INSTALLATION AND OPERATION MANUAL

FOR THE

WJ-8700 DUAL VLF/HF RECEIVER

P/N 181331-001, Revision Q

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

April 2004

PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which DRS Signal Solutions, Inc. retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

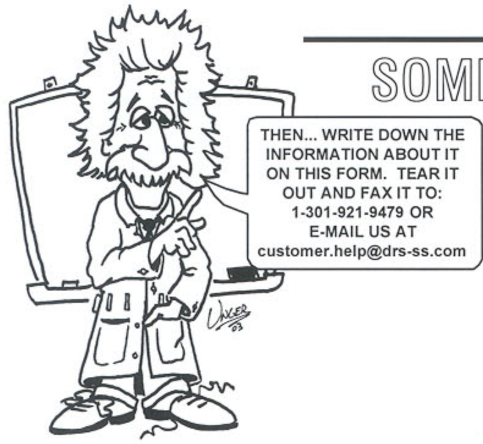
EXPORT STATEMENT

The technical data contained in this document is controlled for export by the U.S. Department of State under the International Traffic in Arms Regulations. It may not be re-exported, transferred or diverted to any other end-user or any other end-use without the prior written approval of the Office of Defense Trade Controls.

WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services, as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER; OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

TEAR OUT AND FAX: 1-301-921-9479



SOMETHING WRONG WITH THIS PUBLICATION ?

FROM: (PRINT YOUR COMPLETE ADDRESS)

DATE SENT

PUBLICATION PART NO.	REVISION LEVEL	PUBLICATION TITLE

PIN POINT THE PROBLEM				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF EFFECTIVE PAGES

Page Number	Description	Revision
i	Cover	Q
ii	Proprietary/Export/Warranty Statement	Q
A	Customer Feedback Form	Q
B	Intentionally Blank	Q
iii thru vi	List of Effective Pages	Q
vii	Revision Record	Q
viii	Intentionally Blank	P
ix thu xvi	Table of Contents	P
1-i	Section Cover	P
1-ii	Intentionally Blank	P
1-1 thru 1-12	Section One Pages	N
2-i	Section Cover	P
2-ii	Intentionally Blank	P
2-1	Section Two Page	Q
2-2 thru 2-9	Section Two Pages	P
2-10	Section Two Page	Q
2-11	Section Two Page	P
2-12 thru 2-13	Section Two Pages	Q
2-14 thru 2-53	Section Two Pages	P
2-54	Intentionally Blank	N
2-55/(2-56 blank)	Foldout	N
2-57 thru 2-76	Section Two Pages	N
3-i	Section Cover	P
3-ii	Intentionally Blank	P
3-1 thru 3-2	(Deleted)	P
4-i	Section Cover	P
4-ii	Intentionally Blank	P
4-1 thru 4-8	Section Three Pages	N
5-i	Section Cover	P
5-ii	Intentionally Blank	P
5-1 thru 5-2	Section Five Pages	Q
5-3 thru 5-4	Section Five Pages	N
5-5	Section Five Page	Q
5-6 thru 5-86	Section Five Pages	N
6-i	Section Cover	P
6-ii	Intentionally Blank	P
6-1/(6-2 blank)	Schematic Diagrams	P
6-3/(6-4 blank)	Schematic Diagrams	P
6-5/(6-6 blank)	Schematic Diagrams	P
6-7/(6-8 blank)	Schematic Diagrams	P
6-9/(6-10 blank)	Schematic Diagrams	P
6-11/(6-12 blank)	Schematic Diagrams	P

LIST OF EFFECTIVE PAGES (Continued)

Page Number	Description	Revision
6-13/(6-14 blank)	Schematic Diagrams	P
6-15/(6-16 blank)	Schematic Diagrams	P
6-17/(6-18 blank)	Schematic Diagrams	P
6-19/(6-20 blank)	Schematic Diagrams	P
6-21/(6-22 blank)	Schematic Diagrams	P
6-23/(6-24 blank)	Schematic Diagrams	P
6-25/(6-26 blank)	Schematic Diagrams	P
6-27/(6-28 blank)	Schematic Diagrams	P
6-29/(6-30 blank)	Schematic Diagrams	P
6-31/(6-32 blank)	Schematic Diagrams	P
6-33/(6-34 blank)	Schematic Diagrams	P
6-35/(6-36 blank)	Schematic Diagrams	P
6-37/(6-38 blank)	Schematic Diagrams	P
A-i	Cover	Q
A-ii	Intentionally Blank	Q
A-iii thru A-iv	Table of Contents	P
A-1 thru A-4	Appendix A Pages	N
A-5	Appendix A Page	Q
A-6 thru A-10	Appendix A Pages	N
A-11/(A-12 blank)	Schematic Diagram	P
A-13/(A-14 blank)	Schematic Diagram	P
B-i	Cover	Q
B-ii	Intentionally Blank	Q
B-iii thru A-iv	Table of Contents	P
B-1 thru B-6	Appendix B Pages	N
B-7	Appendix B Page	Q
B-8	Appendix B Page	N
B-9/(B-10 blank)	Schematic Diagram	P
B-11/(B-12 blank)	Schematic Diagram	P
C-i	Cover	Q
C-ii	Intentionally Blank	Q
C-iii thru C-iv	Table of Contents	P
C-1 thru C-2	Appendix C Pages	N
D-i	Cover	Q
D-ii	Intentionally Blank	Q
D-iii thru D-iv	Table of Contents	P
D-1 thru D-2	Appendix D Pages	N
D-3	Appendix D Page	Q
D-4	Appendix D Page	N
D-5/(D-6 blank)	Schematic Diagram	P
D-7/(D-8 blank)	Schematic Diagram	P
D-9/(D-10 blank)	Schematic Diagram	P

LIST OF EFFECTIVE PAGES (Continued)

Page Number	Description	Revision
E-i	Cover	Q
E-ii	Intentionally Blank	Q
E-iii thru E-iv	Table of Contents	P
E-1 thru E-4	Appendix E Pages	N
E-5 thru E-6	Appendix E Pages	Q
E-7 thru E-8	Appendix E Pages	P
E-9/(E-10 blank)	Schematic Diagram	P
E-11/(E-12 blank)	Schematic Diagram	P
E-13/(E-14 blank)	Schematic Diagram	P
F-i	Cover	Q
F-ii	Intentionally Blank	Q
F-iii thru F-iv	Table of Contents	P
F-1 thru F-4	Appendix F Pages	Q
F-5	Appendix F Page	P
F-6	Appendix F Page	N
F-7/(F-8 blank)	Schematic Diagram	P
F-9/(F-10 blank)	Schematic Diagram	P
F-11/(F-12 blank)	Schematic Diagram	P
G-i	Cover	Q
G-ii	Intentionally Blank	Q
G-iii thru G-iv	Table of Contents	P
G-1	Appendix G Page	Q
G-2 thru G-3	Appendix G Pages	N
G-4	Appendix G Pages	Q
G-5	Appendix G Page	N
G-6	Appendix G Page	Q
G-7 thru G-10	Appendix G Page	N
G-11 thru G-12	Appendix G Pages	Q
G-13 thru G-14	Appendix G Pages	N
G-15/(G-16 blank)	Schematic Diagram	P
G-17/(G-18 blank)	Schematic Diagram	P
H-i	Cover	Q
H-ii	Intentionally Blank	Q
H-iii thru H-iv	Table of Contents	P
H-1 thru H-3	Appendix H Pages	N
H-4	Appendix H Page	Q
H-5 thru H-6	Appendix H Pages	N
H-7/(H-8 blank)	Schematic Diagram	P
H-9/(H-10 blank)	Schematic Diagram	P
H-11/(H-12 blank)	Schematic Diagram	P

Insert Appendix I - WJ-860X/MCS-1, WJ-8809/MCS-1, WJ-8654/MCS-1,
WJ-8700/MCS-1 Miniceptor Control Software, Version 5.00
P/N 181185-001 here

LIST OF EFFECTIVE PAGES (Continued)

Page Number	Description	Revision
J-i	Cover	Q
J-ii	Intentionally Blank	Q
J-iii thru J-iv	Table of Contents	P
J-1 thru J-3	Appendix J Pages	N
J-4 thru J-5	Appendix J Page	Q
J-6	Appendix J Page	N
J-7/(J-8 blank)	Schematic Diagram	P
J-9/(J-10 blank)	Schematic Diagram	P
J-11/(J-12 blank)	Schematic Diagram	P
K-i	Cover	Q
K-ii	Intentionally Blank	Q
K-iii thru K-iv	Table of Contents	P
K-1 thru K-11	Appendix K Pages	N
K-12	Appendix K Page	Q
K-13 thru K-17	Appendix K Pages	N
K-18 thru K-19	Appendix K Pages	Q
K-20 thru K-30	Appendix K Pages	N
K-31/(K-32 blank)	Schematic Diagram	P
K-33/(K-34 blank)	Schematic Diagram	P
K-35/(K-36 blank)	Schematic Diagram	P

WJ-8700 VLF/HF RECEIVER INSTRUCTION MANUAL

REVISION RECORD

Revision	Description	Date
A	Initial printing.	9/90
B	Update remote commands, parts lists, and schematics.	3/91
C	Add EPROM replacement procedures, add software version history, add BAG, BMG, and BOC remote commands, update parts lists and schematics.	7/91
D	Clarifies optional bandwidth set configurations. Changes configuration of WJ-8700/XBW8 configuration.	8/91
E	Adds more specific RS-232C information. Clarifies SMD mnemonic and internally-generated spurious specification.	8/91
F	Modifies specifications for minimum 3rd Order Intercept Point, power consumption, operating temperature range, relative humidity environment, and vibration.	4/92
G	Updated parts list and schematics.	7/92
H	Updated parts list and schematics.	6/94
I	Updated parts list and schematics.	10/94
J	Upgraded to PC format.	7/95
K	Added **Appendix K**. Details XOP5 Option of 21.4 MHz SMO, ALC, and 56-bit Synchronous Interface.	3/96
L	Corrected errata associated with nomenclaturing of SW IF, SMO, and ANT connectors. Receiver A connectors were incorrectly associated with Receiver B and vice versa.	4/96
M	Changed IF rejection specification from 90 dB minimum to 85 dB minimum per ECN 35651.	7/96
N	Released to CADIM.	11/2001
P	Incorporated ECO 041700.	3/2002
Q	Incorporated ECO 044660.	4/2004

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

SECTION I

GENERAL DESCRIPTION

SECTION II

INSTALLATION AND OPERATION

TABLE OF CONTENTS (Continued)

SECTION II

INSTALLATION AND OPERATION

TABLE OF CONTENTS (Continued)

SECTION II

INSTALLATION AND OPERATION

TABLE OF CONTENTS (Continued)

SECTION II

INSTALLATION AND OPERATION

SECTION III

RESERVED

SECTION IV

MAINTENANCE

TABLE OF CONTENTS (Continued)

SECTION IV

MAINTENANCE

SECTION V

REPLACEMENT PARTS LIST

LIST OF TABLES

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF ILLUSTRATIONS

TABLE OF CONTENTS (Continued)

SCHEMATICS

APPENDICES

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION I

GENERAL DESCRIPTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL CHARACTERISTICS

The WJ-8700 Dual VLF/HF Receiver is a compact, microprocessor-controlled receiver system intended to monitor or search for AM, FM, CW and SSB/ISB signals in the 5 kHz to 32 MHz frequency range. Each of the two installed receivers contains a fully-synthesized local oscillator which provides precise tuning from 5 kHz to 32 MHz in 10 Hz steps, and a tunable BFO which swings ±9.999 kHz in 1 Hz steps for full intelligence recovery when operating in CW mode. Both an input and an output are provided on the main chassis for the 10 MHz external reference, allowing daisy-chaining of the master reference signal between units.

Each receiver in the WJ-8700 features six selectable IF bandwidth slots, plus a 8 kHz, 16 or 32 kHz "bypass" established by the first IF filter. Various bandwidth sets may be configured from the standard group of IF filters listed in **Table 1-1**. In receivers intended for ISB reception, two of the filter slots contain special upper and lower sideband filters.

Table 1-1. WJ-8700 IF Bandwidth Filters

Bandwidth* (kHz)	Shape Factor
0.1	10:1 (60 dB to 3 dB)
0.25	4:1 (60 dB to 3 dB)
0.5	8:1 (60 dB to 6 dB)
0.5	4:1 (60 dB to 3 dB)
0.75	5:1 (60 dB to 3 dB)
1.0	5:1 (60 dB to 6 dB)
1.0	6:1 (60 dB to 3 dB)
2.0	2.5:1 (60 dB to 6 dB)
2.4	2.5:1 (60 dB to 3 dB)
2.4 (USB)	2.5:1 (60 dB to 3 dB)
2.4 (LSB)	2.5:1 (60 dB to 3 dB)
2.9 (USB)	**
2.9 (LSB)	**
3.2	2.5:1 (60 dB to 3 dB)
4.0	2.5:1 (60 dB to 6 dB)
4.7	2.5:1 (60 dB to 3 dB)
5.5	2.5:1 (60 dB to 3 dB)
6.0	2:1 (60 dB to 3 dB)
6.4	2.5:1 (60 dB to 3 dB)
8.0	4:1 (60 dB to 6 dB)
12.0	3:1 (60 dB to 3 dB)
16.0	3:1 (60 dB to 3 dB)

* All bandwidth specifications ±20%

** ISB filter bandwidth 2.9 kHz @ -3 dB, 4.3 kHz @ -60 dB, optimized for differential group delay. Maximum bandpass ripple 1.5 dB p-p.

Three basic modes of operation are available: Manual (fixed frequency), Sweep (continuous coverage from start frequency to stop frequency), and Step (preprogrammed discrete frequencies). The WJ-8700 is interactive in all of its operational modes. When signal activity is detected, a host controller (if Remote Interface Option is installed) can be alerted. In Sweep mode, a Lockout function is available for locking out portions of the RF spectrum. The receiver contains non-volatile memory for storage of up to 100 Sweep bands or Step channels, or 200 Lockout bands. An 8-bit CMOS microprocessor on each receiver motherboard implements the desired functions, such as AGC, AFC, synthesizer tuning, and I/O control.

All receiver control operations are manually controlled from a menu-driven front panel/controller assembly, which features a built-in 16-bit CMOS microprocessor and "softkey" (i.e., software-controlled key) access to different menu levels. A backlighted liquid-crystal display provides a visual representation of all menus and receiver functions. The front panel controls and display can be utilized to control either of the two receivers in the chassis, or up to 29 other frames within the system network (WJ NET). When the Remote Interface Option is installed external control of the two receivers within the chassis via a IEEE-488 or RS-232 remote interface is provided.

See **Table 1-2** for WJ-8700 Dual VLF/HF Receiver specifications.

Table 1-2. WJ-8700 Dual VLF/HF Receiver Specifications

Frequency Range	5 kHz to 32 MHz
Tuning Resolution	10 Hz (1 Hz BFO)
Internal Reference Stability	±1 ppm over temperature
External Reference Input	10 MHz, 0 dBm nominal
External Reference Output	10 MHz, 0 dBm nominal
Synthesizer lock time	20 msec typical from tuning command
Antenna Input	
Impedance	50 Ohms nominal
Protection	+30 dBm maximum, auto-resetting
Conducted LO at RF input	-100 dBm maximum
Detection Modes	AM, FM, CW, LSB, USB, optional ISB
IF Bandwidths	Supplied in sets; see **Table 1-1** for list of available filters
Predetected IF Output	455 kHz, -20 dBm nominal
Signal Handling Capabilities (1 - 30 MHz)	
3rd Order Intercept Point	+24 dBm minimum, +30 dBm typical
2nd Order Intercept point	+60 dBm minimum
Reciprocal Mix	When operating in a 4 kHz BW at rated sensitivity, an undesired signal 80 dB higher in amplitude at 50 kHz separation does not degrade the signal-to-noise ratio of the desired signal by more than 3 dB.
Preselection	Automatically selected suboctave filters in 9 bands between 1.6 and 32 MHz. Two low-pass filters from 5 kHz to 1.6 MHz.
Gain Control Modes	Automatic, Manual
Range	100 dB minimum
AGC Threshold	-105 dBm typical
AGC Attack Time	10 msec typical
AGC Hold Time (selectable)	50, 250, 3000 msec typical
AGC Decay Time	50 msec typical
AGC Dump	2.0 msec from command

Table 1-2. WJ-8700 Dual VLF/HF Receiver Specifications (Continued)

IF Rejection.. 85 dB minimum
Image Rejection.. 90 dB minimum
Internally-Generated Spurious .... Not more than five responses greater than -120 dBm equivalent input, none greater than -115 dBm equivalent input
Single Tone Spurious Rejection .... -123 dBm equivalent for -50 dBm input signals
Sensitivity (1 MHz - 30 MHz)

Mode	IF BW	Input Signal	Audio (S+N)/N)
CW	0.25 kHz	-119 dBm	16 dB
AM	6 kHz	-105 dBm (50% mod. 400 Hz)	10 dB
AM	12 kHz	-102 dBm (50% mod. 400 Hz)	10 dB
FM	16 kHz	-101 dBm (4.8 kHz peak dev. @ 400 Hz)	17 dB
ISB	2.90 kHz	-114 dBm	10 dB

Add 3 dB to all sensitivity specifications for tuned frequencies between 30 and 32 MHz.

CW Sensitivity (5 kHz - 1 MHz)
(0.25 kHz IF Bandwidth)
500 kHz - 1 MHz .... A -117 dBm signal will produce at least 16 dB (S+N)/N at the audio output.
50 kHz - 500 kHz... A -112 dBm signal will produce at least 16 dB (S+N)/N at the audio output.
5 kHz - 50 kHz... A -60 dBm signal will produce at least 16 dB (S+N)/N at the audio output.
Phase Noise .... -95 dBc/Hz maximum at 1 kHz offset
Signal Monitor Output.. Centered at 40.455 MHz, 500 kHz minimum BW, 0 dBc
Audio Outputs
Power Output
(rear panel 1/4" Stereo).................................... 100 mW rms minimum into 16 ohms, 300-3000 Hz, one output per receiver channel, unbalanced
Line Level Output
(rear panel) .... 0 dBm into 600 ohms, two per receiver channel
Headphone Output
(front panel 1/4" Stereo)................................... 2 mW rms minimum into 16 ohms, 300-3000 Hz, one per chassis
FM Monitor .... DC coupled, 0.25 Volts per kHz into 600 ohms
Power Interrupt .... Stores memory channel data for up to five years. Upon power restoration, receiver returns to previously tuned channel or frequency
Power Requirements... 115/230 VAC ±10%, 48 to 420 Hz
Power Consumption .... 85 Watts maximum without options

Table 1-2. WJ-8700 Dual VLF/HF Receiver Specifications (Continued)

Environmental	
Operating Temperature Range	-20 to +55°C
Full Specification Compliance	20 to 30°C
Relative Humidity	95% relative humidity, non-condensing
Vibration	Per MIL-STD-810D (Method 514.3) Section I-3.2.4, Category 4 Propeller Aircraft
Mechanical	
Size	8.25" wide x 3.5" high x 20" deep (20.9 cm x 8.9 cm x 50.8 cm)
Weight	less than 18 pounds (8.2 kg)

1.2 MECHANICAL CHARACTERISTICS

A WJ-8700 in standard configuration (two receivers installed) contains a total of 13 modules, which include the following: Front Panel Assembly, Reference Generator, and Power Supply, and two each of the Microprocessor/Motherboard, Preselector, Input Converter, Synthesizer, and IF Demodulator. The Front Panel Assembly, Reference Generator, Power Supply, Preselector, and Microprocessor/Motherboard modules fasten directly to the main chassis. The Input Converter, Synthesizer, and IF Demodulator modules plug directly into mating connectors on the Microprocessor/Motherboard modules using card-edge guides mounted on the main chassis.

All switches and indicators, and the headphone connector, are located on the WJ-8700 front panel, and all other connectors are located on the rear panel. Connector types used are multipin and BNC with the exception of the PHONE and SPK audio jacks, which are 1/4" stereo phone jacks.

1.3 OVERALL FUNCTIONAL DESCRIPTION

Refer to **Figure 1-1**. The operating circuitry of each of the two separate receivers ("A" and "B") in the WJ-8700 is contained in four functional sections: Preselector/Converter, Synthesizer, IF/Demodulator, and Digital Controller. An additional functional section which allows direct control over all functions of both receivers is the Front Panel, which contains the front panel microprocessor controller. NET and either IEEE-488 or RS-232 interfaces are available when the Remote Interface Option is installed. Signal connection between the functional sections is via internal cabling.

The following discussion of RF signal processing is applicable to either of the installed receivers in the WJ-8700. The received RF signal first enters the Preselector/ Converter section, where it is filtered, converted to the first IF of 40.455 MHz, filtered again, and converted to the final IF output of 455 kHz. The LO signals used in the two frequency conversions are generated in the Synthesizer section. An 11-band switched-filter preselector is utilized to reject out-of-band signals, while a fixed bandwidth filter following the first frequency conversion sets the maximum bandwidth at either 8, 16 or 32 kHz depending on the bandwidth option installed. A sample of the 1st IF output (40.455 MHz) is provided at the rear panel Signal Monitor Output connector. Two options are available which provide alternate outputs on this connector: WJ-8700X/SM1 455 kHz Signal Monitor Output Option supplies the 455 kHz 2nd IF, while WJ-8700X/SM2 21.4 MHz Signal Monitor Output Option supplies a 21.4 MHz signal.

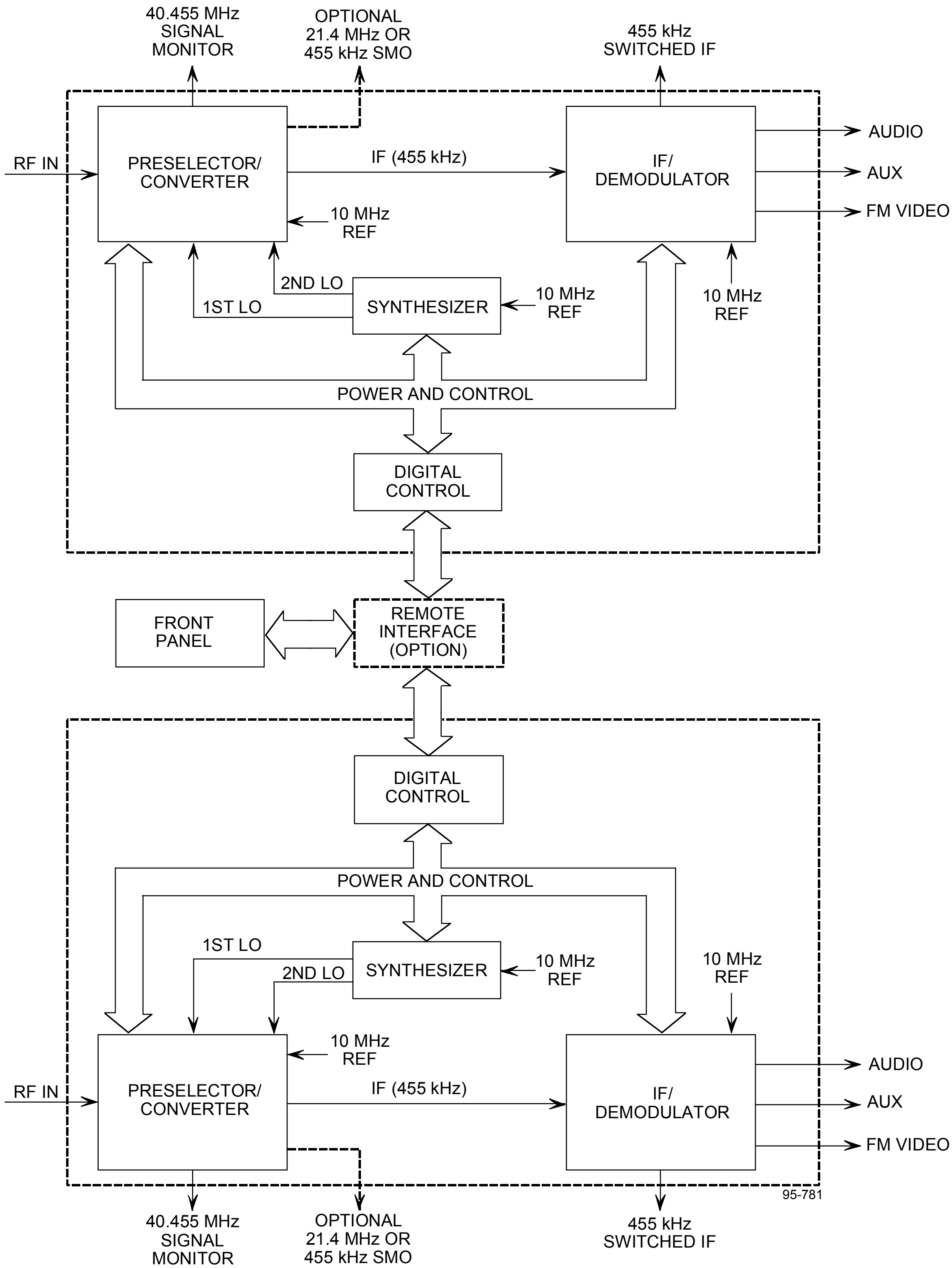


Figure 1-1. WJ-8700 Functional Block Diagram

The LO signals generated in the Synthesizer section include a synthesized 40.455 - 72.455 MHz 1st LO, and a fixed 40 MHz 2nd LO. The synthesized 1st LO is phase-locked to a 10 MHz external reference signal, while the 40 MHz 2nd LO is generated by direct frequency multiplication (X4) of the reference signal. The synthesized 1st LO provides tuning over the input frequency range of 5 kHz – 32 MHz in 10 Hz steps, resulting in the 1st IF of 40.455 MHz, while the 40 MHz fixed 2nd LO accomplishes the second conversion down to the final IF of 455 kHz.

After leaving the Preselector/Converter section, the received signal is routed to the IF/Demodulator section, where it first passes through one of the operator-selectable bandpass filters centered at the 2nd IF of 455 kHz. A bypass position is also provided which permits bypassing the filters, thereby allowing the first IF filter (8, 16 or 32 kHz) to set the receiver bandwidth. After filtering, the signal is amplified and an automatic gain control (AGC) voltage is developed. The AGC is applied to the RF and IF stages to maintain maximum dynamic range and to minimize signal distortion. Several selectable AGC hold times allow the operator to tailor reception to the signal environment.

Demodulation is accomplished in one of three different ways, depending on the modulation mode of the received signal. AM demodulation is by means of a synchronous detector, which provides linear detection and a high dynamic range. On CW and SSB/ISB signals, the WJ-8700 utilizes a product detector in conjunction with a tunable BFO having a range of ±9.99 kHz, in 1 Hz steps, for signal clarification. Simultaneous demodulation of upper and lower sideband signals is possible when the ISB filter set is installed as part of the 455 kHz IF filter bank. FM demodulation is accomplished using a quadrature detector, and a sample of the FM demodulator output is available on a rear panel connector at all times regardless of the selected detection mode.

Audio routing is very flexible, and includes a front-panel stereo headphone jack which allows the operator to connect the audio from one receiver to both ears, or one receiver to each ear. The AUDIO multipin connector provides left and right audio, as well as FM video and signal strength, and the rear-panel high-level SPK jack is capable of driving an external speaker directly with no additional amplification.

The Front Panel, which contains a 16-bit CMOS microcontroller and peripherals, provides overall control of all receiver functions through its interface with the Digital Control section of each receiver, either directly or through the Remote Interface card (if installed). Each Digital Control section interfaces with the primary modules within a receiver to route Front Panel commands and receive status information, utilizing a 8-bit CMOS microcontroller and peripherals for control. When the Remote Interface Option is installed, receiver commands may be initiated via the resident Front Panel controls, by an external Front Panel (via the NET interface), or by an external IEEE-488 or RS-232 controller (as applicable).

DC power for the WJ-8700 is provided by a chassis-mounted central power supply and routed to the appropriate functional sections via the interconnecting wiring.

1.4 EQUIPMENT SUPPLIED

Equipment supplied with the WJ-8700 consists of the receiver (including ordered options) and an accessory kit containing a detachable AC power cord, a PC card puller, fixed rack mounting hardware, a spare fuse, and miscellaneous hardware. Also included are multipin mating connectors for J2 (AUDIO), J12 (AUX), J13 (IEEE-488 or RS-232, if installed), J14 (PRINTER), and J15 (NET).

1.5 EQUIPMENT REQUIRED BUT NOT SUPPLIED

To obtain full utilization of the WJ-8700, equipment from the following list should be selected as required:

1. Antenna, 50 ohms impedance

2. Audio monitoring equipment:

   - Speaker Panel
   - Headphones, 8 ohms to 600 ohms impedance

3. Controller device (compatible with IEEE-488 or RS-232 remote option, if installed).

1.6 AVAILABLE OPTIONS

Available options for the WJ-8700 fall into two categories: channel-dependent and unit-dependent. Channel-dependent options can be installed in either or both receivers within a single chassis, and are designated WJ-8700X where "X" denotes the receiver channel (A or B) in which the option is installed. Unit-dependent options, such as remote interface, are functional with both channels.

Installed options are identified on a tag attached to the rear panel of each receiver.

1.6.1 CHANNEL-DEPENDENT OPTIONS

1.6.1.1 WJ-8700/XBWX Bandwidth Options

Several different IF bandwidth configurations are available on the WJ-8700, and are identified as /BWX where 'X' denotes the number of the bandwidth set. Refer to **Table 2-4** for a list of available filter sets.

1.6.1.2 WJ-8700/XSM1 455 kHz Signal Monitor Output

This option provides a 455 kHz signal monitor output in lieu of the standard 40.455 MHz output. The bandwidth is either 8, 16 or 32 kHz, depending on which filter is installed in the 1st IF. Implementation involves only a cabling change, and no additional modules are required.

1.6.1.3 WJ-8700/XSM2 21.4 Signal Monitor Output

This option provides an additional frequency converter module which is installed in the designated receiver channel option slot. The 1st IF frequency of 40.455 MHz is converted to 21.4 MHz for use with spectral display units such as the WJ-9205 and WJ-9206 Signal Monitors.

1.6.1.4 WJ-8700/XOP1 21.4 MHz Signal Monitor Output with Wideband Baseband Converter

This option combines the 21.4 MHz signal monitor output option (WJ-8700/XSM2) and a wideband baseband converter into one module. The baseband output is centered at 130 kHz and has a bandwidth of 256 kHz. The baseband output replaces the switched IF output on the rear panel of the receiver.

1.6.1.5 WJ-8700/XOP2 21.4 MHz Signal Monitor Output with Narrowband Baseband Converter

This option combines the 21.4 MHz signal monitor output option (WJ-8700/XSM2) and a narrowband baseband converter into one module. The baseband output is centered at 15 kHz and has a bandwidth of 20 kHz. The output is leveled automatically at 2 volts peak-to-peak +3 dB for signals from -105 to -5 dBm at the antenna input. The baseband output replaces the switched IF output on the rear panel of the receiver. In order to maintain the 20 kHz bandwidth, the receiver must be configured with either BW6 or BW7 filters.

1.6.1.6 WJ-8700/XOP3 SMO/Switched IF Converter

This option provides a signal monitor output (SMO) frequency of 21.4 MHz in place of the standard 40.455 MHz output at the rear panel. This option also provides a 45 kHz center frequency signal at the Switched IF rear panel connector in place of the Standard 455 kHz Switched IF signal.

1.6.1.7 WJ-8700/OP4 Baseband Converter with AGC Leveled Output Option

This option provides a 60 kHz center frequency signal at the Switched IF rear panel connector in place of the standard 455 kHz Switched IF signal. The bandwidth is 100 kHz. This output signal is AGC leveled to provide an output at 2.5 mW rms minimum into 90 ohms. Input signals greater than -93 dBm will be leveled. See **Appendix J** for further details.

1.6.1.8 WJ-8700/XOP5 Option

This option combines the 21.4 MHz signal monitor output option (SMO), the Automatic Level Control option (ALC), and a 56-bit synchronous remote control interface scheme into one module. See **Appendix K** for further details.

1.6.2 UNIT-DEPENDENT OPTIONS

1.6.2.1 WJ-8700/488 IEEE-488 Remote Control Interface

This option provides an additional module which is connected to the digital control section of the receiver, and which allows external control of both receiver channels. Both talk and listen capability between the receiver and external equipment, such as a microcomputer, are provided. Data is transferred in bit parallel, byte serial form, which ensures rapid data transfer. The WJ NET interface is included with this option. Refer to **Appendix B** for information concerning this option.

1.6.2.2 WJ-8700/232 RS-232C Remote Control Interface

This option provides an additional module which is connected to the digital control section of the receiver, and which allows external control of both receiver channels. The serial data transfer link provides both talk and listen capability between the receiver and external equipment, such as a microcomputer. The WJ NET interface is included with this option. Refer to **Appendix G** for information concerning this option.

1.6.2.3 WJ-8700/NFP No Front Panel Option and WJ-8700/NFPI No Front Panel/ No Interface Option

These options delete the front panel assembly from the unit, thereby eliminating local control. This option is most applicable to large computer-controlled systems which do not require local operator interface. Additionally, the NFPI option also deletes the connections for the optional remote interface. Refer to **Appendix A** for information concerning these options.

1.6.2.4 WJ-8700/SGL Single Receiver Option

This option deletes receiver channel "B" from the unit for applications with no dual receiver requirement.

1.7 SOFTWARE VERSION HISTORY

The following paragraphs describe the version differences in the various types of software.

1.7.1 RECEIVER SOFTWARE

The original version of the Receiver software was version 0.0.1 was released October 25, 1990.

Version 0.0.2 was released on November 05, 1990. This version fixed the following problems with the version 0.0.1 software. The *RST command now resets the Receiver Operating Mode (OPR) operation of the receiver. Before, if the OPR was previously set to 2 (sweep immediate), the *RST command reset every receiver parameter to the default state except for the OPR operation. It was still set to 2 and the receiver was still sweeping. This problem has now been corrected. Often in the version 0.0.1 software when the receiver was sweeping, the LO lock task reported that the LO was unlocked when it was actually locked. This problem has also been corrected in the version 0.0.2 software. A third problem in the version 0.0.1 software was that the translation loop would indicate unlocked when the receiver was tuned to 0.0000 MHz and the receiver's detection mode was LSB. This problem has also been corrected in the version 0.0.2 software.

Version 0.0.3 was released on January 23, 1991. This version fixed the following problems with the version 0.0.2 software. Now if the pass band tuning operates too close to 0 MHz, the receiver detects this and stops tuning when the receiver's lower limit frequency is reached. A second problem in the version 0.0.2 software was that the *RST command would illegally clear both the lockout and storage memory channels. These problems have been corrected in version 0.0.3. A third problem occurred when the receiver was extremely busy. It had a tendency to output an extra line feed, 'LF', through the parallel port. This has been corrected in the 0.0.3 version. Version 0.0.3 redefines the limits of the BFR? command. BFR? now has a range of ± 4.9999 kHz if the ISB option is installed. Otherwise, the BFR? has a range of ± 9.999 kHz. Version 0.0.3 also added RTK 0? and the RTK 0 commands. RTK 0? is a non-destructive request token query command. RTK 0 has the same function as the RTK command.

Version 0.0.4 was released on April 22, 1991. This version of the software corrected several problems found in the Version 0.0.3 software. In version 0.0.3, sometimes the AFC operation would tune the receiver to a frequency outside the receiver tuning range. This problem has been corrected in version 0.0.4. Also, when the AFC operation was enabled in version 0.0.3, the receiver would sometimes cease to respond to remote commands. The receiver would have stayed in that mode until the power had been recycled. This problem has also been corrected in version 0.0.4. A third problem was when the receiver responded to the RLK nrf? query command. It now responds with LCK nr1, nr2, nr2 instead of RLK nr1, nr2, nr2. When the ISB option is installed, version 0.0.4 supports a BFO range of ±8500 Hz. The Clear Memory (CLM 1) command now does not clear the step (STL) and sweep (SWL) lists. If the COR status was off prior to issuing a Recall and Execute Memory (RCE nrf), where COR was set to 0 in that memory location, the COR stays in an OFF condition. The problem has been fixed in the version 0.0.4 software. Version 0.0.4 now supports the Adjust and the RF Converter D/A (ARF nrf) remote command. Another problem corrected in version 0.0.4 involves the COR Loss Timer (CLT). Now when the CLT is set higher than 40 msec and a signal is detected, the COR always stays on despite the current status of that signal. Also in the version 0.0.4, the Preselector is no longer an option but now part of the standard package.

Version 0.05 was released on July 12, 1991. This version of the software corrected the problem whereby if an SRQ had occurred, the receiver returned an erroneous byte via the parallel I/O before the requested response.

Version 0.06 was released on August 14, 1991. This version of the software provided the OP1, OP2, and OP3 option support. Version 0.06 supports the Option Query (*OPT?), the Set Baseband Attenuation value (BAT nrf), the Baseband Attenuation Query (BAT?), the Set Baseband Automatic Gain Control On/Off (BAT nrf), the Baseband AGC Query (BAG?), the Set Baseband Output Control On/Off (BOC nrf), and the Baseband Output Query (BOC?) commands added for OP1-OP3 option support.

Version 0.07 was released September 23, 1991. This version fixed several problems present in release 0.06. In version 0.06, if there was an SRQ pending prior to power down, when the receiver was powered up again the SRQ line was asserted, but with an empty status byte. In version 0.07, the SRQ line is cleared during power up. In version 0.06, the COR task consumes more than 50% of the microprocessor processing power, causing sluggish performance in receiver I/O remote operation. Version 0.07 COR task allows other software tasks to run inside its operation. The order of the AGT operation in version 0.06 is reversed from that specified in the manual. Version 0.07 corrects this (AGT 0 -> slow; AGT 1 -> medium; AGT 2 -> fast; AGT 3 -> very fast). Version 0.07 will now allow the selection of the Pass Band Tuning (PBT) to be performed with any detection mode. However, the operation of the PBT activates only during the CW detection mode.

Version 0.08 was released January 20, 1992. This version corrected several problems present in release 0.07. In version 0.07, the receiver could take as long as 15 seconds to report signal status (turn on/off audio) in response to an RF signal change. Version 0.08 reduces this time. Version 0.08 fixed the AFC operation so that it is operational when enabled. With Version 0.08, the receiver suspends on a signal and turns the audio on when the SIGNAL DWELL = 0 and Suspend is set to ON SIGNAL. In Version 0.07, when using sweep with RAC set to NEW and SKIP ADJACENT (RAC 9), double entries are placed in the QUE on the first point of a signal acquisition. Version 0.08 fixed this. Version 0.08 fixed the problem of receiver lockup when step operation is used with SRQ enabled and SIGNAL DWELL is 0. Version 0.08 also fixed the following:

a. Intermittent reporting of signal and turning on of audio when signal is below COR level.

b. SPI output control line does not reflect its status.

c. Restart Sweep/Step command (RES) does not restart the sweep or the step operation as specified in the manual.

d. If the level of the intercepted RF signal is at the COR setting, the receiver may report signal is intercepted, but then immediately report signal is lost. This was corrected by adding hysteresis to the calculation in the signal detection routine.

e. The receiver reports no signal or signal lost when the AM detector is at the maximum level.

Version 0.09 was released on April 16, 1992. This version of the software corrected several problems found in the Version 0.08 software. Those problems corrected are listed as follows:

a. Receiver falsely reports BFO unlock, when continuous BFO commands are sent.

b. The ENA command does not unsuspend receiver if the intercepted sign is present (signal over COR setting).

c. If the SRQ for the signal over COR is selected, SRQ (ESC) is always issued at the end of the sweep operation disregarding the condition of the signal intercepted.

d. Receiver falsely reports LO unlock (primarily translation loop unlock) is the commands or queries are continuously sent to the receiver during power up.

Version 0.10 was released on January 25, 1994. This version added the Sweep/Step Output function to the receiver firmware. The Sweep/Step Output Function is useful for drawing a panoramic display, or any operation requiring a quick way of collecting relative signal strength display data while the receiver is sweeping or stepping.

1.7.2 MRFP SOFTWARE

The original version of the MRFP software was version 1.0, released April 22, 1991. Version 1.1 of the MRFP software was released on May 3, 1991. This version changed the startup delay prior to the IOC initialization message being displayed from 200 ms to 350 ms. Sometimes, the shorter delay time resulted in an "IOC COMMUNICATIONS ERROR" message being displayed upon powerup. Also, the clearing of the UART buffer is now done approximately 200 ms after powerup instead of 50 ms. On some WJ-8700's without IOC cards, noise on the TX data lines upon powerup sometimes caused a "MODEL NOT RECOGNIZED" message to be displayed on the front panel.

1.7.3 IEEE-488 REMOTE INTERFACE SOFTWARE

The original version of the IEEE-488 Remote Interface software was version 0.00, released September 28, 1990. Version 0.01 of the Remote Interface software was released on October 2, 1990. This version now accepts any frame address between 1 and 31.

Version 0.02 of the Remote Interface software was released on October 9, 1990. This version corrected some problems with version 0.01. When sending RMD0? (CR)(LF) followed by FRQ?(CR)(LF)(talk)(mla), the response is now SMD xxxx. Also, upon sending a serial poll, the IOC would sometimes lose track of sending messages to the receiver. This has been corrected in version 0.02.

Version 0.03 of the Remote Interface software was released on October 25, 1990. This version corrected some problems with version 0.02. When sending RMDO? (CR)(LF) followed by FRQ?(CR)(LF)(talk)(mla) and at the same time continuously sending data into the MRFP and NET interfaces, the response is now SMD xxxx instead of FRQ x. In version 0.02, the serial interface that is used to interface with the MRFP would sometimes miss handling XON/XOFF. When the XON/XOFF occurred too fast, the serial interface would sometimes transmit a null character but never send XOFF. This problem has been corrected in version 0.03. Also, in version 0.02, the NET transmit interrupt consumed too much time, approximately 1 ms. The last transmit byte sent from the NET UART held the microprocessor IRQ for at least 1 ms. This problem has been corrected in version 0.03.

Version 0.04 of the Remote Interface software was released on January 23, 1991. This version corrected some problems with version 0.03. When the Remote Interface was extremely busy, it sometimes would lose some commands, especially those which originated on the MRFP or the NET interface bus. This problem has been corrected in version 0.04. When the character mode option of the IEEE-488 interface was selected and as soon as data or commands started to flow through the interface, the Remote Interface software operation would halt. This problem has been corrected in version 0.04.

Version 0.05 of the Remote Interface software was released on March 5, 1991. This version corrected two problems in version 0.04. Version 0.05 supports DCL only in the IEEE-488 buffer mode. It is no longer supported in the character mode. In version 0.04, if there is a collision of data during the Remote Interface's data transmission, there was a possibility that the Remote Interface would hang up the NET interface bus. This problem has been corrected in version 0.05.

Version 0.06 of the Remote Interface software was released on March 25, 1991. This version corrected a problem in version 0.05. The Remote Interface can now accept the remote or frame address from the Front Panel within 250 ms after the WJ-8700 is powered up.

SECTION II

INSTALLATION AND OPERATION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION II

INSTALLATION AND OPERATION

2.1 UNPACKING AND INSPECTION

The WJ-8700 and its accessories is shipped cushioned between molded-in-place expanded plastic pads in a double-walled carton. After unpacking the equipment, retain the shipping container and packing material until the equipment has been thoroughly inspected and it is ensured that reshipment is not necessary. Perform the following initial inspection:

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

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

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

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

If damage is found, forward an immediate request to the delivering carrier to perform an inspection and prepare a concealed-damage report. Do not destroy any packing material until it has been examined by an agent of the carrier. Concurrently, report the nature and extent of damage to the factory, 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 the factory until a claim for damages has been established.

2.2 INSTALLATION

The WJ-8700 Dual VLF/HF Receiver is designed for mounting in a half-rack configuration. Two units, mounted side-by-side, satisfy the full 19-inch front panel requirement for a standard equipment rack. The receiver occupies 3.5 inches of vertical rack space and extends approximately 21 inches into the rack as measured to the tips of the rear panel protective handles. A 1.75-inch space above and below the unit is recommended to provide for forced air convection. Access to the rear panel is recommended so that input and output connections can be made or changed conveniently, if desired. **Figure 2-1** illustrates the WJ-8700

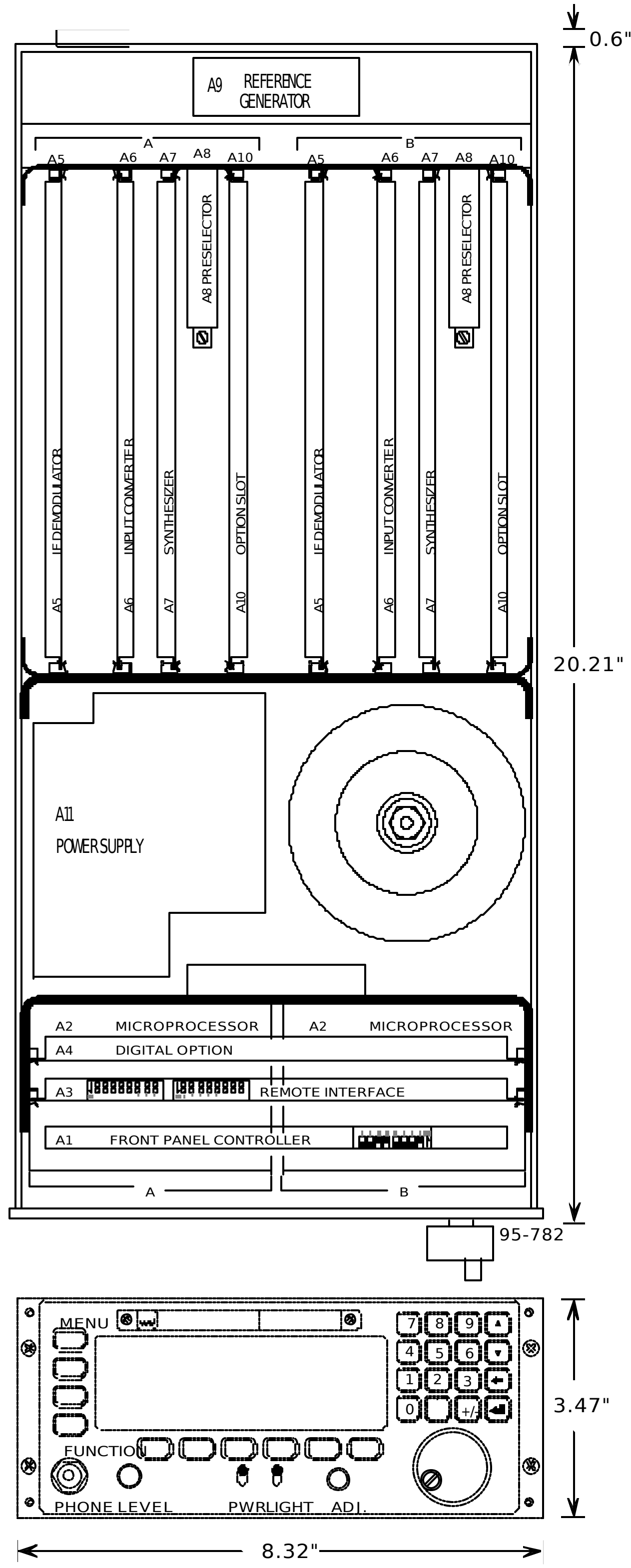


Figure 2-1. WJ-8700 Critical Dimensions

critical dimensions. Refer to **Figure 2-2** when installing a unit utilizing furnished mounting hardware. This figure illustrates the methods and hardware required to rack mount single or dual receiver chassis configurations. All illustrated accessory items except the false front panel assembly are furnished with each receiver.

CAUTION

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

CAUTION

Before applying power to the receiver, ensure that the receiver line voltage selection is set to the AC line voltage to be used. This can be verified by inspecting the PC wafer on the rear panel Voltage Selector Fuse Block, as described in **paragraph 2.2.2.1**.

2.2.1 JONATHAN TYPE 110QD-20-2 SLIDE MOUNTS

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

CAUTION

Do not use screws longer than 5/16-inch in slide mounting holes. Otherwise, permanent damage may occur to the unit being mounted.

LOCATION	Part No.	Nomenclature
A	280504-1	Front Support Bracket
B	280505-1	Center Support Bracket
C	282358-1	Outside Rear Handle
D	282358-2	Inside Rear Handle
E	32306-5	Handle Assembly
F	380539-1	False Front Panel
G	480508-1	Wraparound Assembly

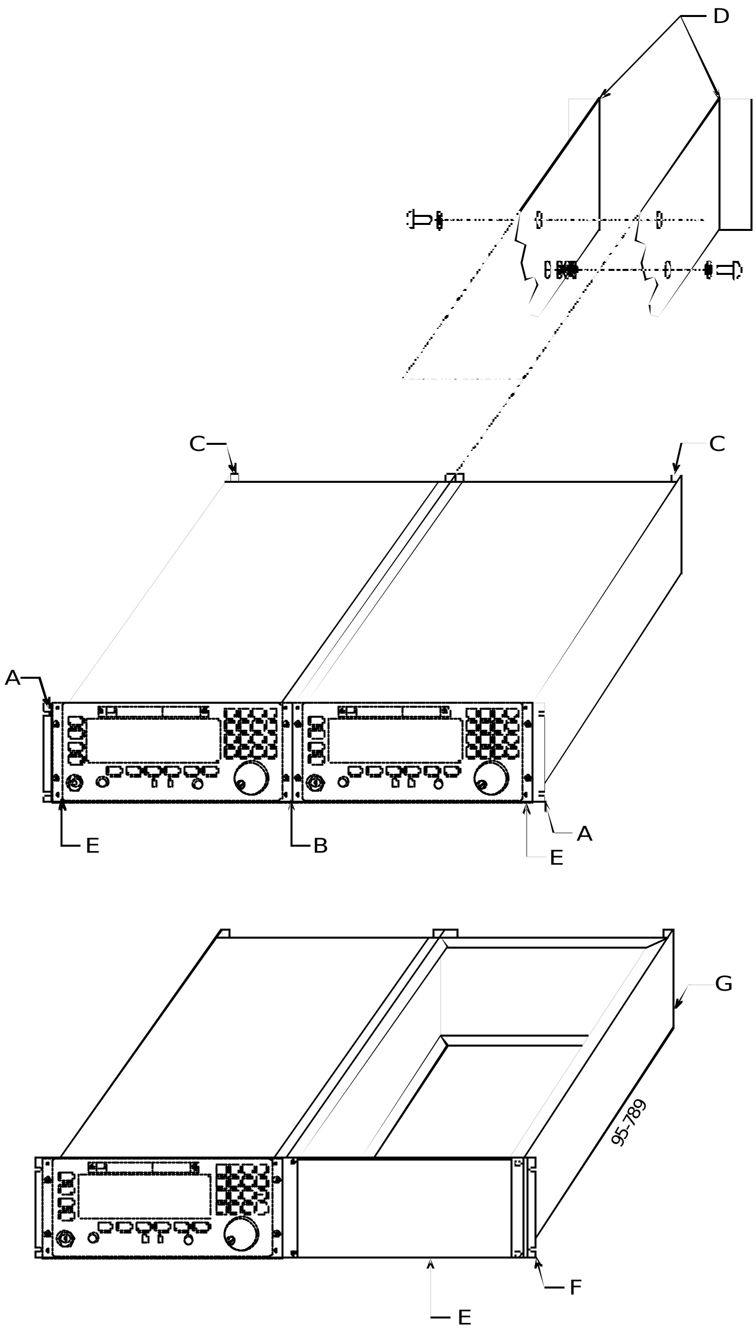


Figure 2-2. WJ-8700, Configuration of Rack Mounting Accessories

Each of the Type 110QD-20-2 slide mounts is comprised of two functional pieces: a chassis section for mounting to the equipment unit, and a cabinet section for mounting to the equipment rack. Three 10-32 x 5/16 pan head screws are used to install each chassis section to a receiver side panel. After both chassis sections have been securely tightened to the equipment unit, cabinet sections are installed into the equipment rack. The WJ-8700 utilizes 3.5 inches of vertical rack space (six bracket holes). The four center bracket holes on each side are used to secure the cabinet section of the slide assembly to the equipment rack. The two outer holes on each side are used to secure the receiver front panel to the equipment rack, if desired. Slide locks permit a quick disconnect of the chassis section from the cabinet section for equipment removal.

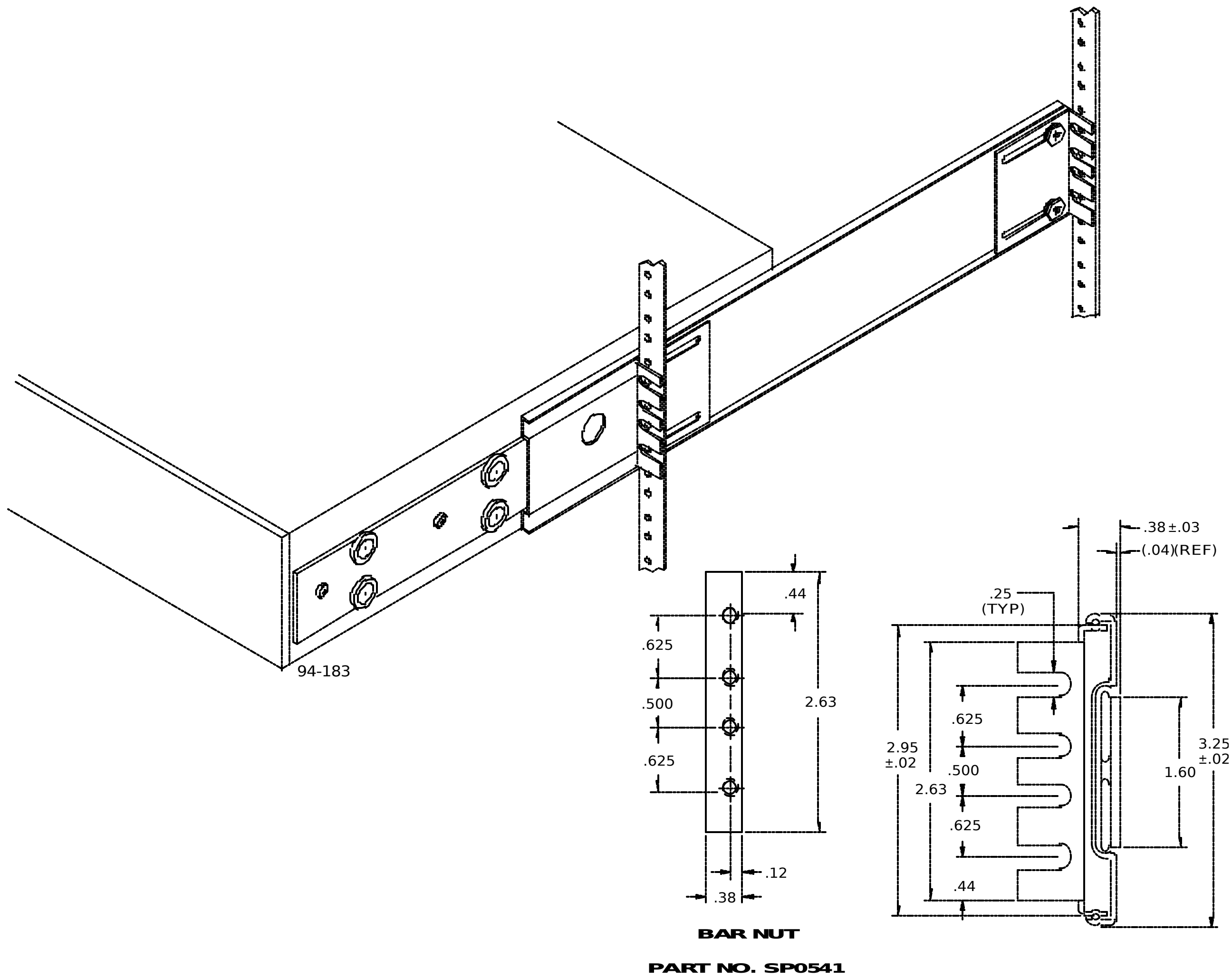


Figure 2-3. Installation of Jonathan Type 110QD-20-2 Slide Mounts

2.2.2 POWER SUPPLY REQUIREMENTS

The WJ-8700 requires an input voltage of 115/230 VAC, ±10%, 47 to 420 Hz. Prior to applying power to the receiver, however, it is necessary that the correct line voltage be selected on the rear panel Voltage Selector Fuse Block.

2.2.2.1 Voltage Selector Fuse Block

This assembly is physically part of the Line Cord Receptacle/Line Filter, FL1, and should always be inspected before installing the receiver in a new location. With the line cord unplugged, the clear plastic window can be slid to the left over the male power receptacle prongs, exposing the line fuse and a hinged plastic fuse pull lever.

Swinging the fuse pull lever to the left ejects the fuse from the holder and frees a line-voltage-select PC wafer at the bottom of the assembly. When viewing the installed PC wafer at a slight angle, the selected line voltage for the receiver is readable on top of the wafer. If the voltage shown does not match the available line voltage, remove the PC wafer and reinstall it so that the correct line voltage is readable with the wafer in position. Also ensure that the installed fuse is the correct value for the line voltage chosen: 1-1/2 amp slow-blow for 115 VAC, or 3/4 amp slow-blow for 230 VAC.

2.2.3 CONNECTOR SIGNALS

The following paragraphs list the input and output signals provided at the WJ-8700 connectors. Refer to **Table 2-1** for a list of the connectors and their corresponding reference designations and functions. **Figure 2-4** shows the locations of all connectors except the headphone jack, which is mounted on the front panel and shown in **Figure 2-5**.

Table 2-1. WJ-8700 Connectors and Functions

Connector	Ref Desig	Type	Function
PHONE	A1A1J10	1/4-inch Stereo	Headphone Audio Output, 2 mW
SPK	J11	1/4-inch Stereo	Speaker Audio Output, 100 mW
NET	J15	9-pin D	WJ NET Bus Interface
SW IF (A)	J8	BNC	Switched IF Output, Receiver A
SW IF (B)	J7	BNC	Switched IF Output, Receiver B
SMO (A)	J6	BNC	Signal Monitor Output, Receiver A
SMO (B)	J5	BNC	Signal Monitor Output, Receiver B

Table 2-1. WJ-8700 Connectors and Functions (Continued)

Connector	Ref Desig	Type	Function
ANT (A)	J4	BNC	Antenna Input, Receiver A
ANT (B)	J3	BNC	Antenna Input, Receiver B
REF OUT	J10	BNC	10 MHz External Reference Output
REF IN	J9	BNC	10 MHz External Reference Input
PRINTER	J14	9-pin D	External Printer Interface
AUDIO	J2	25-pin D	Audio/Video Outputs, Rcvrs A & B
AUX	J12	25-pin D	Auxiliary I/O, Receivers A & B

2.2.3.1 **PHONE, Headphone Audio Output (A1J10)** - The headphone audio output provides audio output up to 2 mW into 16 ohms impedance, using a 1/4-inch stereo phone jack mounted on the front panel. Receiver A and/or B audio output may be fed to both earpieces, or one receiver audio output may be fed to each earpiece, as selected from the front panel.

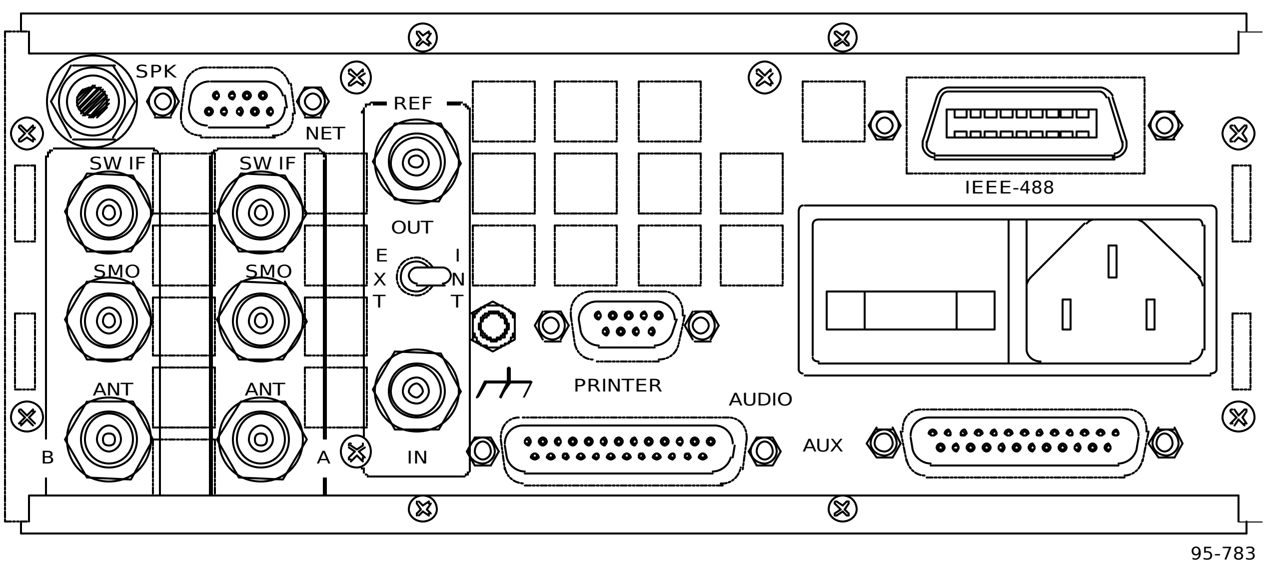


Figure 2-4. WJ-8700 Rear Panel View

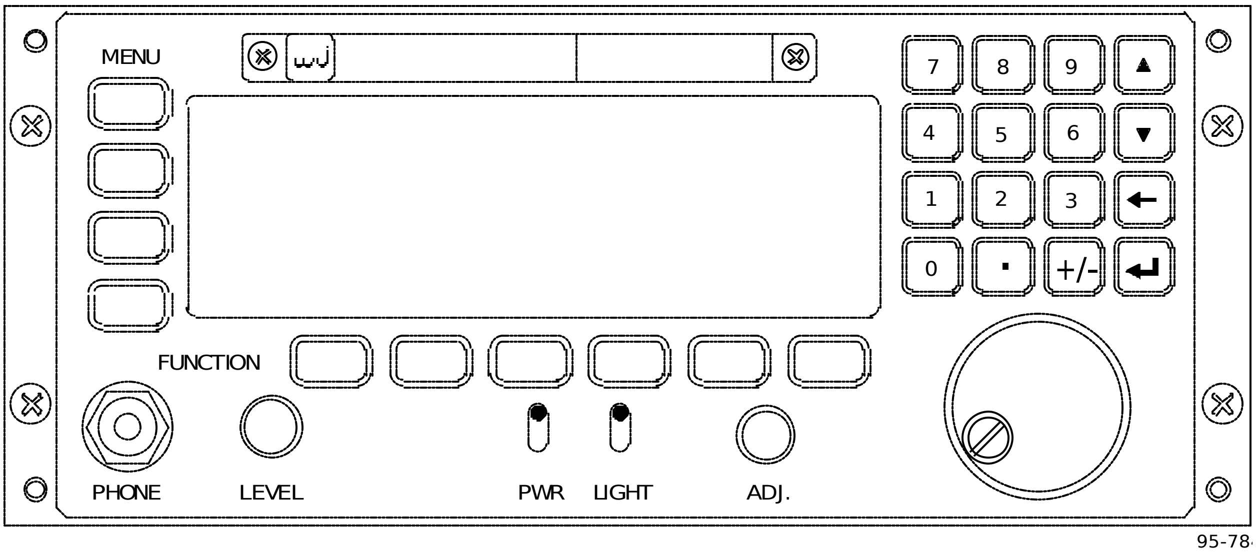


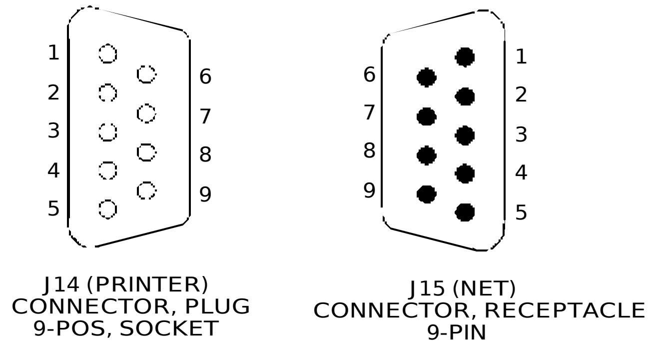
Figure 2-5. WJ-8700 Front Panel View

2.2.3.2 **SPK, Speaker Audio Output (J11)** - This 1/4-inch stereo phone jack provides audio output at up to 100 mW output power into 600 ohms, with one circuit carrying Receiver A and the other carrying Receiver B.

2.2.3.3 **NET, Net Control Bus Interface (J15)** - This 9-pin D subminiature WJ NET connector provides direct interface capability between the WJ-8700 front panel and up to 29 other WJ-8700 units. Requires that a Remote Interface PC card be installed in the WJ-8700 unit(s) being controlled over the WJ NET bus. Refer to **Figure 2-6** for information concerning signals on this connector.

2.2.3.4 **SW IF (A), Switched IF Output, Receiver A (J8)** - The signal present on this BNC connector is the pre-detected 455 kHz 2nd IF signal from Receiver A, at the selected receiver IF bandwidth. The nominal signal level is -20 dBm. This connector has an output impedance of 50 ohms.

2.2.3.5 **SW IF (B), Switched IF Output, Receiver B (J7)** - Same signal type and level as described in **paragraph 2.2.3.4**, but for Receiver B.



Pin	J14 Function	J15 Function
1	Not Used	Select Audio (SAO) Left
2	Receive Data (RXD)	NET +
3	Transmit Data (TXD)	SFSK (Future Expansion)
4	Data Terminal Ready (DTR)	Ground
5	Ground	Not Used
6	Data Set Ready (DSR)	Selected Audio (SAO) Right
7	Request to Send (RTS)	NET -
8	Clear to Send (CTS)	Ground
9	Not Used	Ground

95-785

Figure 2-6. 9-Pin D Connector Configurations

2.2.3.6 **SMO (A), Signal Monitor Output, Receiver A (J6)** - This BNC output provides a sample of the 40.455 MHz 1st IF signal at a minimum bandwidth of 500 kHz, and a nominal signal level of 0 dBc referenced to the RF input, for driving an external video signal monitor unit. This connector has an output impedance of 50 ohms.

2.2.3.7 **SMO (B), Signal Monitor Output, Receiver B (J5)** - This connector is the same signal type and level as described in **paragraph 2.2.3.6**, but for Receiver B.

2.2.3.8 **ANT (A), Antenna Input, Receiver A (J4)** - This BNC connector accepts the RF input to Receiver A, at a nominal input impedance of 50 ohms. Maximum non-destructive input level is +30 dBm.

2.2.3.9 **ANT (B), Antenna Input, Receiver B (J3)** - This connector is the same function, impedance, and maximum signal level as described in **paragraph 2.2.3.8**, but for Receiver B.

2.2.3.10 **REF IN, External 10 MHz Reference Input (J9)** - This BNC connector accepts a 10 MHz external reference input for use by both Receiver A and Receiver B, at a nominal reference input level of 0 dBm. The impedance of this input is 50 ohms.

2.2.3.11 **REF OUT, External 10 MHz Reference Output (J10)** - A sample of the 10 MHz external reference signal is present on this BNC connector, at a nominal level of 0 dBm and output impedance of 50 ohms, for use in "daisy-chaining" units together to the same external reference source.

2.2.3.12 **PRINTER, External Printer Interface (J14)** - This 9-pin D subminiature connector provides standard printer interface I/O control lines. Intended for future expansion of WJ-8700 capability to include front panel screen dumps. Refer to **Figure 2-6** for information concerning signals on this connector.

2.2.3.13 **AUDIO, Receivers A & B Audio/Video Outputs (J2)** - This 25-pin D subminiature connector provides left and right channel audio, FM video, and signal strength indications from receivers A and B. Refer to **Figure 2-7** for information concerning signals on this connector.

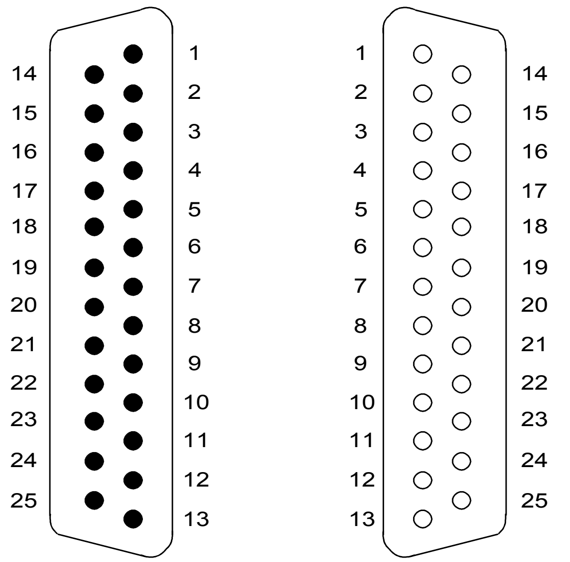
2.2.3.14 **AUX, Receivers A & B Auxiliary I/O (J12)** - This 25-pin D subminiature connector provides direct communications access to Microprocessor/Motherboard, A2. Refer to **Figure 2-7** for information concerning signals on this connector.

2.3 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. Prior to taking any corrective action or breaking any seals, contact your local sales representative, or the factory Customer Service Department, to prevent the possibility of voiding the terms of the warranty. Contact the factory via mail, telephone, wire, or cable at:

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

Toll Call: (301) 948-7550
TELEFAX: (301) 921-9479



Pin	J2 Function	J12 Function
1	Not Used	Receiver A TXD (Note 1)
2	Not Used	Receiver A COR*
3	Not Used	Receiver A AUX I/O (Future)
4	Audio (Left) Ground (RCVR B)	Receiver A Ground
5	Audio (Right) Ground (RCVR B)	+5V Digital (Test Only)
6	Ground (RCVR B)	+8V (Test Only)
7	Ground (RCVR B)	+24V (Test Only)
8	Not Used	+12V (Test Only)
9	Ground (RCVR A)	Receiver B Spectrum Inversion
10	Signal Strength (RCVR A)	Receiver B FSK (Future)
11	FM Video (RCVR A)	Receiver B RXD (Note 1)
12	Audio (Right) (RCVR A)	Not Used
13	Audio (Left) (RCVR A)	Not Used
14	Not Used	Receiver A RXD (Note 1)
15	Not Used	Receiver A FSK (Future)
16	Audio (Left) (RCVR B)	Receiver A Spectrum Inversion
17	Audio (Right) (RCVR B)	+12V (Test Only)
18	FM Video (RCVR B)	+5.8V Analog (Test Only)
19	Signal Strength (RCVR B)	-8V (Test Only)
20	Ground (RCVR B)	Ground
21	Not Used	Receiver B Ground
22	Ground (RCVR A)	Receiver B AUX I/O (Future)
23	Ground (RCVR A)	Receiver B COR*
24	Audio (Right) Ground (RCVR A)	Receiver B TXD (Note 1)
25	Audio (Left) Ground (RCVR A)	Not Used

95-786

Note 1 Only Functional if Receiver has no Front Panel and no Remote Interface

Figure 2-7. 25-Pin D Connector Configurations

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

2.4 PREPARATION FOR RESHIPMENT OR STORAGE

If the unit 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 unit during reshipment or storage. When possible, use the original packing container and cushioning material. If the original packing materials are not available, use the following procedure:

1. Wrap the unit in sturdy paper or plastic.

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

3. If shipping the unit for service, fill out all information on the 5x6-inch PRODUCT DISCREPANCY REPORT card that was provided with the original shipment. Also ensure that the Return for Maintenance Authorization (RMA) number is recorded on the card. (See **paragraph 2.3** for details on obtaining this number.) If this card is not available, attach a tag to the unit containing the following information:

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

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

5. Ship to:

   DRS Signal Solutions, Inc.
   700 Quince Orchard Road
   Gaithersburg, MD 20878-1794
   U.S.A.

When storing the equipment for extended periods, follow the above packing instructions to prevent damage to the equipment. Store in a dark place. The optimal limits for storage environment are:

Temperature: -25^{o}C $\pm$10^{o}C
Humidity: Less than 65%

2.5 LOCAL OPERATION

The WJ-8700 is designed to be operated in one of four possible configurations:

1. Manual operation only, with all functions selected by the operator from the front panel (Remote Interface Option not installed).

2. Manual or remote operation, as desired, with functions controlled either from the front panel or via a IEEE-488 or RS-232 Remote Interface (Remote Interface Option installed).

3. Remote operation only via either IEEE-488 or RS-232 Remote Interface (Remote Interface Option installed, No Front Panel Option installed).

4. External single-receiver control only, with each installed receiver controlled directly via a separate RS-232C interface (Remote Interface Option not installed, No Front Panel Option installed). Refer to WJ-8700/NFP No Front Panel Option, **Appendix A**.

This manual describes the overall operation of the WJ-8700 and the means of implementing appropriate functions via remote control. For detailed operations from the front panel, please refer to the appropriate section of the Front Panel Unit Operator's Manual.

Remote control operation of the WJ-8700 requires the installation of either the WJ-8700/488 IEEE-488 Remote Control Interface Option, or the WJ-8700/232 RS-232C Remote Control Interface Option. The capability to operate the receiver via the WJ NET interface is included with either of the Remote Interface options. Refer to the appropriate appendix for detailed descriptions of operation via either the IEEE-488 or RS-232C Remote Control Interface options.

2.5.1 CONTROLS AND INDICATORS

All controls for the WJ-8700 are located on the front panel, as shown in **Figure 2-5**. Toggle switches are provided for turning on and off the power and the backlighting for the LCD display. Control knobs are available to set the audio output level and manually tune the receiver, with a third knob for adjustment of variable parameters, as explained below. The LCD display provides the status indicators for all receiver functions; there are no discrete indicator lamps or other displays provided. The following paragraphs explain in detail the function of each control and indicator.

2.5.1.1 **PWR Switch, S1** - This two-position, front panel mounted toggle switch turns the primary AC power on when in the "up" position.

2.5.1.2 **LIGHT Switch, S3** - This two-position, front panel mounted toggle switch energizes backlighting for the LCD front panel display when set to the "up" position.

2.5.1.3 **Parameter ADJ. Control, A1A1S2** - This 24-position, front panel mounted encoded rotary switch mimics the use of the **UP** (↑) and **DOWN** (↓) keypad buttons. It is utilized to control variable-parameter subfunctions under software control, such as BFO frequency, IF bandwidth select, COR level, etc. Although it can be turned continuously in either direction, software will not "roll over" the control when the end of a subfunction parameter range is reached; instead, an error beep (if enabled) is generated at the end of a parameter range.

2.5.1.4 **LEVEL Control, A1R1 and A1R2** - Two 270-degree rotation potentiometers, mechanically ganged together, form this front panel control which adjusts the left and right audio levels to the front panel PHONE jack (A1A1J10) and the rear panel SPK connector (J11).

2.5.1.5 **Tuning Wheel, A1U3** - This front panel mounted encoder with spinner knob can be turned continuously in either direction and is utilized to control frequency subfunctions. Software does not "roll over" the control when the end of a subfunction parameter range is reached; instead, an error beep (if enabled) is generated when the parameter limit is reached.

2.5.1.6 **Keypad, A1U2** - This front panel mounted membrane keypad assembly includes: Ten numeric (0-9) and six special function keys, all contained in a 4 X 4 square; four software-controlled **MENU** keys arranged vertically along the left side of the LCD display; and six software-controlled **FUNCTION** keys arranged horizontally below the LCD display. Specific keys are defined in **paragraphs 2.5.1.6.1** through **2.5.1.6.6**.

2.5.1.6.1 **0 through 9, +/-, . Keys** - These keys are used for numeric entry of parameters, or in response to an operator prompt. Subsequent entries after the first are appended to the right of the first entry. Additional entries beyond a full field (as defined for a given parameter) are ignored.

2.5.1.6.2 **Up () and Down (¯) Keys** - These keys are used to increment or decrement an active parameter or operator prompt. The amount incremented or decremented is specified by the particular parameter, or is variable in the case of frequency. If a key is depressed for longer than 0.5 seconds, auto repeat is enabled and the parameter continues to step until the key is released or the parameter limit is reached.

2.5.1.6.3 **Delete (¬) Key** - This key provides two modes of operation based on the keypad mode. In numeric entry mode (at least one key has been pressed), the ¬ key removes the last entry; if the first numeric entry is deleted, the front panel display reverts to non-numeric entry operation.

Pressing the ¬ key while in the non-numeric entry operation mode returns the front panel display to function selection operation.

2.5.1.6.4 **Enter (¿) Key** - This key provides two modes of operation based on the keypad mode. In numeric entry mode, ¿ causes the entered numeric value to become the new subfunction value. If the entry is valid, the front panel display returns to the subfunction, numeric entry inactive mode; an invalid entry causes a display error prompt that requires operator action.

Pressing the ¿ key while in subfunction, numeric entry inactive mode, reverts the front panel display to the function select mode and causes any valid selections to be entered into the receiver.

2.5.1.6.5 **MENU Keys** - These four software-controlled keys enable the operator to select the appropriate menu, as indicated adjacent to each key on the LCD display, to allow the desired function(s) to be performed. **MENU** keys perform no actual device actions, and will not cause any receiver parameters to be changed.

2.5.1.6.6 **FUNCTION Keys** - The six software-controlled **FUNCTION** keys allow the receiver to be controlled by the operator. Functions available from any displayed menu are shown on the LCD display above the appropriate **FUNCTION** keys; where more than six functions are available, one of the keys is labeled more and allows access to additional functions.

Understanding the operation of the software-controlled **FUNCTION** keys requires two basic definitions related to the front panel display:

(1) Function - As discussed in this manual, a function refers to an operation indicated on the front panel display above one of the horizontal **FUNCTION** keys; for example, **frq** (frequency), **ibw** (IF bandwidth), etc.

(2) Subfunction - As discussed in this manual, a subfunction refers to an operation contained within a function, as indicated on the front panel display above one of the horizontal **FUNCTION** keys after the desired function has been selected. For example, pressing the **ibw** (IF bandwidth) key causes the display to indicate the six available bandwidths, one above each **FUNCTION** key. Selecting one of the bandwidths by pressing the appropriate key is therefore a subfunction action.

FUNCTION keys may have an immediate action, wherein they toggle a function which is a simple "ON-OFF" selection. They may also select a new group of subfunction keys (as described in the note above for **ibw** selection). Finally, **FUNCTION** keys for parameters which are not currently displayed access an operator prompt on the function key line.

When a **FUNCTION** key is pressed, the corresponding display readout of the selected function changes to uppercase letters, and is bracketed on either side by a black rectangle.

2.5.1.7 **LCD DISPLAY -** The 4.5" X 1.5" backlit LCD display provides visual indication of the status of all receiver functions, labels for the **MENU** and **FUNCTION** keys, and operator prompts or error messages. The following paragraphs describe the cursors used with the display. For detailed descriptions of other displayed information refer to the appropriate section of the Front Panel Unit Operator's Manual.

2.5.1.7.1 Display Cursors

Three types of display cursors are used on the LCD display: active parameter cursor, tuning resolution cursor, and numeric entry cursor. The active parameter cursor is used in conjunction with either of the other two cursors; however, the tuning resolution and numeric entry cursors are never active at the same time.

2.5.1.7.1.1 ***Active Parameter***

The active parameter cursor consists of a solid box on each end of the currently active parameter; that is, the parameter selected by a **FUNCTION** key for immediate control or alteration. This cursor is accompanied by a change to upper case letters of the parameter name, and is present any time the parameter is active in either the numeric or non-numeric mode.

2.5.1.7.1.2 ***Tuning Resolution Cursor***

The tuning resolution cursor indicates the current tuning resolution for a frequency parameter. It consists of a blinking underline beneath the most significant digit of the tuning rate. This cursor is present any time the tuning wheel is active (refer to **paragraph 2.5.1.5** for a description of tuning wheel operation).

2.5.1.7.1.3 ***Numeric Entry Cursor***

The numeric entry cursor highlights the current active numeric entry field by causing a solid block to blink over the last entered numeric character. This cursor is only present when the display is in the active numeric entry mode.

2.5.2 MENU DISPLAYS

The WJ-8700 front panel LCD display uses a data display technique which is best described as a system of nested menus. That is, the opening menu leads the operator to a series of functional menus, each of which allows access to various functions and subfunctions. The following paragraphs describe the opening menu and the means of accomplishing equipment start-up and device select. Detailed front panel operations are described in the Front Panel Unit Operator's Manual.

2.5.2.1 **Menu Flow Diagrams**

Figure 2-8 is a menu flow diagram which shows the pattern of nested menus utilized by the WJ-8700 front panel display. Refer to the Front Panel Unit Operator's Manual for detailed descriptions of all menus and functions.

As shown in **Figure 2-8**, access to a particular function requires that the operator select the appropriate menu, using the **MENU** keys arranged vertically on the left side of the LCD display. This, in turn, causes the desired function to appear above one of the **FUNCTION** keys, which are arranged horizontally just below the LCD display. Subsequent selection of a **FUNCTION** key either toggles the desired parameter or causes the applicable subfunction(s) to appear on the display above the horizontal keys.

NOTE

Subfunctions are NOT identified on the Menu Flow Diagram.

Since there are more than four menus and six functions available, one of the **MENU** and/or **FUNCTION** keys may be labeled **more**. Pressing the **more** key allows access to additional menus, functions, and subfunctions, as appropriate.

2.5.3 **INITIAL SETUP**

2.5.3.1 **Power-Up** - Initial power-up of the WJ-8700 is accomplished as follows:

1. Energize the WJ-8700 Receiver by moving the **PWR** switch to the On (up) position.

2. If LCD display backlighting is desired, move the **LIGHT** switch to the On (up) position.

2.5.3.2 **DEVICE SELECT Menu** - The initial or opening menu which appears at power-up is the **DEVICE SELECT** menu. This menu allows the operator to select which of the two installed receivers is being controlled. When multiple WJ-8700 receivers are networked together on the WJ NET bus, the **DEVICE SELECT** menu allows selection of both local and external frames and devices. Refer to **Section I** of the Front Panel Unit Operator's Manual for details concerning front panel control of external devices.

From the **DEVICE SELECT** menu, the operator may also enter the Front Panel Configuration (**fp cfg**) or Control (**contrl**) menus. The latter provide access to all other menus on the WJ-8700, as described in the Front Panel Unit Operator's Manual.

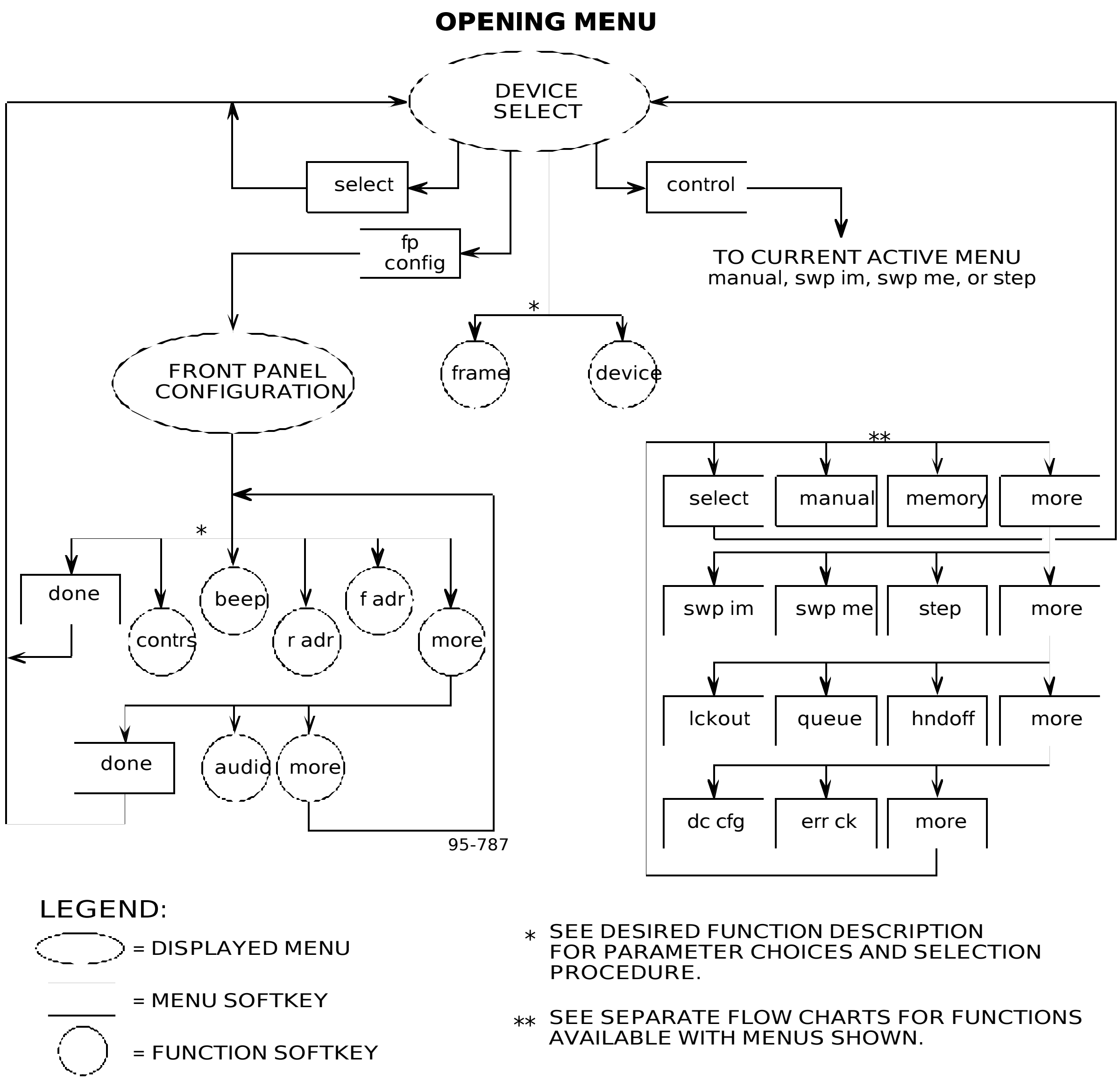


Figure 2-8. WJ-8700 Primary Menu Flow Chart

2.5.3.2.1 **Local Device Selection -** To select a local device, perform the following steps:

1. From the **DEVICE SELECT** menu, press the device **FUNCTION** key. The "device" readout on the display will change to all capital letters, and the word "DEVICE" will be bracketed. Subfunction labels **rcv1** and **rcv2**, which represent receivers A and B in the local frame, will appear above the two left-most **FUNCTION** keys.

NOTE

If only one receiver is installed in the frame, attempting to select the other receiver will result in a "DEVICE NOT RECOGNIZED" error message on the display.

2. Press **rcv1** or **rcv2** to select the desired receiver. The "DEVICE" readout on the display will change to reflect the number (1 or 2) of the device selected.

3. Press the enter key (¿). The display will return to the **DEVICE SELECT** menu, with the selected device indicated on the menu.

2.5.4 LOCAL OPERATION

Operation of the selected receiver in the WJ-8700 is accomplished through use of the remaining menus, all of which are accessed from the **DEVICE SELECT** menu by pressing the MENU key labeled contrl.

To begin manual receiver operation, press the **contrl** key; the display will switch to the **MANUAL** menu. Refer to the appropriate section of the Front Panel Unit Operator's Manual for detailed instructions on front panel operations.

2.5.5 RECEIVER CAPABILITIES

The WJ-8700 Dual VLF/HF Receiver is a 5 kHz to 32 MHz receiver designed for signal collection and analysis. It may be operated from the built-in Front Panel, or by means of an optional Remote Control Interface. Regardless of the means of control, however, the basic functions of the receiver are the same.

The WJ-8700 has three basic operational modes: Manual, Sweep and Step. These operational modes may be selected and controlled by either the Front Panel or via the optional Remote Control Interface. When an operational mode is changed, the receiver will initialize that mode and move to its active state.

Manual mode provides the operator with the capability to adjust receiver operating parameters directly from the Front Panel (or from a controller if the Remote Control Option is installed), and is basically designed for manually-controlled set-on operation. Sweep is contiguous swept coverage from a start frequency to a stop frequency, using a predetermined frequency increment size, and includes Lockout operation to ignore frequencies of no interest. Step allow sequencing thru discrete, pre-programmed memory channels. Both Sweep and Step are automatic modes of operation.

In Sweep or Step operation the receiver is searching 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 control registers. These dwell timer and register settings are entered via the Front Panel as function and subfunction commands, or may be entered via the optional Remote Control Interface. The settings provide a means for defining how a signal will be handled after it is received. Some of the Sweep and Step operations which may be specified by means of these settings are "hold on signal," "queue signals," "report only new signals," "suspend on end of sweep," etc.

The following paragraphs provide more information on the three WJ-8700 modes of operation. In the interest of clarity, no reference is made in this section to the remote control commands used to implement the various functions via the optional Remote Control Interface. The user is referred to the Remote Operation section of this manual (**paragraph 2.6**) for details regarding the remote commands used to control the WJ-8700. Note that the Remote Operations section only applies to WJ-8700 receivers with a Remote Control Option installed.

2.5.5.1 MANUAL (Fixed Tuned) Mode

The Manual mode is non-automatic, and allows the receiver to be set to a specified fixed set of parameters. The parameters may be entered either individually or as a group, or they may be executed from a memory channel. While in this operational mode, the receiver is capable of generating an interrupt to the Front Panel or controller indicating signal acquisition, signal loss, or both.

In the Manual mode of operation, parameters such as frequency, IF bandwidth, detection mode, COR threshold, video bandwidth, AGC, AFC, gain, and others can be controlled either locally (via the Front Panel), or remotely (via a controller) if the Remote Control Option is installed. The Manual mode allows use of the receiver for signal analysis, and in this mode of operation the receiver will return signal strength, COR status, and signal frequency offset values.

2.5.5.1.1 Setting the Tuned Frequency

Tuned frequency control of the WJ-8700 controls all hardware portions of the receiver necessary to convert the desired input frequency to a detectable signal at the second IF of 455 kHz. If AFC operation is enabled, the receiver automatically adjusts this parameter to fine-tune the signal. An external controller may query the WJ-8700 for the current tuned frequency.

The frequency range is from 5 kHz to 32 MHz, with a tuning resolution of 10 Hz. The actual tuning resolution is based on the selected tuning speed. When the receiver is in slow tuning speed the receiver resolution is 10 Hz, while in fast tuning speed the resolution is 25 Hz (rounded off). Regardless of the selected tuning speed, however, the remote control communications format includes 10 Hz resolution.

2.5.5.1.2 **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, LSB and USB detection modes, and with the proper bandwidth filters installed ISB mode is also available. Selecting a detection mode causes the receiver firmware to connect the desired detector to the receiver audio and video outputs. Since the receiver firmware does not allow AFC operation in CW, LSB, USB, or ISB detection modes, AFC is disabled in these modes. AFC can be enabled in the AM and FM detection modes.

In the USB, LSB and ISB detection modes, the receiver firmware will make special adjustments related to the bandwidth selection and location of the signal in the passband. Refer to **paragraph 2.5.5.1.6** for details of this operation.

2.5.5.1.3 **Gain Control**

The receiver supports AGC or manual attenuation 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 may be set from maximum (zero attenuation) to minimum (110 dB attenuation) in approximately 1 dB increments. An additional control function is available to set attenuation for the right channel only in ISB detection mode, when this mode is installed.

AGC operation in the WJ-8700 is hardware controlled, and is unaffected by detection mode. Two "on" modes of AGC operation are available in the WJ-8700: normal AGC, and hang AGC. In the normal mode, AGC immediately decays on loss of signal at the selected decay rate. The four available decay rates range from "slow" to "very fast." In the hang AGC mode, a sudden loss of signal at a rate greater than 20 dB/second causes the AGC to "hang" at its last level for a period of time, before beginning to decay at the selected decay rate. This mode is most useful when monitoring voice transmission, since it holds the gain constant on pauses between words.

2.5.5.1.4 **COR Operation**

The WJ-8700 provides a COR output on the AUX connector, and a signal via the optional Remote Interface (if installed), indicating the absence or presence of a signal. The AUDIO output may also be muted based on this operation. These outputs are based on the level of received signal and the selected COR threshold. When a signal is above the selected COR threshold, the outputs indicate signal presence. After the signal falls below the selected COR threshold 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.

The COR threshold is specified in dB above the theoretical noise floor for the selected IF bandwidth. The range of the COR threshold is from 0 to 99 dB. Setting the COR to -1 dB turns the COR off; i.e., causes the COR to continually indicate signal absence.

2.5.5.1.5 **AFC Operation**

The WJ-8700 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 but is only operational in the AM and FM detection modes. When the AFC operation is enabled it becomes active and retunes the receiver when a signal exceeds COR threshold, the AM 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 and the receiver remains at the last automatically-tuned frequency.

2.5.5.1.6 **IF Bandwidth Selection**

The IF bandwidth control allows selection of one of the 6 possible IF filters in the receiver, or the IF bypass position. 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 the video filter mode is set to automatic (default), the receiver will also automatically select the correct video filter for the current IF filter.

The WJ-8700 incorporates two unique characteristics with regard to filter selection. First, when the detection mode is USB or LSB, the receiver automatically selects a predefined filter and adjusts the IF so as to center the signal envelope in the filter, rather than to have the envelope above (USB) or below (LSB) the center of the IF filter, as would be the case if a signal was precisely tuned and the IF precisely centered on the filter. Second, in ISB detection mode the receiver automatically selects the matched ISB filters, each of which is designed to pass a signal envelope either above or below the tuned frequency. Therefore, attempting to change IF bandwidths in USB, LSB or ISB will have no effect.

2.5.5.1.7 **Video Bandwidth Selection**

The video bandwidth may be selected automatically when IF bandwidth is selected, or may be selected separately. In automatic video bandwidth selection, the correct video bandwidth is selected when the IF bandwidth is selected. For AM and FM detection modes, the video bandwidth is equal to one-half the bandwidth of the selected IF filter. In USB, LSB and ISB detection modes, the video bandwidth is approximately equal to the bandwidth of the selected IF filter.

2.5.5.1.8 **BFO Tuning**

The receiver contains a tunable variable oscillator (BFO) which mixes the final IF to baseband. Its range is ±9.999 kHz in 1 Hz steps. The specified frequency is an offset from the 455 kHz IF. The BFO can only be manually tuned in CW detection mode.

2.5.5.2 **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 WJ-8700 uses specified start and stop frequencies and specified sweep increments for sweeping. The sweep can be set to increment from start frequency to stop frequency or decrement from stop frequency to start frequency. The sweep is ended and started over 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 the start frequency is greater than the stop frequency the sweep will consist of one point. 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 - This operation automatically places the receiver in sweep mode. When the Sweep Immediate mode of operation is selected, sweep parameters for a single sweep sector may be entered such as start frequency, stop frequency, sweep direction, etc. The receiver will commence using the selected values at the beginning of the next sweep. Other receiver parameters such as bandwidth, COR threshold, detection mode, etc., may also be selected at any time and are effective immediately when selected.

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 100 WJ-8700 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 WJ-8700 is actively sweeping either by single parameter inputs or by loading the sweep buffer from memory. This allows for optimizing the sweep without stopping, storing memory, or 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.

2.5.5.2.1 **Lockout**

Parts of the RF spectrum may be locked out from the sweep operation by use of the Lockout function. The area to be locked out is defined with a lockout channel number, a start-of-lockout frequency, and a stop-of-lockout frequency. 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 WJ-8700 must be in the Manual mode or in the Suspend state of Sweep or Step modes before lockout data can be entered. The WJ-8700 memory can contain up to 200 lockout bands.

2.5.5.3 **Step Mode**

The Step mode is an automatic mode of operation that allows the WJ-8700 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, and may be reinstalled at any time.

2.5.5.4 Suspend Function

The Sweep and Step modes of operation may be placed in a suspended state. When the operation is suspended the WJ-8700 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 WJ-8700 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. Six 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, and suspend on full sweep/step data (SSD) buffer. Once the WJ-8700 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.

2.5.5.5 Dwell Timers

The WJ-8700 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.

2.5.5.5.1 Pre Dwell Timer

The Pre Dwell Timer defines how long the WJ-8700 initially waits on a sweep or step frequency for signal activity. The Pre Dwell Timer can be set for up to 996 ms, in 4 ms increments, or it can be set to infinity. A pre dwell of 0 implies that the receiver will perform a minimum dwell before moving on to the next frequency. Any time greater than 0 indicates the time in ms that the receiver will wait on that frequency for a signal. With infinity selected the receiver will dwell on a frequency until a signal is encountered or an advance command is issued. As soon as a signal over the COR threshold is encountered, the WJ-8700 moves to Signal Swell operation.

2.5.5.5.2 Signal Dwell Timer

The Signal Dwell Timer defines how long the WJ-8700 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 upon entry from Pre Dwell. The receiver exits Signal Dwell when either the timer expires or the encountered signal drops below COR threshold. If the timer expires, the receiver tunes to the next frequency. If the signal is lost, the receiver moves to Post Loss Dwell operation. The timer continues on entry from Post Loss Dwell. With the Signal Dwell Timer set to infinity, the WJ-8700 will stay in Signal Dwell until the signal is lost. This timer cumulative for each frequency point in the Sweep and Step modes.

2.5.5.5.3 **Post Loss Dwell Timer**

Post Loss Dwell operation is entered from Signal Dwell upon loss of signal. The Post Loss Dwell Timer specifies how long the WJ-8700 waits for the return of a lost signal before tuning to a new frequency. The timer can be set from 0 to 60 seconds or can be set to infinity. When this timer expires, the receiver automatically tunes to the next frequency. If a signal is reacquired while in Post Loss Dwell, the receiver returns to Signal Dwell operation. With the Signal Dwell and Post Loss Dwell timers set to infinity, the WJ-8700 will move to a new frequency only when commanded to do so by Front Panel or remote control command. This timer is initialized each time the Post Loss Dwell period is entered.

2.5.5.6 **Sweep/Step Data Output Function**

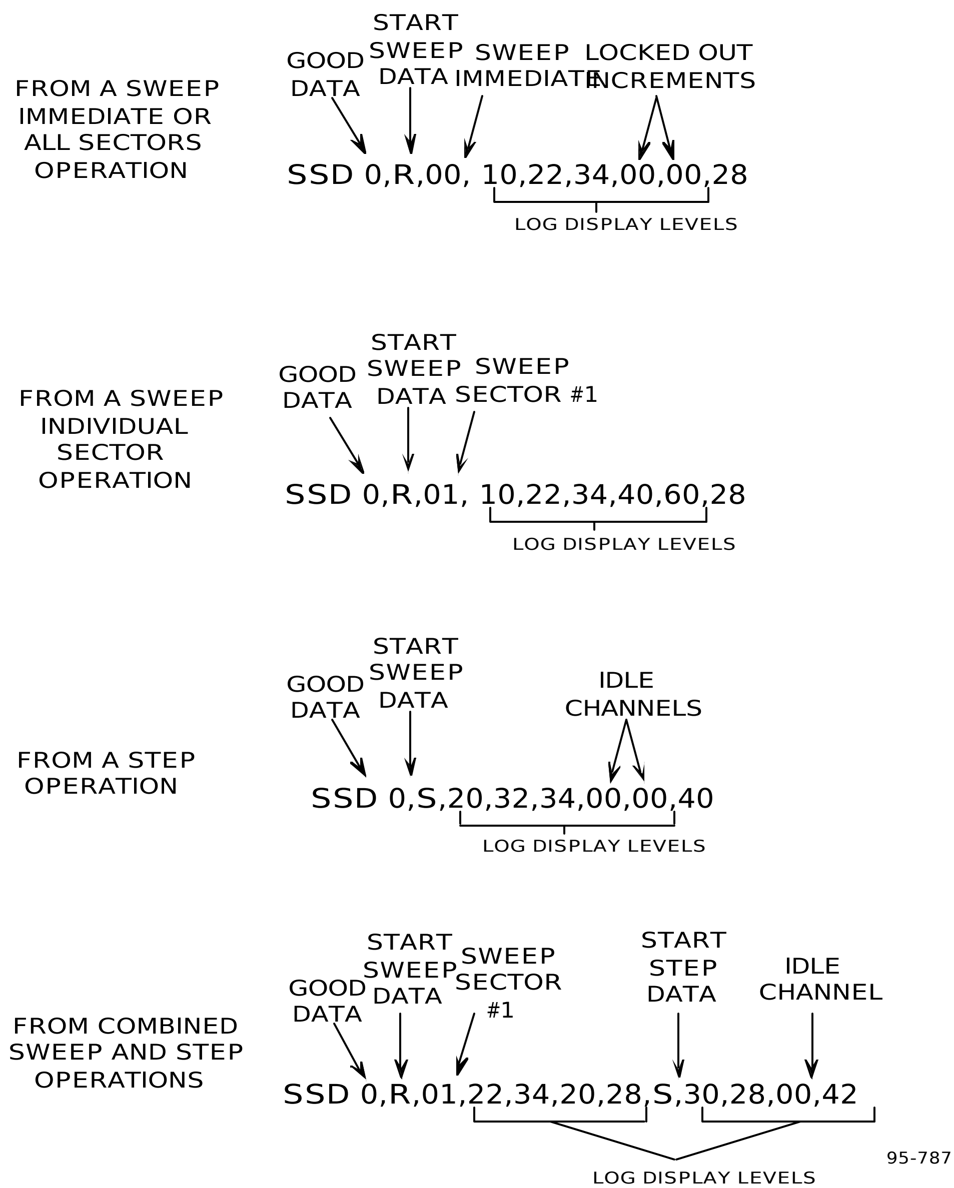
The sweep/step data output (SSD) function provides a means of collecting data containing LOG display levels (the levels of signals in dB above the theoretical noise floor of the selected IF bandwidth) and storing the data in a buffer while the receiver is actively sweeping or stepping. The data can then be retreived 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 levels 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 occured. 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 60 dB, 70 dB, 80 dB, 90 dB, and 100 dB, the average of the five points is 80 dB. Only the 80 dB level is recorded in the SSD buffer for that sweep sequence.

By enabling bit 5 in the Suspend Action Control (SAC 32) register (see **paragraph 2.5.5.4**), 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 2.6.3.4**).

The SSD function is enabled or disabled with the SSO command. When enabled, the operator may make the selection of retreiving 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 retreived 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. The next part of the step string (if preceded with an S) is LOG display data or the next part of a sweep string (if preceded with an R) indicates if the following data is 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 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.

2.6 REMOTE OPERATION

2.6.1 GENERAL

All WJ-8700 remote operations can be controlled by remote commands transferred over an interface bus. Two remote interface options are available for controlling the operation of the WJ-8700: WJ-8700/488 Remote Control Interface for IEEE-488 control, and WJ-8700/232 Remote Control Interface for RS-232C control. Moreover, either of these two options also includes the WJ NET control bus, which essentially provides control of external receivers via a RS-485 serial interface from a local front panel. This interface can also be used with an external RS-485 controller. **Appendix B** provides an overview of IEEE-488 remote operation. RS-232C will be covered in a future appendix.

The ASCII mnemonic structure for controlling the operation of the receiver is the same when using any of the three interfaces, and the protocol for all three interfaces is modeled after the IEEE-488.2 interface protocol standard. Because of the nature of these interfaces, there are some differences in the way data is handled over each one. Refer to the appropriate appendices for details concerning IEEE-488 and RS-232C interfaces.

The WJ-8700 implements a "speak when spoken to" ASCII mnemonic structure on all interfaces. The unit will only provide a response to query messages. Commands are assumed to be accepted unless an error is generated. On all interfaces the unit supports user selection of the asynchronous generation of service requests (SRQ). The actual implementation of the service request is based on the interface.

The following paragraphs provide general information for controlling the operation of the WJ-8700, and apply to all interfaces. As noted above, **Appendix B** describes the characteristics of the IEEE-488 interface, while the RS-232C interface will be covered in a future appendix.

2.6.1.1 Hardware Configuration

Either version of the Remote Interface Option circuit card A3 (IEEE-488 or RS-232C) contains two DIP switches, A3S1 and A3S2, which are used to set hardware configuration parameters. **Table 2-2** lists the various switch functions and the settings available. **Figure 2-9** illustrates the location of the switches, which are accessible when the WJ-8700 top cover is removed.

Table 2-2. Remote Interface Card DIP Switch Setting

Switch Section	Function	Setting
A3S1-1	Frame address selection (488/232)	Note 1
A3S1-2	Frame address selection (488/232)	Note 1
A3S1-3	Frame address selection (488/232)	Note 1
A3S1-4	Frame address selection (488/232)	Note 1
A3S1-5	Frame address selection (488/232)	Note 1
A3S1-6	Serial Interface Baud Rate Select	Note 2
A3S1-7	Serial Interface Baud Rate Select	Note 2
A3S1-8	Serial Interface Baud Rate Select	Note 2, 3
A3S2-1	Frame address selection (NET)	Note 4
A3S2-2	Frame address selection (NET)	Note 4
A3S2-3	Frame address selection (NET)	Note 4
A3S2-4	Frame address selection (NET)	Note 4
A3S2-5	Frame address selection (NET)	Note 4
A3S2-6	Front Panel baud rate select	Note 5
A3S2-7	Front Panel baud rate select	Note 5
A3S2-8	Host/Frame Address select	Note 6

NOTES:

1. Refer to Appendix B (IEEE-488) or Appendix G (RS-232) for frame address settings.

2. Only applicable to RS-232 interface. Sets the RS-232 Interface baud rate. The available baud rates are 300, 600, 1200, 2400, 4800, 7200, 9600 and 19200. Both single-drop and multi-drop interface modes support baud rate selection. Baud rate selection should only be altered with unit turned off. Factory default setting is 9600 baud. Available settings are:

A3S1-8	A3S1-7	A3S1-6	Baud Rate
0	0	0	300
0	0	1	600
0	1	0	1200
0	1	1	2400
1	0	0	4800
1	0	1	7200
1	1	0	9600
1	1	1	19200

3. Factory default setting is 0 (Buffer I/O). May be reconfigured in the field if required. Only applicable to IEEE-488.

4. Refer to **paragraph 2.6.8.3** (WJ NET) for frame address settings.

5. Sets the baud rate between the Front Panel and the Remote Interface card. Available settings are:

A3S2-7	A3S2-6	Baud Rate
0	0	1200
0	1	2400
1	0	9600 (factory default)
1	1	19200

6. Selects the method of defining the host/frame address for the Remote Interface Card. If set to 0, the host/frame addresses for 488/232 and NET default to the settings of A3S1-1 through A3S1-5 and A3S2-1 through A3S2-5, respectively. If set to 1, the host/frame address may be set via the Front Panel. The factory default setting is 1 for units with a Front Panel. Refer to the Front Panel Unit Operator's Manual for information regarding frame address selection.

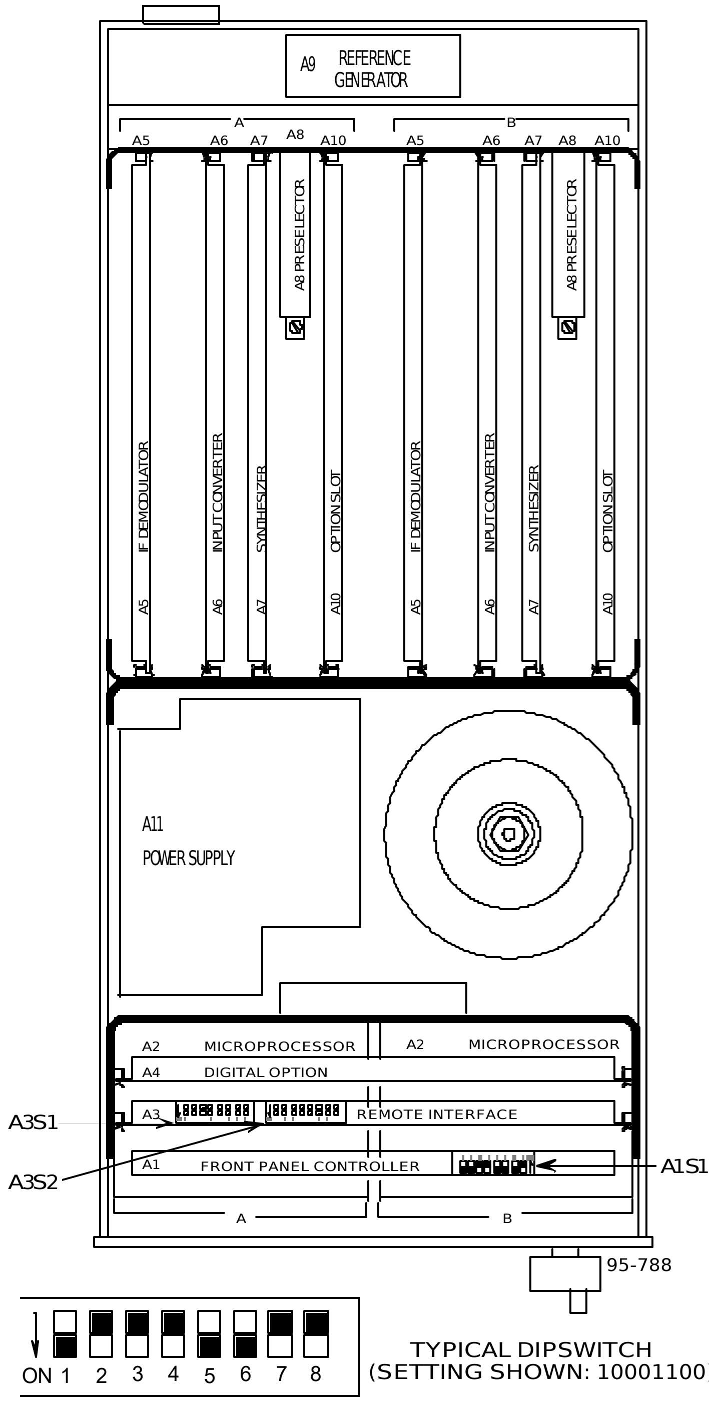


Figure 2-9. WJ-8700 Dip Switch Locations

2.6.1.2 Command Message Format

Command messages are exclusively ASCII-encoded data, and command headers consist of three-character mnemonics. "Common" commands are prefixed with the "*" character, while all queries are suffixed with the "?" character. Multiple commands which are sent to the WJ-8700 must be separated with a semicolon (;) character, and multiple arguments of a single command must be delimited with commas. Numeric arguments that are used with commands are accepted in a "forgiving" numerical representation form.

Messages may be terminated by the use of any of the following combinations 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 IEEE-488 interface.

2.6.1.2.1 Message Processing

When the WJ-8700 receives a message, it is stored in the input buffer until a valid message termination is received. Then, the message is parsed and executed. Message processing is done in the order of command receipt. This means that the software must complete each command in the input buffer before proceeding to the next.

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.

2.6.1.2.2 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. The EOI sequence is only present on the IEEE-488 interface.

2.6.1.3 **Details on 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.

2.6.1.4 **Handling of Communications Errors**

The WJ-8700 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 not in 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 Event Status Bit Register. See **paragraph 2.6.4** for details on WJ-8700 status reporting and reading the contents of status registers.

2.6.2 WJ-8700 DEVICE MESSAGES

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

- General Device Messages
- Signal Readings Messages
- Sweep and Step Modes Setup Parameters Messages
- Operation Control Messages
- Memory Operation Messages
- Sweep Lockout Messages
- Signal Queue Messages

The following paragraphs provide further details on the WJ-8700 device messages in the above categories.

2.6.2.1 General Device Messages

The WJ-8700 general device messages listed in **Table 2-3** are valid when the unit is in Manual, Sweep, Sweep Suspended, Step, or Step Suspended modes of operation.

Table 2-3. General Device Messages

Command	Response	Description
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: AFC, COR, and sweep immediate operation. The COR status output line and status bit become inactive. The unit no longer reacts to RF signal stimuli. While in step or sweep 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
FRQ nrf		Set frequency of receiver in MHz. (00.00000-32.00000) Resolution is dependent on the tuning speed (TSP) selection. In the slow tuning speed (TSP1) the tuning resolution is 10 Hz. While in the fast tuning speed (TSP2) the tuning resolution is 25 Hz (rounded off). The frequency data is unaltered.
FRQ?	FRQ nr2	Request current frequency of operation. Reset: FRQ 15.00000 Default: FRQ 15.00000 Example: FRQ 11.99999
FRG?	FRG nr2,nr2	Request the lower and upper frequency limits of the unit in MHz. Example: FRG 00.00000, 32.00000 TSP nrf
TSP nrf		Select manual tuning speed choices. This allows selection of manual resolution tuning speed. This command has no affect on sweep or step operation. The unit uses fast tuning when in Sweep or Step operation. In TSP2, the receiver rounds the frequency value to the nearest 50 Hz, 0 to 20 Hz is rounded to 0 and 30 to 50 Hz is rounded to 50 Hz. 1 = Slow tuning speed, 10 Hz resolution. 2 = Fast tuning speed, 50 Hz resolution.
TSP?	TSP nr1	Request current tuning speed choice. Reset: TSP 1 Default: TSP 1 Example: TSP 2

Table 2-3. General Device Messages (Continued)

Command	Response	Description
DET nrf		Set detection mode. ISB is only available when the two 2.9 kHz IF bandwidth filters are installed. 1 = AM 2 = FM 3 = CW 4 = Not Used 5 = USB 6 = LSB 7 = ISB 8 = Not Used
DET?	DET nr1	Request current detection mode. Reset: DET 1 Default: DET 1 Example: DET 3
AGC nrf		Select status of gain control. 0 = Manual gain control 1 = Normal AGC on 2 = Hang AGC on
AGC?	AGC nr1	Request current gain control status. Reset: AGC 1 Default: AGC 1 Example: AGC 0
AGT nrf		Select AGC release timer. 3 very fast 2 fast 1 medium 0 slow
AGT?	AGT nr1	Request current AGC release timer. Reset: AGT 2 Default: AGT 2 Example: AGT 0
ATN nrf		Set receiver attenuation 0-110 dB. In ISB detection mode, ATN sets left channel attenuation.
ATN?	ATN nr1	Request current receiver attenuation value. Reset: ATN 000 Default: ATN 000 Example: ATN 110

Table 2-3. General Device Messages (Continued)

Command	Response	Description
ATI nrf		Set receiver right channel attenuation 0-110 dB. Effect only occurs in ISB detection mode.
ATI?	ATI nr1	Request current receiver right channel attenuation value. Reset: ATN 000 Default: ATN 000 Example: ATN 110
LDG		Load (ATN) receiver attenuation and (ATI) receiver independent sideband attenuation from their current AGC attenuation values.
ATD		Attenuation dump causes the unit to dump its AGC circuit. It has no affect on the manual (ATN) value.
AFC nrf		Select status of AFC operation. AFC operation is inhibited while in USB, LSB or ISB detection modes. 0 = AFC off 1 = AFC on
AFC?	AFC nr1	Request current AFC status. A query while in USB, LSB, or ISB yields the selected in condition and not the actual inhibited condition. Reset: AFC 0 Default: AFC 0 Example: AFC 1
BWS nrf		Select IF bandwidth slot 01 to 15. Selection of invalid slots will cause an execution error. Seven IF bandwidth slots reside in the RF Converter card, and seven in the RF Option card. Slot numbers are assigned in the receiver software, and may vary from unit to unit. If selecting an empty IF bandwidth slot, the previous IF bandwidth remains active. Refer to **Table 2-4** for IF bandwidths and slots.
BWS?	BWS nr1	Request selected IF bandwidth slot. Reset: BWS 1 Default: BWS 1 Example: BWS 5
BWA?	BWA nr1	Request active IF bandwidth slot. In all detection modes other than USB, LSB and ISB, the response of BWA and BWS will be the same slot.

Table 2-3. General Device Messages (Continued)

Command	Response	Description
BWC nrf,nrf		Select IF bandwidth size in MHz and its reference center frequency with respect to the IF 455 kHz (+0 = 455 kHz is at a center of the bandpass filter, +1 = 455 kHz is at the upper corner of the bandpass filter, and -1 = 455 kHz is at the lower corner of the bandpass filter). If requested IF bandwidth size is not present an error is generated. IF bandwidth range is from 00.00000 to 19.99999 MHz.
BWC?	BWC nr2,nr1	Request active IF bandwidth size and its reference to the IF 455 kHz. Example: BWC 00.00640, +0 BWC 00.00320, -1 BWC 00.00320, +1
BWL?	BWL nr2,nr1,nr2, nr1,nr2,nr1,nr2, nr1,nr2,nr1,nr2 nr1,nr2,nr1,nr2, nr1,nr2,nr1,nr2 nr1,nr2,nr1,nr2 nr1,nr2,nr1,nr2 nr1,nr2,nr1	Request list of IF bandwidths installed in the receiver. The list is slot ordered. A zero in a nr2 field indicates the absence of a filter in that slot. Example: BWL 00.00050, -1, 00.00050, +1, 00.00100, +0, 00.00200, +0, 00.00250, +0, 00.00300, +0, 00.0160, +0, 00.00000, +0, 00.00000, +0, 00.00000, +0, 00.00000, +0, 00.00000, +0, 00.00000, +0, 00.00000, +0, 00.00000, +0
VBS nrf		Select video bandwidth slot 1-5.
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
VBC nrf		Select video bandwidth size in MHz. If requested size is not present an error is generated.
VBC?	VBC nr2	Request active video bandwidth size in MHz. Example: VBC 00.00010
VBL?	VBL nr2,nr2, nr2,nr2,nr2	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 0000.0100,0000.0200,0000.0300,00.00400,00.00600

Table 2-3. General Device Messages (Continued)

Command	Response	Description
VBM nrf		Set type of video bandwidth selection. 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 = Not Used. 3 = Mute the video output.
VBM?	VBM nr1	Request current video bandwidth mode. Reset: VBM 1 Default: VBM 1 Example: VBM 0
BFO nrf		Set BFO frequency in kHz from +9.999 to -9.999 in 1 Hz steps in CW mode only. When ISB option is installed, the range is ±8.500 kHz in 1 Hz steps.
BFO?	BFO nr2	Request current BFO frequency. Reset: BFO +0.000 Default: BFO +0.000 Example: BFO -3.759
BFR?	BFR nr2,nr2	Request the lower and the upper BFO range in kHz. The BFO range is ±9.999 in CW mode only. When ISB option is installed, the range is ±8.500 kHz in 1 Hz steps. Reset: BFR -9.999, +9.999 Default: BFR -9.999, +9.999 Example: BFR -5.975, +5.975
PBT nrf		Set Pass band tuning on or off, 1 = on and 0 = off. Use the BFO frequency to adjust the tuning filter. Range remains the same as BFO.
PBT?	PBT nr1	Request current PBT status. Reset: PBT 0 Default: PBT 0 Example: PBT 1
ARF nrf		Adjust the RF converter D/A. (This command is for factory alignment use only.) Range: 000 to 255

Table 2-3. General Device Messages (Continued)

Command	Response	Description
ARF?	ARF nr1	Request the current setting of the RF Converter D/A. Reset: ARF 000 Default: ARF 000 Example: ARF 100
COR nrf		Set COR level from 0 to 99 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
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.
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.
COD?	COD nr1	Request the current COR output delay timer value. Reset: COD 0 Default: COD 0 Example: COD 4
SAO nrf		Set the selected audio output on or off. 0 selected audio L off and R off 1 selected audio L on and R off 2 selected audio L off and R on 3 selected audio L on and R on
SAO?	SAO nr1	Return the current SAO condition. Reset: SAO 0 Default: SAO 0 Example: SAO 1

Table 2-3. General Device Messages (Continued)

Command	Response	Description
BAG nrf		Set baseband automatic gain control on or off. This command is only valid when the WJ-8700/XOP2 option is installed. 0 = off 1 = on
BAG?	BAG nr1	Request the current BAG status. This command is only valid when the WJ-8700/XOP2 option is installed. Reset: BAG 1 Default: BAG 1 Example: BAG 0
BAT nrf		Set baseband attenuation value. This command is only valid when the WJ-8700/XOP1 or WJ-8700/XOP2 option is installed. Range: 00 to 90 dB
BAT?	BAT nr1	Request the BAT value. This command is only valid when the WJ-8700/XOP1 or WJ-8700/XOP2 option is installed. Reset: BAT 00 Default: BAT 00 Example: BAT 24
BOC nrf		Set baseband output control to enable or disable the output. This command is only valid when the WJ-8700/XOP1 option is installed. 0 = disabled 1 = enabled
BOC?	BOC nr1	Request the current BOC status. This command is only valid when the WJ-8700/XOP1 option is installed. Reset: BOC 1 Default: BOC 1 Example: BOC 0

Table 2-4. IF Bandwidth Sets

REF DESIG	FILTER BANDWIDTH SET							
	796861-1 (WJ-8700/BW1)	796861-2 (WJ-8700/BW2)	796861-3 (WJ-8700/BW3)	796861-4 (WJ-8700/BW4)	796861-5 (WJ-8700/BW5)	796861-6 (WJ-8700/BW6)	796861-7 (WJ-8700/BW7)	796861-8 (WJ-8700/BW8)
FL3	455 kHz, 500 Hz BW	455 kHz, 250 Hz BW	455 kHz, 2.9 kHz BW	455 kHz, 2.9 kHz BW	455 kHz, 2.9 kHz BW	455 kHz, 2.9 kHz BW	455 kHz, 2.9 kHz BW	455 kHz, 500 Hz BW
FL4	455 kHz, 1 kHz BW	455 kHz, 500 Hz BW	455 kHz, 250 Hz BW	455 kHz, 100 Hz BW	455 kHz, 250 Hz BW	455 kHz, 500 Hz BW	455 kHz, 1 kHz BW	455 kHz, 1 kHz BW
FL5	455 kHz, 2 kHz BW	455 kHz, 3.3 kHz BW	455 kHz, 500 Hz BW	455 kHz, 250 Hz BW	455 kHz, 500 Hz BW	455 kHz, 2 kHz BW	455 kHz, 4 kHz BW	455 kHz, 2 kHz BW
FL6	455 kHz, 4 kHz BW	455 kHz, 5.5 kHz BW	455 kHz, 5.5 kHz BW	455 kHz, 500 Hz BW	455 kHz, 2 kHz BW	455 kHz, 4 kHz BW	455 kHz, 8 kHz BW	455 kHz, 3.3 kHz BW
FL7	455 kHz, 8 kHz BW	455 kHz, 12 kHz BW	455 kHz, 12 kHz BW	455 kHz, 1 kHz BW	455 kHz, 4 kHz BW	455 kHz, 8 kHz BW	455 kHz, 16 kHz BW	455 kHz, 4 kHz BW
FL8	Not Used	Not Used	455 kHz, 2.9 kHz BW	455 kHz, 2.9 kHz BW	455 kHz, 2.9 kHz BW	455 kHz, 2.9 kHz BW	455 kHz, 2.9 kHz BW	455 kHz, 8 kHz BW

NOTE: Bandwidth filter are installed in the slots according to BW size not refernce designator. Therefore, the smallest bandwidth would be installed into slot 1, the next smallest in slot 2, and so on.

2.6.2.2 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 an invalid reading may be an active sweep or step. The commands in this message category are listed in **Table 2-5**.

Table 2-5. Signal Readings Messages

Command	Response	Description
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 ****
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 -25 dB to +25 dB. The zero point represents the typical gain set position. Example: AMD +10 Example: AMD ***

Table 2-5. Signal Readings Messages (Continued)

Command	Response	Description
SPI?	SPI nr1	Request the status of the IF spectrum. 0 = spectrum is upright 1 = spectrum is inverted Example: SPI 1
SGS?	SGS nr1	Return the current signal strength in dBm. If the receiver is in manual gain an invalid indication may be returned. Range of this number is 0 to -130. 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 the 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.)

2.6.2.3 **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 WJ-8700 for Sweep and Step operations such as start and stop frequencies, RAC and SAC registers parameters, dwell timer parameters, etc. The commands in this message category are listed in **Table 2-6**.

Table 2-6. Sweep and Step Setup Parameters Messages

Command	Response	Description
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.
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

Table 2-6. Sweep and Step Setup Parameters Messages (Continued)

Command	Response	Description
FRA nrf		Set start frequency for sweep in MHz. The same limits that apply to the FRQ command apply here.
FRA?	FRA nr2	Request start frequency for sweep. Reset: FRA 0.00000 Default: FRA 0.00000 Example: 11.99999
FRB nrf		Set stop frequency for sweep in MHz. The same limits that apply to the FRQ command apply here.
FRB?	FRB nr2	Request stop frequency for sweep. Reset: FRB 32.00000 Default: 32.00000 Example: 1.99999
INC nrf		Set sweep increment frequency in MHz. This is the frequency increment that will be used in sweep mode. The range is from 00.00005 MHz to 20.00000 MHz with 00.00025 MHz resolution. Minimum value: 0.00005 MHz
INC?	INC nr2	Request sweep increment. Reset: INC 00.00100 Default: INC 00.00100 Example: 00.01225
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 0000 to 996 ms with 4 ms increments. Entries of other than 4 ms increments will be rounded to the nearest 4 ms increment. (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.
PDW?	PDW nr1	Request the current pre-dwell number. Reset: PDW +000 Default: PDW +000 Example: PDW -001

Table 2-6. Sweep and Step Setup Parameter Messages (Continued)

Command	Response	Description
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 time to be infinity; this causes the receiver to stay on the signal as long as it is active. A selection of 0 represents a queue operation.
SDW?	SDW nr1	Request the current signal dwell time. Reset: SDW -001 Default: SDW -001 Example: SDW +000
LDW nrf		Set the post signal lost dwell timer 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 until signal dwell timer expires. Request current post signal lost timer.
LDW?	LDW nr1	Rest: LDW +000 Default: LDW +000 Example: LDW +010
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. Bit Description 0 Report new signals only. This is only active in Sweep or Step. This option is only valid for the first 8,192 points of a sweep. 1 Report old lost signals only. This action is only effective in buffer sweep or step with queue operations. Lost signals may be placed in the signal queue. This option is only valid for the first 8,192 points of a sweep.

Table 2-6. Sweep and Step Setup Parameter Messages (Continued)

Command	Response	Description
RAC nrf (Cont'd)		Bit Description (Continued) 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. 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 option enabled. In Step mode, this option has no affect. 4-7 Not Used.
RAC?	RAC nr1	Request the entry currently in the report action control register. Reset: RAC 000 Default: RAC 000 Example: RAC 003
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. 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. 5-7 Not Used.
SAC?	SAC nr1	Return the current suspend action control register value. Reset: SAC 0 Default: SAC 0 Example: SAC 1
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

Table 2-6. Sweep and Step Setup Parameter Messages (Continued)

Command	Response	Description
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 memory. 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 is reached the process starts over. A single channel may be entered in the sector list to load a single sweep set from memory.
SWO?	SWP nr1	Request the current sweep operation. Reset: SWO 0 Default: SWO 0 Example: SWO 1
SWL nrf,nrf, nrf,nrf,nrf, nrf,nrf,nrf, nrf,nrf		This is 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.
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
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 from 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 2.5.2.6**. Reset: SSO -1 Default: SSO -1 Example: SSO 01

Table 2-6. Sweep and Step Setup Parameter Messages (Continued)

Command	Response	Description
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. Number 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.
STL?	STL nr1,nr1, nr1,nr1,nr1, nr1...nr1 or (nr1;nr1), (nr1;nr1), nrf...(nr1:nr1)	This query returns the step channel list. Reset: STL Default: STL Example: STL 001,002,003,019 Example: STL (001:005),007,(009:011)

2.6.2.4 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 WJ-8700 modes of operation. The commands in this message category are listed in **Table 2-7**.

Table 2-7. Operation Control Messages

Command	Response	Description
*RST		This command causes all receiver device messages to be set to the reset values.
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

Table 2-7. Operation Control Messages (Continued)

Command	Response	Description
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
MST?	MST nr1	Request Manual operation status. 0 = Manual off 1 = Manual active Reset: MST 1 Default: MST 1 Example: MST 0
SSD?	SSD nr1,R, nr1(a),nr1(b), ...,nr1(c), or SSD nr1,S, nr1(b),....,nr1(c) or SSD nr1,R,nr1(a), nr1(b),....,nr1(c), 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 2.5.2.6. nr1 - 0 = Good SSD data in buffer 1 = SSD buffer overflowed R = Restart sweep data S = Restart step data nr1(a) - 00 = sweep immediate data 01-10 = data of sweep sector nr1(b) to nr1(c) - 00 = locked out increment or idle channel 01 to 99 = LOG display levels in dBm (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 operation status. 0 = Step off 1 = Step active 2 = Step suspended Reset: SST 0 Default: SST 0 Example: SST 1

Table 2-7. Operation Control Messages (Continued)

Command	Response	Description
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
ADV		The advance command causes Sweep or Step to advance to the next frequency if the current state is active.
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 plus the next step. Any frequency tuning done during the suspend has no affect when the operation is continued.
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.
RES		Restart the operation. This command causes an active or suspended sweep or step to be restarted from the beginning.

2.6.2.5 Memory Operation Messages

The mnemonics in this message category are valid in Manual, Sweep, or Step modes of operation. These commands, listed in **Table 2-8**, are used to set up memory channels for operation.

Table 2-8. Memory Operation Messages

Command	Response	Description
STO nrf		Store current parameters to memory channel specified. Range is from 1 to 100.
RCE nrf		Recall and execute memory channel specified. Range is from 1 to 100.
SMD nrf,nrf, 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.

Field	Parameter	Range
1	Memory channel number	1 to 100 (See Note Below)
2	Idle mode status (IDM)	0,1
3	Tuned frequency (FRQ)	see FRQ?, **Table 2-3**
4	Bandwidth slot (BWS)	1 to 15
5	COR threshold (COR)	-1 to 99
6	Detection mode (DET)	1 to 7
7	AGC mode (AGC)	0 to 2
8	AGT mode (AGT)	0 to 3
9	Attenuation setting (ATN)	0 to 110
10	ATI	0 to 110
11	AFC mode (AFC)	0,1
12	Pre-signal dwell (PDW)	-1 to 996
13	Signal dwell (SDW)	-1 to 600
14	Post signal lost dwell (LDW)	-1 to 60
15	Sweep start frequency (FRA)	see FRQ?, **Table 2-3**
16	Sweep stop frequency (FRB)	see FRQ?, **Table 2-3**
17	Sweep increment frequency (INC)	00.00001 to 20 MHz
18	Sweep direction (SWD)	0,1
19	BFO frequency (BFO)	-9.999 to +9.999 kHz
20	Passband tuning status (PBT)	0,1

NOTE: SMD 0,... is a valid command. It can be used to set up the current receiver's operating parameters in lieu of storing data to a memory channel.

Table 2-8. Memory Operation Messages (Continued)

Command	Response	Description
RMD nrf?	SMD nr1,nr1, nr2,nr1,nr1, nr1,nr1,nr1, nr1,nr1,nr1, nr1,nr1,nr1, nr2,nr2,nr2, nr1,nr2,nr1	Recall directly from memory the specified memory channel. See SMD for field definitions of the response. Reset: no change Default: SMD ###,0,15.00000,1,+00,1,1,1,000,000,0, +000,-001,+00,00.00000,32.00000,00.00100,1,+0.000,0 Note: (### indicates this is the default for all storage memory channels. This is also the memory cleared condition). Example: SMD 001,0,25.99999,2,+10,3,1,1,000,000,1, +000, -001,+00,10.00000,21.10000,00.00200,1,+0.000,0 Note: RMD 0? Returns current receiver's operating parameters.
CLM nrf		Clear specified memory area. The argument is bit mapped to indicate the area to be cleared. Decimal Value / Bit 1 / Bit 0 / Description 1 / 0 / 1 / Clear channel storage memory. 2 / 1 / 0 / Clear lockout memory. 3 / 1 / 1 / Clear channel storage and lock?out memories.

2.6.2.6 Sweep Lockout Messages

The mnemonics in this message category are valid in Manual, Sweep Suspended, or Step Suspended modes of operation. These commands, listed in **Table 2-9**, are used for controlling parameters pertaining to Sweep mode lockout channels.

Table 2-9. 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 stop frequency in ascending order. The channel number assigned with this command remains constant as channels are added or deleted. This lockout data overwrites any previous data at the specified channel. <u>Field</u> <u>Parameter</u> 1 Channel number from 1 to 200. 2 Start frequency of the lockout from 00.00000 to (high limit of the receiver). 3 Stop frequency of the lockout from 00.00000 to (high limit of the receiver). Note: The stop must be greater than the start or else an Execution error is generated.
ULC nrf		Unlock channel specified. Causes the specified lockout to be cleared. This returns it to the default condition.
RLK nrf?	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 00.00000. Example: LCK 001,00.25000,00.26000
SLM?	SLM nr1	Request the available space in lockout memory in unused channels.

2.6.2.7 Signal 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 2-10**.

Table 2-10. Signal Queue Messages

Command	Response	Description
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 25.01000:000:1,25.01000:000:0
CQU		Clear the signal queue.

2.6.3 WJ-8700 STATUS SUMMARY

Figure 2-10 illustrates the architecture of the WJ-8700 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 consist of a status register and an enable register.

One pair is composed of the Event Status Register (whose functions are summarized in **Table 2-12**) 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 2.6.3.3**).

The second pair is composed of the Status Byte Register and the Service Request Enable Register. The WJ-8700 uses only four bits of the Status Byte Register as described in **Table 2-11**. 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 2-14**) 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.

2.6.3.1 **Status Bytes**

The following information discusses the operation of the serial poll and the "*STB?" query. The operation of these two is very similar. The serial poll status byte allows the controller to establish which event has caused the WJ-8700 to set the SRQ. The "*STB?" query response includes similar information as detailed below.

Serial Poll - When the WJ-8700 services a serial poll, the unit outputs the decimal equivalent of the Status Byte Register and clears the SRQ and the Status Byte Register. The evaluation of each bit in this status byte is listed in **Table 2-11**.

***STB? Query** - The Status Byte Register can also be read using the *STB? query. The primary difference between a serial poll and the *STB? query operation is that the *STB? query does not clear the SRQ status line.

Table 2-11. 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 2.6.3.4**). This bit is cleared by *CLS or by reading the contents of the Receiver Status Register.
1	Not Used	
2	Not Used	
3	Not Used	
4	MAV	**Message Available Bit** - This bit, when set, indicates that the WJ-8700 has placed data in its output buffer and is ready to output this data. The bit is cleared by performing a serial poll or 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 performing a serial poll, *CLS, or reading contents of the Event Status Register.
6	RQS	**Request Service** - This bit, when set, indicates that the unit has asserted SRQ. This bit is cleared by performing a serial poll.
7	Not Used	

THIS PAGE INTENTIONALLY LEFT BLANK

2.6.3.2 Event Status Register

The following discussion covers the Event Status Register and the *ESR? query. See **Table 2-12** 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 2-12. 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	Not Used	
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 2.6.3.3**).
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	Not Used	
7	PON	**Power On** - Sets at power up of the WJ-8700.

2.6.3.3 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 2-7**). 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 2-13** 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 2-13**. Reading this register has no effect on it.

Table 2-13. Device Dependent Error Register, Bit Evaluation

Bit	Decimal Value	Description
0	1	Power supply fault
1	2	+12 Vdc fault
2	4	+8 Vdc fault
3	8	-8 Vdc fault
4	16	+24 Vdc fault
5	32	+5.8 Vdc analog fault
6	64	1st LO Resolution loop unlocked
7	128	1st LO Reference step loop unlocked
8	256	1st LO Translation loop unlocked
9	512	Reference loop unlocked
10	1024	2nd LO failure
11	2048	BFO unlocked
12	4096	Not Used
13	8192	EEPROM default (only apply to DDE?)
14	16384	RAM default (only apply to DDE?)
15	32768	Not Used

2.6.3.4 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 2-14** for the bit evaluation of the Receiver Status Register.

Table 2-14. Receiver Status Register, Bit Evaluation

Bit	Decimal Value	Description
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. This bit is set only while the Report New Signals flag is set in the Report Action Control Register. See "RAC" command in **Table 2-6**.
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. This bit is set only while the Report Old Lost Signals flag is set in the Report Control Register. See "RAC" command in **Table 2-6**.
4	16	ESW, end of single sweep. This bit indicates the end of sweep has been encountered. This bit is only set while in sweep mode.
5	32	ESS, end of single sweep sequence. This bit indicates the end of a sweep sequence has been encountered. This bit is only set while in the sweep memory mode.
6	64	ESP, end of single step sequence. This bit indicates that the single step sequence has been completed. This bit is set only while in 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	Not used.
9	512	SD?, SSD buffer is 75% full. This bit indicates that the sweep/step data (SSD) buffer is 75% full of data.
10	1024	SDF, SSD buffer full. This bit indicates that the sweep/step data (SSD) buffer is full of data.
11	2048	Not used.
12	4096	Not used.
13	8192	Not used.
14	16384	Not used.
15	32768	Not used.

2.6.4 WJ-8700 COMMUNICATIONS MESSAGES

The commands in this message category are always valid. These are commands which establish communications between the WJ-8700 and the controller. The mnemonics associated with this message category are listed in **Table 2-15**.

Table 2-15. Communication Messages

Command	Response	Description
CFG?	CFG nr1	Request status of configuration mode switch (switch 6 in DIP switch A2S1). 0 = the unit is set to operation mode. 1 = the unit is set to configuration mode. Reset: No change Default: Position of DIP switch Example: CFG 0
*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 ISB (WJ-8700X/BW3, BW4, or BW5 IF Bandwidth Configurations) 1 SSB (WJ-8700X/BW3, BW4, or BW5 IF Bandwidth Configurations) 2 WJ-8700/SM1 - 455 kHz Signal Monitor Output 3 WJ-8700/SM2 - 21.4 MHz Signal Monitor Output 4 WJ-8700/XOP1 - Baseband Converter, centered at 130 kHz 5 WJ-8700/XOP2 - Baseband Converter, centered at 15 kHz 6 WJ-8700/XOP3 - SMO/Switched IF Converter
*CLS		This command causes all the communication status registers to be cleared.

Table 2-15. Communication Messages (Continued)

Command	Response	Description
*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 but bit 6. <u>Bit</u> <u>Function</u> 0 Receiver Status Bit (RSB) 1 Not Used 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
*SRE nrf		This command allows writing to the Service Request Enable Register. The appropriate bit must be set to generate an interrupt via the Status Byte Register indicated event. <u>Bit</u> <u>Function</u> 0 Enable (RSB) interrupt 1 Not Used 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)

Table 2-15. Communication Messages (Continued)

Command	Response	Description
*ESR?	*ESR nr1	This command responds with the current setting of the Event Status Register. <u>Bit</u> <u>Function</u> 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
*ESE nrf		This command allows writing to the Event Status Enable Register. This 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. <u>Bit</u> <u>Function</u> 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

Table 2-15. Communication Messages (Continued)

Command	Response	Description
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. <u>Bit</u> <u>Function</u> 0 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 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 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. 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 ESW, 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 the end of a sweep sequence has been encountered. The bit is only set while in the Sweep Memory mode. 6 ESP, end of single step sequence. This 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 will cause the oldest entries to be lost. 8-15 Not Used.

Table 2-15. Communication Messages (Continued)

Command	Response	Description
RSE nrf		This command allows writing to a register that enables interrupts to be passed from the RSR register to the *STB register via its RSB bit. The numeric argument is a decimal number corresponding to a bit-mapped, 16-bit word. 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 ESW, 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. 8-15 Not Used.
*RSE?	RSE nr1	Request the contents of the Receiver Status Enable Register. The response is a decimal number corresponding to a bit-mapped, 16-bit word. Reset: No change Default: *RSE 00000 Example: *RSE 00001
CDE?	CDE nr1	Request the current Device Dependent Error Register contents. The response is a decimal number corresponding to a bit-mapped, 16-bit word indicating current error conditions. Reading the register has no effect on it. Bit Function 0 Supply fault - This bit is to indicate a supply fault. One or more of the bits may be set below if a concise failure mode can be determined. 1 +12 Vdc 2 +8 Vdc fault 3 -8 Vdc fault 4 +24 Vdc fault 5 +5.8 Vdc analog fault 6 1st LO Resolution loop unlocked - greater than allowed lockup timer (lck 2). 7 1st LO Reference step loop unlocked - greater than allowed lockup timer (lck 3). 8 1st LO Translation loop unlocked - greater than allowed lockup timer (lck 4).

Table 2-15. Communication Messages (Continued)

Command	Response	Description
CDE? (Cont'd)	CDE nr1 (Cont'd)	Bit — Function 9 — Reference loop unlocked 10 — 2nd LO failure. 11 — BFO unlocked. 12-15 — Not Used. Example: CDE 00000
DDE?	DDE nr1	Request the latched error status. The response is a decimal number corresponding to 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. Bit — Function 0 — Supply fault - This bit is set to indicate a supply fault. One or more of the bits may be set below if a concise failure mode can be determined. 1 — +12 Vdc fault 2 — +8 Vdc fault 3 — -8 Vdc fault 4 — +24 Vdc fault 5 — +5.8 Vdc analog fault 6 — 1st LO Resolution loop unlocked - greater than allowed lockup timer (lck 2). 7 — 1st LO Reference step loop unlocked - greater than allowed lockup timer (lck 3). 8 — 1st LO Translation loop unlocked - greater than allowed lockup timer (lck 4). 9 — Reference loop unlocked 10 — 2nd LO failure 11 — BFO unlocked 12 — Not Used 13 — EEPROM default 14 — RAM default 15 — Not Used Example: DDE 00000
*IDN?	*IDN (see example)	This command returns the receiver identity. The fields provide the following order of information: manufacturer, model number, serial number, and software version number. Reset: No change Default: *IDN WJ,9999-99,99999,9.99 Example:*IDN WJ,8700- ,00001,0.00

2.6.5 TOKEN EXCHANGE

As an alternative to a hardware "remote-local" control, the WJ-8700 utilizes a "token exchange" protocol. This concept is based on the pre-assignment of token numbers to all controllers capable of interfacing with and controlling a receiver, whether locally (as with the WJ-8700 resident Front Panel), or remotely via a remote interface (IEEE-488 or RS-232C) or the WJ NET (from an external Front Panel).

Figure 2-11 illustrates the manner in which a dual receiver unit is functionally connected to a resident Front Panel, and via the remote IOC to an external controller and the WJ NET. The following paragraphs describe the manner in which the token concept is implemented.

2.6.5.1 Front Panel Token Operation

The following steps describe the operation of the token concept when receiver control is attempted from a Front Panel Unit, either local (resident in the WJ-8700) or remote (interfaced via the WJ NET).

1. A Front Panel Unit (FPU) attempts to take control of Receiver A by sending a token request (see **Table 2-16**). In the example shown in **Figure 2-11**, the local FPU would request a token of 03, which is the local FPU's frame number.

2. If Receiver A is in use by an external controller or external FPU, it will respond to the token request with "TOKEN XX", where XX is the token assigned to the controlling device. This informs the local FPU that Receiver A is being controlled by another device, and will cause a "DEVICE NOT AVAILABLE" message to appear on the local FPU display. The local FPU is therefore prevented from taking control of Receiver A.

3. If Receiver A is not in use, it will respond to the token request with "Token 03," which informs the local FPU that it now has control of Receiver A. Note that Receiver B is available for control by either the remote front panel or one of the two external controllers shown in **Figure 2-11**.

4. When the local FPU is returned to the SELECT menu, the FPU software will automatically return the token to Receiver A, thereby making it available for use by another FPU.

Table 2-16. Token Messages

Command	Response	Description
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. (0 = token is not held by any controller.) Power up: RTK 00 Default: RTK 00 Example: RTK 09
RTK or RTK 0		Query the status of the token from the receiver. If token is held by another controller, the response will be the number of the other controller's token request. If token is not held by another controller, the response will be 0. If response is 0, the token may now be requested by another controller.

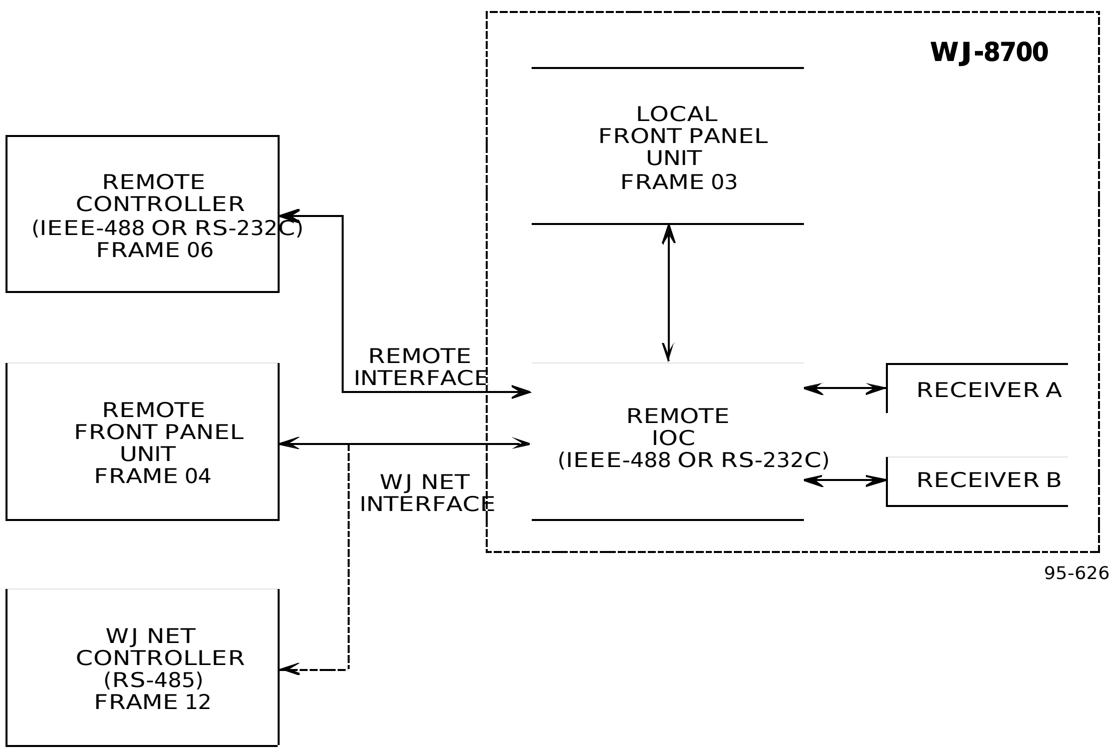


Figure 2-11. Example of WJ-8700 Functional Control Interface

2.6.5.2 **Remote Controller Token Operation**

Token operation using a remote controller, whether via the remote interface (IEEE-488 or RS-232C) or the WJ NET (RS-485), is accomplished in the same manner as operation using a Front Panel Unit. However, the following differences apply:

1. When operating from a remote controller, the controlling software must begin with a token request (**RTK nrf?**) command to capture control of the receiver, and must conclude with a token return (RTK) command to release the receiver for use by another controller or FPU. Refer to **Table 2-16** for information regarding the two mnemonic commands.

2. Unlike FPU operation, even if the receiver responds to the controller's token request by indicating that it is already being controlled by another controller or FPU, the requesting controller may still send commands to the receiver. The receiver will then process all commands received, regardless of source. There is no "lockout" to prevent multiple control (as exists in the FPU software) unless the controller software is written to include such a feature.

2.6.5.3 **Token Assignment**

When operating units from a local FPU or remote FPU (via the WJ NET), the token will always be the frame number of the frame in which the FPU resides, and will be a number between 00 and 30. When using a remote controller, the token may be any number between 00 and 99 assigned by the user. However, the following convention is recommended for token assignments using the WJ-8700:

FPU tokens:	00 to 30
Controller tokens:	31 to 60
Reserved tokens:	61 to 99

2.6.6 **WJ-8700/488 IEEE-488 REMOTE CONTROL INTERFACE OPTION I/O OPERATION**

For detailed information regarding the WJ-8700/488 IEEE-488 Remote Control Interface Option, refer to **Appendix B**.

2.6.7 **WJ-8700/232 RS-232C REMOTE CONTROL INTERFACE OPTION I/O OPERATION**

For detailed information regarding the WJ-8700/232 RS-232C Remote Control Interface Option, refer to **Appendix G**.

2.6.8 WJ NET REMOTE CONTROL INTERFACE OPERATION DETAILS

2.6.8.1 General Description

The WJ NET interface is a special half-duplex differential serial interface which uses the RS-485 format. It requires a pair of a differential line driver/receiver (transceiver) units and one signal ground. This interface is intended to support multiple controllers and independent slave devices.

Figure 2-12 shows the WJ NET connector installed at J7. The following definitions apply to the functions shown next to the connector pins:

SAO (L) and SAO (R)	:	Left and right Selected Audio Output.
SFSK	:	Serial FSK; intended for future expansion
NET + and NET-	:	RS-485 differential pair.
GND	:	Ground

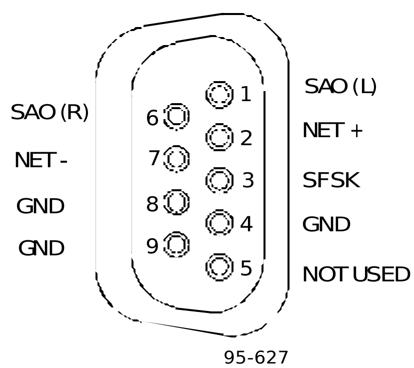


Figure 2-12. WJ NET Connector

2.6.8.2 **Data Format**

The data format for the WJ NET interface is comprised of the following:

1 start bit
7 data bits
1 "wake-up" address/data bit
1 stop bit

2.6.8.3 **Addressing**

Since WJ NET is designed to support other types of controller units as well as multiple controllers, it is required to implement the extended addressing mode.

The method of assigning the frame address is dependent on the setting of DIP switch A3S2 section 8, as described in Note 5 of **Table 2-2**. If the WJ-8700 has a front panel installed, the default setting of A3S2-8 is 1, which allows the frame address to be configured from the front panel. If A3S2-8 is set to 0, the frame address is set using DIP switches A3S2-1 through A3S2-5. **Table 2-17** lists the valid frame address settings, while **Figure 2-9** illustrates the location of the DIP switches. The WJ-8700 secondary address setting is defined in hardware within the frame as "Receiver 1" and "Receiver 2."

Extended addressing is implemented over the WJ NET by using the "wake-up" address/data bit. This "wake-up" address/data bit is used to wake up the Remote Interface unit as well as to differentiate between the different types of command received. **Table 2-18** lists the appropriate commands.

Once the interface link is established and the active controller is properly maintaining ownership of the WJ NET, that controller no longer needs to reissue an address command in order to pass data to the already-addressed frame and receiver.

Table 2-17. WJ NET Frame Address Selection

	A3A2 Section				
Frame Address	5	4	3	2	1
00	0	0	0	0	0
01	0	0	0	0	1
02	0	0	0	1	0
03	0	0	0	1	1
04	0	0	1	0	0
05	0	0	1	0	1
06	0	0	1	1	0
07	0	0	1	1	1
08	0	1	0	0	0
09	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1
16	1	0	0	0	0
17	1	0	0	0	1
18	1	0	0	1	0
19	1	0	0	1	1
20	1	0	1	0	0
21	1	0	1	0	1
22	1	0	1	1	0
23	1	0	1	1	1
24	1	1	0	0	0
25	1	1	0	0	1
26	1	1	0	1	0
27	1	1	0	1	1
28	1	1	1	0	0
29	1	1	1	0	1
30	1	1	1	1	0
NOT VALID - DO NOT USE	1	1	1	1	1

Table 2-18. Extended Addressing Data Format

Data Bit								
D0	D1	D2	D3	D4	D5	D6	a/d	Command Type
x	x	x	x	x	x	x	0	Data (Remote Interface "wake-up")
0	0	0	0	0	0	0	1	Take bus (sent by NET owner)
1	0	0	0	0	0	0	1	Release bus (by NET owner)
x	x	x	x	x	1	0	1	Not defined
f	f	f	f	f	0	1	1	Frame address
r	r	r	r	f	1	1	1	Receiver address

LEGEND: x = Don't care

f = Frame select bits (see **Table 2-17**)

r = Receiver select bits (Hardware-defined by the Microprocessor/ Motherboard slot connector)

2.6.8.4 **WJ NET Rules**

In order to successfully use the WJ NET interface bus, every controller as well as every receiver connected to the bus must follow these rules:

1. All non-active controllers must implement a "Bus Busy" flag. This flag shall be used to determine if the interface bus is available for use.

2. Each controller must set its "Bus Busy" flag to "busy" at power-up.

3. All devices (controllers and slave devices) shall power up with the WJ NET interface port set to "sleep" mode; i.e., ignore all device dependent data.

4. Each controller must loop its "Take Bus" message back and check for bus contention. If bus contention occurs, the "Bus Busy" flag shall be set to "busy" and a bus unavailable message sent to the operator.

5. All devices shall wake up if a message is received with the address/data bit set to logic 1. The following additional rules apply:

   a. If the message is a "Take Bus" command, all non-active controllers should set their "Bus Busy" flags and remember that the bus belongs to the active controller.

   b. If the message is a "Release Bus" command, all non-active controllers should reset their "Bus Busy" flags and remember that the bus is now free to be used. All slave devices will go into "sleep" mode.

   c. If the message is an IOC frame address command, all non-active controllers should ignore the command and return to sleep mode. Only the IOC that matches the address command should remain awake.

   d. If the message is a slave receiver address command, all non-active controllers should ignore the command and return to sleep mode. All IOCs should remember the slave receiver address.

6. To request the bus, a controller must check its "Bus Busy" flag. The subsequent action taken by the controller depends on the state of this flag:

   a. If the flag is "not busy," the controller may send its "Take Bus" command and monitor for bus contention.

   b. If the flag is "busy," the controller should monitor the bus for 0.5 seconds. If data transfer occurs on the bus during this time, the controller should report "bus busy" and return to sleep mode. If no data transfer occurs on the bus for more than 0.5 seconds, the controller may send its "Take Bus" command and monitor for bus contention.

7. To preserve ownership of the bus, the active controller should use the bus at least once every 0.4 seconds.

8. The active controller should have its "Bus Busy" flag set to "not busy."

9. The active controller must implement the ACK/NAK commands. Every completed message (i.e., every message terminated with a LF) sent by an active controller will result in either a ACK or NAK response by the IOC. It is therefore the responsibility of the active controller to turn the bus around and ready it to accept the ACK or NAK character. Controller bus turn-around time should be within 1 msec. If there is no response from the IOC within 1 second, the controller should assume that a hardware fault involving the IOC has occurred.

2.6.8.5 Communication Protocol

2.6.8.5.1 Speed

The WJ NET baud rate is fixed at 9600 baud.

2.6.8.5.2 Terminator

The Remote Interface does not transfer data to a receiver until a "LF" character is received. The Remote Interface responds with the exact terminator received from the receiver.

2.6.8.5.3 Query

The Remote Interface monitors for a "?" character. Upon seeing this character, the Host Interface prepares to receive a message from a slave receiver as soon as it completes transferring data to that receiver.

A response message from a slave receiver is not placed onto the WJ NET bus until a "LF" character is received from that slave receiver.

2.6.8.5.4 ACK/NAK

When a "LF" character is received, the Remote Interface responds with an ACK character upon emptying its WJ NET input buffer. It responds with a NAK character upon detecting that its input buffer has overflowed or a communications error in a UART occurs.

2.6.8.5.5 Device Clear

Receipt of a DCL command causes the Remote Interface to clear both the input and output buffers of the WJ NET interface port. This command is acted upon as soon as it is received.

2.6.8.5.6 Service Request

The Remote Interface does not support a service request in the WJ NET interface port.

2.6.8.5.7 Buffer Handling

The input buffer of this interface port is handled in linear fashion. The input buffer accepts up to 512 bytes before overflowing. If the input buffer is overflowing or a UART communications error is detected, the input buffer is cleared as soon as a "LF" character is received. No data will be transferred to any slave receiver, and a NAK character is transmitted to the controller.

Incoming data is not transferred to the Remote Interface's slave receiver output buffer until a "LF" character is received.

The output buffer is also handled in linear fashion. Capacity of the output buffer is 512 bytes of data.

2.6.8.5.8 **Supported Communications Control Commands**

The following list indicates the communications control commands supported by the WJ NET.

HEX	ASCII	Function
06	ACK	Acknowledged
15	NAK	Not acknowledged
0A	LF	Line feed
14	DC4	Device clear (DCL)

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION III

RESERVED

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION IV

MAINTENANCE

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION IV

MAINTENANCE

4.1 INTRODUCTION

Only preventive and operator maintenance procedures are provided in this Installation and Operation manual.

4.2 PREVENTIVE MAINTENANCE

Preventive maintenance at the operator level consists of cleaning the unit and handling the unit carefully.

4.2.1 HANDLING

The LCD panel is made of plate glass, do not apply mechanical shocks or press hard on it. The polarizer on the display is easily scratched. Handle with care. Do not remove the panel or frame from the LCD.

WARNING

If the Liquid Crystal Display (LCD) panel breaks, do not allow the liquid crystal to get in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately with soap and water.

4.2.2 CLEANING

The polarizer on the LCD is easily scratched. Therefore, do not wipe it with a dry cloth. Wipe gently with a soft cloth moistened with water. Do not use ketone (methylethyl ketone, acetone) or aromatic (toluene, xylene) solvents, as they dissolve or damage the polarizer, and may attack other parts used in the FPU.

4.3 WJ-8700 EPROM REPLACEMENT PROCEDURES

These procedures cover the replacement of EPROMs in each of the four microprocessor sections of the WJ-8700. These four sections are: front panel, remote interface, Receiver A, and Receiver B. The front panel and remote interface EPROMS are accessible from the top of the unit, while the Receiver A and Receiver B EPROMs are accessible from the bottom of the unit.

4.3.1 PREPARATION FOR EPROM REPLACEMENT

To prepare the WJ-8700 for EPROM replacement use the following procedure.

1. Remove power from the receiver.

2. If front panel or remote EPROMs are to be replaced:

   a. Remove the top cover by loosening the two screws at the rear of the cover and then sliding it back about 1/4 inch.

   b. Lift the cover straight up and set it aside.

3. If Receiver A or B EPROMs are to be replaced:

   a. Turn the receiver upside down, then remove the two screws at the rear of the bottom cover and slide the cover back about 1/4 inch.

   b. Lift the cover straight up and set it aside.

4.3.2 REMOTE INTERFACE EPROM REPLACEMENT

The following procedure details the replacement of the Remote Interface EPROM, A3U18.

1 With the receiver right side up, locate the Remote Interface card, A3. Refer to **Figure 4-1** for the location of this card. This is a plug-in card found behind the front panel and in front of the power supply.

2. Remove the plug from the top of the Remote Interface without placing stress on the ribbon cable.

3. Remove the Remote Interface card by inserting a card removal tool in the removal holes provided and by gently pulling the card upward.

4. Locate the Remote Interface EPROM U18 which is located on the bottom left corner of the card. Refer to **Figure 4-2**.

5. Remove the metal retainer clip, if installed.

6. Remove the EPROM by gently prying on opposite corners using a small pointed tool.

7. Place the new EPROM in the open socket. The "*" on the EPROM label must be on the same side as the indented dot on the socket.

8. Replace the metal EPROM retaining clip, if installed.

9. Reinstall the Remote Interface card and reattach the ribbon cable.

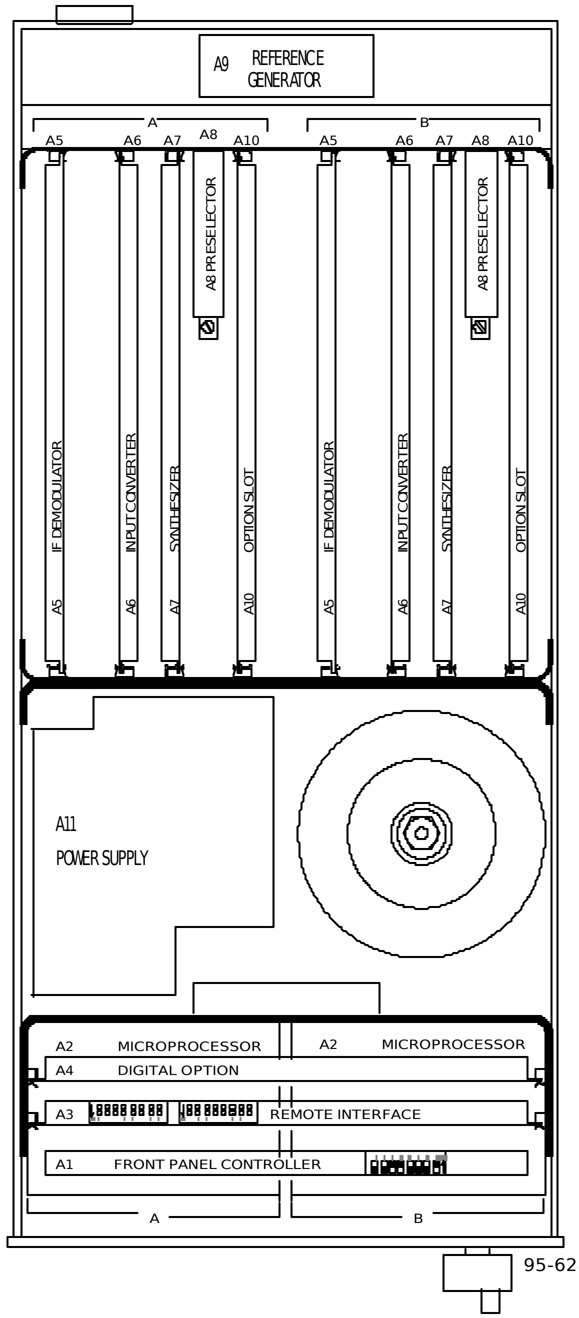


Figure 4-1. WJ-8700 Board Locations

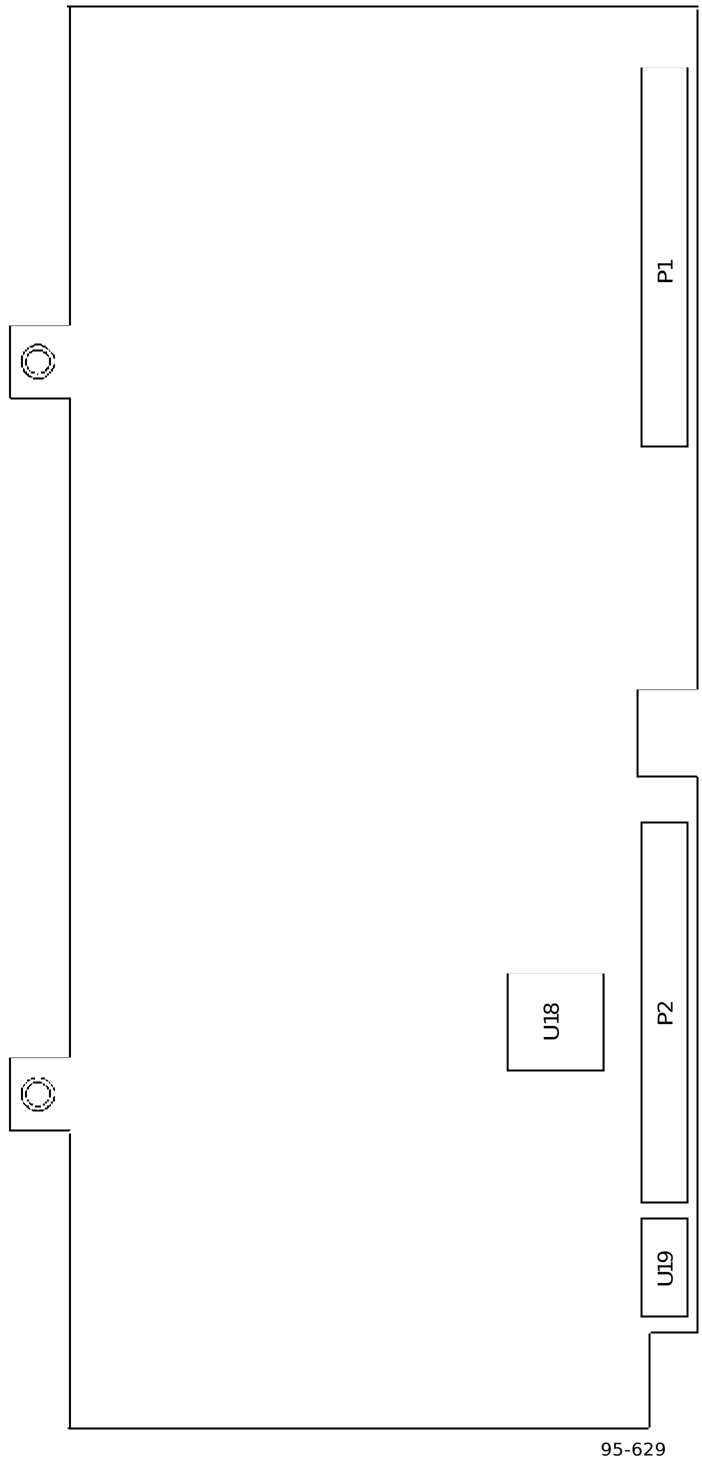


Figure 4-2. Location of Remote Interface EPROM, U18, on Remote Interface Card, A3

4.3.3 FRONT PANEL EPROM REPLACEMENT

The following procedure details the replacement of the Front Panel EPROMs, A1A1U28 and A1A1U29.

1. With the receiver right side up, locate the Front Panel Control Assembly, A1A1. Refer to **Figure 4-1** for the location of this card.

2. Locate the two Front Panel EPROMs U28 and U29 which are located near the top of the card. Refer to **Figure 4-3**.

3. Remove the metal retainer clip, if installed.

4. Remove the EPROMs by gently prying on opposite corners using a small pointed tool.

5. Place the new EPROMs in the appropriate open socket. The "*" on the EPROM label must be on the same side as the indented dot on the socket.

6. Replace the metal EPROM retaining clip, if installed.

4.3.4 RECEIVER A OR B EPROM REPLACEMENT

The following procedure details the replacement of the Receiver A or B EPROM, A2AU10 or A2BU10.

1. With the receiver upside down, the microprocessor/motherboard is visible when the unit is upside down. Locate the Receiver A EPROM, U10, on the microprocessor/motherboard, A2. Refer to **Figure 4-4** for the location of this EPROM.

2. Remove the metal retainer clip, if installed.

3. Remove the EPROM by gently prying on opposite corners using a small pointed tool.

4. Place the new EPROM in the open socket. The "*" on the EPROM label must be on the same side as the indented dot on the socket.

5. Replace the metal EPROM retaining clip, if installed.

6. Repeat the steps 1 through 5 for Receiver B EPROM replacement.

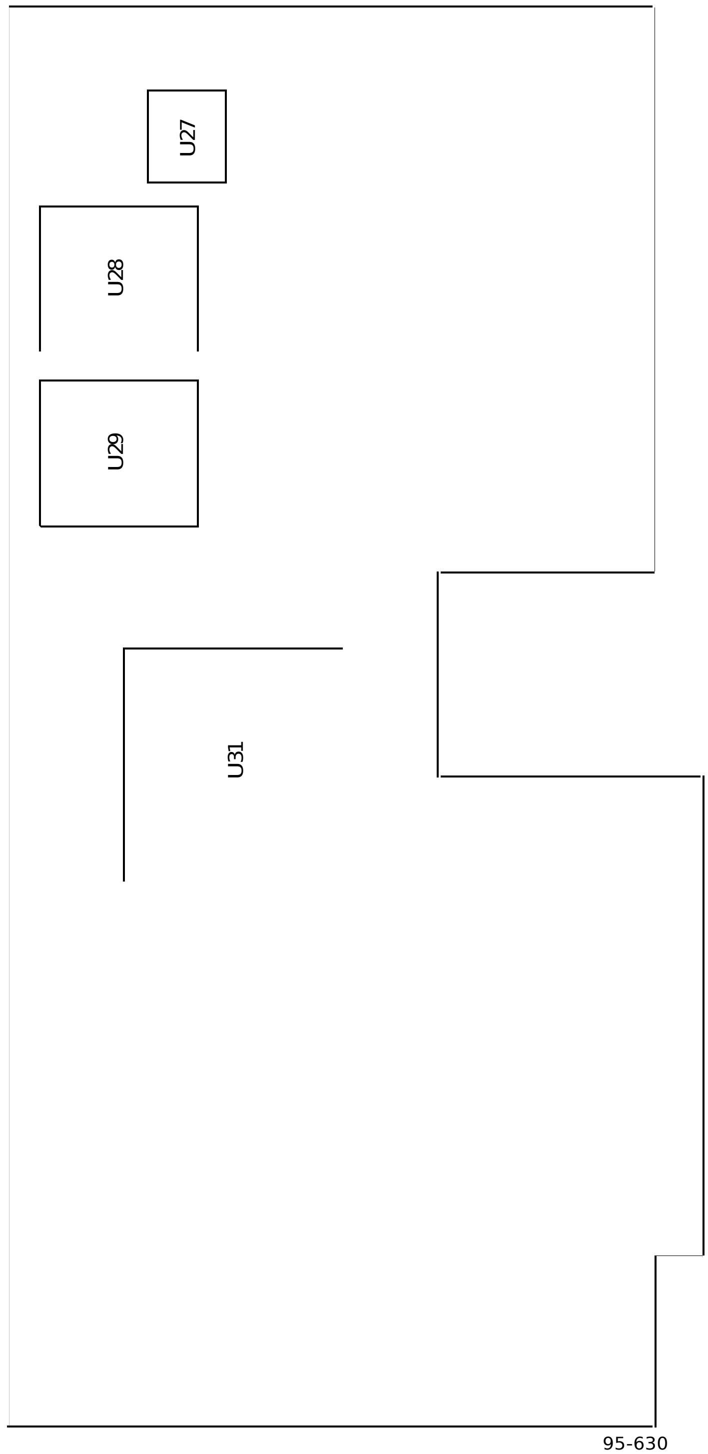


Figure 4-3. Location of Front Panel EPROMS, U28 and U29, on the Front Panel Control Assembly, A1A1

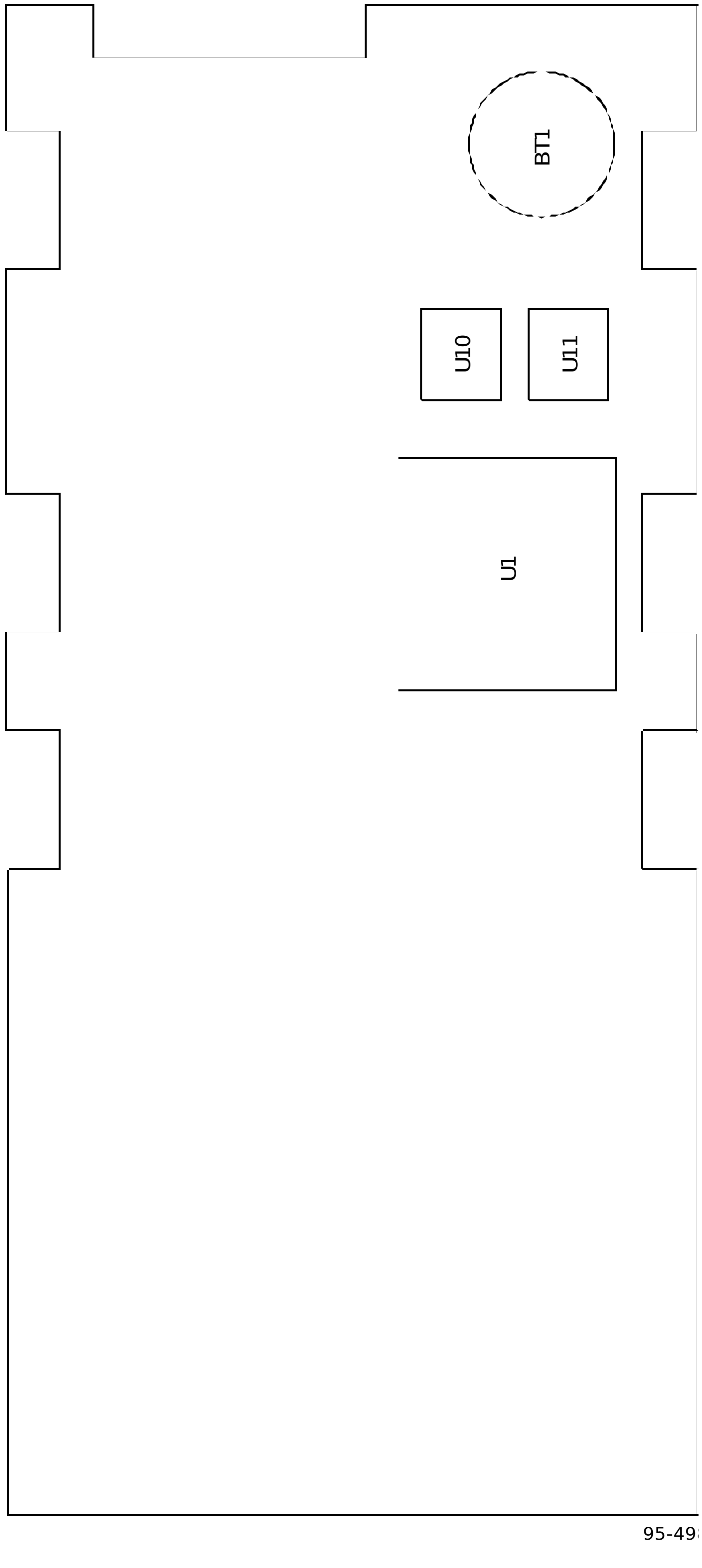


Figure 4-4. Location of Receiver A or Receiver B EPROM, U10, on the Microprocessor/Motherboard, A2

4.3.5 COMPLETION OF EPROM REPLACEMENT

1. Replace covers.

2. Apply power and verify proper operation.

   a. If a front panel is installed, it should display the version number, indicated on the front panel EPROMs, at power up. Also verify the ability to select each local receiver. This verifies proper operation of the receiver microprocessor sections. If a remote interface is installed, it is also verified by the ability to select the receivers from the front panel.

   b. If no front panel is installed, proper operation can be verified by the ability to communicate with the receivers via the remote interface.

SECTION V

REPLACEMENT PARTS LIST

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION V

REPLACEMENT PARTS LIST

5.1 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.

5.2 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).

5.3 PROVISIONING NOTE - INCONSISTENCIES IN PART NUMBERING CONVENTIONS

The internal computer applications at BAE SYSTEMS Gaithersburg Operations have undergone upgrades to better serve our customers. With this upgrade came alterations to the numbering scheme for parts reporting to an end item. Due to these alterations, minor inconsistencies may exist between identifying parts numbers found on drawings, piece parts, or other documentation. No form fit and function specifications have been altered due to this change in the numbering scheme.

The inconsistencies take two forms. New part number conventions mandate the use of three-digit suffixes for part numbers used within computer applications. Part numbers having single-digit suffixes have been altered by the addition of leading zeroes. Therefore, a piece part with an identifying number having a suffix of "-2" may be represented in a computer-generated document with a part number having a suffix of "-002". Also the new part numbering convention requires that the base portion of a part number be made up of six digits. Part numbers with base portions with less than six digits are expressed with leading zeroes to meet this requirement. Accordingly, a part number having a base of "34456" may appear as "034456". If you have questions or concerns regarding the configuration identification of piece parts, contact the plant for additional information at 1-800-954-3577.

5.4 LIST OF MANUFACTURERS

Mfr. Code	Name and Address
00779	Amp, Inc. 2800 Fulling Mill Rd. P.O. Box 3608 Middletown, PA 17105-3608
02114	Amperex Electronic Corp. Ferroxcube Div. 5083 Kings Hwy. Saugerties, NY 12477
04713	Motorola, Inc. Semiconductor Products Sector 5005 E. McDowell Rd. Phoenix, AZ 85008-4229
0EXD1	Inductor Supply Co. 1849 W. Sequoia Ave. Orange, CA 92668-1017
0GP12	Radiall, Inc. 150 Long Beach Blvd. Stratford, CT 06497
11502	International Resistive Co., Inc. Greenway Rd. PO Box 1860 Boone, NC 28607-1860
12020	Ovenaire Div. Of Electronic Technologies, Incorporated 100 Watts St. PO Box B Mt. Holly Springs, PA 17065
14632	DRS Signal Solutions, Inc. 700 Quince Orchard Rd. Gaithersburg, MD 20878-1706
15542	Mini-Circuits Laboratory Div. of Scientific Components Corporation 13 Neptune Ave. PO Box 350165 Brooklyn, NY 11235

Mfr. Code	Name and Address
04850	Dexter Magnetic Materials Div. 400 Karin Ln. Hicksville, NY 11801-5328
05245	CORCOM, Inc. 1600 Winchester Road Libertyville, IL 60048-1267
09353	C and K Components, Inc. 15 Riverdale Ave. Newton, MA 02158-1057
18324	Signetics Co. Military Products Div. 1275 S. 800 E. St Orem, UT 84058
19505	Applied Engineering Products 104 John W. Murphy Dr. PO Box 510 New Haven, CT 06513
1Z447	RCA Corp. Solid State Div. 2872 Woodcock Blvd., Suite 304 Atlanta, GA 30341-4002
21912	M/A-Com, Inc. Anzac Operations 80 Cambridge St. Burlington, MA 01803-4107
22526	Dupont E I Denemours and Co, Inc. Dupont Connector Systems Rt. 141 and Rt. 48 BMP19 Wilmington, DE 19880-0019
23936	Purdy, William J., Co. Interfan Division 770 Airport Blvd. Burlingame, CA 94010-1927

Mfr. Code	Name and Address	Mfr. Code	Name and Address
16428	Cooper Industries, Inc. Belden Div. 350 NW N St. Richmond, IN 47374	24539	Avantek, Inc. 3175 Bowers Ave. Santa Clara, CA 95054-3292
17540	Alpha Industries, Inc. HQ/Semiconductor Div. 20 Sylvan Rd. PO Box 1044 Woburn, MA 01801-1854	25088	Siemens Corp. 186 Wood Ave., S. Iselin, NJ 08830-2704
17856	Siliconix, Inc. 2201 Laurelwood Rd. Santa Clara, CA 95054-1516	27014	National Semiconductor Corp. 2900 Semiconductor Dr. Santa Clara, CA 95051-0606
27264	Molex, Inc. 2222 Wellington Ct. Lisle, IL 60532-1613	55322	Samtec, Inc. 810 Progress Blvd. PO Box 1147 New Albany, IN 47150-2257
28480	Hewlett-Packard Co. Corporate Hq. 3000 Hanover St. Palo Alto, CA 94304-1112	53469	Plessey Semiconductors Corp. 1500 Green Hills Rd. PO Box 660017 Scotts Valley, CA 95067-0017
2X491	Rockwell International Corp. Filter Products/CTSD 2990 Airway Ave. Costa Mesa, CA 92626-6018	54473	Matsushita Electric Corp. of America M/S 7H-4 2 Panasonic Way Secaucus, NJ 07094
33095	Spectrum Control, Inc. World Hq. 6000 W. Ridge Rd. Erie, PA 16505	54583	TDK Electronics Corp. 12 Harbor Park Dr. Port Washington, NY 11550
33297	NEC Electronics USA, Inc. Electronic Arrays Div. 550 E. Middlefield Rd. Mountain View, CA 94043-4008	55027	Q-Bit Corp. 2575 Pacific Ave., NE Palm Bay, FL 32905
50101	Frequency Sources, Inc. Loral Microwave - FSI 75 Technology Dr. Chelmsford, MA 01824-3737	55322	Samtec, Inc. 810 Progress Blvd. PO Box 1147 New Albany, IN 47150-2257

Mfr. Code	Name and Address
51642	Centre Engineering, Inc. 2820 E. College Ave. State College, PA 16801-7515
53387	Minnesota Mining & Mfg. Co. Electronic Products Div. 3M Austin Ctr. Austin, TX 78769-2963
61271	Fujitsu Microelectronics, Inc 3545 N. 1st St, Bldg 1 San Jose, CA 95134-1804
71400	Bussman Mfg. Div of Cooper Industries, Inc 114 Old State Road Ellisville, MO 63021
71468	ITT Corp. ITT Cannon Division 666 East Dyer Road Santa Ana, CA 92702
71482	CP Clare Corp. 3101 W. Pratt Blvd. Chicago, IL 60645-4125
72982	Erie Specialty Products, Inc. 645 W. 11th St. Erie, PA 16512
73138	Beckman Industrial Corp. Electronic Technologies Div. 4141 Palm St. Fullerton, CA 92635
80131	Electronic Industries Association
56289	Sprague Electric Co. World Hqs. 267 Lowell Rd. Hudson, NH 03051-4900
59124	KOA Speer Electronics Bolivar Drive PO Box 547 Bradford, PA 16701
81349	Military Specifications Promulgated by Military Dept.
82389	Switchcraft, Inc. Sub. Of Raytheon Co. 5555 N. Ellston Ave. Chicago, IL 60630-1314
8Z573	J S Terminal Corp. Of America 1380 Brummel Ave. Elk Grove Village, IL 60007-2109
91637	Dale Electronics, Inc. 1122 23rd St. PO Box 609 Columbus, NE 68601-3632
95146	Alco Electronic Products, Inc. 1551 Osgood St. North Andover, MA 01845-1014
95275	Vitramon, Inc PO Box 544 Bridgeport, CT 06601-0544
95348	Gordos Arkansas, Inc. 1000 N. 2nd St. PO Box 824 Rogers, AR 72757
9J979	Hitachi America, Ltd. 950 Benicia Ave. Sunnyvale, CA 94086-2804

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 the factory, 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 5.4**, and the manufacturer's part number, provided in **paragraph 5.6**, 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 5.6** 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 the factory 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.

THIS PAGE INTENTIONALLY LEFT BLANK

5.6 TYPE WJ-8700 VLF/HF DUAL RECEIVER MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision L1				
A1	Front Panel (Select Applicable Config)	1	797011-2 (Also see **Appendix A**)	14632	
A2A	Microprocessor, Motherboard	2	796859-1	14632	
A2B	Same as A2A				
A3	Remote Interface (Select Applicable Config)		See **Appendixes B and G**	14632	
A4	Not Used				
A5A	If Demodulator	2	796860-1	14632	
A5B	Same as A5A				
A6A	Input Converter (Select Applicable 8700/BW Set, **Table 5-1**)	2	796861-X	14632	
A6B	Same as A6A				
A7A	Synthesizer	2	796862-1	14632	
A7B	Same as A7A				
A8A	Preselector	2	796863-1	14632	
A8B	Same as A8A				
A9	Reference Generator	1	796864-1	14632	
A10A	RF Option (Select Applicable Config)		See **Appendixes C thru F, H, J, and K**	14632	
A10B	Same as A10A				
A11	Power Supply	1	766023-1	14632	
B1	Blower Fan, 12-30Vdc, 250mA, 5300RPM, 11-29CFM	1	614	23936	
FL1	Filter, Line, AC, 115V to 220Vac, 6 A	1	6J4	05245	
J2	Connector, Plug, 25 Pin D Type	1	DBSF-25P	71468	
J3	Connector, Jack, BNC, for RD-178 Cable	6	R141-301-000	0GP12	
J4 Thru J8	Same as J3				
J11	Jack, Phone, Three Conductor Open Circuit	1	L-112B	82389	
J12	Connector, Plug, 25 Position	1	8325-6063	53387	
J14	Connector, Plug, 9 Position, D-Type	1	8309-6063	53387	
J15	Connector, Plug, 9 Pin, D-Type	1	8209-6063	53387	
JW1	Jumper Assembly	1	282697-1	14632	
T1	Transformer Assembly	1	382368-1	14632	
W1	Cable Assembly, AC Input	1	382370-1	14632	
W1P1	Connector, PC Board, 8 Pin, .156 Centers	1	09-50-3081	27264	
W3	Cable Assembly	1	17300-485-4	14632	
W3P1	Connector, MCX, for RD-178 Cable	6	R113-180-000	0GP12	
W4	Cable Assembly	1	17300-485-1	14632	
W4P1	Same as W3P1				
W5	Cable Assembly	1	17300-485-6	14632	
W5P1	Same as W3P1				
W6	Cable Assembly	1	17300-485-3	14632	
W6P1	Same as W3P1				
W7	Cable Assembly	1	17300-485-5	14632	

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

MAIN CHASSIS

W7P1	Same as W3P1				
W8	Cable Assembly	1	17300-485-2	14632	
W8P1	Same as W3P1				
W9	Cable Assembly, Printer	1	382372-1	14632	
W9P1	Connector, Plug, Double Row 10 position	5	IDD-5-G	55322	
W10	Cable Assembly, Net	1	382309-1	14632	
W10P1	Same as W9P1				
W10P2	Same as W9P1				
W11	Cable Assembly, Audio	1	382308-1	14632	
W11P1	Same as W9P1				
W11P2	Same as W9P1				
W12	Cable Assembly, Aux	1	382307-1	14632	
W12P1	Connector, Plug, 14 Position,.10 Center	2	IDD-7-G	55322	
W12P2	Same as W12P1				
W13	Phone Jack Assembly	1	282521-1	14632	
W13P1	Housing, 4 Position, Nylon	1	PHR-4	8Z573	
	ACCESSORY ITEMS				
AI-1	Cord, Line, 3 Conductor, Shielded	1	17600	16428	
AI-2	Center Support Bracket	1	280505-1	14632	
AI-3	Connector, Plug, 9 Position, D Type	1	205204-1	00779	
AI-4	Connector, Receptacle, 25 Position, D-Type	1	205207-1	00779	
AI-5	Connector, Receptacle, 9 Position, D-Type	1	205203-1	00779	
AI-6	Handle, 3.50 Inch	1	32306-5 3.40	14632	
AI-7	Support Bracket	1	280504-1	14632	
AI-8	Rear Handle Assembly	1	282358-1	14632	
AI-9	Rear Handle Assembly	1	282358-2	14632	
AI-10	Fuse, Cartridge, 3/4 Amp, 3AG, Slow Blow	1	Mdl3/4	71400	
AI-11	Connector, Plug, 25 Pin, D-Type	1	205208-1	00779	

Table 5-1. Input Converter Assembly Part Numbers for Selected BW Sets

Bandwidth Set	Input Converter Assembly (A6) Part No.
WJ-8700/BW1	796861-1 (-9*)
WJ-8700/BW2	796861-2 (-10*)
WJ-8700/BW3	796861-3 (-11*)
WJ-8700/BW4	796861-4 (-12*)
WJ-8700/BW5	796861-5 (-13*)
WJ-8700/BW6	796861-6 (-14*)
WJ-8700/BW7	796861-7 (-15*)
WJ-8700/BW8	796861-8 (-16*)
WJ-8700/BW9	796861-17 (-19*)
WJ-8700/BW10	796861-18 (-20*)
WJ-8700/BW11	796861-21

* Dash numbers in parenthesis are conformal coated versions of the assembly.

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

5.6.1 **TYPE 797011-2 FRONT PANEL ASSEMBLY** REF DESIG PREFIX **A1**

	Revision F1				
A1	Front Panel Controller	1	796856-1	14632	
P4	Connector, 2 pin,	1	09-50-3021	27264	
P5	Housing, 4 Pin, Nylon	2	PHR-4	8Z573	
P6	Housing 6 Pin, Nylon	1	PHR-6	8Z573	
P8	Same as P5				
R1/R2	Potentiometer, Cable Assembly	1	282522-1	14632	
S1	Switch, Toggle, SPDT, On-None-On	2	MTA106D	95146	
S2	Same as S1				
U1	LCD Assembly	1	282524-1	14632	
U2	Keyboard Assembly	1	482060-1	14632	
U3	Encoder Assembly	1	282520-1	14632	

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

5.5.1.1 **Type 796856-1 Front Panel Control PC Assembly** REF DESIG PREFIX **A1A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision D1				
BT1	Battery, Lithium Iodine, 3.0V@350maHours@500kΩ	1	180867	14632	
C1	Capacitor, Ceramic, .01ΩF ±10%, 50V	42	841250-19	14632	
C2	Same as C1				
C3	Same as C1				
C4	Not Used				
C5 Thru C7	Same as C1				
C8	Capacitor, Ceramic, 47pF ±5%, 50V	3	841250-05	14632	
C9 Thru C11	Same as C1				
C12	Capacitor, Ceramic, 22pF ±5%, 50V	3	841250-03	14632	
C13	Same as C12				
C14 Thru C16	Same as C1				
C17	Same as C8				
C18	Same as C1				
C19	Capacitor, Ceramic, 100pF ±5%, 50V	1	841250-07	14632	
C20	Capacitor, Tantalum, 1.0ΩF ±20%, 16V	3	841293-04	14632	
C21	Capacitor, Tantalum, 33ΩF ±20%, 16V	14	841293-22	14632	
C22	Same as C1				
C23	Same as C21				
C24	Capacitor, Ceramic, .1ΩF ±10%, 50V	7	841250-25	14632	
C25	Capacitor, Tantalum, 3.3ΩF ±20%, 16V	1	841293-10	14632	
C26	Same as C1				
C27	Same as C8				
C28 Thru C35	Same as C1				
C36	Capacitor, Ceramic, 1500pF ±10%, 50V	2	841250-14	14632	
C37	Same as C24				
C38 Thru C43	Same as C1				
C44	Capacitor, Ceramic, 33pF ±5%, 50V	1	841250-04	14632	
C45	Same as C21				
C46	Same as C21				
C47	Same as C20				
C48	Same as C24				
C49	Same as C1				
C50	Same as C1				

REF DESIG PREFIX **A1A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C51	Capacitor, Ceramic, .015ΩF ±10%, 50V	2	841250-20	14632	
C52	Same as C21				
C53	Same as C21				
C54	Capacitor, Tantalum, 15ΩF ±20%, 25V	2	841293-19	14632	
C55	Same as C24				
C56	Same as C21				
C57	Same as C1				
C58	Same as C24				
C59	Same as C21				
C60	Same as C1				
C61	Same as C1				
C62	Same as C21				
C63	Same as C1				
C64	Same as C1				
C65	Capacitor, Tantalum, 68ΩF ±20%, 6.3V	2	841293-24	14632	
C66	Same as C21				
C67	Same as C1				
C68	Same as C1				
C69	Same as C21				
C70	Same as C24				
C71	Same as C20				
C72	Same as C51				
C73	Same as C21				
C74	Same as C54				
C75	Same as C65				
C76	Same as C21				
C77	Same as C36				
C78	Same as C1				
C79	Same as C1				
C80	Same as C21				
C81	Same as C24				
C82	Same as C1				
C83	Same as C1				
C84	Same as C12				
CR1	Not Used				
CR2	Not Used				
CR3	Not Used				
CR4	Diode, Schottky Barrier, General Purpose	3	HSMS-2810T31	28480	
CR5	Diode, General Purpose	7	MMBD1203-HIGH	27014	
CR6	Same as CR4				
CR7	Same as CR4				
CR8 Thru CR13	Same as CR5				

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

REF DESIG PREFIX **A1A1**

J1	Connector, Header, 16 Pin, .10 Centers	2	TSW-108-08-G-D-RA	55322	
J2	Same as J1				
J3	Connector, Header, 8 Pin, .10 Centers	1	TSW-104-08-G-D-RA	55322	
J4	Connector, PC, 4 Pin, 2.0mm Centers	2	S4B-PH-K	8Z573	
J5	Connector, PC, 11 Pin, .10 Centers	1	SSW-111-01-G-S	55322	
J6	Connector, PC, 16 Pin, .10 Centers	1	SSW-108-01-G-D	55322	
J7	Same as J4				
J8	Connector, Header, PC, 4 Pin, 2.0mm Centers	1	B4B-PH-K	8Z573	
J9	Connector, Header, PC, 6 Pin, 2.0mm Centers	1	B6B-PH-K	8Z573	
J10	Connector, Jack, Phone, 3 Conductor	1	M-112BPC	82389	
JW1	Not Used				
JW2	Wire, Bus, 22 AWG	AR	8021	70903	
LS1	Speaker Transducer, Miniature, 16?	1	BRT1209P-01	61499	
Q1	Transistor	1	MMBT6429L	04713	
Q2	Transistor	1	MMBT3904LT1	04713	
Q3	Transistor	1	MMBT2907ALT1	04713	
R1	Resistor, Fixed, 3.3? ±5%, .125W	8	841296-005	14632	
R2	Resistor, Fixed, 100k? ±5%, .125W	57	841296-113	14632	
R3	Same as R2				
R4 Thru R8	Same as R1				
R9	Same as R2				
R10	Same as R2				
R11	Resistor, Fixed, 10k? ±5%, .125W	22	841296-089	14632	
R12	Same as R2				
R13	Same as R2				
R14	Same as R11				
R15	Same as R11				
R16	Resistor, Fixed, 33.0? ±5%, .125W	5	841296-029	14632	
R17	Same as R16				
R18 Thru R21	Same as R2				
R22	Same as R11				
R23 Thru R32	Same as R2				
R33	Resistor, Fixed, 10M? ±5%, .125W	1	841296-161	14632	
R34	Resistor, Fixed, 2.2? ±5%, .125W	4	841296-001	14632	
R35 Thru R38	Same as R11				

REF DESIG PREFIX **A1A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R39 Thru R48	Same as R2				
R49	Resistor, Fixed, 15k? ±5%, .125W	1	841296-093	14632	
R50	Resistor, Fixed, 5.6k? ±5%, .125W	3	841296-083	14632	
R51	Same as R2				
R52	Resistor, Fixed, less than .05?, 2Amax	3	841341	14632	
R53	Resistor, Fixed, 150? ±5%, .125W	4	841296-045	14632	
R54	Not Used				
R55	Same as R2				
R56	Same as R2				
R57	Not Used				
R58	Not Used				
R59	Same as R2				
R60	Same as R11				
R61	Resistor, Fixed, 12k? ±5%, .125W	1	841296-091	14632	
R62	Same as R2				
R63	Resistor, Fixed, 1.0k? ±5%, .125W	7	841296-065	14632	
R64	Resistor, Fixed, 4.7k? ±5%, .125W	5	841296-081	14632	
R65 Thru R74	Same as R2				
R75	Same as R63				
R76	Same as R64				
R77	Same as R2				
R78	Same as R2				
R79	Same as R11				
R80 Thru R82	Same as R2				
R83	Same as R11				
R84	Not Used				
R85	Same as R63				
R86	Same as R52				
R87	Resistor, Fixed, 8.2k? ±5%, .125W	2	841296-087	14632	
R88	Resistor, Fixed, 330? ±5%, .125W	2	841296-053	14632	
R89	Same as R11				
R90	Same as R2				
R91	Same as R11				
R92	Same as R11				
R93	Same as R2				
R94	Resistor, Fixed, 2.2k? ±5%, .125W	3	841296-073	14632	
R95	Same as R63				
R96	Same as R94				

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

REF DESIG PREFIX **A1A1**

R97	Same as R50				
R98	Same as R16				
R99	Same as R16				
R100	Same as R1				
R101	Same as R53				
R102	Resistor, Fixed, 6.8? ±5%, .125W	2	841296-013	14632	
R103	Not Used				
R104	Same as R11				
R105	Same as R88				
R106	Same as R11				
R107	Same as R2				
R108 Thru R110	Same as R11				
R111	Same as R63				
R112	Same as R34				
R113	Same as R34				
R114	Same as R87				
R115	Same as R53				
R116	Same as R102				
R117	Same as R11				
R118	Resistor, Fixed, 10.0? ±5%, .125W	4	841296-017	14632	
R119	Same as R11				
R120	Same as R118				
R121	Same as R2				
R122	Same as R2				
R123	Same as R52				
R124	Same as R16				
R125	Same as R50				
R126	Same as R94				
R127	Same as R1				
R128	Same as R118				
R129	Same as R118				
R130	Same as R2				
R131	Same as R34				
R132	Same as R53				
R133 Thru R135	Not Used				
R136	Same as R11				
R137 Thru R139	Same as R64				
R140	Same as R63				

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

REF DESIG PREFIX **A1A1**

R141	Same as R63				
R142	Resistor, Fixed, 220? ±5%, .125W.	1	841296-049	14632	
R143	Same as R2				
R144	Not Used				
S1	Switch, Dip, 8-Position	1	ADF-08S	95146	
S2	Switch, Rotary Encoder.	1	LCE-24-1(70125)	82104	
U1	Integrated Circuit, Realtime Clock Module	1	RTC-72423B	61722	
U2	Integrated Circuit, CMOS, Hex Inverter	1	74AC04SO14	04713	
U3	Integrated Circuit, Presettable Binary Counter	1	74AC161SO16	34371	
U4	Integrated Circuit, Quad 2-Input OR Gate	2	8674HC32SO14U	14632	
U5	Same as U4				
U6	Not Used				
U7	Integrated Circuit, CMOS, Quad 2-Input AND Gate	1	74AC08SO14	04713	
U8	Integrated Circuit, Hex Inverter	1	74HC04SO14	04713	
U9	Integrated Circuit, 3-to-8-Line Decoder	1	74AC138SO16	34371	
U10	Integrated Circuit, 3-to-8 Line Decoder	2	74HC138SO16	02735	
U11	Integrated Circuit, CMOS, 10-to-4 Line Encoder	1	74HC147SO16	04713	
U12	Integrated Circuit, CMOS, 12-State Ripple Counter	1	8674HC4040SO16U	14632	
U13	Integrated Circuit, CMOS, Contact Bopunce Eliminator	1	MC14490DW	04713	
U14	Not Used				
U15	Integrated Circuit, CMOS, Hex Buffer/Line Driver	1	8674HC365SO16U	14632	
U16	Integrated Circuit, CMOS, Hex D-Type Flip-Flop	1	8674HC174SO16U	14632	
U17	Integrated Circuit, CMOS, Triple 3-Input AND Gate	1	74HC11 SO14	04713	
U18	Integrated Circuit, CMOS, Hex Buffer/Line Driver	1	8674HC367SO16U	14632	
U19	Amplifier, Dual Operational Amplifier, JFET-Input	2	8634002SO8	14632	
U20	Integrated Circuit, D/A Converter	1	AD558JP	24355	
U21	DC-DC Converter, 80mA, 3-18V, 28W	1	TSC962COE	15818	
U22	Integrated Circuit, CMOS 16 Key Encoder	1	MM74C922N	27014	
U23	Same as U10				
U24	Integrated Circuit, Dual D-Type Flip-Flop	3	74HC74 SO14	04713	
U25	Same as U24				
U26	Same as U24				
U27	Integrated Circuit, Dot MAtrix/LCD Controller	1	HD61830AOOH	62786	
U28	EPROM, Programmed	1	841550	14632	
U29	EPROM, Programmed	1	841551	14632	
U30	Integrated Circuit, Switch, Quad 4 Section SPST	3	DG412DY	17856	
U31	Integrated Circuit, Microprocessor, 16 Bit	1	MC68HC000FN12	01537	
U32	Integrated Circuit, DUART	2	SCC2692AC1A44	18324	
U33	Integrated Circuit, 3-State, Octal D-Type Latch	1	8674HC373SOL20U	14632	
U34	Integrated Circuit, MIPRCS Supervisory Circuit	1	MAX691CWE	1ES66	
U35	Integrated Circuit, CMOS, RAM, 8192 x 8-Bit	1	HM6264ALFP	62786	
U36	Integrated Circuit, CMOS, 32kWord x 8-Bit Static RAM	2	HM62256LFP-12SLT	9J979	
U37	Same as U36				
U38	Integrated Circuit, Octal D-Type Flip-Flop	2	8674HC273SOL20U	14632	

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

REF DESIG PREFIX **A1A1**

U39	Amplifier, Mini-W Audio Output	2	MC13060D	04713	
U40	Same as U19				
U41	Same as U30				
U42	Same as U30				
U43	Same as U38				
U44	Same as U32				
U45	Integrated Circuit, Driver/Receiver	1	MC145406DW	04713	
U46	Same as U39				
U47	Integrated Circuit, Differential Bus Transceiver	1	8675176SO8N	14632	
VR1	Diode, Zener, 3.3V	1	MMBZ5226BLT1	04713	
XU14	Socket, 32 Lead Leadless Chip Carrier	3	IC61-0324-059	0HSF8	
XU28	Same as XU14				
XU29	Same as XU14				
XU31	Socket, 68 Pin PLCC, .050 Centers	1	213-068-601	26742	
Y1	Crystal	1	NCS120	61441	
Y2	Crystal	1	NMS037-20	61441	

5.6.2 TYPE 796859-1 MICROPROCESSOR/ MOTHERBOARD PC ASSEMBLY

REF DESIG PREFIX **A2A, A2B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision G1				
BT1	Battery, Lithium Iodine, 3.0V, 200mAHrs@600k	1	180866	14632	
C1	Capacitor, Ceramic, 22pF ±5%, 50V	2	841250-03	14632	
C2	Same as C1				
C3	Capacitor, Tantalum, 68?F ±20%, 6.3V	3	841293-24	14632	
C4	Capacitor, Tantalum, 33?F ±20%, 16V	6	841293-22	14632	
C5	Capacitor, Ceramic, .1?F ±10%, 50V	75	841250-25	14632	
C6	Same as C5				
C7	Same as C5				
C8	Capacitor, Tantalum, 22?F ±20%, 20V	1	841293-21	14632	
C9 Thru C32	Same as C5				
C33	Same as C3				
C34 Thru C45	Same as C5				
C46	Same as C4				
C47 Thru C57	Same as C5				
C58	Capacitor, Ceramic, 100pF ±5%, 50V	37	841250-07	14632	
C59	Same as C58				
C60 Thru C63	Same as C5				
C64	Same as C3				
C65 Thru C67	Same as C4				
C68	Capacitor, Tantalum, 3.3?F ±20%, 35V	1	841293-11	14632	
C69	Same as C5				
C70 Thru C74	Same as C58				
C75	Same as C5				
C76	Same as C5				
C77 Thru C85	Same as C58				
C86 Thru C93	Same as C5				
C94	Same as C58				
C95	Same as C58				
C96	Same as C4				

REF DESIG PREFIX **A2A, A2B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C97	Same as C5				
C98	Not Used				
C99 Thru C112	Same as C58				
C113	Same as C5				
C114	Same as C5				
C115 Thru C120	Same as C58				
C121 Thru C127	Same as C5				
CR1	Diode, Schottky, 250mW	13	HSMS-2802T31	28480	
CR2 Thru CR13	Same as CR1				
DS1	LED, Red, High Efficiency, 5V@4mA	1	HLMP-6620	28480	
J1	Connector, Ribbon Cable, 16 Pin, .10 Centers	1	IDMD-08-T-A-R	55322	
J2	Connector, Header, 7 Pin Shrouded Header, .10 Centers	1	102202-4	00779	
J3	Connector, Header, 14 Pin Header, .10 Centers	1	TSW-107-07-G-D	55322	
J4	Connector, Header, 10 Pin Header, .10 Centers	4	TSW-105-07-G-D	55322	
J5	Same as J4				
J6	Header, 36 Pin, .10 Centers	6	67273-018	22526	
J7 Thru J11	Same as J6				
J12	Same as J4				
J13	Same as J4				
Q1	Transistor	1	MMBT6429L	04713	
Q2	Transistor	1	MMBT2222ALT1	04713	
R1	Resistor, Fixed, 6.8M? ±5%, .125W	3	841296-157	14632	
R2	Resistor, Fixed, 10k? ±5%, .125W	26	841296-089	14632	
R3	Same as R2				
R4	Resistor, Fixed, 100k? ±5%, .125W	69	841296-113	14632	
R5	Same as R4				
R6	Same as R4				
R7	Resistor, Fixed, 4.7k? ±5%, .125W	11	841296-081	14632	
R8	Same as R2				
R9	Same as R2				
R10	Resistor, Fixed, 15k? ±1%, .125W	14	841311-005	14632	
R11	Same as R10				
R12	Resistor, Fixed, 1.0k? ±5%, .125W	7	841296-065	14632	

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

REF DESIG PREFIX **A2A, A2B**

R13 Thru R18	Same as R10				
R19	Same as R12				
R20 Thru R44	Same as R4				
R45	Same as R12				
R46	Resistor, Fixed, 47k? ±5%, .125W	1	841296-105	14632	
R47 Thru R55	Same as R4				
R56	Resistor, Fixed, 470? ±5%, .125W	9	841296-057	14632	
R57	Same as R56				
R58	Same as R2				
R59	Same as R1				
R60	Same as R7				
R61	Same as R12				
R62	Same as R2				
R63	Same as R1				
R64	Same as R7				
R65	Same as R12				
R66	Resistor, Fixed, 6.8? ±5%, .125W	23	841296-013	14632	
R67	Same as R66				
R68	Same as R56				
R69	Same as R56				
R70	Same as R66				
R71	Same as R66				
R72	Same as R2				
R73 Thru R80	Same as R4				
R81 Thru R83	Same as R2				
R84	Same as R4				
R85	Resistor, Fixed, 620? ±5%, .125W	9	841296-060	14632	
R86	Same as R85				
R87	Same as R4				
R88	Same as R56				
R89	Same as R4				
R90	Same as R4				
R91	Same as R66				
R92	Same as R2				

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

REF DESIG PREFIX **A2A, A2B**

R93	Same as R4				
R94	Same as R7				
R95	Same as R7				
R96	Same as R85				
R97	Same as R85				
R98	Same as R2				
R99	Same as R66				
R100	Resistor, Fixed, 22k? ±5%, .125W	3	841296-097	14632	
R101	Same as R4				
R102	Same as R56				
R103	Same as R4				
R104					
Thru	Same as R10				
R109					
R110	Same as R56				
R111	Same as R4				
R112	Same as R4				
R113	Same as R56				
R114					
Thru	Same as R66				
R118					
Thru	Same as R66				
R119					
Thru	Same as R2				
R123					
R124	Same as R100				
R125	Same as R85				
R126	Same as R66				
R127	Same as R2				
R128	Same as R100				
R129	Same as R85				
R130	Same as R66				
R131	Same as R66				
R132					
Thru	Same as R4				
R136					
R137					
Thru	Same as R66				
R142					
R143	Same as R2				
R144	Same as R4				
R145					
Thru	Same as R2				
R148					

REF DESIG PREFIX **A2A, A2B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R149	Resistor, Fixed, 3.3k? ±5%, .125W	1	841296-077	14632	
R150					
Thru	Same as R4				
R152					
R153	Same as R7				
R154	Same as R85				
R155	Same as R7				
R156	Same as R85				
R157	Same as R56				
R158	Same as R66				
R159	Same as R66				
R160	Same as R4				
R161	Same as R7				
R162	Same as R12				
R163					
Thru	Same as R7				
R165					
R166	Same as R66				
R167					
Thru	Same as R4				
R170					
R171	Same as R85				
R172	Same as R2				
R173	Resistor, Fixed, 330? ±5%, .125W	2	841296-053	14632	
R174	Same as R12				
R175	Same as R2				
R176	Same as R2				
R177	Same as R173				
R178	Same as R4				
S1	Switch, DIP, 8 Positon	1	ADF-08S	95146	
U1	Integrated Circuit, 8 Bit Microprocessor	1	MC68HC11A1FN	04713	
U2	Integrated Circuit, MIPRCS Supervisory Circuit	1	MAX691CWE	1ES66	
U3	Integrated Circuit, Programmable Precision Reference	1	TL431CD	04713	
U4	Integrated Circuit, Tri-State Octal D-Type Latch	3	74HC373 SOL20	1Z447	
U5	Integrated Circuit, Quad 2-Input OR Gate	2	74HC32 SO14	1Z447	
U6	Integrated Circuit, Hex Inverter	2	74HC04 SO14	04713	
U7	Integrated Circuit, Quad 2-Input NAND Gate	3	74HC00 SO14	1Z447	
U8	Integrated Circuit, Quad 2-Input NOR Gate	2	74HC02 SO14	1Z447	
U9	Same as U7				
U10	EPROM, Programmed	1	841723	14632	
U11	Not Used				
U12	Integrated Circuit, 3-to-8 Line Decoder	3	74HC138 SO16	1Z447	
U13	Same as U12				

REF DESIG PREFIX **A2A, A2B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
U14	Same as U12				
U15	Integrated Circuit, Octal D-Type Flip-Flops With Clear	3	74HC273 SOL20	34371	
U16	Integrated Circuit, Octal Tri-State Buffer	9	74HC244 SOL20	04713	
U17	Same as U15				
U18 Thru U20	Same as U16				
U21	Same as U5				
U22	Same as U7				
U23 Thru U26	Same as U16				
U27	Integrated Circuit, CMOS, 32k x 8-Bit Static Ram, 120ns	1	HM62256LFP-12SLT	9J979	
U28	Integrated Circuit, Octal Tri-State Transceivers	1	74HC245 SOL20	04713	
U29	Integrated Circuit, CMOS, 8-Bit Shift Register	1	74HC165 SO16	1Z447	
U30	Same as U4				
U31	Integrated Circuit, Quad 2-Input AND Gate	1	74HC08 SO14	1Z447	
U32	Integrated Circuit, Synchronous Binary Counter	2	74HC161 SO16	1Z447	
U33	Same as U32				
U34	Same as U8				
U35	Integrated Circuit, Dual 4-Input NAND Gate	1	74HC20 SO14	1Z447	
U36	Integrated Circuit, Dual D-Type Flip-Flop	3	74HC74 SO14	04713	
U37	Same as U36				
U38	Same as U6				
U39	Integrated Circuit, CMOS, 4-to-16 Line Decoder/Demux	2	74HC4514 SOL24	04713	
U40	Same as U39				
U41	Same as U15				
U42	Integrated Circuit, Quad 8-Bit D/A Converter	1	867226D120	14632	
U43	Integrated Circuit, Switch, Quad Precision, SPST	5	DG412DY	17856	
U44	Operational Amplifier, Low Power JFET Input	3	TL062CD	04713	
U45	Integrated Circuit, Low Power Quad Comparator	1	LM339D	04713	
U46	Same as U36				
U47	Same as U4				
U48	Same as U16				
U49	Same as U44				
U50	Same as U44				
U51	Integrated Circuit, CMOS, Hex Schmt Inverter	1	74HC14 SO14	1Z447	
U52	Same as U43				
U53	Operational Amplifier, Dual, JFET-Input	3	MC34002D	04713	
U54	Same as U53				
U55	Same as U53				

REF DESIG PREFIX **A2A, A2B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
U56 Thru U58	Same as U43				
XU1	Socket, 52-Pin PLCC, .05 Centers	1	213-052-601	26742	
XU10	Socket, 32 Pin, PLCC	2	IC61-0324-059	0HSF8	
XU11	Same as XU10				
Y1	Crystal	1	FPX-SM-8MHZ	61429	

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

5.5.3 TYPE 796860-1 IF DEMODULATOR PC ASSEMBLY REF DESIG PREFIX **A5A, A5B**

	Revision R1				
C1	Capacitor, Ceramic, .1?F ±10%, 50V	58	841250-25	14632	
C2	Same as C1				
C3	Capacitor, Tantalum, 3.3?F ±20%, 16V	41	841293-10	14632	
C4	Same as C1				
C5	Capacitor, Ceramic, 150pF ±5%, 50V	3	841250-08	14632	
C6	Same as C3				
C7	Not Used				
C8	Same as C1				
C9	Same as C1				
C10	Same as C3				
C11	Same as C1				
C12	Capacitor, Ceramic, .01?F ±10%, 50V	31	841250-19	14632	
C13	Same as C12				
C14	Capacitor, Ceramic, 1000pF ±5%, 50V	13	841250-13	14632	
C15	Same as C3				
C16	Same as C12				
C17	Same as C1				
C18	Same as C12				
C19	Same as C3				
C20 Thru C22	Same as C12				
C23	Same as C1				
C24	Same as C14				
C25	Same as C14				
C26	Same as C1				
C27	Same as C12				
C28	Same as C3				
C29	Same as C1				
C30	Same as C1				
C31	Same as C3				
C32	Same as C1				
C33	Same as C3				
C34	Same as C5				
C35	Same as C1				
C36	Same as C5				
C37	Same as C1				
C38	Same as C3				
C39	Same as C1				
C40	Same as C1				
C41	Same as C12				
C42	Same as C12				
C43	Same as C3				

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

REF DESIG PREFIX **A5A, A5B**

C44	Same as C3				
C45 Thru C47	Same as C1				
C48	Same as C12				
C49	Capacitor, Ceramic, 4700pF ±10%, 50V	1	841250-17	14632	
C50 Thru C53	Same as C1				
C54	Same as C14				
C55	Same as C3				
C56	Same as C12				
C57	Same as C1				
C58	Same as C12				
C59	Same as C3				
C60 Thru C62	Same as C12				
C63	Same as C1				
C64	Same as C14				
C65	Same as C14				
C66	Same as C1				
C67	Same as C12				
C68	Same as C3				
C69	Same as C12				
C70	Capacitor, Ceramic, 33pF ±2%, 50V	1	841314-037	14632	
C71	Capacitor, Variable, 7-50pF, 100V, Reverse Adjust	1	TZBX4R500BE110T00	72982	
C72	Not Used				
C73	Same as C12				
C74	Same as C12				
C75	Capacitor, Ceramic, 1800pF ±2%, 50V	2	841314-079	14632	
C76	Capacitor, Ceramic, 820pF ±2%, 50V	1	841314-071	14632	
C77 Thru C80	Same as C3				
C81	Same as C1				
C82	Same as C1				
C83	Capacitor, Ceramic, 3300pF ±10%, 50V	6	841250-16	14632	
C84	Same as C14				
C85	Same as C12				
C86	Same as C83				
C87	Same as C12				
C88	Same as C83				
C89	Same as C12				

REF DESIG PREFIX **A5A, A5B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C90	Same as C83				
C91	Same as C83				
C92	Same as C14				
C93	Same as C83				
C94	Same as C14				
C95 Thru C103	Same as C3				
C104 Thru C106	Same as C1				
C107 Thru C110	Same as C3				
C111	Capacitor, Ceramic, 100pF ±5%, 50V	7	841250-07	14632	
C112 Thru C117	Same as C1				
C118	Capacitor, Ceramic, 470pF ±5%, 50V	3	841250-11	14632	
C119	Same as C1				
C120	Same as C3				
C121	Same as C1				
C122	Same as C1				
C123	Capacitor, Tantalum, 1.0?F ±20%, 35V	2	841293-05	14632	
C124	Same as C3				
C125	Same as C3				
C126	Same as C118				
C127	Capacitor, Variable, 4-25pF +100/-0%, 50V	1	TZBX4Z250BA110TOO	72982	
C128	Capacitor, Ceramic, 10pF ±2%, 50V	1	841314-025	14632	
C129	Same as C111				
C130	Same as C1				
C131	Capacitor, Ceramic, 7.5pF ±.25pF, 50V	1	841314-022	14632	
C132	Same as C12				
C133	Same as C12				
C134	Same as C14				
C135	Same as C1				
C136	Same as C14				
C137	Same as C1				
C138	Same as C1				
C139	Same as C3				
C140	Same as C1				
C141	Same as C1				
C142	Same as C14				
C143	Same as C14				

REF DESIG PREFIX **A5A, A5B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C144	Same as C111				
C145	Same as C3				
C146	Capacitor, Ceramic, 1200pF ±2%, 50V	1	841314-075	14632	
C147	Same as C118				
C148	Capacitor, Ceramic, 2200pF ±10%, 50V	1	841250-15	14632	
C149	Capacitor, Tantalum, 22?F ±20%, 6.3V	2	841293-20	14632	
C150	Same as C12				
C151 Thru C154	Same as C1				
C155	Same as C111				
C156	Not Used				
C157	Same as C1				
C158	Same as C149				
C159	Capacitor, Tantalum, 1.5?F ±20%, 10V	1	841293-06	14632	
C160	Capacitor, Tantalum, 2.2?F ±20%, 6.3V	1	841293-08	14632	
C161	Capacitor, Tantalum, 68?F ±20%, 6.3V	1	841293-24	14632	
C162	Same as C1				
C163	Same as C3				
C164	Same as C1				
C165	Same as C123				
C166	Same as C1				
C167	Same as C3				
C168	Same as C1				
C169	Same as C1				
C170	Capacitor, Ceramic, 22pF ±5%, 50V	10	841250-03	14632	
C171 Thru C179	Same as C170				
C180	Same as C1				
C181	Capacitor, Ceramic, Monolithic, 68pF ±5%, 100V	1	200-100-N3300-680J	51642	
C182	Same as C3				
C183	Same as C1				
C184	Same as C3				
C185	Same as C111				
C186	Same as C111				
C187 Thru C190	Same as C12				
C191	Same as C111				
C192	Same as C12				
C193	Same as C3				
C194	Capacitor, Ceramic, .10?F ± 10%, 100V	1	VJ1812Y104KXBMT	95275	
C195	Capacitor, Ceramic, 4.7pF ±.1pF, 50V	1	841314-017	14632	

REF DESIG PREFIX **A5A, A5B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C196	Same as C75				
C197	Capacitor, Ceramic, 68pF ±5%, 50V	1	841250-06	14632	
CR1	Diode, Sschooky, 250mW	8	HSMS-2802T31	28480	
CR2	Not Used				
CR3	Not Used				
CR4					
Thru	Same as CR1				
CR8					
CR9	Diode, Tuning Varactor	1	KV31S1	50101	
DS1	LED, Red, Low Current	1	HLMP-7000-021	28480	
E1	Connector, Receptacle, SMB, for RG-178 Cable	1	8145-7521-005	19505	
FL1	Filter, Ceramic, 455kHz, 4kHz BW	1	CFS-455I	72982	
FL2	Filter, Ladder, 455kHz	2	CFU455B2	72982	
FL3	Same as FL2				
FL4	Discriminator, 455kHz, for FM Demodulation	1	CDB455C7	72982	
J1	Connector, Jack, SMB	1	R113-665	0GP12	
L1	Not Used				
L2	Inductor, 330?H, 5%, Qmin-40@.79MHz	1	841444-061	14632	
L5	Inductor, 47?H, 5%, Qmin-50@2.5MHz	1	841444-041	14632	
L6	Not Used				
L7	Inductor, 47?H, ±20%, Qmin-25@2.52MHz	1	B82422-A1473-M	25088	
L8	Inductor, 18nH, ±5%, Qmin-50@100MHz	1	841438-007	14632	
L9	Inductor, 1500?H, ±10%, Qmin 40 @252kHz	1	LQH4N152K-TA	72982	
P1	Connector, Plug, 36 Pin, .10 Centers	1	66527-018	22526	
Q1	Transistor	8	MMBR2857-LT1	04713	
Q2					
Thru	Same as Q1				
Q4					
Q5	Transistor	2	SST-310T1	17856	
Q6	Same as Q1				
Q7	Same as Q5				
Q8					
Thru	Same as Q1				
Q10					
Q11	Transistor	1	MMBR941	04713	
Q12	Transistor	1	MMBT2222ALT1	04713	
R1	Resistor, Fixed, 1.0kΩ ±5%, .125 W	32	841296-065	14632	
R2	Resistor, Fixed, 120Ω ±5%, .125 W	4	841296-043	14632	
R3	Resistor, Fixed, 100Ω ±5%, .125 W	17	841296-041	14632	
R4	Same as R1				
R5	Same as R2				
R6	Resistor, Fixed, 820Ω ±5%, .125 W	2	841296-063	14632	
R7	Resistor, Fixed, 2.2kΩ ±5%, .125 W	17	841296-073	14632	
R8	Same as R7				

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

REF DESIG PREFIX **A5A, A5B**

R9	Resistor, Fixed, 4.7kΩ ±5%, .125 W	12	841296-081	14632	
R10	Resistor, Fixed, 1.5kΩ ±5%, .125 W	4	841296-069	14632	
R11	Same as R1				
R12	Resistor, Fixed, 10kΩ ±5%, .125 W	31	841296-089	14632	
R13	Same as R3				
R14	Same as R1				
R15	Same as R3				
R16	Same as R7				
R17	Same as R7				
R18	Same as R1				
R19	Same as R12				
R20	Same as R3				
R21	Same as R1				
R22	Same as R12				
R23	Resistor, Fixed, 56kΩ ±5%, .125 W	1	841296-107	14632	
R24	Same as R7				
R25	Resistor, Fixed, 47kΩ ±5%, .125 W	6	841296-105	14632	
R26	Same as R1				
R27	Resistor, Fixed, 10.0Ω ±5%, .125 W	27	841296-017	14632	
R28	Same as R1				
R29	Same as R2				
R30	Same as R1				
R31	Same as R1				
R32	Same as R7				
R33	Same as R7				
R34	Same as R2				
R35	Same as R6				
R36	Same as R7				
R37	Same as R7				
R38	Same as R9				
R39	Same as R12				
R40	Same as R3				
R41	Resistor, Fixed, 680Ω ±5% .125 W	2	841296-061	14632	
R42	Resistor, Fixed, 1.8kΩ ±5%, .125 W	2	841296-071	14632	
R43	Same as R27				
R44	Same as R12				
R45	Resistor, Fixed, 3.3kΩ ±5%, .125 W	5	841296-077	14632	
R46	Same as R45				
R47	Resistor, Fixed, 220Ω ±5%, .125 W	3	841296-049	14632	
R48	Same as R1				
R49	Same as R3				
R50	Resistor, Fixed, 150Ω ±5%, .125 W	3	841296-045	14632	
R51	Same as R41				
R52	Same as R10				

REF DESIG PREFIX **A5A, A5B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R53	Resistor, Fixed, 3.9kΩ ±5%, .125 W	1	841296-079	14632	
R54	Not Used				
R55	Same as R3				
R56	Same as R3				
R57	Same as R12				
R58	Same as R3				
R59	Same as R1				
R60	Same as R3				
R61	Same as R7				
R62	Same as R7				
R63	Same as R1				
R64	Same as R1				
R65	Same as R3				
R66	Same as R1				
R67	Same as R12				
R68	Resistor, Fixed, 15kΩ ±5%, .125 W	5	841296-093	14632	
R69	Same as R7				
R70	Same as R25				
R71	Same as R1				
R72	Same as R27				
R73	Same as R10				
R74	Same as R1				
R75	Same as R1				
R76	Resistor, Fixed, 22k? ±5%, .125 W	13	841296-097	14632	
R77	Same as R12				
R78	Resistor, Fixed, 27k? ±5%, .125 W	3	841296-099	14632	
R79	Same as R12				
R80	Same as R12				
R81	Same as R76				
R82	Same as R12				
R83	Same as R12				
R84	Not Used				
R85	Resistor, Fixed, .05?max, 2Amax	2	841341	14632	
R86	Same as R27				
R87	Resistor, Fixed, 470? ±5%, .125 W	9	841296-057	14632	
R88	Same as R76				
R89	Same as R1				
R90	Same as R78				
R91	Same as R1				
R92	Resistor, Fixed, 39k? ±5%, .125 W	1	841296-103	14632	
R93	Same as R3				
R94	Same as R12				
R95	Resistor, Fixed, 12k? ±5%, .125 W.	3	841296-091	14632	

REF DESIG PREFIX **A5A, A5B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R96	Resistor, Fixed, 6.8kW ±5%, .125 W.	4	841296-085	14632	
R97	Resistor, Fixed, 20kW ±5%, .125 W.	2	841296-096	14632	
R98	Resistor, Fixed, 9.1kW ±5%, .125 W.	1	841296-088	14632	
R99	Resistor, Fixed, 24kW ±5%, .125 W.	1	841296-098	14632	
R100	Same as R9				
R101	Resistor, Fixed, 13kW ±5%, .125 W.	2	841296-092	14632	
R102	Resistor, Fixed, 3.0kW ±5%, .125 W	1	841296-076	14632	
R103	Resistor, Fixed, 8.2kW ±5%, .125 W.	1	841296-087	14632	
R104	Same as R96				
R105	Same as R97				
R106	Same as R9				
R107	Same as R101				
R108	Same as R27				
R109	Same as R27				
R110	Same as R12				
R111	Resistor, Fixed, 220kW ±5%, .125 W.	2	841296-121	14632	
R112	Resistor, Fixed, 330kW ±5%, .125 W.	2	841296-125	14632	
R113	Same as R76				
R114	Resistor, Fixed, 150kW ±5%, .125 W.	2	841296-117	14632	
R115	Resistor, Fixed, 680kW ±5%, .125 W.	4	841296-133	14632	
R116	Resistor, Fixed, 3.3MW ±5%, .125 W.	2	841296-149	14632	
R117	Same as R76				
R118	Same as R12				
R119	Resistor, Fixed, 2.7kW ±5%, .125 W.	3	841296-075	14632	
R120	Same as R95				
R121	Resistor, Fixed, 18kW ±5%, .125 W.	2	841296-095	14632	
R122	Not Used				
R123	Not Used				
R124	Same as R12				
R125	Same as R12				
R126	Same as R1				
R127	Same as R9				

REF DESIG PREFIX **A5A, A5B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R128	Same as R1				
R129	Same as R96				
R130	Same as R76				
R131	Resistor, Fixed, 100kW ±5%, .125 W.	3	841296-113	14632	
R132	Resistor, Fixed, 1.0MW ±5%, .125 W.	2	841296-137	14632	
R133	Same as R12				
R134	Same as R111				
R135	Same as R112				
R136	Same as R76				
R137	Same as R114				
R138	Same as R115				
R139	Same as R116				
R140	Same as R76				
R141	Same as R12				
R142	Same as R119				
R143	Same as R95				
R144	Same as R121				
R145	Same as R25				
R146	Same as R78				
R147	Same as R12				
R148	Same as R12				
R149	Same as R1				
R150	Same as R9				
R151	Same as R1				
R152	Same as R96				
R153	Same as R76				
R154	Same as R131				
R155	Same as R132				
R156	Resistor, Fixed, 82kW ±5%, .125 W.	2	841296-111	14632	
R157	Same as R156				
R158	Resistor, Fixed, 470kW ±5%, .125 W.	2	841296-129	14632	
R159	Same as R158				
R160	Same as R12				
R161	Same as R68				
R162	Same as R9				
R163	Same as R27				
R164	Same as R12				
R165	Resistor, Fixed, 560kW ±5%, .125 W.	1	841296-131	14632	
R166 Thru R168	Same as R3				
R169	Same as R27				

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

REF DESIG PREFIX **A5A, A5B**

R170	Same as R27				
R171	Same as R87				
R172	Same as R25				
R173	Same as R68				
R174	Resistor, Fixed, 47.0W ±5%, .125 W.	3	841296-033	14632	
R175	Resistor, Fixed, 33.0W ±5%, .125 W	3	841296-029	14632	
R176	Same as R27				
R177	Same as R50				
R178	Same as R87				
R179	Resistor, Fixed, 22.0W ±5%, .125 W.	7	841296-025	14632	
R180	Same as R179				
R181	Same as R87				
R182	Resistor, Fixed, 820kW ±5%, .125 W.	1	841296-135	14632	
R183	Resistor, Fixed, 330W ±5%, .125 W.	1	841296-053	14632	
R184	Same as R87				
R185	Same as R25				
R186	Resistor, Fixed, 270W ±5%, .125 W.	2	841296-051	14632	
R187	Same as R179				
R188	Same as R27				
R189	Same as R179				
R190	Same as R45				
R191	Same as R45				
R192	Same as R87				
R193	Same as R87				
R194	Same as R9				
R195	Same as R12				
R196	Same as R12				
R197	Same as R27				
R198	Same as R1				
R199	Same as R12				
R200	Same as R27				
R201	Same as R186				
R202	Resistor, Fixed, 33kW ±5%, .125 W.	1	841296-101	14632	
R203	Same as R12				
R204	Same as R12				
R205	Same as R179				
R206	Same as R87				
R207	Same as R174				
R208	Same as R85				
R209	Same as R47				
R210	Same as R179				

REF DESIG PREFIX **A5A, A5B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R211	Same as R47				
R212	Resistor, Fixed, 15.0W ±5%, .125 W.	3	841296-021	14632	
R213	Same as R212				
R214	Same as R212				
R215	Same as R174				
R216	Same as R179				
R217	Same as R9				
R218	Same as R9				
R219	Resistor, Fixed, 1.2kW ±5%, .125 W.	1	841296-067	14632	
R220	Same as R131				
R221	Same as R7				
R222	Same as R68				
R223	Same as R119				
R224	Same as R42				
R225	Same as R10				
R226	Same as R27				
R227	Same as R87				
R228	Same as R76				
R229	Same as R12				
R230	Same as R12				
R231	Same as R3				
R232	Same as R27				
R233					
Thru	Same as R7				
R235					
R236	Same as R3				
R237					
Thru	Same as R27				
R240					
R241	Same as R1				
R242	Same as R45				
R243	Same as R50				
R244	Same as R27				
R245	Same as R1				
R246	Same as R27				
R247	Same as R27				
R248	Same as R1				
R249	Same as R27				
R250	Same as R76				
R251	Same as R9				
R252	Same as R9				
R253	Resistor, Film, 20kW ±10%, .5W	3	82PAR20K	73138	
R254	Same as R175				

REF DESIG PREFIX **A5A, A5B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R255	Same as R175				
R256	Same as R115				
R257	Same as R76				
R258	Same as R115				
R259	Same as R76				
R260	Same as R1				
R261	Same as R1				
R262	Same as R27				
R263	Same as R27				
R264	Same as R25				
R265	Same as R7				
R266	Same as R27				
R267	Same as R27				
R268	Same as R1				
R269	Same as R1				
R270	Same as R253				
R271	Resistor, Film, 50kW ±10%, .5W	1	82PAR50K	73138	
R272	Same as R253				
U1	Amplifier, RF	4	SL1611C/DP	53469	
U2	Same as U1				
U3	Mixer, Double Balanced	5	NE602AD	18324	
U4	Operational Amplifier, High Output, Low Noise	6	8633179S014U	14632	
U5	Integrated Circuit, FM IF	2	863357S016U	14632	
U6	Same as U3				
U7	Same as U1				
U8	Integrated Circuit, Switch, Quad, SPST	9	DG411DY	17856	
U9	Same as U1				
U10	Same as U8				
U11	Same as U3				
U12	Same as U4				
U13	Same as U5				
U14	Same as U3				
U15	Same as U4				
U16	Same as U8				
U17	Same as U4				
U18	Same as U4				
U19	Same as U8				
U20	Same as U8				
U21	Operational Amplifier, Quad, JFET Input	2	TL074CD	04713	
U22	Same as U8				
U23	Same as U8				

REF DESIG PREFIX **A5A, A5B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
U24	Same as U21				
U25	Same as U4				
U26	Same as U8				
U27	Same as U8				
U28	Integrated Circuit, Programmable Precision Reference	1	TL431CD	04713	
U29	Integrated Circuit, CMOS, 8-Bit Shift Registers	4	74HC595 SO16	04713	
U30 Thru U32	Same as U29				
U33	Integrated Circuit, Hex Inverter	1	74HC04 SO14	04713	
U34	Integrated Circuit, CMOS,Frequency Synthensizer	1	NJ88C25MP18	53469	
U35	Operational Amplifier, Dual, JFET Input	5	TL072CD	04713	
U36	Integrated Circuit, 520 MHz, Divide by 80/81	2	SP8719/MP	53469	
U37	Same as U36				
U38	Integrated Circuit, Dual 4-Bit Counters	2	8674HC390SO16U	14632	
U39	Same as U35				
U40	Integrated Circuit, Quad 2-Input NAND Gate	1	74HC00 SO14	1Z447	
U41	Same as U38				
U42	Same as U3				
U43	Voltage Regulator, +5V, 1A	1	LM79L05ACM	27014	
U44	Integrated Circuit, Voltage Regulator, +5V, .1A ±3.8%	1	LM2931AD-5	04713	
U45 Thru U47	Same as U35				
W1	Cable Assembly	1	17300-485-7	14632	

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

5.6.4 TYPE 796861-X INPUT CONVERTER PC ASSEMBLY REF DESIG PREFIX **A6A, A6B**

	Revision P1				
C1	Capacitor, Ceramic, .01?F +10%, 50V	60	841250-19	14632	
C2	Same as C1				
C3	Capacitor, Tantalum, 33?F +20%, 16V	2	841293-22	14632	
C4	Same as C1				
C5	Same as C1				
C6	Capacitor, Tantalum, 3.3?F +20%, 16V	18	841293-10	14632	
C7	Same as C1				
C8	Same as C3				
C9	Not Used				
C10	Same as C6				
C11	Same as C6				
C12 Thru C15	Same as C1				
C16	Same as C6				
C17	Same as C1				
C18	Same as C6				
C19	Same as C6				
C20 Thru C22	Same as C1				
C23	Same as C6				
C24	Same as C1				
C25	Same as C1				
C26	Capacitor, Ceramic, 10pF +5%, 50V	2	841250-01	14632	
C27	Same as C26				
C28 Thru C36	Same as C1				
C37	Same as C6				
C38 Thru C48	Same as C1				
C49	Capacitor, Ceramic, 1500pF +10%, 50V	1	841250-14	14632	
C50	Capacitor, Ceramic, 3300pF ±10%, 50V	2	841250-16	14632	
C51	Same as C1				
C52	Same as C1				
C53	Not Used				
C54	Same as C6				
C55	Same as C1				
C56	Capacitor, Ceramic, 33pF +5%, 50V	9	841250-04	14632	

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

REF DESIG PREFIX **A6A, A6B**

C57 Thru C59	Same as C56				
C60 Thru C63	Same as C1				
C64	Capacitor, Ceramic, 150pF +5%, 50V	1	841250-08	14632	
C65	Same as C1				
C66	Same as C1				
C67	Same as C6				
C68 Thru C70	Same as C1				
C71	Not Used				
C72	Capacitor, Ceramic, 15pF +2%, 50V	1	841314-029	14632	
C73	Capacitor, Ceramic, 22pF +5%, 50V	2	841250-03	14632	
C74	Same as C1				
C75	Same as C6				
C76	Same as C1				
C77	Capacitor, Ceramic, 1000pF +5%, 50V	3	841250-13	14632	
C78	Same as C1				
C79	Same as C1				
C80	Same as C77				
C81	Capacitor, Ceramic, .1?F +10%, 50V	34	841250-25	14632	
C82	Capacitor, Ceramic, 2200pF +10%, 50V	1	841250-15	14632	
C83 Thru C85	Same as C81				
C86	Same as C6				
C87 Thru C95	Same as C81				
C96 Thru C98	Same as C56				
C99	Same as C6				
C100	Capacitor, Tantalum, .33?F +20%, 35V	3	841293-01	14632	
C101	Same as C100				
C102	Same as C100				
C103 Thru C112	Same as C81				
C113	See Table 5-2				
C114	Same as C56				

REF DESIG PREFIX **A6A, A6B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C115 Thru C118	See Table 5-2				
C119	Same as C56				
C120 Thru C130	See Table 5-2				
C131	Not Used				
C132	Same as C81				
C133	Same as C81				
C134	Same as C6				
C135	Same as C1				
C136 Thru C138	Same as C81				
C139	Same as C6				
C140	Same as C6				
C141	Same as C1				
C142	Same as C81				
C143	Same as C81				
C144	See Table 5-2				
C145	See Table 5-2				
C146	Same as C6				
C147 Thru C149	Same as C81				
C150	Same as C1				
C151	Capacitor, Ceramic, 270pF +2%, 50V	1	841314-059	14632	
C152	Same as C1				
C153	Same as C1				
C154	Same as C50				
C155	Same as C1				
C156	Same as C1				
C157	Capacitor, Ceramic, 39pF +2%, 50V	3	841314-039	14632	
C158	Not Used				
C159	Capacitor, Ceramic, 120pF +2%, 50V	1	841314-051	14632	
C160	Not Used				
C161	Same as C157				
C162	Capacitor, Ceramic, 82pF +2%, 50V	1	841314-047	14632	
C163 Thru C167	Not Used				
C168	Same as C157				
C169	Same as C1				

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

REF DESIG PREFIX **A6A, A6B**

C170	Same as C77				
C171	Capacitor, Tantalum, 10?F +20%, 35V	1	841293-17	14632	
C172	Same as C81				
C173	Same as C1				
C174	Capacitor, Ceramic, 47pF +5%, 50V	1	841415-005	14632	
C175	Same as C6				
CR1	Diode, Dual Switching Pin	8	MMBD7000LT1	04713	
CR2	Same as CR1				
CR3	Diode, Pin, 250MW, 1A	7	HSMP-3800-T31	28480	
CR4	Same as CR3				
CR5	Same as CR1				
CR6 Thru CR9	Same as CR3				
CR10	Not Used				
CR11 Thru CR14	Same as CR1				
CR15	Same as CR3				
CR16	Same as CR1				
DS1	Not Used				
DS2	LED, Red	1	HLMP-7000-021	28480	
E1	Not Used				
E2	Connector, Receptacle, SMB, for RG-178 Cable	1	8145-7521-005	19505	
FB1	Ferrite Bead, 31? +25%@100MHz, 400mA	7	LCB1210/A	0EXD1	
FB2 Thru FB5	Same as FB1				
FB6	Not Used				
FB7	Same as FB1				
FB8	Same as FB1				
FL1 Thru FL8	See Table 5-2				
J1	Not Used				
J2	Connector, Jack, SMB	4	R113-665	0GP12	
J3 Thru J5	Same as J2				
J6	Connector, Receptacle, SMB	1	2010-1511-000	19505	
L1	Inductor, 4700nH +5%, Qmin35@7.9MHz	10	841438-065	14632	
L2	Same as L1				
L3	Inductor, 47nH +5%, Qmin-50@100MHz	3	841438-017	14632	

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

REF DESIG PREFIX **A6A, A6B**

L4 Thru L8	Same as L1				
L9	Same as L3				
L10	Same as L1				
L11	Inductor, 3300nH +5%, Qmin-35@7.9MHz	1	841438-061	14632	
L12	Inductor, 1500nH +5%, Qmin-35@7.9MHz	1	841438-053	14632	
L13	Inductor, 100nH +5%, Qmin-50@25MHz	1	841438-025	14632	
L14	Same as L3				
L15	Inductor, 10KnH +5%, Qmin-35@7.9MHz	1	841438-073	14632	
L16	Inductor, 47KnH +5%	1	841438-089	14632	
L17	Inductor, 470?H +5%, Qmin-40@.79MHz	9	841444-065	14632	
L18 Thru L25	Same as L17				
L26	Inductor, 47?H +5%, Qmin-50@2.5MHz	1	841444-041	14632	
L27	Inductor, 3900nH +5%, Qmin-35@7.9MHz	2	841438-063	14632	
L28	Same as L27				
L29	Same as L1				
L30	Inductor, 270nH +5%, Qmin-50@25MHz	2	841438-035	14632	
L31	Same as L30				
L32	Inductor, 22nH +5%, Qmin-50@100MHz	3	841438-009	14632	
L33	Same as L32				
L34	Same as L32				
L35	Same as L1				
L36	Inductor, 820?H +5%, Qmin-30@.79MHz	2	841444-071	14632	
L37	Same as L36				
P1	Connector, Plug, 36 Position, .10 Centers	1	66527-018	22526	
Q1	Transistor	7	MMBT2907ALT1	04713	
Q2	Transistor	5	MRF5812	04713	
Q3	Not Used				
Q4	Not Used				
Q5	Same as Q1				
Q6	Same as Q2				
Q7	Same as Q1				
Q8	Transistor	1	MRF3866	04713	
Q9	Same as Q1				
Q10	Transistor	5	MMBT2222ALT1	04713	
Q11	Same as Q2				
Q12	Same as Q1				
Q13	Same as Q2				
Q14	Same as Q10				

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

REF DESIG PREFIX **A6A, A6B**

Q15	Same as Q10				
Q16	Same as Q1				
Q17	Same as Q1				
Q18	Same as Q2				
Q19	Same as Q10				
Q20	Same as Q10				
R1	Resistor, Fixed, 3.9k? +5%, .125W.	3	841296-079	14632	
R2	Resistor, Fixed, 33k? +5%, .125W.	5	841296-101	14632	
R3	Resistor, Fixed, 680? +5% .125W.	5	841296-061	14632	
R4	Same as R3				
R5	Resistor, Fixed, 10.0? +5%, .125W.	23	841296-017	14632	
R6 Thru R10	Same as R5				
R11	Resistor, Fixed, 47k? +5%, .125W.	5	841296-105	14632	
R12	Same as R11				
R13	Resistor, Fixed, 300? +5%, .125W.	2	841296-052	14632	
R14	Same as R5				
R15	Resistor, Fixed, 2.7k? +5%, .125W.	1	841296-075	14632	
R16	Same as R1				
R17	Resistor, Fixed, 47.0? +5%, .125W.	27	841296-033	14632	
R18	Resistor, Fixed, 18.0? +5%, .125W.	1	841296-023	14632	
R19	Same as R13				
R20	Resistor, Fixed, 100? +5%, .125W.	19	841296-041	14632	
R21	Same as R20				
R22	Resistor, Fixed, 22.0? +5%, .125W.	4	841296-025	14632	
R23	Resistor, Fixed, 4.7? +5%, .125W.	2	841296-009	14632	
R24	Same as R3				
R25	Not Used				
R26	Not Used				
R27	Resistor, Fixed, less than .05?, 2Amax	1	841341	14632	
R28	Resistor, Fixed, 4.7k? +5%, .125W.	8	841296-081	14632	
R29	Same as R28				
R30	Same as R2				
R31	Resistor, Fixed, 1.0kΩ ±5%, .125W.	10	841296-065	14632	
R32	Resistor, Fixed, 390? +5%, .125W.	3	841296-055	14632	
R33	Not Used				
R34	Same as R22				
R35	Same as R5				
R36	Same as R5				
R37	Same as R17				
R38	Resistor, Fixed, 2.2k? +5%, .125W.	7	841296-073	14632	

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

REF DESIG PREFIX **A6A, A6B**

R39	Same as R20				
R40	Same as R38				
R41	Same as R17				
R42	Same as R20				
R43	Same as R20				
R44	Same as R2				
R45	Same as R28				
R46	Same as R2				
R47	Same as R31				
R48	Same as R32				
R49	Same as R20				
R50	Resistor, Fixed, 33.0? +5%, .125W	5	841296-029	14632	
R51	Same as R5				
R52	Resistor, Fixed, 10k? +5%, .125W.	5	841296-089	14632	
R53	Same as R17				
R54	Same as R38				
R55	Same as R20				
R56	Same as R38				
R57	Same as R17				
R58	Same as R20				
R59	Same as R20				
R60	Same as R17				
R61	Same as R38				
R62	Same as R38				
R63	Same as R17				
R64	Same as R17				
R66	Same as R31				
R67	Same as R3				
R68	Resistor, Fixed, 470? +5%, .125W.	3	841296-057	14632	
R69	Same as R68				
R70	Not Used				
R71	Same as R1				
R72	Resistor, Fixed, 220? +5%, .125W.	2	841296-049	14632	
R73	Not Used				
R74	Same as R20				
R75	Same as R20				
R76	Same as R2				
R77	Same as R5				
R78	Same as R3				
R79	Same as R22				
R80	Same as R5				

REF DESIG PREFIX **A6A, A6B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R81	Same as R50				
R82	Resistor, Fixed, 2.2Ω ±5%, .125W.	1	841296-001	14632	
R83	Same as R31				
R84	Same as R5				
R85	Same as R17				
R86	Same as R5				
R87	Same as R5				
R88	Same as R11				
R89	Same as R11				
R90	Same as R28				
R91	Same as R5				
R92	Same as R23				
R93	Resistor, Fixed, 330Ω ±5%, .125W.	1	841296-053	14632	
R94	Same as R38				
R95	Same as R28				
R96	Same as R20				
R97 Thru R102	Not Used				
R103	Same as R17				
R104	Same as R17				
R105	Same as R11				
R106	Same as R28				
R107	Same as R52				
R108	Same as R31				
R109	Resistor, Fixed, 68kΩ ±5%, .125W.	1	841296-109	14632	
R110	Same as R28				
R111	Same as R68				
R112	Same as R28				
R113	Resistor, Fixed, 27kΩ ±5%, .125 W.	1	841296-099	14632	
R114	Same as R31				
R115	Same as R32				
R116	Same as R17				
R117	Same as R22				
R118	Same as R5				
R119	Same as R5				
R120	Same as R17				
R121	Same as R20				
R122	Same as R5				
R123	Same as R17				
R124	Same as R5				
R125	Same as R31				

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

REF DESIG PREFIX **A6A, A6B**

R126	Resistor, Fixed, 12kΩ ±5%, .125W.	2	841296-091	14632	
R127	Resistor, Fixed, 1.8kΩ ±5%, .125W.	2	841296-071	14632	
R128	Same as R17				
R129	Same as R20				
R130	Not Used				
R131	Same as R17				
R132	Same as R5				
R133	Same as R31				
R134	Same as R126				
R135	Same as R127				
R136 Thru R138	Same as R50				
R139	Same as R5				
R140 Thru R145	Same as R17				
R146 Thru R152	Not Used				
R153	Same as R31				
R154	Same as R5				
R155 Thru R157	Same as R20				
R158	Not Used				
R159	Same as R20				
R160	Same as R17				
R161	Same as R20				
R162	Same as R72				
R163 Thru R167	See **Table 5-2**				
R168 Thru R171	Same as R17				
R172	Same as R31				
R173 Thru R175	Same as R52				
T1	Transformer, Broadband	1	282561-1	14632	
T2	Transformer, Broadband	1	282561-2	14632	
T3	Transformaer, Broadband	1	282561-3	14632	
U1	Mixer, Balanced	1	SI8901Y	17856	
U2	Integrated Circuit, Programmable Precision Reference	1	Tl431CD	04713	

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

REF DESIG PREFIX **A6A, A6B**

U3	Not Used				
U4	Amplifier, 3.6GHz, 8.3dB Gain@1.0GHz	1	MSA-0486-TR1	24539	
U5	Amplifier, RF, 3-125MHz, 16.3dB Gain	1	QBH-118	55027	
U6	Amplifier, 4.5GHz, 6dB@1GHz	1	MSA-0186	24539	
U7	Integrated Circuit, Dual 4-Bit Decade/Binary Counters	1	8674HC390SO16U	14632	
U8	Integrated Circuit, CMOS, 2-Input Exclusive OR Gate	1	74HC86 SO14	04713	
U9	Divider, Power, 4 Way, 100 kHz-200 MHz	1	PSC-4-1	15542	
U10	Integrated Circuit, Switch, Quad SPST	5	DG412DY	17856	
U11 Thru U13	Same as U10				
U14	Integrated Circuit, 100MHz	2	SL1611C/DP	53469	
U15	Same as U14				
U16	Integrated Circuit, CMOS, 8-Bit Shift Register, 3 State	3	74HC595 SO16	04713	
U17	Same as U16				
U18	Same as U16				
U19	Integrated Circuit, Switch, Quad 4 Section SPST	2	DG411DY	17856	
U20	Same as U19				
U21	Same as U10				
U22	Coupler, Directional, 0.5-500, 11.5dBm, 50Ω	1	PDC-10-1	15542	
U23	Mixer, Double Balanced, and Oscillator, 5dB@45MHz	2	NE602AD	18324	
U24	Same as U23				
U25	Mixer, Double Balanced, 50kHz-300MHz, 50Ω,	1	TAK-3H	15542	
U26	Integrated Circuit, Quad 8-Bit D/A Converter	1	867226D120	14632	
W1	Cable Assembly	1	17300-485-8	14632	

Table 5-2. Component Values for Selected IF Bandwidths

REF DESIG	FILTER BANDWIDTH SET							
	796861-1/-9* WJ-8700/XBW1	796861-2/-10* WJ-8700/XBW2	796861-3 WJ-8700/XBW3	796861-4 WJ-8700/XBW4	796861-5 WJ-8700/XBW5	796861-6 WJ-8700/XBW6	796861-7 (WJ-8700/XBW7)	796861-8 (WJ-8700/XBW8)
C113	360pF ±2%, 50V 841314-062 14632	Not Used	470pF ±5%, 50V 841250-11 14632	470pF ±5%, 50V 841250-11 14632	470pF ±5%, 50V 841250-11 14632	470pF ±5%, 50V 841250-11 14632	470pF ±5%, 50V 841250-11 14632	360pF ±2%, 50V841314-062 14632
C115	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	Not Used	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632
C116	360pF ±2%, 50V 841314-062 14632	470pF ±5%, 50V 841250-11 14632	470pF ±5%, 50V 841250-11 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632
C117	360pF ±2%, 50V 841314-062 14632	Not Used	Not Used	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632
C118	360pF ±2%, 50V 841314-062 14632	30pF ±2%, 50V 841314-036 14632	330pF ±2%, 50V 841250-10 14632	330pF ±2%, 50V 841250-10 14632	330pF ±2%, 50V 841250-10 14632	360pF ±2%, 50V 841314-062 14632	330pF ±2%, 50V 841250-10 14632	360pF ±2%, 50V 841314-062 14632
C120	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	30pF ±2%, 50V 841314-036 14632	30pF ±2%, 50V 841314-062 14632	330pF ±2%, 50V 841314-062 14632	330pF ±2%, 50V 841250-10 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632
C121	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	30pF ±2%, 50V 841314-036 14632	360pF ±2%, 50V 841314-062 14632	30pF ±2%, 50V 841314-036 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632
C122	360pF ±2%, 50V 841314-062 14632	330pF ±2%, 50V 841250-10 14632	330pF ±2%, 50V 841250-10 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632
C123	330pF ±5%, 50V 841250-10 14632	30pF ±2%, 50V 841314-036 14632	30pF ±2%, 50V 841314-036 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632
C124	Not Used	Not Used	330pF ±2%, 50V 841250-10 14632	330pF ±2%, 50V 841250-10 14632	330pF ±2%, 50V 841250-10 14632	330pF ±2%, 50V 841250-10 14632	360pF ±2%, 50V 841250-10 14632	Not Used
C125	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±2%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF 52%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±2%, 50V 841250-05 14632

Table 5-2. Component Values for Selected IF Bandwidths (Continued)

REF DESIG	FILTER BANDWIDTH SET							
	796861-1/-9* WJ-8700/XBW1	796861-2/-10* WJ-8700/XBW2	796861-3 WJ-8700/XBW3	796861-4 WJ-8700/XBW4	796861-5 WJ-8700/XBW5	796861-6 WJ-8700/XBW6	796861-7 (WJ-8700/XBW7)	796861-8 (WJ-8700/XBW8)
C126	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632
C127	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632
C128	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632
C129	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632
C130	Not Used	Not Used	330pF ±2%, 50V 841250-10 14632	330pF ±2%, 50V 841250-10 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	47pF ±5%, 50V 841250-05 14632	Not Used
C144	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	Not Used	Not Used	Not Used	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632	360pF ±2%, 50V 841314-062 14632
C145	Not Used	Not Used	470pF ±5%, 50V 841250-11 14632	470pF ±5%, 50V 841250-11 14632	470pF ±5%, 50V 841250-11 14632	470pF ±5%, 50V 841250-11 14632	470pF ±5%, 50V 841250-11 14632	Not Used
FL1	40.455MHz 92572 14632	40.455MHz 92572 14632	40.455MHz 92572 14632	40.455MHz 92572 14632	40.455MHz 92572 14632	40.455MHz 92572 14632	40.455MHz 92572 14632	40.455MHz 92572 14632
FL2	40.455MHz,16kHzB W 92633 14632	40.455MHz,16kHzB W 92633 14632	40.455MHz,16kHzB W 92633 14632	40.455MHz,8kHzBW 92608 14632	40.455MHz,8kHzBW 92608 14632	40.455MHz 92605 14632	40.455MHz 92605 14632	40.455MHz,8kHzBW 92608 14632
FL3	455kHz,500HzBW 526-8610-010 2X491	455kHz,250HzBW 526-8610-010 2X491	455kHz,2900HzBW 526-8610-010 2X491	455kHz,2900HzBW 526-8610-010 2X491	455kHz,500HzBW 526-8610-010 2X491	455kHz,2900HzBW 526-8610-010 2X491	455kHz,2900HzBW 526-8610-010 2X491	455kHz,500HzBW 526-8610-010 2X491
FL4	455kHz,1000HzBW 526-8611-010 2X491	455kHz,500HzBW 526-8610-020 2X491	455kHz,250HzBW 526-8587-010 2X491	455kHz,100HzBW 526-8611-010 2X491	455kHz,250HzBW 526-8610-010 2X491	455kHz,500HzBW 526-8610-020 2X491	455kHz,1000HzBW 526-8611-020 2X491	455kHz,1000HzBW 526-8611-020 2X491

Table 5-2. Component Values for Selected IF Bandwidths (Continued)

REF DESIG	FILTER BANDWIDTH SET							
	796861-1/-9* WJ-8700/XBW1	796861-2/-10* WJ-8700/XBW2	796861-3 WJ-8700/XBW3	796861-4 WJ-8700/XBW4	796861-5 WJ-8700/XBW5	796861-6 WJ-8700/XBW6	796861-7 WJ-8700/XBW7	796861-8 WJ-8700/XBW8
FL5	455 kHz, 2000Hz BW 526-8612-010 2X491	455 kHz, 3300Hz BW 526-8630-010 2X491	455kHz, 500Hz BW 526-8610-020 2X491	455kHz, 250Hz BW 526-8587-020 2X491	455kHz, 500Hz BW 526-8610-010 2X491	455kHz, 2000Hz BW 526-8612-010 2X491	455kHz, 4000Hz BW 526-8613-020 2X491	455kHz, 2000Hz BW 526-8612-020 2X491
FL6	455 kHz, 2000Hz BW 526-8613-010 2X491	455 kHz, 5500Hz BW 526-8590-010 2X491	455kHz, 5500Hz BW 526-8590-010 2X491	455kHz, 500Hz BW 526-8610-020 2X491	455kHz, 2000Hz BW 526-8612-020 2X491	455kHz, 4000Hz BW 526-8613-020 2X491	455kHz, 8000Hz BW 526-8614-010 2X491	455kHz, 3300Hz BW 526-8630-010 2X491
FL7	455 kHz, 8000Hz BW 526-8614-010 2X491	455 kHz, 12 kHz BW 526-8591-010 2X491	455 kHz, 12 kHz BW 526-8591-010 2X491	455kHz, 1000Hz BW 526-8611-020 2X491	455kHz, 4000Hz BW 526-8613-020 2X491	455kHz, 8000Hz BW 526-8614-010 2X491	455kHz, 16kHz BW 526-8639-010 2X491	455kHz, 4000Hz BW 526-8613-020 2X491
FL8	Not Used	Not Used	455kHz, 2900Hz BW 526-8588-010 2X491	455kHz, 2900Hz BW 526-8588-010 2X491	455kHz, 2900Hz BW 526-8588-010 2X491	455kHz, 2900Hz BW 526-8588-010 2X491	455kHz, 2900Hz BW 526-8588-010 2X491	Not Used
R146	2.2kΩ ±5%, .125W 841296-073 14632	1.5kΩ ±5%, .125W 841296-065 14632	3.3kΩ ±5%, .125W 841296-077 14632	3.3kΩ ±5%, .125W 841296-077 14632	3.3kΩ ±5%, .125W 841296-077 14632	3.3kΩ ±5%, .125W 841296-077 14632	3.3kΩ ±5%, .125W 841296-077 14632	2.2kΩ ±5%, .125W 841296-073 14632
R147	2.2kΩ ±5%, .125W 841296-073 14632	2.5kΩ ±5%, .125W 841296-073 14632	1.0kΩ ±5%, .125W 841296-065 14632	1.0kΩ ±5%, .125W 841296-065 14632	1.0kΩ ±5%, .125W 841296-065 14632	2.2kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632
R148	2.2kΩ ±5%, .125W 841296-073 14632	2.5kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632	1.0kΩ ±5%, .125W 841296-065 14632	2.2kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632
R149	2.2kΩ ±5%, .125W 841296-073 14632	3.5kΩ ±5%, .125W 841296-077 14632	3.3kΩ ±5%, .125W 841296-077 14632	2.2kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632
R150	2.2kΩ ±5%, .125W 841296-073 14632	1.5kΩ ±5%, .125W 841296-069 14632	1.5kΩ ±5%, .125W 841296-069 14632	2.2kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632	2.2kΩ ±5%, .125W 841296-073 14632	1.0kΩ ±5%, .125W 841296-065 14632	2.2kΩ ±5%, .125W 841296-073 14632
R151	Not Used	Not Used	3.3kΩ ±5%, .125W 841296-077 14632	3.3kΩ ±5%, .125W 841296-077 14632	3.3kΩ ±5%, .125W 841296-077 14632	3.3kΩ ±5%, .125W 841296-077 14632	3.3kΩ ±5%, .125W 841296-077 14632	Not Used
R152	Not Used	10.0Ω ±5%, .125W 841296-017 14632	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used

Table 5-2. Component Values for Selected IF Bandwidths (Continued)

REF DESIG	FILTER BANDWIDTH SET							
	796861-1/-9* WJ-8700/XBW1	796861 -2/-10* WJ-8700/XBW2	796861-3 WJ-8700/XBW3	796861-4 WJ-8700/XBW4	796861-5 WJ-8700/XBW5	796861 -6 WJ-8700/XBW6	796861-7 (WJ-8700/XBW7)	796861-8 (WJ-8700/XBW8)
R163	Not Used	Not Used	10.0Ω ±5%, .125W 841296-017 14632	10.0Ω ±5%, .125W 841296-017 14632	10.0Ω ±5%, .125W 841296 -017 14632	Not Used	Not Used	Not Used
R164	Not Used	Not Used	Not Used	10.0Ω ±5%, .125W 841296-017 14632	Not Used	Not Used	Not Used	Not Used
R165	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
R166	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
R167	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used

5.6.5 TYPE 796862-1 SYNTHESIZER PC ASSEMBLY REF DESIG PREFIX **A7A, A7B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision M1				
C1	Capacitor, Ceramic, .047µF ±10%, 50V	66	841415-023	14632	
C2	Capacitor, Ceramic, 4.7pF ±.1pF, 50V	5	841416-017	14632	
C3	Capacitor, Ceramic, 1.8pF ±.1pF, 50V	1	841416-007	14632	
C4	Same as C1				
C5	Capacitor, Ceramic, .01µF ±10%, 50V	45	841415-019	14632	
C6	Same as C1				
C7	Same as C2				
C8	Same as C1				
C9	Capacitor, Ceramic, 4700pF ±10%, 50V	1	841415-017	14632	
C10	Capacitor, Tantalum, 2.2µF ±20%, 6.3V	5	841293-08	14632	
C11	Capacitor, Ceramic, 15pF ±2%, 50V	1	841416-029	14632	
C12	Capacitor, Ceramic, 10pF ±2%, 50V	9	841416-025	14632	
C13	Same as C5				
C14	Same as C1				
C15	Capacitor, Ceramic, 3300pF ±10%, 50V	2	841415-016	14632	
C16	Capacitor, Ceramic, 18pF ±2%, 50V	1	841416-031	14632	
C17	Same as C1				
C18	Same as C5				
C19	Capacitor, Ceramic, 330pF ±5%, 50V	6	841415-010	14632	
C20	Same as C1				
C21	Same as C5				
C22	Capacitor, Ceramic, 220pF ±5%, 50V	5	841415-009	14632	
C23	Same as C1				
C24	Same as C22				
C25	Same as C5				
C26	Same as C12				
C27	Same as C1				
C28	Same as C1				
C29	Capacitor, Ceramic, 100pF ±5%, 50V	27	841415-007	14632	
C30	Same as C5				
C31	Same as C10				
C32	Same as C12				
C33	Capacitor, Tantalum, 15µF ±20%, 10V	5	841293-18	14632	
C34	Capacitor, Ceramic, 1500pF ±10%, 50V	2	841415-014	14632	
C35	Same as C1				
C36	Same as C34				
C37	Capacitor, Ceramic, 33pF ±5%, 50V	2	841415-004	14632	
C38	Capacitor, Ceramic, 2200pF ±10%, 50V	4	841415-015	14632	
C39	Same as C5				
C40	Capacitor, Ceramic, .22µF ±10%, 25V	2	VJ1206Y224KXXMT	95275	

REF DESIG PREFIX **A7A, A7B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C41	Same as C2				
C42	Capacitor, Ceramic, .022µF ±10%, 50V	3	841415-021	14632	
C43	Same as C5				
C44	Capacitor, Ceramic, 22pF ±2%, 50V	4	841416-033	14632	
C45	Same as C38				
C46	Same as C40				
C47	Same as C10				
C48	Same as C10				
C49	Same as C5				
C50	Same as C42				
C51	Capacitor, Tantalum, 4.7µF ±20%, 25V	3	841293-13	14632	
C52	Capacitor, Tantalum, 1.0µF ±20%, 16V	9	841293-04	14632	
C53	Same as C29				
C54	Same as C12				
C55	Capacitor, Ceramic, 4.3pF ±.1pF, 50V	1	841416-016	14632	
C56	Capacitor, Tantalum, 6.8µF ±20%, 6.3V	5	841293-14	14632	
C57	Same as C1				
C58	Same as C22				
C59	Capacitor, Ceramic, 47pF ±2%, 50V	6	841416-041	14632	
C60	Same as C5				
C61	Same as C56				
C62	Capacitor, Ceramic, Monolithic, 22pF ±10%, 100V	1	100-100-N3300-220K	51642	
C63	Same as C56				
C64	Same as C37				
C65	Same as C5				
C66	Same as C44				
C67	Same as C19				
C68 Thru C70	Same as C5				
C71	Same as C1				
C72	Same as C12				
C73	Same as C56				
C74	Same as C5				
C75 Thru C77	Same as C52				
C78	Capacitor, Ceramic, 100pF ±2%, 50V	3	841416-049	14632	
C79	Capacitor, Ceramic, 470pF ±5%, 50V	13	841415-011	14632	
C80	Same as C44				
C81	Same as C79				
C82	Same as C19				
C83	Same as C22				

REF DESIG PREFIX **A7A, A7B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C84	Capacitor, Tantalum, .47µF ±20%, 25V	6	841293-02	14632	
C85	Same as C5				
C86	Same as C1				
C87	Same as C1				
C88	Same as C52				
C89	Same as C1				
C90	Same as C84				
C91	Same as C5				
C92	Same as C42				
C93	Same as C33				
C94	Same as C1				
C95	Same as C1				
C96	Capacitor, Tantalum, 22µF ±20%, 6.3V	3	841293-20	14632	
C97	Same as C5				
C98	Same as C1				
C99	Same as C5				
C100	Same as C1				
C101	Same as C38				
C102	Capacitor, Tantalum, 3.3µF ±20%, 16V	2	841293-10	14632	
C103	Same as C1				
C104	Capacitor, Ceramic, 2.2pF ±.1pF, 50V	1	841416-009	14632	
C105	Same as C5				
C106	Capacitor, Ceramic, 5.6pF ±.25pF, 50V	1	841416-019	14632	
C107	Same as C1				
C108	Capacitor, Ceramic, 3.3pF ±.1pF, 50V	2	841416-013	14632	
C109	Same as C1				
C110	Same as C12				
C111	Same as C5				
C112	Same as C5				
C113	Same as C1				
C114	Same as C29				
C115	Capacitor, Ceramic, 39pF ±2%, 50V	1	841416-039	14632	
C116	Same as C1				
C117	Same as C29				
C118	Same as C29				
C119	Capacitor, Tantalum, 68µF ±20%, 6.3V	10	841293-24	14632	
C120	Same as C12				
C121	Same as C1				
C122	Same as C1				
C123	Capacitor, Ceramic, 1000pF ±10%, 50V	5	841415-013	14632	
C124	Same as C5				

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

REF DESIG PREFIX **A7A, A7B**

C125	Same as C1				
C126	Same as C5				
C127	Same as C1				
C128	Same as C29				
C129	Same as C1				
C130	Same as C5				
C131	Same as C1				
C132	Same as C123				
C133	Same as C119				
C134	Same as C59				
C135	Same as C1				
C136	Same as C5				
C137	Same as C29				
C138	Capacitor, Tantalum, 15µF ±20%, 25V	7	841293-19	14632	
C139	Same as C56				
C140	Same as C33				
C141	Same as C52				
C142	Same as C38				
C143	Same as C5				
C144	Same as C52				
C145	Same as C52				
C146	Same as C1				
C147	Same as C79				
C148	Same as C52				
C149	Capacitor, Tantalum, 2.2µF ±20%, 20V	3	841293-09	14632	
C150	Same as C15				
C151	Same as C5				
C152	Capacitor, Ceramic, 56pF ±2%, 50V	2	841416-043	14632	
C153	Same as C152				
C154	Same as C79				
C155	Capacitor, Ceramic, 6.8pF ±.25pF, 50V	1	841416-021	14632	
C156	Same as C19				
C157	Same as C149				
C158	Capacitor, Ceramic, Monolithic, 27pF ±10%, 100V	1	100-100-N3300-270K	51642	
C159	Same as C5				
C160	Same as C123				
C161	Same as C59				
C162	Same as C19				
C163 Thru C166	Same as C1				

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

REF DESIG PREFIX **A7A, A7B**

C167	Same as C5
C168	Same as C59
C169	Same as C1
C170	Same as C5
C171 Thru C173	Same as C1
C174	Same as C5
C175	Same as C1
C176	Same as C1
C177 Thru C179	Same as C5
C180	Same as C123
C181	Same as C84
C182	Same as C44
C183	Same as C5
C184	Same as C1
C185	Same as C5
C186	Same as C5
C187	Same as C84
C188	Same as C5
C189	Same as C5
C190	Same as C96
C191	Same as C29
C192	Same as C96
C193	Same as C29
C194	Same as C29
C195	Same as C84
C196	Same as C79
C197 Thru C200	Same as C1
C201	Same as C5
C202	Same as C1
C203	Same as C1
C204	Same as C12
C205	Same as C2
C206	Same as C1
C207	Same as C5
C208	Same as C79
C209	Same as C29
C210	Same as C59

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

REF DESIG PREFIX **A7A, A7B**

C211	Same as C79				
C212 Thru C214	Same as C29				
C215	Same as C12				
C216	Same as C79				
C217	Same as C119				
C218	Same as C1				
C219	Same as C10				
C220	Same as C1				
C221	Same as C1				
C222 Thru C224	Same as C29				
C225	Same as C1				
C226	Same as C1				
C227	Same as C29				
C228	Same as C79				
C229	Same as C1				
C230	Same as C1				
C231	Same as C102				
C232	Same as C1				
C233	Same as C1				
C234	Same as C79				
C235	Same as C79				
C236	Same as C1				
C237	Capacitor, Ceramic, Monolithic, 33pF $\pm$10%, 100V	1	100-100-N1500-330K	51642	
C238	Same as C52				
C239	Same as C5				
C240	Same as C79				
C241	Same as C149				
C242 Thru C244	Same as C29				
C245	Same as C59				
C246	Same as C1				
C247	Same as C108				
C248	Same as C1				
C249	Same as C123				
C250	Capacitor, Ceramic, 33pF $\pm$2%, 50V	1	841416-037	14632	
C251	Same as C2				
C252	Same as C19				
C253	Same as C78				

REF DESIG PREFIX **A7A, A7B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C254	Capacitor, Ceramic, 33pF	1	GRM40-T2H330J050BD	72982	
C255	Same as C1				
C256	Same as C5				
C257	Same as C1				
C258	Same as C1				
C259	Same as C5				
C260	Same as C29				
C261	Same as C79				
C262 Thru C266	Same as C29				
C267	Same as C138				
C268	Same as C33				
C269	Same as C138				
C270	Same as C138				
C271	Same as C51				
C272	Same as C119				
C273	Same as C138				
C274	Same as C84				
C275	Same as C51				
C276	Same as C138				
C277	Same as C33				
C278	Same as C138				
C279 Thru C283	Same as C119				
C284	Same as C78				
C285	Same as C119				
CR1	Diode, Tuning Varactor	4	KV31S1	50101	
CR2	Diode, Dual Switching, Pin	5	MMBD7000LT1	04713	
CR3	Diode, Tunuing Varactor	11	KV38S2	50101	
CR4	Same as CR3				
CR5	Same as CR2				
CR6	Same as CR1				
CR7	Same as CR1				
CR8	Diode, Schottky, 250mW	1	HSMS-2802T31	28480	
CR9 Thru CR14	Same as CR3				
CR15	Same as CR1				
CR16 Thru CR18	Same as CR3				

REF DESIG PREFIX **A7A, A7B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
CR19 Thru CR21	Same as CR2				
DS1	LED, Red, Low Current	3	HLMP-7000-021	28480	
DS2	Same as DS1				
DS3	Same as DS1				
E1	Connector, Receptacle, SMB, for RG-178 Cable	2	8145-7521-005	19505	
E2	Same as E1				
FB1	Ferrite Bead, 52Ω ±25%@100MHz, 300mA	15	CB30-322513T	54583	
FB2 Thru FB11	Same as FB1				
FB12	Ferrite Bead, 31Ω ±25%@100MHz, 400mA	6	LCB1210/A	0EXD1	
FB13	Same as FB12				
FB14	Same as FB1				
FB15	Same as FB12				
FB16	Same as FB12				
FB17	Same as FB1				
FB18	Same as FB12				
FB19	Same as FB12				
FB20	Same as FB1				
FB21	Same as FB1				
L1	Inductor, 4.7µH ±20%, Qmin-25@7.96MHz	21	B82422-A1472-M	25088	
L2	Inductor, 47µH ±20%, Qmin-25@2.52MHz	1	B82422-A1473-M	25088	
L3	Not Used				
L4	Inductor, 8.2µH ±5%, Qmin-50@7.9MHz	1	841444-023	14632	
L5	Inductor, 22µH ±5%, Qmin-50@2.5MHz	1	841444-033	14632	
L6	Same as L1				
L7	Inductor,	1	20681-320		
L8	Inductor, 33nH ±5%, Qmin-50@100MHz	3	841438-013	14632	
L9	Inductor, 120nH ±5%, Qmin-50@25MHz	2	841438-027	14632	
L10	Same as L8				
L11 Thru L13	Same as L1				
L14	Inductor, 1000µH ±5%, Qmin-30@.25MHz	1	841444-073	14632	
L15	Inductor, 56nH ±5%, Qmin-50@100MHz	2	841438-019	14632	
L16	Same as L15				
L17	Same as L1				
L18	Inductor, 68nH ±5%, Qmin-50@100MHz	1	841438-021	14632	
L19	Same as L8				
L20 Thru L24	Same as L1				

REF DESIG PREFIX **A7A, A7B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
L25	Inductor, 1.5µH ±20%, Qmin-25@7.96MHz	5	B82422-A1152-M	25088	
L26 Thru L28	Same as L1				
L29	Inductor,	1	20681-321		
L30	Same as L25				
L31 Thru L35	Same as L1				
L36	Inductor, 180nH ±5%, Qmin-50@25MHz	2	841438-031	14632	
L37	Same as L36				
L38	Same as L1				
L39	Same as L25				
L40	Same as L25				
L41	Same as L1				
L42	Inductor,	1	20681-322		
L43	Same as L25				
L44	Same as L9				
P1	Connector, Plug, 36 Pin, .10 Centers	1	66527-018	22526	
Q1	Transistor	4	841381-2	14632	
Q2	Transistor	4	MMBR2857-LT1	04713	
Q3	Transistor	1	MMBT3960A	04713	
Q4	Transistor	3	MMBT-3906	04713	
Q5	Transistor	5	SST-310T1	17856	
Q6	Same as Q5				
Q7	Transistor	3	MMBT2222ALT1	04713	
Q8	Same as Q7				
Q9	Transistor	5	MMBT2907ALT1	04713	
Q10	Same as Q7				
Q11	Same as Q2				
Q12	Same as Q1				
Q13	Same as Q1				
Q14 Thru Q17	Same as Q9				
Q18	Same as Q2				
Q20	Same as Q5				
Q21	Same as Q5				
Q22	Same as Q2				
Q23	Same as Q4				
Q24	Same as Q1				
Q25	Same as Q4				
Q26	Same as Q5				

REF DESIG PREFIX **A7A, A7B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R1	Resistor, Fixed, 1.0kΩ ±5%, .1W	24	841414-073	14632	
R2	Same as R1				
R3	Resistor, Fixed, 1.5kΩ ±5%, .1W	8	841414-077	14632	
R4	Resistor, Fixed, 330Ω ±5%, .1W	7	841414-061	14632	
R5	Resistor, Fixed, 10Ω ±5%, .1W	39	841414-025	14632	
R6	Same as R1				
R7	Resistor, Fixed, 100kΩ ±5%, .1W	4	841414-121	14632	
R8	Resistor, Fixed, 2.2kΩ ±5%, .1W	9	841414-081	14632	
R9	Same as R1				
R10	Same as R8				
R11	Resistor, Fixed, 47Ω ±5%, .1W	27	841414-041	14632	
R12	Resistor, Fixed, 10kΩ ±5%, .1W	16	841414-097	14632	
R13	Same as R1				
R14	Resistor, Fixed, 22Ω ±5%, .1W	18	841414-033	14632	
R15	Resistor, Fixed, 100Ω ±5%, .1W	50	841414-049	14632	
R16	Same as R3				
R17	Resistor, Fixed, 15kΩ ±5%, .1W	4	841414-101	14632	
R19	Same as R11				
R20	Same as R11				
R21	Same as R15				
R22	Resistor, Fixed, 470Ω ±5%, .1W	19	841414-065	14632	
R23	Resistor, Fixed, 270Ω ±5%, .1W	3	841414-059	14632	
R24	Resistor, Fixed, 68Ω ±5%, .1W	10	841414-045	14632	
R26	Same as R14				
R27	Resistor, Fixed, 3.3kΩ ±5%, .1W	7	841414-085	14632	
R28	Same as R14				
R29	Same as R5				
R31	Same as R27				
R32	Same as R11				
R34	Same as R14				
R35	Resistor, Fixed, 3.3MΩ ±5%, .1W	1	841414-157	14632	
R36	Same as R7				
R37	Same as R5				
R38	Resistor, Fixed, 1.2MΩ ±5%, .1W	1	841414-147	14632	
R39	Same as R8				
R40	Same as R22				
R41	Same as R5				
R42	Resistor, Fixed, 180kΩ ±5%, .1W	2	841414-127	14632	
R43	Same as R5				
R44	Same as R4				
R45	Same as R5				

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

REF DESIG PREFIX **A7A, A7B**

R46	Same as R22				
R47	Same as R1				
R48	Same as R5				
R49	Same as R42				
R50	Same as R5				
R51	Resistor, Fixed, 18kΩ ±5%, .1W	2	841414-103	14632	
R52	Same as R12				
R53	Same as R12				
R54	Same as R51				
R55	Same as R5				
R56	Resistor, Fixed, 3.9kΩ ±5%, .1W	1	841414-087	14632	
R57	Same as R1				
R58	Same as R14				
R59	Same as R4				
R60	Resistor, Fixed, 5.1kΩ ±5%, .1W	1	841414-090	14632	
R61	Resistor, Fixed, 22kΩ ±5%, .1W	2	841414-105	14632	
R62	Same as R5				
R63	Same as R15				
R64	Resistor, Fixed, 180Ω ±5%, .1W	4	841414-055	14632	
R65	Same as R5				
R66	Same as R22				
R67	Same as R15				
R68	Same as R1				
R69	Same as R11				
R70	Same as R15				
R71	Same as R15				
R72	Same as R5				
R73	Same as R11				
R74	Same as R8				
R75	Same as R11				
R76	Same as R15				
R77	Same as R8				
R78	Same as R5				
R79	Same as R24				
R80	Same as R8				
R81	Same as R7				
R82	Same as R3				
R83	Same as R22				
R84	Same as R11				
R85	Same as R15				
R86	Resistor, Fixed, 33? +5%, .1W	2	841414-037	14632	

REF DESIG PREFIX **A7A, A7B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R88	Same as R24				
R89	Same as R8				
R90	Same as R8				
R91	Same as R23				
R92	Same as R23				
R93	Same as R22				
R94	Same as R15				
R95	Resistor, Fixed, 150? +5%, .1W	6	841414-053	14632	
R96	Same as R5				
R97	Same as R5				
R98 Thru R102	Same as R15				
R103	Same as R22				
R104	Same as R1				
R105	Same as R27				
R106	Same as R12				
R107	Same as R12				
R108	Same as R15				
R109	Resistor, Fixed, 6.8k? +5%, .1W	5	841414-093	14632	
R110	Same as R11				
R111	Same as R22				
R112	Same as R12				
R113	Same as R11				
R114	Same as R5				
R115	Same as R1				
R116	Same as R3				
R117	Same as R4				
R118	Same as R5				
R119	Same as R1				
R120	Same as R1				
R121	Same as R3				
R122	Resistor, Fixed, 220? +5%, .1W	3	841414-057	14632	
R123	Same as R5				
R124	Same as R1				
R125	Same as R15				
R126	Same as R17				
R127	Same as R109				
R128	Same as R15				
R129	Same as R14				
R130	Same as R14				
R131	Same as R15				

REF DESIG PREFIX **A7A, A7B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R132	Same as R15				
R133	Same as R12				
R134	Same as R1				
R135	Same as R12				
R136	Same as R14				
R137	Same as R12				
R138 Thru R140	Same as R5				
R141	Same as R15				
R142	Same as R11				
R143	Same as R95				
R144	Same as R24				
R145	Same as R15				
R146	Same as R4				
R147	Same as R15				
R148	Same as R61				
R149	Same as R5				
R150	Resistor, Fixed, 6.8? +5%, .1W	1	841414-021	14632	
R151	Same as R5				
R152	Same as R14				
R153	Same as R22				
R154	Same as R1				
R155	Same as R14				
R156	Same as R1				
R157	Same as R11				
R158	Same as R14				
R159	Resistor, Fixed, 4.7k? +5%, .1W	9	841414-089	14632	
R160	Same as R12				
R161	Same as R12				
R162	Same as R17				
R163	Resistor, Fixed, 13k? +5%, .1W	1	841414-100	14632	
R164	Same as R12				
R165	Same as R109				
R166	Resistor, Fixed, 15? +5%, .1W	4	841414-029	14632	
R167	Resistor, Fixed, 20k? +5%, .1W	1	841414-104	14632	
R168	Same as R5				
R169	Same as R5				
R170	Same as R3				
R171	Same as R64				
R172	Varistor, 5k? +30%, 200mW, 100VD, Top Adjust	3	ST-23-A-502-C-W	91637	

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

REF DESIG PREFIX **A7A, A7B**

R173	Same as R109				
R174	Same as R109				
R175	Same as R27				
R176	Resistor, Fixed, 3.6k? +5%, .1W	2	841414-086	14632	
R177	Resistor, Fixed, 6.2k? +5%, .1W	3	841414-092	14632	
R178	Same as R5				
R179	Same as R5				
R180	Same as R172				
R181	Same as R177				
R182	Same as R176				
R183	Same as R5				
R184	Same as R122				
R185	Same as R15				
R186	Resistor, Fixed, 680? +5%, .1W	1	841414-069	14632	
R187	Same as R11				
R188	Same as R4				
R189	Same as R7				
R190	Same as R14				
R191	Same as R15				
R192	Same as R8				
R193	Same as R22				
R194	Same as R27				
R195	Same as R15				
R196	Same as R17				
R197	Same as R15				
R198	Same as R15				
R199	Same as R24				
R200	Same as R22				
R201	Same as R64				
R202	Same as R15				
R203*	Same as R11				
R204	Same as R15				
R205	Same as R1				
R206	Same as R166				
R207	Same as R166				
R208	Same as R11				
R209	Same as R166				
R210	Same as R95				
R211	Resistor, Fixed, 4.7Ω ±5%, .1W	1	841414-017	14632	
R212	Same as R15				
R213	Same as R24				

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

REF DESIG PREFIX **A7A, A7B**

R214	Same as R15				
R215	Same as R24				
R216	Same as R24				
R217 Thru R219	Same as R15				
R220	Same as R3				
R221	Same as R15				
R222	Same as R22				
R223	Same as R14				
R224	Same as R12				
R225	Same as R5				
R226	Same as R5				
R227	Same as R159				
R228	Same as R159				
R229	Same as R5				
R230	Same as R15				
R231	Same as R1				
R232	Same as R27				
R233	Same as R1				
R234	Same as R64				
R235	Same as R15				
R236	Same as R159				
R237	Same as R14				
R238	Same as R14				
R239	Same as R1				
R240	Same as R1				
R241	Same as R3				
R242	Same as R4				
R243	Same as R15				
R244	Same as R12				
R245	Resistor, Fixed, 3.3? +5%, .1W	5	841414-013	14632	
R246	Same as R1				
R247	Same as R245				
R248	Same as R245				
R249 Thru R251	Same as R22				
R252	Same as R245				
R253 Thru R255	Same as R15				
R256	Same as R1				

REF DESIG PREFIX **A7A, A7B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R257	Same as R245				
R258	Same as R1				
R259	Same as R5				
R260	Same as R22				
R261	Same as R22				
R262	Same as R12				
R263	Same as R11				
R264	Same as R15				
R265	Same as R22				
R266	Same as R159				
R267	Same as R11				
R268	Same as R159				
R269	Same as R12				
R270	Same as R27				
R271 Thru R273	Same as R5				
R274	Same as R159				
R275	Same as R11				
R276	Same as R15				
R277	Same as R11				
R278	Same as R15				
R279	Same as R11				
R280	Resistor, Fixed, 4.3k? +5%, .1W	1	841414-088	14632	
R281	Same as R159				
R282	Same as R5				
R283	Same as R22				
R284	Same as R159				
R285	Same as R5				
R286	Same as R172				
R287	Same as R177				
R288 Thru R293	Same as R15				
R294	Same as R95				
R295	Same as R86				
R296	Same as R11				
R297	Same as R5				
R298	Same as R95				
R299	Same as R95				
R300	Same as R122				
R301	Same as R5				

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

REF DESIG PREFIX **A7A, A7B**

R302 Thru R308	Same as R11				
R309 Thru R311	Same as R14				
T1	Transformer	4	281926-1		
T2 Thru T4	Same as T1				
U1	Operational Amplifier, Dual, JFET-Input	3	8634002SO8	14632	
U2	Integrated Circuit, CMOS, Frequency Synbthesizer	1	NJ88C24MA MP	53469	
U3	Integrated Circuit,CMOS, Hex Schmidt Inverter	1	74HC14 SO14	1Z447	
U4	Integrated Circuit, Divide by 64/65 or 128/129	1	MB501LPF	61271	
U5	Integrated Circuit, Switch, Quad SPST	4	DG413DY	17856	
U6	Same as U5				
U7	Operational Amplifier, Single, Low Noise	3	NE5534D	18324	
U8	Same as U7				
U9	Integrated Circuit, Dual D-Type Flip-Flop	1	74HC74 SO14	04713	
U10	Integrated Circuit, Quad 2-Input NOR Gate	1	74HC02 SO14	1Z447	
U11	Same as U7				
U12	Mixer, Double Balanced, and Oscillator, 5dB@45MHz	1	NE602AD	18324	
U13	Amplifier	7	MSA-0611-TR1	24539	
U14	Integrated Circuit, Voltage Regulator, +5V, .1A +3.8%	4	LM2931AD-5	04713	
U15	Integrated Circuit, 1GHz, Prescaler, Divide by 2/4/8	1	UPB587G	33297	
U16	Same as U5				
U17	Same as U13				
U18	Integrated Circuit, Quad 2-Input NOR Gate	1	8674F02SO14U	14632	
U19	Integrated Circuit, Dual D-Type Flip Flops	1	74F74 SO14	04713	
U20	Integrated Circuit, Dual 4-Bit Counters	2	8674HC390SO16U	14632	
U21	Same as U5				
U22	Same as U13				
U23	Same as U20				
U24	Same as U13				
U25	Integrated Circuit, 2.5 GHz Preascler, Divide by 4	1	UPB585G	33297	
U26	Integrated Circuit, 225 MHz, Divide by 10/11	1	SP8799/MP	53469	
U27	Operational Amplifier, Dual Low Power	1	MC33172D	04713	
U28	Voltage Regulator, Adjustable, Posative or Negative	3	MC1723CD	04713	
U29	Integrated Circuit, Switch, Quad SPST	3	DG412DY	17856	
U30	Integrated Circuit, CMOS, 8-Bit Shift Registers	4	74HC595 SO16	04713	
U31	Same as U29				
U32	Amplifier	2	MSA-0711	24539	
U33	Same as U14				

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

REF DESIG PREFIX **A7A, A7B**

U34	Same as U13				
U35	Integrated Circuit, Prescaler, Two-Modulus	1	MC12011FN	04713	
U36	Same as U13				
U37	Operational Amplifier, Low Power, JFET Input	1	TL062CD	04713	
U38	Same as U13				
U39	Programmed EPROM,	1	841532	14632	
U40	Same as U30				
U41	Same as U28				
U42	Same as U1				
U43	Same as U30				
U44	Same as U14				
U45	Voltage Regulator, -5V, .1A	1	LM79L05ACM	27014	
U46	Same as U1				
U47	Same as U30				
U48	Same as U28				
U49	Same as U29				
U50	Same as U32				
U51	Same as U14				
U52	Voltage Regulator, +5V, .1A	1	LM78L05ACM	27014	
W1	Cable Assembly	1	17300-485-9	14632	
W1P1	Connector, Plug, SMB, for RD-178 Cable	1	2002-7571-005	19505	
W2	Cable Assembly	1	17300-485-10	14632	

* Nominal Value. Final Value Factory Selected.

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

5.6.6 **TYPE 796863-1 PRESELECTOR MODULE ASSEMBLY** REF DESIG PREFIX **A8A, A8B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision D1				
A1	HF Preselector	1	382316-1	14632	
C1	Capacitor, Ceramic, Feedthru, 1000pF +20%, 100V	4	281216-2	14632	
C2					
Thru	Same as C1				
C4					
C5	Capacitor, Ceramic, Feedthru, 100pF, 100V, 10A	3	SCI-9110-101	33095	
C6	Same as C5				
C7	Same as C5				
E1	Connector, Bulkhead, for RD-178 Cable	1	8144-7521-005	19505	
E2	Turret, Modified	1	282510-1	14632	
FB1	Ferrite Bead, VHF	2	56-590-65-4A	02114	
FB2	Same as FB1				
J1	Connector, Receptacle, MCX, Bulkhead	1	R113-553-020	0GP12	
W1	Cable Assembly	1	17300-485-11	14632	
W1P1	Connector, Plug, 10 Pin, .10 Centers	1	87631-6	00779	

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

5.6.6.1 **Type 382316-1 Preselector PC Assembly** REF DESIG PREFIX **A8A1**

	Revision D1				
C1	Capacitor, Ceramic, .047?F +10%, 50V	34	841415-023	14632	
C2	Capacitor, Tantalum, 10?F +20%, 35V	4	841293-17	14632	
C3	Not Used				
C4	Not Used				
C5	Capacitor, Ceramic, 68pF +2%, 50V	6	841416-045	14632	
C6	Capacitor, Ceramic, 18pF +2%, 50V	5	841416-031	14632	
C7	Capacitor, Ceramic, 8.2pF +.25pF, 50V	6	841416-023	14632	
C8	Capacitor, Ceramic, 2.2pF +.1pF, 50V	1	841416-009	14632	
C9	Capacitor, Ceramic, 120pF +2%, 50V	3	841416-051	14632	
C10	Capacitor, Ceramic, 12pF +2%, 50V	7	841416-027	14632	
C11	Capacitor, Ceramic, 39pF +2%, 50V	5	841416-039	14632	
C12	Same as C10				
C13	Capacitor, Ceramic, 100pF +2%, 50V	7	841416-049	14632	
C14	Same as C6				
C15	Capacitor, Ceramic, 27pF +2%, 50V	7	841416-035	14632	
C16	Capacitor, Ceramic, 10pF +2%, 50V	1	841416-025	14632	
C17	Capacitor, Ceramic, 62pF +2%, 50V	6	841416-044	14632	
C18 Thru C20	Not Used				
C21	Same as C1				
C22	Capacitor, Ceramic, 33pF +2%, 50V	6	841416-037	14632	
C23	Capacitor, Ceramic, 6.8pF +.25pF, 50V	9	841416-021	14632	
C24	Same as C10				
C25	Same as C23				
C26	Capacitor, Ceramic, 22pF +2%, 50V	6	841416-033	14632	
C27	Same as C1				
C28	Capacitor, Ceramic, 3.3pF +.1pF, 50V	1	841416-013	14632	
C29	Same as C10				
C30	Capacitor, Ceramic, 4.7pF +.1pF, 50V	1	841416-017	14632	
C31	Not Used				
C32	Same as C22				
C33	Capacitor, Tantalum, 6.8?F +20%, 6.3V	12	841293-14	14632	
C34	Not Used				
C35	Not Used				
C36	Same as C1				
C37	Same as C11				
C38	Same as C7				
C39	Same as C1				
C40	Capacitor, Ceramic, 56pF +2%, 50V	5	841416-043	14632	
C41	Same as C23				

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

REF DESIG PREFIX **A8A1**

C42	Same as C26				
C43	Same as C23				
C44	Same as C15				
C45	Same as C7				
C46	Same as C26				
C47	Same as C23				
C48	Same as C1				
C49	Same as C33				
C50	Same as C23				
C51	Same as C40				
C52	Same as C7				
C53	Same as C11				
C54	Same as C1				
C55	Same as C26				
C56	Same as C23				
C57	Same as C1				
C58	Same as C5				
C59	Same as C10				
C60	Same as C13				
C61	Same as C15				
C62	Same as C17				
C63	Same as C23				
C64	Same as C13				
C65	Same as C15				
C66	Same as C10				
C67	Same as C5				
C68	Same as C1				
C69	Same as C33				
C70	Same as C23				
C71	Same as C26				
C72	Same as C1				
C73	Same as C13				
C74	Same as C6				
C75	Same as C1				
C76	Capacitor, Ceramic, 150pF +2%, 50V	6	841416-053	14632	
C77	Same as C15				
C78	Capacitor, Ceramic, 270pF +2%, 50V	7	841416-059	14632	
C79	Capacitor, Ceramic, 47pF +2%, 50V	10	841416-041	14632	
C80	Same as C1				
C81	Same as C5				
C82	Same as C10				

REF DESIG PREFIX **A8A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C83	Same as C79				
C84	Same as C78				
C85	Same as C15				
C86	Same as C33				
C87	Same as C76				
C88	Same as C6				
C89	Same as C13				
C90	Same as C1				
C91	Same as C76				
C92	Same as C22				
C93	Same as C1				
C94	Capacitor, Ceramic, 220pF +2%, 50V	6	841416-057	14632	
C95	Same as C79				
C96	Capacitor, Ceramic, 330pF +2%, 50V	4	841416-061	14632	
C97	Capacitor, Ceramic, 82pF +2%, 50V	5	841416-047	14632	
C98	Same as C97				
C99	Same as C1				
C100	Same as C6				
C101	Same as C96				
C102	Same as C97				
C103	Same as C79				
C104	Same as C33				
C105	Same as C94				
C106	Same as C22				
C107	Same as C76				
C108	Same as C1				
C109	Capacitor, Ceramic, 180pF +2%, 50V	5	841416-055	14632	
C110	Same as C11				
C111	Same as C1				
C112	Same as C78				
C113	Same as C17				
C114	Capacitor, Ceramic, 470pF +2%, 50V	6	841416-065	14632	
C115	Same as C17				
C116	Same as C76				
C117	Same as C15				
C118	Same as C1				
C119	Same as C33				
C120	Same as C114				
C121	Same as C17				
C122	Same as C17				
C123	Same as C78				

REF DESIG PREFIX **A8A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
C124	Same as C11				
C125	Same as C76				
C126	Same as C1				
C127	Same as C94				
C128	Same as C1				
C129	Same as C22				
C130	Same as C96				
C131	Same as C97				
C132	Same as C1				
C133	Capacitor, Ceramic, 680pF +2%, 50V	4	841416-069	14632	
C134	Same as C79				
C135	Same as C78				
C136	Same as C79				
C137	Same as C133				
C138	Same as C79				
C139	Same as C97				
C140	Same as C33				
C141	Same as C96				
C142	Same as C22				
C143	Same as C94				
C144	Same as C1				
C145	Same as C78				
C146	Same as C5				
C147	Same as C1				
C148	Same as C114				
C149	Same as C13				
C150	Same as C1				
C151	Same as C1				
C152	Same as C79				
C153	Same as C79				
C154	Capacitor, Ceramic, 560pF +2%, 50V	3	841416-067	14632	
C155 Thru C159	Not Used				
C160	Capacitor, Ceramic, 820pF +2%, 50V	4	841416-071	14632	
C161	Same as C9				
C162	Capacitor, Ceramic, 390pF +2%, 50V	1	841416-063	14632	
C163	Same as C40				
C164	Same as C33				
C165	Same as C160				
C166	Same as C9				
C167	Same as C13				

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

REF DESIG PREFIX **A8A1**

C168	Same as C114				
C169	Same as C5				
C170	Same as C78				
C171	Same as C1				
C172	Same as C40				
C173	Same as C114				
C174	Same as C1				
C175	Same as C109				
C176	Same as C133				
C177	Same as C109				
C178	Capacitor, Ceramic, 1200pF +2%, 50V	6	841416-075	14632	
C179	Same as C79				
C180	Same as C1				
C181	Same as C109				
C182	Same as C178				
C183	Same as C33				
C184	Same as C109				
C185	Same as C133				
C186	Same as C114				
C187	Same as C40				
C188	Same as C94				
C189	Same as C1				
C190	Capacitor, Ceramic, .015?F +10%, 50V	1	841415-020	14632	
C191	Same as C160				
C192	Capacitor, Ceramic, 1500pF ±2%, 50V	2	841416-077	14632	
C193	Same as C1				
C194	Same as C178				
C195	Same as C33				
C196	Same as C178				
C197	Same as C192				
C198	Same as C94				
C199	Same as C160				
C200	Same as C1				
C201	Capacitor, Ceramic, 2700pF +2%, 50V	2	841314-083	14632	
C202	Same as C201				
C203	Same as C178				
C204	Capacitor, Ceramic, 4700pF +2%, 50V	6	841314-089	14632	
C205	Same as C2				
C206 Thru C210	Same as C204				
C211	Same as C178				

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

REF DESIG PREFIX **A8A1**

C212	Same as C2				
C213	Same as C33				
C214	Same as C33				
C215	Same as C1				
C216	Same as C2				
C217	Capacitor, Variable, 7-50pF +100/-0%, 50V	2	TZBX4R500BA110TOO	72982	
C218	Same as C154				
C219	Same as C217				
C220	Same as C154				
C221	Capacitor, Variable, 2-6pF +50/-0%, 50VDC	2	TZBX4Z060BA110TOO	72982	
C222	Same as C7				
C223	Same as C7				
C224	Same as C221				
C225	Same as C1				
C226	Capacitor, Tantalum, 4.7?F +20%, 10V	4	841293-12	14632	
C227	Same as C226				
C228	Same as C1				
C229	Same as C226				
C230	Same as C226				
CR1	Diode, General Purpose, 100V	4	MMBD1203-HIGH	27014	
CR2	Not Used				
CR3	Same as CR1				
CR4	Same as CR1				
CR5	Diode, 300V		SMP1300-99	17540	
CR6 Thru CR24	Same as CR5				
CR25	Same as CR1				
JW1	Resistor, Fixed, < .05?, 2Amax	2	841341	14632	
JW2	Same as JW1				
K1	Relay, Reed, 5V Coil	1	SMJ1A05-S	95348	
L1	Inductor, 270nH +5%, Qmin-50@25MHz	1	841438-035	14632	
L2	Inductor, 220nH +5%, Qmin-50@100MHz		841438-033	14632	
L3	Same as L2				
L4	Inductor, 680nH +5%, Qmin-50@25MHz	9	841438-045	14632	
L5	Same as L4				
L6	Same as L4				
L7	Inductor, 680?H +5%, Qmin-30@.79MHz	23	841444-069	14632	
L8	Same as L7				
L9	Same as L7				

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

REF DESIG PREFIX **A8A1**

L10 Thru L12	Same as L4				
L13	Same as L7				
L14	Same as L7				
L15	Inductor, 560nH +5%, Qmin-50@25MHz	3	841438-043	14632	
L16	Same as L15				
L17	Same as L15				
L18	Same as L7				
L19	Same as L7				
L20 Thru L22	Same as L4				
L23	Same as L7				
L24	Same as L7				
L25	Inductor, 1000nH +5%, Qmin-50@25MHz	5	841438-049	14632	
L26	Same as L25				
L27	Same as L25				
L28	Same as L7				
L29	Same as L7				
L30	Inductor, 1500nH +5%, Qmin-35@7.9MHz	3	841438-053	14632	
L31	Same as L30				
L32	Same as L30				
L33	Same as L7				
L34	Same as L7				
L35	Inductor, 2200nH +5%, Qmin-35@7.9MHz	3	841438-057	14632	
L36	Same as L35				
L37	Same as L35				
L38	Same as L7				
L39	Same as L7				
L40	Inductor, 3300nH +5%, Qmin-35@7.9MHz	3	841438-061	14632	
L41	Same as L40				
L42	Same as L40				
L43	Same as L7				
L44	Same as L7				
L45	Inductor, 4700nH +5%, Qmin-35@7.9MHz	3	841438-065	14632	
L46	Same as L45				
L47	Same as L45				
L48	Same as L7				
L49	Same as L7				
L50	Inductor, 5600nH +5%, Qmin-35@7.9MHz	2	841438-067	14632	
L51	Inductor, 6800nH +5%, Qmin-35@7.9MHz	1	841438-069	14632	
L52	Same as L50				

REF DESIG PREFIX **A8A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
L53 Thru L55	Same as L7				
L56	Inductor, 22?H +5%, Qmin-50@2.5MHz	3	841444-033	14632	
L57	Same as L56				
L58	Same as L56				
L59	Inductor, 100µH ±5%, Qmin-40@.79MHz	1	841444-049	14632	
L60	Same as L7				
L61	Inductor, 47?H +10%, Q=30@2.52MHz	1	NL322522-470K	54583	
L62	Same as L25				
L63	Inductor, 22nH +5%, Qmin-50@100MHz	2	841438-009	14632	
L64	Same as L63				
L65	Same as L25				
Q1	Transistor	2	MMBT3904LT1	04713	
Q2	Same as Q1				
Q3	Transistor	12	MMBT2907ALT1	04713	
Q4 Thru Q14	Same as Q3				
R1	Resistor, Fixed, 3.9k? +5%, .1W	1	841414-087	14632	
R2	Resistor, Fixed, 1.0k? +5%, .1W	1	841414-073	14632	
R3	Resistor, Fixed, 10k? +5%, .1W	12	841414-097	14632	
R4	Same as R3				
R5	Resistor, Fixed, 56? +5%, .1W	20	841414-043	14632	
R6	Same as R5				
R7	Same as R3				
R8	Resistor, Fixed, 1.8k? +5%, .1W	16	841414-079	14632	
R9	Same as R5				
R10	Same as R5				
R11	Same as R3				
R12	Same as R8				
R13	Same as R5				
R14	Same as R3				
R15	Same as R5				
R16	Same as R8				
R17	Same as R5				
R18	Same as R3				
R19	Same as R5				
R20	Same as R8				
R21	Same as R5				
R22	Same as R3				
R23	Same as R8				

REF DESIG PREFIX **A8A1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R24	Same as R5				
R25	Same as R5				
R26	Same as R3				
R27	Same as R5				
R28	Same as R8				
R29	Same as R5				
R30	Same as R3				
R31	Same as R5				
R32	Same as R8				
R33	Same as R5				
R34	Same as R3				
R35	Same as R8				
R36	Same as R5				
R37	Same as R3				
R38	Same as R5				
R39	Same as R8				
R40	Same as R5				
R41	Same as R5				
R42	Same as R3				
R43	Same as R5				
R44	Same as R8				
R45	Not Used				
R46	Not Used				
R47 Thru R50	Same as R8				
R51	Resistor, Fixed, 1.5k? +5%, .1W	2	841414-077	14632	
R52	Same as R51				
R53	Resistor, Fixed, 680? +5%, .1W	2	841414-069	14632	
R54	Same as R53				
R55	Same as R8				
R56	Same as R8				
R57	Resistor, Fixed, 330? +5%, .1W	3	841414-061	14632	
R58	Same as R57				
R59	Same as R57				
U1	Integrated Circuit, CMOS, 8-Bit Shift Registers	2	74HC595 SO16	04713	
U2	Same as U1				
U3	Switch, SPDT, RF, DC-100MHz	2	SW-239	21912	
U4	Same as U3				
V1	Arrester, Gas Discharge, Surge	1	CG75L	71482	

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

5.6.7 **TYPE 796864-1 REFERENCE GENERATOR PC ASSEMBLY** REF DESIG PREFIX **A9**

	Revision C1				
C1	Capacitor, Ceramic, .047?F +10%, 50V	59	841415-023	14632	
C2	Same as C1				
C3	Capacitor, Tantalum, 68?F +20%, 6.3V	3	841293-24	14632	
C4	Same as C1				
C5	Same as C1				
C6	Capacitor, Ceramic, 68pF +5%, 50V	4	841415-006	14632	
C7	Same as C6				
C8	Same as C6				
C9 Thru C11	Same as C1				
C12	Same as C6				
C13	Capacitor, Ceramic, 150pF +5%, 50V	2	841415-008	14632	
C14	Same as C1				
C15	Not Used				
C16	Capacitor, Ceramic, 470pF +5%, 50V	2	841415-011	14632	
C17	Same as C16				
C18	Same as C13				
C19 Thru C21	Same as C1				
C22	Capacitor, Ceramic, 2200pF +10%, 50V	1	841415-015	14632	
C23 Thru C69	Same as C1				
C70	Same as C3				
C71	Same as C3				
C72	Same as C1				
C73	Same as C1				
DS1	LED, Red, High Efficiency	1	HLMP-6620	28480	
J1	Connector, Receptacle, SMB, PC Mount	8	2009-7511-000	19505	
J2 Thru J8	Same as J1				
J9	Connector, Jack, BNC, PC Mount	2	227673-1	00779	
J10	Same as J9				
L1	Inductor, 3.3?H +5%, Qmion-35@7.9MHz	1	841438-061	14632	
L2	Inductor, 560nH +5%, Qmin-50@25MHz	1	841438-043	14632	
L3	Inductor, 47?H +5%	1	841438-089	14632	
E1	Cable Assembly, 10 Pin, 28AWG	1	IDMD-05-T-13-C-G	55322	
Q1	Not Used				
Q2	Transistor	9	MMBR2857-LT1	04713	

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

REF DESIG PREFIX **A9**

Q3 Thru Q10	Same as Q2				
R1	Resistor, Fixed, 10? +5%, .1W	19	841414-025	14632	
R2	Resistor, Fixed, 10k? +5%, .1W	2	841414-097	14632	
R3	Same as R2				
R4	Resistor, Fixed, 22k? +5%, .1W	2	841414-105	14632	
R5	Resistor, Film, 50k? +10%, .5W	1	62PR50K	73138	
R6	Same as R4				
R7	Resistor, Fixed, 100? +5%, .1W	10	841414-049	14632	
R8	Resistor, Fixed, 470? +5%, .1W	9	841414-065	14632	
R9 Thru R14	Same as R8				
R15	Resistor, Fixed, 1.5k? +5%, .1W	2	841414-077	14632	
R17	Same as R8				
R18	Resistor, Fixed, 47? +5%, .1W	13	841414-041	14632	
R19	Same as R1				
R20	Same as R1				
R21	Resistor, Fixed, 100k? +5%, .1W	1	841414-121	14632	
R22	Same as R7				
R23	Resistor, Fixed, 680k? +5%, .1W	1	841414-141	14632	
R24	Same as R15				
R25	Resistor, Fixed, 3.3k? +5%, .1W	21	841414-085	14632	
R26	Same as R25				
R27	Same as R7				
R28	Same as R8				
R29	Same as R1				
R30	Same as R25				
R31	Not Used				
R32	Same as R25				
R33	Same as R7				
R34	Resistor, Fixed, 22? +5%, .1W	9	841414-033	14632	
R35 Thru R37	Same as R1				
R38	Same as R34				
R39 Thru R42	Same as R25				
R43	Same as R34				
R44	Resistor, Fixed, 270? +5%, .1W	2	841414-059	14632	
R45	Same as R44				
R46	Same as R1				

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

REF DESIG PREFIX **A9**

R47	Same as R1
R48	Same as R18
R49	Same as R18
R50	Same as R7
R51	Same as R34
R52	Same as R25
R53	Same as R25
R54	Same as R1
R55	Same as R1
R56	Same as R18
R57	Same as R18
R58	Same as R7
R59	Same as R34
R60	Same as R25
R61	Same as R25
R62	Same as R1
R63	Same as R1
R64	Same as R18
R65	Same as R18
R66	Same as R7
R67	Same as R34
R68	Same as R25
R69	Same as R25
R70	Same as R1
R71	Same as R1
R72	Same as R18
R73	Same as R18
R74	Same as R7
R75	Same as R34
R76	Same as R25
R77	Same as R25
R78	Same as R1
R79	Same as R1
R80	Same as R18
R81	Same as R18
R82	Same as R7
R83	Same as R34
R84	Same as R25
R85	Same as R25
R86	Same as R1
R87	Same as R1

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

REF DESIG PREFIX **A9**

R88	Same as R18				
R89	Same as R18				
R90	Same as R7				
R91	Same as R34				
R92					
Thru	Same as R25				
R94					
R95	Resistor, Fixed, 6.8? +5%, .1W	2	841414-021	14632	
R96	Resistor, Fixed, 1.0k? +5%, .1W	1	841414-073	14632	
R97	Same as R95				
S1	Switch, Toggle, DPDT	1	E201-S-D1-C-B-E	09353	
U1	Integrated Circuit, Voltage Regulator, +5V, .1A +3.8%	1	LM2931AD-5	04713	
U2	Operational Amplifier, Dual, JFET-Input	1	MC34002D	04713	
U3	Integrated Circuit, Frequency Synthesizer, PLL	1	MC145158DW-2	04713	
U4	TCXO, 10.000MHz	1	92686	12020	
U5	Integrated Circuit, CMOS, Quad 2-Iinput NAND Gate	1	74HC132 SO14	27014	

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

5.6.8 **TYPE 766023-1 POWER SUPPLY PC ASSEMBLY** REF DESIG PREFIX **A11**

	Revision A				
C1	Capacitor, Electrolytic, Aluminum, 3300?F, 35V	4	ECE-T35R332SW	54473	
C2	Same as C1				
C3	Capacitor, Electrolytic,Tantalum, 1?F +20%, 35V	7	199D105X0035AE3	56289	
C4	Capacitor, Electrolytic, Aluminum, 10000?F, 25V	3	ECE-T25R103SW	54473	
C5	Same as C4				
C6	Capacitor, Ceramic, Monolithic, 1000pF +2%, 100V	2	150-100-NPO-102G	51642	
C7	Same as C3				
C8	Same as C6				
C9	Same as C3				
C10	Same as C4				
C11	Same as C3				
C12	Same as C3				
C13	Same as C1				
C14	Same as C3				
C15	Same as C1				
C16	Same as C3				
CR1	Diode, Rectifier, 600V, 1A, Silicon	6	1N4005	80131	
CR2	Same as CR1				
CR3	Diode, Rectifier, Fast Recovery, 100V	4	MR851	04713	
CR4 Thru CR6	Same as CR3				
CR7 Thru CR10	Same as CR1				
E1	Terminal, 22-20 AWG, Brass	14	42658-3	00779	
E2 Thru E7	Same as E1				
E8 Thru E10	Not Used				
E11 Thru E17	Same as E1				
J1	Connector, Header, 2 Pin, Friction Lock, .156 centers	1	26-48-2025	27264	
J2	Connector, Header, 8 Pin , Friction Lock, .156 centers	1	26-48-2085	27264	
J3	Connector, Header, 14 Pin , Friction Lock, .156 centers	1	26-48-2145	27264	
J4	Connector, Header, 3 Pin , Friction Lock, .156 centers	1	26-48-2035	27264	
P1	Connector, Shell, 7 Pin	2	87499-1	00779	
P2	Same as P1				
Q1	Transistor, TMOS, FET Power, 12A, 80V	2	MTP12N08	04713	
Q2	Same as Q1				

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

REF DESIG PREFIX **A11**

R1	Resistor, Fixed,Wire-Wound, .33? +5%, 1W	2	BW20-0.33?-J	75042	
R2	Resistor, Fixed, Film, 1.0k? +5%, .25W	2	CF1/4-1K/J	59124	
R3	Resistor, Fixed, Film, 1.33k? +1%, 0.10W	1	RN55C1331F	81349	
R4	Resistor, Fixed, Film, 5.11k? +1%, 0.10W	2	RN55C5111F	81349	
R5	Resistor, Fixed, Film, 220?, +5%, .25W	1	CF1/4-220?,/J	59124	
R6	Same as R1				
R7	Same as R2				
R8	Resistor, Fixed, Film, 2.21k? +1%, 0.10W	1	RN55C2211F	81349	
R9	Same as R4				
R10	Resistor, Fixed, Film, 22? +5%, .25W	1	CF1/4-22?,/J	59124	
U1	Voltage Regulator, +24V, 1.0A	1	MC7824CT	04713	
U2	Voltage Regulator, Adjustable, 150mA	2	MC1723CP	04713	
U3	Same as U2				
U4	Voltage Regulator, +12V, 1.5A	2	MC7812CT	04713	
U5	Same as U4				
U6	Voltage Regulator, +8V, 1.5A	1	MC7808CT	04713	
U7	Voltage Regulator , -8V, 1.5A	1	MC7908CT	04713	

NOTES

SECTION VI

SCHEMATIC DIAGRAMS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A

TYPE WJ-8700/NFP NO FRONT PANEL OPTION

AND

TYPE WJ-8700/NFPI NO FRONT PANEL/NO INTERFACE OPTION

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

APPENDIX A

TYPE WJ-8700/NFP NO FRONT PANEL OPTION

AND

TYPE WJ-8700/NFPI NO FRONT PANEL/NO INTERFACE OPTION

LIST OF ILLUSTRATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A

TYPE WJ-8700/NFP NO FRONT PANEL OPTION

AND

TYPE WJ-8700/NFPI NO FRONT PANEL/NO INTERFACE OPTION

A.1 GENERAL DESCRIPTION

The WJ-8700/NFP No Front Panel Option eliminates the front panel display and all front panel operator controls except for a lighted primary power switch. This option is available with WJ-8700 Receivers which have an IEEE-488 or RS-232C Remote Interface Option installed, so that the receiver may be controlled via a remote interface bus controller. The WJ-8700/NFP Option also allows external single-receiver control. This configuration permits each installed receiver to be controlled directly via a separate RS-232C interface. In this configuration, the receivers do not have the remote interface installed.

The WJ-8700 No Front Panel/No Interface option provides the simplest front panel for those who are using external single-receiver control only. With this option, the only method of receiver control is via the receivers' individual RS-232C interfaces available at the WJ-8700 rear-panel connector, AUX, J12.

A.2 MECHANICAL DESCRIPTION

The WJ-8700/NFP No Front Panel option and the WJ-8700/NFPI No Front Panel/No Interface option both use a Type 796893-1 Front Panel Assembly which is mounted to the front of the receiver frame in lieu of the standard Type 796890-1 Front Panel Assembly. These options involve no change in the WJ-8700 Receiver dimensions or rack mounting procedure.

A.3 ELECTRICAL CHARACTERISTICS

The WJ-8700/NFP and WJ-8700/NFPI options eliminate all front panel controls, displays, and indicators associated with the Type 796890-1 Front Panel Assembly. The replacement Type 796893-1 Front Panel Assembly contains only a lighted rocker-type switch which is used to control the primary power.

The WJ-8700/NFP includes a front panel connector and the cables to support the operation of a Remote Interface Option board (IEEE-488 or RS-232C), while the WJ-8700/NFPI omits these cables/connectors.

A.4 EXTERNAL SINGLE-RECEIVER CONTROL

In this mode of operation, each installed receiver is controlled directly via a separate RS-232C interface. The receivers installed in the WJ-8700 do not have a Remote Interface Option installed.

The RS-232C interface has a full duplex capability. It supports only a single drop environment. The WJ-8700 HF Receivers support software protocol only in this mode. Hardware handshake signals such as RTS, CTS, DTR, or DSR are not supported.

A.4.1 INSTALLATION

To operate in the external single-receiver control mode, the following jumper wires need to be installed on the A2J11 REMOTE connector of the Microprocessor/Motherboard (A2A/B).

jumper pin 31 (RCV RXD) to pin 33 (MC RXD)
jumper pin 32 (RCV TXD) to pin 34 (MC TXD)

If both receiver A and receiver B in the WJ-8700 are to be operated in this mode, jumpers need to be installed on A2J11 on both receivers.

A.4.2 RS-232C INTERFACE SWITCH, A2S1, SETTINGS

During power up, if the microcontroller senses that there is no I/O control card (A3) installed, the WJ-8700 Receiver automatically uses the internal RS-232C interface for its remote interface. If, however, there is an IOC card installed, the internal RS-232C interface should be disabled (all A2S1 switch positions set to 0).

The baud rate is selective through a combination of DIP settings (A2S1). The DIP switch positions 1 through 3 define the baud rate as follows:

A2S1 Switch Settings

-3	-2	-1	Baud Rate
0	0	0	9600
0	0	1	4800
0	1	0	2400
0	1	1	1200
1	0	0	600
1	0	1	300
1	1	0	150
1	1	1	75

The default switch settings are set to all zeroes (9600 baud). To operate the internal RS-232C interface at a different baud rate, switch positions 1-3 should be changed. Refer to **Figure A-1** for the location of A2S1.

NOTE

DIP switch settings 4-8 must remain set to 0.

A.4.3 AUX INPUT/OUTPUT CONNECTOR, J12

To operate in the external single-receiver mode, connect the external controlling unit to the AUX connector, J12, on the rear panel of the receivers. Refer to **paragraph 2.2.3** in the WJ-8700 Installation and Operation Manual. The RS-232C interface signals from both receiver A and receiver B are provided at this connector. The pin assignments are as follows:

Receiver A's RS-232C interface signals

Pin 1	TXD
Pin 4	Signal Ground
Pin 14	RXD

Receiver B's RS-232C interface signals

Pin 11	RXD
Pin 21	Signal Ground
Pin 24	TXD

A.4.4 COMMUNICATION PROTOCOL

Refer to **Appendix G** for the RS-232C interface communication protocol. Receivers operated in the external single-receiver mode are limited to the single-drop mode of operation.

A.5 REPLACEMENT PARTS LIST

A.5.1 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.

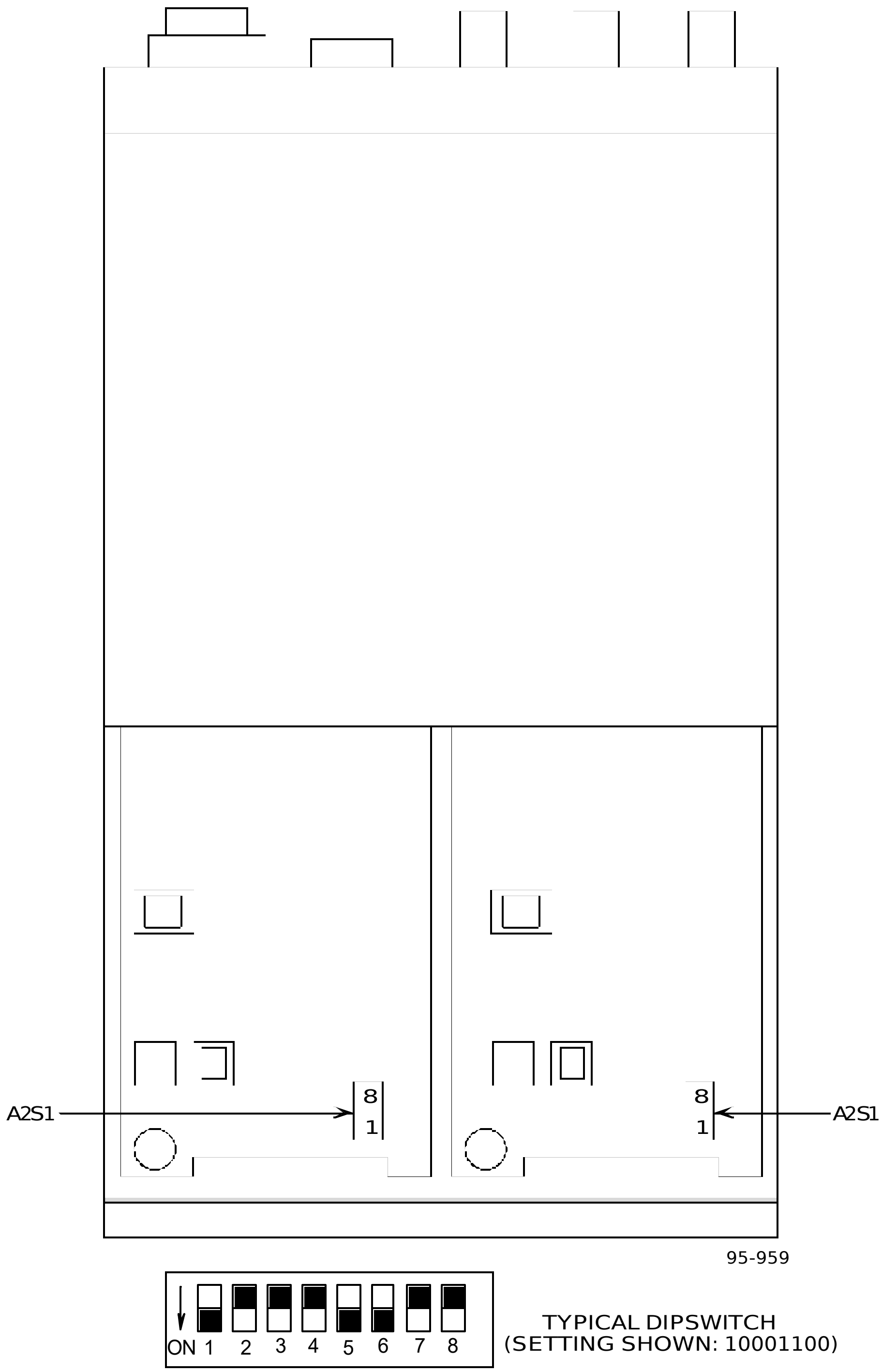


Figure A-1. Location of A2S1 on the Microprocessor/Motherboard PC Assembly (A2)

A.5.2 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).

A.5.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address	Mfr. Code	Name and Address
00779	AMP, Inc. 2800 Fulling Mill Road P. O. Box 3608 Middletown, PA 17105-3608	31918	ITT Schadow, Inc. 8081 Wallace Road Eden Prairie, MN 55344-2224
14632	DRS Signal Solutions, Inc. 700 Quince Orchard Rd. Gaithersburg, MD 20878	59124	KOA Speer Electronics, Inc. Bolivar Drive P. O. Box 547 Bradford, PA 16701
27264	Molex, Inc. 2222 Wellington Court Lisle, IL 60532-1613	83330	Herman H. Smith, Inc. 812 Snediker Avenue Brooklyn, NY 11207

A.5.4 PARTS LIST

The following parts lists contain all the major electrical components provided with this option, along with mechanical parts which may be subject to unusual wear or damage. When ordering replacement parts from the factory, 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.5.3,** and the manufacturer's part number, provided in **paragraphs A.5.5** and **A.5.6**, 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.5.5** and **A.5.6** 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.

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

A.5.5 TYPE WJ-8700/NFP NO FRONT PANEL OPTION — MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision A				
A1	Front Panel Assembly	1	796893-1	14632	
J1	Connector, Plug, 16 Position	2	1-87456-2	00779	
J2	Same as J1				
J11	Plug	1	652	83330	
J16	Connector, D-type Submin., 9 Position	1	745907-1	00779	
P4	Connector, PC Board, 2 Position	1	09-50-3021	27264	

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

A.5.5.1 **<u>Type 796893-1 Front Panel Assembly</u>** REF DESIG PREFIX **A1**

	Revision F1				
R1	Resistor, Fixed, Film: 270Ω, 5%, 1/4 W	1	CF1/4-270 OHMS/J	59124	
S1	Switch, Rocker: SPST	1	SCWL01A02BB	31918	

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

A.5.6 TYPE 8700/NFPI NO FRONT PANEL/NO INTERFACE OPTION

REF DESIG PREFIX

	Revision A				
A1	Front Panel Interface Assembly (refer to **paragraph A.5.5.1**)	1	796893-1	14632	
J1	Connector, Plug, 16 Position	1	874456-2	00779	

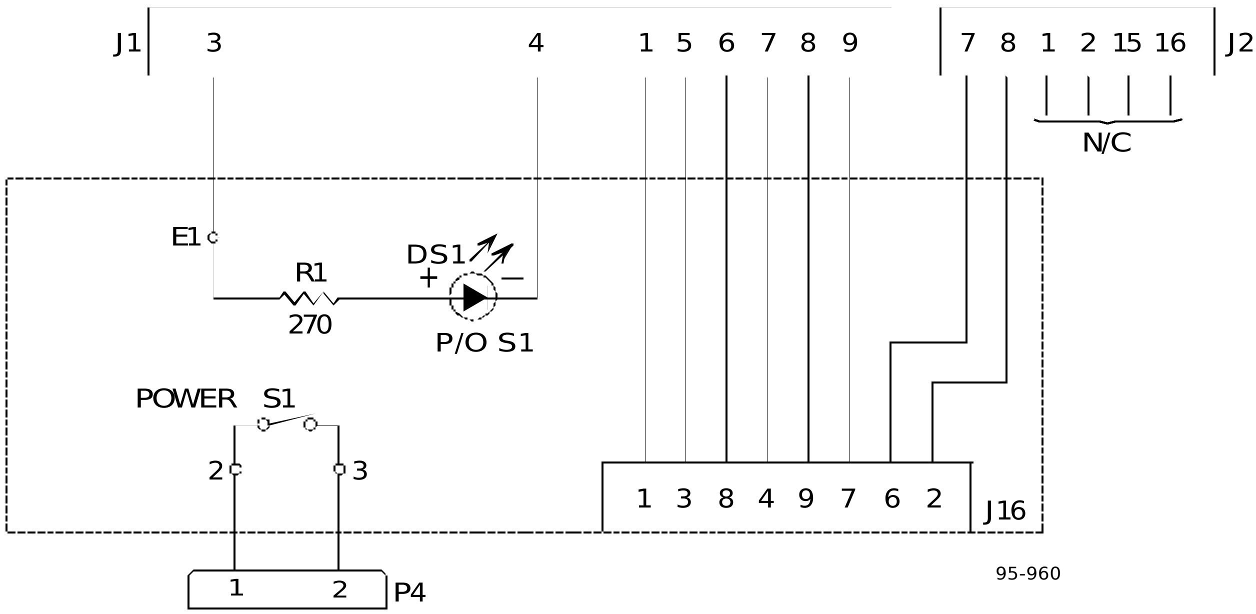


Figure A-2. Type WJ-8700/NFP No Front Panel Option, Schematic Diagram 283165(A)

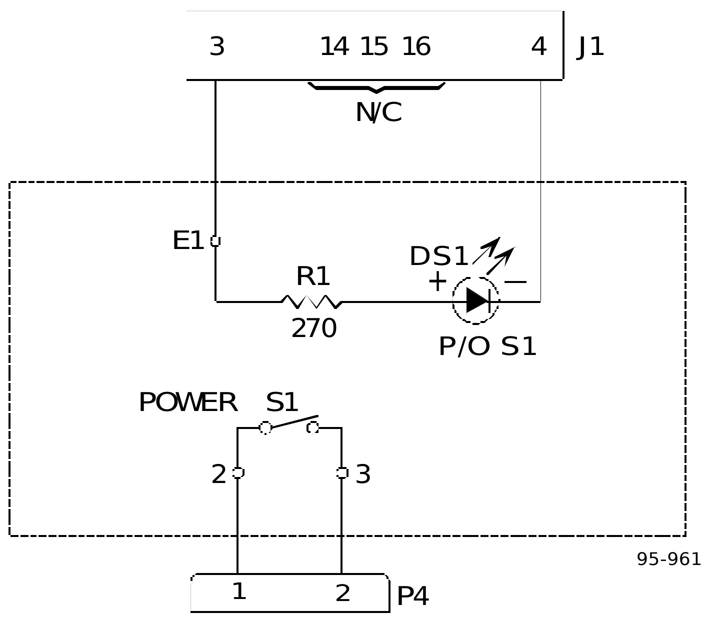


Figure A-3. Type WJ-8700/NFP1 No Front Panel/No Interface Option, Schematic Diagram 283166(A)

NOTES

APPENDIX B

WJ-8700/488 IEEE-488 REMOTE CONTROL INTERFACE

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

APPENDIX B

TYPE WJ-8700/488 IEEE-488 REMOTE CONTROL INTERFACE

LIST OF TABLES

LIST OF ILLUSTRATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

WJ-8700/488 IEEE-488 REMOTE CONTROL INTERFACE

B.1 GENERAL DESCRIPTION

The WJ-8700/488 IEEE-488 Remote Control Interface Option provides a means for controlling both receiver channels of a WJ-8700 Dual VLF/HF Receiver with an external IEEE-488 controller. The WJ NET control interface is also provided as part of this option. The WJ-8700/488 Option consists of one additional PC card which plugs into the digital control section of the WJ-8700 Receiver mainframe.

B.2 MECHANICAL DESCRIPTION

The WJ-8700/488 Option consists of a PC card which plugs directly into a slot near the front of the WJ-8700 Receiver mainframe, behind the Front Panel Controller PC board. There are two PC card option slots located at the front of the mainframe, but the WJ-8700/488 Option PC card must be installed in the front-most slot; that is, the slot immediately behind the Front Panel Controller. **Figure B-1** shows the location of the card, which contains DIP switches A3S1 and A3S2.

B.3 WJ-8700/488 IEEE-488 REMOTE CONTROL INTERFACE OPTION OPERATION

The following paragraph provide further details of WJ-8700 remote operations when the WJ-8700/488 IEEE-488 Remote Control Interface Option is installed, and apply only to IEEE-488 I/O operations. For additional information on the IEEE-488 interface, see the IEEE-488.2 Interface Specification. Refer to **paragraph 2.6** of the WJ-8700 Installation and Operation Manual for information concerning the receiver remote command messages. For information concerning the operation of the WJ NET control interface, refer to the WJ-8700 Installation and Operation Manual.

B.3.1 IEEE-488 INTERFACE

The WJ-8700 may be interfaced with an external controller via the IEEE-488 Remote Control Interface (connector J13 on the WJ-8700). The IEEE-488 interface provides both talk and listen capabilities between the WJ-8700 and the controller, transferring data in a bit-parallel, byte-serial form. Sixteen interconnecting lines plus eight ground and shield lines form the interface. The sixteen interconnecting lines consist of eight bi-directional data bus lines, three data byte transfer lines, and five bus management lines. Data or address (command) information is transferred between the two devices using the eight data bus lines (DIO1-DIO8). The three data byte transfer lines (DAV, NRFD, and NDAC) indicate the availability and validity of the information on the data bus lines, the readiness of the listening device to accept data, and whether the data has been accepted. Four of the five interface management lines (ATN, SRQ, IFC, and EOI) are used to indicate whether the data bus is carrying data or address information, to request service, to clear the interface, and to indicate the end of a transfer sequence. The fifth line (REN) is not used.

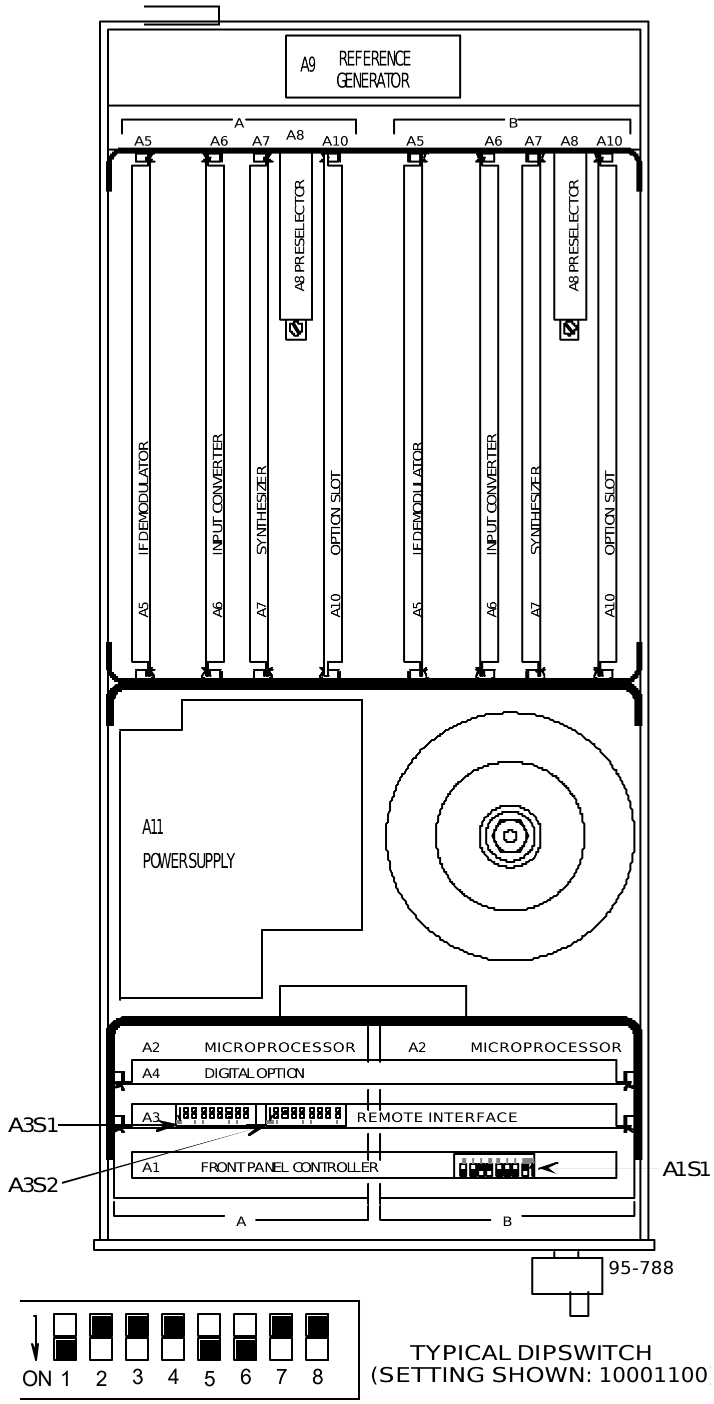


Figure B-1. WJ-8700/488 Option PC Card Location

As implemented on the WJ-8700, the capabilities of the IEEE-488 interface include:

SH1................. Source handshake
AH1................ Acceptor handshake
TE6................. Extended basic talker, serial poll and unaddress if MLA
LE4................. Extended basic listener and unaddress if MTA
SR1................. Service request
RL0................. No Remote/Local capability (ignores REN bus command)
PP0................. No parallel poll
DC1 .... Device clear
DT0 .... No device trigger capability
E2................... Tri-state driver
C0................... No controller capability

This means that the WJ-8700 can talk or listen when commanded by a controller. The unit can also initiate a SRQ to the controller and reply to the controller's serial poll, and will respond to SDC (Selected Device Clear) and DCL (Universal Device Clear). Note that the condition of the Remote Enable (REN) line has no effect on unit operation. **Figure B-2** shows the IEEE-488 connector installed at J13.

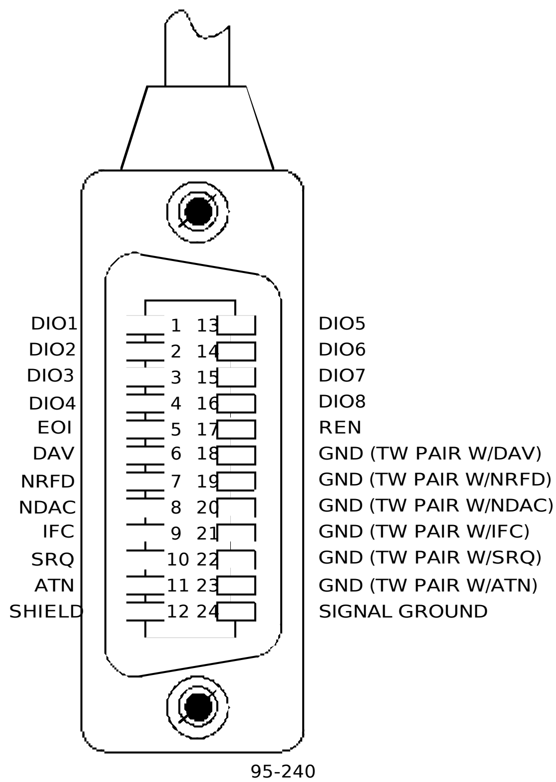


Figure B-2. IEEE-488 Connector, J13

B.3.2 ADDRESSING

Extended addressing is used in order to pass information from a controller to a slave receiver through the IEEE-488 interface. The primary address selects equipment frame, while the secondary address selects the desired receiver residing in the selected frame.

The frame address may be controlled via the WJ-8700 Front Panel, or assigned through the setting of sections 1 through 5 of DIP switch A3S1, located on Remote Interface Card A3 (Type 796857-1) and shown in **Figure B-1**. Refer to the WJ-8700 Installation and Operation Manual for details concerning the two types of frame address selection.

When the frame address is set via A3S1, refer to **Table B-1** for proper switch settings. Note that frame address 11111 (31) is not valid and should not be used; only addresses 00000 through 11110 (0 through 30) are valid.

Table B-1. IEEE-488 Frame Address Selection

Frame Address	A3S1 Section				
	5	4	3	2	1
00	0	0	0	0	0
01	0	0	0	0	1
02	0	0	0	1	0
03	0	0	0	1	1
04	0	0	1	0	0
05	0	0	1	0	1
06	0	0	1	1	0
07	0	0	1	1	1
08	0	1	0	0	0
09	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1
16	1	0	0	0	0
17	1	0	0	0	1
18	1	0	0	1	0
19	1	0	0	1	1
20	1	0	1	0	0
21	1	0	1	0	1
22	1	0	1	1	0
23	1	0	1	1	1
24	1	1	0	0	0
25	1	1	0	0	1
26	1	1	0	1	0
27	1	1	0	1	1
28	1	1	1	0	0
29	1	1	1	0	1
30	1	1	1	1	0
NOT VALID - DO NOT USE	1	1	1	1	1

The receiver address within the frame is configured in hardware and cannot be changed. Receiver A uses a fixed secondary address of 1. Receiver B uses a fixed secondary address of 2. Any attempt to communicate with a receiver which has no Microprocessor/ Motherboard (A2) card installed will result in an interface timeout.

B.3.3 COMMUNICATION PROTOCOL

B.3.3.1 Character and Buffer I/O Modes

Either the Character or Buffer I/O mode can be selected by DIP switch A3S1-8 (see **Table 2-2** in the WJ-8700 Installation and Operation Manual). In the Character mode, the Remote Control Interface card will transfer data received from an external controller to a selected receiver without waiting for a terminator. In Buffer mode, the Remote Control Interface card will transfer data received from an external controller to a selected receiver only when a terminator is received.

B.3.3.2 Message Terminator

A valid terminator consists of a LF character, or a "true" on the EOI status line. Upon receiving either of these terminators, the Remote Control Interface will not accept any additional incoming data from an external controller until the previously-received message (including terminator) has been transferred to the output buffer.

The Remote Control Interface will terminate the output message to the IEEE-488 interface bus if a terminator is received from the selected receiver and a EOI status line inserted.

NOTE

It is the responsibility of the external controller to know the terminator protocol of any receiver it wishes to control and query, in order to successfully communicate with that receiver.

B.3.3.3 Query

The Remote Control Interface will monitor for a "?" character. Upon receiving this character, the Interface will wait to receive a message from a receiver as soon as the transfer of data to that receiver is completed.

A response message from a receiver will not be accessible to the IEEE-488 interface until the "LF" character is received from that receiver.

B.3.3.4 Device Clear and Selected Device Clear

The Device Clear (DCL) command is only supported in the IEEE-488 buffer mode. Upon receipt of a DCL command in the buffer mode, only the input buffer of the IOC is cleared.

B.3.3.5 **Service Request**

The IEEE-488 Remote Control Interface card supports the serial poll function. However, serial poll must be performed with secondary addressing. When the Remote Control Interface receives a SRQ from a receiver, it immediately passes that SRQ to the external controller. The SRQ merely acts as a flag, causing the controller to initiate a serial poll of the two receivers in the frame. When the "talk" secondary address (i.e., 1 or 2) of each receiver is received by the Remote Control Interface, it places a status byte from the polled receiver into a serial poll register.

NOTE

The firmware and Status Byte Registers of the receiver(s) installed in the equipment frame are designed to have the capability of generating a service request when a Message Available (MAV) flag is set. However, the generation of a service request via the MAV bit in the receivers' Status Byte Registers causes communications conflicts when "talking" to the remote controller via the IOC-488. To ensure no communications conflicts occur, the enable bit (enMAV) in the receivers' Service Request Enable Register must remain in the off (0) state. This disables the MAV generation of a service request.

B.3.3.6 **Buffer Handling**

The IEEE-488 buffers are handled in linear fashion. When a valid terminator has been received, the Remote Control Interface will accept no further data until all data in the input buffer has been transferred to the output buffer. Data in the output buffer is made available to an external controller upon receiving a LF character from a queried receiver. The data in the output buffer is read destructively, and the Remote Control Interface empties the output buffer of any remaining unread data upon receiving a new query message from the external controller.

In response to either SDC or DCL, the IEEE-488 Remote Control Interface empties both its input and output buffers. Either buffer will hold up to 512 bytes of data.

B.4 REPLACEMENT PARTS LIST

B.4.1 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.

B.4.2 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).

B.4.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address	Mfr. Code	Name and Address
00779	AMP Inc. 2800 Fuling Mill Road P.O. Box 3608 Middletown, PA 17105-3608	22526	Du Pont E I De Nemours and Co., Inc. Du Pont Connector Systems Rt 141 and Rt 48 BMP 19 Wilmington, DE 19880-0019
14632	DRS Signal Solutions, Inc. 700 Quince Orchard Rd. Gaithersburg, MD 20878-1706		

B.4.4 PARTS LIST

The following parts lists contain all the major electrical components provided with this option, along with mechanical parts which may be subject to unusual wear or damage. When ordering replacement parts from the factory, 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.4.3**, and the manufacturer's part number, provided in **paragraph B.4.5**, 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 B.4.5** 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.

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

B.4.5 TYPE WJ-8700/488 IEEE-488 REMOTE INTERFACE OPTION

	Revision D1				
A3	Remote Interface PC Assembly	1	796857-1	14632	
J13	Connector, Receptacle, 24 Pin	1	554349-1	00779	
W14	Cable Assembly	1	382426-1	14632	
W14J13	Connector, Receptacle, 24-Pin	1	554349-1	00779	
W14P1	Connector, Plug, 24 Socket	1	66900-124	22526	

APPENDIX C

TYPE WJ-8700/XSM1 455 kHz SIGNAL MONITOR OUTPUT OPTION

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

APPENDIX C

TYPE WJ-8700/XSM1 455 kHz SIGNAL MONITOR OUTPUT OPTION

LIST OF TABLES

LIST OF ILLUSTRATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C

TYPE WJ-8700/XSM1 455 kHz SIGNAL MONITOR OUTPUT OPTION

C.1 GENERAL DESCRIPTION

The WJ-8700/XSM1 455 kHz Signal Monitor Output Option consists of an internal cabling change to either or both receiver channels in the WJ-8700 Dual VLF/HF Receiver. This cabling change alters the signal monitor output frequency of the affected channels from 40.455 MHz to 455 kHz. The SMO bandwidth is 8, 16, or 32 kHz, depending on the bandwidth set installed. No additional modules are required with this option.

Figure C-1 depicts the cabling change necessary to implement the WJ-8700/XSM1 Option. As shown in the figure, the standard 40.455 MHz interconnection consists of a cable from the rear panel SMO jack (SMO A or SMO B, depending on the receiver channel) to J2 of the appropriate Input Converter, A6A or A6B. The change to 455 kHz SMO involves connecting the cable from the rear panel SMO jack to J3 on the Input Converter. No other alterations are necessary. **Table C-1** lists the specifications for the optional 455 kHz signal monitor output.

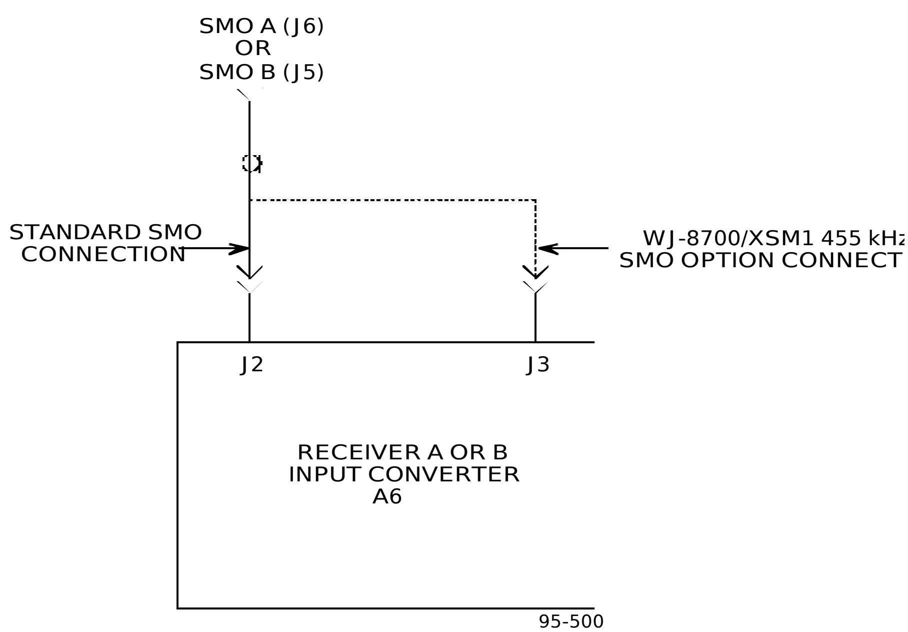


Figure C-1. SMO Interconnection Diagram

Table C-1. WJ-8700/XSM1 455 kHz SMO Specifications

Center Frequency	455 kHz
Bandwidth	8, 16, or 32 kHz (set by 2nd IF input filter bandwidth)
Output Level	20 dB above RF input (nominal)
Output Impedance	50 ohms

C.2 PARTS LIST

No unique devices or components are used with the WJ-8700/XSM1 Option. Refer to the WJ-8700 Installation and Operation Manual for identification of mechanical and electrical components, manufacturer information, and recommended vendors.

APPENDIX D

WJ-8700/XSM2 21.4 MHz SIGNAL MONITOR OUTPUT OPTION

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

APPENDIX D

WJ-8700/XSM2 21.4 MHz SIGNAL MONITOR OUTPUT OPTION

LIST OF TABLES

LIST OF ILLUSTRATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D

WJ-8700/XSM2 21.4 MHz SIGNAL MONITOR OUTPUT OPTION

D.1 GENERAL DESCRIPTION

The WJ-8700/XSM2 21.4 MHz Signal Monitor Output Option provides a signal monitor output (SMO) frequency of 21.4 MHz from the WJ-8700 Dual VLF/HF Receiver, in lieu of the standard 40.455 MHz output. This option, which may be installed in either or both receiver channels, allows the WJ-8700 to be used with displays which require a 21.4 MHz signal monitor input signal, such as the WJ-9205 and WJ-9206 Signal Monitors.

The WJ-8700/XSM2 Option is implemented by the installation of additional circuitry into Receiver A and/or Receiver B of the WJ-8700. The additional circuitry is contained on RF Option PC card A10, which plugs into the RF option slot on the Receiver A and/or Receiver B Microprocessor/Motherboard, A2.

Table D-1 lists the signal monitor output specifications when the WJ-8700/XSM2 Option is installed.

Table D-1. WJ-8700/XSM2 21.4 MHz SMO Specifications

Center Frequency	21.4 MHz
Bandwidth	500 kHz nominal
Output Level	+17 dB above RF input (nominal)
Output Impedance	50 ohms

D.2 FUNCTIONAL DESCRIPTION

As shown in **Figure D-1**, the WJ-8700/XSM2 Option provides an extra stage of frequency conversion which translates the standard 40.455 MHz Signal Monitor Output to 21.4 MHz. The 40.455 MHz 1st IF signal is amplified and routed to a double-balanced mixer, where it is mixed with a 61.855 MHz signal from a phase-locked conversion oscillator. The resulting 21.4 MHz output is filtered, amplified, and routed to the appropriate SMO rear-panel connector of the WJ-8700.

D.3 OPERATIONAL CONSIDERATIONS

The signal monitor output spectrum of the WJ-8700 Receiver with standard 40.455 MHz SMO is inverted with respect to the RF input spectrum. In the 21.4 MHz SMO Converter contained in the WJ-8700/XSM2 Option, however, the frequency relationship between the 40.455 MHz converter input signal and the 61.855 MHz conversion oscillator results in an additional frequency inversion. This second inversion results in the 21.4 MHz signal monitor output spectrum being upright with respect to the WJ-8700 Receiver RF input spectrum.

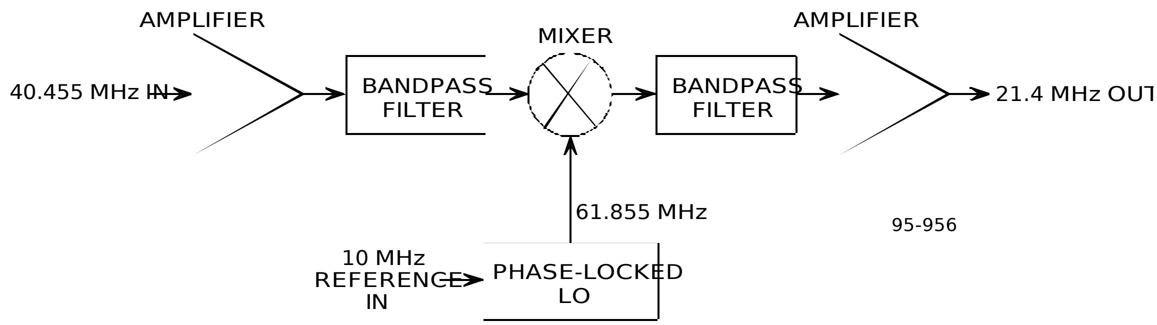


Figure D-1. 21.4 MHz SMO Converter Functional Block Diagram

D.4 REPLACEMENT PARTS LIST

D.4.1 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.

D.4.2 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).

D.4.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address
14632	DRS Signal Solutions, Inc. 700 Quince Orchard Rd. Gaithersburg, MD 20878-1706

D.4.4 PARTS LIST

The following parts lists contain all the major electrical components provided with the option, along with mechanical parts which may be subject to unusual wear or damage. When ordering replacement parts from the factory, 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 D.4.3**, and the manufacturer's part number, provided in **paragraph D.4.5**, 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 D.4.5** 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 improved semiconductors become available, it is the policy of the factory 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
D.4.5	**TYPE WJ-8700/XSM2 21.4 MHz SIGNAL MONITOR OUTPUT OPTION**				
	Revision D1				
A10	SMO Converter PC Assembly	1	796928-2	14632	

APPENDIX E

WJ-8700/XOP1 SMO/BASEBAND CONVERTER OPTION

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

APPENDIX E

WJ-8700/XOP1 SMO/BASEBAND CONVERTER OPTION

LIST OF TABLES

LIST OF ILLUSTRATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX E

WJ-8700/XOP1 SMO/BASEBAND CONVERTER OPTION

E.1 GENERAL DESCRIPTION

The WJ-8700/XOP1 SMO/Baseband Converter Option provides a signal monitor output (SMO) frequency of 21.4 MHz from the WJ-8700 Dual VLF/HF Receiver, in lieu of the standard 40.455 MHz output. This option, which may be installed in either or both receiver channels, allows the WJ-8700 to be used with displays which require a 21.4 MHz input signal, such as the WJ-9205 or the WJ-9206 Signal Monitors. This option also provides a 256 kHz bandwidth, 135 kHz center frequency Baseband Converter signal at the rear panel connector. The switched IF feature is not available when this option is installed.

The WJ-8700/XOP1 Option is implemented mainly by the installation of an additional PC board into Receiver A and/or Receiver B of the WJ-8700. This additional board is installed into the RF Option Slot, A10, on the Receiver A and/or Receiver B Microprocessor/Motherboard, A2.

In addition, a Type 796863-2 Preselector Module (A8) is installed in the WJ-8700 when the WJ-8700/XOP1 option is installed, in place of the Type 796863-1 Preselector Module that is normally installed. The only difference between the two modules is the cable type used to connect them to the Motherboard Assembly. All electrical characteristics between the two are identical.

Table E-1 lists the signal monitor output and baseband converter output specifications when the WJ-8700/XOP1 Option is installed.

Table E-1. WJ-8700/XOP1 SMO/Baseband Converter Specifications

SMO Center Frequency	21.4 MHz
SMO Bandwidth	500 kHz nominal
SMO Output Level	+17 dB above RF input (nominal)
SMO Output Impedance	50 ohms
BBC Center Frequency	135 kHz
BBC Bandwidth	256 kHz
BBC Output Gain Control	Manual
BBC Output Range	0 to 90 dB

E.2 FUNCTIONAL DESCRIPTION

As shown in **Figure E-1**, the WJ-8700/XOP1 Option provides an extra stage of frequency conversion which translates the standard 40.455 MHz Signal Monitor Output to 21.4 MHz. The 40.455 MHz 1st IF signal is amplified and routed to a double-balanced mixer, where it is mixed with a 61.855 MHz phase-locked conversion oscillator. The resulting 21.4 MHz output is filtered, amplified, and routed to the appropriate SMO rear panel connector of the WJ-8700.

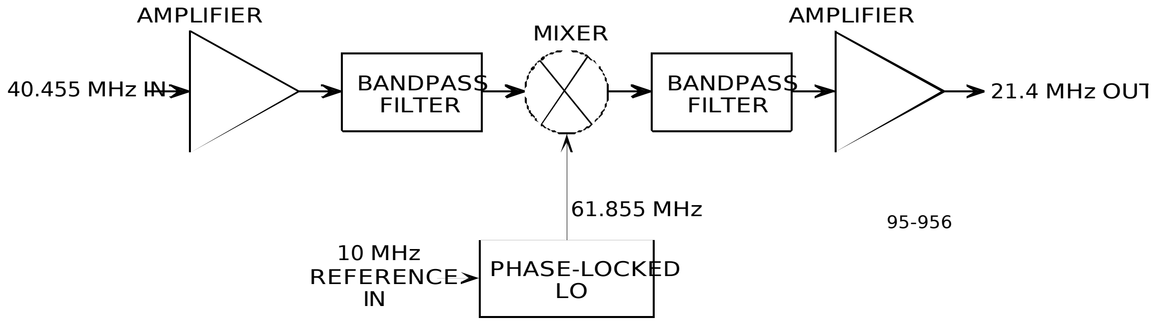


Figure E-1. 21.4 MHz SMO Converter Functional Block Diagram

As shown in **Figure E-2**, the WJ-8700/XOP1 Option provides a baseband signal at the rear panel. The 40.455 MHz 1st IF signal is amplified and routed through a bandpass filter. It is then amplified with the AGC and routed to a balanced mixer, where it is mixed with a 40 MHz signal. The resulting 455 kHz signal is then amplified and routed through a band pass filter. This signal is then routed to a balanced mixer, where it is mixed with the 590 kHz signal from the phase-locked conversion oscillator. The resulting signal is then routed through a low pass filter, amplified, and output through the rear panel connector. This signal has a 256 kHz bandwidth with a center frequency of 135 kHz.

E.3 OPERATIONAL CONSIDERATIONS

The signal monitor output spectrum of the WJ-8700 Receiver with standard 40.455 MHz SMO is inverted with respect to the RF input spectrum. In the 21.4 MHz SMO Converter contained in the WJ-8700/XOP1 Option, however, the frequency relationship between the 40.455 MHz converter input signal and the 61.855 MHz conversion oscillator results in an additional frequency inversion. This second inversion results in the 21.4 MHz signal monitor output spectrum being upright with respect to the WJ-8700 Receiver RF input spectrum.

The baseband converter output signal of the WJ-8700 Receiver is centered at 135 kHz and has a bandwidth of 256 kHz. The baseband output replaces the switched IF output on the rear panel of the receiver.

Several additional front panel and remote operations become available with the WJ-8700/XOP1 option. See the following paragraphs.

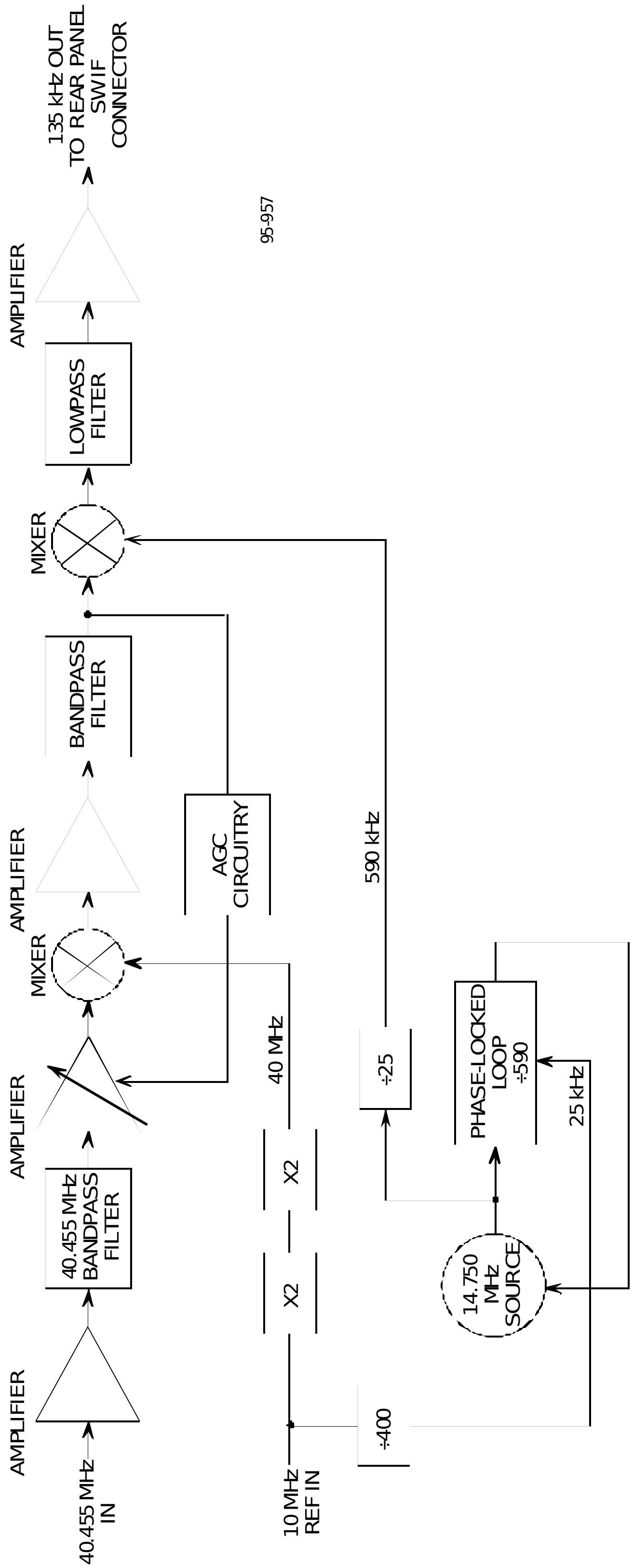


Figure E-2. Baseband Converter Functional Block Diagram

E.3.1 FRONT PANEL OPERATIONS ASSOCIATED WITH WJ-8700/XOP1 OPTION

When the WJ-8700/XOP1 Option is installed, the baseband converter gain (bc-gain) and the baseband converter output parameters (bc-outp) are displayed on the Device Configuration menu.

E.3.2 REMOTE OPERATIONS ASSOCIATED WITH WJ-8700/XOP1 OPTION

Table E-2 shows the remote commands associated with the WJ-8700/XOP1 option.

Table E-2. WJ-8700/XOP1 Remote Commands

Command	Response	Description
BAT nrf		Set baseband manual gain value. This command is only valid when the WJ-8700/XOP1 or WJ-8700/XOP2 option is installed. Range: 00 to 90 dB
BAT?	BAT nr1	Request the BAT value. This command is only valid when the WJ-8700/XOP1 or WJ-8700/XOP2 option is installed. Reset: BAT 00 Default: BAT 00 Example: BAT 24
BOC nrf		Set baseband output control to enable or disable the output. This command is only valid when the WJ-8700/XOP1 option is installed. 0 = disabled 1 = enabled
BOC?	BOC nr1	Request the current BOC status. This command is only valid when the WJ-8700/XOP1 option is installed. Reset: BOC 1 Default: BOC 1 Example: BOC 0

E.4 REPLACEMENT PARTS LIST

E.4.1 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.

E.4.2 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).

E.4.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address
14632	DRS Signal Solutions, Inc. 700 Quince Orchard Rd. Gaithersburg, MD 20878-1706

E.4.4 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 the factory, 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 E.4.5**, and the manufacturer's part number, provided in **paragraph E.4.5**, 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 E.4.5** 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 improved semiconductors become available, it is the policy of the factory 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

E.4.5 TYPE WJ-8700/XOP1 SMO/BASEBAND CONVERTER OPTION

	Revision D1				
A8	Preselector Assembly	1	796863-2	14632	
A10	SMO/Switched IF Converter Assembly	1	796914-1	14632	

NOTES

APPENDIX F

WJ-8700/XOP2 SMO/BASEBAND CONVERTER OPTION

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

APPENDIX F

WJ-8700/XOP2 SMO/BASEBAND CONVERTER OPTION

LIST OF TABLES

LIST OF ILLUSTRATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX F

WJ-8700/XOP2 SMO/BASEBAND CONVERTER OPTION

F.1 GENERAL DESCRIPTION

The WJ-8700/XOP2 SMO/Baseband Converter Option provides a signal monitor output (SMO) frequency of 21.4 MHz from the WJ-8700 Dual VLF/HF Receiver, in lieu of the standard 40.455 MHz output. This option, which may be installed in either or both receiver channels, allows the WJ-8700 to be used with displays which require a 21.4 MHz input signal, such as the WJ-9205 or the WJ-9206 Signal Monitors. This option also provides a 20 kHz bandwidth, 15 kHz center frequency Baseband Converter signal at the rear panel connector. The switched IF feature is not available when this option is installed.

The WJ-8700/XOP2 Option is implemented by the installation of an additional PC board into Receiver A and/or Receiver B of the WJ-8700. This additional board is installed into the RF Option Slot, A10, on the Receiver A and/or Receiver B Microprocessor/Motherboard, A2.

Table F-1 lists the signal monitor output and baseband converter output specifications when the WJ-8700/XOP2 Option is installed.

Table F-1. WJ-8700/XOP2 SMO/Baseband Converter Specifications

SMO Center Frequency	21.4 MHz
SMO Bandwidth	500 kHz minimum
SMO Output Level	+17 dB above RF input (nominal)
SMO Output Impedance	50 ohms
BBC Center Frequency	15 kHz
BBC Bandwidth	20 kHz
BBC Output Gain Control	Automatic or Manual
BBC Output Range	0 to 90 dB

F.2 FUNCTIONAL DESCRIPTION

As shown in **Figure F-1**, the WJ-8700/XOP2 Option provides an extra stage of frequency conversion which translates the standard 40.455 MHz Signal Monitor Output to 21.4 MHz. The 40.455 MHz 1st IF signal is amplified and routed to a double-balanced mixer, where it is mixed with a 61.855 MHz signal from a phase-locked conversion oscillator. The resulting 21.4 MHz output is filtered, amplified, and routed to the appropriate SMO rear panel connector of the WJ-8700.

As shown in **Figure F-2**, the WJ-8700/XOP2 Option provides a baseband signal at the rear panel. The 455 kHz signal from the Input Converter (A6) is amplified and routed through a bandpass filter. It is then variably amplified with the AGC or the manual gain. This signal is then routed to a balanced mixer, where it is mixed with the 470 kHz signal from the phase-locked conversion oscillator. The resulting signal is then routed through a low pass filter, amplified, and output through the rear panel connector. This signal has a 20 kHz bandwidth with a center frequency of 15 kHz.

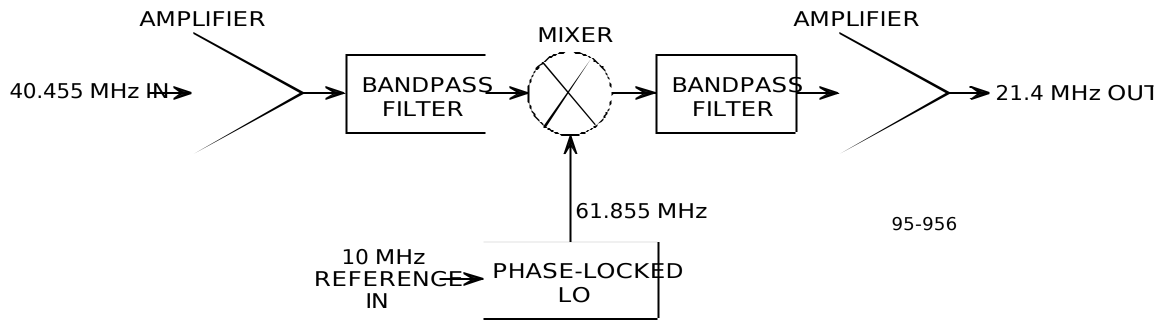


Figure F-1. 21.4 MHz SMO Converter Functional Block Diagram

F.3 OPERATIONAL CONSIDERATIONS

The signal monitor output spectrum of the WJ-8700 Receiver with standard 40.455 MHz SMO is inverted with respect to the RF input spectrum. In the 21.4 MHz SMO Converter contained in the WJ-8700/XOP2 Option, however, the frequency relationship between the 40.455 MHz converter input signal and the 61.855 MHz conversion oscillator results in an additional frequency inversion. This second inversion results in the 21.4 MHz signal monitor output spectrum being upright with respect to the WJ-8700 Receiver RF input spectrum.

The baseband converter output signal of the WJ-8700 Receiver is centered at 15 kHz and has a bandwidth of 20 kHz. The baseband output replaces the switched IF output on the rear panel of the receiver.

When the WJ-8700/XOP2 option is installed, there are several additional front panel and remote operations. See the following paragraphs.

F.3.1 FRONT PANEL OPERATIONS ASSOCIATED WITH WJ-8700/XOP2 OPTION

When the WJ-8700/XOP2 Option is installed, the baseband converter gain (bc-gain) and the baseband converter agc parameters (bc-agc) are included on the Device Configuration menu.

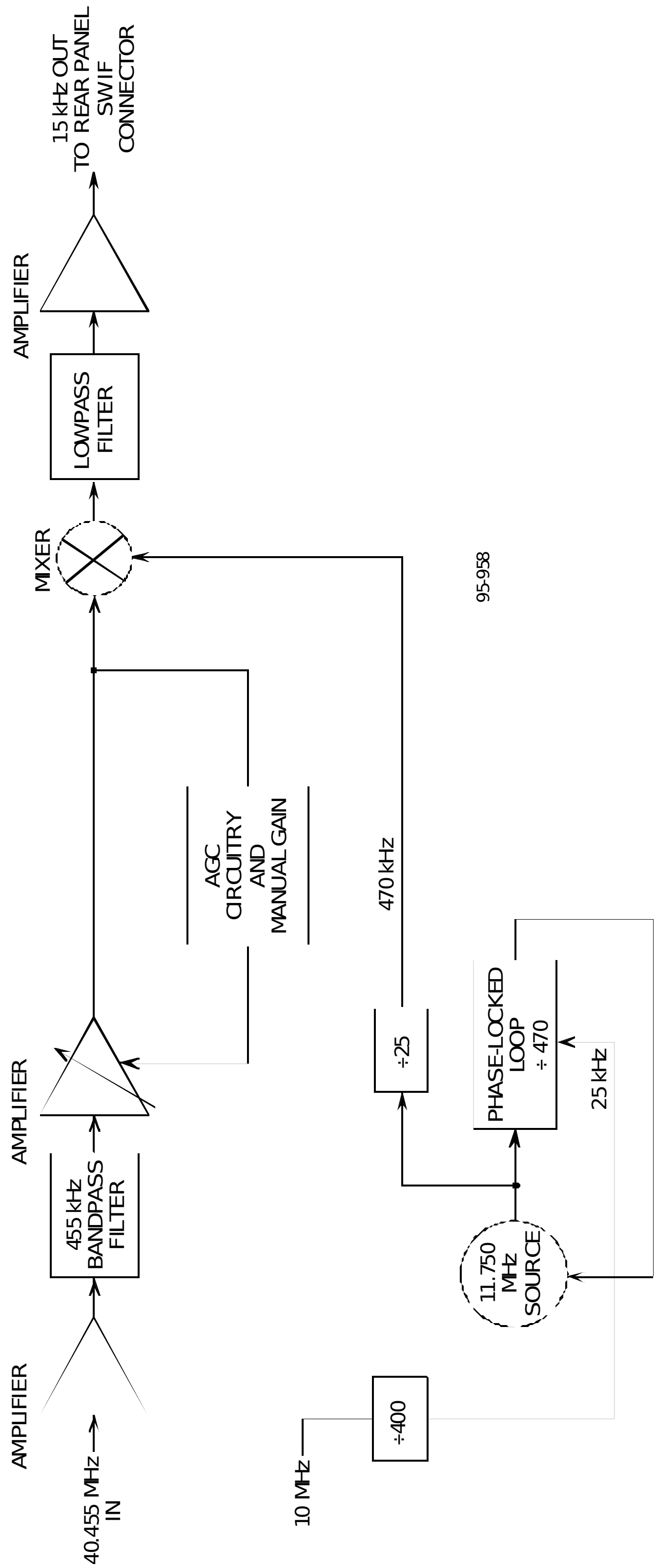


Figure F-2. Baseband Converter Functional Block Diagram

F.3.2 REMOTE OPERATIONS ASSOCIATED WITH WJ-8700/XOP2 OPTION

Table F-2 shows the remote commands associated with the WJ-8700/XOP2 option.

Table F-2. WJ-8700/XOP2 Remote Commands

Command	Response	Description
BAG nrf		Set baseband automatic gain control on or off. This command is only valid when the WJ-8700/XOP2 option is installed. 0 = off 1 = on
BAG?	BAG nr1	Request the current BAG status. This command is only valid when the WJ-8700/XOP2 option is installed. Reset: BAG 1 Default: BAG 1 Example: BAG 0
BAT nrf		Set baseband manual gain value. This command is only valid when the WJ-8700/XOP1 or WJ-8700/XOP2 option is installed. Range: 00 to 90 dB
BAT?	BAT nr1	Request the BAT value. This command is only valid when the WJ-8700/XOP1 or WJ-8700/XOP2 option is installed. Reset: BAT 00 Default: BAT 00 Example: BAT 24

F.4 REPLACEMENT PARTS LIST

F.4.1 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.

F.4.2 **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).

F.4.3 **LIST OF MANUFACTURERS**

Mfr. Code	Name and Address
14632	DRS Signal Solutions, Inc. 700 Quince Orchard Rd. Gaithersburg, MD 20878-1706

F.4.4 **PARTS LIST**

The following parts lists contain all the major electrical components provided with the option, along with mechanical parts which may be subject to unusual wear or damage. When ordering replacement parts from the factory, 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 F.4.3**, and the manufacturer's part number, provided in **paragraph F.4.5**, 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 F.4.5** 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 improved semiconductors become available, it is the policy of the factory 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
F.4.5	**TYPE WJ-8700/XOP2 SMO/BASEBAND CONVERTER OPTION**				
	Revision D1				
1	SMO/Baseband Converter Assembly	1	796928-1	14632	

APPENDIX G

FOR THE

WJ-8700/232 RS-232C REMOTE INTERFACE OPTION

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

APPENDIX G

TYPE WJ-8700/232 RS-232C REMOTE INTERFACE OPTION

LIST OF TABLES

LIST OF ILLUSTRATIONS

PRELIMINARY

APPENDIX G

TYPE WJ-8700/232 RS-232C REMOTE INTERFACE OPTION

G.1 GENERAL DESCRIPTION

The WJ-8700/232 RS-232C Remote Control Interface provides a means for controlling both receiver channels of a WJ-8700 Dual VLF/HF Receiver with an external RS-232C controller. The NET control interface is also provided as part of this option. The WJ-8700/232 Option consists of one additional PC card which plugs into the digital control section of the WJ-8700 Receiver mainframe.

G.2 MECHANICAL DESCRIPTION

The WJ-8700/232 Option consists of a PC card which plugs directly into a slot near the front of the WJ-8700 Receiver mainframe, behind the Front Panel Controller PC board. There are two PC card option slots located at the front of the mainframe, however the WJ-8700/232 Option PC must be installed in the front-most slot (the slot immediately behind the Front Panel Controller). **Figure G-1** shows the location of the card, which contains DIP switches A3S1 and A3S2.

G.3 ELECTRICAL DESCRIPTION

The RS-232C Remote Interface provides both talk and listen capabilities between the WJ-8700 Host Interface and the external controller. Seven interconnecting lines plus a ground line form the RS-232C interface. The seven interconnecting lines consist of the following signals: DCD, DSR, RXD, RTS, TXD, CTS, and DTR. The data word format is fixed and comprised of the following:

One start bit
Seven bits of data
One address/data bit
One stop bit

The baud rate is remotely selectable for 300 to 19200 bits per second (bps). Refer to **paragraph G.4.2**.

G.4 INSTALLATION

This option is installed at the factory.

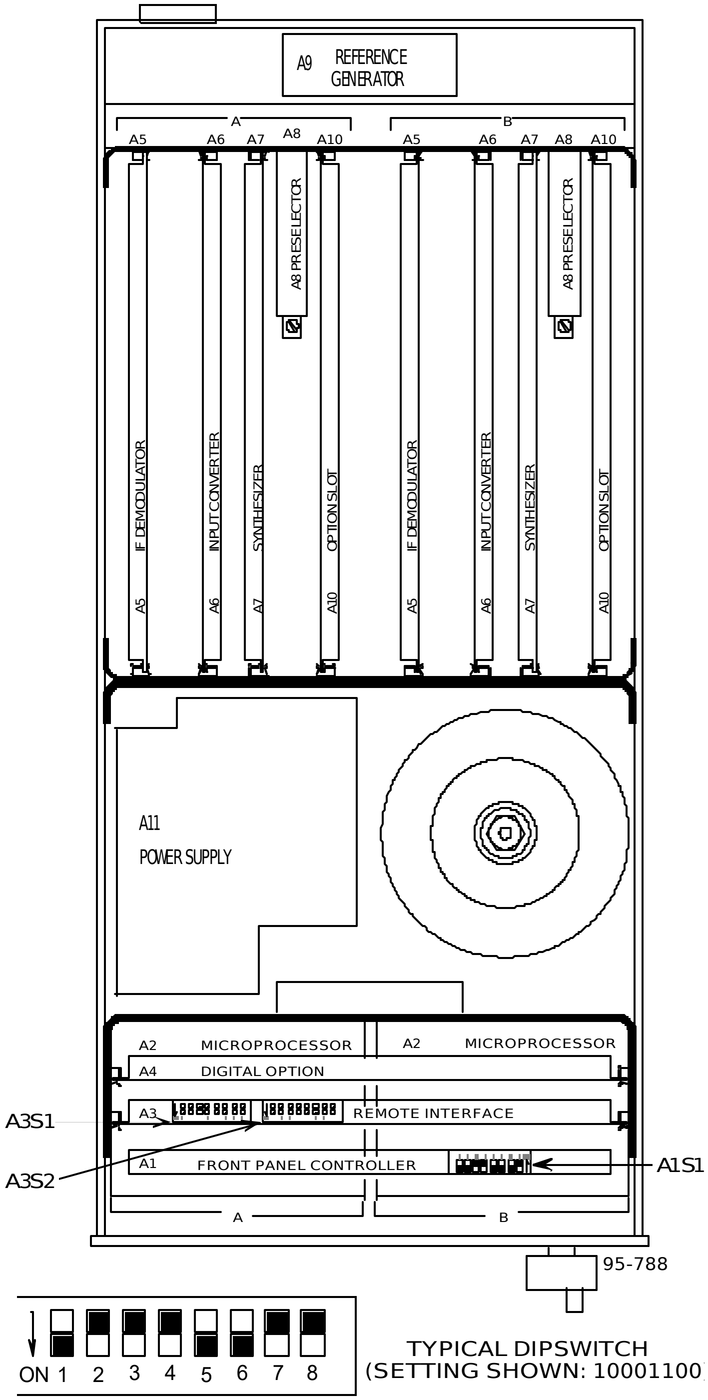
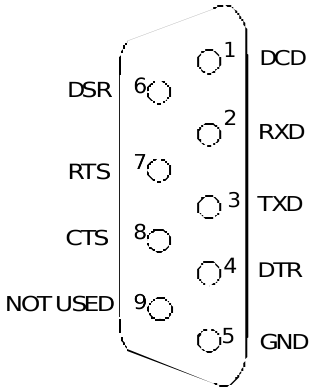


Figure G-1. WJ-8700 Dip Switch Locations

G.4.1 REMOTE I/O CONNECTOR, J13

This 9-pin D-type male subminiature RS-232C connector permits the connection of a remote controller to the WJ-8700 Equipment Frame. This connector is mounted on the rear panel of the WJ-8700. Refer to **Figure G-2** for the pin assignments.



PIN	SIGNAL	DIRECTION
1	DCD	INPUT
2	RXD	INPUT
3	TXD	OUTPUT
4	DTR	OUTPUT
5	GND	
6	DSR	INPUT
7	RTS	OUTPUT
8	CTS	INPUT
9	NOT USED	

95-962

Figure G-2. Pin Assignments for the Remote I/O Connector, J13

G.4.2 CHANGING THE USER-SPECIFIED RS-232C BAUD RATE

The Remote Interface RS-232C baud rate may be changed to another value other than the default value of 9600 bps. The available baud rates are: 300, 600, 1200, 2400, 4800, 7200, 9600 and 19200. Both single-drop and multi-drop interface modes support baud rate selection.

To change the baud rate, the applicable switches in DIP switch A3S1 must be set to select the baud rate. See **Figure G-1**. Refer to **Table G-1** for the switch settings. Baud rate selection should be set before power up of the RS-232C Remote Interface option.

Table G-1. A3S1 Switch Settings

-8	-7	-6	Baud Rate
0	0	0	300
0	0	1	600
0	1	0	1200
0	1	1	2400
1	0	0	4800
1	0	1	7200
1	1	0	9600 (factory default)
1	1	1	19200

G.5 WJ-8700/232 RS-232 REMOTE CONTROL INTERFACE OPTION OPERATION

The following paragraphs provide further details of the WJ-8700 remote operations when the WJ-8700/232 RS-232C Remote Control Interface Option is installed, and apply only to RS-232C I/O operations. For information concerning the operation of the NET control interface, refer to the WJ-8700 Installation and Operation Manual.

The RS-232C Remote Interface option consists of two modes of operation; single-drop and multi-drop. Single-drop interface mode allows one controller to communicate with the equipment frame containing two receivers. The single-drop mode uses a full-duplex format. Refer to **Figure G-3**. The multi-drop interface mode allows one controller to communicate with up to six equipment frames, with each frame containing two receivers. However, the equipment frame address can be set from 1 to 30. The multi-drop interface mode uses a half-duplex format. Refer to **Figure G-4**.

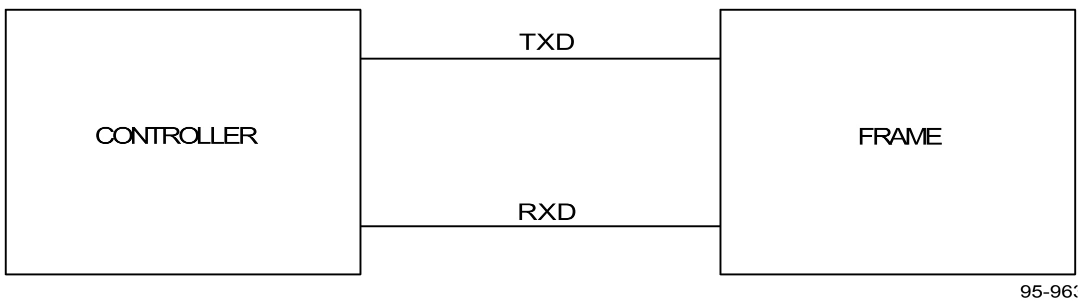


Figure G-3. Single-drop Interface Mode

G.5.1 ADDRESSING

Extended addressing is used in order to pass information from a controller to a slave receiver through the RS-232C interface. The primary address selects the equipment frame, while the secondary address selects the desired receiver residing in the selected frame. Single-drop addressing uses only the secondary address, while multi-drop addressing uses both the primary and secondary address.

The frame address (not to be confused with the net frame address) may be controlled via the WJ-8700 Front Panel, or assigned through the setting of sections 1 through 5 of DIP switch A3S1, located on the Remote Interface Card A3. Complete switch settings are given in **Table G-2**. Refer to the WJ-8700 Installation and Operation Manual for details concerning the two types of frame address selection.

When the frame address is set via A3S1, refer to **Table G-3** for proper switch settings. Note that frame address 11111 (31) is not valid and should not be used; only addresses 00000 through 11110 (00 through 30) are valid.

The receiver address within the frame is configured in hardware and cannot be changed. Receiver A has receiver address one, while receiver B has receiver address 2. Any attempt to select a location which has no receiver installed will result in an error message.

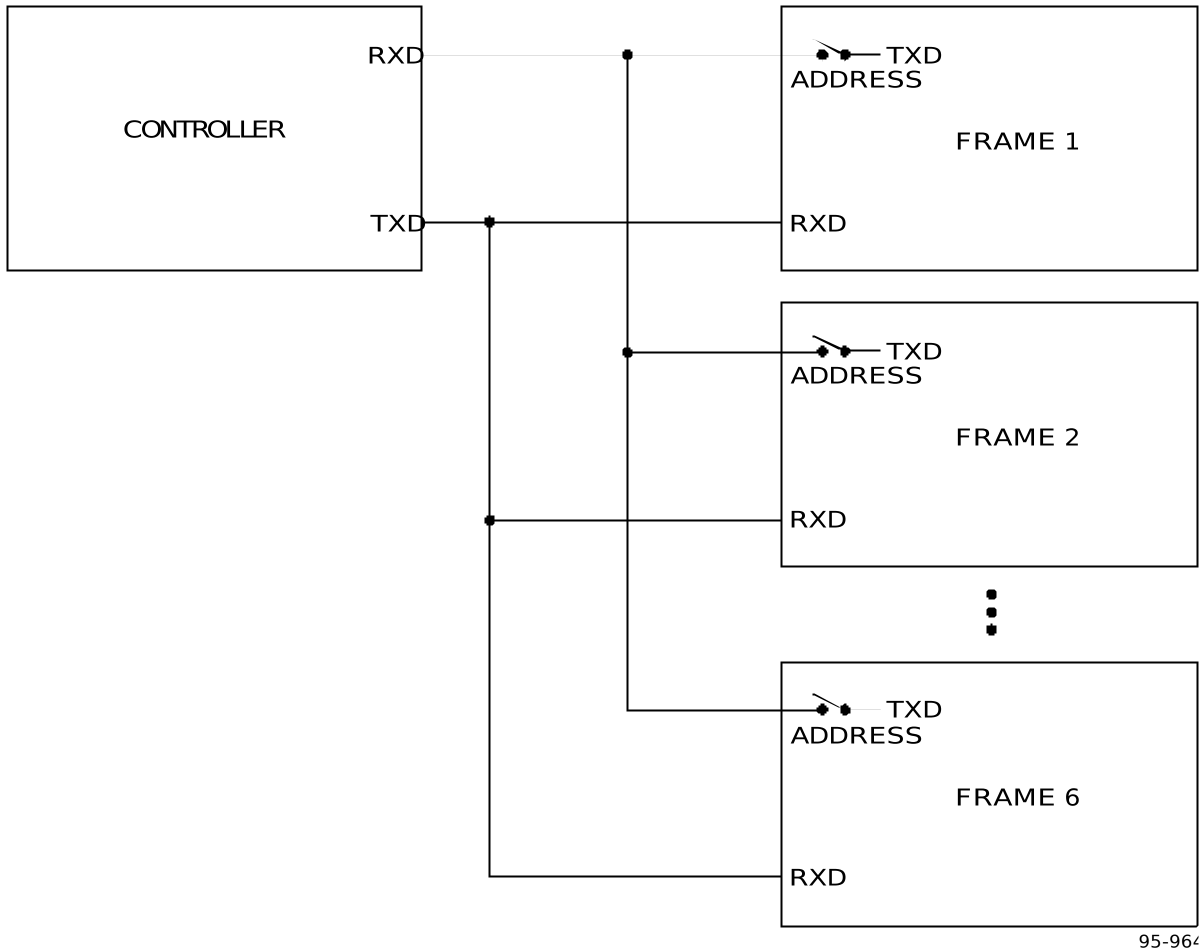


Figure G-4. Multi-drop Interface Mode

G.5.1.1 **Single-drop Interface Mode Addressing**

Frame address 00 is used to select the single-drop interface mode. The frame address is set using the DIP switch position 1 through 5 of the DIP switch A3S1, which is located on the IOC-SIO Remote Interface Assembly, A3. Refer to **Table G-3** for the proper switch settings.

Even though single-drop mode allows one controller to talk to only one WJ-8700 equipment frame, there can be up to two Receivers in that frame. Therefore, one external addressing command (Receiver Address Command) is required in order to pass information between the controller and the selected receiver. This command must be issued to the equipment frame before data can be passed to the selected receiver. Refer to **Table G-4** for the format of the receiver address command. Once the link is established between the controller and the receiver, there is no need to reissue the receiver address command unless the controller wishes to control a different receiver. The receiver's address within the frame is fixed: Receiver A's address is 1 and Receiver B's address is 2.

Table G-2. IOC-SIO Remote Interface Card DIP Switch Settings

Switch Section	Function	Setting
A3S1-1	Frame address selection (232/488)	Note 1
A3S1-2	Frame address selection (232/488)	Note 1
A3S1-3	Frame address selection (232/488)	Note 1
A3S1-4	Frame address selection (232/488)	Note 1
A3S1-5	Frame address selection (232/488)	Note 1
A3S1-6	Serial Interface baud rate select	Note 2
A3S1-7	Serial Interface baud rate select	Note 2
A3S1-8	Serial Interface baud rate select	Note 2
A3S2-1	Frame address selection (NET)	Note 3
A3S2-2	Frame address selection (NET)	Note 3
A3S2-3	Frame address selection (NET)	Note 3
A3S2-4	Frame address selection (NET)	Note 3
A3S2-5	Frame address selection (NET)	Note 3
A3S2-6	Front Panel baud rate select	Note 4
A3S2-7	Front Panel baud rate select	Note 4
A3S2-8	Front Panel/Internal remote address setting select	Note 5

NOTES:

1. Refer to **paragraph G.5.1** (RS-232C) for frame address settings. Refer to **Appendix B** (IEEE-488) for IEEE-488 address settings.

2. Factory default setting is 9600 baud. May be reconfigured in the field if required. Refer to **paragraph G.4.2**.

3. Refer to the WJ-8700 Installation and Operation Manual for the NET frame address settings.

4. Sets the baud rate between a WJ-8700 Front Panel and the Remote Interface card. Available settings are:

-7	-6	Baud Rate
0	0	1200
0	1	2400
1	0	9600 (factory default)
1	1	19200

5. Selects the method of defining the host/frame address for the Remote Interface Card. If set to 0, the host/frame addresses for 488/232 and NET default to the settings of A3S1-1 through A3S1-5 and A3S2-1 through A3S2-5, respectively. If set to 1, the host/frame address may be set via the Front Panel. The factory default setting is 1.

Table G-3. RS-232C Frame Address Selection

Interface Mode	Frame Address	A3S1 Section				
		5	4	3	2	1
Single-drop RS-232C	00	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
Not Valid - Do Not Use	31	1	1	1	1	1

G.5.1.2 Multi-drop Interface Mode Addressing

Frame addresses 01-30 are used to select the multi-drop interface mode. The frame address is set using the DIP switch position 1 through 5 of the DIP switch A3S1, which is located on the IOC-SIO Remote Interface card, A3. Refer to **Table G-3** for the proper switch settings.

In the multi-drop interface mode, one controller can communicate with up to six WJ-8700 equipment frames, with each frame containing up to two Receivers. Therefore, two external addressing commands (Frame Address and Receiver Address Commands) are required before information can be passed from the controller to a selected receiver through the selected WJ-8700 Equipment Frame. The frame address selects the equipment frame, while the receiver address selects the desired receiver residing in the selected frame. These two commands must be issued to the equipment frame prior to data being passed to the selected receiver. Refer to **Table G-4** for the format of the address commands.

The address command is implemented by using the most significant of the eight data bits (D7) as an address/data bit. A one (1) represents a bus command and a zero (0) represents a slave receiver command. Refer to **Table G-4**.

Table G-4. External Addressing 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	0	0	0	r	r	Receiver Address

NOTES: x = Don't care
f = Frame select bits (see **Table G-3**)
r = receiver select bits

D1	D0	
0	0	Not Used
0	1	RCVR A
1	0	RCVR B
1	1	Not Used

G.5.2 COMMUNICATION PROTOCOL

The communication protocol described in the following paragraphs is common between both single-drop and multi-drop interface modes. Refer to **paragraph G.5.3** for specific communications protocol information related only to the single-drop interface mode. Refer to **paragraph G.5.4** for specific protocol information related only to multi-drop interface mode.

G.5.2.1 Terminator

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

G.5.2.2 Device Clear

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

G.5.3 SINGLE-DROP INTERFACE MODE SPECIFIC COMMUNICATION PROTOCOL

The following paragraphs describe the single-drop RS-232C full-duplex serial interface format. The transmit data (TXD) and receive (RXD) data signals are used.

G.5.3.1 XON/XOFF Protocol

The XON/XOFF communications protocol is always active in the WJ-8700 Remote Interface. In the event the input buffer has room for less than 16 additional characters the Remote Interface outputs an XOFF command. When the Remote Interface 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 buffer is full, the Remote Interface issues an XOFF. The user may start sending data to the WJ-8700 after receiving the XON character.

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

G.5.3.2 Buffer Handling

The Remote Interface input buffer is handled in a circular fashion allowing the simultaneous inputting and processing of data. The input buffer accepts up to 512 bytes before overflowing. As data in the buffer is being processed, additional inputs may come into the receiver. Upon receiving a valid terminator (LF), the Remote Interface transfers any previous messages in the buffer to a slave Miniceptor receiver. When the buffer has less than 16 unused bytes, XOFF is generated. 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 from the end of the last processed message through 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.

The Remote Interface output buffer is also handled in a circular fashion allowing simultaneous additions and outputting of data. The transmission of XON/XOFF has priority over data in the output buffer awaiting transmission. The output buffer holds up to 1k bytes of data.

G.5.3.3 Supported Communication Control Commands

The following list indicates the communication control commands supported by the RS-232C single-drop interface mode.

HEX	ASCII	Function
11	DC1	XON
13	DC3	XOFF
0A	LF	Line feed
14	DC4	Device Clear (DCL)

G.5.4 MULTI-DROP INTERFACE MODE SPECIFIC COMMUNICATION PROTOCOL

The following paragraphs describe the multi-drop RS-232C half-duplex serial interface format. This format requires the completion of a query and response command set before another command set can be sent.

G.5.4.1 ACK/NAK Protocol

When an "LF" character is received, the Remote Interface responds with an ACK (acknowledge) character upon emptying its input buffer. The Remote Interface responds with a NAK (not acknowledge) character upon detecting that its input buffer has overflowed or a communication error has occurred.

G.5.4.2 Buffer Handling

The Remote Interface input buffer is handled in a linear fashion. The input buffer accepts up to 512 bytes before overflowing. Upon receiving a valid terminator (LF), the Host Interface transfers any previous messages in the buffer to a slave Miniceptor receiver.

The input buffer processing starts on the receipt of a terminator. If the communications error flag is set or the buffer is overflowing, the buffer is cleared upon receipt of a valid terminator (LF). No data is transferred to any slave receiver and a NAK character is transmitted to the controller.

The Remote Interface output buffer is also handled in a linear fashion. The output buffer holds up to 1K bytes of data.

G.5.4.3 Supported Communication Control Commands

The following list indicates the communication control commands supported by the RS-232C multi-drop interface mode.

HEX	ASCII	Function
06	ACK	Acknowledged
15	NAK	Not acknowledged
0A	LF	Line feed
14	DC4	Device Clear (DCL)

G.6 REPLACEMENT PARTS LIST

G.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.

G.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).

G.6.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address
14632	DRS Signal Solutions, Inc. 700 Quince Orchard Road Gaithersburg, MD 20878
53387	M Co. Electronic Prod. Division 11550 Stonehollow Drive Austin, TX 78764
55322	Samtec, Inc. 810 Progress Blvd. P.O. Box 1147 New Albany, IN 47150-2257

G.6.4 **PARTS LIST**

The following parts list contains all the major electrical components provided with the option, along with mechanical parts which may be subject to unusual wear or damage. When ordering replacement parts from the factory, 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 G.6.3**, and the manufacturer's part number, provided in **paragraph G.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 G.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 improved semiconductors become available, it is the policy of the factory 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
G.6.5	**WJ-8700/232 RS-232 REMOTE INTERFACE OPTION**			**MAIN CHASSIS**	
	Revision C1				
A1	RS-232 Remote Interface	1	796954-1	14632	
J13	Connector, Receptacle	1	8209-6063	53387	
W14	Cable Assembly	1	382407-2	14632	
W14P1	Connector Plug	1	IDD-5-G	55322	

NOTES

APPENDIX H

WJ-8700/XOP3 SMO/SWITCHED IF CONVERTER OPTION

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

APPENDIX H

WJ-8700/XOP3 SMO/SWITCHED IF CONVERTER OPTION

LIST OF TABLES

LIST OF ILLUSTRATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX H

WJ-8700/XOP3 SMO/SWITCHED IF CONVERTER OPTION

H.1 GENERAL DESCRIPTION

The WJ-8700/XOP3 SMO/Switched IF Converter Option provides a signal monitor output (SMO) frequency of 21.4 MHz from the WJ-8700 Dual VLF/HF Receiver, in lieu of the standard 40.455 MHz output. This option, which may be installed in either or both receiver channels, allows the WJ-8700 to be used with displays which require a 21.4 MHz input signal, such as the WJ-9205 or the WJ-9206 Signal Monitors. This option also provides a 45 kHz center frequency signal at the Switched IF rear panel connector in place of the standard 455 kHz switched IF signal.

The WJ-8700/XOP3 Option is implemented by the installation of an additional PC board into Receiver A and/or Receiver B of the WJ-8700. This additional board is installed into the RF Option Slot, A10, on the Receiver A and/or Receiver B Microprocessor/Motherboard, A2.

Table H-1 lists the signal monitor output and switched IF output specifications when the WJ-8700/XOP3 Option is installed.

Table H-1. WJ-8700/XOP3 SMO/Switched IF Converter Specifications

SMO Center Frequency	21.4 MHz
SMO Bandwidth	500 kHz nominal
SMO Output Level	+17 dB above RF input (nominal)
SMO Output Impedance	50 ohms
Switched IF Center Frequency	45 kHz

H.2 FUNCTIONAL DESCRIPTION

As shown in **Figure H-1**, the WJ-8700/XOP3 Option provides an additional stage of frequency conversion which translates the standard 40.455 MHz Signal Monitor Output to 21.4 MHz. The 40.455 MHz 1st IF signal is amplified and routed to a double-balanced mixer, where it is mixed with a 61.855 MHz phase-locked conversion oscillator. The resulting 21.4 MHz output is filtered, amplified, and routed to the appropriate SMO rear panel connector of the WJ-8700.

As shown in **Figure H-2**, the WJ-8700/XOP3 Option provides a 45 kHz switched IF signal at the rear panel. The 455 kHz Switched IF signal from the IF Demodulator (A5) is amplified and routed to a modulator/demodulator where the 455 kHz is beat with a 500 kHz signal. The resulting 45 kHz is amplified and output through the Switched IF rear panel connector. This signal has a center frequency of 45 kHz and a bandwidth matching that currently selected in the receiver.

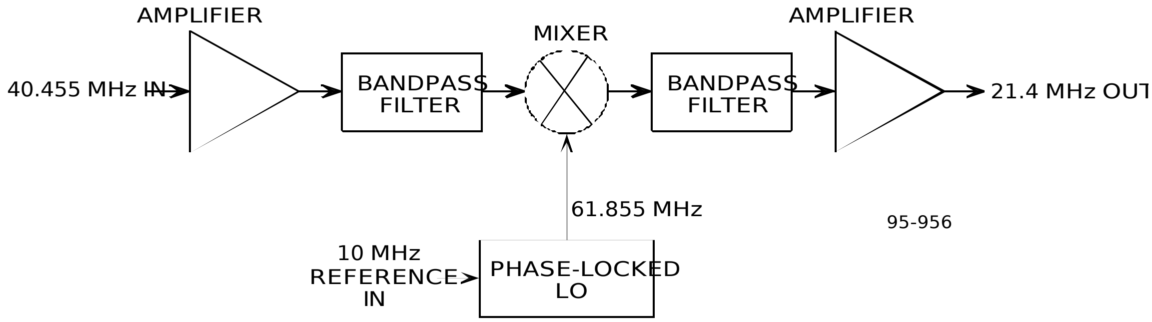


Figure H-1. 21.4 MHz SMO Converter Functional Block Diagram

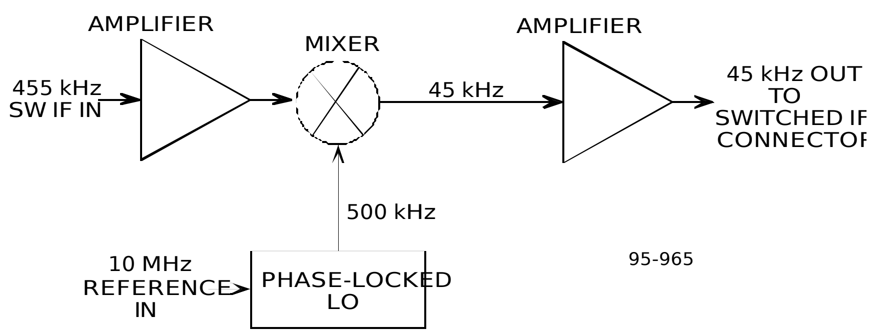


Figure H-2. Switched IF Converter Functional Block Diagram

H.3 OPERATIONAL CONSIDERATIONS

The signal monitor output spectrum of the WJ-8700 Receiver with a standard 40.455 MHz SMO is inverted with respect to the RF input spectrum. In the 21.4 MHz SMO Converter contained in the WJ-8700/XOP3 Option, however, the frequency relationship between the 40.455 MHz converter input signal and the 61.855 MHz conversion oscillator results in an additional frequency inversion. This second inversion results in the 21.4 MHz signal monitor output spectrum being upright with respect to the WJ-8700 Receiver RF input spectrum.

The standard 455 kHz Switched IF output signal of the WJ-8700 is inverted with respect to the RF input spectrum. In the Switched IF converter contained in the WJ-8700/XOP3 Option, mixing the 455 kHz signal with the phase-locked 500 kHz signal results in an additional frequency inversion. This second inversion in the Switched IF signal causes the output spectrum to be upright with respect to the WJ-8700 Receiver RF input spectrum. The Switched IF converter output signal of the WJ-8700 Receiver is centered at 45 kHz. The 45 kHz signal is output on the Switched IF rear panel connector.

H.4 REPLACEMENT PARTS LIST

H.4.1 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.

H.4.2 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).

H.4.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address
14632	DRS Signal Solutions, Inc. 700 Quince Orchard Rd. Gaithersburg, MD 20878-1706

H.4.4 PARTS LIST

The following parts list contains all the major electrical components provided with the option, along with mechanical parts which may be subject to unusual wear or damage. When ordering replacement parts from the factory, 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 H.4.3**, and the manufacturer's part number, provided in **paragraph H.4.5**, 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 H.4.5** 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 improved semiconductors become available, it is the policy of the factory 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

H.4.5 TYPE WJ-8700/XOP3 SMO/SWITCHED IF CONVERTER OPTION

	Revision D1				
A10	SMO/Switched IF Converter Assembly	1	796928-3	14632	

NOTES

APPENDIX J

WJ-8700/OP4 BASEBAND CONVERTER OPTION

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

APPENDIX J

WJ-8700/OP4 BASEBAND CONVERTER OPTION

LIST OF TABLES

LIST OF ILLUSTRATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX J

WJ-8700/OP4 BASEBAND CONVERTER OPTION

J.1 GENERAL DESCRIPTION

The WJ-8700/OP4 Baseband Converter Option, which may be installed in either or both receiver channels of the WJ-8700 Dual VLF/HF Receiver provides a 60 kHz bandwidth, 100 kHz center frequency Baseband Converter signal at the rear panel SW IF connector. The baseband converter output is leveled at 25 mW for RF input signals of -93 dBm or greater. The SMO feature is not available when this option is installed. A label is provided with the option that attaches to the rear panel, identifying the 60 kHz output in lieu of the SMO output.

The WJ-8700/OP4 Option is implemented by the installation of an additional PC board into Receiver A and/or Receiver B of the WJ-8700. This additional board is installed into the RF Option Slot, A10, on the Receiver A and/or Receiver B Microprocessor/Motherboard, A2.

Table J-1 lists the baseband converter output specifications when the WJ-8700/OP4 Option is installed.

Table J-1. WJ-8700/OP4 Baseband Converter Specifications

BBC Center Frequency	60 kHz
BBC Bandwidth	100 kHz
BBC Output Gain Control	Automatic
BBC Output Level	2.5 mW (leveled) for RF input signals $\geq$ -93 dBm
BBC Output Impedance	90 ohms

J.2 FUNCTIONAL DESCRIPTION

As shown in **Figure J-1**, the WJ-8700/OP4 Option provides a baseband signal of 60 kHz. The 40.555 kHz signal from the Input Converter (A6) is amplified and routed through a bandpass filter. It is then variably amplified with the AGC circuitry. This signal is then routed to a balanced mixer where it is mixed with a 40 MHz signal to produce a 455 kHz IF signal. The 40 MHz signal is the result of the 10 MHz reference input being multiplied by four. The 455 kHz is applied to a 100 kHz bandpass filter, which is centered at 455 kHz, and applied to another mixer. Here, the IF signal is mixed with a 515 kHz signal from the phase-locked loop oscillator circuit. The resultant output of the mixer is an IF signal centered at 60 kHz with a bandwidth of 100 kHz. This IF signal is then filtered, amplified, and routed to the rear panel 60 kHz IF output connector (old SMO connector).

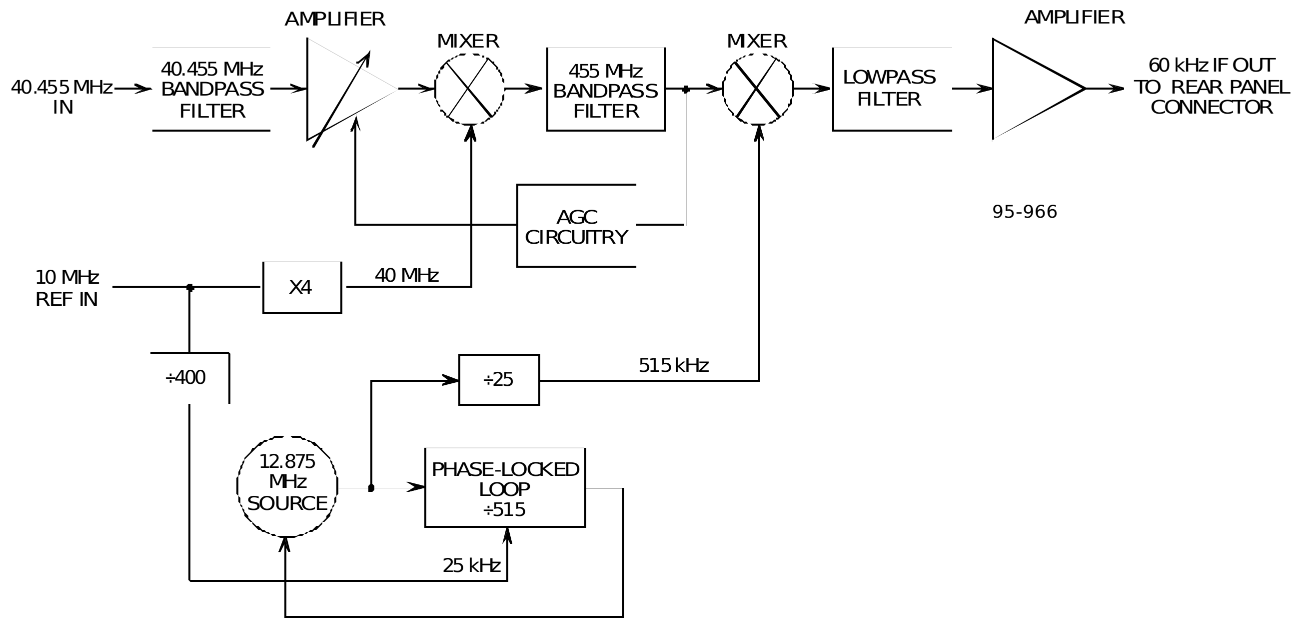


Figure J-1. Baseband Converter Option Functional Block Diagram

J.3 OPERATIONAL CONSIDERATIONS

There are no additional front panel or remote operations required when the WJ-8700/OP4 option is installed.

The baseband converter output signal of the WJ-8700 is centered at 60 kHz and has a bandwidth of 100 kHz. The baseband output replaces the SMO output on the rear panel SMO connector of the receiver.

J.4 FIELD INSTALLATION PROCEDURE

The WJ-8700/OP4 option can 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 procedure with power applied to the WJ-8700. Ensure power is removed from the receiver before attempting the following procedure.

1. Turn off the receiver and disconnect the power cord from the rear panel.

2. Remove two screws from the top cover, then slide the cover back and off of the receiver.

3. Determine the slot in which the option is to be installed (A10A or A10B) and disconnect any cables obstructing the slot opening.

4. Using needle-nose pliers, remove the two blue jumpers from the multipin connector in the option slot.

5. Install the option module in the option slot and press firmly in place.

6. Reconnect any cables that were disconnected in step 3.

7. Locate cable W2 of the option module. Connect the end marked "A9-J4/J8" to the Reference Generator Assembly (A9) located on the rear panel of the receiver. Connect to A9-J8 for Receiver A or A9-J4 for Receiver B. The A9 connector reference designators are labeled directly below the connectors.

8. Disconnect the cable end marked "A6XJ2/J3" on W6 from the Input Converter module (A6). Reconnect this cable to J2 of the option module.

9. Connect the cable marked "A6XJ2" of the option module to J2 of the Input Converter module (A6) (where W6 was disconnected in step 8).

10. Fasten the 60 kHz IF decal supplied with the option over "SMO" at the applicable rear panel connector (J5 for Receiver A, J6 for Receiver B).

11. Reinstall the top cover.

J.5 REPLACEMENT PARTS LIST

J.5.1 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.

J.5.2 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).

J.5.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address
14632	DRS Signal Solutions, Inc. 700 Quince Orchard Rd. Gaithersburg, MD 20878-1706

J.5.4 PARTS LIST

The following parts lists contain all the major electrical components provided with the option, along with mechanical parts which may be subject to unusual wear or damage. When ordering replacement parts from the factory, 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 J.5.3**, and the manufacturer's part number, provided in **paragraph J.5.5**, 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 J.5.5** 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 improved semiconductors become available, it is the policy of the factory 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

J.5.5 WJ-8700/OP4 BASEBAND CONVERTER OPTION

	Revision B1				
A10	Baseband Converter PC Assembly	1	797094-1	14632	
1	Label, Rear Panel, 60 kHz IF	1	282801-3	14632	

APPENDIX K

WJ-8700/XOP5 OPTION

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

APPENDIX K

WJ-8700/XOP5 OPTION

TABLE OF CONTENTS (Continued)

APPENDIX K

WJ-8700/XOP5 OPTION

LIST OF TABLES

LIST OF ILLUSTRATIONS

APPENDIX K

WJ-8700/XOP5 OPTION

K.1 GENERAL DESCRIPTION

The WJ-8700/XOP5 Option adds the following three functions to the WJ-8700 Receiver:

- 21.4 MHz signal monitor output (SMO) instead of the standard 40.455 MHz output.
- Automatic Level Control (ALC) of the audio channels.
- 56-Bit synchronous remote control interface scheme for the receiver.

The WJ-8700/XOP5 Circuit Card Assembly plugs into the RF option slot on the Receiver A and/or Receiver B Microprocessor/Motherboard, A2. To modify both receivers within the WJ-8700 Dual Channel Receiver requires two modification kits.

K.2 ELECTRICAL CHARACTERISTICS

The 21.4 MHz SMO of the WJ-8700/XOP5 Option provides an extra stage of frequency conversion, mixing, filtration, and amplification before routing the signal to the appropriate SMO rear-panel connector on the WJ-8700.

The Automatic Level Control (ALC) of the WJ-8700/XOP5 Option provides circuitry that limits the audio output levels. The limiter can be turned on or off from the front panel or by remote control via software controls.

The 56-Bit synchronous remote control interface of the WJ-8700/XOP5 Option provides a path for a serial data stream from a remote control that sets the receiver according to a command word. This option does not interfere with other remote control options. All remote interfaces and the front panel have simultaneous access to each receiver. The receiver obeys the most recent command regardless of its source. The 56-bit word input signals conform to RS-422 differential voltage levels.

When the WJ-8700/XOP5 Option is installed, two features are not implemented. First, the “NET” output, which provides direct interface capability between the WJ-8700 front panel and up to 29 other WJ-8700 receivers, is not implemented. The “PRINTER” output is also not implemented.

K.3 MECHANICAL CHARACTERISTICS

The WJ-8700/XOP5 Option provides the above three functions on a Type 797325-1 circuit board. It requires two circuit board assemblies to provide these functions in both receiver channels. The boards reside in RF option slot A10 of each receiver. Refer to **Figure K-1**.

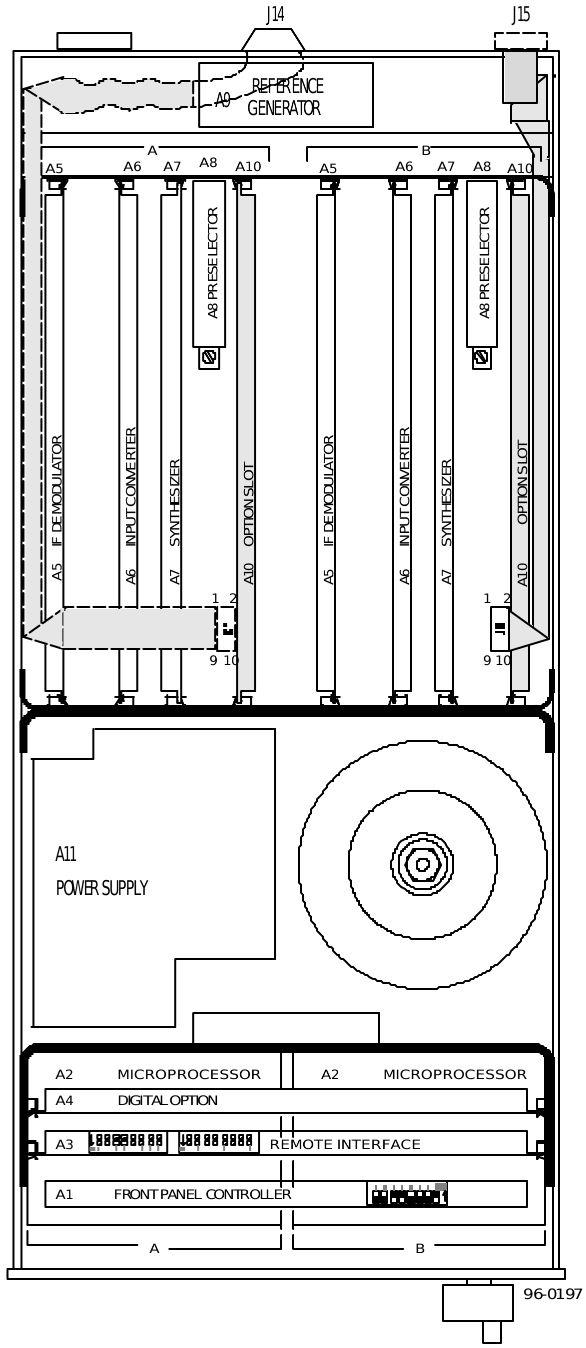


Figure K-1. WJ-8700 Circuit Board/Cable Location

The 56-bit function requires two cables to connect the new circuit boards to 9-pin "D" connectors on the rear panel of the WJ-8700 Receiver. The rear panel connector RCV A, normally labeled "PRINTER", accepts the differential Clock, Data, and Strobe inputs of the 56-bit data stream for Receiver A. The rear panel connector RCV B, normally labeled "NET", accepts the differential Clock, Data, and Strobe inputs of the 56-bit data stream for Receiver B. Refer to **Figure K-2**.

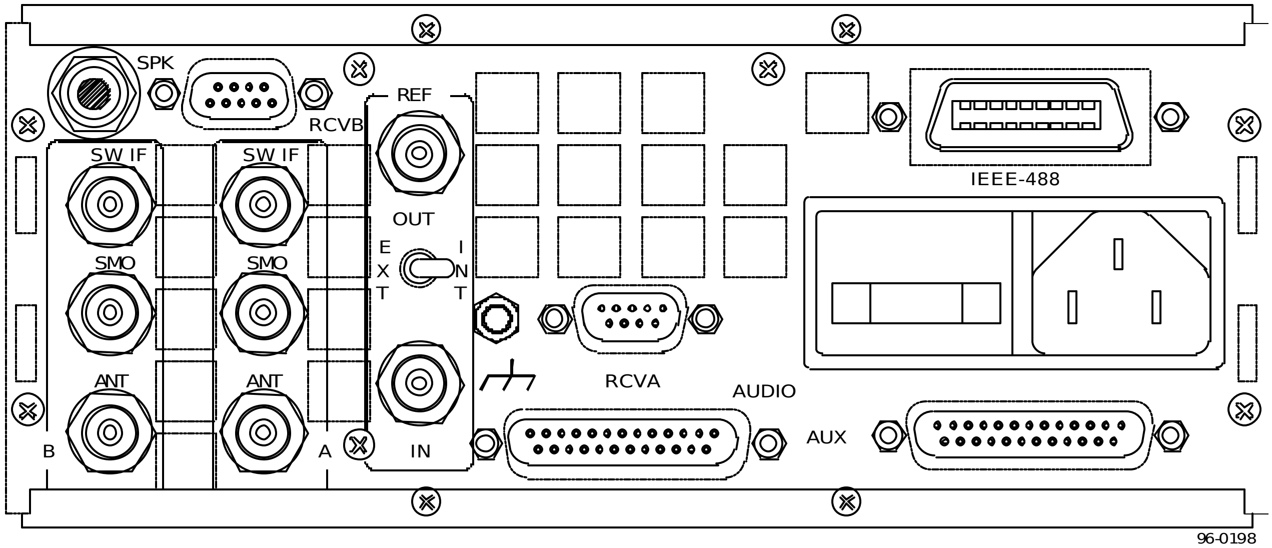


Figure K-2. WJ-8700/XOP5 Rear Panel

K.4 SOFTWARE UPGRADE

The WJ-8700/XOP5 Option requires software upgrades to the WJ-8700 Motherboards and front panel. The new receiver software allows the receiver to react to interrupts and interpret new commands from the 56-bit remote control interface. It also provides the On/Off control for the ALC hardware. The front panel software upgrade provides ALC control for the local operator.

K.5 EQUIPMENT SUPPLIED

A field retrofit kit adds the WJ-8700/XOP5 Option to a single receiver within the WJ-8700 Dual VLF/HF Receiver. A WJ-8700 dual-receiver chassis requires two modification kits for a complete chassis upgrade. Each kit includes a Type 797325-1 PC board, a software upgrade for one Motherboard (EPROM), one cable assembly and mounting hardware, two rear panel labels for RCV A and RCV B, and one option manual. One front panel software upgrade is provided for each pair of kits ordered.

K.6 21.4 MHz SIGNAL MONITOR OUTPUT

The WJ-8700/XOP5 21.4 MHz SMO provides a signal monitor output frequency of 21.4 MHz instead of the standard 40.455 MHz output. **Table K-1** lists the signal monitor output specifications that are part of the WJ-8700/XOP5 Option.

Table K-1. 21.4 MHz SMO Specifications

Center Frequency	21.4 MHz
Bandwidth	500 kHz nominal
Output Level	+17 dB above RF input nominal
Output Impedance	50 ohms

K.6.1 **FUNCTIONAL DESCRIPTION**

Refer to **Figure K-3**. The WJ-8700/XOP5 Option provides an extra stage of frequency conversion that translates the standard 40.455 MHz Signal Monitor Output to 21.4 MHz. The 40.455 MHz 1st IF signal is amplified and routed to a double-balanced mixer, where it mixes with a 61.855 MHz signal from a phase-locked conversion oscillator. The resulting 21.4 MHz output is filtered, amplified, and routed to the appropriate SMO rear-panel connector of the WJ-8700.

K.6.2 **OPERATIONAL CONSIDERATION**

The signal monitor output spectrum of the WJ-8700 Receiver with the standard 40.455 MHz SMO is inverted with respect to the RF input spectrum. In the 21.4 MHz SMO Converter contained in the WJ-8700/XOP5 Option, however, the frequency relationship between the 40.455 MHz converter input signal and the 61.855 MHz conversion oscillator results in an additional frequency inversion. This second inversion results in the 21.4 MHz SMO spectrum being upright with respect to the WJ-8700 Receiver RF input Spectrum.

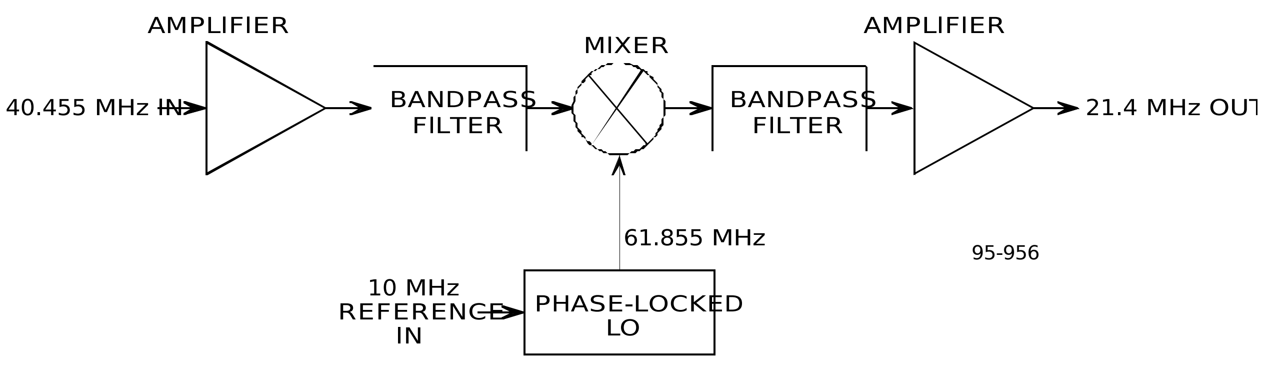


Figure K-3. 21.4 MHz SMO Converter Functional Block Diagram

K.7 **AUTOMATIC LEVEL CONTROL**

The audio Automatic Leveling Control function (ALC) provides for a constant audio output level regardless of the input signal level. With ALC enabled, the receiver maintains the line audio outputs at a constant level of 1 volt peak-to-peak, ±0.1 volt, at 1 kHz with a 20 dB change in the audio modulation level. In order to minimize apparent level differences as ALC is turned on and off, the WJ-8700/XOP5 option reduces levels at all audio outputs compared with audio levels of a standard WJ-8700 configuration.

K.7.1 **OPERATIONAL DESCRIPTION**

There are three ways to enable the ALC function: by front panel control, via the RS-232 interface, or via the 56-bit interface.

The new front panel EPROMs add the ALC function to the menu selections available from the front panel. Using **Section II** of the base manual or **Section I** of the Front Panel Unit Operator's Manual, bring the Main Menu to the FPU's screen. Then perform the following steps to access the ALC function.

1. Select "more" on the vertical menu buttons until the screen displays "dv cfg".
2. Select "dv cfg". The labels above the function buttons change.
3. Select "more"on the horizontal function buttons until the screen displays ALC.
4. Use the ALC function button to exercise the ALC options of On or Off.

ASCII commands, via any RS-232 interface, can also control the ALC function. **Table K-2** lists the mnemonics added for the WJ-8700/XOP5 ALC Option.

Finally, the 56-bit data stream from a remote control device also controls the ALC function. Setting bit 50 high will turn the ALC function On. Setting bit 50 low will turn the ALC function Off. See **Table K-3** for the 56-bit data stream bit assignments.

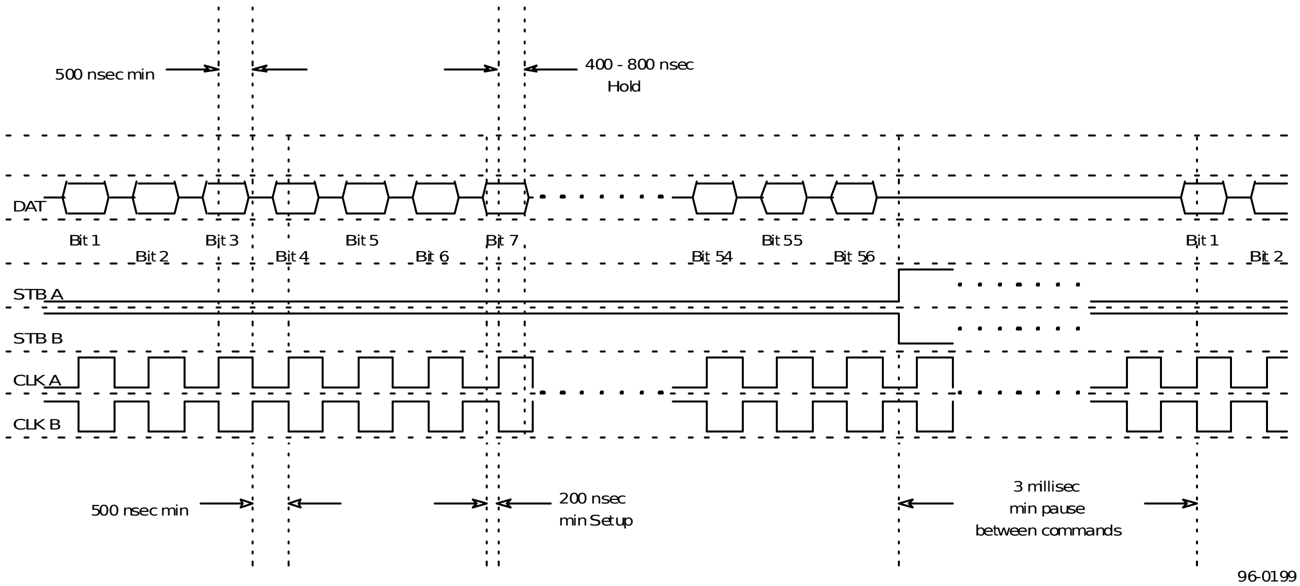
Table K-2. ASCII Mnemonics for ALC Function

Command	Response	Description
ALC nrf		Set audio automatic level control. 0 = Automatic level control off. 1 = Automatic level control on.
ALC?	ALC nrl	Request current audio level control status. Reset: ALC 1 Default: ALC 1 Example: ALC 0

K.8 **56-BIT SYNCHRONOUS SERIAL INTERFACE**

The WJ-8700/XOP5 provides the ability to control the WJ-8700 Dual VLF/HF Receiver by synchronous serial interfaces. The remote control interfaces should be capable of transmitting a clock, a load strobe, and a command word consisting of 56 bits. Receiver A and Receiver B within the WJ-8700 Dual VLF/HF Receiver have independent remote control interfaces.

Figure K-4 shows the typical timing relationships of the command (data) word, the clock, and the load strobe. Bit 1 is the first bit transmitted from the remote control device and the load strobe occurs after bit 56.



Maximum CLK rate: 250 KHz

Data is sampled when CLK A becomes more positive than CLK B at J14/J15.

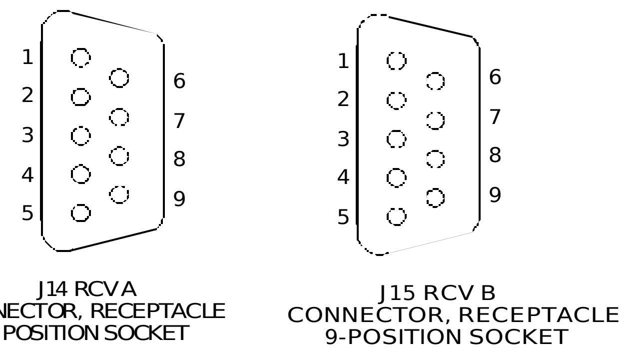
The strobe occurs when STB A becomes more positive than STB B at J14/J15.

Data is set to logic 1 when DAT A is more positive than DAT B at J14/J15.

Figure K-4. Timing Characteristics of the 56-Bit Serial Interface

The clock pulse train loads the 56-bit command word into a 56-bit register on the A10 option board. The strobe pulse informs a WJ-8700 receiver that the previous 56 bits contain information that the receiver should act upon. The receiver provides a clock train that transfers the data from the option board into the receiver Motherboard. The receiver interprets the bit configuration and sets the receiver parameters accordingly.

Figure K-5 defines the signal names and pin numbers of the rear panel 9-pin D connectors associated with the WJ-8700/XOP5 Option boards. Pins one through six carry the synchronous 56-bit serial interface signals. The interface uses RS-422 receivers to balance the differential signals through the use of an A line and a B line. It is important not to equate the A and B clock, data, and strobe lines with RCV A and RCV B. A and B signal lines refer to balanced differential lines. One set of A and B signal lines is for RCV A, while another set of A and B signal lines is for RCV B.



D-CONNECTOR Pin	SIGNAL	J14/J15 Function	A10J3
1	CLOCK A INPUT LINE (CLOCK A)	CLOCK	1
2	CLOCK B INPUT LINE (CLOCK B)	CLOCK	3
3	DATA A INPUT LINE (DATA A)	DATA	5
4	DATA B INPUT LINE (DATA B)	DATA	7
5	STROBE A INPUT LINE (STB A)	STROBE	9
6	STROBE B INPUT LINE (STB B)	STORBE	2
7	NOT USED		4, 6, 10
8	NOT USED		NOT USED
9	GROUND		8

96-0200

Figure K-5. Serial Interface Connectors and Signal Names

K.8.1 56-BIT COMMAND WORD

The WJ-8700/XOP5 Option permits connection of a 56-bit serial interface remote control device. **Table K-3** defines the 56-bit command word format.

Table K-3. 56-Bit Command Word Format

Bit	Function	Note
1	Tuning 8 x 100 MHz	High = On; Low = Off
2	Tuning 4 x 100 MHz	High = On; Low = Off
3	Tuning 2 x 100 MHz	High = On; Low = Off
4	Tuning 1 x 100 MHz	High = On; Low = Off
5	Tuning 8 x 10 MHz	High = On; Low = Off
6	Tuning 4 x 10 MHz	High = On; Low = Off
7	Tuning 2 x 10 MHz	High = On; Low = Off
8	Tuning 1 x 10 MHz	High = On; Low = Off
9	Tuning 8 x 1 MHz	High = On; Low = Off
10	Tuning 4 x 1 MHz	High = On; Low = Off
11	Tuning 2 x 1 MHz	High = On; Low = Off
12	Tuning 1 x 1 MHz	High = On; Low = Off
13	Tuning 8 x 100 kHz	High = On; Low = Off
14	Tuning 4 x 100 kHz	High = On; Low = Off
15	Tuning 2 x 100 kHz	High = On; Low = Off
16	Tuning 1x 100 kHz	High = On; Low = Off
17	Tuning 8 x 10 kHz	High = On; Low = Off
18	Tuning 4 x 10 kHz	High = On; Low = Off
19	Tuning 2 x 10 kHz	High = On; Low = Off
20	Tuning 1 x 10 kHz	High = On; Low = Off
21	Tuning 8 x 1 kHz	High = On; Low = Off
22	Tuning 4 x 1 kHz	High = On; Low = Off
23	Tuning 2 x 1 kHz	High = On; Low = Off
24	Tuning 1 x 1 kHz	High = On; Low = Off
25	Tuning 8 x 100 Hz	High = On; Low = Off
26	Tuning 4 x 100 Hz	High = On; Low = Off
27	Tuning 2 x 100 Hz	High = On; Low = Off
28	Tuning 1 x 100 Hz	High = On; Low = Off
29	Tuning 8 x 10 Hz	High = On; Low = Off
30	Tuning 4 x 10 Hz	High = On; Low = Off
31	Tuning 2 x 10 Hz	High = On; Low = Off
32	Tuning 1 x 10 Hz	High = On; Low = Off
33	AGC/MGC	0 = MGC, 1 = AGC (See **paragraph K.8.1.2**)
34	Reserved	
35	MGC Weight 32/COR Value	
36	MGC Weight 16/COR Value	
37	MGC Weight 8/COR Value	
38	MGC Weight 4/COR Value	

Table K-3. 56-Bit Command Word Format (Continued)

Bit	Function	Note
39	MGC Weight 2/COR Value	
40	MGC Weight 1/COR Value	
41	Reserved	
42	IF Bandwidth 1	See **Table K-5**
43	IF Bandwidth 0	See **Table K-5**
44	Demodulation 2	See **Table K-6**
45	Demodulation 1	See **Table K-6**
46	Demodulation 0	See **Table K-6**
47	AGC Time Constant	0 = very fast, 1 = fast (See **paragraph K.8.1.5**)
48	AGC Dump	0 = dump. 1 = no dump
49	Squelch Enable	1 = On, 0 = Off (See **paragraph K.8.1.6**)
50	ALC ON/OFF	1 = On (default), 0 = Off
51	Spare Bit	
52	Spare Bit	
53	Spare Bit	
54	Spare Bit	
55	Spare Bit	
56	Spare Bit	

K.8.1.1 Setting the Tuned Frequency

Bits 1 through 32 of the 56-bit command word set the receiver's tuned frequency. Data is interpreted as binary coded decimal (BCD) with bit weights indicated in **Table K-3**. As **Table K-3** depicts, each bit represents a numeric value. Setting a bit high selects its numeric value to be part of the tuned frequency. The combined numeric value of high set bits represents the tuned frequency. The following are examples of the state of bits to select several tuned frequencies.

Frequency (MHz)	Tuning Bits 1234 ——— 32
001.00000	0000 0000 0001 0000 0000 0000 0000 0000
017.25000	0000 0001 0111 0010 0101 0000 0000 0000
027.66500	0000 0010 0111 0110 0110 0101 0000 0000

K.8.1.2 **Setting Automatic and Manual Gain Control**

In addition to enabling AGC, the AGC/MGC bit, bit 33, controls the manner in which the receiver interprets bits 35 through 40. When bit 33 is high (AGC On), bits 35 through 40 set the Carrier Operated Relay (COR) value. If bit 33 is low (AGC Off), bits 35 through 40 set the RF attenuation (ATN) level. Refer to **Table K-4**.

Table K-4. AGC/MGC Bit Configuration

Bit 33	Bit 35	Bit 36	Bit 37	Bit 38	Bit 39	Bit 40	Interpretation
0	0	0	0	0	0	0	MGC; ATN = 0
0	0	0	0	0	0	1	MGC; ATN = 1
0	0	0	0	0	1	0	MGC; ATN = 2
:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:
0	1	1	1	1	1	0	MGC; ATN = 62
0	1	1	1	1	1	1	MGC; ATN = 63
1	0	0	0	0	0	0	AGC; COR = 0
1	0	0	0	0	0	1	AGC; COR = 1
:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:
1	1	1	1	1	1	0	AGC; COR = 62
1	1	1	1	1	1	1	AGC; COR = 63

K.8.1.3 **IF Bandwidth Selection**

The IF bandwidth selection uses bits 42 and 43 of the 56-bit command word. See **Table K-5**.

Table K-5. IF Bandwidth Selection

Bit 42	Bit 43	IF Bandwidth Selection
0	0	1 kHz
0	1	2.4 kHz
1	0	4.7 kHz
1	1	6 kHz

K.8.1.4 **Demodulation Selection**

The Demodulation selection uses bits 44, 45, and 46 of the 56-bit word. See **Table K-6**.

Table K-6. Demodulation Selection

Bit 44	Bit 45	Bit 46	Function
0	0	0	FM
0	1	0	AM
1	0	0	CW
1	0	1	LSB
1	1	0	USB

K.8.1.5 **AGC Speed Selection and AGC Dump Control**

The WJ-8700 Dual Channel Receiver has four selectable AGC speeds. Only “fast” and “very fast” are selectable using the 56-bit command word. If bit 47 is set low, then, the AGC is set for very fast. If it is set high, then it is set for fast.

The AGC Dump function is controlled by the logic of bit 48. Setting bit 48 low causes the current attenuation value used by AGC to be set to zero.

K.8.1.6 **Squelch Enable Selection**

The Squelch Enable, bit 49, uses the status of bit 33 (AGC/MGC) to determine receiver action. Refer to **Table K-7**.

Table K-7. Squelch Enable Action Table

Bit 33 (AGC/MGC)	Bit 49 (Squelch)	Action to COR	Action to ATN
0	0	COR forced to 0	determined by bits 35 - 40
0	1	COR unchanged	determined by bits 35 - 40
1	0	COR forced to 0	ATN unchanged
1	1	determined by bits 35-40	ATN unchanged

K.8.1.7 **Uncontrolled Parameters**

Some WJ-8700/XOP5 receiver variables are not controllable by the 56-bit command word and are forced to known settings whenever receiving a 56-bit command word. A WJ-8700 receiver receiving a 56-bit command word will therefore force the following settings:

BFO = 0 (0.000 kHz offset)	IDM = 0 (Idle mode off)
OPR = 1 (Operating mode = Manual)	PBT = 0 (Pass Band tuning = Off)
RTK = 99 (Request Token)	TSP = 1 (Manual tuning speed = slow)
VBM = 1 (Video BW selection = Auto)	AFC = 0 (AFC = Off)

K.9 INSTALLATION

If the WJ-8700/XOP5 option was installed at the factory, the rack installation of the WJ-8700/XOP5 VLF/HF Receiver is outlined in the base manual, **Section II**. If the option is a field retrofit, the following paragraphs outline the procedures to install the WJ-8700/XOP5 Option in the WJ-8700 Dual VLF/HF Receiver chassis.

The modification requires two kits, one for each receiver in the WJ-8700 Dual VLF/HF Receiver. In addition to the modification kits, the following tools are required to perform the modification.

1. Philip's screwdriver
2. 3/16 inch socket wrench
3. 9/16 inch socket wrench
4. Needle nose pliers

K.9.1 WJ-8700/XOP5 EPROM REPLACEMENT

The procedures to replace Receiver A, Receiver B, and Front Panel EPROMs are in **Section IV** of the base manual. The modification kits contain the necessary EPROMs. The following pertains to the EPROM replacement:

1. One EPROM from each kit is labeled U10 - 796859-X. These two EPROMs are for the Motherboard for each receiver.
2. Two front panel EPROMs, labeled U28 - 796856-X and U29 - 796856-X, are provided with each pair of WJ-8700/XOP5 modification kits.
3. Follow the procedures for the replacement of U10, U28, and U29 found in **Section IV** of the base manual. After replacement of the EPROMs, leave the top and bottom covers off for the installation of the two new cable assemblies.

K.9.2 A10 PRINTED CIRCUIT CARD ASSEMBLY INSTALLATION

To install the WJ-8700/XOP5 Printed Circuit Card, proceed according to the following steps:

NOTE

The following procedure assumes that the field installation is being performed on a receiver channel that has an empty RF option slot (A2AJ10 or A2BJ10).

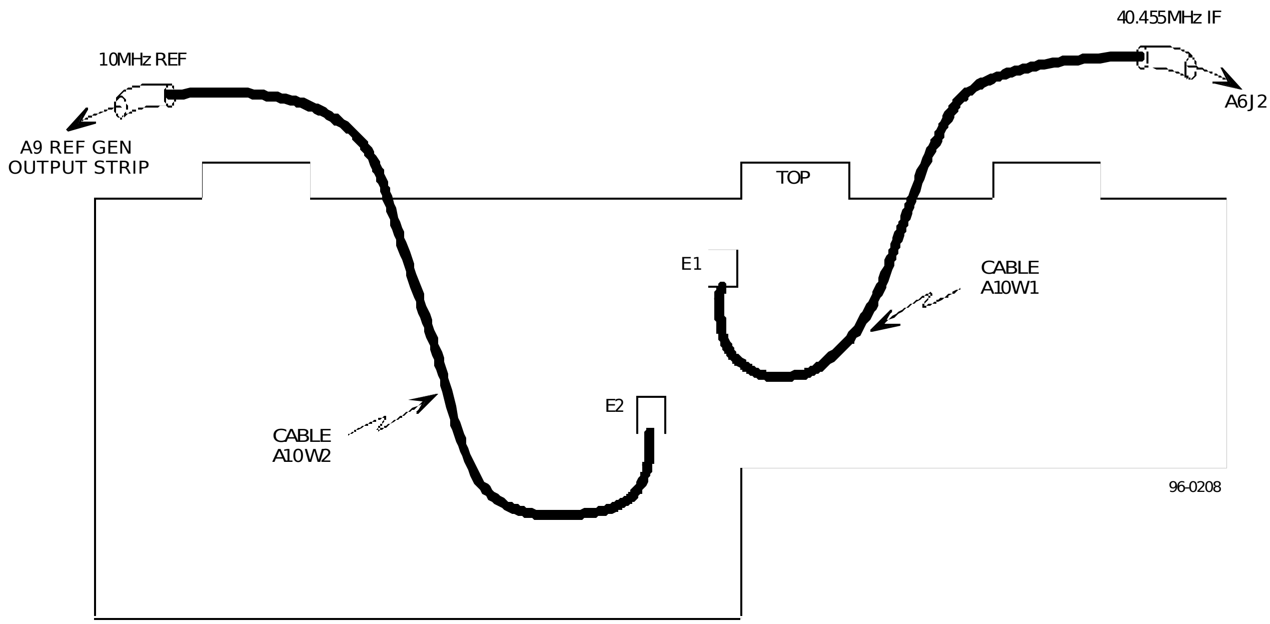


Figure K-6. Type 797325-1 PC Assembly (A10) (Back)

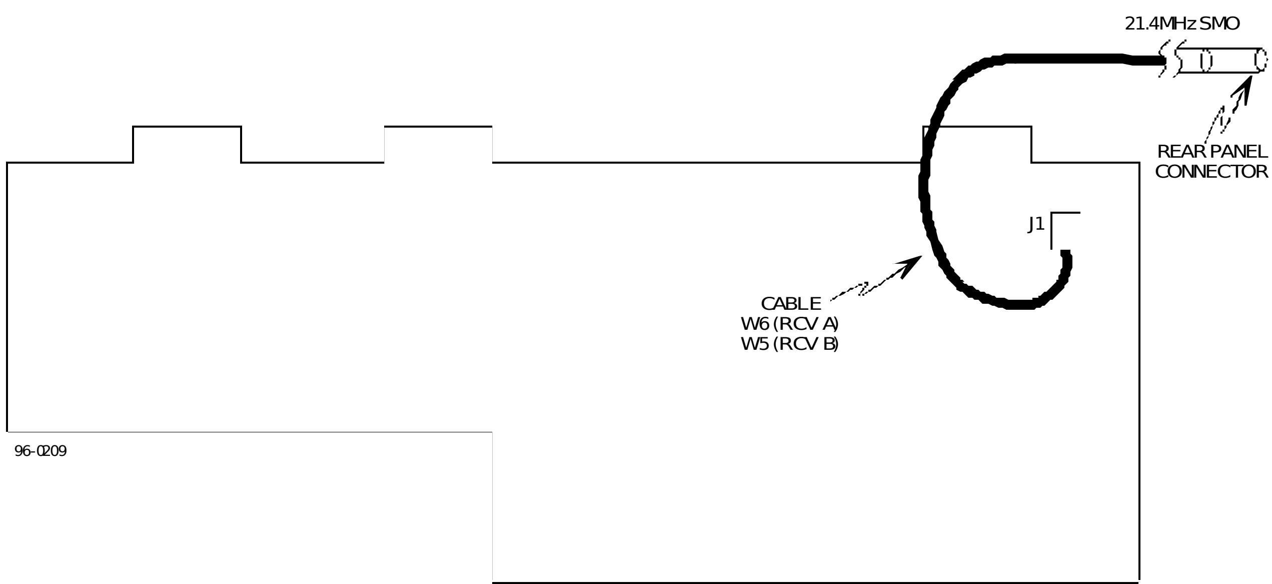


Figure K-7. Type 797325-1 PC Assembly (A10) (Component Side)

1. Referring to **Figure K-1**, locate one of the two option slots associated with the A10 assemblies.

2. Inspect the Microprocessor/Motherboard's A2AJ10 or A2BJ10 connector to ensure that there are no jumper blocks installed. If so, use needle nose pliers to carefully remove any jumper blocks.

3. Refer to **Figures K-6**, **K-7**, and **K-11**, to identify the three coaxial cable assemblies associated with the WJ-8700/XOP5 Option. A10W1 and A10W2 are permanently connected to the A10 printed circuit assembly. Main chassis cable W6 (or W5) is normally plugged onto A6AJ2 (or A6BJ2).

4. Slide the stiff cable markers on all cables at least two inches from the connectors in order to ensure a proper bend radius of the cables. Avoid twisting or bending the coaxial cables at the points where they enter the connectors.

5. Before inserting a printed circuit card into the A2AJ10 motherboard connector, remove and label any cables that will impede access to the slot. There should be free access to the A2BJ10 slot.

6. Disconnect cable W6 (RCV A) or cable W5 (RCV B), which leads to the J6 or J5 SMO output, from A6AJ2 or A6BJ2. Connect this cable to A10J1. See **Figure K-7**.

7. Firmly seat the WJ-8700/XOP5 option board into the A2AJ10 or A2BJ10 slot. Ensure that the assembly fully seats since the new assembly has stiff sockets.

8. Connect A10W1, which carries the 40.455 MHz IF from A6J2. See **Figure K-6**.

9. Referring to **Figures K-1** and **K-6**, connect cable A10W2 to A9J4 or A9J8.

10. Replace any cable assemblies removed in **step 5**.

K.9.3 J15 CABLE ASSEMBLY INSTALLATION

To install the new RCV B (J15) cable assembly, the existing NET cable assembly (W10) must first be removed.

1. Disconnect the W10 plugs from the PC assemblies from the bottom of the receiver.

2. Remove the two screws from the NET connector on the rear panel using the 3/16 inch socket wrench. Save the screws as they are reusable.

3. Remove the entire NET cable assembly and put aside.

4. Select one of the new cable assemblies

NOTE

To avoid having different kits for RCV A and RCV B, the cable assemblies are double-labeled; that is, both cables have RCV A and RCV B labels. Remove and discard the incorrect label. See **Figure K-8**.

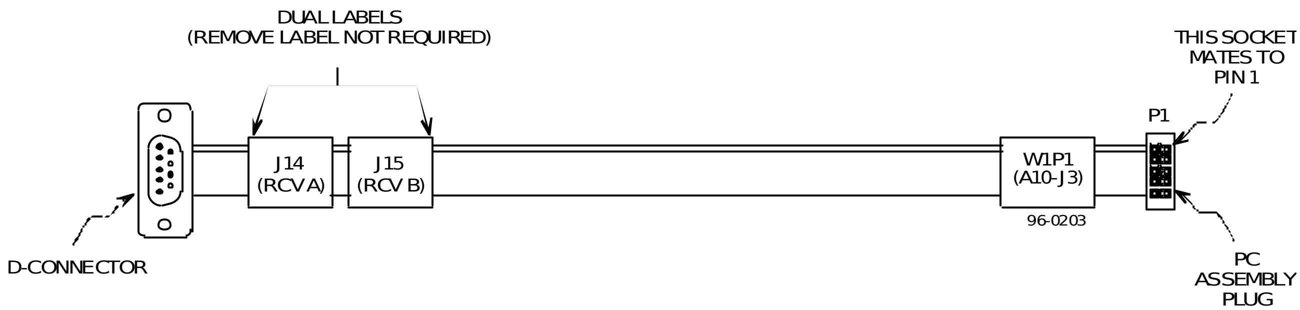


Figure K-8. J14/J15 Cable Assembly

5. Remove and discard the J14 label on the cable assembly.

6. Install the connector in the rear panel. The connector will only fit in the rear panel one way. Refer to **Figure K-2**. When installing the connector, use the two screws that held the NET connector. **Use the screws only**. Do not use the flat or lock washers when mounting the connector to the rear panel.

7. Connect the new J15 cable assembly to the new RCV B A10 Option board, Type 797325-1. Ensure a pin 1 to pin 1 connection. The plug is not keyed. The color band on the ribbon cable denotes the line connecting pin 1 on J15 to pin 1 on P1. P1 should be connected to A10J3 in such a way that the color band is closest to the rear of the receiver.

8. Dress the cable to lay flat as shown in **Figure K-1**.

K.9.4 J14 CABLE ASSEMBLY INSTALLATION

To install the new RCV A (J14) cable assembly, the existing PRINTER cable assembly (W9) must first be removed.

1. Remove the three rear panel main chassis screws that hold the Reference Generator Assembly. See **Figure K-9**.

2. Remove the hardware holding the REF IN and REF OUT connectors using the 9/16 inch socket wrench.

3. Remove the screws for the PRINTER connector using the 3/16 inch socket wrench. Save the screws as they are reusable.

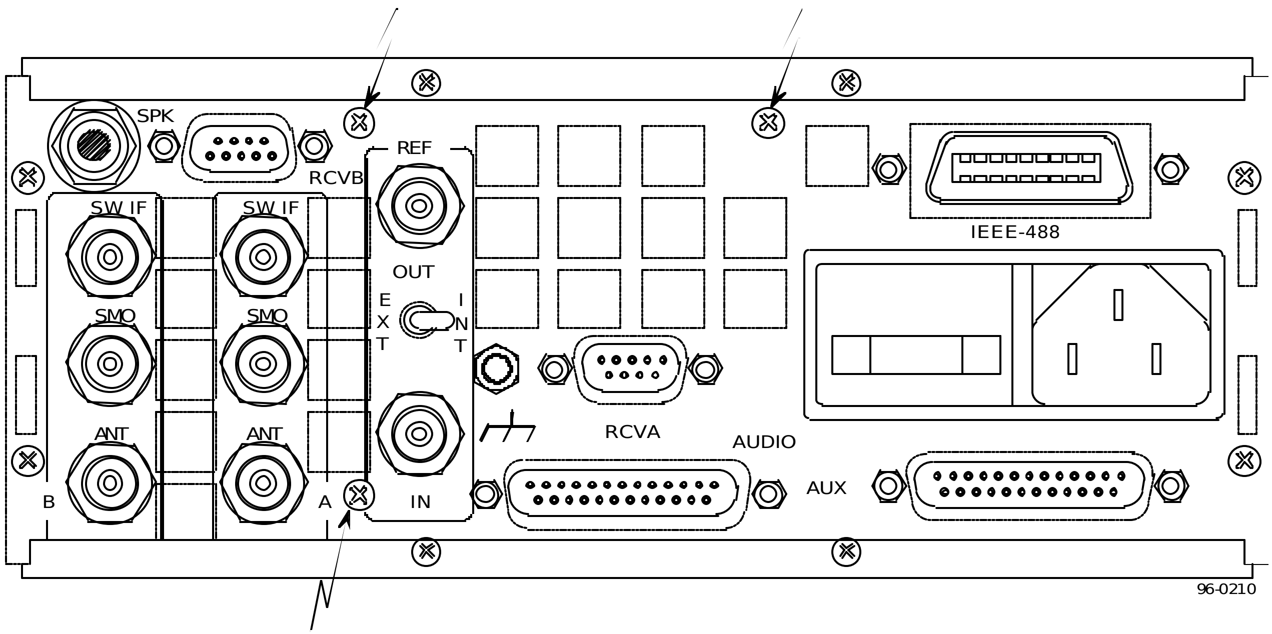


Figure K-9. Rear Panel Reference Generator (A9) Main Chassis Screws

4. Place the receiver on the bench with the front panel facing you. Remove the four front panel screws and lay the front panel on its face.

5. Unplug the W9 cable from J3 on the 796856 Front Panel Controller. Cut the ribbon cable and remove both parts of the cable assembly from the receiver chassis.

6. Replace the front panel.

7. Select the remaining cable assembly from the modification kits. Remove and discard the J15 label.

8. Install the new cable assembly. The connector will only fit in the rear panel in one direction. See **Figure K-2**. When installing the connector, use the two screws that held the PRINTER connector. **<u>Use the screws only</u>**. Do not use the flat or lock washers when mounting the connector to the rear panel.

9. Replace the three screws holding the Reference Generator to the rear panel. Replace the hardware connecting the REF IN and REF OUT connectors to the rear panel.

10. Run the cable assembly along the top of the receiver near the side panel as shown in **Figure K-1**. Ensure that the cable is oriented so that pin 1 on P1 is toward the rear of the receiver. The plug is not keyed. The color band on the ribbon cable denotes the line connecting pin 1 on J14 to pin 1 on P1.

11. Connect the new J14 cable assembly to the new RCV A A10 Option board, Type 797325-1. Ensure a pin 1 to pin 1 connection.

12. Dress the cable to lay flat as shown in **Figure K-1**.

13. Replace the top and bottom covers as outlined in **Section IV** of the base manual.

14. Place the new RCV A and RCV B labels on the rear panel. See **Figure K-2**.

This completes the installation of the modification kits.

K.10 REPLACEMENT PARTS LIST

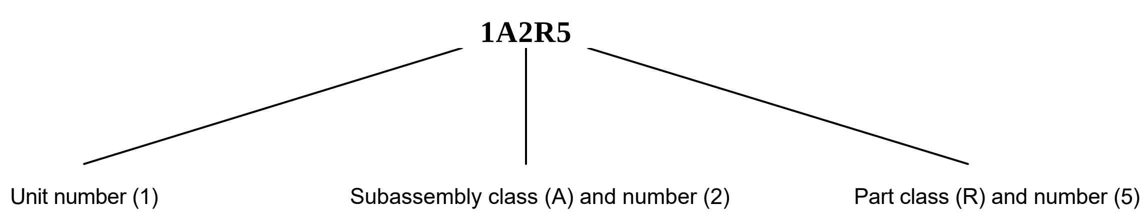
The following paragraphs provide comprehensive information on the parts used in the option. Included is an overview of the method used to number the parts, a brief definition of the reference designator prefix, a list of applicable manufacturers including addresses, and the physical parts lists.

K.10.1 PART NUMBERING METHOD

The numbering method used to identify the parts used in this unit is consistent with most commercial and military numbering standards. Reference designations are assigned to assemblies, subassemblies, modules within a subassembly, and discrete components. These designations allow the user to quickly identify and locate specific parts, regardless of the complexity of the unit. A basic reference designation consists of a letter identifying the class (type) of the item followed by the item number. For example, the first resistor in an assembly is identified as “R1”. Both complete and partial reference designations are found in this manual and throughout the unit.

K.10.2 COMPLETE REFERENCE DESIGNATION

A complete reference designation is used to identify a basic part along with each applicable unit and subassembly associated with the part. The unit and subassembly reference designations are listed as prefixes to the part’s reference designation. For example, the following complete reference designation identifies the fifth resistor (R5) of the second subassembly (A2) in the first unit (1):



K.10.3 PARTIAL REFERENCE DESIGNATION

A partial reference designation, consisting only of the basic part's reference designator (e.g. R1), is used to identify each basic part in the replacement parts lists and schematic diagrams. The applicable unit and subassembly reference designation prefixes, which are not included in the actual partial reference designation, may be found at the beginning of each replacement parts list. Placing these reference designation prefixes before the basic part's partial reference designation yields the complete reference designation for the basic part.

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

K.11 LIST OF MANUFACTURERS

Additional manufacturers are required for the parts listed in this supplement, compared to those required for the base system. Refer to the base manual for a complete list of manufacturers, including those associated with the replacement parts listed in this supplement.

Mfr. Code	Name and Address
00809	Croven Crystals, Ltd. Sub. of Oak Industries, Inc. 500 Beech Street P.O. Box 420 Whitby, Ontario, Canada L1N 5S5
14482	Watkins-Johnson Company 3333 Hillview Avenue Palo Alto, CA 94304-1204
34371	Harris Corporation SemiConductor Sector 200 Palm Bay Boulevard P.O. Box 883 Melbourne, FL 32902-0883
4W716	Specialty Electric, Inc. Airport Way Hailey, ID 83333
56699	Philips Components Discrete Products Division 6071 St Andrews Road Columbia, SC 29212-3198
64155	Linear Technology Corporation 1630 McCarthy Boulevard Milpitas, CA 95035-7487

K.12 PARTS LIST

The following parts lists contain the electrical components used in this option, along with mechanical parts which may be subject to unusual wear or damage. Refer to the base manual for a comprehensive listing of all parts. When ordering replacement parts from the factory, 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 K.11**, and the manufacturer's part number provided in **paragraph K.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 K.13** 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 is suggested as a convenience to the user.

NOTE

As improvements in semiconductors are made, it is the policy of the factory 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, 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
K.13	**WJ-8700/XOP5 21.4 MHz SIGNAL MONITOR OPTION AUDIO LEVEL CONTROL (ALC)/SYNCHRONOUS CONTROL**			**MAIN CHASSIS**	
	Revision X1				
A10	WJ-8700/XOP5	1	797325-1	14632	

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

K.13.1 TYPE 797325-1 WJ-8700/XOP5 PC ASSEMBLY REF DESIG **A10**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
	Revision B				
C1	Capacitor, Ceramic, .047 µF ±10%, 50V	20	841415-023	14632	
C2	Capacitor, Ceramic, .01 µF ±10%, 50V	20	841415-019	14632	
C3	Same as C2				
C4	Same as C2				
C5	Capacitor, Ceramic, 1000 pF ±10%, 50V	16	841415-013	14632	
C6	Same as C5				
C7	Capacitor, Tantalum, 3.3 µF ±20%, 16V	14	841293-10	14632	
C8	Same as C5				
C9	Capacitor, Tantalum, 15µF ±20%, 25V	3	841293-19	14632	
C10	Capacitor, Ceramic, 100 pF ± 5%, 50V	8	841415-007	14632	
C11 Thru C15	Same as C10				
C16	Same as C7				
C17	Same as C2				
C18	Capacitor, Tantalum, 6.8 µF ±20%, 6.3V	4	841293-14	14632	
C19	Same as C18				
C20	Same as C7				
C21	Same as C2				
C22	Capacitor, Ceramic, 68 pF ±2%, 50V	3	841416-045	14632	
C23	Capacitor, Variable, 4-25 pF, 50V	7	TZBX4Z250BA110TOO	72982	
C24	Same as C2				
C25	Capacitor, Ceramic, 130 pF ±2%, 50V	2	841416-052	14632	
C26	Capacitor, Ceramic, 18 pF ±2%, 50V	2	841416-031	14632	
C27	Same as C22				
C28	Same as C26				
C29	Same as C25				
C30	Same as C7				
C31	Same as C5				
C32	Capacitor, Ceramic, 100 pF ±2%, 50V	2	841416-049	14632	
C33	Same as C2				
C34 Thru C36	Same as C1				
C37	Same as C5				
C38	Same as C2				

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

REF DESIG **A10**

C39	Same as C2				
C40	Capacitor, Ceramic, 43 pF ±2%, 50V	1	841416-040	14632	
C41	Capacitor, Ceramic, 10pF ±2%, 50V	2	841416-025	14632	
C42	Same as C41				
C43	Same as C23				
C44	Same as C2				
C45					
Thru	Same as C23				
C47					
C48	Same as C32				
C49	Capacitor, Ceramic, 47pF ±2%, 50V	4	841416-041	14632	
C50	Same as C2				
C51	Same as C2				
C52	Same as C9				
C53					
Thru	Same as C1				
C55					
C56	Same as C2				
C57	Same as C7				
C58	Same as C7				
C59	Same as C22				
C60	Same as C23				
C61					
Thru	Same as C2				
C63					
C64	Same as C49				
C65	Same as C49				
C66	Same as C7				
C67	Same as C1				
C68	Same as C2				
C69					
Thru	Same as C5				
C71					
C72	Same as C1				
C73	Same as C1				
C74	Same as C2				
C75					
Thru	Same as C5				
C78					

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

REF DESIG **A10**

C79	Not Used				
C80	Same as C1				
C81	Same as C1				
C82	Same as C7				
C83	Same as C2				
C84	Same as C18				
C85	Same as C18				
C86	Same as C7				
C87	Same as C5				
C88	Same as C5				
C89	Same as C2				
C90	Same as C7				
C91 Thru C93	Same as C1				
C94	Same as C5				
C95	Same as C9				
C96	Same as C7				
C97	Same as C7				
C98	Capacitor, Ceramic, 150pF ±5%, 50V	1	841415-008	14632	
C99	Same as C1				
C100	Capacitor, Tantalum, .47µF ±20%, 25V	2	841293-02	14632	
C101	Same as C1				
C102	Same as C5				
C103	Same as C7				
C104	Same as C7				
C105	Capacitor, Tantalum, 68µF ±20%, 6.3V	2	841293-24	14632	
C106	Same as C105				
C107	Same as C100				
C108	Same as C1				
C109	Same as C1				
C110	Capacitor, Ceramic, 22pF ±2%, 50V	1	841416-033	14632	
C111	Same as C1				
C112	Same as C49				
C113	Capacitor, Ceramic, 33pF ±2%, 50V	1	841416-037	14632	
C114	Same as C23				
CR1	Diode, Dual Switching	14	MMBD7000LT1	04713	
CR2 Thru CR14	Same as CR1				

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

REF DESIG **A10**

CR15	Diode, Tuning Varactor	1	KV38S2	50101	
E1	Connector, Receptacle, SMB PC Mount For RG-178 Cable	2	8145-7521-005	19505	
E2	Same as E1				
FB1	Ferrite, Bead 52Ω ±25%, @100MHz=IMPED	4	CB30-322513T	54583	
FB2					
Thru	Same as FB1				
FB4					
J1	Connector, Jack, MCX, PC Mount	1	R113-426	0GP12	
J2	Not Used				
J3	Connector, Header, 10 Pin, Double Row,	1	TSW-105-08-G-D-RA	55322	
JP1	Connector, Double Row, 4 Pin	3	ULPSMD02S33-02	4W716	
JP2	Same as JP1				
JP3	Same as JP1				
JW1	Jumper, .05Ω Max, 1A Min	16	841417	14632	
JW2					
Thru	Same as JW1				
JW16					
L1	Inductor, 470nH ±5%, QMin-50@25MHz	5	841438-041	14632	
L2	Inductor, 220nH ±5%, QMin-50@100MHz	5	841438-033	14632	
L3	Same as L2				
L4	Inductor, 1000nH +, 15%, QMin-50@25MHz	7	841438-049	14632	
L5	Inductor, 270nH ±5%, QMin-50@25MHz	1	841438-035	14632	
L6	Inductor, 4700nH ±5%, QMin-35@7.9MHz	1	841438-065	14632	
L7	Same as L4				
L8	Same as L2				
L9	Inductor, 120nH ±5%, QMin-50@25MHz	2	841438-027	14632	
L10	Same as L1				
L11	Same as L4				
L12					
Thru	Same as L1				
L14					
L15	Same as L4				
L16	Same as L9				
L17	Inductor, 68nH ±5%, QMin-50@100MHz	1	841438-021	14632	
L18					
Thru	Same as L4				
L20					
L21	Inductor, 10nH ±10%, QMin-50@100MHz	1	841438-001	14632	
L22	Same as L2				
L23	Same as L2				

REF DESIG **A10**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
P1	Connector, Plug, PC Mount, 36 pins, Double Row	1	66527-018	22526	
P2	Connector, MCX, Right Angle, For RD-178	1	R113-180-000	0GP12	
P3	Connector, Plug, SMB, For RD-178	1	2002-7571-005	19505	
Q1	Transistor, N-Channel, MOSFET	4	2N7002-LT1	17856	
Q2	Transistor, NPN Bipolar RF	4	MRF5812	04713	
Q3	Same as Q1				
Q4	Same as Q2				
Q5	Transistor, PNP	4	MMBT2907ALT1	04713	
Q6	Same as Q5				
Q7	Same as Q5				
Q8	Transistor	3	SST-310T1	17856	
Q9	Same as Q2				
Q10	Same as Q1				
Q11	Same as Q2				
Q12	Same as Q1				
Q13	Same as Q5				
Q14	Same as Q8				
Q15	Same as Q8				
R1	Resistor, Fixed, 1.0kΩ ±5%, .1W	20	841414-073	14632	
R2	Resistor, Fixed, 100kΩ ±5%, .1W	9	841414-121	14632	
R3	Resistor, Fixed, 220Ω ±5%, .1W	2	841414-057	14632	
R4	Resistor, Fixed, 300Ω ±5%, .1W	2	841414-066	14632	
R5	Resistor, Fixed, 18Ω ±5%, .1W	2	841414-031	14632	
R6	Same as R4				
R7	Same as R3				
R8	Resistor, Fixed, 22Ω ±5%, .1W	8	841414-033	14632	
R9	Same as R8				
R10	Same as R1				
R11	Resistor, Fixed, 10Ω ±5%, .1W	11	841414-025	14632	
R12	Same as R8				
R13	Same as R8				
R14	Resistor, Fixed, 33kΩ ±5%, .1W	4	841414-109	14632	
R15	Resistor, Fixed, 100Ω ±5%, .1W	7	841414-049	14632	
R16 Thru R20	Same as R15				
R21	Varistor, 10kΩ, 30%, 200 mW, 100V	2	ST-23-A-103-C-W	91637	
R22	Varistor, 100kΩ, 30%, 200 mW, 100V	4	ST-23-A-104-C-W	91637	
R23	Resistor, Fixed, 10kΩ ±5%, .1W	17	841414-097	14632	

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

REF DESIG **A10**

R24	Same as R11				
R25	Same as R74				
R26	Same as R50				
R27	Same as R1				
R28	Same as R1				
R29	Same as R8				
R30	Same as R8				
R31	Same as R14				
R32	Resistor, Fixed, 4.7kΩ ±5%, .1W	4	841414-089	14632	
R33	Resistor, Fixed, 330Ω ±5%, .1W	2	841414-061	14632	
R34	Same as R5				
R35	Same as R33				
R36	Same as R32				
R37	Same as R1				
R38	Resistor, Fixed, 33Ω ±5%, .1W	1	841414-037	14632	
R39					
Thru	Same as R23				
R44					
R45	Same as R1				
R46	Resistor, Fixed, 470Ω ±5%, .1W	4	841414-065	14632	
R47	Same as R2				
R48	Same as R2				
R49	Resistor, Fixed, 220kΩ ±5%, .1W	4	841414-129	14632	
R50	Resistor, Fixed, 4.7MΩ ±5%, .1W	4	841414-161	14632	
R51	Resistor, Fixed, 47kΩ ±5%, .1W	4	841414-113	14632	
R52	Resistor, Fixed, 2.2kΩ ±5%, .1W	3	841414-081	14632	
R53	Same as R32				
R54	Same as R14				
R55	Same as R11				
R56	Same as R8				
R57	Resistor, Fixed, 300Ω ±5%, .1W	2	841414-060	14632	
R58	Resistor, Fixed, 47Ω ±5%, .1W	5	841414-041	14632	
R59	Resistor, Fixed, 330Ω ±5%, .1W	3	841414-061	14632	
R60	Same as R11				
R61	Same as R23				
R62	Same as R60				
R63	Same as R22				
R64	Same as R60				

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

REF DESIG **A10**

R65	Same as R49				
R66	Resistor, Fixed, 470kΩ ±5%, .1W	2	841414-137	14632	
R67	Same as R51				
R68	Same as R11				
R69	Same as R1				
R70	Varistor, 1kΩ, 30%, 200 mW, 100V	2	ST-23-A-102-C-W	91637	
R71	Resistor, Fixed, 18Ω ±5%, .1W	1	841414-031	14632	
R72	Same as R57				
R73	Same as R11				
R74	Resistor, Fixed, 82kΩ ±5%, .1W	6	841414-119	14632	
R75	Same as R74				
R76	Same as R1				
R77	Same as R58				
R78	Same as R58				
R79	Resistor, Fixed, 180Ω ±5%, .1W	2	841414-055	14632	
R80	Same as R79				
R81	Same as R11				
R82	Same as R1				
R83	Same as R1				
R84	Same as R2				
R85	Same as R11				
R86	Same as R52				
R87	Same as R59				
R88	Same as R23				
R89	Resistor, Fixed, 150Ω ±5%, .1W	2	841414-053	14632	
R90	Same as R21				
R91	Same as R22				
R92	Same as R2				
R93	Same as R23				
R94	Same as R74				
R95	Same as R50				
R96	Same as R1				
R97	Same as R32				
R98	Same as R14				
R99	Same as R1				
R100	Same as R1				
R101	Same as R46				
R102	Same as R2				
R103	Same as R49				
R104	Same as R51				

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

REF DESIG **A10**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURERS PART NO.	MFR. CODE	RECM VENDOR
R105	Same as R50				
R106	Same as R58				
R107	Same as R11				
R108	Same as R8				
R109	Same as R15				
R110	Same as R58				
R111	Same as R89				
R112	Same as R1				
R113	Same as R23				
R114	Same as R22				
R115	Same as R60				
R116	Same as R60				
R117	Same as R49				
R118	Same as R66				
R119	Same as R11				
R120	Same as R51				
R121	Same as R1				
R122	Same as R70				
R123	Same as R52				
R124	Same as R1				
R125	Resistor, Fixed, 3.3kΩ ±5%, .1W	2	841414-085	14632	
R126	Resistor, Fixed, 1.5MΩ ±5%, .1W	2	841414-149	14632	
R127	Same as R23				
R128	Same as R11				
R129	Same as R74				
R130	Same as R74				
R131	Same as R1				
R132	Same as R23				
R133	Same as R23				
R134	Same as R1				
R135	Same as R126				
R136	Same as R125				
R137	Resistor, Fixed, 22kΩ ±5%, .1W	1	841414-105	14632	
R138	Same as R23				
R139	Same as R59				
R140	Same as R2				
U1	Integrated Circuit, CMOS Differential BUS Transceiver	3	LTC485CS8	64155	
U2	Same as U1				
U3	Same as U1				
U4	Amplifier, JFET, Quad OPAMP, 4MHz BW	2	MC33184D	04713	

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

REF DESIG **A10**

U5	Mixer, Balanced 5-500MHz	1	WJ-M6E	14482	
U6	Integrated Circuit, CMOS,	1	74HC4094 SO16	34371	
U7	Integrated Circuit, Quad 64-Bit Static Shift Register	1	74HC7731 SO16	56699	
U8	Integrated Circuit, Dual D Flip-Flop	1	74HC74 SO14	04713	
U9	Integrated Circuit, Quad 2-Input NAND Gate	1	74HC00 SO14	1Z447	
U10	Amplifier, .1-3.7 GHz, Gain=12.5dB	1	MSA-0786-TR1	24539	
U11	Integrated Circuit, Dual 4-Bit Decade and Binary Counter	2	74HC390 SO16	1Z447	
U12	Integrated Circuit, Synthesizer	1	MC145152FN-2	04713	
U13	Integrated Circuit, Divider	1	MB501LpF	61271	
U14	Same as U4				
U15	Integrated Circuit, Volt Reg +5V, .1A	1	LM2931AD-5	04713	
U16	Same as U11				
U17	Amplifier, JFET-Input OPAMP	1	MC34001D	04713	
W1	Cable Assembly	1	17300-485-14	14632	
W2	Cable Assembly	1	17300-485-16	14632	
Y1	Crystal, Quartz, 61.855 MHz	1	B180FFF00 61.855MHz	00809	

NOTES

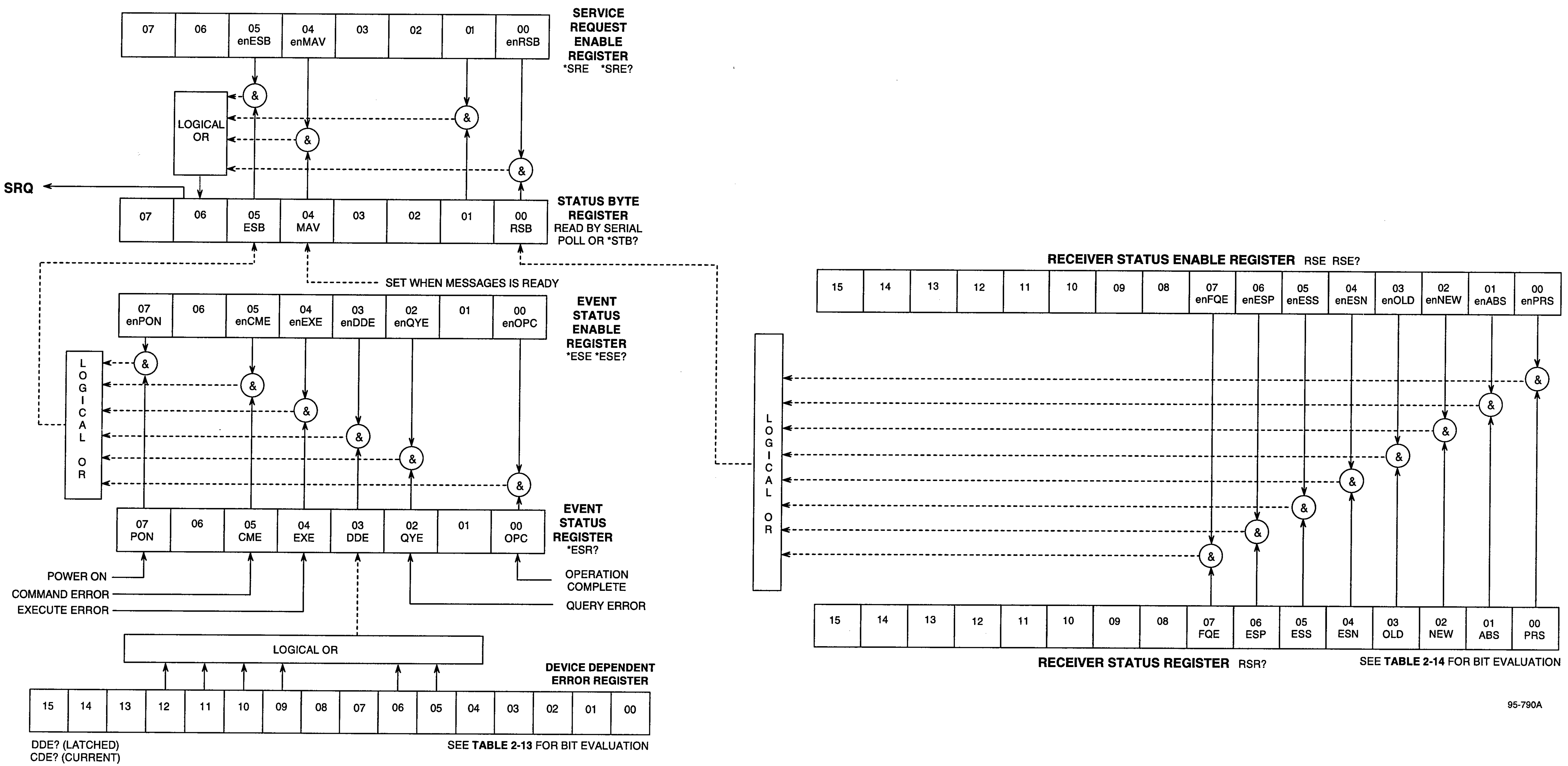


Figure 2-10. WJ-8700 Status Data Structure

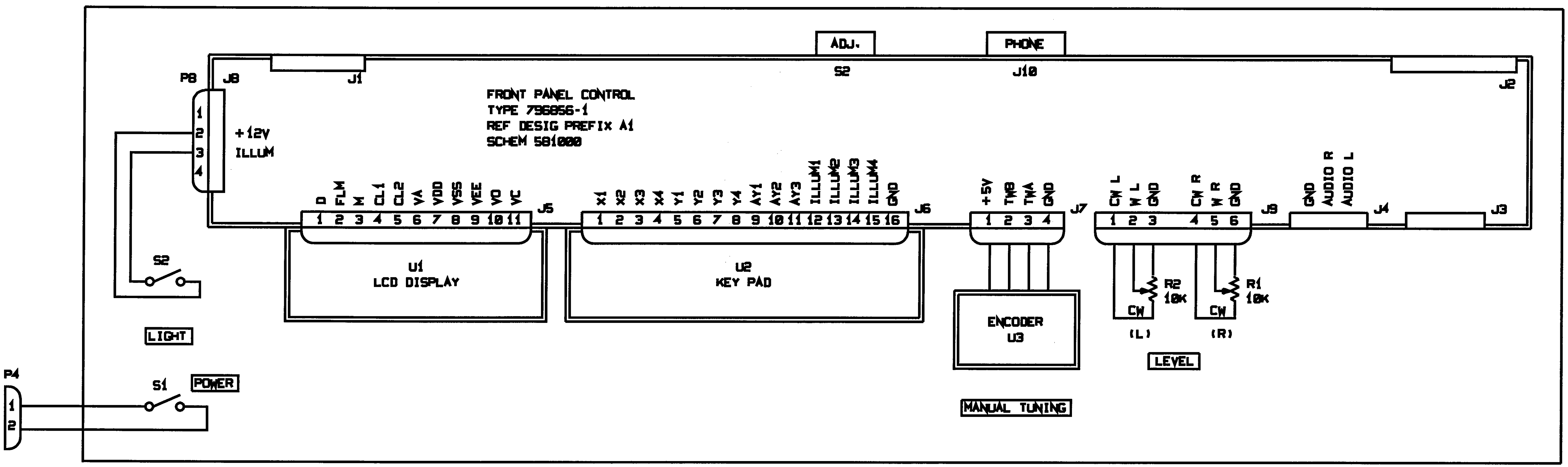
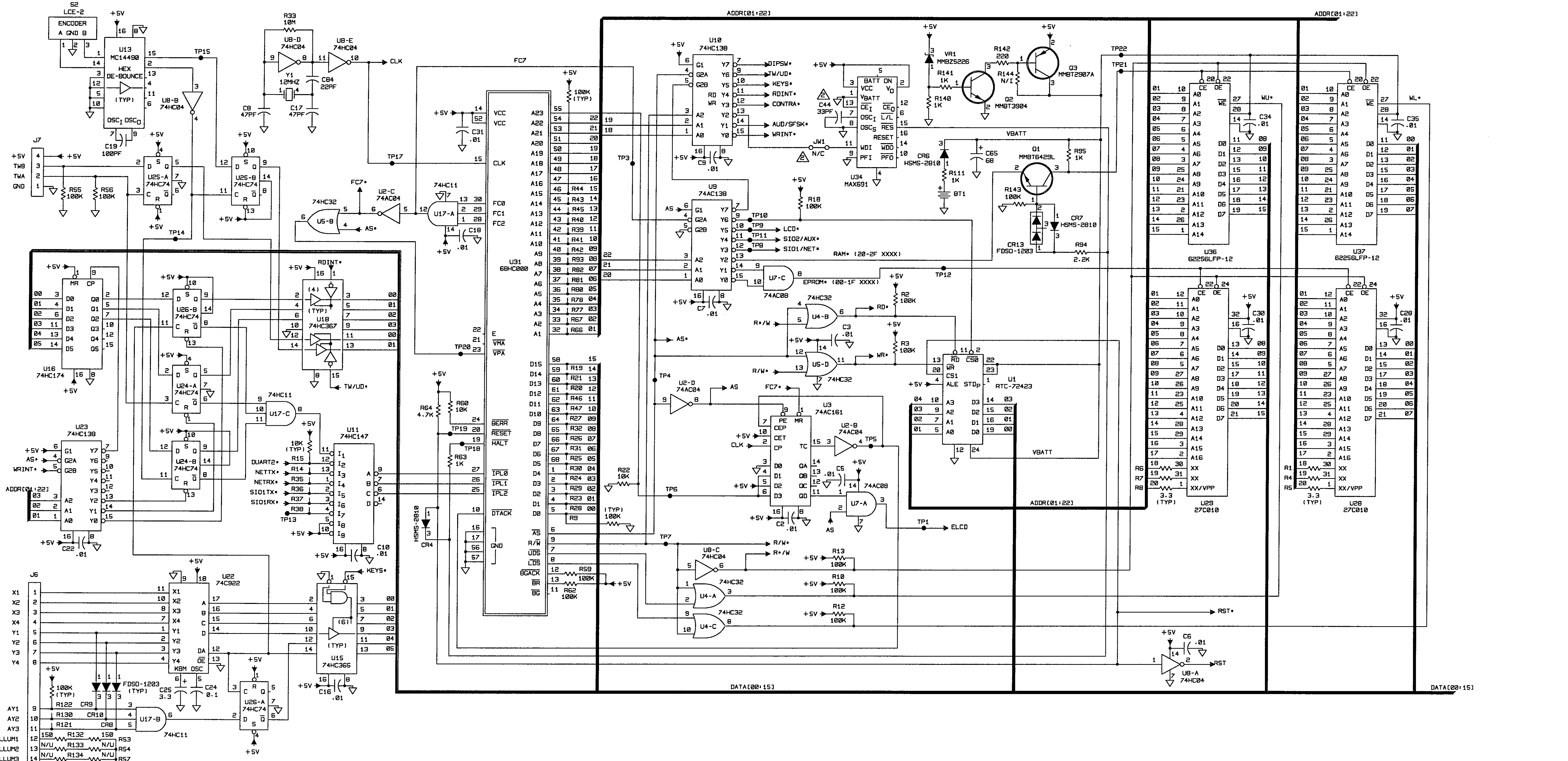


Figure 6-1. Type 797011-2, Front Panel Assembly (A1), Schematic Diagram 383410 (A)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   B) CAPACITANCE IS IN μF.

2 DIFFERENCES BETWEEN TYPES IS LISTED IN TABLE A.

TABLE A

TYPE	U6	CR1-3	C4	C44	R52	S1	JW1	JW2
796856-1	N/U	N/U	N/U	33PF	USED	ADF-08S	N/U	1-2
796856-2	USED	USED	USED	33PF	N/U	ADF-08S	N/U	1-2
796856-3	USED	USED	USED	33PF	N/U	ADP-08S	N/U	1-2
796856-4	USED	USED	USED	100PF	N/U	ADP-08S	N/U	1-2

Figure 6-2. Type 796856-1, Front Panel Assembly (A1A1), Schematic Diagram 581000 (Sheet 1 of 2) (G2)

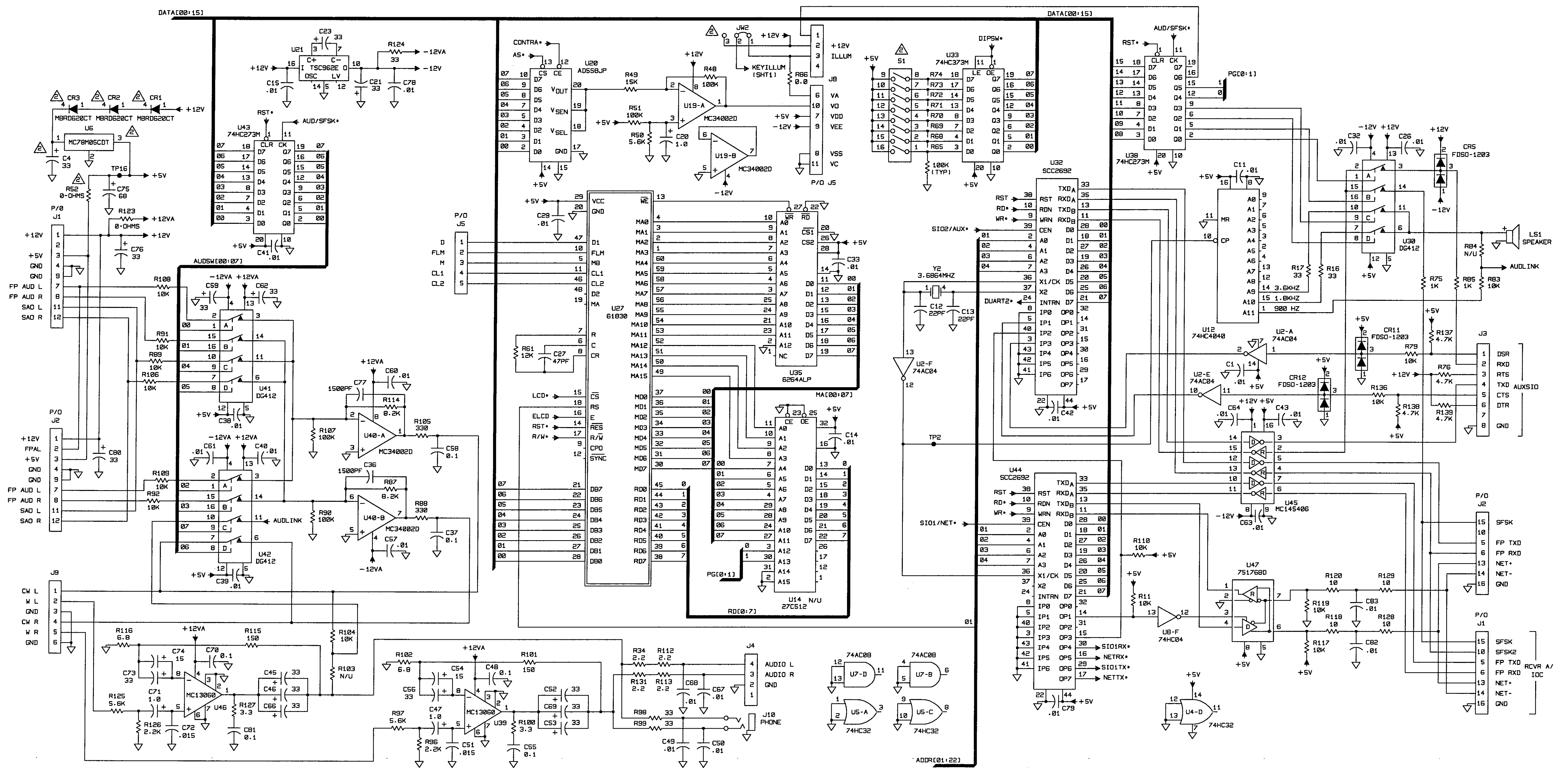
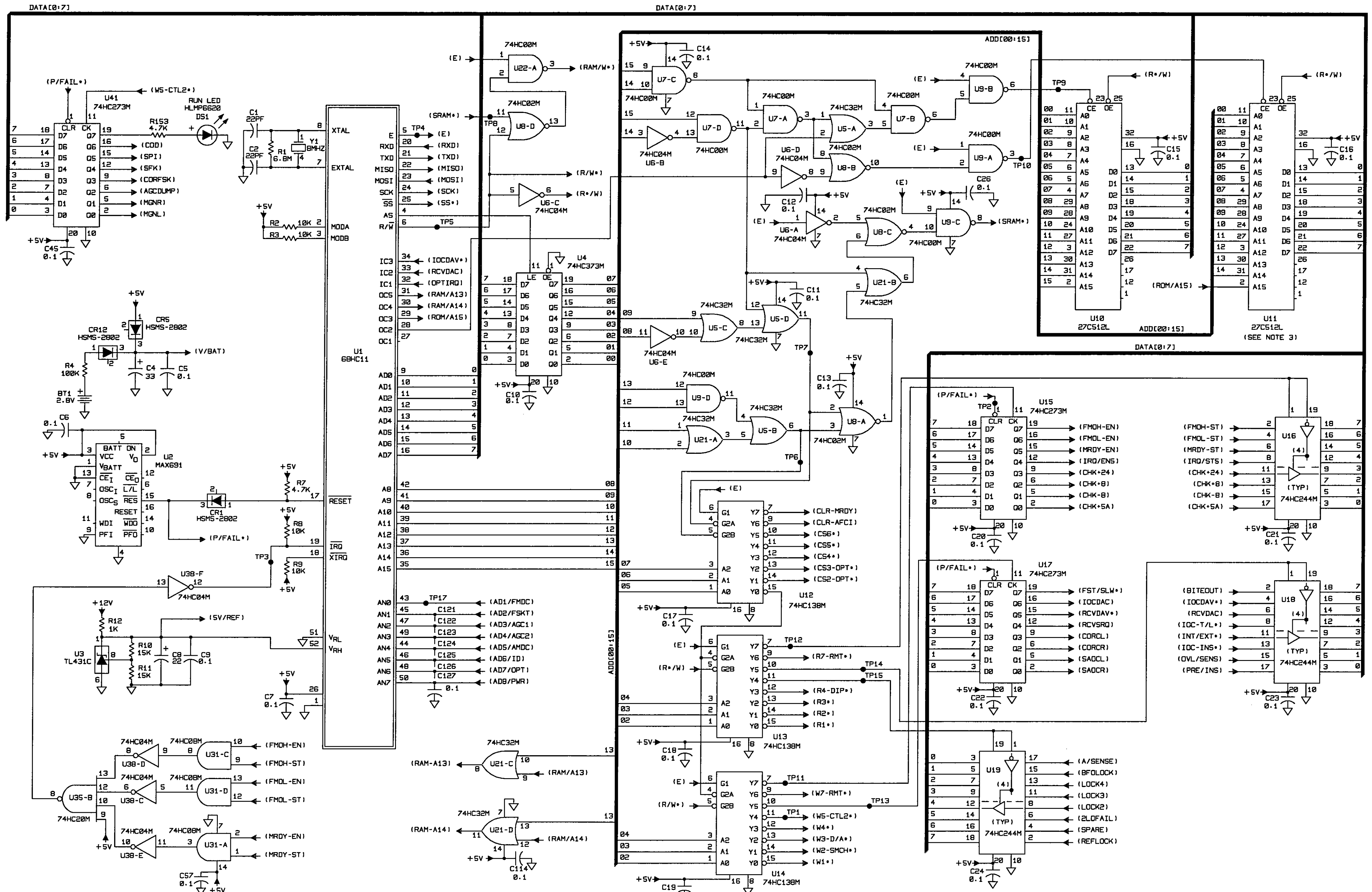


Figure 6-2. Type 796856-1, Front Panel Assembly (A1A1),
Schematic Diagram 581000 (Sheet 2 of 2) (G2)



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS OHMS, ±5%, 1/10W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.
2. −2 SAME AS −1 EXCEPT WITH CONFORMAL COATING.
3. SEE TABLE A FOR DIFFERENCE IN DASH NO.S.

TABLE A

DASH NO.	U11	UNIT
796859-1	NI	WJ-8700
796859-2	SEE NOTE 2	WJ-8700-2
796859-3	INSTALLED	WJ-8700-1

Figure 6-3. Type 796859-1, Microprocessor/Motherboard (A2), Schematic Diagram 581005 (Sheet 1 of 4) (G)

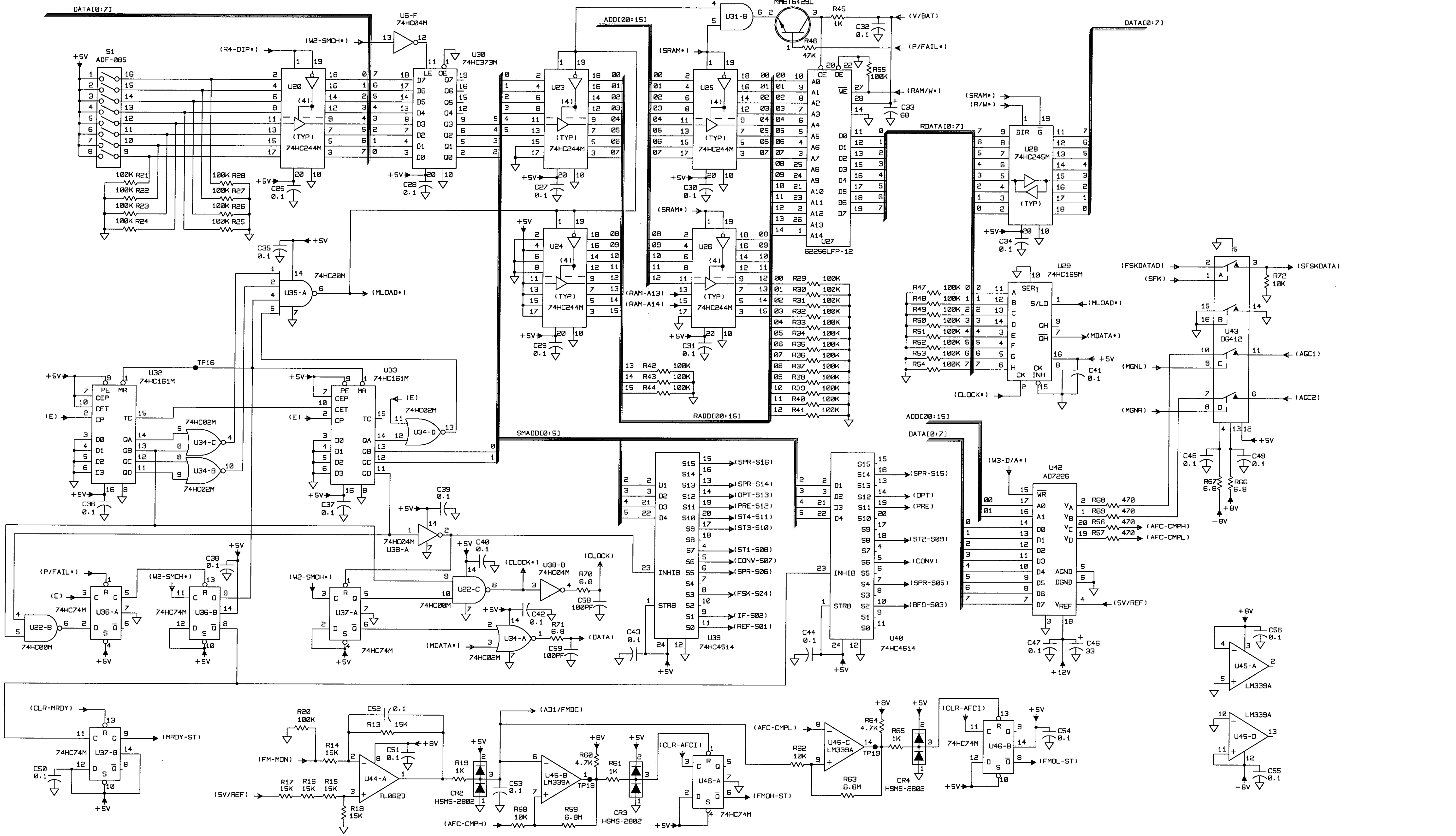


Figure 6-3. Type 796859-1, Microprocessor/Motherboard (A2),
Schematic Diagram 581005 (Sheet 2 of 4) (G)

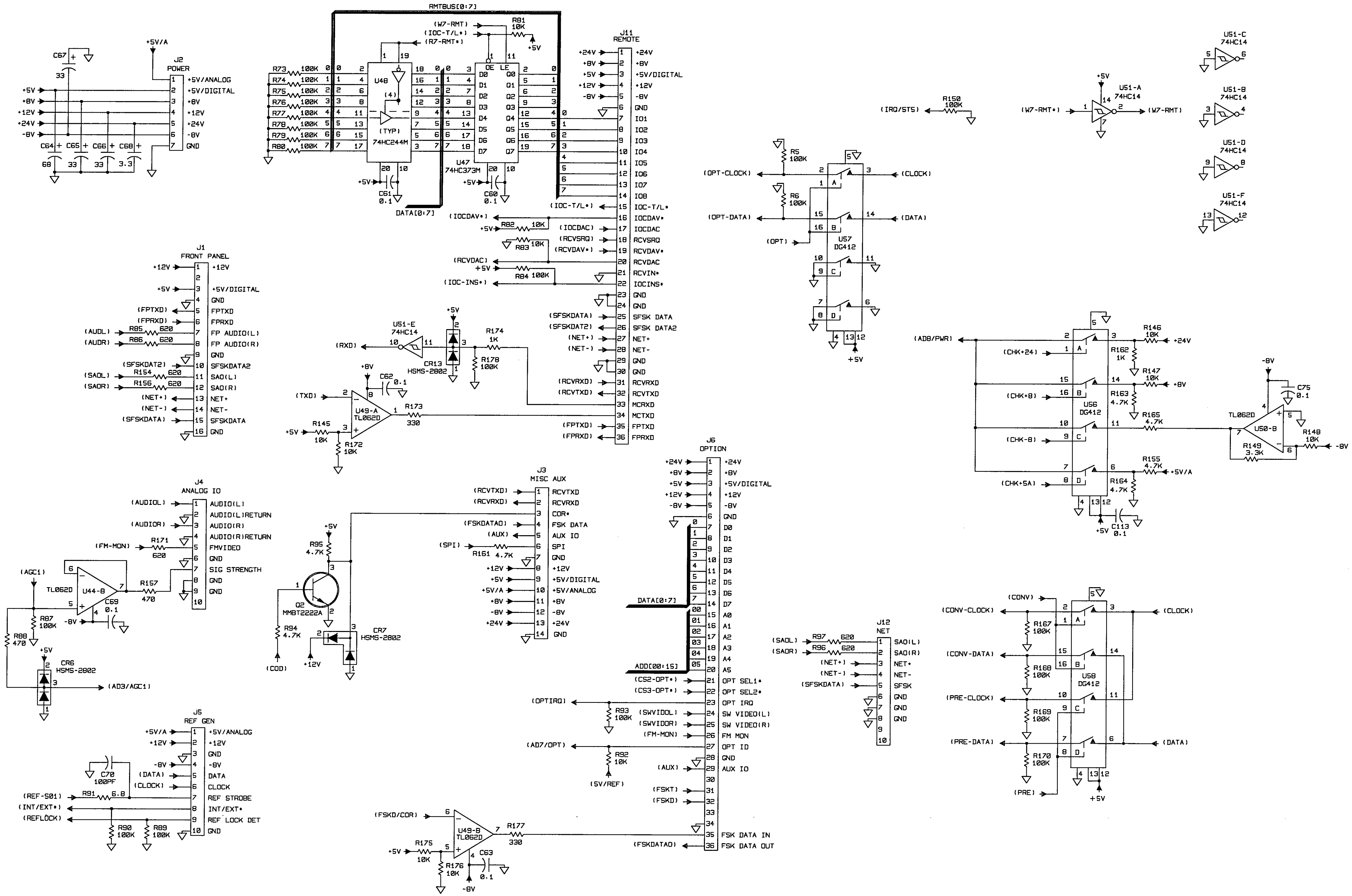


Figure 6-3. Type 796859-1, Microprocessor/Motherboard (A2), Schematic Diagram 581005 (Sheet 3 of 4) (G)

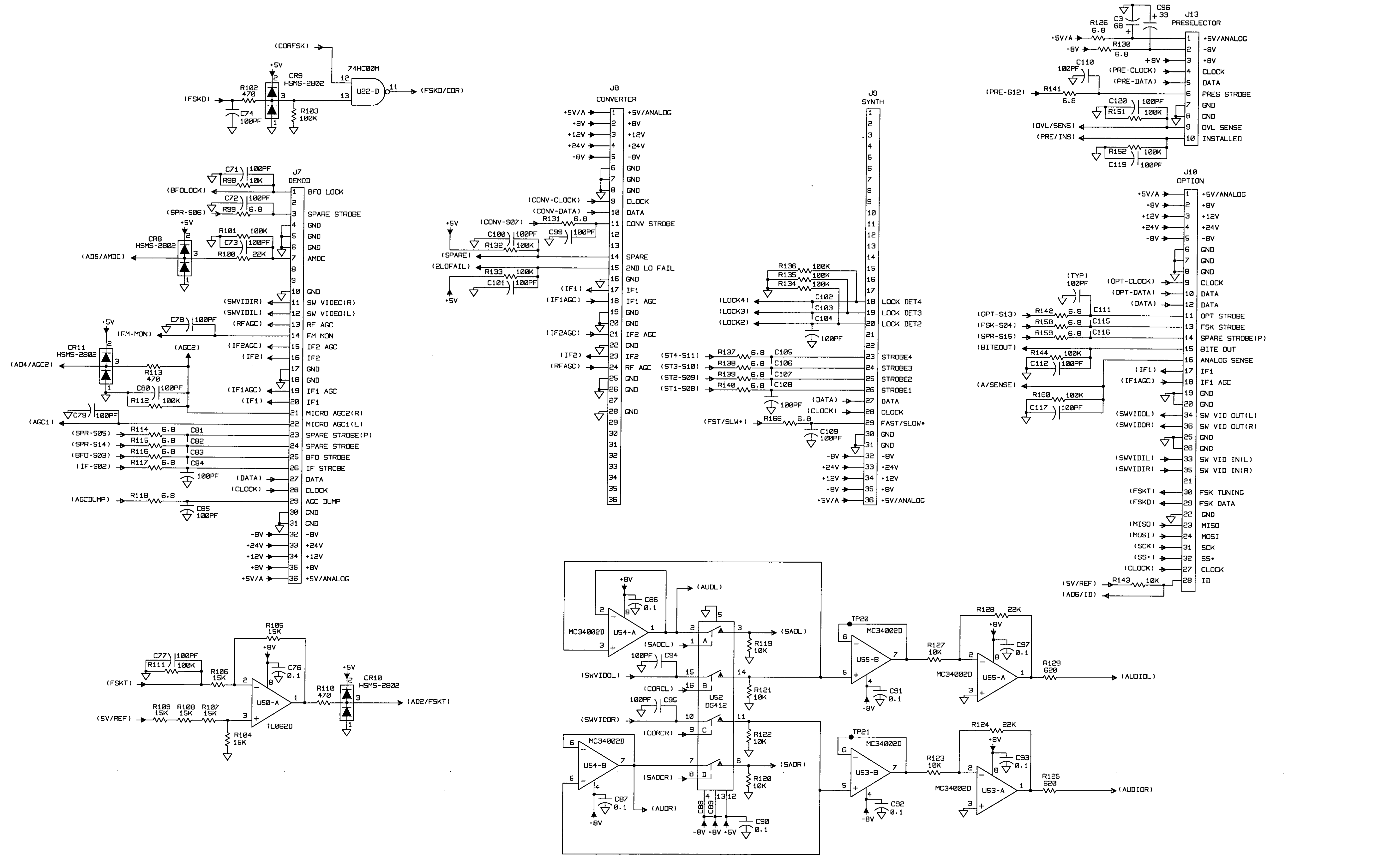
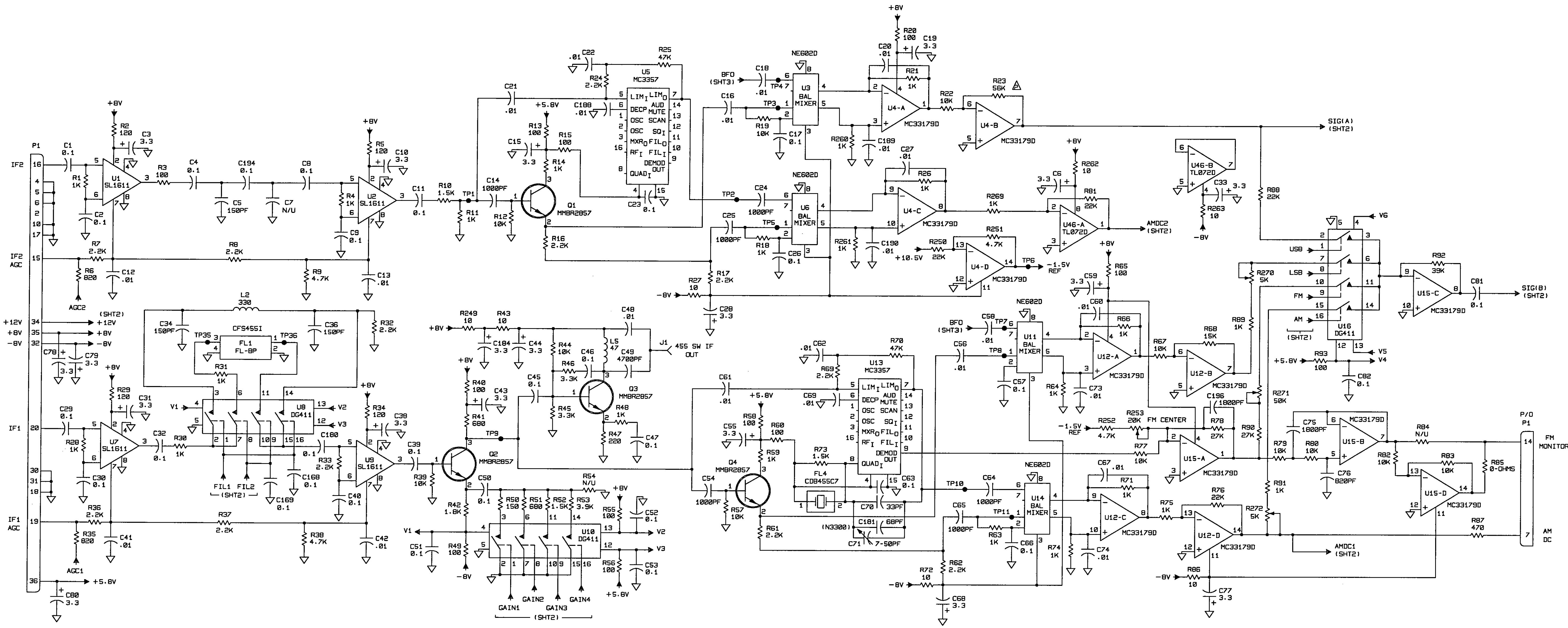


Figure 6-3. Type 796859-1, Microprocessor/Motherboard (A2), Schematic Diagram 581005 (Sheet 4 of 4) (G)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   - A) RESISTANCE IS IN OHMS, ±5%,1/8W.
   - B) CAPACITANCE IS IN μF.
   - C) INDUCTANCE IS IN μH.

2. NOMINAL VALUE: FINAL VALUE FACTORY SELECTED.

3. – 2 SAME AS – 1 EXCEPT WITH CONFORMAL COATING.

Figure 6-4. Type 796860-1, IF Demodulator/BFO (A5), Schematic Diagram 581006 (Sheet 1 of 3) (R)

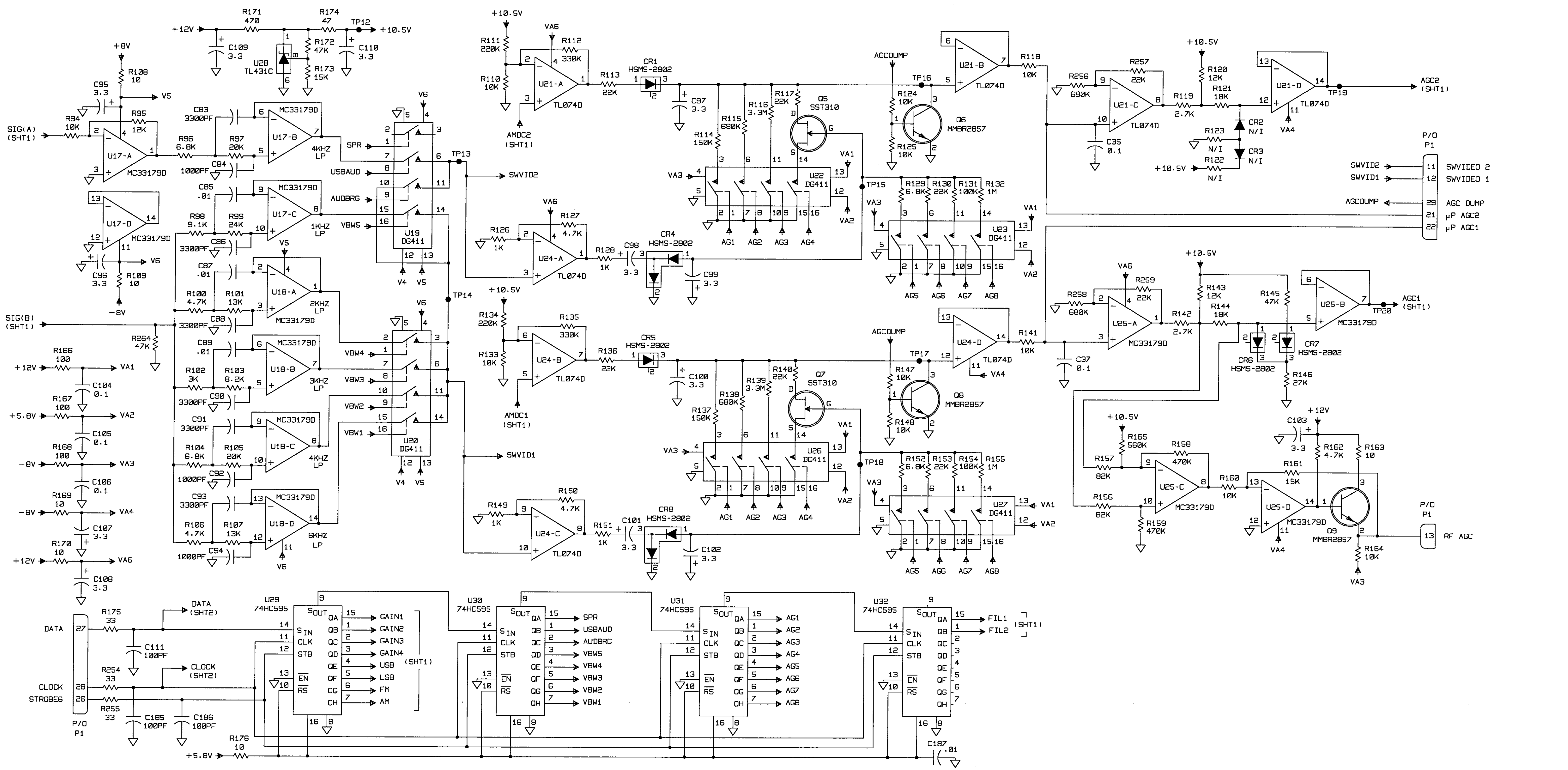


Figure 6-4. Type 796860-1, IF Demodulator/BFO (A5),
Schematic Diagram 581006 (Sheet 2 of 3) (R)

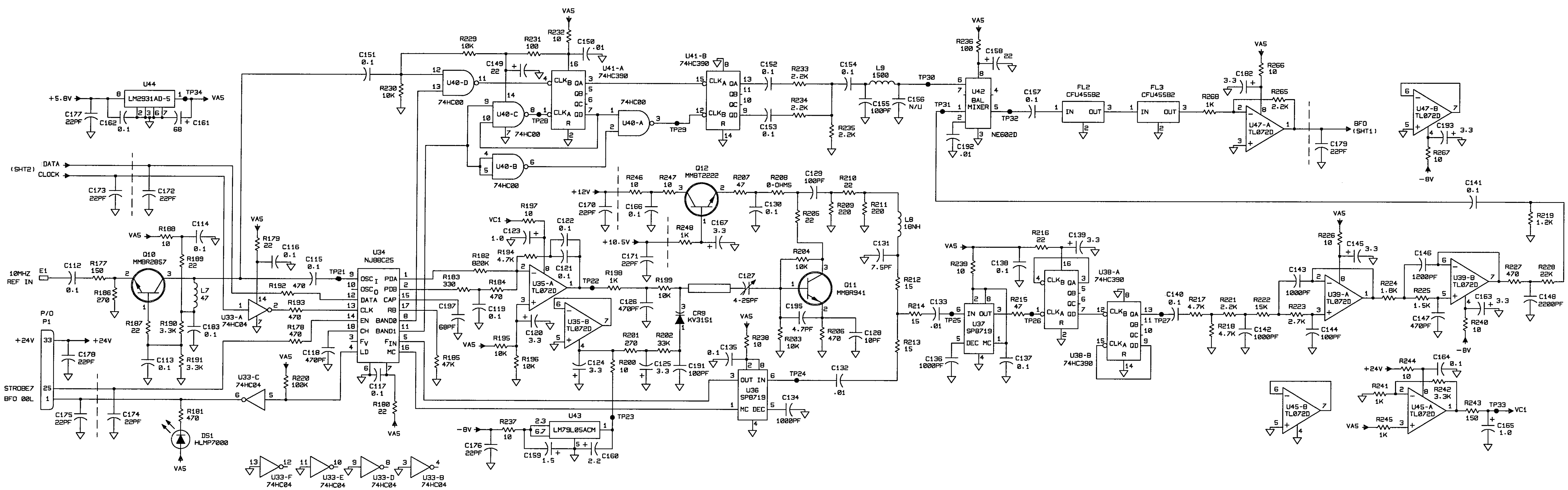
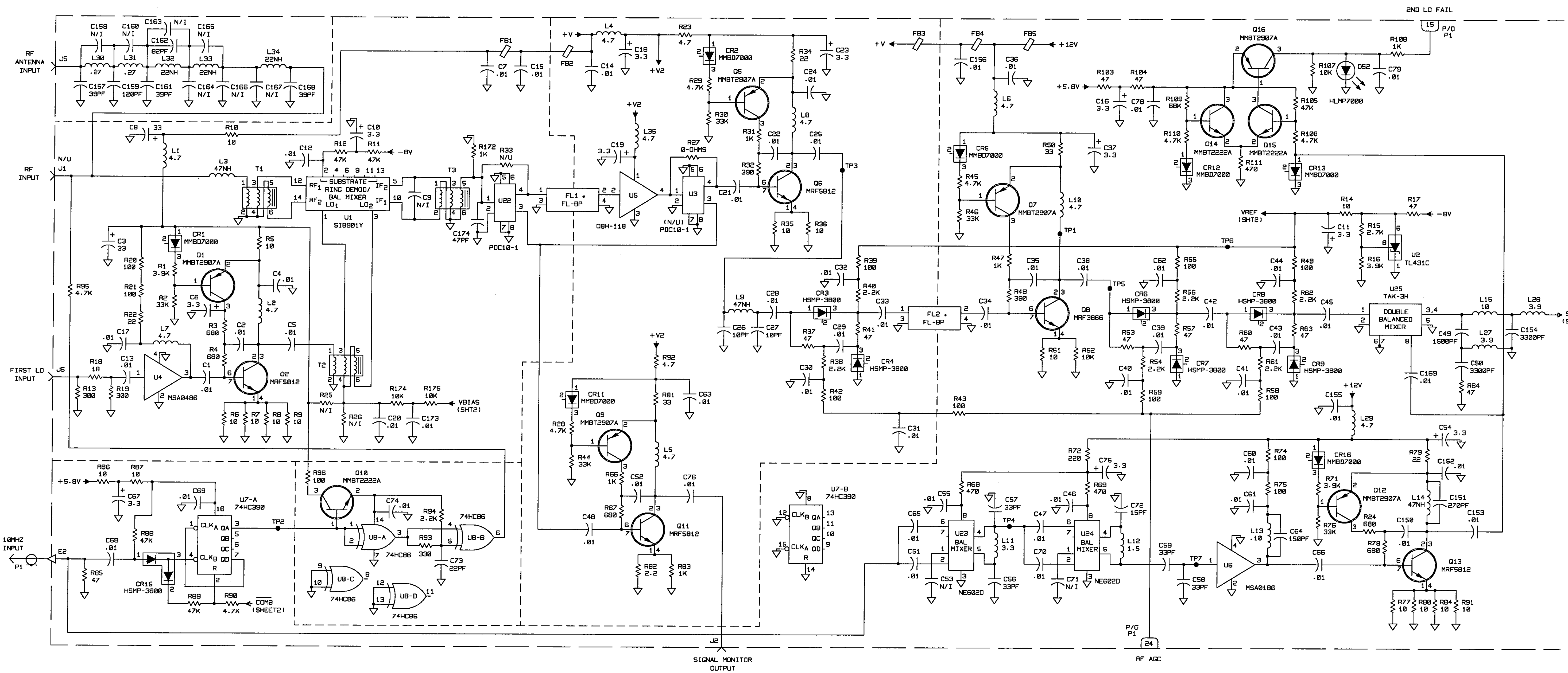


Figure 6-4. Type 796860-1, IF Demodulator/BFO (A5), Schematic Diagram 581006 (Sheet 3 of 3) (R)



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS. ±5%,1/8W.
   B) CAPACITANCE IS IN µF.
   C) INDUCTANCE IS IN µH.
2. * REF WJ DWG 180791 FOR FILTER CONFIGURATION TABULATION.

Figure 6-5. Type 796861-X, Input Converter (A6),
Schematic Diagram 581007 (Sheet 1 of 2) (L)

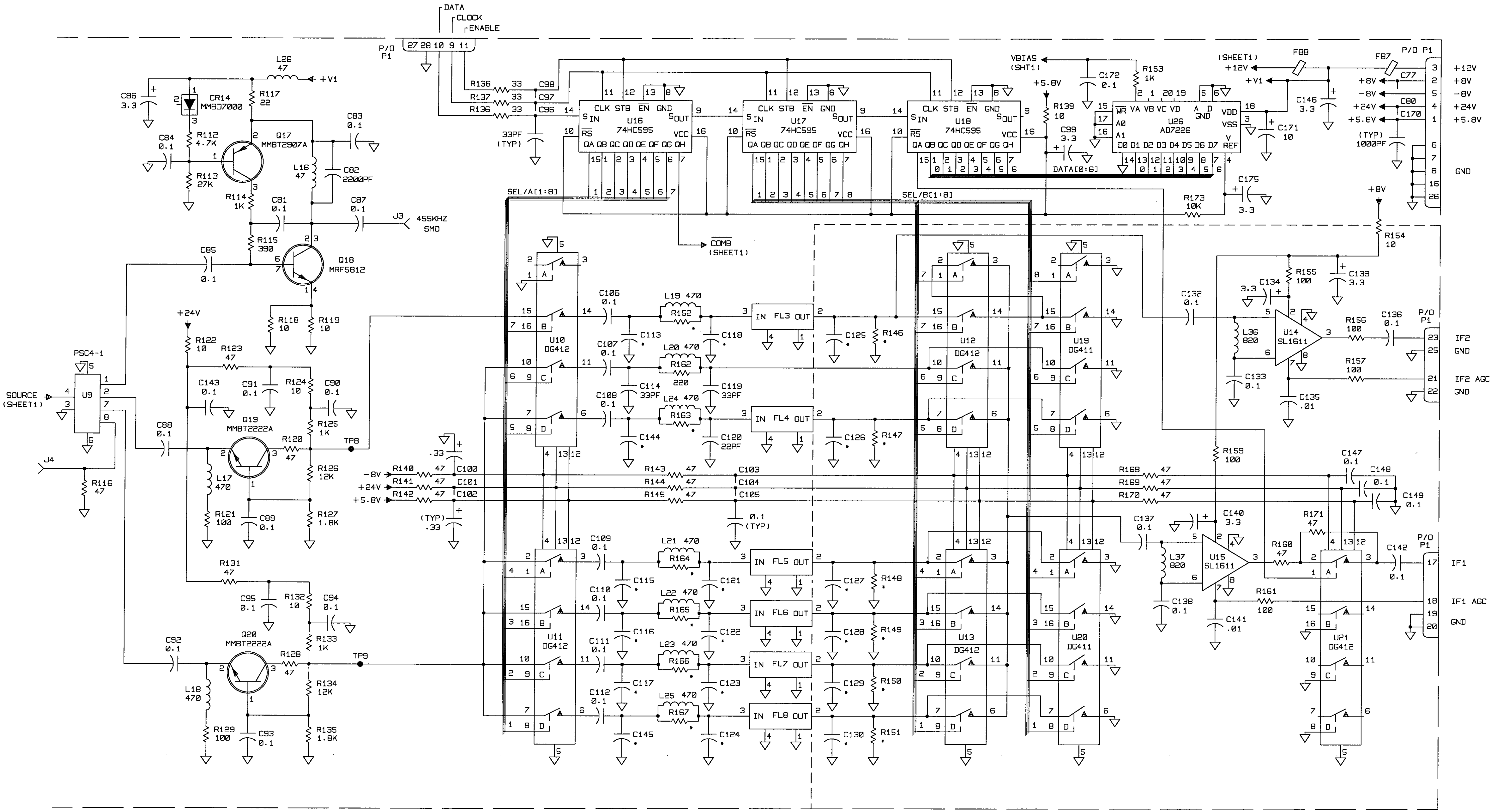
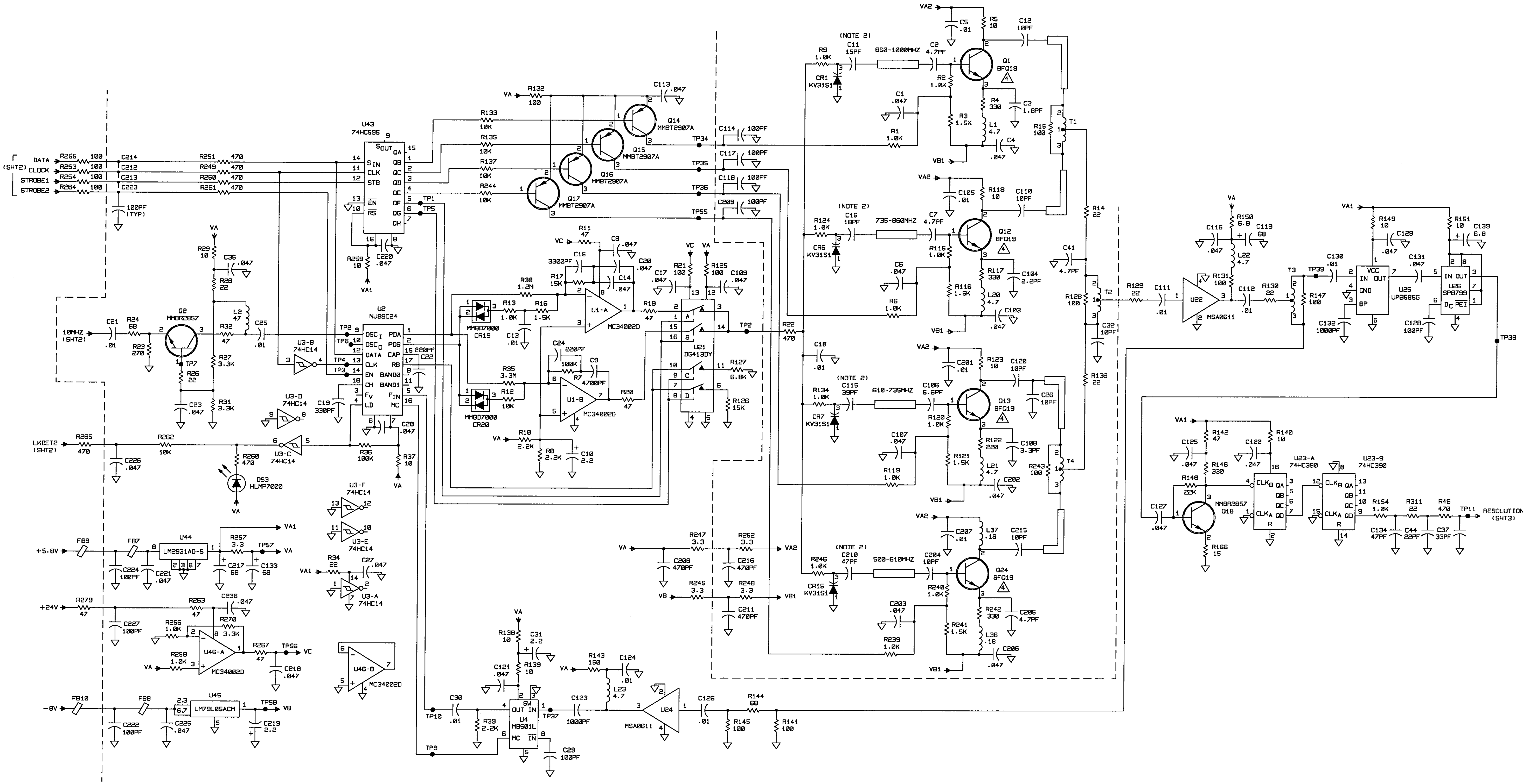


Figure 6-5. Type 796861-X, Input Converter (A6),
Schematic Diagram 581007 (Sheet 2 of 2) (L)



NOTES:

1. UNLESSS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS. ±5%, 1/8W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.
2. NOMINAL VALUE. FINAL VALUE FACTORY SELECTED.
3. –2 SAME AS –1 EXCEPT WITH CONFORMAL COATING.
4. INSTALL WJ PART NO. 841381-2, C/N=643936.

Figure 6-6. Type 796862-1, 1st LO Synthesizer (A7), Schematic Diagram 581008 (Sheet 1 of 3) (S)

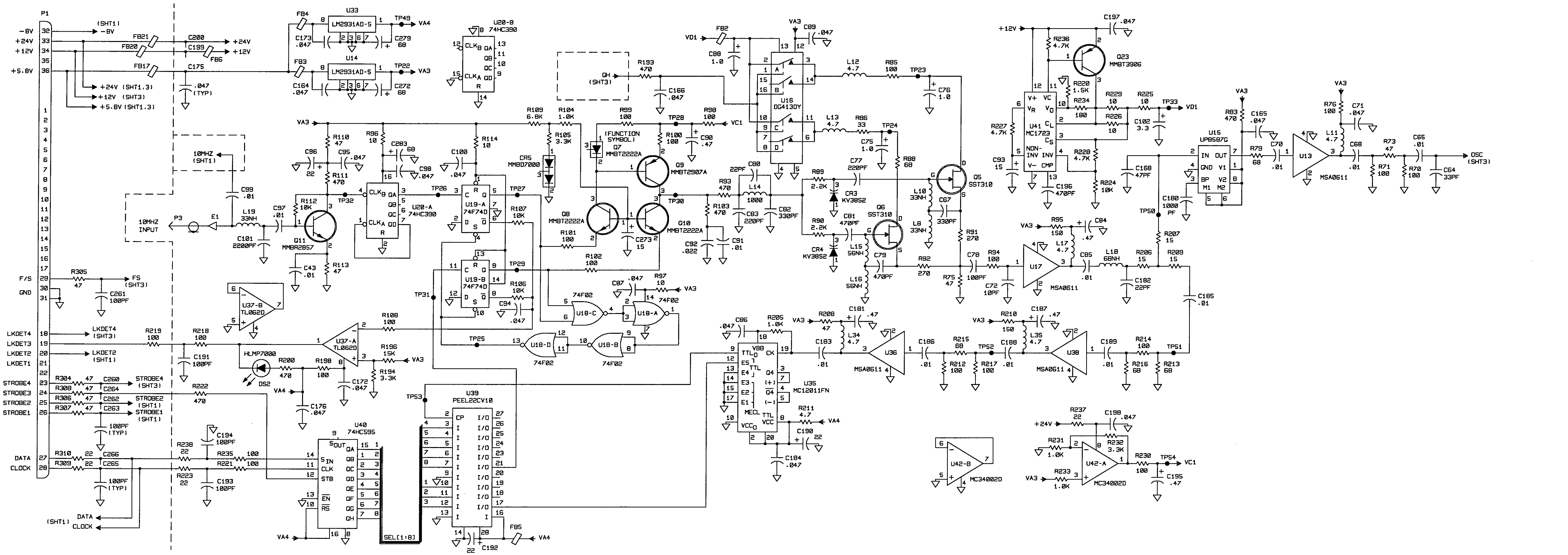


Figure 6-6. Type 796862-1, 1st LO Synthesizer (A7),
Schematic Diagram 581008 (Sheet 2 of 3) (S)

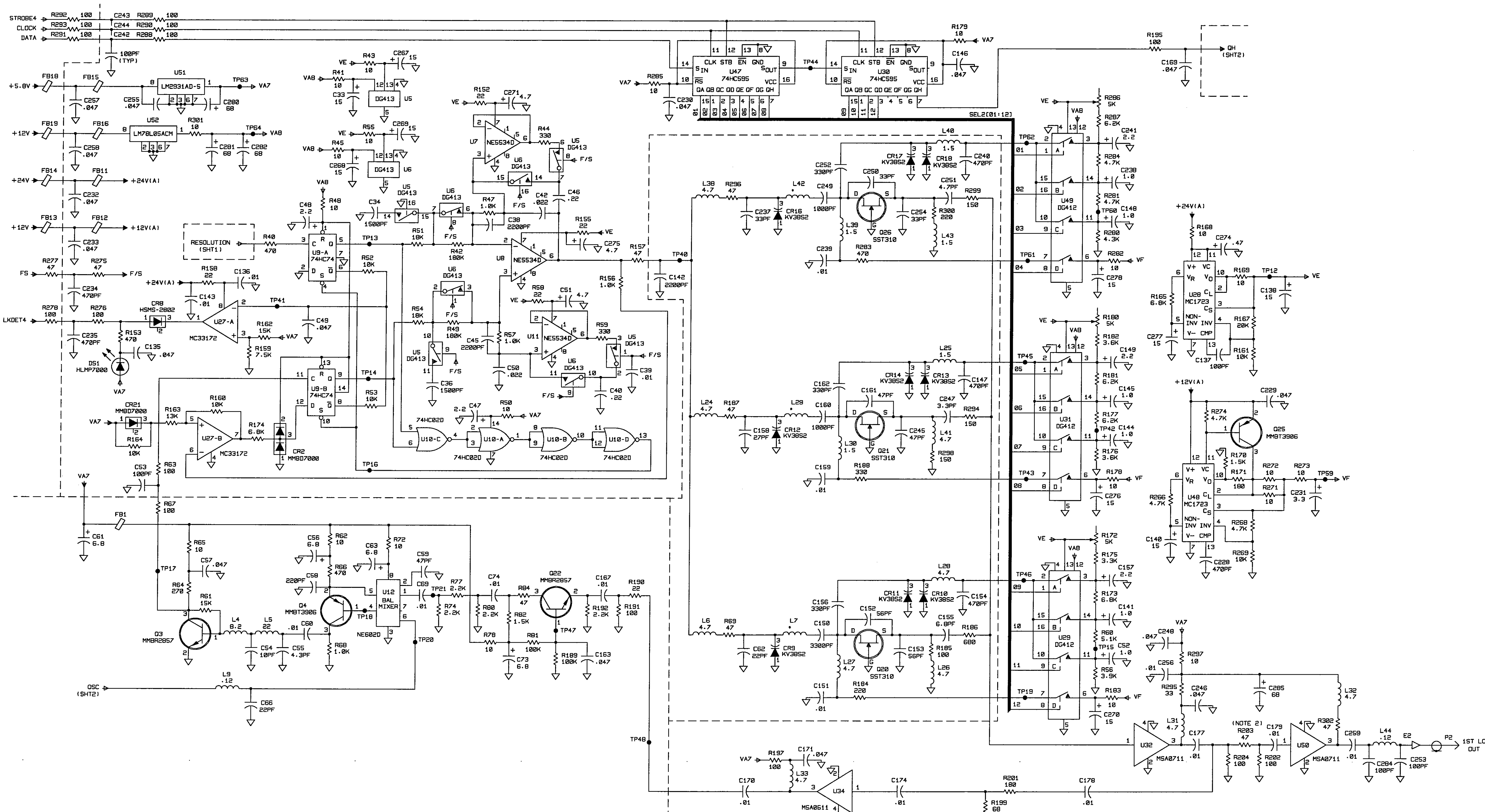
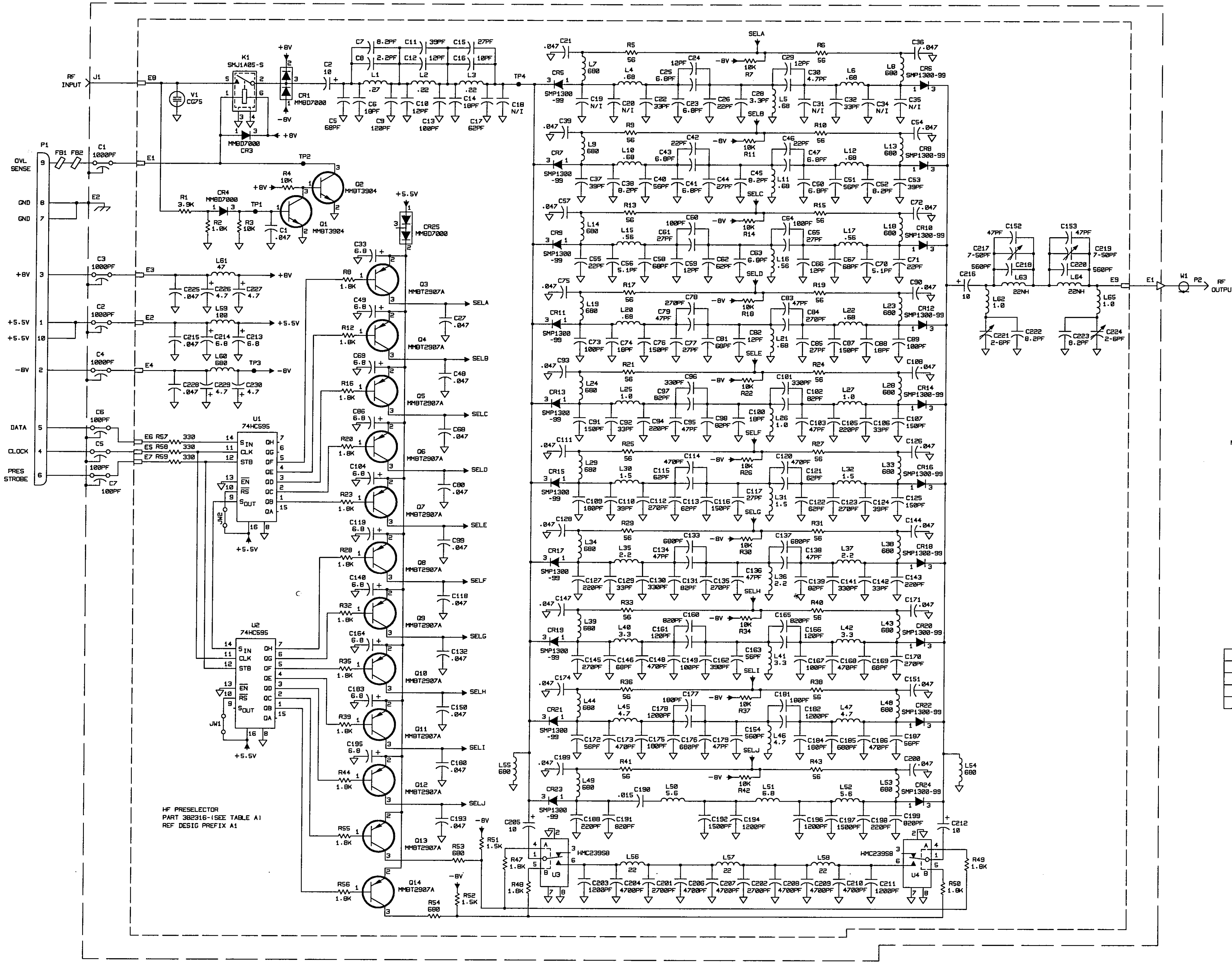


Figure 6-6. Type 796862-1, 1st LO Synthesizer (A7), Schematic Diagram 581008 (Sheet 3 of 3) (S)



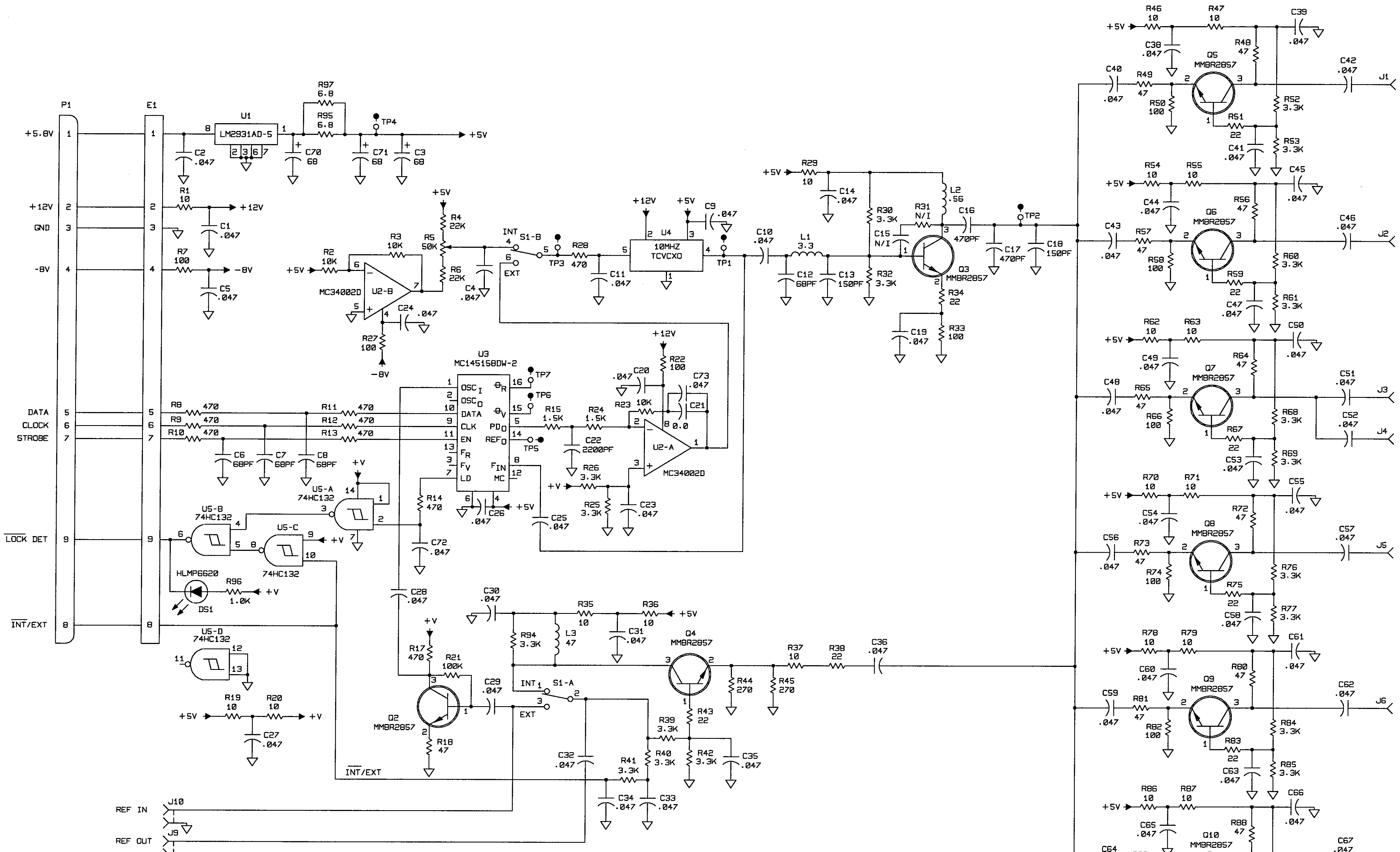
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
A) RESISTANCE IS IN OHMS, ±5%, 1/10W
B) CAPACITANCE IS IN μF.
C) INDUCTANCE IS IN μH.

2. −3 & −4 SAME AS −1 & −2 RESPECTIVELY, EXCEPT WITH CONFORMAL COATED A1, SEE TABLE A. DIFFERENCE BETWEEN PAIRS, OTHERWISE, MECHANICAL ONLY.

TABLE A

TYPE	A1	NOTE
796863-1	382316-1	———
796863-2	382316-1	———
796863-3	382316-2	A1 CONFORMAL COATED
796863-4	382316-2	A1 CONFORMAL COATED

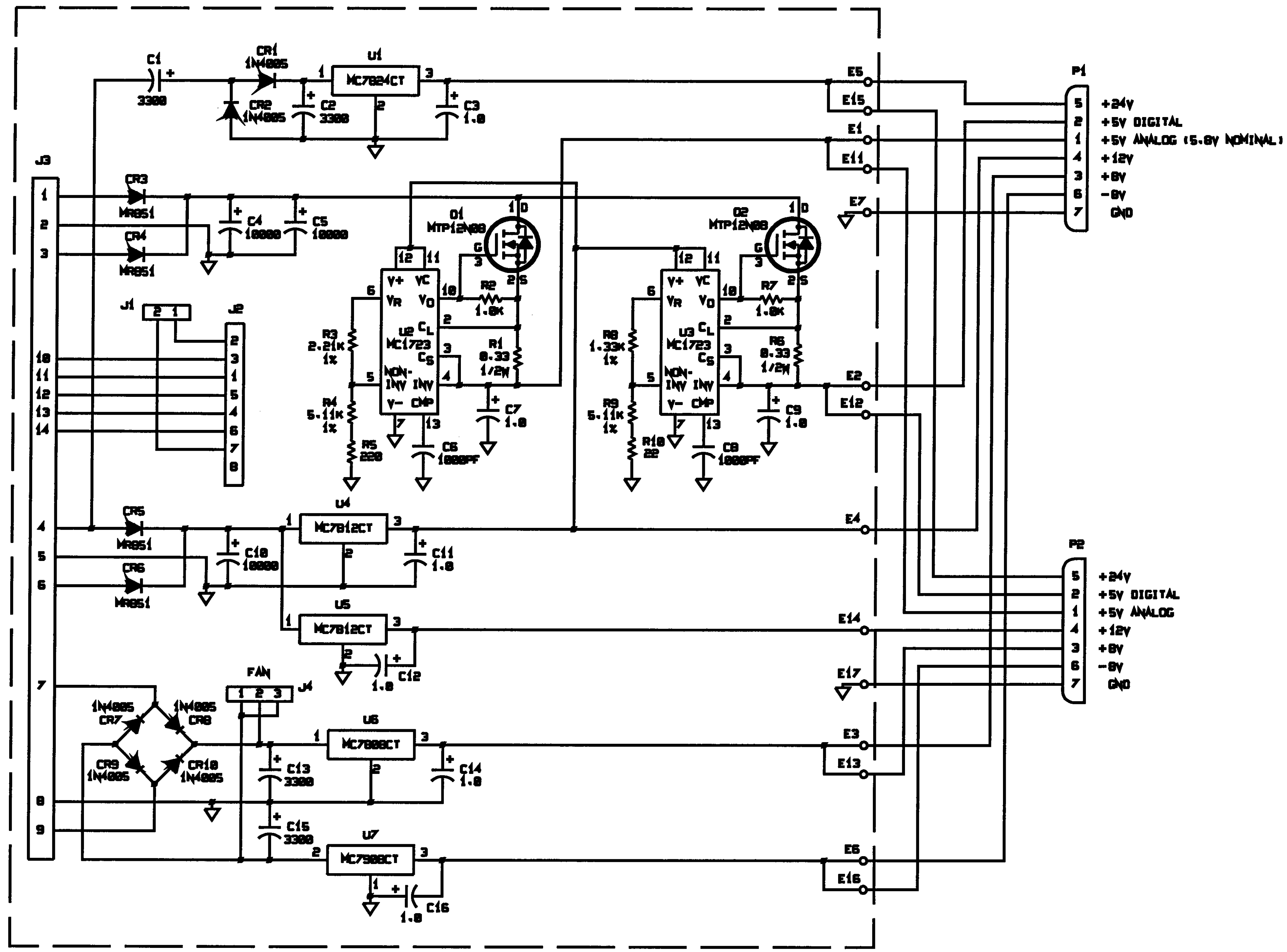
Figure 6-7. Type 796863-1, Preselector Assembly (A8), Schematic Diagram 581009 (J)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS. ±5%.1/8W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.
2. – 3 SAME AS – 1 EXCEPT WITH CONFORMAL COATING.

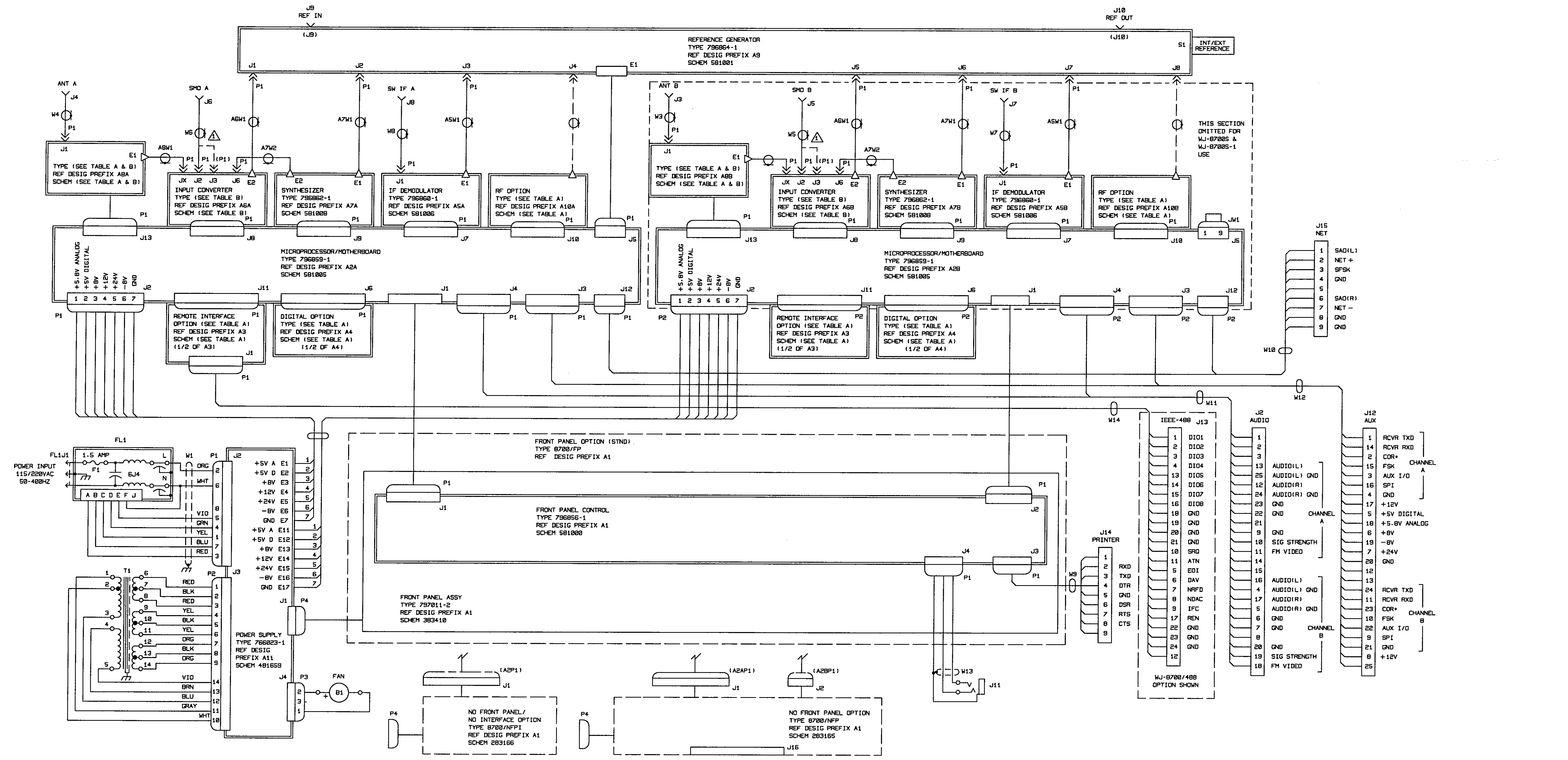
Figure 6-8. Type 796864-1, Reference Generator (A9), Schematic Diagram 581001 (F)



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS. ±5%.1/4W.
   B) CAPACITANCE IS IN μF.

2. - 2 SAME AS - 1 EXCEPT WITH CONFORMAL COATING.

Figure 6-9. Type 7766023-1, Power Supply (A11), Schematic Diagram 481659 (A)



NOTES:
⚠ WHEN USING 8700/SM1 INSTALL W5 AND/OR W6 AS INDICATED IN DASHED LINE (J3 INSTEAD OF J2).

TABLE A

OPTION	INT DIAG	TYPE	SCHEM	REF DES	REFERENCE
8700/488	581002	796857-1	581003	A3	———
8700/232	———	796954-1	581204	A3	———
8700/SM2	382429	796928-2	581143	A10(A/B)	———
8700/OP1	382626	796914-1	581131	A10(A/B)	CANNOT BE USED ON 8700-1
		796863-2	581009	A8(A/B)	
8700/OP2	382627	796928-1	581143	A10(A/B)	———
8700/OP3	382714	796928-3	581143	A10(A/B)	———
8700/OP4	383356	797094-1	581453	A10(A/B)	———

TABLE B

UNIT	TYPE	REF DES	SCHEM	REFERENCE	JX
WJ-8700 & WJ-8700S	796861-X	A6 (A/B)	581007	180791 (FILTER CONFIG)	J1 OR J5*
	796863-1 (PRESELECTOR)	A8 (A/B)	581009	8700/PRTE	———
WJ-8700-1 & WJ-8700S-1	796889-X	A6 (A/B)	581079	180792 (FILTER CONFIG)	J1 OR J5*
	796958-1 (INPUT ASSY)	A8 (A/B)	581213	———	———

* USE J1 OR J5 WHICHEVER JACK IS AVAILABLE.

Figure 6-10. Type WJ-8700 VLF/HF Dual Receiver, Main Chassis Schematic Diagram 581002 (P)

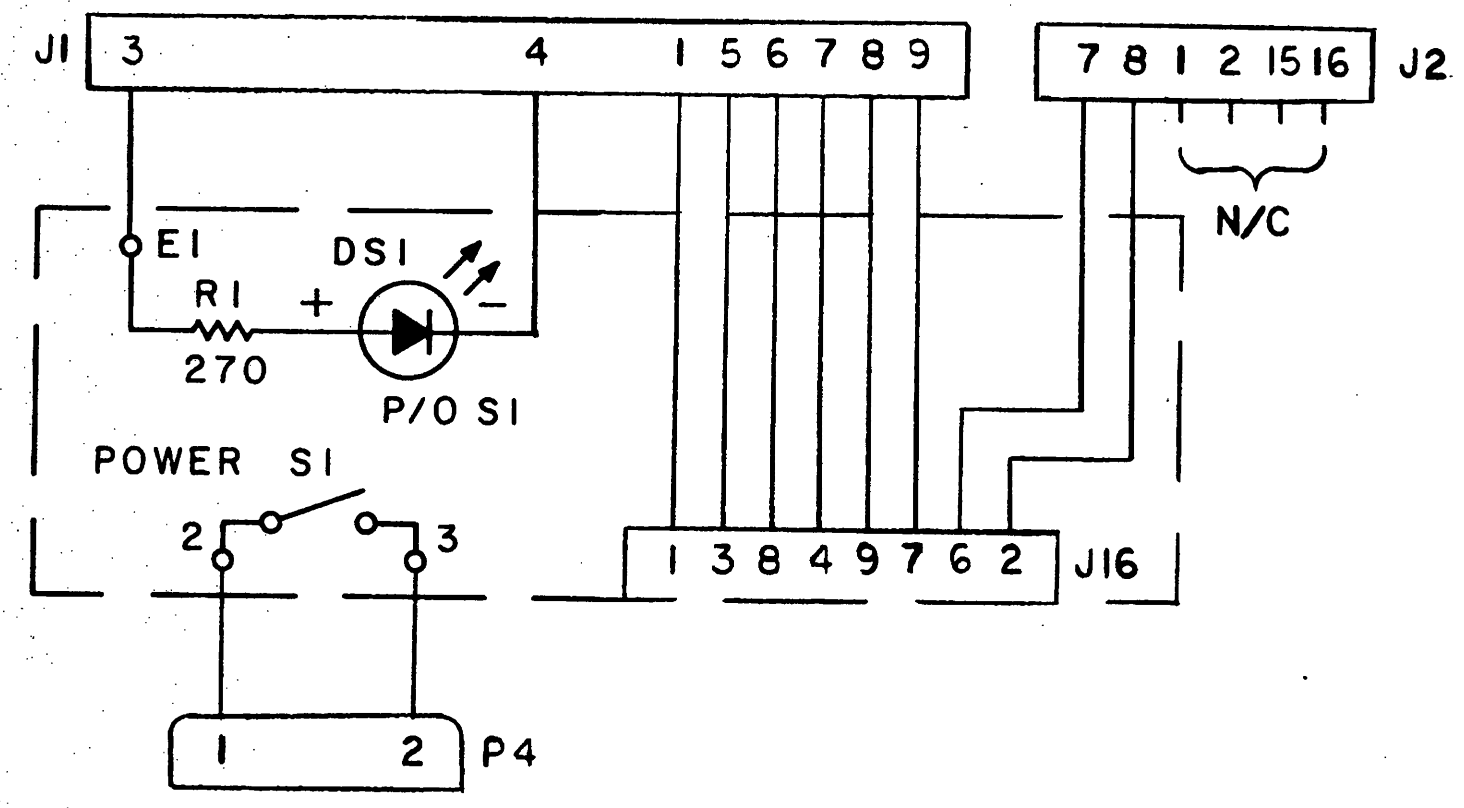


Figure A-2. Type 796893-1, NFP Front Panel Assembly (A1), Schematic Diagram 283165 (A)

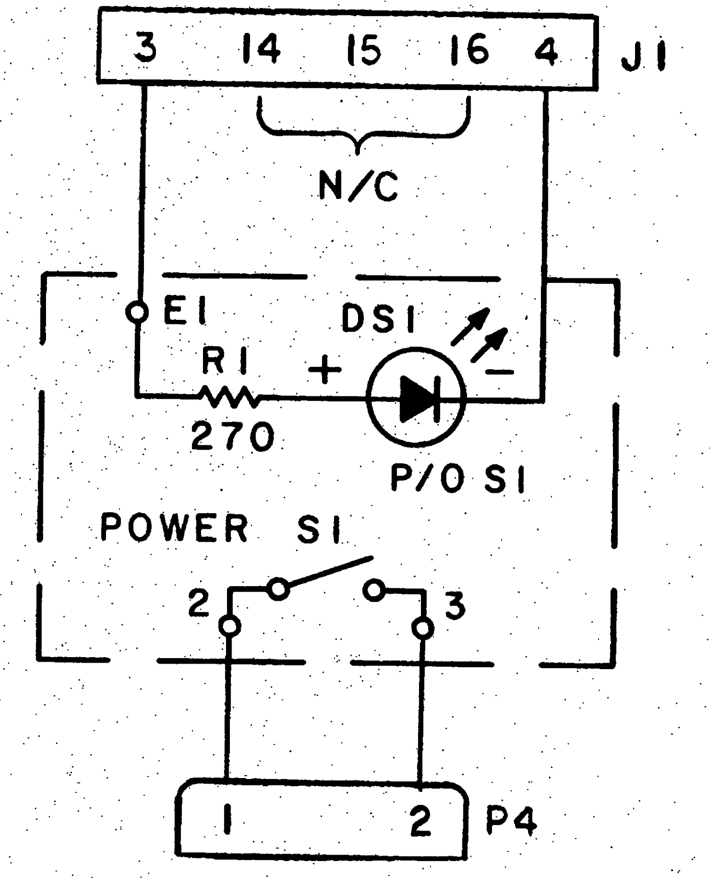


Figure A-3. Type 796893-2, NFP Front Panel Assembly (A1), Schematic Diagram 283165 (A)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
A) RESISTANCE IS IN OHMS, ±5%, 1/8W.
B) CAPACITANCE IS IN μF.
2. SEE TABLE A FOR SELECTED RESISTORS.

TABLE A

TYPE	796857-1
R7	USED
R8	NOT USED
R9	NOT USED
R10	USED
R11	USED
R12	USED
R13	USED
R14	USED
R19	NOT USED
R20	USED
R21	NOT USED
R22	NOT USED

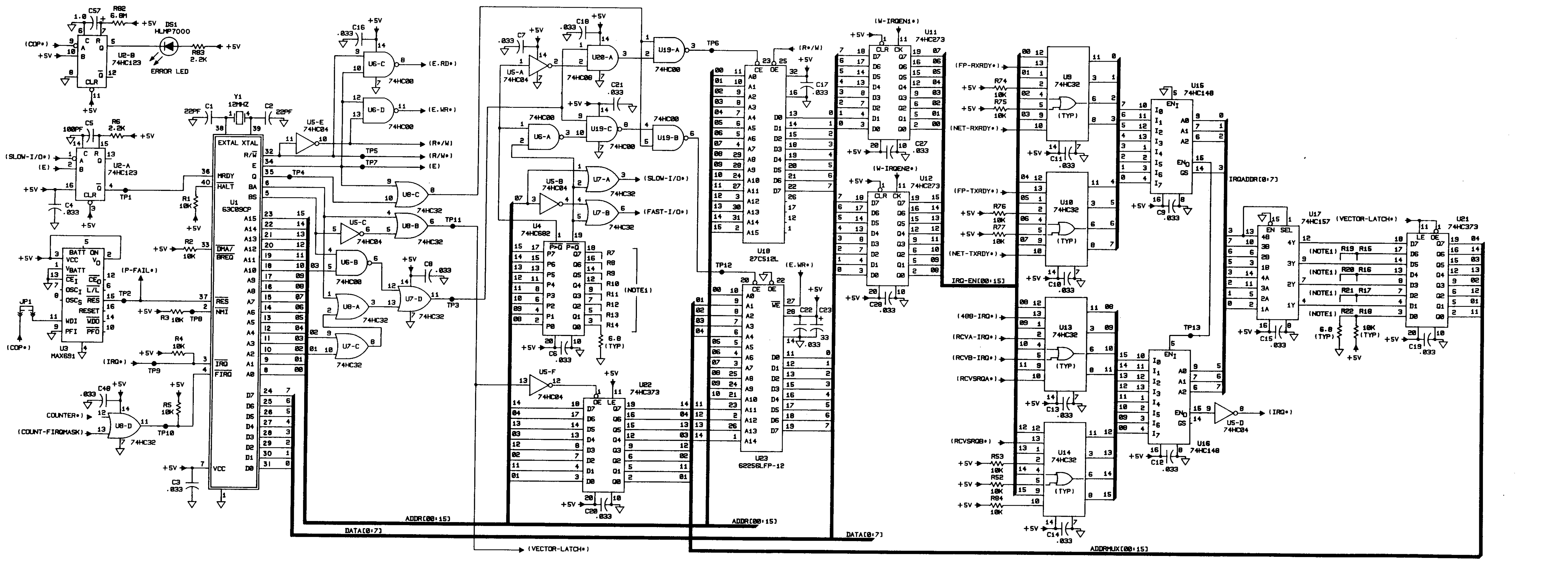


Figure B-3. Type 796857-1, Remote Interface (A3), Schematic Diagram 581003 (Sheet 1 of 2) (B)

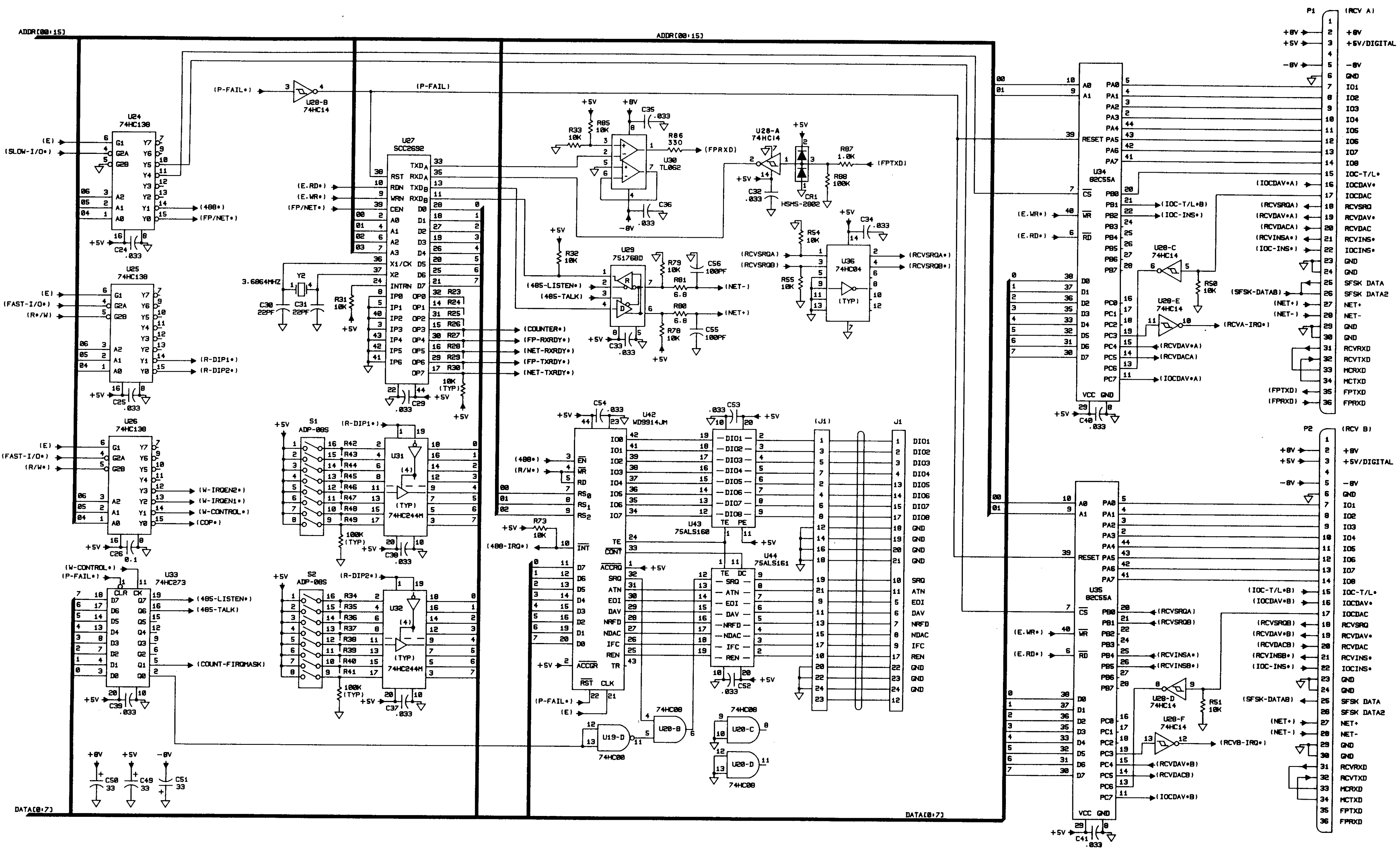
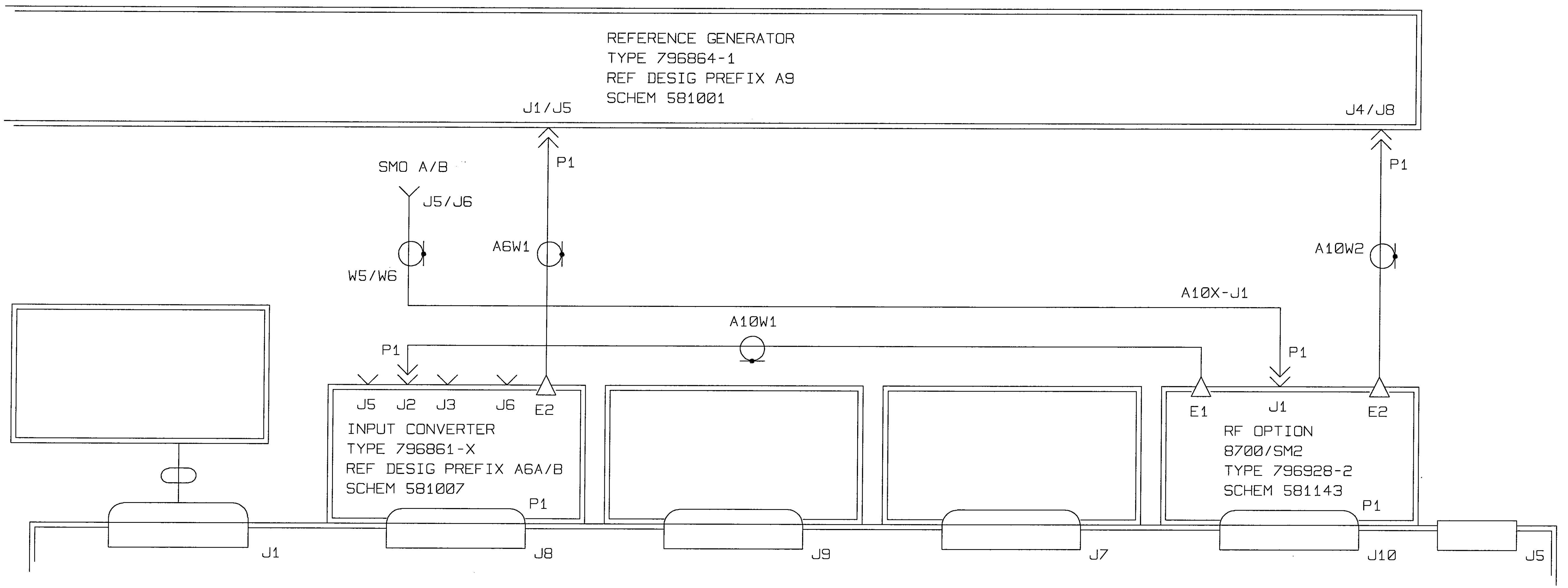


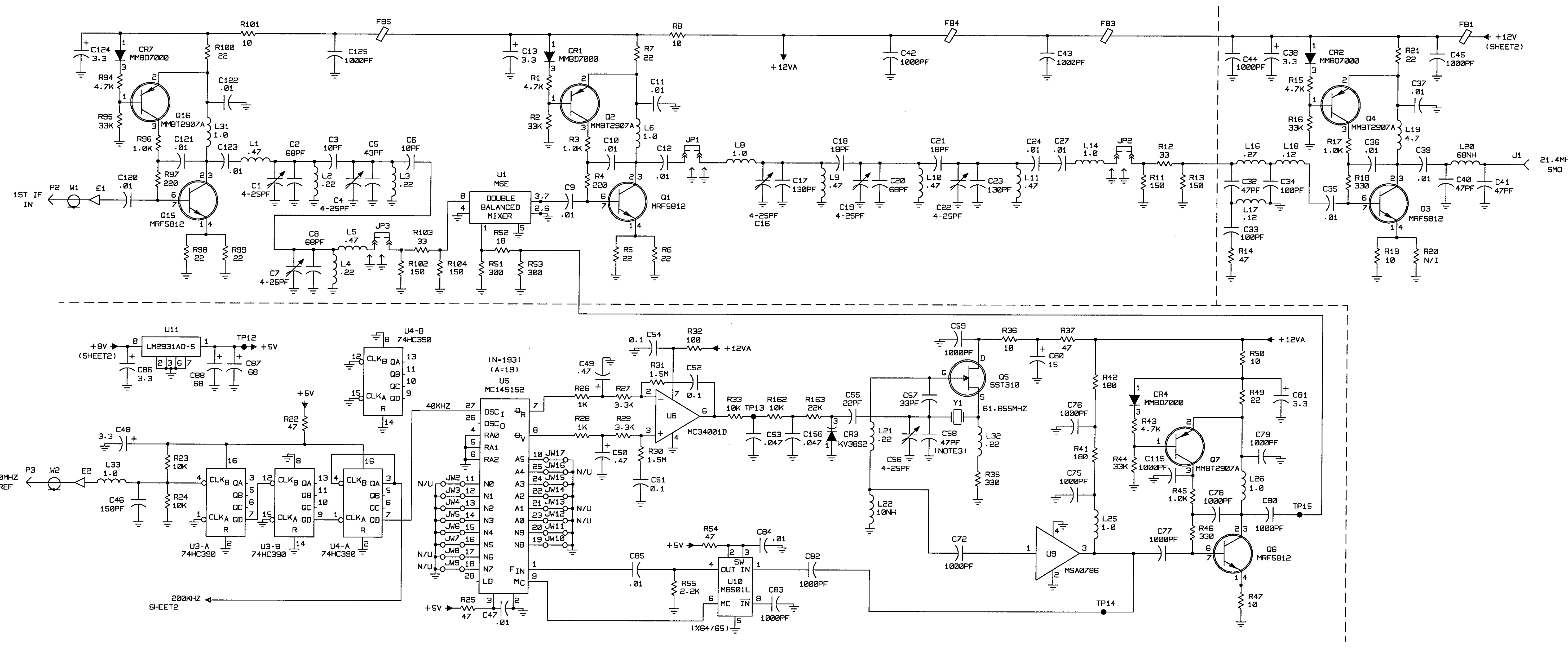
Figure B-3. Type 796857-1, Remote Interface (A3), Schematic Diagram 581003 (Sheet 2 of 2) (B)



NOTES:

INTERCONNECTION FOR 8700/SM2 IS SHOWN.
OTHER INTERCONNECTIONS HAVE NOT BEEN SHOWN;
FOR CLARITY, REFER TO SCHEM 581002 FOR DETAILS.

Figure D-2. Type WJ-8700/XSM2 Option Interconnection Diagram 382429 (C)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS OHMS, ±5%, 1/10W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.
2. 796928-2 USES SHEET 1 CIRCUITRY ONLY. (SM2 CONVERTER).
3. NOMINAL VALUE: FINAL VALUE FACTORY SELECTED.
4. FOR -1 R146 IS 2.2K; FOR -2 R146 IS 6.8K.
5. – 4 & – 5 SAME AS – 1 & – 2, RESPECTIVELY, EXCEPT WITH CONFORMAL COATING.

Figure D-3. Type 796928-2, 21.4 MHz SMO Converter (A16), Schematic Diagram 581143 (G2) (Sheet 1 of 2)

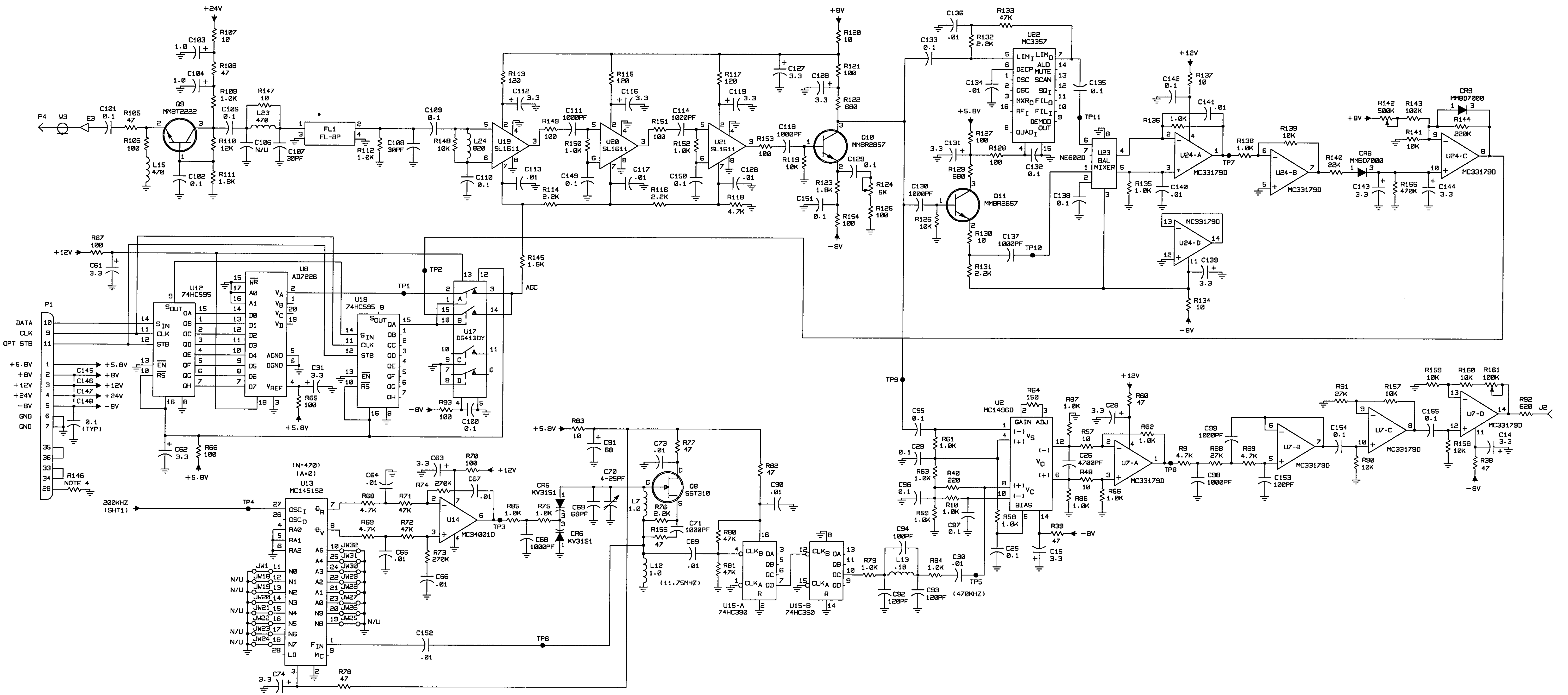
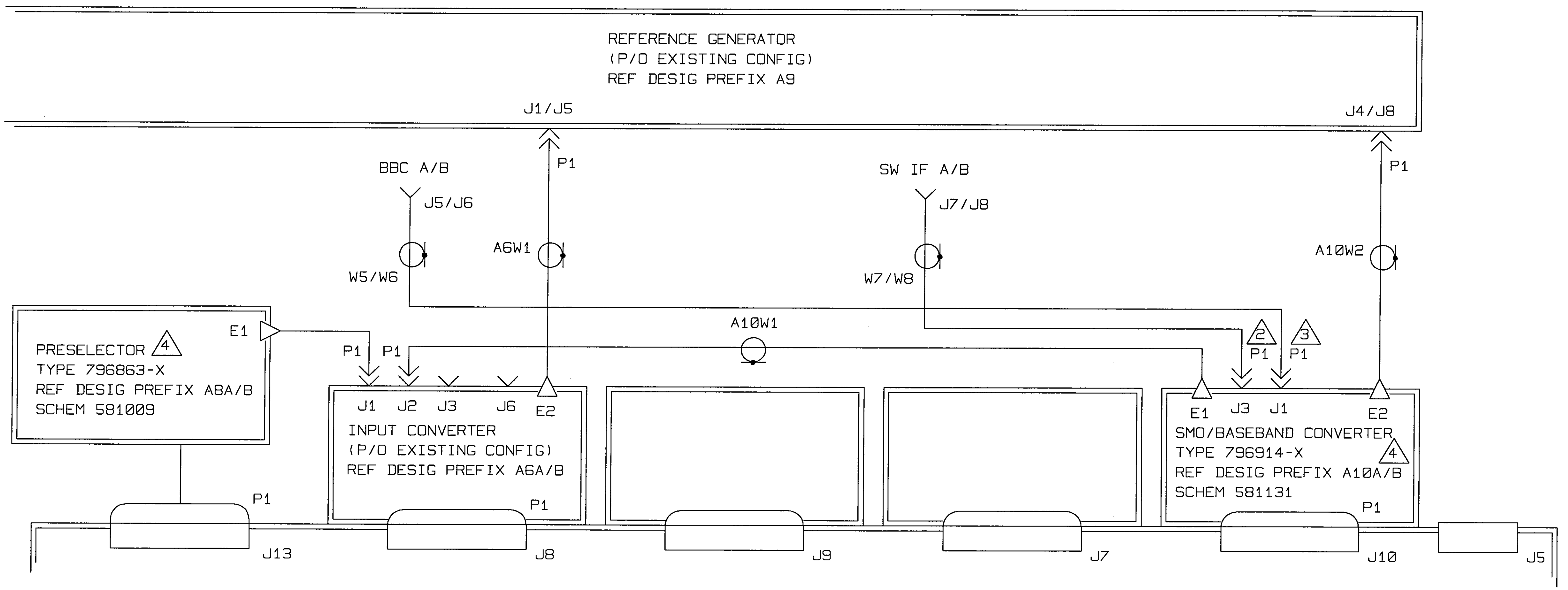


Figure D-3. Type 796928-2, 21.4 MHz SMO Converter (A16), Schematic Diagram 581143 (G2) (Sheet 2 of 2)



NOTES:

1. OPTION INTERCONNECTION IS SHOWN. OTHER INTERCONNECTIONS HAVE NOT BEEN SHOWN; FOR CLARITY, REFER TO APPLICABLE MC SCHEM FOR DETAILS.

2. CABLE LABEL A10X-J3

3. CABEL LABEL A10X-J1

4. DIFFERENCE BETWEEN 8700/OP1 & 8700-2/OP1 IS CONFORMAL COATED A8 & A10 BOARD(S); SEE TABLE A.

TABLE A

TYPE	REF DESIG	RF OPTION	REF
796863-2	A8(A/B)	8700/OP1	———
796863-4	A8(A/B)	8700-2/OP1	CONF CTD
796914-1	A10(A/B)	8700/OP1	———
796914-2	A10(A/B)	8700-2/OP1	CONF CTD

Figure E-3. Type WJ-8700/XOP1 Option Interconnection Diagram 382626 (B)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
A) RESISTANCE IS IN OHMS, ±5%, 1/10W.
B) CAPACITANCE IS IN µF.
C) INDUCTANCE IS IN µH.

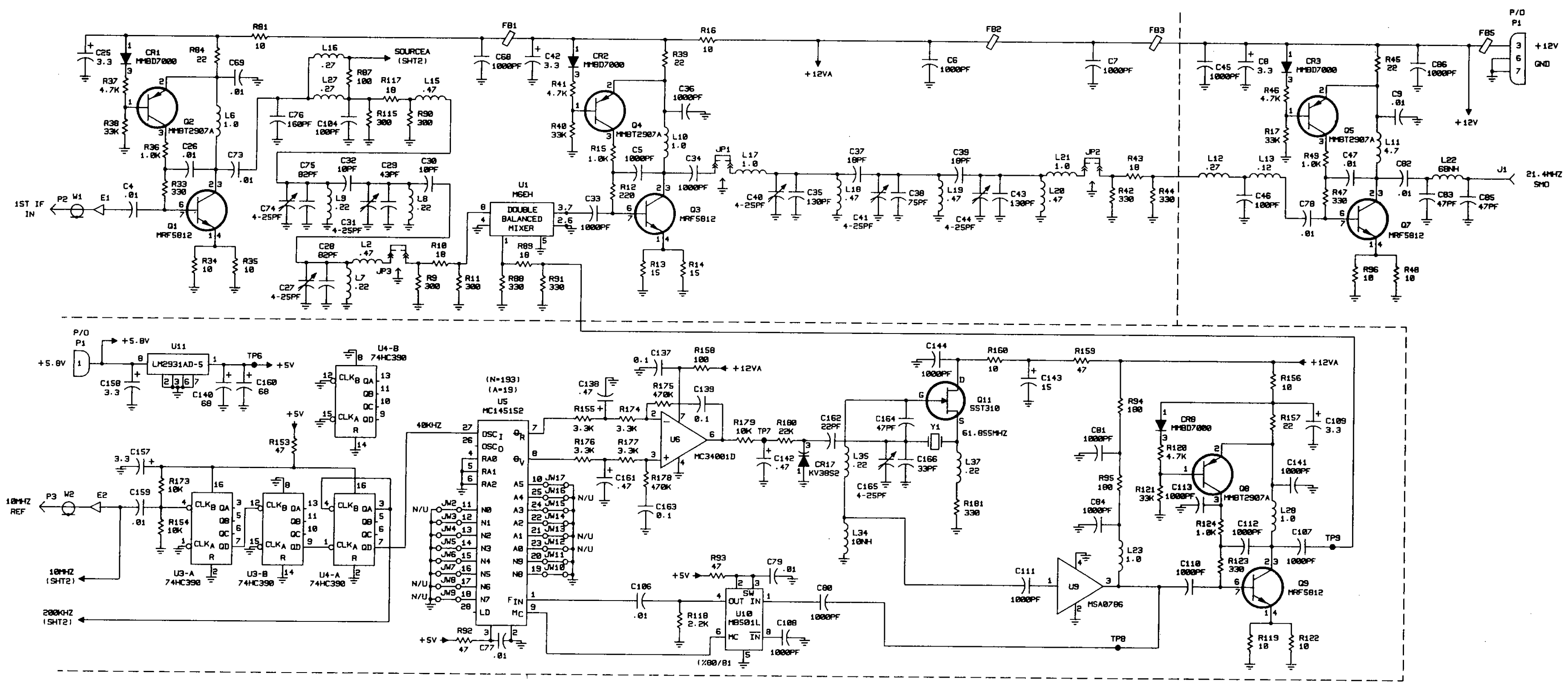


Figure E-4. Type 796914-1, SMO/Baseband Converter PC Assembly (A10), Schematic Diagram 581131 (Sheet 1 of 2) (A)

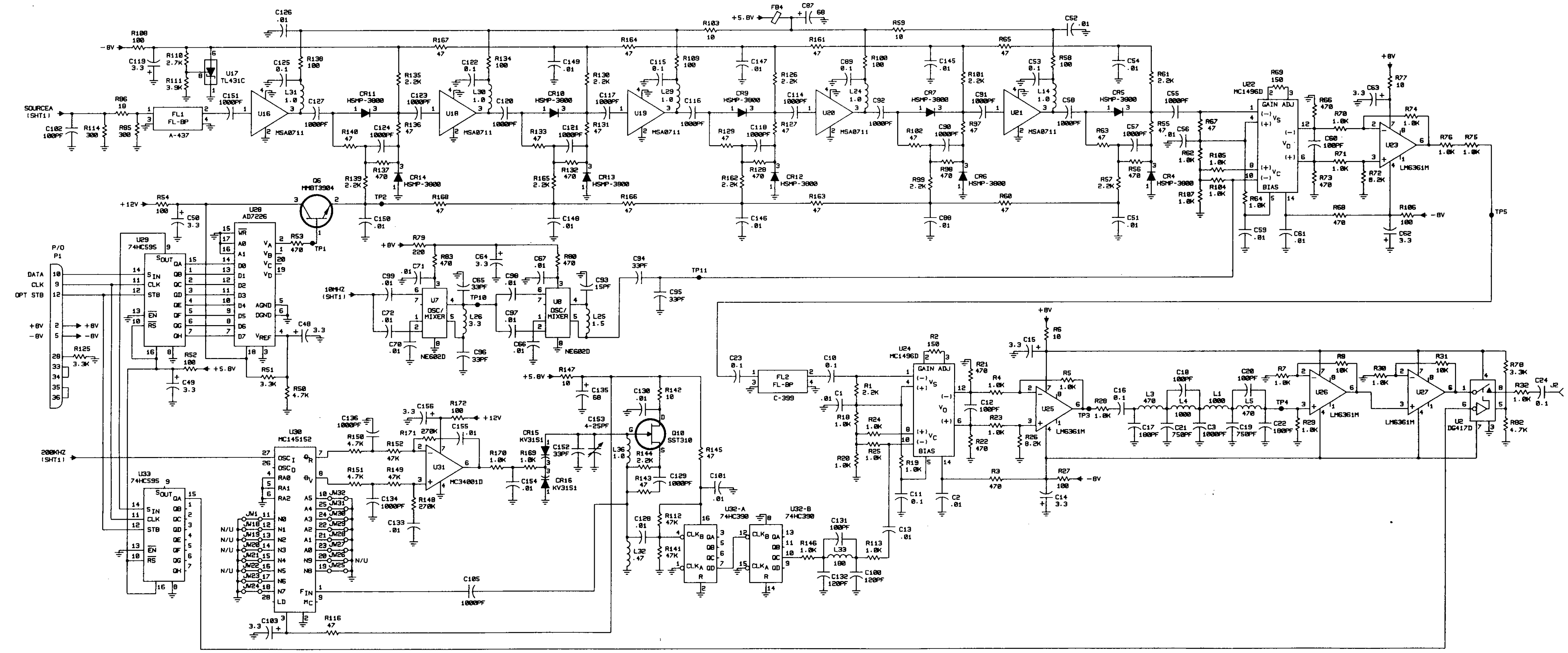
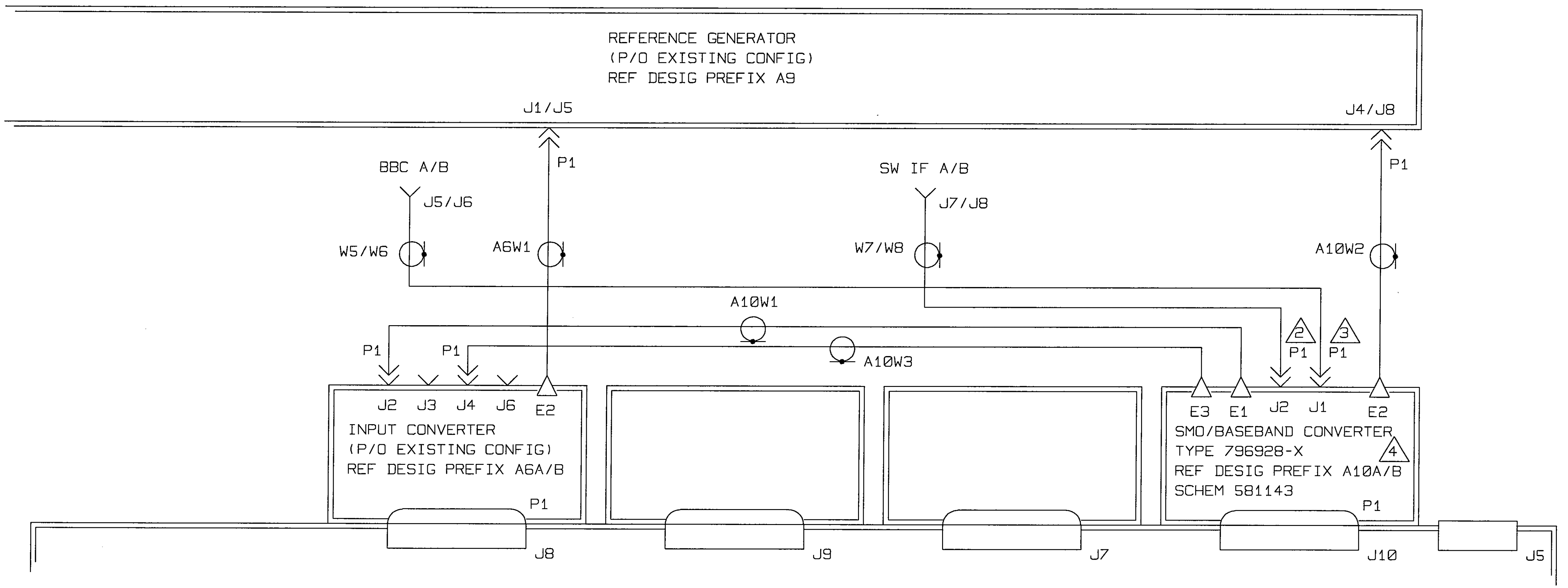


Figure E-4. Type 796914-1, SMO/Baseband Converter
PC Assembly (A10), Schematic
Diagram 581131 (Sheet 2 of 2) (A)



NOTES:

1. OPTION INTERCONNECTION IS SHOWN. OTHER INTERCONNECTIONS HAVE NOT BEEN SHOWN; FOR CLARITY, REFER TO SCHEM 581002 FOR DETAILS.

2. CABLE LABEL A10X-J2

3. CABLE LABEL A10X-J1

4. DIFFERENCE BETWEEN 8700/OP2 AND 8700-2/OP2 IS CONFORMAL COATED A10 BOARD(S); SEE TABLE A.

TABLE A

TYPE	REF DESIG	RF OPTION	REF
796928-1	A10(A/B)	8700/OP2	———
796928-4	A10(A/B)	8700-2/OP2	CONFORMAL COATED

Figure F-3. Type WJ-8700/XOP2 Option Interconnection Diagram 382627 (B)

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS OHMS. ±5%. 1/10W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.
2. 796928-2 USES SHEET 1 CIRCUITRY ONLY, (SM2 CONVERTER).

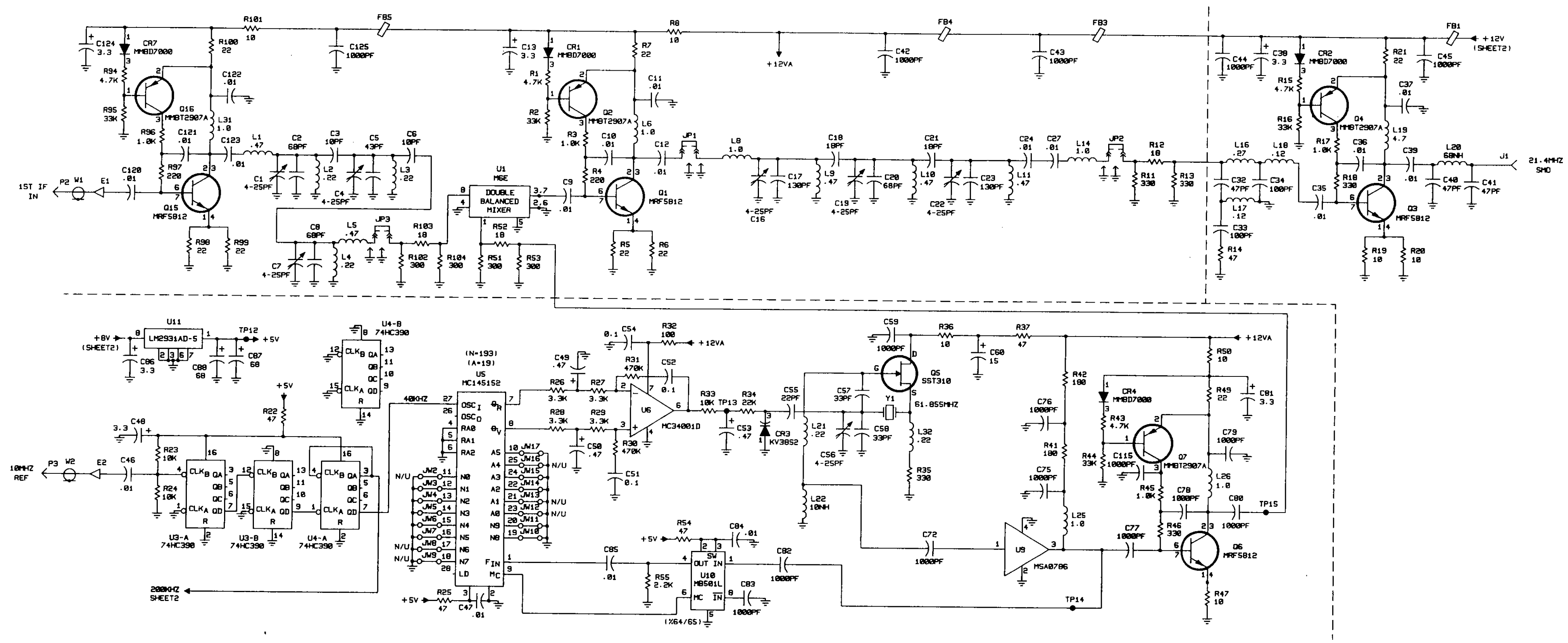


Figure F-4. Type 796928-1, SMO/Baseband Converter PC Assembly (A10), Schematic Diagram 581143 (Sheet 1 of 2) (B)

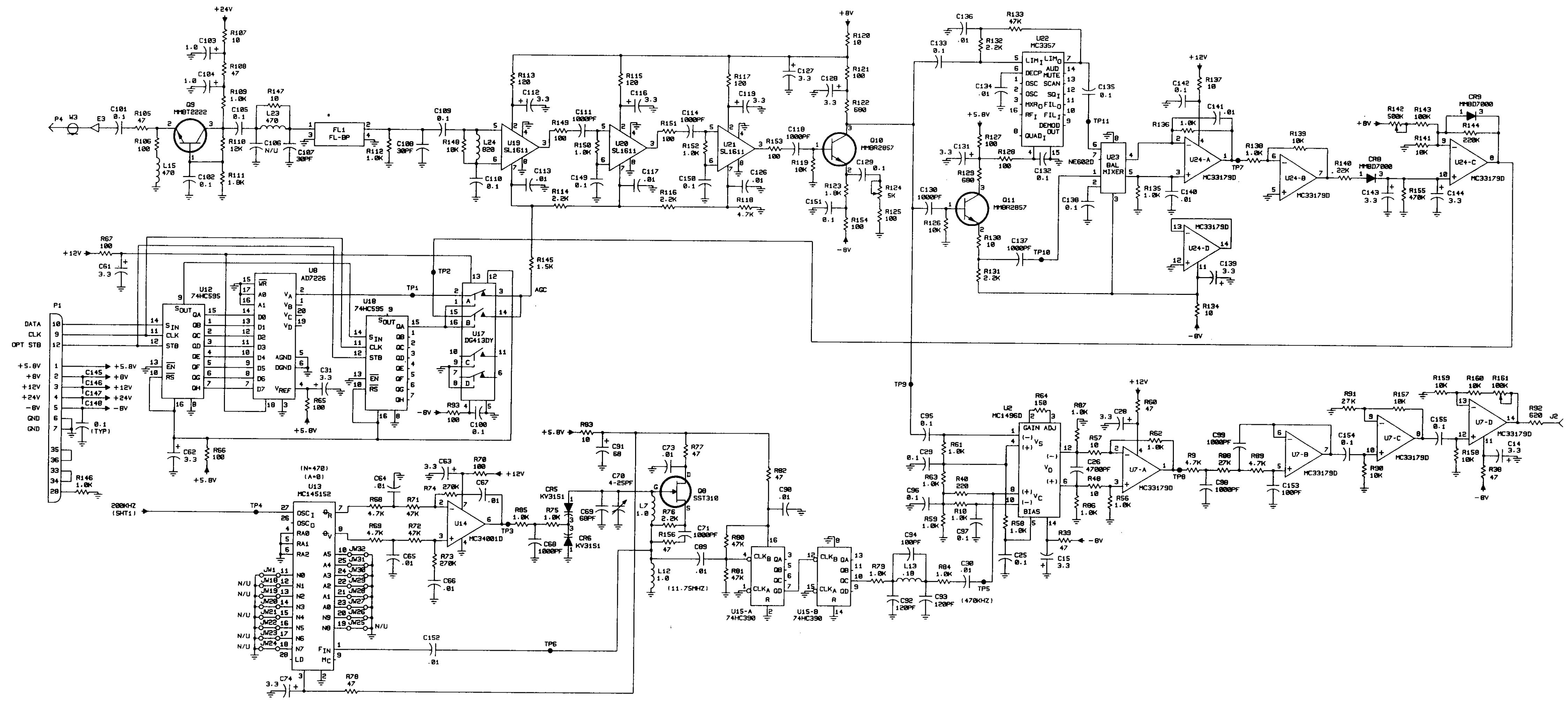
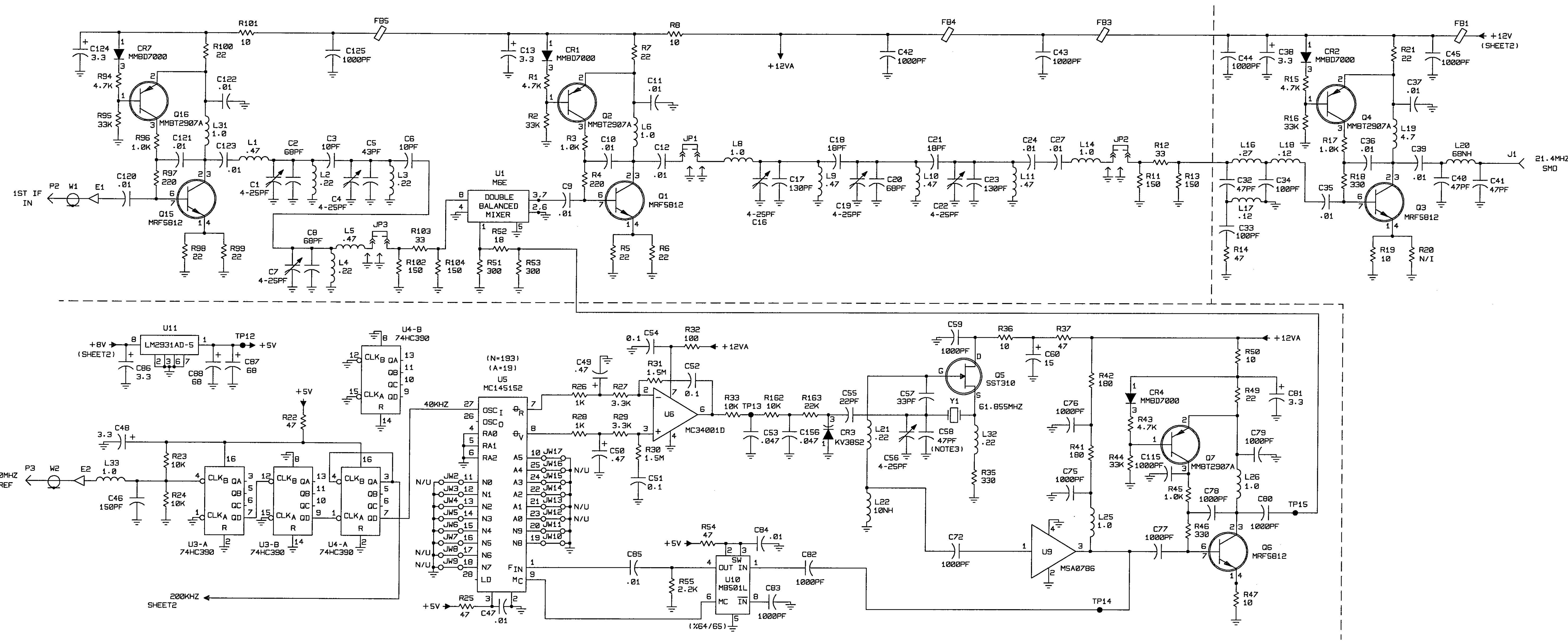


Figure F-4. Type 796928-1, SMO/Baseband Converter PC Assembly (A10), Schematic Diagram 581143 (Sheet 2 of 2) (B)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS OHMS, ±5%, 1/10W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.
2. 796928-2 USES SHEET 1 CIRCUITRY ONLY, (SM2 CONVERTER).
3. NOMINAL VALUE: FINAL VALUE FACTORY SELECTED.
4. FOR -1 R146 IS 2.2K; FOR -2 R146 IS 6.8K.
5. - 4 & - 5 SAME AS - 1 & - 2, RESPECTIVELY, EXCEPT WITH CONFORMAL COATING.

Figure G-5. Type WJ-8700/232 RS-232C Remote Interface Option Schematic Diagram 581204 (Sheet 1 of 2) (03)

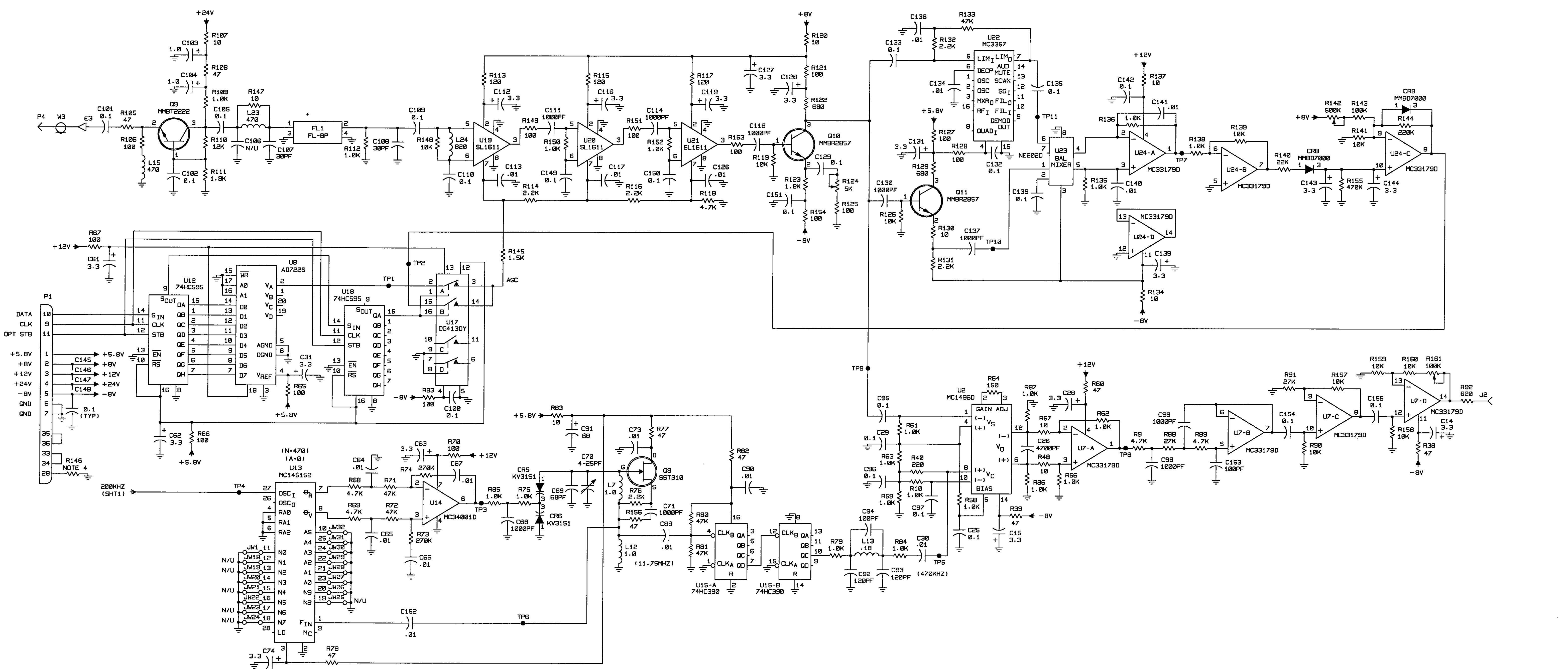
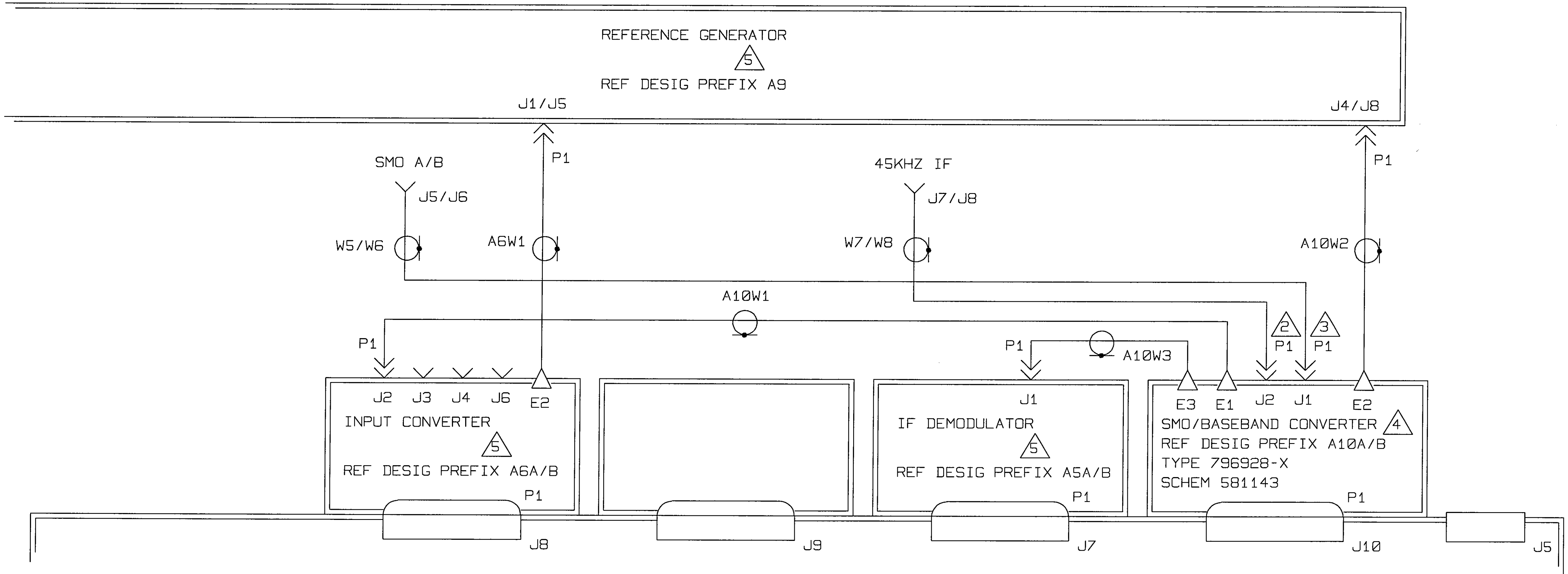


Figure G-5. Type WJ-8700/232 RS-232C Remote Interface Option Schematic Diagram 581204 (Sheet 2 of 2) (03)



NOTES:

1. OPTION INTERCONNECTION IS SHOWN. OTHER INTERCONNECTIONS HAVE NOT BEEN SHOWN; FOR CLARITY, REFER TO SCHEM 581002 FOR DETAILS.

2. CABLE LABEL A10X-J2

3. CABLE LABEL A10X-J1

4. DIFFERENCE BETWEEN 8700/OP3 & 8700-2/OP3 IS CONFORMAL COATED A10 BOARD(S); SEE TABLE A.

TABLE A

TYPE	REF DESIG	RF OPTION	REF
796928-3	A10(A/B)	8700/OP3	———
796928-6	A10(A/B)	8700-2/OP3	CONF CTD

Figure H-3. Type WJ-8700/OP3 Option Interconnection Diagram 382714 (B)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
A) RESISTANCE IS OHMS, ±5%, 1/10W.
B) CAPACITANCE IS IN μF.
C) INDUCTANCE IS IN μH.
2. 796928-2 USES SHEET 1 CIRCUITRY ONLY. (SM2 CONVERTER).

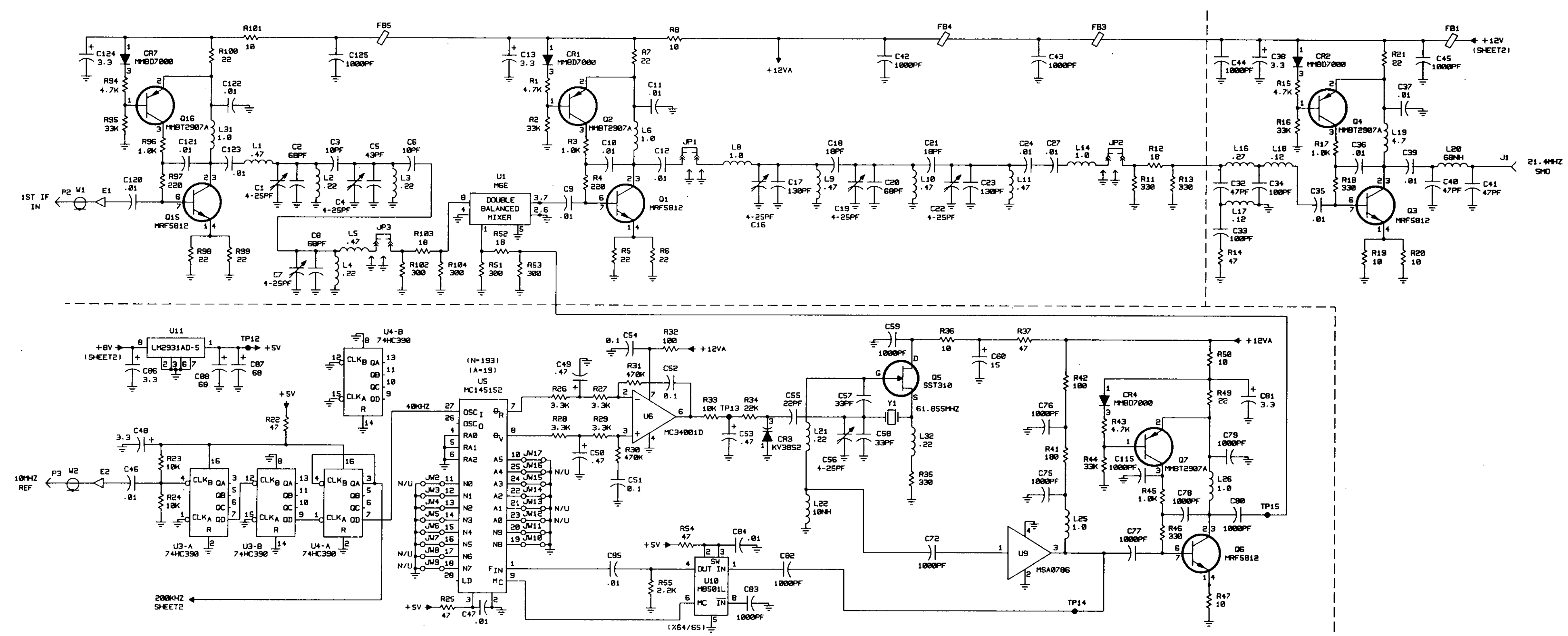


Figure H-4. Type 796928-1, SMO/Switched IF Converter PC Assembly (A10), Schematic Diagram 581185 (Sheet 1 of 2) (A)

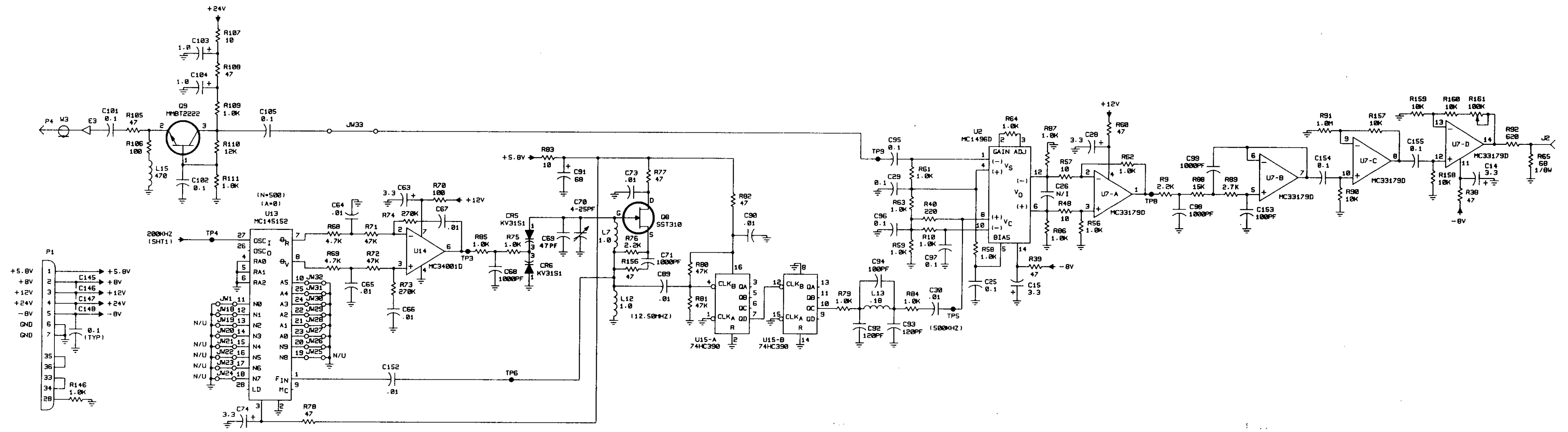
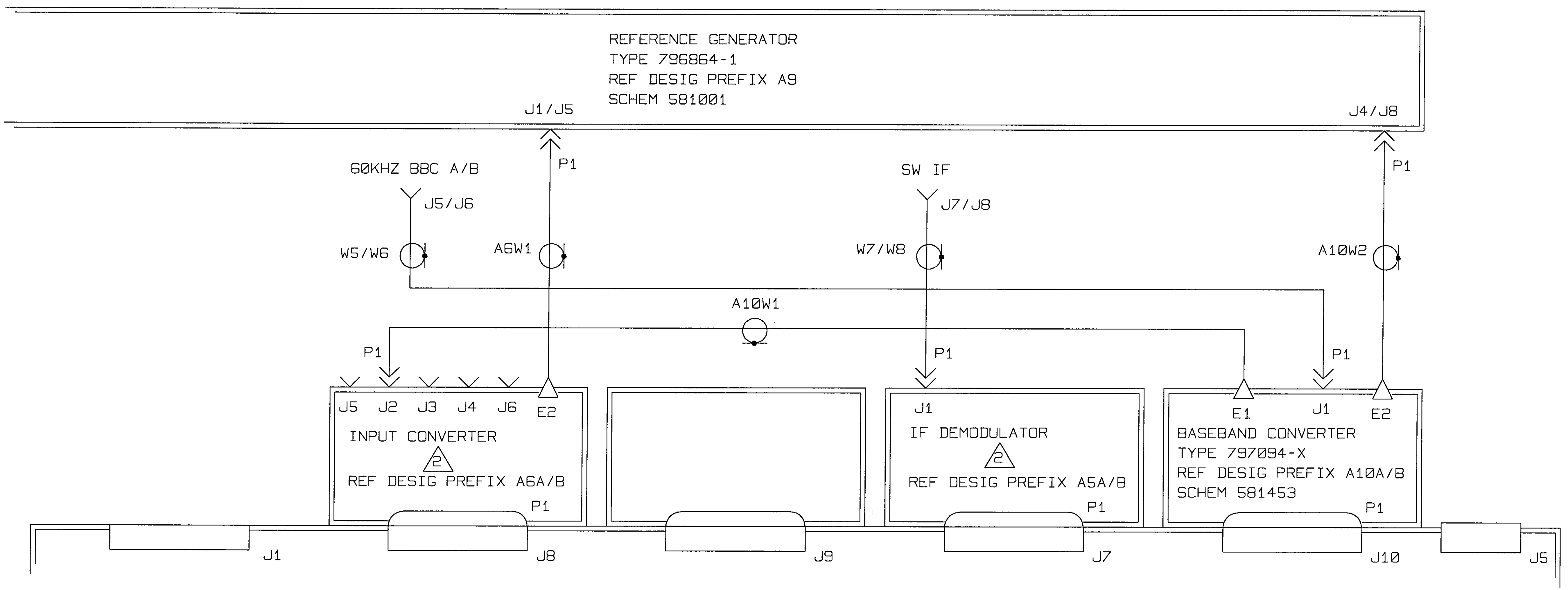


Figure H-4. Type 796928-1, SMO/Switched IF Converter PC Assembly (A10), Schematic Diagram 581185 (Sheet 2 of 2) (A)



NOTES:

1. INTERCONNECTION FOR 8700/OP4 IS SHOWN. OTHER INTERCONNECTIONS HAVE NOT BEEN SHOWN; FOR CLARITY, REFER TO SCHEM 581100 FOR DETAILS.

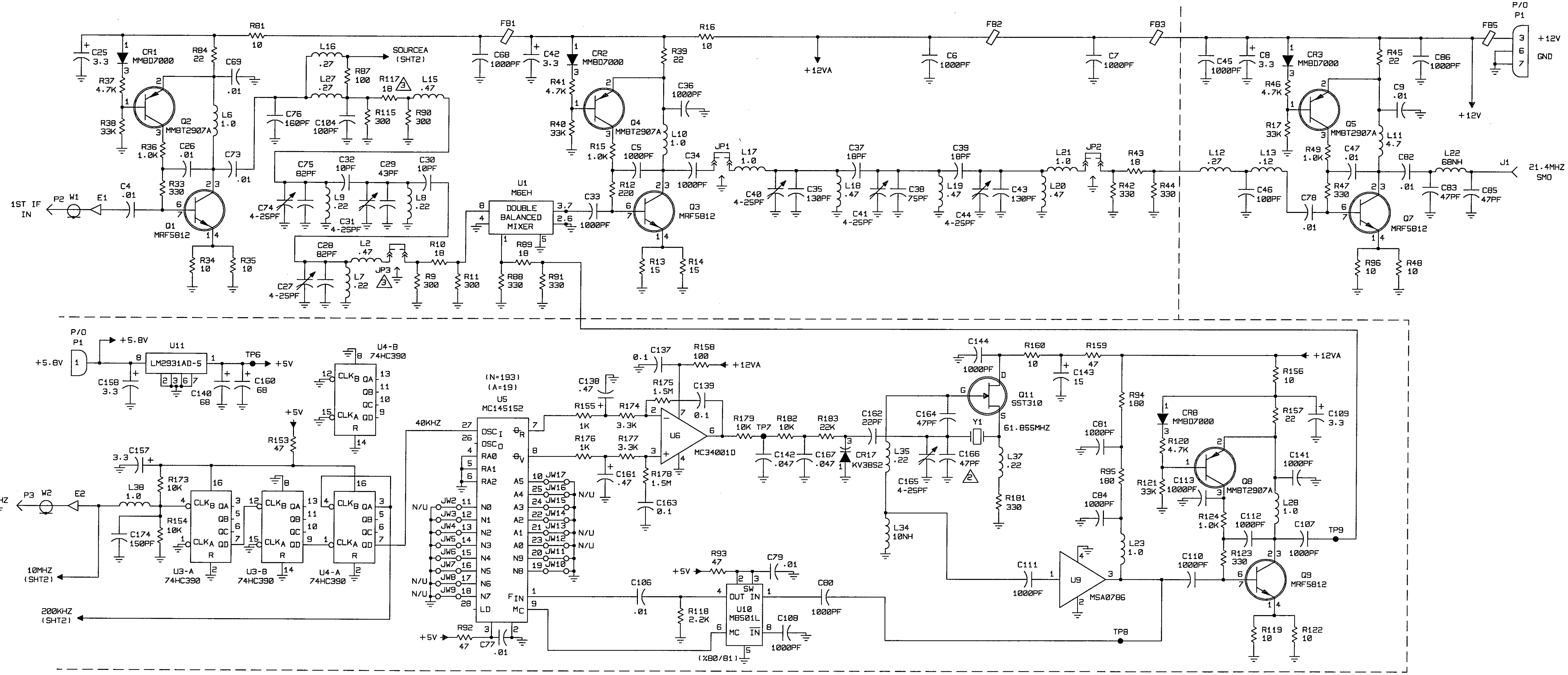
2. P/O EXISITING CONFIG

3. DIFFERENCE BETWEEN 8700/OP4 & 8700-2/OP4 IS CONFORMAL COATED A10 BOARD(S); SEE TABLE A.

TABLE A

TYPE	REF DESIG	RF OPTION	REF
797094-1	A10(A/B)	8700/OP4	———
797094-3	A10(A/B)	8700-2/OP4	CONF CTD

Figure J-2. Type WJ-8700/OP4 Option Interconnection Diagram 383365 (B)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS OHMS, ±5%, 1/10W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.

2\ NOMINAL VALUE: FINAL VALUE FACTORY SELECTED.

3\ SEE TABLE 'A' FOR DIFFERENCE BETWEEN DASH NUMBERS. (SHOWN IN DWG AS -2)

TABLE 'A'

TYPE	C152	JP3	R30	R117	R198	R200
797094-1	47PF	N/I	330	N/I	4.7K	220K
797094-2	33PF	USED	2.2K	18	1K	10K
797094-3	S/A -1 EXCEPT CONFORMAL COATED					

Figure J-3. WJ-8700/OP4 Baseband Converter PC Assembly (A10), Schematic Diagram 581453 (Sheet 1 of 2) (D)

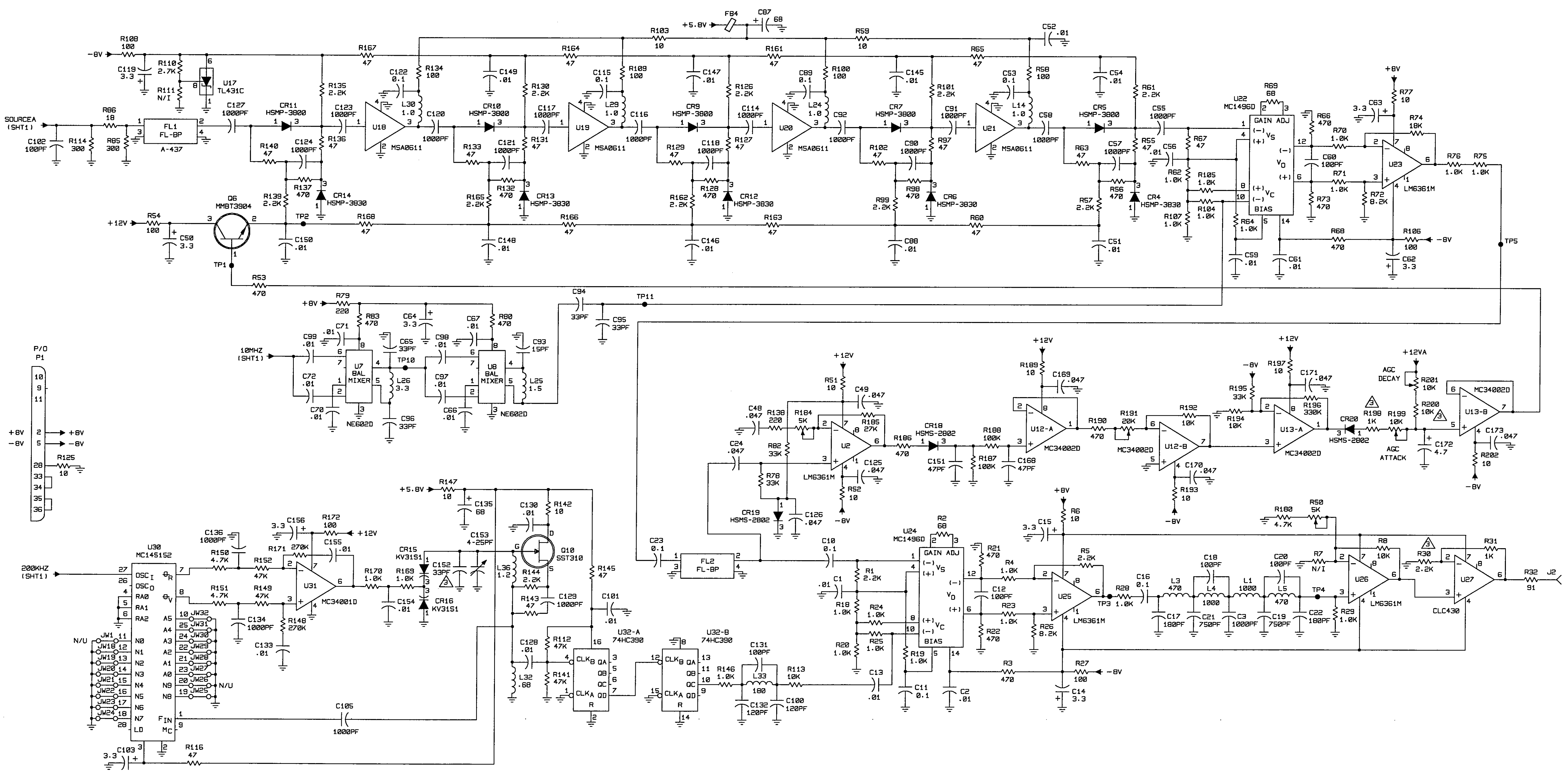
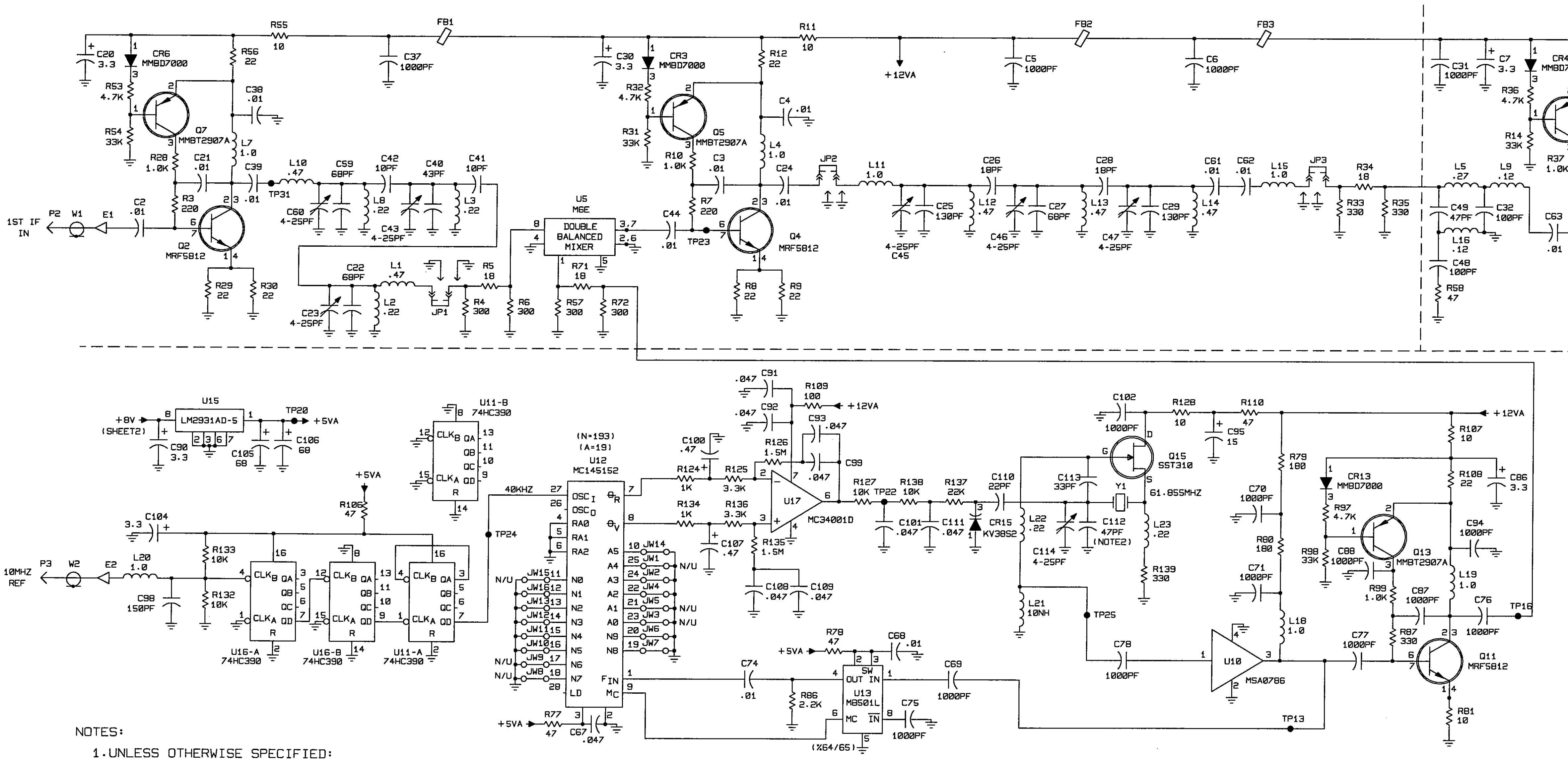


Figure J-3. WJ-8700/OP4 Baseband Converter PC Assembly (A10), Schematic Diagram 581453 (Sheet 2 of 2) (D)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS OHMS, ±5%, 1/10W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.
2. NOMINAL VALUE: FINAL VALUE FACTORY SELECTED.

Figure K-10. Type 797325-1 WJ-8700/XOP5 Option (A10)
Schematic Diagram 582116 (Sheet 1 of 2) (B)

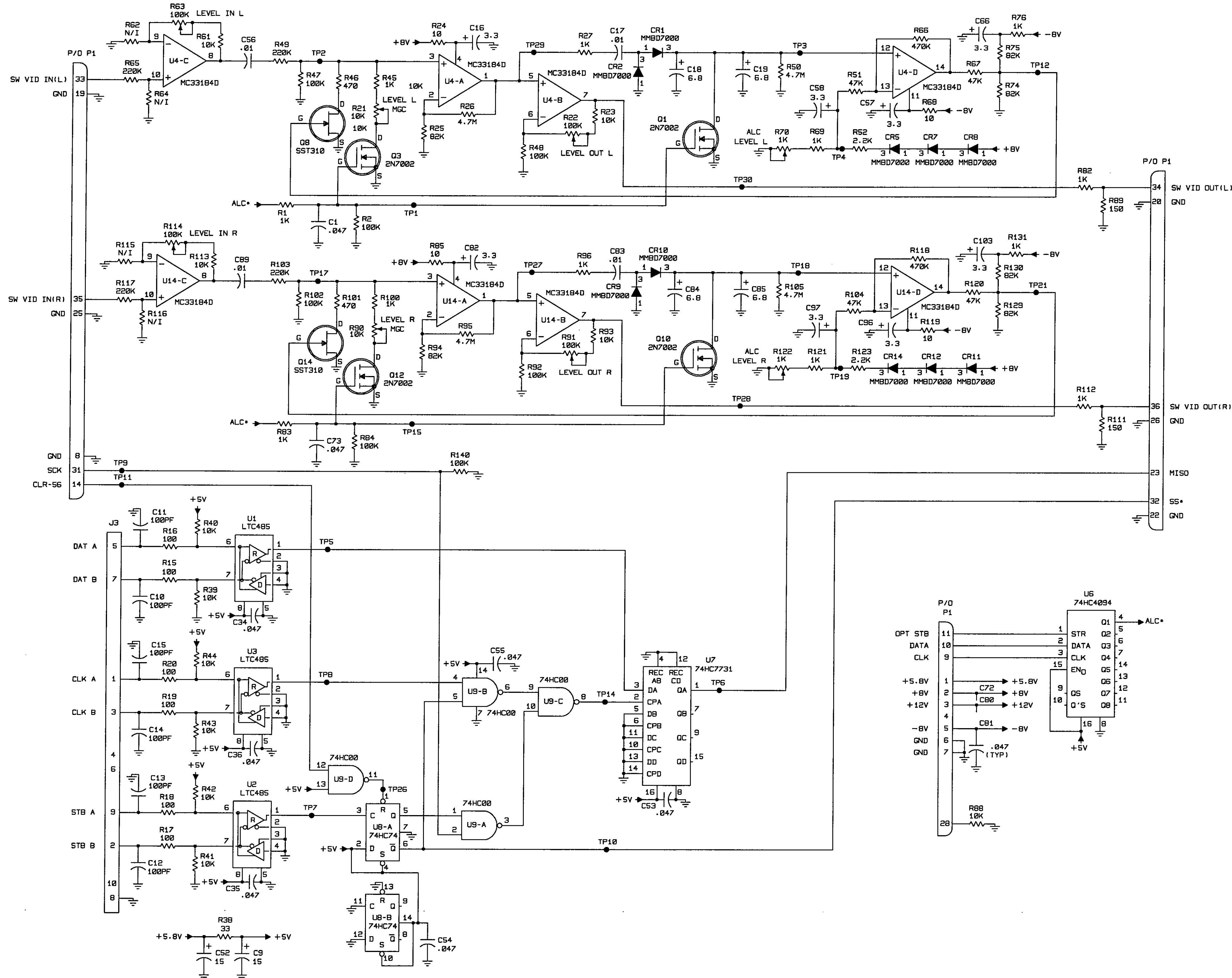
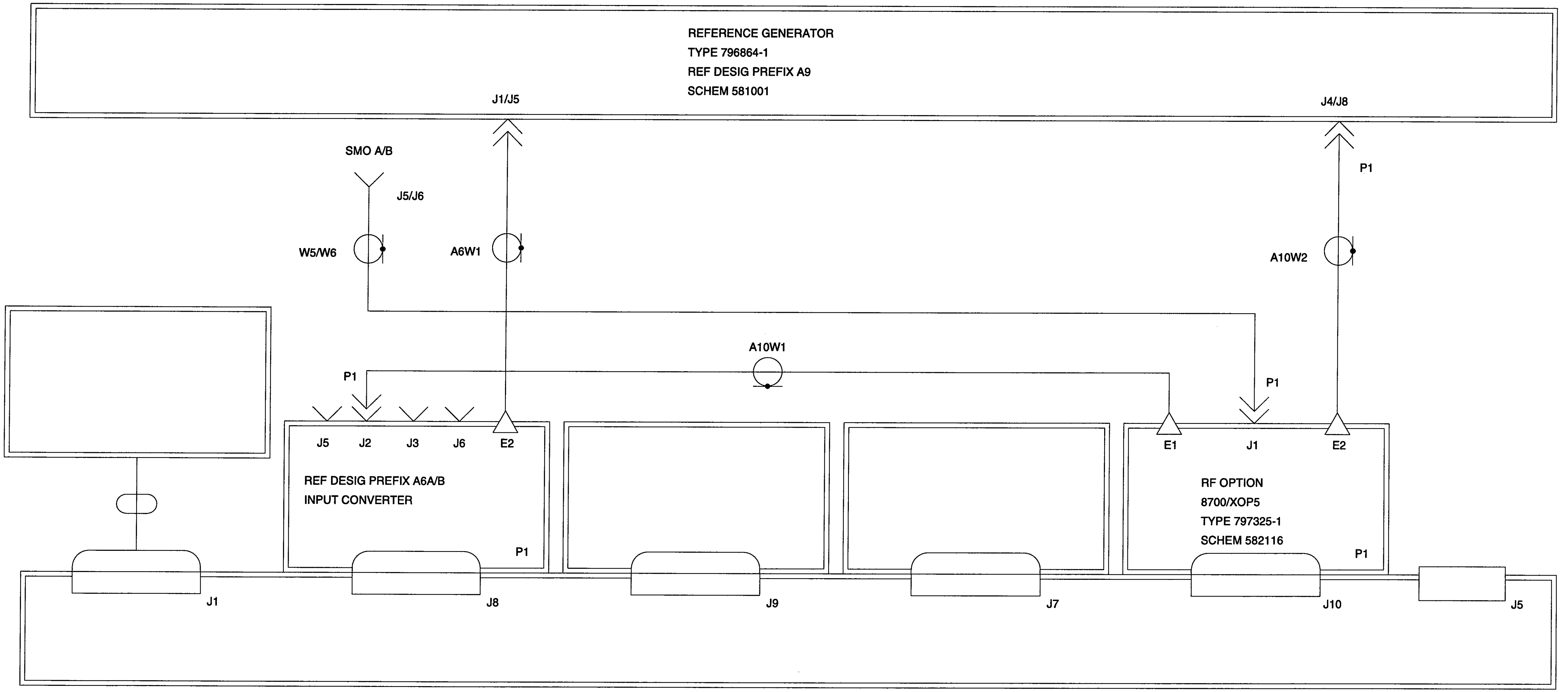


Figure K-10. Type 797325-1 WJ-8700/XOP5 Option (A10)
Schematic Diagram 582116 (Sheet 2 of 2) (B)



NOTES:
INTERCONNECTION FOR 8700/XOP5 IS SHOWN.
OTHER INTERCONNECTIONS HAVE NOT BEEN SHOWN.

Figure K-11. Type WJ-8700/XOP5 Option Schematic Diagram