INSTALLATION AND OPERATION MANUAL

FOR THE

WJ-8607A VHF/UHF SURVEILLANCE RECEIVER

P/N 181733-001, Revision H

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INSTALLATION AND OPERATION MANUAL

REVISION RECORD

Revision	Description	Date
A	Initial issue.	10/99
B	Incorporated ECO 040960.	12/00
C	Incorporated ECO 041867.	3/02
D	Incorporated ECO 041936.	4/02
E	Incorporated ECO 042597.	3/03
F	Incorporated ECO 040398.	3/03
H	Incorporated ECO 043430.	6/03

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GENERAL DESCRIPTION

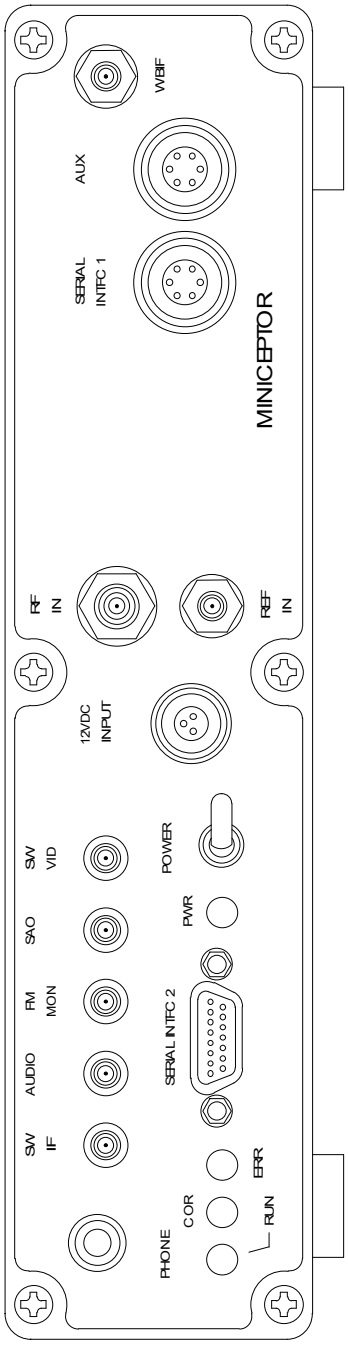

Figure 1-1. WJ-8607A VHF/UHF Surveillance Receiver (Miniceptor)

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL CHARACTERISTICS

The WJ-8607A VHF/UHF Surveillance Receiver "Miniceptor", which is shown in **Figure 1-1**, is a compact, lightweight, receiver for use in limited space applications. The Miniceptor detects AM, FM, CW and Pulse signals over the frequency range of 20 to 512 MHz. Single Side Band (SSB) demodulation is available as an installed option. The tuning range is extended to 2000 MHz when the 860XA/FE Option is installed. Installation of the 860XA/3GFE Option extends the tuning range to 3000 MHz. Although the Miniceptor is not specified for operation below 20 MHz, tuning to 2 MHz is allowed for applications where modest HF performance is acceptable. Accurate tuning is provided by fully synthesized, low phase noise local oscillators. Up to five IF bandwidths may be installed in the Miniceptor, ranging from 6.4 kHz to 8 MHz (dependent on customer requirements). These IF filters may also be bypassed entirely, yielding a bandwidth of approximately 10 MHz. The Miniceptor achieves a third-order intercept point of +6 dBm typical, while maintaining a typical noise figure of 8 dB. A built-in tracking preselector with a nominal bandwidth of 10 percent reduces out-of-band signals.

Three basic modes of operation are available: Manual (fixed frequency), Sweep (contiguous coverage from start to stop frequency), and Step (preprogrammed discrete frequencies). The Miniceptor is interactive in all of its operational modes. When signal activity is detected, the host controller can be alerted. In Sweep mode, a Lockout function is available for locking out portions of the RF spectrum. The Miniceptor contains non-volatile memory for storage of up to 200 Sweep or Step setups and 200 Lockout bands. A Motorola 68HC11 Microcontroller is employed and is responsible for controlling and monitoring receiver functions such as automatic gain control (AGC), automatic frequency control (AFC), synthesizer tuning, and I/O control functions.

All WJ-8607A control and analysis functions are managed remotely from an external device via one of four user-selectable communication interfaces: an RS-232C full duplex interface, an RS-422A interface, an RS-485 interface, and an optional Hewlett Packard Interface Loop (HPIL). ENQ/ACK and Xon/Xoff communications formats are supported at data rates up to 230.4 kb/s.

Two IF outputs are provided. A wideband IF output provides nominally 10 dB of gain above the RF input with 12 MHz of bandwidth. When the 860X/WBO Wideband Output Option is installed, a constant -30 dBm output level at 21.4 MHz with a minimum bandwidth of 12 MHz is provided in place of the signal monitor output. A switched IF output provides a sample of the predetected 21.4 MHz IF at a level of -30 dBm at the selected IF bandwidth. Other outputs include FM monitor, switched audio, switched video, line audio, and phones. In addition, a direct baseband output may be enabled, which allows the operator to translate the 21.4 MHz down to a baseband output with a variable center frequency. When enabled, the baseband output is routed to the video output jack, in lieu of the normal detected video.

See **Table 1-1** for WJ-8607A VHF/UHF Surveillance Receiver specifications.

1.2 MECHANICAL CHARACTERISTICS

The standard configured Miniceptor contains four modules: Frequency Converter, Synthesizer, Demodulator, and Digital Controller. Each module is a multilayer PC board with surface-mounted components on one side and plug-in metal-cased components on the other side. The modules are attached to two milled-out aluminum housings that make up the main chassis.

Table 1-1. WJ-8607A VHF/UHF Surveillance Receiver, Specifications

Frequency Range	20 to 512 MHz (2000 MHz with FE option) (3000 MHz with 3GFE option). Tuning allowed to 2 MHz
Tuning Resolution	100 Hz, synthesized
Internal Reference Accuracy	±1 part in 10E -6 (0 to 50°C)
External Reference Frequency	Selectable, 1, 5, or 10 MHz; 0 dBm nominal input level
Detection Modes	AM, FM, CW, and Pulse standard (SSB optional)
RF Input Impedance	50 ohms nominal
Preselection	Tracking Preselector, 20 to 512 MHz. 10 percent nominal bandwidth with bypass mode. Five suboctave filters 512 to 2000 MHz (FE). Eight suboctave filters, 512 to 3000 MHz (3GFE).
Input VSWR	2.0:1 typical, 3.0:1 maximum at the tuned frequency
Noise Figure	12 dB maximum, 20 to 512 MHz (Preselector on). 8 dB typical, 5 to 512 MHz (Preselector off). 13 dB maximum, 20 to 512 MHz with Preselector on and FE 15 dB maximum, 512 to 2000 MHz with FE option. 15 dB maximum, 512 to 3000 MHz with 3GFE option.
Intermodulation:	
2nd Order Intercept Point	+45 dBm, 20 to 512 MHz (Preselector on) +35 dBm, 512 to 3000 MHz
3rd Order Intercept Point	+6 dBm, 20 to 512 MHz (Preselector on) 0 dBm, 512 to 3000 MHz +5 dBm typical, 2 to 20 MHz
Image Rejection	80 dB minimum 90 dB typical
IF Rejection:	
21.4 MHz	90 dB minimum
691 MHz	90 dB minimum (Preselector on)
FE IF Rejection (Variable)	75 dB minimum (with FE option)
LO Phase Noise at 20 kHz Offset	-93 dBc/Hz, 20 to 512 MHz
LO Phase Noise at 20 kHz Offset in FE Bands	-88 dBc/Hz, 512-1410 MHz -85 dBc/Hz, 1410-3000 MHz
Synthesizer Tuning Speed	300 µSec maximum (from receipt of the last data byte to within 10 kHz of the final frequency). When tuning from non-FE to FE frequency, max tuning time is 5 mSec. The 3GHz FE tuning time is 1 mSec typical (512 to 3000 MHz)
Sweep Tuning Speed	200 µSec, typical for 25 kHz steps
Signal Monitor Output	Nominally 10 dB above RF input (WBO option provides -30 dBm leveled)
Gain Control Modes	Manual, automatic, 100 dB minimum range
AM Stability	6 dB maximum change from AGC threshold to 100 dB above AGC threshold (-5 dBm maximum input)
Internally Generated Spurious	Less than -110 dBm equivalent input 20 to 3000 MHz)
LO Level at RF Input	-100 dBm typical, -90 dBm maximum

Table 1-1. WJ-8607A VHF/UHF Surveillance Receiver, Specifications (Continued)

Switched Video Output	0.5 volts peak-to-peak into 50 ohms (30 percent deviation in FM or 50 percent AM modulation)
Video Frequency Response	DC to 1/2 the IF bandwidth, -3 dB
Line Audio Output	5 mW minimum into 32 ohms
Headphone Audio Output	5 mW minimum into 32 ohms
Switched Audio Output	400 mV RMS into 600 ohms
Audio Frequency Response	200 Hz to 15 kHz minimum (can be bused with other similar audio outputs)
FM Monitor Output	0.5 volts peak-to-peak with 30 percent FM deviation. DC coupled, 100 kHz maximum bandwidth. 10 k-ohm load.
Ultimate FM S + N/N	40 dB minimum in a 50 kHz bandwidth
Reciprocal Mixing	With an input at rated sensitivity level in a 20 kHz bandwidth, an out-of-band signal 350 kHz removed and 70 dB higher in level will not degrade the S + N/N of the desired signal by more than 3 dB
Selected IF Output	Centered at 21.4 MHz, -30 dBm nominal output level
IF Bandwidths	Five plus bypass mode (three supplied and two optional). See **Table I** for selection
IF Shape Factor	See **Table I**
Translated IF Output	2 MHz maximum center frequency. Output on the selected video jack
COR/Squelch	Adjustable from 0 to 55 dB above the noise floor of the selected bandwidth
Weight	5 pounds nominal (FE option adds 1.5 pounds to weight)
Dimensions	1.5" x 6.5" x 10.5" (FE option adds 2.85" to length)
Power Requirements	12 Volts DC (+9 to 16 VDC) (+11 to +16 VDC with 3GFE)
Power Consumption	21 watts nominal (20 to 512 MHz) (Add 6 watts for FE or 3GFE option)
Remote Interface	Optional HPIL or Standard RS-232C, RS-422A, or RS-485 interface (supports only one at a time)
Handoff Interface	HPIL interface option, compatible with WJ-8615P Receiver
Maximum RF Input without damage	+20 dBm
Temperature*	
Operating Temperature Range	-25 to +55°C
Non-Operating	-40 to +70°C
Shock	Meets the environmental conditions of MIL-E-5400T, **paragraph 3.2.24.6.1** pertaining to equipment shock
Vibration	Meets environmental conditions of MIL-STD-810D, method 514.3, section I-3.2.4, category 4-propeller aircraft. Figure 514.3-25(a) defines the power spectral density with Li = 0.3 (g2/Hz), and Fi = 68 Hz

* All Specifications herein apply over an operating temperature range of +20 to +30°C.

Table 1-1. WJ-8607A VHF/UHF Surveillance Receiver, Specifications (Continued)

Table I. Available Bandwidths and Rated Sensitivity

Bandwidth (kHz)	Shape Factor 60:3 dB	Sensitivity (dBm)* 20 to 512 MHz
3.2** (See Note 1)	3:1	-107
6.0**	3:1	-105
6.4**	3:1	-105
10**	3:1	-104
10G***	4:1	-104
12.5**	3:1	-104
15**	3:1	-103
20**	3:1	-101
25G***	4:1	-100
30**	3:1	-99
50**	3:1	-97
50G***	4:1	-97
75**	3:1	-95
100**	3:1	-94
250	3:1	-90
300	4:1	-89
500	4:1	-87
1000	4:1	-84
1000	4:1	-81
4000	4:1	-78
4000SF	2:5:1	-78
5000	4:1	-77
6000	4:1	-76
8000	4:1	-75

* Sensitivity Conditions: Based on 20 to 512 MHz receiver. Add 4 dB for FE option

AM--An input signal AM modulated 50 percent by a 1-kHz tone will produce a minimum video output S + N/N ratio of 10 dB.

FM--An input signal FM modulated at a 1-kHz rate with a peak deviation equal to 30 percent of the selected IF BW will produce a minimum video output S + N/N ratio of 17 dB. (Note: A 400-Hz modulation rate is required for IF bandwidths of 10 kHz or less.)

** This IF filter cannot be used in the 5th bandwidth position.

*** G denotes Gaussian response which are utilized for high speed operations in bandwidths less than 100 kHz.

Note 1: With the 3.2 kHz bandwidth, the audio and video outputs will be 6 dB less than published specifications

A power switch, all connectors and indicators of the Miniceptor are located on the front panel. Four LEDs are provided for monitoring of the Miniceptor operating status. Connector types used are D-type, multipin, SMA and SMB with the exception of the phone jack which is a subminiature stereo headphones jack.

1.3 EQUIPMENT SUPPLIED

Equipment supplied consists of the receiver (including the ordered options) and an accessory kit, and an Installation and Operations, and Intermediate Maintenance manual.

1.4 EQUIPMENT REQUIRED BUT NOT SUPPLIED

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

1) Antenna, 50 ohm

2) Audio monitoring equipment:

- Speaker Panel
- Headphones, 8 ohms to 600 ohms

3) Controller device:

- Remote Controller equipped with RS-232C Interface

1.5 RECEIVER OPTIONS

1.5.1 UHF FREQUENCY EXTENDER OPTION (860XA/FE)

The UHF Frequency Extender (FE) option extends the tuning range of the receiver from 512 MHz to 2000 MHz. The extended tuning range is accomplished by block converting five bands of the RF spectrum above 512 MHz into the normal tuning range of the receiver. The option screws onto the rear of the receiver, adding 2.85 inches (7.23 cm) to the overall length of the unit. Two additional PC assemblies are included in the FE's chassis; a five-band oscillator and an RF converter with suboctave preselectors. **Appendix C** provides further details on the 860XA/FE option.

1.5.2 WIDEBAND OUTPUT OPTION (860X/WBO)

The Wideband Output (WBO) option provides a constant -30 dBm output level at 21.4 MHz with a minimum bandwidth of 8 MHz. The WBO module mounts inside the receiver's chassis. See **Appendix B** for further information on the Wideband Output option.

1.5.3 IF BANDWIDTH OPTION (860X/BWS)

Three IF bandwidths are supplied with the standard receiver. Two additional may be optionally installed for a total of five IF bandwidths. The fifth IF filter must be 250 kHz or greater. See **Table I** in **Table 1-1** for the available bandwidth choices. See **Appendix A** for further information on IF bandwidth options.

1.5.4 SINGLE SIDEBAND OPTION (860X/SSB)

The Single Sideband (SSB) option allows the receiver to demodulate upper or lower sideband signals. The IF signal is converted from 21.4 MHz to 500 kHz, where it is filtered and demodulated. When the SSB detection mode is selected via remote control, the receiver routes the 21.4 MHz IF through the narrowest filter available from 6.4 kHz to 20 kHz. For optimum SSB operation, at least one of the five possible IF filters should be between 6.4 kHz and 20 kHz.

1.5.5 ENVIRONMENTAL UPGRADE OPTION (8607A/ENV)

This option includes conformably coated PC boards allowing the receiver to pass MIL-STD-810D Method 507.2, Humidity.

1.5.6 MINICEPTOR CONTROL SOFTWARE OPTION (860X/MCS-1)

This option is an MS-DOS based application program that can be used to control the receiver via menus and display windows. Control of receiver operations such as manual, sweep immediate, sweep sector, and step is provided. An RF panoramic display of intercepted signals is also provided. Hardware requirements for this option is a 386/12 MHz (or higher) IBM-compatible personal computer equipped with an RS-232 serial interface port, 256 kbytes of RAM, and a 5.25-inch floppy drive. **Appendix I** of this manual provides further details on the Miniceptor Control Software.

1.5.7 HEWLETT-PACKARD INTERFACE LOOP OPTION (8607A/HPIL)

The HPIL (Hewlett-Packard Interface Loop) interface is a medium speed, medium distance, low power serial interface loop. This interface offers an additional addressing scheme that allows up to 30 WJ-8607A receivers to share a single interface bus. A service request capability is also included as part of HPIL. **Appendix J** of this manual details this option.

1.5.8 CALIBRATION OPTION (860XA/CAL)

The Calibration (CAL) option improves the accuracy of absolute signal strength data returned via the receiver's Sweep/Step Data (SSD) buffer to within +/-2.0 dB. This is compared to an accuracy of +/-6.0 dB for standard WJ-8607A receivers. The receiver calibration (performed at the factory prior to shipment) consists of running a diagnostic program that characterizes the receiver's attenuator circuits and frequency versus gain response. The compiled data is then loaded into EEPROM and accessed during absolute signal strength calculations.

NOTE

The 860XA/CAL option is only available for receivers with version 6.00 firmware or higher.

Receivers equipped with the 860XA/CAL option are identified with a "CAL" label affixed to the receiver's rear panel. **Appendix K** of this manual further details this option.

1.5.9 3 GHZ FREQUENCY EXTENDER OPTION (860XA/3GFE)

The 3 GHz Frequency Extender option extends the tuning range of the receiver from 512 MHz to 3000 MHz. The extended tuning range is accomplished by block-converting fourteen bands of the RF spectrum above 512 MHz into an IF that is in the normal range of the receiver. The option screws onto the rear of the receiver, adding 2.85 inches (7.23 cm) to the overall length of the unit. Two additional PC assemblies are included in the Frequency Extender's chassis; a Synthesizer and an RF Converter. **Appendix L** of this manual provides further details on the 860XA/3GFE option.

1.5.10 21.4 MHz Amplifier/10 MHz Reference Option (8607A/21.4AMP)

The 8607A/21.4AMP 21.4 MHz Amplifier/10 MHz Reference option provides two additional functions to the WJ-8607A Receiver. It provides a means of amplifying the 21.4 MHz output of the receiver by 30 dB, and provides the receiver's 10 MHz reference signal at an external connector. When this option is installed, the 21.4 MHz IF output at the front panel of the Miniceptor is routed to a rear panel SMA connector via an external cable. The option then amplifies the IF signal by 30 dB before being routed to another rear panel SMA connector.

1.6 SOFTWARE RELEASE HISTORY

The initial version of the receiver software is version 0.30, released August 1, 1994.

Version 0.31 was released August 23, 1994. This release corrected the following problem areas.

- An additional ESC A (stb_sts) was being sent upon the receipt of the SUS command.
- RS-232 communications would sometimes stop after allowing the SRQ mechanism to function and/or sending the ENQ byte.
- The Set_srq() code would still run when the masks (rcv_msk, esb_msk, and stb_msk) were set to disallow the Set_srq() routines.
- Could not set up the SRQ mechanism for LO LOCK bit (Bit 1) of the SRE register.
- When in a detection mode where the BFO was turned on, all other LO's other than the 3rd LO were not reported when unlocked.
- If the detection mode was changed from a detection mode that had BFO off to one that had BFO on, the unlocked 3rd LO (BFO), relocking during a non BFO detection mode, would not clear the LO's out-of-lock LED.

Version 0.40 was released on August 30, 1994. This release added the 8607A/HPIL Interface option and corrected the following problem areas.

- The COR LED would not extinguish when sector sweeping or stepping with the AGC set to OFF and the COR set to infinite.
- The SYNC_OUT line was being set high before the receiver had actually finished tuning to the next sweep frequency during a scan.
- The binary tuning scheme was not available from the SERIAL 1 interface.

Software versions 1.xx through 5.4x were not released.

Version 5.50 was released on September 30, 1994. This release added code in the parsers to find a bad string (invalid configuration command) and then set the pointer properly for the next incoming command. The following problem areas were corrected.

- Unable to enter a letter into the Model number during unit configuration.
- Overrun errors on the SERIAL 2 interface when operating at 230.4 kbaud.

Version 6.00 was released on February 3, 1995. This release added the CFG 1,0 remote command allowing the receiver to be placed in the Configuration mode without accessing DIP switch A1S2. The following software problems have been corrected.

- When programming the EEPROM, the ee_buff array over ran variable data.
- Auto_task (sweep) was running before tune_task and lock_task.
- Auto_task was not reset when the tune_task was reset.

Version 6.01 was released on March 14, 1995. This release changed the default data for the IF Bandwidth structure. The following problem areas have been corrected.

- Multi-drop RS-232/485 operation.
- Occasionally, when returning the response to the FRQ? query, the "F" of the returned string would be corrupted.

Version 6.02 was released on May 5, 1995. This release added configurable Frame Addressing for use during multidrop operations.

Version 6.10 was released on September 22, 1995. This release added Enhanced Sweep/Step Operation which adds Dynamic COR threshold per frequency increment.

Version 6.11 was released on October 24, 1995. This release changed the code to ignore the 12V line check to be ready for a temperature sensor added to new digital boards (#797136). When the temperature sensor exists, the last field (AN7) of the ADC? command returns its voltage.

Version 6.12 was released on December 8, 1995. This release corrected the following problems.

- When tuning from 117.9903 to 117.9904 MHz in binary format, the signal could not be found at 117.9904. Correcting this problem added approximately 4 µs to the binary tuning time.

- The default frame address was not being put into EEPROM when bringing up a new microprocessor.

- When in the RS-485 communication mode, the response to "FRQ?" was sometimes corrupted.

Version 6.13 was released on January 17, 1996. This release corrected a problem that resulted from the changes of version 6.12. When in Serial 1 (SER1) communication mode, an <ACK> was being returned after sending a non-query command.

Version 6.14 was released on April 5, 1996. This release added a binary command (^N or $0E_{16}$) for querying the STB byte, fixed a problem where binary query responses were not synchronized, and fixed another problem where the duart RTS line was not tristated.

Version 7.00 was released on November 8, 1996. This release resulted from the following modifications:

- Improved the speed of the step feature by approximately 25%.

- Enhancements were made to recognize and control the 3 GHz frequency extender option.

- When in sweep sector mode, the receiver would restart a sweep every time the parameters of a memory channel were changed, even if that channel was not included in the sweep list. This problem was corrected so that only a modified memory channel that was included in the sweep list would cause a sweep to restart.

Version 7.01 was released on September 8, 1997.

This version made no changes to the WJ-8607A. It was created to add support for the WJ-8607B and WJ-8607C receivers. This version was not shipped, see version 7.02 release information.

Version 7.02 was released on September 23, 1997.

This version was created to correct a compiler error that surfaced in version 7.01.

Version 7.03 was released on March 25, 1999 to address a COR line output problem and an HPIL communications problem. This version modified functions step( ) and sweep( ) in auto c to conditionally suspend if core task( ) needs to run based on the unlock flag. This version modified auto task( ), to prevent sending rcv_upd( ) for end of sweep and end of step when sweeping (from memory) or stepping without any items in the swl or stl list. It also changed calc_fnr_fne index and fnr_fe index from ubyte to uword. New method of using the tables for the 3GHz FE needs the variables to have range of uword not ubyte. This caused problems when trying to use the fre/fnf tablesin conjunction with the 3GHz FE.

NOTES

SECTION II

INSTALLATION

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SECTION II

INSTALLATION

2.1 UNPACKING AND INSPECTION

Signia-IDT, Inc. ships the WJ-8607A and its accessories 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 Signia-IDT, Inc. 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 controls, indicators, or connectors, 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 it has been examined by an agent of the carrier. Concurrently, report the nature and extent of damage to Signia-IDT, Inc., giving equipment type numbers and serial numbers, so that necessary action can be taken. Under U.S. shipping regulations, damage for claims must be collected by the consignee; do not return the equipment to Signia-IDT, Inc. until a claim for damages has been established.

2.2 INSTALLATION

2.2.1 MOUNTING CONSIDERATIONS

The WJ-8607A VHF/UHF Surveillance Receiver "Miniceptor" is designed to be operated on a bench, table top, or any other secure surface. The Miniceptor may also be rack mounted if desired. Allow sufficient space around the unit (approximately two inches) for air circulation.

CAUTION

Damage will occur to the Miniceptor if the mounting screws penetrate further than 1/8-inch into the mounting holes. When mounting, make certain that the mounting screws used are of a length that does not penetrate further than 1/8-inch into the mounting holes of the Miniceptor.

Holes for mounting the unit are made available by removing four screws and rubber feet from the bottom of the unit, see **Figure 2-1**. Hardware used for mounting should be four Type 6-32-UNC-2A screws. The length of these screws are determined by the thickness of the mounting surface plus 1/8-inch--the **maximum** penetration into the Miniceptor's mounting holes. See **Foldout FO-1** for a critical dimension drawing of the WJ-8607A.

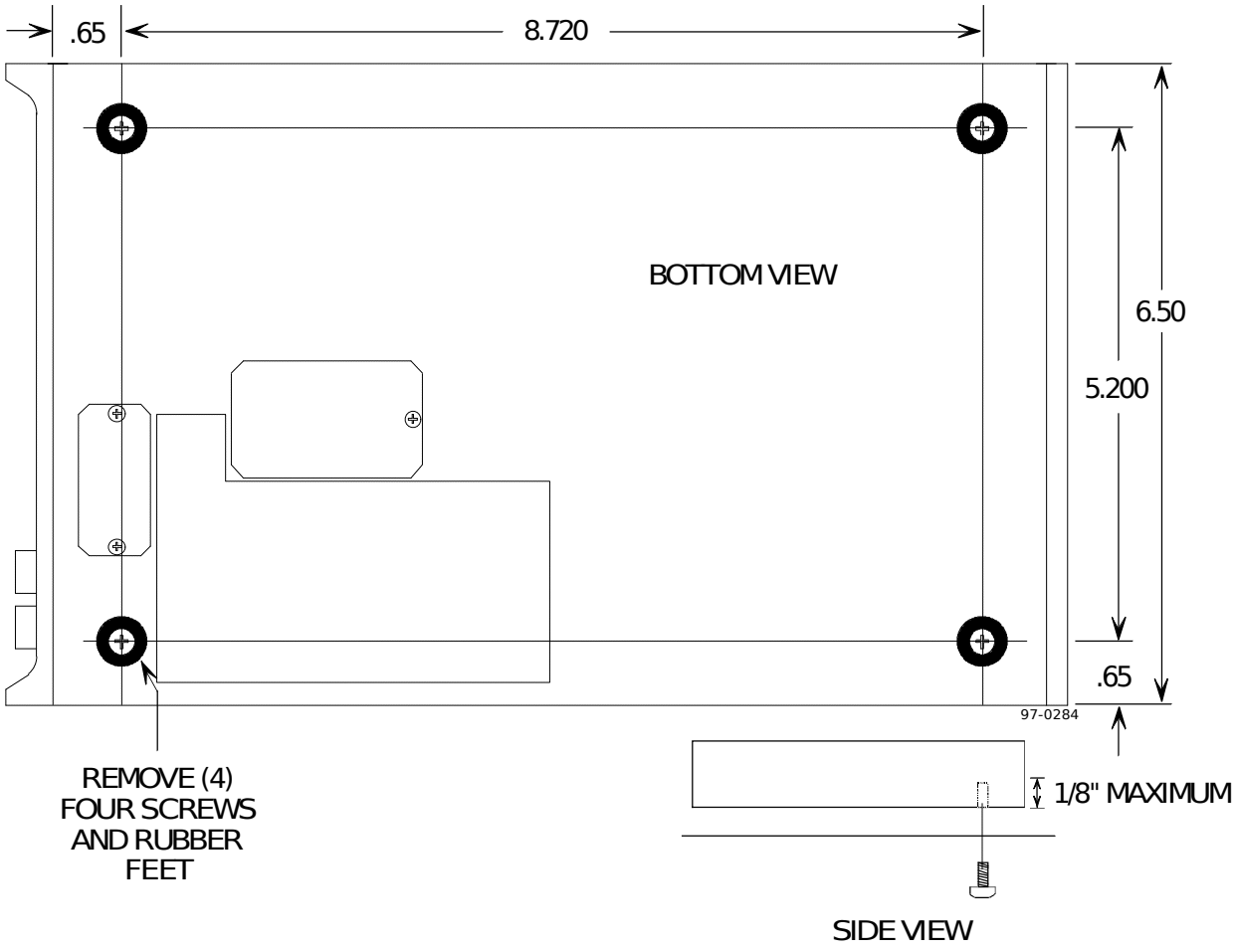


Figure 2-1. Mounting the Miniceptor

2.3 SIGNAL CONNECTION

The following paragraphs provide an explanation of the input and output signals provided at the Miniceptor front panel connectors. **Table 2-1** lists the connectors, their reference designation, and the function for each. **Table 2-2** lists I/O mating connectors and manufacturers. **Figure 2-2** shows the location of the front panel connectors.

Table 2-1. List of Connectors

Connector	Ref Des	Function
SW IF	A4J2	(SMB) Switched 21.4 MHz IF Output
AUDIO	A4J3	(SMB) Line Audio Output
PHONE	A4J1	Phone Output 1/8-inch Miniature Stereo
FM MON	A4J4	(SMB) FM Monitor Output
SAO	A4J5	(SMB) Selected Audio Output
SW VID	A4J6	(SMB) Switched Video Output
REF IN	A2J4	(SMB) External Reference Input
RF IN	A3J1	(SMA) Antenna Input
POWER	A1J14	(Multipin) DC Power Input
SERIAL INTFC 1	A1J7	(Multipin) Serial Interface I/O, RS-232 only
SERIAL INTFC 2	A1J1	(15 Pin D-Type) Serial Interface I/O, RS-232, RS-422, and RS-485 selectable
AUX	A1J8	(Multipin) Log Display, SYNC IN and SYNC OUT
WBIF	A3J3	Wideband IF Output/Signal Monitor Output

Table 2-2. Input/Output Mating Connectors

Connector (Type)	Ref. Desig.	Mating Connector (Cage Code)	Comment
Switched IF Output (SMB Female)	A4J2	2002-7551-019 (19505)	Not Supplied
Line Audio Output (SMB female)	A4J3	2002-75551-019 (19505)	Not Supplied
Phones Jack (1/8" mini-phones jack)	A4J1	LGY6501-0600 (55224)	Not Supplied

Table 2-2. Input/Output Mating Connectors (Continued)

Connector (Type)	Ref. Desig.	Mating Connector (Cage Code)	Comment
FM Monitor Output (SMB female)	A4J4	2002-7551-019 (19505)	Not Supplied
Selected Audio Output (SMB female)	A4J5	2002-7551-019 (19505)	Not Supplied
Switched Video Output (SMB female)	A4J6	2002-7551-019 (19505)	Not Supplied
External Reference In (SMB female)	A2J4	2002-7551-019 (19505)	Not Supplied
RF In (SMA female)	A3J1	2002-7511-019 (19505)	Not Supplied
Vdc Power Input (3-pin connector)	A1J14	FGG.0B.303.C.L.A.D52 (2P953)	Supplied as part of Accessory Kit 8607A/AI with Cable
Serial Interface #1 I/O (6-pin RS-232 connector)	A1J7	FGG.1B.306.C.L.A.D52 (2P953)	Supplied as part of Accessory Kit 8607A/AI with Cable
Serial Interface #2 I/O (15-pin RS-232C, 422A, or 485 connector)	A1J1	MDSM-15SC-Z11 (71468)	Supplied as part of Accessory Kit 8607A/AI with Cable
Auxiliary I/O signals (6-pin connector)	A1J8	FGG.1B.306.C.L.A.D52 (2P953)	Supplied as part of Accessory Kit
Wideband IF Output (SMB female)	A3J3	2002-1557-019 (19505)	Not Supplied

2.3.1 SW IF, SWITCHED IF OUTPUT (A4J2)

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

2.3.2 AUDIO, LINE AUDIO OUTPUT (A4J3)

The line audio output SMB connector provides a limited bandwidth audio signal of 5 mW minimum into 32 ohms. This output is switched on or off based on the absence or presence of a signal above the programmed COR threshold. See **paragraph 3.3.1.4**.

2.3.3 PHONE, HEADPHONES JACK (A4J1)

The output signal at the headphones jack is the same signal as provided at the AUDIO connector. The PHONES jack is a 1/8-inch diameter miniature stereo headphones jack. This output is intended for use with 32 ohm mono or stereo headsets but may be used with other load impedances. This output is switched based on the absence or presence of a signal above the COR threshold.

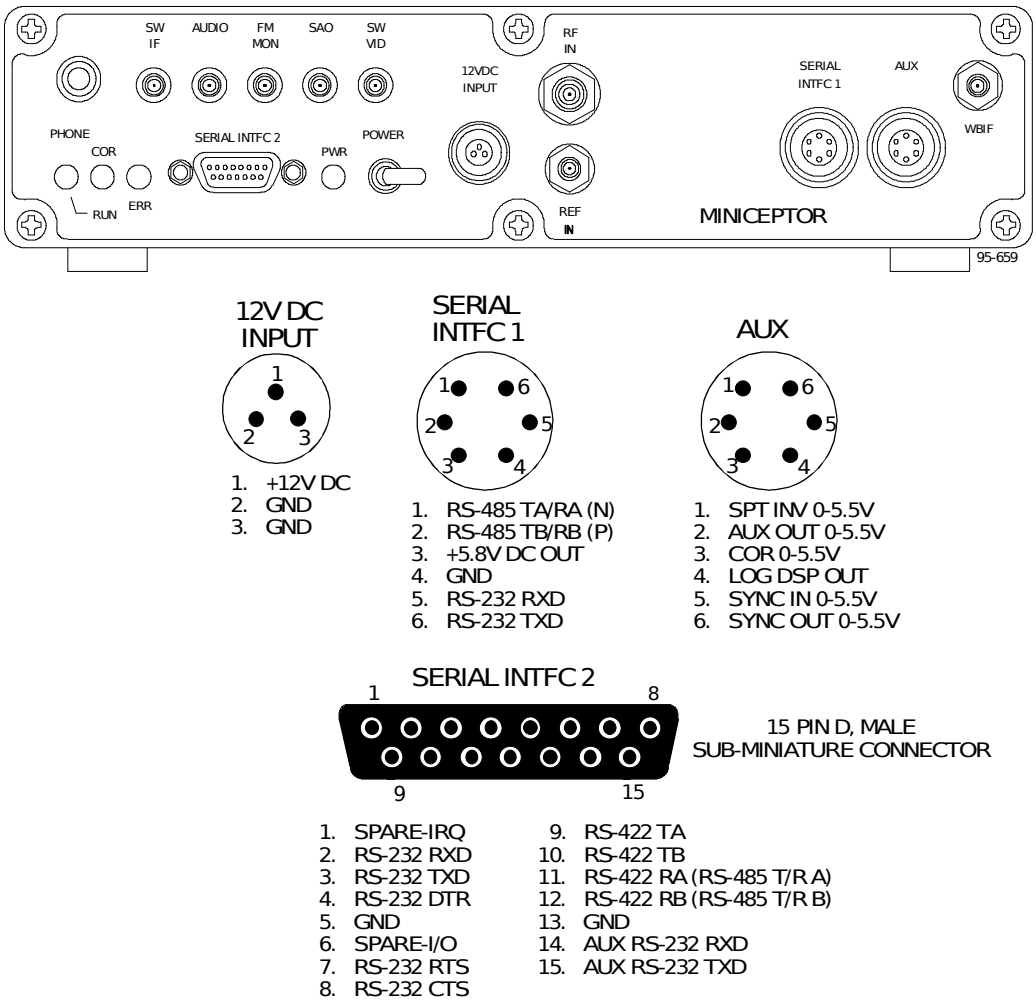


Figure 2-2. Miniceptor Front Panel Connectors

2.3.4 FM MON, FM MONITOR OUTPUT (A4J4)

The output at this SMB connector is a signal from the FM demodulator that is 0.5 volts peak-to-peak with 30% FM deviation, and has a limited bandwidth of 100 kHz or half of the selected IF bandwidth filter whichever is less. This output is present in AM, FM, and Pulse detection modes and is always an FM demodulated signal regardless of the selected detection mode. This signal may be used for signal analysis or by other ancillary equipment.

2.3.5 SAO, SWITCHED AUDIO OUTPUT (A4J5)

The output at this SMB connector is a "Tri-State" audio bus output having a level of 400 mV RMS with a 600 ohm output impedance. A system of Miniceptors may be configured with all of the SAO outputs tied in parallel. In this configuration, any receiver may be selected, by remote command, to be the audio source routed to the system audio monitoring devices. This output is derived from the Line Audio Output.

2.3.6 SW VID, SWITCHED VIDEO OUTPUT (A4J6)

The switched video output SMB connector provides a full bandwidth demodulated signal. When in FM detection mode, the nominal level of the signal is ±0.5 Vp-p for 50% bandwidth frequency deviation. When in AM, CW, or SSB detection modes the nominal level of this signal is 0.5 Vp-p. In the IF translation mode (IFT), the translated IF output is present at this connector with a maximum center frequency of 2 MHz. The impedance of this output is 50 ohms.

2.3.7 REF IN, EXTERNAL REFERENCE INPUT (A2J4)

This SMB connector allows an external 1 MHz, 5 MHz, or 10 MHz reference, having a level of 0 dBm, to be used as the time base for the unit. The Miniceptor must be configured to match the external reference being used. See **paragraph 2.4** for information concerning configuring the Miniceptor for operation.

2.3.8 RF IN, ANTENNA INPUT (A3J1)

This SMA connector accepts the RF input from the antenna. Nominal input impedance is 50 ohms. When the 860XA/FE option is installed, the IF signal from the FE module is input to this connector via external cabling. Maximum RF input without incurring damage is +20 dBm.

2.3.9 12 VDC INPUT (A1J14)

This three pin connector accepts +12 Vdc power. The Miniceptor requires 21 watts. When the 860XA/FE option is installed, an additional 6 watts is required. The mating connector for 12 Vdc input connector is part number FGG.0B.303.C.L.A.D52.

2.3.10 SERIAL INTFC 1, SERIAL INTERFACE I/O (A1J7)

The function of this connector is dependent on the setting of DIP switches on the WJ-8607A. This I/O supports singledrop communications from 150 to 38400 baud and is capable of RS-232C or RS-485 operation.

If the optional HPIL interface is employed, pin 1 and ground will accept manual commands in serial format from a WJ-8615P VHF/UHF Receiver. Up to thirty Miniceptors and WJ-8615P Receivers may be operated on a single handoff network.

5.5 Vdc is supplied on pin 3 to supply an external RS-232 to RS-422 line level adapter. An RS-422A interface may be operated from this connector in addition to the RS-422A interface I/O on Serial Interface 2.

Table 2-3 provides the pin assignments for Serial Interface 1.

Table 2-3. Serial Interface 1, Pin Assignments

Pin Number	Name	Description
1	RS-485TA/RA(N)	-RS-485 Transmit/Receive
2	RS-485TB/RB(P)	+RS-485 Transmit/Receive
3	+5.8V DC OUT	+5.8 Vdc Supply
4	GND	Circuit Ground
5	RS-232 RXD	RS-232C Receive
6	RS-232 TXD	RS-232C Transmit

Also, an adapter cable is provided for mating this connector to a standard 9-pin D-type connector. Pin assignments for this cable are shown in **Figure 2-3**. The mating connector for A1J7 is part of the accessory items provided.

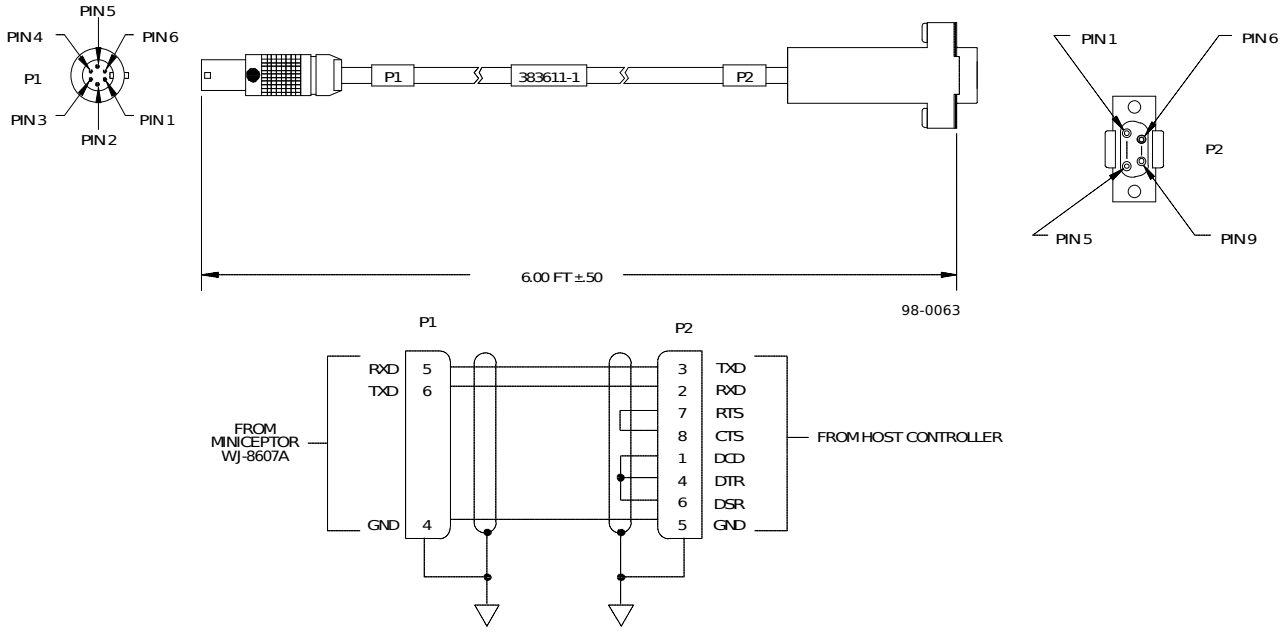


Figure 2-3. RS-232C Adapter Cable, Type 383611

2.3.11 SERIAL INTFC 2, SERIAL INTERFACE I/O (A1J1)

The function of this connector is dependent on the setting of DIP switches on the WJ-8607A. This I/O supports full-duplex, multi-drop communications, at rates up to 230.4 kbaud per second and is capable of RS-232C or RS-422A or RS-485 operation. **Table 2-4** provides pin assignments for Serial Interface 2. The mating connector for A1J1 is part of the accessory items provided. Also, an adapter cable is provided for mating this connector to a customer-supplied multipin connector. Pin assignments for this connector is shown in **Figure 2-4.**

Table 2-4. Serial Interface 2, Pin Assignments

Pin Number	Name	Description
1	IRQ*-Spare	Spare Interrupt Request
2	RS-232RXD	RS-232C Receive
3	RS-232TXD	RS-232C Transmit
4	RS-232DTR	RS-232C Data Transmit
5	GND	Circuit Ground
6	Spare-I/O	Not Used
7	RS-232RTS	RS-232C Request to Send
8	RS-232CTS	RS-232C Clear to Send
9	RS-422TA	RS-422A Transmit A
10	RS-422TB	RS-422A Transmit B
11	RS-422RA (RS-485 T/R A)	RS-422A Receive A, RS-485 Transmit/Receive A
12	RS-422RB (RS-485 T/R B)	RS-422A Receive B, RS-485 Transmit/Receive B
13	GND	Circuit Ground
14	AUX232RXD	RS-232 Auxiliary Receive
15	AUX232TXD	RS-232 Auxiliary Transmit

2.3.12 AUX, AUXILIARY FOR COR, SPECTRUM INVERSION, AND LOG DISPLAY (A1J8)

This multipin connector provides COR, Spectrum Inversion, Log Display, and Sync In and Sync Out signals as described below.

2.3.12.1 Spectrum Inversion (Pin 1)

In the non-extended tuning range, from 20 to 512 MHz, this line is true (high). In the extended tuning range from 514 to 2000 MHz, this line is false (low). When tuning from a frequency below 512 MHz to any frequency between 512 and 514 MHz, the line will also be high, however when tuning from any frequency above 514 MHz to any frequency within the 512 to 514 MHz band the line will be low.

2.3.12.2 COR (Pin 3)

This signal is a CMOS logic output indicating the presence of energy over the programmed COR level. Its operation is controlled by COR, CLT, and COD commands (see **paragraph 3.4.3.1** for Miniceptor general device messages).

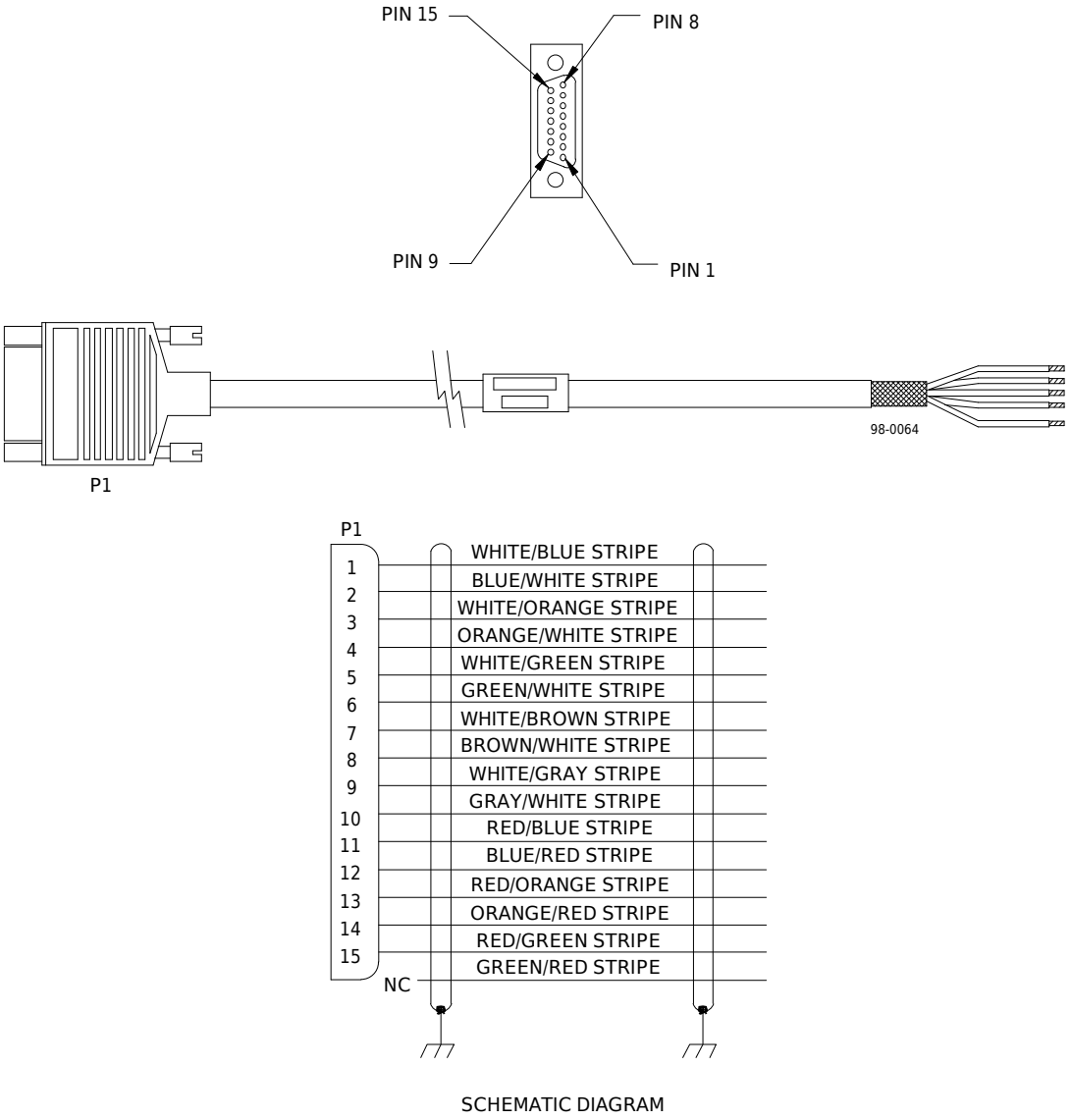


Figure 2-4. Serial Interface Adapter Cable, Type 383570-001

2.3.12.3 **Log Display (Pin 4)**

This output of 0.1 V to 4.57 V is a linear representation of the amplitude of the signal in the selected IF bandwidth from 0 to 60 dB.

2.3.12.4 **Sync In (Pin 5)**

This is a CMOS logic control input. A false-to-true (low-to-high) transition on this line causes the receiver to advance to the next frequency while in Sweep Mode or Step Mode. The effect is the same as if the ADV remote command were issued. To use the Sync In line effectively, the Sync Out control line should be monitored. Refer to **Section III, paragraph 3.3.7** for more information.

2.3.12.5 **Sync Out (Pin 6)**

This is a CMOS logic output control line. This line reflects the locked/unlocked status of the receiver's LO's. When Sync Out reads false (low), the LO's are not locked. When Sync Out reads true (high), the LO's are locked. The Sync Out line goes low briefly when the receiver is tuned to another frequency as by placing the Sync In line high or by issuing a remote command such as FRQ, OPR, ADV, or RES. Once the LO's lock on the new tuned frequency, Sync Out goes high. Refer to **Section III, paragraph 3.3.7** for more information.

2.3.12.6 **WBIF, Wideband IF Output (A3J3)**

The wideband IF output SMB connector provides a sample of the 21.4 MHz IF signal with a 12 MHz typical bandwidth. Nominal impedance is 50 ohms with approximately 10 dB of gain from antenna input. This output may be used by a signal monitor or other ancillary equipment. When this output is not in use, terminate it in 51 ohms with the accessory item provided.

When the 860X/WBO Wideband Output option is installed, connector A3J3 provides a constant -30 dBm output level at 21.4 MHz with a minimum bandwidth of 12 MHz.

2.4 CONFIGURING THE WJ-8607A FOR OPERATION

The WJ-8607A is equipped with two eight-bit DIP switches that configure the unit for its intended application. These DIP switches (A1S2 and A1S3) are located on the Digital Control assembly (A1) and can be accessed through a removable plate on the bottom panel of the WJ-8607A (see **Figure 2-5**). **Figure 2-6** illustrates the function of each rocker position of the DIP switches and the factory default settings for standard units, as well as units supplied with an HPIL interface option.

Note that, the WJ-8607A reads the DIP switch settings only at power-up. If changes are made to the switch settings, the units POWER switch must be set to "OFF" and then "ON" again to read the new configuration.

The following paragraphs provide a description of each WJ-8607A parameter that is controlled by the position of rockers on DIP switch A1S2 and A1S3. The convention for a DIP switch rocker position is: ON equals 1, and OFF equals 0.

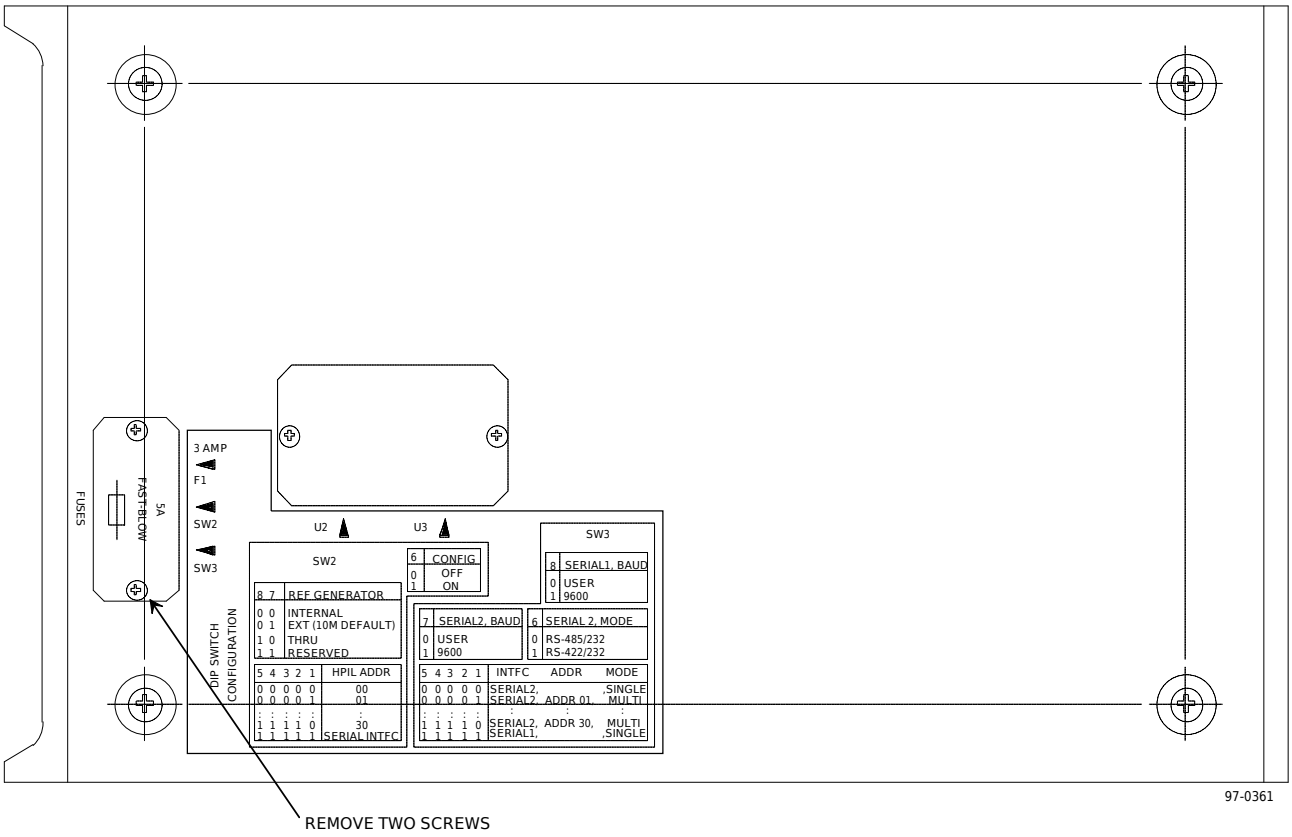


Figure 2-5. Dip Switch and Fuse Cover Plate Location

2.4.1 A1S2 - OPTIONAL HPIL INTERFACE ADDRESS

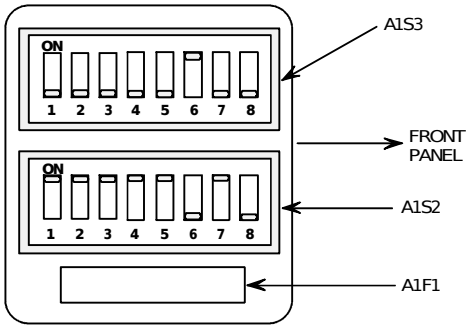
Rocker positions 1 thru 5 set the address for the optional 8607A/HPIL (Hewlett-Packard Interface Loop) Interface I/O. Rocker positions 1 thru 5 do not perform any function on units that do not have the 8607A/HPIL Interface option installed.

2.4.2 A1S2 - CONFIGURATION MODE

Rocker position 6 places the WJ-8607A into the configuration mode. This mode allows the units EEPROM to load hardware configuration parameters from a remote source. In most cases, the WJ-8607A should never be placed in this mode.

CAUTION

Vital EEPROM calibration data is unguarded while the WJ-8607A is in the Configuration mode. Do not set A1S2-6 to ON, unless absolutely necessary.



Note - A1S2 Shown Configured for: SERIAL INTFC, CONFIG OFF, EXT REF GENERATOR
A1S3 Shown Configured for: SERIAL 2, SINGLE DROP, RS-422/232, USER BAUD RATE

A1S2

HPIL ADDRESS

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

A1S3

SERIAL INTERFACE ADDRESS AND MODE

5 4 3 2 1	Address Selection
0 0 0 0 0	Serial 2, Single Drop Mode
0 0 0 0 1	01
0 0 0 1 0	02
0 0 0 1 1	03
0 0 1 0 0	04
0 0 1 0 1	05
0 0 1 1 0	06
0 0 1 1 1	07
0 1 0 0 0	08
0 1 0 0 1	09
0 1 0 1 0	10
0 1 0 1 1	11
0 1 1 0 0	12
0 1 1 0 1	13
0 1 1 1 0	14
0 1 1 1 1	15
1 0 0 0 0	16
1 0 0 0 1	17
1 0 0 1 0	18
1 0 0 1 1	19
1 0 1 0 0	20
1 0 1 0 1	21
1 0 1 1 0	22
1 0 1 1 1	23
1 1 0 0 0	24
1 1 0 0 1	25
1 1 0 1 0	26
1 1 0 1 1	27
1 1 1 0 0	28
1 1 1 0 1	29
1 1 1 1 0	30
1 1 1 1 1	Serial Interface 1

SERIAL 2 MULTI-DROP

CONFIGURATION MODE

SWITCH POSITION 6	FUNCTION
0	NORMAL MODE
1	CONFIGURATION MODE

***CAUTION**

Vital EEPROM calibration data is unguarded while the Miniceptor is in the Configuration mode (position 6 set to ON, 1). Do Not set the Miniceptor to this mode unless absolutely necessary.

REFERENCE GENERATOR

SWITCH POSITION 7 8	FUNCTION
0 0	INTERNAL REFERENCE
1 0	EXTERNAL REFERENCE
0 1	THRU MODE
1 1	NOT USED

SERIAL INTERFACE 2, MODE

SWITCH POSITION 6	MODE
0	RS-485/RS-232
1	RS-422/RS-232

SERIAL INTERFACE 2, BAUD RATE

SWITCH POSITION 7	RATE
0	USER SELECTABLE
1	9600

SERIAL INTERFACE 1, BAUD RATE

SWITCH POSITION 8	RATE
0	USER SELECTABLE
1	9600

Figure 2-6. DIP Switch Configurations

2.4.3 A1S2 - REFERENCE GENERATOR SOURCE

Rocker positions 7 and 8 determine the source of Reference Generation in the WJ-8607A. This reference provides a time-base that ensures a proper phase relationship exists between the synthesizer and other major portions of the receiver. The available selections are internal, external, and thru (bypass).

The internal selection enables an internal oscillator that generates a reference for the synthesizer. The frequency of the oscillator is determined by command from the host.

The external mode allows an externally generated RF signal to determine the output frequency of this same oscillator.

The bypass or thru mode bypasses the internal oscillator and passes the externally generated RF signal straight to the synthesizer for reference.

2.4.4 A1S3 - SERIAL INTERFACE 2, MODE AND ADDRESS SELECTION

Rocker positions 1 thru 5 configure Serial Interface 2 for single or multi-drop mode and set the units serial address in the multi-drop mode. Valid address settings for the multi-drop configuration are 01 thru 30. The single mode is selected by placing positions 1 thru 5 to OFF.

Serial Interface 1 can also be selected by placing positions 1 thru 5 to ON. Serial Interface 1 only functions in single-drop.

2.4.5 A1S3 - SERIAL INTERFACE TYPE SELECTION

Rocker position 6 configures Serial Interface 2 for either the RS-485 or RS-422 interface mode. RS-232 is available at Serial Interface 2, regardless of the rocker position. When RS-485 is selected, the interface must be used in the multi-drop mode with valid address settings being 1 through 30. When RS-422 is selected, the interface can be set to the single-drop or multi-drop mode.

2.4.6 A1S3 - SERIAL INTERFACE 2 BAUD RATE

Rocker position 7 set to “ON” selects a fixed rate of 9600 baud for Serial Interface 2. When set to “OFF”, a #CDR nrf command from the host computer determines the rate. The available range for Serial Interface 2 is from 150 to 230,400 baud. Refer to **paragraph 3.6.3** for further details.

2.4.7 A1S3 - SERIAL INTERFACE 1 BAUD RATE

Rocker position 8 set to “ON” selects a fixed rate of 9600 baud for Serial Interface 1. When set to “OFF”, a #CBR nrf command from the host computer determines the rate. The available range for Serial Interface 1 is from 150 to 38400 baud. Refer to **paragraph 3.6.3** for further details.

NOTES

SECTION III

OPERATION

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SECTION III

OPERATION

3.1 OPERATION

There are no local operator controls on the WJ-8607A, other than the POWER switch. All receiver functions are implemented through a control interface using ASCII or binary formatted remote messages, generated from a computer or other controlling device. The following paragraphs provide details on the control of the receiver. **Paragraph 3.2** provides information on the controls and indicators that are located on the receiver's front panel. **Paragraph 3.3** provides an overview of the receiver's modes of operation and tactical functions available to the operator. Some ASCII formatted remote messages are referred to in **paragraph 3.3** to aid in the understanding of various functions. Complete details on using ASCII-formatted command messages to control the receiver are provided in **paragraph 3.4**. Details on using binary formatted messages and the functions available for control with these messages are provided in **paragraph 3.5**. **Paragraph 3.6** provides details on the communications and protocols associated with the SERIAL 1 and SERIAL 2 remote interfaces.

3.2 CONTROLS AND INDICATORS

There is one control for power and four indicators to monitor the operating status of the WJ-8607A. The following detail the function of each indicator and the POWER switch.

3.2.1 **POWER SWITCH** - When set to the right-hand position, this two-position toggle switch applies input power (+12 Vdc) to all circuits in the receiver. This switch also controls input power to the optional WJ-860XA/FE Frequency Extender, if installed. It should be noted that when the receiver is powered down by the SLP1 (sleep mode on) remote command, the power switch must be turned off for five seconds before power can be reapplied to receiver circuitry.

3.2.2 **POWER INDICATOR -** This LED illuminates when the POWER switch is set to the “ON” position, +12 Vdc is connected to A1J4 and the fuse is not blown. It is extinguished while the receiver is powered down via the SLP1 remote command (sleep mode on).

3.2.3 **RUN INDICATOR -** This LED illuminates approximately one second after the POWER LED illuminates and remains on (steady) as long as the miniceptor is in normal operation. When the WJ-8607A is placed in the configuration mode, through DIP switch A1S2-6, the RUN LED will flash.

NOTE

Valuable configuration information stored in EPROM is unguarded and can be altered in the configuration mode.

3.2.4 **COR (CARRIER OPERATED RELAY) INDICATOR** - This LED illuminates when the signal strength of a selected RF signal exceeds the selected COR threshold value.

3.2.5 **ERR INDICATOR -** This LED illuminates when internal diagnostic circuitry detects any of the following errors:

- Power Supply Fault
- Any Unlocked LO
- EEPROM Defaulted
- RAM Error
- Frequency Extender (if installed) Unlocked
- Reference Generator Unlocked

Note that the ERR indicator does not indicate the receipt of invalid remote messages.

3.3 MODES OF OPERATION

There are basically four modes of operation for the WJ-8607A. Three modes provide signal acquisition and a fourth reduces power consumption. The three modes for acquiring RF signals are: Manual, Sweep, and Step. Manual mode is a fixed-tuned operation. Sweep mode provides contiguous coverage from a start frequency to a stop frequency. A Lockout function is available in the Sweep mode for locking out any unwanted frequencies. The Step mode is for sequencing through specific points in the RF spectrum (200 preprogrammed memory channels). Both Sweep and Step are automatic modes of operation. The fourth mode or sleep mode provides the ability to effectively turn off the receiver from a remote location, saving power consumption. When in the sleep mode, the Miniceptor only uses about 10 mW of power.

The receiver may be placed into the sleep mode by the remote “SLP 1” command. Sending the “SLP 1” command places the Miniceptor in the sleep mode until activity is sensed at the RS-232 RX-2 input of Serial Interface 2 (A1J1 pin 2). Any activity on the serial link wakes up the receiver. After a two second delay the Miniceptor returns ready to accept remote commands.

In the Sweep and Step modes the Miniceptor searches specified areas of the RF spectrum for signal activity. The action taken when a signal is acquired is based on the settings of internal dwell timers and two control registers: the Report Action Control register (RAC) and the Suspend Action Control register (SAC). These control registers allow for defining how a signal will be handled after it is received. Various types of Sweep and Step operations may be specified by messages sent to these control registers, such as: hold on signal, queue signals, report only new signals, suspend on end of sweep, etc.

The following paragraphs provide more information on the three active Miniceptor modes of operation, and the use of the RAC and SAC registers and dwell timers. References are made to the various remote commands for implementing the modes of operation. The Receiver Control section of this manual (**paragraph 3.4**) provides more details of the remote commands used for controlling the Miniceptor.

3.3.1 MANUAL (FIXED TUNED) MODE

This operational mode is not automatic. It allows the Miniceptor to be set to a specified fixed set of parameters. The parameters may be entered singularly or as a group, or can be executed from a memory channel. While in this operational mode the receiver is capable of generating an interrupt to the controller indicating signal acquisition, signal loss, or both.

In the Manual mode of operation parameters such as frequency, detection mode, AGC, COR threshold, AFC, IF bandwidth, video bandwidth and others can be controlled. The Manual mode allows use of the receiver for signal analysis. The receiver, while in this mode of operation, may be interrogated for signal strength, COR status, and signal frequency offset values.

3.3.1.1 Setting the Tuned Frequency

The frequency command (FRQ) allows the tuned frequency of the Miniceptor to be set. This command controls all hardware parts of the receiver necessary to convert the desired input frequency to a detectable signal at the second IF of 21.4 MHz. If AFC operation is enabled, the receiver automatically adjusts this parameter to fine tune the signal. A host may query the Miniceptor for the current tuned frequency.

The frequency range is from 2.0000 to 513.9999 MHz in the standard receiver. When the WJ-860XA/FE option is installed, the upper limit is extended to 2031.9999 MHz. The receiver firmware allows operation as low as 0 MHz for test purposes though receiver performance is only specified to 2 MHz. Tuning resolution is 100 Hz, fixed.

3.3.1.2 Selecting the Detection Mode

The detection mode selection allows the operator to decide by which of the detectors the IF information is to be processed. The basic receiver supports AM, FM, CW, PULSE and IFT (IF translation) detection modes. The WJ-860XA/SSB option adds LSB and USB detection modes. This command causes the receiver firmware to connect the desired detector to the audio and video outputs, as well as to select AGC scheme and AFC disable operations. The receiver firmware maintains three different programmed gate timers used for AGC operations as detailed below. The receiver firmware does not allow AFC operations in CW, IFT, LSB and USB detection modes.

Detection Mode	AGC Gate Timer	AFC On/Off	Video and Audio Source
AM	GTA	OFF	AM detector
FM	GTA	OFF	FM discriminator
CW	GTC	ON	CW product detector
PULSE	GTP	OFF	AM detector
IFT	GTC	ON	CW product detector
LSB	GTC	ON	SSB detector
USB	GTC	ON	SSB detector

3.3.1.3 Manual Attenuation and AGC Operation

The receiver supports AGC or manual attenuation operations for output level control. The operator may select AGC operation ON or AGC operation OFF. When AGC operation is OFF, gain control of the receiver is via the ATN command. The ATN command allows the reduction of gain from maximum (ATN 0) in approximately 1 dB increments to gain minimum (ATN 111). The manual ATN value may be loaded from the current AGC value with the Load Gain (LDG) command.

The Automatic Gain Control (AGC) is implemented digitally in the WJ-8607A. The implementation hardware consists of Digital-to-Analog (D/A) converters, which drive voltage-controlled attenuators; Analog-to-Digital (A/D) converters driven by average and peak detectors; an interrupt-generating level comparator on the peak detector; and the microcontroller.

The AGC firmware supports two different algorithms, one for AM and FM detection modes and one for CW, PLS, IFT, and SSB detection modes. In the AM and FM detection modes, the receiver attenuation is adjusted based on the average value of the signal. In the CW, PLS, IFT, and SSB detection modes, the attenuation is adjusted based on the peak value of the signal. The AGC algorithm also makes decisions based on a fast attack process or adjusting and decaying the signal.

The fast attack is handled based on interrupts provided by a hardware comparator and the peak detector. This fast attack process puts in attenuation to reduce the signal level to the nominal AGC set point, then waits for bandwidth settling, and re-enables the process. The amount of attenuation put in per interrupt is limited by the linear range of the detector, which is about 10 dB above the AGC set point. This causes a maximum step to be approximately 10 dB. Once the fast attack process results in the current detector value being less than 6 dB above the set point, it is no longer activated.

The AGC adjusting and decaying processes are timer driven. The signal is evaluated at the time interval established by the gate timer which is based on the detection mode. At the end of the gate timer interval, the receiver firmware adjusts the attenuation based on the difference between the detector and the AGC set point. If the signal is greater than the set point, the total difference is used for the adjustment. If the signal is less than the set point, the size of the reduction is determined by the detection mode. In AM and FM detection modes, the reduction is half the difference. This value is limited by the difference between the set point and the noise floor of the detector, which is typically 10 dB. In CW, PLS, IFT, and SSB detection modes, the reduction is made in 1 dB steps per gate interval. Some typical AGC response data is shown below.

Detection = AM, FM

	Step signal change			
	20 dB	40 dB	60 dB	dB/ms
Attack	2 ms	4 ms	6 ms	10 db/ms
Decay when Gate Timer for AM & FM (GTA)				
= 4 ms	25 ms	35 ms	40 ms	
= 28 ms*	60 ms	90 ms	120 ms	
= 100 ms	100 ms	220 ms	350 ms	

Detection = CW, LSB, USB, IFT

	Step signal change 20 dB	40 dB	60 dB	dB/ms
Attack	2 ms	4 ms	6 ms	10 db/ms
Decay when Gate Timer for CW, SSB & IFT (GTC)				
= 4 ms	100 ms	200 ms	300 ms	200 dB/s
= 100 ms*	2.5 s	6.0 s	9.0 s	7 dB/s
= 252 ms	7.0 s	13.0 s	19.0 s	3 dB/s

Detection = PLS

	Step signal change 20 dB	40 dB	60 dB	dB/ms
Attack	2 ms	4 ms	6 ms	10 db/ms
Decay when Gate Timer for AM PLS (GTP)				
= 4 ms	100 ms	200 ms	300 ms	200 dB/s
= 100 ms*	2.5 s	6.0 s	9.0 s	7 dB/s
= 252 ms	7.0 s	13.0 s	19.0 s	3 dB/s

The AGC attack is evaluated by increasing the signal from the AGC threshold to the step value indicated (20 dB, 40 dB, or 60 dB). Time is measured from the increase in RF energy until the final AGCed value in the CW, LSB, USB, PLS, IFT detection modes. In the AM or FM detection modes, time is measured from the increase in RF energy until a linear AM detector response for a 50% modulated signal (within 6 dB of the final value) is detected. Decay is measured as the time required for the receiver to return to the maximum gain from the indicated AGC level.

The AGC may be reset by sending the Attenuator Dump (ATD) command to the receiver. This command causes the receiver to reset its gain to maximum and to reattack the signal. The ATD command has no effect on the manual gain value.

3.3.1.4 Carrier-Operated Relay (COR) Operation

The Miniceptor provides outputs on the AUX connector and the remote interface indicating the absence or presence of a signal. The AUDIO output is also muted based on this operation. These outputs are based on the level of the signal and the programmed COR level. When a signal is over the programmed COR level, the outputs indicate signal presence. After the signal falls below the programmed COR level for a specified length of time, the signal absence is indicated via the remote interface. The COR output on the AUX connector is then delayed by another user-specified timer before indicating signal absence. COR operation is derived from the LOG display signal on the Demodulator assembly.

The COR level is set with the COR command. It is specified in dB above the theoretical noise floor for the selected IF bandwidth. The range of the COR level is from 0 to 55 dB. Zero causes the COR to continually indicate signal presence.

A COR Loss Timer (CLT) determines how long a signal must be absent before the COR indicates its loss. This timer is programmable in 20 ms increments from 0 to 2000 ms.

A COR Output Delay Timer (COD) determines how long the COR must indicate signal loss before indicating loss on the COR output on the AUX connector. This timer is programmable in 1 second steps from 0 to 5 seconds.

3.3.1.5 AFC Operation

The Miniceptor has built-in AFC firmware that tunes the receiver based on the DC level at the FM discriminator. The AFC operation may be turned on or off with the AFC command. AFC is only operational with IF bandwidths greater than 6.4 kHz and in AM, FM, and PULSE detection modes. When the AFC operation is enabled it becomes active and retunes the receiver when a signal exceeds the COR level, the LOG detector detects energy, and the FM discriminator indicates that the signal is more than 10% of the selected IF bandwidth off center frequency. As long as the signal is off frequency, the receiver continues to retune it. When the signal drops below COR threshold, the AFC process stops. The receiver remains at the last automatically tuned frequency.

3.3.1.6 IF Bandwidth Selection

The IF bandwidth commands allow selection of one of the five possible IF filters in the receiver or the IF bypass position. The IF filter may be selected by either the BWS (bandwidth slot) or BWC (bandwidth size) commands. Selection of an IF bandwidth causes the receiver firmware to automatically select the necessary gain, post IF filtering, and discriminator paths for the desired filter. If video filter mode is automatic, the receiver automatically selects the correct video filter for the current IF filter. In LSB and USB detection modes, the receiver automatically selects the narrowest IF bandwidth that is greater than 6.4 kHz as a roofing filter. If a bandwidth command is sent at this time, it does not take effect until the SSB detection mode is exited. A BWA (bandwidth active) command allows a controlling device to interrogate which IF slot is currently active regardless of detection mode.

3.3.1.7 Video Bandwidth Selection

The video bandwidth may be selected automatically when the IF bandwidth is selected, bypassed, or manually selected. The Video Bandwidth Mode (VBM) command allows the choice of video bandwidth operation. Video bandwidth is selected manually via the Video Bandwidth Slot (VBS) or Video Bandwidth Size (VBC) commands. In automatic video bandwidth selection, the video bandwidth is selected in accordance with the IF bandwidth selection. IFBW slot 1 selects the video bandwidth slot 1, IFBW slot 2 selects the video bandwidth slot 2, IFBW bypass selects video bandwidth bypass, etc. While in automatic mode the manual VBS and VBC commands may override the automatic selection.

3.3.1.8 BFO and IFO Tuning

The receiver allows tuning of a variable oscillator mixing the final IF to baseband. For CW detection mode, the BFO command is used. Its range is ±4.00 kHz in 0.10 kHz steps. For IF translation (IFT) detection mode, the oscillator is controlled by the IFO command. The IFO command allows the oscillator to be tuned ±2.000 MHz in 1 kHz steps. In either case, the frequency specified is an offset from 21.4 MHz.

3.3.2 Sweep Mode

The Sweep mode is an automatic mode of operation that provides the capability to search preferred portions of the RF spectrum for signal activity. The Miniceptor uses specified start and stop frequencies and specified sweep increments for sweeping. The sweep can increment from start frequency to stop frequency or decrement from stop frequency to start frequency. The direction of the sweep is based on the selection of a sweep direction flag (up = start to stop; down = stop to start). The sweep is ended when the next tuned frequency is greater than the stop frequency if incrementing, or less than the start frequency if decrementing. Generally, the start frequency should be less than the stop frequency. If, however, the start frequency is greater than the stop frequency the sweep will consist of one point, either the start frequency or the stop frequency depending on the selected sweep direction flag. Sweep setups are entered and initialized by selecting one of two sweep operations: Sweep Immediate or Sweep Memory. These sweep operations are described below.

Sweep Immediate - When the Sweep mode of operation is selected, sweep parameters for a single sweep sector may be entered such as start frequency, stop frequency, sweep direction, etc. At this point, selecting the Sweep Immediate operation causes the Miniceptor to use these entered parameters for the sweep.

Sweep Memory - This operation allows for selecting up to ten sweep sectors using parameters contained in preprogrammed memory channels. When this operation is selected, a sector list is used for entering memory channel(s) which contain the desired sweep sector parameters. Up to ten out of the 200 Miniceptor memory channels may be entered on the sector list. When initiated the first memory channel on the sector list is swept, then the second channel is fetched and swept. When the last sweep of the sector list has been completed, the process starts over.

Sweep parameters may be entered and/or changed while the Miniceptor is actively sweeping either by single parameter inputs or by loading the sweep buffer from memory. This allows the optimization of the sweep without stopping, storing memory, and restarting. The parameter changes remain in the active sweep until the sweep buffer is reloaded. If the active sweep is using parameters from a memory channel, any parameter changes must be made and stored in the memory channel for the changes to be permanent.

The Miniceptor can also operate in a Sweep Mode called Enhanced Sweep Operation. In Enhanced Sweep Operation, the Miniceptor first sweeps through a specified frequency range to develop a database representing the average ambient signal activity versus frequency over that range. This database is used to calculate a Dynamic COR threshold level that determines how signal activity detected at specific frequency points are reported on subsequent sweeps (see **paragraph 3.3.2.2**).

The decision as to what action the Miniceptor will take when a signal is found is based on the Report Action Control register (RAC) (**paragraph 3.3.2.3**), the Suspend Action Control register (SAC) (**paragraph 3.3.4**), and the dwell timers (**paragraph 3.3.5**).

3.3.2.1 **Sweep Lockout**

Parts of the RF spectrum may be locked out from the sweep operation by use of the Sweep Lockout function. The area to be locked out is defined with a start-of-lockout frequency, a stop-of-lockout frequency, and a lockout channel number. The start-of-lockout frequency must be less than the stop-of-lockout frequency for the lockout to be accepted. The lockout information is stored in a selected lockout memory channel. The operator may then reference this data by the channel number under which it was stored. The Miniceptor must be in the Manual mode or in the Suspend state of Sweep or Step modes before lockout data can be entered. The Miniceptor's memory can contain up to 200 lockout bands.

3.3.2.2 **Enhanced Sweep Operation**

Enhanced Sweep Mode is set up via the Report Action Control (RAC) register by setting Bit 4. In Enhanced Sweep mode, the Miniceptor first learns the signal environment by sweeping through the Start and Stop frequencies a user-set number of times. Detected signal levels at each sample point can be stored as an average, real-time or peak value. The Miniceptor software places a decaying or rising factor on the stored signal levels. The decaying factor decreases the effect of lost energy on the stored signal levels. The rising factor decreases the effect of a high-energy burst on the stored signal levels. A value of 0 for either factor causes only the peak value of detected signals to be stored. A value of 1 causes the real-time energy level of detected signals to be stored. A value of 2 causes a running average of current-stored signal levels and new signal levels to be stored. Stored energy values of detected signals are the base to which a user set Delta-COR value will be added to create the Dynamic COR Threshold.

After completing the learning process, the Miniceptor continues sweeping through the Start and Stop Frequencies while monitoring the energy at each sample point. During each sweep, one of the following actions will be taken:

1. If the signal energy at a sample point is greater than the Dynamic COR value, the signal will be reported as a new signal. A signal greater than 70 dB above the noise floor will always be reported as a new signal due to the COR range limits of the receiver.

2. If the signal energy at a sample point is less than the Dynamic COR value, the signal will be reported as a lost signal.

3. If the signal energy at a sample point is equal to the Dynamic COR value, the Microceptor will take no action.

When the sweep suspends on a new signal during Enhanced Sweep Operations, the UPB command causes the receiver to store the new signal level in the bin sample. The IGB command can be used in this situation to instruct the receiver to ignore the new signal level for bin update purposes.

3.3.2.3 **Sweep Report Action Control (Sweep RAC)**

A register called Report Action Control (RAC) determines what action is taken when a signal is found in Sweep mode of operation. The Miniceptor features a delta sweep function that reports new signals and loss of old signals while in the Sweep mode of operation. The delta sweep function is enabled by making requests for these reports to the Report Action Control (RAC) register. The delta sweep covers a maximum of 8,192 points. In sweep operation, the Miniceptor keeps a COR status flag for each sweep frequency increment. During the first sweep, it assumes no previous signals. As it sweeps, it stops and reports on all signals it sees as new signals. On each successive sweep, the Miniceptor only stops on and reports the changes requested by the RAC register. Accordingly, a signal that is always up will only be reported on the first pass of the sweep. Every time the sweep is restarted the Miniceptor assumes a "no signal" condition for all points of the sweep. The delta sweep is only valid for buffer sweeps less than 8,192 points. In the event the sweep exceeds 8,192 points, all points with a signal past the 8,192nd point are reported as a new signal on each pass.

The RAC register also determines what action is taken when a signal is found in Enhanced Sweep Mode. During the first sweep of the learning mode, the Miniceptor assumes no previous signals. As it sweeps, it stores signals found at each sample point to build the signal environment base. The Dynamic COR is based on the energy found in each sample point during the learning passes. At the end of the learn sequence, Bit 11 in the RSR register is set. The Miniceptor continues to sweep in the Enhanced Sweep mode. Any signal level exceeding the Dynamic COR threshold causes the signal to be reported as a new signal in the RSR register.

The Ignore Lockout function is also controlled by the RAC register. When enabled, this function will cause the Miniceptor to override the data in its lockout memory and report signals that are present in the lockout area. The RAC register also allows for enabling the "Don't Report or Stop on Adjacent Points" function. In normal operation, anytime a signal is over COR it is reported as well as multiple adjacent signal active points are stopped on and reported. When the "Don't Report or Stop on Adjacent Points" function is enabled, only the first point over COR is reported as a single signal at that frequency.

3.3.3 **STEP MODE**

The Step mode is an automatic mode of operation that allows the Miniceptor to step through selected frequencies of the RF spectrum by use of preprogrammed memory channels. Each memory channel contains all of the parameters required for a complete receiver setup. A step channel list is used to enter up to twenty entries into the step operation. The entries may be discrete channel numbers or sets, each including a start and stop step channel number. Changes may be made to the parameters of a stored memory channel while the Step mode is active. After the changes are made and stored the new parameters will be used on the next pass of the modified memory channel. A memory channel can also be removed entirely from the step channel list while the Step mode is active. This is done by setting an idle flag parameter active in the memory channel, causing it to be ignored. The memory channel may be reinstalled at any time by resetting the idle flag to the inactive state.

The Miniceptor can also operate in a Step Mode called Enhanced Step Operation. In Enhanced Step Operation, the Miniceptor first steps through a selected frequencies of the RF spectrum to develop a database representing the average ambient signal activity versus frequency over that range. This database is used to calculate a Dynamic COR threshold level that determines how signal activity detected at specific frequency points are reported on subsequent sweeps (see **paragraph 3.3.3.1**).

As with the Sweep mode, the decision as to what action the Miniceptor will take when a signal is found in the Step mode is based on the Report Action Control register (RAC) (**paragraph 3.3.3.2**), the Suspend Action Control register (SAC) (**paragraph 3.3.4**), and the dwell timers (**paragraph 3.3.5**).

3.3.3.1 Enhanced Step Operation

Enhanced Step Mode is set up via the Report Action Control (RAC) register by setting Bit 4. In Enhanced Step mode, the Miniceptor first learns the signal environment by sweeping through the specified frequencies a user-set number of times. Detected signal levels at each sample point can be stored as an average, real-time or peak value. The Miniceptor software places a decaying or rising factor on the stored signal levels. The decaying factor decreases the effect of lost energy on the stored signal levels. The rising factor decreases the effect of a high-energy burst on the stored signal levels. A value of 0 for either factor causes only the peak value of detected signals to be stored. A value of 1 causes the real-time energy level of detected signals to be stored. A value of 2 causes a running average of current-stored signal levels and new signal levels to be stored. Stored energy values of detected signals are the base to which a user set Delta-COR value will be added to create the Dynamic COR Threshold.

After completing the learning process, the Miniceptor continues stepping through the specified frequencies while monitoring the energy at each sample point. During each step, one of the following actions will be taken:

1. If the signal energy at a sample point is greater than the Dynamic COR value, the signal will be reported as a new signal. A signal greater than 70 dB above the noise floor will always be reported as a new signal due to the COR range limits of the receiver.

2. If the signal energy at a sample point is less than the Dynamic COR value, the signal will be reported as a lost signal.

3. If the signal energy at a sample point is equal to the Dynamic COR value, the Microceptor will take no action.

When the sweep suspends on a new signal during Enhanced Step Operations, the UPB command causes the receiver to store the new signal level in the bin sample. The IGB command can be used in this situation to instruct the receiver to ignore the new signal level for bin update purposes.

3.3.3.2 Step Report Action Control (Step RAC)

The Miniceptor features a delta step function for reporting acquisition of new signals or loss of old signals while in the Step mode. The delta step function is enabled by making requests of these reports to the Report Action Control (RAC) register. When either report new signals or report old lost signals are requested, the delta step function becomes active. When the delta step function is active, the Miniceptor reports all signals that it receives on the first pass of the step sequence as new signals. On all successive step sequences, only changes will be reported.

The RAC register also determines what action is taken when a signal is found in Enhanced Step Mode. During the first step of the learning mode, the Miniceptor assumes no previous signals. As it steps, it stores signals found at each sample point to build the signal environment base. The Dynamic COR is based on the energy found in each sample point during the learning passes. At the end of the learn sequence, Bit 11 in the RSR register is set. The Miniceptor continues to step in the Enhanced Sweep mode. Any signal level exceeding the Dynamic COR threshold causes the signal to be reported as a new signal in the RSR register.

3.3.4 SUSPEND FUNCTION

The Sweep and Step modes of operation may be placed in a suspended state. When the operation is suspended the Miniceptor moves to a Sweep/Manual or Step/Manual type of operation. From the suspended operation, manual commands may be issued allowing a signal that was found in the automatic mode to be analyzed. The Miniceptor enters the suspended state by either of two methods; manually by remote command (SUS) or automatically by control of the Suspend Action Control (SAC) register. Seven different automatic suspend actions may be set in the SAC register with the SAC command. These are: suspend on end of sweep, suspend on end of sweep sequence, suspend on end of step sequence, suspend on full queue, suspend on reported signal acquisition, suspend on full sweep/step data (SSD) buffer, and suspend on end of learn sequence. Once the Miniceptor has entered the suspended state, it can only be exited by enabling the operation (ENA command) or by changing the mode of operation. Returning to the active mode of operation from the suspended state causes the operation (Sweep or Step) to continue with the next successive point as though the suspend state had never taken place.

3.3.5 DWELL TIMERS

The Miniceptor provides three dwell timers that can be used to further control Sweep and Step operations. The dwell timers are: Pre-Dwell, Signal Dwell, and Post Loss Dwell. The use of these dwell timers makes available operations such as queue, signal hold, synchronous search, and wait for response. The dwell timers, which are active in both Sweep and Step modes, are further explained in the following paragraphs.

3.3.5.1 Pre-Dwell Timer

The Pre-Dwell Timer defines how long the Miniceptor initially waits on a sweep or step frequency for signal activity. The Pre-Dwell Timer can be set with the PDW command from 0 to 996 milliseconds (ms), in 4 ms increments, or can be set to infinity. A pre-dwell of 0 implies that the Miniceptor will perform a minimum dwell before moving to the next frequency. Any time greater than 0 indicates the time in ms that the Miniceptor will wait on that frequency for a signal. With infinity selected the Miniceptor dwells on a frequency until a signal is encountered or an advance command is issued. An infinite pre-dwell timer setting allows scan or sweep operation to be synchronized by remote commands. As soon as a signal over the COR level is encountered, the Miniceptor moves to Signal Dwell operation.

3.3.5.2 Signal Dwell Timer

The Signal Dwell Timer defines how long the Miniceptor stays tuned to an active frequency. The range of the timer can be set from 0 to 600 seconds, in 1 second intervals, or it can be set to infinity. The Signal Dwell Timer is initialized when the Pre-Dwell timer expires. The Miniceptor exits Signal Dwell when

either the timer expires or the encountered signal drops below COR level. If the timer expires, the Miniceptor tunes to the next frequency. If the signal is lost, the Miniceptor moves to Post Loss Dwell operation. The timer continues on entry from Post Loss Dwell. With the Signal Dwell Timer set to infinity, the Miniceptor stays in Signal Dwell until the signal is lost. This timer, which is set with the SDW command, is cumulative for each frequency point in the sweep or step.

3.3.5.3 Post Loss Dwell Timer

Post Loss Dwell operation is entered from Signal Dwell upon loss of a signal. The Post Loss Dwell Timer specifies how long the Miniceptor waits for the return of a lost signal before tuning to a new frequency. The timer can be set to a range from 0 to 60 seconds or can be set to infinity. When this timer expires, the Miniceptor automatically tunes to the next frequency. If a signal is reacquired while in Post Loss Dwell, the Miniceptor returns to Signal Dwell operation. With the Signal Dwell and Post Loss Dwell timers set to infinity, the Miniceptor goes to a new frequency only by remote command. This timer is reinitialized each time Post Loss Dwell is entered.

3.3.6 SWEEP/STEP DATA OUTPUT FUNCTION

The sweep/step data output (SSD) function provides a means of collecting data containing LOG display levels (the levels of signals in dB above the theoretical noise floor of the selected IF bandwidth or absolute signal levels in -dBm). It also provides a means of storing the data in a buffer while the receiver is actively sweeping or stepping. The data can then be retrieved over the remote interface for use by a panoramic (PAN) display or any application that requires a prompt method of collecting LOG display levels while the receiver is sweeping or stepping.

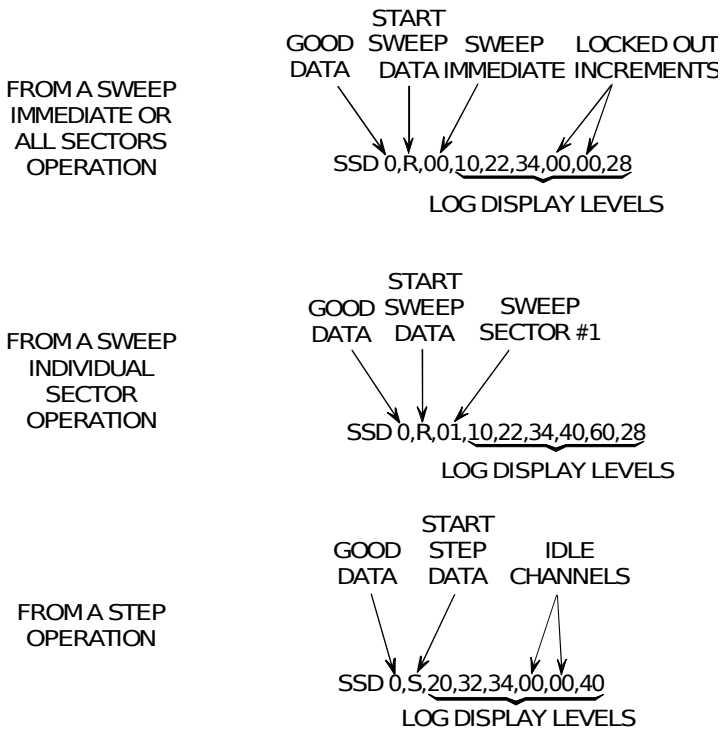
When the SSD function is enabled, the LOG display level at each sweep or step frequency increment is recorded in the SSD buffer. The buffer is capable of storing up to 100 LOG display level points before overflowing. If desired, the data stored in the SSD buffer can be compressed to reduce the chances of SSD buffer overflow. Instead of storing a level for every sweep increment point, the CMP command can be used to force the receiver to store LOG display data only after a specific number of increment points have occurred. This sweep compression increment number can be any value from 1 to 255 increment points. A peak or average data collection type is also selected with the CMP command. Selecting the peak data collection type means that only the sweep increment that has the highest signal strength within its sweep compression increment is recorded in the SSD buffer. Selecting the average data collection type means that the signals at each sweep increment within a sweep compression increment are averaged. Then, the average of all LOG display levels within the sweep is ascertained and recorded in the SSD buffer. For example, if a sweep sequence has five increment points and the levels are 30 dB, 35 dB, 40 dB, 45 dB, and 50 dB, the average of the five points is 40 dB. Only the 40 dB level is recorded in the SSD buffer for that sweep sequence.

The measurement range of data above the theoretical noise floor in the SSD buffer is set by the LGE command. With LGE disabled (LGE 0), the range is 0 to 60 dB. With LGE enabled (LGE 1), the range is 0 to 99 dB. The representation of data in the SSD buffer is set by the DBM command. With DBM disabled (DBM 0), the data is represented as dB above the theoretical noise floor of the receiver. The signal range will be 60 dB (LGE 0) or 99 dB (LGE 1). With DBM enabled (DBM 1), the data is represented in absolute levels of -dBm. The signal range will be from -126 dBm to 0 dBm or the receiver saturation depending on the receiver bandwidth and LGE status. For receivers with the WJ-860XA/CAL option, the signal level accuracy is +/- 2 dB of absolute. Without the WJ-860XA/CAL option, the signal level accuracy is +/- 6 dB of absolute.

By enabling bit 5 in the Suspend Action Control (SAC 32) register (see **paragraph 3.3.4**), the receiver can be automatically set to the suspended state when the SSD buffer becomes full. By enabling bits 9 or 10 in the Receiver Status Enable Register (RSE 9 or RSE 10), a service request can also be automatically asserted when the buffer becomes 75% or 100% full, respectively. (See **paragraph 3.4.7.4**).

The SSD function is enabled or disabled with the SSO command. When enabled, the operator may make the selection of retrieving data during the sweep immediate mode or all channels in the sweep sector mode, or, from a single channel during the sweep sector mode.

Collected LOG display data is retrieved from the SSD buffer with the SSD? query. The response to the query provides an indication of whether the SSD buffer contains good data or has overflowed, and then strings of SSD data. Each string begins with either an R, indicating that the following data is from the start of the sweep sequence, or an S, indicating that the data is from the start of the step sequence. If the data string is from a step sequence (preceded by S) the second part is LOG display data. If the data string is from a sweep sequence (preceded by R) the second part indicates the presence of sweep immediate or sweep sector data. The remaining data part of either type of string contains 1 to 99 LOG display data points. The responding numbers indicate the level of the signal (in dB) above the theoretical noise floor of the selected IF bandwidth or the absolute signal strength (in -dBm) for each point in the sweep or step sequence. A 00 response in this part of the string indicates that the point is locked out (either a locked out sweep increment or an idle channel). The following are examples of responses to the SSD? query.



When the SSD? query is issued, the SSD buffer is cleared. To reduce the chances of buffer overflow during an SSD function, it is recommended that the SSD buffer be cleared on every reinitialization of the sweep or step modes. Note that when the SSD buffer is read, the data to the current sweep or step point is provided. The subsequent read of the buffer will continue at that point assuming the buffer has not overflowed.

This implies that the buffer will not always start with the start of sweep or start of step data character. The operation of the sweep or step is asynchronous to the reading of the buffer.

3.3.7 USING SYNC IN/SYNC OUT SIGNALS TO CONTROL SWEEP/STEP OPERATION

The Sync In and Sync Out lines on the AUX connector may be used by an external controller to operate the receiver more efficiently in Sweep and Step Modes. Refer to **Section II, paragraph 2.3.12** for pinout and logic level definitions for the Sync In and Sync Out signals. A low-to-high transition on Sync In causes the receiver to advance to the next frequency in Sweep or Step modes of operation. A low-to-high transition on Sync Out signifies that the LO's have locked at the new tuned frequency. The Sync In and Sync Out lines, when used together to control sweeping or stepping, allow for fastest operation when it needs to be synchronized to an external device. Set the signal dwell time to infinite (SDW-1) and monitor the Sync Out line for a low-to-high transition. After the transition is detected, wait for the appropriate period of time required to monitor or process the received signal. Then pulse the Sync In line high.

3.4 RECEIVER CONTROL USING ASCII COMMAND MESSAGES

The following paragraphs describe control of the WJ-8607A by an external device using ASCII and limited binary commands. Four electrical interfaces are available for control of the WJ-8607A.

- RS-232C
- RS-422A
- RS-485
- Optional Hewlett Packard Interface Loop (HPIL), see **Appendix J**

The ASCII mnemonic structure of remote commands are the same for all interfaces and are modeled after the IEEE-488.2 standard. Due to characteristic differences of these interfaces, some variations exist in the way data is managed over the respective interface. Refer to **paragraph 3.6** for details on communications and protocols associated with the serial interfaces. Refer to **Appendix J** for I/O details of the optional HPIL interface.

The WJ-8607A utilizes a "speak when spoken to" ASCII mnemonic structure on all interfaces. The receiver only provides a response to inquiries. Commands are considered accepted unless an error is generated. The following paragraphs provide details on the commands and queries used to control and monitor the operation of the receiver. **Table 3-1**, provides an alphabetical listing of the available commands and queries.

3.4.1 ASCII COMMAND MESSAGE FORMAT

Command messages are exclusively ASCII-encoded data. Command headers consist of three-character mnemonics. ALL "IEEE-488.2 Common" commands are prefixed with the "*" character. Configuration messages are prefixed with the "#" character. All queries are suffixed with the "?" character. Also, all command arguments are in the "forgiving" numerical representation form. Multiple commands which are sent to the Miniceptor must be separated with a semicolon (;) character. In addition, multiple arguments of a single command must be delimited with commas.

ASCII messages may be terminated by the use of any of the following combination of characters.

1. CR, LF
2. LF
3. CR, LF/EOI
4. CR/EOI
5. LF/EOI
6. EOI (on the last byte of the message)

Note that CR is essentially ignored, and termination is confirmed on the receipt of a LF and/or EOI. The EOI is only valid for the optional HPIL interface.

Table 3-1. Alphabetical List of ASCII Remote Commands

Command	Function	Refer to Table
ADC?	Request A/D converter output from receiver detectors.	3-9
ADV	Advance sweep or step to the next frequency.	3-5
AFC	Select AFC mode.	3-2
AFC?	Request AFC mode.	3-2
AGC	Select the gain control mode.	3-2
AGC?	Request the gain control mode.	3-2
AMD?	Request current AM detector value.	3-2
AMP?	Request current AM peak detector value.	3-3
ATD	Attenuation dump (AGC dump).	3-2
ATF	Set final attenuator (test purposes only).	3-9
ATF?	Request final IF attenuator (test purposes only).	3-9
ATI	Set 1st IF attenuator (test purposes only).	3-9
ATI?	Request 1st IF attenuator (test purposes only).	3-9
ATN	Set receiver input attenuation.	3-2
ATN?	Request current receiver input attenuation value.	3-2
ATR	Set RF attenuator (test purposes only).	3-9
ATR?	Request RF attenuator (test purposes only).	3-9
ATS	Set 2nd IF attenuator (test purposes only).	3-9
ATS?	Request 2nd IF attenuator (test purposes only).	3-9
BFO	Set BFO frequency.	3-2
BFO?	Request current BFO frequency.	3-2
BND	Select preselector band.	3-2
BND?	Request selected preselector band.	3-2
BUP	Set sample bin update option.	3-4
BUP?	Request value of BUP parameter.	3-4
BWA?	Request active IF bandwidth slot.	3-2
BWC	Select IF bandwidth size.	3-2
BWC?	Request active IF bandwidth size.	3-2
BWL?	Request list of installed IF bandwidths.	3-2
BWS	Select IF bandwidth slot.	3-2
BWS?	Request selected IF bandwidth slot.	3-2

Table 3-1. Alphabetical List of ASCII Remote Commands (Continued)

Command	Function	Refer to Table
BYP	Set preselector bypass status.	3-2
BYP?	Request current preselector bypass status.	3-2
#CBR	Set the RS-232C/RS-422A baud rate.	3-10
#CBR?	Request the current RS-232C/RS-422A baud rate setting.	3-10
#CBW	Enter configuration data for a bandwidth slot.	3-10
#CDE?	Request current contents of the Device-Dependent Error Register	3-11
#CDR	Set Serial Interface 2 Baud Rate.	3-10
#CDR?	Request current user specified baud for Serial 2.	3-10
#CDT	Set the date of configuration	3-10
#CDT?	Request the configuration date	3-10
CFG?	Request status of the configuration mode switch.	3-11
CHN?	Request channel number currently selected.	3-6
CLM	Clear the specified memory area.	3-6
*CLS	Clear all communication status registers.	3-11
CLT	Set COR loss timer.	3-2
CLT?	Request current COR loss timer value.	3-2
CMP	Set the sweep compression ratio.	3-4
CMP?	Request the sweep compression ratio.	3-4
COD	Set COR output delay timer.	3-2
COD?	Request current COR output delay timer.	3-2
#COP	Set the unit's options data.	3-10
#COP?	Request the options configured in this unit.	3-10
COR	Set COR level.	3-2
COR?	Request current COR level.	3-2
CQU	Clear the signal queue.	3-8
#CRF	Set the reference generator divider ratios.	3-10
#CSN	Set the serial number of the unit.	3-10
#CSN?	Request the units serial number.	3-10
CST?	Request COR status (exceeded, not exceeded).	3-3
#CVB	Configure a video bandwidth slot.	3-10
DBM	Set SSD buffer data representation (dB or dBm)	3-2
DBM?	Request status of the DBM response enable.	3-2
DCR	Set Delta COR value.	3-4
DCR?	Request value of DCR parameter.	3-4
DDE?	Request latched contents of the Device-Dependent Error Register.	3-11
DDF	Sets decaying factor.	3-4
DDF?	Request value of decaying factor parameter.	3-4
DET	Select detection mode.	3-2
DET?	Request current detection mode.	3-5
DRF	Sets rising factor.	3-4
DRF?	Request value of rising factor parameter.	3-4
DWS?	Request current dwell status.	3-5

Table 3-1. Alphabetical List of ASCII Remote Commands (Continued)

Command	Function	Refer to Table
#EED	Set EEPROM configuration data to default when configure mode is selected.	3-10
#EED?	Request current valve of configuration data.	3-10
ENA	Restore suspended operation to active.	3-11
*ESE	Write to the Event Status Enable Register.	3-11
*ESE?	Request setting of Event Status Enable Register.	3-11
*ESR?	Request setting of Event Status Register.	3-11
#FAD	Set the Frame Address of the unit.	3-10
#FAD?	Request the unit's Frame Address setting.	3-10
FMO?	Request FM offset percentage of selected IF bandwidth.	3-3
FNO	Enable/Disable frequency normalization.	3-2
FNO?	Request frequency normalization enable status.	3-2
FRA	Set start frequency for sweep.	3-4
FRA?	Request start frequency for sweep.	3-4
FRB	Set stop frequency for sweep.	3-4
FRB?	Request stop frequency for sweep.	3-4
FRG?	Request lower and upper frequency limits of the unit.	3-2
FRQ	Set tuned frequency of receiver.	3-2
FRQ?	Request current tuned frequency.	3-2
GTA	Set gate timer for AM and FM AGC schemes.	3-2
GTA?	Request current AM and FM AGC gate timer.	3-2
GTC	Set gate timer for CW, SSB, and IFT AGC schemes.	3-2
GTC?	Request current CW, SSB, and IFT AGC gate timer.	3-2
GTP	Set gate timer for AM PLS schemes.	3-2
GTP?	Request AM PLS gate timer.	3-2
HAD	Specify the address for the handoff net.	3-11
HAD?	Request the current handoff address.	3-11
IDM	Set receiver manual idle mode.	3-2
IDM?	Request idle mode status.	3-2
*IDN?	Request the Miniceptor’s identity.	3-11
IFO	Set IF downconverter oscillator (IFO) frequency.	3-2
IFO?	Request current IFO frequency.	3-2
IGB	Ignore sample bin update.	3-4
INC	Set sweep increment frequency.	3-4
INC?	Request current sweep increment frequency.	3-4
LCK	Enter a lockout channel.	3-7
LDG	Load receiver attenuation from current AGC attenuation.	3-2
LDW	Set post signal loss dwell time for sweep or step.	3-4
LDW?	Request current post signal loss dwell time.	3-4
LGD?	Request current log display detector value.	3-3
LGE	Enable/Disable log range extension.	3-2
LGE?	Request status of log range extension enable.	3-2
LSP	Set number of learning passes.	3-4
LSP?	Request the value of LSP parameter.	3-4

Table 3-1. Alphabetical List of ASCII Remote Commands (Continued)

Command	Function	Refer to Table
#MDL	Set the unit's model number.	3-10
#MDL?	Request the unit's model number.	3-10
MEM	Write to a memory location.	3-10
MEM?	Read contents of a memory location.	3-10
MST?	Request manual operation	3-5
*OPC	Operation complete switch.	3-11
*OPC?	Load *OPC 1 string in the output buffer.	3-11
OPR	Set the receiver operating mode.	3-5
OPR?	Request the current receiver operating mode.	3-5
*OPT?	Request a list of the installed options.	3-11
PDW	Set pre-dwell time for sweep or step.	3-4
PDW?	Request current pre-dwell time	3-4
#PRA	Load configuration data for preselector band A.	3-10
#PRA?	Request configuration data for preselector band A.	3-10
#PRB	Load configuration data for preselector band B.	3-10
#PRB?	Request configuration data for preselector band B.	3-10
#PRC	Load configuration data for preselector band C.	3-10
#PRC?	Request configuration data for preselector band D.	3-10
#PRD	Load configuration data for preselector band D.	3-10
#PRD?	Request configuration data for preselector band D.	3-10
PRE	Manually set preselector tuning voltage.	3-2
PRE?	Request current preselector tuning voltage.	3-2
QUE?	Return the signal queue.	3-8
RAC	Set the Report Action Control Register.	3-4
RAC?	Request current setting of the Report Action Control Register.	3-4
#RCB?	Request configuration data for a bandwidth slot.	3-10
RCE	Recall and execute the specified memory channel.	3-6
RCF?	Request the reference generator divider ratios.	3-10
RES	Restart the operation.	3-5
RLK?	Recall the specified lockout channel.	3-7
RMD?	Recall the specified memory channel (RMD 1? Thru RMD 100?)	3-6
RMD 0	Recall current receiver parameters.	3-2
RSE	Write to the Receiver Status Enable Register.	3-11
RSE?	Request current setting of the Receiver Status Enable Register.	3-11
RSR?	Read the Receiver Status Register.	3-11
*RST	Set all device messages to their reset values.	3-5
RTK	Return token to the receiver.	3-11
RTK?	Request token from the receiver.	3-11
#RVB?	Request configuration data for a video bandwidth slot.	3-10
SAC	Set Suspend Action Control Register.	3-4
SAC?	Request current selected audio output condition.	3-4
SAO	Set the selected audio output (SAO) on or off.	3-2
SAO?	Request current selected audio output condition.	3-2

Table 3-1. Alphabetical List of ASCII Remote Commands (Continued)

Command	Function	Refer to Table
SDW	Set signal dwell time for sweep or step.	3-4
SDW?	Request current signal dwell time.	3-4
SGS?	Request current signal strength.	3-3
SGV?	Request list of SPI, CST, SGS, and FMO signal values.	3-3
SLM?	Request available space in lockout memory.	3-7
SLP1	Places the receiver in the sleep mode.	3-5
SMD	Store data list in specified memory channel. (SMD 1 thru SMD 200) or set up current receiver parameters (SMD 0).	3-2
SPI?	Request IF spectrum status.	3-3
*SRE	Write to the Service Request Enable Register.	3-11
*SRE?	Read Service Request Enable Register.	3-11
SSD?	Request the sweep/step data collected during the sweep or step operation.	3-5
SSO	Disable or set up and enable the sweep/step data output function.	3-4
SSO?	Request the set up status of the sweep/step data output function.	3-4
SST?	Request step operation status.	3-5
*STB?	Request the Status Byte Register.	3-11
STL	Enter a step channel list.	3-4
STL?	Request the step channel list.	3-4
STO	Store current parameters in the specified memory channel.	3-6
SUS	Suspend the operation.	3-5
SWD	Set sweep direction.	3-4
SWD?	Request current sweep direction.	3-4
SWL	Select memory channels for sector sweep list.	3-4
SWL?	Request current sector sweep list.	3-4
SWO	Select type of sweep operation.	3-4
SWO?	Request type of sweep operation selected.	3-4
SWS?	Request sweep operation status.	3-5
ULC	Unlock specified lockout channel.	3-7
UPB	Update sample bin.	3-4
VBC	Select video bandwidth size.	3-2
VBC?	Request active video bandwidth size.	3-2
VBL?	Request list of installed video bandwidth sizes.	3-2
VBM	Set mode of video bandwidth selection.	3-2
VBM?	Request current video bandwidth selection mode.	3-2
VBS	Select video bandwidth slot.	3-2
VBS?	Request active video bandwidth slot.	3-2

3.4.1.1 **ASCII Message Processing**

When the Miniceptor receives a message, it is stored in the input buffer until a valid message termination is received. Then, the message is parsed and executed. Additional input data cannot be received until the execution of the message is completed.

The command message format is checked for validity as the message is parsed and executed. If the command message fails to meet the restrictions of the command message format, then an error is generated in the event status register and the rest of the message is not processed.

3.4.1.2 **Query Response Format**

A fixed field format is used for query responses. Query responses begin with the mnemonic in upper-case characters, followed by a numeric argument. Query responses separate the first argument from the mnemonic by a space. Numeric arguments are represented by the least number of digits possible, while still representing the entire range of the value. If a negative value is allowed for the argument, a sign is always given. Single queries that require multiple arguments are delimited by commas. Responses which are multiple command queries are linked together in a series in the output buffer and delimited by a semicolon. All output message terminations consist of a CR (carriage return) and a LF (line feed) with an EOI sequence.

3.4.1.3 **Numeric Data Representation**

Numeric arguments that are used with commands are accepted in a forgiving numeric representation. This implies that the unit is a forgiving listener. All data output from the unit is in a fixed field, precise format.

Specific details on numeric representation used in this document are given below.

nrf - forgiving numeric representation

The nrf data element is composed of the sequential fields listed below. All fields are optional with one restriction: at least one digit must be present within the active data element.

1. Plus (+) or minus (-) sign.
2. Any number of digits, up to eight.
3. Decimal point.
4. Any number of digits, up to eight.
5. Uppercase or lower case "E,e" followed by an optional sign and at least one digit but no more than two digits.

This data structure defines all of the numeric data input. If the unit receives a nrf of a precision greater than it can handle, it will round the number rather than truncating it. When rounding, the unit ignores the sign of the number and rounds up on values greater than or equal than one half. It rounds down on values less than one half.

nr1 - numeric response data - integers

Numeric response data format is composed of an optional sign, followed by any number of digits. The decimal point is implicitly defined to follow the last digit and is not present in the data element.

nr2 - nr2 numeric response data is composed of an optional sign field, followed by any number of digits, a decimal point, and any number of digits. As implied, there must be at least one digit on either side of the decimal point.

3.4.2 COMMUNICATION ERRORS

The Miniceptor implements three types of communications errors: command errors, execution errors, and query errors. A command error indicates that the unit could not interpret the mnemonic in the input buffer. An execution error indicates when the data sent with the mnemonic is outside the range or acceptable format. A query error is generated when the output buffer overflows or its contents are discarded. The contents of the output buffer are discarded when a terminated query is sent to the unit before the data from the previous query has been returned. Any command or execution error detected in the input buffer stops further processing of data in the input buffer and causes any remaining data to be ignored.

Any of these types of errors generates an SRQ if enabled. The actual cause of the error may be determined by reading the contents of the Status Bit Register. See **paragraph 3.4.7.1** for details on Miniceptor status reporting and reading the contents of status registers.

3.4.3 DEVICE MESSAGES

Device messages are commands that affect the operational parameters of the Miniceptor. These commands can be divided into the following operational subcategories:

- General Device Messages
- Signal Readings Messages
- Sweep and Step Modes Setup Parameters Messages
- Operational Control Messages
- Memory Operation Messages
- Sweep Lockout Messages
- Queue Messages
- Attenuator Test Operations Messages
- Configuration Messages
- Communication Messages

The following paragraphs provide further details on the Miniceptor device messages in the above categories.

3.4.3.1 General Device Messages

The Miniceptor general device messages listed in **Table 3-2** are valid when the unit is in Manual, Sweep Suspended, or Step Suspended modes of operation.

Table 3-2. General Device Messages

Command	Response	Description
AFC nrf		Select status of AFC operation. AFC operation is inhibited while in CW, IFT, USB, or LSB detection modes. See **paragraph 3.3.1.5.** 0 = AFC off 1 = AGC on
AFC?	AFC nr1	Request current AFC status. A query while in CW, IFT, USB, or LSB yields the actual condition and not the inhibited condition. Reset: AFC 0 Default: AFC 0 Example: AFC 1
AGC nrf		Select status of gain control. See **paragraph 3.3.1.3.** 0 = Manual gain control 1 = Normal AGC on
AGC?	AGC nr1	Request current gain control status. Reset: AGC 1 Default: AGC 1 Example: AGC 0
ATN nrf		Set receiver input attenuation 0-111 dB. See **paragraph 3.3.1.3.**
ATN?	ATN nrl	Request current receiver input attenuation value. Reset: ATN 000 Default: ATN 000 Example: ATN 111
ATD		Attenuation dump. Causes the current attenuation value used by AGC to be set to zero. This command simulates an AGC dump operation. It has no affect on the manual (ATN) value. See **paragraph 3.3.1.3.**
BFO nrf		Set BFO frequency in kHz from +4.00 to -4.00 in 0.10 kHz steps. This is used for CW detection.
BFO?	BFO nr2	Request current BFO frequency. Reset: BFO +0.00 Default: BFO +0.00 Example: BFO -3.75

Table 3-2. General Device Messages (Continued)

Command	Response	Description
BND nrf		Manually select a preselector band. This command overrides the current preselector band selection, as set by the tuned frequency. Range 0 to 4. (0 = bypass, 1 = band A, 2 = band B, 3 = band C, 4 = band D.) Maintenance command - FACTORY USE ONLY.
BND?	BND nr1	Request the selected preselected band. The response is the preselector band that was last selected by the BND command. Reset: BND 1 Default: BND 1 Example: BND 2 These commands are used for test purposes only.
BWA?	BWA nr1	Request active IF bandwidth slot. In all detection modes other than USB and LSB the response of BWA and BWS are the same slot. Differences occur from automatic roofing filter selection in USB and LSB. See **paragraph 3.3.1.6**.
BWC nrf	BWC nr1	Select IF bandwidth size in MHz. If request size is not present, an error is generated. Range is form 0000.0000 to 0019.9999 MHz. See **paragraph 3.3.1.6**.
BWC?	BWC nr2	Request active IF bandwidth size. Example: BWC 0000.0064
BWL?	BWL nr2,nr2, nr2,nr2,nr2,nr2	Request list of IF bandwidths (in MHz) installed in the receiver. The list is slot ordered. A zero in a field indicates the absence of a filter in that slot. Sixth slot is bypass. Example: BWL 0000.0100,0000.0200,0000.0500,0000.3000, 0002.0000,0012.0000
BWS nrf		Select IF bandwidth slot 1-6. Selection of invalid slots causes an execution error. BWS 6 is IF bypass operation.
BWS?	BWS nr1	Request selected IF bandwidth slot. Reset: BWS 1 Default: BWS 1 Example: BWS 5
BYP nrf		Set bypass status on the preselector. 0 = bypass off 1 = bypass on
BYP?	BYP nr1	Request the current bypass condition. Reset: BYP 0 Default: BYP 0 Example: BYP 1

Table 3-2. General Device Messages (Continued)

Command	Response	Description
CLT nrf		Set COR loss timer in msec. This timer specifies the amount of time the signal must be below COR threshold after detection before a signal loss is reported. Range is from 0 to 2000 ms in 20 ms increments. The COR status is driven as a result of this timer. See **paragraph 3.3.1.4**.
CLT?	CLT nr1	Request the value of the COR loss timer. Reset: CLT 0000 Default: CLT 0000 Example: CLT 0020
COD nrf		COR output delay timer. This timer establishes how long the COR output signal is held active after the COR status changes from signal to no signal. This timer starts after COR loss timer (CLT) expires. The range of this timer is from 0 to 5 seconds in 1 second steps. See **paragraph 3.3.1.4**.
COD?	COD nr1	Request the current COR output delay timer value. Reset: COD 0 Default: COD 0 Example: COD 4
COD nrf		COR output delay timer. This timer establishes how long the COR output signal is held active after the COR status changes from signal to no signal. This timer starts after COR loss timer (CLT) expires. The range of this timer is from 0 to 5 seconds in 1 second steps. See **paragraph 3.3.1.4**.
COD?	COD nr1	Request the current COR output delay timer value. Reset: COD 0 Default: COD 0 Example: COD 4
COR nrf		Set COR level from 0 to 55 dB above theoretical noise floor. A number of -1 sets COR to the off condition.
COR?	COR nr1	Return current COR value. The number -01 is returned for COR off. Reset COR +00 Default: COR +00 Example: COR -01
DBM nrf		Set data representation in SSD buffer for dB above receiver noise floor or absolute level in dBm. 0 sets it to dB, 1 sets it to dBm.
DBM?	DBM nr1	Request current SSD buffer data representation. Reset: DBM 0 Default: DBM 0 Example: DBM 1

Table 3-2. General Device Messages (Continued)

Command	Response	Description
DET nrf		Select detection mode. See **paragraph 3.3.1.2**. 1 = AM 2 = FM 3 = CW 4 = AM PLS 5 = USB * 6 = LSB * 7 = not used 8 = IFT * Available with WJ-860X/SSB option. Causes automatic roofing filter selection of the smallest IFBW (10 kHz or greater). After deselecting USB or LSB, the previously specified IFBW (BWS) will be reselected
DET?	DET nr1	Request current detection mode. Reset: DET 1 Default: DET 1 Example: DET 3
FNO nrf		Enable or disable frequency normalization data. This command is valid only if the receiver has the /CAL option. When enabled, the receiver will be gain normalized by frequency, based on data loaded into the receiver EEPROM. 1 = enable frequency normalization. 0 = disable frequency normalization.
FNO?	FNO nr1	Request status of frequency normalization enable. Reset: FNO 1 Default: FNO 1 Example: FNO 0
FRG?	FRG nr2,nr2	Request the lower and upper frequency limits of the unit in MHz. Example: FRG 0002.0000,0513.9999
FRQ nrf		Set tuned frequency of receiver in MHz. Standard receiver (0002.0000-0513.9999) with FE option (0002.0000-2031.9999). Tuning resolution is 100 Hz.
FRQ?	FRQ nr2	Request current frequency of operation. Reset: FRQ 0002.0000 Default: FRQ 0002.0000 Example: FRQ 0511.9999
GTA nrf		Set gate timer for AM and FM AGC schemes. The timer establishes how long the receiver waits for signal energy before decaying that gain. The range is 4 ms to 100 ms in 4 ms increments. See **paragraph 3.3.1.2**.

Table 3-2. General Device Messages (Continued)

Command	Response	Description
GTA?	GTA nr1	Request current AM and FM gate timer. Reset: GTA 028 Default: GTA 028 Example: GTA 004
GTC nrf		Set gate timer for CW, SSB, and IFT AGC schemes. The timer establishes how long the receiver waits for signal energy before decaying the gain. The range is 4 ms to 252 ms in 4 ms increments. See **paragraph 3.3.1.2**.
GTC?	GTC nr1	Request current CW, SSB, and IFT AGC gate timer. Reset: GTC 252 Default: GTC 252 Example: GTC 004
GTP nrf		Set gate timer for AM PLS schemes. The timer establishes how long the receiver waits for signal energy before decaying the gain. The range is for 4 ms to 252 ms in 4 ms increments . See **paragraph 3.3.1.2**.
GTP?	GTP nr1	Request current AM PLS gate timer. Reset: GTP 252 Default: GTP 252 Example: GTP 004
IDM nrf		Set receiver manual idle mode. 0 = Idle off; this is normal operation. 1 = Idle on; upon being placed in this state normal receiver operations halt without change and the IDM flag is set. The following processes are aborted: AGC, AGC, COR. The COR status output line and status bit become inactive. The unit no longer reacts to RF signal stimuli. While in step mode, if a memory channel is encountered with the IDM flag set, the memory channel is skipped.
IDM?	IDM nr1	Request idle mode status. Reset: IDM 0 Default: IDM 0 Example: IDM 1
IFO nrf		Set IF downconverter oscillator frequency in MHz from +2.000 to -2.000 MHz in 0.001 MHz steps. This oscillator is only used in IFT detection mode.
IFO?	IFO nr2	Request current IFO frequency. Reset: IFO +0.000 Default: IFO +0.000 Example: IFO +2.000

Table 3-2. General Device Messages (Continued)

Command	Response	Description
LDG		Load receiver attenuation (ATN) to reflect current AGC attenuation value.
LGE nrf		Enable or disable the log range extension for SSD buffer operation. Range is 0 to 60 dB if disabled and 0 to 99 if enabled. 0 = Disable Log Range Extension 1 = Enable Log Range Extension
LGE?	LGE nr1	Request status of log range extension enable. Reset: LGE 0 Default: LGE 0 Example: LGE 1
PRE nrf		Set the tuning voltage of the preselector band specified by BND. Range is 0 to 255 (0 to 28.5 Vdc). Maintenance command - FACTORY USE ONLY.
PRE?	PRE nr1	Request the tuning voltage set by PRE for the preselector band specified by BND. Reset: PRE 0 Default: PRE 0 Example: PRE 125 These commands are used for test purposes only.
SAO nrf		Set the selected audio output on or off. 0 = selected audio off 1 = selected audio on
SAO?	SAO nr1	Return the current SAO condition. Reset: SAO 0 Default: SAO 0 Example: SAO 1

Table 3-2. General Device Messages (Continued)

<table>
<tr><th>Command</th><th>Response</th><th>Description</th></tr>
<tr><td>SMD 0,nrf,
nrf,nrf,nrf,nrf
nrf,nrf,nrf,nrf
nrf,nrf,nrf,nrf
nrf,nrf,nrf,nrf</td><td></td><td>Set up the current receiver parameters from the following data list. The data of this command is field dependent. Each comma causes the next field to be selected. Any blank data fields will cause the specified parameter to remain unchanged. The command may be terminated after any complete field. The remaining data is unchanged</td></tr>
<tr><td colspan="3">
<table>
<tr><th>Field</th><th>Parameter</th><th>Range</th></tr>
<tr><td>1</td><td>Idle mode status (IDM)</td><td>0,1</td></tr>
<tr><td>2</td><td>Tuned frequency (FRQ)</td><td>See FRQ?</td></tr>
<tr><td>3</td><td>Bandwidth slot (BWS)</td><td>1 to 6</td></tr>
<tr><td>4</td><td>COR threshold (COR)</td><td>-1 to 55</td></tr>
<tr><td>5</td><td>Detection mode (DET)</td><td>1 to 8</td></tr>
<tr><td>6</td><td>AGC mode (AGC)</td><td>0,1</td></tr>
<tr><td>7</td><td>Attenuation setting (ATN)</td><td>0 to 111</td></tr>
<tr><td>8</td><td>AGC mode (AFC)</td><td>0,1</td></tr>
<tr><td>9</td><td>Pre-signal dwell (PDW)</td><td>-1 to 996</td></tr>
<tr><td>10</td><td>Signal dwell (SDW)</td><td>-1 to 600</td></tr>
<tr><td>11</td><td>Post signal lost dwell (LDW)</td><td>-1 to 60</td></tr>
<tr><td>12</td><td>Sweep start frequency (FRA)</td><td>see FRA? (Table 3-4)</td></tr>
<tr><td>13</td><td>Sweep stop frequency (FRB)</td><td>see FRB? (Table 3-4)</td></tr>
<tr><td>14</td><td>Sweep increment frequency (INC)</td><td>.0005 to 20 MHz</td></tr>
<tr><td>15</td><td>Sweep direction (SWD)</td><td>0,1</td></tr>
<tr><td>16</td><td>BFO frequency (BFO)</td><td>-4.00 to +4.00 kHz in .25 kHz steps</td></tr>
<tr><td>17</td><td>IFO frequency (IFO)</td><td>-2.000 to +2.000 MHz in .001 MHz steps</td></tr>
</table>
</td></tr>
<tr><td>RMD 0?</td><td>SMD 0,nr1,
nr2,nr1,nr1
nr1,nr1,nr1
nr1,nr1,nr1
nr1,nr2,nr2
nr2,nr1,nr2,nr2</td><td>Recall current receiver parameters. See (SMD) for field definitions of the response.
Reset: No change
Defaults: SMD 000,0,20.0000,1,+00,1,1,000,0,+000,-001,
+00,20.0000,512.0000,0.0200,1,+0.00,+0.0000
Example: SMD 000,0,0025.9999,2,+10,3,1,000,1,+000,-001,
+10,0110.0000,0121.1000,0000.0200,1,+0.00,+0000.0000</td></tr>
<tr><td>VBC nrf

VBC?</td><td>

VBC nr2</td><td>Select video bandwidth size in MHz. If requested size is not

Request active video bandwidth size in MHz.
Example: VBC 0000.0003</td></tr>
<tr><td>VBL?</td><td>VBL nr2,nr2,
nr2,nr2,nr2</td><td>Request list of video bandwidth sizes in MHz installed in the receiver. The list is slot ordered. A zero in a field indicates the absence of a filter in that slot

Example:
VBL 0000.0100,0000.0200,0000.0500,0000.3000,0002.0000</td></tr>
</table>

Table 3-2. General Device Messages (Continued)

Command	Response	Description
VBM nrf		Set type of video bandwidth selection. See **paragraph 3.3.1.7**. 0 = Manual: allows selection by use of VBS or VBC commands. 1 = Automatic: video bandwidth is chosen based on the IF bandwidth. This relationship is established in Configuration mode. The automatic selection is only made when the IF bandwidth is selected. 2 = Bypass the video filters. 3 = Mute the video output.
VBM?	VBM nr1	Request current video bandwidth mode. Reset: VBM 1 Default: VBM 1 Example: VBM 0
VBS nrf		Select video bandwidth slot 1-5. See **paragraph 3.3.1.7**.
VBS?	VBS nr1	Request active video bandwidth slot. Reset: Based on video bandwidth configured for BWS 1. Default: Based on video bandwidth configured for BWS 1. Example: VBS 2

3.4.3.2 Signal Readings Messages

The mnemonics in this message category are valid in Sweep, Step, or Manual modes of operation. The numeric response field for any of these numbers is replaced with asterisks (*) if the response is invalid at the time of the reading. Causes for an invalid reading may be an active sweep or step. The commands in this message category are listed in **Table 3-3**.

Table 3-3. Signal Readings Messages

Command	Response	Description
AMD?	AMD nr1	Request current AM detector value in ± dB. This number will be of little value while AGC is active. When AGC is inactive this number is used to establish the amount of attenuation required to place the signal in a linear portion of the detector. The range is from -22 dB to +14 dB. The zero point represents the typical gain set position. Example: AMD +10 Example: AMD ***
AMP?	AMP nr1	Request the current AM peak detector value in ± dB. This number is of little value while AGC is active. The range is from -22 dB to +14 dB. The zero point represents the typical gain set point for CW, LSB, USB and PLS detection modes. Example: AMP +05
CST?	CST nr1	Request the current COR status. 0 = COR is not exceeded 1 = COR is exceeded Example: CST 0
FMO?	FMO nr1	Request the FM Offset percentage of the selected IF bandwidth. The range is from +100 to -100. A positive number indicates the signal is greater than tuned frequency. Example: FMO +050 Example: FMO ****
LGD?	LGD nr1	Request the current log display detector value in dB above the theoretical noise floor for the selected IF bandwidth. The range is from 0 to 60 dB. Example: LGD 25 Example: LGD **
SGS?	SGS nr1	Return the current signal strength in dBm. This number is a result of the AGC operation. If the receiver is in manual gain, an invalid indication may be returned. Range of this number is 0 to -127. Example: SGS -100 Example: SGS <<<< (insufficient manual gain) Example: SGS >>>> (overload) Example: SGS **** (no valid reading)
SGV?	SGV, nr1,nr1, nr1,nr1	Request the current list of signal values; SPI, CST, SGS, FMO. If any of these fields are invalid an asterisk will be returned in that field. Example: SGV 0,0,-100,+050 (indicates upright spectrum, COR level not exceeded, signal strength is -100 dBm, and FM offset is 50% of the selected bandwidth.)
SPI?	SPI nr1	Request the status of the IF spectrum. 0 = spectrum is upright 1 = spectrum is inverted Example: SPI 1

3.4.3.3 Sweep and Step Modes Setup Parameters Messages

The mnemonics in this message category are valid in Sweep, Step, and Manual modes of operation. These commands are used to set up the Miniceptor for Sweep and Step operations such as start and stop frequencies, RAC and SAC register parameters, dwell timer parameters, etc. The commands in this message category are listed in **Table 3-4**.

Table 3-4. Sweep and Step Setup Parameters Messages

Command	Response	Description
BUP nrf		Sets the sample bin update option. Range of values is: 0 = Do not update the bin stored energy level to the acquired energy level. 1 = Update the bin stored energy level to the acquired energy level.
BUP?	BUP nr1	Request the status of the BUP parameter. Reset: BUP 0 Default: BUP 1 Example: BUP 1
CMP nrf,nrf		Set the sweep data compression ratio. This command is used to compress data stored in the sweep/step data (SSD) buffer. The first nrf is used to enter the sweep increment points from 1 to 255. Only after each time this number of points is reached will the LOG display data be stored in the SSD buffer. The second nrf is used to select either peak data (1) or average data (2) collection. See **paragraph 3.3.6**.
CMP?	CMP nr1,nr1	Request the status of the sweep compression ratio selection. Reset: CMP 001,1 Default: CMP 001,1 Example: CMP 175,2
DCR nrf		Sets the value of the Delta COR parameter. Range of values is 0 to 25.
DCR?	DCR nr1	Request the value of the DCR parameter. Reset: DCR 0 Default: DCR 5 Example: DCR 15
DDF nrf		Sets the value of the Decaying factor parameter. Range of values is 0 to 32.
DDF?	DDF nr1	Request the value of the Decaying factor parameter. Reset: DDF 0 Default: DDF 2 Example: 1

Table 3-4. Sweep and Step Setup Parameters Messages (Continued)

Command	Response	Description
DRF nrf		Sets the value of the Rising factor parameter. Range of values is 0 to 32.
DRF?	DRF nr1	Request the value of the Rising factor parameter. Reset: DRF 0 Default: DRF 1 Example: DRF 2
FRA nrf		Set start frequency for sweep in MHz. The same limits that apply to the FRQ command apply here. See **Table 3-2**.
FRA?	FRA nr2	Request start frequency for sweep. Reset: FRA 0002.0000 Default: FRA 0002.0000 Example: FRA 0111.9999
FRB nrf		Set stop frequency for sweep in MHz. The same limits that apply to the FRQ command apply here. See **Table 3-2**.
FRB?	FRB nr2	Request stop frequency for sweep. Reset: FRB 0512.0000 Default: FRB 0512.0000 Example: FRB 0111.9999
IGB		While stopped or suspended on a signal, ignore the sample bin update. Do not update the particular sample bin with the acquired energy level.
INC nrf		Set sweep increment frequency in MHz. This is the frequency increment that will be used in sweep mode. The range is from 0000.0001 MHz to 513.9999 MHz with 0000.0001 MHz resolution.
INC?	INC nr2	Request sweep increment. Reset: INC 0000.1000 Default: INC 0000.1000 Example: INC 0011.9995
LDW nrf		Set the post signal lost dwell time for sweep or step. This is the time the receiver waits after the signal is lost before continuing the sweep or step. The range of the entry is from 0 to 60 seconds. A setting of -1 seconds will cause the receiver to hold on a frequency until advanced or the signal dwell timer expires. See **paragraph 3.3.5.3**.
LDW?	LDW nr1	Request current post signal lost dwell time. Reset: LDW +00 Default: LDW +00 Example: LDW +10

Table 3-4. Sweep and Step Setup Parameters Messages (Continued)

Command	Response	Description
LSP nrf		Sets the number of learning passes. Range of values is: -1 for infinite passes. 0 for no learning passes. Dynamic COR will equal user defined Delta COR value. 1 to 600 number of sweep or step passes.
LSP?	LSP nr1	Request the value of the LSP parameter. Reset: LSP 0 Default: LSP 1 Example: LSP 10
PDW nrf		Set pre-dwell time for sweep or step. This is the time the receiver waits on a frequency for signal activity. The range is from 000 to 996 ms with 4 ms increments. Entries of other than 4 ms increments are rounded to the nearest 4 ms increments. (2 ms is rounded to 4 ms, 1 ms is rounded to 0 ms). Selection of -1 ms yields pre-dwell until advance command. A selection of zero causes minimum signal sample time. See **paragraph 3.3.5.1**.
PDW?	PDW nr1	Request the current pre-dwell time. Reset: PDW +000 Default: PDW +000 Example: PDW -001
RAC nrf		Set the report action control register. This register allows the report action to be controlled for sweep or step modes of operation by setting the associated register bit high. See **paragraph 3.3.2.2** and **3.3.3.1**. BIT DESCRIPTION 0 Report new signals only. This is only active in sweep or step. This operation is only valid for the first 8,192 points of a sweep. 1 Report lost old signals only. This action in only effective in buffer sweep or step with queue operations. Lost signals may be placed in the signal queue. This operation is only valid for the first 8,192 points of a sweep. 2 Ignore the lockout list. This causes the receiver to ignore its lockout memory. 3 Don't report or stop on adjacent points while in sweep or manual modes. The signal must drop below COR before a new signal is stopped on or reported. The assumed COR status each time the sweep restarts is 0. This means a sweep with all points over COR stops at and reports the first point and only the first point with this operation enabled. In step mode, this option has no effect. 4 Enable Enhanced Sweep/Step operation. 5-7 Not used
RAC?	RAC nr1	Request the entry currently in the report action control register. Reset: RAC 000 Default: RAC 000 Example: RAC 003

Table 3-4. Sweep and Step Setup Parameters Messages (Continued)

Command	Response	Description
SAC nrf		Set the suspend action control register. This register allows sweep or step actions to suspend the current sweep or step. The task can only be restarted by receiving an enable or an operational mode change. See **paragraph 3.3.4**. BIT DESCRIPTION 0 Suspend on end of sweep. 1 Suspend on end of sweep sequence. 2 Suspend on end of step sequence. 3 Suspend on full queue. 4 Suspend on reported signal acquisition. 5 Suspend on full sweep/step data (SSD) buffer. 6 Suspend on end of learn sequence. 7 Not used.
SAC?	SAC nr1	Return the current suspend action control register value. Reset: SAC 0 Default: SAC 0 Example: SAC 1
SDW nrf		Set the signal dwell time for sweep or step. This is the cumulative time the receiver spends listening to a single frequency during a sweep or scan pass. The range is from 0 to 600 seconds, in one second increments. A selection of -1 seconds causes the timer to be infinity; this causes the receiver to stay on the signal until it is lost. A selection of 0 represents a queue operation. See **paragraph 3.3.5.2**.
SDW?	SDW nr1	Request the current signal dwell time. Reset: SDW -001 Default: SDW -001 Example: SDW +000
SSO nrf		Disable or setup and enable the sweep/step data output function (SSD). Sending SSO 00 enables the function to get data from immediate or all sectors, sending a number from 01 to 10 enables the function to get data only form that specified sector. Sending -1 disables the function.
SSO?	SSO nr1	Request the setup status of the sweep/step data output function (SSD). See **paragraph 3.3.6**. Reset: SSO -1 Default: SSO -1 Example: SSO 01
STL nrf,nrf,nrf, nrf,nrf,nrf,...nrf or (nrf:nrf),(nrf:nrf), nrf,...(nrf:nrf)		This command allows entry of a step channel list. The list may have a maximum of 20 numeric entries. Single numeric entries separated by commas indicate single step channels. Numbers in parentheses indicate ascending, inclusive, groups to be stepped. Each group represents two numeric entries for establishing the start channel and stop channel of a step list.

Table 3-4. Sweep and Step Setup Parameters Messages (Continued)

Command	Response	Description
STL?	STL,nr1,nr1 nr1,nr1,nr1, nr1,...nr1 or (nr1:nr1), (nr1:nr1), nrf,...(nr1:nrl)	This query returns the step channel list. Reset: STL Default: STL Example: STL 001,002,003,019 Example: STL (001:005),007,(009:011)
SWD nrf		Sweep direction. 0 = Sweep from FRB down to FRA. 1 = Sweep from FRA up to FRB.
SWD?	SWD nr1	Request current sweep direction. Reset: SWD 1 Default: SWD 1 Example: SWD 0
SWL nrf,nrf nrf,nrf,nrf,nrf, nrf,nrf,nrf,nrf		Specify the list of 1 to 10 memory channel numbers that are to be used for sector sweep sequences. This list is only used when sector sweep is on (SWO 1).
SWL?	SWL nr1, nr1...,nr1	This command returns the current sector sweep list. The length of the list is based on the number of entries. Reset: SWL Default: SWL Example: SWL 001,002,003,019
SWO nrf		Select the type of sweep operation. 0 = Sweep immediate, this causes the sweep to use the entered parameters for the sweep. (FRA, FRB, INC) 1 = Sweep sector, this operation causes the sector list to be used to identify the sweep area. Each channel in the list is swept then the next channel is fetched. When the end of the list has been swept the process starts over. A single channel may be entered in the sector list to load a single sweep set from memory.
SWO?	SWO nr1	Request the current sweep operation. Reset: SWO 0 Default: SWO 0 Example: SWO 1
UPB		While stopped or suspended on a signal, update the sample bin. Force an update of the particular sample bin with the acquired energy level.

3.4.3.4 Operation Control Messages

The mnemonics in this message category are valid in Manual, Sweep, and Step modes of operation. These commands are used for selecting and enabling the Miniceptor modes of operation. The commands in this message category are listed in **Table 3-5**.

Table 3-5. Operation Control Messages

Command	Response	Description
ADV		The advance command causes Sweep or Step to advance to the next frequency if the current state is active.
DWS?	DWS nr1	Request current dwell state. This command returns the current state of the dwell. 0 = None of the dwell states are active. 1 = Pre-dwell active. 2 = Signal dwell active. 3 = Post loss dwell active. Reset: DWS 0 Default: DWS 0 Example: DWS 1
ENA		The enable command causes a suspended operation to be restored to active. This command has no effect if the operation is not currently suspended. The command only has an effect in Sweep or Step operational modes. When the operation is continued it starts from the original suspended frequency. Any frequency tuning done during the suspend has no effect when the operation is continued.
MST?	MST nr1	Request Manual operation status. 0 = Manual off 1 = Manual active Reset: MST 1 Default: MST 1 Example: MST 0
OPR nrf		Set the receiver operating mode. 1 = Manual operation 2 = Sweep operation 3 = Step operation
OPR?	OPR nr1	Request the current operational mode. Reset: OPR 1 Default: OPR 1 Example: OPR 2
RES		Restart the operation. This command causes an active or suspended sweep or step to be restarted from the beginning.
*RST		This command causes all receiver device messages to be set to the reset values.

Table 3-5. Operation Control Messages (Continued)

Command	Response	Description
SLP 1		This command places the receiver in the "sleep" mode until activity is sensed on the Serial Interface 2 RS-232C RXD line. Note: While in the sleep mode, the first command received at Serial Interface 2 "wakes up" the receiver. All data associated with this command is ignored. After a two second delay the receiver will be ready to accept remote commands.
SSD?	SSD nr1,R, nr1(a),nr1(b), ...,nr1(c), or SSD nr1,S, nr1(b),.....,nr1(c)	Request the sweep/step LOG display data collected during the sweep or step operation. Sending this query clears the SSD buffer. See **paragraph 3.3.6**. nr1 - 0 = Good SSD data in buffer 1 = SSD buffer overflowed R = Restart sweep data nr1(a) - 00 = Sweep immediate data 01-10 = Data of sweep sector nr1(b) to nr1(c) (When data representation is set to DBM 0. See **Table 3-2**.) 00 = locked out increment or idle channel 01-99 = LOG display levels in dB above the theoretical noise floor nr1(b) to nr1(c) (When data representation is set to DBM 1. See **Table 3-2**.) 000 to 126 = absolute signal level in -dBm nr1 - 0 = Good SSD data in buffer 1 = SSD buffer overflowed S = Restart step data nr1(b) to nr1(c) (When data representation is set to DBM 0. See **Table 3-2**.) 00 = locked out increment or idle channel 01-99 = LOG display levels in dB above the theoretical noise floor

Table 3-5. Operation Control Messages (Continued)

Command	Response	Description
SSD? (Continued)		nr1(b) to nr1(c) (When data representation is set to DBM 1. See **Table 3-2**.) 000 to 126 = absolute signal level in -dBm
	or	
	SSD nr1, R, nr1(a), nr1(b), ..., nr1(c), S, nr1(b), ..., nr1(c),	Both sweep (R) and step (S) data can be returned sequentially. Data formats are identical to those shown above. (The nr1(b) is the first LOG display level for the operation in the string and the nr1(c) is the last level. Up to 100 levels can be returned in the total response.) Power up: SSD 0 Reset: SSD 0 Default: SSD 0 Example: SSD, 0, R, 00, 10, 22, 34, 00, 55
SST	SST nr1	Request Step operations status. 0 = Step off 1 = Step active 2 = Step suspended Reset: SST 0 Default: SST 0 Example: SST 1

Table 3-5. Operation Control Messages (Continued)

Command	Response	Description
SUS		Suspend the operation. This command causes the sweep or step to be placed in the suspend state. While in the suspend state, manual operations may be performed.
SWS?	SWS nr1	Request Sweep operation status. 0 = Sweep off 1 = Sweep active 2 = Sweep suspended Reset: SWS 0 Default: SWS 0 Example: SWS 2

3.4.3.5 **Memory Operation Messages**

The mnemonics in this message category are valid in Manual, Sweep, or Step modes of operation. These commands, listed in **Table 3-6** are used to set up memory channels for operation.

Table 3-6. Memory Operation Messages

Command	Response	Description
CHN?	CHN nr1	Request current memory channel accessed. Reset: CHN 000 Default: CHN 000 Example: CHN 050
CLM nrf		Clear specified memory area. The argument is bit mapped to indicate the area to be cleared. BIT DESCRIPTION 0 Clear channel storage memory. 1 Clear lockout memory.
RCE nrf		Recall and execute memory channel specified. Range is from 1 to 200.

Table 3-6. Memory Operation Messages (Continued)

Command	Response	Description
SMD nrf,nrf nrf,nrf,nrf,nrf nrf,nrf,nrf,nrf nrf,nrf,nrf,nrf nrf,nrf,nrf,nrf		Store directly to the specified memory channel the following data list. The data of this command is field dependent. Each comma causes the next field to be selected. Any blank data fields will cause the specified parameter to remain unchanged in memory. The command may be terminated after any complete field. The remaining data is unchanged.
RMD nrf?	SMD nr1,nr1, nr2,nr1,nr1 nr1,nr1,nr1 nr1,nr1,nr1, nr1,nr2,nr2, nr2,nr1,nr2,nr2	Recall directly from memory the specified memory channel. See (SMD) for field definitions of the response. Reset: No change Defaults: SMD ###,0,20.0000,1,+00,1,1,000,0,+000,-001, +00,20.0000,512.0000,0.0200,1,+0.00,+0.000 (Note: ### indicates channel number. This is the default for all storage memory channels. This is also the memory cleared condition.) Example: SMD 1,0,25.9999,2,+10,3,1,000,1,+000,-001, +10,110.0000,121.1000,0.0200,1,+0.00,+0.000
STO nrf		Store current parameters to memory channel specified. Range is from 1 to 200.

Field	Parameter	Range
1	Memory channel number	1 to 200
2	Idle mode status (IDM)	0,1
3	Tuned frequency (FRQ)	See FRQ? (**Table 3-2**)
4	Bandwidth slot (BWS)	1 to 6
5	COR threshold (COR)	-1 to 55
6	Detection mode (DET)	1 to 8
7	AGC mode (AGC)	0,1
8	Attenuation setting (ATN)	0 to 111
9	AGC mode (AFC)	0,1
10	Pre-signal dwell (PDW)	-1 to 996
11	Signal dwell (SDW)	-1 to 600
12	Post signal lost dwell (LDW)	-1 to 60
13	Sweep start frequency (FRA)	see FRA? (**Table 3-4)**
14	Sweep stop frequency (FRB)	see FRB? (**Table 3-4**)
15	Sweep increment frequency (INC)	0.0001 to 513.9999 MHz
16	Sweep direction (SWD)	0,1
17	BFO frequency (BFO)	-4.00 to +4.00 kHz in 0.01 kHz steps
18	IFO frequency (IFO)	-2.000 to +2.000 MHz in .001 MHz steps

3.4.3.6 Sweep Lockout Messages

The mnemonics in this message category are valid in Manual, Sweep, and Step modes of operation. These commands, listed in **Table 3-7**, are used for controlling parameters pertaining to Sweep mode lockout channels.

Table 3-7. Sweep Lockout Messages

Command	Response	Description
LCK nrf,nrf, nrf		Enter a lockout channel to be used in Sweep operation. The lockout is specified as a start and a stop frequency in ascending order. The channel number assigned with this command remains constant as channels are added or deleted. This lockout data will overwrite any previous data at the specified channel. Field — Parameter 1 — Channel number from 1 to 200 2 — Start frequency of the lockout from 2.0000 to (high limit of receiver) expressed in MHz. 3 — Stop frequency of the lockout from 2.0000 to (high limit of receiver) expressed in MHz. Note: The stop must be greater than the start or else an Execution error is generated.
RLK?	LCK nr1,nr2, nr2	Recall the specified lockout channel. The returned values are in the form of the LCK command. They are channel, start frequency and stop frequency. Reset: No change. Default: All lockout channels contain start and stop frequencies of 0000.0000 MHz Example: LCK 001,0025.0000,0026.0000
SLM?	SLM nr1	Request the available space in lockout memory in unused channels.
ULC nrf		Unlock channel specified. Causes the specified lockout channel to be cleared. This returns it to the default condition.

3.4.3.7 Queue Messages

The mnemonics in this message category are valid in Manual, Sweep, and Step modes of operation. These commands relate to signal queue operations and are listed in **Table 3-8**.

Table 3-8. Signal Queue Messages

Command	Response	Description
CQU		Clear the signal queue.
QUE?	QUE nr2:nr1: nr1,nr2:nr1: nr1,nr2:nr1: nr1...	Return the signal queue. The queue consists of up to 50 of the most recently reported entries. Each entry consists of a frequency, memory channel (0 if sweep immediate mode) and an activity indicator (0 = inactive, 1 = active). Reading of the queue causes it to be cleared. After 50 entries are collected the next entry causes the first entry to be lost. Information is only loaded to the queue from active step or sweep. Reset: QUE Default: QUE Example: QUE 0025.0100:000:1,0025.0100:000:0

3.4.4 ATTENUATOR TEST OPERATIONS

The mnemonics in this message category are valid in Manual mode only. These commands only work in manual gain control. When an operation such as BWS or ATN is sent, the gain is set according to that command. These commands may be sent to control the Miniceptor's attenuators directly. They work on a "last one there wins" control basis. The query responds with the last data base entry, not the current condition. See **Table 3-9** for a list of the commands in this message category. **Note: These commands are intended for maintenance operations only.**

Table 3-9. Attenuator Test Operations Messages

Command	Response	Description
ADC?	ADC nr1,nr1, nr1,..nr1	Request unmodified results of A/D conversion of the eight receiver detectors. Each field is a value of 0 to 255 indicating the DC value (0 to 5 V) of the voltage applied to the A/D input. The fields represent the AM average detector, AM peak detector, RSSI, FM detector, power monitor, video output, FE installed voltage, and 12 Vdc input in that order. Maintenance Command - FACTORY USE ONLY. Example: ADC 025,027,035,077,089,128,200,000

Table 3-9. Attenuator Test Operations Messages (Continued)

Command	Response	Description
ATE nrf		Set frequency extender attenuator 0-23 dB (when 860XA/FE Frequency Extender option is installed). Maintenance Command - FACTORY USE ONLY.
ATE?	ATE nr1	Request frequency extender attenuator value.
ATF nrf		Set final attenuator 0-48 dB. Maintenance command - FACTORY USE ONLY.
ATF?	ATF nr1	Request final IF attenuator value.
ATI nrf		Set 1st IF attenuator 0-23 dB. Maintenance command - FACTORY USE ONLY.
ATI?	ATI nr1	Request 1st IF attenuator value.
ATR nrf		Set RF attenuator 0-23 dB. Maintenance command - FACTORY USE ONLY.
ATR?	ATR nr1	Request RF attenuator value.
ATS nrf		Set 2nd IF attenuator 0-23 dB. Maintenance command - FACTORY USE ONLY.
ATS?	ATS nr1	Request 2nd IF attenuator value.

Default for all above queries: ATx 00 (ADC? excluded)

3.4.5 MINICEPTOR CONFIGURATION MESSAGES

The commands in this message category, which begin with the pound sign (#), are valid only when the unit is set to the Configuration mode (refer to **paragraph 2.4.2**). These commands are used to configure the receiver with parameters required for the proper operation of the unit and should therefore be used only by qualified maintenance personnel. See **Table 3-10** for a list of commands in this message category.

Table 3-10. Configuration Messages

<table>
<tr><th>Command</th><th>Response</th><th>Description</th></tr>
<tr><td>#CBW nrf,nrf
nrf,nrf,nrf,
nrf,nrf,nrf,
nrf,nrf</td><td></td><td>Enter configuration data for a bandwidth slot see (Appendix A for the application of this command). Entries are defined in the following data list.

<table>
<tr><th>Field</th><th>Parameter</th><th>Range</th></tr>
<tr><td>1</td><td>IF bandwidth slot number.</td><td>1 to 6</td></tr>
<tr><td>2</td><td>IF bandwidth size in kHz.
(0.0 kHz indicates no bandwidth installed).</td><td>0.0 to 19999.9 kHz</td></tr>
<tr><td>3</td><td>Video filter slot to be used with IF bandwidth.</td><td>1-6</td></tr>
<tr><td>4</td><td>FM discriminator to be used.</td><td>1-3</td></tr>
<tr><td>5</td><td>FM scaling to be used.</td><td>0-7</td></tr>
<tr><td>6</td><td>Post IF filter.</td><td>1-3</td></tr>
<tr><td>7</td><td>IF normalization.</td><td>0-25 dB</td></tr>
<tr><td>8</td><td>IF filter equalization.</td><td>-3 to +3 dB</td></tr>
<tr><td>9</td><td>Signal strength noise floor.</td><td>-50 to -140 dBm</td></tr>
<tr><td>10</td><td>Bandwidth Delay Time</td><td>0 to 5000 µsec</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>Typical Defaults:
#CBW 1,0000.0100,1,1,7,1,02,+0,-122,500
#CBW 2,0000.0200,2,1,4,1,05,+0,-121,200
#CBW 3,0000.0500,3,1,2,1,09,+0,-117,50
#CBW 4,0000.2500,4,2,3,2,05,+0,-110,10
#CBW 5,0004.0000,5,3,2,3,07,+0,-098,5
#CBW 6,0013.0000,5,3,1,3,12,+0,-093,0</td></tr>
<tr><td>#CBR nrf</td><td></td><td>Configure the Serial Interface 1 user position baud rate. This is the baud rate used when switch 8 of DIP switch A1S3 is in User-Specified or OFF position and switches 1 thru 5 are in the Serial 1, Single or ON position. The parameter is stored in EEPROM and only changeable in the Configuration mode of operation.

Range: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.</td></tr>
<tr><td>#CBR?</td><td>#CBR nr1</td><td>Request the current user specified baud rate.
Default: #CBR 300
Example: #CBR 9600</td></tr>
</table>

Table 3-10. Configuration Messages (Continued)

Command	Response	Description
#CDR nrf		Configure the Serial Interface 2 user position baud rate expressed in kilobaud. This is the baud rate used when switch 7 of DIP switch A1S3 is in User-Specified or OFF position and switches 1 thru 5 in any Serial 2 position. The parameter is stored in EEPROM and only changeable in the Configuration mode of operation. Range: 0.15, 0.30, 0.60, 1.200, 2.400, 4.800, 9.600, 14.400, 19.200, 28.800, 38.400, 57.600, 115.200, 230.400.
#CDR?	#CDR nr1	Request the current user specified baud rate. Default: #CDR 115.200 Example: #CDR 9.600
#CDT nrf, nrf,nrf		Set the date of configuration. The fields are defined as follows:

Field	Parameter	Range
1	Month	0 to 12
2	Day	0-31
3	Last two digits of the year.	00-99

#CDT?	#CDT nr1,nr1, nr1	Request the date of configuration. Default: #CDT 00,00,00 Example: #CDT 09,08,90
#COP nrf		Enter the options installed in the unit. BIT OPTION 0 Reserved 1 SSB filter 2 WBO wideband output 3 HPIL 4-15 Not used
#COP?	#COP nr1	Request the options installed in the unit. This command returns a bit-mapped value of sixteen bits indicating the options installed. See #COP command for the bit evaluation. Default: #COP 00000 Example: #COP 00000
#CRF 3, 100,nrf		Configure the reference generator divider ratios. This allows a custom selection of non-standard reference inputs to be assigned to external reference positions. The 3 is the reference code number, the 100 is the reference /N number, and the nrf is the /R number which can be any value from 3 to 255.
#CSN nrf		Set the serial number of the unit. Range is 00000 to 99999.
#CSN?	#CSN nr1	Request the serial number of the unit. Default: #CSN 99999 Example #CSN 00001

Table 3-10. Configuration Messages (Continued)

Command	Response	Description
#CVB nrf,nrf		Configure a video bandwidth slot. The fields are defined as follows:
Field	Parameter	Range
1	Video filter slot	1 to 5
2	Video filter size.	0.0 to 19999.9 kHz
		Defaults: #CBW 1,00010.0000 #CBW 2,00020.0000 #CBW 3,00050.0000 #CBW 4,00300.0000 #CBW 5,02000.0000
#EED 0		Load default configuration data to EEPROM (valid only in the Configure Mode).
#EED?	#EED 43690	Return current valve in EEPROM. Any response other than '43960' indicates the EEPROM will load default valves on next power-up.
#FAD nrf		Configure the Frame Address of the receiver. Valid settings are 0 to 31. Refer to **paragraph 3.6.2.1** for further details on this command.
#FAD?	#FAD nr1	Request the unit's Frame Address. Default: #FAD 22 Example: #FAD 00
#MDL '860-A-_ _'		Enter the unit's model number.
#MDL?		Request the unit's model number. Default: #MDL '860-A-_ _' Example: #MDL '8607A'
#MEM nrf,nrf,nrf		Write to memory location. Caution: Use of this command may disrupt unit operation and require the unit to be powered off and back on to restore proper operation. Maintenance Command - FACTORY USE ONLY.
Field	Parameter	Range
1	Memory Page	0 - 15
2	Memory Address	0 - 65536
3	Byte value to write	0 - 255
#MEM nrf,nrf?	MEM nr1,nr1,nr1	Read a memory location. Response: Range: 0 - 15 Range: 0 - 65535 Range: 0 - 255

Table 3-10. Configuration Messages (Continued)

Command	Response	Description
#PRA nrf,nrf, nrf,.....,nrf		Load configuration data list for preselector band A (19.9936 to 48.9983 MHz). The list contains 122 frequency data points defined in groups as listed below.
Field		Parameter
1 - 99		204.8 kHz points from 19.9936 to 39.9871
100 - 122		409.6 kHz points from 39.9872 to 48.9983
#PRA?	#PRA nrf,nrf nrf,nrf,nrf,.....,nrf	Request the configuration data list for preselector band A as defined in the #PRA command.
#PRB nrf,nrf, nrf,.....nrf		Load configuration data list for preselector band B (48.9984 to 117.9903 MHz). The list contains 127 frequency data points defined in groups as listed below.
Field		Parameter
1-82		409.6 kHz points from 48.9984 to 81.9967 MHz
83-127		819.2 kHz points from 81.9968 to 117.9903 MHz
#PRB?	#PRB nrf,nrf,nrf, nrf,nrf,....,nrf	Request the configuration data list for preselector band B as defined in the #PRB command.
#PRC nrf,nrf, nrf,.....nrf		Load configuration data list for preselector band C (117.9904 to 274.9951 MHz). The list contains 123 frequency data points defined in groups as listed below.
Field		Parameter
1-52		819.2 kHz points from 117.9904 to 159.9999 MHz
53-123		1,638.4 kHz points from 160.0000 to 274.9951 MHz
#PRC?	#PRC nrf,nrf, nrf,nrf,nrf,....,nrf	Request the configuration data list for preselector band C as defined in the #PRC command.
#PRD nrf,nrf, nrf,....,nrf		Load configuration data list for preselector band D (274.9952 to 514.4576 MHz). The list contains 75 frequency data points defined in groups as listed below.
Field		Parameter
1-75		3.2768 kHz points from 274.9952 to 514.4576 MHz
#PRD?	#PRD nrf,nrf, nrf,nrf,nrf,....,nrf	Request the configuration data list for preselector band D as defined in the #PRD command

Table 3-10. Configuration Messages (Continued)

Command	Response	Description
#RCB nr1?	#CBW nr1,nr2, nr1,nr1,nr1,nr1, nr1,nr1,nr1,nr1	Request configuration of bandwidth specified by nr1. See #CBW for field definitions of response. Default: #CBW 1,000.0100,1,1,7,1,02,+0,-124,500
#RCF 3?	#RCF 3,100,nr1	Request the specified reference divider ratios. Default: 3,100,100 Example: 3,100,100
#RVB nr1?	#CVB nr1,nr2	Request the configuration of the video bandwidth slot specified by nr1. Default: #CVB 1,00010.0000

3.4.6 MINICEPTOR COMMUNICATION MESSAGES

The commands in this message category are always valid. These are commands which establish communications between the Miniceptor and the controller. The mnemonics associated with this message category are listed in **Table 3-11**.

Table 3-11. Communication Messages

Command	Response	Description
CDE?	CDE nr1	Request the current Device-Dependent Error Register contents. The response is a bit-mapped 16-bit word indicating current error conditions. Reading the register has not effect on it. Refer to **Table 3-14** for the significance of each bit in this register.
CFG?	CFG nr1	Request status of configuration mode switch (switch 6 in DIP switch A1S2). 0 = the unit is set to operation mode 1 = the unit is set to configuration mode. Default: Position of DIP switch Example: CFG 0
*CLS		This command causes all the communication status registers to be cleared.

Table 3-11. Communication Messages (Continued)

Command	Response	Description
DDE?	DDE nr1	Request the latched error status. The response is a bit-mapped 16-bit word indicating the error conditions that have occurred since the last reading of the Device-Dependent Error Register. Reading the register clears it until the error condition is corrected and reappears, or upon a new power up. An event causing this register to be loaded with an error event sets the DDE bit in the Event Status Register. Refer to **Table 3-14** for the significance of the bits in this register.
*ESE nrf		This command allows writing to the Event Status Enable Register. That register allows events that set a flag in the Event Status Register to be passed on to the Event Status Bit (bit 5) of the Status Byte Register. BIT FUNCTION 0 Enable OPC (operation complete) 1 Not used 2 Enable QYE (query error) 3 Enable DDE (device-dependent error) 4 Enable EXE (execution error) 5 Enable CME (command error) 6 Not used 7 Enable PON (power on)
*ESE?	*ESE nr1	Read the current value of the Event Status Enable Register. Reset: No change. Default: *ESE 000 Example: *ESE 255
*ESR?	*ESR nr1	This command responds with the current setting of the Event Status Register. BIT FUNCTION 0 OPC operation complete 1 Not used 2 QYE query error 3 DDE device-dependent error 4 EXE execution error 5 CME command error 6 Not used 7 PON power on Cleared by: *ESR?, power up, *CLS Example: *ESR 000

Table 3-11. Communication Messages (Continued)

Command	Response	Description
HAD nrf		Specify the handoff address for the handoff net. This command is only valid for the WJ-860X/HPIL Interface option. The range is from 1 to 99. A -1 indicates the receiver ignores all data on the handoff net. This parameter is defaulted to the address specified on the HPIL address switch on defaulted memory.
HAD?	HAD nr1	Request the current handoff address. Reset: No change. Default: Address on HPIL switch Example: HAD +99
*IDN?	*IDN (see example)	This command returns the Miniceptor identity. The fields provide the following order of information: manufacture, model number, serial number, and software version number. Reset: No change Default: *IDN_WJ,8607_-_ _,99999,0.00 Example: *IDN_WJ,8607A-_ _,00001,0.00
*OPC		Operation complete switch. When this command is sent with a data string, the OPC bit in the Event Status Register will be set upon completion of the operation(s) in the input buffer. An SRQ may be generated with corresponding bit enabled.
*OPC?	*OPC 1	An *OPC 1 string will be loaded into the output buffer (returned at the completion of the operation in the input buffer).
*OPT?	*OPT nr1	This command returns a bit-mapped value of 16-bits indicating the options installed in the unit. BIT OPTION 0 WJ-860XA/FE - Frequency Extender 1 WJ-860X/SSB - Single Sideband Filter 2 WJ-860X/WBO - Wideband IF Output 4-15 Not used. Default: *OPT 00000 Example: *OPT 00001 (Indicates FE option installed)

Table 3-11. Communication Messages (Continued)

Command	Response	Description
RSE nrf		This command allows writing to a register that enables interrupts to be passed form the RSR register to the *STB register via its RSB bit. BIT FUNCTION 0 Enable PRS, signal exceeded COR event to set the RSB bit. 1 Enable ABS, signal below COR event to set the RSB bit. 2 Enable NEW, new signal event to set the RSB bit. 3 Enable OLD, old lost signal event to set the RSB bit. 4 Enable ESN, end of single sweep event to set the RSB bit. 5 Enable ESS, end of sweep sequence event to set the RSB bit. 6 Enable ESP, end of step sequence to set the RSB bit. 7 Enable FQE, full queue event to set the RSB bit. 8 Enable PRS, sweep or step operation suspended on signal event to set the RSB bit. 9 Enable SD¾, sweep/step data (SSD) buffer 75% full event to set the RSB bit. 10 Enable SDF, sweep/step data (SSD) buffer full event to set the RSB bit. 11 Enable service request upon end of learn sequence. 12-15 Not used.
RSE?	RSE nr1	Request the contents of the Receiver Status Enable Register. Reset: No change Default: RSE 00000 Example: RSE 00001
RSR?	RSR nr1	Read the Receiver Status Register. The information included in this register is latched. It is cleared by the *CLS command or a read of the register. The information in the register discloses the reason for the RSB bit to be set in the Status Byte Register. BIT FUNCTION 0 PRS, signal exceeded COR threshold. This is an edge triggered event on the action of a signal going form below COR threshold to above COR threshold. 1 ABS, signal fell below COR threshold. This is an edge triggered event on the action of a signal going form above COR threshold to below COR threshold. 2 NEW, new signal found. This bit indicates that a signal has been found that was not active on the previous pass of the sweep or step sequence. This bit is only set while the report new signals flag is set.

Table 3-11. Communication Messages (Continued)

Command	Response	Description
RSR? (Cont'd)		3 OLD, old signal no longer present. This bit indicates that a signal that was previously present is not present and was placed in the queue. This bit is only set while the report old lost signals flag is set. 4 ESN, end of single sweep. This bit indicates the end of sweep has been encountered. This bit is only set while in sweep mode. 5 ESS, end of single sweep sequence. This bit indicates that the single sweep sequence has been completed. The bit is only set while in the sweep mode. 6 ESP, end of single step sequence. The bit indicates that the single step sequence has been completed. The bit is only set while in the step mode. 7 FQE, full queue encountered. This bit indicates that the signal queue is full and any further entries causes the oldest entries to be lost. 8 PRS, sweep or step operation suspended on signal. This bit indicates that the sweep or step operation is automatically suspended due to a signal received above the COR threshold. 9 SD¾, SSD buffer 75% full. This bit indicates that the sweep/step data (SSD) buffer is 75% full of data. 10 SDF, SSD buffer full. This bit indicates that the sweep/ step data (SSD) buffer is full of data. 11 End of learn sequence. 12-15 Not used.
RTK nrf?	RTK nr1	Request token from the receiver. If token is granted response will match request. If token is held by another controller response will be number of the other controller's token request. Token can be any number from 0 to 99.
RTK		Return token to the receiver allowing it to be requested by another controller. Power up: RTK 00 Default: RTK 00 Example: RTK 09

Table 3-11. Communication Messages (Continued)

Command	Response	Description
*SRE nrf		This command allows the writing to the Service Request Enable Register. The appropriate bit must be set to generate an interrupt via the Status Byte Register indicated event. BIT FUNCTION 0 Enable RSB interrupt. 1 Enable SYNC interrupt. 2 Not used. 3 Not used. 4 Enable MAV interrupt. 5 Enable ESB event interrupt. 6 Not used. 7 Not used.
*SRE?	*SRE nr1	This command allows the reading of the Service Request Enable Register. Reset: No change Default: *SRE 000 Example: *SRE 255 (Indicates all bits set high)
*STB?	*STB nr1	This command returns the Status Byte Register. This is a summary level status byte indicating the general cause of interrupts. The Status Byte Register is cleared by power up. The *CLS command clears all bits of this command except bit 6. BIT FUNCTION 0 Receiver Status bit (RSB). 1 LOs Locked bit (LOL). 2 Not used. 3 Not used. 4 Message Available (MAV) bit. 5 Event Summary Bit (ESB). 6 Request Service (RQS) bit. 7 Not used. Example: *STB 000

3.4.7 MINICEPTOR STATUS SUMMARY

Figure FO-2 illustrates the architecture of the Miniceptor's status register. It is composed of four eight-bit registers and three 16-bit registers, whose logic gating allows the programmer great flexibility in remote operations. The four eight-bit registers and two of the 16-bit registers can be split into three pairs. Each pair consists of a status register and an enable register.

One pair is composed of the Event Status Register (whose functions are summarized in **Table 3-13**) and the Event Status Enable Register. Each bit in the Event Status Register is logically ANDed to a bit in the Event Status Enable Register. The ANDed combination of these two registers are logically ORed to set the Event Status Bit (ESB) of the Status Byte Register. The Device-Dependent Error Bit (DDE) of the Event Status Register is the ORed combination of the 16-bit Device-Dependent Error Register (see **paragraph 3.4.7.3**).

The second pair is composed of the Status Byte Register and the Service Request Enable Register. The Miniceptor uses only four bits of the Status Byte Register as described in **Table 3-12**. The ANDed combination of the Status Byte Register and the Service Request Enable Register are logically ORed to determine the setting of bit 6 (RQS) of the Status Byte Register. If the RQS bit is set high, a service request is asserted.

The third pair is composed of the Receiver Status Register (whose functions are summarized in **Table 3-15**) and the Receiver Status Enable Register. The ANDed combination of these two registers are logically ORed to set the Receiver Status Bit (RSB) of the Status Byte Register.

An LO Lock condition sets Bit 1 of the receiver's Status Byte Register to logic 1. That in turn will result in a Service Request (SRQ) being sent to the external controller if Bit 1 of the Service Request Enable Register (SRE) is set. Thus when the LO’s lock after execution of remote commands FRQ, OPR, ADV, or RES or after a high pulse on the Sync In line, an SRQ will be generated when SRE Bit 1 is set.

3.4.7.1 **Status Bytes**

The Miniceptor may send a one-byte control character (ESC) followed by an eight-bit binary encoded status byte (if enabled when in the Single-Drop interface mode). The service request byte (ESC) indicates that a requesting event has occurred. The status byte immediately follows the service request byte. The contents of the status byte identifies the reason for the service request. The contents of the status byte matches that of the encoding of the *STB? query response (see **Table 3-12**). The status byte can also be requested by sending the *STB? query.

A LO locked condition will set Bit 1 of the Status Byte Register to 1. That in turn will result in a Service Request (SRQ) being sent to the external controller if Bit 1 of the Service Request Enable Register (SRE) is set. Thus when the LO's lock after execution of remote commands FRQ, OPR, ADV, or RES or after a high pulse on the Sync In line at the AUX connector, an SRQ will be generated when SRE Bit 1 is set.

Table 3-12. Status Byte Register, Bit Evaluation

Bit Number	Mnemonic	Description
0	RSB	**Receiver Status Bit** - This bit, when set, indicates that an event has caused a bit or bits in the Receiver Status Register to be set (see **paragraph 3.4.7.4**). This bit is cleared by *CLS or by reading the contents of the Receiver Status Register.
1	SYNC	**SYNC Bit** - This bit, when set, indicates that the receiver LO's are in the Locked condition after the reciept of a FRQ, binary frequency or ADV command. The bit gets set when Sync Out goes high. The bit is cleared once an SRQ is sent.
2	N/U	
3	N/U	
4	MAV	**Message Available Bit** - This bit, when set, indicates that the Miniceptor has placed data in its output buffer and is ready to output this data. The bit is cleared by emptying the output buffer.
5	ESB	**Event Summary Bit** - This bit, when set, indicates that the Event Status Register has set SRQ. By reading the Event Status Register via the *ESR? mnemonic, the host controller may identify what status event has caused the SRQ. This bit is cleared by sending *CLS, or reading contents of the Event Status Register.
6	RQS	**Request Service** - This bit, when set, indicates that the unit has asserted SRQ.
7	N/U	

3.4.7.2 Event Status Register

The following discussion covers the Event Status Register and the *ESR? query. See **Table 3-13** for the Event Status Register bit numbers, mnemonics, and descriptions.

The Event Status Register is read destructively by the *ESR? query, which clears the register. The *CLS command also clears the register. The power on sequence automatically sets the Power On bit and initially resets the remaining bits.

The Event Status Enable Register allows the event flags of the Event Status register to be reflected in the Event Summary Bit (ESB) of the status byte. The setting of an event status flag sets the event summary bit only if the corresponding bit in the Event Status Enable Register is set high. The Event Status Enable Register is written to with the *ESE command. The data following the mnemonic is the decimal equivalent of a binary number representing the register bits. The *ESE? query loads the output buffer with a decimal number, which can be converted to binary to determine the setting of the Event Status Enable Register.

Table 3-13. Event Status Register, Bit Evaluation

Bit Number	Mnemonic	Description
0	OPC	**Operation Complete** - This bit is set on completion of operation that has been designated by the *OPC command.
1	N/U	
2	QYE	**Query Error** - Set on an attempt to read data from the output buffer with no data stored or pending, or on output buffer overflow.
3	DDE	**Device-Dependent Error** - Set when a device-dependent error occurs (see **paragraph 3.4.7.3**).
4	EXE	**Execution Error** - Set by a data element out of range, or by a valid message which could not be processed due to some device condition.
5	CME	**Command Error** - Set by an unrecognized remote error message header.
6	N/U	
7	PON	**Power On** - Sets at power up of the Miniceptor.

3.4.7.3 Device-Dependent Error Register

The contents of the Device-Dependent Error Register can be read to determine what event has caused the DDE bit in the Event Status Register to be raised (see **Figure FO-2**). The DDE? and CDE? queries are used and are further discussed below.

The DDE? query requests the latched error status. The response is a bit-mapped 16-bit word indicating the error conditions that have occurred since the last read of the register. Reading the contents of the register clears it. See **Table 3-14** for the bit evaluation of the Device-Dependent Error Register.

The CDE? query requests the current device error. The response to this query is also a bit-mapped 16-bit word as detailed in **Table 3-14**. Reading this register has no effect on it.

Table 3-14. Device-Dependent Error Register, Bit Evaluation

Bit	Decimal Value	Description
0	1	Power Supply Fault - This bit is set to indicate a power supply fault. One or more of the bits below (1-4) may be set if a concise failure mode can be determined.
1	2	+12 Vdc Fault
2	4	+7.5 Vdc Fault
3	8	-7.5 Vdc Fault
4	16	+30 Vdc Fault
5	32	1st LO Unlocked
6	64	2nd LO Unlocked
7	128	3rd LO Unlocked
8	256	Not Used
9	512	EEPROM has been defaulted.
10	1024	RAM has been defaulted.
11	2048	FE LO Unlocked
12	4096	EEPROM failure to be written.
13	8192	2nd LO DDS Unlocked
14	16384	2nd LO REF STEP Unlocked
15	32768	Reference Generator Unlocked

3.4.7.4 Receiver Status Register

The Receiver Status Register allows for interrupts to be generated when particular operational events occur. The information in this register discloses the reason for the RSB bit to be set in the Status Byte Register. The RSR? query reads the latched contents of this register and clears it. It is also cleared by *CLS. See **Table 3-15** for the bit evaluation of the Receiver Status Register.

Table 3-15. Receiver Status Register, Bit Evaluation

Bit	Decimal Value	Function
0	1	PRS, signal exceeded COR threshold. This is an edge triggered event on the action of a signal going from below COR threshold to above COR threshold.
1	2	ABS, signal fell below COR threshold. This is an edge triggered event on the action of a signal going from above COR threshold to below COR threshold.
2	4	NEW, new signal found. This bit indicates that a signal has been found that was not active on the previous pass of the sweep or step sequence. See RAC command in **Table 3-4**.
3	8	OLD, old signal no longer present. This bit indicates that a signal that was previously present is no longer present and was placed in the queue. See RAC command in **Table 3-4**.
4	16	ESN, end of single sweep. This bit indicates the end of a sweep has been encountered. This bit is only set while in the sweep mode.
5	32	ESS, end of single sweep. This bit indicates the end of a sweep has been encountered. This bit is only set while in the sweep mode.
6	64	ESP, end of single step sequence. This bit indicates the end of a step sequence has been encountered. This bit is only set while in the step mode.
7	128	FQE, full queue encountered. This bit indicates that the signal queue is full and any further entries causes the oldest entries to be lost.
8	256	PRS, sweep or step operation suspended on signal. This bit indicates that the sweep or step operation is automatically suspended due to a signal received above the COR threshold.
9	512	SD¾, SSD buffer is 75% full. This bit indicates that the sweep/step data (SSD) buffer is 75% full of data.

Table 3-15. Receiver Status Register, Bit Evaluation (Continued)

Bit	Decimal Value	Function
10	1024	SDF, SSD buffer full. This bit indicates that the sweep/step data (SSD) buffer is full of data.
11	2048	EOL. This bit reports end of learn.
12	4096	Not used.
13	8192	Not used.
14	16384	Not used.
15	32768	Not used.

3.5 RECEIVER CONTROL USING BINARY COMMANDS

The WJ-8607A supports a limited number of binary commands which can be used when optimum speed performance of the receiver is desired. The following binary commands are available: Frequency, Set Receiver, Attenuator Dump (ATD), Advance (ADV). These commands are further described in the following paragraphs.

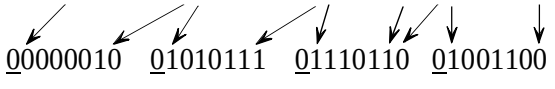
3.5.1 THE FREQUENCY BINARY COMMAND

The Frequency Binary Command is a 28-bit command expressing frequency as four "7-bit" bytes. To calculate the four binary frequency data bytes, the required frequency must first be expressed as a 28-bit, modulo 100 Hz value. It must then be converted from the Decimal base (DEC) to Hexadecimal base (HEX). The resulting HEX number must then be separated into four "7-bit" bytes and converted to four "8-bit" bytes, with bit 8 set to "0", for sending in ASCII format.

Example: Desired Frequency = 563.4892 MHz

Modulo 100 Hz: 563.4892 X 1E6 / 100 = 5634892

Hex			5	5	F	B	4	C
Binary		0000	01010101		11111011		01001100	
7-bit binary		00000010	01010111		01110110		01001100	
Data to be sent	06 (^F)	02	57		76		4C	



96-0020

3.5.2 THE SET RECEIVER BINARY COMMAND

The Set Receiver binary command is a six-byte command which allows access to the following receiver parameters: tuned frequency, bandwidth slot, detection mode, AGC operation, AFC operation, and attenuation. The advantages of tuning the receiver with this binary command instead of the conventional "FRQ nrf" ASCII command are the faster tuning speed and the increased rate of transferring the frequency information to the receiver. Using the binary command, the tuning calculation for the receiver is improved to 65µs. In addition, only four bytes are required compared to 14 ASCII bytes (FRQ 563.4892 CR LF). Only one byte is required to provide detection mode, AGC status and bandwidth slot parameters and one byte is used to provide the attenuation value.

The structure of the binary Set Receiver command is as follows:

^G		(<control> G, ASCII 07*)
Frequency	Byte 1	(7 bits*)
Frequency	Byte 2	(7 bits*)
Frequency	Byte 3	(7 bits*)
Frequency	Byte 4	(7 bits*)
Det/AGC/Bws	Byte 5	(7 bits*)
Attenuation	Byte 6	(7 bits*)

* (the most significant bit must be 0)

NOTE

Once a ^G has been sent to the receiver, it assumes that the next six bytes that it receives is binary data.

The four frequency data bytes (bytes 1-4) represent a binary frequency word 28 bits long. See **paragraph 3.5.1** for calculation of frequency portion of message.

The Detection mode/AGC/bandwidth slot byte (byte 5) is a bit-mapped byte as follows:

Bit	7	6	5	4	3	2	1	0
	0	D2	D1	D0	A0	B2	B1	B0

Where:

Detection Mode	Code D2	D1	D0
AM	0	0	0
FM	0	0	1
CW	0	1	0
AM-PLS	0	1	1
USB	1	0	0
LSB	1	0	1
ISB	1	1	0
IFT	1	1	1

AGC Mode	Code A0
Off	0
ON	1**

**Causes an attenuation dump as well as turning the AGC mode ON.

IFBW Slot	Code B2	B1	B0
Invalid	0	0	0
Slot 1	0	0	1
Slot 2	0	1	0
Slot 3	0	1	1
Slot 4	1	0	0
Slot 5	1	0	1
Bypass	1	1	0
Invalid	1	1	1

The Attenuation data byte (byte 6) is used to enter a binary equivalent of the attenuation value in 1-dB resolution.

Bit	7	6	5	4	3	2	1	0
	0	Atn6	Atn5	Atn4	Atn3	Atn2	Atn1	Atn0

Attenuation	Atn6 - Atn0
Minimum 0 dB	000 0000
.	.
.	.
.	.
Maximum 111 dB	110 1111

NOTE

Each time the Detection mode/AGC/Bandwidth slot data byte (byte 5) is sent with the AGC bit set to "1" (AGC on), the receiver executes an attenuation dump. In addition, the Attenuation data byte (byte 6) only has effect on the receiver's attenuation when the AGC bit of byte 5 is set to "0" (AGC off).

3.5.3 THE ATTENUATION DUMP BINARY COMMAND

The Attenuation Dump binary command is used to perform the same function as that controlled by the ATD ASCII command. Sending this command causes the current attenuation value used by automatic gain control (AGC) to be set to zero, simulating an AGC dump operation. It has no effect on the manual attenuation value (ATN). The Attenuation Dump binary command is structured as follows:

^I (<control> I, ASCII 09) with the most significant bit always set to "0"

3.5.4 THE ADVANCE BINARY COMMAND

The Advance binary command is used to perform the same function as that controlled by the ADV ASCII command. Sending this command causes the Sweep or Step operation to advance to the next frequency when a dwell state is currently active (Pre Dwell, Signal Dwell, Post Loss Dwell). The Advance binary command is structured as follows:

^K (<control> K, ASCII 11) with the most significant bit always set to "0"

3.6 COMMUNICATIONS/PROTOCOL DETAILS FOR THE REMOTE INTERFACES

The WJ-8607A provides several remote interfaces that can be selected and used to control the receiver. Depending on the interface selected, the receiver can be configured and connected to operate in the single-drop interface mode or in the multi-drop interface mode. See **Section II** for details on configuring the receiver and the typical connections used when operating in single-drop and multi-drop interface modes.

The 6-pin connector on the receiver's front panel labeled SERIAL INTFC 1 provides an RS-232C full duplex interface, single-drop communications at rates from 150 baud to 38.4 kbaud. The RS-232C I/O supports a three-wire data transfer using the ground, transmit data (TXD), and receive data (RXD) lines only.

The 15-pin connector on the receiver's front panel labeled SERIAL INTFC 2 provides a full duplex RS-232C interface, a full duplex RS-422A interface, and a half-duplex RS-485 interface. All three interfaces can operate in the single-drop or multi-drop modes at a selectable baud rate from 150 to 230400 baud. The I/O configuration for the SERIAL INTFC 2 connector is determined by the setting of DIP switch A1S3 (see **Section II**).

The RS-422A interface at the SERIAL INTFC 2 connector supports a five-wire data transfer, using ground, 422 TXA, 422 TXB, 422 RXA, and 422 RXB data lines. The RS-485 interface supports three-wire, half-duplex communications using the 485 T/RA and 485 T/RB data lines. With RS-422 and RS-485 interfaces, a mark condition is intended whenever a "B" signal has a more positive voltage than its corresponding "A" signal.

An RS-232C interface provided at the SERIAL INTFC 2 connector uses a six-line data transfer system. In addition to the ground, transmit data (TXD), and receive data (RXD) lines, this interface provides three hardware handshake lines: the 232DTR (data terminal ready) line, the 232RTS (request to send) line, and the 232CTS (clear to send) line. When the 232CTS input (J1, pin 8) is forced to ground or below, the receiver completes the transfer of the current byte being output on SERIAL INTFC 2. It then suspends the transmission of data until the 232CTS line goes high. The 232RTS output (J1, pin 7) is high whenever the receiver is configured for SERIAL INTFC 2, Single-Drop operation. The 232DTR output (J1, pin 4) goes high when the receiver is powered up and remains high until powered down.

The software handshaking and communications protocol used in all of the above interfaces is determined by whether they are operating in the single-drop or multi-drop modes as selected by the DIP switches. Refer to **paragraph 3.6.1** for I/O details when controlling the receiver in the single-drop mode. Refer to **paragraph 3.6.2** for I/O details when controlling the receiver in the multi-drop mode. Refer to **paragraph 3.6.3** for details on changing the user-specified baud rate in either single-drop or multi-drop modes.

3.6.1 SINGLE-DROP MODE I/O OPERATION

The Miniceptor supports a software communications protocol only in the single-drop mode. Hardware handshake signals such as RTS, CTS and DTR are not supported on serial interface 1. Data word format is fixed and comprised of the following:

- One start bit
- An 8 bit character (bit 8 should be set to 0)
- No parity
- One stop bit

The communications protocol in the single-drop mode implements both ENQ/ACK (ENQuire/ACKnowledge) and XON, XOFF (ctl Q, ctl S). The ENQ/ACK format allows the user to send an ENQ character to the receiver when an acknowledge is required. The receiver then responds with the ACK/NAK character indicating the validity of the data received in the input buffer and the fact that the receiver has completed processing all current data thru the last received terminator. The XON, XOFF format is supported by both the transmitting and receiving lines. This allows transmission based on the availability of buffer space.

3.6.1.1 XON/XOFF Protocol

The XON/XOFF communications protocol is always active in the receiver. In the event the input buffer has no room for more than 16 additional characters the receiver will output an XOFF command. When the receiver empties its input buffer, it issues an XON. The user must stop sending data within 15 characters after receiving the XOFF character. On each character that is received while the input buffer is full, the receiver issues an XOFF. The user may start sending data to the receiver after receiving the XON character.

The Miniceptor responds to the XON and XOFF commands while outputting data to the user. If the receiver receives an XOFF while sending, it stops transmitting within two characters. The receiver will not transmit any further data until an XON is received. The receiver assumes the XON condition at power-up.

3.6.1.2 ENQ/ACK Protocol

When the ENQ character is sent to the Miniceptor, it responds to a valid message with an ACK, or to an invalid message with a NAK. An invalid message is indicated on a communications error such as, framing, noise or overrun. The transmission of a NAK indicates that one or more of the bytes received after the last ENQ had a communications error. The ACK/NAK response is only sent after the receiver has completed processing any previous messages in the input buffer and output any response necessary.

The receiver internally maintains a communications error flag. The flag is cleared on power up or the transmission of a NAK. The flag is set when a byte is received with a communications error. Upon receiving an ENQ character, the receiver responds with an ACK/NAK based on the condition of the communications flag, after any pending input and output operations are complete.

3.6.1.3 Terminator

The input buffer is processed on the receipt of a LF character. The Miniceptor outputs messages terminated with CR, LF.

3.6.1.4 Device Clear

Receipt of the DCL (Device Clear) command causes the Miniceptor to clear both input and output buffers of any data. This command is not buffered and is acted upon as soon as it is received.

3.6.1.5 **Service Request (SRQ)**

The Miniceptor may send a one byte control character (ESC) indicating a service request, followed by an 8-bit binary encoded status byte if enabled. This SRQ byte (ESC) indicates to the user that a requesting event has occurred. The receiver status byte immediately follows the SRQ byte (ESC). This byte identifies the reason for requesting service. The encoding of this byte matches that of the *STB response (see **paragraph 3.4.7.1**).

The SRQ sequence either proceeds or follows the output of a data string being transmitted from the output buffer. It does not interrupt the data string. The SRQ sequence may be enabled or disabled with the *SRE command. SRQ is only functional in Single Drop mode.

3.6.1.6 **Buffer Handling**

The Miniceptor handles buffers in circular fashion to allow full duplex operation of the serial I/O. The following paragraphs provide further details on the operation of the receiver's input an output buffers.

3.6.1.6.1 **Input Buffer**

The input buffer is handled in circular fashion allowing the simultaneous inputting and processing of data. The input buffer accepts up to 1024 bytes before overflowing. As data in the buffer is being processed, additional inputs may come into the receiver. Upon receiving a terminator character, the receiver processes any previous messages in the buffer. When the buffer has less than 16 unused bytes, XOFF is generated. An XON is generated when the buffer is no longer full (two messages removed or empty).

The input buffer processing starts on the receipt of a terminator. If the communications error flag is set, the buffer contents from the end of the last processed message thru the terminator is discarded. In the event the buffer is overrun, its contents are discarded. Messages such as XON, XOFF, ENQ and DCL have immediate actions. These commands are processed on receipt and not buffered. All other incoming data is buffered and processed in the order which it was received.

3.6.1.6.2 **Output Buffer**

The output buffer is handled in a circular fashion allowing simultaneous additions and outputting. The transmission of XON/XOFF has priority over data in the output buffer awaiting transmission. The ACK/NAK and SRQ transmission are buffered operations so they stay in time synchronization with query operations. The output buffer holds up to 1024 bytes of data.

3.6.1.7 **Supported Communications Control Commands**

Table 3-16 lists the supported communications control commands for single-drop operation.

Table 3-16. Supported Single-Drop Communications Control Commands

HEX	ASCII	Rx0	Tx	Function
11 14	DC1 DC3	x x	x x	XON, allow data transmission XOFF, disallow data transmission
05 06 15	ENQ ACK NAK	x	 x x	Enquire, request acknowledge Acknowledged, data received okay Not acknowledged, data communications error
0A 0D	LF CR	x x	x x	Line feed, start processing input buffer Carriage return, no action
14	DC4	x		DCL, clear input and output buffers
1B	ESC		x	Service Request character, always directly followed by status byte.

3.6.2 **MULTI-DROP MODE I/O OPERATION**

Multi-drop communication is available on the receiver's SERIAL INTFC 2 connector using RS-232, RS-422, and RS-485 remote interfaces. Up to six receivers can be directly connected to the host controller's serial port using the RS-232 interface in multi-drop mode as shown in **Figure 3-1**. Up to 30 receivers can be connected to the host controller's serial port using the RS-422 or RS-485 interfaces in multi-drop mode as shown in **Figure 3-2** and **Figure 3-3**, respectively.

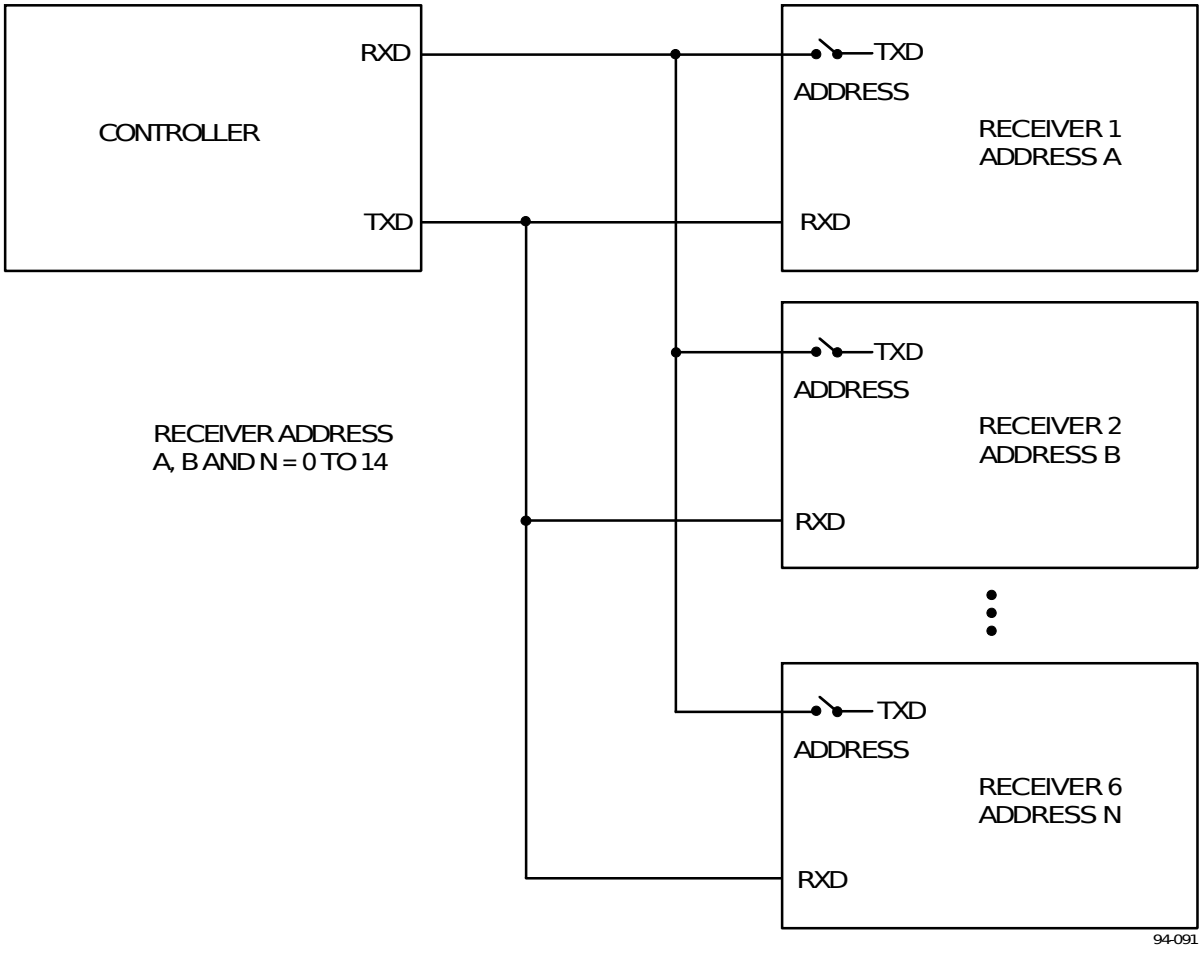


Figure 3-1. RS-232 Multi-Drop Interface Mode

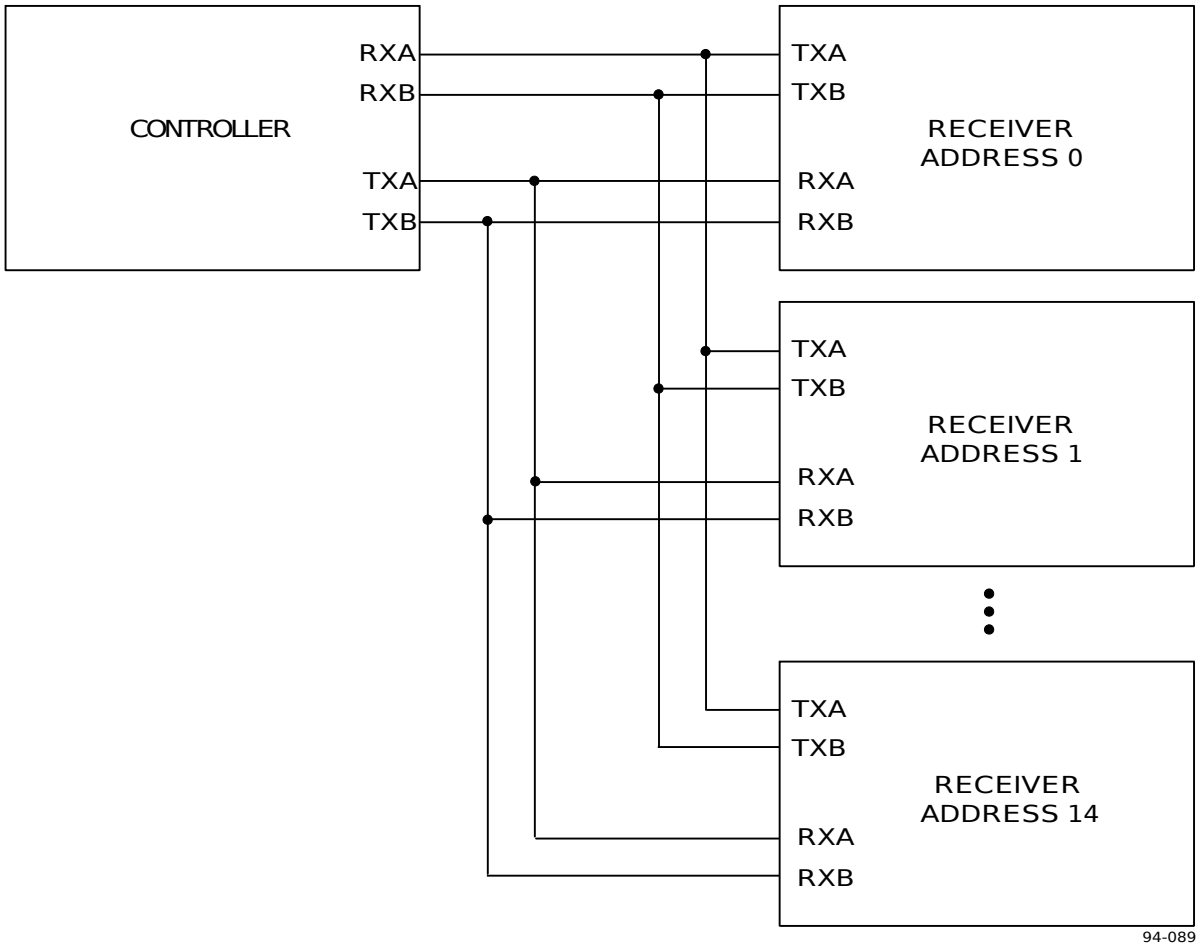


Figure 3-2. RS-422 Multi-Drop Interface Mode

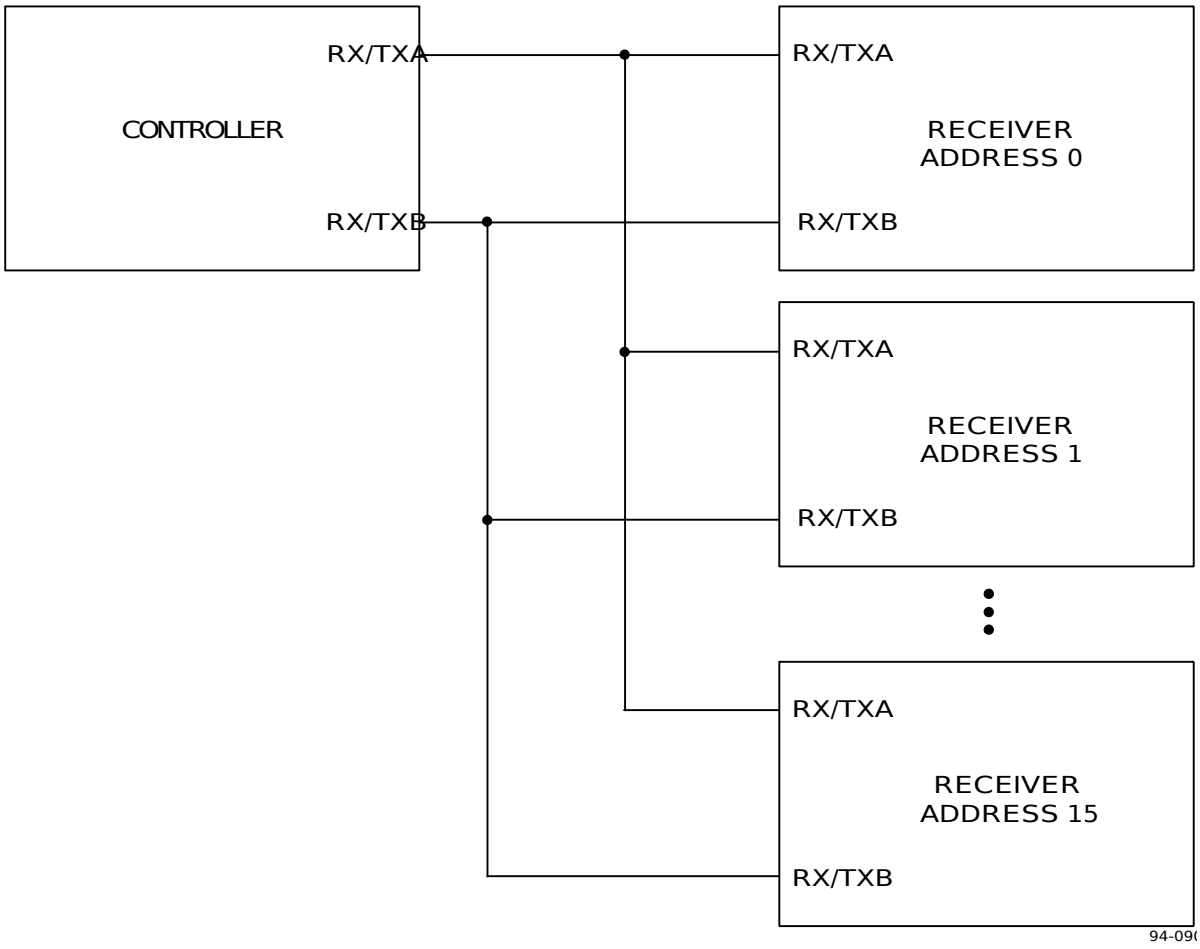


Figure 3-3. RS-485 Multi-Drop Interface Mode

Each WJ-8607A connected on the multi-drop communications bus speaks only when spoken to. The host controller issues commands and queries to only one receiver at a time. Therefore, each receiver on the bus is required to have its own unique address (refer to **paragraph 3.6.2.1**).

Hardware handshakes such as RTS, CTS, DTR or DSR are not supported in multi-drop operations. Therefore, the 232CTS, 232 RTS, and 232DTR hardware lines at the SERIAL INTFC 2 connector should not be connected when the receiver is installed in the multi-drop setup. For all interfaces in the multi-drop mode, the data word format is fixed and comprised of the following:

- One start bit
- An 8 bit character (most significant bit indicates address (1) or data (0)
- No parity
- One stop bit

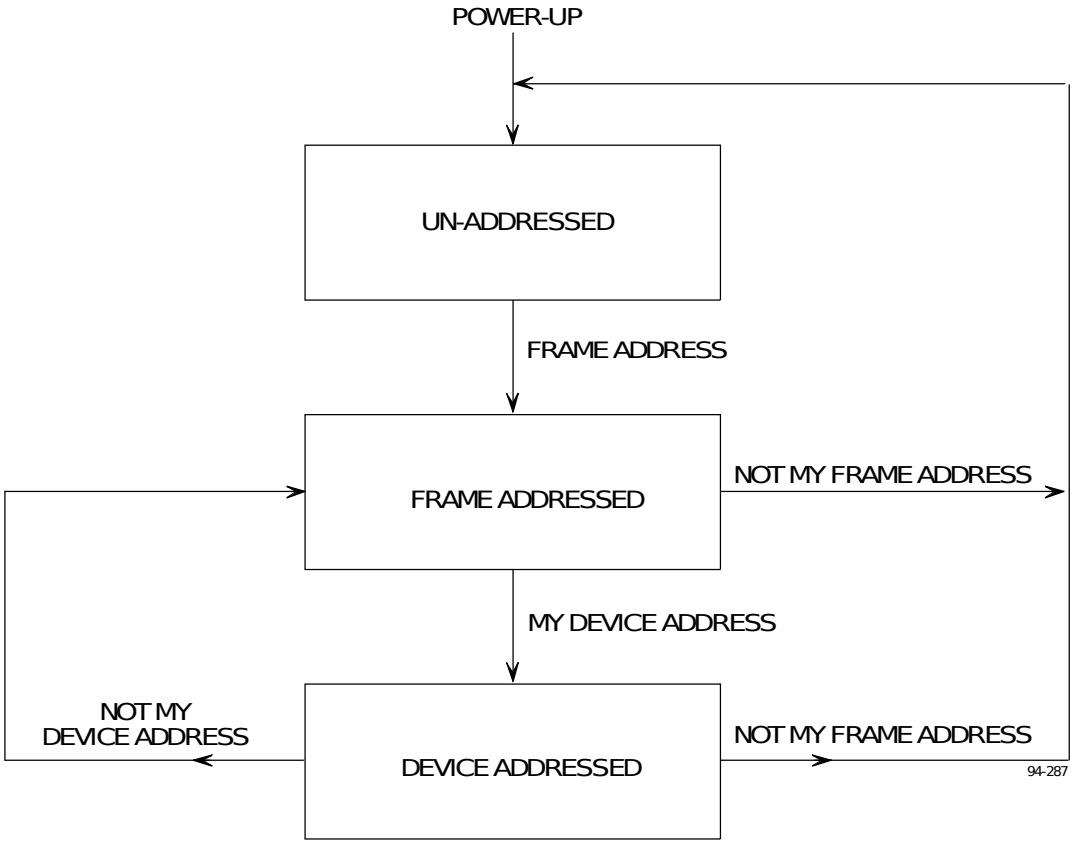
When a LF (line feed) character is sent to the Miniceptor, it responds to a valid message with an ACK, or to an invalid message with a NAK. An invalid message is indicated on a communications error such as, framing, noise or overrun. The transmission of a NAK indicates that one or more of the bytes received after the last LF had a communications error.

3.6.2.1 **Receiver Addressing**

The addressing scheme for the WJ-8607A in the multi-drop mode includes a Frame address and a separate Device address. The default Frame address is 22 for the WJ-8607A. If desired, the Frame address may be changed using the #FAD command. Valid Frame addresses are 0 to 31 (refer to **paragraph 3.4.5**). The Device address is set by DIP switch A1S3, positions 1 thru 5. Refer to **paragraph 2.4** and **Figure 2-5** for the location of DIP switch A1S3. Each receiver on the multi-drop bus must be assigned a unique device address. **Table 3-17** relates the DIP switch settings to device address numbers. See **Figure 3-4** for addressing state transitions.

Table 3-17. Device Address Selection

Interface Mode	Device Address	A1S3 Section				
		5	4	3	2	1
Serial 2 Single-drop	N/A	0	0	0	0	0
Multi-drop RS-232C	01	0	0	0	0	1
Multi-drop RS-232C	02	0	0	0	1	0
Multi-drop RS-232C	03	0	0	0	1	1
Multi-drop RS-232C	04	0	0	1	0	0
Multi-drop RS-232C	05	0	0	1	0	1
Multi-drop RS-232C	06	0	0	1	1	0
Multi-drop RS-232C	07	0	0	1	1	1
Multi-drop RS-232C	08	0	1	0	0	0
Multi-drop RS-232C	09	0	1	0	0	1
Multi-drop RS-232C	10	0	1	0	1	0
Multi-drop RS-232C	11	0	1	0	1	1
Multi-drop RS-232C	12	0	1	1	0	0
Multi-drop RS-232C	13	0	1	1	0	1
Multi-drop RS-232C	14	0	1	1	1	0
Multi-drop RS-232C	15	0	1	1	1	1
Multi-drop RS-232C	16	1	0	0	0	0
Multi-drop RS-232C	17	1	0	0	0	1
Multi-drop RS-232C	18	1	0	0	1	0
Multi-drop RS-232C	19	1	0	0	1	1
Multi-drop RS-232C	20	1	0	1	0	0
Multi-drop RS-232C	21	1	0	1	0	1
Multi-drop RS-232C	22	1	0	1	1	0
Multi-drop RS-232C	23	1	0	1	1	1
Multi-drop RS-232C	24	1	1	0	0	0
Multi-drop RS-232C	25	1	1	0	0	1
Multi-drop RS-232C	26	1	1	0	1	0
Multi-drop RS-232C	27	1	1	0	1	1
Multi-drop RS-232C	28	1	1	1	0	0
Multi-drop RS-232C	29	1	1	1	0	1
Multi-drop RS-232C	30	1	1	1	1	0
Serial 1 Single-drop	N/A	1	1	1	1	1



UN-ADDRESSED - THE RECEIVER IGNORES ALL DATA ON THE INTERFACE UNLESS BIT 8 OF THE INPUT CHARACTER IS SET. IT IS LOOKING FOR A FRAME ADDRESS

FRAME-ADDRESSED - THE RECEIVER HAS SEEN ITS FRAME ADDRESS OCCUR. IT IS NOW LOOKING FOR A DEVICE ADDRESS.

DEVICE-ADDRESSED - THE RECEIVER IS ADDRESSED, IT ACCEPTS AND RESPONDS TO ASCII MNEMONICS (BIT 8 CLEAR), AND IT ACCEPTS ADDRESSES (BIT 8 SET). TO REACH THIS STATE THE RECEIVER MUST HAVE SEEN BOTH ITS FRAME ADDRESS (0 TO 31) AND ITS DEVICE ADDRESS (AS SET ON DIP SWITCH A1S3).

Figure 3-4. Receiver Addressing State Transitions

As 8-bit data is sent to the receiver, the most significant bit (D7) informs the receiver whether the byte is address information or part of a message. **Table 3-18** shows how to construct address bytes. Once the host has addressed a particular WJ-8607A, a stop bit is sent followed by a 43 µsec timeout period (see **Figure 3-5**). The host may then send any number of unaddressed messages. The most recently addressed WJ-8607A will continue to respond to the unaddressed messages. Thus, the WJ-8607A remains addressed until its power is cycled or until the host issues a new address. **Figure 3-6** illustrates the multi-drop communications syntax from the host to the WJ-8607A.

Table 3-18. External Address Data Format

Data Bit								
a/d	D6	D5	D4	D3	D2	D1	D0	Command Type
0	x	x	x	x	x	x	x	Data only acknowledged by previously addressed receiver.
1	1	0	f	f	f	f	f	Frame address
1	1	1	r	r	r	r	r	Receiver address

NOTES: x = Don't care
r = Receiver select bits

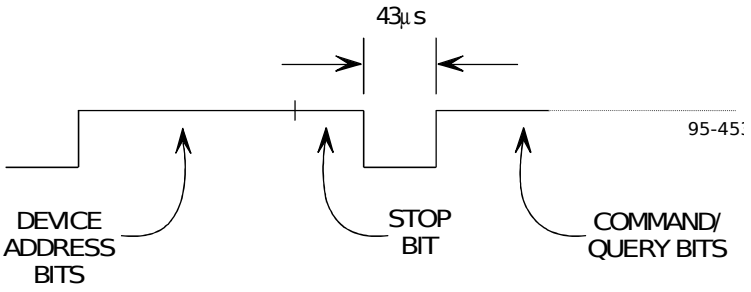


Figure 3-5. Host Addressing Timing Diagram

3.6.2.2 Terminators

The input buffer is processed on the receipt of a LF character or CR, LF characters. The Miniceptor Receiver outputs messages terminated with CR, LF.

3.6.2.3 Device Clear

Receipt of the DCL (Device Clear) command causes the Miniceptor to clear both input and output buffers of any data. This command is not buffered and is acted upon as soon as it is received.

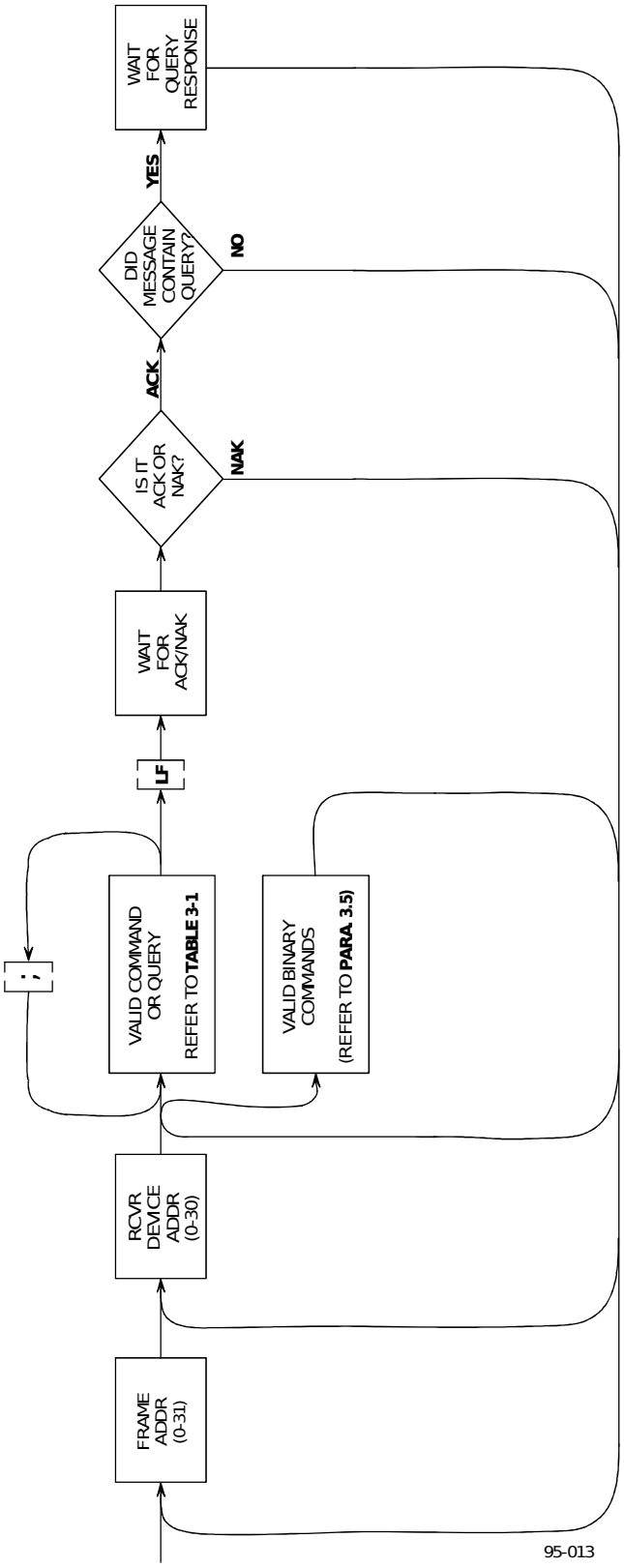


Figure 3-6. Multi-Drop Communication Syntax for Host Control of the WJ-8607A

3.6.2.4 **XON/XOFF Protocol**

The multi-drop mode does not support XON/XOFF protocol.

3.6.2.5 **Service Request (SRQ)**

The multi-drop mode does not support asynchronous generation of service requests (SRQ). The *STB? query can be issued to determine the contents of the receiver status byte. Refer to **paragraph 3.6.1.5** for details on the receiver's status byte.

3.6.2.6 **Buffer Handling**

The input and output buffers are handled in linear fashion. Each holds up to 1024 bytes of data. If the input buffer is overflowed or the UART communications error is detected, the input buffer is cleared as soon as an LF character is received. No data is processed and a NAK character is transmitted to the controller.

3.6.2.7 **Supported Communications Control Commands**

Table 3-19 lists the supported communications control commands for multi-drop operation.

Table 3-19. Supported Multi-Drop Communications Control Commands

HEX	ASCII	Rx	Tx	Function
06 15	ACK NAK		x x	Acknowledged, data received okay Not acknowledged, data communications error
0A 0D	LF CR	x x	x x	Line feed, start processing input buffer Carriage return, no action
14	DC4	x		DCL, clear input and output buffers
C0-DF E1-FE		x x		Frame address group (0-31). Receiver address group (1-30).

3.6.3 **CHANGING THE USER-SPECIFIED BAUD RATE**

The user-specified RS-232C baud rate value is stored in the Miniceptor's EEPROM. The baud rate value may be changed, via remote command, to another value other than the default user specified value of 300. The baud rates available for Serial Interface 1 are 150, 300, 600, 1200, 2400, 4800, 9600, 19200, and 38400. Serial Interface 2 allows all Serial Interface 1 baud rates plus 14400, 28800, 57600, 115200, and 230400 baud.

Before changing the user specified baud rate, applicable switches in DIP switch A1S2 must be set to select Configuration Mode. See **Section II** for information pertaining to setting DIP switch A1S2.

The mnemonics used for user-specified baud rate selection are #CBR and #CBR? for Serial Interface 1 and #CDR and #CDR? for Serial Interface 2 as detailed in **Table 3-20** below. Note that the Serial Interface 1 baud rates are expressed in baud. Serial Interface 2 baud rates are expressed in kilobaud. The "#" character indicates that these are Configuration Mode device messages.

Table 3-20. User-Specified Baud Rate Commands

Command	Response	Description
#CBR nrf		Configure the Serial Interface 1 user-specified baud rate. This is the baud rate used when switch 8 of DIP switch A1S3 is in User-Specified or OFF position and switches 1 thru 5 are in the Serial 1, Single or ON position. The parameter is stored in EEPROM and only changeable while in the Configuration mode of operation. Range: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.
#CBR?	#CBR 19200	Request the current user-specified baud rate. Default: #CBR 19200 Example: #CBR 9600
#CDR nrf		Configure the Serial Interface 2 user-specified baud rate expressed in kilobaud. This is the baud rate used when switch 7 of DIP switch A1S3 is in User-Specified or OFF position and switches 1 thru 5 in any Serial 2 position. The parameter is stored in EEPROM and only changeable in the Configuration mode of operation.
#CDR?	#CDR 230.4	Range: 0.15, 0.3, 0.6, 1.2, 2.4, 4.8, 9.6, 14.4, 19.2, 28.8, 38.4, 57.6, 115.2, 230.4. Request the current user-specified baud rate Default: #CDR 230.4 Example: #CDR 9.6

3.7 PROGRAMMING THE RECEIVER TO ACCEPT A DIFFERENT EXTERNAL REFERENCE FREQUENCY

The receiver can be programmed to accept an external reference frequency other than the default reference of 10 MHz. Prior to programming the receiver to accept a different external reference frequency, ensure DIP switch A1S2 is set for external reference and Configuration mode. Refer to **Section II** for details on locating and configuring A1S2.

The #CRF 3,100,nrf configuration command is used to program the receiver for the external reference. The argument "3" is used to enter the memory location. The argument "100" is a divide-by-N number which provides a base value of 100 kHz. This base value is multiplied by the nrf value. The nrf can be any value from 003 to 255 (to accept an external reference frequency from 300 kHz to 25.5 MHz). Refer to **Table 3-10** for a summary of command and response formats.

For example, to program for an external reference of 5 MHz, the proper command would be #CRF 3,100,050 (50 x 100 kHz = 5 MHz). For an external reference of 1 MHz the command would be #CRF 3,100,010. The formula is as follows:

$$\text{nrf} = \frac{\text{Ext. Ref.}}{(100\ \text{kHz})}$$

Table 3-21 lists some of the more commonly used reference frequencies and the proper command required for each.

Table 3-21. Common External References

Frequency	Configure Command
0.5 MHz	#CRF 3,100,005
1.0 MHz	#CRF 3,100,010
2.0 MHz	#CRF 3,100,020
5.0 MHz	#CRF 3,100,050
10.0 MHz	#CRF 3,100,100 (default value)

The #RCF 3? query is used to request the external reference for which the receiver is currently programmed. The response will be #RCF 3,100,nrl, where nrl can be any value from 003 to 255 (or 300 kHz to 25.5 MHz). To calculate the current programmed reference, multiply the returned nrl value times 100 kHz as shown in the following formula: Ext. Ref. = (nrl) (100 kHz)

For example, a returned nrl value of 100 indicates that the receiver is programmed to accept an external reference of 10 MHz (100 x 100 kHz = 10 MHz).

Once the correct value is entered for the desired external reference frequency, the receiver must be turned off, the Configuration mode turned off (via A1S2), and the receiver turned back on. This configures the receiver with the new external reference data. The external reference data is maintained in the EEPROM of the Microcontroller in the receiver. This allows the data to be saved during power down.

NOTES

SECTION IV

FUNCTIONAL DESCRIPTION

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SECTION IV

FUNCTIONAL DESCRIPTION

4.1 OVERALL FUNCTIONAL DESCRIPTION

Refer to **Figure 4-1**. The operating circuitry of the WJ-8607A consists of four functional sections. These are the RF Converter section, the Synthesizer section, the Demodulator section, and the Digital Control section. Signal and control connections between the functional groups are via internal cabling. External connections are through the front panel.

The RF input signal, entering at the receiver's front panel connector, is applied directly to the RF Converter section. The signal is filtered and mixed with two LO frequencies from the Synthesizer section. The result is an intermediate frequency (IF) with a center frequency of 21.4 MHz. A sample of the IF is provided at the Signal Monitor Output (SMO/WBIF) connector. Five IF bandwidth filters, ranging from 3.2 kHz to 8 MHz, are used in the RF Converter section. These filters are selected by control signals from the Digital Control section. A bypass path can also be selected which allows the IF to bypass these filters. The IF is then input to the Demodulator section.

The Synthesizer section provides three tunable local oscillator (LO) signals and a 10 MHz internal reference. Two of the LO signals are used by the RF Converter section to generate its 21.4 MHz IF frequency. The 1st LO is tunable from 692.5 MHz to 1205 MHz in 2.5 MHz steps. The 2nd LO is tunable from 668.6001 MHz to 671.1000 MHz in 100 Hz steps. A 3rd LO oscillator, or beat frequency oscillator (BFO), is tunable from 19.4 to 23.4 MHz in 250 Hz steps and is used by the Demodulator section during BFO tuning while in the CW detection mode.

Amplification and demodulation of the IF from the RF Converter section is accomplished in the Demodulator section. The IF signal from the RF Converter section is first filtered in a selected IF filter path then passed thru several stages of amplification and gain control. A sample of the bandlimited IF is provided at -30 dBm and is made available at the front panel switched IF (SW IF) connector. The signal then undergoes AM, FM, CW, Pulse, or SSB demodulation and is passed thru a video filter. Demodulation control and switching of the demodulated signal to the video filter is via control from the Digital Control section. After passing thru the video filter, the resultant switched video output is available at the front panel. Microcontroller switching makes available audio and switched audio outputs (dependent on COR level, SAO, etc.).

The Digital Control section provides control for all receiver operations. A microcontroller and its peripherals are employed to perform this function. The microcontroller contains an on-board EEPROM which stores the configuration parameters of the receiver, such as the unit serial number, installed options data, and bandwidth parameters. This section also contains the serial interfaces. These interfaces permit the transfer of data between the WJ-8607A and an external controlling device. Incoming commands, via a serial interface, are processed and control signals are generated to control circuitry within the receiver. The DC voltages are derived and distributed to the RF Converter, the Synthesizer, and the Demodulator sections from the Digital Control section. This section also provides CMOS logic level outputs for a carrier-operated relay (COR) and a spectrum inversion (SPTI) sense signal. A log display output is also provided. Status driver signals for external indicators are generated in this section as well as the sync out signal.

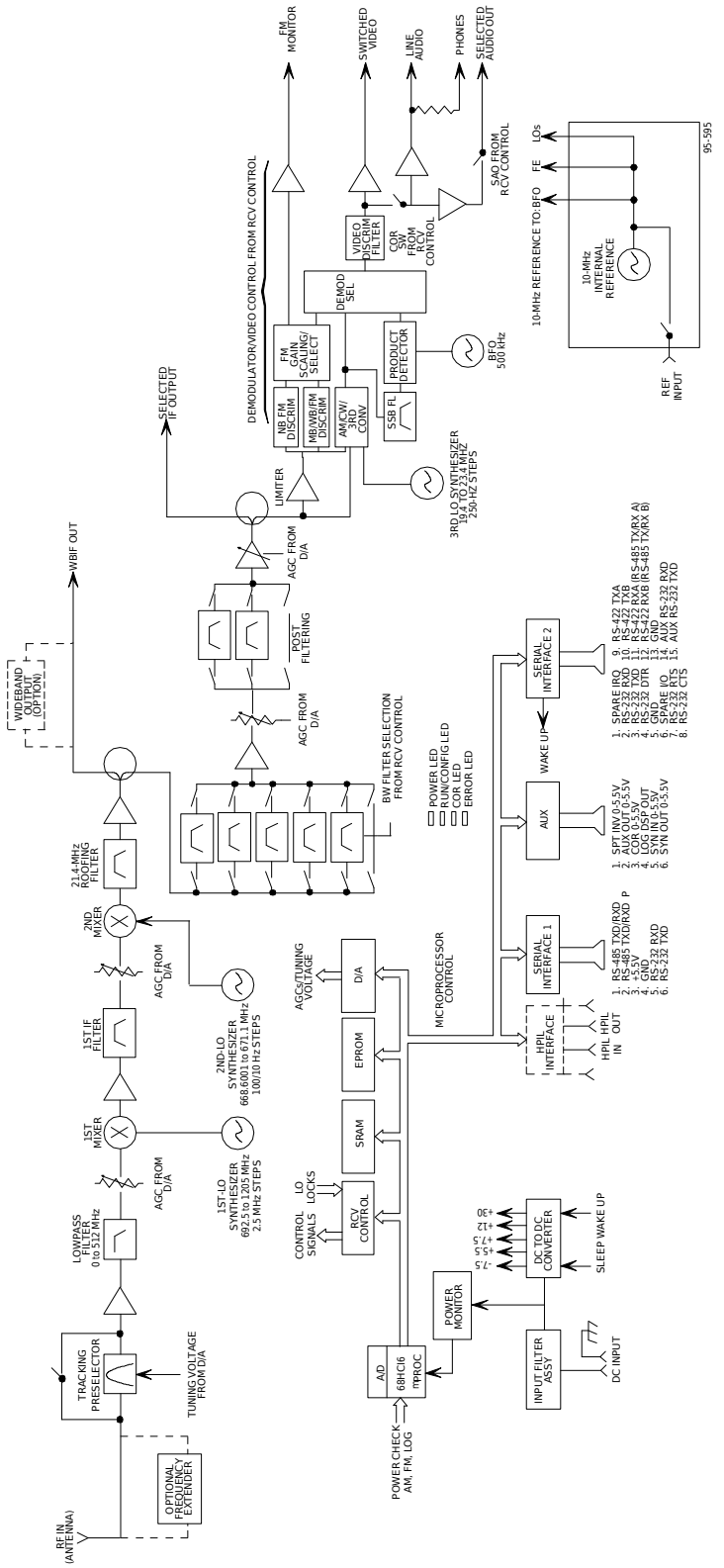

Figure 4-1. WJ-8607A Overall Functional Block Diagram

4.2 DETAILED FUNCTIONAL DESCRIPTION

Refer to the Type WJ-8607A Miniceptor Receiver Main Chassis schematic diagram in **Figure FO-3** during the detailed functional descirption that follows. As shown in the **Figure FO-3**, the unit comprises four major functinoal sections: the RF Converter section (A3), the Demodulator section (A4), the Synthesizer section (A2), and the Digital Control section (A1).

The RF input from front panel connector J1 (RF IN), is passed to the RF Converter Assembly (A3) at input jack A3J1. Upon entering the RF assembly, the signal is directed through one of four tracking preselector filters (20-49 MHz, 49-118 MHz, 118-275 MHz, and 275-512 MHz), or bypass path. Each tracking preselector path contains a tunable bandpass filter, used to reject out-of-band signals on the IF input. Each bandpass filter has a bandwidth that is typically 11% of the tuned frequency.

The preselected output is then amplified, applied to a 512 MHz low pass filter, and gain adjusted under microcontroller control. The IF signal is mixed in the first mixer with 1st LO signal from the Synthesizers section. This 1st LO signal varies from 692.5 to 1205 MHz in 2.5 MHz steps. The mixing of the RF signal and the 1st LO signal produces a 1st IF spectrum ranging from 690.0001 to 692.5000 MHz. This 1st IF signal is amplified and applied to a bandpass filter centered at approximately 691 MHz.

The 1st IF signal is gain adjusted under microcontroller control and input to the second mixer. Here the 1st IF signal is mixed with the 2nd LO signal from the synthesizers section. The 2nd LO signal, which varies from 668.6001 to 671.1000 MHz in 100 Hz steps, mixed with the 1st IF, produces a 2nd IF signal that is centered at 21.4 MHz with a bandwidth of approximately 12 MHz. This 2nd IF signal is then applied to a filter that is centered at 21.4 MHz, amplified, and split.

One path of the 21.4 MHz IF signal is routed to the front panel SM OUT/WBIF (Signal Monitor Output/Wideband IF connector J3. The SM OUT/WBIF output provides an IF signal that is nominally 12 dB above the RF input level. The other path is routed to the five IF bandwidth filters and the bypass path. As determined by the operator's IF bandwidth filter selection and under microcontroller control, the IF signal is routed to one of the six filter paths. The bandlimited 21.4 MHz IF signal is then amplified, gain adjusted under microcontroller control, and routed out of IF OUT jack, A3J8, to the Demodulator section.

The bandlimited 21.4 MHz IF signal from the RF Converter section is passed to the Demodulator Assembly (A4), entering at IF IN jack, A4J10, where it is applied to one of two roofing filters (a narrowband filter for signals with bandwidths of up to 50 kHz or a midband filter for bandwidths from 50 kHz of the signal is routed to the switched IF (SW IF) output jack, A4J2. After filtering, but before the amplifier chain, a sample of the 21.4 MHz IF signal is tapped off the path for the generator of the LOG Display (LOG DSP) signal. This signal is passed back to the Digital Control section where it is made available at the Auxiliary (AUX) output jack, A1J8.

The other path of the IF signal goes to the demodulator circuits where it encounters an FM Discriminator, an AM detector, or a single sideband detector. Demodulated signals from the FM discriminator are made available at the front panel FM Monitor (FM MON) output jack, J4. It is also routed to the Digital Control section for level monitoring.

When either the IFT (intermediate frequency translation) of the SSB (single sideband) detection modes are selected, the 21.4 MHz IF signal is mixed with the 3rd LO signal from the Synthesizer section for downconversion prior to demodulation. In SSB mode, the downconverted IF is applied to a single sideband filter. The filtered IF is then mixed with a 500 kHz reference frequency, derived from the 10 MHz reference input, in a product detector. As an additional function, both the CW and SSB demodulated signal levels are monitored by the Digital Control section via a peak detector circuit.

When the operator selects a deception mode, the output of the respective demodulator is selected, via microcontroller control, and rerouted to the video filter circuits. The detected video is then amplified and routed to the front panel switched video (SW VID) output jack, A4J6.

When the signal level is at or above the set COR threshold, the selected video is available as audio output at the AUDIO and PHONES jacks, A4J3 and A4J1 respectively. When the operator enables the Switched Audio Output function (SAO command), this audio is also routed to the front panel switched audio output (SAO) jack, A4J5.

The Synthesizer section (A2) consists of a group of phase-locked loop (PLL) and Direct Digital Synthesizer (DDS) circuits. Each circuit is controlled by data inputs received from the Digital Control Assembly (A1). One PLL circuit is used to generate the 692.5 to 1205 MHz 1st LO signal. Three other PLL circuits and a direct digital synthesizer are used to produce the 668.6001 to 671.1000 MHz 2nd LO signal. A fifth PLL circuit provides the 19.4 to 23.4 MHz 3rd LO signal which is used by the demodulator circuitry in the IF Amplifier/Demodulator section during BFO, CW, IFT, and SSB modes of receiver operation.

The final PLL system generates a 10 MHz reference signal for use by the other PLL systems in this section. It is also used by the demodulator circuits in the demodulator section. The 10 MHz reference is generated internally by 10 MHz TCVCXO oscillator.

The Digital Control section (A1) is responsible for overseeing all receiver operations. Included in this section are the serial remote interface circuits. When the operator issues a command over an interface, the remote interface circuit translates it and updates the microcontroller. The microcontroller (with support from its peripherals consisting of RAM, ROM, and D/A) then calculates and carries out the instructions. The instructions are provided to circuits in the other sections of the receiver via the parallel and serial decoders. Upon request, and upon completion of the task, the microcontroller provides a response back to the remote interface circuits for transmission to the remote controller, informing the operator that the panel AUX jack 18, these auxiliary outputs include SYNC IN and OUT, IF Spectrum status, COR status, and LOG display level. In the WJ-8607A-1 configuration, VHF and Microwave switching outputs are also provided for controlling an external RF switch. The RS-232, RS-422 and RS-485 serial remote interface circuits are also available at A1J7 and A1J1.

This section also provides regulated DC voltages to the other major sections. The +12 Vdc input, connected to the front panel +12V IN connector J14, is filtered and applied to a DC-to-DC converter. This converter provides +5.5 Vdc, -7.5 Vdc, +7.5 Vdc, +12 Vdc and +30 Vdc voltage. Further, the DC output is monitored by a power monitor circuit. If the +5 Vdc output power drops to a level below +4.62 Vdc, the power monitor circuit. If the +5 Vdc output power drops to a level below +4.62 Vdc, the power monitor circuit resets the microcontroller, write-protects static RAM (SRAM) memory, and places it on battery backup, ensuring no loss of data.

SECTION V

PREVENTIVE MAINTENANCE

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SECTION V

PREVENTIVE MAINTENANCE

5.1 GENERAL

The WJ-8607A VHF/UHF Surveillance Receiver has been designed to operate for extended periods of time with minimum routine maintenance. Cleaning and inspection should be performed at regular intervals, consistent with the facility's normal maintenance schedule.

5.2 CLEANING AND LUBRICATION

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

5.3 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 outer mechanical parts, such as connectors and interconnecting cabling, for looseness, wear, and other signs of deterioration. If it is determined that the unit must be opened, ensure that internal cabling and assemblies are properly inserted and secured into their appropriate location and making good contact.

5.4 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. Also check the 5 amp fuse located beneath the access plate on the bottom panel of the unit. Refer to **Figure 2-5** and **Figure 2-6**. Prior to taking any corrective maintenance action or breaking any seals, contact your BAE SYSTEMS representative, or BAE SYSTEMS Service Department to prevent the possibility of voiding the terms of the warranty. Contact BAE SYSTEMS via mail, telephone, wire, or cable at:

BAE SYSTEMS
Advanced Systems
Customer Service Department
700 Quince Orchard Road
Gaithersburg, Maryland 20878-1794

Toll Free: 1-800-954-3577
TELEX: 89-8402
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 BAE SYSTEMS Customer Service Department See the **General Terms and Conditions of Sale** paper (Form # WJ-151-X) for more information on equipment returns.

NOTE:

A nominal fee will be charged for all non-warranty repairs to cover the cost of handling, evaluation, and repair.

5.5 PREPARATION FOR RESHIPMENT OR STORAGE

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

1. Wrap the equipment in sturdy paper or plastic.

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

3. If shipping the equipment for service, fill out all information on the 5x6-inch PRODUCT DISCREPANCY REPORT card (Form # WJC-QA55-0) that was provided with the original shipment. Also ensure that the Return for Maintenance Authorization (RMA) number is recorded on the card. (See **paragraph 5.4** for details on obtaining this number.) If this card is not available, attach a tag to the equipment containing the following information:

   a. Return for Maintenance Authorization (RMA) number.

   b. The 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 FRAGILE.

When storing the equipment for extended periods, follow the above packing instructions to prevent damage to the equipment. The safe limits for storage environment are as follows:

Temperature: -40 to +70°C
Humidity: less than 95%

5.5.1 RESHIPPING EQUIPMENT WITHIN THE UNITED STATES

If reshipping the equipment within the United States, perform the following steps:

1. Prepare for reshipment in accordance with **paragraph 5.4**.
2. Ship to:

BAE SYSTEMS
Advanced Systems
700 Quince Orchard Road
Gaithersburg, MD 20878-1794
U.S.A.

5.5.2 RESHIPPING EQUIPMENT FROM OUTSIDE THE UNITED STATES

Additional information must be provided when reshipping equipment to BAE SYSTEMS from outside the United States that required an export license. Failure to follow these steps will make it necessary for BAE SYSTEMS to reapply for an export license from the U.S. Department of State. This may take six-to-eight weeks for approval. In order to assist in the rapid clearing of goods through U.S. Customs, perform the following steps:

1. Perform initial preparations for reshipment in accordance with **paragraph 5.4**.
2. Provide complete details of equipment being returned including part number, serial number (if applicable), quantity, and value in U.S. dollars.
3. Mark all documents with the RMA number.
4. Include the following statement on invoice:

> "U.S. Goods Temporarily Returned for Repair. These items are being returned to the United States under the authority of 22 CFR 123.4(a)(1)"

5. Mark the Air Waybill "NOTIFY CONSIGNEE UPON ARRIVAL."
6. Contact BAE SYSTEMS to obtain detailed information regarding the current consignee identity and shipping address. Do not ship until this information is provided.
7. Ship the equipment to BAE SYSTEMS in care of the identified consignee.

5.6 UPDATING FIRMWARE VIA EPROM REPLACEMENT

The following procedure describes the steps necessary to update WJ-8607A VHF/UHF Surveillance Receivers with new firmware versions, by replacing two EPROMS in the Digital Controller Assembly (A1). This procedure should performed by qualified maintenance technicians who are familiar with handling sensitive data storage devices.

The following hand tools are required in performing the replacement procedure:

a. No. 2 phillips-head screwdriver
b. ESD Wrist Strap
c. EPROM Extraction Tool (not required but recommended)

5.6.1 PROCEDURE

WARNING

Electrical shock hazard to personnel exists when the EPROM access cover of the receiver is removed while power is applied in addition to potential damage to the receiver. Insure that power is removed from the unit before proceeding with the following procedure

a. Ensure that the POWER switch on the receiver is set to OFF and that all cabling has been disconnected. Position the unit on a flat surface with the bottom side up.

b. Remove the two phillips-head screws used to secure the EPROM access cover to the receiver. See **Figure 5-1**.

c. Remove the EPROM access cover from the receiver.

CAUTION -- EQUIPMENT CONTAINS ASSEMBLIES SUBJECT TO DAMAGE BY STATIC ELECTRICITY. USE APPROVED GROUNDING PROCEDURES BEFORE TOUCHING, REMOVING, OR REPLACING ASSEMBLIES OR COMPONENTS.

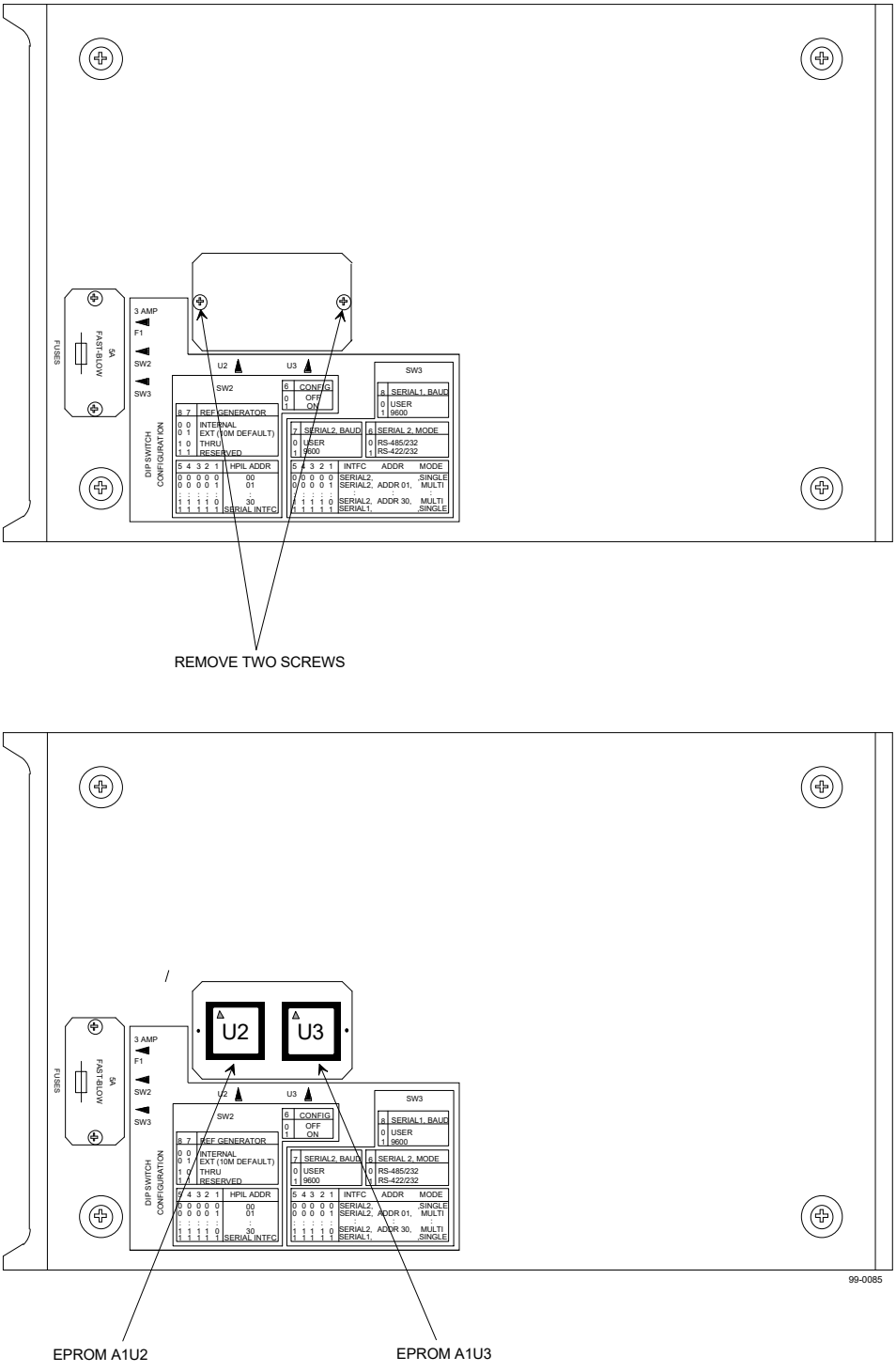

Figure 5-1. Location of EPROM Access Cover and EPROMs A1U2 and A1U3

NOTE

EPROM retainer clips are required with receivers using ceramic EPROMs.

d. Carefully remove the EPROM retainer clips if installed from EPROMs A1U2 and A1U3.

e. Using an EPROM extraction tool, carefully remove U2 and U3 from the receiver. Note the EPROM orientation in its socket by the location of the notches and small arrows to ensure correct pin alignment on insertion of the new EPROM.

f. Referring to **Figure 5-1**, install the new U2 and U3 EPROMs on the A1 assembly. The EPROMs are prominently marked with a white label giving the IC number (A1U2 or A1U3) and firmware version. Ensure proper pin alignment before applying downward pressure to seat the EPROM.

NOTE

EPROM retainer clips are required with receivers using ceramic EPROMs.

g. If ceramic EPROMs are used, reinstall the EPROM retainer clips (removed in **step d**) on the new EPROMs.

h. Reinstall the EPROM access cover and secure it to the receiver with the two phillips-head screws that were removed in **step b**.

i. Reconnect cabling to the receiver.

j. Power-up the receiver and check for normal power-up and initialization. Refer to **Section III**.

SECTION VI

REPLACEMENT PARTS LIST

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SECTION VI

REPLACEMENT PARTS LIST

6.1 UNIT NUMBERING METHOD

The method of numbering used throughout the unit is assigning reference designations (electrical symbol numbers) to identify: assemblies, subassemblies, modules within a subassembly, and discrete components. An example of the unit numbering method used is as 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)

On the main chassis schematic, components which are an integral part of the main chassis have no subassembly designations.

6.2 REFERENCE DESIGNATION PREFIX

The use of partial reference designations are used on the equipment and on the manual illustrations. This partial reference designation consists of the component type letter(s) and the identifying component number. The complete reference designation may be obtained by placing the proper prefix before the partial reference designation. Reference designation prefixes are included on the drawings and illustrations in the figure titles (in parenthesis).

6.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address	Mfr. Code	Name and Address
0AKZ5	Crane Electronics Inc. 4700 Smith Road Suite R Cincinnati, OH 45212	00681	Catalyst Research Corp. 1421 Clarkview Road Baltimore, MD 21209
0EXD1	Inductor Supply Company 1849 W. Sequoia Avenue Orange, CA 92668-1017	00779	AMP, Inc. P.O. Box 3608 Harrisburg, PA 17150
0GP12	Radiall, Inc. 150 Long Beach Blvd. Stratford, CT 06497	01037	Pyroferric New York Inc. 621 E. 216th Street Bronx, NY 10467
0HSF8	Nepenthe 2471 E. Bayshore Road, No. 600 Palo Alto, CA 94303	01295	Texas Instruments, Inc. Semiconductor-Components Division 13500 North Central Expressway Dallas, TX 75231

Mfr. Code	Name and Address
02113	Coilcraft, Inc. 1102 Silver Lake Road Cary, IL
04713	Motorola Incorporated Semiconductor Products Div. 5005 East McDowell Road Phoenix, AZ 85008
1ES66	Maxim Integrated Products 120 San Gabriel Drive Sunnyvale, CA 94086
11532	Teledyne Relays 3155 W. El Segundo Blvd. Hawthorne, CA 90250
14632	Signia-IDT, Inc. 700 Quince Orchard Road Gaithersburg, MD 20874
14482	Watkins-Johnson Company 3333 Hillview Avenue Palo Alto, CA 94304
14674	Corning Glass Works Houghton Park Corning, NY 14830
15542	Mini-Circuits Laboratories Division of Scientific Components Corporation 2625 E. 14th Street Brooklyn, NY 11235
16179	Omni-Spectra, Inc. 21 Continental Blvd. Merrimack, NH 03054
17856	Siliconix, Incorporated 2201 Laurelwood Road Santa Clara, CA 95054
18324	Signetics Corporation 811 East Arques Avenue Sunnyvale, CA 94086
19505	Applied Eng. Products Co. Division of Samarious, Inc. 300 Seymour Avenue Derby, CT 06418
20462	PREM Magnetics, Inc. 3519 N. Chapel Hill McHenry, IL 60050-2504
22526	Berg Electronics, Inc. Route 83 New Cumberland, PA 17070
24539	Avantek, Inc. 3175 Bowers Avenue Santa Clara, CA 95051
25088	Siemens America, Inc. 186 Wood Avenue S. Iselin, NJ 08830
26629	Frequency Sources, Inc. 16 Maple Road Chelmsford, MA 01824
27014	National Semiconductor Corp. 2950 San Ysidro Way Santa Clara, CA 95051
27956	Relcom 3333 Hillview Avenue Palo Alto, CA 94304
28480	Hewlett-Packard Company Corporate Headquarters 1501 Page Mill Road Palo Alto, CA 94304
29990	American Technical Ceramics One Norden Lane Huntington Station, NY 11746
2P953	Lemo USA, Inc. Santa Rosa, CA 95406

Mfr. Code	Name and Address
2X491	Rockwell International Corp. Filter Products 2990 Airway Avenue Costa Mesa, CA 92626
34899	Fair-Rite Products Corporation 1 Commercial Row Wallkill, NY 12589
4J627	Engineered Assemblies & Components Corp. 380 North Street Teterboro, NJ 07608
50101	Frequency Sources, Inc. 16 Maple Road Chelmsford, MA 01824-3737
50140	K and L Microwave, Inc. 203 Newton Street Salisbury, MD 21801
51406	Murata Erie North America, Inc. 1148 Franklin Road, S.E. Marietta, GA 30067
51642	Centre Engineering, Inc. 2820 E. College Avenue State College, PA 16801-7515
52648	Plessey Semiconductors 1641 Kaiser Avenue Irvine, CA 92714
54473	Matsushita Electric Corp. of America M/S 7H-4 2 Panasonic Way Secaucus, NJ 07094
54583	TDK Electronics Corp. 755 Eastgate Blvd. Garden City, NY 11530
55027	Q-Bit Corporation 311 Pacific Avenue, N.E. Palm Bay, FL 32905
55224	SMK Electronics Corporation 1901 Naneita Circle Placentia, CA 92670
55322	Samtec, Inc. 810 Progress Blvd. P.O. Box 1147 New Albany, IN 47150
61271	Fujitsu Microelectronics, Inc. 2985 Kifer Road Santa Clara, CA 95051
61429	Fox Electronics P.O. Box 1078 Cape Coral, FL 33910
61441	Saronix 4010 Transport Street Palo Alto, CA 94303-4913
61722	Epson America, Inc. 3415 Kashiwa Street Torrance, CA 90505-4024
63155	Synergy Microwave 483 McLean Blvd. & 18th Ave. Paterson, NJ 07504
64155	Linear Technology Corporation 1630 McCarthy Blvd. Milpitas, CA 95035-7487
64762	Elantec, Inc. 1996 Tarob Court Milpitas, CA 95035
71279	Cambridge Thermionic Corp. 445 Concord Avenue Cambridge, MA 02138
72982	Erie Technological Products 644 West 12th Street Erie, PA 16512

Mfr. Code	Name and Address	Mfr. Code	Name and Address
75915	Littlefuse Tracor, Inc. 800 E. Northwest Highway Des Plaines, IL 60016-3049	94902	Coilcraft, Inc. Otis Division 222 Avenue East Hawarden, IA 51023
7W259	Tel Cal Corporation 9108 Mayflower Avenue El Paso, TX 79925	95146	Alco Electronics Products, Inc. 1551 Osgood Street Woodside, NY 11377
91637	Dale Electronics, Inc. P.O. Box 609 Columbus, NE 68601	9AA16	SAI 407 Whooping Loop Altamonte Springs, FL 32701
91802	Industrial Devices, Inc. 982 River Road Edgewater, NJ 92705	9J979	Hitachi America, Ltd. 950 Benicia Avenue Sunnyvale, CA 94086-2804

6.4 PARTS LIST

The following parts list contain all the electrical components used in the unit, along with mechanical parts which may be subject to the unusual wear or damage. When ordering replacement parts from Signia-IDT, Inc., specify the unit type, the serial number, and the option configuration. Also include the reference designation and the description of each item ordered. The list of manufacturers, provided in **paragraph 6.3**, and the manufacturer's part number, provided in **paragraph 6.5**, are supplied as a guide to aid the user of the equipment while in the field. The parts listed may not necessarily be identical with the parts installed in the unit. The parts listed in **paragraph 6.5** will provide for satisfactory unit operation.

Replacement parts may be obtained from any manufacturer provided that the physical characteristics and electrical parameters of the replacement item are compatible with the original part. In the case where components are defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

NOTE

As improvements are made, it is the policy of Signia-IDT, Inc. to incorporate them in proprietary products. As a result, some transistors, diodes and integrated circuits which are installed in the unit may not agree with the parts lists or schematic diagrams of this manual. However, substitution of the semiconductor devices listed in this manual may be substituted with satisfactory results.

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
6.5	**TYPE WJ-8607A MINICEPTOR RECEIVER ASSEMBLY**			**MAIN CHASSIS**	
	Revision H1				
A1	Digital Control PC Assembly	1	797339-1	14632	
A1U2	EPROM, Programmed	1	842264-1	14632	
A1U3	EPROM, Programmed	1	842264-2	14632	
A2	Synthesizer PC Assembly	1	797135-1*	14632	
A3	RF Converter PC Assembly	1	797156-1*	14632	
A4	Demodulator PC Assembly	1	796780-7*	14632	
A4A1	Video Filter PC Assembly	X	381999-1	14632	
A4A1	Video Filter PC Assembly	X	382000-1	14632	
A4A1	Video Filter PC Assembly	X	382001-1	14632	
A4A1	Video Filter PC Assembly	X	382002-1	14632	
A4A1	Video Filter PC Assembly	X	382003-1	14632	
INTFC	Serial Interface	X	8607A	14632	
J1	Connector, Jack, SMA	1	2004-7985-00	16179	
J2	Connector, Jack, SMB	2	2003-7571-025	19505	
J3	Same As J2				
W1					
Thru	Not in Circuit				
W4					
W5	Cable Assembly	1	17300-723-5	14632	
W5P1	Connector, MCX, Right Angle	2	R113-180-000	0GP12	
W6	Cable Assembly	1	382106-1	14632	
W6P1	Connector, Plug, Right Angle	1	2007-7985-00	16179	
W7	Cable Assembly	1	17300-723-7	14632	
W7P1	Connector, Plug, SMB, Right Angle, Female	1	2105-7521-025	19505	
W7P2	Connector, Plug, SMB, Right Angle, Female	1	2105-7521-025	19505	
W8	Cable Assembly	1	17300-723-8	14632	
W8P1	Connector, Plug, SMB, Female	2	2002-7571-025	19505	
W9	Not In Circuit				
W10	Harness	1	482590-1	14632	
W10P1	Connector, Plug, 17-Pin	2	M80-8981705	KQ536	
W10P2	Strip, Modification	1	282220-1	14632	
W10P3	Strip, Modification	1	282220-2	14632	
W10P4	Same As W10P1				
W10P5	Strip, Modification	1	282220-3	14632	
W11	Cable, Flex, PC Assembly	1	383569-1	14632	
	Accessory Items				
	Connector, Plug, 6-Pin, Mates with EPG.1B.306.HRD	2	FGG.1B.306.C.L.A.D52	2P953	
	Connector, Plug, 3-Pin, Mates with EGG.0B.303.C.L.A.D52	1	FGG.0B.303.C.L.A.D52	2P953	
	Cable Assembly	1	383611-001	14632	
	Connector, Adapter, 9-Pin to 25-Pin D, Female Shielded	1	118-0	86072	
	Cable Assembly	1	3835701-001	14632	
	Fuse, 5A, Fast-Blo	2	R451005	75915	
	Connector, Receptacle, SMB, Female 51-ohm	1	2036-1511-051	19505	

*When the WJ-8607A/ENV Environmental Sealing option is implemented the assemblies installed are as follows:

Ref. Desig.	Part Number
A1	797136-3 (Conformal coated version of the 797136-1)
A2	797135-2 (Conformal coated version of the 797135-1)
A3	797156-2 (Conformal coated version of the 797156-1)
A4	796780-9 (Conformal coated version of the 796780-7)

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
6.5.1	**TYPE 797339-1 DIGITAL CONTROL PC ASSEMBLY**			REF DESIG PREFIX **A1**	
	Revision E1				
BT1	Battery, Lithium, 3V	1	VL2330-1HF	4J627	
C1	Capacitor, Ceramic, .047mF, 10%, 50V	69	841415-023	14632	
C2 Thru C11	Same as C1				
C12	Capacitor, Tantalum, 47mF, 20%, 16V	7	841293-30	14632	
C13	Same as C12				
C14	Capacitor, Tantalum, 3.3mF, 20%, 16V	7	841293-36	14632	
C15	Same as C14				
C16	Same as C1				
C17	Capacitor, Ceramic, 22pF, 2%, 50V	5	841416-033	14632	
C18	Same as C17				
C19	Same as C1				
C20	Same as C1				
C21	Same as C14				
C22	Same as C14				
C23	Same as C1				
C24	Capacitor, Ceramic, 100pF, 5%, 50V	160	841415-007	14632	
C25	Same as C24				
C26	Same as C1				
C27	Same as C14				
C28	Same as C1				
C29	Same as C1				
C30	Same as C1				
C31	Not in Circuit				
C32 Thru C40	Same as C1				
C41 Thru C70	Same as C24				
C71	Same as C1				
C72	Same as C1				
C73 Thru C107	Same as C24				
C108	Capacitor, Tantalum, 6.8mF, 20%, 16V	4	841293-26	14632	
C109	Same as C1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	REF DESIG PREFIX **A1**				
C110	Same as C1				
C111	Same as C108				
C112	Same as C108				
C113	Same as C1				
C114	Same as C1				
C115					
Thru	Same as C24				
C120					
C121	Not in Circuit				
C122	Not in Circuit				
C123					
Thru	Same as C24				
C146					
C147	Same as C1				
C148	Not in Circuit				
C149	Same as C14				
C150					
Thru	Same as C1				
C162					
C163	Same as C12				
C164	Capacitor, Ceramic, 100pF, 5%, 50V	1	841415-007	14632	
C165	Same As C12				
C166	Capacitor, Ceramic, .047 µF, 10%, 50V	1	841415-023	14632	
C167	Not Installed				
C168	Same As C17				
C169	Same as C17				
C170					
Thru	Same as C24				
C195					
C196	Same as C1				
C197	Same as C1				
C198	Same as C1				
C199					
Thru	Same as C24				
C204					
C205	Same as C1				
C206	Same as C24				
C207	Same as C24				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1**

C208					
Thru	Not Installed				
C213					
C214	Same as C24				
C215	Same as C24				
C216	Same as C1				
C217	Same as C24				
C218					
Thru	Same as C1				
C223					
C224	Same as C12				
C225	Same as C1				
C226	Same as C1				
C227	Not Installed				
C228	Not Installed				
C229	Same As C24				
C230	Same as C24				
C231	Same as C24				
C232	Same as C1				
C233	Same as C1				
C234	Same as C1				
C235	Capacitor, Electrolytic	2	ECE-A1HFS470	54473	
C236	Same as C235				
C237					
Thru	Same as C24				
C254					
C255	Capacitor, Tantalum, 3.3mF, 20%, 35V	1	841293-11	14632	
C256	Same as C108				
C257	Same as C1				
C258	Same as C1				
C259	Same as C17				
C260	Same as C12				
C261	Capacitor, Tantalum, 1.0mF, 20%, 35V	1	841293-05	14632	
C262	Same as C12				
C263	Same as C14				
C264	Same as C1				
C265					
Thru	Same as C24				
C269					

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	REF DESIG PREFIX **A1**				
C270	Same as C1				
CR1	Diode, Switching	6	MMBD7000LT1	04713	
CR2	Diode, Schottky Barrier	5	HSMS-2812-T31	28480	
CR3	Same as CR1				
CR4	Same as CR1				
CR5	Same as CR2				
CR6	Same as CR2				
CR7	Same as CR1				
CR8	Same as CR1				
CR9	Not Installed				
CR10	Not Installed				
CR11	Same as CR1				
CR12	Same as CR2				
CR13	Not in Circuit				
CR14	Diode Rectifier 200PRV 1.0A	1	1N4003	80131	
CR15	Same as CR2				
DS1	LAMP Assembly, LED Red	2	5600F1	91802	
DS2	LAMP Assembly, LED Green	1	5600F5	91802	
DS3	LAMP Assembly, LED Yellow	1	5600F7	91802	
DS4	Same as DS1				
F1	Fuse 5A	1	R451005	61935	
FB1	Ferrite, Bead	1	LCB1210/A	0EXD1	
FB2	Ferrite, Bead	1	2743021446	34899	
J1	Connector, 15-Pin	1	MDSM-15PE-Z10	71468	
J2	Connector, 17 Position	2	M80-8761722	KQ536	
J3	Same as J2				
J4	Socket	15	645952-2	00779	
J5	Not Installed				
J6	Not Installed				
J7	Connector, 6-Pin	2	EPG.1B.306.HLN	2P953	
J8	Same as J7				
J9	Not Installed				
J10	Not Installed				
J11	Connector, Header, 26 Position	1	SPGM-30DS-G0533	0AKZ5	
J12	Connector, Header, 36 Position	1	SPGM-40DS-G0533	0AKZ5	
J13	Connector, Header, 12 Position	1	SPGM-16DS-G0533	0AKZ5	
J14	Connector, 3-Pin	1	EPG.0B.303.HLN	2P953	
K1	Not Installed				
L1	Inductor, 4.7mH, +20%	3	B82422-A1472-M	25088	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A1**		
L2	Same as L1				
L3	Same as L1				
L4	Inductor, 28mH	2	SPS-207	20462	
L5	Same as L4				
PS1	Power Supply, DC See Appropriate CPL	1	766019-1	14632	
Q1	Not Installed				
Q2	Not Installed				
Q3	Transistor	3	MMBT2222ALT1	04713	
Q4	Transistor	4	SI9430DY	17856	
Q5	Same as Q4				
Q6	Same as Q4				
Q7	Same as Q4				
Q8	Same as Q3				
Q9	Same as Q3				
Q10	Transistor	1	MMBT2907ALT1	04713	
R1	Resistor, Fixed, 330kW, 5%, .1W	1	841414-133	14632	
R2	Resistor, Fixed, 10MW, 5%, .1W	2	841414-169	14632	
R3	Resistor, Fixed, 2.7kW, 5%, .1W	2	841414-083	14632	
R4	Resistor, Fixed, 33K 0.5%, .1W	7	841752-109	14632	
R5	Resistor, Fixed, 4.7kW, 5%, .1W	17	841414-089	14632	
R6	Same as R5				
R7	Same as R5				
R8	Not in Circuit				
R9	Not in Circuit				
R10	Same as R5				
R11	Same as R5				
R12	Resistor, Fixed, 10K 0.5%, .1W	20	841752-097	14632	
R13	Resistor, Fixed, 100kW, 5%, .1W	76	841414-121	14632	
R14	Same as R13				
R15	Resistor, Fixed, 47K 0.5%, .1W	3	841752-113	14632	
R16	Same as R5				
R17	Resistor, Fixed, 1.0kW, 5%, .1W	13	841414-073	14632	
R18	Same as R5				
R19	Same as R5				
R20	Same as R4				
R21 Thru R24	Same as R5				
R25	Same as R12				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1**

R26	Same as R13				
R27	Same as R4				
R28	Same as R13				
R29	Same as R13				
R30	Same as R13				
R31	Same as R4				
R32	Same as R4				
R33	Same as R17				
R34	Same as R17				
R35	Same as R17				
R36	Resistor, Fixed, 6.8W, 5%, .1W	22	841414-021	14632	
R37	Same as R36				
R38	Same as R36				
R39					
Thru	Same as R13				
R72					
R73	Not in Circuit				
R74					
Thru	Same as R13				
R78					
R79	Same as R17				
R80	Same as R13				
R81	Same as R12				
R82	Same as R5				
R83	Same as R17				
R84	Resistor, Fixed, 470kW, 5%, .1W	1	841414-137	14632	
R85	Resistor, Fixed, 47W, 5%, .1W	4	841414-041	14632	
R86	Same as R17				
R87					
Thru	Same as R36				
R90					
R91	Same as R5				
R92	Same as R12				
R93	Resistor, Fixed, 22kW, 5%, .1W	6	841414-105	14632	
R94	Same as R12				
R95	Same as R93				
R96	Same as R12				
R97	Same as R93				
R98	Same as R12				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A1**

R99	Same as R93				
R100	Same as R12				
R101	Same as R93				
R102	Same as R36				
R103	Same as R36				
R104	Same as R12				
R105	Same as R93				
R106	Same as R85				
R107	Same as R2				
R108	Same as R13				
R109	Same as R36				
R110	Resistor, Fixed, 27K 0.5%, .1W	6	841752-107	14632	
R111	Same as R36				
R112	Same as R110				
R113	Same as R36				
R114	Same as R110				
R115	Same as R36				
R116	Same as R110				
R117	Same as R110				
R118	Same as R110				
R119	Same as R4				
R120	Same as R15				
R121	Same as R5				
R122	Same as R12				
R123	Same as R13				
R124	Same as R12				
R125	Same as R13				
R126	Same as R12				
R127	Same as R13				
R128	Same as R12				
R129	Same as R12				
R130	Same as R12				
R131					
Thru	Same as R36				
R134					
R135	Same as R12				
R136	Same as R12				
R137	Same as R36				
R138	Same as R36				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	REF DESIG PREFIX **A1**				
R139	Same as R85				
R140					
Thru	Same as R13				
R161					
R162	Resistor, Fixed, 100W, 5%, .1W	4	841414-049	14632	
R163	Same as R17				
R164	Same as R162				
R165	Same as R162				
R166	Same as R17				
R167	Same as R17				
R168	Same as R36				
R169	Resistor, Fixed, 150K 0.5%, .1W	1	841752-125	14632	
R170	Same as R85				
R171	Same as R15				
R172	Same as R17				
R173	Same as R17				
R174					
Thru	Not Installed				
R180					
R181	Same as R13				
R182	Same as R12				
R183	Same as R13				
R184	Same as R12				
R185	Same as R162				
R186	Not Installed				
R187	Not Installed				
R188	Same as R3				
R189	Same as R13				
R190	Same as R17				
R191	Same as R4				
R192	Resistor, Fixed, 56K 0.5%, .1W	2	841752-115	14632	
R193	Same as R12				
R194	Same as R192				
R195	Resistor, Fixed, 15K 0.5%, .1W	1	841752-101	14632	
R196	Resistor, Fixed, 6.8K 0.5%, .1W	1	841752-093	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A1**		
R197	Resistor, Fixed, 330W, 5%, .1W	1	841414-061	14632	
R198	Same as R5				
R199	Same as R5				
R200	Same as R36				
R201	Same as R36				
R202	Same as R13				
S1	Switch, toggle	1	ET01-M-D1-SA-K-E	09353	
S2	Switch, 8-Position, Slide	2	CHS08A OR CHS08TA	9AA35	
S3	Same as S2				
T1	Not Installed				
U1	Integrated Circuit	1	MC68HC16Z1CFC16	04713	
U2	Integrated Circuit, EPROM	1	841969-1	14632	
U3	Integrated Circuit, EPROM	1	841969-2	14632	
U4	Integrated Circuit	2	HM62832HLJP-35	9J979	
U5	Same as U4				
U6	Integrated Circuit	1	BQ2203ASN	-TBD-	
U7	Integrated Circuit	1	AT28C16-25JC	IFN41	
U8	Not in Circuit				
U9	Integrated Circuit	1	8674HC04SO14U	14632	
U10	Integrated Circuit	2	867226D120	14632	
U11	Same as U10				
U12	Integrated Circuit	1	MAX516AEWG	1ES66	
U13	Integrated Circuit	1	8674AC139SO16U	14632	
U14	Integrated Circuit	2	8674HC174SO16U	14632	
U15	Integrated Circuit	5	8674HC273SOL20U	14632	
U16	Same as U15				
U17	Same as U15				
U18	Same as U14				
U19	Same as U15				
U20	Same as U15				
U21	Integrated Circuit	3	8674HC08SO14U	14632	
U22	Same as U21				
U23	Integrated Circuit	1	864050SO16N	14632	
U24	Integrated Circuit	1	SC26C92C1A	18324	
U25	Integrated Circuit	3	LTC485CS8	64155	
U26	Same as U25				
U27	Same as U25				
U28	Integrated Circuit	2	DS3691M	27014	
U29	Same as U28				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A1**		
U30	Amplifier	1	86064SO14U	14632	
U31	Integrated Circuit	1	8674HC14SO14U	14632	
U32	Integrated Circuit	1	8674HC74SO14U	14632	
U33	Integrated Circuit	2	8674HC373SOL20U	14632	
U34	Same as U33				
U35	Amplifier	1	MC33171D	04713	
U36	Not Installed				
U37	Same as U21				
U38	Not Installed				
U39	Integrated Circuit	1	TL431CD	04713	
U40	Integrated Circuit	2	TK11550MT	TOKO0	
U41	Same as U40				
VR1	Varistor	1	LM4040CIM3-5.0	27014	
VR2 Thru VR5	Not Installed				
VR6	Diode, Zener 3.3V	1	MMBZ5226BLT1	04713	
XF1	Fuseholder with 5 Amp Fuse	1	154005	61935	
Y1	Crystal	1	MC-405 32.768KAA0	61722	
Y2	Crystal	1	NMS037-20	61441	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

6.5.1.1 TYPE 766019-1 DC/DC POWER SUPPLY — REF DESIG PREFIX **A1PS1**

	Revision C				
A1	DC/DC Power Supply PC Assembly	1	381987-1	14632	
A2	DC/DC Controller PC Assembly	1	381988-1	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
6.5.1.1.1	**Type 381987-1 DC/DC Converter Power Supply Assembly**		REF DESIG PREFIX **A1PS1A1**		
	Revision D2				
C1	Capacitor, Ceramic: .10 µF, 10%, 50 Vdc	7	841250-25	14632	
C2	Capacitor, Tantalum: 15 µF, 20%, 25 V	10	841293-19	14632	
C3	Same as C1				
C4	Capacitor, Electrolytic, Aluminum: 100 µF, 20%, 16 V	2	ECE-A1CFS101	54473	
C5	Same as C4				
C6	Same as C2				
C7	Capacitor, Tantalum: 1.0 µF, 20%, 35 V	3	841293-05	14632	
C8	Same as C7				
C9	Same as C1				
C10	Same as C7				
C11	Same as C2				
C12	Same as C2				
C13	Same as C1				
C14	Same as C2				
C15	Same as C2				
C16	Same as C1				
C17	Same as C2				
C18	Same as C2				
C19	Same as C1				
C20	Same as C2				
C21	Same as C2				
C22	Same as C1				
CR1	Rectifier	6	MURD610CT	04713	
CR2	Not Used				
CR3	Not Used				
CR4	Rectifier	1	MURD620CT	04713	
CR5					
Thru	Same as CR1				
CR9					
CR10	Diode, Zener	1	MLL4752A	04713	
CR11	Not Used				
CR12	Same as CR4				
E1	Pin, Connector	8	460-2620-01-03-00	71279	
E2					
Thru	Same as E1				
E8					
FB1	Ferrite, Bead	4	2743021447	34899	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A1PS1A1**		
FB2					
Thru	Same as FB1				
FB4					
J1	Connector, 6 Position	1	SSM-106-S-SV	55322	
L1	Inductor	1	382059-1	14632	
L2	Inductor	1	382061-1	14632	
L3	Inductor	1	20681-308	14632	
L4	Inductor: 47 µH, ±10%	1	NL322522-470K	54583	
L5	Inductor	4	20681-309	14632	
L6					
Thru	Same as L5				
L8					
Q1	Transistor	2	MTD10N05E	04713	
Q2	Same as Q1				
R1	Resistor, Fixed, 10.0Ω, 5%, 1/18 W	1	841296-017	14632	
R2	Resistor, Fixed, 10 kΩ, ±5%, .1 W	2	841414-097	14632	
R3	Same as R2				
T1	Transformer	1	382060-1	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	6.5.1.1.2 Type 381988-1 DC/DC Converter Controller Assembly		REF DESIG PREFIX **A1PS1A2**		
	Revision F1				
C1	Capacitor, Tantalum: 3.3 µF, 20%, 35 V	1	841293-11	14632	
C2	Capacitor, Tantalum: .47 µF, 20%, 35 V	1	841293-02	14632	
C3	Capacitor, Ceramic: .10 µF, 10%, 50 Vdc	3	841250-25	14632	
C4	Capacitor, Ceramic: 2.2 µF, 20%, 20 V	1	841293-09	14632	
C5	Same as C3				
C6	Capacitor, Ceramic: 470 pF, 5%, 50 Vdc	1	841250-11	14632	
C7	Same as C3				
CR1	Diode	1	MBAV74	04713	
CR2	Diode, Zener	1	MMBZ5246BLT1	04713	
P1	Terminal, Strip, 6 Pin	1	65500-106	22526	
R1	Resistor, Fixed: 150 kΩ, 5%, 1/8 W	1	841296-117	14632	
R2	Resistor, Fixed: 10 kΩ, 5%, 1/8 W	8	841296-089	14632	
R3	Resistor, Fixed: 100Ω, 5%, 1/8 W	1	841296-041	14632	
R4	Resistor, Fixed: 1.0 kΩ, 5%, 1/8 W	1	841296-065	14632	
R5	Same as R2				
R6	Resistor, Fixed: 82 kΩ, 5%, 1/18 W	1	841296-111	14632	
R7	Resistor, Fixed: 15 kΩ, 5%, 1/8 W	1	841296-093	14632	
R8	Resistor, Fixed: 6.8 kΩ, 5%, 1/8 W	3	841296-085	14632	
R9	Resistor, Fixed: 47 kΩ, 5%, 1/8 W	1	841296-105	14632	
R10	Same as R2				
R11	Same as R2				
R12	Resistor, Fixed: 470Ω, 5%, 1/8 W	1	841296-057	14632	
R13	Not Used				
R14	Resistor, Fixed: 2.7 kΩ, 5%, 1/8 W	1	841296-075	14632	
R15	Resistor, Fixed: 2.2 kΩ, 5%, 1/8 W	1	841296-073	14632	
R16	Same as R8				
R17	Same as R8				
R18	Resistor, Fixed: 470 kΩ, 5%, 1/8 W	1	841296-129	14632	
R19					
Thru	Same as R2				
R22					
R23	Resistor, Fixed: 22 kΩ, 5%, 1/8 W	1	841296-097	14632	
R24	Resistor, Fixed: 100 kΩ, 5%, 1/8 W	1	841296-113	14632	
U1	Integrated Circuit	1	TSC170C0E	15818	
U2	Integrated Circuit, Quad 2-Input NOR	1	CD4001BCM	27014	
U3	Integrated Circuit, Quad Comparator	1	LM339D	04713	

6.5.2 TYPE 797135-1 SYNTHESIZER PC ASSEMBLY — REF DESIG PREFIX **A2**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision J1				
C1	Capacitor, Ceramic, 1000 pF, ±10%, 50V	28	841415-013	14632	
C2	Capacitor, Ceramic, 2.4 pF, ±0.1pF 50V	3	841416-010	14632	
C3	Not Used				
C4	Capacitor, Ceramic, 6.8 pF, ±0.25pF 50V	2	841416-021	14632	
C5	Capacitor, Film, .039 mF, ±5%, 50V	1	ECH-U1H393JB5	-TBD-	
C6	Capacitor, Ceramic, 10 pF, ±2%, 50V	3	841416-025	14632	
C7	Capacitor, Ceramic, .047mF ±10%, 50V	191	841415-023	14632	
C8	Capacitor, Ceramic, 1.5 pF, ±0.1pF 50V	3	841416-005	14632	
C9	Same as C7				
C10	Same as C1				
C11	Capacitor, Ceramic, 3.9 pF, ±0.1pF 50V	1	841416-015	14632	
C12	Same as C8				
C13	Same as C4				
C14	Same as C7				
C15	Capacitor, Ceramic, 1.8 pF, ±0.1pF 50V	2	841416-007	14632	
C16	Capacitor, Ceramic, 3.3 pF, ±0.1pF 50V	7	841416-013	14632	
C17	Same as C7				
C18	Capacitor, Tantalum, 100 mF, ±20%, 6V	17	841293-32	14632	
C19	Same as C1				
C20	Capacitor, Ceramic, 4.3 pF, ±0.1pF 50V	2	841416-016	14632	
C21	Same as C8				
C22	Same as C6				
C23	Not Used				
C24	Same as C7				
C25	Same as C2				
C26	Same as C7				
C27	Capacitor, Ceramic, 4.7 pF, ±0.1pF 50V	6	841416-017	14632	
C28	Same as C1				
C29	Capacitor, Ceramic, 7.5 pF, ±0.25pF 50V	1	841416-022	14632	
C30	Same as C15				
C31	Capacitor, Ceramic, 24 pF, ±2%, 50V	1	841416-034	14632	
C32	Not Used				
C33	Same as C7				
C34	Same as C2				
C35	Same as C16				
C36	Same as C7				
C37	Same as C7				
C38	Same as C27				
C39	Same as C27				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A2**

C40					
Thru	Same as C7				
C43					
C44	Same as C1				
C45					
Thru	Same as C7				
C48					
C49	Same as C1				
C50	Same as C7				
C51	Same as C7				
C52	Same as C1				
C53	Same as C7				
C54	Same as C1				
C55	Same as C7				
C56	Same as C7				
C57	Capacitor, Tantalum, 15 mF, ±20%, 6V	12	841293-28	14632	
C58	Same as C7				
C59	Capacitor, Ceramic, 82 pF, ±2%, 50V	2	841416-047	14632	
C60	Capacitor, Ceramic, 4700 pF, ±10%, 50V	1	841415-017	14632	
C61	Same as C18				
C62	Same as C1				
C63	Same as C59				
C64	Capacitor, Ceramic, 220 pF, ±2%, 50V	3	841416-057	14632	
C65	Same as C18				
C66	Same as C18				
C67	Same as C7				
C68	Capacitor, Tantalum, 1.0 mF, ±20%, 35V	3	841293-05	14632	
C69	Same as C7				
C70	Same as C18				
C71	Same as C18				
C72	Same as C7				
C73	Same as C7				
C74	Capacitor, Tantalum, .47 mF, ±20%, 25V	4	841293-02	14632	
C75	Same as C7				
C76	Same as C7				
C77	Same as C18				
C78					
Thru	Same as C7				
C81					
C82	Same as C57				
C83	Same as C7				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
					REF DESIG PREFIX **A2**
C84	Capacitor, Tantalum, 10 mF, ±20%, 10V	1	841293-27	14632	
C85	Same as C74				
C86	Capacitor, Tantalum, 1.0 mF, ±20%, 16V	6	841293-04	14632	
C87					
Thru	Same as C86				
C91					
C92	Capacitor, Ceramic, 6800 pF, ±10%, 50V	1	841415-018	14632	
C93					
Thru	Same as C7				
C95					
C96	Capacitor, Tantalum, 10 mF, ±20%, 35V	1	841293-17	14632	
C97					
Thru	Same as C7				
C104					
C105	Same as C57				
C106					
Thru	Same as C7				
C112					
C113	Same as C27				
C114	Same as C57				
C115	Same as C18				
C116					
Thru	Same as C7				
C119					
C120	Same as C18				
C121					
Thru	Same as C7				
C123					
C124	Same as C18				
C125	Same as C7				
C126	Same as C68				
C127	Capacitor, Ceramic, 330 pF, ±2%, 50V	1	841416-061	14632	
C128	Capacitor, Ceramic, 750 pF, ±2%, 50V	2	841416-070	14632	
C129	Capacitor, Ceramic, 620 pF, ±2%, 50V	1	841416-068	14632	
C130	Same as C7				
C131	Same as C7				
C132	Capacitor, Tantalum, .33 mF, ±20%, 35V	3	841293-01	14632	
C133	Same as C132				
C134					
Thru	Same as C7				
C137					

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A2**		
C138	Same as C132				
C139	Same as C7				
C140	Capacitor, Ceramic, 47 pF, ±2%, 50V	2	841416-041	14632	
C141	Same as C140				
C142					
Thru	Same as C7				
C151					
C152	Same as C68				
C153	Same as C7				
C154	Same as C7				
C155	Capacitor, Ceramic, .01 mF, ±10%, 50V	4	841415-019	14632	
C156*	Same as C7				
C157*	Same as C7				
C158	Same as C155				
C159	Same as C7				
C160	Same as C16				
C161	Capacitor, Ceramic, .7 pF, ±0.05 pF 150V	2	ATC100A0R7AW150X	29990	
C162	Same as C27				
C163	Same as C20				
C164	Capacitor, Ceramic, 2.2 pF, ±0.1 pF 50V	3	841416-009	14632	
C165	Capacitor, Ceramic, 22 pF, ±2%, 50V	4	841416-033	14632	
C166	Same as C164				
C167					
Thru	Same as C7				
C170					
C171	Same as C16				
C172	Capacitor, Ceramic, 1 pF, ±0.1 pF 50V	2	841416-001	14632	
C173					
Thru	Same as C7				
C179					
C180	Same as C64				
C181	Capacitor, Ceramic, 470 pF, ±2%, 50V	2	841416-065	14632	
C182					
Thru	Same as C7				
C187					
C188	Same as C18				
C189					
Thru	Same as C7				
C191					
C192	Capacitor, Ceramic, 47 pF, ±5%, 50V	24	841415-005	14632	
C193	Capacitor, Ceramic, 100 pF, ±5%, 50V	13	841415-007	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A2**

C194	Same as C193				
C195	Same as C193				
C196	Same as C7				
C197	Same as C57				
C198					
Thru	Same as C7				
C203					
C204	Same as C155				
C205	Same as C16				
C206	Same as C161				
C207	Same as C38				
C208	Same as C16				
C209	Same as C164				
C210	Same as C165				
C211	Same as C172				
C212					
Thru	Same as C7				
C228					
C229	Same as C18				
C230					
Thru	Same as C7				
C232					
C233	Same as C74				
C234	Same as C7				
C235	Capacitor, Tantalum, 3.3 mF, ±20%, 16V	1	841293-10	14632	
C236	Same as C7				
C237	Same as C7				
C238	Same as C18				
C239					
Thru	Same as C7				
C242					
C243					
Thru	Same as C193				
C245					
C246	Same as C7				
C247	Same as C18				
C248					
Thru	Same as C7				
C250					
C251	Capacitor, Ceramic, .1 mF, ±10%, 50V	2	841250-25	14632	
C252	Same as C251				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A2**

C253					
Thru	Same as C7				
C256					
C257	Same as C74				
C258	Same as C7				
C259	Same as C7				
C260	Same as C193				
C261					
Thru	Same as C7				
C264					
C265	Same as C18				
C266					
Thru	Same as C7				
C268					
C269	Same as C181				
C270	Same as C57				
C271					
Thru	Same as C7				
C274					
C275	Capacitor, Ceramic, 150 pF, ±5%, 50V	3	841415-008	14632	
C276	Same as C7				
C277	Same as C275				
C278	Same as C275				
C279	Not Used				
C280	Same as C7				
C281	Same as C7				
C282	Same as C7				
C283	Same as C18				
C284	Same as C7				
C285	Same as C7				
C286	Same as C1				
C287	Capacitor, Ceramic, 33 pF, ±5%, 50V	1	841415-004	14632	
C288	Same as C7				
C289	Same as C57				
C290	Same as C16				
C291	Same as C155				
C292	Same as C57				
C293	Same as C18				
C294	Same as C7				
C295	Same as C7				
C296	Same as C6				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A2**

C297					
Thru	Same as C7				
C299					
C300	Not Used				
C301					
Thru	Same as C193				
C303					
C304					
Thru	Same as C7				
C307					
C308	Not Used				
C309	Same as C7				
C310	Same as C64				
C311	Same as C7				
C312					
Thru	Same as C1				
C329					
C330	Same as C7				
C331*	Same as C7				
C332	Same as C193				
C333	Same as C57				
C334					
Thru	Same as C192				
C356					
C357					
Thru	Same as C7				
C360					
C361	Same as C57				
C362	Same as C7				
C363	Capacitor, Ceramic, 220 pF, ±5%, 50V	1	841415-009	14632	
C364					
Thru	Same as C7				
C366*					
C367	Same as C57				
C368	Not Used				
C369	Same as C193				
C370	Same as C193				
C371	Not Used				
C372	Not Used				
C373					
Thru	Same as C7				
C377					

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A2**		
C378	Same as C165				
C379	Same as C165				
C380	Same as C7				
C381	Capacitor, Ceramic, 1500 pF, ±2%, 50V	1	841416-077	14632	
C382	Capacitor, Ceramic, 180 pF, ±2%, 50V	1	841416-055	14632	
C383					
Thru	Not Used				
C385					
C386	Same as C57				
C387	Capacitor, Ceramic, 68 pF, ±5%, 50V	2	841415-006	14632	
C388	Same as 387				
C389	Same as C128				
CR1	Diode, Reverse Voltage, 30 V, 200 mAMPS	6	MMBV105G	04713	
CR2	Diode, Reverse Voltage, 30 V, 200 mAMPS	1	MMBV109-L-T1	04713	
CR3					
Thru	Same as CR1				
CR5					
CR6	Diode, Dual Switching	3	MMBD7000LT1	04713	
CR7	Same as CR6				
CR8	Diode, Tuning, mHF C=1 to 9 pF	2	BB811E7263	25088	
CR9	Same as CR6				
CR10	Same as CR8				
CR11	Same as CR1				
CR12	Same as CR1				
DS1	Not Used				
DS2	Lamp, LED, Red	6	HLMP-7000-021	28480	
DS3					
Thru	Same as DS2				
DS7					
E1	Connector, PC, Terminal	4	8145-7521-025	19505	
E2					
Thru	Same as E1				
E4					
FB1	Ferrite, Bead	12	CB70-201209T	54583	
FB2					
Thru	Same as FB1				
FB5					
FB6					
Thru	Not Used				
FB11					

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A2**

FB12				
Thru	Same as FB1			
FB18				
J1	Connector, Header, 26 position	1	SPGM-30DS-G0533	0AKZ5
J2	Not Used			
J3	Connector, Jack MCX	2	R113-426	0GP12
J4	Same as J3			
J5	Connector, Header, 36 position	1	SPGM-40DS-G0533	0AKZ5
J6	Connector, Header, 16 position	1	SPGM-16DS-G0533	0AKZ5
L1				
Thru	Not Used			
L3				
L4	Inductor, 4.7 mH, ±20%, @7.96 MHz	16	B82422-A1472-M	25088
L5	Same as L4			
L6				
Thru	Not Used			
L8				
L9				
Thru	Same as L4			
L11				
L12	Inductor, 5600 nH, ±5%, @7.9 MHz	1	841438-067	14632
L13	Same as L4			
L14	Inductor, 6800 nH, ±5%, @7.9 MHz	2	841438-069	14632
L15	Inductor, 1.2 mH, ±5%,@7.9 MHz	1	841444-003	14632
L16	Inductor, 0.1 mH, ±20%, 400 mAMPS	1	B82422-A3101-M	25088
L17	Same as L4			
L18	Inductor, 10 nH, ±10%	2	841698-001	14632
L19	Same as L4			
L20	Same as L4			
L21	Same as L18			
L22	Inductor, 47mH, ±5%, @2.5 MHz	2	841444-041	14632
L23	Same as L4			
L24	Inductor, 100 nH, ±10%	4	841698-013	14632
L25				
Thru	Same as L4			
L27				
L28	Same as L22			
L29				
Thru	Same as L4			
L31				
L32	Inductor, 820 nH, ±5%, @25 MHz	1	841438-047	14632

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A2**		
L33	Inductor, 220 nH, ±20%	19	CS-221-XMBC	02113	
L34					
Thru	Same as L33				
L51					
L52	Same as L14				
L53	Inductor, 1.0 mH, ±20%, @7.96 MHz	23	B82422-A1102-M	25088	
L54					
Thru	Same as L53				
L75					
L76	Not Used				
L77					
Thru	Same as L24				
L79					
L80	Inductor, 150 nH, ±5%, @25 MHz	1	841438-029	14632	
P1	Connector, Plug, SMB Female, for RD-178	2	2105-7521-025	95505	
P2	Connector, Plug, SMB Female, for RD-178		2105-7521-025	95505	
P3	Connector, Plug, SMB Female, for RD-178	2	2002-7571-005	19505	
P4	Same as P3				
Q1	Transistor	4	841381-1	14632	
Q2					
Thru	Same as Q1				
Q4					
Q5	Transistor	12	MMBT2907ALT1	04713	
Q6					
Thru	Same as Q5				
Q9					
Q10	Transistor	8	MMBT2222ALT1	04713	
Q11	Same as Q5				
Q12	Same as Q10				
Q13	Same as Q10				
Q14	Transistor	2	2N7002-LT1	17856	
Q15	Same as Q5				
Q16	Same as Q14				
Q17	Transistor	1	MMBR941	04713	
Q18	Same as Q10				
Q19	Same as Q5				
Q20	Same as Q10				
Q21	Same as Q10				
Q22	Transistor	2	NE85633-T1	4T165	
Q23	Transistor	1	MMBR2857-LT1	04713	
Q24	Same as Q22				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A2**		
Q25	Transistor	2	VP0610T	17856	
Q26	Same as Q5				
Q27	Same as Q10				
Q28	Same as Q5				
Q29	Transistor	1	MMBR911	04713	
Q30	Same as Q25				
Q31	Same as Q10				
Q32	Same as Q5				
Q33	Same as Q5				
R1	Resistor, Fixed, 1.0 kW, ±5%, .1W	33	841414-073	14632	
R2	Resistor, Fixed, 1.5 kW, ±5%, .1W	7	841414-077	14632	
R3	Resistor, Fixed, 220 W, ±5%, .1W	15	841414-057	14632	
R4	Jumper, .05W Max	2	841417	14632	
R5	Resistor, Fixed, 15 W, ±5%, .1W	8	841414-029	14632	
R6	Resistor, Fixed, 10 W, ±5%, .1W	33	841414-025	14632	
R7	Resistor, Fixed, 47 W, ±5%, .1W	12	841414-041	14632	
R8	Same as R1				
R9	Same as R2				
R10	Resistor, Fixed, 330W, ±5%, .1W	10	841414-061	14632	
R11	Same as R6				
R12	Same as R6				
R13	Same as R5				
R14	Same as R1				
R15	Same as R2				
R16	Same as R3				
R17	Not Used				
R18	Same as R5				
R19	Resistor, Fixed, 22 W, ±5%, .1W	3	841414-033	14632	
R20	Same as R5				
R21	Same as R1				
R22	Same as R2				
R23	Same as R10				
R24	Same as R1				
R25	Same as R6				
R26	Same as R19				
R27	Resistor, Fixed, 100 W, ±5%, .1W	26	841414-049	14632	
R28	Resistor, Fixed, 6.8 kW, ±5%, .1W	2	841414-093	14632	
R29	Same as R7				
R30	Same as R27				
R31	Resistor, Fixed, 68 W, ±5%, .1W	5	841414-045	14632	
R32	Same as R31				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A2**		
R33	Same as R5				
R34	Same as R6				
R35	Resistor, Fixed, 33 W, ±5%, .1W	6	841414-037	14632	
R36	Resistor, Fixed, 150 W, ±5%, .1W	5	841414-053	14632	
R37	Same as R36				
R38	Resistor, Fixed, 470 W, ±5%, .1W	17	841414-065	14632	
R39					
Thru	Same as R5				
R41					
R42	Resistor, Fixed, 6.8 W, ±5%, .1W	6	841414-021	14632	
R43	Same as R27				
R44	Resistor, Fixed, 47 kW, ±5%, .1W	8	841414-113	14632	
R45	Resistor, Fixed, 18 kW, ±5%, .1W	1	841414-103	14632	
R46	Same as R27				
R47					
Thru	Same as R6				
R49					
R50	Resistor, Fixed, 10 kW, ±5%, .1W	27	841414-097	14632	
R51					
Thru	Same as R50				
R53					
R54	Resistor, Fixed, 15 kW, ±5%, .1W	3	841414-101	14632	
R55	Same as R27				
R56	Resistor, Fixed, 3.3 kW, ±5%, .1W	12	841414-085	14632	
R57	Same as R6				
R58	Same as R3				
R59	Same as R50				
R60	Same as R50				
R61	Same as R42				
R62	Same as R42				
R63	Same as R27				
R64	Same as R27				
R65	Same as R42				
R66	Same as R27				
R67	Same as R56				
R68	Same as R42				
R69	Same as R56				
R70					
Thru	Same as R1				
R76					
R77	Resistor, Fixed, 8.2 kW, ±5%, .1W	3	841414-095	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A2**

R78	Same as R27				
R79	Same as R27				
R80	Same as R1				
R81	Same as R1				
R82	Resistor, Fixed, 22 kW, ±5%, .1W	9	841414-105	14632	
R83	Same as R77				
R84	Same as R50				
R85	Same as R1				
R86					
Thru	Same as R56				
R88					
R89	Same as R6				
R90	Same as R50				
R91	Same as R50				
R92	Resistor, Fixed, 100 kW, ±5%, .1W	8	841414-121	14632	
R93	Same as R82				
R94	Same as R44				
R95	Same as R50				
R96	Same as R92				
R97	Same as R50				
R98	Same as R50				
R99	Same as R92				
R100	Same as R27				
R101	Same as R56				
R102	Same as R56				
R103*	Resistor, Fixed, 680 W, ±5%, .1W	2	841414-069	14632	
R104	Resistor, Fixed, 120 W, ±5%, .1W	13	841414-051	14632	
R105					
Thru	Same as R104				
R115					
R116	Same as R6				
R117	Same as R19				
R118	Same as R77				
R119	Same as R38				
R120	Same as R27				
R121	Same as R27				
R122	Not Used				
R123	Same as R1				
R124	Same as R1				
R125	Same as R6				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	REF DESIG PREFIX **A2**				
R126					
Thru	Same as R1				
R129					
R130	Resistor, Fixed, 470 kW, ±5%, .1W	3	841414-137	14632	
R131	Same as R130				
R132	Same as R6				
R133	Same as R44				
R134	Same as R92				
R135	Same as R92				
R136	Same as R44				
R137	Same as R103				
R138	Same as R6				
R139	Same as R6				
R140	Same as R27				
R141	Not Used				
R142	Not Used				
R143	Same as R27				
R144	Same as R50				
R145	Same as R50				
R146	Same as R3				
R147	Same as R3				
R148	Same as R38				
R149	Same as R38				
R150	Resistor, Fixed, 2.2 kW, ±5%, .1W	9	841414-081	14632	
R151	Same as R1				
R152	Same as R50				
R153	Same as R50				
R154	Same as R1				
R155	Same as R50				
R156	Same as R50				
R157	Same as R28				
R158	Same as R1				
R159	Same as R82				
R160	Same as R92				
R161*	Same as R7				
R162	Same as R130				
R163	Same as R6				
R164	Resistor, Fixed, 120 kW, ±5%, .1W	1	841414-123	14632	
R165	Same as R50				
R166	Same as R50				
R167	Same as R44				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	REF DESIG PREFIX **A2**				
R168	Same as R150				
R169	Same as R2				
R170	Same as R6				
R171	Same as R3				
R172	Same as R27				
R173	Same as R27				
R174	Same as R31				
R175	Same as R27				
R176	Same as R6				
R177	Same as R36				
R178	Same as R35				
R179	Same as R36				
R180	Same as R38				
R181	Same as R7				
R182	Same as R6				
R183	Same as R3				
R184	Same as R35				
R185	Same as R3				
R186	Resistor, Fixed, 4.7 kW, ±5%, .1W	8	841414-089	14632	
R187	Same as R82				
R188	Same as R27				
R189	Same as R1				
R190	Same as R3				
R191	Same as R6				
R192					
Thru	Same as R38				
R194					
R195	Same as R6				
R196	Same as R1				
R197	Same as R1				
R198	Same as R56				
R199	Same as R56				
R200	Same as R186				
R201	Same as R186				
R202	Same as R6				
R203	Same as R3				
R204	Same as R150				
R205	Same as R2				
R206	Resistor, Fixed, 3.3 W, ±5%, .1W	3	841414-013	14632	
R207	Same as R3				
R208	Same as R3				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A2**

R209	Same as R35				
R210	Same as R3				
R211	Same as R31				
R212	Same as R6				
R213	Same as R7				
R214	Resistor, Fixed, 560 W, ±5%, .1W	1	841414-067	14632	
R215	Same as R7				
R216	Same as R38				
R217	Same as R31				
R218	Same as R6				
R219	Same as R50				
R220	Same as R1				
R221	Same as R3				
R222	Same as R35				
R223	Same as R3				
R224	Same as R38				
R225	Same as R6				
R226					
Thru	Same as R38				
R228					
R229	Same as R27				
R230	Same as R150				
R231	Same as R27				
R232	Same as R54				
R233	Same as R54				
R234	Resistor, Fixed, 220 kW, ±5%, .1W	2	841414-129	14632	
R235	Same as R234				
R236	Same as R82				
R237	Same as R82				
R238	Same as R6				
R239	Not Used				
R240	Not Used				
R241	Same as R6				
R242	Same as R6				
R243	Same as R27				
R244	Same as R27				
R245	Same as R50				
R246	Resistor, Variable, Film, 5 K, 10%, .25W	1	3262W-1-502	80294	
R247	Same as R206				
R248	Same as R92				
R249	Same as R50				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A2**

R250	Same as R150				
R251	Same as R56				
R252	Same as R82				
R253	Same as R7				
R254	Same as R38				
R255	Same as R6				
R256	Same as R92				
R257	Same as R82				
R258	Same as R82				
R259	Same as R10				
R260	Same as R50				
R261					
Thru	Same as R10				
R263					
R264	Same as R50				
R265	Same as R4				
R266	Resistor, Fixed, 82W, ±5%, .1W	3	841414-047	14632	
R267	Same as R27				
R268	Same as R266				
R269	Same as R6				
R270	Not Used				
R271	Same as R10				
R272	Not Used				
R273	Same as R10				
R274	Same as R10				
R275	Same as R206				
R276	Same as R6				
R277	Same as R186				
R278	Not Used				
R279	Same as R7				
R280	Same as R7				
R281	Same as R42				
R282	Same as R6				
R283	Same as R50				
R284	Same as R186				
R285	Same as R50				
R286	Same as R2				
R287	Same as R1				
R288	Same as R44				
R289	Same as R186				
R290	Same as R186				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A2**

R291	Same as R186				
R292	Same as R10				
R293	Same as R27				
R294	Same as R7				
R295	Same as R1				
R296	Same as R150				
R297	Same as R150				
R298	Same as R56				
R299	Same as R44				
R300	Same as R7				
R301	Same as R36				
R302	Same as R7				
R303	Same as R35				
R304	Same as R150				
R305	Same as R1				
R306					
Thru	Same as R38				
R308					
R309	Same as R150				
R310	Same as R44				
R311	Same as R1				
R312	Same as R1				
R313	Same as R27				
R314	Not Used				
R315	Same as R266				
R316	Same as R104				
R317	Same as R6				
R318	Not Used				
U1	Amplifier	2	MSA-0611-TR1	24539	
U2	Integrated Circuit	5	UPC2713T-E3	62104	
U3	Integrated Circuit	2	MC12026AD	04713	
U4	Integrated Circuit	2	74HC390 SO16	1Z447	
U5	EPLD Programmed	1	842211-3	14632	
U6	EPLD Programmed	1	842210-3	14632	
U7	Integrated Circuit	1	74AC74 SO14	02735	
U8	Integrated Circuit	1	74AC02 SO14	1Z447	
U9	Integrated Circuit	4	TK11550MT	TOKO-*644837	
U10	Voltage Regulator	2	LM79L05ACM	27014	
U11	Integrated Circuit	1	DG508ADY	17856	
U12	Amplifier	2	MC34002D	04713	
U13	Integrated Circuit	1	AD9955KS	24355	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A2**		
U14	Integrated Circuit	1	AD9713BAP	24355	
U15	Integrated Circuit	2	74HC04 SO14	04713	
U16	Same as U9				
U17	Voltage Regulator	1	MC79M05CDT	04713	
U18	Integrated Circuit	1	MC145151FN-2	04713	
U19	Amplifier	1	MC33171D	04713	
U20	Same as U4				
U21	Integrated Circuit	1	74HC74 SO14	04713	
U22	Integrated Circuit	1	74HC02 SO14	1Z447	
U23	Integrated Circuit	1	LM393M	27014	
U24	Integrated Circuit	1	UPC2710T	4T165	
U25	Same as U2				
U26	Mixer	1	IAM-81008-TR1	24539	
U27	Same as U9				
U28	Integrated Circuit	1	MB87086ApF	61271	
U29	Amplifier	1	NE5534D	18324	
U30	Same as U2				
U31	Same as U2				
U32	Same as U3				
U33	Same as U9				
U34	Same as U10				
U35	Integrated Circuit	1	MC145158DW-2	04713	
U36	Integrated Circuit	1	74HC00 SO14	1Z447	
U37	Amplifier	1	MC34181D	04713	
U38	Integrated Circuit	1	DG417DY	17856	
U39	Oscillator	1	92688	31785	
U40	Same as U15				
U41	Integrated Circuit	1	74HC125 SO14	34371	
U42	Same as U12				
U43	Same as U1				
U44	Integrated Circuit	1	MB1501pF	61271	
U45	Integrated Circuit	1	MC12034AD	04713	
U46	Amplifier	1	MSA-0711	24539	
U47	Same as U2				
VR1	Diode, Zener	1	MMBZ5248BLT1	04713	
Y1	Crystal, 26.2144 MHz	1	A187GEF-11 26.2144MHz	00809	
Z1	Resonator	2	SR9000LPQ810AY	14591	
Z2	Same as Z1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
6.5.3	**TYPE 797156-1 RF CONVERTER PC ASSEMBLY**			REF DESIG PREFIX **A3**	
	Revision G1				
C1	Capacitor, Ceramic, 1000 pF, ±10%, 50V	26	841415-013	14632	
C2	Same as C1				
C3	Same as C1				
C4	Capacitor, Ceramic, .047 mF, ±10%, 50V	59	841415-023	14632	
C5	Capacitor, Ceramic, 1.8 pF, ±0.1 pF 50V	5	841416-007	14632	
C6	Capacitor, Ceramic, 1.5 pF, ±0.1 pF 50V	1	841416-005	14632	
C7					
Thru	Same as C1				
C10					
C11	Capacitor, Ceramic, 4.7 pF, ±0.1 pF 50V	2	841416-017	14632	
C12	Same as C11				
C13	Same as C4				
C14	Same as C4				
C15	Same as C1				
C16					
Thru	Same as C4				
C18					
C19	Same as C1				
C20	Same as C5				
C21	Same as C4				
C22	Same as C4				
C23	Same as C1				
C24	Same as C5				
C25	Capacitor, Ceramic, 1.3 pF, ±0.1 pF 50V	2	841416-004	14632	
C26	Capacitor, Ceramic, 1 pF, ±0.1 pF 50V	4	841416-001	14632	
C27	Same as C4				
C28	Same as C4				
C29					
Thru	Same as C1				
C31					
C32	Capacitor, Ceramic, 47 pF, ±5%, 50V	7	841415-005	14632	
C33	Same as C4				
C34	Capacitor, Tantalum, 6.8 mF, ±20%, 16V	6	841293-26	14632	
C35					
Thru	Same as C34				
C37					
C38	Capacitor, Ceramic, 100 pF, ±5%, 50V	13	841415-007	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A3**

C39					
Thru	Same as C38				
C44					
C45	Same as C4				
C46	Same as C4				
C47	Capacitor, Ceramic, 24 pF, ±2%, 50V	2	841416-034	14632	
C48	Capacitor, Ceramic, 5.1 pF, ±0.25 pF 50V	6	841416-018	14632	
C49	Capacitor, Ceramic, 15 pF, ±2%, 50V	1	841416-029	14632	
C50	Same as C4				
C51	Same as C34				
C52	Same as C38				
C53	Same as C4				
C54	Same as C34				
C55	Capacitor, Ceramic, .01mF, ±10%, 50V	1	841415-019	14632	
C56	Same as C4				
C57	Same as C4				
C58	Same as C32				
C59	Same as C4				
C60	Capacitor, Ceramic, 16 pF, ±2%, 50V	1	841416-030	14632	
C61	Capacitor, Ceramic, 33 pF, ±2%, 50V	2	841416-037	14632	
C62	Capacitor, Ceramic, 27 pF, ±2%, 50V	2	841416-035	14632	
C63	Capacitor, Variable, 5.0-20 pF	3	GKX20000	52769	
C64	Same as C63				
C65	Same as C63				
C66	Same as C47				
C67	Same as C62				
C68	Same as C48				
C69	Same as C38				
C70	Same as C38				
C71					
Thru	Same as C4				
C73					
C74	Same as C38				
C75	Same as C4				
C76	Same as C4				
C77	Same as C32				
C78	Same as C4				
C79	Same as C38				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A3**

C80	Same as C4				
C81	Same as C38				
C82					
Thru	Same as C4				
C87					
C88	Same as C32				
C89					
Thru	Same as C4				
C91					
C92	Capacitor, Ceramic, 3.6 pF, ±0.1pF 50V	2	841416-014	14632	
C93					
Thru	Same as C4				
C96					
C97	Same as C32				
C98					
Thru	Same as C4				
C100					
C101	Same as C61				
C102					
Thru	Same as C4				
C114					
C115					
Thru	Same as C1				
C119					
C120	Same as C4				
C121					
Thru	Same as C1				
C124					
C125	Same as C4				
C126	Same as C48				
C127	Same as C26				
C128	Same as C48				
C129	Same as C26				
C130					
Thru	Same as C1				
C133					
C134	Same as C92				
C135	Same as C5				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A3**		
C136	Same as C5				
C137					
Thru	Same as C4				
C139					
C140	Capacitor, Ceramic, 3.3 pF, ±0.1pF 50V	1	841416-013	14632	
C141	Same as C32				
C142	Same as C32				
C143	Same as C48				
C144	Capacitor, Ceramic, 3.9 pF, ±0.1pF 50V	2	841416-015	14632	
C145	Same as C144				
C146	Same as C26				
C147	Same as C48				
C148	Capacitor, Ceramic, 33 pF, ±5%, 50V	19	841415-004	14632	
C149					
Thru	Same as C148				
C166					
C167	Same as C25				
CR1	Diode, Tuning	14	281991-2	14632	
CR2					
Thru	Same as CR1				
CR4					
CR5	Diode, Pin	10	HSMP-3892L31	28480	
CR6	Diode, Tuning	4	282034-2	14632	
CR7	Same as CR5				
CR8	Same as CR5				
CR9	Same as CR6				
CR10	Same as CR5				
CR11	Same as CR6				
CR12	Same as CR5				
CR13	Diode, Tuning	3	281991-1	14632	
CR14	Diode, Tuning	1	282034-1	14632	
CR15	Same as CR5				
CR16	Same as CR6				
CR17					
Thru	Same as CR1				
CR22					

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A3**		
CR23					
Thru	Same as CR5				
CR25					
CR26					
Thru	Not Used				
CR34					
CR35	Same as CR5				
CR36	Not Used				
CR37	Not Used				
CR38	Same as CR1				
CR39	Not Used				
CR40	Same as CR13				
CR41	Same as CR13				
CR42	Not Used				
CR43	Same as CR1				
CR44	Not Used				
CR45	Diode, Tuning	11	281991-3	14632	
CR46					
Thru	Same as CR45				
CR50					
CR51	Not Used				
CR52	Not Used				
CR53	Same as CR1				
CR54	Not Used				
CR55	Not Used				
CR56					
Thru	Same as CR45				
CR60					
CR61	Diode, Pin	12	HSMP-3822-T31	28480	
CR62					
Thru	Same as CR61				
CR72					
FB1	Ferrite, Bead	8	LCB1210, A	0EXD1	
FB3					
Thru	Same as FB1				
FB7					
FB8	Ferrite, Bead	5	CB30-322513T	54583	
FB9	Not Used				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A3**

FB10	Same as FB1				
FB11	Same as FB1				
FB12	Same as FB8				
FB13	Not Used				
FB14	Same as FB8				
FB15	Same as FB8				
FB16	Not Used				
FB20					
FB21	Same as FB8				
FB22	Same as FB1				
FL1	Filter, Lowpass 575 MHz	1	92522	14632	
FL2	Filter, Bandpass CF=691 MHz	1	92523	14632	
FL3	Filter, Bandpass Customer Selected Option	X		14632	
FL4	Filter, Bandpass Customer Selected Option	X		14632	
FL5	Filter, Bandpass Customer Selected Option	X		14632	
FL6	Filter, Bandpass Customer Selected Option	X		14632	
FL7	Filter, Bandpass Customer Selected Option	X		14632	
FL8	Filter, EMI, 4700 pF, 50V, 2A	6	NFM61R30T472B1	51406	
FL9					
Thru	Same as FL8				
FL13					
J1	Connector, Receptacle	1	9650-7113-000	19505	
J2	Socket	28	645952-2	00779	
J3	Connector, Receptacle, SMB Male	1	2019-1511-000	19505	
J4	Connector, Receptacle, SMB	3	2009-7511-000	19505	
J5	Same as J2				
J6	Same as J2				
J7	Same as J4				
J8	Same as J4				
L1	Coil, Assembly	2	282038-1	14632	
L2	Same as L1				
L3	Inductor, 120 nH, ±5%	2	841438-027	14632	
L4	Inductor, 4.7mH, ±20%	12	B82422-A1472-M	25088	
L5	Same as L4				
L6	Same as L3				
L7	Coil	1	180712-1	14632	
L8	Coil	1	180712-2	14632	
L9	Coil	1	180707-1	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A3**		
L10	Coil	1	180707-2	14632	
L11	Same as L4				
L12	Same as L4				
L13	Inductor, 10 nH, ±10%	2	841698-001	14632	
L14	Same as L4				
L15	Same as L4				
L16	Coil, Fixed, .040 mH	2	L10-0R040	7W259	
L17	Same as L16				
L18	Same as L4				
L19	Inductor, 270 nH, ±10%	2	1008CS-271-XKB	02113	
L20	Same as L4				
L21	Coil	1	180341-1	14632	
L22	Coil	1	180341-2	14632	
L23	Same as L19				
L24	Same as L4				
L25	Coil	2	282037-1	14632	
L26	Same as L25				
L27	Same as L4				
L28	Inductor, 150 nH, ±10%	4	841698-015	14632	
L29	Same as L28				
L30	Inductor, 8 nH, ±, 20%	3	1008CT-080XKBB	02113	
L31	Same as L30				
L32	Inductor, 910 nH, ±5%	3	841438-048	14632	
L33	Not Used				
L34	Same as L30				
L35	Same as L4				
L36	Inductor, 120 nH, ±5%	1	841438-027	14632	
L37	Same as L32				
L39	Same as L32				
L40	Same as L28				
L41	Same as L28				
L42	Same as L4				
L43	Same as L13				
L44	Inductor, 3.3 mH, ±20%	1	B82422-A1332	25088	
R1	Resistor, Fixed, 100 W, ±5%, .1W	3	841414-049	14632	
R2	Resistor, Fixed, 1.0 kW, ±5%, .1W	26	841414-073	14632	
R3	Same as R2				
R4	Same as R2				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A3**		
R5	Resistor, Fixed, 27 kΩ, ±5%, .1W	8	841414-107	14632	
R6					
Thru	Same as R5				
R8					
R9	Same as R2				
R10	Resistor, Fixed, 680Ω, ±5%, .1W	4	841414-069	14632	
R11	Same as R2				
R12	Same as R2				
R13	Resistor, Fixed, 24 kΩ, ±5%, .1W	4	841414-106	14632	
R14	Same as R13				
R15	Same as R2				
R16	Same as R13				
R17	Same as R13				
R18					
Thru	Same as R2				
R22					
R23					
Thru	Same as R5				
R26					
R27	Same as R2				
R28	Same as R2				
R29	Same as R10				
R30	Same as R2				
R31	Resistor, Fixed, 47 Ω, ±5%, .1W	6	841414-041	14632	
R32	Same as R1				
R33	Same as R2				
R34	Same as R31				
R35	Same as R31				
R36	Same as R2				
R37	Same as R31				
R38	Resistor, Fixed, 470 Ω, ±5%, .1W	6	841414-065	14632	
R39	Same as R38				
R40	Same as R10				
R41	Same as R38				
R42					
Thru	Same as R2				
R44					
R45	Resistor, Fixed, 150Ω, ±5%, .1W	2	841414-053	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A3**		
R46	Resistor, Fixed, 33Ω, ±5%, .1W	1	841414-037	14632	
R47	Same as R45				
R48	Same as R1				
R49	Same as R31				
R50	Same as R31				
R51	Same as R2				
R52	Same as R2				
R53	Same as R38				
R54	Same as R2				
R55	Same as R38				
R56	Same as R2				
R57	Same as R10				
R58	Same as R38				
R59	Same as R2				
R60	Same as R2				
U1	Amplifier	1	QBH-126	55027	
U2	Attenuator	2	WJ-G1-15	14482	
U3	Mixer, Balanced	1	WJ-M2B	14482	
U4	Integrated Circuit	2	HEF4094BTD	18324	
U5	Amplifier	1	MSA-0486-TR1	24539	
U6	Same as U2				
U7	Amplifier	2	GPD-430	24539	
U8	Amplifier	1	WJ-A32-16	14482	
U9	Mixer, Balanced	1	WJ-M8T	14482	
U10	Amplifier	1	QBH-1321	55027	
U11	Divider, Power	1	SPD-C1	63155	
U12	Same as U7				
U13	Integrated Circuit	1	MWA320	04713	
U14	Same as U4				
U15	Attenuator	1	WJ-G1	14482	
U16	Amplifier	1	AMP-75	15542	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
6.5.4	**TYPE 796780-7 DEMODULATOR PC ASSEMBLY**			REF DESIG PREFIX **A4**	
	Revision E1				
C1	Capacitor, Ceramic, .047 mF, ±10%, 50V	13	841415-023	14632	
C2	Capacitor, Ceramic, .01 mF, ±10%, 50V	107	841415-019	14632	
C3	Capacitor, Ceramic, 2200 pF, ±10%, 50V	1	841415-015	14632	
C4	Same as C1				
C5	Capacitor, Tantalum, 3.3 mF, ±20%, 16V	23	841293-10	14632	
C6	Same as C5				
C7	Same as C2				
C8	Same as C2				
C9					
Thru	Same as C1				
C11					
C12	Same as C5				
C13					
Thru	Same as C2				
C16					
C17	Capacitor, Ceramic, 47 pF, ±5%, 50V	4	841415-005	14632	
C18	Capacitor, Ceramic, 6.8 pF, ±0.25pF 50V	2	841416-021	14632	
C19					
Thru	Same as C2				
C22					
C23	Capacitor, Ceramic, 33 pF, ±5%, 50V	6	841415-004	14632	
C24	Same as C2				
C25	Capacitor, Variable, 4.5-20 pF, +50%	3	TZBX4R200BE110T00	72982	
C26	Same as C17				
C27	Capacitor, Ceramic, 150 pF, ±2%, 50V	1	841416-053	14632	
C28	Same as C2				
C29	Capacitor, Ceramic, 1000 pF, ±10%, 50V	13	841415-013	14632	
C30	Capacitor, Ceramic, 68 pF, ±5%, 50V	3	841415-006	14632	
C31					
Thru	Same as C2				
C35					
C36	Same as C5				
C37	Same as C2				
C38	Same as C2				
C39	Same as C1				
C40	Same as C2				
C41	Same as C5				
C42	Same as C1				
C43	Same as C5				
C44	Same as C2				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A4**		
C45	Same as C2				
C46	Capacitor, Ceramic, 680 pF, ±10%, 50V	2	841415-012	14632	
C47	Same as C2				
C48	Same as C1				
C49	Same as C2				
C50	Same as C5				
C51	Capacitor, Tantalum, 33 mF, ±20%, 16V	3	841293-22	14632	
C52	Same as C2				
C53	Same as C23				
C54	Same as C46				
C55	Capacitor, Tantalum, 15 mF, ±20%, 6V	1	841293-28	14632	
C56	Same as C2				
C57	Same as C2				
C58	Capacitor, Ceramic, 15 pF, ±5%, 50V	3	841415-002	14632	
C59	Same as C2				
C60	Same as C5				
C61	Same as C2				
C62	Capacitor, Ceramic, 3.3 pF, ±0.1pF 50V	2	841416-013	14632	
C63	Same as C2				
C64	Same as C1				
C65	Same as C2				
C66	Same as C5				
C67	Same as C51				
C68	Same as C51				
C69	Same as C2				
C70	Same as C2				
C71	Same as C58				
C72	Same as C2				
C73	Same as C2				
C74	Same as C30				
C75	Same as C2				
C76	Same as C2				
C77	Same as C58				
C78	Same as C5				
C79	Same as C2				
C80	Capacitor, Ceramic, 4.7 pF, ±0.1pF 50V	1	841416-017	14632	
C81	Same as C2				
C82	Same as C18				
C83	Capacitor, Ceramic, .5 pF, ±0.1pF 500V	2	ATC100B0R5BP500X	29990	
C84	Same as C5				
C85	Same as C2				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A4**

C86	Same as C2				
C87	Same as C5				
C88					
Thru	Same as C2				
C91					
C92	Same as C5				
C93	Same as C2				
C94	Same as C5				
C95	Same as C5				
C96	Same as C23				
C97	Capacitor, Ceramic, 82 pF, ±2%, 50V	1	841416-047	14632	
C98	Same as C5				
C99	Same as C2				
C100	Same as C1				
C101	Same as C5				
C102	Same as C2				
C103	Same as C29				
C104	Same as C5				
C105	Same as C23				
C106	Same as C29				
C107					
Thru	Same as C2				
C109					
C110	Same as C5				
C111	Same as C2				
C112	Same as C29				
C113	Same as C2				
C114	Capacitor, Ceramic, 100 pF, ±5%, 50V	4	841415-007	14632	
C115	Same as C29				
C116	Same as C29				
C117	Same as C114				
C118	Same as C2				
C119	Same as C2				
C120	Same as C5				
C121	Same as C2				
C122	Same as C29				
C123	Same as C1				
C124	Same as C29				
C125	Same as C2				
C126	Same as C2				
C127	Same as C114				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	REF DESIG PREFIX **A4**				
C128	Same as C83				
C129	Same as C114				
C130					
Thru	Same as C2				
C140					
C141	Capacitor, Ceramic, 220 pF, ±5%, 50V	2	841415-009	14632	
C142					
Thru	Same as C2				
C150					
C151	Same as C30				
C152					
Thru	Same as C29				
C155					
C156	Same as C141				
C157					
Thru	Same as C2				
C159					
C160	Same as C5				
C161	Same as C2				
C162	Capacitor, Ceramic, 150 pF, ±5%, 50V	1	841415-008	14632	
C163	Same as C2				
C164	Same as C17				
C165	Same as C25				
C166	Same as C2				
C167	Same as C17				
C168	Same as C2				
C169	Same as C2				
C170	Same as C23				
C171	Capacitor, Ceramic, 22 pF, ±5%, 50V	2	841415-003	14632	
C172	Same as C25				
C173	Same as C62				
C174	Same as C2				
C175	Same as C2				
C176	Same as C23				
C177	Same as C2				
C178	Same as C171				
C179					
Thru	Same as C2				
C185					
C186	Same as C1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A4**

C187					
Thru	Same as C2				
C190					
C191	Same as C1				
C192					
Thru	Same as C2				
C195					
C196	Same as C29				
C197	Capacitor, Ceramic, 470 pF, ±5%, 50V	5	841415-011	14632	
C198	Capacitor, Ceramic, 39 pF, ±5%, 50V	1	GRM40U2J390J050B	72982	
C199	Same as C197				
C200	Same as C2				
C201	Same as C197				
C202	Same as C2				
C203	Same as C197				
C204	Same as C197				
C205	Same as C5				
C206	Same as C5				
CR1	Diode	5	HSMS-2802T31	28480	
CR2	Same as CR1				
CR3	Diode	10	HSMP-3822-T31	28480	
CR4	Same as CR3				
CR5	Same as CR3				
CR6	Diode	3	MBAV74	04713	
CR7	Same as CR6				
CR8	Same as CR6				
CR9	Same as CR3				
CR10					
Thru	Same as CR1				
CR12					
CR13	Diode	8	HSMP-3800-T31	28480	
CR14					
Thru	Same as CR13				
CR20					
CR21					
Thru	Same as CR3				
CR26					
FB1	Ferrite, Bead 31 W, ±25%	7	LCB1210, A	0EXD1	
FB2					
Thru	Same as FB1				
FB7					

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	REF DESIG PREFIX **A4**				
FL1	See Appropriate CPL				
FL2	Filter, Bandpass 21.4 MHz	1	92493	14632	
J1	Phone Jack, PC Mount, Miniature	1	S-G8042-01	55224	
J2	Connector, Receptacle, SMB	5	2110-7511-000	19505	
J3					
Thru	Same as J2				
J6					
J7	Connector, Receptacle, SMB	2	2010-1511-000	19505	
J8	Same as J7				
J9	Socket, Miniature	27	645952-2	00779	
J10	Connector, Receptacle, SMB	1	2009-7511-000	19505	
J11	Same as J9				
JW1	Jumper, .05W	1	841417	14632	
JW2	Not Used				
L1	Inductor, 60 nH, ±10%	1	1008CT-600-XK1	02113	
L2	Inductor, 2.2 mH, ±10%	1	1008LS-222-XK2	02113	
L3	Inductor, 470 nH, ±10%	1	1008CS-471-XKB	02113	
L4	Inductor, 120 nH, ±10%	1	1008CS-121-XKB	02113	
L5	Inductor, 180 nH, ±10%	1	1008CS-181-XK2	02113	
L6	Inductor, 1.5 mH, ±20%	2	B82422-A1152-M	25088	
L7	Inductor, 100 nH, ±10%	1	1008CT-101-XK1	02113	
L8	Inductor, 330 nH, ±10%	2	1008CS-331-XKB	02113	
L9	Inductor, 1.0 mH, ±20%	3	B82422-A1102-M	25088	
L10	Inductor, 47 mH, ±20%	11	B82422-A1473-M	25088	
L11	Same as L9				
L12	Same as L6				
L13	Inductor, 270 nH, ±10%	2	1008CS-271-XKB	02113	
L14	Same as L13				
L15					
Thru	Same as L10				
L17					
L18	Same as L9				
L19	Inductor, 0.82 mH	2	20681-305	14632	
L20	Same as L8				
L21	Same as L10				
L22	Same as L19				
L23					
Thru	Same as L10				
L28					
Q1	Transistor	6	MMBT2222ALT1	04713	
Q2	Transistor	2	SST-310T1	17856	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A4**		
Q3	Same as Q1				
Q4	Same as Q2				
Q5	Transistor	2	MMBT2907ALT1	04713	
Q6					
Q7	Same as Q1				
Thru					
Q10	Same as Q5				
R1	Resistor, Fixed, 2.2 kW, ±5%, .1W	31	841414-081	14632	
R2	Resistor, Fixed, 1.0 kW, ±5%, .1W	23	841414-073	14632	
R3	Same as R1				
R4	Resistor, Fixed, 47 W, ±5%, .1W	30	841414-041	14632	
R5	Resistor, Fixed, 33 W, ±5%, .1W	3	841414-037	14632	
R6	Resistor, Fixed, 10 W, ±5%, .1W	36	841414-025	14632	
R7	Resistor, Fixed, 15 kW, ±5%, .1W	4	841414-101	14632	
R8	Resistor, Fixed, 3.3 kW, ±5%, .1W	5	841414-085	14632	
R9	Same as R6				
R10	Same as R4				
R11	Same as R6				
R12	Resistor, Fixed, 100 W, ±5%, .1W	39	841414-049	14632	
R13	Resistor, Fixed, 47 kW, ±5%, .1W	4	841414-113	14632	
R14	Same as R4				
R15	Same as R1				
R16	Varistor	4	ST-23-A-104-C-W	91637	
R17	Resistor, Fixed, 10 kW, ±5%, .1W	11	841414-097	14632	
R18	Resistor, Fixed, 4.7 kW, ±5%, .1W	5	841414-089	14632	
R19	Same as R4				
R20	Same as R17				
R21	Same as R6				
R22	Same as R12				
R23	Same as R2				
R24	Same as R6				
R25	Same as R2				
R26	Same as R17				
R27	Same as R17				
R28	Same as R1				
R29	Same as R4				
R30	Same as R4				
R31	Resistor, Fixed, 12 kW, ±5%, .1W	1	841414-099	14632	
R32	Same as R5				
R33	Same as R2				
R34	Same as R2				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
			REF DESIG PREFIX **A4**		
R35	Resistor, Fixed, 1.8 kW, ±5%, .1W	2	841414-079	14632	
R36	Same as R4				
R37	Resistor, Fixed, 300 W, ±5%, .1W	4	841414-060	14632	
R38	Same as R1				
R39	Same as R4				
R40	Resistor, Fixed, 620 W, ±5%, .1W	1	841414-068	14632	
R41	Same as R4				
R42	Resistor, Fixed, 470 W, ±5%, .1W	5	841414-065	14632	
R43	Same as R6				
R44	Same as R6				
R45	Same as R2				
R46	Same as R1				
R47	Same as R12				
R48	Same as R12				
R49	Same as R6				
R50	Same as R17				
R51	Same as R6				
R52	Same as R16				
R53	Same as R12				
R54	Same as R6				
R55	Same as R42				
R56	Resistor, Fixed, 8.2 kW, ±5%, .1W	3	841414-095	14632	
R57	Resistor, Fixed, 2.7 kW, ±5%, .1W	3	841414-083	14632	
R58	Varistor	2	ST-23-A-102-C-W	91637	
R59	Same as R12				
R60	Same as R6				
R61	Resistor, Fixed, 3.9 kW, ±5%, .1W	2	841414-087	14632	
R62	Same as R13				
R63	Resistor, Fixed, 5.6 kW, ±5%, .1W	1	841414-091	14632	
R64	Same as R2				
R65	Same as R17				
R66	Same as R2				
R67	Resistor, Fixed, 1.5 kW, ±5%, .1W	6	841414-077	14632	
R68	Same as R2				
R69	Same as R67				
R70	Same as R67				
R71	Same as R6				
R72	Same as R57				
R73	Resistor, Fixed, 150 W, ±5%, .1W	2	841414-053	14632	
R74	Same as R4				
R75	Same as R2				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A4**

R76	Same as R6				
R77	Same as R17				
R78	Not Used				
R79	Same as R2				
R80	Same as R17				
R81	Same as R13				
R82	Same as R42				
R83	Same as R1				
R84	Same as R1				
R85	Resistor, Fixed, 15 W, ±5%, .1W	1	841414-029	14632	
R86	Same as R6				
R87	Resistor, Fixed, 680 W, ±5%, .1W	3	841414-069	14632	
R88	Same as R1				
R89	Same as R1				
R90	Same as R87				
R91	Same as R1				
R92	Same as R2				
R93	Resistor, Fixed, 220 W, ±5%, .1W	3	841414-057	14632	
R94	Same as R93				
R95	Same as R1				
R96	Same as R1				
R97	Same as R2				
R98	Same as R4				
R99	Same as R4				
R100	Same as R7				
R101	Resistor, Fixed, 27 kW, ±5%, .1W	1	841414-107	14632	
R102	Resistor, Fixed, 22 kW, ±5%, .1W	1	841414-105	14632	
R103	Resistor, Fixed, 11 kW, ±5%, .1W	1	841414-098	14632	
R104	Resistor, Fixed, 120 W, ±5%, .1W	6	841414-051	14632	
R105	Same as R6				
R106	Same as R6				
R107	Same as R17				
R108	Same as R6				
R109	Same as R4				
R110	Same as R6				
R111	Same as R6				
R112	Same as R93				
R113	Same as R17				
R114	Same as R8				
R115	Same as R6				
R116	Same as R6				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	REF DESIG PREFIX **A4**				
R117	Same as R12				
R118	Same as R12				
R119	Same as R6				
R120	Resistor, Fixed, 24 kW, ±5%, .1W	1	841414-106	14632	
R121	Same as R12				
R122	Same as R2				
R123	Same as R42				
R124	Same as R2				
R125	Same as R56				
R126	Varistor	1	ST-23-A-101-C-W	91637	
R127	Same as R18				
R128	Same as R18				
R129	Same as R2				
R130	Varistor	1	ST-23-A-103-C-W	91637	
R131	Same as R1				
R132	Same as R12				
R133	Same as R35				
R134	Same as R6				
R135	Same as R6				
R136	Same as R13				
R137	Same as R1				
R138	Same as R42				
R139	Same as R56				
R140	Same as R6				
R141	Resistor, Fixed, 100 kW, ±5%, .1W	1	841414-121	14632	
R142	Same as R4				
R143	Same as R104				
R144	Resistor, Fixed, 180 W, ±5%, .1W	1	841414-055	14632	
R145	Same as R8				
R146	Resistor, Fixed, 68 W, ±5%, .1W	3	841414-045	14632	
R147	Same as R8				
R148	Same as R12				
R149	Same as R1				
R150	Same as R12				
R151	Same as R6				
R152	Same as R12				
R153	Same as R12				
R154	Same as R1				
R155	Same as R1				
R156	Same as R12				
R157	Same as R12				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	REF DESIG PREFIX **A4**				
R158	Same as R6				
R159	Same as R6				
R160	Same as R12				
R161	Same as R6				
R162	Same as R16				
R163	Same as R4				
R164	Same as R7				
R165	Resistor, Fixed, 1.0 MW, ±5%, .1W	1	841414-145	14632	
R166	Same as R2				
R167	Same as R12				
R168	Same as R6				
R169	Same as R2				
R170	Same as R18				
R171	Same as R12				
R172	Same as R6				
R173	Same as R1				
R174	Same as R37				
R175	Same as R67				
R176	Same as R12				
R177	Same as R2				
R178	Same as R7				
R179	Resistor, Fixed, 270 W, ±5%, .1W	1	841414-059	14632	
R180	Same as R18				
R181	Same as R12				
R182	Same as R12				
R183	Same as R4				
R184	Same as R12				
R185	Same as R4				
R186	Same as R12				
R187	Same as R4				
R188	Same as R12				
R189	Same as R61				
R190	Same as R67				
R191	Same as R1				
R192	Same as R87				
R193	Same as R4				
R194	Resistor, Fixed, 6.8 kW, ±5%, .1W	1	841414-093	14632	
R195	Same as R1				
R196	Same as R4				
R197	Same as R1				
R198	Same as R4				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

REF DESIG PREFIX **A4**

R199	Same as R1
R200	Same as R4
R201	Same as R58
R202	Same as R57
R203	Same as R2
R204	Same as R2
R205	
Thru	Same as R4
R208	
R209	Same as R1
R210	Same as R12
R211	Same as R12
R212	Same as R8
R213	Same as R1
R214	Same as R12
R215	Same as R12
R216	Same as R1
R217	Same as R12
R218	Same as R1
R219	Same as R12
R220	Same as R12
R221	Same as R2
R222	Same as R12
R223	Same as R37
R224	Same as R1
R225	Same as R12
R226	Same as R6
R227	Same as R73
R228	Same as R1
R229	Same as R6
R230	Same as R12
R231	Same as R104
R232	Same as R4
R233	Same as R104
R234	Same as R4
R235	Same as R4
R236	Same as R146
R237	Same as R12
R238	Same as R12
R239	Same as R2
R240	Same as R6
R241	Same as R1

REF DESIG PREFIX **A4**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R242	Same as R12				
R243	Same as R12				
R244	Same as R1				
R245	Same as R37				
R246	Same as R6				
R247	Same as R4				
R248	Same as R146				
R249	Same as R104				
R250	Same as R6				
R251	Same as R104				
R252	Same as R16				
R253	Same as R67				
R254	Same as R17				
R255	Same as R5				
U1	Amplifier, JFET, Dual Operational Amplifier	6	MC34002D	04713	
U2	Same as U1				
U3	Integrated Circuit, Receiver	1	MC10116FN	04713	
U4	Integrated Circuit, Quad Multiplexer	3	MC14016BD	04713	
U5	Same as U1				
U6	Amplifier, J-FET, Operational Amplifier	3	MC34080D	04713	
U7	Integrated Circuit, Multiplexer/Demultiplexer	2	CD4051BCM	27014	
U8	Amplifier, 50 MHz	3	EL2020CM	64762	
U9	Integrated Circuit, Shift/Storage	3	HEF4094BTD	18324	
U10	Same as U7				
U11	Mixer, Balanced Double Mixer/Oscillator	2	NE602AD	18324	
U12	Same as U6				
U13	Amplifier, UHF	2	NE5539D	18324	
U14	Integrated Circuit, Decade/Binary Counter	1	74HC390 SO16	1Z447	
U15	Same as U8				
U16	Same as U1				
U17	Integrated Circuit, Balanced Modulator/Demodulator	1	MC1496D	04713	
U18	Same as U13				
U19	Integrated Circuit	2	TL431CD	04713	
U20	Crystal, 21.4 MHz	1	92737	14632	
U21	Same as U8				
U22	Same as U4				
U23	Same as U4				
U24	Same as U6				
U25	Same as U9				
U26	Same as U1				
U27	Same as U11				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
					REF DESIG PREFIX **A4**
U28	Coupler	1	TDC-10-1	15542	
U29	Same as U19				
U30	Splitter, Power	1	TSC-2-1	15542	
U31	Amplifier	5	MSA-0286-TR1	24539	
U32	Same as U31				
U33	Same as U31				
U34	Amplifier	3	MSA-0186	24539	
U35	Integrated Circuit, Wideband Receiver	1	MC3356DW	04713	
U36	Same as U1				
U37	Same as U31				
U38	Same as U34				
U39	Same as U31				
U40	Same as U9				
U41*	Same as U34				
U42	Not Used				
U43	Not Used				

NOTES

APPENDIX A

WJ-8607A VHF/UHF RECEIVER IF BANDWIDTHS

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WJ-8607A VHF/UHF RECEIVER IF BANDWIDTHS

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LIST OF TABLES

LIST OF ILLUSTRATIONS

APPENDIX A

WJ-8607A VHF/UHF RECEIVER IF BANDWIDTHS

A.1 GENERAL DESCRIPTION

The WJ-8607A VHF/UHF Receiver may contain up to five user selectable IF bandwidths which are normally factory configured prior to delivery. **Table A-1** provides a list of the available IF Bandwidths for the WJ-8607A VHF/UHF Receiver and the part numbers of the components associated with each selection. The IF filters and Video filter assembly components for each receiver are unique to the bandwidth configuration of that receiver. The actual IF bandwidth is determined by plug-in filters contained on the RF Converter Assembly. Video bandwidth is determined by the appropriate Video Filter Assembly, mounted on the Demodulator Assembly. Once the bandwidth components are properly installed, the receiver firmware is configured to store parameters associated with the selected bandwidths into memory for use during normal receiver operation.

This appendix provides the component values associated with each of the available bandwidth selections to assist in troubleshooting, repair, and modification of the bandwidth configuration should a change in the installed bandwidths be required. Following the bandwidth description, the configuration procedure is described.

A.2 IF BANDWIDTH CONFIGURATION

For each of the bandwidth selections listed in **Table A-1**, the IF Filter part number is provided along with the designated parts list containing the component values installed on the Video Filter for that bandwidth location. Also included in the table is an IF Bandwidth Group code that signifies the type filter that is used on the Video Filter Assembly for each of the bandwidth selections. Bandwidth selections ranging from 3.2 kHz to 100 kHz are coded to signify that an active (A) video filter is used. Bandwidths of 250 kHz and greater are coded to signify that a passive (P) video filter is used. The combination of active and passive filters that are installed determines the type video filter card that is used to contain the video filter components. In order to provide the proper receiver operation, the Video Filter Assembly must contain the appropriate video response filters that match with the bandwidth filters installed in the receiver (as listed in **Table A-1**).

A.2.1 IF BANDWIDTH FILTER SELECTION

Selection of the desired IF bandwidth consists of choosing the appropriate IF filter from the available choices listed in **Table A-1**. Each IF filter is a sealed circuit that plugs directly into the RF Converter Assembly. It is recommended that the bandwidths be installed in ascending order, with the narrowest bandwidth filter installed in slot #1. Additionally, if a filter is installed in bandwidth slot #5, its value must be 250 kHz or greater.

Table A-1. IF Bandwidth and Video Response Components

IF Bandwidth kHz	IF Filter Part Number	Bandwidth Group	Video Response Parts List	Video Response kHz
3.2	92610	A	860X/3.2	2.1
6.4	92535	A	860X/6.4	4.0
10.0	92503	A	860X/10	6.5
10G	92770	A	860X/10G	6.5
12.5	92819	A	860X/12	6.5
15.0	92830	A	860X/15	10.0
20.0	92504	A	860X/20	13.0
25G	92771	A	860X/25G	13.0
25.0	92558	A	860X/25	13.0
30.0	92704	A	860X/30	20.0
50.0	92501	A	860X/50G	30.0
50.G	92772	A	860X/50	30.0
75.0	92536	A	860X/75	45.0
100.0	92502	A	860X/100	60.0
200.0	92665	A	860X/200	130.0
250.0	92505	P	860X/250	175.0
300.0	92529	P	860X/300	200.0
500.0	92500	P	860X/500	325.0
1000.0	92499	P	860X/1M	650.0
2000.0	92498	P	860X/2M	1300.0
4000.0	92497	P	860X/4M	2600.0
5000.0	92570	P	860X/5M	3250.0
6000.0	92889	P	860X/6M	4000.0
8000.0	92531	P	860X/8M	5500.0

A.2.2 VIDEO FILTER ASSEMBLY SELECTION

The Video Filter Assembly is factory assembled to match the bandwidth configuration of the receiver. The finished assembly is unique to a specific bandwidth configuration and may only be installed in receivers containing those bandwidths. Should a replacement Video Filter be required, it is ordered by specifying the bandwidth values that are contained in the receiver, in the order that they are installed.

There are six Video Filter Assemblies available for installation into the WJ-8607A VHF/UHF Receiver. Each is designed to accept various combinations of active and passive type video filters. The assembly supplied depends on the bandwidth group into which the selected IF bandwidths fall. **Figure A-1** provides a tabular listing of the component values used for each IF bandwidth selection.

A.2.2.1 **Type 382003-1 Video Filter**

The Type 382003-1 Video filter is used for receivers that contain bandwidths from Bandwidth Group P only. This Video Filter Assembly is used with configurations that contain only bandwidths of 250 kHz and greater. It contains no provisions for the installation of active filters that are used by filters from bandwidth group A.

A.2.2.2 **Type 382002-1 Video Filter**

The Type 382002-1 Video Filter is used in bandwidth configurations that contain one bandwidth from group A and up to four filters from group P. On this Video Assembly, filter location #1 contains a video filter that matches with an IF filter from group A (100 kHz and less). Locations #2 through #5 contain filters that match with IF filters from group P (250 kHz and greater).

A.2.2.3 **Type 382001-1 Video Filter**

The Type 382000-1 Video Filter is used in bandwidth configurations that contain two bandwidths from group A and three from group P. The video filters that match with the group A IF filters (100 kHz and less) are installed in locations #1 and #2, and those that match with the group P IF filters (250 kHz and greater) are installed in locations #3, #4, and #5.

A.2.2.4 **Type 382000-1 Video Filter**

The Type 382000-1 Video Filter is used in bandwidth configurations that contain three IF bandwidths from group A and two from group P. The video filters that match with the group A filters (100 kHz and less) are installed in locations #1, #2, and #3, and those that match with the group P IF filters (250 kHz and greater) are installed in locations #4, and #5.

A.2.2.5 **Type 382000-2 Video Filter**

The Type 382000-2 Video Filter is identical to the Type 382000-1 Video Filter except that the Type 382000-2 is conformally coated allowing the assembly to pass the environmental conditions of MIL-STD-810D, Method 507.2, Humidity.

A.2.2.6 **Type 381999-1 Video Filter**

The Type 381999-1 Video Filter is used in bandwidth configurations that contain four IF bandwidths from group A and one from group P. The video filters that match with the group A IF filters (100 kHz and less) are installed in locations #1, through #4, and location #5 contains the one that matches with the group P IF filters (250 kHz and greater).

A.3 UNIT NUMBERING METHOD

The method of numbering used throughout the unit is assigning reference designations (electrical symbol numbers) to identify: assemblies, subassemblies, modules within a subassembly, and discrete components. An example of the unit numbering method used is as 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)

On the main chassis schematic, components which are an integral part of the main chassis have no subassembly designations.

A.4 REFERENCE DESIGNATION PREFIX

The use of partial reference designations are used on the equipment and on the manual illustrations. This partial reference designation consists of the component type letter(s) and the identifying component number. The complete reference designation may be obtained by placing the proper prefix before the partial reference designation. Reference designation prefixes are included on the drawings and illustrations in the figure titles (in parenthesis).

A.5 LIST OF MANUFACTURERS

Mfr. Code	Name and Address
01295	Texas Instruments, Inc. Semiconductor-Components, Div. 13500 North Central Expressway Dallas, TX 75231
14632	Signia-IDT, Inc. 700 Quince Orchard Rd. Gaithersburg, MD 20878-1794
55322	Samtec, Inc. 801 Progress Blvd. P.O. Box 1147 New Albany, IN 47150
72982	Erie Tech. Products, Inc. 644 West 12th Street Erie, PA 16512
99800	American Precision Industries, Inc. Delevan Division 270 Quaker Road E. Aurora, NY 14052-2114

A.6 PARTS LIST

The following parts lists contain all the electrical components used in the unit, along with mechanical parts which may be subject to unusual wear or damage. When ordering replacement parts from Signia-IDT, Inc., specify the unit type, the serial number, and the option configuration. Also include the reference designation and the description of each item ordered. The list of manufacturers, provided in **paragraph A.5**, and the manufacturer's part number, provided in **paragraph A.6.1**, are supplied as a guide to aid the user of the equipment while in the field. The parts listed may not necessarily be identical with the parts installed in the unit. The parts listed in **paragraph A.6.1** will provide for satisfactory unit operation.

Replacement parts may be obtained from any manufacturer provided that the physical characteristics and electrical parameters of the replacement item are compatible with the original part. In the case where components are defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

NOTE

As improvements in semiconductors are made, it is the policy of Signia-IDT, Inc. to incorporate them in proprietary products. As a result, some transistors, diodes and integrated circuits which are installed in the unit may not agree with the parts lists or schematic diagrams of this manual. However, substitution of the semiconductor devices listed in this manual may be substituted with satisfactory results.

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.1 TYPE 381999-1 VIDEO FILTER ASSEMBLY (4 ACTIVE, 1 PASSIVE)

	Revision C				
C1	See IF Bandwidth Kit Parts List				
C2	See IF Bandwidth Kit Parts List				
C3	See IF Bandwidth Kit Parts List				
C4	Capacitor, Ceramic: .01 µF, 10%, 50 Vdc	2	841250-19	14632	
C5	Same as C4				
P1	Connector, Terminal, PC Mount, 10 Pin	1	TD-105-G-A-1	55322	
R1	See IF Bandwidth Kit Parts List				
R2	See IF Bandwidth Kit Parts List				
R3	See IF Bandwidth Kit Parts List				
R4	See IF Bandwidth Kit Parts List				
R5	Resistor, Fixed: 220Ω, 5%, 1/8 W	2	841296-049	14632	
R6	Same as R5				
U1	Amplifier	1	86064SO14U	14632	
U2	Integrated Circuit, Analog, Multiplexer/Demultiplexer	1	864051SO16N	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.2 TYPE 382000-1 VIDEO FILTER ASSEMBLY (3 ACTIVE, 2 PASSIVE)

	Revision C				
C1	See IF Bandwidth Kit Parts List				
C2	See IF Bandwidth Kit Parts List				
C3	See IF Bandwidth Kit Parts List				
C4	Capacitor, Ceramic: .01 µF, 10%, 50 Vdc	2	841250-19	14632	
C5	Same as C4				
P1	Connector, Terminal, PC Mount, 10 Pin	1	TD-105-G-A-1	55322	
R1	See IF Bandwidth Kit Parts List				
R2	See IF Bandwidth Kit Parts List				
R3	See IF Bandwidth Kit Parts List				
R4	See IF Bandwidth Kit Parts List				
R5	Resistor, Fixed: 200Ω, 5%, 1/8 W	2	841296-049	14632	
R6	Same as R5				
U1	Amplifier	1	86064SO14U	14632	
U2	Integrated Circuit, Analog, Multiplexer/Demultiplexer	1	864051SO16N	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.3 TYPE 382000-2 VIDEO FILTER ASSEMBLY, CONFORMAL COATED (3 ACTIVE, 2 PASSIVE)

	Revision A				
C1	See IF Bandwidth Kit Parts List				
C2	See IF Bandwidth Kit Parts List				
C3	See IF Bandwidth Kit Parts List				
C4	Capacitor, Ceramic: .01 µF, 10%, 50 Vdc	2	841250-19	14632	
C5	Same as C4				
P1	Connector, Terminal, PC Mount, 10 Pin	1	TD-105-G-A-1	55322	
R1	See IF Bandwidth Kit Parts List				
R2	See IF Bandwidth Kit Parts List				
R3	See IF Bandwidth Kit Parts List				
R4	See IF Bandwidth Kit Parts List				
R5	Resistor, Fixed: 200Ω, 5%, 1/8 W	2	841296-049	14632	
R6	Same as R5				
U1	Amplifier	1	86064SO14U	14632	
U2	Integrated Circuit, Analog, Multiplexer/Demultiplexer	1	864051SO16N	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.4 TYPE 382001-1 VIDEO FILTER ASSEMBLY (2 ACTIVE, 3 PASSIVE)

	Revision C				
C1	See IF Bandwidth Kit Parts List				
C2	See IF Bandwidth Kit Parts List				
C3	See IF Bandwidth Kit Parts List				
C4	Capacitor, Ceramic: .01 µF, 10%, 50 Vdc	2	851250-19	14632	
C5	Same as C4				
P1	Connector, Terminal, PC Mount, 10 Pin	1	TD-105-G-A-1	55322	
R1	See IF Bandwidth Kit Parts List				
R2	See IF Bandwidth Kit Parts List				
R3	See IF Bandwidth Kit Parts List				
R4	See IF Bandwidth Kit Parts List				
R5	Resistor, Fixed: 220Ω, 5%, 1/8 W	2	841296-049	14632	
R6	Same as R5				
U1	Amplifier	1	86062SO8	14632	
U2	Analog Multiplexer/Demultiplexer	1	864051SO16N	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	A.6.5 TYPE 382002-1 VIDEO FILTER ASSEMBLY (1 ACTIVE, 4 PASSIVE)				
	Revision C1				
C1	See IF Bandwidth Kit Parts List				
C2	See IF Bandwidth Kit Parts List				
C3	See IF Bandwidth Kit Parts List				
C4	Capacitor, Ceramic: .01 µF, 10%, 50 Vdc	2	841250-19	14632	
C5	Same as C4				
P1	Connector, Terminal, PC Mount, 10 Pin	1	TD-105-G-A-1	55322	
R1	See IF Bandwidth Kit Parts List				
R2	See IF Bandwidth Kit Parts List				
R3	See IF Bandwidth Kit Parts List				
R4	See IF Bandwidth Kit Parts List				
R5	Resistor, Fixed: 220Ω, 5%, 1/8 W	2	841296-049	14632	
R6	Same as R5				
U1	Amplifier	1	86062SO8	14632	
U2	Integrated Circuit, Analog, Multiplexer/Demultiplexer	1	864051SO16N	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.6 TYPE 382003-1 VIDEO FILTER ASSEMBLY (0 ACTIVE, 5 PASSIVE)

	Revision C1				
C1	See IF Bandwidth Kit Parts List				
C2	See IF Bandwidth Kit Parts List				
C3	Not Used				
C4	Capacitor, Ceramic: .01 µF, 10%, 50 VDC	2	841250-19	14632	
C5	Same as C4				
P1	Connector, Terminal, PC Mount, 10 Pin	1	TD-105-G-A-1	55322	
R1	See IF Bandwidth Kit Parts List				
R2	See IF Bandwidth Kit Parts List				
R3	Not Used				
R4	Not Used				
R5	Resistor, Fixed: 220 Ω, 5%, 1/8 W	2	841296-049	14632	
R6	Same as R5				
U1	Not Used				
U2	Integrated Circuit, Analog, Multiplexer/Demultiplexer	1	864051SO16N	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.7 TYPE 860X/3.2IF BANDWIDTH KIT 3.2 kHz (ACTIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic, .047µF, 10%, 50V	2	841250-23	14632	
C2	Same as C1				
C3	Capacitor, Ceramic, 4700pF, 10%, 50V	1	841250-17	14632	
R1	Resistor, Fixed, 3.3K5%	2	841296-077	14632	
R2	Same as R1				
R3	Resistor, Fixed, 12K, 5%,	1	841296-091	14632	
R4	Resistor, Fixed, 2.2K, 5%	1	841296-073	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.8 TYPE 860X/6.4 IF BANDWIDTH KIT, 6.4 kHz (ACTIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 4700 pF, 10%, 50 Vdc	2	841250-17	14632	
C2	Same as C1				
C3	Capacitor, Ceramic: 470 pF, 5%, 50 Vdc	1	841250-11	14632	
R1	Resistor, Fixed: 18 kΩ, 5%, 1/8 W	2	841296-095	14632	
R2	Same as R1				
R3	Resistor, Fixed: 68 kΩ, 5%, 1/8 W	1	841296-109	14632	
R4	Resistor, Fixed: 10 kΩ, 5%, 1/8 W	1	841296-089	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
A.6.9	**TYPE 860X/10 IF BANDWIDTH KIT, 10 kHz (ACTIVE FILTER)**				
	Revision A				
C1	Capacitor, Ceramic: 4700 pF, 10%, 50 Vdc	2	841250-17	14632	
C2	Same as C1				
C3	Capacitor, Ceramic: 470 pF, 5%, 50 Vdc	1	841250-11	14632	
R1	Resistor, Fixed: 10 kΩ, 5%, 1/8 W	2	841296-089	14632	
R2	Same as R1				
R3	Resistor, Fixed: 33 kΩ, 5%, 1/8 W	1	841296-101	14632	
R4	Resistor, Fixed: 6.2 kΩ, 5%, 1/8 W	1	841296-084	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.10 TYPE 860X/12.5 IF BANDWIDTH KIT, 12.5 kHz (ACTIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 4700 pF, 10%, 50 Vdc	2	841250-17	14632	
C2	Same as C1				
C3	Capacitor, Ceramic: 470 pF, 5%, 50 Vdc	1	841250-11	14632	
R1	Resistor, Fixed: 10 kΩ, 5%, 1/8 W	2	841296-089	14632	
R2	Same as R1				
R3	Resistor, Fixed: 33 kΩ, 5%, 1/8 W	1	841296-101	14632	
R4	Resistor, Fixed: 6.2 kΩ, 5%, 1/8 W	1	841296-084	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.11 TYPE 860X/20 IF BANDWIDTH KIT, 20 kHz (ACTIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 4700 pF, 10%, 50 Vdc	2	841250-17	14632	
C2	Same as C1				
C3	Capacitor, Ceramic: 470 pF, 5%, 50 Vdc	1	841250-11	14632	
R1	Resistor, Fixed: 4.7 kΩ, 5%, 1/8 W	2	841296-081	14632	
R2	Same as R1				
R3	Resistor, Fixed: 18 kΩ, 5%, 1/8 W	1	841296-095	14632	
R4	Resistor, Fixed: 3.3 kΩ, 5%, 1/8 W	1	841296-077	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.12 TYPE 860X/50 IF BANDWIDTH KIT, 50 kHz (ACTIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 2700 pF, 2%, 50 W Vdc	2	841314-083	14632	
C2	Same as C1				
C3	Capacitor, Ceramic: 270 pF, 2%, 50 W Vdc	1	841314-059	14632	
R1	Resistor, Fixed: 3.9 kΩ, 5%, 1/8 W	2	841296-079	14632	
R2	Same as R1				
R3	Resistor, Fixed: 15 kΩ, 5%, 1/8 W	1	841296-093	14632	
R4	Resistor, Fixed: 2.4 kΩ, 5%, 1/8 W	1	841296-074	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.13 TYPE 860X/75 IF BANDWIDTH KIT, 75 kHz (ACTIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 1000 pF, 5%, 50 Vdc	2	841250-13	14632	
C2	Same as C1				
C3	Capacitor, Ceramic: 100 pF, 5%, 50 Vdc	1	841250-07	14632	
R1	Resistor, Fixed: 15 kΩ, 5%, 1/8 W	2	841296-093	14632	
R2	Same as R1				
R3	Resistor, Fixed: 27 kΩ, 5%, 1/8 W	1	841296-099	14632	
R4	Resistor, Fixed: 4.7 kΩ, 5%, 1/8 W	1	841296-081	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.14 TYPE 860X/100 IF BANDWIDTH KIT, 100 kHz (ACTIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 1000 pF, 5%, 50 Vdc	2	841250-13	14632	
C2	Same as C1				
C3	Capacitor, Ceramic: 100 pF, 5%, 50 Vdc	1	841250-07	14632	
R1	Resistor, Fixed: 4.7 kΩ, 5%, 1/8 W	2	841296-081	14632	
R2	Same as R1				
R3	Resistor, Fixed: 15 kΩ, 5%, 1/8 W	1	841296-093	14632	
R4	Resistor, Fixed: 2.7 kΩ, 5%, 1/8 W	1	841296-075	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.15 TYPE 860X/250 IF BANDWIDTH KIT, 250 kHz (PASSIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 2200 pF, +10%, 50 Vdc	2	841250-15	14632	
C2	Same as C1				
L1	Inductor: 680 µH	1	841444-069	14632	
R1	Resistor, Fixed: 470Ω, 5%, 1/8 W	2	841296-057	14632	
R2	Same as R1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.16 TYPE 860X/300 IF BANDWIDTH KIT, 300 kHz (PASSIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 1800 pF, 2%, 50 W Vdc	2	841314-079	14632	
C2	Same as C1				
L1	Inductor: 680 µH	1	841444-069	14632	
R1	Resistor, Fixed: 470Ω, 5%, 1/8 W	2	841296-057	14632	
R2	Same as R1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.17 TYPE 860X/500 IF BANDWIDTH KIT, 500 kHz (PASSIVE FILTER)

	Revision B				
C1	Capacitor, Ceramic: 1000 pF, 5%, 50 Vdc	2	841250-13	14632	
C2	Same as C1				
L1	Inductor: 470 µH, 5%	1	841444-065	14632	
R1	Resistor, Fixed: 470Ω, 5%, 1/8 W	2	841296-057	14632	
R2	Same as R1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.18 TYPE 860X/1M IF BANDWIDTH KIT, 1 MHz (PASSIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 1000 pF, 5%, 50 Vdc	2	841250-13	14632	
C2	Same as C1				
L1	Inductor: 100 µH, ±10%, 1 MHz	1	LQN4N101K-TA	72982	
R1	Resistor, Fixed: 270Ω, 5%, 1/8 W	2	841296-051	14632	
R2	Same as R1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.19 TYPE 860X/2M IF BANDWIDTH KIT, 2 MHz (PASSIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 470 pF, 5%, 50 Vdc	2	841250-11	14632	
C2	Same as C1				
L1	Inductor: 68 µF, ±10%, 1 MHz	1	LQN4N680K	72982	
R1	Resistor, Fixed: 270Ω, 5%, 1/8 W	2	841296-051	14632	
R2	Same as R1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.20 TYPE 860X/4M IF BANDWIDTH KIT, 4 MHz (PASSIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 270 pF, 2%, 50 W Vdc	2	841314-059	14632	
C2	Same as C1				
L1	Inductor: 22µH	1	841444-033	14632	
R1	Resistor, Fixed: 200Ω, 5%, 1/8 W	2	841296-048	14632	
R2	Same as R1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

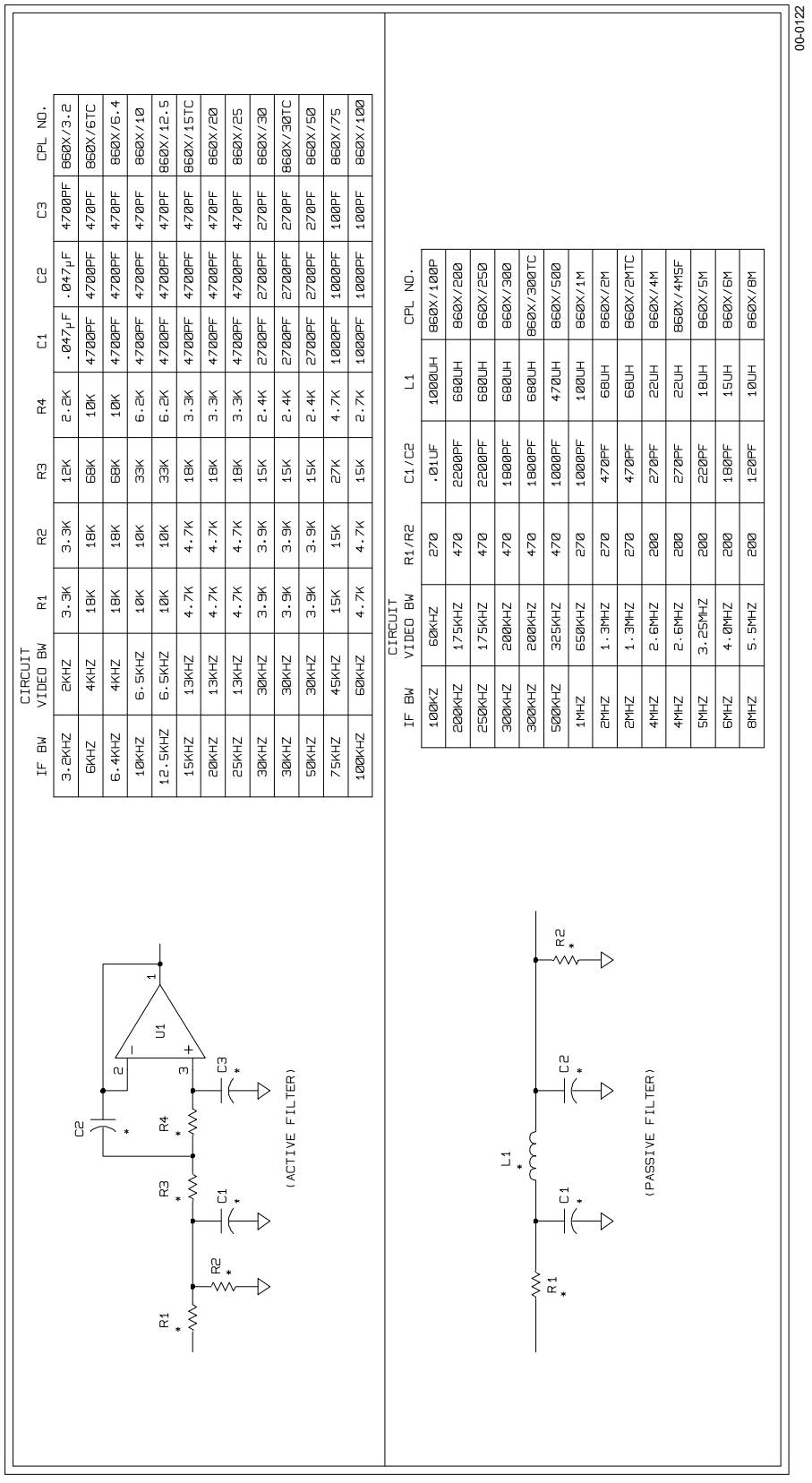
A.6.21 TYPE 860X/6M IF BANDWIDTH KIT, 8 MHz (PASSIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 180 pF, ±2%, 50 W Vdc	2	841314-055	14632	
C2	Same as C1				
L1	Inductor: 15 µH, 5%	1	1812-1531	99800	
R1	Resistor, Fixed: 200Ω, 5%, 1/8 W	2	841296-048	14632	
R2	Same as R1				

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR

A.6.22 TYPE 860X/8M IF BANDWIDTH KIT, 8 MHz (PASSIVE FILTER)

	Revision A				
C1	Capacitor, Ceramic: 120 pF, ±2%, 50 W Vdc	2	841314-051	14632	
C2	Same as C1				
L1	Inductor: 10 µH	1	841444-025	14632	
R1	Resistor, Fixed: 200Ω, 5%, 1/8 W	2	841296-048	14632	
R2	Same as R1				



IF BW	CIRCUIT VIDEO BW	R1	R2	R3	R4	C1	C2	C3	CPL NO.
3.2KHZ	2KHZ	3.3K	3.3K	12K	2.2K	.047µF	.047µF	4700PF	860X/3.2
6KHZ	4KHZ	18K	18K	68K	10K	4700PF	4700PF	470PF	860X/6TC
6.4KHZ	4KHZ	18K	18K	68K	10K	4700PF	4700PF	470PF	860X/6.4
10KHZ	6.5KHZ	10K	10K	33K	6.2K	4700PF	4700PF	470PF	860X/10
12.5KHZ	6.5KHZ	10K	10K	33K	6.2K	4700PF	4700PF	470PF	860X/12.5
15KHZ	13KHZ	4.7K	4.7K	18K	3.3K	4700PF	4700PF	470PF	860X/15TC
20KHZ	13KHZ	4.7K	4.7K	18K	3.3K	4700PF	4700PF	470PF	860X/20
25KHZ	13KHZ	4.7K	4.7K	18K	3.3K	4700PF	4700PF	470PF	860X/25
30KHZ	30KHZ	3.9K	3.9K	15K	2.4K	2700PF	2700PF	270PF	860X/30
30KHZ	30KHZ	3.9K	3.9K	15K	2.4K	2700PF	2700PF	270PF	860X/30TC
50KHZ	30KHZ	3.9K	3.9K	15K	2.4K	2700PF	2700PF	270PF	860X/50
75KHZ	45KHZ	15K	15K	27K	4.7K	1000PF	1000PF	100PF	860X/75
100KHZ	60KHZ	4.7K	4.7K	15K	2.7K	1000PF	1000PF	100PF	860X/100

IF BW	CIRCUIT VIDEO BW	R1/R2	C1/C2	L1	CPL NO.
100KZ	60KHZ	270	.01UF	1000UH	860X/100P
200KHZ	175KHZ	470	2200PF	680UH	860X/200
250KHZ	175KHZ	470	2200PF	680UH	860X/250
300KHZ	200KHZ	470	1800PF	680UH	860X/300
300KHZ	200KHZ	470	1800PF	680UH	860X/300TC
500KHZ	325KHZ	470	1000PF	470UH	860X/500
1MHZ	650KHZ	270	1000PF	100UH	860X/1M
2MHZ	1.3MHZ	270	470PF	68UH	860X/2M
2MHZ	1.3MHZ	270	470PF	68UH	860X/2MTC
4MHZ	2.6MHZ	200	270PF	22UH	860X/4M
4MHZ	2.6MHZ	200	270PF	22UH	860X/4MSF
5MHZ	3.25MHZ	200	220PF	18UH	860X/5M
6MHZ	4.0MHZ	200	180PF	15UH	860X/6M
8MHZ	5.5MHZ	200	120PF	10UH	860X/8M

Figure A-1. Type 382090, Value Selection, Schematic Diagram 382090

APPENDIX B

TYPE WJ-860X/WBO WIDEBAND OUTPUT OPTION

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APPENDIX B

TYPE WJ-860X/WBO WIDEBAND OUTPUT OPTION

LIST OF ILLUSTRATIONS

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APPENDIX B

TYPE WJ-860X/WBO WIDEBAND OUTPUT OPTION

B.1 GENERAL DESCRIPTION

When the WJ-860X/WBO Wideband Output Option is installed, a wideband 21.4 MHz IF output signal is made available at the front panel WBIF connector. This wideband signal, which is leveled by an independent AGC circuit, has a bandwidth of 12 MHz. The nominal power output level of this signal is -30 dBm.

B.2 MECHANICAL DESCRIPTION

The WJ-860X/WBO Option consists of the Type 382454-1 WBO 21.4 MHz Amplifier Assembly (A3A1). It is installed on the RF Converter Assembly (A3) of the WJ-860X Receiver.

B.3 INSTALLATION

The WJ-860X/WBO option is installed at the factory.

B.3.1 CONNECTORS

B.3.1.1 WBIF Connector

The wideband 21.4 MHz IF signal is output from the WBIF connector, which is located on the extreme right of the WJ-860X front panel. See **Figure B-1.** This SMB connector has an output impedance of 50 ohms. The reference designation for this connector is A3W8P3.

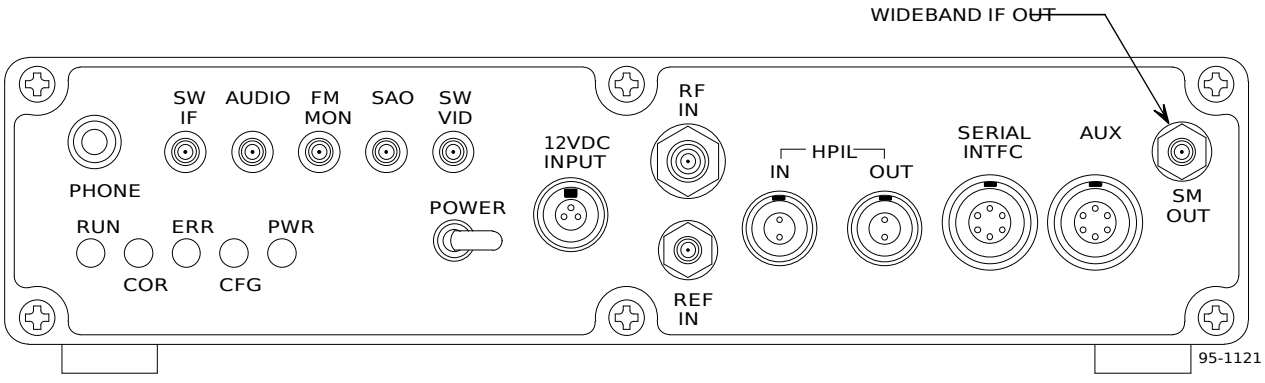

Figure B-1. Location of Wideband (WBIF) Connector

B.4 WBO (A3A1) PERFORMANCE TEST

1. Connect the test equipment as shown in **Figure B-2**.

2. Set the signal generator to produce a -65 dBm CW signal at the frequency of 21.4 MHz.

3. Verify that the signal level indicated on the RF millivoltmeter is between -30 dBm and -25 dBm. Note this level.

4. While observing the level displayed on the RF millivoltmeter, slowly tune the signal generator to 17.4 MHz and verify that the output level does not vary more than ±1 dB from the level noted in step 3.

5. Reset the signal generator frequency to 21.4 MHz and again note the level on the RF millivoltmeter.

6. Slowly tune the signal generator to 25.4 MHz and verify that the level on the RF millivoltmeter does not vary more than ±1 dB from the level noted in step 5.

7. Reset the signal generator frequency to 21.4 MHz with an output level of -65 dBm.

8. Verify the level on the RF millivoltmeter is between -30 dBm and -25 dBm.

9. While observing the level on the RF millivoltmeter, increase the signal generator output level from -60 dBm to -10 dBm in 10 dB steps.

10. Verify that the displayed level on the RF millivoltmeter remains between -30 dBm and -25 dBm.

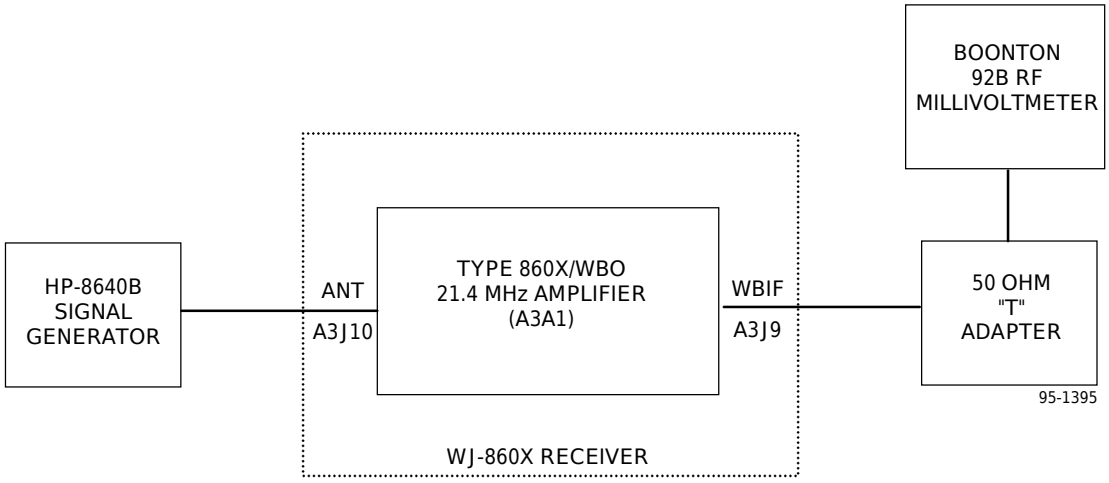

Figure B-2. WBO Option Test Equipment Connections

B.5 UNIT NUMBERING METHOD

The method of numbering used throughout the unit is assigning reference designations (electrical symbol numbers) to identify: assemblies, subassemblies, modules within a subassembly, and discrete components. An example of the unit numbering method used is as 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)

On the main chassis schematic, components which are an integral part of the main chassis have no subassembly designations.

B.6 REFERENCE DESIGNATION PREFIX

The use of partial reference designations are used on the equipment and on the manual illustrations. This partial reference designation consists of the component type letter(s) and the identifying component number. The complete reference designation may be obtained by placing the proper prefix before the partial reference designation. Reference designation prefixes are included on the drawings and illustrations in the figure titles (in parenthesis).

B.7 LIST OF MANUFACTURERS

Mfr. Code	Name and Address	Mfr. Code	Name and Address
14632	Signia-IDT, Inc. 700 Quince Orchard Road Gaithersburg, MD 20878	71279	Midland-Ross Corp. 445 Concord Avenue Cambridge, MA 02140
52648	Plessy Semiconductors 1674 McGraw Avenue Irvine, CA 92714	81349	Military Specifications
55322	Santec Inc. 810 Progress Blvd. P.O. Box 1147 New Albany, IN 47150	94375	Automatic Connector Inc. 400 Moreland Road Commack, NY 11725

B.8 PARTS LIST

The following parts lists contain all the electrical components used in the unit, along with mechanical parts which may be subject to unusual wear or damage. When ordering replacement parts from Signia-IDT, Inc., specify the unit type, the serial number, and the option configuration. Also include the reference designation and the description of each item ordered. The list of manufacturers, provided in **paragraph B.9**, and the manufacturer's part number, provided in **paragraph B.11**, are supplied as a guide to aid the user of the equipment while in the field. The parts listed may not necessarily be identical with the parts installed in the unit. The parts listed in **paragraph B.11** will provide for satisfactory unit operation.

Replacement parts may be obtained from any manufacturer provided that the physical characteristics and electrical parameters of the replacement item are compatible with the original part. In the case where components are defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

NOTE

As improved semiconductors become available, it is the policy of Signia-IDT, Inc. to incorporate them in proprietary products. For this reason some transistors, diodes and integrated circuits installed in the equipment may not agree with those specified in the parts lists and schematic diagrams of this manual. However, the semiconductors designated in the manual may be substituted in every case with satisfactory results.

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
B.9	**TYPE WJ-860X/WBO WIDEBAND OUTPUT ASSEMBLY**				**REF DESIG A3A1**
	Revision A				
A1	WBO 21.4 MHz Amplifier PC Assembly	1	382454-1	14632	

NOTES

APPENDIX C

WJ-860XA/FE FREQUENCY EXTENDER OPTION

PROPRIETARY STATEMENT

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TYPE WJ-860XA/FE FREQUENCY EXTENDER OPTION

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APPENDIX C

TYPE WJ-860XA/FE FREQUENCY EXTENDER OPTION

C.1 GENERAL DESCRIPTION

The WJ-860XA/FE Frequency Extender Option (FE) extends the tuning range of the WJ-860XA VHF/UHF Surveillance Receiver "Miniceptor" from 512 MHz to 2032 MHz. The extended tuning range is accomplished by block converting 14 bands of the RF spectrum to the tuning range of the Miniceptor. When the FE option is installed, the RF input at the front panel of the Miniceptor is routed directly to the FE where it in turn returns a downconverted IF for further processing.

See **Table C-1** for the WJ-860XA/FE Frequency Extender specifications.

C.2 MECHANICAL DESCRIPTION

The WJ-860XA/FE option attaches to the rear of the Miniceptor adding 2.85 inches to the overall length of the unit (see **paragraph C.3** for installation instructions). Cables are provided with the option for electrical connection of the FE to the Miniceptor.

The FE consists of internal cabling and two circuit boards: the Type 797130-3 Synthesizer Assembly and the Type 796892-1 RF Assembly, which are enclosed in an aluminum chassis.

Table C-1. WJ-860XA/FE Frequency Extender Specifications

Frequency Range	512 to 2032 MHz
Gain	1 dB ±2 dB
Noise Figure	12 dB maximum
3rd Order Input Intercept Point	+3 dBm maximum
2nd Order Input Intercept Point	+45 dBm minimum
Image Rejection	80 dB minimum
IF Rejection	80 dB minimum
Conducted LO	-90 dBm maximum
Phase Noise	-102 dBc/Hz at 20 kHz offset
VSWR	3.0:1 maximum
Power Requirements	+5.5 Vdc at 270 mA
(Supplied from Miniceptor)	+12 Vdc at 30 mA
	+7.5 Vdc at 85 mA
	-7.5 Vdc at 20 mA
	+30 Vdc at 5 mA
Dimensions	1.5" x 6.5" x 2.85" (3.81 x 16.51 x 7.24 cm)
Weight	1 lb. 8 oz. (0.68 kG)

C.3 INSTALLATION

The WJ-860XA/FE option may be installed at the factory or in the field. For field installation perform the following procedures:

WARNING

A shock hazard exists when performing the following procedures with power applied to the Miniceptor. Ensure power is removed from the Miniceptor before proceeding.

1. Disconnect all cabling from the Miniceptor.
2. Referring to **Figure C-1**, remove six screws to detach the rear panel of the Miniceptor.
3. Remove six screws to detach the front panel.
4. Carefully lift the top half of the unit from the bottom half and spread open clockwise, similar to opening a book (see **Figure C-2**).
5. Referring to **Figure C-2**, disconnect cable W6 from the RF Converter module (at J1).
6. Remove two screws, the connector bracket, and cable W6 from the unit. Remove W6 from the connector bracket.
7. Referring to **Figure C-3**, align the FE with the rear top half of the Miniceptor and hand tighten the retaining screw of the FE into the Miniceptor's chassis.
8. Install connector J4 of FE cable W3 onto the connector bracket that was removed in Step 6. Secure the connector bracket to the main chassis with the two screws that were removed in Step 6.
9. Connect FE cable W1 to connector J1 of the RF Converter module.
10. Connect FE cable W2 to connector J3 of the Synthesizer module.
11. Connect FE cable W4 to connector J4 of the Digital Controller module. The pin identified with a white dot on P1 of W4 inserts to pin receptacle 1 of J4.

CAUTION

Damage may occur to internal cabling and wiring if pinched or bent sharply when re-installing the top half of the unit to the bottom half. Ensure cables are properly positioned when reinstalling.

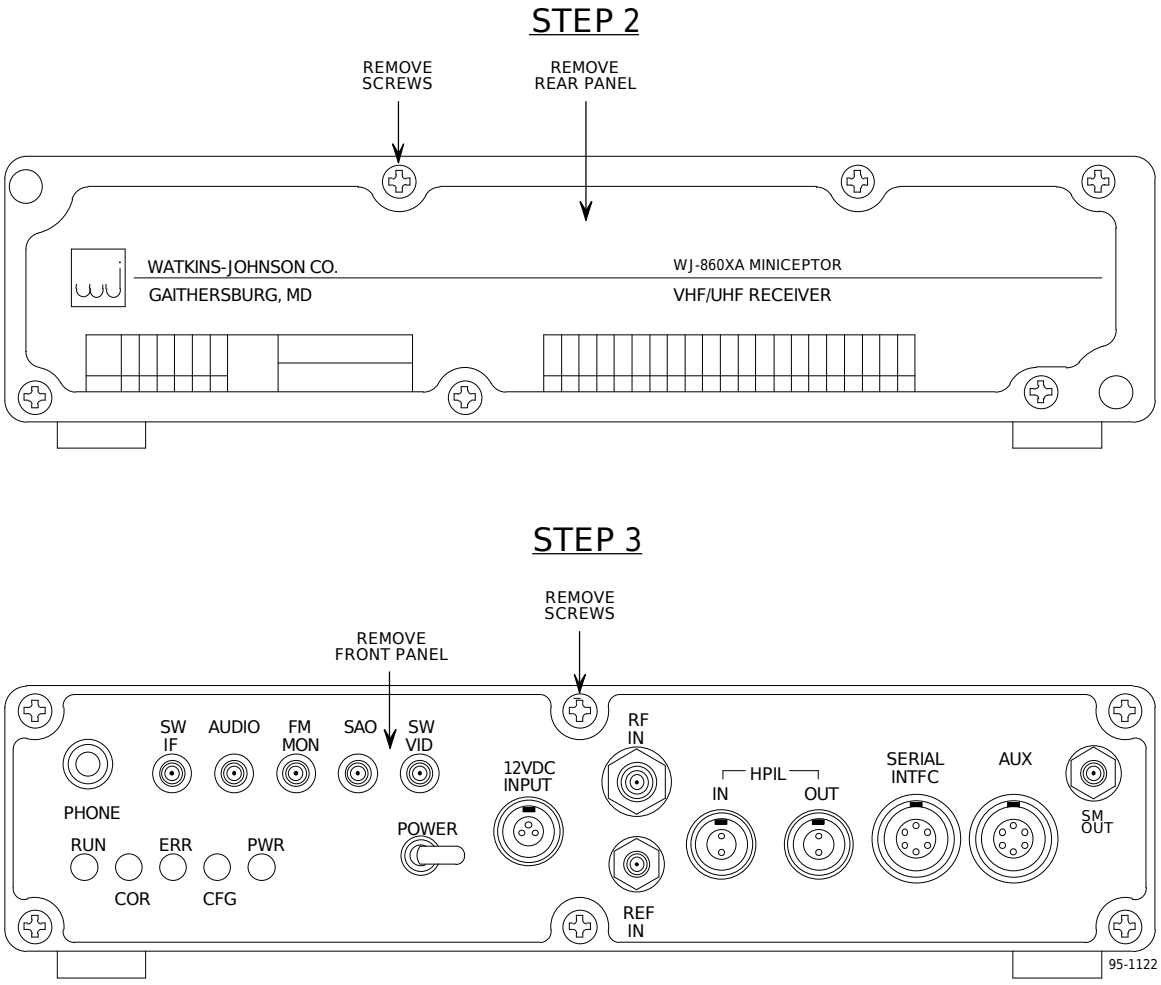

Figure C-1. Removing the Miniceptor's Front and Rear Panels

12. Ensuring all cabling is positioned properly, realign the bottom half of the Miniceptor with the top half.

13. Tighten the retaining screws on the rear of the FE to secure it to the Miniceptor's chassis.

14. Using a scribing tool, mark the FE option label on the rear panel that was removed in Step 2. If desired, write the serial number of the FE in the space provided near the serial number of the main chassis on the rear panel.

15. Reinstall the rear panel and six screws that were removed in Step 2.

16. Reinstall the front panel and six screws that were removed in Step 3. The Miniceptor may now be reconnected for operation.

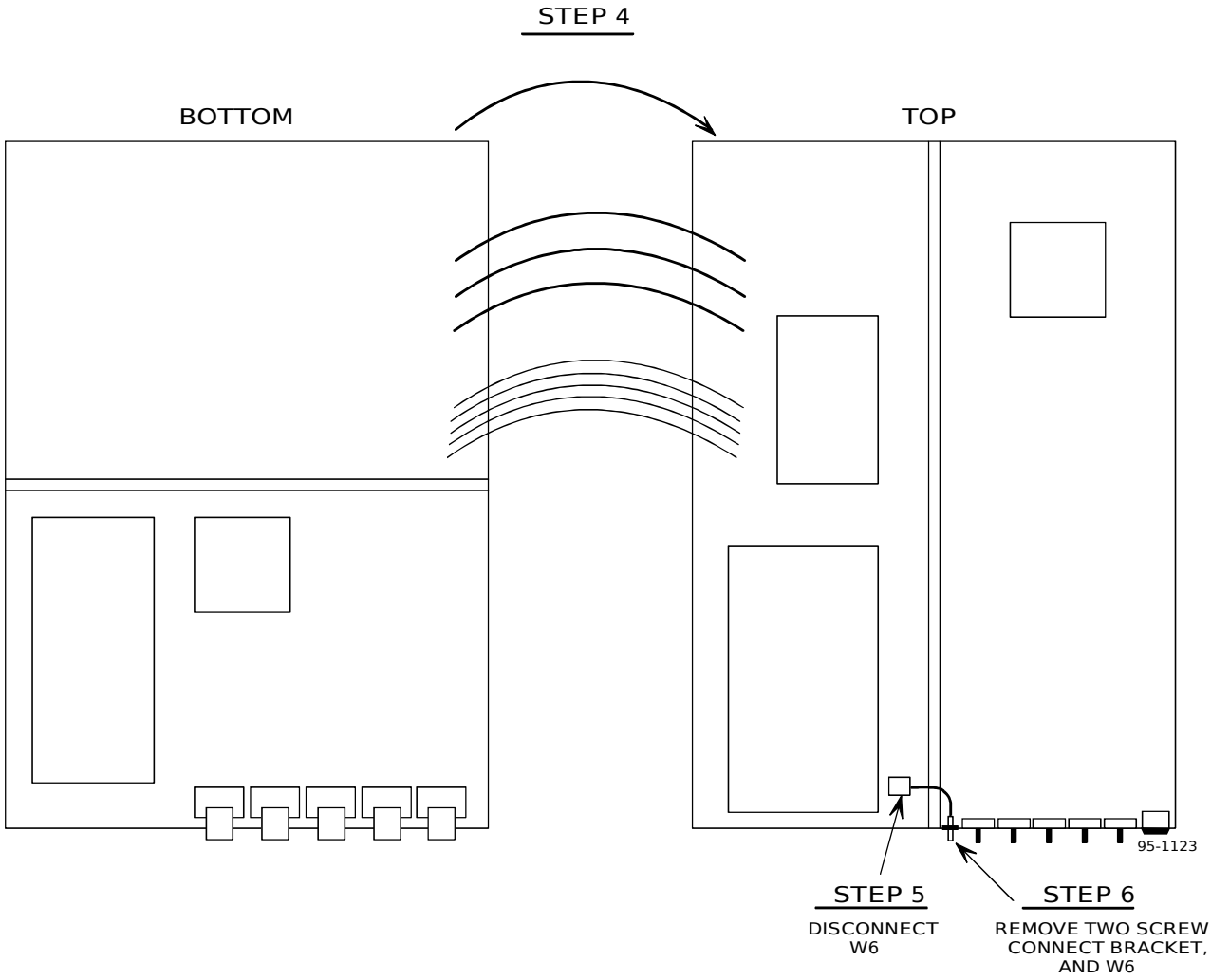

Figure C-2. Opening the Miniceptor and Removing W6

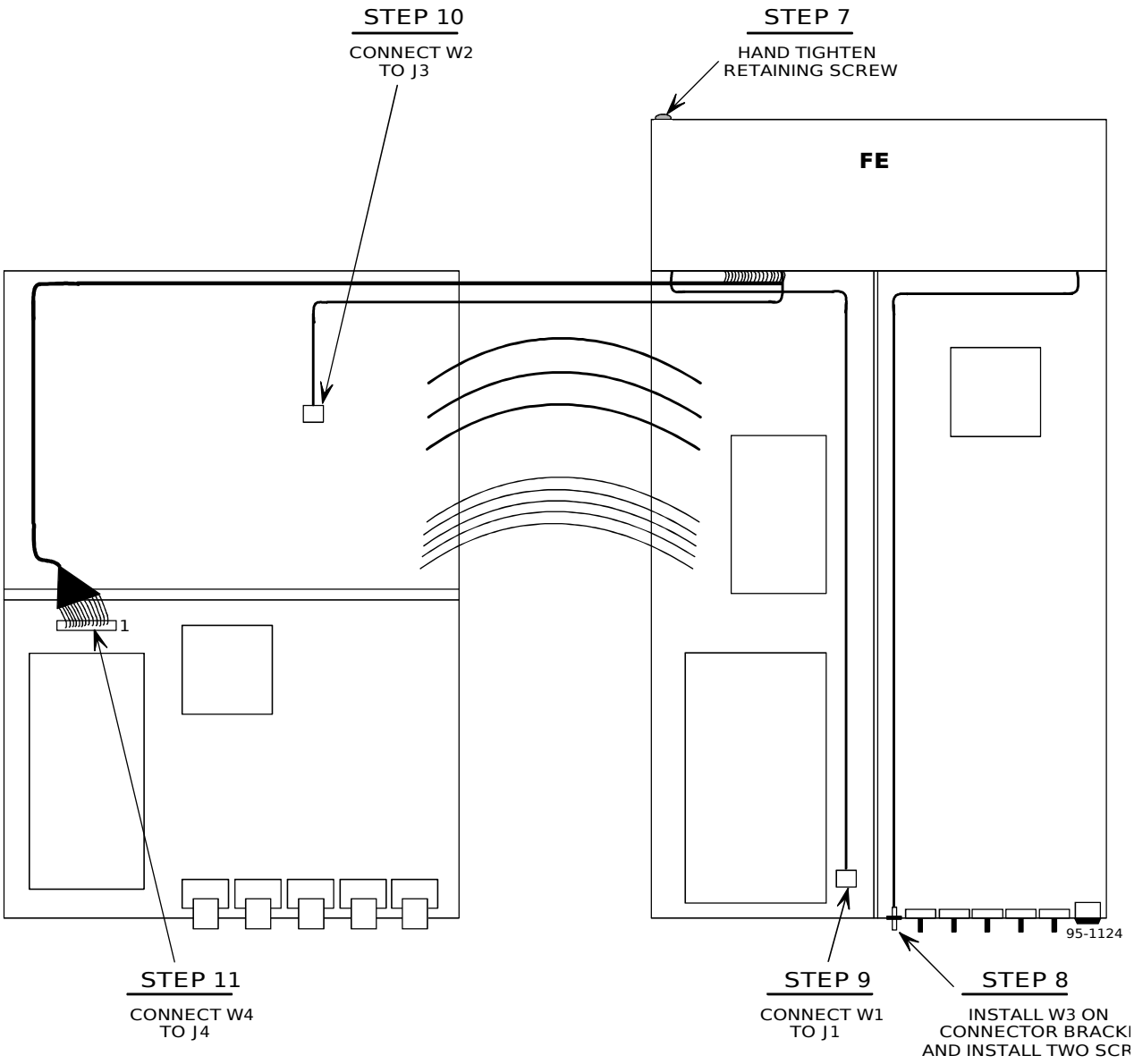

Figure C-3. Installing the FE and Connecting the Cables

C.4 INPUT AND OUTPUT CONNECTORS

C.4.1 **IF OUTPUT (W1P1)** - This connector provides the 235 to 512 MHz IF output of the FE. See **Table C-2** for the IF outputs of the FE versus the tuned frequency of the Miniceptor. Output impedance is 50 ohms.

Table C-2. IF Output of the FE Versus Miniceptor Tuned Frequency

Band	Tuned Frequency	1st LO (MHz)	Output Frequencies (MHz)
1	512 – 579.9999	880	300.0001 – 368
2	580 – 689.9999	960	270.0001 – 380
3	690 – 849.9999	1200	350.0001 – 510
4	850 – 929.9999	1200	270.0001 – 350
5	930 – 1009.9999	1440	430.0001 – 510
6	1010 – 1089.9999	1440	350.0001 – 430
7	1090 – 1249.9999	1600	350.0001 – 510
8	1250 – 1314.9999	1760	445.0001 – 510
9	1315 – 1409.9999	1760	350.0001 – 445
10	1410 – 1569.9999	1920	350.0001 – 510
11	1570 – 1709.9999	2080	370.0001 – 510
12	1710 – 1729.9999	2080	350.0001 – 370
13	1730 – 1889.9999	2240	350.0001 – 510
14	1890 – 2031.9999	2240	208.0001 - 350

C.4.2 **10 MHz REFERENCE INPUT (W2P1)** - This connector accepts the 10 MHz, -25 dBm minimum reference from the Miniceptor. Nominal input impedance is 100 ohms.

C.4.3 **RF INPUT (W3J4)** - This connector accepts the RF input from the antenna via the Miniceptor's front panel RF IN connector. Nominal input impedance is 50 ohms.

C.4.4 **POWER AND DIGITAL INTERFACE (W4P1)** - This connector provides power inputs and the control interface between the FE and the Miniceptor. **Figure C-4** illustrates the pin assignments for this connector. Explanations of the signals resident on the specific pins of this connector are provided in the following.

Serial Data Input (Pin 2) - The input on pin 2 is a serial data stream, from the Miniceptor's digital controller, consisting of 16-bit data words. These data words contain LO synthesizer and bandwidth filter select information.

Clock Input (Pin 1) - The input on this pin is a 1.14 MHz, TTL level clock input used for synchronizing the serial data input to the FE's digital interface. The positive transition of the clock (from low to high) occurs in the middle of each data bit in the serial 16-bit data words input on pin 2.

Enable Input (Pin 4) - This TTL level input, when high, enables the FE's digital interface circuits, unlatching the serial data inputs. This signal is high for 1.5 µsec at the end of each 16th clock input on pin 1.

AGC Input (Pin 5) - The input on this pin is the AGC control voltage, ranging from +2 Vdc to +8 Vdc, from the Miniceptor's digital controller. This input controls an attenuator for automatic attenuation of the FE's IF output.

Lock Detect Output (Pin 6) - This output, when high, indicates a synthesizer phase-locked loop condition in the FE.

Power Inputs - Pins 7, 8, 9, 10, and 14 are the +12 Vdc, +7.5 Vdc, -7.5 Vdc, +5.5 Vdc, and +30 Vdc power inputs, respectively, to the FE. Pins 12 and 13 are ground.

FE Installed (Pin 11) - When the FE is electrically connected to the Miniceptor and +5.5 Vdc power is applied to the FE, this pin outputs a constant +3.97 Vdc signal for indication to the Miniceptors digital controller that the FE is installed.

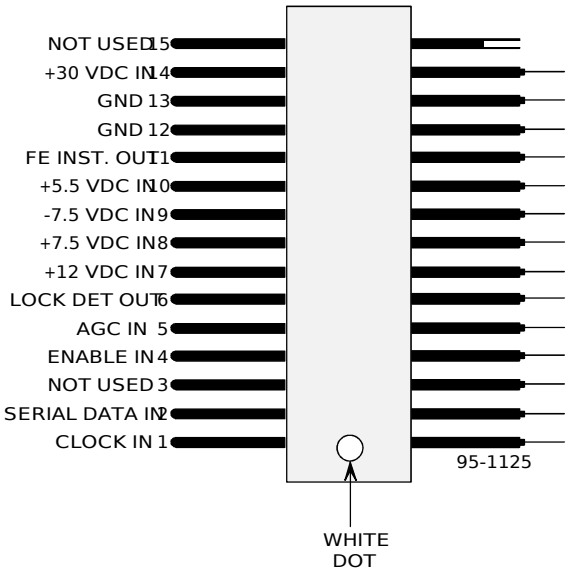

Figure C-4. Connector W4P1, Pin Assignments

C.5 FUNCTIONAL DESCRIPTION

The Frequency Extender Assembly is responsible for downconverting any received frequency outside the passband of the main receiver (512 to 2032 MHz) to a frequency within the receiver passband (20 to 512 MHz). The Frequency Extender (FE) Assembly can be divided into two major sections (see **Figure C-5**): the RF section and the Synthesizer section. The RF input to the receiver is first routed to the RF section where, if it is above 512 MHz, it is switched to one of five RF Band paths (see **Table C-3**). If the RF input frequency is below 512 MHz, the input is switched to the RF BYPASS path. The RF output of the RF Band

path is attenuated, amplified, and mixed with the FE LO to create the FE IF. Either the FE IF or the bypassed RF is switched to the output of the FE and passed to the RF Converter Assembly.

The LO Synthesizer produces the LO frequency, used by the Converter in the RF section (A1). Data inputs received from the Digital Control Assembly (A1) control three transmission-line oscillators and the charge pump, the RF path selected (in the RF section), the value of reference frequency, and the phase-locked loop (PLL) frequency divider PAL contained in this section. The LO generates a signal from 880 thru 2400 MHz at nine predetermined steps.

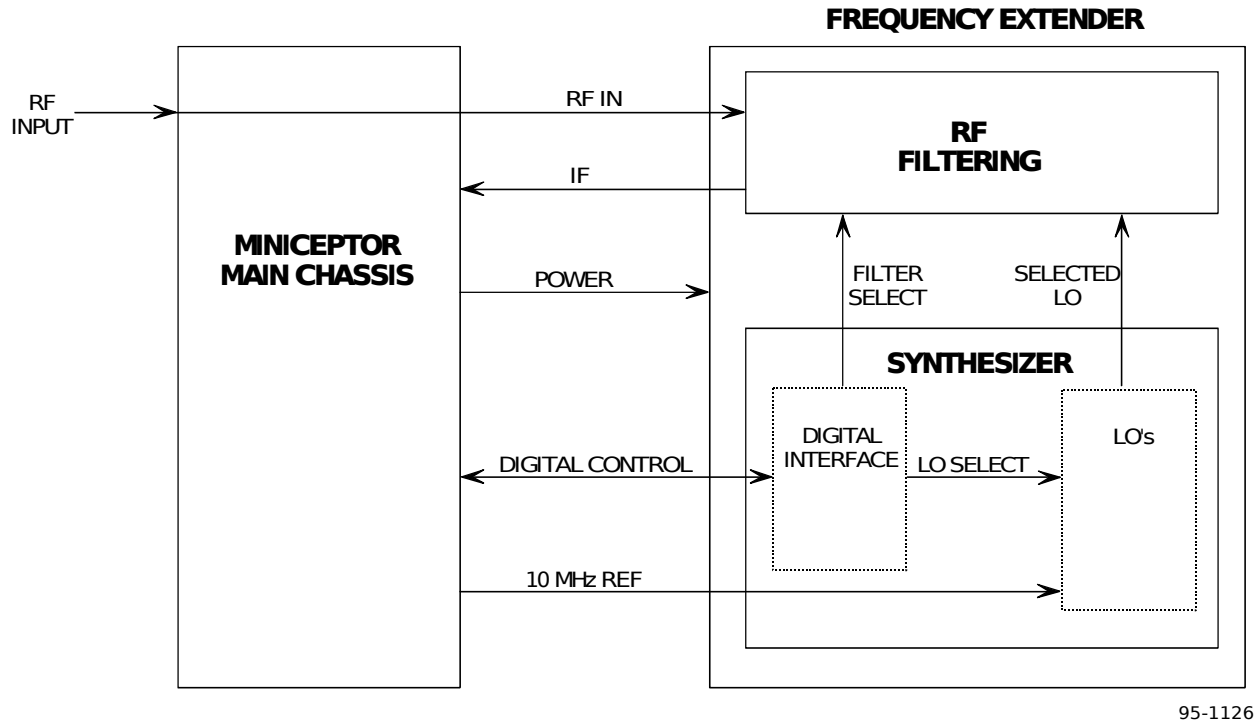

Figure C-5. Functional Block Diagram

C.6 UNIT NUMBERING METHOD

The method of numbering used throughout the unit is assigning reference designations (electrical symbol numbers) to identify: assemblies, subassemblies, modules within a subassembly, and discrete components. An example of the unit numbering method used is as 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)

On the main chassis schematic, components which are an integral part of the main chassis have no subassembly designations.

C.7 REFERENCE DESIGNATION PREFIX

The use of partial reference designations are used on the equipment and on the manual illustrations. This partial reference designation consists of the component type letter(s) and the identifying component number. The complete reference designation may be obtained by placing the proper prefix before the partial reference designation. Reference designation prefixes are included on the drawings and illustrations in the figure titles (in parenthesis).

C.8 LIST OF MANUFACTURERS

Mfr. Code	Name and Address	Mfr. Code	Name and Address
01295	Texas Instruments Inc. 13500 North Central Expressway P.O. Box 655303 Dallas, TX 75265-5303	19505	Applied Eng. Products Co. Division of Samarious, Inc. 300 Seymour Avenue Derby, CT 06418
01VL0	Sterling Electronics Corp 6304 Woodside Court Suite 115 Columbia, MD 21046	22526	Berg Electronics, Inc. Route 83 New Cumberland, PA 17070
02113	Coilcraft, Inc. 1102 Silver Lake Road Cary, IL	22526	Berg Electronics, Inc. Route 83 New Cumberland, PA 17070
04713	Motorola Inc. Semiconductor Products Sector 5005 East Mcdowell Road Phoenix, AZ 85008-4229	25088	Siemens America, Inc. 186 Wood Avenue S. Iselin, NJ 08830
0CF99	Siemens – Electrogeraete – Abt Zkd Hochstr 17 D-8000 Munich None, Germany	27956	Relcom 3333 Hillview Avenue Palo Alto, CA 94304
0JX84	Sgs-Thomson Microelectronics Inc. 2055 Gateway Plaza Suite 300 San Jose, CA 95110	27014	National Semiconductor Corp. 2900 Semiconductor Drive Santa Clara, CA 95051-0606
14632	Signia-IDT, Inc. 700 Quince Orchard Road Gaithersburg, MD 20878-1706	29990	American Technical Ceramics One Norden Lane Huntington Station, NY 11746

Mfr. Code	Name and Address
33095	Spectrum Control, Inc. World Headquarters 6000 West Ridge Road Erie, PA 16505
54583	TDK Electronics Corp. 755 Eastgate Blvd. Garden City, NY 11546
55322	Samtec Inc. 810 Progress Boulevard P.O. Box 1147 New Albany, IN 47150-2257
71279	Cambridge Thermionic Corp. 445 Concord Avenue Cambridge, MA 02138
72982	Erie Speciality Products, Inc. 645 West 11th Street Erie, PA 16512
95275	Vitramon, Inc. Box 544 Bridgeport, CT 06601-0544

C.9 PARTS LIST

The following parts lists contain all the electrical components used in the unit, along with mechanical parts which may be subject to unusual wear or damage. When ordering replacement parts from Signia-IDT, Inc., specify the unit type, the serial number, and the option configuration. Also include the reference designation and the description of each item ordered. The list of manufacturers, provided in **paragraph C.10**, and the manufacturer's part number, provided in **paragraph C.12**, are supplied as a guide to aid the user of the equipment while in the field. The parts listed may not necessarily be identical with the parts installed in the unit. The parts listed in **paragraph C.12** will provide for satisfactory unit operation.

Replacement parts may be obtained from any manufacturer provided that the physical characteristics and electrical parameters of the replacement item are compatible with the original part. In the case where components are defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

NOTE

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REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C.10	**WJ-860XA/FE FREQUENCY EXTENDER**			**MAIN CHASSIS**	
	Revision D1				
A1	RF PC Assembly	1	796892-1	14632	
A2	Synthesizer PC Assembly	1	797130-3	14632	
C1	Capacitor, Feedthru, EMI: 1000 pF, 100 V, 10 Amp	8	54-790-018	33095	
C2	Same as C1				
C3	Capacitor, Ceramic, Feedthru: 100 pF, 20%, 200 V	3	54-790-001-101M	33095	
C4	Same as C3				
C5	Same as C4				
C6 Thru C11	Same as C1				
CP1	Connector, Adaptor	1	5918-9103-000	19505	
E1	Terminal, Feedthru, Turret	1	160-2004-02-01	71279	
P1	Not Used				
P2	Connector, Housing, 14 Pos	1	87631-9	14632	
W1	Cable Assembly	1	383590-1	14632	
W2	Cable Assembly	1	17300-723-10	14632	
W3	Cable Assembly	1	383590-3	14632	
W4	Cable Assembly	1	17300-723-12	14632	
W4P1	Connector, Plug, SMC	2	1002-7571-019	19505	
W4P2	Connector, Plug, SMC	2	1105-7521-019	19505	
W5	Cable Assembly	1	17300-723-13	14632	
W5P1	Same as W4P1				
W5P2	Same as W4P2				

NOTES

APPENDIX F THRU APPENDIX H

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FOLDOUTS

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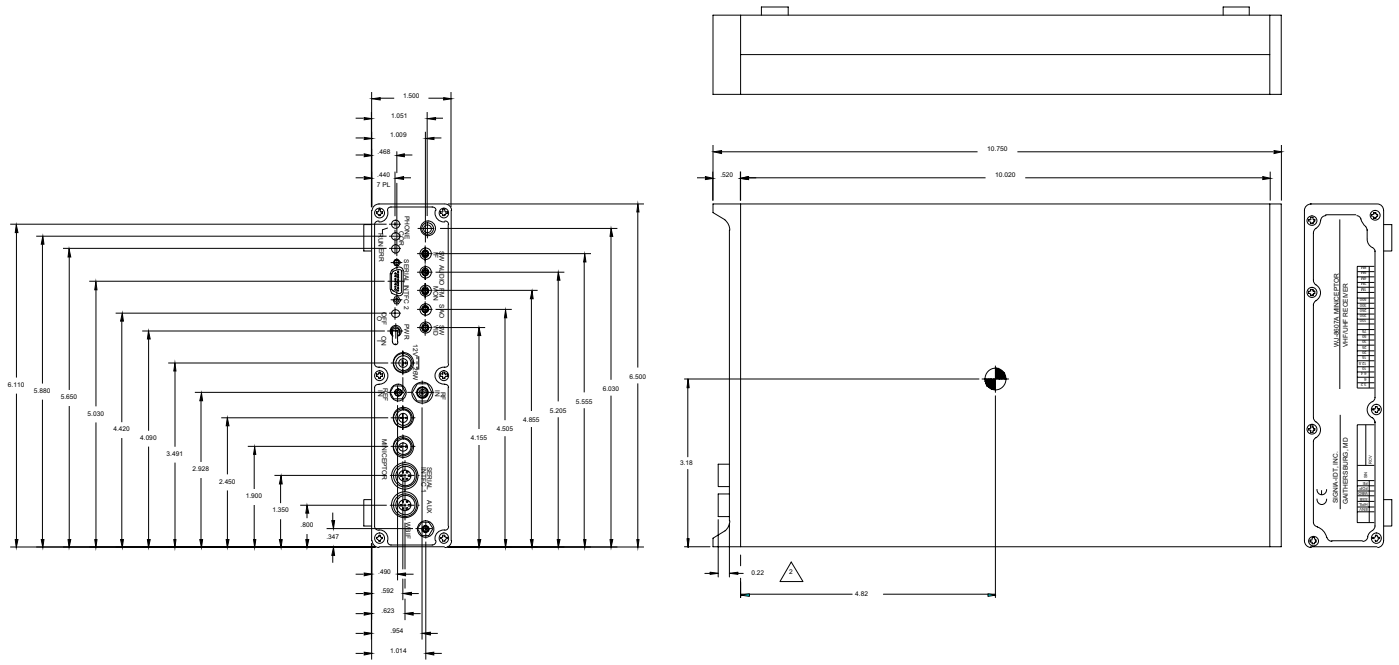
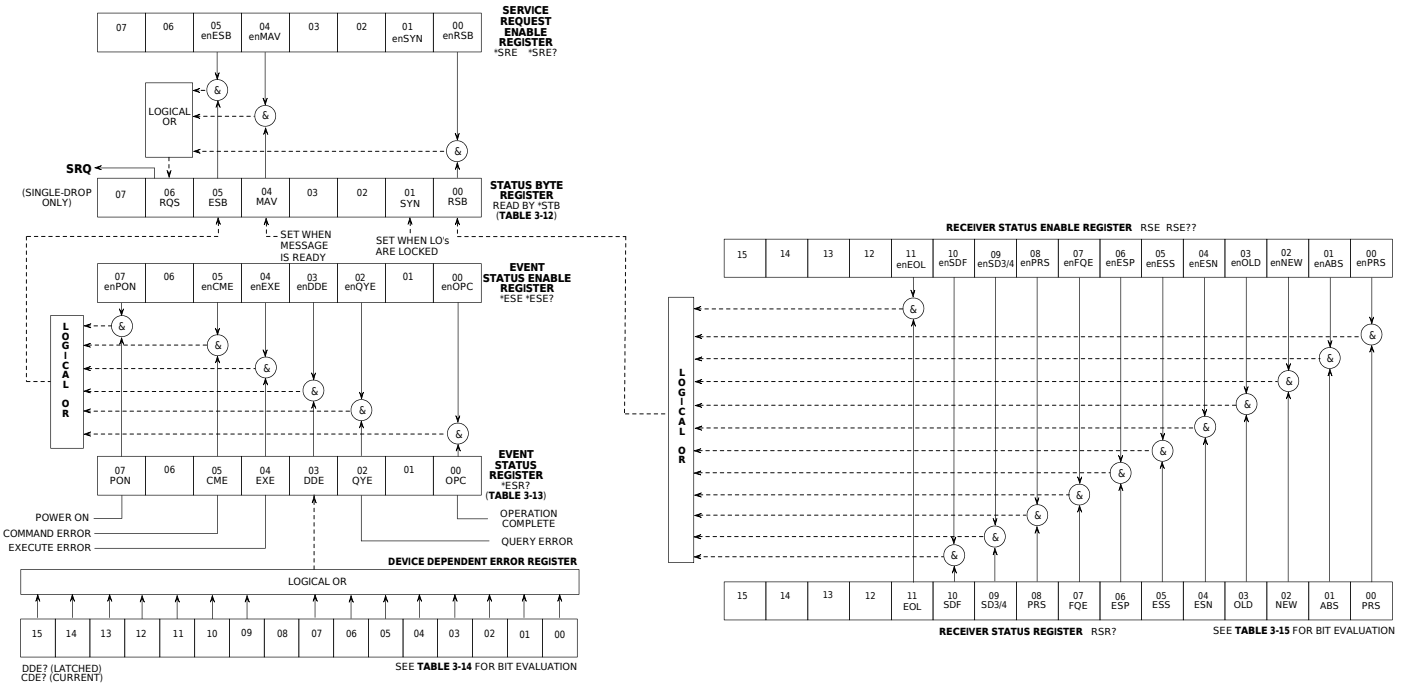
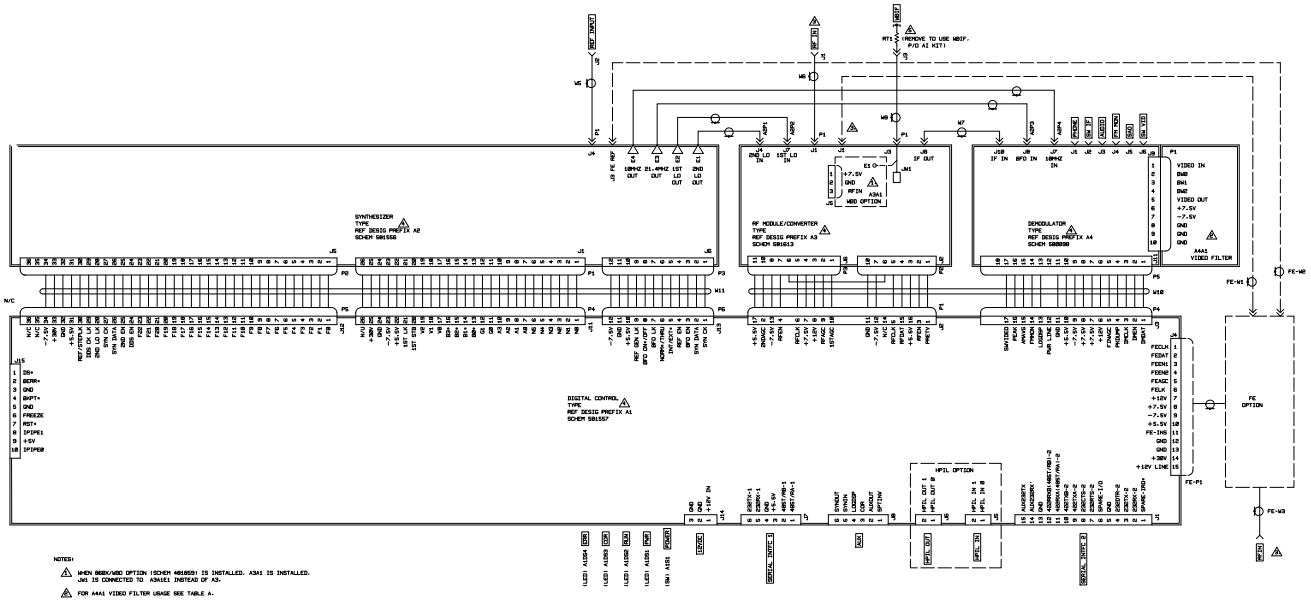


FO-1. WJ-8607A VHF/UHF Surveillance Receiver
Critical Dimensions Diagram 482627 (C)
FP-1/(FP-2 blank)



FO-2. Microceptor Status Data Structure
FP-3/(FP-4 blank)



NOTES:

⚠ WHEN 8686K/WBD OPTION (SCHEM 4818591) IS INSTALLED, A3A1 IS INSTALLED. JW1 IS CONNECTED TO A3A1E1 INSTEAD OF A3.

⚠ FOR A4A1 VIDEO FILTER USAGE SEE TABLE A.

TABLE A

TYPE	SCHEM	DESCRIPTION
382899	382884	VIDEO FILTER. 4 ACTIVE. 1 PASSIVE
382900	382885	VIDEO FILTER. 3 ACTIVE. 2 PASSIVE
382901	382886	VIDEO FILTER. 2 ACTIVE. 3 PASSIVE
382902	382887	VIDEO FILTER. 1 ACTIVE. 4 PASSIVE
382903	382888	VIDEO FILTER. 0 ACTIVE. 5 PASSIVE

⚠ WHEN FE-OPTION IS INSTALLED, A3W5 IS NOT USED. FE-W1 CONNECTS TO A3J4. FE-W2 CONNECTS TO A4J3. FE-W3 CONNECTS TO RF IN .

⚠ FOR TYPE NO.S OF BOARDS SEE TABLE B.

TABLE B

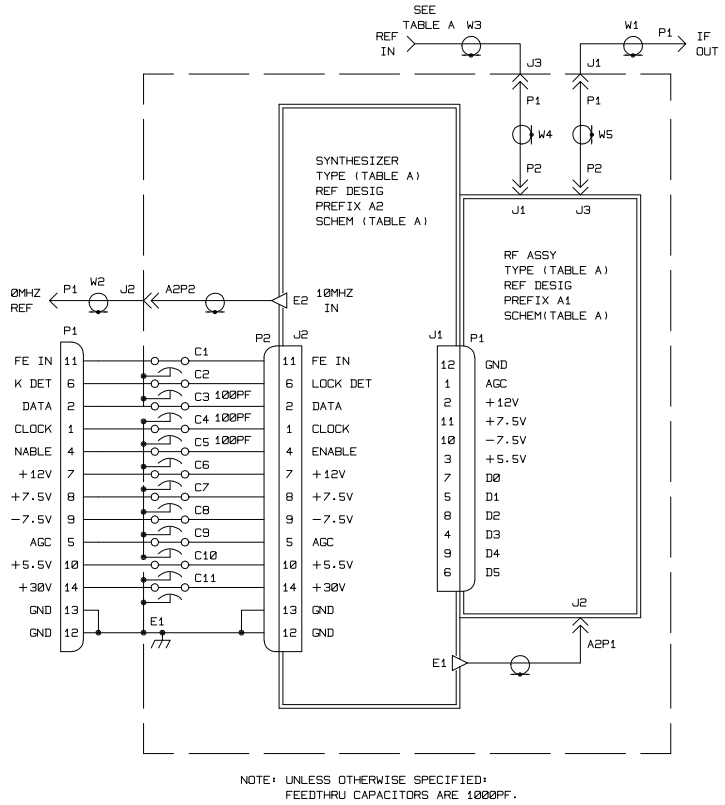
SER NO.	REF DES	STD	8687A/HPIL	STD W/ENV	8687A/HPIL W/ENV
1-247	A1	797136-1	797136-2	797136-3	797136-4
248 UP	A1	797339-1	797339-2	797339-3	797339-4
ALL	A2	797156-1	797156-1	797156-2	797156-2
ALL	A3	797158-1	797158-1	797158-2	797158-2
ALL	A4	796788-7	796788-7	796788-9	796788-9

⚠ INSTALL RT1 ON WB3F OUTPUT BEFORE SHIPPING

FO-3. Type WJ-8607A Miniceptor Receiver, Main Chassis
Schematic Diagram 581581 (D)

TABLE A

UNIT	A1 TYPE	A1 SCHEM	A2 TYPE	A2 SCHEM	W3 RF IN REF DES
WJ-860X/FE	796892-1	581095	796824-1	580949	J4
860X/FE07	796803-1	581109	796824-2	581036	J4
8604-1/FE	796892-5	581095	796824-5	580949	J4
860XA/FE	796892-1	581095	797130-3	581540	J4
8604A-1/FE	796892-1	581095	797130-4	581540	P1
860XA/FEENV	796892-5	581095	797130-5	581540	J4
8604A/FE	796892-1	581095	797130-3	581540	P1



NOTE: UNLESS OTHERWISE SPECIFIED:
FEEDTHRU CAPACITORS ARE 1000PF.

FO-C-1. Type WJ-860XA/FE Frequency Extender
Main Chassis, Schematic Diagram 382058 (J)
FP-C-1/(FP-C-2 blank)