches at upperband of 7th Preselector 382 MHz
- - 1 0 0 0	Antenna Switches at upperband of 8th Preselector 500 MHz
- - 1 0 0 1	Antenna Switches at 700 MHz
- - 1 0 1 0	Antenna Switches at 900 MHz
- - 1 0 11	Antenna Switches at 233 MHz
*1 0 0 0 0 0	Normal Shipping Positions (with FE installed)
*0 0 0 0 0 0	Normal Shipping Positions (without FE installed)

Switch S2 on A5A2

87654321	
1 1 1 1 1 1 0 1	Post Dwell selected
1 1 1 1 1 1 1 0	Digital Audio/Video Gain Option selected (if installed)

NOTE: 1= OPEN
0 = CLOSED

Table 2-2. Table of Connectors

Connector	Function
ANT 1 ANTENNA INPUT	(Type-N) RF Input From #1 Antenna
ANT 2 ANTENNA INPUT	(Type-N) RF Input From #2 Antenna
J1 SW IF OUT (50 ohms)	(TNC) Selected Bandwidth IF Output
J2 FM MON	(BNC) FM Monitor Output (91 ohms)
J3 AUDIO	(BNC) AUDIO Output (600 ohms)
J4 SW VIDEO OUT	(BNC) AM/FM Video Output (91 ohms)
J5 SCAN OUT	(BNC) Scan Output
J6 X OUT	(BNC) SM Display Output
J7 Y OUT	(BNC) SM Display Output
J22 Z OUT	(BNC) 8 psec blanking pulse for external
display J81 MHz REF (BNC) 1 MHz Reference In/Out (50 ohms)	
J20 WB IF OUT	(BNC) Wideband IF Output (50 ohms)
J21 COR	(BNC) Carrier Operated Relay
REMOTE CONTROL	Remote Control Input/Output (optional)
A7J1 PHONES	Phone Output (Front Panel)
A6J1 OPTIONAL TUNING	Optional Tuning Input (Front Panel)
FLIJ1 Line Cord Receptacle and Voltage Selector	Power Input

2.2.1 CONNECTOR SIGNALS

2.2.1.1 Line Cord Receptacle And Voltage Selector Fuse Block

This multi-functioned assembly should always be inspected before installation of the receiver in a new location. With the line cord unplugged, the clear plastic window can be slid over the male power receptacle prongs. This exposes the line fuse and a hinged plastic fuse pull lever.

Swinging the lever to the left ejects the fuse from the holder and frees a line-voltage-select pc wafer, at the bottom of the assembly. Looking down on the pc wafer, at a slight angle, the selected line voltage for the receiver will show on the left side (either 100, 120, 220, 240 Vac). If the voltage shown does not match the available line voltage, remove the pc wafer and install it so that the closest line voltage is visible with the pc wafer in position. The pc wafer should be set in the voltage position closest to the line voltage being used. Then, install the fuse suitable for the line voltage: 1.5 ampere slow-blow for 100 Vac and 120 Vac or .75 ampere for 220 Vac and 240 Vac. Install the other fuse in the alternate fuse holder.

2.2.1.2 Antenna #1 Input ANT 1

This N-type connector provides the RF input signal from the #1 antenna. Nominal input impedance is 50 ohms.

2.2.1.3 Antenna #2 Input ANT 2

This N-type connector provides the RF input signal from the #2 antenna. Nominal input impedance is 50 ohms.

2.2.1.4 SW IF OUT J1

The switched IF output TNC connector supplies a -30 dBm IF signal into 50 ohms. The center frequency is 21.4 MHz with a bandwidth equal to the selected IF bandwidth.

2.2.1.5 FM MON J2

The FM Monitor BNC connector provides a DC coupled FM output. The level will be 2 volt peak-to-peak, minimum, into 91 ohms, for input signals with a peak deviation equal to the selected IF bandwidth.

2.2.1.6 Audio J3

This BNC connector provides a 600 ohm audio output. This output will drive a 600 ohm load at a level adjustable to 10 mW minimum. The output level is controlled by Line Audio Control R3.

2.2.1.7 SW Video Out J4

This Switched Video Output BNC connector provides a 1 volt peak-to-peak, minimum, video signal into a 91 ohm load. The output is an DC coupled AM or FM video signal, determined by the operation mode chosen.

2.2.1.8 OPT OUT J5

The Option Output Multipin connector provides output signals from the installed options as follows.

Pin	Signal	
1	ASO	Audio Scan Output
2	GND	
3	DFC	Direction Finder Control
4	GND	
5		
6	TX DATA	
7	GND	RS-232 Interface
8	RX DATA	
9		

2.2.1.9 X OUT J6

This BNC connector provides X axis signal monitor information to drive an external display.

2.2.1.10 Y OUT J7

This BNC connector provides Y axis signal monitor information to drive an external display.

2.2.1.11 Z OUT J22

This BNC connector provides an 8 usec blanking pulse to an external display to blank the display on retrace. A negative blanking pulse is standard and a positive pulse is optionally available.

2.2.1.12 1 MHz REF J8

With the REF SEL switch in the internal position, this BNC connector will provide a 1 MHz output with a level of 100 mV rms into 50 ohms. In the external position, a 1 MHz reference signal must be applied to J8 to provide a time base for the receiver. The level of the EXTERNAL SIGNAL must be at least 4.5 V out less than 5 V, into 50 ohms.

2.2.1.13 WB IF OUT J20

The Wideband IF Output BNC connector provides a -30 dBm IF signal into 50 ohms. The center frequency is 21.4 MHz with a bandwidth of 4 MHz.

2.2.1.14 COR J21

The Carrier-Operated-Relay BNC connector provides a 100 mA current-sink to ground for control of external equipment. The maximum external voltage that can be applied is +24 Vdc.

2.2.1.15 Remote Control (Optional)

The Remote Control multipin connector allows the receiver to interface with other equipment via an optional interface bus. This permits the receiver to be controlled from an external source or it can be programmed to supply signals to other receivers.

2.2.1.16 Phones A7J1

The Phone Jack, mounted on the front panel, provides an audio signal of 10 mW, minimum, into 600 ohms. This signal is capable of driving a standard 600 ohm headphone set.

2.2.1.17 Optional Tuning A6J1

The optional tuning multipin connector permits receiver control using an optional external keyboard.

2.3 EQUIPMENT MALFUNCTIONS

This unit was thoroughly inspected and adjusted for optimum performance prior to shipment. If any malfunctions are encountered after performing the recommended installation procedures, verify that the correct input signals are present at the proper jacks. Maintenance and troubleshooting of the unit can be aided by using the procedures shown in Section IV of this manual. Contact with your Watkins-Johnson representative or the Watkins-Johnson Company, CEI Division, Gaithersburg, Maryland, should be made to prevent possible voiding of the warranty prior to taking any corrective maintenance action.

2.4 OPERATION

The WJ-8617B-5 Receiver is capable of manual, semiautomatic, and automatic operation in its standard configuration. This local operation is exercised using the front panel controls and indicators described in paragraph 2.4.1. Pressing a front panel pushbutton will illuminate an LED on the button, indicating that particular function is active. Depressing any pushbutton in a group will deactivate any previously selected button in that group. The CLR pushbutton activates a special three step sequence, as described in paragraph 2.4.1.18. In addition to the operating modes available in local operation, the WJ-8617B-5 Receiver is capable of remote operation. Via the remote interface, all receiver operations can be controlled by an external controlling device, with the exception of signal monitor operation.
Remote operation is described in paragraph 2.5.

2.4.1 CONTROLS AND INDICATORS

2.4.1.1 Push ON/OFF Power

This pushbutton applies power to the unit. When pushed the button will remain partially depressed indicating that the switch is energized. Depressing the button again will cause the button to return to its fully extended OFF position. On power up, the receiver will be set to the operating mode and parameters that were present prior to the last power interruption. However, if the Scan mode was active when the receiver was last turned off, it will return at the beginning of the scan sequence, rather than at the point where power was interrupted.

Table 2-3. Table of Controls and Indicators

PUSH ON/OFF POWER	Applies power to the receiver.
DETECT MODE (AM, FM, PLS)	Selects the mode of operation.
BANDWIDTH	Selects the IF bandwidth.
AFC	Activates automatic frequency control.
AGC	Activates automatic gain control to the RF and IF amplifiers
COR LEVEL UP/DOWN	Selects the level at which the COR function activates.
MEMORY SELECT UP/DOWN...........................	Selects the desired memory channel.
TUNING RATE (1 MHz, 10 kHz, 100 Hz)	Selects the increments of the frequency being tuned.
DISABLE	Locks receiver to the displayed frequency and disables tuning knob.
ANT 2	Selects RF input from Antenna 2.
STO	Stores the selected receiver functions into the displayed memory channel.
MAN	Selects manual operation.
REM	Selects either the local or remote mode of operation.
RCL	Recalls and displays information stored in active memory channel.
EXC	Sets receiver in accordance with active memory channel.
CLR	Resets the receiver front panel and clears the memory.
SCAN	Scans operator programmed bands for signal activity.
STEP	Steps to each frequency stored in the memory channels in search of signal activity.
FUNCTION (F t)	Selects the uppercase mode of the front panel pushbuttons.
DWELL	Sets the period spent at each frequency or band in the SCAN and STEP modes.
AUDIO GAIN	Controls the audio signal at the Phones Jack.
RF/IF GAIN	Manually controls the gain of the RF and IF amplifiers.
MSTR/SLAVE (Option)	Permits receiver parameters to be selected at a remote terminal.
LOCK-OUT (Option)	Excludes operator programmed signals from a scan.
INTENSITY (SM Option)	Controls the intensity of the Signal Monitor's CRT.
FOCUS (SM Option)	Provides focus of the trace on the CRT.
SWEEP RATE (SM Option)	Controls the rate at which the Signal Monitor sweeps the spectrum.
SWEEP WIDTH (SM Option)	Controls the width of the spectrum being viewed.
CENTER FREQ (SM Option)	Controls the horizontal position of the IF band displayed.

Table 2-3. Table of Controls and Indicators-Continued

GAIN (SM Option)	Controls the amplitude of the signal displayed on the CRT.
MARKER (SM Option)..	Superimposes a 21.4 MHz reference marker on the IF signal displayed.
LIN/LOG (SM Option)...	Selects either a linear or logarithmic vertical display.
DIGITAL DISPLAY	Displays digitally the COR LEVEL SELECTED, Relative Signal Strength, Memory Channel selected, and the Receiver Tuned Frequency.

2.4.1.2 DETECT MODE

Depressing a button in the DETECT MODE group will select the desired receiver detection mode. An LED on the pushbutton will light indicating the active mode. The operator may select standard AM) FM, CW, or PULSE modes. SSB is optionally available.

2.4.1.3 BANDWIDTH

This group of pushbuttons permit the operator to select the desired IF bandwidth. An LED will light on the active pushbutton, indicating the IF bandwidth has been selected. Up to five IF Amplifiers and matched FM Demodulators can be installed in the receiver. Refer to paragraph 5.5.2, of the parts list, for a list of the available IF Amplifiers and FM Demodulators.

2.4.1.4 AFC

Depression of the AFC pushbutton switches the Automatic Frequency Control circuitry on (AFC LED illuminated) or off (AFC LED extinguished). When this function is enabled, it will correct for any frequency drift to keep the receiver locked on to the desired signal, as long as the signal strength is sufficient to exceed the programmed COR level.

NOTE

1. If AFC is selected, the COR level should be set such that the COR LED is off when no signal is present. This will prevent the AFC circuitry from hunting or attempting to correct the RF frequency, in the absence of a valid signal.

2. With two signals in close proximity, the AFC could lock on to the stronger signal. Therefore, when monitoring a low level signal, in the presence of stronger signals close in frequency to the desired signal, it is advisable to select AFC OFF.

2.4.1.5 AGC

Depressing the AGC pushbutton switches control of the RF/IF gain between Automatic Gain Control (AGC LED illuminated) and Manual Gain Control (AGC LED extinguished). When in the AGC mode, the RF/IF gain is automatically controlled by the internal AGC circuitry. In the Manual Gain Control mode, receiver RF/IF gain is set by rotating the front panel RF/IF Gain control. During a scan, if AGC is selected as one of the programmed parameters, it will be off during the scan and the receiver will be set at maximum gain. When a signal is detected and the receiver is set to the "Scan Continue" mode, the AGC will be then activated to control receiver gain.

2.4.1.6 COR LEVEL

Two pushbuttons are provided to set the level at which the COR and squelch circuits activate. The COR level is adjustable from noise level to approximately 40 dB above noise. When the COR level is exceeded, both the COR and AUDIO circuits activate. An LED, on the down button, lights when the level is exceeded. With "00" displayed in the COR window, the COR level is set to minimum and the COR circuit will be active at all times. A display of "-" indicates maximum level, keeping the COR circuit inactive at all signal levels. The COR Level also controls the activation of automatic frequency control when AFC is selected. This circuit prevents AFC from affecting the operation of the receiver until the signal level is above the set COR level. When AFC is selected, the COR Level should be increased until the COR LED extinguishes, with no signal present.

2.4.1.7 MEMORY SELECT

Two pushbuttons are provided to select the desired memory channel. Pressing the up button will count up through the memory channels while the down button will count down. Each memory channel stores all receiver information (COR LEVEL, RF/IF GAIN, AFC and AGC STATUS, ANTENNA, DETECT MODE, BANDWIDTH and TUNED FREQUENCY).

2.4.1.8 TUNING RATE

Depressing one of the three tuning rate pushbuttons will cause the tuned frequency to change in 1 MHz, 10 kHz or 100 Hz steps as the tuning knob is rotated.

2.4.1.9 TUNING KNOB

Rotation of this knob will change the receiver’s tuned frequency. The frequency will change at a rate determined by the tuning rate pushbuttons.

2.4.1.10 DISABLE

Pressing this button removes control of the tuned frequency by the tuning knob. The receiver will remain locked at the last selected frequency. Pressing any tuner related pushbutton will restore control to the tuning knob.

2.4.1.11 ANT 2

This pushbutton selects the RF input from either the ANT 1 or ANT 2 input connector. When the ANT 2 pushbutton LED is illuminated, ANT 2 is selected. When the LED is extinguished, ANT 1 is selected.

2.4.1.12 STO

Depression of the STO pushbutton will transfer the selected receiver functions into the active memory channel. The TUNED FREQUENCY, AFC, AGC, RF/IF GAIN, COR LEVEL, BANDWIDTH, DETECT MODE, OPTIONAL BFO FREQUENCY, and ANTENNA selections will be stored simultaneously into the channel displayed in the Memory Select window. After the data is stored, the Memory Select display is incremented to the next higher memory channel. The upper case mode of operation will activate 150 Hz select preset.

2.4.1.13 MAN

The MAN pushbutton permits the return to the manual mode of operation from the Scan, Step, or Memory Recall modes. When returning from Recall, a single depression of the MAN pushbutton returns the receiver to the Manual mode. When returning from the SCAN or STEP mode, a single depression places the receiver into the SCAN or STEP CONTINUE modes respectively. A second depression places the receiver into the MANUAL operating mode. The upper case mode of operation will act.

2.4.1.14 REM

Permits switching at the receiver between the local and remote modes of operation. The REM pushbutton LED is illuminated when in the remote mode and extinguished when in the local mode. When switching between modes is performed by a remote controlling device, the REM pushbutton LED indicates the operating mode.

2.4.1.15 RCL

The RCL pushbutton recalls the receiver information stored in the active memory channel and displays the information on the front panel display and indicator lights. The display of the memory information does not affect the receiver operation. The receiver will remain locked to the previously selected functions and frequency.

2.4.1.16 EXC

Depressing the EXC button sets the receiver in accordance with the frequency and function selection stored in the active memory.

2.4.1.17 CLR

The CLR pushbutton activates a three step clear sequence that resets the receiver front panel and clears the memory. Depressing the CLR pushbutton one time initiates the clear sequence. The CLR LED illuminates, indicating the clear sequence has been initiated, but the front panel and memory are not affected. This sequence can be aborted by depressing any front panel pushbutton, other than CLR. Depressing CLR a second time resets the front panel to: AGC ON, AFC OFF, BW#1, AM, MAN, COR-00, MEM-00, ANT 1, 20.0000 MHz with tuning disabled. The clear sequence can be aborted at this time without clearing the memory by depressing any front panel pushbutton, other than CLR. Depressing the CLR pushbutton a third time completes the clear sequence. The memory is cleared and the CLR LED is extinguished.

2.4.1.18 **SCAN**

In the SCAN mode the receiver will search up to 8 operator programmed bands for signal activity greater than the programmed COR level. When signal activity is present, the receiver will stop until the signal falls below the COR level or the operator again depresses the SCAN button. With the inclusion of the Extended Memory option (EM), SCAN capabilities can be increased to 48 operator programmed frequency bands.

2.4.1.19 **STEP**

In the STEP mode, the receiver will step to the frequency set in each of the 16 memory channels. When signal activity greater than the programmed COR level is present, the receiver will stop until the signal falls below the COR level or the operator again depresses the step button. With the inclusion of the Extended Memory option (EM), STEP capabilities can be increased to 96 memory channels.

2.4.1.20 **FUNCTION (F ↑)**

This pushbutton places the front panel pushbuttons into the uppercase mode of operation. In this mode, selected pushbuttons are used to control receiver options associated with the uppercase mode. The primary function of the pushbuttons will be unaffected when in the uppercase mode.

2.4.1.21 **DWELL**

The DWELL control is a dual function control that can be set to operate in either Pre-DWELL or Post-DWELL modes by changing the configuration of DIP switch S2 on the Synthesizer Interface subassembly (A5A2).

Pre-DWELL sets the time period the receiver spends at each SCAN increment or STEP frequency in the SCAN or STEP mode. It adjusts the time increment from approximately 0 (CCW) to 2 sec (CW). Post-DWELL determines the time period the receiver remains locked onto a signal acquired in the SCAN or STEP mode. Full counterclockwise rotation of the DWELL control provides a minimum dwell period, with the dwell period increasing as the control is rotated clockwise. Full clockwise rotation causes the receiver to remain locked onto the signal as long as the signal level is greater than the programmed COR level. Regardless of the DWELL control setting, once the signal stops or falls below the COR threshold level, the SCAN or STEP sequence continues. Refer to **paragraphs 2.4.2.3** and **2.4.2.4** for a description of SCAN and STEP modes.

The WJ-8617B receiver is shipped with the Pre-DWELL mode selected. DIP switch S2 on the Synthesizer Interface subassembly (A5A2) switch #2 is in the closed position. Opening switch #2 selects the Post-DWELL mode.

2.4.1.22 **AUDIO GAIN**

The AUDIO GAIN control adjusts the level of the audio signal present at the phones jack. This level is adjustable to 10 mW.

2.4.1.23 **LINE AUDIO**

This rear panel control adjusts the level of the audio signal present at the rear panel audio output J3. The level of the signal is adjustable to 10 mW.

2.4.1.24 **RF/IF GAIN**

The RF/IF GAIN control provides manual control of the RF and IF amplifiers when AGC is not selected.

2.4.1.25 **LOCK-OUT (Optional)**

This function permits the exclusion of selected signals from a scan to prevent the receiver from locking-on to undesired signals. Pressing LOCK-OUT with the undesired frequency selected places the frequency and bandwidth of the signal in the lock-out memory. LOCKOUT LED illuminates for 1 second. All signals within ½ of the IF bandwidth of the lock-out frequency will be omitted from succeeding scans. Lock-out channels are sorted in order of ascending frequency regardless of the number displayed in the MEMORY SELECT window. The highest lock-out frequency occupies Channel 95. This button is blank if the Lock-Out option is not included.

2.4.1.26 **MSTR/SLAVE (Optional)**

The Master/Slave option permits the control of up to 14 additional master/slave equipped receivers, using the front panel controls of one of the receivers. Each receiver must. be equipped with the IEEE Interface option. This button is blank if the master/slave option is not included.

2.4.1.27 **INTENSITY (Optional)**

The INTENSITY control varies the brightness of the trace on the CRT of the signal monitor.

2.4.1.28 **FOCUS (Optional)**

The FOCUS control provides a means of obtaining a sharp trace on the CRT.

2.4.1. 29 SWEEP RATE (Optional)

The SWEEP RATE control is used to obtain optimum resolution at the sweep width being used and to prevent loss of sensitivity by sweeping too fast. The sweep rate is adjustable to 25 Hz.

2.4.1.30 **SWEEP WIDTH (Optional)**

The SWEEP WIDTH control varies the width of the frequency spectrum being reviewed. In a fully clockwise position, the maximum bandwidth is displayed. The sweep width is adjustable from 0-4 MHz.

2.4.1.31 **CENTER FREQ (Optional)**

The CENTER FREQ control varies the horizontal position of the vertical pips on the CRT. Use this control to center the frequency spectrum under the center mark of the CRT.

2.4.1.32 **GAIN (Optional)**

The GAIN control varies the height of the vertical pips displayed on the CRT. This control is adjusted to maintain the desired height of the display.

2.4.1.33 **MARKER (Optional)**

In the ON position a 21.4 MHz marker is superimposed on the display as a reference marker. The marker frequency is locked to the receiver synthesizer.

2.4.1.34 **LIN/LOG (Optional)**

The LIN/LOG switch provides a linear or logarithmic vertical deflection. The LIN position will provide a display with a vertical deflection proportional to the signal strength. In the LOG position, the vertical deflection is proportional to the log of the signal strength. This provides greater resolution of weaker signals in the log position.

2.4.1.35 **DIGITAL DISPLAY**

The DIGITAL DISPLAY is composed of seven-segment LEDs. The display provides a digital read out, displaying the tuned frequency, COR level selected, relative signal strength, and active memory channel. With the DAV option installed, the audio or video output levels will be displayed in the COR window when the uppercase mode is selected.

2.4.2 LOCAL OPERATION

2.4.2.1 Manual Control

The manual mode of operation permits total control of the receiver utilizing the front panel pushbuttons and control knobs. All operating parameters are selected utilizing the controls described in paragraph 2.4.1.

In addition to manually operating the receiver, the manual mode also permits the operator to program the receiver's 16 channel memory (96 channel memory with the EM, Extended Memory, option installed) and to enter into the Scan or Step modes of operation.

2.4.2.2 Memory Programming

The receiver's memory permits storage of receiver parameters such as COR level, RF/IF Gain, AFC and AGC status, ANTENNA, DETECTION MODE, IF BANDWIDTH, and TUNED FREQUENCY. This stored data can be used to provide the desired receiver parameters during the SCAN or STEP modes of operation, or it can function as a scratch-pad memory in the manual mode to retain particular receiver settings. Programming of the memory is performed as follows:

Depress Memory Select	Hold the Up or Down Memory Up/Down Select pushbutton depressed until the number corresponding to the desired memory channel is displayed in the Memory Select window (00-15 standard; 00-95 optional).
Depress COR Up/Down	Hold up or down COR LEVEL pushbutton depressed until the number corresponding to the desired COR LEVEL is displayed in the COR window (00-40 or --).
Depress AFC	Changes status of AFC. AFC on - LED illuminated AFC off - LED extingushed
Depress AGC	Changes AGC status. Automatic Gain Control - LED illuminated Manual Gain Control - LED extinguished

Depress BW	Depress Bandwidth pushbutton corresponding to the desired IF Bandwidth. LED on the selected Bandwidth pushbutton illuminates.
Depress DETECT	Depress pushbutton corresponding to the desired Detection mode. AM, FM, or Pulse detection standard; LOG, CW, and SSB optional. LED on selected Detection mode pushbutton illuminates.
Rotate Tuning Knob	Rotate the tuning knob CW or CCW until the desired frequency is displayed by the frequency display above the tuning knob. The tuning increments are determined by the 1 MHz, 10 kHz and 100 Hz Tuning Rate pushbuttons.
Depress ANT 2	Selects RF input from the standard Antenna 1 or Auxiliary Antenna 2. LED illuminated - Antenna 2 selected LED extingushed - Antenna 1 selected
Depress STO	Stores the selected receiver parameters into the memory channel displayed in the memory select window. Once the information is stored, the memory channel display is automatically incremented to the next higher channel.

Data stored in each memory channel can be recalled by depressing the RCL pushbutton. When RCL is depressed, the receiver parameters stored in the channel displayed in the memory select window will be displayed on the front panel indicators of the receiver. The receiver remains at the parameters set prior to the selection of RCL. Depression of the MAN pushbutton returns the indicators to that of the receiver setting or depression of EXC (EXECUTE) sets the receiver to the recalled data on the front panel.

2.4.2.3 **SCAN Mode**

In the SCAN Mode, the receiver will scan up to 8 operator programmed frequency bands utilizing the standard receiver memory. Up to 48 programmed frequency bands can be scanned when the receiver is equipped with the extended memory option (EM). All receiver parameters and the start frequency of each scan are stored in the even numbered memory channels and the stop frequency is stored in the odd channels. Upon initiation of the Scan, the receiver will begin the scan at the frequency stored in the even numbered channel, setting the receiver to the parameters stored in that channel, and continue to the next higher odd numbered channel, containing the stop frequency. The scan is performed in discrete increments equal to approximately one-half the programmed IF bandwidth. The SCAN increments for the various IF bandwidths are listed in the Table of Scan Increments (Table 2-4). A maximum of 65536 incremental steps can be made in each scan, limiting the width of each scan band to the scan increment times 65536. If the maximum width is exceeded, an ERROR 812 will appear on the front panel display.

Table 2-4. Table of Scan Increments

SELECTED IF BANDWIDTH	SCAN INCREMENT	SELECTED IF BANDWIDTH	SCAN INCREMENT
10 kHz	5 kHz	300 kHz	150 kHz
20 kHz	10 kHz	500 kHz	250 kHz
50 kHz	20 kHz	1MHz	500 kHz
75 kHz	30 kHz	2 MHz	1 MHz
100 kHz	50 kHz	4 MHz	2 MHz
250 kHz	120 kHz		

If the COR LED is illuminated when the Scan is initiated, the receiver will wait 50 msec before stepping to the next frequency increment, to permit the COR circuits to deactivate. After stepping to the new frequency, if the COR LED extinguishes and comes back on, the receiver will lock on to the signal. Otherwise, the Scan will continue. When programming the COR level as one of the Scan parameters, it should be set at a level that will permit the LED to extinguish in the absence of signals, but cause the LED to illuminate when signal activity is present. Otherwise, the COR LED will remain on at all times and the receiver will not stop on a signal during the scan.

During the scan, if AFC is selected, the AFC LED will remain illuminated. When a signal is detected, and the COR LED illuminates, the AFC will adjust the receiver to center the signal within the IF bandwidth. If AGC is selected, the AGC LED will extinguish and the receiver will operate at maximum gain during the scan. AGC will remain inactive until the operator selects the Scan Continue mode.

The type Scan sequence is determined by the channel number displayed in the memory select window, when the SCAN button is depressed. When an even number is displayed, the receiver will begin the scan at the even channel and continue to the next odd number in sequence. This single band will continue to be scanned until signal activity greater than the programmed COR level is detected or until the MAN pushbutton is depressed. If an odd number is displayed when the Scan is initiated, the scan will begin scanning at channel 00 and scan each band until it reaches the odd number that was present when the scan button was depressed. This multiple Scan sequence will continue until signal activity greater than the programmed COR level is detected or the MAN pushbutton is depressed.

Prior to initiating the Scan function, the memory must be programmed, using the procedures described in paragraph 2.4.2.2. Using this procedure, enter the operating parameters and start frequency into the even channel and then step the memory select to the next higher odd channel. Enter the stop frequency (stop frequency must be greater than start frequency). Upon completion of memory programming, the Scan function can be initiated as follows:

Depress Memory Select Up/Down	Hold the Up or Down pushbutton depressed until the desired memory channel is displayed in the memory select window (n). This step will determine the type scan sequence that will be selected. n = odd number - Receiver will first scan from channels 00 to 01. Each succeeding band will be sequentially scanned up to and including the band comprised of channels n - 1 to n. n = even number - Receiver will scan a single band from channel n to n + 1.
Depress SCAN	Initiates the selected Scan sequence. Scan pushbutton LED illuminates and the front panel indicators reflect the programmed parameters for the active band. The frequency display displays the frequency of each increment of the Scan. If AGC has been selected as one of the programmed parameters the AGC LED will be extinguished and the receiver will operate at maximum gain, during the Scan.
Rotate Dwell Knob	Controls the scan rate by controlling the time that the receiver dwells at each increment of the scan. Fully counter-clockwise rotation selects minimum dwell time with the time increasing as the knob is rotated clockwise.

When a signal greater than the programmed COR level is encountered the scan will stop and the COR pushbutton LED will illuminate. The receiver will remain at this frequency as long as the signal is present or until the scan button is again depressed to resume the scan sequence.

2.4.2.3.1 **SCAN Continue**

The Scan Continue function permits the interruption of the Scan sequence to allow manual control of the receiver. This mode permits an operator to manually optimize the detected signal and to reenter the scan sequence at the point where the interrupt took place. Entering into the Scan Continue mode from the Scan mode is performed as follows:

Depress MAN	Initiates the Scan Continue mode of operation. Scan pushbutton LED remains on and the MAN push-button LED illuminates. If AFC was on during the Scan, it will be turned off and the AFC LED will extinguish. If AFC is still desired, it must be reselected by depressing the AFC pushbutton. If AGC was selected as a scan parameter, it will be activated and the AGC LED will illuminate. The receiver gain will then be controlled by the AGC circuitry.
Operate Manual Controls	All front panel controls function as if in the manual mode of operation. Use controls to optimize response of detected signal. From this mode: a) the scan can be reentered at the point where the scan was interrupted, or b) the receiver can be placed into the manual mode of operation.

a) Reenter the Scan mode:

Depress Scan	Returns the receiver to the Scan mode of operation. The MAN LED is extingushed and the SCAN LED remains illuminated. The scan is restarted at the point where it was interrupted by the Scan Continue function.

b) Enter Manual mode:

Depress MAN	Places the receiver into the manual mode of operaton from the Scan Continue mode. The MAN LED remains illuminated and the SCAN LED is extinguished.

2.4.2.3.2 **SCAN Lock-Out (Optional)**

SCAN Lock-out is an optional function that is available when the Type 794137-3 Extended Memory option (EM) is incorporated in the receiver. This function permits the exclusion of selected signals from the scan to prevent the receiver from locking onto undesired signals. Lock-out data is stored in the higher order memory channels, in ascending order according to frequency (channel 95 will store the highest lock-out frequency). The Scan mode, utilzing the Lock-out function, is described as follows:

Depress SCAN	Activates the Scan mode of operation. The SCAN LED is ill-uminated. The receiver will scan the programmed freqency bands until signal activity is encountered. When signal activity greater than the programmed COR level is encountered, the receiver will lock onto the signal.
Depress MAN	Places the receiver into the SCAN CONTINUE mode of operation. The SCAN and MAN LEDs are both illuminated. The receiver can not be operated manually to optimize the detected signal and the band-width can be changed to determine the bandwidth of the LOCK-OUT channel.
Depress LOCK-OUT	The frequency and bandwidth of the undesired signal is stored in the Lock-out memory. LOCK-OUT LED illuminates for 1 second. All signals within ½ of the IF band-width of the Lock-out frequency will be omitted from succeeding scans. If AFC has been selected, LOCK-OUT will occur after the signal is centered.

2.4.2.3.3 **LOCK-OUT Channel Recall and Deletion**

This mode permits the recall and display of the information stored in the lock-out channels. It also permits revision of lock-out memory by permitting the deletion of channels where lock-out is no longer desired. To activate the recall mode, the receiver must be in either the Scan Continue or Manual mode of operation. This operating mode is activated as follows:

Depress RCL	Initializes the Recall mode of operation. The RCL pushbutton LED is illuminated and the front panel displays reflect the infor-mation stored in the channel whose number is displayed in the MEMORY SELECT window.

Depress MEMORY SELECT	Hold the MEMORY SELECT Up or Down pushbutton in until the number corresponding to the desired memory channel is displayed in the MEMORY SELECT window. When the displayed channel is a Lock-Out channel, the letters “LL” will be displayed in the COR window.
Depress MAN	Deactivates the Recall mode and activates the previously selected operating mode (MAN or SCAN CONTINUE).

2.4.2.3.4 **150 Hz Recognition Operating Modes**

Three operating modes are available utilizing the Type 796290-1 150 Hz Recognition assembly. These are selectable via the appropriate front panel pushbuttons. Modifications in the receiver software change the SSB operation. If USB or LSB is selected, IF Bandwidth #1 is examined determining what IF Bandwidth is present. If the IF Bandwidth in position #1 is less than 6 kHz, IF Bandwidth #2 is selected. The ideal IF Bandwidth utilized for SSB operation should be 6.4 kHz, but not greater than 20 kHz. The software selects IF Bandwidth position #2, but does not verify if this bandwidth is within this range.

MODE 1: Audio and COR circuits are activated only when the signal is above the selected COR level and the 150 Hz tone is present in the video signal. This mode is selected by:

Depress FUNCTION (F ↑) pushbutton	Activates upper case function of the pushbuttons.
Depress PRESENT pushbutton	Activates 150 Hz tone recognition circuitry to respond to tone presence. A letter “P” is displayed on digital display indicating MODE 1 is active.
Depress F ↑ pushbutton	Returns pushbuttons to their lower case functions. However, MODE 1 remains active and the letter “P” continues to be displayed.

MODE 2: Audio and COR circuits are activated only when the signal is above the selected COR level and the 150 Hz tone is absent. To select this mode:

Depress FUNCTION (F ↑) pushbutton	Activates upper case function of pushbuttons.
Depress ABSENT pushbutton	Activates 150 Hz tone recognition circuitry to respond to tone absence. Letter “A” is displayed on digital display indicating MODE 2 is active.
Depress F ↑ pushbutton	Returns pushbuttons to their lower case functions. However, MODE 2 remains active and letter “A” continues to be displayed.

MODE 3: This mode is the normal operating mode of the receiver. In this mode, audio and COR circuits are activated by the level of the received signal regardless of the 150 Hz tone status. No letter is displayed on the front panel digital display. To return to MODE 3 from MODES 1 or 2:

Depress F↑ pushbutton	Activates upper case function of pushbuttons.
Depress PRESENT or ABSENT pushbutton	Depress the pushbutton corresponding to the letter displayed on the front panel. Letter extinguishes and receiver returns to MODE 3 operation.
Depress F↑ pushbutton	Returns pushbuttons to their lower case functions.

2.4.2.4 **STEP Mode**

In the STEP mode, the receiver will step through up to 16 operator programmed memory channels in search of signal activity, utilizing the standard receiver memory. Up to 96 channels can be stepped through when the Type 794137-1 or Type 794137-3 Extended Memory is incorporated. Each memory channel is programmed with a complete set of receiver parameters using the memory programming procedure described in **paragraph 2.4.2.2**. RF frequencies need not be in ascending order as in the SCAN mode.

The number displayed in the memory select window (n) determines the highest channel that will be used in the step sequence. When the STEP pushbutton is depressed, the receiver will begin stepping all channels containing valid memory data, starting at channel 00 and continuing to channel n. This stepping sequence will continue until a signal greater than the programmed COR level is detected or until the MAN pushbutton is depressed.

If the COR LED is illuminated when the Step mode is initiated, the receiver will wait 50 msec before stepping to the next memory channel to permit the COR circuits to deactivate. After 50 msec, if the COR LED is still on, the receiver will lock on to the signal. Otherwise, the receiver will step to the next memory channel.

Prior to initiating the Step mode, program the memory utilizing the procedure outlined in **paragraph 2.4.2.2.** The Step mode can then be initiated as follows:

Depress Memory Select Up/Down	Hold the Up or Down pushbutton depressed until the number corresponding to the highest desired memory channel is displayed in the Memory Select window. NOTE: The displayed number must be greater than 00.
Depress STEP	Initiates the STEP mode of operation. The STEP pushbutton LED illuminates and the front panel indicators reflect the programmed parameters in each memory channel as it is selected. The STEP sequence begins at channel 00 and sequentially steps to each channel.
Rotate Dwell Knob	Controls the time the receiver dwells at each channel in the STEP sequence. Fully counterclockwise rotation selects minimum dwell time with the time increasing as the knob is rotated clockwise.

When a signal greater than the COR level is encountered, the STEP sequence will stop and the COR pushbutton LED will illuminate. The receiver will remain at this frequency as long as the signal is present or until the STEP pushbutton is again depressed to resume the STEP sequence.

2.4.2.4.1 STEP CONTINUE

The STEP CONTINUE function permits the interruption of the STEP sequence to allow manual control of the receiver. This function permits an operator to manually optimize the detected signal and reenter the STEP sequence at the point where the interrupt took place. It also allows the operator to reprogram that memory channel if the signal is of no further interest. Entering into the STEP CONTINUE mode from the STEP mode is performed as follows:

Depress MAN	Initiates the STEP CONTINUE mode of operation. The STEP pushbutton LED remains on and the MAN LED illuminates. The front panel indicators reflect the data stored in the channel displayed in the memory select window.
Operate MANUAL Controls	All front panel controls function as in the Manual mode of operation. Use the controls to optimize the detected signal or to change parameters if the detected signal is of no interest.
Depress STO	Updates the displayed memory channel with the new or revised data. The STO pushbutton LED illuminates for 1 second when depressed.

From the STEP CONTINUE mode, the STEP mode can be reentered at the point where the STEP sequence was interrupted or the receiver can be placed into the Manual mode of operation.

a) Reenter the STEP mode: Depress STEP	Returns the receiver to the STEP mode of operation. The MAN pushbutton LED is extinguished and the STEP LED remains illuminated. The STEP sequence is restarted at the point where the interrupt took place.
b) Enter the MANUAL Mode: Depress MAN	Places the eceiver into the Manual mode of operation. The MAN pushbutton remains illuminated and the STEP pushbutton LED extinguished.

2.4.2.5 **Master/Slave Operation (Optional)**

The Master/Slave function permits the control of up to 14 additional Master/Slave equipped receivers, utilizing the front panel controls of one of the receiver. Each receiver must be equipped with an IEEE-488 Interface. Switch #6 of the DIP switch on the IEEE-488 must be in the open position on each receiver and the remaining 5 switches are set to a binary number between 0 and 30 to designate the receiver address. Address 31 (11111) cannot be used as a valid address. Only one receiver can function as the master unit at a given time and the remaining receivers function as slave units when addressed.

Depress Memory Select Up/Down	Hold Memory Select Up or Down pushbutton depressed until the number corresponding to the address of the desired slave receiver appears in the Memory Select window of the Master receiver. If more than one receiver is designated with the displayed address, each receiver will respond to the Master commands.
Depress MSTR/SLAVE	Activates the Master/Slave mode of operation and places the addressed receiver(s) in the Slave mode. The LED on the MSTR/SLAVE pushbutton illuminates on the master unit and the remote pushbutton LED illuminates on the addressed slave unit(s). All front panel controls on the slave unit(s) are disabled except for the remote* pushbutton All master unit controls function normally and control both the master and addressed slave units.
Depress MSTR/SLAVE	When in the Master/Slave mode, depression of the MSTR/SLAVE pushbutton deactivates the Master/Slave mode. The MSTR/SLAVE pushbutton LED is extinguished.

* At the slave unit, depression of the REM pushbutton removes the unit from control by the master and restores local control.

2.4.2.6 **CURSOR (Optional)**

Cursor is an optional mode of operation that is available when the Type 794137-2 (or Type 794137-3) Extended Memory, Type 794122 Digital Refreshed Display and an active Function (F) pushbutton are installed. In this mode, a portion of the RF spectrum can be scanned with a signal strength vs. frequency display of the scanned frequencies displayed on the signal monitor of the receiver. The tuning knob can then be rotated to position a cursor over any of the signal PIPS displayed on the signal monitor. When the cursor is positioned over the signal pip, the frequency of that signal is displayed in the frequency window of the digital display.

Prior to entering into the Cursor mode, the memory must be programmed, using the procedure described in **paragraph 2.4.2.2.** Store the start frequency and operating parameters into the even numbered channels and the stop frequency in the odd channels. Upon completion of the memory programming, the cursor mode may be entered into, as follows:

Depress F	Selects the uppercase function. All pushbutton LEDs, except for active uppercase functions, will extinguish
Depress Cursor (scan pushbutton)	Selects the Cursor mode of operation and activates the cursor scan. The pushbutton LEDs on the front panel will again illuminate and the receiver will perform a single scan of the programmed band. Upon completion of the Scan the receiver will enter into the Cursor/Manual mode of operation.
Operate the Tuning Rate pushbutton	Select the desired tuning rate by depressing the 1 MHz, 10 kHz, or 100 Hz pushbutton and rotate the tuning knob until the cursor is positioned over the desired signal pip on the signal monitor. The frequency display on the digital display indicates the frequency at which the cursor is positioned. Note: The cursor travel is not limited to the frequency band displayed on the signal monitor. Therefore, if the cursor does not appear on the signal monitor, rotate the tuning knob until the displayed frequency is within the scanned frequency band.

To disable the Cursor mode, and return the receiver to normal operation, proceed as follows:

Depress F	The Cursor (Scan) pushbutton LED will illuminate and all other LEDs will extinguish.
Depress Cursor (Scan)	The Cursor (Scan LED will extinguish and the selected pushbutton LEDs will again illuminate. The receiver will then be restored to normal operation.

2.4.2.7 **Digital Audio/Video Gain (Optional)**

Digital Audio/Video Gain (DAV) is an option that permits digital control of the audio and video outputs of the receiver. With the Type 798037-1, Digital Audio/Video Gain subassembly installed in option slot 6 of the Digital Motherboard (A5), the audio and video outputs can be controlled over a 30 dB range, using the front panel pushbuttons. In the DAV mode, the COR window displays a number from 00 to 99 that represents the output level of either the audio or video outputs, depending on which of the functions are selected.

Selection of DAV and the setting of the output levels are performed as follows:

Depress F	Selects the uppercase function. All pushbutton LEDs, except for active uppercase functions will extinguish. The F LED will illuminate, indicating that the front panel is in the uppercase mode.
Depress Audio (AFC Pushbutton)	Selects Audio Gain Control. The LED on the AUDIO (AFC) pushbutton illuminates and the COR window displays the audio output level.
Depress COR UP/Down	Depress and hold the COR UP or Down pushbutton until the desired audio output level is displayed in the COR window. 99 - Maximum output level. (Clipping level at 100% modulation.) 00 - Minimum output level. (Noise level when no modulation is present.)
Depress VIDEO (AGC Pushbutton)	Selects Video Gain Control. The LED on the Video pushbutton illuminates and the Audio LED (if previously selected) extinguishes. The COR window displays the video output level.
Depress COR UP/Down	Depress and hold the COR UP or Down pushbutton until the desired video output level is displayed in the COR window. 99 - Maximum output level. (Clipping level at 100% modulation.)

00 - Minimum output level.
(Noise level when no modulation is present.)

2.4.2.8 **Single Sideband Operation (Optional)**

The capability of detecting Upper Sideband (USB) and Lower Sideband (LSB) signals is incorporated in the WJ-8717B-5 receiver when the Type 79188-1 SSB Demodulator (A3A14) and the Type 794195-1 SSB BFO (A4A5) are installed. With Single Sideband capabilities added, an IF Amplifier and FM Demodulator with a bandwidth of 20 kHz or less should be installed in the bandwidth #1 slot. A 6 kHz IF bandwidth is preferred for SSB operation.

Selection of SSB operation is accomplished by depressing the SSB pushbutton. When selected, the SSB pushbutton illuminates and the #1 bandwidth is automatically selected. A “U” or an “L” illuminates on the digital display to indicate whether the Upper Sideband (U) or Lower Sideband (L) is active. Switching between Upper and Lower Sideband operation is performed by again depressing the SSB pushbutton.

2.4.2.9 **Error Codes**

If an error condition should occur, the word “Error” along with a three digit error code will be momentarily displayed in place of the frequency display. The error codes associated with the various operating modes are as follows:

Error 551	This code will be displayed if all lock-out channels are in use and the creation of an additional one is attempted. To increase lock-out memory space, press RCL and step to a channel number below the lowest existing lock-out channel. Press LOCK-OUT. The displayed channel and all higher channel numbers will now be available for lock-out.
Error 552	This code will be displayed if an attempt is made to store data other than lockout data into a channel designated for lock-out.
Error 810	This code will be displayed if an attempt is made to initiate the STEP or SCAN mode when no valid data is stored in the memory locations to be scanned or stepped. The memory must be programmed as described in paragraph 2.4.2.2.

Error 811	This code will be displayed if an attempt is made to initiate the STEP mode when 00 is displayed in the Memory Select window. Depress the Memory Select UP pushbutton to select a channel greater than 00.
Error 812	This code will be displayed if an attempt is made to initiate a SCAN when the number of Scan increments required is greater than 65536. The maximum width of a Scan band is equal to the Scan increment times 65536.
Error 813	This code will be displayed if SCAN is initiated when the memory is programmed with the start frequency greater than the stop frequency. The memory must be programmed with the even numbered channel containing the lower frequency with the frequencies in ascending order.
Error 814	This code will be displayed if an attempt is made to utilize a non-existing IF bandwidth.

When the receiver is equipped for remote operation, an additional set of error codes is utilized to inform the operator of an error condition, associated with the remote mode. If an error condition should occur, the word “Error” along with a three digit error code will be momentarily displayed in place of the frequency display. In addition, a service request will be initiated to flag the controller. When queried by the controller, the two least significant digits of the error code will be placed on the bus. The error codes associated with the remote mode of operation are as follows:

Error 401	Buffer full (message too long).
Error 402	Less than two characters in the message.
Error 403	Framing, parity, or overrun error (RS-232)
Error 404	Invalid number
Error 406	”/” or “?” not valid for this mnemonic.
Error 407	Invalid message.

2.5 REMOTE OPERATION

2.5.1 GENERAL

Remote operation of the WJ-8617B-5 Receiver requires the installation of the IEEE-488 (Type 794116). This interface provides the electrical and mechanical compatibility to permit the exchange of messages between the receiver and a compatible controlling device. The IEEE-488 Interface recognizes messages and operates in ASCII or binary formats. The table of Mnemonics and Binary Codes **(Table 2-5)** lists the usable message codes, as mnemonics for ASCII operation and hexadecimal codes for binary operation, along with a description of their function.

In the ASCII format, the message consists of a series of data bytes that form one of the mnemonics listed in **Table 2-5**. Each byte is one ASCII character of the mnemonic. When the mnemonic contains a variable value (n or f) the mnemonic is followed by a number representing that value. Each digit of the number is sent as a separate ASCII character. In the binary format, the mnemonic is sent as one 8-bit byte containing the hexadecimal code corresponding to the mnemonic. When a variable value is to be included in the message, it is sent as one or more data bytes, representing the binary or hexadecimal value.

Table 2-5. Mnemonics and Binary Codes

NOTE: The mnemonics in parentheses are to possible receiver responses for that function.

Mnemonic	Hexa Decimal	Function
ABS	B7	Select ABSENT mode
ABS/	B8	Deselect ABSENT mode
AFC	42	Turn on AFC function
AFC/	43	Turn off AFC
AFC	44	What is state of AFC? (AFC or AFC/)
AGC	45	Turn on AGC
AGC/	46	Turn off AGC
AGC?	47	What is state of AGC? (AGC or AGC/)
AM	48	Set AM detection mode
AM?	4A	What is value of AM video? (AM n) 000-068 Range
ANT n	4B	Select antenna n
ANT?	4D	Which antenna is selected? (ANT n)
AUD n	9F	Set audio
AUD?	A1	What is audio
BIN	54	Set binary remote interface mode
BIN/	55	Set ASCII remote interface mode
BIT	A5	Perform BIT
BIT?	A7	What is BITE error
BIC?	AA	What is BITE parameter
BFO f	39	Set BFO frequency
BFO?	3B	What is BFO frequency? (BFO f)
BW n	4E	Set bandwidth number n
BW?	50	What bandwidth is selected? (BW n) 15
BWC?	9C	What is bandwidth? (in kHz)
CLR	51	Perform the clear function

Table 2-5. Mnemonics and Binary Codes-Continued

Mnemonic	Hexa Decimal	Function
CLM	6C	Clear memory
COR n	57	Set the COR level: 0 minimum, 40 maximum
COR?	59	What is the COR level? (COR n)
CST?	9B	What is COR status? (CST or CST/)
CW	5A	Set the CW detection mode
DET?	5F	Which detection mode is selected? (AM, FM, CW, PLS,USB, LSB)
DWL n	60	Set dwell value: 0 minimum, 255 maximum
DWL?	62	What is the dwell value? (DWL n)
ERR?	65	What is the error number? (ERR n)
EXC	66	Perform the execute function
FM	69	Set FM detection mode
FMO?		What is FM DC offset value?
FM?	6B	What is the value of the FM modulation? (FM n) 000-100 range. Reads directly in % of modulation
FRQ f	3C	Set the RF frequency
FRQ?	3E	What is the frequency? (FRQ f)
LCK	94	Lock Out
LGV?	71	What is the the log video value? (LGV n) 000-085 range
LOG	96	Set LOG detection mode
LSB	72	Select the lower sideband SSB detection mode
MAN	75	Perform the manual function
NOR	BA	Select NORMAL operating mode
PLS	78	Select the pulse detection mode
PRS	BD	Select PRESENT mode
PRS/	BE	Deselect PRESENT mode
RCL n	7B	Recall memory channel n
RCL?	7D	What memory channel is displayed?
RFG n	7E	Set the RF gain: 0 minimum, 255 maximum
RFG?	80	What is the RF gain? (RFG n) 0-255 range
RMT	81	Put the receiver in remote mode
RMT/	82	Put the receiver in local mode
RMT?	83	Is the receiver in remote mode? (RMT or RMT/)
SCN n	84	Put receiver in scan mode n = channel number
SS?	89	What is signal strength? (SS n)
STO n	8A	Perform a store n = channel number
STP n	8D	Put receiver in step mode n = channel number
STS n	90	Set status bit. (n = 1, Enable SRQ interrupts n = 0, Disable SRQ interrupts)
STS?	92	What is the receiver status?
TON?	BC	Request present TONE mode
USB	93	Select the upper sideband SSB detection mode
VID	A2	Set video
VID?	A4	What is video?

2.5.1.1 **Variable Values**

In **Table 2-5** n represents a decimal number ranging from 0 to 255. When the ASCII format is used, each digit is represented by a separate ASCII character. In the binary format, this value is sent as a single byte containing the binary number representing the value. The example below illustrates, in simplified form, the differences in the data when the ASCII and Binary formats are used to send a DWL n message (n = 125). In actual practice, additional data is required to address the bus and to indicate the end of the message.

ASCII FORMAT

D	0 1 0 0 0 1 0 0
W	0 1 0 1 0 1 1 1
L	0 1 0 0 1 1 0 0
1	0 0 1 1 0 0 0 1
2	0 0 1 1 0 0 1 0
5	0 0 1 1 0 1 0 1

BINARY FORMAT

DWL	0 1 1 0 0 0 0 0
125	0 1 1 1 1 1 0 1

When an FRQ f message is sent, f represents the frequency in MHz. Using the ASCII format, each digit and the decimal point are represented by a separate ASCII character. Leading and trailing zeros may be omitted. Using the Binary format, the value of f is sent as eight BCD digits packed into four bytes. The example below illustrates the differences in the ASCII and Binary formats when an FRQ f message is sent (f = 20.5 MHz). In actual practice, additional data bytes are required to address the interface and to indicate the end of a message.

ASCII FORMAT

F	0 1 0 0 0 1 1 0
R	0 1 0 1 0 0 1 0
Q	0 1 0 1 0 0 0 1
2	0 0 1 1 0 0 1 0
0	0 0 1 1 0 0 0 0
	0 0 1 0 1 1 1 0
5	0 0 1 1 0 1 0 1

BINARY FORMAT

FRQ	0 1 1 1 1 1 0 0
000	0 0 0 0 0 0 0
200	0 1 0 0 0 0 0
500	1 0 1 0 0 0 0
000	0 0 0 0 0 0 0

The BFO f message is used to set the Beet-Frequency-Oscillator frequency when the VBFO option is installed in the receiver. In this message, f represents an offset frequency of +7.99 kHz. When sending a positive offset frequency, using the ASCII format, a separate ASCII character is used for each digit and the decimal point. A minus sign indicates a negative offset. In the Binary format, f is sent in the same manner as the FRQ f message, with negative offset frequencies sent by setting Bit 3 of the kHz byte.

When a DWL n message is sent, n represents a number from 0 to 255, which is used by the receiver to determine the time that it will dwell at each frequency increment, during the Scan and step modes of operation. A value of n = 0 would represent a zero dwell time, while a value of n = 255 represents the maximum dwell time (approximately 2 seconds). To determine the dwell time (in milliseconds) for the various values of n, the following formula is used:

(2Y x 8) -8 = dwell time

where: Y = n + 32

When the RFG n message is sent, n represents a gain control number from 0 to 255. This message provides a minimum of 90 dB of control over the gain of the receiver. Each of the 255 increments represents approximately .35 dB of change, with 0 representing minimum gain and 255 representing maximum gain.

The response to an AM? mnemonic is a number from 000 to 068 which represents the level of AM Video present at the output of the receiver. Each digit represents approximately 13 mVrms of AM video. For FM?, the response is a number ranging from 000 to 100, which represents the precentage of FM modulation. Each digit represents a 1 percent increment with 100 being equal to 100% modulation and 000 equal to no modulation.

LGV? provides a number from 000 to 085, which represents the Log video level of the receiver. This number represents the signal level above the noise floor, of the receiver, with each number representing a .47 dB change. The noise floor is represented by 000, with 085 representing 40 dB above noise.

To set the COR level, a COR n function would be used. With this function, n represents a decimal number from 0 to 40. This number corresponds to a threshold setting from noise level (0) to approximately 40 dB above noise (40). Each interim step is equivalentto approximately a 1 dB change.

As a response to an STS? instruction or a serial poll, a status byte is returned to indicate the receiver status. This response is a three-digit decimal number that corresponds to the binary number contained in the returned byte (000 = 00000000; 127 = 01111111). The significance of each bit of the status byte is as follows:

Bit	Description
0	Indicates a signal is present.
1	Set on power up. Cleared by STS?
2	Set if BITE completed or error found by BITE. Cleared by BIT?
3	Not Used
4	Set to 1 when processing or responding to a message.
5	Set to 1 if an error exists. Cleared by “ERR?t.
6	Set to 1 if a service request was sent.
7	Not Used

2.6 PREPARATION FOR RESHIPMENT

If the unit must be prepared for reshipment, the packaging methods should follow the pattern established in the original shipment. If retained, the original materials can be reused to a large extent or will at minimum provide guidance for the repackaging effort.

SECTION III

CIRCUIT DESCRIPTION

3.1 GENERAL

3.1.1 The operating circuitry of the WJ-8617B-5 Receiver is contained in four main sections. Each of the sections contains the circuitry required to perform a specific portion of the overall receiver operation. The sections are interconnected, via the main chassis, by a network of control and signal lines to permit the various sections to perform as a signal unit, under the control of the Digital Control Section. Operation of the Digital Control, RF/IF, Synthesizer, Power Distribution, Digital Refreshed Display, IEEE-488 Remote Interface, and Extended Memory are described in the paragraphs that follow. Reference should be made to the functional block diagrams, provided in this section, and to the schematic diagrams, provided in **Section VI,** to supplement the circuit description.

3.1.2 The unit number method is used for the identification of electrical components within this receiver. Parts on the various subassemblies carry a prefix before the usual class letter and item number, such as A3A1 or A4AlQ1. These prefixes, which identify the subassembly, are omitted in the circuit descriptions and illustrations, except where confusion might result from their omission.

3.2 DIGITAL CONTROL SECTION

3.2.1 FUNCTIONAL DESCRIPTION

The Digital Control section consists of the Front Panel Display and Control (A6) and the subassemblies installed on the Digital I/O Motherboard (A5). This microprocessor controlled section continuously monitors the operation of the receiver and provides control signals to direct its operation. The primary subassemblies responsible for controlling the receiver are the Microprocessor (A5A3), Synthesizer Interface (A5A2), Receiver Interface (A5A1), and the Front Panel Display and Control (A6). These subassemblies and their interconnections are illustrated in the Digital Control Section Functional Block Diagram, **Figure 3-1.** In addition to the primary control subassemblies, the Digital I/O Motherboard provides six option slots that accept up to six additional digitally controlled subassemblies which extend the control capabilities and provide enhancements to the operation of the receiver. Refer to **paragraphs 3.5, 3.6, and 3.7** for descriptions on the current options contained in the WJ-8617B-5.

The Microprocessor (A5A3) performs the task of controlling the operation of the receiver by providing control signals to the various receiver circuits and monitoring the receiver operation. This subassembly consists of a microprocessor, a list of operating instructions contained in ROM (Read-Only-Memory) and 1 k bytes of RAM (Random-Access-Memory) where the microprocessor can store and retrieve variable data as required, as it performs its control function. Under the direction of the program, the microprocessor continuously monitors the receiver operation and checks the status of the interrupt latches on the receiver interface. If the interrupt latches indicate that the receiver operation should be updated due to parameter changes or if the front panel display must be updated, the operation of the microprocessor is interrupted and it enters into an appropriate subroutine to perform the required task.

Communication between the microprocessor and the other subassemblies on the Digital I/O Motherboard is established using the microprocessor 16-line address bus and 8-line data bus. Each of the input and output circuits on the receiver interface and synthesizer interface as well as each of the option slots are assigned specific addresses. By placing the appropriate address on the address bus, the microprocessor can communicate with the desired location using the data bus.

3.2.2 DETAILED CIRCUIT DESCRIPTION

3.2.2.1 Type 794109-1 Microprocessor (A5A3)

The reference designation for the microprocessor subassembly is A5A3. Refer to **Figure 6-47** for the Type 794109-1 Microprocessor schematic diagram.

Integrated circuit U1 functions as the main clock for the Digital Control section of the Receiver. It provides three clock outputs (BO2, 01, and 02) and a reset pulse (RST) which resets the microprocessor when power is first applied. Clock outputs 0 and 0 are bi-phase clocks that are supplied directly to the microprocessor to control its operation. The third clock (BO2) provides the 1 MHz Data Bus Enable (DBE) system's clock to the microprocessor and system. Y1, a 4 MHz crystal, sets the clock frequency and the tank circuit, comprised of C10, L1 and R16 and assures the crystal oscillates at its fundamental frequency. Capacitor C9 generates the reset pulse, due to its charge time. When power is first applied, or interrupted, a reset pulse is generated to reset the microprocessor to the beginning of its program. The RST pulse is supplied to other circuits in the system via board terminal B8 and its complement (RST) is supplied via terminal B10, after being inverted by U16A. The B02 output of U1 generates the DBE clock which is supplied to the microprocessor at pin 36 and to other circuits in the system via board terminal B16. The DBE signal is also sent to U20 to generate the remaining clocks required by the digital control section.

Integrated circuit U20 is a binary divider which divides the DBE clock to provide the CLK 1, CLK 5, CLK 8 and CLK 11 outputs to the digital section. CLK 1 is equal to DBE.2 (500 kHz) and is supplied to the Receiver Interface to clock the circuitry supplying the receiver status inputs to the microprocessor. CLK 8 and CLK 11 are equal to DBE +256 and DBE-2048 respectively and are supplied to the Receiver Interface to generate interrupt requests to the microprocessor. CLK 5 (DBE*32) is routed off of the Microprocessor board via board terminal A18 and is supplied to Option Slot 2 on the motherboard to be used when the Digital Refresh Display subassembly is installed. The RAM clock is supplied to the on board RAM, via Q1 and is also present at board terminal A4 for use with the RAM option, when installed.

Integrated Circuit U2 is the MC68BOO Microprocessor. Pins 39 (ISC), 2 (HALT), and 6 (NM-) are unused and are tied high or low to disable these inputs. The IRQ is the interrupt request line which receives an input from the receiver interface when an interrupt is requested. The Data I/O lines consist of DO through D7. These lines connect to the memories and to the data bus on the motherboard to read from and write data into the input and output circuits of the digital control section. Pin 34, the Read/Write line of the microprocessor indicates whether the microprocessor is in a Read (High) or Write (Low) mode. Lines AO through A15 comprise the address bus of the microprocessor. AO through A12 are connected to the Address Bus of the motherboard and to the memories. Address lines A13 through A15 go to U18, which decodes the address lines to divide the address space into eight sectors. The VMA output from the microprocessor indicates when the address on AO through A15 is valid. This line in turn enables U18.

Output “0” of U18 goes to U17 to enable the left half of this decoder. U17 decodes address lines A8 and A12 to enable the RAMs or the SIOO and SIO1 outputs of the Board. With A12 low, outputs 0 and 1 of U17 each supply enable pulses to the CS1 chip select inputs of half the RAMs according to the status of A8. When A12 is high, output 2 enables SIO0, when A8 is low, and output 3 enables SIO1 when A8 is high. Output “7” of U18 enables the right half of U17, which decodes address All and A12 to select the EPROMs. Outputs 0 through 3 of U17 each go to the CS chip select inputs of one of the EPROMs. The remaining six outputs of U18 (1 through 6) go to the SELl through SEL6 outputs of the microprocessor subassembly. These outputs are connected to the option slots on the motherboard and are used to enable the option installed in that slot. The four digit number in parenthesis is the Hexadecimal address that enables these lines.

U7 through U12 and U22 comprise the RAMs. Each of these integrated circuits contains 256 memory locations 4 bits wide. By arranging the ICs in pairs and sequentially enabling each pair, over 1000 locations, 8 bits wide, are produced. One IC in each pair connects to data bus lines DO through D3 and the other IC connects to lines D4 through D7. The chip select inputs (CS1 and CS2) permit selection of each pair of RAMs in accordance with the address on A8 and A9. The CS1 lines are enabled by decoder U17 in accordance with line A8 and the CS2 line is enabled by A9, via the decoder formed by U15C, U15D and U16C. A High level on A9 pulls the output of U15D low and a low on A9 pulls the output of U15C low. The read-only memory is comprised of EPROMs U3 through U6. Each EPROM connects to address lines AO through A10 of the address bus to provide over 2000 memory locations each for a total of 8 K bytes of EPROM. The EPROMs are sequentially enabled in accordance with address lines All and A12 via decoder U17. Each select output of U17 goes to the CS and PGM inputs of one of the EPROM to enable it when the line is pulled low. The CSand PGM inputs of each chip are tied together to conserve power. With this connection, the EPROMs draw full power only when the chip is selected.

Integrated Circuit U19 connects to the data bus and is clocked by the ELVL output of the receiver interface. This latch supplies data to the RF/IF and Synthesizer Motherboards. U21 decodes address lines AO, Al, and A2 to provide reset pulses for flip-flops located on the Receiver and Synthesizer Interfaces. This decoder is enabled by the EPLS output from the Receiver Interface.

When the receiver is powered on, +5 Vdc is supplied to the RAMs, U23, and U15 by regulator U24, via CR1. CR2, installed at U24 pin 3, raises the output of the regulator by approximately .7 V to compensate for the diode drop introduced by CR1. The +5 Vdc from U24 is also supplied at connnector pin A6 for use when the extended memory option is used in the receiver and also at connector pin A36, via current limiting resistor R4, to supply charging current for the battery back-up. When the receiver is powered off the back-up battery supplies a voltage of approximately 3.6 Vdc, via R4, to supply a stand-by voltage to the RAMs. This prevents the data stored in the RAMs from being lost. At this time, CR1 is reverse biased, preventing any additional battery current drain by U24.

The power fail circuit, comprised of Q1, Q2, U15A, U15B and U23, disables the Digital Control section if the supply voltage drops to low to provide reliable microprocessor operation. When this circuit is activated, transistor Q1 is cut-off to disable the RAM clock and transistor Q4 conducts to discharge capacitor C9, causing the microprocessor to be reset. Integrated Circuit U23 monitors the unregulated +9 Vdc line, via the voltage divider formed by

R24 and R23, and compares the voltage level with a sample of the regulated +5 Vdc line. If the sample of the +9 V line, applied to U23 pin 3, falls below the reference level supplied at U23 pin 2, the output of U23 switches from +5 V (logic “1”) to 0 (logic “O”). This causes the output of U15A to assume a logic “1” state, which saturates Q2. Q2, now saturated, removes bias from Q1 to cut the transistor off and disable the RAM clock. The logic “1” output of U15A also causes U15B to switch to logic “O” at pin 6. The output of U15B causes Q4 to conduct, discharging C9, and it causes the outputs of U15C and U15D to assume a logic “1” state, to disable the RAMs. This power fail condition will be maintained as long as the low voltage condition exists.

3.2.2.2 **Type 794108-3 Receiver Interface (A5A1)**

The reference designation for this subassembly is A5A1. Refer to **Figure 6-45** for the Type 794108-3 Receiver Interface schematic diagram.

The Receiver Interface decodes address information from the microprocessor to enable input and output circuits throughout the digital control section. The address decoders, comprised of U7, U8, and U9, decode the address information on address lines A4 through A6 of the address bus to enable the appropriate circuit in accordance with the address. Sections D, E, and F of inverter U2 buffer the address lines to prevent loading by the decoders. The decoders are enabled by the SIOO, SIO1, R/W, and R/W outputs from the microprocessor, causing U7 and U8 to be enabled when the microprocessor is in a write mode and U9 to be enabled in a read mode. The DBE and DBDLY clocks provide the final enabling pulses to the decoders. U7 and U8 are enabled by the DBDLY clock from the microprocessor subassembly to delay the enabling of the output devices until the data from the microprocessor is present on the data bus. The outputs of the address decoders are provided to the enable or clock inputs of the various interface circuits of the digital control section. The four digit numbers in parentheses at the decoder output lines represent the hexadecimal address that enables that line.

Tri-state buffers U14B and U18 provide inputs to the data bus, indicating which optional subassemblies are installed in the receiver. The OPT 0 input connects to the optional tuning jack on the front panel and OPT1 connects to the VBFO connector on the Synthesizer Motherboard (A4). The remaining inputs, OPT 2 through OPT 6, are wire wrapped to the option slots on the Digital I/O Motherboard. When an option is installed in the receiver, the appropriate OPT input is connected to +5V. If no option is installed, that input is tied to ground via R29, R30 or R31. When a Read Address 1040 is output by the microprocessor, the option data is placed on the data bus to be read by the microprocessor.

Integrated circuits U10 through U13 and U1 control the seven segment LED display on the front panel. The display is multiplexed by the microprocessor which causes each digit of the display to be turned on for only a short period of time, at the end of which the next digit is turned on. The multiplexing occurs at a high speed so that each digit appears to be on continuously. The digits are divided into two groups of nine each and are enabled in pairs by Decoder U10. Ull latches data from the data bus to drive U10. The output of U10 to the Front Panel Display and Control (A6) to drive the nine pairs of display LEDs. Resistors R17 and R18 limit the current at the decoded outputs to prevent damage to U10. Latches U12 and U13 supply the data to the individual segments of the digital display. U12 supplies data to group 1 and U13 supplies data to group 2. When the microprocessor updates the display, it writes data into U12, corresponding to the LED segments to be lit in group 1 and then writes data into U13 corresponding to the group 2 segments to be lit. It then writes the number of the digit pair that is being updated into Ull to drive decoder U10. For example, if the first pair of digits is being updated, a 1 is written into Ull, which enables the DENB1 output of U10.

The brightness of the display is controlled by the length of time that the seven-segment LEDs are enabled. This time is controlled by timer U1. When data is clocked into U11, the timer (U1) is also activated causing the Q output to go low to enable Ull. The RC network consisting of C1, R2, and the adjustment of R1 determines the length of time that Ull is enabled, thereby determining the brightness of the display. The second output of U1 is inverted by U2A and is used to turn on Q1 during the time that U1 is timing. This controls the length of the pulses that go to the LEDs on the front panel pushbuttons, thus controlling their intensity. Resistors R16 and R15 place +5 V at the C and D inputs of U10 when Ull is disabled, placing a 12 at the input of U10, which does not enable any of the outputs. This causes the display driven by U10 to be enabled only during the time that U1 is timing.

Integrated circuit U17 latches bandwidth and detect mode data from the data bus to its outputs to provide the outputs to the RF/IF Motherboard. When the microprocessor updates this information, it writes the data into hexadecimal address 1150, which places the new data into U17. U17 then provides this data to the RF/IF Motherboard to select the IF bandwidth and the detection mode.

U6 and U3 are D-Type Flip-Flops which are used to latch interrupts. These interrupts signal the microprocessor to jump to a subroutine and perform the task required by the requesting circuits. U6A is set every 256 psec by the positive transition of clock 8 from the microprocessor. This is used to generate the scan when the receiver is in the scan mode. After the scan, the microprocessor will reset the scan interrupt by generating a PLSO which is generated on the microprocessor board. U6B generates a display interrupt on the positive transition of clock 11, which occurs every 2 msec. The display interrupt controls the updating of the display information on the front panel. When the update is complete, U6B is cleared by a PLS1 from the microprocessor. U3B generates an interrupt which comes from the keyboard, via the Synthesizer Interface subassembly. After the completion of the keyboard interrupt, this flip-flop is reset by a PLS2. U3A is set by the TUNE 3 input which is generated on the Synthesizer Interface. The TUNE 3 input is present each time the tuning wheel is rotated and generates the interrupt to signal the microprocessor to update the frequency display on the front panel. This flip-flop is reset by a PLS3 from the microprocessor.

The outputs of U3 and U6 are applied to U5 and U14A. Tri-state buffer U14A places the data from the flip-flops onto the data bus when the microprocessor reads address 1000. This permits the microprocessor to monitor the status of U3 and U6. The Hex-latch U4 is written into by the microprocessor when it writes into address 1000. The outputs from U4 then go to U5 to permit the interrupts to generate the IRQ pulse to interrupt the microprocessor. U5, an AND-OR-INVERT gate, generates the IRQ output when the two inputs of one of its input pairs are high. For example, if the scan interrupt flip-flop is set and the input to U5 corresponding to D7 is high, U5 will generate a scan interrupt. The interrupt will be generated only if the scan interrupt and D7 inputs are both high. This is also true for the Display, Keyboard and dial interrupts-and their corresponding data input lines. Data bits D3 and D2 are used to generate interrupts requested by options. The INT EXT input to the board generates the IRQ output when an interrupt is requested by an option.

U15 is an Analog-to-Digital-Converter which is used to convert analog data from various receiver circuits into digital form to be read by the microprocessor. INO through IN7 are the analog inputs from the receiver. These inputs are selected by data lines DO through D2 when the microprocessor writes into address 1050. Data lines DO through D2 select one of the seven analog inputs via the address inputs AO through A2 of U15. When the microprocessor reads address 1050, digital data representing the selected input is supplied to the micropro-cessor via the Data bus.

The INO input to U15 is connected to the wiper of the dwell potentiometer on the front panel and supplies a voltage representing the dwell setting. IN1 connects to the front panel RF/IF gain potentiometer and supplies a voltage representing its setting. A voltage representing the signal strength is supplied to IN2 by the receiver. A signal from the AM Detector of the receiver is supplied to IN3 via the peak detector formed by CR1, R19 and C15. This supplies a voltage to U15 representing the peak amplitude of the AM detector. C21 and R6 couple the AM signal to the peak detector. The FM Detector output is supplied to IN4 and slso to IN7 via the peak detector formed by CR2, R14, and C2. This supplies the dc level of the FM Detector to IN4, which tells the microprocessor if the receiver is on frequency, and the peak amplitude to IN7. C20, and R13 couple the FM Detector signal to the peak detector. IN5 receives a LOG IF signal from the receiver which indicates the IF signal strength. The input to IN6 is a voltage representing the IF Bandwidth selected. This voltage is generated by a potentiometer on each IF Amplifier which is adjusted to a voltage representing its IF bandwidth. R22 through R24 and R26 through R28 are current limiting resistors, used to protect U15. R24, R27, and R28 also form voltage dividers with R12, R7, and R21, respectively, to reduce their inputs to levels within U15.

3.2.2.3 Type 794110-1 Synthesizer Interface (ASA2)

The reference designation for this subassembly is A5A2. Refer to **Figure 6-46** or the Type 794110-1 Synthesizer Interface schematic diagram.

The circuit comprised of UlA, U2A, and U2B form part of the circuitry used to interface the front panel keyboard with the microprocessor. These D-Type flip-flops latch the ready pulses which come from the front panel (KRDY and KRDY2) or the optional external Keyboard (KRDY3), whenever a pushbutton is depressed. The front panel pushbuttons are arranged in two banks, each providing a separate ready pulse. KRDY1 is supplied by the first bank of pushbuttons and the second bank supplies KRDY2. The KRDY3 pulse is supplied by the Optional Tuning keyboard (when used). The outputs of U1A, U2A and U2B go to a priority network, comprised of U3B and U3C, to enable the appropriate KDATA output from the front panel. The circuit is arranged such that KRDY1 has first priority followed by KRDY2 and finally KRDY3. This asssures that only one circuit is supplying KDATA at a given time. U3A provides the keyboard interrupt (KBINT) to the interrupt flip-flops on the receiver interface when one of the KRDY latches is set, indicating a pushbutton on the front panel has been depressed. The Q outputs of the KRDY latches are also supplied to the inputs of TRI-STATE BUFFER U17, to be read by the microprocessor when the KDATA is read. These flip-flops are reset by a PLS7 from the Microprocessor Subassembly after the Keyboard interrupt is completed.

KDATA, from the front panel enters the synthesizer interface and is applied to the inputs of Tri-state buffers U17 and U16. When enabled by hexadecimal address 1010 (Read) U17 and U16 places the KDATA, representing the status of the pushbuttons, onto the data bus to be read by the microprocessor. When the microprocesor reads address 1020, a low on pin 1 of U16 enables its outputs at pins 3, 5, 7, and 9 providing data from KRDY2, STAT7, STATO and DIAL Direction to the data bus. The KRDY2 input indicates that one of the momentary contact pushbuttons in bank 2 on the front panel is being held in. STAT7 indicates if the receiver COR circuit is active and STATO indicates if the analog-digital-converter on the receiver interface is ready to supply data. The dial direction input to U16 (DIAL DIRT) is a high or low level from flip-flop U1B which tells the microprocessor which direction the tuning knob is turning when it is rotated.

U1B compares the phase between the TUNE 1 and TUNE 2 signals supplied by the ENCODER assembly (U5) remounted on the front panel of the receiver, and provides a High or Low level to the data bus indicating the direction of the tuning knob rotation. When the Tuning Knob is rotated in one direction, the TUNE 2 signal will lead the

TUNE 1 signal causing the Q output of U1B to be high. When the dial rotation is reversed, the TUNE 1 signal will lead the TUNE 2 signal causing the Q output to be low. Refer to the timing diagram in **Figure 3-2** for the input phase versus output of U1B. The TUNE 1 input is applied to U1B via U14A and U14B. is also supplied to the receiver interface as TUNE 3 to generate the Dial Interruptwhen the tuning knob is rotated.

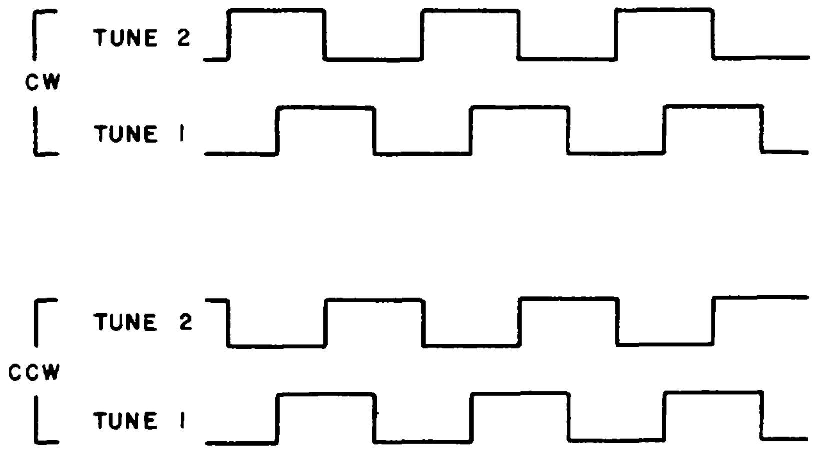


Figure 3-2. Encoder Assembly Timing Diagram

U8 through Ull, U21 and U22 are Octal latches which latch data from the data bus when their respective addresses are written into. This data is supplied to the Synthesizer Section to control the frequency of the synthesizers. U21 and U22 provide an interface between the microprocessor and the synthesizer to determine the frequency of the Variable BFO, when this option is installed. U8 through Ull interface with the synthesizers to control the frequency; the outputs of U10 and Ull are applied to the inputs of U12. This output represents the 4 most significant digits of the frequency.

U12 is a field programmable logic array which is programmed to properly select the synthesizer band and the bands of the receiver. These outputs go to the RF/IF Motherboard to control the UHF VCO and to select the appropriate RF preselectors. In addition, the F2 output of U12 is supplied the sweep reversal circuit consisting of R14 through R16, Q1 and CR1, via inverter U13C. The sweep reversal circuit reverses the sweep of the signal monitor when the UHF band is selected. When UHF is selected, Q1 is saturated causing CR1 to be reverse biased. This removes the -15 Vdc that is supplied to the signal monitor causing the sweep on the CRT to be reversed.

Tri-state buffer U4 supplies data onto the data bus from ANTENNA SELECT switch Sl when hexadecimal address 1060 is read. The settings of Sl tell the microprocessor at what frequency to switch between antenna 1 and antenna 2

Octal latch U15 latches data from the data bus to light the LEDs on the front panel pushbuttons. The outputs of U15 are buffered by U14 (sections C through F) and U13 (sections A, B, E, and F) and supplied to the Front Panel Display and control (A6). The LDATA output indicates whether the addressed LED should be on or off, LADDRO through LADDR2 is the address of the LED in each of four LED banks and LCLKO through LCLK3 are used to clock each of the four LED Banks

U7, U20, and U18A form a digital-to-analog converter circuit which generates the RF and IF gain for the receiver circuits. Data representing gain is latched into U7 when address 1140 is written into. This supplies the data to the digital-to-analog-converter (U20) where the data is converted into an analog voltage. R1, R2 and decoupling capacitor C1 pro-vide bias for U20 to control the scale factor for the output current of U20. R4 provides compensation current to U20 to reduce drift due to temperature changes and C3 provides high frequency compensation. The output current of U20 is converted to a voltage by U18A with R3 controlling the output voltage range.

The circuitry comprised of U6, U19, and U18B function the same as the gain digital-to-analog converter except that it supplies COR level information to the receiver.

3.2.2.4 **Type 796290-1 150 Hz Filter (ASAX)**

The 150 Hz tone circuitry provides the receiver with the capability of decoding a 150 Hz recognition tone within the detected video signal. The WJ-8617B-5 receiver can be programmed, by front panel controls, to detect the presence or absence of the recognition tone. When present is selected the 150 Hz tone circuitry decodes the tone when present, and activates the audio and COR circuitry. When absent is selected the 150 Hz tone circuit acti-vates the audio and COR circuitry when signal without the 150 Hz tone are detected.

3.2.2.5 **Type 794190-1 Front Panel Display and Control (A6)**

The reference designation for this subassembly is A5A6. Refer to Figure 6-48 for the Type 794190-1 Front Panel Display and Control schematic diagram.

The control section of the Front Panel Display and Control Subassembly consists of pushbutton switches S1 through S35. These pushbuttons are divided into two banks and supply KDATA to the microprocessor via the Keyboard Interface ICs, U6 and U9. The first bank of switches (S1 through S20) connect to Keyboard Interface U6. Each of the normally open pushbutton switches connects between the X and Y pins of U6, with no two switches connecting between the same pins. Pins X1 through X4 are pulsed in sequence by U6 while the Y inputs are examined for the presence of the pulses. When a pushbutton is pressed, the switch provides a path for the pulse from the X output, connected to the switch, to its cor-responding Y input. This indicates to U6 which pushbutton is pressed. The speed at which the X pins are pulsed is determined by C1. C2 provides debounce, which is the time that U6 waits to determine if the switch is actually pushed before providing an output. Once a switch has been pushed the data corresponding to the address of that switch is latched into U6 and the available output (AV) is pulsed. The available output provides the KRDY1 input to the Synthesizer Interface which in turn provides the KENB1 signal to enable the DA through DE out-puts of U6. These outputs are then provided as KDATA to be read by the microprocessor. The second bank of switches (S21 through S35) function identically to the first bank and interface with the microprocessor via U9.

U4, U5, U7, and U8 are addressable latches used to light the LEDs on the pushbuttons, indicating the keyboard status stored in the microprocessor memory. The inputs to these latches consist of LADDRO through LADDR2, which selects the LED to be lit by each latch, LDATA which determines whether the addressed LED is to be on or off and

LCLK0 through LCLK4 which enable the outputs of each latch to light or extinguish the LED. The addressable latches pull the cathode of the selected LED low causing the LED to light for the duration of the positive LVLTG pulse applied to the anode. The LVLTF pulse duration deter-mines the LED intensity in accordance with its pulse width. This pulse is supplied by the receiver interface board via voltage dropping circuit comprised of Q10, R19, and R20. In addi-tion to supplying the pushbutton LEDs the LVLTG pulse is applied to the anode of DS19. DS19 provides the decimal point for the digital display. The cathode of this LED receives its ground via a current limiting resistor (A5A1R4) located on the receiver interface.

The remainder of the display section consists of 18 seven-segment displays (DS1 through DS18) and their control circuitry. These displays are divided into two banks of nine each. The first bank receives data from driver U1. The outputs of U1 are connected to the cathodes of each display segment via current limiting resistors R2 through R8 and provide a low output to the segment to be lit. The second Display bank is driven by U2 via current limiting resistors R9 through R15. The inputs to U1 and U2 are data representing the LED segments to be lit. This data is supplied from the receiver interface board.

Multiplexing permits the displays in each bank to share a common driver. The drivers are connected to the segments of each display in the bank simultaneously and each display is enabled only when data pertaining to it is present. Enabling of the displays is accomplished using transistor switches Q1 through Q9 and the DENB1 through DENB9 pulses from the receiver interface. The collectors of each transistor connect to one display in each bank and the emitters connect to +9 V. A DENB pulse pulls the transistor base low which causes the transistor to conduct and enable the two displays connected to its collector. Each display pair is enabled for a short duration of time, at the end of which another pair is switched on. However due to the high rate of speed that the multiplexing occurs, each digit to be continuously lit. The intensity of the display is determined by the width of the DENB pulse, which controls the on-time of each display pair. A timing circuit on the Receiver Interface controls the pulse width to make the display appear brighter or dimmer.

Integrated circuit U3A functions as an audio amplifier used to drive headphones connected to the phone jack on the front panel. The gain is fixed by the values of R21 and R22. The audio input is taken from the wiper of the audio level potentiometer on the front panel which provides gain adjustment by adjusting the input level.

The Dwell potentiometer R1 sets the duration of time that the receiver stops at each frequency during the scan and step modes of operation. The wiper of R1 connects to a digital-to-analog converter on the receiver interface, where a digital signal representing the setting of the potentiometer is created and read by the microprocessor.

3.3 RF/IF SECTION

3.3.1 FUNCTIONAL DESCRIPTION

Refer to the RF/IF Section Functional Block Diagram **(Figure 3-3)** for the following functional description. The incoming RF signal enters the receiver via the ANT 1 or ANT 2 antenna inputs and enters the Antenna Switch (A8). This subassembly accepts the RF signal from the selected input and directs the signal to the VHF High Band Preselector (A3A3) on the RF/IF Motherboard. Selection of the RF input is controlled by the LVL3 signal provided by the digital control section, in accordance with the antenna select pushbutton on the receiver front panel. A second output from the Antenna Switch is available for use when the 500-1100 MHz Frequency Extender is incorporated in the receiver. With this option installed in the receiver, the Antenna Switch directs frequencies above 500 MHz through the frequency extender prior to being sent to the VHF High band preselector. The Antenna Switch output is controlled by the FPLA2 signal from the digital control section, which switches the output in accordance with the tuned frequency of the receiver.

The VHF High Band Preselector (A3A3) provides preselection for signals between 120 and 500 MHz and directs signals within the 20 to 120 MHz range to the VHF Low Band Preselector (A3A4). Together, these subassemblies divide the 20 to 500 MHz frequency range into eight frequency bands. The High Band Preselector divides the 120 to 500 MHz frequency range into four bands of 120 to 187 MHz, 187 to 292 MHz, 292 to 382 MHz and 382 to 500 MHz. The Low Band Preselector divides the 20 to 120 MHz frequency range into four bands of 20 to 30 MHz, 30 to 47 MHz, 47 to 75 MHz and 75 to 120 MHz. Switching between frequency bands is controlled by the VHF HI/LO and VHF Select signal (FPLA3 through FPLA6) supplied by the Digital Control Section.

After preselection, the RF signal enters the VHF Preamplifier (A3A5) where it is amplified to a level sufficient to drive the 1st Converter. An attenuator at the output of the VHF Preamplifier limits the output level under strong signal conditions to prevent overdriving of the mixer in the next stage. Under strong signal conditions, the VHF AGC voltage from the AGC I/O subassembly (A3A8) provides bias for the attenuator, thereby limiting the output level.

From the VHF Preamplifier, the signal is passed to the 1st Converter (A3A6), where the signal is mixed with a 572 to 1052 MHz 1st LO signal from the synthesizer section. The LO signal varies in 1 MHz steps, thus providing a tuning resolution of 1 MHz. The output of the mixer is a band of frequencies whose center frequencies are from 552 to 551 MHz. Even megahertz signals such as 20.000 MHz and 30.000 MHz convert to 552 MHz and fractional megahertz signals such as 20.999 and 30.999 when converted, approach an IF center frequency of 551 MHz. IF amplifier Q1 amplifies the signal to restore the signal level lost in the conversion process.

The output of the 1st Converter is directed to the 2nd Converter (A3A7) where the 552 to 551 MHz 1st IF is mixed with the 2nd LO signal from the Synthesizer Section to provide a 21.4 MHz second IF. The 2nd LO signal varies from 530.6 to 529.6 MHz in 100 Hz steps, thus providing a 100 Hz tuning resolution. The 21.4 MHz IF signal is then amplified and made available to the 21.4 MHz IF Amplifiers (A3A9 through A3A13). Samples of the IF signal are also provided to the Signal Monitor, and to the receiver rear panel (J20). When installed, the 21.4 MHz IF output to the IF Amplifiers is switched to the appropriate 21.4 MHz IF Amplifier by a PIN diode switching network which is controlled by the BW #1 through BW #5 bandwidth select inputs supplied by the AGC subassembly (A3A8). This switch directs the signal to the IF Amplifier with the desired bandwidth. Each 21.4 MHz IF Amplifier contains an IF Amplifier and a bandpass filter to limit the bandwidth of the IF signal. The standard receiver can accept up to five IF Bandwidths.

The output of the selected 21.4 MHz IF Amplifier is directed to the AM Demodulator (A3A16), where the signal is amplified both linearly and logarithmically. Amplifiers Q1 and U1 provide linear amplification of the 21.4 MHz signal which is then passed through a 4 MHz bandpass filter when wideband IF Amplifiers are selected or a 300 kHz filter when narrow-band IF amplifiers are used. The Post Filter output is provided to the Switched IF connector (J1) on the rear panel which provides a sample of the band limited IF signal, to the FM Demodulators for detection of FM video and to the AM Detector for detection of AM video. Logarithmic Amplifiers U5, U6, and U7 provide an output that is a dc level that varies logarithmically with signal strength. This dc level is directed to the AGC I/O subassembly where it is summed with a sample of the AM video to provide an indication of the signal strength to the Digital Control Section. The Log Video level is also provided to the Audio/Video/COR subassembly to activate the COR and Squelch circuitry

Both the 21.4 MHz IF and AM video signals from the AM Demodulator are directed to the FM Demodulators (A3A17 through A3A21). Up to five FM Demodulators can be used with bandwidths corresponding to the 21.4 MHz IF Amplifiers. Each demodulator is matched in bandwidth to one of the 21.4 MHz IF Amplifiers to provide a full scale output at the band-edge of the IF signal. The FM portion of these subassemblies consist of FM detector circuitry to demodulate the 21.4 MHz IF and provide a video signal which is amplified by the video amplifier. The AM portion consists of a low-pass filter to filter out any 21.4 MHz component that may be present on the AM video signal. The AM and FM video outputs are then directed to the Audio/Video/COR subassembly (A3A15).

The video outputs of the FM Demodulators are applied to a switching network at the input of the Audio/Video/COR subassembly (A3A15) to permit selection of AM or FM video from the appropriate FM Demodulator. The FM video is amplified and directed to the FM monitor connector (J2), on the rear panel of the receiver, and to the AM/FM select switch on the Audio/Video/COR subassembly. A sample of this signal is also provided to the Digital Control Section for monitoring. AM video signals are amplified and applied to the AM input of the AM/FM select switch. Depending on the detection mode selected, the output of the AM/FM select switch will be either AM or FM video which is amplified and applied to the video output connector (J4) on the receiver rear panel. The video signal is also directed to the audio circuitry where the signal is amplified and directed to the Audio Output connector (J3) on the rear panel and to the front panel phone jack via the Digital Control Section. The log video signal, from the AM Demodulator, and the COR level, from the Digital Control Section also enter this subassembly to activate the COR and squelch circuits. These two levels are compared by U8 and when the log video level is greater than the COR level reference, provided by the Digital Control Section, the COR and squelch circuits are activated. This activates the audio outputs and provides a 100 mA current-sink via the COR connector on the rear panel to ground (J21), to activate external equipment.

The AGC subassembly (A3A8) provides AGC voltages to the RF and IF circuits, selects and activates the desired IF bandwidth and selects the proper post filter, in the AM Demodulator, for the IF bandwidth selected. This subassembly receives samples of the AM and LOG video signals to produce RF and IF AGC voltages and to provide an indication of signal strength to Control Section. The AGC voltages are derived from the AM video signal. This signal is detected and applied directly to U5C when fast AGC is selected, causing the AGC circuits to quickly respond to gradual changes in signal level as in continuous AM and FM signals. With slow AGC selected, the AM video is passed through a pulse stretching network prior to application to U5C. This permits the AGC circuits to respond to short duration pulses. When manual gain is selected, the Digital Control Section removes the output of U5C from the AGC circuits and supplies an analog signal representative of the front panel RF/IF gain control setting.

The bandwidth select signals from the Digital Control Section enter the AGC subassembly and are decoded by U9. The outputs of U9 activate the appropriate 21.4 MHz IF Amplifier and control the switching of the various pin diode switching networks associated with the different bandwidth signal paths. Each 21.4 MHz IF Amplifier provides a DC level representing its bandwidth, when activated, to U5D which in turn selects either the wideband or narrowband Post filter on the AM Demodulator.

3.3.2 DETAILED CIRCUIT DESCRIPTION

3.3.2.1 Type 794128-1 Antenna Switch (A8)

The reference designation for this module is A8. Refer to Figure 6-52 for the Type 794128-1 Antenna Switch schematic diagram.

RF signals enter the Type 794128-1 Antenna Switch via J1 (ANT 1) and J2 (ANT 2) and are directed to the RF Switch subassembly (A8A1). Signals entering at J1 are coupled through C1 to the ANT 1 branch of the RF Switch comprised of CR1, CR5, and CR9. The ANT 2 branch of the switch, comprised of CR2, CR6, and CR10 receives its signal from J2, via C4. The selection of the desired input is controlled by the polarity of the bias voltage provided by the Switch Driver (A8A2). With ANT 1 selected, the Switch Driver provides .15 Vdc at terminal El and -10 Vdc at E2. The +15 Vdc at El provides a current source for pin diode CR1 causing it to conduct to provide a signal path through this branch of the switch. The -10 Vdc at E2 provides a current-sink for diodes CR6 and CR10 which effectively grounds the ANT 2 input and holds series diode CR2 cut off. With ANT 2 selected, the voltages at El and E2 are reversed causing signal flow through the ANT 2 branch of the switch. Decoupling of the switching lines is provided by C2, C3, R1, R2, L1, L2, and FB5 through FB8.

The outputs of the RF Switch direct the RF signal to the UHF or VHF section of the receiver. When frequencies between 20 and 500 MHz are tuned, +15 Vdc is provided to terminal E3 which forward biases CR3 to permit signal flow through the VHF output branch of the switch (CR3, CR7, and CR11). A -10 Vdc potential at E4 forward biases CR8 and cuts off CR4 to block signal flow through the UHF output branch. Tuning above 500 MHz (with FE installed) causes a reverse of the voltages at E3 and E4 to allow the RF signal to pass to the UHF section of the receiver. Decoupling of the switching inputs is provided with C5, C6, R3, R5, L3, L5, and FB9 through FB12. Capacitors C12 through C14, along with L8 and L9 form a 500 MHz low-pass filter to prevent signals above 500 MHz from entering into the VHF section of the receiver. The 500 MHz high-pass filter comprised of C7 through Cll, L6 and L7 block signals below 500 MHz from entering the UHF section.

The Switch Driver (A8A2) receives the ANT 2/ANT 1 and UHF/VHF select signals from the receiver and provides a bias voltage of +15 V or -10 Vdc to each switch branch of the RF Switch. The outputs are provided by four operational amplifiers (UlA, U1B, U2A, and U2B) whose outputs switch between +15 Vdc and -10 Vdc according to the logic levels at the select inputs. The divider formed by R3, CR1, and CR2 provides a switching reference of approximately +1.5 Vdc to insure proper switching. VR1, installed in series with the -15 Vdc input, drops the negative source voltage to -10 Vdc which limits the negative outputs of the drivers to -10 Vdc. This reduces the current requirement needed to drive the shunt diodes in the RF switch.

When ANT 2 is selected, the ANT 2/ANT 1 select input is at a logic 1 level. This places a positive voltage at the inverting input of U1A and the noninverting input of U1B causing the bias voltage at E1l to switch to -10 Vdc and the voltage at E2 to switch to +15 Vdc. At this time, the ANT 2 branch of the RF Switch is turned on to permit the signal to pass. When ANT 1 is selected, the ANT 2/ANT 1 select input is at logic 0. This switches the voltage at terminals E1l and E2 to +15 Vdc and -10 Vdc respectively, thereby turning on the ANT 1 branch of the RF Switch. The low pass RC filter formed by R1 and C1 prevent high frequency noise or transients from falsely triggering the switch drivers.

The operation of the UHF/VHF portion of the switch driver is identical to the ANT 2/ANT 1 portion just described. This portion is activated by the UHF/VHF select input.

When frequencies of 500 MHz or above are tuned, the UHF/VHF select input-is at a logic 1 level. Below 500 MHz, this input is at a logic 0.

3.3.2.2 Type 794189-1 RF/IF Motherboard (A3)

The reference designation for this subassembly is A3. Refer to **Figure 6-1** for the Type 794189-1 RF/IF Motherboard schematic diagram.

With the exception of the Antenna Switch (A8) the Type 794189-1 RF/IF Mother-board provides plug-in slots for all of the subassemblies in the RF/IF section of the receive Operating voltages of +9 V, .15 V, and -15 Vdc are provided via J1 and are distributed to the various subassemblies by the motherboard PC tracks. Transistor **Q1** along with R4 and C42 form a regulator to provide a regulated +9 Vdc and integrated circuit U1 is a regulator which provides a regulated +5 Vdc. Connector P1 Interconnects the RF/IF motherboard with the Digital Control Section to accept control inputs and to provide analog signals representing the status of the RF/IF circuits.

Integrated circuit U2 decodes the VHF Select and HB/LB VHF signal lines from the Digital Control Section to provide switching of the VHF preselectors in accordance with the tuned frequency. The decoded outputs of U2 are applied to switch drivers U3, U4, and U5 which in turn provide bias current to the PIN diode switching networks in the VHF Preselectors. The VHF Preselector Switching Sequence Table **(Table 3-1)** illustrates the preselector switching with respect to the select inputs from the Digital Control Section. A logic “1” at a preselector input activates its respective bandpass filter, while a logic “0” deactivates it.

Table 3-1. VHF Preselector Switching Sequence Table

U2 Input				Preselector Input (Band #)								HB/LB SEL		Bandpass
21	HB/LB	21	20	#8	#7	#6	#5	#4	#3	#2	#1	HB	LB	(MHZ)
0	0	0	0	0	0	0	0	0	0	0	1	1	0	20 - 30
0	0	0	1	0	0	0	0	0	0	1	0	1	0	30 - 47
0	0	1	0	0	0	0	0	0	1	0	0	1	0	47 - 75
0	0	1	1	0	0	0	0	1	0	0	0	1	0	75 - 120
0	1	0	0	0	0	0	1	0	0	0	0	0	1	120 - 187
0	1	0	1	0	0	1	0	0	0	0	0	0	1	187 - 292
0	1	1	0	0	1	0	0	0	0	0	0	0	1	292 - 382
0	1	1	1	1	0	0	0	0	0	0	0	0	1	382 - 500

1 = +5 Vdc; 0 = -9 Vdc

3.3.2.3 Type 794094-1 VHF Hight-Band Preselector (A3A3)

The reference designation for this subassembly is A3A3. Refer to Figure 6-2 for the Type 794094-1 VHF High-Band Preselector schematic diagram. The VHF High-Band Preselector provides preselection for RF frequencies from 120 to 500 MHz by dividing this frequency range into four bands of 120 - 187 MHz (Filter #5), 187 - 292 MHz (Filter #6), 292 - 382 MHz (Filter #7) and 382 - 500 MHz (Filter #8). The band-edges of each of the bandpass filters were selected to minimize second order two-tone intermodulation distortion which could create spurious signals within the receiver. Figure 3-4a illustrates the effect of second order interference on a receiver. In the example shown, the receiver is tuned to 180 MHz with undesired signals present at 80 MHz and 100 MHz. The intermodulation product of the undesired signals (80 +100 MHz) falls at the tuned frequency of 180 MHz, causing interference with the tuned frequency. Figure 3-4b illustrates the same signal condition with RF preselection employed, in this case, the undesired signals fall out of the preselector bandpass, causing a considerable reduction in their signal strength. As a result, the intermodulation product (falling at the tuned frequency) is reduced to an insignificant level.

The RF signal enters the VHF High-Band Preselector at J3 and is directed through the appropriate filter via the PIN diode switching network comprised of CR1 through CR20. This switching network consists of five branches to direct the signal to one of the four bandpass filters or to the VHF Low-Band Preselector (A3A4), depending on the tuned RF frequency. Each switch branch consists of two series diodes connected in the signal path and two or more shunt diodes connected from ‘he signal path to ground. Control of switching is provided by the Digital Control Section via the switch drivers on the RF/IF Motherboard. When tuned to frequencies below 120 MHz the Hi-Band Select input (board terminal 3) is at +15 Vdc, causing series diodes CR3 and CR4 to conduct. At this time, the RF signal is directed through CR3 and out at J4 to the Low-Band Preselector (A3A4). After preselection, the signal re-enters the board at J1 and is passed through CR4 to the RF output (J2). When tuned above 120 MHz the Hi-Band select input is at -10 Vdc. This negative voltage cuts off CR3 and CR4 and causes shunt diodes CR1 and CR2 to conduct, thus cutting off the RF signal path to and from the Low-Band Preselector. During this time, one of the band select inputs (terminals 9, 11, 51, and 49) is at +15 Vdc, forward biasing its respective series diodes to allow the signal to pass through the appropriate filter. The remaining band select inputs are at -10 Vdc, cutting off the signal path to the other three filters.

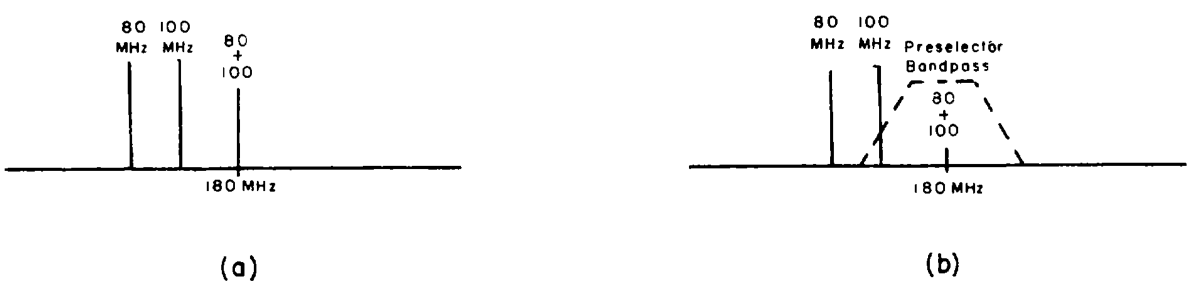


Figure 3-4. Preselector Effects on Intermodulatoin

Bandpass filter no. 5 (120-187 MHz) is a five-pole Chebishev filter comprised of L23 through L27, C45 through C54, and C56 through C65. The filter is tuned for a flat response across the 120 to 187 MHz frequency band by variable inductors L23 through L27 and _ variable capacitors C58 and C63. Filtering of the band select input is provided by the pi-filter comprised of C74, C68, and R14C with additional filtering provided by L22, L28, C44, and C55. R12 and R13 limit current through the PIN diodes.

Bandpass filter no. 6 (187-292 MHz), another five-pole Chebishev filter, is comprised of C23 through C42 and L16 through L20 (C23, C25, C30, C31, C33, C34, C38, and C39 are not used). This filter is tuned for a flat response across the 187-292 MHz bandpass by variable inductors L16 through L20 and capacitors C36 and C41. Bandpass filter no. 7 (292-382 MHz) is a three-pole Chebishev filter comprised of C16 through C20 and inductors L11, L12, and L14. Variable capacitors C16, C18, and C20 tune this filter for a flat response across the 292-382 MHz frequency band. Filter no. 8 is a three-pole Chebishev filter comprised of L6, L7, L9, C7, C8, C10, Cll, and C12. Variable capacitor C10, Cll, and C12 tune this filter for a flat response across the 382-500 MHz bandpass of the filter. Filtering of the band select inputs for filters 6 through 8 is identical (with the exception of reference designations) to that of Filter no. 5. Refer to the VHF High-Band Preselector schematic diagram for the reference designations of these components.

3.3.2.4 <u>Type 794095-1 VHF Low-and Preselector (A3A4)</u>

The reference designation for this subassembly is A3A4. Refer to Figure 6-3 for the Type 794095-1 VHF Low-Band Preselector schematic diagram. The Type 794095-1 VHF Low-Band Preselector provides RF preselection for the frequencies ranging from 20 to 120 MHz. This frequency range is divided into four bands of 20 to 30 MHz (band 1), 30 to 47 MHz (band 2), 47 to 75 MHz (band 3) and 75 to 120 MHz (band 4). The bandpass of each filter is selected to minimize the effects of second order two-tone intermodulation distortion. Refer to the Type 794094-1 VHF High-Band Preselector circuit description **(paragraph 3.3.2.4)** for a more detailed description of the effects of preselection on second order two-tone intermodulation.

RF frequencies ranging from 20 through 120 MHz enter the VHF Low-Band Preselector at J2 and are coupled via C4 to the four branch PIN diode switching network (CR1 through CR15). The switching network directs the RF signal through the appropriate bandpass filter to the output (J4) in accordance with the polarity of the band select voltage at board terminals 9, 11, 49, and 51, and the Low-Band select voltage at terminal 3. When the receiver is tuning within the 20 to 120 MHz frequency range, the Low-Band select line (terminal 3) is at +15 Vdc. This places the cathodes of the series diodes at a +7 Vdc reference due to the voltage dividers formed by R1 and R3, and R2 and R4. With a tuned frequency in the 20 to 30 MHz range, the band no. 1 select input is switched from -10 Vdc to +.5 Vdc, thus providing a current source through a series diodes CR1 and CR3. This permits the signal to pass through filter no. 1 to the RF output (J1). The remaining band select inputs are at -10 Vdc which causes the shunt diodes in filters 2 through 4 to conduct, placing a ground potential at the anodes of there respective series diodes. This prevents RF signals from reaching filters 2, 3, and 4 by keeping the series diodes in their switch branches in a reverse biased condition. Bands 2, 3, and 4 are controlled in the same manner as band 1, just described, as the receiver is tuned within their frequency range.

Each of the filters in the VHF Low-Band Preselector is a five-pole Chebishev filter with a flat response throughout its respective range. Typically these filters introduce a 1 dB insertion loss to in-band signals, with an additional .75 dB loss due to the switching network, for a total of 1.75 dB loss at the tuned frequency. The out-of-band attenuation is 25-30 dB at twice the low frequency cutoff and one-half the high frequency cutoff. Filter no. 1 (20 - 30 MHz) is comprised of inductors L5 through L9 and capacitors C6 through C25. Inductors L5 through L9 are variable to tune each filter pole thus providing the best overall response. Capacitors C97, C93, C26, and C5, inductors L3, L4 and resistor R13A provide decoupling for the band 1 select line. Resistors R5 and R6 limit bias current through the PIN diodes. The decoupling for the band 2 through 4 select lines are identical to band 1 with the exception of the reference designations of the components. Refer to the Type 794095-1 VHF Low-Band Preselector for the corresponding reference designations. Capacitors C101, C2, and C3 along with coils L1 and L2 provide decoupling for the low-band select line. Filter no. 2 passes a 47 to 75 MHz frequency band. This filter is comprised of variable inductors L19 through L23 and capacitors C51 through C68 (C50, C58, C63, and C69 are not used). The variable inductors provide means of tuning each filter pole for the best overall response.

Variable inductors L12 through L16 and capacitors C28 through C47 comprise filter no. 3 (30-47 MHz) and variable inductors L5 through L9 along with capacitors C6 through C25 make up filter no. 4 (47-120 MHz).

3.3.2.5 <u>Type 794097-1 Preamplifier (A3AS)</u>

The reference designation for this subassembly is A3A5. Refer to Figure 6-4 for the Type 794097-1 Preamplifier schematic diagram.

The RF signal enters this subassembly at J1 and is applied to the input of preamplifier U1. U1 is a broadband amplifier which provides +15 dB of gain to RF frequencies of 20 to 500 MHz. The amplified output at U1 pin 4 is then directed to the input (El) of the Type 370285 500 MHz low-pass filter. This circuit is a 9-pole, elliptic filter with an insertion loss of .5 dB at frequencies of 500 MHz and below. Attenuation rapidly increases to 80 dB for frequencies above 500 MHz. The 500 MHz low-pass filter is comprised of L1 through L9 and variable capacitors C2, C4, C6, and C8. The variable capacitors provide a means of tuning for the best response. This filter attenuates RF near the receivers first IF frequency, image frequency signals and provides reverse isolation to reduce LO radiation.

From the 500 MHz low-pass filter, the RF signal is coupled through C5 to a PIN diode attenuating network comprised of CR1, CR2 and CR3. The RF resistance of each diode varies inversely with the dc bias current provided by the shaper driver circuit (U2A and U2B). These diodes are connected to form a pi-network which provides a variable attenuation, while presenting a constant impedance to the output of the 500 MHz low-pass filter. Under strong signal conditions, the VHF AGC voltage of 0 to -10 Vdc (supplied by the AGC Amplifier A3A8) is applied to the shaper driver comprised of U2A, U2B, and their associated circuitry. The shaper provides two output voltages in response to the AGC voltage to bias the attenuator network. The output voltages are shaped to match the nonlinear characteristics to the pin diodes. When strong signals are present, the AGC voltage will be at a value between 0 and -10 Vdc, with stronger signals producing a greater negative voltage. This voltage is applied to the inverting input of U2B to produce a positive voltage to the anodes of shunt diodes CR2 and CR3. CR6 modifies the gain characteristics U2B to provide a nonlinear response to the applied AGC voltage. The anode of CR6 is held at approximately -1.5 Vdc by the voltage divider formed by R23 and R28. When the voltage at the cathode of CR6 becomes more negative than the anode, it begins to conduct and shunts a portion to the AGC voltage. Thus, any further increase in AGC voltage is attenuated which causes the required nonlinear output of U2B. The output is provided, through current limiting resistors R5 and R6 to the attenuator shunt diodes (CR2 and CR6) and also through R19 and R12 to the inverting input of U2A.

With a zero input to U2A (from U2B) the inverting input is held slightly negative by the voltage the voltage divider formed by R11 and R14, thus providing approximately +6 Vdc at its output. This positive voltage is applied to the anode of series PIN diode CR1 causing it to conduct and provide minimum attenuation under weak signal conditions. R13 adjusts the level of the output voltage by varying the negative voltage at the input to U2A. Diodes CR5 and CR4 modify the gain of U2A by providing two break points in its output voltage curve. With no input, the cathode CR4 is held at approximately +3.4 Vdc by the divider formed by R16 and R15. The cathode of CR5 is held at approximately +5 Vdc by the divider formed by R20 and R21. Both diodes are cut off and effectively out of the circuit until their anode voltage exceeds the cathode voltage level. As the input voltage to U2A increases the output begins to decrease by a corresponding amount until CR4 and CR5 become forward biased. CR4 becomes forward biased first, placing R16 in parallel with feedback resistor R8, reducing the gain of U2A. When CR5 becomes forward biased, R20 also shunts the feedback further reducing the gain of U2A. As a result, the output of U2A is shaped to follow the non-linear characteristics of CR1.

The gain controlled output of the PIN diode attenuator is coupled to the RF output (J2) of the Preamplifier via coupling capacitor C8.

3.3.2.6 Type 794096-1 1st Converter (A3A6)

The reference designation for this subassembly is A3A6. Refer to **Figure 6-5** for the Type 794096-1 1st Converter schematic diagram.

The Type 794096-1 1st Converter accepts the RF signal from the Preamplifier at RF input A1Jl and passes this signal through a low-pass filter (formed by C1, C2, and L1) to the RF input of mixer U1. The 572 to 1051 MHz LO input from the synthesizer section enters the subassembly at the LO input (A1J2) and is applied to the input of buffer amplifier U2. U2 provides +12 dB of gain to increase the LO signal level to +15 dBm prior to its application to the LO input of mixer U2. Double balanced mixer U1 combines the 20 to 500 MHz RF signal with the 572 to 1051 MHz LO signal to provide a difference frequency of 552 to 551 MHz as the receiver's 1st IF. The difference frequency is selected by the bandpass filter, comprised of L1 through L4 and C4 through C10, at the mixer output. The signal enters the filter via a tap in inductor L1 to match the mixer output impedance with the filter. This filter is a fourpole bandpass filter with an 8 MHz bandwidth centered at 551.5 MHz. Variable capacitors C4, C6, C8, and C10 provide a means of tuning each filter pole for the best overall response and capacitors C5, C7, and C9 provide coupling between the poles. The filter output is taken from the tap of inductor L4 and coupled via Cll and C13 to the input of IF amplifier Q1. The input of Q1 is tuned to the IF center frequency by C12 and L5.

Amplifier Q1 provides a gain of +10 dB, which compensates for the -7 dB conversion loss in the mixer and the -.5 dB loss in each of the bandpass filter networks, to provide an overall subassembly gain of +2 dB. Gate bias for Q1 is provided by the voltage divider formed by R1 and R2, connected between +15 V and ground. R3 develops source bias due to the conduction of Q1 while C15 decouples the source of the transistor. The output of Q1 is developed across the tank circuit formed by L6, L7, C14, and C16. This circuit is tuned to the IF center frequency by variable capacitor C16.

The output of Q1 is then coupled to a three-pole bandpass filter via C17. This filter, comprised of C18 through C22 and L8 through L10, has an 8 MHz bandwidth, centered at 551.5 MHz. C18, C20, and C22 tune each pole for the best overall response while C19 and C21 provide coupling between the poles. The filter output is taken from tapped inductor L10 and is directed out of the subassembly via the IF Output (A1J3).

3.3.2.7 Type 716003-1 2nd Converter (A3A7)

The reference designation for this subassembly is A3A7. Refer to **Figure 6-6** for the Type 716003-1 2nd Converter schematic diagram.

The Type 716003-1 2nd Converter receives the 8 MHz wide frequency spectrum from the 1st Converter and mixes it with the 530.6000 to 529.6001 MHz 2nd LO signal from the Synthesizer Section to place the signal of interest at the 21.4 MHz IF frequency. The LO signal provided by the Synthesizer and can be varied in 100 Hz steps thus providing a 100 Hz tuning resolution. IF input A1P1l accepts the 552-551 MHz 1st IF signal and directs it to mixer U1. U1, a double-balanced mixer, combines the input signal with the 2nd LO signal to provide a difference frequency of 21.4 MHz. The LO signal enters the 2nd Converter via AIJ1 and is amplified +17 dB by Q1 and Q2 prior to being applied to mixer U1. The first circuit encountered by the LO signal, an impedance matching network, comprised of R6, R11, R13, and C2. This circuit matches the synthesizer output with the LO Amplifier to assure maximum signal transfer. The signal is then coupled through C3 to the base of common emitter amplifier Q2. Base bias for Q2 is provided by the voltage divider formed by R10, R9, and R6, while the emitter is biased by the conduction of the transistor through emitter resistors R7 and R8. The output is developed across L3. The signal, taken from the common point between L3 and the collector of Q2, is coupled through C1 via R5 and is applied to the base of common-emitter amplifier Q1 where it is further amplified. Base bias is developed by the voltage divider formed by R3, R4, R5, and L3 and emitter bias is developed by the conduction of Q1 through R1. The output, developed across L1 and L2, is taken from the top of L1 and passed to mixer U1 at a level of +17 dBm. The output of U1 is tuned to the 21.4 MHz difference frequency by the bandpass filter comprised of L6 through L8 and C8 through C12. This three-pole filter has a center frequency of 21.4 MHz and a 1 dB bandpass of 6 MHz. The output of the 21.4 MHz bandpass filter is applied to pin 1 of U2 where it is amplified to restore the signal level lost in the conversion process. At pin 9 of U2, the amplified 21.4 MHz IF signal is then directed to a variable attenuator network, comprised of CR1, CR2, and CR3. In addition, a sample of this IF spectrum is taken from the pad formed by R21 and R22 and is provided at output pin 43, for use when the signal monitor is installed in the receiver.

The pin diode attenuator provides a variable attenuation of from 0 to 40 dB by varying the dc bias current to the diodes. A dc voltage of between 0 and -10 Vdc, which is representative of the signal strength, is provided at connector pin 5 from the AGC Amplifier subassembly (A3A8). This bias voltage is converted to bias current for the attenuator by the shaper/driver network comprised of integrated circuit U1 and its associated components. The shaper driver and the pin diode network function identically to the network used in the Type 794097-1 Preamplifier described in **paragraph 3.3.2.6.**

From the attenuator network, the IF signal is directed, via the pad comprised of R27 and R28 to pin 1 of amplifier U3. The IF signal is also directed via C24 and C21 to connector pin 13, where it is directed to the receiver rear panel or to the wideband IF Amplifier, if this option is installed in the receiver. Integrated Circuit U3 provides final amplification of the 21.4 MHz IF signal prior to directing the signal to the 21.4 MHz IF Amplifiers. The output of U3 is coupled via R29, R30, and C10 to a pin diode switching network to direct the IF signal to the proper IF Amplifier subassembly.

The output switching network comprised of CR4 through CR13 directs the 21.4 MHz IF signal to one of five possible IF Amplifiers. This switching network consists of five identical branches containing a series diode, a shunt diode and biasing components. Control over the switching of the output is accomplished by the IF bandwidth select inputs which are provided by the AGC Amplifier subassembly. The switch branch that controls the input to the subassembly installed in the IF bandwidth #1 slot consists of CR10, CR11, and Resistors R37 and R38. When a bandwidth other than #1 is selected, pin 1 of the connector is effectively an open circuit. At this time the -15 V supply forward biases CR11 and cuts off CR10, preventing signal flow through this branch. When IF Bandwidth #1 is selected, plus 15 Vdc is applied to the IF bandwidth 1 select input (pin 1). This positive voltage causes shunt diode CR11 to be cut-off and saturates CR10 due to the current flow through R38, CR10, R41, and L5. The saturated CR10 now functions as a closed switch to provide a signal path through dc blocking capacitor C14 and out pin 7 to the IF amplifier. Each of the remaining switch branches functions exactly as the band #1 branch.

3.3.2.8 Type 784002-1 AGC Amplifier (A3A8)

The reference designation for this subassembly is A3A8. Refer to **Figure 6-7** for the Type 784002-1 AGC Amplifier schematic diagram.

AM Video, from the AM Demodulator (A3A16), enters the AGC Amplifier at connector pin 49. This video signal is applied to a pulse stretching network comprised of Q1, Q2, U5A, and associated circuit components, and also to pin 13 of U2B, via CR7, and U2A. The pulse stretching network is used to detect and hold the peaks of short duration signals, such as pulse signals, to provide a usable indication of the actual signal level. Transistors Q1 and Q2 conduct for the duration of the incoming pulse to charge Capacitor C3, through R7, to the peak level of the signal. The time constant of C3, R7, and R5 provides a slow discharge for C3, thus holding the peak level. The level, stored in C3, is buffered by unity gain amplifier U5A and is provided at pin 10 of U2B for use when the pulse detection mode is selected.

During the AM or FM modes, the AM Video is passed directly to the averaging circuit, U5C. This averaging circuit functions as a unity gain integrator with a time constant set by C8 and R16. The output of U5C is the averaged video level which is supplied to U6B to develop[, the appropriate AGC voltages and to the summing circuit, U6C where the level is summed with the Log Video level to produce the front panel signal strength reading.

When the SSB option is installed in the receiver the SSB Demodulator provides an output which enters at connector pin 17. This signal is applied to peak detection circuit comprised of Q10, U5B, and their associated components. The SSB signal causes Q10 to conduct for the duration of the time that the transmitted signal is modulated, charging C5 through R76. The time constant of C5 and R68 provides a slow discharge path for C5, thus averaging the SSB input and providing the averaged level at pin 5 of U2A, via unity gain amplifier U5B. VR1, in the emitter of Q10 prevents the emitter from reaching a level greater than 5.6 Vdc.

When pulse detection is selected, a logic 1 is provided at connector pin 56 (Pulse/AGC select) and at pin 55 (SSB/Pulse Select). This disables the AM video path through U2B and selects the output of the pulse stretching network by providing a signal path between pins 10 and 11 of U2B. The path between pins 8 and 9 of U4B is opened, making U5C function as a unity gain amplifier. In the SSB mode, a logic 1 is again provided at connector pin 55, and pin 54 is also placed at logic 1. (The Pulse/AGC select input is returned to 0.) The logic 1 level at the SSB select input causes U2A to switch. The AM video path is cut off and the output of U5B is provided to U5C via pins 5 and 4 of U2A. U5C functions as a unity gain amplifier, due to the open switch between pins 8 and 9 of U4B.

The summing network, consisting of U6C and its associated components sums the averaged AM video output from U5C and the LOG input from the AM Demodulator to produce an output that is a dc level, representative of the signal strength of the received signal. This level is then used by the digital control section to produce the signal strength reading on the front panel of the receiver. From the receivers minimum sensitivity, to 40 dB above sensitivity, the LOG VIDEO input (at pin 51) increases logarithmically from approximately .4 Vdc to its maximum of approximately +5.40 Vdc. This positive going voltage is directed to the signal strength output, connector pin 60. The positive voltage is also applied to the cathode of CR8, keeping the diode cut off. Once the log video voltage reaches +5.40 Vdc the voltage at the cathode no longer increases with further increases in signal level. Further increases in received signal level causes the output of U6C to forward bias CR8, causing the signal strength output to continue to increase, following increases in the AM video level. Potentiometer R72 provides a minimum level reference and R9 controls the affects to the Log Video voltage on the signal strength output. In the circuitry of U6C, R70 adjusts the offset at the output of U6C to set the point at which its output begins to affect the signal strength output. R12, installed in the feedback path of the operational amplifier sets the gain of U6.

Control of the RF and IF gain of the receiver is provided by the AGC Amplifier circuitry comprised of operational amplifiers U6A, U6B, U6D, and U7 (A through D). Integrated Circuit U6B provides gain control voltage to AGC Drivers U7D, U7C, U7A, U6A, and U7B by amplifying the voltage from U5C, in the AGC mode or U6D in the manual mode. During AGC operation, the averaged AM video input from U5C is provided to U6B through the closed switch within U3B. This negative going voltage is amplified by a factor of approximately 2, due to the values of R18 and R64, and applied to the noninverting inputs of the IF AGC driver (U7D), VHF AGC driver (U7C), and the 2nd Mixer/Amp AGC driver (U7A). Increases in AM video cause the output of U7D to begin to go negative to provide an AGC voltage output at pin 53. This output begins to go negative at the minimum sensitivity level of the receiver and provides 40 dB of gain control to the AM Demodulator when it reaches its maximum of approximately -6 Vdc. Transistor Q3, at the output of U7D functions as an output limiter to prevent the IF AGC voltage from exceeding its -6 Vdc maximum. The voltage divider formed by R24 and R25 holds the base of Q3 at -5.5 Vdc. As the output of U7D increases, Q3 remains cut-off until the output level is sufficiently negative to forward bias the emitter base junction of Q3. When the output of V7D reaches approximately -6.2 Vdc, Q3 begins to conduct to prevent the output from further increasing.

Signal levels from approximately 40 dB above the minimum sensitivity of the receiver cause integrated circuit U7C to begin to take control over the gain of the receiver. The voltage divider formed by R26 and R19 prevents the output of U7C from going negative until the IF AGC driver (U7D) is approaching the end of its control. At 40 dB above the receiver sensitivity level, the voltage level at the noninverting input of U7C becomes sufficiently negative to overcome the reference set by R19 and R26. At this time, further increases in signal level cause the output of U7C to swing in the negative direction to provide AGC voltage to the VHF Preamplifier or to the UHF Preamplifier/Mixer, when the receiver is tuned above 500 MHz. U7C provides an output of 0 to -10 Vdc to provide 20 dB of gain control. The output limiter comprised of Q4, R30, and R31 prevents the output of U7C from exceeding -10 Vdc. When the UHF frequency extender is installed in the receiver, and when the receiver is tuned above 500 MHz the output of U7C is shaped by U6A and provided, via buffer U7B to the UHF Preamplifier/Mixer. This shaper circuit inverts the AGC voltage and shapes the AGC response to match the nonlinear characteristics to the UHF attenuator used. The voltage divider formed by R35 and R36 maintains a negative voltage on anode of CR5 to keep it cut off at lower AGC levels. The gain of U6A is determined by the ratio of R32 and R34, which provides an output that increases linearly with the input from U7C. As the output U6A increases, the anode of CR5 eventually becomes forward biased and begins to conduct. This places R33 and R35 into the feedback path to reduce the gain of U6A, causing the required shaped output.

Integrated circuit U7A provides an AGC voltage of 0 to -10 Vdc to the 2nd Converter to provide 40 dB of gain control. The voltage divider formed by R44 and R45 prevents the output of U7A from changing until the VHF (or UHF) AGC driver is near the end of its range (60 dB above receiver sensitivity). Signal levels of 60 dB above sensitivity level and greater cause U7A to begin to take control over the gain of the receiver. As the signal level increases, the output of U7A forward biases CR6, causing the output at connector pin 43 to begin to swing in the negative direction. This output continues to go negative with increases in signal strength. until it reaches a maximum of -10 Vdc, reflecting 40 dB of gain control.

During manual operation, the AGC drivers function exactly as in the AGC mode, except that the drivers are under the control of the RF/IF Gain control on the receiver front panel. In this mode, switch U3B is opened, removing the input from pin 5 of U6B. The manual gain control input then provides a dc voltage, via buffer U6D, to control the gain of the receiver circuits. Potentiometer R20 taps a portion of the gain control voltage and provides it via U6D to the inverting input of U6B.

The remaining circuitry of the AGC Amplifier deals with the selection of the receiver IF bandwidth and the IF post filter on the AM Demodulator subassembly. A 3-bit binary word, provided by the Digital Control section, enters the AGC Amplifier via connector pins 2, 4, and 6. This binary input, which represents the selected IF bandwidth, is decoded by integrated circuit U9 to select the appropriate IF bandwidth. In the output of U9, transistors Q5 through Q9 function as switches to provide +15 Vdc to the circuitry of the selected IF bandwidth. Integrated circuit U9 is a binary-decimal decoder with an open collector output. The outputs of U9 are activated, according to the input binary code, and provide a ground potential in the base circuit of the transistor switch corresponding to the desired bandwidth. This causes the transistor to conduct to provide +15 Vdc at the appropriate IF BW select output. The U9 outputs that are not selected remain in a high impedance state to hold the remaining transistor switches cut off.

Integrated circuit U5D functions as a comparator. This circuit compares the bandwidth code, provided by the active IF Amplifier with a 4.1 Vdc reference set by the voltage divider formed by R59 and R60. When the bandwidth code at connector pin 16 is less than the reference, the voltage at pin 14 of U5D is switched to -15 Vdc. The negative output voltage forward biases VR2, causing R63 to drop most of the voltage to provide a near O voltage at connector pin 15. When the bandwidth code at connector pin 16 is greater than the reference (IF bandwidths of 250 kHz or above), the output at pin 14 of U5D is switched to +15 Vdc. This voltage is regulated by VR1 to provide a +5 Vdc output to select the wideband post filter on the AM Demodulator subassembly.

3.3.2.9 <u>Type 724006-X 21.4 MHz IF Amplifier (A3A9-A3A13)</u>

The Type 724006-X 21., MHz IF Amplifier is produced in seven versions to provide IF bandwidths of 10 to 300 kHz. Table 3-2 lists the different versions of the subassembly along with their associated bandwidths and the figure number of the schematic diagrams. Refer to the schematic diagram listed in **Table 3-2** as a reference for the following circuit description.

Table 3-2. Type 724006, 21.4 MHz IF Amplifier Versions

Type	IF Bandwidth	Bandwidth	Schematic Diagram
724006-1	10 kHz	1.0 Vdc	Figure 6-8
724006-16	3.2 kHz	0.5 Vdc	Figure 6-9
724006-3	50 kHz	3.0 Vdc	Figure 6-10
724006-9	75 kHz	3.5 Vdc	Figure 6-11
724006-4	100 kHz	4.0 Vdc	Figure 6-12
724006-5	250 kHz	5.0 Vdc	Figure 6-13
724006-6	300 kHz	5.5 Vdc	Figure 6-14

Each version of the Type 724006 IF Amplifier is identical, with the exception of the band-limiting crystal filter, FL1, and values of some of the components used. Refer to the schematic diagrams for the specific component values.

When the IF Bandwidth slot containing this IF Amplifier is selected, the decoder on the AGC Amplifier (A3A8) applies -15 Vdc at connector pin 15 to energize the subassembly. The input signal from the 2nd Converter is supplied to input transformer T1. The voltage divider comprised of R20, R19, and R18, connected between +15 Vdc and ground, provides a dc level at connector pins 11 and 12 that is representative of the subassembly's IF bandwidth (see **Table 3-2** Bandwidth Code). This dc level, which is set by the adjustment of R19 is provided to the AGC Amplifier and to the Digital Control section to determine the bandwidth of the subassemblies installed in each of the IF Bandwidth slots. Diode CR1 isolates the voltage divider from the bandwidth code line when the IF Amplifier is not selected.

The 21.4 MHz input signal enters via connector pin 1 and is applied to the primary of T1. This transformer provides an impedance match between the 2nd Converter and the crystal filter, FL1. Filter FL1 band-limits the 21.4 MHz IF signal to the stated bandwidth of the IF Amplifier and directs the band-limited signal, via C2 to pin 3 of FET amplifier Q1. Bias for gate 1 of Q1 (pin 3) is provided by the voltage divider formed by R5, R6, and R7. Bias for gate 2 (pin 2) is provided by the voltage divider formed R2, R4, and potentiometer R3, with R3 permitting the adjustment of gain by varying the gate bias on pin 2. The output of Q1 is developed by the tuned circuit formed by C9, C15, L2, and R11. This tank circuit is center tuned to 21.4 MHz and has a bandwidth greater than that of the tuned filter. Resistor R11 lowers the Q of the tank to broaden the bandwidth of the tuned circuit and limit the tank impedance. Its value is selected to provide the proper gain of Q1, with R3 (in the gate 2 circuit) providing fine adjustment.

The output of Q1 is coupled across C10 to emitter follower Q2. This circuit buffers the output of Q1 and provides a low impedance output at connector pin 29. The 21.4 MHz IF output is developed across R15 and is coupled to the output via C12 and R17. Bias for Q2 is provided to the base of the transistor by the voltage divider formed by R12 and R13.

3.3.2.10 Type 724019-1 21.4 MHz IF Amplifier (500 kHz BW) (A3A9-A3A13)

The Type 724019-1 IF Amplifier can be installed in slots A9 through A13 of the RF/IF Motherboard to provide an IF bandwidth of 500 kHz. Refer to Figure 6-15 for the schematic diagram of the Type 724019-1 21.4 MHz IF Amplifier.

When the bandwidth slot containing this IF Amplifier is selected, +15 Vdc is supplied at connector pin 15 to energize the circuitry and the 21.4 MHz IF signal from the 2nd Converter is provided at the input (connector pin 1). The voltage divider formed by R1, R2, and R3, connected between -15 Vdc and ground, provides a dc level at connector pins 11 and 12 that is representative of the subassembly IF bandwidth. R2 is used to set the bandwidth code to +6.0 Vdc, which indicates that the 500 kHz IF bandwidth is located in the active IF bandwidth slot. Diode CR1 isolates the voltage divider from the bandwidth line when this IF Amplifier is not selected.

The 21.4 MHz IF signal enters this subassembly via connector pin 1 and is applied to a 7-pole bandpass filter comprised of C5 through C20 and L2 through L11. C6, L4, Cll, L7, C16, and L10 provide coupling between the various poles of the filter. This filter passes the 21.4 MHz IF signal and band-limits the signal to 500 kHz at the 3 dB down points. Capacitors C5, C8, C10, C13, C15, C18, and C20 tune each filter pole to obtain the proper response.

The output of the 500 kHz bandpass filter is coupled via C21 and R6 to gate 1 (pin 3) of FET amplifier Q1. This amplifier provides +5 dB of gain. Bias to gate 1 of Q1 is provided by the voltage divider formed by R4, R5, and R7. Bias for gate 2 is provided by the divider formed by R8, R9, and R10. R9 allows the adjustment of the bias at gate 2 to adjust the gain. The output of Q1 is coupled to the output of the subassembly via transformer T1. T1 functions as an impedance matching transformer to provide the proper impedance at the output of the subassembly. Resistor R14, connected in parallel with the primary of T1, loads the transformer primary to provide a constant impedance throughout the 500 kHz IF bandwidths.

3.3.2.11 Type 724007-1 (1 MHz BW), Type 724007-2 (2 MHz BW) 21.4 MHz IF Amplifier (A3A9-A3A13)

The Type 724007-1 and Type 724007-2 21.4 MHz IF Amplifiers can be installed in slots A9 through A13 of the RF/IF Motherboard to provide IF bandwidths of 1 MHz and 2 MHz, respectively. With the exception of the component value differences noted in the table on the schematic diagram, these subassemblies are identical. Refer to Figure 6-16 for the Type 724007-1,-2 21.4 MHz IF Amplifier schematic diagram.

When the bandwidth slot containing this IF Amplifier is selected, +15 Vdc is supplied at connector pin 15 to energize the circuitry and the 21.4 MHz IF signal from the 2nd Converter is provided at the input (connector pin 1). The voltage divider formed by R13, R12, and R11, connected between +15 Vdc and ground, provides a dc level to pins 11 and 12 of the connector that represents the IF bandwidth of the amplifier. Resistor R12 is used to set the bandwidth code to +7.0 Vdc for the 1 MHz IF bandwidth and to +8.0 Vdc for the 2 MHz IF bandwidth. This dc level indicates to the AGC Amplifier and to the Digital Control section, which IF bandwidth is present in the active bandwidth slot. Diode CR1 isolates the voltage divider from the bandwidth code line if the IF Amplifier is not selected.

The 21.4 MHz IF signal entering at connector pin 1 is applied to the tiepoint between capacitors C1 and C2. The signal is then coupled through C1 to the input of the bandpass filter. This input network provides an impedance match between the incoming signal and the input to the bandpass filter. The bandpass filter comprised of C1 through C15 and L1 through L9, is a six-pole filter which provides a 3 dB bandpass of 1 MHz for the Type 724007-1 and 2 MHz for the Type 724007-2 subassemblies. C4, L3, L5, L7, and C13 provide coupling between the filter poles and capacitors C3, C5, C7, C9, Cll, and C14 tune each pole to provide the proper output response.

Capacitor C16 couples the band-limited output from the bandpass filter to IF Amplifier Q1. Q1 provides amplification to restore the signal level lost in the bandpass filter. Typically Q1 provides a subassembly gain of -2 dB for a 1 MHz bandwidth and -1 dB for the 2 MHz bandwidth. Bias for Q1 is provided at the transistor base by the voltage divider formed by R5, R4, and R2. Capacitor C19 and resistors R7 and R8 control the negative feedback at the emitter to control the transistor gain. Adjustment of R8 controls the amount of decoupling present at the emitter thus increasing or decreasing the transistor gain.

The output of Q1 is coupled to the output of the subassembly via transformer T1. T1 functions as an impedance matching transformer to provide the output impedance at output connector pin 29. Resistor R9, connected in parallel with the primary of T1, loads the primary winding to provide a constant load for Q1, throughout the bandpass of the IF Amplifier.

3.3.2.12 Type 724008-1 21.4 MHz IF Amplifier (4 MHz BW) (A3A9-A3A13)

The Type 724008-1 21.4 MHz IF Amplifier can be installed in slots A9 through A13 of the RF/IF Motherboard, although, it is usually installed in the highest bandwidth slot (A12 when four IF bandwidths are used or A13 when five bandwidths are used). Refer to **Figure 6-17** for the Type 724008-1 21.4 MHz IF Amplifier schematic diagram.
When the bandwidth slot containing this IF amplifier is selected, +15 Vdc is supplied at connector pin 15 to energize the circuitry and the IF input signal from the 2nd Converter is present at connector pin 1. The voltage divider formed by R13, R12, and R13 provide a dc level at connector pins 11 and 12 to provide the bandwidth code that indicates to the digital control section and to the AGC Amplifier that the 4 MHz IF bandwidth is present in the active bandwidth slot. Resistor R12 is used to adjust the bandwidth code to +9.0 Vdc and CR1 isolates the voltage divider from the bandwidth code line when this IF Amplifier is not selected.

The input signal entering at connector pin 1 is applied to a 6-pole bandpass filter, comprised of C1 through C10 and L1 through L8. The input signal is applied to the filter at the tap between capacitors C1 and C2 to provide the proper impedance match between the input signal and the input to the filter. C3, L3, C6, L6, and C9 provided coupling between the filter poles and coils, L1, L2, L4, L5, L7, and L8 are used to tune each pole for the proper overall bandpass response. This filter provides a response centered at 21.4 MHz, with a 3 dB bandwidth of 4 MHz at its output.

The filter output is coupled via Cll, and R3 to IF amplifier Q1. Transistor Q1 provides amplification to compensate for the signal level lost in the filter and provides an overall subassembly gain of -4 dB. Base bias for Q1 is provided by the voltage divider formed by R5, R4, and R2. The decoupling network at the emitter, comprised of C14, R7, and R8 control the gain of Q1 by controlling the amount of negative feedback present at the emitter. Potentiometer R8 adjusts the gain by varying the resistance in series with decoupling capacitor C14. The output signal is coupled to the output via transformer T1. This impedance matching transformer provides the proper impedance to match with the next stage in the signal path.

3.3.2.13 Type 798074-1 SSB Bypass (A3A14)

The reference designation for this subassembly is A3A14. Refer to **Figure 6-18** for the SSB Bypass schematic diagram.

The SSB Bypass subassembly (A3A14) installs into the AM slot of the RF/IF Motherboard, when the SSB Option is not installed. Resistors R2 and R1 provide a 50 ohm termination for the 31.2 MHz and 10.7 MHz signals provided to the A14 slot. Resistors R4, R5, and R3 form a 3 dB attenuating pad to reduce AM Demodulator output level and provides the interconnection to the rear panel Switched IF Output (J1).

3.3.2.14 Type 796233-1 Audio/Video/COR (A3A15)

The reference designation for this subassembly is A3A15. Refer to **Figure 6-19** for the Type 796233-1 Audio/Video/COR schematic diagram.

The detected AM and FM video signals provided by the FM Demodulators (A3A17 through A3A21) enter the Audio/Video/COR subassembly and are applied to the input switching network, comprised of U1, U2, and U3. These integrated circuits, which are controlled by the BW SELECT outputs of the AGC Amplifier (A3A8), provide a signal path for the AM and FM video signals from the active FM Demodulator. An SSB input is also available to U3 to permit the SSB Demodulator output signal to be selected when this option is incorporated in the receiver. The switching network directs the AM and FM video signals from the active FM Demodulator to the AM and FM video drivers, U5 and U4 respectively.

Integrated Circuit U4 receives the FM video signal from the active FM Demodulator and amplifies the signal to drive the output current amplifier U6. R2 and the output circuitry of the active FM Demodulator, along with feedback resistors R3 and R4, set the gain J of U4. The amplified output of U4 is then directed to current amplifier U6 via resistor R6. This integrated circuit functions as a current amplifier to provide the proper current drive at the rear panel FM monitor connector, J2. Resistor R7 sets the output impedance to 91 ohms and the low-pass filter, formed by L3, C13, and C14 filters out any high frequency noise and any residual 21.4 MHz IF component from the output. The output of U6 is also provided to the digital control section via R29 and connector pin 46. This signal is used by the digital control section to determine the percent of FM modulation present and to indicate when the receiver is properly tuned to the received signal. Resistor R30 forms a voltage divider with circuitry in the Digital Control section to prevent any offset from being introduced by the Digital Control circuitry. A portion of the output of U6 is also tapped from the voltage divider formed by R43 and R36 and is provided to the FM input (pin 4) of the AM/FM select switch, U7.

The AM signal from the input switching network (U1, U2, and U3) or the SSB signal (when incorporated) is directed, via R9, to amplifier U5. The output circuitry of the active FM Demodulator and R9, along with feedback resistors R11 and R12 set the gain of U5. Resistor R8 and capacitor C33, connected between pins 2 and 8 of U5, provide feed forward frequency compensation to increase the bandwidth of the amplifier. The output of U5 is then directed to the AM input (pin 11) of the AM/FM select switch, U7.

AM/FM Select switch, U7, selects the FM video signal from U6 or the AM video (or SSB) signal from U5 and directs the signal to the video output and audio output circuitry. This switch is controlled by the logic levels provided to U7, via connector pin 45, by the digital control section. With AM or SSB selected, the voltage provided to the control input of U7 is near 0 Vdc, causing U7 to switch as indicated in Figure 6-19. The signal from U5 is passed by the closed switch between pins and 13 of U7. When FM is selected, the control input to U7 is placed at +5 Vdc, causing U7 to switch. The switch between pins 11 and 13 of U7 opens, blocking the signal path from U5, and the switch between pins 4 and 2 closes, providing a signal path for the FM video signal. The video signal from the AM/FM select switch is then directed to the video output circuitry via R44 and to the audio output circuitry via R49 and DC blocking capacitors C27 and C28.

Resistor R44 and the resistance of isolator U8 (or resistor R37) provide the input circuit to the video output amplifier. The voltage divider formed by these components permits the video output level to be controlled by controlling the level of the input signal provided to U10. By controlling the bias current of the LED in U8, the resistance of U8 can be increased or decreased, to set the level of the input signal. In the standard receiver configuration, a fixed bias is provided for U8 by a potentiometer located on the RF/IF Motherboard (A3R12).

When the DAV Option is incorporated in the receiver, the DAV subassembly provides an operator variable bias that permits the video level to be varied. From U8, the input signal is applied to U10 where it is amplified to drive output amplifier Ull. The gain of U10 is set by R45 and the combination of R46 and R47. Integrated circuit Ull provides current amplification to drive the video output. The output of Ull is directed to the output via R14 and the low-pass filter formed by C25, C26, and L4. R14 sets the output impedance at 91 ohms and the low-pass filter prevents high frequency noise and any 21.4 MHz IF component from being passed out of the video output, pin 47.

Resistor R49, and capacitors C27 and C48 direct the AM or FM video signal to the audio amplifier circuitry. The signal is developed across R38 and directed to buffer U12C, via the voltage divider formed by R48 and U9. The resistance of U9 controls the overall audio amplifier gain, by controlling the level of the input signal applied to U12C. Bias, provided from connector pin 50 controls the resistance of U9, thus controlling the amount of signal applied to buffer U12C. In the standard receiver configuration, a fixed bias is provided to U9 by a gain potentiometer located on the RF/IF Motherboard (A3Rll). However, when the DAV option is installed, a variable bias is provided to this point to permit the overall gain of the audio amplifier to be controlled.

The output of U12C is directed via R16 to U13D. U13D functions as a squelch-gated audio amplifier that is activated whenever the received signal is sufficient to activate the receiver COR circuitry. When the programmed COR level is exceeded, U13A provides a negative voltage to the gate of Field-Effect-Transistor Q1, keeping the transistor cut-off. U13D provides a voltage gain of 10 at this time, due to the ratio of resistors R16 and R18. Capacitor, C1, connected in the feedback path of U13D provides a shunt across R18 causing the gain of U13D to decrease at higher frequencies, thus limiting the high frequency response of the audio amplifier circuitry.

When the received signal is of insufficient strength to activate the COR level, the output of U13A switches to +15 Vdc. This reverse biases CR3 and removes the negative bias at the gate of Q1. With bias removed, Q1 saturates and shorts out feedback resistor R18. With R18 shorted, U13D is effectively removed from the circuit and the audio signal is attenuated to prevent an audio output.

The output of U13D is directed to the front panel audio circuitry via R19 and connector pin 53. The output is also provided to U13C, via R33, to provide audio to the rear panel audio output. Integrated circuit U13C functions as the output amplifier for the rear panel audio output. Resistor R32 and the rear panel Line Audio Adjustment (R3 on the main chassis) control the gain of U13C. The Line Audio potentiometer connects in the feedback path via connector pins 51 and 52 and permits adjustment of the gain of the output amplifier.

The audio output at pin 8 of U13C is directed through R34, and the low-pass filter comprised of C2, C30, and L5 to the rear panel, via connector pin 55.

The COR circuitry is activated by the COR/NRT input provided by the Digital Control Section at board terminal 41. This input provides a logic level “1” when the received signal exceeds the programmed COR level. A logic “O” is provided when the signal is below the COR level. The COR/NRT logic level is then applied to the noninverting input of U13B. Comparator U13B compares the logic level with a fixed bias at its inverting input (pin 6) and provides a +15 Vdc output when noninverting input (pin 5) exceeds the inverting input (pin 6). When the level at pin 5 is less than the voltage at pin 6 (COR/NRT = 0) the output of U13B is -15 Vdc.

The DC level provided at the output of U12B is compared with the DC level provided at connector pin 58 by the Digital Control section. The COR level input at pin 58 is a DC level of from 0 to 5 Vdc which represents the operator selected COR Level. The LOG IF input and the COR Level are compared by U13B. The output of comparator U13B switches to +15 Vdc when the LOG IF input exceeds the programmed COR Level or to -15 Vdc when it is less than the programmed level.

CR4 functions as a switch to indicate the status of the COR circuit to the Digital Control section. When the incoming signal is of sufficient strength to activate the COR circuits, the positive output of U13B forward biases CR4, causing a positive voltage to appear at the COR Status output (pin 57). Otherwise, the negative output of U13B cuts CR4 off, causing a ground potential at connector pin 57, due to the ground return via R42.

Transistor Q2 functions as the Carrier-Operated-Relay (COR) to provide a 100 mA current-sink to ground for external equipment, via the rear panel COR connector. CR2 turns Q1 on or off, in accordance with the output of comparator U13B. When this output is positive, CR2 conducts to provide sufficient base current to source Q2. When the output of U13B is negative, CR2 cuts off, causing Q2 to also cut off. The time delay circuit comprised of Q3, U14, and CR1, installed in the base circuit of Q2, delays the Q2 turn off for approximately 5 seconds when the output of U12B switches from positive to negative. When U13B switches negative, Q3 conducts to cause C5 to discharge. This creates a negative trigger pulse to U14, causing its output (pin 3) to swing positive for approximately 5 seconds. The time constant of R23 and C3 determines the time that the output remains positive. CR1 becomes forward biased for the duration of the positive output of U14, causing Q2 to continue to conduct.

3.3.2.15 Type 724016-1 AM Demodulator (A3A16)

The reference designation for this subassembly is A3A16. Refer to **Figure 6-20** for the Type 724016-1 AM Demodulator/IF Output Amplifier schematic diagram.

The incoming IF signal from the selected 21.4 MHz IF Amplifier is applied to the circuitry of the AM Demodulator/IF Output Amplifier, via the input switching network comprised of CR1 through CR4, CR13 and the associated bias resistors R1 through R5 and R88.

This input switching network provides a signal path for the output of the active 21.4 MHz IF Amplifier to enter the AM Demodulator subassembly. The paths from the inactive subassemblies are turned off to prevent any interaction between the inactive output stages and the signal path. Switching of this input network is controlled by the IF bandwidth select outputs of the AGC Amplifier by the application of +15 Vdc at the BW SEL input corresponding to the selected IF bandwidth. This forward biases the series PIN diode in the signal path to cause it to function as a closed switch, permitting the incoming signal to pass. The signal entering the subassembly is then directed through capacitor C55 to the LOG IF Amplifier and through C5 to the IF Amplifier circuitry.

The signal passing through C5 is applied gate 1 (pin 3) of dual gate FET transistor Q1. Bias for gate 1 is provided by resistors R8 and R6. Bias for gate 2 is provided by the divider formed by resistors R9, R10, and R11, connected between the +15 Vdc supply and the AGC input at connector pin 53. This bias network permits the AGC input voltage to provide 40 dB of control over the IF Output signal level. With no AGC voltage applied at pin 53, the circuit operates at maximum gain. Bias at gate 2 is set by the voltage divider formed by R9, R10, and forward biased diode CR5. When the AGC input voltage begins to go negative, due to an increase in signal strength, the negative voltage is felt at the anode of CR5, causing the diode to be cut off. With CR5 out of the circuit, the bias for Q1 is developed by the voltage divider formed by R9, R10, and R11. The output of Q1 is developed by the 21.4 MHz tank circuit formed by L1 and C9 and is coupled through C10 and C12 to the input of amplifier U1. U1, a broad-band amplifier, then directs the signal through C16, C18, and R20 to the base of transistor Q2. VR1 connected to pin 2 of U1, drops a constant 8.2 V to provide U1 with a 6.8 Vdc supply. Resistor R17 functions as. the output load for U1.

Bias for Q2 is developed by the voltage divider formed by R21, R20, R19, and the emitter base junction of the transistor. Capacitor C19 and potentiometer R23 control the gain of Q2. The adjustment of R23 sets the amount of signal that is decoupled by C19, thus controlling the overall gain of this circuit. From the collector of Q2, the signal is directed to the output circuitry through C20 or through C21 to the 200 kHz post filter.

The path of the 21.4 MHz IF signal is dependent on the selected IF bandwidth. When a bandwidth of 250 kHz or greater is selected, a 0 voltage level is present at connector pin 41, causing U2 to switch as shown in the schematic diagram. The closed contacts of U2 pins 2 and 4 forward bias CR10 and CR11 to permit the signal to pass through C20, R29 and C35. R29 is installed in the signal path to create an insertion loss equal to that of the narrow-band signal path. When an IF bandwidth of 100 kHz or less is selected, the AGC Amplifier (A3A8) places .5 Vdc at connector pin 41. This causes pins 2 and 4 of U2 to open and pins 11 and 13 to close. The -15 Vdc supplied by pin 11 of U2 causes diodes CR6 and CR9 to conduct, providing a signal path through the 200 kHz bandpass filter, comprised of T1, T2, and C25 through C29. The 200 kHz post filter limits the bandpass to reduce broadband noise when narrowband IF bandwidths are selected.

From the Post filter circuitry, the 21.4 MHz is directed to three outputs via transistors Q3, Q5, and Q6. Transistor Q3 provides drive for the AM video detector. Base bias for this transistor is provided by the voltage divider formed by resistors R33 and R34. Emitter bias is achieved using the divider formed by R33, R35, R37, and the emitter base junction of the transistor. Emitter decoupling is provided by C39 and R38. The output of Q3 is developed across the primary of T3 and is coupled to the AM detector in the secondary. Capacitor C42, in parallel with the secondary of the transformer, tunes the secondary circuit to the 21.4 MHz IF frequency. The AM detector, comprised of CR12, C44, C45, and L7, removes the 21.4 MHz component from the signal and directs the video component of the signal to the output, via buffer U3. The pi-filter, comprised of C44, C45, and L7, provides the primary filtering of the detected signal to remove the 21.4 MHz component. The voltage divider formed by R39 and R40 maintain a bias current through CR12 to cause it to operate in the most linear portion of its operating range. The output of the AM detector is buffered by unity gain amplifier U3 and provided via connector pin 3 to the AGC Amplifier and via pin 5 to the FM Demodulators for final filtering of the video signal. The divider network comprised of R43, R42, and R46 provide a means of offset correction at the pin 5 output.

During the CW detection mode, the AM detector functions exactly as in the AM mode, except that a 21.4 MHz Beat-Frequency-Oscillator (BFO) signal is mixed with the incoming signal. The BFO signal and the IF signal zero beat to produce an audible output tone. When the CW mode is selected, the synthesizer section provides the BFO frequency at connector pin 8. The signal is coupled to driver transistor, Q4, via C41, and provided to the primary of T3, along with the 21.4 MHz IF signal. Base bias for Q4 is provided by R83 and R84.

Transistor Q5 provides the 21.4 MHz IF signal to the FM Demodulators (A3A17 through A3A21). This emitter follower provides an impedance match with the FM Demodulators. The output signal is developed across R51 and coupled to the output via C50 and R52. Resistors R48 and R49 provide bias for the transistor.

The 21.4 MHz Switched IF Output at the receiver is provided by transistor Q6. The output of the post filter is coupled via C52 to the base of the transistor. Base bias for Q6 is provided by the voltage divider formed by R54 and R55 and the gain is controlled by the decoupling circuit comprised of C53 and potentiometer R59. The output of Q5 is developed across the primary of output transformer T4 and coupled to the secondary. Transformer T4 provides DC isolation at the rear panel connector and provides a 93 ohm output impedance. The 21.4 MHz IF signal provided by the input switching network is coupled through C55 to the LOG IF Amplifier, comprised of input driver U4, LOG amplifiers U5 through U7 and voltage amplifier U8. This circuit provides a dc output voltage that increases logarithmically from .4 Vdc at noise level to 5.0 Vdc at levels 40 dB above noise. The 21.4 MHz input signal, coupled through C55 is applied to the input of U4, where it is amplified to drive the LOG IF amplifiers. The output signal is developed across R89 and potentiometer R62. The signal, taken from the wiper of R62, is coupled through C60 and is applied to the LOG IF Amplifier, comprised of U5, U6, and U7. Each of the integrated circuits forming the LOG IF Amplifier provides approximately 13 dB of gain and are cascaded to provide an overall range of 40 dB. The amplified IF signal at the output of each of these IF amplifiers is output at pin 3 of the integrated circuit and directed to the input of the next stage. The output of the final stage (U7) is developed across the output load, C67, and R76. Pin 4 of each integrated circuit provides a dc bias current which varies logarithmically with the output level of its respective amplifier. These bias outputs are summed together by the summing network comprised of R66 through R70, R78 and RT1 and then provided to U8 for voltage amplification. The summing network components, along with feedback resistors R72 and R73 set the gain of U8. From pin 6 of U8, the LOG IF Output is passed via R74 to connector pin 20 to provide the LOG video output to the required circuits.

3.3.2.16 Type 794106-1, -2 (10 kHz, 20 kHz BW), FM Demodulator (A3A17-A3A21)

The Type 794106-1 and Type 794106-2 FM Demodulators provide FM demodulation and AM filtering of the received signals. These FM Demodulators can be installed in slots A3A17 through A3A21 of the RF/IF Motherboard and have bandwidths of 10 kHz and 20 kHz, respectively. Refer to **Figures 6-22** and **6-22** for the Type 794106-1 and Type 794106-2 FM Demodulator schematic diagrams.

With the exception of component values which determine the bandwidth of these subassemblies, the Type 794106-1 and Type 794106-2 FM Demodulators are identical. Refer to the schematic diagrams for the component value differences.

The detected AM signal, from the AM Demodulator (A3A16), enters at connector pins 15 and 16 and is supplied at pin 16 of U3. U3 functions as a switch to permit the signal to pass when the bandwidth slot containing this FM Demodulator is selected. When selected, a +15 Vdc switching voltage, provided by the AGC Amplifier (A3A8), is provided to pin 15 of U3, causing the switch between pins 16 and 1 to close. The AM signal is then permitted to pass to the output connector pin 13, via the low-pass filter comprised of L5 and C17. This filter has a cut-off frequency equal to one half of the selected bandwidth, to limit the bandwidth of the detected AM signal.

The FM portion of this subassembly is comprised of U1, U2, and their associated components. Integrated circuit U1 functions as an FM limiter and quadrature detector, with crystal filter Y1 and coils L1 and L2 forming the quadrature circuit. U1 compares the phase of the 21.4 MHz IF signal with the signal developed across the quadrature circuit and provides a demodulated output which represents the phase deviations about 900. At the 21.4 MHz center frequency, the phase difference is 900, with the phase difference shifting above and below 900 with FM modulation. The demodulated FM signal is then directed, via buffer U2B, to Amplifier U2A. Integrated circuit U2A provides amplification of the detected signal to drive the output stages in the Audio/Video/COR subassembly (A3A15). The gain of this circuit is set to provide a 2 volt peak-to-peak output at full IF deviation by the ratio of R14 and potentiometer R15. Resistors R11, R13, and potentiometer R12 provide a dc bias to pin 3 of U2A to adjust the offset of the output. R12 is adjusted to provide a 0 output at the 21.4 MHz IF center frequency. The low-pass filter at the output of U2A, comprised of L4 and Cll, filters out any IF component present on the detected video signal.

3.3.2.17 Type 794107-X FM Demodulator (A3A17-A3A21)

The Type 79107-X FM Demodulator is produced in five versions to provide band-widths of from 50 to 300 kHz. Table 3-3 lists the different versions of the subassembly along with the figure numbers of their respective schematic diagrams. Refer to the schematic diagrams listed in Table 3-3 as a reference for the following circuit description.

Table 3-3. Type 794107 FM Demodulator Versions

Type	Bandwidth	Schematic Diagram
794107-1	50 kHz	Figure 6-23
794107-6	75 kHz	Figure 6-24
794107-2	100 kHz	Figure 6-25
794107-3	250 kHz	Figure 6-26
794107-4	300 kHz	Figure 6-27

With the exception of component value differences, each of the Type 794107 FM Demodulator versions function identically. The AM portion of this subassembly accepts the detected AM video signal from the AM Demodulator (A3A16) and provides band limiting via the low-pass filter, comprised of L4 and C16. The filter cutoff frequency is set to one half of the selected IF bandwidth. Integrated circuit U4 functions as a switch to permit the AM video signal to pass only when the slot containing this subassembly is selected. When selected +15 Vdc is provided by the AGC Amplifier at connector pin 25, causing the switch between pins 16 and 1 to close.

The FM portion of this subassembly is comprised of U1, U2, U3, and their associated components. The 21.4 MHz IF signal enters at connector pins 27 and 28 and is coupled through C1 to integrated circuit U1. Integrated circuit U1 provides limiting and demodulation of the IF signal to produce the FM video output. The tank circuit, comprised of R2, C6, C7, C18, and L2 is tuned to 21.4 MHz and is connected in series with L7 to provide the required phase shifted signals to the quadrature detector, contained in U1. At the 21.4 MHz center frequency the tank circuit appears as a pure resistance, causing a 900 phased shifted signal to be applied at pin 9 of U1. The IF signal and the 900 phase shifted signal produce a 0 output from the detector. As the IF signal shifts above and below 21.4 MHz, due to FM modulation, the signal phase at pin shifts above and below 900 causing the detector to produce an output equal to the modulation present. This demodulated output is then passed to output amplifier U3, via buffer U2. U2 provides a voltage gain to the signal that is determined by R10 and potentiometer R11. The gain is set by R11 to produce a 2 Volt peak-to-peak signal at the output when the FM modulation is equal to the bandwidth of the FM demodulator. The voltage divider formed by R13, R15, and potentiometer R14 provides bias at pin 3 of U3 to adjust the offset of the output signal. From U3, the signal is directed to the output via the low-pass filter comprised of L3 and C12. The filter removes any residual 21.4 MHz IF component from the demodulated signal.

3.3.2.18 Type 794104-2, -1 (500 kHz, I MHz BW) FM Demodulator (A3A17-A3A21)

The Type 794104-2 and Type 794104-1 FM Demodulator provide FM demodulation and AM video filtering for IF bandwidths of 500 kHz and 1 MHz, respectively. These subassemblies can be installed into slots A3A17 through A3A21 of the RF/IF Motherboard. Refer to **Figure 6-28** for the Type 794104-2, -1 FM Demodulator schematic diagram. The IF input to this subassembly enters at connector pin 27 and is coupled through C1 to integrated circuit U1. U1 is a high gain wideband amplifier which provides an over driven output in order to clip any AM variations from the IF signal. The supply voltage for U1 is provided by VR1 and VR2 which drops the +15 Vdc input to approximately -6.5 Vdc. At the tie point between VR1 and VR2, approximately +10 Vdc is supplied, via R3, T1, L1, and R2 to provide the collector supply for the output.

From the limiter (U1) the clipped signal is directed to a Foster-Seeley discriminator. The primary of transformer T1, L1, R5, and C6 through C8 form a tank circuit, tuned to 21.4 MHz by the adjustment of C8. Capacitor C9 couples and phase shifts a portion of the primary signal to the secondary circuit of T1 for summing with the signal coupled across the transformer. The secondary circuit of T1, tuned to 21.4 MHz by the secondary of T1, C12, C14 and the adjustment of C10, senses the phase difference as the FM modulated signal deviates about the IF center frequency. In the secondary circuit, an amplitude-varying signal is created whose amplitude varies with frequency shift. The amplitude varied signal is then detected by CR1 and CR2 and is developed across R7 and R8. Capacitor C15 filters out any IF component from the detected signal.

The detected video signal from the FM discriminator is transferred, via R11, to the output amplifier U2. Resistors R10, R12, R13, R14 and potentiometer R9 form a voltage divider to provide bias at pin 2 of U2. The adjustment of R9 adjusts the offset at the output to provide a 0 output at the 21.4 MHz IF center frequency. R15 and potentiometer R16 set the gain of U2 to provide the proper peak-to-peak output signal level. At the output of U2, the low-pass filter, comprised of L7 and C21 eliminates any residual IF component and high frequency noise from the output signal.

The AM video signal provided by the AM Demodulator (A3A16) enters this subassembly at connector pin 15. This signal is developed across R18 and is applied to pin 16 of U3. The +15 Vdc BW SEL input from the AGC Amplifier (A3A8) causes U3 to switch on when this subassembly is selected, providing a signal path out of U3 pin 1. L4 and C22 comprise a low-pass filter to limit the bandwidth of the video signal. The cutoff frequency of this filter is equal to one half of the selected IF bandwidth.

3.3.2.19 Type 794105-1, -2 FM Demodulator (2 MHz, 4 MHz) (A3A17-A3A21)

The Type 794105-1 and Type 794105-2 FM Demodulators provide FM demodulation and AM filtering when the 2 MHz and 4 MHz bandwidths are selected. These subassemblies can be installed in slots A3A17 through A3A21 on the RF/IF Motherboard and they are identical, except for the component values indicated in the table provided on the schematic diagram. Refer to **Figure 6-29** for the Type 794105-1, -2 FM Demodulator schematic diagram.
The IF input signal to this subassembly enters at connector pin 27 and is coupled via C1 to amplifier U1. This high gain amplifier provides an overdriven output that clips any AM variation from the IF signal. The supply voltage for U1 is provided through VR1, which drops the +15 Vdc input to approximately +10 Vdc. This voltage is supplied to U1 pin 10, to provide operating voltage, and to U1 pin 5, via T1, L1, and R2, to provide the collector supply for the output.

From the output of U1, the signal is applied to a Foster-Seeley discriminator. The primary of transformer T1, L1, C9,and C2 form a tank circuit tuned to 21.4 MHz by the adjustment of C2. Capacitor C5 couples and phase shifts the primary signal and supplies the phase shifted signal to the secondary circuit of T1 for summing with the signal coupled across the transformer. The secondary circuit, of T1, tuned to 21.4 MHz by the secondary winding of T1, C6, C7, and C10, senses the phase difference as the modulated signal deviates about the IF center frequency, due to FM modulation. In the secondary circuit, an amplitude-varied signal is created, whose amplitude varies with the frequency shift. This signal is detected by CRI and CR2 and is developed across resistors R4 and R5. Capacitor C8 functions as a filter capacitor to remove any residual IF component from the detected signal.

The deleted video signal from the FM discriminator is transferred, via R2, to the output amplifier U2. The voltage divider formed by R6, R8, R12, R13, and potentiometer R14 provides a dc bias voltage at the inverting input of U2 to adjust the dc offset at the output of the amplifier. Potentiometer R9 adjusts the amplifier gain to provide the proper peak-to-peak output signal amplitude. At the output of U2, the low-pass filter comprised of L3 and Cll provides additional filtering to eliminate residual IF components and high frequency noise.

The AM video signal, provided by the AM Demodulator (A3A16) enters the FM Demodulator at connector pin 15. This signal is developed across R10 and is then applied to pin 16 of U3. The +15 Vdc BW SEL input supplied by the AGC Amplifier (A3A8) causes U3 to switch on when this subassembly is selected, providing a signal path through U3 to the output. L4 and C12 comprise a low-pass filter with a cutoff frequency equal to one-half of the selected IF bandwidth. This filter limits the bandwidth of the AM Video signal to the proper frequency range.

3.4 SYNTHESIZER SECTION

3.4.1 FUNCTIONAL DESCRIPTION

The subassemblies that comprise the synthesizer section are illustrated in the Synthesizer Section Functional Block Diagram, **Figure 3-5**. Refer to **Figure 3-5** for the following functional description.

The Reference Generator (A4A1) provides the 250 kHz, 25 kHz, 1 MHz and 10.7 MHz reference signals required by the Synthesizer section to produce the required output signals. This subassembly contains a 10 MHz oven-controlled crystal oscillator which functions as the main time base of the receiver. A series of frequency dividers then divide this frequency to produce the 250 kHz, 25 kHz and 1 MHz reference signal. The 10.7 MHz reference is produced utilizing the divided reference frequencies in conjunction with a 10.7 MHz VCO (Voltage-Controlled-Oscillator). Using this arrangement, all reference signals, including the 10.7 MHz signal, are phase locked to the same time base.

A connection from the Reference Generator to the rear panel of the receiver provides a 1 MHz reference to rear panel connector J8 or it accepts a 1 MHz reference from an external time base. The setting of the rear panel INT/EXT switch determines whether the receiver is using its internal time base and providing a time base to external equipment (INT) or if the receiver is accepting a 1 MHz external signal as its time base (EXT).

The 250 kHz reference signal is directed to the 1st LO Synthesizer (A4A2). This input provides the reference utilized by the 1st LO Synthesizer phase-locked loop to produce the 572 to 1051 MHz 1st LO frequency. The 1st LO Synthesizer is comprised of a voltage controlled oscillator (VCO), a prescaler, a variable frequency divider, a phase detector, and a loop filter. A sample of the VCO output frequency is directed to the prescaler, where it is divided and directed to the variable divider. At the variable divider the signal is further divided and provided to the phase detector. At the phase detector, the divided VCO frequency is compared in frequency and phase with the 250 kHz reference and a tuning voltage representing the difference between the two signals is produced. This tuning voltage is filtered by the loop filter and provided to the VCO to tune the VCO frequency up or down until the divided VCO signal and the reference frequency are equal. When the two signals are equal the VCO will then be locked.

Tuning of the 1st LO frequency is accomplished digitally, using three BCD tuning words provided by the Digital Control section. These tuning words are provided as presets to a divide-by-n counter in the variable divider to vary the division factor of the VCO signal. The change in the division factor in the variable divider causes a difference between the divided VCO signal and the reference, causing the phase detector to generate a tuning voltage to increase or decrease the VCO frequency until the divided frequency is again equal to the reference. When the two signals are equal, the VCO will be locked on to the new frequency.

The 2nd LO Synthesizer is comprised of the 535 MHz Generator (A4A6), the 4.4-5.4 MHz Synthesizer (A4A4), and the Translation Oscillator (A4A3). Together these subassemblies produce the 529.6001 to 530.6000 MHz 2nd LO frequency that is provided to the 2nd Converter in the RF/IF section.

The 535 MHz Generator receives the 10.7 MHz reference signal and multiplies it by a factor of 50 to obtain its final output. This subassembly utilizes a fixed frequency phase- locked loop synthesizer to obtain a 535 MHz output that is phase locked to the receiver time-base. The 10.7 MHz reference signal from the Reference generator is divided by a factor of 2 to provide a reference frequency of 5.35 MHz to the phase detector. The second phase detector input is a sample of the VCO output after being divided by a factor of 100. These two frequencies are compared in frequency and phase in the phase detector and a tuning voltage is generated to maintain the VCO locked at 535 MHz. The 535 MHz signal is then directed to the Translation Oscillator (A4A3) to provide one of the two required inputs.

The second input to the Translation Oscillator is provided by the 4.4-5.4 MHz Synthesizer (A4A4). This incoming signal is a tunable 4.4000 to 5.3999 MHz frequency that determines the final output frequency of the 2nd LO signal. The 4.4-5.4 MHz Synthesizer is comprised of the 352-432 MHz VCO and Divide-By-80 Assembly (A4A4A1), the Prescaler (A4A4A2), and the Divider and Phase Comparator (A4A4A3). The 352-432 MHz VCO is designed to lock on frequencies ranging from 352.000 to 431.992 MHz. This VCO frequency is directed to a divide-by-80 circuit to produce the 4.4 to 5.3999 MHz signal to the Translation Oscillator and to the Prescaler to produce the feedback signal for the phase-locked loop. The Prescaler is a two modulus frequency divider that divides the VCO frequency by 100 or by 101 to produce 1 kHz and 100 Hz tuning resolution. From this subassembly, the divided signal is then directed to the modulus counter and the divide-by-n counter, located in the Divider and Phase Comparator subassembly. Four BCD digits, provided by the Digital Control section preset these counters to control the overall division factor. The 1 kHz and 100 Hz digits are applied to the modulus counter which controls the number of times the Prescaler is to divide by a factor of 101. When a number other than zero is present in the modulus counter, the prescaler divides the signal by a factor of 101. Division by 101 continues until the modulus counter reaches its minimum count of zero, at which time the output of the modulus counter causes the prescaler to divide by a factor of 100. This dual division factor provides the fractional frequency division required to obtain the 100 Hz and 1 kHz tuning resolution. From the Prescaler, the divided VCO signal is supplied to the divide-by-n counter for further division. This counter, which is preset by the 100 kHz and 10 kHz tuning words provides the final division of the signal. Its output is then directed to the phase detector, where it is compared with an 8 kHz reference signal to create a tuning voltage to lock the VCO on to the desired frequency. The divide-by-n counter, the prescaler, and the modulus counter circuits introduce a division factor of 44000 to 54000 as the least significant digits of the tuned frequency is tuned between XX.0000 and XX.9999. The 8 kHz reference is obtained utilizing the 1 MHz reference provided by the Reference Generator (A4A1). This signal is divided by a factor of 125 to obtain the 8 kHz reference which is provided to the phase detector.

The 4.4000 to 5.3999 MHz signal, along with the fixed 535 MHz signal are provided to the Translation Oscillator (A4A3) to produce the final 2nd LO signal. The Translation Oscillator is a translation loop synthesizer, comprised of the VCO/Buffer (A4A3A1), the 4.4-5.4 MHz Amplifier (A4A3A2) and the Phase Detector (A4A3A3). The VCO/Buffer is a voltage controlled oscillator that tunes between 529.6001 and 530.6000 MHz. This frequency is provided to the 2nd Converter in the RF/IF section as the 2nd LO signal and also to the 4.4-5.4 MHz Amplifier to produce the Phase Detector reference frequency.

In the 4.4-5.4 MHz Amplifier, the 529.6001 to 530.6000 MHz VCO frequency is mixed with the fixed 535 MHz frequency from the 535 MHz Generator (A4A6). The mixing of these two frequencies produces a difference frequency of from 5.3999 MHz (when the VCO is tuned to 529.6001 MHz) to 4.4000 MHz (when the VCO is tuned to 530.6000 MHz). This signal is then amplified, converted to a TTL level and provided one of the phase detector inputs.

The Phase Detector receives the signal from the 4.4.-5.4 MHz Amplifier and compares it with the signal provided by the 4.4-5.4 MHz Synthesizer. These two frequencies are compared in frequency and phase and a tuning voltage, equal to the difference between the two signals is produced. This tuning voltage then tunes the VCO up or down in frequency until the two signals are equal. When the two signals are equal, the VCO locks on to the desired 2nd LO frequency.

Tuning of the 2nd LO frequency is accomplished using the 100 kHz, 10 kHz, 1 kHz, and 100 Hz BCD words provided by the Digital Control section. These tuining words preset the counters in the Divider and Phase Comparator of the 4.4 to 5.4 MHz Synthesizer (A4A4A3) to vary the output frequency of the 4.4.-5.4 MHz Synthesizer. This frequency change causes the Phase Detector in the translation oscillator to generate a tuning voltage that tunes the VCO up or down in frequency until the output of the 4.4-5.4 MHz Amplifier is again equal to the 4.4-5.4 MHz Synthesizer output. When the two frequencies are equal in frequency and phase, the VCO will lock on to the new 2nd LO frequency.

The final subassembly in the Synthesizer section is the SSB/BFO (A4A5). This subassembly receives the 10.7 MHz reference signal from the Reference Generator (A4A1) and uses this signal to produce a 21.4 MHz BFO frequency for use with the CW detection mode, or a 10.7 MHz and 32.1 MHz output for use in the optional SSB detection mode. The activation of the output signals is controlled by the CW BFO ON/OFF control line which assumes a logic 1 level, causing the SSB/BFO subassembly to provide a 21.4 MHz output signal to the RF/IF section. Selection of the SSB detection modes (with the SSB Option installed in the receiver) causes the SSB BFO ON/OFF control line to assume a logic 1 state, causing this subassembly to provide outputs of 10.7 and 32.1 MHz.

3.5 TYPE 796217-1, DIGITAL REFRESHED DISPLAY (DRD)

3.5.1 GENERAL DESCRIPTION

The Type 796217-1 Digital Refreshed Display is operational in the Scan mode and provides a signal strength versus frequency plot of the frequency band being scanned. As the receiver scans, the signal strength is sampled at 256 equally spaced points throughout the Scan and the signal strength data is stored in an on-bound memory. The memory locations are then stepped through at a higher rate of speed by an on-board counter reading the stored data and supplying the display with the horizontal and vertical signals needed to generate the signal strength plot. The signal strength data is displayed in ascending frequency order, with the start frequency at the extreme left of the display and the stop frequency at the extreme right.

3.5.2 FUNCTIONAL DESCRIPTION

When Scan is initiated, the microprocessor divides the Scan band into 256 equal segments and provides the signal strength data obtained in each segment to the DRD memory (U4 and U7). As the first segment is scanned, the signal strength data acquired is written into the DRD memory at address 0. The output of the DRD circuitry is then enabled and the memory is then stepped through at a rapid rate producing the first segment of the signal strength versus frequency trace. When the second segment of the frequency band is scanned, the DRD output is disabled and the signal strength data acquired during the second segment of the Scan is written into memory address 1. The DRD output is again enabled and the on-board counter again steps through the memory locations producing the first and second segments of the signal strength versus frequency trace. This sequence continues until the entire 256 segments have been scanned or until the Scan is halted, due to the acquisition of a signal greater than the programmed COR level or until the receiver is placed into the Scan continue mode of operation. At that time, the memory locations are continuously stepped through by the counter providing a continuous trace of the signals acquired up to that point. When the receiver is returned to the manual operating mode, the DRD output is disabled and the standard signal monitor trace is provided to the display (when the SM option is installed in the receiver).

3.5.3 DETAILED CIRCUIT DESCRIPTION

3.5.3.1 Type 796217-1 Digital Refreshed Display (DRD)

The option designation for this subassembly is DRD. Refer to Figure 6-53 for the Type 796217-1 Digital Refresh Display schematic diagram.

The Type 796217-1 Digital Refreshed Display is comprised of a 1024-byte memory (U10 and Ull), a 12-bit binary counter (U12) and two Digital-to-Analog Converters to provide X axis (U14) and Y axis (U13) signals to the display unit. The remaining circuitry comprises the switching circuits to control the DRD operation, under the direction of the microprocessor. Integrated circuits U10 and Ull form the DRD random-access memory, which is capable of storing up to 1024 8-bit data words. With the standard receiver software, only the first 256 memory locations are utilized providing a single output trace. When data is written into memory, address bus lines AO through A7 are applied to the memory address inputs, via the switching circuit comprised of U7, U8, and U9. The R/W select input to the W (write enable) input of each memory chip, placing the memory into the write mode, is enabled via decoder U4. Data representing the strength of the acquired signal is then placed on the memory data input lines via octal buffer U1. After the signal data is stored in memory, the microprocessor causes the memory address inputs to be switched from the address bus to the on-board binary counter (U12). U12 then continuously steps through each of the memory locations recalling the data stored at each address. The outputs of U12 are also provided to the data inputs of D/A converter U14, generating a linear voltage sawtooth that causes the display tracks to trace horizontally across the CRT face. Since the data recall and the horizontal trace are both synchronized to the outputs of U12, the signal data appears as a vertical deflection at the proper time relationship with the sweep. The output data from the memory is applied to D/A converter U13 producing an analog voltage that is proportional to the magnitude of the data byte. This analog voltage is then applied to the vertical circuitry of the dis-play producing a vertical deflection that is proportional to the signal strength of the signal.

D/A converter U14 produces an output current sink at pin 1 that is capable of sinking from 0 mA, when the inputs at pins 4 through 11 are all at logic “0”, to approximately 2 mA, when the inputs are all at logic “1”. Each binary input between these two extremes produces a current change that is equal to 1/256 of the total current range. Potentiometer R10 provides a voltage reference for the current amplifier within U14. The output is converted to a voltage sawtooth that varies from -10 V to +10 V by U16B. Resistor R21 controls the offset at the output. Potentiometer R10 adjusts the offset controlling the horizontal placement of the CRT trace and potentiometer R10 adjusts the peak-to-peak output of the sawtooth adjusting the horizontal width of the trace. This output is applied, via U17, to the H output (connector pin 4) and to the EH output (pin 47), via the voltage divider formed by R16, R25, and R19. This voltage divider drops the output voltage to a 1 V peak-to-peak level to be compatible with an external display. The D/A converter and the output circuit comprised of U13 and U16A is identical to the circuitry of U14, except that this circuit produces short duration pulses that range from -.5 V, when the data inputs are all at logic “O”, to .5 V, when the data inputs are all at logic “1”. Potentiometer R5 adjusts the vertical amplitude and R7 adjusts the vertical offset controlling the vertical placement of the CRT trace.

Binary counter U12 receives a 31.25 kHz signal from the microprocessor subassembly (CLK 5) and utilizes this clock to produce a continuous binary count from 0 to 1023. The CAO through CA7 outputs are utilized to step through the DRD memory and to produce a sawtooth output voltage, which drives the display trace. These outputs continuously count from 0 to 255, every 8 msec. The CA7 output of U12 is also utilized to produce a retrace blanking pulse every time the counter passes its maximum count of 255. Integrated circuit U15A is strobed on the 256^{th} count providing a pulse to pin 22 as the +Z output. The inverted blanking pulse is provided as a negative going pulse at the -Z output (pin 21).

Integrated circuit U4 decodes the logic levels of inputs A10 and R/W controlling the DRD inputs and outputs. This decoder is enabled when the OE input is “0” and the DBE clock is at “1”, to enable the appropriate switching circuits. When A10 and R/W are “0”, and R/W at “1”, U1 is enabled placing data from the DRD memory on the data bus. This permits the microprocessor to read data from the DRD memory, as required. U4 enables control register U2 when the microprocessor is in the wire mode (R/W-“O”)and A10 is at logic “1”. A “O”transition at pin 11 of U4 causes the data present on the DO, D1, and D2 data bus lines to belatched at the Q outputs of U2. DO enables (1) or disables (0) the DRD output and D1 enables(1) or disables (0) the standard signal monitor trace (when installed in the receiver). D2 is provided to enable U3A and U3B when the receiver software utilized contains the capability of a four trace display.

3.6 TYPE 798044-1, IEEE-488 REMOTE INTERFACE (488)

3.6.1 GENERAL DESCRIPTION

The IEEE-488 Remote Interface provides talk and listen capabilities between the receiver and external equipment, such as calculators, minicomputers, or other IEEE-488 equipped controlling devices. The data is transferred between units in a bit-parallel, byte serial form, utilizing sixteen interconnection lines. These lines consist of eight bi-directional data bus lines, three data byte transfer lines, and five management lines. Data or address in-formation is transferred between devices, utilizing the data bus lines. The data byte transfer lines indicate: the availability and validity of the information on the data bus lines, if the de-vices are ready to accept data, and if the data has been accepted. The interface management lines: specify whether the data bus lines are carrying data or address information, request service, clear the interface, and indicate the end of a transfer sequence. Refer to **Figure 3-6.**
The capabilities of the IEEE-488 Interface include:

- Source handshake
- Acceptor handshake
- Basic talker with serial poll
- Basic listener with serial poll
- Service request

Essentially, this means that the receiver can talk or listen when commanded by the controller. It can also issue a service request to notify the controller when it needs service. To be compatible, the controller should have the following capabilities:

C1, C2, C4, C27 System controller - single controller system.
AH1, SH1, T3, L1

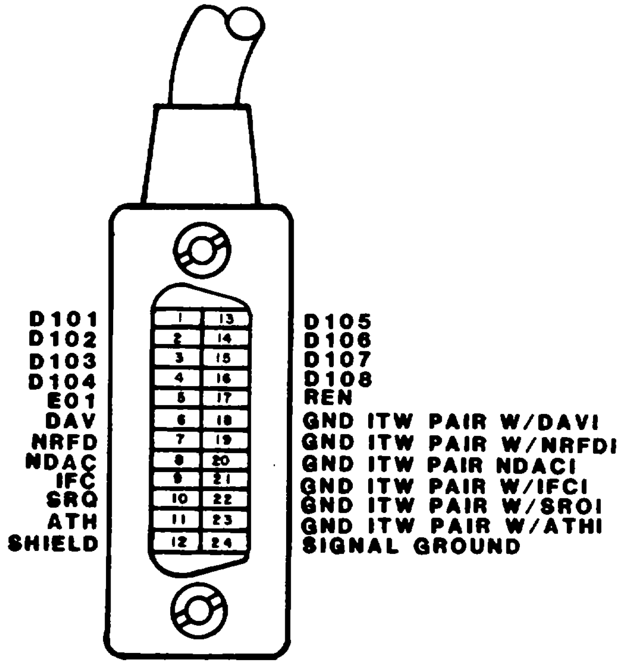


Figure 3-6. Configuration of IEEE-488 Data Bus

Up to fourteen 488 equipped receivers can interface with a single controller, with the controller having the ability to address each receiver individually. A six position DIP switch located on each 488 card is utilized to set the address of its receiver. Switch positions #1 through #5 allow address setting of from 0 (00000) to 3 (11110). 31 (11111) is not a valid address and should not be used. An open switch indicates a logic “1” state and a closed switch indicates a logic “0” state. Switch position #6 should be set to the logic “O” (closed) position.

3.6.2 INTERFACE OPERATION

Two types of data transfer are supported on the WJ-861XB Receiver. One type of data transfer on the IEEE-488 interface bus is ASCII. This type of transfer utilizes ASCII mnemonics to control the receiver. The termination may be CR, LF (Carriage Return, Line Feed) or LF (Line Feed) or EOI (End or Identify) set on the last character of the transfer. These mnemonics may be strung together utilizing a semicolon. Another type of data transfer supported by the WJ-861XB Receiver is binary. This type of data transfer allows single information bytes to control the receiver. In the binary operation, each command must end with an EOI (End or Identify) set on the last byte of the command. Commands may not be strung with a semicolon or terminated with CR (Carriage Return) or LF (Line Feed). The ASCII operation format tends to be self-documenting and easy to understand. Binary, on the other hand, lessens the number of bytes that must be transferred and has a faster execution speed. In the ASCII format, the message consists of a series of data bytes that form one of the mnemonics listed in **Table 3-4**. Each byte is one ASCII character of the mnemonic and is followed by a number representing that value. Each digit of the number is applied as a separate ASCII character. In the binary format, the mnemonic is one 8-bit byte containing the hexadecimal code corresponding to the mnemonic. When a variable value is to be included in the message, it is sent as one or more additional data bytes, representing the binary or hexadecimal value.

Table 3-4. Table of Mnemonics

Mnemonic	Hex	Dec	Description	Refer to Table
AFC	42	66	Turn AFC on	D-5
AFC/	43	67	Turn AFC Off	D-5
AFC?	44	68	Request AFC mode	D-5
AGC	45	69	Turn AGC on	D-5
AGC/	46	70	Turn AGC off	D-5
AGC?	47	71	Request AGC mode	D-5
AM	48	72	Select AM detection mode	D-4
AM?	4A	74	Request AM modulation 0-68	D-7
ANT(a)	4B(b)	75(b)	Select antenna (1,2)	D-5
ANT?	4D	77	Request what antenna used	D-5
AUD	9F	159	Set Audio level 0 to 255	D-5
AUD?	Al	161	Request Audio level	D-5
BFO(a)	39(p)	57(p)	Set BFO frequency +7.99 kHz	D-8
BFO?	3B	59	Request BFO frequency	D-8
BIC?	AA	170	Request reading of error	D-8
BIN		84	Causes all future commands to be in binary.	D-2
.	55	85	Causes all future commands to be in ASCII	D-2
BIT (a)	A5(b)	165(b)	Cause BITE to start/continue	D-8
BIT?	A7	167	Request BITE error number	D-8
BW(a)	4E(b)	78(b)	Select BW slot 1-5	D-3
BW?	50	80	Request which BW slot	D-3
BWC?	9E	158	Request BW size	D-3
CLM	6C	108	Clear receiver & memory	D-5
CLR	51	81	Clear receiver	D-5
COR(a)	57(b)	87(b)	Set COR level 0-40	D-5
COR?	59	89	Request COR level	D-5
CST?	9B	155	Request COR status	D-5
CW	5A	90	Select CW detection mode	D-4
DET?	5F	95	Request detection mode selected	D-4
DWL(a)	60(b)	96(b)	Select DWELL time period	D-5
DWL?	62	98	Request DWELL number	D-5
EPR?	65	101	Request Error number	D-2
EXC	66	102	Execute current parameters	D-6

(a) - Utilized in a command as an ASCII number or a group of numbers.
(b) - A single byte of binary information.
(p) - Eight packed BCD digits in four bytes of information.
(_) - Represents the default mode.

Table 3-4. Table of Mnemonics-Continued

Mnemonic	Hex	Dee	Description	Refer to Table
FM	69	105	Select FM detection mode	D-4
FBW	---	----	Take full bandwidth steps in SCAN	D-3
FBW1	---	---	Take 1/2 bandwidth steps in SCAN (Normal Operation)	D-3
FBW?	----	----	Which bandwidth mode is selected	D-3
FM?	6B	107	Request FM modulation 0-100	D-7
FMO?	AD	173	Request reading of offet 0-255	D-7
FRQ(a)	3C(p)	60(p)	Set tuned frequency in MHz	D-5
FRQ?	3E	62	Request tuned frequency	D-5
LCK	94	148	Lock Out current parameters	D-8
LGV?	71	113	Request reading of Log Video	D-5
LSB	72	114	Select LSB detection mode	D-4
MAN	75	117	Select Manual operation	D-6
MOD?	B3	179	Request operation mode	D-6
NRT	B4	180	Select NRT mode	D-5
NRT/	B5	181	De-select NRT mode	D-5
NRT?	B6	182	Request NRT status	D-5
OPT?				
PLS	78	120	Select Pulse detection mode	D-4
RCL(a)	7B(b)	123(b)	Select Recall operation	D-6
RCL?	7D	125	Request current channel	D-6
RFG(a)	7E(b)	126(b)	Enter RF Gain (0-255)	D-5
RFG?	80	128	Request RF Gain	D-5
RMT	81	129	Select Remote operation	D-2
RMT/	82	130	De-select Remote	D-2
RMT?	83	131	Request control mode	D-2
SCN(a)	84(b)	132(b)	Select Scan operation	D-6
SS?	89	137	Request Signal Strength in dBm	D-7
STO(a)	8A(b)	138(b)	Store current parameters	D-6
STP(a)	8D(b)	141(b)	Select Step operation	D-6
STS(a)	90(b)	144(b)	Sets status byte	D-2
STS?	92	146	Request device status command	D-2

(a) - Utilized in a command as an ASCII number or a group of numbers.
(b) - A single byte of binary information.
(p) - Eight packed BCD digits in four bytes of information.
(__) - Represents the default mode.

Table 3-4. Table of Mnemonics-Continued

Mnemonic	Hex	Dec	Description	Refer to Table
TIM(a)	AE	174	Set Time function	D-5
TIM?	BO	176	Request Time setting	D-5
USB	93	147	Select USB detection mode	D-4
VER?	EO	224	Request Software version	D-5
VID(a)	A2	162	Set Video level (0 to 255)	D-5
VID?	A4	164	Request Video level	D-5

(a) - Utilized in a command as an ASCII number or a group of numbers.
(b) - A single byte of binary information.
(p) - Eight packed BCD digits in four bytes of information.
(__) - Represents the default mode.

In the ASCII mode of operation, the WJ-861XB Remote Interface can accept data at a rate of 300 µsec per byte. The overall time to send the message to the receiver is determined by the number of characters in the message times 300 µsec or the number of bytes times the transfer rate of the controller, whichever is greater. Once the last message byte (line feed) is accepted, the receiver carries out the command within 2 msec. A message such as RFG (n) could take significantly longer due to the receiver's method of updating this parameter. The time required could vary from 2 msec to 20 msec. When a message such as FRG? is sent, the receiver will begin to return data within 2.0 msec to 20 msec of the time that the last message byte was sent. The response is returned at a maximum rate of 70 psec per byte. This time will vary with the speed that the controller can accept the data provided. A typical response to an FRQ? is 3.0 msec or less.

The binary mode of operation permits a faster transfer of data. The interface can accept data at a rate of 250 psec per byte and the message length is considerably shorter. Processing of the message by the receiver is also shorter in this mode. After the last byte of the command is accepted the receiver carries out the message within 1.5 msec.

In both the binary and ASCII modes of the interface, the time lapse from the time the receiver acquires or loses a signal to the time that SRQ (Service Request) is set is determined by the receiver's operating mode. When the receiver is at a fixed frequency and a signal comes up above the programmed COR level, the SRQ bit will be set within 2 msec. A loss of the signal causes the receiver to verify that the signal is no longer present. The SRQ is set within 10 msec of signal loss. If the receiver is tuned to a frequency where a signal is present, it sets SRQ in 15 msec. If it is tuned from an existing signal to a frequency where no signal is present, the SRQ is set in 25 msec.

3.6.2.1 Device Dependent Commands

The tables (**Tables 3-5** through **3-11**) that follow provide a more detailed description of the commands listed in Table 3-4. The commands and responses are grouped according to their command category and are provided with their ASCII, Hexidecimal and Decimal equivalents.

The command columns depict messages that can be applied to the WJ-861XB Receiver as an active listener. Responses returned are messages returned when the receiver is a talker. ASCII messages may be applied with embedded spaces or any combination of upper and lower case characters. Refer to paragraph 3.6.1, for specific requirements of IEEE-488 operation.

Table 3-5. WJ-861XB Configuration Commands and Responses

Commands			Responses			
ASCII	**HEX**	**Dee**	**ASCII**	**Hex**	**Dec**	**Description**
BIN		84				Causes all future expected commands to be in binary.
	55	85				Causes all future expected commands to be in ASCII (default).
ERR?	65	101	ERR(b)	63(b)	99(b)	Returns a number (0-99) representing the two digit error code.
RMT	81	129				Select remote operation.
RMT/	82	130				Activate local operation.
RMT?	83	131	RMT RMT/	81 82	129 130	Requests control mode (Remote/Local)
STS(a)	90(b)	144(b)				Sets status byte to cause receiver reactions in accordance with the variable (a) sent. Variables are ORED together when multiple STS(a) commands are sent. STS9 must be sent to reset status byte. a = 0 - Resets all bits of Status byte to 0. a = 1- Send SRQ on signal acquisition.

(a) - Utilized in a command as an ASCII number or a group of numbers.
(b) - A single byte of binary information.
(_) - Represents the default mode.

Table 3-5. WJ-861XB Configuration Commands and Responses-Continued

Commands			Responses			
ASCII	HEX	Dee	ASCII	Hex	Dec	Description
						a = 4 - Cause receiver to enter into Scan Continue or Step Continue mode on signal acquisition. a = 8 - Cause receiver to enter into Scan Continue mode at the end of Scan sequence.
STS?	92	146	STS(a)	90(b)	144(b)	Request device status command. Bit Function 0 Signal above COR level. 1 Unitpower-upor IEEE-488 DCL or SDC activated SRQ. 2 BITE activated SRQ. (Cleared by BIT?) 3 Indicates end of scan sequence (Reset by serial poll followed by SCN) 4 Receiver responding to query. 5 Uniterroractivated SRQ. (Cleared by ERR?) 6SRQ activated by this unit. (Cleared by serial poll followed by STS?) 7 Not Utilized.

(a) - Utilized in a command as an ASCII number or a group of numbers.
(b) - A single byte of binary information.
(_) - Represents the default mode.

Bandwidths for the receiver are applied utilizing the following commands and responses.

Table 3-6. WJ-861XB Bandwidth Commands and Responses

Commands			Responses			
ASCII	**HEX**	**Dee**	**ASCH**	**Hex**	**Dec**	**Description**
BW(a)		4E(b)	78(b)			Select BW slot 1 - 5. (WJ-861XB does not allow selection of empty BW slot.)
BW?	50	80	BW(a)	4E(b)	78(b)	Request which slot is selected. (BW 1 is default)
BWC?	9E	158	BWC(c).	9E(b)(b)	15E(b)(b)	Request size of selected BW (Number returned in ASCII is in kHz.) (Number returned in binary is a 2 byte binary number representing kHz.) 6.4 kHz is returned as 6 kHz; 3.2 kHz is returned as 3 kHz.
FBW	---	---				Select full bandwidth increments in SCAN.
FBW/	---	---				Select 1/2 bandwidth increments in SCAN.
FBW?	---	---	FBW	---	---	bandwidth mode selected
			FBW/	---	---	

(a) - Utilized in a command as an ASCI number or a group of numbers.
Utilized in a response as a space followed by 3 bytes of ASCII data representing a number.
(b) - A single byte of binary information.
(c) - Utilized in a response as 4 bytes of ASCII data representing a number.
(_) - Represents the default mode.

Detection modes for the receiver are applied utilizing the following commands and responses.

Table 3-7. WJ-861XB Detection Commands and Responses

Commands			Responses			
ASCII	**HEX**	**Dee**	**ASCII**	**Hex**	**Dec**	**Description**
AM	48	72				Select AM detection mode.
CW	5A	90				Select CW detection mode.
FM	69	105				Select FM detection mode.
PLS	78	120				Select PULSE detection mode.
LSB	72	114				Select LSB detection mode.
USB	93	147				Select USB detection mode.
DET?	5F	95	AM	48	72	Request mode of detection selected
			CW	5A	90	
			FM	69	105	
			PLS	78	120	
			LSB	72	114	
			USB	93	147	

(__) - Represents the default mode.

Miscellaneous control of the receiver is applied utilizing the following commands and responses.

Table 3-8. WJ-861XB Miscellaneous Control Commands and Responses

Commands			**Responses**			
ASCII	**HEX**	**Dee**	**ASCII**	**Hex**	**Dec**	**Description**
AFC		42	66			Turn AFC on.
AFC/		43	67			Turn AFC off.
AFC?	44	68	AFC/ AFC	42 43	66 67	Request AFC mode.
AGC		45	69			Turn AGC on.
AGC/		46	70			Turn AGC off.
AGC?	47	71	AGC AGC/	45 46	69 70	Request AGC mode.
			ANT(a)	4B(b)	75(b)	Select antenna1. (1, 2)
ANT?	4D	77	ANT(a)	4B(b)	75(b)	Request which antenna is in use. (ANT 1 is default)
AUD		9F	159			Set Audio level (0 to 255).
AUD?	A1	161	AUD(a)	9F	159	Request Audio level.
CLR	51	81				Clear receiver. All conditions to default. Memory not affected.
CLM	6C	108				Clear receiver. All conditions to default. Memory cleared.

(a) - Utilized in a command as an ASCII number or a group of numbers. Utilized in a response as a space followed by 3 bytes of ASCII data representing a number.
(b) - A single byte of binary information.
(f) - Utilized in a command as a group of ASCII numbers representing a frequency. This should not exceed 10 characters, including sign and decimal. Leading and trailing zeros need not be sent.
(p) - Eight packed BCD digits in four bytes of information.
(_) - Represents the default mode.

Table 3-8. WJ-861XB Miscellaneous Control Commands and Responses-Continued

Commands			**Responses**			
ASCH	**HEX**	**Dec**	**ASCH**	**Hex**	**Dec**	**Description**
COR(a)	57(b)	87(b)				Set COR level (0-40 = on, 41 = off). Level if1 dB steps starting at noise floor threshold of selected BW.
COR?	59	89	COR(a)	57(b)	87(b)	Request the COR level.
			CST?	9B	155	What is COR status?
			CST	99	153	Signal is above COR.
			CST/	9A	155	Signal is below COR.
DWL(a)	60(b)	96(b)				Select the DWELL time per increment in scan or step 0-255; (2Y x 8)-8 = dwell time. where: y = a - 32
DWL?		DWL(a)	60(b)	96(b)		Request Dwell number. (Dwell 0 is default.)
FRQ(f)	3C(p)	60(p)				Set the tuned frequency in MHz. (20-1100 in .0001 MHz steps.) (Binary mode is packed BCD always 4 bytes.) (Upper limit 500 MHz without FE option.)
FRQ?	3E	62	FRQ(f)	3C(p)	60	Request tuned frequency. (20 MHz is default.)

(a) - Utilized in a command as an ASCII number or a group of numbers.
Utilized in a response as a space followed by 3 bytes of ASCII data representing a number.
(b) - A single byte of binary information
(f) - Utilized in a command as a group of ASCII numbers representing a frequency.
This should not exceed 10 characters, including sign and decimal. Leading and trailing zeros need not be sent.
(p) - Eight packed BCD digits in four bytes of information.
(_) - Represents the default mode.

Table 3-8. WJ-861XB Miscellaneous Control Commands and Responses-Continued

Commands			Responses			
ASCII	HEX	Dee	ASCII	Hex	Dec	Description
NRT	B4	180				Select NRT mode.
NRT/	B5	181				De-select NRT mode.
NRT?	B6	182	NRT	B4	180	Request NRT status.
RFG(a)	7E(b)	126(b)				Enter RF Gain number (0-255). 0 = minimum gain, 255 = maximum gain.
RFG?	80	128	RFG(a)	7E(b)	126(b)	Request RF Gain number. (The RF Gain 0 is default.)
TIM(a)	AE	174			.	Set Time function
TIM?	BO	176	TIM(a)	AE	174	Request Time setting.
VER	EO	224				Request software version.
VID(a)	A2	162				Set Video level (0 to 255).
VID?	A4	164	VID(a)	A2	162	Request Video Level.

(a) - Utilized in a command as an ASCII number or a group of numbers. Utilized in a response as a space followed by 3 bytes of ASCII data representing a number.
(b) - A single byte of binary information.
(f) - Utilized in a command as a group of ASCII numbers representing a frequency. This should not exceed 10 characters, including sign and decimal. Leading and trailing zeros need not be sent.
(p) - Eight packed BCD digits in four bytes of information.
(_) - Represents the default mode.

Control of the receiver is applied utilizing the following commands and responses.

Table 3-9. WJ-861XB Receiver Mode Control Commands and Responses

Commands			Responses			
ASCH	**HEX**	**Dee**	**ASCII**	**Hex**	**Dee**	**Description**
MAN	75	117			Select Manual operation (to exit	Scan or Step, send MAN twice).
STO(a)	8A(b)	138(b)				Store current parameters in channel (0-95).
RCL(a)	7B(b)	123(b)				Select Recall operation Recall parameters in channel (0-95).
RCL?	7D	125	RCL(a)	7B(b)	123(b)	Request current channel number.
EXC	66	102				Execute current parameters (used with Recall mode).
SCN(a)	84(b)	132(b)	.			Select Scan operation If odd, scan from proceeding even number. If even, scan from 0.
STP(a)	8D(b)	141(b)	.			Select Step operation Start with 0 and step to number in STP command.
MOD?	B3 .	179				Request mode of operation
			MAN	75	117	Manual
			RCL	7B	123	Recall
			SCN	84	132	Scanning
			SCM	B2	178	Scan Continue
			STP	8D	141	Stepping
			STM	B1	177	Step Continue

(a) - Utilized in a command as an ASCII number or a group of numbers. Utilized in a response as a space followed by 3 bytes of ASCII data representing a. number.
(b) - A single byte of binary information.
(_) - Represents the default mode.

Signal information for the receiver is applied utilizing the following commands and responses.

Table 3-10. WJ-861XB Signal Information Commands and Responses

Commands			Responses			
ASCII	**HEX**	**Dee**	**ASCII**	**Hex**	**Dec**	**Description**
AM?	4A	74	AM(a)	48(b)	72(b)	Request reading from AM modulation. 000-068 Range
FM?	6B	107	FM(a)	69(b)	105	Request reading from FM modulation. 000-100 Range
FMO?	AD	173	FMO(a)	AB(b)	171(b)	Request reading of FM offset. 000-255 Range
LGV?	71	113	LGV(a)	6F(b)	111	Request reading of Log Video. 000-080 Range
SS?	89	137	SS(a)	87(b)	135(b)	Request reading of Signal Strength in dBm. (In manual, gain represents % of AM Detector (000-100.)

(a) - Utilized in a command as an ASCII number or a group of numbers
Utilized in a response as a space followed by 3 bytes of ASCII data representing a number.

(b) - A single byte of binary information.

Optional commands are applied to the receiver utilizing the following commands and responses.

Table 3-11. WJ-861XB Optional Command and Responses

Commands			**Responses**			
ASCII	**HEX**	**Dec**	**ASCII**	**Hex**	**Dee**	**Description**
BITE	OPTION					
BIT(a)	A5(b)	165				Cause BITE to start or continue.
BIT?	A7	167	BIT(a)	A5(b)	165	Request BITE error number. (O = no error)
BIC?	AA	170	BIC(a)	A8(b)	168	Request reading of error.
BFO	OPTION					
BFO(f)	39(p)	57(p)				Set BFO frequency in kHz. (-7.99 to +7.99) Binary is sent as four packed BCD bytes. (Sign is bit 3 of second byte.) First and last byte are zeros.
BFO?	3B(p)	59	BFO (+/-)(f)	39(p)	57	Request BFO frequency. (O kHz is default)
LOCK-	OUT					
LCK	94	148				Lock-Out current parameters.

(a) - Utilized in a command as an ASCII number or a group of numbers. Utilized in a response as a space followed by 3 bytes of ASCII data representing a number.
(b) - A single byte of binary information.
(f) - Utilized in a command as group of ASCII numbers representing a frequency. This should not exceed 10 characters, including sign and decimal. Leading and trailing zeros need not be sent.
(p) - Eight packed BCD digits in four bytes of information.
(_) - Represents default mode.

The response to an AM? mnemonic is a number from 000 to 068 representing the level of AM Video present at the output of the receiver. Each digit represents approximately 13 mV rms of AM Video. For FM?, the response is a number ranging from 000 to 100, representing the percentage of FM modulation. Each digit represents a 1 percent increment with 100 equaling 100% modulation and 000 equaling no modulation. For FMO?, the response is a number from 0-255, representing the FM Discriminator offset. The number 127 represents a signal at tuned frequency, 127 means the signal is tuned frequency, 127 means the signal is tuned frequency.

LGV? provides a number from 000 to 080 representing the Log video level of the receiver. This number represents the signal level above the theoretical noise floor of the receiver, with each number representing a 0.5 dB change (000 represents the theoretical noise floor and 080 represents 40 dB above that level).

The response to SS? provides a signal strength number in dBm from -125 to -20.
In manual gain this number represents the level of the AM detector.
The WJ-861XB Receiver is capable of activating the SRQ line indicating controller service is required. Four different stimuli cause the receiver to set the SRQ line indicating the reasons for this assertion. These include: errors, power-up, clear and signal activity. If an error occurs during operation of the receiver, it sets the SRQ line and bits 5 and 6 of the status byte. If the BITE option is installed, the completion of BITE, or upon an error acquisition, SRQ is set with bits 2 and 6 of the status byte. When the receiver is powered up or sent SDC or DCL commands, it sets SRQ and bits 1 and 6 *of* the status byte.

The remaining stimuli that cause the SRQ line to become active is the acquisition or loss of a signal (signal level above or below COR level). This sets bit 6 of the status byte. Signal activity SRQ must be enabled by sending STS 1 to enable this interrupt.

A serial poll clears the SRQ line as defined by the IEEE-488 specification. The status byte read by the computer while doing the serial poll is defined as follows:

Bit	Set Indicates	Cleared Indicates	Cleared By
0	Signal above COR	No signal above COR	Non-latched indicator
1	Unit Power-up SRQ		Requesting receiver status (device dependent command)
2	BITE complete or error found		Requesting BITE status (device dependent command)
3	End of Scan sequence (when status byte pre-vioulsy set with STS 8)		Reset by serial poll followed by SCN.
4	Responding to request for data	Non-latched indicator	
5	Error condition occurred	Error condition cleared	Requesting Receiver status (device dependent command)
6	SRQ has occurred	SRQ not active from this device	Requesting Receiver status or Error status (device dependent command)

As a response to an STS? instruction or serial poll, a status byte is returned to indicate the receiver status. This response is a three-digit decimal number that corresponds to' the binary number contained in the return byte (0=00000000; 127=01111111).

3.6.2.2 Examples of Remote Operation

The examples that follow (Tables 3-12 through 3-17) provide examples of control operations, using an HP85 as a controlling device. These examples are shown in the ASCII and binary modes. Similar type messages will use a similar format.

Table 3-12. Sending a Tuned Frequency of 25 MHz to the WJ-861XB Using a HP85 (WJ-861XB Device t6)

Message: Send tuned frequency of 25.00p9 MHz

ASCII Mode	Actual Bus Transfer					
	#	**ATN**	**EOI**	**HEX**	**ASCII**	**Comment**
Output 706 using "K"; "FRQ25"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP85 TALK
ASCII message may have leading	3	1	0	26		861XB LISTEN
zeros. Total non-blank character	4	0	0	46	F	
count 15, for single commands,	5	0	0	52	R	DATA TO
exponential format not supported.	6	0	0	51	Q	WJ-861XB
IE: "FRQ 0025.0000 is valid	7	0	9	32	2	
message. EOI may be terminator.	8	0	0	35	5	
	9	0	0	0D	(CR)	
	10	9	1	0A	(LF)	TERMINATOR
Binary Mode	**#**	**ATN**	**EOI**	**HEX**	**DEC**	**Comment**
* Print using "B"; 60, 0, 37, 0, 0	1	1	.0	3F		UNLISTEN
	2	1	0	55		HP85 TALK
All bytes must be sent with no	3	1	0	26		861XB LISTEN
spaces or terminator characters.	4	0	0	36	60	FRWQ CODE
	5	0	0	00	0	BYTE 1
	6	0	0	25	37	BYTE 2
	7	0	0	00	0	BYTE 3
	8	0	1	00	0	BYTE 4

*Control Statement: Control 7, 16; 128 (sets HP85 to EOI terminator for printer messages).
Printer is 706 (directs print statements to WJ-861XB).

Table 3-13. Sending a COR "OFF" Command

Message: send COR off (41)

ASCII Mode	Actual Bus Transfer					
	#	**ATN**	**EOI**	**HEX**	**ASCII**	**Comment**
Output 706 using "K"; "COR 41"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP85 TALK
	3	1	0	26		861XB LISTEN
	4	0	0	43	C	DATA TO
	5	0	0	4F	O	WJ-861XB
	6	0	0	52	R	
	7	0	0	34	4	
	8	0	0	31	1	
	9	0	0	0D	(CR)	
	10	0	0	0A	(LF)	TERMINATOR
Binary Mode	**#**	**ATN**	**EOI**	**HEX**	**DEC**	**Comment**
* Print using "B"; 87, 41	1	1	0	3F		UNLISTEN
	2	1	0	55		HP85 TALK
	3	1	0	26		861XB LISTEN
	4	0	0	57	87	COR CODE
	5	0	1	29	41	VALUE

* Control Statement: Control 7, 16; 128 (sets HP85 to EOI terminator for printer messages).
Printer is 706 (directs print statements to WJ-861XB).

Table 3-14. Sending a Frequency Request

Message: request frequency (assume 25 MHz last sent)

ASCII Mode	Actual Bus Transfer					
	#	**ATN**	**EOI**	**HEX**	**DEC**	**Comment**
Output 706 using "K"; "FRQ?"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP85 TALK
Instruct WJ-861XB to	3	1	0	26		861XB LISTEN
prepare to output	4	0	0	46	F	
frequency information	5	0	0	52	R	DATA TO
when made a talker	6	0	0	51	Q	WJ-861XB
	7	0	0	3F	?	
	8	0	0	0D	CR	
	9	0	0	0A	LF	TERMINATOR
			0			
	10	1		3F		UNLISTEN
Enter 706; A$	11	1	0	35		HP85 TALK
	12	1	0	46		861XB LISTEN
	13	0	0	46	F	
	14	0	0	52	R	
	15	0	0	21	Q	DATA TO
	16	0	0	20		WJ-861XB
A$ will contain "FRQ	17	0	0	30	0	
0025.0000"	18	0	0	30	0	
	19	0	0	32	2	
	20	0	0	35	5	
	21	0	0	2E	.	
Frequency response is always	22	0	0	30	0	
15 characters	23	0	0	30	0	
	24	0	0	30	0	
	25	0	0	30	0	
	26	0	0	0D	CR	
	27	0	0	0A	LF	TERMINATOR
	1	1	0	3F		UNLISTEN
	2	1	0	55		HP85 TALK
* Print using "B"; 62	3	1	0	26		861XB LISTEN
	4	0	1	3E		

*Control Statement: Control 7, 16; 128 (sets HP85 to EOI terminator for printer messages)
Printer is 706 (directs print statements to WJ-861XB).

Table 3-14. Sending a Frequency Request-Continued

Binary Mode	#	ATN	EOI	HEX	DEC	Comment
Enter 706 using "#%, #%K"; A$		1	0	3F		UNLISTEN
		1	0	35		HP85 TALK
Image causes enter enter to terminate		1	0	46		861XB LISTEN
on EOI only.		0	0	3C	60	FREQ CODE
		0	0	00	0	BYTE 1
		0	0	25	37	BYTE 1
		0	0	00	0	BYTE 1
		0	1	00	0	BYTE 1

Table 3-15. Sending a Bandwidth Size Request

Message: request size of currently selected
bandwidths (assume 10 kHz)

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "COR 41"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP85 TALK
Instruct 861XB to output size of	3	1	0	26		861XB LISTEN
selected BW in kHz when made an	4	0	0	42	B	
active talker.	5	0	0	57	W	DATA TO
	6	0	0	43	C	WJ-861XB
	7	0	0	3F	?	
	8	0	0	0D	(CR)	
	9	0	0	0A	(LF)	TERMINATOR
Enter 706; A$	10	1	0	3F		UNLISTEN
	11	1	0	35		HP85 TALK
A$ will contain "BWC 10".	12	1	0	46		861XB LISTEN
	13	0	0	42	B	
	14	0	0	57	W	DATA TO
	15	0	0	43	C	WJ-861XB
	16	0	0	20		
	17	0	0	20		
	18	0	0	31	1	
	19	0	0	30	0	
	20	0	0	0D	CR	
	21	0	0	0A	LF	TERMINATOR

Table 3-15. Sending a Bandwidth Size Request-Continued

Binary Mode	#	ATN	EOI	HEX	DEC	Comment
						UNLISTEN
		(Assume	4 MHz)			HP85 TALK
Enter 706; A$	10			3F		861XB LISTEN
				35		COR CODE
A$ will contain "BWC 4000".	11			46		VALUE
	12			42	B	
	13			57	W	DATA FROM
	14			43	C	WJ-861-XB
	15			34	4	
	16			30	0	
	17			30	0	
	18			30	0	
	19			0D	(CR)	
	20			0A	(LF)	TERMINATOR
	21					
* Print using "B"; 158	1	1	0	3F		UNLISTEN
	2	1	0	55		HP85 LISTEN
	3	1	0	26		861XB TALK
	4	0	1	9E		BW CODE
						BINARY CODED
						BANDWIDTH
Enter 706 using "#%, #%K"; A$	5	1	0	3F		IN kHz
	6	1	0	B5		
	7	1	0	46		
A $ will contain binary BW	8	0	0	9C	156	
size information.	9	0	0	00	0	
	10	0	1	0A	10	
		(Assume	4 MHz)			
Enter 706 using "#%, #%K"; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP85 LISTEN
Byte 1, Byte 2	7	1	0	46		861XB TALK
	8	0	0	9C	156	BW CODE
A$ will contain binary BW size	9	0	0	0F	156	BINARY CODED
information.	10	0	1	A0	160	BANDWIDTH
						IN kHz

*Control Statement: Control 7, 16; 128 (sets HP85 to EOI terminator for printer messages).
Printer is 706 (directs print statements to WJ-861XB).

Table 3-16. Sending a Detection Mode Request

ASCII Mode	#	ATN	EOI	HEX	DEC	Comment
Output 706 using "K"; "DET?"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP85 TALK
	3	1	0	26		861XB LISTEN
	4	0	0	44	D	
	5	0	0	45	E	DATA FROM
	6	0	0	54	T	WJ-861-XB
	7	0	0	3F	?	
	8	0	0	0D	(CR)	
	9	0	0	0A	(LF)	TERMINATOR
Enter 706 using ; A$	10	1	0	3F		UNLISTEN
	11	1	0	35		HP85 LISTEN
	12	1	0	46		
	13	0	0	41	A	
	14	0	0	4D	M	DATA FROM
	15	0	0	20		WJ-861XB
	16	0	0	0D	(CR)	
	17	0	1	0A	(LF)	TERMINATOR
Enter 706 using ; A$	10	1	0	3D		UNLISTEN
	11	1	0	35		HP85 LISTEN
	12	1	0	46		861XB TALK
A$ will contain "PLS".	13	0	0	50	P	
	14	0	0	4C	L	DATA FROM
	15	0	0	53	S	WJ-861XB
	16	0	0	0D	(CR)	
	17	0	0	0A	(LF)	TERMINATOR
* Print using "B"; 95.	1	1	0	3F		UNLISTEN
	2	1	0	55		HP85 TALK
	3	1	0	26		861XB LISTEN
	4	0	1	5F		REQUEST DETECTION MODE

*Control Statement: Control 7, 16; 128 (sets HP85 to EOI terminator for printer messages).
Printer is 796 (directs print statements to WJ-861XB).

Table 3-16. Sending a Detection Mode Request-Continued

Binary Mode	#	ATN	EOI	HEX	DEC	Comment
Enter 706 using I#%, #%K"; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP85 TALK
A$ will contain 1 byte binary	7	1	0	46		861XB LISTEN
information	8	0	1	48		AM CODE
		(ASSUME	4 PLS)			
Enter 706 using "#%, #%K"; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP85 TALK
	7	1	0	46		861XB LISTEN
A$ will contain 1 byte binary information	8	0	1	78		PLS CODE

Table 3-17. Sending a COR Level Request

Message: request COR level, (assume off)

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "COR ?"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP85 TALK
	3	1	0	26		861XB LISTEN
	4	0	0	42	C	
	5	0	0	57	O	DATA TO
	6	0	0	43	R	WJ-861XB
	7	0	0	4F	?	
Enter 706; A$	8	0	0	0D	(CR)	
	9	0	0	0A	(LF)	TERMINATOR
A$ will contain "COR 041".						
	10	1	0	3F		UNLISTEN
	11	1	0	35		HP85 TALK
	12	1	0	46		861XB LISTEN
	13	0	0	43	C	
	14	0	0	4F	O	DATA TO
	15	0	0	52	R	WJ-861XB
	16	0	0	20		
	17	0	0	30	0	
	18	0	0	34	4	
	19	0	0	31	1	
	20	0	0	0D	CR	
	21	0	0	0A	LF	TERMINATOR

Table 3-17. Sending a COR Level Request-Continued

Binary Mode	#	ATN	EOI	HEX	DEC	Comment
* Print using "B"; 89		1	0	3F		UNLISTEN
		1	0	55		HP85 TALK
		1	0	26		861XB LISTEN
		0	0	59	89	REQUEST CODE
Enter 706 using "#%, #%K"; A$		1	0	3F		UNLISTEN
		1	0	55		HP85 LISTEN
A$ will contain 2 bytes binary		1	0	46		861XB TALK
information		0	0	57	87	COR CODE
		0	1	29	41	VALUE

*Control Statement: Control 7, 16; 128 (sets HP85 to EOI terminator for printer messages).
Printer is 706 (directs print statements to WJ-861XB).

3.7 TYPE 796185-X, EXTENDED MEMORY (EM)

3.7.1 GENERAL INFORMATION

The Extended Memory (EM) option provides increased receiver operating capabilities. It is installed in Option Slot 1 of the Digital Control Section (A5) and provides plug-in sockets which accept additional read-only memory (ROM) and/or random-access memory (RAM). This subassembly permits options such as Lockout (LOC), and 96-channel memory (RAM) to be included into the receiver.

EM option, Type 796185-4 consists of four integrated circuits arranged and sequenced in pairs providing an additional 2048 random-access memory (RAM) locations. This option, together with the standard memory of the microprocessor, provides up to 96 operator programmable memory channels utilized in the Step mode or up to 48 frequency bands utilized in the Scan mode. The read-only memory (ROM) locations are not utilized in this version.

Cursor (CUR), lockout (LOC) and real time clock (RTC) options utilize the Type 796185-2 subassembly. This subassembly version provides additional software adding cursor, lockout and real time clock capabilities to the receiver operation. An EPROM containing cursor and lockout software is installed in the EPROM location, U13.

The lockout option (LOC) utilizes the Type 796185-4 subassembly. This subassembly version provides the additional 1536 memory locations, as in the Type 796185-1 version, and also contains the software associated with the lockout operation. Additional software is contained in the EPROM installed in the U13 EPROM socket.

The cursor option (CUR) utilizes the Type 796185-5 subassembly. This subassembly provides the additional software to add cursor capabilities to the receiver operation. An EPROM containing cursor software is installed in the EPROM location U13. RAM locations U2 through U5 are not utilized in this version.

The real time clock option (RTC) is available in all versions. However, if this option is intended for stand-alone operation, the Type 796185-11 subassembly is utilized. The Real Time Clock provides the operator with 24-hour time information. RAM locations U2 through U5 are not utilized in this version.

NOTE

Combinations of the above listed options may be configured. Refer to the Tabulation Block on the schematic diagram, **Figure 6-55.**

3.7.2 CIRCUIT DESCRIPTION

The Type 796185-4 Extended Memory subassembly is installed in Option Slot 1 of the Digital I/O Motherboard (AS). This subassembly provides an additional 2K bytes of random-access memory to support a 96 channel memory, a real time clock to provide the time of day, and 5K bytes of read-only memory that contain the software for the operation of the clock, Lockout, and Cursor. Refer to Figure 6-55 for the Type 796185-4 Extended Memory schematic diagram.

The circuitry of the Extended Memory is activated in accordance with the status of address lines A10, All, A12, and the status of control lines PFAIL and OPT, provided by the Digital Control section of the receiver. These inputs are decoded by the decoder circuit comprised of integrated circuits U6 through U9, which in turn activates the circuit addressed by the microprocessor. Table 3-18 provides a truth table illustrating the various input combinations and the circuits that they activate.

Integrated circuit U1 is a 4K-byte read-only memory that contains a list of instructions which extends the operation of the Digital Control Section of the receiver. It contains software subroutines that permit the microprocessor to perform the operations associated with Lockout, Cursor and the Real Time Clock functions. When the four most significant bits of the microprocessor address bus are set to Hexidecimal 3 (OPT = 0, A12=1), the 0 output of U6A is pulled low, enabling U1. The remaining address lines (AO through All) contain the address of the desired memory location, to be read by the microprocessor. The data at the addressed location is then output to the microprocessor via the data bus.

Integrated circuits U2 through U5 comprise a 2K-byte random-access memory. U2 and U3 together provide 1024 8-bit data bytes and U4 and U5 provide another 1024 bytes. This circuitry provides an extension of the standard receiver memory to provide a total of 96 programmable memory channels. When the four most significant bits of the microprocessor address bus are set to hexidecimal 2 (OPT = 0, A12 = 1), and All is set to logic "0", the remaining address lines (AO through A10) select one of the 2 K-byte memory locations contained in integrated circuits U2 through U5. U9 and U8B form a chip select circuit which monitors the status of address line A10 and enables RAM pair U2 and U3 (when A10 = 1) or U4 and U5 (when A10 = 0). The R/W input (board terminal 14) places the enabled RAM chips into the read (R/W = 1) or write (R/W = 0) mode to permit data to be written into or read from memory.

Table 3-18. Type 796185-1 Extended Memory Control Inputs

PIFAIL	OPT	A12	A11	A10	R/W	FUNCTION
1	0	0	0	0	1	Enables RAM U4 & U5, Read Mode
1	0	0	0	0	1	Enables RAM U4 & U5, Write Mode
1	0	0	0	1	1	Enables RAM U2 & U3, Read Mode
1	0	0	0	1	0	Enables RAM U2 & U3, Write Mode
1	0	0	1	0	1	Enables Latch U12 to read clock data
1	0	0	1	0	0	Enables Latch U13 to set clock
1	0	0	1	1	0	Clocks Latch U10 to select clock counter
1	0	1	X	X	1	Enables Read Only Memory U1
X	1	X	X	X	X	Subassembly disabled
0	X	X	X	X	X	Subassembly disabled

X = Don't Care

When the four most significant bits of the microprocessor address bus are set to hexidecimal 2 (OPT = 0, A12 = 0) and All is set to "1", the clock circuitry of the subassembly is enabled. This circuitry permits the setting or reading of the time by the microprocessor.

Integrated circuit U7 decodes the status of A10 and the R/W inputs and uses its decoded outputs to control the data flow between the clock circuitry of U13 and the data bus, via the input and output data latches (U10, U11 and U12). Integrated circuit U13 is a microprocessor Real Time Clock/Calendar circuit utilized to provide the time of day. It consists of thirteen internal counters, of which six are utilized providing time outputs in hours, minutes and seconds. The time base for U13 is provided by a 32.768 kHz crystal (Y1) and loading capacitors C6, C7, and C8, which assumes that Y1 oscillates at the proper frequency. Data input/output ports DO through D3 accept data from input latch Ull (to preset the time counters when the time is being set) to provide time data to the data bus via U12 (when the time is being read by the microprocessor). The data is input or output as a series of six BCD digits, each representing one of the six digits of the time readout. The counter that is accessed by the data ports is determined by address lines AO through A3 and the mode (input or output) is determined by the RD and WR status lines. Pin 18 of U13, the Hold line, is set to logic "1" each time data is written into or read from U13. This line stops the clock operation momentarily to prevent the data from changing during the read or write cycle. Integrated Circuit U10 provides data to U13 to control its operating mode. This latch also enables Ull to input data to U13 when it is in the write mode. **Table 3-19** provides a truth table of the operation of U13.

Table 3-19. Microprocessor Real-Time Clock Control

A3	A2	AI	AO	RD	WR	FUNCTION
1	0	0	0	0	1	Enables RAM U4 & U5, Read Mode
1	0	0	0	0	1	Enables RAM U4 & U5, Write Mode
1	0	0	0	1	1	Enables RAM U2 & U3, Read Mode
1	0	0	0	1	0	Enables RAM U2 & U3, Write Mode
1	0	0	1	0	1	Enables Latch U12 to read clock data
1	0	0	1	0	0	Enables Latch U13 to set clock
1	0	0	1	1	0	Clocks Latch U10 to select clock counter
1	0	1	X	X	1	Enables Read Only Memory Ul
X	1	X	X	X	X	Subassembly disabled
0	X	X	X	X	X	Subassembly disabled

LSD = Least Significant Digit
MSD = Most Significant Digit

SECTION IV

MAINTENANCE

4.1 GENERAL

The WJ-8617B-5 Receiver has been designed to operate for extended periods of time with minimum routine maintenance. Cleaning, inspection, and performance tests should be performed at regular intervals, consistent with the facility's normal scheduling and after repairs have been made.

4.2 CLEANING AND LUBRICATION

The unit should be kept free of dust, moisture, grease, and other foreign matter to ensure trouble free operation. Use low pressure air, if available, to remove accumulated dust from the interior of the receiver. A clean, dry cloth or soft bristle brush may also be used for this purpose. No lubrication is required.

4.3 INSPECTION FOR DAMAGE OR WEAR

Many existing or potential troubles can be detected by making a thorough visual inspection of the unit. For this reason, as a first step, a complete visual inspection should be made whenever the unit is inoperative. Inspect mechanical parts such as pin connectors and interconnecting cables for looseness, wear, and other signs of deterioration. Plug-in subassemblies and modules should be checked to assure that they are properly inserted into their appropriate connector slots and make good electrical contract. Electronic components that show signs of deterioration, such as overheating, should be inspected and a thorough investigation of the associated circuitry should be made to verify proper operation. Often, damage due to heat is a result of other, less apparent problems in the circuit.

4.4 TEST EQUIPMENT REQUIRED

The test equipment listed in **Table** 4-1 or equivalents is required to perform the troubleshooting procedures, performance checks, and alignment procedures that follow.

4.5 TROUBLESHOOTING PROCEDURES AND FAULT ISOLATION

NOTE

Troubleshooting of the WJ-8617B-5 Receiver is not authorized at the direct support level. Forward malfunctioning unit to depot for troubleshooting and fault location.

Troubleshooting of the WJ-8617B-5 Receiver can be performed by placing the Receiver in its normal operating condition and observing its operation in the various operating modes. To eliminate external conditions as a possible cause of the malfunction, the equipment listed in **Table 4-1** should be used to inject the appropriate test signals and to monitor the results at the outputs of the Receiver.

The performance test that follows, and the Troubleshooting Table (Table 4-2), are provided as an aid for localizing the cause of a malfunction to a particular subassembly within the Receiver. Reference should also be made to the Receiver block diagrams provided in Section III of the WJ-8617B-5 Manual and to the schematic diagrams provided in Section VI.

Table 4-1. Test Equipment Required

Item	Equipment Type	NSN
2	Test Lead Set, Simpson Catalog No. 00577	N/A
4	Cable, RF, ohms, 4 ft., BNC-BNC	5995-00-070-8747
5	Oscilloscope, AN/USM-488	N/A
7	Counter, Frequency, TD-1225A(V) 1/U	6625-00-498-8946
9	High Frequency Probe 5kv, Simpson Cat. No. 0053	N/A
11	Counter, Frequency, TD-1225A(V)1/U	6625-00-498-8946
13	Spectrum Analyzer, AN/USM-489	6625-01-083-9446
14	Tracking Generator, SG-1125/U	6625-00-185-4802
15	Generator, Sweep Signal, SG-1206	N/A
16	Power Meter, TS-3793/U	6625-01-033-5050
17	Autotransformer, General Radio W5MT3W	N/A
19	AC Voltmeter, ME-459/U	6625-00-229-0457
	Transfer Oscillator	HP-5257A
	Power Sensor	HP-8481
	Synthesizer Generator, Sweep Capabilities	HP-8662A
	RF Analyzer, Display Section	Wiltron 640
	Log Transmission Plug-in	Wiltron 640 T50

Table 4-2. WJ-8617B-5 Troubleshooting Table

Symptom	Probable Cause	Corrective Action
Receiver totally inoperative. Front panel blank, no signal at any output connector.	Fuse Fl (F2) blown	Locate and correct cause of blown fuse.
	Defective power switch S1.	Check operation of switch S1. Replace if defective.
	Defective Power Distribution Section (Al).	Refer to paragraph 4.6.1
	Defective Digital Control Section (A5).	Refer to paragraph 4.6.3
Receiver front panel controls function but no signals at any output connector.	Defective Digital Control Section (A5).	Refer to paragraph 4.6.3
	Defective Synthesizer Section (A4).	Refer to paragraph 4.6.4
	Defective 2nd Converter (A3A7)	Refer to paragraph 4.6.2.6
	Defective 1st Converter (A3A6)	Refer to paragraph 4.6.2.7
	Defective VHF Preamplifier (A3A5)	Refer to paragraph 4.6.2.8
	Defective Synthesizer Section (A4)	Refer to paragraph 4.6.4
During operation within the 20-500 MHz frequency range, the receiver malfunctions in one or more of the VHF Pre-	Defective Digital Control Section (A5)	Refer to paragraph 4.6.3
	Defective VHF Preselector bands.	Refer to paragraph 4.6.2.9 selector (A3A3 or A3A4)
Wideband IF Output normal; all other Outputs inoperative. Malfunction occurs with all bandwidth selections.	Defective Digital Control Section (A5)	Refer to paragraph 4.6.3
	Defective AM Demodulator (A3A16)	Refer to paragraph 4.6.2.4
	Defective AGC Amplifier (A3A8)	Refer to paragraph 4.6.2.3

Table 4-2. WJ-8617B-5 Troubleshooting Table-Continued

Symptom	Probable Cause	Corrective Action
Wideband IF Output normal. All other outputs function on one or more, but not all, bandwidths.	Defective Digital Control Section (A5)	Refer to paragraph 4.6.3
	Defective 21.4 MHz IF Amplifier (A3A9-A3A13)	Refer to paragraph 4.6.2.1
	Defective FM Demodulator (A3A17-A3A21)	Refer to paragraph 4.6.2.2
	Defective AGC Amplifier (A3A8)	Refer to paragraph 4.6.2.3
Switched IF Output inoperative, all other outputs function normally.	Defective AM Demodulator (A3A16)	Refer to paragraph 4.6.2.4
FM Monitor Output inoperative, all Bandwidths affected.	Defective Audio/Video/ COR (A3A15)	Refer to paragraph 4.6.2.5
FM Monitor Output inoperative in one or more, but not all, bandwidth selections.	Defective FM Demodulator (A3A17-A3 A21)	Refer to paragraph 4.6.2.2
	Defective AM Demodulator (A3A16)	Refer to paragraph 4.6.2.4
No FM Video at the Switched Video Output when FM Detection is selected. FM Monitor Output normal.	Defective Digital Control Section (A5)	Refer to paragraph 4.6.3
	Defective Audio/Video/ COR (A3A15)	Refer to paragraph 4.6.2.5

4.6 PERFORMANCE TESTS

The performance test procedures provided in this section may be used for periodic performance testing, as an aid in troubleshooting, or as a performance test after repairs have been made. These procedures should be carried out only by skilled technicians, using the equipment listed in **Table 4-1** or their equivalents.

Unless otherwise specified in a particular test procedure, the receiver controls should be set to the standard test settings listed in **Table 4-3** for each of the performance tests.

Table 4-3. Receiver Standard Test Setting

Front Panel:	Frequency:	255.5550 MHz
	Detect Mode:	AM
	Gain Mode:	AGC ON
	Bandwidth:	75 KHz
	Tuning Rate:	Disabled
	AFC:	AFC OFF
	Audio Gain:	Midrange
	RF/IF Gain:	Fully CW
	Memory Select:	00
	COR Level:	00
	Dwell:	Fully CW
	Antenna:	Antenna 1 (Antenna 2 OFF)
	Operating Mode:	Manual (Local Control)
Rear Panel:	REF SEL (S2)	INT
	FLISI	120 V or as applicable for local line voltage
	Line Audio	Midrange

4.6.1 POWER SUPPLY REGULATOR TESTS

1. Prior to connecting power to the receiver, check the line cord receptacle and voltage selector fuse block, as described in paragraph 2.2.1.1.

2. Connect the receiver to the Variable Auto transformer and set the output voltage to a voltage corresponding to the selected voltage printed on the voltage selector pc wafer, described in step 1.

3. Apply power to the receiver by pressing the Power ON/OFF switch to the ON position. Note the power consumption, as indicated by the Autotransformer wattmeter. The power consumption should be no greater than 106 watts.

4. Using the Digital Voltmeter, measure the outputs of each of the DC supplies at the test points listed in **Table 4-4.** The measured voltages should fall within the limits specified in the table.

5. Set the Oscilloscope to AC coupling and monitor each of the test points listed in **Table** 4-4. Vary the output voltage of the Autotransformer above and below the line voltage set in step 2 by 10% and observe that the combined ripple and noise at each test point (except A1J19) does not exceed 30 mV P/P. The combined ripple and noise on the +9 V supply (A1Jl9) should not exceed 600 mV P/P.

Table 4-4. Power Supply Voltages

Test Point	Supply	Limits
A1J15	+15V	+.30 Vdc
A1Jl9	+9V	(Nominal)
A5J1-3	+5V (A)	+.25 Vdc
A4J1-3	+5V (B)	+.25 Vdc
A1J17	-15V	+.30 Vdc
A3U1 (Pin 2)	+5V (C)	+.25 Vdc
A4U1 (Pin 2)	+5V (D)	+.25 Vdc
A4U2 (Pin 2)	+5V (E)	+.25 Vdc
A4U3 (Pin 2)	+5V	+.25 Vdc

4.6.2 RF/IF SECTION, PERFORMANCE TESTS

4.6.2.1 IF Amplifier Performance Tests

1. Connect the test equipment as illustrated in **Figure 4-1.**

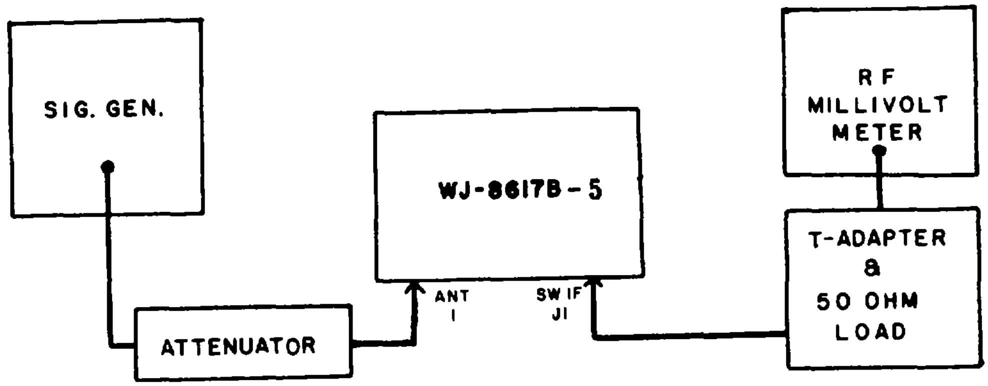


Figure 4-1. IF Amplifier Performance Test, Equipment Connections

2. Set the receiver to the standard test setting described in **Table 4-3** except tune the receiver to 30.0000 MHz and select AGC off.

3. Adjust the Signal Generator for a 30.0000 MHz CW signal, with the output set to minimum. Set the RF Millivoltmeter.

4. Increase or decrease the signal generator output level to produce a -30 dBm indication on the RF Millivoltmeter.

5. Set the attenuator to 0 dB and Increase the signal generator frequency until the RF millivoltmeter again reads -30 dBm. Note the generator frequency.

6. Decrease the signal generator frequency, past 30.0000 MHz, until the millivoltmeter again reaches -30 dBm. Note the generator frequency.

7. Compute the dB bandwidth by subtracting the frequency reading obtained in step 4 from that obtained in step 5. The computed bandwidth should equal the selected bandwidth +10%.

8. Set the generator frequency for 30.0000 MHz and adjust the output for -30 dBm on the millivoltmeter.

9. Tune the receiver across the IF passband while observing the level variations above and below the -30 dBm reference. The level variations should be no greater than 2.0 dBm peak-to-peak.

10. Select the #2 bandwidth and repeat steps 3 through 9.

11. Select the #3 bandwidth and repeat steps 3 through 9.

12. Select the #4 bandwidth and repeat steps 3 through 9.

13. If a 5th IF bandwidth is used, select bandwidth #5 and repeat steps 3 through 9.

14. If the results in steps 3 through 12 are incorrect for any of the selected bandwidths, place the suspected subassembly into a normally operating IF Amplifier slot and retest. If the results are still abnormal, replace the IF Amplifier.

4.6.2.2 FM Demodulator Performance Test

1. Connect the test equipment as illustrated in **Figure 4-2.**

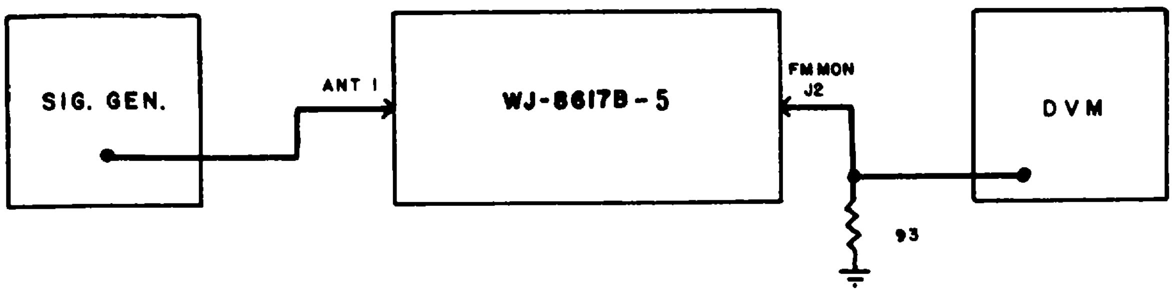


Figure 4-2. FM Demodulator Performance Test, Equipment Connections

2. Set the receiver to the standard test setting described in **Table 4-3** except, select FM Detection and the #1 bandwidth.

3. Adjust the signal generator to produce a 255.5550 MHz CW signal at an output level of -45 dBm. Set the DVM to measure DC voltage.

4. Observe the DC voltage offset displayed on the DVM. This voltage should be 0.00 +10 Vdc.

5. Increase the signal generator frequency by exactly 1/2 of the selected IF bandwidth and observe the DC voltage reading on the DVM. This voltage should read -2.00 +.20 Vdc, + the offset observed in step 4.

6. Return the signal generator frequency to 255.5550 MHz and then decrease the frequency by exactly 1/2 of the selected IF bandwidth. The voltage displayed on the DVM should read +2.00 +.20 Vdc, + the offset observed in step 4.

7. Select IF bandwidth #2 and repeat steps 3 through 6.

8. Select IF bandwidth #3 and repeat steps 3 through 6.

9. Select IF bandwidth #4 and repeat steps 3 through 6.

10. Select IF bandwidth #5 (if used) and repeat steps 3 through 6.

11. If the results obtained in steps 3 through 10 are incorrect for any of the selected IF bandwidths, place the suspected FM Demodulator into one of the normally operating FM Demodulators. (The IF Amplifier associated with the suspected bandwidth must also be exchanged). Retest the subassembly in the new location.

12. If the results are still abnormal and the IF Amplifier checks normal, per **paragraph 4.6.2.1,** replace the FM demodulator.

4.6.2.3 AGC Amplifier Performance Tests

1. Connect the signal generator to the ANT #1 input at the receiver rear panel and set the generator to produce a 450.000 MHz CW signal at a level of -90 dBm.

2. Tune the receiver to 450.000 MHz and select the AGC mode of operation. Select bandwidth #1.

3. Note that the signal strength display on the receiver front panel reads -90 dB +4 dBm.

4. Increase the output of the signal generator to -20 dBm, in 10 dB steps, while observing the signal strength display. Observe that the displayed signal strength remains within +8 dBm of the generator output level.

5. Connect the RF millivoltmeter and 50 load to the switched IF output connector on the receiver rear panel (J1).

6. Adjust the output level of the signal generator to the minimum sensitivity level of the IF Amplifier installed in the bandwidth #1 slot as follows:

IF Bandwidth	Sensitivity Level	IF Bandwidth	Sensitivity Level
10	-104	300	-89
20	-101	500	-87
50	-97	1000	-84
75	-95	2000	-81
100	-94	4000	-78
250	-90		

7. Note the switched IF Output level on the RF millivoltmeter.

8. Increase the generator output level to -10 dBm and again note the RF millivoltmeter indication.

9. Observe that the level noted in step 8 varies no more than 6 dB from the level noted in step 7.

10. Reduce the signal generator output level to minimum and set the receiver to manual gain control (AGC off). Rotate the front panel RF/IF Gain control fully CW.

11. Adjust the signal generator output level to produce a -30 dBm indication on the RF millivoltmeter.

12. Rotate the RF/IF gain control fully CCW.

13. Increase the signal generator output level by exactly 90 dB and note the level on the RF millivoltmeter.

14. The indication on the RF millivoltmeter should be -30 +6 dBm.

4.6.2.3.1 Bandwidth Selection

1. Set the signal generator output level to minimum and select the #1 bandwidth, on the front panel of the receiver.

2. Place the receiver on its side and remove the bottom panel to gain access to the RF/IF motherboard pin connections.

3. Set the Oscilloscope for DC coupling and measure the input and output logic levels at the connector pins listed in **Table 4-5.**

Table 4-5. IF Bandwidth Switching Logic

Bandwidth	Input (A3XA8)				Output (A3XA8)				
	pin	6	4	2	9	13	11	7	5
#1		0	0	0	0	0	0	0	1
#2		0	0	1	0	0	0	1	0
#3		0	1	0	0	0	1	0	0
#4		0	1	1	0	1	0	0	0
#5		1	0	0	1	0	0	0	0

4. Select the #2 IF bandwidth and repeat step 3.

5. Selec't the #3 IF bandwidth and repeat step 3.

6. Select the #4 IF bandwidth and repeat step 3.

7. Select the #5 IF bandwidth (if used) and repeat steps.

4.6.2.4 AM Demodulator Performance Tests

4.6.2.4.1 IF Output

1. Remove the 21.4 MHz IF Amplifier installed in the bandwidth #1 IF Amplifier slot (A9).

2. Set the signal generator to produce a 21.4 MHz CW output level of -57 dBm.

3. From the underside of the receiver, connect the signal generator between pins 43 (signal) and 44 (shield) of connector XA16 and connect the RF millivoltmeter to rear panel connector J1, as illustrated in **Figure 4-3.**

4. Apply power to the receiver and select bandwidth number 1, on the receiver front panel. Jumper pin 16 of the AGC Amplifier connector (XA8) and ground, through a 1 k ohm resistor, to select the narrow-band post filter of the AM Demodulator card.

5. Ensure that the switched IF output level on the RF millivoltmeter reads -30 dB.

6. Slowly increase the signal generator frequency until the level displayed on the RF millivoltmeter decreases by 1 dB. Note the signal generator frequency.

7. Decrease the signal generator frequency, past 21.4 MHz, until the 1 dB down point is again displayed on the RF millivoltmeter. Note the signal generator output frequency.

8. Determine the bandwidth of the IF post filter by subtracting the frequency obtained in step 6 from that obtained in step 7. This frequency should be between 200 and 400 kHz.

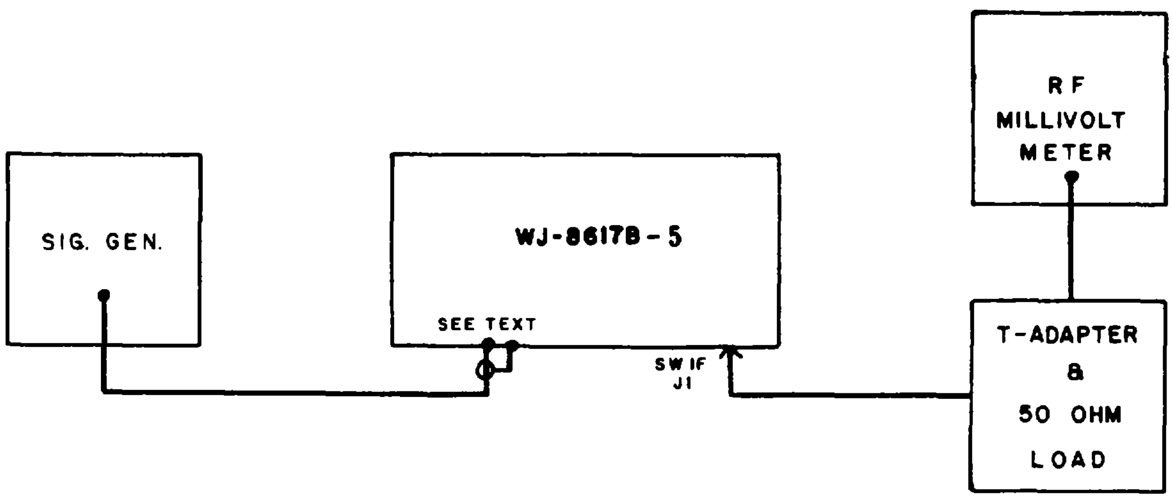


Figure 4-3. AM Demodulator Performance Test, Equipment Connections

9. Reset the signal generator to 21.4 MHz and disconnect the RF millivoltmeter from rear panel connector J1.

10. Connect the DVM between pin 20 of XA16 and ground to observe the log video output level.

11. Decrease the signal generator output level until DVM indicates +0.4 +.2 Vdc and note the signal generator output level (typically -76 dBm).

12. Increase the generator output level by 40 dB above the level set in step 11. Observe an indication of between 5.0 and 5.5 Vdc on the DVM.

4.6.2.5 <u>Audio/Video/COR Performance Tests</u>

4.6.2.5.1 Video Output

1. Connect the test equipment as illustrated in Figure **4-4,** and remove the FM Demodulators from their slots on the RF/IF motherboard.

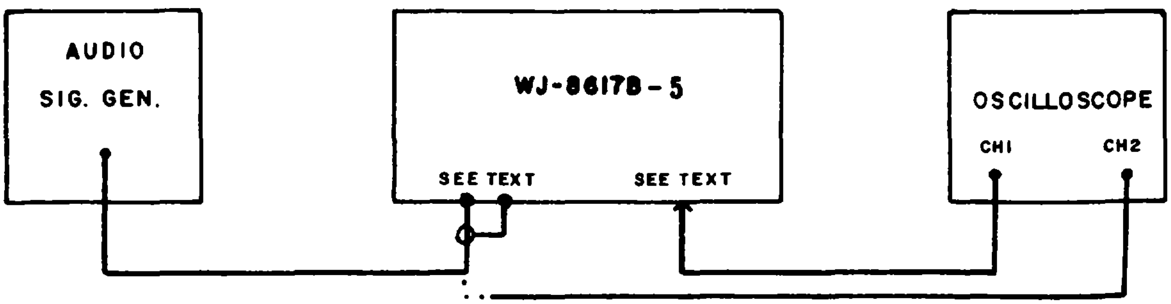


Figure 4-4. Audio/Video/COR Performance Test, Equipment Connections

2. Set the receiver to AM Detection and select the #1 IF bandwidth.

3. Connect the Audio signal generator and the channel B input of the oscilloscope to pin 3 of connector XA15. Adjust the generator to produce a 1 kHz signal at 2 V p/p amplitude, as observed on channel B of the oscilloscope. Remove the oscilloscope probe.

4. Connect the channel A input of the oscilloscope, and 93 & termination to J2 (FM MON) on the receiver rear panel. Observe that the signal at J2 is between 2 and 6 V p/p.

5. Move the channel A input of the oscilloscope and the 93 Q termination to J4 (switched Video) on the receiver rear panel. Observe no AM video is present.

6. Move the input signal from the signal generator to pin 1 of XA15. Observe a signal of 2 to 4 V p/p displayed on the A trace of the oscilloscope.

7. Connect the channel B input of the oscilloscope and 600 R termination to the J3 (Audio) output on the receiver.

8. Rotate the line audio fully CW and observe that the output reaches an amplitude of at least 7 V p/p with no clipping present.

9. Select the #2 IF bandwidth and repeat steps 3 through 8. Connect the signal generator to pin 5 of XA15 in step 3 and to pin 7 of XA15 in step 6.

10. Select the #3 IF bandwidth and repeat steps 3 through 8. Connect the signal generator to pin 9 of XA15 in step 3 and to pin 11 in step 6.

11. Select the #4 IF bandwidth and repeat steps 3 through 8. Connect the signal generator to pin 13 of XA15 in step 3 and to pin 15 in step 6.

12. If the 5th IF bandwidth is used, select bandwidth #5 and repeat steps 3 through 8. Connect the signal generator to pin 17 of XA15 in step 3 and to pin 19 in step 6.

4.6.2.5.2 COR Operation

1. Connect the test equipment as illustrated in **Figure 4-5.**

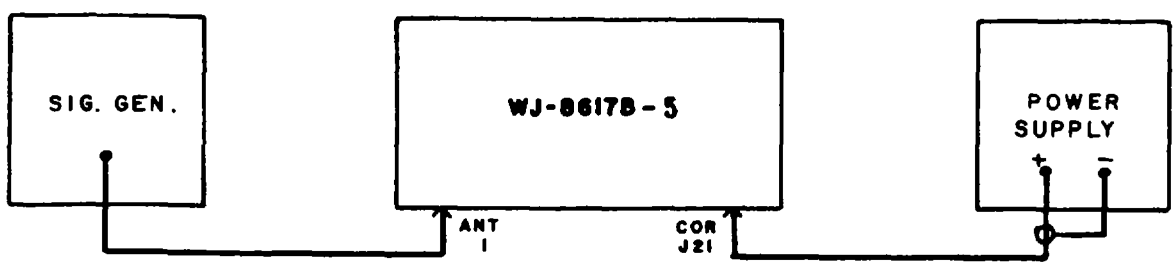


Figure 4-5. COR Circuit Test, Equipment Connections

2. Adjust the signal generator for a 255.5550 MHz CW signal, with the output level set to minimum. Set the power supply output for 24 V and adjust the current limit for 100 ma maximum.

(CAUTION: Exceeding 100 mA can cause damage to the audio/video COR circuitry.)

3. Set the receiver to the standard test set-up described in **Table 4-3** and observe that the COR LED is illuminated. Observe the milliammeter on the power supply reads 100 mA.

4. Depress the COR UP pushbutton and increase the COR level until the COR LED extinguishes. This level is typically 10 or less. Observe the milliammeter on the power supply reads near 0 mA.

5. Slowly increase the output level of the signal generator until the COR LED just illuminates. Note the generator output level.

6. Increase the COR level of the receiver to 40 and observe the COR LED is extinguished.

7. Increase the Signal Generator RF output until the COR LED just illuminates and note the generator output level.

8. Compute the COR range by subtracting the level obtained in step 5 from the level obtained in step 7. This range should be a minimum of 24 dBm.

4.6.2.6 <u>2nd Converter Performance Tests</u>

1. Remove the IF Amplifiers installed in slots A9 through A13 of the RF/IF Motherboard.

2. Connect the test equipment as illustrated in Figure 4-6.

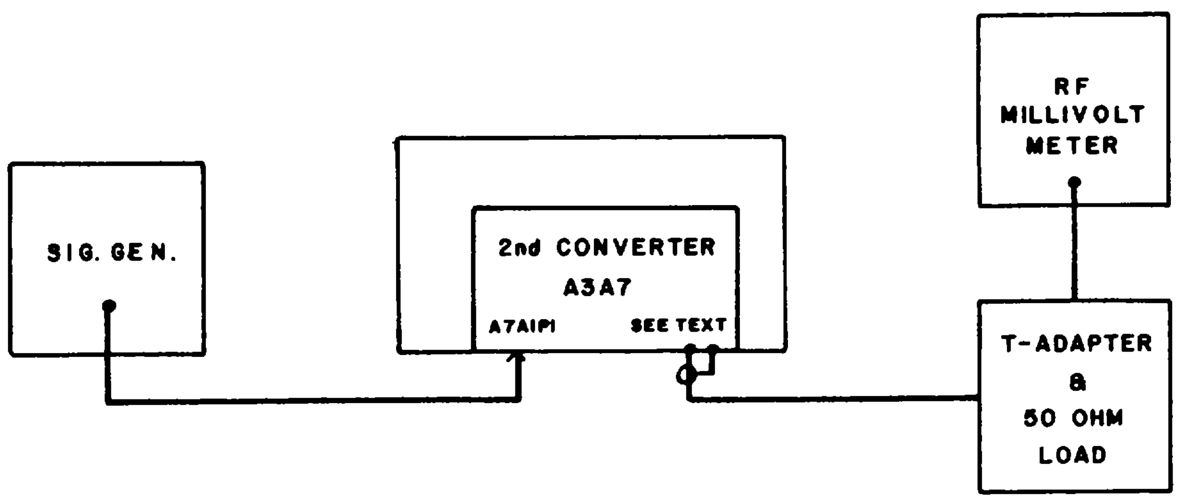


Figure 4-6. 2nd Converter Performance Test, Equipment Connections

3. Set the Receiver to 20.0000 MHz, IF bandwidth #1, AGC OFF and AFC OFF. Rotate the RF/IF gain control fully clockwise.

4. Connect the RF millivoltmeter probe between pin 7 (signal) and pin 8 (shield) of connector XA7.

5. Set the signal generator to produce a 552 MHz CW signal at the second Converter input (A7A1P1). Adjust the output level to produce a -40 dBm indication on the RF millivoltmeter.

6. Note the output level of the signal generator and determine the 2nd Converter Gain by subtracting the signal generator output level from the level displayed on the RF millivoltmeter. The gain should be 13 + 1 dB.

7. Slowly increase the signal generator frequency until the RF millivoltmeter reading decreases by 1 dB. Note the signal generator frequency.

8. Decrease the signal generator frequency, past 552 MHz, until the RF millivoltmeter again reaches the 1 dB down point observed in step 7. Note the signal generator frequency.

9. Determine the 1 dB bandwidth of the second converter by subtracting the frequency obtained in step 7 from the frequency obtained in step 8. This frequency should be 6 Hz minimum.

10. Slowly vary the Generator frequency across the frequency range noted in steps 6 and 7 and observe the level variations above and below the -40 dBm reference. The passband response should not vary more than +.5 dB between the adjacent level variations above and below the reference (1 dB of in-band ripple).

11. Return the signal generator to 552 MHz and verify the output level of the 2nd Converter, as indicated by the RF millivoltmeter, is -40 dBm. Readjust the signal generator output level, if necessary.

12. Remove the RF millivoltmeter from pins 7 and 8 of XA7.

13. Install the RF millivoltmeter across pin 17 (signal) and pin 18 (shield). Select the IF bandwidth #2.

14. Observe that the output displayed on the RF millivoltmeter is equal to the reference set in step 11. Remove the voltmeter.

15. Install the RF millivoltmeter across pin 51 (signal) and pin 52 (shield). Select the IF bandwidth #3.

16. Observe that the output displayed on the RF millivoltmeter is equal to the reference set in step 11. Remove the voltmeter.

17. Install the RF millivoltmeter across pin 55 (signal) and pin 56 (shield). Select the IF bandwidth #4.

18. Observe that the output displayed on the RF millivoltmeter is equal to the reference set in step 11.

19. Install the RF millivoltmeter across pin 47 (signal) and pin 48 (shield). Select IF bandwidth #5.

20. Observe that the output level displayed on the RF millivoltmeter is equal to the reference set in step 11. Note the output level of the signal generator.

21. Connect the DVM to pin 5 of XA7 and observe the AGC voltage present. The AGC voltage present should be 0 +.1 Vdc.

22. Rotate the RF/IF gain control, on the receiver front panel, fully CCW and observe the AGC voltage present at pin 5 of XA7. The AGC voltage should increase to -9.0 +1.0 Vdc.

23. Increase the output level of the signal generator until -40 dBm is again indicated on the RF millivoltmeter. Note the generator output level.

24. Determine the gain control range by subtracting the signal generator output level obtained in step 23 from that obtained in step 20. This control range should be between 30 and 40 dB.

25. Remove the test equipment and replace IF Amplifiers into their respective locations. Reconnect A7A1P1 to A1J3 on the 1st Converter.

4.6.2.7 1st Converter, Performance Tests

1. Connect the test equipment as illustrated in **Figure 4-7.**

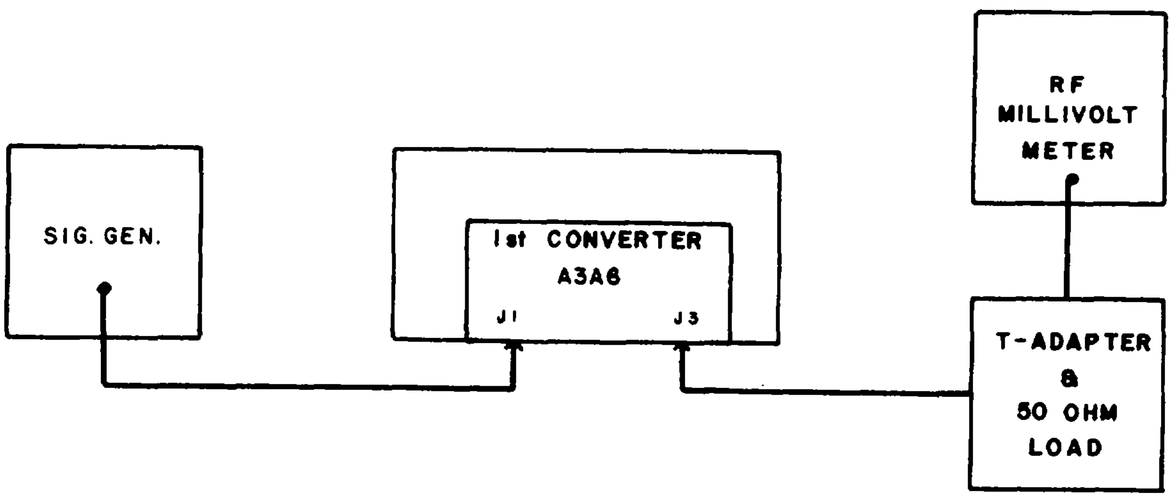


Figure 4-7. Converter Performance Test, Equipment Connections

2. Set the receiver to the standard test setting.

3. Adjust the signal generator output to produce a 255 MHz CW signal. Adjust the output level to produce a -10 dBm reading on the RF millivoltmeter.

4. Increase the output frequency of the signal generator until a 1 dB decrease is observed on the RF millivoltmeter. Note the frequency of the signal generator.

5. Decrease the output frequency of the generator, past 255 MHz, until the 1 dB down level is again observed. Note the frequency of the signal generator.

6. Determine the 1 dB bandwidth of the 1st Converter by subtracting the frequency noted in Step 5 from that noted in step 4. The bandwidth should be 8 MHz minimum.

7. Return the signal generator frequency to 255 MHz and verify the output of the 1st Converter is -10 dBm, as indicated by the RF millivoltmeter. If necessary, readjust the signal generator output level.

8. Disconnect the signal generator and RF millivoltmeter from the 1st Converter and connect the generator to the input of RF millivoltmeter.

9. Observe the signal generator output level, as displayed on the RF millivoltmeter. This level should be between -12 and -16 dBm, reflecting again of from 2 to 6 B.

10. Reconnect Pll to J1 and A7AlW1 to J3 on the 1st Converter.

4.6.2.8 VHF Preamplifier Performance Tests

1. Tune the receiver to the standard test setting listed in **Table 4-3,** except, select AGC OFF. Verify that the RF/IF gain control, on the receiver front panel, is in its fully CW position.

2. Adjust the signal generator to produce a 255.0 Hz CW signal and connect the generator output to the input of the RF millivoltmeter. Adjust the signal generator level to produce a -32 dBm output level, as indicated on the RF millivoltmeter.

3. Connect the test equipment as illustrated in **Figure 4-8.**

4. Observe the level indicated on the RF millivoltmeter.

5. Determine the VHF Preamplifier gain by subtracting the level obtained in step 4 from that obtained in step 2. This gain should be a minimum of 12 dB.

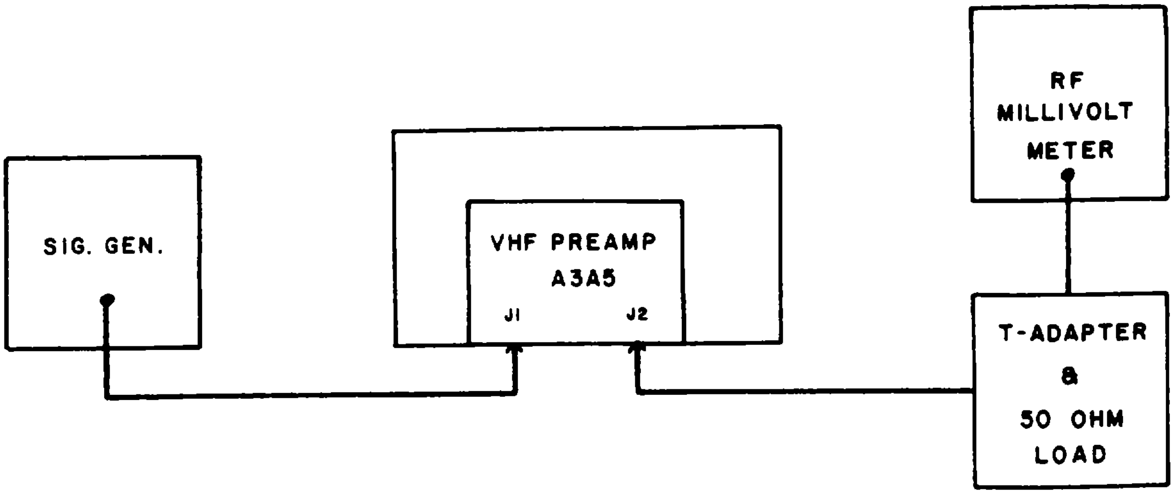


Figure 4-8. VHF Preamplifier Performance Test, Equipment Connections

6. Adjust the signal generator output to produce a -20 dBm indication on the RF millivoltmeter. Vary the signal generator frequency between 20 and 500 MHz, while observing the level indication on the millivoltmeter. This level should remain at -20 +2 dBm across the frequency range.

7. Continue to increase the generator above 500 MHz and observe a rapid decrease in the level indicated on the RF millivoltmeter.

8. Return the signal generator frequency to 255.0 MHz and increase the generator output level to produce a -10 dBm indication on the RF millivoltmeter.

9. Rotate the RF/IF gain control, on the receiver front panel to its full CCW position. Observe the output level, as indicated on the RF millivoltmeter. The output level should be 20 dB less than the level observed in step 8.

4.6.2.9 VHF Preselector, Performance Tests

1. Connect the output of the RF signal generator to the input of the RF millivoltmeter. Tune the generator to produce a 25.200 MHz CW signal and adjust the output level for a -20 dBm indication on the RF millivoltmeter. Do not change the generator output level as this level will be used as a reference to determine the insertion loss of the preselector.

2. Connect the test equipment as indicated in **Figure 4-9.** Tune the receiver to 22.0000 MHz.

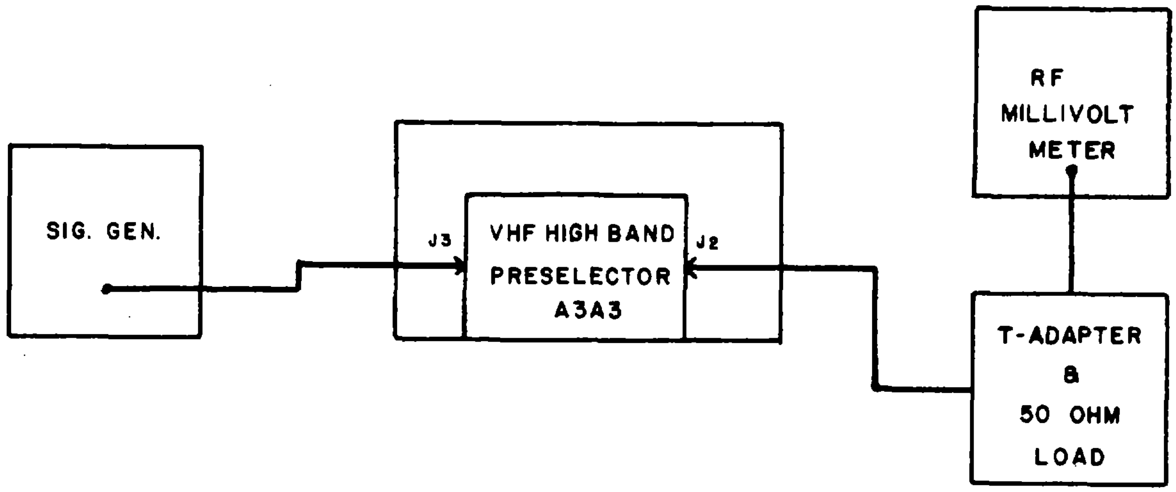


Figure 4-9. VHF Preselector Performance Test, Equipment Connections

3. Observe the VHF preselector output level, as indicated on the RF millivoltmeter. This level should be no less than -22 dBm.

4. Slowly tune the signal generator through the passband of the preselector, as listed in **Table 4-6.** The level indicated on the RF millivoltmeter should remain within +1 dB of the level observed in step 3.

5. Repeat steps 1 through 4 for the remaining preselector bands, using the frequencies listed in **Table 4-6.** In each case, recalibrate the generator output level to -20 dBm at the preselector center frequency, as described in step 1.

6. Determine the out-of-band attenuation of each preselector by tuning the receiver to the frequencies listed in the table. Tune the signal generator to upper frequency 2 and lower frequency X2 as listed.

7. Observe that the RF millivoltmeter indications observed in Step 6 are at least 25 dB less the level obtained in Step 3.

Table 4-6. RF Preselector Passband

CENTER FREQ (MHz)	LOWER FREQ (MHz)	UPPER FREQ (MHz)	UPPER FREQ. 2 (MHz)	LOWER FREQ X2 (MHz)
25.2	20	30	15	40
38.5	30	47	23	60
61.0	47	75	37	94
97.5	75	120	60	150
153.5	120	187	93	240
239.5	187	292	146	374
337.0	292	382	191	584
441.0	382	500	250	764

4.6.2.10 Antenna Switch, Performance Test

1. Tune the Signal Generator to produce a 250 MHz CW output and connect the RF millivoltmeter to the generator output. Adjust the generator output for a -20 dBm indication on the RF millivoltmeter.

2. Disconnect the RF millivoltmeter from the Signal Generator and connect it to the RF output of the HP-612A Signal Generator. Tune the HP-612A Generator to produce a 600 MHz CW output and adjust the level to produce a -20 dBm indication on the RF millivoltmeter.

NOTE

The Antenna Switch performance test checks the 20-500 MHz and the 500-1100 MHz portion of this subassembly. If the 500-1100 MHz Frequency Extender is not installed in the receiver, temporarily place switch number 6 of S1 on the Synthesizer Interface (A5A2) into the open position to permit tuning above 500 MHz. Be sure to restore S1 to its original position after the Antenna Switch performance test is completed.

3. Connect the test equipment as illustrated in Figure 4-10, with the RF millivoltmeter connected to J3.

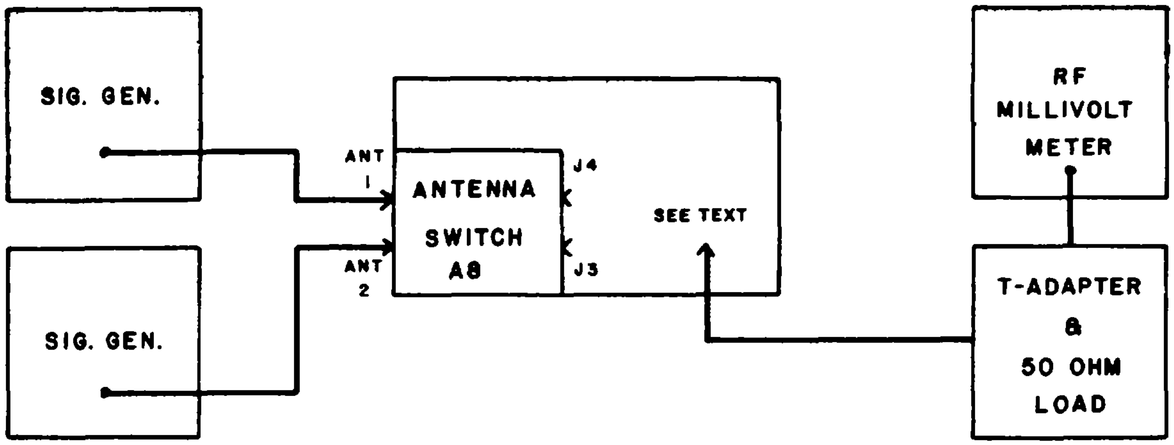


Figure 4-10. Antenna Switch Performance Test, Equipment Connections

4. Tune the Receiver to 250 MHz and select Antenna 1. Using the DVM, measure the switching voltage at pins 3 and 1 of J2 (on the RF/IF Motherboard). The voltage at these pins should measure near 0 Vdc. Leave the DVM connected to pin 1.

5. Note the output level of the antenna switch as indicated by the RF millivoltmeter. This level should measure no less than -21 dBm.

6. Tune the Signal Generator to 500 MHz and slowly decrease the generator frequency to 20 MHz, while observing the RF millivoltmeter. The level should vary no more than +.5 dB from the level observed in step 5.

7. Slowly tune the Receiver to 600 MHz, while observing the DVM. Observe that the voltage at pin 1 of J2 switches to +5 Vdc as the receiver is tuned past 501 MHz. Observe that the RF millivoltmeter indicates that the signal is no longer present.

8. Connect the DVM to J2 pin 3 and select Antenna 2. Observe that the voltage at pin 3 switches to +5 Vdc when Antenna 2 is selected.

9. Disconnect the RF millivoltmeter from J3 and connect it to J4. Observe that the Antenna Switch output is no less than -21 dBm, as indicated by the RF millivoltmeter.

10. Tune the Signal Generator to 500 MHz and slowly increase the generator frequency to 1000 MHz, while observing the RF millivoltmeter. The level should vary no more than +.5 dB from the level observed in step 9.

11. Tune the receiver to a frequency below 499 MHz. Observe that the RF millivoltmeter indicates that the signal is no longer present at J4.

4.6.3 DIGITAL CONTROL SECTION, PERFORMANCE TESTS

4.6.3.1 Microprocessor Performance Tests

1. Set the oscilloscope for a DC coupled input with the horizontal sweep set to .5 psec/Div.

2. Using the oscilloscope, verify the presence of changing logic levels on the Address and Data Buses of the Digital control section. Changing logic levels between +3.5 V and 0 V should be observed at the following connector pins of A5XA3:

Address Bus		Data Bus	
B43-A12	B55-A10	B3-D3	B11-D7
B48-A4	B56-A7	B5-D4	B13-D0
B50-A3	B57-All	B7-D5	B15-D1
B51-A8	B58-A6	B9-D6	B17-D2
B52-A2	B59-A0		
B53-A9	B60-A5		
B54-A1			

3. Connect the oscilloscope to the XA3 connector pins listed in Table 4-7 and observe that the results are as described in the table.

4. Connect the oscilloscope to pin A35 of XA3 and toggle the AGC pushbutton between AGC ON and AGC OFF. Observe a logic 0 when AGC is on and a logic 1 when AGC is off.

5. Select AGC on, AM Detection and connect the oscilloscope to pin A37 of XA3. Observe a logic 0 at A37.

6. Select Pulse Detection. Observe a logic 1 present at A37.

7. Connect the oscilloscope to pin A33 of XA3 and toggle the ANT 2 pushbutton on and off. Observe a logic 0 at A33 when Antenna 1 is selected and logic 1 when Antenna 2 is selected.

Table 4-7. Microprocessor Control Signals

Connector Pin	Description	Signals
B49	1RQ	Changing logic level
B14	R/W	Changing logic level
B12	R/W	Changing logic level
B8	RST	Constant logic 1
B10	RST	Constant logic 0
B16	DBE	Squarewave, 1 μsec period (symmetrical)
B18	DBDLY	Squarewave, 1 μsec period (symmetrical)
A4	RAM clk	Squarewave, 1 μsec period (symmetrical)
A12	CLK 1	Squarewave, 2 μsec period (symmetrical)
A18	CLK 5	Squarewave, 32 μsec period (symmetrical)
A14	CLK 8	Squarewave, .256 msec period (symmetrical)
A16	CLK 11	Squarewave, 2 msec period (symmetrical)
A34	PFAIL	Constant logic 1

Logic 1>+2.7 V   Logic 0 = 0V

4.6.3.2 Receiver Interface, Performance Tests

1. Select the bandwidth pushbuttons listed in Table 4-8 and observe the logic levels at the XA1 connector pins indicated in the table. These levels represent the Digital code required to activate the selected receiver bandwidth.

Table 4-8. Receiver Bandwidth Selection Codes

Bandwidth	XA1 A29	XA1 A27	XA1 A25
#1	0	0	0
#2	0	0	1
#3	0	1	0
#4	0	1	1
#5	1	0	0

2. Select the Detection modes listed in Table 4-9 and observe the logic levels at the connector pins indicated in the table. These logic levels represent the digital code required to activate the selected detection mode.

Table 4-9. Receiver Detection Mode Selection Codes

Detection Mode	XA1 A35	XA1 A33	XA1 A31
AM	0	0	0
FM	0	0	1
CW	0	1	0
Pulse	0	1	1
* LSB	1	1	0
*USB	1	0	0

* With SSB Option Installed

4.6.3.3 Synthesizer Interface, Performance Tests

1. Select the 1 MHz Tuning Rate pushbutton on the front panel and set the receiver to the frequencies listed in Table 4-10. (Only 1 MHz and above tuning steps are being tested at this time. The digits below 1 MHz will not affect the results.) Using the oscilloscope, observe the logic levels at the XA2 connector pins listed in the table.

2. The results observed in step 1 should yield BCD words equivalent to the 1st LO frequency. The decimal equivalent of the BCD words will be equal to the tuned frequency +552. As can be seen in the table, the most significant digit is omitted when the decimal equivalent is above 1000.

Table 4-10. 1st LO Synthesizer Control Words

Tuned Freq	100 MHz Control A18	A26	A16	A24	10 MHz Control A10	A6	A22	A28	1 MHz Control A14	A8	A12	A4	Decimal Equivalent
20.X MHz	0	1	0	1	0	1	1	1	0	0	1	0	572
25.X MHz	0	1	0	1	0	1	1	1	0	1	1	1	577
35.X MHz	0	1	0	1	1	0	0	0	0	1	1	1	587
50.X MHz	0	1	1	0	0	0	0	0	0	0	1	0	602
250.X MHz	1	0	0	0	0	0	0	0	0	0	1	0	802
456.X MHz	0	0	0	0	0	0	0	0	1	0	0	0	008

3. Return the tuned frequency to 20 MHz and select the 10 kHz Tuning Rate pushbutton. Set the receiver to the frequencies listed in Table 4-11 and observe the logic levels at the XA2 connector pins listed in the table. (Only the 100 kHz and 10 kHz tuning steps are being tested at this time. The 1 kHz and 100 Hz digits will not affect the results.)

Table 4-11. 2nd LO Synthesizer Control Words (100 kHz and 10 kHz)

Tuned Freq	100 MHz Control A51	A55	A47	A43	10 MHz Control A57	A59	A49	A53	Decimal Equivalent
20.01 MHz	0	0	0	0	0	0	0	1	01
20.22 MHz	0	0	1	0	0	0	1	0	22
20.35 MHz	0	0	1	1	0	1	0	1	35
20.77 MHz	0	1	1	1	0	1	1	1	77
20.99 MHz	1	0	0	1	1	0	0	1	99

4. The results obtained in step 3 should yield the BCD equivalent of the 100 kHz and 10 kHz digits present on the front panel frequency display.

5. Return the receiver frequency to 20.00 MHz and select the 100 Hz Tuning Rate pushbutton. Set the receiver to the frequencies listed in Table 4-12 and observe the logic levels present at the XA2 connector pins listed in the table.

Table 4-12. 2nd LO Synthesizer Control Words (1 kHz and 100 Hz)

Tuned Freq	1 kHz Control A48	A44	A50	A52	100 kHz Control A56	A58	A60	A54	Decimal Equivalent
20.0000	0	0	0	0	0	0	0	0	00
20.0013	0	0	0	1	0	0	1	1	13
20.0067	0	1	1	0	0	1	1	1	67
20.0089	1	0	0	0	1	0	0	1	89

6. The results obtained in step 5 should yield the BCD equivalent of the 1 kHz and 100 Hz digits present on the front panel frequency display.

7. Tune the receiver to the frequencies listed in Table 4-13 and observe the logic levels present at XA2 connector pins listed in the table. These logic levels form a digital code which selects UHF or VHF operation, activates the appropriate RF preselector and selects the correct UHF LO frequency.

Frequencies above 500 MHz require the 500-1100 MHz Frequency Extender to be installed on the RF/IF Motherboard.

8. Select AGC OFF and rotate the RF/IF gain control to its Fully CCW position.

9. Connect the DVM to pin B5 of XA2 and adjust the RF/IF Gain between its maximum CCW to maximum CW position. Observe that the DVM reading continuously decreases from 5.0 to 0 Vdc +10%.

10. Connect the DVM to pin B7 of XA2 and set the COR LEVEL Display to 00, using the front panel COR pushbuttons.

11. Step the COR LEVEL up to 40 while observing DVM. The voltage should increase from 0 +.1 to 5.0 +.4 Vdc in steps of approximately .125 Vdc.

Table 4-13. RF Preselector and UHF VCO Control

	UHF2 A34	**UHF1 A36**	**UHF/ VHF A32**	**VHF3 A3**	**VHF2 A7**	**VHF1 A5**	**Comments**
25.0000	0	0	0	0	0	0	20-30 MHz preselector
35.0000	0	0	0	0	0	1	30-47 MHz preselector
60.0000	0	0	0	0	1	0	47-75 MHz preselector
100.0000	0	0	0	0	1	1	75-120 MHz preselector
150.0000	0	0	0	1	0	0	120-187 MHz preselector
250.0000	0	0	0	1	0	1	187-292 MHz preselector
350.0000	0	0	0	1	1	0	292-382 MHz preselector
450.0000	0	0	0	1	1	1	382-500 MHz preselector
550.0000	0	0	1	1	1	0	500-700 MHz preselector UHF VCO = 848 MHz
650.0000	0	1	1	1	1	0	500-700 MHz preselector UHF VCO = 944 MHz
800.0000	1	0	1	1	1	0	700-900 MHz preselector UHF VCO = 1144 MHz
1000.0000	1	1	1	1	1	0	900-1100 MHz preselector UHF VCO = 1344 MHz

4.6.4 SYNTHESIZER SECTION PERFORMANCE TESTS

4.6.4.1 Reference Generator, Performance Tests

1. Connect the frequency counter to the 1 MHz Ref connector (J8) on the receiver rear panel. Observe the frequency displayed on the counter. The frequency should be 1 MHz +1 Hz.

2. Remove the frequency counter and connect the oscilloscope at J8 and observe the waveform present. Observe that the waveform viewed is a distorted sine wave with an amplitude of approximately 2.5 V p/p.

3. Connect the frequency counter first to connector pin 17 of XA1, then to connector pin 49. Observe that the frequency present at both connector pins is 250 kHz. The accuracy of the 250 kIIz signal is determined by the accuracy of the 1 MHz reference, measured in step 1.

4. Connect the frequency counter to connector pin 55 of XA1 and observe the frequency present. This frequency should be 25 kHz. The accuracy of the 25 kHz signal is determined by the accuracy of the 1 MHz reference observed in step 1.

5. Remove the frequency counter and observe the waveform present at connector pins 17, 49, and 55. The waveform present at each connector pin should be a symmetrical square wave switching between 0 and approximately +4 V.

4.6.4.2 <u>1st LO Synthesizer, Performance Tests</u>

1. Connect the frequency counter to the 1st LO Synthesizer output jack A1J1. Reference the frequency counter to the 1 MHz REF output of the receiver, J8.

2. Using the oscilloscope, verify the presence of the 250 kHz reference, from the reference generator, at connector pin 12 of XA2.

3. Tune the receiver to the frequencies listed in Table 4-14 and observe the 1st LO frequency varies as listed in the table.

Table 4-14. 1st LO Synthesizer Frequency Versus Tuned Frequency

Tuned FREQ (MHz)	***1st LO FREQ (MHz) A1J1**	**Control Logic Input (A4XA2)**											
			100MHz				**10 MHz**				**1 MHz**		
		46	**45**	**48**	**47**	**13**	**15**	**44**	**43**	**4**	**3**	**5**	**6**
20.0000	572	0	1	0	1	0	1	1	1	0	0	1	0
25.0000	577	0	1	1	1	0	1	1	1	0	1	1	1
50.0000	602	0	1	1	0	0	0	0	0	0	0	1	0
250.0000	802	1	0	0	0	0	0	0	0	0	0	1	0
336.0000	888	1	0	0	0	1	0	0	0	1	0	0	0
499.0000	1051	0	0	0	0	0	1	1	1	0	0	0	1

* +1 Hz frequency accuracy should be observed when the frequency counter is referenced to the 1 MHz reference of the receiver (J8).

4. If the results are not as listed in Table 4-14, use the oscilloscope to verify the BCD control words provided at the indicated XA2 connector pins.

5. Remove the frequency counter from A1J1 and connect the RF millivoltmeter and 50 ohm load. Observe that the output level is at least -3 dBm.

6. Tune the Receiver through the 20-500 MHz frequency range while observing the output level on the RF millivoltmeter. Observe that the output level of at least -3 dBm is present throughout the frequency range of the 1st LO.

4.6.4.3 2nd LO Synthesizer Performance Tests

4.6.4.3.1 535 MHz Generator, Performance Tests

1. Connect the frequency counter to the 535 MHz output jack of the 535 MHz Generator, A4A6J2. Reference the frequency counter to the 1 MHz REF output of the receiver at rear panel connector, J8.

2. Observe that the output frequency is locked at 535.000 MHz, as indicated by the frequency counter.

3. Remove the frequency counter and connect the RF millivoltmeter and 50 ohm load to output jack A4A6J2.

4. Observe the 535 MHz output level. The output level should be -5 +2 dBm.

5. Remove the RF millivoltmeter and 50 ohm load and reconnect P5 of W2 to A4A6J2.

4.6.4.3.2 4.4-4.5 MHz Synthesizer, Performance Tests

1. Connect the frequency counter to the 4.4-5.4 MHz output of the 4.4-5.4 MHz Synthesizer, A4A4J1. Reference the frequency counter to the 1 MHz REF output of the receiver at rear panel connector, J8.

2. Tune the receiver to the RF frequencies listed in **Table 4-15** while observing the indication on the frequency counter. Observe that the 4.4-5.4 MHz synthesizer output frequency locks at the output frequencies listed in the table.

3. Retune the receiver to 20.000 MHz and slowly increase the tuned frequency while observing the frequency counter indication. Observe that for each 100 Hz, 1 kHz, 10 kHz and 100 kHz change in tuned frequency, the frequency counter indication changes by an equal amount.

4. If the results obtained in step 2 and 3 are not as described, use the oscilloscope to verify the BCD control words at the connector pins indicated in Table 4-15.

5. Remove the frequency counter and reconnect P8 at A4A4J1.

Table 4-15. 4.4-5.4 MHz Synthesizer Output Frequency Versus Tuned Frequency

Tuned (MHz)	4.4-5.4 MHz Output (MHz)	100 kHz				10 kHz				1 kHz				100 Hz			
		12	3	15	14	2	1	13	4	8	9	6	5	3	2	1	4
20.0000	4.4000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20.0001	4.4001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
20.0002	4.4002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
20.0012	4.4012	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
20.0022	4.4022	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
20.0122	4.4122	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0
20.0222	4.4222	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0
20.1222	4.5222	0	0	0	1	0	0	1	0	0	0	1	0	0	0	1	0
20.2222	4.6222	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
20.5555	4.9555	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
20.7777	5.1777	0	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1
20.9999	5.3999	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1

4.6.4.3.3 Translation Oscillator, Performance Tests

1. Disconnect P54 from the 2nd Converter LO input at A3A7A1J1, and connect the frequency counter at P54.

2. Tune the receiver to the RF frequencies listed in **Table 4-16** while observing the indication on the frequency counter. Observe that the 2nd LO Output locks at the 2nd LO Output frequencies as listed in the table.

3. If the counter fails to display the 2nd LO frequency, verify that +4 $\pm$1 dBm of RF power is present at cable P54. If this power level is not present, connect a test cable directly to A4A3J2. If the level at A4A3J2 is correct, check cables W24, W10, and W27.

4. Remove the frequency counter and connect the RF millivoltmeter and 50 ohm load at A4A3J2.

5. Tune the receiver between 20.0000 and 20.9999 MHz while observing the output on the RF millivoltmeter. The output should be 4 $\pm$1 dBm, throughout the 2nd LO frequency range.

6. Remove the RF millivoltmeter and reinstall P59 at A4A3J2.

Table 4-16. 2nd LO Frequency Versus Tuned Frequency

Tuned Freq (MHz)	2nd LO Freq (MHz)	Tuned Freq. (MHz)	2nd LO Freq. (MHz)
20.0000	530.6000	20.2234	530.3766
20.0001	530.5999	20.3234	530.2766
20.0002	530.5998	20.4234	530.1766
20.0013	530.5987	20.6234	529.9766
20.0023	530.5977	20.7234	529.8766
20.0123	530.5877	20.8234	529.7766
20.0223	530.5777	20.9234	529.6766
20.1234	530.4766	20.9999	529.6001

4.6.4.4 SSB BFO, Performance Tests

1. Connect the oscilloscope at connector pin 45 of XA5 on the synthesizer motherboard.

2. Using the front panel pushbuttons, switch between the AM and CW detection modes. Observe that a 21.4 MHz sinewave is present when the CW mode is selected and this signal is absent when the AM mode is selected.

3. If the 21.4 MHz signal is not observed, as described in step 2, connect the oscilloscope at connector pin 53 to verify that the 10.7 MHz signal from the Reference Generator is present at the SSB BFO input.

4. Remove the oscilloscope from pin 53 and connect it to the CW BFO ON/OFF input (pin 49 of XA5). Monitor the logic level at this line while switching between the AM and CW detection modes. A TTL logic "1" should be present when the CW mode is selected and a logic "0" should be present when the AM mode is selected.

NOTE

Alignment of the WJ-8617B-5 Receiver is not authorized at the direct support maintenance level. The alignment procedures that follow are to aid in depot maintenance.

4.7 ALIGNMENT PROCEDURES

4.7.1 RP/IF SECTION ALIGNMENT PROCEDURES

4.7.1.1 VHF High-Band Preselector (A3A3), Alignment

1. Extend the VHF High-band Preselector subassembly (A3A3).
2. Connect the signal generator to the EXTMARK input of the RF Analyzer and adjust the signal generator to the center frequency of the preselector to be tested, as listed in **Table 4-17**. Set the MARKER SPACING control on the RF analyzer to EXT and tune the analyzer frequency control until the marker is at the center of the CRT trace.
3. Set the output of the RF Analyzer to -10 dBm and select 2 dB/DIV on the Log Transmission plug-in. Connect RF out to the RF in and calibrate the analyzer to provide a convenient reference.
4. Connect the test equipment as illustrated in **Figure 4-11.**
5. Tune the receiver to a frequency within the passband of the preselector to be aligned and adjust the sweep width controls of the analyzer to produce a suitable response on the CRT. Determine the upper and lower band-edge frequencies by tuning the Generator to first the upper and then the lower frequency limits of the preselector, as listed in the Preselector Under Test column of **Table 4-17**. In each case, note the point on the trace where the marker occurs.
6. Adjust the tuning components for the preselector under Test, as listed in **Table 4-17**, for the flattest overall response within the frequency limits of the preselector. The flat portion of the response should not be more than 2 dB (1 division on the CRT) down from the reference set in step 3, with no more than .5 dB of variation within the passband.

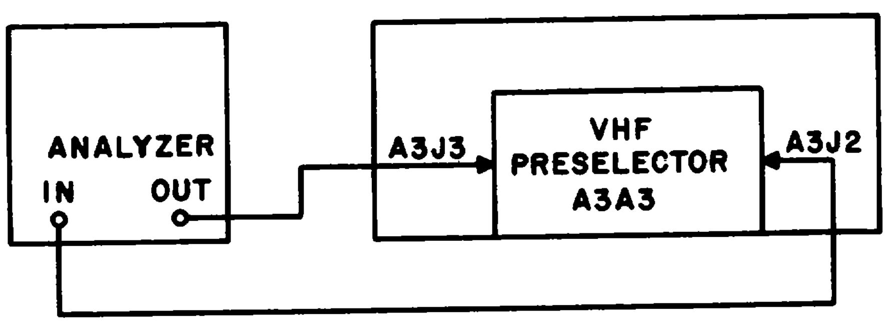


Figure 4-11. VHF Preselector Alignment, Equipment Connectors

Table 4-17. VHF High-Band Preselector Alignment Data

Preselector Under Test (MHz)	Preselector Center Freq (MHz)	Tuning Components
382-500	442	C10, C11, C12
292-382	337	C16, C18, C20
187-292	240	L16 through L20, C36, C41
120-187	152	L23 through L27, C58, C63

7. Refer to **Figures 4-12A** through **4-12D** through for the typical responses for each of the High-Band Preselectors.

8. If alignment of the VHF Low-Band Preselector is to be Performed, leave the test equipment connected and install the VHF High-Band Preselector into its appropriate connector on the RF/IF Motherboard. Otherwise, disconnect the test equipment.

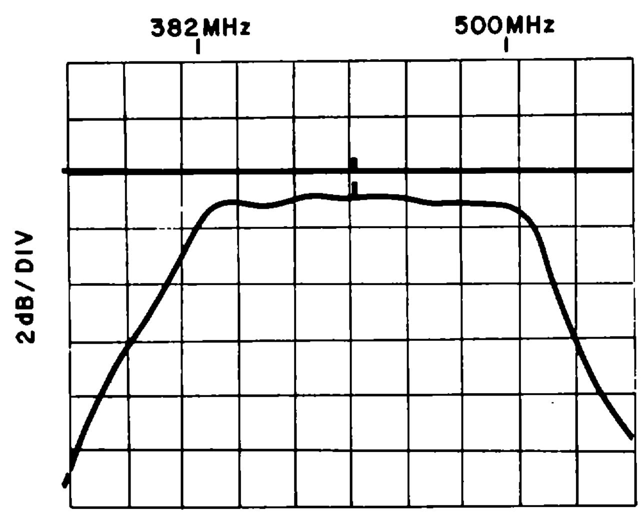


Figure 4-12A. 382-500 MHz Preselector, Typical Response

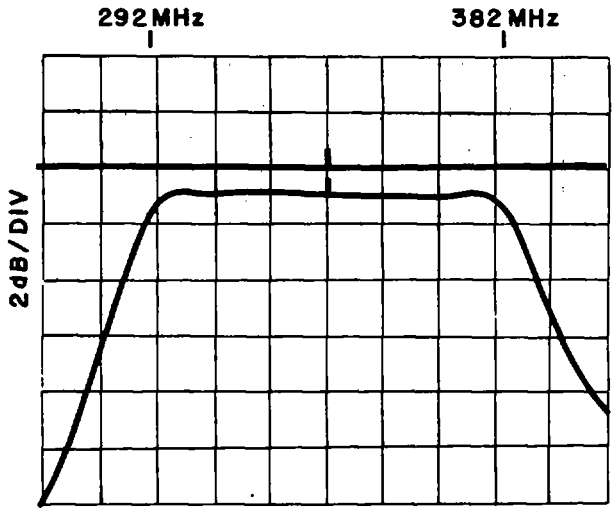


Figure 4-12B. 292-382 MHz Preselector, Typical Response

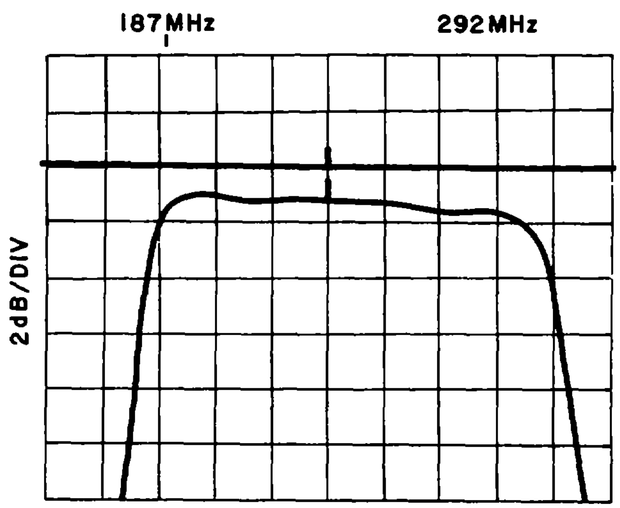


Figure 4-12C. 187-292 MHz Preselector, Typical Response

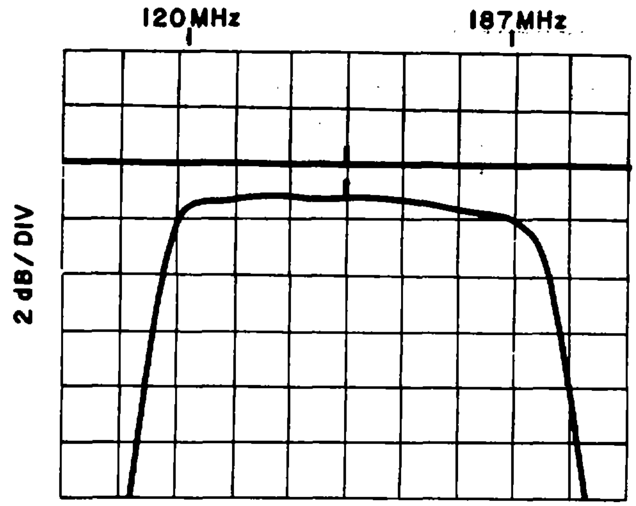


Figure 4-12D. 120-187 MHz Preselector, Typical Response

4.7.1.2 VHF Low-Band Preselector (A3A4), Alignment

1. Perform steps 2 and 3 of **paragraph 4.7.1.1**, using the center frequencies listed in **Table 4-18**.

2. Connect the test equipment to the High-Band Preselector (A3A3) as illustrated in **Figure 4-11** and reinstall A3A3 into its appropriate slot. Extend the VHF Low-Band Preselector (A3A4).

3. Tune the receiver to a frequency within the passband of the preselector to be aligned and adjust the sweepwidth controls of the analyzer to produce a suitable response on the CRT. Determine the upper and lower band-edge frequencies by tuning the Generator to first the upper and then the lower frequency limits of the preselector, as listed in the Preselector Under Test column of **Table 4-18**. In each case, note the point on the trace where the marker occurs.

4. Adjust the tuning components for the preselector under test, as listed in **Table 4-18**, for the flattest overall response within the limits of the preselector. The flat portion of the response should be no more than 2 Db (1 division on the CRT) down from the reference set in step 3 of **paragraph 4.7.1.1,** with no more than .5 dB of variation within the passband.

Table 4-18. VHF Low-Band Preselector Alignment Data

Preselector Under Test (MHz)	Preselector Center Freq (MHz)	Tuning Components
75-120	97	L26 through L30
47-75	61	L19 through L23
30-47	38	L12 through L16
20-30	25	L5 through L9

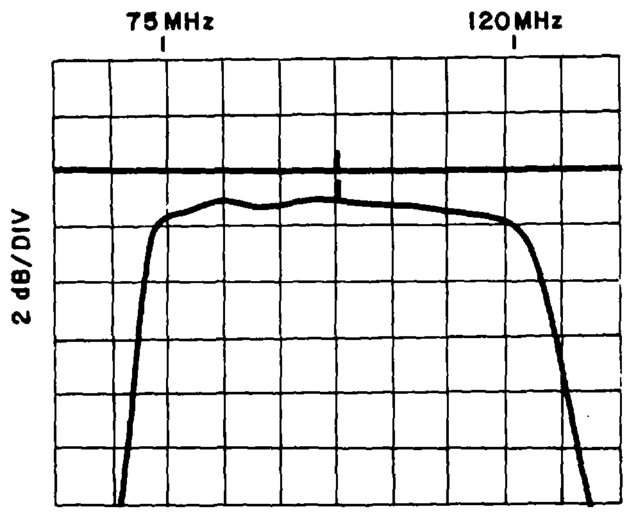


Figure 4-13A. 75-120 MHz Preselector, Typical Response

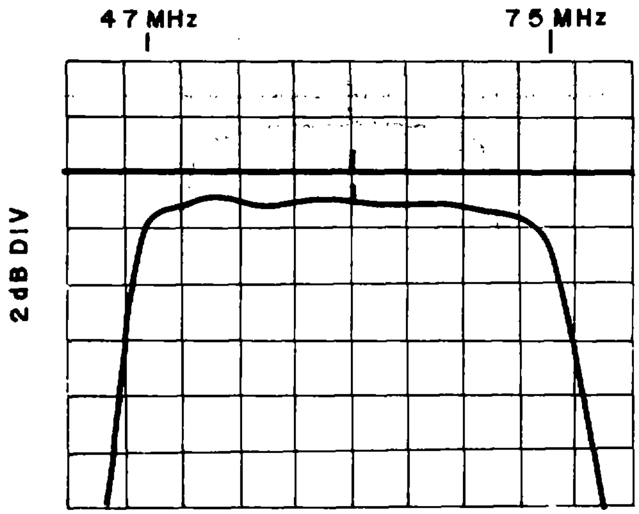


Figure 4-13B. 47-75 MHz Preselector, Typical Response

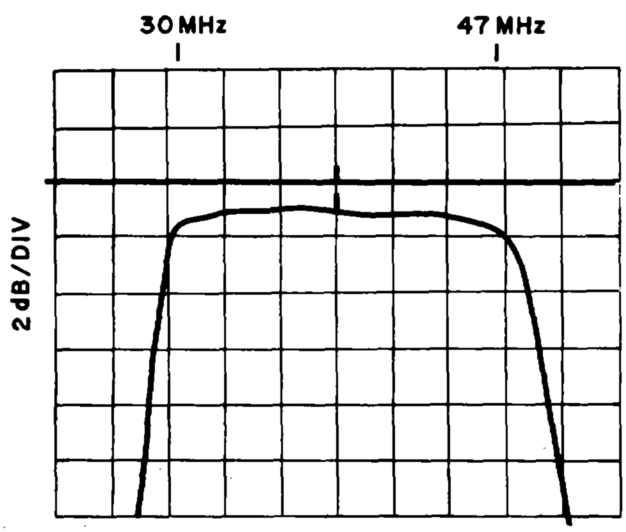


Figure 4-13C. 30-47 MHz Preselector, Typical Response

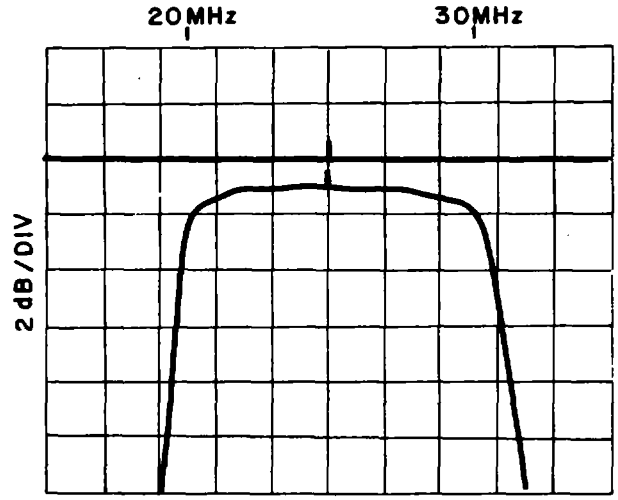


Figure 4-13D. 20-30 MHz Preselector, Typical Response

4.7.1.3 <u>VHF Preamplifier (A3A5), Alignment</u>

1. Entend the VHF Preamplifier module (A3A5) and connect the test equipment as illustrated in **Figure 4-14.**

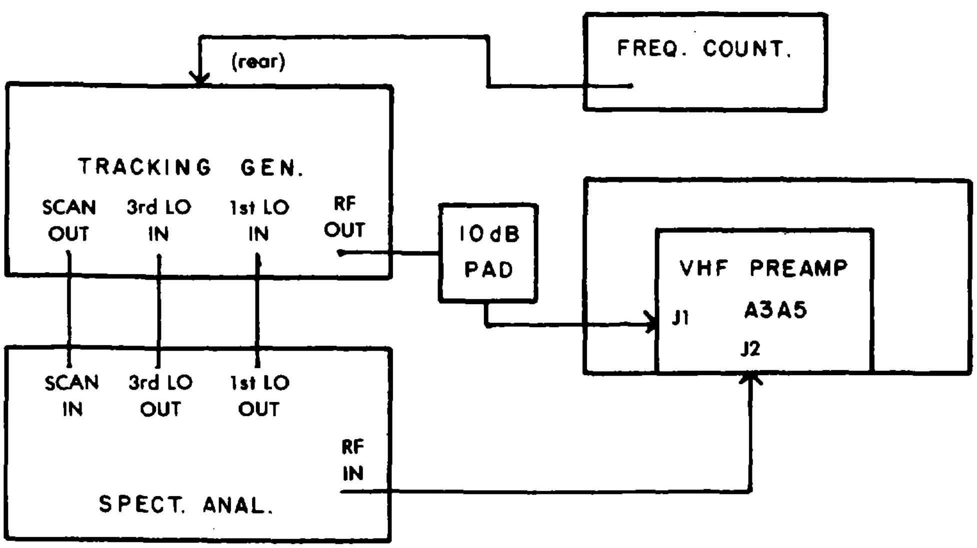


Figure 4-14. VHF Preamplifier Alignment, Equipment Connections

2. Place the spectrum analyzer in the manual mode with a 1 MHz per division scan. Adjust the analyzer frequency to the null frequencies listed below. Observe the frequency counter for an indication of the tuned frequency. At each of the listed frequencies adjust the appropriate capacitor for a null.

NULL FREQ.	CAPACITOR
553.5 MHz	C 6
582.0 MHz	C 4
690.0 MHz	C 8
1200.0 MHz	C 2

3. Repeat step 2 as required to obtain the best null at each frequency.

4. Set the analyzer to internal scan and select the 100 MHz per division scan width. Tune the analyzer frequency to 600 MHz.

5. Readjust C2, C4, C6, and C8 for the best overall response as illustrated in Figure 4-15. Adjust for the best response, as follows:

    a) The response from 20 to 500 MHz must be flat, within $\pm$2 dB.

    b) The response at 551.5 MHz must be down by at least 52 dB from the 500 MHz response.

    c) The peaks between the null frequencies must be at least 50 dB below the 500 MHz response.

    Capacitor C2 has the greatest effect on the bandpass ripple between 20 and 500 MHz and C4, C6, and C8 have the greatest effect on the cutoff frequency adjustment.

6. Set the analyzer to the manual mode of operation and tune the frequency to 400 MHz.

7. On the receiver, select AGC OFF and rotate the RF/IF Gain control fully CW.

8. Connect the DVM at the junction of R5 and R6 and adjust R29 until the voltage just begins to go positive. Take note of the response level on the spectrum analyzer.

9. Rotate the RF/IF Gain control fully CCW. Adjust R13 until the response level is 20 dB below the level noted in step 8.

10. Repeat steps 7 through 9 until interaction between adjustments is minimized.

11. Remove the test equipment and reinstall the VHF Preamplifier into the receiver.

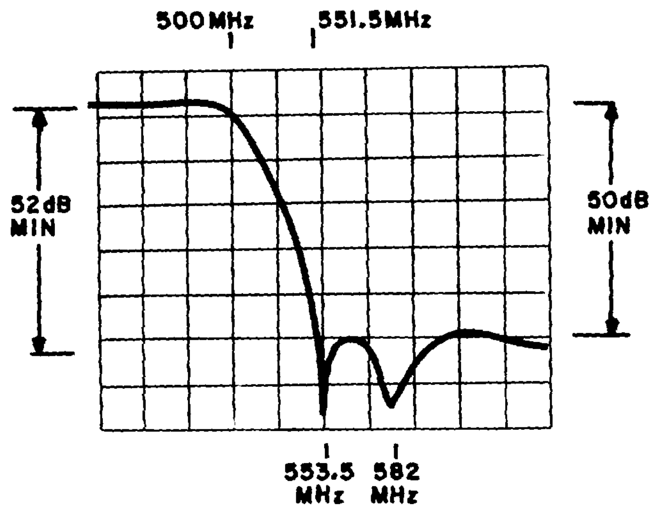


Figure 4-15. Type 370285, 500 MHz LP Filter, Typical Response

4.7.1.4 <u>1st Converter (A3A6), Alignment</u>

1. Extend the 1st Converter (A3A6) subassembly and position the receiver to permit access to the tuning capacitors, at the back of the subassembly. (Subassembly cover must be left on.)

2. Set the Wiltron 640 RF Analyzer to sweep about a 450 MHz frequency with a sweep width of 1 MHz per division. Set the output level to -20 dBm.

3. Connect the RF Output of the RF Anlayzer to its RF input and calibrate the Analyzer trace.

4. Connect the RF Analyzer as illustrated in **Figure 4-16** and Tune the receiver to 450.0000 MHz. (P53 must be connected to A3A6J2, 1st Converter LO input).

5. Adjust Capacitors C4, C6, C8, C10, C12, C18, C20, and C22 for the maximum gain and flattest response about the 552 MHz center frequency (center of the CRT Horizontal scale). Refer to **Figure 4-17** for the typical 1st Converter response.

6. Repeat step 5 until a 6 MHz minimum response curve is obtained at a level of at least +2 dB above the reference set in step 3. The ripple, within the bandwidth, should be no greater than .5 dB peak-to-peak.

7. Slowly tune the receiver and the RF Analyzer down in frequency, while observing the level of the response curve on the Analyzer CRT. The gain should vary no more than -1 or +2 dB throughout the frequency range.

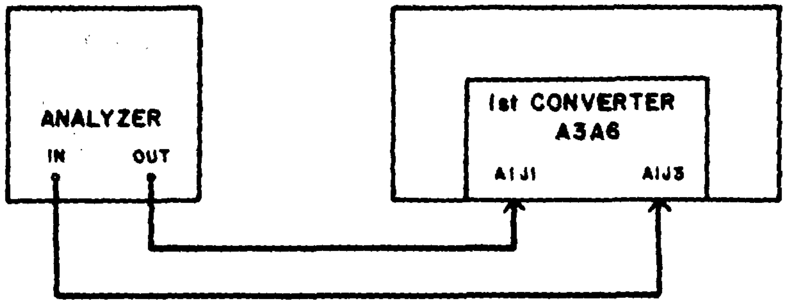


Figure 4-16. 1st Converter Alignment, Equipment Connections

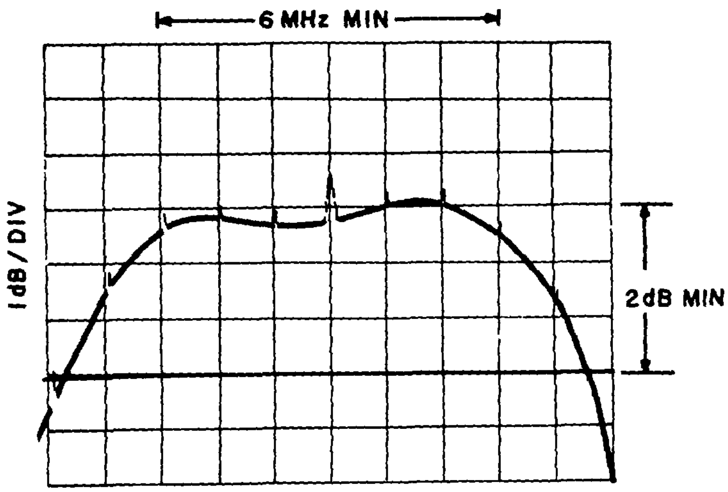


Figure 4-17. 1st Converter Alignment, Typical Response

8. If necessary, readjust the tuning capacitors at the lowest gain point, observed in step 7, to obtain the best overall response across the 20-500 MHz tuning range of the receiver.

4.7.1.5 2nd Converter (A3A7), Alignment

1. Extend the 2nd Converter subassembly, using the appropriate extender card, and remove the LO Amplifier (A3A7A1) cover. Remove the IF Amplifier installed in the XA9 slot of the RF/IF Motherboard.

2. Tune the receiver to 20.0000 MHz and select AGC OFF. Set the RF/IF gain to Maximum, by rotating the RF/IF Gain control fully CW. Select the #1 IF bandwidth.

3. Set the RF Analyzer to sweep about a 552 MHz frequency, with a sweep width of 1 MHz per division. Set the output level to -20 dB.

4. Connect the RF Output of the Analyzer to its input and set a convenient reference. Readjust the analyzer such that 552 MHz is at the center of the trace. (Use the internal markers of the generator to locate 552 MHz).

5. Connect the RF Analyzer to the 2nd Converter, as illustrated in **Figure 4-18**.

6. Adjust coils L6, L7, and L8 for the flattest response, with a minimum 1 dB bandwidth of 6 MHz as illustrated in **Figure 4-19**. The subassembly gain should be 13 + dB greater than the reference set in step 5.

7. Tune receiver to 20.9999 MHz and tune the Analyzer to 551 MHz. Observe that the response remains as stated in step 6. Readjust L6, L7, and L8 as required to obtain a uniform response at both frequency settings.

8. Reinstall the cover on the LO Amplifier Assembly.

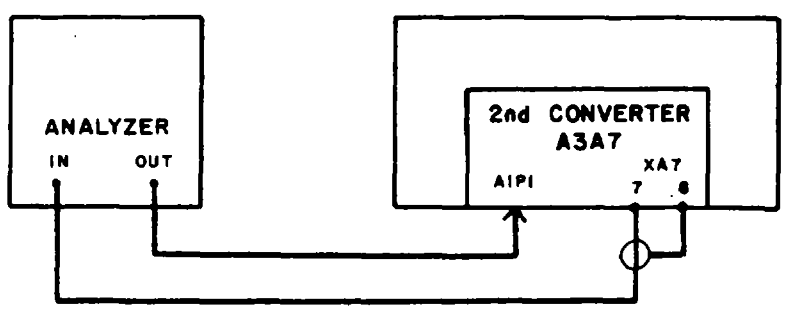


Figure 4-18. 2nd Converter Alignment, Equipment Connections

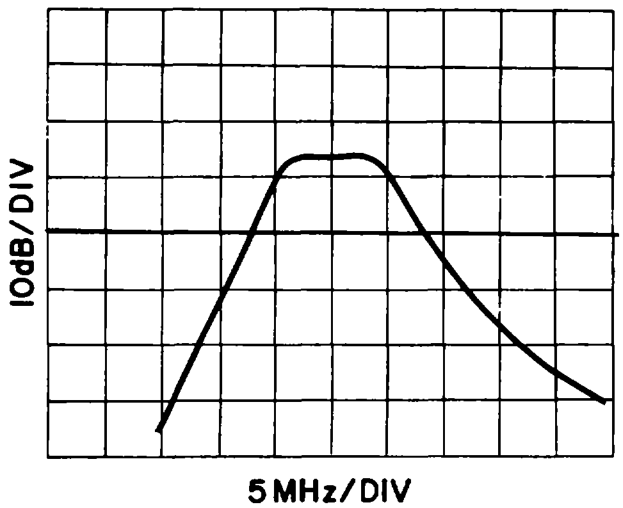


Figure 4-19. 2nd Converter Alignment, Typical Response

9. Rotate the RF/IF Gain Control, on the receiver front panel, to obtain -1.5 Vdc at pin 5 of XA7. Adjust R2 until the response amplitude is 5 + 1 dB below the level noted in step 6.

10. Rotate the RF/IF Gain control fully CCW and adjust R15 until the response amplitude is 38 + 2 dB below the amplitude noted in step 6.

11. Readjust R2 and R15 as required to obtain the stated results.

4.7.1.6 IF Amplifier (A3A9 through A3A13), Alignment

1. Remove the 2nd Converter (A3A7) and the AM Demodulator (A3A16) from their respective slots on the RF/IF Motherboard. Remove the IF Amplifiers installed in slots XA9 through XA13.

2. Insert the appropriate extender card into the XA9 slot of the RF/IF Motherboard and install the IF Amplifier into the extender. Select the #1 IF Bandwidth pushbutton on the receiver front panel.

3. Set the generator to sweep about a 21.4 MHz center frequency, with a bandwidth 20% greater than the IF Amplifier under test.

4. Connect the test equipment as illustrated in **Figure 4-20** except, connect the attenuator output to the input of the 50 Ω detector.

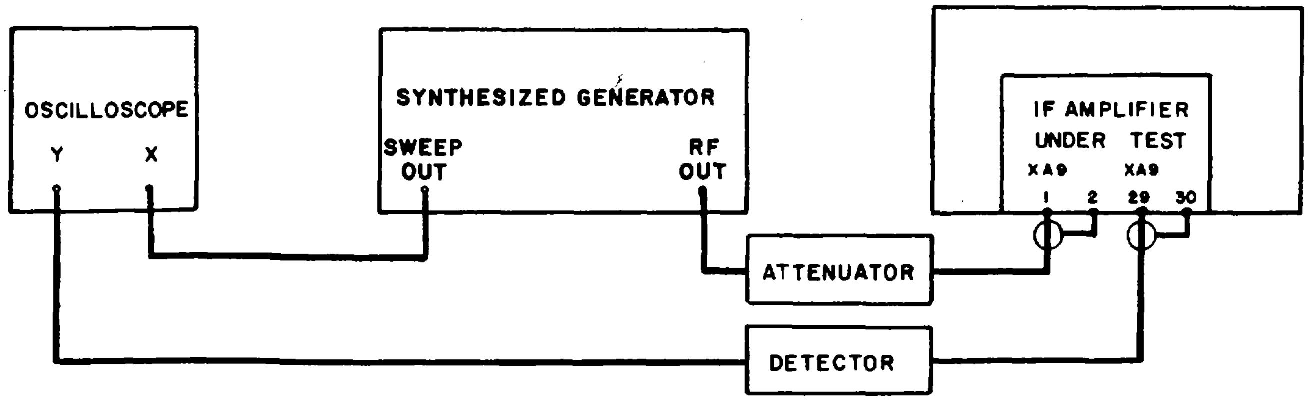


Figure 4-20. IF Amplifier Alignment, Equipment Connections

5. Set the attenuator to 0 dB and set the generator to sweep about a 21.4 MHz center frequency, with a sweepwidth at least 20% greater than the IF Amplifier under test. Adjust the sweep generator output and the oscilloscope to provide a convenient reference on the CRT.

6. Connect the detector and attenuat6r as illustrated in **Figure 4-20** and increase the attenuator setting to the dB level listed in the Gain column of **Table 4-19**, corresponding to the IF Amplifier under test.

7. For the Type 724006-X IF Amplifiers, adjust C15 for the best overall response, as illustrated in **Figure 4-21A**. Adjust R3 to set the response amplitude equal to within $\pm$1 dB of the reference set in step 5. Connect the DVM between connector pin 12 and ground and adjust R19 to provide the proper IFBW code as indicated in **Table 4-18**.

8. For the Type 724019-1 IF Amplifier, adjust C5, C8, C10, C13, C15, C18, and C20 to obtain the best overall response, as illustrated in **Figure 4-21B**. Adjust R9 to set the response amplitude equal to $\pm$1 dB of the reference set in step 5. Connect the DVM between connector pin 12 and ground and adjust R2 for a -6.00 Vdc reading on the DVM.

Table 4-19. IF Amplifier Response Characteristics

IF Bandwidth Type	3 dB Bandwidth kHz	IF BW Code Vdc	Nominal Gain dB
724006-1	10±1	1.00	+22
724006-2	20±2	2.00	+19
724006-1	50±2	3.00	+15
724006-9	75±2	3.50	+13
724006-4	100±10	4.00	+12
724006-5	250+25	5.00	+8
724006-6	300±30	5.50	+7
724019-1	500+50	6.00	+5
724007-1	1000±100	7.00	+2
724007-2	2000±200	8.00	-1*
724008-1	4000±400	9.00	-4**

* Set attenuator to 0 and increase generator output by 1 dB.

** Set attenuator to 0 and increase generator output by 4 dB.

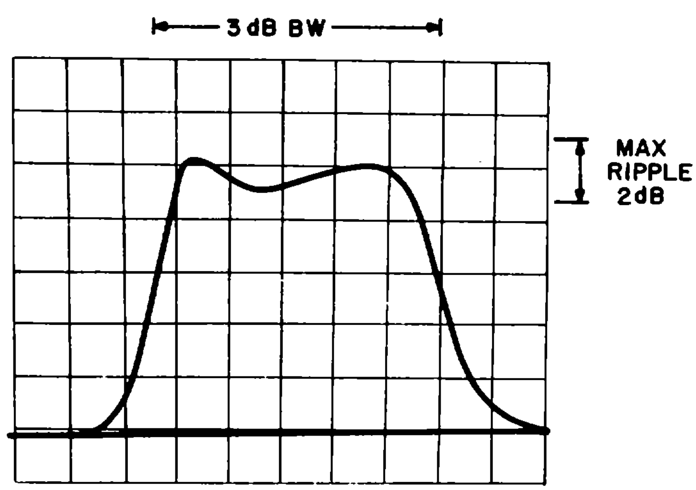


Figure 4-21A. Type 724006-4IF Amplifier, Typical Response

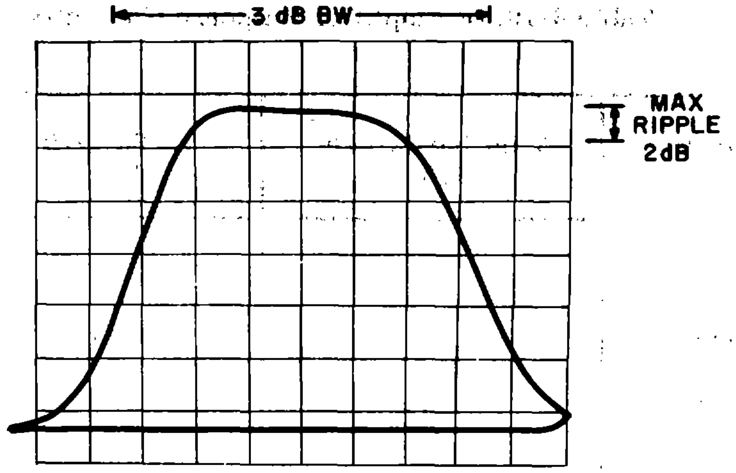


Figure 4-21B. Type 7240191-1 IF Amplifier, Typical Response

9. For the Type 724007-1, -2 IF Amplifiers, adjust C3, C5, C7, C9, Cll, and C14 for the best overall response, as illustrated in **Figure 4-21C**. Adjust R8 to set the response amplitude equal to within $\pm$1 dB of the reference set in step 5. Connect the DVM between connector pin 12 and ground and adjust R12 to produce a DVM reading of +7.00 Vdc for the Type 724007-1 Amplifier, or -8.00 Vdc for the Type 724007-2 Amplifier.

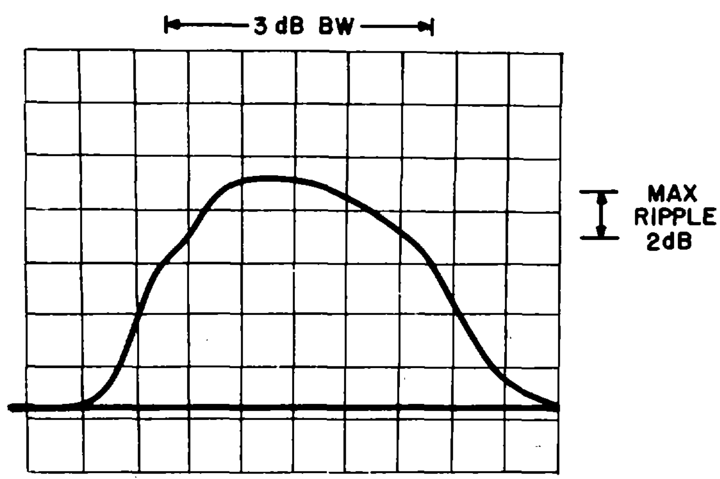


Figure 4-21C. Type 724007-Xand724008-1 IF Amplifier, Typical Response

10. For the Type 724008-1 IF Amplifier, adjust L1, L2, L4, L5, L7, and L8 for the best overall response, as illustrated in **Figure 4-21C**. Adjust R8 to set the response amplitude equal to within $\pm$1 dB of the reference set in step 5. Connect the DVM between connector pin 12 and ground and adjust R12 for a +9.00 Vdc DVM reading.

11. Disconnect the test equipment and reinstall the IF Amplifiers, the 2nd Converter and the AM Demodulator into their respective slots on the RF/IF Motherboard.

4.7.1.7 AM Demodulator (A3A16), Alignment

1. Extend the AM Demodulator subassembly (A3A16), using the Type 798076-1, short extender card. Remove the IF Amplifier installed in the #1 IF bandwidth slot (XA9). Remove the IF Amplifier from XA9 with power applied to the receiver, but first select bandwidth #2 to deenergize the #1 bandwidth circuitry. This will prevent an Error 814 code when activating bandwidth #1 with no subassembly installed.

2. Connect the test equipment as illustrated in **Figure 4-22.**

3. Select the #1 IF bandwidth and select AGC OFF, with the RF/IF Gain fully CW.

4. Adjust the sweep generator to produce a 10 MHz wide sweep, centered at 21.4 MHz. Set the output level to 0 dBm and adjust the attenuator to 56 dB of attenuation. Activate the 21.4 MHz marker.

5. Connect the + output of the DC power supply to pin 11 of XA9 and connect the - output to pin 27 (GND). Adjust the output of the power supply to +5.00 Vdc, to activate the wideband post filter.

6. Set the oscilloscope vertical sensitivity to 0.2 v/div.

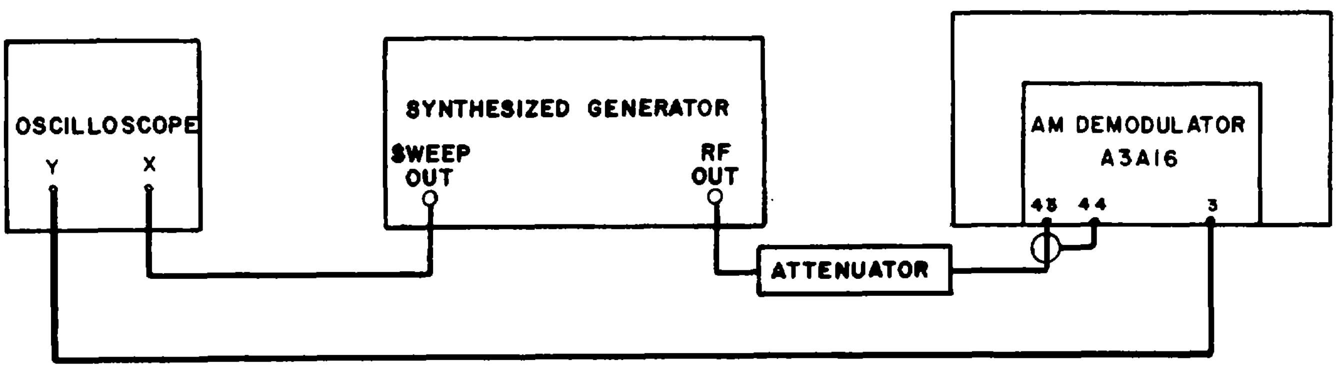


Figure 4-22. AM Demodulator Alignment, Equipment Connections

7. Adjust C9 and C42 for the best wideband response, centered at 21.4 MHz. The oscilloscope response should be centered at 21.4 MHz, with a 1 dB bandwidth of 4 MHz, minimum, as illustrated in **Figure 4-23.**

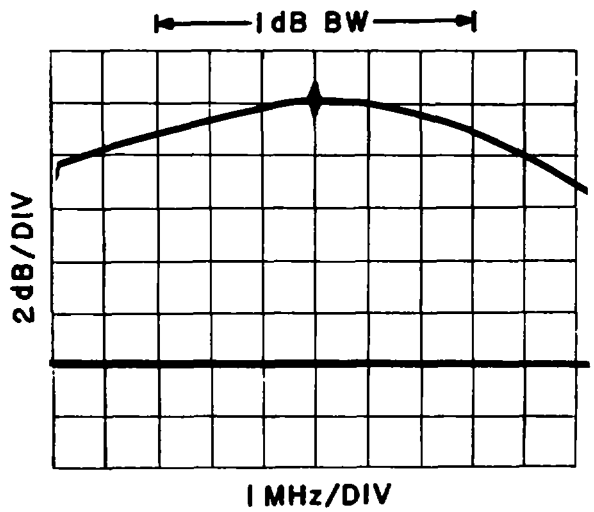


Figure 4-23. AM Demodulator Wideband Alignment, Typical Response

8. Reset the sweep generator to sweep .5 MHz about the 21.4 MHz center frequency. Decrease the power supply output to +2.00 Vdc, to select the narrowband post filter.

9. Adjust C26 and C28 for the best response. The response should be centered at 21.4 MHz with a 1 dB bandwidth of between 200 and 400 kHz, as illustrated in **Figure 4-24.**

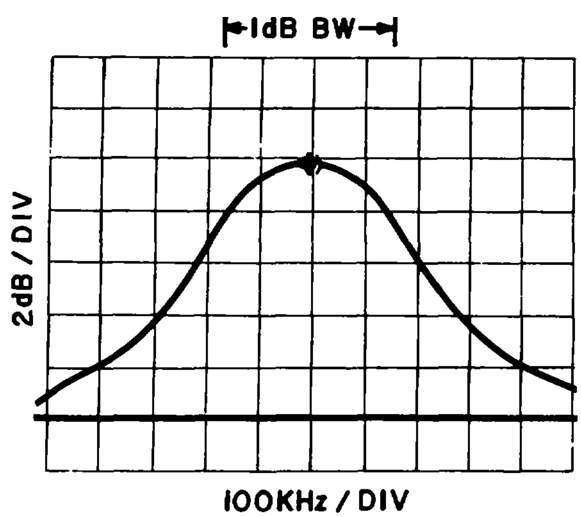


Figure 4-24. AM Demodulator Narrowband Alignment, Typical Response

10. Set the generator to produce a fixed 21.4 MHz CW signal and set the attenuator for 57 dB of attenuation. Connect the DVM at TP1 (brown) of the AGC Amplifier (A3A8) and connect the RF millivoltmeter and 50 ohm load at the switch IF output of the receiver (J1).

11. Adjust R23 for a +1.00 Vdc indication on the DVM. Adjust R59 for a -30.0 dBm indication on the RF millivoltmeter.

12. Remove the DVM from TP1 and connect it to TP3 (orange) on the AGC Amplifier.

13. Adjust R62, R69, and R72 to midrange.

14. Remove the 21.4 MHz input signal from the board and adjust R69 to produce a +0.4 Vdc indication on the DVM.

15. Reconnect the 21.4 MHz input signal at connector pins 43 and 44 and set the attenuator for 76 dB of attenuation. Adjust R62, as required, to produce +0.6 Vdc at TP3 of A3A8.

16. Set the attenuator for 36 dB of attenuation. Adjust R72 for a +5.4 Vdc indication on the DVM.

17. Repeat steps 14 through 16 to minimize interaction between adjustments.

18. Reinstall the AM Demodulator into the receiver and recheck the subassembly operation. Slight changes in the operation may occur when the subassembly is reinstalled and minor readjustments may be required.

4.7.1.8 FM Demodulator (A3A17 through A3A21), Alignment

1. Remove the AM Demodulator (A3A16) from Slot XA16 on the RF/IF Motherboard.

2. Connect the test equipment as illustrated in **Figure 4-25**, with the sweep generator RF output connected between pin 1 (signal) and pin 2 (shield) of connector XA16. Connect the sweep generator demod input at terminal E1 of the FM Demodulator under test.

3. Select the IF bandwidth corresponding to the FM Demodulator to be tested and set the sweep about the 21.4 MHz IF center frequency with a bandwidth slightly greater than the bandwidth of the FM Demodulator under test. Activate the 21.4 MHz marker on the sweep generator.

4. Adjust the oscilloscope and sweep generator controls to display an "S" curve as illustrated in **Figure 4-26.**

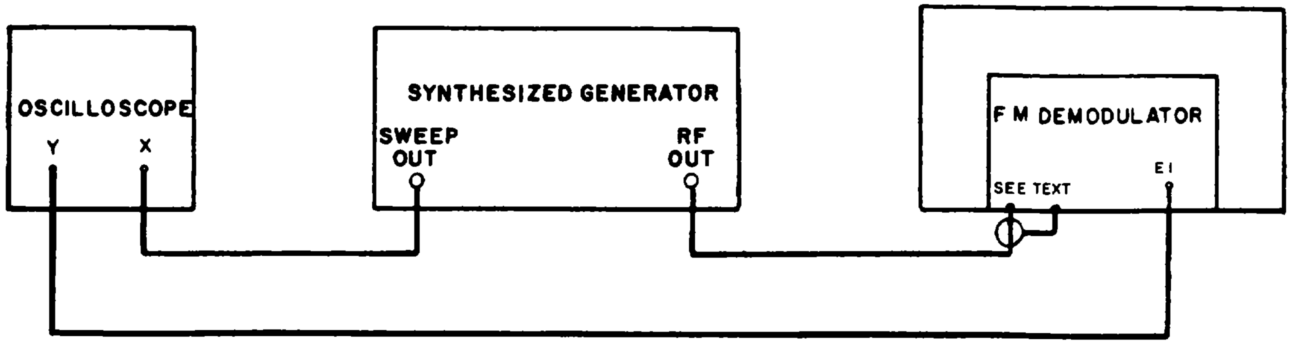


Figure 4-25. FM Demodulator Alingnment, Equipment Connections

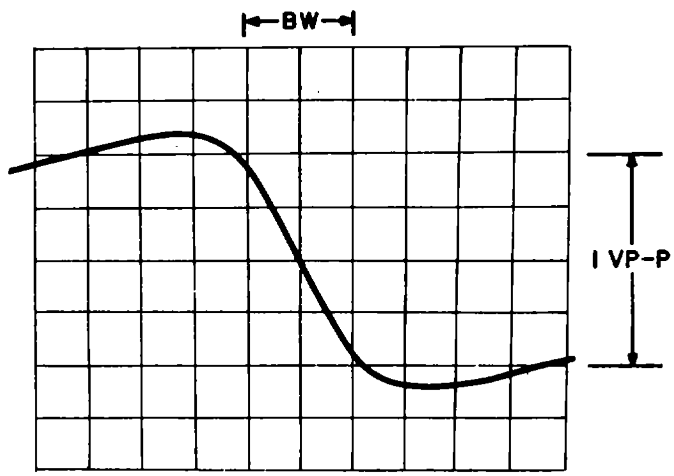


Figure 4-26. FM Demodulator "S" Curve

5. For the FM Demodulator under test, adjust the tuning components listed below for the straightest possible line extending from the upper and lower band edges of the FM Demodulator response, with the 21.4 MHz marker at the zero crossing point on the response:

FM Demodulator	Tuning Components
794106-X	L1, L2
794107-X	C18
794104-X	C8, C10
794105-X	C2, C6

6. Disconnect the demod input of the sweep generator from terminal E1 of the FM Demodulator and set the generator to produce a fixed 21.4000 MHz output frequency.

7. Connect the DVM to pin 1 of the FM Demodulator under test.

8. For the FM Demodulator under test, adjust the offset potentiometer listed in **Table 4-20** for a DVM reading of 0 ±.1 Vdc.

9. Increase the generator output frequency by exactly 1/2 of the IF Bandwidth. Adjust the gain potentiometer listed in **Table 4-20** for a DVM reading of -1.00 ±.10 Vdc (± any offset observed in step 8).

10. Decrease the generator output frequency to exactly 1/2 of the IF Bandwidth below the 21.4 MHz center frequency and observe the reading on the DVM. This level should be +1.00 ±.10 Vdc (± any offset observed in step 8).

11. Repeat steps 6 through 10, as required, to obtain a 0 ±.1 Vdc offset at 21.4 MHz and ±1.00 ±.05 Vdc at the band-edge frequencies.

Table 4-20. FM Offset and Gain Adjustments

FM Demodulator	**Offset Adjustment**	**Gain Adjustment**
794106-X	R12	R15
794107-X	R14	R11
794104-X	R9	R16
794105-X	R14	R9

4.7.1.9 AGC Amplifier (A3A8), Alignment

1. The following test requires a properly aligned 10, 20, or 75 kHz IF Amplifier installed in the #1 IF bandwidth slot (XA9).

2. Extend the AGC Amplifier (A3A8) and set R9, R12, R66, and R72 to midrange. Set R20 fully CCW.

3. Connect the DVM between connector pin 8 and ground and adjust R66 for -12.0 Vdc.

4. Place the DVM at pin 10 of U6 and adjust R70 for -0.10 Vdc at this point.

5. Set the receiver to 450.0000 MHz, AGC on, ANT 1 and select bandwidth #1.

6. With no signal input, adjust R72 for a front panel signal display as follows:

#1 IF BW	Sig. Strength Display
10 kHz	-122
20 kHz	-119
75 kHz	-113

7. Connect the signal generator at the Antenna 1 input. Set the generator to 450.0000 MHz and set the output to the level that corresponds to the installed IF bandwidth listed below. Adjust R9 for the signal strength display reading that corresponds to the installed IF bandwidth.

IF Bandwidth	RF Input	Sig. Strength Display
10 kHz	-82 dBm	-82
20 kHz	-79 dBm	-79
75 kHz	-73 dBm	-73

8. Repeat steps 6 and 7 until interaction between adjustments is minimized.

9. Increase the generator output by 1 dB. Slowly turn R70 CCW until the signal strength display reads 1 dBm greater than the generator output level and then back off until the output of the generator and the signal strength display are equal.

10. Increase the generator output to the level listed below for the installed IF bandwidth. Adjust R12 for the signal strength display that corresponds to the IF bandwidth.

IF Bandwidth	RF Input	Sig. Strength Display
10 kHz	-61 dBm	-61
20 kHz	-58 dBm	-58
75 kHz	-52 dBm	- -52

11. Repeat steps 7 through 10 as required to minimize interaction between adjustments.
12. Connect the RF millivoltmeter and 50 ohm load at the switched IF output of the receiver (J1). Select AGC OFF and rotate the RF/IF Gain control fully CW.
13. Adjust the generator output level to produce a -30.0 dBm indication on the RF millivoltmeter.
14. Rotate the RF/IF Gain control fully CCW and increase the generator output level by 90 dB.

15. Adjust R20 for a -30.0 dBm indication on the RF millivoltmeter.

16. Reinstall the AGC Amplifier into the receiver.

4.7.1.10 **Audio/Video/COR (A3A15), Alignment**

1. The following test requires that the # IF bandwidth slot (AX9) contain an IF Amplifier with a 10, 20, or 75 kHz bandwidth. A matching FM Demodulator must be installed in slot XA17.
2. Connect the test equipment as illustrated in **Figure 4-27.**

3. Tune the receiver to 20.0000 MHz and select AGC on, Bandwidth #1, FM Detection and Antenna 1.

4. Set the signal generator to produce a 20.000 MHz signal, modulated at a 400 Hz rate. Set the peak deviation to 30% of selected FM bandwidth. Adjust the output level of the generator as listed below for the installed IF bandwidth:

IF Bandwidth	RF Output
10 kHz	-104 dBm
20 kHz	-101 dBm
75 kHz	-95 dBm

5. Set R4, R12, and R47 (on the A3A15 subassembly) to midrange.

6. Adjust R4 for a 2.5 V p/p signal on channel 2 of the oscilloscope (approximately .884 Vrms on the 400 EL).

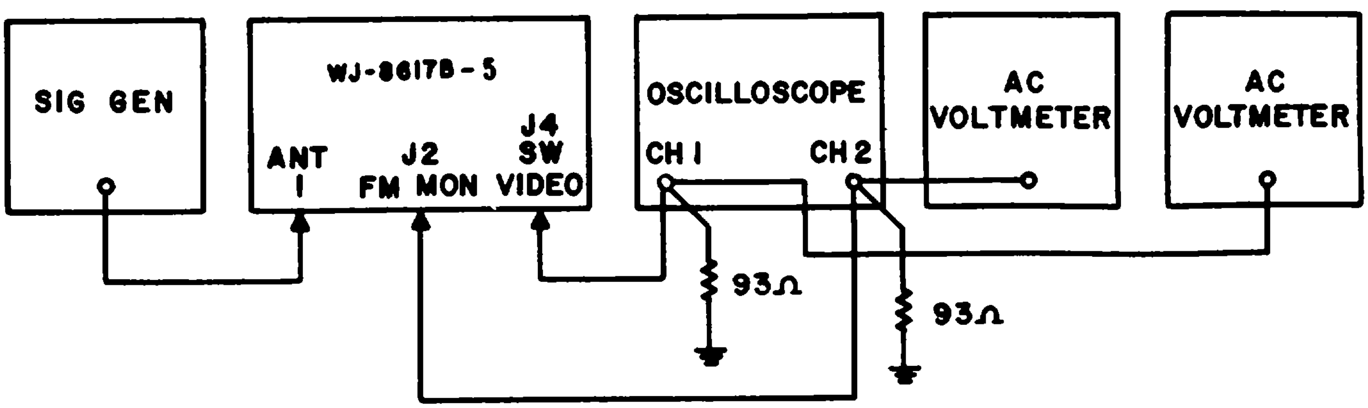


Figure 4-27. Audio/Video/COR Alignment, Equipment Connections

7. Observe the switched video output level on the AC voltmeter, connected to Channel 1 of the oscilloscope, and adjust R47 for a .4 Vrms indication on the AC voltmeter.

8. Select AM modulation on the signal generator and set the modulation for 50% at a 400 Hz rate. Select AM Detection on the receiver.

9. Adjust R12 for the same AC voltmeter level noted in step 7.

10. Connect the AC voltmeter and the oscilloscope at the rear panel audio output (J3). Terminate the output into 600 ohms. Adjust the rear panel line audio control, R3, maximum CCW.

11. Increase the signal generator output to -20 dBm and adjust the AM modulation to 90%. Observe that the AC voltmeter is reading less than 2.4 Vrms and there is no clipping present on the signal displayed on the oscilloscope.

12. Return the modulation to 50% and reduce the generator output level to the level set in step 4.

13. Adjust the rear panel Line Audio control for 2.45 Vrms (6.93 V p/p). 4.7.2 SYNTHESIZER SECTION ALIGNMENT PROCEDURES

4.7.2 SYNTHESIZER SECTION ALIGNMENT PROCEDURES

4.7.2.1 **Reference Generator (A4A1), Alignment**

1. Extend the Reference Generator subassembly (A4A1) and connect the DVM between the tuning voltage test point (connector pin 7) and ground (connector pin 8).

2. Adjust C15 for a +3.50 Vdc indication on the DVM.

3. Connect the frequency counter at pin 5 (signal) and pin 6 (ground) of connector XA1 and observe the frequency at this point. The counter should indicate a frequency of 10.7000 MHz +1 Hz.

4. Remove the DVM and reinstall the Reference Generator into slot XA1.

4.7.2.2 **1st LO Synthesizer (A4A2), Alignment**

Alignment of the 1st LO Synthesizer is determined by the programming of EPROMs U1 and U2 on the Diode Control subassembly (A4A2A2). Should alignment be required, the complete 1st LO synthesizer must be returned to the factory for reprogramming.

4.7.2.3 **535 MHz Generator (A4A6), Alignment**

1. Remove the 535 MHz Generator module (A4A6) from the receiver chassis and remove the cover to expose the A4A6A2 VCO. This is the cover with the access hole for adjustment of C7.

2. Connect the RF power meter and 50 ohm load to the 535 MHz output (J2) and reconnect J1 and P1 to their appropriate locations within the receiver. Orient the subassembly to provide access to the VCO subassembly.
3. Connect an end of a length of insulated hook-up wire at terminal E2 of the A4A6A2 VCO circuit board and connect the other end to the DVM.

4. Adjust capacitor C7 for a DVM indication of +7.0 +.2 Vdc.

5. While observing the indication on the power meter, adjust the coil winding of L2, L4, L6, and L7 to obtain an output power of -5 +2 dBm.

6. Place the cover on the subassembly, taking care not to short the hook-up wire installed in step 3. Retune C7 to obtain a 7.0 +.2 Vdc tuning voltage with a -5 +2 dBm output power.

7. Remove the hook-up wire from terminal E2 and reinstall the cover on the 535 MHz Generator.
8. Remove the power meter and connect the spectrum analyzer at J2.

9. Select the 300 Hz bandwidth on the spectrum analyzer and observe the phase noise at 10 kHz away from the 535 MHz signal. Typically the phase noise should be -70 dBc, which when normalized to a 1 Hz bandwidth indicates -94 dBc phase noise. Power line sidebands should be down greater than 50 dBc.

10. Remove the test equipment and reinstall the 535 MHz Generator into the receiver.

4.7.2.4 **4.4-5.4 MHz Synthesizer (A4A4), Alignment**

1. Remove the 4.4-5.4 MHz synthesizer (A4A4) from the receiver main chassis and remove the cover to expose the 352-432 MHz VCO and Divide-by-80 subassemblies. (This is the cover with the access hole labeled A1C7.)

2. Connect the frequency counter at the 4.4-5.4 MHz output (J1) and reconnect P1 and P2 to their appropriate connectors on the synthesizer motherboard.

3. Orient the subassembly to permit access to the 352-432 MHz VCO and Divide-by-80 subassembly (A4A4A1).

4. Tune the receiver RF frequency to 20.0000 MHz. Observe that the frequency counter indicates an output frequency of 4.4000 MHz.

5. Connect the DVM at terminal El of the A4A4A1 subassembly and adjust the turns of L1 for a reading of -7.5 + .3 Vdc. Remove the DVM.

NOTE
L1 is coated with Q-dope at the factory. This coating must be dissolved with Q-dope thinner before adjustment can be made.

6. Connect the spectrum analyzer at the junction of R9 and C8 on the A4A4A1 subassembly and the adjacent ground plane. Adjust the analyzer to observe the 352.000 MHz VCO output and select the 300 Hz bandwidth on the analyzer. Set the analyzer sweep to display the sidebands 24 kHz away from the 352 MHz carrier. If the carrier contains FM components, Tune C7 to stabilize the carrier across the tuning range.

7. Observe the response 8 kHz from the 352 MHz carrier and adjust L6, on the Divider and Phase Comparator (A4A4A3) to null the 8 kHz sideband (adjust L6 through the access hole labeled A3L6 on the opposite side of the subassembly). The 8 kHz sideband null must be -52 dBc or greater.

8. Tune the receiver from 20.0000 to 20.9999 MHz while observing the spectrum analyzer response. Retune the analyzer as required to keep the response displayed on the CRT. Throughout the frequency range, the 8 kHz null must be greater than -52 dBc and the 16 and 24 kHz sidebands should be greater than -40 dBc. Retune L6 as required to obtain the best overall null of the 8 kHz sideband. Sideband levels above -40 dBc at 16 and 24 kHz away usually indicate a defective phase detector, U12, on the Divider and Phase Comparator, A4A4A3).

9. Remove the spectrum analyzer from the junction of R9 and C8 and reinstall the subassembly cover.

10. Tune the receiver from 20.0000 to 20.9999 MHz, while observing the frequency counter indication. Observe that the synthesizer locks at each frequency change and that the frequency ranges from 4.4000 to 5.3999 MHz.

11. Disconnect the test equipment and reinstall the 4.4-5.4 MHz synthesizer into the receiver.

4.7.2.5 Translation Oscillator (A4A3), Alignment

1. Remove the Translation Oscillator (A4A3) from the receiver and remove the top cover.

2. Connect the power meter and 50 ohm load at the 2nd LO output connector J2 and connect the remaining Translator Oscillator connectors to their appropriate mating connections within the Synthesizer section of the receiver. Position the module to provide access to the VCO/Buffer subassembly (A4A3A1).

3. Connect the DVM at feedthru capacitor C5 and tune the receiver to 20.5000 MHz. Adjust capacitor C7, on the VCO/Buffer subassembly, for a stable +7.0 +.2 Vdc.

4. While observing the power meter indications, adjust the turns of coils L2, L4, L7, and L6 for the maximum output power. Typically, this output level is from +3 to +5 dBm.

5. Slowly tune the receiver between 20.0000 and 20.9999 MHz while observing the power meter indication. Readjust L2, L4, L6, and L7, as required, to obtain a relatively constant output level throughout the tuning range.

6. Disconnect the DVM and power meter and install the cover onto the module.

7. Connect the frequency counter at the 2nd LO Output connector (A4A3J2). Insulate the tip of the DVM probe and insert the probe into the access hole in the cover, (adjacent to the A1C7 access hole), to monitor the tuning voltage at feed through capacitor C5.

8. Tune the receiver to 20.5000 MHz and adjust C7 while observing the DVM indication and the frequency displayed on the counter. Adjust C7 until 530.1000 MHz is displayed on the counter.

9. Adjust C7 for a DVM indication of from +7.0 to 7.5 Vdc.

10. Remove the frequency counter and connect the spectrum analyzer at J2. Set the analyzer bandwidth to 300 Hz and adjust the analyzer to observe the 2nd LO output frequency and the response at 10 kHz away.

11. Tune the receiver from 20.0000 and 20.9999 MHz while observing the response displayed on the spectrum analyzer. (Retune the analyzer as required to maintain the response on the CRT.) Observe that the phase noise at 10 kHz away from the carrier is equal to or greater than -70 dBc, throughout the 2nd LO tuning range.

12. Disconnect the analyzer and connect the frequency counter at J2.

13. Tune the receiver between 20.0000 and 20.9999 MHz while observing the frequency counter display. The frequency should lock at all frequencies throughout the 530.6000 to 529.6001 MHz range.

14. Remove the test equipment and reinstall the translation oscillator into its appropriate slot in the receiver.

4.7.2.6 **SSB BFO (A4A5), Alignment**

1. Extend the SSB BFO subassembly (A4A5) and set potentiometer R9 to the center of its range.

2. Connect the RF millivoltmeter between the 21.4 MHz BFO output (connector pin 45) and ground (connector pin 46).

3. Select the CW detection mode on the receiver front panel.

4. Adjust C6, L4, and L5 for a maximum indication on the RF millivoltmeter.

5. Remove the RF millivoltmeter and connect the test equipment as illustrated in **Figure 4-28**.

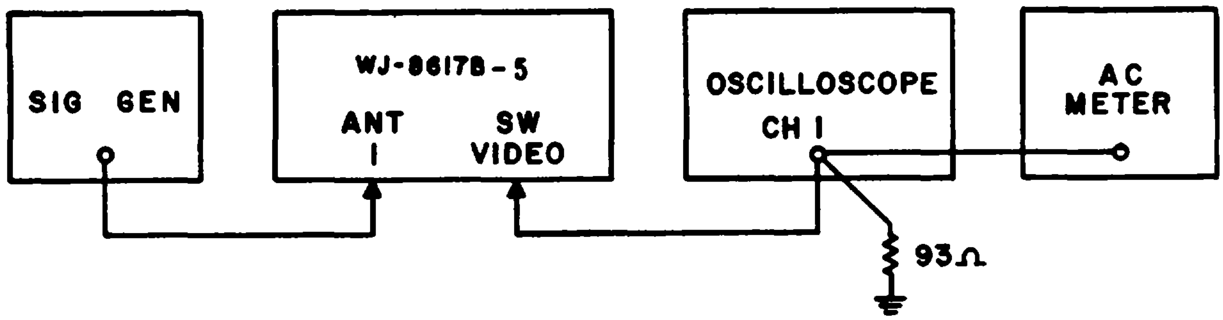


Figure 4-28. SSB BFO Alignment, Equipment Connections

6. Adjust the signal generator to produce a 450.000 MHz CW output, at a level corresponding to the sensitivity of bandwidth #1, (see the table in step 6 of **paragraph 4.6.2.3).**

7. Tune the receiver as follows:

FREQ:	450.0010 MHz
ANT:	ANT 1
AGC:	ON
DETECT:	CW
BE:	#1

8. Set A4A5R9 fully CCW and slowly adjust in the CW direction while observing the Switched Video output level on the AC meter. The level should increase at first and then begin to decrease. Continue adjusting R9 CW until AGC action reduces the video output to 0.359 Vrms.

9. If the SSB Option is installed in the receiver, continue to step 10. Otherwise, remove the test equipment and reinstall the SSB BFO subassembly into slot XA5.

10. Remove P79 from XA5. Connect the RF millivoltmeter and 50 ohm load to the 32.1 MHz output of the SSB BFO subassembly (connector pin 12) and ground (connector pin 8).

11. Select the upper or lower SSB detection mode.

12. Adjust L8 and L9 for a -10 + dBm indication or the RF millivoltmeter.

13. Remove the RF millivoltmeter and reinstall the SSB BFO into slot XA5.

4.7.3 DIGITAL SELECTION ALIGNMENT PROCEDURES

4.7.3.1 Display Intensity Adjustment

1. Power up receiver.
2. While observing the intensity of the front panel display, adjust R1, on the Receiver Interface (A5A1), to obtain the desired intensity of the front panel LEDs and digital display.

4.7.3.2 Power Fail Adjustment

1. Extend the microprocessor subassembly (A5A3) and connect the oscilloscope to the +5 V input at connector pin B20.
2. Set R23 to its maximum CW position.
3. Connect the receiver to the Variable Autotransformer and adjust the output to correspond to the selected voltage printed on the voltage selector pc wafer (FL1).
4. Apply power to the receiver.
5. Set the oscilloscope to AC coupling and adjust the gain until noise on the +5 Vdc supply is just visible.
6. Slowly decrease the autotransformer output until voltage spikes begin to appear.
7. Slowly adjust R23 while observing the front panel display. Continue to adjust R23 until the display LEDs extinguish.
8. Increase the autotransformer output to the proper level. The front panel should again illuminate.
9. Disconnect the oscilloscope and reinstall the microprocessor into the XA3 slot.

4.7.4 DIGITAL REFRESHED DISPLAY ALIGNMENT PROCEDURES

Alignment of the Type 796217-1 Digital Refreshed Display consists of setting the offset and gain of the DRD output circuits, as follow:

1. Remove the receiver top cover to provide access to the DRD adjustment potentiometers.
2. Set the receiver to scan between 20 and 30 MHz. Set the COR level to “ providing a continuous Scan.
3. Connect the signal generator to the ANT 1 input and set the generator to produce a 25 MHz CW output. Adjust the output level to minimum.

4. Adjust R22, on the DRD subassembly centering the trace horizontally on the signal monitor CRT.

5. Adjust R10 until the trace just touches the scale markings at the extreme left and right of the CRT face.

6. Adjust the vertical position of the trace by rotating R7 until the trace is directly under the bottom line of the CRT scale.

7. Increase the signal generator output level until a signal pip, one division in amplitude, is present on the trace.

8. Increase the generator output level by 30 dB and adjust R5 for a pip amplitude of exactly four divisions.

9. If an external display is utilized, adjust R25 to obtain the desired sweep width on the CRT of the display.

4.7.5 **TYPE 796185-1 EXTENDED MEMORY, ALIGNMENT**

Alignment of the Type 796185-1 Extended Memory subassembly requires the use of a frequency counter capable of measuring period, such as the Fluke 1953A or equivalent. Utilizing this test equipment, proceed as follows:

1. Connect the frequency counter at Terminal El of the Extended Memory subassembly and adjust the counter controls to display the period of the waveform present at this point.

2. Activate the 1024 Hz test signal at El by depressing the front panel CLR pushbutton two times and then depress the MAN pushbutton.

3. Adjust capacitor C7, on the Extended Memory subassembly, to produce a frequency counter display of 976.5625 usec.

4. Remove the frequency counter and set the clock to the correct time.

Table 4-21. R-2311/G
Direct Support Troubleshooting Symptom Index

SYMPTOM	TROUBLESHOOTING PROCEDURE PAGE
Front Panel Lamps Do Not Light	4-63
No Audio And No Signal Indication On Signal Monitor When Antenna #1 Is Selected	4-67
No Audio And No Signal Indication On Signal Monitor When Antenna #2 Is Selected	4-69
No Audio When 50 kHz Bandwidth Is Selected	4-71
No Audio When 10 kHz Bandwidth Is Selected	4-73
No Audio When 3.2 kHz Bandwidth Is Selected	4-75
No Audio When AM Is Selected	4-77
No Audio When FM Is Selected	4-79
No Audio When CW Is Selected	4-81
No Audio When PLS Is Selected	4-83
No Audio When SSB Is Selected	4-85
No Audio When Speaker Panel Is Used	4-87
No Audio When Headset Is Used	4-89
Digital Display That Does Not Fully Light	4-91
Frequency Display That Locks At A Frequency	4-93
Frequency Display That Has Unstable Digits	4-95
No Trace On CRT Of Signal Monitor	4-97
No RF Signal On CRT Of Signal Monitor	4-99
No Marker On CRT Of Signal Monitor	4-101

Table 4-21. R-2311/G
Direct Support Troubleshooting Symptom Index-Continued

SYMPTOM	TROUBLESHOOTING PROCEDURE PAGE
Front Panel Receiver Control That Does Not Function	4-103
Front Panel Signal Monitor Control That Does Not Function	4-107
Bandwidth Control That Will Not Track With WJ-8971A-6 Direction Finder	4-111
150 Hz Tone That Does Not Function Properly	4-113
No Audio In One Or More Bandwidths When AM Is Selected	4-119
No Audio In One Or More Bandwidths When FM Is Selected	4-123
No Audio In One Or More Bandwidths When CW Is Selected	4-127
No Audio In One Or More Bandwidths When PLS Is Selected	4-131

FRONT PANEL LAMPS DO NOT LIGHT

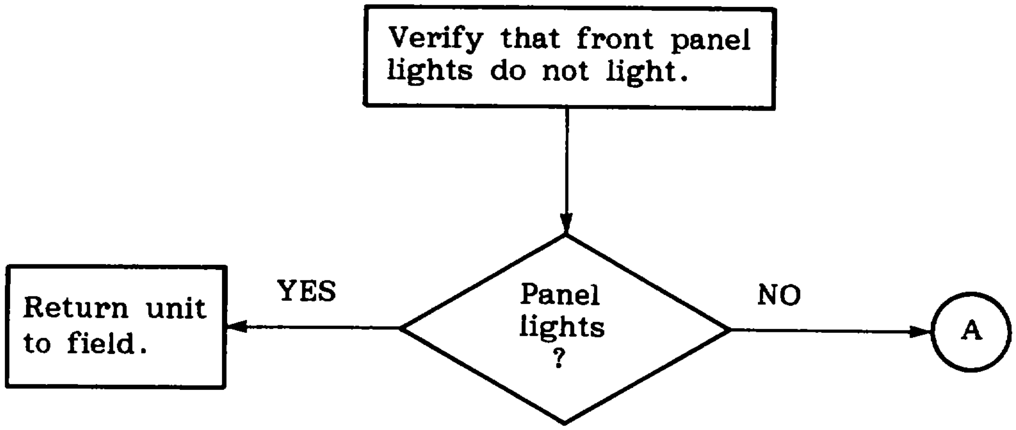
INITIAL SETUP

Test Equipment
None
Tools

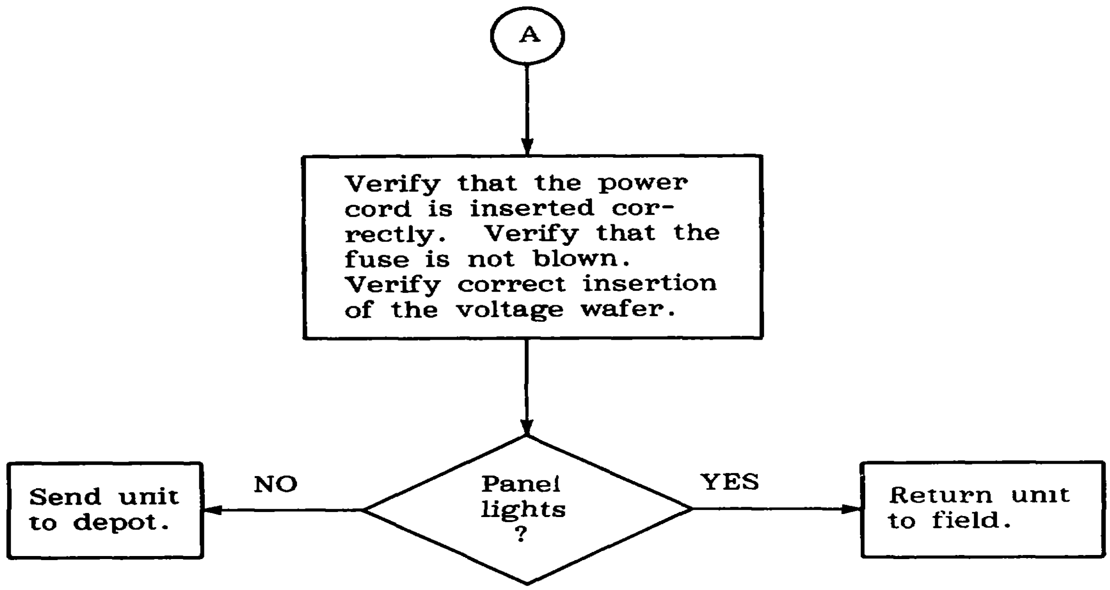
None
Replacement Parts
None
General Safety Instructions

None

FRONT PANEL LAMPS DO NOT LIGHT-Continued



FRONT PANEL LAMPS DO NOT LIGHT-Continued



NO AUDIO AND NO SIGNAL INDICATION ON SIGNAL MONITOR WHEN ANTENNA #1 IS SELECTED

INITIAL SETUP

Test Equipment

• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

None

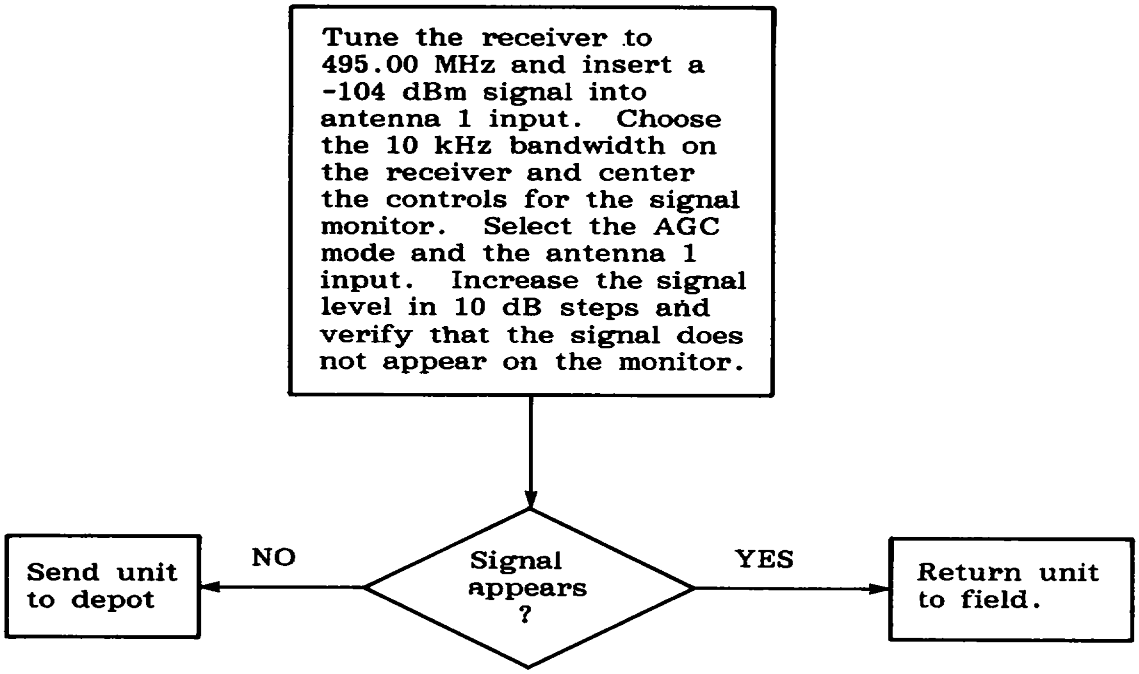
Replacement Parts

None

General Safety Instructions

None

NO AUDIO AND NO SIGNAL INDICATION ON SIGNAL MONITOR WHEN ANTENNA #1 IS SELECTED-Continued



NO AUDIO AND NO SIGNAL INDICATION ON SIGNAL MONITOR WHEN ANTENNA #2 IS SELECTED

INITIAL SETUP

Test Equipment

• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

None

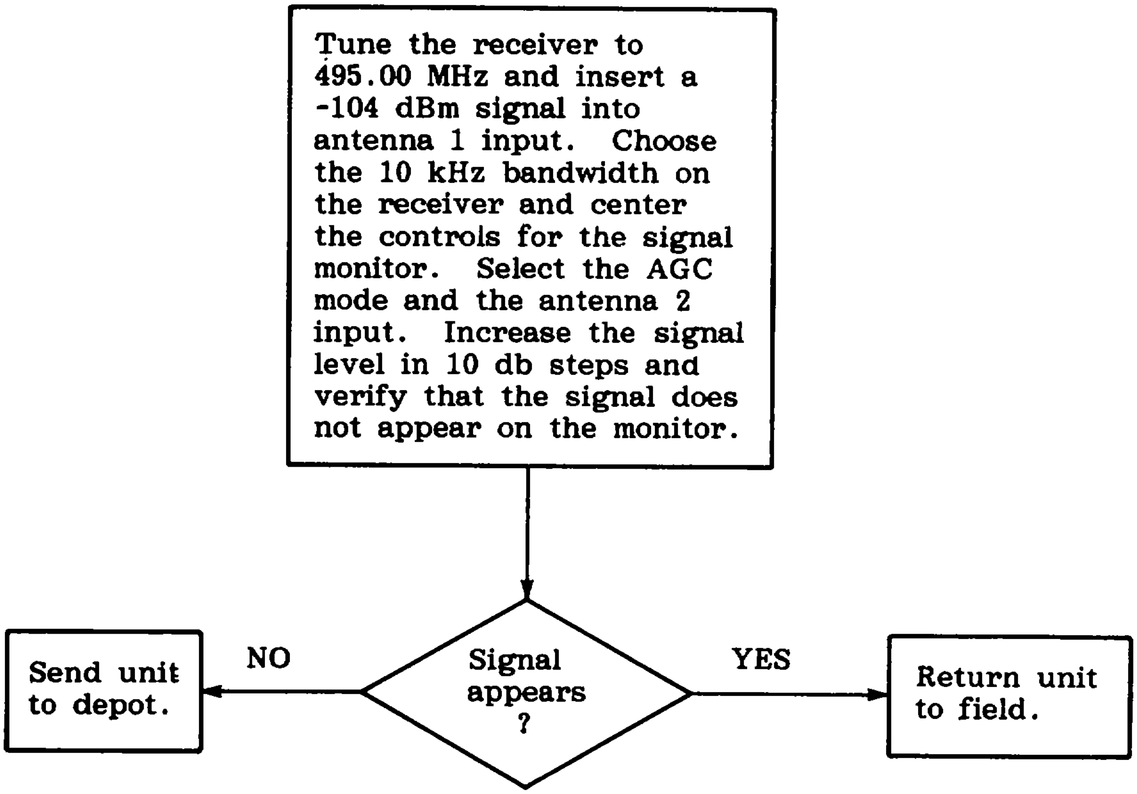
Replacement Parts

None

General Safety Instructions

None

NO AUDIO AND NO SIGNAL INDICATION ON SIGNAL MONITOR WHEN ANTENNA #2 IS SELECTED-Continued



NO AUDIO WHEN 50 kHz BANDWIDTH IS SELECTED

INITIAL SETUP

Test Equipment

• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog NO. 00577
• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

None

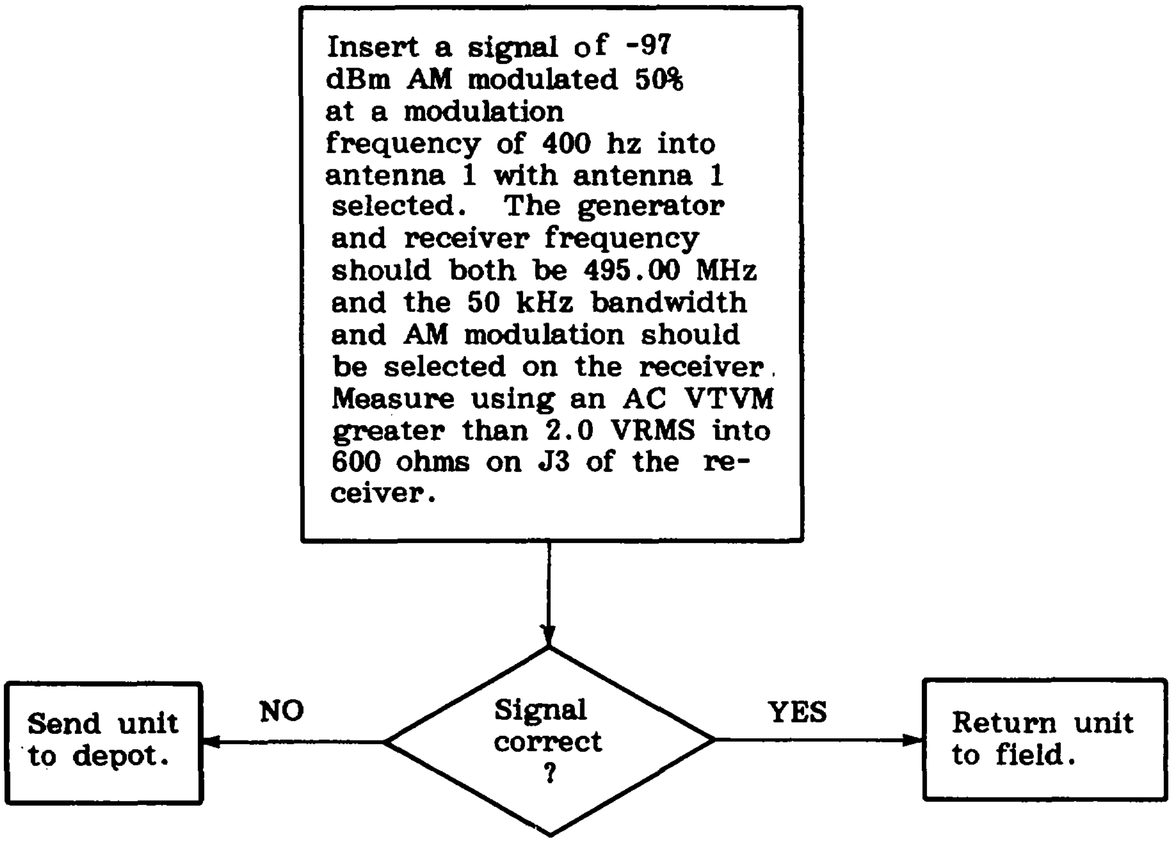
Replacement Parts

None

General Safety Instructions

None

NO AUDIO WHEN 50 kHz BANDWIDTH IS SELECTED-Continued



NO AUDIO WHEN 10 kHz BANDWIDTH IS SELECTED-continued

INITIAL SETUP

Test Equipment

• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577
• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

None

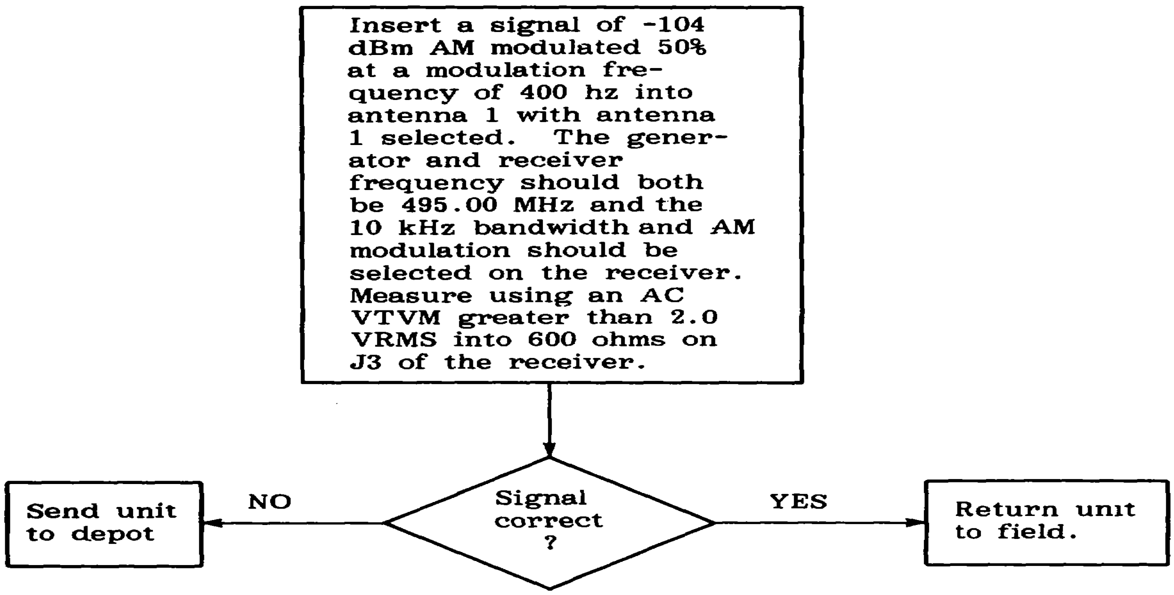
Replacement Parts

None

General Safety Instructions

None

NO AUDIO WHEN 10 kHz BANDWIDTH IS SELECTED-



NO AUDIO WHEN 3.2 kHz BANDWIDTH IS SELECTED

INITIAL SETUP

Test Equipment

• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577
• Signal Generator	SG- 11 (V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

None

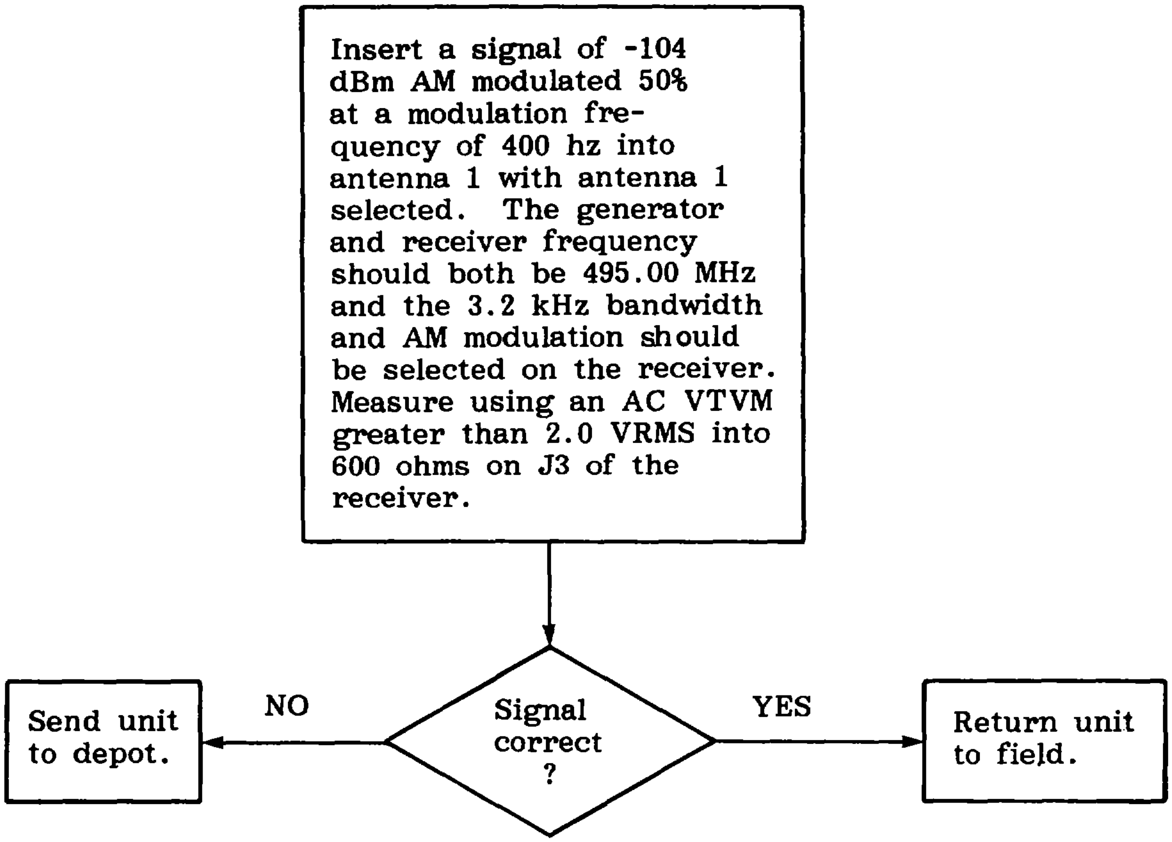
Replacement Parts

None

General Safety Instructions

None

NO AUDIO WHEN 3.2 kHz BANDWIDTH IS SELECTED-Continued



NO AUDIO WHEN AM IS SELECTED

INITIAL SETUP

Test Equipment

• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577
• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

None

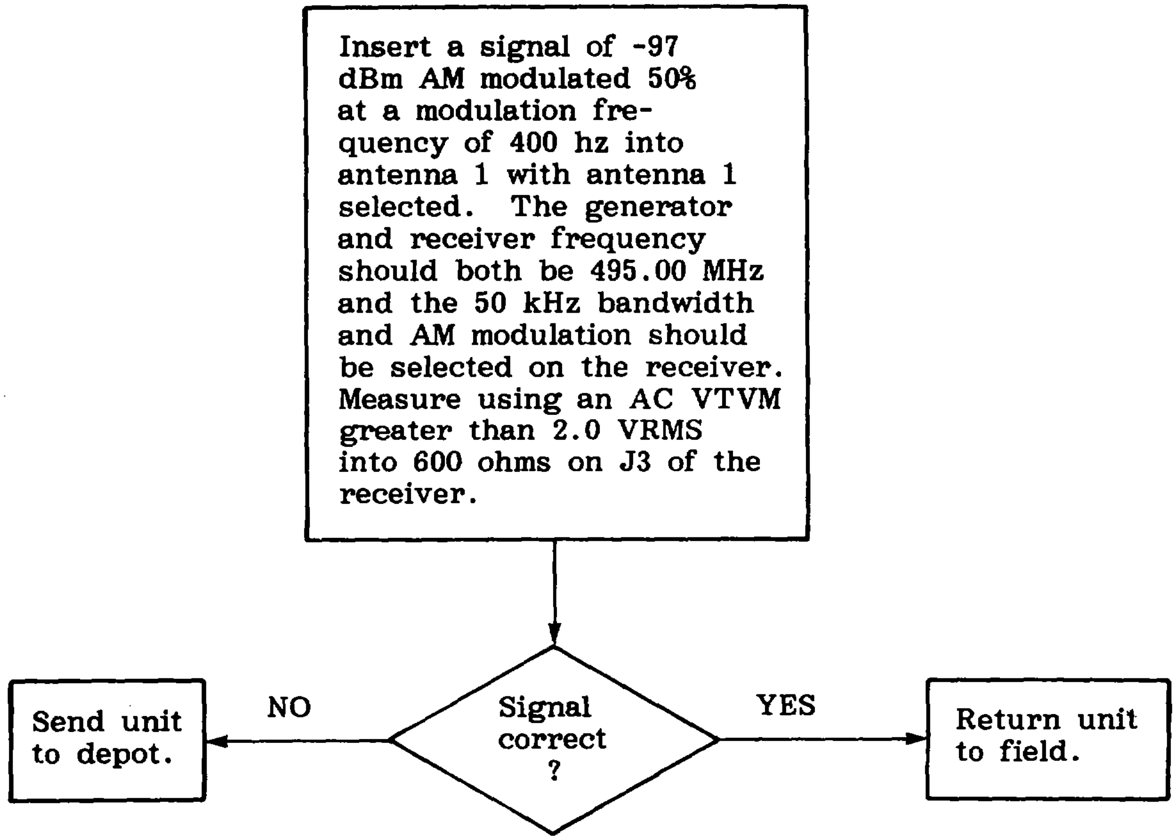
Replacement Parts

None

General Safety Instructions

None

NO AUDIO WHEN AM IS SELECTED



NO AUDIO WHEN FM IS SELECTED

INITIAL SETUP

• Test Equipment	
• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577
• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

None

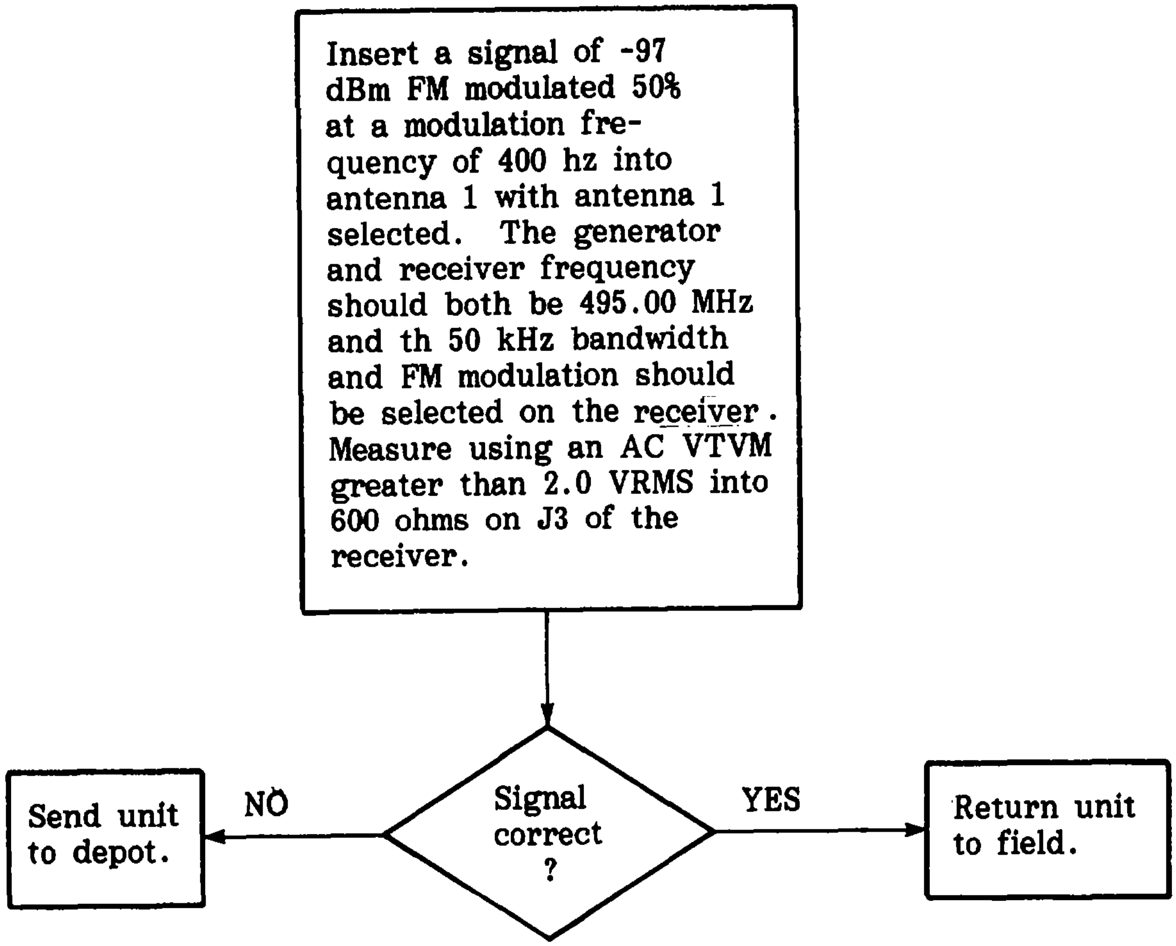
Replacement Parts

None

General Safety Instructions

None

NO AUDIO WHEN FM IS SELECTED-CONTINUED



NO AUDIO WHEN CW IS SELECTED

INITIAL SETUP

• Test Equipment	
• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577
• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC
• Frequency Counter	TD-1225A(V) 1/U

Tools

None

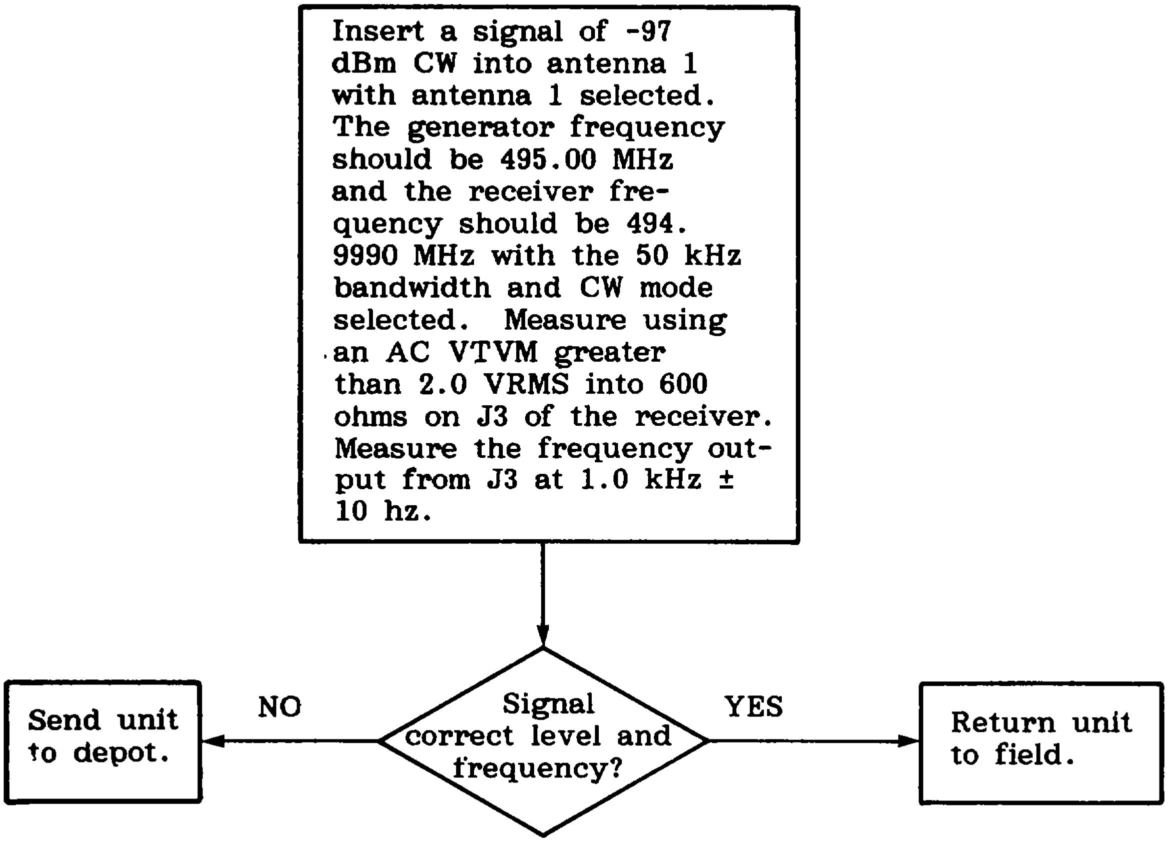
Replacement Parts

None

General Safety Instructions

None

NO AUDIO WHEN CW IS SELECTED-CONTINUED



NO AUDIO WHEN PLS IS SELECTED

INITIAL SETUP

Test Equipment

• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC
• Oscilloscope	AN/USM-488

Tools

None

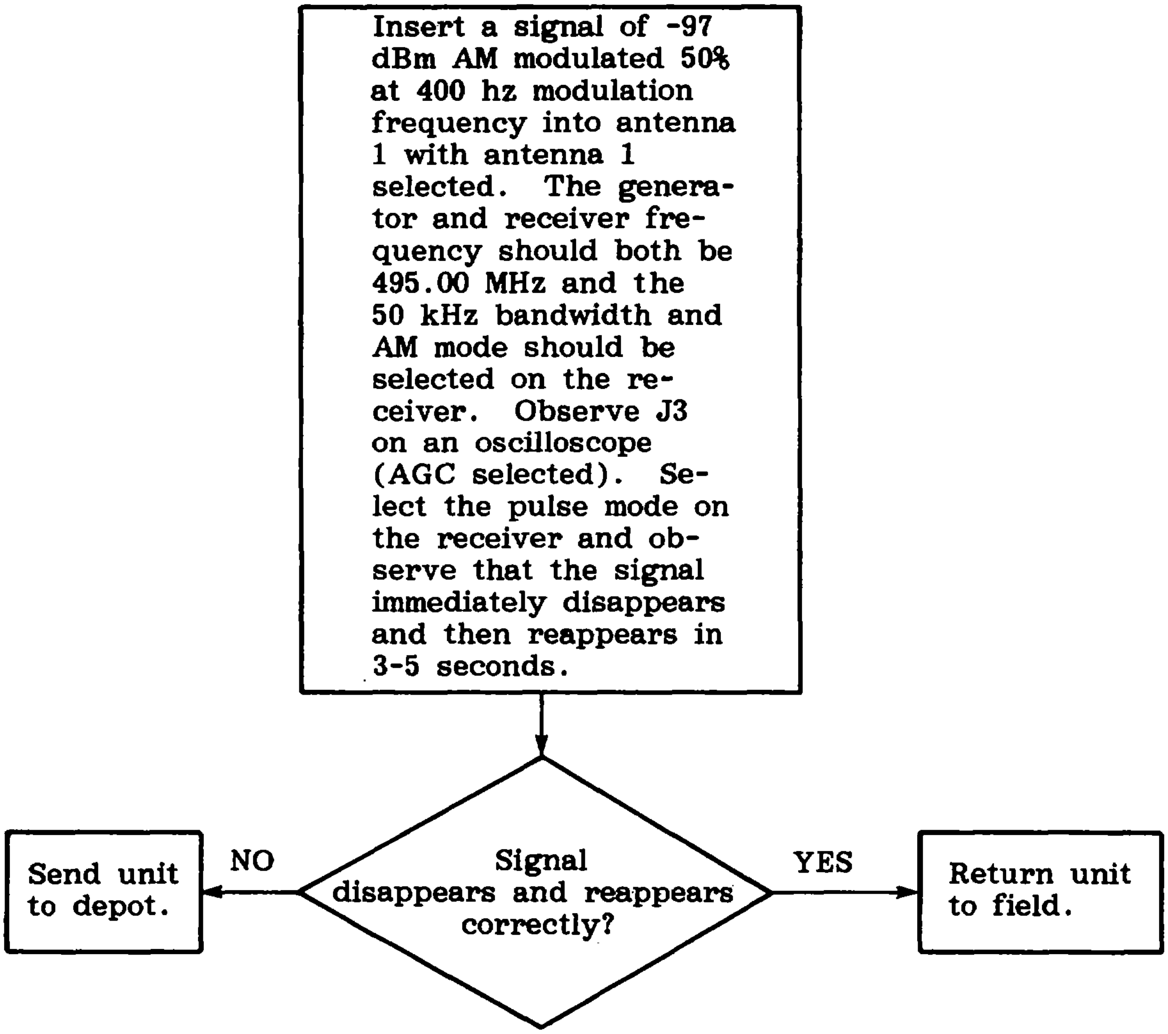
Replacement Parts

None

General Safety Instructions

None

NO AUDIO WHEN PLS IS SELECTED - Continued



NO AUDIO WHEN SSB IS SELECTED

INITIAL SETUP

Test Equipment

• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577
• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

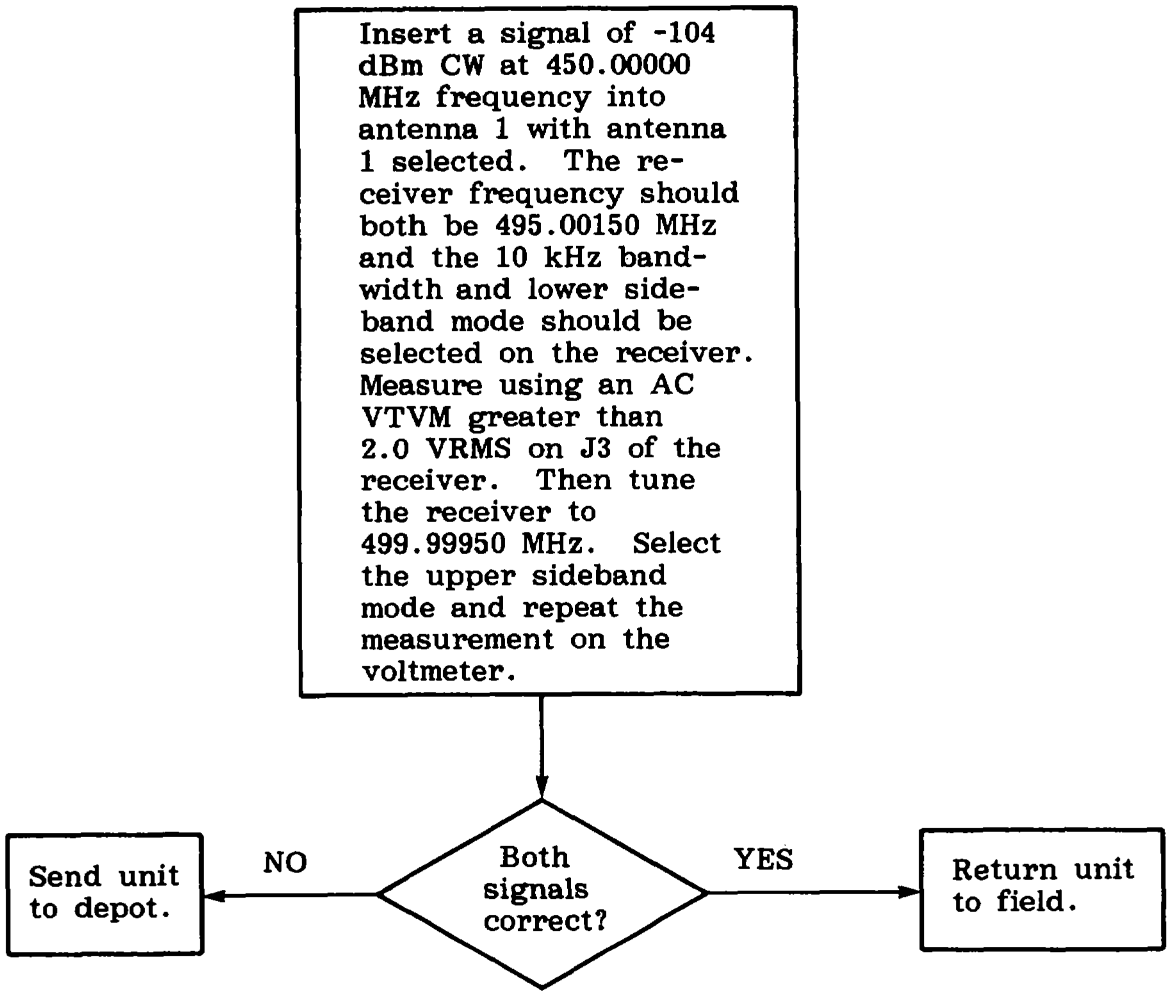
None

Replacement Parts

None

General Safety Instructions

None


Insert a signal of -104 dBm CW at 450.00000 MHz frequency into antenna 1 with antenna 1 selected. The receiver frequency should both be 495.00150 MHz and the 10 kHz bandwidth and lower sideband mode should be selected on the receiver. Measure using an AC VTVM greater than 2.0 VRMS on J3 of the receiver. Then tune the receiver to 499.99950 MHz. Select the upper sideband mode and repeat the measurement on the voltmeter.
Both signals correct?
NO
Send unit to depot.
YES
Return unit to field.

NO AUDIO WHEN SPEAKER PANEL IS USED

INITIAL SETUP

Test Equipment

• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577
• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

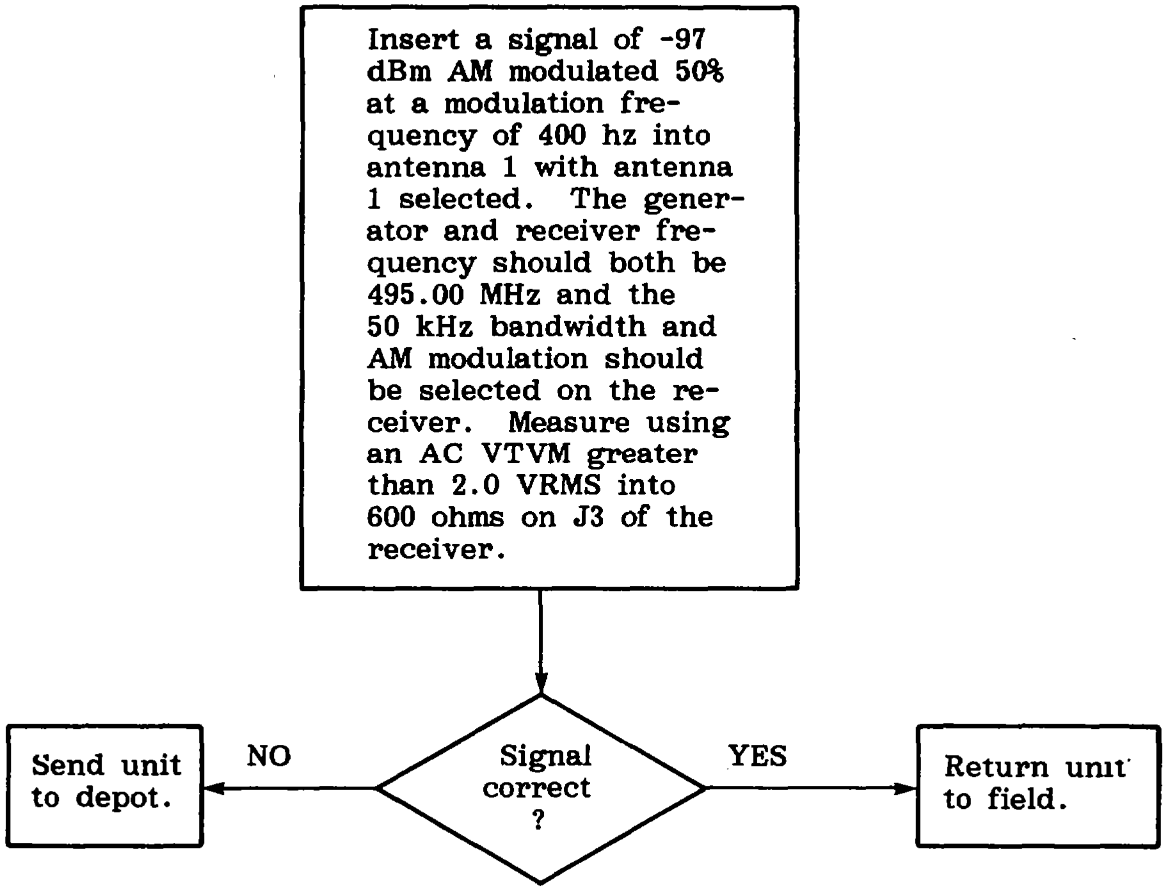
None

Replacement Parts

None

General Safety Instructions

None


Insert a signal of -97 dBm AM modulated 50% at a modulation frequency of 400 hz into antenna 1 with antenna 1 selected. The generator and receiver frequency should both be 495.00 MHz and the 50 kHz bandwidth and AM modulation should be selected on the receiver. Measure using an AC VTVM greater than 2.0 VRMS into 600 ohms on J3 of the receiver.
Signal correct ?
NO
Send unit to depot.
YES
Return unit to field.

NO AUDIO WHEN HEADSET IS USED

INITIAL SETUP

Test Equipment

• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577
• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

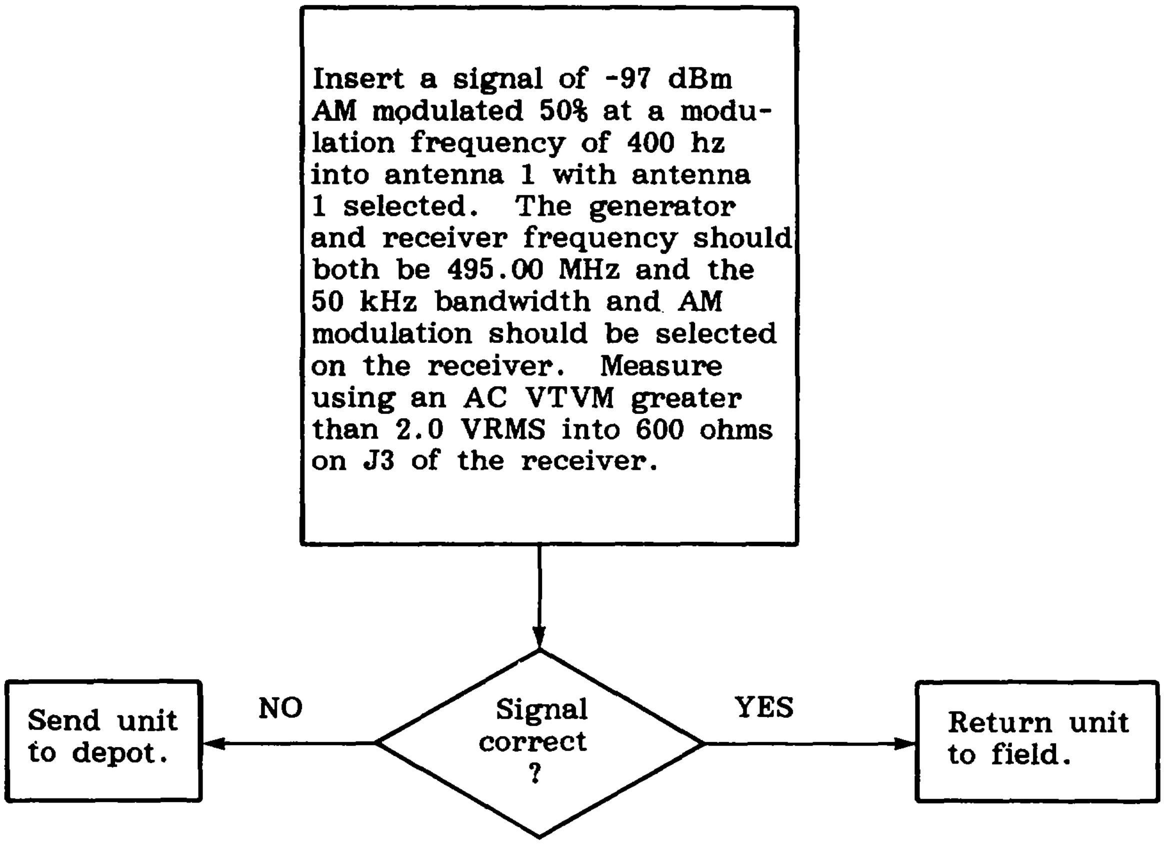
None

Replacement Parts

None

General Safety Instructions

None


Insert a signal of -97 dBm AM modulated 50% at a modulation frequency of 400 hz into antenna 1 with antenna 1 selected. The generator and receiver frequency should both be 495.00 MHz and the 50 kHz bandwidth and AM modulation should be selected on the receiver. Measure using an AC VTVM greater than 2.0 VRMS into 600 ohms on J3 of the receiver.
Signal correct ?
NO
Send unit to depot.
YES
Return unit to field.

DIGITAL DISPLAY THAT DOES NOT FULLY LIGHT

INITIAL SETUP

Test Equipment

None

Tools

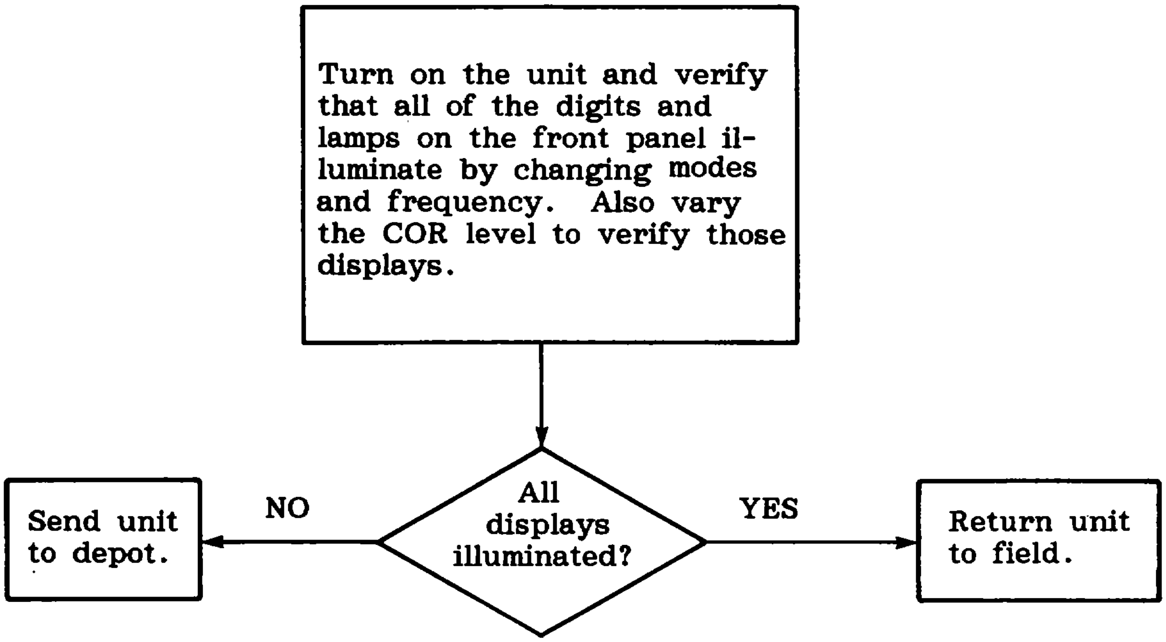
None

Replacement Parts

None

General Safety Instructions

None


Turn on the unit and verify that all of the digits and lamps on the front panel illuminate by changing modes and frequency. Also vary the COR level to verify those displays.
All displays illuminated?
NO
Send unit to depot.
YES
Return unit to field.

FREQUENCY DISPLAY THAT LOCKS AT A FREQUENCY

INITIAL SETUP

Test Equipment

None

Tools

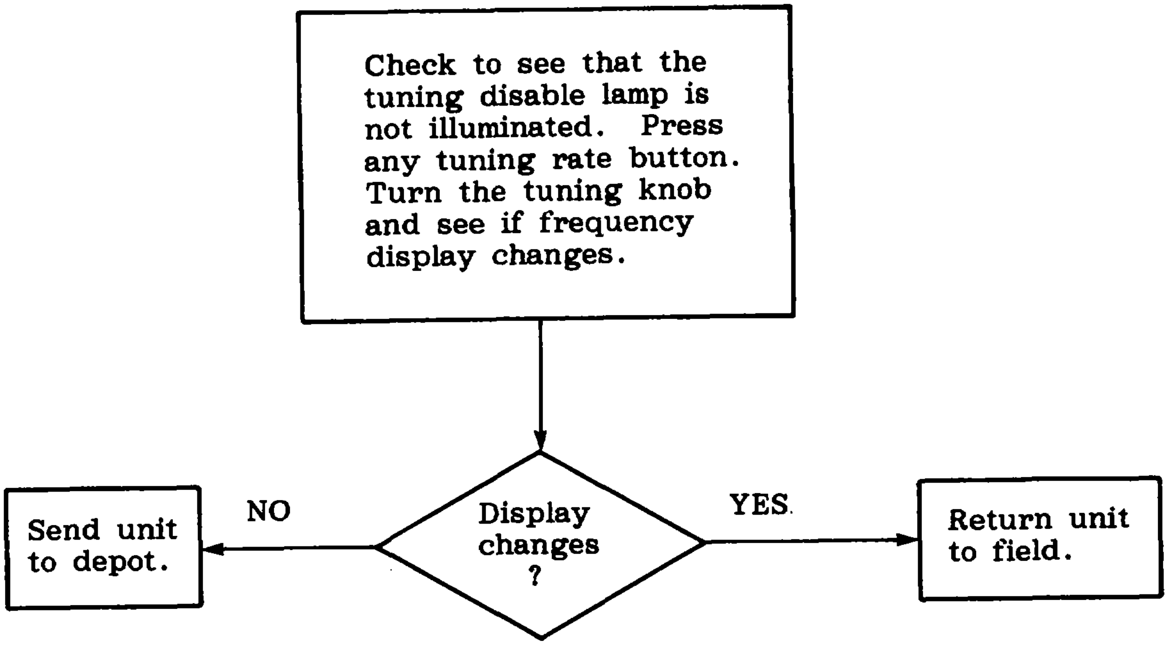
None

Replacement Parts

None

General Safety Instructions

None


Check to see that the tuning disable lamp is not illuminated. Press any tuning rate button. Turn the tuning knob and see if frequency display changes.
Display changes ?
NO
Send unit to depot.
YES
Return unit to field.

FREQUENCY DISPLAY THAT HAS UNSTABLE DIGITS

INITIAL SETUP

Test Equipment

None

Tools

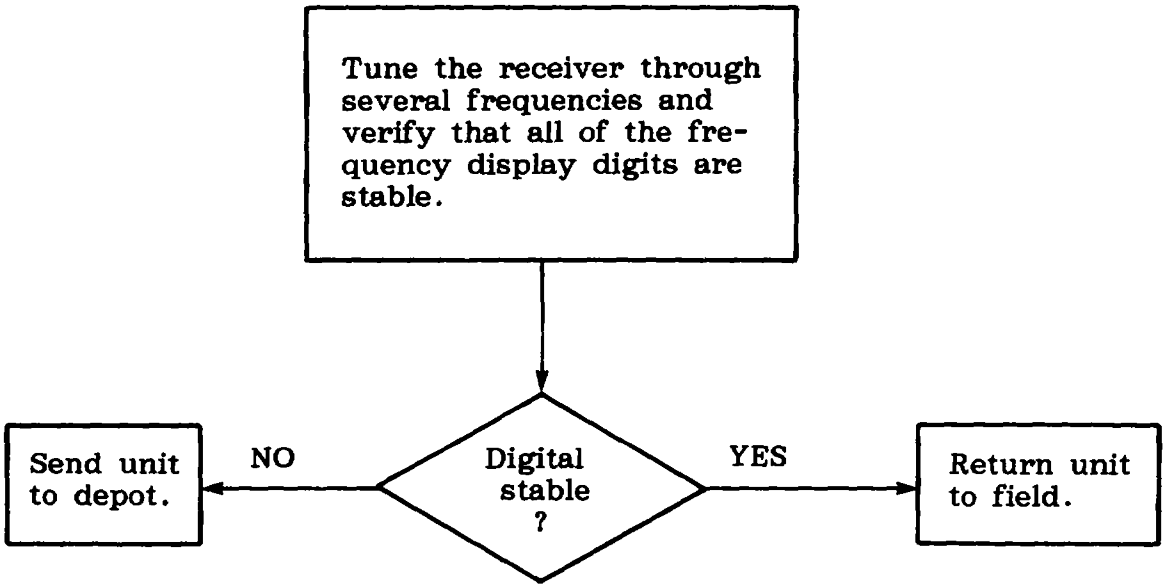
None

Replacement Parts

None

General Safety Instructions

None


Tune the receiver through several frequencies and verify that all of the frequency display digits are stable.
Digital stable ?
NO
YES
Send unit to depot.
Return unit to field.

NO TRACE ON CRT OF SIGNAL MONITOR

INITIAL SETUP

Test Equipment

None

Tools

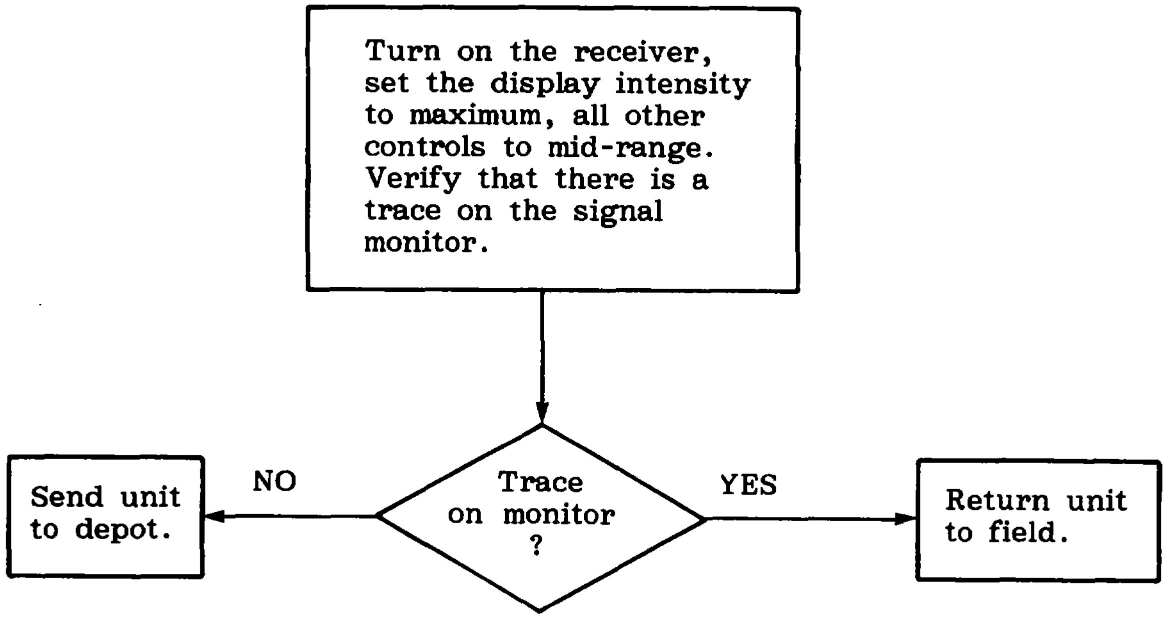
None

Replacement Parts

None

General Safety Instructions

None


Turn on the receiver, set the display intensity to maximum, all other controls to mid-range. Verify that there is a trace on the signal monitor.
Trace on monitor ?
NO
Send unit to depot.
YES
Return unit to field.

NO RF SIGNAL ON CRT OF SIGNAL MONITOR

INITIAL SETUP

Test Equipment

• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

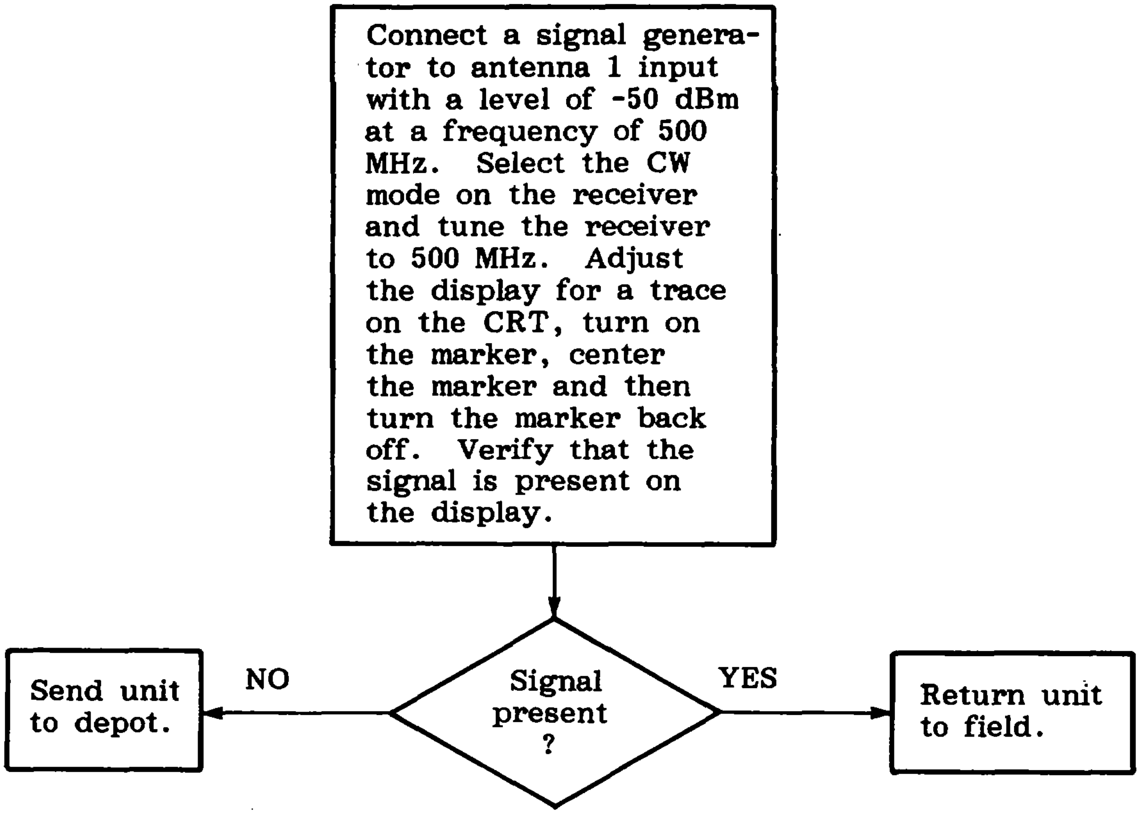
None

Replacement Parts

None

General Safety Instructions

None


Connect a signal generator to antenna 1 input with a level of -50 dBm at a frequency of 500 MHz. Select the CW mode on the receiver and tune the receiver to 500 MHz. Adjust the display for a trace on the CRT, turn on the marker, center the marker and then turn the marker back off. Verify that the signal is present on the display.
Signal present ?
NO
Send unit to depot.
YES
Return unit to field.

NO MARKER ON CRT OF SIGNAL MONITOR

INITIAL SETUP

Test Equipment

None

Tools

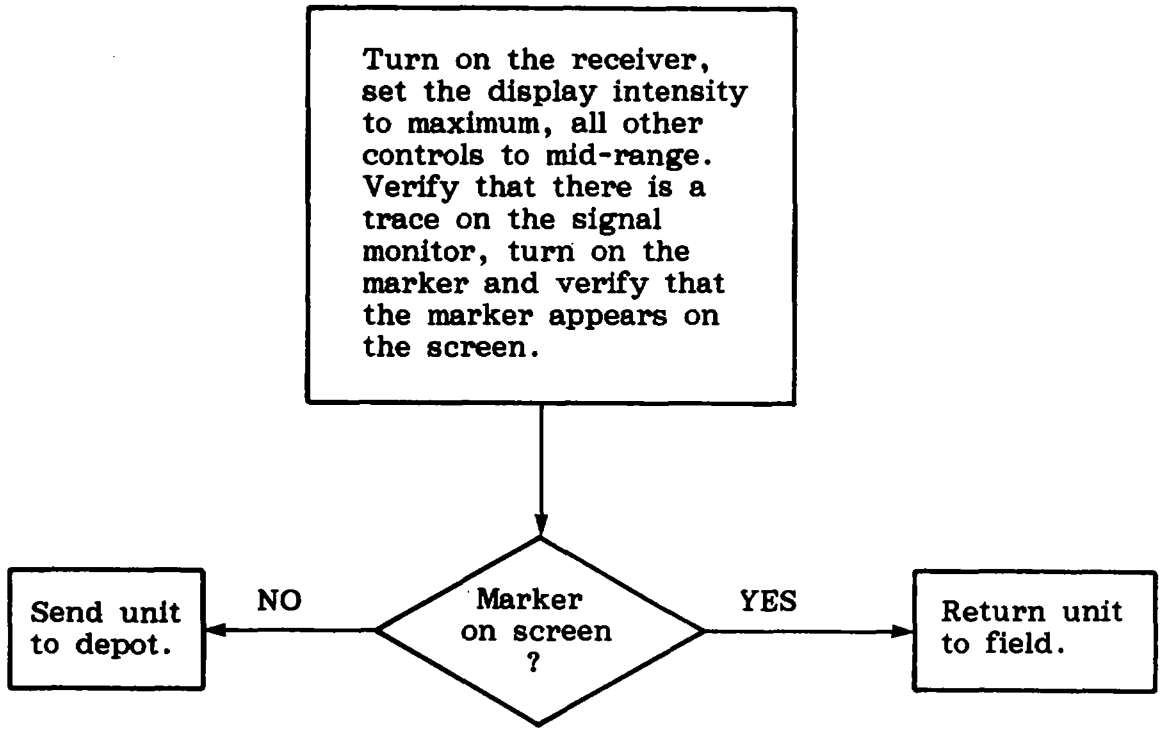
None

Replacement Parts

None

General Safety Instructions

None


Turn on the receiver, set the display intensity to maximum, all other controls to mid-range. Verify that there is a trace on the signal monitor, turn on the marker and verify that the marker appears on the screen.
Marker on screen ?
NO
Send unit to depot.
YES
Return unit to field.

FRONT PANEL RECEIVER CONTROL THAT DOES NOT FUNCTION

INITIAL SETUP

Test Equipment

None

Tools

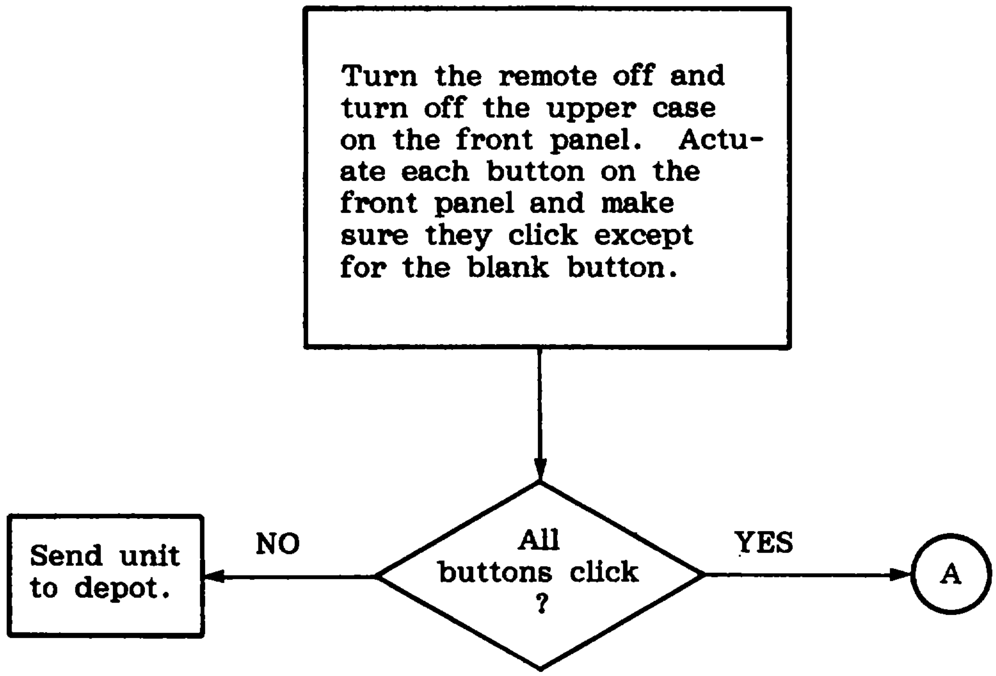
None

Replacement Parts

None

General Safety Instructions

None


Turn the remote off and turn off the upper case on the front panel. Actuate each button on the front panel and make sure they click except for the blank button.
All buttons click ?
NO
Send unit to depot.
YES
A

A

(1) Clear the receiver memory by pressing the CLR button three times.

(2) Tune the receiver to 100.0000 MHz, with AM detection and bandwidth #1 selected. Set the COR level to --.

(3) Press the STO button. Observe that the LED on the STO button illuminates momentarily and the memory select display increments to the next available memory channel.

(4) Press Lock-Out. Observe that the Lock-Out LED illuminates momentarily.

B

B

(5) Tune the receiver to 101.0000 MHz. Select bandwidth #2 and the FM detection mode.

(6) Repeat steps 3 and 4.

(7) For tuned frequencies of from 103.0000 to 147.0000 MHz, repeat steps 3 and 4. In each case, tune the receiver such that the 10 MHz and 1 MHz digits reflect the same digits present in the memory select window. For each programming step select a different bandwidth and detection mode from the previous step.

(8) When the last channel has been programmed, memory channel 47, select the recall mode by pressing the RCL pushbutton.

C

FRONT PANEL RECEIVER CONTROL THAT DOES NOT FUNCTION - CONTINUED

C

(9) Using the memory up/down keys, step through each memory channel from 00 to 47 and observe the front panel display at each step. The 10 MHz and 1 MHz digits of the frequency display should reflect the same digits that are present in the memory select window The bandwidth and detection mode LEDs should follow the same pattern used during the programming procedure. (Steps 2 through 7).

(10) Continue stepping through memory channels 48 to 95. Observe the front panel display at each increment. NOTE: The COR window should display LL, indicating that a Lock-Out channel is being displayed. The Frequency Display should display Lock-Out frequencies in ascending order, starting with 100.0000 MHz for channel 48 and ending with 147.0000 MHz for channel 95. In each step, the bandwidth display should follow the same pattern used during the programming procedure.

Receiver functions ?

NO: Return unit to depot.

YES: Return unit to field.

FRONT PANEL SIGNAL MONITOR CONTROL THAT DOES NOT FUNCTION

INITIAL SETUP

Test Equipment

• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

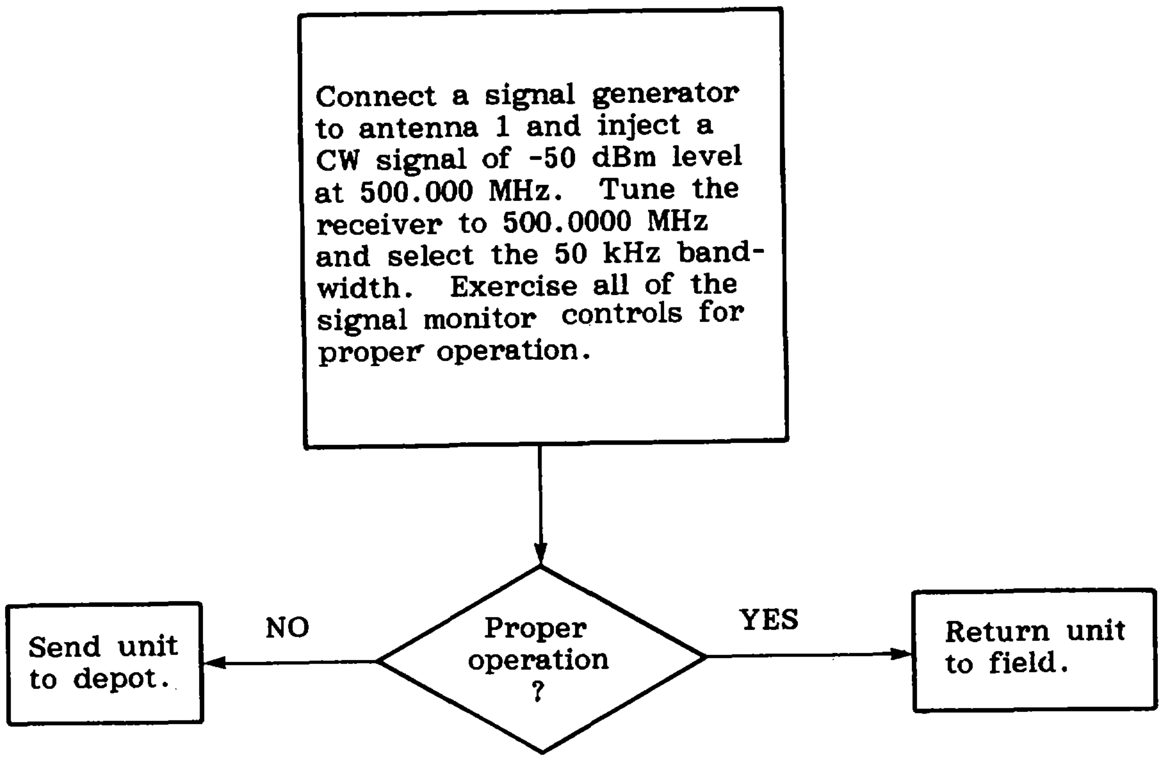
None

Replacement Parts

None

General Safety Instructions

None


Connect a signal generator to antenna 1 and inject a CW signal of -50 dBm level at 500.000 MHz. Tune the receiver to 500.0000 MHz and select the 50 kHz bandwidth. Exercise all of the signal monitor controls for proper operation.
Proper operation ?
NO
Send unit to depot.
YES
Return unit to field.

BANDWIDTH CONTROL THAT WILL NOT TRACK WITH WJ-8917A- DIRECTON FINDER

INITIAL SETUP

Test Equipment

• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577

Tools

None

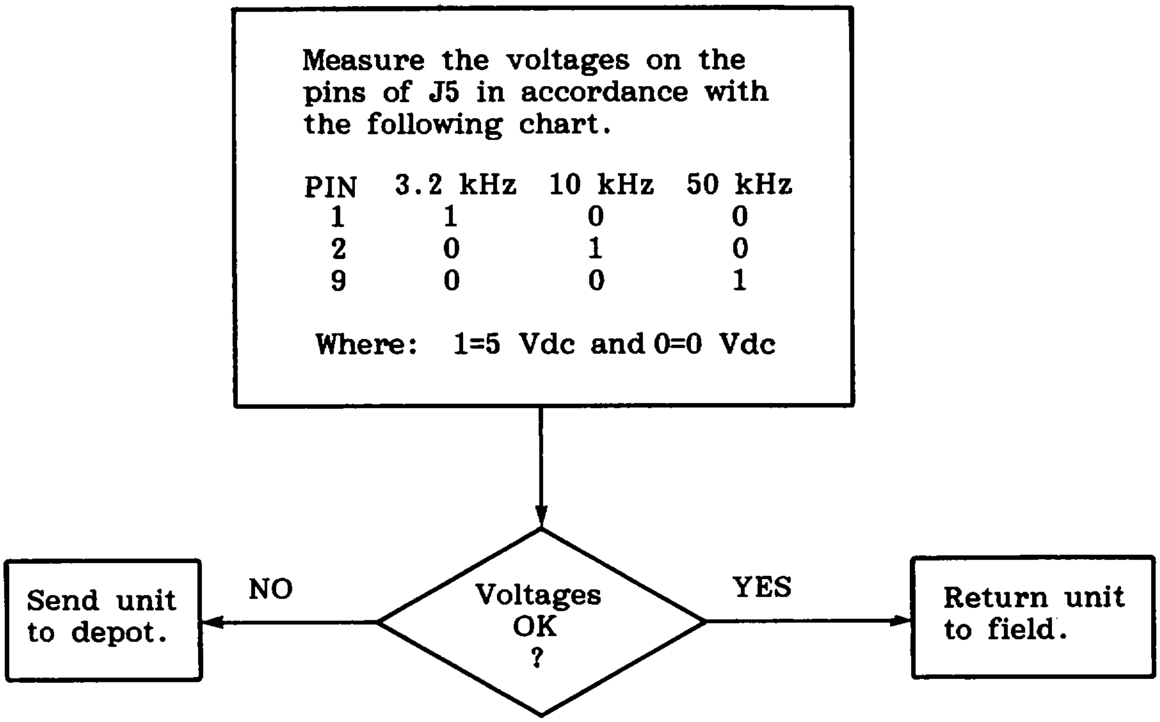
Replacement Parts

None

General Safety Instructions

None

BANDWIDTH CONTROL THAT WILL NOT TRACK WITH WJ-8971A-6 DIRECTION FINDER - CONTINUED



150 Hz TONE THAT DOES NOT FUNCTION PROPERLY

INITIAL SETUP

Test Equipment

• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

None

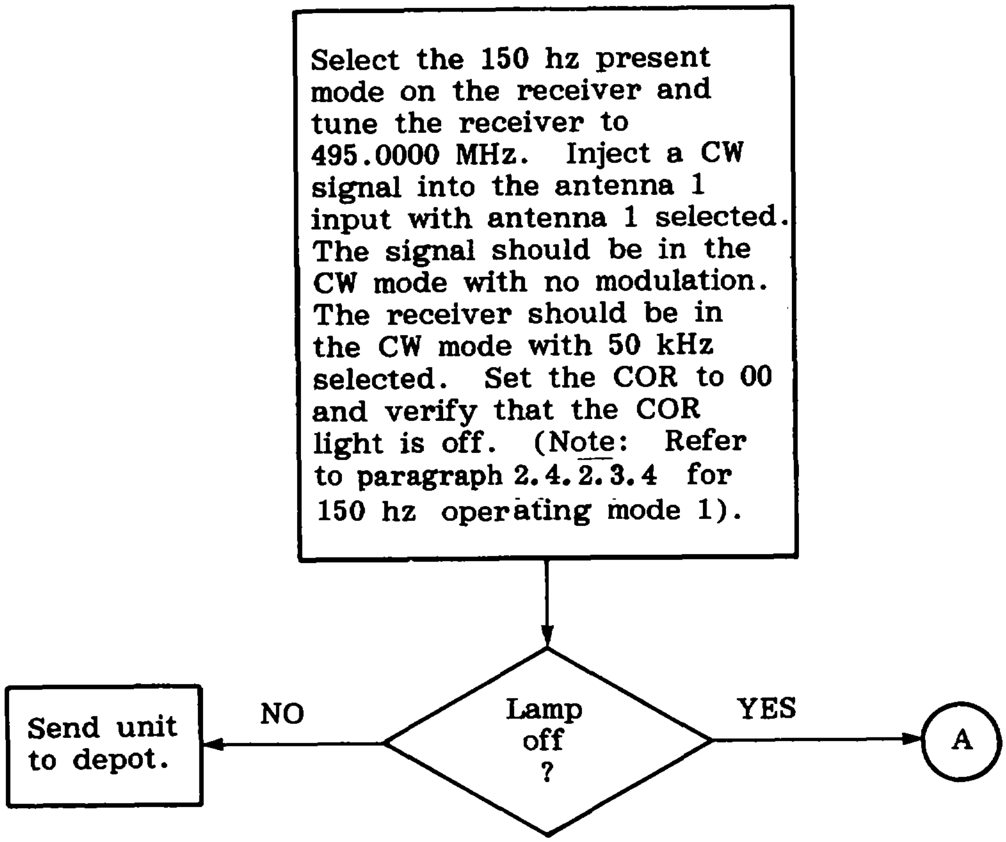
Replacement Parts

None

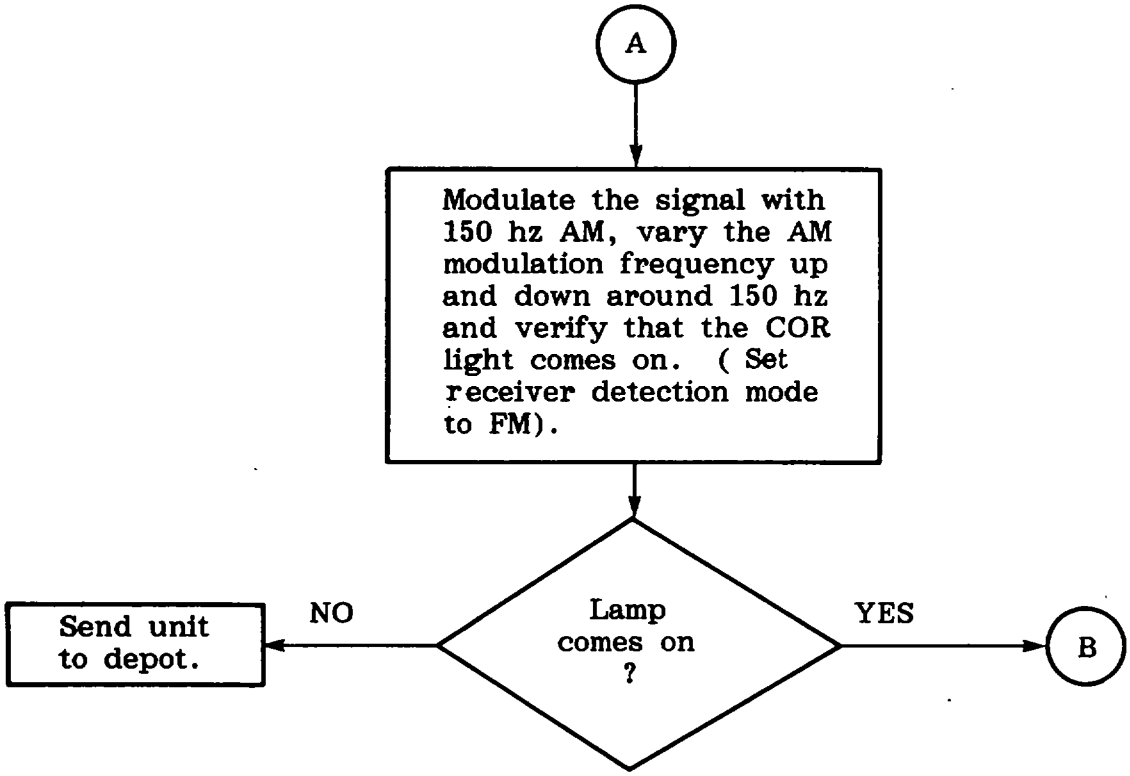
General Safety Instructions

None

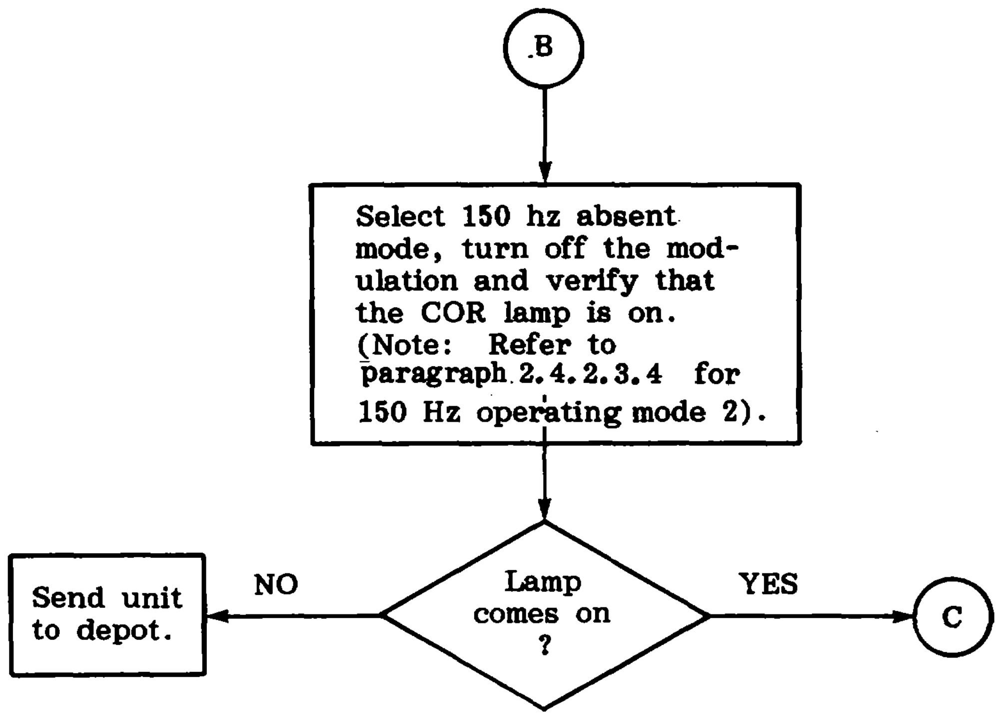
150 Hz TONE THAT DOES NOT FUNCTION PROPERLY - CONTINUED



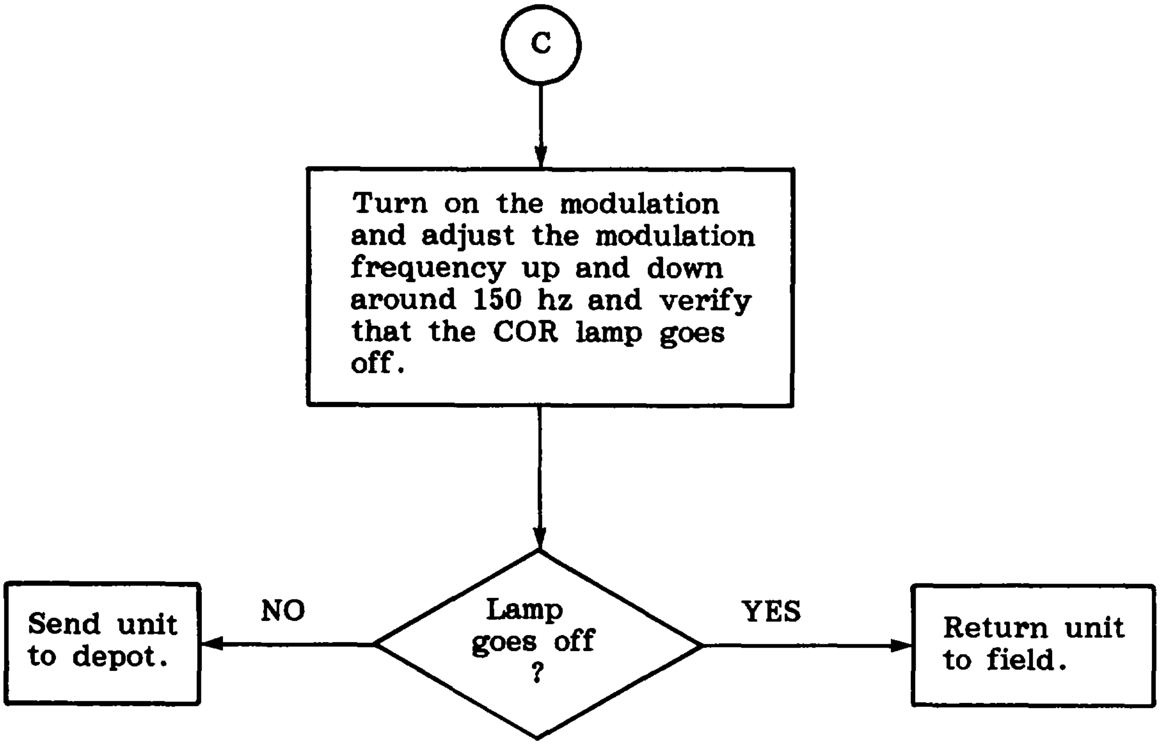
150 Hz TONE THAT DOES NOT FUNCTION PROPERLY - CONTINUED



150 Hz TONE THAT DOES NOT FUNCTION PROPERLY - CONTINUED



150 Hz TONE THAT DOES NOT FUNCTION PROPERLY - CONTINUED



NO AUDIO IN ONE OR MORE BANDWIDTHS WHEN AM IS SELECTED

INITIAL SETUP

Test Equipment

• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577
• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

None

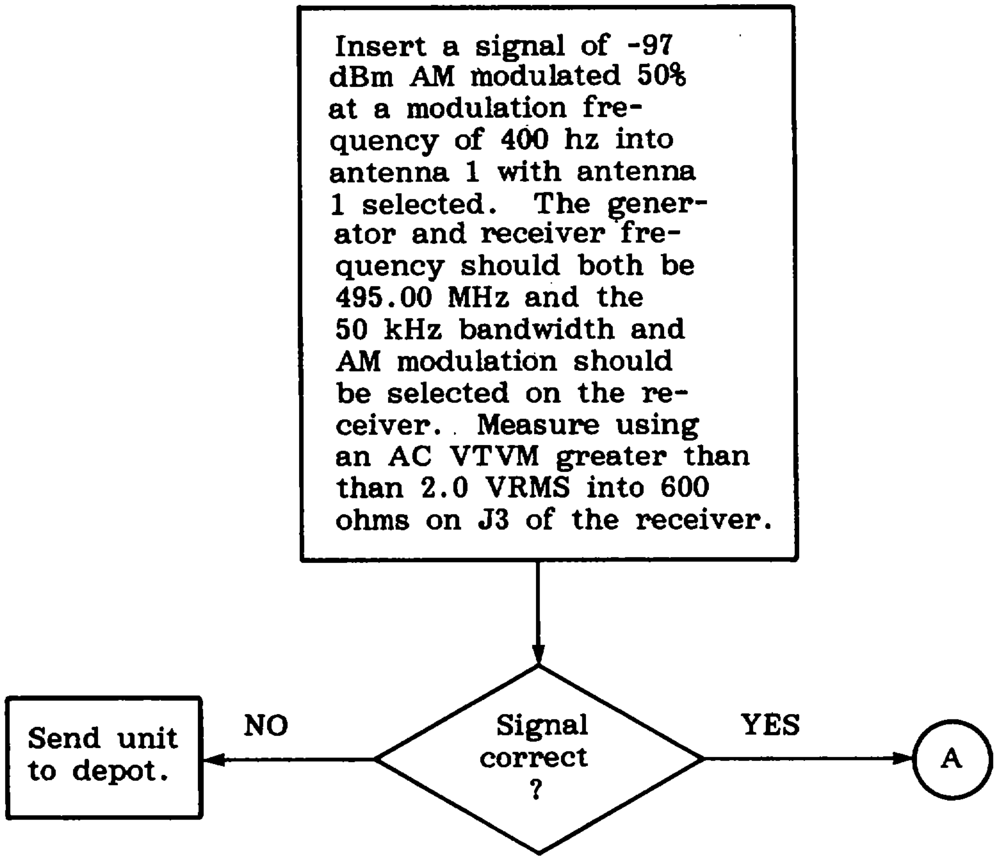
Replacement Parts

None

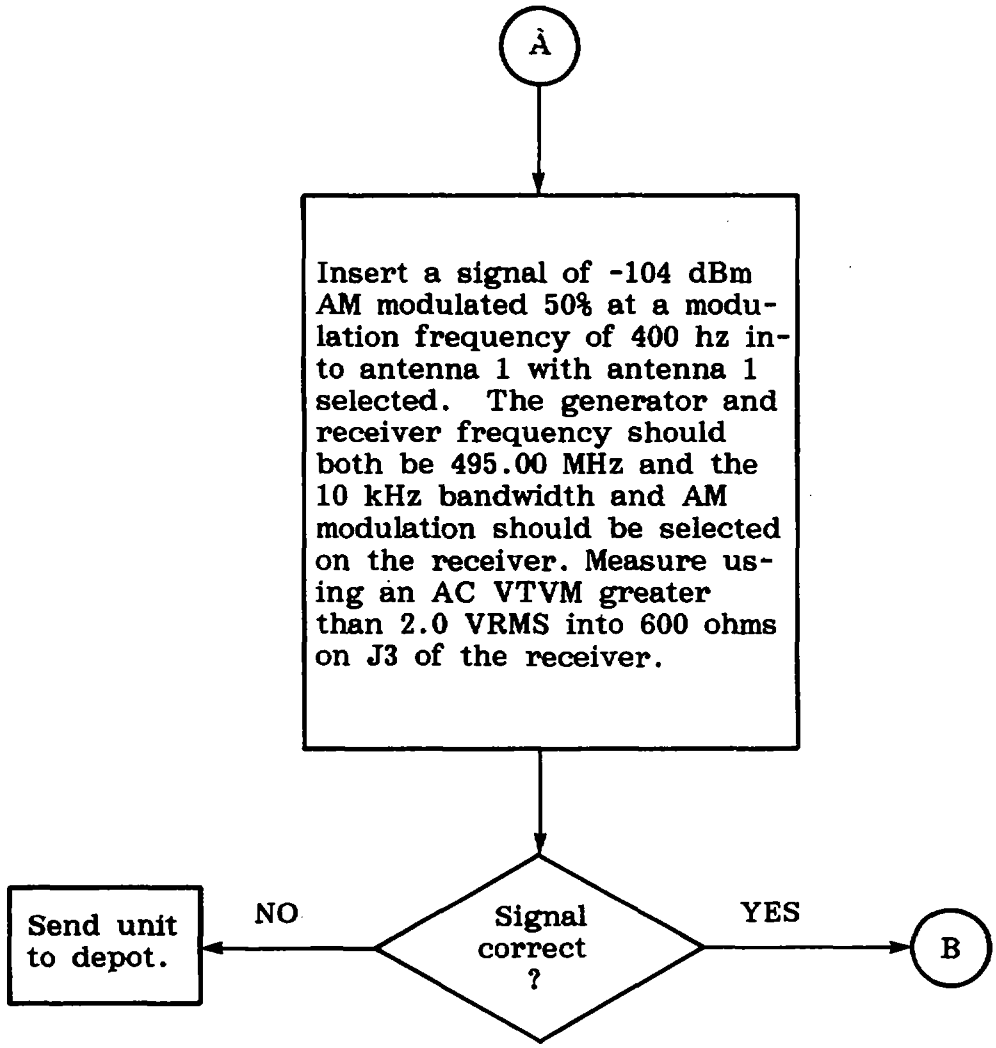
General Safety Instructions

None

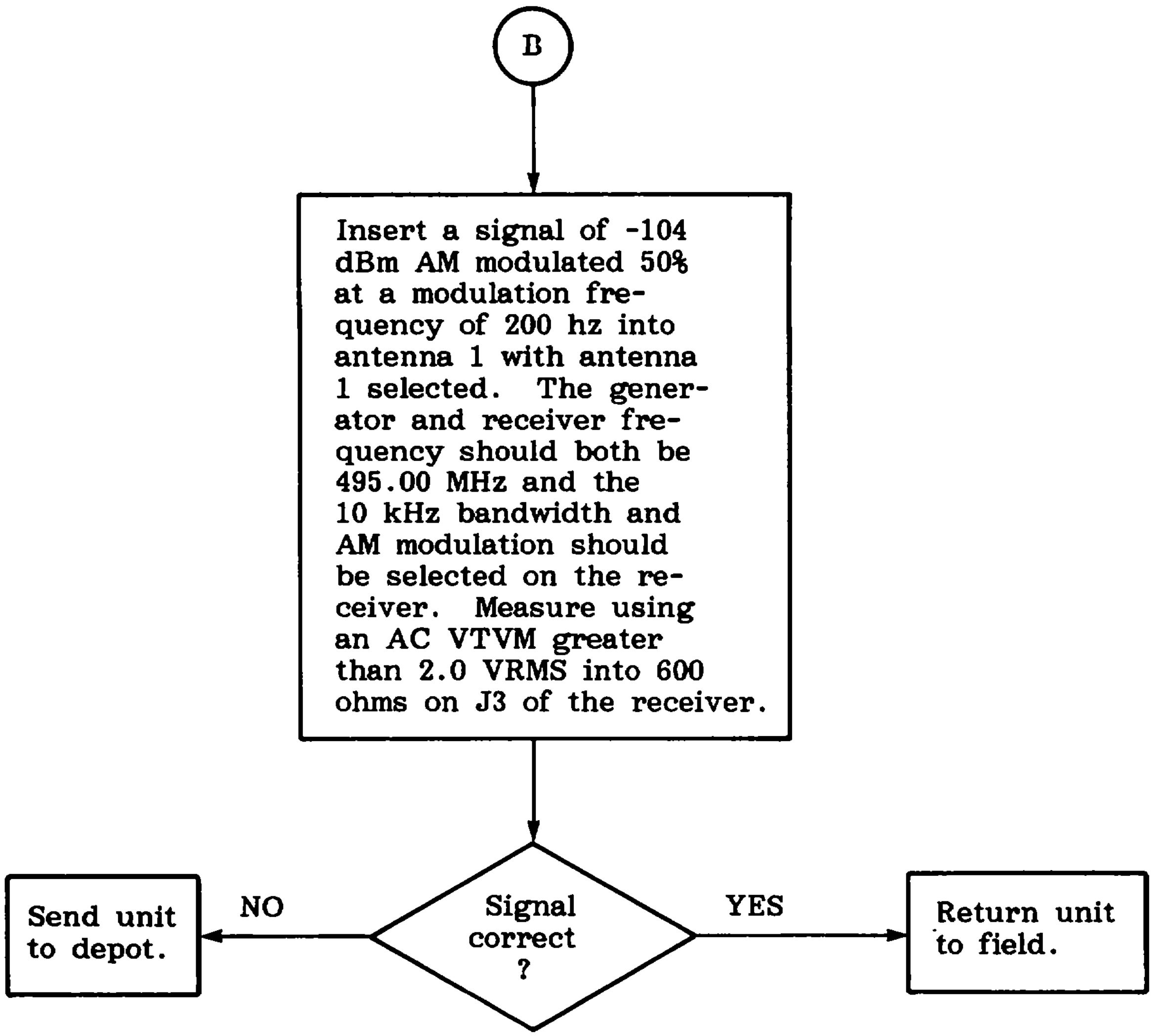
NO AUDIO IN ONE OR MORE BANDWIDTHS WHEN AM IS SELECTED - CONTINUED



NO AUDIO IN ONE OR MORE BANDWIDTHS
WHEN AM IS SELECTED - CONTINUED



NO AUDIO IN ONE OR MORE BANDWIDTHS
WHEN AM IS SELECTED - CONTINUED



NO AUDIO IN ONE OR MORE BANDWIDTHS WHEN FM IS SELECTED

INITIAL SETUP

• Test Equipment	
• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577
• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

None

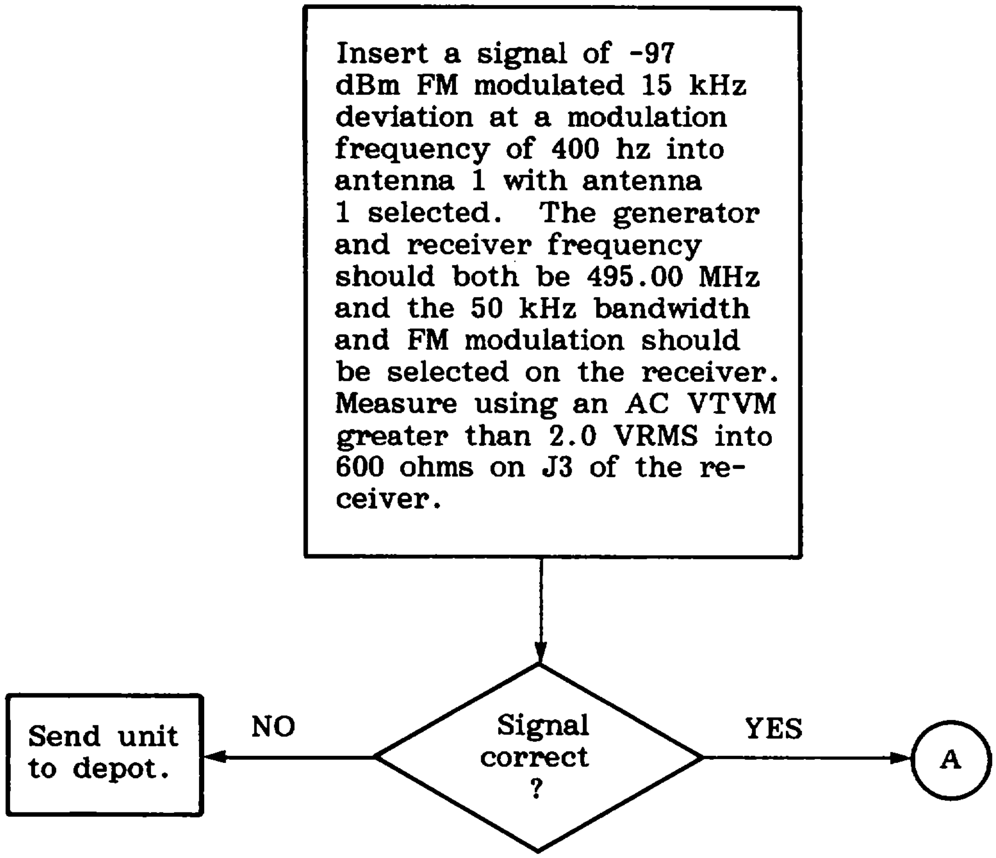
Replacement Parts

None

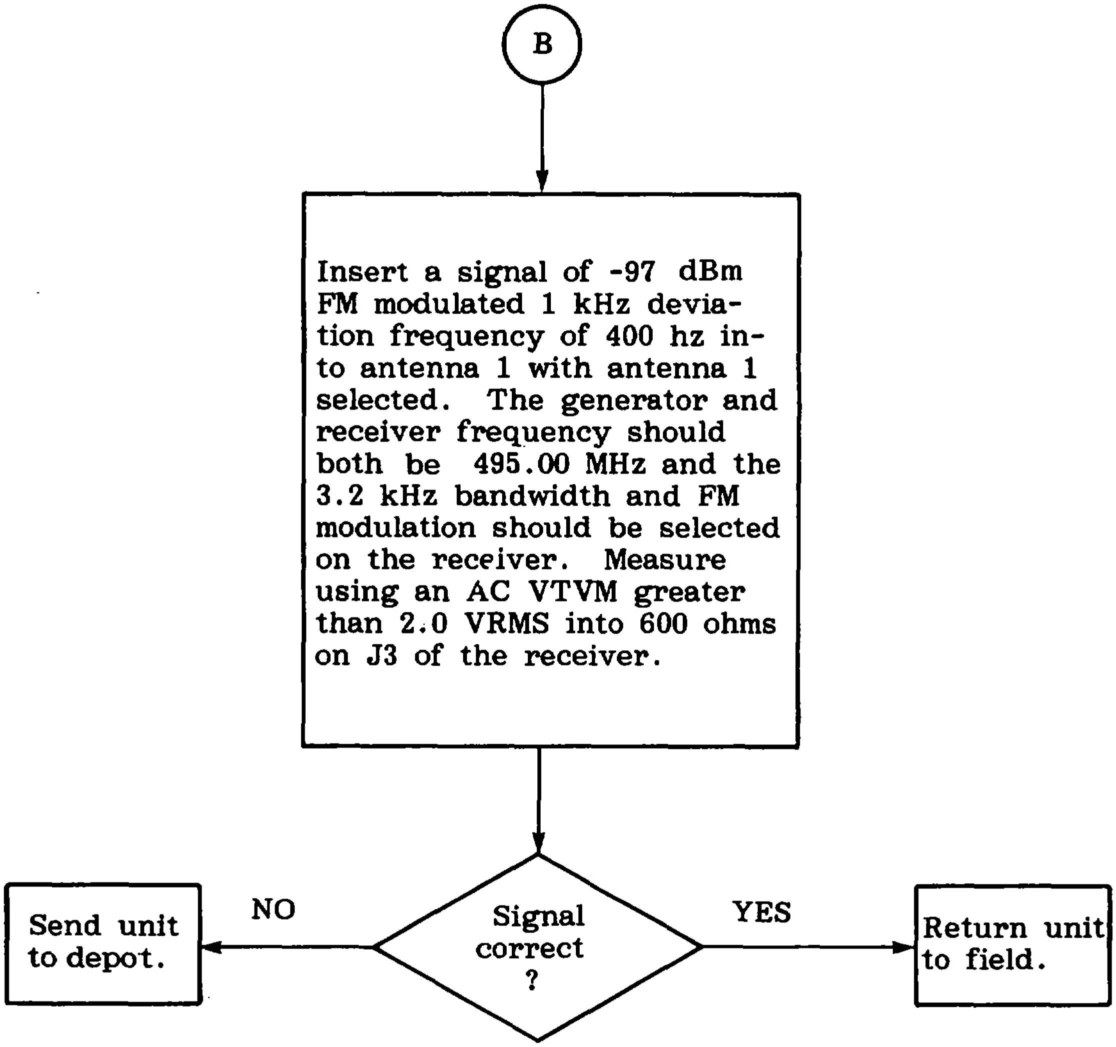
General Safety Instructions

None

NO AUDIO IN ONE OR MORE BANDWIDTHS
WHEN FM IS SELECTED - CONTINUED



NO AUDIO IN ONE OR MORE BANDWIDTHS WHEN FM IS SELECTED - CONTINUED



**NO AUDIO IN ONE OR MORE BANDWIDTHS
WHEN CW IS SELECTED**

INITIAL SETUP

Test Equipment

• Digital Multimeter	AN/PSM-45
• Test Lead Set	Simpson Catalog No. 00577
• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC

Tools

None

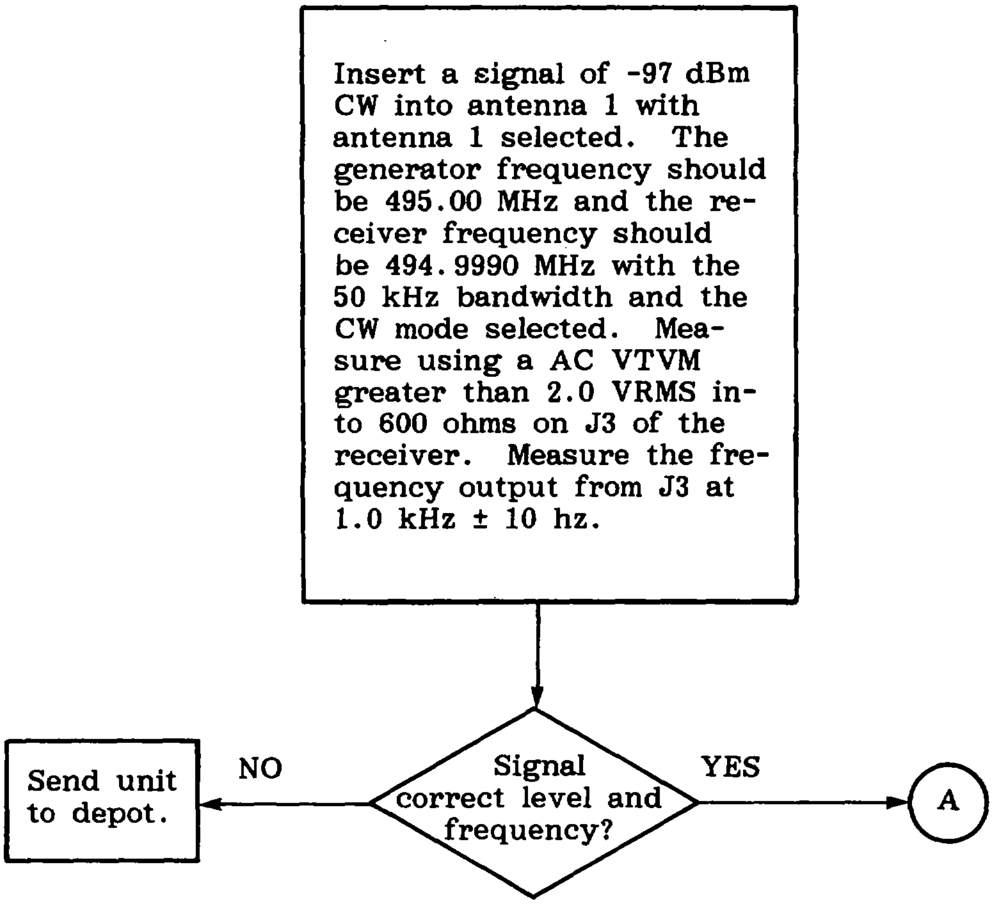
Replacement Parts

None

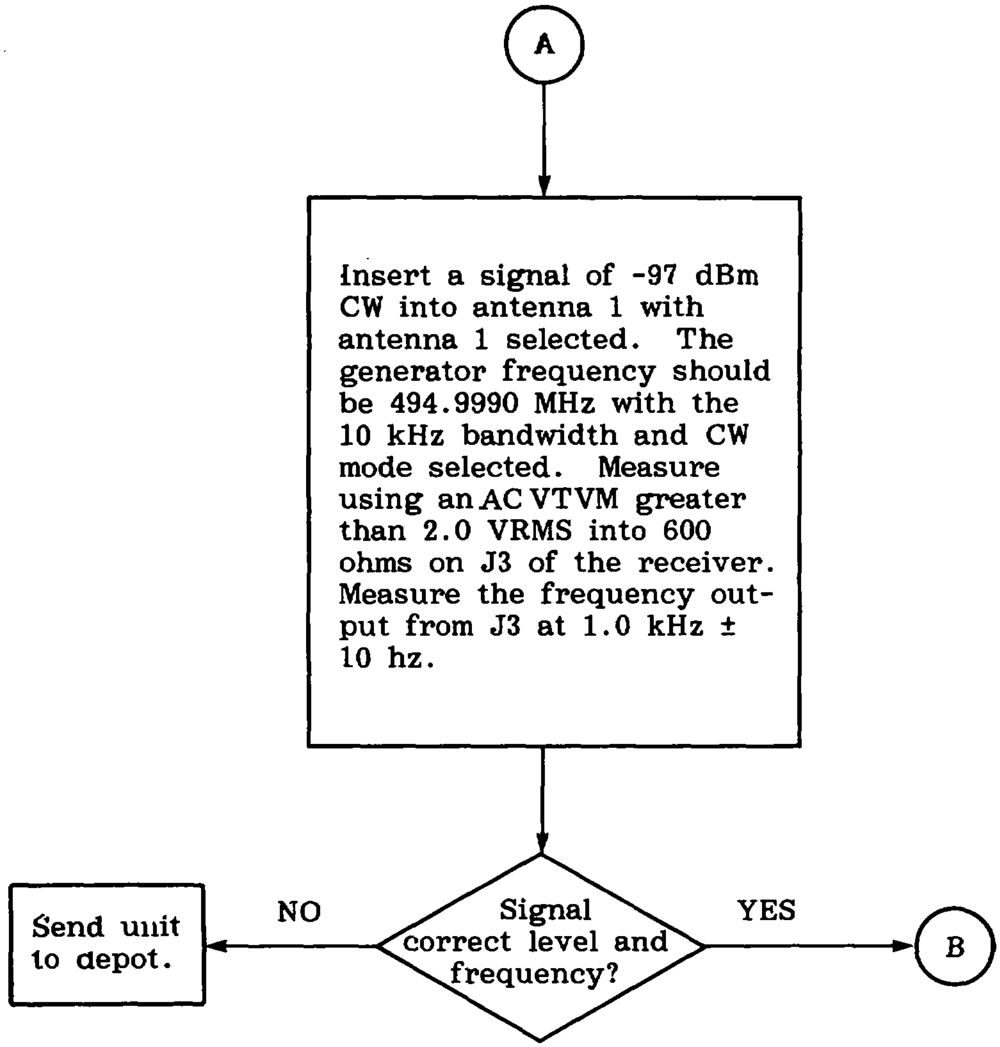
General Safety Instructions

None

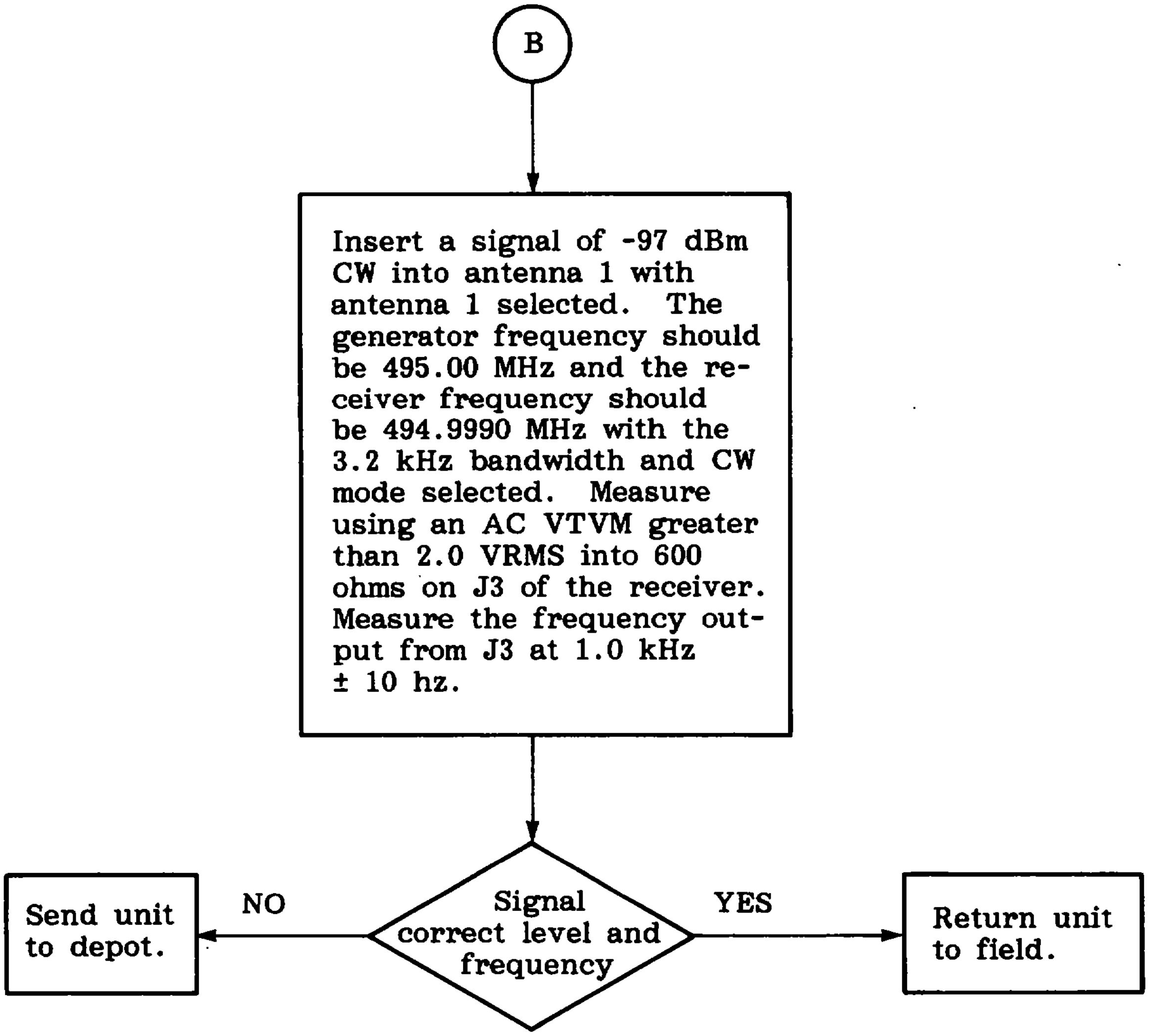
NO AUDIO IN ONE OR MORE BANDWISTHS WHEN CW IS SELECTED-Continued



NO AUDIO IN ONE OR MORE BANDWIDTHS
WHEN CW IS SELECTED - Continued



AUDIO IN ONE OR MORE BANDWIDTHS WHEN CW IS SELECTED - Continued



NO AUDIO IN ONE OR MORE BANDWIDTHS WHEN PLS IS SELECTED

INITIAL SETUP

Test Equipment

• Signal Generator	SG-1112(V) 1/U
• RF Cable, 50 ohms, 4 ft.	BNC-BNC
• Oscilloscope	AN/USM-488

Tools

None

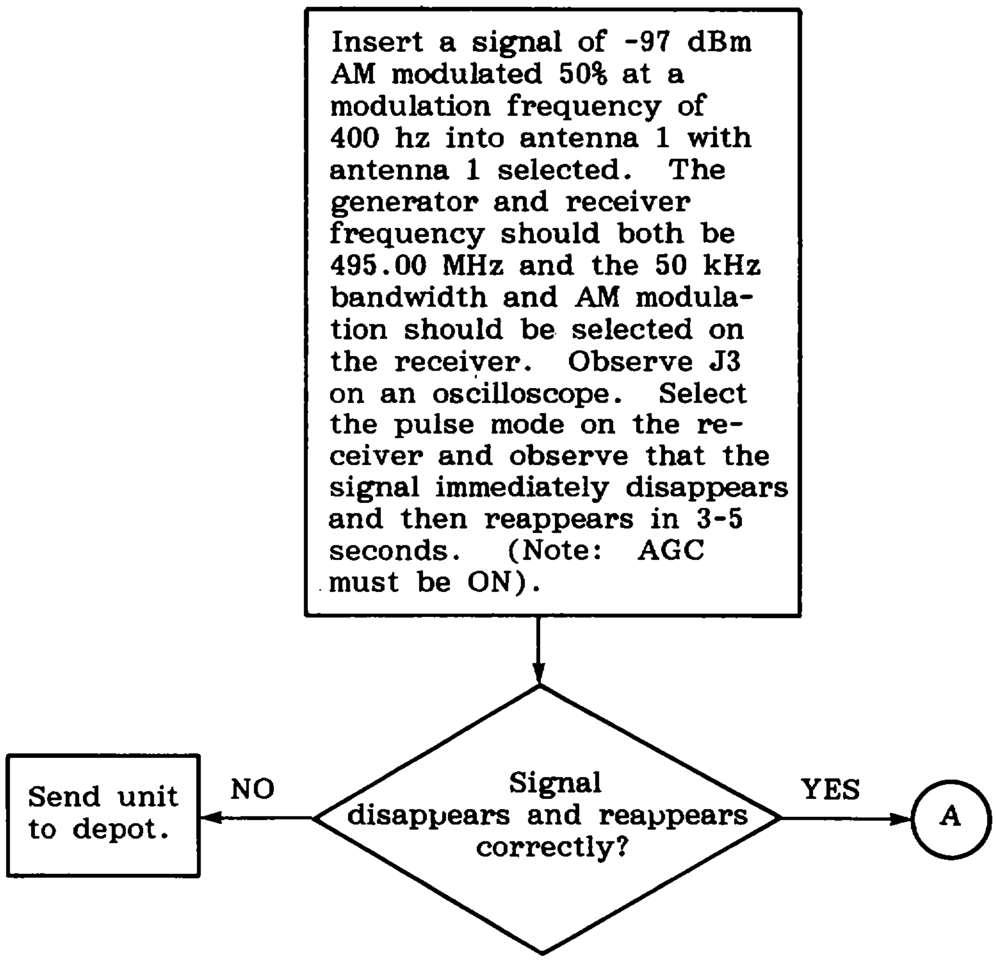
Replacement Parts

None

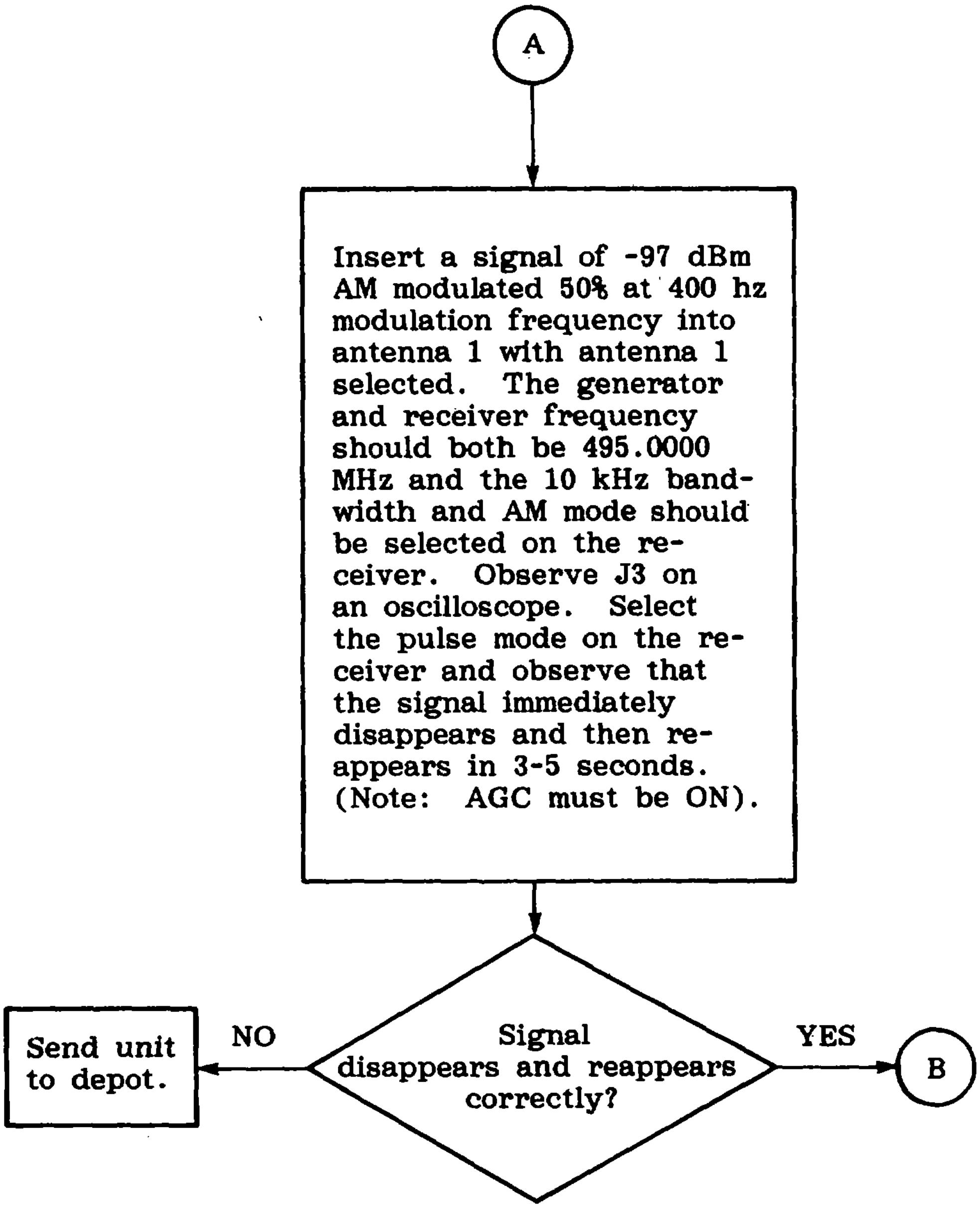
General Safety Instructions

None

AUDIO IN ONE OR MORE BANDWIDTHS WHEN PLS IS SELECTED - Continued



AUDIO IN ONE OR MORE BANDWIDTHS WHEN PLS IS SELECTED - Continued



NO AUDIO IN ONE OR MORE BANDWIDTHS
WHEN PLS IS SELECTED - Continued

B

Insert a signal of -97 dBm AM modulated 50% at 400 hz modulation frequency into antenna 1 with antenna 1 selected. The generator and receiver frequency should both be 495.0000 MHz and the 3.2 kHz bandwidth and AM mode should be selected on the receiver. Observe J3 on an oscilloscope. Select the pulse mode on the receiver and observe that the signal immediately disappears and then reappears in 3-5 seconds. (Note: AGC must be ON).

Signal disappears and reappears correctly?

NO: Send unit to depot.

YES: Return unit to field.

SECTION V

REPLACEMENT PARTS LIST

5.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies (and modules) and parts. An example of the unit numbering method follows:

Subassembly Designation A1	**R1 Class and No. of Item**
Identify from right to left as:	First (1) resistor (R) of first (1) subassembly (A)

As shown on the main chassis schematic, components which are an integral part of the main chassis have no subassembly designation.

5.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and on the illustrations in this manual. The partial reference designations consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Reference Designation Prefixes are provided on drawings and illustrations in parentheses within the figure titles.

5.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address
00779	AMP, Incorporated P.O. Box 3608 Harrisburg, PA 17105 Dallas, TX 75231
01037	Pyroferric-New York, Inc. 621 E. 216th Street Bronx, NY 10467 Saugerties, NY 12477
01121	Allen-Bradley Company 1201 South 2nd Street Milwaukee, WI 53204 Somerville, NJ 08876
01281	TRW Semiconductors, Inc. 14520 Aviation Blvd. Lawndale, CA 90260
01295	Texas Instruments Semiconductor-Components Div. 13500 North Central Expressway
02114	Ferroxcube Corp. P.O. Box 359 Mt. Marion Road
02735	RCA Corporation Solid State Division Route 202
04013	Taurus Corporation 1 Academy Hill Lambertville, NJ 08530

Mfr. Code	Name and Address
04213	Caddell-Burns Mfg. Co., Inc. 40 E. Second Street Mineola, NY 11501 Brooklyn, NY 11229
04239	General Electric Company Chemical & Metallurgical Ventures Op. Magnetic Mtls. Produce Sec. P.O. Box 72 Edmorer, MI 49928
04713	Motorola, Incorporated Semiconductor Products Division 5005 East McDowell Road Phoenix, AZ 80058
05397	Union Carbide Corporation Materials Systems Divisions 11901 Madison Avenue Cleveland, OH 44101
07263	Fairchild Camera & Instr., Corp. Semiconductor Division 464 Ellis Street Mountain View, CA 94040
12475	Circul-Air Corp. 29230 Regan Road Warren, MI 48092
13103	Thermalloy Company 2021 W. Valley View Lane Dallas, TX 75234
14482	Watkins-Johnson Company 3333 Hillview Avenue Palo Alto, CA 94304 Derby, CT 06418
14632	Watkins-Johnson Company 700 Quince Orchard Road Gaithersburg, MD 20878
15454	Rodan Industries, Inc. 2905 Blue Star Street Anaheim, CA 92806 Orlando, FL 32804
15542	Mini-Circuits Laboratory Div. of Scientific Comp. Corp 2913 Quentin Road
15818	Teledyne Semiconductor 1300 Terra Bella Avenue Mountain View, CA 94040
16179	Omni-Spectra, Inc. 24600 Hallwood Court Farmington, MI 48024
16428	Belden Corporation P.O. Box 1101 Richmond, IN 47374
17856	Siliconix, Inc. 2201 Laurelwood Road Santa Clara, CA 95050
18324	Signetics Corporation 811 East Arquest Avenue Sunnyvale, CA 94086
18736	Voltronics Corp. West Street Hanover, NJ 07936
19505	Applied Engineering Prod. Co. Division of Samarius, Inc. 300 Seymour Avenue
24546	Corning Glass Works 550 High Street Bradford, PA 16701
25120	Piezo Technology Inc. P.O. Box 7877 2400 Diversified Way

Mfr. Code	Name and Address
26654	Varadyne Industries, Inc. 2110 Broadway Santa Monica, CA 94040
27014	National Semi-Conductor Corp. 2950 San Ysidro Way Santa Clara, CA 95051
27956	Relcom 3333 Hillview Avenue Palo Alto, CA 94304
28480	Hewlett-Packard Co. Corporation Headquarters 1501 Page Mill Road Palo Alto, CA 94304
28733	Ceramic Magnetics, Inc. 87 Fairfield Road Fairfield, NJ 07006
29990	American Technical Ceramics Division of Phase Industries 1 Norden Lane Huntington Station, NY 11746
30161	Aavid Engineering, Inc. 30 Cook Court Laconia, NH 03246
32293	Intersil, Inc. 10900 North Tantau Avenue Cupertin, CA 95014
32897	Erie Technological Prod., Inc. Erie Frequency Control Div. 453 Lincoln Street Carlisle, PA 17013
33095	Spectrum Control, Inc. 152 E. Main Street Fairview, PA 16415 St. Louis, MO 63107

Mfr. Code	Name and Address
34649	Intel Corp. 3585 SW 198th Street Aloha, OR 97005
49956	Raytheon Company 141 Spring Street Lexington, MA 02173
50101	GHZ Devices, Inc. Kennedy Drive North Chelmsford, MA 01863
52648	Plessey Memories, Inc. DBA Plessey Semiconductors 1674 McGaw Avenue Irvine, CA 92714
52673	KSW Electronics Corp. S. Bedford Street Burlington, MA 01803
55027	Q-Bit Corp. 311 Pacific Avenue Palm Bay, FL 32905
56289	Sprague Electric Co. Marshall Street North Adams, MA 01247
70903	Belden Corporation 415 South Kilpatrick Chicago, IL 60644
71279	Cambridge Thermionic Corp. 445 Concord Avenue Cambridge, MA 02138
71400	Bussman Manufacturing Division of McGraw-Edison Co. 2536 W. University Street

Mfr. Code	Name and Address
72136	Electro Motive Mfg. Co., Inc. South Park & John Streets Willimantic, CT 06226 Riverside, CA 92506
72982	Erie Tech. Products, Inc. 644 West 12th Street Erie, PA 16512
73138	Beckman Instr., Inc. Helipot Division 2500 Harbor Blvd. Fullerton, CA 92634
73445	Amperex Elctrnc. Corp. 230 Duffy Avenue Hicksville, LI, NY 11802
73899	JFD Electronics Co. 15th at 62nd Street Brooklyn, NY 11219
75915	Littelfuse, Inc. 800 E. Northwest Highway Des Plaines, IL 60016 New York, NY 10017
76055	Mallory Controls Division P.R. Mallory and Co., Inc. P.O. Box 327 State Road 28 W Frankfort, IN 46041
80031	Electra-Midland Corp. MEPCO Division 22 Columbia Road Morristown, NJ 07960
80058	Joint Electronic Type Designation System Boonton, NJ 07005
80131	Electronic Industries Assoc. 2001 Eye Street, N.W. Washington, D.C. 20006

Mfr. Code	Name and Address
80294	Bourns, Incorporated Instrument Division 6135 Magnolia Avenue
81073	Grayhill Incorporated 561 Hillgrove Avenue LaGrange, IL 60525
81349	Military Specifications
81350	Joint Army-Navy Specifications
82389	Switchcraft, Inc. 5555 North Elston Avenue Chicago, IL 60630
83740	Union Carbide Corp. Consumers Product Division 270 Park Avenue
88245	Litton Industries USECO Division 13536 Saticay Street Van Nuys, CA 91409
90201	Mallory Capacitor Company 3029 E. Washington Street P.O. Box 372 Indianapolis, IN 46206
91293	Johanson Mfg. Company P.O. Box 329
91418	Radio Materials Company 4242 West Bryn Mawr Avenue Chicago, IL 60646

Mfr. Code	Name and Address
91984	Maida Development Co. 214 Academy Street Hampton, VA 23369
95077	Solitron Devices, Inc. P.O. Box 278 Cove Road Port Salerno, FL 33492
95121	Quality Components, Inc P.O. Box 113 St. Mary's, PA 15857
98291	Sealectro Corporation 225 Hoyt Mamaroneck, NY 10544
99800	American Precision Industries Delevan Electronics Division 270 Quaker Road East Aurora, NY 14052

5.4 PARTS LIST

The parts list which follows contains all electrical parts used in the equipment and certain mechanical parts which are subject to unusual wear or damage. When ordering replacement parts from the Watkins-Johnson Company, specify the type and serial number of the equipment and the reference designation and description of each part ordered. The list of manufacturers provided in **paragraph 5.3** and the manufacturers part number for components are included as a guide to the user of the equipment in the field. These parts may not necessarily agree with the parts installed in the equipment; however, the parts specified in this list will provide satisfactory operation of the equipment. Replacement parts may be obtained from any manufacturer as long as the physical and electrical parameters of the part selected agree with the original indicated part. In the case of components defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

NOTE

As improved semiconductors become available, it is the policy of Watkins-Johnson to incorporate them in proprietary products. For this reason some transistors, diodes, and integrated circuits installed in the equipment may not agree with those specified in the parts lists and schematic diagrams of this manual. However, the semiconductors designated in the manual may be substituted in every case with satisfactory results.

5.5 TYPE WJ-8617B-5, MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	Power Distribution	1	764005-1	14632	
A2	Signal Monitor	1	861XB/SM	14632	
A3	RF/IF Motherboard	1	794189-6	14632	
A4	Synthesizer Motherboard	1	798071-1	14632	
A5	Digital Motherboard	1	798039-3	14632	
A6	Front Panel Display and Control	1	794190-2	14632	
A7	Phone Jack	1	791275-1	14632	
A8	Antenna Switch	1	794128-2	14632	
A9	Wideband IF Output Amplifier	1	861XB/WBO	14632	
Al-i	Extender Board	2	796198-1	14632	
AI-2	Extender Board	1	794140-1	14632	
AI-3	Extender Board	1	798076-1	14632	
AI-4	Handle, PC Board Extender	1	15689-1	14632	
Al-5	Alignment Tool	1	5284	73899	
A1-6	Connector, Plug	1	205204-1	00779	
AI-7	Extender Cable Assembly	1	380259-16	14632	
BT-1	Battery	1	180090-1	14632	
C1	Capacitor, Electrolytic, Tantalum: 27 pF, 10%, 35 V	2	196D276X9035TE4	56289	
C2	Same as C1				
C3	Capacitor, Electrolytic, Tantalum: 2.2 pF, 10%, 35 V	1	CS13BF225K	81349	
C4	Capacitor, Electrolytic, Tantalum: 1 uF, 20%, 35 V	3	196D105X0035HE3	56289	
C5	Capacitor, Ceramic, F-T: 0.05 uF, 20%, 300 V	13	54-785-005-503P	33095	
C6 Thru C13	Same as C5				
C14	Same as C4				
C15	Capacitor, Ceramic, Disc: 0.1 pF, 20%, 50 V	2	34475-1	14632	
C16	Same as C5				
C17	Same as C5				
C18	Same as C5				
C19	Capacitor, Ceramic, Disc: 0.47 pF, 20%, 100 V	1	8131M100-651-474M	72982	
C20	Same as C15				
C21	Same as C5				
C22	Capacitor, Ceramic, F-T: 5000 pF, 200 V	5	2425001XSW0502AA	32897	
C23 Thru C26	Same as C22				
C27	Capacitor, Electrolytic, Aluminum: 17000 pF, 40 V	1	CGS173U040VAC	90201	
C28	Capacitor, Electrolytic, Tantalum: 200 pF, 20%, 15 V	3	MTP207M015PIC	76055	
C29	Same as C28				
C30	Same as C28				

MAIN CHASIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C31	Same as C4				
C32	Capacitor, Ceramic, Disc: .047 uF, 10%, 100 V	2	CK06BX473	81349	
C33	Same as C32				
CR1	Diode	2	1N1614	80131	
CR2	Same as CR1				
F1	Fuse, 3 AG, Slow Blow, 1.5A	1	MLX1.5	71400	
F2	Fuse, 3 AG, Slow Blow, 3/4A	1	MDL-3/4	71400	
FL1	Filter Assembly	1	370436-1	14632	
FL2	Filter	5	1240-030-0000	72982	
FL3	Filter, EMI	2	52-706-301	33095	
FL4	Same as FL2				
FL5	Same as FL3				
FL7 Thru FL9	Same as FL2				
FLIP1	Plug Assembly	1	370433-1	14632	
FL1P2	Plug Assembly	1	370429-1	14632	
FL1P3	Plug Assembly	1	370433-2	14632	
FL1P4	Plug Assembly	1	370433-3	14632	
FLIP5	Plug Assembly	1	370433-4	14632	
FL1P6	Plug Assembly	1	370433-5	14632	
FL1P7	Plug Assembly	1	370429-2	14632	
J1	Connector, Jack, BNC	1	4116-0001	95077	
J2	Part of FL3				
J3	Part of FL4				
J4	Part of FL5				
J5	Connector Assembly	1	280328-1	14632	
J6	Part of FL7				
J7	Part of FL8				
J8	Connector, Receptacle	2	1-225398-5	00779	
J9	Connector, Bulkhead, SMC	2	1006-7541-010	19505	
J10	Same as J16				
J11	Same as J9				
J12	Same as J14				
J13	Same as J16				
J14	Connector, Bulkhead, SMC	4	1003-7541-010	19505	
J15	Same as J16				
J16	Connector, Plug, Right Angle, SMC	7	50-330-0039-91	98291	
J17	Not Used				
J18	Same as J16				
J19	Connector, Receptacle	1	370441-1	14632	
J20	Same as J8				

REF DESIG	DESCRIPTION		QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
J21	Part of FL2					
J22	Part of FL9					
J23	Same as J14					
J24	Same as J14					
J25	Same as J16					
J26	Same as J16					
L1	Ferrite Choke		7	VK200-10/3B	02114	
L2 Thru L7	Same as L1					
LB	Coil		2	20681-129	14632	
L9	Same as L8					
P1	Connector, Plug	P/O W1				
P2	Connector, Plug	P/O W1				
P3	Connector, Plug		4	42236-1	00779	
P4	Connector, Plug		4	2-350804-2		00779
P5	Same as P3					
P6	Same as P4					
P7	Same as P3					
P8	Same as P4					
P9	Plug Assembly		1	370429-9	14632	
P10	Same as P4					
P11	Plug Assembly		1	370429-3	14632	
P12	Plug Assembly		1	370429-4	14632	
P13	Plug Assembly		1	370429-5	14632	
P14	Plug Assembly		1	370429-6	14632	
P15	Plug Assembly		1	370429-7	14632	
P16	Plug Assembly		1	370429-8	14632	
P17	Same as P3					
P18	Plug Assembly		1	370433-6	14632	
P19	Plug Assembly		1	370433-7	14632	
P20	Connector, Plug, SMC		12	50-024-3875-91	98291	
P21	Not Used					
P22	Connector, Plug		5	50-328-3875-91	98291	
P23	Same as P20					
P24	Same as P20					
P25	Same as P20					
P26	Same as P22					
P27	Connector, Plug		17	87499-5	00779	
P28	Same as P27	P/O W13				
P29	Same as P27					
P30	Plug Assembly		1	370429-10	14632	

MAIN CHASIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
P31	Plug Assembly	1	370429-11	14632	
P32	Plug Assembly	1	370429-12	14632	
P33	Plug Assembly	1	270695-2	14632	
P34	Plug Assembly	1	370429-14	14632	
P35	Not Used				
P36	Same as P27 P/O W21				
P37	Plug Assembly	1	370427-1	14632	
P38	Plug Assembly	1	370431-1	14632	
P39	Plug Assembly	1		370427-2	14632
P40	Plug Assembly	1	370427-3	14632	
P41	Plug Assembly	1		370430-1	14632
P42	Plug Assembly	1		370430-2	14632
P43	Plug Assembly	1	370430-3	14632	
P44 Thru P49	Same as P27				
P50	Connector, Plug, SMC	4	1003-7541-010	19505	
P51	Same as P27				
P52	Same as P20				
P53	Same as P22				
P54	Same as P20				
P55	Same as P20				
P56	Connector Plug	1	UG1465/U	80058	
P57	Same as P20				
P58	Same as P20				
P59	Same as P20				
P60	Same as P50				
P61	Not Used				
P62	Not Used				
P63	Connector Plug	1	1-87499-1	00779	
P64	Plug Assembly	1	270695-1	14632	
P65	Not Used				
P66	Plug Assembly	1	370434-1	14632	
P67	Plug Assembly	1	370434-3	14632	
P68	Plug Assembly	1	370434-2	14632	
P69	Same as P20				
P70	Same as P27				
P71	Same as P20				
P72	Same as P50				
P73	Same as PSO				
P74	Same as P27				
P75	Same as P27				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
P76	Same as P22				
P77	Same as P27				
P78	Same as P22				
P79	Same as P27				
R1	Resistor, Variable, Composition: 10 ki, 10%, 1 W	1	70A3N048L103A	01121	
R2	Resistor, Variable, Composition: 10 kl, 10%, 1 W	1	70A3N048L103U	01121	
R3	Resistor, Variable, Composition: 10 kg, 10%, 1 W Linear	1	70A3L036L103U	01121	
RA1	Heat Sink	4	5680-0150-3	30161	
RA2A	Same as RA1				
RA2B	Heat Sink	1	5791C	30161	
RA3	Same as RA1				
RA4	Same as RA1				
RA5	Heat Sink	1	390394-1	14632	
S1	Switch, Pushbutton	1	SCD18542	14632	
S2	Switch, Slide	1	llA1211	82389	
T1	Transformer	1	370378-1	14632	
U1	Voltage Regulator	1	LM340AKC15	27014	
U2	Voltage Regulator	1	LM12OK15	27014	
U3	Voltage Regulator	2	78H05ASC	07263	
U4	Same as U3				
U5	Encoder Assembly	1	290378-1	14632	
USR1	Resistor, Fixed, Film: 10 ki, 5%, 1/4 W	2	CF/Y8-1OK/J	09021	
U5R2	Same as U5R1				
W1	Cable, Power	1	17-250	16428	
W2	Cable Assembly	1	370428-1	14632	
W3	Cable Assembly	1	370428-2	14632	
W4	Cable Assembly	1	370428-3	14632	
W5	Cable Assembly	1	370428-4	14632	
W6	Cable Assembly	1	380260-4	14632	
W7	Cable Assembly	1	380259-8	14632	
W8	Cable Assembly	1	380259-9	14632	
W9	Cable Assembly	1	280225-1	14632	
W10	Cable Assembly	1	280226-1	14632	
W11	Cable Assembly	1	280227-1	14632	
W12	Cable Assembly	1	380260-1	14632	
W13	Cable Assembly	1	380260-2	14632	
W14	Cable Assembly	1	380260-3	14632	
W15	Not Used				
W16	Cable Assembly	1	380260-5	14632	
W17	Cable Assembly	1	380260-6	14632	
W18	Cable Assembly	1	380261-1	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
W2019	Cable Assembly	1	380261-2	14632	
W20	Cable Assembly	1	380261-3	14632	
W21	Cable Assembly	1	380260-7	14632	
W22	Cable Assembly	1	380262-1	14632	
W23	Cable Assembly	1	380259-10	14632	
W24	Cable Assembly	1	380259-11	14632	
W25	Cable Assembly	1	380259-12	14632	
W26	Cable Assembly	1	380259-13	14632	
W27	Cable Assembly	1	380259-14	14632	
W28	Not Used				
W29	Cable Assembly	1	380328-1	14632	
W30	Cable Assembly	1	380260-9	14632	
W31	Cable Assembly	1	380259-15	14632	
W32	Cable Assembly	1	280228-1	14632	
W33	Cable Assembly	1	280229-1	14632	
W34	Cable Assembly	1	380260-10	14632	
W35	Cable Assembly	1	380260-11	14632	
W36	Cable Assembly	1	380260-12	14632	
W37	Cable Assembly	1	380260-13	14632	
XF1	Fuseholder	1	342004	75915	

5.5.1 TYPE 764005-1 POWER DISTRIBUTION REF DESIG PREFIX A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Aluminum: 2200 UF, -10%, +75%, 25 V	2	39D228G025HP4	56289	
C2	Same as C1				
C3	Capacitor, Electrolytic, Aluminum: 8000 uF, -10%, +75%, 15 V	3	39D808G015JT4	56289	
C4	Same as C3				
C5	Same as C3				
CR1	Diode	4	1N4998	80131	
CR2	Same as CR1				
CR3	Same as CR1				
CR4	Same as CR1				
J1	Faston Tabs	19	62073-1	00779	
J2 Thru J7	Same as J1				
J8	Not Used				
J9 Thru J20	Same as J1				

5.5.2 TYPE 794189-6 RF/IF MOTHERBOARD REF DESIG PREFIX A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	UHF Preselector (Optional)	1	796414-1	14632	
A2	UHF Preamplifier/Mixer (Optional)	1	796415-1	14632	
A3	High-Band Preselector	1	794094-1	14632	
A4	Low-Band Preselector	1	794095-1	14632	
A5	VHF Preamplifier	1	794097-1	14632	
A6	1st Converter	1	794096-2	14632	
A7	2nd Converter	1	716003-1	14632	
A8	AGC Assembly	1	784002-1	14632	
A9*	IF Amplifier No. 1	1	Selectable	14632	
A10*	IF Amplifier No. 2	1	Selectable	14632	
A11*	IF Amplifier No. 3	1	Selectable	14632	
A12*	IF Amplifier No. 4	1	Selectable	14632	
A13*	IF Amplifier No. 5	1	Selectable	14632	
A14	SSB Bypass (Optional)	1	798074-1	14632	
A15	Video/Audio/COR	1	796233-1	14632	
A16	IF Output/AM Demodulator	1	724016-1	14632	
A17*	FM Demodulator No. 1	1	Selectable	14632	
A18*	FM Demodulator No. 2	1	Selectable	14632	
A19*	FM Demodulator No. 3	1	Selectable	14632	
A20*	FM Demodulator No. 4	1	Selectable	14632	
A21*	FM Demodulator No. 5	1	Selectable	14632	
	*Selectable				
	IF Amplifiers FM Demodulators				
	3.2 kHz 724006-16 794106-6				
	10 kHz 724006-1 794106-1				
	20 kHz 724006-2 794106-2				
	50 kHz 724006-3 794107-1				
	100 kHz 724006-4 794107-2				
	250 kHz 724006-5 794107-3				
	500 kHz 724019-1 794107-2				
	1 MHz 724007-1 794104-1				
	2 MHz 724007-2 794105-1				
	4 MHz 724008-1 794105-2				
	300 kHz 724006-6 794107-4				
	6 kHz 724006-7 794106-3				
	40 kHz 724006-8 794107-5				
	75 kHz 724006-9 794107-6				
C1	Capacitor, Ceramic, Disc; 4700 pF, 20%, 50 V	29	8121-050-651-472M	72982	
C2 Thru C29	Same as C1				
C30	Capacitor, Electrolytic, Tantalum: 18 pF, 10%, 20 V	1	196D186X9020KE3	56289	

REF DESIG PREFIX **A3**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C31	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	20	34453-1	14632	
C32 Thru C41	Same as C31				
C42	Capacitor, Electrolytic, Tantalum: 200 µF, 20%, 15 V	1	MTP207M015P1C	76055	
C43	Capacitor, Ceramic, Disc: .1 IF, 20%, 50 V	1	34475-1	14632	
C44 Thru C52	Same as C31				
C53	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	4	34452-1	14632	
C54	Same as C53				
C55	Capacitor, Electrolytic, Tantalum: 27 µF, 20%, 35 V	1	196D276X9035TE4	56289	
C56	Same as C53				
C57	Same as C53				
C58	Capacitor, Ceramic, Disc: 1000 pF, 5%, 100 V	1	8121100-COG0102J	72982	
CR1	Diode	4	5082-2800	28480	
CR2 thru CR4	Same as CR1				
CR5	Diode	1	1N462A	80131	
FB1	Ferrite Bead	3	56-590-65-4A	02114	
FB2	Same as FB1				
FB3	Same as FB1				
J1	Combination, Post, Feedthru: 6 position	3	118470-8	00779	
J2	Same as J1				
J3	Same as J1				
JW1	Wire Wrap	AR	5951	92194	
JW2	Same as JW1				
L1	Coil, Fixed: 18 µH, 10%	11	1537-42	99800	
L2 Thru L11	Same as L1				
P1	Flex-cable	1	34832-2	14632	
P2	Connector, Right Angle,	10	328-3875-91	98291	
P3 Thru P11	Same as P2				
P12	Connector	1	88213-1	00779	
Q1	Transistor	1	2N4921	80131	
Q2	Transistor	1	2N2222A	80131	
R1	Resistor, Fixed, Film: 1 kΩ, 5%, 1/4 W	5	CF1/4-1K/J	09021	
R2	Same as R1				
R3	Resistor, Fixed, Film: 150 kΩ, 5%, 1/4 W	1	CF1/4-150K/J	09021	
R4	Resistor, Fixed, Film: 470Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R5	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	1	CF 1/4-100 OHMS/J	09021	
R6	Same as R1				
R7	Same as R1				
R8	Same as R1				
R9	Resistor, Fixed, Film: 390 0, 5%, 1/4 W	2	CF 1/4-390 OHMS/J	09021	
R10	Same as R9				
R11	Resistor, Variable, Film: 10 kΩ,, 10%, 1/2 W	2	62PR10K	73138	
R12	Same as R11				
R13	Resistor, Fixed, Film: 15 kΩ,, 5%, 1/4 W	1	CF 1/4-15K/J	09021	
R14	Resistor, Fixed, Film: 4.7 kΩ,, 5%, 1/4 W	1	CF 1/4-4.7K/J	09021	
R15	Resistor, Fixed, Film: 2.2 kΩ,, 5%, 1/4 W	2	CF 1/4-2.2K/J	09021	
R16	Same as R15				
U1	Voltage Regulator	1	7805UC	07263	
U2	Integrated Circuit	1	867442	14632	
U3	Integrated Circuit	3	LM324N	27014	
U4	Same as U3				
U5	Same as U3				
U6	Integrated Circuit	1	SN74LS138N	01295	
U7	Integrated Circuit	1	SN74LS32N	01295	
U8	Integrated Circuit	1	SN74LS04SN	01295	
VR1	Voltage Regulator: 5.6 V	1		1N752A	80131
VR2	Diode, Zener: 3.3 V	2		1N746A	80131
VR3	Same as VR2				
W1	Cable Assembly	1		380259-1	14632
W2	Cable Assembly	1		380259-2	14632
W3	Cable Assembly	1		380259-3	14632
W4	Cable Assembly	1		380259-4	14632
W5	Cable Assembly	1		380259-5	14632
XA1	Housing	11		117798-3	00779
XA2 Thru XA8	Same as XA1				
XA9	Housing, Connector	10	1-117798-6	00779	
XA10 Thru XA13	Same as XA9				
XA14	Same as XA1				
XA15	Same as XA1				
XA16	Same as XA1				
XA17 Thru XA21	Same as XA9				
XA22	Housing, Connector	1	88374-7	00779	

5.5.2.1 **Type 794094-1 VHF High-Band Preselector** REF DESIG PREFIX A3A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 100 V	6	34475-1	14632	
C2	Capacitor, Ceramic, Chip: 1000 pF, 10%, 50 V	10	M17CG102K50T	28733	
C3	Same as C2				
C4	Same as C1				
C5	Same as C2				
C6	Same as C2				
C7	Capacitor, Ceramic, Tubular: 1.5 pF, +.25 pF, 500 V	4	301-000COKO-159C	72982	
C8	Same as C7				
C9	Not Used				
C10	Capacitor, Variable, Air: .8-10 pF, 250 V	6	5202	91293	
C11	Same as C10				
C12	Same as C10				
C13	Not Used				
C14	Same as C2				
C15	Same as C2				
C16	Same as C10				
C17	Same as C7				
C18	Same as C10				
C19	Same as C7				
C20	Same as C10				
C21	Same as C2				
C22	Same as C2				
C23	Not Used				
C24	Capacitor, Ceramic, Disc: 3.3 pF, +.25 pF, 100 V	8	8101--100COJO-339C	72982	
C25	Not Used				
C26	Capacitor, Ceramic, Disc: 1.5 pF, ±0.1 pF, 100 V	2	8101-100COKO-159B	72982	
C27	Capacitor, Ceramic, Disc: 2.2 pF, ±0.25 pF, 100 V	8	8101-100COJO-229C	72982	
C28	Same as C26				
C29	Same as C27				
C30	Not Used				
C31	Not Used				
C32	Same as C24				
C33	Not Used				
C34	Not Used				
C35	Same as C27				
C36	Capacitor, Variable, Ceramic: 2-5 pF, 100 V	4	518-000A2-5	72982	
C37	Capacitor, Ceramic, Disc: 2.7 pF, +0.25 pF, 100 V	6	8101-100COJO-279C	72982	
C38	Not Used				
C39	Not Used				
C40	Same as C37				
C41	Same as C3f				

REF DESIG PREFIX **A3A3**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C42	Same as C27				
C43	Capacitor, Ceramic, Chip: 0.056 µF, GMV, 50 V	2	C2225C563P5XAH	05397	
C44	Same as C2				
C45	Capacitor, Ceramic, Disc: 1.8 pF, -0.1 pF, 100 V	4	8101-100COKO-189B	72982	
C46	Same as C24				
C47	Same as C24				
C48	Same as C37				
C49	Same as C24				
C50	Same as C37				
C51	Same as C24				
C52	Same as C24				
C53	Same as C45				
C54	Same as C24				
C55	Same as C2				
C56	Same as C45				
C57	Same as C27				
C58	Same as C36				
C59	Same as C37				
C60	Same as C27				
C61	Same as C27				
C62	Same as C37				
C63	Same as C36				
C64	Same as C27				
C65	Same as C45				
C66	Same as C43				
C67 Thru C70	Same as C1				
C71	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	4	B-GP10OOPFP	91418	
C72	Same as C71				
C73	Same as C71				
C74	Same as C71				
CR1	Diode	10	5082-3080	28480	
CR2	Same as CR1				
CR3	Diode	10	MPN3401	04713	
.CR4	Same as CR3				
CR5	Same as CR3				
CR6	Same as CR1				
CR7	Same as CR1				
CR8	Same as CR3				
CR9	Same as CR3				
CR10	Same as CR1				
CR11	Same as CR1				

REF DESIG PREFIX **A3A3**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
CR12	Same as CR3				
CR13	Same as CR3				
CR14	Same as CR1				
CR15	Same as CR1				
CR16	Same as CR3				
CR17	Same as CR3				
CR18	Same as CR1				
CR19	Same as CR1				
CR20	Same as CR3				
J1	Connector, Receptacle, SMC	4	109	19505	
J2	Same as J1				
J3	Same as JI				
J4	Same as JI				
L1	Coil, Fixed: 18 µH, 10%	2	1025-50	99800	
L2	Same as L1				
L3	Coil, Fixed	2	16209-11	14632	
L4	Same as L3				
L5	Coil, Fixed: 0.33 pH, 10%	2	1025-08	99800	
L6	Coil, Fixed:	2		22292-148	14632
L7	Coil, Fixed	1	22292-136	14632	
L8	Same as L5				
L9	Same as L6				
L10	Coil, Fixed: 0.56 µH, 10%	2	1025-14	99800	
L11	Coil, Fixed	1	22292-149	14632	
L12	Coil, Fixed	1	22292-133	14632	
L13	Same as L10				
L14	Coil, Fixed	1	22292-150	14632	
L15	Coil, Fixed: 1.2 µH, 10%	2		1025-22	99800
L16	Coil, Variable	2	34959-2	14632	
L17	Coil, Variable	2		34959-4	14632
L18	Coil, Variable	1	34959-5	14632	
L19	Same as L17				
L20	Same as L16				
L21	Same as L15				
L22	Coil, Fixed: 1.8 mH, 10%	2		1025-26	99800
L23	Coil, Variable	2	6813	04213	
L24	Coil, Variable	2	34959-3	14632	
L25	Coil, Variable	1	6814	04213	
L26	Same as L24				
L27	Same as L23				
L28	Same as L22				

REF DESIG PREFIX **A3A3**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R1	Resistor, Fixed, Film: 1 kΩ, 5%, 1/8 W	12	CF 1/8-1.OK/J	09021	
R2	Same as R1				
R3	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/8 W	1	CF 1/8-2.2K/J	09021	
R4 Thru R13	Same as R1				
R14	Resistor Network: 100 Ω	1	4308R-102-101	80294	

5.5.2.2 **Type 794095-3 VHF Low-Band Preselector** REF DESIG PREFIX **A3A4**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: .05 F, 10%, 50 V	2	8121-100-X7RO-472K	55969	
C2	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	6	34475-1	14632	
C3	Same as C2				
C4	Same as C1				
C5	Capacitor, Ceramic, Disc: 0.01 µF, 10%, 50 V	8	8121-100-W5RO-103K	72982	
C6	Same as C2				
C7 Thru C25	Not Used				
C26	Same as C5				
C27	Same as C5				
C28	Capacitor, Ceramic, Disc: 3.3 pF, 100 V	14	8101-100-COJO-339C	72982	
C29	Same as C28				
C30	Capacitor, Ceramic, Disc: 15 pF, 5%, 100 V	6	8111-100-COGO-150J	72982	
C31	Same as C30				
C32	Same as C28				
C33	Capacitor, Ceramic, Disc: 4.7 pF, +0.5 pF, 100 V	4	8101-100-COHO-479D	72982	
C34	Capacitor, Ceramic, Disc: 18 pF, 5%, 100 V	4	8111-100-COGO-339C	72982	
C35	Capacitor, Ceramic, Disc: 22 pF, 5%, 100 V	2	811-100-COGO-220J	72982	
C36	Same as C33				
C37	Same as C34				
C38	Same as C34				
C39	Same as C33				
C40	Same as C34				
C41	Same as C33				
C42	Same as C35				
C43	Same as C28				
C44	Same as C28				
C45	Same as C30				
C46	Same as C30				
C47	Same as C28				
C48	Same as C5				
C49	Same as C5				
C50	Not Used				
C51	Capacitor, Ceramic, Disc: 1.5 pF, +0.1 pF, 100 V	2	8101-100-COKO-159B	72982	
C52	Capacitor, Ceramic, Monolithic: 10 pF, +.5 pF, 100 V	4	8101-100-COGO-1OOD	72982	
C53	Same as C52				
C54	Same as C28				
C55	Capacitor, Ceramic, Disc: 2.2 pF, +.25 pF, 100 V	6	8101-100-COJO-229C	72982	
C56	Capacitor, Ceramic, Disc: 12 pF, 5%, 100 V	4	8111-100-COGO-120J	72982	
C57	Same as C30				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C58	Not Used				
C59	Same as C56				
C60	Same as C56				
C61	Same as C55				
C62	Same as C56				
C63	Not Used				
C64	Same as C30				
C65	Same as C28				
C66	Same as C51				
C67	Same as C52				
C68	Same as C52				
C69	Not Used				
C70	Same as C5				
C71	Same as C5				
C72	Same as C55				
C73	Same as C28				
C75	Same as C74				
C76	-Same as C28				
C77	Same as C28				
C78	Capacitor, Ceramic, Disc: 5.6 pF, +0.5 pF, 100 V	4	8101-100-COHO-569D	72982	
C79	Capacitor, Ceramic, Disc: 6.8 pF, +0.5 pF, 100 V	2	8101-100-COHO-689D	72982	
C80	Same as C55				
C81	Same as C78				
C82	Same as C78				
C83	Same as C28				
C84	Same as C78				
C85	Same as C55				
C86	Same as C79				
C87	Same as C28				
C88	Same as C28				
C89	Same as C74				
C90	Same as C74				
C91	Same as C55				
C92	Same as C5				
C93 Thru C96	Same as C2				
C97	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	5	B-GP1OO0PFP	91418	
C98 Thru C101	Same as C97				
CR1	Diode	16	MPN3401	04713	

REF DESIG PREFIX **A3A4**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
CR2 Thru CR16	Same as CR1				
J1	Connector, Receptacle, P. C. Mounting	2	109	19505	
J2	Same as J1				
L1	Coil, Fixed: 18 µH, 10%	2	1025-50	99800	
L2	Same as L1				
L3	Coil, Fixed: 47 µH, 10%	8	1025-60	99800	
L4	Same as L3				
L5	Not Used				
L6	Not Used				
L7	Not Used				
L8	Not Used				
L9	Not Used				
L10	Same as L3				
L11	Same as L3				
L12	Coil, Variable		2		6740-9
04213					
L13	Coil, Variable		2		6740-8
04213					
L14	Same as L5				
L15	Same as L13				
L16	Same as L12				
L17	Same as L3				
L18	Same as L3				
L19	Coil, Variable		2	6807	04213
L20	Coil, Variable		2	6808	04213
L21	Coil, Variable		1	6809	04213
L22	Same as L20				
L23	Same as L19				
L24	Same as L3				
L25	Same as L3				
L26	Coil, Variable		2	6810	04213
L27	Coil, Variable		2	6811	04213
L28	Coil, Variable		1	6812	04213
L29	Same as L27				
L30	Same as L26				
R1	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/8 W	4	CF 1/8-2.2K/J	09021	
R2	Same as R1				
R3	Same as R1				
R4	Same as R1				
R5	Resistor, Fixed, Film: 1 kΩ, 5%, 1/8 W	8	CF 1/8-1.OK/J	09021	

REF DESIG PREFIX **A3A4**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R6 Thru R12	Same as R5				
R13	Resistor Network: 100Ω	1	4308R-102-101	80294	

5.5.2.3 **Type 794097-2 Preamplifier** REF DESIG PREFIX **A3A5**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	500 MHz LP Filter	1	370285-2	14632	
C1	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	9	34453-1	72982	
C2	Same as CI				
C3	Same as C1				
C4	Same as C1				
C5	Capacitor, Ceramic, Disc: .05 pF, 10%, 50 V	2	1210-050-X7R-503KS	55969	
C6	Capacitor, Ceramic, Chip: 2200 pF, 10%, 50V	2	C1005C222K5XAH	26654	
C7	Same as C6				
C8	Same as C5				
C9 Thru C13	Same as C1				
C14	Capacitor, Ceramic, Disc: 1000 pF, 10%, 100 V	4	8121-100-X7RO-102K	72982	
C15	Same as C14				
C16	Same as C14				
C17	Same as C14				
CR1	Diode	3	5082-3080	28480	
CR2	Same as CR1				
CR3	Same as CR1				
CR4	Diode	3	5082-2800	28480	
CR5	Same as CR4				
CR6	Same as CR4				
J1	Connector, Receptacle	2	109	19505	
J2	Same as J1				
L1	Coil, Fixed	7	16209-10	14632	
L2 Thru L7	Same as L1				
R1	Not Used				
R2	Not Used				
R3	Not Used				
R4	Resistor, Fixed, Film: 499Ω, 1%, 1/10 W	1	RN55C4990F	81349	
R5	Resistor, Fixed, Film: 8.25 k, 1%, 1/10 W	2	RN55C8251F	81349	
R6	Same as R5				
R7	Resistor, Fixed, Film: 100Ω, 1%, 1/10 W	1	RN55CIOOOF	81349	
R8	Resistor, Fixed, Film: 412 kΩ, 1%, 1/4 W	1	CC4123F	01121	
R9	Resistor, Fixed, Film: 100Ω, 5%, 1/4 W	2	CF 1/4-100 OHMS/J	09021	
R10	Resistor, Fixed, Film: 38.3 kΩ, 1%, 1/10 W	1	RN55C3832F	81349	
R11	Resistor, Fixed, Film: 261 kΩ, 1%, 1/4 W	1	MF4C/261K/F	80031	
R12	Resistor, Fixed, Film: 100 kΩ, 1%, 1/10 W	5	RN55C1003F	81349	
R13	Resistor, Trimmer, Film: 100 kΩ, 10%, 1/2 W	1	62PAR100K	73138	
R14	Resistor, Fixed, Film: 9.09 kΩ, 1%, 1/10 W	1	RN55C9091F	81349	
R15	Resistor, Fixed, Film: 475 kΩ, 1%, 1/4 W	1	CC4753F	01121	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R16	Resistor, Fixed, Film: 121 kΩ, 1%, 1/4 W	1	MF4C/121 K/F	80031	
R17	Resistor, Fixed, Film: 6.19 kΩ, 1%, 1/10 W	1	RN55C6191F	81349	
R18	Resistor, Fixed, Film: 309 kΩ, 1%, 1/4 W	1	CC3093F	01121	
R19	Same as R12				
R20	Resistor, Fixed, Film: 42.2 kΩ, 1%, 1/10 W	1		RN55C4222F	81349
R21	Resistor, Fixed, Film: 619 kΩ, 1%, 1/4 W	1		CC6193F	01121
R22	Same as R12				
R23	Resistor, Fixed, Film: 68.1 kΩ, 1%, 1/10 W	1	RN55C6812F	81349	
R24	Same as R9				
R25	Same as R12				
R26	Resistor, Fixed, Film: 34.8 kΩ,, 1%, 1/10 W	1	RN55C3482F	81349	
R27	Same as R12				
R28	Resistor, Fixed, Film: 21.5 kΩ, 1%, 1/10 W	1	RN55C2152F	81349	
R29	Resistor, Trimmer, Film: 20 kΩ,, 10%, 1/2 W	1	62PAR20K	73138	
R30	Not Used				
R31	Not Used				
RT1	Thermistor: 3.9 kΩ,, 5%, 1/8 W	1	DG125-392J	15454	
U1	Amplifier: 10-500 MHz	1	QBH-110	55027	
U2	Integrated Circuit	1	747HC	07263	
VR1	Diode: Zener, 6.3 V Silicon	1	.4M6.3AZ2	04713	

5.5.2.3.1 **Type 370285-2 500 MHz LP Filter** REF DESIG PREFIX A3A5A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Not Used				
C2	Capacitor, Variable, Air: .8-10 pF, 250 V	4	5202	91293	
C3	Not Used				
C4	Same as C2				
C5	Not Used				
C6	Same as C2				
C7	Not Used				
C8	Same as C2				
E1	Terminal, Feedthru	2	FT-SM-19S2011-1040	98291	
E2	Same as El				
L1	Inductor	1	170203-1	14632	
L2	Part of L1				
L3	Part of L1				
L4	Inductor	1	180074-1	14632	
L5	Part of L1				
L6	Inductor	1	180075-1	14632	
L7	Part of L1				
L8	Inductor	1	180076-1	14632	
L9	Part of L8				

5.5.2.4 **Type 794096-2 1st Converter** REF DESIG PREFIX **A3A6**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	1st Converter Chassis	1	370284-1	14632	
C1	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	1	34453-1	14632	
L1	Coil, Fixed: 0.1 µH	1		1025-94	99800

5.5.2.4.1 **Part 370284-1 1st Converter Chassis** REF DESIG PREFIX **A3A6A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	Mixer/IF Assembly	1		280279-1	14632
C1	Capacitor, Modified: 500 V	3		33728-14	14632
C2	Same as C1				
C3	Same as C1				
C4	Capacitor, Variable, Air: 0.8-10 pF, 250 V	7		5752	91293
C5	Capacitor, Composition, Tubular: .2 pF, 10%, 500 V	2		QCO.2PFK	95121
C6	Same as C4				
C7	Capacitor, Composition, Tubular: .15 pF, 10%, 500 V	1	QCO.15PFK	95121	
C8	Same as C4				
C9	Same as C5				
C10	Same as C4				
C11	Not Used				
C12	Capacitor, Variable, Air: .4-6 pF, 250 V	1		MVMO06	73899
C13	Capacitor, Ceramic, Mono: 470 pF, 5%, 100 V	2		8121-100COGO-471J	
72982					
C14	Same as C13				
C15	Capacitor, Ceramic, Chip: 200 pF, 500 V	1	32-257578-40	91984	
C16	Capacitor, Ceramic, Chip: 1.5 pF, +.1 pF, 500 V	1	ATC700BIR5BP50OX	29990	
C17	Not Used				
C18	Same as C4				
C19	Capacitor, Composition, Tubular: .27 pF, 10%, 500 V	2	QCO.27PFK	95121	
C20	Same as C4				
C21	Same as C19				
C22	Same as C4				
E1	Terminal, Insulated, Feedthru	1	SFU16Y	04013	
E2	Terminal, Insulated, Standoff	2	SOSI	04013	
E3	Same as E2				
FB1	Ferrite Bead	2	P5-1288	01037	
FB2	Same as FB1				
J1	Connector, Jack, SMC	3	10-0104-002	19505	
J2	Same as J1				
J3	Same as J1				
JW1	Not Used				
JW2	Wire, Electronic, Buss	AR	8020	70903	
L1	Inductor Assembly	7	190121-1	14632	
L2	Same as L1				
L3	Same as L1				
L4	Same as L1				
L5	Inductor	1	190123-1	14632	
L6	Coil, Fixed, Molded: 0.22 µH	1	1025-04	99800	
L7	Inductor	1	190147-1	14632	
L8	Same as L1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
L9	Same as L1				
L10	Same as L1				
L11	Coil	1	16209-10	14632	
L12	Inductor	1	280327-1	14632	
Q1	Transistor	1	SD203	18324	
R1	Resistor, Fixed, Film: 12 kΩ, 5%, 1/8 W	1	CF 1/8-12K/J	09021	
R2	Resistor, Fixed, Composition: 5.6 kΩ, 5%, 1/8 W	1	RCR05G562JS	81349	
R3	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	1	CF 1/8-100 OHMS/J	09021	
R4	Resistor, Fixed, Film: 22Ω, 5%, 1/8 W	1	CF 1/8-22 OHMS/J	09021	
U1	Mixer, Double Balanced	1	841066	14632	
U2	Amplifier	1	A17	14482	

5.5.2.4.1.1 **Part 280279-1 Mixer/IF Assembly** REF DESIG PREFIX **A3A6A1A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Chip: 5.1 pF, t.5 pF, 500 V	I	ATC700B5R1CP50OX	29990	
C2	Capacitor, Ceramic, Chip: 2.4 pF, +.25 pF, 500 V	1	ATC700B2R4CP500	29990	
L1	Coil, Fixed	2	170160-1	14632	
L2	Same as L1				

5.5.2.5 **Type 716003-1 2nd Converter** REF DESIG PREFIX **A3A7**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	LO Amplifier Assembly	1	370396-1	14632	
C1	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	22	34453-1	14632	
C2 Thru C8	Same as C1				
C9	Capacitor, Mica, Dipped: 150 pF, 2%, 500 V	1	CM04FD151G03	81349	
C10 Thru C23	Same as C1				
C24	Capacitor, Mica, Dipped: 110 pF, 2%, 500 V	1	CM04FDlllG03	81349	
C25	Capacitor, Ceramic, Mono: 10 pF, 5%, 100 V	1	8101-100COGO-100D	72982	
C26	Capacitor, Ceramic, Chip: 0.056 µF, GMV, 50 V	1	C225C563P5XAH	05397	
C27	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	2		34475-1	14632
C28	Same as C27				
C29	Capacitor, Ceramic, Chip: 4.3 pF, 500 V	1	ATC700B4R3DP50OX	29990	
CR1	Diode	3		5082-3081	28480
CR2	Same as CR1				
CR3	Same as CR1				
CR4	Diode	10	MPN3401	04713	
CR5 Thru CR13	Same as CR4				
CR14	Diode	3	5082-2800	28480	
CR15	Same as CR14				
CR16	Same as CR14				
E1	Terminal	2	140-1941-02-01	71279	
E2	Same as El				
FB1	Ferrite Bead	4	P5-1288	01037	
FB2	Same as FB1				
FB3	Same as FB1				
FB4	Same as FB1				
L1	Coil, Fixed: 10 µh	2	1025-44	99800	
L2	Same as L1				
L3	Coil, Fixed: 0.33 µH	2	1025-08	99800	
L4	Same as L3				
L5	Coil, Fixed, Mold: 27 µH	1	1025-54	99800	
L6	Coil, Fixed: 39 µH, 10%,	2	1537-56	71279	
L7	Same as L6				
R1	Resistor, Fixed, Film: 34.8 kΩ,, 1%, 1/10 W	1	RN55C3482F	81349	
R2	Resistor, Variable, Film: 20 kΩ, 10%, 1/2 W	1	62PR20K	73138	
R3	Resistor, Fixed, Film: 100 kΩ, 1%, 1/10 W	5	RN55C1003F	81349	
R4	Resistor, Fixed, Film: 6.19 kΩ, 1%, 1/10 W	1	RN55C6191F	81349	
R5	Resistor, Fixed, Film: 68.1 kΩ, 1%, 1/10 W	1	RN55C6812F	81349	

REF DESIG PREFIX **A3A7**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R6	Resistor, Fixed, Film: 21.5 kΩ,, 1%, 1/10 W	1	RN55C2152F	81349	
R7	Same as R3				
R8	Same as R3				
R9	Resistor, Fixed, Film: 309 kΩ,, 1%, 1/4 W	1	CC3039F	01121	
R10	Resistor, Fixed, Film: 619 kΩ,, 1%, 1/4 W	1	CC6193F	01121	
R11	Same as R3				
R12	Resistor, Fixed, Film: 475 kΩ,, 1%, 1/4 W	1	CC4753F	01121	
R13	Same as R3				
R14	Resistor, Fixed, Film: 38.3 k, , 1%, 1/10 W	1	RN55C3832F	81349	
R15	Resistor, Variable, Film: 100 kΩ, 10%, 1/2 W	1	62PR100K	73138	
R16	Resistor, Fixed, Film: 261 kΩ,, 1%, 1/10 W	1	MF4C/261K/F	80031	
R17	Resistor, Fixed, Film: 121 kΩ, 1%, 1/4 W	1	MF4C/121K/F	80031	
R18	Resistor, Fixed, Film: 9.09 kΩ, 1%, 1/10 W	1	RN55C9091F	81349	
R19	Resistor, Fixed, Film: 42.2 kΩ, 1%, 1/10 W	1	RN55C4222F	81349	
R20	Resistor, Fixed, Film: 412 kΩ, 1%, 1/4 W	1	CC4123F	01121	
R21	Resistor, Fixed, Film: 110 a, 5%, 1/8 W	1	CFI/8-110 OHMS/J	09021	
R22	Resistor, Fixed, Film: 62 AI, 5%, 1/8 W	1	CF1/8-62 OHMS/J	09021	
R23	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	2	CF1/8-4.7K/J	09021	
R24	Same as R23				
R25	Resistor, Fixed, Film: 825sf, 1%, 1/10 W	1	RN55C8250F	81349	
R26	Resistor, Fixed, Film: 100 , 5%, 1/8 W	1	CF1/8-100 OHMS/J	09021	
R27	Resistor, Fixed, Film: 10 k, 5%, 1/8 W	5	CF1/8-10K/J	09021	
R28	Resistor, Fixed, Film: 620 a, 5%, 1/8 W	5	CF1/8-620 OHMS/J	09021	
R29	Same as R27				
R30	Same as R28				
R31	Same as R27				
R32	Same as R28				
R33	Same as R27				
R34	Same as R28				
R35	Same as R27				
R36	Same as R28				
R37	Resistor, Fixed, Film: 390 Ω, 5%, 1/8W	1	CF1/8-390 OHMS/J	09021	
RT1	Thermistor: 3.9 kΩ, 5%, 1/8 W	1	DG125-392J	15454	
U1l	Integrated Circuit	1	747HC	07263	
U2	Integrated Circuit	1	CA2818	01281	
U3	Amplifier	1	A59	27956	
VR1	Voltage Regulator	1	.4M6.3AZ2	04713	

5.5.2.5.1 **Part 370396-1 LO Amplifier Assembly** REF DESIG PREFIX **A3A7A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	LO Amplifier Board	1	270082-1	14632	
C1	Capacitor, Ceramic, Feedthru: 470pF, 20%, 500 V	1	54-794-009-4	33095	
C2	Capacitor, Ceramic, Feedthru: 33pF, 10%, 500 V	1	54-794-001-3301	33095	
E1	Termination	1	55-037-3875-91	98291	
FBI	Ferrite Bead	4	56-590-65-4A	02114	
FB2	Same as FB1				
FB3	Same as FB1				
FB4	Same as FB1				
J1	Connector, Receptacle, SMC, Right Angle	1	112	19505	
L1	Coil, Fixed: 2.7 MHz, 10%	1	1025-30	99800	
P1	Connector, Plug, SMC	1	50-328-3875-91	98291	
R1	Resistor, Fixed, Film: 330Ω, 5%, 1/8 W	1	C3-330R-5PCT	81349	
R2	Resistor, Fixed, Film: 18 Ω, 5%, 1/8 W	1	C3-18R-SPCT	81349	
W1	Cable Assembly	1	17300-188-2	14632	

5.5.2.5.1.1 **Part 270082-1 LO Amplifier Board** REF DESIG PREFIX **A3A7A1A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Chip: 47 pF, 5%, 500 V	3	ATC10OB470JP500	29990	
C2	Capacitor, Ceramic, Chip: 2.1 pF, +0.1 pF, 500 V	1	ATC700B2R1BP500	29990	
C3	Capacitor, Ceramic, Chip: 470 pF, 10%, 200 V	2	ATC700B471KP200	29990	
C4	Same as C1				
C5	Same as C1				
C6	Capacitor, Ceramic, Chip: 1000 pF, 20%, 50 V	1	ATC700B102MP50	29990	
C7	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	1	34453-1	14632	
C8	Capacitor, Ceramic, Chip: 24 pF, 5%, 500 V	2	ATC700B240JP500	29990	
C9	Capacitor, Mica, Dipped: 12 pF, 5%, 500 V	2	CM04CD120J03	81349	
C10	Capacitor, Mica, Dipped: 22 pF, 5%, 500 V	1	CM04ED220G03	81349	
C11	Same as C9				
C12	Same as C8				
C13	Same as C3				
C14	Capacitor, Ceramic, Chip: 15 pF, 15%, 500 V	1	ATC700B15OJP50OX	29990	
L1	Coil, Fixed: 0.68 µH	1	1025-16	99800	
L2	Coil, Fixed	2	1129-46	14632	
L3	Same as L1				
L4	Not Used				
L5	Coil, Fixed: 33 µH, 10%	1	1025-56	99800	
L6	Coil, Variable	3	6740-15	04213	
L7	Same as L6				
L8	Same as L6				
Q1	Transistor	2	BFR-96	73445	
Q2	Same as Q1				
R1	Resistor, Fixed, Film: 82.5 Ω, 1%, 1/10 W	1	RN55C82R5F	81349	
R2	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	2	C3-10OR-5PCT	81349	
R3	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/8 W	1	C3-2.2K-5PCT	24546	
R4	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	2	C3-1K-5PCT	24546	
RS	Resistor, Fixed, Film: 2.7Ω, 5%, 1/8 W	2	CF1/8-2.7 OHMS/J	09021	
R6	Resistor, Fixed, Film: 330Ω, 5%, 1/8 W	3	C3-330R-5CT	24546	
R7	Same as RS				
R8	Same as R2				
R9	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W	1	C3-2.7K-5PCT	24546	
R10	Same as R4				
R11	Resistor, Fixed, Film: 18Ω, 5%, 1/8 W	1	C3-330R-5PCT	24546	
R12	Same as R6				
R13	Same as R6				
R14	Resistor, Fixed, Film: 47Ω, 5%, 1/8 W	1	CF1/8-47 OHMS/J	09021	
U1	Mixer, Double Balanced	1	M2B	14482	

5.5.2.6 **Type 784002-2 AGC Amplifier** REF DESIG PREFIX **A3A8**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V		3	196D225X0035JE3	56289
C2	Capacitor, Ceramic, Disc: 0.1 pF, 20%, 50 V		4	34475-1	14632
C3	Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V		2	196D475X003JE3	56289
C4	Same as C2				
C5	Capacitor, Electrolytic, Tantalum: 45 µF, 20%, 30 V		1	MTP456M030PIB	76055
C6	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V		9	34453-1	14632
C7	Same as C6				
C8	Same as C1				
C9 Thru C12	Same as C6				
C13	Same as C1				
C14	Same as C2				
C15	Not Used				
C16	Not Used				
C17	Not Used				
C18	Capacitor, Electrolytic, Tantalum: 10 µF, 20%, 30 V	2	MPT106M030P1A	76055	
C19	Same as C6				
C20	Same as C6				
C21	Same as C18				
C22	Same as C2				
C23	Same as C3				
C24	Same as C6				
C25	Capacitor, Electrolytic, Tantalum: 3.3 µF, 20%, 35 V	2	196D335X0035JE3	56289	
C26	Same as C25				
CR1	Diode	8	1N462A	80131	
CR2 Thru CR8	Same as CR1				
L1	Coil, Fixed: 3000 µH, 5%		1	2500-50	99800
L2	Coil, Fixed: 330 µH, 5%		1	2500-04	99800
Q1	Transistor		4		2N2222A
80131					
Q2	Transistor		1		2N3251
80131					
Q3	Same as Q1				
Q4	Same as Q1				
Q5	Transistor	5	2N4037	80131	
Q6 Thru Q9	Same as QS5				
Q10	Same as Q1				
R1	Resistor, Fixed, Film: 47 Ω, 5%, 1/8 W		1	CF1/8-47 OHMS/J	09021
R2	Resistor, Fixed, Film: 2.2 kΩ,I, 5%, 1/4 W		1		CF1/8-2.2K/J
09021					
R3	Resistor, Fixed, Film: 22 Ω, 5%, 1/8 W		1		CF1/8-22
OHMS/J	09021				

REF DESIG PREFIX **A3A8**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R4	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	5	CF1/8-100K/J	09021	
R5	Resistor, Fixed, Film: 510 kΩ, 5%, 1/8 W	1	CF1/8-510K/J	09021	
R6	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	1	CFI/8-100 OHMS/J	09021	
R7	Resistor, Fixed, Film: 220 kΩ,, 5%, 1/8 W	1	CF1/8-220K/J	09021	
R8	Resistor, Fixed, Film: 56 kΩ,2, 5%, 1/8 W	1	CF1/8-56K/J	09021	
R9	Resistor, Trim, Film: 50 kΩ, 10%, 1/2 W	2	62PAR50K	73138	
R10	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	5	CF1/8-1OK/J	09021	
R11	Resistor, Fixed, Film: 82 kΩ, 5%, 1/8 W	1	CF1/8-82K/J	09021	
R12	Same as R9				
R13	Same as R4				
R14	Not Used				
R15	Resistor, Fixed, Film: 3.6 kΩ, 10%, 1/2 W	1	CF1/2-3.6K/J	09021	
R16	Same as R4				
R17	Resistor, Fixed, Film: 2.2 kΩ,, 5%, 1/8 W	4	CF1/8-2.2K/J	09021	
R18	Resistor, Fixed, Film: 6.8 kΩ, 5%, 1/8 W	2	CF1/8-6.8K/J	09021	
R19	Resistor, Fixed, Film: 392 Ω, 1%, 1/10 W	1	RN55C3920F	81349	
R20	Resistor, Trim, Film: 10 kΩ, 10%, 1/2 W	1	62PR10K	73138	
R21	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W	1	CF1/8-2.7K/J	09021	
R22	Resistor, Fixed, Film: 8.2 kΩ, 5%, 1/8 W	1	CF1/8-8.2K/J	09021	
R23	Resistor, Fixed, Film: 1 kΩ, 5%, 1/8 W	4	CF1/8-1K/J	09021	
R24	Resistor, Fixed, Film: 3.92 kΩ, 1%, 1/10 W	1	RN55C3921F	81349	
R25	Resistor, Fixed, Film: 4.75 kΩ, 1%, 1/10 W	1	RN55C4751F	81349	
R26	Resistor, Fixed, Film: 2.61 kΩ, 1%, 1/10 W	1	RN55C2611F	81349	
R27	Resistor, Fixed, Film: 12 kΩ, 5%, 1/8 W	2	CF1/8-12K/J	09021	
R28	Resistor, Fixed, Film: 150 kΩ, 5%, 1/8 W	1	CF1/8-150K/J	09021	
R29	Resistor, Fixed, Film: 470 Ω, 5%, 1/8 W	1	CF1/8-470K/J	09021	
R30	Resistor, Fixed, Film: 10 kΩ, 1%, 1/10 W	1	RN55C1002F	81349	
R31	Resistor, Fixed, Film: 2.0 kΩ, 1%, 1/10 W	1	RN55C2001F	81349	
R32	Resistor, Fixed, Film: 7.5 kΩ, 5%, 1/8 W	1	CF1/8-7.5K/J	09021	
R33	Resistor, Fixed, Film: 1.3 kΩ, 5%, 1/8 W	1	CF1/8-1.3K/J	09021	
R34	Resistor, Fixed, Film: 15 kΩ, 5%, 1/8 W	2	CF1/8-15K/J	09021	
R35	Resistor, Fixed, Film: 2 kΩ, 5%, 1/8 W	1	CF1/8-2K/J	09021	
R36	Resistor, Fixed, Film: 3.9 kΩ, 5%, 1/8 W	1	CF1/8-3.9K/J	09021	
R37	Same as R10				
R38	Same as R10				
R39	Same as R10				
R40	Not Used				
R41	Same as R18				
R42	Same as R4				
R43	Same as R4				
R44	Resistor, Fixed, Film: 324 Ω, 1%, 1/10 W	1	RN55C3240F	81349	

REF DESIG PREFIX **A3A8**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R45	Resistor, Fixed, Film: 1.18 kΩ, 1%, 1/10 W	1	RN55Cl181F	81349	
R46	Same as R34				
R47	Resistor, Fixed, Film: 82 kΩ, 5%, 1/8 W	1	CF1/8-82K/J	09021	
R48	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	10	CF1/8-4.7K/J	09021	
R49 Thru R57	Same as R48				
R58	Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/8 W	1	CF1/8-3.3K/J	09021	
R59	Resistor, Fixed, Film: 16.2 kΩ 1%, 1/10 W	1	RN55C1622F	81349	
R60	Resistor, Fixed, Film: 8.66 kΩ, 1%, 1/10 W	1	RN55C8661F	81349	
R61	Same as R17				
R62	Same as R17				
R63	Same as R10				
R64	Same as R17				
R65	Resistor, Fixed, Film: 120 in, 5%, 1/8 W	1	CF1/8-120 OHMS/J	09021	
R66	Resistor, Variable, Film: 2 kΩ, 10%, 1/2 W	1	62PR2K	73138	
R67	Resistor, Fixed, Film: 11.5 kΩ, 1%, 1/10 W	1	RN5561152F	81349	
R68	Resistor, Fixed, Film: 270 kΩ, 5%, 1/8 W	1	CF1/8-270K/J	09021	
R69	Resistor, Fixed, Film: 30 kΩ, 5%, 1/8 W	1	CF1/8-30K/J	09021	
R70	Resistor, Variable, Film: 10 kΩ, 10%, 1/2 W	1	62PAR10K	73138	
R71	Resistor, Fixed, Film: 33 kΩ, 5%, 1/8 W	1	CF1/8-33K/J	09021	
R72	Resistor, Variable, Film: 100 kΩ, 10%, 1/2 W	1	62PAR100K	73138	
R73	Resistor, Fixed, Film: 1.0 Ω, 5%, 1/4 W	1	CF1/4-1.OM/J	09021	
R74	Same as R23				
R75	Same as R23				
R76	Same as R27				
R77	Same as R23				
TP1	Jack Tip: RT Angle, Brown	1	TJ202BR	49956	
TP2	Jack Tip: RT Angle, Red	1	TJ203R	49956	
TP3	Jack Tip: RT Angle, Orange	1	TJ2040R	49956	
U1	Integrated Circuit	1	LM337H	27014	
U2	Integrated Circuit	1	DG303CJ	17856	
U3	Integrated Circuit	2	DG200BA	17856	
U4	Same as U3				
U5	Integrated Circuit	3	MC3403P	04713	
U6	Same as U5				
U7	Same as U5				
U8	Integrated Circuit	1	DG301CJ	17856	
U9	Integrated Circuit	1	SN54LS145J	01295	
VR1	Voltage Regulator: 5.6 V	1	1N752A	80131	
VR2	Voltage Regulator: 5.1 V	1	1N751A	80131	

5.5.2.7 **Type 724006-1 21.4 MHz IF Amplifier (10 kHz BW)** REF DESIG PREFIX **A3A9-A3A13**
and Type 7924006-16 21.4 MHz IF Amplifier (3.2 kHz BW)

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Not Used				
C2	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	12	8121-050-651-472M	72982	
C3 Thru C8	Same as C2				
C9	Capacitor, Mica, Dipped: 24 pF, 5%, 500 V	1	CM04ED240J03	81349	
C10 Thru C14	Same as C2				
C15	Capacitor, Variable, Ceramic: 5-25 pF, 100 V NPO	1	518-002A5-25	72982	
CR1	Diode	1	1N462A	80131	
FL1	Filter, BP	1	92001	14632	
L1	Coil, Fixed: 2.7 pH, 10%	1	1537-22	99800	
L2	Coil, Fixed	1	22295-66	14632	
L3	Coil, Fixed: 18 pH, 10%	1	1537-42	99800	
Q1	Transistor	1	3N211	80131	
Q2	Transistor	1	2N2857	80131	
R1	Resistor, Fixed, Film: 210 Ω, 1%, 1/10 W	1	RN55C2100F	81349	
R2	Resistor, Fixed, Film: 2.2 kg, 5%, 1/4 W	1	CF1/4-2.2K/J	09021	
R3	Resistor, Variable, Film: 10 kΩ, 10%, 1/2 W	1	62PAR10K	73138	
R4	Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W	1	CF1/4-15K/J	09021	
R5	Resistor, Fixed, Film: 10 kg, 5%, 1/4 W	1	CF1/4-IOK/J	09021	
R6	Resistor, Fixed, Film: 68 kΩ, 5%, 1/4 W	1	CF1/4-68K/J	09021	
R7	Resistor, Fixed, Film: 100 Ω, 5%, 1/4	4	CF1/4-100 OHMS/J	09021	
R8	Resistor, Fixed, Film: 120 Ω, 5%, 1/4 r;	1	CF1/4-120 OHMS/J	09021	
R9	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	3	CF1/4-47 OHMS/J	09021	
R10	Same as R7				
R11	Not Used				
R12	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W	1	CF1/4-4.7K/J	09021	
R13	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	1	CF1/4-22K/J	09021	
R14	Same as R9				
R15	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R16	Same as R7				
R17	Resistor, Fixed, Film: 33 Ω, 5%, 1/4 W	1	CF1/4-33 OHMS/J	09021	
R18	Same as R7				
R19	Resistor, Variable, Film: 500 Ω, 10%, 1/2 W	1	62PR500	73138	
R20	Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/4 W	1	CF1/4-3.3K/J	09021	
R21	Same as R9				
T1	Transformer	1	T4-1	15542	
*	3.2 kHz BW				
FL1	Filter, BP	1	92272	14632	

5.5.2.8 **Type 724006-2 21.4 MHz IF Amplifier (20 kHz BW)** REF DESIG PREFIX **A3A9-A3A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Not Used				
C2	Capacitor, Ceramic, Disc: 4700 pF, +20%, 50 V	12	8121-050-651-472M	72982	
C3 Thru C8	Same as C2				
C9	Capacitor, Mica, Dipped: 24 pF, 5%, 500 V	1	CM04ED240J03	81349	
C10 Thru C14	Same as C2				
C15	Capacitor, Variable, Ceramic: 5-25 pF, 100 V NPO	1	518-002A5-25	72982	
CR1	Diode	1	1N462A	80131	
FL1	Filter, BP	1	92002	14632	
L1	Coil, Fixed: 2.7 µH, 10%	1	1537-22	99800	
L2	Coil, Fixed: 1 µH, 10%	1	1537-12	99800	
L3	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
Q1	Transistor	1	3N211	80131	
Q2	Transistor	1	2N2857	80131	
R1	Resistor, Fixed, Film: 210 Ω, 5%, 1/4 W	1	RN55C2100F	81349	
R2	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/4 W	1	CF1/4-2.2K/J	09021	
R3	Resistor, Trim, Film: 10 kΩ, 10%, 1/2 W	1	62PAR10K	73138	
R4	Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W	1	CF1/4-15K/J	09021	
R5	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-IOK/J	09021	
R6	Resistor, Fixed, Film: 68 kΩ, 5%, 1/4 W	1	CF1/4-68K/J	09021	
R7	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	3	CF1/4-100 OHMS/J	09021	
R8	Resistor, Fixed, Film: 120 Ω, 5%, 1/4 W	1	CF1/4-120 OHMS/J	09021	
R9	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	3	CF1/4-47 OHMS/J	09021	
R10	Same as R7				
R11	Resistor, Fixed, Film: 3.9 kΩ, 5%, 1/4 W	1	CF1/4-3.9K/J	09021	
R12	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W	1	CF1/4-4.7K/J	09021	
R13	Resistor, Fixed, Film: 22 kΩ,l5%, 1/4 W	1	CF1/4-22K/J	09021	
R14	Same as R9				
R15	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R16	Same as R7				
R17	Resistor, Fixed, Film: 33 Ω, 5%, 1/4 W	1	CF1/4-33 OHMS/J	09021	
R18	Resistor, Fixed, Film: 330 Ω, 5%, 1/4 W	1	CF1/4-330 OHMS/J	09021	
R19	Resistor, Trim, Film: 500 Ω, 10%, 1/2 W	1	62PR500	73138	
R20	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/4 W	1	CF1/4-2.7K/J	09021	
R21	Same as R9				
T1	Transformer	1	T4-1	15542	

5.5.2.9 Type 724006-3 21.4 MHz IF Amplifier (50 kHz BW) REF DESIG PREFIX A3A9-A3A13

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Not Used				
C2	Capacitor, Ceramic, Disc: 4700 pF, *20%, 50 V	12	8121-050-651-472M	72982	
C3 Thru C8	Same as C2				
C9	Capacitor, Mica, Dipped: 24 pF, 5%, 500 V	1	CM04ED240J03	81349	
C10 Thru C14	Same as C2				
C15	Capacitor, Variable, Ceramic: 5-25 pF, 100 V NPO	1	518-002A5-25	72982	
CR1	Diode	1	1N462A	80131	
FLI	Filter, BP	1	92000	14632	
L1	Coil, Fixed: 2.7 pH, 10%	1	1537-22	99800	
L2	Coil, Fixed: 1 pH, 10%	1	1537-12	99800	
L3	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
Q1	Transistor	1	3N211	80131	
Q2	Transistor	1	2N2857	80131	
R1	Resistor, Fixed, Film: 210 Ω, 5%, 1/4 W	1	RN55C2100F	81349	
R2	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/4 W	1	CF1/4-2.2K/J	09021	
R3	Resistor, Variable, Film: 10 kΩ, 10%, 1/2 W	1	62PAR1OK	73138	
R4	Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W	1	CF1/4-15K/J	09021	
R5	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-1OK/J	09021	
R6	Resistor, Fixed, Film: 68 kΩ, 5%, 1/4 W	1	CF1/4-68K/J	09021	
R7	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	3	CF1/4-100 OHMS/J	09021	
R8	Resistor, Fixed, Film: 120 Ω, 5%, 1/4 W	1	CF1/4-120 OHMS/J	09021	
R9	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	3	CF1/4-47 OHMS/J	09021	
R10	Same as R7				
R11	Resistor, Fixed, Film: 1.3 kΩ, 5%, 1/4 W	1	CF1/4-1.3K/J	09021	
R12	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W	1	CF1/4-22K/J	09021	
R13	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	1	CF1/4-22K/J	09021	
R14	Same as R9				
R15	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R16	Same as R7				
R17	Resistor, Fixed, Film: 33 Ω, 5%, 1/4 W	1	CF1/4-33 OHMS/J	09021	
R18	Resistor, Fixed, Film: 680 Ω, 5%, 1/4 W	1	CF1/4-680 OHMS/J	09021	
R19	Resistor, Variable, Film: 500 Ω, 10%, 1/2 W	1	62PR500	73138	
R20	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/4 W	1	CF1/4-2.7K/J	09021	
R21	Same as R9				
T1	Transformer	1	T4-1	15542	

5.5.2.10 **Type 724006-9 21.4 MHz IF Amplifier (75 kHz BW)** REF DESIG PREFIX A3A9-A3A13

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Not Used				
C2	Capacitor, Ceramic, Disc: 4700 pF, +20%, 50 V	12	8121-050-651-472M	72982	
C3 Thru C8	Same as C2				
C9	Capacitor, Mica, Dipped: 24 pF, 5%, 500 V	1	CM04ED240J03	81349	
C10 Thru C14	Same as C2				
C15	Capacitor, Variable, Ceramic: 5-25 pF, 100 V NPO	1	518-002A5-25	72982	
CR1	Diode	1	1N462A	80131	
FL1	Filter, BP	1	92230	14632	
L1	Coil, Fixed: 2.7 µH, 10%	1	1537-22	99800	
L2	Coil, Fixed:	1	22295-66	14632	
L3	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
Q1	Transistor	1	3N211	80131	
Q2	Transistor	1	2N2857	80131	
R1	Resistor, Fixed, Film: 210 Ω, 1%, 1/10 W	1	RN55C2100F	81349	
R2	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/4 W	2	CF1/4-22K/J	09021	
R3	Resistor, Variable, Film: 10 kΩ, 10%, 1/2 W	1	62PAR10K	73138	
R4	Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W	1	CF1/4-15K/J	09021	
RS	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-O1K/J	09021	
R6	Resistor, Fixed, Film: 68 kΩ, 5%, 1/4 W	1	CF1/4-68K/J	09021	
R7	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 '	3	CF1/4-100 OHMS/J	09021	
R8	Resistor, Fixed, Film: 120 Ω, 5%, 1/4	1	CF1/4-120 OHMS/J	09021	
R9	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	3	CF1/4-47 OHMS/J	09021	
R10	Same as R7				
R11	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/4 W	1	CF1/4-1.OK/J	09021	
R12	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W	1	CFI/4-4.7K/J	09021	
R13	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	1	CF1/4-22K/J	09021	
R14	Same as R9				
R15	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R16	Same as R7				
R17	Resistor, Fixed, Film: 33 Ω, 5%, 1/4 W	1	CF1/4-33 OHMS/J	09021	
R18	Resistor, Fixed, Film: 680 Ω, 5%, 1/4 W	1	CF1/4-680 OHMS/J	09021	
R19	Resistor, Trim, Film: 1 kΩ, 10%, 1/2 W	1	62PR1K	73138	
R20	Same as R2				
R21	Same as R9				
T1	Transformer	1	T4-1	15542	

5.5.2.11 **Type 724006-4 21.4 MHz IF Amplifier (100 kHz BW)** REF DESIG PREFIX **A3A9-A3A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Not Used				
C2	Capacitor, Ceramic, Disc: 4700 pF, +20%, 50 V	12	8121-050-651-472M	72982	
C3 Thru C8	Same as C2				
C9	Capacitor, Mica, Dipped: 24 pF, 5%, 500 V	1	CM04ED240J03	81349	
C10 Thru C14	Same as C2				
C15	Capacitor, Variable, Ceramic: 5-25 pF, 100 V NPO	1	518-002A5-25	72982	
CR1	Diode	1	1N462A	80131	
FL1	Filter, BP	1	92024	14632	
L1	Coil, Fixed: 2.7 µH, 10%	1	1537-22	Ω99800	
L2	Coil, Fixed: 1 µH, 10%	1	1537-12	99800	
L3	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
Q1	Transistor	1	3N211	80131	
Q2	Transistor	1	2N2857	80131	
R1	Resistor, Fixed, Film: 210 , 5%, 1/10 W	1	RN55C2100F	81349	
R2	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/4 W	2	CF1/4-2.2K/J	09021	
R3	Resistor, Variable, Film: 10 kΩ, 10%, 1/2 W	1	62PAR10OK	73138	
R4	Resistor, Fixed, Film: 15 kΩ,l5%, 1/4 W	1	CF1/4-15K/J	09021	
R5	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-1OK/J	09021	
R6	Resistor, Fixed, Film: 68 kΩ, 5%, 1/4 W	1	CF1/4-68K/J	09021	
R7	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	3	CF1/4-100 OHMS/J	09021	
R8	Resistor, Fixed, Film: 120 Ω, 5%, 1/4 W	1	CF1/4-120 OHMS/J	09021	
R9	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	3	CF1/4-47 OHMS/J	09021	
R10	Same as R7				
R11	Resistor, Fixed, Film: 750 Ω, 5%, 1/4 W	1	CF1/4-750 OHMS/J	09021	
R12	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W	1	CF1/4-4.7K/J	09021	
R13	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	1	CF1/4-22K/J	09021	
R14	Same as R9				
R15	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R16	Same as R7				
R17	Resistor, Fixed, Film: 33 Ω, 5%, 1/4 w	1	CF1/4-33 OHMS/J	09021	
R18	Resistor, Fixed, Film: 680 Ω, 5%, 1/4 W	1	CF1/4-680 OHMS/J	09021	
R19	Resistor, Trim, Film: 1 kΩ, 10%, 1/2 W	1	62PR1K	73138	
R20	Same as R2				
R21	Same as R9				
T1	Transformer	1	T4-1	15542	

5.5.2.12 **Type 724006-5 21.4 MHz IF Amplifier (250 kHz BW)** REF DESIG PREFIX **A3A9-A3A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Not Used				
C2	Capacitor, Ceramic, Disc: 4700 pF, +20%, 50 V	12	8121-050-651-472M	72982	
C3 Thru C8	Same as C2				
C9	Capacitor, Mica, Dipped: 24 pF, 5%, 500 V	1	CM04ED240J03	81349	
C10 Thru C14	Same as C2				
C15	Capacitor, Variable, Ceramic: 5-25 pF, 100 V NPO	1	518-002A5-25	72982	
CR1	Diode	1	1N462A	80131	
FL1	Filter, BP	1	92186	14632	
L1	Coil, Fixed: 2.7 µH, 10%	1	1537-22	99800	
L2	Coil, Fixed: 1 µH. 10%	1	1537-12	99800	
L3	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
Q1	Transistor	1	3N211	80131	
Q2	Transistor	1	2N2857	80131	
R1	Resistor, Fixed, Film: 210 Ω, 1%, 1/10 W	1	RN55C2100F	81349	
R2	Resistor, Fixed, Composition: 2.2 kΩ, 5%, 1/4 W	2	RCR07G222JS	81349	
R3	Resistor, Trim, Film: 10 kΩ, 10%, 1/2 W	1	62PAR10K	73138	
R4	Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W	1	CFI/4-15K/J	09021	
R5	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-IOK/J	09021	
R6	Resistor, Fixed, Film: 68 kΩ, 5%, 1/4 W	1	CF1/4-68K/J	09021	
R7	Resistor, Fixed, Film: 100Ω, 5%, 1/4 W	3	CF1/4-100 OHMS/J	09021	
R8	Resistor, Fixed, Film: 120Ω, 5%, 1/4 W	1	CF1/4-120 OHMS/J	09021	
R9	Resistor, Fixed, Film: 47Ω, 5%, 1/4 W	3	CF1/4-47 OHMS/J	09021	
R10	Same as R7				
R11	Resistor, Fixed, Film: 750 Ω, 5%, 1/4 W	1	CF1/4-750 OHMS/J	09021	
R12	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W	1	CF1/4-4.7K/J	09021	
R13	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	1	CF1/4-22K/J	09021	
R14	Same as R9				
R15	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R16	Same as R7				
R17	Resistor, Fixed, Film: 33 Ω, 5%, 1/4 W	1	CF1/4-33 OHMS/J	09021	
R1B	Resistor, Fixed, Film: 1 kΩ, 5%, 1/4 W	1	CF1/4-1K/J	09021	
R19	Resistor, Trimmer, Film: 1 kΩ, 10%, 1/2 W	1	62PRIK	73138	
R20	Same as R2				
R21	Same as R9				
T1	Transformer	1	T4-1	15542	

5.5.2.13 **Type 724006-6 21.4 MHz IF Amplifier (300 kHz BW)** REF DESIG PREFIX **A3A9-A3A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Not Used				
C2	Capacitor, Ceramic, Disc: 4700 pF, +20%, 50 V	12	8121-050-651-472M	72982	
C3 Thru C8	Same as C2				
C9	Capacitor, Mica, Dipped: 24 pF, 5%, 500 V	1	CM04ED240J03	81349	
C10 Thru C14	Same as C2				
C15	Capacitor, Variable, Ceramic: 5-25 pF, 100 V NPO	1	518-002A5-25	72982	
CR1	Diode	1	1N462A	80131	
FL1	Filter, BP	1	92232	14632	
L1	Coil, Fixed: 2.7 µH, 10%	1	1537-22	99800	
L2	Coil, Fixed: 1 µH, 10%	1	1537-12	99800	
L3	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
Q1	Transistor	1	3N211	80131	
Q2	Transistor	1	2N2857	80131	
R1	Resistor, Fixed, Film: 210 Ω, 5%, 1/10 W	1	RN55C2100F	81349	
R2	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/4 W	2	CF1/4-2.2K/J	09021	
R3	Resistor, Variable, Film: 10 kΩ, 10%, 1/2 W	1	62PAR10K	73138	
R4	Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W	1	CFI/4-15K/J	09021	
R5	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-1OK/J	09021	
R6	Resistor, Fixed, Film: 68 kΩ, 5%, 1/4 W	1	CF1/4-68K/J	09021	
R7	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	3	CF1/4-100 OHMS/J	09021	
R8	Resistor, Fixed, Film: 120 Ω, 5%, 1/4 W	1	CF1/4-120 OHMS/J	09021	
R9	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	3	CF1/4-47 OHMS/J	09021	
R10	Same as R7				
R11	Resistor, Fixed, Film: 750 Ω, 5%, 1/4 W	1	CF1/5-750 OHMS/J	09021	
R12	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W	1	CF1/4-4.7K/J	09021	
R13	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	1	CF1/4-22K/J	09021	
R14	Same as R9				
R15	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R16	Same as R7				
R17	Resistor, Fixed, Film: 33 Ω, 5%, 1/4 W	1	CF1/4-33 OHMS/J	09021	
R18	Resistor, Fixed, Film: 1 kΩ, 5%, 1/4 W	1	CF1/4-1K/J	09021	
R19	Resistor, Trim, Film: 1 kΩ, 10%, 1/2 W	1	62PR1K		
R20	Same as R2				
R21	Same as R9				
T1	Transformer	1	T4-1	15542	

5.5.2.14 **Type 724006-6 21.4 MHz IF Amplifier (500 kHz BW)** REF DESIG PREFIX **A3A9-A3A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	9	8121-050-651-472M	72982	
C2	Same as C1				
C3	Capacitor, Mica, Dipped: 560 pF, 2%, 300 V	1	DM15-561J	72136	
C4	Capacitor, Mica, Dipped: 100 pF, 2%, 500 V	1	CMOS5FD101G03	81349	
C5	Capacitor, Variable, Air: 1-10 pF, 250 V	7	8052	91293	
C6	Capacitor, Ceramic, Tubular: 2.4 pF, 0.25 pF, 500 V	2	301-OO0COJO-249C	72982	
C7	Capacitor, Ceramic, Mono: 100 pF	5	8121-100COGO-101J	72982	
C8	Same as C5				
C9	Same as C7				
C10	Same as C5				
C11	Same as C6				
C12	Same as C7				
C13	Same as C5				
C14	Same as C7				
C15	Same as C5				
C16	Capacitor, Ceramic, Tubular: 2.0 pF, +.25 pF, 500 V	1	301-OOOCOKO-209C	72982	
C17	Same as C7				
C18	Same as C5				
C19	Capacitor, Mica, Dipped: 91 pF, 2%, 500 V	1	CM04FD910G03	81349	
C20	Same as C5				
C21 thru C27	Same as C1				
CR1	Diode	1	1N462A	80131	
L1	Coil, Fixed: 18 µH, 10%	1	1025-50	99800	
L2	Inductor	7	20681-137	14632	
L3	Same as L2				
L4	Coil, Fixed: 22 µH, 10%	3	1025-52	99800	
LS	Same as L2				
L6	Same as L2				
L7	Same as L4				
L8	Same as L2				
L9	Same as L2				
L10	Same as L4				
L11	Same as L2				
Q1	Transistor	1	3N211	80131	
R1	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/8 W	1	CF1/2-1K/J	09021	
R2	Resistor, Variable, Film: 1 kΩ, 10%, 1/2 W	1	62PR1K	73138	
R3	Resistor, Fixed, Film: 1 kΩ, 5%, 1/8 W	1	CF1/8-IK/J	09021	
R4	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	2	CF1/8-100 OHMS/J	09021	
R5	Resistor, Fixed, Film: 150 kΩ, 5%, 1/8 W	1	CF1/8-150 OHMS/J	09021	
R6	Resistor, Fixed, Film: 47 kΩ, 5%, 1/^ W	2	CF1/8-47 OHMS/J	09021	

REF DESIG PREFIX **A3A9-A3A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R7	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	1	CF1/8-10OK/J	09021	
R8	Resistor, Fixed, Film: 13 kΩ, 5%, 1/8 W	1	CF1/8-13K/J	09021	
R9	Resistor, Trim, Film: 5 kΩ, 10%, 1/2 W	1	62PAR5K	73138	
R10	Same as R3				
R11	Resistor, Fixed, Film: 120 Ω, 5%, 1/8 W	1	CF1/8-120 OHMS/J	09021	
R12	Same as R6				
R13	Same as R4				
R14	Resistor, Fixed, Film: 510 Ω 5%, 1/4 W	1	CF1/4-510 OHMS/J	09021	
T1	Transformer	1	T9-1		

5.5.2.15 **Type 724007-1 21.4 MHz IF Amplifier (1 MHz BW)** REF DESIG PREFIX **A3A9-A3A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Mica, Dipped: 120 pF, 2%, 500 V	1	CM05FD121G03	81349	
C2	Capacitor, Mica, Dipped: 470 pF, 2%, 500 V	1	DM15-471G	72136	
C3	Capacitor, Variable, Ceramic: 5-25 pF, 100 V	6	518-000A5-25	72982	
C4	Capacitor, Ceramic, Tubular: 4.3 pF, +0.25 pF, 500 V	1	301-OOOCOHO-439C	72982	
C5	Same as C3				
C6	Capacitor, Mica, Dipped: 91 pF, 2%, 500 V	4	CM04FD910G03	81349	
C7	Same as C3				
C8	Same as C6				
C9	Same as C3				
C10	Same as C6				
C11	Same as C3				
C12	Same as C6				
C13	Capacitor, Ceramic, Tubular: 6.2 pF, +0.5 pF, 500 V	1	301-000COHO-629D	72982	
C14	Same as C3				
C15	Capacitor, Mica, Dipped: 68 pF, 2%, 500 V	1	CM04ED680G03	81349	
C16	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	8	8121-050-651-472M	72982	
C17 Thru C23	Same as C16				
CR1	Diode	1	1N462A	80131	
L1	Inductor	6	22295-65	14632	
L2	Same as L1				
L3	Coil, Fixed: 15 µH, 10%	3	1537-40	99800	
L4	Same as L1				
L5	Same as L3				
L6	Same as L1				
L7	Same as L3				
L8	Same as L1				
L9	Same as L1				
L10	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
Q1	Transistor	1	2N5109	80131	
R1	Resistor, Fixed, Film: 1.3 kΩ, 5%, 1/4 W	1	CF1/4-1.3K/J	09021	
R2	Resistor, Fixed, Film: 6.8 kΩ, 5%, 1/4 W	1	CF1/4-6.8K/J	09021	
R3	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	2	CF1/4-47 OHMS/J	09021	
R4	Resistor, Fixed, Film: 6.2 kΩ, 5%, 1/4 W	1	CF1/4-6.2K/J	09021	
R5	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	2	CF1/4-100 OHMS/J	09021	
R6	Resistor, Fixed, Film: 330 Ω, 5%, 1/4 W	1	CF1/4-330 OHMS/J	09021	
R7	Same as R3				
R8	Resistor, Trim, Film: 500 Ω, 10%, 1/2 W	1	62PAR500	73138	
R9	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R10	Same as R5				
R11	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/4 W	2	CFI/4-1.SK/J	09021	

REF DESIG PREFIX **A3A9-A3A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R12	Resistor, Trim, Film: 500 0, 10%, 1/2 W	1	62PR500	73138	
R13	Same as R11				
T1	Transformer	1	T4-1	15542	

5.5.2.16 **Type 724007-2 21.4 MHz IF Amplifier (2 MHz BW)** REF DESIG PREFIX **A3A9-A3A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Mica, Dipped: 120 pf, 296, 500 V	1	CM05FD121G03	81349	
C2	Capacitor, Mica, Dipped: 300 pF, 2%, 500 V	1	CM05FD301G03	81349	
C3	Capacitor, Variable, Ceramic: 5-25 pF, 100 V	6	518-000A5-25	72982	
C4	Capacity, Ceramic, Tubular: 8.2 pF, +.5 pF, 500 V	1	301-000-COHO-829D	72982	
C5	Same as C3				
C6	Capacitor, Mica, Dipped: 91 pF, 2%, 500 V	4	CM04FD910G03	81349	
C7	Same as C3				
C8	Same as C6				
C9	Same as C3				
C10	Same as C6				
C11	Same as C3				
C12	Same as C6				
C13	Capacitor, Ceramic, Tubular: 12 pF, 5%, 500 V	1	301-OOO00COGO-120J	72982	
C14	Same as C3				
C15	Capacitor, Mica, Dipped: 68 pF, 2%, 500 V	1	CM04ED680G03	81349	
C16	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	8	8121-050-651-472M	72982	
C17 Thru C23	Same as C16				
CR1	Diode	1	1N462A	80131	
L1	Inductor	6	22295-65	14632	
L2	Same as L1				
L3	Coil, Fixed: 8.2 µH, 10%	3	1537-34	99800	
L4	Same as L1				
L5	Same as L3				
L6	Same as L1				
L7	Same as L3				
L8	Same as L1				
L9	Same as L1				
L10	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
Q1	Transistor	1	2N5109	80131	
R1	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R2	Resistor, Fixed, Film: 6.8 kΩ, 5%, 1/4 W	1	CF1/4-6.8K/J	09021	
R3	Resistor, Fixed, Film: 47Ω, 5%, 1/4 W	2	CF1/4-47 OHMS/J	09021	
R4	Resistor, Fixed, Film: 6.2 kΩ, 5%, 1/4 W	1	CF1/4-6.2K/J	09021	
R5	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	2	CF1/4-100 OHMS/J	09021	
R6	Resistor, Fixed, Film: 330 Ω, 5%, 1/4 W	1	CF1/4-330 OHMS/J	09021	
R7	Same as R3				
R8	Resistor, Variable, Film: 500 Ω, 10%, 1/2 W	1	62PAR500	73138	
R9	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R10	Same as R5				

REF DESIG PREFIX **A3A9-A3A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R11	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/4 W	1	CF1/4-1.5K/J	09021	
R12	Resistor, Trim, Film: 1 kΩ, 10%, 1/2 W	1		62PR1K	73138
R13	Resistor, Fixed, Film: 1 kΩ, 5%, 1/4 W	1	CF1/4-1K/J	09021	
T1	Transformer	1		T4-1	15542

5.5.2.17 **Type 724008-1 21.4 MHz IF Amplifier (4 MHz BW)** REF DESIG PREFIX **A3A9-A3A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Mica, Dipped: 160 pF, 2%, 500 V	1	CM04FD161G03	81349	
C2	Capacitor, Mica, Dipped: 180 pF, 2%, 500 V	1		CM04FD181G03	81349
C3	Capacitor, Mica, Dipped: 24 pF, 5%, 500 V	1	CM04ED240J03	81349	
C4	Capacitor, Mica, Dipped: 100 pF, 2%, 500 V	2	CM04FD101G03	81349	
C5	Capacitor, Mica, Dipped: 120 pF, 2%, 500 V	2	CM04FD121G03	81349	
C6	Capacitor, Mica, Dipped: 18 pF, 5%, 500 V	2	CM04CD180J03	81349	
C7	Same as C5				
C8	Same as C4				
C9	Same as C6				
C10	Capacitor, Mica, Dipped: 91 pF, 2%, 500 V	1	CM04FD910G03	81349	
C11	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	8	8121-050-651-472M	72982	
C12 Thru C18	Same as Cl1				
CR1	Diode	1	1N462A	80131	
L1	Coil, Variable	6	558-7107-09	71279	
L2	Same as L1				
L3	Coil, Fixed: 3.9 µH, 10%	2	1537-26	99800	
L4	Same as L1				
L5	Same as L1				
L6	Same as L3				
L7	Same as L1				
L8	Same as L1				
L9	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
Q1	Transistor	1	2N5109	80131	
R1	Resistor, Fixed, Film: 390 Ω, 5%, 1/4 W	1		CF1/4-390 OHMS/J	09021
R2	Resistor, Fixed, Film: 6.8 kΩ, 5%, 1/4 W	1	CF1/4-6.8K/J	09021	
R3	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	1		CF1/4-47 OHMS/J	09021
R4	Resistor, Fixed, Film: 6.2 kΩ, 5%, 1/4 W	1	CF1/4-6.2K/J	09021	
R5	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	2		CF1/4-100 OHMS/J	09021
R6	Resistor, Fixed, Film: 330Ω, 5%, 1/4 W	1	CF1/4-330 OHMS/J	09021	
R7	Resistor, Fixed, Film: 68Ω, 5%, 1/4 W	1		CF1/4-68 OHMS/J	09021
R8	Resistor, Trim, Film: 500 Ω, 10%, 1/2 W	1		62PAR500	73138
R9	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R10	Same as R5				
R11	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/4 W	1	CF1/4-1.5K/J	09021	
R12	Resistor, Trim, Film: 1 kΩ, 10%, 1/2 W	1	62PR1K	73138	
R13	Resistor, Fixed, Film: 1 kΩ, 5%, 1/4 W	1	CF1/4-1K/J	09021	
T1	Transformer	1	T4-1	15542	

5.5.2.18 **Type 798074-1 SSB Bypass Assembly** REF DESIG PREFIX **A3A14**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R1	Resistor, Fixed, Film: 51.1 Ω, 1%, 1/10 W	2	RN55C51RlF	81349	
R2	Same as R1				
R3	Resistor, Fixed, Film: 16.2 Ω, 1%, 1/10 W	2	RN55D16R2F	81349	
R4	Same as R3				
R5	Resistor, Fixed, Film: 68.1 Ω, 1%, 1/10 W	1	RN55C68R1F	81349	

5.5.2.19 **Type 796233-1 Audio/Video/COR** REF DESIG PREFIX A3A14

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Mica, Dipped: 20 pF, 5%, 500 V	1	CM04ED200J03	81349	
C2	Capacitor, Ceramic, Disc: 470 pF, 20%, 200 V	6	BHD470-20PCT	29990	
C3	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	1	196D225X035JE3	56289	
C4	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	3	34453-1	14632	
C5	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	19	34475-1	14632	
C6	Same as C4				
C7	Same as C4				
C8	Capacitor, Electrolytic, Tantalum: 18 µF, + 10%, 20 V	2	196D186X902KE3	56289	
C9	Same as C8				
C10	Same as C5				
C11	Same as C5				
C12	Same as C5				
C13	Same as C2				
C14 Thru C23	Same as C5				
C24	Same as C2				
C25	Same as C2				
C26	Same as C2				
C27	Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V	2	196D475X0035JE3	56289	
C28	Same as C27				
C29	Same as C2				
C30 Thru C36	Same as C5				
CR1	Diode	2	1N4449	80131	
CR2	Same as CR1				
CR3	Diode	2	1N462A	80131	
CR4	Same as CR3				
L1	Coil, Fixed: 1.2 µH, 10%	2	553-3635-38	71279	
L2	Same as L1				
L3	Coil, Fixed: 3.9 µH, 10%	2	1537-26	99800	
L4	Same as L3				
L5	Coil, Fixed: 160 µH, 5%	1	1537-86	99800	
Q1	Transistor	1	U1899E	15818	
Q2	Transistor	1	2N2222A	80131	
Q3	Transistor	1	2N3906	80131	
R1	Resistor, Fixed, Film: 2.2 kΩ 5%, 1/4 W	1	RCR07G222JS	81349	
R2	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	6	RCR07G222JS	81349	
R3	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/4 W	5	RCR07G102JS	81349	
R4	Resistor, Trim, Film: 2 kΩ, 10%, 1/2 W	3	62PAR2K	73138	
R5	Same as R2				

REF DESIGN PREFIX A3A15

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R6	Same as R3				
R7	Resistor, Fixed, Film: 91 Ω, 5%, 1/4 W	3	CFI/4-91 OHMS/J	09021	
R8	Resistor, Fixed, Film: 3.0 kΩ, 5%, 1/4 W	1	CF1/4-3.0K/J	09021	
R9	Same as R2				
R10	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	2	CF1/4-220 OHMS/J	09021	
R11	Resistor, Fixed, Film: 1.3 kΩ, 5%, 1/4 W	1	CF1/4-1.3K/J	09021	
R12	Same as R4				
R13	Resistor, Fixed, Film: 100 Ω, 5%, ¼W	1	CF1/4-100 OHMS/J	09021	
R14	Same as R7				
R15	Resistor, Fixed, Film: 1.0 MΩ, 5%, 1/4 W	1	CF1/4-1.OM/J	09021	
R16	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	6	CF1/4-1OK/J	09021	
R17	Resistor, Fixed, Film: 9.1 kΩ, 5%, 1/4 W	1	CF1/4-9.1K/J	09021	
R18	Resistor, Fixed, Film: 100 kΩ, 5%, 1/4 W	5	CFI/4-10OK/J	09021	
R19	Resistor, Fixed, Film: 560 Ω, 5%, 1/4 W	1	CF1/4-560 OHMS/J	09021	
R20	Same as R16				
R21	Resistor, Fixed, Film: 10 Ω, 5%; 1/4 W	1	CF1/4-10 OHMS/J	09021	
R22	Same as R3				
R23	Resistor, Fixed, Film: 2.2 MΩ, 5%, 1/4 W	1	CF1/4-2.2K/J	09021	
R24	Same as R16				
R25	Same as R16				
R26	Resistor, Fixed, Film: 33 kΩ, 5%, 1/4 W	1	CF1/4-33K/J	09021	
R27	Same as RB1				
R28	Resistor, Fixed, Film: 13 kΩ, 5%, 1/4 W	I	CF1/4-13K/J	09021	
R29	Resistor, Fixed, Film: 4.75 kΩ, 1%, 1/10 W	1	RN55C4751F	81349	
R30	Resistor, Fixed, Film: 178 kΩ, 1%, 1/10 W	1	CF1/4-178K/J	09021	
R31	Same as R18				
R32	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/4 W	I	CF1/4-2.7K/J	09021	
R33	Same as R16				
R34	Resistor, Fixed, Film: 5.6 Ω, 5%, 1/4 W	1	CF1/4-5.6 OHMS/J	09021	
R35	Same as R3				
R36	Resistor, Fixed, Film: 620 Ω, 5%, 1/4 W	1	CF1/4-620 OHMS/J	09021	
R37	Resistor, Fixed, Film: 390 Ω, 5%, 1/4 W	1	CF1/4-390 OHMS/J	09021	
R38	Same as R18				
R39	Same as R10				
R40	Same as R3				
R41	Same as R16				
R42	Resistor, Fixed, Film: 4.7 Ωi, 5%, 1/4 W	1	CF1/4-4.7K/J	09021	
R43	Resistor, Fixed, Film: 200 Ω, 5%, 1/4 W	1	CF1/4-200 OHMS/J	09021	
R44	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	I	RN55C2211F	81349	
R45	Same as R2				
R46	Same as R1°				

REF DESIGN PREFIX A3A15

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R47	Same as R4				
R48	Resistor, Fixed, Film: 1.21 kΩ, 1%, 1/10 W	1	RN55C1211F	81349	
R49	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	1	RN55C1001F	81349	
R50	Same as R7				
R51	Resistor, Fixed, Film: 470 Ω, 5%, 1/8 W	1	CF1/8-470 OHMS/J	09021	
R52	Resistor, Fixed, Film: 1.21 kΩ, 1%, 11/10 W	2	RNC55H1211FM		
R53	Same as R52				
U1	Integrated Circuit	3	DG302CJ	17856	
U2	Same as U1				
U3	Same as U1				
U4	Integrated Circuit	4	LM318N	27014	
U5	Same as U4				
U6	Integrated Circuit	2	LH0002CN	27014	
U7	Integrated Circuit	1	DG301CJ	17056	
U8	Not Used			18178	
U9	Not Used				
U10	Same as U4				
U11	Same as U6				
U12	Integrated Circuit	2	MC3403P	04713	
U13	Same as U12				
U14	Integrated Circuit	1	NE555N	18324	
U15	Same as U4				

5.5.2.20 **Type 724016-1 AM Demodulator/IF output Amplifier** REF DESIGN PREFIX A3A16

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	43	8121-050-651-472M	72982	
C2 Thru C8	Same as C1				
C9	Capacitor, Variable, Ceramic: 5-25 pF, 100 V, N750	1	518-000A5-25	72982	
C10 Thru C14	Same as C1				
C15	Capacitor, Electrolytic, Tantalum: 2.2 pF, 20%, 35 V	1	196D225X0035JE3	56289	
C16 Thru C21	Same as C1				
C22	Not Used				
C23	Same as C1				
C24	Same as C1				
C25	Capacitor, Mica, Dipped: 91 pF, 2%, 500 V	2	CM04FD91OGO3	81349	
C26	Capacitor, Variable, Ceramic: 5-25 pF, 100 V, NPO	2	518-002A5-25	72982	
C27	Capacitor, Ceramic, Disc: 1.8 pF, t0.1 pF, 100 V	1	8101-1OOCOKO-189B	72982	
C28	Same as C26				
C29	Same as C25				
C30	Same as C1				
C31	Same as C1				
C32	Same as C1				
C33	Capacitor, Ceramic, Disc: 0.01 pF, 20%, 50 V	2	34453-1	14632	
C34	Same as C1				
C35	Same as C1				
C36	Capacitor, Ceramic, Mono: 8.2 pF, +.5 pF, 100 V	2	8101-100COHO-829D	72982	
C37	Capacitor, Ceramic, Disc: 0.47 pF, 20%, 50 V	4	34452-1	14632	
C38 Thru C41	Same as CI				
C42	Capacitor, Variable, Ceramic: 1-3 pF, 100 V, NPO	1	518-000A1-3	72982	
C43	Not Used				
C44	Capacitor, Ceramic, Disc: 4.7 pF, t0.5 pF, 100 V	3	8101-100COHO-479D	72982	
C45	Same as C44				
C46	Same as C37				
C47	Same as C37				
C48	Capacitor, Ceramic, Disc: 0.1 VIF, 20%, 50 V	1	34475-1	14632	
C49	Same as C44				
C50	Same as C1				
C51	Same as C33				
C52	Same as C36				
C53	Same as C1				
C54	Same as C1				

REF DESIGN PREFIX A3A16

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C55	Same as C1				
C56	Capacitor, Electrolytic, Tantalum: 22 pF, 20%, 10 V	3	196D226X0010JE3	56289	
C57	Same as C1				
C58	Not Used				
C59	Not Used				
C60	Same as C1				
C61	Same as C1				
C62	Not Used				
C63	Same as C56				
C64	Same as C1				
C65	Same as C56				
C66	Same as C1				
C67	Same as C1				
C68	Capacitor, Ceramic, Mono: 470 pF, 5%, 100 V	1	8121-100-COGO-471J	72982	
C69	Not Used				
C70	Same as C37				
C71	Same as C1				
C72	Same as C1				
CR1	Diode	11	MPN3401	04713	
CR2	Same as CR1				
CR3	Same as CR1				
CR4	Same as CR1				
CR5	Diode	1	1N462A	80131	
CR6 Thru CR11	Same as CR1				
CR12	Diode	1	5082-2800	28480	
CR13	Same as CR1				
El	Terminal Forked	1	140-1941-0201	71279	
L1	Coil, Fixed: 2.2 µH, 10%	1	1025-28	99800	
L2	Coil, Fixed: 27 µH, 10%	4	1025-54	99800	
L3	Same as L2				
L4	Coil, Fixed: 2.2 µH, 10%	1	1025-28	99800	
L5	Same as L2				
L6	Coil, Fixed: 18 µH, 10%	1	1025-50	99800	
L7	Coil, Fixed: 39 µH, 10%	1	1537-56	99800	
L8	Same as L2				
Q1	Transistor	1	3N211	80131	
Q2	Transistor	3	2N2857/JAN	80131	
Q3	Transistor	1	2N5109	80131	
Q4	Same as Q2				
Q5	Transistor	1	2N3904	80131	

REF DESIGN PREFIX A3A16

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
Q6	Same as Q2				
R1	Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/8 W	8	CF1/8-3.3K/J	09021	
R2	Same as R1				
R3	Same as R1				
R4	Same as R1				
R5	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	5	CF1/8-100 OHMS/J	09021	
R6	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	3	CF1/8-10K/J	09021	
R7	Resistor, Fixed, Film: 47 Ω, 5%, 1/8 W	2	CF1/8-47 OHMS/J	09021	
R8	Resistor, Fixed, Film: 130 kΩ, 5%, 1/8 W	1	CF1/8-130K/J	09021	
R9	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	5	CF1/8-100K/J	09021	
R10	Resistor, Fixed, Film: 33 kΩ, 5%, 1/8 W	3	CF1/8-33K/J	09021	
R11	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	7	CF1/8-4.7K/J	09021	
R12	Resistor, Fixed, Film: 120 Ω, 5%, 1/8 W	1	CF1/8-120 OHMS/J	09021	
R13	Resistor, Fixed, Film: 33 Ω, 5%, 1/8 W	4	CF1/8-33 OHMS/J	09021	
R14	Resistor, Fixed, Film: 220 ΩI, 5%, 1/8 W	4	CF1/8-220 OHMS/J	09021	
R15	Not Used				
R16	Not Used				
R17	Resistor, Fixed, Film: 150 Ω, 5%, 1/8 W	2	CF1/8-150 OHMS/J	09021	
R18	Not Used				
R19	Resistor, Fixed, Film: 6.8 kΩ, 5%, 1/8 W	3	CF1/8-6.8K/J	09021	
R20	Same as R17				
R21	Resistor, Fixed, Film: 750 Ω, 5%, 1/4 W	1	CF1/4-750 OHMS/J	09021	
R22	Same as R5				
R23	Resistor, Variable, Film: 200 Ω, 10%, 1/2 W	1	62PAR200	73138	
R24	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W	2	CF1/8-2.7K/J	09021	
R25	Same as R10				
R26	Same as R9				
R27	Same as R1				
R28	Same as RI				
R29*	Resistor, Fixed, Composition: 300 Ω, 5%, 1/8 W	1	RCR05G301JS	81349	
R30	Same as R1				
R31	Same as R10				
R32	Same as R9				
R33	Same as R11				
R34	Same as R11				
R35	Resistor, Fixed, Film: 330 Ω, 5%, 1/8 W	1	CF1/8-330 OHMS/J	09021	
R36	Resistor, Fixed, Film: 22 Ω, 5%, 1/8 W	1	CF1/8-220 OHMS/J	09021	
R37	Resistor, Fixed, Film: 180 Ω, 5%, 1/4 W	1	CF1/8-180 OHMS/J	09021	
R38	Resistor, Fixed, Film: 39 Ω, 5%, 1/8 W	1	CF1/8-39 OHMS/J	09021	
R39	Resistor, Fixed, Film: 200 kΩ, 5%, 1/8 W	1	CFI/8-200K/J	09021	
R40	Resistor, Fixed, Film: 8.2 kΩ, 5%, 1/8 W	3	CF1/8-8.2K/J	09021	

REF DESIGN PREFIX A3A16

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R41	Same as R40				
R42	Resistor, Fixed, Film: 470 Ω, 5%, 1/8 W	3	CF1/8-470 OHMS/J	09021	
R43	Resistor, Trim, Film: 50 kΩ, 10%, 1/2 W	1	62PR50K	73138	
R44	Resistor, Fixed, Film: 10 k, 5%, 1/8 W	2	CFI/8-1OK/J	09021	
R45	Same as R5R46,Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W	1	CF1/8-18K/J	09021	
R47	Same as R7				
R48	Same as R44				
R49	Same as R19				
R50	Same as R5				
R51	Same as R42				
R52	Same as R13				
R53	Same as R5				
R54	Same as R19				
R55	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	1	CF1/8-22K/J	09021	
R56	Resistor, Fixed, Film: 1.2 k, 5%, 1/8 W	1	CF1/8-1.2K/J	09021	
R57	Same as R14				
R58	Resistor, Fixed, Film: 1.0 k, 5%, 1/4 W	1	CF1/4-1.OK/J	09021	
R59	Resistor, Trim, Film: 500 Ω, 10%, 1/2 W	1	62PAR500	73138	
R60	Not Used				
R61	Not Used				
R62	Resistor, Trim, Film: 1 kΩ, 10%, 1/2 W	1	62PAR1K	73138	
R63	Resistor, Fixed, Film: 10 Ω, 5%, 1/8 W	3	CF1/8-10 OHMS/J	09021	
R64	Same as R63				
R65	Same as R63				
R66	Same as R14				
R67	Same as Rll				
R68	Resistor, Fixed, Film: 910 Ω, 5%, 1/8 W	1	CF1/8-910 OHMS/J	09021	
R69	Resistor, Trim, Film: 5 kΩ, 10%, 5 W	1	62PAR5K	73138	
R70	Same as R40				
R71	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/8 W	I	CF1/8-2.2K/J	09021	
R72	Resistor, Trim, Film: 10 kΩ, 10%, 1/2 W	1	62PAR1OK	73138	
R73	Resistor, Fixed, Film: 11 kΩ, 5%, 1/8 W	1	CF1/8-11K/J	09021	
R74	Same as R13				
R75	Same as R24				
R76	Same as R11				
R77	Same as R9				
R78	Resistor, Fixed, Film: 360 Ω, 5%, 1/8 W	1	CF1/8-360 OHMS/J	09021	
R79	Same as R9				
R80	Same as R13				
R81	Same as R42				

REF DESIGN PREFIX A3A16

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R82	Resistor, Fixed, Film: 330 Ω, 5%, 1/4 W	1	CF1/4-330 OHMS/J	09021	
R83	Same as R11				
R84	Same as R11				
R85	Same as R14				
R86	Resistor, Fixed, Film: 56 Ω, 5%, 1/8 W	1	CF1/8-56 OHMS/J	09021	
R87	Resistor, Fixed, Film: 680 Ω, 5%, 1/8 W	1	CF1/8-680 OHMS/J	09021	
R88	Same as RI				
R89	Resistor, Fixed, Film: 510 Ω, 5%, 1/8 W	1	CF1/8-510 OHMS/J	09021	
RT1	Resistor, Thermal: 1 kin	1	2D102	04239	
T1	Transformer	2	390452-1	14632	
T2	Same as T1				
T3	Transformer	1	22295-71	14632	
T4	Transformer	1	T4-1	15542	
U1	Integrated Circuit	2	SL1611C	52648	
U2	Integrated Circuit	1	DG301CJ	17856	
U3	Integrated Circuit	2	LM318N	27014	
U4	Same as U1				
U5	Integrated Circuit	3	SL521C	52648	
U6	Same as U5				
U7	Same as U5				
U8	Same as U3				
VR1	Voltage Regulator: 8.2 V	4	1N756A	80131	
VR2	Same as VR1				
VR3	Same as VR1				
VR4	Same as VR1				

5.5.2.21 Type 794106 FM Demodulator(10 kHz BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	5	34453-1	14632	
C2	Same as C1				
C3	Same as CI				
C4	Same as C1				
C5	Capacitor, Ceramic, Tubular: 15 µF, 5%, 500 V, N750	2	301-00OU2JO-150J	72982	
C6	Same as C5				
C7	Not Used				
C8	Capacitor, Ceramic, Disc: 4700 µF, 10%, 200 V	1	CK06BX472K	81349	
C9	Capacitor, Ceramic, Disc: 0.47 µF, 20%, 50 V	2	34452-1	14632	
C10	Same as C9				
C11	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	2	34475-1	14632	
C12	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	2	196D225X0035JE3	56289	
C13	Same as C12				
C14	Same as C11				
C15	Capacitor, Ceramic, Disc: 4700 µF, 20%, 50 V	1	8121-050-651-472M	72982	
C16	Same as C1				
C17	Capacitor, Ceramic, Disc: 0.068 µF, 10%, 100 V	1	CK06BX683K	81349	
E1	Term, Miniature	1	2010B1	88245	
L1	Coil, Variable: 2.97 - 3.63 µH	1	558-7107-19	71279	
L2	Coil, Variable: 2.43 - 2.97 µH	1	558-7107-18	71279	
L3	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
L4	Coil, Fixed: 22 mH, 10%	1	553-3635-53	71279	
L5	Coil, Fixed: 15 mH, 10%	1	553-3635-51	71279	
L6	Coil, Fixed: 1.2 mH, 10%	2	553-3635-38	71279	
L7	Same as L6				
R1	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 2.37 kΩ, 1%, 1/10 W	1	RN55C2371F	81349	
R3	Resistor, Fixed, Film: 1.37 kΩ, 1%, 1/10 W	1	RN55C1371F	81349	
R4	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-1OK/J	09021	
R5	Resistor, Fixed, Film: 4.75 kΩ, 1%, 1/10 W	1	RN55C4751F	81349	
R6	Resistor, Fixed, Film: 51.1 kΩ, 1%, 1/10 W	1	RN55C5112F	81349	
R7	Resistor, Fixed, Film: 46.4 kΩ, 1%, 1/10 W	3	RN55C4642F	81349	
R8	Same as R7				
R9	Same as R7				
R10	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	2	RN55C2211F	81349	
R11	Resistor, Fixed, Film: 26.7 k, , 1%, 1/10 W	2	RN55C2672F	81349	
R12	Resistor, Trim, Film: 10 kΩ, 10%, 1/2 W	1	62PAR10K	73138	
R13	Same as R11				
R14	Same as R10				
R15	Resistor, Trim, Film: 10 kΩ, 10%, 1/2 W	1	62PAR1OK	73138	

*Nominal Value - Final Value Factory Selected

REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R16	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R17	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	2	CF1/8-22K/J	09021	
R18	Resistor, Fixed, Film: 22 Ω, 5%, 1/4 W	1	CF1/4-22 OHMS/J	09021	
R19	Same as R17				
U1	Integrated Circuit	1	CA3089E	02735	
U2	Integrated Circuit	1	MC1458N	07263	
U3	Integrated Circuit	1	IH5040CPE	32293	
Y1	Discriminator, Crystal	1	2378F	25120	

5.5.2.22 Type 794106-2 FM Demodulator(20 kHz BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	5	34453-1	14632	
C2	Same as C1				
C3	Same as C1				
C4	Same as C1				
C5	Capacitor, Ceramic, Tubular: 15 µF, 5%, 500 V, N750	1	301-00OU2JO-150J	72982	
C6	Capacitor, Ceramic, Tubular: 10 pF, .5 pF, 500 V	1	301-000U2JO-100D	72982	
C7	Not Used				
C8	Capacitor, Ceramic, Disc: 4700 pF, 10%, 200 V	1	CK06BX472K	81349	
C9	Capacitor, Ceramic, Disc: 0.47 µF, 20%, 50 V	2	34452-1	14632	
C10	Same as C9				
C11	Capacitor, Ceramic, Disc: 0.056 µF, 10%, 100 V	2	CK06BX563K	81349	
C12	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	2	196D225X0035JE3	56289	
C13	Same as C12				
C14	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	1	34475-1	14632	
C15	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	1	8121-050-651-472M	72982	
C16	Same as C1				
C17	Same as C11l				
E1l	Term, Miniature	1	2010B1	88245	
L1	Coil, Variable: 2.97 - 3.63 µH	1	558-7107-19	71279	
L2	Coil, Variable: 2.43-2.97 µH	1	558-7107-18	71279	
L3	Coil, Fixed: 18 pH, 10%	1	1537-42	99800	
L4	Coil, Fixed: 10 mH, 10%	1	553-3635-49	71279	
L5	Coil, Fixed: 6.8 mH, 10%	1	553-3635-47	71279	
L6	Coil, Fixed: 1.2 mH, 10%	2	553-3635-38	71279	
L7	Same as L6				
R1	Resistor, Fixed, Film: 220 Ωi, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 3.65 kΩ, 1%, 1/10 W	1	RN55C3651F	81349	
R3	Resistor, Fixed, Film: 1.62kΩ, 1%, 1/10 W	1	RN55C1621F	81349	
R4	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-10OK/J	09021	
R5	Resistor, Fixed, Film: 4.75 kΩ, 1%, 1/10 W	1	RN55C4751F	81349	
R6	Resistor, Fixed, Film: 51.1 kΩl, 1%, 1/10 W	1	RN55C5112F	81349	
R7	Resistor, Fixed, Film: 46.4 kΩ, 1%, 1/10 W	3	RN55C4642F	81349	
R8	Same as R7				
R9	Same as R7				
R10	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	2	RN55C2211F	81349	
R11*	Resistor, Fixed, Film: 26.7 kΩ, 1%, 1/10 W	1	RN55C2672F	81349	
R12	Resistor, Trim, Film: 10 kΩ, 10%, 1/2 W	1	62PAR10K	73138	
R13	Same as R11				
R14	Same as R10				

*Nominal Value - Final Value Factory Selected

REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R15	Resistor, Trim, Film: 10 kΩ, 10%, 1/2 W	1	62PAR10K	73138	
R16	Resistor, Fixed, Composition: 470 Ω, 5%, 1/4 W	1	RCR07G471JS	81349	
R17	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	2	CF1/4-22K/J	09021	
R18	Resistor, Fixed, Film: 22 Ω, 5%, 1/4 W	1	CF1/4-22 OHMS/J	09021	
R19	Same as R17				
U1	Integrated Circuit	1	CA3089E	02735	
U2	Integrated Circuit	1	MC1458N	18324	
U3	Integrated Circuit	1	IH5040CPE	32293	
Y1	Discriminator, Crystal: 21.4 MHz	1	2875	74306	

5.5.2.23 Type 794107-1 FM Demodulator (50 kHz BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	3	34453-1	14632	
C2	Same as Cl				
C3	Same as Cl				
C4	Not Used				
C5	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	2	8121-050-651-472M	72982	
C6	Capacitor, Ceramic, Tubular: 39 pF, 5%, 500 V, N750	1	301-00OU2JO-390D	72982	
C7	Capacitor, Mica, Dipped: 150 pF, 2%, 500 V	1	CM04FD151G03	81349	
C8	Capacitor, Ceramic, Disc: 0.47 µF, 20%, 50 V	4	34452-1	14632	
C9	Same as C8				
C10	Same as C8				
C11	Same as C8				
C12	Capacitor, Ceramic, Disc: 0.018 µH, 10%, 50 V	1	CK06BX183K	81349	
C13	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	2	196D225X0035JE3	56289	
C14	Same as C13				
C15	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	1	34475-1	14632	
C16	Capacitor, Ceramic, Disc: 0.012 µF, 10%, 50 V	1	CK06BX123K	81349	
C17	Same as C5				
C18	Capacitor, Variable, Air: .8 - 10.0 pF, 250 V	1	5201	91293	
C19	Not Used				
El	Term, Miniature	1	2010B1	81349	
L1	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
L2	Coil, Fixed	1	21210-168	14632	
L3	Coil, Fixed: 4.7 mH, 10%	1	553-3635-45	71279	
L4	Coil, Fixed: 3.3 mH, 10%	1	553-3635-43	71279	
L5	Coil, Fixed: 1.2 mH, 10%	2	553-3635-38	71279	
L6	Same as L5				
L7	Coil, Fixed: 10 pH	1	1025-44	99800	
R1	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 4.75 kΩ, 1%, .1 W	2	RN55C4751F	81349	
R3	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CFl/4-1OK/J	09021	
R4	Same as R2				
RS	Resistor, Fixed, Film: 51.1 kΩ, 1%, 1/10 W	1	RN55C5112F	81349	
R6	Resistor, Fixed, Film: 46.4 kΩ, 1%, 1/10 W	1	RN55C4642F	81349	
R7	Resistor, Fixed, Film: 75 kΩ, 1%, 1/10 W	2	RN55C7502F	81349	
R8	Same as R7				
R9	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	1	RN55C2211F	81349	
R10	Resistor, Fixed, Film: 5.11 kΩ, 1%, .1 W	1	RN55C5111F	81349	
R11	Resistor, Trim, Film: 50 kΩ, 10%, 1/2 W	1	62PAR5OK	73138	
R12	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	RN55C2672F	81349	
R14	Resistor, Trim, Film: 5 kΩ, 10%, 1/2 W	1	62PAR5K	73138	

REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R15	Same as R13				
R16	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	2	CF1/8-22K/J	09021	
R17	Resistor, Fixed, Film: 22 Ω, 5%, 1/4 W	1	CF1/4-22 OHMS/J	09021	
R18	Same as R16				
U1	Integrated Circuit	1	CA3089E	02735	
U2	Integrated Circuit	2	741HC	07263	
U3	Same as U2				
U4	Integrated Circuit	1	IH5040CPE	32293	

5.5.2.24 Type 794107-6 FM Demodulator (75 kHz BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 μF, 20%, 50 V	3	34453-1	14632	
C2	Same as C1				
C3	Same as C1				
C4	Not Used				
C5	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	2	8121-050-651-472M	72982	
C6	Capacitor, Ceramic, Tubular: 39 pF, 5%, 500 V, N750	1	301-000U2J0-390J	72982	
C7	Capacitor, Mica, Dipped: 150 pF, 2%, 500 V	1	CM04FD151G03	81349	
C8	Capacitor, Ceramic, Disc: 0.47 μF, 20%, 50 V	4	34452-1	14632	
C9	Same as C8				
CIO	Same as C8				
C11	Same as C8				
C12	Capacitor, Ceramic, Disc: .015 μF, 10%, 50 V	1	CK06BX153K	81349	
C13	Capacitor, Electrolytic, Tantalum: 2.2 μ, 20%, 35 V	2	196D225X0035JE3	56289	
C14	Same as C13				
C15	Capacitor, Ceramic, Disc: 0.1 μF, 20%, 50 V	1	34475-1	14632	
C16	Capacitor, Ceramic, Disc: 8200 pF, 10%, 50 V	1	CK06BX822K	81349	
C17	Same as C5				
C18	Capacitor, Variable, Air: .8 - 10.0 pF, 250 V	1	5201	91293	
C19	Capacitor, Ceramic, Disc: 4.7 pF, +.25, 100 V	1	8101-100COHO-479D	72982	
El	Term, Miniature	1	2010B1	81349	
L1	Coil, Fixed: 18 μH, 10%	1	1537-42	99800	
L2	Coil, Fixed	1	21210-168	14632	
L3	Coil, Fixed: 3.3 mH, 10%	1	553-3635-43	71279	
L4	Coil, Fixed: 2.2 mH, 10%	1	553-3635-41	71279	
L5	Coil, Fixed: 1.2 mH, 10%	2	553-3635-38	71279	
L6	Same as L5				
L7	Coil, Fixed: 10 IH	1	1025-44	99800	
R1	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 2.05 kΩ, 1%, 1/0 W	1	RN55C2051F	81349	
R3	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-1OK/J	09021	
R4	Resistor, Fixed, Film: 4.75 kΩ, 1%, 1/10 W	1	RN55C4751F	81349	
R5	Resistor, Fixed, Film: 51.1 kΩ, 1%, 1/10 W	1	RN55C5112F	81349	
R6	Resistor, Fixed, Film: 46.4 kΩ, 1%, 1/10 W	1	RN55C4642F	81349	
R7	Resistor, Fixed, Film: 75 kΩ, 1%, 1/10 W	2	RN55C7502F	81349	
R8	Same as R7				
R9	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	1	RN55C2211F	81349	
R10	Resistor, Fixed, Film: 5.11 kΩ, 1%, .1 W	1	RN55C5111F	81349	
R11	Resistor, Trim, Film: 50 kΩ, 10%, 1/2 W	1	62PAR50K	73138	
R12	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R13	Resistor, Fixed, Film: 26.7 kΩ, 1%, 1/10 W	2	RN55C2672F	81349	
R14	Resistor, Trim, Film: 5 kΩ, 10%, 1/2 W	1	62PAR5K	73138	

REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R15	Same as R13				
R16	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	2	CF1/8-22K/J	09021	
R17	Resistor, Fixed, Film: 22 P,Ω 5%, 1/4 W	1	CF1/8-22 OHMS/J	09021	
R18	Same as R16				
U1	Integrated Circuit	1	CA3089E	02735	
U2	Integrated Circuit	2	LM318H	27014	
U3	Same as U2				
U4	Integrated Circuit	1	IH5040CPE	32293	

5.5.2.25 Type 794107-2 FM Demodulator (100 kHz BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	3	34453-1	14632	
C2	Same as C1				
C3	Same as C1				
C4	Not Used				
C5	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	2	8121-050-651-472M	72982	
C6	Capacitor, Ceramic, Tubular: 39 pF, 5%, 500 V, N750	1	301-000U2J0-390J	72982	
C7	Capacitor, Mica, Dipped: 150 pF, 2%, 500 V	1	CM04FD151G03	81349	
C8	Capacitor, Ceramic, Disc: 0.47 µF, 20%, 50 V	4	34452-1	14632	
C9	Same as C8				
C10	Same as C8				
C11	Same as C8				
C12	Capacitor, Ceramic, Disc: 0.01 µF, 10%, 200 V	1	CK06BX103K	81349	
C13	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	2	196D225X0035JE3	56289	
C14	Same as C13				
C15	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	1	34475-1	14632	
C16	Capacitor, Ceramic, Disc: 6800 pF, 10%, 200 V	1	CK06BX682K	81349	
C17	Same as C5				
C18	Capacitor, Variable, Air: .8 - 10.0 pF, 250 V	1	5201	91293	
C19	Capacitor, Ceramic, Disc: 4.7 pF, +.5 pF,	1	8101-1OOCOHO-479D	72982	
100 V					
El	Term, Miniature	1	2010B1	88245	
L1	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
L2	Coil, Fixed	1	21210-168	14632	
L3	Coil, Fixed: 2.2 mH, 10%	1	553-3635-41	71279	
1A	Coil, Fixed: 1.5 mH, 10%	1	553-3635-39	71279	
L5	Coil, Fixed: 1.2 mH, 10%	2	553-3635-38	71279	
L6	Same as L5				
L7	Coil, Fixed: 10 pH	1	1025-44	99800	
R1	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 1.21 kΩ, 1%, 1/10 W	1	RN55C1211F	81349	
R3	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-1OK/J	09021	
R4	Resistor, Fixed, Film: 4.75 kΩ, 1%, 1/10 W	1	RN55C4751F	81349	
R5	Resistor, Fixed, Film: 51.1 kΩ, 1%, 1/10 W	1	RN55C5112F	81349	
R6	Resistor, Fixed, Film: 46.4 kΩ, 1%, 1/10 W	1	RN55C4642F	81349	
R7	Resistor, Fixed, Film: 75 kΩ, 1%, 1/10 W	2	RN55C7502F	81349	
R8	Same as R7				
R9	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	1	RN55C2211F	81349	
R10	Resistor, Fixed, Film: 5.11 kΩi, 1%, 1/10 W	1	RN55C5111F	81349	
R11	Resistor, Variable, Film: 50 kΩ, 10%, 1/2 W	1	62PAR50K	73138	
R12	Resistor, Fixed, Film: 470 Ωi, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R13	Resistor, Fixed, Film: 26.7 kΩ, 1%, 1/10 W	2	RN55C2672F	81349	

REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R14	Resistor, Trim, Film: 5 kl, 10%, 1/2 W	1	62PAR5K	73138	
R15	Same as R13				
R16	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	2	CF1/8-22K/J	09021	
R17	Resistor, Fixed, Film: 22 Ω, 5%, 1/4 W	1	CF1/4-22 OHMS/J	09021	
R18	Same as R16				
U1	Integrated Circuit	1	CA3089E	02735	
U2	Integrated Circuit	2	LM318H	27014	
U3	Same as U2				
U4	Integrated Circuit	1	IH5040CPE	32293	

5.5.2.26 Type 794107-3 FM Demodulator (250 kHZ BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 μF, 20%, 50 V	3	34453-1	14632	
C2	Same as C1				
C3	Same as C1				
C4	Not Used				
C5	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	2	8121-050-651-472M	72982	
C6	Capacitor, Ceramic, Tubular: 39 pF, 5%, 500 V, N750	1	301-00OU2JO-390D	72982	
C7	Capacitor, Mica, Dipped: 150 pF, 2%, 500 V	1	CM04FD151G03	81349	
C8	Capacitor, Ceramic, Disc: 0.47 pF, 20%, 50 V	4	34452-1	14632	
C9	Same as C8				
C10	Same as C8				
C11l	Same as C8				
C12	Capacitor, Ceramic, Disc: 3300 pF, 10%, 200 V	1	CK06BX332K	81349	
C13	Capacitor, Electrolytic, Tantalum: 2.2 μF, 20%, 35 V	2	196D225X0035JE3	56289	
C14	Same as C13				
C15	Capacitor, Ceramic, Disc: 0.1 μF, 20%, 50 V	1	34475-1	14632	
C16	Capacitor, Ceramic, Disc: 3900 pF, 10%, 200 V	1	CK06BX392K	81349	
C17	Same as C5				
C18	Capacitor, Variable, Air: .8 - 10.0 pF, 250 V	1	5201	91293	
C19	Capacitor, Ceramic, Disc: 4.7 pF, +.5 pF,	1	8101-100COHO-479D	72982	
100 V					
E1	Term, Miniature	1	2010B1	88245	
L1	Coil, Fixed: 18 μH, 10%	1	1537-42	99800	
L2	Coil, Fixed	1	21210-168	14632	
L3	Coil, Fixed: 1 mH, 10%	1	553-3635-37	71279	
L4	Coil, Fixed: 680 μH, 10%	1	553-3635-35	71279	
L5	Coil, Fixed: 1.2 mH, 10%	2	553-3635-38	71279	
L6	Same as L5				
L7	Coil, Fixed: 10 pH	1	1025-44	99800	
R1	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 453 Ω, 1%, 1/10 W	1	RN55C4530F	81349	
R3	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-10OK/J	09021	
R4	Resistor, Fixed, Film: 4.75 kΩ, 1%, 1/10 W	1	RN55C4751F	81349	
R5	Resistor, Fixed, Film: 51.1 kΩ, 1%, 1/10 W	1	RN55C5112F	81349	
R6	Resistor, Fixed, Film: 46.4 kΩ, 1%, 1/10 W	1	RN55C4642F	81349	
R7	Resistor, Fixed, Film: 75 kΩ, 1%, 1/10 W	2	RN55C7502F	81349	
R8	Same as R7				
R9	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	1	RN55C2211F	81349	
R10	Resistor, Fixed, Film: 5.11 kΩ, 1%, 1/10 W	1	RN55C5111F	81349	
R11	Resistor, Trim, Film: 50 kΩ, 10%, 1/2 W	1	62PAR50K	73138	
R12	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R13	Resistor, Fixed, Film: 26.7 kΩ, 1%, 1/10 W	2	RN55C2672F	81349	

REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R14	Resistor, Trim, Film: 5 kΩ, 10%, 1/2 W	1	62PAR5K	73138	
R15	Same as R13				
R16	Resistor, Fixed, Film: 22 kΩg, 5%, 1/8 W	2	CF1/8-22K/J	09021	
R17	Resistor, Fixed, Film: 22 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R18	Same as R16				
U1	Integrated Circuit	1	CA3089E	02735	
U2	Integrated Circuit	2	LM318H	27014	
U3	Same as U2				
U4	Integrated Circuit	1	IH5040CPE	32293	

5.5.2.27 Type 794104-4 FM Demodulator (300 kHz BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	3	34453-1	14632	
C2	Same as C1				
C3	Same as C1				
C4	Not Used				
C5	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	2	8121-050-651-472M	72982	
C6	Capacitor, Ceramic, Tubular: 39 pF, 5%, 500 V, N750	1	301-000U2JO-390D	72982	
C7	Capacitor, Mica, Dipped: 150 pF, 2%, 500 V	1	CM04FD151G03	81349	
C8	Capacitor, Ceramic, Disc: 0.47 pF, 20%, 50 V	4	34452-1	14632	
C9	Same as C8				
C10	Same as C8				
C11	Same as C8				
C12	Capacitor, Ceramic, Disc: 2700 pF, 10%, 200 V	1	CK06BX272K	81349	
C13	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	2	196D225X0035JE3	56289	
C14	Same as C13				
C15	Capacitor, Ceramic, Disc: 0.1µiF, 20%, 50 V	1	34475-1	14632	
C16	Capacitor, Ceramic, Disc: 3300 pF, 10%, 200 V	1	CK06BX332K	81349	
C17	Same as C5				
C18	Capacitor, Variable, Air: .8-10.0 pF, 250 V	1	5201	91293	
C19	Capacitor, Ceramic, Disc: 4.7 pF, +0.5 pF, 100 V	1	8101-100COHO-479D	72982	
E1l	Term, Miniature	1	2010B1	88245	
L1	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
L2	Coil, Fixed	1	21210-168	14632	
L3	Coil, Fixed: 820 µH, 10%	1	553-3635-36	71279	
L4	Coil, Fixed: 560 µH, 10%	1	553-3635-34	71279	
L5	Coil, Fixed: 1.2 mH, 10%	2	553-3635-38	71279	
L6	Same as L5				
L7	Coil, Fixed, Mold: 10 pH	1	1025-44	99800	
R1	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 392 Ω, 1%, 1/10 W	1	RN55C3920F	81349	
R3	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-IOK/J	09021	
R4	Resistor, Fixed, Film: 4.75 kΩ, 1%, 1/10 W	1	RN55C4751F	81349	
R5	Resistor, Fixed, Film: 51.1 kΩ, 1%, 1/10 W	1	RN55C5112F	81349	
R6	Resistor, Fixed, Film: 46.4 kΩ, 1%, 1/10 W	1	RN55C4642F	81349	
R7	Resistor, Fixed, Film: 75 kΩl, 1%, 1/10 W	2	RN55C7502F	81349	
R8	Same as R7				
R9	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	1	RN55C2211F	81349	
R10	Resistor, Fixed, Film: 5.11 kΩ, 1%, 1/10 W	1	RN55C5111F	81349	
R11	Resistor, Trim, Film: 50 kΩ, 10%, 1/2 W	1	62PAR50K	73138	
R12	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R13	Resistor, Fixed, Film: 26.7 kΩ, 1%, 1/10 W	2	RN55C2672F	81349	
R14	Resistor, Trim, Film: 5 kΩ, 10%, 1/2 W	1	62PAR5K	73138	

REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R15	Same as R13				
R16	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	2	CF1/8-22K/J	09021	
R17	Resistor, Fixed, Film: 22 Ω, 5%, 1/4 W	1	CF1/4-22 OHMS/J	09021	
R18	Same as R16				
U1	Integrated Circuit	1	CA3089E	02735	
U2	Integrated Circuit	2	LM318H	27014	
U3	Same as U2				
U4	Integrated Circuit	1	IH5040CPE	32293	

5.5.2.28 Type 794107-2-FM Demodulator (500 kHz BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	7	8121-050-651-472M	72982	
C2 Thru C5	Same as Cl				
C6	Capacitor, Ceramic, Tubular: 1.5 pF, +0.1 pF, 500 V	2	301-000-COKO-159B	72982	
C7	Capacitor, Ceramic, Tubular: 1.5 pF, +0.25 pF, 500 V	1	301-000-T2KO-159C	72982	
C8	Capacitor, Variable, Ceramic: 2-8 pF, 350 V	1	538-006A2-8	72982	
C9	Capacitor, Ceramic, Tubular: 5.1 pF, +0.5 pF, 500 V	1	301-000-COHO-519D	72982	
C10	Capacitor, Variable, Air: 0.8-10 pF, 250 V	1	5201	91293	
C11l	Same as C1				
C12	Same as C6				
C13	Same as C1				
C14	Capacitor, Ceramic, Tubular: 4.7 pF, +0.25 pF, 500 V	1	301-000-U2JO-479C	72982	
C15	Capacitor, Ceramic, Tubular: 22 pF, 5%, 500 V	1	301-000-COGO-220J	72982	
C16	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	2	34475-1	14632	
C17	Same as C16				
C18	Capacitor, Ceramic, Disc: 0.47 µF, 20%, 50 V	2	34452-1	14632	
C19	Same as C18				
C20	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	2	196D225X0035JE3	56289	
C21	Capacitor, Ceramic, Disc: 1500 pF, 10%, 200 V	1	CK06BX152K	81349	
C22	Capacitor, Ceramic, Disc: 2200 pF, 10%, 200 V	1	CK06BX222K	81349	
C23	Same as C20				
CR1	Diode	2	5082-2800	28480	
CR2	Same as CR1				
L1	Coil, Fixed	1	22295-63	14632	
L2	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
L3	Not Used				
L4	Coil, Fixed: 360 µH, 5%	1	2500-06	99800	
L5	Coil, Fixed: 1.2 mH, 10%	2	553-3635-38	71279	
L6	Same as L5				
L7	Coil, Fixed: 390 pH, 5%	1	2500-08	99800	
R1	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 3.3 Ω, 5%, 1/4 W	1	CF1/4-3.3 OHMS/J	09021	
R3	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	1	CF1/4-100 OHMS/J	09021	
R4	Resistor, Fixed, Film: 10 Ω, 5%, 1/4 W	1	CF1/4-10 OHMS/J	09021	
R5	Resistor, Fixed, Film: 18 kΩ, 5%, 1/4 W	1	CF1/4-18K/J	09021	
R6	Resistor, Fixed, Film: 12 kΩ, 5%, 1/4 W	1	CF1/4-12K/J	09021	
R7	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	2	CF1/4-22K/J	09021	
R8	Same as R7				
R9	Resistor, Trim, Film: 20 kΩ, 10%, 1/2 W	1	62PAR20K	73138	
R10	Resistor, Fixed, Film: 100 kΩ, 1%, 1/10 W	2	RN55C1003F	81349	
R11	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	3	CFl/4-10K/J	09021	

REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R12	Same as R11				
R13	Same as R10				
R14	Same as R11				
R15	Resistor, Fixed, Film: 20 kΩ, 5%, 1/4 W	1	CF1/4-20K/J	09021	
R16	Resistor, Trim, Film: 200 kΩ, 10%, 1/2 W	1	62PAR200K	73138	
R17	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R18	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	2	CF1/8-22K/J	09021	
R19	Resistor, Fixed, Film: 22 Ω, 5%, 1/4 W	1	CF1/4-22 OHMS/J	09021	
R20	Same as R18				
T1	Transformer	1	24608-8	14632	
U1	Integrated Circuit	1	CA3011	02735	
U2	Integrated Circuit	1	LM318N	27014	
U3	Integrated Circuit	1	IH5040CPE	32293	
VR1	Voltage Regulator: 3.3 V	1	1N746A	80131	
VR2	Voltage Regulator: 5.1 V	1	1N751A	80131	

5.5.2.29 Type 794104-1 FM Demodulator (1 MKz BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 4700 F, 20%, 50 V	7	8121-050-651-472M	72982	
C2 Thru C5	Same as C1				
C6	Capacitor, Ceramic, Tubular: 1.5 pF, +0.1 pF, 500 V	2	301-000-COKO-159B	72982	
C7	Capacitor, Ceramic, Tubular: 1.5 pF, +0.25 pF, 500 V	1	301-000-T2KO-159C	72982	
C8	Capacitor, Variable, Ceramic: 2-8 pF, 350 V	1	538-006A2-8	72982	
C9	Capacitor, Ceramic, Tubular: 5.1 pF, +0.5 pF, 500 V	1	301-000-COHO-519D	72982	
C10	Capacitor, Variable, Air: 0.8-10 pF, 250 V	1	5201	91293	
C11l	Same as C1				
C12	Same as C6				
C13	Same as C1				
C14	Capacitor, Ceramic, Tubular: 4.7 pF, +0.25 pF, 100 V	1	301-000-U2JO-479C	72982	
C15	Capacitor, Ceramic, Tubular: 22 pF, 5%, 500 V	1	301-000-COGO-220J	72982	
C16	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	2	34475-1	14632	
C17	Same as C16				
C18	Capacitor, Ceramic, Disc: 0.47 µF, 20%, 50 V	2	34452-1	14632	
C19	Same as C18				
C20	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	2	196D225X0035JE3	56289	
C21	Capacitor, Mica, Dipped: 820 pF, 5%, 500 V	1	DM15-821J	72136	
C22	Capacitor, Mica, Dipped: 1000 pF, 5%, 100 V	1	DM15-102J	72136	
C23	Same as C20				
CR1	Diode	2	5082-2800	28480	
CR2	Same as CR1				
L1	Coil, Fixed	1	22295-63	14632	
L2	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
L3	Not Used				
L4	Coil, Fixed: 180 µH, 5%	1	1537-88	99800	
L5	Coil, Fixed: 1.2 mH, 10%	2	553-3635-38	71279	
L6	Same as L5				
L7	Coil, Fixed: 220 µH, 5%	1	1537-92	99800	
R1	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 3.3 Ω, 5%, 1/4 W	1	CFI/4-3.3K/J	09021	
R3	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	1	CF1/4-100 OHMS/J	09021	
R4	Resistor, Fixed, Film: 10 Ω, 5%, 1/4 W	1	CF1/4-10 OHMS/J	09021	
R5	Resistor, Fixed, Film: 18 kΩ, 5%, 1/4 W	1	CF1/4-18K/J	09021	
R6	Resistor, Fixed, Film: 12 kΩ, 5%, 1/4 W	1	CF1/4-12K/J	09021	
R7	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	2	CF1/4-22K/J	09021	
R8	Same as R7				
R9	Resistor, Trim, Film: 20 kΩ, 1096, 1/2 W	1	62PAR20K	73138	
R10	Resistor, Fixed, Film: 100 kΩ, 1%, 1/10 W	2	RN55C1003F	81349	
R11	Resistor, Fixed, Film: 10 ka, 5%, 1/4 *.	3	CF1/4-1OK/J	09021	

REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R12	Same as R11				
R13	Same as R10				
R14	Same as R11				
R15	Resistor, Fixed, Film: 20 kΩ, 5%, 1/4 W	1	CF1/4-20K/J	09021	
R16	Resistor, Variable, Film: 50 kΩ, 10%, 1/2 W	1	62PAR50K	73138	
R17	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R18	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	2	CF1/4-22K/J	09021	
R19	Resistor, Fixed, Film: 22 Ωn, 5%, 1/4 W	1	CF1/4-22 OHMS/J	09021	
R20	Same as R18				
T1	Transformer	1	24608-8	14632	
U1	Integrated Circuit	1	CA3011	02735	
U2	Integrated Circuit	1	LM318N	27014	
U3	Integrated Circuit	1	IH5040CPE	32293	
VR1	Voltage Regulator: 3.3 V	1	1N746A	80131	
VR2	Voltage Regulator: 5.1 V	1	1N751A	80131	

5.5.2.30 Type 794105-1 FM Demodulator (2 MHz BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	5	8121-050-651-472M	72982	
C2	Capacitor, Variable, Air: 0.8-10 pF, 250 V	2	5201	91293	
C3	Same as C1				
C4	Same as CI				
C5	Capacitor, Ceramic, Tubular: 2.7 pF, +0.25 pF, 500 V	1	301-OOOCOJO-279C	72982	
C6	Same as C2				
C7	Capacitor, Ceramic, Tubular: 4.7 pF, +0.25 pF, 500 V	1	301-00OU2JO-479C	72982	
C8	Capacitor, Ceramic, Tubular: 3.0 pF, +0.25 pF, 500 V	1	301-OOOCOJO-309C	72982	
C9	Not Used				
C10	Not Used				
C11l	Capacitor, Mica, Dipped: 430 pF, 5%, 500 V	1	DM15-431J	72136	
C12	Capacitor, Mica, Dipped: 300 pF, 2%, 500 V	1	CM05FD301G03	81349	
C13	Capacitor, Electrolytic, Tantalum: 2.2 µH, 20%, 35 V	2	196D225X0035JE3	56289	
C14	Same as C1				
C15	Same as C1				
C16	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	2	34475-1	14632	
C17	Same as C16				
C18	Capacitor, Ceramic, Disc: 0.47 µF, 20%, 50 V	2	34452-1	14632	
C19	Same as C18				
C20	Same as C13				
CR1	Diode	2	1N4446	80131	
CR2	Same as CR1				
L1	Coil, Fixed	1	22295-67	14632	
L2	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
L3	Coil, Fixed: 75 µH, 5%	1	1537-70	99800	
L4	Coil, Fixed: 100 µH, 5%	1	1537-76	99800	
LS	Coil, Fixed: 1.2 mH, 10%	2	553-3635-38	71279	
L6	Same as L5				
R1	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/4 W	1	CF1/4-1.5K/J	09021	
R3	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/4 W	1	CF1/4-2.7K/J	09021	
R4	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	2	CF1/4-22K/J	09021	
R5	Same as R4				
R6	Resistor, Fixed, Film: 680 Ω, 5%, 1/4 W	1	CF1/4-680 OHMS/J	09021	
R7	Resistor, Fixed, Film: 4.7 Ω, 5%, 1/4 W	1	CF1/4-4.7 OHMS/J	09021	
R8	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-10K/J	09021	
R9	Resistor, Trim, Film: 20 kΩ, 10%, 1/2 W	2	62PAR20K	73138	
R10	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	2	CF1/8-22K/J	09021	
R11	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R12	Resistor, Fixed, Film: 100 kΩ, 1%, 1/10 W	2	RN5SSC1003FΩ	81349	
R13	Same as R12				

REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R14	Same as R9				
R15	Resistor, Fixed, Film: 22 Ω, 5%, 1/4 W	1	CF1/4-22 OHMS/J	09021	
R16	Same as R10				
T1	Transformer	1	24608-9	14632	
U1	Integrated Circuit	1	CA3011	02735	
U2	Integrated Circuit	1	LM318N	27014	
U3	Integrated Circuit	1	IH5040CPE	32293	
VR1	Voltage Regulator: 5.1 V	1	1N751A	80131	

5.5.2.31 Type 794105-2 FM Demodulator (4 MKz BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	5	8121-050-651-472M	72982	
C2	Capacitor, Variable, Air: 0.8-10 pF, 250 V	2	5201	91293	
C3	Same as C1				
C4	Same as C1				
C5	Capacitor, Ceramic, Tubular: 2.7 pF, +0.25 pF, 500 V	1	301-000COJO-279C	72982	
C6	Same as C2				
C7	Capacitor, Ceramic, Tubular: 4.7 pF, +0.25 pF, 500 V	1	301-000U2JO-479C	72982	
C8	Capacitor, Ceramic, Tubular: 3.0 pF, +0.25 pF, 500 V	1	301-OOOCOHO-689C	72982	
C9	Not Used				
C10	Not Used				
C11l	Capacitor, Mica, Dipped: 130 pF, 2%, 500 V	1	CM05FD131G03	81349	
C12	Capacitor, Mica, Dipped: 180 pF, 2%, 500 V	1	CM05FD181G03	81349	
C13	Capacitor, Electrolytic, Tantalum: 2.2 µH, 20%, 35 V	2	196D225X0035JE3	56289	
C14	Same as C1				
C15	Same as C1				
C16	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	2	34475-1	14632	
C17	Same as C16				
C18	Capacitor, Ceramic, Disc: 0.47µF, 20%, 50 V	2	34452-1	14632	
C19	Same as C18				
C20	Same as C13				
CR1	Diode	2	1N4446	80131	
CR2	Same as CR1				
L1	Coil, Fixed	1	22295-67	14632	
L2	Coil, Fixed: 18 µH, 10%	1	1537-42	99800	
L3	Coil, Fixed: 39 µH, 10%	1	1537-56	99800	
L4	Coil, Fixed: 47 µH, 5%	1	1537-60	99800	
L5	Coil, Fixed: 1.2 mH, 10%	2	553-3635-38	71279	
L6	Same as L5				
R1	Resistor, Fixed, Film: 220 Ωi, 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/4 W	1	CF1/4-1.5K/J	09021	
R3	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/4 W	1	CF1/4-2.7K/J	09021	
R4	Resistor, Fixed, Film: 22 kΩl, 5%, 1/4 W	3	CF1/4-22K/J	09021	
R5	Same as R4				
R6	Resistor, Fixed, Film: 1.8 kΩ, 5%, 1/4 W	1	CF1/4-1.8K/J	09021	
R7	Resistor, Fixed, Film: 4.7 Ω, 5%, 1/4 W	1	CF1/4-4.7 OHMS/J	09021	
R8	Same as R4				
R9	Resistor, Trim, Film: 20 kΩ, 10%, 1/2 W	2	62PAR20K	73138	
R10	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	2	CF1/8-22K/J	09021	
R11	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R12	Resistor, Fixed, Film: 100 kΩ, 1%, 1/10 W	2	RN55C1003F	81349	
R13	Same as R12				

REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R14	Same as R9				
R15	Resistor, Fixed, Film: 22 Ω, 5%, 1/4 W	1	CF1/4-22 OHMS/J	09021	
R16	Same as R10				
T1	Transformer	1	24608-9	14632	
U1l	Integrated Circuit	1	CA3011	02735	
U2	Integrated Circuit	1	LM318N	27014	
U3	Integrated Circuit	1	IH5040CPE	32293	
VR1	Voltage Regulator: 5.1 V	1	1N751A	80131	

5.5.2.32 Type 794106-6 FM Demodulator (3.2 kHz BW) REF DESIGN PREFIX A3A17-A3A21

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
With the exception of those items listed below, the Type 794106-6 FM Demodulator (3.2 kHz BW) is identical electrically to the Type 794106-1 FM Demodulator (10 kHz BW).					
C11	Capacitor, Ceramic, Disc: 0.1 ΩF, 20%, 50 V	3	34475-1	14632	
C17	Same as C11				
L4	Coil, Fixed: 22 mH, 10%	2	553-3635-53	71279	
L5	Same as L4				
R10	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	1	RN55C2211F	81349	
R14	Resistor, Fixed, Film: 1.0 kΩ, 1%, 1/10 W	1	RN55C1OO1F	81349	
R15	Resistor, Trimmer, Film: 20 kΩ, 10%, 1/2 W	1	62PR20K	73138	

5.5.3 Type 798071-1 SYNTHESIZER MOTHERBOARD REF DESIGN PREFIX A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	Reference Generator	1	798028-2	14632	
A2	1st LO Synthesizer	1	778001-1	14632	
A3	Translation Oscillator	1	778002-1	14632	
A4	4.4 - 5.4 MHz Synthesizer	1	776002-1	14632	
A5	SSB BFO	1	794195-1	14632	
A6	535 MHz Generator	1	798043-1	14632	
C1	Capacitor, Ceramic, Disc: .01 µF, 20%, 100 V	58	8121-100-651-103M	72982	
C2 Thru C58	Same as C1				
C59	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	9	34453-1	14632	
C60	Same as C59				
C61	Same as C59				
C62	Same as C59				
C63	Capacitor, Electrolytic, Tantalum: 100 µF, 20%, 35 V	7	MTP107M035P1C	76055	
C64	Same as C63				
C65	Same as C63				
C66	Same as C63				
C67	Same as C59				
C68	Same as C63				
C69	Same as C59				
C70	Same as C63				
C71	Same as C59				
C72	Same as C63				
C73	Same as C59				
C74	Same as C59				
C75	Capacitor, Ceramic, Disc: .047µF, 10%, 100 V	1	8121-100X7RO-473K	72982	
CR1	Diode	2	IN4449	80131	
CR2	Same as CR1				
J1	Connector, Receptacle	4	118470-8	00779	
J2	Same as J1				
J3	Same as J1				
J4	Connector, Receptacle	2	241-14181-1	00779	
P1	Flex Cable	1	34832-2	14632	
P2	Flex Cable	1	34832-1	14632	
P3	Connector, Plug	1	87499-5	00779	
P4	Connector, Plug	2	50-328-3875-91	98291	
P5	Same as P4				
P6	Connector, Plug	1	50-024-3875-91	98291	
P7	Same as P6				
P8	Same as P6				
R1	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	1	CF1/8-22K/J	09021	

REF DESIGN PREFIX A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R2	Resistor, Fixed, Composition: 2.2. kΩ 5%, 1/8 W	1	RCR05G222JS	81349	
U1	Voltage Regulator: SV, 1A	3	7805UC	07263	
U2	Same as U1				
U3	Same as U1				
W1	Cable Assembly	1	380260-8	14632	
W2	Cable Assembly	1	380259-17	14632	
W3	Cable Assembly	1	380259-18	14632	
XA1	Housing	3	117798-3	00779	
XA2	Same as XA1				
XA3	Not Used				
XA4	Not Used				
XA5	Same as XA1				

5.5.3.1 **Type 798028-2 Reference Generator** REF DESIGN PREFIX A4A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	2	34475-1	14632	
C2	Capacitor, Mica, Dipped: 820 pF, 5%, 300 V	1	DM15-821J	72136	
C3	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	10	34453-1	14632	
C4	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	1	B-GP1OO0PFP	91418	
C5	Capacitor, Mica, Dipped: 1000 pF, 5%, 1000 V	1	DM15-102J	72136	
C6	Same as C3				
C7	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	2	34452-1	14632	
C8	Same as C3				
C9	Capacitor, Electrolytic, Tantalum: 22 µF, +20%, 15 V	2	196D226XOO15KE3	56289	
C10	Same as C9				
C11l	Same as C3				
C12	Same as C1				
C13	Same as C7				
C14	Same as C3				
C15	Capacitor, Variable, Ceramic: 2-8 pF, 350 V	1	538-006A2-8	72982	
C16	Same as C3				
C17	Capacitor, Mica, Dipped: 12 pF, 5%, 500 V	1	CM04CD120J03	81349	
C18	Capacitor, Electrolytic, Tantalum: 220 µf:, 20%, 10 V	2	196D227X0010TE4	56289	
C19	Capacitor, Mica, Dipped: 220 pF, 2%, 500 V	2	CM04FD221G03	81349	
C20	Same as C19				
C21	Same as C3				
C22	Same as C3				
C23	Capacitor, Mica, Dipped: 910 pF, 5%, 100 V	1	DM15-911J	72136	
C24	Same as C18				
C25	Same as C3				
C26	Same as C3				
CR1	Diode	1	Ull-3102	52673	
CR2	Diode	1	1N4446	80131	
E2 Thru E12	Terminal, Forked	11	140-1941-02-01	71279	
L1	Coil, Fixed: 8.2 µH, 10%	1	1537-34	99800	
L2	Coil, Fixed: 100µH, 10%	1	553-3635-25	71279	
L3	Coil, Fixed: .22 µH	1	1537-2	99800	
L4	Coil, Fixed: 15 µH, 10%	1	1537-40	99800	
L5	Coil, Fixed: 10 µH, 10%	1	1537-36	99800	
Q1	Transistor	5	2N2222A	80131	
Q2 Thru Q5	Same as Q1				
R1	Resistor, Fixed, Composition: 5.6 kΩ, 5%, 1/4 W	2	RCR07G562JS	81349	
R2	Same as R1				

REF DESIGN PREFIX A4A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R3	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	3	CF1/8-47 OHMS/J	09021	
R4	Resistor, Fixed, Film: 1 kΩ, 5%, 1/8 W	5	CF1/8-1K/J	09021	
R5	Same as R4				
R6	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	3	CF1/8-100 OHMS/J	09021	
R7	Resistor, Fixed, Film: 120 Ω, 5%, 1/8 W	3	CF1/8-120 OHMS/J	09021	
R8	Same as R7				
R9	Same as R7				
R10	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W	1	CF1/8-2.7K/J	09021	
R11	Resistor, Fixed, Film: 270 Ω, 5%, 1/8 W	2	CF1/8-270 OHMS/J	09021	
R12	Resistor, Fixed, Film: 22 Ω, 5%, 1/8 W	2	CF1/8-22 OHMS/J	09021	
R13	Same as R6				
R14	Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W	1	CF1/8-18K/J	09021	
R15	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	4	CF1/8-10OK/J	09021	
R16	Resistor, Fixed, Film: 150 Ω, 5%, 1/8 W	1	CF1/8-150 OHMS/J	09021	
R17	Resistor, Fixed, Film: 2 kΩ, 5%, 1/8 W	1	CF1/8-2K/J	09021	
R18	Resistor, Fixed, Film: 22 kΩ 5%, 1/8 W	1	CF1/8-22K/J	09021	
R19	Resistor, Fixed, Composition: 5.1 kΩ, 5%, 1/8 W	1	RCR05G512JS	81349	
R20	Same as R4				
R21	Same as R15				
R22	Same as R4				
R23	Same as R15				
R24	Resistor, Fixed, Film: 220 Ω, 5%, 1/8 W	1	CF1/8-220 OHMS/J	09021	
R25	Resistor, Fixed, Film: 27 Ω, 5%, 1/8 W	1	CF1/8-27 OHMS/J	09021	
R26	Same as Rll				
R27	Same as R12				
R28	Not Used				
R29	Not Used				
R30	Resistor, Fixed, Composition: 470 Ω, 5%, 1/8 W	1	RCR05G471JS	81349	
R31	Same as R6				
R32	Resistor, Trim, Film: 100 Ω, 10%, 1/2 W	1	62PAR100	73138	
R33	Same as R4				
R34	Same as R15				
R35	Resistor, Fixed, Film: 56 Ω, 5%, 1/8 W	1	CF1/8-56 OHMS/J	09021	
T1	Transformer	1	22295-68	14632	
U1	Oscillator/10 MHz	1	841046	14632	
U2	Integrated Circuit	1	SN75140N	01295	
U3	Integrated Circuit	1	SN74125N	01295	
U4	Integrated Circuit	2		SN74LS196N	01295
U5	Integrated Circuit	2		SN74LS197N	01295
U6	Same as U5				
U7	Same as U4				

REF DESIGN PREFIX A4A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U8	Integrated Circuit	1	I11C44DC	07263	
U9	Integrated Circuit	1	SN74LS74N	01295	
U10	Voltage Regulator: 5 V, 1A	1	7805UC	07263	
Y1	Crystal, Quartz: 10.7 MHz	2	CR64UI0.7 MHz	81349	
Y2	Same as Y1				

5.5.3.2 Type 778001-1 1st LO Synthesizer REF DESIGN PREFIX A4A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	1st LO Synthesizer VCO	1	390361-1	14632	
A2	Diode Control Assembly	1	290443-1	14632	
C1	Capacitor, Electrolytic, Tantalum: 100 µF, 20%, 35 V	2	MTP107M035PIC	76055	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	3	34475-1	14632	
C4	Capacitor, Electrolytic, Tantalum: 22 µF, 10%, 15 V	1	CS13BD226K	81349	
C5	Capacitor, Ceramic, Disc: 5000 pF, 20%, 100 V	2	C023B101E502M	56289	
C6	Same as C3				
C7	Same as C3				
C8	Capacitor, Ceramic, Disc: .047 µF, 10%, 100 V	2	CK06BX473K	81349	
C9	Capacitor, Ceramic, Disc: .01 µF, 10%, 200 V	2	CK06BX103K	81349	
C10	Capacitor, Ceramic, Disc: .015 µF, 10%, 100 V	1	CK06BX153K	81349	
C11	Same as C9				
C12	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	2	34452-1	14632	
C13	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	8	34453-1	14632	
C14	Capacitor, Mica, Dipped: 150 µF, 2%, 500 V	1	CM05FD151G03	81349	
C15 Thru C21	Same as C13				
C22	Capacitor, Electrolytic, Tantalum: 15 µF, 20%, 15 V	1	196D156X0015JE3	56289	
C23	Same as C5				
C24	Same as C8				
C25	Same as C12				
C26	Capacitor, Ceramic, Disc: 470 pF, 20%, 1000 V	1	BH0470-20PCT	91418	
C27	Capacitor, Mica, Dipped: 47 pF, 2%, 500 V	1	CM05ED470G03	81349	
CR1	Diode	9	1N4449	80131	
CR2	Diode	7	5082-2800	28480	
CR3	Same as CR2				
CR4	Same as CR2				
CR5	Same as CR2				
CR6	Same as CR1				
CR7	Same as CRI				
CR8	Same as CR2				
CR9	Same as CR2				
CR10	Same as CR1				
CRI1	Diode	1	1N995	80131	
CR12	Same as CR1				
CR13	Same as CR1				
CR14	Same as CR2				
CR15	Same as CRI				
CR16	Same as CR1				
CR17	Same as CR1				

REF DESIGN PREFIX A4A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
DS1	Diode: LED	2	HLMP-1301	28480	
DS2	Same as DS1				
E31	Terminal, Forked	12	140-1941-02-01	71279	
E32 Thru E42	Same as E1l				
E43 Thru E46	Terminal, Miniature	4	2010B1	88245	
FB1	Ferrite Bead	8	56-590-65-4A	02114	
FB2 Thru FB6	Same as FB1				
FB7	Not Used				
FB8	Same as FB1				
FB9	Same as FBI				
L1	Coil, Fixed	1	16209-4	14632	
L2	Coil, Fixed, Toroid	1	20681-180	14632	
L3	Coil, Fixed: 2.2 µH, 10%	2	553-3635-41	71279	
L4	Same as L3				
L5	Coil, Fixed: 47 µH	1	1537-60	99800	
Q1	Transistor	3	2N3904	80131	
Q2	Same as Q1				
Q3	Transistor	2	2N3906	80131	
Q4	Same as Q1				
Q5	Same as Q3				
R1	Resistor, Fixed, Film: 2.7 Ω, 5%, 1/4 W	1	CF1/4-2.7 OHMS/J	09021	
R2	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	2	CF1/4-100 OHMS/J	09021	
R3	Resistor, Fixed, Film: 330 Ω, 5%, 1/4 W	1	CF1/4-330 OHMS/J	09021	
R4	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W	6	CF1/4-4.7K/J	09021	
R5	Resistor, Fixed, Film: 470 Ωn, 5%, 1/4 W	7	CF1/4-470 OHMS/J	09021	
R6 Thru R9	Same as R5				
R10	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	3	CF1/4-IOK/J	09021	
R11	Same as R5				
R12	Same as R10				
R13	Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/4 W	3	CF1/4-3.3K/J	09021	
R14	Same as R13				
R15	Same as R13				
R16	Same as R10				
R17	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	4	C3-4.7K-5PCT	24546	

REF DESIGN PREFIX A4A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R18	Resistor, Fixed, Film: 1 kiΩ 5%, 1/8 W	8	C3-1K-5PCT	24546	
Rl9	Same as R17				
R20	Same as R18				
R21	Resistor, Fixed, Film: 1.0 kΩ, 1%, 1/10 W	1	RN55C1001F	81349	
R22	Same as R17				
R23	Resistor, Fixed, Film: 200 Ω, 5%, 1/8 W	2	C3-200R-5PCT	24546	
R24	Resistor, Fixed, Film: 100 Ωn, 5%, 1/8 W	2	C3-100R-5PCT	24546	
R25	Same as R24				
R26	Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W	1	CF1/4-15K/J	09021	
R27	Same as R4				
R28	Same as R23				
R29	Resistor, Fixed, Film: 390 , 5%, 1/8 W	2	C3-390R-5PCT	24546	
R30	Same as R29				
R31	Same as R4				
R32	Same as R18				
R33	Same as R18				
R34	Same as R17				
R35	Same as R18				
R36	Same as R18				
R37	Resistor, Fixed, Film: 270 Ω, 5%, 1/4 W	1	CF1/4-270 OHMS/J	09021	
R38	Same as R4				
R39	Resistor, Fixed, Film: 15 kiΩ 5%, 1/8 W	2	C3-10K-5PCT	24546	
R40	Same as R18				
R41	Same as R39				
R42	Same as R18				
R43	Same as R5				
R44	Same as R2				
R45	Same as R4				
R46	Same as R4				
U1	Integrated Circuit	1	MC12014L	04713	
U2	Integrated Circuit	1	SN74LS196N	01295	
U3	Integrated Circuit	1	SN74S74N	01295	
U4	Integrated Circuit	1	11C44DC	07263	
U5	Integrated Circuit	2	SN74LS19ON	01295	
U6	Integrated Circuit	2	MM74C374N	27014	
U7	Integrated Circuit	1	841050	14632	
U8	Same as U5				
U9	Same as U6				
U10	Integrated Circuit	1		NE5534	18324
U11	Integrated Circuit	1		ULN2003A	56289

5.5.3.2.1 Part 390361-1 1st LO Synthesizer VCO REF DESIGN PREFIX A4A2A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	VCO	1	390360-1	14632	
A2	Buffer	1	290433-1	14632	
A3	Prescaler	1	290434-1	14632	
C1	Capacitor, Modified	6	33728-5	14632	
C2 Thru C6	Same as C1				
C7	Capacitor, Ceramic, Feed thru: 330 pF, 10%, 500 V	6	54-794-001-3311	33095	
C8 Thru C11l	Smae as C7				
C12	Capacitor, Ceramic, Feed thru: 33 pF, 10%, 500 V	3	54-794-001-3301	33095	
C13	Same as C12				
C14	Same as C12				
C15	Same as C7				
C16	Capacitor, Electrolytic, Tantalum: 47 µF, 20%, 20 V	1	196D476X0020PE4	56289	
FB1	Ferrite Bead	15	56-590-65-4A	02114	
FB2 Thru FB15	Same as FB1				
J1	Connector, Recepticle	1	UG1619	80058	
J2	Connector, Recepticle, SMA	2	244-2	16179	
J3	Same as J2				
P1	Connector, Plug	2	201-1A	16179	
P2	Same as P1				
R1	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	1	C3-4.7K-5PCT	24546	
R2	Resistor, Fixed, Film: 470 Ω, 5%, 1/8 W	1	C3-470R-5PCT	24546	
R3	Resistor, Fixed, Film: 22 Ω, 5%, 1/8 W	1	C3-22R-5PCT	24546	
W1	Cable Assembly	1	280218-1	14632	

5.5.3.2.1.1 Part 390360-1 vco REF DESIGN PREFIX A4A2A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Chip: 330 pF, 10%, 200 V	2	ATC700B331KP200X	29990	
C2	Capacitor, Ceramic, Chip: 200 pF, NOP 50%, 500 V	25	32-257578-40	91984	
C3	Capacitor, Ceramic, Chip: 4.7 pF, +.1 pF, 500 V	1	ATC100B4R7BP500X	29990	
C4	Not Used				
C5	Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V	1	196D475X0035JE3	56289	
C6	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	3	34453-1	14632	
C7	Same as C1				
C8	Capacitor, Ceramic, Chip: 24 pF, 5%, 500 V	1	ATC700B240JP500X	29990	
C9	Same as C2				
C10	Same as C6				
Cll Thru C14	Same as C2				
C15	Same as C6				
C16 Thru C32	Same as C2				
C33	Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 15 V	3	196D226X0015KE3	56289	
C34	Same as C33				
C35	Same as C2				
C36	Same as C2				
C37	Same as C33				
C38	Capacitor, Ceramic, Disc: .µF, 20%, 50 V	1	34452-1	14632	
C39	Capacitor, Ceramic, Chip: 2.1 pF, +.25 pF, 500 V	1	ATC700B2R4CP500	29990	
CR1	Diode	1	Ull-3102	52673	
CR2	Not used				
CR3 Thru CR24	Same as CR2				
FBi	Ferrite Bead	1	56-590-65-4A	02114	
L1	Coil, Fixed	1	180067-1	14632	
L2	Coil, Fixed	1	22292-120	14632	
L3	Not Used				
L4	Inductor	1	180066-1	14632	
L5	Inductor	1	180065-1	14632	
Q1	Transistor	1	BFR96	73445	
R1	Resistor, Fixed, Film: 180 Ω, 5%, 1/8 W	1	C3-180R-5PCT	24546	
R2	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	4	C3-10OR-5PCT	24546	
R3	Same as R2				
R4	Not Used				
R5	Resistor, Fixed, Film: 15 Ω, 5%, 1/8 W	2	C3-15R-5PCT	24546	
R6	Same as R5				
R7	Resistor, Fixed, Film: 68 Ω, 5%, 1/8 W	1	C3-68R-5PCT	24546	

REF DESIG PREFIX A4A4A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R8	Not Used				
R9	Not Used				
R10	Resistor, Fixed, Film: 8.2 kΩ, 5%, 1/8 W	1	C3-8.2K-5PCT	24546	
R11	Resistor, Fixed, Film: 27 kΩ, 5%, 1/8 W	1	C3-27K-5PCT	24546	
R12	Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W	1	C3-47K-5PCT	24546	
R13	Resistor, Fixed, Film: 4.3 kΩ, 5%, 1/8 W	1	C3-4.3K-5PCT	24546	
R14	Not Used				
R15	Same as R2				
R16	Same as R2				
R17	Resistor, Fixed, Film: 1 kΩ, 5%, 1/8 W	22	C3-iK-5PCT	24546	
R18 Thru R36	Same as R17				
R37	Resistor, Fixed, Film: 27 in, 5%, 1/8 W	1	C3-27R-5PCT	24546	
R38	Same as R17				
R39	Same as R17				
U1	Integrated Circuit	3	CD4094BE	02735	
U2	Same as U1				
U3	Same as U1				

5.5.3.2.1.2 Part 290433-1 Part 290433-1 Buffer REF DESIG PREFIX A4A4A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 10 µF, 10%, 20 V	1	CS13BE106K	81349	
C2	Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V	6	ATC700B471KP200X	29990	
C3	Capacitor, Mica, Dipped: 1000 pF, 5%, 100 V	1	DM15-102J	72136	
C4 Thru C8	Same as C2				
C9	Capacitor, Electrolytic, Tantalum: 18 µF, 10%, 20 V	2	196D186X9020KE3	56289	
C10	Same as C9				
E1l	Terminal/Forked	7	140-1941-02-01	71279	
E2 Thru E7	Same as El				
FB1-FB4	Ferrite Bead	4	56-590-65-4A	02114	
L1	Coil, Fixed	1	180064-1	14632	
R1	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	2	C3-4.7K-5PCT	24546	
R2	Same as RI				
R3	Not Used				
R4	Not Used				
R5	Not Used				
R6	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	2	CF1/8-100 OHMS/J	09021	
R7	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	4	CF1/8-100 OHMS/J	09021	
R8	Resistor, Fixed, Film: 68 Ω, 5%, 1/8 W	2	CF1/8-68 OHMS/J	09021	
R9	Same as R7				
R10	Same as R6				
R11	Same as R7				
R12	Same as R8				
R13	Same as R7				
R14	Resistor, Fixed, Film: 6.2 kΩ, 5%, 1/8 W	1	C3-6.2K-5PCT	24546	
R15	Resistor, Fixed, Film: 6.8 Ω, 5%, 1/8 W	1	CF1/8-6.8 OHMS/J	09021	
U1	Integrated Circuit	1	723DC	07263	
U2	Amplifier	1	A65	27956	
U3	Power Divider	1	PDF-2A-550	12475	
U4	Integrated Circuit	2	MWA320	04713	
U5	Same as U4				

5.5.3.2.1.3 Part 290433-1-Buffer **REF DESIG PREFIX A4A4A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V	6	ATC700B471KP20OX	29990	
C2	Capacitor, Ceramic, Disc: .01 μF, 20%, 50 V	1	34453-1	14632	
C3 Thru C6	Same as C1				
C7	Capacitor, Ceramic, Disc: .1 μF, 20%, 50 V	1	34475-1	14632	
C8	Same as C1				
E3-E8	Terminal, Forked	6	140-1941-02-01	71279	
RA1	Heat Sink	1	290505-1	14632U1	
R1	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	2	C3-1OOR-5PCT	24546	
R2	Resistor, Fixed, Film: 68 Ω, 5%, 1/8 W	1	C3-68R-5PCT	24546	
R3	Same as R1				
R4	Resistor, Fixed, Film: 470 Ω, 5%, 1/8 W	4	C3-470R-5PCT	24546	
R5	Same as R4				
R6	Resistor, Fixed, Film: 1 kΩ, 5%, 1/8 W	1	C3-1K-SPCT	24546	
R7	Same as R4				
R8	Same as R4				
R9	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	1	C3-1OK-5PCT	24546	
U1	Integrated Circuit	1	SP8611B	52648	
U2	Integrated Circuit	1	MC12013P	04713	

5.5.3.2.2 **Part 290433-1 Diode Control** **REF DESIG PREFIX A4A4A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	4	34475-1	14632	
C2	Same as C1				
C3	Same as C1				
C4	Same as C1				
CR1	Diode	5	1N4446	80131	
CR2 Thru CR5	Same as CRI				
R1	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	1	CF1/4-22K/J	09021	
R2	Resistor, Fixed, Film: 3.3 kΩ, 596%, 1/4 W	1	CF1/4-3.3K/J	09021	
R3	Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W	2	CF1/4-15K/J	09021	
R4	Same as R3				
U1	Integrated Circuit	2	B2716	34649	
U2	Same as U1				
U3	Integrated Circuit	2	CD4021AE	02735	
U4	Integrated Circuit	3	MM74C161N	27014	
U5	Same as U4				
U6	Same as U4				
U7	Same as U3				
U8	Integrated Circuit	1	ULN2004A	56289	
U9	Integrated Circuit	1	SN74LS74N	01295	

5.5.3.3 Type 778002-1 Translation Oscillator **REF DESIG PREFIX A4A4A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	VCO Buffer	1	290557-1	14632	
A2	4.4 - 5.4 MHz Amplifier	1	290536-1	14632	
A3	Phase Detector	1	290450-1	14632	
C1	Capacitor, Ceramic, Feedthru: 1000 pF, GMV, 500 V	5	54-794-009-102-W	33095	
C2	Same as C1				
C3	Capacitor, Modified	2	33728-7	14632	
C4	Same as C3				
C5	Same as C1				
C6	Same as C1				
C7	Capacitor, Ceramic, Feedthru: 33 pF, 10%, 500 V	1	54-794-001-3301	33095	
C8	Same as C1				
C9	Capacitor, Mica, Dipped: 15 pF, 5%, 500 V	1	CM04CD150J03	81349	
El	Terminal, Feedthru	1	SFU16Y	04013	
FB1	Ferrite Bead	1	56-590-65-4A	02114	
J1	Connector, Receptacle	3	112	19505	
J2	Same as J1				
J3	Same as J1				
L1	Coil, Fixed: 2.2 µH, 10%	1	1537-20	99800	
L2	Coil, Fixed: 33 µH, 5%	1	1537-52	99800	
L3	Coil, Fixed: 100 µH, 5%	1	1537-76	99800	
P1	Connector, Plug	1	1-87499-1	00779	
R1	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	1	CF1/4-47 OHMS/J	09021	
R2	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	1	CF1/4-100 OHMS/J	09021	

5.5.3.3.1 Part 290557-1 VOC/Buffer REF DESIG PREFIX A4A4A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Chip: 470 pF, 10%, 200 V	10	ATC10OB471KP200X	29990	
C2	Same as C1				
C3	Capacitor, Ceramic, Chip: 6.8 pF, +.25 pF, 500 V	2	ATC100B6RSCP50OX	29990	
C4	Not used				
C5	Capacitor, Ceramic, Tubular: 2.2 pF, 0.25 pF TOL 500 V, N750	1	301-000U2JO-229C		
C6	Capacitor, Ceramic, Chip: 1.0 pF, 500 V	1	ATClOOB1ROCP50OX	29990	
C7	Capacitor, Variable, Air: .6 - 4.5 pF, 500 V	1	M5J	18736	
C8	Same as C3				
C9	Same as C1				
C10	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	1	34452-1	14632	
C11	Capacitor, Composition, Tubular: .62 pF, 10%, 500 V	1	QCO-62PFK	95121	
C12 Thru C18	Same as C1				
C19	Not Used				
C20	Not Used				
C21	Not Used				
C22	Capacitor, Electrolytic, Tantalum: 100 µF, 20%, 20 V	1	196D107X0020TE4	56289	
CRI	Diode	1	UH-3102	52673	
El	Terminal, Forked - E4	4	140-1941-02-01		
E2 Thru **E4**	Same as El				
L1	Coil, Fixed: .68 µH	3	1025-16	99800	
L2	Coil, Fixed:	3	1129-46	14632	
L3	Same as L1				
L4	Same as L2				
L5	Same as L1				
L6	Same as L2				
L7	Coil, Fixed:	1	1129-28	14632	
Q1	Transistor	4	BFR96	73445	
Q2	Same as Q1				
Q3	Same as Q1				
Q4	Same as Q1				
R1	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	4	C3-1K-5PCT	24546	
R2	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	5	C3-4.7K-5PCT	24546	
R3	Resistor, Fixed, Film: 10 Ω, 5%, 1/8 W	1	C3-10R-SPCT	24546	
R4	Resistor, Fixed, Film: 180 Ω, 5%, 1/8 W	1	C3-180R-5PCT	24546	
R5	Same as R1				
R6	Same as R2				
R7	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	3	C3-10OR-SPCT	24546	
R8	Resistor, Fixed, Film: 220 Ω, 5%, 1/8 W	3	C3-220R-5PCT	24546	

REF DESIG PREFIX A4A4A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R9	Resistor, Fixed, Film: 2.7Ω, 5%, 1/8 W	4	CF1/8-2.7 OHMS/J	09021	
R10	Same as R9				
R11	Same as R1				
R12	Same as R2				
R13	Same as R8				
R14	Same as R9				
R15	Resistor, Fixed, Film: 27 Ω, 5%, 1/8 W	2	C3-27R-5PCT	24546	
R16	Same as R1				
R17	Same as R2				
R18	Same as R7				
R19	Same as R8				
R20	Same as R9				
R21	Same as R7				
R22	Same as R2				
R23	Same as R15				
U1	Power Divider	1	290558-1	14632	

5.5.3.3.2 Part 290536-1 4.4-5.4 MHz Amplifier REF DESIG PREFIX A4A3A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	1	B-GP100OOPFP	91418	
C2	Capacitor, Ceramic, Disc: 5000 pF, 20%, 100 V	2	C023B101E502M	56289	
C3	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 100 V	1	8131M100-651-104M	72982	
C4	Same as C2				
El	Terminal	5	140-1941-02-01	71279	
E2 Thru E5	Same as El				
Q1	Transistor	1	2N2222A	80131	
R1	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	1	CF1/8-100 OHMS/J	09021	
R2	Resistor, Fixed, Film: 2 kΩ, 5%, 1/8 W	2	CF1/8-2K/J	09021	
R3	Same as R2				
R4	Resistor, Fixed, Film: 8.2 kΩ, 5%, 1/8 W	1	CF1/8-8.2K/J	09021	
R5	Resistor, Fixed, Film: 5.1 kΩ, 5%, 1/8 W	1	CF1/8-5.1K/J	09021	
R6	Resistor, Fixed, Film: 510 Ω, 5%, 1/8 W	1	CF1/8-510 OHMS/J	09021	
R7	Resistor, Fixed, Film: 68 Ω, 5%, 1/8 W	2	CF1/8-68 OHMS/J	09021	
R8	Resistor, Fixed, Film: 270 Ω, 5%, 1/8 W	1	CF1/8-270 OHMS/J	09021	
R9	Same as R7				
U1	Mixer, Double Balanced	1	TFM-2	15542	
U2	Integrated Circuit	1	N5733K	18324	

5.5.3.3.3 **Part 290450-1 Phase Detector** **REF DESIG PREFIX A4A3A3**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 10 V	1	196D226X0010JE3	56289	
C2	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	2	34453-1	14632	
C3	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	1	34475-1	14632	
C4	Same as C2				
C5	Capacitor, Electrolytic, Tantalum: 100 µF, 20%, 35 V	3	MTP107M035P1C	76055	
C6	Same as C5				
C7	Same as C5				
C8	Capacitor, Electrolytic, Tantalum: 200 µF, 20%, 15 V	1	MTP207MO15P1C	76055	
CR1	Diode	2	1N4446	80131	
CR2	Same as CR1				
DS1	Diode: LED	2	HLMP-1301	28480	
DS2	Same as DS1				
El	Terminal, Forked	10	140-1941-02-01	71279	
E2 Thru E10	Same as El				
L1	Coil, Fixed	1	20681-185	14632	
L2	Coil, Fixed: 1.2 mH, 10%	1	553-3635-38	71279	
L3	Coil, Fixed: 6.8 mH, 10%	1	553-3635-47	71279	
L4	Coil, Fixed: 220 µH, 10%	1	553-3635-29	71279	
Q1	Transistor	2	2N3904	80131	
Q2	Same as QI				
R1	Resistor, Fixed, Film: 1.5 kΩ, 1%, 1/10 W	1	RN55C1501F	81349	
R2	Resistor, Fixed, Film: 1.0 kΩ, 1%, 1/10 W	1	RN55C1001F	81349	
R3	Resistor, Fixed, Film: 332 Ω, 1%, 1/10 W	1	RN55C3320F	81349	
R4	Resistor, Fixed, Film: 1.0 kΩ, 1%, 1/4 W	1	RN60D1O01F	81349	
R5	Resistor, Fixed, Film: 324 Ω, 1%, 1/4 W	1	RN60D3240F	81349	
R6	Resistor, Fixed, Film: 5.11 kΩ, 1%, 1/10 W	1	RN55C5111F	81349	
U1	Integrated Circuit	1	11C44DC	07263	

5.5.3.4 **Type 778003-1 4.4-5.4 MHz Synthesizer Assembly** REF DESIG PREFIX A4A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
Al	352-432 MHz VCO and Divide-by-80 Assembly	1	290454-1	14632	
A2	Prescaler Assembly	1	290455-1	14632	
A3	Divider and Phase Comparator Assembly	1	380374-1	14632	
C1	Capacitor, Ceramic, Feed-thru: 1000 pF, GMV, 500 V	5	54-794-009-102W	33095	
C2 Thru C5	Same as C1				
El	Terminal, Forked	1	140-1941-02-01	71279	
E2	Terminal, Feedthru	3	SFU16Y	04013	
E3	Same as E2				
E4	Same as E2				
J1	Connector, Receptacle	1	112	19505	
R1	Resistor, Fixed, Film: 475 Ω, 1%, 1/10 W	1	RN55C4750F	81349	
R2	Resistor, Fixed, Film: 100 Ω, 1%, 1/10 W	2	RN55C1OOOF	81349	
R3	Same as R2				
R4	Resistor, Fixed, Film: 15 Ω, 5%, 1/8 W	1	CF1/8-15 OHMS/J	09021	
R5	Resistor, Fixed, Film: 120 ΩI, 5%, 1/8 W	1	CF1/8-120 OHMS/J	09021	

5.5.3.4.1 Part 290454-1 352-432 MHz VCO and Divide-By-80 Assembly REF DESIG PREFIX A4A4A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 100 µF, 20%, 35 V	2	MTP107M035PIC	76055	
C2	Same as C1				
C3	Capacitor, Ceramic, Chip: 220 pF, 10%, 50 V	3	C1210C221K5GAH	05397	
C4	Capacitor, Ceramic, Chip: 100 pF, 20%, 500 V	2	ATC10OB101MP500	29990	
C5	Same as C4				
C6*	Capacitor, Ceramic, Chip: 20 pF, 10%, 500 V	1	ATC100OB200KP500	29990	
C7	Capacitor, Variable, Air: .6 - 4.5 pF, 500 V	1	M5F	18736	
CB	Same as C3				
C9	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	4	34453-1	14632	
C10	Same as C9				
Cll	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	2	34475-1	14632	
C12	Same as C9				
C13	Same as C9				
C14	Same as Cll				
C15	Capacitor, Electrolytic, Tantalum: 200 µF, 20%, 15 V	1	MTP207MO15P1C	76055	
C16	Same as C3				
CR1	Diode	1	Ull-3102	52673	
El	Terminal, Forked	5	140-1941-02-01	71279	
E2 Thru E5	Same as El				
L1	Coil, Fixed	1	180073-1	14632	
L2	Not Used				
L3	Coil, Fixed: 100 µH, 5%	1	1537-76	99800	
Q1	Transistor	1	BFR96	73445	
R1	Resistor, Fixed, Film: 100 Ω, 1%, 1/10 W	1	RN55C1000F	81349	
R2	Resistor, Fixed, Film: 432 Ω, 1%, 1/4 W	1	RN60D4320F	81349	
R3*	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W	1	C3-2.7K-5PCT	24546	
R4	Not Used				
R5	Resistor, Fixed, Film: 51 Ω, 5%, 1/8 W	2	CF1/8-51 OHMS/J	09021	
R6	Same as R5				
R7	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	2	CF1/8-100 OHMS/J	09021	
R8	Resistor, Fixed, Film: 68 Ω, 5%, 1/8 W	1	CF1/8-68 OHMS/J	09021	
R9	Same as R7				
R10	Resistor, Fixed, Film: 10 Ω, 5%, 1/4 W	1	CF1/4-10 OHMS/J	09021	
R11	Resistor, Fixed, Film: 1.0 kΩl, 5%, 1/4 W	*1*	*CF*1/4-*1.OK/J*	09021	
U1	Integrated Circuit	1	SP8630B	52648	
U2	Integrated Circuit	1	SP8691B	52648	

* Nominal Value, Final Value Factory Selected

5.5.3.4.2 Part 290454-1 352-432 MHz VCO and Divide-By-80 Assembly REF DESIG PREFIX A4A4A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Chip: 220 pF, 10%, 50 V	1	C1210C221KGAH	05397	
C2	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	3	34453-1	14632	
C3	Same as C2				
C4	Same as C2				
E1l	Terminal, Forked	5	140-1941-02-01	71279	
E2 Thru E5	Same as El				
R1	Resistor, Fixed, Film: 15 Ω, 5%, 1/8 W	1	CF1/8-15 OHMS/J	09021	
R2	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/4 W	3	CF1/4-1K/J	09021	
R3	Resistor, Fixed, Film: 91 Ω, 5%, 1/4 W	1	CF1/4-91 OHMS/J	09021	
R4	Resistor, Fixed, Film: 680 Q, 5%, 1/4 W	1	CF1/4-680 OHMS/J	09021	
R5	Resistor, Fixed, Film: 1.1 kΩ, 5%, 1/4 W	1	CF1/4-1.1K/J	09021	
R6	Resistor, Fixed, Film: 3.0 kΩ, 5%, 1/4 W	3	CF1/4-3.OK/J	09021	
R7	Same as R6				
R8	Same as R6				
R9	Same as R2				
R10	Same as R2				
R11	Resistor, Fixed, Film: 68 n, 5%, 1/8 W	1	CF1/8-68 OHMS/J	09021	
U1	Integrated Circuit	1	SP8680B	52648	
U2	Integrated Circuit	1	SP8695B	52648	
U3	Integrated Circuit	1	MC1013IL	04713	

5.5.3.4.3 Type 390395-1 Divider and Phase Comparator REF DESIG PREFIX A4A4A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 200 μF, 20%, 15 V	1	MTP207M015PlC	76055	
C2	Capacitor, Ceramic, Disc: .01 μF, 20%, 50 V	4	34453-1	14632	
C3	Same as C2				
C4	Same as C2				
C5	Same as C2				
C6	Capacitor, Ceramic, Disc: .01 μF, 20%, 50 V	8	34475-1	14632	
C7	Same as C6				
C8	Same as C6				
C9	Same as C6				
C10	Capacitor, Electrolytic, Tantalum: 100 μF, 20%, 35 V	2	MTP107M035P1C	76055	
C11	Same as C10				
C12	Same as C6				
C13	Capacitor, Electrolytic, Tantalum: 150 μF, 20%, 6 V	1	196D157X0006PE4	56289	
C14	Capacitor, Ceramic, Disc: 1500 pF, 5%, 100 V	2	8121-100COGO-152J	72982	
C15	Same as C14				
C16	Capacitor, Ceramic, Disc: .015 μF, 10%, 100 V	3	8121-10OX7RO-153K	72982	
C17	Same as C16				
C18	Same as C16				
C19	Capacitor, Ceramic, Disc: 3300 pF, 2%, 100 V	1	8131-1OOCOGO-332G	72982	
C20	Capacitor, Ceramic, Disc: .047 μF, 10%, 100 V	1	8121-10OX7RO-473K	72982	
C21	Capacitor, Ceramic, Disc: 6800 pF, 5%, 100 V	1	8131-100COGO-682J	72982	
C22	Capacitor, Ceramic, Disc: .022 μF, 10%, 100 V	2	8121-100X7RO-223K	72982	
C23	Same as C22				
C24	Same as C6				
C25	Same as C6				
C26	Same as C6				
CR1	Diode	2	1N4446	80131	
CR2	Same as CRI				
CR3	Diode	2	50822800	28480	
CR4	Same as CR3				
CR5	Diode	7	IN4449	80131	
E26	Terminal, Forked	1	140-1941-02-01	71279	
E27 Thru E32	Same as E26				
L1	Coil, Fixed: 10 μH, 10%	1	553-3635-13	71279	
L2	Coil, Fixed: 680 μH, 10%	3	553-3635-35	71279	
L3	Same as L2				
L4	Same as L2				
L5	Coil, Fixed: 49.5 mH	1	30312-299	14632	
L6	Coil, Variable: 55.3 mH	1	30312-298	14632	

REF DESIG PREFIX A4A4A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
P1	Plug Assembly	1	280434-1	14632	
P2	Plug Assembly	1	280438-1	14632	
R1	Resistor, Fixed, Film: 1.0 kΩ, 1%, 1/10 W	2	RN55C1001F	81349	
R2	Resistor, Fixed, Film: 4.75 kΩ, 1%, 1/10 W	4	RN55C4751F	81349	
R3	Same as R2				
R4	Same as R2				
R5	Same as R2				
R6	Not Used				
R7	Resistor, Fixed, Film: 5.11 kΩ, 1%, 1/10 W	1	RN55C5111F	81349	
R8	Resistor, Fixed, Film: 27.4 kΩ, 1%, 1/10 W	2	RN55C2742F	81349	
R9	Same as R8				
RIO	Resistor, Fixed, Film: 274 Ω, 1%, 1/10 W	1	RN55C2740F	81349	
R11	Resistor, Fixed, Film: 825 Ω, 1%, 1/10 W	I	RN55C8250F	81349	
R12	Same as RI				
U1	Integrated Circuit	2	MM74C374N	27014	
U2	Integrated Circuit	5	SN74LS168N	01295	
U3	Same as U2				
U4	Same as U1				
U5	Same as U2				
U6	Same as U2				
U7	Same as U2				
U8	Integrated Circuit	1	SN74LS27N	01295	
U9	Integrated Circuit	1	SN74LSOON	01295	
U10	Integrated Circuit	2	SN74LS161AN	01295	
U11	Same as U10				
U12	Integrated Circuit	1	11C44DC	07263	
U13	Integrated Circuit	1	CA6741T	02735	
VR1	Diode, Zener: 7.5 V	1	1N755	80131	

5.5.3.5 **Type 794195-1 SSB BFO (Optional** **REF DESIG PREFIX A4A5**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	3	196D225X0035JE3	56289	
C2	Same as C1				
C3	Same as C1				
C4	Capacitor, Mica, Dipped: 1800 pF, 2%, 500 V	1	CM06FD182G03	81349	
C5	Capacitor, Mica, Dipped: 56 pF, 2%, 500 V	1	CM05ED560G03	81349	
C6	Capacitor, Variable, Ceramic: 9-35 pF, 350 V	1	538-006D9-35	72982	
C7	Capacitor, Mica, Dipped: 47 pF, 2%, 500 V	2	CM05ED470G03	81349	
C8	Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V	6	8121-050651-472M	72982	
C9	Same as CB				
C10	Same as C8				
C11l	Same as C7				
C12	Same as C8				
C13	Same as C8				
C14	Capacitor, Ceramic, Disc: 1000 pF, 5%, 100 V	1	8121-1OOCOG0O-102J	72982	
C15	Same as C8				
C16	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	9	34453-1		
C17	Same as C16				
C18	Capacitor, Mica, Dipped: 250 pF, 5%, 500 V	1	DM15-251J	72136	
C19	Capacitor, Mica, Dipped: 150 pF, 2%, 500 V	1	CM05FD151G03	81349	
C20 Thru C25	Same as C16				
C26	Capacitor, Mica, Dipped: 36 pF, 2%, 500 V	2	CM05ED360G03	81349	
C27	Capacitor, Ceramic, Mono: 1 pF, +.1 pF, 100 V	1	8101-100COKO-109B	72982	
C28	Same as C26				
C29	Capacitor, Mica, Dipped: 300 pF, 2%, 500 V	1	CM05FD301G03	81349	
C30	Same as C16				
CR1	Diode	2	5082-2800	28480	
CR2	Same as CR1				
CR3	Diode, PIN:	2	MPN3401	04713	
CR4	Same as CR3				
L1	Coil, Fixed: 1.2 mH	2	2500-32	99800	
L2	Coil, Fixed: 330 µF, 5%	1	2500-04	99800	
L3	Same as L1				
L4	Coil, Variable: .612 - .748 µH	4	558-7107-11	71279	
L5	Same as L4				
L6	Coil, Fixed: .82 µH, 10%	2	1537-10	99800	
L7	Same as L6				
L8	Same as L4				
L9	Same as L4				
Q1	Transistor	1	2N2857	80131	
Q2	Transistor	1	2N2222A	80131	

REF DESIG PREFIX A4A5

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
Q3	Transistor	1	2N3906	80131	
RI	Resistor, Fixed, Film: 47 kΩ, 5%, 1/4 W	6	CF1/4-47K/J	09021	
R2	Same as R1				
R3	Resistor, Fixed, Film: 100 kΩ, 5%, 1/4 W	4	CFI/4-100K/J	09021	
R4	Same as R1				
R5	Same as R3				
R6	Resistor, Fixed, Film: 12 kΩ, 5%, 1/4 W	1	CF1/4-12K/J	09021	
R7	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	2	CF1/4-IOK/J	09021	
R8	Same as R7				
R9	Resistor, Trim, Film: 1 k±, 10%, 1/2 W	1	62PAR1K	73138	
R10	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/4 W	1	CF1/4-2.7K/J	09021	
R11	Resistor, Fixed, Film: 100 k, 5%, 1/4 W	5	CF1/4-100 OHMS/J	09021	
R12	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W	1	CF1/4-4.7K/J	09021	
R13	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	1	CF1/4-22K/J	09021	
R14	Same as R11				
R15	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R16	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	1	CF1/4-47 OHMS/J	09021	
R17	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/4 W	2	CF1/4-2.2K/J	09021	
R18	Same as R17				
R19	Same as R1				
R20	Same as R1				
R21	Same as R1				
R22	Same as R3				
R23	Same as R11				
R24	Resistor, Fixed, Film: 510 Ω, 5%, 1/4 W	1	CF1/4-510 OHMS/J	09021	
R25	Resistor, Fixed, Film: 56 kΩ, 5%, 1/4 W	1	CF1/4-56K/J	09021	
R26	Same as R3				
R27	Same as R11				
R28	Resistor, Fixed, Film: 220 Ω, 5%, 1/4 W	1	CFI/4-220 OHMS/J	09021	
R29	Same as R11				
R30	Resistor, Fixed, Film: 51 Ω, 5%, 1/4 W	1	CF1/4-51 OHMS/J	09021	
T1	Transformer	1	24608-10	14632	
U1	Integrated Circuit	2	MC1458N	18324	
U2	Same as U1				
U3	Integrated Circuit	1	CA3011	02735	
VR1	Diode, Zener: 3.3 V	1	1N746A	80131	

5.5.3.6 Type 798043-1 535 MHz Generator REF DESIG PREFIX A4A6

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	535 MHz Generator	1	290325-1	14632	
A2	VCO/Buffer	1	290557-2	14632	
C1	Capacitor, Electrolytic, Tantalum: 22 µF, 10%, 35 V	1	CS13BF226K	81349	
El	Terminal, Feedthru	2	SFU16Y	04013	
E2	Same as E1l				
FB1	Ferrite bead	10	56-590-65-4A	02114	
FB2 Thru FB10	Same as FBI				
FL1	Filter	3	51-722-001	33095	
FL2	Same as FL1				
FL3	Same as FL1				
J1	Connector, Receptacle	2	112	19505	
J2	Same as J1				
P1	Plug Assembly	1	370430-6	14632	
R1	Resistor, Fixed, Film: 220 Ω, 5%, 1/8 W	1	CF1/8-220 OHMS/J	09021	
R2	Resistor, Fixed, Film: 56 Ω, 5%, 1/8 W	1	CF1/8-56 OHMS/J	09021	
R3	Resistor, Fixed, Film: 27 Ω, 5%, 1/4 W	1	CF1/4-27 OHMS/J	09021	

5.5.3.6.1 Type 290325-1 535 MHz Generator REF DESIG PREFIX A4A6A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	4	34453-1	14632	
C2	Same as C1				
C3	Same as C1				
C4	Capacitor, Electrolytic, Tantalum: 15 µF, 20%, 15 V	1	196D156X0015JE3	56289	
C5	Capacitor, Ceramic, Disc: .022 µF, 10%, 100 V	1	CK06BX223K	81349	
C6	Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V	1	196D475X0035JE3		
C7	Capacitor, Ceramic, Disc: .047 pF, 10%, 100 V	1	CK06BX473K	81349	
C8	Capacitor, Ceramic, Disc: 1500 pF, 10%, 200 V	1	CK06BX152K	81349	
C9	Capacitor, Mica, Dipped: 470 pF, 5%, 500 V	2	DM15-471J	72136	
C10	Same as C9				
C11	Capacitor, Electrolytic, Tantalum: 15 µF, 10%, 20 V	1	CS13BE156K	81349	
C12	Same as C1				
C13	Capacitor, Ceramic, Chip: .056 µF, 10%, 50 V	1	C2225C563P5XAH	05397	
C14	Capacitor, Ceramic, Chip: .01 µF, 10%, 100 V	1	C1805C103K1XAH	31433	
C15	Capacitor, Electrolytic, Tantalum: 47 µF, 10%, 6 V	1	CS13BB476K	81349	
El	Terminal, Forked	6	140-1941-02-01	71279	
E2 Thru E6	Same as El				
L1	Coil, Fixed: 100 pH, 5%	1	1537-76	99800	
Q1	Transistor	1	2N2222A	80131	
R1	Resistor, Fixed, Film: 120 Ω, 5%, 1/4 W	1	CF1/4-120 OHMS/J	09021	
R2	Resistor, Fixed, Film: 390 Ω, 5%, 1/4 W	1	CF1/4-390 OHMS/J	09021	
R3	Resistor, Fixed, Film: 1.0 kΩ, 1%, 1/10 W	1	RN55C10O01F	81349	
R4	Resistor, Fixed, Film: 10 kΩ, 1%, 1/10 W	2	RN55C1002F	81349	
R5	Resistor, Fixed, Film: 12.1 kΩ, 1%, 1/10 W	1	RN55C1212F	81349	
R6	Resistor, Fixed, Film: 1.5 kΩ, 1%, 1/10 w	1	RN55C1501F	81349	
R7	Same as R4				
R8	Resistor, Fixed, Film: 10 Ω, 5%, 1/4 W	1	CF1/4-10 OHMS/J	09021	
R9	Resistor, Fixed, Film: 27 Ω, 5%, 1/4 W	1	CF1/4-27 OHMS/J	09021	
R10	Resistor, Fixed, Film: 274 Ω, 1%, 1/10 W	1	RN55C2740F	81349	
R11	Resistor, Fixed, Film: 562 Ω, 1%, 1/10 W	2	RN55C5620F	81349	
R12	Same as R11				
R13	Resistor, Fixed, Film: 27 Ω, 5%, 1/8 W	2	CF1/8-27 OHMS/J	09021	
R14	Same as R13				
R15	Resistor, Fixed, Film: 33 Ω, 5%, 1/8 W	1	CF1/8-33 OHMS/J	09021	
R16	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/4 W	1	CF1/4-1.OK/J	09021	
U1	Integrated Circuit	1	SN74LS74N	01295	
U2	Integrated Circuit	1	llC44DC	07263	
U3	Integrated Circuit	1	725HC	07263	
U4	Integrated Circuit	1	93S1ODC	07263	
U5	Integrated Circuit	1	11C9ODC	07263	

5.5.3.6.2 Type 290557-1 VCO/Buffer REF DESIG PREFIX A4A6A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Chip: 470 pF, 10%, 200 V	10	ATC10OB471KP200X	29990	
C2	Same as C1				
C3	Capacitor, Ceramic, Chip: 6.8 pF, +.25 pF, 500 V	2	ATC10OB6R8CP50OX	29990	
C4	Not Used				
C5	Capacitor, Ceramic, Tubular: 2.2, .25 pF, 500 V	1	301-00OU2JO-229C		
C6	Capacitor, Ceramic, Chip: 1.5 pF, 500 V	1	ATC10OB1ROCP500X	29990	
C7	Capacitor, Variable, Air: .6-4.5 pF, 500 V	1	MSJ	18736	
C8	Same as C3				
C9	Same as C1				
C10	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	1	34452-1	14632	
Cll	Capacitor, Composition, Tubular: .62 pF, 10%, 500 V	1	QCO.62PFK	95121	
C12 Thru C18	Same as C1				
C19	Not Used				
C20	Not Used				
C21	Not Used				
C22	Capacitor, Electrolytic, Tantalum: 100 µF, 20%, 20 V	1	196D107X0020TE4	56289	
CR1	Diode	1	Ull-3102	52673	
El-E4	Terminal, Forked	4	140-1941-02-01	71279	
L1	Coil, Fixed: .68 µH	3	1025-16	99800	
L2	Coil, Fixed	3	1129-46	14632	
L3	Same as L1				
L4	Same as L2				
L5	Same as L1				
L6	Same as L2				
L7	Coil, Fixed	1	1129-28	14632	
Q1	Transistor	4	BFR96	73445	
Q2	Same as Q1				
Q3	Same as Q1				
Q4	Same as Q1				
R1	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	4	C3-1K-5PCT	24546	
R2	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	5	C3-4.7K-5PCT	24546	
R3	Resistor, Fixed, Film: 10Ω, 5%, 1/8 W	1	C3-1OR-SPCT	24546	
R4	Resistor, Fixed, Film: 180 Ω, 5%, 1/8 W	1	C3-180R-5PCT	24546	
R5	Same as R1				
R6	Same as R2				
R7	Resistor, Fixed, Film: 100 Ω, 5%, 1/8 W	3	C3-10OR-5PCT	24546	
R8	Resistor, Fixed, Film: 220 Ω, 5%, 1/8 W	3	C3-220R-5PCT	24546	
R9	Resistor, Fixed, Film: 2.7 Ω, 5%, 1/8 W	4	CF1/8-2.7 OHMS/J	09021	
R10	Same as R9				

REF DESIG PREFIX A4A6A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R11	Same as R1				
R12	Same as R2				
R13	Same as R8				
R14	Same as R9				
R15	Resistor, Fixed, Film: 27 Ω, 5%, 1/8 W	2	C3-27R-5PCT	24546	
R16	Same as R1				
R17	Same as R2				
R18	Same as R7				
R19	Same as R8				
R20	Same as R9				
R21	Same as R7				
R22	Same as R2				
R23	Same as R15				
U1	Power Divider	1	290558-1	14632	

5.5.4 TYPE 798039-1 DIGITAL MOTHERBOARD REF DESIG PREFIX A4A6A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	Receiver Interface	1	794108-3	14632	
A2	Synthesizer Interface	1	796321-1	14632	
A3	Microprocessor	1	794109-9	14632	
C1	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	58	34453-1	14632	
C2 Thru C32	Same as C1				
C33	Capacitor, Ceramic, Disc: 470 pF, 20%, 1000 V	4	BHD470-20PCT	91418	
C34	Same as C33				
C35	Same as C33				
C36	Same as C33				
C37 Thru C62	Same as C1				
J1	Combination, Post, Feedthru: 6 positions	4	118470-8	00779	
J2	Combination, Post, Feedthru: 29 positions	3	PE7-14045	00779	
J3	Same as J2				
J4	Same as J2				
J5	Same as J1				
J6	Same as J1				
P1	Cable Assembly	1	370415-1	14632	
P2	Cable Assembly	1	370416-1	14632	
XA1A	Housing	12	117798-3	00779	
XA1B	Same as XA1A				
XA2A	Same as XA1A				
XA2B	Same as XA1A				
XA3A	Same as XA1A				
XA3B	Same as XA1A				
OPT1 Thru OPT 6	Same as XA1A				

5.5.4.1 Type 794108-4 Receiver Interface REF DESIG PREFIX A5A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.047 µF, 10%, 100 V	1	CK06BX473K	81349	
C2	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	13	34475-1	14632	
C3	Same as C2				
C4	Same as C2				
C5	Capacitor, Ceramic, Disc: 1.0 µF, 20%, 50 V	1	8131-050-651-105M	72982	
C6 Thru C13	Same as C2				
C14	Not Used				
C15	Same as C2				
C16	Same as C2				
C17	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	2	34453-1	14632	
C18	Same as C17				
C19	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	1	196D225X0035JE3	56289	
C20	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	2	34452-1	14632	
C21	Same as C20				
C22	Capacitor, Ceramic, Disc: 1000 pF, 5%, 100 V	1	8121-1OOCOGO-102J	72982	
CR1	Diode	3	5082-2800	28480	
CR2	Same as CR1				
CR3	Same as CR1				
CR4	Diode	2	LVA51A	01281	
CR5	Diode	1	1N749A	80131	
CR6	Same as CR4				
E1-E6	Terminal, Miniature	6	2010B1	88245	
Q1	Transistor	1	2N4918	80131	
R1	Resistor, Trimmer, Film: 100 kΩ, 10%, 1/2 W	1	62PAR100K	73138	
R2	Resistor, Fixed, Film: 10 kΩ 5%, 1/4 W	1	CF1/4-IOK/J	09021	
R3	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R4	Resistor, Fixed, Film: 47 Ω, 5%, 1/4 W	1	CF1/4-47 OHMS/J	09021	
R5	Resistor, Fixed, Film: 47 kΩ, 5%, 1/4 W	3	CF1/4-47K/J	09021	
R6	Not Used				
R7	Resistor, Fixed, Film: 43 kΩ, 5%, 1/4 W	2	CF1/4-43K/J	09021	
R8	Resistor, Fixed, Film: 150 Ω, 1%, 1/10 W	1	RN55C1500F	09021	
R9	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	1	CF1/4-100 OHMS/J	09021	
R10	Resistor, Fixed, Film: 4.3 Ω, 5%, 1/4 W	1	CF1/4-4.3 OHMS/J	09021	
R11	Resistor, Fixed, Film: 1.1 kΩ, 5%, 1/4 W	1	CF1/4-1.1K/J	09021	
R12	Resistor, Fixed, Film: 100 kΩ, 1%, 1/10 W	2	RN55C1003F	81349	
R13	Same as R7				
R14	Resistor, Fixed, Film: 100 kΩ, 5%, 1/4 W	5	CF1/4-100K/J	09021	
R15	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	2	CF1/8-4.7K/J	09021	
R16	Same as R15				

REF DESIG PREFIX A5A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R17	Resistor, Network: 390 Ω	2	4310R-102-391	80294	
R18	Same as R17				
R19	Same as R14				
R20	Resistor, Fixed, Film: 10 kΩ, 1%, 1/10 W	1	RN55C1002F	81349	
R21	Resistor, Fixed, Film: 15 kΩ, 1%, 1/10 W	2	RN55CI502F	81349	
R22	Same as R14				
R23	Same as R14				
R24	Same as R12				
R25	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	1	RN55C2211F	81349	
R26	Resistor, Fixed, Film: 30.1 kΩ, 1%, 1/10 W	1	RN55C3012F	81349	
R27	Same as R14				
R28	Same as R21				
R29	Resistor, Network: 47 kΩ	1	4308R101-473	80294	
R30	Same as R5				
R31	Same as R5				
U1	Integrated Circuit	1	SN74LS122N	01295	
U2	Integrated Circuit	2	SN74LS04N	01295	
U3	Integrated Circuit	2	MM74C74N	27014	
U4	Integrated Circuit	2	MM74C174N	27014	
U5	Integrated Circuit	1	MC14506BCP	04713	
U6	Same as U3				
U7	Integrated Circuit	3	SN74LS138N	01295	
U8	Same as U7				
U9	Same as U7				
U1I	Integrated Circuit	1	SN74145N	01295	
Ull	Integrated Circuit	3	MM74C374N	27014	
U12	Same as Ull				
U13	Same as Ull				
U14	Integrated Circuit	2	MM80C97N	27014	
U15	Integrated Circuit	1	ADC0809CCN	27014	
U16	Same as U2				
U17	Same as U4				
U18	Same as U14				

5.5.4.2 Type 794110-1 Synthesizer Interface

REF DESIG PREFIX A5A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	9	34475-1	14632	
C2	Same as C1				
C3	Capacitor, Mica, Dipped: 15 pF, 5%, 500 V	2	CM05CD150J03	81349	
C4	Same as C1				
C5	Same as C3				
C6	Capacitor, Ceramic, Disc: 0.01µF, 20%, 50 V	2	34453-1	14632	
C7	Same as C6				
C8 Thru C13	Same as C1				
CR1	Diode	1	1N4446	80131	
El	Terminal	13	2010B1	88245	
E2 Thru E13	Same as El				
Q1	Transistor	1	2N2907/JAN	81350	
R1	Resistor, Fixed, Film: 1 kΩ, 5%, 1/4 W	4	CFI/4-IK/J	09021	
R2	Resistor, Fixed, Film: 470 Ω, 5%, 1/4 W	2	CF1/4-470 OHMS/J	09021	
R3	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/4 W	2	CF1/4-1.5K/J	09021	
R4	Same as R1				
R5	Same as R2				
R6	Same as RI				
R7	Same as R1				
R8	Same as R3				
R9	Resistor, Network: 47 kΩ	2	4308R-101-473	80294	
R10	Not Used				
R11	Not Used				
R12	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	2	CF1/4-100 OHMS/J	09021	
R13	Same as R12				
R14	Resistor, Fixed, Film: 47 kΩ, 5%, 1/4 W	3	CF1/4-47K/J	09021	
R15	Resistor, Fixed, Film: 22 kΩ, 5%, 1/4 W	1	CF1/4-22K/J	09021	
R16	Resistor, Fixed, Film: 33 kΩ, 5%, 1/4 W	1	CF1/4-33K/J	09021	
R17	Same as R9				
R18	Same as R14				
R19	Same as R14				
S1	Switch, Toggle	1	76PSB06S	81073	
82	Switch, Toggle: SPST	1	76PSB08S	81073	
U1	Integrated Circuit	2	MM74C74N	27014	
U2	Same as U1				
U3	Integrated Circuit	1	MM74C*1ON*	27014	
U4	Integrated Circuit	3	MM80C97N	27014	
U5	Integrated Circuit	10	MM74C374N	27014	

REF DESIG PREFIX ASA2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U6 Thru U11	Same as U5				
U12	Programmable Integrated Circuit	1	170149	14632	
U13	Integrated Circuit	2	SN74LS04N	01295	
U14	Same as U13				
U15	Same as U5				
U16	Same as U4				
U17	Same as U4				
U18	Integrated Circuit	1	MC1458N	18324	
U19	Integrated Circuit	2	MC1408L6	04713	
U20	Same as U19				
U21	Same as U5				
U22	Same as U5				
U23	Integrated Circuit	1	MM74C14N	27014	

5.5.4.3 Type 794109-9 Microprocessor REF DESIG PREFIX A5A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	2	34453-1	14632	
C2	Same as CI				
C3	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	8	34475-1	14632	
C4 Thru C8	Same as C3				
C9	Capacitor, Ceramic, Disc: 0.47 µF, 20%, 50 V	1	34452-1	14632	
C10	Capacitor, Mica, Dipped: 100 pF, 2%, 500 V	1	CM05FD101G03	81349	
C11	Not Used				
C12	Not Used				
C13	Same as C3				
C14	Not Used				
C15	Same as C3				
C16	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	1	B-GI000PFP	91418	
C17	Capacitor, Electrolytic, Tantalum: 1 µF, 20%, 35 V	1	196D105X0035HE3	56289	
CR1	Diode	1	1N4003	80131	
CR2	Diode	1	1N4446	80131	
L1	Coil, Fixed: 10 µH, 10%	1	1537-36	99800	
Q1	Transistor	1	SD304	18324	
Q2	Transistor	1	2N2222A	80131	
Q3	Not Used				
Q4	Transistor	1	2N2907/JAN	81350	
R1	Resistor, Fixed, Composition: 220 µ, 5%, 1/4 W	2	RCR07G221JS	81349	
R2	Resistor, Fixed, Composition: 47 kµ, 5%, 1/4 W	1	RCR07G473JS	81349	
R3	Not Used				
R4	Same as R1				
R5	Not Used				
R6	Not Used				
R7	Not Used				
R8	Resistor, Fixed, Composition: 1 Ω, 5%, 1/4 W	4	RCR07G105JS	81349	
R9	Same as R8				
R10	Resistor, Fixed, composition: 100 kΩ, 5%, 1/4 W	3	RCR07G104JS	81349	
R11	Same as R10				
R12	Same as R8				
R13	Resistor, Fixed, Composition: 750 kΩ, 5%, 1/4 W	1	RCR07G754JS	81349	
R14	Resistor, Fixed, Composition: 2.7 kΩ, 5%, 1/4 W	1	RCR07G272JS	81349	
R15	Resistor, Fixed, Composition: 390 kΩ, 5%, 1/4 W	1	RCR07G394JS	81349	
R16	Resistor, Fixed, Composition: 1.0 kΩ, 5%, 1/4 W	2	RCR07G102JS	81349	
R17	Resistor, Fixed, Composition: 6.8 MΩ, 5%, 1/4 W	1	RCR07G685JS	81349	
R18	Resistor, Fixed, Composition: 2.2 MΩ, 1/4 W	1	RCR07G225JS	81349	
R19	Same as R16				
R20	Same as R8				

REF DESIG PREFIX A5A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R21	Resistor, Fixed, Composition: 470 Ω, 5%, 1/4 W	1	RCR07G471JS	81349	
R22	Same as R10				
R23	Resistor, Trim, Film: 5 Ω, 10%, 1/2 W	1	62PR5K	73138	
R24	Resistor, Fixed, Composition: 10 kΩ, 5%, 1/4 W	1	RCR07G103JS	81349	
RA1	Heatsink	1	2225B	13103	
U1	Integrated Circuit	1	MC6875P	04713	
U2	Integrated Circuit	1	MC68BOOP	04713	
U3	EPROM, Programmed	1	190169-65	14632	
U4	EPROM, Programmed	1	190169-66	14632	
U5	EPROM, Programmed	1	190169-67	14632	
U6	EPROM, programmed	1	190169-68	14632	
U7	Integrated Circuit	8	1M6561-IDN	32293	
U8 Thru U13	Same as U7				
U14	Not Used				
U15	Integrated Circuit	1	MM74COON	27014	
U16	Integrated Circuit	1	SN74LS04N	01295	
U17	Integrated Circuit	1	SN74LS139N	01295	
U18	Integrated Circuit	2	SN74LS138N	01295	
U19	Integrated Circuit	1	MM74C374N	27014	
U20	Integrated Circuit	1	CD4040BE	02735	
U21	Same as U18				
U22	Same as U7				
U23	Integrated Circuit	1	ICL7611DCPA	32293	
U24	Voltage Regulator	1	LM340LAH-5.0	27014	
Y1	Crystal, Quartz: 4.000 MHz	1	91805-29	14632	

5.5.4.4 **Type 96290-1 150 Hz Recognition Assembly** REF DESIG PREFIX A5A6

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 10 ΩF, 20%, 20 V	3	196D106X0020JE3	56289	
C2	Same as C1				
C3	Same as C1				
R1	Resistor, Fixed, Composition: 1.0 kΩ, 5%, 1/4 W	1	RCR07G102JS	81349	
R1	Resistor, Fixed, Composition: 1.0 kΩ, 5%, 1/4 W	2	RCR07G103JS	81349	
R3	Same as R2				
U1	150 Hz Encoder	1	TS-1	58724	
U2	Decoder/Demultiplexer	1	G74SC237N	11293	
VR1	Diode, Zener: 3.3 V	1	IN746A	80131	

5.5.4.5 **Type 796217-1 Digital Refreshed Display** REF DESIG PREFIX

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 10 ΩF, 20%, 20 V	2	196D106X0020JE3	56289	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: .1ΩF, 20%, 50 V	12	34475-1	14632	
C4	Capacitor, Ceramic, Disc: 2200 pF, 10%, 200 V	1	CK06BX222K	81349	
C5	Capacitor, Mica, Dipped: 47 pF, 2%, 500 V	1	CM04ED470G03	81349	
C6	Capacitor, Electrolytic, Tantalum: 47 ΩF, 20%, 20 V	3	196D476X0020PE4	56289	
C7	Same as C6				
C8	Same as C6				
C9 Thru C16	Same as C3				
C17	Not Used				
C18	Same as C3				
C19	Capacitor, Mica, Dipped: 470 pF, 2%, 500 V	1	DMLS-471G	72136	
CR1	Diode	2	5082-2811	28480	
CR2	Same as CR1				
R1	Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/8 W	4	CF1/8-3.3 K/J	09021	
R2	Same as R1				
R3	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/8 W	1	CF1/8-2.2 K/J	09021	
R4	Resistor, Fixed, Film: 470 Ω, 5%, 1/8W	1	CF1/8-470 OHMS/J	09021	
R5	Resistor, Trimmer, Film: 10 kΩ, 10%, 1/2 W	2	62PAR10K	73138	
R6	Resistor, Fixed, Film: 33 kΩ, 5%, 1/8 W	3	CF1/8-33 K/J	09021	
R7	Resistor, Trimmer, Film: 200 kΩ, 10%, 1/2 W	2	62PAR200K	73138	
R8	Resistor, Fixed, Film: 560 Ω, 5%, 1/4 W	1	CF1/4-560 OHMS/J	09021	
R9	Resistor, Fixed, Film: 2.4 kΩ, 5%, 1/4 W	1	CF1/4-2.4 K/J	09021	
R10	Same as R5				
R11	Resistor, Fixed, Film: 680 Ω, 5%, 1/8 W	2	CF1/8-680 OHMS/J	09021	
R12	Resistor, Fixed, Film: 100 Ω, 5%, 1/4 W	2	CF1/4-100 OHMS/J	09021	
R13	Resistor, Fixed, Film: 100 kΩ, 5%, 1/4 W	1	CF1/8-100 K/J	09021	
R14	Same as R11				
R15	Same as R12				
R16	Resistor, Fixed, Film: 8.2 kΩ, 5%, 1/8 W	2	CF1/8-8.2 K/J	09021	
R17	Resistor, Fixed, Film: 120 kΩ, 5%, 1/8 W	1	CF1/8-120 K/J	09021	
R18	Same as R16				
R19	Resistor, Fixed, Film: 150 Ω, 5%, 1/8 W	1	CF1/8-150 OHMS/J	09021	
R20	Same as R1				
R21	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	1	CF1/8-22 K/J	09021	
R22	Same as R7				
R23	Same as R6				
R24	Same as R6				
R25	Resistor, Trimmer, Film: 500 Ω, 10%, 1/2 W	1	62PAR500	73138	
R26	Same as R1				

REF DESIG PREFIX A4A4A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U1	Integrated Circuit	1	MP74SC245AL	36665	
U2	Integrated Circuit	1	MM74C175N	27014	
U3	Integrated Circuit	1	SN74LS002N	01295	
U4	Integrated Circuit	1	SN74LS139N	01295	
U5	Integrated Circuit	1	SN74LS161AN	01295	
U6	Not Used				
U7	Integrated Circuit	3	DM74L157AN	27014	
U8	Same as U7				
U9	Same as U7				
U10	Integrated Circuit	2	HMI-6514-9	34731	
U11l	Same as U10				
U12	Integrated Circuit	1	CD4040BE	02735	
U13	Integrated Circuit	2	AD7524JN	24355	
U14	Same as U13				
U15	Integrated Circuit	1	SN74LS123N	01295	
U16	Integrated Circuit	1	MC1458N	18324	
U17	Integrated Circuit	1	DG302CJ	127856	

5.5.4.6 **Type 798044-1 IEEE488 Interface** REF DESIG PREFIX OPT 4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 /IF, 20%, 50 V	7	34453-1	14632	
C2 Thru C7	Same as C1				
El	Terminal, Forked	5	140-1941-02-01	71279	
E2 Thru E5	Same as El				
J1	Connector, Receptacle, Multipin: 24 pins	1	102160-5	00779	
R1	Resistor Network: 47 kΩ	1	4308R-101-473	80294	
R2	Resistor, Fixed, Composition: 10 kΩ, 5%, 1/4 W	1	RCR07G103JS	81349	
S1	Switch, Toggle	1	76PSB06S	81073	
U1	Integrated Circuit	1	SN74LSOON	01295	
U2	Integrated Circuit	1	SN74LS04N	01295	
U3	Integrated Circuit	1	MM74C74N	27014	
U4	Integrated Circuit	2	MMO8C97N	27014	
U5	Same as U4				
U6	Integrated Circuit	1	190169-21	14632	
U7	Integrated Circuit	1	MC68B488	04713	
U8	Integrated Circuit	1	SN75160N	01295	
U9	Integrated Circuit	1	SN75161N	01295	

5.5.4.7 Type 796185-X Extended Memory REF DESIG PREFIX EM

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.1 ΩF, 20%, 50 V	4	34475-1	14632	
C2	Capacitor, Electrolytic, Tantalum: 4.7 ΩF, 20%, 35 V	1	196D475X0035JE3	56289	
C3 Thru C5	Same as C1				
C6	Capacitor, Mica, Dipped: 20 pF, 5%, 500 V	I	CM05ED200J03	81349	
C7	Capacitor, Variable, Air: .8-10 pF, 250 V	1	5201/W HDW	91293	
C8	Capacitor, Mica, Dipped: 15 pF, 5%, 500 V	1	CM04CD150JO3	81349	
R1	Resistor, Fixed, Composition: 10 kΩ, 5%, 1/4 W	2	RCR07G103JS	81349	
R2	Same as R1				
R3	Resistor, Fixed, Composition: 10 kΩ, 5%, 1/8 W	4	RCR05G103JS	81349	
R4 Thru R6	Same as R3				
U1	Programmed EPROM	1	190169-39	14632	
U2	Integrated Circuit	4	HM3-6514-5	34371	
U3 Thru U5	Same as U2				
U6	Integrated Circuit	1	SN74LS139N	01295	
U7	Integrated Circuit	1	SN74LS138N	01295	
U8	Integrated Circuit	1	8674L04	14632	
U9	Integrated Circuit	1	SN74LS22N	01295	
U10	Integrated Circuit	2	MM74C374N	27014	
U11	Same as U10				
U12	Integrated Circuit	1	MM74C373N	27014	
U13	Integrated Circuit	1	MSM5832	27014	
Y1	Crystal: 32.768 kHz	1	WX-7.03	51791	

5.5.5 TYPE 794190-1 FRONT PANEL DISPLAY + CONTROL REF DESIG PREFIX A6

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	2	34475-1	14632	
C2	Capacitor, Electrolytic, Tantalum: 1.0 µF, 10%, 35 V	2	CS13BF105K	81349	
C3	Same as C1				
C4	Same as C2				
C5	Capacitor, Electrolytic, Tantalum: 200 µF, 20%, 15 V	3	MTP207MO15PIC	76055	
C6	Same as C5				
C7	Same as C5				
DS1	LED Display, .43 RED	8	5082-7651	28480	
DS2 Thru DS8	Same as DS1				
DS9	LED Display, .3 RED	9	5082-7611	28480	
DS10 Thru DS15	Same as DS9				
DS16	LED Display, Numeric	1	5082-7616	28480	
DS17	Same as DS9				
DS18	Same as DS9				
DS19	LED, RED	Part of DS20	31	HLMP-1301	28480
DS20	LED, Modified	30	170155-1	14632	
DS21 Thru DS47	Same as DS20				
DS48	Not Used				
DS49	Not Used				
DS50	Same as DS20				
DS51	Same as DS20				
J1	Connector, Receptacle, Multipin	1	875886-1	00779	
J2	Header Assembly	1	170156-1	14632	
J3	Header Assembly	1	170156-3	14632	
J4	Header Assembly	1	170156-2	14632	
J5	Header Assembly	2	2-87220-9	00779	
J6	Same as J5				
Q1	Transistor	9	2N4918	80131	
Q2 Thru Q9	Same as Q1				
Q10	Transistor	1	2N4921	80131	
R1 Linear	Resistor, Variable, Composition: 10 kΩ, 10%, 1 W	1	70A3N056L103U	01121	
R2	Resistor, Fixed, Composition: 100 Ω, 5%, 1/2 W	14	RCR20G101JS	81349	
R3 Thru R15	Same as R2				

REF DESIG PREFIX A6

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R16	Resistor, Fixed, Film: 6.2 Ω, 5%, 1/4 W	1	CF1/4-6.2 OHMS/J	09021	
R17	Resistor, Fixed, Film: 1 kΩ, 5%, 1/4 W	1	CF1/4-1K/J	09021	
R18	Resistor, Fixed, Film: 47 kΩ, 5%, 1/4 W	2	CF1/4-47K/J	09u21	
R19	Resistor, Fixed, Film: 200 Ω, 1%, 1/4 W	1	RN60D2000F	81349	
R20	Resistor, Fixed, Film: 270 Ω, 5%, 1/4 W	1	CF1/4-270 OHMS/J	09021	
R21	Same as R18				
R22	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-IOK/J	09021	
R23	Resistor, Fixed, Film: 3.0 Ω, 5%, 1/4 W	1	CF1/4-3.0 OHMS/J	09021	
S1	Switch, Pushbutton, SPDT Momentary	32	200117 (SERU)	31918	
S2 Thru S28	Same as S1				
S29	Not Used				
S30	Not Used				
S31	Not Used				
S32 Thru S35	Same as S1				
U1	Integrated Circuit	2	ULN2003A	56289	
U2	Same as U1				
U3	Integrated Circuit	1	MC1458N	18324	
U4	Integrated Circuit	4	DM8834N	02735	
U5	Same as U4				
U6	Integrated Circuit	2	MM74C923N	27014	
U7	Same as U4				
U8	Same as U4				
U9	Same as U6				
U10	Resistor Network: 1 kΩ	1	765-1-RIK	73138	

5.5.6 TYPE 791275-1 PHONE JACK ASSEMBLY REF DESIG PREFIX A7

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Feedthru: 1000 pF, GMV, 500 V	2	54-794009-102W	33095	
C2	Same as C1				
J1	Phone Jack, Modified	1	17420-1	14632	

5.5.7 TYPE 794128-2 ANTENNA SWITCH REF DESIG PREFIX A8

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	RF Switch	1	270450-2	14632	
A2	Switch Driver	1	270451-2	14632	
C1	Capacitor, Ceramic, Feedthru: 1000 pF, GMV, 500 V	4	54-794-009-102W	33095	
C2 Thru C4	Same as C1				
FBI	Ferrite Bead	12	56-590-65-4A	02114	
FB2 Thru FB12	Same as FB1				
J1	Connector, Receptacle, Type-N	2	3052-0000-10	26805	
J2	Same as J1				
J3	Connector, Receptacle, Rt. Angle, SMC	2	112	19505	
J4	Same as J3				
P1	Connector, Plug, Multipin	1	1-87499-1	00779	

5.5.7.1 Part 270450-2 RF Switch REF DESIG PREFIX ASA1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Chip: 0.056 pF, GMV, 50 V	2	C2225C563PXAH	05397	
C2	Capacitor, Ceramic, Disc: 1000 pF, 10%, 100 V	4	8121-10OX7RO-102K	72982	
C3	Same as C2				
C4	Same as C1				
C5	Same as C2				
C6	Same as C2				
C7	Capacitor, Ceramic, Chip: 13 pF, 2%, 500 V	1	ATC700B130GP500	29990	
C8	Capacitor, Ceramic, Chip: 10 pF, 2%, 500 V	1	ATC700B100GP500	29990	
C9	Capacitor, Ceramic, Chip: 4.7 pF, +.25 pF, 500 V	1	ATC700B4R7CP500	29990	
C10	Capacitor, Ceramic, Chip: 33 pF, 2%, 500 V	1	ATC700B330GP500	29990	
C11	Capacitor, Ceramic, Chip: 8.2 pF, +0.25 pF, 500 V	2	ATC700B8R2CP500	29990	
C12	Same as Cll				
C13	Capacitor, Ceramic, Chip: 4.3 pF, +0.5 pF, 500 V	2	ATC700B4R3DP500	29990	
C14	Same as C13				
C15	Capacitor, Ceramic, Chip: 0.5 µF, 10%, 50 V	1	1210-050-X7R-503KS	55969	
C16	Not Used				
C17	Capacitor, Ceramic, Chip: 0.5 pF, +0.1 pF, 500 V	1	ATC100BORSBP	29990	
CR1	Diode	4	GC4371-15	50101	
CR2 Thru CR4	Same as CR1				
CR5	Diode	7	GC4212-15	50101	
CR6 Thru CR11	Same as CR5				
E1l	Terminal	4	140-1941-02-01	71279	
E2 Thru E4	Same as E1l				
LI	Coil, Fixed	5	170134-1	14632	
L2 Thru L5	Same as L1				
L6	Coil, Fixed	1	170158-1	14632	
L7	Coil, Fixed	1	170159-1	14632	
LB	Coil, Fixed	2	170160-1	14632	
L9	Same as L8				
R1	Resistor, Fixed, -Film: 560 l, 5%, 1/8 W	4	CF1/8-560 OHMS/J	09021	
R2	Same as R1				
R3	Same as R1				
R4	Resistor, Fixed, Film: 680 n, 5%, 1/4 W	1	CF1/4-680 OHMS/J	09021	
R5	Same as R1				
R6	Resistor, Fixed, Film: 5.62 kΩ, 1%, 1/10 W	2	RN55C5621F	81349	
R7	Same as R6				

5.5.7.2 Part 270451-1 Switch Driver REF DESIG PREFIX A8A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.1 μF, 20%, 50 V	6	34475-1	14632	
C2 Thru C6	Same as C1				
C7	Capacitor, Ceramic, Disc: 0.47 μF, 20%, 50 V	2	34452-1	14632	
C8	Same as C7				
CR1	Diode	2	1N4446	80131	
CR2	Same as CR1				
E11	Terminal	9	140-1941-02-01	71279	
E2 Thru **E9**	Same as E1l				
L1	Coil, Fixed	2	16209-12	14632	
L2	Same as L1				
R1	Resistor, Fixed, Film: 1 kΩ, 5%, 1/8 W	2	CF1/8-1K/J	09021	
R2	Same as R1				
R3	Resistor, Fixed, Composition: 5.1 kΩ, 5%, 1/8 W	1	RCR05G512JS	81349	
R4	Resistor, Fixed, Film: 180 Ω, 5%, 1/4 W	1	CF1/4-180 OHMS/J	09021	
U1	Integrated Circuit	2	LM358N	27014	
U2	Same as U1				

SECTION VI
SCHEMATICS

The following pages contain the Receiver schematic diagrams. A numerical list by figure number follows:

Figure No.	Diagram No.	Title
6-1	490193	Type 794189-1 RF/IF Motherboard (A3) (2 sheets)
6-2	570057	Type 794094-1 VHF High-Band Preselector (A3A3)
6-3	580197	Type 794095-3, VHF Low-Band Preselector (A3A4)
6-4	480445	Type 794097-2 Preamplifier (A3A5)
6-5	480304	Type 794096-2 1st Converter (A3A6)
6-6	580100	Type 716003-1 2nd Converter (A3A7)
6-7	590099	Type 484002-1 AGC Amplifier (A3A8)
6-8	370348	Type 724006-1 21.4 MHz IF Amplifier (10 KHz BW) (A3A13)
6-9	380456	Type 724006-16, 21.4 MHz IF Amplifier (3.2 KHz BW) (A3A9)
6-10	370348	Type 724006-3 21.4 MHz IF Amplifier (50 KHz BW) (A3A9-A3A13)
6-11	370348	Type 724006-9 21.4 MHz IF Amplifier (75 KHz BW) (A3A9-A3A13)
6-12	370348	Type 724006-6 21.4 MHz IF Amplifier (100 KHz BW) (A3A9-A3A13)
6-13	370348	Type 724006-5 21.4 MHz IF Amplifier (250 KHz BW) (A3A9-A3A13)
6-14	370348	724006-6 21.4 MHz IF Amplifier (300 KHz BW) (A3A9-A3A13)
6-15	470305	Type 724019-1 21.4 MHz IF Amplifier (500 KHz BW) (A3A9-A3A13)

Figure No.	Diagram No.	Title
6-16	470164	Type 724007-1, -2 21.4 MHz IF Amplifier (1 MHz, 2 MHz BW) (A3A9-A3A13)
6-17	370349	Type 724008-1 21.4 MHz IF Amplifier (4 MHz BW) (A3A9-A3A13)
6-18	290505	Type 798074-1 SSB Bypass (A3A14)
6-19	480343	Type 796233-1 Audio/ Video/ COR (A3A15)
6-20	570157	Type 724016-1 AM Demodulator/IF Output Amplifier (A3A16)
6-21	370347	Type 794106-2 FM Demodulator (20 MHz BW) (A3A17-A3A21)
6-22	370346	Type 794107-1 FM Demodulator (50 KHz BW) (A3A17-A3A21)
6-23	370346	Type 704107-6 FM Demodulator (75 KHz BW) (A3A17-A3A21)
6-24	370346	Type 794107-2 FM Demodulator (100 KHz BW) (A3A17-A3A21)
6-25	370346	Type 794107-3 FM Demodulator (250 KHz BW) (A3A17-A3A21)
6-26	370346	Type 794107-4 FM Demodulator (300 KHz BW) (A3A17-A3A21)
6-27	380455	Type 794106-6, 21.4 MHz FM Demodulator (3.2 KHz BW) (A3A17)
6-28	470157	Type 794104-2,-1 FM Demodulator (500 KHz, 1 MHz BW) (A3A17-A3A21)
6-29	470158	Type 794105-1, -2 FM Demodulator (2 MHz, 4 MHz BW) (A3A17-A3A21)
6-30	590143	Type 798071-1 Synthesizer Motherboard (A4)
6-31	590096	Type 798028-1 Reference Generator (A4Al)
8-32	590138	Type 778001-1 1st LO Synthesizer (A4A2) (2 sheets)

Figure No.	Diagram No.	Title
6-33	590139	Type 390361-1 1st LO Synthesizer VCO (A4A2Al)
6-34	490243	Type 778002-1 Translation Oscillator (A4A3)
6-35	490314	Part 290557-1 VCO Buffer (A4A3Al)
6-36	390472	Part 290536-1 4.4-5.4 MHz Amplifier (A4A3A2)
6-37	480366	Type 776002-1 4.4-5.4 MHz Synthesizer (A4A4)
6-38	490273	Part 290454-1 352-432 MHz VCO and Divide-by-80 (A4A4A1)
6-39	490265	Part 290455-1 Prescaler Assembly (A4A4A2)
6-40	590153	Part 390395-1 Divide and Phase Comparator (A4A4A3)
6-41	470311	Type 794195-1 SSB BFO (A4A5)
6-42	490192	Type 798043-1 535 MHz Generator (A4A6)
6-43	490314	Type 290557-2 VCO Buffer (A4A6A2)
6-44	580196	Type 798039-3 Digital Motherboard (A5) 2 Sheets)
6-45	570075	Type 794108 Receiver Interface (A5Al)
6-46	580212	Type 796321-1 Synthesizer Interface (A5A2)
6-47	570074	Type 794109 Microprocessor (A5A3)
6-48	380444	Type 796290-1, 150 Hz Filter (A5AX)
6-49	590097	Type 794190-1 Front Panel Display and Control (A6)
6-50	23519	Type 791275 Phone Jack (A7)
6-51	480446	Type 794128-2, Antenna Switch (A8)
6-52	680054	Type WJ-8617B-5, VHF/UHF Receiver, Main Chassis

Figure No.	Diagram No.	Title
6-53	580165	Type 796217-1, Digital Refresh Display (Option C-DRD)
6-54	590120	Type 798044, IEEE-488 Interface (Option D)
6-55	580079	Type 796185-X4, Extended Memory (Option M-EM)

APPENDIX A

REFERENCES

SECTION L INTRODUCTION

A-1. SCOPE

This appendix lists all the forms, field manuals, technical manuals and miscellaneous publications that apply to the Receiver, Radio R-2311/G. Only those publications available to, and required by operators and organizational maintenance personnel are listed.

A-2. FORMS

Discrepancy in Shipment Report	SF 361
Quality Deficiency Report	SF 368
Recommended Changes to Equipment Technical Manuals	DA Form 2028-2
Report of Discrepancy	SF 364

A-3. FIELD MANUALS

First Aid for Soldiers	FM 21-11

A-4. TECHNICAL MANUALS

Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (CECOM)	TM 750-244-2
Operator's, Organizational, Direct Support and General Support Maintenance Manual, Signal Monitor, WJ-794103-1	TM 5820-936-14-1-1
Operator's, Organizational, Direct Support and General Support Maintenance Manual, Direction Finder, Indicator ID-2380/G	TM 11-5820-936-14-2
Operator's, Organizational, Direct Support and General Support Maintenance Manual, Direction Finder, Indicator ID-2381/G	TM 11-5820-936-14-3
Operator's, Organizational, Direct Support and General Support Maintenance Manual, Intercommunication Units LS-672/G and LS-673/G	TM 11-5820-936-14-4

Operator's, Organizational, Direct Support and General Support Maintenance Manual, Antenna AS-3773/G	TM 11-5820-936-14-5
Operator's and Organizational Maintenance Manual, Receiver Set, Radio AN/TRQ-37	TM 11-5820-938-12

A-5. MISCELLANEOUS PUBLICATIONS

The Army Maintenance Management System (TAMMS	DA Pam 738-750
Consolidated Index of Army Publications and Blank Forms	DA Pam 25-30
Safety Precautions for Maintenance of Electrical/Electronic Equipment	TB 385-4
Report of Packaging and Handling Deficiencies	AR 735-11-2
Reporting of Transportation Discrepancies in Shipment	AR 55-38
Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment	SB 11-573
Safety Measures to be Observed When Installing and Using Whip Antennas, Field-Type Masts, Towers and Antennas and Metal Poles that are Used with Communications, Radar and Direction Finder Equipment	TB SIG 291

APPENDIX B

MAINTENANCE ALLOCATION CHART

SECTION L INTRODUCTION

B-1. GENERAL

This appendix provides a summary of the maintenance operations for the Receiver, Radio R-2311/G. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2. MAINTENANCE FUNCTION

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item; part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

B-2. MAINTENANCE FUNCTIONS-Continued

i. Repair. The application of maintenance services (inspect, test, service, adjust, aline, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e. DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

B-3. COLUMN ENTRIES

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn, the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The number of task hours specified by the work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C Operator/Crew
O Organizational
F Direct Support
H General Support
D Depot

B-3. COLUMN ENTRIES-Continued

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tools sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains an alphabetical code which leads to the remark in Section IV, Remarks, which is pertinent to the item opposite the particular code.

B-4. TOOL AND TEST EQUIPMENT REQUIREMENTS (SECTION if)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5 digit) in parentheses.

B-5. REMARKS (SECTION IV)

a. Reference Code. This code refers to the appropriate item in Section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in Section II.

SECTION II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
0101	VHF Receiver	Test					2.0	2-5,7-16 18-19	
		Replace		0.3				1	
		Repair					1.0	6	

SECTIN III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National Stock Number	(5) Tool Number
1	O	Tool Kit, Electronic Equipment, TK-100/G	5180-00-605-0079	
2	O,F,D	Multimeter, Digital, AN/PSM-45	6625-01-134-2512	
3	O,F,D	Test Lead Set, Simpson Catalog No.	N/A 00577	
4	O,F,D	Voltmeter,RF Boonton 92C	6625-01-116-9500	
5	O,F,D	High Frequency Probe	N/A	
6	F,D	Tool Kit, Electronic Equipment, TK-105/G	5180-00-510-8177	
7	F,D	Generator, Signal SG-112(V)1/U, w/options 001, 002	6625-00-500-6525	
8	F,D	Cable, RF, 50 ohms, 4 ft., BNC-BNC	5995-00-070-8747	
9	F,D	Oscilloscope, AN/USM-488	N/A	
10	F,D	Voltage Probe, 10X TEK P6006	6625-00-524-0572	
11	F,D	Counter, Frequency, TD-1225A(V)1/U	6625-00-498-8946	
13	D	Spectrum Analyzer, AN/USM-489	6625-01-083-9446	
14	D	Tracking Generator, SG-1125/U	6625-00-185-4802	
15	D	Generator, Sweep Signal SG-1206	N/A	
16	D	Power Meter, TS-3793/U	6625-01-033-5050	

SECTIN III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Category	(3) Nomenclature	(4) National Stock Number	(5) Tool Number
18	D	Test Oscillator, SG-970/U	6625-00-145-1193	
19	D	AC Voltmeter, ME-459/U	6625-00-229-0457	

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

SECTION I INTRODUCTION

C- 1. **SCOPE**

This appendix lists the basic issue items for the Receiver, Radio R-2311/G to help you inventory items required for safe and efficient operation. There are no components of end items.

C-2. **GENERAL**

Section II, Basic Issue Items (BII) has the minimum essential items required to replace the antenna in operation, to operate it and to perform emergency repairs. Although packaged and shipped separately, BII must be with the Receiver, Radio R-2311/G during operation and whenever it is transferred between property accounts. This manual is your authority to request/requisition replacement basic issue items.

C-3. **EXPLANATION OF COLUMNS**

The following provides an explanation of columns found in the tabular listings:

a. Column 1 - National Stock Number. This column indicates the national stock number assigned to the item and will be used for requisitioning purposes.

b. Column 2 - Description, FSCM and Part Number. This column indicates the federal item name and, when applicable, a brief description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

c. Column 3 - Unit of Measure (U/M). This column indicates the measure used in performing the actual operation/maintenance function. This measurement is expressed by a two-character alphabetical abbreviation.

d. Column 4 - Quantity Required (Qty Rqd). This column indicates the quantity of the item authorized to be used with/on the equipment.

SECTION II. BASIC ISSUE ITEMS

(1) National Stock Number	(2) Description FSCM and Part Number	(3) Unit of Measure	(4) Quantity Required
N/A	Publication N/S TM -11-5820-936-14-1, 80058, N/A	Ea.	1

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R.L. DILWORTH
Brigadier General, United States Army
The Adjutant General

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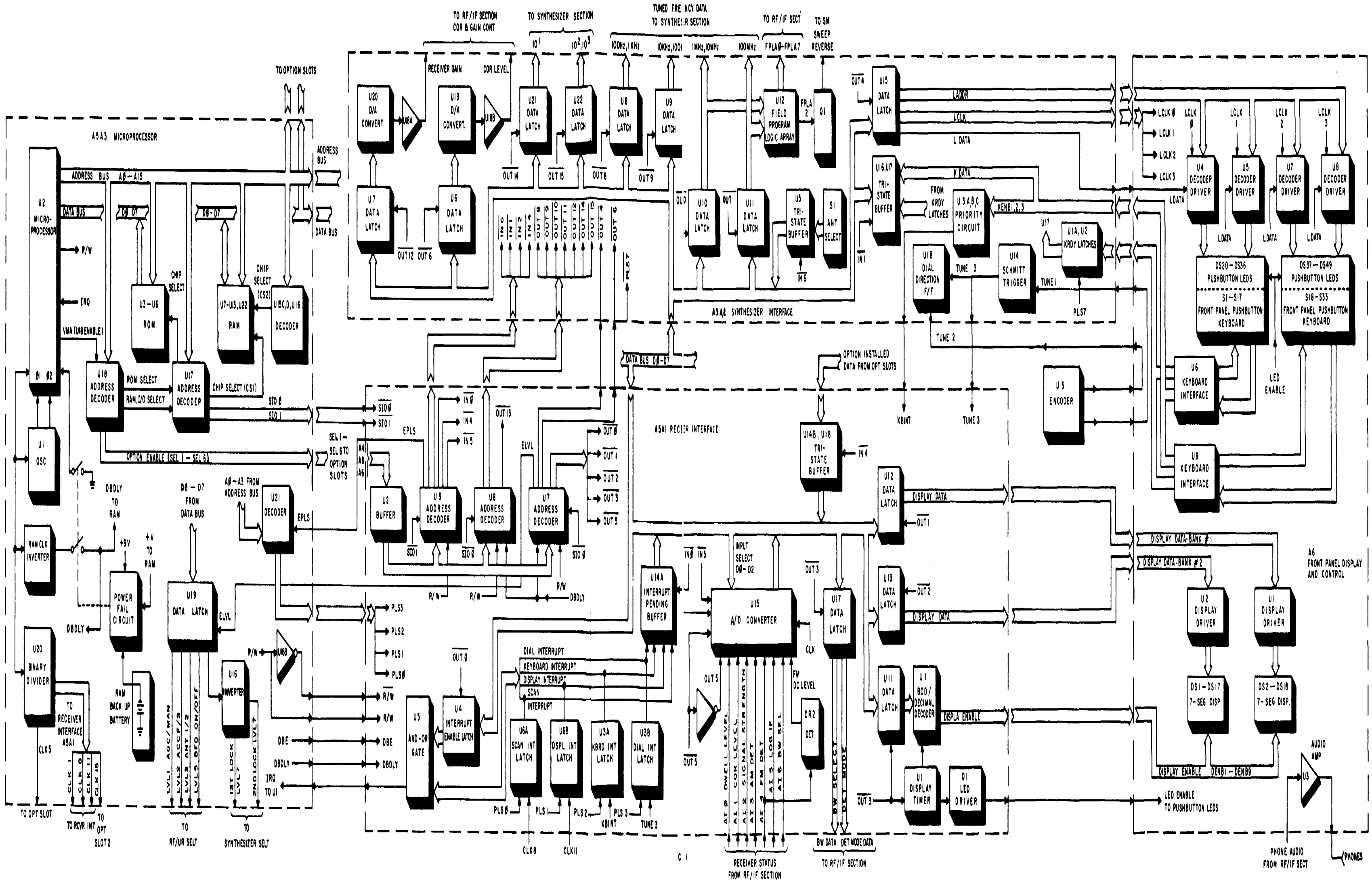


Figure 3-1. Digital Control Section, Functional Block Diagram

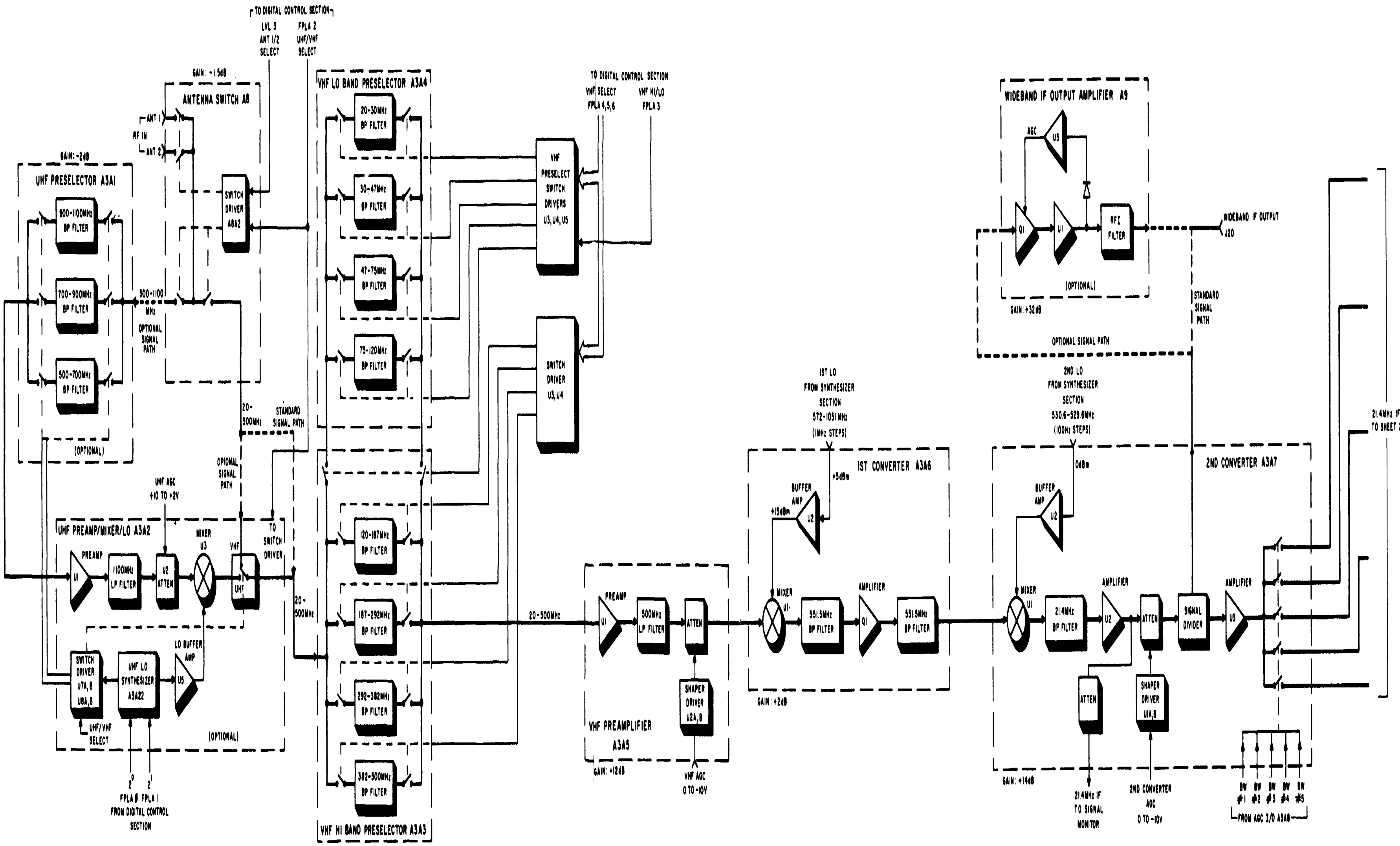


Figure 3-3 RF-IF Section, (Sheet 1 of 2) Functional Block diagram

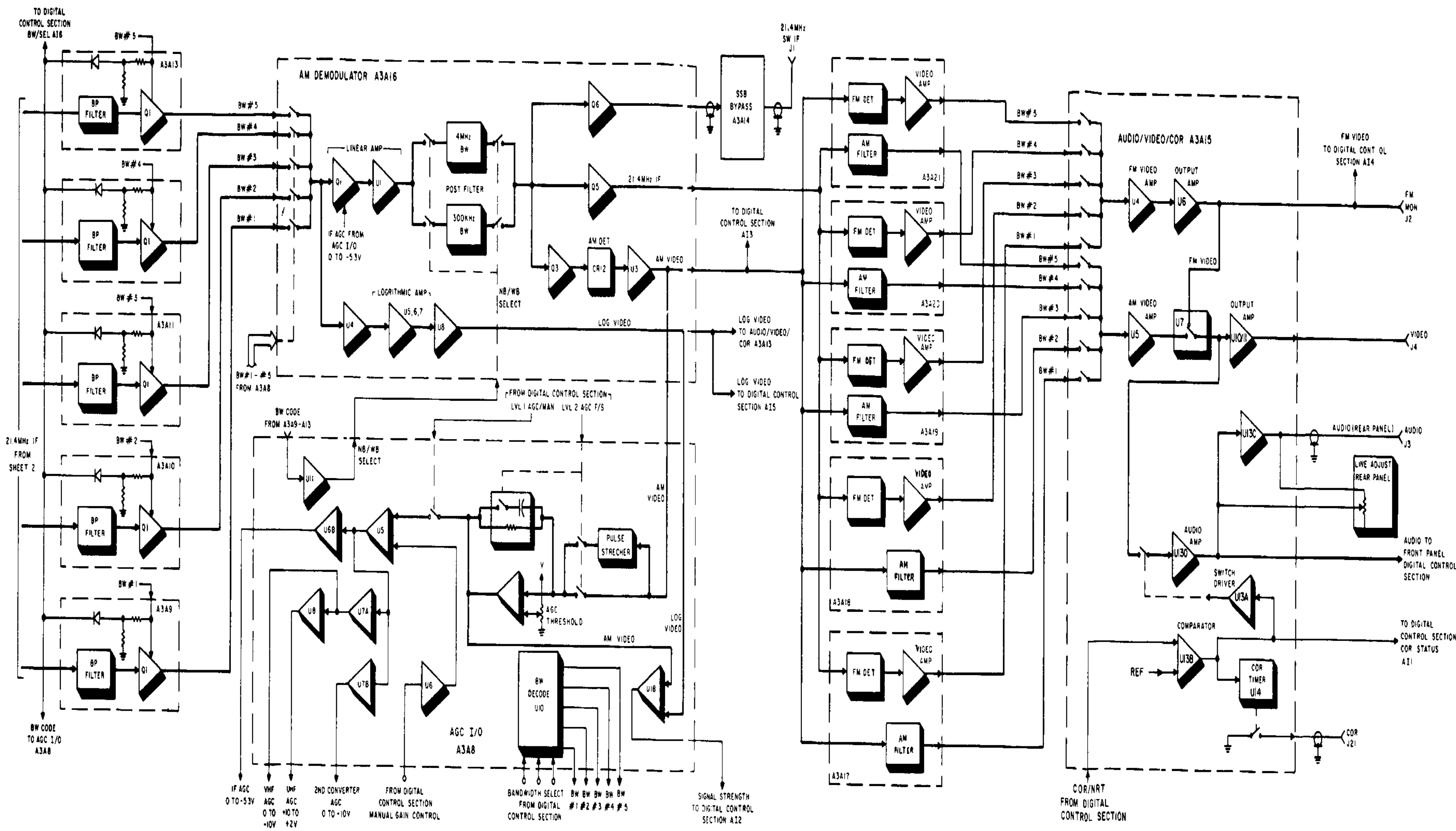


Figure 3-3 RF-IF Section, (Sheet 2 of 2) Functional Block Diagram

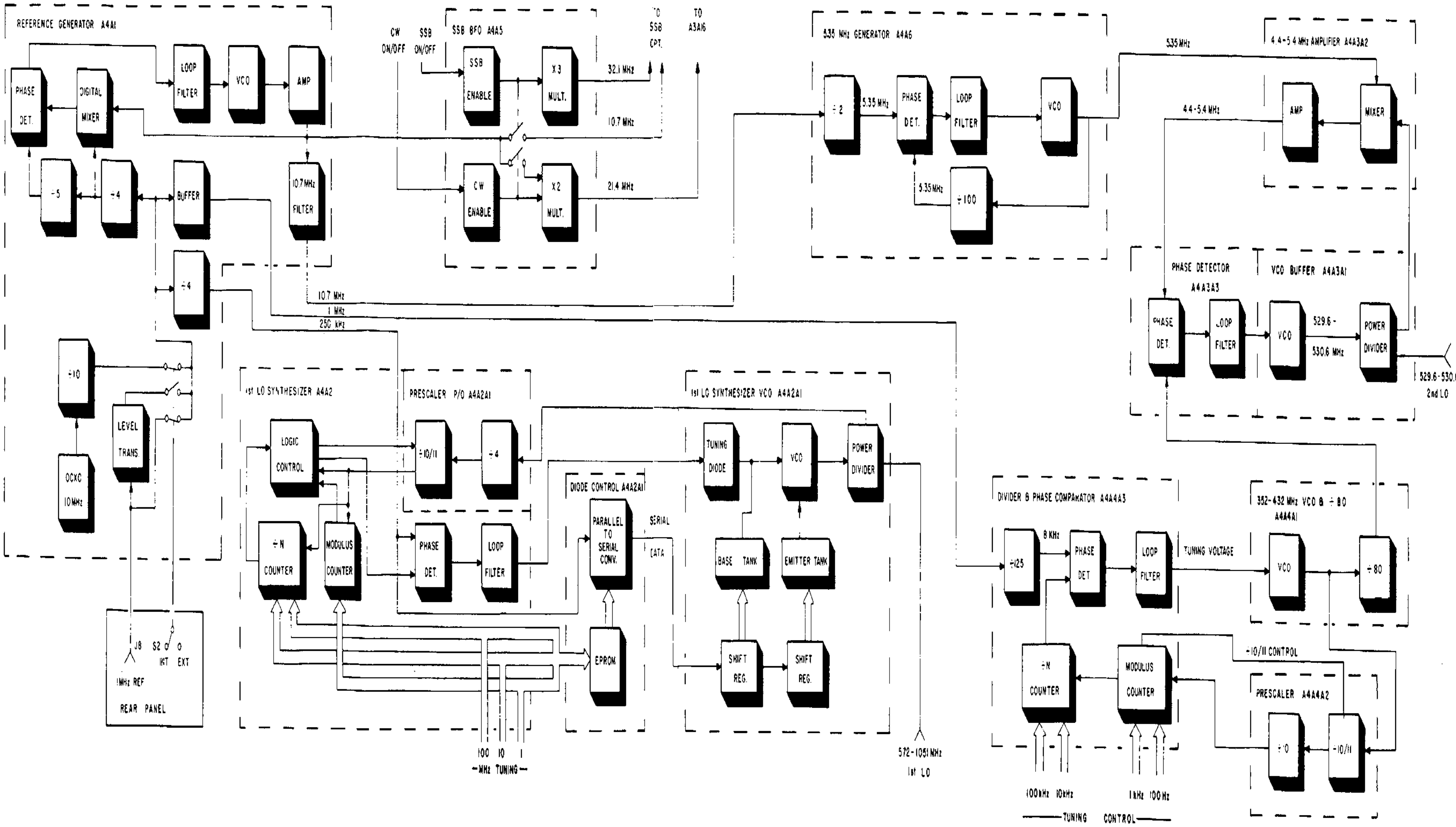
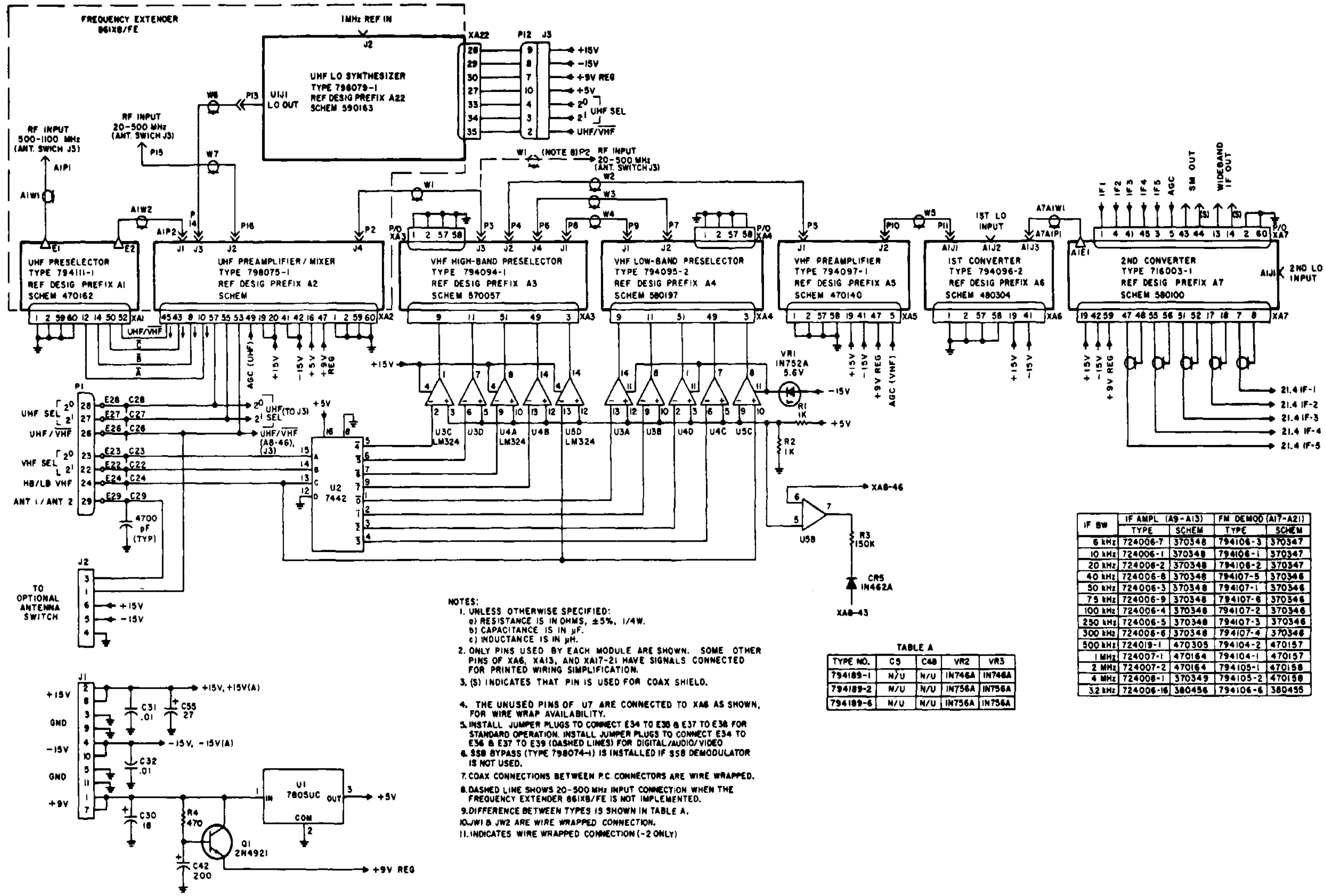


Figure 3-5. Synthesizer Section, Functional Block Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN μF.
   c) INDUCTANCE IS IN μH.
2. ONLY PINS USED BY EACH MODULE ARE SHOWN. SOME OTHER PINS OF XA6, XA13, AND XA17-21 HAVE SIGNALS CONNECTED FOR PRINTED WIRING SIMPLIFICATION.
3. (S) INDICATES THAT PIN IS USED FOR COAX SHIELD.
4. THE UNUSED PINS OF U7 ARE CONNECTED TO XA6 AS SHOWN, FOR WIRE WRAP AVAILABILITY.
5. INSTALL JUMPER PLUGS TO CONNECT E34 TO E38 & E37 TO E38 FOR STANDARD OPERATION. INSTALL JUMPER PLUGS TO CONNECT E34 TO E36 & E37 TO E39 (DASHED LINES) FOR DIGITAL/AUDIO/VIDEO
6. SSB BYPASS (TYPE 798074-1) IS INSTALLED IF SSB DEMODULATOR IS NOT USED.
7. COAX CONNECTIONS BETWEEN P.C. CONNECTORS ARE WIRE WRAPPED.
8. DASHED LINE SHOWS 20-500 MHz INPUT CONNECTION WHEN THE FREQUENCY EXTENDER 861XB/FE IS NOT IMPLEMENTED.
9. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE A.
10. JW1 & JW2 ARE WIRE WRAPPED CONNECTION.
11. INDICATES WIRE WRAPPED CONNECTION (-2 ONLY)

TABLE A

TYPE NO.	C5	C48	VR2	VR3
794189-1	N/U	N/U	IN746A	IN746A
794189-2	N/U	N/U	IN756A	IN756A
794189-6	N/U	N/U	IN756A	IN756A

IF BW	IF AMPL (A9-A13)		FM DEMOD (A17-A21)	
	TYPE	SCHEM	TYPE	SCHEM
6 kHz	724006-7	370348	794106-3	370347
10 kHz	724006-1	370348	794106-1	370347
20 kHz	724006-2	370348	794106-2	370347
40 kHz	724006-8	370348	794107-5	370346
50 kHz	724006-3	370348	794107-1	370346
75 kHz	724006-9	370348	794107-6	370346
100 kHz	724006-4	370348	794107-2	370346
250 kHz	724006-5	370348	794107-3	370346
300 kHz	724006-6	370348	794107-4	370346
500 kHz	724019-1	470305	794104-2	470157
1 MHz	724007-1	470164	794104-1	470157
2 MHz	724007-2	470164	794105-1	470158
4 MHz	724008-1	370349	794105-2	470158
3.2 kHz	724006-16	380456	794106-6	380455

Figure 6-1. Type 794189-1 RF/IF Motherboard (A3) Schematic Diagram 490193 (sheet 1 of 2)

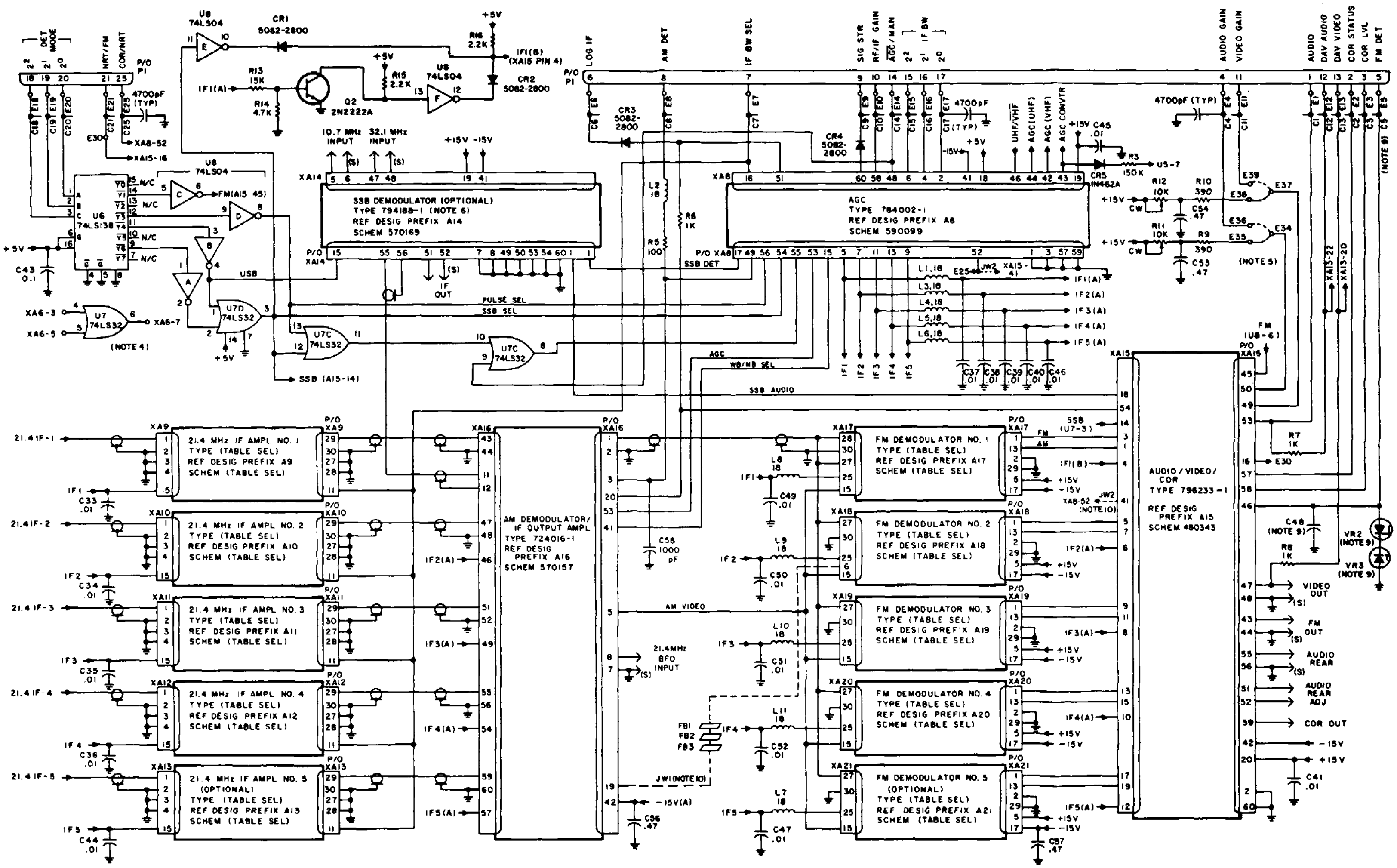


Figure 6-1. Type 794189-1 RF/IF Motherboard (A3)
Schematic Diagram 490193 (Sheet 2 of 2)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ± 5 %, 1/8W.
   b) CAPACITANCE IS IN pF.
2. C23, C25, C30, C31, C33, C34, C38, C39, ARE TO BE SHOWN, BUT DOCUMENTED AS NOT USED.

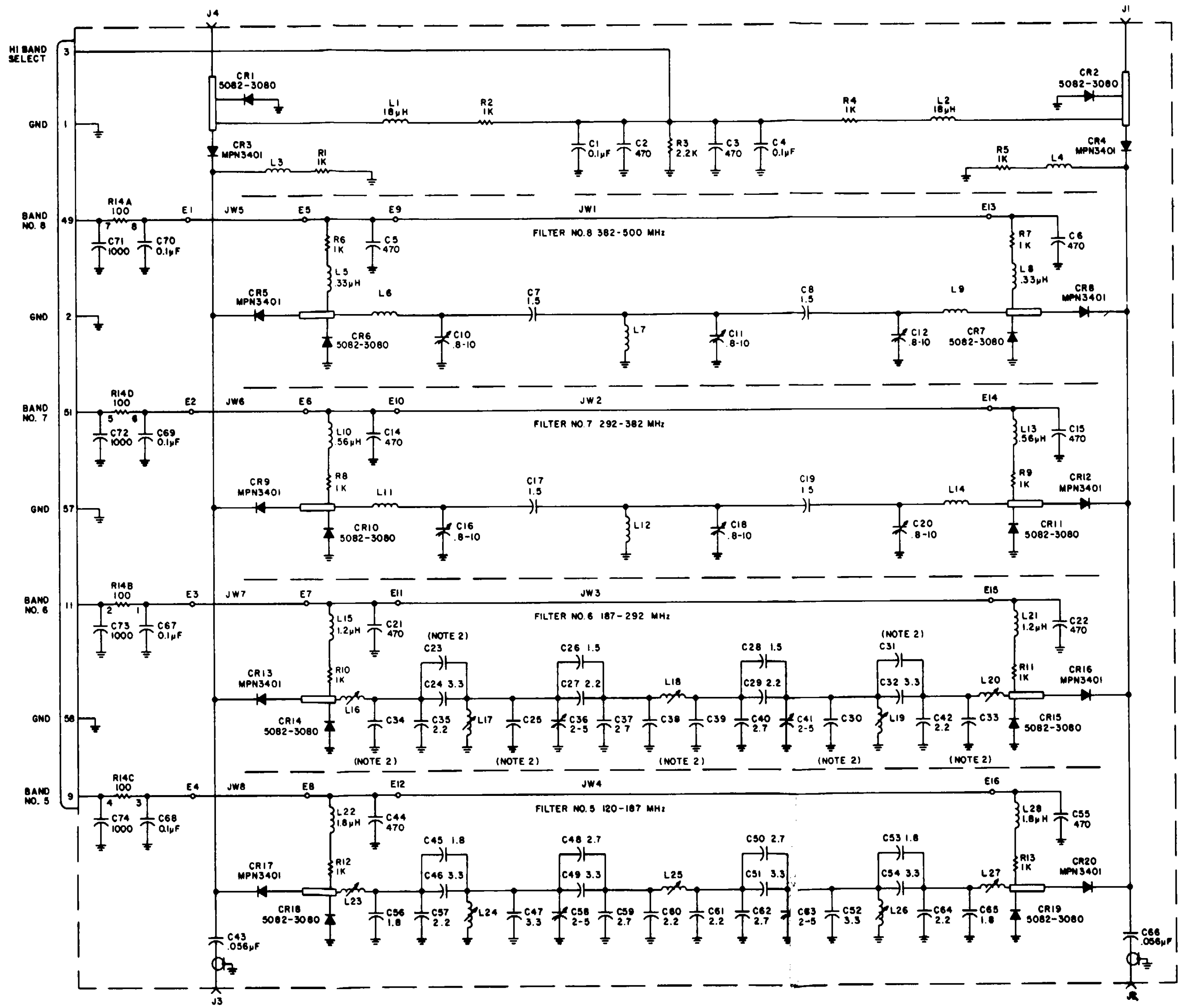


Figure 6-2. Type 794094-1 VHF High-Band Preselector (A3A3) Schematic Diagram 570057

NOTES
1 UNLESS OTHERWISE SPECIFIED
a) RESISTANCE IS IN OHMS, ± 5%, 1/8W
b) CAPACITANCE IS IN pF.
2 C50, C58, C63, C69 ARE TO BE SHOWN BUT DOCUMENTED AS NOT USED

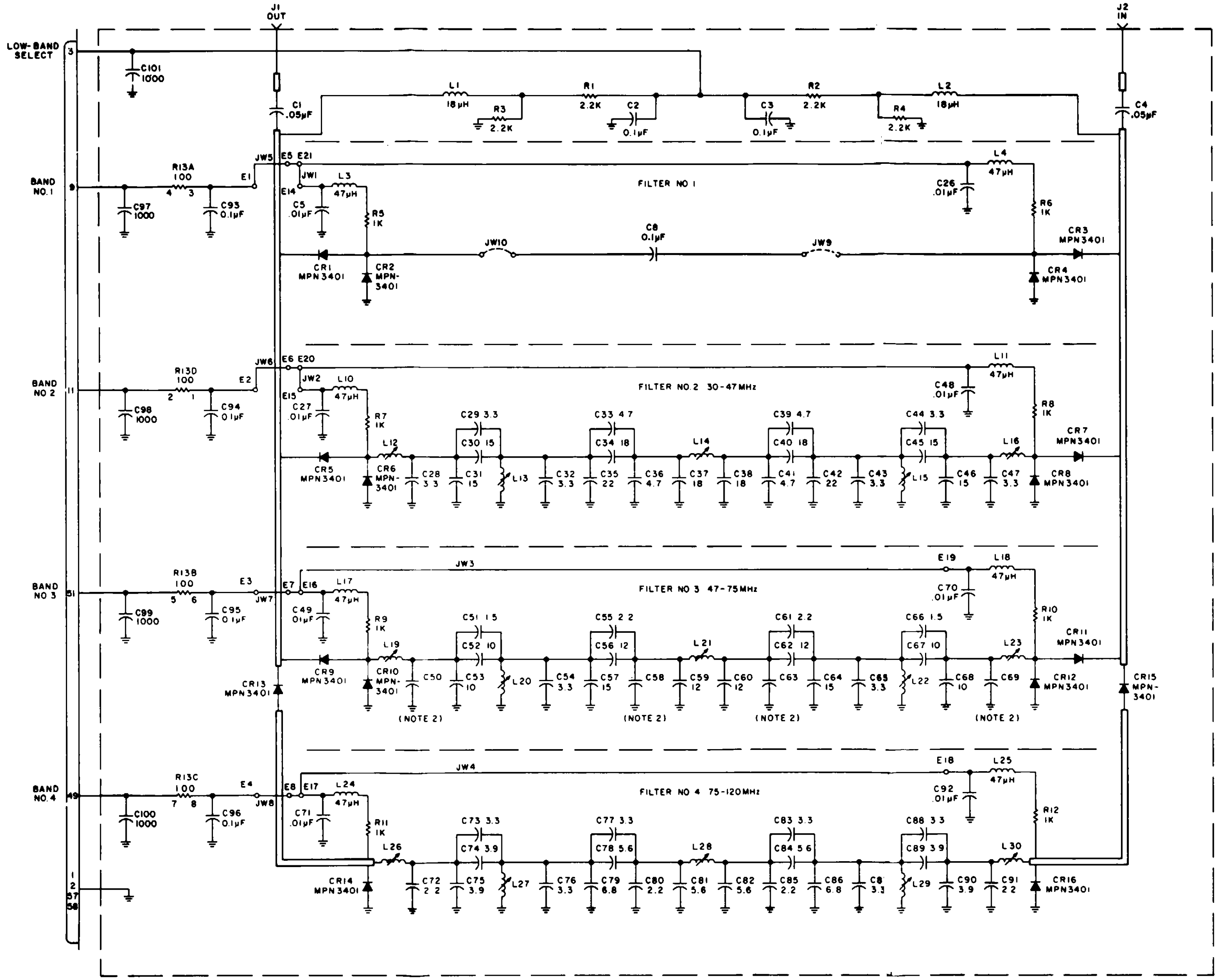
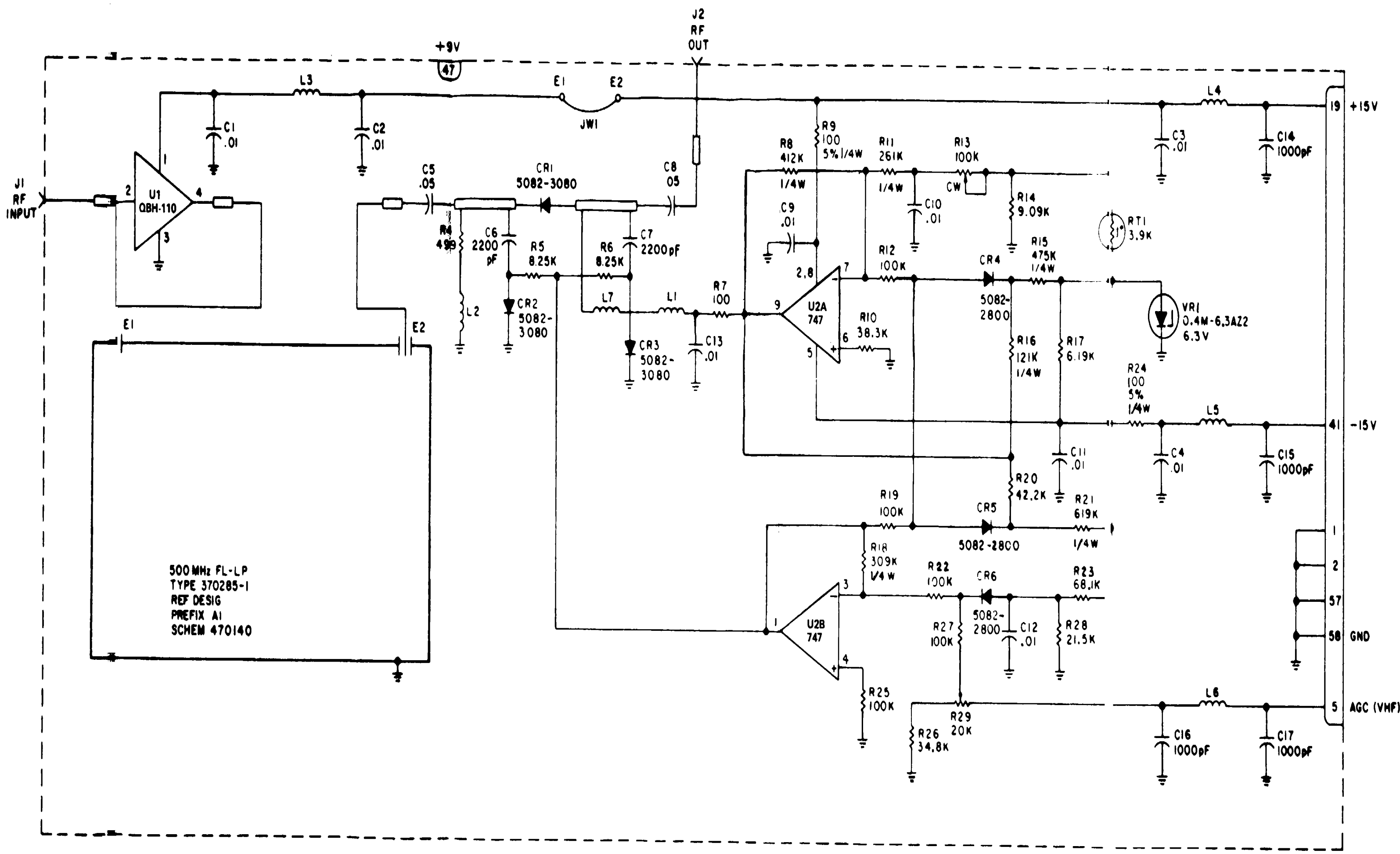


Figure 6-3. Type 794095-3. VHF Low Band Preselector (A3A4) Schematic Diagram 580197



NOTE:
1. UNLESS OTHERWISE SPECIFIED
a) RESISTANCE IS IN OHMS, ± 1%, 1/10 W
b) CAPACITANCE IS IN µF
2. L2 PARASITIC OF C2.

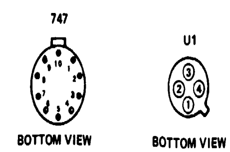
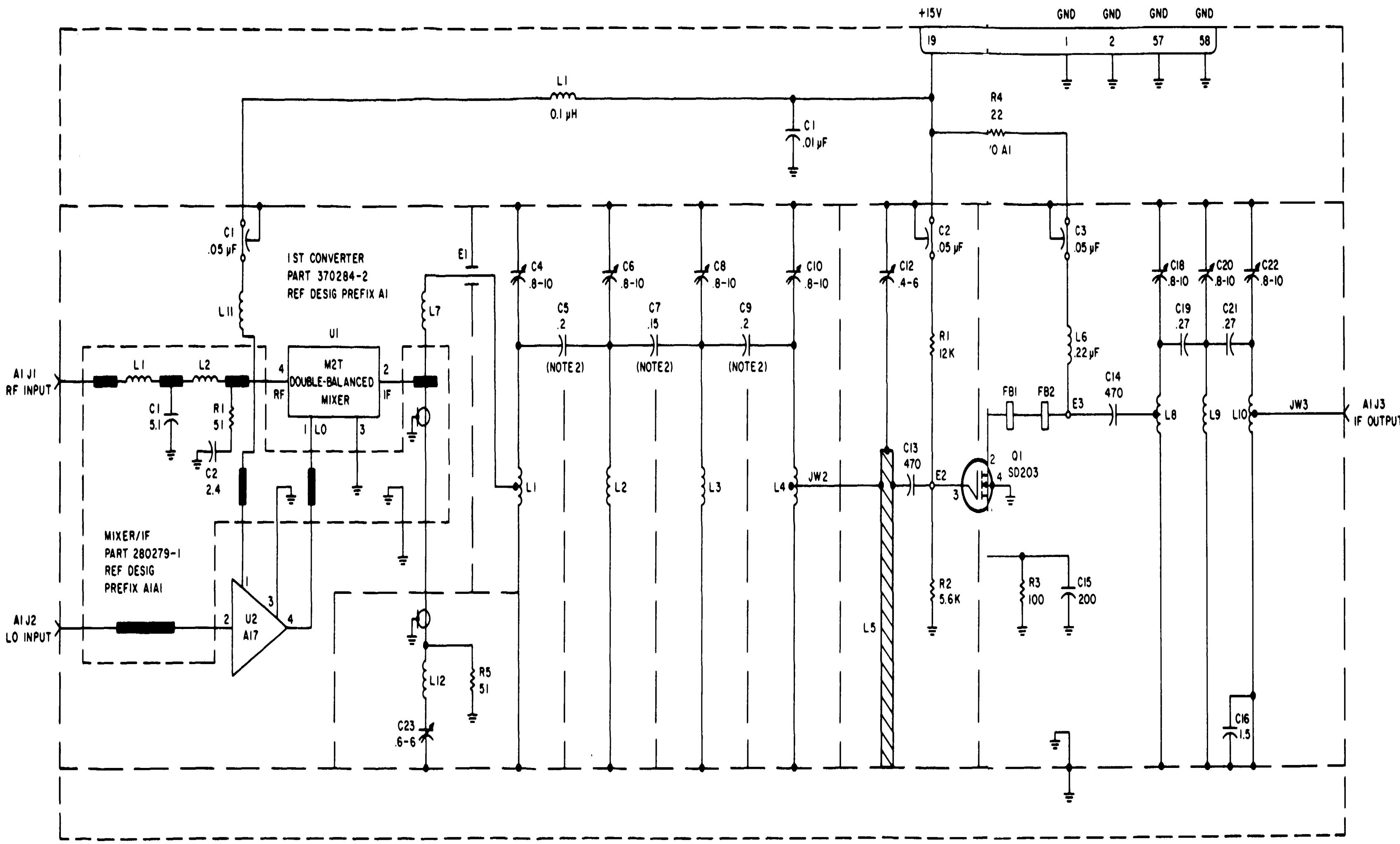


Figure 6-4. Type 794097-2 Preamplifier (A3A5) Schematic Diagram 480445



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W
   b) CAPACITACE IS IN pF
2. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

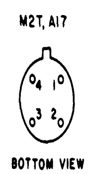


Figure 6-5. Type 794096-2. 1st Converter (A3A6) Schematic Diagram 480304

NOTES:
1. UNLESS OTHERWIS SPECIFIED:
 a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
 b) CAPACITANCE IS IN pF.
 c) INDUCTANCE IS IN μH.
2. NOMINAL VALUE, FINAL VALUE FACTORY SELECT.
3. DIFFERENCE IN TYPE NO.'S IS SHOWN IN TABLE A.

TABLE A

TYPE NO.	U3
716003-1	A59
716003-2	QBH-103

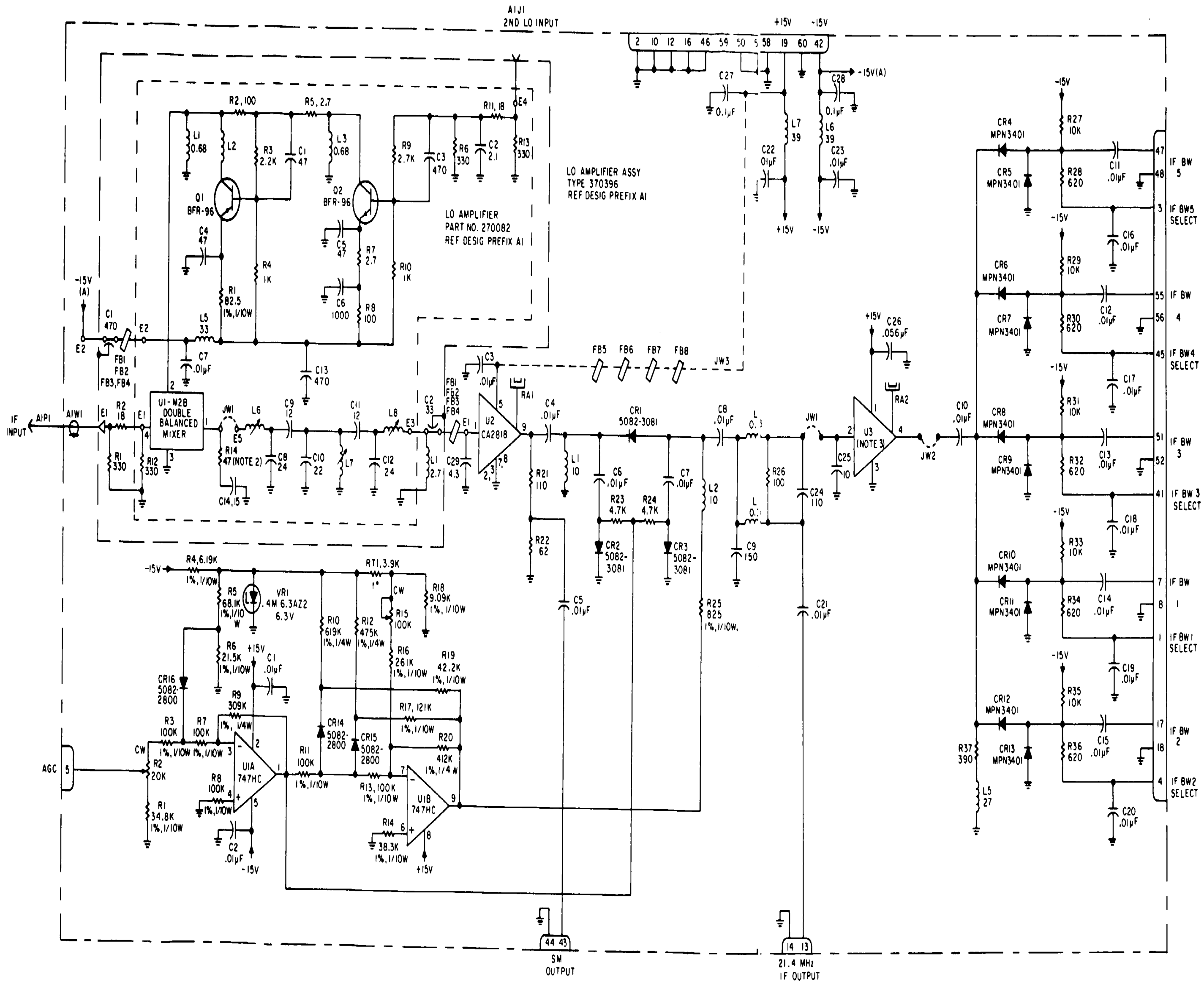


Figure 6-6. Type 716003-1. 2nd Converter (A3A7) Schematic Diagram 580100

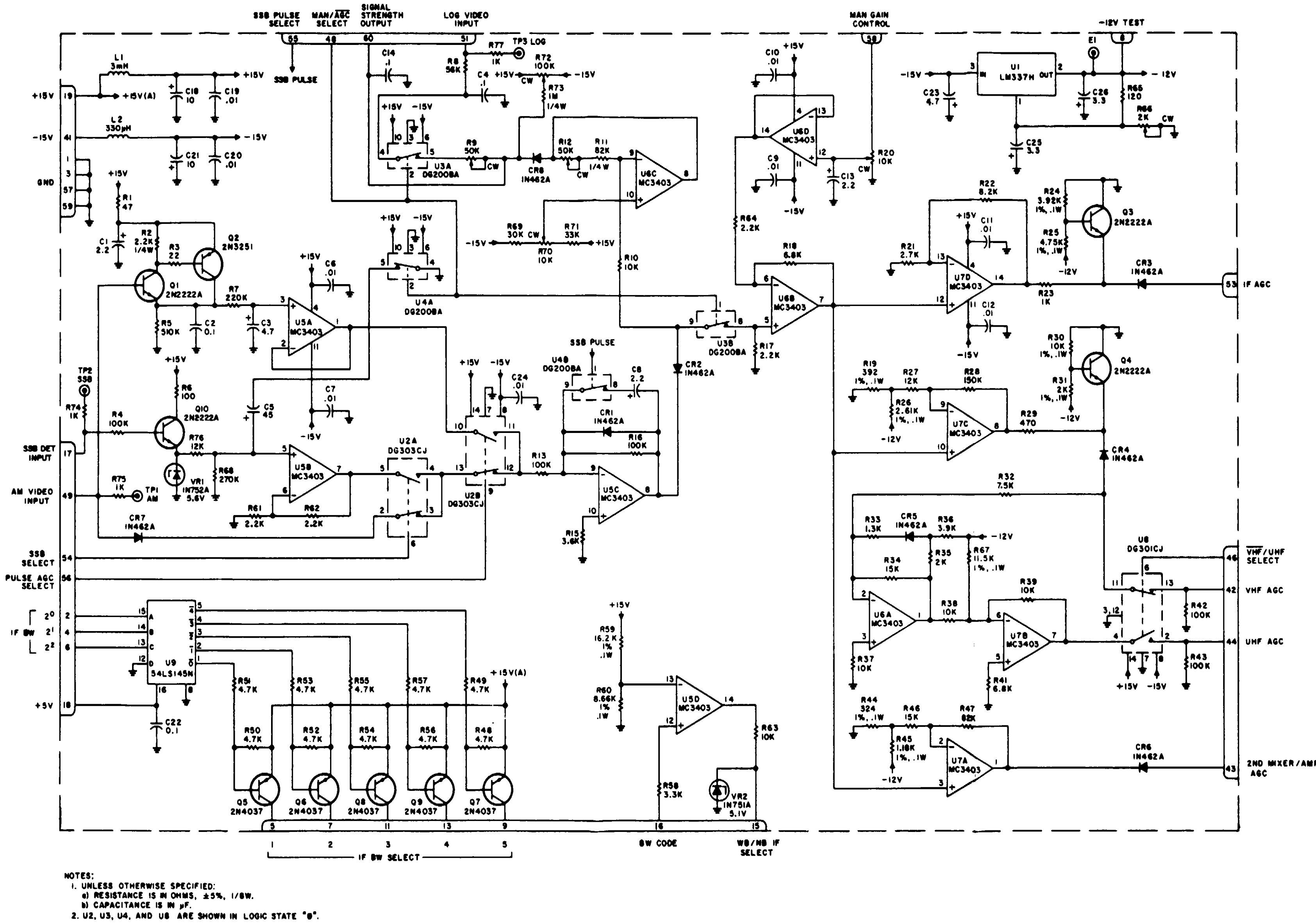
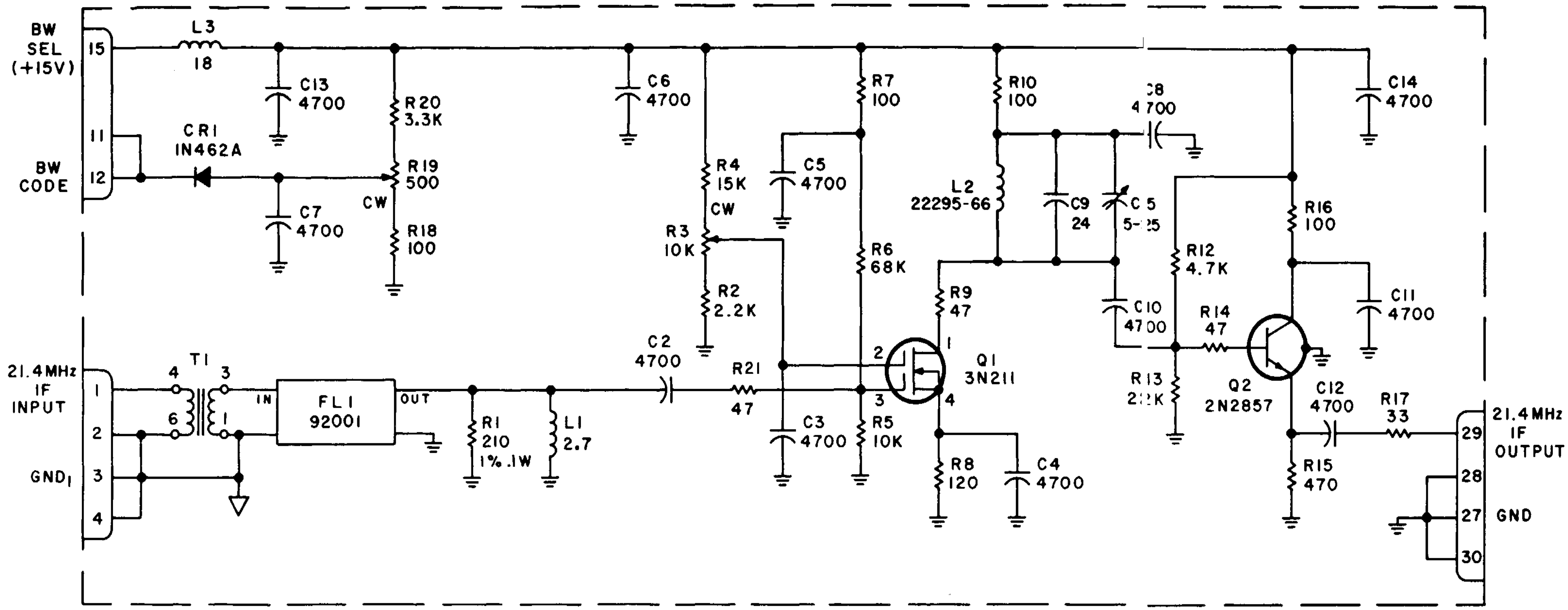


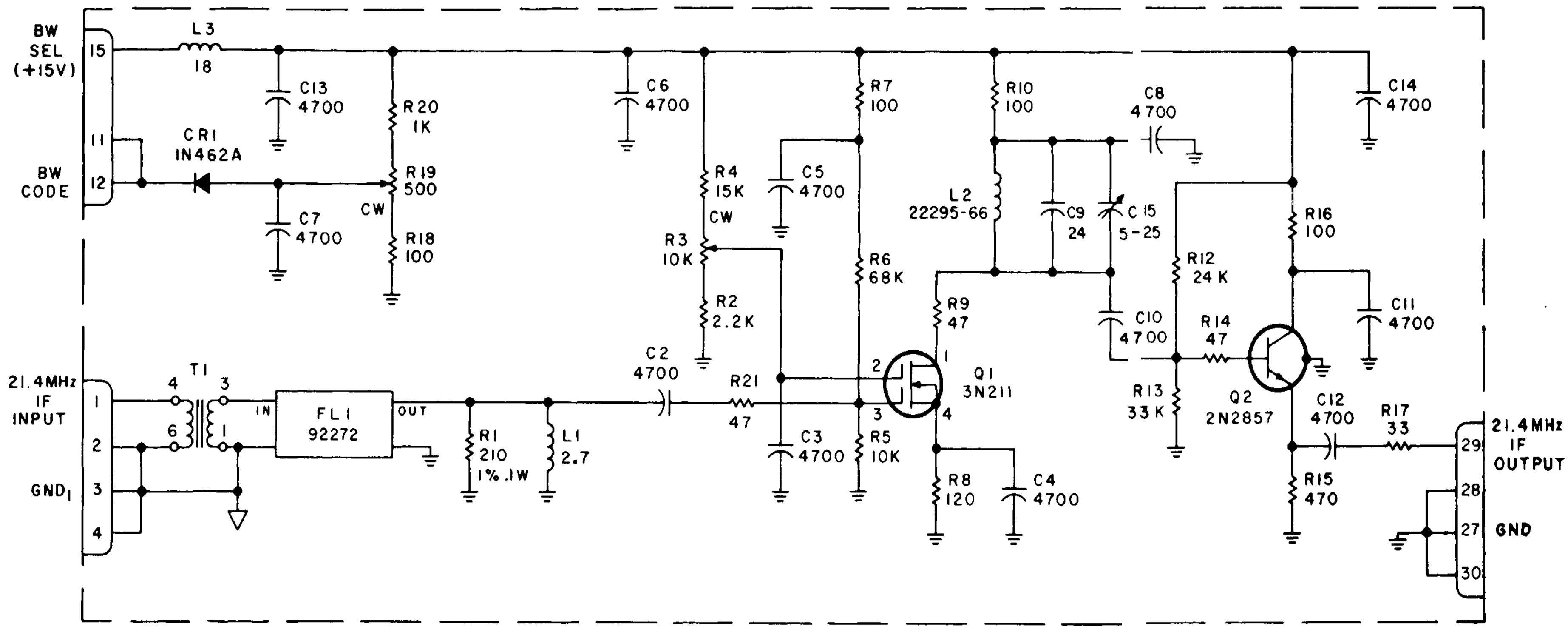
Figure 6-7. Type 784002-1 AGC Amplifier (A3A8) Schematic Diagram 590099



NOTES:

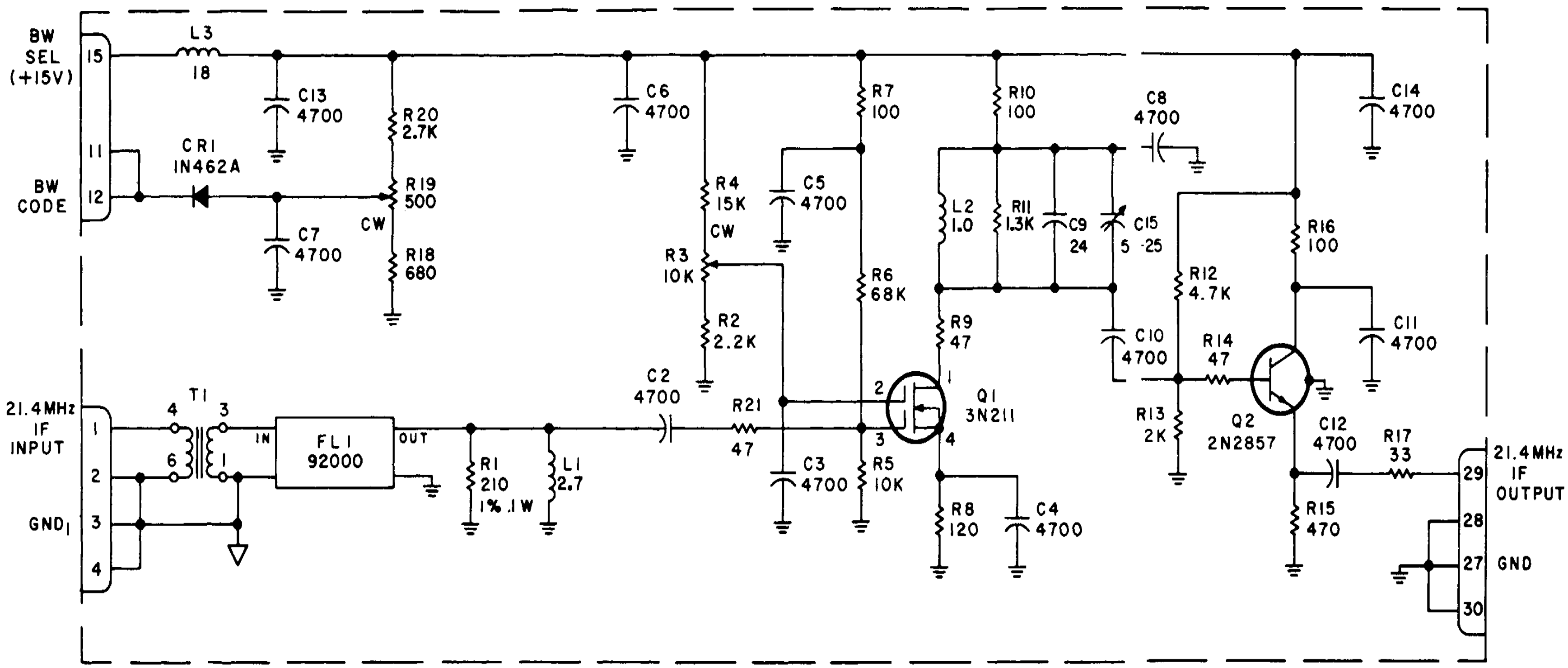
1. UNLESS OTHERWISE SPECIFIED:
   - a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   - b) CAPACITANCE IS IN pF.
   - c) INDUCTANCE IS IN µH.

Figure 6-8. Type 724006-1 21.4 MHz IF Amplifier (10 kHz BW) (A313) Schematic Diagram 370348



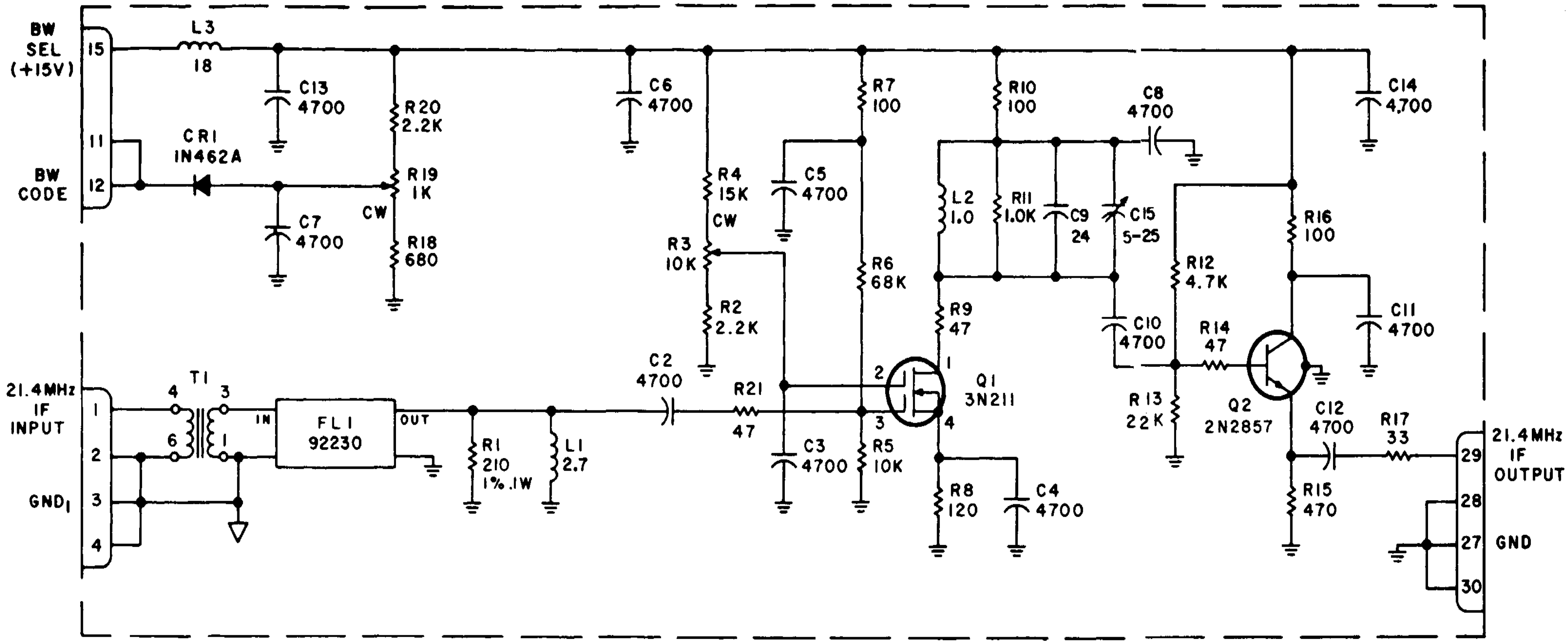
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
b) CAPACITANCE IS IN pF.
c) INDUCTANCE IS IN μH.

Figure 6-9. Type 724006-16 21.4 MHz IF Amplifier (3.2 kHz BW), (A3A9) Schematic Diagram 380456



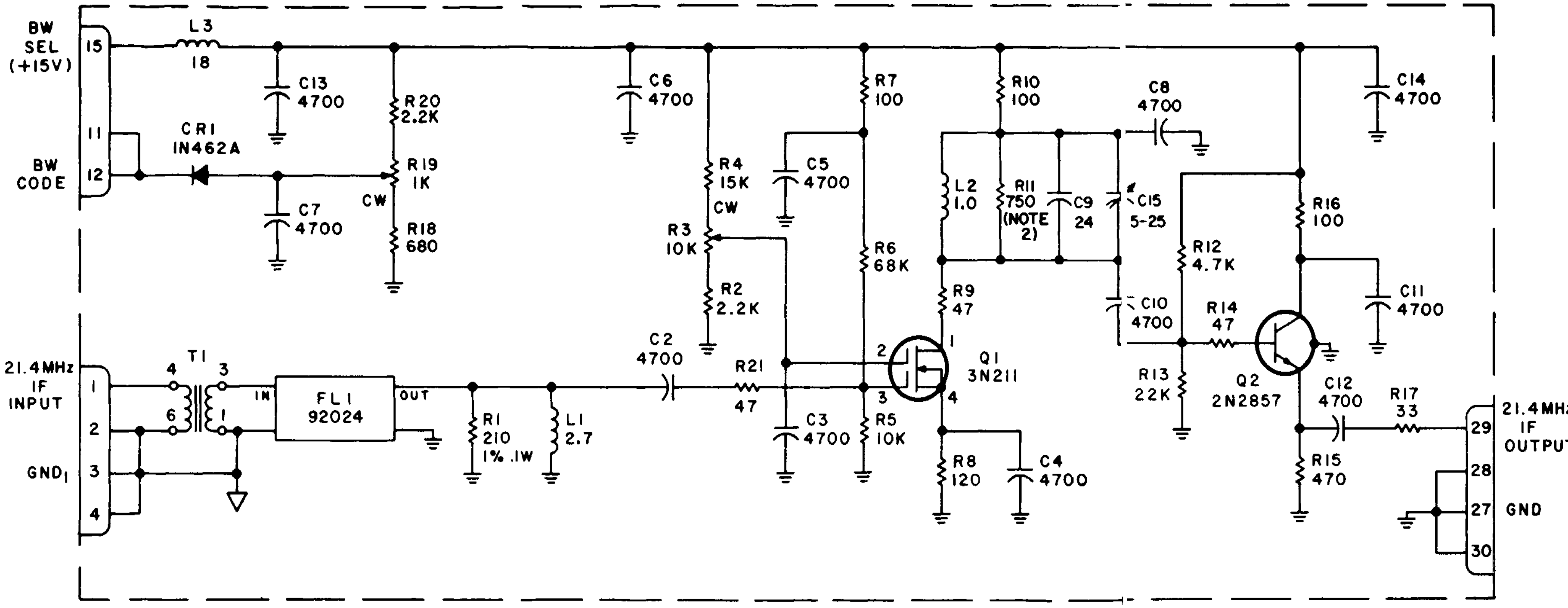
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
b) CAPACITANCE IS IN pF.
c) INDUCTANCE IS IN μH.

Figure 6-10. Type 624006-3 21.4 MHz IF Amplifier (50kHz BW) (A3A9-A3A13) Schematic Diagram 370348



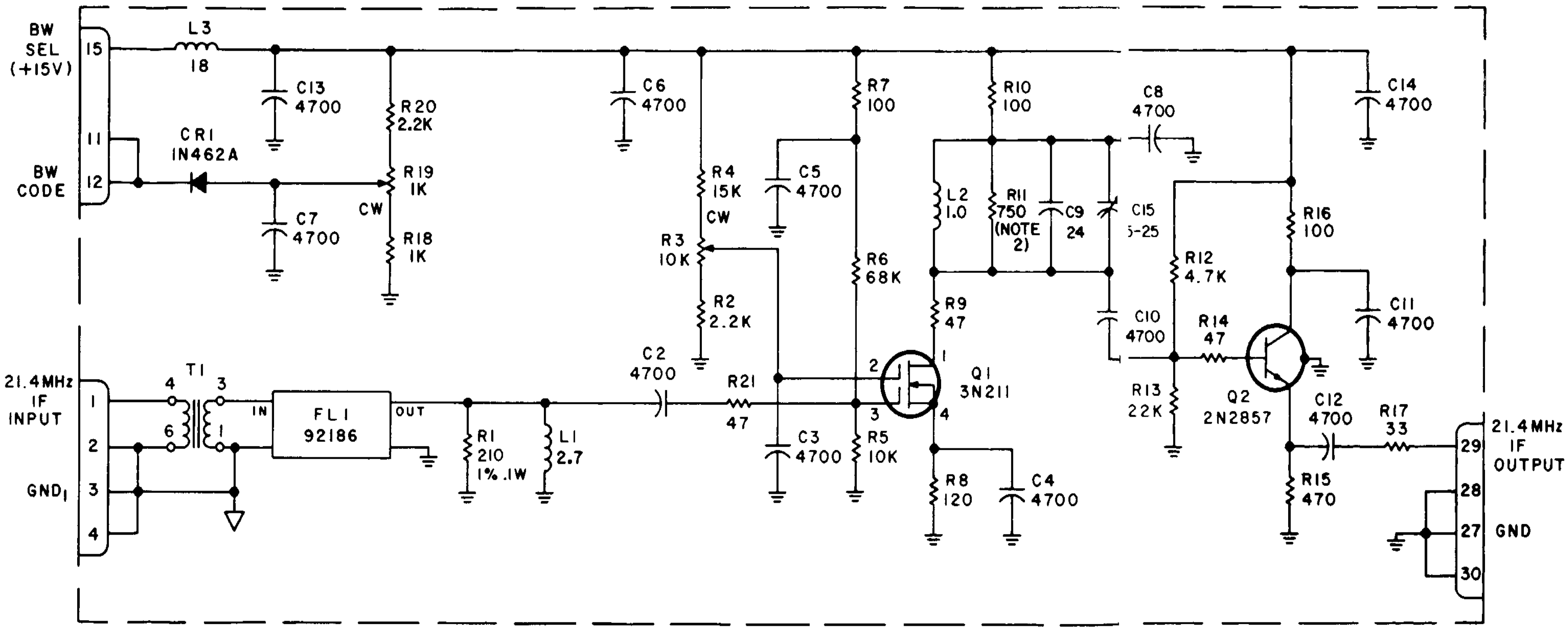
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
b) CAPACITANCE IS IN pF.
c) INDUCTANCE IS IN μH.

Figure 6-11. Type 724006-9 21.4 MHz IF Amplifier (75 kHz BW) (A3A9-A3A13) Schematic Diagram 370348



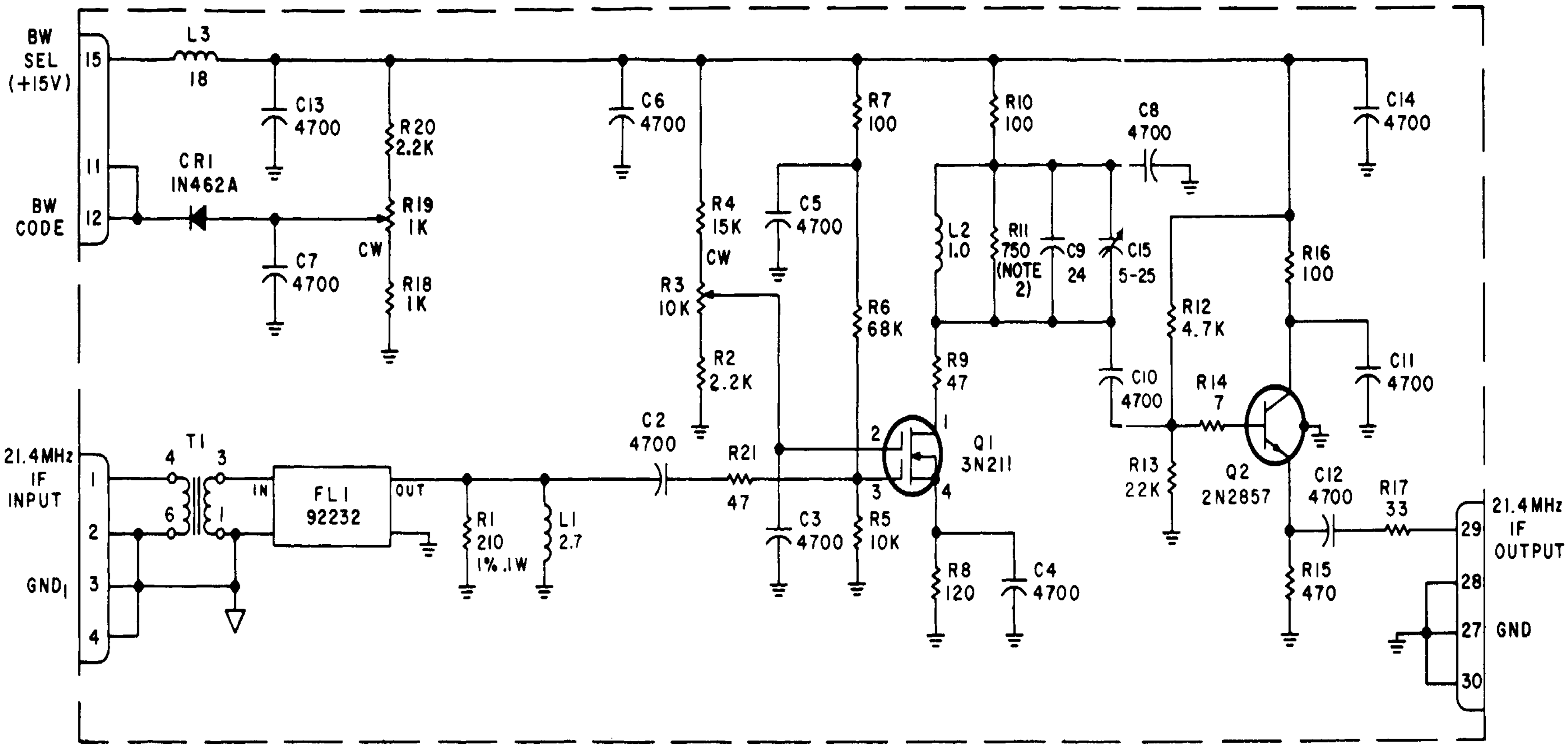
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
b) CAPACITANCE IS IN pF.
c) INDUCTANCE IS IN µH.
2. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

Figure 6-12. Type 724006-4 21.4 MHz IF Amplifier (100 kHz BW) (A3A9-A3A13) (A3A9-A3A13) Schematic Diagram 370348



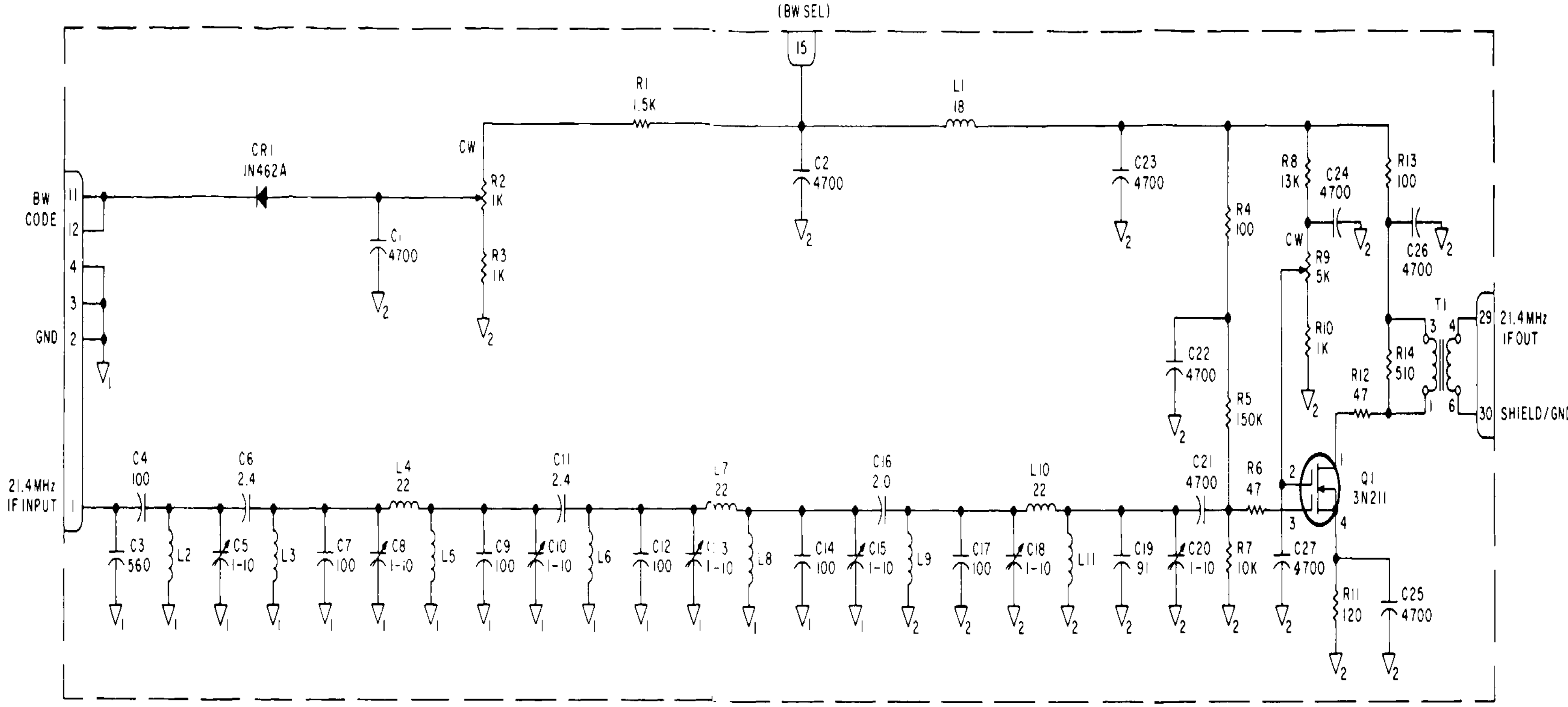
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN pF.
   c) INDUCTANCE IS IN μH.
2. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

Figure 6-13. Type 724006-5 21.4 MHz IF Amplifier (250 kHz BW) (A3A9-A3A13) Schematic Diagram 370348



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
b) CAPACITANCE IS IN pF.
c) INDUCTANCE IS IN μH.
2. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

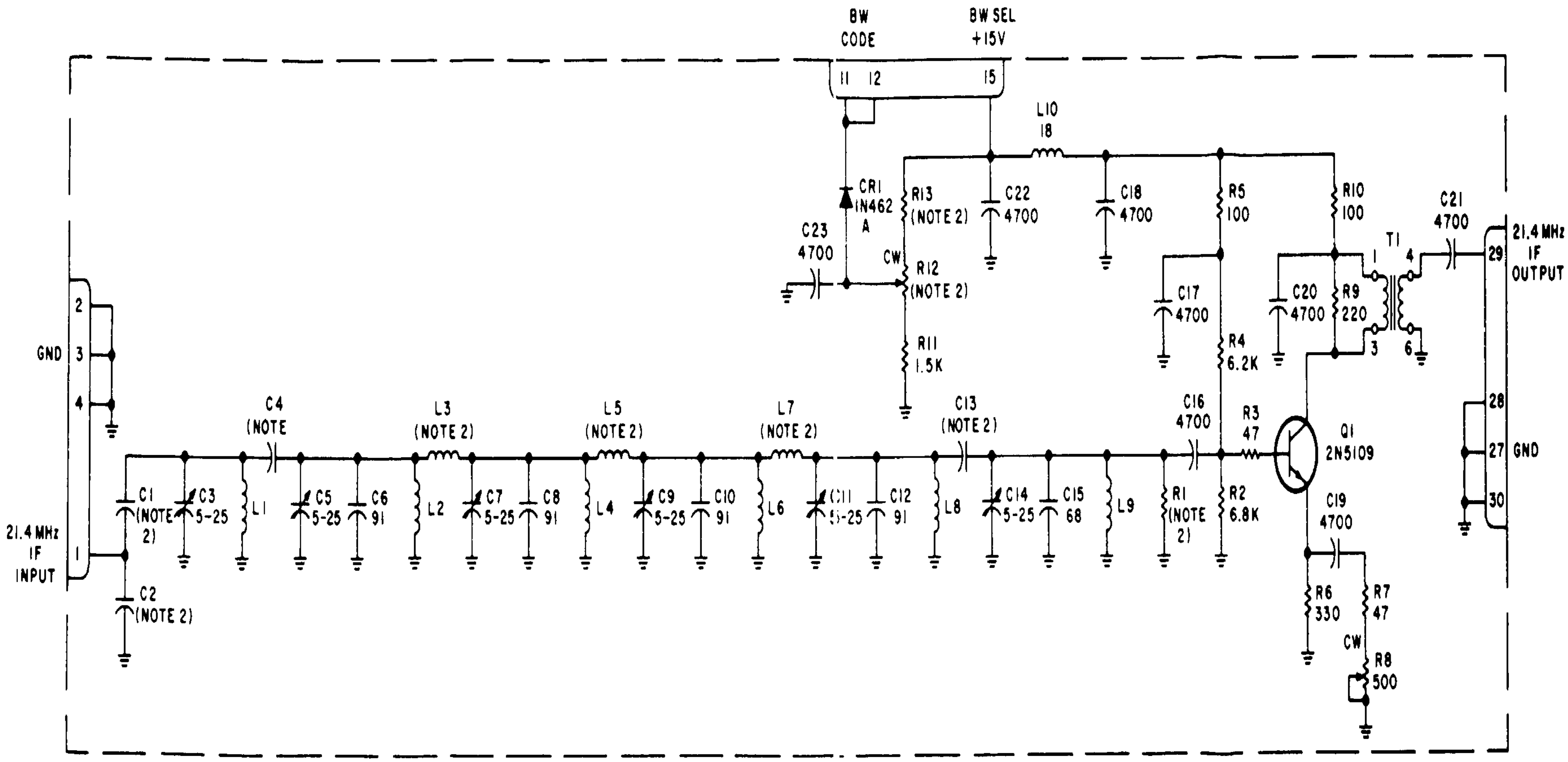
Figure 6-14. Type 724006-6 21.4 MHz IF Amplifier (300 kHz BW)(A3A9-A3A13) Schematic Diagram 370348



NOTES:

1. UNLESS OTHERWISE SPECIFIED.
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN pF.
   c) INDUCTANCE IS IN μH.
2. CW ON POTENTIOMETERS DENOTES FULL CLOCKWISE POSITION OF ACTUATOR.
3. GND 2, CHASSIS GROUND.

Figure 6-15. Type 724019-1 21.4 MHz Amplifier (500 kHz BW), (A3A9-A3A13, Schematic Diagram 470305



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN pF.
   c) INDUCTANCE IS IN μH.
2. DIFFERENCE BETWEEN -1, -2 IS LISTED IN TABLE.

TYPE	IF BW	C1	C2	C4	L3	L5	L7	C13	R1	R12	R13
724007-1	1MHz	120	470	4.3	15	15	15	6.2	1.3K	500	1.5K
724007-2	2MHz	120	300	8.2	8.2	8.2	8.2	12	470	1K	1K

Figure 6-16. Type 724007-1, 21.4 MHz IF Amplifier (1 MHz, 2 MHz BW)(A3A9-A3A13) Schematic Diagram 4701164

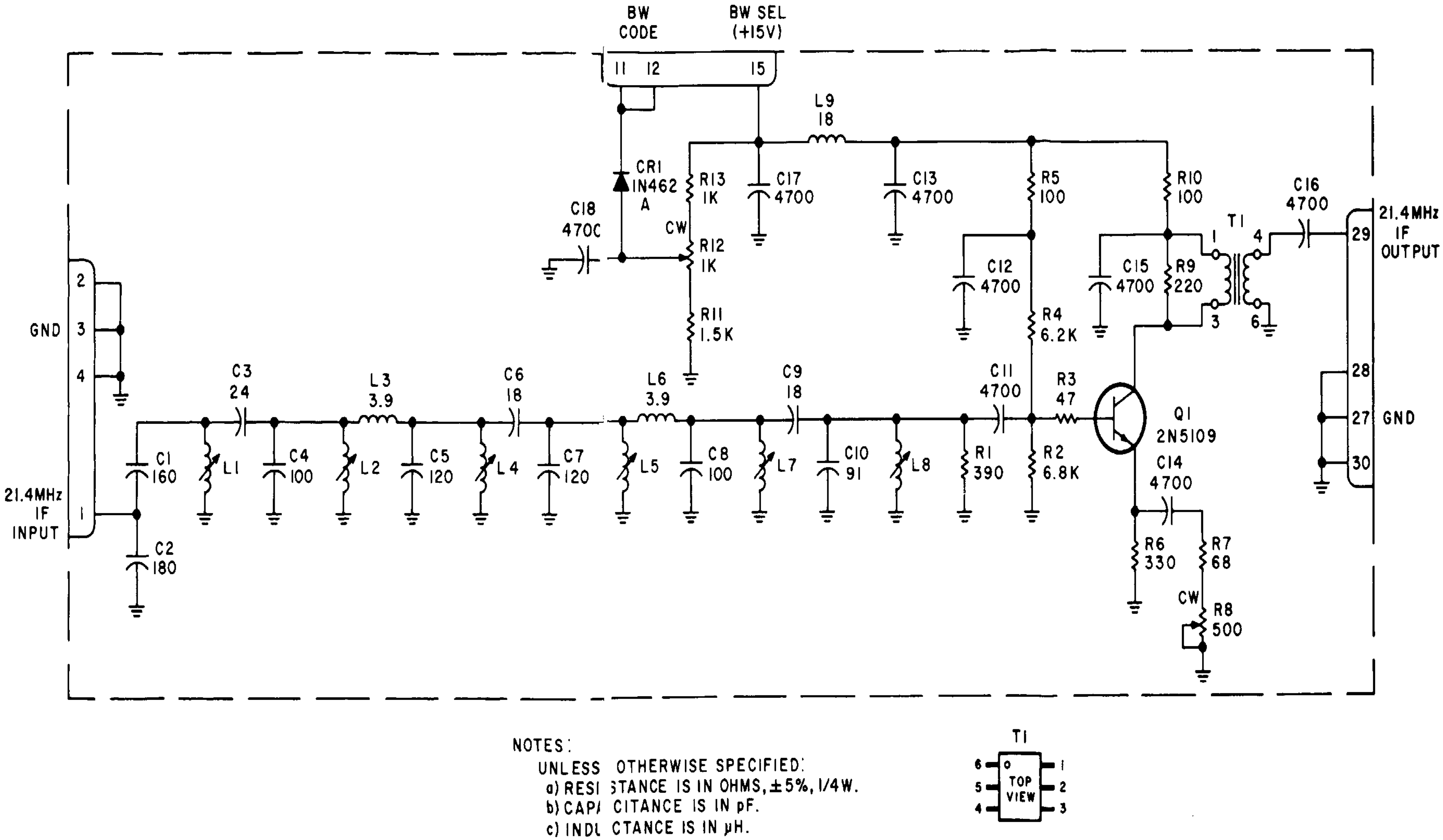


Figure 6-17. Type 724008-1. 21.4 MHz IF Amplifier (4 MHz BW) A3A9-A3A13), Schematic Diagram 370349

NOTE:
1. ALL RESISTORS ARE TYPE RN55D.

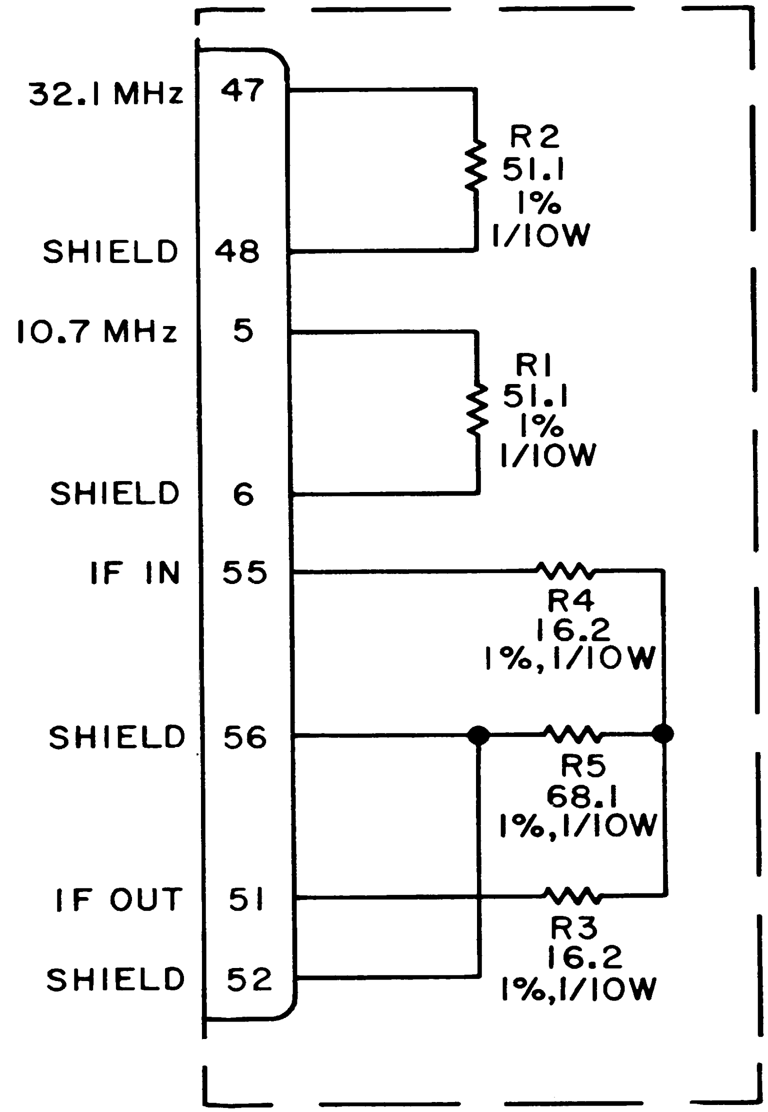


Figure 6-18. Type 798074-1 SSB Bypass (A3A14) Schematic Diagram 290505

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN μF.
2. U1-U3 AND U7 ARE SHOWN IN LOGIC STATE "0".
3. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE A.
4. TYPE 796233-2 USED WHEN DIGITAL/AUDIO/VIDEO OPTION IS INSTALLED IN RECEIVER.

TABLE A

TYPE NO	U8	U9	R37	R39	R50
796233-1	NOT USED	NOT USED	390	220	91
796233-2	VTL5C4	VTL5C4	NOT USED	NOT USED	NOT USED

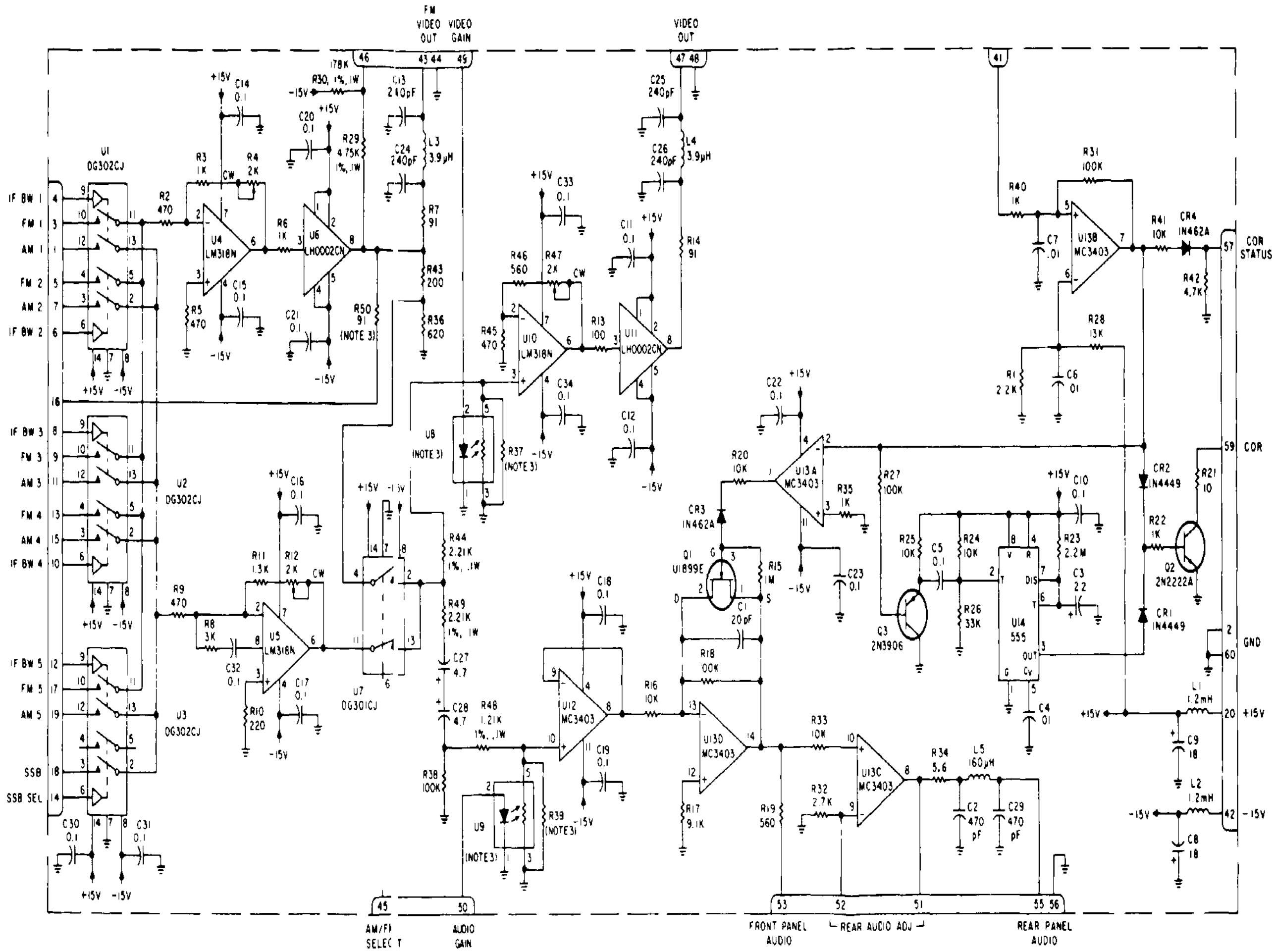


Figure 6-19. Type 796233-1 Audio/Video/COR (A3A15) Schematic Diagram 480343

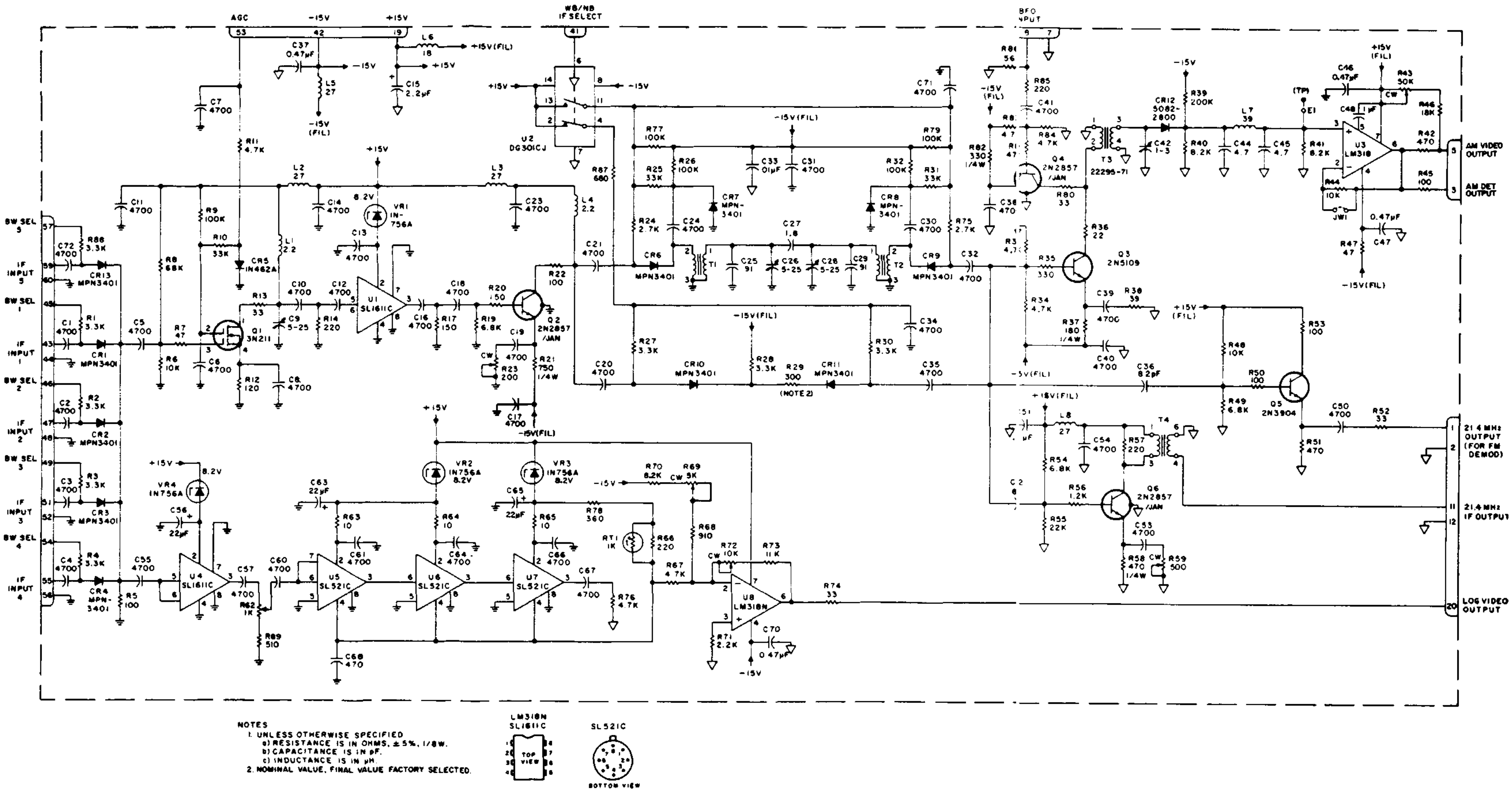
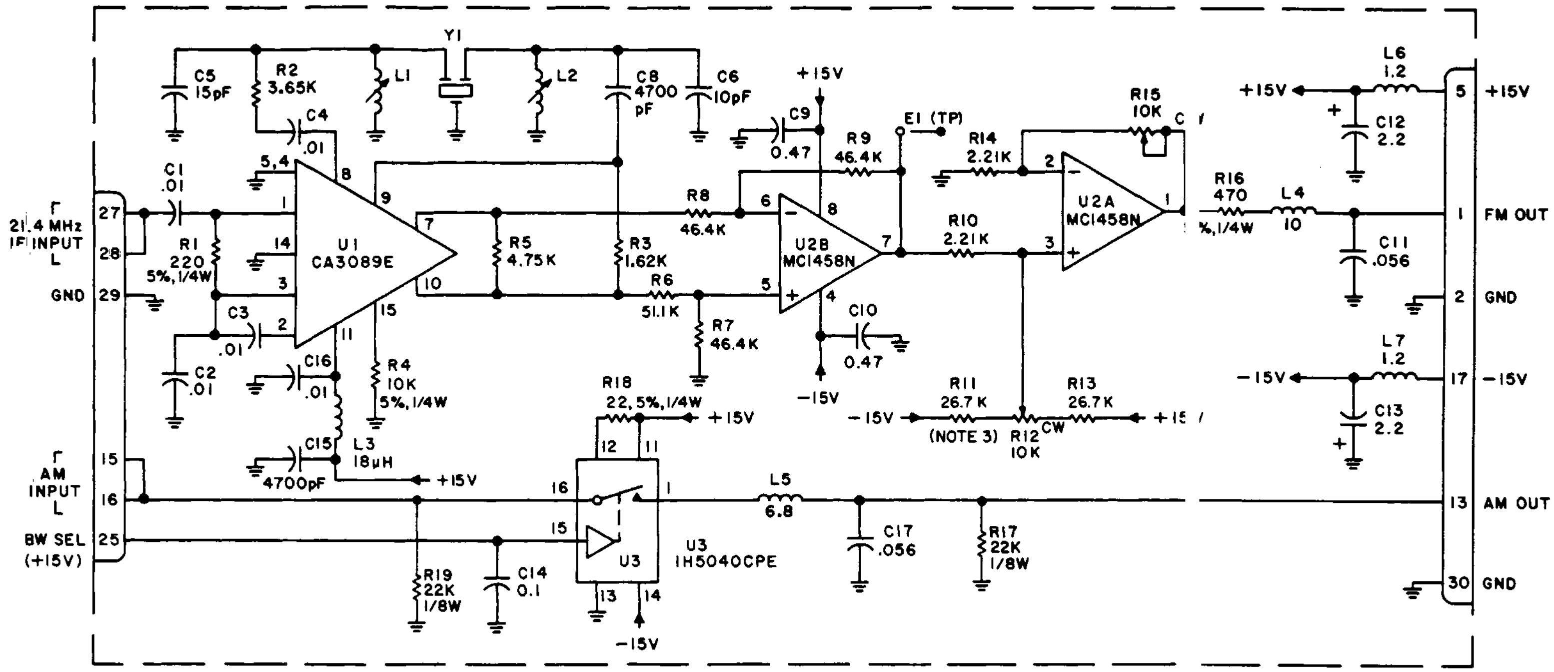


Figure 6-20. Type 724016-1 AM Demodulator/IF Output Amplifier (A3A16) Schematic Diagram 570157



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±1%, 1/10W
   b) CAPACITANCE IS IN μF.
   c) INDUCTANCE IS IN mH.

3. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

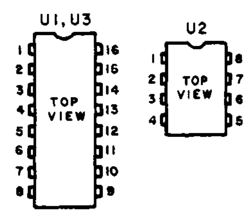


Figure 6-21. Type 794106-2 FM Demodulator (20 kHz BW) (A3A17-A3A21) Schematic Diagram 370347

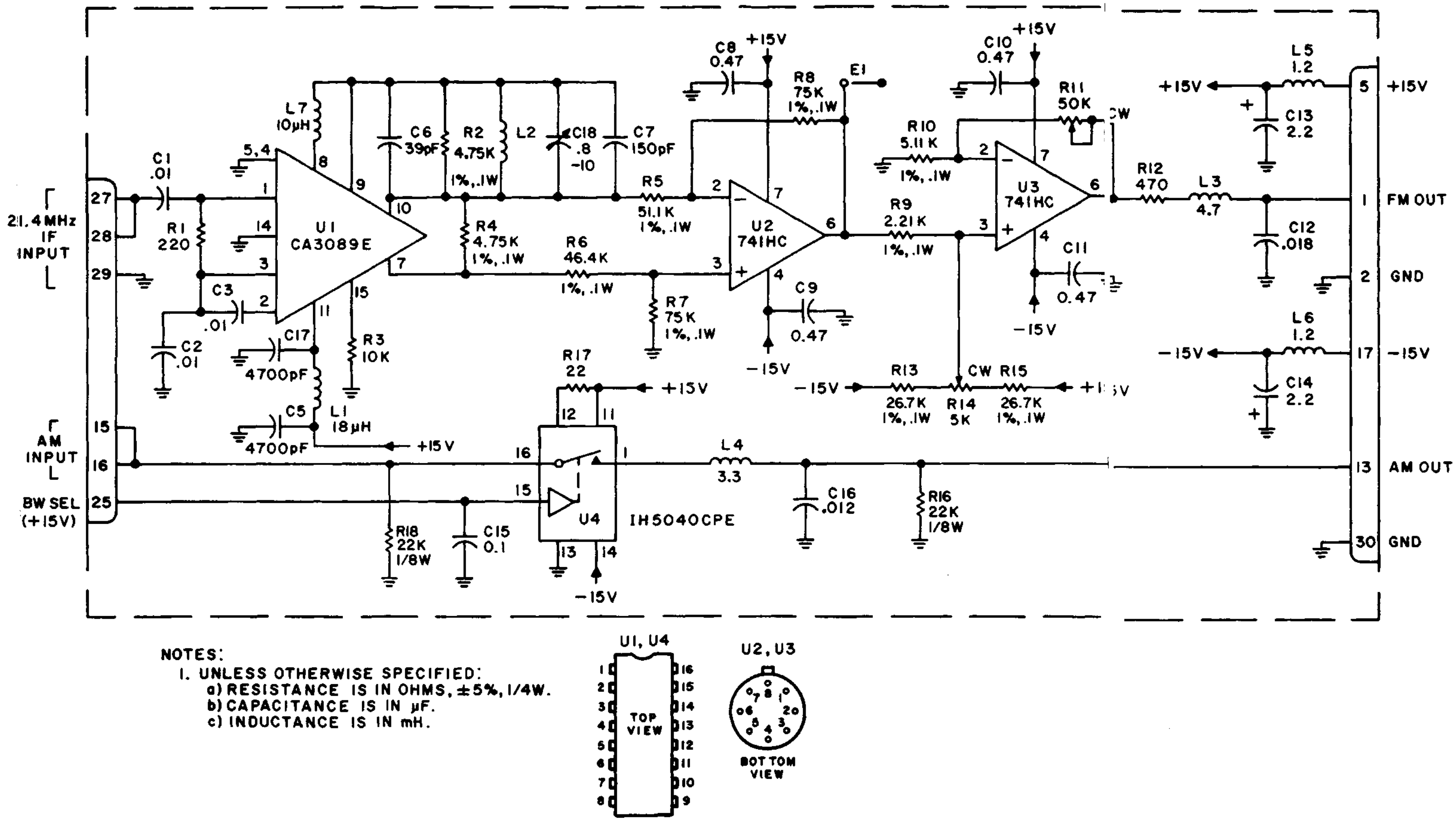


Figure 6-22. Type 794107-1 FM Demodulator (50 kHz BW) (A3A17 - A3A21) Schematic Diagram 370346

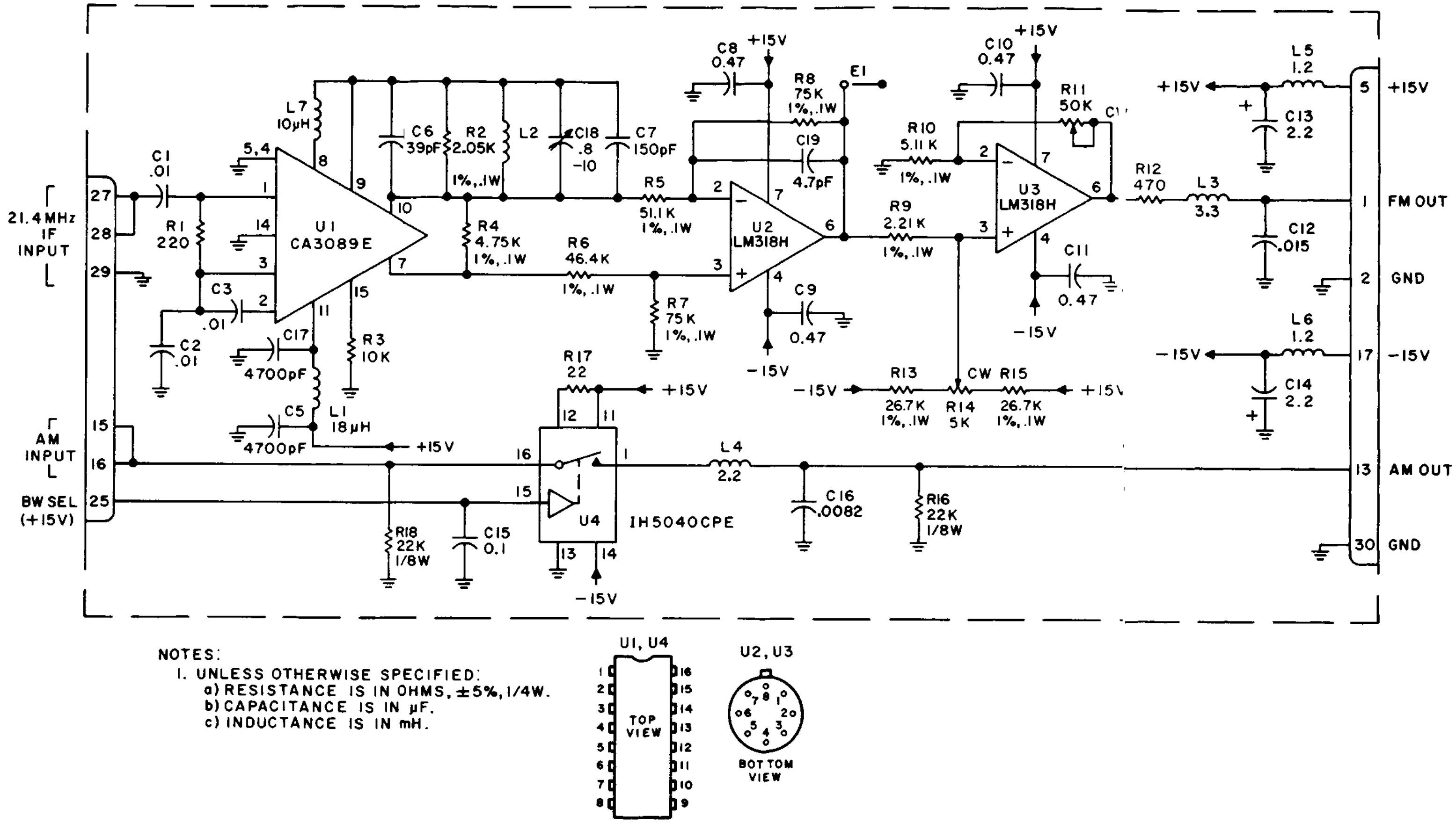


Figure 6-23. Type 794107-6 FM Demodulator (75 kHz BW) (A3A17-A3A21) Schematic diagram 370346

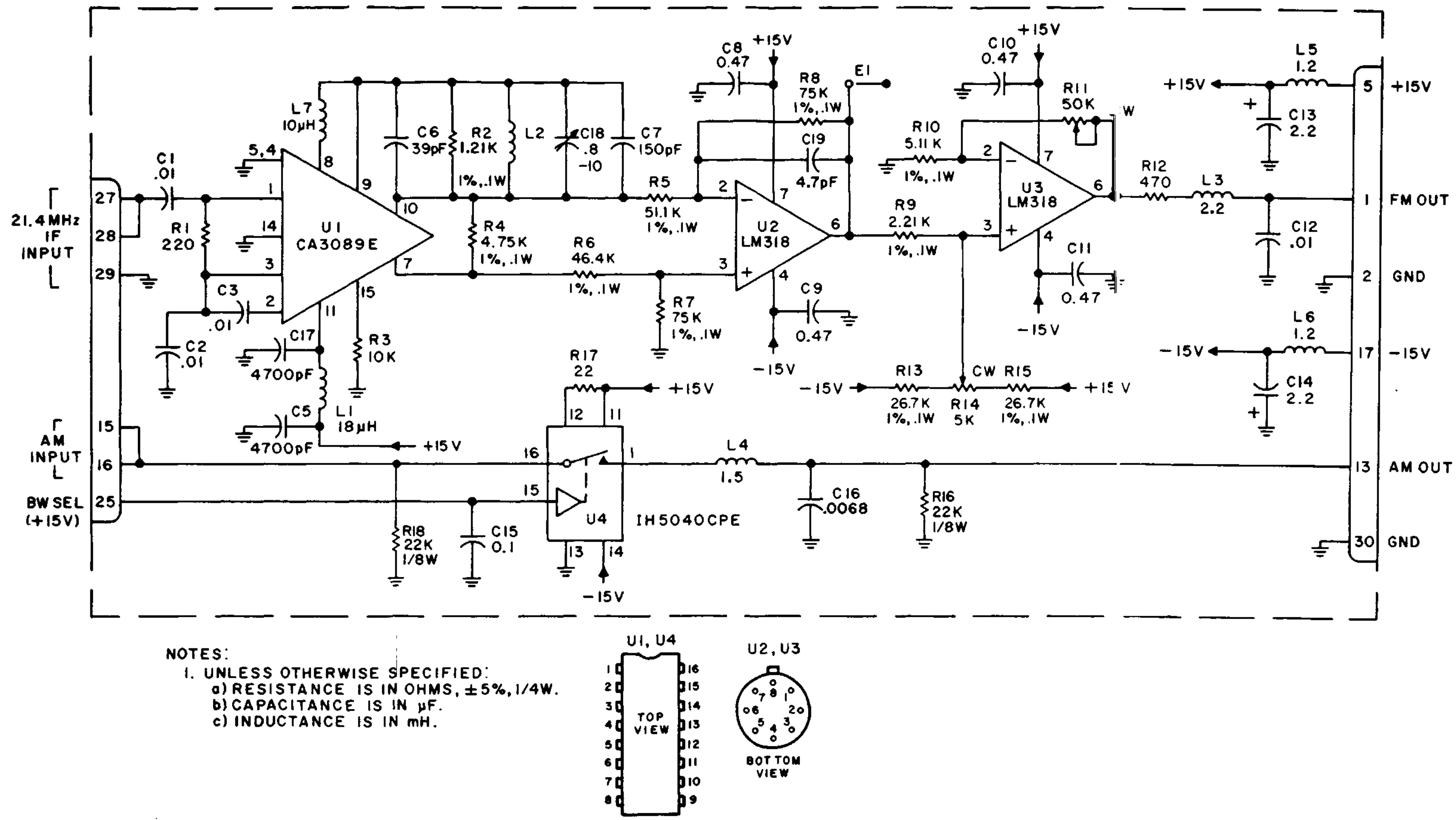
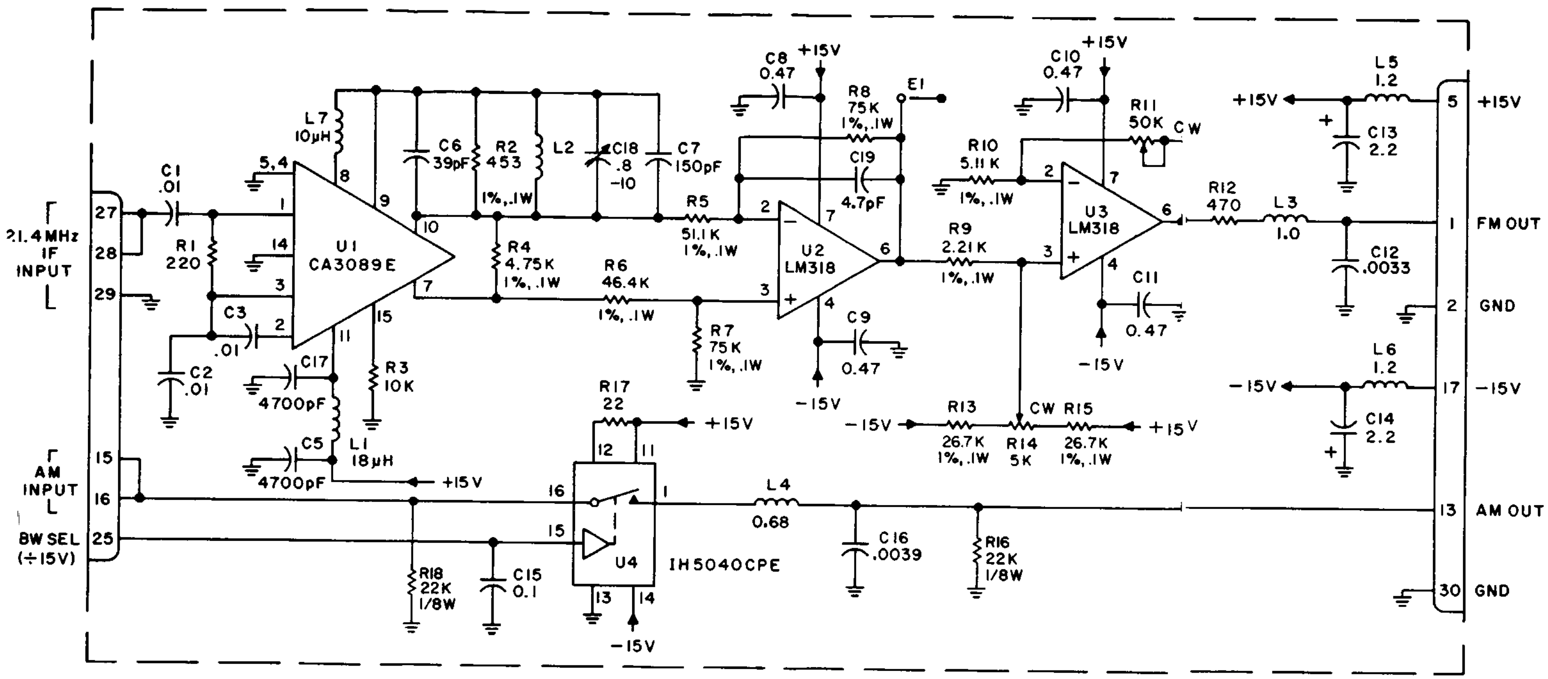


Figure 6-24. Type 794107-2 FM Demodulator (100 kHz BW) (A3A17-A3A21) Schematic Diagram 370346



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN μF.
   c) INDUCTANCE IS IN mH.

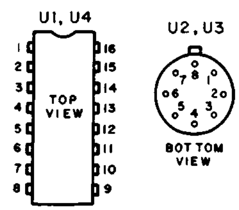
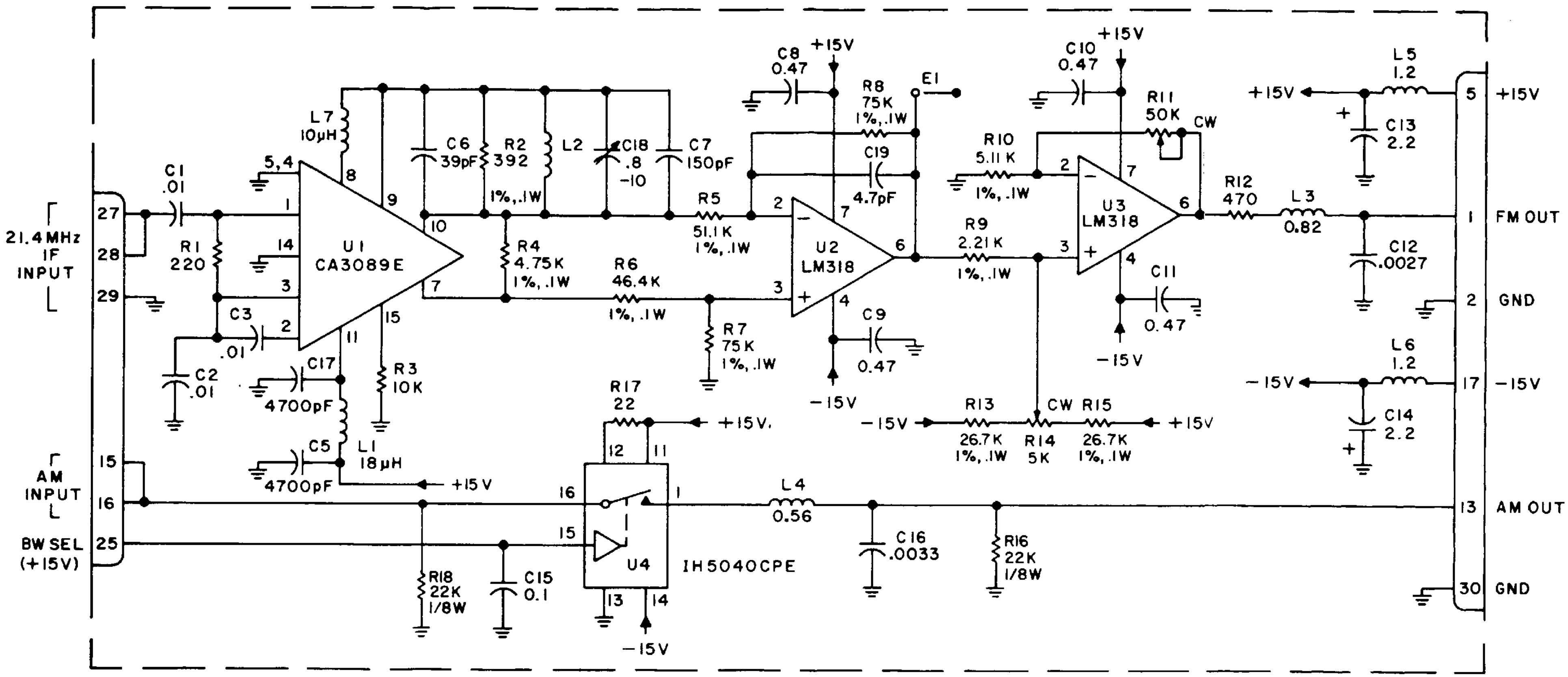


Figure 6-25. Type 794107-3 FM Demodulator (250 kHz BW) (A3A17-A3A21) Schematic Diagram 370346



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
b) CAPACITANCE IS IN μF.
c) INDUCTANCE IS IN mH.

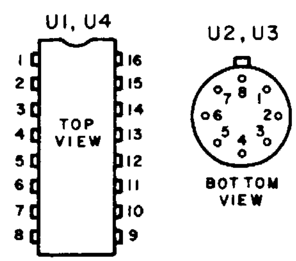
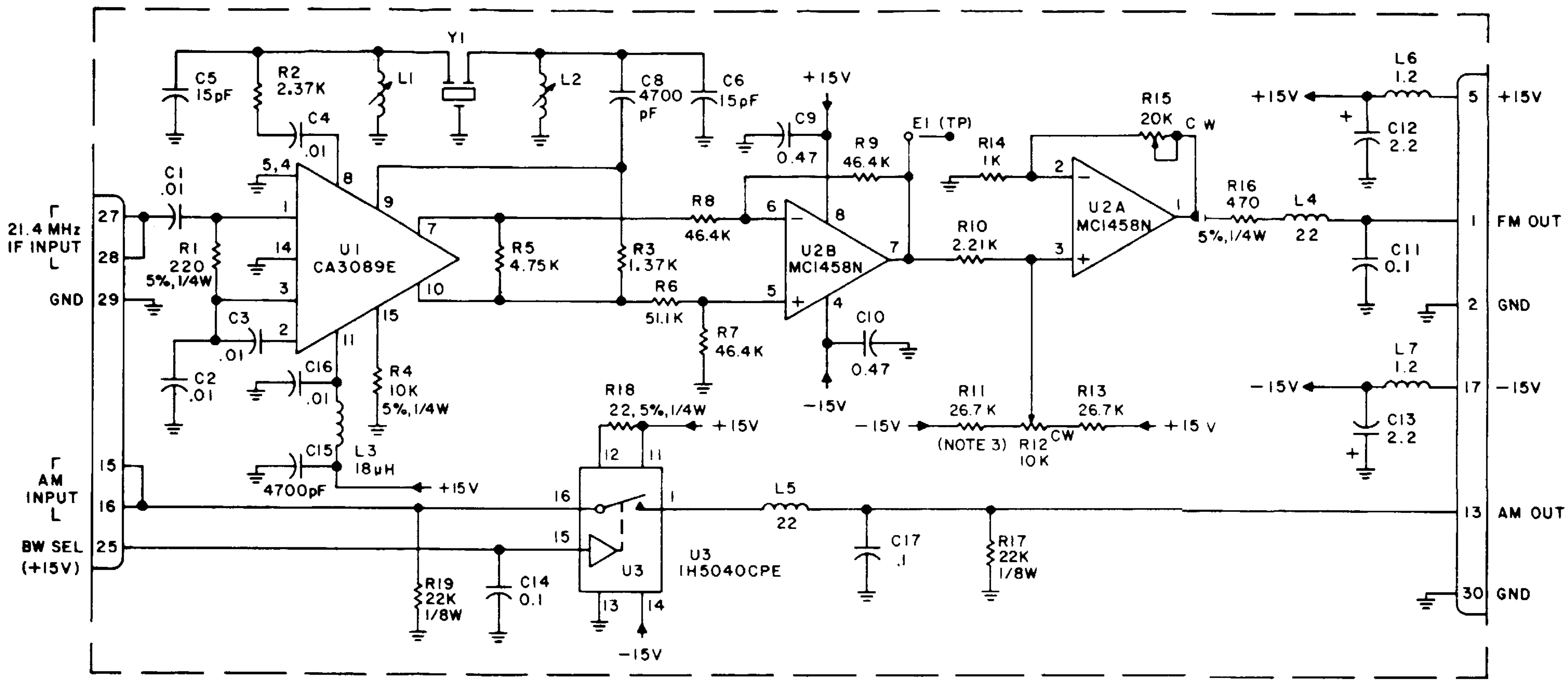


Figure 6-26. Type 794107-4 FM Demodulator (300 kHz BW) (A3A17-A3A21) Schematic Diagram 370346



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±1%, 1/10W
   b) CAPACITANCE IS IN µF.
   c) INDUCTANCE IS IN mH.

3. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

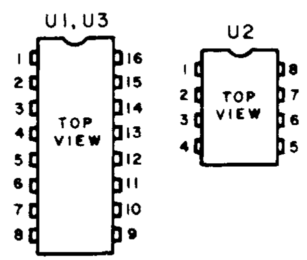
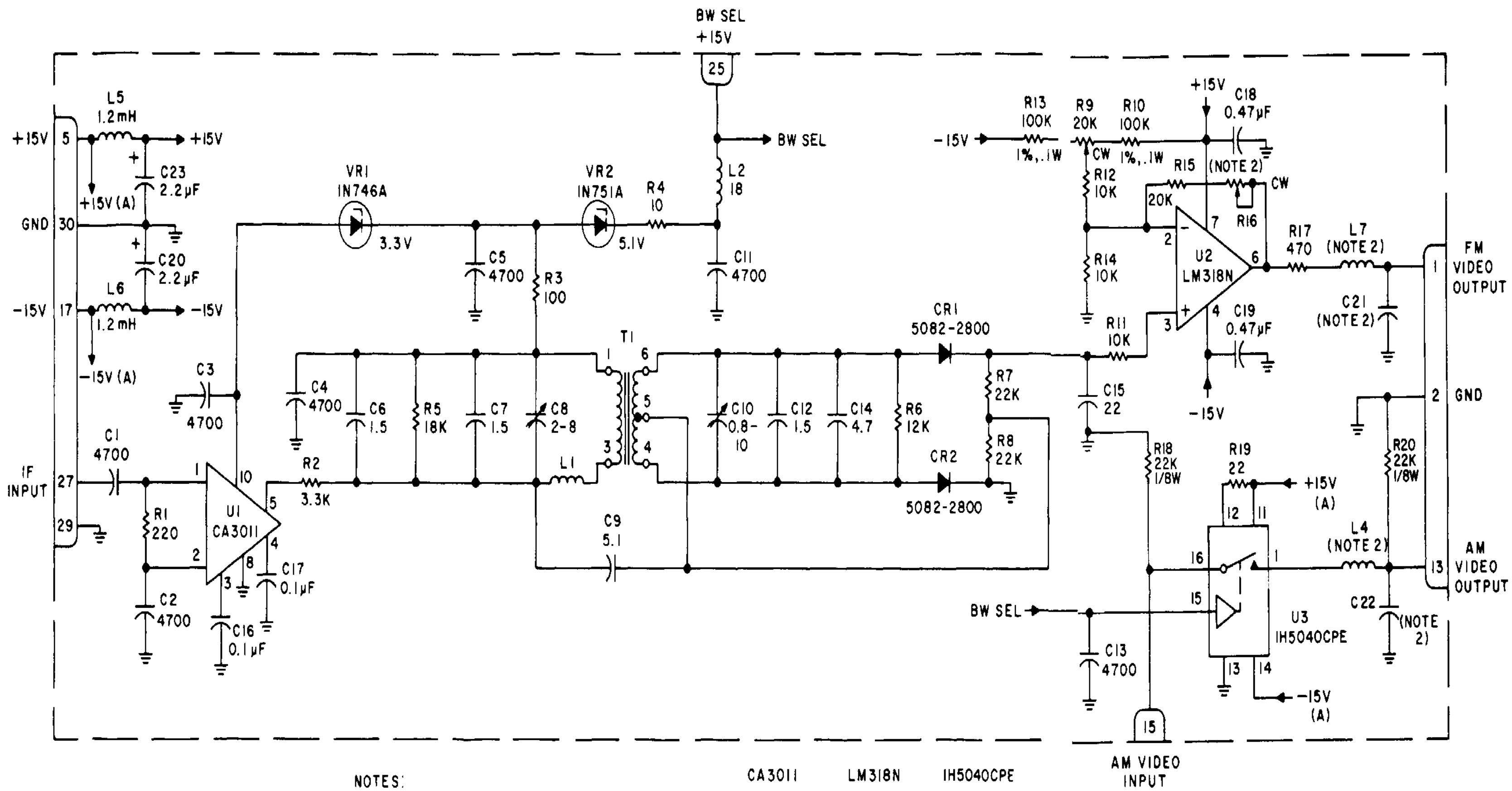
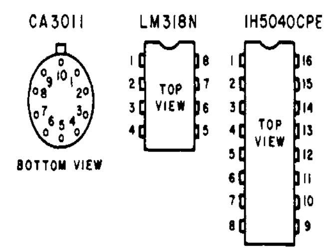


Figure 6-27. Type 794106-6 21.4 MHz FM Demodulator (3.2 kHz), (A3A17), Schematic Diagram 380455



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ± 5%, 1/4W.
   b) CAPACITANCE IS IN pF.
   c) INDUCTANCE IS IN µH.
2. DIFFERENCE BETWEEN -1, -2 IS LISTED IN TABLE.



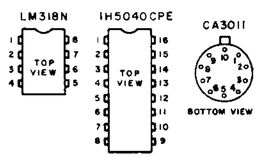
TYPE	IF BW	R16	L4	C22	L7	C21
794104-1	1MHz	50K	180	1000	220	820
794104-2	500kHz	200K	360	2200	390	1500

Figure 6-28. Type 794104-2, -1 FM Demodulator (500 kHz, 1 MHz BW), (A3A17-A3A21), Schematic Diagram 470157

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN pF.
   c) INDUCTANCE IS IN μH.
2. DIFFERENCE BETWEEN -1,-2,-3,-4 IS LISTED IN TABLE 1.

TABLE 1.

TYPE	IF BW	FM BW	R4	C9	C10	C11	C12	L3	L4	R6	R9	R5	T1
794105-1	2MHz	2MHz	22K	N/U	N/U	430	300	75	100	680	20K	22K	24608-9
794105-2	4MHz	4MHz	10K	N/U	N/U	130	180	39	47	1.8K	20K	10K	24608-9
794105-3	1MHz	2MHz	22K	N/U	N/U	820	1000	220	180	680	50K	22K	24608-9
794105-4	8MHz	8MHz	10K	N/U	N/U	100	120	22	27	1.8K	20K	10K	24608-13



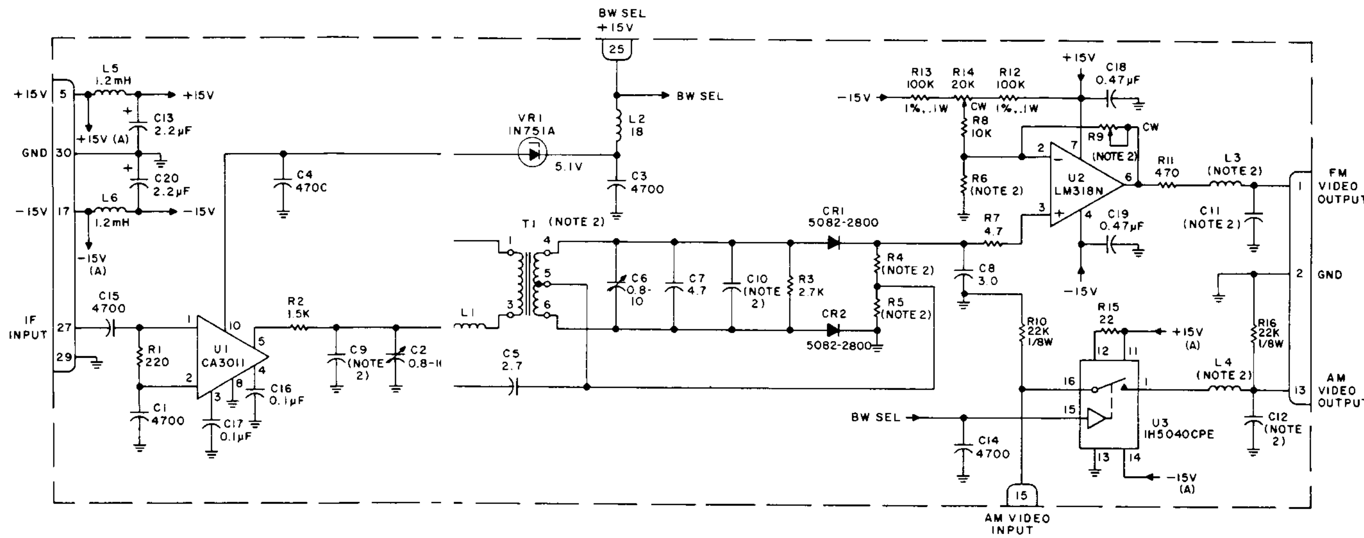
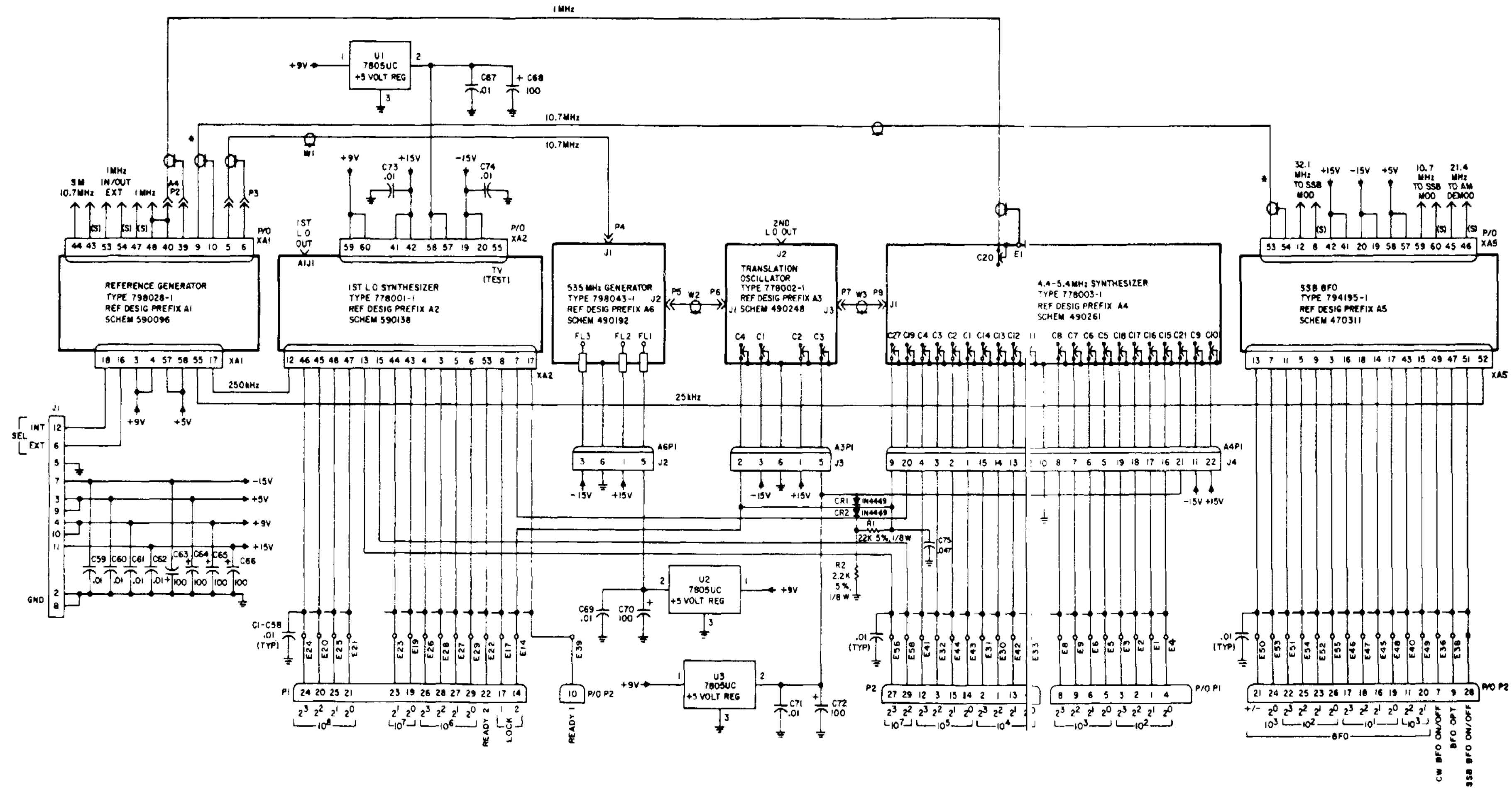


Figure 6-29. Type 794105-1, -2 FM Demodulator (2 MHz, 4 MHz BW), A3A17-A3A21), Schematic Diagrm 470158



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN µF.
2. (S) INDICATES PIN IS USED FOR COAX SHIELD.
3. * INDICATES WIRE WRAP CONNECTION.

MODULE	GND CONNECTIONS
A1	1,2,6,8,10 THRU 15,39, 43,45,47,50,52,54,56 59,60
A2	1,2,49,50,51,52
A5	1,2,8,46,54,60

Figure 6-30. Type 798071 Synthesizer Motherboard (A4) Schematic Diagram 590143

NOTES

1. UNLESS OTHERWISE SPECIFIED
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS IN μF.
2. CW ON R32 DENOTES FULL CLOCKWISE POSITION OF ACTUATOR.
3. THE DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE 1

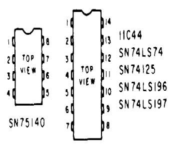


TABLE 1

DASH NO	DIFFERENCE
798028-1	NO CONNECTION FROM U10 PIN 2 TO PINS 19 & 20 OF CONNECTOR
798028-2	AS SHOWN

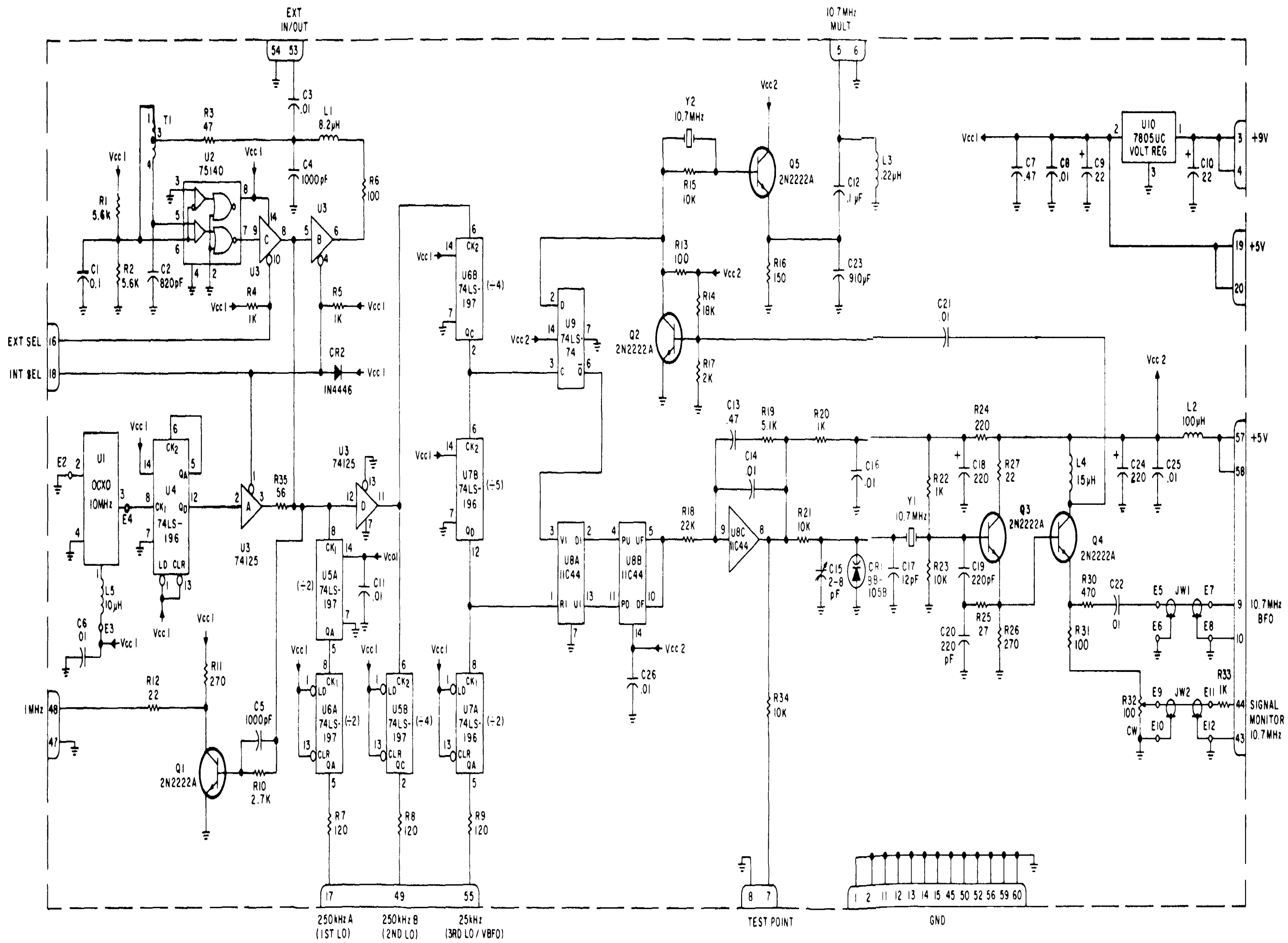
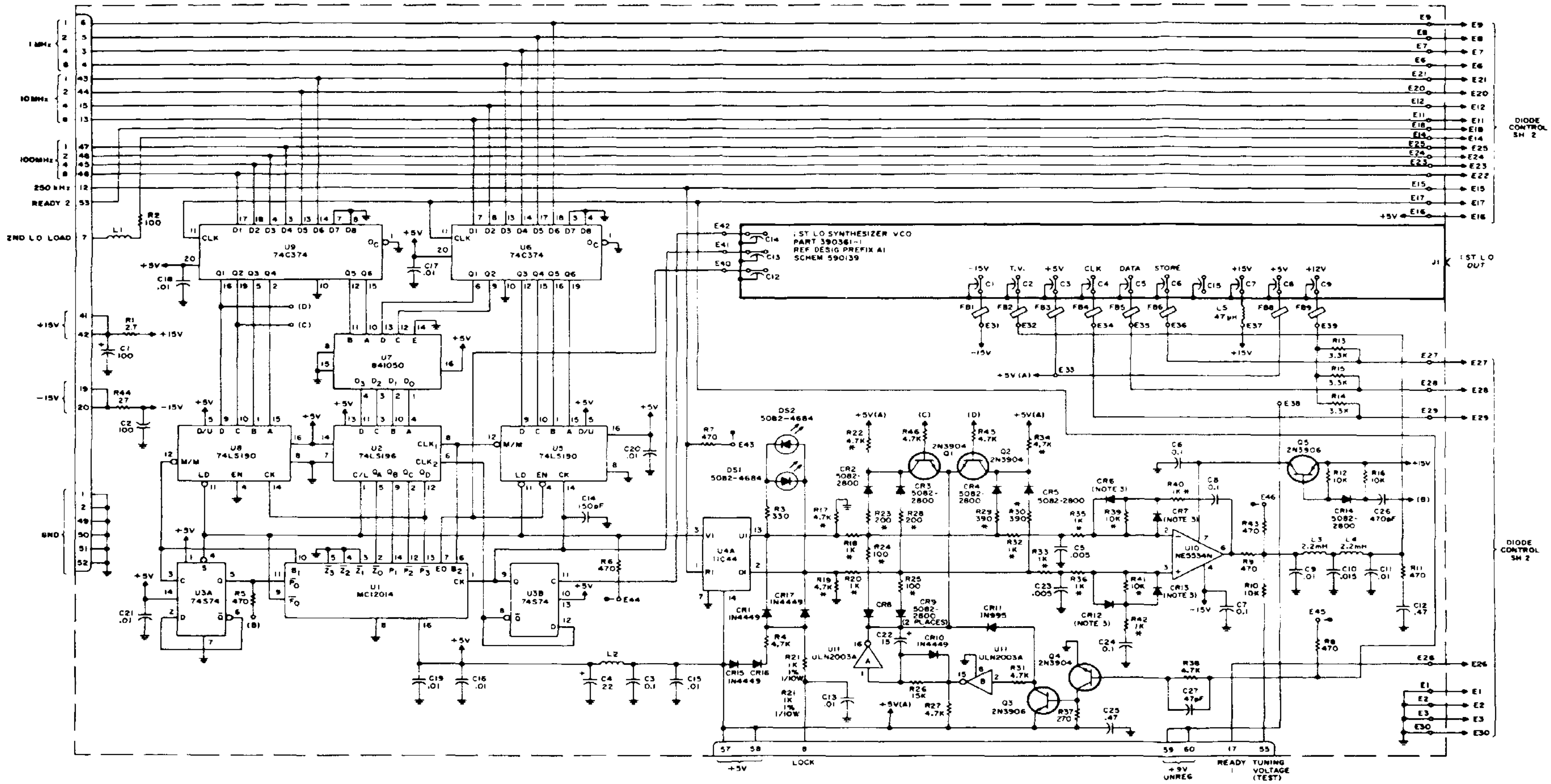


Figure 6-31. Type 798028-1 Reference Generator (A4A1) Schematic Diagram 590096



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN µF.
2. * INDICATES - RESISTANCE IS IN OHMS, ±5%, 1/8W, METAL FILM.
3. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE A.

TABLE A

TYPE	CR6	CR7	CR12	CR13
778001-1	1N4449	1N4449	1N4449	1N4449
778001-2	N/U	N/U	N/U	N/U

Figure 6-32. Type 778001-1 1st LO Synthesizer (A4A2) Schematic Diagram 590138 (Sheet 1 of 2)

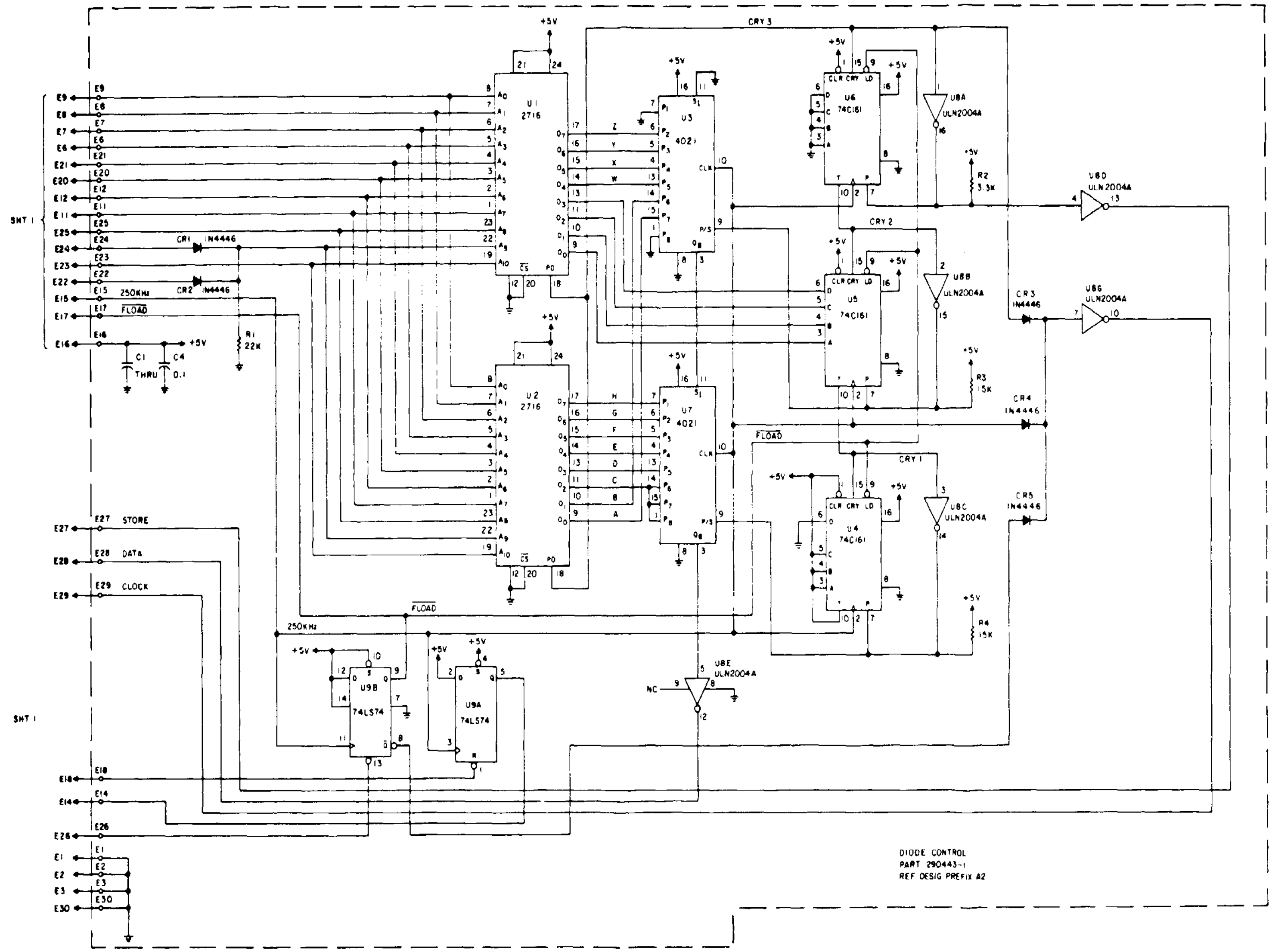


Figure 6-32. Type 778001-1 1st LO Synthesizer (A4A2) Schematic Diagram 590138 (Sheet 2 of 2)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS ± 5%, 1/8W.
2. CAPACITANCE IS pF.
3. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED

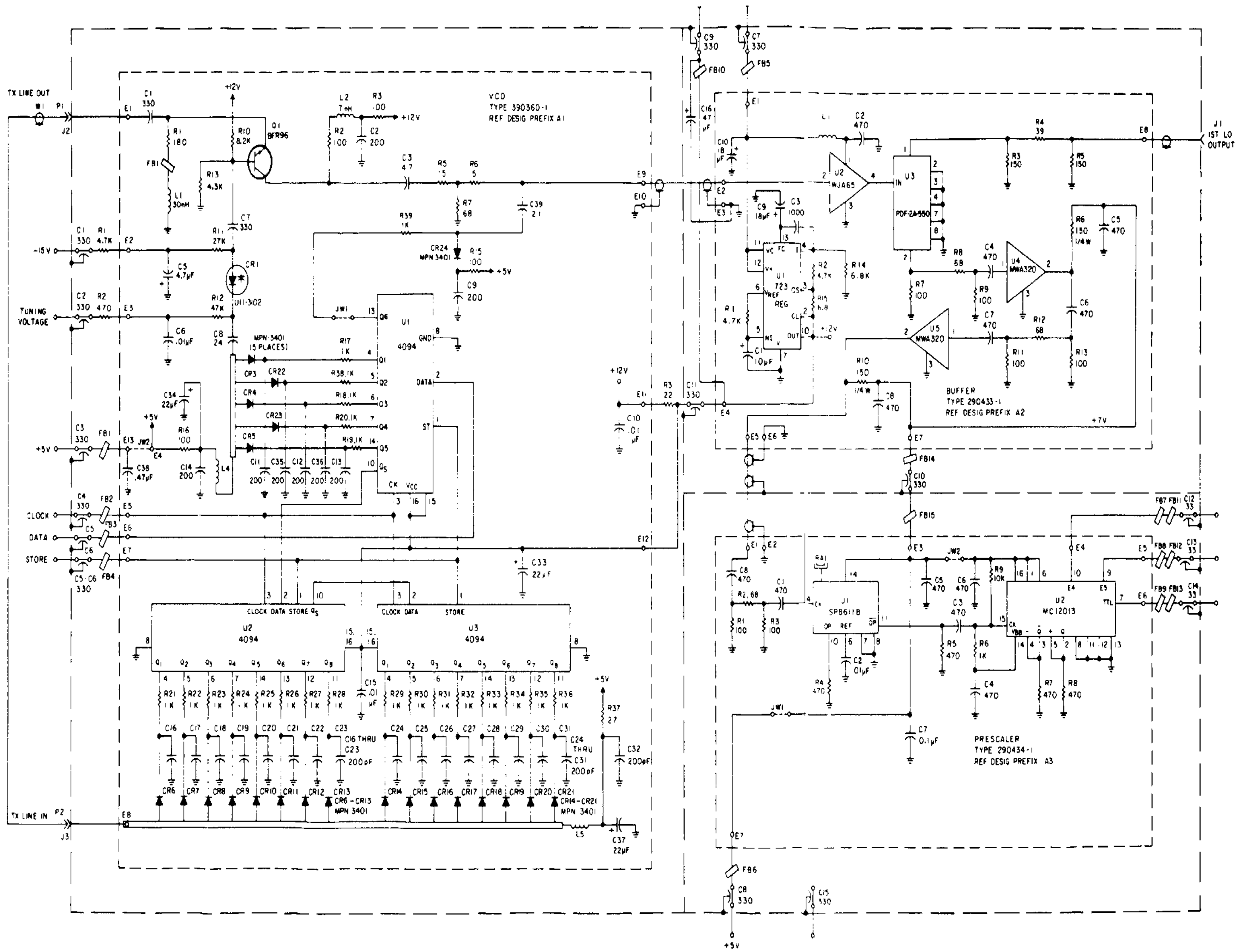


Figure 6-33. Type 390361 1st LO Synthesizer VCO (A4A2A1) Schematic Diagram 590139

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±1%, 1/10W.
b) CAPACITANCE IS IN µF.
c) INDUCTANCE IS IN µH.

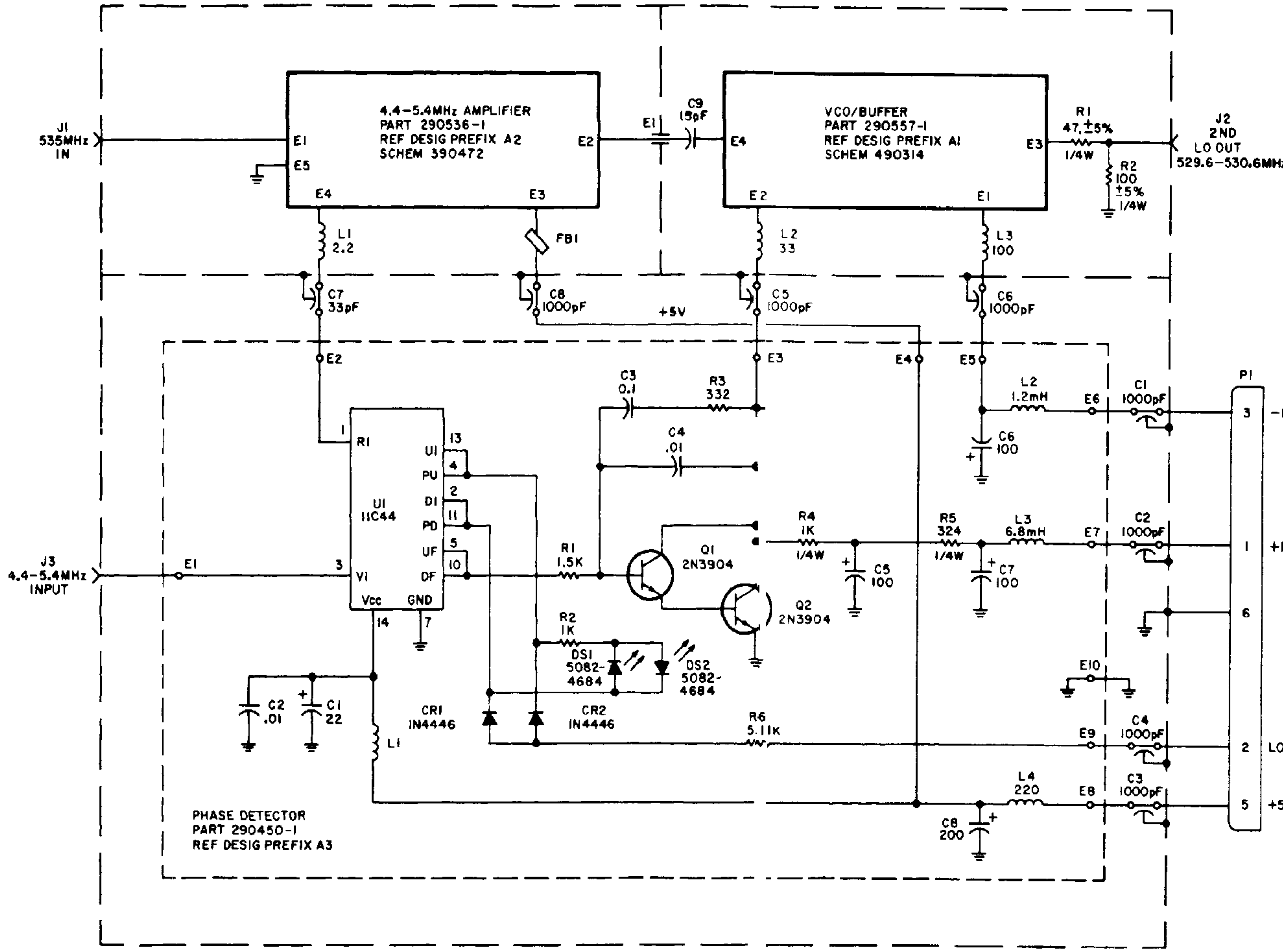


Figure 6-34. Type 778992-1 Translation Oscillator (A4A3) Schematic Diagram 490248

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS IN pF.
   c) INDUCTANCE IS IN µH.
2. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE I.

TABLE I

PART NO.	C2	C4
290557-1	470	0.1µF
290557-2	N/U	N/U

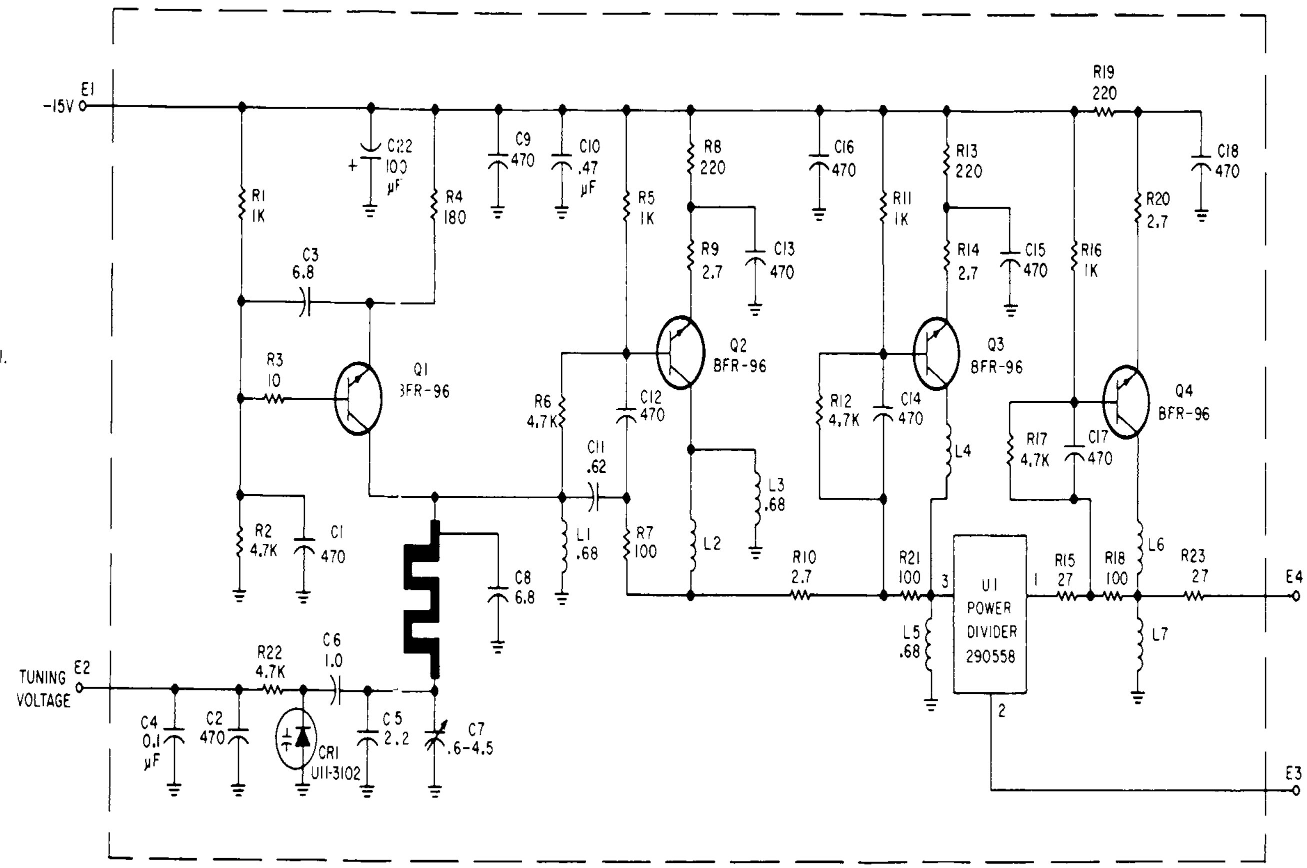


Figure 6-35. Part 290557-1 VCO Buffer, (A4A3A1)
Schematic Diagram 490314

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
b) CAPACITANCE IS IN pF.

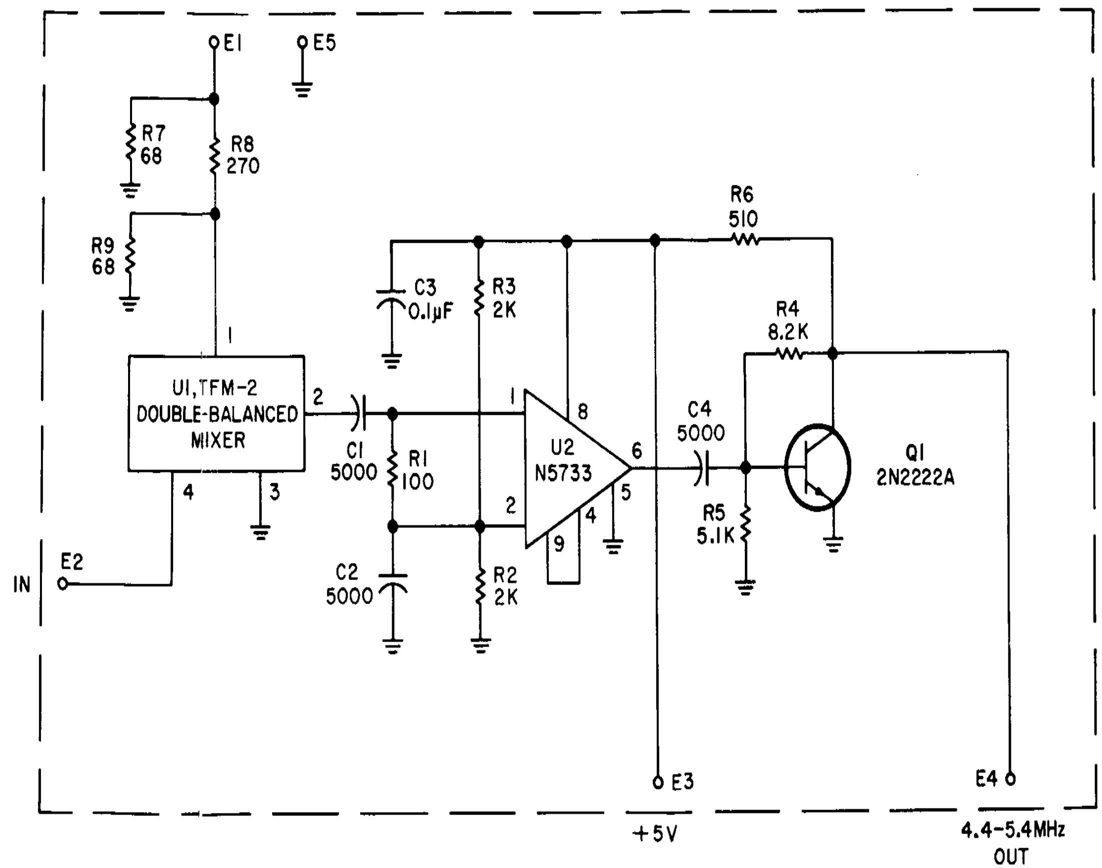


Figure 6-36. Part 290536-1 4.4-5.4 MHz Amplifier (A4A3A2), Schematic Diagram 390472

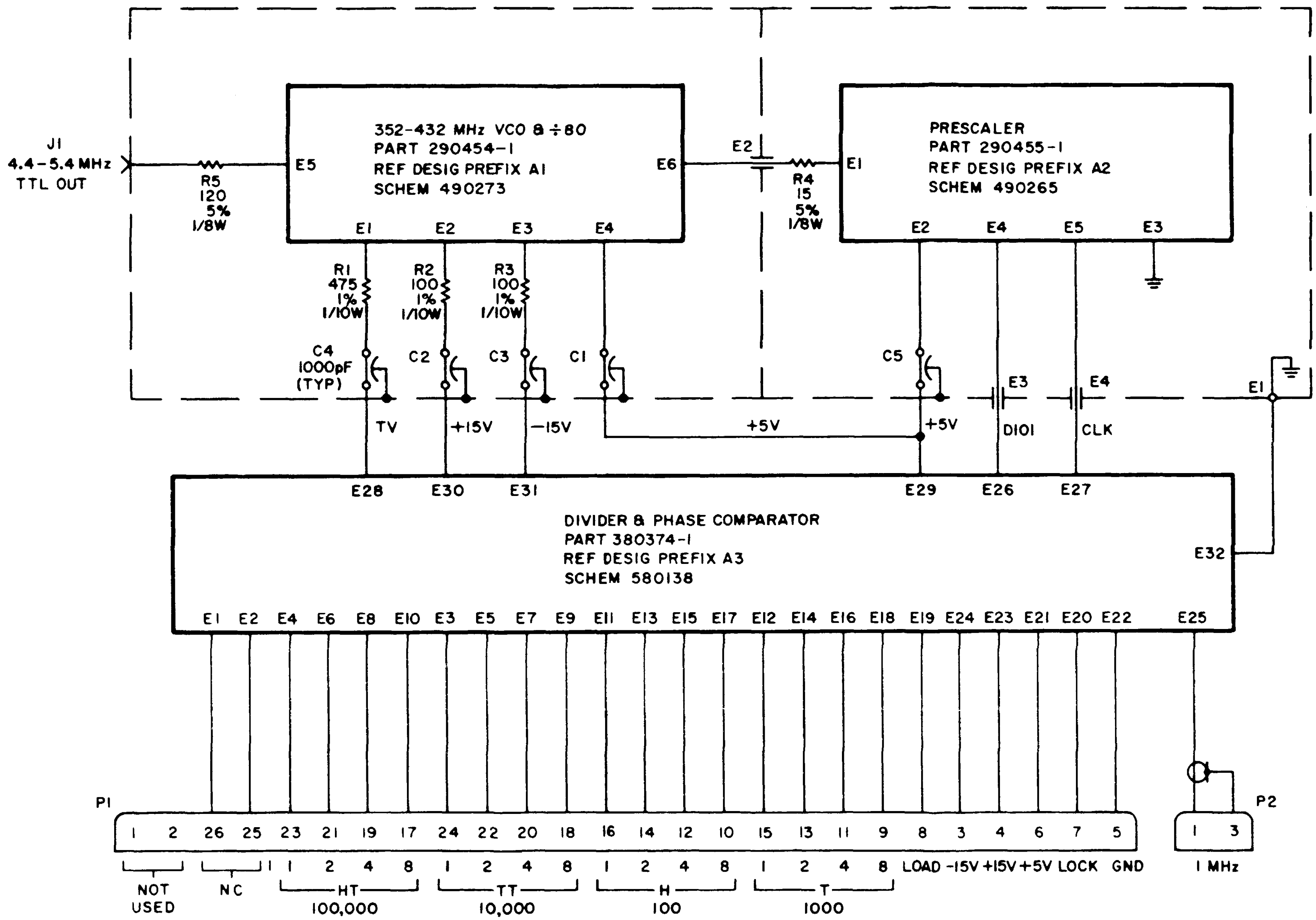


Figure 6-37. Type 776002-1 4.4-5.4 MHz Synthesizer (A4A4), Schematic Diagram 480366

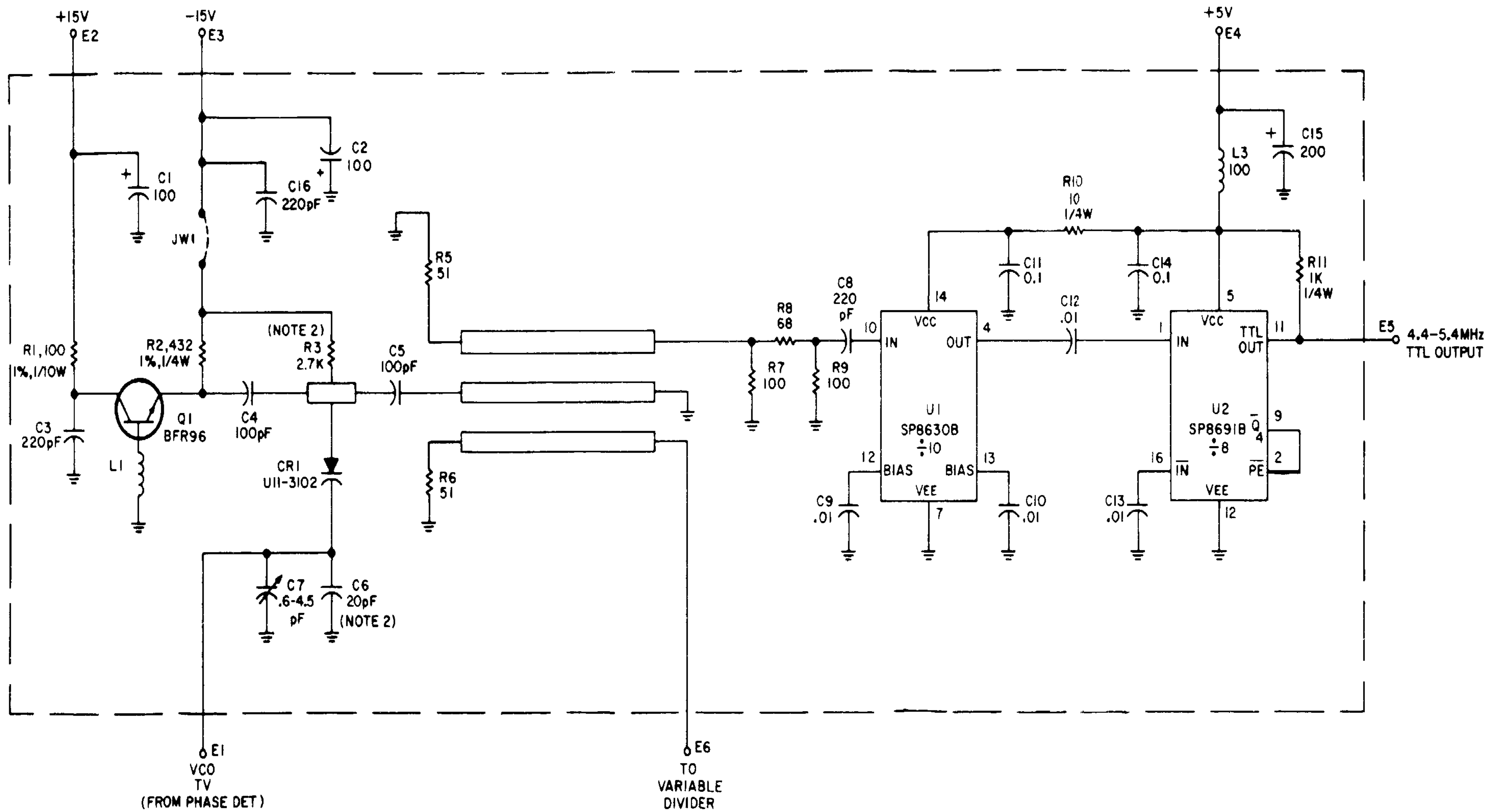


Figure 6-38. Part 290454-1 352-432 MHz VCO and Divide-by-80 (A4A4A1), Schematic Diagram 490273

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
b) CAPACITANCE IS IN μF.

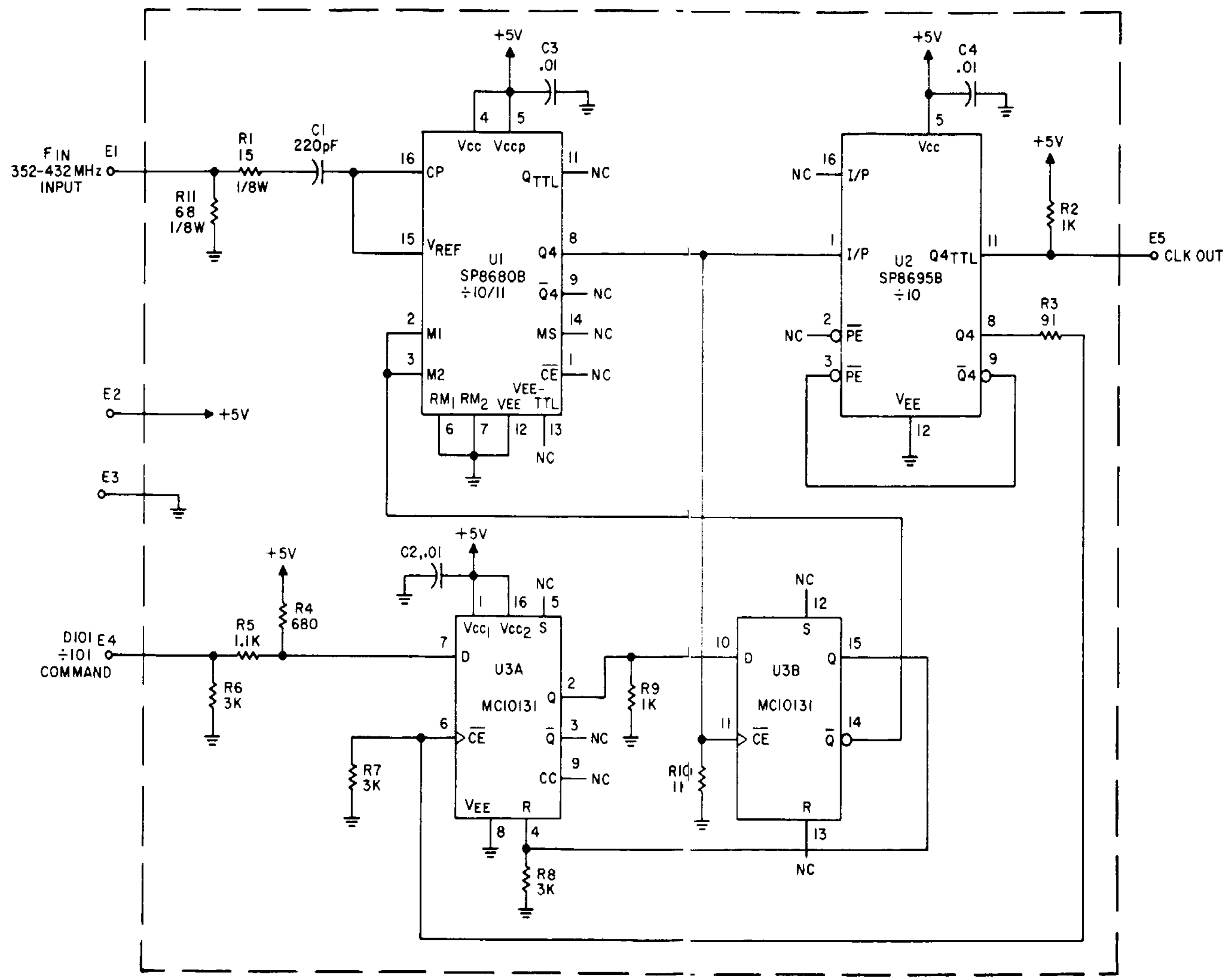


Figure 6-39. Part 290455-1 Prescaler Assembly (A4A4A2), Schematic Diagram 490265

NOTES
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±1%, 1/10W.
b) CAPACITANCE IS IN pF.

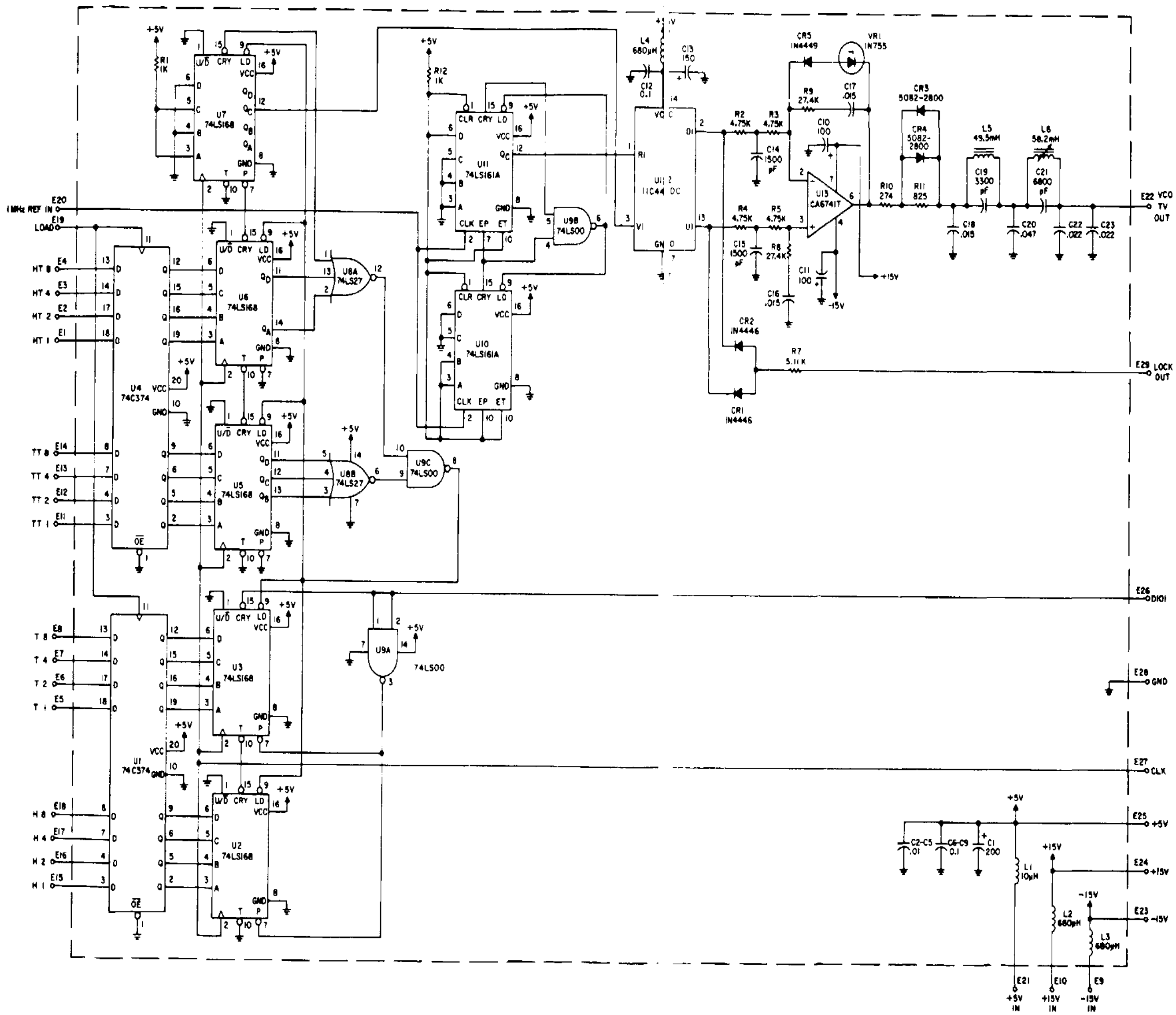


Figure 6-40. Part 390395-1 Divide and Phase Comparator (A4A4A3), Schematic Diagram 590153

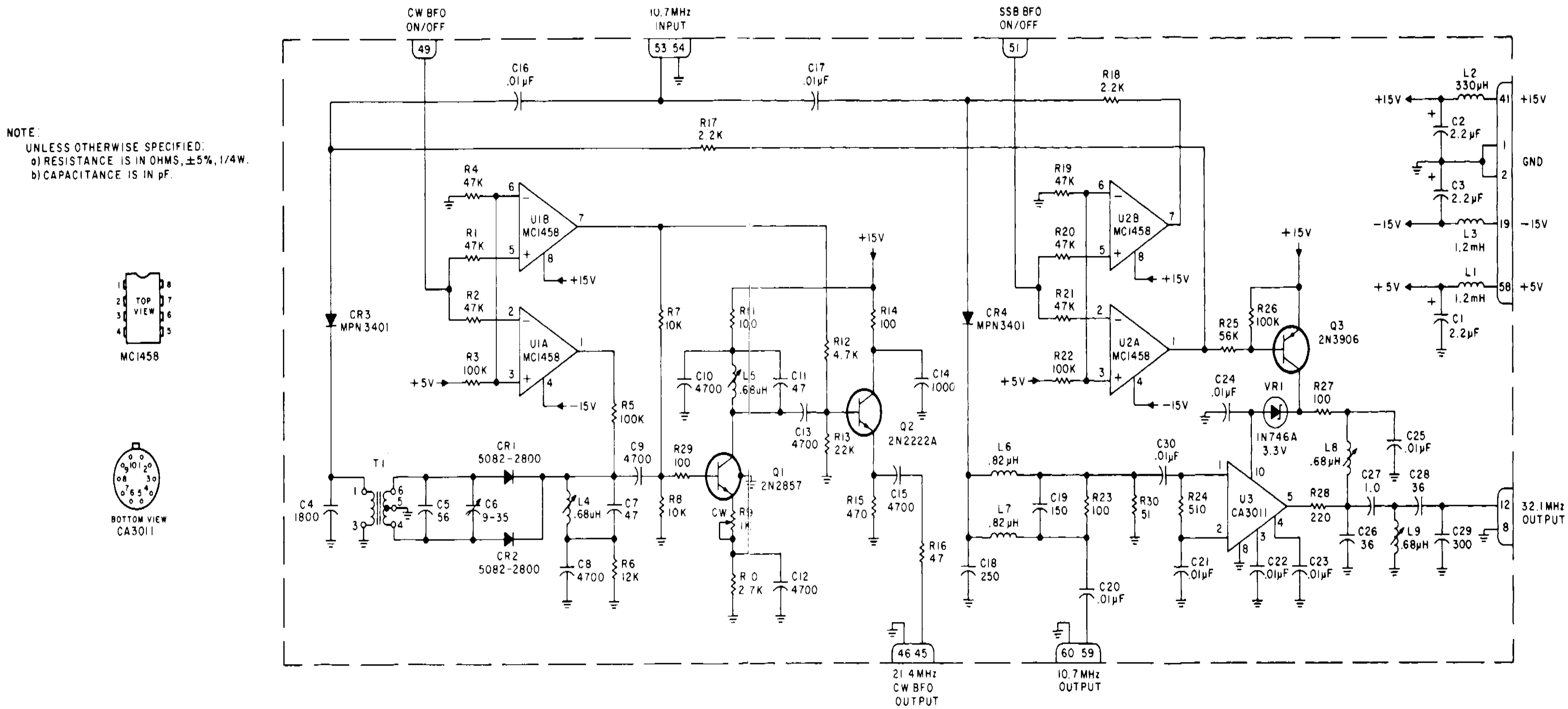
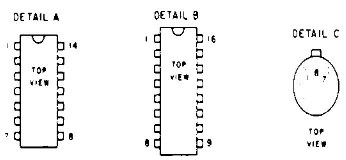


Figure 6-41. Type 794195-1 SSB BFO (A4A5), Schematic Diagram 470311

NOTES

1. UNLESS OTHERWISE SPECIFIED
   a) RESISTANCE IN OHMS ± 1%, 1/10W.
   b) CAPACITANCE IN µF
2. PIN ARRANGEMENT FOR U1 & U2 SHOWN IN DETAIL A. PIN ARRANGEMENT FOR U3 SHOWN IN DETAIL C. PIN ARRANGEMENT FOR U4 & U5 SHOWN IN DETAIL B.



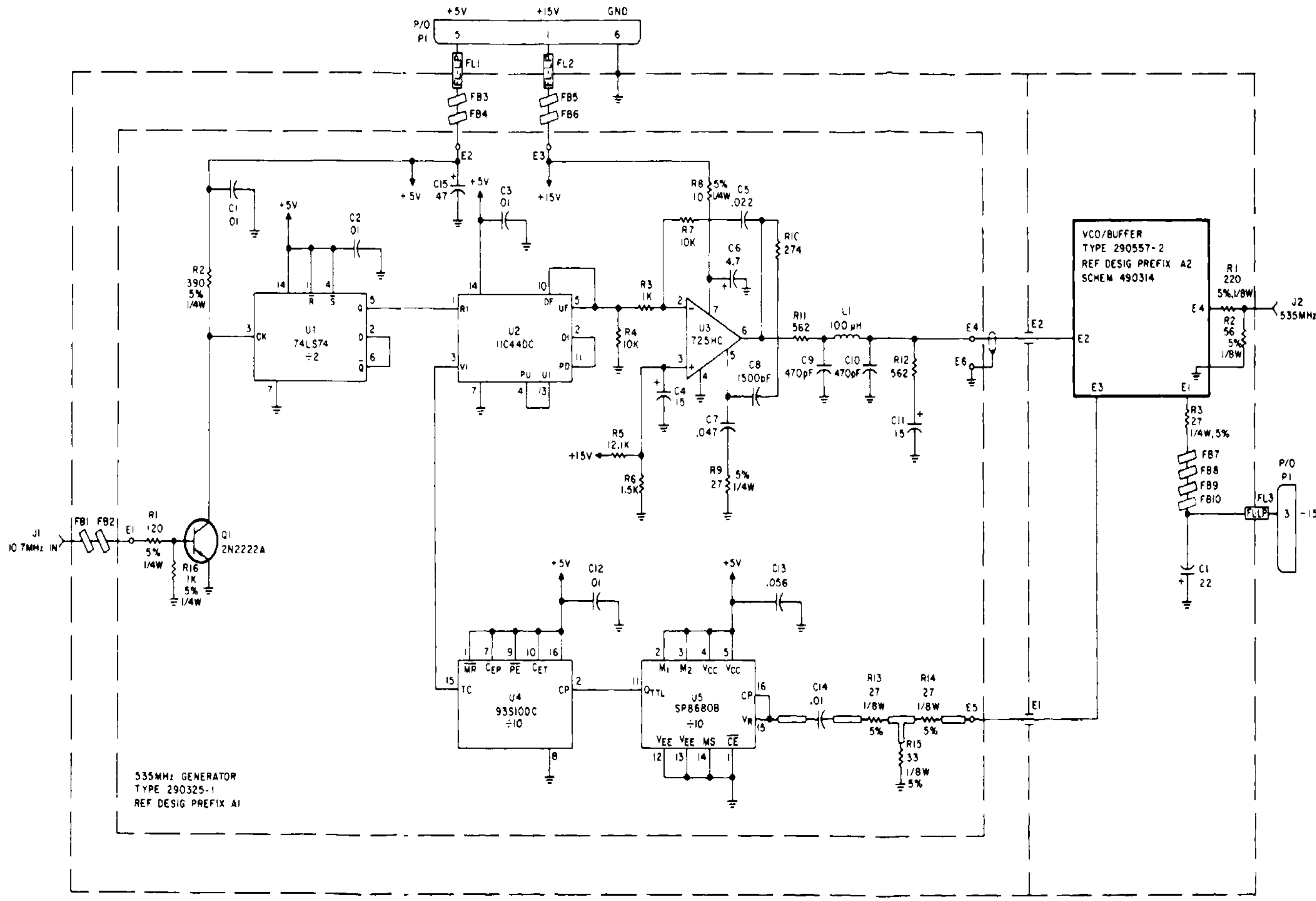


Figure 6-42. Type 798043-1 535 MHz Generator (A4A6), Schematic diagram 490192

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS IN pF.
   c) INDUCTANCE IS IN µH.
2. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE I.

TABLE I

PART NO.	C2	C4
290557-1	470	0.1µF
290557-2	N/U	N/U

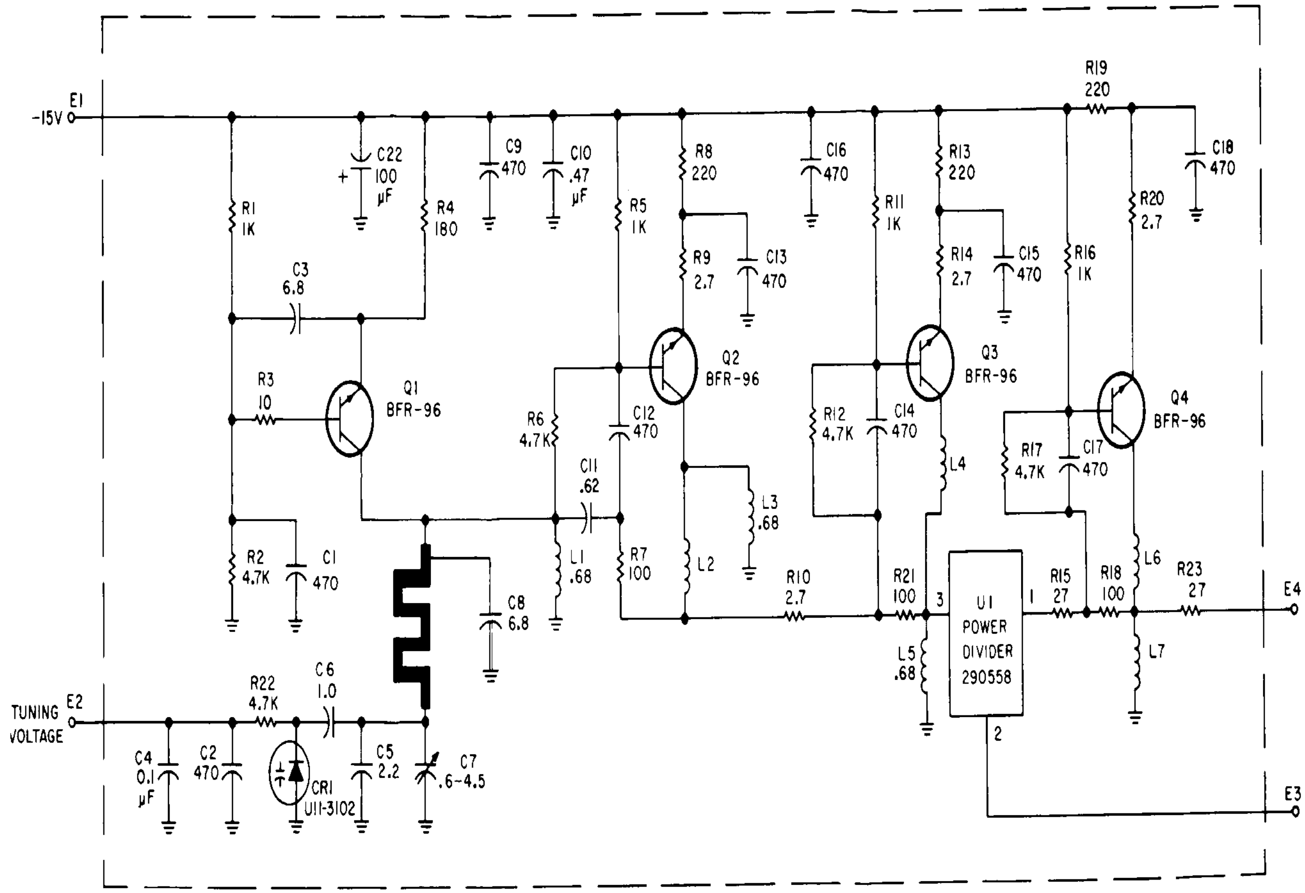


Figure 6-43. Type 290557-2, VCO Buffer, (A4A6A2), Schematic Diagram 490314

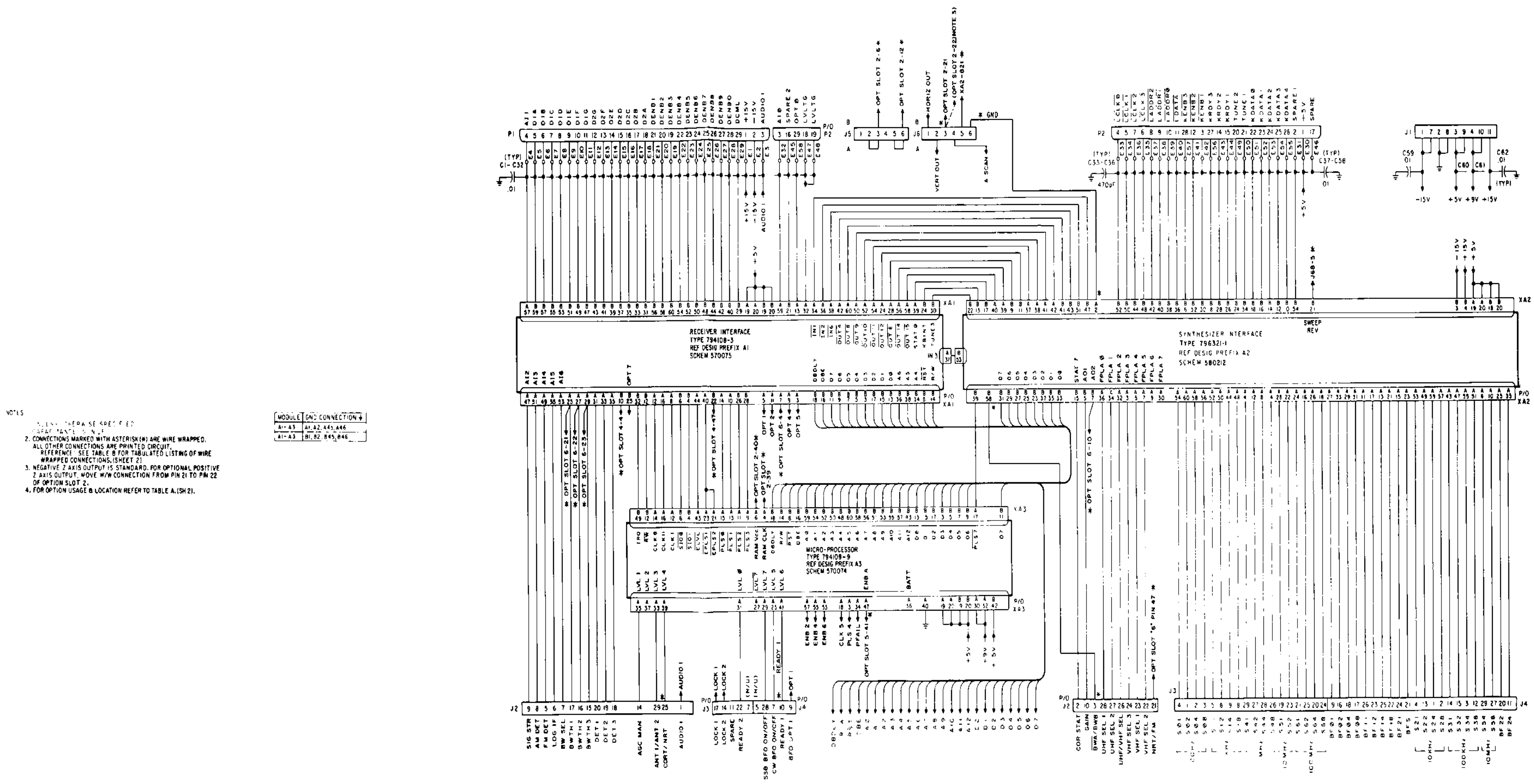


Figure 6-44. Type 798039-3, Digital Motherboard, (A5), Schematic Diagram 580196, Sheet 1 of 2.

	WJ-8617B-5					
	OPTION SLOT					
	1	2	3	4	5	6
861XB/488				OPT		
861X /232				OPT		
861XB/DRD		OPT				
861XB/BITE			OPT			
861X /ASO					OPT	
861X /EM	OPT					
8617B/DFC	STD					
8617B/150Hz						STD

TABLE B

SIGNAL NAME	CONN – PIN NO	CONN – PIN NO	CONN – PIN NO
SWP REV	J6B-5	XA2-B21	
GND	J6B-6	XA2-A2	
COR/NRT	J2-25	XA3-A39	
READY 1	J4-10	XA3-A41	
ENB A	XA3-A47	OPT SLOT 5-41	
EXT INTRPT	XA1-B10	4-4	
EINT 3	XA1-B22	4-47	
Z AXIS +	J6B-3	2-22	OPTIONAL (NOTE)
Z AXIS –	J6B-3	2-21	STD
BW 3	XA1-A29	6-23	
BW 2	XA1- -A27	6-22	
BW 1	XA1- -A25	6-21	
RAM Vcc	XA3- -A6	2-40	
RAM CLK	XA3- -A4	OPT SLOT 2-39	
150 Hz DET	XA1- -A7	6-4	
AUDIO 1	J2- -1	6-47	
HORIZ IN	J5B-3	OPT SLOT 2-6	
VERT IN	J5B-6	OPT SLOT 2-12	

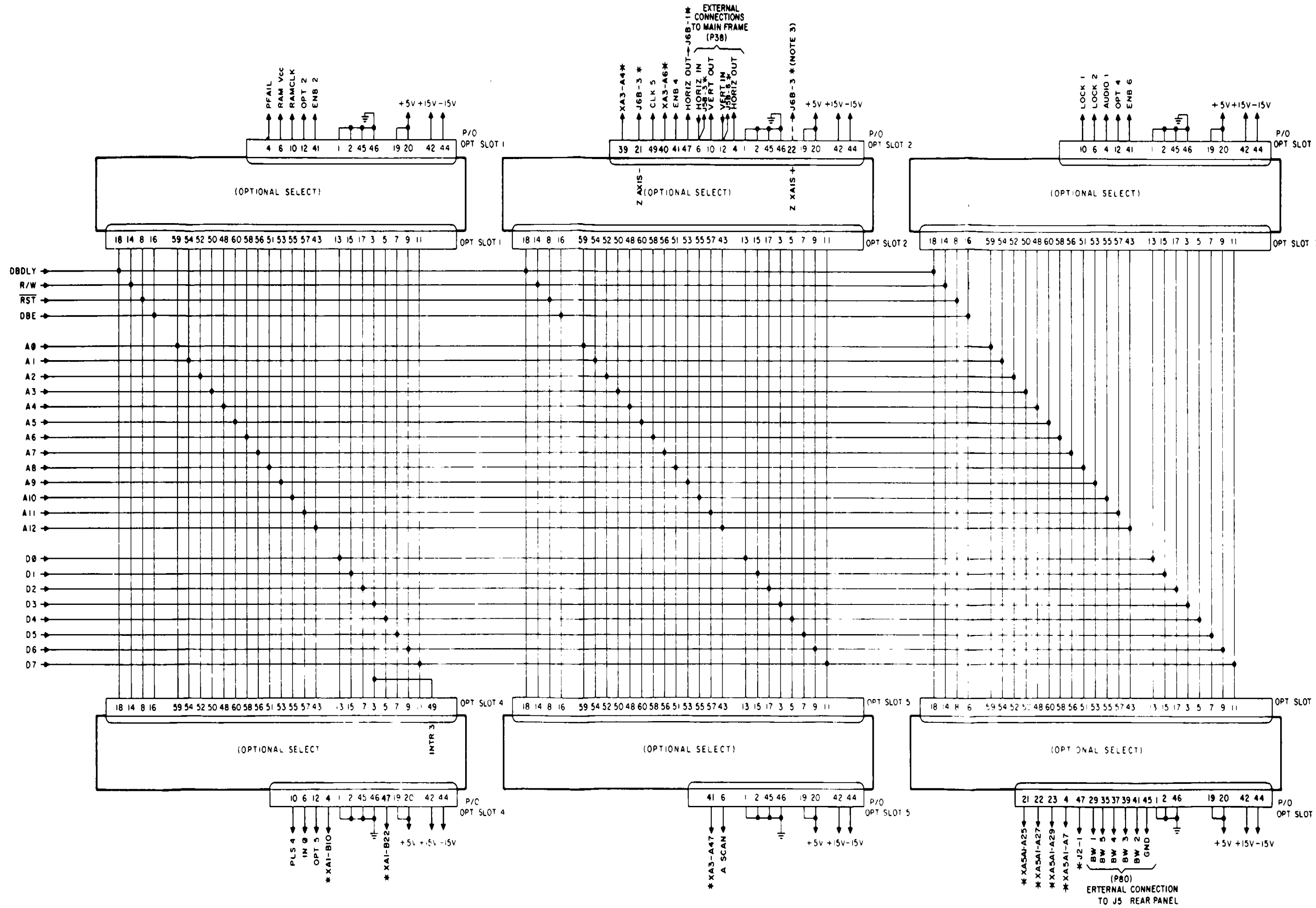


Figure 6-44. Type 798039-3, Digital Motherboard, (A5), Schematic Diagram 580106, Sheet 2 of 2.

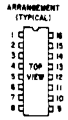
NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN µF
2. POWER AND GND PINS FOR ICs ARE AS FOLLOWS:
   PIN 16 +5V, PIN 8 GND: U4, U5, U7, U8, U9, U10, U14, U17, U18.
   PIN 14 +5V, PIN 7 GND: U1, U2, U3, U6, U16.
   PIN 20 +5V, PIN 10 GND: U11, U12, U13.
   PIN 11 +5V, PIN 13 GND: U15.
3. NUMBERS IN ( ) ARE HEXIDECIMAL MICROPROCESSOR ADDRESSES.
4. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE A

TABLE A

TYPE NO	CR4	CR5	R4	R12	R21	C19	C20	C5	R11	R24	R25	R26	C21	CR3	R6	R28	CR6
794108-1	OMIT	OMIT	47	4.32K 1%, .1W	15K 1%, .1W	4.7	.022	0.1	680	10K 1%, .1W	OMIT	10K 1%, .1W	.022	OMIT	43K	33.2K 1%, 1/10W	OMIT
794108-2	OMIT	OMIT	10	OMIT	OMIT	OMIT	OMIT	0.1	680	10K 1%, .1W	OMIT	10K 1%, .1W	.022	OMIT	43K	33.2K 1%, 1/10W	OMIT
794108-3	OMIT	OMIT	47	100K 1%, .1W	15K 1%, .1W	4.7	.022	1.0	1.1K	100K 1%, .1W	OMIT	10K 1%, .1W	.022	OMIT	43K	33.2K 1%, 1/10W	OMIT
794108-4	LVA51A	IN749A	47	100K 1%, .1W	15K 1%, .1W	2.2	.47	1.0	1.1K	100K 1%, .1W	2.21K 1%, .1W	30.1K 1%, .1W	.47	HP5082 2800	OMIT	33.2K 1%, 1/10W	LVA51A

PIN ARRANGEMENT (TYPICAL)



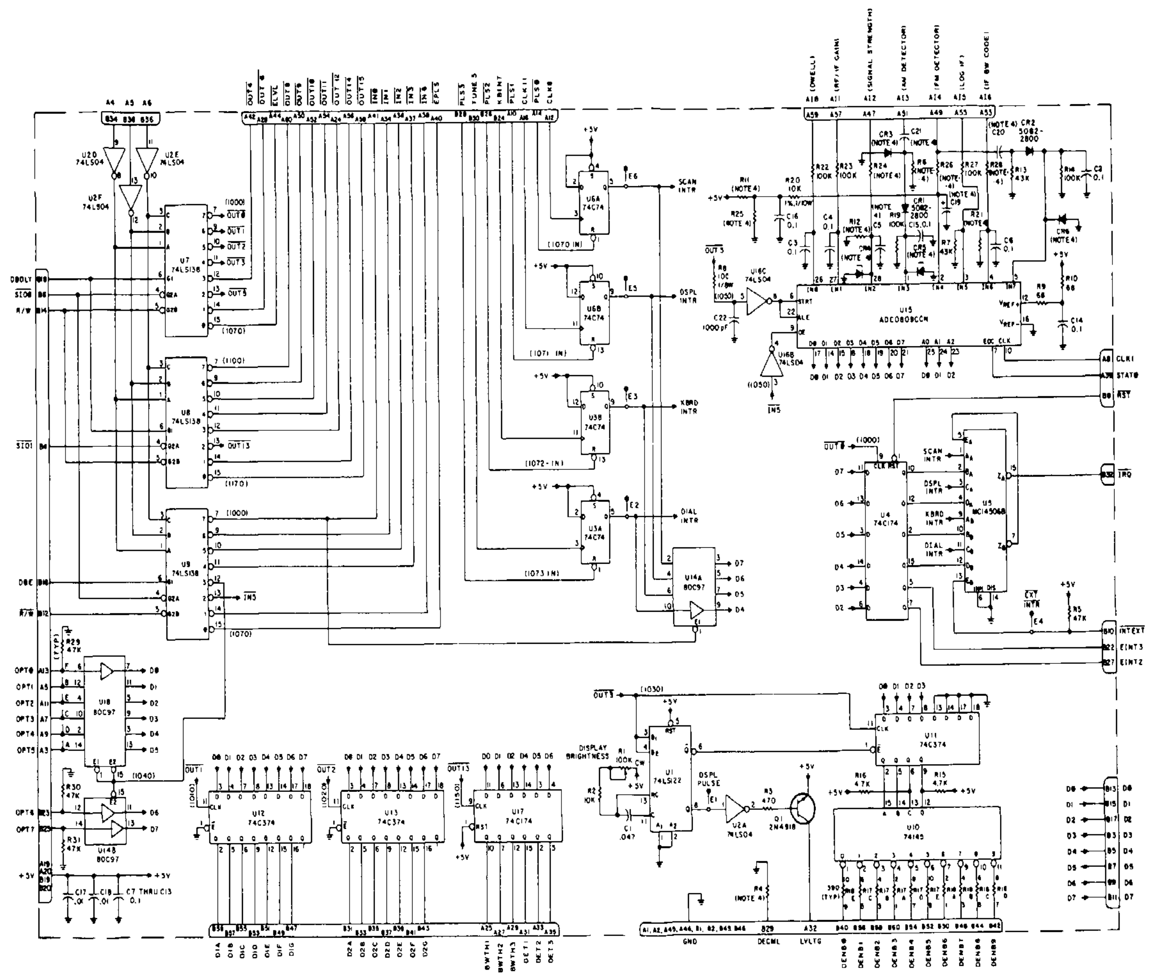


Figure 6-45. Type 794108 Receiver Interface (A5A1), Schematic Diagram 570075

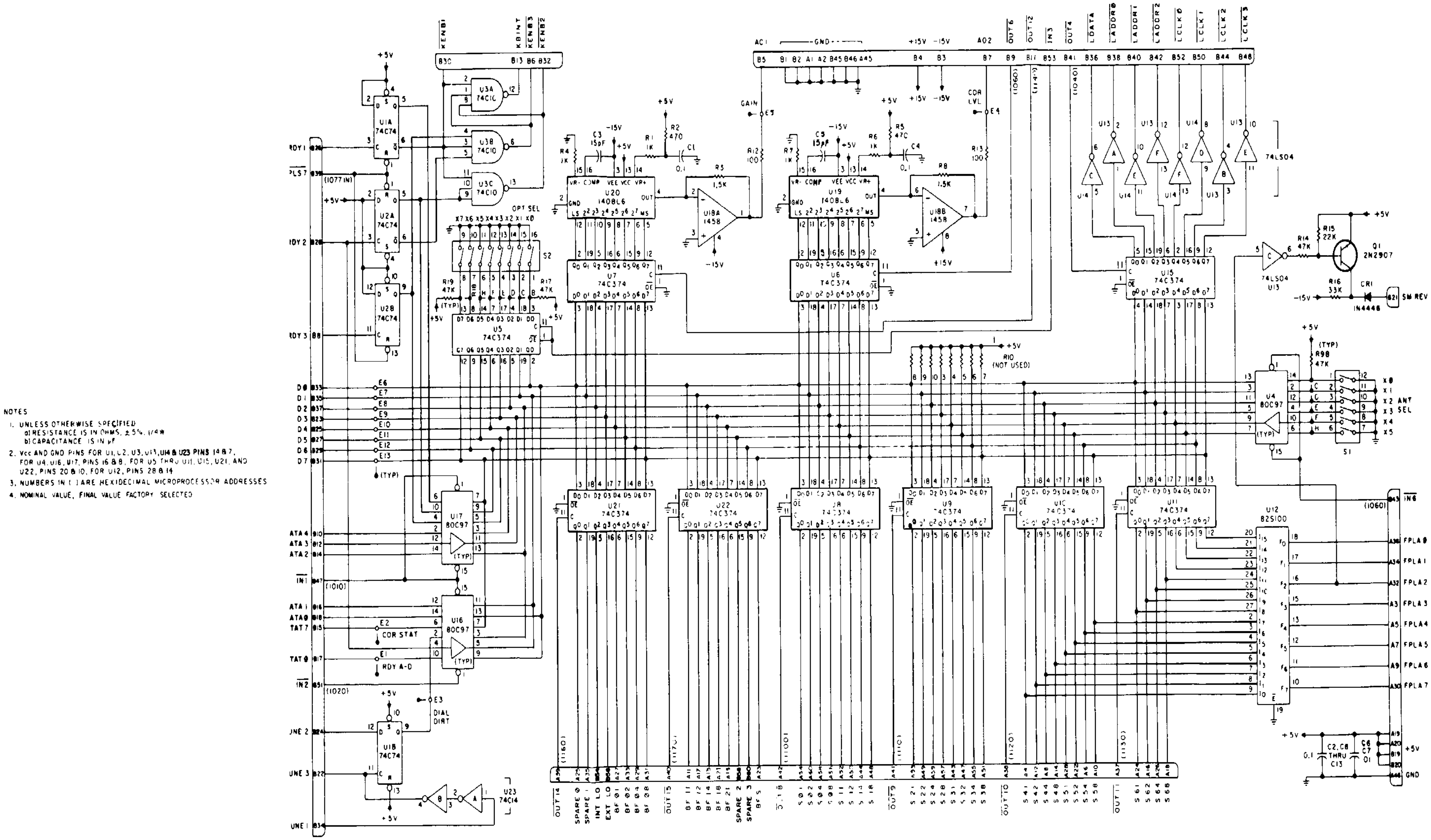


Figure 6-46. Type 796321-1 Synthesizer Interface (A5A2), Schematic Diagram 580212.

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN µF.
2. VCC & GND CONNECTIONS FOR U2 ARE PINS 8, 1 & 21; FOR U16 ARE PINS 14 & 7; FOR U1, U14, U17, U18, U20, & U21 ARE PINS 16 & 8; FOR U3-U6 PINS 24 & 12; FOR U19 PINS 20 & 10; U7-U13 & U22 PIN 8 GND; U15 PIN 7 GND.
3. NUMBERS IN ( ) ARE HEXIDECIMAL MICROPROCESSOR ADDRESSES.
4. U3-U6 ARE EPROMS & CONTAIN THE MICROPROCESSOR PROGRAM. TO FACILITATE CHANGES, SOCKETS ARE INSTALLED. TO FACILITATE MAINTENANCE, SOCKETS ARE INSTALLED FOR MICROPROCESSOR U2 & CLOCK GENERATOR U1.
5. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE 1.

TABLE 1

TYPE NO	U3	U4	U5	U6	WHERE USED REF
794109-1	190169-1	190169-2	190169-3	190169-4	WJ-861XA
" " -2	" " -5	" " -6	" " -7	" " -8	WJ-861XB
" " -3	" " -9	" " -10	" " -11	" " -12	WJ-8616A-4 (KARACAL)
" " -4	" " -13	" " -14	" " -15	" " -16	861XA7150 (TRQ-32)
" " -5	" " -17	" " -18	" " -19	" " -20	8618/ECO-2 (SYLVANIA)
" " -6	" " -40	" " -41	" " -42	" " -43	WJ 8617B-4 (KARACAL)
" " -7	" " -46	" " -47	" " -48	" " -49	WJ-861XB (TCAS)
" " -8	" " -58	" " -59	" " -60	" " -61	861XB/HF
" " -9	" " -65	" " -66	" " -67	" " -68	WJ-8617B-5 (TRQ-23)
" " -10	" " -71	" " -72	" " -73	" " -74	WJ-8618B-1
" " -11	" " -75	" " -76	" " -77	" " -78	WJ-8617B-6

TABLE 1 (CONTINUED)

TYPE NO	U3	U4	U5	U6	WHERE USED REF
794109-12	190169-81	190169-82	190169-83	190169-84	WJ-8616B-2
794109-13	190169-89	190169-90	190169-91	190169-92	WJ-8617B-7
794109-14	190169-94	190169-95	190169-96	190169-97	WJ-8617B-10
794109-15	190169-103	190169-104	190169-105	190169-106	WJ-8618B-8

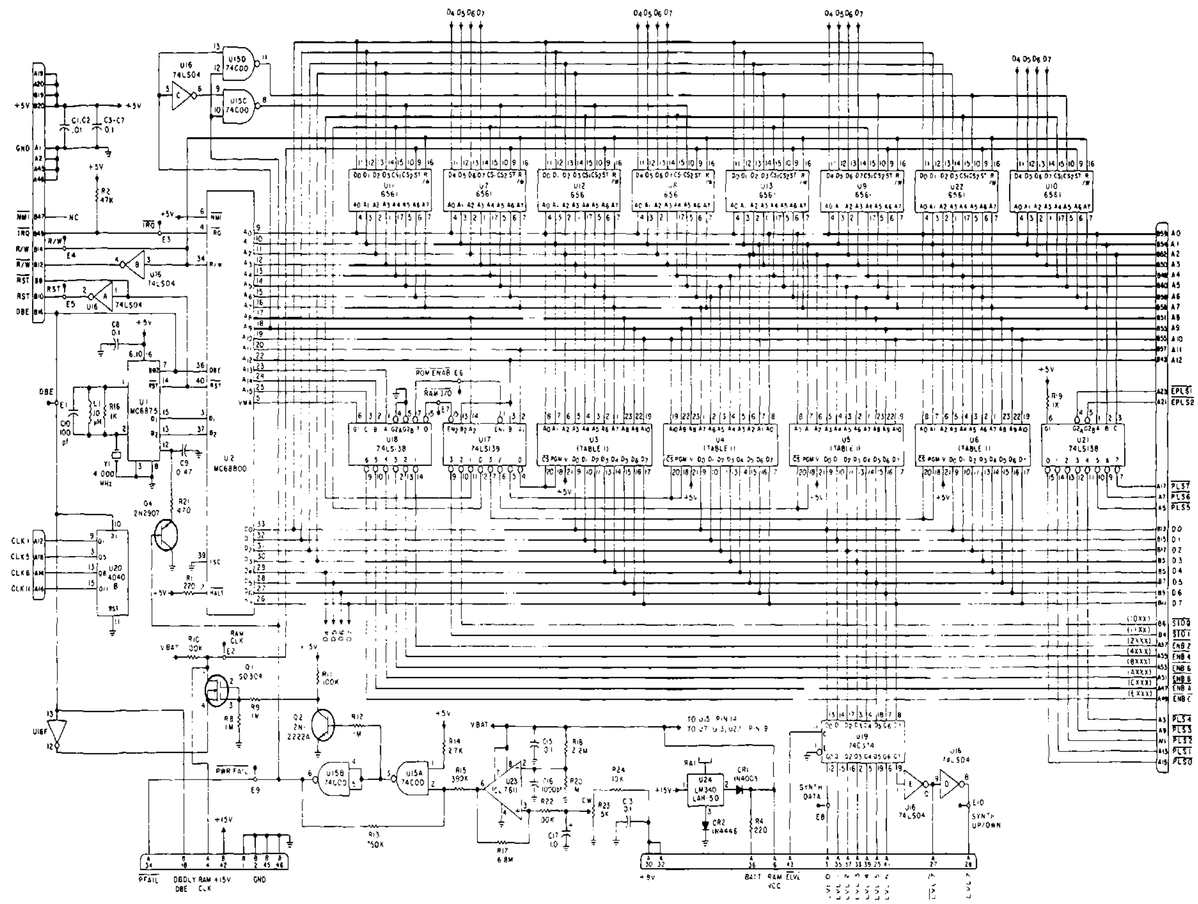
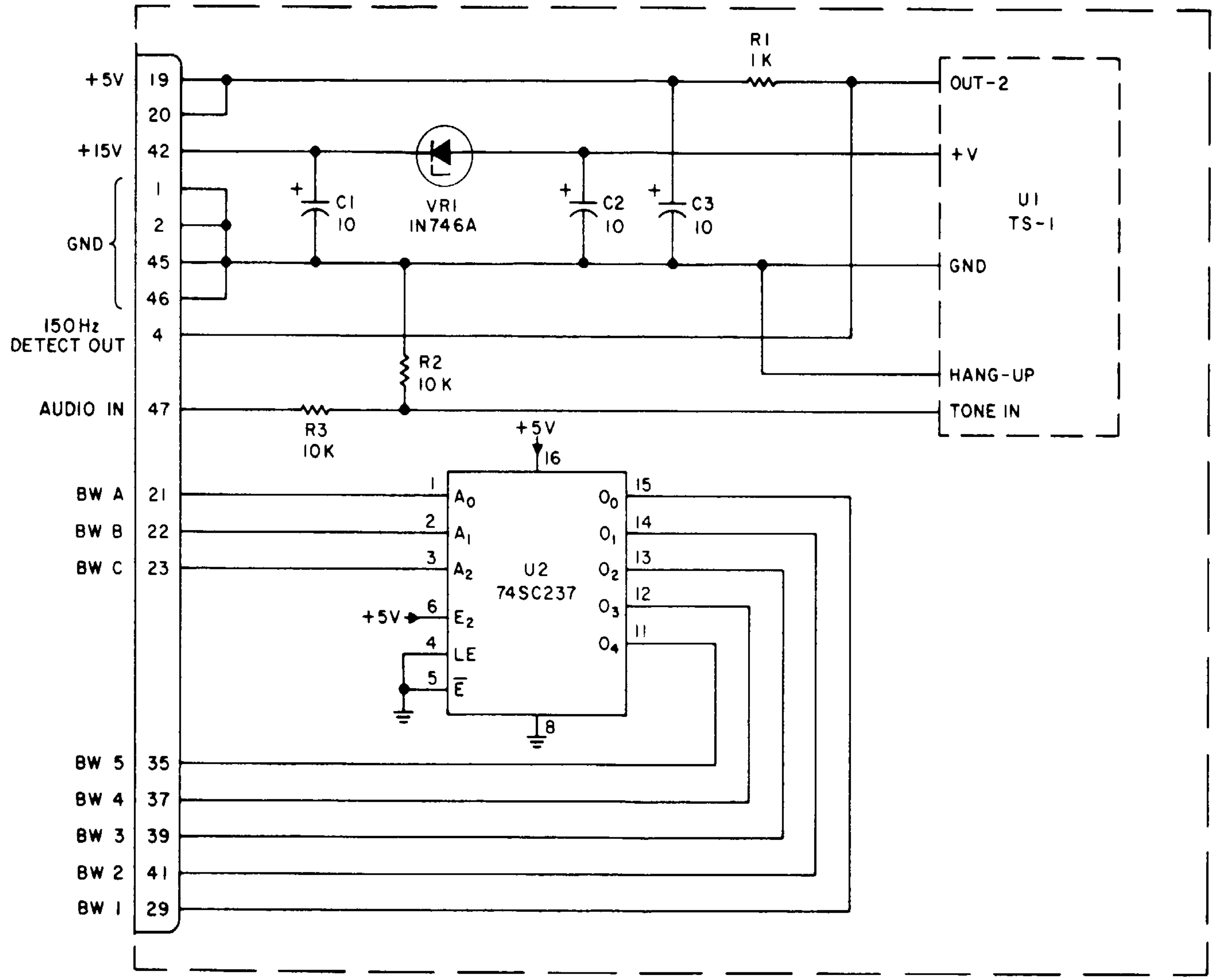


Figure 6-47. Type 794109 Microprocessor (A5A3), Schematic Diagram 570074



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS ±5%, 1/4 W.
   b) CAPACITANCE IS IN μF
2. LEAVE ALL UNUSED PINS OPEN.

Figure 6-48. Type 796290-1. 150 Hz Filter (A5AX) Schematic Diagram 380444

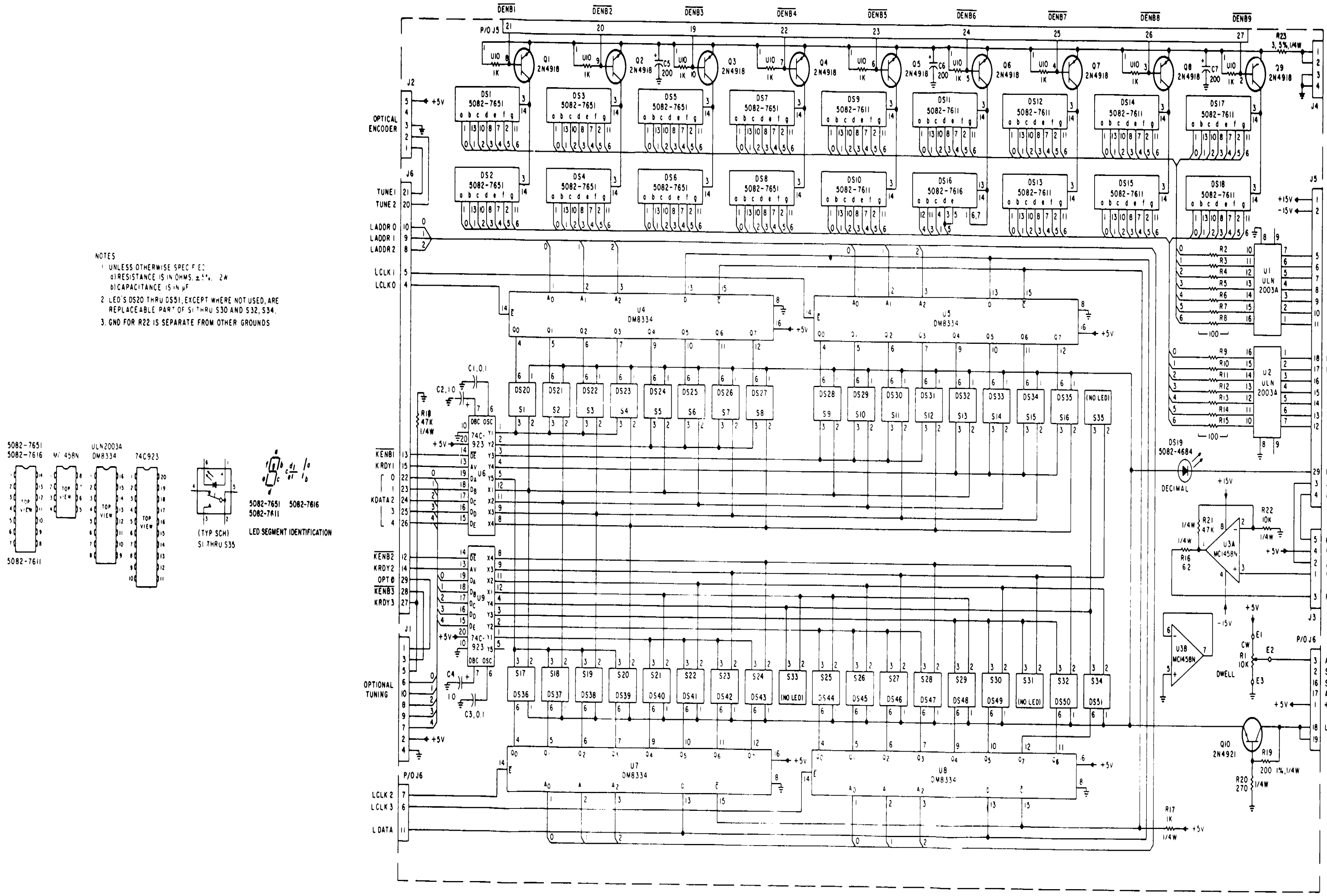


Figure 6-49. Type 794190-1 Front Panel Display and Control (A6) Schematic Diagram 590097

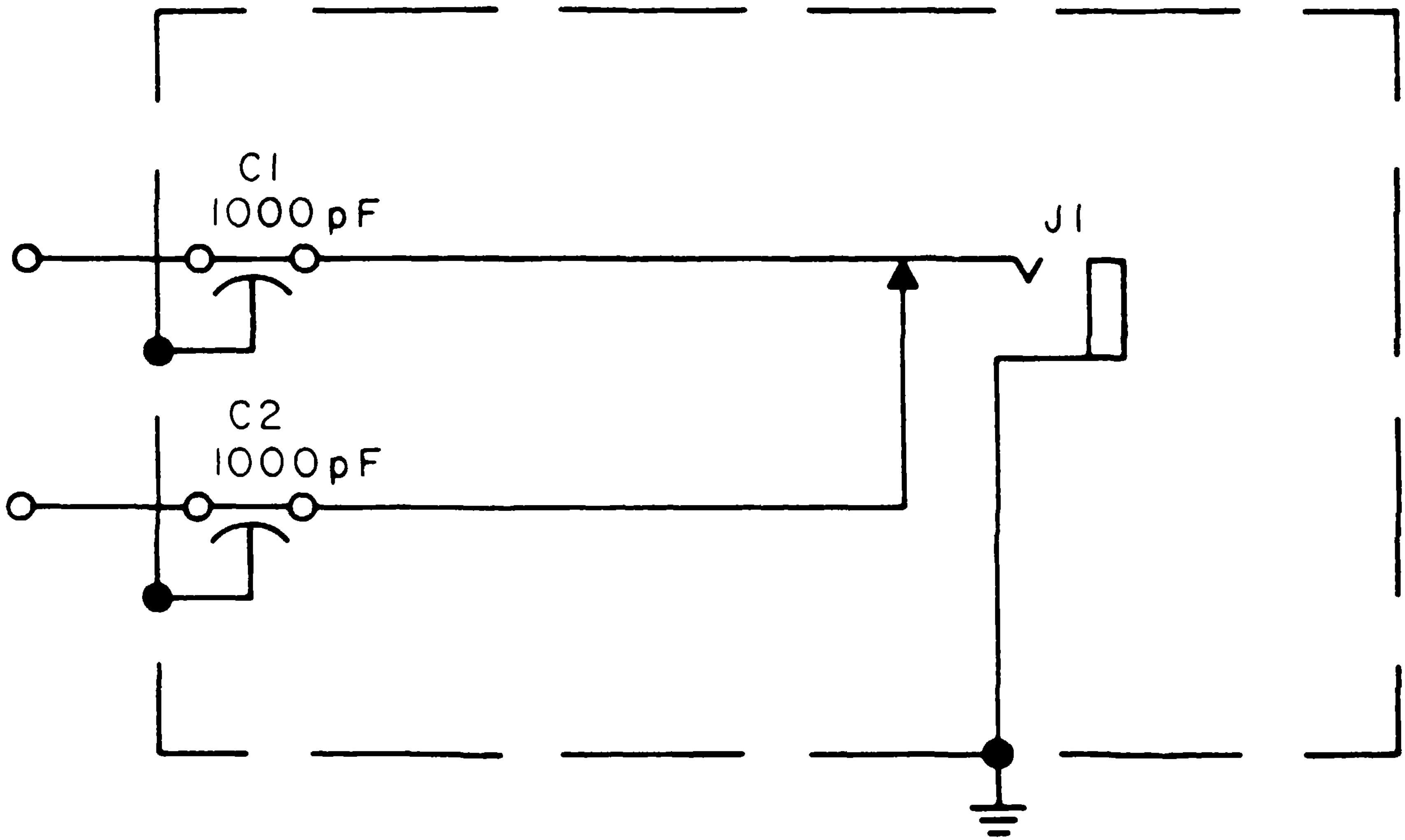


Figure 6-50. Type 791275 Phone Jack (A7)
Schematic Diagram 23519

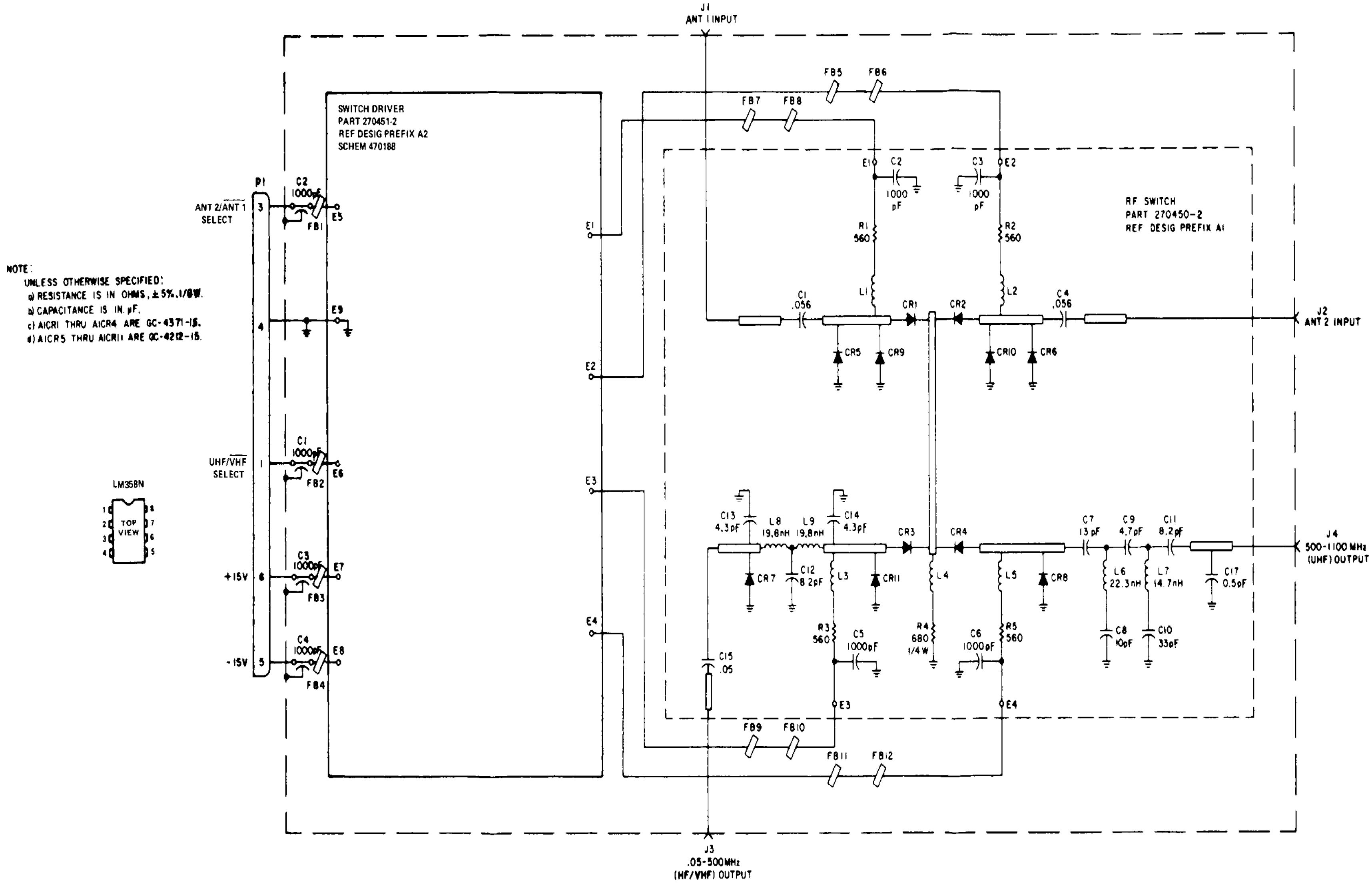


Figure 6-51. Type 794128-2 Antenna Switch (A8)
Schematic Diagram 480446

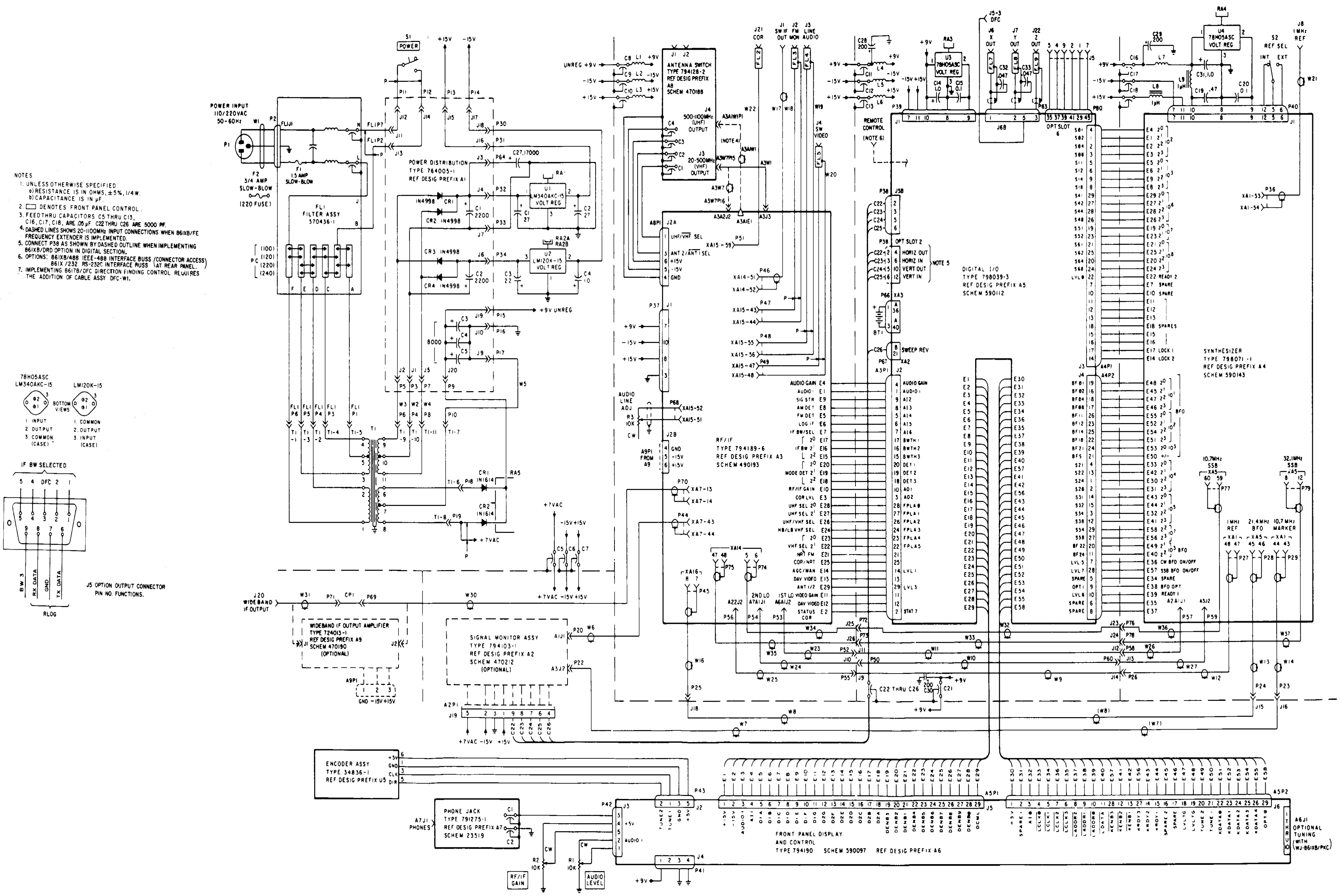
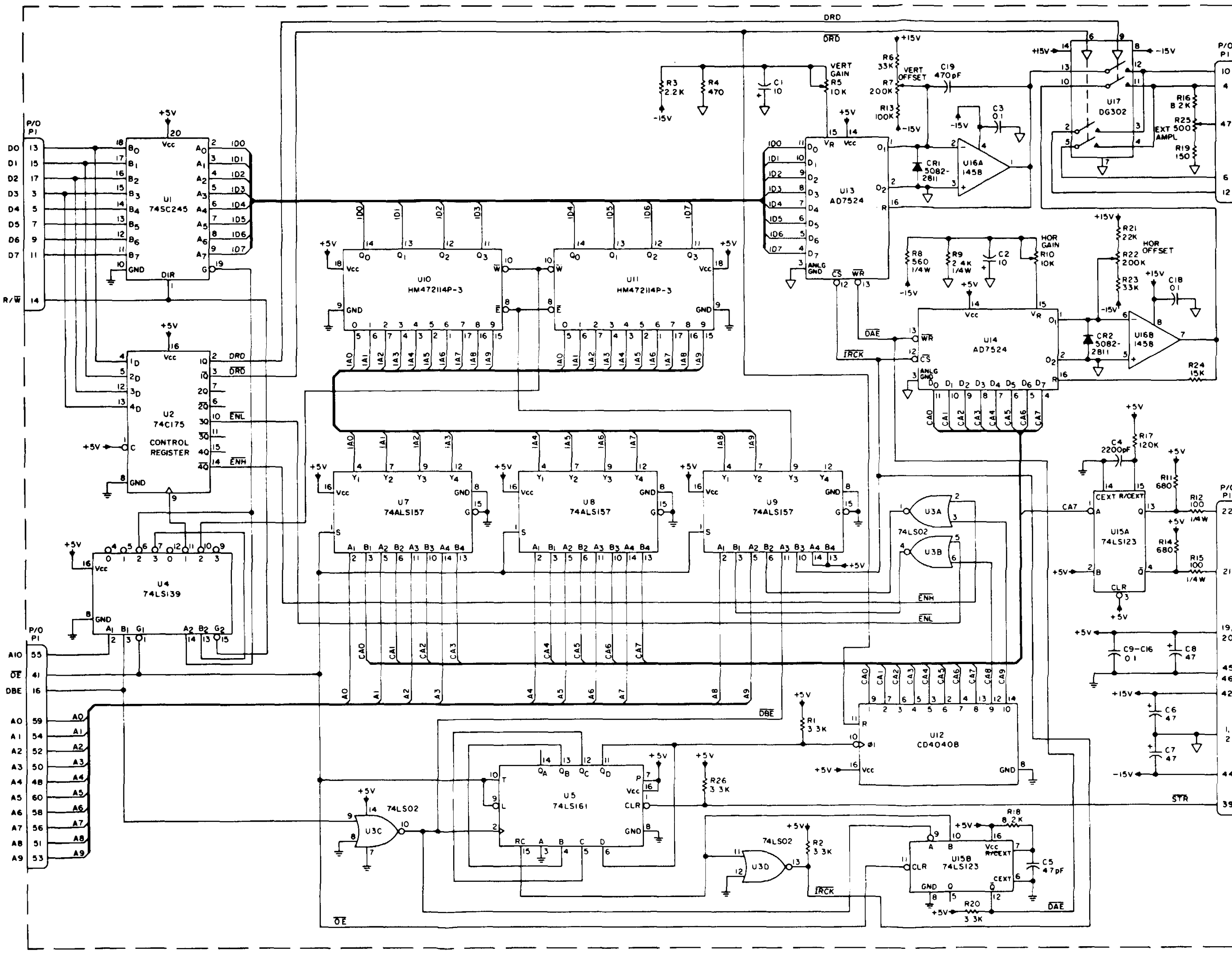


Figure 6-52. Type WJ-8617B-5, VHF/UHF Receiver, Main Chassis Schematic Diagram 680054



NOTES
1 UNLESS OTHERWISE SPECIFIED
a) RESISTANCE IS IN OHMS, ±5%, 1/8W
b) CAPACITANCE IS IN µF

Figure 6-53. Type 796217-1 Digital Refresh Display (Option C-DRD) Schematic Diagram 580165

NOTE

1 UNLESS OTHERWISE SPECIFIED
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W
   b) CAPACITANCE IS IN μF

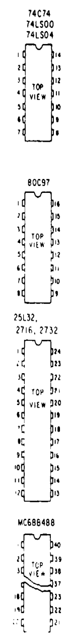
2 DIFFERENCES BETWEEN TYPE NO.'S IS SHOWN IN TABLE I.

TABLE I

TYPE	U6	JUMPERS		WHERE USED REF
		JW1	JW2	
798044-1	190169-21	E1 – E2	E3 – E4	WJ-861XA WJ-861XB
798044-2	2716	E1 – E2	E4 – E5	—
798044-3	190169-22	E1 – E2	E3 – E4	WJ-8616A-4 (KARACAL)
798044-4	190169-23	E1 – E2	E3 – E4	861XA/150 (TRQ-32)
798044-5	190169-24	E1 – E2	E3 – E4	8618/ECO-2
798044-6	190169-44	E1 – E2	E3 – E4	WJ-8617B-4 (KARACAL)
798044-7	190169-69	E1 – E2	E3 – E4	WJ-8617B-5 (TRQ-23)

TABLE I (CONTINUED)

TYPE	U6	JUMPERS		WHERE USED REF
		JW1	JW2	
798044-8	190169-80	E1 – E2	E3 – E4	WJ-8617B-6
798044-9	190169-85	E1 – E2	E3 – E4	WJ-8618B-2
798044-10	190169-88	E1 – E2	E3 – E4	WJ-8617B-7
798044-11	190169-93	E1 – E2	E3 – E4	WJ-8618B-1
798044-12	190169-98	E1 – E2	E3 – E4	WJ-8617B-10
798044-13	190169-107	E1 – E2	E3 – E4	WJ-8618B-8
798044-14	NOT USED	NOT USED	NOT USED	WJ-8618B(1) WJ-8617B(1)



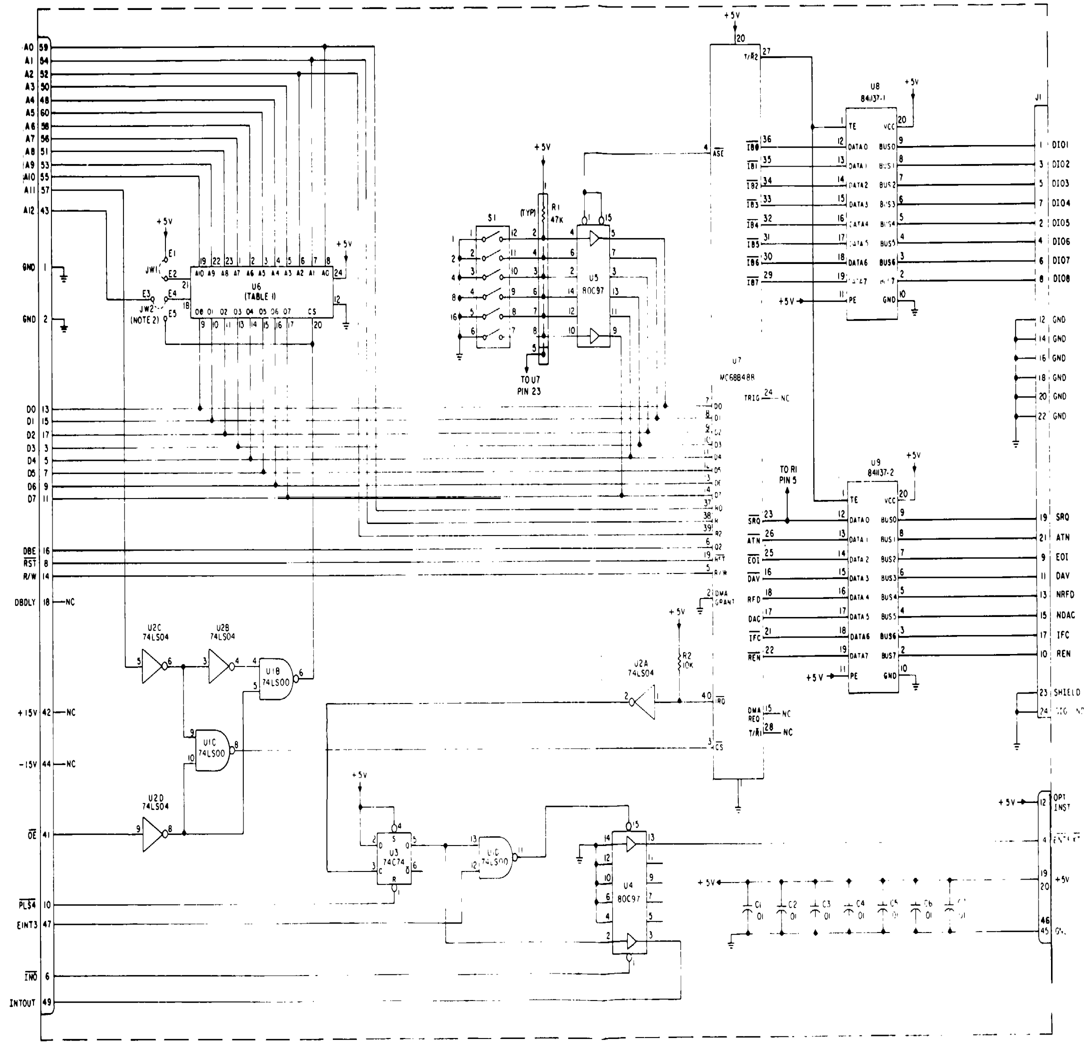


Figure 6-54. Type 798044 IEEE-488 Interface (Option D) Schematic Diagram 590120

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN μF.
2. DIFFERENCE IN TYPE NO.'S IS SHOWN IN TABLE A

TABLE A

TYPE NO.		U1
796185-1	U10 C6 R3 Y1 U11 C7 R4 U12 R5 U13 R6 NOT USED	190169-38
796185-2	AS SHOWN	190169-39
796185-3	C1,C2,C3,C4,C5 U1,U6,U8 USED	190169-64
796185-4	U10 C6 R3 Y1 U11 C7 R4 U12 R5 U13 R6 NOT USED	190169-70
796185-5	AS SHOWN	190169-108

TABLE A (CONT D)

TYPE NO.		U1
796185-6	U2 R1 U3 R2 U4 U5 U9 NOT USED	NOT USED

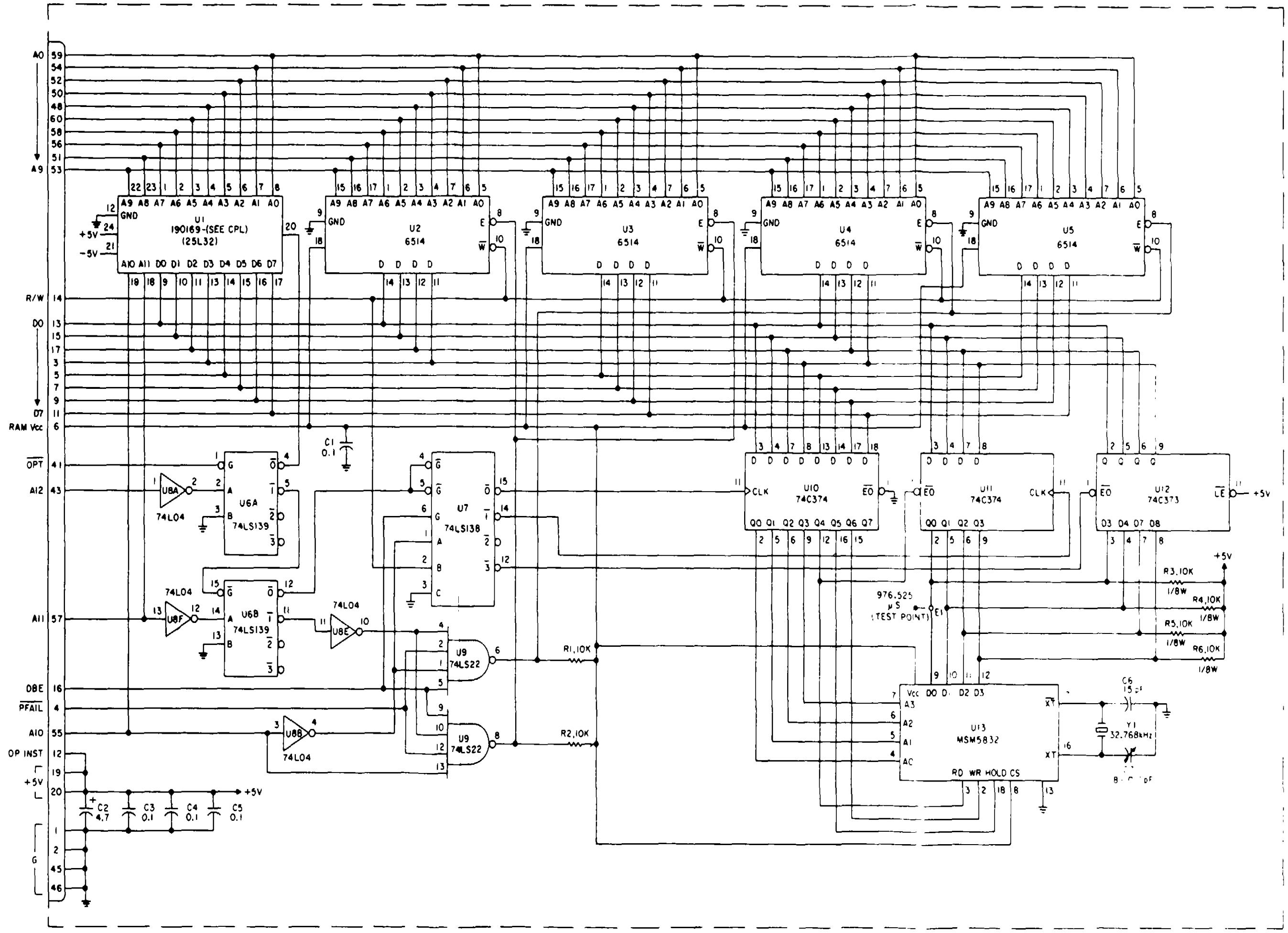


Figure 6-55. Type 796185-X, Extended Memory (Option M-EM), Schematic Diagram 580079

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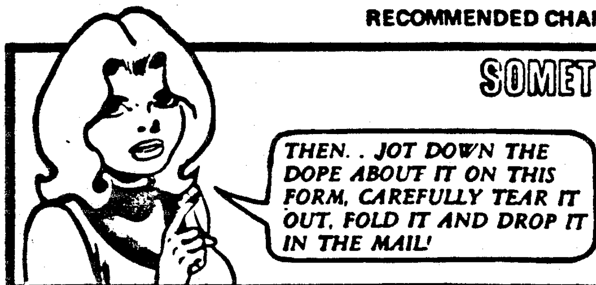

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