INTERMEDIATE LEVEL MAINTENANCE MANUAL

FOR THE

TYPE WJ-8615P

VHF/UHF COMPACT RECEIVER

P/N 181150-001, Revision U

DRS Technologies
DRS Signal Solutions, Inc.
700 Quince Orchard Road
Gaithersburg, Maryland 20878-1794

September 2005

WARNING

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.

NOTE

Leaving the WJ-8615P in a powered-down condition for extended periods of time depletes the internal real time clock battery at A1A3U7. Battery life in stored or unused receivers may be as short as two years.

A discharged battery warrants maintenance action by qualified personnel. Refer to this manual's maintenance section for information on A1A3U7 replacement.

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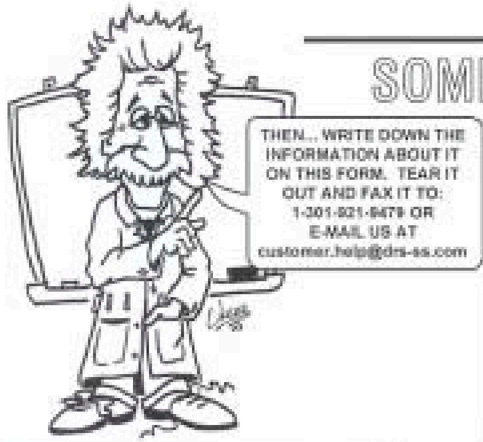

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LIST OF EFFECTIVE PAGES

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WJ-8615P VHF/UHF COMPACT RECEIVER

INTERMEDIATE LEVEL MAINTENANCE MANUAL

REVISION RECORD

Revision	Description	Date
A	Initial release.	7/89
B	Changes reflecting the addition of the remote tuning speed command (TSP) and the updated Front Panel Display Assembly (Type 796823-1) and Microprocessor Assembly (Type 796495-12).	9/89
C	Incorporates Revision B Change 1, Remote Response Times information, and equipment return information.	2/90
D	Incorporates miscellaneous parts list and schematic diagram updates.	6/90
E	Incorporates Revision D Change 1 and Change 2, update parts list and schematics.	7/91
G	Incorporates parts list and schematic diagram updates.	3/93
H	Changes reflecting the change to the part number of the A1A9 assembly form Type 796754-1 to Type 797272-1 and the addition of the part 483114-1 Wideband FM Demodulator, A1A9A1.	7/95
I	Changes reflecting the addition of I/O mating connectors to Table 2-5. Also reflects update to the main chassis parts list and list of manufacturers.	5/96
J	Added WJ part number to the title page. Incorporated a List of Effective Pages. Added page numbers to section cover pages and their back pages. Removed "intentionally left blank" pages and replaced with "Notes" pages that are formatted with headers and page numbers. Reformatted entire manual to PC format.	5/98

WJ-8615P VHF/UHF COMPACT RECEIVER

INTERMEDIATE LEVEL MAINTENANCE MANUAL

REVISION RECORD

Revision	Description	Date
K	Corrects **Figures 3-9** and **3-10**. Expands **paragraph 3.3.8** on 1st LO Synthesizer Assembly. Updates **Table 4-2** on the Audio/Video Subassembly (A1A10). Clarifies **paragraph 4.7.1** and provides updated procedures for **paragraph 4.7.2.1**. Incorporates ECO 039037 and 038971.	8/98
L	Incorporates ECO 039629.	5/99
M	Incorporated ECO 041084.	2/01
N	Incorporated ECO 042082.	6/02
O	Not Used	
P	Incorporated ECO 042166.	7/02
Q	Incorporated ECO 042371.	10/02
R	Incorporated ECO 042752.	1/03
S	Incorporated ECO 044391.	3/04
T	Incorporated ECO 045316.	10/04
U	Incorporated ECO 046295.	9/05

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SECTION I

GENERAL DESCRIPTION

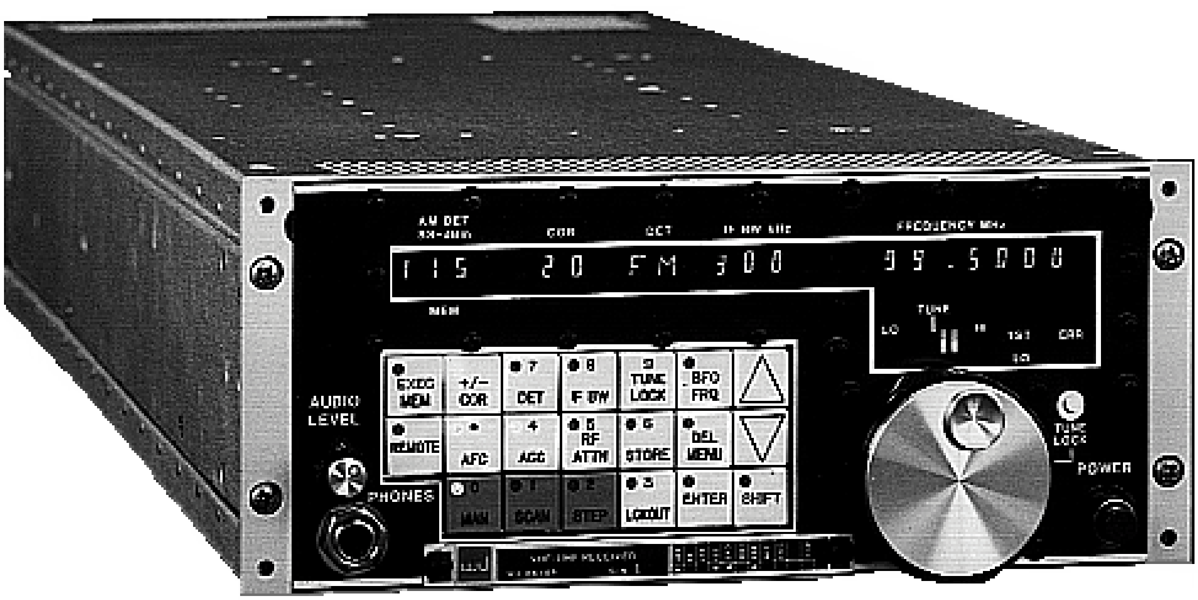

Figure 1-1. WJ-8615P VHF/UHF Compact Receiver

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL CHARACTERISTICS

The WJ-8615P VHF/UHF Compact Receiver is a fully synthesized and digitally controlled receiver, designed to intercept AM, FM, CW, PULSE, and ISB (optional) emissions over a frequency range of 20 - 500 MHz. Frequency coverage is expandable from 2 MHz to 1600 MHz with frequency extender options. Three IF bandwidths, ranging from 3.2 kHz to 8 MHz are provided with the unit. Two additional optional bandwidths are readily accepted, providing a capability of five selectable IF bandwidths.

Memory within the WJ-8615P provides for the storage of as many as 150 receiver front panel set-ups. The WJ-8615P's Handoff feature allows handoff or receipt of front panel parameters. Up to 30 receivers that are compatible with the WJ handoff network can be interconnected via a coaxial cable. The WJ-8615P additionally allows for SCAN, STEP, and LOCKOUT operations. SCAN provides the receiver the capability of scanning across one of up to 74 pre-determined frequency segments. LOCKOUT allows an operator to specify up to 300 segments of the frequency spectrum to be skipped by the SCAN operation. STEP allows the receiver to tune through programmed sequences of stored front panel set-ups.

A 24-character alphanumeric display is present to provide information on receiver parameters such as Signal Strength, Carrier-Operated-Relay (COR) Level, Detection Mode, IF Bandwidth, and Tuned Frequency. During the local operating mode, receiver functions are controlled and parameters are selected by pressing appropriate front panel push buttons. Remote control capabilities are incorporated utilizing an IEEE-488 interface bus, allowing the WJ-8615P to communicate with an external controlling device.

Frequency tuning circuitry of the WJ-8615P includes 1st and 2nd LO synthesizers. These synthesizers determine the tuned frequency to a resolution of 100 Hz. Tuning is performed in 100 MHz to 100 Hz steps. The WJ-8615P's Tape/Printer Logging feature allows the receiver to log signal hits on either a printer or audio tape. The WJ-8615P's Real Time Clock allows the log data to be labeled with the time and date the signal was intercepted. Complete specifications for the WJ-8615P are provided in **Tables 1-1** and **1-2**.

1.2 MECHANICAL CHARACTERISTICS

The WJ-8615P Compact Receiver is designed in a half-rack configuration. It occupies 3.5 inches of vertical rack space and two receivers may be installed side-by-side for installation in a standard 19-inch wide equipment rack. (Refer to **Figure 2-2** for an outline of a two receiver configuration utilizing the accessory mounting hardware furnished with the receiver.) The receiver extends approximately 21 inches (measured to the tips of the rear panel protective handles) into the equipment rack. Except for the Line Audio control (R1) and the Voltage Select switch (S2) mounted on the rear panel, all operating controls are mounted on the front panel. All input and output connectors (except for the phone jack) are located on the rear panel.

An N-type connector is utilized for the ANTENNA input. All other connectors are BNC-type, except for multi-pin connectors for AUX and REMOTE CONTROL. The LINE AUDIO (R1) control, which controls the rear panel AUDIO OUTPUT connectors (J6 and J7), is mounted on the rear panel. A fuse holder (F1) houses the operational line fuse.

The top and bottom covers are held in place with counter-sink Phillips head screws. The Power Distribution circuit, RF/IF modules, Digital I/O modules, and Synthesizer modules occupy separate compartments for mechanical support and shielding purposes. Removal of the top cover permits access to all of the plug-in modules. Removal of the bottom cover exposes the motherboard to which the plug-in modules mount.

1.3 EQUIPMENT SUPPLIED

Equipment supplied consists of the receiver and an accessory kit. This accessory kit includes a detachable line cord, a PC board pulled, fixed rack mounting hardware, an alignment tool, a spare fuse, a connector fixed for use with rear panel connector J13, and miscellaneous hardware.

1.4 EQUIPMENT REQUIRED BUT NOT SUPPLIED

To obtain full utilization of the receiver, equipment from the following list should be selected.

1) Antenna, 50 ohm

2) Audio monitoring equipment:

- speaker panel, 2k ohms nominal
- headphones set, 600 ohms, with 1/4-inch Tip-Ring-Sleeve connector

3) Controller device, IEEE-488 compatible

Table 1-1. WJ-8615P VHF/UHF Compact Receiver Specifications

Frequency Range	20-500 MHz (2-1600 MHz with FE options)
Detection Modes	AM, FM, CW, PULSE, ISB (optional), and Log
Tuning Scheme	Frequency synthesized local oscillators locked to internal reference
Tuning Resolution	100 Hz synthesized (20 Hz in ISB)
Synthesizer Tuning Speed	10 sec maximum, to within 10 kHz
RF Input Impedance	50 ohms, nominal
Maximum RF Input Without Damage	+20 dBm
Input VSWR	2.5:1 typical, 3:1 maximum
Noise Figure	8 dB maximum (12 dB maximum, 500 to 1100 MHz) Add 1.5 dB for FE option (20 to 500 MHz) Add 2.5 dB for Tracking Preselector option (2 to 500 MHz)
Intermodulation	
2nd Order Intercept Point	+20 dBm minimum (+45 dBm typical with Tracking Preselector option)
3rd Order Intercept Point	0 dBm minimum, 20 to 500 MHz (+3 dBm with Tracking Preselector option)

Table 1-1. WJ-8615P VHF/UHF Compact Receiver Specifications (Continued)

Frequency Reference	
Internal	±1 x 10-6(0° - 50°C)
External	10 MHz at 0 dBm, nominal
Ultimate FM (S+N)/N	40 dB minimum in 50 kHz bandwidth
LO Phase Noise	-100 dBc/Hz, with internal reference offset 20 kHz from carrier
LO Radiation	-90 dBm maximum at RF input
Image Rejection	90 dB minimum
IF Rejection	90 dB minimum (above 30 MHz)
Internal Spurious Response	
20 – 1100 MHz	Equivalent to -115 dBm maximum of RF input
1100 – 1600 MHz	No spurs greater than –110 dBm; no more than five spurs greater than –115 dBm
Reciprocal Mixing	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
Signal Monitor Output	15 dB above RF input (WBO option -30 dBm out)
Gain Control Modes	Manual/Automatic, 100 dB range minimum
Video Outputs (simultaneous)*	AM, Pulse, 1 volt peak, when modulated 50%; FM, 1 volt peak into 91 ohms, when modulated 30% of selected IF bandwidth; Log, 0 to 5 V = 50 dB, nominal
IF Bandwidths available	3 bandwidths standard, 2 additional bandwidths may be optionally selected. See **Table 1-2** for available IF bandwidths
IF Shape Factor	See **Table 1-2**
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, equal to 30% of the selected IF bandwidth into 91 ohm load
Video Response	DC to 1/2 IF bandwidth for FM monitor, and 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
AM/FM Audio Response	0.1 to 15 kHz
Variable BFO	±4 kHz in 40 Hz steps (±2 kHz in 20 Hz steps in ISB)
ISB (optional)	200 to 3200 Hz, 20 Hz tuning resolution
COR/Squelch	Adjustable threshold from approximately 80 dB above noise floor for selected IF bandwidth. COR output provides a TTL output along with a 100 mA "sink-to-ground". Maximum external switching voltage is +24 Vdc at the 100 mA current-sink output.

Table 1-1. WJ-8615P VHF/UHF Compact Receiver Specifications (Continued)

Weight	25 pounds, approximately
Size	3.5 inch height; 8.5 inch width; 21 inch depth (including protective handles)
Temperature Range	
Operating	0°C to 50°C**
Storage	-20°C to 80°C
Power Requirement	115/230 Vac (±15%), 47-63 Hz
Power Consumption	40 watts, nominal
Printer Log Output	Selectable Baud Rate: 110, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600 bps
Tape Log Output	1.3 Vpp (into 600Ω) with FSK 1200 bps time tag
Real Time Clock Drift	Less than ±2 minute per month

* With the 3.2 kHz bandwidth, the audio and video outputs will be 6 dB less than published specifications.
** Operation within published specifications guaranteed at 25°C ±5°C.

Table 1-2. Available Bandwidths and Rated Sensitivity

Bandwidth (kHz)	Max. Shape Factor	Sensitivity (dBm)**	30% Deviation (kHz)
3.2*	3:1	-107	1
6.4	3:1	-107	1.9
10	3:1	-107	3
15	3:1	-105	4.5
20	3:1	-104	6
25	3:1	-103	7.5
30	3:1	-102	9
40	3:1	-101	12
50	3:1	-100	15
75	3:1	-98	22.5
100	3:1	-97	30
150	3:1	-95	45
250	4:1	-93	75
300	4:1	-92	90
500	4:1	-90	150
1000	4:1	-87	300
2000	4:1	-84	600
4000	4:1	-81	1200
8000	4:1	-78	2400

* With the 3.2 kHz bandwidth, the audio and video outputs will be 6 dB less than published specifications.
** Sensitivity conditions without preselection, or frequency extender. Add 1.5 dB for receivers with an FE option installed. Add 2.5 dB for receivers with the PRE option installed. For FEX-11, add 4.0 dB only for tuned frequencies above 500 MHz, regardless of options installed. For FEX-16, add only 4.5 dB between 500 and 1100 MHz and only 6.5 dB between 1100 and 1600 MHz.
AM- Input signal AM modulation 50% at a 1 kHz tone, will produce a minimum video output ratio (S+N/N) of 10 dB.
FM- Input signal FM modulated at a 1 kHz rate with a peak deviation equal to 30% of the selected IF bandwidth, will produce a minimum video output ratio (S+N/N) of 17 dB. A 400 Hz modulation rate is required for the 10 kHz and 6.4 kHz IF bandwidths, and 200 Hz modulation is required for the 3.2 kHz bandwidth.

1.5 RECEIVER OPTIONS

1.5.1 TRACKING PRESELECTOR OPTION (WJ-8615/PRE)

The primary function of the Tracking Preselector option is to provide extremely narrow bandpass filtering of the RF spectrum between 20 and 500 MHz. Four separate, tunable filter bands are used in the Preselector, each covering a segment of the overall range, plus a "bypass" band. Selection of the appropriate band and filter tuning is controlled automatically as the receiver is tuned. Varying the selected bandpass filter across its tuning range allows the Preselector to "track" the receiver tuned frequency. This provides the receiver with greater signal selectivity. If Tracking Preselector operation is not desired the option may be bypassed. This option allows the lower frequency limit to be expanded to 2 MHz.

1.5.2 WIDEBAND OUTPUT OPTION (WJ-8615/WBO)

The optional Wideband Output provides AGC for the 21.4 MHz signal at rear panel connector J9. The WBO signal is greater than 6 MHz wide at the 3 dB points, and the output level is maintained at -30 dBm into a 50 ohm load. Internal AGC circuitry provides 30 dB of gain control, maintaining the output to within ±6 dB of the rated level for input variations from -5 dBm to ±75 dBm. The Wideband Output amplifies the converter output signal by approximately 35 dB before the signal is applied to J9. This option is intended for use with wide bandwidth recording devices, but not intended for use with signal monitors.

1.5.3 SELECTED AUDIO OUTPUT OPTION (WJ-8615/SAO)

The Selected Audio Output option permits receiver audio output to be turned-on via a command through the IEEE-488 bus. This allows a remote controller to select and monitor the audio output of any SAO equipped receiver under its control.

1.5.4 INDEPENDENT SIDEBAND OPTION (WJ-8615/ISB)

With the ISB/CW Demodulator option installed, the receiver allows for demodulation of single sideband signals. This subassembly utilizes the 32.1 MHz and 10.7 MHz signals provided by the Reference Generator assembly to demodulate USB, LSB, or ISB (both USB and LSB) signals.

1.5.5 HF FREQUENCY EXTENDER OPTION (WJ-8615/HFE)

Installing the HF Frequency Extender option enables the WJ-8615P to tune from to 2 MHz to 500 MHz.

1.5.6 500 TO 1100 MHz FREQUENCY EXTENDER OPTION (WJ-8615/FEX-11)

Installing the FEX-11 Frequency Extender option in the WJ-8615P expands the 20-500 MHz tuning range up to 1100 MHz. The Frequency Extender utilizes a four band preselector down-converter and diode switching network to select the proper band for the tuned frequency. Preselector frequencies are mixed with one of the four LO frequencies. Mixing the preselector frequency with the local oscillator (LO) frequency produces a difference output frequency within the receiver standard tuning scheme.

1.5.7 500 TO 1200 MHz FREQUENCY EXTENDER OPTION (WJ-8615/FEX-12)

Installing the FEX-12 Frequency Extender Option in the WJ-8615P expands the 20-500 MHz tuning range up to 1200 MHz. The Frequency Extender utilizes a four band preselector down-converter and diode switching network to select the proper band for the tuned frequency. Preselector frequencies are mixed with one of the four LO frequencies. Mixing the preselector frequency with the local oscillator (LO) frequency produces a difference output frequency within the receiver standard tuning scheme.

1.5.8 500 TO 1600 MHz FREQUENCY EXTENDER OPTION (WJ-8615/FEX-16)

Installing the FEX-16 Frequency Extender Option extends the tuning range of the receiver to 1600 MHz. Six frequency bands are used to cover the frequency range. This option consists of an RF switch, a UHF preselector, a UHF preamplifier/mixer, and a UHF LO synthesizer.

SECTION II

INSTALLATION AND OPERATION

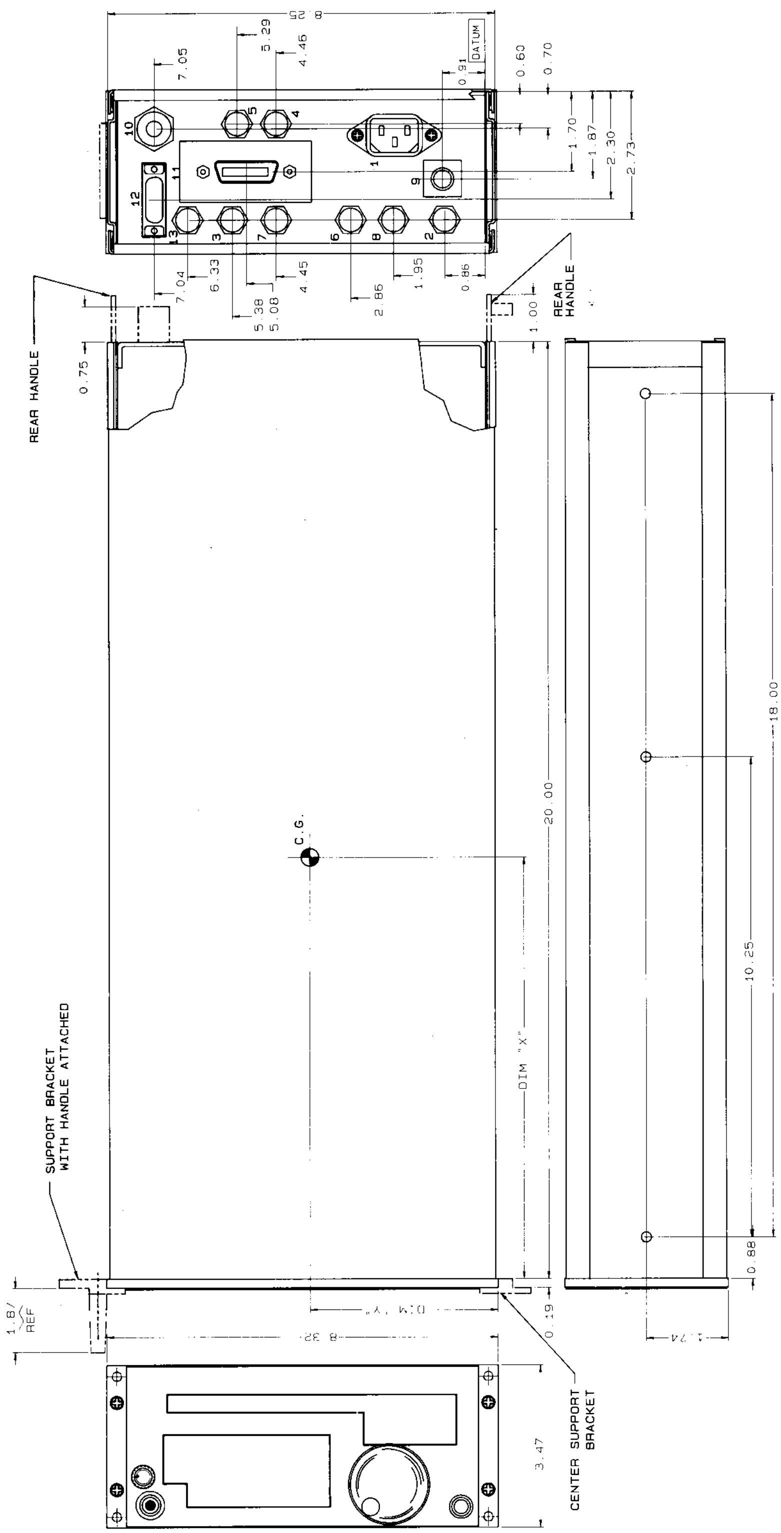

Figure 2-1. WJ-8615P Compact Receiver, Critical Dimensions

SECTION II

INSTALLATION AND OPERATION

2.1 UNPACKING AND INSPECTION

The WJ-8615P and its accessories is shipped cushioned between molded-in-place expanded plastic pads in a double-walled carton. After unpacking the equipment, retain the shipping container and packing material until the equipment has been thoroughly inspected and it is ensured that reshipment is not necessary. Perform the following initial inspection:

1. Carefully inspect the outside of the shipping container for discoloring, stains, charring, or other signs of exposure to excessive heat, moisture or liquid chemicals. Check for any physical damage to the shipping container such as dents, snags, rips, crushed areas, or similar signs of excessive shock or careless handling.

2. Remove all equipment and accessories from the shipping container. If any items are missing, contact the factory or your local sales representative.

3. Remove and retain the white 5x6 inch PRODUCT DISCREPANCY REPORT card. This card is to be used if reshipment of the equipment is required. It also contains important warranty adjustment information.

4. Carefully inspect the equipment looking for dents, scratches, damaged or loose pushbuttons or knobs, or any other signs of physical abuse or careless handling.

If damage is found, forward an immediate request to the delivering carrier to perform an inspection and prepare a concealed-damage report. Do not destroy any packing material until an agent of the carrier has examined it. Concurrently, report the nature and extent of damage to factory giving equipment type numbers and serial numbers, so that necessary action can be taken. Refer to **paragraphs 2.10** and **2.11**. Under U.S. shipping regulations, damage for claims must be collected by the consignee; do not return the equipment to the factory until a claim for damages has been established.

2.2 INSTALLATION

The WJ-8615P Compact Receiver is designed for mounting in a half-rack configuration. Two units, mounted side-by-side, satisfy the full 19-inch front panel requirement for a standard equipment rack. The receiver occupies 3.5 inches of vertical rack space and extends approximately 21 inches into the rack as measured to the tips of the rear panel protective handles. A 1.75-inch space above and below the unit is recommended to provide for forced air convection. Access to the rear panel is recommended so that input and output connections can be made or changed conveniently, if desired. **Figure 2-1** illustrates the WJ-8615P critical dimensions. Refer to **Figure 2-2** for installing equipment utilizing furnished mounting hardware. This figure illustrates the methods and hardware required to rack mount single and dual receiver configurations. All illustrated accessory items, except for the false front panel assembly, are furnished with each receiver.

CAUTION

Units are not to be supported within racks solely by equipment front panels. Jonathan Type 110QD-20-2 slide mounts are recommended. Three pre-tapped holes exist on both sides of the receiver chassis for slide mount installation. Type 10-32 x 5/16 pan head screws (MS51958-60) are to be used.

2.2.1 JONATHAN TYPE 110QD-20-2 SLIDE MOUNTS

Jonathan Type 110QD-20-2 chassis slides accommodate a 17-inch wide chassis into a 19-inch wide standard equipment rack. Supporting loads of up to 120 pounds, these slides mount easily into bracketed equipment racks utilizing machined bar nuts. **Figure 2-3** illustrates installation of slide mounts to an equipment rack, with special attention given to bracket hole spacing.

CAUTION

Do not use screws longer than 5/16 inch in slide mounting holes. Permanent damage may result to the unit.

Each of the Type 110QD-20-2 slide mounts is comprised of two functional pieces: a chassis section for mounting to the equipment unit, and a cabinet section for mounting to the equipment rack. Three 10-32 X 5/16 pan head screws are used to install each chassis section to a receiver side panel. After both chassis sections have been securely tightened to the equipment unit, cabinet sections are to be installed within the equipment rack. The WJ-8615P utilizes 3.5 inches of vertical rack space (six bracket holes). The center four bracket holes are to be used to secure the cabinet section to the equipment rack. The outer two holes are to be used to secure the receiver front panel to the equipment rack, if desired. Slide locks permit quick disconnect of the chassis section from the cabinet section for equipment removal.

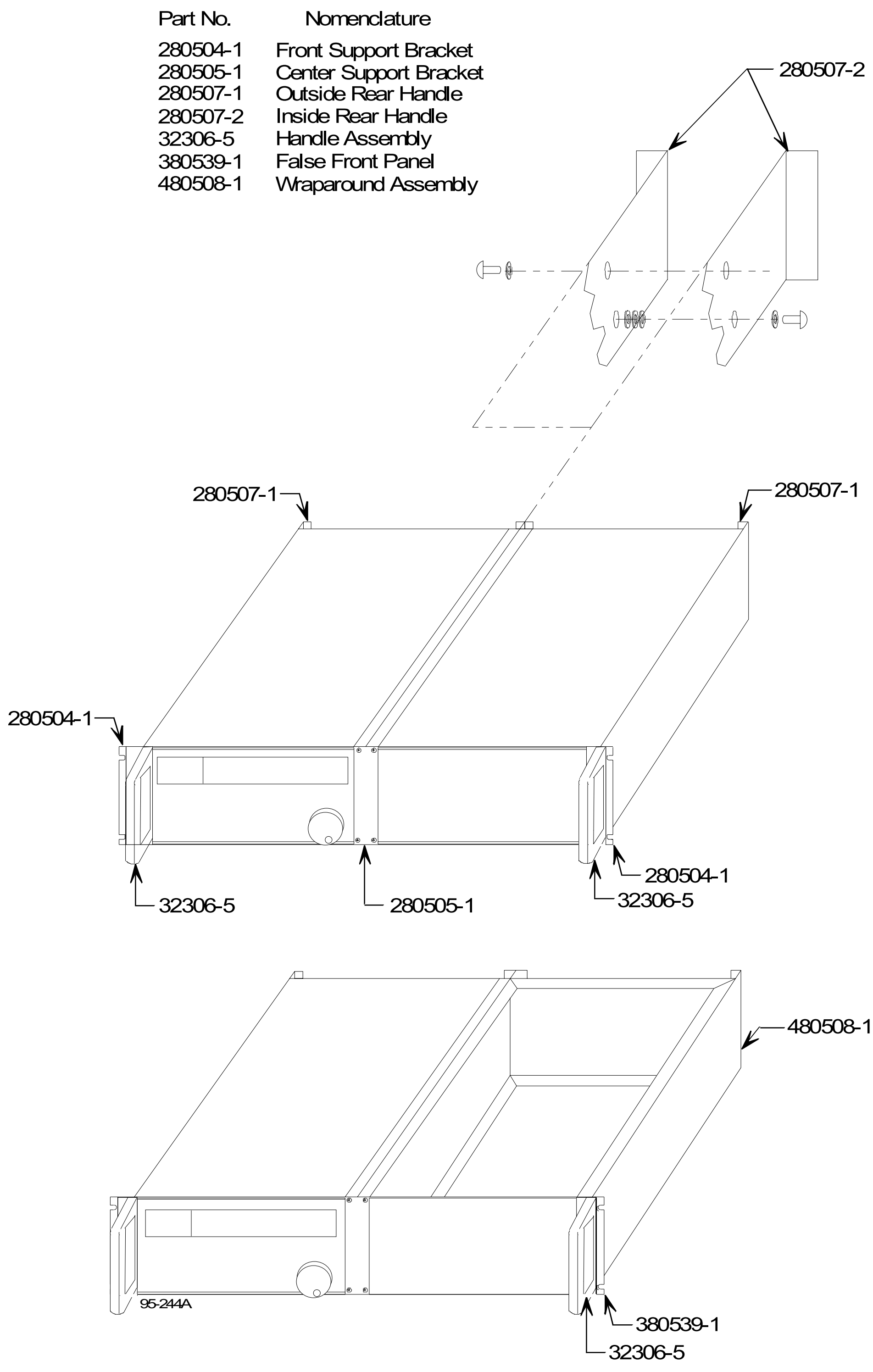

Figure 2-2. WJ-8615P, Configuration of Rack Mounting Accessories

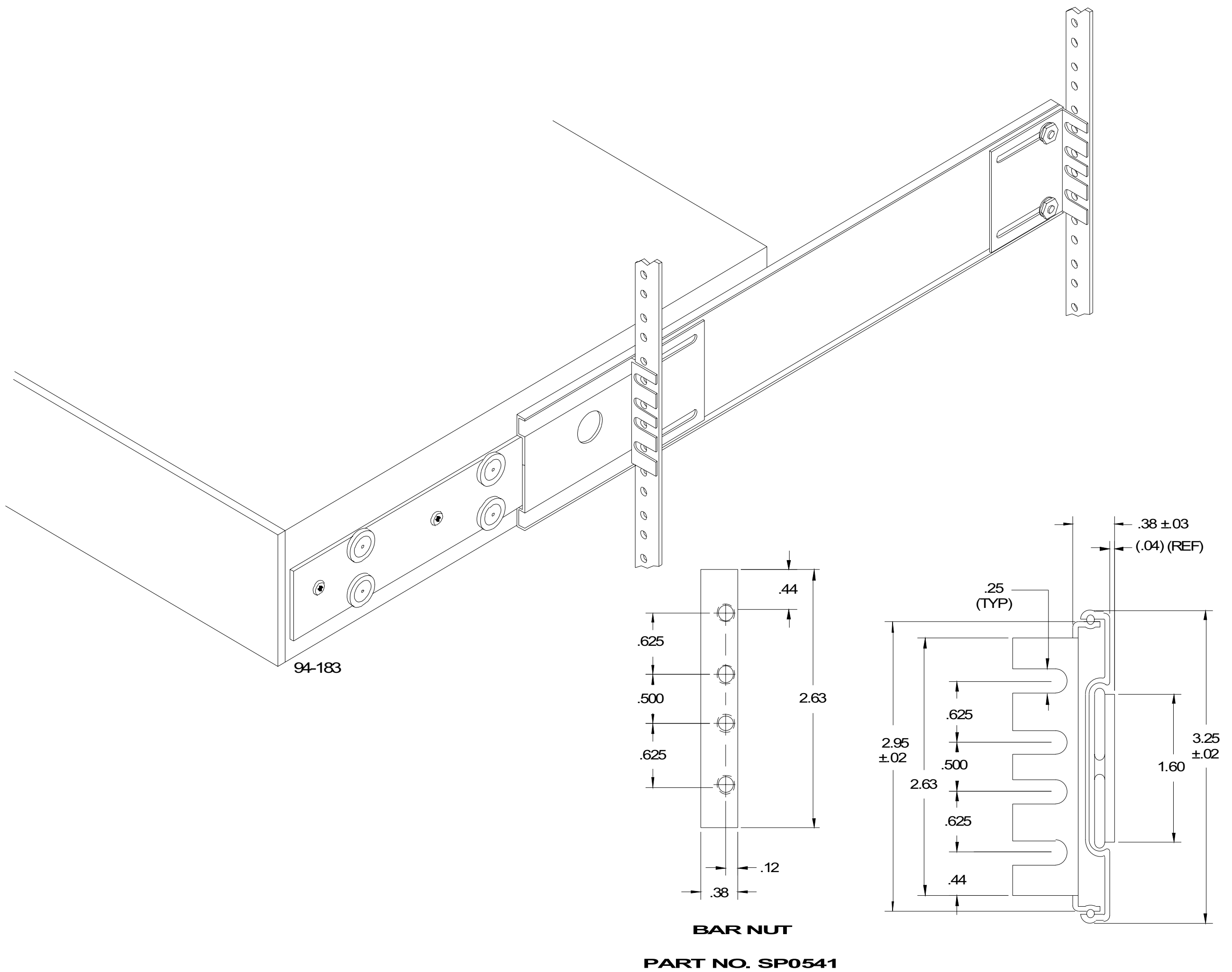

Figure 2-3. Installation of Jonathan Type 110QD-20-2 Slide Mounts

2.2.2 POWER SUPPLY REQUIREMENTS

The WJ-8615P requires an input voltage of either 110 VAC or 220 VAC (±15%) at 47 to 63 Hz for operation. The unit's internal power supply circuitry automatically adjusts to the power input (providing it is within the specified range). Therefore, no manual switching of power source voltage selection is required.

A 1 amp, slo-blo fuse (F1) is provided and located on the rear panel of the unit (see **Figure 2-4**). This type fuse is to be used for either 100 or 220 VAC operation.

2.3 RECEIVER OPERATION CONFIGURATION

The WJ-8615P Receiver operating configuration is hardware determined by the settings of dip switches S1 and S2, located on the IEEE-488/Interrupt module (A1A2). **Tables 2-1** and **2-2** outline the IEEE-488/Interrupt module switch positions. These option switches have been preset at the factory and should not require modification. Refer to **Figure 5-3** for the location of the IEEE-488/Interrupt Assembly A1A2. The A1A2S1 switch is located on the top middle of this assembly; the A1A2S2 switch is located on the top right of this assembly as illustrated in **Figure 5-3**.

2.3.1 IEEE-488/INTERRUPT SWITCH A1A2S1 CONFIGURATION

Opening switch position 1 indicates to the receiver's software the presence one of the Frequency Extender options. The receiver firmware has been configured for the installed Frequency Extender option of 500-1100, 500-1200, or 500-1600 MHz. Opening switch position 2 indicates that the Single Sideband option is installed. Opening switch position 5 indicates to the receiver software the presence of the 2 to 20 MHz HF Frequency Extender (HFE) option or the Tracking Preselector (PRE) option. With position 7 open, the operating configuration may be changed via the front panel controls while in the definitions operating mode. (Refer to **paragraph 2.3.3**.) Opening switch position 8 forces the receiver into a diagnostic test routine.

Table 2-1. IEEE-488/Interrupt Switch A1A2S1, Option B

Position	Parameters
1	FE (Frequency Extender), enabled by opening switch position 1
2	SSB (Single Sideband), enabled by opening switch position 2
3	Not Used
4	Not Used
5	HFE (HF Frequency Extender), enabled by opening switch position 5
6	Not Used
7	DEF (Front Panel Definitions) enabled by opening switch position 7. Allows operation configuration to be changed via front panel controls, during definition operating mode.
8	DIAG (Diagnostics) enabled by opening switch position 8. This switch is an override for test purposes.

Table 2-2. IEEE-488/Interrupt Switch A1A2S2, IEEE-488 Address and Option A

Position	Parameter
1 Thru 5	488 (Selection of IEEE-488 address 0 to 30). Refer to **paragraph 2.3.2** for switch setting. Least significant digit is position 1 and most significant digit is position 5.
6	SLA (Slave Operation), enabled by opening switch position 6
7	SAO (Selected Audio Output), enabled by opening switch position 7
8	PRE (Tracking Preselector), enabled by opening switch position 8

2.3.2 IEEE-488/INTERRUPT SWITCH A1A2S2 CONFIGURATION

Switch positions 1 to 5 are used to set the receiver IEEE-488 address. Any address from 0 to 31 is selectable via these switch positions. (31 is an invalid IEEE-488 address and is not recognized.) Refer to **Table 2-3** for IEEE-488 address settings.

Opening A1A2S2 position 6 allows the receiver to operate as a slave receiver with the WJ-8617B Receiver. Opening position 7 enables the Selected Audio Output option. Opening switch position 8 enables the internal Tracking Preselector option.

Table 2-3. IEEE-488/Interrupt Switch A1A2S2 Address Settings

Position					Address	Position					Address
5	4	3	2	1		5	4	3	2	1	
0	0	0	0	0	00	1	0	0	0	0	16
0	0	0	0	1	01	1	0	0	0	1	17
0	0	0	1	0	02	1	0	0	1	0	18
0	0	0	1	1	03	1	0	0	1	1	19
0	0	1	0	0	04	1	0	1	0	0	20
0	0	1	0	1	05	1	0	1	0	1	21
0	0	1	1	0	06	1	0	1	1	0	22
0	0	1	1	1	07	1	0	1	1	1	23
0	1	0	0	0	08	1	1	0	0	0	24
0	1	0	0	1	09	1	1	0	0	1	25
0	1	0	1	0	10	1	1	0	1	0	26
0	1	0	1	1	11	1	1	0	1	1	27
0	1	1	0	0	12	1	1	1	0	0	28
0	1	1	0	1	13	1	1	1	0	1	29
0	1	1	1	0	14	1	1	1	1	0	30
0	1	1	1	1	15	1	1	1	1	1	--

1 = Open 0 = Closed

2.3.3 FRONT PANEL DEFINITIONS

The definitions function (see **Table 2-4**) allows the local operator to determine the status of switches A1A2S1 and A1A2S2 on the IEEE-488/Interrupt module without removing the top cover. To place the receiver in the definition mode, hold the MENU push button pressed in during power up until the prompt RESET THE RECEIVER is displayed. Tuning wheel adjustment is available to toggle this YES/NO decision. With "NO" selected, press the increment key (Δ) to progress to DEFINE. By selecting "NO" with the tuning wheel, the operator can use the increment or decrement key (∇) to determine the configuration of DIP switches A1A2S1 and A1A2S2. To override the configuration of these switches return to DEFINE and select "YES" with the tuning wheel. The receiver now accepts its configuration from the front panel instead of switches A1A2S1 and A1A2S2. Pressing the ENTER control key terminates definitions mode operation. If memory is cleared and the receiver is powered on, an ERR 230 (RAM check sum failure) will occur. The receiver definitions are then determined by the position settings of switches A1A2S1 and A1A2S2 on the IEEE-488/Interface module. For definitions operation, position 7 of switch A1A2S1 must be open.

Table 2-4. Definitions Menu

RESET THE RECEIVER	NO setting enables definitions mode. Selecting YES and pressing the ENTER key will cause all receiver memory to be cleared and ERROR 230 to be generated.
DEFINE	YES setting permits changing of definitions status via tuning wheel adjustment. NO setting permits review of definitions status only.
DIAGNOSTICS	YES setting enables diagnostics mode.
IEEE-488 ADDRESS	Selectable receiver IEEE-488 address (0 to 30).
SLAVE OPTION	YES setting enables control via WJ-861X master device.
PRESELECTOR OPTION	YES setting enables PRE option.
SSB OPTION	YES setting enables SSB option.
FE OPTION	YES setting enables FE option.
HF OPTION	YES setting enables HF option or allows 2-20 MHz tuning when the PRE option is installed.
SAO OPTION	YES setting enables SAO option.
HANDOFF ADDRESS	Selectable 1 to 99
HANDOFF SLAVE, ONLY	YES setting configures the receiver to only receive handoff parameters. NO setting configures receiver to send and accept handoffs.
COR DELAY	Selectable Carrier Operated Relay (COR) delay time (0 to 10 seconds).
TAPE DELAY	Selectable Tape Delay 0 to 5,000 milliseconds in 50 millisecond increments
PRINTER BAUD RATE	Selectable 110, 150, 300, 600, 1200, 1800, 2000 2400, 4800, and 9600 bps.

2.4 WJ-8615P RECEIVER CONNECTOR SIGNALS

All receiver interface connectors with the exception of headphone connector J12 are located on the rear panel of the WJ-8615P Receiver. **Table 2-5** lists the I/O Connectors with data on mating connectors. **Figure 2-4** illustrates the location of the receiver rear panel connectors.

Table 2-5. WJ-8615P Table of Connectors

Connector (Type)	Ref Des	Function	Mating Connector (Cage Code)	Comments
Vac Line Power (3-pin)	J1	Power Input	17600 (14632)	Supplied as part of Accessory Kit
EXT REF (BNC female)	J2	10 MHz Reference Input	225398-7 (00779)	Not supplied
COR (BNC female)	J3	Carrier Operated Relay	225398-7 (00779)	Not supplied
FM MON (BNC female)	J4	FM Monitor Output (91 ohms)	225398-7 (00779)	Not supplied
SW VIDEO (BNC female)	J5	Selected Video Output (91 ohms)	225398-7 (00779)	Not supplied

Table 2-5. WJ-8615P Table of Connectors (Continued)

Connector (Type)	Ref Des	Function	Mating Connector (Cage Code)	Comments
USB/AUD 1 * (BNC female)	J6	USB Audio Output (8 to 600 ohms)	225398-7 (00779)	Not supplied
LSB/AUD 2 * (BNC female)	J7	LSB Audio Output (8 to 600 ohms)	225398-7 (00779)	Not supplied
SW IF (BNC female)	J8	Selected IF Output (50 ohms)	225398-7 (00779)	Not supplied
SM IF (BNC female)	J9	21.4 MHz IF Output (50 ohms)	225398-7 (00779)	Not supplied
WBO (Option) (BNC female)	J9	21.4 MHz Wideband IF Output (50 ohms)	225398-7 (00779)	Not supplied
ANTENNA (N-Type female)	J10	RF Input (50 ohms)	3031-7388-10 (16179)	Not supplied
IEEE-488 (24-pin Latch)	J11	IEEE Remote Control Input	554947-2 (00779)	Not supplied
PHONES (1/4" Ring-Tip-Sleeve)	J12	Headphone Audio Output (8 to 600 ohms)	TAD-3 (82389)	Not supplied
AUX (15-socket D-Type)	J13	Auxiliary Output	205206-1 (00779)	Supplied as part of Accessory Kit
SAO (Optional) (BNC female)	J14	Selected Audio Output (8 to 600 ohms)	225398-7 (00779)	Not supplied

* Both of these connectors provide the same signals in all detection modes except for ISB.

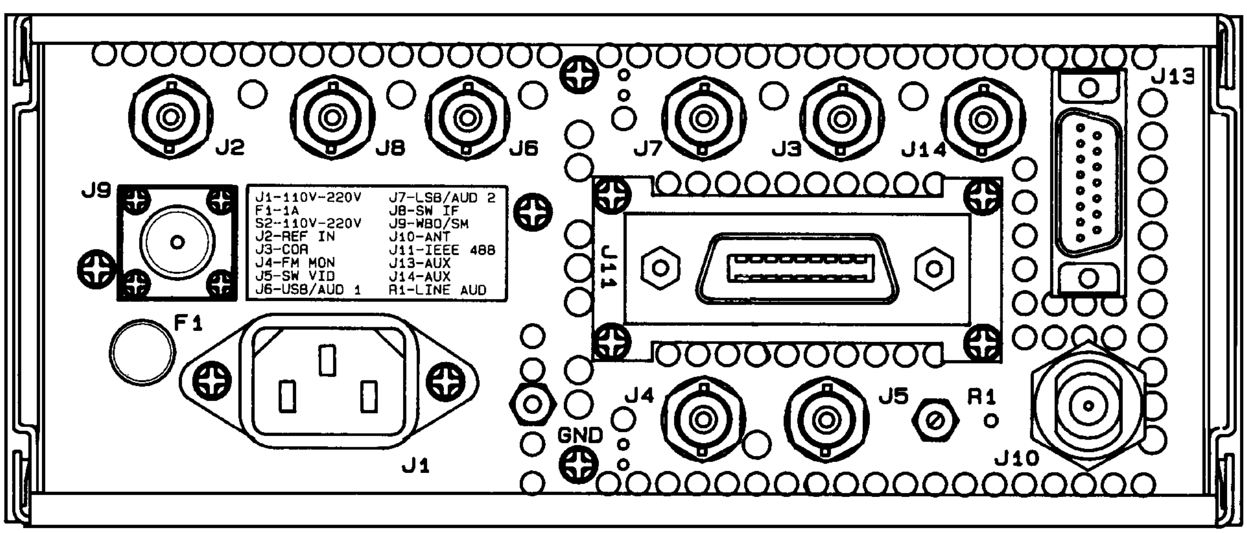

Figure 2-4. WJ-8615P Rear Panel Connectors

2.4.1 **LINE CORD RECEPTACLE (J1)** - This 3-prong receptacle mates with the line power cord to accept line voltage of 110 or 220 Vac for receiver operation. See **paragraph 2.2.2** for further information about power supply requirements.

2.4.2 **REF IN (J2)** - This BNC connector allows an external 10 MHz reference signal, having a level of 0 dBm, to be used as the time base for the receiver when selected. When the external reference level drops below a suitable level (-10 dBm), the receiver automatically switches to an internal reference. If the external reference returns to a suitable level, the external reference is automatically selected again.

2.4.3 **COR (J3)** - This BNC connector provides a 100 mA current-sink to ground for Carrier-Operated-Relay control of external equipment such as a tape recorder. This control signal is activated when the tuned carrier frequency level exceeds an operator-selected power threshold. This threshold level is called the COR threshold. This control signal is deactivated when the carrier level drops below the COR threshold. This output has a selectable 0 to 10 second delayed release after the signal drops below the set COR threshold. This delay prevents loss of second party response when monitoring two-way push-to-talk communications. (Refer to **paragraph 2.3.3**.) Maximum external voltage that can be applied is +24 Vdc.

2.4.4 **FM MON (J4)** - This FM Monitor output provides a dc coupled FM output. The FM output level at this BNC connector is 1 volt peak-to-peak, minimum, for input signals with a peak deviation equal to 30% of the selected IF bandwidth.

2.4.5 **SW VID (J5)** - The dc coupled Switched Video output provides a signal corresponding to the selected detection mode. When the input signal is properly modulated (50% for AM detection and 30% for FM detection) at the rated sensitivity for the selected IF bandwidth, the Switched Video output at this BNC connector is 1 volt peak-to-peak.

2.4.6 **USB/AUD 1 (J6) and LSB/AUD 2 (J7)** - These BNC connectors provide for a 600 ohm audio output at a level adjustable to at least 10 mW, via the Line Audio Control R1. Under normal operating conditions, the signals at these connectors are identical. During ISB optional detection the USB signal is present at J6 and the LSB signal is present at J7.

2.4.7 **SW IF (J8)** - The Selected IF output provides a -40 dBm IF signal during AGC operation. The center frequency is 21.4 MHz with a bandwidth equal to that of the selected IF Bandwidth. This BNC connector has output impedance of 50 ohms.

2.4.8 **SM IF/WBO (J9)** - This BNC connector provides a 21.4 MHz IF output at a level 15 dB greater than the level displayed in the SS-dBm window. With the Wideband Output option installed, this BNC connector provides a -30 dBm signal centered at 21.4 MHz that is at least 6 MHz wide with respect to the upper and lower 3 dB points.

2.4.9 **ANTENNA (J10)** - This N-Type connector accepts the RF input signal from an external antenna. Nominal input impedance is 50 ohms. Maximum RF input level is +20 dBm.

2.4.10 **IEEE-488 (J11)** - This Remote Control multipin connector allows the receiver to interface with other equipment via the IEEE-488 interface bus. This permits the receiver to be controlled or monitored from an external IEEE-488 controller.

2.4.11 **PHONE (J12) -** The Headphone Audio output jack mounted on the front panel is a "tip-ring-sleeve" type connector. Under normal operation, audio levels are adjustable to 10 mV via the front panel audio level control knob. During optional ISB operation, USB signals are present at the "tip" and LSB signals are present at the "ring". The "sleeve" portion of this connector is a common ground.

2.4.12 **AUX (J13)** - This Auxiliary Output multi-pin connector provides signals related to HANDOFF operations, printer logging, or tape logging as indicated in Table 2-6. A male 15-pin D-type connector that mates with this output is provided as an accessory item. This connector can be modified to meet customer applications.

Table 2-6. Auxiliary Output Connector J13

Pin	Signal	Characteristics	Function
1	PTR/Tape IN		Not Used
2	GND		Chassis Ground
3	+5 V		Regulated +5 Vdc, 5 A Output
4	DAC OUT		Not Used
5	A/D IN		Not Used
6	SM INV	Logic "0", Logic "1"	Signal Monitor Spectrum Inversion Control
7	Print Out	RS-232, Selectable Baud Rate	Print Logging Data Output
8	SYNC	TTL level	Scan/Step Synchronization Output
9	Log Video	0-5 Vdc	DC Representation of 55 dB LOG range
10	Tape Out	FSK output, 1200 baud	Tape Logging Data Output
11	+15 V		Regulated +15 Vdc, 1 A Output
12	-15 V		Regulated -15 Vdc, 1 A Output
14	AUX SER INTF	Asynchronous Data, Active high, passive low	WJ Handoff Net

2.4.13 **AUX (J14)** - With the Selected Audio Output option installed, this BNC connector provides an output for the active audio, when the SAO function is activated.

2.5 EQUIPMENT MALFUNCTIONS

This unit was thoroughly inspected and factory adjusted for optimum performance prior to shipment. If an apparent malfunction is encountered after installation, verify that the correct input signals are present at the proper connectors. Maintenance and troubleshooting of the unit can be aided utilizing the procedures outlined in Section IV of this manual. Prior to taking any corrective maintenance action or breaking any seals, contact your factory representative, or the factory Customer Service Department to prevent the possibility of voiding the terms of the warranty. Contact the factory any via mail, telephone, wire, or cable, at:

DRS Signal Solutions, Inc.
Customer Service Department
700 Quince Orchard Road
Gaithersburg, Maryland 20878-1794

Toll Free: 1-800-954-3577
TELEFAX: (301) 948-5666

If reshipment is necessary, follow the instructions in the following paragraph (Preparation for Reshipment or Storage). Do not return the equipment until a Return for Maintenance Authorization (RMA) number has been obtained from the factory Customer Service Department. See Item 10 in the **General Terms and Conditions of Sale** paper for more information on equipment returns.

2.6 PREPARATION FOR RESHIPMENT

If the unit must be prepared for shipment, the packaging method should follow the pattern established in the original shipment. Use the best packaging materials available to protect the unit during reshipment or storage. When possible, use the original packing container and cushioning material. If the original packing materials are not available, use the following procedure:

1. Wrap the unit in sturdy paper or plastic.

2. Place the wrapped unit in a strong shipping container and place a layer of shock-absorbing material (3/4-inch minimum thickness) around all sides of the unit to provide a firm cushion and to prevent movement inside the container.

3. If shipping the unit for service, fill out all information on the 5x6-inch PRODUCT DISCREPANCY REPORT card that was provided with the original shipment. Also ensure that the Return for Maintenance Authorization (RMA) number is recorded on the card (see **paragraph 2.5**) for details on obtaining this number. If this card is not available, attach a tag to the unit containing the following information:

   a. Return for Maintenance Authorization (RMA) number.
   b. Type/Model number of the equipment.
   c. Serial number.
   d. Date received.
   e. Date placed in service.
   f. Date of failure
   g. Warranty adjustment requested, yes or no.
   h. A brief description of the discrepant conditions.
   i. Customer name and return address.
   j. Original Purchase Order/Contract number.

4. Thoroughly seal the shipping container and mark it FRAGILE.

5. Ship to:

   DRS Signal Solutions, Inc.
   700 Quince Orchard Road
   Gaithersburg, Maryland 20878-1794

When storing the equipment for extended period, follow the above packing instructions to prevent damage to the equipment. The safe limits for storage environment is:

Temperature: -20 to +80°C
Humidity: less than 95%

2.7 LOCAL OPERATION

The WJ-8615P Receiver provides three basic modes of operation to be used for search, acquisition, and analysis of signal activity in the RF spectrum. The three basic modes are Step, Scan, and Manual. Additionally, two combination modes are available: Step/Man and Scan/Man.

The Step mode is an automatic mode of operation that allows the receiver to step through selected frequencies in the RF spectrum by use of preprogrammed memory channels. The data entered in each memory channel contains the receiver operating parameters for the specific channel. While the receiver is active in the Step mode it may be entered into Step/Man mode. This allows for optimizing receiver parameters without exiting the current Step mode plan.

The Scan mode allows the receiver to tune between two operator determined frequencies by also using preprogrammed memory channels. The start frequency and receiver set up parameters is loaded into one memory channel and the stop frequency is loaded into the next memory channel. As with Step mode, the receiver may be entered into Scan/Man mode anytime during an active scan to allow for parameter adjustments. After adjustments are made, the scan is resumed at the point it was interrupted. Additionally a Lockout function is available for locking out any unwanted frequencies within the scan.

The Manual mode is a fixed tuned operation that allows for optimizing receiver parameters for further signal analysis. This mode can be entered initially or can be entered from either Scan/Man or Step/Man modes.

Front panel controls, indicators, and displays provide the local operator total control over the receiver's operation. The following paragraphs provide detailed information on WJ-8615P local operations. **Table 2-7** lists the controls and indicators and provides references for quick access to information concerning their role in implementing the receiver's local operation. **Figure 2-5** shows the location of the controls, indicators, and displays.

Table 2-7. WJ-8615P Controls and Indicators

Controls and Indicators		Ref. Para.
POWER	Power ON/OFF push button.	2.7.1.1
Line Audio (R1) (Rear Panel)	Audio level control for Line Audio output connectors J6 and J7.	2.4.6
AUDIO LEVEL	Headphone audio level control knob.	2.7.4.10
Tuning Wheel	Tuning wheel available in most front panel modes for adjustment of selected parameters indicated by blinking cursor. Tuning wheel response indicated by Tune Lock LED (Off).	2.7.3.1
TUNE LOCK	Disables tuning wheel adjustment. (TUNE LOCK LED On)	2.7.3.2
TUNE LOCK Indicator	Tuning wheel operation disable indicator (LED On). Activated by pressing TUNE LOCK control key.	2.7.2.6
Alphanumeric Display	24-character readout for visual monitoring of receiver status.	2.7.2.1
TST Indicator	Indicates receiver is in Diagnostics mode when lit.	2.7.2.2
ERR Indicator	Indicates receiver non-fatal error.	2.7.2.3
LO Indicator	Indicates either 1st or 2nd LO unlock.	2.7.2.4
TUNE Meter	HIGH/LOW LED indicators located above tuning wheel. Indicates direction for fine tuning adjustment.	2.7.2.5
SHIFT	SHIFT (LED On) required to activate upper case function of two-function keys.	2.7.3.4
Numeric Entry Keys	Digits "0" through "9" and decimal point available in most front panel modes. All are upper case functions that must be preceded by SHIFT (LED On). Allows for direct entry of data when permitted by receiver parameter.	2.7.3.5
DEL	Delete function permits change of last numeric entry (least significant digit) while SHIFT key is still active.	2.7.3.7
Increment (Δ) and Decrement (∇)	In most cases, permits stepping through available values of selected parameter. In frequency display, used to adjust position of blinking cursor (tuning resolution). Also available in MENU operation for toggle ON/OFF, YES/NO parameters, and to step through selection of menus.	2.7.3.3
COR	Permits adjustment of active COR level (COR LED On).	2.7.4.7
DET	Permits setting of active detection mode (DET LED On).	2.7.4.2

Table 2-7. WJ-8615P Controls and Indicators (Continued)

Controls and Indicators		Ref. Para.
IF BW	Permits setting of active IF bandwidth (IF BW LED On).	2.7.4.5
BFO	Permits adjustment of active BFO offset (special prompt displayed). Can only be used when DET = CW, LSB, USB, or ISB. SHIFT must be enabled.	2.7.4.8
+/-	Used in BFO offset entries.	2.7.4.9
FRQ	Permits adjustment of active tuned frequency (FRQ LED On).	2.7.4.1
AFC	Toggles AFC ON/OFF (AFC LED indicator On/Off).	2.7.4.4
AGC	Toggles AGC ON/OFF (AGC LED indicator On/Off).	2.7.4.3
RF ATTN	Permits adjustment of active RF attenuation level (RF ATTN LED On and special prompt displayed. AGC LED indicator Off).	2.7.4.6
STORE	Permits storage of active receiver parameters in set memory location (special prompt displayed).	2.7.7.1
MEM	Permits access to set memory location for review and editing of stored parameters (MEM LED On).	2.7.7.2
EXEC	Used in MEM mode to set active receiver parameters to values displayed.	2.7.7.3
MENU	Permits selection of MENU set-up mode (MENU LED On).	2.7.7.4
SCAN	Permits review and selection of SCAN set-up channel (special prompt displayed). Used in conjunction with ENTER control key to initiate SCAN.	2.7.5.3
STEP	Permits setting of STEP start and stop channels (special prompt displayed). Used in conjunction with ENTER control key to initiate STEP.	2.7.5.2
MAN	Halts SCAN and STEP action (MAN LED On or blinking On and Off).	2.7.5.1
LCKOUT	Permits setting of LOCKOUT parameters (LCKOUT LED On and special prompt displayed). Used in conjunction with increment and decrement keys and ENTER control keys to initiate LOCKOUT.	2.7.7.6
HDOFF	Permits handoff of receiver parameters to a compatible receiver on the WJ HANDOFF network.	2.7.7.5

Table 2-7. WJ-8615P Controls and Indicators (Continued)

Controls and Indicators		Ref. Para.
ENTER	Used to complete numeric key entries setting parameter to new numeric value. Also used as sequence prompt in SCAN, STEP, LOCK-OUT, and MENU modes, and for executing selected decisions.	2.7.3.6
REMOTE	Places receiver under remote control of remote controller (REMOTE LED On).	2.7.1.2

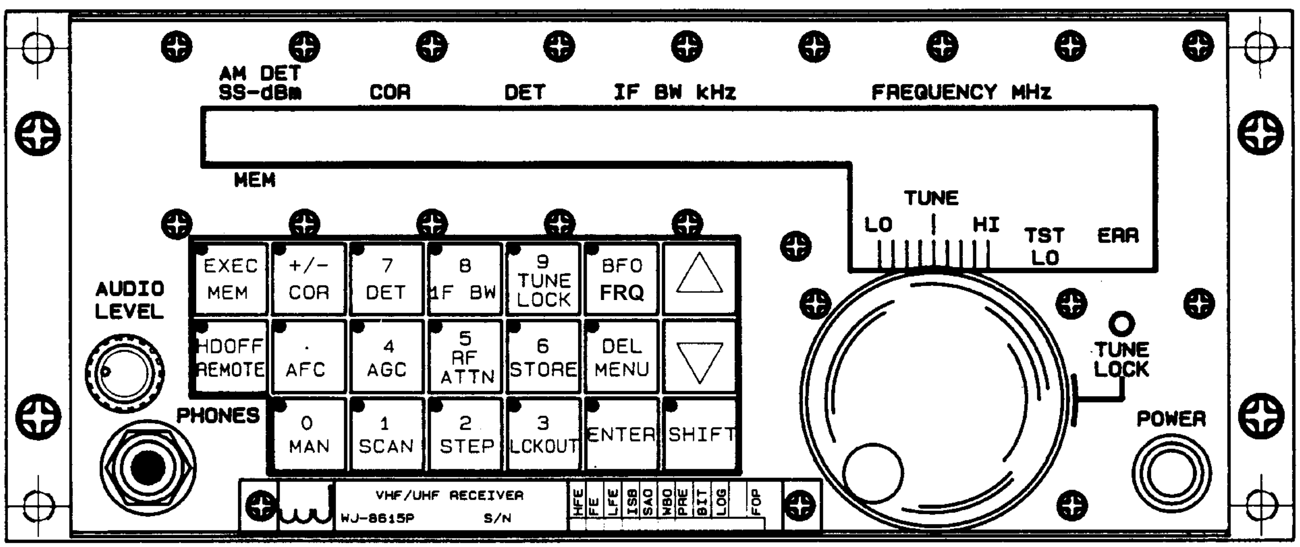

Figure 2-5. WJ-8615P Front Panel Controls and Indicators

2.7.1 INITIATING LOCAL OPERATIONS

To operate the WJ-8615P locally using the front panel controls, indicators, and displays, the unit is first powered-up using the POWER push button then placed into Local mode by depressing the REMOTE key (if powered-up in Remote mode). Local operation is enabled when the REMOTE key LED is off. **Paragraphs 2.7.1.1** and **2.7.1.2** provide more details on the POWER push button and REMOTE key, respectively.

2.7.1.1 **POWER Push Button** - This ON/OFF push button enables power to the WJ-8615P. Upon power-up, three actions occur. First, all LED indicators on the front panel are illuminated verifying front panel operation. Second, "WJ-8615P" followed by the software revision level are displayed. And third, the receiver front panel returns to the operating mode and parameters that were present prior to the last power interruption.

2.7.1.2 **REMOTE Key** - This key is used to place the receiver in either Remote or Local operation. The receiver is in Local operation when the REMOTE key LED is off. When placed in Remote (REMOTE key LED on), either by depressing the REMOTE key or by a command sent from a remote controller, adjustment of receiver parameters is carried out by the remote controller. As a convenience, the REMOTE mode permits the front panel of the receiver to display selected parameters. Remote operation may be exited by pressing the REMOTE key a second time (REMOTE key LED off), or by a command sent from the remote controller. The previous state of the receiver prior to entering the REMOTE mode will once again be displayed.

2.7.2 FRONT PANEL INDICATORS AND ALPHANUMERIC DISPLAY

The front panel indicators and alphanumeric display of the WJ-8615P enable the local operator to continuously monitor the status of the receiver's operation. Observing the information on the 24-character alphanumeric display, the front panel LED’s recognizes the status and the LED's associated with the keys on the keypad. The key LED's, when lit, are an indication that the function associated with the key is active.

The key LED's are color-coded. Green keys are receiver operating mode functions (MAN, STEP, and SCAN). Yellow keys are toggle on/off functions (AFC, AGC, TUNE LOCK). Red keys are mode keys which, when lit, allow for numeric entries related to the operating mode (FRQ, DET, COR, etc.). The red ENTER, SHIFT, and REMOTE keys deviate slightly. The ENTER LED prompts for action when either lit or flashing. The SHIFT LED, when lit, indicates that the keypad is in the upper case function. The REMOTE LED, when lit, indicates that the receiver is in Remote operations.

2.7.2.1 **Alphanumeric Display** - The alphanumeric display is a 24-character readout that provides the local operator the capability too visually monitor the status of the receiver. The information displayed is determined by the current operating mode. For example, when the receiver is in Manual mode the COR setting, detection mode, selected IF bandwidth and the tuned frequency are displayed. However, while in Scan mode, the Scan channel number and the Scan start and stop frequencies is displayed. When Menu operations are selected specific menus are displayed, and so on. In some displays a flashing cursor appears in a character position. This indicates that the parameter displayed in that the tuning wheel may adjust character position. More details on the various types of information displayed are provided throughout the Local Operations section where applicable.

2.7.2.2 **TST Indicator** - The TST LED, when lit, indicates that the receiver is in the Diagnostics mode. Refer to **paragraph 2.3.3** for details on the Diagnostics mode.

2.7.2.3 **ERR Indicator** - The ERR LED, when lit, indicates that a receiver non-fatal error has occurred. Refer to **paragraph 2.7.9.1** for details on determining the error and resetting the ERR LED.

2.7.2.4 **LO Indicator** - The LO LED illuminates in the event that either the 1st or 2nd LO unlock.

2.7.2.5 **TUNE Meter** - The TUNE meter LO/HI indicator bars are provided above the tuning wheel to indicate direction for tuning wheel fine adjustment. The receiver is properly centered on a signal when only the center bar of the tune meter is illuminated. The frequency range of the TUNE meter is one and one-half the selected IF bandwidth. For proper use of the TUNE meter display, the blinking cursor in the frequency window should be positioned so that adjustments do not exceed the range of the TUNE meter.

2.7.2.6 **TUNE LOCK Indicator** - The TUNE LOCK LED adjacent to the tuning wheel is lit when the TUNE LOCK key is depressed and the TUNE LOCK key LED is lit. When this LED is lit, the tuning wheel operation is disabled.

2.7.3 GENERAL ENTRY FUNCTION KEYS

2.7.3.1 **Tuning Wheel** - Tuning wheel operation is available in several front panel modes for the adjustment of selected receiver parameters. The primary use of the tuning wheel is to adjust the receiver tuned frequency. Tuning wheel availability is indicated by a blinking cursor in that parameters display area. The increment and decrement keys are used to reposition the blinking cursor in the frequency display window for tuning wheel adjustment.

2.7.3.2 **TUNE LOCK Key** - To prevent inadvertent adjustment of the tuning wheel from affecting a selected receiver parameter, tuning wheel operation may be disabled by pressing the TUNE LOCK key. When Tune Lock is enabled the TUNE LOCK key LED and the TUNE LOCK LED adjacent to the tuning wheel are illuminated.

2.7.3.3 **Increment and Decrement Keys (Arrows)** - The increment (Δ) and decrement (∇) keys permit selected receiver parameters to be adjusted by specific levels. In most cases, parameter adjustments are immediately set. In front panel operations where tuned frequency adjustment is permitted, the increment and decrement keys are used to reposition the blinking cursor in the tuned frequency display. In Menu operations the increment and decrement keys may be used to step through selection of menus, and to toggle ON/OFF and YES/NO parameters.

2.7.3.4 **SHIFT** - The SHIFT key is required to access upper case functions of two-function keys. The SHIFT entry must precede the control key entry in order to enable the upper case function (SHIFT LED on).

2.7.3.5 **Numeric Entry Keys** - The numeric entry keys are an upper case function of two-function keys which requires the SHIFT mode to be entered first (SHIFT LED on). The numeric entry keys (0 - 9) provide the capability for direct entry of numeric values when in a permitted direct entry mode. Entries may be canceled by pressing the SHIFT key a second time, exiting the SHIFT mode and restoring the front panel to values previously displayed. The decimal key (?) permits the entry of fractional values when permitted by the front panel parameter. Pressing the ENTER key completes a direct numeric entry and places the receiver in the previous front panel mode (SHIFT LED off).

2.7.3.6 **ENTER Key** - The ENTER key is available in most front panel operations to execute numeric entries (ENTER key LED blinking on and off). The ENTER key is also available as a prompt for walking the operator through multi-step functions such as Scan, Step, Lockout, and Menu, and for executing selected decisions.

2.7.3.7 **DEL Key** - The DEL key provides a means for editing direct entry values. This key is an upper case function of a two-function key which requires the SHIFT mode to be entered first (SHIFT LED on). When the DEL key is pressed, the last digit entered is deleted. If all set digits are deleted, the original value returns to the display.

2.7.4 RECEIVER PARAMETER CONTROLS

2.7.4.1 **FRQ Key** - The FRQ key permits adjustment of the receiver tuned frequency (FRQ LED on). Up to nine characters including the decimal point are available on the display for adjusting this parameter. When using the increment and decrement keys (to adjust cursor location) and the tuning wheel, the adjusted frequency is immediately set and signals are available to audio outputs. When using the numeric entry keys, the DEL key can be used to delete the last numeric entry. Direct numeric entries are completed after the ENTER key has been pressed (SHIFT and ENTER LEDs off). Attempts to enter a frequency beyond the capability of the receiver causes the special prompt "ENTRY OUT OF RANGE" to be displayed. This is followed by previous front panel values being returned to the display. FRQ selection may be exited by pressing an alternate front panel control key.

2.7.4.1.1 **FRQ Display** - The tuned frequency display is provided in the right-most area of the display window. Up to nine characters including a decimal point are available for the setting of this parameter in MHz.

2.7.4.2 **DET Key** - The DET control key (DET LED on) allows for selection of either AM, FM, CW, or Pulse detection modes. When the ISB option is installed LSB, USB, and ISB detection modes can be selected. The increment and decrement keys are available to immediately set this front panel parameter. DET selection may be exited by pressing an alternate front panel control key.

2.7.4.3 **AGC Key** - The AGC control key toggles Automatic Gain Control on and off (AGC LED on and off). When AGC is off, manual control of the receiver's RF gain can be achieved through the RF ATTN control key.

2.7.4.3.1 **AM DET/SIG STR Display** - The three available digits are used to display the signal strength of the receiver tuned frequency (in -dBm) when the receiver is set for Automatic Gain Control (AGC key LED on). If the receiver is set for manual RF attenuation (AGC key LED off), the signal strength window displays percent of utilization of the AM detector from 0 to 99%.

2.7.4.4 **AFC** - The AFC control key toggles Automatic Frequency Control on and off (AFC LED on and off). When enabled this function corrects for any frequency drift, keeping the receiver locked onto a set signal as long as the signal strength is sufficient to exceed the programmed COR level. AFC circuitry has an unlimited tracking range. (Although not apparent from the receiver front panel, AFC is momentarily defeated whenever the frequency is adjusted via the tuning wheel. This feature prevents AFC from competing with the tuning wheel.) When two signals are present which are close in frequency, AFC may lock onto the stronger signal. Therefore, when monitoring a low-level signal in the presence of stronger signals, it is advisable to disable AFC.

2.7.4.5 **IF BW Key** - The IF BW control key permits an operator to select between the IF bandwidth filters installed in the receiver (IF BW LED on). The increment and decrement keys may be used to cycle through a list of the three standard IF bandwidths and two optional bandwidths if installed. IF BW selection may be exited by pressing an alternate front panel control key.

2.7.4.5.1 **IF BW Display** - The IF bandwidth display provides for three alphanumeric characters to indicate the selected IF bandwidth of the receiver or a memory location. IF bandwidth size is in kHz unless M is displayed indicating MHz.

2.7.4.6 **RF ATTN Key** - The RF ATTN control key permits an operator to adjust RF attenuation values of the receiver (RF ATTN LED on). Once enabled, the special prompt "ATN=" is displayed, followed by the current RF attenuation level. The increment and decrement keys and the numeric entry keys are available to enter values from "0" to "114" dB. RF ATTN selection may be exited by pressing an alternate front panel control key. This parameter is recognized only when AGC is off.

2.7.4.7 **COR Key** - The COR control key places the Carrier Operated Relay threshold of the receiver under keypad command (COR LED on). The COR level is an operator-selected power threshold. When the power level of the tuned carrier signal exceeds the COR threshold, the receiver responds in two ways. First, the audio output signals are activated. Second, a 100 mA current-sink to ground signal is generated that can activate an external device such as a tape recorder. See **paragraph 2.4.3** for details on the COR output. Initially, the active COR level is displayed. The increment and decrement keys can be used to adjust this level immediately. COR adjustments may also be set by use of the numeric entry keys (up to two digits). The DEL key is available to delete the last set digit.

The COR level is adjustable from the theoretical noise floor of a selected bandwidth to approximately 80 dB above that theoretical noise floor. When the receiver COR level is exceeded, both COR and AUDIO circuits activate. If the COR level is incremented above 80 or if a number greater than 80 is entered using the numeric entry keys, " -- " appears in the COR display indicating that no signal will exceed COR (regardless of signal strength). COR may be exited by pressing an alternate front panel control key.

2.7.4.8 **BFO Key** - The BFO control key is utilized to allow tuning of the Beat Frequency Oscillator. This key is an upper case function of a two-function key which requires the SHIFT mode to be entered first (SHIFT LED on). This function is accessible only in CW, LSB, USB, or ISB detection modes. Once enabled, the special prompt "BFO OFFSET =" will be displayed, followed by an offset frequency of ±4 kHz in 40 Hz steps for CW or ±2 kHz in 20 Hz steps for LSB, USB, and ISB modes. The increment and decrement keys and tuning wheel adjustment are available to immediately set BFO offset, stepping up or down by appropriate increments. The numeric entry keys may be used to select a specific BFO offset (up to five characters including a decimal point and plus (+) or minus (-) sign). BFO selection may be exited by pressing an alternate front panel control key.

2.7.4.9 **+/- Key** - The +/- key allows for entry of BFO offsets. This key is an upper case function of a two-function key which requires the SHIFT mode to be entered first (SHIFT LED on). This key toggles between positive and negative with successive entries. This entry is permitted only in CW, LSB, USB, and ISB detection modes.

2.7.4.10 **AUDIO LEVEL Control** - This control knob adjusts the level of audio signal present at the headset phone jack (J12). Adjustment of this control does not affect the audio level present at Audio Line outputs USB/AUD 1 (J6) and LSB/AUD 2 (J7).

2.7.5 MODE CONTROL KEYS

2.7.5.1 **MAN Key** - The MAN key is used to place the receiver in the Manual mode of operation. Manual mode is enabled when the MAN key LED is lit. The MAN key is also used to freeze a Scan or Step operation at any point in the sequence so that receiver parameters can be modified and/or stored. Pressing the MAN key twice during an active Scan or Step operation places the receiver into Manual mode.

2.7.5.2 **STEP Key** - The STEP key is used to place the receiver in the Step mode of operation. The Step mode allows the receiver to tune to discrete frequencies by stepping through receiver parameters stored in sequences of memory channels. The receiver is in a Step mode when the STEP key LED is lit. Refer to **paragraph 2.7.10** for more details on Step operations.

2.7.5.3 **SCAN Key** - The SCAN key is used to place the receiver in the SCAN mode of operation. The SCAN mode provides the capability of scanning across operator determined frequency segments. The receiver is in a Scan mode when the SCAN key LED is lit. Refer to **paragraph 2.7.11** for more details on Scan operations.

2.7.6 LOCAL OPERATION EXAMPLE - MANUAL MODE

When the receiver is in Manual mode (MAN key LED on), front panel controls keys and tuning wheel adjustment are used to set active receiver parameters. The following paragraphs provide examples that illustrate the setting of front panel parameters with typical values.

2.7.6.1 Placing the Receiver into Local Operating Mode

The following example illustrates the action of placing the receiver into local operation from the receiver front panel. As shown, pressing the REMOTE key places the receiver out of remote control and into local. See **paragraph 2.7.1.2** for more details on the REMOTE key.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
	0%	*00	AM	10	20.0000	REMOTE	20.0000
REMOTE	0%	*00	AM	10	20.0000	Indeterminant	20.0000

Note: Underlined character indicates flashing cursor position.

2.7.6.2 Adjusting the Tuned Frequency

While in Manual mode, the active tuned frequency may be changed to another frequency as illustrated in the following example. In the example, the FRQ (frequency) key is depressed first to activate the frequency display mode. The SHIFT key is pressed to activate the numeric entry keys. Then the numeric entry keys and the decimal key are used to enter the new frequency, starting with the most significant digit. Pressing the ENTER key enters the new tuned frequency. Notice that while the display may indicate a new tuned frequency that the tuned frequency is not valid until the ENTER key is pressed. If the adjusted frequency is outside the tuning range of the receiver, the entry is not accepted and the prompt "ENTRY OUT OF RANGE" is displayed. This then causes the last valid frequency entered to be displayed. Refer to **paragraph 2.7.4.1** for more details on the FRQ key and adjusting the receiver tuned frequency.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
FRQ	80	*18	FM	300	20.0000	FRQ	20.0000
SHIFT	80	*18	FM	300	20.0000	FRQ	20.0000
9	80	*18	FM	300	9	FRQ	20.0000
8	80	*18	FM	300	98	FRQ	20.0000
•	80	*18	FM	300	98.	FRQ	20.0000
7	80	*18	FM	300	98.7	FRQ	20.0000
ENTER	41	*18	FM	300	98.7000	FRQ	98.700

Note: Underlined character indicates flashing cursor position.

2.7.6.3 Setting the Detection Mode

The receiver active detection mode may be changed at any time while in Manual by first pressing the DET (detection) key, then pressing the increment and decrement keys until the desired detection mode is displayed. The following example illustrates the sequence for changing the detection mode from AM to FM. See **paragraph 2.7.4.2** for additional information on the DET key.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
DET	80	*18	AM	10	20.000<u>0</u>	DET	20.0000
∇	80	*18	FM	10	20.000<u>0</u>	DET	20.0000

Note: Underlined character indicates flashing cursor position.

2.7.6.4 Selecting the IF Bandwidth

As illustrated in the following example, the IF bandwidth selection may be changed while in Manual by first pressing the IF BW key. Then the increment and decrement keys are used to step through the installed IF bandwidth values until the desired IF bandwidth is displayed. Using the increment key steps to the next widest bandwidth filter installed. See **paragraph 2.7.4.5** for more details on the IF BW key.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
DET	80	*18	FM	10	20.000<u>0</u>	IF BW	20.0000
∇	80	*18	FM	100	20.000<u>0</u>	IF BW	20.0000
∇	80	*18	FM	300	20.000<u>0</u>	IF BW	20.0000

Note: Underlined character indicates flashing cursor position.

2.7.6.5 Setting AGC Status

As shown in the following example, AGC may be turned on and off while in Manual by pressing the AGC key. The AGC LED is illuminated when AGC is active. Refer to **paragraph 2.7.4.3** for more information on AGC operation.

Local Input	WJ-8615P Response						
Keypad Entry/ Tuning Wheel Adjustment	Alphanumeric Display						
	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
AGC	80	*18	AM	10	20.000<u>0</u>	COR	20.0000

Note: Underlined character indicates flashing cursor position.

2.7.6.6 Setting AFC Status

As shown in the following example, AFC may be turned on and off while in Manual by pressing the AFC key. The AFC LED is illuminated when AFC is active. Refer to **paragraph 2.7.4.4** for more information on AFC operation.

Local Input	WJ-8615P Response						
Keypad Entry/ Tuning Wheel Adjustment	Alphanumeric Display						
	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
AGC	80	*18	AM	10	20.000<u>0</u>	FRQ	20.0000

Note: Underlined character indicates flashing cursor position.

2.7.6.7 Adjusting the COR Level

The following example illustrates a procedure for adjusting the active COR level to the desired setting while in Manual mode. As shown, the COR key is pressed to enter the display into COR mode. The COR level is then changed by first pressing the SHIFT key (SHIFT key LED on) and then the appropriate numeric entry keys. After the COR level is set to the desired value, the ENTER key is pressed to set the new level. See **paragraph 2.7.4.7** for more details on the COR key.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
COR	0%	*00	AM	10	20.000<u>0</u>	COR	20.0000
SHIFT	0%	*0<u>0</u>	AM	10	20.0000	COR	20.0000
1	0%	* 1	AM	10	20.0000	COR	20.0000
8	0%	*1<u>8</u>	AM	10	20.0000	COR	20.0000
ENTER	0%	*1<u>8</u>	AM	10	20.000<u>0</u>	COR	20.0000

Note: Underlined character indicates flashing cursor position.

2.7.7 SPECIAL FUNCTION KEYS

2.7.7.1 **<u>STORE Key</u>** - The STORE control key allows for the storage into memory of the primary front panel parameters such as COR level, detection mode, IF bandwidth, BFO offset, tuned frequency, AFC on/off, AGC on/off, and RF attenuation. The message "STORE IN MEM CHNL" will be displayed followed by a value ranging from "0" through "149", indicating the set memory location to be used (initially the address of the current memory channel). Channel numbers prefixed with "M" are for Manual and Step operation use. Channel numbers prefixed with "S" are for Scan operations. The increment and decrement keys and tuning wheel adjustment may be used to immediately step through memory channels. Numeric entries may be used (up to three digits) to select a specific memory location. The DEL key is available to delete the last numeric digit entered. Actual storage of front panel parameters will not occur until the ENTER key is pressed (both STORE and ENTER LEDs off). STORE may be exited by pressing the STORE key a second time, or by pressing an alternate front panel control key.

2.7.7.2 **<u>MEM Key</u>** - The MEM control key permits access to any of 150 memory channels for the review of stored front panel setups (MEM key LED on). Pressing this key will cause the current memory channel of the receiver and its parameters to be displayed. See **paragraph 2.7.8** for more details on the use of the MEM key.

2.7.7.3 **<u>EXEC Key</u>** - The EXEC key is used to set active receiver parameters to those displayed in the called up memory channel (MEM key). This key is an upper case function of a two-function key which requires the SHIFT mode to be entered first (SHIFT LED on). See **paragraph 2.7.8** for more details on the use of the EXEC key.

2.7.7.4 **<u>MENU Key</u>** - The MENU key allows access to eight receiver menus for viewing and/or adjustment of menu settings. See **paragraph 2.7.9** for details of menu operations.

2.7.7.5 **<u>HDOFF Key</u>** - The HDOFF key is used to handoff parameters to any compatible receiver connected to the WJ HANDOFF network. This key is an upper case function of a two-function key which requires the SHIFT mode to be entered first (SHIFT LED on). See **paragraph 2.7.12** for more details on Handoff operations.

2.7.7.6 **<u>LCKOUT Key</u>** - The Lockout function allows an operator to specify segments of the frequency spectrum to be skipped during Scan operations. See **paragraph 2.7.11.9** for more details on the Lockout function.

2.7.8 MEM OPERATIONS

150 memory channels are available for the storage of front panel setups. Front panel setups may be loaded into a memory channel by pressing the STORE key. The MEM control key permits access to any of the 150 memory channels for the review of stored front panel setups (MEM LED on). Pressing this control key will cause the current memory channel of the receiver and its parameters to be displayed. Partition of memory occurs between channels allocated for SCAN ("S") and channels allocated for STEP ("M"). (Refer to **paragraph 2.7.9.5** for partitioning of memory.) The increment and decrement keys or the tuning wheel may be used to step up or down through adjacent memory channels, immediately displaying stored front panel parameters. Specific memory channels may be selected using the numeric entry keys to enter the three-digit memory location. The numeric entry selection is displayed after pressing the ENTER key (both SHIFT and ENTER LEDs on). These parameters may be executed as active parameters by pressing the EXEC key, refreshing the MEM window display with a SIG STR or % AM DET display.

The MEM display window is functionally shared with the SIG STR and % IS display. Three digits are used to indicate which of memory channels "0" through "149" is being viewed while the receiver is in MEM mode. The first character in the MEM display is used to indicate whether the memory location is partitioned as a SCAN channel ("S") or as a memory location allocated for STEP or MANUAL ("M").

2.7.8.1 <u>Placing Front Panel Setup in Receiver Memory</u>

Front panel setups may be stored in the receiver memory for later recall. In the following example, a front panel setup with a tuned frequency of 98.7000 and IF bandwidth of 300, etc., is stored in memory channel 000 by use of the STORE and ENTER keys. Next, the tuned frequency and IF bandwidth entries are adjusted to new values. After determining which memory channel the new front panel setup parameters will be stored in, the MEM key is pressed and the increment key is used to toggle through memory channels until the desired channel is displayed. The current contents of that memory channel are also displayed. Prior to storing a front panel setup in receiver memory, it is advisable to review stored parameters in the target memory channel to avoid destroying what may be valuable data. The STORE key is pressed, which then displays a prompt asking for the target memory channel. When the desired memory channel is displayed, the ENTER key is pressed which loads the new front panel parameters into the memory channel. See **paragraph 2.7.7.1** for more details on the use of the STORE key and **paragraph 2.7.7.2** for the MEM key.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
STORE	STORE IN MEM CHNL				M000	STORE	98.7000
ENTER	41	*18	FM	300	98.7000	FRQ	98.7000
SHIFT	41	*18	FM	300	98.7000	FRQ	
1	41	*18	FM	300	1	FRQ	
6	41	*18	FM	300	16	FRQ	
2	41	*18	FM	300	162	FRQ	
•	41	*18	FM	300	162.	FRQ	
5	41	*18	FM	300	162.5	FRQ	
5	41	*18	FM	300	162.55	FRQ	
ENTER	70	*18	FM	300	162.5500	FRQ	
IF BW	70	*18	FM	300	162.5500	IF BW	
∇	70	*18	FM	100	162.5500	IF BW	
∇	70	*18	FM	10	162.5500	IF BW	
MEM	M000	*18	FM	300	98.7000	MEM	
Δ	M001	*00	AM	10	20.000	MEM	
STORE	STORE IN MEM CHNL				M001	STORE	
ENTER	70	*18	FM	10	162.5500	IF BW	

Note: Underlined character indicates flashing cursor position.

2.7.8.2 Recalling Front Panel Setups from Receiver Memory

A front panel setup may be recalled from a previously stored memory channel to automatically change front panel parameters. As shown in the following example, the MEM key is pressed then the increment or decrement key is used to toggle through to the memory channel, which contains the desired front panel setup. The SHIFT key is pressed to enable the EXEC (execute) key. Pressing the EXEC key automatically changes the front panel setup to the parameters stored in the memory channel. See **paragraph 2.7.7.3** for more details on the EXEC key.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
MEM	M001	18	FM	10	162.5500	MEM	162.5500
∇	M000	*18	FM	300	98.7000	MEM	162.5500
SHIFT	M000	*18	FM	300	98.7000	MEM	162.5500
EXEC	41	*18	FM	300	98.7000	IF BW	98.7000

Note: Underlined character indicates flashing cursor position.

2.7.8.3 Modifying Front Panel Setups in Receiver Memory

In MEM mode, any of the following six memory combination modes can be entered to adjust parameters stored in the selected memory channel:

- MEM COR
- MEM DET
- MEM IF BW
- MEM SHIFT BFO
- MEM FRQ
- MEM RF ATTN

The new value is stored in memory by exiting the MEM mode, or by entering a new MEM combination mode. To change from one combination mode to the next requires only that a new combination function key be pressed (e.g., press DET to change from MEM COR to MEM DET). The MEM mode may be exited by pressing the MEM control key a second time (MEM LED off), or by pressing an alternate front panel control key that is not a MEM combination key. Also the AFC and AGC settings that prevail at the time of the MEM combination mode is exited are stored in memory. The following paragraphs further explain the individual MEM combination modes.

2.7.8.3.1 MEM FRQ Combination

In this mode both MEM and FRQ indicators are on. Tuning wheel adjustment and numeric entry keys (up to nine characters including a decimal point) can be used to set the tuned frequency. The increment and decrement keys are available to adjust the location of the cursor in the frequency display window. The DEL key is available to delete the last numeric entry character entered. The numeric key entry is fixed by pressing the ENTER key (both SHIFT and ENTER LEDs off).

2.7.8.3.2 **MEM DET Combination**

In this mode both MEM and DET indicators are on. The increment and decrement keys and tuning wheel adjustment are available to set the detection mode.

2.7.8.3.3 **MEM IF BW Combination**

The MEM IF BW combination allows for adjusting the IF bandwidth selection. Both MEM and IF BW indicators will be on. The increment and decrement keys and tuning wheel adjustment are available to set the IF bandwidth.

2.7.8.3.4 **MEM RF ATTN Combination**

In this mode both MEM and RF ATTN indicators will be on and "ATN =" message will be displayed. The increment and decrement keys, tuning wheel adjustment and numeric entry keys (up to three digits) can be used to set RF attenuation. The DEL key is available to delete the last digit entered. The numeric key entry is fixed by pressing the ENTER key (both SHIFT and ENTER LEDs Off).

2.7.8.3.5 **MEM COR Combination**

In this combination mode both MEM and COR indicators are on. The increment and decrement keys, tuning wheel adjustment, and numeric key entries (up to two digits) are available to adjust the COR level. The DEL key is available to delete the last numeric key digit entered. The numeric key entry is fixed by pressing the ENTER key (both SHIFT and ENTER LEDs off).

2.7.8.3.6 **MEM SHIFT BFO Combination**

In this mode the MEM indicator will be on and "MEM BFO =" message will be displayed. The increment and decrement keys, tuning wheel adjustment, and numeric entry keys (up to five characters including a decimal point and positive or negative sign) can be used to adjust this parameter. The DEL key is available to delete the last character entered by the numeric entry keys. The +/- key is provided to toggle between positive and negative offset. The numeric key entry is fixed by pressing the ENTER key (both SHIFT and ENTER LEDs off).

2.7.8.3.7 **Changing the AFC and AGC Status of Memory**

The AFC and AGC status can be changed in the selected memory channel by pressing the AFC and AGC keys toggling them on or off while the MEM indicator is lit.

2.7.9 MENU OPERATIONS

Eight receiver menus are available for further enhancement of receiver operations. The MENU control key allows access to the receiver menus for viewing and/or adjustment of menu settings. Pressing this key illuminates the MENU LED and causes the special prompt "ACKNOWLEDGE ERR MENU" to be displayed. The increment and decrement keys, tuning wheel adjustment, and numeric entry keys are available to select between any of the following eight receiver menus:

- 00 ACKNOWLEDGE ERR MENU
- 01 LOAD SCAN MENU
- 02 LOAD MEM/STEP MENU
- 03 SCAN/STEP CONFIGURATION MENU
- 04 MEMORY PARTITION MENU
- 05 TIME/DATE MENU
- 06 LOG SELECTION MENU
- 07 RESET RECEIVER MENU

The ENTER control key (ENTER LED blinking on and off) is used as an operator prompt to initiate the selected menu. Pressing the MENU key a second time prior to storing decisions during review and/or adjustment of a receiver menu causes the receiver to exit MENU mode (MENU LED Off), restoring MENU parameters to previous values. The following paragraphs provide further details on the eight receiver menus.

2.7.9.1 00 Acknowledge Err Menu

Selecting this menu item and pressing the ENTER control key accesses the ACKNOWLEDGE ERR MENU, allowing the most recent receiver error number to be reviewed and cleared.

ERROR NUMBER: A three-digit error code is displayed. (Refer **to paragraph 2.10** for definition of error codes.) Pressing the ENTER control key clears the error and causes the receiver to exit the MENU mode (MENU LED off).

2.7.9.2 01 Load Scan Menu

Selecting this menu item and pressing the ENTER control key accesses the LOAD SCAN MENU, allowing for the review and/or setting of the following SCAN parameters:

SCAN CHANNEL NUMBER: Increment and decrement keys, tuning wheel adjustment, and numeric entry keys are available to select between one of as many as 74 SCAN channels. Each SCAN channel requires two memory locations: one location for START FREQ, SCAN IF BW, SCAN COR LEVEL, SCAN DETECTION MODE, SCAN AFC, and SCAN AGC, SCAN RF ATTN, and the second location for STOP FREQ. The number of SCAN channels available equals one-half of the number of "S" memory locations partitioned. SCAN channel "00" corresponds to the first two "S" memory locations. (See **paragraph 2.7.9.4**).

Pressing the ENTER control key sets the selected SCAN CHANNEL NUMBER and advances the LOAD SCAN MENU to START FREQ.

START FREQ: Numeric key entries (up to nine characters including a decimal point) and tuning wheel adjustment are available for setting START FREQ. When adjusting by tuning wheel, increment and decrement keys provide for repositioning of the blinking cursor. Pressing the ENTER key sets the selected START FREQ and advances the LOAD SCAN MENU to STOP FREQ. Entries beyond the tuning range of the receiver cause the prompt ENTRY OUT OF RANGE to be displayed. The LOAD SCAN MENU will then return to START FREQ.

STOP FREQ: Numeric key entries (up to nine characters including a decimal point) and tuning wheel adjustment are available for setting STOP FREQ. When adjusting by tuning wheel, the increment and decrement keys provide for repositioning of the blinking cursor. The STOP FREQ entered must be greater than or equal to the set START FREQ. Pressing the ENTER key sets the selected STOP FREQ and advances the LOAD SCAN MENU to SCAN IF BW. Entries beyond the tuning range of the receiver cause the prompt ENTRY OUT OF RANGE to be displayed. The LOAD SCAN MENU will then return to STOP FREQ.

SCAN IF BW: The increment and decrement keys and tuning wheel adjustment are available to select any of the available IF bandwidths installed in the receiver. Pressing the ENTER key sets the selected SCAN IF BW and advances the LOAD SCAN MENU to SCAN COR LEVEL.

SCAN COR LEVEL: The increment and decrement keys, tuning wheel adjustment, and numeric key entries are available to select the SCAN COR LEVEL. The receiver allows for entries of 0 to 80 which correspond to decibels above the theoretical noise floor of a selected IF bandwidth. Entries greater than 80 place COR off, and are displayed as "--". With this setting no signal will exceed COR (regardless of signal strength). Pressing the ENTER key sets the selected SCAN COR LEVEL and advances the LOAD SCAN MENU to SCAN DETECTION MODE.

SCAN DETECTION MODE: The increment and decrement keys and tuning wheel adjustment are available to select SCAN DETECTION MODE. Pressing the ENTER key sets the selected decision and advances LOAD SCAN MENU to SCAN AFC.

SCAN AFC: The increment and decrement keys and tuning wheel adjustment are available to toggle SCAN AFC "ON"/"OFF". Pressing the ENTER key sets the selected SCAN AFC decision and advances LOAD SCAN MENU to SCAN AGC.

SCAN AGC: The increment and decrement keys and tuning wheel adjustment are available to toggle SCAN AGC "ON"/"OFF". During SCAN operations, AGC should always be ON. Pressing the ENTER key set to "OFF" advances LOAD SCAN MENU to SCAN RF ATTN. Pressing the ENTER key set to "ON" advances LOAD SCAN MENU to STORE DECISIONS.

SCAN RF ATTN: The increment and decrement keys, tuning wheel adjustment, and numeric key entries allow for setting RF attenuation to a value ranging from "0" to "114".

STORE DECISIONS: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". Pressing the ENTER key with the display set to "NO" advances the LOAD SCAN MENU back to SCAN CHANNEL NUMBER. Pressing the ENTER key set to "YES" stores all set LOAD SCAN MENU decisions and causes the receiver to exit the MENU mode (MENU LED off).

2.7.9.3 02 Load Mem/Step Menu

Pressing the ENTER control key places the receiver into LOAD MEM/STEP MENU mode, allowing for the review and/or setting of the following STEP parameters:

MEM CHANNEL NUMBER: The increment and decrement keys, tuning wheel adjustment, and numeric key entries (up to three characters) are available to select any one of as many as 148 STEP channels. Each STEP channel requires one memory location. The number of STEP channels available equals the number of "M" memory locations partitioned. STEP channel "000" corresponds to the first "M" memory location. (See **paragraph 2.7.9.4**) Pressing the ENTER control key sets the selected MEM CHANNEL NUMBER and advances the LOAD MEM/STEP MENU to STEP CHANNEL ENABLE.

STEP CHANNEL ENABLE: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". With STEP CHANNEL ENABLE set to "NO", the receiver is able to avoid stopping on a known signal during STEP (even if signal activity exceeds COR). This avoids deleting STEP channel parameters, and losing what may be a desirable signal at a later time. Pressing the ENTER key sets the selected decision and advances LOAD MEM/STEP MENU to FREQUENCY.

FREQUENCY: Numeric key entries (up to nine characters including a decimal point) and tuning wheel adjustment are available for setting FREQUENCY. When adjusting by tuning wheel, the increment and decrement keys provide for advancing of the blinking cursor. Pressing the ENTER key sets the selected value and advances LOAD MEM/STEP MENU to IF BW. Entries beyond the tuning range of the receiver cause the prompt ENTRY OUT OF RANGE to be displayed. The LOAD MEM/STEP MENU will then return to FREQUENCY.

IF BW: The increment and decrement keys and tuning wheel adjustment are available to select any of the available IF bandwidths installed in the receiver. Pressing the ENTER key sets the selected IF BW and advances the LOAD MEM/STEP MENU to COR LEVEL.

COR LEVEL: The increment and decrement keys, tuning wheel adjustment, and numeric key entries are available to select COR LEVEL. The receiver allows for entries of 0 to 80. Entries greater than 80 place COR off, and are displayed as "--". With this setting, no signal will exceed COR (regardless of signal strength). Pressing the ENTER key sets the selected COR LEVEL and advances the LOAD MEM/STEP MENU to DETECTION MODE.

DETECTION MODE: The increment and decrement keys and tuning wheel adjustment are available to select DETECTION MODE: AM, FM, CW, Pulse, LSB, USB, or ISB. Pressing the ENTER key sets the selected decision and advances LOAD MEM/STEP MENU to BFO OFFSET if CW, LSB, USB, or ISB detection mode is selected; otherwise it advances to AFC.

BFO OFFSET: The increment and decrement keys, tuning wheel adjustment, and numeric key entries are available to set BFO OFFSET. This parameter is accessible only in CW, LSB, USB, and ISB detection modes. Adjustments are between ±4.00 kHz in 40 Hz steps for CW or ±2.00 kHz in 20 Hz steps for LSB, USB, and ISB. Pressing the ENTER key sets the selected BFO OFFSET value and advances LOAD MEM/STEP MENU to AFC. Entries beyond the range of the set detection mode cause the prompt ENTRY OUT OF RANGE to be displayed and cause LOAD MEM/STEP MENU to advance back to BFO OFFSET.

AFC: The increment and decrement keys and tuning wheel adjustment are available to toggle AFC "ON"/"OFF". Pressing the ENTER key sets the selected AFC decision and advances LOAD MEM/STEP MENU to AGC.

AGC: The increment and decrement keys and tuning wheel adjustment are available to toggle AGC "ON"/"OFF". Pressing the ENTER key sets the selected AGC decision and advances LOAD MEM/STEP MENU to STORE DECISIONS when AGC is set to ON; otherwise, it advances to RF ATTN.

RF ATTN: The increment and decrement keys, tuning wheel adjustment, and numeric key entries are available to set RF ATTN. This parameter is accessible only when AGC is set to OFF. Pressing the ENTER key sets the selected decision and advances the LOAD MEM/STEP MENU to STORE DECISIONS.

STORE DECISIONS: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". Pressing the ENTER key with the display set to "NO" advances LOAD MEM/STEP MENU back to MEM CHANNEL NUMBER. Pressing the ENTER key set to "YES" stores all LOAD MEM/STEP MENU decisions and causes the receiver to exit the MENU mode (MENU LED off).

2.7.9.4 **<u>03 Scan/Step Configuration Mode</u>**

Pressing the ENTER key places the receiver into SCAN/STEP CONFIG MENU mode, allowing for the review and/or setting of the following SCAN/STEP operation decisions:

PRE DWELL: The increment and decrement keys, tuning wheel adjustment, and numeric key entries (up to three characters) are available to set PRE DWELL between 0 to 200 msec. Each SCAN can be thought of as a frequency range consisting of a finite number of sample points. PRE DWELL relates to the time the receiver waits at each sample point for energy detection before incrementing to the next. The lower the PRE DWELL time, the faster one SCAN is completed. A PRE DWELL of 0 causes the receiver to dwell the minimum time necessary for energy detection before advancing. High PRE DWELL settings allow the receiver more time to pick up on a signal if it is present. Pressing the ENTER key sets the selected PRE DWELL value and advances SCAN/STEP CONFIG MENU to SIG DWELL. Entries greater than 200 cause the prompt ENTRY OUT OF RANGE to be displayed and cause SCAN/STEP CONFIG MENU to advance back to PRE DWELL.

SIG DWELL: The increment and decrement keys, tuning wheel adjustment, and numeric key entries (up to three characters) are available to set SIG DWELL between 0 to 600 seconds. This relates to the maximum length of time the receiver will stay on a signal before continuing a SCAN or STEP sequence. Adjusting the SIG DWELL time to 601 causes Hold Signal Dwell to be selected. This causes the receiver to enter SCAN/MAN or STEP/MAN when a signal is encountered. Entries set greater than 601 are displayed as "INFINITY". This causes the receiver SCAN or STEP operation to halt as long as the signal is present. Pressing the ENTER key sets the selected SIG DWELL value and advances SCAN/STEP CONFIG MENU to POST DWELL.

POST DWELL: The increment and decrement keys, tuning wheel adjustment, and numeric key entries (up to three characters) are available to set POST DWELL between 0 to 200 seconds. This relates to the maximum time the receiver SCAN or STEP operation will halt after the signal is no longer present (i.e., how long the receiver waits for the signal to return before continuing the SCAN or STEP sequence). Entries set greater than 200 are displayed as INFINITY. This causes the receiver to halt a SCAN or STEP sequence until continued by the operator or time out of signal dwell. Pressing the ENTER key sets the selected POST DWELL value and advances SCAN/STEP CONFIG MENU to REPORT ADJACENT FRQ.

REPORT ADJACENT FRQ: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". Depending on the RF energy characteristics of a signal, several consecutive SCAN sample points may exist within the bandwidth of one signal. The "NO" setting allows the receiver to stop only once on the leading edge of a broadband signal. The SCAN will stop on a new signal only after the old signal drops below the set COR threshold. Pressing the ENTER key sets the selected decision and advances SCAN/STEP CONFIG MENU to SINGLE PASS SCAN.

SINGLE PASS SCAN: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". The "YES" setting will cause the receiver to halt a SCAN operation after completing one pass from start frequency to stop frequency. The receiver then enters SCAN/MAN mode. Pressing the SCAN key restarts SCAN. Pressing the ENTER key sets the selected decision and advances SCAN/STEP CONFIG MENU to HALF IF BW SCAN.

HALF IF BW SCAN: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". Pressing the ENTER key with the display set to "YES" enables the receiver to increment scans by one-half the selected IF bandwidth. The minimum SCAN increment size is 1 kHz. The SCAN/STEP CONFIG MENU will advance to STORE DECISIONS. Pressing the ENTER key set to "NO" advances SCAN/STEP CONFIG MENU to FULL IF BW SCAN.

FULL IF BW SCAN: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". Pressing the ENTER key with the display set to "YES" enables the receiver to increment scans by one full IF bandwidth. The SCAN/STEP CONFIG MENU will advance to STORE DECISIONS. Pressing the ENTER key set with the display to "NO" advances SCAN/STEP CONFIG MENU to SCAN INCREMENT.

SCAN INCREMENT: The increment and decrement keys, tuning wheel adjustment, and numeric key entries (up to four characters) are available to set SCAN INCREMENT size to any value from 1 kHz to 10 MHz in 1 kHz steps. Pressing the ENTER keys sets the selected value and advances SCAN/STEP CONFIG MENU to STORE DECISIONS. Entries outside the 1 kHz to 10 MHz range cause the prompt ENTRY OUT OF RANGE to be displayed and cause SCAN/STEP CONFIG MENU to advance back to SCAN INCREMENT.

STORE DECISIONS: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". Pressing the ENTER key with the display set to "NO" advances SCAN/STEP CONFIG MENU back to PRE DWELL. Pressing the ENTER key with the display set to "YES" stores all SCAN/STEP CONFIG MENU decisions and causes the receiver to exit the MENU mode (MENU LED off).

2.7.9.5 **04 Memory Partition Menu**

Pressing the ENTER key places the receiver into MEMORY PARTITION MENU, allowing for the review and/or setting of the SCAN/STEP memory channel partition.

PARTITION AT MEMORY: The increment and decrement keys, tuning wheel adjustment, and numeric key entries (up to three characters) are available to partition memory locations 0 to 149 between channels allocated for STEP ("M"), and channels allocated for SCAN ("S"). Partition of memory is permitted in increments of 2. For example, adjusting the tuning wheel for partition to take place at memory location channel 65 allocates channels 0 through 65 for STEP operations, and channels 66 through 149 for SCAN operations. Pressing the ENTER key stores the set decision and causes the receiver to exit the MENU mode (MENU LED off).

2.7.9.6 **05 Time/Date Menu**

The TIME/DATE menu allows entry of real time clock data such as the time of day in hours, minutes, and seconds and the date. This data complements the log output feature of the receiver. Pressing the ENTER key results in the following display of the time.

TIME HH:MM:SS SET, NO

To reset the time, turn the tuning wheel or press the increment and decrement keys to change the display to read SET, YES and press the ENTER key. The flashing cursor indicates the time field. Use the increment and decrement keys or the ENTER key to move the cursor from field to field. The digits may be changed using the tuning wheel or numeric entry keys. When in the seconds field pressing the increment key will wrap the cursor around to the hours field, while pressing the ENTER key, exits the TIME submenu. If no time reset is required, press ENTER. This results in the display:

DATE MM/DD/YY SET, NO

If no change in date is required, press ENTER. If a date reset is required, then proceed in a manner similar to entering the time.

2.7.9.7 **06 Log Selection Menu**

When the 06 LOG SELECTION MENU message is displayed, pressing the ENTER key places the receiver into a menu when one of the following five logging modes can be selected:

- LOG = OFF
- LOG = TAPE
- LOG = AUTOTAPE
- LOG = PRINTER
- LOG = AUTOPRINTER

This feature allows the receiver to log and time tag its signal hits in Scan or Step on either a printer or audiotape. Press the increment or decrement keys or slowly rotate the tuning wheel to observe the menu items. To select a menu item, press the ENTER key when the desired logging option is displayed. Tagging of signal data with time information is made possible by the inclusion of a Real Time Clock, which can be observed or reset in the TIME/DATE MENU.

2.7.9.7.1 **Log Message Formats**

There are four different types of logging message formats. Depending on the signal activity or the type of command, one of the following four different log formats is provided.

The Type #1 message format is provided when a signal is acquired. The Type #1 format is a 76-character string using the following format:

mm/dd_hh:mm:ss_mode_ffff.ffffMHz_bandxx_det_ss=-xxxdBm_am=xx%_fm=xx%_fmo=*xx%

An example of a typical Type #1 format is as follows:

09/17 11:42:36 MAN 1100.0000MHZ 250KHZ PLS SS=-115DBM AM=05% FM=99% FMO=-02%

Each parameter listed in **Table 2-8** provides the data for the receiver operating status at the time the signal was encountered. Blanks are added to fill the parameter field. For example; if the 10 kHz bandwidth is selected at the time a signal is encountered, the band parameter field displays _10kHz. The following table lists the parameter, the functions, and the parameter range.

Table 2-8. Logging Parameters

Parameter	Function	Range
mm	Month	01-12
dd	Day	01-31
hh	Hour	00-23
mm	Minute	00-59
ss	Second	00-59
mode	Step or Scan	SCN;STP;MAN;SCM;STM
ffff.ffff MHz	Tuned Frequency	0002.0000 to 1100.0000 MHz
band	IF Bandwidth	3.2 kHz to 4 MHz
det	Detection Mode	_AM; _FM; _CW PLS; ISB
ss=-xxx dBm	Signal Strength	000-127 dBm
am=xx%	AM Modulation % of IF BW	00-99%
fm=xx%	FM Modulation	00-99%
fmo=*xx%	FM Offset % of IF BW	± 00-99% (* = + or -)
inc=xxxxkHz	Step Size	1 kHz - 1 MHz

The Type #2 logging message format is provided when the level of a previously acquired signal drops below the set COR level. When this occurs, the following logging message format is sent:

mm/dd_hh:mm:ss_LOST.

This message informs the operator of the month **(mm)**/day **(dd)** hour **(hh)**: minute (mm): second (ss) and the reason for the data **(LOST)** and appears as follow:

09/22 18:32:04 LOST

If the signal level does not drop below the set COR level, and the receiver is forced to continue scanning or stepping, the Type #2 continue message format is used. The continue format as follows:

mm/dd_hh:mm:ss_CONT

This type of format indicates that the signal activity was still above the set COR level at the time the receiver continued its signal search. This message appears as follows:

09/22 18:31:58 CONT

The Type #3 message is provided only when a Scan mode is first initiated. Starting a scan produces the following message:

mm/dd_hh:mm:ss_SCAN_START_ffff.ffff_-_ffff.ffff MHz_inc=xxxx kHz_band_det_cor

Table 2-8 lists the logging parameters. The receiver does not begin scanning until the Type #3 message format is logged. The Type #3 message is as follows:

10/23 14:07:17 SCAN START 0350.0000 - 0450.0000MHZ INC-0010KHZ 10KHZ AM 20

SCAN START is used to indicate that this is the first data for the start of a scan. The **ffff.ffff** is used to indicate the starting frequency and **ffff.ffff MHz** indicates the stop frequency. The step size is indicated by the data in the **inc=xxxx kHz field**. The COR range is from 00 to 80. Once the Type #3 format is logged, the scan begins. When a signal is encountered that exceeds the set COR level, the Type #1 logging format is used to log signal data.

A Type #4 message is sent when the step mode is first initiated. The following message format is sent when the step mode is initiated:

mm/dd_hh:mm:ss_STEP_START

This information is output to the printer or tape recorder to provide a log indicating the month, day, and time stepping began. The following Type #4 message indicates only three channels are to be used for the step mode.

09/22 18:31:45 STEP START

CHL	FREQUENCY	IFBW	DET	COR
000	0030.0000MHz	10KHZ	AM	40
001	0040.0000MHz	10KHZ	AM	40
002	0034.6200MHz	10KHZ	AM	40

2.7.9.7.2 **Logging Modes**

The logging mode format is as follows:

Stop Bit	1
Bits per Character	7
Parity	Odd (On)

When the OFF logging mode is selected, no information is output from the receiver. The logging option is disabled.

Setting of the COR delay time is recommended prior to logging. The COR delay time is the time between losing the signal (when the signal level drops below the set COR level) and disabling the COR line. The COR time delay is selectable via the Definitions menu (see **paragraph 2.3.3**). The COR delay is selectable from 0 to 10 seconds (in 1 second increments). It is helpful in preventing the receiver from losing second parties when monitoring two-way push-to-talk communications on recorders. This causes the recorder to continue running after the signal goes down.

In the printer modes the receiver may interface to an RS-232 input device working at a baud rate of 110,150, 300, 600, 1200, 1800, 2000, 2400, 4800, or 9600 bits per second. The baud rate is set in the Definitions menu (**see paragraph 2.3.3**). If the receiver memory is lost, the default baud rate is 9600.

When the LOG = PRINTER mode is entered, the receiver provides the Type #4 message format to the printer. The memory channels that are going to be stepped through then follow this message. One line of data is output to the printer for each channel. Refer to the Type #4 message sample. This is a sample of this step mode using three memory channels.

This message format is provided for each memory channel that is included in the step sequence. When the printer logging scan mode is started, the receiver provides a Type #3 message to the printer. The step or scan operation is performed until a signal exceeding the set COR level is encountered. When a valid signal is encountered, the signal data is output to the printer using the Type #1 data format.

The receiver remains locked on the signal until the signal level drops below the set COR level. When the signal level no longer exceeds the COR level, the following continue message is output: mm/dd_hh:mm:ss_LOST, indicating the step or scan operation is continuing.

The LOG = AUTO-PRINTER mode is very similar to the LOG = PRINTER mode, except that the receiver continues its operation after the signal data is logged. Encountering a frequency that exceeds the set COR level causes the receiver to halt, to output the signal data, using Type #1 data format, to output the Type #2 continue message, and then to resume the sequence.

In tape mode the signal hits may be stored on the second track of a recorder in an FSK format to characterize collected audio track information with time and parameter data. The WJ-9863 allows the decoding of this data to RS-232 format during playback. When logging to a printer and an audiotape simultaneously, use LOG=TAPE or LOG=AUTO-TAPE mode. In either instance, the printer has to be configured for 1200 baud.

Before setting up either of the tape logging modes (LOG = TAPE or LOG=AUTO-TAPE), the tape delay must be set, so that FSK data bursts are not lost before the tape drive mechanism starts and gets up to full speed. Different tape machines require different amounts of time delay for the tape drive mechanism to start. The tape delay is the time between the COR output enable going Low and the output of logging data. The tape delay is selectable from 0 to 5000 milliseconds (in 50 millisecond increments). The tape delay is set in the Definitions menu (see paragraph 2.3.3). If the receiver memory is lost, the default tape delay is 250 milliseconds. The tape log mode allows the data from the receiver to be applied to a tape recorder. Data is applied to the tape device using frequency shift keying (FSK). FSK uses 1300 Hz for a "mark" (a logic 1) and 2100 Hz for a "space" (a logic 0).

The LOG = TAPE mode uses the output COR level to start and stop the tape recorder. A tape delay can be set, allowing the tape device to be turned on before receiving data from the receiver. This prevents the loss of data due to the recorder start up time. The tape delay is variable from 0 to 5000 milliseconds (in 50 millisecond steps). The default tape delay is 250 milliseconds.

When first starting a scan or step operation, the receiver sends either the Type #3 (for scan) or Type #4 (for step) message format. This data informs the operator that the step or scan sequence is starting. Encountering a signal during step or scan operation, which exceeds the set COR level, causes the receiver to halt its scan or step operation and output data to the tape recorder. Output data is in the Type #1 format.

Once data has been logged to the tape recorder, the receiver operation halts and remains locked on frequency until the signal level drops below the set COR level. For stepping or scanning to continue, the signal level must drop below the set COR level. When this happens, the receiver provides the Type #2 message format, indicating that the signal was lost.

The LOG = AUTO-TAPE mode is very similar to LOG = TAPE mode, with the exception that the receiver continues its operation after logging the signal data. This mode is useful to log signal activity quickly within the scanning frequency or to log the specific signal activity at the step frequencies without waiting for the signal to drop below the set COR level.

At the start of an Auto Tape Log, the receiver outputs a Type #4 message format indicating the start of the step operation or Type #3 message format, indicating the start of the scan operation. In the step mode, the receiver tunes to the operator-programmed frequencies, in search of frequencies that exceed the set COR level. Once a signal exceeds the set COR level, the receiver logging data is output to the tape recorder using the Type #1 format. The receiver then sends the following message:

mm/dd_hh:mm:ss_CONT,

The receiver then automatically continues its step or scan operation. When another signal is encountered, the receiver halts, outputs data to the tape recorder, outputs the continue message, and then resumes the step or scan operation.

2.7.9.8 07 Reset Receiver Menu

Pressing the ENTER key places the receiver into RESET RECEIVER MENU, permitting selection of the following decisions:

CLEAR ALL MEMORIES: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". The "YES" decision will erase all SCAN, STEP, and LOCKOUT channels, MENU decisions, and reset active receiver parameters to default values. Pressing the ENTER key will set the selected decision and advance RESET RECEIVER MENU to STORE DECISIONS. Pressing the ENTER key set to "NO" will advance RESET RECEIVER MENU to CLEAR STORAGE CHNLS.

CLEAR STORAGE CHNLS: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". The "YES" decision will erase all

SCAN and STEP channels. Pressing the ENTER key will set the selected decision and advance RESET RECEIVER MENU to CLEAR ALL LOCKOUTS.

CLEAR ALL LOCKOUTS: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". The "YES" decision will erase LOCKOUT channels. Pressing the ENTER key will set the selected decision and advance RESET RECEIVER MENU to RESET FRONT PANEL.

RESET FRONT PANEL: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". The "YES" decision will reset active receiver parameters to default values. Pressing the ENTER key will set the selected decision and advance RESET RECEIVER MENU to STORE DECISIONS.

STORE DECISIONS: The increment and decrement keys and tuning wheel adjustment are available to toggle "YES"/"NO". Pressing the ENTER key set to "NO" advances RESET RECEIVER MENU back to CLEAR ALL MEMORIES. Pressing the ENTER key set to "YES" stores all RESET RECEIVER MENU decisions and causes the receiver to exit the MENU mode (MENU LED off).

2.7.10 STEP AND STEP/MAN OPERATIONS

The STEP operation allows the receiver to tune to discrete programmed frequencies by stepping through receiver parameters stored in sequences of memory channels. Frequencies in these memory channels may be stored in any order for the STEP operation.

The start and stop STEP channel numbers must be set in ascending order before the STEP operation can be initiated. For example, if channel 5 is selected as the start channel, channels 0 through 4 will not be accepted as valid stop channels. The receiver stops on memory channel frequencies with active signals greater than the set COR level. The STEP operation can additionally disable locking onto a known signal by proper adjustment of LOAD MEM/STEP MENU. (See **paragraph 2.7.9.3**).

Pressing the STEP control key causes the special prompt "STEP FROM CHN" to be displayed. The increment and decrement keys, tuning wheel adjustment, and numeric key entries (up to three characters) are available to select the STEP start channel. Pressing the ENTER control key sets the selected start channel and prompts the operator to select the STEP stop channel. Again, the increment and decrement keys, tuning wheel adjustment, and numeric key entries are available. Pressing the ENTER control key sets the selected stop channel and initiates the STEP operation (STEP LED on). The selected STEP start and stop channels will remain displayed until the first signal is acquired. At that time the stepping operation will halt and the front panel will display the active tuned frequency and its signal strength.

The MAN control key is available to freeze the STEP operation (MAN and STEP LEDs blinking). The receiver will enter the STEP/MAN mode. While in STEP/MAN, parameters may be adjusted for optimizing signal acquisition. Also, setting the SIG DWELL timer to HOLD in the SCAN/STEP CONFIG MENU will cause the receiver to automatically enter the STEP/MAN mode upon signal acquisition. The STEP control key may be pressed to continue the STEP operation, or the MAN key may be pressed a second time to return the receiver to MAN status.

2.7.10.1 **Selecting and Initiating a Step Setup**

Prior to entering STEP operation, STEP channels must be programmed with the appropriate step parameters. See **paragraph 2.7.9.3** for information on programming STEP memory channels using the LOAD MEM/STEP MENU. To enter the receiver into STEP operation, press the STEP key as shown in the following example. The prompt "STEP FROM CHN 000" is displayed. Rotating the tuning wheel toggles through the STEP channels. Pressing ENTER allows selection of the next STEP channels by again rotating the tuning wheel. Pressing the ENTER key initiates the STEP operation.

Local Input	WJ-8615P Response						
Keypad Entry/ Tuning Wheel Adjustment	Alphanumeric Display						
	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
	123	*18	AM	10	130.1000	IF BW	130.1000
STEP	STEP FROM CHN 000					STEP	130.1000
Tuning Wheel Turn CW	STEP FROM CHN 002					STEP	130.1000
ENTER	STEP FROM CHN 002 TO CHN 001					STEP	130.1000
Tuning Wheel Turn CW	STEP FROM CHN 002 TO CHN 004					STEP	130.1000
ENTER	117	*18	AM	100	118.7500	STEP	118.7500

Note: Underlined character indicates flashing cursor position.

2.7.10.2 **Setting Up Step Dwell Timers**

After the SCAN/STEP CONFIG MENU is enabled (**paragraph 2.7.9.4**), signal acquisition parameters for STEP operations may be adjusted or reviewed. In the following example the PRE DWELL level is adjusted using the numeric keys (tuning wheel may also be used). Pressing the ENTER key changes to a prompt which asks for SIG DWELL values. Any PRE DWELL entry higher than 200 msec causes the prompt ENTRY OUT OF RANGE to be displayed. Next the SIG DWELL then the POST DWELL values are entered. See **paragraph 2.7.9.4** for more information on the SCAN/STEP CONFIG MENU.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
ENTER	PRE DWELL		=		000 MSEC	MENU	98.7000
SHIFT	PRE DWELL		=		000 MSEC	MENU	98.7000
1	PRE DWELL		=		1 MSEC	MENU	98.7000
0	PRE DWELL		=		10 MSEC	MENU	98.7000
0	PRE DWELL		=		100 MSEC	MENU	98.7000
ENTER	SIG DWELL		=		INFINITY	MENU	98.7000
ENTER	POST DWELL		=		000 MSEC	MENU	98.7000

Note: Underlined character indicates flashing cursor position.

2.7.10.3 **Halting STEP Operation and Identifying Which Channel Is Active**

When the receiver acquires a signal during STEP operation, the STEP operation may be halted to identify which STEP channel is active. After observing the front panel parameters (frequency, etc.), press the MAN key then the MEM key as illustrated in the following example. Use the increment and decrement keys (or tuning wheel) to toggle through memory channels until a memory channel with parameters matching the previously observed front panel parameters is displayed.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
MAN	117	*18	AM	100	118.7400	STEP/MAIN/ FRQ	118.7500
MEM	M004	*18	AM	10	132.9500	STEP/MAIN/ FRQ	118.7500
∇	M003	*18	AM	10	125.0500	STEP/MAIN/ FRQ	118.7500
∇	M002	*18	AM	100	118.7500	STEP/MAIN/ FRQ	118.7500

Note: Underlined character indicates flashing cursor position.

2.7.10.4 **Disabling a Step Channel Within Step Sequence**

STEP channels may be disabled so they are passed over during the STEP operation. This prevents a known signal from becoming active without purging that channel's parameters from memory. To disable a STEP channel, first press the MENU key as shown in the following example. Rotate the tuning wheel until the prompt "02 LOAD MEM/STEP MENU" is displayed. Press ENTER, then use the increment or decrement key to display the STEP memory channel number to be disabled. Pressing ENTER again displays the prompt "STEP CHANNEL ENABLE, YES." Use the increment key to change "YES" to "NO." Continue to press the ENTER key until the display exits the menu mode.

Local Input	WJ-8615P Response						
Keypad Entry/ Tuning Wheel Adjustment	Alphanumeric Display						
	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
MENU	01 ACKNOWLEDGE EDRR MENU					MENU	118.7500
Tuning Wheel Turn CW	02 LOAD MEM/STEP MENU					MENU	118.7500
ENTER	MEM CHANNEL NUMBER =				004	MENU	118.7500
ENTER	STEP CHANNEL ENABLE,				YES	MENU	118.7500
Δ	STEP CHANNEL ENABLE,				NO	MENU	118.7500
ENTER	FREQUENCY =				118.7500	MENU	118.7500
ENTER	IF BW =				100KHZ	MENU	118.7500
ENTER	COR LEVEL =				18	MENU	118.7500
ENTER	DETECTION MODE =				AM	MENU	118.7500
ENTER	AFC =				OFF	MENU	118.7500
ENTER	AGC =				ON	MENU	118.7500
ENTER	STORE DECISIONS =				YES	MENU	118.7500
ENTER	117	*18	AM	100	118.7500	STEP/MAN	118.7500

Note: Underlined character indicates flashing cursor position.

2.7.11 SCAN OPERATIONS

SCAN provides the receiver with the capability of scanning across operator determined frequency segments. Initiating the SCAN operation causes the receiver to SCAN from a start frequency to a stop frequency. The SCAN operation is halted when a signal greater than the receiver COR level is encountered. The start frequency set up parameters, and stop frequency must be stored in receiver memory using the LOAD SCAN MENU prior to initiating the SCAN operation. (See **paragraph 2.7.9.2**). SCAN additionally has the ability not to respond to certain frequency segments (LOCKOUT). See **paragraph 2.7.11.9** for Scan Lockout operations.

Pressing the SCAN control key causes the receiver to display the current SCAN memory location, and start and stop frequencies. The increment and decrement keys, tuning wheel adjustment, and numeric key entries (up to two characters) are available to select between SCAN memory locations. Pressing the ENTER control key initiates the SCAN operation (SCAN LED on). The selected SCAN memory channel and start and stop frequencies will remain displayed until the first signal is acquired. At that time, the scanning operation will halt and the front panel will display the active tuned frequency and its signal strength. The MAN function key is available to freeze the SCAN (MAN and SCAN LEDs blinking). This places the receiver in SCAN/MAN mode allowing for adjustment of receiver parameters. The SCAN control key may be pressed to continue the SCAN operation, or the MAN key may be pressed a second time to return the receiver to MAN mode.

2.7.11.1 Placing Receiver into LOAD SCAN MENU Mode

The LOAD SCAN MENU is used to enter SCAN mode setups. As shown in the following example, the MENU mode is entered by pressing the MENU key. The 00 ACKNOWLEDGE ERR MENU prompt is displayed. Adjusting the tuning wheel clockwise changes the prompt to 01 LOAD SCAN MENU (the increment key may also be used). Pressing the ENTER key enables the LOAD SCAN MENU which prompts for the SCAN CHANNEL NUMBER for which the SCAN parameters are to be entered. See **paragraph 2.7.9.2** for more information on the LOAD SCAN MENU.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
	41	*18	FM	300	98.7000	IF BW	98.70000
MENU	00 ACKNOWLEDGE ERR MENU					MENU	98.7000
Tuning Wheel Turn CW	01 LOAD SCAN MENU					MENU	98.7000
ENTER	SCAN CHANNEL NUMBER = 00					MENU	98.7000

Note: Underlined character indicates flashing cursor position.

2.7.11.2 Setting Up Scan Dwell Timers

After the SCAN/STEP CONFIG MENU is enabled (**paragraph 2.7.9.4**), signal acquisition parameters for SCAN operations may be adjusted or reviewed. In the following example the PRE DWELL level is adjusted using the numeric keys (tuning wheel may also be used). Pressing the ENTER key changes to a prompt which asks for SIG DWELL values. Any PRE DWELL entry higher than 200 msec causes the prompt ENTRY OUT OF RANGE to be displayed. Next the SIG DWELL then the POST DWELL values are entered. See **paragraph 2.7.9.4** for more information on the SCAN/STEP CONFIG MENU.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
ENTER	PRE DWELL			=	000MSEC	MENU	98.7000
SHIFT	PRE DWELL			=	000MSEC	MENU	98.7000
1	PRE DWELL			=	1MSEC	MENU	98.7000
0	PRE DWELL			=	10MSEC	MENU	98.7000
0	PRE DWELL			=	100MSEC	MENU	98.7000
ENTER	SIG DWELL			=	INFINITY	MENU	98.7000
ENTER	POST DWELL			=	000SEC	MENU	98.7000

Note: Underlined character indicates flashing cursor position.

2.7.11.3 Adjusting SCAN Start and Stop Frequencies

After the LOAD SCAN MENU is enabled, and the SCAN CHANNEL NUMBER is selected, the display prompts for SCAN parameters. The first prompt asks for the start scan frequency (START FREQ). The following example illustrates the use of the numeric keys to adjust the start frequency (tuning wheel may also be used). After the START FREQ is adjusted, the ENTER key is pressed which then changes the prompt to STOP FREQ. Again the numeric keys (or tuning wheel) are used to adjust the stop frequency for the scan. Pressing the ENTER key changes the prompt to the next parameter.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
ENTER	START FREQ =				20.0000	MENU	98.7000
SHIFT	START FREQ =				20.0000	MENU	98.7000
1	START FREQ =				1	MENU	98.7000
1	START FREQ =				11	MENU	98.7000
8	START FREQ =				118	MENU	98.7000
ENTER	STOP FREQ =				20.0000	MENU	98.7000
SHIFT	STOP FREQ =				20.0000	MENU	98.7000
1	STOP FREQ =				1	MENU	98.7000
3	STOP FREQ =				13	MENU	98.7000
3	STOP FREQ =				133	MENU	98.7000

Note: Underlined character indicates flashing cursor position.

2.7.11.4 Adjusting SCAN IF BW, COR, DET, AFC, and AGC Conditions

After the START FREQ and STOP FREQ values have been entered in the LOAD SCAN MENU (**paragraph 2.7.11.3**), the IF bandwidth, COR level, detection mode, AFC, and AGC parameters are entered, in that order, as illustrated in the following example. After STOP FREQ is entered, the prompt asks for the IF bandwidth (IF BW). Pressing the increment keys steps through the installed IF bandwidth filter values. After the desired IF BW value is displayed, the ENTER key is pressed which changes the prompt for COR level entries. This procedure is used to enter the remaining SCAN parameters (DET, AFC, AGC). After the AGC selection is entered, the prompt STORE DECISIONS, YES is displayed. Pressing the ENTER key stores the parameters in the selected SCAN channel. To view or change the adjusted parameters prior to storing use the increment or decrement key to change YES to NO and then press ENTER.

Local Input	WJ-8615P Response						
Keypad Entry/ Tuning Wheel Adjustment	Alphanumeric Display						
	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
ENTER	SCAN IF BW =				1<u>0</u>KHZ	MENU	98.7000
ENTER	SCAN COR LEVEL =				0<u>0</u>	MENU	98.7000
Tuning Wheel Turn CW	SCAN COR LEVEL =				1<u>8</u>	MENU	98.7000
ENTER	SCAN DETECTION MODE =				A<u>M</u>	MENU	98.7000
ENTER	SCAN AFC =				<u>O</u>FF	MENU	98.7000
Δ	SCAN AFC =				<u>O</u>N	MENU	98.7000
ENTER	STORE DECISIONS,				<u>Y</u>ES	MENU	98.7000
ENTER	41	*18	FM	300	98.7000	IF BW	98.7000

Note: Underlined character indicates flashing cursor position.

2.7.11.5 Selecting and Initiating a Stored SCAN Setup

The following example shows the sequence for starting a SCAN operation. In the example, the SCAN key is pressed which displays a SCAN memory channel (SCAN 00) and the start and stop frequency values (118.00-133.00) stored in the memory channel. Pressing the ENTER key initiates the SCAN operation using all parameters stored in the selected SCAN channel.

Local Input	WJ-8615P Response						
Keypad Entry/ Tuning Wheel Adjustment	Alphanumeric Display						
	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
	41	*18	FM	300	98.700<u>0</u>	IF BW	98.7000
SCAN	SCAN 00			118.00-133.00		SCAN	98.7000
ENTER	SCAN 00		SS = 117		118.7500	SCAN	118.7500

Note: Underlined character indicates flashing cursor position.

2.7.11.6 **Halting SCAN Operation**

A SCAN operation may be halted at any time to optimize front panel parameters by pressing the MAN key. In the following example the MAN key is pressed which enters the receiver into the SCAN/MAN mode. The IF BW key is pressed and the increment key is used to adjust the IF bandwidth value. Other SCAN parameters may also be adjusted while the receiver is in SCAN/MAN.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
MAN	SCAN 00		Ss = 117		118.7500	SCAN	118.7500
IF BW	117	*18	AM	10	118.7500	SCAN/MAN/ IFBW	118.7500
Δ	117	*18	AM	100	118.7500	SCAN/MAN/ IF BW	118.7500

2.7.11.7 **Storing Acquired Signal**

A signal acquired during SCAN operation may be stored in receiver memory for later recall if desired. Prior to storing, the receiver is placed in SCAN/MAN mode. As shown in the following example, the MEM key is then pressed which calls up memory channel M000. The tuning wheel is rotated to display the target memory channel (M002). Prior to storing acquired signal parameters in receiver memory, it is advisable to review stored parameters in the target memory channel to avoid destroying what may be valuable data. The STORE key is pressed which displays the prompt "STORE IN MEM CHNL" and the target memory channel, in this example M002. Pressing the ENTER key stores the front panel parameters in the target memory channel.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
	117	*18	AM	100	118.7500	SCAN/MAN/ IF BW	118.7500
MEM	M000	18	FM	300	118.7500	SCAN/MAN/ IF MEM	118.7500
Tuning Wheel Turn CW	M002	00	AM	10	20.0000	SCAN/MAN/ IF MEM	118.7500
STORE	STORE IN MEM CHNL M002					SCAN/MAN/ MEM	118.7500
ENTER	117	*18	AM	100	118.7500	SCAN/MAN/ IF BW	118.7500

Note: Underlined character indicates flashing cursor position.

2.7.11.8 **Continuation of SCAN and Exiting SCAN Mode**

The SCAN operation may be restarted at any time from SCAN/MAN mode by again pressing the SCAN key. The following example illustrates a SCAN operation, which has acquired a signal (125.0500). The SCAN is halted and the acquired signal parameters are stored in memory channel M003. The SCAN is then restarted by pressing the SCAN key. A new signal is acquired and stored in channel M004. The SCAN/MAN operation is then exited by pressing the MAN key.

Local Input	WJ-8615P Response						
Keypad Entry/ Tuning Wheel Adjustment	Alphanumeric Display						
	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
	117	*18	AM	100	118.7500	SCAN/MAN/ IF BW	118.7500
SCAN	SCAN 00	SS = 84			125.0500	SCAN	125.0500
MAN	84	*18	AM	10	125.0500	SCAN/MAN/ IF BW	125.0500
MEM	M002	18	AM	100	118.7500	SCAN/MAN/ MEM	125.0500
Δ	M003	00	AM	10	20.0000	SCN/MAN/ MEM	125.0500
STORE	STORE IN MEM CHNL M003					SCAN/MAN/ MEM	125.0500
ENTER	84	*18	AM	10	125.0500	SCAN/MAN	125.0500
SCAN	SCAN 00	SS = 104			132.9500	SCAN	132.9500
MAN	104	*18	AM	10	132.9500	SCAN/MAN/ IF BW	132.9500
MEM	M003	18	AM	10	125.0500	SCAN/MAN/ MEM	132.9500
Δ	M004	00	AM	10	20.0000	SCAN/MAN/ MEM	132.9500
STORE	STORE IN MEM CHANL M004					SCAN/MAN/ MEM	132.9500
ENTER	104	*18	AM	10	132.9500	SCAN/MAN/ IF BW	132.9500
MAN	104	*18	AM	10	132.9500	IF BW	132.9500

Note: Underlined character indicates flashing cursor position.

2.7.11.9 Scan Lockout Operations

Scan Lockout allows an operator to specify segments of the frequency spectrum to be skipped by the SCAN operation. Each Lockout is specified in terms of either center frequency and width, or start frequency and stop frequency. Lockout widths of between 10 kHz to 99.99 MHz are permitted, as is overlapping coverage (allowing the width of one Lockout to extend into the width of another). Lockout data consists of a center frequency and width of each frequency segment to be locked-out. Lockout frequencies may be entered into Lockout channels in any order. Frequencies are rearranged by the receiver microprocessor in descending order for SCAN operation (apparent during review of Lockout channels).

The receiver must be in either the MAN operating mode, the STEP/MAN, or the SCAN/MAN operating mode before a frequency can be entered into a Lockout memory channel. Pressing the LCKOUT control key (LCKOUT LED on) enables the increment and decrement keys, tuning wheel adjustment, and numeric key entries to select between one of three LOCKOUT menus: CENTER/WIDTH LOCKOUT, START/STOP LOCKOUT, and REVIEW/CLEAR LOCKOUT. The ENTER key is used to initiate the selected LOCKOUT menu. Pressing the LCKOUT control key a second time causes the receiver to terminate review and/or adjustment of LOCKOUT decisions, restoring the front panel to the previous mode.

2.7.11.9.1 0 CENTER/WIDTH LOCKOUT Menu

Pressing the ENTER control key initiates CENTER/WIDTH LOCKOUT and advances the set up level to CENTER FREQ.

> CENTER FREQ: Numeric key entries (up to nine characters including a decimal point) and tuning wheel adjustment are available to select the LOCKOUT center frequency. When adjusting by tuning wheel, the increment and decrement keys provide for advancing of the blinking cursor. The active tuned frequency of the receiver is automatically adjusted to match CENTER FREQ as it is being selected. Pressing the ENTER key fixes the set CENTER FREQ and advances CENTER/WIDTH LOCKOUT to LOCKOUT WIDTH.
>
> LOCKOUT WIDTH: The increment and decrement keys, tuning wheel adjustment, and numeric key entries (up to five characters) are available to select LOCKOUT WIDTH (kHz). The increment and decrement keys are used in conjunction with tuning wheel adjustment to vary tuning resolution between 10 kHz to 10 MHz. Pressing the ENTER key causes the receiver to exit LOCKOUT (LCKOUT LED off), and sets both fixed CENTER FREQ and LOCKOUT WIDTH into the next available LOCKOUT memory channel.

2.7.11.9.2 1 START/STOP LOCKOUT Menu

Pressing the ENTER control key initiates START/STOP LOCKOUT and advances the set up level to START FREQ.

> START FREQ: Numeric key entries (up to nine characters including a decimal point)

The active tuned frequency is automatically adjusted to match START FREQ as it is being selected. Pressing the ENTER key fixes the set START FREQ and advances START/STOP LOCKOUT to STOP FREQ.

STOP FREQ: Numeric key entries (up to nine characters including a decimal point) and tuning wheel adjustment are available to select the LOCKOUT stop frequency. The active tuned frequency is automatically adjusted to match STOP FREQ as it is being selected. The STOP FREQ selected must be greater than the fixed START FREQ. Pressing the ENTER key sets both the fixed START FREQ and STOP FREQ, and causes the receiver to exit LOCKOUT, restoring the front panel to MAN operation. Bandwidths greater than 99.99 MHz cause the prompt "ENTRY OUT OF RANGE" to be displayed, and cause START/STOP LOCKOUT to advance back to STOP FREQ. As START and STOP LOCKOUT frequencies are entered, the receiver is tuned to these frequencies. A signal may be locked out by tuning the START frequency down in small steps until the audio is squelched and then pressing the ENTER key. Then tune up across the signal again until the audio is squelched and press ENTER.

2.7.11.9.3 2 REVIEW/CLEAR LOCKOUT Menu

Pressing the ENTER control key initiates REVIEW/CLEAR LOCKOUT and refreshes the front panel with the latest LOCKOUT memory channel parameters. The increment and decrement keys, tuning wheel adjustment, and numeric key entries (up to three characters) are available to selectively review and/or clear LOCKOUT channels. The selected LOCKOUT channel can be cleared by using the SHIFT DEL entry. Pressing the LCKOUT control key a second time causes the receiver to exit LOCKOUT (LCKOUT LED off).

2.7.11.9.4 Entering Lockout During Scan Operation and Continuing Scan

LOCKOUT operation may be enabled for entering lockout parameters for use during SCAN operation. As shown in the following example, before entering LOCKOUT the receiver is placed in SCAN/MAN by pressing MAN key. Pressing the LCKOUT key places the display in LOCKOUT mode, which automatically displays 0 CENTER/WIDTH LOCKOUT. Pressing the ENTER key allows for adjusting the center frequency (CENTER FREQ) of the lockout area. Pressing ENTER again enables adjustment of the LOCKOUT WIDTH. Pressing ENTER once more stores the LOCKOUT parameters and places the receiver back into SCAN/MAN operation.

Local Input	WJ-8615P Response						
Keypad Entry/ Tuning Wheel Adjustment	Alphanumeric Display						
	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
	SCAN 00	SS = 107			123.6500	SCAN	123.6500
MAN	84	*18	AM	10	123.6500	SCAN/MAN/ IF BW	123.6500
LCKOUT	0 CENTER/WIDTH LOCKOUT					LOCKOUT	123.6500
ENTER	CENTER FREQ				123.6500 MHz	LOCKOUT	123.6500
ENTER	LOCKOUT WIDTH				10 kHz	LOCKOUT	123.6500
Tuning Wheel Turn CW	LOCKOUT WIDTH				500 kHz	LOCKOUT	123.6500
ENTER	107	*18	AM	10	123.6500	SCAN/MAN/ IF BW	123.6500
SCAN	SCAN 00	SS = 123			130.1000	SCAN	130.1000

Note: Underlined character indicates flashing cursor position.

2.7.11.9.5 Entering Lockout Using Start and Stop Frequencies

Paragraph 2.7.11.9.4 illustrates the procedure for entering LOCKOUT parameters by using the center frequency and width of the lockout values. LOCKOUT parameters may also be entered using start and stop frequencies as shown in the following example. As before, SCAN/MAN is entered first then LOCKOUT operation is enabled by pressing the LCKOUT key. Using the increment key toggles the display to the prompt "1 START/STOP LOCKOUT." Pressing ENTER allows for adjusting the start frequency (START FREQ) of the LOCKOUT. Pressing ENTER again enables adjustment of the stop frequency (STOP FREQ). Pressing ENTER once more stores the LOCKOUT parameters and places the receiver back into SCAN/MAN operation.

Local Input	WJ-8615P Response						
Keypad Entry/ Tuning Wheel Adjustment	Alphanumeric Display						
	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
	SCAN 00		SS = 107		123.6500	SCAN	130.1000
MAN	123	*18	AM	10	123.6500	SCAN/MAN/ IF BW	130.1000
LCKOUT	0 CENTER/WIDTH LOCKOUT					LOCKOUT	123.6500
ENTER	CENTER FREQ				123.6500 MHz	LOCKOUT	123.6500
ENTER	LOCKOUT WIDTH				10 kHz	LOCKOUT	123.6500
Tuning Wheel Turn CW	LOCKOUT WIDTH				500 kHz	LOCKOUT	123.6500
ENTER	107	*18	AM	10	123.6500	SCAN/MAN/ IF BW	123.6500
SCAN	SCAN 00		SS = 123		130.1000	SCAN	130.1000

Note: Underlined character indicates flashing cursor position.

2.7.11.9.6 Review and Deletion of Lockout Channels

LOCKOUT channels may also be reviewed and cleared, if desired, by first enabling LOCKOUT by pressing the LCKOUT key and using the increment key to toggle to the prompt "2 Review/CLEAR LOCKOUT" as shown in the following example. Pressing ENTER from this prompt displays a previously programmed LOCKOUT channel (L002). Using the increment or decrement key (or tuning wheel) toggles through all of the LOCKOUT channels until the desired channel is displayed (L001). If only reviewing the LOCKOUT parameters, pressing the LCKOUT key exits the LOCKOUT operation. To delete the displayed LOCKOUT channel, press the SHIFT then the DEL key prior to pressing LCKOUT.

Local Input	WJ-8615P Response						
Keypad Entry/	Alphanumeric Display						
Tuning Wheel Adjustment	AM DET SS-dBm	COR	DET	IF BW kHz	Frequency MHz	Operating Mode	Tuned Frequency
	123	*18	AM	10	130.1000	SCAN/MAN/ IF BW	130.1000
LCKOUT	1 START/STOP LOCKOUT					LOCKOUT	130.1000
Δ	1 START/STOP LOCKOUT					LOCKOUT	130.1000
ENTER	L002			500K	130.1000M	LOCKOUT	130.1000
∇	L001			500K	123.6500M	LOCKOUT	130.1000
SHIFT	L001			500K	130.1000M	LOCKOUT	130.1000
DEL	L001			500K	130.1000M	LOCKOUT	130.1000
LOCKOUT	123	*18	AM	10	130.1000	SCAN/MAN/ IF BW	130.1000

Note: Underlined character indicates flashing cursor position.

2.7.12 HANDOFF OPERATIONS

A WJ-8615P is capable of handing its parameters to any compatible receiver connected to the WJ HANDOFF network. This operation can be performed without the assistance of a system controller.

The bus is a serial communication network, which allows multiple access for up to 30 units. The bus is connected to the receiver at rear panel AUX connector J13, pin 14 and J13 ground. The network is an all master system with acknowledge response from the handoff acceptor to the handoff generator. The WJ-8615P is configured for master or slave operations in the Definitions Menu (see **paragraph 2.3.3**). Handoff addresses are also set in Definitions mode. Valid handoff addresses are 1 through 99. The default handoff address is the IEEE-488 default address plus 1. Each receiver on the handoff network must have a unique address.

To perform a handoff of front panel parameters, press the SHIFT and HDOFF keys. The WJ-8615P displays the message:

HANDOFF TO RECEIVE X

By pressing the INC/DEC keys or the SHIFT NUMERIC keys or by turning the tuning wheel, the display can be changed as desired. Pressing the ENTER key initiates the handoff. If the handoff is completed successfully, the sending receive responds with the message:

HANDOFF COMPLETE.

If the handoff is not completed successfully, the sending receiver will display one of the messages listed and explained in **Table 2-9**. The operator can respond by retransmitting the handoff or taking another course of action.

Table 2-9. Handoff Error Messages

NO RESPONSE TO HANDOFF	The handoff has been sent to a receiver that is non-existent on the bus or malfunctioning. Verify handoff address.
COMMUNICATION ERROR	The destination address was transmitted but the response from the destination receiver indicates that a subsequent portion of the originator's handoff message contained overrun or framing errors. Verify connections and try again.
INCOMPATIBLE HANDOFF	The transmitted command or message judged invalid by the destination receiver. This error suggests an incompatibility between versions of software.
ILLEGAL FREQ OR DET MODE	The destination receiver understood the entire message, but was not capable of complying with the frequency or detection mode request.
NETWORK BUSY, TRY AGAIN	Two operators attempted a handoff on the same network at the same time. Both operators are notified of the data collision and are asked to try again.

Each receiver on the bus is responsible for maintaining the integrity of its own transmission. A transmitting unit receives its own transmission for verification and aborts it if unable to verify. This could occur when more than one unit on the network was transmitting. When a transmission is aborted, the unit immediately transmits the terminator to alert other units on the bus that data collision has occurred.

The serial handoff data consists of 8 data bits per byte with no parity bit, which is transmitted at a baud rate of 2400 bps.

Upon receipt of a message of the proper format, the receiver accepting the handoff data immediately aborts any impeding operations and executes the settings of the command. The receiver tries to overcome ambiguities in commands that are properly formatted. For instance, if the handoff bandwidth does not match any of the bandwidths installed, the receiver accommodates this discrepancy by choosing the closest bandwidth that is larger than the prescribed handoff bandwidth. Furthermore, other settings that are out of range are accommodated by assignment of the closest limit. However, the extent of the receiver's ability to accommodate certain handoff parameters is limited. Specifically, when a tuning frequency outside the range of their receiver or an invalid detection mode is received, it results in an error message. Handoff commands related to unsupported items are ignored.

2.8 REMOTE CONTROL

The IEEE-488 Remote Interface bus provides the electrical link for talk and listen capabilities between the receiver and other IEEE-488 equipped controlling devices. Data is transferred over the bus in a byte-serial, bit-parallel form, utilizing sixteen interconnection lines. These lines consist of eight bi-directional data bus lines, three data transfer lines and five bus management lines. Data or address information is transferred between devices, utilizing the data bus lines (DIO1-DIO8). Refer to **Figure 2-6** for the IEEE-488 connector pin configuration.

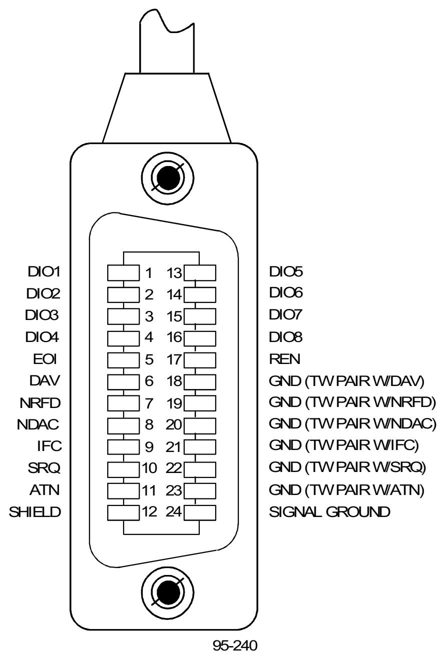

Figure 2-6. Configuration of the IEEE-488 Connector

Data byte transfer lines (NRFD, NDAC and DAC) indicate: the availability and validity of the information on the data bus lines; the readiness of the device to accept data; and that the data has been accepted. Interface management lines (IFC, ATN, SRQ, REN and EOI) specify whether the data bus lines are carrying data or address information (ATN); a request for service (SRQ); that the interface is clear (IFC); and the end of a transfer sequence (EOI). The capabilities of the IEEE-488 Interface include:

Description	IEEE-488-1978-Function
Source handshake	(SHI)
Acceptor handshake	(AHI)
Basic talker with serial poll	(T6)
Basic listener with serial poll	(L4)
Service request	(SR1)
Device clear (DC1)	

Essentially these functions allow the receiver to talk or to listen, when commanded by the controller. It can also issue a service request notifying the controller that it needs attention.

Two types of data transfer are supported on the WJ-8615P IEEE-488 Interface: ASCII and binary. The ASCII operation format tends to be self-documenting and easy to understand. Binary on the other hand decreases the number of bytes that must be transferred. It allows faster execution.

ASCII transfer uses 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. In the ASCII format, the message consists of a series of eight-bit data bytes that form one of the mnemonics listed in **Table 2-10**. Each byte is one ASCII character of the mnemonic. When the mnemonic contains a variable value, the mnemonic is followed by a number (a) representing that value. Each digit of the number is represented as a separate ASCII character. During ASCII operation, only ASCII commands are valid and only ASCII responses are returned.

The second type of data transfer supported by the WJ-8615P IEEE-488 Interface is binary. This type of data transfer allows single information bytes to control the receiver. In the binary operation, a command or group of commands must end with EOI set active on the last byte of the command. Commands may not be strung with a semicolon or terminated with CR or LF. Binary sends only one command at a time. In the binary format, the mnemonic is an eight-bit byte that accepts 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. In binary operation, only binary commands are valid and only binary responses are returned.

Table 2-10. Mnemonics and Binary Codes

Mnemonics		Description	Refer To Table
ASCII	HEX		
ACL	09	Has no effect on 8615P. **	----
ACL/	0A	Has no effect on 8615P. **	----
ACL?	0B	Has no effect on 8615P. **	----
AFC	42	Turn AFC on.	2-23
AFC/	43	Turn AFC off (Default).	2-23
AFC?	44	Requests AFC status.	2-23
AGC	45	Turn AGC ON (Default).	2-23
AGC/	46	Turn AGC OFF.	2-23
AGC?	47	Requests AGC status.	2-23
AM	48	Select AM Detection mode (Default).	2-14
AM?	4A	Request AM modulation percentage.	2-15
BFO f	39 pppp	Set BFO frequency in kHz.	2-23
BFO?	3B	Request BFO frequency.	2-23
BIN		Causes all future commands to be in binary.	2-12
	55	Causes all future commands to be in ASCII (Default).	2-12
BND a	56	Preselector calibration command; sets band to be calibrated, * a = 0 - 3.	----
BND?	58	Preselector calibration command: responds with band currently being calibrated, last set with BND a command or default. *	----

Table 2-10. Mnemonics and Binary Codes (Continued)

Mnemonics ASCII	Mnemonics HEX	Description	Refer To Table
BW a	4E b	Select BW slot 1-5.	2-13
BW?	50	Request which BW slot used.	2-13
BWC?	9E	Request BW size.	2-13
BYP	3F	Select bypass of preselector.	2-23
BYP/	40	De-select bypass of preselector (Default).	2-23
BYP?	41	Request present status of preselector (Bypass On/OFF).	2-23
CAL	5B	Preselector calibration command: enables calibration of Preselector. *	----
CAL/	5C	Preselector calibration command. Preselector operates normally. *	----
CAL?	5D	Request Preselector calibration, enabled or disabled. * Returns CAL or CAL/.	----
CAP	0F	Has no affect on 8615P. **	----
CFG a	12 b	Sets MASK conditions that will be responded to with SRQ.	2-12
CFG?	14	Request current mask	2-12
CHN	0C	Turn channel on.	2-20
CHN/	0D	Turn channel off.	2-20
CHN?	0E	Request channel status.	2-20
CLC	15	Clear all lockout channels.	2-22
CLM	6C	Clear receiver and memory.	2-16
CLR	51	Clear receiver.	2-23
CLS	16	Clear storage memory.	2-16
COR a	57 b	Set COR level 0-80.	2-23
COR?	59	Request COR level.	2-23
CST?	9B	Request COR status.	2-23
CW	5A	Select CW detection mode.	2-14
DAT a/a/a	95 bbb	Set Date (dd:mm:yy)	2-23
DAT?	97	Request Date	2-23
DET?	5F	Request detection mode selected.	2-14
DWL a	60 b	Set pre-dwell time for signal evaluation on scan or step.	2-18
DWL?	62	Request current pre-dwell setting.	2-18
ERR?	65	Request error number.	2-12
FBW	D8	Select full bandwidth scan increment.	2-11
FBW/	D9	Select half bandwidth scan increment.	2-21
FBW?	DA	Request current scan bandwidth increment.	2-21
FM	69	Select FM detection mode.	2-14
FM?	6B	Request FM Modulation 0-100%.	2-15
FMO?	AD	Request reading of FM offset 0-255.	2-15
FPL	CF	Turn front panel displays on (Default).	2-12
FPL/	D0	Turn front panel displays off.	2-12
FPL?	D1	Request front panel display status.	2-12
FRQ f	3C pppp	Set tuned frequency in MHz.	2-23
FRQ?	3E	Request tuned frequency.	2-23
ISB	64	Select ISB detection mode.	2-14
LCH?	1D	Request the last lockout used.	2-22
LCK	94	Lockout current frequency and bandwidth.	2-22
LDW a	38 b	Set post signal lost dwell timer for scan or step.	2-18

Table 2-10. Mnemonics and Binary Codes (Continued)

Mnemonics		Description	Refer To Table
ASCII	HEX		
LDW?	3A	Request current post signal lost dwell.	2-18
LGV?	71	Request reading of Log Video.	2-15
LKF f,f	1E pppppp	Lockout specified frequency and width.	2-22
LOGa	96 b	Set Logging Mode	2-23
LOG?	98	Request Logging Mode Setting	2-23
LSB	72	Select LSB detection mode.	2-14
MAN	75	Select Manual operation (Default).	2-12
MOD?	B3	Request operation mode.	2-12
OPT?	DD	Request option configuration.	2-12
PAR a	21 b	Command has no effect on (8615P). **	----
PAR?	23	Response will always be "Par 150".	----
PDW a	32b	Set Pre-signal dwell timer.	2-18
PDW?	34	Request current Pre-signal dwell timer.	2-18
PLS	78	Select Pulse detection mode.	2-14
PRE a	CC	Preselector calibration command: "a" sets the voltage that tunes the Preselector. Range 0-255, where higher number = higher freq.*	----
PRE?	CE	Preselector calibration command: Request Preselector Tuning word. *	----
QUE?	26	Request data in the queue.	
RCE a	27	Recall and execute the specified channel.	2-19
RCH a?	2C b	Request data in the specified channel.	2-16
RFG a	7E b	Enter RF Gain 0-255.	2-16
RFG/	7F	Set RF Gain based on current AGC level.	2-23
RFG?	80	Request RF Gain.	2-23
RLK a?	2F bb	Recall the specified lockout channel.	2-23
RMT	81	Select Remote operation.	2-22
RMT/	82	De-select Remote (Default).	2-12
RMT?	83	Request control mode.	2-12
RFG/	7F	Set RF Gain Based on current AGC level	2-12
SAO	03	Turns on Selected Audio Output. ***	----
SAO/	04	Turns off Selected Audio Output. ***	***
SAO?	05	Request status of Selected Audio Output. ***	***
SCH....	30....	Store the following data in specified channel.	***
SCH a, CHN	30b 0C	Enable memory channel "n" from a preset Step sequence.	2-16
SCH a, CHN/	30b 0D	Disable memory channel "n" to a preset Step sequence	2-20
SCI a	06 pppp	Specify scan step size in MHz.	2-20
SCI?	08	Request current scan increment.	2-21
SCM	B2	Enters SCAN Manual IF BW Scan Continue.	2-21
SCN	84	Continue Scan if current mode is scan.	2-21
SCN a	84 b	Scan from start frequency in specified channel to stop frequency +1 in channel.	2-21 2-21
SCN a-a	84 bb	Scan from start frequency in first channel to stop frequency in second channel.	2-21
SDW a	35 bb	Set signal dwell time for scan or step.	2-18
SDW?	37	Request current signal dwell.	2-18
SS?	89	Request Signal Strength in -dBm.	2-15

Table 2-10. Mnemonics and Binary Codes (Continued)

Mnemonics ASCII	Mnemonics HEX	Description	Refer To Table
SSC	10	Resume scan or step operation.	2-20
STM	B1	Enters step manual if current mode is step.	2-20
STO a	8A b	Store manual parameters in specified channel.	2-16
STP	8D	Continue step operation if current mode is step.	2-20
STPa	8D b	Step from channel 0 to specified channel number.	2-20
STP a-a	8D bb	Step from first specified channel to second specified channel inclusive.	2-20
STP a,a,...	8E bbbb...	Step the sequential list, (maximum of 25 entries).	2-20
STS a	90 b	Set status byte	2-11
STS?	92	Request device status command	2-12
TIM a:a	AE bb	Set Time of Day: HH:MM	2-23
TIM?	B0	Request Time of Day - Response = HH:MM:SS	2-23
TSP a	E1 b	Set remote tuning speed	2-23
TSP?	E3	Request remote tuning speed	2-23
ULC a	33 b	Unlock the specified channel	2-22
ULF f	36 p	Unlock the specified frequency	2-22
USB	93	Select USB detection mode	2-14
VER?	E0	Request receiver type and software revision	2-12

LEGEND:

Chr	Used in Command	Used in Response
b	Is a single byte of data	Is a single byte of data
p	Is a packed BCD data byte	Is a packed BCD data byte
a	Is 1-3 ASCII digits used as a number	Is a space and 3 ASCII digits
f	Is a maximum of 4 ASCII digits, a decimal and 4 more ASCII digits	Is a space, 4 digits, a decimal, and 4 more ASCII digits

* = Maintenance command only.
** = These commands have no affect on the WJ-8615P and are included only for compatibility with the WJ-8615.
*** = Option command - See option manual for description.

2.8.1 GENERAL

The command column (in **Table 2-10**) lists the message that can be sent remotely to the WJ-8615P Receiver as an active listener. Responses are messages returned when the receiver is an active talker. ASCII messages may be sent with embedded spaces or any combination of upper and lower case characters. The response column indicates the response to a query. The response may either be ASCII or the binary equivalent. A response containing a variable may either be in decimal, binary, or packed BCD (binary coded decimal).

Remote command structure of the WJ-8615P is a super set of the WJ-8615 and the WJ-8615 with SSL and EM options. The major difference in operation is in the scan and step modes. Since the WJ-8615P receiver uses all locked LOs for scan and step operation, the need for the receiver calibration has been eliminated. The commands relating to calibration are accepted by the WJ-8615P without error, but causes no action in the receiver.

The WJ-8615P includes SSL and EM as standard features. For compatibility with existing WJ-8615 remote programs, these features are indicated as installed options in the OPT? response. The WJ-8615P also includes dwell timers to allow more flexibility to the scan and step operations. The default values of these timers after the clear command (CLR, CLM) causes operation identical to that of the WJ-8615 with SSL.

The WJ-8615P Compact Receiver is capable of activating the SRQ line indicating controller service is required. Four different conditions cause the receiver to set the SRQ line. 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. When the receiver is powered-up or sent SDC (selected device clear) or DCL (device clear) commands, it sets SRQ and bits 1 and 6 of the status byte.

The WJ-8615P responds to the IEEE-488 commands, DCL (Device Clear) and SDC (Selective Device Clear). Either of these commands causes the receiver to clear its input and output buffers and set SRQ and power up flags. This restores the receiver to the power-up state.

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 in **Table 2-11**.

Table 2-11. Status Byte Bit Definitions for WJ-8615P

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	Queue is full	Queue is not full	Reading data from queue.
3	Scan or step stopped on single sequence.	Scan or step not stopped on single sequence.	Continuing scan or step operation.
4	Responding to request for data.		Non-latched indicator.
5	Error condition occurred.	Error condition cleared.	Requesting Error status (device dependent command)
6	SRQ has occurred.	SRQ not active this device.	Requesting RCVR Serial poll status.

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 returned byte (0=00000000; 127 = 01111111).

2.8.2 CONFIGURATION COMMANDS

Table 2-12 illustrates configuration commands and responses in ASCII and hexadecimal. The commands and responses are utilized to configure the receiver to the proper format.

Table 2-12. WJ-8615P Configuration Commands and Responses

Commands		Response		
ASCII	HEX	ASCII	HEX	Description
BIN				Causes all future expected commands to be in binary.
	55			Causes all future expected commands to be in ASCII (Default)
CFG a	12 b			Set receiver configuration: (Default is 0) Bit Description 0 Generate an SRQ on a change in COR status. 1 Causes AGC to re-check signals upon receipt of a new frequency message. 2 Enter scan or step manual mode on signal acquisition from scan or step. 3 Set SRQ at the end of SCAN or step. 4 Queue signals only in scan or step. 5 Enter scan or step manual mode on full queue. 6 Report all signals over COR level in scan instead of leading edge only. 7 Not used.
CFG?	14	CFGa	12 b	Request receiver configuration
ERR?	65	ERR a	63 b	Request error number. Returns 2 right hand digits of error code. Error 0 indicates no current error.
FPL	CF			Turns front panel display on (Default).
FPL/	D0			Turns front panel display off, (EXCEPT Remote LED).
FPL?	D1	FPL	CF	Request current front panel display status (on/off).
		FPL/	D0	
MAN	75			Selects Manual mode.
MOD?	B3			Request operating mode.
				Returns proper mnemonic:
		STM	B1	Step Manual.
		MAN	75	Manual mode.
		SCM	B2	Scan-Manual mode.
		RCL	7B	Recall mode.
		SCN	84	Scan mode.
		STP	8D	Step mode.

Table 2-12. WJ-8615P Configuration Commands and Responses (Cont'd.)

Commands		Response		Description
ASCII	HEX	ASCII	HEX	
OPT?	DD	OPTa,a,a	DB bbb	Request option configurations. Returns three groups of ASCII characters representing numbers from 0 to 255, separated with commas in ASCII. The groups are bit mapped to represent the installed options. Bit / Byte 1 / Byte 2 / Byte 3 0 CLK 1 EM HF FE16 2 LCK 3 PRE FE11 4 LOG SSB 5 BFO MX 6 SAO 7 SSL (CLK, EM, LCK, LOG, SSB, SSL, BFO are set on the WJ-8615P response.)
RMT	81			Select Remote operation. Must be selected to send RMT commands. Queries are valid in Remote or Local.
RMT/	82			Select Local mode (Default).
RMT?	83	RMT RMT/	81 82	Request current control mode.
STS a	90 b			Allows setting of CFG byte.
STS?	92	STSa	90b	Request device status. Bit / Function 0 Signal above COR level. 1 Unit power-up or IEEE-488 DCL (Device Clear) or SDC (Selective Device Clear) activated SRQ. 2 Queue is full. 3 Scan or Step single sequence complete. 4 Receiver responding to query. 5 Unit error activated SRQ. (Cleared by ERR?) 6 SRQ activated by this unit. (Cleared by serial poll followed by STS?)
VER?	E0	VER	DE**	Request receiver mode and software version level. Returns in the form: VER 8615XYYYYZ.Z.Z where: X = Letter designation of receiver. Y = Dash number of receiver. Z = Software designation. ** In binary the ASCII response follows the binary command byte. The response is terminated with EOI.

LEGEND:

Chr	Used in Command	Used in Response
b	Is a single byte of data	Is a single byte of data
p	Is a packed BCD data byte	Is a packed BCD data byte
a	Is 1-3 ASCII digits used as a number	Is a space and 3 ASCII digits
f	Is a maximum of 4 ASCII digits, a decimal and 4 more ASCII digits	Is a space, 4 digits, a decimal, and 4 more ASCII digits

2.8.3 BANDWIDTH COMMANDS AND RESPONSES

Table 2-13 is provided to list the commands and responses related to the setting of Bandwidth.

Table 2-13. WJ-8615P Bandwidth and Responses

Commands		Response		
ASCII	HEX	ASCII	HEX	Description
BW a	4E b			Select BW slot 1-5. Receiver does not allow empty slot selection.
BW?	50	BW a	4E b	Request which slot is selected. (BW 1 is default.)
BWC?	9E	BWC c	9C bb	Request size of selected BW. Number returned is ASCII, in kHz. Number returned in binary is a 2 byte binary number representing kHz.

LEGEND:

Chr	Used in Command	Used in Response
b	Is a single byte of data	Is a single byte of data
p	Is a packed BCD data byte	Is a packed BCD data byte
a	Is 1-3 ASCII digits used as a number	Is a space and 3 ASCII digits
f	Is a maximum of 4 ASCII digits, a decimal and 4 more ASCII digits	Is a space, 4 digits, a decimal, and 4 more ASCII digits

2.8.4 DETECTION COMMANDS

Detection commands for the WJ-8615 receiver are given in **Table 2-14**, which also lists descriptions for each command.

Table 2-14. WJ-8615P Detection Commands and Descriptions

Commands		Response		
ASCII	HEX	ASCII	HEX	Description
AM	48			Select AM detection mode. (Default)
CW	5A			Select CW detection mode.
FM	69			Select FM detection mode.
ISB	64			Select ISB detection mode.
LSB	72			Select LSB detection mode.
PLS	78			Select PULSE detection mode.
USB	93			Select USB detection mode.
DET?	5F	AM	48	Request detection mode selected.
		CW	5A	
		FM	69	
		ISB	64	
		LSB	72	
		PLS	78	
		USB	93	

2.8.5 SIGNAL INFORMATION COMMANDS

Commands for signal information from the WJ-8615P Receiver, are given in **Table 2-15**. Signal information is acquired from the receiver using the commands listed.

Table 2-15. WJ-8615P Receiver Information Query Commands

Commands		Response		
ASCII	HEX	ASCII	HEX	Description
AM?	4A	AMa	48b	Request reading from AM modulation %, 000-100 range.
FM?	6B	FMa	69b	Request reading from FM modulation. (Response is % of selected bandwidth.)
FMD?	AD	FMDa	ABb	Request reading of FM offset. 000-255 range. 127 indicates center tuned.
LGV?	71	LGVa	6Fb	Request reading of Log Video. 000-120 range. Each count represents .5 dB.
SS?	89	SSa	87b	Request reading of Signal Strength in dBm. (In manual, gain represents AM Detector utilization, 0 - 100%.)

LEGEND:

Chr	Used in Command	Used in Response
b	Is a single byte of data	Is a single byte of data
p	Is a packed BCD data byte	Is a packed BCD data byte
a	Is 1-3 ASCII digits used as a number	Is a space and 3 ASCII digits
f	Is a maximum of 4 ASCII digits, a decimal and 4 more ASCII digits	Is a space, 4 digits, a decimal, and 4 more ASCII digits

2.8.6 STORAGE MEMORY

Storage memory is used for scan step and manual parameter storage. Unlike the front panel operations, there is no partition between manual step and scan storage channels. This change in memory operation from front panel to remote allows remote software compatibility with other WJ-861X products.

Storing Scan set-up data requires two memory channels. The first channel Scan Set-up Parameters include:

- Start Frequency
- IF Bandwidth
- COR Level
- Detection Mode
- AFC Status
- AGC Status
- RF Gain
- BFO Frequency

The second channel is a stop channel. The only data needed by the scan operation of this channel is the frequency, which is interpreted as a stop frequency.

Memory channels allow universal use for scan, step or manual storage. Data may be entered into or retrieved from storage memory using one of two methods. One method is to tune the receiver to the desired frequency with the desired parameters, then use a "STO a" command, where "a" is the specified channel number. This method may be used only if the receiver is in one of the manual modes of operation: manual; scan manual; or step manual.

Associated with this storage method is a recall and execute command that allows data to be transferred from storage memory to current receiver operational parameters. This function is performed by sending the recall and execute command "RCE a" where "a" is the specified channel. This command is only valid in one of the manual modes of operation.

The other method of memory access is direct. This method allows stored parameter data to be read from memory without affecting the current receiver parameters or operation. The store channel command is followed by the channel number and channel parameters. The command may be used in any of the manual receiver modes of operation or in step mode, to turn channels ON or OFF. Other parameters may not be changed while in Scan or Step operation. The recall channel command "RCH n" is valid in all modes of receiver operation. It returns the data from the requested channel "a" in the form of the store channel command. When the channel command is used, any blank fields retain their previous value. **Table 2-16** lists memory commands with descriptions.

Table 2-16. Memory Commands and Descriptions

Commands		Response		Description
ASCII	HEX	ASCII	HEX	
CLM	6C			Clear receiver memory. Both lockout and storage memory are cleared. The receiver returns to the default conditions.
CLS	16			Clears all storage memory. Receiver operation and lockouts are unchanged.
RCE a	27 b			Recall and execute data from the specified memory channel. The data from the channel is used for the current operating parameters.
RCH a?	2C b	SCH...	30...	Requests data in the specified channel. (Responds with an SCH command.)

Table 2-16. Memory Commands and Descriptions (Cont'd.)

Commands		Response		Description
ASCII	HEX	ASCII	HEX	
SCH 1, 2, 3, 4, 5, 6, 7, 8, 9, 0	30 bbpppp bbbbbb pppp			Store the designated data into the specified memory channel, where: 1 = memory channel number where data is to be stored. (0-partitioned channel or 149 with EM.) 2 = chan. off/on flag (CHN, CHN/) 3 = frequency: in MHz 4 = bandwidth slot: 1-5 5 = cor level: 0-80, 99 for OFF 6 = detection mode: AM, FM, CW, PLS, USB, LSB, or ISB 7 = afc status: AFC, AFC/ 8 = agc status: AGC, AGC/ 9 = RF gain setting: 0-255 0 = BFO freq.: -4 kHz - +4 kHz
STO a	8A b			Store current active parameters to the specified memory channel. The channel number must be 0 through 149.

LEGEND:

Chr	Used in Command	Used in Response
b	Is a single byte of data	Is a single byte of data
p	Is a packed BCD data byte	Is a packed BCD data byte
a	Is 1-3 ASCII digits used as a number	Is a space and 3 ASCII digits
f	Is a maximum of 4 ASCII digits, a decimal and 4 more ASCII digits	Is a space, 4 digits, a decimal, and 4 more ASCII digits

2.8.7 CONFIGURATION REGISTER

WJ-8615P Receivers provide three modes of Step/Scan operation. These modes are described in the following paragraphs. Selection of the desired Scan or Step mode must be performed before initiating a Step or Scan operation. Selection of the Scan/Step mode determines the receiver response during a Scan or Step operation when a signal greater than the COR level is encountered.

2.8.7.1 Mode 1 (Signal Activated Step/Scan)

When the Mode 1 operation is selected, the Step or Scan operation halts whenever a signal is encountered that exceeds the set COR level. The selected operations will continue when one of two conditions occur. The selected operation will continue when:

1. The signal drops below the set COR level, or
2. A Scan (SCN) or a Step (STP) command is received.

When either of these condition are met, the receiver resumes its previous scan or step operation.

When the receiver stops on a signal in scan or step, it sets the SRQ line and bit 6 of the status byte, if enabled. Bit 0 of the status byte indicates the current COR status. Reading the COR status will indicate if the receiver is currently scanning, stepping or stopped on a signal.

Mode one is the default for Scan or Step Operations.

2.8.7.2 Mode 2 (Stop on Signal)

Operation of Mode 2 is identical to Mode 1, until a signal is encountered that exceeds the COR level. When this occurs, the receiver is placed in the Step Manual or Scan Manual mode and the SRQ bit (6) is set in the status byte, as is the SRQ line (provided that SRQ has been enabled previously).

2.8.7.3 Mode 3 (Queue Signals Only)

Mode 3 operates the same as Modes 1 and 2 until a signal greater than the COR level is encountered. When a signal is encountered, the receiver operations halts only long enough to store the signal frequency in a queue before continuing its Step or Scan operation.

When the receiver is in Mode 3 (Queue signals only), the queue is filled using a first in, first out, operation (FIFO). When Variation 3 is disabled, the first data in the queue (the oldest data) is written over first. This allows the last data entered (the most recent) to be stored for the longest time. Sending the "QUE?" command results in the receiver sending the current data entered in the queue. This represents 16 most recent signals that were entered in the queue. The queue is filled with signals independent of the selected configuration mode. If no signals have been found since the last "QUE?" command, no frequencies are returned.

The three Step/Scan modes of operation may be varied in one of three ways. The variation selected affects the operation of the selected Step or Scan. Refer to **Table 2-17** for the Step/Scan Configuration Register and Variations.

Table 2-17. Step/Scan Configuration Register and Variations

Command	Bit Value	Description
CFG	1	Set SRQ on a status change.
CFG	2	Cause AGC to re-attack signals upon receipt of new frequency.
CFG	4	Mode 2 (Stop on Signal).
CFG	8	Variation 1 (Single Sequence).
CFG	16	Mode 3 (Queue Signals Only).
CFG	32	Variation 3 (Stop on Full Queue).
CFG	64	Variation 2 (All Signals Scan Log).
CFG	128	For Future Expansion

NOTES

Mode 1 is enabled by disabling both Mode 2 and Mode 3. Mode 2 and Mode 3 cannot be enabled simultaneously. The last CFG command set determines the Mode.

Variation 1: (Single Sequence) - The receiver scans or steps, depending on the mode selected. When the Scan reaches the stop frequency or the step frequency reaches the last channel in the group, the receiver stops and enters Scan/Step Manual mode. When this happens, bit 3 (Scan or Step sequence complete) and bit 6 (SRQ) is set in the status byte along with SRQ line.

Variation 2: (All Signals Scan Log) - During normal receiver operation, the receiver only detects the leading edge of signals that are greater than the set COR level. This avoids repetitive logging of single signals that occupy more than one adjacent scan increment. Enabling this variation allows the receiver to log each frequency where signal energy is detected. This variation is valid in all three modes but has not effect during Manual or Step operations.

Variation 3: (Stop on Full Queue) - The receiver operation halts and enters the Step Manual or Scan Manual mode when the queue is full and sets bit 2 and bit 6 of the status byte, along with the SRQ line.

2.8.8 DWELL TIMERS

In order to increase the flexibility of scan, step operations the WJ-8615P includes three user programmable dwell timers. These timers allow the user to modify the scan step operation based on the signal environment. The same three timers are global in nature and are used for both scan and step. The timers are a pre-dwell, a signal dwell and a post signal loss dwell timer. Dwell Timer commands is listed with descriptions in **Table 2-18**.

2.8.8.1 The Pre-Dwell Timer

The pre-dwell timer command "PDW a" establishes how long the receiver will wait on each frequency for signal activity. It is programmable from 0 to 200 ms. Zero implies the receiver will wait only for a single sample after the LO is locked on frequency in scan or step. If no energy over the preset cor level is present, the receiver will go to the next point. If energy is present it will be reported and the signal dwell timer then becomes active.

2.8.8.2 The Signal Dwell Timer

The signal dwell timer command "SDW a" establishes how long the receiver will remain on a signal after it has been acquired. Signal dwell is programmable from 0 to 600 seconds and entry of 601 causes the signal dwell to be infinity. With a signal dwell of infinity, the receiver will stay on an acquired signal frequency until the signal drops below COR threshold. With signal dwell set to 0 seconds, the receiver reports acquisition of the signal, then tunes to the next frequency. The signal dwell timer is a cumulative timer that is reset upon starting from the pre-dwell condition. When the signal dwell expires, the receiver continues to the next point in the scan or step. If the signal is lost before the signal dwell timer expires, the post signal loss dwell timer becomes active.

Table 2-18. Dwell Timer Commands and Descriptions

Commands		Response		Description
ASCII	HEX	ASCII	HEX	
DWL a	60 b			Same as PDW - 861X compatible.
DWL?	62	DWL a	60 b	Same as PDW? - 861X compatible.
LDW a	38 b			Post signal loss dwell timer. Selectable from 0 to 200 seconds in 1.0 second increments. Selection of 255 causes LDW to be infinity. (Default = 0.)
LDW?	3A	LDW a	38 b	Request the current loss dwell timer value.
PDW a	32 b			Pre-signal dwell timer. Selectable from 0 to 200 ms in 1.0 ms increments. (Default value = 0)
PDW?	34	PDW a	32 b	Request the current Pre-dwell timer value.
SDW a	35 bb			Signal dwell timer. Selectable from 0 to 600 seconds. Selection of 601 indicates infinity, which means no time out. (601 = Default)
SDW?	37	SDW a	35 bb	Request the current signal dwell timer value.

LEGEND:

Chr	Used in Command	Used in Response
b	Is a single byte of data	Is a single byte of data
p	Is a packed BCD data byte	Is a packed BCD data byte
a	Is 1-3 ASCII digits used as a number	Is a space and 3 ASCII digits
f	Is a maximum of 4 ASCII digits, a decimal and 4 more ASCII digits	Is a space, 4 digits, a decimal, and 4 more ASCII digits

2.8.8.3 Post Signal Loss Dwell Timer

The post signal loss dwell timer command "LDW a", establishes how long the receiver will wait on the previously active signal frequency before continuing the scan or step operation. The timer is programmable from 0 - 200 seconds and 255 seconds indicating infinity. This timer keeps the receiver on the previously active frequency waiting for additional activity. If the timer expires, the receiver continues its scan or step operation. In the event the signal re-appears before the timer expires, the signal dwell timer again becomes active with the full post loss dwell interval. When the timer is set to infinity, the receiver will wait until the signal re-appears or the receiver is commanded to continue.

2.8.9 QUEUE OPERATION

While the receiver is in Scan or Step, the queue is filled using a first in, first out, approach. If Variation 3 is disabled (Stop on Full Queue), the oldest data in the queue is over-written first. The queue may be queried (emptied) at any time using the "QUE?" command. The receiver responds with up to the most recent 16 signals it has found. Due to the amount of data requested by this command, do not issue any other commands in the same string with QUE? to avoid overflowing the output buffer. **Table 2-19** lists and describes queue command and queries.

Table 2-19. Queue Commands/Descriptions

Commands		Response		Description
ASCII	HEX	ASCII	HEX	
QUE?	26	QUE f,f,f..	24 pppp....	Return all frequencies in queue. If queue is empty, no frequencies are returned. Response to QUE? query. Sample response: 24pppp pppp... (Returns frequencies in queue up to a maximum of 16 frequencies.

LEGEND:

Chr	Used in Command	Used in Response
b	Is a single byte of data	Is a single byte of data
p	Is a packed BCD data byte	Is a packed BCD data byte
a	Is 1-3 ASCII digits used as a number	Is a space and 3 ASCII digits
f	Is a maximum of 4 ASCII digits, a decimal and 4 more ASCII digits	Is a space, 4 digits, a decimal, and 4 more ASCII digits

2.8.10 STEP OPERATION

During Step operation, the receiver steps through the programmed memory channels 0-149. Data entered into each memory channel contains the receiver operating parameters for that specific frequency. Step memory channels do not have to be entered in ascending frequency order. The Step frequency order is determined by the memory channel order.

Before Step operations are initiated, the configuration register mode (Modes 1 through 3) and the variation (1 through 3) must be selected. Refer to the preceding paragraphs for an explanation of the modes and variations available. There are three forms of Step operation available. The three forms are:

1. Sequential Step
2. Sequential Sector Step
3. Random Step

Sequential Step operation begins at memory channel zero and continues to the operator determined stop memory channel. Thus only the stop memory channel must be defined. Sending the Step command in the following form: "STP a", (where a = the desired stop memory channel). The frequency data stored in the memory channels between 0 and the value of "a" is stepped through in numerical sequence, regardless of the frequency entered in the memory channel location. When memory channel "a" is stepped to, the receiver action is determined by the configuration register mode selected. If single sequence is on, the receiver will stop and enter Step Manual. If OFF, the sequence is repeated.

Sequential Sector Step operation begins at an operator defined memory channel and ends at another operator defined memory channel. Thus the operator defines both the start and stop memory channels. The stop memory channel number must be higher than the start memory channel. Sending the sequential sector command takes the form: "STP a-a" (where the first "a" is start, the second a is the stop channel). All memory channels between the first and second "a" is stepped in numerical sequence order.

When the stop memory channel is reached the operation of the receiver is determined by the configuration register mode selected the same as in the Sequential Step operation.

Random Step operation is a series of up to 25 discrete memory channels, stepped through in the order in which they have been entered in the memory channels. This allows the operator the flexibility to create a series of custom frequencies for the receiver to tune through in a specified order. The form for entering the series of step memory channels is: "STP" a, a, a, a, a, a.....", up to a maximum of 25 channels. Thus the receiver steps through each of the discrete memory channel frequencies in the order in which they are listed in the Step command. Once the final random step memory channel is reached, the receiver operation is determined by the selection of the configuration register mode, as in Sequential Step operation.

Step operation may change from Step continue to Step manual, as determined by the configuration register mode selected and by the variation selected. Step continue mode allows the receiver to halt at a frequency with a signal level that exceeds the COR level, until the signal is lost or the controller sends a resume STEP command "STP." The Step manual operation is similar to the manual operation by allowing the receiver to accept new commands for optimization of the signal encountered. If the Step operation is continued, the Step operation resumes with the next memory channel in the programmed sequence. However, if the Step operation is halted, placing the receiver in the Step continue mode, and the manual command "MAN" is sent, the Step operation is terminated and the receiver is placed in the Manual operating mode. Refer to **Table 2-20** for a list of the Step commands.

Since lockouts are not supportable in the Step operating mode, memory channels must be enabled or disabled. Enabling or disabling memory channels is accomplished by a combination of two commands. The commands are store memory channel, "SCH" and channel enable, "CHN" or, channel disable "CHN/." The form used to disable a memory channel is as follows: "SCHa,CHN/." Using this form memory channel "a" has been disabled. For memory channels to be enabled or disabled, they must first have been included in the Step sequence being performed. Thus, if a sequential sector Step of memory channels 5 to 10 is being performed, memory channel 12 cannot be disabled. Only memory channels between 5 and 10 (in this case), can be disabled. Likewise, in a random Step operation, a memory channel must be included in the start Step command "STP a, a, a," before it can be enabled or disabled.

Table 2-20. Step Commands

Commands		Response		Description
ASCII	HEX	ASCII	HEX	
CHN	0C			Enable current channel for storage.
CHN/	0D			Disable current channel for storage.
CHN?	0E	CHN CHN/	0C 0D	Request current channel status.
MAN	75			Stops the Step and enters Step manual, or if in Step already enters the manual mode.
SCHa, CHN	30 b 0C			Enable memory channel "n" from a preset Step sequence.
SCHa, CHN/	10			Disable memory channel "n" to a preset Step sequence.

Table 2-20. Step Commands (Continued)

Commands		Response		Description
ASCII	HEX	ASCII	HEX	
SSC	10			Resume Step operation if in Step manual or Continue.
STM	B1			Enters Step manual if in Step mode, otherwise it is ignored.
STP	8D			Resume Step from Step continue or step Manual.
STP a	8D b			Start Step from channel 0 using stop channel "a".
STPa-a	8D bb			Start Step sequentially using the first memory channel "a" as the start and the second "a" as the stop
STP a,a,	8E bb			Start Step using channel "a", then Step to channel "a", then step to "a", in the order entered to a maximum of 25 channels.

LEGEND:

Chr	Used in Command	Used in Response
b	Is a single byte of data	Is a single byte of data
p	Is a packed BCD data byte	Is a packed BCD data byte
a	Is 1-3 ASCII digits used as a number	Is a space and 3 ASCII digits
f	Is a maximum of 4 ASCII digits, a decimal and 4 more ASCII digits	Is a space, 4 digits, a decimal, and 4 more ASCII digits

2.8.11 SCAN OPERATION

Scan operation in the WJ-8615 Receiver allows the receiver to tune between two operator determined frequencies. The start frequency and setup parameters are loaded into one memory channel and the stop frequency is loaded into the next memory channel. The start frequency must always be lower in frequency than the stop frequency. Both frequencies must be entered into memory before a scan is initiated. In addition to the parameters entered in the memory channel, the scan increment size is also entered. The scan increment size is determined by the increment size and the bandwidth increment commands. The scan size increment command "SCI" is used to set the desired scan increment (between 10 kHz and 5 MHz in 5 kHz increments). When sending the scan increment size, the frequency is always represented as MHz. Thus selecting a scan increment of 500 kHz would require the following format: "SCI 0.5". This produces a 500 kHz scan increment.

If no scan increment is specified "SCI 0", the scan increment is determined by the bandwidth stored in the memory channel and the bandwidth increment status. If a scan increment is specified, the Bandwidth commands "FBW or FBW/" have no affect. The bandwidth commands are used only when the Scan increment is set to the default value by "SCI 0". When "SCI" is set for a Scan increment of zero, full bandwidth is selected by sending the full Bandwidth command, FBW. The Scan increment is equal to the size of the bandwidth stored in the memory channel. However, if half bandwidth is selected "FBW/", the scan increment is one-half of the bandwidth stored in the memory channel. If no scan increment is set, the default scan increment is "SCI 0" and the bandwidth is set to half bandwidth.

When entering parameters into the memory channels, the lower numbered memory channel contains the start frequency and the receiver setup parameters. The next higher numbered memory channel contains the stop frequency. (The other parameters are not used for Scan.) The start frequency must always be lower than the stop frequency. Initiating the Scan operation causes the receiver to scan from the start frequency to the stop frequency. The Scan operation is halted when a signal greater than the COR level is encountered or if the controller sends the manual command, MAN. When this occurs, the receiver is placed in the Scan continue mode. The Scan operation can be resumed by sending the Scan continue command, "SCN" or the receiver can be placed in the Manual mode by sending the manual command, "MAN."

Initiating a Scan sequence can be done in two ways. The Scan operation may be set to Scan from the start frequency contained in memory channel "a" and the stop frequency contained in the next memory channel, by using the form "SCN a". Or a scan can be initiated using the start frequency in one memory channel and end using the stop frequency in another specified memory channel by using the form: "SCN a-a". When specifying two memory channels in a scan command, the first channel number is the start frequency and start parameters. The second number contains the stop frequency.

Scan operation may change to Scan continue or to Scan manual, based on configuration register and the variation selections. While in the Scan continue mode, the receiver can accept new commands and operating parameters may be varied. This allows an active signal to be more closely observed before resuming the scan or before entering into the Manual mode. Sending the Scan command "SCN" allows the receiver to exit the Scan continue command and resume the scan.

The action taken by the receiver when a signal is encountered that exceeds the set COR level is determined by the configuration mode and the variation selected. If the SRQ bit is enabled for signal activity, the receiver sets the SRQ bit as signals are found in the scan. **Table 2-21** lists the Scan commands.

Table 2-21. Scan Commands

Commands		Response		
ASCII	HEX	ASCII	HEX	Description
FBW	D8			Selects full bandwidth Scan increment mode
FBW/	D9			Selects half bandwidth Scan increment mode
FBW?	DA	FBW	D8	Request current Scan Bandwidth increment Status.
MAN	75	FBW/	D9	Stops scan and enters Scan continue. If in Scan continue already enters Manual mode.

Table 2-21. Scan Commands (Continued)

Commands		Response		Description
ASCII	HEX	ASCII	HEX	
SCI a	06pppp			Scan increment freq. in MHz. Selectable from 1 kHz to 5 MHz in 1 kHz increments. SCI mnemonic with an argument of 0 causes increment to be controlled by FBW command.
SCI?	08	SCI f	06pppp	Request the selected Scan increment
SCN	84			Resume Scan from Scan continue or Scan Manual.
SCN a	84 b			Start Scan from frequency stored in memory channel "a" and with frequency in channel "a" +1.
SCN a-a	84 bb			Start Scan using frequency in memory channel "a" as the start frequency and frequency in the second "a" memory channel as the stop frequency.
SCM	B2			Enters Scan Manual if in Scan mode, otherwise it is ignored.
SSC	10			Resume Scan operation if in Scan or continue.

LEGEND:

Chr	Used in Command	Used in Response
b	Is a single byte of data	Is a single byte of data
p	Is a packed BCD data byte	Is a packed BCD data byte
a	Is 1-3 ASCII digits used as a number	Is a space and 3 ASCII digits
f	Is a maximum of 4 ASCII digits, a decimal and 4 more ASCII digits	Is a space, 4 digits, a decimal, and 4 more ASCII digits

2.8.12 SCAN LOCKOUT

Lockout allows specific segments of the frequency spectrum to be ignored during the Scan operating mode. This allows previously identified signals to appear invisible to the Scan operation. The Lockout frequency entered into the memory channel is the center frequency of the undesired signal. In addition to entering the center frequency, the operator must determine the width of the RF spectrum band to also lock out. The lockout bandwidth is selectable from 10 kHz to 99.99 MHz in 10 kHz increments. By overlapping the Lockout frequency and bandwidth, one Lockout may extend into another Lockout, thus eliminating an entire segment of the RF spectrum.

A frequency may be entered into a Lockout memory channel when the receiver is in Scan, Manual, or Scan Manual mode. Upon receiving the lockout channel the scan is restarted.

When storing Lockout frequencies in memory channels, each Lockout is given a separate memory channel, starting with Lockout #1. Lockout frequencies may be entered into memory in any order, but are arranged in memory in descending frequency order by the processor. This places the highest Lockout frequency in memory Lockout #1.

Two methods may be used to enter a Lockout into memory. One method is by sending the Lockout command "LCK". This command locks out the current tuned frequency and uses the selected IF bandwidth as the lockout width. If the selected IF bandwidth is not an even 10 kHz increment, the bandwidth is truncated to the nearest 10 kHz multiple. The other method is to use the lock frequency command "LKF", followed by the Lockout center frequency and the Lockout bandwidth.

Once a frequency has been locked out, there are two methods of re-enabling (or "de-selecting'), a Lockout frequency. When the lockout channel is removed, the Scan is restored.

One method to re-enable a Lockout frequency is by using the center frequency. The unlock frequency command, "ULF" must be accompanied by the center frequency to be unlocked (re-enabled). If an unlock frequency command is sent and there is no frequency at the specified frequency, an "816" error will be generated.

The other method for re-enabling a locked out frequency is to use the unlock command, ULK and the associated memory channel number. The Lockout memory channels may be searched by the controller in a non-destructive manner, by using the recall lockout command and the lockout channel number "RLK a." Once the desired Lockout is found, the unlock command may be used to re-enable the locked out frequency and the associated bandwidth. To determine the number of Lockout channels in use, the Lockout channel query," LCH?" may be used. The Lockout query requests the number of Lockout memory channels that are being used. The receiver responds by returning "LCH" followed by the number of locked-out channels.

Refer to **Table 2-22** for a complete list of the Scan Lockout commands supported by the WJ-8615P Receiver. **Paragraph 2-9** provides information and tables for the Error signals and messages.

Table 2-22. Scan Lockout Commands

Commands		Response		
ASCII	HEX	ASCII	HEX	Description
CLC	15			Clears all Lockout memory channels.
LKD f,f	1Epppppp			Locks center frequency and width in Lockout memory. In binary, the first 4 bytes are center frequency and the last 2 bytes are width. (10's MHz, 1's MHz, 100's kHz and 10's kHz.)
LCH?	1D	LCH a	1B bb	Requests the number of Lockouts being used.
LCK	94			Locks out the current tuned frequency and uses the IF bandwidth as the width.
RLK a?	2F bb	LKF f,f	1Epppppp	Requests the center frequency and width of Lockout channel "a."
ULC a	33 bb			Unlocks frequency and width in memory channel "a."
ULF f	36 pppp			Unlocks center frequency "f."

LEGEND:

Chr	Used in Command	Used in Response
b	Is a single byte of data	Is a single byte of data
p	Is a packed BCD data byte	Is a packed BCD data byte
a	Is 1-3 ASCII digits used as a number	Is a space and 3 ASCII digits
f	Is a maximum of 4 ASCII digits, a decimal and 4 more ASCII digits	Is a space, 4 digits, a decimal, and 4 more ASCII digits

2.8.13 MISCELLANEOUS WJ-8615P COMMANDS

Miscellaneous control functions of the WJ-8615P Receiver are obtained using the commands listed in **Table 2-23**, which also contains descriptions of the commands.

Table 2-23. Miscellaneous WJ-8615P Receiver Commands

Commands		Response		
ASCII	HEX	ASCII	HEX	Description
AFC	42			Turn AFC on.
AFC/	43			Turn AFC off. (Default)
AFC?	44	AFC	42	Request AFC mode.
		AFC/	43	
AGC	45			Turn AGC on (Default).
AGC/	46			Turn AGC off.
AGC?	47	AGC	45	Request AGC mode.
		AGC/	46	
BFO f	39 pppp			Set BFO frequency in kHz. While in CW mode, range is ±4.00 kHz, with 40 Hz resolution. In SSB mode, range is ±2.00 kHz, with 20 Hz resolution. First ASCII character after space in "f" field is sign, (0 = -). In binary, frequency is packed BCD in kHz with a decimal point assumed between 2nd and 3rd byte. Sign is bit 3 of 2nd byte. Set indicates negative.
BFO?	3B	BFO f	39pppp	Request current BFO Frequency.
BYP	3F			Select bypass of preselector.
BYP/	40			De-select bypass of preselector (Default).
BYP?	41	BYP	3F	Request present status of preselector (bypass ON/OFF).
		BYP/	40	
CLR	51			Clear receiver to default conditions.
COR a	57 b			Set COR level: (0 to >81 = OFF). Level is 1 dB steps starting at noise floor of selected BW.
COR?	59	CORa	57 b	Request COR level, 99 indicates off.
CST?	9B			Request COR STATUS.
		CST	99	Signal is above COR.
		CST/	9A	Signal is below COR.
DAT a/a/a	95 bbb			Set date in receiver RTC chip. (dd/mm/yy)
DAT?	97	DAT a/a/a	95 bbb	Request current date.
FRQ f	3C pppp			Set the tuned frequency in MHz. 20-500 in .001 MHz steps.) (Binary mode is packed BCD always 4 bytes.) (Limits are based on options.)

Table 2-23. Miscellaneous WJ-8615P Receiver Commands (Continued)

Commands		Response		Description
ASCII	HEX	ASCII	HEX	
FRQ?	3E	FRQ f	3C pppp	Request tuned Frequency. (Default Frequency = 20 MHz.)
LOG a	96 b			Set receiver log mode. 0 = log disabled 1 = tape log 2 = auto tape log 3 = printer log 4 = auto printer log
LOG?	98	LOG a	96 b	Request log mode.
RFG a	7E b			Enter RF Gain number (0-255). 0 = minimum gain, 255 - maximum.
RFG/	7F			Set current RF gain word based on current AGC gain level.
RFG?	80	RFG a	7E b	Request RF Gain number. (Default RF Gain is 0.)
TIM a:a	AE bb			Set time hours and minutes. Seconds are zeroed when command is received.
TIM?	B0	TIM a:a:a	AE bbb	Returns time in hours, minutes and seconds.
TSP a	E1 b			Set remote tuning speed. 0 = 100 Hz resolution, 3 = 1 kHz resolution (default = 100 Hz)
TSP?	E3	TSP a	E1 b	Request remote tuning speed

LEGEND:

Chr	Used in Command	Used in Response
b	Is a single byte of data	Is a single byte of data
p	Is a packed BCD data byte	Is a packed BCD data byte
a	Is 1-3 ASCII digits used as a number	Is a space and 3 ASCII digits
f	Is a maximum of 4 ASCII digits, a decimal and 4 more ASCII digits	Is a space, 4 digits, a decimal, and 4 more ASCII digits

2.8.13.1 Setting Remote Tuning Speed

The TSP 003 command is used to increase the tuning speed of a remotely controlled receiver by reducing the receiver's tuning resolution. TSP 003 mode only affects tuning speed of a remotely controlled receiver, which is not scanning or stepping. TSP 003 allows faster execution of remote frequency messages by rounding frequency commands to the nearest 1000 Hz. The transition to 1 kHz resolution takes place with the first frequency command following TSP 003. TSP 001 returns the receiver to the standard 100 Hz resolution but not until a frequency with a non-zero value in the 100 Hz position is requested. TSP 001 is always the default condition. Except for forcing a default to TSP 001, the TSP mode can only be selected remotely. The TSP mode is unaffected by REMOTE/LOCAL transitions and by MAN/SCAN/STEP transitions.

2.8.14 EXAMPLES OF REMOTE BUS TRANSACTIONS

Tables 2-24 through **Table 2-40** are examples of various remote bus transactions.

Table 2-24. Sending a Tuned Frequency of 25 MHz to the WJ-8615P Using an HP-85 (WJ-8615P Device #6)

Message: Send tuned frequency of 25.0000 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		HP-85 TALK
ASCII message may have leading zeros.	3	1	0	26		WJ-8615P LISTEN
Total none blank character count 15,	4	0	0	46	F	
For single commands, exponential	5	0	0	52	R	DATA TO
Format not supported. IE: "FRQ	6	0	0	51	Q	WJ-8615P
0025.0000 is valid message.	7	0	0	32	2	
EOI may be the terminator.	8	0	0	35	5	
	9	0	0	0D	(CR)	
	10	0	0	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		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	3C	60	FREQ 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 HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-25. Sending an AFC "ON" Command

Message: Turn AFC On

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "AFC"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	41	A	
	5	0	0	46	F	DATA TO
	6	0	0	43	C	WJ-8615P
	7	0	0	0D	(CR)	
	8	0	0	0A	(LF)	TERMINATOR
Binary Mode	#	ATN	EOI	HEX	DEC	Comment
*Print using "B"; 66	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	1	42	66	AFC/ON CODE

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-26. Sending an AFC "OFF" Command

Message: Turn AFC Off

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "AFC/"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	41	A	
	5	0	0	46	F	DATA TO
	6	0	0	43	C	WJ-8615P
	7	0	0	2F	/	
	8	0	0	0D	(CR)	
	9	0	0	0A	(LF)	TERMINATOR
Binary Mode	#	ATN	EOI	HEX	DEC	Comment
*Print using "B"; 67	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	1	43	67	AFC/OFF CODE

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-27. Sending an AM Detection Command

Message: Send AM Detection Mode

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "AM"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	41	A	DATA TO
	5	0	0	4D	M	WJ-8615P
	6	0	0	0D	(CR)	
	7	0	0	0A	(LF)	TERMINATOR
Binary Mode	#	ATN	EOI	HEX	DEC	Comment
*Print using "B"; 72	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	1	48	72	AM CODE

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-28. Sending an COR "OFF" Command

Message: Send COR Off

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "COR 81"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	43	C	
	5	0	0	4F	O	DATA TO
	6	0	0	52	R	WJ-8615P
	7	0	0	34	8	
	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, 81	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	57	87	COR CODE
	5	0	1	29	81	VALUE

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-29. Sending a Command To Set BFO To -3.99 kHz

Message: Send BFO to -3.99 kHz

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "BFO -3.99"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	42	B	
	5	0	0	46	F	DATA TO
	6	0	0	4F	O	WJ-8615P
	7	0	0	2D	-	
	8	0	0	37	3	TERMINATOR
	9	0	0	2E	.	
	10	0	0	39	9	
	11	0	0	39	9	
	12	0	0	0D	(CR)	
	13	0	0	0A	(LF)	
Binary Mode	#	ATN	EOI	HEX	DEC	Comment
*Print using "B"; 57, 0, 11, 153, 0	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
Bit 3 of byte 6 is the sign bit	4	0	0	39	57	BFO CODE
0 = +, 1 = -,	5	0	0	00	00	BYTE 1
The remaining 3 bits are BCD 1's of kHz digit.	6	0	0	0B	11	BYTE 2
i.e. byte 6 for +3 kHz = 03 Hex.	7	0	0	99	153	BYTE 3
byte 6 for -3 kHz = 0B Hex.	8	0	1	00	0	BYTE 4

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-30. Sending a Frequency Request

Message: Request Frequency (Assume 25 MHz last sent)

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using “K”; “FRQ?”	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
Instruct WJ-8615 to prepare to output	3	1	0	26		WJ-8615P LISTEN
frequency information	4	0	0	46	F	
	5	0	0	52	R	DATA TO
	6	0	0	51	Q	WJ-8615P
	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		HP-85 LISTEN
	12	1	0	46		WJ-8615P TALK
	13	0	0	46	F	
	14	0	0	52	R	
	15	0	0	51	Q	DATA FROM
A$ will contain “FRQ 0025.0000”.	16	0	0	20		WJ-8615P
	17	0	0	30	0	
	18	0	0	30	0	
	19	0	0	32	2	
Frequency response is always 15	20	0	0	35	5	
characters.	21	0	0	2E	.	
	22	0	0	30	0	
	23	0	0	30	0	
	24	0	0	30	0	
	25	0	0	30	0	
	26	0	0	0D	(CR)	
	27	0	1	0A	(LF)	TERMINATOR
Binary Mode	#	ATN	EOI	HEX	DEC	Comment
*Print using “B”; 62	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	1	3E		REQUEST FREQUENCY
Enter 706 using “#%, #%K”; A$	1	1	0	3F		UNLISTEN
	2	1	0	35		HP-85 LISTEN
Image causes enter to terminate on EOI	3	1	0	46		WJ-8615P TALK
only.	4	0	0	3C	60	FREQ CODE
	5	0	0	00	0	BYTE 1
A$ will contain frequency data in packed	6	0	0	25	37	BYTE 2
BCD.	7	0	0	00	0	BYTE 3
	8	0	1	00	0	BYTE 4

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-31. Sending an AFC Condition Request

Message: Request AFC Condition (Assume AFC off)

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "AFC?"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
Instruct WJ-8615 to prepare to output	3	1	0	26		WJ-8615P LISTEN
AFC status	4	0	0	41	A	
	5	0	0	46	F	DATA TO
	6	0	0	43	C	WJ-8615P
	7	0	0	3F	?	
	0	0	0D	0D	(CR)	
	0	0	0A	0A	(LF)	TERMINATOR
Enter 706; A$	8	1	0	3F		UNLISTEN
	9	1	0	35		HP-85 LISTEN
	10	1	0	46		WJ-8615P TALK
A$ will contain "AFC/".	11	0	0	41	A	
	12	0	0	46	F	DATA FROM
	13	0	0	43	C	WJ-8615P
	14	0	0	2F	/	
	15	0	0	0D	(CR)	
	16	0	1	0A	(LF)	TERMINATOR
			(Response if AFC On)			
Enter 706; A$	8	1	0	3F		UNLISTEN
	9	1	0	35		HP-85 LISTEN
	10	1	0	46		WJ-8615P TALK
A$ will contain "AFC".	11	0	0	41	A	
	12	0	0	46	F	DATA FROM
	13	0	0	43	C	WJ-8615P
	14	0	0	0D	(CR)	
	15	0	1	0A	(LF)	TERMINATOR
Binary Mode	**#**	**ATN**	**EOI**	**HEX**	**DEC**	**Comment**
*Print using "B"; 68	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	1	44	68	REQUEST AFC
Enter 706 using "#%, #%K"; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP-85 LISTEN
	7	1	0	46		WJ-8615P TALK
A$ will contain 1 byte binary data.	8	0	1	43	67	AFC OFF
			(Response if AFC On)			
Enter 706 using "#%, #%K"; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP-85 LISTEN LISTEN
	7	1	0	46		WJ-8615P TALK
A$ will contain 1 byte binary data.	8	0	1	42	66	AFC OFF

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-32. Sending a Bandwidth Size Request

Message: Request Size of Currently Selected Bandwidth (Assume 4 MHz)

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "BWC?"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
Instruct WJ-8615P to output size of	3	1	0	26		WJ-8615P LISTEN
selected BW in kHz	4	0	0	42	B	
	5	0	0	57	W	DATA TO
	6	0	0	43	C	WJ-8615P
	7	0	0	3F	?	
	8	0	0	0D	(CR)	
	9	0	0	0A	(LF)	TERMINATOR
	10	1	0	3F		UNLISTEN
Enter 706; A$	11	1	0	35		HP-85 LISTEN
	12	1	0	46		WJ-8615P TALK
	13	0	0	42	B	
A$ will contain "BWC…10".	14	0	0	57	W	DATA FROM
	15	0	0	43	C	WJ-8615P
	16	0	0	20		
	17	0	0	20		
	18	0	0	20		
	19	0	0	31	1	
	20	0	0	30	0	
	21	0	0	0D	(CR)	
	22	0	1	0A	(LF)	TERMINATOR
	(Assume 4 MHz)					
Enter 706; A$	10	1	0	3F		UNLISTEN
	11	1	0	35		HP-85 LISTEN
	12	1	0	46		WJ-8615P TALK
A$ will contain "BWC 4000".	13	0	0	42	B	
	14	0	0	57	W	DATA FROM
	15	0	0	43	C	WJ-8615P
	16	0	0	20		
	17	0	0	34	4	
	18	0	0	30	0	
	19	0	0	30	0	
	20	0	0	30	0	
	21	0	0	0D	(CR)	
	22	0	1	0A	(LF)	TERMINATOR
Binary Mode	#	ATN	EOI	HEX	DEC	Comment
*Print using "B"; 158	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	1	9E	158	BW SIZE REQUEST
Enter 706 using "#%, #%K"; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP-85 LISTEN
	7	1	0	46		WJ-8615P TALK
A$ will contain binary BW size	8	0	0	9C	156	BW CODE
information.	9	0	0	00	0	BINARY CODED
	10	0	1	0A	10	BANDWIDTH IN kHz
	(Assume 4 MHz)					
Enter 706 using "#%, #%K"; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP-85 LISTEN
Byte 1, Byte 2	7	1	0	46		WJ-8615P TALK
	8	0	0	9C	156	BW CODE
A$ will contain binary BW size	9	0	0	0F	15	BINARY CODED
information.	10	0	1	A0	160	BANDWIDTH IN kHz

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-33. Sending a Detection Mode Request

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using “K”; “DET?”	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	44	D	
	5	0	0	45	E	DATA TO
	6	0	0	54	T	WJ-8615P
	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		HP-85 LISTEN
A$ will contain “AM”.	12	1	0	46		WJ-8615P TALK
	13	0	0	41	A	
	14	0	0	4D	M	DATA FROM
	15	0	0	20		WJ-8615P
	16	0	0	0D	(CR)	
	17	0	1	0A	(LF)	TERMINATOR
			(Assume PLS)			
Enter 706; A$	10	1	0	3F		UNLISTEN
	11	1	0	35		HP-85 LISTEN
A$ will contain “PLS”.	12	1	0	46		WJ-8615P TALK
	13	0	0	50	P	
	14	0	0	4C	L	DATA FROM
	15	0	0	53	S	WJ-8615P
	16	0	0	0D	(CR)	
	17	0	1	0A	(LF)	TERMINATOR
Binary Mode	**#**	**ATN**	**EOI**	**HEX**	**DEC**	**Comment**
*Print using “B”; 95	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 LISTEN
	3	1	0	26		WJ-8615P TALK
	4	0	1	5F	95	REQUEST DETECTION MODE
Enter 706 using “#%, #%K”; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP-85 LISTEN
	7	1	0	46		WJ-8615P TALK
	8	0	1	48	72	AM CODE
				(Assume PLS)		
Enter 706 using “#%, #%K”; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP-85 LISTEN
A$ will contain 1 byte binary data	7	1	0	46		WJ-8615P TALK
information.	8	1	1	78	120	PLS CODE

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-34. 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		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	43	C	
	5	0	0	4F	O	DATA TO
	6	0	0	52	R	WJ-8615P
	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		HP-85 LISTEN
A$ will contain "COR 001".	12	1	0	46		WJ-8615P TALK
	13	0	0	43	C	
	14	0	0	4F	O	DATA FROM
	15	0	0	52	R	WJ-8615P
	16	0	0	20		
	17	0	0	30	0	
	18	0	0	30	8	
	19	0	0	31	1	
	20	0	0	0D	(CR)	
	21	0	1	0A	(LF)	TERMINATOR
Binary Mode	**#**	**ATN**	**EOI**	**HEX**	**DEC**	**Comment**
*Print using "B"; 89		1	0	3F		UNLISTEN
		1	0	55		HP-85 TALK
		1	0	26		WJ-8615P LISTEN
		0	1	59	89	REQUEST COR
Enter 706 using "#%, #%K"; A$	1	1	0	3F		UNLISTEN
	2	1	0	35		HP-85 LISTEN
	3	1	0	46		WJ-8615P TALK
A$ will contain 2 bytes binary	4	0	0	57	87	COR CODE
information.	5	0	1	01	01	VALUE

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-35. Sending a BFO Frequency Request

Message: Request Frequency (Assume -3.60 kHz)

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "BFO?"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	42	B	
	5	0	0	46	F	DATA TO
	6	0	0	4F	O	WJ-8615P
	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		HP-85 LISTEN
	12	1	0	46		WJ-8615P TALK
A$ will contain "BFO -003.6000".	13	0	0	42	B	
	14	0	0	46	F	DATA FROM
	15	0	0	4F	O	WJ-8615P
	16	0	0	20		
	17	0	0	2D	-	
	18	0	0	30	0	
	19	0	0	30	0	
	20	0	0	33	3	
	21	0	0	2E	.	
	22	0	0	36	6	
	23	0	0	30	0	
	24	0	0	30	0	
	25	0	0	30	0	
	26	0	0	0D	(CR)	
	27	0	1	0A	(LF)	TERMINATOR
Binary Mode	#	ATN	EOI	HEX	DEC	Comment
*Print using "B"; 59	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	1	3B	59	REQUEST BFO
Enter 706 using "#%, #%K"; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP-85 LISTEN
A$ will contain 5 bytes BFO	7	1	0	46		WJ-8615P TALK
information.	8	0	0	39	57	BFO CODE
	9	0	0	00	0	BYTE 1
	10	0	0	0B	11	BYTE 2
	11	0	0	60	96	BYTE 3
	12	0	1	00	00	BYTE 4
			(Assume 3.60 kHz)			
Enter 706 using "#%, #%K"; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP-85 LISTEN
A$ will contain 5 bytes BFO	7	1	0	46		WJ-8615P TALK
information.	8	0	0	39	57	BFO CODE
	9	0	0	00	0	BYTE 1
	10	0	0	03	03	BYTE 2
	11	0	0	60	96	BYTE 3
	12	0	1	00	00	BYTE 4

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-36. Sending a Signal Strength Level Request

Message: Read signal strength (Assume SS = 95)

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using “K”; “SS?”	1	0	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	53	S	
	5	0	0	53	S	DATA TO
	6	0	0	3F	?	WJ-8615P
	7	0	0	0D	(CR)	
	8	0	0	0A	(LF)	TERMINATOR
Enter 706; A$	9	1	0	3F		UNLISTEN
	10	1	0	35		HP-85 LISTEN
	11	1	0	46		WJ-8615P TALK
	12	0	0	53	S	
A$ will contain “SS 095”.	13	0	0	53	S	DATA FROM
	14	0	0	20		WJ-8615P
	15	0	0	20		
	16	0	0	30	0	
	17	0	0	39	9	
	18	0	0	35	5	
	19	0	0	0D	(CR)	
	20	0	1	0A	(LF)	TERMINATOR
Binary Mode	#	ATN	EOI	HEX	DEC	Comment
*Print using “B”; 137	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	1	89	137	REQUESTS
Enter 706 using “#%, #%K”; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP-85 LISTEN
Signal strength is returned in binary	7	1	0	46		WJ-8615P TALK
format.	8	0	0	87	135	SS CODE
	9	0	1	5F	95	SS BYTE

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-37. Sending a Recall Memory Channel Command

Message: Request Data From Memory Channel 1

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using “K”; “RCH1?”	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	52	R	
	5	0	0	43	C	
	6	0	0	48	H	
	7	0	0	31	1	
	8	0	0	3F	?	
	9	0	0	0D	(CR)	
	10	0	0	0A	(LF)	TERMINATOR
Enter 706; A$	11	1	0	3F		UNLISTEN
	12	1	0	35		HP-85 LISTEN
	13	1	0	46		WJ-8615P TALK
	14	0	0	53	S	
	15	0	0	43	C	
	16	0	0	48	H	DATA FROM
	17	0	0	20		MEMORY CHANNEL
	18	0	0	30	0	001
	19	0	0	30	0	
	20	0	0	31	1	
	21	0	0	2C	,	
	22	0	0	43	C	CHANNEL IS
	23	0	0	48	H	ON
	24	0	0	4E	N	
	25	0	0	20		
	26	0	0	2C	,	
	27	0	0	30	0	
	28	0	0	31	1	FREQUENCY =
	29	0	0	36	6	0162.5500 MHz
	30	0	0	32	2	
	31	0	0	2E	.	
	32	0	0	35	5	
	33	0	0	35	5	
	34	0	0	30	0	
	35	0	0	30	0	
	36	0	0	2C	,	
	37	0	0	30	0	
	38	0	0	30	0	BANDWIDTH
	39	0	0	33	3	SLOT = 3
	40	0	0	2C	,	
	41	0	0	30	0	
	42	0	0	32	2	COR = 022
	43	0	0	32	2	
	44	0	0	2C	,	

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-37. Sending a Recall Memory Channel Command (Continued)

Message: Request Data From Memory Channel 1

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
	45	0	0	46	F	DETECTION IS
	46	0	0	4D	M	FM
	50	0	0	20		
	51	0	0	2C	,	
	52	0	0	41	A	AFC IS ON
	53	0	0	46	F	
	54	0	0	43	C	
	55	0	0	20		
	56	0	0	2C	,	
	57	0	0	41	A	AGC IS OFF
	58	0	0	47	G	
	59	0	0	43	C	
	60	0	0	2F	/	
	61	0	0	2C	,	
	62	0	0	30	0	RFG = 000
	63	0	0	30	0	
	64	0	0	30	0	
	65	0	0	2C	,	
	66	0	0	30	0	
	67	0	0	30	0	BFO FREQUENCY
	68	0	0	30	0	= 0000.0000 kHz
	69	0	0	30	0	
	70	0	0	2E	.	
	71	0	0	30	0	
	72	0	0	30	0	
	73	0	0	30	0	
	74	0	0	30	0	
	75	0	0	0D	(CR)	
	76	0	1	0A	(LF)	TERMINATOR
Binary Mode	#	ATN	EOI	HEX	DEC	Comment
*Print using “B”; 44, 01	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	2C	44	REQUEST CHANNEL
	5	0	1	01	01	1
Enter 706 using “#%, #%K”; A$	6	1	0	3F		UNLISTEN
	7	1	0	35		HP-85 LISTEN

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-37. Sending a Recall Memory Channel Command (Continued)

Message: Request Data From Memory Channel 1

Binary Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	DEC	Comment
	8	1	0	46		WJ-8615P TALK
	9	0	0	30	48	SCH CODE
	10	0	0	01	01	CHANNEL 1
	11	0	0	0C	12	CHANNEL ON
	12	0	0	01	01	FRQ = 0162.5500
	13	0	0	62	98	
	14	0	0	55	85	
	15	0	0	00	00	
	16	0	0	03	03	BW SLOT = 3
	17	0	0	16	22	COR = 22
	18	0	0	69	105	FM
	19	0	0	42	66	AFC ON
	20	0	0	46	70	AGC OFF
	21	0	0	00	00	RFG = 0
	22	0	0	00	00	BFO = 0000.0000
	23	0	0	00	00	
	24	0	0	00	00	
	25	0	1	00	00	

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-38. Sending a Version Request Command

Message: Request Version and Model Data

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "VER?"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	56	V	VERSION REQUEST
	5	0	0	45	E	
	6	0	0	52	R	
	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		HP-85 LISTEN
	12	1	0	46		WJ-8615P TALK
	13	0	0	56	V	VER RESPONSE
	14	0	0	45	E	
	15	0	0	42	R	
	16	0	0	20	0	
	17	0	0	38	8	MODEL NUMBER
	18	0	0	36	6	
	19	0	0	31	1	
	20	0	0	35	5	
	21	0	0	50	P	
	22	0	0	20		
	23	0	0	20		
	24	0	0	20		
	25	0	0	20		
	26	0	0	30	0	FIRMWARE
	27	0	0	2E	.	VERSION
	28	0	0	31	1	
	29	0	0	2E	.	
	30	0	0	31	1	
	31	0	0	0D	(CR)	
	32	0	1	0A	(LF)	TERMINATOR

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-39. Sending a Recall Lockout Frequency Request

Message: Request Lockout Frequency Data From Lockout Channel 1

ASCII Mode	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "RLK 1?"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	52	R	RECALL LOCKOUT
	5	0	0	4C	L	CHANNEL 1
	6	0	0	4B	K	
	7	0	0	31	1	
	8	0	0	3F	?	
	9	0	0	0D	(CR)	
	10	0	0	0A	(LF)	TERMINATOR
	11	1	0	3F		UNLISTEN
	12	1	0	35		HP-85 LISTEN
	13	1	0	46		WJ-8615P TALK
	14	0	0	4C	L	LOCKOUT
	15	0	0	4B	K	RESPONSE
	16	0	0	46	F	
	17	0	0	20		
	18	0	0	30	0	
	19	0	0	30	0	LOCKOUT FREQ
	20	0	0	32	2	0020.0000 MHz
	21	0	0	30	0	
	22	0	0	2E	.	
	23	0	0	30	0	
	24	0	0	30	0	
	25	0	0	30	0	
	26	0	0	30	0	
	27	0	0	2C	,	
	28	0	0	30	0	
	29	0	0	31	1	LOCKOUT WIDTH =
	30	0	0	2E	.	01.00 MHz
	31	0	0	30	0	
	32	0	0	30	0	
	33	0	0	0D	(CR)	
	34	0	1	0A	(LF)	
						TERMINATOR
Binary Mode	**#**	**ATN**	**EOI**	**HEX**	**DEC**	**Comment**
*Print using "B"; 47, 00, 01	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	2F	47	REQUEST LOCKOUT
	5	0	0	00	00	CHANNEL 1
	6	0	1	01	01	

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-39. Sending a Recall Lockout Frequency Request (Continued)

Message: Request Lockout Frequency Data From Lockout Channel 1

Binary Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	DEC	Comment
Enter 706 using "#%,#%K"; A$	7	1	0	3F		UNLISTEN
	8	1	0	35		HP-85 LISTEN
	9	1	0	46		WJ-8615P TALK
	10	0	0	1E	30	LKF CODE
	11	0	0	00	00	LOCKOUT CENTER
	12	0	0	20	00	0020.0000 MHz
	13	0	0	00	00	
	14	0	0	00	00	
	15	0	0	01	01	LOCKOUT WIDTH
Enter 706; A$	16	0	1	00	00	01.00 MHz

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-40. Sending a Read Signal Queue Request

Message: Request the Frequencies in the Signal Queue

ASCII Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	ASCII	Comment
Output 706 using "K"; "QUE?"	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	0	51	Q	
	5	0	0	55	U	
	6	0	0	45	E	
	7	0	0	3F	?	
	8	0	0	0D	(CR)	
	9	0	0	0A	(LF)	TERMINATOR
	(Assume no queued signals)					
Enter 706; A$	10	1	0	3F		UNLISTEN
	11	1	0	35		HP-85 LISTEN
	12	1	0	46		WJ-8615P TALK
	13	0	0	51	Q	QUE RESPONSE
	14	0	0	55	U	
	15	0	0	45	E	
	16	0	0	0D	(CR)	
	17	0	1	0A	(LF)	
	(Assume two queued signals)					
Enter 706; A$	10	1	1	3F		UNLISTEN
	11	1	1	35		HP-85 LISTEN
	12	1	1	46		WJ-8615P TALK
	13	0	0	51	Q	QUE RESPONSE
	14	0	0	55	U	
	15	0	0	45	E	
	16	0	0	20		
	17	0	0	30	0	FIRST SIGNAL
	18	0	0	30	0	FREQUENCY IS
	19	0	0	35	5	0054.9900 MHz
	20	0	0	34	4	
	21	0	0	2E	.	
	22	0	0	39	9	
	23	0	0	39	9	
	24	0	0	30	0	
	25	0	0	30	0	
	26	0	0	2C	,	
	27	0	0	30	0	SECOND SIGNAL
	28	0	0	31	1	FREQUENCY IS
	29	0	0	35	5	0157.9050 MHz
	30	0	0	37	7	
	31	0	0	2E	.	
	32	0	0	39	9	
	33	0	0	30	0	
	34	0	0	35	5	
	35	0	0	30	0	
	36	0	0	0D	(CR)	
	37	0	1	0A	(LF)	TERMINATOR

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

Table 2-40. Sending a Read Signal Queue Request (Continued)

Message: Request the Frequencies in the Signal Queue

Binary Mode	Actual Bus Transfer					
	#	ATN	EOI	HEX	DEC	Comment
*Print using “B”; 38	1	1	0	3F		UNLISTEN
	2	1	0	55		HP-85 TALK
	3	1	0	26		WJ-8615P LISTEN
	4	0	1	26	38	REQUEST QUE
(Assume no queued signals)						
Enter 706 using “#%, #%K”; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP-85 LISTEN
A$ will contain “PLS”.	7	1	0	46		WJ-8615P TALK
	8	0	1	24	36	QUE CODE
(Assume two queued signals)						
Enter 706 using “#%, #%K”; A$	5	1	0	3F		UNLISTEN
	6	1	0	35		HP-85 LISTEN
	7	1	0	46		WJ-8615P TALK
	8	0	0	24	36	QUE CODE
	9	0	0	00	00	FIRST SIGNAL IS
	10	0	0	54	84	0054.9900 MHz
	11	0	0	99	153	
	12	0	0	00	00	
	13	0	0	01	01	SECOND SIGNAL IS
	14	0	0	57	87	0157.9050 MHz
	15	0	0	90	144	
	16	0	1	50	80	

*Control Statement: Control 7, 16; 128 (sets HP-85 to EOI terminator for printer messages.)
Printer is 706 (directs print statements to WJ-8615P).

2.8.15 STEP/SCAN SYNCHRONIZATION SIGNAL

Step and scan provide a series of synchronization pulses at pin 8 of rear panel connector J13 (AUX). At the initialization of each scan operation and each time that the scan or step is started, an active LOW pulse ranging from 500 µsec to 2 µsec in duration is available at J13, pin 8. At each frequency increment within the scan the receiver will again provide an active low pulse for use in a sync pulse for external devices. If the frequency of the scan increment is at a locked out frequency or step channel disable, the output pulse will have a duration of from 16 to 64 µsec. For normal frequency increments (frequencies that are not locked out or steps), the output at J13 pin 8 will be active LOW for a duration of from 80 to 140 µsec.

The output synchronization pulse is typically used as a trigger by external devices to synchronize the reading of the receiver Log Video Output (connector J13, pin 9) with the Scan operation. At each scan increment the Log Video Output provides a DC voltage (between 0 V and +5 V) that reflects the signal strength at the receiver-tuned frequency. The DC voltage is proportional to the signal strength. No signal activity produces 0 Vdc and a signal level of 55 dB or greater (above the noise floor of the selected IF bandwidth) produces a voltage of +5 Vdc.

While the receiver is operating in the Step or Scan operating mode, the Log Video Output voltage will be constantly changing to reflect the signal activity at the tuned frequency. During the time the sync pulse is LOW (J13 pin 8), indicating a scan or step increment, the Log Video Output represents the RF signal activity for the currently tuned frequency. The Log Video Output is also valid during scan lockout sync pulses. However, the Log Video Output is not valid during Step or Scan operation restart pulses.

An external device may use the synchronization pulses and Log Video Output to capture Step/Scan data for evaluation. After the restart frequency pulse, each successive normal pulse (between 80 and 140 µsec) represents a signal. The counting of pulses may relate to the frequency of the data they represent. **Figure 2-7** illustrates typical examples of the synchronization pulses as they occur at the output of the receiver. Note that the start of the sequence is represented by a 1.0 msec. pulse. Normal step and scan increments and locked out or disabled increments are represented by 100 µsec and 32 µsec pulses respectively.

2.9 REMOTE RESPONSE TIMES FOR THE WJ-8615P

The following paragraphs provide information on typical remote response times for the WJ-8615P Receiver. Response times provide for some of the most commonly used commands and queries.

All timing measurements were made using either a HP-85 desktop or an IBM XT computer as the controller of the IEEE-488 bus. Both controllers are capable of transmitting data faster than the WJ-8615P is capable of receiving it. This ensures that the actual time to accept data from the IEEE-488 bus is driven primarily by the WJ-8615P.

The response times can be divided into four types: data byte acceptance time, processing time, data byte out time, and complete operation time. The following paragraphs provide further information on the four response time types.

Example of Sync Pulses

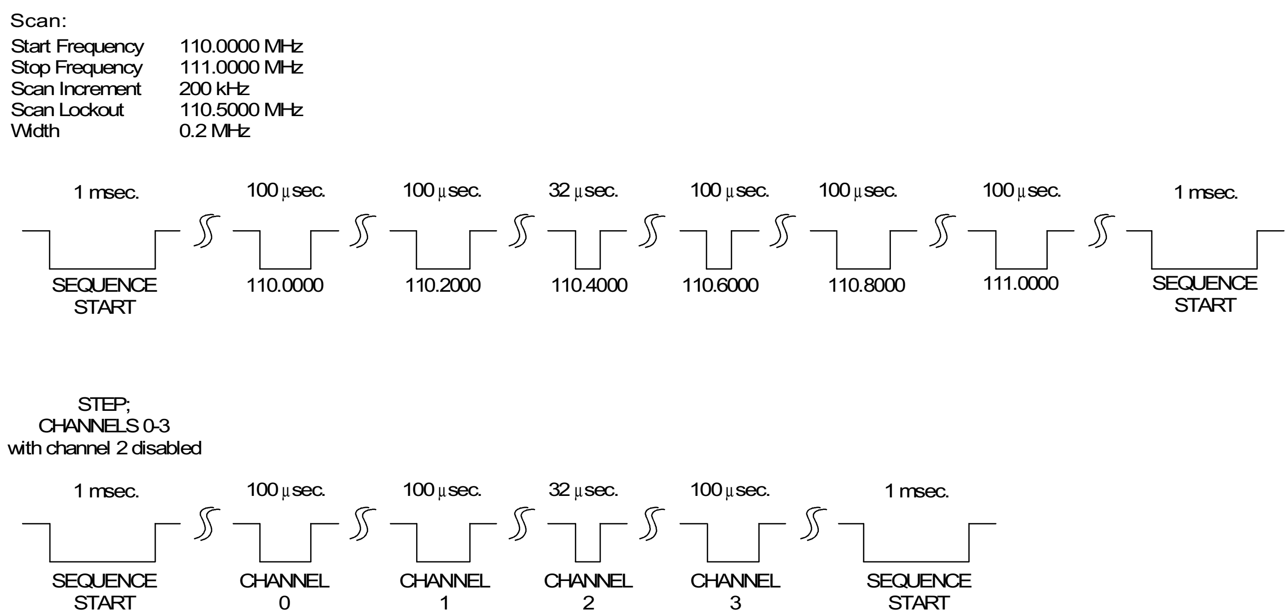

Figure 2-7. Examples of Synch Pulses

2.9.1 DATA BYTE ACCEPTANCE TIME

Data byte acceptance time is defined as the time for the bus controller to send, and the WJ-8615P to receive one data byte. The typical data byte acceptance time for an ASCII formatted message is 130 μsecs. The typical data byte acceptance time for a binary formatted message is 120 μsecs.

This information can be used to estimate how long it takes for a message to be received by the WJ-8615P.

2.9.2 PROCESSING TIME

Processing time is defined as the amount of time required by the WJ-8615P to process a particular command. This time is measured from the last data byte of the command to the time in which the receiver acts upon the command.

Table 2-41 provides a listing of several commonly used commands, including their typical processing times for both ASCII and binary formats.

Table 2-41. Processing Times for Commonly Used Commands

	Processing Time (msecs)	
Command	ASCII	Binary
FRQ	2.6	.80
FRQ?	2.4	.50
BW	1.2	.25
BW?	1.9	.20
DET	1.0	.27
RFG	1.0	.30
SS?	1.7	.40
QUE?	2.7	.50

2.9.3 DATA BYTE OUT TIME

Data byte out time is defined as the amount of time required for the WJ-8615P to output one data byte while as the "talker" on the IEEE-488 bus. This time, which is applicable when a receiver query command is being used, is useful when estimating how long it takes to receive a message back from the WJ-8615P.

The typical data byte out time for the WJ-8615P is .175 msecs/byte.

2.9.4 COMPLETE OPERATION TIME

The complete operation time consists of the amount of time for the controller to send a message, the amount of time for the WJ-8615P to process the message, and the amount of time for the receiver to settle to an operational state.

Table 2-42 provides several examples of complete operation response time measurements. The following paragraphs provide details for each measurement in the table, including the operation scenarios in which the measurements were taken.

2.9.4.1 Frequency Tune to LO Lock

The Frequency Tune to LO Lock measurement in **Table 4-42** indicates the time required for the receiver to accept the frequency message (FRQ) from the controller, process it, and lock the local oscillators to within 1 kHz of the final value. The frequencies used represent a worst case situation, excluding frequency extender band breaks.

2.9.4.2 Frequency Tune to AGCed (Attack)

The Frequency Tune to AGCed (attack) measurement in **Table 2-42** indicates the time required for the receiver to accept the frequency message (FRQ) from the controller, process it, lock the local oscillators, and AGC within 3 dB of the final value. The frequencies used represent a worst case situation, excluding frequency extender band breaks. The old frequency had no signal level and the signal level at the new frequency was at noise floor plus 50 dB.

2.9.4.3 Frequency Tune to AGCed (Decay)

The Frequency Tune to AGCed (decay) measurement in **Table 2-42** indicates the time required for the receiver to accept the frequency message (FRQ) from the controller, process it, lock the local oscillators, and AGC within 3 dB of the final value. The frequencies used represent a worst case situation, excluding frequency extender band breaks. The signal at the old frequency was at noise floor plus 80 dB, and the signal at the new frequency was at noise floor plus 20 dB. Measurements were made for both AGC dump on and dump off settings (bit 1 of CFG command argument).

2.9.4.4 Frequency Tune to SRQ

The Frequency Tune to SRQ measurement in **Table 2-42** indicates the time required for the receiver to assert SRQ on the IEEE-488 bus when tuning to a new signal. The response time includes the time to receive the frequency message (FRQ) from the controller, process it, lock the local oscillators and decide that a signal is present, and then set SRQ. The frequencies used represent a worst case situation, excluding frequency extender band breaks. The COR level was set to 10 dB and the signal at the new frequency was 20 dB above the noise floor. There was no signal at the old frequency.

Table 2-42. Complete Operation Response Times

Measurement	Response Time (msecs)
Frequency Tune (FRQ) to LO Lock	ASCII 11.9 Binary 9.9
Frequency Tune (FRQ) to AGCed (attack)	16.0
Frequency Tune (FRQ) to AGCed (decay) AGC Dump Off (CFG bit 1 off) AGC Dump On (CFG bit 1 on)	 536.0 11.0
Frequency Tune (FRQ) to SRQ (COR level at 10)	11.0
Frequency Tune (FRQ) to Audio On (COR level at 10)	11.0
Frequency Tune (FRQ) and Signal Strength Query (SS?) (nf + 50dB)	41.5
Frequency Tune (FRQ) and Request COR Status Query (CST?) (AGC on, AGC dump on)	42.5
Frequency Tune (FRQ) and FM Offset Query (FMO?) (AGC on, AGC dump on)	41.2
Frequency Tune (FRQ) and AM Modulation Query (AM?) (AGC on, AGC dump on)	47.0
Frequency Tune (FRQ) and FM Modulation Query (FM?) (AGC on, AGC dump on)	40.8
Frequency Tune (FRQ) and Log Video Query (LGV?) (AGC on, AGC dump on) Frequency Tune (FRQ) and Log Video Query (LGV?) (AGC off, RF gain at 255 (max.))	44.55 33.45

2.9.4.5 **Frequency Tune to Audio On**

The Frequency Tune to Audio On measurement in **Table 2-42** indicates the time for the receiver to accept the frequency message (FRQ) from the controller, process it, lock the local oscillators, AGC, and to turn on the audio output.

2.9.4.6 **Frequency Tune and Signal Strength Query (SS?)**

The Frequency Tune and Signal Strength Query measurement in **Table 2-42** indicates the time required for the receiver to accept the frequency tune (FRQ) and request signal strength (SS?) message from the controller, process it, lock the local oscillators, AGC, and respond back with the signal strength. The frequencies used represent a worst case situation, excluding frequency extender band breaks. The signal at the old frequency was at noise floor plus 0 dB, and the signal at the new frequency was at noise floor plus 50 dB.

2.9.4.7 **Frequency Tune and Request COR Status Query (CST?)**

The Frequency Tune and Request COR Status Query (CST?) measurement in **Table 2-42** indicates the time required for the receiver to accept the frequency tune (FRQ) and request COR status (CST?) message from the controller, process it, lock the local oscillators, AGC, and respond back with the COR status. The frequencies used represent a worst case situation, excluding frequency extender band breaks. The signal at the old frequency was at noise floor plus 0 dB, and the signal at the new frequency was at noise floor plus 50 dB.

2.9.4.8 **Frequency Tune and FM Offset Status Query (FMO?)**

The Frequency Tune and FM Offset Status Query (FMO?) measurement in **Table 2-42** indicates the time required for the receiver to accept the frequency tune (FRQ) and request FM offset (FMO?) message from the controller, process it, lock the local oscillators, AGC, and respond back with the FM offset status. The frequencies used represent a worst case situation, excluding frequency extender band breaks. The signal at the old frequency was at noise floor plus 0 dB, and the signal at the new frequency was at noise floor plus 50 dB.

2.9.4.9 **Frequency Tune and AM Modulation Status Query (AM?)**

The Frequency Tune and AM Modulation Status Query (AM?) measurement in **Table 2-42** indicates the time required for the receiver to accept the frequency tune (FRQ) and request AM modulation percentage (AM?) message from the controller, process it, lock the local oscillators, AGC, and respond back with the AM modulation percentage status. The frequencies used represent a worst case situation, excluding frequency extender band breaks. The signal at the old frequency was at noise floor plus 0 dB, and the signal at the new frequency was at noise floor plus 50 dB.

2.9.4.10 **Frequency Tune and FM Modulation Status Query (FM?)**

The Frequency Tune and FM Modulation Status Query (FM?) measurement in **Table 2-42** indicates the time required for the receiver to accept the frequency tune (FRQ) and request FM modulation percentage (FM?) message from the controller, process it, lock the local oscillators, AGC, and respond back with the FM modulation percentage status. The frequencies used represent a worst case situation, excluding frequency extender band breaks. The signal at the old frequency was at noise floor plus 0 dB, and the signal at the new frequency was at noise floor plus 50 dB.

2.9.4.11 Frequency Tune and Log Video Status Query (LGV?)

The Frequency Tune and Log Video Status Query (LGV?) measurement in **Table 2-42** indicates the time required for the receiver to accept the frequency tune (FRQ) and request log video status (LGV?) message from the controller, process it, lock the local oscillators, AGC, and respond back with the reading of the log video status. The frequencies used represent a worst case situation, excluding frequency extender band breaks. The signal at the old frequency was at noise floor plus 0 dB, and the signal at the new frequency was at noise floor plus 50 dB.

Two measurements were recorded. The first measurement was taken with AGC turned on. The second measurement was taken with AGC turned off and the RF gain set to maximum (RFG 255).

2.10 ERROR CODES

Error codes of the WJ-8615P Compact Receiver are divided into two categories: fatal and non-fatal. Fatal errors detect faults, which are not predictable and will not allow receiver operation. The first of the fatal errors encountered is displayed as "HARD ERRxxx" and no other operation continues. **Table 2-43** lists the fatal errors and a description of them.

Table 2-43. WJ-8615P Fatal Error Codes

Fatal Error Code	Description
---	Hardware failure of RAM, microprocessor or data bus.
100	Hardware failure of RAM or data bus: Bit 0
101	Bit 1
102	Bit 2
103	Bit 3
104	Bit 4
105	Bit 5
106	Bit 6
107	Bit 7
108	Failure of RAM in the RTC chip.
110	RAM check sum cannot be calculated properly
120	3.33 msec. interrupt non-functional or not properly timed.
121	833 msec. interrupt non-functional or not properly timed.
130	A/D end of conversion not active or improper A/D operation.
131	-15 V supply not functional. +15 Supply OK
132	+15 V supply not functional. Not capable of testing -15 V supply.
140	Illegal key code detected from keyboard encoder.
160	EPROM check sum failure

Non-fatal errors cause the front panel error LED (ERR) to light. These errors set SRQ on the remote bus along with bit 5 of the status byte. The error number is determined by requesting error status from the receiver. This returns the two least significant digits of the error. Non-fatal errors indicate remote errors or receiver errors. Any non-fatal error code clears after 5 seconds or clears on front panel activity. **Table 2-44** lists the non-fatal errors. **Table 2-45** lists the Remote Error Codes.

Table 2-44. WJ-8615P Non-fatal Error Codes

Non-Fatal Error Code	Description
221	Unlock condition detected for >75 msec. on 1st LO. The error is only reported on the initial failure. The current LO condition is shown on the LO display.
222	Unlock condition detected for >75 msec. on 2nd LO. The error is only reported on the initial failure. The current LO condition is shown on the LO display.
223	2nd LO synthesizer output loop unlocked. The current LO condition is shown on the LO display.
230	RAM check sum failed. The receiver uses internal switches for configuration and returns to default parameters. A second failure after re-calculation causes an Err 110. (This error occurs if the microprocessor card is unplugged, Err 230.)
240	BFO counter timer not functional or out of time specification. BFO will not function properly. Other receiver operation is normal. See **Section IV** for BFO countertimer alignment procedure.

Table 2-45. WJ-8615P Receiver Remote Error Codes

Remote Error Code	Description
401	Input or output data buffer is full (message is to long). Issuing QUE? Not by itself may cause this error.
402	Less than 2 characters in message.
404	Number is out of range for command.
405	"/" Or "?" not valid for this command.
407	Invalid mnemonic or binary code received.
416	This type mnemonic or binary code is not executed on the WJ-8615P
551	No more lockout space in lockout memory.
552	Attempt to unlock a frequency that is not currently in lockout memory.
810	Attempt to scan or step using a cleared memory channel.
813	Attempt to scan with the start frequency greater than or equal to the stop frequency.
814	An attempt was made to select a non-occupied bandwidth slot.
818	Attempt to store a memory channel greater than the partition.

SECTION III

CIRCUIT DESCRIPTION

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SECTION III

CIRCUIT DESCRIPTION

3.1 OVERALL FUNCTIONAL DESCRIPTION

The operating circuitry of the WJ-8615P Compact Receiver is contained in three main sections as shown in **Figure 3-1**. The three main sections are: the RF/IF Section, the Synthesizer Section, and the Digital Control Section. Each section contains the circuitry required to perform specific portions of the overall receiver operation. The overall functions of the three main sections are further discussed below.

The RF from the antenna is input to the RF/IF Section. This section contains circuitry which performs amplification, conversion, bandwidth filtering, and demodulation of the input signal to ultimately provide the audio and video outputs of the receiver. Tunable LO signals from the Synthesizer Section are used for converting the input RF to a fixed 21.4 MHz IF. Control signals from the Digital Control Section select the desired bandwidth filters and demodulation mode, and control other functions.

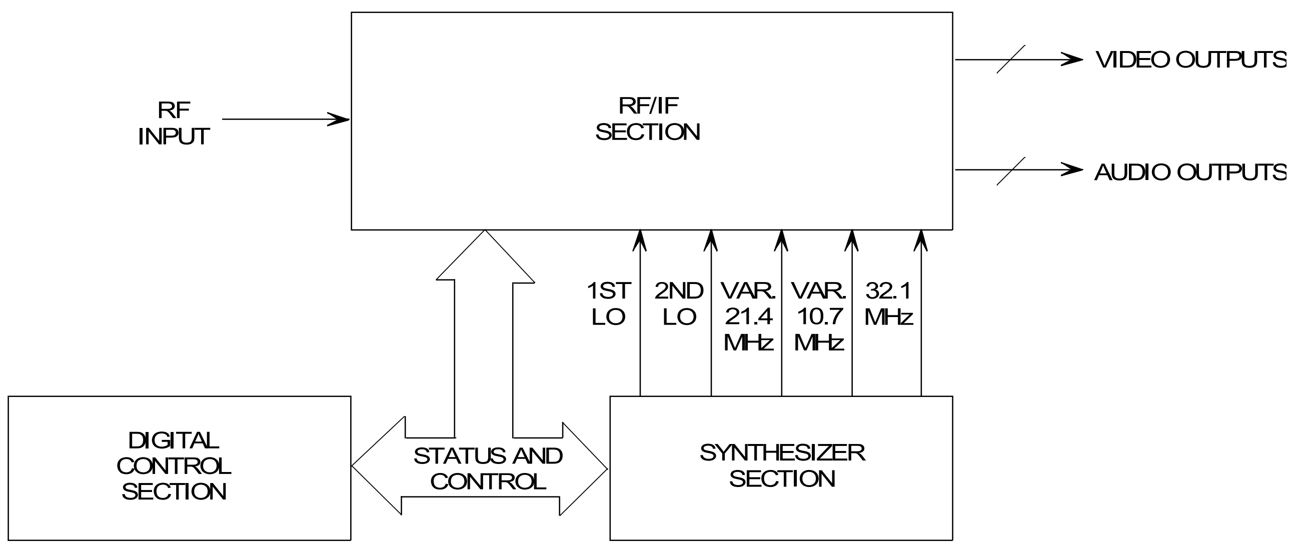

Figure 3-1. WJ-8615P Overall Functional Block Diagram

The Synthesizer Section contains circuitry for providing two tunable LO signals which are used by the RF/IF Section, as mentioned before. The 1st LO tunes from 577.5000 to 1057.5000 MHz. The 2nd LO tunes from 531.1001 to 536.1000 MHz. The tuning of both LO synthesizers is controlled by inputs from the Digital Control Section. A reference generator is also contained in this section which provides a common time base for the LO synthesizers. This reference generator is driven by either an internal or external 10 MHz source which is selected by the Digital Control Section. In addition, this section provides variable 21.4 MHz and 10.7 MHz signals and a fixed 32.1 MHz signal which are used by the CW and SSB demodulation circuits in the RF/IF Section.

The Digital Control Section oversees all receiver operations. Circuitry contained in this section processes the front panel inputs (or remote commands if controlled remotely), initiates control and monitors the applicable receiver circuits, and replies with display information (or remote responses). Analog-to-Digital and Digital-to-Analog circuits are used for the transfer of information between this section and the other main sections of the receiver.

3.2 DETAILED FUNCTIONAL DESCRIPTION

The following paragraphs provide more detailed information on the operating circuitry of the RF/IF Section, the Synthesizer Section, and the Digital Control Section of the WJ-8615P Compact Receiver.

3.2.1 RF/IF SECTION

See **Figure FO-1**, RF/IF Section Functional Block Diagram. The incoming 20 to 500 MHz RF signal enters the receiver via the Antenna input connector (J4) and is applied to the RF Input Attenuator subassembly (A1A14). This subassembly functions as a wide bandpass filter, rejecting signals below 20 MHz and above 500 MHz. From this subassembly, the filtered RF signal is input to the Preamplifier/Converter subassembly (A1A13).

Amplification of the incoming RF signal and conversion to a fixed 21.4 MHz IF is the primary function of the Preamplifier/Converter. This subassembly is composed of four sections: Preamplifier/Low Pass Filter, 1st Mixer/LO Amplifier and Bandpass Filter, Gain Control and 2nd Mixer/LO Amplifier, and Power Splitter.

Within the 1st Mixer/LO Amplifier, the RF signal is mixed with a 577.5000 to 1057.5000 MHz 1st LO signal from the Synthesizer Section. The output is a band of frequencies centered from 552.5000 to 557.5000 MHz. The output is filtered and then amplified to restore the signal level that was lost in the conversion process.

The output of the 1st Mixer/LO Amplifier is applied to the 2nd Mixer/LO Amplifier where the 552.5000 to 557.5000 MHz 1st IF is mixed with the 2nd LO from the Synthesizer Section, providing a second IF of 21.4 MHz. Gain control is provided in this stage from the Digital Control Section. The 2nd LO Signal varies from 536.1000 to 531.1001 MHz in 100 Hz steps. The 21.4 MHz IF signal is amplified, split, and then applied to the IF Bandwidth Filter subassembly (A1A12) and either the rear panel SM IF output (J9) or the optional wideband output assembly (A2).

The 21.4 MHz IF input to the IF Bandwidth Filter subassembly is applied to an appropriate filter via switching signals provided by the Digital Control Section. The IF output of the selected IF BW filter is applied to the AM/FM Demodulator subassembly (A1A9) where the IF signal is amplified linearly and logarithmically for video detection and signal strength representation.

The amplified 21.4 MHz signal is applied to the FM Demodulator circuitry for detection of FM video, to the AM Demodulator circuitry for detection of AM video, and to the Single Sideband and CW Demodulator circuitry in the SSB/CW Demodulator subassembly (A1A11). A logarithmic amplifier circuit provides a DC output voltage that varies logarithmically with the signal strength. AM and FM video is applied to video filters on the Audio/Video subassembly (A1A10). LOG video is applied to the Digital Control Section and to the AUX connector (J13) on the rear panel representing the video signal from 0 to approximately 60 dB above the noise floor of the receiver.

Detected FM video is amplified and applied to the FM MON connector (J4) on the receiver rear panel via the Audio/Video subassembly. AM and FM video is applied to the appropriate video response modules according to the selected IF bandwidth via the Digital Control Section. Depending on the detection mode selected, the AM or FM video is amplified and applied to the SW VIDEO connector (J5) on the rear panel. The video signal is also applied to the audio circuitry where the signal is amplified and made available at the rear panel LINE AUDIO connectors (J6 and J7) and to the front panel phone jack (J12). When the LOG video level from the AM/FM Demodulator subassembly is greater than the COR reference level from the Digital Control Section, the COR circuitry is activated. This activates the audio outputs and provide a 100 mA current sink to ground via the COR connector (J3), activating external equipment.

The 21.4 MHz IF from the AM/FM Demodulator subassembly is available at the rear panel SW IF connector (J9) after passing through a bandpass filter in the SSB/CW Demodulator subassembly (A1A11). When a SSB detection mode is selected, the 21.4 MHz IF (SSB IN) is mixed with a 32.1 MHz fixed frequency. Mixing these two signals produces a frequency centered about the difference frequency of 10.7 MHz. This signal is then applied to an upper sideband (USB) and a lower sideband (LSB) filter. The USB filter passes frequencies from 10.69965 MHz down to 10.69680 MHz, as the LSB filter passes frequencies from 10.70035 MHz up to 10.70320 MHz. The outputs of the LSB and USB filters are combined with a variable 10.7 MHz input in a pair of balanced modulator/demodulators. The outputs of the balanced modulator/demodulators are summed and amplified resulting in frequencies of 200 to 3200 Hz that are then input to the Audio/Video subassembly. When CW detection mode is selected, the 21.4 MHz IF (SSB IN) is mixed with a variable 21.4 MHz signal. The resultant signal is then amplified and input to the Audio/Video subassembly.

3.2.2 SYNTHESIZER SECTION

The Synthesizer Section of the WJ-8615P Receiver consists of three major subassemblies: the Reference Generator, the 1st LO Synthesizer, and the 2nd LO Synthesizer. See **Figure FO-2** for the Synthesizer Section Functional Block Diagram.

The Reference Generator develops the following reference frequencies for use by various receiver circuits:

10 MHz Fixed
2.5 MHz Fixed
1.0 MHz Fixed
250 kHz Fixed
32.1 MHz Fixed
21.4 MHz Variable
10.7 MHz Variable

A 10 MHz Temperature Compensated Crystal Oscillator (TXCO) is used to develop the 10 MHz reference signal. However, an external 10 MHz source may be used. When a 10 MHz, 0 dBm or greater external signal is present at the rear panel EXT REF connector (J2), the Reference Generator automatically switches to the external source.

The 10 MHz reference signal passes through a number of frequency dividers in order to produce the required frequencies. The developed 2.5 MHz and 250 kHz reference frequencies are used by the 1st LO Synthesizer subassembly while the 10 MHz reference is used by the 2nd LO Synthesizer subassembly. The 1 MHz reference is used only by the Frequency Extender option.

The 250 kHz reference, divided down from the 10 MHz reference signal, is connected to a 10.7 MHz reference loop where it is divided further then input to a phase detector circuit. The 10.7 MHz reference signal is developed by a crystal oscillator. The output of the 10.7 MHz reference is routed to two circuits. The 10.7 MHz reference becomes one of the inputs to a phase detector (U14A). The second 10.7 MHz reference output is applied to a tripler circuit. This produces a fixed 32.1 MHz signal which is then available at P1 pin 13, when enabled by digital control, and also used by circuits in the RF/IF Section.

The Reference Generator also contains a 21.4 MHz crystal oscillator used in the digitally controlled BFO/SSB tuning. The 21.4 MHz output is a variable frequency, which is divided by two and connected to the second input of the phase detector (U14A). The 10.7 MHz reference is also available at P1 pin 17, when enabled by digital control, for use by circuits in the RF/IF Section. The phase detector produces BFO "HIGH" and BFO "LOW" voltages for digital control. Any detected difference between the BFO "HIGH" and "LOW" outputs is reported as an error signal voltage to the Synthesizer Interface (A1A5) located in the Digital Control Section. It responds by sending a correction tuning voltage (BFO TUNE) which is then used to steer the 21.4 MHz reference. The 21.4 MHz reference output is also available at P1 pin 5, when enabled by digital control, which is used by circuits in the RF/IF Section.

The 2.5 MHz reference signal from the Reference Generator is applied to the 1st LO Synthesizer (A1A7). This input provides the reference frequency utilized by the 1st LO Synthesizer phase-locked loop circuitry in producing the 1st LO output. The major components which make up the 1st LO Synthesizer include an EPROM, 8-bit data latches, fixed and programmable dividers, four VCOs to cover the required frequency range, a phase detector, and a loop filter.

Frequency information, in the form of two BCD data words and one toggle bit provided by the Digital Control Section, is applied to the EPROM as an address. The addressed EPROM location then provides the appropriate tuning words, via the data latches, to the programmable dividers, and also provides VCO band select and phase detector gain select information.

A sample of the selected VCO output is divided in two fixed dividers, and then applied to the programmable dividers for final division. The programmable divider output is compared with a divided-by-4 sample of the 2.5 MHz reference in a phase detector, and any frequency error in the VCO output results in the presence of a DC correction voltage at the loop filter output. This voltage is applied to the varacter tuning diode in the selected VCO, which varies the VCO frequency so as to lock it to the reference frequency. In this manner, the 1st LO Synthesizer provides an output which covers the frequency range 577.5000 -1057.5000 MHz, in 5 MHz steps, allowing the WJ-8615P Receiver to be tuned from 20 - 500 MHz. (NOTE: In the DIAGNOSTIC mode, the 1st LO Synthesizer output tunes from 557.500-1057.500 MHz.)

The 2nd LO Synthesizer subassembly (A1A6) consists of a three-loop circuit that tunes over a 5 MHz range in 100 Hz steps. The loop circuits are: the Resolution Loop, the Reference Loop, and the Output Loop.

The Resolution Loop contains a VCO (Q1) that tunes from 1008 to 1028 MHz in 8 kHz steps. The output of the VCO is split and applied to a dual modulus divider (U7) and dividers U8 and U9. The output of U7 drives a synthesizer controller (U2) which accepts digital tuning inputs from the Digital Control Section. The synthesizer controller outputs phase detect information which is used to steer the VCO thus creating the phase-locked loop. The resultant output of the Resolution Loop, which is divided by U8 and U9 to tune from 12.6 to 12.85 MHz, drives the input to the Output Loop phase detector (U17).

The Reference Loop provides the capability to tune across 5 MHz in 250 kHz steps. A VCO (Q2) tunes from 523.25 to 518.5 MHz in 250 kHz steps. A buffer amplifier (U12) drives a dual modulus prescaler (U13). The output of U13 drives a synthesizer controller (U10) which accepts digital tuning information from the Digital Control Section. U10 internally contains programmable dividers, a phase detector, and a reference divider. The output of the phase detector in U10 drives a loop filter (U11) which provides the tuning voltage for the VCO thus locking the phase-locked loop. A sample of the Reference Loop VCO drives a mixer (U14) in the Output Loop. The other signal to this mixer is from a VCO in the Output Loop. The difference of these two VCO signals is then amplified by U15 and applied to the input of Output Loop phase detector U17.

The Output Loop translates the sum of the Reference Loop frequency and the Resolution Loop frequency up to the desired output frequency of 536.1000 to 531.1001 MHz. The Output Loop VCO (Q5) drives buffer amplifier U19 and power splitter U20. The 2nd LO output is then available to the RF/IF Section. A sample of the Output Loop VCO is input to mixer U14 via amplifier U16. The other input to this mixer is from the Reference Loop. When the loop is locked, the output frequency of U14 is the same as the output of the Resolution Loop. U15 amplifies the output of the mixer and drives the input of phase detector U17. The phase detector outputs the appropriate error voltage to steer the VCO to the correct frequency when the output frequency of U14 does not equal the Resolution Loop output.

3.2.3 **DIGITAL CONTROL SECTION**

The microprocessor controlled Digital Control Section continuously monitors the operation of the receiver and provides control signals directing its operation. The primary subassemblies responsible for controlling the receiver are the Microprocessor (A1A3), the IEEE-488/Interrupt Assembly (A1A2), the Analog/Digital Assembly (A1A4), the Synthesizer Interface (A1A5), and the Front Panel Display (A1A1). These subassemblies and their interconnections are illustrated in the Digital Control Section Functional Block Diagram, **Figure FO-3**.

The Microprocessor (A1A3) 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 EPROM (Erasable-Programmable-Read-Only-Memory), and 8 k-bytes of RAM (Random-Access-Memory) where the microprocessor stores and retrieves variable data as required to perform its control functions. Under the direction of the program, the microprocessor continuously monitors the receiver operation and performs tasks as required. Communications between the microprocessor and the other subassemblies within the Digital Control Section is established utilizing the 16-line address bus and the 8-line data bus of the microprocessor. Each of the input and output circuits on the Synthesizer Interface, the Analog/Digital Assembly, the IEEE-488/Interrupt assembly, and the Front Panel Display are assigned specific addresses. By placing the appropriate address on the address bus, the microprocessor communicates with the desired location via the data bus. The control bus which is comprised of the I/O enable, Read/Write, and IRQ lines permit the microprocessor to activate the required circuit by controlling the direction and timing of the data flow and to sense when a circuit is exercising the IRQ line (requesting service by the microprocessor).

The Analog/Digital Assembly (A1A4) is utilized to convert analog data from various receiver circuits such as LO Lock inputs and Detector inputs into digital form to be read by the microprocessor. These signals are conditioned and applied to analog-to-digital converters to be read by the microprocessor, when address lines A0 through A3 are enabled. The Analog/Digital Assembly also converts digital signals to analog control voltages used for automatic gain control, BFO tuning, and IF normalization. Control data is applied to the other receiver circuits via the analog control lines and the bandwidth control lines.

The IEEE-488/Interrupt Assembly (A1A2) provides interfacing between the receiver and external controlling devices and peripherals, and provides interrupt latching circuitry that generates interrupt requests (IRQ) which are applied to the microprocessor. Interrupt requests are generated by the front panel when a detection mode is changed, an IF bandwidth is changed, or when the tuned frequency is changed. This subassembly provides control logic to monitor the 1st LO, the 2nd LO and the BFO counter. When interrupts occur, this subassembly alerts the microprocessor via the IRQ line that a service request has been made. This subassembly also contains an Aux Serial Interface (A1A2A1). A dual-port UART is used in the interface which allows for serial communications between the receiver and external peripheral equipment such as tape recorders and printers.

The Synthesizer Interface subassembly (A1A5) is utilized to provide an interface between the microprocessor and the 1st LO and 2nd LO in the Synthesizer Section as well as circuits in the RF/IF Section. The data latches on this subassembly provide the tuning information for the LOs, detection mode information, and optional preselector data information.

The Front Panel Display subassembly (A1A1) contains circuitry which provides an interface between front panel controls and indicators and the microprocessor. A logic encoder senses front panel keypad presses and relays the data and interrupt information to the microprocessor. A data latch latches keypad press information and data from the microprocessor for representation on the alphanumeric display. When addressed by the microprocessor, character codes are decoded to determine the character to be displayed. A discrete LED driver controls the illumination of the keypad LEDs and discrete front panel LEDs from data and control inputs.

3.3 CIRCUIT DESCRIPTION

3.3.1 TYPE 796291-1 RF INPUT ATTENUATOR ASSEMBLY (A1A14)

The RF Input attenuator provides minimal attenuation (0.5 dB) to signals within the tuning range of the receiver, while providing high attenuation (approx. 50 dB) to signals outside the tuning range. Refer to **Figure FO-23** for the schematic diagram of A1A14.

The RF signals are applied to the ANT input connector (J10) on the receiver rear panel and coupled to J1 of the RF Input Attenuator Assembly (A1A14). The impedance of this subassembly is approximately 50 ohms for frequencies between 20 and 500 MHz. Frequencies within this range are passed through with less than 0.5 dB of attenuation.

This Assembly is made up a high-pass filter and a low pass filter. These two filter characteristics combine to provide a flat response to frequencies within the receiver tuning range. The filter frequency response extends beyond the receiver tuning range and begins to roll off at approximately 17 MHz for the low end, and 630 MHz for the high end. Approximately 50 dB of attenuation is applied to frequencies beyond the filter skirt. The bandpass frequencies (20-500 MHz) are routed, via W1P1, to connector J3 of the Preamplifier/Converter Assembly (A1A13).

3.3.2 TYPE 796251-1 PREAMPLIFIER/CONVERTER ASSEMBLY (A1A13)

The primary functions of the Preamplifier/Converter is amplification of the incoming RF signal and its conversion to a fixed 21.4 MHz IF. Refer to Figure 6-19 for the A1A13 schematic diagram. Refer to **Figure 3-2** for the A1A13 block diagram and **Table 3-1** for a summary of inputs to and outputs from this assembly.

The bandlimited RF signals from the RF Input Attenuator Assembly (A1A14) are input at J3 of the Preamplifier/Converter Assembly (A1A13) and are applied directly to the input of a wideband amplifier (U4). Amplifier U4 provides approximately 15 dB of gain to signals in the 20-500 MHz frequency range. Amplified signals from U4 are applied to a 4 pole low-pass filter. The filter rapidly attenuates signals above 505 MHz, providing approximately 55 dB of attenuation to signals within the first IF frequency range (552.500 to 557.500 MHz).

The bandlimited signal is applied to a 3 dB pad in the 1st Mixer/LO Amplifier (A1A13A1) and input to one port of a double balanced mixer (U1). The second input to the mixer is the 1st LO signal. The 1st LO has a frequency range of 577.5000 to 1057.5000 MHz in 5 MHz steps; the LO signal level ranges between +3 to +5 dBm. After input at J1, the 1st LO signal is amplified by 12 dB by amplifier U2 before being input to the mixer. U1 mixes the receiver RF signal with the 1st LO signal, producing the 1st IF signal which is the difference between the two inputs. Thus, the 1st IF frequency range is 552.5000 to 557.5000 MHz. The 1st IF signal then passes through a three-pole bandpass filter, centered at 555 MHz, an amplifier (U3) which provides 15 dB of gain, and a four-pole bandpass filter, also centered at 555 MHz. The 1st IF is then routed to the 2nd Mixer/LO Amplifier (A1A13A2).

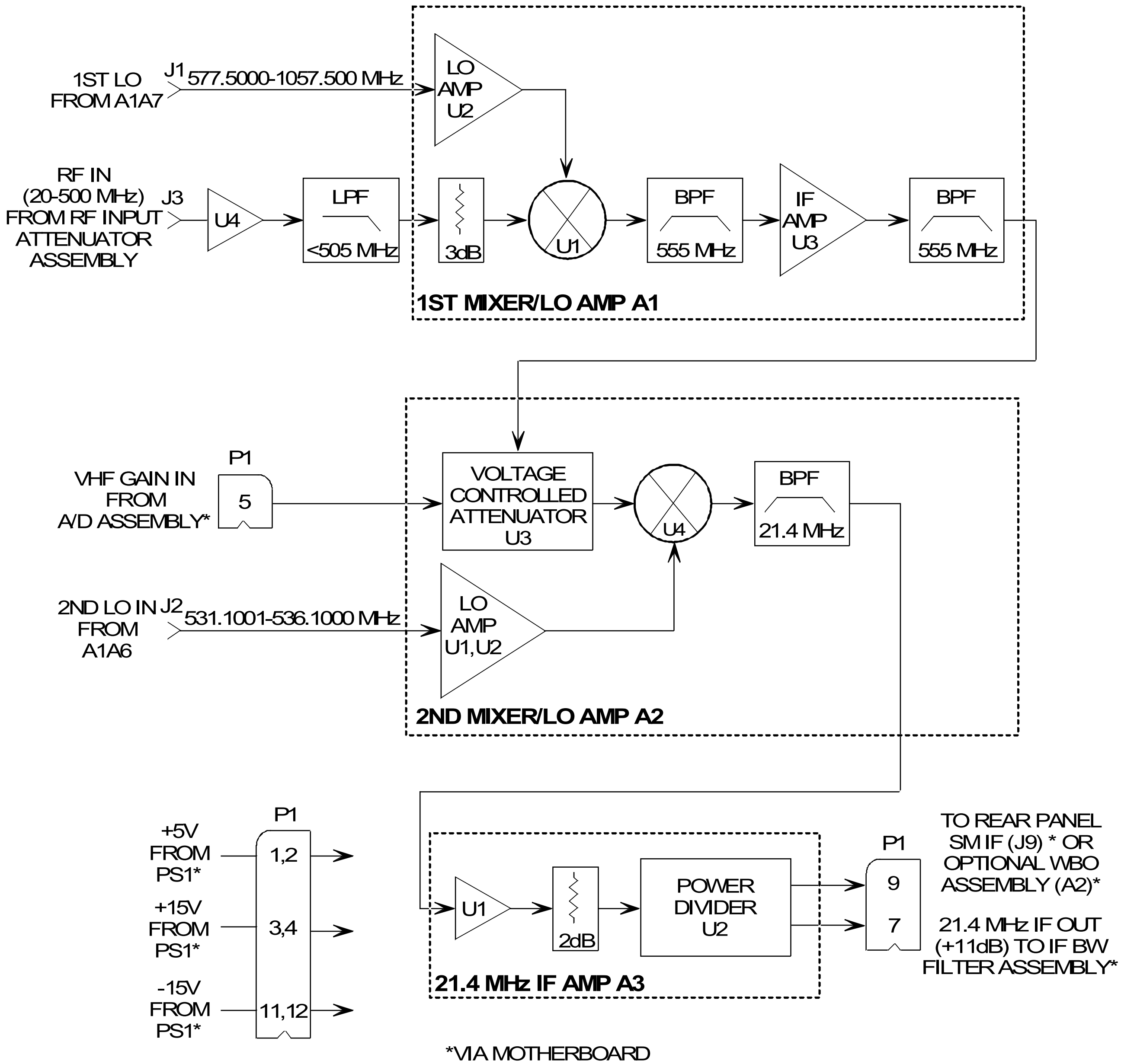

Figure 3-2. Preamplifier/Converter Assembly (A1A13) Block Diagram

Table 3-1. Preamplifier/Converter Assembly (A1A13) Inputs and Outputs

Description	A1A13 Port	Source/Destination	Via Motherboard
20-500 MHz RF IN	J3	From RF Input Attenuator Assembly (A1A14)	A1A14W1
1st LO IN 577.5000 - 1057.5000 MHz	J1	From 1st LO Synthesizer Assembly (A1A7)	A1W3
VHF GAIN IN	P1, Pin 5	From A/D Assembly (A1A4)	XA14B Pin 22, and XA13 Pin 5
2nd LO IN 531.1001 - 536.1000 MHz	J2	From 2nd LO Synthesizer Assembly (A1A6)	A1W2
21.4 MHz SM/WBO Output	P1, Pin 9	To rear panel SM IF Output (J9) or Optional WBO Assembly (A2)	XA13 Pin 9, A1W4, and W3
21.4 MHz IF Out	P1, Pin 7	To IF BW Filter Assembly (A1A12)	XA13 Pin 7, and XA12 Pin 4
+5 V	P1, Pins 1 and 2	From Power Supply (PS1)	A1J12 Pins 1 and 2, and XA13 Pins 1 and 2
+15 V	P1, Pins 3 and 4	From Power Supply (PS1)	A1J12 Pins 5 and 6, and XA13 Pins 3 and 4
-15 V	P1, Pins 11 and 12	From Power Supply (PS1)	A1J12 Pins 3 and 4, and XA13 Pins 11 and 12

The 1st IF signal from A1A13A1 is applied to a voltage controlled attenuator (U3). Attenuation of U3 is controlled by the VHF/AGC input at A1A13A3P1 pin 5. This variable input nominally ranges from 2.4 to 12.6 Vdc and sets the nominal attenuation level of U3 from 2.5 dB to 26 dB. From U3 the 1st IF signal is input to a double balanced mixer (U4) and mixed with the 2nd LO signal input at J2 whose power level ranges between 0 dBm and +2 dBm and whose frequencies range between 531.1001 and 536.1000 MHz. Prior to the mixer, the 2nd LO signal is amplified by amplifiers U1 and U2. The LO signal level at the output of U2 is +17 to +20 dBm.

The output frequencies of U4 are applied to a three-pole bandpass filter which is centered at 21.4 MHz, producing the second IF signal. This 2nd IF of 21.4 MHz is then routed to amplifier U1 of the 21.4 MHz IF Amplifier (A1A13A3). Amplifier U1 provides approximately 18 dB of gain to the 21.4 MHz signal. From U1 the 2nd IF is attenuated by a 2-dB pad and input to a splitter (U2). One output of the splitter exits the 21.4 MHz Amplifier at A1A13A3P1 pin 9. This output is routed to the receiver rear panel SM IF connector (J9) or the optional WBO Assembly (A2). The other output of the splitter exits the assembly at P1 pin 7 and is routed to the IF Bandwidth Filter Assembly (A1A12). The nominal gain of the IF signal routed to the IF Bandwidth Filter Assembly provided by the Preamplifier/Converter Assembly is +16 dB with all RF attenuation removed.

3.3.3 TYPE 726016-X IF BANDWIDTH FILTER ASSEMBLY (A1A12)

The function of the Bandwidth Filter Assembly, A1A12, is to provide selectable bandpass filtering, IF normalization, and gain control of the 21.4 MHz IF signal. Refer to **Figure FO-21** for the A1A12 schematic diagram. Refer to **Figure 3-3** for the A1A12 block diagram and **Table 3-2** for a summary of inputs and outputs to this assembly.

The IF Bandwidth Filter Assembly (A1A12) provides for installation of up to five IF bandwidth filters (FL1-FL5). Gain normalization circuitry sets the receiver gain based on the selected bandwidth (i.e., the wider the bandwidth, the lower the gain.)

The 21.4 MHz signal from the Preamplifier/Converter Assembly (A1A13) is input to A1A12 at P1 pin 4 where it then encounters five input diode switches. The diode switches are turned on and off by control signals BW1 through BW5, input at P1 pins 3, 5, 7, 9, and 11, respectively. These bandwidth control signals are input from the Analog/Digital Assembly (A1A14). The control signal on each line is either 0 Vdc (off) or +12 Vdc (on). When a bandwidth is selected, the appropriate BW signal is high corresponding to the slot the bandwidth filter is located in. For example, BW1 is high when the bandwidth selected is located in slot 1. Only one control line is high (+12 V) at a time, while the others remain low (0 V). When high, the +12 Vdc biases the diode switch which then passes the IF input to the appropriate bandwidth filter.

Corresponding control signals BW1 through BW5, input at P2 pins 2, 4, 6, 8, and 10, respectively, control the output diode switches in the same manner as the BW1-BW5 control inputs at P1 control the input diode switches. When the output diode switch is turned on, the bandlimited IF signal is routed to the amplification and normalization circuits.

Amplifiers U1, U2, and U3 amplify the IF signal, with each amplifier being followed by a bridge attenuator. The three bridge attenuators each attenuate the IF signal by approximately 0 to 11 dB, depending on the level of the IF normalization control voltage (IF NORM) which is input at P2 pin 1. The IF NORM signal is input from the Analog/Digital Assembly and has an approximate range from 0 to 9 Vdc. The lower the IF NORM voltage, the higher the attenuation applied to the IF signal, from 0 to 33 dB. The IF signal is then applied to a variable attenuator (U4) that provides an additional 28 dB of AGC range as controlled by the IF AGC input at P2 pin 3. The IF AGC signal, which is variable from 0 to 12.5 Vdc, is also provided by the Analog/Digital Assembly. The IF signal, is then output at P2 pin 5 and routed to the AM/FM Demodulator Assembly (A1A9). The maximum gain of the IF signal provided by the IF Bandwidth Filter when all RF attenuation is removed is +36 dB.

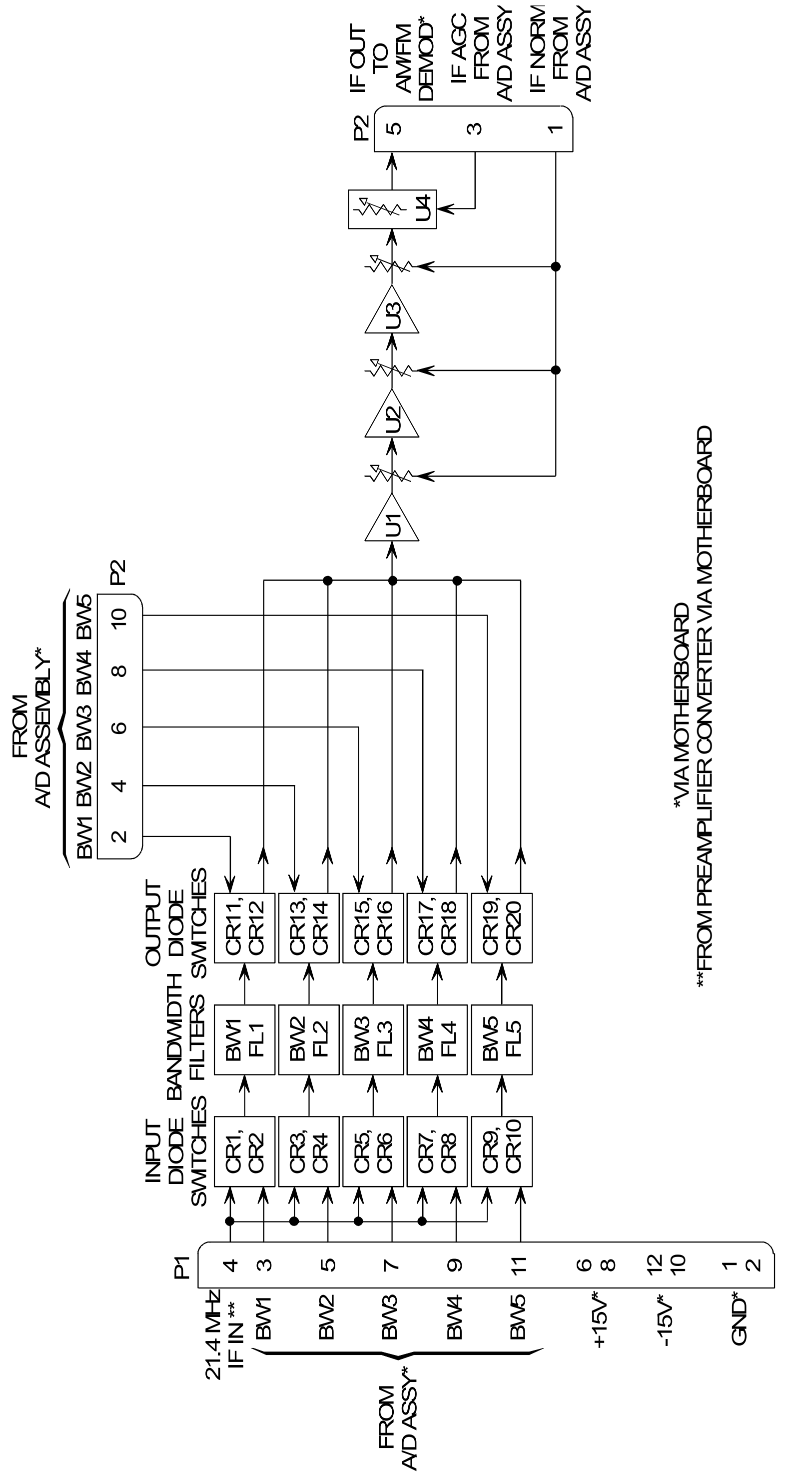

Figure 3-3. IF Bandwidth Filter Assembly (A1A12) Block Diagram

Table 3-2. IF Bandwidth Filter Assembly (A1A12) Inputs and Outputs

Description	A1A12 Port	Source/Destination	Via Motherboard
21.4 MHz IF IN	P1, Pin 4	From Preamplifier/ Converter Assembly (A1A13)	XA13 Pin 7 and XA12A, Pin 4
BW1 INPUT SW	P1, Pin 3	From A/D Assembly (A1A4)	XA4A Pin 5, XA10A Pin 5, XA12B Pin 2, and XA12A Pin 3
BW1 OUTPUT SW	P2, Pin 2	From A/D Assembly (A1A4)	XA4A Pin 7, XA10A Pin 6, and XA12B Pin 4
BW2 INPUT SW	P1, Pin 5	From A/D Assembly (A1A4)	XA4A Pin 7, XA10A Pin 6, XA12B Pin 4, and XA12A, Pin 5
BW2 OUTPUT SW	P2, Pin 4	From A/D Assembly (A1A4)	XA4A Pin 7, XA10A Pin 6, and XA12B Pin 4
BW3 INPUT SW	P1, Pin 7	From A/D Assembly (A1A4)	XA4A Pin 8, XA10A Pin 7, XA12B Pin 6, and XA12A Pin 7
BW3 OUTPUT SW	P2, Pin 8	From A/D Assembly (A1A4)	XA4A Pin 8, XA10A Pin 7, and XA12B Pin 6
BW4 INPUT SW	P1, Pin 9	From A/D Assembly (A1A4)	XA4A Pin 10, XA10A Pin 8, XA12B Pin 8, and XA12A Pin 9
BW4 OUTPUT SW	P2, Pin 8	From A/D Assembly (A1A4)	XA4A Pin 10, XA10A Pin 8, and XA12B Pin 8
BW5 INPUT SW	P1, Pin 11	From A/D Assembly (A1A4)	XA4A Pin 12, XA10A Pin 9, XA12B Pin 9, and XA12A Pin 11

Table 3-2. IF Bandwidth Filter Assembly (A1A12) Inputs and Outputs (Continued)

Description	A1A12 Port	Source/Destination	Via Motherboard
BW5 OUTPUT SW	P2, Pin 10	From A/D Assembly (A1A4)	XA4A Pin 12, XA10A Pin 9, and XA12B Pin 9
21.4 MHz IF OUT	P2, Pin 5	To AM/FM Demod (A1A9)	XA12B Pin 5, and XA9B Pin 12
IF AGC	P2, Pin 3	From A/D Assembly (A1A4)	XA4B Pin 16, and XA12B Pin 3
IF NORM	P2, Pin 1	From A/D Assembly (A1A4)	XA4B Pin 14, and XA12B Pin 1
+15 V	P1, Pins 6 and 8	From Power Supply (PS1)	J6 Pin 1, and XA12A Pins 6 and 8
-15 V	P1, Pins 12 and 10	From Power Supply (PS1)	J6 Pin 2, and XA12A Pins 10 and 12

3.3.4 AM/FM DEMODULATOR ASSEMBLY (A1A9)

Two versions of the AM/FM Demodulator Assembly, A1A9, are used in the WJ-8615P VHF/UHF Receiver. Type 796754-1 is employed in receivers with serial numbers of 910 and below. The circuit description for Type 796754-1 is provided in **paragraph 3.3.4.1**. Type 797272-1 is employed in receivers with serial numbers of 911 and above. The circuit description for Type 797272-1 is provided in **paragraph 3.3.4.2.**

3.3.4.1 Type 796754-1 AM/FM Demodulator Assembly

The AM/FM Demodulator Assembly detects AM and FM from the 21.4 MHz IF output of the A1A12 Assembly. The IF signal is linearily and logarithmically amplified for video detection and signal strength representation. Refer to **Figure FO-15** for the A1A9 schematic diagram. Refer to **Figure 3-4** for the A1A9 block diagram and **Table 3-3** for a summary of input and output signals.

The AM/FM Demodulator Assembly receives the post-filtered 21.4 MHz IF from the IF Bandwidth Filter Assembly (A1A12). The IF signal is amplified and filtered prior to being split. One IF signal path is output at connector P2 pin 1 to the ISB/CW Demodulator Assembly (A1A11). Remaining paths are passed to the AM detector and FM demodulator (narrowband, midband, and wideband) circuits. AM and FM video outputs are provided to the Audio/Video Assembly (A1A10). LOG video outputs are applied to the rear panel and to the Analog/Digital Assembly (A1A4).

The bandlimited 21.4 MHz IF at connector P2 pin 12 (IF IN) is applied to a broadband amplifier (U1) which provides approximately 14 dB of gain to the IF signal. The output from U1 can take one of two paths. One path is to a narrowband/midband post-filter and the second path is to a wideband post-filter. Selection of the post-filter is determined by the operator selected IF bandwidth, causing either a logic high (+5 Vdc) or a logic low (0 V) to be applied at connector P1 pin 6. A 0 V level at connector P1 pin 6 selects the wideband post-filter by enabling +15 Vdc through the closed switch contacts (11 and 13) of electronic switch U9. Applying this positive voltage to wideband filter diode switches CR1 and CR4 causes them to forward bias, allowing IF signals with bandwidths greater than 500 kHz to be coupled through the wideband path to the input of broadband amplifier U2. IF signals with less than or equal to 500 kHz are routed through the narrowband/midband filter path by a +5 V level input at connector P1 pin 6. This +5 V level closes contacts 2 and 4 of switch U9 and opens contacts 11 and 13. Closing contacts 2 and 4 allows the +15 Vdc to bias diode switches CR2 and CR3 which route the IF to the narrowband/midband post-filter. The post-filter passes the IF with a 3 dB bandwidth of approximately 800 kHz to broadband amplifier U2. The IF signal is amplified approximately 14 dB by U2 then applied to the primary of transformer T3. T3 passes half of the IF signal to U11 of the AM detector circuit and the other half to the FM demodulator circuits.

Attenuator U11 is controlled by the DET AGC signal of 0 to +12 Vdc input at P2 pin 2 from the Analog/Digital Assembly (A1A4). The IF output of U11 is routed to the AM detector circuits and to P2 pin 1 (IF OUT) which is the IF input to the A1A11 Assembly. The IF routed to the AM detector circuits is amplified and applied to a full wave AM detector, passed through a low pass filter, amplified by a video amplifier, then output at P1 pin 5 (AM VIDEO OUT). This is the AM Video signal input to the Audio/Video Assembly (A1A10).

With IF bandwidths of 500 kHz and greater (wideband), the secondary of transformer T3 couples the FM IF to the input of limiter U12. The IF output of U12 is input to an FM discriminator which detects the wideband FM. The detected wideband FM is routed to pin 4 of electronic switch U18.

With IF bandwidths of 75 to 500 kHz (midband), transformer T3 couples the FM IF to the input of limiter/discriminator U3. U3 and a parallel resonant tank make up a quadrature detector circuit which detects the midband FM. The detected midband FM is amplified and routed to pin 5 of electronic switch U18. A LOG output of U3 is amplified and routed to P3 pins 3 and 9. The output at pin 3 is the LOG VIDEO input to the Analog/Digital Assembly (A1A4). The LOG VIDEO output at pin 9 is routed to the rear panel AUX connector (J13, pin 9).

With IF bandwidths of 50 kHz and less (narrowband), the IF from pin 1 of transformer T3 is coupled to a narrowband discriminator consisting of limiter/discriminator U7 and a tank circuit. A 21.4 MHz crystal oscillator (Y1) provides the high "Q" required for the tank circuit. The detected narrowband FM is amplified and applied to pin 9 of U18.

Switching of electronic switch U18 is determined by the operator selected IF bandwidth, thus selecting the proper FM band output at P3 pin 4 (FM OUT) for input to the Audio/Video Assembly (A1A10). Logic level inputs of 0 V and +5 Vdc from the Analog/Digital Assembly (A1A4) automatically switches U18 corresponding to the selected IF bandwidth. The table below shows the switching scheme of U18, providing the FM output compared to the selected IF bandwidth.

Selected IF BW	P3 Pin 5 Input	P3 Pin 6 Input	P3 Pin 4 Output
< 50 kHz	+5 Vdc	+5 Vdc	Narrowband FM
75-500 kHz	+5 Vdc	0 V	Midband FM
> 500 kHz	0 V	Either	Wideband FM

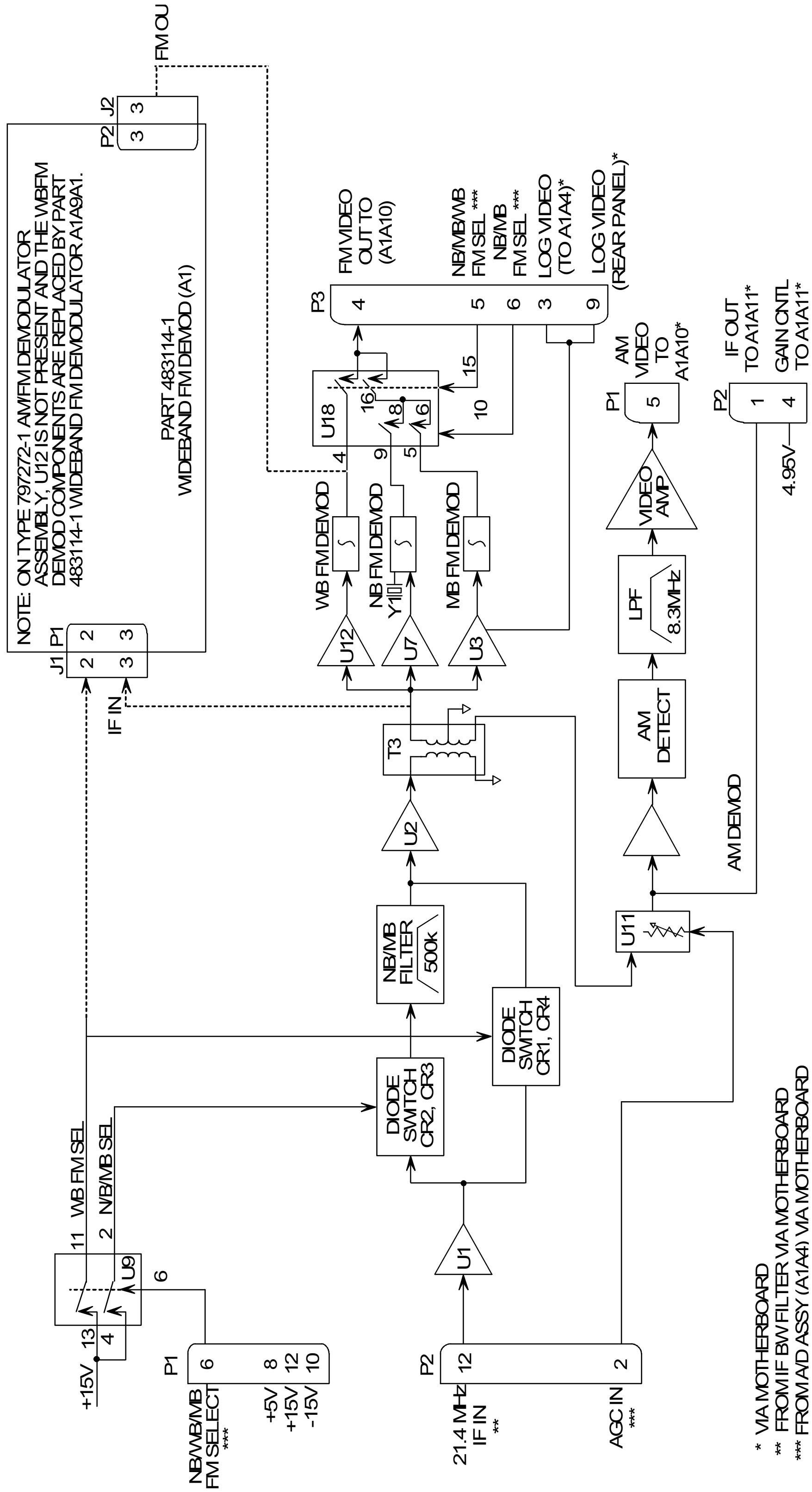

Figure 3-4. AM/FM Demodulator Assembly (A1A9) Block Diagram

Table 3-3. AM/FM Demodulator Assembly (A1A9) Inputs and Outputs

Description	A1A9 Port	Source/Destination	Via Motherboard
21.4 MHz IF IN	P2, Pin 12	From IF Bandwidth Filter (A1A12)	XA12B Pin 5, and XA9B Pin 12
GAIN CONTROL IN	P2, Pin 2	From Analog/Digital Assembly (A1A4)	XA4B Pin 18, and XA9B Pin 2
NB/MB/WB FM SEL (NB/MB Active Low)	P1, Pin 6 and P3, Pin 5	From Analog/Digital Assembly (A1A4)	XA4B Pin 37, XA9A Pin 6, XA4B Pin 37, and XA9C Pin 5
NB/MB FM SEL (NB Active Low)	P3, Pin 6	From Analog/Digital Assembly (A1A4)	XA4B Pin 36, and XA9C Pin 6
GAIN CONTROL OUT (4.95 Vdc)	P2, Pin 4	To ISB/CW Demodulator Assembly (A1A11)	XA9B Pin 4, and XA11A Pin 15
21.4 MHz IF OUT	P2, Pin 1	To ISB/CW Demodulator Assembly (A1A11)	XA9B Pin 1, and XA11A Pin 19
AM VIDEO OUT	P1, Pin 5	To Audio/Video Assembly (A1A10)	XA9A Pin 5, and XA10A Pin 3
FM VIDEO OUT	P3, Pin 4	To Audio/Video Assembly (A1A10)	XA9C Pin 4, and XA10A Pin 4
LOG VIDEO OUT	P3, Pin 3	To Analog/Digital Assembly (A1A4)	XA9C Pin 3, and XA4B Pin 44
LOG VIDEO OUT	P3, Pin 9	To Rear Panel Aux. Connector J13 Pin 9	XA9C Pin 9, and J4 Pin 11
+15 V	P1, Pin 12	From Power Supply (PS1)	XA9A Pin 12, and J6 Pin 1
+5 V	P1, Pin 8	From Power Supply (PS1)	XA9A, Pin 8, and J6 Pin 3
-15 V	P1, Pin 10	From Power Supply (PS1)	XA9A Pin 10, and J6 Pin 2

3.3.4.2 Type 797272-2 AM/FM Demodulator Assembly

Refer to **Figure FO-16** for the A1A9 (Type 797272-1) Schematic Diagram. Refer to **Figure 3-4** for the A1A9 block diagram and **Table 3-3** for a summary of input and output signals.

The function of Type 797272-1 AM/FM Demodulator is identical to the function of Type 796754-1 AM/FM Demodulator (**paragraph 3.3.4.1**) except for the following difference. With FM bandwidths of 500 kHz and greater (wideband), the secondary of transformer T3 couples the FM IF to P1-2 of Wideband FM Demodulator A1A9A1. A +15 Vdc WBFM select voltage from U9-11 is applied to A1A9A1P1-2, which energizes A1A9A1. A1A9A1 demodulates the wideband FM IF signal and provides a demodulated wideband FM output at A1A9A1P2-3. This output is routed to pin 4 of electronic switch U18.

3.3.5 TYPE 796755-1 ISB/CW DEMODULATOR ASSEMBLY (A1A11) OR TYPE 796755-2 CW DEMODULATOR ASSEMBLY (A1A11)

When the WJ-8615/ISB option is installed, the Type 796755-1 ISB/CW Demodulator Assembly is used and provides USB, LSB, ISB, and CW audio outputs which are derived from the 21.4 MHz IF from the A1A9 Assembly. Without the ISB option, the Type 796755-2 CW Demodulator Assembly is used and provides CW audio. The difference between the hardware configurations is the addition of two filters in the Type 796755-1 ISB/CW Demodulator. All other differences relate to the controlling software. Refer to **Figure FO-20** for the A1A11 schematic diagram. Refer to **Figure 3-5** for the A1A11 block diagram and **Table 3-4** for a summary of input and output signals.

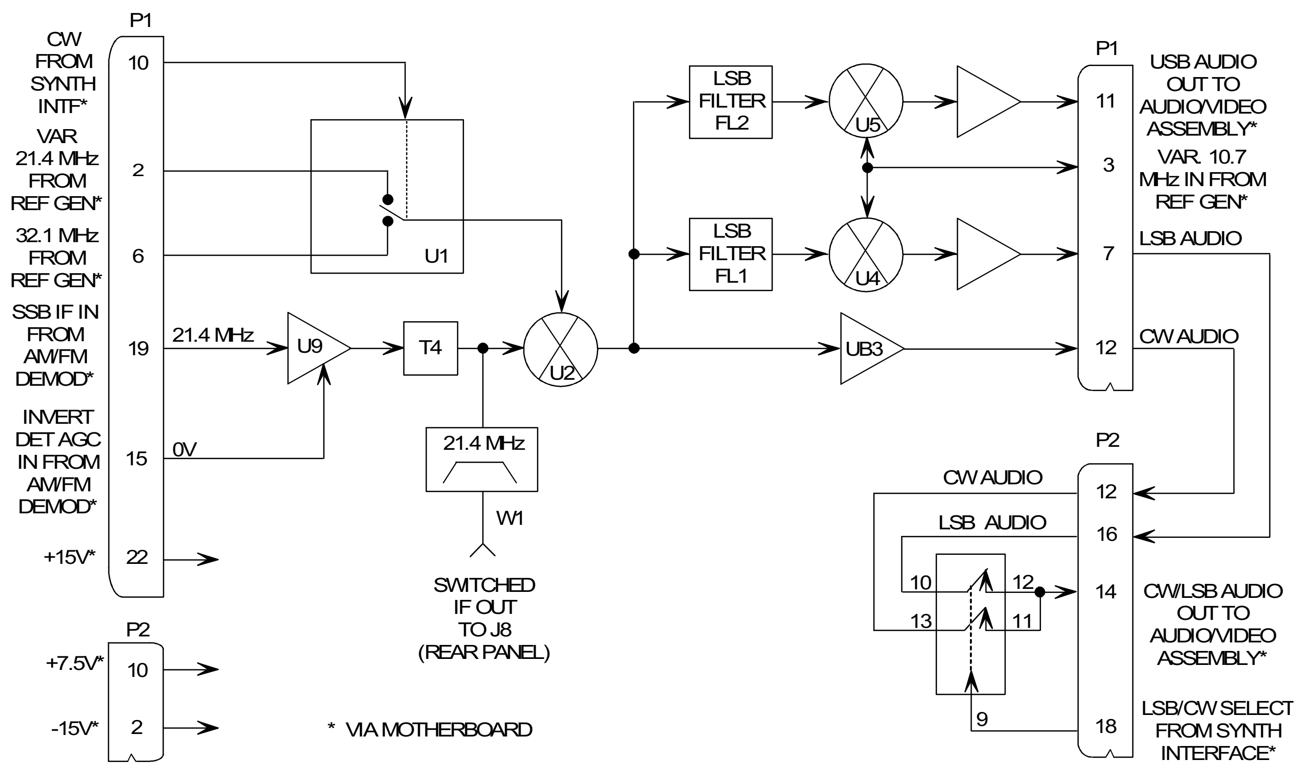

Figure 3-5. ISB/CW Demodulator Assembly (A1A11) Block Diagram

Table 3-4. ISB/CW Demodulator Assembly (A1A11) Inputs and Outputs

Description	A1A11 Port	Source/Destination	Via Motherboard
CW SELECT	P1, Pin 10	From Synthesizer Interface Assembly (A1A5)	XA5A Pin 4, and XA11A Pin 10
21.4 MHz VAR	P1, Pin 2	From Reference Generator Assembly (A1A8)	XA8A Pin 5, and XA11 Pin 2
ISB/CW IF IN (21.4 MHz)	P1, Pin 19	From AM/FM Demodulator Assembly (A1A9)	XA9B Pin 1, and XA11A Pin 19
32.1 MHz	P1, Pin 6	From Reference Generator Assembly (A1A8)	XA8A Pin 13, and XA11A Pin 6
INVERT DET AGC	P1, Pin 15	From AM/FM Demodulator Assembly (A1A9)	XA9B Pin 4, and XA11A Pin 15
LSB AUDIO OUT	P1, Pin 7	To ISB/CW Demodulator Assembly (A1A11)	XA11A Pin 7, and XA11B Pin 16
LSB AUDIO IN	P2, Pin 16	From ISB/CW Demodulator Assembly (A1A11)	XA11A Pin 7, and XA11B Pin 16
CW AUDIO OUT	P1, Pin 12	To ISB/CW Demodulator Assembly (A1A11)	XA11A Pin 12, and XA11B Pin 12
CW AUDIO IN	P2, Pin 12	From ISB/CW Demodulator Assembly (A1A11)	XA11A Pin 12, and XA11B Pin 12
USB AUDIO OUT	P1, Pin 11	To Audio/Video Assembly (A1A10)	XA11A Pin 11, and XA10A Pin 15
LSB/CW OUT	P2, Pin 14	To Audio/Video Assembly (A1A10)	XA11B Pin 14, and XA10A Pin 17
10.7 MHz VAR	P1, Pin 3	From Reference Generator Assembly (A1A8)	XA8A Pin 17, and XA11A Pin 3
SWITCHED IF OUT	A1A11W1P3	To rear panel SW IF Connector J8 via W2	
+15 V	P1, Pins 22 and 24	From Power Supply (PS1)	J6 Pin 1, and XA11A Pins 22 and 24
-15 V	P2, Pins 2 and 4	From Power Supply (PS1)	J6 Pin 2, and XA11B Pins 2 and 4
+7.5 V	P2, Pin 10	Not Used	

The 21.4 MHz IF from the AM/FM Demodulator Assembly (A1A9) is input at P1 pin 19 (SSB IF IN) of the ISB/CW Demodulator Assembly (A1A11). This IF input is routed to an amplifier (U9) whose gain is held fixed by the 0 V output from U3A. This voltage is derived from the 4.9 Vdc applied at P1 pin 15 (INVERT DET AGC IN) which is also input from A1A9. The IF is then routed to transformer T4. T4 couples the IF to an input of a balanced modulator/ demodulator (U2) and to a broadband bandpass filter. The bandpass filter, which is centered at 21.4 MHz and has a bandwidth of 10 MHz, filters the noise bandwidth. The 21.4 MHz switched IF from the bandpass filter is routed to the rear panel SW IF connector (J8) via coaxial cables A1A11W1 and W2.

Selecting the CW detection mode applies a variable 21.4 MHz IF (21.4 MHz ±4 kHz) from the Reference Generator input at P1 pin 2 and a +5 Vdc input at P1 pin 10. The +5 Vdc input at pin 10, which originates from the Synthesizer Interface, is applied to pin 6 of electronic switch U1, closing the switch contact between pins 2 and 4. A +15 Vdc applied at U1 pin 2 is output at pin 4 which biases switching diode CR1, allowing the 21.4 MHz IF to be input to balanced modulator/demodulator U2. In CW detection mode, U2 mixes the variable 21.4 MHz IF input from the Reference Generator Assembly (A1A8) with the 21.4 MHz IF (SSB IF IN) from the AM/FM Demodulator Assembly (A1A9). U2 produces positive and negative output signals which are input to a differential amplifier (U3B). The CW audio output of U3B is output at P1 pin 12, jumpered to P2 pin 12, and applied to pin 10 of electronic switch U13.

When the ISB option is installed, selecting a single sideband detection mode applies a fixed 32.1 MHz IF input at P1 pin 6 and 0 V at P1 pin 10. With 0 V from pin 10 applied to pin 6 of electronic switch U1, the switch contact between pins 13 and 11 is closed, allowing the +15 Vdc resident on pin 13 of U1 to bias switching diode CR2, which then passes the 32.1 MHz IF to the input of balanced modulator/demodulator U2. U2 mixes the 32.1 MHz IF with the 21.4 MHz IF (SSB IF IN), which produces frequencies centered about the difference frequency of 10.7 MHz. These frequencies are input to a lower sideband (LSB) filter (FL1) and an upper sideband (USB) filter (FL2). LSB filter FL1 passes frequencies from 10.69965 MHz down to 10.69680 MHz. USB filter FL2 passes frequencies from 10.70035 MHz up to 10.70320 MHz. The output frequencies from FL1 and FL2 are input to modulator/demodulators U4 and U5, respectively.

When a single sideband detection mode is selected with the ISB option installed, a variable 10.7 MHz IF (10.7 MHz ±2 kHz) from the Reference Generator Assembly (A1A8) is input at P1 pin 3 (10.7 MHz VAR). The 10.7 MHz IF is input to both U4 and U5. U5 combines the LSB IF frequency with the variable 10.7 MHz IF. The output of U5 is summed, then amplified and output at P1 pin 11 (USB AUDIO OUTPUT). The 350 to 3200 Hz output at pin 11 is the USB audio input to the Audio/Video Assembly (A1A10). Modulator/demodulator U4 combines the variable 10.7 MHz IF input with the LSB IF frequency from FL1. The output of U4 is summed, then amplified and output at P1 pin 7. This 350 to 3200 Hz output at pin 7 (LSB AUDIO OUTPUT) is jumpered to P2 pin 16 (LSB IN) and applied to pin 13 of electronic switch U13.

U13 is controlled by logic level inputs at P2 pin 18 (LSB*/CW) from the Synthesizer Interface Assembly (A1A5). When CW detection mode is selected, +5 Vdc is input on pin 18 which closes the switch contact between pins 10 and 13 of U11, thus routing the CW audio to P2 pin 14 (LSB/CW OUT). When Lower Sideband (LSB) detection mode is selected, 0 V is on pin 18 which holds the switch contact between pins 12 and 13 of U13 closed, thus routing the LSB audio to P2 pin 14. As determined by the detection mode selected (LSB or CW), the output at P2 pin 14 is the LSB or CW audio input to the Audio/Video Assembly (A1A10).

3.3.6 TYPE 796622-X AUDIO/VIDEO ASSEMBLY (A1A10)

The Audio/Video Assembly (A1A10) provides demodulated audio for all detection modes, and video for AM and FM detection modes. Output signals from the Audio/Video Assembly include: AM DC (for signal strength level), FM DC (for tuning meter), FM MONITOR (for rear panel connector J4), FRONT PANEL AUDIO (for front panel PHONES jack), SELECTED VIDEO OUT (for rear panel connector J5), FM AC (for percent of FM modulation), AM AC (for percent of AM modulation), and LINE AUDIO OUT (for rear panel connectors J6 and J7). Refer to **Figures FO-18** and **FO-19** for the A1A10 and A1A10AX schematic diagrams, respectively. See **Figure FO-1** for a block diagram of A1A10, and **Table 3-5** for a summary of input and output signals.

AM video and FM video signals are applied, respectively, to connector P1 pin 3 and pin 4 from the AM/FM Demodulator Assembly (A1A9). The AM video input at P1 pin 3 is routed to pin 1 of jacks J1, J3, J5, J7, and J9 of the Bandwidth/Video Response subassemblies (A1A10AX). The AM video signal is also routed directly out at connector P1 pin 21 (AM DC) to the Analog/Digital Assembly (A1A4).

Selecting a bandwidth slot applies a high (+12 Vdc) to one of the five bandwidth select lines (BW1 to BW5) at connector P1 pins 5 to 9, which enables the selected Bandwidth/ Video Response subassembly (A1A10AX). Selecting bandwidth 1 (BW1) applies the +12 V at connector P1 pin 5 to pin 4 of J1 on the Bandwidth/Video Response subassembly installed in Position 1. The remaining bandwidth select lines (BW2-BW5) have a low (0 V) on them. With +12 V applied to J1 pin 4 of A1A10AX. AM and FM video signals are routed through the Bandwidth/Video Response subassembly. This applies the FM video, routed from P1 pin 4 to J1 pin 2, through a low-pass filter and FM slope normalizing resistors R2 and R3 and output at pin 5 of J2 on A1A10AX. This also passes the AM video signal input at P1 pin 3 (AM IN) through a low-pass filter and outputs it at J2 pin 1.

In addition to filtering and normalizing the IF bandwidth, the Bandwidth/Video Response subassembly provides a BW CODE voltage which is routed to the Analog/Digital Assembly and used to identify which Frequency Response subassembly that is currently selected. The +12 Vdc bandwidth select voltage at J1 pin 4 passes through a resistor in A1A10AX, producing an analog voltage out at J1 pin 3 to connector P1 pin 1. The values of this resistor and other components on A1A10AX are identified in **Figure FO-17**. Regardless of which as many as five IF bandwidth filters are installed, the narrowest bandwidth must always occupy Position 1 with wider bandwidths progressively installed in Positions 2 through 5.

The filtered FM output video bandwidth at J2 pin 5 is approximately one-half of the selected IF bandwidth. From the output of A1A10AX the FM video is split. One path is to switch U5, and the other path to operational amplifier U6. When FM detection mode is selected, a logic low (0 V) is present at P1 pin 22 and pin 9 of switch U5. This allows the FM video to be routed to amplifier U8 through dual switch S1 if positive video is selected. The amplified video from U8 is resistively coupled by S1 to amplifier U9. If positive video is not selected, switch S1 routes the FM video from U5 directly to U9. Through U9, the video is directed to connector P2 pin 19 as the SELECTED VIDEO OUT which is routed to the rear panel SW VIDEO connector J5. An additional path is provided to switch U1 for AM/FM audio output.

*Indicates Active Logic Low

Table 3-5. Audio/Video Assembly (A1A10) Inputs and Outputs

Description	A1A10 Port	Source/Destination	Via Motherboard
BW CODE	P1, Pin 1	To A/D Assembly (A1A4)	XA10A Pin 1, and XA4A Pin 4
BW1	P1, Pin 5	From A/D Assembly (A1A4)	XA4A Pin 5, and XA10A Pin 5
BW2	P1, Pin 6	From A/D Assembly (A1A4)	XA4 Pin 7, and XA10A Pin 6
BW3	P1, Pin 7	From A/D Assembly (A1A4)	XA4A Pin 8, and XA10A Pin 7
BW4	P1, Pin 8	From A/D Assembly (A1A4)	XA4A Pin 10, and XA10A Pin 8
BW5	P1, Pin 9	From A/D Assembly (A1A4)	XA4A Pin 12, and XA10A Pin 9
AM VIDEO IN	P1, Pin 3	From AM/FM Demodulator Assembly (A1A9)	XA9A Pin 5, and XA10A Pin 3
AM DC	P1, Pin 21	To A/D Assembly (A1A4)	XA10A Pin 21, and XA4B Pin 41
FM VIDEO IN	P1, Pin 4	From AM/FM Demodulator Assembly (A1A9)	XA9C Pin 4, and XA10A Pin 4
AM/FM SELECT (FM Active Low)	P1, Pin 22	From Synthesizer Interface Assembly (A1A5)	XA5A Pin 3, and XA10A Pin 22
USB IN	P1, Pin 15	From ISB/CW Demodulator Assembly (A1A11)	XA11A Pin 11, and XA10A Pin 15
USB/LSB SELECT (LSB Active Low)	P1, Pin 16	From Synthesizer Interface Assembly (A1A5)	XA5A Pin 6, and XA10A Pin 16
LSB/CW IN	P1, Pin 17	From ISB/CW Demodulator Assembly (A1A11)	XA11B Pin 14, and XA10A Pin 17
SSB SELECT	P1, Pin 18	From Synthesizer Interface Assembly (A1A5)	XA5A Pin 5, and XA10A Pin 18

Table 3-5. Audio/Video Assembly (A1A10) Inputs and Outputs (Continued)

Description	A1A10 Port	Source/Destination	Via Motherboard
ISB SELECT	P1, Pin 19	From Synthesizer Interface Assembly (A1A5)	XA5A Pin 7, and XA10A Pin 19
SQUELCH	P1, Pin 20	From Synthesizer Interface Assembly (A1A5)	XA5A Pin 8, and XA10A Pin 20
LSB FRONT PANEL AUDIO	P2, Pin 2	To A/D Assembly (A1A4) and Front Panel Phones jack (J12)	XA10B Pin 2, J11 Pin 6, and XA4B Pin 47
USB FRONT PANEL AUDIO	P2, Pin 3	To A/D Assembly (A1A4) and Front Panel Phones jack (J12)	XA10B Pin 3, J11 Pin 2, and XA4B Pin 46
(W) LSB	P2, Pin 13	From Front Panel AUDIO LEVEL Control (RIB)	J4 Pin 6, and XA10B Pin 13
LSB GAIN	P2, Pin 5	To Front Panel AUDIO LEVEL Control (RIB)	XA10B Pin 5, and J4 Pin 10
LSB AUDIO OUT	P2, Pin 7	To Rear Panel LSB/AUD2 connector (J7) and optional Selected Audio Output Assembly (A6)	XA10B Pin 7, and J4 Pin 9
USB GAIN	P2, Pin 9	To Front Panel AUDIO LEVEL Control (RIA)	XA10B Pin 9, and J4 Pin 8
USB AUDIO OUT	P2, Pin 11	To Rear Panel USB/AUD1 CONNECTOR (J6)	XA10B Pin 11, and J4 Pin 7
(W) USB	P2, Pin 15	From Front Panel AUDIO LEVEL Control (RIA)	J4 Pin 5, and XA10B Pin 15
FM DC	P2, Pin 30	To A/D Assembly (A1A4)	XA10B Pin 30, and XA4B Pin 43
AM PEAK DUMP	P2, Pin 25	From Synthesizer Interface Assembly (A1A5)	XA5A Pin 10, and XA10B Pin 25
AM PEAK	P2, Pin 27	To A/D Assembly (A1A4)	XA10B Pin 27, and XA4B Pin 39
AM AC	P2, Pin 34	To A/D Assembly (A1A4)	XA10B Pin 34, and XA4B Pin 40

Table 3-5. Audio/Video Assembly (A1A10) Inputs and Outputs (Continued)

Description	A1A10 Port	Source/Destination	Via Motherboard
SELECTED VIDEO OUT	P2, Pin 19	To Real Panel SW VIDEO connector (J5)	XA10B Pin 19, and J4 Pin 4
FM MONITOR	P2, Pin 23	To Rear Panel FM MON connector (J4)	XA10B Pin 23, and J4 Pin 2
FM AC	P2, Pin 32	To A/D Assembly (A1A4)	XA10B Pin 32, and XA4B Pin 42
+15 V	P1, Pin 23	From Power Supply (PS1)	J6 Pin 1, and XA10A Pin 23
-15 V	P1, Pin 2	From Power Supply (PS1)	J6 Pin 2, and XA10A Pin 2
+5 V	P1, Pin 36	From Power Supply (PS1)	J6 Pin 3, and XA10B Pin 36

The FM video provided to amplifier U6 is amplified and inverted before being fed to the input of U15 and to the output at P1 pin 23 (FM MONITOR). The FM MONITOR output is routed to the rear panel connector J4 (FM MON). U15 inverts the FM signal. The U15 output is then split, with one path output at P2 pin 30 (FM DC), and the second path to amplifier U10. The FM DC output voltage at P2 pin 30 serves as the level for AFC operations, the front panel tuning meter voltage, and as a response to the query 'FMO?' from a remote controller. At 21.4 MHz, the output at pin 30 is approximately +2.45 Vdc. As the IF frequency deviates from 21.4 MHz, the output voltage varies from 0.1 to 4.8 Vdc indicating where the receiver is tuned. 0.1 Vdc indicates the receiver is tuned 50% of the selected IFBW below center frequency, 4.8 Vdc indicates 50% of the IF BW above signal. U10 amplifies the FM video AC component. AC variations from U10 are applied to a fullwave bridge rectifier. Rectified outputs are applied to a buffer amplifier (U11) that outputs a DC voltage at P2 pin 32 (FM AC) which is proportional to the amount of FM modulation. This information is available via the 'FM?' command from a remote controller.

The AM video signal from the selected Bandwidth/Video Response subassembly is split, with one path to amplifier U4 and switch U5. From U5 the signal is passed to U9 (via U8 if positive video selected) and directed to P2 pin 19 as the SELECTED VIDEO OUT. The AM video level (400 mV rms for 50% modulation) is controlled by variable resistor R6. The second path of the AM video from the Bandwidth/Video Response subassembly is to amplifier U12. The output of U12 is applied to a fullwave bridge that detects the AC component of the AM signal and provides a DC voltage to amplifier U13 (0.1 Vdc for 05, +4.8 Vdc for 100%). The rectified DC voltage is amplified by U13 and routed to P2 pin 34 as the AM AC output, which is then routed to the Analog/Digital Assembly (A1A4).

AM signals input at P1 pin 3 (AM IN) are also applied to a peak detector circuit (Q1, Q2, U14 and associated components) which holds them at their peak value until read by the Microprocessor Assembly via the Analog/Digital Assembly. The AM signals at P1 pin 3 are applied to the base of Q1, causing it to conduct. The output of Q1, in turn, is applied to the base of Q2. Capacitor C10 quickly charges to the level of Q2. The Microprocessor reads the peak AM level through buffer U14 at P2 pin 27 (AM PEAK). After the Microprocessor reads the peak AM level, a logic high from the Synthesizer Interface Assembly (A1A5) is applied at P2 pin 25 (AM PEAK DMP). This input closes the switch contacts of switch U3, which allows C10 to discharge. When the P2 pin 25 is at a logic low, the switch contact of U3 is broken allowing C10 to charge to the next AM peak value.

Switches U1, U2, and U3 are used to control the audio path for the selected detection mode. With a logic level low at connector P1 pin 18 (SSB), the AM or FM audio present at pin 12 of U1 is transferred through the closed contacts (pins 12 and 13) of U1 to pins 12 and 3 of U2. A logic level low at P1 pin 19 (ISB) passes the signal through the closed contacts of U2 (pins 2, 3, and 13). From U2 the audio signal is AC coupled to the inverting inputs of amplifier U7A and to U7B. Amplified signals from U7A and U7B are split. One signal path from U7A is through R37 to connector P2 pin 3 (USB). From U7B, the first signal path is through R33 to connector P2 pin 2 (LSB). These audio signals output at P2 pins 2 and 3 are amplified by two amplifiers (A1U1C and A1U1B) on the Motherboard Assembly (see **Figure FO-4**) and routed to the front panel PHONES jack. The second path from U7A is through R35 to U7C. The second path from U7B is through R39 to U7D. The output from U7C is applied through R42 to connector P2 pin 11 (USB AUDIO OUT). This signal is routed to rear panel connector J6 (USB/AUD 1). The output from U7D is applied through R41 to connector P2 pin 7 (LSB AUDIO OUT). This signal is routed to rear panel connector J7 (LSB/AUD 2).

When Single Sideband (SSB) detection mode is selected, a logic level high is present at P1 pin 18 (SSB), causing contact to be made between pins 10 and 11 of U1. The logic level at P1 pin 16 (USB/LSB*) determines whether the audio signal through U1 is either USB, LSB, or CW.

In CW detection mode, a logic level low at P1 pin 16 (USB/LSB*) closes the contact between pins 4 and 5 of switch U1. This allows the CW signal at P1 pin 17 to be applied through switch U1 (pins 4 and 5, and pins 10 and 11) to U2 pins 12 and 3. The CW audio is AC coupled to U7A and U7B and ultimately to P2 pins 7 and 11, providing the same audio signal to rear panel connectors J6 and J7.

In the Lower Sideband (LSB) detection mode, a logic level low at P1 pin 16 (LSB) closes the contacts between pins 4 and 5 of switch U1. When LSB is selected, LSB audio at P1 pin 17 is applied through U1 (pins 4 and 5, and pins 10 and 11) to U2. U2 provides LSB audio through U7B and U7D to P2 pin 7 (LSB AUDIO OUT), and through U7A and U7C to P2 pin 11 (USB AUDIO OUT).

In the Upper Sideband (USB) detection mode, a logic level high present at P1 pin 16 (USB/LSB*) closes the contact between pins 2 and 3 of switch U1, and directs the USB audio at P1 pin 15 through the closed contact between pins 10 and 11 of U1 to U2. From U2, the USB audio is applied through U7B/U7D and U7A/U7C to P2 pins 7 and 11, respectively.

*Indicates Active Logic Low

If ISB is selected, a logic level high is present at P1 pin 19 (ISB), closing the contacts between pins 10 and 11 and pins 4 and 5 of switch U2. This provides LSB audio through U7B and U7D to P2 pin 7, and USB audio through U7A and U7C to P2 pin 11.

The squelch control logic at P1 pin 20 allows the audio signal to be amplified and output at P2 pins 7 and 11 or to be shunted to ground. When the set COR level has not been exceeded for five seconds, a logic level high routed from the Synthesizer Interface Assembly (A1A5) is input at P1 pin 20 which closes the contacts of U3, causing all signal activity to be shorted to ground. A signal level greater than the set COR level applies a logic level low at P1 pin 20, opening the contacts of U3 interrupting the low resistance path to ground.

3.3.7 TYPE 796747-1 REFERENCE GENERATOR (A1A8)

The Reference Generator Assembly provides the reference frequencies used by the 1st LO Synthesizer Assembly (A1A7) and the 2nd LO Synthesizer Assembly (A1A6). It also provides fixed and variable frequencies used by the ISB/CW Demodulator Assembly (A1A11). Refer to **Figure FO-14** for the A1A8 schematic diagram. See **Figure 3-6** for the A1A8 block diagram, and **Table 3-6** for a summary of inputs to and outputs from this assembly.

The frequencies produced by this assembly are as follows: 32.1 MHz (fixed), 21.4 MHz (variable), 10.7 MHz (variable), 10 MHz (reference), 2.5 MHz (reference), 1 MHz (reference), and 250 kHz (reference). The Reference Generator Assembly utilizes either an external 10 MHz, 0 dBm reference (connected to EXT REF connector J2 on the receiver rear panel) or an internal 10 MHz temperature compensated crystal oscillator (TXCO) for its time base. Selection of the Reference Generator timebase is accomplished by a dual line receiver and its associated components. When the input level at P2 pin 22 (EXT IN) is greater than -5 dBm, the external reference is selected.

The selected 10 MHz reference is buffered by U3 and routed to other circuits in the assembly. One output of U3 is routed to a crystal oscillator (Y3) which acts as a series resonant 10 MHz bandpass filter. Y3 readily passes the 10 MHz signal and attenuates all other frequencies. From Y3 the 10 MHz reference is amplified and output at J1 (10 MHz OUT). This is the 10 MHz reference input to the Type 776003-1 1st LO Synthesizer Assembly. On units having a different 1st LO Synthesizer Assembly, the J1 output is reserved for future use. A second output of U3 is routed to P2 pin 13. This 10 MHz reference is used by the 2nd LO Synthesizer Assembly.

Another 10 MHz signal output of U3 is routed to an asynchronous counter (U4). U4 divides the 10 MHz signal by a factor of 10, producing a 1 MHz signal output at P2 pin 15. This 1 MHz reference is for use by the optional Frequency Extender Assembly (A2). U3 also outputs a 10 MHz signal to binary counter U6B. U6B provides an output of 2.5 MHz which is routed to P2 pin 12. This reference is used by the 1st LO Synthesizer Assembly.

The final 10 MHz output of U3 is applied to a series of counters (U7, U6A, and U8A) which divide the signal down to 250 kHz. The 250 kHz output of the final counter (U8A) is split, with one of the 250 kHz signals input to a 10.7 MHz reference generator circuit while the other routed to P2 pin 17. This is the 250 kHz reference input to the 1st LO Synthesizer Assembly. The 10.7 MHz output of the 10.7 MHz reference generator circuit is split. One signal is routed to a frequency/phase detector (U14A). The other splitter output is routed to a multiply-by-three circuit that produces a fixed 32.1 MHz signal, which is routed to the ISB/CW Demodulator Assembly.

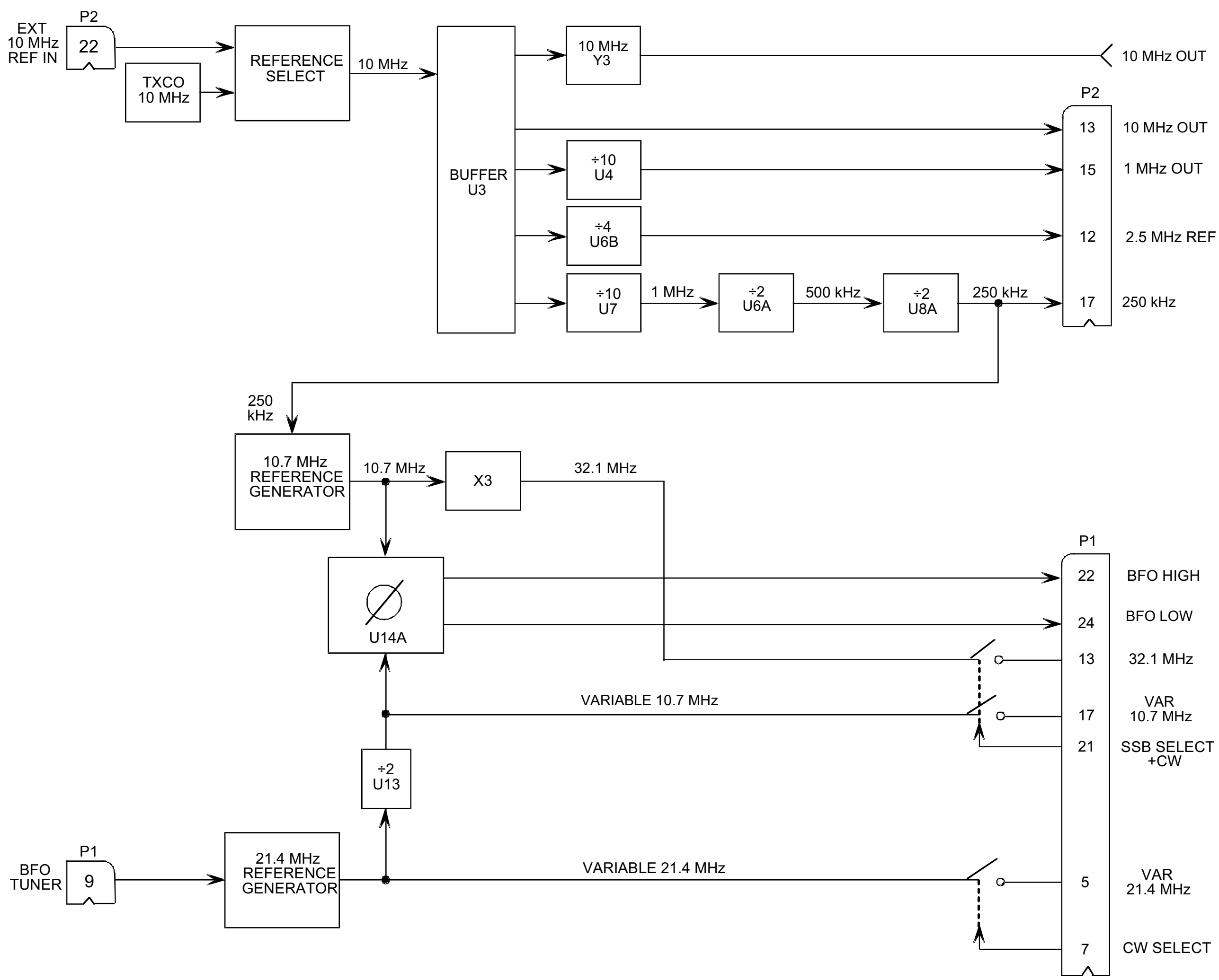

Figure 3-6. Reference Generator Assembly (A1A8) Block Diagram

Table 3-6. Reference Generator Assembly (A1A8) Inputs and Outputs

Description	A1A8 Port	Source/Destination	Via Motherboard
EXT REF IN	P2, Pin 22	From Rear Panel REF IN connector (J2)	J3 Pin 3, and XA8B Pin 22
10 MHz (1st LO)	J1	To 1st LO Synthesizer VCO (Type 776003-1 Only) Assembly Cable W2 Connector P3 (A1A7A2W2P3)	N/A
2.5 MHz (1st LO)	P2, Pin 12	To 1st LO Synthesizer Assembly (A1A7)	XA8B Pin 12, and XA7 Pin 3
250 kHz (1st LO)	P2, Pin 17	To 1st LO Synthesizer Assembly (A1A7)	XA8B Pin 17, and XA7 Pin 15
10 MHz (2nd LO)	P2, Pin 13	To 2nd LO Synthesizer Assembly (A1A6)	XAB Pin 13, and XA6 Pins 27 and 30
1 MHz OUT	P2, Pin 15	To Optional Frequency Extender Assembly (A3)	XA8B Pin 15, and J1 Pin 2
32.1 MHz OUT	P1, Pin 13	To ISB/CW Demodulator Assembly (A1A11)	XA8 A Pin 13, and XA11A Pin 6
21.4 MHz VAR	P1 Pin 5	To ISB/CW Demodulator Assembly (A1A11)	XA8A Pin 5, and XA11A Pin 2
10.7 MHz VAR	P1, Pin 17	To ISB/CW Demodulator Assembly (A1A11)	XA8A Pin 17, and XA11A Pin 3
CW SELECT	P1, Pin 7	From Synthesizer Interface Assembly (A1A5)	XA5A Pin 4, and XA8A Pin 7
SSB + CW	P1, Pin 21	From Synthesizer Interface Assembly (A1A5)	XA5A Pin 5, and XA8A Pin 21
BFO LOW	P1, Pin 24	To Synthesizer Interface Assembly (A1A5)	XA8A Pin 24, and XA5A Pin 35
BFO HIGH	P1, Pin 22	To Synthesizer Interface Assembly (A1A5)	XA8A Pin 22, and XA5A Pin 33
BFO TV	P1, Pin 9	From A/D Assembly (A1A4)	XA4B Pin 20, and XA8A Pin 9
+15 V	P1, Pin 23	From Power Supply (PS1)	J2 Pin 2, and XA8A Pin 23
-15 V	P1, Pin 2	From Power Supply (PS1)	J2 Pin 3, and XA8A Pin 2
+15 V	P2, Pins 1 and 24	From Power Supply (PS1)	J2 Pin 4, and XA8B Pins 1 and 24

A 21.4 MHz reference generator circuit (Q9 and Y2) produces a variable 21.4 MHz signal which is routed to a D-type flip-flop (U13). U13 divides the variable signal by two, producing a variable 10.7 MHz signal which is routed to U14A. U14A compares the frequency of both 10.7 MHz signals and produces output error signals that are applied to P1 pin 22 (BFO HIGH) and pin 24 (BFO LOW). Any difference in frequency results in an error signal being directed to the Synthesizer Interface Assembly (A1A5). The Synthesizer Interface responds by sending a corrected tuning voltage to P1 pin 9 (CW + V) from the Analog/Digital Assembly (A1A4). The tuning voltage (from 0 V to +12 Vdc) tunes the variable 21.4 MHz in the proper direction, eliminating the output error signal from U14A.

Logic levels input at P1 pin 7 (CW) and pin 21 (SSB + CW) from the Synthesizer Interface Assembly determine which reference generator circuit and its associated output is enabled. When SSB or CW detection modes are selected, a logic level high (+5 Vdc) is present at P1 pin 21. When CW detection mode is selected, the level at pin 7 is also high. Selecting SSB enables the 32.1 MHz fixed frequency output (pin 13), the 10.7 MHz variable frequency output (pin 17), and disables the 21.4 MHz variable frequency output (pin 5). Selecting CW disables the 32.1 MHz and 10.7 MHz outputs, and enables the 21.4 MHz output. The selected frequency output(s) are routed to the ISB/CW Demodulator Assembly (A1A11).

3.3.8 TYPE 796869-1 1ST LO SYNTHESIZER ASSEMBLY (A1A7)

The 1st LO Synthesizer (A1A7) produces the 577.5 to 1057.5 MHz local oscillator signal, in 5 MHz steps, required by the 1st mixer in the Preamplifier/Converter Assembly (A1A13). Refer to **Figure FO-13** for the A1A7 schematic diagram, **Figure 3-7** for the A1A7 Functional Block Diagram, and **Table 3-8** for a summary of A1A7 inputs and outputs.

The 1st LO Synthesizer Assembly is comprised of a single PC board assembly which performs all required functions and signal processing. Reference frequency signals of 2.5 MHz and 250 kHz from the Reference Generator Assembly (A1A8) are utilized in producing the phase-locked 1st LO output. The 1st LO output frequency may be determined when the frequency input to the Preamplifier/Converter Assembly is known. If the tuned frequency is less than or equal to 500 MHz, then this frequency is equal to the tuned frequency. To determine this frequency when the tuned frequency is greater than 500 MHz, refer to **Table B-2** (for the /FE option), **Table D-3** (for the FEX-16 option), or **Table I-2** (for the FEX-12 option). This information is provided in the Appendix Manual for the WJ-8615 Series VHF/UHF Receiver. Once this frequency is known, perform the following steps:

(1) Divide the receiver tuned frequency by 5, and discard any fractional remainder.

(2) Multiply the result of (1) by 5.

(3) Add the result of (2) to 557.5 MHz; this is the 1st LO frequency corresponding to the receiver tuned frequency.

Written as a formula, this procedure can be expressed in the following manner:

$$f\,(LO) = 557.5 + 5\left[\left(\frac{\text{Receiver tuned frequency}}{5}\right) - \text{remainder}\right] \text{MHz}$$

As the WJ-8615P Receiver is tuned over the range of 20 - 500 MHz, the 1st LO Synthesizer tunes 577.5 - 1057.5 MHz in 5 MHz increments. This LO frequency range is split into four bands in order to optimize VCO operation and improve the receiver phase noise characteristic. The four VCO bands are listed in **Table 3-7**.

Table 3-7. 1st LO Synthesizer VCO Operating Bands

Receiver Tuning Range	VCO Tuning Range
20.000 - 119.999 MHz	577.5 - 672.5 MHz
120.000 - 249.999 MHz	677.5 - 802.5 MHz
250.000 - 369.999 MHz	807.5 - 922.5 MHz
370.000 - 500.00 MHz	927.5 - 1057.5 MHz

NOTE

In the DIAGNOSTIC mode of operation, the 1st LO Synthesizer is tuned from 557.500 to 1057.500 MHz, allowing the receiver to be tuned from 0 - 500 MHz.

The following paragraphs describe the operation of the 1st LO Synthesizer. Refer to **Figure 3-7**, 1st LO Synthesizer Functional Block Diagram.

When a particular tuned frequency is selected by the operator, either manually or via remote control, the Digital Control Section of the WJ-8615P Receiver calculates the required 1st LO frequency and sends appropriate data to the 1st LO Synthesizer. This data consists of address commands and the FLOAD* command strobe.

Address commands from the Digital Control Section are received by EPROM U15, and consist of four-bit BCD addresses for 100 MHz (P1 pins 5, 7, 12, and 22) and 10 MHz (P1 pins 16, 18, 20 and 24) and a single toggle line (P1 pin 14) to select either 2 or 7 for the 1 MHz digit. This data is used to select the divide-by commands stored in EPROM memory. Table 4-5 provides information on the binary state of the 100 MHz, 10 MHz, and 7/2 control lines, and the corresponding 1st LO output frequencies, for various receiver tuned frequencies. The FLOAD* load strobe (P1 pin 17) is routed through U18 and U20, and is used to strobe the data into U15 and through octal 3-state noninverting D flip-flops U19 and U17. Based on the receiver tuned frequency, the appropriate commands are latched into programmable dividers U4 (divide-by-N) and U5 (divide-by-A) by U19 and U17, respectively. U19 also provides the band select code to the VCO bandswitch circuitry, while U17 also controls transistors Q6 and Q7 which set the gain of the charge pump circuit.

The VCO bandswitch circuitry, which consists of analog demultiplexer U12 and switching transistors Q12-Q15, accepts a two-bit control word from U19 and turns on the appropriate voltage-controlled oscillator. The output signal from the selected VCO is amplified in buffer amplifier U7 and fed to connector J1 for routing to the Preamplifier/Converter Assembly (A1A13).

A sample of the U7 VCO output is further amplified by buffer amplifiers U8 and U10, divided by 4 in fixed prescaler U9, and fed to dual-modulus prescaler U6. U6 divides by either 10 or 11, depending on the programming data latched into programmable divider U5 and supplied from U5 pin 12 to U6 pin 12. The output of U6 is supplied to U4 pin 1 and U5 pin 1, and is subsequently divided to near 625 kHz and fed to U2, pin 11, in the phase detector circuit.

Table 3-8. 1st LO Synthesizer Assembly (A1A7) Inputs and Outputs

Description	A1A7 Port	Source/Destination	Via Motherboard
LOCK Indicator	P1, Pin 13	To A/D Assembly (A1A4)	XA7 Pin 13, and XA4B Pin 27
1st LO Out	J1	To Preamplifier/Converter Assembly (A1A13)	A1W3
100 MHz 28	P1, Pin 7	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 44, and XA7 Pin 7
100 MHz 24	P1, Pin 12	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 43, and XA7 Pin 12
100 MHz 22	P1, Pin 5	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 42, and XA7 Pin 5
100 MHz 21	P1, Pin 22	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 41, and XA7 Pin 22
10 MHz 28	P1, Pin 24	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 40, and XA7 Pin 24
10 MHz 24	P1, Pin 20	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 39, and XA7 Pin 20
10 MHz 22	P1, Pin 18	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 38, and XA7 Pin 18
10 MHz 21	P1, Pin 16	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 37, and XA7 Pin 16
7/2 (2 is active low)	P1, Pin 14	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 36, and XA7 Pin 14
FLOAD*	P1, Pin 17	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 45, and XA7 Pin 17
250 kHz	P1, Pin 15	From Reference Generator Assembly (A1A8)	XA8B Pin 17, and XA7 Pin 15
2.5 MHz REF	P1, Pin 3	From Reference Generator Assembly (A1A8)	XA8B Pin 12, and XA7 Pin 3
+15 V	P1, Pin 2	From Power Supply (PS1)	J2 Pin 2, and XA7 Pin 2
+5 V	P1, Pin 1	From Power Supply (PS1)	J2 Pin 4, and XA7 Pin 1

* Active Low

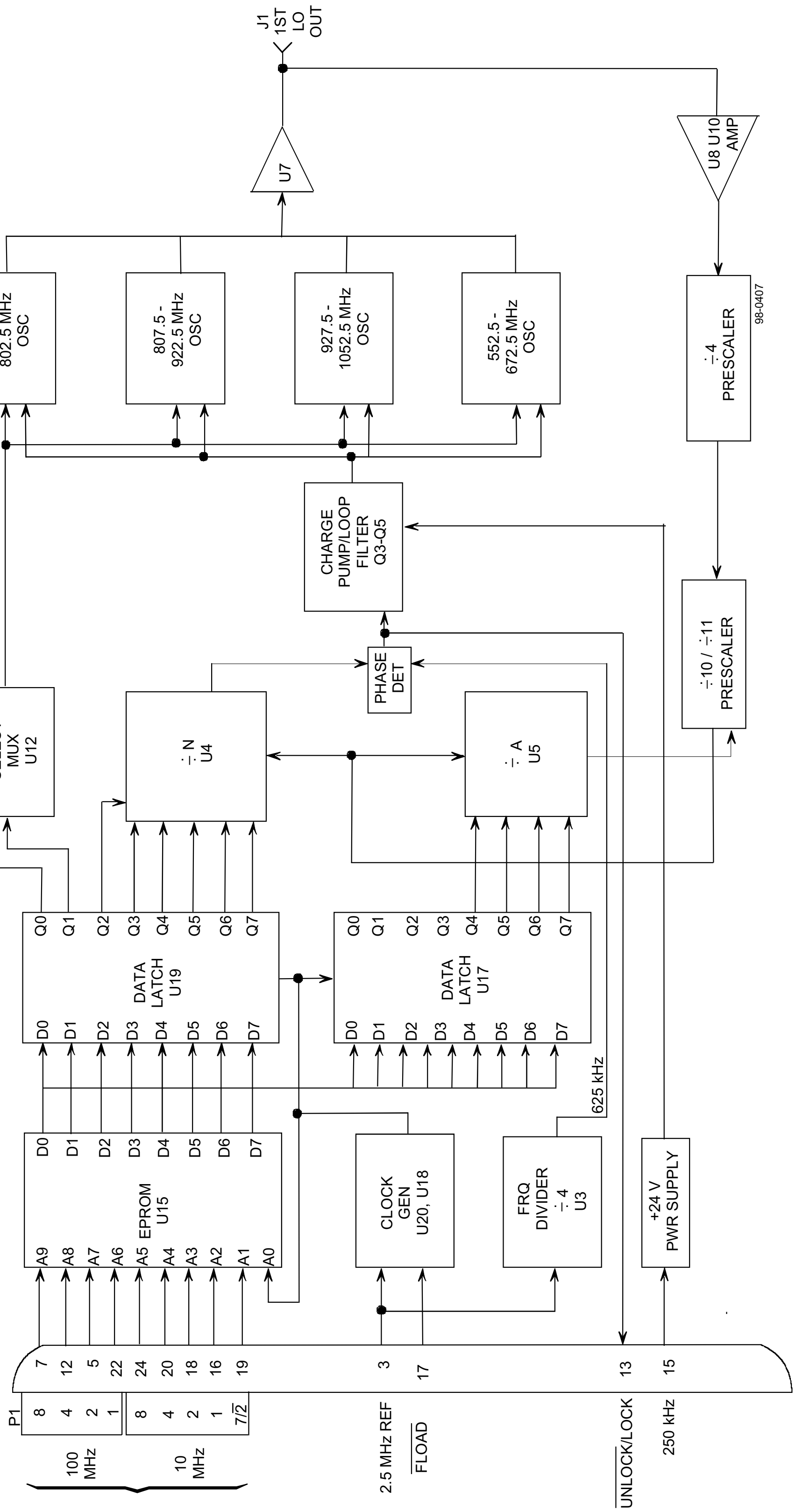

Figure 3-7. 1st LO Synthesizer Assembly (A1A7) Block Diagram

The reference input to the phase detector is derived from the 2.5 MHz reference frequency (P1 pin 3) which is divided by 4 in U3, a dual 4-stage binary ripple counter. The resulting 625 kHz signal is fed from U3 pin 13 to U2 pin 3.

The phase detector, which consists of quad NOR gate U1 and dual D-type flip-flop U2, compares the divided VCO sample from U4, pin 13, with the 625 kHz reference input from U3, pin 13, and produces pulses whose widths are proportional to the phase difference between the divided VCO signal and the 625 kHz reference. These pulses are integrated in the charge pump/loop filter circuit made up of transistors Q2 through Q5 and associated components, producing a DC correction voltage which shifts the VCO frequency up or down until the divided VCO and reference signals are at the same frequency. The gain of the charge pump circuitry is under digital control via the two gain control lines from U17, pins 6 and 9. These two lines control the base bias of transistors Q6 and Q7, which in turn set the loop gain through the charge pump circuitry. This allows the phase-locked loop operating characteristics to be software-controlled for optimum performance.

The phase detector Q* output from U2, pin 8, is fed through U13 and U18D to create a LOCK indication which is routed to the A/D Assembly (A1A4) via P1 pin 13. When the VCO output signal is phase-locked to the 625 kHz reference, the LOCK line is a logic high, and when unlocked the LOCK line is a logic low.

The +24 Vdc supply voltage required by the charge pump is developed from the +15 Vdc supply voltage present on P1, pin 2. This voltage transformation takes place in a DC-DC converter consisting of hex schmitt-trigger inverter U16, transistor Q16, and dual rectifiers CR7 and CR8. The 250 kHz reference signal (P1 pin 15) is used to generate the switching waveform necessary for operation of the converter.

Voltage regulator U14 provides regulated +12 Vdc from the +15 Vdc input on P1 pin 2, while U11 and Q11 are configured to regulate the +5 Vdc supply voltage present on P1 pin 1.

* Active Low

3.3.9 TYPE 776017-1 AND TYPE 797426-1 2ND LO SYNTHESIZER ASSEMBLIES (A1A6)

In WJ-8615P units with serial numbers up to 1200, the Type 776017-1 2nd LO Synthesizer is used. Thereafter, the Type 797426-1 2nd LO Synthesizer is used. The assemblies are compatible in form and fit but not in function. The only functional difference is related to Dual Modulus Prescaler U13, which is a divide by 40/41 in the earlier units and a divide by 32/33 in later units. As a result, the tuning word input at A1A6P1 pins 17 through 20 is necessarily different for the two 2nd LO Synthesizer types. A change of an EPROM physically located on the Microprocessor Assembly A1A3 accommodates the tuning word difference. In serial numbers up to 1200, the A1A3U9 EPROM is part number 841475-1. In later serial numbers, A1A3U9 is part number 841475-2.

The 2nd LO Synthesizer Assembly provides the 2nd LO frequency of 536.1000 MHz to 531.1001 MHz, in 100 Hz steps, for use by the Preamplifier/Converter Assembly (A1A13). Refer to **Figure FO-12** for the 2nd LO Synthesizer Block diagram. See **Figure 3-8** for the A1A6 block diagram, and **Table 3-9** for a summary of A1A6 inputs and outputs.

The 2nd LO Synthesizer Assembly consists of a three-loop circuit that tunes over a 5 MHz range in 100 Hz steps. The 2nd LO tunes from 536.1000 MHz to 531.1001 MHz for a carrier frequency of 20.0000 MHz to 24.9999 MHz. The tuning range is identical for 25.0000 MHz to 29.9999 MHz. This same tuning scheme applies to each 5 MHz increment of the receiver tuning range. The three loop circuits of this assembly are the Resolution Loop, the Reference Loop, and the Output Loop which are further discussed in the following.

The Resolution Loop contains a VCO that tunes from 1008 to 1028 MHz in 8 kHz steps. This loop also contains a PLL synthesizer (U2) which controls the tuning of the VCO. U2 contains internal latches, counters, and phase detectors. When the receiver tuned frequency is set, the Synthesizer Interface Assembly outputs digital tuning data (from the microprocessor) which programs the PLL synthesizer. The data information is applied on data lines D0-D3 input at P1 pins 17-20, respectively, and address lines A0, A1, and A2 input at P1 pins 15, 16, and 21. The address lines determine which internal latches of U2 receives the information on the data lines. When the strobe input at P1 pin 13 (2ND ST) is high, the data is unlatched to the internal counters. One counter develops a frequency derived from the 10 MHz reference input at P1 pin 27 (10 MHz) while another counter develops a frequency derived from the VCO output which is routed to U2 via divide-by-128/129 modulus U7. The two frequencies are applied to two internal phase detectors in U2 which output error signals if any difference is seen between the two frequencies. One of the phase detectors has a differential error output (0R,0V) which drives a narrow loop filter consisting of U3 and associated components. The other phase detector has a single ended error output (PD) which drives a wide loop filter consisting of U4, U5, and associated components. The wide and narrow loop filters are enabled and disabled by electronic switch U6 which is controlled by the logic level input at P1 pin 9 (FAST*/SLOW) routed from the Synthesizer Interface Assembly. When Manual mode is selected, a logic level high is present at pin 9 (SLOW) which sets U6 to enable the narrow loop filter and disable the wide loop filter. When Step or Scan mode is selected, a logic level low is present at pin 9 (FAST*) which sets U6 to disable the narrow loop filter and enable the wide loop filter. The error signal output of the selected loop filter is then used to steer the VCO to the proper frequency.

*Indicates Active Logic Low

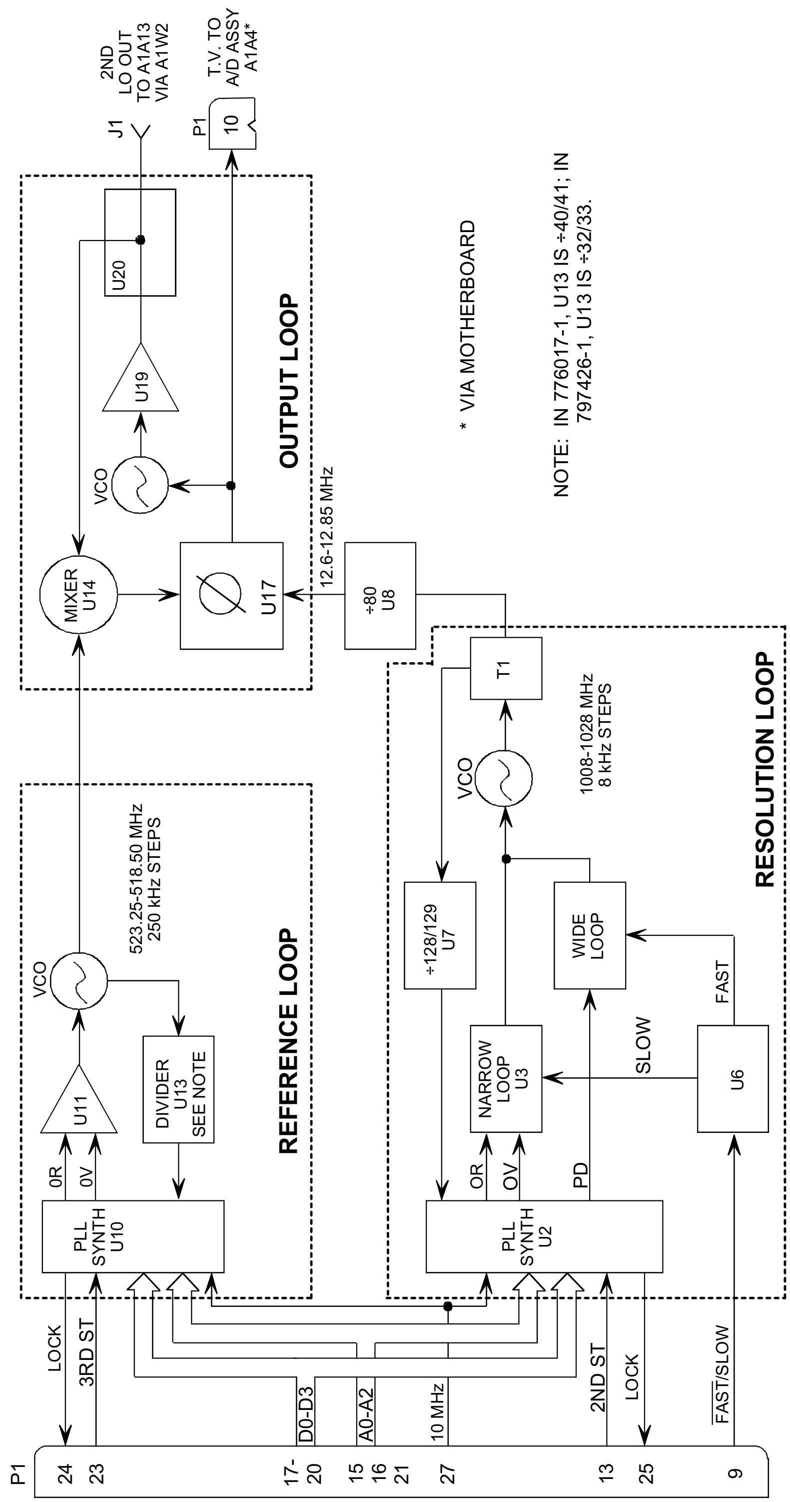

Figure 3-8. 2nd LO Synthesizer Assembly (A1A6) Block Diagram

Table 3-9. 2nd LO Synthesizer Assembly (A1A6) Inputs and Outputs

Description	A1A6 Port	Source/Destination	Via Motherboard
2nd LO OUT	J1	To Preamplifier/ Converter Assembly (A1A13)	A1W2
FAST/SLOW (FAST Active Low)	P1, Pin 9	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 32, and XA6 Pin 9
2nd LO T.V.	P1, Pin 10	To A/D Assembly (A1A4)	XA6 Pin 10, and XA4A Pin 6
10 MHz REF	P1, Pin 27	From Reference Generator Assembly (A1A8)	XA8B Pin 13, and XA6 Pin 27
2nd LOCK (Resolution Loop)	P1, Pin 25	To A/D Assembly (A1A4)	XA6 Pin 25, CR2, and XA4B Pin 33
2nd LOCK (Reference Loop)	P1, Pin 24	To A/D Assembly (A1A4)	XA6 Pin 24, CR1, and XA4B Pin 33
2nd ST (Resolution Loop)	P1, Pin 13	From A/D Assembly (A1A4)	XA4A Pin 18, and XA6 Pin 13
3rd ST (Reference Loop)	P1, Pin 23	From A/D Assembly (A1A4)	XA4A Pin 20, and XA6 Pin 23
D0	P1, Pin 17	From Synthesizer Interface Assembly (A1A5)	XA5A Pin 25, and XA6 Pin 17
D1	P1, Pin 18	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 26, and XA6 Pin 18
D2	P1, Pin 19	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 27, and XA6 Pin 17
D3	P1, Pin 20	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 28, and XA6 Pin 20
A0	P1, Pin 15	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 29, and XA6 Pin 15
A1	P1, Pin 16	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 30, and XA6 Pin 16
A2	P1, Pin 21	From Synthesizer Interface Assembly (A1A5)	XA5B Pin 31, and XA6 Pin 21

Table 3-9. 2nd LO Synthesizer Assembly (A1A6) Inputs and Outputs (Continued)

Description	A1A6 Port	Source/Destination	Via Motherboard
+15 V	P1, Pin 5 and Pin 33	From Power Supply (PS1)	J2 Pin 2, and XA6 Pin 5 and Pin 33
-15 V	P1, Pin 7	From Power Supply (PS1)	J2 Pin 5, and XA6 Pin 7
+5 V	P1, Pin 3 and Pin 31	From Power Supply (PS1)	J2 Pin 4, and XA6 Pin 3 and Pin 31

When the two frequencies within U2 are identical, the Resolution Loop is locked. U2 responds by outputting a logic level high lock detect signal at P1 pin 25 (LOCK). When this lock detect line and the Reference Loop Lock detect signal at P1 Pin 24 are both high, A1CR1 and A1CR2 do not pull down the voltage across A1R1; therefore, a logic high is routed to the Analog/Digital Assembly (A1A4). If either lock detect line is low, then a logic low is seen by A1A4. The locked output of the VCO is then divided by 80, by U8. The output of the Resolution Loop, 12.6 to 12.85 MHz is then routed to the input of a phase detector (U17) in the Output Loop.

The Reference Loop contains a VCO that tunes from 523.25 MHz to 518.50 MHz. A PLL synthesizer (U10) is used in this loop that operates the same as the PLL synthesizer (U2) previously discussed in the Resolution Loop. The same data and address lines (D0-D3, A0-A2) used by the Resolution Loop synthesizer are used by U10. However, a separate strobe signal is used which is input at P1 pin 23 (3RD ST). The lock detect signal is output at P1 pin 24 (LOCK). One phase detector is used within U10 which outputs the differential error signals (0R,0V). Operational amplifier U11 sums the error signals, producing the error voltage used to steer the VCO to the proper frequency. The output of the VCO is split, with one path routed to modulus divider (U13) which produces the signals used to drive U10. In Type 776017-1 Assemblies, U13 is a divide-by-40/41 device. In Type 797426-1 Assemblies, U13 is a divide-by-32/33 device. The other VCO output signal is routed to a mixer (U14) in the Output Loop.

The Output Loop translates the sum of the Reference Loop frequency and the Resolution Frequency up to the desired output frequency of 536.1000 MHz to 531.1001 MHz. The Output Loop VCO drives buffer amplifier U19 and power splitter U20. One output of U20 is routed to connector J1 (LO OUT). This is the 2nd LO output frequency which is routed to the Preamplifier/Converter Assembly (A1A13). The other output of U20 is a sample of the VCO output which is amplified and applied to a mixer (U14). The second input to U14 is the Reference Loop frequency. When the loop is locked, the output frequency of U14 is the same as the Resolution Loop frequency. The output of U14 is input to a phase detector (U17). The second input to U17 is the Resolution Loop frequency. When the frequencies are different, U17 outputs an error voltage which is used to steer the VCO to the proper frequency. The error voltage is also applied to P1 pin 10 (T.V.) where it is then routed to the Analog/Digital Assembly (A1A4).

3.3.10 TYPE 796495-12 MICROPROCESSOR ASSEMBLY (A1A3)

The Microprocessor Assembly contains the software operating program stored in EPROM, temporary parameter storage in RAM, and the microprocessor (U5). These devices are used to control the receiver operation. An internal clock frequency of 2 MHz controls timing functions and determines the rate at which instructions are performed. See **Figure FO-9** for the schematic diagram of A1A3. Refer to **Figure 3-9** for a block diagram of A1A3, and **Table 3-10** for a summary of A1A3 input and output signals.

Upon power-up of the receiver, +5 Vdc is applied at P2 pins 49 and 50. A power detect circuit monitors the +5 V supply line and provides a time delay, keeping the microprocessor turned off until the +5 V supply stabilizes. At power-up, microprocessor operation does not begin until the supply voltage at pins 49 and 50 are at least +4.8 Vdc. At power-down, the microprocessor halts operation when the dc level is +4.7 Vdc or less. When the supply line falls below +4.7 V, the P FAIL line (power fail) at P2 pin 5 goes low. A low on this line causes the microprocessor to be held at a known quiescent state, keeping it from responding to any address or data information on the buses. When this line returns high, the microprocessor resumes operation.

This assembly also contains a primary lithium cell battery, which supplies power to internal RAM when power is interrupted. When the supply voltage applied to the power detect circuit falls below +4.7 Vdc, the battery back-up circuit is enabled which then provides +2.8 Vdc to RAM. This allows the information stored in RAM to be saved, allowing the receiver operating parameters to be maintained when power has been turned off.

The microprocessor communicates with other receiver circuits by the use of address and data buses. A 16-bit unidirectional address bus from the microprocessor is applied to P2 via address decoders and address buffers. The information on the address bus allows for selection of a device to be activated for control. When address line is not in use it remains constantly high. An 8-bit bidirectional data bus transfers data between the addressed device and the microprocessor via a data transceiver. The data bus lines also remain constantly high when not in use. The read/write lines at P2 instruct the addressed device to transmit or accept data. A sample of the 2 MHz microprocessor clock, output at P2 pin 4 (Enable), as well as an inverted sample of this clock output at P2 pin 6 (Enable*) are used to synchronize the rate of data transfers between the microprocessor and an addressed device. The FIRQ (Fast Interrupt Request) and IRQ (Interrupt Request) lines input at P1 provide an interrupt to the microprocessor main routine. These two lines are held high, unless pulled low by an interrupt request. The IOM1*, IOM2*, and IOM3* control outputs of the Microprocessor Assembly are enable signals that assist in the management of data traffic via the IEEE-488/Interrupt Assembly (A1A2), the Synthesizer Interface Assembly (A1A5), and the Analog/Digital Assembly (A1A4), respectively.

* Indicates Active Logic Low

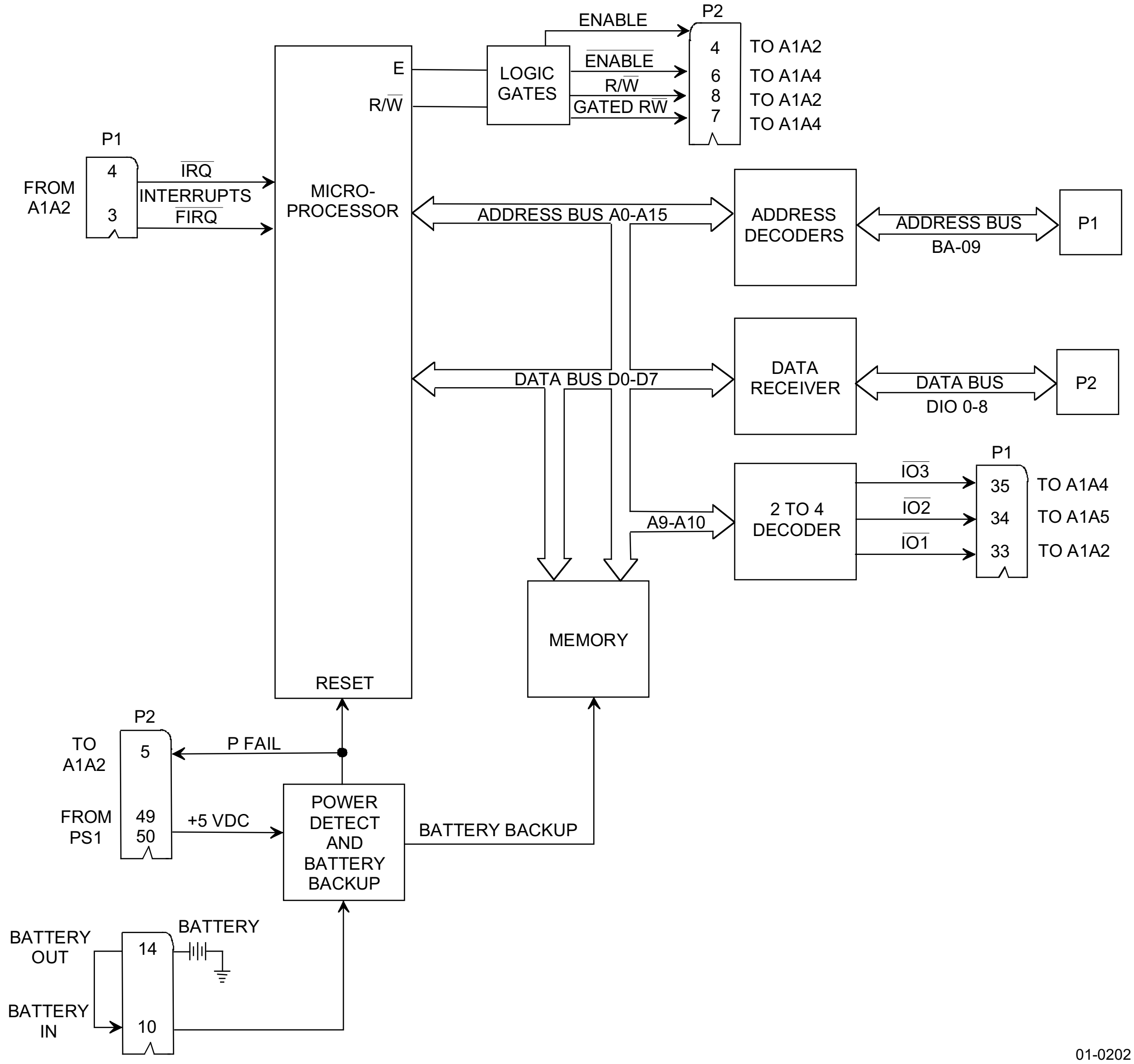

Figure 3-9. Microprocessor Assembly (A1A3) Block Diagram

Table 3-10. Microprocessor Assembly (A1A3) Inputs and Outputs

Description	A1A3 Port	Source/Destination	Via Motherboard
IRQ (Active Low)	A1A3 Port P1, Pin 4	From IEEE-488/Interrupt Assembly (A1A2)	XA2A Pin 4, and XA3A Pin 4
FIRQ (Active Low)	P1, Pin 3	From IEEE-488/Interrupt Assembly (A1A2)	XA2A Pin 3, and XA3A Pin 3
P FAIL (Active Low)	P2, Pin 5	To IEEE-488/Interrupt Assembly (A1A2)	XA3B Pin 5, and XA2B Pin 5
ENABLE	P2, Pin 4	To IEEE-488/Interrupt Assembly (A1A2), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XA3B Pin 4, and XA2B Pin 4. XA3B Pin 4, XA4B Pin 4, and XA5B Pin 4.
ENABLE (Active Low)	P2, Pin 6	To A/D Assembly (A1A4)	XA3B Pin 6, and XA4B Pin 6
READ/WRITE (WRITE Active Low)	P2, Pin 8	To IEEE-488/Interrupt Assembly (A1A2), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XA3B Pin 8, and XA2B Pin 8. XA3B Pin 8, and XA4B Pin 8, and XA5B Pin 8.
G READ/WRITE (WRITE Active Low)	P2, Pin 7	To A/D Assembly (A1A4)	XA3B Pin 7, and XA4B Pin 7
BA0	P1, Pin 9	To Front Panel Display Assembly (A1A1), IEEE-488/Interrupt Assembly (A1A2), and A/D Assembly (A1A4)	XA3A Pin 9, and XA4A Pin 9. XA3A Pin 9, and XA2A Pin 9, and J10 Pin 16.
BA1	P1, Pin 11	To A/D Assembly (A1A4), IEEE-488/Interrupt Assembly (A1A2), and Front Panel Display Assembly (A1A1)	XA3A Pin 11, and XA4A Pin 11. XA3A Pin 11, and XA2A Pin 11, and J10 pin 8.
BA2	P1, Pin 13	To A/D Assembly (A1A4), IEEE-488/Interrupt Assembly (A1A2), and Front Panel Display Assembly (A1A1)	XA3A Pin 13, and XA4A Pin 13. XA3A Pin 13, and XA2A Pin 13, and J10 Pin 17.
BA3	P1, Pin 15	To A/D Assembly (A1A4), IEEE-488/Interrupt Assembly (A1A2), and Front Panel Display Assembly (A1A1)	XA3A Pin 15, and XA4A Pin 15. XA3A Pin 15 and XA2A Pin 15, and J10 Pin 7.

Table 3-10. Microprocessor Assembly (A1A3) Inputs and Outputs (Continued)

Description	A1A3 Port	Source/Destination	Via Motherboard
BA4	P1, Pin 17	To IEEE-488/Interrupt Assembly (A1A2) and Front Panel Display Assembly (A1A1)	XA3A Pin 17, and XA2A Pin 17, and J10 Pin 12
BA5	P1, Pin 19	To IEEE-488/Interrupt Assembly (A1A2)	XA3 Pin 19, and XA2A Pin 19
BA6	P1, Pin 21	To IEEE-488 Interrupt Assembly (A1A2), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XA3A Pin 21, and XA2A Pin 21. XA3A Pin 21, and XA4A Pin 21, and XA5A Pin 21.
BA7	P1, Pin 23	To IEEE-488 Interrupt Assembly (A1A2), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XA3A Pin 23, and XA2A Pin 23. XA3A Pin 23, and XA4A Pin 23, and XA5A Pin 23.
BA8	P1, Pin 25	To IEEE-488 Interrupt Assembly (A1A2), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XA3A Pin 25, and XA2A Pin 25. XA3A Pin 25, and XA4A Pin 25, and XA5A Pin 25.
BA9	P1, Pin 27	To IEEE-488/Interrupt Assembly (A1A2)	XA3A Pin 27, and XA2A Pin 27
DIO 0	P2, Pin 9	To/From IEEE-488/ Interrupt Assembly (A1A2), Front Panel Display Assembly (A1A1), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XAB Pin 9, XA2B Pin 9, and J10 Pin 20. XA3B Pin 9, XA4B Pin 9, and XA5B Pin 9.
DIO 1	P2, Pin 11	To/From IEEE-488/ Interrupt Assembly (A1A2), Front Panel Display Assembly (A1A1), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	X3B Pin 11, XA2B Pin 11, and J10 Pin 3. XA3B Pin 11, XB4B Pin 11, and XA5B Pin 11.
DIO 2	P2, Pin 13	To/From IEEE-488/ Interrupt Assembly (A1A2), Front Panel Display Assembly (A1A1), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XA3B Pin 13, XA2B Pin 13, and J10 Pin 2. XA3B Pin 13, XA4B Pin 13, and XA5B Pin 13.

Table 3-10. Microprocessor Assembly (A1A3) Inputs and Outputs (Continued)

Description	A1A3 Port	Source/Destination	Via Motherboard
DIO 3	P2, Pin 15	To/From IEEE-488/ Interrupt Assembly (A1A2), Front Panel Display Assembly (A1A1), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XA3B Pin 15, XA2B Pin 15, and J10 Pin 22. XA3B Pin 15, XA4B Pin 15, and XA5B Pin 15.
DIO 4	P2, Pin 17	To/From IEEE-488/ Interrupt Assembly (A1A2), Front Panel Display Assembly (A1A1), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XA3B Pin 17, XA2B Pin 17, and J10 Pin 23. XA3B Pin 17, XA4B Pin 17, and XA5B Pin 17.
DIO 5	P2, Pin 19	To/From IEEE-488/ Interrupt Assembly (A1A2), Front Panel Display Assembly (A1A1), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XA3B Pin 19, XA2B Pin 19, and J10 Pin 15. XA3B Pin 19, XA4B Pin 15, and XA5B Pin 19.
DIO 6	P2, Pin 21	To/From IEEE-488/ Interrupt Assembly (A1A2), Front Panel Display Assembly (A1A1), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XA3B Pin 21, XA2B Pin 21, and J10 Pin 10. XA3B Pin 21, XA4B Pin 21, and XA5B Pin 21.
DIO 7	P2, Pin 23	To/From IEEE-488/ Interrupt Assembly (A1A2), Front Panel Display Assembly (A1A1), A/D Assembly (A1A4), and Synthesizer Interface Assembly (A1A5)	XA3B Pin 23, XA2B Pin 23, and J10 Pin 9. XA3B Pin 23, XA4B Pin 23, and XA5B Pin 23.
I/O 1 (Active Low)	P1, Pin 33	To IEEE-488/Interrupt Assembly (A1A2)	XA3A Pin 33, and XA2A Pin 20
I/O 2 (Active Low)	P1, Pin 34	To Synthesizer Interface Assembly (A1A5)	X3A Pin 34, and XA5A Pin 34
I/O 3 (Active Low)	P1, Pin 35	To A/D Assembly (A1A4)	XA3A Pin 35, and XA4A Pin 35
BATTERY OUT	P2, Pin 14	To Microprocessor Assembly (A1A3)	XA3B Pin 14, and XA3B Pin 10

Table 3-10. Microprocessor Assembly (A1A3) Inputs and Outputs (Continued)

Description	A1A3 Port	Source/Destination	Via Motherboard
BATTERY IN	P2, Pin 10	From Microprocessor Assembly (A1A3)	XA3B Pin 10, and XA3B Pin 14
+5 V	P2, Pin 49 and 50	From Power Supply (PS1)	J12 Pins 1 and 3, and XA3B Pins 49 and 50
Q	P1, Pin 6	Not Used	
READ/WRITE (READ Active Low)	P2, Pin 3	Not Used	
BA10	P1, Pin 29	Not Used	
BA11	P1, Pin 31	Not Used	
BA12	P1, Pin 20	Not Used	
BA13	P1, Pin 18	Not Used	
BA14	P1, Pin 16	Not Used	
BA15	P1, Pin 14	Not Used	
I/O 4 (Active Low)	P1, Pin 36	Not Used	
SP ADDR DEC 1-1 (Active Low)	P1, Pin 26	Not Used	
SP ADDR DEC 1-2 (Active Low)	P1, Pin 28	Not Used	
SP ADDR DEC 1-3 (Active Low)	P1, Pin 30	Not Used	
SP ADDR DEC 1-4 (Active Low)	P1, Pin 32	Not Used	
SP ADDR DEC 2 (Active Low)	P1, Pin 22	Not Used	
SP ADDR DEC 3 (Active Low)	P1, Pin 24	Not Used	

3.3.11 TYPE 796772-1 ANALOG/DIGITAL ASSEMBLY (A1A4)

The Analog/Digital Assembly is the primary interface between the Microprocessor Assembly and receiver analog circuits. Onboard digital-to-analog and analog-to-digital converters are used to perform this function. Refer to **Figure FO-10** for the A1A4 schematic diagram. See **Figure 3-10** for the A1A4 block diagram, and **Table 3-11** for a summary of A1A4 inputs and outputs.

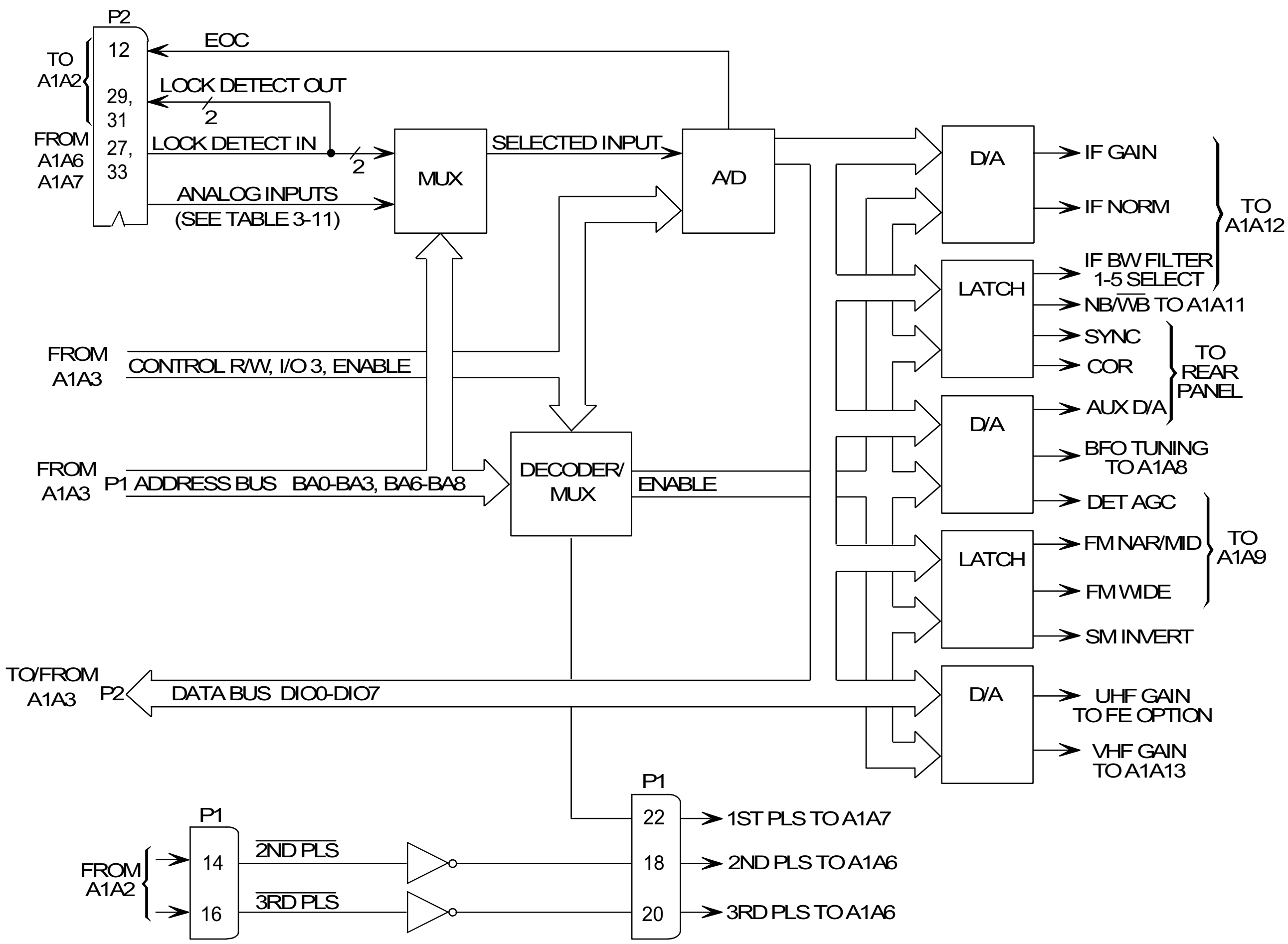

Figure 3-10. Analog/Digital Assembly (A1A4) Block Diagram

Table 3-11. Analog/Digital Assembly (A1A4) Inputs and Outputs

Description	A1A4 Port	Source/Destination	Via Motherboard
EOC	P2, Pin 12	To IEEE-488/Interrupt Assembly (A1A2)	XA2B Pin 12, and XA4B Pin 12
FP LSB	P2, Pin 47	From Audio/Video Assembly (A1A10)	XA10B Pin 2, and XA4B Pin 47
FP USB	P2, Pin 46	From Audio/Video Assembly (A1A10)	XA10B Pin 3, and XA4B Pin 46
AD IN	P2, Pin 45	From Rear Panel AUX Connector (J13)	A1J13 Pin 8, and XA4B Pin 45
LOG VIDEO	P2, Pin 44	From AM/FM Demodulator Assembly (A1A2)	XA9C Pin 3, and XA4B Pin 44
FM DC	P2, Pin 43	From Audio/Video Assembly (A1A10)	XA10B Pin 30, and XA4B Pin 43
FM AC	P2, Pin 42	From Audio/Video Assembly (A1A10)	XA10B Pin 32, and XA4B Pin 42
AM DC	P2, Pin 41	From Audio/Video Assembly (A1A10)	XA10A Pin 21, and XA4B Pin 41
AM AC	P2, Pin 40	From Audio/Video Assembly (A1A10)	XA10B Pin 34, and XA4B Pin 40
AM PK	P2, Pin 39	From Audio/Video Assembly (A1A10)	XA10B Pin 27, and XA4B Pin 39
1ST LCK	P2, Pin 27	From 1st LO Synthesizer Assembly (A1A7)	XA7 Pin 13, and XA4B Pin 27
LCK 1 (Active Low)	P2, Pin 29	To IEEE-488/Interrupt Assembly (A1A2)	XA2B Pin 29, and XA4B Pin 29
2ND LCK	P2, Pin 33	From 2nd LO Synthesizer Assembly (A1A6)	XA6 Pin 24/25, and XA4B Pin 33
LCK 2 (Active Low)	P2, Pin 31	To IEEE-488/Interrupt Assembly (A1A2)	XA2B Pin 31, and XA4B Pin 31
2ND TV IN	P1, Pin 6	From 2nd LO Synthesizer Assembly (A1A6)	XA6 Pin 10, and XA4A Pin 6
BW CODE	P1, Pin 4	From Audio/Video Assembly (A1A10)	XA10A Pin 1, and XA4A Pin 4
BA0	P1, Pin 9	From Microprocessor Assembly (A1A3)	XA3A Pin 9, and XA4A Pin 9
BA1	P1, Pin 11	From Microprocessor Assembly (A1A3)	XA3A Pin 11, and XA4A Pin 11

Table 3-11. Analog/Digital Assembly (A1A4) Inputs and Outputs (Continued)

Description	A1A4 Port	Source/Destination	Via Motherboard
BA2	P1, Pin 13	From Microprocessor Assembly (A1A3)	XA3A Pin 13, and XA4A Pin 13
BA3	P1, Pin 15	From Microprocessor Assembly (A1A3)	XA3A Pin 15, and XA4A Pin 15
BA6	P1, Pin 21	From Microprocessor Assembly (A1A3)	XA3A Pin 21, and XA4A Pin 21
BA7	P1, Pin 23	From Microprocessor Assembly (A1A3)	XA3A Pin 23, and XA4A Pin 23
BA8	P1, Pin 25	From Microprocessor Assembly (A1A3)	XA3A Pin 25, and XA4A Pin 25
I/O 3 (Active Low)	P1, Pin 35	From Microprocessor Assembly (A1A3)	XA3A Pin 35, and XA4A Pin 35
READ/WRITE (WRITE Active Low)	P2, Pin 8	From Microprocessor Assembly (A1A3)	XA3B Pin 8, and XA4B Pin 8
ENABLE	P2, Pin 4	From Microprocessor Assembly (A1A3)	XA3B Pin 4, and XA4B Pin 4
DIO 7	P2, Pin 23	From Microprocessor Assembly (A1A3)	XA3B Pin 23, and XA4B Pin 23
DIO 6	P2, Pin 21	From Microprocessor Assembly (A1A3)	XA3B Pin 21, and XA4B Pin 21
DIO 5	P2, Pin 19	From Microprocessor Assembly (A1A3)	XA3B Pin 19, and XA4B Pin 19
DIO 4	P2, Pin 17	From Microprocessor Assembly (A1A3)	XA3B Pin 17, and XAB4 Pin 17
DIO 3	P2, Pin 15	From Microprocessor Assembly (A1A3)	XA3B Pin 15, and XA4B Pin 15
DIO 2	P2, Pin 13	From Microprocessor Assembly (A1A3)	XA3B Pin 13 , and XA4B Pin 13
DIO 1	P2, Pin 11	From Microprocessor Assembly (A1A3)	XA3B Pin 11, and XA4B Pin 11
DIO 0	P2, Pin 9	From Microprocessor Assembly (A1A3)	XA3B Pin 9, and XA4B Pin 9
FM NAR/MID (NAR Active Low)	P2, Pin 36	To AM/FM Demodulator (A1A9)	XA9C Pin 6, and XA4B Pin 36

Table 3-11. Analog/Digital Assembly (A1A4) Inputs and Outputs (Continued)

Description	A1A4 Port	Source/Destination	Via Motherboard
FM WIDE	P2, Pin 37	To AM/FM Demodulator (A1A9)	XA9C Pin 5, and XA4B Pin 37 13 Pin 5
COR EXT	P1, Pin 31	To Rear Panel COR connector (J3)	XA4A Pin 31, and J13 Pin 3
SYNC	P1, Pin 29	To Rear Panel AUX connector (J13) Pin 8	XA4A Pin 29, and J13 Pin 2
SM INV	P1, Pin 32	To Rear Panel AUX connector (J13) Pin 6	XA4A Pin 29, and J13 Pin 5
NB/WB (WB Active Low)	P1, Pin 27	To ISB/CW Demodulator (A1A11)	XA11A Pin 23, and XA4A Pin 27
BW 5	P1, Pin 12	To IF BW Filter (A1A12)	XA12 Pin 11, XA12B Pin 9, XA10A Pin 9, and XA4A Pin 12
BW4	P1, Pin 10	To IF BW Filter (A1A12)	XA12 Pin 9, XA12B Pin 8, XA10A Pin 8, and XA4A Pin 10
BW3	P1, Pin 8	To IF BW Filter (A1A12)	XA12A Pin 7, XA12B Pin 6, XA10A Pin 7, and XA4A Pin 8
BW2	P1, Pin 7	To IF BW Filter (A1A12)	XA12A Pin 5, XA12B Pin 4, XA10A Pin 6, and XA4A Pin 7
BW1	P1, Pin 5	To IF BW Filter (A1A12)	XA12A Pin 3, XA12B Pin 2, XA10A Pin 5, and XA4A Pin 5
IF AGC	P2, Pin 16	To IF BW Filter Assembly (A1A12)	XA12B Pin 3, and XA4B Pin 16
IF NORM	P2, Pin 14	To IF BW Filter Assembly (A1A12)	XA12B Pin 1, and XA4B Pin 14
AUX D/A	P2, Pin 25	To Rear Panel AUX connector (J13) Pin 4	XA4B Pin 25, U1B, and J13 Pin 7

Table 3-11. Analog/Digital Assembly (A1A4) Inputs and Outputs (Continued)

Description	A1A4 Port	Source/Destination	Via Motherboard
BFO TV	P2, Pin 20	To Reference Generator Assembly (A1A8)	XA8A Pin 9, and XA4B Pin 20
DET AGC	P2, Pin 18	To AM/FM Demodulator Assembly (A1A9)	XA9B Pin 2, and XA4B Pin 18
UHF AGC	P2, Pin 24	To option Frequency Extender Assembly (A3)	XA4B Pin 24, and J1 Pin 3
VHF AGC	P2, Pin 22	To Preamplifier/Converter Assembly (A1A13)	XA13 Pin 5, and XA4B Pin 22
3RD PLS (Active Low)	P1, Pin 16	From IEEE-488/Interrupt Assembly (A1A2)	XA2A Pin 16, and XA4A Pin 16
3RD PLS	P1, Pin 20	To 2nd LO Synthesizer Assembly (A1A6)	XA4A Pin 20, and XA6 Pin 23
2ND PLS (Active Low)	P1, Pin 14	From IEEE-488/Interrupt Assembly (A1A2)	XA2A Pin 14, and XA4A Pin 14
2ND PLS	P1, Pin 18	To 2nd LO Synthesizer Assembly (A1A6)	XA4A Pin 18, and XA6 Pin 13
1ST PLS	P1, Pin 22	To 1st LO Synthesizer Assembly (A1A7)	XA4A Pin 22, and XA7 Pin 4
U3	P1, Pin 30	Not Used	
AD11	P2, Pin 48	Not Used	
SPR4	P2, Pin 28	Not Used	
SPR5	P2, Pin 30	Not Used	
SPR6	P2, Pin 32	Not Used	
SPR7	P2, Pin 34	Not Used	
SPR8	P2, Pin 35	Not Used	
+5 V	P2, Pins 49 and 50	From Power Supply (PS1)	J12 Pins 1 and 2, and XA4B Pin 49
+15 V	P1, Pin 2	From Power Supply (PS1)	J12 Pins 5 and 6, and XA4A Pin 2
-15 V	P1, Pin 1	From Power Supply (PS1)	J12 Pins 3 and 4, and XA4A Pin 1

Inputs on Address lines BA0 through BA3 and BA6 through BA8, from the Micro?processor Assembly, control the conversion processes. BA0 through BA3 determine which analog input to A1A4 is to be converted. These address lines control a multiplexer which selects the analog input and which then applies it to an analog-to-digital converter (A/D). The A/D converts the analog signal into digital form, when enabled, and outputs it onto the data bus. **Table 3-12** illustrates the status of these address lines to select the analog input.

Table 3-12. Selection of A1A4 Analog Input

Address				Selected Input
BA3	BA2	BA1	BA0	
0	0	0	0	BW Code, P1 pin 4
0	0	0	1	2nd LO T.V., P1 pin 6
0	0	1	0	AM Peak, P2 pin 39
0	0	1	1	AM AC, P2 pin 40
0	1	0	0	AM DC, P2 pin 41
0	1	0	1	FM AC, P2 pin 42
0	1	1	0	FM DC, P2 pin 43
0	1	1	1	LOG Video, P2 pin 44
1	0	0	0	ADIN, P2 pin 45
1	0	0	1	Front Panel USB, P2, pin 46
1	0	1	0	Front Panel LSB, P2, pin 47

Note: See **Table 3-11** for input sources.

The A/D begins converting when the Enable input at P2 pin 4 is high, the Read/ Write line at P2 pin 8 is low, the I/O 3 input at P1 pin 35 is low, and a write address of W0540 through W054F is applied on the address lines. When the A/D is finished converting, the EOC line at P2 pin 12 goes high. The microprocessor then reads the result at address 0400.

The BW Code input at P1 pin 4 is provided by the Audio/Video Assembly (A1A10). The current level at this input is a determining factor of which AlA10AX filter slot is enabled, and the IF normalization voltage applied to the IF Bandwidth Filter Assembly (A1A12). This analog voltage is converted to digital form and routed to the Microprocessor Assembly for interpretation. As a result, the microprocessor directs the Analog/Digital Assembly to set one of its five bandwidth select lines (P1, pins 5, 7, 8, 10 and 12) high. This signal is routed to the A1A12 Assembly.

The analog input at P1 pin 6 is the 2nd LO tuning voltage from 0 to +12 Vdc. The AM PEAK input at P2 pin 39 is the dc representation of the peak component from the AM demodulator circuits. This voltage is used for sideband and pulse AGC operations. The AM/AC input at P2 pin 40 is the dc representation of the AC component from the AM demodulator circuits. The AM/DC input at P2 pin 41 is the dc component seen on the AM demodulator. These are utilized for AM and FM AGC operations. P2, pin 43, FM/DC is used for AFC operation and for the front panel tuning meter. The LOG VIDEO input at P2 pin 44, is the dc component from the LOG detector. FP USB, P2 pin 46, is the upper channel audio which is also routed to the front panel phones jack. FP LSB, P2 pin 47, is the lower channel audio, also routed to the front panel phones jack.

Address lines BA6, BA7, and BA8 control a decoder/demultiplexer which enable a conversion or latch device as specified by the write address from the microprocessor. The following chart illustrates which conversion or latch device is selected by write addresses, the function performed, and the output of the function.

Write Address	Device Selected	Function Performed	Output Level
W0400	D/A	IF Norm Voltage	+0.4 - +12.4 V
W0401	D/A	IF Gain Control	0 - +13 V
W0440	D/A	Detector Gain Control	0 - +7.5 V
W0441	D/A	BFO Tuning Voltage	+1.1 - +7.2 V
W0480	D/A	VHF Gain Control	+2.6 - +12.6 V
W0481	D/A	UHF Gain Control	+2.6 - +12.6 V
W0500	Latch	BW Filter Select	0, +12 V
W0540	A/D	Start A/D Conv.	Data Bus
W0580	Latch	FM BW Filter Select	Logic Levels
W05C0	Inverter	1st LO Frequency	Positive-Going Pulse

The IF Norm voltage is output at P2 pin 14 and routed to the IF Bandwidth Filter Assembly (A1A12). The voltage output is dependent on the IF bandwidth filter selected. See **paragraph 3.3.3** for additional information on this control voltage. IF gain control voltage is output at P2 pin 16 and also routed to A1A12. This output automatically varies between 0 and +13 Vdc in response to a detected signal with a varying signal level when AGC is turned on. When manual gain control is used, the RF attenuation setting determines the level at this output.

The Detector Gain Control is output at P2 pin 18 and routed to the AM/FM Demodulator Assembly (A1A9) and the ISB/CW Demodulator Assembly (A1A11). The VHF Gain Control signal is output at P2 pin 22 and routed to the Preamplifier/Converter Assembly (A1A13). UHF Gain Control is output at P2 pin 24 and routed to the optional frequency extender. These gain control outputs are also determined by manual RF attenuation settings or AGC operation.

The BFO Tuning Voltage is output at P2 pin 20 and routed to the Reference Generator Assembly (A1A8). The voltage level at this output is a result of the BFO error signals sent to the Synthesizer Interface Assembly (A1A5) from A1A8 and any operator selected BFO offset values, while in CW or SSB detection modes.

When selecting an IF bandwidth filter while in FM mode, A1A4 provides logic level outputs at P2 pins 36 and 37. These logic levels are used to select the appropriate FM demodulator (wide, mid, narrow) in the AM/FM Demodulator Assembly (A1A9) according to the selected IF bandwidth. The following chart shows the status of these outputs for the range of IF bandwidth filters.

Selected IF BW	P2 Pin 36 Output	P2 Pin 37 Output
<50 kHz	+5 Vdc	+5 Vdc
75-500 kHz	0 V	+5 Vdc
>500 kHz	0 V	0 V

3.3.12 TYPE 796627-2 IEEE-488/INTERRUPT ASSEMBLY (A1A2)

See **Figure FO-7** for the A1A2 schematic diagram. See **Figure 3-11** for a block diagram of A1A2, and **Table 3-13** for a summary of A1A2 inputs and outputs.

The A1A2 assembly allows the receiver to interface with compatible devices connected to the IEEE-488 Interface Bus. Data to and from an external device is applied through the rear panel IEEE-488 connector (J11) via cable W1 and A1A2J1. See **paragraph 2.8**, Remote Control, for detailed information on the IEEE-488 interface signals. Switch A1A2S1 is used to configure receiver options and the IEEE-488 address Switch A1A2S2 is also used to configure receiver options. Closing a switch position causes a logic low to be seen. See **paragraph 2.3** for further details.

A1A2 contains a General Purpose Interface Adapter (GPIA) which processes the exchange of data on the IEEE-488 interface bus. The Read/Write* signal input at P2 pin 8 determines whether the GPIA receives data from or transmits data onto the interface bus. When a logic level low (Write) is on pin 8, data is written onto the interface bus. When high (Read), information on the interface bus is read by the GPIA. When addressed by the address bus inputs at P1 (and enabled by the E input at P2 pin 4, and the IOM1* input at P1 pin 20, the GPIA loads data onto, or reads data from the microprocessor data bus at P2 (DIO 0 - DIO 7).

A second major function of this assembly is to monitor the status of other assemblies in the receiver and to transmit interrupts to the Microprocessor Assembly when changes in status occur. The Read/Write*, Enable, and IOM1* signals are also instrumental in this role. The microprocessor is interrupted when the IRQ output at P1 pin 4 goes low (as a result of a power failure (PFAIL* low) or when the FIRQ* output at P1 pin 3 goes low as a result of an interrupt. For example, when a front panel key is pressed the KEY AV input at P2 pin 10 goes high. This causes an FIRQ* interrupt to be generated to the microprocessor which ultimately enables it to read front panel key data. The R KEY* output at P1 pin 18 is at a logic low when the microprocessor is ready to read the data. A logic low at P1 pin 22 (WFP*) enables the circuits in the Front Panel Display Assembly (A1A1) to accept and display data.

* Indicates Active Logic Low

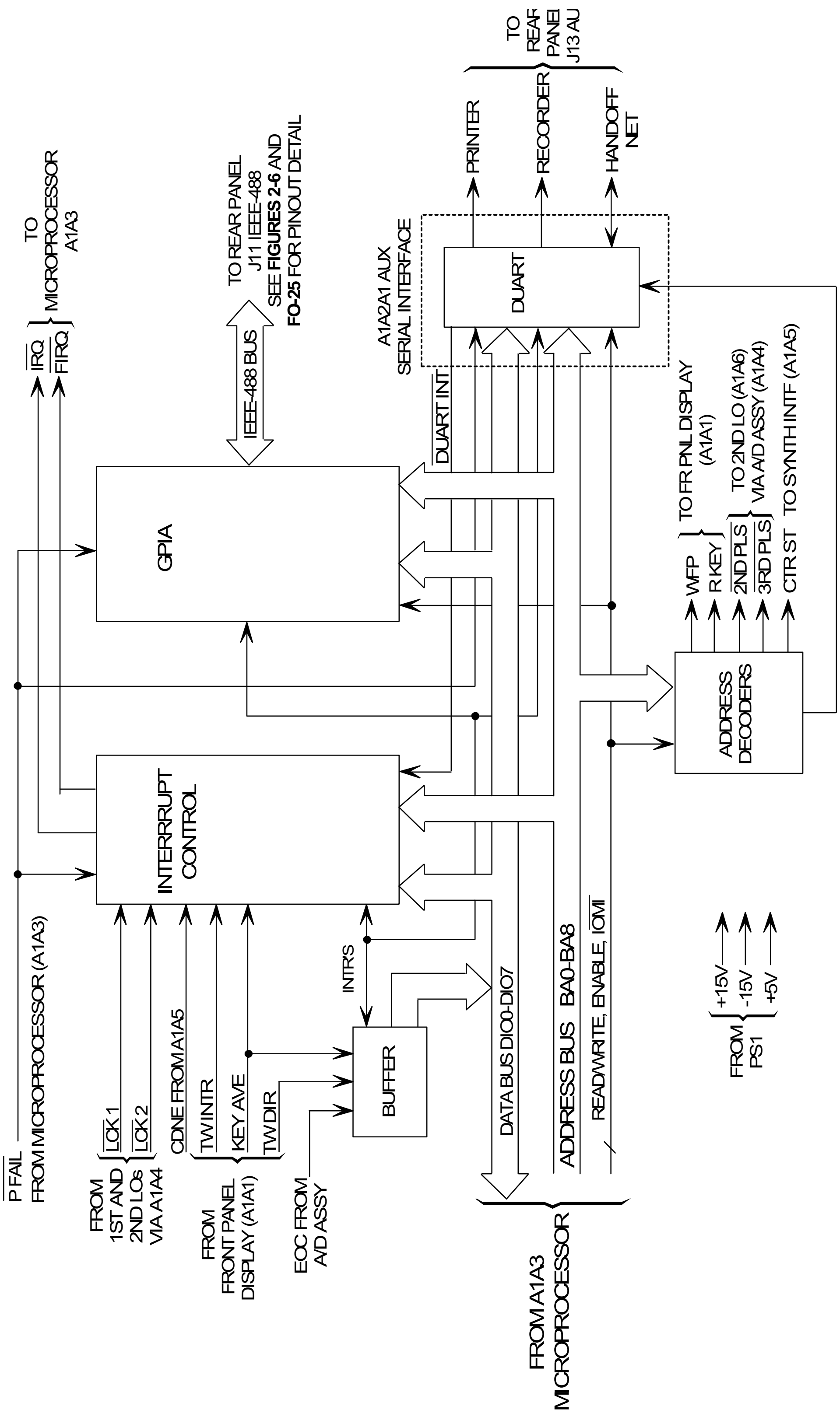

Figure 3-11. IEEE-488/Interrupt Assembly (A1A2) Block Diagram

Table 3-13. IEEE-488/Interrupt Assembly (A1A2) Inputs and Outputs

Description	A1A2 Port	Source/Destination	Via Motherboard
LCK 1 (Active Low)	P2, Pin 29	From 1st LO Synthesizer Assembly (A1A7) via A/D Assembly (A1A4)	XA4B Pin 29, and XA2B Pin 29
LCK 2 (Active Low)	P2, Pin 31	From 2nd LO Synthesizer Assembly (A1A6) via A/D Assembly (A1A4)	XA4B Pin 31, and XA2B Pin 31
EOC	P2, Pin 12	From A/D Assembly (A1A4)	XA4B Pin 12, and XA2B Pin 12
KEY AV	P2, Pin 10	From Front Panel Display Assembly (A1A1)	J10 Pin 21, and XA2B Pin 10
TW DIR	P1, Pin 31	From Front Panel Display Assembly (A1A1)	J10 Pin 13, and XA2A Pin 31
TW INTR	P1, Pin 5	From Front Panel Display Assembly (A1A1)	J10 Pin 6, and XA2A Pin 5
WFP (Active Low)	P1, Pin 22	To Front Panel Display Assembly (A1A1)	XA4A Pin 22, and J10 Pin 18
R KEY (Active Low)	P1, Pin 18	To Front Panel Display Assembly (A1A1)	XA2A Pin 18, and J10 Pin 4
CTR ST (Active Low)	P1, Pin 12	To Synthesizer Interface Assembly (A1A5)	XA2A Pin 12, and XA5A Pin 12
CDNE	P1, Pin 29	From Synthesizer Interface Assembly (A1A5)	XA5A Pin 29, and XA2A Pin 29
2ND PLS (Active Low)	P1, Pin 14	To 2nd LO Synthesizer Assembly (A1A6) resolution loop via A/D Assembly (A1A4)	XA2A Pin 14, and XA4A Pin 14
3RD PLS (Active Low)	P1, Pin 16	To 2nd LO Synthesizer Assembly (A1A6) reference loop via A/D Assembly (A1A4)	XA2A Pin 16, and XA4A Pin 16
FIRQ (Active Low)	P1, Pin 3	To Microprocessor Assembly (A1A3)	XA2A Pin 3, and XA3A Pin 3
IRQ (Active Low)	P1, Pin 4	To Microprocessor Assembly (A1A3)	XA2A Pin 4, and XA3A Pin 4

Table 3-13. IEEE-488/Interrupt Assembly (A1A2) Inputs and Outputs (Continued)

Description	A1A2 Port	Source/Destination	Via Motherboard
PFAIL (Active Low)	P2, Pin 5	From Microprocessor Assembly (A1A3)	XA3A Pin 5, and XA2A Pin 5
ENABLE	P2, Pin 4	From Microprocessor Assembly (A1A3)	XA3A Pin 4, and XA2A Pin 4
READ/WRITE (WRITE Active Low)	P2, Pin 8	From Microprocessor Assembly (A1A3)	XA3B Pin 8, and XA2B Pin 8
I/O 1 (Active Low)	P1, Pin 20	From Microprocessor Assembly (A1A3)	XA3A Pin 33, and XA2A Pin 20
BAO	P1, Pin 9	From Microprocessor Assembly (A1A3)	XA3A Pin 9, and XA2A Pin 9
BA1	P1, Pin 11	From Microprocessor Assembly (A1A3)	XA3A Pin 11, and XA2A Pin 11
BA2	P1, Pin 13	From Microprocessor Assembly (A1A3)	XA3A Pin 13, and XA2A Pin 13
BA5	P1, Pin 19	From Microprocessor Assembly (A1A3)	XA3A Pin 19, and XA2A Pin 19
BA6	P1, Pin 21	From Microprocessor Assembly (A1A3)	XA3A Pin 21, and XA2A Pin 21
BA7	P1, Pin 23	From Microprocessor Assembly (A1A3)	XA3A Pin 23, and XA2A Pin 23
BA8	P1, Pin 25	From Microprocessor Assembly (A1A3)	XA3A Pin 25, and XA2A Pin 25
DIO 0	P2, Pin 9	To/From Microprocessor Assembly (A1A3)	XA2B Pin 9, and XA3B Pin 9
DIO 1	P2, Pin 11	To/From Microprocessor Assembly (A1A3)	XA2B Pin 11, and XA3B Pin 11
DIO 2	P2, Pin 13	To/From Microprocessor Assembly (A1A3)	XA2B Pin 13, and XA3B Pin 13
DIO 3	P2, Pin 15	To/From Microprocessor Assembly (A1A3)	XA2B Pin 15, and XA3B Pin 15
DIO 4	P2, Pin 17	To/From Microprocessor Assembly (A1A3)	XA2B, Pin 17, and XA3B Pin 17
DIO 5	P2, Pin 19	To/From Microprocessor Assembly (A1A3)	XA2B Pin 19, and XA3B Pin 19

Table 3-13. IEEE-488/Interrupt Assembly (A1A2) Inputs and Outputs (Continued)

Description	A1A2 Port	Source/Destination	Via Motherboard
DIO 6	P2, Pin 21	To/From Microprocessor Assembly (A1A3)	XA2B Pin 21, and XA3B Pin 21
DIO 7	P2, Pin 23	To/From Microprocessor Assembly (A1A3)	XA2B Pin 23, and XA3B Pin 23
TW1	P2, in 37	Not Used	
+15 V	P1, Pin 2	From Power Supply (PS1)	J12 Pins 3 and 4, and XA2A Pin 1
-15 V	P1, Pin 1	From Power Supply (PS1)	J12 Pins 5 and 6, and XA2A Pin 2
+5 V	P2, Pins 49 and 50	From Power Supply (PS1)	J12 Pins 1 and 2, C96, and XA2A Pins 49 and 50
SPR IN 3	P2, Pin 41	Not Used	
SPR IN 2	P2, Pin 39	Not Used	
SPRINTR (Active Low)	P2, Pin 16	Not Used	
Bus INTR	P1, Pin 24	Not Used	

The TW INTR input at P1 pin 5 receives a logic low pulse when the front panel tuning wheel is rotated. This causes the tuning wheel direction data to be read. A logic high at P1 pin 31 (TW DIR) indicates counterclockwise rotation of the tuning wheel. A logic low indicates clockwise rotation.

A logic level high at P1 pin 29 (CDNE) indicates that the BFO counter in the Synthesizer Interface Assembly (A1A5) is finished counting. A logic level low at P1 pin 12 (CTRST) enables this counter to start counting. A logic level high at P2 pin 12 (EOC) is an indication that the A/D converter in the Analog/Digital Assembly (A1A4) is finished converting. The P FAIL input at P2 pin 5, when at a logic level high, indicates that power to the microprocessor is stable. A low on this input resets the GPIA. Logic low signals at P1 pins 14 and 16 (2ND PLS and 3RD PLS) enable the synthesizer controllers in the 2nd LO Synthesizer Assembly (A1A6) to accept tuning data. Logic low signals at P2 pins 29 and 31, respectively indicate that the 1st and 2nd LO synthesizers are locked.

The address and data buses, power and control signals are routed to P3. This connector mates with the Auxiliary Serial Interface Assembly (A1A2A1) connector J2.

3.3.12.1 **Type 796631-2 Auxiliary Serial Interface Assembly (A1A2A1)**

See **Figure FO-8** for the schematic diagram of A1A2A1. This assembly is illustrated in block diagram form in **Figure 3-11**.

The Auxiliary Serial Interface Assembly contains a dual-port universal asynchronous receiver/transmitter (DUART) which allows for serial data communications between the receiver and peripheral equipment such as printers and tape recorders used for logging data.

A logic level low at the Read/Write input at J2 pin 19 and a low at pin 17 enables the microprocessor to write data to the DUART. The DUART transforms the parallel data to serial data. The port selected to output the serial data is determined by the write address applied on the address bus (A0-A2, A5) input at J2. One port is used to output serial data to a printer (J1 pin 1) and to a tape recorder (J1 pin 3). The other port is the serial interface used to output and receive data on the WJ-8615P Handoff Net (J1 pin 4).

Serial data from the Handoff Net is converted to parallel data by the DUART, causing DUART INTR (J2 pin 18) to go low. This interrupts the microprocessor, then applies a logic high to J2 pin 19 and a logic low at pin 17 to allow the DUART to output parallel data onto the data bus. The rate at which the serial data is transmitted and received is determined by the operator selected baud rate. J1 pins 1, 2, 3, and 4 are connected to the rear panel AUX connector (J13) pins 7, 1, 10, and 14, respectively. See **paragraph 2.4.12**.

3.3.13 **TYPE 796245-1 SYNTHESIZER INTERFACE ASSEMBLY (A1A5)**

See **Figure FO-11** for a schematic diagram of A1A5. **Figure 3-12** is a block diagram of A1A5. **Table 3-14** is a summary of A1A5 inputs and outputs.

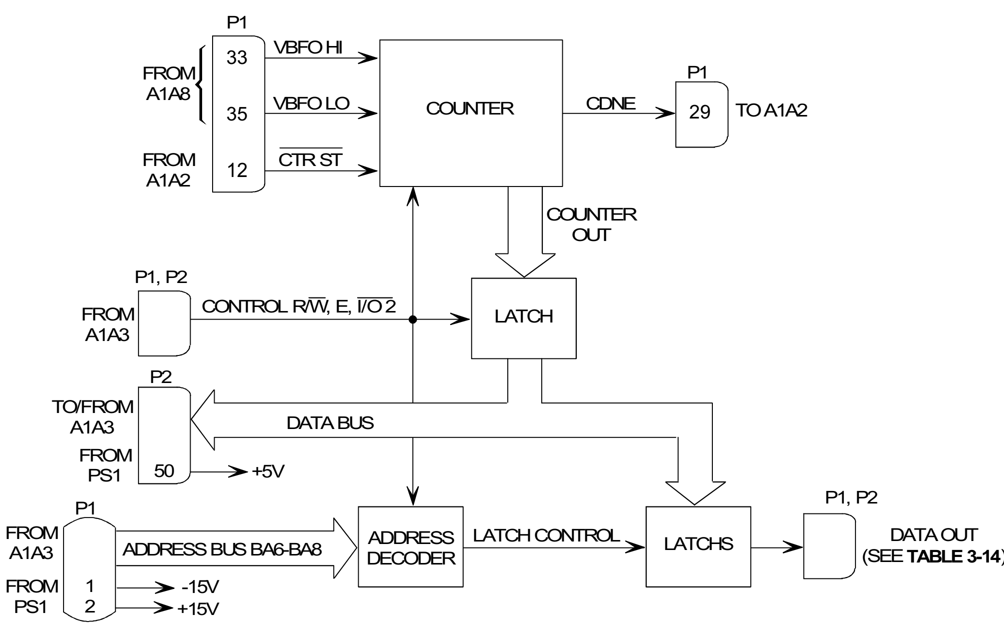

Figure 3-12. Synthesizer Interface Assembly (A1A5) Block Diagram

Table 3-14. Synthesizer Interface Assembly (A1A5) Inputs and Outputs

Description	A1A5 Port	Source/Destination	Via Motherboard
VBFO HI	P1, Pin 33	From Reference Generator Assembly (A1A8)	XA8A Pin 22, and XA5A Pin 33
VBFO LO	P1, Pin 35	From Reference Generator Assembly (A1A8)	XA8A Pin 24, and XA5A Pin 35
CTR ST (Active Low)	P1, Pin 12	From IEEE-488/Interrupt Assembly (A1A2)	XA2A Pin 12, and XA5A Pin 12
CDNE	P1, Pin 29	To IEEE-488/Interrupt Assembly (A1A2)	XA5A Pin 29, and XA2A Pin 29
FM/AM SELECT (FM Active Low)	P1, Pin 3	To Audio/Video Assembly (A1A10)	XA5A Pin 3, C61, and XA10A Pin 22
CW SELECT	P1, Pin 4	To Reference Generator Assembly (A1A8), and ISB/CW Demodulator Assembly (A1A11)	XA5A Pin 4, XA8A Pin 7, C42, XA11B Pin 18, and XA11A Pin 10
CW + SSB SELECT	P1, Pin 5	To Reference Generator Assembly (A1A8) and Audio/Video Assembly (A1A10)	XA5A Pin 5, XA8A Pin 21, C38, and XA10A Pin 18
USB/LSB SELECT (LSB Active Low)	P1, Pin 6	To Audio/Video Assembly (A1A10)	XA5A Pin 6, C60, and XA10A Pin 16
ISB SELECT	P1, Pin 7	To Audio/Video Assembly (A1A10)	XA5A Pin 7, C59, and XA10A Pin 19
SQUELCH	P1, Pin 8	To Audio/Video Assembly (A1A10)	XA5A Pin 8, C58, and XA10A Pin 20
PRESEL ATTN	P1, Pin 9	To optional Tracking Preselector Assembly (A1A14)	XA5A Pin 9, U1A Pin 2, C65, C100, and XA14A Pin 12
AM PK DMP	P1, Pin 10	To Audio/Video Assembly (A1A10)	XA5A Pin 10, and XA10B Pin 25
PRESEL DATA 0	P1, Pin 11	To optional Tracking Pre-selector Assembly (A1A14)	XA5A Pin 11, C56 and XA14B Pin 1
PRESEL DATA 1	P1, Pin 13	To optional Tracking Preselector Assembly (A1A14)	XA5A Pin 13, C55, and XA14B Pin 2
PRESEL DATA 2	P1, Pin 14	To optional Tracking Preselector Assembly (A1A14)	XA5A Pin 14, C54, and XA14B Pin 3
PRESEL DATA 3	P1, Pin 15	To optional Tracking Preselector Assembly (A1A14)	XA5A Pin 15, C53, and XA14B Pin 4
PRESEL DATA 4	P1, Pin 16	To optional Tracking Preselector Assembly (A1A14)	XA5A Pin 16, C52, and XA14B Pin 5

Table 3-14. Synthesizer Interface Assembly (A1A5) Inputs and Outputs (Continued)

Description	A1A5 Port	Source/Destination	Via Motherboard
PRESEL DATA 5	P1, Pin 17	To optional Tracking Preselector Assembly (A1A14)	XA5A Pin 17, C51, and XA14B Pin 6
PRESEL DATA 6	P1, Pin 18	To optional Tracking Preselector Assembly (A1A14)	X5A Pin 18, C50, and XA14B Pin 7
PRESEL DATA 7	P1, Pin 19	To optional Tracking Preselector Assembly (A1A14)	X5A Pin 17, C49, and XA14B Pin 8
PRESEL DATA 8	P1, Pin 20	To optional Tracking Preselector Assembly (A1A14)	XA5A Pin 20, C48, and XA14B Pin 9
PRESEL DATA 9	P1, Pin 22	To optional Tracking Preselector Assembly (A1A14)	X5A Pin 22, C47, and XA14B Pin 10
PRESEL CODE 0	P1, Pin 24	To optional Tracking Preselector Assembly (A1A14)	XA5A Pin 24, C46, and XA14B Pin 11
PRESEL CODE 1	P1, Pin 26	To optional Tracking Preselector Assembly (A1A14)	XA5A Pin 26, C45, and XA14B Pin 12
PRESEL CODE 2	P1, Pin 27	To optional Tracking Preselector Assembly (A1A14)	XA5A Pin 27, C64, and XA14A Pin 10
PRE STB (Active Low)	P1, Pin 28	To optional Tracking Preselector Assembly (A1A14)	XA5A Pin 28, C63, and XA14A Pin 9
SAO SELECT (Active Low)	P2, Pin 12	To optional Tracking Preselector Assembly (A1A14)	XA5B Pin 12, and J13 Pin 9
2ND LO D0	P2, Pin 25	To 2nd LO Synthesizer Assembly (A1A6)	XA5B Pin 25, and XA6 Pin 17
2ND LO D1	P2, Pin 26	To 2nd LO Synthesizer Assembly (A1A6)	XA5B Pin 26, and XA6 Pin 18
2ND LO D2	P2, Pin 27	To 2nd LO Synthesizer Assembly (A1A6)	XA5B Pin 27, and XA6 Pin 19
2ND LO D3	P2, Pin 28	To 2nd LO Synthesizer Assembly (A1A6)	XA5B Pin 28, and XA6 Pin 20
2ND LO A0	P2, Pin 29	To 2nd LO Synthesizer Assembly (A1A6)	XA5B Pin 29, and XA6 Pin 15
2ND LO A1	P2, Pin 30	To 2nd LO Synthesizer Assembly (A1A6)	XA5B Pin 30, and XA6 Pin 16
2ND LO A2	P2, Pin 31	To 2nd LO Synthesizer Assembly (A1A6)	XA5B Pin 31, and XA6 Pin 21
TUNE FAST/SLOW (FAST Active Low)	P2, Pin 32	To 2nd LO Synthesizer Assembly (A1A6)	XA5B Pin 32, and XA6 Pin 9

Table 3-14. Synthesizer Interface Assembly (A1A5) Inputs and Outputs (Continued)

Description	A1A5 Port	Source/Destination	Via Motherboard
7/2 (2 Active Low)	A1A5 Port P2, Pin 36	To 1st LO Synthesizer Assembly (A1A7)	XA5B Pin 36, and XA7 Pin 14
10 MHz 1^1	P2, Pin 37	To 1st LO Synthesizer Assembly (A1A7)	XA5B Pin 37, and XA7 Pin 16
10 MHz 1^2	P2, Pin 38	To 1st LO Synthesizer Assembly (A1A7)	XA5B Pin 38, and XA7 Pin 18
10 MHz 1^4	P2, Pin 39	To 1st LO Synthesizer Assembly (A1A7)	XA5B Pin 39, and XA7 Pin 20
10 MHz 1^8	P2, Pin 40	To 1st LO Synthesizer Assembly (A1A7)	XA5B Pin 40, and XA7 Pin 24
100 MHz 2^1	P2, Pin 41	To 1st LO Synthesizer Assembly (A1A7)	XA5B Pin 41, and XA7 Pin 22
100 MHz 2^2	P2, Pin 42	To 1st LO Synthesizer Assembly (A1A7)	XA5B Pin 42, and XA7 Pin 5
100 MHz 2^4	P2, Pin 43	To 1st LO Synthesizer Assembly (A1A7)	XA5B Pin 43, and XA7 Pin 12
100 MHz 2^8	P2, Pin 44	To 1st LO Synthesizer Assembly (A1A7)	XA5B Pin 44, and XA7 Pin 7
F LOAD	P2, Pin 45	To 1st LO Synthesizer Assembly (A1A7)	XA5A Pin 45, and XA7 Pin 17
UHF LO U^1	P2, Pin 46	To optional Frequency Extender Assembly (A3)	XA5B Pin 46, C4, and J1 Pin 6
UHF LO U^2	P2, Pin 47	To optional Frequency Extender Assembly (A3)	XA5B Pin 47, C2, and J1 Pin 4
UHF LO U^3	P2, Pin 48	To optional Frequency Extender Assembly (A3) and A/D Assembly (A1A4)	XA5B Pin 48, C3 J1 Pin 5, and XA4A Pin 30
BA6	P1, Pin 21	From Microprocessor Assembly (A1A3)	XA3A Pin 21, XA4A Pin 21, and XA5A Pin 21
BA7	P1, Pin 23	From Microprocessor Assembly (A1A3)	XA3A Pin 23, XA4A Pin 23, and XA5A Pin 23
BA8	P1, Pin 25	From Microprocessor Assembly (A1A3)	XA3A Pin 25, XA4A Pin 25, and XA5A Pin 25
I/O 2 (Active Low)	P1, Pin 34	From Microprocessor Assembly (A1A3)	XA3A Pin 34, and XA5A Pin 35

Table 3-14. Synthesizer Interface Assembly (A1A5) Inputs and Outputs (Continued)

Description	A1A5 Port	Source/Destination	Via Motherboard
ENABLE	P2, Pin 4	From Microprocessor Assembly (A1A3)	XA3B Pin 4, XA4B Pin 4, and XA5B Pin 4
READ/WRITE (WRITE Active Low)	P2, Pin 8	From Microprocessor Assembly (A1A3)	XA3B Pin 8, XA4B Pin 8, and XA5B Pin 8
DI/O 0	P2, Pin 9	To/From Microprocessor Assembly (A1A3)	XA3B Pin 9, XA4B Pin 9, and XA5B Pin 9
DI/O 1	P2, Pin 11	To/From Microprocessor Assembly (A1A3)	XA3B Pin 11, XA4B Pin 11, and XA5B Pin 11
DI/O 2	P2, Pin 13	To/From Microprocessor Assembly (A1A3)	XA3B Pin 13, XA4B Pin 13, and XA5B Pin 13
DI/O 3	P2, Pin 15	To/From Microprocessor Assembly (A1A3)	XA3B Pin 15, XA4B Pin 15, and XA5B Pin 15
DI/O 4	P2, Pin 17	To/From Microprocessor Assembly (A1A3)	XA3B Pin 17, XA4B Pin 17, and XA5B Pin 17
DI/O 5	P2, Pin 19	To/From Microprocessor Assembly (A1A3)	XA3B Pin 19, XA4B Pin 19, and XA5B Pin 19
DI/O 6	P2, Pin 21	To/From Microprocessor Assembly (A1A3)	XA3B Pin 21, XA4B Pin 21, and XA5B Pin 21
DI/O 7	P2, Pin 23	To/From Microprocessor Assembly (A1A3)	XA3B Pin 23, XA4B Pin 23, and XA5B Pin 23
+15 V	P1, Pin 2	From Power Supply (PS1)	J12 Pins 5 and 6, and XA5A Pin 2
-15 V	P1, Pin 1	From Power Supply (PS1)	J12 Pins 3 and 4, and XA5A Pin 1
+5 V	P2, Pins 49 and 50	From Power Supply (PS1)	J12 Pins 1 and 2, and XA5B Pins 49 and 50
PRINTER	P1, Pin 31	Not Used	
+30 V	P1, Pin 30	Not Used	
SP 1	P2, Pin 33	Not Used	
SP 2	P2, Pin 34	Not Used	

The Synthesizer Interface Assembly transfers data from the microprocessor data bus (DI/O 0-DI/O 7) to other assemblies in the receiver. This assembly also contains an up/down counter. The counter counts up or down as determined by the VBFO HI and VBFO LO inputs at P1 pins 33 and 35, respectively. These inputs represent the frequency and phase differences of the variable beat frequency oscillator in the Reference Generator Assembly (A1A8). Pulses on the VBFO HI input instruct the counter to count up, while pulses on the VBFO LO input instruct it to count down. The counter starts counting when the CTR ST input at P1 pin 12 is at a logic low. When the counter is done, a logic high is present at P1 pin 29 (C DNE). The counter begins its count at zero upon receiving a low logic CTR ST* signal at P1, pin 12. The counter enumerates the net VBFO error count over a 50 ms period and then sends the C DNE line high. The Microprocessor then reads the VBFO error count by setting the R/W* control lines at P2, pin 8 high and the I/O2* and E control lines at P2, pin 4 and P1, pin 34, respectively, low. Upon interpreting the error count, the microprocessor sends a correction voltage to the Reference Generator Assembly (A1A8).

Address lines BA6-BA8 of the address bus are input at P1 pins 21, 23, and 25, respectively, and applied to a 3-to-8 line address decoder which is enabled by the E (logic High), I/O2* (logic low), and R/W* (logic low) signals. Write addresses on these lines cause the decoder to drive one of six 8-bit flip-flops which latch instantaneous data bus information to the other assemblies in the receiver. The following charts in **Table 3-15** illustrate the write addresses used to enable the latches and the resultant output as determined by the data bus inputs.

Table 3-15. A1A5 Latch Outputs

Relative Write Address W03C0											
BA8	BA7	BA6	D0	D1	D2	D3	D4	D5	D6	D7	Output P1
1	1	1	X								Pin 3 FM (LOW), AM (HI) to A1A10
1	1	1		X							Pin 4 CW to A1A8, A1A11
1	1	1			X						Pin 5 CW + SSB to A1A8, A1A10
1	1	1				X					Pin 6 LSB (LOW), USB (HI)to A1A10
1	1	1					X				Pin 7 ISB to A1A10
1	1	1						X			Pin 8 SQUELCH to A1A10
1	1	1							X		Pin 9 PRESEL ATTN to A1U1A
1	1	1								X	Pin 10 AM PK DMP to A1A10

*Indicates Active Logic Low

Table 3-15. A1A5 Latch Outputs (Continued)

Relative Write Address W0380

BA8	BA7	BA6	D0	D1	D2	D3	D4	D5	D6	D7	Output P1
1	1	0	X								Pin 11 DATA 0 to A1A14
1	1	0		X							Pin 13 DATA 1 to A1A14
1	1	0			X						Pin 14 DATA 2 to A1A14
1	1	0				X					Pin 15 DATA 3 to A1A14
1	1	0					X				Pin 16 DATA 4 to A1A14
1	1	0						X			Pin 17 DATA 5 to A1A14
1	1	0							X		Pin 18 DATA 6 to A1A14
1	1	0								X	Pin 19 DATA 7 to A1A14

Relative Write Address W0340

BA8	BA7	BA6	D0	D1	D2	D3	D4	D5	D6	D7	Output
1	0	1	X								P1 Pin 20 DATA 8 to A1A14
1	0	1		X							P1 Pin 22 DATA 9 to A1A14
1	0	1			X						P1 Pin 24 CODE 0 to A1A14
1	0	1				X					P1 Pin 26 CODE 1 to A1A14
1	0	1					X				P1 Pin 27 CODE 2 to A1A14
1	0	1						X			P1 Pin 28 PRE STB (LOW) to A1A14
1	0	1							X		P2 Pin 12 SAO SELECT (LOW) to A6
1	0	1								X	P1 Pin 31 Not Used

Relative Write Address W0280

BA8	BA7	BA6	D0	D1	D2	D3	D4	D5	D6	D7	Output P2
0	1	0	X								Pin 25 LO D0 to A1A6
0	1	0		X							Pin 26 LO D1 to A1A6
0	1	0			X						Pin 27 LO D2 to A1A6
0	1	0				X					Pin 28 LO D3 to A1A6
0	1	0					X				Pin 29 LO A0 to A1A6
0	1	0						X			Pin 30 LO A1 to A1A6
0	1	0							X		Pin 31 LO A2 to A1A6
0	1	0								X	Pin 32 FINE OFF/ON to A1A6

Table 3-15. A1A5 Latch Outputs (Continued)

Relative Write Address W0240											
BA8	BA7	BA6	D0	D1	D2	D3	D4	D5	D6	D7	Output P2
0	0	1	X								Pin 33 Not Used
0	0	1		X							Pin 34 Not Used
0	0	1			X						Pin 36 7/2 to A1A7
0	0	1				X					Pin 35 Not Used
0	0	1					X				Pin 37 10 MHz 11 to A1A7
0	0	1						X			Pin 38 10 MHz 12 to A1A7
0	0	1							X		Pin 39 10 MHz 14 to A1A7
0	0	1								X	Pin 40 10 MHz 18 to A1A7

Relative Write Address W0200											
BA8	BA7	BA6	D0	D1	D2	D3	D4	D5	D6	D7	Output P2
0	0	0	X								Pin 41 100 MHz 21 to A1A7
0	0	0		X							Pin 42 100 MHz 22 to A1A7
0	0	0			X						Pin 43 100 MHz 24 to A1A7
0	0	0				X					Pin 44 100 MHz 28 to A1A7
0	0	0					X				Pin 45 FLOAD to A1A7
0	0	0						X			Pin 46 U1 to A3
0	0	0							X		Pin 47 U2 to A3
0	0	0								X	Pin 48 U3 to A3

3.3.14 TYPE 796823-1 FRONT PANEL DISPLAY ASSEMBLY (A1A1)

The Front Panel Display Assembly is the main interface between the receiver circuitry and the local operator. A 24-character alphanumeric display, a 20-key keypad, a tuning wheel, and discrete LEDs are used in this assembly to provide the interface. See **Figure FO-5** for the schematic diagram of A1A1. Refer to **Figure 3-13** for a block diagram of A1A1. See **Figure FO-6** for the schematic diagram of the Front Panel Keyboard Assembly (A1A1A1). Refer to **Table 3-16** for a summary of the Front Panel Display Assembly inputs and outputs.

Front panel key presses are sensed by a key encoder. The key encoder transmit lines (KX1-KX4) are applied to the front panel keys. Pressing a key closes its contacts which ties the encoder transmit line with the appropriate encoder receive line (KY1-KY5). The encoder responds by applying a logic level high at J1 pin 21 (KEY AV). This signal is applied to the IEEE-488/Interrupt Assembly (A1A2) which interrupts the microprocessor. The R KEY input at J1 pin 4 goes low which places the key data onto the microprocessor data lines DI00-DI04.

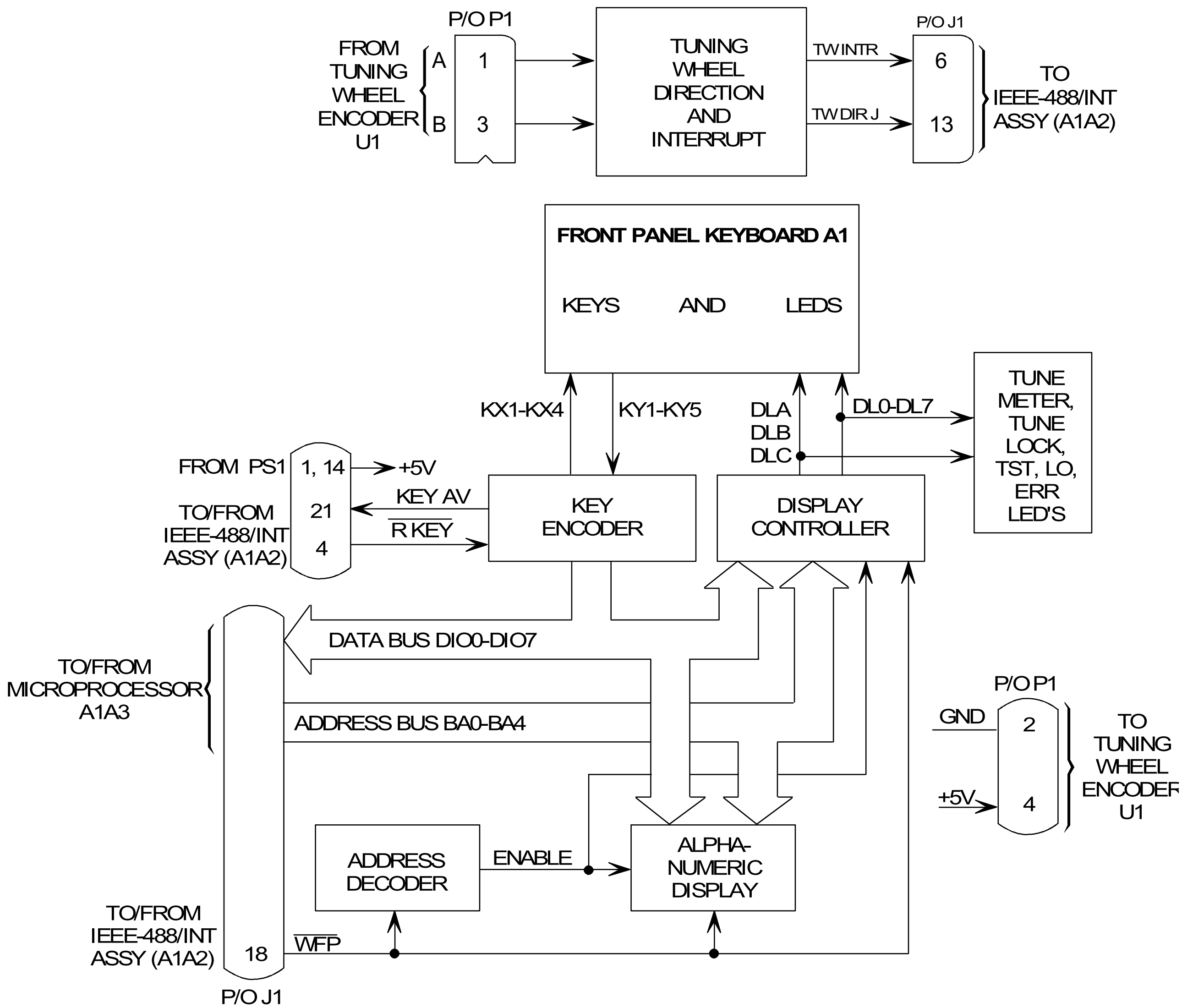

Figure 3-13. Front Panel Display Assembly (A1A1) Block Diagram

Table 3-16. Front Panel Display Assembly (A1A1) Inputs and Outputs

Description	A1A1 Port	Source/Destination	Via Motherboard
KEY AV	J1, Pin 21	To IEEE-488/Interrupt Assembly (A1A2)	J10 Pin 21, and XA2B Pin 10
TW INTR	J1, Pin 6	To IEEE-488/Interrupt Assembly (A1A2)	J10 Pin 6, and XA2A Pin 5
TW DIR J	J1, Pin 13	To IEEE-488/Interrupt Assembly (A1A2)	J10 Pin 13, and XA2A Pin 31
R KEY (Active Low)	J1, Pin 4	From IEEE-488/Interrupt Assembly (A1A2)	XA2A Pin 18, and J10 Pin 4
+5 V	J1, Pins 1 and 14	From Power Supply (PS1)	J12 Pins 7 and 8, and J10 Pins 1 and 14
DIO 0	J1, Pin 20	To Microprocessor Assembly (A1A3)	XA3B Pin 9, XA2B Pin 9, and J10 Pin 20
DIO 1	J1, Pin 3	To Microprocessor Assembly (A1A3)	XA3B Pin 11 XA2B Pin 11, and J10 Pin 3
DIO 2	J1, Pin 2	To Microprocessor Assembly (A1A3)	XA3B Pin 13, XA2B Pin 13, and J10 Pin 2
DIO 3	J1, Pin 22	To Microprocessor Assembly (A1A3)	XA3B Pin 15, XA2B Pin 15, and J10 Pin 22
DIO 4	J1, Pin 23	To Microprocessor Assembly (A1A3)	XA3B Pin 17, XA2B Pin 17, and J10 Pin 23
DIO 5	J1, Pin 15	To Microprocessor Assembly (A1A3)	XA3B Pin 19, XA2B Pin 19, and J10 Pin 15
DIO 6	J1, Pin 10	To Microprocessor Assembly (A1A3)	XA3B Pin 21, XA2B Pin 21, and J10 Pin 10
DIO 7	J1, Pin 9	To Microprocessor Assembly (A1A3)	XA3B Pin 23, XA2B Pin 23, and J10 Pin 9
WFP (Active Low)	J1, Pin 18	From IEEE-488/Interrupt Assembly (A1A2)	XA2A Pin 22, and J10 Pin 18

Table 3-16. Front Panel Display Assembly (A1A1) Inputs and Outputs (Continued)

Description	A1A1 Port	Source/Destination	Via Motherboard
BA0	J1, Pin 16	From Microprocessor Assembly (A1A3)	XA3A Pin 9, XA2A Pin 9, and J10 Pin 16
BA1	J1, Pin 8	From Microprocessor Assembly (A1A3)	XA3A Pin 11, XA2A Pin 11, and J10 Pin 8
BA2	J1, Pin 17	From Microprocessor Assembly (A1A3)	XA3A Pin 13, XA2A Pin 13, and J10 Pin 17
BA3	J1, Pin 7	From Microprocessor Assembly (A1A3)	XA3A Pin 15, XA2A Pin 15, and J10 Pin 7
BA4	J1, Pin 12	From Microprocessor Assembly (A1A3)	XA3A Pin 17, XA2A Pin 17,and J10 Pin 12
A	P1, Pin 1	From Tuning Wheel Encoder (U1)	
B	P1, Pin 3	From Tuning Wheel Encoder (U1)	

Update data for the front panel alphanumeric display is applied on the data bus input at J1. Address bus lines BA0-BA4 input at J1 determine what part of the alphanumeric display will read the new data, by way of an address decoder. When the WFP* input at J1 pin 18 is at a logic low, the alphanumeric display is refreshed and the new data is displayed.

Lighting of front panel LEDs are also controlled by address bus inputs, the data bus, and the WFP* input. Address lines BA0 (P1 pin 16) and BA1 (P1 pin 8) control a display controller which uses the data on the data bus to illuminate the LEDs. The display controller outputs a high on the appropriate output lines (DL0-DL7) to the Front Panel Keyboard Assembly (A1A1A1) and a low on lines DLA, DLB and DLC (one at a time). A different combination of high DL0-DL7 outputs is used with the DLA line than is used for the DLB line, or the DLC line and so on. This scheme gives the microprocessor individual control of the various keypad LEDs. This same operation applies to the front panel TUNE meter LED bar, the TUNE LOCK LED, and the TST, LO, and ERR LEDs.

*Indicates Active Logic Low

Rotating the tuning wheel applies +5 V pulses to terminals E23 and E22 of A1A1. The pulses at E23 lead the pulses at E22 when the tuning wheel is rotated clockwise. E22 leads E23 for counterclockwise rotation. When the tuning wheel is rotated in either direction, circuitry in A1A1 generates an interrupt signal, (negative-going pulse) output at J1 pin 6 (TW INTR). The TW DIR output at J1 pin 13 is at logic high when the tuning wheel is rotated counterclockwise and low at clockwise rotation. This output stays high or low until the tuning wheel is rotated again.

3.3.15 SWITCHING POWER SUPPLY (PS1)

The Switching Power Supply (PS1) accepts either a 110 VAC or 230 VAC power input at 47-63 Hz and converts it to the three dc levels used by the receiver: +5 Vdc at 5 amps, +15 Vdc at 1 amp, and -15 Vdc at 1 amp. Refer to **Figure FO-24** for a schematic representation of inputs and outputs. **Table 3-17** provides a summary of source voltages.

Table 3-17. WJ-8615P Source Voltages

Assembly	+5 Vdc @ 5A	+15 Vdc @ 1A	-15 Vdc @ 1A
Motherboard Assembly (A1)	X	X	X
Front Panel Display Assembly (A1A1)	X		
IEEE-488/Interrupt Assembly (A1A2)	X	X	X
Auxiliary Serial Interface Assembly (A1A2A1)	X	X	X
Microprocessor Assembly (A1A3)	X		
Analog/Digital Assembly (A1A4)	X	X	X
Synthesizer Interface Assembly (A1A5)	X	X	X
2nd LO Synthesizer Assembly (A1A6)	X	X	X
1st LO Synthesizer Assembly (A1A7)	X	X	
Reference Generator Assembly (A1A8)	X	X	X
AM/FM Demodulator Assembly (A1A9)	X	X	X
Audio/Video Assembly (A1A10)	X	X	X
Bandwidth Video Response Assembly (A1A10AX)		X	X
ISB/CW Demodulator Assembly(A1A11)		X	X
IF Bandwidth Filter Amplifier Assembly (A1A12)		X	X
Preamplifier/Converter Assembly (A1A13)	X	X	X
Optional Wideband Output Assembly (A2)		X	X
Optional Frequency Extender Assembly (A3)	X	X	
Fan Filter Assembly (A5)	X	X	X
Optional Selected Audio Output Assembly (A6)		X	
Tuning Wheel Encoder (U1)	X	X	X

SECTION IV

MAINTENANCE

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SECTION IV

MAINTENANCE

4.1 GENERAL

The WJ-8615P 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 maintenance schedule, and after any repairs have been completed.

4.2 CLEANING AND LUBRICATION

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

4.3 INSPECTION FOR DAMAGE OR WEAR

Many existing or potential problems can be discovered or detected by making a thorough visual inspection of the unit. For this reason, as the first step in troubleshooting, a thorough visual inspection should be performed whenever the unit is inoperative. Inspect mechanical parts, such as pin connectors and interconnecting wiring for looseness, wear, and other signs of deterioration. Ensure that plug-in subassemblies and modules are checked to verify that they are properly inserted and secured into their appropriate location and making good contact. Electronic components that show signs of deterioration, such as discoloration, "sweating", or overheating should be inspected, along with associated circuitry, to verify proper operation. Often, damage by overheating is the result of other, less apparent problems in the circuitry.

4.4 TEST EQUIPMENT REQUIRED

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

Table 4-1. Test Equipment Required

Equipment	Description	Type
Autotransformer	Variable	General Radio W5MT3W
Digital Voltmeter	High Impedance	Fluke 8100A
RF Millivoltmeter	Calibrated in dB	Boonton 92B
	Probe	Boonton 91-12F
	"T" Adapter	Boonton 91-14A
	50Ω Termination	Boonton 91-15A
Distortion Analyzer	550 kHz to 65 MHz	HP-334A
Oscilloscope	DC to 35 MHz	Tektronix T935
Frequency Counter	DC to 50 MHz	HP-5245L
	50 to 1250 MHz	Fluke 1953A
Feedthru Termination	600Ω	Tektronix 011-0092-00
Signal Generator	20 Hz to 1024 MHz, with Audio oscillator option	HP-8640B Option 001, 002
Sweep Generator	1 to 1500 MHz	Wiltron 650
Attenuator	0 to 11 dB	HP-8494B
Load	600Ω (Resistor, Fixed, Film)	CF1/4-600 OHMS/J
Load	50Ω (Resistor, Fixed, Film)	CF1/4-50 OHMS/J
Load	91Ω (Resistor, Fixed, Film)	CF1/4-91 OHMS/J

4.5 DIAGNOSTICS MODE OPERATIONS

The Diagnostic Mode operation of the WJ-8615P Receiver permits examination of certain receiver firmware operations. The diagnostics mode is selected through the Definitions mode. Refer to **paragraph 2.3.3**. Select YES for both the DEFINE and DIAGNOSTIC MENU options. Press ENTER to terminate the Definitions Mode and enter the Diagnostics Mode. When the diagnostics mode is activated, the TST LED on the front panel of the receiver is lit. The receiver remains in the diagnostics mode, even if the power is cycled, until it is returned to the normal operations mode. To deactivate the diagnostics mode, enter the definitions mode and select NO for the DIAGNOSTIC MENU option. Press ENTER to terminate the Definitions Menu and enter the normal operating mode.

Once the diagnostics mode is entered, many of the front panel receiver operations change. The lower frequency limit, bandwidth selection, and the signal strength field have changed.

The selection of empty bandwidth slots is allowed when the receiver is in the diagnostics mode. This permits debugging of the bandwidth code and selection circuits. Normally, the receiver firmware does not allow selection of an empty or nonfunctional slot. When the receiver is in the FM detection mode, the bandwidth A/D code replaces the IF bandwidth size display on the front panel. This new display allows adjustment of the IF bandwidth code on the Analog/Digital Assembly (A1A4). Refer to **paragraph 4.7.2**.

When the receiver is in the diagnostics mode with any detection mode other than FM selected and the AGC is on, the signal strength field displays the AGC derived attenuation. This permits a direct correlation between the AGC derived attenuation and the RF ATTN parameter. Noting at what signal level the AGC derived attenuation changes from 0 to 1 indicates at what point the AGC is activated.

The lower frequency limit is removed while in the diagnostics mode. The receiver may now be tuned down to 0 MHz. When the receiver is tuned near zero, its own LOs may be used to generate a test signal for verification of the signal paths and for the FM discriminator offset adjustment.

When the receiver is in the diagnostics mode with the FM detection mode selected and the AGC is on, the signal strength field displays the FM offset A/D value. This value is between 0 and 255. This value permits the DC offset adjustment of the FM discriminators, which is necessary for proper AFC operation. This can be used as an aid in troubleshooting any suspected AGC faults. A value of 127 indicates that the signal is center tuned. The tune bar on the display should also be centered. A value below 127 indicates the signal is below the tuned frequency. A value above 127 indicates the signal is above the tuned frequency.

When the receiver is in the diagnostics mode, the BFO operation is now an open loop. The receiver software no longer adjusts the BFO oscillator for errors or drift. This allows the BFO oscillator range and center frequency to be adjusted.

4.6 TROUBLESHOOTING AND FAULT ISOLATION PROCEDURES

The following Troubleshooting Table (**Table 4-2**) and performance tests are provided as an aid to the user, for localizing the cause of a malfunction to a particular subassembly within the receiver. During troubleshooting, or performance testing, reference to the schematic diagrams in **Section VI** in this manual should be made.

To monitor the overall receiver capability to produce an output signal at each rear panel connector, the following steps are recommended:

1. Inject a -40 dBm 255.5550 MHz FM signal, with 30% peak deviation of the selected IF bandwidth into RF input connector J10 on the receiver rear panel.

2. Energize the receiver.

3. Refer to **paragraph 2.4** for an explanation of the signals present at each rear panel output connector.

The performance tests that follow 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.

NOTE

To prevent damage to the receiver circuitry, always de-energize the receiver before removing or installing any subassembly.

Table 4-2. WJ-8615P Troubleshooting Table

Symptom	Probable Cause	Corrective Action
Receiver totally inoperative. Front panel blank, no signal at any output connector.	Fuse F1 blown.	Locate and correct cause of blown fuse. Replace the fuse.
	Defective power switch S1.	Check operation of switch S1. Replace if defective.
	Defective Power Supply.	Refer to **paragraph 4.7.1**.
Receiver front panel controls function but no signals at any output connector.	Defective Digital Control Section.	Refer to **paragraph 4.7.4**.
Receiver front panel indicators randomly illuminate. Front panel controls inoperative. Erroneous or nonexistent signals at output connectors.	ICs U3 and U4 not installed or installed in wrong socket on Microprocessor A1A3.	Install U3 and U4 correctly.
Malfunction occurs with all bandwidth selections.	Defective Digital Control Section.	Refer to **paragraph 4.7.4**. Replace subassembly.
	IF Bandwidth Filter (A1A12) defective. AM/FM Demodulator (A1A9) defective.	Replace subassembly.
All outputs function on one or more, but not all bandwidths.	Defective Digital Control Section.	Refer to **paragraph 4.7.4**.
	If Bandwidth Filter (A1A12) defective or ISB/CW Demodulator (A1A11) defective.	Replace subassembly.
Switched IF output inoperative, all other outputs function normally.	ISB/CW Demodulator (A1A11) defective.	Replace subassembly.
FM Monitor output inoperative, all bandwidths affected.	Audio/Video subassembly (A1A10) is most likely to be defective.	Replace A1A10. If fault persists, A1A10 is OK. Replace AM/FM Demodulator (A1A9).

Table 4-2. WJ-8615P Troubleshooting Table (Continued)

Sympton	Probable Cause	Corrective Action
FM Monitor output inoperative, in one or more, but not all bandwidth selections.	Defective Digital Control Section. AM/FM Demodulator (A1A9) defective.	Refer to **paragraph 4.7.4**. Replace subassembly.
FM Monitor output inoperative in wide bandwidths.	AM/FM Demodulator (A1A9) defective. Wideband FM Demodulator (A1A9A1) defective.	Refer to **paragraph 4.7.4**. Replace subassembly.
No FM Video at Switched Video output when FM detection is selected. FM Monitor output normal.	Defective Digital Control Section. Audio/Video subassembly (A1A10) defective.	Refer to **paragraph 4.7.4** Replace subassembly.

4.7 PERFORMANCE TESTS

The performance tests provided in this Section may be utilized for periodic performance testing, as an aid in troubleshooting, or as a verification procedure after repairs have been completed. These procedures should be performed only by skilled technicians who are thoroughly familiar with proper operation of the equipment listed in **Table 4-1**.

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:	Control	Local
	Frequency	255.5550 MHz
	Tuning Rate	1 kHz
	AGC	ON
	AFC	OFF
	COR Level	00
	RF/IF Gain	Maximum
	Bandwidth Select	#1
	Detection Mode	AM
	Audio Gain	Midrange
Rear Panel:	Line Audio Adjust (R1)	Midrange

4.7.1 POWER SUPPLY PERFORMANCE TEST

1. Connect the receiver to the Type W5MT3W Variable Autotransformer. Set the autotransformer output voltage to 110 Vac.

2. Apply power to the receiver by depressing the POWER switch. Note the power consumption indicated by the autotransformer wattmeter. The power consumption should be no greater than 45 watts. (If the FE option is installed, power consumption should be no greater than 50 watts. Add 1 watt if the WJ-8615/PRE Tracking Preselector option is installed.)

3. Using the Type 8100A Digital Voltmeter, measure the output voltage for the DC power supplies at the test points listed in **Table 4-4**. The measured voltage should fall within the limits specified in the table.

Table 4-4. Power Supply Voltages

Test Point	Supply	Limits
A1A5TP9	-15 Vdc	-15.00 ±0.75 Vdc
A1A5TP8	+15 Vdc	+15.00 ±0.75 Vdc
A1A5TP7	+5 Vdc	+5.00 ±0.25 Vdc

4. Set the output of the autotransformer to 97.7 Vac rms. Using the digital voltmeter probe, verify that the DC supplies fall within the limits identified in **Table 4-4**.

5. Set the output of the autotransformer to 132.2 Vac rms. Using the digital voltmeter probe, verify that the DC supplies fall within the limits identified in **Table 4-4**.

6. Adjust the output of the autotransformer to 264.5 Vac rms.

7. Using the digital voltmeter probe, again verify that the DC supplies fall within the limits identified in **Table 4-4**.

8. Monitor each of the DC supply test points in **Table 4-4** with the oscilloscope probe. Decrease the output amplitude of the autotransformer until spikes appear on the oscilloscope trace. Using the digital voltmeter, measure the input voltage to the receiver at this point. The input voltage should be no less than 195.5 Vac rms.

4.7.2 RF/IF SECTION, PERFORMANCE TESTS

4.7.2.1 Preamplifier/Converter Performance Test

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

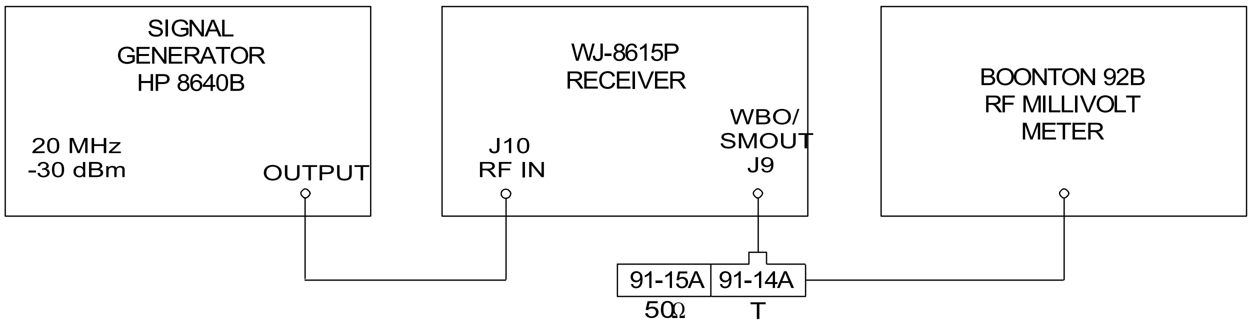

Figure 4-1. Preamplifier/Converter Performance Test, Equipment Connections

2. Set the receiver to 20.0000 MHz, IF bandwidth #1, AGC off, and AFC off.
3. Set the RF generator for 20 MHz at -30 dBm and connect the signal generator to receiver input connector J10.
4. Connect the RF millivoltmeter cable to rear panel SM output, J9. Measure the level in parallel to a 50-ohm termination. The output level should be -12 dBm ±1.5 dB. If WBO option is available, the output level should be -30 dBm.
5. If these levels are available, then the performance test of the Preamplifier/Converter is complete. If not, remove power from the unit and proceed to **step 6**.
6. Remove the IF BW Filter/Amplifier subassembly (A1A12).
7. Reapply power and connect a RF millivoltmeter cable to motherboard connector XA12A pin 4, and measure the level in parallel to a 50-ohm termination. The gain through the module should be 12 dBm (±1.5 dB). If these levels are not available, suspect the WBO option assembly, A1W4 or W3. If still not available, suspect the Preamplifier/Converter.
8. Reinstall the IF BW Filter/Amplifier subassembly (A1A12).

4.7.2.2 IF Bandwidth Filter Performance Test

1. Connect the test equipment as illustrated in **Figure 4-2**.
2. Set the receiver to the Standard Test Setting described in **Table 4-3**, with the exception of AGC set to the off condition. Connect the RF millivoltmeter to SW IF connector J8 on the receiver rear panel.

3. Adjust the Type 8640B signal generator for a 255.5550 MHz signal, with no modulation and the output level set to minimum (maximum attenuation). Set the step attenuator for a 3 dB loss.

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

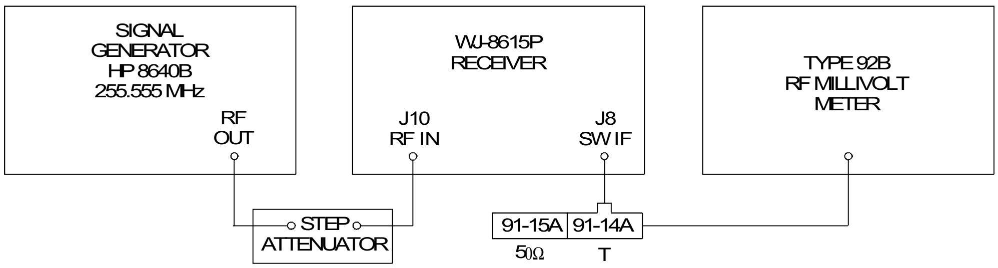

Figure 4-2. IF Bandwidth Filter Performance Test, Equipment Connections

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 255.5550 MHz, until the millivoltmeter again reaches -30 dBm. Note the generator frequency.

7. Compute the 3 dB bandwidth by subtracting the frequency reading obtained in **step 6** from the frequency obtained in **step 5**. The computed bandwidth should equal the selected IF bandwidth ±10%.

8. Set the signal generator frequency for 255.5550 MHz and adjust its output level for -30 dBm reading on the RF millivoltmeter.

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

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

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

12. Select bandwidth #4 (if installed) and repeat **steps 3** through **9**.

13. Select bandwidth #5 (if installed) and repeat **steps 3** through **9**.

4.7.2.3 **AM/FM Demodulator Performance Test**

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

2. Set the receiver to the Standard Test Setting described in **Table 4-3** except set the receiver to FM detection mode.

3. Adjust the signal generator for a 255.5550 MHz signal at an output level of -65 dBm. FM modulate the output signal at a 400 Hz rate, with the appropriate peak deviation. (**Table 1-2** lists the deviation for the selected IF bandwidth.)

4. Connect the Type 334A Distortion Analyzer to the FM MON connector (J4) on the rear panel. Connect a 91-ohm load in parallel to J4.

5. Measure and record the distortion present. This level should be no greater than 5% for all bandwidths, when modulated 30%.

6. Remove the distortion analyzer and the 91-ohm load from J4 and connect the distortion analyzer to the USB/AUD 1 output connector (J6). Connect a 600-ohm load in parallel to J6.

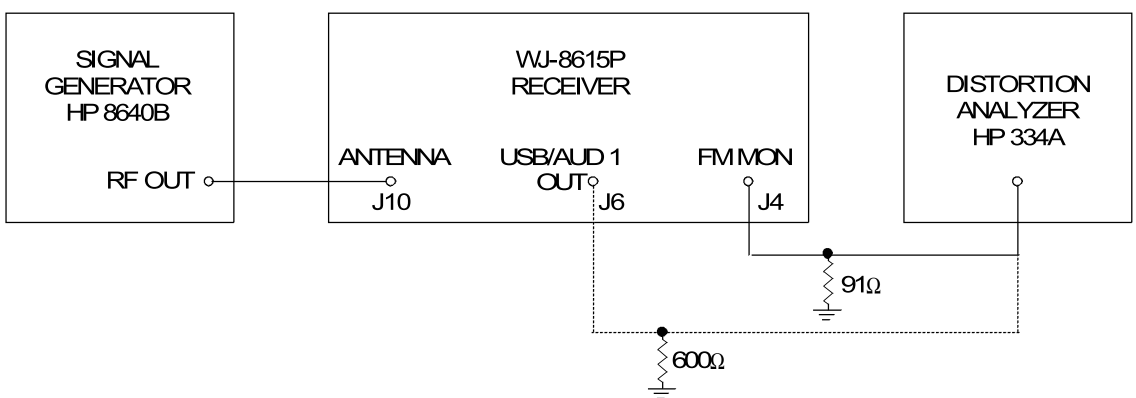

Figure 4-3. AM/FM Demodulator Performance Test, Equipment Connections

7. Ensure the line audio output level is capable of being adjusted to a minimum of 2.45 V rms via Line Audio adjuster R1 on the receiver rear panel.

8. Repeat **steps 3** through **7**, for each of the remaining bandwidths. Change the modulation rate to 1 kHz for IF bandwidths greater than 20 kHz.

4.7.2.4 Audio/Video Performance Test

1. Refer to **Figure 4-4**.

2. Remove the AM/FM Demodulator subassembly (A1A9). Set the receiver to FM detection and select bandwidth #1.

3. Connect the audio signal generator to pin 4 of motherboard connector XA9C and to channel 2 of the oscilloscope. Connect the ground lead to pin 12 of XA9C. Adjust the signal generator output level to produce a 1 kHz signal with a 2 V peak-to-peak amplitude as observed on channel 2 of the oscilloscope. Remove the oscilloscope probe.

4. Connect the channel 1 input of the oscilloscope, and a 91 ohm termination to J4 (FM MON) on the receiver rear panel. Observe that the signal level at J4 is between 2 and 3 V peak-to-peak.

5. Move the channel 1 input of the oscilloscope and the 91 ohm termination to J5 (SW VIDEO) on the receiver rear panel. Observe that a signal between .8 and 1.5 V peak-to-peak is displayed on channel 1.

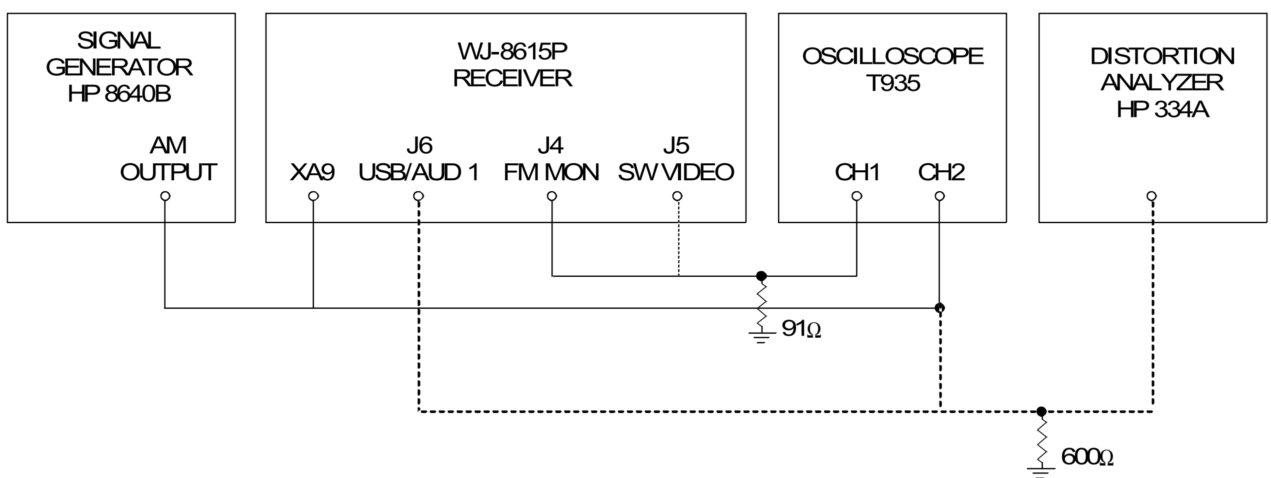

Figure 4-4. Audio/Video Performance Test, Equipment Connections

6. Select the AM detection mode. Move the signal output to pin 5 of connector XA9A. Move the ground lead to pin 1 of XA9A. Observe that a signal from .8 to 1.5 V peak-to-peak is displayed on trace 1 of the oscilloscope.

7. Remove the oscilloscope channel 2 input connection from the receiver and connect the oscilloscope channel 2 input and the distortion analyzer, with a 600Ω termination, to the J6 (USB/AUD1) output on the receiver rear panel (as illustrated in **Figure 4-4** by the heavy dotted line.)

8. Set the LINE AUDIO control (R1) on the rear panel to the point just before clipping of the audio signal begins, as observed on the oscilloscope. The amplitude should be no less than 7.0 V peak-to-peak.

9. Set the LINE AUDIO control for 2.45 V rms as indicated by the distortion analyzer voltmeter. The distortion should be no greater than 5%.

10. Replace the AM/FM Demodulator subassembly (A1A9). Set the signal generator for a frequency of 255.555 MHz and its controls for: variable, internal, and AM modulation. Connect the signal generator output to the RF input of the receiver (J10). Adjust the generator for 30% modulation at a 1.0 kHz rate. The IF bandwidth selected must be greater than or equal to 100 kHz. Set the LINE AUDIO control (R1) for a reference on the dB scale of the distortion analyzer at or near the 2.45 V rms point as a reference level.

11. Vary the modulation frequency of the signal generator from 50 Hz to 15 kHz noting the greatest deviations from the reference. Measure the greatest positive difference from the reference and measure the greatest negative difference from the reference. The total variation should be no greater than 2.0 dB.

12. Connect the distortion analyzer, set for voltmeter operation, to the SW VIDEO connector (J5). Set the signal generator to an output level of -65 dBm. AM modulate the signal generator 50% at a 1 kHz rate (400 Hz rate for bandwidths less than 20 kHz).

13. Measure the AM video output level present on the distortion analyzer. This level should be 0.21 to 0.59 V rms.

14. Select the FM detection mode and adjust the signal generator as in **step 12** except FM modulate at a peak deviation of 30% of the selected IF bandwidth. The FM video output level present on the distortion analyzer should be 0.21 to 0.59 V rms.

4.7.3 REFERENCE GENERATOR PERFORMANCE TESTS

4.7.3.1 Reference Generator Performance Test

1. Refer to **Figure 4-5**.

2. Remove the 1st LO Synthesizer (A1A7), the 2nd LO Synthesizer (A1A6), and the ISB/CW Demodulator (A1A11) from the motherboard.

3. Set the receiver to the Standard Test Setting described in **Table 4-3**, except set the detection mode to SSB.

4. Connect the frequency counter first to motherboard connector XA7 pin 15 and verify the frequency present is 250 kHz.

5. Connect the frequency counter to motherboard connector XA11A pin 6 and verify the frequency present is 32.1 MHz.

6. Connect the frequency counter to motherboard connector XA6 pin 27 and verify the frequency present is 10 MHz.

7. Remove the frequency counter and observe the waveforms present at connector XA7 pin 15, connector XA11A pin 6, and connector XA6 pin 27 with an oscilloscope. The waveform at each connector pin should be a symmetrical square wave, switching between 0 and approximately +4 Vdc.

8. Reinstall the A1A6, A1A7, and A1A11 modules.

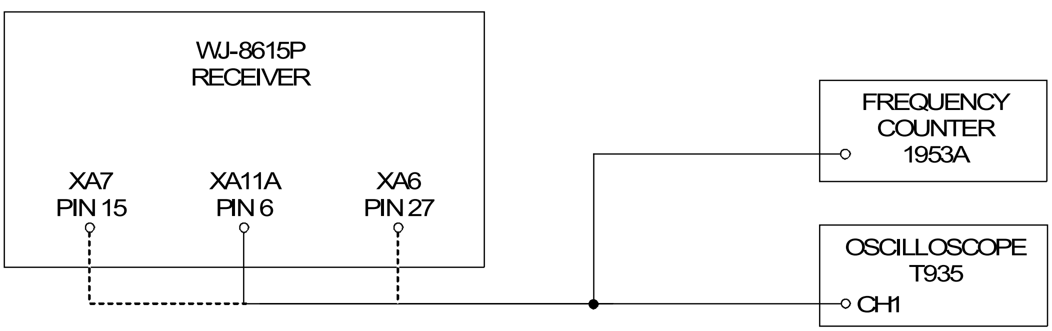

Figure 4-5. Reference Generator Performance Test, Equipment Connections

4.7.3.2 **1st LO Synthesizer Performance Test**

1. Connect the equipment as illustrated in **Figure 4-6**.

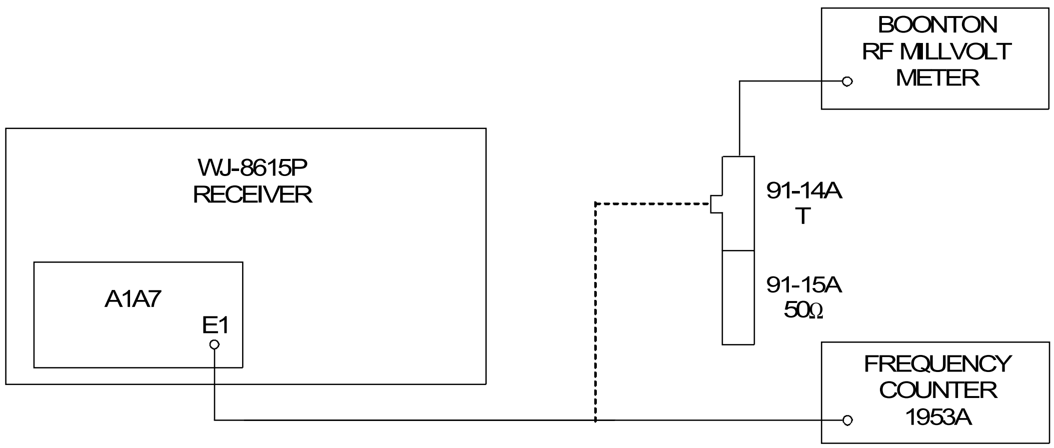

Figure 4-6. 1st LO Synthesizer Performance Test, Equipment Connections

2. Extend the 1st LO Synthesizer Assembly (A1A7).

3. Utilizing the oscilloscope, verify the presence of the 250 kHz reference, from the Reference Generator, at XA7 pin 15.

4. Connect the frequency counter to the 1st LO Synthesizer output jack A1A7J1.

5. Tune the receiver to the frequencies listed in **Table 4-5** and observe that the 1st LO frequency varies as listed in the table.

6. If the results are not as listed in **Table 4-5**, use the oscilloscope to verify the BCD control word provided at the indicated pins of connector XA7.

7. Remove the frequency counter from A1A7J1. Connect the RF millivoltmeter, with a 50 ohm load, and observe that the output level is at least +3 dBm.

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

Table 4-5. 1st LO Synthesizer Frequency Versus Tuned Frequency

Tuned Frequency (MHz) (E1)	1st LO Frequency (MHz) (E1)	Control Logic Input 100 MHz					Control Logic Input 10 MHz					7/2*
		Bit	8	4	2	1	Bit	8	4	2	1	
20.0000	577.50		0	1	0	1		0	1	1	1	1
25.0000	582.50		0	1	0	1		1	0	0	0	0
50.0000	607.50		0	1	1	0		0	0	0	0	1
250.0000	807.50		1	0	0	0		0	0	0	0	1
335.0000	892.50		1	0	0	0		1	0	0	1	0
495.0000	1052.50		1	0	1	0		0	1	0	1	0
	XA7 pins:		7	12	5	22		24	20	18	16	14

0 = TTL Low
1 = TTL High

4.7.4 DIGITAL CONTROL SECTION PERFORMANCE TESTS

4.7.4.1 Microprocessor Interrupt Performance Test

1. Set the receiver to the Standard Test Setting described in **Table 4-3**.

2. Connect channel 1 of the oscilloscope to the IRQ line at TP4 on the Microprocessor Assembly (A1A3).

3. Rotate the tuning wheel while observing the trace on the oscilloscope. Check for additional interrupt pulses while the tuning wheel is rotated.

4. Power down the unit. Verify 2.5 – 2.9 Vdc at A1A3 TP21 (VBATT).

4.7.4.2 A/D Circuits Performance Test

1. Set the receiver to the Standard Test Setting described in **Table 4-3**.

2. Remove the bottom cover of the receiver.

3. Locate resistor R1 on the Motherboard Assembly (A1).

4. While observing the front panel LO indicator, apply a ground short to the lead of R1 closest to the center of the motherboard. When the ground short is applied the LO indicator should be lit.

5. Connect the lead of the digital voltmeter to TP8 on the A/D Assembly (A1A4).

6. While observing the digital voltmeter select each IF bandwidth installed using the front panel IF BW key and the increment or decrement key.

7. Verify the voltage level is different for each IF bandwidth.

8. Extend the A/D Assembly.

9. Select the narrowest IF bandwidth installed (BW 1). Check for +12 Vdc at P1 pin 5.

10. Using the increment key select the next IF bandwidth (BW 2) and check for +12 Vdc at P1 pin 7.

11. Do the same procedure for IF bandwidths 3 through 5 at P1 pins 8, 10, and 12, respectively.

4.8 ALIGNMENT PROCEDURES

The following alignment procedures should not be performed on a routine basis. These procedures should be considered after repairs have been completed or as a touch-up after a subassembly has been replaced. Only after it has been determined that alignment is necessary, should any adjustment be made. The following alignments are for fine-tuning of the receiver. Their purpose is not to remedy grossly misaligned assemblies. **Table 4-6** lists the WJ-8615P standard unit settings to be utilized during the alignment procedures.

Table 4-6. Standard Alignment Settings

Parameter	Setting
CONTROL	LOCAL
FREQUENCY	100.0000 MHz
TUNING RATE	100 HZ
BFO	OFF
AGC	OFF
AFC	OFF
COR LEVEL	00
RF/IF GAIN	MAXIMUM
BANDWIDTH SELECT	500 kHz (or less)
DETECTION MODE	AM

The typical signal waveforms illustrated in the following alignment procedures are reproductions of actual waveform responses. Due to the variables involved with alignment, the equipment utilized, equipment settings, and component interaction, the waveforms should be used as alignment aids rather than waveform models. Oscilloscope voltage settings (V/DIV) will vary depending on the test equipment utilized.

4.8.1 AM/FM DEMODULATOR ALIGNMENT

NOTE

Unless otherwise stated, this procedure applies to Type 796754-1 and Type 797272-2 assemblies.

1. Remove the IF BW Filter module (A1A12) from the receiver and extend the AM/FM Demodulator module (A1A9) via the test extender board.
2. Set the receiver to the parameters listed in **Table 4-6**.
3. Connect the test equipment as illustrated in **Figure 4-7**.

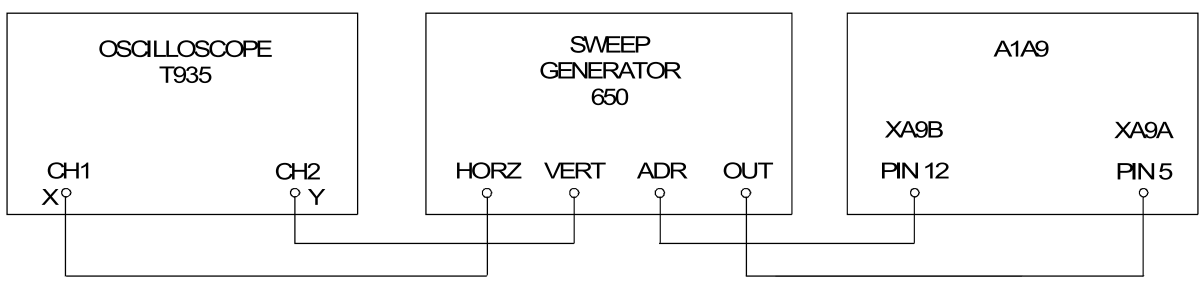

Figure 4-7. AM/FM Demodulator Alignment, Equipment Connections

4. Adjust the sweep generator controls to produce a 2 MHz wide response, centered at 21.4 MHz, and at a -50 dBm output level.
5. Adjust C5 and C9 for maximum flatness and symmetrical response, centered at 21.4 MHz, with a 3 dB bandwidth of approximately 800 kHz and a 0.5 dB bandwidth of 500 kHz.
6. Select an IF bandwidth greater than 500 kHz.
7. Adjust the sweep generator to optimize the displayed response. The response should be centered at 21.4 MHz and should be approximately 10 MHz wide at the 3 dB points at an output level of -50 dBm.
8. Connect the test equipment as illustrated in **Figure 4-8** and again set the receiver to the parameters listed in **Table 4-6**.
9. Adjust R93 for a 0 Vdc output reading on the voltmeter.
10. Select the FM detection mode, a bandwidth less than or equal to 50 kHz, and adjust R58 for a 0 Vdc reading at J5.
11. Select and IF bandwidth from 75 kHz to 500 kHz and adjust R28 for 0 Vdc on the digital voltmeter.

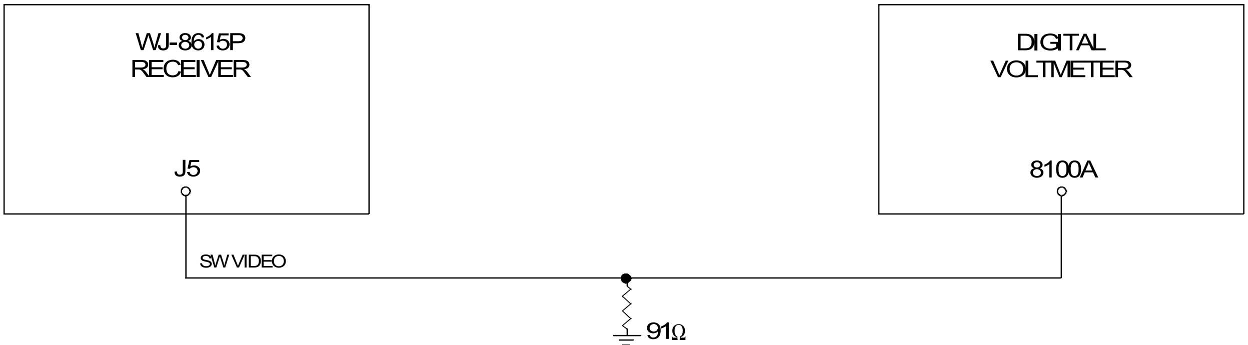

Figure 4-8. Video Alignment, Equipment Connections

12. Select an IF bandwidth greater than 500 kHz and adjust R74 for a reading of 0 Vdc on the voltmeter.

13. Connect the test equipment as illustrated in **Figure 4-9**. Set the sweep generator to produce a 100 kHz wide response, centered at 21.4 MHz, and at a -50 dBm output level.

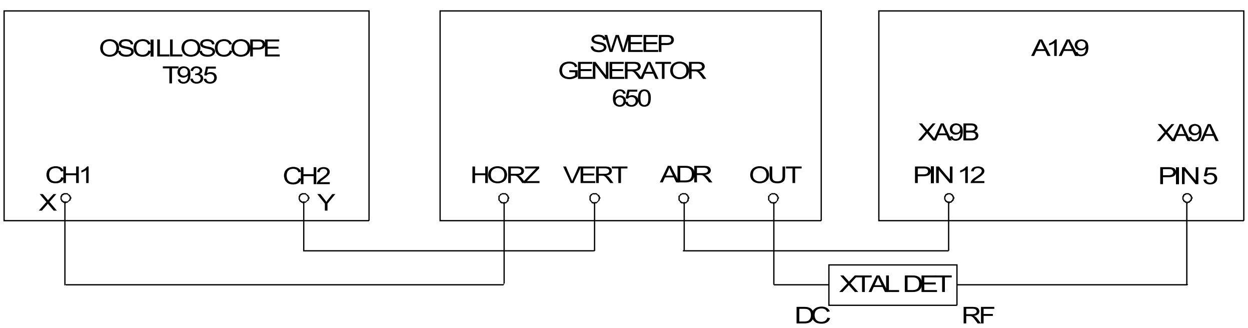

Figure 4-9. FM Discriminator Alignment, Equipment Connections

14. Select an IF bandwidth less than or equal to 50 kHz. Adjust L9 and L10 for best linearity and a zero crossing at 21.4 MHz. **Figure 4-10** illustrates a typical narrow band sweep response.

Figure 4-10. Typical Narrow Band FM Discriminator Response

15. Select an IF bandwidth from 75 kHz to 500 kHz. Set the sweep generator for a 1 MHz wide response. Adjust L7 for maximum linearity and a zero crossover at 21.4 MHz. **Figure 4-11** illustrates a typical midband response.

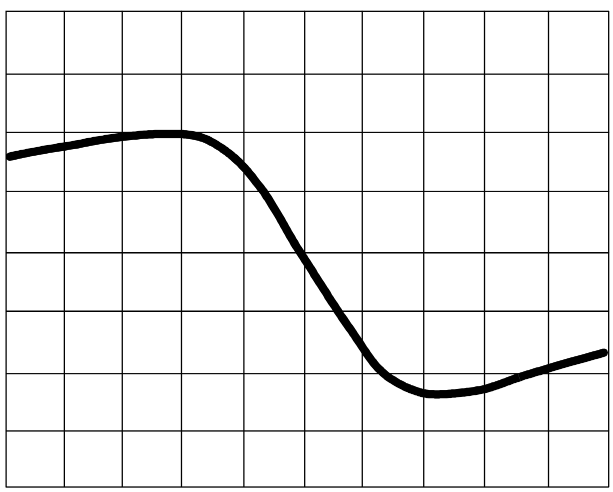

Figure 4-11. Typical Midband FM Discriminator Response

16. Select an IF bandwidth greater than 500 kHz. Adjust the sweep generator for a sweep width of 15 MHz. Adjust L14 and L15 (type 796754-1 only) for maximum linearity and a zero crossover at 21.4 MHz. Refer to **Figure 4-12** for a typical FM discriminator wideband response.

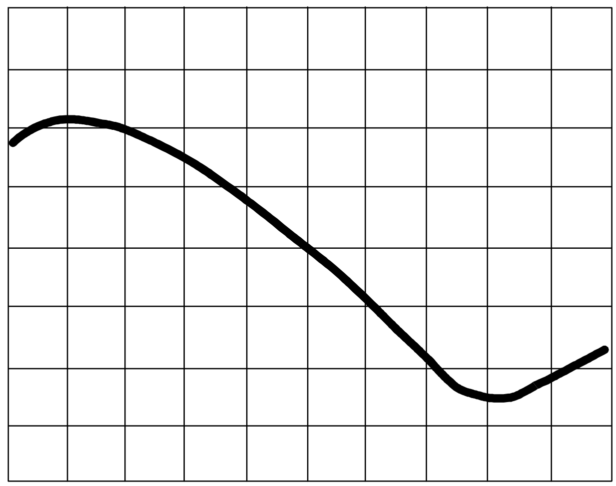

Figure 4-12. Typical Wideband FM Discriminator Response

17. Disconnect the test equipment from the receiver.

18. Set the receiver to the Diagnostics Mode.

19. Set the Detection mode to FM.

20. Set the AFC to OFF and set the AGC ON.

21. Tune the receiver to 0 MHz.

22. Select the narrowest IF bandwidth available below 50 kHz.

23. The signal strength field displays the FM discriminator offset A/D value from 0 to 255. Verify that this value is 127 ±3. If this value is not 127 ±3, adjust A1A9R58.

24. Select the narrowest IF bandwidth between 50 kHz and 500 kHz.

25. Verify that the FM discriminator offset A/D value is 127 ±3. If this value is not 127 ±3, adjust A1A9R28.

26. Select the narrowest IF bandwidth greater than 500 kHz.

27. Verify that the FM discriminator offset A/D value is 127 ±3. If this value is not 127 ±3, adjust A1A9R70 (type 796754-1) or A1A9A1R23 (type 797272-2).

28. Select AM detection mode, AGC to off, and RF ATTN to 0 dB.

29. Set resistors R75 and R80 on A1A9 to midrange.

30. Set AGC to ON.

31. Adjust R84 to give 2 to 4 dB of attenuation at rated sensitivity. Refer to **Table 1-2**.

32. Disable AGC and set RF ATTN to 0 dB.

33. Connect channel 1 of the oscilloscope to J5 (SW VID).

34. Note the signal level on the oscilloscope (DC coupled) of the video output for future reference.

35. Reconnect the signal generator to the antenna input (J10).

36. Set the power level of the signal generator so the signal on the oscilloscope is now 20 dB above the reference noted in step 24.

37. Adjust R75 to obtain the video output level note in step 24.

38. Reduce the power level on the signal generator by 10 dB.

39. Set RF ATTN to 10 dB.

40. Adjust R80 and R75 until the video output is again equal to the reference noted in step 24.

41. Set the reference generator level to 5 dB above the rated sensitivity of the receiver.

42. Set RF ATTN to 5 dB.

43. Verify the video output is close to the reference level noted in step 24.

44. Repeat steps 24 through 33 until the RF attenuation function is within ±1 dB of the actual level change of the signal generator.

4.8.2 IF BANDWIDTH CODE ADJUSTMENT

1. Set the receiver to the Diagnostics mode.
2. Set the detection mode to FM.
3. Select the narrowest IF bandwidth installed.
4. Verify the IF BW kHz display indicates a decimal value code for the selected IF bandwidth as listed in **Table 4-7**.
5. If the decimal code is not within the minimum and maximum values listed in **Table 4-7**, adjust resistor R3 on the Analog/ Digital Assembly (A1A4) until it does (center is ideal).
6. Repeat steps 3 through 5 for all installed IF bandwidths.

Table 4-7. IF Bandwidth Code Decimal Values

IF Bandwidth (kHz)	Bandwidth Code (Decimal Value) Minimum	Center	Maximum
3.2	32	38	44
6.4	45	51	57
10	58	64	70
15	71	78	82
20	83	90	95
50	109	115	121
75	136	142	147
100	148	153	158
250	159	164	171
300	173	180	185
500	186	190	196
1000	197	204	210
2000	211	219	224
4000	225	230	235

4.8.3 POWER-UP THRESHOLD ADJUSTMENT

1. Connect the AC power cord of the WJ-8615P to a Model W5MT3W autotransformer (Variac).
2. Connect channel 2 of a two-channel oscilloscope to the PFAIL* signal at A1A3TP22.
3. Connect channel 1 of the oscilloscope to the +5 Vdc signal at A1A5TP7.
4. Set the Variac to 117 VAC and turn on the WJ-8615P.

5. While observing the trace on channel 1 of the oscilloscope, adjust the output of the Variac down until the lowest part of the valleys of the ripple are at +4.5 Vdc. This occurs at approximately 70 VAC on the Variac.

6. While observing the PFAIL signal on channel 2 of the oscilloscope, adjust A1A3R8 until the signal toggles between Vcc and ground. Also, while adjusting A1A3R8, verify the valleys on the channel 1 trace remain at +4.5 Vdc as in step 5.

7. Set the Variac to 117 VAC.

8. Turn the receiver off and on several times. Verify that an error 230 is not generated and that the receiver powers up normally each time. An error 230 is an indication that the power-down voltage is set too low. If the receiver does not always power up, the power-down voltage is set too high. If either an error 230 is generated or the receiver does not always power up, repeat steps 5 and 6.

4.8.4 BFO COUNTER TIMER ADJUSTMENT (ERROR 240)

In the event that the Synthesizer Interface Assembly has been replaced or an ERROR 240 has occurred, perform the following procedure.

1. Power up the receiver in normal mode (not in Diagnostics mode).

2. Set detection mode to CW.

3. Connect channel 1 of the oscilloscope to TP5 on the Synthesizer Interface Assembly (A1A5).

4. Measure the width of the pulse on the oscilloscope from its leading edge to its falling edge (See **Figure 4-13**). The pulse should be 50 ms wide.

5. If not, adjust R6 to obtain 50 ms width.

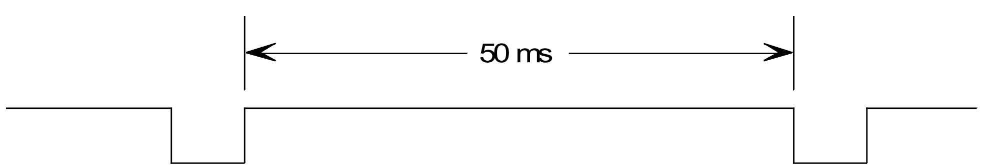

Figure 4-13. BFO Timer Pulse

4.8.5 A1A3U7 INTERNAL BATTERY FAULT ISOLATION PROCEDURES (ERROR 108)

In the event that an ERROR 108 has occurred (receivers with software versions earlier than 0.1.0) or that the receiver has locked up during power-up (receivers with software version 0.1.0 and later), the internal battery in the Real Time Clock chip (A1A3U7) may be dead and A1A3U7 may need replacement.

Receivers with software versions earlier than 0.1.0 can not be operated while ERROR 108 is displayed. Power may be cycled in an attempt to clear the fault. If the fault does not clear, A1A3U7 must be replaced.

Receivers with software version 0.1.0 and later can be operated by quickly cycling the power off and on. The battery can be checked by setting the receiver's time, shutting the receiver off for five to ten minutes, turning the receiver on, and checking the receiver's time. If the time is not correct, A1A3U7 needs replacement. Typically, the internal battery lasts two to three years in spare boards or in receivers that are rarely used. The internal battery can last up to ten years in continuously operating receivers.

When replacing A1A3U7 ensure that pin 1 of A1A3U7 is aligned with pin 3 of the circuit board. Pins 1, 2, 27, and 28 on the circuit board are not used by A1A3U7. Carefully pry U7 from its sockets and replace it with a new MK48T12B-20. A1A3U7 is a socketed-in-place component, not a soldered-in-place one. No attempts should be made to solder or desolder A1A3U7.

Refer to **Figure 5-3** to locate the Microprocessor A1A3 assembly.

4.9 REMOVAL AND REPLACEMENT PROCEDURES

4.9.1 GENERAL GUIDELINES

After taking off the top panel of the WJ-8615P by removing ten screws and sliding off the cover, it is generally easy to remove and replace many of the unit's modules. Many modules are seated in motherboard connections. For easy withdrawal of most modules, insert a card puller tool into the holes provided along the top ridge of the module and pull with steady pressure. To replace modules, position modules so that puller holes are located at the top and bottom ridge connectors are mated cleanly with motherboard connections and push down with steady pressure. To replace the cover, slide it into position and replace ten screws.

CAUTION

When replacing the top cover, never use screws longer than 5/16 of an inch. Using longer screws may cause damage to the equipment.

The following procedures provide detailed instruction for removing the A1A1 through A1A14 Assemblies.

4.9.2 **A1A3, A1A4, A1A5, A1A8, A1A9, A1A10, and A1A12 REMOVAL AND REPLACEMENT**

To remove and replace the Microprocessor (A1A3), Analog/Digital (A1A4), Synthesizer Interface (A1A5), Reference Generator (A1A8), AM/FM Demodulator (A1A9), Audio/Video (A1A10), or IF Bandwidth Filter Amplifier (A1A12) Assemblies, follow the general guidelines outlined in **paragraph 4.9.1**. Note that the Type 796754-1 and the Type 797272-1 AM/FM Demodulator Assemblies (A1A9) are form, fit, and function replacements for each other.

4.9.3 **FRONT PANEL DISPLAY (A1A1) REMOVAL AND REPLACEMENT**

To remove and replace the Front Panel Display Assembly, proceed according to the following steps:

1. Remove four screws and associated lock washers located on the right and left vertical edge of the front panel using a #2 phillips screwdriver. Do not remove black anodized screws retaining the front panel bezel.

2. Disconnect ribbon cable W5 from the A1A1J1 connector using a flat screwdriver to provide leverage under the connector in a manner that will prevent the bending of connector pins. Note that the red edge of the cable faces upward when correctly installed.

3. Using a #1 phillips screwdriver, remove four standoff screws and associated flat and lock washers. Note that the larger flat washer is installed closer to the PC board than the smaller lock washer.

4. Remove the board from the front panel's keyboard opening.

5. This completes the Front Panel Display Assembly's removal. To replace the A1A1 assembly, reverse **steps 1** through **4**. If unable to properly align the #2 screws into the holes in the side panels when reversing **step 1**, remove the A1A2 assembly to gain sufficient flexibility to insert the screws property. Once A1A1 is installed, re-install the A1A2 assembly.

4.9.4 **IEEE-488/INTERRUPT ASSEMBLY (A1A2) REMOVAL AND REPLACEMENT**

To remove and replace the IEEE-488/Interrupt Assembly (A1A2), proceed as follows:

1. Remove flat cable W1 from A1A2J1 by pulling the mating connector upwards. This connector is located on the top edge of the board.

2. Using a card puller, remove A1A2 from its motherboard connection.

3. Remove plug P22 from the J1 connector on the AUX Serial Interface subassembly (A1A2A1). Note that pin1 is marked with a dot and that it mates with the farthest right pin in the front pin row.

4. This completes the removal of the A1A2 Assembly. To re-install A1A2, observe the general guidelines and reverse **steps 1** through **3**. Take care to ensure that the wiring associated with the PHONES jack and AUX serial connector are properly dressed before reseating the card in its motherboard connection.

4.9.5 AUX SERIAL INTERFACE SUBASSEMBLY (A1A2A1) REMOVAL AND REPLACEMENT

To remove the AUX Serial Interface Subassembly, proceed according to the following steps.

1. Remove the IEEE-488/Interrrpt Assembly (A1A2) in accordance with **paragraph 4.9.4**.

2. Using a #1 phillips screwdriver, remove four standoff screws and associated flat and lock washers. Note that the lock washer is positioned closest to the board.

3. To replace this assembly, reverse **steps 1** and **2**.

4.9.6 SECOND LO (A1A6) ASSEMBLY REMOVAL AND REPLACEMENT

To remove the 776017-1 or the 797426-1 Second LO Assembly and to replace it with an assembly of the same type number, proceed according **steps 1** through **3**. If replacing an A1A6 with an assembly having a different type number, add **step 4**.

1. Using pliers, remove pull-off plug A1P4 associated with cable A1W2 from connector A1A6J1. A1A6J1 is located on the rear of the top edge of the assembly.

CAUTION

Take care not to strip components off of board when removing the assembly in the next step.

2. Remove the assembly from the unit by using a card puller to free the assembly from its motherboard connection.

3. This completes the removal of the Second LO Assembly. To replace the assembly, observe the general guidelines and reverse **steps 1** and **2**.

4. The Type 776017-1 and the Type 797426-1 Assemblies are not functional replacements for each other. An EEPROM on the Microprocessor Assembly (A1A3) must also be swapped. Refer to Table A on **FO-26**. Replace A1A3U9 as indicated by the table.

4.9.7 FIRST LO (A1A7) ASSEMBLY REMOVAL AND REPLACEMENT

To remove and replace the First LO Assembly, proceed according to the following steps:

1. Using a card puller, unseat the assembly from its motherboard connection.

2. Slide the assembly one-third of the way up in order to gain access to A1A7J1.

3. Using pliers, remove plug A1P6 from the A1A7J1 connector. Remove the assembly through the top of the unit.

4. This completes the removal of the First LO Assembly. To replace the assembly, observe the general guidelines and reverse **steps 1** through **3**.

4.9.8 ISB DEMODULATOR (A1A11) ASSEMBLY REMOVAL AND REPLACEMENT

To remove and replace ISB Demodulator Assembly, proceed as follows:

1. Remove A1A11W1 from J16.

2. Follow the general guidelines in **paragraph 4.9.1** to complete removal.

3. To replace the ISB Demodulator Assembly, reverse **steps 1** and **2**.

CAUTION

Do not provide undue stress to hidden cable in the following step.

4. Gently remove the A1A4 Assembly from its motherboard connector and lift the module until the 2nd LO input A1A14J2 is visible. Remove the pull-off cable with the aid of pliers.

5. The removal is complete. To re-install the module, refer to general guidelines and reverse **steps 1** through **4**.

4.9.9 PRESELECTOR ASSEMBLY (A1A14) REMOVAL AND REPLACEMENT

To remove and replace the Preselector Option Assembly (A1A14), proceed as follows:

1. Refer to **Figure 5-3** to locate the Frequency Extender A3, the A1A14 Preselector Option, and the A1A13 Preamplifier Converter Assemblies. Find cable W4 that runs between the A3 and A1A14 assemblies along the top of the unit.

2. Remove cable W4 from A1A14J1 using a 7/32-inch wrench.

3. Locate cable A1A14W1 that runs between the A1A14 and A1A13 assemblies. Pull the connector associated with A1A14W1 off of A1A13J3 using needle nose pliers.

4. Remove A1A14 using a card puller tool according to general guidelines.

5. The removal is complete. To re-install the module, refer to general guidelines and reverse **steps 1** through **4**.

4.9.10 ISB DEMODULATOR (A1A11) ASSEMBLY REMOVAL AND REPLACEMENT

To remove and replace the ISB Demodulator Assembly, proceed as follows:

1. Remove A1A11W1 from J16.

2. Follow general guidelines in **paragraph 4.9.1** to complete removal.

3. To replace the ISB Demodulator Assembly, reverse **steps 1** and **2**.

4.9.11 PREAMPLIFIER CONVERTER (A1A13) REMOVAL AND REPLACEMENT

To remove the Preamplifier Converter Assembly, proceed according to the following steps:

1. Remove the Preselector Option Assembly A1A13 according to **paragraph 4.9.9**.

2. Find the U-shaped metal shield located at the front left side of the A1A13 module. Note how the flat right side of the bracket butts up against the A1A13 Assembly. Grasp the shield with pliers and pull upward with steady pressure to allow access to the 1st LO input A1A13J1.

3. Grasp the pull-off cable connected to A1A13J1 by grasping the connector side of the cable with pliers and pulling gently.

CAUTION

Do not provide undue stress to the hidden cable in the following step.

4. Gently remove the A1A13 Assembly from its motherboard connector and lift the module until the 3rd LO input A1A13J3 is visible. Remove the pull-off cable with the aid of pliers.

5. The removal is complete. To re-install the module, refer to general guidelines and reverse **steps 1** through **4**.

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SECTION V

REPLACEMENT PARTS LIST

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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 components. 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 that are an integral part of the main chassis have no subassembly designations.

5.2 PROVISIONING NOTE - INCONSISTENCIES IN PART NUMBERING CONVENTIONS

The internal computer applications at the factory have undergone upgrades to better serve our customers. With this upgrade came alterations to the numbering scheme for parts reporting to an end item. Due to these alterations, minor inconsistencies may exist between identifying parts numbers found on drawings, piece parts, or other documentation. No form fit and function specifications have been altered due to this change in the numbering scheme.

The inconsistencies take two forms. New part number conventions mandate the use of three-digit suffixes for part numbers used within computer applications. Part numbers having single-digit suffixes have been altered by the addition of leading zeroes. Therefore, a piece part with an identifying number having a suffix of “-2” may be represented in a computer-generated document with a part number having a suffix of “-002”. Also the new part numbering convention requires that the base portion of a part number be made up of six digits. Part numbers with base portions with less than six digits are expressed with leading zeroes to meet this requirement. Accordingly, a part number having a base of “34456” may appear as “034456”. If you have questions or concerns regarding the configuration identification of piece parts, contact the plant for additional information at 1-800-954-3577.

5.3 REFERENCE DESIGNATION PREFIX

Partial reference designations have been utilized on the equipment and on the drawings and illustrations in this manual. The partial reference designations consist of the class letter(s) and identify the component number. The complete reference designations may be obtained by placing the proper prefix (subassembly designation) before the partial reference designations.

5.4 **LIST OF MANUFACTURERS**

Mfr. Code	Name and Address
00681	Catalyst Research Corp. 1421 Clark View Road Baltimore, MD 21209
00779	Amp Incorporated P. O. Box 3608 Middletown, PA 17105-3608
01121	Allen-Bradley Company 1201 South 2nd Street Milwaukee, WI 53204
0EXD1	Inductor Supply Company 15206 Transistor Lane Huntington Beach, CA 92649
02735	RCA Corporation Solid State Division 2872 Woodcock Blvd. Suite 304 Atlanta, GA 30341-4002
04013	Taurus Corporation 1 Academy Hill Lambertville, NJ 08530
04213	Caddell-Burns Manufacturing 40 East 2nd Street Mineola, NY 11501
04222	AVX Ceramics 19th Avenue South P.O. Box 867 Myrtle Beach, SC 29577
04713	Motorola, Incorporated Semiconductor Products Div. 5005 East McDowell Road Phoenix, AZ 85008
05245	Corcom, Incorporated 1600 Winchester Road Libertyville, IL 60048-1267
06090	Raychem Corporation 300 Constitution Drive Menlo Park, CA 94025
01281	TRW Semiconductors, Inc. 14520 Aviation Blvd. Lawndale, CA 90260
01295	Texas Instruments, Inc. Semiconductor Division. 13500 North Central Expressway Dallas, TX 75265-5303
02113	Coilcraft Incorporation 1102 Silver Lake Rd. Cary, IL 60013-1658
02114	Amperex Electronic Corp. Ferroxcube Division 5083 Kings Highway Saugerties, NY 12477
14632	DRS Signal Solutions, Inc. 700 Quince Orchard Road Gaithersburg, MD 20878
14674	Corning Glass Works Houghton Park Corning, NY 14830
15542	Mini-Circuits Laboratories P.O. Box 350165 Brooklyn, NY 11235
16179	M/A-COM, Inc. M/A-COM Central Components Div. 21 Continental Blvd. Merrimack, NH 03054-4304
17217	W.L. Gore and Assoc. 555 Paper Mill Rd. Newark, DE 19714
17856	Siliconix, Incorporated 2201 Laurelwood Road Santa Clara, CA 95050
18324	Signetics Corporation 811 East Arques Avenue Sunnyvale, CA 94086

Mfr. Code	Name and Address	Mfr. Code	Name and Address
06540	Amaton Electronics 446 Blake Street New Haven, CT 06515	18778	Thomson-Components and Tubes 40G Commerce Way Totowa, NY 07511
09021	Airco Electronics P.O. Box 547 Bradford, PA 16701	19449	Berk-Tek, Inc. 132 White Oak Road New Holland, PA 17757
09353	C&K Components, Inc. 15 Riverdale Avenue Newton, MA 02158	19505	Applied Engineering Products 104 John. W. Murphy Dr. P.O. Box 510 New Haven, CT 06513
14482	Watkins-Johnson Company 3333 Hillview Avenue Palo Alto, CA 94804	22526	Berg Electronics, Inc. 515 Fishing Creek Road New Cumberland, PA 17070
24355	Analog Devices, Inc. P.O. Box 280 Norwood, MA 02062	32293	Intersil Incorporated 10600 Ridgeview Court Cupertino, CA 95014
24539	Avantek Incorporated 3175 Bowers Avenue Santa Clara, CA 95051	32897	Erie Frequency Control 644 West 12th Street Carlisle, PA 17013
25088	Siemen's America, Inc. 186 Wood Avenue South Iselin, NJ 08830	33095	Spectrum Control, Inc. World Headquarters 6000 W. Ridge Road Erie, PA 16505
26629	Frequency Sources, Inc. Loral Microwave-FSI Division 16 Maple Road Chelmsford MA 01824-3737	33297	NEC Electronics 550 E. Middlefield Road Mountain View, CA 94043
27014	National Semiconductor 2900 Semiconductor Drive Santa Clara, CA 95051	34371	Harris Corporation Harris Semiconductor Prod. Grp. 200 Palm Bay Boulevard P.O. Box 883 Melbourne, FL 32919
27956	Relcom 3333 Hillview Avenue Palo Alto, CA 94304	34649	Intel Corporation 3065 Bowers Avenue Santa Clara, CA 95051
28480	Hewlett-Packard Company 1501 Page Mill Road Palo Alto, CA 94304	36665	Mitel Corporation P.O. Box 13089 350 Leggett Drive Kanata, Ontario Canada

Mfr. Code	Name and Address
29990	American Technical Ceramics 1 Norden Lane Huntington Station, NY 11746
2S894	Digi-Key Corp. Three River Falls, MN 800-344-4539
31433	Kemet Electronics Corp. 2835 Kemet Way Simpsonville, SC 29681
31745	Rogers Corporation 2001 West Chandler Blvd. Chandler, AZ 85224
52648	Plessy Semiconductors 3 Whatney Drive Irvine, CA 92714
52673	KSW Electronics South Bedford Street Burlington, MA 01803
53469	Plessey Semiconductors Corp. 1500 Green Hills Rd. Scotts Valley, CA 95067
54473	Matsushita Elec. Corp. One Panasonic Way P.O. Box 1501 Secaucus, NJ 07094-2917
55027	Q-Bit Corporation 311 Pacific Avenue Palm Bay, FL 32905
55322	Santec Incorporated P.O. Box 1147 810 Progress Blvd. New Albany, IN 47150
56289	Sprague Electric Company 300 Minuteman Road North Adams, MA 01247
59124	KOA Speer Electronics, Inc. Bolivar Drive Bradford, PA 16701

Mfr. Code	Name and Address
4W715	Linear Technology, Inc. 1630 McCarthy Blvd. Milpitas, CA 95035
50101	Frequency Sources, Inc. 16 Maple Road South Chelmsford, MA 01824
51167	Aries Electronics, Inc. P.O. Box 130 62 Trenton Avenue Frenchtown, NJ 08825
51642	Centre Engineering, Inc. 2820 East College Avenue State College, PA 16801
64155	Linear Technology Corp. 1630 Mccarthy Blvd. Milpitas, CA 95035-7487
71279	Midland-Ross Corporation One Alewife Place Cambridge, MA 02140
72982	Erie Specialty Products, Inc. 645 West 11th Street Erie, PA 16512
73138	Beckman Instruments, Inc. 2500 Harbor Blvd. Fullerton, CA 92634
74306	Piezo Crystal Company 100 K Street Carlisle, PA 17013
75378	CTS Knights, Inc. 400 Reimann Avenue Sandwich, IL 60548
75915	Little Fuse Tracor, Inc. 800 E. Northwest Highway Des Plaines, IL 60016-3049
79515	EMCO Wheaton, Inc. Union, NJ 07033

Mfr. Code	Name and Address	Mfr. Code	Name and Address
59660	Tusonix Incorporated 2155 North Forbes Blvd. Tuscon, AZ 85745	80131	EIA Specifications
61271	Fujitsu Microelectronics, Inc 3545 N 1st St. Bldg. 1 San Jose, CA 95134-1804		World Products, Inc. P.O. Box 517 19678 8th Street East Sonoma, CA 95476
62786	Hitachi America Ltd. 100 Aero Seal Drive San Jose, CA 95122	7K104	Belden Corporation 2000 South Batavia Avenue Geneva, IL 60134
63155	Synergy Microwave Corporation 483 Mclean Blvd. And 18th Ave Paterson, NJ 07504-1000	80294	Bourns Instruments, Inc. 6135 Magnolia Avenue Riverdale, CA 92506
81073	Grayhill Incorporated P.O. Box 10373 561 Millgrove Avenue La Grange, IL 60525	94271	Weston Industries, Inc. Components Division Archbald, PA 18403
81349	Military Standards	95121	Quality Components, Inc. P.O. Box 113 St. Marys, PA 15857
91293	Johanson Manufacturing Co. P.O. Box 372 Booton, NJ 07005	95146	Alco Electronic Corporation 1551 Osgood Street North Adams, MA 01845
91506	Augat Incorporated 33 Perry Avenue Attleboro, MA 02703	98291	ITT Sealectro 585 E. Main Street New Britain, CT 06051
92194	Alpha Wire Corp. 711 Lidgenwood Avenue Elizabeth, NJ 07207	99800	American Precision Ind. Delevan Electronics Div. 270 Quaker Road Aurora, NY 14052

5.5 REPLACEMENT PARTS LIST

The following parts list contains all of the electrical components which may be subject to unusual wear or damage. When ordering replacement parts from the factory, specify the unit type and serial number along with the reference designation and the complete description of each part ordered. The list of manufacturers provided in **paragraph 5.3**, and the manufacturer's component part number are included as an aid to the user of the equipment in the field. Replacement components may be obtained from any manufacturer, as long as the physical and electrical parameters of the part selected agree with the originally specified component. In the case where components are defined by military or industrial specifications, a vendor that can provide the necessary component is suggested as a convenience to the user.

NOTE

As improved semi-conductors become available, it is the policy of the factory to incorporate these devices in proprietary products. For this reason, some transistors, diodes, and integrated circuits installed in this equipment may not agree with the components specified in the parts list and schematic diagrams of this manual. However, the semi-conductors listed in this manual may be substituted, in every case, with satisfactory results.

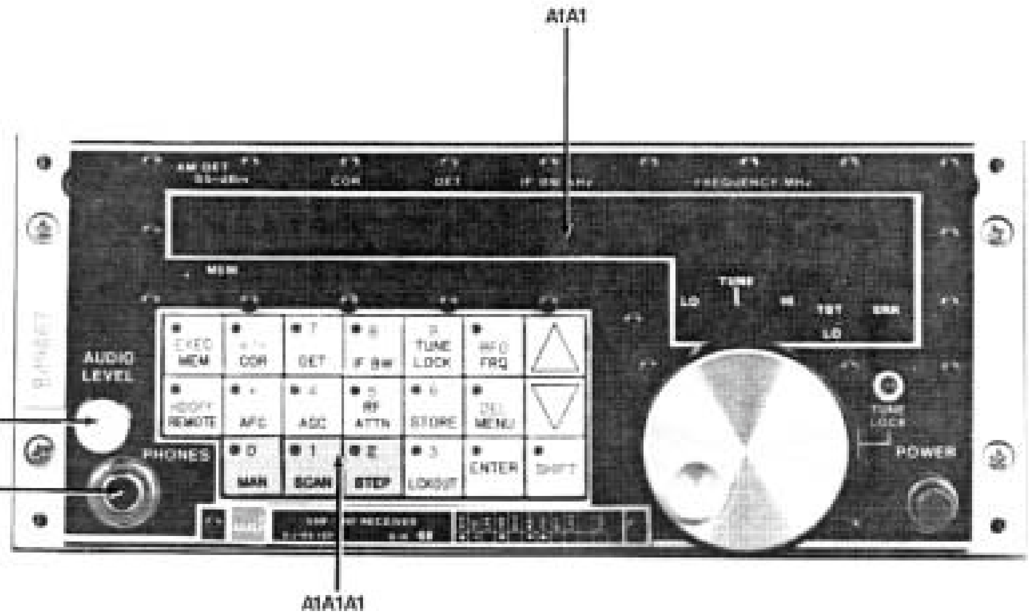


Figure 5-1. Type WJ-8615 VHF/UHF Compact Receiver, Front View, Location of Components

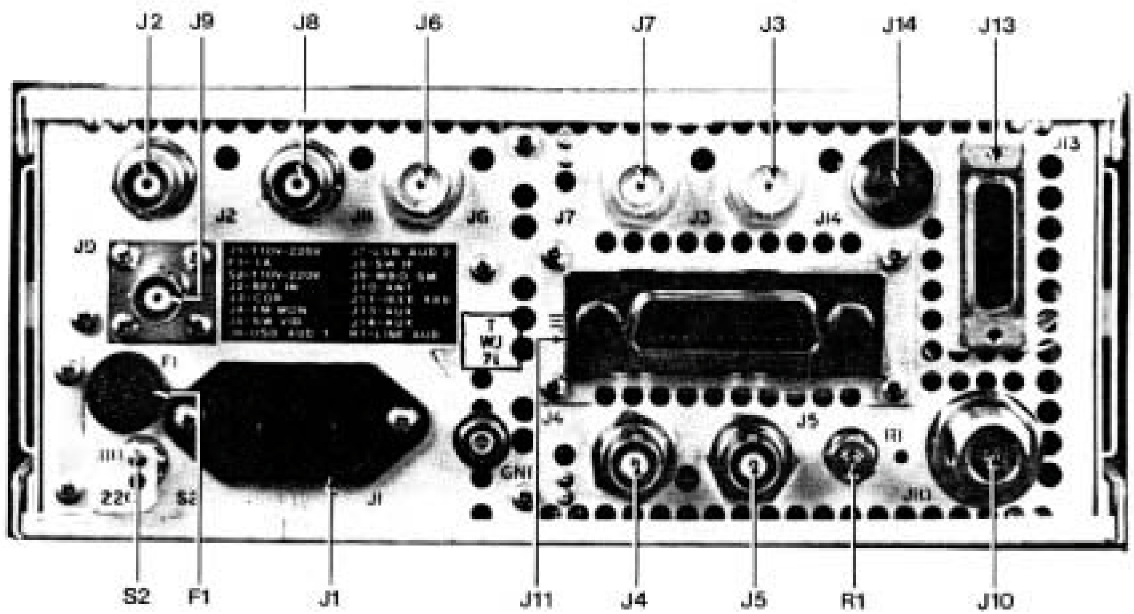


Figure 5-2. Type WJ-8615P VHF/UHF Compact Receiver, Rear View, Location of Components

5.6 TYPE WJ-8615P VHF/UHF COMPACT RECEIVER — MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision G1				
A1	Motherboard Assembly	1	796629-3	14632	
A2	Wideband Output Assembly (Optional)				
A3	Frequency Extender Assembly (Optional)				
A4	Not Used				
A5	Fan Filter Assembly	1	796638-1	14632	
A6	Selected Audio Output Assembly (Optional)				
A1A1	Front Panel Display Assembly	1	796823-1	14632	
A1A1A1	Front Panel Keyboard Assembly	1	796822-1	14632	
A1A2	IEEE 488/Interrupt PC Assembly	1	796627-2	14632	
A1A2A1	Auxiliary Serial Interface Assembly	1	796631-2	14632	
A1A3	Microprocessor Assembly	1	796495-12	14632	
A1A3U9	Programmed Eprom (See Notes 1 and 2)	1	841475	14632	
A1A4	Analog/Digital Assembly	1	796772-1	14632	
A1A5	Synthesizer Interface PC Assembly	1	796245-1	14632	
A1A6	2nd LO Synthesizer PC Assembly (See Note 1)	1	776017-1	14632	
A1A6	2nd LO Synthesizer PC Assembly (See Note 2)	1	797426-1	14632	
A1A7	1st LO Synthesizer PC Assembly	1	796869-1	14632	
A1A8	Reference Generator PC Assembly	1	796747-1	14632	
A1A9	AM/FM Demodulator PC Assembly	1	797272-1	14632	
A1A10	Audio/Video PC Assembly	1	796622-100	14632	
A1A11	CW Demodulator PC Assembly	1	796755-2	14632	
A1A12	IF BW Filter PC Assembly	1	726016-X	14632	
A1A13	Preamplifier Converter PC Assembly	1	796251-1	14632	
A1A14	RF Input Attenuator PC Assembly	1	796291-1	14632	
B1	Blower Fan	1	180507-1	14632	
C1	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	2	34453-1	14632	
C2	Same as C1				
F1	Fuse, 1 Amp	1	218001	79515	
FB1	Ferrite Bead	10	56-590-65--4A	02114	
FB2 Thru FB10	Same as FB1				
FL1	Filter	3	1240-030-0000	72982	
FL2	Filter	2	52-706-301	33095	
FL3	Same as FL2				
FL4	Same as FL1				
FL5	Same as FL1				

NOTES
1 Type 776017-1 requires A1A3U9 Eprom P/N 841475-1
2 Type 797426-1 requires A1A3U9 Eprom P/N 841475-2

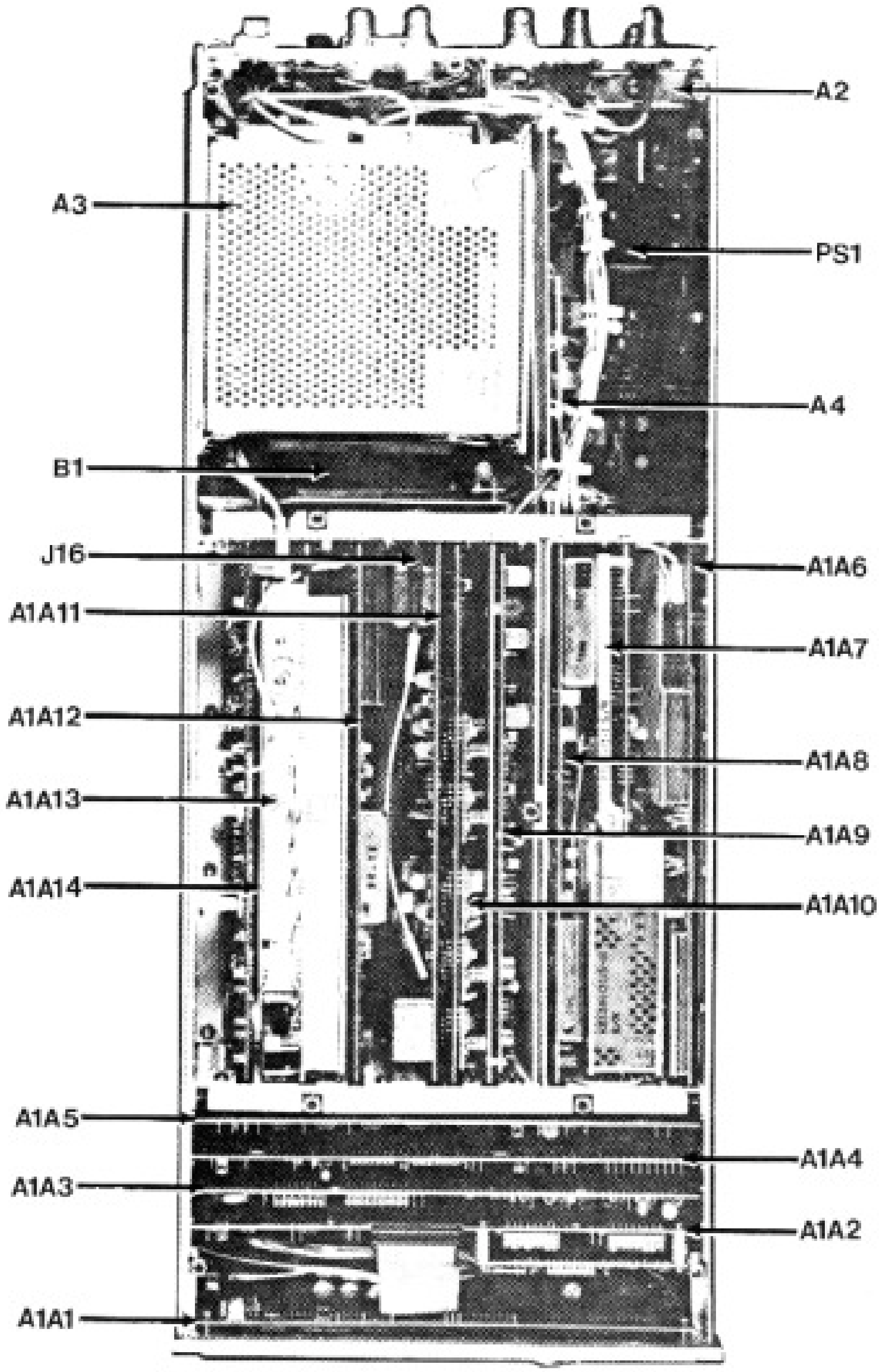


Figure 5-3. Type WJ-8615P VHF/UHF Compact Receiver, Top View, Location of Components

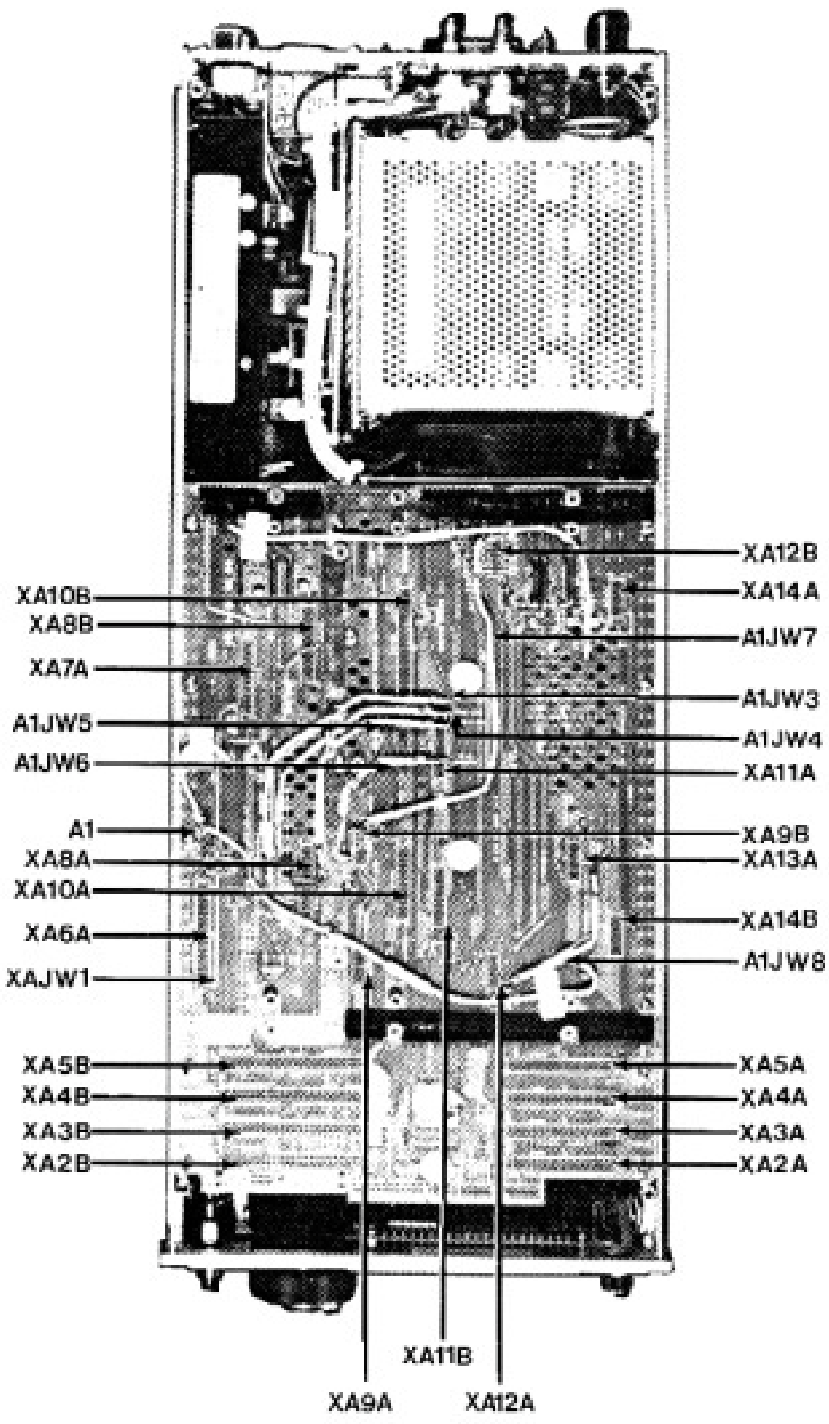


Figure 5-4. Type WJ-8615P VHF/UHF Compact Receiver, Bottom View, Location of Components

MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
FL6	Filter, EMI	1	841427	14632	
J1	Filter, Power	1	1EF1	05245	
J2	Connector, Receptacle	2	225398-7	00779	
J3	Part of FL1				
J4	Part of FL2				
J5	Part of FL3				
J6	Part of FL4				
J7	Part of FL5				
J8	Same as J2				
J9	Adapter, BNC	1	5504-7501-000	19505	
J10	Connector, Jack	1	3004-7388-10	16179	
J11	Connector, Receptacle	1	554349-1	00779	
J12	Phone Jack, Three Conductor	1	L-112B	82389	
J13	Connector, Filtered	1	842926-3	00779	
J14	Used with A6 Option				
J15	Connector, Jack	1	2106-7521-025	19505	
J16	Connector, Jack	1	2106-7521-019	19505	
P1	Part of A3 Option				
P2	Connector, Housing	2	87499-7	00779	
P3	Connector, Shell	2	87499-9	00779	
P4	Connector, Housing	1	2-87499-1	00779	
P5	Part of A2 Option				
P6	Same as P3				
P7	Part of A3 Option				
P8	Connector, Receptacle	3	499568-6	00779	
P9	Not Used				
P10	Connector, Plug, SMB	1	50-328-3875-91	19505	
P11	Housing, Connector	1	87456-4	00779	
P12	Housing, Connector	1	87456-6	00779	
P13	Connector, Shell	1	87456-8	00779	
P14	Not Used				
P15	Connector, Plug	1	2105-7521-025	19505	
P16	Not Used				
P17	Connector, Housing	2	102269-4	00779	
P18	Same as P17				
P19	Housing, Connector	1	640440-3	00779	
P20	Housing, Connector	1	2-64044-0	00779	
P21	Connector, Plug	1	1-87499-1	00779	
P22	Connector, Housing	1	87456-2	00779	
P23	Same as P8				
P24	Same as P8				
PS1	Power Supply	1	481447-1	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			MAIN CHASSIS		
R1	Resistor, Variable, Composition: 50 kΩ, 10%, 1 W	1	70C3L040L503U	01121	
R2	Resistor, Variable, Composition: 10 kΩ, 10%, 1 W	1	GDIN048S103AA	01121	
RT1	Thermistor, Modified	1	180278-2	14632	
S1	Switch, Pushbutton	1	8161-S-H-Z3-QE	09353	
U1	Encoder Assembly	1	SP-16	14632	
W1	Cable Assembly	1	380511-1	14632	
W2	Cable Assembly	1	280574-1	14632	
W3	Cable Assembly	1	280575-1	14632	
W4	Cable Assembly (Not Installed with FE)	1	280573-1	14632	
W5	Cable Assembly	1	281504-2	14632	
W6	Cable Assembly	1	383019-1	14632	
	Accessory Items				
AI-1	Line Cord, 3 Conductor, 6 FT	1	17600	16428	
AI-2	Center Support Bracket	1	280505-1	14632	
AI-3	Handle, PC Board	1	15689-1	14632	
AI-4	Alignment, Adjusting Tool	1	5284	73899	
AI-5	Connector, Plug	1	205206-1	00779	

5.6.1 TYPE 796629-3 MOTHERBOARD ASSEMBLY — REF DESIG PREFIX **A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision D1				
C1	Capacitor, Ceramic, Disc: .01 µF, 5%, 50 V	15	RPE110-X7R103K50V	72982	
C2 Thru C7	Same as C1				
C8	Capacitor, Ceramic, Monolithic: 47 pF, 2%, 100 V	1	150-100-NPO-470J	51642	
C9	Not Used				
C10	Not Used				
C11	Capacitor, Ceramic, Monolithic: 470 pF, 2%, 100 V	9	150-100-NPO-471G	51642	
C12 Thru C17	Same as C11				
C18 Thru C22	Same as C1				
C23	Capacitor, Ceramic, Disc: .01 µF, 10%, 100 V	36	CK05BX103K	81349	
C24 Thru C30	Same as C23				
C31	Same as C1				
C32	Not Used				
C33	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	33	34453-1	14632	
C34	Same as C33				
C35 Thru C38	Same as C23				
C39	Same as C1				
C40	Same as C23				
C41	Same as C23				
C42	Same as C1				
C43 Thru C64	Same as C23				
C65	Not Used				
C66	Same as C33				
C67	Same as C11				
C68	Same as C11				
C69 Thru C95	Same as C33				
C96	Capacitor, Ceramic, Disc: .1 µF, 20%, 100 V	3	RPE122-Z5U104M100V	72982	
C97	Same as C96				
C98 Thru C100	Same as C33				
C101	Same as C96				
C102	Capacitor, Ceramic: .01 µF, 10%, 50 Vdc	7	841250-19	14632	
C103 Thru C108	Same as C102				

REF DESIG PREFIX **A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
CR1	Diode	2	1N4449	80131	
CR2	Same as CR1				
J1	Post, Feedthru	1	280567-4	14632	
J2	Post, Feedthru	1	280567-2	14632	
J3	Post, Feedthru	1	280567-3	14632	
J4	Post, Feedthru	1	280567-6	14632	
J5	Post, Feedthru	1	280567-1	14632	
J6	Post, Feedthru	1	280567-3	14632	
J7	Post, Feedthru	1	280567-4	14632	
J8	Not Used				
J9	Post, Feedthru	1	280567-8	14632	
J10	Post, Feedthru	1	280567-7	14632	
J11	Not Used				
J12	Post, Feedthru	1	280567-9	14632	
J13	Post, Feedthru	1	280567-10	14632	
JW1	Cable, Coaxial	AR	CXN1214	17217	
JW2	Same as JW1				
JW3	Cable Assembly	1	280554-1	14632	
JW4	Cable Assembly	1	280554-2	14632	
JW5	Cable Assembly	1	280554-3	14632	
JW6	Cable Assembly	1	280554-4	14632	
JW7	Cable Assembly	1	280554-5	14632	
JW8	Cable Assembly	1	280554-6	14632	
JW9	Not Used				
L1	Inductor Assembly	6	180227-1	14632	
L2 Thru L6	Same as L1				
P1	Not Used				
P2	Not Used				
P3	Connector, Plug	3	2002-7571-005	19505	
P4	Same as P3				
P5	Connector, Plug	2	2105-7521-005	19505	
P6	Same as P1				
P7	Same as P3				
R1	Resistor, Fixed, Film: 100 kΩ, 5%, 1/4 W	1	CF1/4-100K/J	09021	
R2	Resistor, Fixed, Composition: 10 MΩ, 5%, 1/8 W	1	RCR05G106JS	81349	
R3	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	4	CF1/8-10K/J	09021	
R4	Same as R3				
R5	Same as R3				
R6	Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W	2	CF1/8-47K/J	09021	
R7	Resistor, Fixed, Film: 56Ω, 5%, 1/4 W	2	CF1/4-56 OHMS/J	09021	
R8	Same as R3				

REF DESIG PREFIX **A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R9	Same as R6				
R10	Same as R7				
U1	Quad Operational Amplifier	1	MC3403P	04713	
W1	Not Used				
W2	Cable Assembly	1	280556-1	14632	
W3	Cable Assembly	1	280555-1	14632	
W4	Cable Assembly	1	280571-1	14632	
XA2A	Header Assembly	6	89466-118	22526	
XA2B	Header Assembly	4	89466-125	22526	
XA3A	Same as XA2A				
XA3B	Same as XA2B				
XA4A	Same as XA2A				
XA4B	Same as XA2B				
XA5A	Same as XA2A				
XA5B	Same as XA2B				
XA6	Same as XA2A				
XA7	Header Assembly	2	89466-112	22526	
XA8A	Header Assembly, Modified	4	280494-2	14632	
XA8B	Same as XA8A				
XA9A	Header Assembly	6	89466-106	22526	
XA9B	Same as XA9A				
XA9C	Same as XA9A				
XA10A	Same as XA7				
XA10B	Same as XA2A				
XA11A	Same as XA8A				
XA11B	Same as XA8A				
XA12A	Header Assembly, Modified	2	280494-1	14632	
XA12B	Same as XA12A				
XA13	Same as XA9A				
XA14A	Same as XA9A				
XA14B	Same as XA9B				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.6.1.1 **Type 796823-1 Front Panel Display PC Assembly** REF DESIG PREFIX **A1A1**

	Revision C1				
A1	Front Panel Keyboard PC Assembly	1	796822-1	14632	
C1	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	16	34475-1	14632	
C2	Same as C1				
C3	Capacitor, Ceramic, Monolithic: 10 pF, 2%, 100 V	1	100-100-NPO-100G	51642	
C4	Same as C1				
C5	Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 10 V	4	TMM-L-226M-010R	04222	
C6 Thru C9	Same as C1				
C10	Capacitor, Electrolytic, Tantalum: 3.3 µF, 10%, 35 V	1	199D335X9035BE3	56289	
C11	Same as C1				
C12	Capacitor, Ceramic, Disc: 1 µF, 20%, 50 V	1	8131-050-651-105M	59660	
C13	Same as C1				
C14	Same as C1				
C15	Capacitor, Ceramic, Monolithic: 1000 pF, 2%, 100 V	2	150-100-NPO-102G	51642	
C16	Same as C15				
C17	Same as C1				
C18	Same as C1				
C19 Thru C21	Not Used				
C22	Same as C5				
C23	Same as C1				
C24	Capacitor, Electroytic, Aluminum: 3300 µF, ±20%, 10V	1	22221381432	2S894	
C25	Same as C1				
C26	Same as C5				
C27	Same as C5				
C28	Same as C1				
CR1	Diode	20	1N4444	80131	
CR2	Same as CR1				
CR3	Diode, LED	1	HLMP-1301	28480	
CR4 Thru CR21	Same as CR1				
E1	Connector, Receptacle	22	450-3703-01-03-00	71279	
E2 Thru E25	Not Used				
E26	Same as E1				
J1	Terminal, Strip	1	65610-124	22526	
J2	Terminal, Strip	1	65500-103	22526	
JP1	Connector, Plug	1	ML-100S	51167	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A1**

P1	Connector, Plug	1	640441-4	00779	
Q1	Transistor	4	2N2222A	80131	
Q2 Thru Q4	Same as Q1				
R1	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	3	CF1/8-10K/J	09021	
R2	Resistor, Fixed, Film: 39 kΩ, 5%, 1/8 W	1	CF1/8-39K/J	09021	
R3	Resistor, Fixed, Film: 5.6 kΩ, 5%, 1/8 W	1	CF1/8-5.6K/J	09021	
R4	Resistor, Trimmer, Film: 200 kΩ, 10%, 1/2 W	1	62PAR200K	73138	
R5	Not Used				
R6	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	2	CF1/8-1.0K/J	09021	
R7	Not Used				
R8	Resistor, Fixed, Film: 560 kΩ, 5%, 1/8 W	1	CF1/8-560K/J	09021	
R9	Same as R1				
R10	Same as R1				
R11	Same as R6				
R12	Resistor, Fixed, Film: 470Ω, 5%, 1/8 W	4	CF1/8-470 OHMS/J	09021	
R13 Thru R15	Same as R12				
R16	Resistor, Fixed, Film: 56Ω, 5%, 1/8 W	1	CF1/8-56 OHMS/J	09021	
R17	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	1	CF1/8-22K/J	09021	
R18	Resistor, Fixed, Film: 3.9 kΩ, 5%, 1/8 W	1	CF1/8-3.9K/J	09021	
R19	Resistor, Fixed, Film: 2.0 kΩ, 5%, 1/8 W	1	CF1/8-2.0K/J	09021	
R20	Not Used				
R21	Resistor, Fixed, Film: 560 kΩ, 5%, 1/8 W	1	CF1/8-560K/J	09021	
TP1	Pin, Test Point	7	460-3241-02-0400	71279	
TP2 Thru TP7	Same as TP1				
U1	Display, Alphanumeric LED	6	HPDL-2416	28480	
U2 Thru U6	Same as U1				
U7	Integrated Circuit, Decoder Demultiplexer	1	MM74HC137N	27014	
U8	Light Bar	2	HLMP-2600	28480	
U9	Same as U8				
U10	Light Bar	1	HDSP-4820	28480	
U11	Network, Resistor	2	4308R-102-220	80294	
U12	Integrated Circuit, Display Controller	1	MM74C911N	27014	
U13	Integrated Circuit, Multivibrator	1	841277-1	14632	
U14	Integrated Circuit, Latch	1	SN74HC37SN	27014	
U15	Integrated Circuit, Timer	1	1CM-75561PD	32293	
U16	Integrated Circuit, Buffer	1	MM74HC14N	27014	

REF DESIG PREFIX **A1A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
U17	Same as U11				
U18	Integrated Circuit, Gate	1	MM74HC86N	27014	
U19	Integrated Circuit, Buffer	1	MM74HC365N	27014	
U20	Integrated Circuit, Latch	1	MM74HC373N	27014	
U21	Network, Resistor	2	4308R-102-330	80294	
U22	Same as U21				
U23	Integrated Circuit, Dual Flip-Flop	1	74AC74PC	27014	
U24	Integrated Circuit, Encoder	1	MM74C923N	27014	
U25	Resistor, Fixed, Film: 560Ω, 5%, 1/8 W	1	CF1/8-560 OHMS/J	09021	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.6.1.1.1 **Type 796822-1 Front Panel Keyboard PC Assembly** REF DESIG PREFIX **A1A1A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision A				
E1	Pin, Connector	21	460-2620-02-03-00	71279	
E2 Thru E21	Same as E1				
E22 Thru E25	Not Used				
E26	Same as E1				
R1	Resistor, Fixed: 2.2 kΩ, 5%, 1/8 W	2	841296-074	14632	
R2	Same as R1				
S1	Switch, Marked	1	382110-1	14632	
S2	Switch, Marked	1	382110-2	14632	
S3	Switch, Marked	1	382110-3	14632	
S4	Switch, Marked	1	382110-4	14632	
S5	Switch, Marked	1	382110-5	14632	
S6	Switch, Marked	1	382110-6	14632	
S7	Switch, Marked	1	382110-7	14632	
S8	Switch, Marked	1	382110-8	14632	
S9	Switch, Marked	1	382110-9	14632	
S10	Switch, Marked	1	382110-10	14632	
S11	Switch, Marked	1	382110-11	14632	
S12	Switch, Marked	1	382110-12	14632	
S13	Switch, Marked	1	382110-13	14632	
S14	Switch, Marked	1	382110-14	14632	
S15	Switch, Marked	1	382110-15	14632	
S16	Switch, Marked	1	382110-16	14632	
S17	Switch, Marked	1	382110-17	14632	
S18	Switch, Marked	1	382110-18	14632	
S19	Switch, Marked	1	382110-19	14632	
S20	Switch, Marked	1	382110-20	14632	

5.6.1.2 **Type 796627-2 IEEE-488/Interrupt PC Assembly** REF DESIG PREFIX **A1A2**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision A				
C1	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	3	34475-1	14632	
C2	Same as C1				
C3	Same as C1				
C4	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	4	34453-1	14632	
C5 Thru C7	Same as C4				
C8	Capacitor, Electrolytic, Tantalum: 220 µF, 20%, 10 V	1	196D227X0010TE4	56289	
J1	Connector, Receptacle	1	65624-124	22526	
P1	Connector	1	SSW-122-01-G-S	55322	
P2	Receptacle Assembly	1	66527-018	22526	
P3	Receptacle Assembly	1	66527-025	22526	
R1	Resistor, Fixed, Film: 2.7 MΩ, 5%, 1/4 W	2	CF1/4-2.7M/J	09021	
R2	Same as R1				
R3	Resistor, Network	2	L10-1C223	73138	
R4	Same as R3				
R5	Resistor, Fixed, Film: 100 kΩ, 5%, 1/4 W	5	CF1/4-100K/J	09021	
R6	Same as R5				
R7	Same as R5				
R8	Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W	1	CF1/4-10K/J	09021	
R9	Same as R5				
R10	Same as R5				
S1	Switch, Dip	2	76PSB08S	81073	
S2	Same as S1				
U1	Integrated Circuit, Controller	1	MM74HC4020N	27014	
U2	Integrated Circuit, Decoder	3	MM74HCT138N	27014	
U3	Integrated Circuit, Buffer	1	MM74HC14N	27014	
U4	Integrated Circuit, Latch	3	MM74HC273N	27014	
U5	Same as U4				
U6	Integrated Circuit, GPIB Transceiver	1	841137-1	14632	
U7	Integrated Circuit, GPIB Transceiver	1	841137-2	14632	
U8	Same as U4				
U9	Integrated Circuit	1	MM74HC174N	27014	
U10	Integrated Circuit	2	MM74HC74N	27014	
U11	Same as U2				
U12	Same as U2				
U13	Same as U10				
U14	Integrated Circuit, GPIB Adapter	1	MC68B488	04713	
U15	Integrated Circuit	1	MM74HC367N	27014	
U16	Integrated Circuit	1	MM74HCT00N	27014	
U17	Integrated Circuit	1	MM14506BCP	04713	

5.6.1.2.1 **Type 796631-2 Auxiliary Serial Interface PC Assembly** REF DESIG PREFIX **A1A2A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision C1				
C1	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	4	34475-1	14632	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: 1 µF, 20%, 50 V	2	8131-050-651-105M	59660	
C4	Same as C1				
C5	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	2	34453-1	14632	
C6	Capacitor, Ceramic, Monolithic: 18 pF, 2%, 100 V	2	100-100-NPO-180G	51642	
C7	Same as C1				
C8	Capacitor, Ceramic, Monolithic: 100 pF, 2%, 100 V	2	200-100-NPO-101G	51642	
C9	Same as C5				
C10	Same as C3				
C11	Same as C6				
C12	Capacitor, Ceramic, Monolithic: 30 pF, 2%, 100 V	2	150-100-NPO-300G	51642	
C13	Same as C12				
C14	Same as C8				
CR1	Diode	5	5082-2800	28480	
CR2 Thru CR5	Same as CR1				
J1	Connector, Receptacle	1	65624-106	22526	
J2	Connector	1	TSW-122-07-G-S	55322	
R1	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	1	CF1/8-22K/J	09021	
R2	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	2	CF1/8-100K/J	09021	
R3	Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W	3	CF1/8-47K/J	09021	
R4	Resistor, Fixed, Film: 56 kΩ, 5%, 1/8 W	2	CF1/8-56K/J	09021	
R5	Resistor, Fixed, Film: 33 kΩ, 5%, 1/8 W	1	CF1/8-33K/J	09021	
R6	Resistor, Fixed, Film: 68 kΩ, 5%, 1/8 W	1	CF1/8-68K/J	09021	
R7	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	2	CF1/8-10K/J	09021	
R8	Not Used				
R9	Same as R3				
R10	Same as R7				
R11	Resistor, Fixed, Film: 3.9 kΩ, 5%, 1/8 W	1	CF1/8-3.9K/J	09021	
R12	Same as R2				
R13	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	1	CF1/8-1.0K/J	09021	
R14	Same as R4				
R15	Same as R3				
R16	Resistor, Fixed, Film: 100Ω, 5%, 1/4 W	1	CF1/4-100 OHMS/J	09021	
R17	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	1	CF1/8-4.7K/J	09021	
U1	Integrated Circuit, Line Driver	1	SN7515OP	01295	
U2	Integrated Circuit, Inverter	1	MC74HCU04N	04713	
U3	Integrated Circuit, Asynchronous Transceiver	1	SCN2681AC1N24	18324	
U4	Integrated Circuit, FSK Modem	1	TCM3105JL	01295	

REF DESIG PREFIX **A1A2A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
U5	Integrated Circuit, Clock Generator	1	ICM72091PA	32293	
U6	Integrated Circuit	1	LH0002CN	27014	
U7	Integrated Circuit, Receiver Interface	1	SN75140N	01295	
VR1	Diode, Zener: 3.3 V	2	1N746A	80131	
VR2	Same as VR1				
Y1	Crystal, Quartz: 3.6864 MHz	1	91805-64	14632	
Y2	Crystal, Quartz: 4.4336 MHz	1	91805-65	14632	

5.6.1.3 **Type 796495-12 Microprocessor PC Assembly** REF DESIG PREFIX **A1A3**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision B2				
BT1	Battery: 2.8 V	1	1935-DE	00681	
C1	Capacitor, Ceramic, Monolithic: 18 pF, 5%, 100 V	2	8111-100-COGO-180J	59660	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	9	34453-1	14632	
C4	Same as C3				
C5	Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 10 V	2	96D226X0010JE3	56289	
C6 Thru C11	Same as C3				
C12	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	3	34475-1	14632	
C13	Same as C12				
C14	Same as C12				
C15	Capacitor, Ceramic, Monolithic: 1000 pF, 2%, 100 V	1	150-100-NPO-102-G	51642	
C16	Same as C3				
C17	Same as C5				
CR1	Diode	5	5082-2800	28480	
CR2 Thru CR5	Same as CR1				
P1	Receptacle, Assembly	1	66527-018	22526	
P2	Receptacle, Assembly	1	66527-025	22526	
Q1	Transistor	1	2N2222A	80131	
Q2	Transistor	1	2N2907A	80131	
R1	Not Used				
R2	Resistor, Fixed, Film: 300 kΩ, 5%, 1/8 W	1	CF1/8-300K/J	09021	
R3	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	6	CF1/8-100K/J	09021	
R4	Same as R3				
R5	Same as R3				
R6	Resistor, Fixed, Film: 1.0 MΩ, 5%, 1/8 W	1	CF1/8-1M/J	09021	
R7	Resistor, Fixed, Composition: 6.8 MΩ, 5%, 1/8 W	1	RCR05G685JS	81349	
R8	Resistor, Trimmer, Film: 5 kΩ, 10%, 1/2 W	1	62PARSK	73138	
R9	Same as R3				
R10	Resistor, Fixed, Film: 150 kΩ, 5%, 1/8 W	1	CF1/8-150K/J	09021	
R11	Same as R3				
R12	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/8 W	1	CF1/8-2.2K/J	09021	
R13	Same as R3				
U1	PROM Decoder	1	841455	14632	
U2	Programmed Shunt (DIP)	1	180246-1	14632	
U3	Resistor, Network	1	L10-1C102	73138	
U4	Resistor, Network	1	L10-1C103	73138	
U5	Microprocessor	1	HD63B09P	62786	
U6	Resistor, Network	3	L10-1C104	73138	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A3**

U7	EPROM/RAM	1	MK48T12B-20	18778	
U8	Same as U6				
U9	Programmed EPROM (See Note)	1	841475	14632	
U10	Same as U6				
U11	Integrated Circuit, RAM	1	HM6264LP-12	62786	
U12	Integrated Circuit, Buffer	2	MM74HCT244N	27014	
U13	Same as U12				
U14	Resistor, Network	2	L10-1C223	73138	
U15	Integrated Circuit, Decoder	1	MM74HCT139N	27014	
U16	Same as U14				
U17	Integrated Circuit	1	SN74ALS32N	01295	
U18	Integrated Circuit	1	SN74ALS04N	01295	
U19	Integrated Circuit, Transceiver	1	MM74HCT245N	27014	
U20	Integrated Circuit	1	MM74C00N	27014	
VR1	Diode, Zener: 3.3 V	1	1N746A	80131	
Y1	Crystal, Quartz: 8 MHz	1	MP1-8MHz	23875	

NOTE: U9 is P/N 841475-1 if A1A6 2nd LO Synthesizer is Type 776017-1. U9 is P/N is 841475-2 if A1A6 is Type 797426-1.

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.6.1.4 **Type 796772-1 Analog/Digital PC Assembly** REF DESIG PREFIX **A1A4**

	Revision C1				
C1	Capacitor, Ceramic, Disc: 4.7 µF, 20%, 35 V	2	196D475X0035JE3	56289	
C2	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	13	34453-1	14632	
C3	Same as C1				
C4	Capacitor, Ceramic, Disc: 2.2 µF, 20%, 35 V	4	199D225X0035BE3	56289	
C5	Same as C4				
C6	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	5	34475-1	14632	
C7	Same as C2				
C8	Same as C4				
C9	Same as C4				
C10 Thru C14	Same as C2				
C15	Same as C6				
C16	Same as C2				
C17	Same as C2				
C18	Capacitor, Ceramic, Disc: 1000 pF, 10%, 200 V	10	CK05BX102K	81349	
C19 Thru C22	Same as C18				
C23	Capacitor, Ceramic, Disc: 4700 pF, 10%, 100 V	1	CK05BX472K	81349	
C24	Same as C2				
C25	Capacitor, Electrolytic, Tantalum: 0.047 µF, 10%, 100 V	1	CK06BX473K	81349	
C26	Same as C18				
C27	Same as C2				
C28	Same as C18				
C29	Same as C18				
C30	Same as C6				
C31	Same as C6				
C32	Same as C2				
C33	Capacitor, Ceramic,Monolithic: 100 pF, 2%, 100 V	2	200-100-NPO-101G	51642	
C34	Same as C6				
C35	Capacitor, Ceramic, Monolithic: 1.0 pF, ±0.1 pF, 100 V	1	100-100-NPO-109B	51642	
C36	Same as C33				
C37	Same as C2				
C38	Same as C17				
C39	Capacitor, Ceramic, Disc: 0.47 µF, 20%, 50 V	2	34452-1	14632	
C40	Same as C39				
C41	Same as C18				
C42	Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 10 V	1	196D226X0010JE3	56289	
CR1	Diode	4	1N4003	80131	
CR2 Thru CR4	Same as CR1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A4**

CR5	Diode	11	5082-2800	28480	
CR6 Thru CR15	Same as CR5				
JW1	Buss Wire	1	8021	70903	
P1	Receptacle Assembly	1	66527-018	22526	
P2	Receptacle Assembly	1	66527-025	22526	
Q1	Transistor	1	2N2222A	80131	
Q2	Transistor	1	2N2907/JAN	81350	
Q3	Transistor	2	2N2270	80131	
Q4	Same as Q3				
R1	Resistor, Fixed, Film: 9.09 kΩ, 1%, 1/10 W	1	RN55C9091F	81349	
R2	Not Used				
R3	Resistor, Trimmer, Film: 2 kΩ, 10%, 3/4 W	1	89PR2K	73138	
R4	Resistor, Fixed, Film: 22.1 kΩ, 1%, 1/10 W	1	RN55C2212F	81349	
R5	Resistor, Fixed, Film: 15 kΩ, 1%, 1/10 W	3	RN55C1502F	81349	
R6	Resistor, Fixed, Film: 10 kΩ, 1%, 1/10 W	3	RN55C1002F	81349	
R7	Resistor, Fixed, Film: 28.7 kΩ, 1%, 1/10 W	1	RN55C2872F	81349	
R8	Same as R6				
R9	Resistor, Fixed, Film: 470Ω, 5%, 1/8 W	2	CF1/8-470 OHMS/J	09021	
R10	Resistor, Fixed, Film: 562Ω, 1%, 1/10 W	11	RN55C5620F	81349	
R11	Resistor, Fixed, Film: 33.2 kΩ, 1%, 1/10 W	1	RN55C3322F	81349	
R12	Same as R10				
R13	Same as R10				
R14	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	6	CF1/8-100 OHMS/J	09021	
R15 Thru R17	Same as R10				
R18	Same as R14				
R19	Same as R10				
R20	Same as R10				
R21	Resistor, Fixed, Film: 5.62 kΩ, 1%, 1/10 W	1	RN55C5621F	81349	
R22	Same as R5				
R23	Resistor, Fixed, Film: 14.7 kΩ, 1%, 1/10 W	1	RN55C1472F	81349	
R24	Same as R14				
R25	Same as R10				
R26	Same as R10				
R27	Same as R14				
R28	Same as R10				
R29	Same as R14				
R30	Not Used				
R31	Same as R5				
R32	Resistor, Fixed, Film: 100 kΩ, 1%, 1/10 W	2	RN55C1003F	81349	

REF DESIG PREFIX **A1A4**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R33	Same as R32				
R34	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	6	CF1/8-1.0K/J	09021	
R35	Resistor, Fixed, Film: 91 kΩ, 5%, 1/8 W	1	CF1/8-91K/J	09021	
R36	Same as R34				
R37	Resistor, Fixed, Film: 90.9 kΩ, 1%, 1/10 W	1	RN55C9092F	81349	
R38	Resistor, Fixed, Film: 8.2 kΩ, 5%, 1/8 W	6	CF1/8-8.2K/J	09021	
R39	Resistor, Fixed, Composition: 6.8 MΩ, 5%, 1/8 W	2	RCR05G685JS	81349	
R40	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	2	CF1/8-100K/J	09021	
R41	Same as R38				
R42	Same as R34				
R43	Same as R39				
R44	Same as R40				
R45	Same as R41				
R46	Same as R41				
R47	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	1	CF1/8-4.7K/J	09021	
R48	Resistor, Fixed, Film: 6.8 kΩ, 5%, 1/8 W	1	CF1/8-6.8K/J	09021	
R49	Same as R34				
R50	Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W	1	CF1/8-18K/J	09021	
R51	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	4	CF1/8-100 OHMS/J	09021	
R52	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	1	CF1/8-10K/J	09021	
R53 Thru R55	Same as R51				
R56	Resistor, Fixed, Film: 30.1 kΩ, 1%, 1/10 W	1	RN55C3012F	81349	
R57	Resistor, Fixed, Film: 75 kΩ, 5%, 1/8 W	1	CF1/8-75K/J	09021	
R58	Resistor, Fixed, Film: 150 kΩ, 5%, 1/8 W	1	CF1/8-150K/J	09021	
R59	Resistor, Fixed, Composition: 47 kΩ, 5%, 1/8 W	2	RCR05G473JS	81349	
R60	Resistor, Fixed, Composition: 36 kΩ, 5%, 1/8 W	2	CF1/8-36K/J	09021	
R61	Same as R59				
R62	Same as R60				
R63	Same as R9				
R64	Same as R38				
R65	Same as R38				
R66	Resistor, Fixed, Film: 62 kΩ, 5%, 1/8 W	1	CF1/8-62K/J	09021	
R67	Resistor, Fixed, Film: 130 kΩ, 5%, 1/8 W	1	CF1/8-130K/J	09021	
R68	Same as R34				
R69	Same as R14				
R70	Same as R6				
R71	Resistor, Fixed, Film: 7.5 kΩ, 1%, 1/10 W	1	RN55C7501F	81349	
R72	Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/8 W	1	CF1/8-3.3K/J	09021	
TP1	Pin, Test Point	21	460-2976-02-0400	71279	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A4**

TP2 Thru TP21	Same as TP1				
U1	Quad Operational Amplifier	3	MC3403P	04713	
U2	Same as U1				
U3	Same as U1				
U4	Dual Operational Amplifier	1	CA3260E	02735	
U5	Dual Operational Amplifier	1	LM358AN	27014	
U6	Band-Gap Voltage Reference	1	AD581JH	24355	
U7	Octal Decoder	1	MM74HCT138N	27014	
U8	Hex Level Shifter	1	MC14504BCP	04713	
U9	Integrated Circuit	2	MM74C374N	27014	
U10	Dual Buffered Multiplying DAC	3	AD7528JN	24355	
U11	Same as U10				
U12	Same as U10				
U13	Same as U9				
U14	Analog to Digital Converter	1	ADC0820CCN	27014	
U15	Dual Multivibrator	1	841277-1	14632	
U16	16 Channel Multiplexer	1	DG526CJ	17856	
U17	HEX Inverter	1	MM74HC04N	27014	
U18	Integrated Circuit	1	MM74HC10N	27014	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.6.1.5 Type 796245-1 Synthesizer Interface PC Assembly

REF DESIG PREFIX **A1A5**

	Revision B2				
C1	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	6	34453-1	14632	
C2	Same as C1				
C3	Capacitor, Mica, Dipped: 100 pF, 2%, 500 V	1	CM05FD101G03	81349	
C4	Capacitor, Polycarbonate: .47 µF, 5%, 30 V	1	ECR474BJ	50558	
C5	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	8	34475-1	14632	
C6	Same as C1				
C7	Same as C5				
C8	Same as C1				
C9	Same as C5				
C10	Same as C1				
C11	Same as C5				
C12	Same as C1				
C13	Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 10 V	1	196D226X0010JE3	56289	
C14 Thru C16	Same as C5				
C17	Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V	1	196D475X0035JE3	56289	
C18	Same as C5				
CR1	Diode	2	1N4003	80131	
CR2	Same as CR1				
L1	Coil, Fixed: 1.0 mH, 10%	1	553-3635-37	71279	
L2	Coil, Fixed: 220 µH, 10%	1	553-3635-29	71279	
P1	Receptacle Assembly	1	66527-018	22526	
P2	ReceptacleAssembly	1	66527-025	22526	
R1	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/4 W	2	CF1/4-1K/J	09021	
R2	Same as R1				
R3	Not Used				
R4	Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W	1	CF1/4-15K/J	09021	
R5	Resistor, Fixed, Film: 200 kΩ, 5%, 1/4 W	1	CF1/4-200K/J	09021	
R6	Resistor, Trimmer, Film: 100 kΩ, 10%, 3/4 W	1	89PR100K	73138	
R7	Resistor, Network	1	L10-1C223	73138	
U1	Integrated Circuit	1	CD4093BE	02735	
U2	Binary Counter	2	MM74HC193N	27014	
U3	Same as U2				
U4	Octal Decoder	1	MM74HCT138N	27014	
U5	Multivibrator	1	841277-1	14632	
U6	Integrated Circuit	6	MM74HC374N	27014	
U7	Same as U6				
U8	Same as U6				
U9	Integrated Circuit	1	MM74HC373N	27014	
U10	Integrated Circuit	1	DS7515ON-8	27014	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A5**

U11	Not Used				
U12 Thru U14	Same as U6				
U15	Not Used				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.6.1.6A **Type 776017-1 2nd LO Synthesizer PC Assembly (For WJ-8615P Up to Serial Number 1200)**

REF DESIG PREFIX **A1A6**

	Revision E1				
C1	Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 15 V	10	TMM-5-226M-015R	04222	
C2	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	5	34452-1	14632	
C3	Same as C2				
C4	Same as C2				
C5	Same as C1				
C6	Same as C2				
C7	Same as C2				
C8	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	13	34475-1	14632	
C9	Same as C1				
C10	Same as C1				
C11	Capacitor, Ceramic, Monolithic: 10000 pF, 2%, 100 V	4	300-100-NPO-103G	51642	
C12	Same as C11				
C13	Capacitor, Ceramic, Monolithic: 5600 pF, 2%, 100 V	2	300-100-NPO-562G	51642	
C14	Same as C13				
C15 Thru C17	Same as C8				
C18	Capacitor, Ceramic, Monolithic: 1000 pF, 2%, 100 V	4	150-100-NPO-102G	51642	
C19	Capacitor, Ceramic, Monolithic: 100 pF, 2%, 100 V	1	200-100-NPO-101G	51642	
C20	Capacitor, Ceramic, Monolithic: 2200 pF, 2%, 100 V	1	200-100-NPO-222G	51642	
C21	Same as C1				
C22	Capacitor, Ceramic, Monolithic: 6800 pF, 2%, 100 V	1	300-100-NPO-682G	51642	
C23	Capacitor, Ceramic, Monolithic: 4700 pF, 2%, 100 V	3	300-100-NPO-472G	51642	
C24	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	1	34453-1	14632	
C25	Not Used				
C26	Capacitor, Ceramic: 1.2 pF, ±0.1 pF, 50 WVDC	1	841314-003	14632	
C27	Capacitor, Ceramic: 1.8 pF, ±0.1 pF, 50 WVDC	1	841314-007	14632	
C28	Capacitor, Ceramic: 470 pF, 10%, 100 V	17	841250-11	14632	
C29	Capacitor, Ceramic: 2.2 pF, ±0.1 pF, 50 WVDC	1	841314-009	14632	
C30	Same as C1				
C31 Thru C35	Same as C28				
C36	Capacitor, Ceramic, 470 pF, 2%, 50 WVDC	1	841314-065	14632	
C37	Same as C28				
C38	Not Used				
C39	Not Used				
C40	Same as C8				
C41	Capacitor, Ceramic, Monolithic: 430 pF, 2%, 100 V	2	150-100-NPO-431G	51642	
C42	Same as C23				
C43	Same as C41				
C44	Same as C23				
C45	Same as C18				
C46	Capacitor, Ceramic, Monolithic: 5.1 pF, ±.25 pF, 100 V	2	100-100-NPO-519C	51642	
C47	Capacitor, Variable, Air: .4-2.5 pF, 500 V	2	27283	91293	
C48	Not Used				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A6**

C49	Capacitor, Ceramic, Monolithic: 3.3 pF, 5%, 100 V	2	150-100-N1500-339B	51642	
C50	Capacitor, Ceramic, Monolithic: 2.20pF, ±.1 pF, 100 V	2	100-100-NPO-22915	51642	
C51 Thru C53	Same as C28				
C54 Thru C57	Same as C8				
C58 Thru C60	Same as C28				
C61	Same as C8				
C62	Same as C1				
C63	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 25 V	1	TMM-M-225M-025R	04222	
C64	Same as C1				
C65	Same as C8				
C66	Same as C11				
C67	Same as C11				
C68	Same as C8				
C69	Same as C46				
C70	Same as C47				
C71	Capacitor, Ceramic, Monolithic: 1.0 pF, ±0.1 pF, 100 V*	1	100-100-NPO-109B	51642	
C72	Same as C49				
C73	Same as C50				
C74	Same as C28				
C75	Same as C28				
C76	Same as C8				
C77	Same as C28				
C78	Same as C1				
C79	Capacitor, Ceramic: 8.2 pF, ±0.25 pF, 50 WVDC	1	841314-023	14632	
C80	Capacitor, Ceramic, Feedthru: 1000 pF, 20%, 100 VDC	10	281216-2	14632	
C81 Thru C89	Same as C80				
C90	Same as C1				
C91	Same as C18				
C92	Same as C18				
C93	Same as C28				
C94	Capacitor, Ceramic, Monolithic: 2000 pF, 2%, 100 V	1	200-100-NPO-202G	51642	
C95	Capacitor, Ceramic, Monolithic: 3.9 ±.1 pF, 100 V	2	100-100-NPO-339B	51642	
C96	Same as C95				
CR1	Not Used				
CR2	Not Used				

* Nominal Value, Select at Test. May be left off.

REF DESIG PREFIX **A1A6**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
CR3	Diode	3	U11-3102	52673	
CR4	Not Used				
CR5	Same as CR3				
CR6	Diode	1	1N4449	80131	
CR7	Same as CR3				
FB1	Ferrite Bead	5	56-590-65-4A	02114	
FB2					
Thru	Same as FB1				
FB5					
J1	Connector, Receptacle, SMB	1	2012-7511-000	19505	
JW1	Jumperwire	AR	8021 22AWG	70903	
JW2	Same as JW1				
JW3	Same as JW1				
L1	Coil, Fixed, Molded: 10 mH	1	2534-00	99800	
L2	Coil, Fixed, Molded: 4.7 µH, 10%	5	1025-36	99800	
L3					
Thru	Same as L2				
L6					
L7	Coil, Fixed, Molded: 68 µH, 10%	1	2534-68	99800	
L8	Coil, Fixed, Molded: 10 mH	1	2534-48	99800	
L9	Coil, Wound	6	190187-1	14632	
L10					
Thru	Same as L9				
L12					
L13	Chip, Inductor: 4.7 µH, 20%	3	B82412-A1472-M	25088	
L14	Coil, Fixed, Molded: 22 µH, 10%	1	1025-52	99800	
L15	Same as L9				
L16	Same as L9				
L17	Same as L13				
L18	Same as L13				
P1	Receptacle Assembly	1	66527-018	22526	
Q1	Transistor	3	841269	14632	
Q2	Same as Q1				
Q3	Transistor	1	2N2369	80131	
Q4	Transistor	1	2N3906	80131	
Q5	Same as Q1				
Q6	Transistor	1	2N3904	80131	
R1	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	4	CF1/8-100 OHMS/J	09021	
R2	Same as R1				
R3	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	10	CF1/8-10K/J	09021	
R4	Same as R3				
R5	Resistor, Fixed, Film: 5.6 kΩ, 5%, 1/8 W	2	CF1/8-5.6K/J	09021	
R6	Same as R5				

REF DESIG PREFIX **A1A6**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R7	Resistor, Fixed, Film: 150 kΩ, 5%, 1/8 W	2	CF1/8-150K/J	09021	
R8	Same as R7				
R9	Resistor, Fixed, Film: 560Ω, 5%, 1/8 W	1	CF1/8-560 OHMS/J	09021	
R10	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	2	CF1/8-4.7K/J	09021	
R11	Same as R10				
R12	Resistor, Fixed, Film: 16.5 kΩ, 1%, 1/10 W	1	RN55C1652F	81349	
R13	Resistor, Fixed, Film: 221 kΩ, 1%, 1/10 W	1	RN55C2213F	81349	
R14	Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W	4	CF1/8-47K/J	09021	
R15	Same as R14				
R16	Same as R3				
R17	Same as R3				
R18	Resistor, Fixed, Film: 820Ω, 5%, 1/8 W	1	CF1/8-820 OHMS/J	09021	
R19	Same as R3				
R20	Resistor, Fixed, Film: 51Ω, 5%, 1/8 W	5	CF1/8-51 OHMS/J	09021	
R21	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	8	CF1/8-1.0K/J	09021	
R22	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/8 W	6	CF1/8-1.5K/J	09021	
R23	Resistor, Fixed, Film: 470Ω, 5%, 1/8 W	2	CF1/8-470 OHMS/J	09021	
R24	Resistor, Fixed, Film: 270Ω, 5%, 1/8 W	1	CF1/8-270 OHMS/J	09021	
R25	Same as R1				
R26	Jumper, .05Ω, 1A	1	841417	14632	
R27	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/8 W	1	CF1/8-2.2K/J	09021	
R28	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/8 W	2	370297	14632	
R29	Not Used				
R30	Not Used				
R31	Same as R14				
R32	Same as R14				
R33	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	2	CF1/8-100K/J	09021	
R34	Same as R33				
R35 Thru R37	Same as R3				
R38	Same as R20				
R39	Same as R21				
R40	Same as R22				
R41	Same as R21				
R42	Resistor, Fixed, Film: 10Ω, 5%, 1/8 W	1	CF1/8-10 OHMS/J	09021	
R43	Resistor, Fixed, Film: 150Ω, 5%, 1/8 W	5	CF1/8-150 OHMS/J	09021	
R44	Resistor, Fixed, Film: 33Ω, 5%, 1/8 W	2	CF1/8-33 OHMS/J	09021	
R45	Same as R43				
R46	Resistor, Fixed, Film: 2.0 kΩ, 5%, 1/8 W	2	CF1/8-2.0K/J	09021	
R47	Same as R46				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A6**

R48	Same as R20				
R49	Resistor, Fixed, Film: 8.2 kΩ, 5%, 1/8 W	1	CF1/8-8.2K/J	09021	
R50	Resistor, Fixed, Film: 5.1 kΩ, 5%, 1/8 W	1	CF1/8-5.1K/J	09021	
R51	Same as R23				
R52	Same as R21				
R53	Same as R22				
R54	Not Used				
R55	Same as R43				
R56	Same as R44				
R57	Same as R43				
R58	Resistor, Fixed, Film: 15Ω, 5%, 1/8 W	3	CF1/8-15 OHMS/J	09021	
R59	Same as R21				
R60	Same as R21				
R61	Same as R22				
R62	Same as R22				
R63	Resistor, Fixed, Film: 330Ω, 5%, 1/8 W	2	CF1/8-330 OHMS/J	09021	
R64	Same as R63				
R65	Same as R3				
R66	Same as R1				
R67	Same as R3				
R68	Same as R20				
R69	Same as R21				
R70	Same as R22				
R71	Same as R21				
R72	Resistor, Fixed, Film: 68Ω, 5%, 1/8 W	2	CF1/8-68K/J	09021	
R73	Same as R43				
R74	Same as R72				
R75	Same as R58				
R76	Resistor, Fixed, Film: 82Ω, 5%, 1/8 W	1	CF1/8-82 OHMS/J	09021	
R77	Resistor, Fixed, Film: 3.9 kΩ, 5%, 1/8 W	1	CF1/8-3.9K/J	09021	
R78	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W	1	CF1/8-2.7K/J	09021	
R79	Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W	1	CF1/8-18K/J	09021	
R80	Same as R20				
R81	Same as R58				
T1	Power Divider	1	281926-1	14632	
U1	Voltage Regulator	1	LM78L05ACZ	27014	
U2	Frequency Synthesizer	2	MC145146P	04713	
U3	Operational Amplifier	5	LT1007CN8	4W715	
U4	Same as U3				
U5	Same as U3				
U6	Analog Switch	1	DG303ACJ	17856	
U7	Divider	1	MB501LP	61271	
U8	Integrated Circuit	1	MC12080D	04713	

REF DESIG PREFIX **A1A6**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
U9	Not Used				
U10	Same as U2				
U11	Same as U3				
U12	Amplifier	3	GPD-321	24539	
U13	Dual Modulus Pre-scaler ÷40/41	1	SP8716/NA/DP	53469	
U14	Mixer, Double Balanced	1	TFM-2	15542	
U15	Differential Video Amplifier	1	MC1733CG	04713	
U16	Same as U12				
U17	Integrated Circuit	1	MC12040L	04713	
U18	Same as U3				
U19	Same as U12				
U20	Divider	1	SPD-C1	00000	
W1	Cable, Coaxial	AR	CXN1214	17217	
W2	Wire Wrap	AR	BTK-30-3B-1WHT	19449	
W3	Same as W2				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.6.1.6B **<u>Type 797426-1 2nd LO Synthesizer PC Assembly</u> (For WJ-8615P Serial Number 1201 and Above)** REF DESIG PREFIX **A1A6**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision B				
C1	Capacitor, Electro, Tantalum, 22 µF, 20%, 15 V	10	T370E226K015AS	31433	
C2	Capacitor, Ceramic, Disc, .47 µF, 20%, 50 V	5	34452-1	14632	
C3	Capacitor, Ceramic, Disc, .47 µF, 20%, 50 V	5	34452-1	14632	
C4	Capacitor, Ceramic, Disc, .47 µF, 20%, 50 V	5	34452-1	14632	
C5	Capacitor, Electro, Tantalum, 22 µF, 20%, 15 V	10	T370E226K015AS	31433	
C6	Capacitor, Ceramic, Disc, .47 µF, 20%, 50 V	5	34452-1	14632	
C7	Capacitor, Ceramic, Disc, .47 µF, 20%, 50 V	5	34452-1	14632	
C8	Capacitor, Ceramic, Disc, .1 µF 20%, 50 V	13	34475-1	14632	
C9	Capacitor, Electro, Tantalum, 22 µF, 20%, 15 V	10	T370E226K015AS	31433	
C10	Capacitor, Electro, Tantalum, 22 µF, 20%, 15 V	10	T370E226K015AS	31433	
C11	Capacitor, Ceramic, Monolithic, 10000 µF, 2%, 100 V, NPO	4	300-100-NPO-103G	51642	
C12	Capacitor, Ceramic, Monolithic, 10000 µF, 2%, 100 V, NPO	4	300-100-NPO-103G	51642	
C13	Capacitor, Ceramic, Monolithic, 5600 µF, 2%, 100 V, NPO	2	300-100-NPO-562G	51642	
C14	Capacitor, Ceramic, Monolithic, 5600 µF, 2%, 100 V, NPO	2	300-100-NPO-562G	51642	
C15	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	
C16	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	
C17	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	
C18	Capacitor, Ceramic, Monolithic, 1000 µF, 2%, 100 V, NPO	5	150-100-NPO-102G	51642	
C19	Capacitor, Ceramic, Monolithic, 100 µF, 2%, 100 V, NPO	1	200-100-NPO-101G	51642	
C20	Capacitor, Ceramic, Monolithic, 2200 µF, 2%, 100 V, NPO	1	200-100-NPO-222G	51642	
C21	Capacitor, Electro, Tantalum, 22 µF, 20%, 15 V	10	T370E226K015AS	31433	
C22	Capacitor, Ceramic, Monolithic, 6800 pF 2%, 100 V, NPO	1	300-100-NPO-682G	51642	
C23	Capacitor, Ceramic, Monolithic, 4700pF 2%, 100 V, NPO	3	300-100-NPO-472G	51642	
C24	Capacitor, Ceramic, Disc, .01 µF, 20%, 50 V	1	34453-1	14632	
C26	Capacitor, Ceramic, 1.2 pF, ±.1pF, >/= 50 Vdc, NPO	1	841314-003	14632	
C27	Capacitor, Ceramic, 1.8 pF, ± .1pF, >/=50 W,Vdc, NPO	1	841314-007	14632	
C28	Capacitor, Ceramic, 470 pF, ± 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C29	Capacitor, Ceramic, 2.2 pf, ±.1pF, >/=50 W Vdc, NPO	1	841314-009	14632	
C30	Capacitor, Electro, Tantalum, 22µF, 20%, 15 V	10	T370E226K015AS	31433	
C31	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C32	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C33	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C34	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C35	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C36	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C37	Capacitor, Ceramic, 470 pF 5% >/=50Vdc, NPO	18	841250-11	14632	
C38	Capacitor, Ceramic, Monolithic, 1000 pF, 2%, 100 V, NPO	5	150-100-NPO-102G	51642	
C40	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	

REF DESIG PREFIX **A1A6**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C41	Capacitor, Ceramic, Monolithic, 430 pF, 2%, 100 V, NPO	2	150-100-NPO-431G	51642	
C42	Capacitor, Ceramic, Monolithic, 4700 pF, 2%, 100 V, NPO	3	300-100-NPO-472G	51642	
C43	Capacitor, Ceramic, Monolithic, 430 pF, 2%, 100 V, NPO	2	150-100-NPO-431G	51642	
C44	Capacitor, Ceramic, Monolithic, 4700 pF, 2%, 100 V, NPO	3	300-100-NPO-472G	51642	
C45	Capacitor, Ceramic, Monolithic, 1000 pF, 2%, 100 V, NPO	5	150-100-NPO-102G	51642	
C46	Capacitor, Ceramic, Monolithic, 5.1 pF, ±.25 pF 100 V, NPO	2	100-100-NPO-519C	51642	
C47	Capacitor, Variable, Air, .4-2.5 pF, 500 V	2	27283	91293	
C49	Capacitor, Ceramic, Monolithic, 3.3 pF, ±5%, 100 Vdc, N1500	2	150-100-N1500-339B	51642	
C50	Capacitor, Ceramic, Monolithic, 2.2 pF, ±.1pF, 100 V, NPO	2	100-100-NPO-229B	51642	
C51	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C52	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C53	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C54	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	
C55	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	
C56	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	
C57	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	
C58	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C59	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C60	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C61	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	
C62	Capacitor, Electro, Tantalum, 22 µF, 20%, 15 V	10	T370E226K015AS	31433	
C63	Capacitor, Electro, Tantalum, 2.2 µF, 20%, 25 V Radial	1	T370C225KO25AS	31433	
C64	Capacitor, Electro Tantalum, 22 µF, 20%, 15 V	10	T370E226K015AS	31433	
C65	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	
C66	Capacitor, Ceramic, Monolith, 10000 pF, 2%, 100 V, NPO	4	300-100-NPO-103G	51642	
C67	Capacitor, Ceramic, Monolith, 10000 pF, 2%, 100 V, NPO	4	300-100-NPO-103G	51642	
C68	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	
C69	Capacitor, Ceramic, Monolith, 5.1 pF, ±.25 pF, 100 V, NPO	2	100-100-NPO-519C	51642	
C70	Capacitor, Variable, Air, .4-2.5pF, 500 V	2	27283	91293	
C71	Capacitor, Ceramic, Monolith, 1.0 ±.1 pF, 100 V, NPO	1	100-100-NPO-109B	51642	
C72	Capacitor, Ceramic, Monolith, 3.3 pF, ±5%, 100 Vdc N1500	2	150-100-N1500-339B	51642	
C73	Capacitor, Ceramic, Monolith, 2.2 pF, ±.1pF, 100 V NPO	2	100-100-NPO-229B	51642	
C74	Capacitor, Ceramic, 470, pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C75	Capacitor, Ceramic, 470, pF, 5%, >/=50Vdc, NPO	18	841250-11	14632	
C76	Capacitor, Ceramic, Disc, .1 µF, 20%, 50 V	13	34475-1	14632	
C77	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C78	Capacitor, Electro, Tantalum, 22 µF, 20% 15 V	10	T370E226K015AS	31433	
C79	Capacitor, Ceramic, 8.2 pF, ±.25pF, >/=50 WVdc NPO	1	841314-023	14632	
C80	Capacitor, Ceramic, Feedthru, 1000 pF, 20%, 100 Vdc	10	281216-2	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A6**

C81	Capacitor, Ceramic, Feedthru, 1000 pF, 20%, 100 Vdc	10	281216-2	14632	
C82	Capacitor, Ceramic, Feedthru, 1000 pF, 20%, 100 Vdc	10	281216-2	14632	
C83	Capacitor, Ceramic, Feedthru, 1000 pF, 20%, 100 Vdc	10	281216-2	14632	
C84	Capacitor, Ceramic, Feedthru, 1000 pF, 20%, 100 Vdc	10	281216-2	14632	
C85	Capacitor, Ceramic, Feedthru, 1000 pF, 20%, 100 Vdc	10	281216-2	14632	
C86	Capacitor, Ceramic, Feedthru, 1000 pF, 20%, 100 Vdc	10	281216-2	14632	
C87	Capacitor, Ceramic, Feedthru, 1000 pF, 20%, 100 Vdc	10	281216-2	14632	
C88	Capacitor, Ceramic, Feedthru, 1000 pF, 20%, 100 Vdc	10	281216-2	14632	
C89	Capacitor, Ceramic, Feedthru, 1000 pF, 20%, 100 Vdc	10	281216-2	14632	
C90	Capacitor, Electro, Tantalum, 22 µF, 20%, 15 V	10	T370E226K015AS	31433	
C91	Capacitor, Ceramic, Monolithic, 1000 pF, 2% 100 V, NPO	5	150-100-NPO-102G	51642	
C92	Capacitor, Ceramic, Monolithic, 1000 pF, 2% 100 V, NPO	5	150-100-NPO-102G	51642	
C93	Capacitor, Ceramic, 470 pF, 5%, >/=50 Vdc, NPO	18	841250-11	14632	
C94	Capacitor, Ceramic, Monolith, 2000 pF, 2%, 100 V, NPO	1	200-100-NPO-202G	51642	
C95	Capacitor, Ceramic, Monolith, 3.9 ± .1 pF, 100 V, NPO	2	100-100-NP0-399D	51642	
C96	Capacitor, Ceramic, Monolith, 3.9 ±.1 pF, 100V, NPO	2	100-100-NP0-399D	51642	
CR3	Diode, Tuning VHF & UHF	3	U11-3102	26629	
CR5	Diode, Tuning VHF & UHF	3	U11-3102	26629	
CR6	Diode, Hi Cond Hs Sw 75prV Silon	1	1N4449	80131	
CR7	Diode, Tuning VHF & UHF	3	U11-3102	26629	
FB1	Ferrite, Bead, VHF 0.047 Id 0.138 Od 0.128 Lg	5	56-590-65-4A	02114	
FB2	Ferrite, Bead, VHF 0.047 Id 0.138 Od 0.128 Lg	5	56-590-65-4A	02114	
FB3	Ferrite, Bead, VHF 0.047 Id 0.138 Od 0.128 Lg	5	56-590-65-4A	02114	
FB4	Ferrite, Bead, VHF 0.047 Id 0.138 Od 0.128 Lg	5	56-590-65-4A	02114	
FB5	Ferrite, Bead, VHF 0.047 Id 0.138 Od 0.128 Lg	5	56-590-65-4A	02114	
J1	Connector, Jack, Smb, Rt Angle Male Bulkhead Jack	1	2012-1511-000	19505	
L1	Coil, Fixed, Molded, .10 MHz, Porm 10%, 3.3 MHz 1.8Ω	1	2534-00	99800	
L2	Coil, Fixed, Molded, 4.7 µH, 10%	5	1025-36 (75084-8)	99800	
L3	Coil, Fixed, Molded, 4.7 µH, 10%	5	1025-36 (75084-8)	99800	
L4	Coil, Fixed, Molded, 4.7 µH, 10%	5	1025-36 (75084-8)	99800	
L5	Coil, Fixed, Molded, 4.7 µH, 10%	5	1025-36 (75084-8)	99800	
L6	Coil, Fixed, Molded, 4.7 µH, 10%	5	1025-36 (75084-8)	99800	
L7	Coil, Fixed, Molded, 68 µH, 10%	1	2534-68	99800	
L8	Coil, Fixed,10 mH, ±10%, 250 kHz .42 MHz 51Ω 58 mA	1	2534-48	99800	
L9	Coil, Wound	6	MC145146P1	04713	
L10	Coil, Wound	6	MC145146P1	04713	
L11	Coil, Wound	6	MC145146P1	04713	
L12	Coil, Wound	6	MC145146P1	04713	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A6**

L13	Inductor , 4.7µH, ±20% @ 7.96 MHz Qmin-45 160 mA	3	B82412-A1472-M	25088	
L14	Coil, Fixed, Mold, 22 µH, 10%	1	1025-52 (75084-16)	99800	
L15	Coil, Wound	6	MC145146P1	04713	
L16	Coil, Wound	6	MC145146P1	04713	
L17	Inductor , 4.7µH, ±20% @ 7.96 MHz Qmin-45 160 mA	3	B82412-A1472-M	25088	
L18	Inductor , 4.7µH, ±20% @ 7.96 MHz Qmin-45 160 mA	3	B82412-A1472-M	25088	
P1	Connector, Plug, PC Mount, 36 Pos Dbl Row .10ctrs	1	66527-018	22526	
Q1	Transistor, Low Noise, Low Noise Silon Xstr; Pretested	3	841269-1	14632	
Q2	Transistor, Low Noise, Low Noise Silon Xstr; Pretested	3	841269-1	14632	
Q3	Transistor, BP SW 500mA, Npn To-18	1	2N2369A	80131	
Q4	Transistor, High Speed Sw Sat Pnp Sil Jedec To-92	1	2N3906	80131	
Q5	Transistor, Low Noise, Low Noise Silon Xstr; Pretested	3	841269-1	14632	
Q6	Transistor, High Speed Sw Sat Npn Sil Jedec To-92	1	2N3904	80131	
R1	Resistor, Fixed, Film, 100Ω, 5%, 0.125 W	4	CF1, 8-100 OHMS, J	59124	
R2	Resistor, Fixed, Film, 100Ω, 5%, 0.125 W	4	CF1, 8-100 OHMS, J	59124	
R3	Resistor, Fixed, Film, 10 kΩ, 5%, 0. 125 W	10	CF1, 8-10K, J	59124	
R4	Resistor, Fixed, Film, 10 kΩ, 5%, 0.125 W	10	CF1, 8-10K, J	59124	
R5	Resistor, Fixed, Film, 5.6 kΩ, 5%, 0.125 W	2	CF1, 8-5.6K, J	59124	
R6	Resistor, Fixed, Film, 5.6 kΩ, 5%, 0.125 W	2	CF1, 8-5.6K, J	59124	
R7	Resistor, Fixed, Film, 150 kΩ, 5%, 0.125 W	2	CF1, 8-150K, J	59124	
R8	Resistor, Fixed, Film, 150 kΩ, 5%, 0.125 W	2	CF1, 8-150K, J	59124	
R9	Resistor, Fixed, Film, 560Ω, 5%, 0.125 W	1	CF1, 8-560 OHMS, J	59124	
R10	Resistor, Fixed, Film, 4.7 kΩ, 5%, 0.125 W	2	CF1, 8-4.7K, J	59124	
R11	Resistor, Fixed, Film, 4.7 kΩ, 5%, 0.125 W	2	CF1, 8-4.7K, J	59124	
R12	Resistor, Fixed, Film, 16.5 kΩ, 1%, 0.10 W	1	RN55C1652F	81349	
R13	Resistor, Fixed, Film, 221 kΩ, 1%, .10 W	1	RN55C2213F	81349	
R14	Resistor, Fixed, Film, 47 kΩ, 5%, 0.125 W	4	CF1, 8-47K, J	59124	
R15	Resistor, Fixed, Film, 47 kΩ, 5%, 0.125 W	4	CF1, 8-47K, J	59124	
R16	Resistor, Fixed, Film, 10 kΩ, 5%, 0.125 W	10	CF1, 8-10K, J	59124	
R17	Resistor, Fixed, Film, 10 kΩ, 5%, 0.125 W	10	CF1, 8-10K, J	59124	
R18	Resistor, Fixed, Film, 820Ω, 5%, 0.125 W	1	CF1, 8-820 OHMS, J	59124	
R19	Resistor, Fixed, Film, 10 kΩ, 5%, 0.125 W	10	CF1, 8-10K, J	59124	
R20	Resistor, Fixed, Film, 51Ω, 5%, 0.125 W	5	CF1, 8-51 OHMS, J	59124	
R21	Resistor, Fixed, Film, 1.0 kΩ, 5%, 0.125 W	8	CF1, 8-1.0K, J	59124	
R22	Resistor, Fixed, Film, 1.5 kΩ, 5%, 0.125 W	7	CF1, 8-1.5K, J	59124	
R23	Resistor, Fixed, Film, 470Ω, 5%, 0.125 W	2	CF1, 8-470 OHMS, J	59124	
R24	Resistor, Fixed, Film, 270Ω, 5%, 0.125 W	1	CF1, 8-270 OHMS, J	59124	
R25	Resistor, Fixed, Film, 100Ω, 5%, 0.125 W	4	CF1, 8-100 OHMS, J	59124	
R26	Resistor, Fixed, Film, 2.2 kΩ, 5%, 0.125 W	2	CF1, 8-2.2K, J	59124	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A6**

R27	Resistor, Fixed, Film, 2.2 kΩ, 5%, 0.125 W	2	CF1, 8-2.2K, J	59124	
R28	Resistor, Fixed, Film, 1.5 kΩ, 5%, 0.125 W	7	CF1, 8-1.5K, J	59124	
R31	Resistor, Fixed, Film, 47 kΩ, 5%, 0.125 W	4	CF1, 8-47K, J	59124	
R32	Resistor, Fixed, Film, 47 kΩ, 5%, 0.125 W	4	CF1, 8-47K, J	59124	
R33	Resistor, Fixed, Film, 100 kΩ, 5%, 0.125 W	2	CF1, 8-100K, J	59124	
R34	Resistor, Fixed, Film, 100 kΩ, 5%, 0.125 W	2	CF1, 8-100K, J	59124	
R35	Resistor, Fixed, Film, 10 kΩ, 5%, 0.125 W	10	CF1, 8-10K, J	59124	
R36	Resistor, Fixed, Film, 10 kΩ, 5%, 0.125 W	10	CF1, 8-10K, J	59124	
R37	Resistor, Fixed, Film, 10 kΩ, 5%, 0.125 W	10	CF1, 8-10K, J	59124	
R38	Resistor, Fixed, Film, 51Ω, 5%, 0.125 W	5	CF1, 8-51 OHMS, J	59124	
R39	Resistor, Fixed, Film, 1.0 kΩ, 5%, 0.125 W	8	CF1, 8-1.0K, J	59124	
R40	Resistor, Fixed, Film, 1.5 kΩ, 5%, 0.125 W	7	CF1, 8-1.5K, J	59124	
R41	Resistor, Fixed, Film, 1.0 kΩ, 5%, 0.125 W	8	CF1, 8-1.0K, J	59124	
R42	Resistor, Fixed, Film, 10Ω, 5%, 0.125 W	1	CF1, 8-10 OHMS, J	59124	
R43	Resistor, Fixed, Film, 150Ω, 5%, 0.125 W	5	CF1, 8-150 OHMS, J	59124	
R44	Resistor, Fixed, Film, 33Ω, 5%, 0.125 W	2	CF1, 8-33 OHMS, J	59124	
R45	Resistor, Fixed, Film, 150Ω, 5%, 0.125 W	5	CF1, 8-150 OHMS, J	59124	
R46	Resistor, Fixed, Film, 2.0 kΩ, 5%, 0.125 W	2	CF1, 8-2.0K, J	59124	
R47	Resistor, Fixed, Film, 2.0 k 5%, 0.125 W	2	CF1, 8-2.0K, J	59124	
R48	Resistor, Fixed, Film, 51Ω, 5%, 0.125 W	5	CF1, 8-51 OHMS, J	59124	
R49	Resistor, Fixed, Film, 8.2 kΩ, 5%, 0.125 W	1	CF1, 8-8.2K, J	59124	
R50	Resistor, Fixed, Film, 5.1 kΩ, 5%, 0.125 W	1	CF1, 8-5.1K, J	59124	
R51	Resistor, Fixed, Film, 470Ω, 5%, 0.125 W	2	CF1, 8-470 OHMS, J	59124	
R52	Resistor, Fixed, Film, 1.0 kΩ, 5%, 0.125 W	8	CF1, 8-1.0K, J	59124	
R53	Resistor, Fixed, Film, 1.5 kΩ, 5%, 0.125 W	7	CF1, 8-1.5K, J	59124	
R55	Resistor, Fixed, Film, 150Ω, 5%, 0.125 W	5	CF1, 8-150 OHMS, J	59124	
R56	Resistor, Fixed, Film, 33Ω, 5%, 0.125 W	2	CF1, 8-33 OHMS, J	59124	
R57	Resistor, Fixed, Film, 150Ω, 5%, 0.125 W	5	CF1, 8-150 OHMS, J	59124	
R58	Resistor, Fixed, Film, 15Ω, 5%, 0.125 W	3	CF1, 8-15 OHMS, J	59124	
R59	Resistor, Fixed, Film, 1.0 kΩ, 5%, 0.125 W	8	CF1, 8-1.0K, J	59124	
R60	Resistor, Fixed, Film, 1.0 kΩ, 5%, 0.125 W	8	CF1, 8-1.0K, J	59124	
R61	Resistor, Fixed, Film, 1.5 kΩ, 5%, 0.125 W	7	CF1, 8-1.5K, J	59124	
R62	Resistor, Fixed, Film, 1.5 kΩ, 5%, 0.125 W	7	CF1, 8-1.5K, J	59124	
R63	Resistor, Fixed, Film, 330Ω, 5%, 0.125 W	2	CF1, 8-330 OHMS, J	59124	
R64	Resistor, Fixed, Film, 330Ω, 5%, 0.125 W	2	CF1, 8-330 OHMS, J	59124	
R65	Resistor, Fixed, Film, 10 kΩ, 5%, 0.125 W	10	CF1, 8-10K, J	59124	
R66	Resistor, Fixed, Film, 100Ω, 5%, 0.125 W	4	CF1, 8-100 OHMS, J	59124	
R67	Resistor, Fixed, Film, 10 kΩ, 5%, 0.125 W	10	CF1, 8-10K, J	59124	
R68	Resistor, Fixed, Film, 51Ω, 5%, 0.125 W	5	CF1, 8-51 OHMS, J	59124	

REF DESIG PREFIX **A1A6**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R69	Resistor, Fixed, Film, 1.0 kΩ, 5%, 0.125 W	8	CF1, 8-1.0K, J	59124	
R70	Resistor, Fixed, Film, 1.5 kΩ, 5%, 0.125 W	7	CF1, 8-1.5K, J	59124	
R71	Resistor, Fixed, Film, 1.0 kΩ, 5%, 0.125 W	8	CF1, 8-1.0K, J	59124	
R72	Resistor, Fixed, Film, 68Ω, 5%, 0.125 W	2	CF1, 8-68 OHMS, J	59124	
R73	Resistor, Fixed, Film, 150Ω, 5%, 0.125 W	5	CF1, 8-150 OHMS, J	59124	
R74	Resistor, Fixed, Film, 68Ω, 5%, 0.125 W	2	CF1, 8-68 OHMS, J	59124	
R75	Resistor, Fixed, Film, 15Ω, 5%, 0.125 W	3	CF1, 8-15 OHMS, J	59124	
R76	Resistor, Fixed, Film, 82Ω, 5%, 0.125 W	1	CF1, 8-82 OHMS, J	59124	
R77	Resistor, Fixed, Film, 3.9 kΩ, 5%, 0.125 W	1	CF1, 8-3.9K, J	59124	
R78	Resistor, Fixed, Film, 2.7kΩ, 5%, 0.125 W	1	CF1, 8-2.7K, J	59124	
R79	Resistor, Fixed, Film, 18kΩ, 5%, 0.125 W	1	CF1, 8-18K, J	59124	
R80	Resistor, Fixed, Film, 51Ω, 5%, 0.125 W	5	CF1, 8-51 OHMS, J	59124	
R81	Resistor, Fixed, Film, 15Ω, 5%, 0.125 W	3	CF1, 8-15 OHMS, J	59124	
T1	Transformer	1	MC145146P1	04713	
U1	Voltage, Regulator, + 5 V 0.1A To-92 Pkg 3l	1	LM78L5ACZ	27014	
U2	IC, Cmos Synth, Cmos 4-Bit Bus In Pll Freq Synth	2	MC145146P1	04713	
U3	IC, Op Amp Low Noise High Speed +22 V	5	LT1007CN8	64155	
U4	IC, Op Amp Low Noise High Speed +22 V	5	LT1007CN8	64155	
U5	IC, Op Amp Low Noise High Speed +22 V	5	LT1007CN8	64155	
U6	IC, Monolithic CMOS Analog Switch Dual Spot	1	DG303ACJ	17856	
U7	1.1GHz Divide By 64/65 or 128/129, 2 Modulus Prescaler	1	MB501LP	61271	
U8	1.1GHz Single Modulus Prescale Divide By 80	1	MC12080P	04713	
U10	IC, CMOS Synth, CMOS 4-Bit Bus In Pll Freq Synth	2	MC145146P1	04713	
U11	IC, Op Amp Low Noise High Speed +22 V	5	LT1007CN8	64155	
U12	IC Amplifier, Amplifier 0.1-1000 MHz To -12	3	GPD-321	24539	
U13	1.1 GHz Dual Modulus Prescaler Divide By 32, 33	1	MC12028AP	04713	
U14	Double Balanced Mixer, Lo 1-1000 RF				
	1-1000 IF DC 1000 MHz	1	TFM-2	15542	
U15	IC, Differential Video Amplifier	1	1025-52 (75084-16)	99800	
U16	Amplifier, Amplifier 0.1-1000 MHz T	3	GPD-321	24539	
U17	ECL BP Phase-Frequency Detector 70 MHz	1	MC12040L	04713	
U18	Op Amp Low Noise High Speed +22 V	5	LT1007CN8	64155	
U19	Amplifier 0.1-1000 MHz To -12 3 Pin	3	GPD-321	24539	
U20	Divider, Power , Power Divider Smd	1	SPD-C1	63155	
W01	Coax Cable, Miniature 50Ω, Wire Wrappable, Green	1	CXN1214 GREEN	17217	
W02	Wire, Kynar, No. 30 White Kynar Insulated .005 Thk	1	BTK-30-3B-1 WHT	19449	
W03	Wire, Kynar, No. 30 White Kynar Insulated .005 Thk	1	BTK-30-3B-1 WHT	19449	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.5.1.7 Type 796869-1 First LO Synthesizer PC Assembly

REF DESIG PREFIX **A1A7**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision E2				
C1	Capacitor, Ceramic: .01, µF, 10%, 50 VDC	13	841250-19	14632	
C2	Capacitor, Ceramic: 2200, pF, ± 10%, 50 VDC	1	841250-15	14632	
C3	Capacitor, Ceramic: 47 pF, 2%, 50 WVDC	1	841314-041	14632	
C4	Capacitor, Ceramic: 68 pF, 2%, WVDC	2	841314-045	14632	
C5	Capacitor, Ceramic: 10 pF, 2%, 50 WVDC	4	841314-025	14632	
C6	Capacitor, Ceramic: 1000 pF, 2%, 50 VDC	14	841250-073	14632	
C7	Same as C6				
C8	Same as C4				
C9	Capacitor, Ceramic: .1 µF, 10%, 50 VDC	29	841252-25	14632	
C10	Capacitor, Ceramic: .047 pF, 10%, 50 VDC	1	841250-23	14632	
C11	Same as C9				
C12	Capacitor, Ceramic: 470 pF, 2%, 50 WVDC	2	841314-065	14632	
C13	Capacitor, Tantalum: 68 µF, 20%, 6.3 V	3	841293-24	14632	
C14	Same as C1				
C15	Capacitor, Ceramic: 3.3 pF, ±.1 pF, 50 WVDC	6	841314-013	14632	
C16	Same as C5				
C17	Same as C15				
C18	Same as C6				
C19	Capacitor, Tantalum: 1.0 µF, 20%, 35 V	1	841293-05	14632	
C20	Same as C1				
C21	Same as C15				
C22	Same as C5				
C23	Capacitor, Ceramic: 1.5 pF, ±.1 pF, 50 WVDC	1	841314-005	14632	
C24	Same as C6				
C25	Capacitor, Ceramic: 150 pF, 5%, 50 VDC	1	841250-08	14632	
C26	Same as C6				
C27	Same as C6				
C28	Same as C1				
C29	Same as C6				
C30	Same as C15				
C31	Capacitor, Ceramic: 8.2 pF, ± .1 pF, 50 WVDC	1	841314-023	14632	
C32	Capacitor, Ceramic: 4.7 pF, ± .1 pF, 50 WVDC	1	841314-017	14632	
C33	Same as C1				
C34	Capacitor, Ceramic: 1.0 pF, ±.1 pF, 50 VDC	2	841314-001	14632	
C35	Same as C9				
C36	Capacitor, Tantalum: 3.3 µF, 20%, 16 V	5	841293-10	14632	
C37	Same as C36				
C38	Same as C9				
C39	Capacitor, Ceramic: 27 pF, 2%, 50 WVDC	1	841314-035	14632	
C40	Capacitor, Ceramic: 22 pF, 2%, 50 WVDC	1	841314-033	14632	

REF DESIG PREFIX **A1A7**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C41	Same as C6				
C42	Same as C9				
C43	Same as C1				
C44	Same as C5				
C45	Same as C34				
C46	Same as C9				
C47	Same as C6				
C48	Same as C6				
C49	Same as C9				
C50	Same as C1				
C51	Same as C1				
C52	Same as C13				
C53	Same as C9				
C54	Same as C1				
C55	Same as C1				
C56	Same as C6				
C57	Same as C6				
C58	Same as C9				
C59	Same as C6				
C60	Capacitor, Ceramic: 47 pF, 5%, 50 VDC NPO	2	841250-05	14632	
C61	Same as C60				
C62	Same as C9				
C63	Same as C6				
C64	Same as C36				
C65	Same as C9				
C66	Capacitor, Tantalum: 6.8 µF, 20%, 6.3 V	1	841293-14	14632	
C67	Same as C1				
C68	Same as C36				
C69	Same as C9				
C70	Capacitor, Tantalum: 22 µF, 20%, 20 V	1	841293-21	14632	
C71	Same as C9				
C72	Same as C9				
C73	Capacitor, Tantalum: 1514L, 33 µF, 20%, 16V	2	841293-22	14632	
C74	Same as C13				
C75	Same as C9				
C76	Same as C12				
C77	Same as C73				
C78 Thru C81	Same as C9				
C82	Capacitor, Tantalum: 3.3 µF, 20%, 35 V	3	841293-11	14632	
C83	Same as C82				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A7**

C84	Same as C82				
C85 Thru C91	Same as C9				
C92	Same as C36				
C93 Thru C95	Same as C9				
C96	Same as C1				
C97	Same as C15				
C98	Same as C1				
CR1	Diode, Tuning Varactor	4	KV31S1	50101	
CR2	Same as CR1				
CR3	Diode, General Purpose	5	FDSO-1203.SO	27014	
CR4	Same as CR1				
CR5	Same as CR1				
CR6 Thru CR9	Same as CR3				
DS1	LED, Red, 5V	1	LSS260-DOE-7502	25088	
FB1	Ferrite Bead: 31Ω	4	LCB1210/A	OEXD1	
FB2 Thru FB4	Same as FB1				
J1	Connector, Receptacle, SMB	1	2010-1511-000	19505	
JW1	Jumper, .05 OHM MAX, 1A.	2	841341	14632	
JW2	Same as JW1				
L1	Inductor: 1000 µH, 5%	1	841444-073	14632	
L2	Inductor: .15 µH, ± 20%	5	B82422-A3151-M	25088	
L3	Same as L2				
L4	Inductor: 0.1 µH, ± 20%	2	B82422-A3101-M	25088	
L5	Same as L4				
L6	Same as L2				
L7	Same as L2				
L8	Not In Circuit				
L9	Inductor: 4.7 µH, ± 20%	3	B82422-A1472-M	25088	
L10	Same as L2				
L11	Same as L9				
L12	Same as L9				
P1	Connector, Plug, 24 Pin	1	66527-012	22526	
Q1	Transistor	4	841381-1	14632	
Q2	Transistor	6	MMBT2222ALT1	04713	
Q3	Transistor	5	MMBT2907ALT1	04713	

REF DESIG PREFIX **A1A7**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
Q4 Thru Q7	Same as Q2				
Q8 Thru Q10	Same as Q1				
Q11	Transistor	1	MTD10N05E	04713	
Q12 Thru Q15	Same as Q3				
Q16	Same as Q2				
R1	Resistor, Fixed: 470Ω, 5%, 1/8 W	5	841296-057	14632	
R2	Same as R1				
R3	Resistor, Fixed: 100Ω, 5%, 1/8 W	8	841296-041	14632	
R4	Resistor, Fixed: 1.0kΩ, 5%, 1/8 W	16	841296-065	14632	
R5	Same as R3				
R6	Same as R4				
R7	Resistor, Fixed: 3.3kΩ, 5%, 1/8 W	5	841296-077	14632	
R8	Resistor, Fixed: 15kΩ, 5%, 1/8 W	6	841296-093	14632	
R9	Resistor, Fixed: 220Ω, 5%, 1/8 W	2	841296-049	14632	
R10	Resistor, Fixed: 1.2kΩ, 5%, 1/8 W	1	841296-067	14632	
R11	Same as R4				
R12	Resistor, Fixed: 22.0Ω, 5%, 1/8 W	3	841296-025	14632	
R13	Same as R4				
R14	Same as R4				
R15	Same as R7				
R16	Same as R8				
R17 Thru R19	Same as R4				
R20	Same as R7				
R21	Resistor, Fixed: 10kΩ, 5%, 1/8 W	13	841296-089	14632	
R22	Resistor, Fixed: 4.7kΩ, 5%, 1/8 W	1	841296-081	14632	
R23	Resistor, Fixed: 2.2kΩ, 5%, 1/8 W	3	841296-073	14632	
R24	Same as R8				
R25	Same as R21				
R26	Same as R3				
R27	Resistor, Fixed: 10.0Ω, 5%, 1/8 W	12	841296-017	14632	
R28	Resistor, Fixed: 150Ω, 5%, 1/8 W	6	841296-045	14632	
R29	Same as R4				
R30	Same as R4				
R31	Same as R27				

REF DESIG PREFIX **A1A7**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R32 Thru R35	Same as R21				
R36	Same as R4				
R37	Same as R3				
R38	Same as R12				
R39	Same as R4				
R40	Same as R27				
R41	Same as R7				
R42	Same as R8				
R43	Same as R28				
R44	Same as R27				
R45	Same as R21				
R46	Same as R27				
R47	Same as R4				
R48	Same as R7				
R49	Same as R4				
R50	Same as R8				
R51	Same as R9				
R52	Same as R27				
R53	Same as R4				
R54	Resistor, Fixed: 4.7Ω, 5%, 1/8 W	2	841296-009	14632	
R55	Resistor, Fixed: 6.8Ω, 5%, 1/8 W	1	841296-013	14632	
R56	Resistor, Fixed: 47Ω, 5%, 1/8 W	2	841296-033	14632	
R57	Same as R3				
R58	Same as R56				
R59	Same as R1				
R60	Same as R28				
R61	Resistor, Fixed: 33.0Ω, 5%, 1/8 W	2	841296-029	14632	
R62	Same as R28				
R63	Same as R28				
R64	Same as R61				
R65	Same as R28				
R66	Same as R27				
R67	Not Used				
R68	Resistor, Fixed: 47kΩ, 5%, 1/8 W	2	841296-105	14632	
R69	Same as R3				
R70	Same as R23				
R71	Same as R12				
R72 Thru R75	Same as R21				
R76	Same as R27				

REF DESIG PREFIX **A1A7**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R77	Same as R4				
R78	Same as R3				
R79	Same as R3				
R80	Same as R68				
R81	Not Used				
R82	Same as R21				
R83	Same as R27				
R84	Same as R8				
R85	Resistor, Fixed: 6.8kΩ, 5%, 1/8 W	1	841296-085	14362	
R86	Same as R23				
R87	Same as R21				
R88	Same as R27				
R89	Same as R27				
R90	Same as R1				
R91	Same as R27				
R92	Resistor, Fixed: 22kΩ, 5%, 1/8 W	1	841296-097	14362	
R93	Same as R1				
R94	Same as R54				
T1	Transformer	3	281926-1	14362	
T2	Same as T1				
T3	Same as T1				
U1	Integrated Circuit, Quad 2-Input NOR Gate	1	8674AC02S014	14632	
U2	Integrated Circuit, Dual D-Type Flip Flop	1	8674HC74S014U	14632	
U3	Integrated Circuit Dual 4-Bit Decade Counter	1	8674HC390SO16U	14632	
U4	PAL, Down Counter/Synthesizer	1	841530-1	14632	
U5	PAL, Down Counter/Synthesizer	1	841531-1	14632	
U6	Integrated Circuit, Prescaler, Two Modulus, Divide by 10/11	1	MC12013FN	04713	
U7	Amplifier	3	MSA-0611	24539	
U8	Same as U7				
U9	Integrated Circuit, Prescaler, Divide By 4	1	UPB585G	33279	
U10	Same as U7				
U11	Amplifier, Dual Op Amp	2	MC33172D	04713	
U12	Integrated Circuit, Dual 4-Channel Analog Multiplexer	1	864052S016U	14632	
U13	Same as U11				
U14	Integrated Circuit, Voltage Regulator	1	UA723CD	18324	
U15	Integrated Circuit, EPROM	1	841548-1	14632	
U16	Integrated Circuit, HEX Schmitt Inverter	1	8674HC14SO14U	14632	
U17	Integrated Circuit, Octal D-Type Flip Flop	2	8674HC374SO20WU	14632	
U18	Integrated Circuit, Quad 2-Input OR Gate	1	8674HC32SO14U	14632	
U19	Same as U17				
U20	Integrated Circuit, Dual D Flip-Flop	1	8674HC74SO14U	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.5.1.8 **Type 796747-1 Reference Generator PC Assembly** REF DESIG PREFIX **A1A8**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision F1				
AT1	Connector, Receptacle, SMB: 51Ω	1	2036-1511-051	19505	
C1	Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V	11	34475-1	14632	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	19	34453-1	14632	
C4	Not Used				
C5	Capacitor, Ceramic, Monolithic: 220 pF, 2%, 100 V	5	150-100-NPO-221G	51642	
C6	Same as C3				
C7	Not Used				
C8	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	6	34452-1	14632	
C9	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	4	196D225X0035JE3	56289	
C10	Same as C9				
C11	Capacitor, Electrolytic, Tantalum: 220 µF, 20%, 10 V	2	196D227X0010TE4	56289	
C12	Not Used				
C13	Same as C8				
C14	Same as C3				
C15	Capacitor, Variable, Ceramic: 2.5-9 pF, 100 V	1	518-002A2.5-9	59660	
C16	Same as C3				
C17	Capacitor, Ceramic, Monolithic: 12 pF, 5%, 100 V	1	518-002A2.5-9	51642	
C18	Capacitor, Electrolytic, Tantalum: 18 µF, 10%, 20 V	2	196D186X9020KE3	56289	
C19	Same as C5				
C20	Same as C5				
C21	Same as C3				
C22	Capacitor, Ceramic, Disc: 3.9 pF, ±.25 pF, 100 V	1	8101-100-C0J0-399C	59660	
C23	Same as C1				
C24	Same as C18				
C25	Same as C3				
C26	Same as C3				
C27	Not Used				
C28	Not Used				
C29	Capacitor, Ceramic, Monolithic: 15 pF	1	100-100-NPO-150G	51642	
C30	Same as C1				
C31	Capacitor, Ceramic, Monolithic: 180 pF, 2%, 100 V	1	150-100-NPO-181G	51642	
C32	Same as C5				
C33	Capacitor, Ceramic, Monolithic: 1000 pF, 2%, 100 V	4	150-100-NPO-102G	51642	
C34 Thru C38	Same as C3				
C39	Same as C1				
C40	Capacitor, Ceramic, Monolithic: 22 pF, 5%, 100 V	1	100-100-NPO-220J	51642	
C41	Capacitor, Ceramic, Monolithic: 1.0 pF, ±.1 pF, 100 V	1	8101-100-C0K0-109B	59660	
C42	Capacitor, Ceramic, Monolithic: 36 pF, 2%, 100 V	1	150-100-NPO-360G	51642	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A8**

C43	Same as C5				
C44	Same as C1				
C45	Same as C3				
C46	Same as C3				
C47	Same as C1				
C48	Same as C9				
C49	Same as C3				
C50	Same as C1				
C51	Same as C9				
C52	Capacitor, Variable, Ceramic: .6 - 4.5 pF, 500 V	1	27271	91293	
C53	Capacitor, Ceramic, Disc: 330 pF, 10%, 200 V	1	CK05BX331K	81349	
C54	Same as C8				
C55	Same as C1				
C56	Same as C1				
C57	Same as C8				
C58	Same as C33				
C59	Same as C8				
C60	Same as C8				
C61	Same as C11				
C62	Same as C3				
C63	Not Used				
C64	Same as C33				
C65	Same as C3				
C66	Same as C3				
C67	Same as C3				
C68	Same as C33				
C69	Capacitor, Ceramic, Monolithic: 150 pF, 2%, 100 V	1	150-100-NPO-151G	51642	
CR1	Diode	4	5082-2800	28480	
CR2	Diode	1	U11-3102	52673	
CR3	Diode, Variable, Capacitor	1	KV3901	52673	
CR4 Thru CR6	Same as CR1				
CR7	Diode	2	1N995	80131	
CR8	Same as CR7				
J1	Connector, Receptacle	1	2010-1511-000	19505	
JW1	Not Used				
JW2	Jumper Wire	AR	8021 22AWG	70903	
L1	Coil, Fixed: 27 µH, 5%	1	1537-48	99800	
L2	Coil, Fixed: 4.7 µH, 10%	2	1537-28	99800	
L3	Coil, Fixed: 100 µH, 5%	4	1537-76	99800	
L4	Coil, Fixed, Molded: 330 µH, 5%	1	2500-04	99800	

REF DESIG PREFIX **A1A8**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
L5	Same as L3				
L6	Same as L3				
L7	Coil, Fixed, Molded: 8.2 µH	1	1025-42	99800	
L8	Coil, Variable: .68 µH	2	MS21381-11	83125	
L9	Same as L8				
L10	Coil, Fixed: 22 µH, 10%	4	1537-44	99800	
L11	Same as L10				
L12	Coil, Fixed: 15 µH, 10%	1	1025-48	99800	
L13	Same as L3				
L14	Same as L10				
L15	Same as L10				
L16	Same as L2				
L17	Coil, Fixed, Molded	1	1025-36	99800	
L18	Coil, Fixed, Molded: .39 µH, 10%	1	1025-10	99800	
P1	Receptacle Assembly	2	66527-012	22526	
P2	Same as P1				
Q1	Transistor	2	2N3906	80131	
Q2	Transistor	7	2N2222A	80131	
Q3 Thru Q6	Same as Q2				
Q7	Same as Q1				
Q8	Transistor	1	2N2369	80131	
Q9	Transistor	1	2N2857/JAN	81350	
Q10	Same as Q2				
Q11	Same as Q2				
R1	Resistor, Fixed, Film: 5.6 kΩ, 5%, 1/8 W	2	CF1/8-5.6K/J	09021	
R2	Same as R1				
R3	Resistor, Fixed, Film: 120 kΩ, 5%, 1/4 W	1	CF1/4-120K/J	09021	
R4	Not Used				
R5	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	5	CF1/8-1.0K/J	09021	
R6	Resistor, Fixed, Film: 470Ω, 5%, 1/8 W	7	CF1/8-470 OHMS/J	09021	
R7	Same as R6				
R8	Not Used				
R9	Resistor, Fixed, Film: 22Ω, 5%, 1/8 W	2	CF1/8-22 OHMS/J	09021	
R10	Same as R6				
R11	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	8	CF1/8-10K/J	09021	
R12	Resistor, Fixed, Film: 120Ω, 5%, 1/8 W	1	CF1/8-120 OHMS/J	09021	
R13	Not Used				
R14	Jumperwire	AR	8021 22AWG	70903	
R15	Not Used				
R16	Resistor, Fixed, Film: 150Ω, 5%, 1/4 W	1	CF1/4-150 OHMS/J	09021	

REF DESIG PREFIX **A1A8**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R17	Resistor, Fixed, Film: 10Ω, 5%, 1/8 W	1	CF1/8-10 OHMS/J	09021	
R18	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	3	CF1/8-100 OHMS/J	09021	
R19	Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W	2	CF1/8-18K/J	09021	
R20	Resistor, Fixed, Film: 2.0 kΩ, 5%, 1/8 W	1	CF1/8-2.0K/J	09021	
R21	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	1	CF1/8-22K/J	09021	
R22	Resistor, Fixed, Film: 5.1 kΩ, 5%, 1/8 W	1	CF1/8-5.1K/J	09021	
R23	Same as R11				
R24	Same as R11				
R25	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	2	CF1/8-1.0K/J	09021	
R26	Same as R25				
R27	Same as R11				
R28	Resistor, Fixed, Film: 220Ω, 5%, 1/8 W	2	CF1/8-220 OHMS/J	09021	
R29	Resistor, Fixed, Film: 27Ω, 5%, 1/8 W	1	CF1/8-27 OHMS/J	09021	
R30	Same as R9				
R31	Same as R6				
R32	Not Used				
R33	Resistor, Fixed, Film: 200Ω, 5%, 1/8 W	1	CF1/8-200 OHMS/J	09021	
R34	Not Used				
R35	Same as R19				
R36	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	1	CF1/8-4.7K/J	09021	
R37	Resistor, Trimmer, Film: 10 kΩ	1	3266X-1-103	80294	
R38	Same as R11				
R39	Resistor, Fixed, Film: 1.8 kΩ, 5%, 1/8 W	1	CF1/8-1.8K/J	09021	
R40	Same as R11				
R41	Same as R6				
R42	Not Used				
R43	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	3	CF1/8-100K/J	09021	
R44	Resistor, Fixed, Film: 1.8 kΩ, 5%, 1/8 W	1	CF1/8-1.8K/J	09021	
R45	Same as R5				
R46	Resistor, Fixed, Film: 8.2 kΩ, 5%, 1/8 W	1	CF1/8-8.2K/J	09021	
R47	Same as R5				
R48	Not Used				
R49	Resistor, Fixed, Film: 510Ω, 5%, 1/8 W	1	CF1/8-510 OHMS/J	09021	
R50	Same as R18				
R51	Resistor, Fixed, Film: 47Ω, 5%, 1/8 W	1	CF1/8-47 OHMS/J	09021	
R52	Same as R43				
R53	Resistor, Fixed, Film: 27 kΩ, 5%, 1/8 W	2	CF1/8-27K/J	09021	
R54	Same as R6				
R55	Same as R18				
R56	Resistor, Fixed, Film: 39Ω, 5%, 1/8 W	1	CF1/8-39 OHMS/J	09021	
R57	Same as R28				

REF DESIG PREFIX **A1A8**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R58	Resistor, Fixed, Film: 68Ω, 5%, 1/8 W	1	CF1/8-68 OHMS/J	09021	
R59	Same as R43				
R60	Same as R11				
R61	Same as R5				
R62	Same as R5				
R63	Same as R11				
R64	Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W	1	CF1/8-47K/J	09021	
R65	Resistor, Fixed, Film: 15 kΩ	1	CF/18-15K/J	09021	
R66	Resistor, Fixed, Film: 20 kΩ, 5%, 1/8 W	1	CF1/8-20K/J	09021	
R67	Same as R19				
R68	Same as R6				
R69	Resistor, Fixed, Film: 220 kΩ, 5%, 1/8 W	1	CF1/8-220K/J	09021	
R70	Same as R53				
R71	Same as R5				
T1	Transformer	1	T4-1	15542	
TP1	Not Used				
TP2	Pin, Test Point	2	460-2976-02-0400	71279	
TP3	Same as TP2				
U1	Crystal Oscillator	1	841112	14632	
U2	Integrated Circuit	1	SN75140N	01295	
U3	Integrated Circuit	1	SN74125N	01295	
U4	Asychronous Counter	3	SN74LS196N	01295	
U5	Not Used				
U6	Preselectable Decoder and Binary Counter	1	SN74LS197N	01295	
U7	Same as U4				
U8	Same as U4				
U9	Integrated Circuit	2	SN74LS74N	01295	
U10	Phase Frequency Detector	2	11C44DC	07263	
U11	Integrated Circuit	1	MC33172P	18324	
U12	Wideband Amplifier	1	CA3011	02735	
U13	Same as U9				
U14	Same as U10				
U15	Integrated Circuit	1	SN74LS00N	01295	
VR1	Diode, Zener: 3.3 V	1	1N746A	80131	
Y1	Crystal Quartz: 10.7 MHz	1	CR64U 10.7 MHz	80058	
Y2	Crystal Quartz: 21.415 MHz	1	91805-34	14632	
Y3	Crystal Quartz: 10.000 MHz	1	CR64U 10.000 MHz	80058	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.5.1.9 **Type 796754-1 AM/FM Demodulator PC Assembly (For WJ-8615P Ser. Nos. up to 910)** REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision F1				
C1	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	49	34453-1	14632	
C2 Thru C4	Same as C1				
C5	Capacitor, Variable, Ceramic: 2.5-9 pF, 100 V	2	518-002A2.5-9	59660	
C6	Capacitor, Ceramic, Monolithic: 2.7 pF, ±0.25 pF, 100 V	2	8101-100-COJO-279C	59660	
C7	Capacitor, Ceramic, Disc: 6.8 pF, ±.25 pF, 100 V	2	200-100-N1500-689C	51642	
C8	Capacitor, Ceramic, Monolithic: 1.0 pF, ±0.1 pF, 100 V	1	100-100-NPO-109B	51642	
C9	Same as C5				
C10	Same as C6				
C11	Same as C7				
C12 Thru C14	Same as C1				
C15	Capacitor, Ceramic, Monolithic: 220 pF, 2%, 100 V	3	150-100-NPO-221G	51642	
C16	Same as C15				
C17	Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 10 V	2	196D226X0010JE4	56289	
C18 Thru C26	Same as C1				
C27	Capacitor, Ceramic, Monolithic: 5100 pF, 2%, 100 V	1	300-100-NPO-512G	51642	
C28	Capacitor, Ceramic, Disc: 56 pF, 5%, 100 V	1	200-100-N470-560J	51642	
C29	Capacitor, Ceramic, Monolithic: 91 pF, 2%, 100 V	1	200-100-NPO-910G	51642	
C30	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	3	34475-1	14632	
C31	Same as C30				
C32	Same as C30				
C33	Capacitor, Ceramic, Monolithic: 100 pF, 2%, 100 V	1	200-100-NPO-101G	51642	
C34	Capacitor, Ceramic, Monolithic: 4.7 pF, ±.25 pF, 100 V	4	100-100-N1500-479C	51642	
C35	Same as C34				
C36	Same as C34				
C37	Same as C1				
C38	Same as C1				
C39	Same as C34				
C40	Capacitor, Ceramic, Monolithic: 3300 pF, 2%, 100 V	1	200-100-NPO-332G	51642	
C41	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	2	34452-1	14632	
C42	Same as C41				
C43 Thru C49	Same as C1				
C50	Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V	3	196D475X0035JE3	56289	
C51	Same as C1				
C52	Same as C1				
C53	Capacitor, Ceramic, Monolithic: 1000 pF, 2%, 100 V	2	150-100-NPO-102G	51642	

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C54	Same as C1				
C55	Same as C1				
C56	Capacitor, Ceramic, Monolithic: 1.5 pF, ±0.1 pF, 100 V	1	100-100-NPO-159B	51642	
C57	Same as C1				
C58	Capacitor, Ceramic, Monolithic: 12 pF, 2%, 100 V	1	100-100-NPO-120G	51642	
C59	Capacitor, Ceramic, Monolithic: 15 pF, 2%, 100 V	1	100-100-NPO-150G	51642	
C60	Capacitor, Ceramic, Disc: 5.6 pF, 5%, 100 V	1	150-100-N1500-569J	51642	
C61	Capacitor, Ceramic, Monolithic: 3.0 pF, ±0.1 pF, 100 V	2	100-100-NPO-309B	51642	
C62	Same as C61				
C63	Same as C1				
C64	Same as C1				
C65	Same as C50				
C66 Thru C71	Same as C1				
C72	Capacitor, Ceramic, Monolithic: 47 pF, 2%, 100 V	2	150-100-NPO-470G	51642	
C73	Same as C1				
C74	Same as C72				
C75	Same as C1				
C76	Same as C1				
C77	Same as C17				
C78	Capacitor, Electrolytic, Tantalum: 10 µF, 20%, 20 V	2	199D106X0020CE3	56289	
C79	Same as C78				
C80	Same as C53				
C81	Same as C1				
C82	Capacitor, Ceramic, Monolithic: 110 pF, 2%, 100 V	1	200-100-NPO-111G	51642	
C83	Same as C15				
C84 Thru C89	Same as C1				
C90	Capacitor, Ceramic, Monolithic: 75 pF, 2%, 100 V	2	200-100-NPO-750G	51642	
C91	Capacitor, Ceramic, Monolithic: 120 pF, 2%, 100 V	1	200-100-NPO-121G	51642	
C92	Same as C90				
C93	Same as C1				
C94	Same as C50				
C95	Capacitor, Ceramic, Monolithic: 2.0 pF, ±0.1 pF, 100 V	1	100-100-NPO-209B	51642	
CR1	Diode	4	5082-3188	28480	
CR2 Thru CR4	Same as CR1				
CR5	Diode	2	1N4449	80131	
CR6	Same as CR5				
CR7	Diode	5	5082-2800	28480	

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
CR8	Same as CR7				
CR9	Same as CR7				
CR10	Diode, Zener: 8.2 V	1	1N756A	80131	
CR11	Same as CR7				
CR12	Same as CR7				
CR13	Diode	1	1N462A	80131	
JW1	Cable, Coaxial	AR	CXN1214	17217	
JW2	Same as JW1				
L1	Coil, Fixed, Molded: 22 µH, 10%	13	1025-52	99800	
L2 Thru L5	Same as L1				
L6	Coil, Fixed, Molded: 33 µH, 10%	2	1025-08	99800	
L7	Coil, Variable: .33 µH	1	6740-07	04213	
L8	Coil, Fixed, Molded: 5.6 µH, 10%	1	1025-38	99800	
L9	Coil, Variable: 2.2-3.9 µH	2	6740-19	04213	
L10	Same as L9				
L11	Same as L6				
L12	Same as L1				
L13	Same as L1				
L14	Coil, Variable: 2.43-2.97 µH	1	6740-18	04213	
L15	Coil, Variable: 8.2 µH	1	6740-24	04213	
L16	Same as L1				
L17	Coil, Fixed, Molded: 180 µH, 10%	1	1025-74	99800	
L18	Same as L1				
L19	Coil, Fixed, Molded: 15 µH, 10%	1	1025-48	99800	
L20	Same as L1				
L21	Same as L1				
L22 Thru L27	Not Used				
L28	Same as L1				
L29	Same as L1				
L30	Not Used				
L31	Not Used				
P1	Receptacle Assembly	3	66527-006	22526	
P2	Same as P1				
P3	Same as P1				
Q1	Transistor	1	2N2857	80131	
R1	Resistor, Fixed, Film: 15 kΩ, 5%, 1/8 W	3	CF1/8-15K/J	09021	
R2	Same as R1				
R3	Resistor, Fixed, Film: 22Ω, 5%, 1/8 W	2	CF1/8-22 OHMS/J	09021	

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R4	Resistor, Fixed, Film: 270Ω, 5%, 1/8 W	2	CF1/8-270 OHMS/J	09021	
R5	Same as R4				
R6	Same as R1				
R7	Resistor, Fixed, Film: 7.5 kΩ, 5%, 1/8 W	3	CF1/8-7.5K/J	09021	
R8	Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W	2	CF1/8-47K/J	09021	
R9	Same as R8				
R10	Resistor, Fixed, Film: 47Ω, 5%, 1/8 W	2	CF1/8-47 OHMS/J	09021	
R11	Resistor, Fixed, Film: 470Ω, 5%, 1/8 W	10	CF1/8-470 OHMS/J	09021	
R12	Same as R11				
R13	Same as R3				
R14	Resistor, Fixed, Film: 1.8 kΩ, 5%, 1/8 W	1	CF1/8-1.8K/J	09021	
R15	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	7	CF1/8-1.0K/J	09021	
R16	Resistor, Variable, Film: 500Ω, 10%, 1/4W	1	RJ26CX501	81349	
R17	Resistor, Fixed, Film: 100Ω, 5%, 1/4 W	4	CF1/4-100 OHMS/J	09021	
R18	Resistor, Fixed, Film: 220Ω, 5%, 1/8 W	2	CF1/8-220 OHMS/J	09021	
R19	Resistor, Fixed, Film: 6.8 kΩ, 5%, 1/8 W	1	CF1/8-6.8K/J	09021	
R20	Resistor, Fixed, Film: 4.75 kΩ, 1%, 1/10 W	2	RN55C4751F	81349	
R21	Resistor, Fixed, Film: 46.4 kΩ, 1%, 1/10 W	2	RN55C4642F	81349	
R22	Resistor, Fixed, Film: 51.1 kΩ, 1%, 1/10 W	2	RN55C5112F	81349	
R23	Resistor, Fixed, Film: 180 kΩ, 5%, 1/8 W	1	CF1/8-180K/J	09021	
R24	Resistor, Fixed, Film: 220 kΩ, 5%, 1/8 W	1	CF1/8-220K/J	09021	
R25	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	7	CF1/8-10K/J	09021	
R26	Same as R25				
R27	Resistor, Fixed, Film: 27 kΩ, 5%, 1/8 W	5	CF1/8-27K/J	09021	
R28	Resistor, Variable, Film: 10 kΩ, 10%, 1/4 W	1	3262W1-103	80294	
R29	Same as R27				
R30	Resistor, Variable, Film: 50 kΩ, 10%, 1/4 W	1	3262X-1-503	80294	
R31	Same as R25				
R32	Resistor, Fixed, Film: 12 kΩ, 5%, 1/8 W	1	CF1/8-12K/J	09021	
R33	Resistor, Trimmer, Film: 10 kΩ, 10%, 1/2 W	2	62PAR10K	73138	
R34	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	9	CF1/8-100 OHMS/J	09021	
R35	Resistor, Fixed, Film: 560Ω, 5%, 1/8 W	1	CF1/8-560 OHMS/J	09021	
R36	Same as R15				
R37	Resistor, Fixed, Film: 51 kΩ, 5%, 1/8 W	2	CF1/8-51K/J	09021	
R38	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W	1	CF1/8-2.7K/J	09021	
R39	Same as R33				
R40	Same as R37				
R41	Same as R15				
R42	Same as R15				
R43	Same as R34				
R44	Same as R34				

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R45	Same as R18				
R46	Resistor, Fixed, Film: 2.21 kΩ, 1%, 1/10 W	1	RN55C2211F	81349	
R47	Resistor, Fixed, Film: 68 kΩ, 5%, 1/8 W	2	CF1/8-68K/J	09021	
R48	Resistor, Trimmer, Film: 50 kΩ, 10%, 1/2 W	1	62PAR50K	73138	
R49	Same as R25				
R50	Same as R20				
R51	Resistor, Fixed, Film: 11 kΩ, 1%, 1/10 W	1	RN55C1102F	81349	
R52	Same as R21				
R53	Same as R22				
R54	Same as R25				
R55	Same as R17				
R56	Same as R47				
R57	Same as R27				
R58	Resistor, Variable, Film: 5kΩ, 10%, 1/4W	2	3262X-1-502	80294	
R59	Same as R27				
R60	Same as R34				
R61	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	1	CF1/8-100K/J	09021	
R62	Resistor, Fixed, Film: 820Ω, 5%, 1/8 W	2	CF1/8-820 OHMS/J	09021	
R63	Same as R62				
R64	Resistor, Fixed, Film: 680Ω, 5%, 1/8 W	1	CF1/8-680 OHMS/J	09021	
R65	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	3	CF1/8-4.7K/J	09021	
R66	Same as R65				
R67	Same as R11				
R68	Same as R34				
R69	Same as R11				
R70	Resistor, Trimmer, Film: 20 kΩ, 10%, 1/2 W	1	62PR20K	73138	
R71	Same as R65				
R72	Same as R11				
R73	Same as R7				
R74	Same as R58				
R75	Resistor, Trimmer, Film: 5 kΩ, 10%, 1/2 W	1	62PAR5K	73138	
R76	Resistor, Fixed, Film: 2.4 kΩ, 5%, 1/8 W	1	CF1/8-2.4K/J	09021	
R77	Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W	1	CF1/8-18K/J	09021	
R78	Same as R25				
R79	Same as R25				
R80	Resistor, Trimmer, Film: 2 kΩ, 10%, 1/2 W	1	62PAR2K	73138	
R81	Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/8 W	1	CF1/8-3.3K/J	09021	
R82	Same as R34				
R83	Resistor, Fixed, Film: 12 kΩ, 5%, 1/8 W	1	CF1/8-12K/J	09021	
R84	Resistor, Trimmer, Film: 1 kΩ, 10%, 1/2 W	1	62PAR1K	73138	
R85	Resistor, Fixed, Film: 2.0 kΩ, 5%, 1/8 W	1	CF1/8-2.0K/J	09021	

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R86	Same as R10				
R87	Resistor, Fixed, Film: 56Ω, 5%, 1/4 W	1	CF1/4-56 OHMS/J	09021	
R88	Resistor, Fixed, Film: 10Ω, 5%, 1/4 W	7	CF1/4-10 OHMS/J	09021	
R89	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	1	CF1/8-22K/J	09021	
R90	Resistor, Fixed, Film: 360Ω, 5%, 1/8 W	1	CF1/8-360 OHMS/J	09021	
R91	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/8 W	2	CF1/8-1.5K/J	09021	
R92	Same as R91				
R93	Resistor, Trimmer, Film: 100 kΩ, 10%, 1/2 W	1	62PAR100K	73138	
R94	Same as R27				
R95	Resistor, Fixed, Film: 3.9 kΩ, 5%, 1/8 W	1	CF1/8-3.9K/J	09021	
R96	Same as R34				
R97	Same as R11				
R98	Same as R34				
R99	Same as R11				
R100 Thru R102	Same as R15				
R103	Same as R11				
R104	Same as R34				
R105	Same as R7				
R106	Same as R11				
R107	Same as R11				
R108	Same as R17				
R109	Same as R17				
R110 Thru R115	Same as R88				
R116	Same as R89				
T1	Transformer	2	381701-1	14632	
T2	Same as T1				
T3	Transformer	1	T2-1T	15542	
T4	Transformer	1	381800-1	14632	
T5	Transformer	1	T4-1	15542	
U1	Amplifier	2	MWA130	04713	
U2	Same as U1				
U3	Integrated Circuit	2	CA3189E	02735	
U4	Dual Operational Amplifier	1	HA3-5102-5	34371	
U5	Operational Amplifier	1	HA3-2525-5	34371	
U6	Operational Amplifier	1	CA3160AE	02735	
U7	Same as U3				
U8	Dual Operational Amplifier	2	MC1458N	18324	
U9	Analog Switch	1	DG301ACJ	17856	
U10	Same as U8				
U11	Voltage Attenuator	1	WJ-G1	14482	

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
U12	Integrated Circuit	1	MC1355P	04713	
U13	Integrated Circuit	1	SL1611C/DP	52648	
U14	Amplifier	1	GPD-321	24539	
U15	Amplifier	1	MWA-230	04713	
U16	Operational Amplifier	1	HA2-5160-5	34371	
U17	Operational Amplifier	1	HA3-2539-5	34371	
U18	Dual Analog Switch	1	DG243CJ	17856	
Y1	Crystal: 21.4 MHz	1	3099	74306	

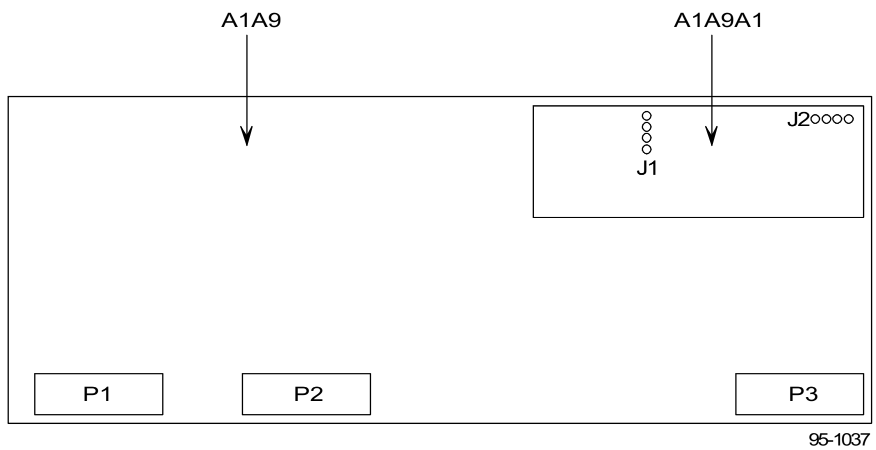


Figure 5-5. Type 797272-1 AM/FM Demodulator PC Assembly (A1A9), Location of Components

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.5.1.10 **<u>Type 797272-1 AM/FM Demodulator PC Assembly (For WJ-8615P Ser. Nos. 911 and Up)</u>**

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision B1				
A1	Wideband FM Demodulator PC Assembly	1	483114-1	14632	
C1	Capacitor, Ceramic, DISC .01uF, ±20%, 50V	43	34453-1	14632	
C2	Same as C1				
C3	Same as C1				
C4	Same as C1				
C5	Capacitor, Variable, Ceramic, 2.5-9 pF	2	518-002A2.5-9	59660	
C6	Capacitor, Ceramic, Monolithic, 2.7pF, ±.1pF, 100V	2	8101-100-COJO-279B	59660	
C7	Capacitor, Ceramic, Monolithic, 6.8pF, ±.25pF, 100V	2	200-100-N1500-689C	51642	
C8	Capacitor, Ceramic, Monolithic, 1.0 ±.1pF, 100V NPO	1	100-100-NPO-109B	51642	
C9	Same as C5				
C10	Same as C6				
C11	Same as C7				
C12	Same as C1				
C13	Same as C1				
C14	Same as C1				
C15	Capacitor, Ceramic, Monolithic, 220pF, ±2%, 100V NPO	3	150-100-NPO-221G	51642	
C16	Same as C15				
C17	Capacitor, Electrolytic, Tantalum, 22µF, ±20%, 10V	2	199D226X0010CE3	56289	
C18	Same as C1				
C19	Same as C1				
C20	Same as C1				
C21	Same as C1				
C22	Same as C1				
C23	Same as C1				
C24	Same as C1				
C25	Same as C1				
C26	Same as C1				
C27	Capacitor, Ceramic, Monolithic, 5100pF, ±2%, 100V NPO	1	300-100-NPO-512G	51642	
C28	Capacitor, Ceramic, DISC 56pF, ±5%, 100V TC N470	1	DR20DT560J	55969	
C29	Capacitor, Ceramic, Monolithic, 91pF, ±2%, 100V NPO	1	200-100-NPO-910G	51642	
C30	Capacitor, Ceramic, DISC .1µF, ±20%, 50V	3	34475-1	14632	
C31	Same as C30				
C32	Same as C30				
C33	Capacitor, Ceramic, Monolithic, 100pF, ±2%, 100V NPO	1	200-100-NPO-101G	51642	
C34	Capacitor, Ceramic, Monolithic, 4.7pF, ±.25pF, 100V TCN1	4	100-100-N1500-479C	51642	
C35	Same as C34				
C36	Same as C34				
C37	Same as C1				
C38	Same as C1				
C39	Same as C34				

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C40	Capacitor, Ceramic, Monolithic, 3300pF, ±2%, 100V NPO	1	200-100-NPO-332G	51642	
C41	Capacitor, Ceramic, DISC .47µF, ±20%, 50V Z5U	2	34452-1	14632	
C42	Same as C41				
C43	Same as C1				
C44	Same as C1				
C45	Same as C1				
C46	Same as C1				
C47	Same as C1				
C48	Not Used				
C49	Not Used				
C50	Not Used				
C51	Not Used				
C52	Same as C1				
C53	Not Used				
C54	Not Used				
C55	Not Used				
C56	Not Used				
C57	Not Used				
C58	Not Used				
C59	Not Used				
C60	Not Used				
C61	Not Used				
C62	Not Used				
C63	Same as C1				
C64	Same as C1				
C65	Capacitor, Electrolytic, Tantalum, 4.7µF, ±20%, 35V	2	199D475X0035CE3	56289	
C66	Same as C1				
C67	Same as C1				
C68	Same as C1				
C69	Same as C1				
C70	Same as C1				
C71	Same as C1				
C72	Capacitor, Ceramic, Monolithic, 47pF, ±2%, 100V NPO	2	150-100-NPO-470G	51642	
C73	Same as C1				
C74	Same as C72				
C75	Same as C1				
C76	Same as C1				
C77	Same as C17				
C78	Capacitor, Electrolytic, Tantalum, 10µF, ±20%, 20V	2	199D106X0020CE3	56289	
C79	Same as C78				
C80	Not Used				
C81	Same as C1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A9**

C82	Capacitor, Ceramic, Monolithic, 110pF, ±2%, 100V NPO	1	200-100-NPO-111G	51642	
C83	Same as C15				
C84	Same as C1				
C85	Same as C1				
C86	Same as C1				
C87	Same as C1				
C88	Same as C1				
C89	Same as C1				
C90	Capacitor, Ceramic, Monolithic, 75pF, ±2%, 100V NPO	2	200-100-NPO-750G	51642	
C91	Capacitor, Ceramic, Monolithic, 120pF, ±2%, 100V NPO	1	200-100-NPO-121G	51642	
C92	Same as C90				
C93	Same as C1				
C94	Same as C65				
CR1	Diode VHF/UHF, Switch PIN, 1.0 pF	4	5082-3188	28480	
CR2	Same as CR1				
CR3	Same as CR1				
CR4	Same as CR1				
CR5	Diode, pF, .25W	5	5082-2800	28480	
CR6	Same as CR5				
CR7	Same as CR5				
CR8	Not Used				
CR9	Not Used				
CR10	Diode, Zener, 8.2V, Silicon	1	1N756A	80131	
CR11	Same as CR5				
CR12	Same as CR5				
CR13	Diode	1	1N462A	80131	
JW1	Cable, Coax, Miniature, 50Ω	AR	CXN1214 GREEN	17217	
JW2	Same as JW1				
L1	Coil, Fixed, 22µH, 10%	12	1025-52 (75084-16)	99800	
L2	Same as L1				
L3	Same as L1				
L4	Same as L1				
L5	Same as L1				
L6	Coil, Fixed, .33µH, 10%	2	1025-08 (75083-7)	99800	
L7	Coil, Variable, .33µH	1	6740-07	04213	
L8	Coil, Fixed, 5.6µH, 10%	1	1025-38(75084-09)	99800	
L9	Coil, Variable, 2.2-3.9µH	2	6740-19	04213	
L10	Same as L9				
L11	Same as L6				
L12	Same as L1				
L13	Same as L1				

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
L14	Not Used				
L15	Not Used				
L16	Same as L1				
L17	Not Used				
L18	Not Used				
L19	Coil, Fixed, 15 µH, 10%	1	1025-48 (75084-14)	99800	
L20	Same as L1				
L21	Same as L1				
L22	Not Used				
L23	Not Used				
L24	Not Used				
L25	Not Used				
L26	Not Used				
L27	Not Used				
L28	Same as L1				
L29	Same as L1				
P1	Connector, Plug, PC MT, 12 position	3	66527-006	22526	
P2	Same as P1				
P3	Same as P1				
Q1	Transistor, RF-IF Ampl, NPN Sil.	1	2N2857	80131	
R1	Resistor, Fixed, Film, 15kΩ, 5%, 0.125W	3	CF1, 8-15K, J	59124	
R2	Same as R1				
R3	Resistor, Fixed, Film, 22Ω, 5%, 0.125W	2	CF1, 8-22?, J	59124	
R4	Resistor, Fixed, Film, 270Ω, 5%, 0.125W	2	CF1, 8-270?, J	59124	
R5	Same as R4				
R6	Same as R1				
R7	Resistor, Fixed, Film, 7.5kΩ, 5%, 0.125W	2	CF1, 8-7.5K, J	59124	
R8	Resistor, Fixed, Film, 47kΩ, 5%, 0.125W	2	CF1, 8-47K, J	59124	
R9	Same as R8				
R10	Resistor, Fixed, Film, 47Ω, 5%, 0.125W	2	CF1, 8-47?, J	59124	
R11	Resistor, Fixed, Film, 470Ω, 5%, 0.125W	8	CF1, 8-470?, J	59124	
R12	Same as R11				
R13	Same as R3				
R14	Resistor, Fixed, Film, 1.8kΩ, 5%, 0.125W	2	CF1, 8-1.8K, J	59124	
R15	Resistor, Fixed, Film, 1.0kΩ, 5%, 0.125W	6	CF1, 8-1.0K, J	59124	
R16	Resistor, Variable, Film, 500Ω, ±10%, .25W	1	RJ26CX501	81349	
R17	Resistor, Fixed, Film, 100Ω, 5%, .25W	4	CF1, 4-100?, J	59124	
R18	Resistor, Fixed, Film, 220Ω, 5%, 0.125W	2	CF1, 8-220?, J	59124	
R19	Resistor, Fixed, Film, 6.8kΩ, 5%, 0.125W	1	CF1, 8-6.8K, J	59124	
R20	Resistor, Fixed, Film, 4.75kΩ, 1%, 0.10W	2	RN55C4751F	81349	
R21	Resistor, Fixed, Film, 46.4kΩ, 1%, 0.10W	2	RN55C4642F	81349	

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R22	Resistor, Fixed, Film, 51.1kΩ, 1%, 0.10W	2	RN55C5112F	81349	
R23	Resistor, Fixed, Film, 180kΩ, 5%, 0.125W	2	CF1, 8-180K, J	59124	
R24	Same as R23				
R25	Resistor, Fixed, Film, 10kΩ, 5%, 0.125W	7	CF1, 8-10K, J	59124	
R26	Same as R25				
R27	Resistor, Fixed, Film, 27kΩ, 5%, 0.125W	5	CF1, 8-27K, J	59124	
R28	Resistor, Variable, Film, 10kΩ, 10%, .25W, Side Adj, PC Mount	1	3262X-1-103	80294	
R29	Same as R27				
R30	Resistor, Variable, Film, 50kΩ, 10%, 0.25W, Side Adj	1	3262X-1-503	80294	
R31	Same as R25				
R32	Resistor, Fixed, Film, 12kΩ, 5%, 0.125W	2	CF1, 8-12K, J	59124	
R33	Resistor, Trim, Film, 10kΩ, ±10%, .5W	2	82PAR10K	73138	
R34	Resistor, Fixed, Film, 100Ω, 5%, 0.125W	8	CF1, 8-100?, J	59124	
R35	Resistor, Fixed, Film, 560Ω, 5%, 0.125W	1	CF1, 8-560?, J	59124	
R36	Same as R15				
R37	Resistor, Fixed, Film, 51kΩ, 5%, 0.125W	2	CF1, 8-51K, J	59124	
R38	Resistor, Fixed, Film, 2.7kΩ, 5%, 0.125W	1	CF1, 8-2.7K, J	59124	
R39	Same as R33				
R40	Same as R37				
R41	Same as R15				
R42	Same as R15				
R43	Same as R34				
R44	Same as R34				
R45	Same as R18				
R46	Resistor, Fixed, Film, 2.21kΩ, 1%, 0.10W	1	RN55C2211F	81349	
R47	Resistor, Fixed, Film, 68kΩ, 5%, 0.125W	2	CF1, 8-68K, J	59124	
R48	Resistor, Trim, Film, 50kΩ, ±10%, 0.5W	1	82PAR50K	73138	
R49	Same as R25				
R50	Same as R20				
R51	Resistor, Fixed, Film, 11kΩ, 1%, 0.10W	1	RN55C1102F	81349	
R52	Same as R21				
R53	Same as R22				
R54	Same as R25				
R55	Same as R17				
R56	Same as R47				
R57	Same as R27				
R58	Resistor, Variable, Film, 5kΩ, 10%, 0.25W Side Adj	1	3262X-1-502	80294	
R59	Same as R27				
R60	Not Used				
R61	Resistor, Fixed, Film, 100kΩ, 5%, 0.125W	1	CF1, 8-100K, J	59124	
R62	Not Used				

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R63	Not Used				
R64	Not Used				
R65	Not Used				
R66	Not Used				
R67	Not Used				
R68	Same as R34				
R69	Not Used				
R70	Not Used				
R71	Not Used				
R72	Same as R11				
R73	Not Used				
R74	Not Used				
R75	Resistor, Trimmed, Film, 5kΩ, ±10%, .5W	1	82PAR5K	73138	
R76	Resistor, Fixed, Film, 2.4kΩ, 5%, 0.125W	1	CF1, 8-2.4K, J	59124	
R77	Resistor, Fixed, Film, 18kΩ, 5%, 0.125W	1	CF1, 8-18K, J	59124	
R78	Same as R25				
R79	Same as R25				
R80	Resistor, Trimmed, Film, 2kΩ, ±10%, .5W	1	82PAR2K	73138	
R81	Resistor, Fixed, Film, 3.3kΩ, 5%, 0.125W	1	CF1, 8-3.3K, J	59124	
R82	Same as R34				
R83	Same as R32				
R84	Resistor, Trimmed, Film, 1kΩ, ±10%, .5W	1	82PAR1K	73138	
R85	Resistor, Fixed, Film, 2.0kΩ, 5%, 0.125W	1	CF1, 8-2.0K, J	59124	
R86	Same as R10				
R87	Resistor, Fixed, Film, 56Ω, 5%, .25W	1	CF1, 4-56?, J	59124	
R88	Resistor, Fixed, Film, 10Ω, 5%, .25W	5	CF1, 4-10?, J	59124	
R89	Resistor, Fixed, Film, 22kΩ, 5%, 0.125W	2	CF1, 8-22K, J	59124	
R90	Resistor, Fixed, Film, 360Ω, 5%, 0.125W	1	CF1, 8-360?, J	59124	
R91	Resistor, Fixed, Film, 1.5kΩ, 5%, 0.125W	2	CF1, 8-1.5K, J	59124	
R92	Same as R91				
R93	Resistor, Trimmed, Film, 100kΩ, ±10%, .5W	1	82PAR100K	73138	
R94	Same as R27				
R95	Resistor, Fixed, Film, 3.9kΩ, 5%, 0.125W	1	CF1, 8-3.9K, J	59124	
R96	Same as R34				
R97	Same as R11				
R98	Same as R34				
R99	Same as R11				
R100	Same as R14				
R101	Same as R15				
R102	Same as R15				
R103	Same as R11				

REF DESIG PREFIX **A1A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R104	Same as R34				
R105	Same as R7				
R106	Same as R11				
R107	Same as R11				
R108	Same as R17				
R109	Same as R17				
R110	Not Used				
R111	Not Used				
R112	Same as R88				
R113	Same as R88				
R114	Same as R88				
R115	Same as R88				
R116	Same as R89				
T1	Transformer	2	381701-1	14632	
T2	Same as T1				
T3	Transformer, Wideband RF, .07 to 200 MHz	1	T2-1T	15542	
T4	Not Used				
T5	Transformer, RF, 10 kHz-800 MHz, 50Ω	1	T4-1	15542	
U1	Amplifier, RF, 0.1-400 MHz	2	MWA-130	04713	
U2	Same as U1				
U3	Integrated Circuit, Amp, RF, Linear	2	CA3189E	34371	
U4	Integrated Circuit, Dual OP Amp	1	HA3-5102-5	34371	
U5	Integrated Circuit, OP Amp, 120 V	1	HA3-2525-5	34371	
U6	Integrated Circuit, OP Amp	1	CA3160AE	02735	
U7	Same as U3				
U8	Integrated Circuit, Dual OP Amp	2	MC1458N	18324	
U9	Integrated Circuit, Monolithic CMDS Analog Switch	1	DG301ACJ	17856	
U10	Same as U8				
U11	Attenuator, 5-2000 MHz, Voltage Controlled	1	WJ-G1	14482	
U12	Not Used				
U13	Integated Circuit, RF Amp, 100 MHz, 20 V Gain	1	SL1611C, DP	53469	
U14	Amplifier, 0.1-1000 MHz	1	GPD-321	24539	
U15	Amplifier, Single Stage, DC-600 MHz, 18.5 dBm	1	MWA-230	04713	
U16	Not Used				
U17	Integrated Circuit, OP Amp	1	HA3-2539-5	34371	
U18	Integrated Circuit, 2-Channel SPDT Analog Switch	1	DG243CJ	17856	
Y1	Crystal, 21.4 MHz, 35 kHz BW	1	3099	74306	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.5.1.10.1 **Part 483114-1Wideband FM Demodulator PC Assembly** REF DESIG PREFIX **A1A9A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision A				
C1	Capacitor, Ceramic, .01 µF, ±10%, 50V	12	841415-019	14632	
C2	Capacitor, Tantalum, 15 µF, ±20%, 10V	1	841293-18	14632	
C3	Same as C1				
C4	Same as C1				
C5	Same as C1				
C6	Capacitor, Ceramic, .047 µF, ±10%, 50V	9	841415-023	14632	
C7	Same as C6				
C8	Same as C6				
C9	Same as C1				
C10	Same as C1				
C11	Same as C1				
C12	Same as C1				
C13	Same as C1				
C14	Same as C1				
C15	Same as C1				
C16	Capacitor, Tantalum, 2.2 µF, ±20%, 20V	1	841293-09	14632	
C17	Same as C1				
C18	Capacitor, Tantalum, 3.3 µF, ±20%, 16V	1	841293-10	14632	
C19	Capacitor, Ceramic, 6.8pF, ±.25pF, 50V	1	841416-021	14632	
C20	Capacitor, Ceramic, 33pF, ±2%, 50V	1	841416-037	14632	
C21	Capacitor, Ceramic, 47pF, ±2%, 50V	1	841416-041	14632	
C22	Capacitor, Ceramic, 150pF, ±2%, 50V	1	841416-053	14632	
C23	Same as C6				
C24	Same as C6				
C25	Same as C6				
C26	Same as C6				
C27	Same as C6				
C28	Same as C6				
CR1	Diode, Schottky, Barrier	1	HSMS-2810T31	28480	
FB1	Ferrite, Bead, 31Ω, ±25%	3	LCB1210, A	0EXD1	
FB2	Same as FB1				
FB3	Same as FB1				
L1	Inductor, 4.7 µH, ±20%, @7.96MHz	1	B82422-A1472-M	25088	
L2	Inductor, 60 nH, ±10%, @50MHz	1	1008CT-600-XK1	02113	
L3	Inductor, 120 nH, ±10%, @25MHz	1	1008CS-121-XKB	02113	
L4	Inductor, 180 nH, ±10%, @25MHz	1	1008CS-181-XK2	02113	
P1	Socket, 100 position	2	SSB-1100-G-2	55322	
P2	Same as P1				
Q1	Transistor, NPN	2	MMBT2222ALT1	04713	
Q2	Same as Q1				

REF DESIG PREFIX **A1A9A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R1	Resistor, Fixed, 2.2kΩ, ?5%, .1W	9	841414-081	14632	
R2	Same as R1				
R3	Same as R1				
R4	Same as R1				
R5	Same as R1				
R6	Same as R1				
R7	Same as R1				
R8	Same as R1				
R9	Resistor, Fixed, 680Ω, ±5%, .1W	2	841414-069	14632	
R10	Same as R9				
R11	Same as R1				
R12	Resistor, Fixed, 15kΩ, ±5%, .1W	1	841414-101	14632	
R13	Resistor, Fixed, 3.3kΩ, ±5%, .1W	1	841414-085	14632	
R14	Resistor, Fixed, 10Ω, ±5%, .1W	7	841414-025	14632	
R15	Same as R14				
R16	Resistor, Fixed, 47Ω, ±5%, .1W	3	841414-041	14632	
R17	Same as R16				
R18	Resistor, Fixed, 15Ω, ±5%, .1W	1	841414-053	14632	
R19	Same as R16				
R20	Same as R14				
R21	Resistor, Fixed, 33kΩ, ±5%, .1W	1	841414-109	14632	
R22	Resistor, Fixed, 1.0kΩ, ±5%, .1W	4	841414-073	14632	
R23	Varistor, 100kΩ, ±20%, .25W	1	3314G-1-104E	80294	
R24	Same as R14				
R25	Same as R14				
R26	Varistor, 2kΩ, ±20%, .25W	1	3314G-1-202E	80294	
R27	Same as R22				
R28	Same as R22				
R29	Same as R14				
R30	Same as R14				
R31	Same as R22				
R32	Resistor, Fixed, 470Ω, ±5%, .1W	1	841414-065	14632	
T1	Tranformer, RF, .15-200MHz, Wide Band	1	T9-1-KK81	15542	
U1	Integrated Circuit, Triple line Receiver	1	MC10116FN	04713	
U2	Mixer, Balanced	1	NE602AD	18324	
U3	Amplifier, J-FET Input	2	MC34080D	04713	
U4	Same as U3				
VR1	Diode, Zener 8.2V	1	MMBZ5237BLT1	04713	

5.5.1.11 **Type 796622-X Audio/Video PC Assembly** REF DESIG PREFIX **A1A10**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision F				
A1	Bandwidth/Video Response PC Assembly	5	281516-X	14632	
A2 Thru A5	Same as A1				
C1	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	13	34452-1	14632	
C2	Capacitor, Ceramic, Monolithic: 10 pF, 2%, 100 V	1	100-100-NPO-100G	51642	
C3	Same as C1				
C4	Capacitor, Ceramic, Monolithic: 1.0 pF, ±0.1 pF, 100 V	1	100-100-NPO-109B	51642	
C5	Same as C1				
C6	Same as C1				
C7	Capacitor, Ceramic, Monolithic: 6.2 pF, ±0.25 pF, 100 V	1	100-100-NPO-629C	51642	
C8	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	10	34475-1	14632	
C9	Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V	2	NRWA-4R7-M-35V	9AAA1	
C10	Same as C8				
C11	Same as C1				
C12	Same as C1				
C13	Same as C9				
C14	Same as C1				
C15	Same as C1				
C16	Capacitor, Electrolytic, Tantalum: 100 µF, 20%, 25 V	6	NRWA-101-M-25V	9AAA1	
C17 Thru C21	Same as C16				
C22	Capacitor, Ceramic, Disc: .047 µF, 10%, 100 V	2	CK06BX473K	81349	
C23	Same as C1				
C24	Same as C22				
C25	Same as C8				
C26	Same as C8				
C27	Capacitor, Ceramic, Monolithic: 4.7 pF, ±.1 pF, 100 V	1	100-100-NPO-479B	51642	
C28	Same as C8				
C29	Capacitor, Ceramic, Monolithic: 120 pF, 2%, 100 V	2	200-100-NPO-121G	51642	
C30	Same as C29				
C31	Same as C1				
C32	Same as C1				
C33	Not Used				
C34	Not Used				
C35 Thru C37	Same as C8				
C38	Same as C1				
C39	Same as C1				
C40	Capacitor, Ceramic, Disc: 18 pF, 5%, 100 V	1	8111-100-COGO-180J	59660	

REF DESIG PREFIX **A1A10**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
CR1	Diode	10	5082-2800	28480	
CR2					
Thru	Same as CR1				
CR9					
CR10	Diode	1	1N462A	80131	
CR11	Same as CR1				
CR12	Diode, Zener: 6.2 V	1	1N753A	80131	
J1	PC Socket	10	8134-HC-5P2	91506	
J2					
Thru	Same as J1				
J10					
JW1	Jumperwire	AR	5951	92194	
L1	Coil, Fixed, Molded: 1.0 mH, 10%	3	2534-24	99800	
L2	Same as L1				
L3	Same as L1				
P1	Receptacle Assembly	1	66527-012	22526	
P2	Receptacle Assembly	1	66527-018	22526	
Q1	Transistor	1	2N2857	80131	
Q2	Transistor	1	2N3251	80131	
R1	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	5	CF1/8-100 OHMS/J	09021	
R2	Resistor, Fixed, Film: 91Ω, 5%, 1/8 W	2	CF1/8-91 OHMS/J	09021	
R3	Same as R1				
R4	Same as R2				
R5	Resistor, Fixed, Film: 220Ω, 5%, 1/8 W	1	CF1/8-220 OHMS/J	09021	
R6	Resistor, Trimmer, Film: 500Ω, 10%, 1/2 W	1	62PAR500	73138	
R7	Resistor, Fixed, Film: 270Ω, 5%, 1/8 W	1	CF1/8-270 OHMS/J	09021	
R8	Not Used				
R9	Not Used				
R10	Resistor, Fixed, Film: 2.0 kΩ, 1%, 1/10 W	5	RN55C2001F	81349	
R11	Resistor, Fixed, Film: 20 kΩ, 1%, 1/10 W	1	RN55C2002F	81349	
R12	Same as R10				
R13	Same as R10				
R14	Resistor, Fixed, Film: 3.0 kΩ, 5%, 1/8 W	1	CF1/8-3.0K/J	09021	
R15	Same as R10				
R16	Same as R10				
R17	Resistor, Fixed, Film: 51.1Ω, 1%, 1/10 W	1	RN55C51RF	81349	
R18	Resistor, Fixed, Film: 1.0 kΩ, 1%, 1/10 W	2	RN55C1001F	81349	
R19	Resistor, Fixed, Film: 5.6 kΩ, 5%, 1/8 W	1	CF1/8-5.6K/J	09021	
R20	Resistor, Fixed, Composition: 22 MΩ, 5%, 1/8 W	1	RCR0J5G226JS	81349	
R21	Resistor, Fixed, Film: 56Ω, 5%, 1/8 W	1	CF1/8-56 OHMS/J	09021	
R22	Same as R1				
R23	Resistor, Fixed, Film: 51 kΩ, 5%, 1/8 W	6	CF1/8-51K/J	09021	

REF DESIG PREFIX **A1A10**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R24 Thru R26	Same as R23				
R27	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	2	CF1/8-100K/J	09021	
R28	Resistor, Fixed, Film: 464Ω, 1%, 1/10 W	1	RN55C4640F	81349	
R29	Same as R23				
R30	Same as R23				
R31	Same as R27				
R32	Same as R18				
R33	Resistor, Fixed, Film: 560Ω, 5%, 1/8 W	2	CF1/8-560 OHMS/J	09021	
R34	Resistor, Fixed, Film: 5.1 kΩ, 5%, 1/8 W	2	CF1/8-5.1K/J	09021	
R35	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	4	CF1/8-10K/J	09021	
R36	Same as R35				
R37	Same as R33				
R38	Same as R34				
R39	Same as R35				
R40	Same as R35				
R41	Resistor, Fixed, Film: 5.6Ω, 5%, 1/8 W	2	CF1/8-5.6 OHMS/J	09021	
R42	Same as R41				
R43	Resistor, Fixed, Film: 33.2 kΩ, 1%, 1/10 W	1	RN55C3322F	81349	
R44	Resistor, Fixed, Film: 4.99 kΩ, 1%, 1/10 W	1	RN55C4991F	81349	
R45	Resistor, Fixed, Film: 2.43 kΩ, 1%, 1/10 W	1	RN55C2431F	81349	
R46	Resistor, Fixed, Film: 15 kΩ, 1%, 1/10 W	1	RN55C1502F	81349	
R47	Resistor, Fixed, Film: 73.2 kΩ, 1%, 1/10 W	1	RN55C7322F	81349	
R48	Resistor, Fixed, Film: 100 kΩ, 1%, 1/10 W	3	RN55C1003F	81349	
R49	Resistor, Fixed, Film: 604 kΩ, 1%, 1/10 W	1	RN55C6043F	81349	
R50	Resistor, Fixed, Film: 499 kΩ, 1%, 1/10 W	6	RN55C4993F	81349	
R51 Thru R53	Same as R50				
R54	Resistor, Fixed, Film: 18.2 kΩ, 1%, 1/10 W	1	RN55C1822F	81349	
R55	Same as R48				
R56	Same as R48				
R57	Resistor, Fixed, Film: 249 kΩ, 1%, 1/10 W	2	RN55C2493F	81349	
R58	Same as R57				
R59	Same as R50				
R60	Same as R50				
R61 Thru R64	Not Used				
R65	Resistor, Fixed, Film: 1.2 MΩ, 5%, 1/8 W	2	CF1/8-1.2M/J	09021	
R66	Same as R65				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A10**

R67	Same as R1				
R68	Same as R1				
R69	Resistor, Fixed, Film: 330Ω, 5%, 1/8 W	1	CF1/8-330 OHMS/J	09021	
S1	Switch, Dip	1	78K01	81073	
U1	Dual Analog Switch	2	DG303ACJ	17856	
U2	Same as U1				
U3	Analog Switch	1	DG302CJ	17856	
U4	Operational Amplifier	1	HA3-2625-5	34371	
U5	Dual Analog Switch	1	DG139BP	17856	
U6	Operational Amplifier	2	HA3-2539-5	34371	
U7	Quad Operational Amplifier	1	MC3403P	04713	
U8	Operational Amplifier	3	LM318N	27014	
U9	Same as U6				
U10	Same as U8				
U11	Operational Amplifier	2	CA3160AE	02735	
U12	Same as U8				
U13	Same as U11				
U14	Operational Amplifier	2	MC34001P	04713	
U15	Same as U14				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.5.1.11.1 **Part 281516-X, Bandwidth/Video Response** REF DESIG PREFIX **A1A10A1 THRU A1A10A5**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision B1				
C1	See **Table 5-1**				
C2	See **Table 5-1**				
C3	See **Table 5-1**				
C4	See **Table 5-1**				
L1	See **Table 5-1**				
L2	See **Table 5-1**				
P1	Plug	1	180226-1		
P2	Plug	1	180226-2		
R1	See **Table 5-1**				
R2	See **Table 5-1**				
R3	See **Table 5-1**				
R4	Resistor, Fixed, Film: 7.5 kΩ, 5%, 1/8 W	1	CF1/8-7.5 K/J	09021	
R5	Resistor, Fixed, Film: 4.3 kΩ, 5%, 1/8 W	1	CF1/8-4.3K/J	09021	
R6	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	1	CF1/8-1.0 K/J	09021	
U1	Integrated Circuit, CMOS	1	DG442DJ	17856	

	C1, C2	C3	C4	L1	L2	R1	R2	R3
281516-1 6.4 kHz BW	Cap/Cer/Disc .068 µF, 5%, 50 V 200-050-X7R-683J	S/A C1	S/A C1	Coil/Fixed/Molded 82 mH, ±15% 2534-70	S/A L1	Res/Fixed//Film 121k, 1%, 1/4 W MF4C/121K/F	Res/Fixed/Film 1.0k, 1%, 1/10 W	Not Used
281516-2 10 kHz BW	Cap/Cer/Disc .047 µF, 10%, 50 V 200-050-X7R-473J 51642	S/A C1	S/A C1	47 mH, ±15% 2534-64	S/A L1	95.3k, 1%, 1/10 W RN55C9532F	1.58k, 1%, 1/10 W RN55C1581F	2.8k, 1%, 1/10 W RN55C2801F
281516-3 15 kHz BW	Cap/Cer/Disc .03 µF, 5%, 50 V 200-050-X7R-303J	S/A C1	S/A C1	33 mH, ±15% 2534-60	S/A L1	80.6k, 1%, 1/10 W RN55C8062F	2.32k, 1%, 1/10 W RN55C2321F	1.74k, 1%, 1/10 W RN55C1741F
281516-4 20 kHz BW	Cap/Cer/Disc .022 µF, 5%, 50 V 200-050-X7R-223J	S/A C1	S/A C1	27 mH, ±15% 2534-58	S/A L1	68.1k, 1%, 1/10 W RN55C6812F	3.16k, 1%, 1/10 W RN55C3161F	1.47k, 1%, 1/10 W RN55C1471F
281516-5 40 kHz BW	Cap/Cer/Disc .011 µF, 5%, 50 V 200-050-X7R-113J	S/A C1	S/A C1	12 mH, ±15% 2534-50	S/A L1	53.6k, 1%, 1/10 W RN55C5362F	6.19k, 1%, 1/10 W RN55C6191F	1.21k, 1%, 1/10 W RN55C1211F
281516-6 50 kHz BW	Cap/Cer/Mono .012 µF, ±2%,100 V 300-100-NPO-123G	Cap/Cer/Mono 10000 pF, ±2%, 100 V 300-100-NPO-103G	S/A C1	10 mH, ±10% 2534-48	S/A L1	53.6k, 1% 1/10 W RN55C5362F	8.87k, 1%, 1/10 W RN55C8871F	1.13k, 1%, 1/10 W RN55C1131F
281516-7 75 kHz BW	Cap/Cer/Mono 5600 pF, ±2%, 100 V 300-100-NPO-562G	S/A C1	S/A C1	8.2 mH, ±10% 2534-46	S/A L1	43.2k, 1%, 1/10 W RN55C4322F	1.0k, 1%, 1/10 W RN55C1001F	Not Used
281516-8 100 kHz BW	Cap/Cer/Mono 3600 pF, ±2%, 100 V 300-100-NPO-362G	S/A C1	S/A C1	6.8 mH, ±10% 2534-44	S/A L1	40.2k, 1%, 1/10 W RN55C4022F	1.33k, 1%, 1/10 W RN55C1331F	4.02k, 1%, 1/10 W RN55C4021F
281516-9 250 kHz BW	Cap/Cer/Mono 1600 pF, ±2%, 100 V 200-100-NPO-162G	S/A C1	S/A C1	2.2 mH, ±10% 2534-32	S/A L1	37.4k, 1%, 1/10 W RN55C3742F	3.32k, 1%, 1/10 W RN55C3321F	1.43k, 1%, 1/10 W RN55C1431F

Table 5-1. Component Values for Selected IF Bandwidth

	C1, C2	C3	C4	L1	L2	R1	R2	R3
281516-10 300 kHz BW	Cap/Cer/Mono 1300 pF, ±2%, 100 V 150-100-NPO-132G	S/A C1	S/A C1	1.8 mH, ± 10% 2534-30	S/A L1	34.0k, 1%, 1/10 W RN55C3402F	4.02k, 1%, 1/10 W RN55C4021F	1.33k, 1%, 1/10 W RN55C1331F
281516-11 500 kHz BW	Cap/Cer/Mono 620 pF, ±2%, 100 V 150-100-NPO-621G	S/A C1	S/A C1	1.2 mH, ±10% 2534-26	S/A L1	32.4k, 1%, 1/10 W RN55C3242F	1.0k, 1%, 1/10 W RN55C1001F	Not Used
281516-12 1 MHz BW	Cap/Cer/Mono 360 pF, ±2%, 100 V 150-100-NPO-361G	Cap/Cer/Mono 390 pF, ±2%, 100 V 150-100-NPO-391G	S/A C3	.56 mH, ±10% 2534-18	S/A L1	30.1k, 1%, 1/10 W RN55C3012F	2.0k, 1%, 1/0 W RN55C2001F	S/A R2
281516-13 12 MHz BW	Cap/Cer/Mono 100 pF, ±2%, 100 V 200-100-NPO-101G	S/A C1	S/A C1	.27 mH, ±10% 2534-10	S/A L1	28k, 1%, 1/10 W RN55C2802F	4.02k, 1%, 1/10 W RN55C4021F	1.33k, 1%, 1/10 W RN55C1331F
281516-14 4 MHz BW	Cap/Cer/Mono 24 pF, ± 2%, 100 V 150-100-NPO-240G	Cap/Cer/Mono 91 pF, ±2%, 100 V 200-100-NPO-910G	Cap/Cer/Mono 36 pF, ±2%, 100 V 150-100-NPO-360G	.12 mH, ±10% 2534-02	.10 mH, ±10% 2534-00	26.7k, 1%, 1/10 W RN55C2672F	8.06k, 1%, 1/10 W RN55C8061F	1.15k, 1%, 1/10 W RN55C1151F
281516-15 3.2 kHz BW	Cap/Cer/Disc .150 µF, 5%, 50 V 200-050-X7R-154J	S/A C1	S/A C1	150.0 mH, ±15% 2534-76	S/A L1	162k, 1%, 1/10 W RN55C1623F	365Ω, 1%, 1/10 W RN55C3650F	Not Used
281516-16 30 kHz BW	Cap/Cer/Disc .015 µF, 10%, 100 V CK06BX153K	S/A C1	S/A C1	18.0 mH, ±15% 2534-54	S/A L1	60.4k, ±1%, 1/10 W RN55C6042F	4.64k, 1%, 1/10 W RN55C4641F	1.27k, 1%, 1/10 W RN55C1271F
281516-17 25 kHz BW	Cap/Cer/Disc .018 µF, 10%, 50 V 200-050-X7R-183K	S/A C1	S/A C1	22 mH, ±15% 2534-56	S/A L1	475k, 1%, 1/10 W RN55C4753F	3.92k, 1%, 1/10 W RN55C3921F	1.33k, 1%, 1/10 W RN55C1331F
281516-18 150 kHz BW	Cap/Cer/Mono 2400 pF, ±2%, 100 V 200-100-NPO-242G	Cap/Cer/Mono 2700 pF, ±2%, 100 V 200-100-NPO-272G	S/A C3	3.9 mH, ±10% 2534-38	S/A L1	25.5k, 1%, 1/10 W RN55C2252F	2.0k, 1%, 1/10 W RN55C2001F	S/A R2

Table 5-1. Component Values for Selected IF Bandwidth (Continued)

	C1, C2	C3	C4	L1	L2	R1	R2	R3
281516-19 500 kHz BW	Cap/Cer/Mono 620 pF, 2%, 100 V 150-100-NPO-621G	S/A C1	S/A C1	Coil/Fixed/Molded 1.2 mH, ±10% 2534-26	S/A L1	Res/Fixed/Film 32.4k, 1%, 1/10 W RN55C3242F	Res/Fixed/Film 6.65k, 1%, 1/10 W RN55C6651F	Res/Fixed/Film 1.18k, 1%, 1/10 W RN55C1181F
281516-20 1 MHz BW	Cap/Cer/Mono 360 pF, 2%, 100 V 150-100-NPO-361G	Cap/Cer/Mono 390 pF, 2%, 100 V 150-100-NPO-391G	S/A C3	Coil/Fixed/Molded .56 mH, 10% 2534-18	S/A L1	Res/Fixed/Film 30.1k, 1%, 1/10 W RN55C3012F	Res/Fixed/Film 1.0k, 1%, 1/10 W RN55C1001F	Not Used
281516-21 2 MHz BW	Cap/Cer/Mono 100 pF, 2%, 100 V 200-100-NPO-101G	S/A C1	S/A C1	Coil/Fixed/Molded .27 MH, 10% 2534-10	S/A L1	Res/Fixed/Film 28k, 1%, 1/10 W RN55C2802F	Res/Fixed/Film 2.0k, 1%, 1/10 W RN55C2001F	S/A R2
281516-22 4 MHz BW	Cap/Cer/Mono 24.2%, 100 V 150-100-NPO-240G	Cap/Cer/Mono 91 pF, 2%, 100 V 200-100-NPO-910G	Cap/Cer/Mono 36 pF, 2%, 100 V 150-100-NPO-360G	Coil/Fixed/Molded .12 mH, ±10% 2534-02	Coil/Fixed/Molded .10 MH, ±10% 2534-00	Res/Fixed/Film 26.1k, 1%, 1/10 W RN55C2672K	Res/Fixed/Film 4.02k, 1%, 1/10 W RN55C021F	Res/Fixed/Film 1.33k, 1%, 1/10 W RN55C1331F
281516-23 10 MHz BW	Not Used	Not Used	Not Used	Wire/Elec/Buss 802122AWG Busswire	S/A L1	Res/Fixed/Film 24.3k, 1%, 1/10 W RN55C2432F	Res/Fixed/Film 10k, 1%, 1/10 W RN55C1002F	Res/Fixed/Film 1.1k, 1%, 1/10 W RN55C1101F
281516-24	Cap/Cer/Mono 24 pF, 2%, 100 V 150-100-NPO-240G	Cap/Cer/Mono 91 pF, 2%, 100 V 200-100-NPO-240G	Cap/Cer/Mono 36 pF, 2%, 100 V 150-100-NPO-360G	Coil/Fixed/Molded .12 µH, ±10% 2534-02	Coil/Fixed/Molded .10 MH, ±10% 2534-00	Res/Fixed/Film 47.5k, 1%, 1/10 W RN55C4752F	Res/Fixed/Film 3.16k, 1%, 1/10 W RN55C3161F	Res/Fixed/Film 1.47k, 1%, 1/10 W RN55C1471F
281516-25 8 MHz BW	Cap/Cer/Mono 10 pF, 2%, 100 V 100-100-NPO-100G	Not Used	Not Used	Coil/Fixed 47 µH, 10% 1025-60	Coil/Fixed/Molded 15 µH, 10% 1025-48	Res/Fixed/Film 25.5k, 1%, 1/10 W RN55C2552F	Res/Fixed/Film 8.25k, 1%, 1/10 W RN55C8251F	Res/Fixed/Film 1.21k, 1%, 1/10 W RN55C1211F
281516-26 6 MHz BW	Not Used	Not Used	Not Used	Coil/Fixed 33 µH, 10% 1025-26	S/A L1	Res/Fixed/Film 24.3k, 1%, 1/10 W RN55C2432K	Res/Fixed/Film 3.01k, 1%, 1/10 W RN55C3011F	Res/Fixed/Film 562?, 1%, 1/10 W RN55C560F
281516-27 700 kHz BW	Cap/Cer/Mono 360 pF, 2%, 100 V 150-100-NPO-101G	Cap/Cer/Mono 390 pF, 2%, 100 V 150-100-NPO-391G	S/A C3	Coil/Fixed/Molded .56 mH, ±10% 2534-18	S/A L1	Res/Fixed/Film 249k, 1%, 1/10 W RN55C2493F	Res/Fixed/Film 3.32k, 1%, 1/10 W RN55C3321F	Res/Fixed/Film 7.5k, 5%, 1/10 W RN55C1471F
281516-28 1.4 MHz BW	Cap/Cer/Mono 100pF, 2%, 100V 200-100-NPO-101G	S/A C1	S/A C1	Coil/Fixed/Molded .27 mH, ±10% 2534-10	S/A L1	Res/Fixed/Film 47.5k, 1%, 1/10 W RN55C4752F	Res/Fixed/Film 1.43k, 1%, 1/10 W RN55C1431F	Res/Fixed/Film 3.32k, 1%, 1/10 W RN55C3321F
281516-29	Cap/Cer/Mono 1300pF, 2%, 100V 150-100-NPO-132G	S/A C1	S/A C1	Coil/Fixed/Molded 1.8 mH, ±10% 2534-30	S/A L1	Res/Fixed/Film 34.0k, 1%, 1/10 W RN55C3402F	Res/Fixed/Film 1.5k, 1%, 1/10 W RN55C1501F	Res/Fixed/Film 3.65k, 1%, 1/10 W RN55C3651F

Table 5-1. Component Values for Selected IF Bandwidth (Continued)

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.5.1.12 **Type 796755-1 ISB/CW Demodulator or Type 796755-2 CW Demodulator PC Assembly** REF DESIG PREFIX **A1A11**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision D1				
C1	Capacitor, Ceramic, Disc: 1000 pF, 10%, 200 V	7	CK05BX102K	81349	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: .01 pF, 20%, 50 V	11	34453-1	14632	
C4	Same as C1				
C5	Same as C1				
C6	Capacitor, Ceramic, Disc: 5000 pF, 20%, 100 V	11	C023B101E502M	56289	
C7	Same as C3				
C8	Same as C3				
C9	Same as C6				
C10	Same as C3				
C11	Same as C3				
C12	Same as C6				
C13	Capacitor, Ceramic, Monolithic: 15 pF, 5%, 100 V	2	8111-100-COGO-150J	59660	
C14	Same as C13				
C15	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	6	34452-1	14632	
C16 Thru C18	Same as C3				
C19 Thru C21	Same as C8				
C22	Same as C15				
C23	Same as C15				
C24 Thru C26	Same as C3				
C27 Thru C29	Same as C6				
C30	Same as C15				
C31	Same as C15				
C32	Same as C1				
C33	Same as C6				
C34	Same as C1				
C35	Same as C6				
C36	Same as C15				
C37 Thru C41	Not Used				

REF DESIG PREFIX **A1A11**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C42	Same as C1				
C43	Not Used				
C44	Capacitor, Ceramic, Monolithic: 220 pF, 2%, 100 V	2	150-100-NPO-221G	51642	
C45	Capacitor, Ceramic, Monolithic: 68 pF, 2%, 100 V	1	200-100-NPO-680G	54642	
C46	Not Used				
C47	Same as C44				
C48 Thru C51	Not Used				
C52	Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V	1	34453-1	14632	
C53	Not Used				
C54	Capacitor Electrolytic, Tantalum: 10 µF, 10%, 20 V	2	CS13BE106K	81349	
C55	Same as C54				
C56	Capacitor Electrolytic, Tantalum: 100 µF, 20%, 20 V	1	196D107X0020TE4	56289	
CR1	Diode	2	5082-3188	28480	
CR2	Same as CR1				
CR3	Diode	1	1N4446	80131	
FL1*	Filter, Crystal: 10.7 MHz CF, BW=LSB	1	92218	14632	
FL2*	Filter, Crystal: 10.7 MHz CF, BW=USB	1	92217	14632	
JW1	Cable, Coaxial	AR	CXN1214	17217	
L1	Coil, Fixed: 100 µH, 5%	2	1537-76	99800	
L2	Same as L1				
L3	Coil, Fixed: 3.9 µH, 10%	2	1025-34	99800	
L4	Same as L3				
L5	Coil, Variable: .33 µH nominal	2	6740-07	04213	
L6	Same as L5				
L7	Coil, Variable: 68 mH	1	6740-12	04213	
P1	Receptacle Assembly	2	66527-012	22526	
P2	Same as P1				
P3	Connector, Jack, SMB	1	2002-7571-005	19505	
R1	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	6	CF1/8-100K/J	09021	
R2	Resistor, Fixed, Film: 7.5 kΩ, 5%, 1/8 W	4	CF1/8-7.5K/J	09021	
R3	Same as R2				
R4	Same as R1				
R5	Same as R2				
R6	Resistor, Fixed, Film: 470Ω, 5%, 1/8 W	1	CF1/8-470 OHMS/J	09021	
R7	Resistor, Fixed, Film: 22Ω, 5%, 1/8 W	1	CF1/8-22 OHMS/J	09021	
R8	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	9	CF1/8-100 OHMS/J	09021	
R9	Same as R8				
R10	Same as R8				
R11	Resistor, Trimmer, Film: 1 kΩ, 10%, 1/2 W	3	62PAR1K	73138	
R12	Resistor, Fixed, Film: 47Ω, 5%, 1/8 W	2	CF1/8-47 OHMS/J	09021	
R13	Resistor, Fixed, Film: 12 kΩ, 5%, 1/8 W	3	CF1/8-12 K/J	09021	
R14	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W	2	CF1/8-2.7 K/J	09021	
R15	Resistor, Fixed, Film: 220Ω, 5%, 1/8 W	3	CF1/8-22 OHMS/J	09021	
R16	Same as R14				

* Not Used on Type 796755-2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A11**

R17	Same as R15				
R18	Resistor, Fixed, Film: 33 kΩ, 5%, 1/8 W	2	CF1/8-33K/J	09021	
R19	Resistor, Fixed, Film: 220 kΩ, 5%, 1/8 W	2	CF1/8-220K/J	09021	
R20	Same as R18				
R21	Same as R19				
R22	Same as R8				
R23	Resistor, Fixed, Film: 3 kΩ, 5%, 1/8 W	4	CF1/8-3K/J	09021	
R24	Same as R23				
R25	Same as R8				
R26	Same as R11				
R27	Same as R13				
R28	Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/8 W	4	CF1/8-3.3K/J	09021	
R29	Same as R28				
R30	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	3	CF1/8-1.0K/J	09021	
R31	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/8 W	2	CF1/8-2.2K/J	09021	
R32	Same as R1				
R33	Resistor, Fixed, Film: 75 kΩ, 5%, 1/8 W	2	CF1/8-75K/J	09021	
R34	Resistor, Fixed, Film: 27Ω, 5%, 1/8 W	1	CF1/8-27 OHMS/J	09021	
R35	Same as R8				
R36	Same as R23				
R37	Same as R23				
R38	Same as R8				
R39	Same as R11				
R40	Same as R13				
R41	Same as R28				
R42	Same as R28				
R43	Same as R30				
R44	Same as R31				
R45	Same as R1				
R46	Same as R33				
R47	Not Used				
R48	Same as R15				
R49	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	1	CF1/8-4.7K/J	09021	
R50	Resistor, Fixed, Film: 82 kΩ, 5%, 1/8 W	2	CF1/8-82K/J	09021	
R51	Resistor, Trimmer, Film: 50 kΩ, 10%, 1/2 W	1	62PAR50K	73138	
R52	Resistor, Fixed, Film: 68 kΩ, 5%, 1/8 W	1	CF1/8-68K/J	09021	
R53	Same as R50				
R54	Resistor, Fixed, Film: 200 kΩ, 5%, 1/8 W	1	CF1/8-200K/J	09021	
R55	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	3	CF1/8-10K/J	09021	
R56	Resistor, Fixed, Film: 150 kΩ, 5%, 1/8 W	1	CF1/8-150K/J	09021	
R57	Resistor, Trimmer, Film: 100 kΩ, 10%, 1/2 W	1	62PAR100K	73138	

REF DESIG PREFIX **A1A11**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R58	Resistor, Fixed, Film: 2.2 MΩ, 5%, 1/8 W	1	CF1/8-2.2M/J	09021	
R59	Not Used				
R60	Same as R55				
R61	Same as R55				
R62 Thru R67	Not Used				
R68	Resistor, Fixed, Film: 120Ω, 5%, 1/8 W	2	CF1/8-120 OHMS/J	09021	
R69	Resistor, Fixed, Film: 51Ω, 5%, 1/8 W	1	CF1/8-51 OHMS/J	09021	
R70	Same as R68				
R71	Same as R12				
R72 Thru R74	Not Used				
R75	Same as R30				
R76	Same as R2				
R77	Resistor, Fixed, Film: 200Ω, 5%, 1/8 W	1	CF1/8-200 OHMS/J	09021	
R78	Not Used				
R79	Resistor, Fixed, Film: 51 kΩ, 5%, 1/8 W	1	CF1/8-51K/J	09021	
R80	Not Used				
R81	Not Used				
R82	Resistor, Fixed: 10 kΩ, 5%, 1/10 W	2	841414-097	14632	
R83	Same as R82				
T1	Transformer	2	T9-1	15542	
T2	Same as T1				
T3	Transformer	2	T4-1	15542	
T4	Same as T3				
U1	Analog Switch	1	DG301ACJ	17856	
U2	Integrated Circuit	3	MC1496P	04713	
U3	Dual Operational Amplifier	2	MC1458N	18324	
U4	Same as U2				
U5	Same as U2				
U6	Same as U3				
U7	Voltage Regulator	1	LM317H	27014	
U8	Not Used				
U9	Integrated Circuit	1	SL1611C/DP	52648	
U10 Thru U12	Same as Not Used				
U13	Dual Analog Switch	1	DG303ACJ	17856	
W1	Cable Assembly	1	280566-2	14632	

5.5.1.13 Type 726016-X IF Bandwidth Filter Amplifier PC Assembly

REF DESIG PREFIX **A1A12**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision A				
C1	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	45	34453-1	14632	
C2	Same as C1				
C3	Capacitor, Variable, Ceramic: 1-5 pF, 20%, 250 V	10	9621	91293	
C4	Not Used				
C5	Same as C1				
C6	Same as C1				
C7	Same as C3				
C8	Not Used				
C9	Same as C1				
C10	Same as C1				
C11	Same as C3				
C12	Not Used				
C13	Same as C1				
C14	Same as C1				
C15	Same as C3				
C16	Not Used				
C17 Thru C19	Same as C1				
C20	Same as C3				
C21	Not Used				
C22	Same as C1				
C23	Capacitor, Ceramic, Monolithic: 1000 pF, 2%, 100 V	5	150-100-NPO-102G	51642	
C24	Same as C3				
C25	Not Used				
C26	Same as C1				
C27	Same as C1				
C28	Same as C23				
C29	Same as C3				
C30	Not Used				
C31	Same as C1				
C32	Same as C1				
C33	Same as C23				
C34	Same as C3				
C35	Not Used				
C36	Same as C1				
C37	Same as C1				
C38	Same as C23				
C39	Same as C3				
C40	Not Used				
C41	Same as C1				

REF DESIG PREFIX **A1A12**

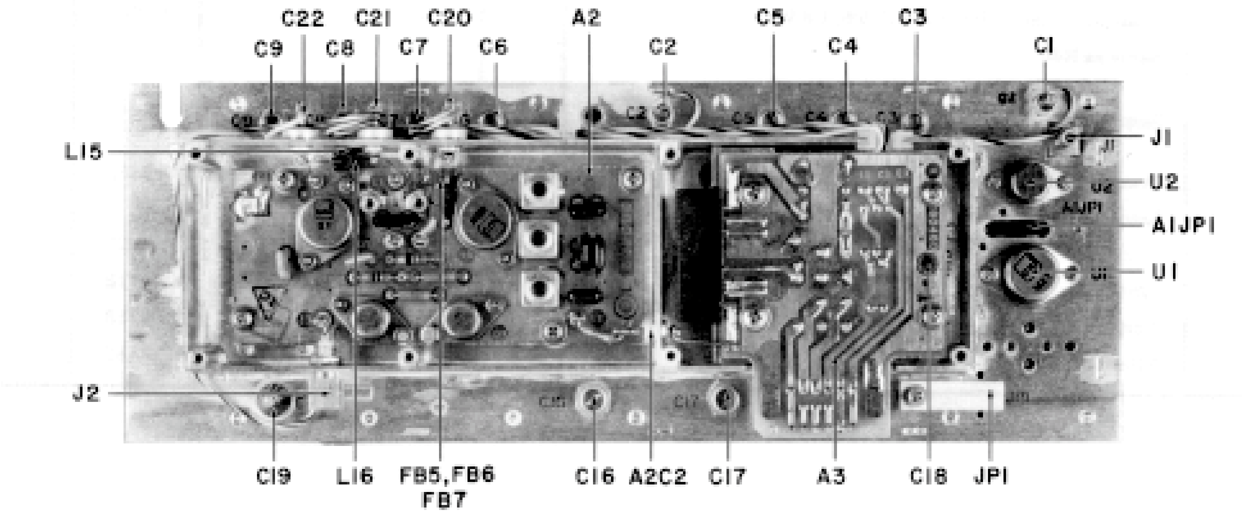
REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C42	Same as C1				
C43	Same as C23				
C44	Same as C3				
C45	Not Used				
C46 Thru C64	Same as C1				
C65	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	1	34475-1	14632	
C66 Thru C68	Same as C1				
C69	Capacitor, Ceramic, Monolithic: 68 pF, 2%, 100V	2	200-100-NPO-680G	51642	
C70	Same as C69				
C71 Thru C73	Same as C1				
CR1	Diode	20	MPN3401	04713	
CR2 Thru CR20	Same as CR1				
CR21	Diode	6	5082-3080	28480	
CR22 Thru CR26	Same as CR21				
CR27	Diode	3	1N4449	80131	
CR28	Same as CR27				
CR29	Same as CR27				
FL1 Thru FL5	See **Appendix K**				
L1	Coil, Fixed, Molded: 22 µH, 10%	12	1025-52	99800	
L2 Thru L10	Same as L1				
L11	Coil, Fixed, Molded: 10 µH	2	1025-44	99800	
L12	Same as L11				
L13	Same as L1				
L14	Same as L1				
L15	Coil, Fixed, Molded: 0.33 µH, 10%	1	1025-08	99800	
P1	Receptacle Assembly	2	66527-006	22526	
P2	Same as P1				
R1	Resistor, Fixed, Film: 3.0 kΩ, 5%, 1/8 W	5	CF1/8-3.0K/J	09021	
R2	Resistor, Fixed, Film: 30 kΩ, 5%, 1/8 W	10	CF1/8-30K/J	09021	
R3	Same as R1				
R4	Same as R2				
R5	Same as R1				

REF DESIG PREFIX **A1A12**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R6	Same as R2				
R7	Same as R1				
R8	Same as R2				
R9	Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/8 W	10	CF1/8-1.5K/J	09021	
R10	Same as R1				
R11	Same as R2				
R12	Resistor, Fixed, Film: 5.1 kΩ, 5%, 1/8 W	10	CF1/8-5.1K/J	09021	
R13	Same as R12				
R14	Same as R2				
R15	Szame as R12				
R16	Same as R12				
R17	Same as R2				
R18	Same as R12				
R19	Same as R12				
R20	Same as R2				
R21	Same as R12				
R22	Same as R12				
R23	Same as R2				
R24	Same as R12				
R25	Same as R12				
R26	Same as R2				
R27	Resistor, Fixed, Film: 2.2 kΩ, 5%, 1/8 W	2	CF1/8-2.2K/J	09021	
R28	Resistor, Fixed, Film: 47Ω, 5%, 1/8 W	6	CF1/8-47 OHMS/J	09021	
R29	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W	9	CF1/8-2.7K/J	09021	
R30	Same as R29				
R31	Same as R28				
R32	Resistor, Fixed, Composition: 91Ω, 5%, 1/8 W	2	RCR20G910JS	81349	
R33	Same as R32				
R34	Same as R28				
R35	Same as R29				
R36	Same as R29				
R37	Same as R28				
R38	Resistor, Fixed, Composition: 75Ω, 5%, 1/2 W	2	RCR20G750JS	81349	
R39	Same as R38				
R40	Same as R28				
R41	Same as R29				
R42	Same as R29				
R43	Same as R28				
R44	Resistor, Fixed, Film: 100Ω, 5%, 1/8 W	2	CF1/8-100 OHMS/J	09021	
R45	Resistor, Fixed, Film: 1.0 MΩ, 5%, 1/8 W	1	CF1/8-1M/J	09021	
R46	Same as R27				

REF DESIG PREFIX **A1A12**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R47	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	1	CF1/8-100K/J	09021	
R48	Same as R44				
R49 Thru R51	Same as R29				
T1	Transformer Assembly	2	281929-1	14632	
T2	Same as T1				
U1	Amplifier	1	QBH-105	55027	
U2	Amplifier, RF	1	MWA120	04713	
U3	Amplifier, RF	1	MWA130	04713	
U4	Attenuator	1	G1	14482	



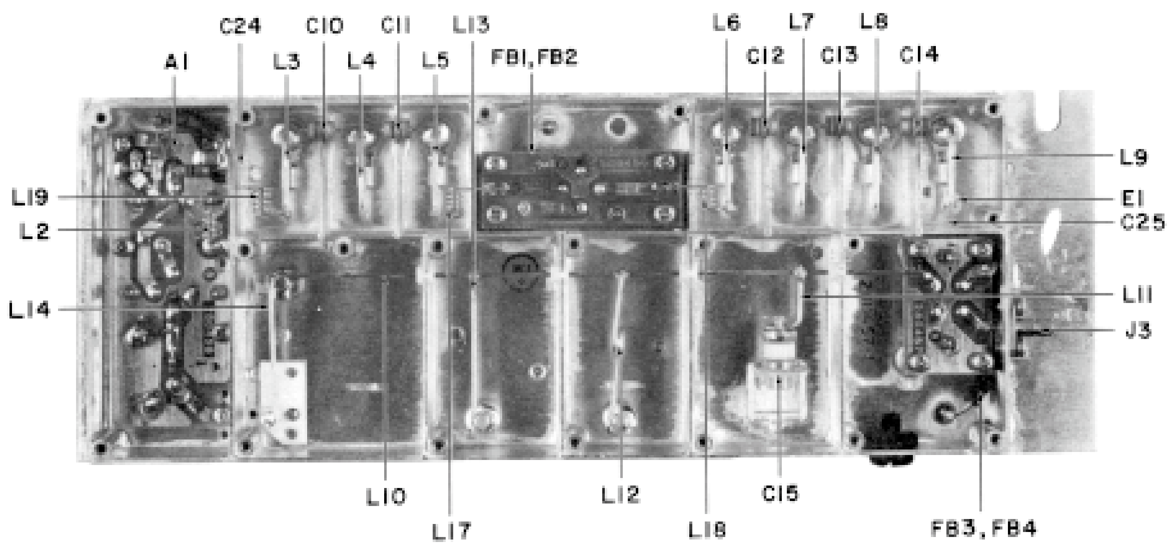


Figure 5-6. Type 796251-1 Preamplifier/Converter Assembly (A1A13), Location of Components

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.5.1.14 **Type 796251-1 Preamplifier/Converter Assembly** REF DESIG PREFIX **A1A13**

	Revision J1				
A1	1st Mixer LO Amplifier PC Assembly	1	280458-1	14632	
A2	2nd Mixer LO Amplifier PC Assembly	1	280459-1	14632	
A3	21.4 MHz IF Amplifier PC Assembly	1	280460-1	14632	
C1	Capacitor, Ceramic, Feedthru: .05 ΩF, 50 V	1	SC1-9102-503	32897	
C2	Capacitor, Ceramic, Feedthru: 1000 pF, 150 V	5	54-809-002-FC102P	33095	
C3	Part of L3				
C4	Part of L4				
C5	Part of L5				
C6	Part of L6				
C7	Part of L7				
C8	Part of L8				
C9	Part of L9				
C10	Capacitor, Composition, Tubular: .27 pF, 10%, 500 V	4	QCO.PFK	95121	
C11	Same as C10				
C12	Same as C10				
C13	Capacitor, Composition, Tubular: 0.18 pF, 10%, 500 V	1	QCO.18PFK	95121	
C14	Same as C10				
C15	Capacitor, Variable, Air: 0.8-10.0 pF, 250 V	4	5202	91293	
C16 Thru C18	Same as C15				
C19 Thru C22	Same as C2				
C23	Capacitor, Ceramic, Feedthru: 33 pF, 10%, 500 V	1	54-794-001-3301	33095	
C24	Capacitor, Modified	1	180258-1	14632	
C25	Capacitor, Ceramic, Chip: 1.5 pF, ± 0.1 pF, 500 V	1	ATC700B1R5BP500X	29990	
FB1	Ferrite Bead	10	56-590-65-4A	02114	
FB2 Thru FB10	Same as FB1				
J1	Part of A1				
J2	Connector, Receptacle	1	2012-1511-000	19505	
J3	Connector, Receptacle	1	51-045-4524-89	98291	
JP1	Jumper Plug	1	461-2872-04-03-10	71279	
L1	Coil, Fixed: 0.12 µH, 10%	1	1025-96	99800	
L2	Coil	1	180574-1	14632	
L3	Inductor Assembly	7	180461-1	14632	
L4 Thru L9	Same as L3				
L10	Inductor	1	180167-1	14632	
L11	Inductor	1	180218-1	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1A13**

L12	Inductor	11	180219-1	14632	
L13	Inductor	1	180220-1	14632	
L14	Part of C18				
L15	Coil, Fixed	2	16209-10	14632	
L16	Same as L15				
L17	Coil	1	180576-1	14632	
L18	Coil	1	180577-1	14632	
L19	Coil	1	180575-1	14632	
R1	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	1	CF1/8-1.0K/J	09021	
U1	Mixer, Double Balanced	1	M2T	27956	
U2	Amplifier	1	GPD 430	24539	
U3	Amplifier	2	QBH-126	55027	
U4	Same as U3				

5.5.1.14.1 **Part 280458-1 1st Mixer/LO Amplifier PC Assembly** REF DESIG PREFIX **A1A13A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision E1				
C1	Capacitor, Ceramic, Chip: 47 pF, 5%, 500 V	1	ATC100B470JP500X	29990	
C2	Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V	1	C1210C471K1GAC	31433	
C3	Capacitor, Ceramic, Chip: 4700 pF, 10%, 50 V	1	C1210C472KRAC	31433	
J1	Connector, Receptacle	1	2009-1511-000	19505	
JP1	Jumper Plug, 2 pin	1	461-2872-01-03-10	71279	
L1	Coil, Fixed: 0.15 µH	1	1025-00	99800	
R1	Resistor, Fixed, Film: 330Ω, 5%, 1/8 W	2	C3-330R-5PCT	24546	
R2	Resistor, Fixed, Film: 16Ω, 5%, 1/8 W	1	C3-16R-5PCT	24546	
R3	Same as R1				

5.5.1.14.2 **Part 280459-1 2nd Mixer/LO Amplifier PC Assembly** REF DESIG PREFIX **A1A13A2**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision D1				
C1	Not Used				
C2	Capacitor, Ceramic, Chip: 47 pF, 5%, 500 V	2	ATC100B470JP500X	29990	
C3	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	2	34453-1	14632	
C4	Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V	3	C1210C471K1GAC	31433	
C5	Same as C4				
C6	Same as C3				
C7	Same as C4				
C8	Capacitor, Ceramic, Chip: 15 pF, 5%, 500 V	1	ATC700B150JP500X	29990	
C9	Capacitor, Ceramic, Chip: 30 pF, 5%, 500 V	2	ATC700B300JP500X	29990	
C10	Capacitor, Mica, Dipped: 10 pF, ± 0.5 pF, 500 V	2	CM04CD100D03	81349	
C11	Capacitor, Mica, Dipped: 22 pF, 5%, 500 V	1	CM04ED220J03	81349	
C12	Same as C10				
C13	Same as C9				
C14	Capacitor, Mica Dipped: 33 pF, 2%, 500 V	1	CM04ED330G03	81349	
C15	Same as C2				
L1	Coil, Fixed: 0.27 µH	2	1025-06	99800	
L2	Same as L1				
L3	Coil, Variable: 1.277 µH nominal	3	6806	04213	
L4	Same as L3				
L5	Same as L3				
R1	Resistor, Fixed, Film: 68Ω, 5%, 1/4 W	1	CF1/4-68 OHMS/J	09021	
R2	Resistor, Fixed, Film: 10Ω, 5%, 1/4 W	1	CF1/4-10 OHMS/J	09021	
R3	Resistor, Fixed, Film: 47Ω, 5%, 1/8 W	1	C3-47R-5PCT	24546	
U1	Amplifier	1	MWA-220	04713	
U2	Amplifier	1	MWA-230	04713	
U3	Attenuator	1	G1	14482	
U4	Mixer, Balanced	1	M2B	14482	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.5.1.14.3 **Part 280460-1 21.4 MHz IF Amplifier PC Assembly** REF DESIG PREFIX **A1A13A3**

	Revision C1				
C1	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	1	34453-1	14632	
CR1	Diode	2	1N4449	80131	
CR2	Same as CR1				
L1	Coil, Fixed, Molded: 10 µH	1	1025-44	99800	
P1	Receptacle Assembly	1	66527-006	22526	
R1	Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W	1	CF1/8-1.0K/J	09021	
R2	Resistor, Fixed, Film: 1.0 MΩ, 5%, 1/8 W	1	CF1/8-1.0M/J	09021	
R3	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	1	CF1/8-100K/J	09021	
R4	Resistor, Fixed, Film: 10Ω, 5%, 1/8 W	1	C3-10R-5PCT	24546	
R5	Resistor, Fixed, Film: 470Ω, 5%, 1/8 W	1	C3-470R-5PCT	24546	
R6	Same as R5				
T1	Balun	2	282032-1	14632	
T2	Same as T1				
U1	Amplifier	1	CA2850R	01281	
U2	Power Divider	1	PSC2-1	15542	

5.5.1.15 Type 796291-1 RF Input Attenuator PC Assembly

REF DESIG PREFIX **A1A14**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision D1				
C1	Capacitor, Mica, Dipped: 160 pF, 2%, 500 V	1	CM04FD161G03	81349	
C2	Capacitor, Ceramic, Chip: 4.3 pF, ± 0.5 pF, 500 V	2	ATC700B4R3DP500X	29990	
C3	Capacitor, Ceramic, Chip: 8.2 pF, ± 0.25 pF, 500 V	1	ATC700B8R2CP500X	29990	
C4	Same as C2				
J1	Connector, Receptacle, subminiature	1	1009-7511-000	19505	
L1	Coil, Fixed, Molded: .47µH, 10%	2	1537-06	99800	
L2	Same as L1				
L3	Coil, Fixed	2	170160-1	14632	
L4	Same as L3				
P1	Connector, Plug	1	2105-7521-005	19505	
W1	Cable Assembly	1	280570-1	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

5.5.2 TYPE 796638-1 FAN FILTER ASSEMBLY — REF DESIG PREFIX **A5**

	Revision B1				
C1	Capacitor, Electrolytic, Tantalum: 100 µF, 20%, 20 V	2	196D107XX020TE4	56289	
C2	Same as C1				
C3	Capacitor, Electroytic, Tantalum: 27 µF, 10%, 35 V	1	199D276X9035FE4	56289	
E1	Terminal, Forked	4	140-1941-02-01	71279	
E2 Thru E4	Same as E1				
Q1	Transistor	1	2N2222A	80131	
R1	Resistor, Fixed, Film: 10Ω, 5%, 1/4 W	1	CF1/4-10 OHMS/J	09021	
R2	Resistor, Fixed, Film: 330Ω, 5%, 1/8 W	1	CF1/8-330 OHMS/J	09021	

NOTES

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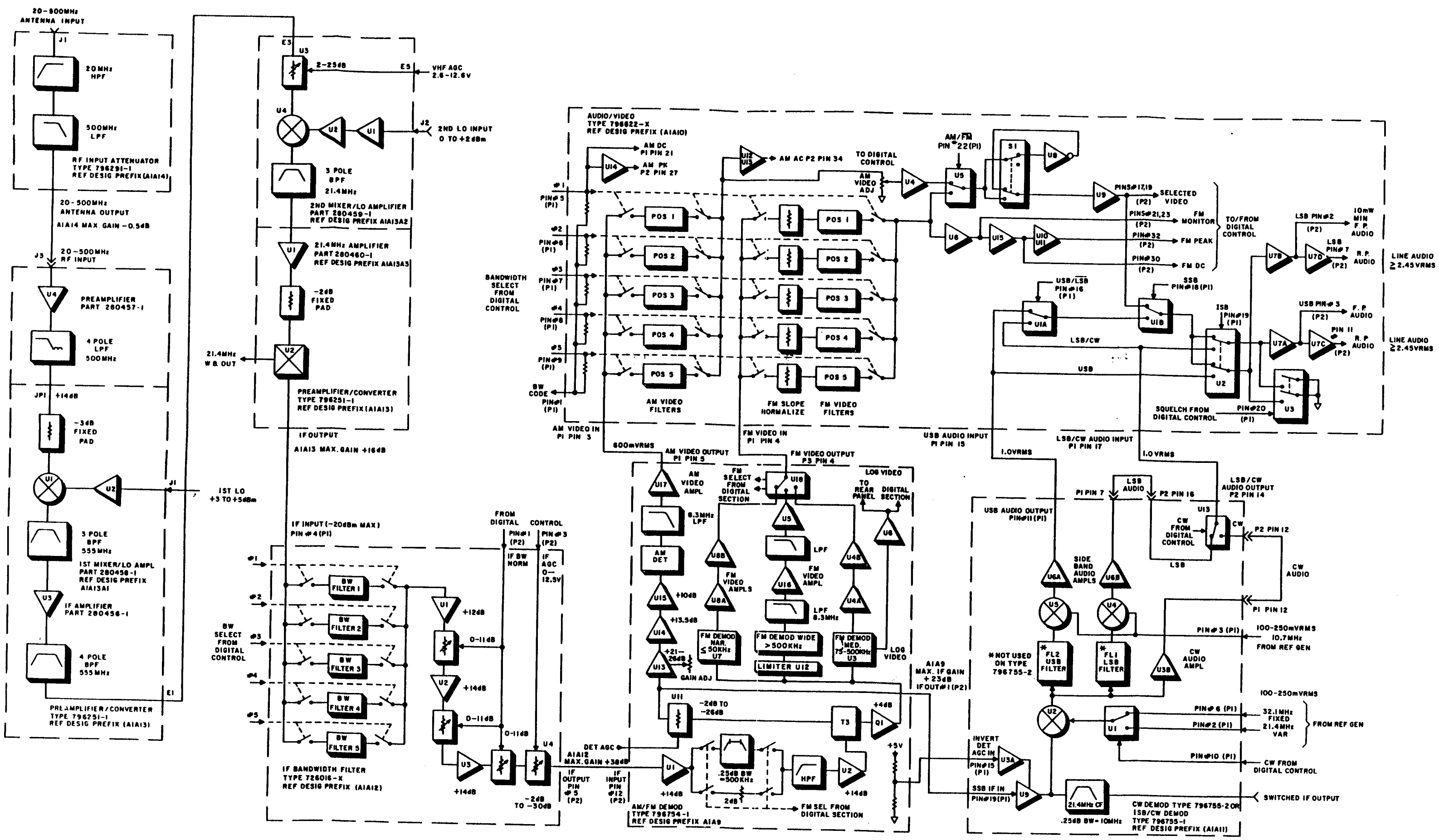
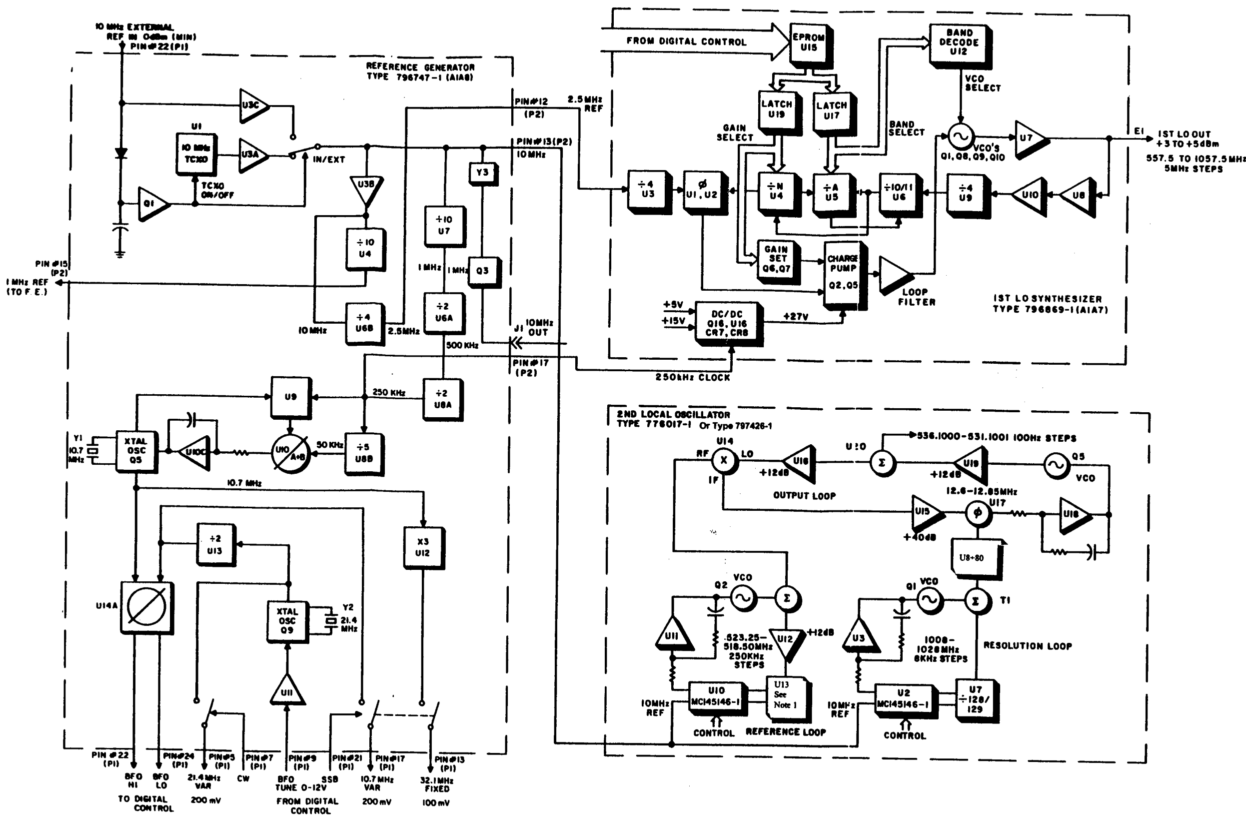


FO-1. RF/IF Section
Functional Block Diagram (B)
FP-1/(FP-2 blank)

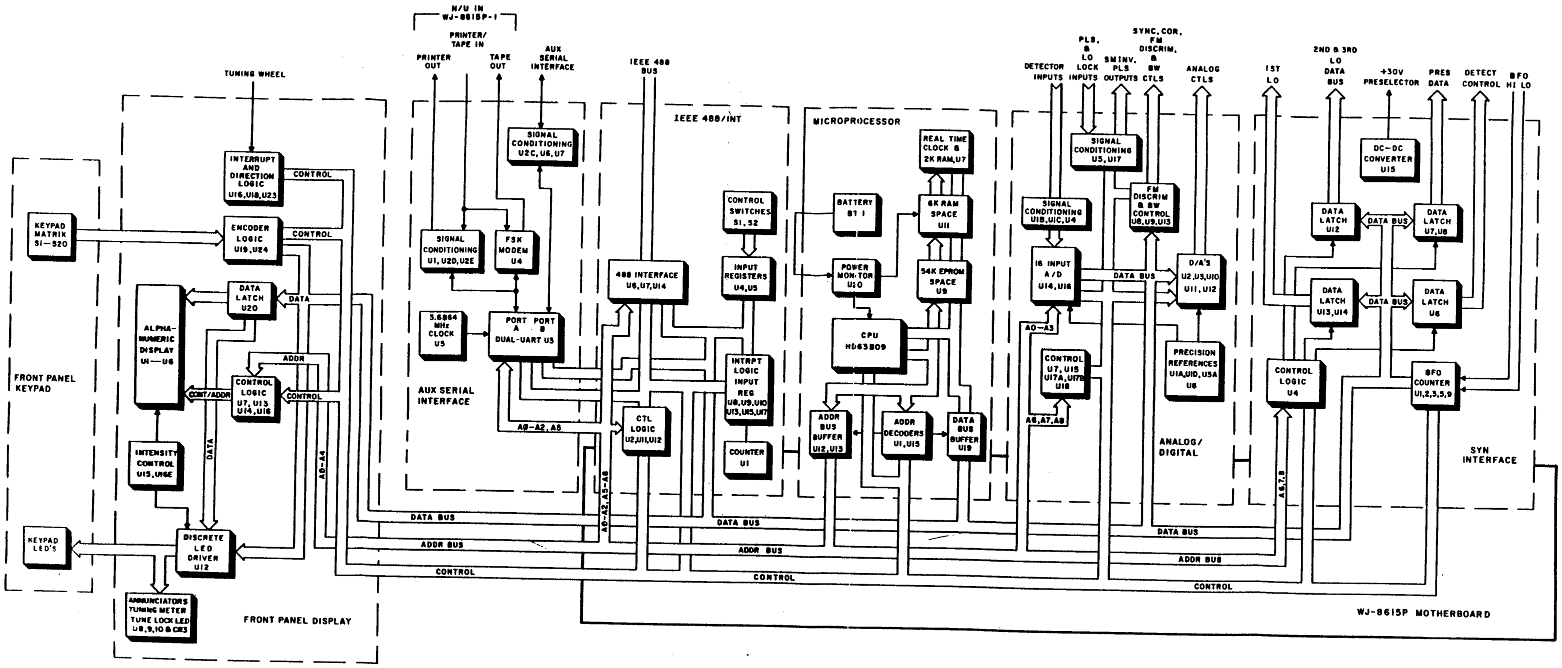


NOTE:
1. IN TYPE 776017-1, U13 IS ÷40/41 DUAL MODULUS DIVIDER;
IN TYPE 797426-1, U13 ÷32/33 DUAL MODULUS DIVIDER

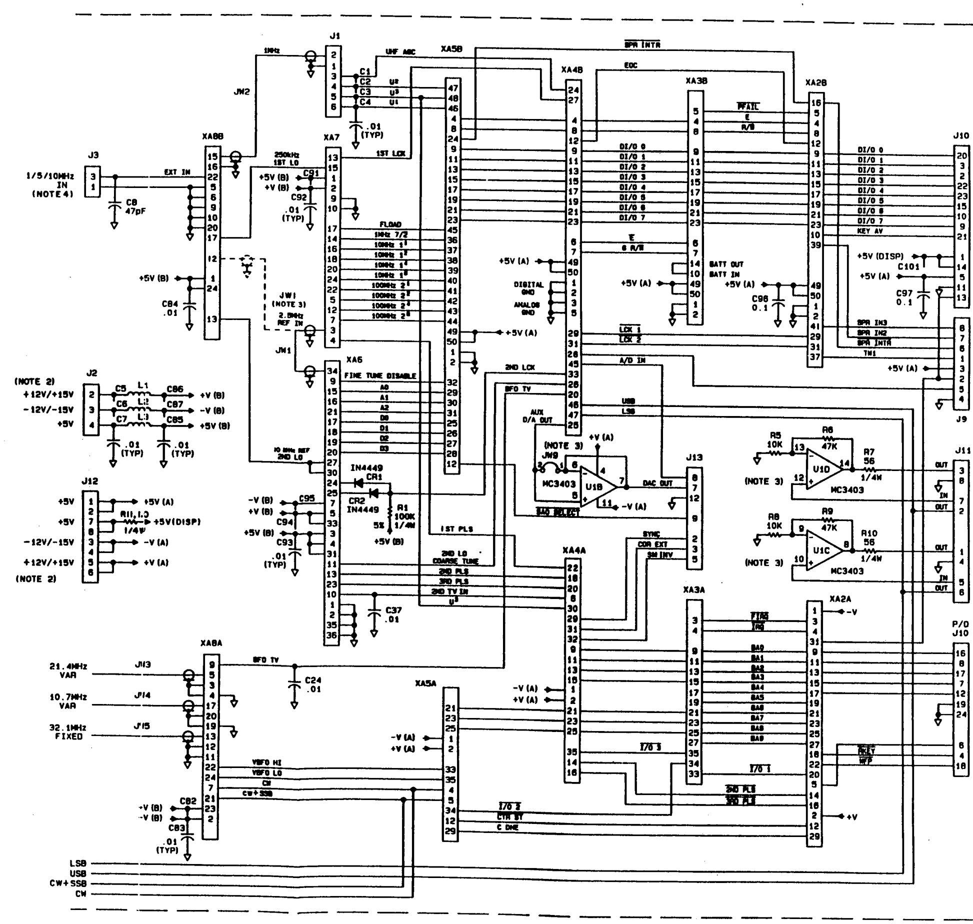
SYNTHESIZER TUNING SCHEME

CARRIER FREQ.	1ST LO	2ND LO
20.0000–24.9999 MHz	577.5000 MHz	536.1000–531.1001 MHz
25.0000–29.9999 MHz	582.5000 MHz	536.1000–531.1001 MHz

FO-2. Synthesizer Section
Functional Block Diagram (D)



FO-3. Digital Control Section
Functional Block Diagram (C)
FP-5/(FP-6 blank)



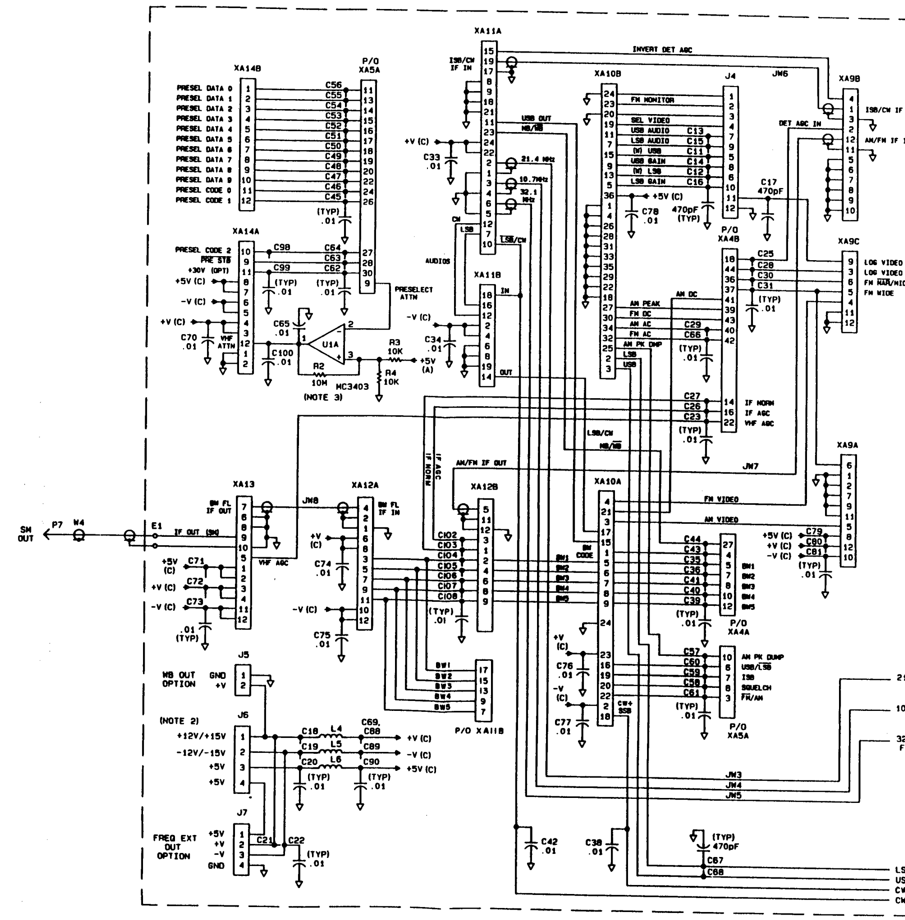
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.
2. +12V/+15V (+V) AND -12V/-15V (-V) ARE SELECTED TO THE BOARD'S USAGE: SEE TABLE A.
3. DIFFERENCE BETWEEN TYPES IS LISTED IN TABLE A.
4. 10MHz IN ALL VERSIONS. 1/5 MHz AVAILABLE ONLY IN 8615P-2.

TABLE A

TYPE	R2 THRU R10 / U1	+V	-V	JW9	JW1
796629-1	NOT USED	+12V	-12V	USED	XA7-3 TO XA8B-12
796629-2	USED	+15V	-15V	NOT USED	XA7-3 TO XA6-34
796629-3	USED	+15V	-15V	NOT USED	XA7-3 TO XA8B-12

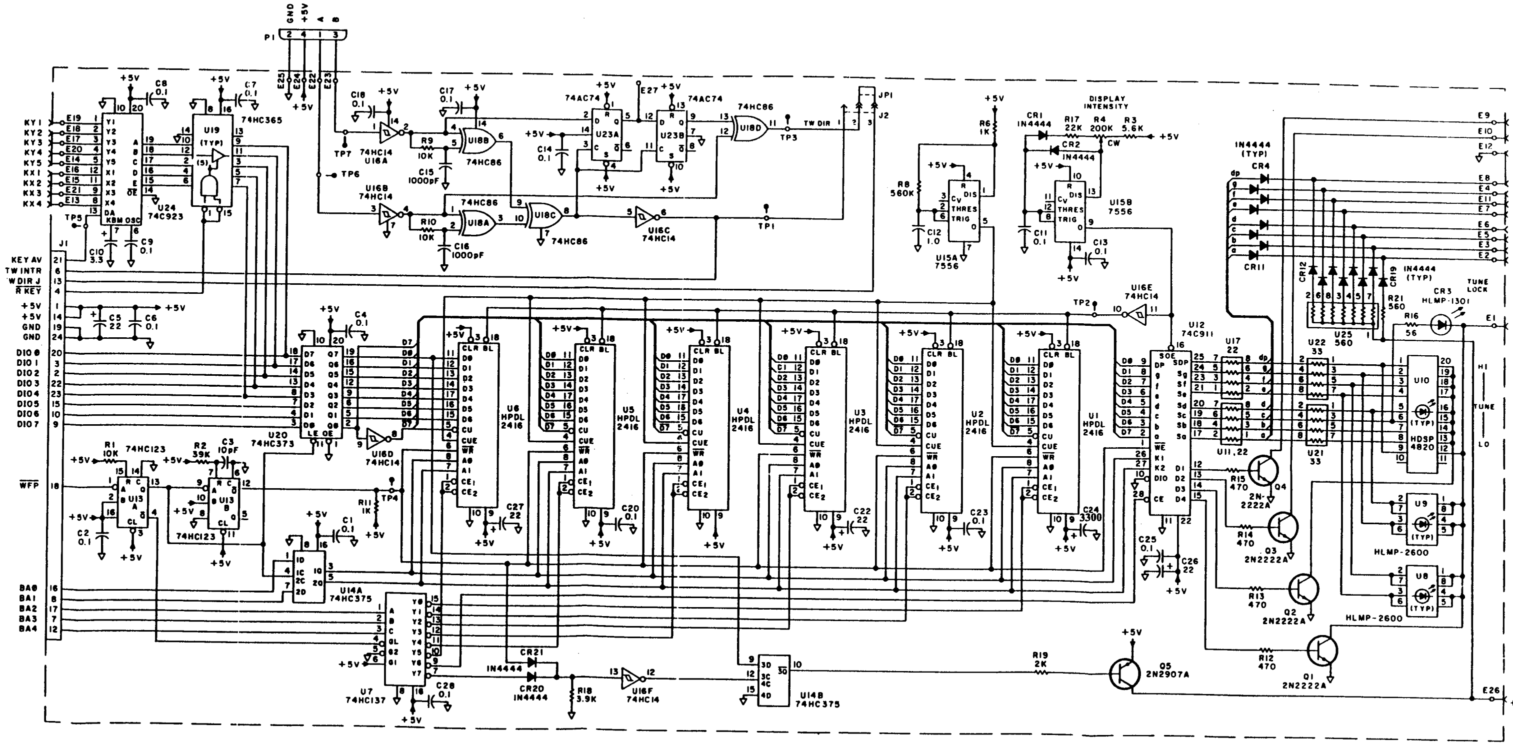
REF DESIG	BOARD FUNCTION
A2	REMOTE INTERFACE
A3	MICROPROCESSOR
A4	ANALOG/DIGITAL INTERFACE
A5	SYNTHESIZER INTERFACE
A6	2ND LO SYNTHESIZER
A7	1ST LO SYNTHESIZER
A8	REFERENCE GENERATOR
A9	AM/FM DEMODULATOR
A10	AUDIO/VIDEO AMPLIFIER
A11	ISB/CW DEMODULATOR
A12	IF BW AMPLIFIER
A13	PREAMPLIFIER/CONVERTER
A14	PRESELECTOR

FO-4. Type 796629-3, Motherboard Assembly (A1), Schematic Diagram 580413 (Sheet 1 of 2) (E)

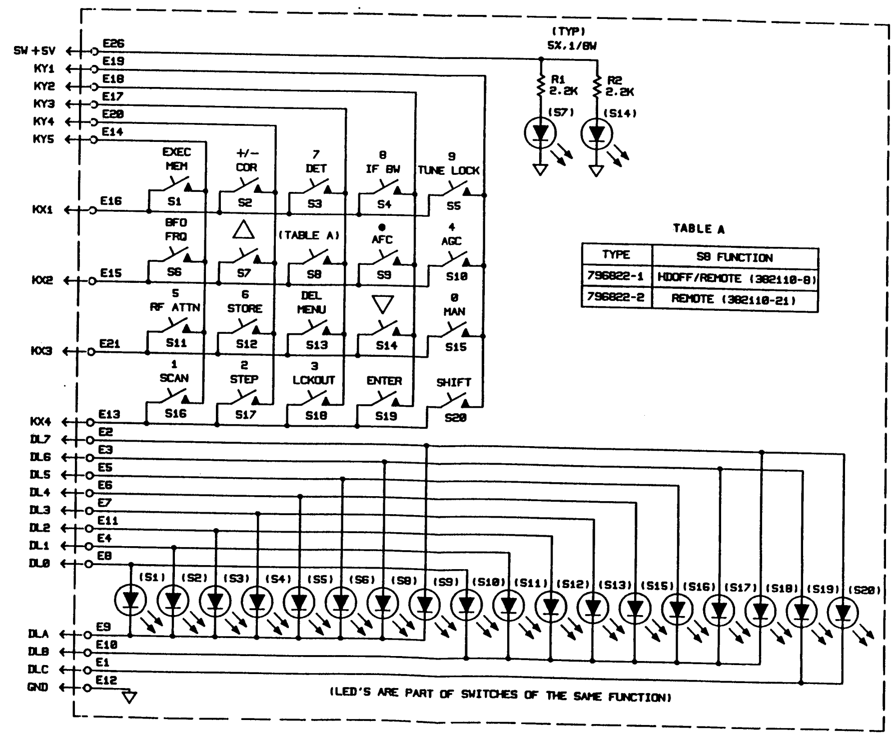


FO-4. Type 796629-3, Motherboard Assembly (A1), Schematic Diagram 580413 (Sheet 2 of 2) (E)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
b) CAPACITANCE IS IN pF.



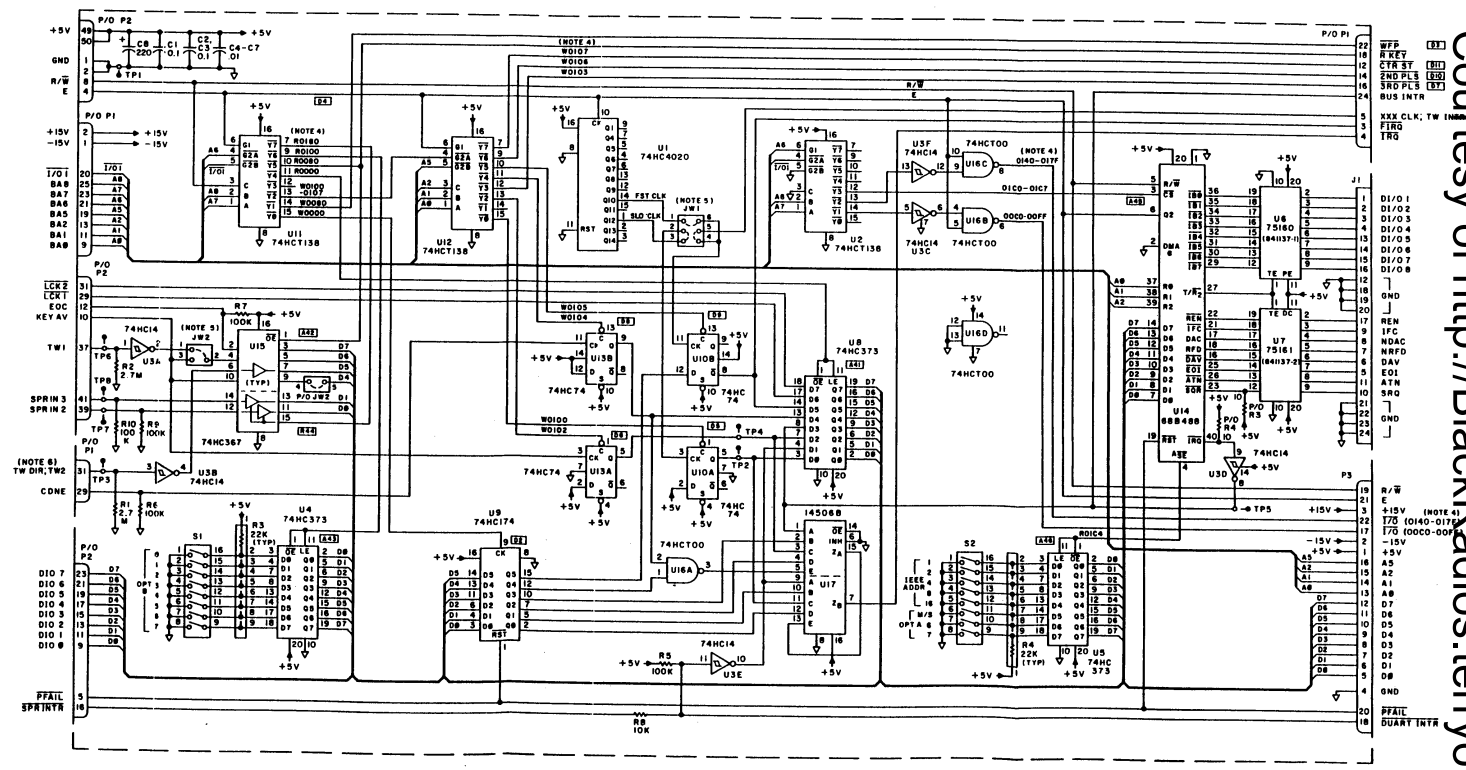
FO-5. Type 796823-1, Front Panel Display Assembly (A1A1), Schematic Diagram 580978 (C)



FO-6. Type 796822-1, Front Panel Keyboard Assembly (A1A1A1), Schematic Diagram 382123 (B)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN µF.
2. ▭ SIGNATURE ANALYSIS TEST POINT.
3. SECONDARY SIGNAL NAMES ARE LISTED IN ( ).
4. ADDRESSES ARE RELATIVE.
   ACTUAL ADDRESS = RELATIVE ADDRESS + I/O BASE ADDRESS
   SEE MICROPROCESSOR SCHEM FOR I/O BASE ADDRESS.
5. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE A.
6. SIGNAL NAMES ARE DETERMINED BY SPECIFIC APPLICATION.
   SEE JW1 CONNECTIONS AND SIGNAL NAMES ON FRONT PANEL SCHEMATIC.

TYPE	JW1	JW2
796627-1	1-6 2-3 4-5	1-2 4-5
796627-2	3-4 2-5	2-3

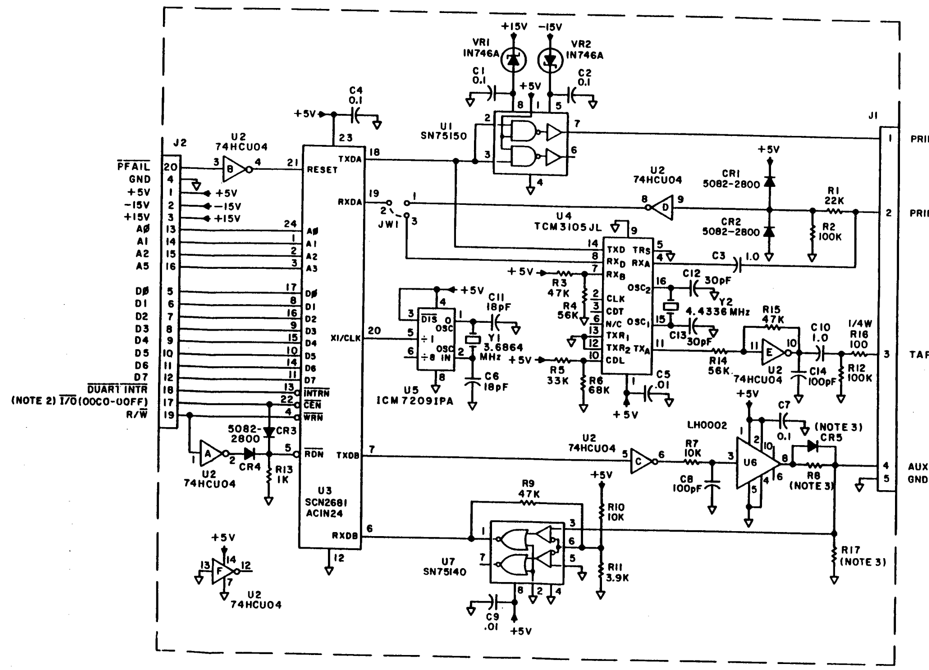


FO-7. Type 796627-2, IEEE-488/Interrupt Assembly (A1A2), Schematic Diagram 580597 (D)

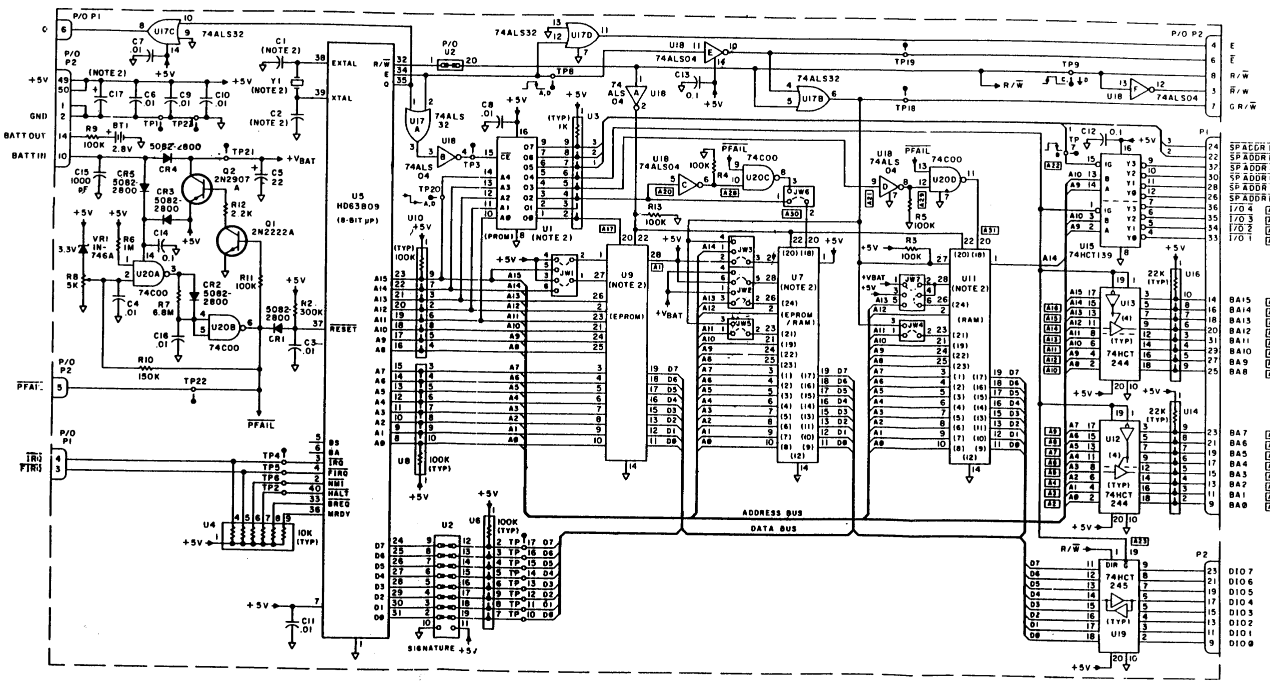
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS IN µF.
2. ADDRESSES ARE RELATIVE.
   ACTUAL ADDRESS ← RELATIVE ADDRESS + I/O BASE ADDRESS.
   SEE MICROPROCESSOR SCHEM FOR I/O BASE ADDRESS.
3. DIFFERENCE BETWEEN TYPES IS LISTED IN TABLE A.

TABLE A

TYPE NO.	CR5	R8	R17
796631-1	N/U	47Ω, 1/4W	N/U
796631-2	5082-2800	N/U	4.7K



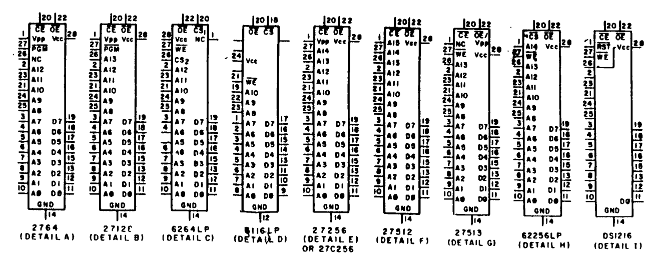
FO-8. Type 796631-2, Auxiliary Serial Interface Assembly (A1A2A1), Schematic Diagram 480952 (B)



NOTES: 1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
b) CAPACITANCE IS IN µF.
2. DIFFERENCE BETWEEN TYPES (U1, U7, U9, U11, Y1, C17, C2, C1) ARE LISTED IN TABLE A.

TABLE A

TYPE		U1	U7 (DETAIL)	U9 (DETAIL)	U11 (DETAIL)	JW1	JW2	JW3	JW4	JW5	JW6	JW7	Y1	C17	I/O BASE ADDRESS	C1, C2
796495-1	EM/SSL	841168	27128 (B)	27128 (B)	6264LP (C)	1-3 2-4	2-3 5-6	2-3	1-2	1-2	1-2	1-2 4-6	4.9152 MHz	22	1800	22pF
796495-2	SSL	841190	27128 (B)	27128 (B)	6264LP (C)	1-3 2-4	2-3 5-6	2-3	1-2	1-2	1-2	1-2 4-6	4.9152 MHz	22	1800	22pF
796495-3	STD-(NEW)	841191	27128 (B)	27128 (B)	6116LP (D)	1-3 2-4	2-3 5-6	2-3	2-3	1-2	1-2	1-2 4-6	4.9152 MHz	22	1800	22pF
796495-4	STD-(OLD)	841192	2764 (A)	2764 (A)	6116LP (D)	1-3 2-4	2-3 5-6	2-3	2-3	1-2	1-2	1-2 4-6	4.9152 MHz	22	1800	22pF
796495-5	(SI) STD	841206	27128 (B)	27128 (B)	6264LP (C)	1-3 2-4	2-3 5-6	2-3	1-2	1-2	1-2	1-2 4-6	4.9152 MHz	22	1800	22pF
796495-6	LOG/RTC	841225	DS1216 (I)	27256 (E)	6264LP (C)	1-6 2-4	— 5-6	3-4	1-2	1-2	1-2	1-2 4-6	4.9152 MHz	22	1800	22pF
796495-7	TC(OLD)	841226	27C256 (E)	27C256 (E)	6264LP (C)	1-6 2-4	2-3 5-6	1-3	1-2	1-2	1-2	1-2 4-6	4.9152 MHz	220	1800	22pF
796495-8	STD	841247	27128 (B)	27128 (B)	6264LP (C)	1-3 2-4	2-3 5-6	2-3	1-2	1-2	1-2	1-2 4-6	8.0 MHz	22	—	18pF
796495-9	WJ-8942/CU	841249	27C513 (G)	27C512 (F)	6264LP (C)	1-6 2-5	2-3 5-6	3-4	1-2	1-2	1-2	1-2 4-6	4.9152 MHz	22	0000	22pF
796495-10	P-1	841302	MK48T128 (D)	27C512 (F)	6264LP (C)	1-6 2-5	2-6	N/U	1-2	2-3	1-2	1-2 4-6	4.9152 MHz	22	0000	22pF
796495-11	P (Ver 0.0.X)	841302	MK48T128-20 (D)	27C512-20 (F)	6264LP (C)	1-6 2-5	2-6	N/U	1-2	2-3	1-2	1-2 4-6	8.0MHz	22	0000	18pF
796495-12	P (Ver 2.0.1.X)	841455	"	"	"	"	"	"	"	"	"	"	"	"	"	"
796495-13	600 CHAN P	841612	27C513 (G)	27C256 (E)	62256LP (H)	1-6 2-4	2-3 5-6	3-4	1-2	1-2	1-2	1-2 3-6	8.0 MHz	22	0000	18pF
796495-14	TC	841455	MK48T128 (C)	27C512 (F)	6264LP (C)	1-6 2-5	2-6	N/U	1-2	2-3	1-2	1-2 4-6	4.9152 MHz	22	0000	22pF



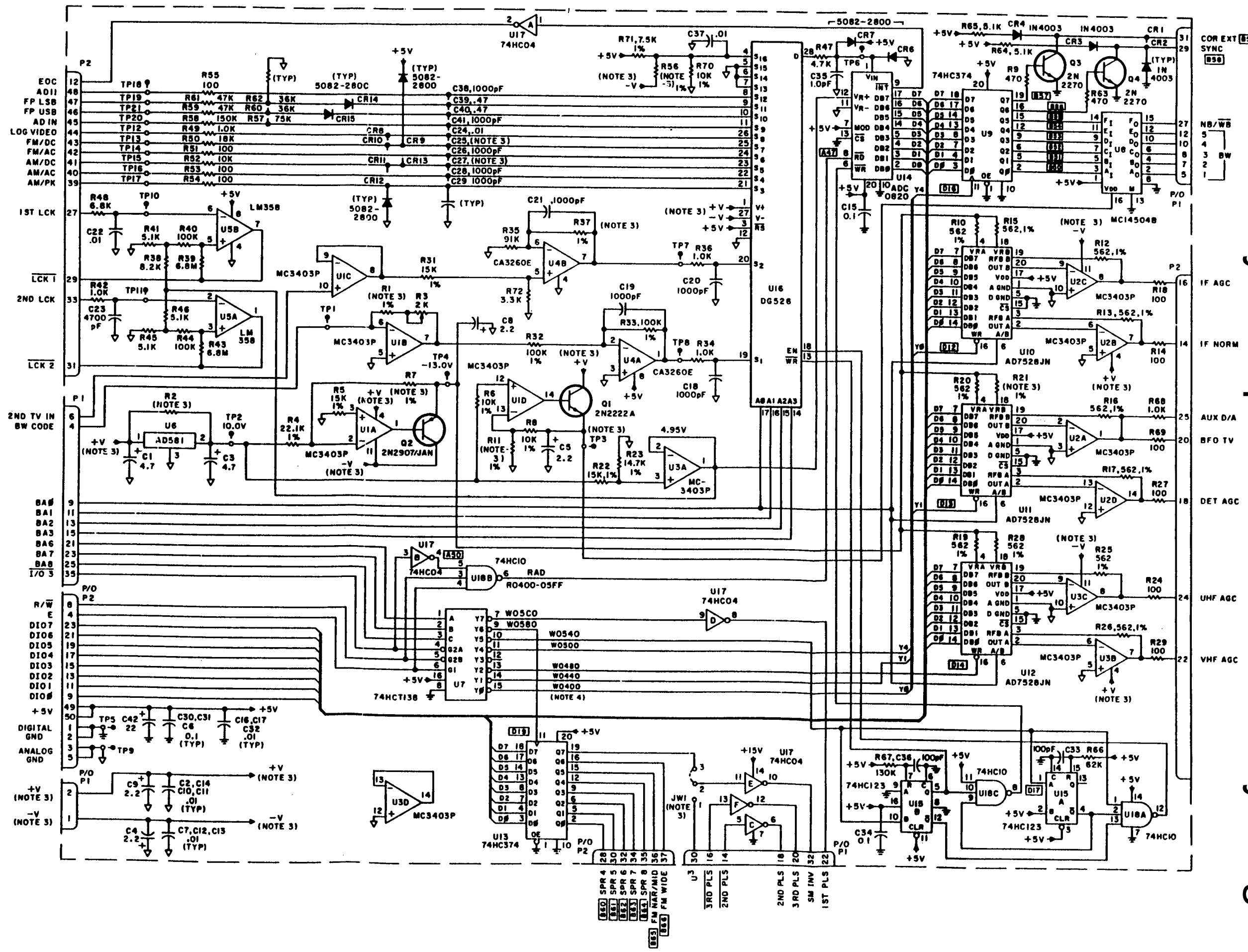
FO-9. Type 796495-12, Microprocessor Assembly (A1A3), Schematic Diagram 580472 (L)

WJ-8615P VHF/UHF COMPACT RECEIVER

NOTES
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS IN µF.
   c) ALL 1% RESISTORS ARE 1/10W.
2. ▭ SIGNATURE ANALYSIS TEST POINT.
3. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE A.
4. ADDRESSES ARE RELATIVE. ACTUAL ADDRESS = RELATIVE ADDRESS + I/O BASE ADDRESS. SEE MICROPROCESSOR SCHEMATIC FOR I/O BASE ADDRESS.

TABLE A

TYPE NO.	C25	C27	R1	R2	R7	R11	R21		R37	R56	TP3	+V	−V	JW1
796772-1	.047	.01	9.09K	N/U	28.7K	33.2K	5.62K		90.9K	30.1K	12.0V	+15V	−15V	2-3

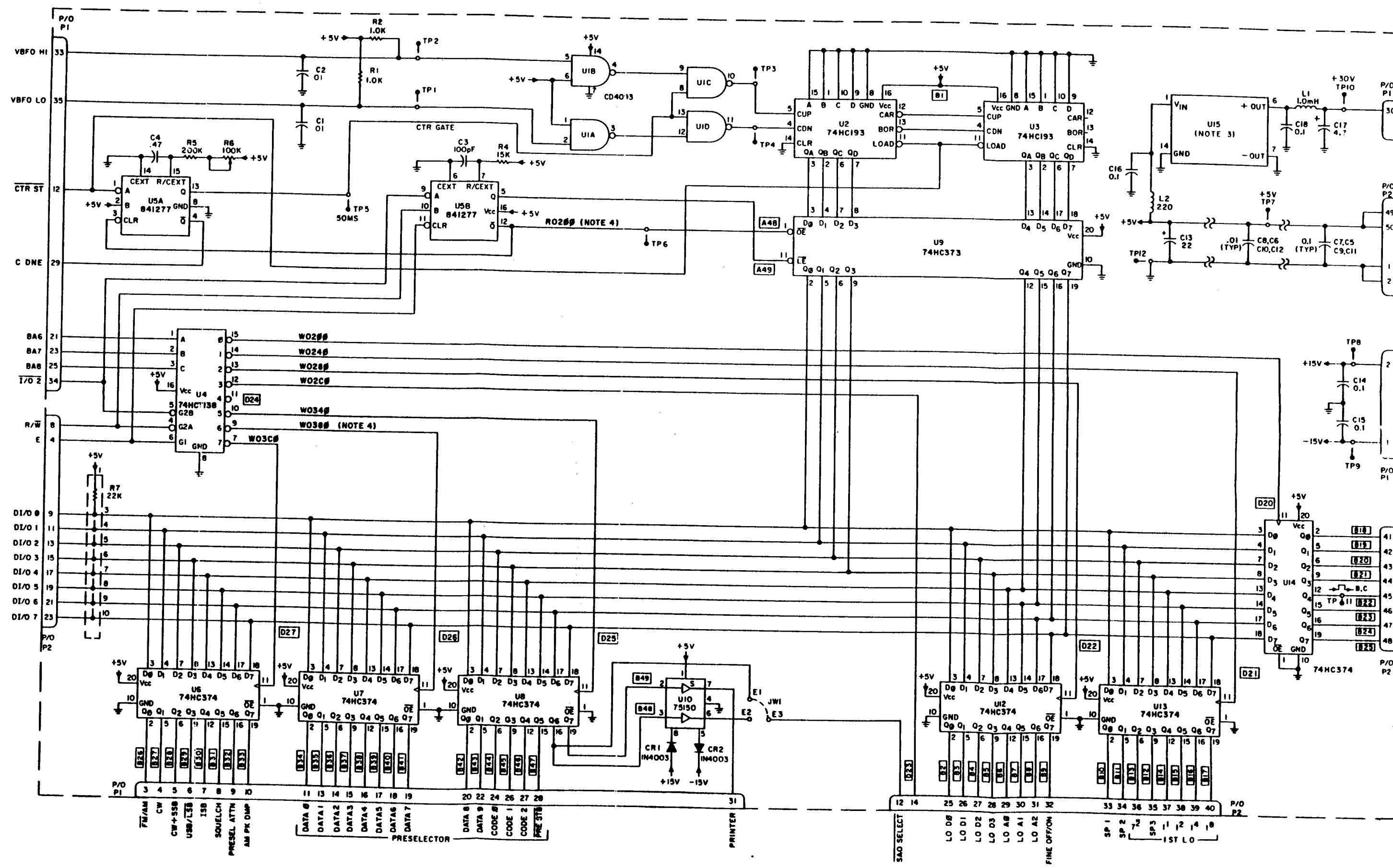


FO-10. Type 796772-1, Analog/Digital Assembly (A1A4), Schematic Diagram 580883 (C)
FP-21/(FP-22 blank)

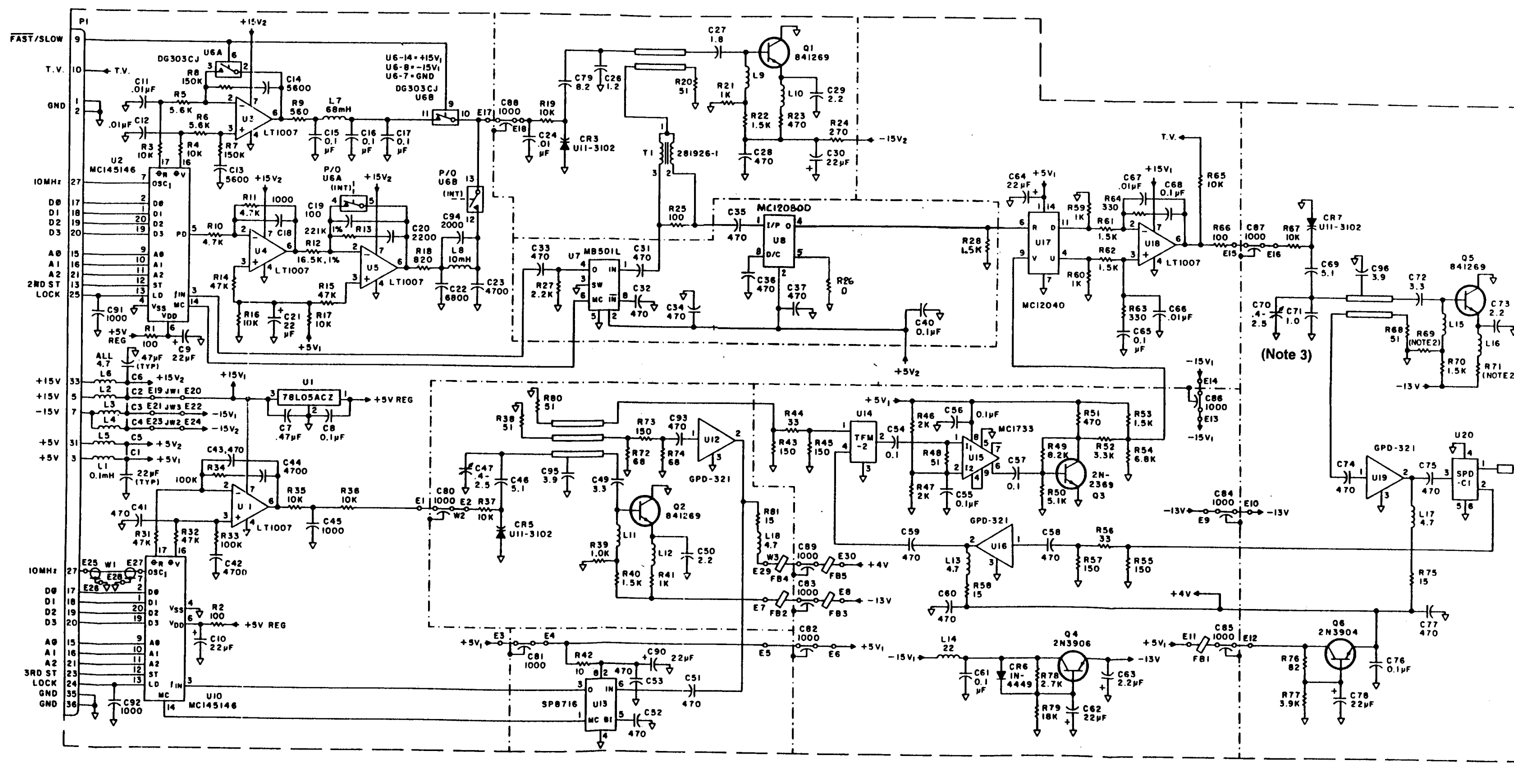
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN µF.
   b) RESISTANCE IS IN OHMS, ±5%, 1/4W.
2. ▭ SIGNATURE ANALYSIS TEST POINT.
3. FOR DIFFERENCE IN TYPES SEE TABLE A. (-2 USED WITH TRACKING PRESELECTOR OPTION).
4. ADDRESSES ARE RELATIVE.
   ACTUAL ADDRESS = RELATIVE ADDRESS + I/O BASE ADDRESS.
   SEE MICROPROCESSOR SCHEMATIC FOR I/O BASE ADDRESS.

TABLE A

TYPE NO.	U15
796245-1	NOT USED
-2	DIP5150T



FO-11. Type 796245-1, Synthesizer Interface Assembly (A1A5), Schematic Diagram 580174 (K)

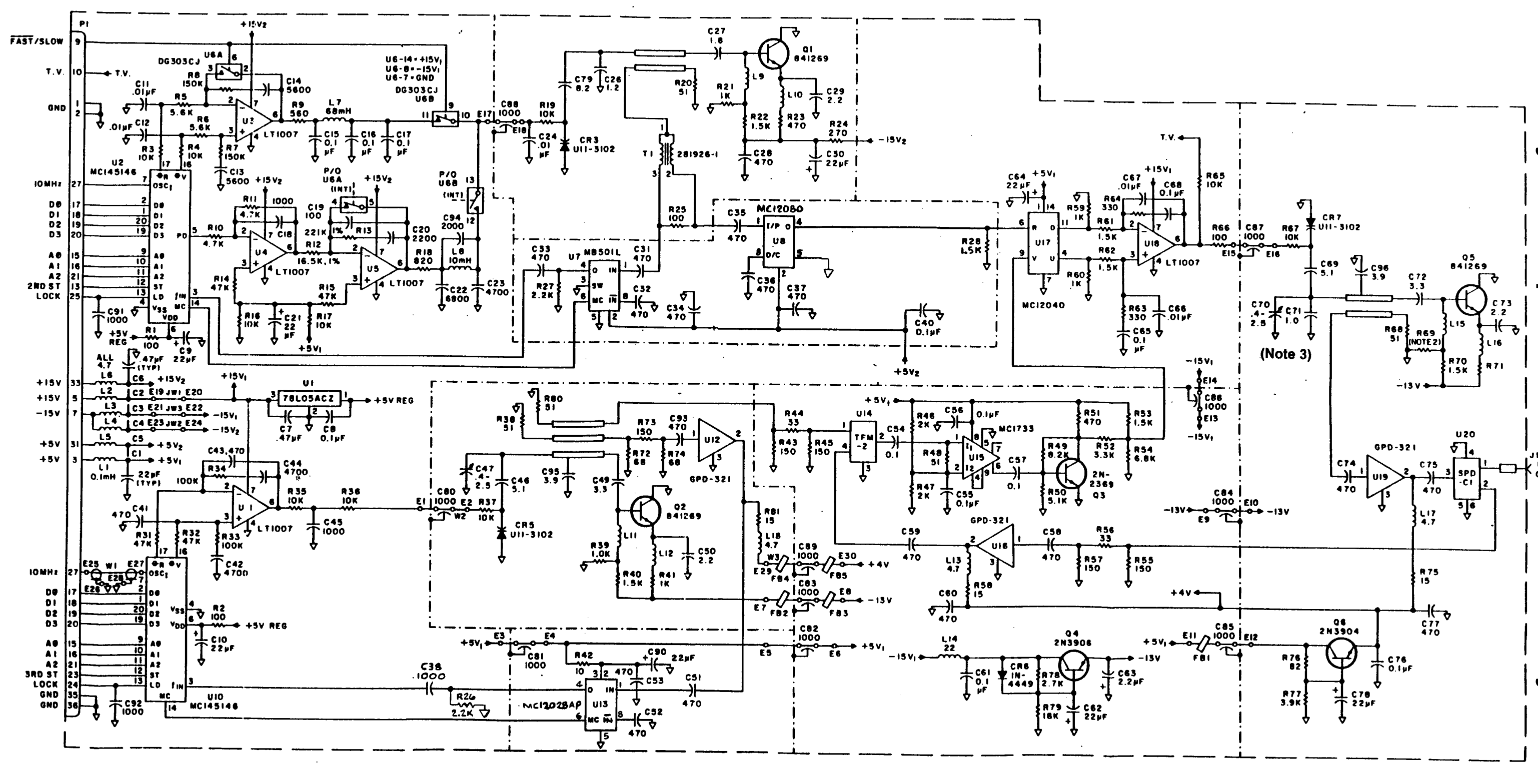


NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS IN Pf.
   c) INDUCTANCE IS IN µH.
2. DIFFERENCE BETWEEN TYPES IS LISTED IN TABLE.
3. C71 IS NOMINAL VALUE. SELECT AT TEST. MAY BE LEFT OFF.
4. FOR WJ-8615P S/N UP TO 1200.

TYPE	R69	R71
776017-1	1K	1K
776017-2	820	820

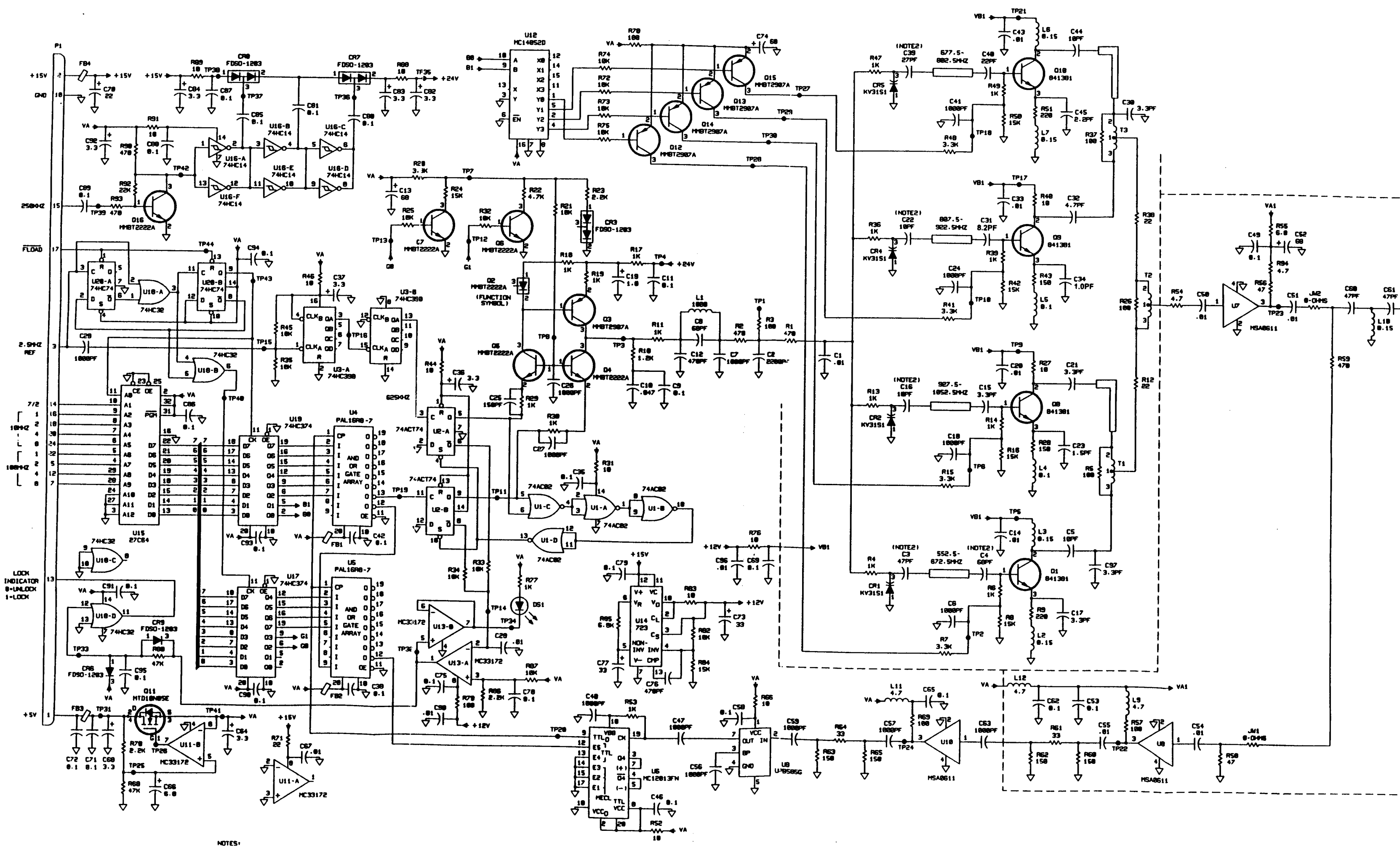
(See Note 4)
FO-12. Type 776017-1, 2nd LO Synthesizer Assembly (A1A6), Schematic Diagram 580859 (F)

NOTES:
1. UNLESS OTHERWISE SPECIFIED
   a) RESISTANCE IS IN OHMS, ± 5%, 1/8 W.
   b) CAPACITANCE IS IN pF.
   c) INDUCTANCE IS IN µH.
2. FOR WJ-8615P S/N 1201 AND UP.
3. C71 IS NOMINAL VALUE. SELECT AT TEST. MAY BE LEFT OFF.



(See Note 2)

FO-12A. Type 797426-1, 2nd LO Synthesizer Assembly (A1A6), Schematic Diagram 580859 (B)



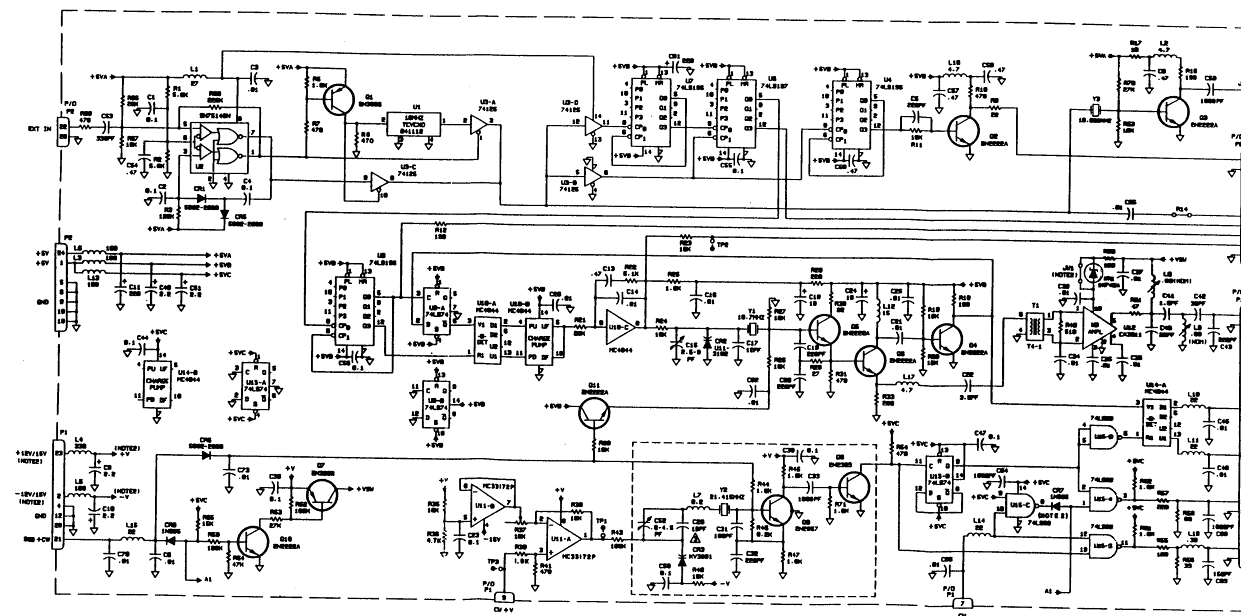
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
A) RESISTANCE IS IN OHMS, ±5%, 1/8W.
B) CAPACITANCE IS IN µF.
C) INDUCTANCE IS IN µH.
2. NOMINAL VALUE; FINAL VALUE FACTORY SELECTED.

FO-13. Type 796869-1, 1st LO Synthesizer Assembly (A1A7), Schematic Diagram 581033 (E)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
A) RESISTANCE IS IN OHMS, ±5%, 1/8W.
B) CAPACITANCE IS IN µF.
C) INDUCTANCE IS IN µH.
2. FOR DIFFERENCES BETWEEN TYPE NO.S. SEE TABLE A.
△ NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

TABLE A

TYPE	JA1	VR1	+V	−V	CR7
796747-1	N/U	USED	+15V	−15V	USED
796747-2	USED	N/U	+15V	−15V	USED
796747-3	N/U	USED	+18V	−18V	N/U

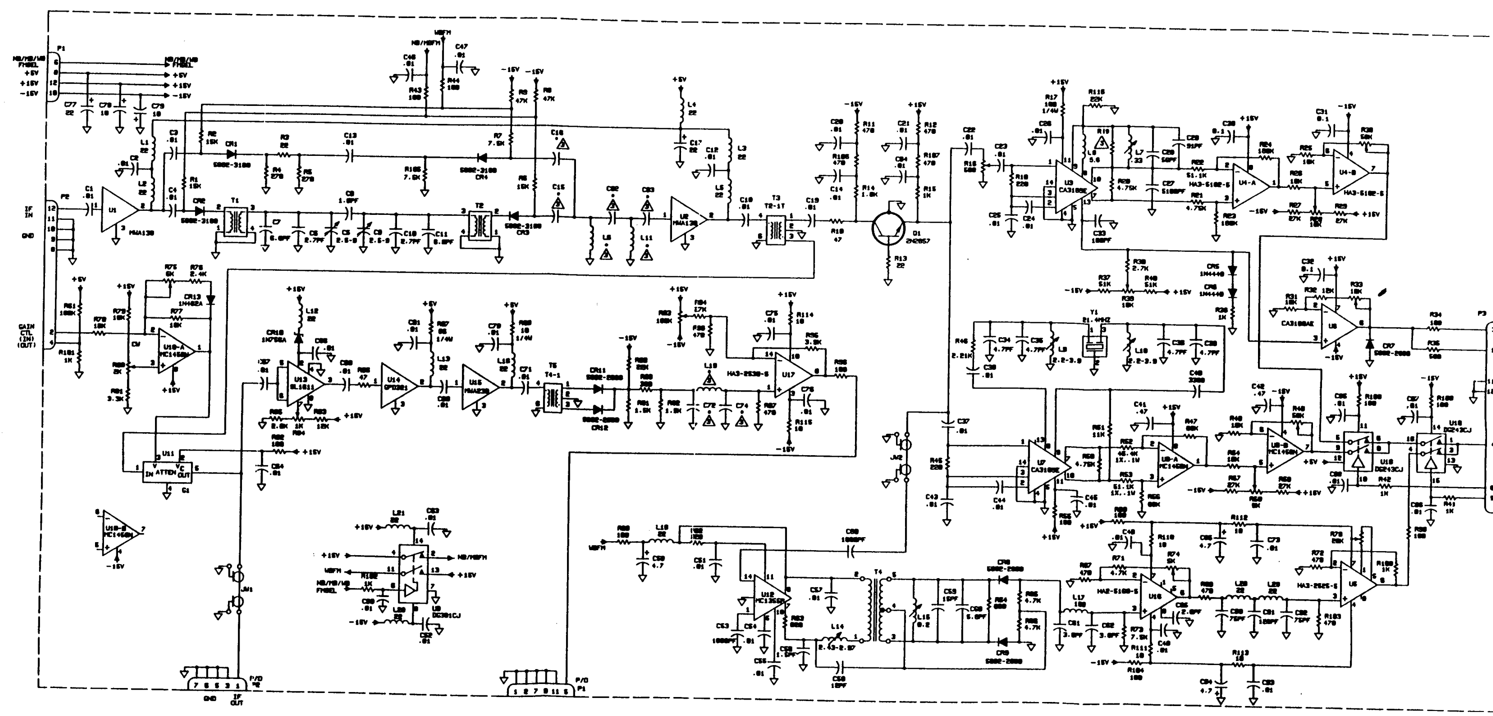


FO-14. Type 796747-X, Reference Generator Assembly (A1A8), Schematic Diagram 580846 (J)

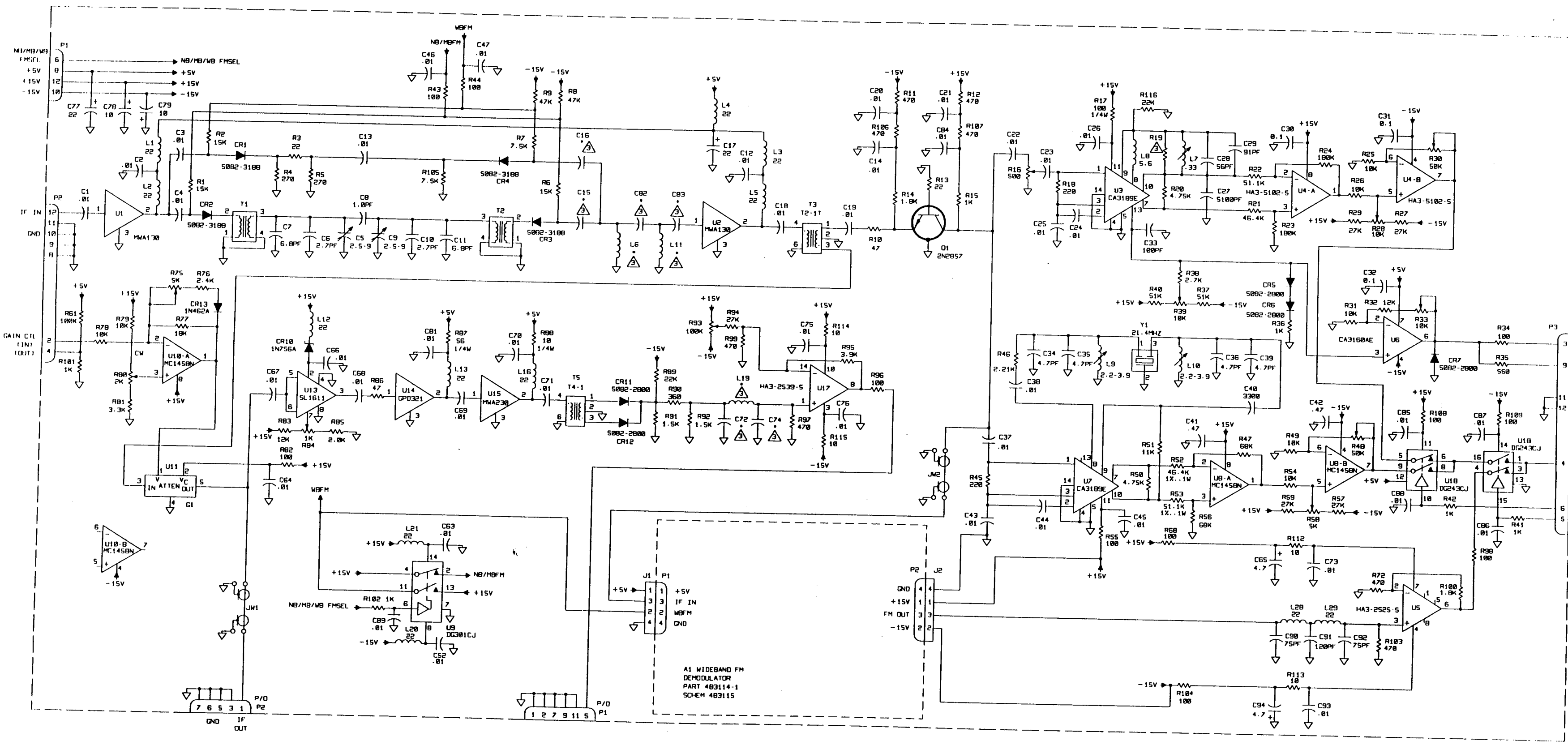
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
A) RESISTANCE IS IN OHMS, ±5%, 1/8W.
B) CAPACITANCE IS IN µF.
C) INDUCTANCE IS IN µH.
2. U12-GND PINS: 2,3,4,5,9,12,13
3. DIFFERENCE BETWEEN TYPE NO.S IS IS LISTED IN TABLE 'A'.

TABLE A

TYPE NO.	C10	C15	C82	C83	L8	L11	L18	C72	C74	R10
-1	[illegible]	[illegible]	110PF	[illegible]	.39	.39	15	47	47	6.8K
-2	390PF	390PF	[illegible]	390PF	.56	.56	6.8	24	24	[illegible]
-3	220PF	220PF	110PF	220PF	.33	.33	10	47	47	820



FO-15. Type 796754-1, AM/FM Demodulator Assembly (A1A9),
Schematic Diagram 580862 (H)



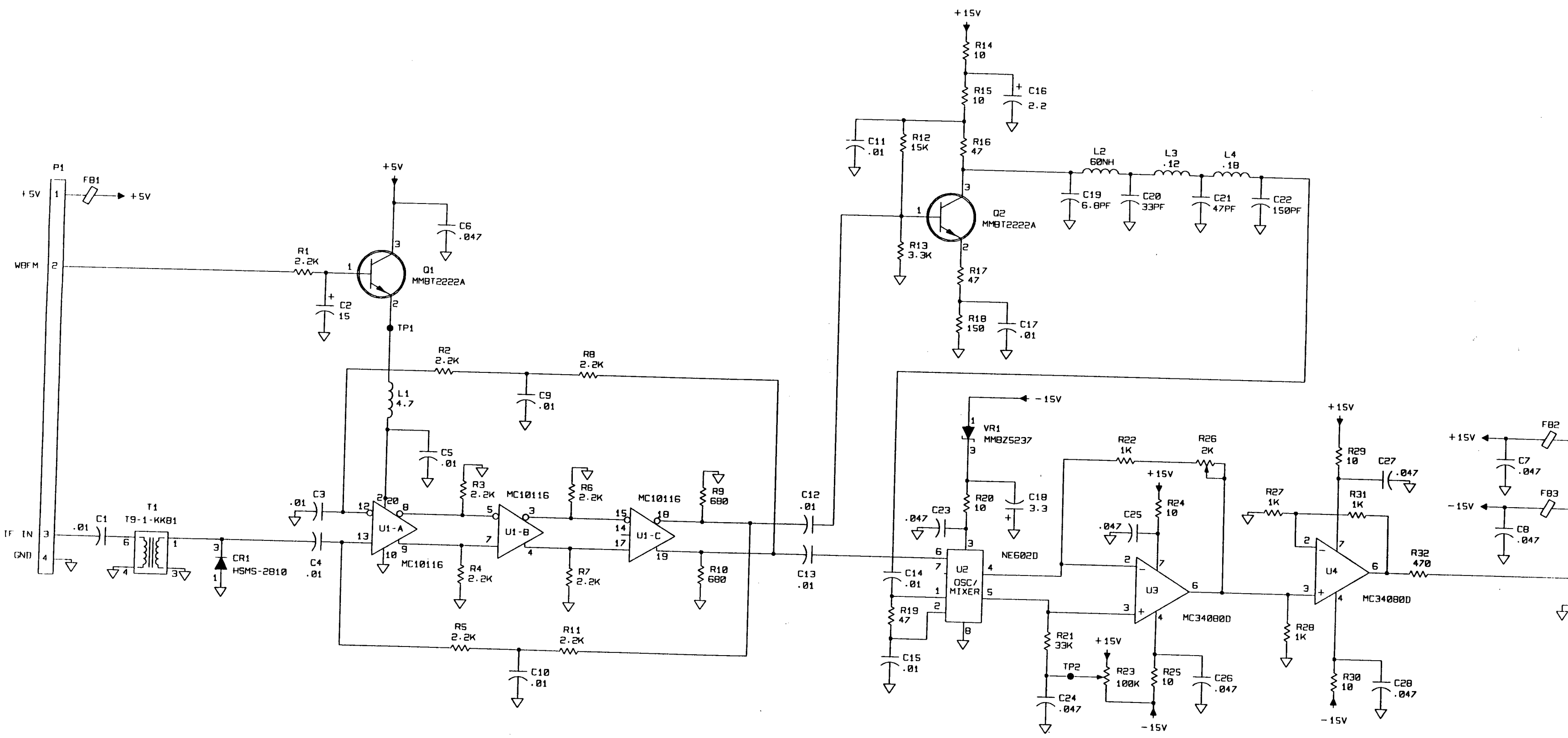
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.
2. U12-GND PINS: 2,3,4,6,9,12,13

△3 DIFFERENCE BETWEEN TYPE NO.S IS IS LISTED IN TABLE 'A'.

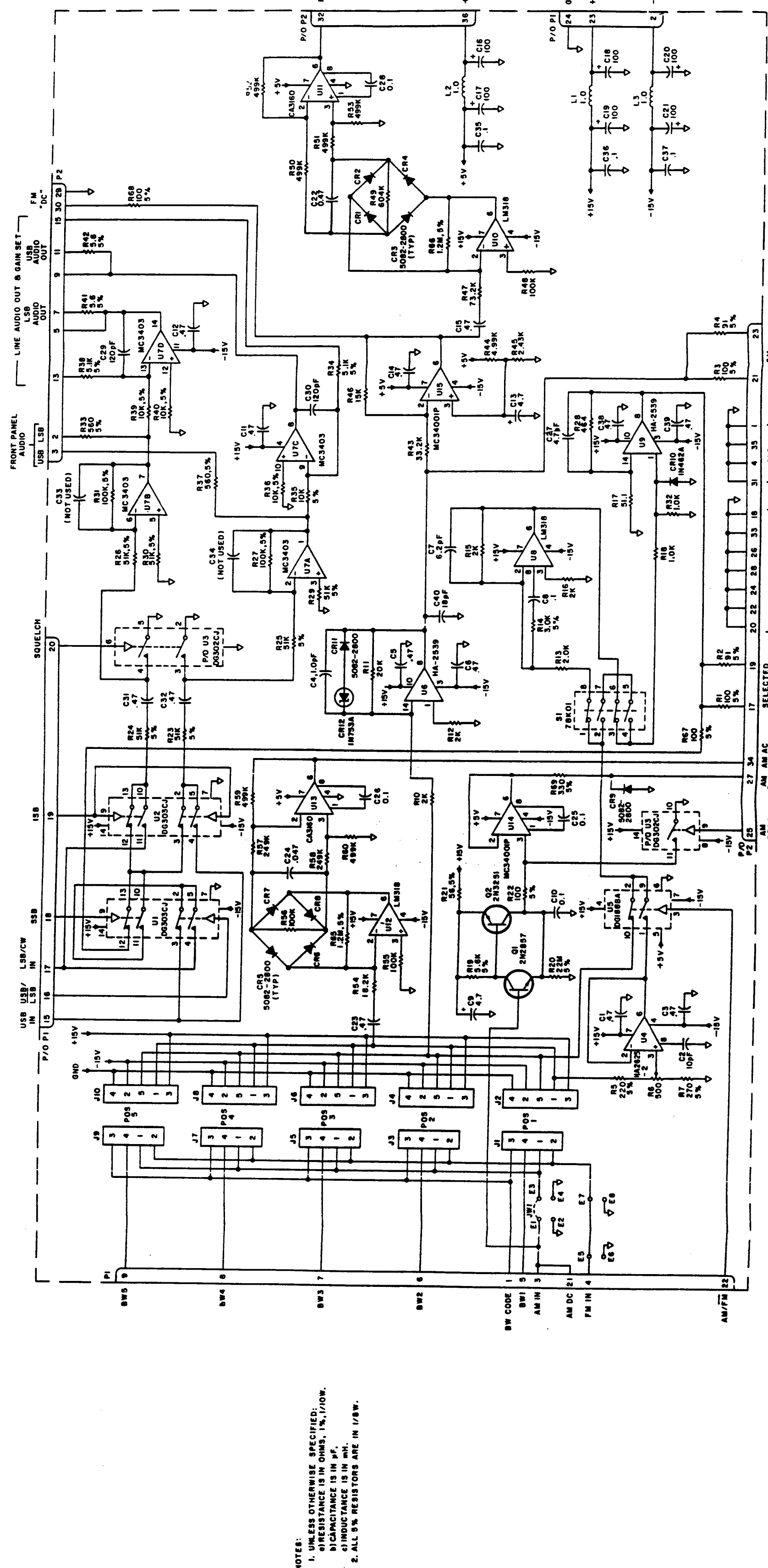
TABLE A

TYPE NO.	C16	C15	C82	C83	L6	L11	L19	C72	C74	R19
-1	220PF	220PF	110PF	220PF	.33	.33	15	47	47	6.8K
-2	390PF	390PF	200PF	390PF	.56	.56	6.8	24	24	6.8K
-3	220PF	220PF	110PF	220PF	.33	.33	15	47	47	820

FO-16. Type 797272-1, AM/FM Demodulator Assembly (A1A9), Schematic Diagram 582030 (A)



FO-17. Type 483114-1, Wideband FM Demodulator PC Assembly (A1A9A1), Schematic Diagram 483115 (A)

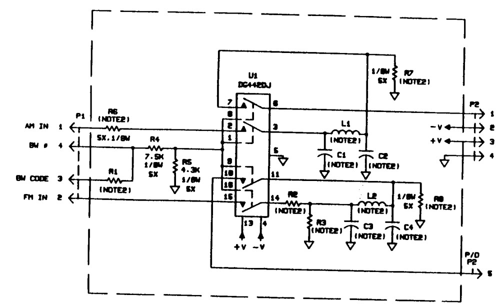


NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, 1%, 1/10W.
b) CAPACITANCE IS IN pF.
c) INDUCTANCE IS IN mH.
2. ALL 5% RESISTORS ARE IN 1/8W.

FO-18. Type 796622-X, Audio/Video Assembly (A1A10), Schematic Diagram 580571 (H)

TABLE A

	TYPE	IF BW	R1	R2	R3	R6	R7	R8	C1,C2	C3	C4	L1	L2	
	281516-1	6.4KHZ	121K	1.0K	N/U	1K	N/U	N/U	.068UF	.068UF	.068UF	82MH	82MH	
	281516-2	10KHZ	95.3K	1.50K	2.00K	1K	N/U	N/U	.047UF	.047UF	.047UF	47MH	47MH	
	281516-3	15KHZ	68.0K	2.30K	1.74K	1K	N/U	N/U	.03UF	.03UF	.03UF	33MH	33MH	
	281516-4	20KHZ	80.1K	3.16K	1.47K	1K	N/U	N/U	.022UF	.022UF	.022UF	27MH	27MH	
	281516-5	40KHZ	53.6K	6.19K	1.21K	1K	N/U	N/U	.011UF	.011UF	.011UF	12MH	12MH	
	281516-6	50KHZ	53.6K	8.87K	1.13K	1K	N/U	N/U	.012UF	.01UF	.012UF	10MH	10MH	
	281516-7	75KHZ	43.2K	1.0K	N/U	1K	N/U	N/U	5600PF	5600PF	5600PF	8.2MH	8.2MH	
	281516-8	100KHZ	40.2K	1.33K	4.99K	1K	N/U	N/U	3600PF	3600PF	3610PF	6.8MH	6.8MH	
	281516-9	250KHZ	37.4K	3.32K	1.43K	1K	N/U	N/U	1600PF	1600PF	1600PF	2.2MH	2.2MH	
	281516-10	300KHZ	34.8K	4.99K	1.33K	1K	N/U	N/U	1300PF	1300PF	1300PF	1.8MH	1.8MH	
	281516-11	500KHZ	32.4K	1.0K	N/U	1K	N/U	N/U	620PF	620PF	610PF	1.2MH	1.2MH	
	281516-12	1.0MHZ	30.1K	2.0K	2.0K	1K	N/U	N/U	360PF	390PF	310PF	.56MH	.56MH	
	281516-13	2.0MHZ	28.0K	4.99K	1.33K	1K	N/U	N/U	100PF	100PF	110PF	.27MH	.27MH	
	281516-14	4.0MHZ	26.7K	8.88K	1.15K	1K	N/U	N/U	10PF	91PF	10PF	.12MH	.10MH	
	281516-15	3.2KHZ	169K	1.0K	N/U	1K	N/U	N/U	.150UF	.150UF	.150UF	150MH	150MH	
	281516-16	30KHZ	80.4K	4.64K	1.27K	1K	N/U	N/U	.015UF	.015UF	.015UF	10MH	10MH	
(NOTE 3)	281516-17	25KHZ	475K	3.92K	1.33K	1K	N/U	N/U	.018UF	.018UF	.018UF	22MH	22MH	
(NOTE 3)	281516-18	150KHZ	25.5K	2.0K	2.0K	1K	N/U	N/U	2400PF	2700PF	2700PF	3.9MH	3.9MH	
	281516-19	500KHZ	32.4K	6.65K	1.10K	1K	N/U	N/U	620PF	620PF	630PF	1.2MH	1.2MH	'P' RECEIVER ONLY
	281516-20	1.0MHZ	30.1K	1.0K	N/U	1K	N/U	N/U	360PF	390PF	310PF	.56MH	.56MH	'P' RECEIVER ONLY
	281516-21	2.0MHZ	28.0K	2.0K	2.0K	1K	N/U	N/U	100PF	100PF	110PF	.27MH	.27MH	'P' RECEIVER ONLY
	281516-22	4.0MHZ	26.7K	4.99K	1.33K	1K	N/U	N/U	10PF	91PF	10PF	.12MH	.10MH	'P' RECEIVER ONLY
	281516-23	10.0MHZ	24.3K	6.11K	562	470	1K	1K	N/U	N/U	N/U	NOTE 5	NOTE 5	'P' RECEIVER ONLY
	281516-24	3.2MHZ	47.5K	3.16K	1.47K	1K	N/U	N/U	10PF	91PF	10PF	.12MH	.10MH	'P' RECEIVER ONLY
	281516-25	8.0MHZ	25.5K	4.02K	562	470	1K	1K	N/U	N/U	N/U	NOTE 5	NOTE 5	'P' RECEIVER ONLY
	281516-26	6.0MHZ	24.3K	3.01K	562	470	1K	1K	N/U	N/U	N/U	33UH	33UH	'P-3' RECEIVER ONLY
	281516-27	700KHZ	249K	3.32K	1.47K	1K	N/U	N/U	360PF	390PF	310PF	.56MH	.56MH	"P-11" RECEIVER ONLY
	281516-28	1.4MHZ	47.5K	1.43K	3.32K	1K	N/U	N/U	100PF	100PF	100PF	.27MH	.27MH	"P-11" RECEIVER ONLY
	281516-29	300KHZ	34.8K	1.50K	3.65K	1K	N/U	N/U	1300PF	1300PF	1310PF	1.8MH	1.8MH	"P-11" RECEIVER ONLY



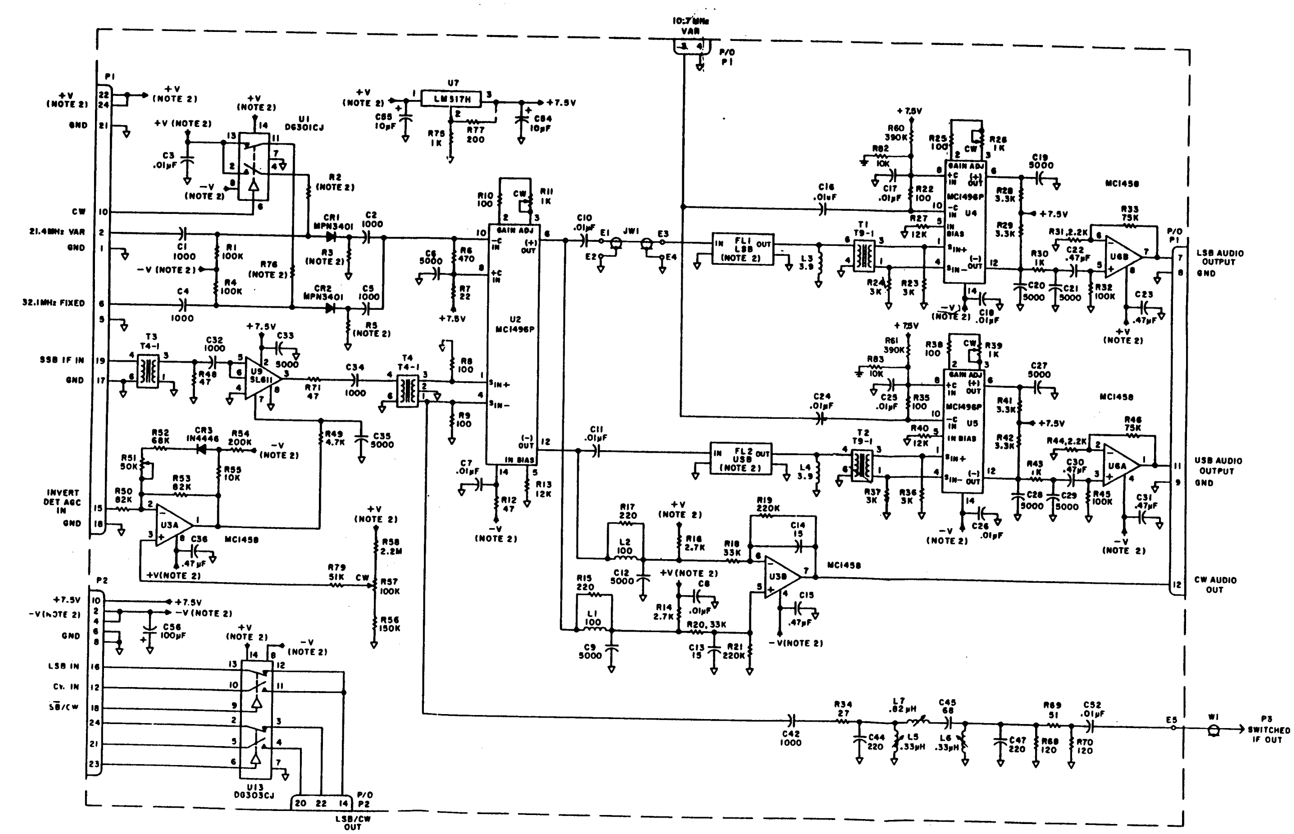
NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±1%, 1/10W.
   B) CAPACITANCE IS AS NOTED.
   C) INDUCTANCE IS AS NOTED.
2. DIFFERENCE BETWEEN TYPES IS LISTED IN TABLE A.
3. NON-STANDARD BANDWIDTH.
4. VOLTAGES ARE +12V AND -12V FOR BOARDS USED IN THE WJ-8615/TC RCVR AND +15V AND -15V FOR ALL OTHER APPLICATIONS.
5. INSTALL NO.22 BUSSWIRE IN PLACE OF COMPONENT.

FO-19. Type 281516-X, Bandwidth Response Assembly (A1A10AX), Schematic Diagram 481067 (J)

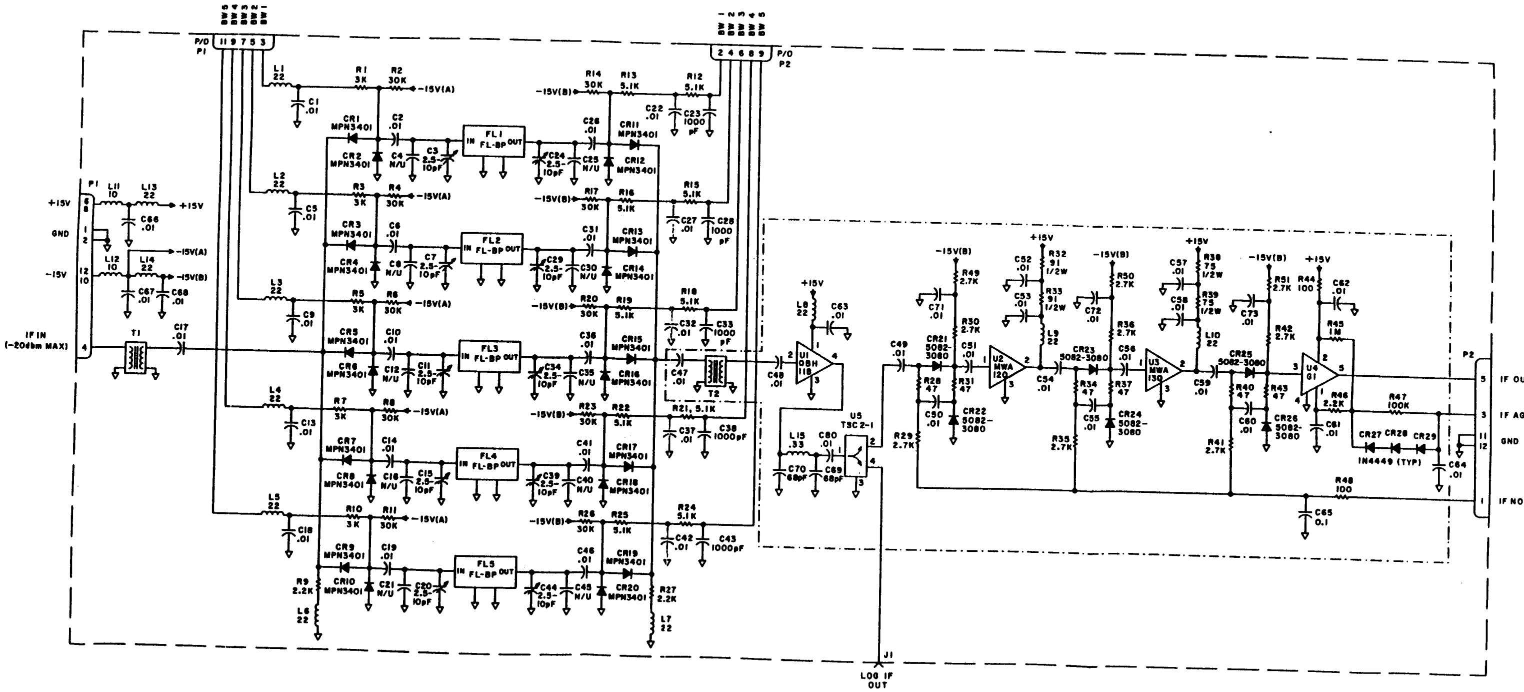
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS IN pF.
   c) INDUCTANCE IS IN µH.
2. DIFFERENCE BETWEEN IS SHOWN IN TABLE 1.

TYPE NO.	TITLE	FL1	FL2	R2,R3,R5,R76	+V	−V
796755-1	ISB/CW DEMODULATOR	92218	92217	7.5K	+15V	−15V
796755-2	CW DEMODULATOR	N/U	N/U	7.5K	+15V	−15V
796756-3	ISB/CW CEMODULATOR	92218	92217	5.6K	+12V	−12V
796756-4	CW DEMODULATOR	N/U	N/U	5.6K	+12V	−12V



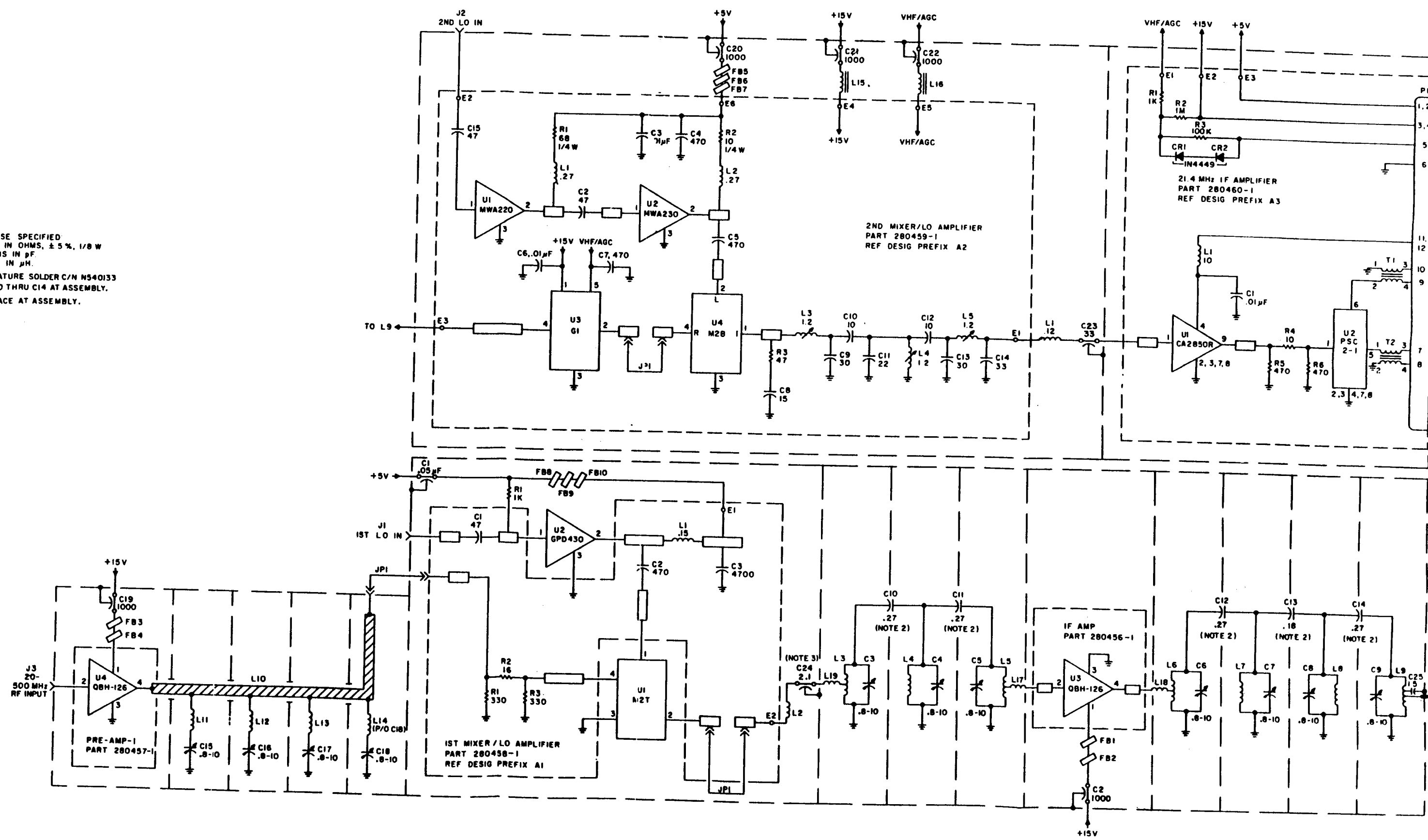
FO-20. Type 796755-1, ISB Demodulator Assembly (A1A11), or Type 796755-2, CW Demodulator Assembly (A1A11), Schematic Diagram 580863 (D)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
b) CAPACITANCE IS IN µF.
c) INDUCTANCE IS IN µH.



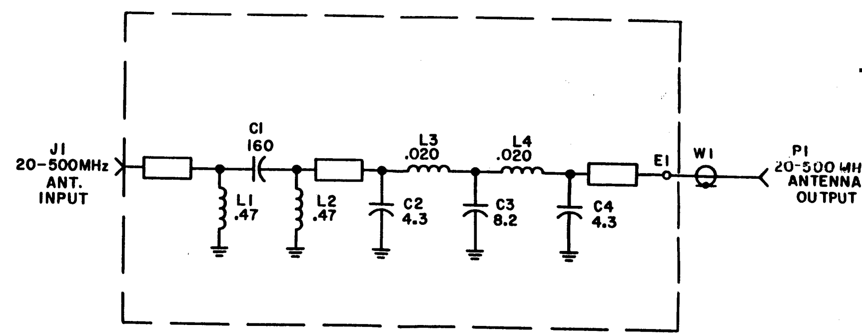
FO-21. Type 726016-X, IF Bandwidth Filter Amplifier Assembly (A1A12), Schematic Diagram 580861 (C)

NOTES:
1. UNLESS OTHERWISE SPECIFIED
   a) RESISTANCE IS IN OHMS, ± 5 %, 1/8 W
   b) CAPACITANCE IS IN pF
   c) INDUCTANCE IS IN μH.
2. USE LOW TEMPERATURE SOLDER C/N N540133 P/N 4705 FOR C10 THRU C14 AT ASSEMBLY.
3. EPOXY C24 IN PLACE AT ASSEMBLY.



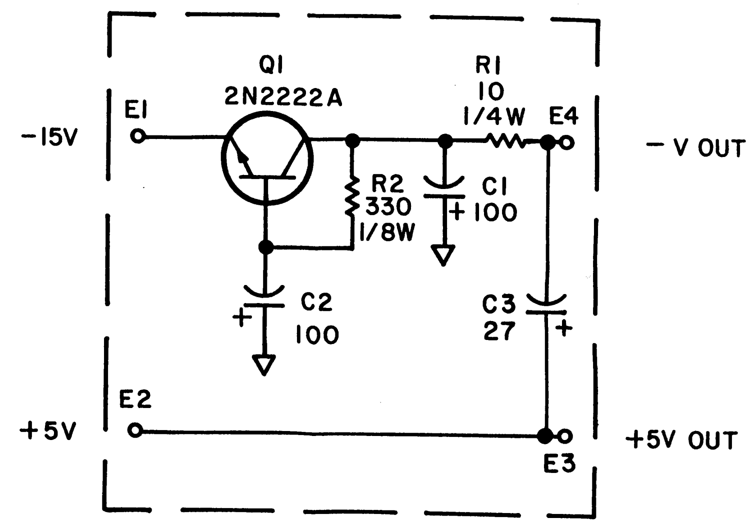
FO-22. Type 796251-1, Preamplifier/Converter Assembly (A1A13), Schematic Diagram 580195 (E)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) CAPACITANCE IS IN pF.
b) INDUCTANCE IS IN µH.



FO-23. Type 796291-1, RF Input Attenuator Assembly (A1A14), Schematic Diagram 380413 (A)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN μF.
   b) RESISTANCE IS IN OHMS, ±5%.

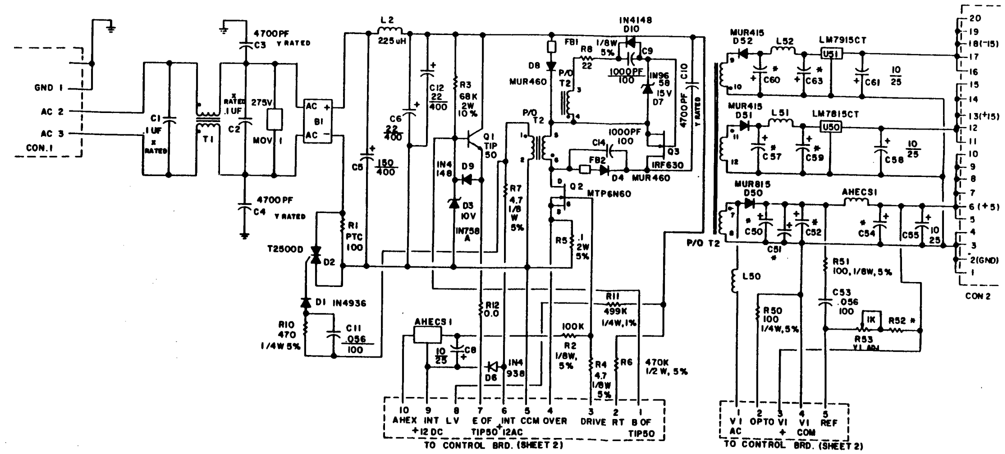


FO-24. Type 796638-1, Fan Filter Assembly (A5), Schematic Diagram 281469 (B)

NOTES

1. RESISTORS VALUES ARE IN OHMS
2. CAPACITOR VALUES = MICROFARADS/VOLTS
3. THIS CIRCUIT REPRESENTS A DUPLICATION OF DOCUMENTATION SUPPLIED BY CONVERTER CONCEPTS, INC. REVISIONS TO CIRCUIT MAY BE MADE WITHOUT NOTIFICATION TO WATKINS-JOHNSON.

* C57,59,60,63 = 330UF @ 25V
* C50,51,52,54 = 1000UF @ 10V
* R52 = 2K, 1/4W, 1% WHEN V1 = +5V @ 4A
  R52 = 5.11K, 1/4W, 1% WHEN V1 = +8V @ 3A
  V2 = +15V @ 1A
  V3 = −15V @ 1A



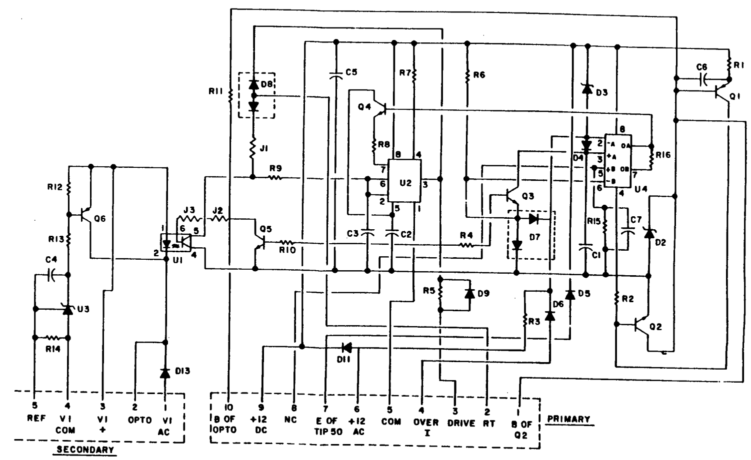
FO-25. Type 481447-1, Switching Power Supply Assembly (PS1), Schematic Diagram 581351 (Sheet 1 of 2) (A)

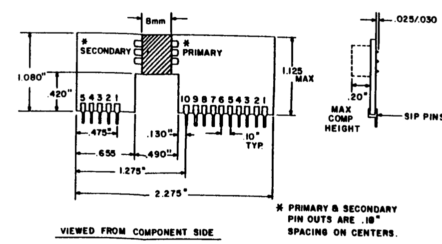
NOTES:

1. THIS CIRCUIT REPRESENTS A DUPLICATION OF DOCUMENTATION SUPPLIED BY CONVERTER CONCEPTS, INC. REVISIONS TO CIRCUIT MAY BE MADE WITHOUT NOTIFICATION TO WATKINS-JOHNSON.
2. ALL RESISTORS ARE 1/8W, UNLESS SPECIFIED.

PARTLIST

REF DESIG	VALUE
C1	220PF/100V
C2	1UF/35V
C3	220PF/100V
C4	.047UF/50V
C5	.1UF/50V
C6	.056UF/100V
C7	.047UF/50V
D1	N/I
D2	10V ZENER
D3	15V ZENER
D4	1N4148
D5	1N4148
D6	1N4148
D7	1N4148 X 2
D8	1N4148 X 2
D9	1N4148
D10	N/I
D11	1N4938
D12	N/I
D13	1N4938
J1	0 ohm
J2	0 ohm
J3	0 ohm
Q1	2N3906
Q2	2N3904
Q3	2N3904
Q4	2N3904
Q5	2N3904
Q6	2N3906
R1	10K
R2	10K
R3	100K
R4	10K
R5	22ohm
R6	4.7K
R7	10K
R8	470 ohm
R9	1K
R10	10K
R11	100K
R12	470 ohm
R13	100 ohm
R14	2.49K 1/8 W 1%
R15	3.24K 1/8 W 1%
R16	0 ohm
U1	H11AV1
U2	µA555
U3	TL431C
U4	LM393





FO-25. Type 481447-1, Switching Power Supply Assembly (PS1), Schematic Diagram 581351 (Sheet 2 of 2) (A)

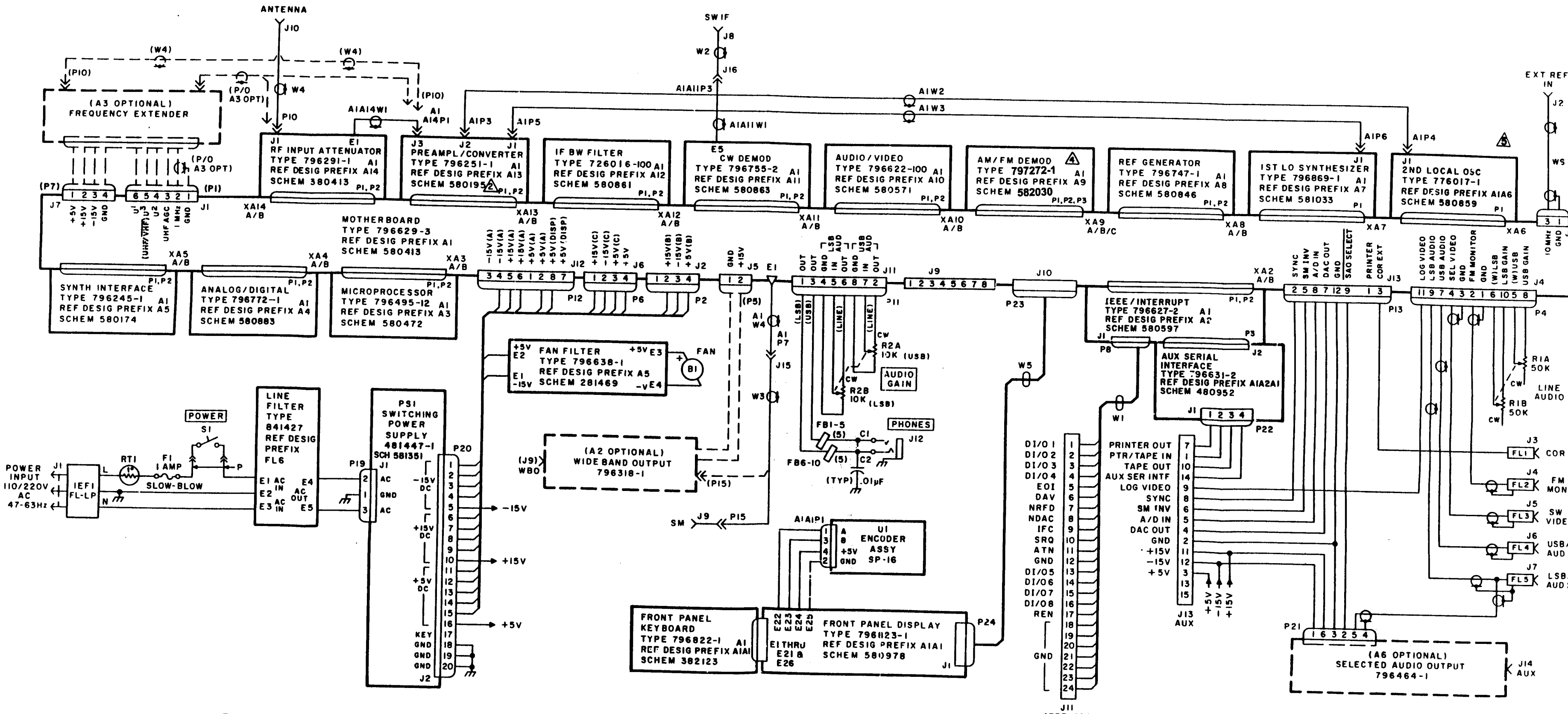


Table A

	A1A6	Schematics	A1A3U9 EPROM
WJ-8615P up to S/N 1200	776017-1	580859	841475-1 Rev. 1.xx
WJ-8615P S/N 1201 and up	797426-1	582322	841475-2 Rev.2.xx

NOTES:

1. SECONDARY SIGNAL NAMES ARE SHOWN IN ( ).
2. A1A13 IS 796251-4 FOR WJ-8615P-3.
3. A1A1A1 IS 796822-2 FOR WJ-8615P-7. A1A2A1 IS 796631-1 FOR WJ-8615P-7.
4. A1A9 IS 797272-3 FOR WJ-8615P-11.
5. REFERENCE TO TABLE A FOR A1A6 CONFIGURATION

FO-26. Type WJ-8615P VHF/UHF Compact Receiver, Main Chassis. Schematic Diagram 580844 (S)