INSTALLATION AND OPERATION MANUAL

FOR THE

WJ-9548 DIGITAL FDM DEMULTIPLEXER

WATKINS-JOHNSON COMPANY
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20878-1794

November 1994

WARNING

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

PROPRIETARY STATEMENT

FOR CUSTOMER SERVICE CALL:

1-800-WJ HELPS

(1-800-954-3577)

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PRODUCT WARRANTY

FOR ONE YEAR FOLLOWING DATE OF SHIPMENT, the Seller's products described are warranted to conform to Seller's specifications and to be free from defects in workmanship and materials; minor deviations from said specifications, not affecting performance shall not constitute defects in workmanship and materials, or failure to comply with said specifications. Further, Watkins-Johnson Company warrants that the associated product software and firmware performs in accordance with the accompanying operator's manual. **EXCEPT AS PROVIDED IN THE PREVIOUS SENTENCES, SELLER MAKES NO WARRANTY, EXPRESSED OR IMPLIED, OF DESIGN, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, AND NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE MADE HEREIN UNLESS THE SAME APPEAR ON THE FACE HEREOF OR ARE SPECIFICALLY PROVIDED FOR BY WRITTEN ATTACHMENT HERETO.**

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.

TECHNICAL NOTE

HANDLING OF LITHIUM BATTERIES

WARNING

This unit contains a lithium battery as back up power for memory retention. The battery (A6BT1) is located on the Type 796821-1 Motherboard Assembly (A6) directly behind the fan. Extreme care should be used in storage, handling, and disposal of lithium batteries. Improper handling may present explosion hazard.

- Always wear eye protection when handling batteries.
- Do not puncture, compact, incinerate, short circuit, or expose to temperatures above 160°F (71°C).
- Do not expose batteries to charging currents.
- Do not store loose batteries in bins. Always store in original containers.
- Dispose of batteries properly. Discharged cells should be handled with care, as they retain significant energy. They should be electrically isolated and packaged for disposal. Dispose in accordance with local regulations for hazardous material disposal. DO NOT INCINERATE OR COMPACT.

WJ-9548 DIGITAL FDM DEMULTIPLEXER INSTRUCTION MANUAL

REVISION RECORD

Revision	Description	Date
A	Initial issue.	12/89
B	Reprint. Changes resulting from Remote Control software Version 1.01 are incorporated.	3/90
C	Change Power Supply Schematic	7/90
D	Update Parts Lists and Schematics	9/90
E	Update Parts Lists and Schematics. Changes resulting from Remote Control software Version 2.00 are incorporated.	3/91
F	Clarify BBN remote command.	7/91
G	Updates Parts Lists and Schematics for Control Microprocessor Assembly. Provides additional information in Section 1 concerning FLX and ACT2 options. Clarifies information about *OPT? query and OPS nrf command in base manual and appendices. Added information about firmware release history.	9/91
H	Update Parts List and Schematics. Update OPT remote command. Add OPS remote command.	11/91
I	Update information about SPD? remote command and software release history.	1/92
J	Update firmware release history. Update Appendices A and E to reflect Version 2.00 and 2.01 changes. Update Appendix D to reflect new WJ FAX upgrade. Update Parts Lists and Schematics.	7/92
K	Update Appendix D and Sections 1 and 2 to reflect new WJ-9548/FLX-1 option.	1/93
L	Update Table 1-2 and Appendix D.	8/93
M	Update firmware/software release history. Update Appendix D to reflect addition of signaling tone demodulation and real time bit stream data transmission capabilities to the WJ-9548/FLX Flexible Demodulator Option.	12/93
N	Added Appendix H, WJ-9548/232 RS-232 Option.	2/94
O	Updated Appendix D, adding the PI/4QPSK constellation for QAM and incorporating changes to the WJFAX program.	3/94

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REVISION RECORD (Continued)

Revision	Description	Date
P	Updated Table 1-2 (Software/Firmware Release History) to release 3.14. Also, Appendices A thru F were updated to the WJ-954X format so they can be used across the WJ-954X family.	5/94
Q	Updated Schematics, Parts Lists, and Firmware/Software Release History Table.	11/94

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SECTION I

GENERAL DESCRIPTION

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL CHARACTERISTICS

The WJ-9548 is a multi-channel tunable FDM demultiplexer. The unit can be configured with 6, 12, 18, or 24 Single Sideband (SSB) demodulators that are independently tunable over the frequency range of 0-20 MHz. The WJ-9548 accepts up to four baseband inputs that can be connected to any of the demodulators. A buffered version of each baseband input is also provided as an output allowing multiple units to access the same baseband. Other outputs include a parallel Time Division Multiplex (TDM) bus, which provides voice-grade data in 16-bit linear format, and a front panel stereo headphone that allows the operator to simultaneously monitor any two audio channels.

Two tuning modes are available for signal detection: Manual and Scan. The Manual mode allows for tuning to a fixed frequency while the Scan mode allows for scanning between two frequencies. Four tuning schemes are available within the two tuning modes. These are: Direct Frequency Tuning, Channel Tuning, CCITT 960 Plan tuning, and CCITT 2700 Plan tuning. Direct frequency tuning allows for entering specific frequencies. Channel tuning allows for tuning to any of 5000 channels, incremented in 4 kHz steps over the 0 to 20 MHz range. The preprogrammed CCITT 960 and 2700 Plans provide for tuning to specific channel positions within those frequency plans. CCITT 960 tuning is accomplished by specifying Supergroup (SG), Group (GP), and Channel (CH). CCITT 2700 tuning is accomplished by specifying Supermastergroup (SMG), Mastergroup (MG), Supergroup (SG), Group (GP), and Channel (CH). 100 scan channels are available for preprogramming scan strategies for later recall and commencement.

Control of the WJ-9548 can be performed either locally, via the front panel LCD display, knobs, and keypad controls or remotely via an IEEE-488.2-1987 interface. Except for the headphones volume control, all operator-selectable parameters, including programmable scan strategies, are controllable and accessible over the remote interface. Additionally, a Built-In-Test (BITE) feature capable of isolating circuit faults to the module level is provided which can also be implemented locally or remotely.

Up to eight WJ-9548s can be connected in series via the TDM interface bus. This allows an operator at one unit to monitor voice-grade channels, via the headphones, from any other units connected on the bus.

The WJ-9548's internal power supply accepts 115/230, 50 to 420 Hz line power as its power source.

Table 1-1 provides a list of specifications for the WJ-9548 Digital FDM Demultiplexer.

1.2 MECHANICAL CHARACTERISTICS

The WJ-9548 is designed in a half-rack configuration, occupying 3.5 inches of vertical rack space. Two units may be mounted side-by-side for installation in a standard 19-inch wide equipment rack. Refer to **Figure 2-1** for an outline drawing of a two-unit configuration utilizing the accessory mounting hardware furnished with the WJ-9548. The unit extends approximately 21 inches into the equipment rack.

All operation controls and indicators are located on the front panel. All input and output connectors (except for the PHONES jack) are located on the rear panel. Connectors used are BNC and multipin, except for the PHONES jack which is a standard .25-inch stereo headphones jack. A fuse holder (XF1), located on the rear panel, houses the operational line power fuse.

The top and bottom covers and main chassis are constructed of aluminum. The top cover is held in place with flush-mount captive screw fasteners. The bottom cover is held in place with counter-sunk Phillips head screws. Removal of the top cover permits access to all of the unit's plug-in modules. Removal of the bottom cover exposes all option cabling and a foam pad protecting them from the motherboard.

The number of plug-in modules installed is dependent on the number of channels the unit is configured with. A six-channel unit contains 12 plug-in modules, a 12-channel unit contains 20, an 18-channel unit contains 28, and a 24-channel unit contains 36 plug-in modules. Four extra slots are available for the addition of optional plug-in assemblies.

Table 1-1. WJ-9548 Digital FDM Demultiplexer Specifications

Input Characteristics:	
Number of Inputs	Four analog basebands (connects to any channel demodulator in a nonblocking manner)
Input Range	150 Hz to 20 MHz (reduced performance below 8 kHz)
Input Impedence	75 ohms, unbalanced
Input Level Range	-30 to 0 dBm, composite baseband
Baseband Gain Control	Long time-constant AGC that optimizes input gain over input level range
Output Characteristics:	
Digital Output (Standard)	Parallel TDM data bus; 16-bit linearly-coded VGC data with word and framing clocks
Frequency Response	175 to 3825 Hz (-3 dB)
Bandpass Ripple	±0.35 dB maximum (600 to 3400 Hz)
Adjacent Channel Rejection	60 dB minimum (300 Hz above and below band edge)
Total Harmonic Distortion	0.1% maximum (820 Hz test tone at nominal output)
Residual Noise	57 dB minimum below nominal output
Noise Power Ratio (NPR)	50 dB minimum, (600 channel noise load at -7 dBm)
Differential Group Delay	75 microseconds maximum (400 to 3825 Hz)
Incidental FM	1.00 Hz RMS (0 to 15 MHz tuned frequency) 1.25 Hz RMS (15 to 20 MHz tuned frequency)
Headphone Audio (Standard)	Toll quality stereo; independent channel selection and volume control for each side
Output Impedence	600 ohms, unbalanced
Nominal Output Level	Adjustable up to 8 dBm into 600 ohms
Video Baseband Output (Standard)	Four buffered outputs; one for each baseband input
Output Impedence	75 ohms, unbalanced
Gain Relative to Input	0 dB nominal
Passband	150 Hz to 18 MHz (-1 dB)

Table 1-1. WJ-9548 Digital FDM Demultiplexer Specifications (Continued)

Control :	
Local Control	LCD display (8 x 40 characters), keypad, cursor and edit control knobs, and headphone volume controls
Remote Control	IEEE-488 interface (standard); consult factory for alternate interfaces
Gain Control Modes	Manual or AGC, applied to individual VGCs
Gain Range	42 dB minimum
Tuning Modes	Direct frequency, channel number, CCITT 960 and CCITT 2700 (operator selectable for each VGC)
Tuning Range	0 to 20 MHz
Tuning Resolution	1 Hz (offsets may be entered as PPM corrections)
Scans	Selectable (start, stop, step) or formatted (SMG, MG, SG, G) based on CCITT 960 and 2700 frequency plans
Detection Modes	SSB upright or inverted spectrum (operator selectable for each VGC); USB/LSB tuning convention is selectable via internal switch
Frequency Reference:	
Internal Reference Stability	$\pm 5 \times 10^{-7}$ maximum
Internal Reference Aging	$\pm 3 \times 10^{-9}$ drift per day maximum
External Reference	Will accept 1, 2, 5 or 10 MHz. ±1 PPM, 200 mV peak-to-peak minimum into a high impedence load. Automatically switches to external reference upon application of signal
Reference Output	10 MHz, 0 dBm nominal into 50 ohms
Physical Environmental:	
Temperature Range	
Operating	0 to 50°C
Meets All Specifications	10 to 40°C
Power Requirements	115/230 VAC ±10%, 48 to 72 Hz 108 to 118 VAC, 380 to 420 Hz
Physical Environmental: (Continued)	
Power Consumption	35 watts (12 Channel) 60 watts (24 Channel) (Approximate, no output options installed)
Size	3.5 x 8.25 x 20 inches, excluding connectors, knobs and handles
Weight	20 pounds, approximate

1.3 OVERALL FUNCTIONAL DESCRIPTION

As previously mentioned, the WJ-9548 can be configured as a 6, 12, 18, or 24 channel unit. For simplification, the following discussion assumes the unit is equipped with 24 channels. See **Figure 1-1** for an overall functional block diagram of the WJ-9548.

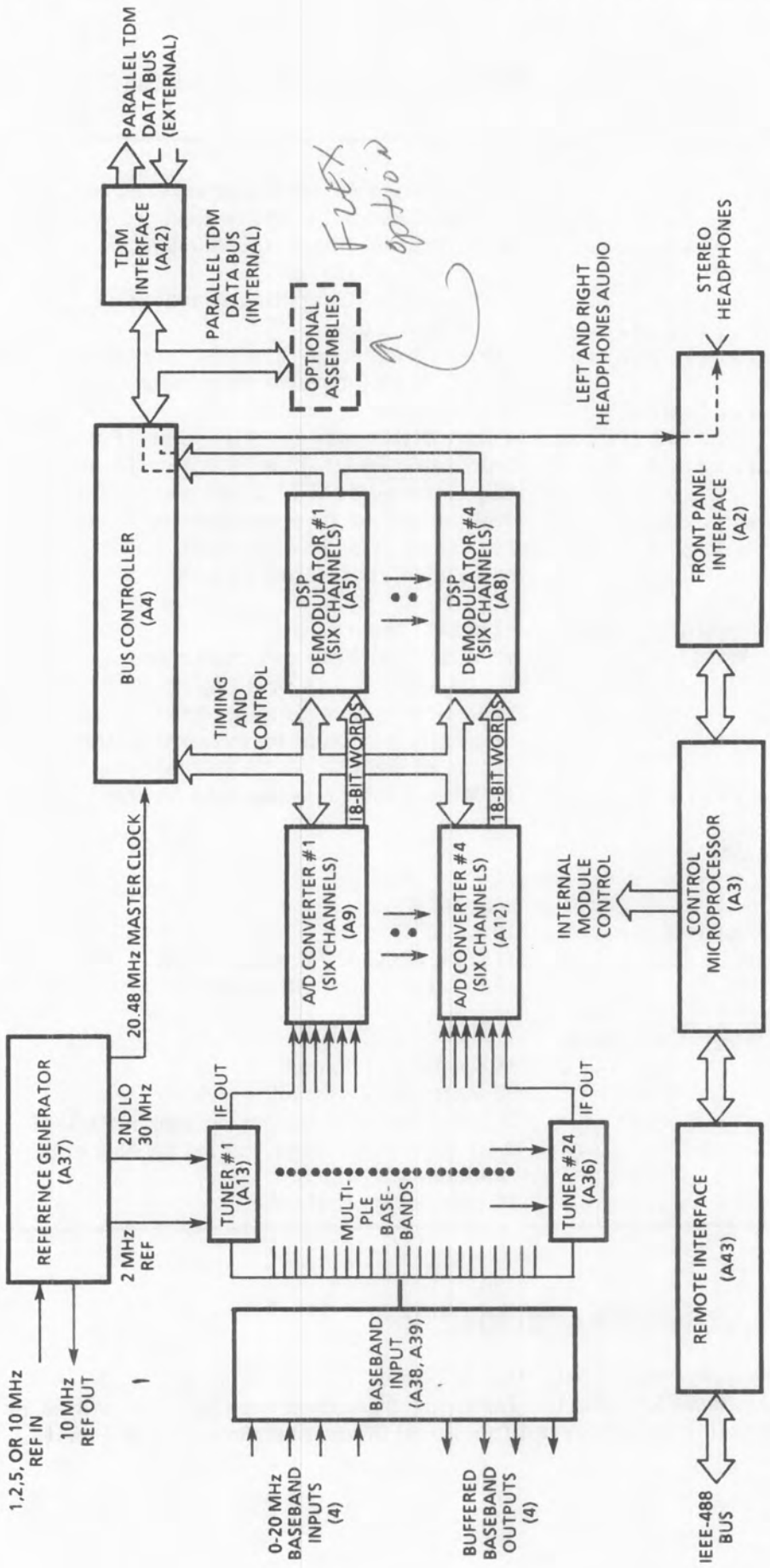


Figure 1-1. WJ-9548 Digital FDM Demultiplexer Functional Block Diagram

The external 0-20 MHz baseband input signals first encounter buffer and AGC circuits in the Baseband Input Assemblies (A38, A39). Baseband inputs 1 and 2 are connected to A38 while baseband inputs 3 and 4 are connected to A39. A buffered version of each baseband signal is routed to the rear panel baseband out connectors. Additionally, all four buffered baseband signals are routed to the twenty-four Tuner Assemblies (A13-A36). Each Tuner Assembly is capable of independently selecting one of these inputs for further processing. This allows the four baseband input signals to be connected to the 24 independently tunable demodulators.

The Tuner Assemblies perform two frequency translations, converting the 0-20 MHz baseband input to a final IF centered at 8 kHz with a bandwidth of approximately 8 kHz. These frequency conversions are performed with the aid of the 30 MHz 2nd LO and the 2 MHz reference signal supplied by the Reference Generator Assembly (A37).

The Reference Generator uses an external 1, 2, 5, or 10 MHz reference input or an internal 10 MHz reference to produce the 30 MHz 2nd LO and the 2 MHz reference signal. The Reference Generation circuitry also provides a 20.48 MHz master clock for use by the Bus Controller Assembly (A4) and a 10 MHz reference input.

The 8 kHz IF signals from the Tuners are converted to digital form by the A/D Converter Assemblies (A9-A12). The digital outputs of the A/D Converters are 18-bit digital words consisting of a 14-bit data sample and a 4-bit gain code. The digital data is then applied to the DSP Demodulator Assemblies (A5-A8).

The DSP Demodulators provide Single Sideband (SSB) demodulation and filtering, fine tuning in 1 Hz steps, and automatic gain control (AGC) of the digitized data. The processed data is then output on a time-division multiplex (TDM) bus under the control of the Bus Controller Assembly (A4).

The primary function of the Bus Controller is to monitor run-time error and slot occupancy status and to generate timing and control signals for the A/D Converters, the DSP Demodulator, the TDM Interface, and any assemblies installed in the option slots. The Bus Controller also reconstructs two operator-selected voice-grade channels (VGC) into audio form for the front panel headphone jack (J5) left and right channels. The Bus Controller uses the 20.48 MHz master clock from the Reference Generator to derive all the necessary timing and control signals. This assembly also contains the circuitry necessary to the unit's built-in-test functions.

The TDM Interface Assembly (A42) acts as a transceiver, transmitting and receiving data over the internal and external parallel TDM data buses when instructed by the Bus Controller.

The Remote Interface Assembly (A43) provides the communication links between the IEEE-488 interface equipped controller and the WJ-9548's Control Microprocessor. The communications protocol incorporated into the IEEE-488 interface complies with the guidelines of the IEEE-488.2-1987 Interface specification. Operational details of this interface can be found in **Section II** of this manual.

The Front Panel Interface Assembly (A2) senses front panel key presses and knob movements and relays the information to the Control Microprocessor. The response from the Control Microprocessor is then processed for visual representation on the LCD display.

The Control Microprocessor Assembly (A3) processes the data received from the Remote Interface and Front Panel Interface Assemblies and instructs the WJ-9548 circuits to perform functions accordingly. The Control Microprocessor monitors the functions and generates responses which are transmitted back to the remote controller via the Remote Interface Assembly, and back to the Front Panel Interface for visual display.

1.4 EQUIPMENT SUPPLIED

The standard equipment supplied consists of:

1) One WJ-9548 Digital FDM Demultiplexer

2) One detachable AC Line Power Cable

3) Fixed Rack Mounting Hardware (See **Figure 2-1**)

4) One TDM Interface Cable, WJ P/N 481672-1

5) One Instruction Manual

1.5 EQUIPMENT REQUIRED BUT NOT SUPPLIED

To obtain operational utilization of the WJ-9548, equipment from the following list should be used.

1) Audio monitoring equipment:

- 600 ohm headphone set
  or
- 600 ohm speaker panel

2) Controller Device, IEEE-488 compatible

To obtain complete maintenance capabilities for the WJ-9548, equipment from the following list should be used.

- Remote Interface Extender Board, WJ P/N 796847-1
- Control Microprocessor Extender Board, WJ P/N 796848-1
- Reference Generator Extender Board, WJ P/N 796849-1
- Tuner Extender Board, WJ P/N 796850-1
- A/D Converter Extender Board, WJ P/N 796851-1
- DSP Extender Board, WJ P/N 796852-1
- Option Assemblies Extender Board, WJ P/N 796853-1
- Bus Controller Extender Board, WJ P/N 796854-1

1.6 AVAILABLE OPTIONS

1.6.1 WJ-954X/6CH 6-CHANNEL CARDSET

This option contains all the hardware necessary to add six channel demodulators to the WJ-9548 Digital FDM Demultiplexer. It consists of six Tuner PC Assemblies, one A/D Converter PC Assembly and one DSP Demodulator PC Assembly. This option is easily installed in the field and requires no software updates to the Control Microprocessor.

1.6.2 WJ-954X/ACT1 ACTIVITY MONITOR OPTION

The WJ-954X/ACT1 Activity Monitor option provides sort capability for differentiating among no activity, CW tones, voice and non-voice conditions on a channel-by-channel basis. This option consists of an Activity Monitor PC Assembly (WJ P/N 796845-1) which plugs into one of the available option slots in the WJ-9548's chassis. **Appendix A** of this manual provides details of this option.

1.6.3 WJ-954X/ACT2 ACTIVITY MONITOR OPTION

This option provides a signal classification capability for the WJ-9548. Voice grade channels can be categorized as voice, signaling tones, phase-shift keyed (PSK) data, frequency-shift keyed (FSK) data or no activity. See **Appendix E** of this manual for further information.

1.6.4 WJ-954X/CEPT CEPT FORMATTER OPTION

The WJ-954X/CEPT CEPT Formatter option provides voice-grade data output in the form of a primary level CEPT PCM stream (20.48 Mbps, 30 channel capacity). This option consists of a CEPT Formatter PC Assembly (WJ P/N 796820-1), a Cable Assembly (WJ P/N 382221-1), and a cable plug marking kit. The 75 ohm, unbalanced output is made available on a standard BNC connector mounted on the rear panel of the unit. **Appendix B** of this manual provides details of this option.

1.6.5 WJ-954X/AUD AUDIO RECONSTRUCTION OPTION

The WJ-954X/AUD Audio Reconstruction option provides analog audio output signals of 175-3850 Hz from twelve operator-selected voice-grade channels. This option consists of a Twelve Channel Audio PC Assembly (WJ P/N 796844-1), Cable Assembly (WJ P/N 382198-1), and a cable plug marking kit. The cable assembly includes a 25-pin D-type connector that attaches to the rear panel in one of the vacant connector slots. This allows the audio outputs to be connected to external audio monitoring equipment. **Appendix C** of this manual provides details of this option.

1.6.6 WJ-954X/FLX FLEXIBLE DEMODULATOR OPTION

This option is installed in one of four option slots and provides a single channel voice frequency demodulator capable of demodulating signaling tones and a variety of Modem, VFT, and FAX signal types. This option consists of a Flexible Demodulator PC Assembly (WJ P/N 796927-1), Cable Assembly (WJ P/N 382650-1), Jumper Cable Assembly (WJ P/N 282770-1), cable marking kit, and a floppy disc containing the WJ-954X/FLX PC software programs. See **Appendix D** of this manual for further details.

1.6.7 WJ-954X/FLX-1 FLEXIBLE DEMODULATOR OPTION

This option is installed in one of four option slots and provides a single channel voice frequency demodulator capable of demodulating signaling tones and a variety of Modem, VFT, and FAX signal types. This option consists of a Flexible Demodulator PC Assembly (WJ P/N 796927-4), Cable Assembly (WJ P/N 382650-1), Jumper Cable Assembly (WJ P/N 282770-1), cable marking kit, and a floppy disc containing the WJ-954X/FLX-1 PC software programs. See **Appendix D** of this manual for further details.

1.6.8 WJ-954X/T1 T1 FORMATTER OPTION

This option can be installed in one of the four option slots, and provides a standard T1 PCM data stream containing up to 24 selected voice grade channels. See **Appendix F** of this manual for further details.

1.6.9 WJ-9548/422 RS-422 REMOTE INTERFACE OPTION

This option provides the WJ-9548 the capability of being remotely controlled from an IEEE-488 or RS-422 remote controller. The RS-422 interface is a full duplex differential interface and is available via a rear panel multi-pin connector. Refer to **Appendix G** of this manual for further details.

1.6.10 WJ-9548/232 RS-232 REMOTE INTERFACE OPTION

This option provides the WJ-9548 the capability of being remotely controlled from an IEEE-488 or RS-232 controller. The RS-232 interface is a full duplex serial interface and is available via a rear panel multi-pin connector. Refer to **Appendix H** of this manual for further details.

1.7 HISTORY OF WJ-9548 FIRMWARE RELEASES

To date, the Watkins-Johnson Company has made a number of releases of the WJ-9548 firmware to accommodate new options and hardware modifications. **Table 1-2** summarizes the history of these releases. Each firmware release is made up of three components: the internal control firmware, the remote interface firmware, and related firmware options. **Table 1-2** depicts the various versions of each of these three firmware components, as well as the relationship between firmware and the Control Microprocessor and Remote Interface hardware. It is important to note that the field installation of some hardware options may require an upgrade in the firmware release.

Table 1-2. WJ-9548 Firmware/Software Release History

WJ-9548 Release	Internal Control Version	Control µprocessor Type No.	Remote Version	Standard Remote Interface Type No.	WJ-9548 Options								
					/AUD	/ACT1	/CEPT	/ACT2	/FLX	/T1	/FLX-1	FLX PROG. DISK	/422*
1.01	1.01	796816-1	1.00	796817-2	1.00	1.00	X	--	--	--	--	--	--
1.02	1.02	796816-1	1.01	796817-2	1.00	1.00	X	1.01	--	--	--	--	--
1.03	1.03	796816-1	1.02	796817-2	1.00	1.00	X	1.01	--	--	--	--	--
1.04	1.04	796816-1	1.03	796817-2	1.00	1.00	X	1.01	--	--	--	--	--
1.05	1.05	796816-1	1.05	796817-2	1.00	1.00	X	1.01	--	--	--	--	--
1.06	1.06	796816-1	1.06	796817-2	1.00	1.00	X	1.01	--	--	--	--	--
2.00	2.00	796816-3	2.00	796817-2	1.00	1.00	X	1.01	1.00	--	--	1.1	--
2.01	2.01	796816-3	2.01	796817-2	1.00	1.00	X	1.01	1.00	--	--	1.1	--
3.00	3.00	796816-3	3.00	796959-1	1.00	1.00	X	1.01	1.10	--	--	1.1	--
3.01	3.01	796816-3	3.01	796959-1	1.00	1.00	X	1.01	1.10	1.00	--	1.1	--
3.02	3.02	796816-3	3.02	796959-1	1.01	1.00	X	1.01	1.10	1.00	--	1.1	--
3.03	3.03	796816-3	3.03	796959-1	1.01	1.00	X	1.01	1.10	1.00	--	1.1	--
3.04	3.04	796816-3	3.04	796959-1	1.01	2.00	X	2.01	1.10	1.00	--	1.1	--
3.05	3.05	796816-3	3.05	796959-1	1.01	2.00	X	2.01	1.10	1.00	2.00	1.1	--
3.06	3.06	796816-3	3.06	796959-1	1.01	2.00	X	2.01	2.01	1.00	2.01	3.00	--
3.07	3.07	796816-3	3.07	796959-1	1.01	2.00	X	2.01	2.02	1.00	2.02	3.00	--
3.08	3.08	796816-3	3.08	796959-1	1.01	2.00	X	2.01	2.02	1.00	2.02	3.00	3.08
3.09	3.09	796816-3	3.09	796959-1	1.01	2.00	X	2.01	2.03	1.00	2.03	3.01	3.09
3.10	3.10	796816-3	3.10	796959-1	1.01	2.00	X	2.01	2.03	1.01	2.03	3.01	3.10
3.11	3.11	796816-3	3.11	796959-1	1.01	2.00	X	2.01	2.04	1.01	2.04	3.01	3.11
3.12	3.12	796816-3	3.12	796959-1	1.01	2.00	X	2.01	2.04	1.01	2.04	3.01	3.12
3.13	3.13	796816-3	3.13	796959-1	1.01	2.00	X	2.01	2.05	1.01	2.05	3.02	3.13
3.14	3.14	796816-3	3.14	796959-1	1.01	2.00	X	2.01	2.06	1.01	2.06	3.02	3.14
4.00	4.00	796816-3	4.00	796959-1	1.01	2.00	X	2.01	2.06	1.01	2.06	3.02	3.14

X - indicates compatability * Remote Option Board replaces Standard Remote Board

SECTION II

INSTALLATION AND OPERATION

SECTION II

INSTALLATION AND OPERATION

2.1 UNPACKING AND INSPECTION

Upon receipt of shipment, examine the shipping container for any visible signs of damage before unpacking of the equipment. If the shipping container appears to be damaged, attempt to have the carrier's agent present during the equipment unpacking. If the carrier's agent cannot be present and equipment damage is discovered, retain all packing materials and the shipping container for the carrier's inspection. If any discrepancy or shortage is discovered, contact your Watkins-Johnson representative, or the Watkins-Johnson Company, Gaithersburg, Maryland.

2.2 INSTALLATION

2.2.1 RACK MOUNTING

2.2.1.1 Fixed Rack Mounting (Standard)

The WJ-9548 Digital FDM Demultiplexer 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 WJ-9548 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. Refer to **Figure 2-1** for installing equipment utilizing furnished mounting hardware. This figure illustrates the methods and hardware required to rack mount single and dual receiver configurations into a fixed position. All illustrated accessory items, except for the false front panel assembly, are furnished with each receiver.

CAUTION

Units are not to be supported within racks solely by equipment front panels. **Figure 2-1** shows how to properly fix rack mount alternatively. Jonathan Type 110QD-20-2 slide mounts are recommended. Three pre-tapped holes exist on both sides of the receiver chassis for slide mount installation. Type 10-32 x 5/16 pan head screws (MS51958-60) are to be used.

Part No.	Nomenclature
280504-1	Front Support Bracket
280505-1	Center Support Bracket
32306-5	Handle Assembly
280507-1	Outside Rear Handle
280507-2	Inside Rear Handle
32306-5	Handle Assembly*
380539-1	False Front Panel*
480508-1	Wraparound Assembly*

*Optional

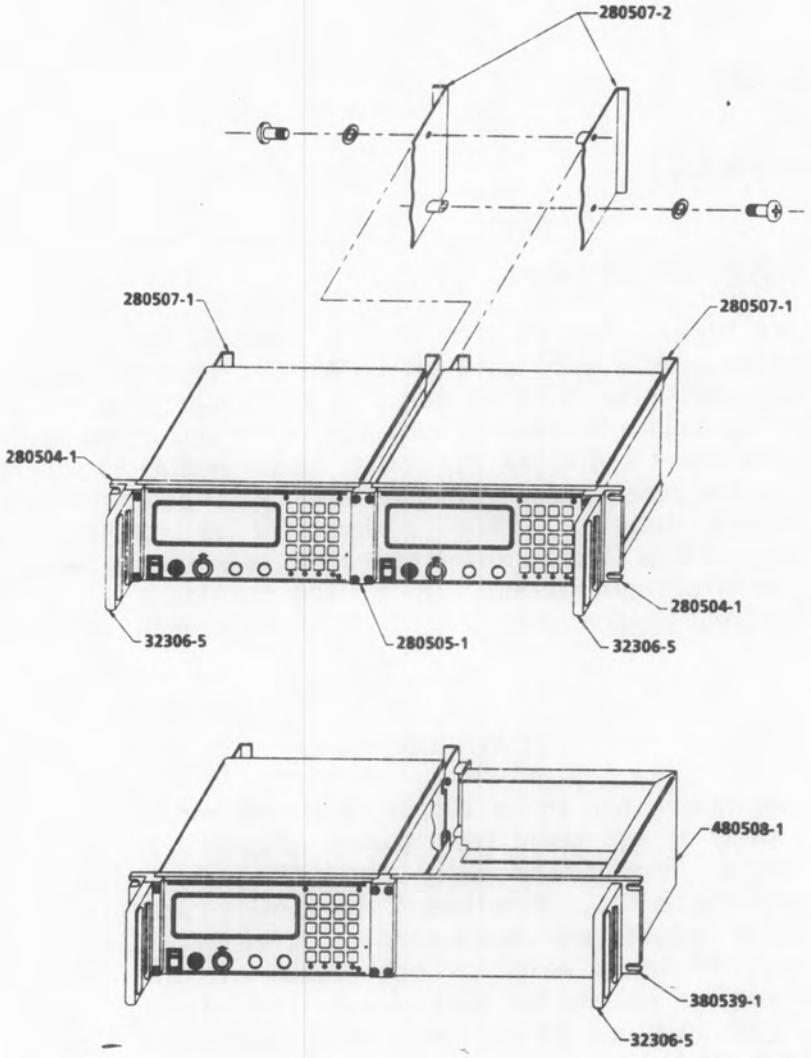


Figure 2-1. WJ-9548 Configuration of Rack Mounting Accessories

2.2.1.2 **Slide Rack Mounting With Jonathan Type 110QD-20-2 Slide Mounts (Optional)**

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

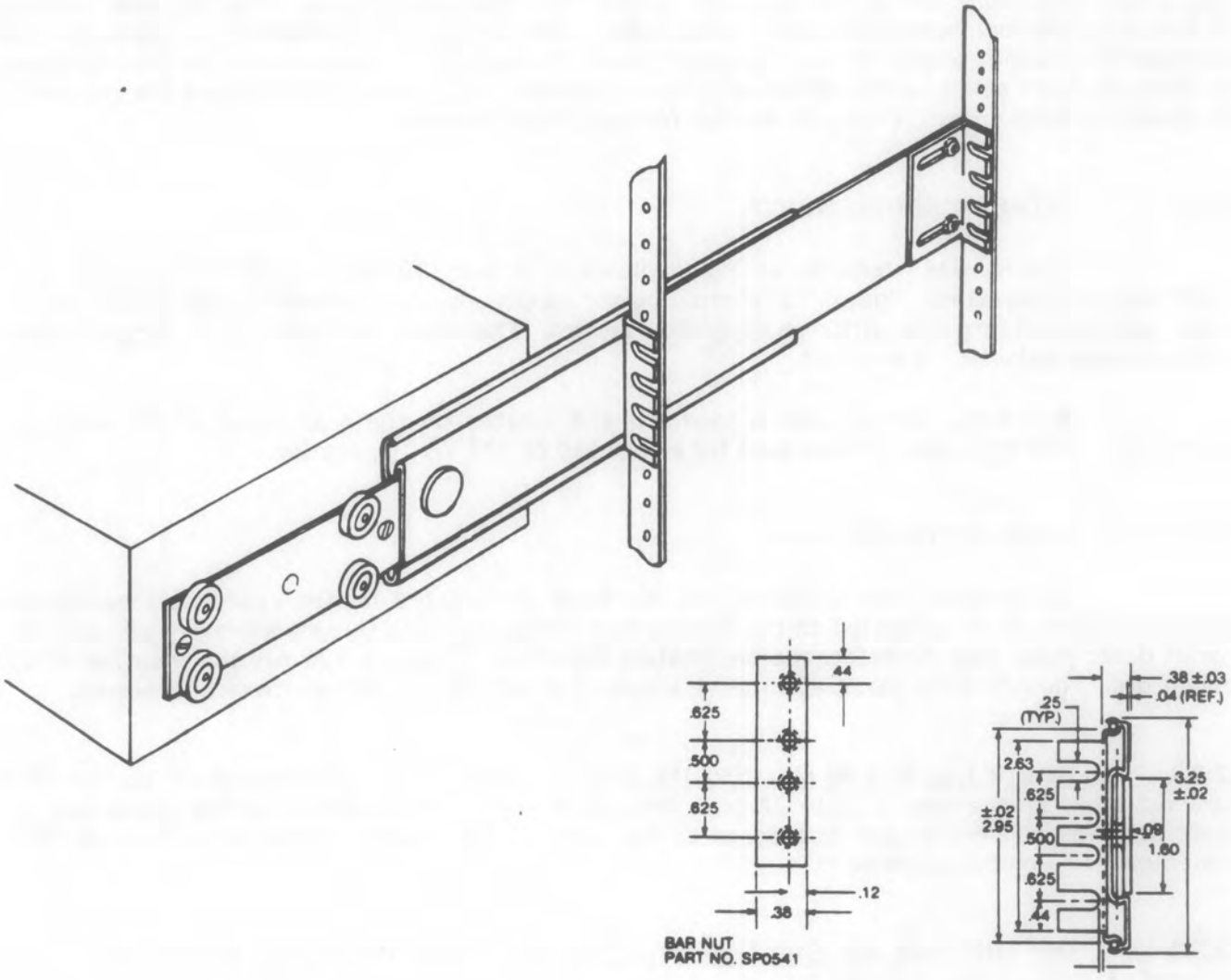


Figure 2-2. Installation of Optional Jonathan Type 110QD-20-2 Slide Mounts

CAUTION

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

Each of the Type 110Q-20-2 slide mounts are comprised of two functional pieces: a chassis section for mounting to the equipment unit, and a cabinet section for mounting to the equipment rack. Three 10-32 X 5/16 pan head screws are used to install each chassis section to a receiver side panel. After both chassis sections have been securely tightened to the equipment unit, cabinet sections are to be installed within the equipment rack. The WJ-9548 utilizes 3.5 inches of vertical rack space (six bracket holes). The center four bracket holes are to be used to secure the cabinet section to the equipment rack. The outer two holes are to be used to secure the receiver front panel to the equipment rack, if desired. Slide locks permit quick dis-connect of the chassis section from the cabinet section for equipment removal.

2.2.2 POWER REQUIREMENTS

The WJ-9548 requires an input voltage of either 110 VAC or 230 VAC (±15%) at 48 to 420 Hz for operation. The unit's internal power supply circuitry automatically adjusts to the power input (providing it is within the specified range). Therefore, no manual switching of power source voltage selection is required.

A 1 amp, slo-blo fuse is provided and located on the rear panel of the unit (see **Figure 2-3**). This type fuse is to be used for either 110 or 230 VAC operation.

2.2.3 CONNECTOR SIGNALS

All external connectors of the WJ-9548 are located on the rear panel except for headphones jack which is located on the front panel. **Table 2-1** lists these connectors and provides a brief description and the reference designation for each. **Figure 2-3** shows the location of the connectors. The following paragraphs provide details of signals resident at these connectors.

2.2.3.1 **BB1 IN thru BB4 IN (J8, J10, J12, J14)** - These BNC female connectors accept FDM baseband input frequencies of 0 to 20 MHz with levels of -30 to 0 dBm. During operation, the inputs at these connectors are considered as the physical input ports. Input impedance at these connectors is 75 ohms, unbalanced.

2.2.3.2 **BB1 OUT thru BB4 OUT (J9, J11, J13, J15)** - These BNC female connectors provide buffered versions of the BB1 thru BB4 inputs for access by multiple units. Output impedance is 75 ohms.

2.2.3.3 **REF IN ($\overline{J4}$)** - This BNC female connector allows an external 1, 2, 5, or 10 MHz reference signal, having a minimum level of 200 mV peak-to-peak into a high impedance load, to be used as the timebase for the unit. The WJ-9548 automatically switches to the external reference upon sensing the external reference signal.

Table 2-1. List of Connectors

Connector	Reference Designator	Function
BB1 IN, BB2 IN, BB3 IN, BB4 IN	J8, J10, J12, J14	BNC female, accept baseband input signals of 0 to 20 MHz for demodulation.
BB1 OUT, BB2 OUT BB3 OUT, BB4 OUT	J9, J11, J13, J15	BNC female, provides buffered version of the corresponding baseband input.
REF IN	J4	BNC female, external reference input.
REF OUT	J5	BNC female, internal reference output.
RMT CTL	J3	Multipin, allows remote control via an IEEE-488 equipped controller.
TDM DATA IN	J6	Multipin, accepts voice grade data from a TDM data bus.
TDM DATA OUT	J7	Multipin, outputs voice grade data onto a TDM data bus.
110/220 VAC	FL1J1	Three-prong male line cord receptacle, accepts 110 or 220 VAC, 48 to 420 Hz power.
PHONES	J2	Standard .25-inch stereo headphones jack, provides left and right audio of independently selected channels.

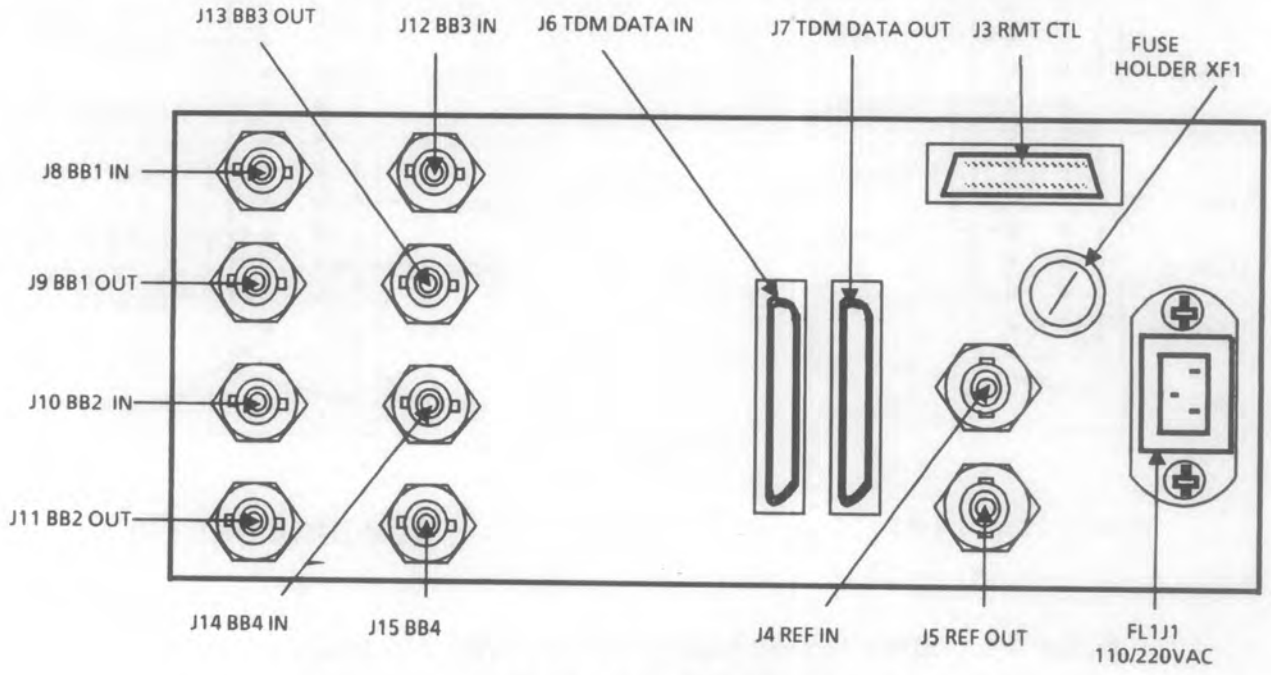


Figure 2-3. WJ-9548 Rear Panel Connectors

2.2.3.4 **REF OUT (J5)** - This BNC female connector outputs the unit's internal 10 MHz, 0 dBm reference for access by multiple units. Output impedance is 50 ohms.

2.2.3.5 **RMT CTL (J3)** - This multipin connector allows the WJ-9548 to interface with an external controller via an IEEE-488 interface bus. See **paragraph 2.6** for a discussion of the physical interface.

2.2.3.6 **TDM DATA IN (J6)** - This multipin connector accepts linearly-encoded, 16-bit data from a parallel TDM Voice-Grade Channel (VGC) bus. See **Figure 2-4** for the pin assignments of this connector.

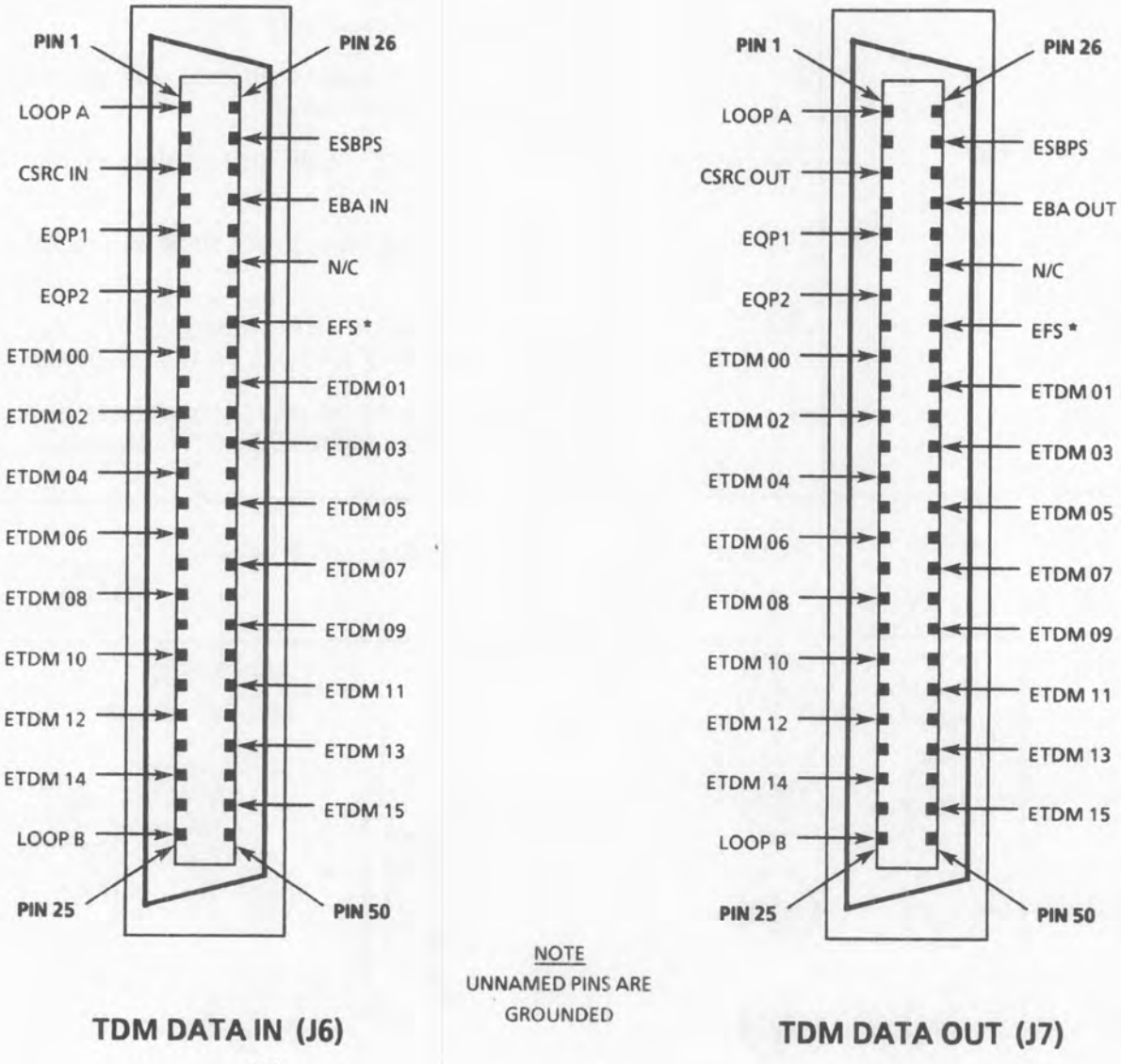


Figure 2-4. TDM Interface Connectors J6 and J7, Pin Assignments

2.2.3.7 **TDM DATA OUT (J7)** - The output at this multipin connector is a parallel TDM Voice-Grade Channel (VGC) bus for access by multiple units. Output data is linearly-encoded, 16-bit channel data with word and framing clocks. See **Figure 2-4** for the pin assignments of this connector.

2.2.3.8 **110/220 VAC (FL1J1)** - This three-prong male receptacle mates with the line power cord to accept the line voltage for the unit operation. Acceptable input power is 110 or 220 VAC (±15%) at 48 to 420 Hz. The WJ-9548 requires approximately 50 watts when configured with 12 channels and approximately 70 watts when configured with 24 channels.

2.2.3.9 **PHONES (J2)** - This standard .25-inch stereo headphones jack is located on the front panel. The left headphone channel at this connector can provide audio from one demodulator while the right headphone channel provides audio from another demodulator. Or, both headphone channels can provide audio from the same demodulator. The front panel VOLUME control provides independent adjustment of the left and right audio outputs up to 10 dBm into a 600 ohm load.

2.2.4 SETTING THE IEEE-488 ADDRESS SWITCH (A43S1) AND THE SPECTRUM INVERSION CONTROL SWITCH (A43S5)

A five-bit DIP switch, located on the Remote Interface Assembly (A43), is used to set the IEEE-488 bus address for the unit. This DIP switch, A43S1, is accessed by removing the top cover (see **Figure 2-5**). Switch positions 1 thru 5 are used for setting the bus address. A bus address of 00 to 30 may be entered. If a binary value of 31 is applied to A43S1 the unit will default the IEEE-488 address to 7. A43S1 is only read when the unit is turned on. Power must be removed and then reapplied for any changes in A43S1 to be implemented. During local operations, the setting of this switch for the IEEE-488 bus address may be overridden by setting the bus address in the Remote Configuration Menu (see Remote Configuration, **paragraph 2.5.4.3** for more details). However, in the event of loss of battery backed-up memory, the unit defaults to the IEEE-488 address setting of A43S1 upon power-up.

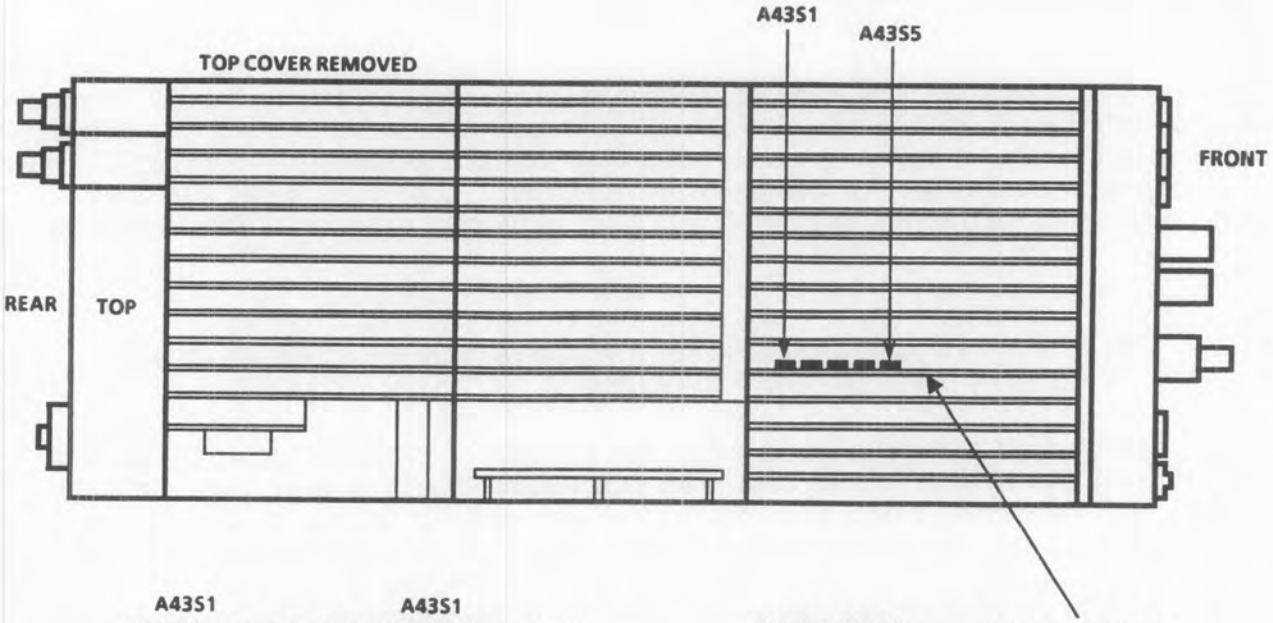
A43S5 is also located on the Remote Interface Assembly (A43) (see **Figure 2-5**). Dip switch A43S5 position 5 allows control of spectral inversion based on either the Upright/Invert convention or the USB/LSB convention. The Upright/Invert convention is selected by placing S5 position 5 in the "OFF" position. Likewise, the USB/LSB convention is selected in the "ON" position (refer to **Figure 2-5**). Positions 1 through 4 are not used. A43S5 is only read when power is applied to the unit. Power must be removed and then reapplied for any changes in A43S5 to be implemented.

When upright or inverted single sideband demodulation is chosen (A43S5 position 5 = "OFF"), the tuned frequency always corresponds to the low frequency edge of the 4 kHz channel within the baseband, regardless of whether the channel is an upright or inverted sideband. **Figure 2-7** illustrates channels within the baseband with upright and inverted sidebands. In each case, f1 corresponds to the tuned frequency.

When the USB/LSB convention is selected (A43S5 position 5 = "ON"), the relative locations of the tuned frequency and the demodulated 4 kHz signal depends on the spectral inversion mode selected. In USB, the signal will occupy the 4 kHz portion of the baseband above the tuned frequency (identical to Upright mode). In LSB mode, however, the signal will occupy the 4 kHz portion of the baseband below the tuned frequency. Simply stated, the tuned frequency

in USB or LSB mode always corresponds to the location of the suppressed carrier on the baseband signal.

USB or LSB demodulation is only available in Direct Frequency Tuning. When in Channel Tuning, spectral inversion is available according to the Upright/Invert convention only regardless of the setting of A43S5.



A43S1 POSITIONS 1 2 3 4 5	IEEE-488 ADDRESS	A43S1 POSITIONS 1 2 3 4 5	IEEE-488 ADDRESS
0 0 0 0 0	00	1 0 0 0 0	16
0 0 0 0 1	01	1 0 0 0 1	17
0 0 0 1 0	02	1 0 0 1 0	18
0 0 0 1 1	03	1 0 0 1 1	19
0 0 1 0 0	04	1 0 1 0 0	20
0 0 1 0 1	05	1 0 1 0 1	21
0 0 1 1 0	06	1 0 1 1 0	22
0 0 1 1 1	07	1 0 1 1 1	23
0 1 0 0 0	08	1 1 0 0 0	24
0 1 0 0 1	09	1 1 0 0 1	25
0 1 0 1 0	10	1 1 0 1 0	26
0 1 0 1 1	11	1 1 0 1 1	27
0 1 1 0 0	12	1 1 1 0 0	28
0 1 1 0 1	13	1 1 1 0 1	29
0 1 1 1 0	14	1 1 1 1 0	30
0 1 1 1 1	15	1 1 1 1 1	07

1 = ON (CLOSED)
0 = OFF (OPEN)

A43S5
POSITIONS
1 2 3 4 5
X X X X 0 - UPRIGHT/INVERT CONVENTION
X X X X 1 - UBS/LSB CONVENTION

NOTE = X = DOESN'T MATTER

Figure 2-5. Location of Dip Switches A43S1-A43S5

2.2.5 CONNECTING MULTIPLE WJ-9548'S IN A "STACKED" CONFIGURATION

Up to eight WJ-9458's can be connected via an external TDM bus. This is referred to as "stacking." **Figure 2-6** shows an example of a stacked setup. When in a stacked configuration, each of the eight units can access the output of a demodulator that resides in any of the other frames in the setup. When accessed, the output of the demodulator can be monitored via the front panel PHONES jack of the accessing frame.

In **Figure 2-6**, the TDM DATA OUT connector (J7) of Frame #1 is connected to the TDM DATA IN connector (J6) of Frame #2. The TDM DATA OUT connector of Frame #2 is connected to the TDM DATA IN connector of Frame #3. The same method of connections is used through to Frame #8. No connection is made to the TDM DATA OUT connector on Frame #8. To ensure that all stacked units are operating from a common reference, their REF IN and REF OUT connectors are similarly linked. Units in Frames #2 thru 8 are configured to accept an external reference. The REF OUT (J5) connector of Frame #1 is cabled to the REF IN (J4) connector of Frame #2, while the REF OUT (J5) connector of Frame #3 is cabled to the REF IN (J4) connector of Frame #3, etc. Frame #1 can be configured to output its internally-generated reference frequency or an externally-supplied reference. If any units are powered down thus breaking the reference chain, then operational problems will occur because the units will not be operating from a common reference.

Similarly, no connection is made to the TDM DATA IN connector on Frame #1. When no connection is made to this connector and no data bus information is present, the unit recognizes that it is designated as Frame #1 on the TDM bus. A11 units recognize their frame number designation by the order in which they are connected. The unit with the lowest frame number which is powered-up assumes the responsibility of providing clock and sync signals to the remaining frames.

In **Figure 2-6** each WJ-9548 has its own baseband inputs. If desired, each unit may access the same basebands by connecting the baseband to the baseband inputs connectors and then daisy-chaining the baseband outputs connectors and baseband inputs connectors from frame to frame.

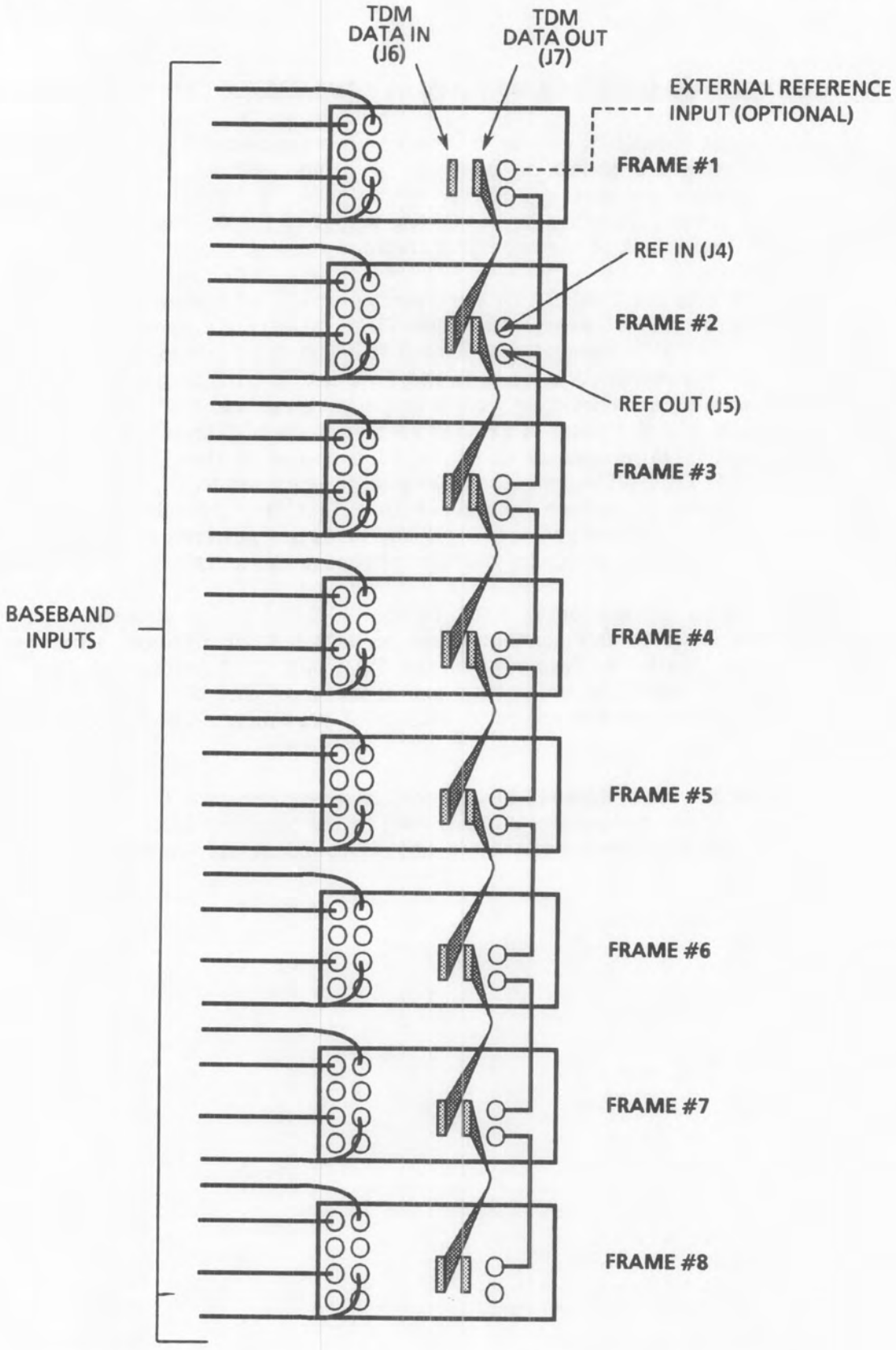


Figure 2-6. Example Setup for Connecting Multiple WJ-9548's In a "Stacked" Configuration

2.3 EQUIPMENT MALFUNCTIONS

The WJ-9548 has been factory checked and adjusted for optimum performance prior to shipment. If malfunctions are encountered, verify the correct input signals are present at the proper connectors.

Avoid any corrective maintenance which would break an inspection seal and void the written warranty. Instead, contact your Watkins-Johnson representative or the Watkins-Johnson Company, Gaithersburg, Maryland, USA.

2.4 OVERVIEW OF OPERATIONAL CAPABILITIES

The WJ-9548 can be controlled locally using the front panel keyboard and display or remotely via commands sent over an IEEE-488 interface bus. The following paragraphs provide an overview of the operational capabilities of the WJ-9548 and apply to both local and remote control operations. After reading the following paragraphs, refer to **paragraph 2.5** for Local Operations and **paragraph 2.6** for Remote Operations.

2.4.1 INITIAL SETUP

In addition to demodulator tuning operations, several initial setups are available consisting of the following:

- Assigning the basebands to one of the four physical baseband input ports
- Assigning descriptive labels to the basebands
- Entering a PPM correction factor for the basebands as required
- Assigning demodulator outputs to the left and right headphones audio output jack
- Entering the time and date
- Assigning the demodulators to the basebands

The WJ-9548 allows for four baseband input signals to be connected at its rear panel. Up to 32 baseband numbers may be assigned to the four inputs.

Once the 32 baseband numbers have been assigned, they may be given descriptive labels for further distinction. Any alphanumeric label consisting of up to eight characters can be used such as: NORTH 1, SOUTH, NORTH 2, etc.

A baseband correction factor adjustment is available which can be used to correct for frequency offsets between the transmitting device and the WJ-9548. The correction factor is in parts-per-million (PPM) of the tuned frequency and has a range of -50 to +50 PPM.

Any two of the demodulators may be assigned to provide the audio output at the front panel PHONE jack. One demodulator is assigned to the left headphone channel while another demodulator is assigned to the right headphone channel. If desired, one demodulator can be assigned to provide audio to both left and right headphone channels. Since the audio to the headphone jack is turned off upon reset, no audio is present at the PHONES jack until a demodulator is assigned.

The time and date may be entered or adjusted if desired. As with all the above parameter setups, the time and date is stored in battery backed-up memory when the unit is powered down. These initial setup parameters may be modified at any time during operation if desired.

Each demodulator may be individually connected to any of the basebands. This allows all of the demodulators or a combination of them to simultaneously process the data on any of the basebands.

2.4.2 MANUAL TUNING OPERATION

Manual tuning operation provides a means to tune a demodulator to a fixed frequency. Four tuning schemes within the Manual tuning operation are available: Direct Frequency tuning, Channel tuning, CCITT 960 Plan tuning, and CCITT 2700 Plan tuning. These four tuning schemes are further described in the following paragraphs.

2.4.2.1 Direct Frequency Tuning

The Direct Frequency tuning scheme allows the selected demodulator to be tuned to an operator-entered fixed frequency. Any frequency between 00.000000 and 20.000000 MHz may be entered with a tuning resolution of 1 Hz. Additionally, there are two demodulation choices available (via dip switch A43S5, refer to **paragraph 2.2.4**):

Upright or inverted single sideband demodulation

Upright upper or lower sideband demodulation

When upright or inverted single sideband demodulation is chosen (A43S5 position 5 = "OFF") the tuned frequency always corresponds to the low frequency edge of the 4 kHz channel within the baseband, regardless of whether the channel is an upright or inverted sideband. **Figure 2-7** illustrates channels within the baseband with upright and inverted sidebands. In each case, f1 corresponds to the tuned frequency.

When the USB/LSB convention is selected (A43S5 position 5 = "ON"), the relative locations of the tuned frequency and the demodulated 4 kHz signal depends on the spectral inversion mode selected. In USB, the signal will occupy the 4 kHz portion of the baseband above the tuned frequency (identical to Upright mode). In LSB mode, however, the signal will occupy the 4 kHz portion of the baseband below the tuned frequency. Simply stated, the tuned frequency in USB or LSB mode always corresponds to the location of the suppressed carrier on the baseband signal.

2.4.2.2 **Channel Tuning**

In the Channel tuning scheme the selected demodulator may be commanded to tune to one out of 5,000 available channels. Channels are spaced 4 kHz apart, thus covering the 0 to 20 MHz frequency range of the unit. For instance, commanding the selected demodulator to tune to channel 2500 is equivalent to entering a direct frequency of 10.000000 MHz. An upright or inverted channel spectrum may be selected for demodulation regardless of the setting of A43S5 (refer to **paragraph 2.2.4**). **Figure 2-7** illustrates channels with upright and inverted sidebands.

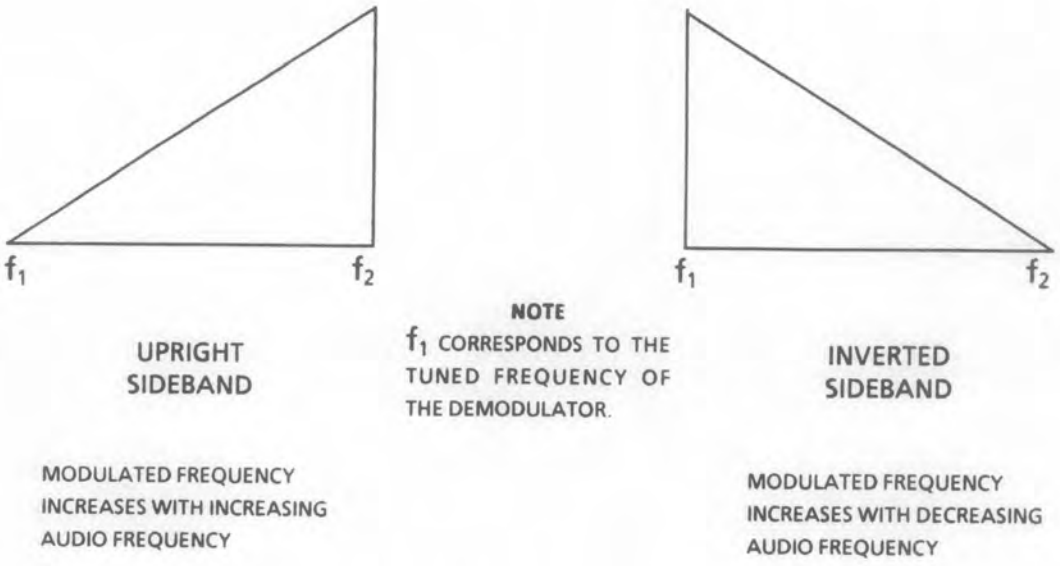


Figure 2-7. Upright and Inverted Sidebands

2.4.2.3 **CCITT Plan Tuning**

The WJ-9548 is preprogrammed with parameters allowing for tuning to voice channels in the CCITT 960 Plan and CCITT 2700 Plan. Both plans are in accordance with the International Telegraph and Telephone Consultative Committee (CCITT) Recommendation G.423. **Figure 2-8** illustrates the structure of both plans. **Table 2-2** illustrates the CCITT symbols.

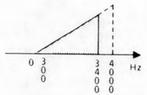
The CCITT 960 Plan consists of 960 voice channels. Each voice channel, having a bandpass of 4 kHz, are transmitted with a carrier frequency spaced every 4 kHz from 64 to 108 kHz. Twelve voice channels constitute a Group. Five Groups constitute a Supergroup. Sixteen Supergroups are contained in the CCITT 960 Plan for a total of 960 channels.

The CCITT-2700 Plan consists of 2700 voice channels. Twelve channels are contained in a Group. Five Groups are contained in a Supergroup (60 channels). Five Supergroups are contained in a Mastergroup (300 channels). Three Mastergroups are contained in a Supermastergroup (900 channels). The CCITT 2700 Plan contains three Supermastergroups for a total of 2700 voice channels.

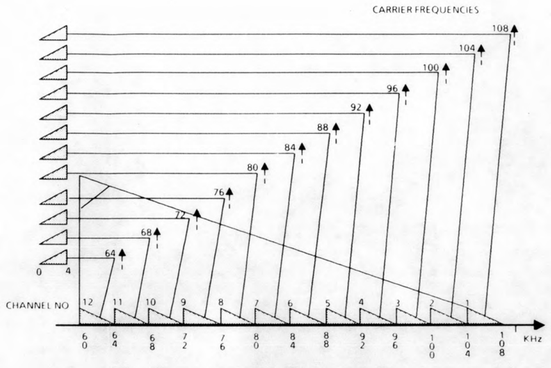
For more information on the CCITT 960 Plan and the CCITT 2700 Plan, see Recommendation G.423 in the CCITT RED BOOK, VOLUME III, International Carrier Systems, Transmission Media-Characteristics.

Tuning in the CCITT 960 Plan is accomplished by first entering the Supergroup, the Group, and then the channel.

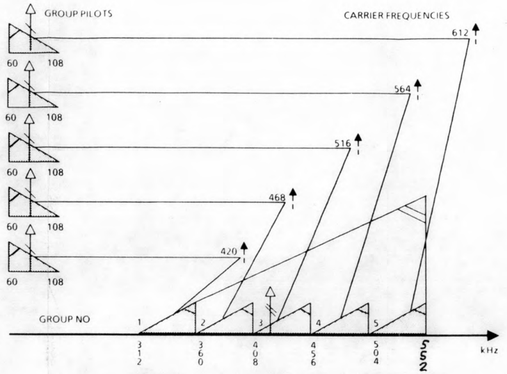
Tuning in the CCITT 2700 Plan is done by entering the Supermastergroup, the Mastergroup, the Supergroup, the Group, and then the channel.



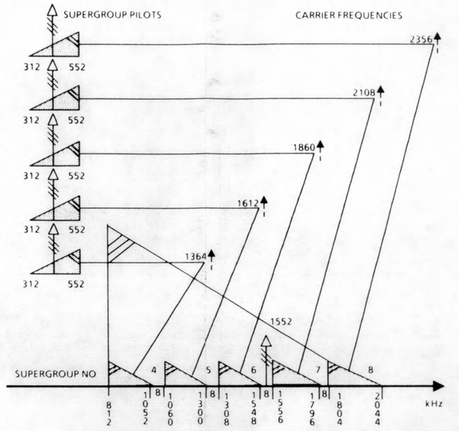
Frequency Band of a Telephone Channel



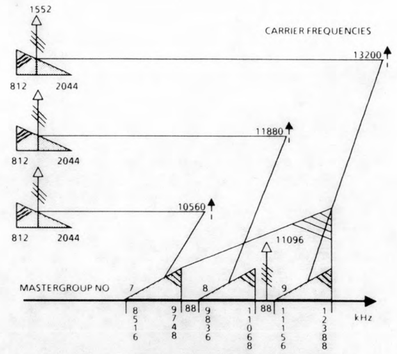
Constitution of the Basic Group



Constitution of the Basic Supergroup

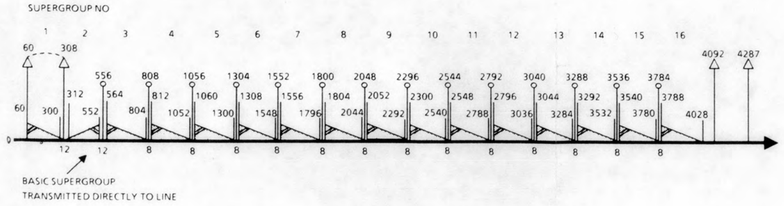


Constitution of the Basic Mastergroup

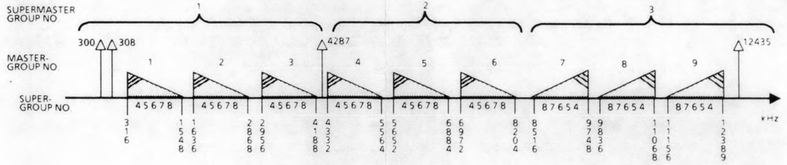


Constitution of the Basic Supermastergroup

Note: See Table 2-2 for explanations of the CCITT Symbols



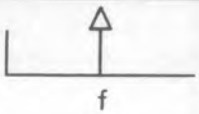
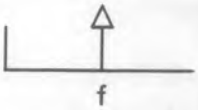
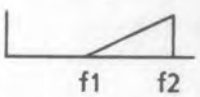
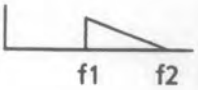
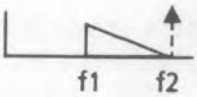
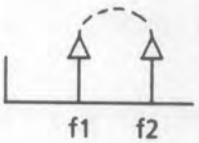
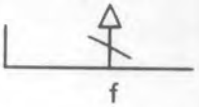
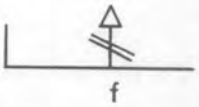
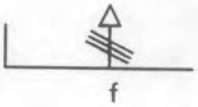
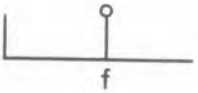
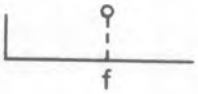
CCITT 960 PLAN



CCITT 2700 PLAN

Figure 2-8. Structure of the CCITT 960 and CCITT 2700 Frequency Plans

Table 2-2. CCITT Symbols

Description	Symbol	Description	Symbol
Carrier frequency		Group in which the channel sidebands are erect (group frequency increases with increasing audio frequency)	
Carrier frequency, suppressed		Group in which the channel sidebands are inverted (group frequency increases with decreasing audio frequency)	
Pilot frequency		Supergroup in which the channel sidebands are erect (supergroup frequency increases with increasing audio frequency)	
Erect sideband		Supergroup in which the channel sidebands are inverted (supergroup frequency increases with decreasing audio frequency)	
Inverted sideband		Mastergroup in which the channel sideband frequencies are erect (mastergroup frequency increases with increasing audio frequency)	
Single sideband, suppressed carrier (lower sideband only transmitted)		Mastergroup in which the channel sideband frequencies are inverted (mastergroup frequency increases with decreasing audio frequency)	
Two pilot tones of which one or the other is transmitted		Supermastergroup in which the channel sidebands are erect (supermastergroup frequency increases with increasing audio frequency)	
Group pilot		Supermastergroup in which the channel sidebands are inverted (supermastergroup frequency increases with decreasing audio frequency)	
Supergroup pilot			
Mastergroup pilot			
Supermastergroup pilot			
Additional measuring frequency, general symbol			
Additional measuring frequency, which is transmitted or measured on request			

2.4.3 SCAN OPERATION

The Scan operation of the WJ-9548 provides the means for a demodulator to scan a segment of the tuning range while monitoring for signal activity. Four tuning schemes are available in the Scan operation: Direct Frequency scanning, Channel scanning, CCITT 960 Plan scanning, and CCITT 2700 Plan scanning. These four scan tuning schemes are further described in **paragraphs 2.4.3.1** through **2.4.3.3.**

A threshold adjustment is available to aid in the detection of signal activity within a voice channel. During a scan, only those channels with a power level that exceeds the preset threshold level will be reported as active. It is important that this threshold adjustment be set at a level that ensures optimum detection of signal activity without triggering on noise. See **paragraph 2.4.4** for more details on the Threshold control.

Additionally, three dwell timers are available for use during scan operations. These timers determine what action the WJ-9548 takes when signal activity is detected. **Paragraph 2.4.3.5** provides more details on the dwell timers.

A scan operation may be halted at any time by use of the Suspend function as discussed in **paragraph 2.4.3.4.**

2.4.3.1 Direct Frequency Scanning

The Direct Frequency Scanning operation provides a means to enable a demodulator to scan from a designated start frequency to a designated stop frequency. The start frequency may be any frequency from 00.000 to 19.999 MHz. The stop frequency may be from 00.001 to 20.000 MHz. For proper Direct Frequency Scanning operation, the start frequency must always be less than the stop frequency.

Additionally, upright or inverted frequency spectrum may be selected if the Upright/Invert convention is selected on A43S5 (refer to **paragraph 2.2.4**). USB or LSB may be selected if the USB/LSB convention is selected on A43S5.

2.4.3.2 Channel Scanning

The Channel Scanning operation allows a demodulator to scan from a start channel to a stop channel. The start channel may be any channel from 0000 to 4999. The stop channel may be from 0001 to 5000. For proper Channel Scanning operation the start channel must always be less than the stop channel. The channels are spaced in 4 kHz steps. Therefore, for example, when the selected demodulator is commanded to scan from start channel 100 to stop channel 3500 it is actually scanning from 00.400 to 14.000 MHz in 4 kHz steps.

Upright or inverted channel spectrum may also be selected regardless of the setting of A43S5 (refer to **paragraph 2.2.4**).

2.4.3.3 CCITT Plan Scanning

CCITT Plan Scanning provides the means to enable a demodulator to scan between channels within the preprogrammed CCITT 960 or CCITT 2700 Plans.

In CCITT 960 Plan scanning, the selected demodulator may be directed to scan one out of 16 Supergroups (each containing 60 channels) or one out of five Groups within a Supergroup (each containing 12 channels).

In CCITT 2700 Plan scanning, the selected demodulator may be directed to scan one out of three Supermastergroups (each containing 900 channels), one out of three Mastergroups within a Supermastergroup (each containing 300 channels), one out of five Supergroups within a Mastergroup (each containing 60 channels), or one out of five Groups within a Supergroup (each containing 12 channels).

2.4.3.4 Suspending a Scan

An active scan operation may be halted at any time by entering the Suspend mode. When the scan is suspended, scan setup parameters such as frequency, spectrum, gain mode/level, and the threshold level may be modified to optimize signal detection. After the adjustments are made, the scan may be resumed at the next step after the point at which it was interrupted.

The selected demodulator may also be set to automatically enter the Suspend state at the end of a single scan sequence.

2.4.3.5 Dwell Timers

Three dwell timers are available that can be used to further control scan operations. The dwell timers are: Pre Dwell, Signal Dwell, and Post Loss Dwell.

The Pre Dwell Timer defines how long the selected demodulator initially waits on a frequency for signal activity above the threshold level before moving on to the next frequency. This timer can be set from +0050 to +9975 msec. This timer may be also set to infinite.

The Signal Dwell Timer defines how long the selected demodulator remains tuned to an active frequency. The range of this timer is 000 to +600 seconds and can also be set to infinite.

The Post Loss Dwell Timer operation is entered from Signal Dwell upon loss of a signal. The setting of this timer determines how long the selected demodulator channel waits for the return of a lost signal before tuning to a new frequency. This timer has a range of 000 to +200 seconds. It may also be set to infinite.

2.4.4 GAIN AND THRESHOLD SETTINGS

The WJ-9548 provides both a gain and a threshold setting for use during Manual and Scan operations to optimize signal detection.

The gain of a selected demodulator may be set to Manual or Automatic Gain Control (AGC) mode. In the Manual Gain mode, a gain setting from 0 to 36 dB may be entered.

The signal power threshold level for a demodulator may be set to any value from 0 to -90 dBm. This parameter should be set to a level that ensures a maximum probability of signal detection without interference from baseband noise. A proper setting of the threshold level is extremely important during Scan operations.

2.5 LOCAL OPERATIONS

The WJ-9548 Digital FDM Demultiplexer is controlled locally through the front panel controls, indicators, and alphanumeric display. **Paragraph 2.5.1** provides details for each control and indicator including their role in the operation of the unit.

Various menus and displays are available to provide the local operator visual monitoring and control of the WJ-9548. These menus and displays and their role in the units operation are defined in the following paragraphs where applicable.

2.5.1 CONTROLS AND INDICATORS

All controls and indicators of the WJ-9548 are located on the front panel. Refer to **Table 2-3** for a listing of each control and indicator and to **Figure 2-9** which shows their physical location. The following paragraphs provide details of the function of each control and indicator.

Table 2-3. Controls and Indicators

Control/Indicator	Description
POWER switch	Applies power to the internal supply and initializes the unit.
Alphanumeric Display	Liquid crystal display used for visual monitoring and control of the unit.
BASE BAND key	Places the alphanumeric display into the Baseband Table Display mode.
DEMOD key	Places the alphanumeric display into the Demodulator Display mode.
SCAN key	Places the alphanumeric display into the Scan List Display mode.
MENU key	Places the alphanumeric display into the Main Menu Display mode.
SHIFT key	Places the keypad into the shift (upper case) mode.
SHIFT indicator	Indicates the keypad is in the shift mode.
HELP key	Available in keypad shift mode. Displays descriptive information for the current display.
LOCAL key	Available in keypad shift mode. Toggles the frame between Remote and Local operation.

Table 2-3. Controls and Indicators (Continued)

Control/Indicator	Description
REMOTE indicator	Indicates the frame is in Remote operation.
CLEAR indicator	Indicates an operator or hardware error, an operator prompt, or keypad is in shift or help mode.
CLEAR key	Clears operator errors, edits numeric entries, and exits the keypad out of the shift or help mode.
ENTER key	Enters numeric entries and selects cursor highlighted items.
Numeric Entry keys (0 thru 9, +/-, .)	Available for entering numeric values in applicable display fields.
MEM key	Not used.
MSTR indicator	Not used.
VOLUME control	Individual left and right control of the level of the audio outputs at the PHONES jack.
CURSOR control	Positions the cursor in the display or selects highlighted items. In shift mode, toggles LCD backlight.
EDIT control	Adjusts parameters highlighted by the cursor.
LCD Contrast control	When the keypad is in the shift mode, the EDIT control adjusts the LCD backlight contrast.

2.5.1.1 **POWER Switch (S1)** - This rocker-type switch provides line power to the unit's internal power supply when the top half of the switch is pushed in. An indicator on the top half of this switch lights when power is applied.

2.5.1.2 **Alphanumeric Display (U4)** - The alphanumeric display is a 8-line-by-40-character liquid crystal display (LCD). This display provides the local operator constant visual monitoring of the unit's operation. The information displayed is dependent on the current display mode selected. A reverse-video, flashing bar is used in the alphanumeric display to indicate the cursor position.

2.5.1.3 **Keypad (U3)** - The front panel keypad of the WJ-9548 contains 20 soft-touch keys and four LED's. The left-hand column of keys, shaded grey, are display mode keys while the remainder of the keys are primarily used for entering and editing parameters. The LED's are status and prompt indicators. The function of these keys and indicators are further defined in the following paragraphs.

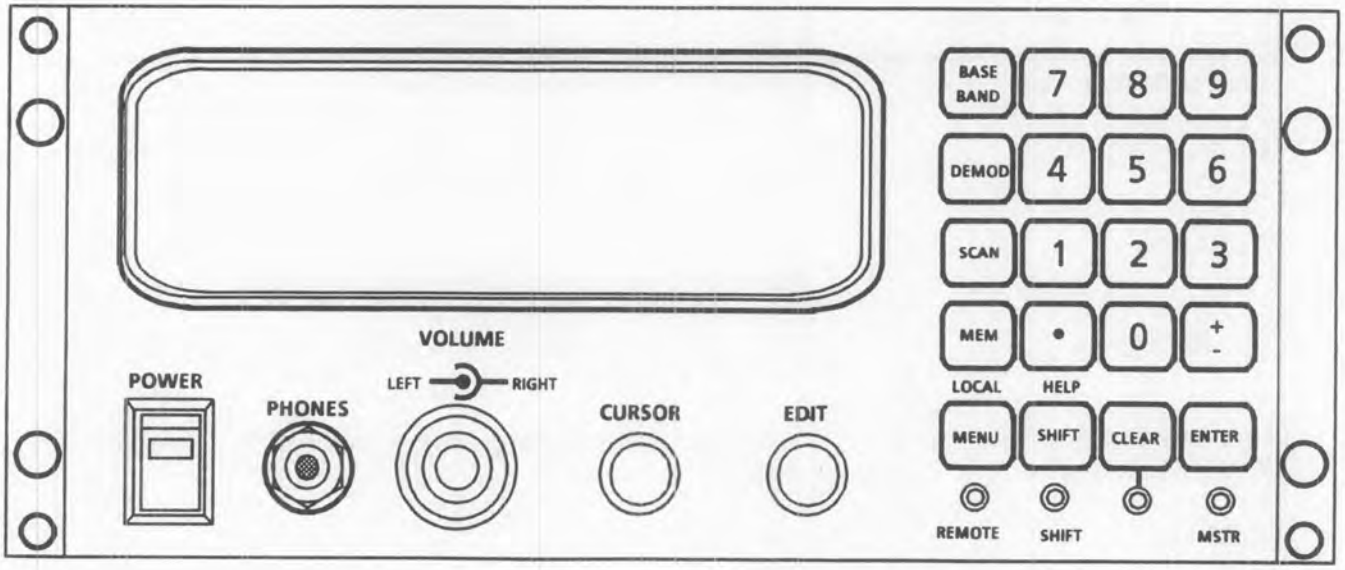


Figure 2-9. WJ-9548 Front Panel

2.5.1.3.1 **BASEBAND Key** - Pressing this key enters the alphanumeric display into the Baseband Table Display mode. This display allows for monitoring the status of all demodulators assigned to a particular baseband. See **paragraph 2.5.6** for more details. This display can be exited by pressing another display mode key.

2.5.1.3.2 **DEMOD Key** - Pressing the DEMOD key enters the alphanumeric display into the Demodulator Display mode. This display allows the operator to control all parameters of a demodulator. See **paragraph 2.5.5.1.1** for more details. This display can be exited by pressing another display mode key.

2.5.1.3.3 **SCAN Key** - Pressing this key enters the alphanumeric display into the Scan Setup Display mode. This display allows for entering scan setups that can later be recalled and executed on a selected demodulator. See **paragraph 2.5.5.2** for further details on scan operations. This display can be exited by pressing another display mode key.

2.5.1.3.4 **MENU Key** - Pressing the MENU key places the alphanumeric display into the Main Menu Display mode. From this display mode various other menus and displays can be selected such as those used to configure the unit for operation, to reset the unit, and to run BITE.

2.5.1.3.5 **SHIFT Key** - Pressing this key places the keypad into the shift mode. This allows upper case functions of two-function keys to become available (LOCAL and HELP). Additionally, the EDIT knob becomes a contrast adjustment for the alphanumeric display when the SHIFT key is pressed. Pressing the CURSOR knob while in shift mode toggles the LCD backlighting. Pressing the CLEAR key returns the keypad to the normal mode.

2.5.1.3.6 **SHIFT Indicator** - This red LED, when lit, indicates that the keypad is in the shift (upper case) mode. Upper case functions of two-function keys, the contrast adjustment (via the EDIT knob), and toggling the LCD backlight (via the cursor knob) are available. This indicator extinguishes when the CLEAR or MENU key is pressed.

2.5.1.3.7 **HELP Key (SHIFT-SHIFT)** - When the keypad is in the shift mode the SHIFT key becomes the HELP key. Pressing the HELP key allows information to be displayed describing the functions of the current display. See **paragraph 2.5.3** for more details on the Help displays.

2.5.1.3.8 **LOCAL Key (SHIFT-MENU)** - When the keypad is in the shift mode (SHIFT LED lit), the MENU key becomes the LOCAL key. Pressing the LOCAL key places the WJ-9548 frame into Remote operation if already in Local, or Local operation if already in Remote.

2.5.1.3.9 **REMOTE Indicator** - This red LED, when lit, indicates the WJ-9548 frame is in Remote operation. In this mode the frame can accept remote command and queries from a remote controller via an IEEE-488 interface bus.

2.5.1.3.10 **CLEAR Key and Indicator** - The red LED immediately below the CLEAR key lights when an operator or hardware error occurs, or in some cases as a prompt for operator action. An operator error occurs when an out of sequence operator action is attempted, such as the EDIT knob is turned while the cursor is in a non-editing field. When an operator error occurs, the CLEAR indicator remains lit while the error number is flashed for two seconds on the display, then extinguishes. **Paragraph 2.5.8** provides further details on operator error codes.

The CLEAR indicator also lights when the keypad is placed in the shift or help mode. Pressing the CLEAR key exits the keypad out of the shift or help mode.

Making entries with the numeric entry keys causes the CLEAR indicator to light, indicating that the CLEAR key can be pressed to erase the last numeric digit entered, and as a reminder to press the ENTER key when the numeric entry is completed.

If the CLEAR indicator remains lit in any case, a hardware error is probable. If this occurs, cycle the power off then back on to reinitialize the unit and run BITE.

2.5.1.3.11 **ENTER Key** - The ENTER key is used to commence an action as determined by the position of the cursor in the display. For instance, if the cursor is located over a menu item, pressing the ENTER key causes that menu to be displayed. It is also used to complete numeric entries (see **paragraph 2.5.1.3.12**).

2.5.1.3.12 **Numeric Entry Keys** - The numeric entry keys consisting of digits 0 thru 9 can be used to enter or modify numeric parameters in the display. Plus and minus signs (+/-) and a decimal point are also available for numeric entries that require them. For numerical fields that can be expressed positively or negatively, a positive number is assumed when the numerical entry does not begin with the sign key. To use these keys the cursor is first placed over the field to be modified. Pressing a numeric entry key causes the entire value in the field to be erased and the value of the key that was pressed to be displayed in the right-most digit of the field. This also lights the CLEAR indicator. The CLEAR key may be pressed to delete the last digit entered if incorrect.

Numeric values are entered until all digits in the field are filled. Plus or minus signs must be entered first for parameters that require them. The first numeric value entered is the most significant digit. Once the desired value is displayed, the ENTER key is pressed to enter the value and to extinguish the CLEAR indicator. If the value entered is not valid for the parameter, an operator error message is displayed and the value is not accepted.

2.5.1.4 **VOLUME Control (R1)** - The VOLUME control is used to adjust the audio output level at the front panel PHONES jack. Separate left and right knobs are available for independent control of each headphone channel.

2.5.1.5 **CURSOR Control (U1)** - The cursor control is used to position the cursor in the display, which is indicated by a reverse-video flashing bar. Rotating this knob in one-click increments moves the cursor from field to field. This control knob may also be pushed in to move the cursor to the next field or to perform the same function as the ENTER key. The CURSOR control can be used to toggle the LCD backlight in the shift mode.

2.5.1.6 **EDIT Control (U2)** - The EDIT control is used to adjust parameters highlighted by the cursor. Rotating the knob in one-click increments steps the parameter through all of its valid values. This control knob may also be pushed in, which increments the value of the parameter by one step.

When the keypad is in the shift mode, the edit control is disabled. This knob is then used to adjust the contrast of the LCD.

2.5.2 POWER-UP ROUTINE

Pressing the top half of the POWER switch applies power to the unit and causes two power-up routines to take place. First the unit is initialized. The display confirms this by briefly showing the name of the unit, a message indicating the unit is initializing, and the software release and version numbers.

After the unit is initialized, it automatically performs the built-in-test (BITE) routine. After the BITE routine is completed the display shows the results. A successful BITE routine result is displayed as shown in **Figure 2-10.** If the test is unsuccessful error messages will replace the "PASSED" messages. In the event of an unsuccessful BITE routine, refer to **paragraph 2.5.9** for more details on determining the cause of the failure.

After the unit has initialized and the BITE routine has completed successfully, setup and tuning operations can be performed.

2.5.3 HELP DISPLAYS

Numerous displays and menus are used to control the operation of the WJ-9548. Descriptive information for these displays and menus are saved in the units memory which can be retrieved by the operator and displayed on the alphanumeric display.

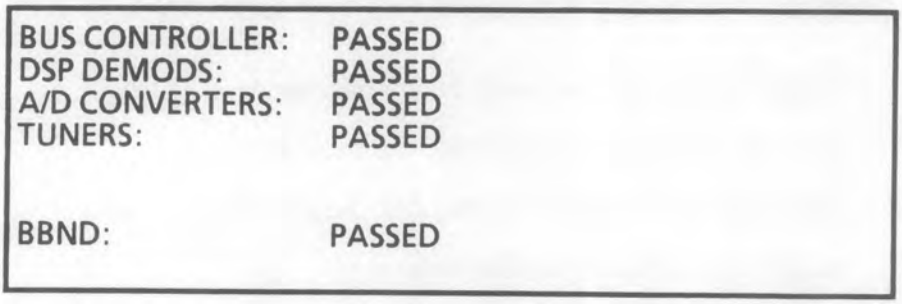


Figure 2-10. Successful BITE Routine Display

If the operator is unsure of the function of a current display, the Help Display mode can be selected. While the display in question is displayed, press the HELP key. The display automatically changes to the Help Display mode and provides descriptive information for the current display. **Figure 2-11** shows the Help Display for the Main Menu display.

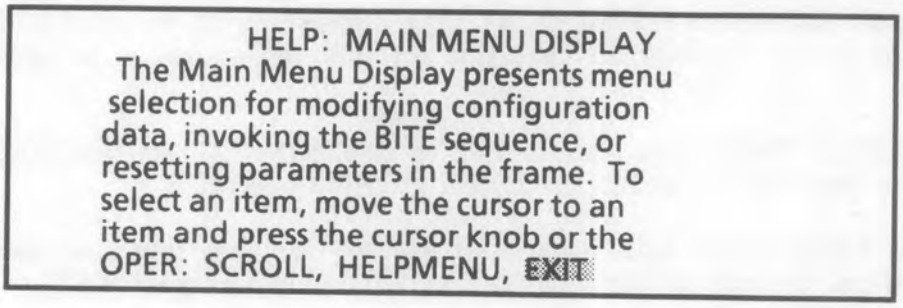


Figure 2-11. Example of a Help Display

Each Help display is capable of showing up to six lines of descriptive information at one time. To view the remainder of the information, move the cursor over the SCROLL field and push or turn the CURSOR knob.

Moving the cursor over the HELP MENU field and pushing the CURSOR control or ENTER key displays the Help Menu. This menu lists each menu and display for which help information is available. Moving the CURSOR control over this menu and pressing ENTER selects the Help information.

To exit the Help Menu or a Help display, move the cursor over the EXIT field and push the CURSOR control or press the CLEAR key.

2.5.4 INITIAL SETUP

Prior to performing tuning operations, several setup procedures are required. These are:

- Assigning descriptive labels to the basebands
- Entering correction factors for the basebands
- Assigning basebands to the physical baseband input ports
- Assigning basebands to demodulators
- Verifying the installed options
- Verifying the bus address of the unit for IEEE-488 remote control (if required)
- Assigning demodulators to provide left and right headphones audio
- Setting the time and date
- Internal/external reference selection

The displays used to perform these initial setups are accessed from the main menu. Pressing the MENU key places the display into the Main Menu Display mode as shown in **Figure 2-12.** As seen in this display six menu items can be selected. The first four menu items are primarily used to set up the unit for operations. The displays for these menu items and their role in the initial setup of the WJ-9548 for operation are further detailed in **paragraphs 2.5.4.1** thru **2.5.4.4.**

The SELF TEST menu item is used to invoke the built-in-test (BITE) routine. See **paragraph 2.5.9** for more details on this menu item and BITE operation.

The RESET CONTROL menu item is used for resetting the system and various operation parameters. The use of this menu item is detailed in **paragraph 2.5.7.**

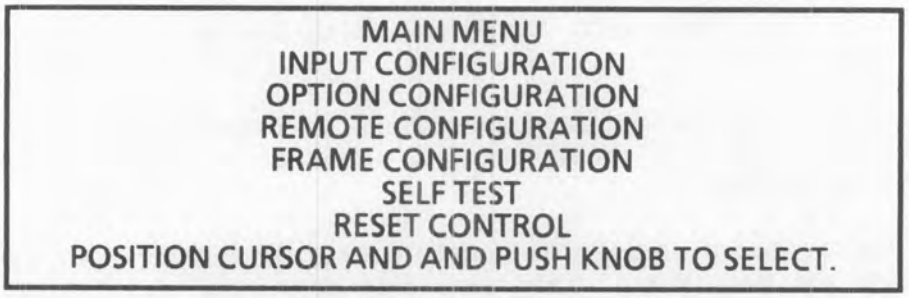


Figure 2-12. Main Menu Display

2.5.4.1 Input Configuration

Selecting the Input Configuration menu item displays a submenu that allows access to displays used to perform the first four setups listed in **paragraph 2.5.4.** To select the Input Configuration menu item, highlight it with the flashing cursor by rotating the CURSOR control. Then either push in the CURSOR control or press ENTER to display the Input Configuration menu, shown in **Figure 2-13.** As seen in the display, four new menu items are now available. The use of these menu items are further detailed in the following paragraphs.

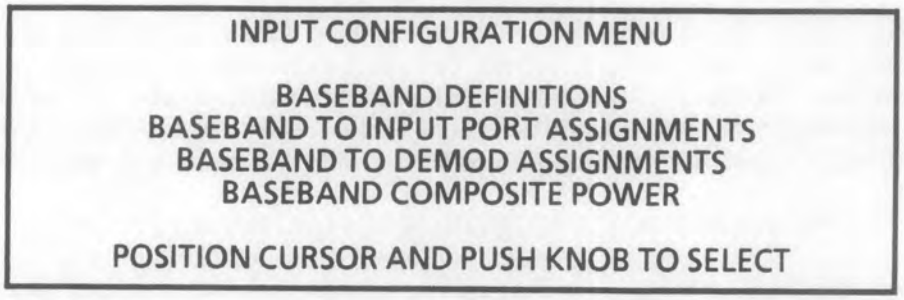


Figure 2-13. Input Configuration Menu

2.5.4.1.1 Assigning Descriptive Labels and Entering Correction Factors for Basebands

The display associated with the Baseband Definitions menu item is used to assign descriptive labels to the basebands and enter correction factors for them if desired. To select the Baseband Definitions display, use the CURSOR control to highlight the Baseband Definitions menu item and push in the CURSOR knob. The Baseband Definitions display is displayed as shown in **Figure 2-14.**

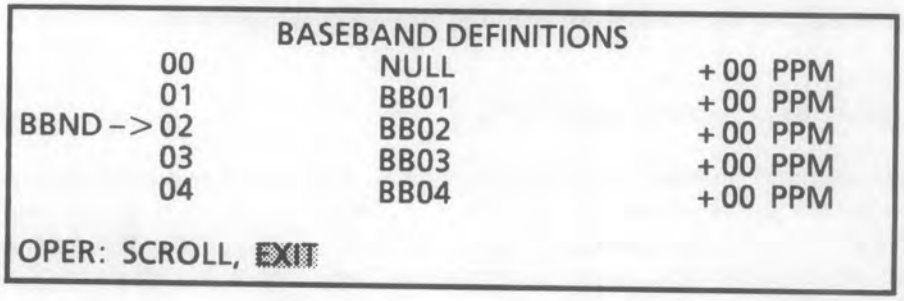


Figure 2-14. Baseband Definitions Display

Thirty-three baseband numbers are available for use during operations and are shown in the display as 00 thru 32. Baseband 00 is a null baseband, reserved for no baseband input connection. The amount of baseband numbers available are provided as an operator convenience, but do not infer that 32 baseband inputs are available. Typically, up to four baseband numbers can be used at any one time during operations.

To assign a descriptive label and enter a correction factor for a baseband, the baseband must first be located on the editing line of the display. The editing line is indicated by BBND ->. If the desired baseband number is not on the editing line, move the cursor to the SCROLL field and rotate or push the EDIT knob until the baseband number is beside BBND ->.

A descriptive label for a baseband can consist of a combination of up to eight alpha and numeric characters. The default labels for all basebands are BBXX, where XX is the corresponding baseband number. To enter or edit the descriptive label move the cursor to the first (left-most) character in the descriptive label field. Pushing the EDIT knob or rotating it clockwise steps through all of the available characters. The available characters are:

"0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ_ "

When the correct character is entered move the cursor to the next character field and perform the same procedure until all characters for the label are entered.

The baseband correction factor is used to correct for frequency offsets between the transmitting device and the WJ-9548. The correction factor is set in parts-per-million (PPM) of the tuned frequency (or 1 Hz per 1 MHz) at a range of -50 to +50 PPM. For example, if a demodulator is instructed to tune at 10,000.000 kHz and is connected to a baseband number that has a correction factor setting of +50 PPM, the actual tuned frequency of the demodulator will be 10,001.000 kHz.

Correction factor settings for all basebands are defaulted to +00 PPM. To adjust this setting move the cursor to the correction factor field. The EDIT control or the numeric entry keys can be used to enter the new setting.

After the descriptive labels and correction factors have been entered, move the cursor to the EXIT field and push in the CURSOR knob or press the ENTER key to exit the Baseband Definitions display and return to the Input Configuration Menu.

2.5.4.1.2 Assigning Basebands to Input Ports

Four baseband numbers can be assigned to represent the baseband inputs connected at the rear panel. To assign basebands to the physical input ports, first move the cursor over the BASEBAND TO INPUT PORT ASSIGNMENT menu item in the Input Configuration menu and push the CURSOR knob or ENTER key. The Baseband to Input Port Assignment display appears as shown in **Figure 2-15.** The display is defaulted so that baseband #1 is assigned to input port 1, baseband #2 assigned to input port 2, and so on.

To edit a baseband assignment, move the cursor over the baseband number field located beside the input port number. Use the EDIT control or the numeric entry keys to enter the desired baseband number is displayed (from 00 thru 32). Perform this procedure for each input port. A baseband number can only be assigned to one input port at one time. When all assignments are made, move the cursor to the EXIT field and push the CURSOR knob or the ENTER key to exit the display to the Input Configuration menu.

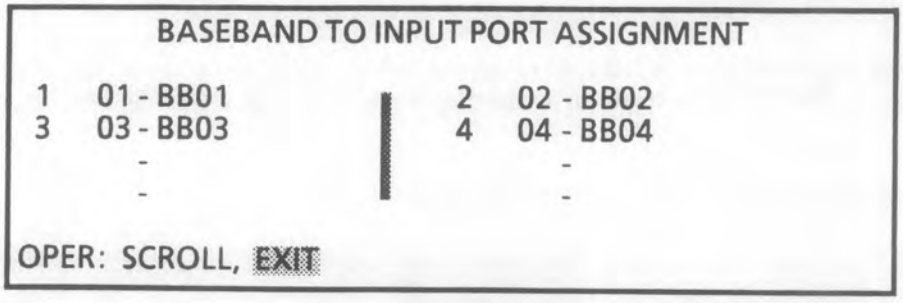


Figure 2-15. Baseband to Input Port Assignment Display

2.5.4.1.3 **Assigning Basebands to Demodulators**

Any assigned baseband can be assigned to a demodulator. In the Input Configuration menu move the cursor over the BASEBAND TO DEMOD ASSIGNMENT menu item and push in the CURSOR knob or ENTER key. The Baseband to Demod Assignment display appears as shown in **Figure 2-16.** This display is defaulted so that baseband #1 is assigned to each demodulator.

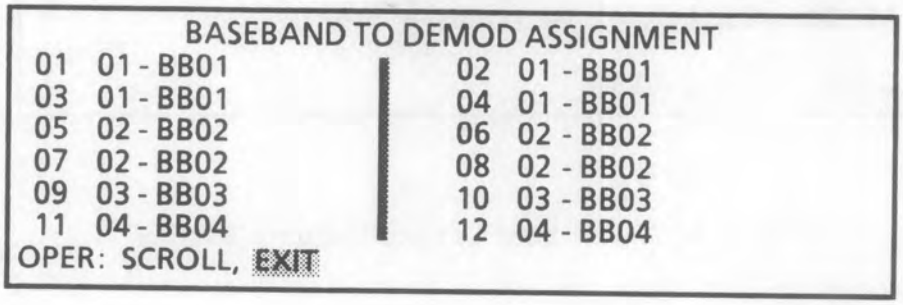


Figure 2-16. Baseband to Demod Assignment Display

To change the baseband assignment for a demodulator, move the cursor over the baseband number field located beside the demodulator number. Use the EDIT control or numeric entry keys to enter the desired baseband number. Perform this procedure for each demodulator as required.

This display is capable of showing twelve demodulators at one time. To view more demodulators move the cursor over the SCROLL field and use the EDIT control until the desired demodulator number is displayed.

When all assignments have been made, move the cursor over the EXIT field and push the CURSOR knob or ENTER key to return the display to the Input Configuration menu.

2.5.4.1.4 Monitoring the Power Level of the Basebands

The Baseband Composite Power display provides the operator the means to monitor the composite power level of each physical baseband input connected at the rear panel. To enter this display move the cursor over the BASEBAND COMPOSITE POWER menu item in the Input Configuration menu and push the CURSOR knob or ENTER key. The Baseband Composite Power display appears (see **Figure 2-17**). The display lists each input port with a connected baseband and the numeric value of the baseband's composite power level from 0 to -30 dBm. A bar graph is provided at the right portion of the display which allows for comparing the power levels between baseband inputs. To exit the Baseband Composite Power display and return to the Input Configuration menu, move the cursor to the EXIT field and push the CURSOR control.

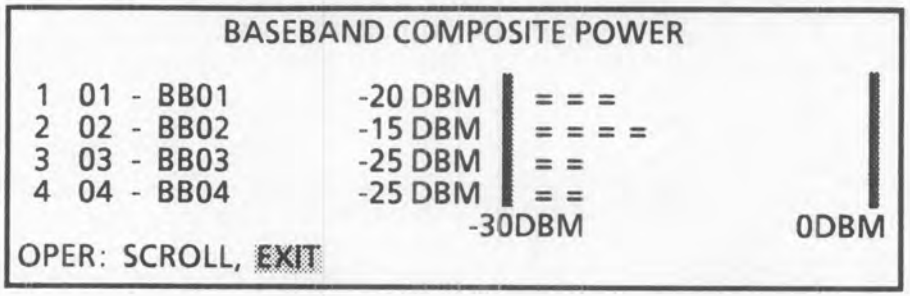


Figure 2-17. Baseband Composite Power Display

2.5.4.2 Option Configuration

Selecting the Option Configuration menu item in the Main Menu display displays a list of controllable plug-in option modules that are installed in the unit. The display lists the four option slots in the unit and the name of the option installed in each slot (see **Figure 2-18**). If an option is not installed in the slot the display will show "NO OPTION" directly beside the listed option slot. More details on the use of this display can be found in the applicable appendix to this manual for the installed option.

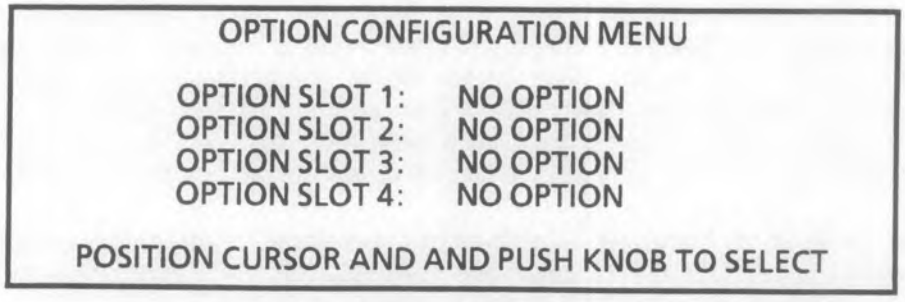


Figure 2-18. Option Configuration Menu

2.5.4.3 **Remote Configuration**

Selecting the Remote Configuration menu item in the Main Menu display displays the Remote Configuration display (see **Figure 2-19**). This display shows the setting of the IEEE-488 address switch (A43S1). Refer to **paragraph 2.2.4** for more details on the setting of this switch.

The Remote Configuration display allows the setting of A43S1 to be overridden, by entering a new IEEE-488 bus address. To enter the new bus address move the cursor to the numerical BUS ADDRESS field. The new address can be entered with the EDIT control or the numeric entry keys. Once the field has been entered move the cursor to the EXIT field and push the CURSOR control to return to the Main Menu display.

When the IEEE-488 address is changed via the front panel, the actual IEEE-488 address will not change until after power is turned off and then turned on. There is no possibility of the actual address changing while the unit is powered on.

Once changed from the front panel, the IEEE-488 address will remain changed through repeated power on/off cycles. It will only revert to A43S1 setting when:

1. Battery-backed memory is lost, or
2. When, at power-up, a change in the switch setting is detected since the last power-up.

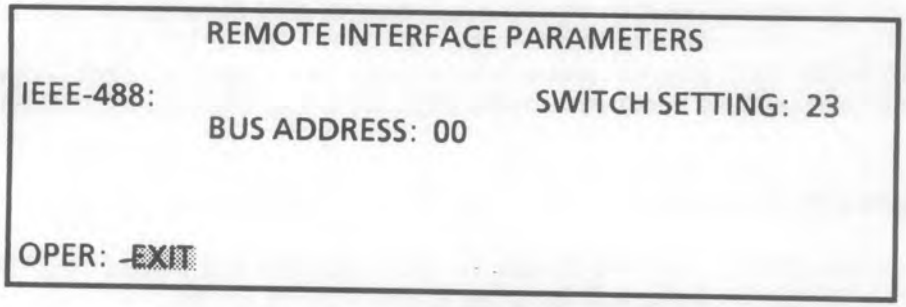


Figure 2-19. Remote Configuration Display

2.5.4.4 Frame Configuration

The Frame Configuration display (**Figure 2-20**) is accessed by moving the cursor over the FRAME CONFIGURATION menu item in the Main Menu display and pushing the CURSOR knob or ENTER key. This display shows the frame number of the WJ-9548. If in a "stacked" setup, the frame number is a number from 1 to 8 depending on the time slot to which the unit is connected on the TDM bus. If the unit is in a "stand-alone" setup the frame number is always 0.

The number of installed demodulators, baseband input ports available, and options installed are provided in this display. Headphone assignments, time and date setups, and timebase reference selection are also provided which are further detailed in the following paragraphs. The Frame Configuration display is exited when a display mode key is pressed.

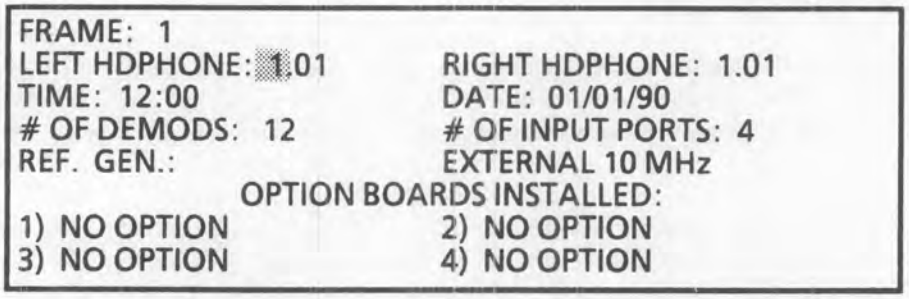


Figure 2-20. Frame Configuration Display

2.5.4.4.1 Assigning Demodulators to Provide Headphones Audio

The Frame Configuration display allows the operator to select demodulators to provide the audio for the left and right audio channels at the front panel PHONES jack. If the unit is in a "stacked" setup, a frame number for another unit in the setup can be selected along with one of its demodulators to provide the the left or right audio for the current frame's PHONES jack.

To select the source for the left headphone audio channel, move the cursor to the numeric field LEFT HDPHONE field. The first digit is used to select the frame, while the last two digits are used to select the demodulator number in the frame. If the unit is not in a "stacked" setup, only the demodulator digits are available. The EDIT control or numeric entry keys can be used to enter the frame and demodulator selection. This same procedure is performed to select the source for the right headphone audio channel in the numeric RIGHT HDPHONE field.

2.5.4.4.2 Setting the Time and Date

To set the time, move the cursor to the numeric field beside the TIME field in the Frame Configuration display. Hours and minutes are separated in the field by a colon. The left two digits are for hours, while the right two are for minutes. Use the EDIT control or the numeric entry keys to enter the correct value for each field.

To set the date move the cursor to the numeric DATE field. The day, month, and year fields (from left to right) are separated with slashes. Use the EDIT control or numeric entry keys to enter the correct value for each field.

2.5.4.4.3 Timebase Reference Selection

The WJ-9548 contains an internally generated 10 MHz reference frequency to be used as the timebase for the unit. If desired, an external reference frequency of 1, 2, 5, or 10 MHz can be used when connected to the rear panel REF IN connector (J4).

When no external reference is connected, the internal 10 MHz reference is used as indicated in the Frame Configuration display with INTERNAL displayed beside the REF. GEN.: field. When an external reference is connected, EXTERNAL and the associated external reference frequency are displayed and the internally generated reference is ignored. If an external reference is connected but is not stable enough for the reference circuitry of the WJ-9548 to lock onto, the unit switches to its internal reference and INTERNAL is displayed.

Additionally, the unit can be forced to use its internal reference when an external reference is connected if desired. To force the internal reference selection, move the cursor over the EXTERNAL field and use the EDIT control to select the internal reference. When the reference is forced to the internal reference INTERNAL (FORCED) is displayed. The external reference is ignored and internal reference is used.

2.5.5 TUNING OPERATIONS

Two types of tuning operations are available for controlling the demodulators; Manual and Scan. Manual tuning allows for a demodulator to tune to a fixed frequency. Scan tuning enables a demodulator to scan a range of frequencies in search for signal activity.

Displays associated with the BASE BAND, DEMOD, and SCAN keys are used to setup and control all tuning operations. The purpose and uses of these displays and the tuning operations available are further defined in the following paragraphs.

Refer to **paragraph 2.5.5.1** for details on Manual Tuning operations and **paragraph 2.5.5.2** for details on Scan operations. **Paragraph 2.5.5.3** provides details on the Baseband Table display (BASE BAND key) which is used to monitor the operations of the demodulators.

2.5.5.1 Manual Tuning Operations

2.5.5.1.1 General (Demodulator Display)

The Demodulator display is used to control the operation of a demodulator. This display is accessed by pressing the DEMOD key. **Figure 2-21** shows the default settings for the Demodulator display.

The fields of this display contain the status information pertinent to the operation of a demodulator. The basic fields in the display in Manual operations provides the number of the demodulator for which parameters are currently being displayed, the baseband assigned to which

it is assigned, its local or remote control status, its tuning operation, the current tuned frequency, gain mode, the level of the current signal, and the selected threshold level. Fields relating to the tuning operation vary, as determined by the Manual tuning mode selected.

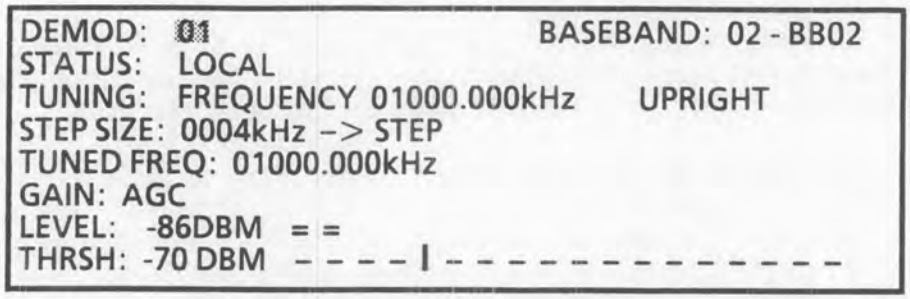


Figure 2-21. Demodulator Display, Default Settings

To select a demodulator for a Manual tuning setup, move the cursor to the numeric DEMOD field. Use the EDIT control or numeric entry keys to select the desired demodulator. The display changes to show the current setup for the selected demodulator.

The baseband number assigned to the demodulator is shown in the BASEBAND field. The baseband assignment for the current demodulator can be changed if desired. If so, move the cursor to the baseband number field. Use the EDIT control or numeric entry keys to change the baseband assignment to the baseband number desired. The demodulator is automatically connected to the new baseband.

The demodulator can also be set to Remote operation in the Demodulator display (or Local if already in Remote). Move the cursor to the LOCAL STATUS field. Use the EDIT control to change the status to REMOTE.

If the status field shows "REMOTE (LLO)", the demodulator is in Remote with Local Lockout. This can only be enabled and disabled from an external bus controller. If in local lockout all selectable fields in the Demodulator display are disabled with the exception of the demodulator number field.

The TUNED FREQ field is an indicator field which provides the value of the actual tuned frequency, which takes into consideration the baseband correction factor setting for the assigned baseband, and the nominal frequency position of the demodulator.

The gain mode of the demodulator can be set to either AGC (automatic gain control) or manual. To change the gain mode, move the cursor to the GAIN field. Use the EDIT control to toggle between AGC and MAN. In MAN, the gain level can be manually set to a value from 0 to 36 dB. Move the cursor beside the MAN field and use the EDIT control or numeric entry keys to enter the desired gain setting.

The numeric LEVEL field is used to indicate the power level of the current signal. This value can range from 0 to -90 dBm. The bar graph located beside the power level field is provided to show the power level of the signal compared to the setting of the threshold level.

The threshold level can be set to a value from 0 to -90 dBm. Move the cursor to the THRSH field. Use the EDIT control or the numeric entry keys to enter the desired threshold setting. The threshold level should be set to a value which is just above the noise floor of the assigned baseband, thus ensuring a maximum probability of signal detection without interference from baseband noise. The bar graph located beside the threshold setting is provided to show the comparison of the threshold setting to the power level of the signal. When the LEVEL value is greater than the THRSH value, an asterisk (*) appears to the far right of the level bar graph.

Four tuning modes are available in Manual Tuning operations: Direct Frequency, CCITT 960 Plan, and CCITT 2700 Plan, and Channel. These tuning modes are further detailed in the following paragraphs.

2.5.5.1.2 Direct Frequency Tuning

The Direct Frequency tuning mode allows the selected demodulator to tune to a fixed frequency from 00,000.000 to 20,000.000 kHz, with a resolution of 1 Hz. To enter the displayed demodulator into the Direct Frequency tuning mode, move the cursor to the TUNING field. Rotate or push the EDIT knob until FREQUENCY appears in this field.

The FREQUENCY field is used to enter the nominal frequency. Eight digits are available for numeric entries with a decimal point located between the 1 kHz and 100 Hz position. The EDIT control or numeric entry keys can be used to modify or enter the value.

When using the EDIT knob, position the cursor on a digit in the FREQUENCY field. Rotate or push the EDIT knob until the desired value for the digit is displayed. Perform the same procedure for each digit in the field as required.

An alternate method to change the frequency is to use the Step function. This function allows the frequency to change according to the value of the entered step size. The step size is indicated in the numeric -> STEP SIZE: field. Move the cursor to this numeric field and use the EDIT control or the numeric entry keys to enter the desired step size. The step size can be any value from 0001 to 1000 kHz.

To change the frequency using the Step function move the cursor to the STEP field and push the EDIT knob. The frequency value increases by the value of the entered step size. Rotating the EDIT control clockwise increases the frequency value by one step for each click position. Rotate the EDIT knob clockwise to decrease the frequency value.

The field located to the right of the numeric frequency field is used to enter upright or inverted spectrum for demodulation. Move the cursor to this field and push or rotate the EDIT knob to toggle between INVERTED and UPRIGHT if the Upright/Invert convention is selected on A43S5 (refer to **paragraph 2.2.4**). USB or LSB may be selected if the USB/LSB convention is selected on A43S5.

2.5.5.1.3 CCITT 960 Plan Tuning

In the CCITT 960 Plan tuning mode, the selected demodulator is instructed to tune to one of 960 preprogrammed channels (see **Figure 2-8**). The channels are contained in groups that are contained in supergroups. Sixteen supergroups are available, each containing five groups that contain twelve channels each.

To select the CCITT 960 Plan tuning mode, move the cursor to the TUNING field. Rotate or push the EDIT knob until CCITT 960 is displayed (see **Figure 2-22**). Located beside the CCITT 960 field is a numeric field containing two digits, a decimal point, one digit, a decimal point, and two digits. The left two digits are used to enter the supergroup number from 01 to 16. The middle digit is used to enter the group number from 1 to 5, and the last two digits are used to enter the channel number from 01 to 12.

Move the cursor to the field to be modified. Rotate or push the EDIT knob until the desired value is displayed. Move the cursor to the next digit field and again use the EDIT knob to enter the value.

The numeric entry keys can also be used to enter the plan position. When using this method, the entire CCITT 960 position and decimal points must be entered in the required positions.

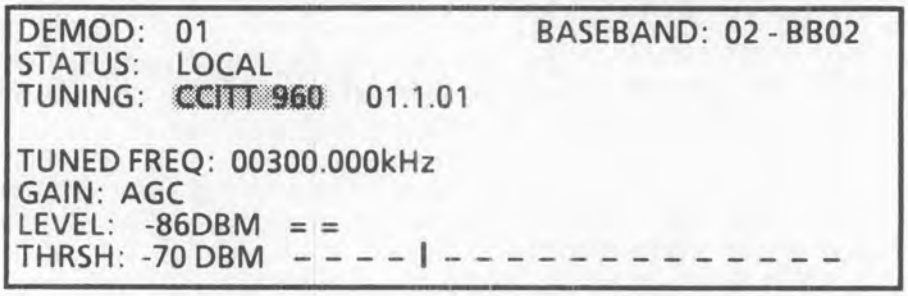


Figure 2-22. Demodulator Display in CCITT 960 Plan Tuning Mode

2.5.5.1.4 CCITT 2700 Plan Tuning

In the CCITT 2700 Plan tuning mode, the selected demodulator is instructed to tune to one of 2,700 preprogrammed voice channels (see **Figure 2-8**).

To select the CCITT 2700 Plan tuning mode, move the cursor to the TUNING field. Rotate or push the EDIT knob until CCITT 2700 is displayed (see **Figure 2-23**). Located beside the CCITT 2700 field is a numeric field containing, from left to right, four digits separated by decimal points and two digits. The left most digit is used to enter the supermastergroup (1-3), the next digit is used to enter the mastergroup (7-9), the third digit is used to enter the supergroup (4-8), the fourth digit is used to enter the group (1-5), and the last two digits are used to enter the channel (1-12).

Move the cursor to the field to be modified. Rotate or push the EDIT knob until the desired number is displayed. Only numbers that are valid for the digit(s) highlighted with the cursor can be selected. For instance when in the mastergroup field (second digit from left), only

numbers 7, 8, or 9 can be selected. Move the cursor to each digit(s) field and perform the same procedure until all fields contain the proper values.

The numeric entry keys can also be used to enter the plan position. When using this method, the entire CCITT 2700 plan position and decimal points must be entered in the required positions.

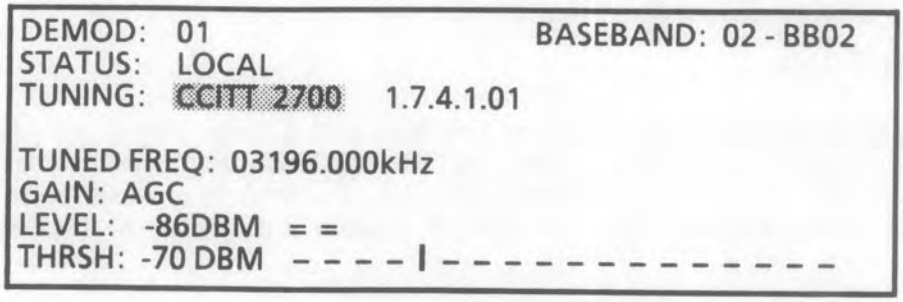


Figure 2-23. Demodulator Display in CCITT 2700 Plan Tuning Mode

2.5.5.1.5 **Channel Tuning**

The Channel tuning mode allows the selected demodulator to tune to one out of 5,000 available channels. The channels are incremented in 4 kHz steps, thus covering the 0 to 20 MHz tuning range of unit.

To select the Channel tuning mode, move the cursor to the TUNING field. Rotate or push the EDIT knob until CHANNEL is displayed. **Figure 2-24** shows a demodulator with Channel tuning mode selected. The field located to the right of CHANNEL is a four-digit numeric field, used to enter the desired channel. Move the cursor to this field and use the EDIT control or numeric entry keys to enter the channel number.

The field located to the right of the channel number field is used to select upright or inverted spectrum of the channel for demodulation. Move the cursor to this field and rotate or push the EDIT knob to toggle between INVERTED and UPRIGHT selections.

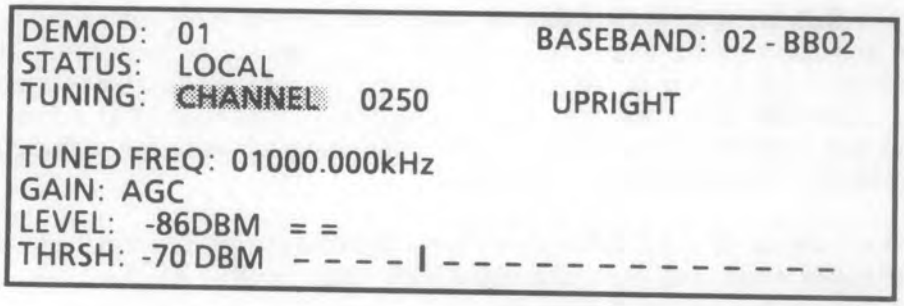


Figure 2-24. Demodulator Display in Channel Tuning Mode

2.5.5.2 Scan Operations

Scan operations enables a demodulator to scan over a range of frequencies while searching for signal activity. Prior to performing a scan operation, a scan setup must first be entered into a scan channel. One hundred scan channels are available, which allows for the entry of up to 100 scan setups. Once a scan channel has been defined, the parameters in the setup can be modified or passed to the demodulator and the scan operation commenced.

2.5.5.2.1 Scan Setups

Pressing the SCAN key displays the Scan List display (see **Figure 2-25**). To setup a scan channel, first select a scan channel that has "UNDEFINED" displayed beside it (scan channels are defaulted to be undefined). To select the scan channel, move the cursor to the SCROLL field. Push or rotate the EDIT knob until the scan channel number is displayed beside SCAN ->.

Figure 2-25. Scan List Display

Next move the cursor to the EDIT field and push the CURSOR knob. The Scan Setup display for the scan channel is displayed (see **Figure 2-26**). The numeric field located to the right of the SCAN: field indicates the scan channel number. The setups for the remaining fields in this display are used to select the type of scan setup, stop at the end of of single pass selection, dwell timer settings, and gain and threshold settings.

Eight different scan setups can be selected: Direct Frequency Scan, Channel Scan, CCITT 960 Group and Supergroup Scans, and CCITT 2700 Group, Supergroup, Mastergroup, and Supermastergroup Scans. The stop at the end of a single pass selection, when enabled, is used to automatically stop a scan sequence when the stop parameter is reached in the first scan sequence. Three dwell timers are provided for control of the scan such as wait for signal, pause on signal encountered, and wait for the return of a lost signal.

When all fields in the display have been modified with the desired values, move the cursor to the CONFIRM field and push the CURSOR knob or ENTER key. This sets the new parameters in memory for the selected scan channel. To cancel the scan setup changes, move the cursor to the CANCEL field and push the CURSOR knob. Press the SCAN key to return to the Scan List display.

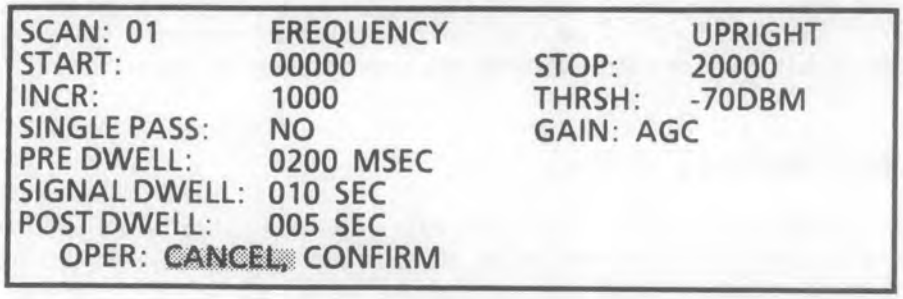


Figure 2-26. Direct Frequency Scan Setup Display

2.5.5.2.1.1 ***Single Pass Function***

The single pass function is used to automatically suspend a scan operation at the end of a single scan sequence. This means that when a scan is started, it continues scanning until it reaches the stop parameter. When the single pass function is enabled the scan will be suspended until manually restarted. If the single pass function is disabled, the scan will continuously scan from start to stop parameters until manually suspended (or while the demodulator is dwelling on a signal).

To enable the single pass function, move the cursor to the SINGLE PASS field. Rotate or push the EDIT knob until the field displays YES.

2.5.5.2.1.2 ***Dwell Timers***

Three dwell timers are provided that can be used to further control scan operations. The dwell timers are: Pre Dwell, Signal Dwell, and Post Loss Dwell. All dwell timers can be set to INFINITE dwell using edit control or a -1 numeric entry.

The Pre Dwell timer defines how long the demodulator initially waits on a scan step to detect signal activity. The range of this timer can be any value in the range of 0050 to 9975 msec in increments of 0025 msec. To enter the Pre Dwell timer value move the cursor to the PRE DWELL field in the Scan Setup display (see **Figures 2-26** thru **2-30**). Use the EDIT control or numeric entry keys to enter the desired value.

The Signal Dwell timer determines how long the demodulator stays tuned to an active frequency. This timer is automatically initialized upon entry from Pre Dwell. The demodulator exits Signal Dwell when either the timer expires or the encountered signal drops below the threshold level setting. If the timer expires, the demodulator moves to Pre Dwell operation and the next scan step.

The Signal Dwell timer can be set to any value from 000 to 600 seconds in 1 second intervals. To enter the value, move the cursor to the SIGNAL DWELL field. Use the EDIT control or numeric entry keys to enter the desired value.

The Post Loss Dwell timer operation is entered from Signal Dwell upon loss of signal activity. This timer determines how long the demodulator will wait for the return of a lost signal before tuning to the next scan step. Any value from 000 to 200 seconds can be entered. Move the cursor to the POST DWELL field. Use the EDIT control or numeric entry keys to enter the desired value. Reacquisition of a signal returns the demodulator to Signal Dwell.

2.5.5.2.1.3 ***Direct Frequency Scan Setup***

The Direct Frequency Scan mode allows a demodulator to scan a portion of its tuning range over a range of frequencies while monitoring for signal activity. In the Scan Setup display, move the cursor to the SCAN channel number field. Rotate or push the EDIT knob until FREQUENCY is displayed. **Figure 2-26** shows the Direct Frequency Scan Setup Display with its default parameters.

If desired, move the cursor to either the UPRIGHT or the USB field. Only the one selected by A43S5 (refer to **paragraph 2.2.4**) will be available. Push the EDIT key to select either an INVERTED frequency spectrum or LSB demodulation (again dependent on the A43S5 setting). Located directly below the FREQUENCY field is a five-digit numeric field which is used to enter the start frequency of the scan. This value can be any number from 00000 to 19999 kHz. The numeric STOP field is used to enter the stop frequency of the scan. Any value from 00001 to 20000 kHz can be entered. The stop frequency must be greater than the start frequency. Both start and stop values can be entered with the EDIT control or numeric entry keys.

The numeric INCR field is used to enter the four-digit scan increment. This value, which is entered with the EDIT knob or numeric entry keys, can be any number from 0001 to 1000 kHz. The scan increment setting determines the frequency steps of the scan from the start frequency to the stop frequency. Refer to **paragraph 2.5.5.2.2** for details on commencing the scan.

2.5.5.2.1.4 ***Channel Scan Setup***

The Channel Scan mode provides the means for a demodulator to scan its tuning range by scanning between any two of the 5,000 available channels. In the Scan Setup display move the cursor to the field located to the right of the scan channel number. Rotate or push the EDIT control until CHANNEL is displayed (see **Figure 2-27**). If desired, move the cursor to the UPRIGHT field to select INVERTED for inverted channel spectrum demodulation.

```
SCAN: 01        CHANNEL                 UPRIGHT
START:          0000          STOP:     5000
                              THRSH:    -70DBM
SINGLE PASS:    NO            GAIN: AGC
PRE DWELL:      0200 MSEC
SIGNAL DWELL:   010 SEC
POST DWELL:     005 SEC
  OPER: CANCEL, CONFIRM
```

Figure 2-27. Channel Scan Setup Display

The four-digit numeric START field located below the CHANNEL field is used to enter the start channel number for the scan. This value can be any number from 0000 to 4999. The four-digit numeric STOP field is used to enter the stop channel number. This value can be any number from 0001 to 5000. The stop channel must be greater than the start channel.

Both start and stop channel numbers can be entered by moving the cursor to the respective numeric field and using the EDIT control or numeric entry keys. Refer to **paragraph 2.5.5.2.2** for details on commencing the scan.

2.5.5.2.1.5 ***CCITT 960 Plan Scan Setups***

Two types of scan setups can be entered for CCITT 960 Plan scanning operations: Group Scan and Supergroup Scan. In the Group Scan mode the demodulator scans twelve channels within a specified group within a specified supergroup.

In Supergroup Scan mode, the demodulator scans twelve channels within the five groups, which are within a specified supergroup. When it is finished scanning one group, it starts scanning twelve channels within the next group of the specified supergroup, and so on until all groups within the specified supergroup are scanned. The threshold and gain levels can be changed for any CCITT 960 Plan Scan Setup through the THRSH and GAIN fields, respectively. To change the threshold use the CURSOR knob to move the cursor to the THRSH field and press the EDIT key to change the value. To change the gain mode, use the CURSOR knob to position the cursor in the GAIN field. Pressing the EDIT key toggles between AGC and Manual gain. When Manual gain is selected, a field appears that allows the manual gain level to be changed. Use the CURSOR knob to position the cursor in this field and press the EDIT key to change the gain value.

To enter a CCITT 960 Group Scan, move the cursor in the Scan Setup display to the field located to the right of the scan channel number. Rotate or push the EDIT knob until CCITT 960 GP is displayed (see **Figure 2-28**). Directly below this field is a numeric field consisting of two digits, a decimal point, a single digit, a decimal point, and two asterisks. The first two digits are used to enter the supergroup number from 01 to 16 and the middle single digit is used to enter the group number from 1 to 6. Move the cursor to the numeric field and use the EDIT control to enter the desired supergroup and group numbers. Two asterisks are located in the channel position for which no selection is available in the group scan. The numeric entry keys can also be used to enter the supergroup and group numbers. However, when using this method of entry, all fields must be entered in their proper position including decimal points and the channel position. When the numeric entry is entered, the channel position entry is automatically ignored and the two asterisks are redisplayed.

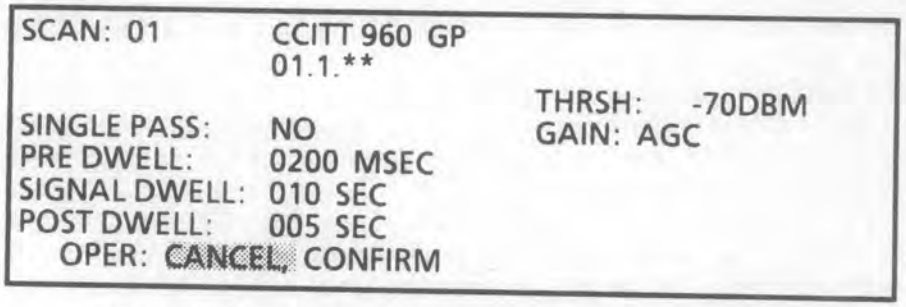


Figure 2-28. CCITT 960 Group Scan Setup Display

To enter a CCITT 960 Supergroup Scan, move the cursor to the field located beside the scan channel number and rotate or push the EDIT knob until CCITT 960 SG is displayed (see **Figure 2-29**). The numeric field located directly below this field is used to enter the supergroup number. Move the cursor to the left two digits in this field. Use the EDIT control to enter the desired supergroup number from 01 to 16. As with the Group Scan setup, the asterisks indicate non-selectable fields. Also the same numeric entry key restrictions apply. Refer to **paragraph 2.5.5.2.2** for details on commencing a scan.

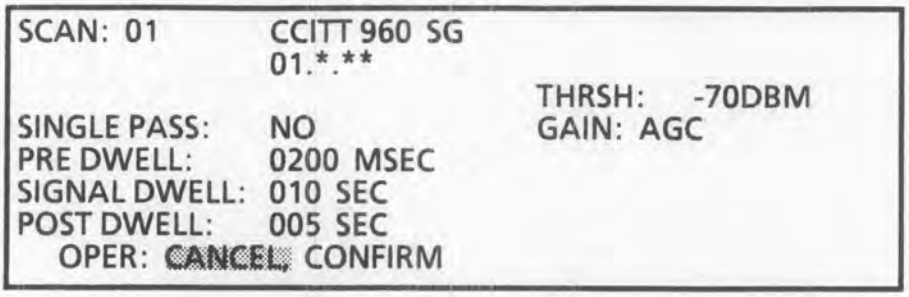


Figure 2-29. CCITT 960 Supergroup Scan Setup Display

2.5.5.2.1.6 ***CCITT 2700 Plan Scan Setups***

Four scan modes are available for scanning channels in the CCITT 2700 Plan: Group Scan, Supergroup Scan, Mastergroup Scan, and Supermastergroup Scan. The threshold and gain levels can be changed for any CCITT 2700 Plan Scan setup via the THRSH and GAIN fields, respectively. To change the threshold level, use the CURSOR knob to move the cursor to the THRSH field and press the EDIT key to change the value. To change the gain mode, use the CURSOR knob to reposition the cursor to the GAIN field. Pressing the EDIT key toggles the gain mode between AGC and Manual. If Manual gain is selected, a field appears that allows the manual gain level to be changed. Use the CURSOR knob to reposition the cursor into this position and press the EDIT knob to change the gain value.

In the Group Scan mode the demodulator scans twelve channels within a specified group which is within a specified supergroup, within a specified mastergroup, within a specified supermastergroup. In this mode twelve channels are scanned. To enter a CCITT 2700 Group Scan, move the cursor in the Scan Setup display to the field located to the right of the scan channel number. Rotate or push the EDIT knob until CCITT 2700 GP is displayed (see **Figure 2-30**). Directly below this field is a numeric field consisting of four digits separated by decimal points, and two asterisks. The left most digit in this field is used to enter the supermastergroup number from 1 to 3, the second is for the mastergroup from 7 to 9, the third is for the supergroup from 4 to 8, and the fourth digit is for the group from 1 to 5. The two asterisks are in the non-selectable channel field. Move the cursor to the numeric field and use the EDIT control to enter the desired supermastergroup, mastergroup, supergroup, and group numbers. The numeric entry keys can also be used to enter the numbers. However, when using this method of entry, all fields must be entered in their proper position, including decimal points and the channel position. When the numeric entry is entered, the channel position entry is automatically ignored and the two asterisks are redisplayed.

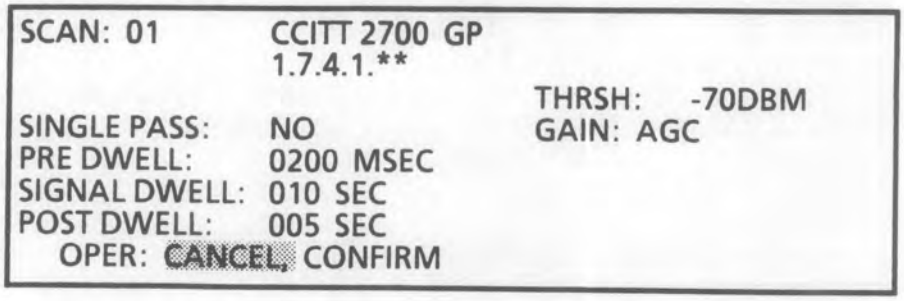


Figure 2-30. CCITT 2700 Group Scan Setup Display

In the Supergroup Scan mode, all channels of all groups within a specified supergroup are scanned. Sixty channels are scanned in this mode. To enter a CCITT 2700 Supergroup Scan, move the cursor to the field located beside the scan channel number and rotate or push the EDIT knob until CCITT 2700 SG is displayed (see **Figure 2-31**). The numeric field located directly below this field is used to enter the supermastergroup, mastergroup, and supergroup numbers. Move the cursor to this field and use the EDIT control to enter the desired numbers. As with the Group Scan setup, the asterisks indicate non-selectable fields. Also the same numeric entry key restrictions apply.

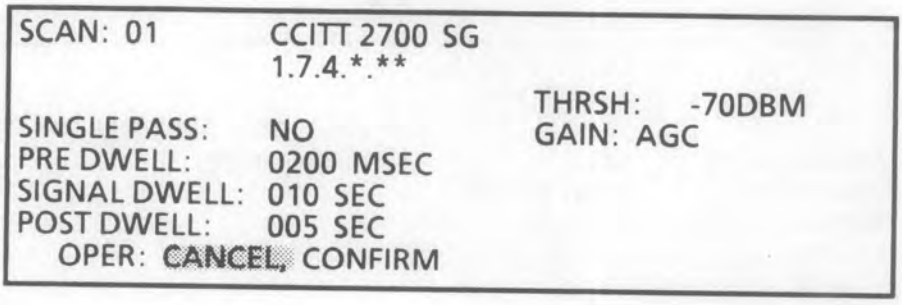


Figure 2-31. CCITT 2700 Supergroup Scan Setup Display

In the Mastergroup Scan mode, all channels of all groups of all supergroups within a specified mastergroup are scanned. Three hundred channels are scanned in this mode. To enter a CCITT 2700 Mastergroup Scan, move the cursor to the field located beside the scan channel number and rotate or push the EDIT knob until CCITT 2700 MG is displayed (see **Figure 2-32**). The numeric field located directly below this field is used to enter the supermastergroup and mastergroup numbers. Move the cursor to this field and use the EDIT control to enter the desired numbers. As with the Group Scan setup, the asterisks indicate non-selectable fields. Also the same numeric entry key restrictions apply.

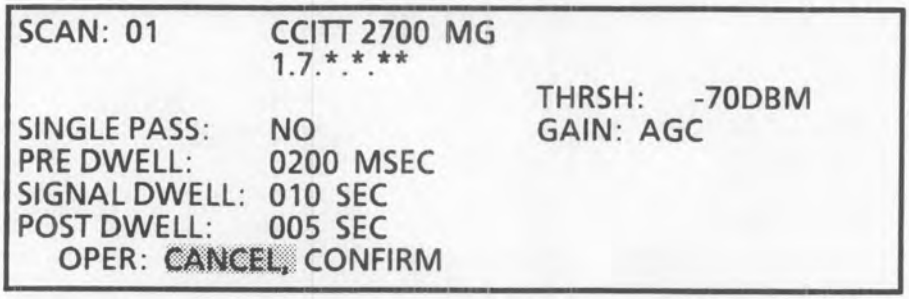


Figure 2-32. CCITT 2700 Mastergroup Scan Setup Display

In the Supermastergroup Scan mode, all channels of all groups of all supergroups of all mastergroups within a specified supermaster group are scanned. Nine hundred channels are scanned in this mode. To enter a CCITT 2700 Supermastergroup Scan, move the cursor to the field located beside the scan channel number and rotate or push the EDIT knob until CCITT 2700 SMG is displayed (see **Figure 2-33**). The numeric field located directly below this field is used to enter the supermastergroup number. Move the cursor to this field and use the EDIT control to enter 1, 2, or 3 as desired. As with the Group Scan setup, the asterisks indicate non-selectable fields. Also the same numeric entry key restrictions apply.

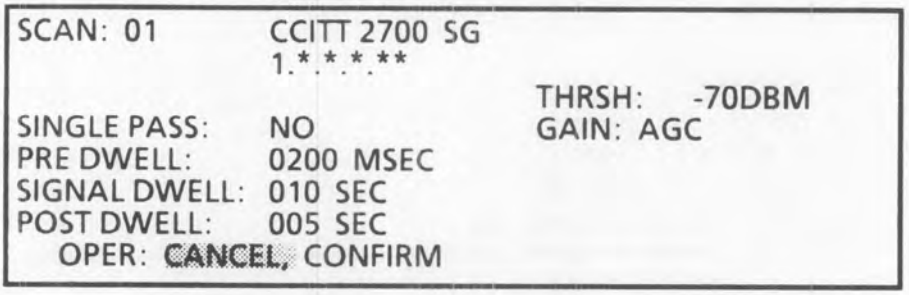


Figure 2-33. CCITT 2700 Supermastergroup Scan Setup Display

2.5.5.2.2 **Commencing a Scan Operation**

Once a scan channel has been properly setup for a scan operation (**paragraph 2.5.5.2.1**) the scan setup parameters can be set in a demodulator and the scan started.

Before the scan can be started a demodulator must be selected to receive the scan setup parameters. The demodulator is selected in the numeric DEMOD: field in the Scan List display (see **Figure 2-25**). Beside the demodulator number are the general tuning parameters for

the demodulator and its remote/local status (the demodulator must be in local before it can receive scan setup parameters). To change the demodulator selection, if desired, move the cursor to the demodulator number field and use the EDIT control or numeric entry keys to change the demodulator selection.

Once the demodulator is selected, select the scan channel number for which the scan setup is located. The field located to the right of the scan channel number shows the type of scan setup entered or UNDEFINED. Use the scroll function in the display to move the scan channel number with the desired scan setup until it is displayed next to the SCAN -> field.

To load the scan setup into the demodulator and commence the scan operation, move the cursor to the EXECUTE field and push the CURSOR control or the ENTER key.

2.5.5.2.3 Monitoring a Scanning Demodulator

After the demodulator has commenced scanning (**paragraph 2.5.5.2.2**), the Demodulator display can be selected to closely monitor the scan operation.

Press the DEMOD key to select the Demodulator display. **Figure 2-34** is an example of a Demodulator display showing a demodulator that is scanning in the Direct Frequency Scan mode. The demodulator number, assigned baseband, remote/local status, scan mode, scan channel number, scan increment, spectrum, start and stop parameters, and the status of the scan are displayed.

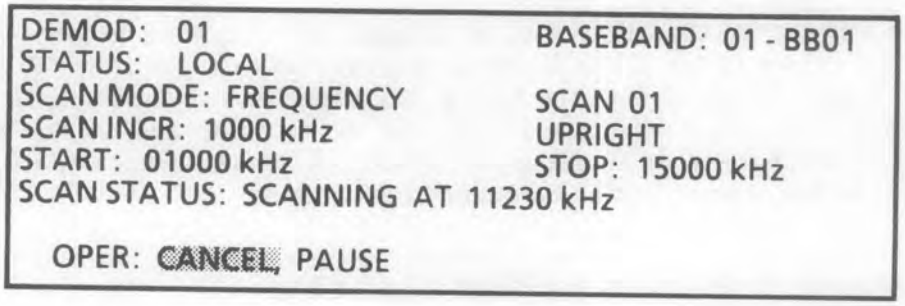


Figure 2-34. Demodulator Display, Direct Frequency Scanning

2.5.5.2.4 Pausing an Active Scan

An actively scanning demodulator can be paused if desired, for closer viewing or modification of the demodulator's status. To pause the scan operation move the cursor to the PAUSE field in the Demodulator display (**Figure 2-34**) and push the CURSOR control or ENTER key. The scan is paused and the display is updated as shown in the example in **Figure 2-35.** The display shows the current demodulator parameters and indicates the scan operation is paused.

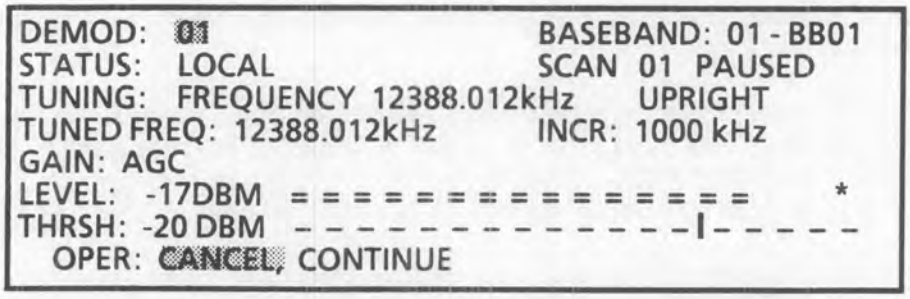


Figure 2-35. Demodulator Display, Paused Scan

2.5.5.2.5 Continuing a Paused Scan

A paused scan can be restarted by moving the cursor to the CONTINUE field and pushing the CURSOR control (**Figure 2-35**). The scan operation resumes at the next step in the scan sequence after the point at which it was paused.

Additionally, a scan operation that is stopped on a signal and held due to dwell timer operation can be continued. Again, move the cursor to the CONTINUE field and push the CURSOR control or ENTER key to resume the scan.

2.5.5.2.6 Canceling an Active Scan

An active scan operation can be stopped and canceled at any time during the sequence. Move the cursor to the CANCEL field (**Figure 2-34**) and push the CURSOR control or ENTER key. The scan is canceled and the tuning operation for the demodulator changes to the Manual Tuning version of the tuning mode that was used in the scan. For example, if the demodulator is performing a Direct Frequency Scan and the scan is canceled, the demodulator is automatically reset to the Manual Direct Frequency tuning mode.

2.5.6 BASEBAND TABLE DISPLAY (BASE BAND KEY)

Once the demodulators have been set up and are actively tuning, the Baseband Table display can be used to monitor all demodulators connected to a baseband. To view the Baseband Table display press the BASE BAND key.

Figure 2-36 is an example of a typical Baseband Table display. The display shows all demodulators that are assigned to the baseband whose number is displayed in the field located to the right of the BASEBAND field. To view the status of the demodulators connected to a different baseband, move the cursor to the baseband number field and use the EDIT control to select the baseband. The display changes to show all demodulators connected to the newly selected baseband.

The correction factor for the currently selected baseband may be adjusted in this display, if desired. Move the cursor to the numeric field located to the right of the CORR: field. Use the EDIT control or numeric entry keys to adjust the correction factor.

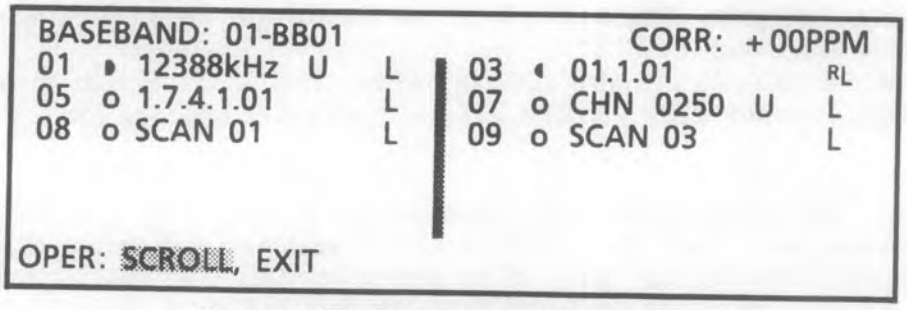


Figure 2-36. Baseband Table Display

The basic tuning parameters of the listed demodulators are displayed in the fields located to the right of the respective demodulator number. These parameters can be adjusted in this display as long as the demodulator is not actively scanning, is in remote mode or is in remote mode with local lockout.

The display shows that demodulator number 01 is currently in Manual Direct Frequency mode and tuned to a frequency of 12388 kHz. An asterisk to the left of the frequency value indicates that the signal to which the demodulator is currently tuned is above the threshold level setting.

To change the frequency setting move the cursor to the field and use the EDIT control or numeric entry keys to make the change.

The U located to the right of the frequency parameter for demodulator 01 indicates that upright frequency spectrum or that USB demodulation is selected. This is dependent upon the selection of tuning mode and the position of A43S5-5 (see **paragraph 2.2.4**). **Table 2-4** describes all possible selections. Cognizant of these settings, the U can be changed to either I, for inverted spectrum or to L, for LSB demodulation. This is done by moving the cursor to this field and using the EDIT control to change the character.

Table 2-4. A43S5-5/Tuning Selection Table

	Channel Tuning	Direct Frequency Tuning
A43S5-5 off	Upright/Invert U = Upright Spectrum I = Inverted Spectrum	Upright/Invert U = Upright Spectrum I = Inverted Spectrum
A43S5-5 on	Upright/Invert U = Upright Spectrum I = Inverted Spectrum	USB/LSB U = USB demodulation L = LSB demodulation

The L character located to the right of the spectrum character indicates the demodulator is in Local mode. The demodulator can be changed to Remote mode by moving the cursor to this field and using the EDIT control to change the character to R. The remote/local status field for demodulator 03 contains an *RL* in italics. This indicates that the demodulator is in Remote with Local Lockout mode. In this case no parameter changes for the demodulator are available.

The field located between the demodulator number field and the tuning parameter field is the headphone assignment field. The headphone assignment is indicated with either a left or right headphone character, a filled or an empty circle. A filled circle indicates the demodulator is assigned to provide audio to both the left and right PHONES jacks. An empty circle indicates the demodulator is not assigned to provide any audio to the front panel PHONES jack. The left headphone character is a filled left semicircle and is shown in the headphone assignment field for demodulator 03. The right headphone character is a filled right semicircle and is shown in the headphone assignment field for demodulator 01. These headphone assignments can be changed by moving the cursor to the field and using the EDIT control. The selection can be either no headphone assignment (empty circle) assignment (filled left semicircle), right headphone assignment (filled right semicircle), or both left and right headphone assignment (filled circle).

The Baseband Table display shows up to twelve demodulators at one time. If more demodulators are connected to the selected baseband, move the cursor to the SCROLL field and use the EDIT control to view the remaining demodulators.

The Baseband Table display can be exited by pressing another display mode key.

2.5.7 RESET FUNCTIONS

Reset functions are accessed by selecting the RESET CONTROL menu item in the Main Menu display and displaying the Reset Control menu (see **Figure 2-37**). Three reset functions are available: Reset System, Reset All Scan Setups, and Reset all Demods. These reset functions are further detailed in the following paragraphs. The RESET ALL MEMORY SETUPS menu item is reserved for further system enhancements and is not available.

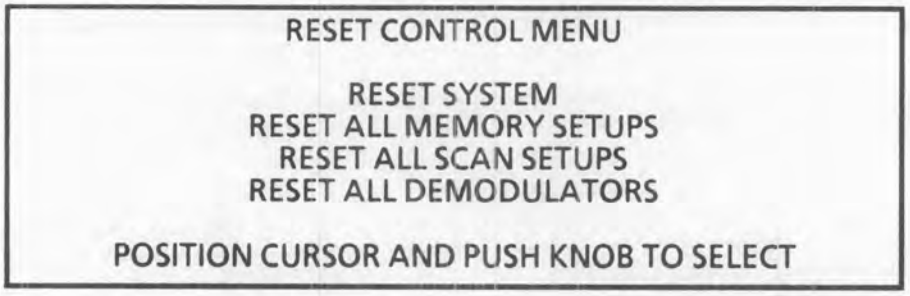


Figure 2-37. Reset Control Menu

2.5.7.1 Resetting the System

The Reset System function is used to reset all operator selectable parameters in the unit to their default values, including demodulator setups and scan setups. The Reset System Function is selected by moving the cursor in the Reset Control Menu to the RESET SYSTEM menu item and pushing the CURSOR knob or ENTER key.

A Reset Confirmation display is displayed, including two operator selectable fields : CANCEL and CONFIRM. If it is assured that resetting the system to default parameters is desired, move the cursor to the CONFIRM field and push the CURSOR knob or ENTER key to reset the system and to return the display to the Reset Control Menu.

Moving the cursor to the CANCEL field and pushing the CURSOR knob or ENTER key cancels the selected reset function and returns the display to the Reset Control Menu.

2.5.7.2 Resetting Scan Setups

The Reset All Scan Setups function is used to delete scan setups in all scan channels, returning them to the undefined state. This function is selected by moving the cursor in the Reset Control Menu to the RESET ALL SCAN SETUPS menu item and pushing the CURSOR control.

A Reset Confirmation display is displayed, including two operator selectable fields : CANCEL and CONFIRM. If it is assured that resetting all scan channels to default parameters and deleting scan setups is desired, move the cursor to the CONFIRM field and push the CURSOR knob or ENTER key to reset the scan channels and return the display to the Reset Control Menu.

Moving the cursor to the CANCEL field and pushing the CURSOR knob or ENTER key cancels the selected reset function and returns the display to the Reset Control Menu.

2.5.7.3 Resetting the Demodulators

The Reset All Demods function is used to reset the parameters for all installed demodulators to their default values. This function is selected by moving the cursor in the Reset Control Menu to the RESET ALL DEMODS menu item and pushing the CURSOR control or ENTER key.

A Reset Confirmation display is displayed, including two operator selectable fields : CANCEL and CONFIRM. If it is assured that resetting parameters for all demodulators to default values is desired, move the cursor to the CONFIRM field and push the CURSOR control or ENTER key to reset the demodulators and return the display to the Reset Control Menu.

Moving the cursor to the CANCEL field and pushing the CURSOR knob or ENTER key cancels the selected reset function and returns the display to the Reset Control Menu.

2.5.8 ERROR CODES

The WJ-9548 is capable of continuously monitoring hardware conditions and operator initiated actions. During operation, if an error occurs, an error code will be displayed on the front panel display. Error codes are divided into two categories: internal control system errors and operator errors.

Internal control system errors are those related to system hardware failures. **Table 2-5** provides a listing of the error codes. In the event of an internal control system error, the error code remains displayed on the display until cleared.

Table 2-5. WJ-9548 Internal Control System Error Codes

Error Code	System Error
0001	Dual port Semaphore Access Error
0002	Command Message Queue Overflow Error
0003	Reference Generator Unlocked
0004	State Machine Error
	A/D CONVERTER ERRORS
0005	A/D Converter #1 Error
0006	A/D Converter #2 Error
0007	A/D Converter #3 Error
0008	A/D Converter #4 Error
0009	A/D Error (reserved for future use)
	DIGITAL SIGNAL PROCESSOR ERRORS
0010	DSP #1 Error
0011	DSP #2 Error
0012	DSP #3 Error
0013	DSP #4 Error
0014	DSP Error (reserved for future use)
0015	Real Time Clock Error
0016	Front Panel Interface Error
0017	Reference Generator to FP Output Task Call Error
0018	BITE Complete to FP Output Task Call Error
0019	Reference Generator Relock Task Call Error
0020	A/D Calibration Error
	AUDIO RECONSTRUCTION OPTION ERRORS
0021	Audio Channel Request Error
0022	Audio Channel Acknowledge Error
0023	Audio Gain Request Error
0024	Audio Gain Acknowledge Error

Table 2-5. WJ-9548 Internal Control System Error Codes (Continued)

Error Code	System Error
	CEPT FORMATTER OPTION ERRORS
0025	Digital Switch Matrix failed to show busy status after instruction write.
0026	Digital Switch Matrix failed to show ready status after processing.
0027	Digital Switch Matrix incorrectly echoes written instruction.
0028	HDB3 Encoder Hardware Failure
0029	HDB3 Encoder Hardware Failure
0030	HDB3 Encoder Hardware Failure
0031	PCM Line Driver Hardware Failure
0032	HDB3 Encoder Hardware Failure
0033	PCM Line Driver Hardware Failure
0034	HDB3 Encoder or PCM Line Driver Hardware Failure
0035	Cept Formatter interrupt has been disabled due to hardware failure.
	ACTIVITY MONITOR OPTION ERRORS
0036	Activity Channel Request Error
0037	Activity Channel Acknowledge Error
0038	Activity Status Request Error
0039	Activity Status Acknowledge Error
0040	Front Panel Activity Update Error
0055	Activity Transmit Register Full
0056	Activity Not Sending
0057	Activity Command Failure
0058	Activity Not Responding
	OPTION INTERRUPT ERRORS
0041	Cept Formatter Interrupt Task Error
0042	Undefined Option Interrupt Error
0043	Front Panel CORR Tune Error
1000 - 1999	Front Panel Errors

Operator errors occur when an improper front panel action is attempted, such as using the EDIT control while the cursor is in a non-editing field. When an operator error occurs, the error code number is displayed for two seconds, then is automatically cleared. **Table 2-6** provides a listing of operator error codes.

Table 2-6. WJ-9548 Operator Error Codes

Error Code	Operator Error
000	Function key pressed when not valid.
001	ENTER key pressed when not valid
002	CLR key pressed when not valid
003	Numeric key pressed when not valid
004	Shifted function key invalid
005	ENTER key not valid for current field
006	Overflow entering a positive/negative whole number
007	Decimal in a positive/negative whole number
008	Overflow entering a positive whole number
009	Decimal or sign in a positive whole number
010	Overflow entering a negative whole number
011	Positive number entered in a negative whole number field
012	Plus sign in a negative whole number field
013	Decimal in a negative whole number field
014	Overflow on a number in a decimal number entry
015	Overflow on a decimal in a decimal number entry
016	Multiple decimals in a single decimal field
017	Sign entered in a decimal field
018	Overflow on a Date numeric entry
019	Sign entered in a data field
020	Overflow on a CCITT numeric entry
021	Sign entered in a CCITT field
022	Invalid numeric entry in non-numeric field
023	Invalid frame number entered
024	Invalid frame number entered
025	Unable to convert numeric entry to a frame number
026	Field is invalid for numeric entry
027	Demodulator numeric entry invalid
028	Unable to convert numeric entry to a demodulator
029	Frame/Demod Demodulator numeric entry invalid
030	Frame/Demod Frame numeric entry invalid
031	Unable to convert numeric entry to a frame/demodulator number
032	Frequency numeric entry invalid
033	Unable to convert numeric entry to a frequency
034	CCITT 960 Channel numeric entry invalid
035	CCITT 960 Group numeric entry invalid
036	CCITT 960 Supergroup numeric entry invalid
037	Unable to convert numeric entry to a CCITT 960 plan position
038	CCITT 2700 Channel numeric entry invalid
039	CCITT 2700 Group numeric entry invalid

Table 2-6. WJ-9548 Operator Error Codes (Continued)

Error Code	Operator Error
040	CCITT 2700 Supergroup numeric entry invalid
041	CCITT 2700 Mastergroup numeric entry invalid
042	CCITT 2700 Supermastergroup numeric entry invalid
043	Unable to convert numeric entry to a CCITT 2700 plan position
044	Channel numeric entry invalid
045	Unable to convert numeric entry to a channel number
046	Step Size numeric entry invalid
047	Unable to convert numeric entry to a frequency step size
048	Threshold level numeric entry invalid
049	Unable to convert numeric entry to a threshold level
050	MGC Level numeric entry invalid
051	Unable to convert numeric entry to a manual gain level
052	Memory Setup Number numeric entry invalid
053	Unable to convert numeric entry to a memory setup number
054	Scan Setup Number numeric entry invalid
055	Unable to convert numeric entry to scan setup number
056	Scan start frequency numeric entry invalid
057	Unable to convert numeric entry to scan start frequency
058	Scan stop frequency numeric entry invalid
059	Unable to convert numeric entry to a scan stop frequency
060	Scan start channel numeric entry invalid
061	Unable to convert numeric entry to a scan start channel number
062	Scan stop channel numeric entry invalid
063	Unable to convert numeric entry to a scan stop channel number
064	Scan pre dwell numeric entry invalid
065	Unable to convert numeric entry to a pre dwell time
066	Scan signal dwell numeric entry invalid
067	Unable to convert numeric entry to a signal dwell time
068	Scan post dwell numeric entry invalid
069	Unable to convert numeric entry to a post dwell time
070	Baseband definition number numeric entry invalid
071	Unable to convert numeric entry to a baseband definition number
072	Baseband correction numeric entry invalid
073	Unable to convert numeric entry to a baseband correction
074	Bus Address numeric entry invalid
075	Unable to convert numeric entry to a bus address
076	Minutes numeric entry invalid
077	Hours numeric entry invalid
078	Unable to convert numeric entry to a time
079	Numeric entry invalid for date field

Table 2-6. WJ-9548 Operator Error Codes (Continued)

Error Code	Operator Error
080	Edit knob invalid for current field
081	Edit knob invalid for current Help mode field
082	Edit knob invalid for the current display mode
083	Edit knob invalid for the current display field
084	Edit knob invalid for the current OPERATION field
085	Baseband number numeric entry indicates an inactive baseband
086	Invalid field type for a selection
087	Invalid display mode for a cursor annunciator selection
088	Invalid function key pressed while in Numeric entry mode
089	Invalid cursor movement for the current display mode
090	Invalid Decimal or Sign entered in a frame/demodulator field
091	Scan execution invalid due to the selected demodulator already scanning
092	Scan execution invalid due to the selected demodulator not in local status
093	CEPT Pattern numeric entry error
094	Option Assignment numeric entry invalid
095	Option Assignment numeric conversion invalid
096	Option Assignment demodulator numeric entry invalid
097	Option Assignment frame numeric entry invalid
098	Option Assignment numeric conversion invalid
099	Invalid active baseband numeric entry
100	Invalid baseband to input port baseband numeric entry
101	Invalid demodulator number on a headphone assignment
102	Invalid frame number on a headphone assignment
103	Invalid numeric entry for a headphone assignment

2.5.9 BUILT-IN-TEST OPERATION (BITE)

The Built-In-Test operation is automatically performed at power-up. It can also be initiated from the front panel if a system error is suspected. The BITE operation consists of several tests that check the operational integrity of the units internal circuitry.

To initiate the BITE operation, first select the Main Menu by pressing the MENU key. In the Main Menu move the cursor to the SELF TEST menu item and push the cursor control. The Self Test Menu is displayed (see **Figure 2-38**). If desired the Self Test Menu selection can be canceled by moving the cursor to the CANCEL field and pushing the CURSOR control. This action returns the display to the Main Menu.

To invoke the BITE operation, move the cursor to the CONFIRM field in the Self Test Menu and push the CURSOR control. After several seconds the results of the BITE operation are displayed. If the results are successful, the display appears as shown in **Figure 2-39**. If all installed modules within a major test pass, PASSED is displayed to the right of the module type.

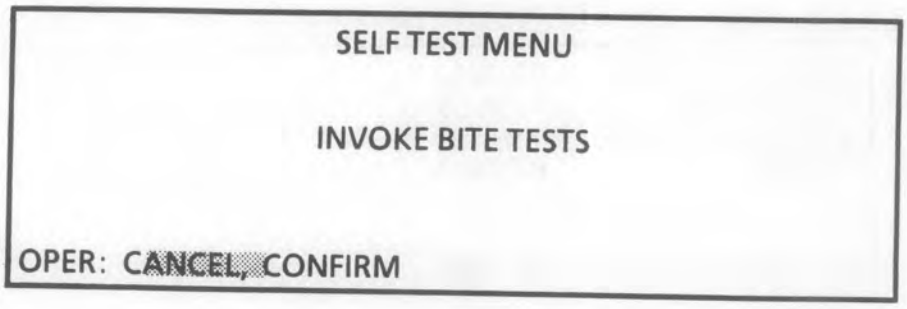


Figure 2-38. Self Test Menu

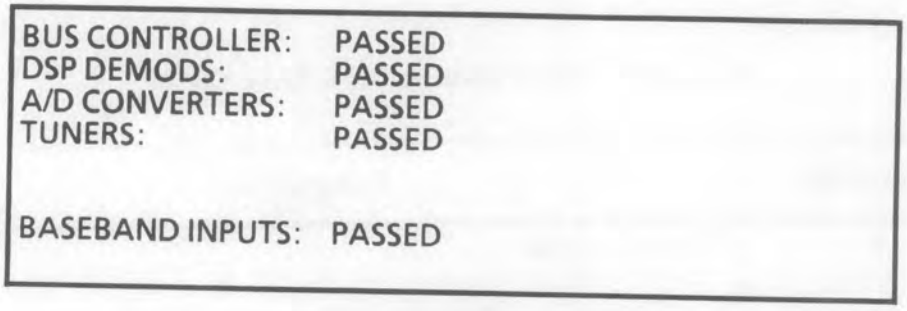


Figure 2-39. Successful BITE Routine Display

A failed test is indicated when a series of numbers are displayed beside the module type. **Figure 2-40** shows an example of a BITE result in which the A/D CONVERTERS test has failed. The numbers indicate the A/D Converter numbers and their own test result number separated by a hyphen. If any one of installed modules within the module type has failed, all other like modules will be listed including their test result.

Figure 2-40 shows that four A/D Converters are installed and were tested. If an asterisk (*) is displayed beside the module number, this means that the module is not installed. If a question mark character (?) is displayed beside the number, this means that the module could not be tested due to a failure of a module that is required to perform the test. If a zero (0) is displayed beside the number, this means that the module has passed. Any other number(s) displayed beside the module number represents an error condition for the associated module. **Table 2-7** thru **2-11** lists the error codes for the Bus Controller Assembly (A4), DSP Demodulator Assemblies (A5-A8), A/D Converter Assemblies (A9-A12), Tuner Assemblies (A13-A36), and Baseband Input Assemblies (A38, A39), respectively, and provide a brief description for each error code.

```
BUS CONTROLLER:    PASSED
DSP DEMODS:        PASSED
A/D CONVERTERS:    1-0, 2-0, 3-2, 4-0
TUNERS:            PASSED

BASEBAND INPUTS:   PASSED
```

Figure 2-40. Example of Unsuccessful BITE Results

Table 2-7. Bus Controller BITE Error Codes

Error Code	Description
0	Module passed.
1	Bus Controller signature analysis test failed.
2	Left headphone circuitry test failed.
3	Bus Controller signature analysis and left headphone circuitry tests failed.
4	Right headphone circuitry test failed.
5	Bus Controller signature analysis and and right headphone circuitry tests failed.
6	Both left and right headphone circuitry tests failed.
7	Bus Controller signature analysis and both left and right headphone circuitry tests failed.
*	Module not installed.
?	Could not be tested due to a failure in another module.

Table 2-8. DSP Demodulator BITE Error Codes

Error Code	Description
0	Module passed.
1	DSP BITE execution error.
2	DSP BITE Done error.
3	X Data failure.
4	Y Data failure.
5	X Address failure.
6	Y Address failure.
7	8k IRQ Fast.
8	8k IRQ Slow.
9	FIFO Data In.
10	FIFO Sync Fail.
11	FIFO Frame Fail.
12	Signature analysis test failure.
13	Signature analysis test done error.
14	A/D calibration error.
15	DSP Bus Controller error.
*	Module not installed.
?	Could not be tested due to a failure in another module.

Table 2-9. A/D Converter BITE Error Codes

Error Code	Description
0	Module passed.
1	BITE calibration error.
2	A/D path error.
3	Utility monitor error.
4	Utility monitor done error.
5	A/D DSP BITE error.
6	A/D Bus Controller error.
*	Module not installed.
?	Could not be tested due to a failure in another module.

Table 2-10. Tuner BITE Error Codes

Error Code	Description
0	Module passed.
1	Tuner path error.
2	Tuner A/D BITE error.
3	Tuner DSP BITE error.
4	Tuner Bus Controller.
*	Module not installed.
?	Could not be tested due to a failure in another module.

Table 2-11. Baseband Inputs (BBND) BITE Error Codes

Error Code	Description
0	Module passed.
1	Module failed.
*	Module not installed.

2.6 REMOTE OPERATION

The WJ-9548 Digital FDM Demultiplexer interfaces with an external controller using a standard IEEE-488.2-1987 remote interface. This interface provides both talk and listen capabilities between the WJ-9548 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 information is transferred between the two devices using the eight data bus lines (DIO1-DIO8). The data byte transfer lines (NRFD, NDAC, and DAV) indicate the availability and validity of the information on the data bus lines, the readiness of the listening device to accept data, and that the data has or has not been accepted. The interface management lines (IFC, ATN, SRQ, REN, and EOI) specify if the data bus is carrying data or address information, request service, clear the interface, and indicate the end of a transfer sequence. Refer to **Figure 2-41** for the pin configuration of the standard IEEE-488 interface connector.

Figure 2-41. IEEE-488 Interface Connector

As implemented on the WJ-9548, the capabilities of the IEEE-488 interface include:

SH1	Source Handshake
AH1	Acceptor Handshake
T6	Basic Talker with Serial Poll
L4	Basic Listener
SR1	Service Request
DC1	Device Clear
RL2	No Remote Local Capability
PP0	No Parallel Poll
DT0	No Device Trigger
C0	No Controller Capability
E2	Tristate Drivers

This means that the unit can talk or listen when commanded by a controller. The unit can also request an SRQ from a controller and reply to controller's serial poll. The condition of the Remote Enable (REN) bus signal line has no effect on the unit. The unit is also capable of responding to SDC (selected device clear) and DCL (universal device clear).

2.6.1 COMMAND MESSAGE FORMAT

Command messages are exclusively ASCII-encoded data. Command headers consist of three-character mnemonics (see **paragraph 2.6.5, 2.6.6,** and **2.6.7**). "Common" commands are prefixed with the "*" character. All queries are suffixed with the "?" character. Also, all command arguments are in the "forgiving" numerical representation form. Multiple commands which are sent to the WJ-9548 must be separated with a semicolon (;) character. In addition, multiple arguments of a single commands must be delimited with commas.

Messages may be terminated with any of the following combination of characters:

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

Note that CR is essentially ignored, and termination is confirmed on the receipt of a LF and/or EOI.

2.6.1.1 Message Processing

When the WJ-9548 receives a message, it is stored in the input buffer until a valid message termination is received. Then, the message is parsed and executed. Additional input data cannot be received until the execution of the message is finished.

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 and the rest of the message is not processed.

2.6.1.2 Query Response Format

A fixed field is used for query responses. Query responses begin with the mnemonic in uppercase characters, followed by a numerical or string 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 to multiple command queries are linked together in a series in the output buffer and delimited by semicolons. All output message terminations consist of a CR (carriage return) and a LF (line feed) with an EOI sequence.

2.6.1.3 I/O Buffer Control

The DCL (device clear) and SDC (selective device clear) bus commands and power-on are functionally similar in that all three clear both the input and output buffers. No other condition or action clears the input buffer. A query error is generated if the contents of the output buffer are discarded for any other reason.

Buffer sizing is based on the maximum reasonable message length, taking into consideration that the size of the input and output buffers are 1024 bytes each. If the input buffer becomes full, an execution error is set in the Event Status Register and the input buffer is cleared.

Detection of any invalid input command or data halts the execution of an input message, resets the input buffer and sets the appropriate error flag in the Event Status Register. Output buffer overflow causes the buffer to reset and the query error flag to be set in the Event Status Register.

2.6.2 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 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.

If the unit receives a nrf of a precision greater than it can handle, it will round the number rather than truncate it. When rounding, the unit ignores the sign of the number and rounds up on values greater than or equal to one half. It rounds down on values less than one half.

str - alphanumeric label

The data elements in this representation consists of alpha-numeric data prefixed and suffixed by a pair of single quotation marks. Valid alphanumeric data consists of the following characters:

0123456789. ABCDEFGHIJKLMNOPQRSTUVWXYZ

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.

2.6.3 HANDLING OF COMMUNICATIONS ERRORS

The WJ-9548 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 is generated when the data sent with the mnemonic is outside the range or acceptable format. A query error is generated when the output buffer overflows or its contents 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 a service request (SRQ) when enabled. The actual cause of the error may be determined by reading the contents of the Event Status Register. See **paragraph 2.6.9** for details on WJ-9548 status reporting and reading the contents of the status registers.

2.6.4 MESSAGE CATEGORIES

The commands and queries used for remote operation of the WJ-9548 are contained in two main categories: Communication Messages and Device Messages.

Communication Messages are commands and queries that are used to establish and monitor communications between the WJ-9548 and the remote controller, and other functions not directly related to the tactical operation of the unit. See **paragraph 2.6.5** for more details on the Communication Messages.

Device Messages are commands and queries that affect the operational parameters of the unit. Device Messages are further divided into two subcategories: Frame Device Messages and Demodulator Device Messages.

Frame Device Messages affect parameters of the unit not directly related to the parameters of any specified demodulator. Examples of Frame Device Messages are the command used to set a baseband correction factor and the command used to set the time. See **paragraph 2.6.6** for more details on Frame Device Messages.

Demodulator Device Messages are those that affect the parameters of a specified demodulator such as tuning mode, gain mode, etc. Refer to **paragraph 2.6.7** for more details on the use of these messages.

2.6.5 COMMUNICATION MESSAGES

Table 2-12 lists the Communication Messages that are used to establish communications protocol between the WJ-9548 and the remote controller. These commands do not directly affect the user operation of the unit and are, therefore, independent of all device modes and are valid in any operating state.

Table 2-12. Communication Messages

Command	Response	Description
RMU nrf		Selects the frame or a demodulator to be accessed by subsequent messages. Range: 0 to 24 Where RMU 0 is used to to indicate Frame Device messages and 1 to 24 indicates Demodulator Device messages (see **paragraph 2.6.5.1**).
*IDN?	*IDN WJ, 9548, 0, 1.00	Request manufacturer, model number, serial number (always 0) and software release level.

Table 2-12. Communication Messages (Continued)

Command	Response	Description
*OPC		Set service request upon completion of execution of the input buffer.
*OPC?	*OPC 1	Return the response upon completion of execution of the input buffer.
*CLS		Clear all events summarized in the status byte, except the output queue.
*STB?	*STB nr1	Request status byte (see **paragraph 2.6.9.1**). Range: 000 to 255 Response example: *STB 128
*SRE nrf		Set Service Request Enable Register. Range: 000 to 255 The appropriate bit(s) of this register must be set to generate an SRQ interrupt via the RQS bit. Bit — Function 0 Not Used 1 Not Used 2 Not Used 3 Not Used 4 Enable MAV interrupt 5 Enable ESB interrupt 6 Not Used 7 ASB interrupt
*SRE?	*SRE nr1	Request Service Request Enable Register. Response example: *SRE 080 Default value: 000
*ESR?	*ESR nr1	Request Event Status Register (see **paragraph 2.6.9.2**). Range: 000 to 255 Response example: *ESR 136
*ESE nrf		Set Event Status Enable Register. Range: 000 to 255
*ESE?	*ESE nr1	Request Event Status Enable Register. Response example: *ESE 253 Default value: 000

Table 2-12. Communication Messages (Continued)

Command	Response	Description
ASR?	ASR nr1, nr1	Request Activity Summary Register Contents (see **paragraph 2.6.9.3**). Range: 00000 to 65535 Response example: ASR 00000, 00128
ASE nrf, nrf		Set Activity Summary Enable Register. Range: 00000 to 65535
ASE?	ASE nr1, nr1	Request Activity Summary Enable Register. Response example: ASE 00128, 00000 Default value: 00000, 00000
URR?	URR nr1, nr1	Request Contents of User Request Summary Register (see **paragraph 2.6.9.4**). Range: 00000 to 65535 Response example: URR 00000, 00128
URE nrf, nrf		Set User Request Enable Register. Range: 00000 to 65535
URE?	URE nr1, nr1	Request User Request Enable Register. Response example: URE 00128, 00064 Default value: 00000, 00000
ERR?	ERR nr1, nr1	Request Error Summary Register Contents (see **paragraph 2.6.9.5**). Range: 00000 to 65535 Response example: ERR 32768, 00002
ERE nrf, nrf		Set Error Summary Enable Register. Range: 00000 to 65535 Response example: ERE 32768, 00255
ERE?	ERE nr1, nr1	Request Error Summary Enable Register. Range: 00000 to 65535 Response example: ERE 32767, 00255 Default value: 00000, 00000
CDE?	CDE nr1	Request the current Device-Dependent Error Register contents. The response is a bit-mapped 16-bit word indicating current error conditions. See **paragraph 2.6.9.5** for the bit evaluations. Reading the contents of the register has no effect on it.
*WAI		Wait-to-Continue command. Wait until preceding commands in the input buffer have been executed before processing the remaining buffer.

Table 2-12. Communication Messages (Continued)

Command	Response	Description
HER?	HER nr1	Request the latched error status. The response is a bit-mapped 16-bit word indicating the error conditions that have occurred since the last reading of the Device-Dependent Error Register. See **paragraph 2.6.9.5** for the bit evaluations. Reading the register clears it until the error condition is corrected and reappears, or upon a new power-up.
*TST?	*TST nr1	Request the status of the Built-In-Test (BITE) tests. The response is a bit-mapped 16-bit word indicating the success or failure of the tests. See **paragraph 2.6.8** for more details on BITE operation.
*OPT?	*OPT nr1,nr1,nr1,nr1	Request installed options in slot order. This query returns four 2-digit numeric arguments which represent the option(s) installed in slot order. Range: 00 to 99 Argument — Description 00 — No option installed 01 — Single CEPT Formatter 02 — T1 Formatter 03-04 — Reserved 05 — Audio Reconstruction (6 channels) 06 — Audio Reconstruction (12 channels) 07 — Audio Reconstruction (24 channels) 08-09 — Reserved 10 — Activity Monitor 11-14 — Reserved 15 — Single RS-232 Interface 16-19 — Reserved 20 — Flexible Demodulator (/FLX) 21 — Flexible Demodulator (/FLX-1)
OPS nrf		Select the option slot number for configuration changes. See **paragraph 2.6.5.2.** Range: 1 to 4
OPS?	OPS nr1	Request the current selected option slot number. Response example: OPS 1;Reset value: 1

2.6.5.1 Directing Device Messages (RMU Command)

The RMU command is used to direct WJ-9548 device messages to the appropriate destination. All Frame Device messages are directed with RMU 0. Demodulator Device messages should be preceded by an RMU X command, where X is the number of the demodulator from 1 to 24.

After a device message is accepted, the RMU value is automatically reset to 0. Therefore, the only time a Frame Device message has to be preceded by RMU 0 is when the Frame Device message follows a Demodulator Device message in the same string.

2.6.5.2 Selecting Options for Control

Before demodulators can be selected to interact with the various options, the option must first be selected. The OPS command and argument is used to select options slots 2, 3, or 4. This command must always precede, on the same program line, any CEPT option command intended for slots 2, 3, or 4. If a slot number is not specified on the program line, the WJ-9548 directs the command to the option in slot 1. Each remote command on the program line should be delimited with a semicolon. Before selecting the option, it can first be determined in which of the four option slots the CEPT Formatter option is located (*OPT?). Then send the OPS command with an argument of 2, 3, or 4 (as determined by option slot location) followed by a semicolon and the rest of the program line. Subsequent to processing a command line, the WJ-9548 returns to its control of slot 1. See **Table 2-12** for more information on the *OPT? query.

2.6.6 OPERATIONS CONTROLLED BY FRAME DEVICE MESSAGES

Table 2-13 lists all WJ-9548 Frame Device messages. Frame Device Messages affect unit parameters not directly related to any specified demodulator. These unit parameters affected by these commands and queries and their role in the operation of the unit are further described in the following paragraphs.

Table 2-13. Frame Device Messages

Command	Response	Description
CTL nrf		Set the control mode for the frame. See **paragraph 2.6.6.1.** nr1 Control Mode 0 Local 1 Remote 2 Remote/Local Lockout
CTL?	CTL nr1	Request Control Mode. Response example: CTL1 Default value: 0

Table 2-13. Frame Device Messages (Continued)

Command	Response	Description
FIR nrf		Enable or disable forced internal reference where 0 is disabled and 1 is enabled. Enabling forced internal reference causes the unit to ignore the external reference and to use its internally generated 10 MHz reference as its time base. See **paragraph 2.6.6.3.**
FIR?	FIR nr1	Request the status of the forced internal reference. Range: 0 to 1 Response example: FIR 0 Reset value: 0
INP?	INP?	Request the bit mapped representation for the number of input ports installed in the frame. Range: 000 to 255 Response example: INP 015 Bit — Input Number 0 — Input port 1 (BB1-J8) 1 — Input port 2 (BB2-J10) 2 — Input port 3 (BB3-J12) 3 — Input port 4 (BB4-J14) 4-7 — Reserved
BBN nrf		Select a baseband number to be accessed by subsequent messages for configuration operations. See **paragraph 2.6.6.2.** Range: 0 to 32
BBN?	BBN nr1	Request the current selected baseband number. Response example: BBN 2 Reset value: 0
BBI nrf		Assign the selected baseband number to the physical input port specified by nrf. See **paragraph 2.6.6.2.1.** Range: 1 to 4
BBI?	BBI nr1	Request input configuration for the selected baseband number. Response example: BBI 4 Reset value = 1

Table 2-13. Frame Device Messages (Continued)

Command	Response	Description
BBD?	BBD nr1, nr1, etc...	Request frame and demodulator channel numbers assigned to the selected baseband. Range, frame: 0 to 8 Range, demodulator channel: 01 to 24 Response example: BBD 0.01, 0.03, 0.05, 0.07, 0.09
BBL str		Assign the baseband label to the selected baseband number. See **paragraph 2.6.6.2.2.** Range: up to 8 characters
BBL?	BBL str	Request label assignment for selected baseband. Response example: BBL 'NORTH' Reset value = 'BBn' where n is the corresponding baseband number
BBC nrf		Set the baseband correction factor in parts-per-million (PPM) for selected baseband number. See **paragraph 2.6.6.2.3.** Range: -50 to +50
BBC?	BBC nr1	Request baseband correction factor for the selected baseband number. Response example: BBC -24 Returns BBC-99 if the baseband is not associated with an input port. Reset value: +00
BBP?	BBP nr1	Request the power level in dBm of the selected baseband number. See **paragraph 2.6.6.2.4.** Range: +08 to -30 Response example: BBP -20
LBB?	LBB nr1, nr1, str	Request the selected baseband number and its correction factor and label. Response example: LBB 01, +50, 'SOUTH'
ADM?	ADM nr1	Request the number of demodulator channels installed in the frame. Range: 00 to 24 Response example: ADM 24

Table 2-13. Frame Device Messages (Continued)

Command	Response	Description
FRM?	FRM nr1	Request the frame number. Range: 0 to 8; Response example: FRM 8
HPL nrf, nrf		Set left headphone channel to specified frame and demodulator channel numbers respectively. See **paragraph 2.6.6.4.** Range, frame: 0 to 8 Range, demod: 00 to 24 Where: 0,00 turns off the left headphone channel
HPL?	HPL nr1, nr1	Request frame and demodulator channel number providing audio to the left headphone channel. Response example: HPL 1,07 Reset value: 0,00
HPR nrf, nrf		Set right headphone channel to specified frame and demodulator channel numbers respectively. See **paragraph 2.6.6.4.** Range, frame: 0 to 8 Range, demod: 00 to 24 Where: 0,00 turns off the right headphone channel
HPR?	HPR nr1, nr1	Request frame and demodulator channel number providing audio to the right headphone channel. Response example: HPR 1,07 Reset value: 0,00
*LRN?	RMU 0; HPL nr1,nr1; HPR nr1,nr1; FIR nr1; DAT mm,dd,yy; TIM hh,mm,ss; CTL nr1	Request current frame operating parameters. Response example: HPL 0,02; HPR 0,03; FIR 1; DAT 01,23,88; TIM 13,01,15
*RST		Reset Frame Device parameters to reset values as listed in this table.
REF?	REF nr1	Request the reference generator source. See **paragraph 2.6.6.4.** Response value will be one of the following: nr1 Source 0 internal 10 MHz 1 external 1 MHz 2 external 2 MHz 3 external 5 MHz 4 external 10 MHz Response example: REF 1; Reset value: 0

2.6.6.1 Placing the Frame in Remote Mode

Before any Frame Device commands may be accepted, the frame must be placed into remote mode. Sending RMU 0;CTL 1 sets the frame into remote mode. Sending RMU 0;CTL 2 places the frame into remote mode with local lockout. In this mode, the front panel is essentially disabled whereas the frame cannot be placed back into local control from the front panel. RMU 0;CTL 0 places the frame back into local mode. Any Frame Device commands that are sent while the frame is in local mode (except CTL) generates an execution error. However, Frame Device queries may be issued in any of the control modes. The current control mode of the frame can be requested with the CTL? query.

2.6.6.2 Baseband Setup

Thirty-three baseband numbers are available for use during operations (Baseband #0 - Baseband #32). Prior to performing any tuning operations a baseband setup procedure is performed for each baseband number consisting of the following:

- Assign the baseband number to one of the four physical baseband input ports
- Assign a descriptive label to the baseband number
- Enter a PPM correction factor for the baseband number

Prior to performing any of the above setups, the baseband number must be selected for configuration changes. The BBN command and operand is used to select the baseband number. BBN 1 selects baseband #1, BBN 2 selects baseband #2, and so on. The current baseband number selected for configuration changes can be requested with the BBN? query. Once the baseband number is selected, the setups in the following paragraphs may be performed.

Baseband 0 is a null baseband. This is provided so a demodulator can be disconnected from all baseband inputs, if desired. After a device message is accepted, the BBN value is automatically reset to 0.

2.6.6.2.1 Assigning a Baseband Number to a Baseband Input

The selected baseband number can be assigned to any of the four available baseband input signals connected to the WJ-9548 rear panel connectors. This setup is defaulted so that Baseband #1 is assigned to the baseband input connected to rear panel connector J8 (BB1 IN), Baseband #2 is assigned to J10 (BB2 IN), Baseband #3 is assigned to J12 (BB3 IN), and Baseband #4 is assigned to J14 (BB4 IN).

This baseband number-to-baseband input assignment can be changed with the BBI command. BBI 1 assigns the selected baseband number to the baseband input at J8 (BB1 IN), BBI 2 assigns the baseband number to the baseband input at J10 (BB2 IN), etc. The baseband number-to-baseband input assignment for the selected baseband number can be requested with the BBI? query.

2.6.6.2.2 Assigning a Label to a Baseband Number

A descriptive label may be assigned to the selected baseband number, if desired, which can be used for further definition between the baseband numbers. The BBL command and argument is used to enter the label. The label may consist of a combination of up to eight of the following alphanumeric characters:

0123456789. ABCDEFGHIJKLMNOPQRSTUVWXYZ

Labels such as NORTH 1, NORTH 2, SOUTH, etc., can be used. The label assignment for the selected baseband number can be requested with the BBI? query. The response baseband label is delimited with single quotation marks and are left justified including spaces to occupy the full eight characters.

2.6.6.2.3 Entering a Correction Factor for the Baseband

A baseband correction factor adjustment is provided which is used to correct for frequency offsets between the transmitting device and the WJ-9548.

The correction factor is set in parts-per-million (PPM) of the tuned frequency (or 1 Hz per 1 MHz) at a range from -50 to +50 PPM. For example, if a demodulator is instructed to tune at 20.000000 MHz and is connected to a baseband number that has a correction factor setting of +50 PPM, the actual tuned frequency of the demodulator will be 20.001000 MHz.

The BBC command is used to enter the correction factor for the selected baseband number. Any correction factor in the range of -50 to +50 PPM may be entered. The value of the correction factor for the selected baseband number may be requested by the BBC? query.

2.6.6.2.4 Monitoring the Power Level of the Baseband

The power level of the selected baseband number may be monitored by using the BBP? query. The response operand will represent a range from +08 to -30 dBm. Due to the limited range of the baseband power level monitoring circuitry, power levels outside this range will cause a power indication equal to one of the limits.

2.6.6.3 Timebase Reference Frequency

The WJ-9548 accepts 1, 2, 5, or 10 MHz external reference frequencies to be used as its timebase. If the unit finds that the external reference is unstable or out of its capture range, it automatically switches to its internally generated 10 MHz reference. The reference generator source on which the unit is currently locked is requested with the REF? query. The response operand will be any digit from 0 to 4, where 0 = internal 10 MHz, 1 = external 1 MHz, 2 = external 2 MHz, 3 = external 5 MHz, and 4 = external 10 MHz.

If desired, the unit may be commanded to disregard the external reference and lock onto its internal 10 MHz reference by using the FIR command (forced internal reference). The command operand may be either a 0 or a 1: 0 to disable forced internal reference, 1 to enable forced internal reference. The status of the forced internal reference setting may be requested by the FIR? query.

2.6.6.4 Selecting the Sources for the Headphones Audio

The front panel PHONES jack (J2) can provide separate left and right channels of audio. One demodulator may be assigned to provide the audio for the left headphone channel while a second demodulator may be assigned to provide the audio for the right. Or one demodulator may be assigned to provide the audio to both left and right headphone channels.

If the currently controlled WJ-9548 is in a "Stacked" configuration and is connected to other WJ-9548's via the TDM bus, it may assign demodulators in other frames of the bus to provide the audio to its PHONES jack.

The HPL command and argument is used to assign a demodulator to provide the audio for the left headphone channel. The argument consists of one digit, a comma, and two digits. The first digit is used to select the frame where the targeted demodulator is located (0 - 8). The last two digits are used to select the demodulator (0 - 24). The left headphones audio channel can also be turned off by entering HPL 0,00 (no frame or demodulator selected). The current demodulator providing the audio to the left headphones channel can be requested with the HPL? command. The response contains the frame number and demodulator number.

The same procedure is used to select the source for the right headphones audio channel except the HPR command is used. The current frame and demodulator providing the audio to the right headphones channel can be requested with the HPR? query.

2.6.7 OPERATIONS CONTROLLED BY DEMODULATOR DEVICE MESSAGES

Table 2-14 lists all WJ-9548 Demodulator Device messages. The parameters affected by these commands and queries and their role in the operation of the unit are further described in the following paragraphs. As previously discussed in **paragraph 2.6.5.1**, all messages listed in **Table 2-14** must be preceded by an RMU X command, where X is the demodulator for which the message is to be directed.

Table 2-14. Demodulator Device Messages

Command	Response	Description
CTL nrf		Set the control mode for the demodulator. nrf — Operating Mode 0 — Local 1 — Remote 2 — Remote/Local Lockout
CTL?	CTL nr1	Request Control Mode. Response Example: CTL 1 Default value: 0
DBB nrf		Connect demodulator to baseband number specified by nrf. Range: 0 to 32, where 0 represents no connection (null baseband).
DBB?	DBB nr1	Request demodulator to baseband number connection. Response example: DBB 02 Reset value: 0 (null baseband)
OPR nrf		Set the operating mode. See **paragraph 2.6.7.3.** nrf — Operating Mode 0 — Manual operation 1 — Scan operation
OPR?	OPR nr1	Request the current operating mode. Response example: OPR 1 Reset value: 0

Table 2-14. Demodulator Device Messages (Continued)

Command	Response	Description
TNM nrf		Set the Manual operation tuning mode. nrf Tuning Mode 0 Direct Frequency tuning 1 CCITT 960 Plan tuning 2 CCITT 2700 Plan tuning 3 Channel Tuning
TNM?	TNM nr1	Request the tuning mode. Response example: TNM 3 Reset value: 0
FRQ nrf		Set frequency in MHz for the Direct Frequency Tuning mode. Range: 00.000000 to 20.000000
FRQ?	FRQ nr2	Request direct frequency in MHz. Response example: FRQ 10.004124 Reset value: 00.100000
SPD nrf		Set frequency spectrum for Direct Frequency Tuning mode. nrf Frequency Spectrum 0 upright 1 inverted 3 upper sideband 4 lower sideband 0 and 1 arguments are valid when upright/inverted convention selected by A43S5-5; 3 and 4 arguments are only valid when USB/LSB convention selection. See **paragraph 2.2.4.**
SPD?	SPD nr1	Request direct frequency spectrum. Response example: SPD 1 Reset value: 0
CHN nrf		Set channel number for the Channel Tuning mode. Range: 0000 to 5000
CHN?	CHN nr1	Request channel number. Response example: CHN 4750 Reset value: 0250

Table 2-14. Demodulator Device Messages (Continued)

Command	Response	Description
SPC nrf		Set channel spectrum for Channel Tuning mode. nrf Channel Spectrum 0 upright 1 inverted
SPC?	SPC nr1	Request channel spectrum. Response example: SPC 1 Reset value: 0
CTA nrf,nrf,nrf		Set CCITT 960 Plan Supergroup (SG), Group (GP), and Channel (CH). See **paragraph 2.6.7.4.3.** Range: SG 01 to 16, GP 1 to 5, CH 01 to 12.
CTA?	CTA nr1,nr1,nr1	Request CCITT 960 Plan. Response example: CTA 01,3,05 Reset value: 01,1,01
CTB nrf,nrf,nrf, nrf, nrf		Set CCITT 2700 Plan Supermastergroup (SMG), Mastergroup (MG), Supergroup (SG), Group (GP), and Channel (CH). See **paragraph 2.6.7.4.4.** Range: SMG 1 to 3, MG 7 to 9, SG 4 to 8, GP 1 to 5, CH 01 to 12.
CTB?	CTB nr1,nr1,nr1,nr1,nr1	Request CCITT 2700 Plan. Response example: CTB 1,7,4,1,12 Reset value: 1,7,4,1,01
TUN?	TUN nr2,nr2,nr1	Request actual tuned frequency, nominal tuned frequency, and spectrum (0= upright, 1= inverted). Response example: TUN 12.000075,12.000100,0
AGC nrf		Set Gain control mode. nrf Gain Control Mode 0 Manual 1 Automatic
AGC?	AGC nr1	Request Gain control mode. Response example: AGC 1 Reset value: 1

Table 2-14. Demodulator Device Messages (Continued)

Command	Response	Description
RFG nrf		Set Manual Gain level in dB. Range: 00 to 36
RFG?	RFG nr1	Request Manual Gain level setting. Response example: RFG 24 Reset value: 00
THR nrf		Set Signal Threshold level in dBm. Range: -90 to 00
THR?	THR nr1	Request Signal Threshold level setting. Response example: THR -65 Reset value: 00
SGV?	SGV nr1,nr1	Request signal values. Response arguments are signal strength and signal activity. Signal activity is 0 or 1 (0 = signal below threshold, 1 = signal above threshold) Response example: SGV -65,0
SCF nrf, (freq. specifier)		Set up a scan configuration for the demodulator, where nrf represents the scan tune mode as listed below: nrf — Scan Mode 0 — Direct Frequency 1 — 960 Group 2 — 960 Supergroup 3 — 2700 Group 4 — 2700 Supergroup 5 — 2700 Mastergroup 6 — 2700 Supermastergroup 7 — Channel The frequency specifier arguments are dependent on the scan mode selected by nrf. See the appropriate discussion on the scan mode selected (**paragraphs 2.6.7.8.1** thru **2.6.7.8.4**) for the frequency specifier definitions.
SCF?	SCF nr1, (freq. specifier)	Request the demodulator scan configuration, where nr1 in the response is the scan tune mode and the remaining arguments are the frequency specifier.

Table 2-14. Demodulator Device Messages (Continued)

Command	Response	Description
PDW nrf		Set Scan Pre Dwell timer in msec. See **paragraph 2.6.7.8.6.1.** Range: +0050 to +9975, in 25 msec steps. Where: -1 sets infinite Pre Dwell
PDW?	PDW nr1	Request Scan Pre Dwell timer. Response example: PDW +0100 Reset value: +0100
SDW nrf		Set Scan Signal Dwell timer in Sec. See **paragraph 2.6.7.8.6.2.** Range: +000 to +600 Where: -1 sets infinite Signal Dwell
SDW?	SDW nr1	Request Scan Signal Dwell timer. Response example: SDW -1 Reset value: +000
LDW nrf		Set Scan Post Lost Dwell timer in Sec. See **paragraph 2.6.7.8.6.3.** Range: +000 to +200 Where: -1 sets infinite Post Lost Dwell.
LDW?	LDW nr1	Request Scan Post Lost Dwell timer. Response example: LDW -1 Reset value: +000
DWS?	DWS nr1	Request current dwell status. nr1 Dwell Status 0 None of the dwell states are active (the demod is either in Manual operation or suspended). 1 Pre Dwell active 2 Signal Dwell active 3 Post Lost Dwell active Response example: DWS 1 Reset value: 0

Table 2-14. Demodulator Device Messages (Continued)

Command	Response	Description
SUS		Suspend the Scan operation. See **paragraph 2.6.7.8.5.** This command causes the Scan condition to be placed in the suspended state. While suspended, frequency, spectrum, gain mode/level, and threshold level may be modified. The gain and threshold modifications will be maintained when the Scan operation is continued (see ENA command).
ENA		Enable suspended Scan. See **paragraph 2.6.7.8.5.** This command causes a suspended scan operation to be restored to active. This command has no effect if the scan status is not suspended. When the operation is continued, it will be from the original suspended frequency plus the next step. Any frequency modification performed while suspended will have no effect when the operation is continued.
SAC nrf		Set the Suspend Action Control (SAC) register. Scan operation may be set to suspend automatically at the end of a single pass, or may be set to continuously repeat. See **paragraph 2.6.7.8.5.** nrf — SAC Operation 000 — Continuously repeat Scan 128 — Suspend on end of single pass
SAC?	SAC nr1	Request the current Suspend Action Control register value. Range: 000 to 255 Response example: SAC 128 Default value: 000
ADV		Advance to next step in the scan sequence if the scan is active. See **paragraph 2.6.7.8.6.**

Table 2-14. Demodulator Device Messages (Continued)

Command	Response	Description
SCS?	SCS nr1	Request Scan status. nr1 Scan Status 0 Scan off 1 Scan active 2 Scan suspended Response example: SCS 0
DAC?	DAC nr1	Request latched contents of Demodulator Activity Status register. Range: 000 to 255 Response example: DAC 001 See the Demod Activity Status register discussion for bit definitions.
DAE nrf DAE?	 DAE nr1	Set Demod Activity Enable register. See the discussion of the Demod Activity Status register for bit mapping. Range: 000 to 255 Request Demod Activity Enable register Range: 000 to 255 Response example: DAE 255 Default value = 000
*LRN?	See **paragraph 2.6.7.9** for responses.	Request current demodulator operating parameters. See **paragraph 2.6.7.9.**
*RST		Reset Demodulator Device parameters to reset values as listed in this table.

2.6.7.1 Placing a Demodulator in Remote Mode

Before any Demodulator Device commands can be accepted, the targeted demodulator must first be placed into remote mode. Sending RMU X;CTL 1 places the demodulator into remote mode (where X is the target demodulator number from 1 to 24). Sending RMU X;CTL 2 places the demodulator into remote mode with local lockout. In this mode, the demodulator cannot be placed back into local mode via the front panel. RMU X;CTL 0 places the demodulator back into local mode. Any Demodulator Device commands that are sent while the targeted demodulator is in local mode (except CTL) generates an execution error. However, Demodulator Device queries may be issued in any of the control modes. The current control mode of a demodulator can be requested with the CTL? query.

It should be noted that a demodulator may be set to any control mode, regardless of the control mode setting of the frame. This means that a demodulator may be controlled remotely while the frame is in local or a demodulator may be controlled locally while the frame is in remote, and so on.

2.6.7.2 Connecting a Demodulator to a Baseband Input

The demodulator may be directed to monitor any of the 32 baseband numbers. The DBB command is used to connect the demodulator to the baseband. DBB 1 provides connection to Baseband #1 while DBB 2 provides connection to Baseband #2, and so on. If desired the demodulator may be disconnected from all basebands by using DBB 0 (null baseband). The DBB? query is used to determine the baseband number connection for the selected demodulator.

2.6.7.3 Selecting an Operating Mode

The OPR command is used to select a demodulator operating mode. Sending OPR 0 selects the manual operating mode. Sending OPR 1 selects the scan operating mode.

Sending the OPR command initiates the operation. Prior to initiating any scan operation (OPR 1), the applicable scan operation parameters must be previously set. See **paragraph 2.6.7.8** for details on Scan operations and setups.

The current operation for the selected demodulator may be verified with the OPR? query.

2.6.7.4 Manual Operations

When a demodulator is in Manual operation, the TNM command is used to select a tuning mode. Four tuning modes may be selected with the TNM command and operand as follows:

- TNM 0 - Direct Frequency Tuning
- TNM 1 - CCITT 960 Plan Tuning
- TNM 2 - CCITT 2700 Plan Tuning
- TNM 3 - Channel Tuning

While in Manual operation, parameter changes such as tuning mode, tuned frequency, threshold level, etc., are acted upon as soon as they are received.

The current tuning mode may be verified with the TNM? query.

2.6.7.4.1 Direct Frequency Tuning

The Direct Frequency Tuning mode is selected with the TNM 0 command. This tuning mode allows the selected demodulator to tune to a fixed frequency from 00.000000 to 20.000000 MHz, with a resolution of 1 Hz. Direct Frequency entries are made with the FRQ command. The tuned frequency setting may be verified with the FRQ? query.

Frequency spectrum for demodulation is selected with the SPD command. SPD 0 selects upright frequency spectrum, SPD 1 selects inverted frequency spectrum. The SPD? query is used to check the spectrum selection.

2.6.7.4.2 Channel Tuning

The Channel Tuning mode is selected with the TNM 3 command. This tuning mode allows the selected demodulator to tune to one out of 5,000 available channels. The channels are incremented in 4 kHz steps, thus covering the 0 to 20 MHz tuning range of the unit. The channel selection is made with the CHN command and an operand consisting of four digits in the range of 0000 to 5000. The CHN? query is used to verify the channel selection.

Channel spectrum for demodulation is selected with the SPC command. SPC 0 selects upright channel spectrum, SPC 1 selects inverted channel spectrum. The selected channel spectrum may be checked with the SPC? query.

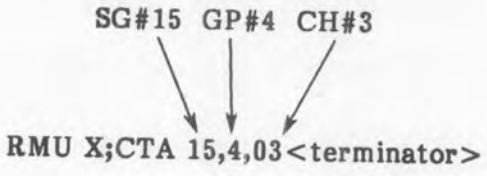
2.6.7.4.3 CCITT 960 Plan Tuning

The CCITT 960 Plan tuning mode is selected with the TNM 1 command. In the CCITT 960 Plan tuning mode the selected demodulator is instructed to tune to one out of 960 preprogrammed channels (see **Figure 2-8**). The Channels (CH) are contained in Groups (GP) that are contained in Supergroups (SG). Sixteen Supergroups are selectable, each containing five Groups that contain twelve channels each.

The CTA command and arguments are used to select SG, GP, and CH. The available selections are as follows:

Supergroup	-	01 thru 16
Group	-	1 thru 5
Channel	-	01 thru 12

For example, selecting Channel 3 of Group 4 of Supergroup 15 is performed with the CTA command as follows:



The CTA? query is used to verify the CCITT 960 Plan channel selection.

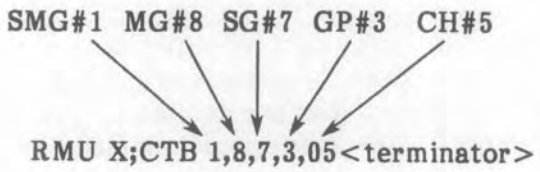
2.6.7.4.4 CCITT 2700 Plan Tuning

The TNM 2 command selects the CCITT 2700 Plan tuning mode. In the CCITT 2700 Plan tuning mode the selected demodulator is instructed to tune to one out of 2,700 available preprogrammed voice channels (see **Figure 2-8**).

The CTB command and five arguments are used to select the channel in the CCITT 2700 Plan. The arguments start with the Supermastergroup (SMG) selection, the Mastergroup (MG), the Supergroup (SG), Group (GP), and Channel (CH). The available selections are as follows:

Supermastergroup	-	1 thru 3
Mastergroup	-	7 thru 9
Supergroup	-	4 thru 8
Group	-	1 thru 5
Channel	-	01 thru 12

As an example, entering the following command and arguments selects Channel 5 of Group 3, of Supergroup 7, of Mastergroup 8 of Supermastergroup 1.



The CTB? query is used to verify the CCITT 2700 Plan channel selection.

2.6.7.5 Setting the Threshold Level

For all tuning modes a threshold level adjustment is provided to optimize signal activity detection. The setting of the threshold parameter should be just above the noise floor of the baseband input, ensuring a maximum probability of signal detection without interference from baseband noise. This is especially important during Scan operations.

During Scan operations, a signal encountered which has a power level equal to or above the threshold setting initiates Signal Dwell Timer operation (see **paragraph 2.6.7.8.6.2**).

The threshold level setting is entered with the THR command. The valid entries are in the range from -90 to 00 dBm. The threshold level setting may be verified with the THR? query.

2.6.7.6 Gain Control

Two gain control modes are selectable: Manual and Automatic. The gain control mode is selected with the AGC command. AGC 0 sets the gain control mode to Manual, AGC 1 sets it to Automatic. The AGC? query is used to verify the gain control mode selection.

In Manual gain control mode, the RFG command and operand are used to enter the manual gain parameter at a level from 00 to 36 dB. This parameter should be set to a level that ensures optimum signal detection without distortion. The Manual gain level setting may be verified with the RFG? query.

2.6.7.7 Monitoring Signal Activity

The SGV? query may be used to evaluate the current signal activity of the selected demodulator. The response arguments are signal strength and signal activity. For example, a response of SGV -55,0 indicates the current signal has a signal strength of -55 dBm which is lower than the threshold level setting (0).

A response of SGV-55, 1 indicates the current signal has a signal strength of -55 dBm which is above the threshold level setting (1).

2.6.7.8 Scan Operations

The selected demodulator may be instructed to scan a segment of its tuning range from one point to another. As mentioned in **paragraph 2.6.7.3,** the OPR command is used to initiate a scan operation. Eight scan operations are available. Prior to initiating a scan operation with the OPR command, parameters for the scan operation must be set.

The SCF nrf, (freq. specifier) command is used to set the parameters for a scan operation. The nrf field is used to select the type of scan operation as follows:

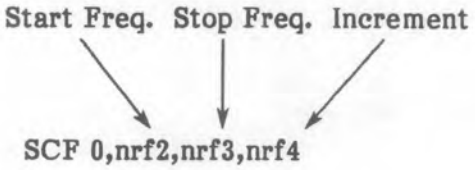
SCF 0 = Direct Frequency Scan
SCF 1 = CCITT 960 Group Scan
SCF 2 = CCITT 960 Supergroup Scan
SCF 3 = CCITT 2700 Group Scan
SCF 4 = CCITT 2700 Supergroup Scan
SCF 5 = CCITT 2700 Mastergroup Scan
SCF 6 = CCITT 2700 Supermastergroup Scan
SCF 7 = Channel Scan

The (freq. specifier) arguments are dependent on the scan operation selected by nrf and are used to up the scan parameters for the scan. The following paragraphs provide details for setting up and initiating the available scan operations. Also provided are details on suspending and restarting a scan and dwell timer operation.

The status of the scan operation may be verified with the SCS? query. A response of SCS 0 indicates the scan is off, SCS 1 indicates the scan is active, and SCS 2 indicates the scan is suspended.

2.6.7.8.1 Direct Frequency Scanning

The Direct Frequency Scan mode allows the selected demodulator to scan a portion of its tuning range from one fixed frequency point to another while monitoring for signal activity. The setup for this scan mode consists of SCF 0 and entering a start frequency, a stop frequency, and an increment frequency. The following defines the argument list for the Direct Frequency Scan mode:



The start frequency is entered in the first freq. specifier argument (nrf2) and consists of two digits, a decimal point, and three digits. The range of the start frequency (in MHz) is 00.000 to 19.999.

The stop frequency is entered in the second freq. specifier argument (nrf3) and consists of two digits, a decimal point, and three digits. The range of the stop frequency (in MHz) is 00.001 to 20.000.

NOTE

For proper Direct Frequency Scan operation, the start frequency must be less than the stop frequency.

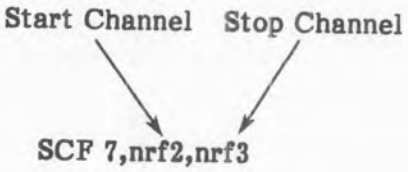
The scan increment setting determines the frequency steps of the scan from the start frequency to the stop frequency. The scan increment is entered in the third freq. specifier argument (nrf4) and consists of two digits, a decimal point, and three digits. The range of the scan increment (in MHz) is 00.001 to 01.000. The scan configuration setup can be checked with the SCF? query.

The frequency spectrum for demodulation is selected with the SPD command. SPD 0 selects upright frequency spectrum; SPD 1 selects inverted frequency spectrum.

After the start frequency, stop frequency, scan increment, and spectrum parameters are entered, the Direct Frequency Scan may be initiated with the OPR 1 command.

2.6.7.8.2 Channel Scanning

The Channel Scan mode provides the means for the selected demodulator to scan its tuning range by scanning between any two of the 5,000 available channels. Before the Channel Scan can be started a designated start channel and stop channel must be entered. The setup for this scan mode consists of SCF 7 and entering a start channel and a stop channel. The following defines the argument list for the Channel Scan mode:



The start channel is entered in the first freq. specifier argument (nrf2) and consists of four digits. The range of the start channel entry is 0000 to 4999. The start channel entry determines at what frequency point the scan pass begins. For example, a start channel entry of 0100 sets the demodulator channel to begin scanning at a frequency of 400 kHz.

The stop channel entry determines at what point the channel scan pass stops. The stop channel is entered in the second freq. specifier argument (nrf3) and consists of four digits. The range of the stop channel entry is 0001 to 5000.

NOTE

For proper Channel Scan operation, the start channel must be less than the stop channel.

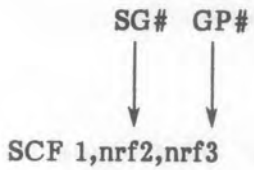
In Channel Scan operation the demodulator step tunes from channel to channel in 4 kHz increments. Therefore, no increment selection is used for this scan mode. The scan configuration setup can be checked with the SCF? query.

The channel spectrum for demodulation in the Channel Scan operation is selected with the SPC command. Select SPC 0 for upright spectrum and SPC 1 for inverted spectrum.

After the start channel, the stop channel, and the spectrum parameters are entered, the Channel Scan operation may be initiated with the OPR 1 command.

2.6.7.8.3 CCITT 960 Plan Scanning

Two scan modes are available for scanning channels in the CCITT 960 Plan: CCITT 960 Group Scan and CCITT 960 Supergroup Scan. In the Group Scan mode the selected demodulator scans twelve channels within a specified Group which is within a specified Supergroup. The setup for the CCITT 960 Group Scan mode consists of SCF 1 and entering a Supergroup number and a Group number. The following defines the argument list for the CCITT 960 Group Scan mode:



The Supergroup number is entered in the first freq. specifier argument (nrf2) and has a range of 1 to 16. The Group number is entered in the second freq. specifier argument (nrf3) and has a range of 1 to 5.

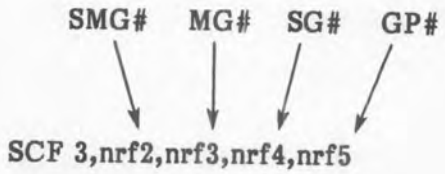
In the Supergroup Scan mode, the demodulator begins by scanning twelve channels within the first Group within a specified Supergroup. When it is finished scanning that group, it starts scanning twelve channels within the next Group of the specified Supergroup, and so on until all Groups within the specified Supergroup are scanned. The setup for the CCITT 960 Supergroup Scan mode consists of SCF 2 and entering a Supergroup number, from 1 to 16, in the freq. specifier argument (nrf2) as shown in the following:

After the scan mode is set up, it may be initiated with the OPR 1 command. The scan configuration setup can be checked with the SCF? query.

2.6.7.8.4 CCITT 2700 Plan Scanning

Four scan modes are available for scanning channels in the CCITT 2700 Plan: CCITT 2700 Group Scan, CCITT 2700 Supergroup Scan, CCITT 2700 Mastergroup Scan, and CCITT 2700 Supermastergroup Scan.

In the Group Scan mode the selected demodulator scans twelve channels within a specified Group which is within a specified Supergroup, within a specified Mastergroup, within a specified Supermastergroup. In this mode twelve channels are scanned. The setup for the CCITT 2700 Group Scan mode consists of SCF 3 and entering a Supermastergroup number, a Mastergroup number, a Supergroup number, and a Group number. The following defines the argument list for the CCITT 2700 Group Scan mode:

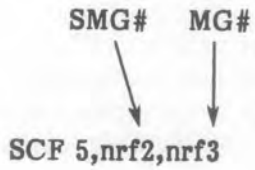


The Supermastergroup number is entered in the first freq. specifier argument (nrf2) and has a range of 1 to 3. The Mastergroup number is entered in the second freq. specifier argument (nrf3) and has a range of 7 to 9. The Supergroup number is entered in the third freq. specifier argument (nrf4) and has a range of 4 to 8. The Group number is entered in the fourth freq. specifier argument (nrf5) and has a range of 1 to 5.

In the Supergroup Scan mode, all channels of all Groups within a specified Supergroup are scanned. Sixty channels are scanned in this mode. The setup for the CCITT 2700 Supergroup Scan mode consists of SCF 4 and entering a Supermastergroup number, a Mastergroup number, and a Supergroup number. The following defines the argument list for the CCITT 2700 Supergroup Scan mode:

The Supermastergroup number is entered in the first freq. specifier argument (nrf2) and has a range of 1 to 3. The Mastergroup number is entered in the second freq. specifier argument (nrf3) and has a range of 7 to 9. The Supergroup number is entered in the third freq. specifier argument (nrf4) and has a range of 4 to 8.

In the Mastergroup Scan mode, all channels of all Groups of all Supergroups within a specified Mastergroup are scanned. Three hundred channels are scanned in this mode. The setup for the CCITT 2700 Mastergroup Scan mode consists of SCF 5 and entering a Supermastergroup number and a Mastergroup number. The following defines the argument list for the CCITT 2700 Mastergroup Scan mode:



The Supermastergroup number is entered in the first freq. specifier argument (nrf2) and has a range of 1 to 3. The Mastergroup number is entered in the second freq. specifier argument (nrf3) and has a range of 7 to 9.

In the Supermastergroup Scan mode, all channels of all Groups of all Supergroups of all Mastergroups within a specified Supermastergroup are scanned. Nine hundred channels are scanned in this mode. The setup for the CCITT 2700 Supermastergroup Scan mode consists of SCF 6 and entering a Supermastergroup number, from 1 to 3, in the freq. specifier argument (nrf2) as shown in the following:

After the scan mode is set up, it may be initiated with the OPR 1 command. The scan configuration setup can be checked with the SCF? query.

2.6.7.8.5 Suspending an Active Scan

An active scan operation may be interrupted in order to perform signal evaluation or to adjust demodulator parameters. This is referred to as the Suspend mode and is entered with the SUS command.

While in the Suspend mode parameters such as tuned frequency, spectrum inversion, gain mode/level, and threshold level may be adjusted. The scan operation may then be restarted with the ENA command. The scan operation resumes at the next point in the scan sequence after the point at which it was interrupted. When a scan operation is restarted from the Suspend state, only gain and threshold adjustments made during the suspend state are maintained.

The scan operation may be automatically suspended at the end of a single scan pass if desired. This operation is enabled by writing to the Suspend Action Control register (SAC). The SAC 128 command is used to enable the Suspend on End of Single Pass Scan operation. This

operation may be disabled by sending the command SAC 000. When this operation is disabled, the scan operation continuously sequences from the start parameter to the stop parameter until manually suspended (SUS command), or until a signal is acquired and dwelled on (depending on dwell timer operation).

2.6.7.8.6 Dwell Timers

Three dwell timers are provided that can be used to further control Scan operations. The dwell timers are: Pre-Dwell, Signal Dwell, and Post Loss Dwell. When the demodulator is in a dwell state, it may be advanced to the next step in the scan sequence if desired by sending the ADV command (advance). The following paragraphs further explain the use of the three dwell timers.

2.6.7.8.6.1 *Pre-Dwell Timer*

The Pre-Dwell timer defines how long the demodulator initially waits on a scan step for signal activity. The PDW command and operand are used to set the Pre-Dwell timer parameter. Any value in the range +0050 to +9975 msec may be entered in 25 msec steps. The setting of the Pre-Dwell timer may be verified with the PDW? query.

The Pre-Dwell timer may also be set to infinite with PDW -1. This causes the demodulator to dwell on a scan step until a signal is encountered or the ADV command is issued.

As soon as a signal over the threshold level setting is encountered, the demodulator moves to Signal Dwell operation.

2.6.7.8.6.2 *Signal Dwell Timer*

The Signal Dwell timer determines how long the selected demodulator stays tuned to an active frequency. The SDW command and operand are used to set the signal dwell time in a range from +000 to +600 seconds in 1 second intervals. It may also be set to infinite with SDW -1. The setting of the Signal Dwell timer may be verified with the SDW? query.

The Signal Dwell timer is initialized upon entry from Pre Dwell. The demodulator exits Signal Dwell when either the timer expires or the encountered signal drops below the threshold level setting. If the timer expires, the demodulator tunes to the next scan step. If the signal is lost, the demodulator moves to Post Loss Dwell operation. The timer continues on re-entry from Post Loss Dwell.

With the Signal Dwell timer set to infinite, the demodulator will remain in Signal Dwell until the signal is lost or the ADV command is received.

2.6.7.8.6.3 *Post Loss Dwell Timer*

The Post Loss Dwell operation is entered from Signal Dwell upon loss of a signal. The Post Loss Dwell timer determines how long the demodulator will wait for the return of a lost signal before tuning to the next scan step.

The Post Loss Dwell timer is set with the LDW command and operand in the range of +000 to +200 seconds. It may also be set to infinite with LDW -1. The setting of this timer may be verified with the LDW? query.

When this timer expires, the demodulator automatically tunes to the next scan step. If a signal is acquired while in Post Loss Dwell, the demodulator returns to Signal Dwell timer operation. With the Post Loss Dwell timer set to infinite, the demodulator goes to the next scan step only upon receipt of the ADV command. This timer is reinitialized each time Post Loss Dwell is entered.

2.6.7.9 Requesting the General Parameter Settings of a Demodulator

The general parameter settings of a demodulator can be requested by sending the *LRN command. When the WJ-9548 receives the *LRN command it returns the following response string to the controller:

RMU XX;<freq status>;AGC X;RFG XX;TNM X;OPR X;CTL X<CR><LF>

where "X" represents the current parameter setting and where <freq status> assumes one of the following formats, depending on the current tuning mode.

Manual mode, Direct Frequency:
FRQ XX.XXXXXX;SPD X

Manual mode, CCITT 960 Plan:
CTA XX,X,XX

Manual mode, CCITT 2700 Plan:
CTB X,X,X,X,XX

Manual mode, Channel:
CHA XXXX;SPC X

Scan mode, Direct Frequency:
SCF 0,XX.XXX,XX.XXX,XX.XXX;SPD X;THR (+/-)XX;
SAC XXX;PDW (+/-)XXX;SDW (+/-)XXX;LDW (+/-)XXX;

Scan mode, CCITT 960 Group:
SCF 1, XX,X;THR (+/-)XX;SAC XXX;PDW (+/-)XXXX;
SDW (+/-)XXX;LDW (+/-)XXX;

Scan mode, CCITT 960 Supergroup:
SCF 2,XX;THR (+/-)XX;SAC XXX;PDW (+/-)XXXX;
SDW (+/-)XXX;LDW (+/-)XXX;

Scan mode, CCITT 2700 Group:
SCF 3,X,X,X,X;THR (+/-)XX;SAC XXX;PDW (+/-)XXXX;
SDW (+/-)XXX;LDW (+/-)XXX;

Scan mode, CCITT 2700 Supergroup:
SCF 4,X,X,X;THR (+/-)XX;SAC XXX;PDW (+/-)XXXX;
SDW (+/-)XXX;LDW (+/-)XXX;

Scan mode, CCITT 2700 Mastergroup:
SCF 5,X,X;THR (+/-)XX;SAC XXX;PDW (+/-)XXXX;
SDW (+/-)XXX;LDW (+/-)XXX;

Scan mode, CCITT 2700 Supermastergroup:
SCF 6,X;THR (+/-)XX;SAC XXX;PDW (+/-)XXXX;
SDW (+/-)XXX;LDW (+/-)XXX;

Scan mode, Channel:
SCF 7,XXXX,XXXX;SPC X;THR (+/-)XX;SAC XXX;
PDW (+/-)XXXX;SDW (+/-)XXX;LDW (+/-)XXX;

2.6.8 BUILT-IN-TEST OPERATION

The Built-In-Test (BITE) operation is automatically performed at power-up. It can also be initiated when a fault is suspected by sending the *TST? query. The *TST? query invokes the BITE sequence and requests the results of the BITE tests. The results of BITE are returned in a bit mapped value of 16 bits, indicating success or failure of tests. The bit evaluation of the *TST? query is listed in **Table 2-15.**

Any bits which are set represent that the associated BITE test has failed. If a hardware error is suspected from the results of the BITE tests, refer to **paragraph 2.6.9.5** for information on determining device-dependent errors. The following paragraphs provide descriptions of the individual tests that are performed during the BITE sequence.

Table 2-15. Bit Evaluation of the TST? Query (BITE)

Bit	BITE Result
0	A/D Calibration Fault #1
1	A/D Calibration Fault #2
2	Bus Controller Signature Analysis Fault
3	DSP Memory Fault
4	DSP Signature Analysis Fault
5	A/D Signal Path Fault
6	A/D Utilization Monitor Fault
7	Left Headphone Fault
8	Right Headphone Fault
9	Tuner Signal Path Fault
10	Not Used
11	Not Used
12	Not Used
13	Not Used
14	Not Used
15	Not Used

The Built-In-Test sequence begins with a calibration of the A/D conversion circuitry. During calibration, the A/D Converter Assembly is monitored to determine if the A/D calibration process commences and completes as expected. An A/D Calibration Fault #1 (bit 0 set) indicates that the calibration did not begin as commanded. The probable cause of this error condition is a faulty A/D Converter Assembly or broken control signal connections between the A/D Converter Assembly and the Bus Controller Assembly.

An A/D Calibration Fault #2 (bit 1 set) indicates that the A/D calibration did not complete within the normal time interval required for that task. The probable cause of this error is a faulty A/D Converter Assembly.

After successfully completing the A/D calibration, a hardware verification test sequence is initiated within the WJ-9548. The tests begin at the output end of the unit's signal path and work their way toward the input end, identifying hardware faults and isolating them to the module level.

The Bus Controller Signature Analysis performs a test on the Bus Controller data path. If this test fails (bit 2 set), the probable cause is either a faulty Bus Controller Assembly or interrupted data lines on the Motherboard Assembly (A1).

The DSP Memory Fault bit (bit 3), when set, is an indication that a circuit fault exists on the DSP Demodulator Assembly.

The DSP Signature Analysis test thoroughly exercises the data path through the DSP Demodulator Assembly. If this test fails (bit 4 set), the probable cause is a faulty DSP Demodulator Assembly.

The A/D Signal Path test performs a test on the signal path of the A/D Converter Assembly. If this test fails (bit 5 set), the probable cause is a faulty A/D Converter Assembly.

If the A/D Utilization Monitor test fails (bit 6 set), the probable cause is a faulty A/D Converter Assembly. "Utilization Monitor" refers to a block of control circuitry on the A/D Converter Assembly. This circuitry monitors each A/D converter output and dynamically adjusts the gain of the buffer amplifiers preceding the converters in order to optimize the "utilization" of their dynamic range.

The Left Headphone Fault bit (bit 7) and the Right Headphone Fault bit (bit 8), when set, indicate hardware malfunctions on the left and right headphone circuits, respectively.

The Tuner Signal Path Fault bit (bit 9), when set, is an indication of a fault in one or more of the Tuner Assemblies.

2.6.9 WJ-9548 STATUS SUMMARY

Figure 2-42 illustrates the architecture of the Status Register in the WJ-9548. It consists of six eight-bit registers, six 32-bit registers, and two 16-bit registers. Additionally, each demodulator contains two 16-bit registers and one eight-bit register. The logic gating of these registers allows the programmer great flexibility in remote operations. The six eight-bit registers, the six 32-bit registers, and the two 16-bit registers in the demodulators can be split into six pairs. Each pair consists of a status or summary register and an enable register.

One pair is composed of the Status Byte Register and the Service Request Enable Register. The WJ-9548 uses only four bits of the Status Byte Register as described in **Table 2-16.** 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.

A second pair is the Event Status Register (whose functions are summarized in **Table 2-17)** and the Event Status Enable Register. Each bit in the Event Status Register is logically ANDed with 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.

Another pair is composed of the Activity Summary Register and the Activity Summary Enable Register. The ANDed combination of these two registers are logically ORed to set the Activity Status Bit (ASB) of the Status Byte Register. The ANDed combination of the Demod Activity Enable Register(s) and the Demod Activity Status Register(s) **(Table 2-18)** are logically ORed to determine the setting of the Demod bit(s) in the Activity Summary Register.

The ANDed combination of the User Request Summary Register and the User Request Enable Register are logically ORed to set the User Request bit (URQ) in the Event Status Register.

Another pair of registers is the Error Summary Register and the Error Summary Enable Register. The ANDed combination of these registers are logically ORed to set the Device-Dependent Error Bit (DDE) in the Event Status Register. The ORed combination of the Demod Device-Dependent Error Register sets the Demod bit in the Error Summary Register. The ORed combination of the Frame Device-Dependent Error Register sets the frame bit (FRM) in the Error Summary Register.

2.6.9.1 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-9548 to set the SRQ. The "*STB?" query response includes similar information as detailed below.

Serial Poll - When the WJ-9548 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 2-16.**

***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.

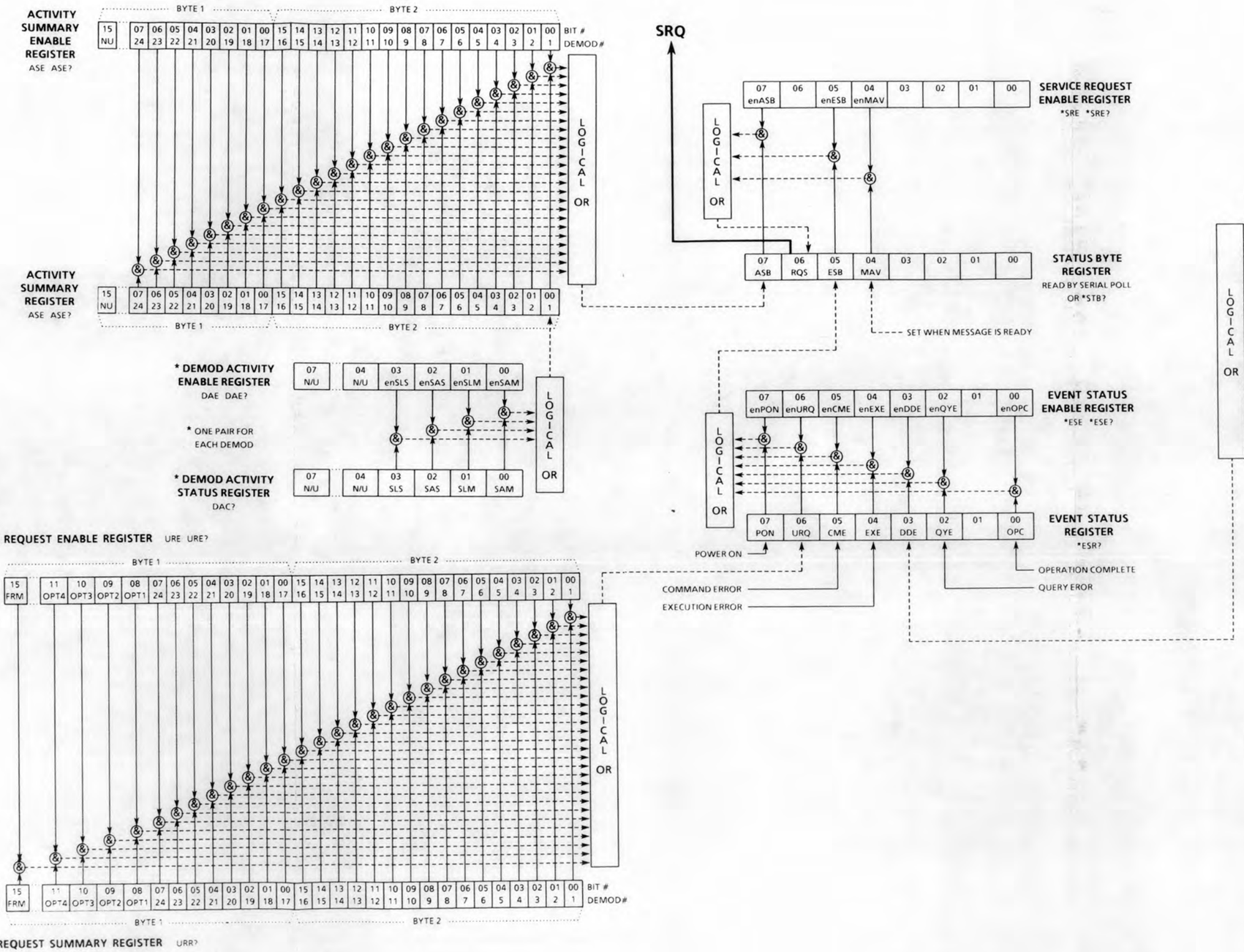


Figure 2-42. WJ-9548 Status Data Structure

Table 2-16. Status Byte Register, Bit Evaluation

Bit Number	Mnemonic	Description
0	N/U	
1	N/U	
2	N/U	
3	N/U	
4	MAV	**Message Available Bit** - This bit, when set, indicates that the WJ-9548 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	ASB	**Activity Summary Bit** - This bit, when set, indicates that an event has caused a bit or bits in the Activity Summary Register to be set (see **paragraph 2.6**). This bit is cleared by *CLS or by reading the contents of the Activity Summary Register.

2.6.9.2 Event Status Register

The following discussion covers the Event Status Register and the *ESR? query. See **Table 2-17** 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 2-17. Event Status Register, Bit Evaluation

Bit Number	Mnemonic	Description
0	OPC	**Operation Complete** - This bit is set on completion of operation that has been designated by the *OPC command.
1	N/U	
2	QYE	**Query Error** - Set on an attempt to read data from the output buffer with no data stored or pending, or on output buffer overflow.
3	DDE	**Device-Dependent Error** - Set when a device-dependent error occurs (see **paragraph 2.6.9.5**).
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	URQ	**User Request** - Set when a user request event occurs (see **paragraph 2.6.9.4**).
7	PON	**Power On** - Sets at power up of the WJ-9548.

2.6.9.3 **Activity Summary Register**

The contents of the Activity Summary Register can be read to determine which demodulator(s) has had a change in signal status, thus causing the ASB bit in the Status Byte Register to be raised. Each bit in this second byte register, which consists of two 16-bit bytes represents one of the installed demodulators (see **Figure 2-42**). Bit 00 of the second byte represents demodulator #1 while bit 7 of the first byte represents demodulator #24. Bits 8 thru 15 of the second word are not used. The contents of the register is requested with the ASR? query. The status response consists of two 16-bit words which are accessed simultaneously. The response format for ASR? is:

ASR nr1,nr1

where the first argument represents the first word and the second argument represents the second word. Upon reading the contents of the register, it is cleared. It is also cleared by *CLS and power on.

The event that has caused the bit(s) in the Activity Summary Register to be raised can be determined by reading the contents of the Demod Activity Status Register (see **paragraph 2.6.9.3.1**).

The Activity Summary Enable Register allows the event flags of the Activity Summary Register to be reflected in the Activity Summary Bit (ASB) of the status byte. The setting of an activity status flag sets the ASB bit only if the corresponding bit in the Activity Summary Enable Register is set high. The Activity Summary Enable Register is written to with the ASE command. The data following the mnemonic can be used to evaluate the two 16-bit binary numbers which represent the register bits.

2.6.9.3.1 Demodulator Activity Status Register

The contents of the Demodulator Activity Status Register can be read to determine what event has caused the corresponding Demodulator bit to be raised in the Activity Summary Register. This register is read by sending the RMU X command (where X is the demodulator number) and the DAC? query. Reading the latched contents of this register clears it. It is also cleared by *CLS and power on. **Table 2-18** provides the bit evaluation of this register.

The Demodulator Activity Enable Register allows the Demodulator flags of the Demod Activity Status Register to be reflected in the associated Demodulator number bit in the Activity Summary Register. Setting an activity flag sets the Demodulator bit only if the corresponding bit is set in the Demodulator Activity Enable Register. This register is written to with the DAE command. The data following the mnemonic evaluates to a binary value representing the register bits.

Table 2-18. Demodulator Activity Summary Register, Bit Evaluation

Bit	Mnemonic	Description
0	SAM	Signal acquired while in Manual.
1	SLM	Signal lost while in Manual.
2	SAS	Signal acquired while in Scan.
3	SLS	Signal lost while in Scan.
4-7		Not Used.

2.6.9.4 User Request Summary Register

The User Request Summary Register provides information on front panel activity for the frame. When a demodulator has had a parameter change locally from the front panel, the corresponding bit is set in the User Request Summary Register. Bit 00 of the second byte is for demodulator #1 while bit 7 of byte 2 is for demodulator #24 (see **Figure 2-42**). Bits 8 - 11 of the first byte represent front panel control of an option module in an option slot (bit 8 - option 1, bit 9 - option 2, bit 10 - option 3, bit 11 - option 4). When a frame parameter has been modified locally from the front panel, bit 15 of the first byte is set. The contents of the User Request Summary Register can be read to determine if the frame or which demodulator(s) has had a local parameter change, thus causing the URQ bit in the Event Status Register to be raised. The

contents of the register is requested with the URR? query. The status response consists of two 16-bit words which are accessed simultaneously. The response format for URR? is:

URR nr1,nr1

where the first argument represents demodulators 16 through 24 and options 1 through 4 and the second argument represents demodulators 1 through 15. Upon reading the contents of the register, it is cleared. It is also cleared by *CLS and power on.

Once it has been determined which demodulator(s) has had a parameter change, the *LRN command can be sent to the demodulator(s) to determine what parameters have been changed. This can also be done for the frame.

The User Request Enable Register allows the event flags of the User Request Summary Register to be reflected in the User Request bit (URQ) of the Event Status Register. The setting of a user request flag sets the URQ bit only if the corresponding bit in the User Request Enable Register is set high. The User Request Enable Register is written to with the URE command. The data following the mnemonic can be used to evaluate the two 16-bit binary numbers which represent the register bits.

2.6.9.5 Determining Device-Dependent Errors

The WJ-9548 contains device-dependent error registers that may be accessed to obtain information aiding in localizing failures. For instance, if the results of BITE were unsuccessful the device-dependent error registers may quickly reveal the source of the failure. The contents of the device-dependent error registers are accessed by sending the HER? or CDE? queries.

Sending the HER? query requests the latched contents of the device-dependent error register. The response to this query contains errors that occurred since the last read of the register. The register is automatically cleared after access by the HER? query. It is also cleared by the *CLS command (clear status) and at power-up. The CDE? query reads the current device-dependent errors. Reading the contents of the register with this query has no effect on it.

Two types of device-dependent error registers may be accessed with the HER? and CDE? queries: Frame and Demodulator. These registers are further explained in **paragraphs 2.6.9.5.1** and **2.6.9.5.2.**

When a device-dependent error occurs a corresponding bit is set in the Error Summary Register (see **Figure 2-42**). The contents of this register can be requested to determine where the error occurred that set the DDE bit in the Event Status Register. The status response consists of two 16-bit words which represent up to 24 demodulators or Frame error (bit 15 of the first word) which are accessed simultaneously. The response format for ERR? is:

ERR nr1,nr1

where the first argument represents bits 00 thru 15 of the first word and the second argument represents bits 00 thru 15 of the second word. Upon reading the contents of the register, it is cleared. It is also cleared by *CLS and power on.

The Error Summary Enable Register allows the error flags of the Error Summary Register to be reflected in the DDE bit in the Event Status Register. The setting of an error flag sets the DDE bit only if the corresponding bit in the Error Summary Register is set. The Error Summary Enable Register is written to with the ERE command. The data following the mnemonic can be used to evaluate the two 16-bit binary numbers which represent the register bits.

2.6.9.5.1 Frame Device-Dependent Errors

The frame device-dependent error register contains frame level error status information. This register is accessed by preceding the HER? or CDE? query with RMU 0. The response is a bit-mapped value of 16 bits. **Table 2-19** provides the bit evaluation of the frame device-dependent error register. Unused bits (3 and 12 thru 15) have a value of zero.

Table 2-19. Bit Evaluation of the Frame Device-Dependent Error Register

Bit	Mnemonic	Description
0	REF	Reference Generator unlocked
1	BCTL	Bus Controller failure
2	DPE	Dual Port Interface failure
3		Not used
4	OPT1	Option Slot 1 hardware failure
5	OPT2	Option Slot 2 hardware failure
6	OPT3	Option Slot 3 hardware failure
7	OPT4	Option Slot 4 hardware failure
8	INP1	Baseband Input #1 failure
9	INP2	Baseband Input #2 failure
10	INP3	Baseband Input #3 failure
11	INP4	Baseband Input #4 failure
12-15		Not used

2.6.9.5.2 Demodulator Device-Dependent Errors

The demodulator device-dependent error register contains demodulator level error status information. This register is accessed by preceding the HER? or CDE? query with RMU X, where X is the demod number from 1 to 24. The response is a bit-mapped value of 8 bits. **Table 2-20** provides the bit evaluation of the demodulator device-dependent error register. The error bits are set by the detection of a hardware failure and do not remain cleared until the problem has been rectified. Unused bits (6 thru 15) have a value of zero.

Table 2-20. Bit Evaluation of the Demodulator Device-Dependent Error Register

Bit	Mnemonic	Description
0	TRT	Tuner Board Run-time Error
1	TBT	Tuner Board BITE Error
2	ADRT	A/D Converter Board Run-time Error
3	ADBT	A/D Converter Board BITE Error
4	DSPRT	DSP Board Run-time Error
5	DSPBT	DSP Board BITE Error
6-15		Not used

The Tuner Board Run-time Error bit (bit 0) is set when the Tuner is found to be unlocked during normal operation.

The Tuner Board BITE Error bit (bit 1) is set when the Tuner is found to be inoperative during the BITE sequence.

The A/D Converter Board Run-time Error bit (bit 2) is set due to a hardware failure on the A/D Converter Assembly during normal operation.

The A/D Converter Board BITE Error bit (bit 3) is set when the A/D Converter Assembly is found to be inoperative during the BITE sequence.

The DSP Board Run-time Error bit (bit 4) is set due to a hardware failure on the DSP Demodulator Assembly during normal operation.

The DSP Board BITE Error bit (bit 5) is set when the DSP Demodulator Assembly is found to be inoperative during the BITE sequence.

SECTION III

CIRCUIT DESCRIPTION

SECTION III

CIRCUIT DESCRIPTION

3.1 INTRODUCTION

There are no circuit descriptions provided in an Installation and Operation Manual.

SECTION IV

MAINTENANCE

SECTION IV

MAINTENANCE

4.1 INTRODUCTION

There are no maintenance procedures provided in an Installation and Operation Manual.

SECTION V

REPLACEMENT PARTS LIST

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 LIST OF MANUFACTURERS

Mfr. Code	Name and Address	Mfr. Code	Name and Address
0A384	Crystal Semiconductor Corp. 2024 East St. Elmo Road P.O. Box 17847 Austin, TX 78760	00779	AMP, Incorporated P.O. Box 3608 Harrisburg, PA 17150
0B3G8	Tokin America, Inc. 2261 Fortune Drive San Jose, CA 95131	1ES66	Maxim Integrated Products 120 San Gabriel Drive Sunnyvale, CA 94086
0CY71	C and K Components, Inc. 2035 Hwy 70 E Clayton, NC 27520	01121	Allen-Bradley Company 1201 South 2nd Street Milwaukee, WI 53204
00681	Catalyst Research Corporation 1421 Clarkview Road Baltimore, MD 21209	01295	Texas Instruments, Inc. Semiconductor-Components Div. 13500 North Central Expressway Dallas, TX 75231

Mfr. Code	Name and Address
01961	Pulse Engineering, Inc. 7250 Convoy Court P.O. Box 12235 San Diego, CA 92112
02114	Ferroxcube Corporation P. O. Box 359 Mt. Marion Road Saugerties, NY 12477
02735	RCA Corporation Solid State Division Route 202 Somerville, NJ 08876
04713	Motorola, Incorporated Semiconductor Products Div. 5005 East McDowell Road Phoenix, AZ 85008
06665	Precision Monolithics, Inc. 1500 Space Park Drive Santa Clara, CA 95050
09021	Airco, Inc. Airco Electronics Bradford, PA 17055
11711	General Instrument Corporation 600 W. John Street Hicksville, NY 11802
12697	Clarostat Mfg. Co., Inc. Lower Washington Street Dover, NH 03820
12969	Unitrode Corporation 580 Pleasant Street Watertown, MA 02172
14632	Watkins-Johnson Company 700 Quince Orchard Road Gaithersburg, MD 20878
15542	Mini-Circuits Laboratories Division of Scientific Components Corporation 2625 E. 14th Street Brooklyn, NY 11235
15912	Thomas and Betts Corporation 4371 Valley Blvd. Los Angeles, CA 90032-3632
16428	Belden Corporation N.W. "N" Street Richmond, IN 47374
17856	Siliconix, Inc. 2201 Laurelwood Road Santa Clara, CA 95050
18178	EG&G Vactec, Inc. 10900 Pace Avenue St. Louis, MO 63132-1020
18324	Signetics Corporation 811 East Arques Avenue Sunnyvale, CA 94086
18722	Harris Corporation Semiconductor Sector 125 Crestwood Road Mountaintop, PA 18707-2189
19505	Applied Eng. Products, Co. 1475 Whalley Ave., P.O.Box A-D New Haven, CT 06525
20462	PREM Magnetics, Inc. 3521 N. Chapel Hill Road McHenery, IL 60050
22526	Berg Electronics Division Rt. 83 New Cumberland, PA 17070
24355	Analog Devices, Inc. Route 1 Industrial Park P.O. Box 280 Norwood, MA 02062
24539	Avantek, Inc. 3175 Bowers Avenue Santa Clara, CA 95051

Mfr. Code	Name and Address
25088	Siemens America, Inc. 186 Wood Avenue S. Iselin, NJ 08830
26742	Methode Electronics Inc. 7447 W. Wilson Avenue Chicago, IL 60656
27014	National Semi-Conductor Corp. 2950 San Ysidro Way Santa Clara, CA 95051
28480	Hewlett-Packard Company Corporate Headquarters 1501 Page Mill Road Palo Alto, CA 94304
30035	Jolo Industries 13921 Nautilus Drive Garden Grove, CA 92463
31918	ITT Schadow, Inc. 8081 Wallace Road Eden Prairie, MN 55344
34335	Advanced Micro Devices 901 Thompson Place Sunnyvale, CA 94086-4518
34371	Harris Corporation Semiconductor Sector 200 Palm Bay Blvd. P.O. Box 883 Melbourne, FL 32902
50088	SGS-Thomson Microelectronics, Inc. 1310 Electronics Drive Carrolton, TX 75006
52063	EXAR Integrated Products 2222 Qume Drive P. O. Box 49007 San Jose, CA 95161
52648	Plessey Semiconductors 1641 Kaiser Avenue Irvine, CA 92714
52840	Western Digital Corporation 3128 Red Will Avenue Costa Mesa, CA 92626
53387	Minnesota Mining & Mfg. Co. 11550 Stonehollow Drive P.O. Box 2963 St. Paul, MN 55101
53469	Plessey Semiconductor, Inc. 1500 Green Hills Road P.O. Box 660017 Scotts Valley, CA 95067
54483	TDK Electronics Corp. 755 Eastgate Blvd. Garden City, NY 11530
55224	SMK Electronics Corporation Carson, CA
55322	Samtec, Inc. 810 Progress Blvd. P.O. Box 1147 New Albany, IN 47150
55342	Pilot Industries Corporation 7400 Washington Avenue Eden Prairie, MN 55344-3704
55387	Passive Microwave Tech., Inc. DBA PAMTECH 1151 Avenida Acaso Camarillo, CA 93010
55680	Nichicon/America Corporation 927 E. State Parkway Schaumburg, IL 60195
55969	Metuchen Cap Inc. 420 Park Avenue Perth Amboy, NJ 08861
56289	Sprague Electric Company 300 Minuteman Road North Adams, MA 01247
59993	Internatonal Rectifier Semiconductor Division 233 Kansas Street El Segundo, Ca 90245-4316
6Y440	Micron Technology, Inc. 2805 E. Columbia Road Boise, ID 83706

Mfr. Code	Name and Address
61127	NAS Electronics 381 Park Street Hackensack, NJ 07606
61429	Fox Electronics 6225 Presidential Court Ft. Myers, FL 33905
61722	Epson America Inc. 3415 Kashiwa Street Torrance, CA 90505
61772	Integrated Device Technology 3236 Scott Blvd Santa Clara, CA 95051
62786	Hitachi America Ltd. 1800 Bering Drive San Jose, CA 95122
62839	Comlinear Corporation 4800 Wheaton Drive P.O. Box 20600 Ft. Collins, CO 80522
67129	Minnesota Mining & Mfg. Co. Electronics Product Division 9450 Pineneedle Drive P.O. Box 270 Mentor, OH 44061-0270
7J069	TDK Corp. of America 4015 W. Vincennes Road Indianapolis, IN 46268
7R101	Current Components 215 Marcus Blvd. Hauppauge, NY 11787
72982	Erie Technological Products 644 West 12th Street Erie, PA 16512
73631	Curtis Industries, Inc. 7400 W. Douglas Avenue P.O. Box 18699 Milwaukee, WI 53218-0699
75263	Keystone Carbon, Inc. 1935 State Street St. Marys, PA 15857
75915	Littelfuse Tracor, Inc. 800 E. Northwest Hwy. Des Plaines, IL 60016-3049
80131	Electronic Industries Assoc. 2001 Eye Street, N.W. Washington, DC 20006
80294	Bourns, Incorporated 6135 Magnolia Avenue Riverside, CA 92506
81349	Military Specifications
81433	Niener Hyman & Sons 6600 Annandale Road Beltsville, MD 20705-1204
82389	Switchcraft, Inc. 5555 North Elston Avenue Chicago, IL 60630
85146	Alco Electronics Products, Inc. 1551 Osgood Street North Andover, MA 01845
89473	General Electric Distributing Corporation Schenectady, NY
9AA13	Maxim Integrated Products Sunnyvale, CA 94086
9AA32	Oshino Electric Lamp Works Wamco, Inc. 11555 Coley River Circle Fountain Valley, CA 92708

Mfr. Code	Name and Address
9J979	Hatachi America, Ltd. 950 Benicia Avenue Sunnyvale, CA 94086
90201	Mallory Capacitor Company 3029 East Washington Street P.O. Box 372 Indianapolis, IN 46206
91636	Cutris Industries Inc. 74999 Curtis Blvd. Eastlake, OH 44095
95146	Alco Electronic Products, Inc. 1551 Osgood Street North Andover, MA 01845-1014

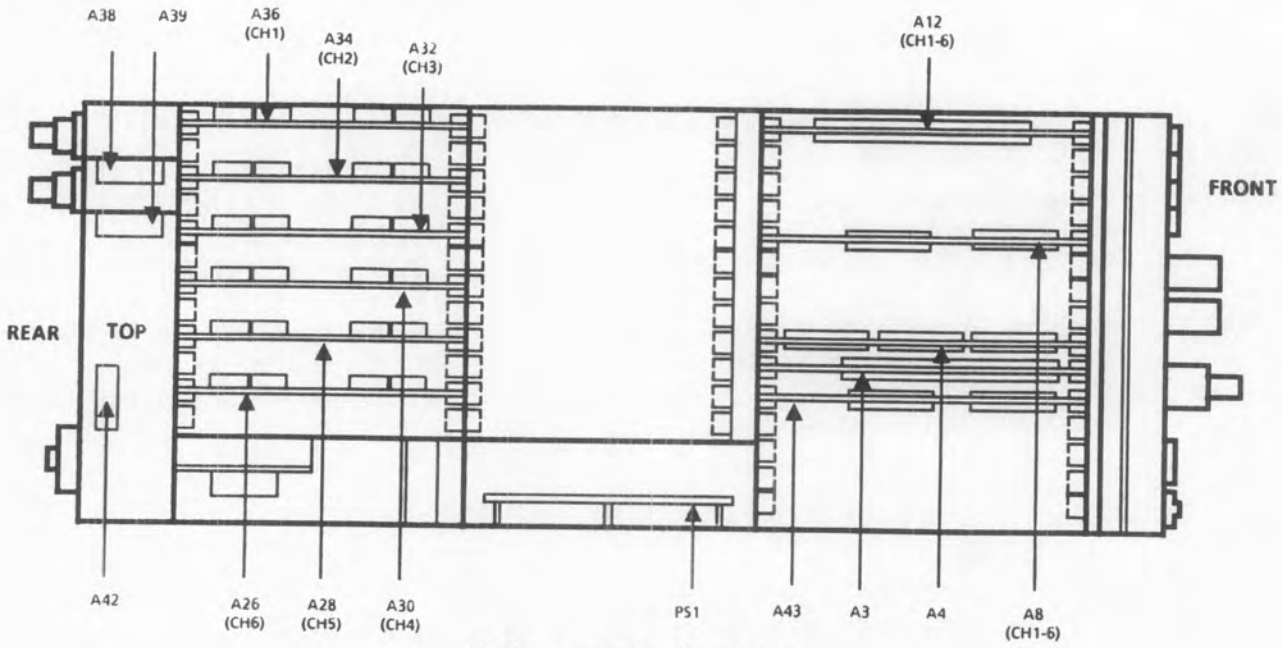
5.4 PARTS LIST

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 Watkins-Johnson Company, 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 5.3**, and the manufacturer's part number, provided in **paragraph 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 5.5** will provide for satisfactory unit operation.

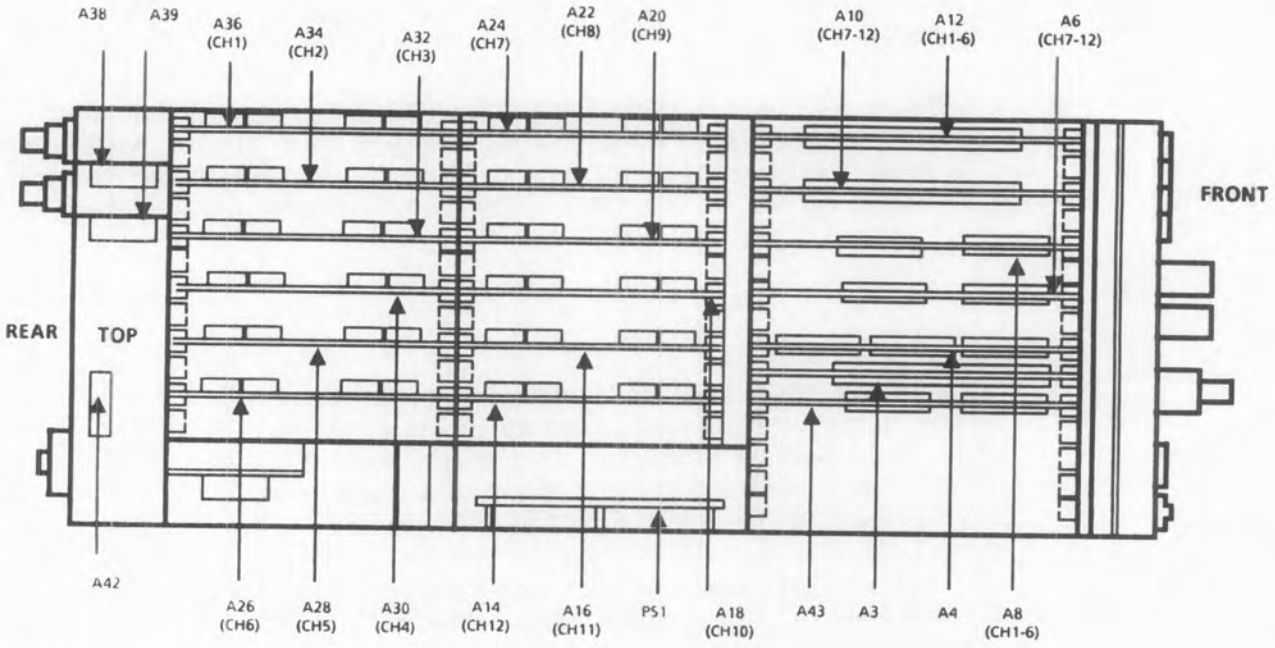
Replacement parts may be obtained from any manufacturer provided that the physical characteristics and electrical parameters of the replacement item are compatible with the original part. In the case where components are defined by a military or industrial specification, a vendor which can provide the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

NOTE

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

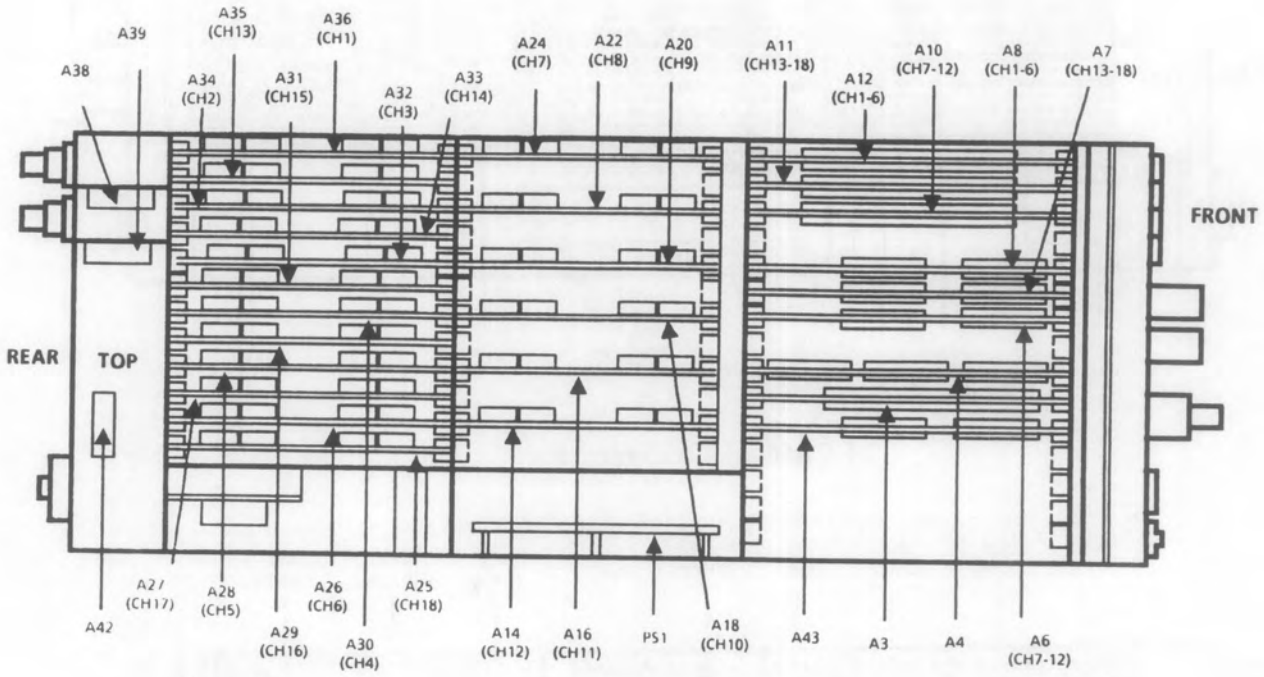


6 Channel Configuration



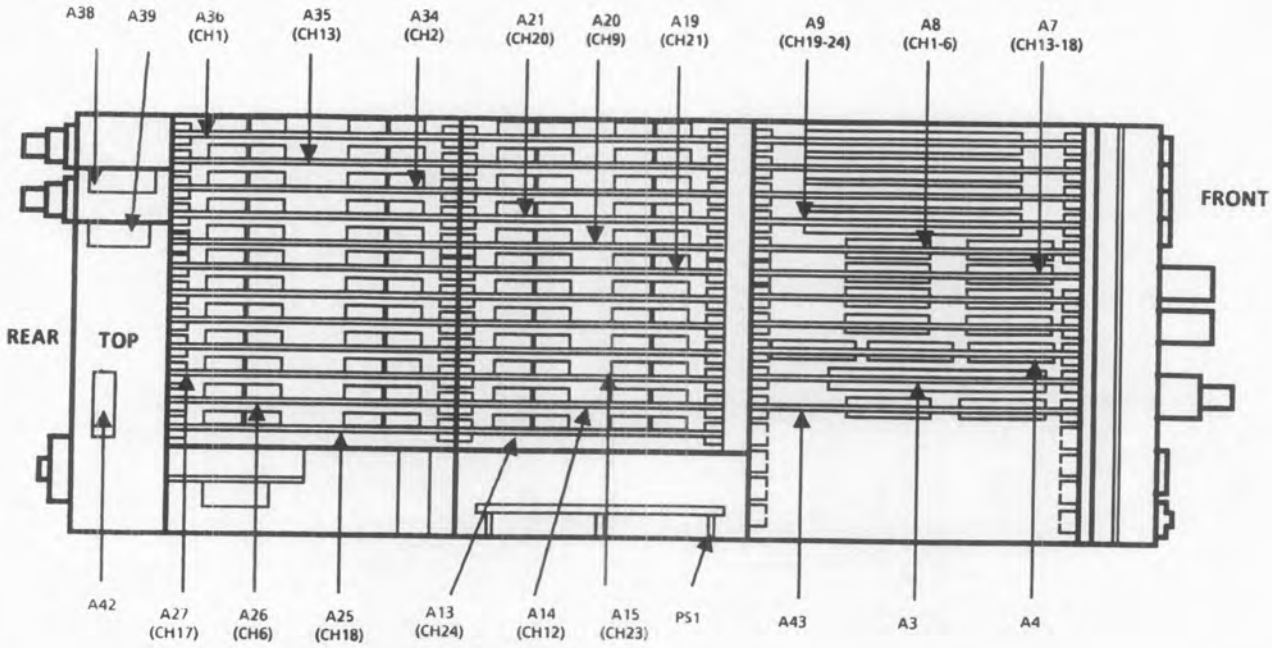
12 Channel Configuration

Figure 5-1. WJ-9548 Digital FDM Demultiplexer, Location of Assemblies (Sheet 1 of 3)



18 Channel Configuration

Figure 5-1. WJ-9548 Digital FDM Demultiplexer, Location of Assemblies (Sheet 2 of 3)



24 Channel Configuration

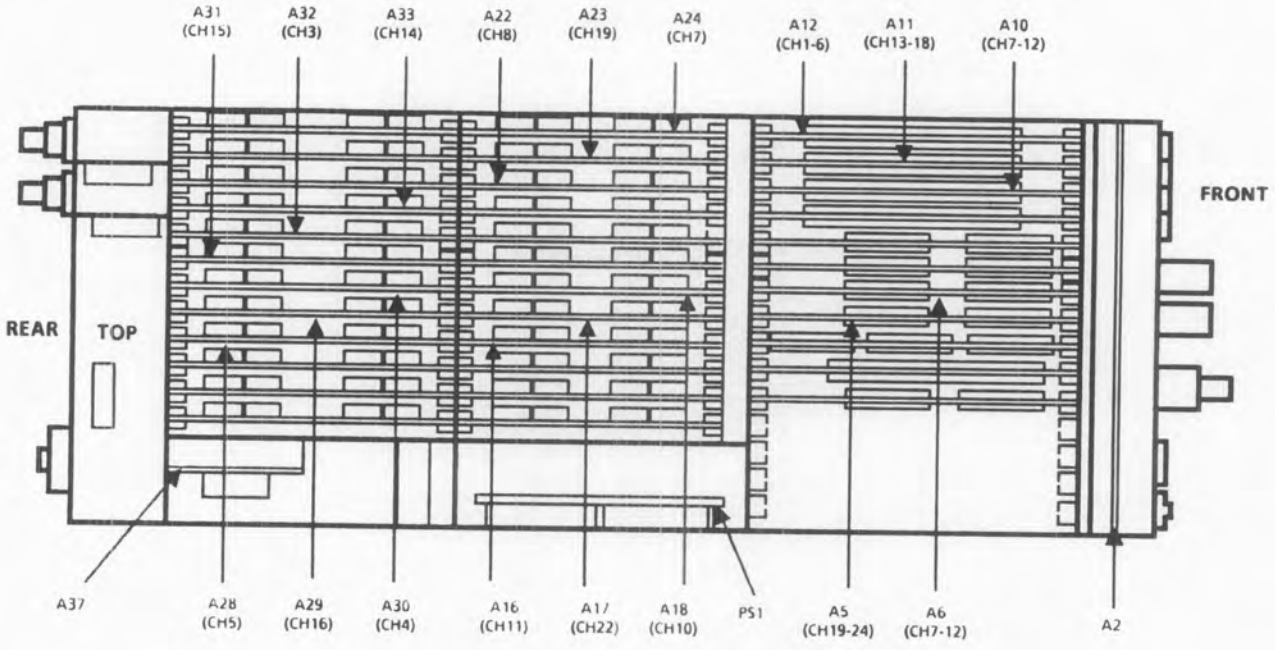


Figure 5-1. WJ-9548 Digital FDM Demultiplexer, Location of Assemblies (Sheet 3 of 3)

5.5 TYPE WJ-9548 DIGITAL FDM DEMULTIPLEXER

MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision R2				
A1	Motherboard Assembly	1	796821-1	14632	
A2	Front Panel Interface Assembly	1	796808-1	14632	
A3	Control Microprocessor PC Assembly	1	796816-3	14632	
A4	Bus Controller PC Assembly	1	796818-1	14632	
A5	DSP Demodulator PC Assembly	1-4	796812-1	14632	
A6 Thru A8	Same as A5				
A9	A/D Converter PC Assembly	1-4	796815-1	14632	
A10 Thru A12	Same as A9				
A13	Tuner PC Assembly	6-24	796804-1	14632	
A14 Thru A36	Same as A13				
A37	Reference Generator Assembly	1	796814-1	14632	
A38	Baseband Input Assembly (No.1 and No. 2 Inputs)	2	796802-1	14632	
A39	Same as A38 (No. 3 and No. 4 Inputs)				
A40	Not Used				
A41	Not Used				
A42	TDM Connector Interface Assembly	1	796819-1	14632	
A43	Remote Control Interface Assembly	1	796959-1	14632	
B1	Fan, Modified	1	382173-1	14632	
C1	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	2	34453-1	14632	
C2	Same as C1				
F1	Fuse, Slo-Blo, 1A	1	218001	75915	
FB1	Ferrite Bead	2	56-590-65-4A	02114	
FB2	Same as FB1				
FL1	Filter, Power	1	F5100CG03	91636	
J1	Part of FL1				
J2	Jack, Phone	1	L12B	82389	
J3	Connector, Receptacle (Part of W1)	1	554434-1	00779	
J4	Connector, Receptacle (Part of W2)	2	1-225398-5	00779	
J5	Same as J4 (Part of W3)				
J6	Part of A42				
J7	Part of A42				
J8 Thru J11	Part of A38				
J12 Thru J15	Part of A39				

MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
J16	Option Output No.1				
J17	Option Output No.2				
J18	Option Output No.3				
J19	Option Output No.4				
J20	Option Output No.5				
J21	Option Output No.6				
P1	Plug Assembly	1	282321-1	14632	
P2	Connector, Rib-Cable	1	CLG-1002-00101B-CER	53387	
P3	Connector, Plug, Multipin	1	102241-1	00779	
PS1	Power Supply PC Assembly	1	766022-1	14632	
R1	Resistor, Variable, Composition: 20 kΩ	1	28M939	01121	
S1	Switch, Rocker	1	DM24-J72-S2-05-Q-6	0CY71	
U1	Encoder, Modified	2	388EN-6P-DJ	12697	
U2	Same as U1				
U3	Keyboard Assembly, Front Panel	1	382012-1	14632	
U4	LCD, Modified	1	282336-1	14632	
W1	Cable Assembly	1	382169-1	14632	
W1P1	Connector, Plug	1	609-2430	15912	
W2	Cable Assembly	1	282302-1	14632	
W2P1	Connector, Plug, SMB	2	2105-7521-008	19505	
W3	Cable Assembly	1	282302-2	14632	
W3P1	Same as W2P1				
XF1	Fuseholder	1	345621	75915	
	Accessory Items				
AI-1	Cord, Line	1	17600	16428	
AI-2	Bracket, Center Support	1	280505-1	14632	
AI-3	Handle, 3.50	1	32306-5	14632	
AI-4	Bracket, Support	1	280504-1	14632	
AI-5	Handle, Rear	1	280507-1	14632	
AI-6	Handle Assembly, Rear	1	280507-2	14632	
AI-7	Cable Assembly, TDM Interconnect	1	481672-1	14632	

5.5.1 TYPE 796821-1 MOTHERBOARD ASSEMBLY

REF DESIG PREFIX A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision D1				
BT1	Battery, Lithium, 3.0 V	1	180867	14632	
C1	Capacitor, Tantalum: 68 µF, 20%, 6.3 V	5	841293-22	14632	
C2 Thru C5	Same as C1				
C6	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	8	34453-1	14632	
C7 Thru C13	Same as C6				
J1	Not Used				
J2	Connector, PC Board	1	3-102202-4	00779	
J3	Connector, Male Header	1	609-1037	15912	
J4	Connector, Male Header	1	609-2437	15912	
J5	Not Used				
J6	Connector, Male Header	1	104549-5	00779	
J7	Connector, Male Header	2	609-1637	15912	
J8	Same as J7				
J9	Not Used				
J10	Not Used				
P1	Flexible Cable Assembly 50 Pos.	1	282251-1	14632	
P2	Cable Plug Assembly	1	282326-1	14632	
RN1	Resistor, Network: 100 kΩ, 2%, .2 W	4	4306R-101-104	80294	
RN2 Thru RN4	Same as RN1				
RN5	Resistor, Network	4	4306R-101-103	80294	
RN6 Thru RN8	Same as RN5				
XA3	Connector, PC Board	5	236-21-100DS-23	26742	
XA4A	Connector, PC Board	10	236-21-050DS-23	26742	
XA4B	Connector, PC Board	7	236-21-060DS-23	26742	
XA4C	Same as XA4B				
XA5A	Same as XA4A				
XA5B	Same as XA4B				
XA6A	Same as XA4A				
XA6B	Same as XA4B				
XA7A	Same as XA4A				
XA7B	Same as XA4B				
XA8A	Same as XA4A				
XA8B	Same as XA4B				
XA9 Thru XA12	Same as XA3				
XA13A	Connector, Plug	72	PB-2W-P0316#01	55224	
XA13B	Same as XA13A				

REF DESIG PREFIX A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
XA13C	Connector, Plug	24	PB-2W-P0320#01	55224	
XA13D	Same as XA13A				
XA14A	Same as XA13A				
XA14B	Same as XA13A				
XA14C	Same as XA13C				
XA14D	Same as XA13A				
XA15A	Same as XA13A				
XA15B	Same as XA13A				
XA15C	Same as XA13C				
XA15D	Same as XA13A				
XA16A	Same as XA13A				
XA16B	Same as XA13A				
XA16C	Same as XA13C				
XA16D	Same as XA13A				
XA17A	Same as XA13A				
XA17B	Same as XA13A				
XA17C	Same as XA13C				
XA17D	Same as XA13A				
XA18A	Same as XA13A				
XA18B	Same as XA13A				
XA18C	Same as XA13C				
XA18D	Same as XA13A				
XA19A	Same as XA13A				
XA19B	Same as XA13A				
XA19C	Same as XA13C				
XA19D	Same as XA13A				
XA20A	Same as XA13A				
XA20B	Same as XA13A				
XA20C	Same as XA13C				
XA20D	Same as XA13A				
XA21A	Same as XA13A				
XA21B	Same as XA13A				
XA21C	Same as XA13C				
XA21D	Same as XA13A				
XA22A	Same as XA13A				
XA22B	Same as XA13A				
XA22C	Same as XA13C				
XA22D	Same as XA13A				
XA23A	Same as XA13A				
XA23B	Same as XA13A				
XA23C	Same as XA13C				

REF DESIG PREFIX A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
XA23D	Same as XA13A				
XA24A	Same as XA13A				
XA24B	Same as XA13A				
XA24C	Same as XA13C				
XA24D	Same as XA13A				
XA25A	Same as XA13A				
XA25B	Same as XA13A				
XA25C	Same as XA13C				
XA25D	Same as XA13A				
XA26A	Same as XA13A				
XA26B	Same as XA13A				
XA26C	Same as XA13C				
XA26D	Same as XA13A				
XA27A	Same as XA13A				
XA27B	Same as XA13A				
XA27C	Same as XA13C				
XA27D	Same as XA13A				
XA28A	Same as XA13A				
XA28B	Same as XA13A				
XA28C	Same as XA13C				
XA28D	Same as XA13A				
XA29A	Same as XA13A				
XA29B	Same as XA13A				
XA29C	Same as XA13C				
XA29D	Same as XA13A				
XA30A	Same as XA13A				
XA30B	Same as XA13A				
XA30C	Same as XA13C				
XA30D	Same as XA13A				
XA31A	Same as XA13A				
XA31B	Same as XA13A				
XA31C	Same as XA13C				
XA31D	Same as XA13A				
XA32A	Same as XA13A				
XA32B	Same as XA13A				
XA32C	Same as XA13C				
XA32D	Same as XA13A				
XA33A	Same as XA13A				
XA33B	Same as XA13A				
XA33C	Same as XA13C				
XA33D	Same as XA13A				

REF DESIG PREFIX A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
XA34A	Same as XA13A				
XA34B	Same as XA13A				
XA34C	Same as XA13C				
XA34D	Same as XA13A				
XA35A	Same as XA13A				
XA35B	Same as XA13A				
XA35C	Same as XA13C				
XA35D	Same as XA13A				
XA36A	Same as XA13A				
XA36B	Same as XA13A				
XA36C	Same as XA13C				
XA36D	Same as XA13A				
XA37	Connector, Modified	1	282252-1	14632	
XA43A	Same as XA4A				
XA43B	Same as XA4B				
XA44A	Same as XA4A				
XA44B	Connector, PC Board	4	236-21-030DS-23	26742	
XA45A	Same as XA4A				
XA45B	Same as XA44B				
XA46A	Same as XA4A				
XA46B	Same as XA44B				
XA47A	Same as XA4A				
XA47B	Same as XA44B				

5.5.2 TYPE 796808-1 FRONT PANEL INTERFACE ASSEMBLY REF DESIG PREFIX A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision A				
C1	Capacitor, Ceramic: .033 µF, 10%, 50 V	28	841415-022	14632	
C2	Same as C1				
C3	Capacitor, Ceramic: .10 µF, 10%, 50 VDC	1	841250-25	14632	
C4	Same as C1				
C5	Capacitor, Ceramic: 47 pF, 5%, 50 V	1	841415-005	14632	
C6 Thru C11	Same as C1				
C12	Capacitor, Tantalum: 4.7 µF, 20%, 10 V	1	841293-12	14632	
C13 Thru C20	Same as C1				
C21	Capacitor, Tantalum: 10 µF, 20%, 35 V	1	841293-17	14632	
C22	Capacitor, Tantalum: 22 µF, 20%, 20 V	1	841293-21	14632	
C23 Thru C27	Same as C1				
C28	Capacitor, Ceramic: 1000 pF, 10%, 50 V	6	841415-013	14632	
C29	Same as C1				
C30	Same as C28				
C31	Same as C1				
C32	Same as C28				
C33	Same as C28				
C34	Same as C1				
C35	Same as C28				
C36	Same as C28				
C37 Thru C39	Same as C1				
CR1	Diode	2	FDSO-1203.SO	27014	
CR2	Same as CR1				
J1	Connector, Header	1	BBL-111-G-F	55322	
J2	Connector, Header	1	104069-2	00779	
J3	Connector, OMNETIC	1	282320-1	14632	
P1	Cable Assembly	1	282134-1	14632	
Q1	Transistor	1	MMBT2222A	04713	
Q2	Transistor	1	MMBT2907ALT1	04713	
R1	Resistor, Fixed: 220Ω, 5%, .1 W	9	841414-057	14632	
R2	Same as R1				
R3	Resistor, Fixed: 10 kΩ, 5%, .1 W	8	841414-097	14632	
R4	Same as R1				
R5	Same as R1				
R6	Resistor, Fixed: 12 kΩ, 5%, .1 W	1	841414-099	14632	

REF DESIG PREFIX A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R7	Resistor, Fixed: 18 kΩ, 5%, .1 W	1	841414-103	14632	
R8 Thru R14	Same as R3				
R15	Resistor, Fixed: 47 kΩ, 5%, .1 W	2	841414-113	14632	
R16 Thru R18	Same as R1				
R19	Resistor, Fixed: 3.3 kΩ, 5%, .1 W	1	841414-085	14632	
R20	Same as R1				
R21	Same as R15				
R22	Same as R1				
U1	Integrated Circuit, Inverter	1	74HC04 S014	04713	
U2	Integrated Circuit, Encoder, 20 Key	1	MM74C923N	27014	
U3	Amplifier	1	TL062CD	27014	
U4	Integrated Circuit, RAM	1	HM6264ALFP	62786	
U5	Integrated Circuit, D/A Converter, 12 Bit	1	AD7545AKP	24355	
U6	Integrated Circuit, Multiplier	2	74HC257 S016	04713	
U7	Same as U6				
U8	Integrated Circuit, LCD Controller	1	HD61830AOOH	62786	
U9	Integrated Circuit, EPROM, Programmed	1	841486-1	14632	
U10	Integrated Circuit, Octal D-Type Flip-Flop	1	74HC377 S0L20	01295	
U11	Integrated Circuit, Quad Buffer	1	74HC125 S014	34371	
U12	Integrated Circuit, Dual D Flip-Flop	5	74HC74 S014	34371	
U13	Same as U12				
U14	Integrated Circuit, Comparator	1	74HC688 S0L20	02735	
U15	Integrated Circuit, Octal Tri-State Transceiver	1	74HC245 S0L20W	04713	
U16	Same as U12				
U17	Integrated Circuit, Triple 3-Input AND Gate	1	74HC11 S014	04713	
U18	Same as U12				
U19	Integrated Circuit, Inverter	1	74HC14 S014	02735	
U20	Integrated Circuit, 3-to-8 Line Decoder	2	74HC138 S016	02735	
U21	Integrated Circuit, Quad EX-OR Gate	2	74HC86 S014	04713	
U22	Same as U20				
U23	Integrated Circuit, Quad 2-Input OR Gate	1	74HC32 S014	02735	
U24	Same as U12				
U25	Same as U21				
U26	Integrated Circuit, Quad 2-Input NAND Gate	1	74HC00 S014	02735	
U27	Integrated Circuit, Bounce Eliminator	1	MC14490DW	04713	

5.5.3 TYPE 796816-3 CONTROL MICROPROCESSOR PC ASSEMBLY REF DESIG PREFIX A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision D2				
C1	Capacitor, Ceramic: .033 µF, 10%, 50 V	49	841415-022	14632	
C2 Thru C13	Same as C1				
C14	Capacitor, Ceramic: 47 pF, 5%, 50 V	4	841415-005	14632	
C15 Thru C26	Same as C1				
C27	Same as C14				
C28 Thru C42	Same as C1				
C43	Capacitor, Tantalum: 15 µF, 20%, 10 V	1	841293-18	14632	
C44 Thru C46	Same as C1				
C47	Capacitor, Tantalum: 6.8 µF, 20%, 6.3 V	1	841293-14	14632	
C48	Capacitor, Tantalum: 1.0 µF, 20%, 16 V	1	841293-04	14632	
C49	Same as C14				
C50	Same as C14				
C51 Thru C56	Same as C1				
CR1	Diode, Schottky	1	HSMS-2812-T31	28480	
J1	Connector, Plug	2	68705-102	22526	
J2	Connector, Header	1	68705-103	22526	
J3	Same as J1				
JP1	Connector, Header	2	68786-202	22526	
JP2	Same as JP1				
JW1	Not Used				
JW2	Jumper Wire	1	841417	14632	
Q1	Transistor, PNP	1	MMBT2907ALT1	04713	
R1	Resistor, Fixed: 100 kΩ, 5%, .1 W	57	841414-121	14632	
R2 Thru R31	Same as R1				
R32	Resistor, Fixed: 10 kΩ, 5%, .1 W	18	841414-097	14632	
R33	Same as R32				
R34 Thru R37	Same as R1				
R38 Thru R52	Same as R32				
R53 Thru R60	Same as R1				

REF DESIG PREFIX A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R61	Resistor, Fixed: 2.2 kΩ, 5%, .1 W	1	841414-081	14632	
R62	Resistor, Fixed: 10 MΩ, 5%, .1 W	1	841414-169	14632	
R63	Resistor, Fixed: 1 kΩ, 5%, .1 W	1	841414-073	14632	
R64 Thru R68	Same as R1				
R69	Same as R32				
R70	Resistor, Fixed: 1.5 kΩ, 5%, .1 W	1	841414-077	14632	
R71 Thru R79	Same as R1				
TP1	Not Used				
TP33	Connector, Terminal	1	929805-01-01-15	67129	
TP34	Connector, Terminal	1	929805-01-07-15	67129	
U1	Integrated Circuit, Microprocessor	1	HD68HC000CP8	62786	
U2	Integrated Circuit, Microprocessor	1	MAX693CWE	1ES66	
U3	Integrated Circuit, RAM	4	HM662256LFP-12SLT	9J979	
U4 Thru U6	Same as U3				
U7	Integrated Circuit	3	74HC165 S016	02735	
U8	Same as U7				
U9	Integrated Circuit, EPROM, Programmed	1	841679	14632	
U10	Same as U7				
U11	Integrated Circuit, EPROM, Programmed	1	841680	14632	
U12	Integrated Circuit, Decoder/Demultiplexer	1	74AC139 S016	34371	
U13	Integrated Circuit	1	AD7828LP	24355	
U14	Integrated Circuit, PAL, Programmed	1	841927	14632	
U15	Integrated Circuit, Octal Tri-state Tansceivers	2	74HCT245 S0L20	04713	
U16	Same as U15				
U17	Integrated Circuit, Decoder/Demultiplexer	1	74AC138 S016	34371	
U18	Integrated Circuit, Quad 2-Input OR Gate	3	74HC32 S014	02735	
U19	Integrated Circuit, Inverter	1	74HC04 S014	04713	
U20	Integrated Circuit, Dual 4-Input AND Gate	4	74HC21 S014	02735	
U21	Same as U20				
U22	Integrated Circuit, Up/Down Counter	2	74HC191 S016	02735	
U23	Integrated Circuit, Quad 2-Input AND Gate	1	74HC08 S014	02735	
U24	Integrated Circuit, Octal D-Type Flip-Flop	2	74HC574 S020	34371	
U25	Integrated Circuit, HEX Buffer/Line Driver	3	74HC367 S016	04713	
U26	Integrated Circuit, Realtime Clock	1	RTC-72423B	61722	
U27	Same as U18				
U28	Integrated, Binary Ripple Counter	1	74HC4020 S016	34371	
U29	Same as U24				
U30	Integrated Circuit, HEX Inverter	1	74AC04 S014	04713	
U31	Same as U25				
U32	Same as U25				

REF DESIG PREFIX A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U33	Same as U20				
U34	Same as U20				
U35	Integrated Circuit, Flip-Flop, D-Type	1	74HC174 S016	18722	
U36	Same as U18				
U37	Integrated Circuit, Encoder	1	74HC148 S016	50088	
U38	Integrated Circuit, Dual D-Type Flip-Flop	1	74HC74 S014	04713	
U39	Same as U22				
U40	Same as U29				
XU1	Socket, 68 positions	1	213-068-601	26742	
XU9	Socket, Receptacle, 16 positions	4	SL-116-G-11	55322	
Y1	Crystal, Quartz: 8 MHz CF	1	FPX-SM-8 MHZ	61429	

5.5.4 TYPE 796818-1 BUS CONTROLLER PC ASSEMBLY REF DESIG PREFIX A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision D1				
C1	Capacitor, Ceramic: .033 µF, 10%, 50 V	106	841415-022	14632	
C2 Thru C14	Same as C1				
C15	Capacitor, Ceramic: 150 pF, 5%, 50 V	2	841415-008	14632	
C16 Thru C24	Same as C1				
C25	Capacitor, Tantalum: 15 µF, 20%, 10 V	1	841293-18	14632	
C26	Same as C15				
C27 Thru C57	Same as C1				
C58	Not Used				
C59 Thru C65	Same as C1				
C66	Capacitor, Tantalum: 3.3 µF, 20%, 16 V	3	841293-10	14632	
C67	Same as C66				
C68 Thru C74	Same as C1				
C75	Capacitor, Tantalum: .33 µF, 20%, 35 V	2	841293-01	14632	
C76	Same as C1				
C77	Capacitor, Tantalum: 1.0 µF, 20%, 16 V	2	841293-04	14632	
C78 Thru C89	Same as C1				
C90	Capacitor, Ceramic: 1500 pF, 2%, 50 V	2	841416-077	14632	
C91 Thru C93	Same as C1				
C94	Same as C75				
C95	Same as C77				
C96	Same as C1				
C97	Capacitor, Ceramic: 10 pF, 5%, 50 V	1	841415-001	14632	
C98	Same as C90				
C99 Thru C118	Same as C1				
C119	Not Used				
C120	Same as C66				
C121	Same as C1				
CR1	Diode	1	HSMS-2810T31	28480	
E1	Clip, Edge	AR	C1218-D06-C-SOC	61127	
R1	Resistor, Fixed: 100 kΩ, 5%, .1 W	38	841414-121	14632	
R2	Same as R1				
R3	Same as R1				
R4	Resistor, Fixed: 30 kΩ, 5%, .1 W	6	841414-108	14632	

REF DESIG PREFIX A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R5	Same as R4				
R6	Same as R4				
R7 Thru R11	Same as R1				
R12	Resistor, Fixed: 15 kΩ, 5%, .1 W	2	841414-101	14632	
R13	Same as R4				
R14	Same as R4				
R15	Resistor, Fixed: 10 kΩ, 5%, .1 W	12	841414-097	14632	
R16	Same as R15				
R17	Same as R4				
R18	Same as R12				
R19	Same as R1				
R20	Resistor, Fixed: 1.0 kΩ, 5%, .1 W	2	841414-073	14632	
R21	Resistor, Fixed: 100Ω, 5%, .1 W	6	841414-049	14632	
R22	Same as R15				
R23 Thru R27	Same as R1				
R28	Resistor, Fixed: 18 kΩ, 5%, .1 W	2	841414-103	14632	
R29	Same as R1				
R30	Same as R21				
R31	Resistor, Fixed: 22Ω, 5%, .1 W	3	841414-033	14632	
R32	Same as R31				
R33	Same as R1				
R34	Same as R1				
R35	Same as R28				
R36	Same as R1				
R37	Same as R1				
R38	Same as R21				
R39	Same as R15				
R40	Same as R15				
R41	Same as R31				
R42	Same as R15				
R43	Same as R1				
R44	Same as R1				
R45 Thru R48	Same as R15				
R49 Thru R54	Same as R1				
R55	Resistor, Fixed: 47 kΩ, 5%, 1/10 W	2	841414-113	14632	
R56 Thru R60	Same as R1				

REF DESIG PREFIX A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R61	Same as R15				
R62	Same as R15				
R63	Same as R55				
R64	Same as R1				
R65	Same as R20				
R66 Thru R68	Same as R1				
R69	Same as R21				
R70	Same as R21				
R71	Same as R21				
R72	Not Used				
R73	Not Used				
R74	Varistor: 20 kΩ, ±20%, 1/4 W	2	3314G-1-203E	80294	
R75	Same as R74				
R76	Same as R1				
R77	Same as R1				
U1	Integrated Circuit, Octal Tri-state Transceiver	2	74HC245 S020	04713	
U2	Integrated Circuit, Comparator, 8-Bit	1	74HC688 S0L20	02735	
U3	Integrated Circuit, Flip-Flop, D-Type, Hex	7	74HC378 S016	01295	
U4	Same as U3				
U5	Integrated Circuit, Binary Down Counter	8	74HC40103 S016	34371	
U6	Integrated Circuit, D/A Converter, 12-Bit	2	AD7545AKP	24355	
U7	Amplifier, JFET	4	TL062CD	04713	
U8	Same as U5				
U9	Integrated Circuit, Hex Buffer/Line Driver	14	74HC367 S016	04713	
U10	Same as U3				
U11	Same as U5				
U12	Integrated Circuit, PAL, Programmable	2	841929	14632	
U13	Integrated Circuit, Quad Buffer/Line Driver	5	74HC125 S014	34371	
U14	Integrated Circuit, 3-to-8 Line Decoder	3	74HC138 S016	02735	
U15	Same as U13				
U16	Integrated Circuit, Addressable Latch, 8-Bit	5	74HC259 S016	04713	
U17	Same as U16				
U18	Integrated Circuit, Inverter, Hex	2	74HC04 S014	04713	
U19	Integrated Circuit, Precision Reference, Programmable	1	TL431CD	04713	
U20	Same as U6				
U21	Same as U7				
U22	Same as U5				
U23	Same as U14				
U24	Same as U14				
U25	Same as U3				
U26	Integrated Circuit, Shift Register	2	74HC164 S014	02735	
U27	Integrated Circuit, Quad 2-Input OR Gate	5	74HC32 S014	02735	

REF DESIG PREFIX A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U28	Integrated Circuit, Quad D-Type Flip-Flop	1	74HC175 S016	34371	
U29	Same as U13				
U30	Same as U16				
U31	Same as U3				
U32	Same as U9				
U33	Same as U16				
U34	Integrated Circuit, Quad D-Type Flip-Flop	2	74HC173 S016	04713	
U35	Integrated Circuit, Binary Ripple Counter	1	74HC393 S014	34371	
U36	Integrated Circuit, Dual D-Type Flip-Flop	9	74HC74 S014	04713	
U37	Same as U27				
U38	Same as U13				
U39	Same as U9				
U40	Same as U3				
U41 Thru U44	Same as U9				
U45	Integrated Circuit, Quad 2-Input EX-OR Gate	1	74HC86 S014	04713	
U46	Same as U16				
U47	Integrated Circuit, Binary Counters	1	74HC390 S016	02735	
U48	Same as U7				
U49	Integrated Circuit, Filter	2	TP3040V	27014	
U50	Same as U9				
U51	Same as U34				
U52	Same as U9				
U53	Integrated Circuit, Octal D-Type Flip-Flop	2	74HCT574 S0L20	34371	
U54	Integrated Circuit, HEX D-Type Flip-Flop	1	74HC174 S016	18722	
U55	Integrated Circuit, Quad 2-Input NAND Gate	1	74AC00 S014	02735	
U56	Same as U1				
U57 Thru U59	Same as U36				
U60	Same as U12				
U61	Same as U3				
U62	Same as U9				
U63	Same as U5				
U64	Integrator Circuit, Quad 2-Input OR Gate	1	74HCT32 S014	34371	
U65	Integrated Circuit, Quad 2-Input NAND Gate	2	74HC00 S014	02735	
U66	Integrated Circuit, Comparator	1	74HC85 S016	02735	
U67	Integrated Circuit, Decoder/Demultiplexer	1	74HC139 S016	04713	
U68	Integrated Circuit, Decoder	2	NE567D	18324	
U69	Same as U13				
U70	Same as U27				
U71	Same as U36				

REF DESIG PREFIX A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U72	Same as U5				
U73	Same as U36				
U74	Integrated Circuit, Quad 2-Input AND Gate	2	74HC08 S014	02735	
U75	Same as U7				
U76	Same as U65				
U77	Same as U5				
U78	Same as U27				
U79	Integrated Circuit, Multiplexer	1	74HC157 S016	04713	
U80	Same as U74				
U81	Integrated Circuit, Binary Counter, Synchronous	2	74HC161 S016	02735	
U82	Same as U68				
U83	Same as U27				
U84	Same as U9				
U85 Thru U87	Same as U36				
U88	Same as U26				
U89	Same as U18				
U90	Same as U81				
U91	Same as U49				
U92	Same as U53				
U93	Same as U5				
U94 Thru U96	Same as U9				

5.5.5 TYPE 796812-1 DSP DEMODULATOR PC ASSEMBLY REF DESIG PREFIX A5-A8

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision B1				
C1	Capacitor, Ceramic: .033 µF, 10%, 50 V	33	841415-022	14632	
C2 Thru C21	Same as C1				
C22 Thru C24	Not Used				
C25 Thru C28	Same as C1				
C29	Capacitor, Tantalum: 6.8 µF, 20%, 6.3 V	1	841293-14	14632	
C30	Same as C1				
C31	Capacitor, Tantalum: 2.2 µF, 20%, 20 V	2	841293-09	14632	
C32	Same as C31				
C33 Thru C39	Same as C1				
C40	Not Used				
C41	Not Used				
J1	Connector, Receptacle	1	68016-103	22526	
R1	Resistor, Fixed: 10 kΩ, 5%, .1 W	4	841414-097	14632	
R2	Same as R1				
R3	Same as R1				
R4	Not Used				
R5	Resistor, Fixed: 22Ω, 5%, .1 W	1	841414-033	14632	
R6	Resistor, Fixed: 100 kΩ, 5%, .1 W	25	841414-121	14632	
R7	Not Used				
R8 Thru R31	Same as R6				
R32	Not Used				
R33	Same as R1				
TP1	Connector, Terminal	3	929805-01-10-15	53387	
TP2	Same as TP1				
TP3	Same as TP1				
U1	Integrated Circuit, Processor, DSP	1	XSP56001FE27	04713	
U2	Integrated Circuit, RAM	4	67C4500-35NL	34335	
U3 Thru U5	Same as U2				
U6	Integrated Circuit, SRAM	6	MT5C6408DJ-35	6Y440	
U7 Thru U11	Same as U6				

REF DESIG PREFIX A5-A8

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U12	Integrated Circuit, Quad 2-Input OR Gate	1	74AC32 S014	34371	
U13	Integrated Circuit, Comparator	2	74HC85 S016	02735	
U14	Integrated Circuit, Quad 2-Input AND Gate	1	74HC08 S014	02735	
U15	Integrated Circuit, Quad 2-Input EX OR Gate	1	74HC86 S014	04713	
U16	Integrated Circuit, Quad 2-Input OR Gate	2	74HC32 S014	02735	
U17	Integrated Circuit, Dual D Flip-Flop	2	74HC74 S014	04713	
U18	Same as U13				
U19	Integrated Circuit, Quad Buffer/Line Driver	1	74HC125 S014	34371	
U20	Integrated Circuit, Line Driver	1	SN75155D	01295	
U21	Same as U17				
U22	Not Used				
U23	Integrated Circuit, Comparator	1	74HC688 S0L20	02735	
U24	Integrated Circuit, Decoder	1	74AC138 S016	34371	
U25	Integrated Circuit, Inverter	1	74HC04 S014	04713	
U26	Same as U16				
Y1	Not Used				

5.5.6 TYPE 796815-1 A/D CONVERTER PC ASSEMBLY

REF DESIG PREFIX **A9–A12**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision B				
C1	Capacitor, Ceramic: .033 µF, 10%, 50 V	85	841415-022	14632	
C2 Thru C4	Same as C1				
C5	Capacitor, Ceramic: 1000 pF, 2%, 50 V	6	841416-073	14632	
C6 Thru C9	Same as C1				
C10	Same as C5				
C11 Thru C14	Same as C1				
C15	Same as C5				
C16 Thru C19	Same as C1				
C20	Same as C5				
C21 Thru C24	Same as C1				
C25	Same as C5				
C26 Thru C29	Same as C1				
C30	Same as C5				
C31	Same as C1				
C32	Capacitor, Tantalum: 33 µF, 20%, 16 V	5	841293-22	14632	
C33 Thru C47	Same as C1				
C48	Capacitor, Ceramic: 330 pF, 5%, 50 V	6	841415-010	14632	
C49	Same as C1				
C50	Capacitor, Ceramic: 1.5 pF, .1 pF, 50 V	6	841416-005	14632	
C51	Same as C1				
C52	Same as C48				
C53	Same as C1				
C54	Same as C50				
C55	Same as C1				
C56	Same as C50				
C57	Same as C1				
C58	Same as C48				
C59 Thru C63	Same as C1				
C64	Same as C48				

REF DESIG PREFIX **A9–A12**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C65	Same as C50				
C66	Same as C1				
C67	Same as C1				
C68	Same as C50				
C69	Same as C1				
C70	Same as C48				
C71	Same as C1				
C72	Same as C1				
C73	Same as C48				
C74	Same as C50				
C75 Thru C81	Same as C1				
C82	Same as C32				
C83	Same as C1				
C84	Same as C1				
C85	Capacitor, Tantalum: 3.3 µF, 20%, 16 V	3	841293-10	14632	
C86	Same as C32				
C87 Thru C89	Same as C1				
C90	Capacitor, Ceramic: .022 µF, 10%, 50 VDC	6	841250-21	14632	
C91 Thru C98	Same as C1				
C99	Same as C85				
C100	Same as C1				
C101	Same as C1				
C102	Same as C32				
C103	Same as C32				
C104	Capacitor, Ceramic: 6800 pF, 10%, 50 V	6	841415-018	14632	
C105	Same as C85				
C106	Same as C90				
C107	Same as C104				
C108	Same as C90				
C109	Same as C1				
C110	Same as C1				
C111	Same as C90				
C112	Same as C1				
C113	Same as C90				
C114	Same as C1				
C115	Same as C104				
C116	Same as C90				

REF DESIG PREFIX **A9–A12**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C117 Thru C120	Same as C1				
C121 Thru C123	Same as C104				
CR1	Diode, Switch Pin	1	MMBD7000LT1	04713	
J1	Connector, Header	8	929805-01-02-15	67129	
J2 Thru J8	Same as J1				
L1	Inductor: 100 µH, 5%	2	841444-049	14632	
L2	Same as L1				
L3	Inductor: 4.7 µH, ±20%	2	B82422-A1472-M	25088	
L4	Same as L3				
L5	Inductor: 1000 µH, 10%	6	NLF453232-102K	7J069	
L6 Thru L10	Same as L5				
R1	Resistor, Fixed: 100 kΩ, 5%, .1 W	22	841414-121	14632	
R2	Same as R1				
R3	Resistor, Fixed: 10Ω, 5%, .1 W	12	841414-025	14632	
R4	Same as R3				
R5	Resistor, Fixed: 220Ω, 5%, .1 W	6	841414-057	14632	
R6	Same as R3				
R7	Same as R3				
R8	Same as R5				
R9	Same as R3				
R10	Same as R3				
R11	Same as R5				
R12	Same as R3				
R13	Same as R3				
R14	Same as R5				
R15	Same as R3				
R16	Same as R3				
R17	Same as R5				
R18	Same as R3				
R19	Same as R3				
R20	Same as R5				
R21 Thru R34	Same as R1				
R35	Resistor, Fixed: 3.3 kΩ, 5%, .1 W	6	841414-085	14632	
R36	Same as R35				
R37	Same as R35				

REF DESIG PREFIX **A9-A12**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R38 Thru R40	Same as R1				
R41 Thru R43	Same as R35				
R44	Same as R1				
R45	Resistor, Fixed: 10 kΩ, 5%, .1 W	21	841414-097	14632	
R46 Thru R48	Same as R45				
R49	Resistor, Fixed: 1.0 kΩ, 5%, .1 W	2	841414-073	14632	
R50	Same as R45				
R51	Resistor, Fixed: 100Ω, 5%, .1 W	1	841414-049	14632	
R52	Same as R1				
R53	Same as R45				
R54	Same as R1				
R55 Thru R64	Same as R45				
R65	Resistor, Fixed: 100Ω, 1%, 1/8 W	1	841311-016	14632	
R66	Same as R45				
R67	Resistor, Fixed: 3.92 kΩ, 1%, 1/8 W	1	841311-013	14632	
R68	Same as R45				
R69	Same as R49				
R70 Thru R72	Same as R45				
U1	Integrated Circuit, A/D Converter	6	CS5014-KL14	0A384	
U2 Thru U6	Same as U1				
U7	Integrated Circuit, Precision Reference, Programmable	1	TL431CD	04713	
U8	Integrated Circuit, PAL	6	841930	14632	
U9 Thru U13	Same as U8				
U14	Integrated Circuit, D/A Converter, 12-Bit	6	AD7545AKP	24355	
U15	Amplifier	6	MC34081D	04713	
U16	Same as U14				
U17	Same as U15				
U18	Same as U14				
U19	Same as U15				
U20	Integrated Circuit, Quad D-Type Flip-Flop	6	74HC173 S016	14632	
U21 Thru U25	Same as U20				

REF DESIG PREFIX A9–A12

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U26	Integrated Circuit, PAL	1	841931	14632	
U27	Integrated Circuit, PAL	1	841932	14632	
U28	Same as U14				
U29	Same as U15				
U30	Same as U14				
U31	Same as U15				
U32	Same as U14				
U33	Same as U15				
U34	Integrated Circuit, Quad Buffer/Line Driver	2	74HC125 S014	34371	
U35	Integrated Circuit, Quad 2-Input OR Gate	2	74HC32 S014	02735	
U36	Same as U35				
U37	Integrated Circuit, Inverter	1	74HC04 S014	04713	
U38	Integrated Circuit, CMOS, Comparator	1	74HC85 S016	02735	
U39	Integrated Circuit, CMOS, Buffer/Line Driver	3	74HC367 S016	04713	
U40	Same as U39				
U41	Same as U39				
U42	Integrated Circuit, CMOS, MUX/DMUX	2	74HC4053 S016	02735	
U43	Same as U42				
U44	Integrated Circuit, PAL	1	841933	14632	
U45	Same as U34				
U46	Integrated Circuit, CMOS, Quad 2-Input X-OR	1	74HC86 S014	04713	
U47	Integrated Circuit, 3-to-8 Decoder	1	74HC138 S016	02735	

5.5.7 TYPE 796804-1 TUNER PC ASSEMBLY

REF DESIG PREFIX A13-A36

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision K1				
C1	Capacitor, Ceramic: .01 µF, 10%, 50 V	73	841415-019	14632	
C2 Thru C10	Same as C1				
C11	Capacitor, Ceramic, Variable: 4-25 pF, ±100%	2	TZB04Z250BA006	72982	
C12	Not Used				
C13	Not Used				
C14	Same as C11				
C15 Thru C20	Same as C1				
C21	Capacitor, Ceramic: 27 pF, 2%, 50 V	1	841416-035	14632	
C22	Same as C1				
C23	Capacitor, Ceramic: 1000 pF, 10%, 50 V	6	841415-013	14632	
C24	Same as C1				
C25	Same as C1				
C26	Capacitor, Tantalum: 3.3 µF, 20%, 16 V	9	841293-10	14632	
C27 Thru C32	Same as C1				
C33	Same as C26				
C34	Same as C1				
C35	Same as C23				
C36	Same as C26				
C37	Same as C1				
C38	Same as C1				
C39	Same as C23				
C40	Same as C1				
C41	Same as C23				
C42	Same as C1				
C43	Capacitor, Tantalum: 6.8 µF, 20%, 6.3 V	8	841293-14	14632	
C44	Capacitor, Ceramic: 15 pF, 5%, 50 V	2	841415-002	14632	
C45	Capacitor, Ceramic: 6.8 pF, .25 pF, 50 V	1	841416-021	14632	
C46 Thru C50	Same as C1				
C51	Same as C26				
C52	Same as C1				
C53	Same as C43				
C54	Same as C26				
C55 Thru C58	Same as C1				
C59	Capacitor, Ceramic: .10 µF, 10%, 50 VDC	4	841250-25	14632	

REF DESIG PREFIX A13-A36

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C60 Thru C62	Same as C59				
C63	Same as C1				
C64	Same as C1				
C65	Same as C23				
C66	Same as C23				
C67	Same as C1				
C68	Same as C43				
C69	Same as C1				
C70	Capacitor, Tantalum: 68 µF, 20%, 6.3 V	8	841293-24	14632	
C71	Same as C1				
C72	Same as C1				
C73	Same as C43				
C74	Capacitor, Ceramic: 100 pF, 5%, 50 V	2	841415-007	14632	
C75	Same as C74				
C76 Thru C84	Same as C1				
C85	Capacitor, Ceramic: 470 pF, 5%, 50 V	3	841415-011	14632	
C86	Same as C44				
C87	Same as C1				
C88	Same as C70				
C89	Same as C1				
C90	Capacitor Ceramic: 47 pF, 5%, 50 V	2	841415-005	14632	
C91	Same as C90				
C92 Thru C96	Same as C1				
C97	Same as C70				
C98	Same as C1				
C99	Capacitor, Ceramic: .033 µF, 10%, 50 V	1	841415-022	14632	
C100	Same as C85				
C101	Same as C85				
C102 Thru C104	Same as C1				
C105	Not Used				
C106	Same as C26				
C107	Same as C1				
C108	Same as C1				
C109	Same as C26				
C110	Capacitor, Tantalum: 33 µF, 20%, 16 V	2	841293-22	14632	
C111	Same as C26				

REF DESIG PREFIX A13-A36

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C112	Same as C110				
C113	Same as C70				
C114	Same as C70				
C115	Same as C26				
C116	Same as C43				
C117	Same as C43				
C118	Same as C70				
C119	Same as C70				
C120	Same as C1				
C121	Same as C1				
C122	Same as C43				
C123	Same as C43				
C124	Same as C70				
C125 Thru C127	Same as C1				
CR1	Diode	3	HSMS-2810T31	28480	
CR2	Same as CR1				
CR3	Diode	3	MMBV109-L-T1	04713	
CR4	Same as CR1				
CR5	Same as CR3				
CR6	Diode, Switch Pin	5	MMBD700LT1	04713	
CR7	Same as CR3				
CR8 Thru CR11	Same as CR6				
FL1	Filter, Bandpass, CF = 30.008 MHz	1	92749	14632	
L1	Inductor: 4.7 µH, ±20%	8	B82422-A1472-M	25088	
L2*	Inductor: 1200 nH, ±5%	2	841438-001	14632	
L3*	Same as L2				
L4	Same as L1				
L5	Inductor: 1000 nH, ±15%	1	841438-049	14632	
L6	Inductor: 470 nH, ±5%	1	841438-041	14632	
L7	Not Used				
L8	Same as L1				
L9	Inductor: 100 nH, ±5%	1	841438-025	14632	
L10	Inductor: 82 nH, ±5%	2	841438-023	14632	
L11	Same as L1				
L12	Same as L1				
L13	Inductor: 120 nH, ±5%	1	841438-027	14632	
L14	Same as L10				
L15	Same as L1				
L16	Same as L1				

* Nominal Value, Final Value Factory Selected.

REF DESIG PREFIX A13–A36

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
L17	Inductor: 39 nH, ±5%	1	841438-015	14632	
L18	Inductor: 1000 µH, 10%	5	NLF453232-102K	54483	
L19 Thru L22	Same as L18				
L23	Same as L1				
P1	Connector, Socket	3	PB-2W-D2816#01	55224	
P2	Connector, Socket	1	PB-2W-D2820#01	55224	
P3	Same as P1				
P4	Same as P1				
Q1	Transistor	3	MMBT3904LT1	04713	
Q2	Transistor	2	MMBR901	04713	
Q3	Transistor	2	0ST310	17856	
Q4	Transistor	4	MMBTH81LT1	04713	
Q5 Thru Q7	Same as Q4				
Q8	Same as Q3				
Q9	Transistor	1	MMBR2857-LT1	04713	
Q10	Same as Q2				
Q11	Same as Q1				
Q12	Transistor	1	MTD10N05E	04713	
Q13	Same as Q1				
R1	Resistor, Fixed: 1.0 kΩ, 5%, .1 W	9	841414-073	14632	
R2	Resistor, Fixed: 680Ω, 5%, .1 W	8	841414-069	14632	
R3	Same as R2				
R4	Resistor, Fixed: 47Ω, 5%, .1 W	7	841414-041	14632	
R5	Same as R4				
R6	Resistor, Fixed: 33Ω, 5%, .1 W	1	841414-037	14632	
R7	Same as R1				
R8	Same as R4				
R9	Same as R4				
R10	Resistor, Fixed: 4.7 kΩ, 5%, .1 W	7	841414-089	14632	
R11	Resistor, Fixed: 3.3 kΩ, 5%, .1 W	5	841414-085	14632	
R12	Same as R4				
R13	Resistor, Fixed: 220Ω, 5%, .1 W	3	841414-057	14632	
R14	Resistor, Fixed: 56Ω, 5%, .1 W	2	841414-043	14632	
R15	Same as R11				
R16	Resistor, Fixed: 1.5 kΩ, 5%, .1 W	4	841414-077	14632	
R17	Resistor, Fixed: 22Ω, 5%, .1 W	2	841414-033	14632	
R18	Same as R11				
R19	Same as R16				
R20	Resistor, Fixed: 150Ω, 5%, .1 W	1	841414-053	14632	

REF DESIG PREFIX A13-A36

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R21	Resistor, Fixed: 470Ω, 5%, .1 W	5	841414-065	14632	
R22	Resistor, Fixed: 47 kΩ, 5%, .1 W	8	841414-113	14632	
R23	Resistor, Fixed: 1.0 MΩ, 5%, .1 W	2	841414-145	14632	
R24	Same as R1				
R25	Same as R1				
R26	Resistor, Fixed: 15 kΩ, 5%, .1 W	2	841414-101	14632	
R27	Resistor, Fixed: 100Ω, 5%, .1 W	4	841414-049	14632	
R28	Same as R10				
R29	Same as R21				
R30	Same as R4				
R31	Same as R1				
R32	Resistor, Fixed: 330Ω, 5%, .1 W	1	841414-061	14632	
R33	Same as R26				
R34	Same as R10				
R35 Thru R37	Same as R21				
R38	Resistor, Fixed: 220 kΩ, 5%, .1 W	3	841414-129	14632	
R39	Not Used				
R40	Same as R1				
R41	Same as R2				
R42	Same as R1				
R43	Same as R2				
R44	Same as R16				
R45	Same as R16				
R46	Resistor, Fixed: 10 kΩ, 5%, .1 W	4	841414-097	14632	
R47	Same as R46				
R48	Resistor, Fixed: 12 kΩ, 5%, .1 W	1	841414-099	14632	
R49	Resistor, Fixed: 270Ω, 5%, .1 W	2	841414-059	14632	
R50	Same as R49				
R51	Same as R46				
R52	Resistor, Fixed: 1.8 kΩ, 5%, .1 W	2	841414-079	14632	
R53	Same as R52				
R54	Same as R2				
R55	Same as R10				
R56	Same as R10				
R57	Same as R22				
R58	Not Used				
R59	Same as R22				
R60	Not Used				
R61 Thru R63	Same as R22				

REF DESIG PREFIX A13-A36

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R64	Same as R10				
R65	Resistor, Fixed: 2.2 kΩ, 5%, .1 W	2	841414-081	14632	
R66	Same as R10				
R67	Resistor, Fixed: 33 kΩ, 5%, .1 W	2	841414-109	14632	
R68	Resistor, Fixed: 100 kΩ, 5%, .1 W	3	841414-121	14632	
R69	Same as R27				
R70	Same as R46				
R71	Same as R27				
R72	Same as R14				
R73	Resistor, Fixed: 221Ω, 1%	1	841311-017	14632	
R74	Same as R1				
R75	Same as R17				
R76	Same as R38				
R77	Same as R11				
R78	Resistor, Fixed: 68Ω, 5%, .1 W	1	841414-045	14632	
R79	Same as R68				
R80	Same as R68				
R81	Same as R13				
R82	Same as R13				
R83	Same as R27				
R84	Same as R38				
R85	Same as R2				
R86	Same as R22				
R87	Same as R2				
R88	Same as R1				
R89	Same as R67				
R90	Same as R23				
R91	Same as R2				
R92	Same as R22				
R93	Same as R4				
R94	Same as R65				
R95	Resistor, Fixed: 4.7Ω, 5%, .1 W	1	841414-017	14632	
R96	Resistor, Fixed: 2.7 kΩ, 5%, .1 W	1	841414-083	14632	
R97	Same as R11				
U1	Integrated Circuit, Wideband Video Multiplexer	1	DG538DN	17856	
U2	Integrated Circuit, Quad Buffer/Line Driver	1	74HC125 SO14	34371	
U3	Integrated Circuit, 3-to-8 Line Decoder	1	74HC238 SO16	02735	
U4	Integrated Circuit, Comparator	1	74HC688 SOL20	02735	
U5	Integrated Circuit, Shift Latch	1	74HC4094 SO16	34371	
U6	Amplifier	1	LM6361M	27014	
U7	Mixer, Balanced, DC-1000 MHz	2	RMS-1	15542	

REF DESIG PREFIX A13-A36

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U8	Amplifier	2	MSA-0711	24539	
U9	Same as U8				
U10	Same as U7				
U11	Amplifier	3	NE5534D	18324	
U12	Integrated Circuit, Dual D-Type Flip-Flop	2	74AC74 SO14	02735	
U13	Integrated Circuit, Quad 2-Input NAND Gate	1	74AC00 SO14	02735	
U14	Same as U11				
U15	Amplifier	1	MC34002D	04713	
U16	Mixer, Balanced, Double	1	NE602D	18324	
U17	Integrated Circuit, PLL	2	MC145158DW-2	04713	
U18	Integrated Circuit, Divider, 10/11	1	SP8799/MP	53469	
U19	Same as U11				
U20	Same as U17				
U21	Amplifier	2	TL061CD	04713	
U22	Integrated Circuit, Divider, 32/33	1	SP8795/MP	53469	
U23	Integrated Circuit, Divider, 80/81	1	SP8792/MP	53469	
U24	Integrated Circuit, Dual J-K Flip-Flops	1	SN74AS109D	01295	
U25	Same as U21				
U26	Same as U12				
VR1	Diode, Zener	2	MMBZ5235BLT1	04713	
VR2	Same as VR1				

5.5.8 TYPE 796814-1 REFERENCE GENERATOR PC ASSEMBLY REF DESIG PREFIX A37

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision D2				
C1	Capacitor, Ceramic: .01 µF, 10%, 50 V	36	841415-019	14632	
C2 Thru C5	Same as C1				
C6	Capacitor, Tantalum: 3.3 µF, 20%, 16 V	3	841293-10	14632	
C7	Not Used				
C8	Not Used				
C9	Capacitor, Ceramic: .10 µF, 10%, 50 VDC	4	841250-25	14632	
C10	Same as C9				
C11	Same as C1				
C12	Same as C1				
C13	Capacitor, Ceramic: 4.7 pF, .1 pF, 50 V	1	841416-017	14632	
C14	Same as C1				
C15	Not Used				
C16	Not Used				
C17	Capacitor, Ceramic, Variable: 2-6 pF, ±50%, 50 VDC	1	TZB04Z060BA006	72982	
C18	Capacitor, Ceramic: 27 pF, 2%, 50 V	1	841416-035	14632	
C19	Capacitor, Ceramic: 68 pF, 5%, 50 V	1	841415-006	14632	
C20 Thru C23	Same as C1				
C24	Same as C9				
C25	Same as C9				
C26	Same as C1				
C27	Same as C1				
C28	Capacitor, Ceramic: 180 pF, 2%, 50 V	1	841416-055	14632	
C29	Capacitor, Ceramic: 33 pF, 2%, 50 V	1	841416-037	14632	
C30	Same as C6				
C31	Same as C1				
C32	Same as C1				
C33	Same as C6				
C34 Thru C37	Same as C1				
C38	Capacitor, Tantalum: 68 µF, 20%, 6.3 V	4	841293-24	14632	
C39	Same as C38				
C40	Same as C1				
C41	Capacitor, Tantalum: 33 µF, 20%, 16 V	2	841293-22	14632	
C42	Same as C41				
C43 Thru C48	Same as C1				
C49	Capacitor, Ceramic: 470 pF, 5%, 50 V	1	841415-011	14632	

REF DESIG PREFIX **A37**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C50 Thru C55	Same as C1				
C56	Capacitor, Tantalum: 6.8 µF, 20%, 6.3 V	1	841293-14	14632	
C57	Same as C1				
C58	Same as C1				
C59	Capacitor, Ceramic: 150 pF, 2%, 50 V	1	841416-053	14632	
C60	Not Used				
C61	Same as C38				
C62	Same as C1				
C63	Capacitor, Ceramic: 56 pF, 2%, 50 V	1	841416-043	14632	
C64	Same as C38				
CR1	Diode, Switch Pin	6	MMBD700LT1	04713	
CR2 Thru CR4	Same as CR1				
CR5	Diode	1	MMBV109-L-T1	04713	
CR6	Same as CR1				
CR7	Same as CR1				
J1	Connector, Receptacle	2	2009-7511-000	19505	
J2	Same as J1				
L1	Inductor: 1000 nH, ±15%	2	841438-049	14632	
L2	Inductor: 1800 nH, ±5%	1	841438-055	14632	
L3	Inductor: 4.7 µH, ±20%	1	B82422-A1472-M	25088	
L4	Same as L1				
P1	Connector, Plug	1	66527-015	22526	
Q1	Transistor	8	MMBT3904LT1	04713	
Q2	Not Used				
Q3	Same as Q1				
Q4	Same as Q1				
Q5	Transistor	1	2N7002	17856	
Q6	Same as Q1				
Q7	Transistor	2	MMBT-3906	04713	
Q8 Thru Q10	Same as Q1				
Q11	Transistor	1	MTD10N05E	04713	
Q12	Transistor	1	MTD2955	04713	
Q13	Same as Q7				
Q14	Same as Q1				
R1	Resistor, Fixed	8	841414-069	14632	
R2	Resistor, Fixed: 1.0 kΩ, 5%, .1 W	4	841414-073	14632	
R3	Same as R1				
R4	Same as R1				
R5	Resistor, Fixed: 100 kΩ, 5%, .1 W	13	841414-121	14632	

REF DESIG PREFIX A37

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R6	Same as R5				
R7	Same as R2				
R8	Resistor, Fixed: 15 kΩ, 5%, .1 W	2	841414-101	14632	
R9	Resistor, Fixed: 10 kΩ, 5%, .1 W	9	841414-097	14632	
R10	Resistor, Fixed: 4.7 MΩ, 5%, .1 W	1	841414-161	14632	
R11	Same as R9				
R12	Resistor, Fixed: 1.5 kΩ, 5%, .1 W	5	841414-149	14632	
R13	Same as R5				
R14	Resistor, Fixed: 2.2 MΩ, 5%, .1 W	1	841414-153	14632	
R15	Resistor, Fixed: 47 kΩ, 5%, .1 W	2	841414-113	14632	
R16	Resistor, Fixed: 1.0 MΩ, 5%, .1 W	2	841414-145	14632	
R17	Resistor, Fixed: 68 kΩ, 5%, .1 W	2	841414-117	14632	
R18	Same as R17				
R19	Same as R12				
R20	Same as R12				
R21 Thru R24	Same as R5				
R25	Resistor, Fixed: 22 kΩ, 5%, .1 W	3	841414-105	14632	
R26	Same as R25				
R27	Not Used				
R28	Same as R5				
R29	Same as R2				
R30	Same as R5				
R31 Thru R34	Same as R1				
R35	Resistor, Fixed: 220 kΩ, 5%, .1 W	2	841414-129	14632	
R36	Same as R35				
R37	Same as R12				
R38	Same as R12				
R39	Same as R15				
R40	Same as R9				
R41	Same as R5				
R42	Same as R5				
R43	Resistor, Fixed: 470Ω, 5%, .1 W	1	841414-065	14632	
R44	Resistor, Fixed: 100Ω, 5%, .1 W	4	841414-049	14632	
R45	Resistor, Fixed: 6.8 kΩ, 5%, .1 W	1	841414-093	14632	
R46	Same as R25				
R47	Same as R8				
R48	Same as R5				
R49	Same as R44				
R50	Resistor, Fixed: 33 kΩ, 5%, .1 W	1	841414-109	14632	

REF DESIG PREFIX **A37**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R51	Same as R16				
R52	Same as R9				
R53	Resistor, Fixed: 680 kΩ, 5%, .1 W	1	841414-141	14632	
R54 Thru R56	Same as R9				
R57	Resistor, Fixed: 3.3 kΩ, 5%, .1 W	2	841414-085	14632	
R58	Same as R44				
R59	Same as R44				
R60	Varistor: 10 kΩ, 10%, 1/4 W	1	3272C-1-103	80294	
R61	Same as R9				
R62	Resistor, Fixed: 220Ω, 5%, .1 W	2	841414-057	14632	
R63	Same as R62				
R64	Same as R1				
R65	Resistor, Fixed: 2.2 kΩ, 5%, .1 W	1	841414-081	14632	
R66	Resistor, Fixed: 33Ω, 5%, .1 W	1	841414-037	14632	
R67	Same as R2				
R68	Resistor, Fixed: 47Ω, 5%, .1 W	1	841414-041	14632	
R69	Same as R57				
R70	Resistor, Fixed: 3.3Ω, 5%, .1 W	1	841414-013	14632	
R71	Same as R9				
R72	Resistor, Fixed: 4.7 kΩ, 5%, .1 W	1	841414-089	14632	
R73	Resistor, Fixed: 10Ω, 5%, .1 W	2	841414-025	14632	
R74	Jumper .05Ω	1	841417	14632	
R75	Same as R5	1	841417	14632	
R76	Same as R73				
U1	Integrated Circuit, Quad 2-Input NAND Gate	1	74HC00 S014	02735	
U2	Not Used				
U3	Integrated Circuit, HEX Buffer/Line Driver	1	74HC365 S016	18324	
U4	Integrated Circuit, Shift Latch	1	74HC4094 S016	34371	
U5	Not Used				
U6	Amplifier	4	TL061CD	04713	
U7	Same as U6				
U8	Not Used				
U9	Integrated Circuit, Quad 2-Input OR Gate	1	74HC32 S014	02735	
U10	Not Used				
U11	Integrated Circuit, Quad 2-Input NAND Gate	2	74AC00 SO14	02735	
U12	Integrated Circuit, Decode and Binary Counter	1	74HC390 S016	02735	
U13	Integrated Circuit, Quad 2-Input EX-OR Gate	1	74AC86 S014	34371	
U14	Not Used				

REF DESIG PREFIX A37

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U15	Same as U6				
U16	Same as U11				
U17	Integrated Circuit, Dual D-Type Flip-Flop	1	74AC74 SO14	02735	
U18	Integrated Circuit, PLL	2	MC145151FN-2	04713	
U19	Same as U18				
U20	Same as U6				
U21	Amplifier	1	NE5534D	18324	
U22	Integrated Circuit, Precision Reference, Programmable	1	TL431CD	04713	
U23	Crystal, TC VCXO: 10 MHz	1	92664	14632	
Y1	Crystal, Quartz: 20.480 MHz	1	92567	14632	

5.5.9 TYPE 796802-1 BASEBAND INPUT ASSEMBLY REF DESIG PREFIX A38-A39

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision E1				
C1	Capacitor, Tantalum: 3.3 µF, 20%, 16 V	16	841293-10	14632	
C2	Capacitor, Ceramic: .047 µF, 10%, 50 VDC	6	841250-023	14632	
C3	Capacitor, Ceramic: .01 µF, 10%, 50 V	13	841415-019	14632	
C4	Capacitor, Ceramic: 62 pF, 2%, 50 V	2	841416-044	14632	
C5	Capacitor, Ceramic: 27 pF, 2%, 50 V	2	841416-035	14632	
C6	Capacitor, Ceramic: 150 pF, 2%, 50 V	2	841416-053	14632	
C7	Capacitor, Ceramic: 51 pF, 2%, 50 V	2	841416-042	14632	
C8	Capacitor, Ceramic: 130 pF, 2%, 50 V	2	841416-052	14632	
C9	Capacitor, Ceramic: 68 pF, 2%, 50 V	2	841416-045	14632	
C10	Same as C2				
C11	Same as C3				
C12	Same as C2				
C13	Same as C3				
C14	Same as C1				
C15	Same as C3				
C16	Same as C1				
C17	Same as C2				
C18	Same as C3				
C19	Same as C2				
C20	Same as C3				
C21	Same as C1				
C22	Same as C3				
C23	Same as C2				
C24	Same as C3				
C25	Same as C4				
C26	Same as C5				
C27	Same as C6				
C28	Same as C7				
C29	Same as C8				
C30	Same as C9				
C31	Same as C3				
C32 Thru C35	Same as C1				
C36	Capacitor, Tantalum: 68 µF, 20%, 6.3 V	2	841293-24	14632	
C37	Capacitor, Tantalum: 6.8 µF, 20%, 6.3 V	2	841293-14	14632	
C38	Same as C1				
C39	Same as C1				
C40	Same as C36				
C41	Same as C37				
C42	Same as C1				

REF DESIG PREFIX A38-A39

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C43	Same as C1				
C44	Same as C3				
C45 Thru C48	Same as C1				
C49 Thru C51	Same as C3				
CR1	Diode, Switch Pin	8	MMBD700LT1	04713	
CR2	Diode	4	HSMS-2810T31	28480	
CR3	Same as CR1				
CR4	Same as CR2				
CR5	Same as CR2				
CR6	Not Used				
CR7	Same as CR2				
CR8	Not Used				
CR9	Same as CR1				
CR10	Not Used				
CR11 Thru CR15	Same as CR1				
E1	Connector, Rib-Cable	1	609-1653	15912	
J1	Connector, Jack, BNC	4	227677-1	00779	
J2 Thru J4	Same as J1				
L1	Inductor: 560 nH, ±5%	4	841438-043	14632	
L2 Thru L4	Same as L1				
L5	Inductor: 4.7 µH, ±20%	4	B82422-A1472-M	25088	
L6 Thru L8	Same as L5				
P1	Connector, Rib-Cable	1	609-1630	15912	
Q1	Transistor	2	MMBT3904LT1	04713	
Q2	Same as Q1				
Q3	Transistor	2	MTD10N05E	04713	
Q4	Same as Q3				
R1	Resistor, Fixed: 82Ω, 5%, .1 W	2	841414-047	14632	
R2	Resistor, Fixed: 180Ω, 5%, .1 W	2	841414-055	14632	
R3	Resistor, Fixed: 1.0 kΩ, 5%, .1 W	8	841414-073	14632	
R4	Resistor, Fixed: 220Ω, 5%, .1 W	4	841414-057	14632	
R5	Resistor, Fixed: 270Ω, 5%, .1 W	6	841414-059	14632	
R6	Resistor, Fixed: 68Ω, 5%, .1 W	6	841414-045	14632	
R7	Same as R6				
R8	Resistor, Fixed: 1.5 kΩ, 5%, .1 W	4	841414-077	14632	

REF DESIG PREFIX **A38-A39**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R9	Resistor, Fixed: 120Ω, 5%, .1 W	2	841414-051	14632	
R10	Same as R4				
R11	Same as R5				
R12	Not Used				
R13	Not Used				
R14	Same as R8				
R15	Resistor, Fixed: 150Ω, 5%, .1 W	2	841414-053	14632	
R16	Same as R5				
R17	Same as R3				
R18	Resistor, Fixed: 100Ω, 5%, .1 W	2	841414-049	14632	
R19	Resistor, Fixed: 3.3Ω, 5%, .1 W	14	841414-013	14632	
R20	Same as R1				
R21	Same as R4				
R22	Same as R5				
R23	Not Used				
R24	Not Used				
R25	Same as R8				
R26	Same as R15				
R27	Same as R5				
R28	Same as R3				
R29	Same as R18				
R30	Same as R19				
R31	Same as R2				
R32	Same as R3				
R33	Same as R4				
R34	Same as R5				
R35	Same as R6				
R36	Same as R6				
R37	Same as R8				
R38	Same as R9				
R39	Not Used				
R40	Not Used				
R41	Resistor, Fixed: 680 kΩ, 5%, .1 W	4	841414-141	14632	
R42	Resistor, Fixed: 33 kΩ, 5%, .1 W	4	841414-109	14632	
R43	Resistor, Fixed: 15 kΩ, 5%, .1 W	2	841414-101	14632	
R44	Resistor, Fixed: 10 kΩ, 5%, .1 W	2	841414-097	14632	
R45	Same as R6				
R46	Same as R41				
R47	Same as R42				
R48	Same as R43				
R49	Same as R44				

REF DESIG PREFIX **A38-A39**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R50	Same as R6				
R51	Resistor, Fixed: 100 kΩ, 5%, .1 W	4	841414-121	14632	
R52	Same as R51				
R53	Same as R51				
R54	Same as R41				
R55	Same as R3				
R56	Resistor, Fixed: 1.5 MΩ, 5%, .1 W	4	841414-149	14632	
R57	Same as R56				
R58	Not Used				
R59	Resistor, Fixed: 10 MΩ, 5%, .1 W	2	841414-169	14632	
R60	Same as R51				
R61	Same as R41				
R62	Same as R3				
R63	Same as R56				
R64	Same as R56				
R65	Not Used				
R66	Same as R59				
R67	Resistor, Fixed: 1.0 MΩ, 5%, .1 W	2	841414-145	14632	
R68	Same as R42				
R69	Same as R3				
R70	Same as R67				
R71	Same as R42				
R72	Same as R3				
R73	Varistor: 500Ω, ±10%, 1/2 W	2	3325X-1-501	80294	
R74 Thru R85	Same as R19				
R86	Same as R73				
TP12	Test Jack	2	SPCJ-123-02	30035	
TP24	Same as TP12				
U1	Amplifier	6	CLC400AJE	62839	
U2	Same as U1				
U3	Isolator, Dual Element, LED	2	VTL5C4/2	18178	
U4 Thru U6	Same as U1				
U7	Same as U3				
U8	Same as U1				
U9	Amplifier	3	TL062CD	04713	
U10	Same as U9				
U11	Same as U9				

5.5.10 TYPE 796819-1 TDM CONNECTOR INTERFACE ASSEMBLY REF DESIG PREFIX A42

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision B1				
A1	TDM Connector Interface PC Assembly	1	382151-1	14632	
A2	TDM Input/Output Connector PC Assembly	1	382152-1	14632	

5.5.10.1 Type 382151-1 TDM Connector Interface PC Assembly REF DESIG PREFIX A42A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision C1				
C1	Capacitor, Ceramic: .033 µF, 10%, 50 V	4	841415-022	14632	
C2 Thru C4	Same as C1				
C5	Capacitor, Tantalum: 3.3 µF, 20%, 16 V	1	841293-10	14632	
CR1	Diode	3	HSMS-2810T31	28480	
CR2	Rectifier, Schottky	1	MBRD650CT	04713	
CR3	Same as CR1				
CR4	Same as CR1				
DS1	Lamp	1	OL381BP-RA	9AA32	
P1	Connector, Header, 15 pin	2	BBL-115-G-E	55322	
P2	Same as P1				
P3	Cable Assembly, Flexible, 30 position	1	282271-1	14632	
Q1	Transistor	1	MMBT2222ALT1	04713	
R1	Resistor, Fixed: 220Ω, 5%, .1 W	1	841414-057	14632	
R2	Resistor, Fixed: 100 kΩ, 5%, .1 W	29	841414-121	14632	
R3 Thru R7	Same as R2				
R8	Resistor, Fixed: 10 kΩ, 5%, .1 W	2	841414-097	14632	
R9 Thru R26	Same as R2				
R27	Resistor, Fixed: 22Ω, 5%, .1 W	38	841414-033	14632	
R28 Thru R58	Same as R27				
R59 Thru R62	Same as R2				
R63 Thru R68	Same as R27				
R69	Same as R2				
R70	Same as R8				
R71	Resistor, Fixed: 22 kΩ, 5%, .1 W	1	841414-105	14632	
U1	Integrated Circuit, HEX Buffer/Line Driver	1	74HC367 SO16	04713	
U2	Integrated Circuit, Transceiver, Bidirectional	2	74AC245 S020	04713	
U3	Same as U2				
U4	Integrated Circuit, Quad Bus Transceiver	1	74HC243 SO14	02735	

5.5.10.2 **Type 382152-1 TDM Input/Output Connector PC Assembly**

REF DESIG PREFIX **A42A2**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision A				
J1	Socket, PC MT	2	SL-115-G-11	55322	
J2	Same as J1				
J3	Connector, Receptacle	2	10250-6202JL	55387	
J4	Same as J3				
RN1	Resistor Network: 100 kΩ, 2%, .2 W	4	4306R-101-104	80294	
RN2 Thru RN4	Same as RN1				

5.5.11 TYPE 796959-1 REMOTE CONTROL INTERFACE PC ASSEMBLY

REF DESIG PREFIX A43

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision D1				
C1	Capacitor, Ceramic: .033 µF, 10%, 50 V	35	841415-022	14632	
C2 Thru C20	Same as C1				
C22	Capacitor, Tantalum: 15 µF, 20%, 10 V	1	841293-18	14632	
C23	Same as C1				
C24	Capacitor, Tantalum: 1.0 µF, 20%, 16 V	2	841293-04	14632	
C25	Same as C24				
C26	Same as C1				
C27	Same as C1				
C28	Capacitor, Ceramic: 22 pF, 5%, 50 V, NPO	2	841415-003	14632	
C29	Same as C28				
C30 Thru C39	Same as C1				
C40	Not Used				
C41	Not Used				
C42 Thru C45	Same as C1				
C46	Not Used				
C47	Not Used				
C48	Same as C1				
CR1	Dual Switching Diode	1	MMBD7000LT1	04713	
R1	Resistor, Fixed: 10 kΩ, 5%, .1 W	4	841414-097	14632	
R2	Resistor, Fixed: 220Ω, 5%, .1 W	1	841414-057	14632	
R3	Resistor, Fixed: 100 kΩ, 5%, .1 W	51	841414-121	14632	
R4	Same as R3				
R5	Same as R3				
R6	Same as R1				
R7 Thru R19	Same as R3				
R20	Resistor, Fixed: 10 MΩ, 5%, .1 W	1	841414-169	14632	
R21 Thru R28	Same as R3				
R29	Same as R1				
R30	Same as R1				
R31 Thru R50	Same as R3				
R51	Not Used				
R52	Not Used				

REF DESIG PREFIX **A43**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R53 Thru R57	Same as R3				
R58	Not Used				
R59	Same as R3				
R60	Same as R3				
S1	Switch, DIP, 5-Position	5	ADP-05SA	95146	
S2 Thru S5	Same as S1				
U1	Integrated Circuit, RAM, 32K	2	IDT71342LA-70J	61772	
U2	Integrated Circuit, Decoder/DMUX	2	74AC139 SO16	34371	
U3	Integrated Circuit, Quad 2-Input OR Gate	2	74AC32 SO14	34371	
U4	Integrated Circuit, Dual D-Type Flip-Flop	2	74HC74 SO14	04713	
U5	Integrated Circuit, Hex Buffer/Line Driver	6	74HC365 SO16	07029	
U6	Integrated Circuit, Hex Inverter	1	74AC04 SO14	04713	
U7	Same as U2				
U8	Integrated Circuit, 3-to-8 Decoder/DMUX	1	74AC138 SO16	34371	
U9	Same as U5				
U10	Same as U3				
U11	Integrated Circuit, Microcontroller Unit	1	MC68HC11A0FN	04713	
U12	Integrated Circuit, Dual D-Type Transp. Latch	1	74HC573 SOL20	18722	
U13	Same as U1				
U14	Same as U4				
U15	Same as U5				
U16	Integrated Circuit, GPIB Interface	1	TMS9914AFNL	01295	
U17	Same as U5				
U18	Integrated Circuit, Octal Tri-State XCVR	2	74HC245 SOL20	04713	
U19	Same as U18				
U20	Same as U5				
U21	Same as U5				
U22	Integrated Circuit, Quad Buffer/Line Driver	1	74HC125 SO14	34371	
U23	Integrated Circuit, 2-Input AND Gate	1	74HC08 SO14	02735	
U24	Integrated Circuit, 8-CH Directional XCVR	1	SN75ALS160DW	01295	
U25	Integrated Circuit, XCVR Control Bus Intfc.	1	SN75ALS161DW	01295	
U28	Integrated Circuit, ULINE Driver/Receiver	2	SN75155D	01295	
U29	Integrated Circuit, EPROM, Programmed	1	841707	14632	
U30	Integrated Circuit, CMOS, RAM, Static	1	HM62256LFP-12SLT	9J979	
U31	Integrated Circuit, Quad 2-Input NAND Gate	1	74AC00 SO14	02735	
U32	Not Used				
U33	Integrated Circuit, EPROM, Programmed	1	841708	14632	
U34	Not Used				

REF DESIG PREFIX A43

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U35	Integrated Circuit, UART	1	SCC2691AC1A28	18324	
U36	Same as U28				
U37	Integrated Circuit, Diff. Bus XCVR	1	SN75176AD	01295	
U38	Same as U22				
XU11	Socket	1	213-052-601	26742	
XU29	Socket, Receptacle PC MT	4	SL-114-G-11	55342	
XU33	Same as XU29				
Y1	Crystal, Quartz: CF = 7.3728 MHz	1	FPX073-20	61429	

5.5.12 TYPE 766022-1 POWER SUPPLY PC ASSEMBLY REF DESIG PREFIX PS1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision H1				
C1	Capacitor, Ceramic, Disc: 2000 pF, 20%, 300 VAC	2	125LD20	56289	
C2	Same as C1				
C3	Capacitor, Aluminum, Electrolytic: 330 µF, 200 V, ±20%	2	LGK2D331MHSA	55680	
C4	Same as C3				
C5	Capacitor, Tantalum: 15 µF, 20%, 25 V	1	841293-19	14632	
C6	Capacitor, Ceramic: .033 µF, 10%, 50 V	19	841415-022	14632	
C7 Thru C9	Same as C6				
C10	Capacitor, Ceramic: 1500 pF, 10%, 50 V	1	841415-014	14632	
C11	Capacitor, Ceramic: 150 pF, 5%, 50 V NPO	1	841415-008	14632	
C12	Capacitor, Ceramic: 330 pF, 5%, 50 V	2	841415-010	14632	
C13	Same as C12				
C14	Capacitor, Ceramic: .01 µF, 10%, 50 V	4	841415-019	14632	
C15	Same as C6				
C16	Same as C14				
C17	Capacitor, Tantalum: 1.0 µF, 20%, 35 V	4	841293-05	14632	
C18	Same as C14				
C19	Same as C17				
C20	Same as C17				
C21	Capacitor, Mica, Dipped: 3900 pF, 2%, 500 V	2	CM06FD392G03	81349	
C22	Same as C21				
C23	Capacitor, Ceramic, Display: .1 µF, 20%, 600 V	1	DR50-GBM-104M	55969	
C24	Same as C17				
C25	Capacitor, Ceramic: 1000 pF, 10%, 50 V	4	841415-013	14632	
C26 Thru C28	Same as C25				
C29	Capacitor, Ceramic: 33 µF	1	1C336ZY5U-S	0B3G8	
C30	Capacitor, Ceramic, Disc: 10 mF, 25 V	3	M60U10M25	90201	
C31	Same as C30				
C32	Same as C30				
C33 Thru C39	Same as C6				
C40	Not Used				
C41	Capacitor, Tantalum: 33 µF, 20%, 16 V	4	841293-22	14632	
C42 Thru C44	Same as C41				
C45 Thru C49	Same as C6				
C50	Capacitor, Tantalum: 6.8 µF, 20%, 6.3 V	1	841293-14	14632	
C51	Same as C6				

REF DESIG PREFIX PS1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C52	Same as C14				
C53	Same as C6				
C54	Capacitor, Electrolytic, Alum: 1000 µF, 20%, 10 V	1	UVZ0J472MHH	55680	
C55	Capacitor, Ceramic: .047 µF, 10%, 50 V	1	841415-023	14632	
CR1	Diode	9	FDSO-1203.SO	27014	
CR2 Thru CR6	Same as CR1				
CR7	Diode	6	1N5819	80131	
CR8	Same as CR7				
CR9	Diode	2	MUR450	04713	
CR10	Same as CR9				
CR11	Same as CR1				
CR12	Same as CR1				
CR13	Diode	1	30CPQ030	59993	
CR14	Same as CR7				
CR15	Same as CR7				
CR16	Rectifier	1	MBRD650CT	04713	
CR17	Same as CR7				
CR18	Same as CR7				
CR19	Not Used				
CR20	Same as CR1				
J1	Connector, Male, Header, 2 position	1	CLK-1002-L01A10-JPR	53387	
J2	Connector, Male, Header, 12 position	1	CLK-1012-L01A10-JPR	53387	
L1	Inductor: 100 µH, 10%	2	SPE110	20462	
L2	Same as L1				
L3	Inductor: 1.5 µH	1	SPE100-0	20462	
Q1	TRIAC	1	MAC310-6	04713	
Q2	Transistor	4	MMBT2222ALT1	04713	
Q3	Transistor	1	TIP50	04713	
Q4	Same as Q2				
Q5	Transistor: 500 V, 1.50Ω	2	IRFI830	81433	
Q6	Same as Q5				
Q7	Transistor	2	IRFZ22	81433	
Q8	Transistor	2	IRF9531	81433	
Q9	Same as Q7				
Q10	Transistor	4	MMBT2907ALT1	04713	
Q11	Same as Q2				
Q12	Same as Q8				
Q13	Same as Q10				
Q14	Same as Q10				
Q15	Same as Q2				
Q16	Same as Q10				

REF DESIG PREFIX PS1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R1	Resistor, Fixed: 10 kΩ, 5%, .1 W	10	841414-097	14632	
R2	Resistor, Fixed: 330 kΩ, 5%, 1/8 W	2	841296-125	14632	
R3	Same as R2				
R4	Resistor, Fixed, Composition: 22 kΩ, 5%, 1/2 W	1	RCR20G223JS	81349	
R5	Resistor, Fixed: 100 kΩ, 5%, 1/8 W	2	841296-113	14632	
R6	Resistor, Fixed: 475 kΩ, 1%, 1/8 W	2	841311-018	14632	
R7	Same as R6				
R8	Resistor, Fixed: 1.82 kΩ, 1%, 1/8 W	1	841311-019	14632	
R9	Resistor, Fixed: 7.5 kΩ, 1%, 1/8 W	1	841311-020	14632	
R10	Resistor, Fixed: 13.3 kΩ, 1%, 1/8 W	1	841311-004	14632	
R11	Resistor, Fixed: 330 kΩ, 5%, .1 W	2	841414-133	14632	
R12	Resistor, Fixed: 47 kΩ, 5%, .1 W	6	841414-113	14632	
R13	Same as R12				
R14	Same as R12				
R15	Resistor, Fixed: 22 kΩ, 5%, .1 W	2	841414-105	14632	
R16	Resistor, Fixed: 68 kΩ, 5%, .1 W	2	841414-117	14632	
R17	Same as R1				
R18	Same as R1				
R19	Same as R12				
R20	Resistor, Fixed: 220 kΩ, 5%, .1 W	4	841414-129	14632	
R21	Same as R20				
R22	Resistor, Fixed: 100 kΩ, 5%, .1 W	4	841414-121	14632	
R23	Same as R22				
R24	Resistor, Fixed: 15Ω, 5%, 1/2 W	1	RCR20G150JS	81349	
R25	Resistor, Fixed: 56Ω, 5%, .1 W	1	841414-043	14632	
R26	Same as R16				
R27	Same as R22				
R28	Same as R11				
R29	Same as R12				
R30	Same as R1				
R31	Same as R15				
R32	Same as R1				
R33	Resistor, Fixed: 39 kΩ, 5%, .1 W	1	841414-111	14632	
R34	Resistor, Fixed: 4.7Ω, 5%, .1 W	4	841414-017	14632	
R35	Same as R34				
R36	Same as R34				
R37	Resistor, Fixed: 4.75 kΩ, 1%	6	841311-023	14632	
R38	Same as R37				
R39	Resistor, Fixed: 47.5 kΩ, 1%, 1/8 W	1	841311-021	14632	
R40	Resistor, Fixed: 33.2 kΩ, 1%, 1/8 W	1	841311-009	14632	
R41	Resistor, Fixed: 680 MΩ, 5%, .1 W	1	841414-141	14632	
R42	Same as R20				

REF DESIG PREFIX **PS1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R43	Same as R37				
R44	Same as R37				
R45	Same as R34				
R46	Same as R37				
R47	Same as R37				
R48	Resistor, Fixed: 1.0 kΩ, 5%, .1 W	2	841414-073	14632	
R49	Resistor, Fixed: 470Ω, 5%, .1 W	2	841414-065	14632	
R50	Same as R49				
R51	Same as R1				
R52	Same as R1				
R53	Same as R20				
R54	Same as R12				
R55	Resistor, Fixed: 4.7 kΩ, 5%, .1 W	2	841414-089	14632	
R56	Same as R1				
R57	Same as R5				
R58	Same as R55				
R59	Same as R1				
R60	Resistor, Wire Wound: 0.47Ω, 5%, 1 W	2	SP-20-.47 OHMS-5%	81433	
R61	Same as R60				
R62	Resistor, Wire Wound: 0.1Ω, 5%, 1 W	1	SP-20-.1 OHMS-5%	81433	
R63	Resistor, Fixed: 390Ω, 5%, .1 W	1	841414-063	14632	
R64	Same as R1				
R65	Resistor, Fixed: 470 kΩ, 5%, .1 W	1	841414-137	14632	
R66	Same as R48				
R67	Resistor, Fixed: 15Ω, 5%, .1 W	1	841414-029	14632	
R68	Resistor, Fixed: 2.2 kΩ, 5%, .1 W	1	841414-081	14632	
R69	Same as R22				
RT1	Thermistor	2	CL-120	75263	
RT2	Same as RT1				
RT3	Thermistor	1	PTH487A01BD222TS	72982	
RV1	Varistor	1	V275LA20A	89473	
T1	Transformer	2	5761	01961	
T2	Transformer	1	382271-1	14632	
T3	Same as T1				
TP1	Jack, Test	4	SPCJ-123-02	30035	
TP2	Same as TP1				
TP7	Same as TP1				
TP8	Same as TP1				
U1	Rectifier: 600 Volts, 8-0 Amps	1	KBU8J	11711	
U2	Integrated Circuit, Transducer, Ref/Temp	1	REF-02CS	06665	
U3	Integrated Circuit, Quad Comparator	1	LM339D	04713	
U4	Integrated Circuit, Quad 2-Input NAND Gate	1	74HC00 SO14	02735	
U5	Integrated Circuit, Dual D-Type Flip-Flop	1	74HC74 SO14	04713	

REF DESIG PREFIX PS1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U6	Integrated Circuit, Multivibrator	1	74HC123 S016	02735	
U7	Integrated Circuit, Optoisolator	2	MOC217	04713	
U8	Integrated Circuit, Linear PS Controller	1	UC3860Q	12969	
U9	Voltage Regulator: +15 V	1	MC78M15CDT	04713	
U10	Amplifier	1	MC33172D	04713	
U11	Amplifier	2	MC33171D	04713	
U12	Same as U11				
U13	Not Used				
U14	Same as U7				
U15	Integrated Circuit, Precision Reference, Programmable	1	TL431CD	04713	
VR1	Diode, Zener	1	MMBZ5250BLT1	04713	

SECTION VI

SCHEMATIC DIAGRAMS

FUNCTION TABLE

SLOTS	USAGE BOARD	TYPE	R/D	SCHEM	NOTES
XA3	CONTROL MICROPROCESSOR	796816-1	A3	580966	
XA4A.B.C	BUS CONTROLLER	796818-1	A4	580968	
XA8A.B	DSP DEMODULATOR 1	796812-1	A8	580963	
XA6A.B	DSP DEMODULATOR 2	796812-1	A6	580963	
XA7A.B	DSP DEMODULATOR 3	796812-1	A7	580963	
XA5A.B	DSP DEMODULATOR 4	796812-1	A5	580963	
XA12	A/D CONVERTER 1	796815-1	A12	580965	
XA10	A/D CONVERTER 2	796815-1	A10	580965	
XA11	A/D CONVERTER 3	796815-1	A11	580965	
XA9	A/D CONVERTER 4	796815-1	A9	580965	
XA37	REFERENCE GENERATOR	796814-1	A37	580964	
XA43A.B	REMOTE CNTRL INTERFACE	796817-2	A43	580967	IEEE-488.STD
XA36A-D	TUNER 1	796804-1	A36	580933	
XA34A-D	TUNER 2	▲	A34	▲	
XA32A-D	TUNER 3		A32		
XA30A-D	TUNER 4		A30		
XA28A-D	TUNER 5		A28		
XA26A-D	TUNER 6		A26		
XA24A-D	TUNER 7		A24		
XA22A-D	TUNER 8		A22		
XA20A-D	TUNER 9		A20		
XA18A-D	TUNER 10		A18		
XA16A-D	TUNER 11		A16		
XA14A-D	TUNER 12		A14		
XA35A-D	TUNER 13		A35		
XA33A-D	TUNER 14		A33		
XA31A-D	TUNER 15		A31		
XA29A-D	TUNER 16		A29		
XA27A-D	TUNER 17		A27		
XA25A-D	TUNER 18		A25		
XA23A-D	TUNER 19		A23		
XA21A-D	TUNER 20		A21		
XA19A-D	TUNER 21		A19		
XA17A-D	TUNER 22		A17		
XA15A-D	TUNER 23	▼	A15	▼	
XA13A-D	TUNER 24	796804-1	A13	580933	
XA44A.B	OPTION 1		A44		
XA45A.B	OPTION 2		A45		
XA46A.B	OPTION 3		A46		
XA47A.B	OPTION 4		A47		

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±2%, 0.2W.
   B) CAPACITANCE IS IN µF.
   C) ALL GNDS ARE DGNDS.
2. USE FUCTIONAL TABLE FOR SLOT USAGE.

(3) INSTALLED IN -2 ONLY.

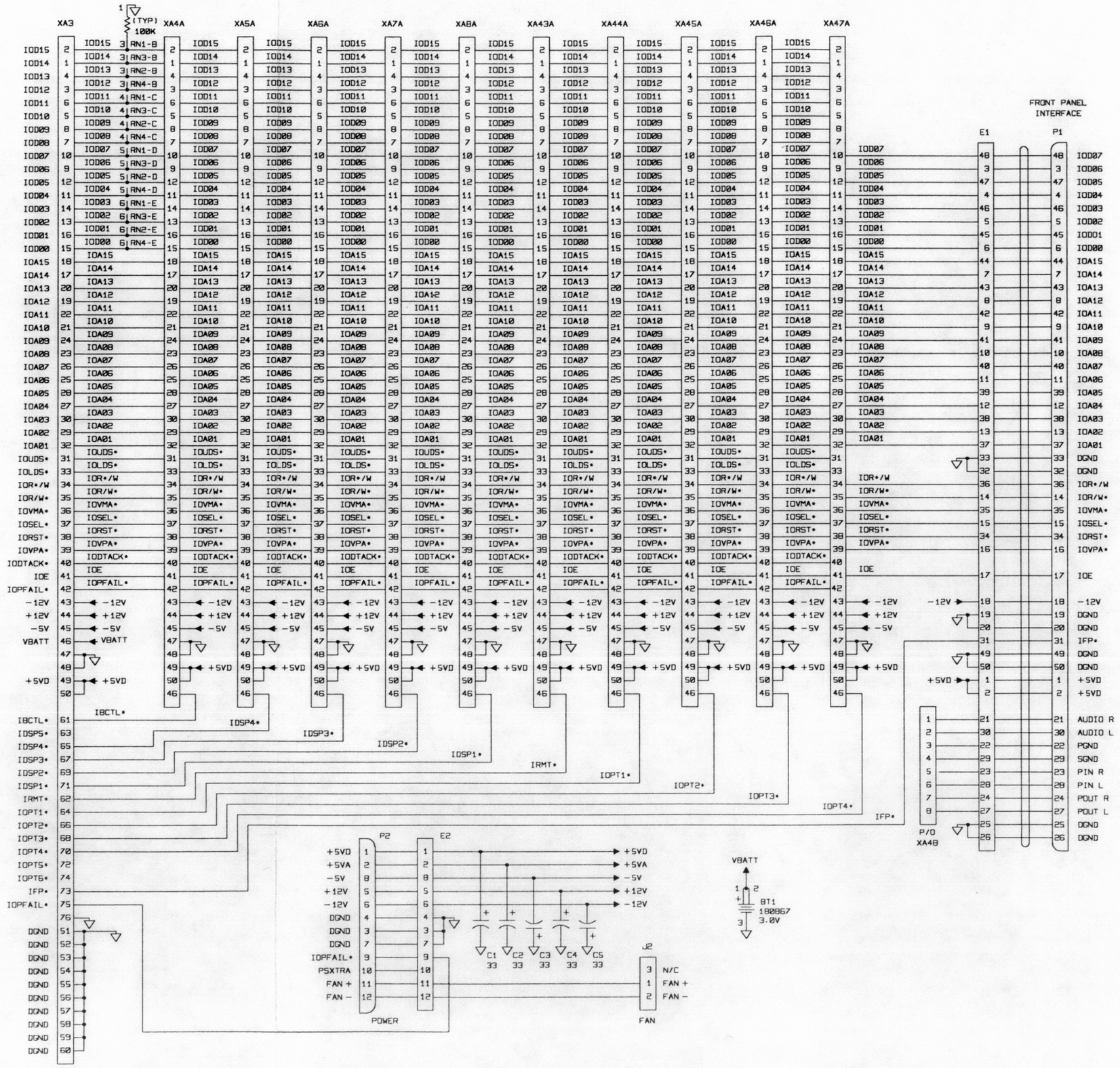


Figure 6-1. Type 796821-1, Motherboard Assembly (A1), Schematic Diagram 580971 (Sheet 1 of 3) (C)

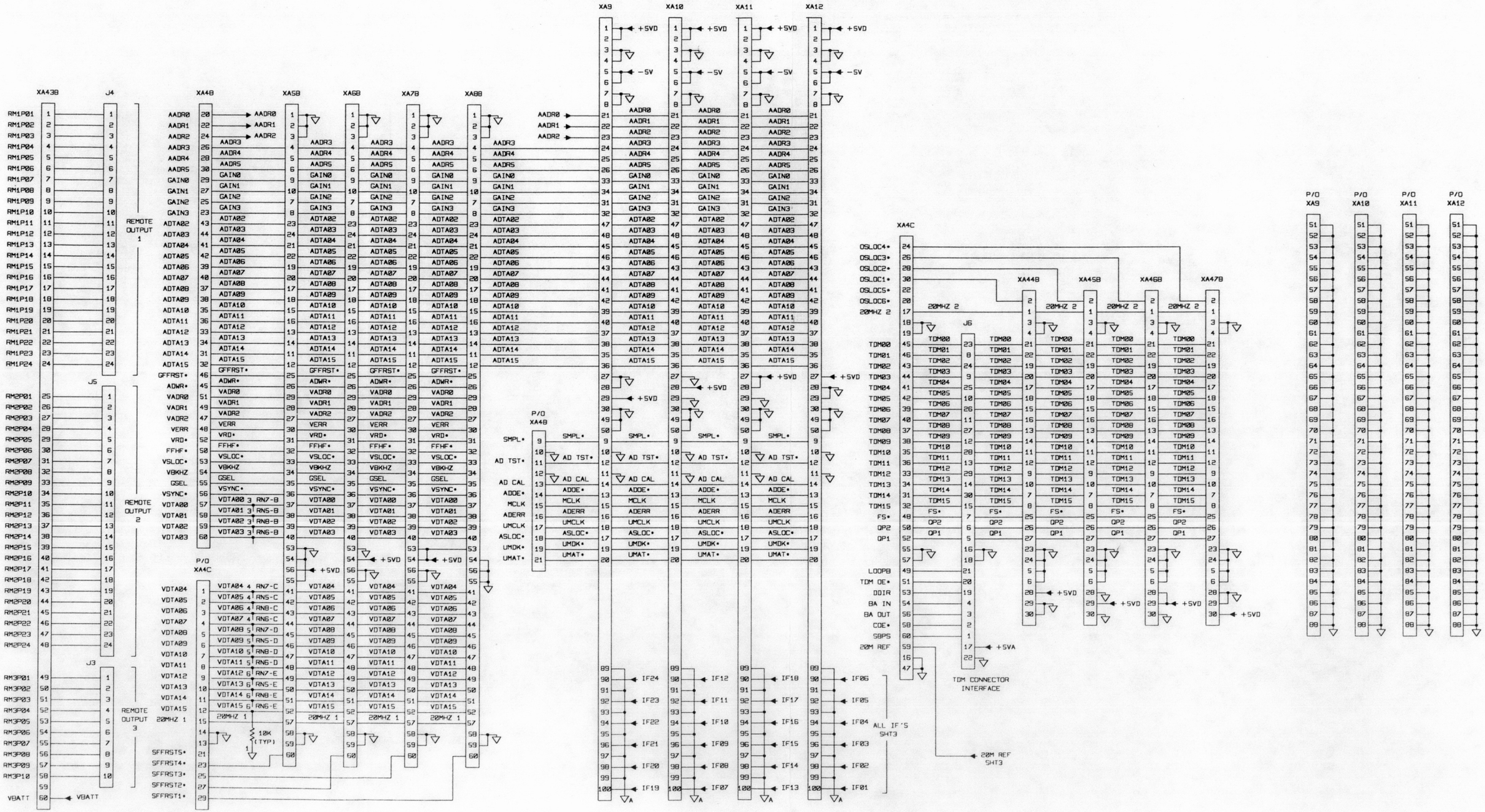


Figure 6-1. Type 796821-1, Motherboard Assembly (A1), Schematic Diagram 580971 (Sheet 2 of 3) (C)

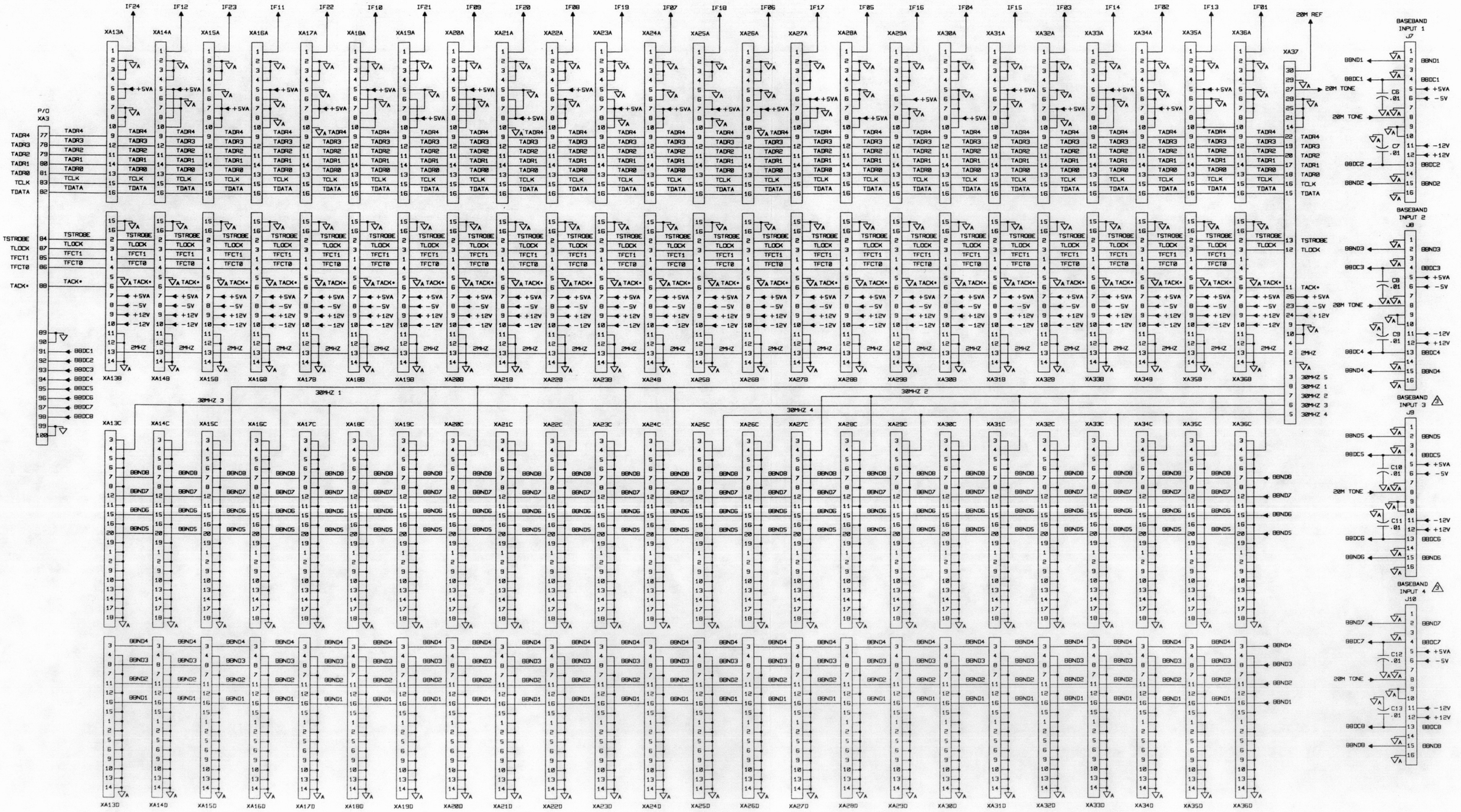


Figure 6-1. Type 796821-1, Motherboard Assembly (A1), Schematic Diagram 580971 (Sheet 3 of 3) (C)

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   B) CAPACITANCE IS IN μF.

2 DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE 1.

TABLE 1

	U9
796808-1	841486
796808-2	841846

Figure 6-2. Type 796808-1, Front Panel Interface (A2), Schematic Diagram 580942 (B)

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS. ±5%.1/8W.
   B) CAPACITANCE IS IN μF.
2. SEE TABULATION FOR DIFFERENCES BETWEEN TYPE NUMBERS.

JUMPER PINS (ALL TYPES)

PLUG	CONNECTION
JP1	J1 PINS 1-2
JP2	J2 PINS 1-2

			U9 (EPROM)			U11 (EPROM)			
TYPE	R70	JW2	SCD	PART	ORG	SCD	PART	ORG	USED ON
796816-1	1.5K	N/I	841488	27C010	128KX8	841489	27C010	128KX8	WJ-9548
796816-2	1.5K	N/I	841518	27C010	128KX8	841519	27C010	128KX8	WJ-9546
796816-3	1.5K	USED	841679	27C401	512KX8	841680	27C401	512KX8	WJ-9548
796816-4	1.5K	USED	841711	27C401	512KX8	841712	27C401	512KX8	WJ-9547
796816-5	2.7K	USED	841722	27C401	512KX8	841721	27C401	512KX8	WJ-8698/91
796816-6	1.5K	USED	841784	27C401	512KX8	841785	27C401	512KX8	WJ-9497
796816-7	1.5K	USED	841810	27C401	512KX8	841811	27C401	512KX8	WJ-9424
796816-8	1.5K	USED	841934	27C401	512KX8	841935	27C401	512KX8	WJ-9543
796816-9	1.5K	USED	841961	27C401	512KX8	841958	27C401	512KX8	WJ-9548-1

Figure 6-3. Type 796816-3, Control Microprocessor Assembly (A3), Schematic Diagram 580966 (Sheet 1 of 2) (H)

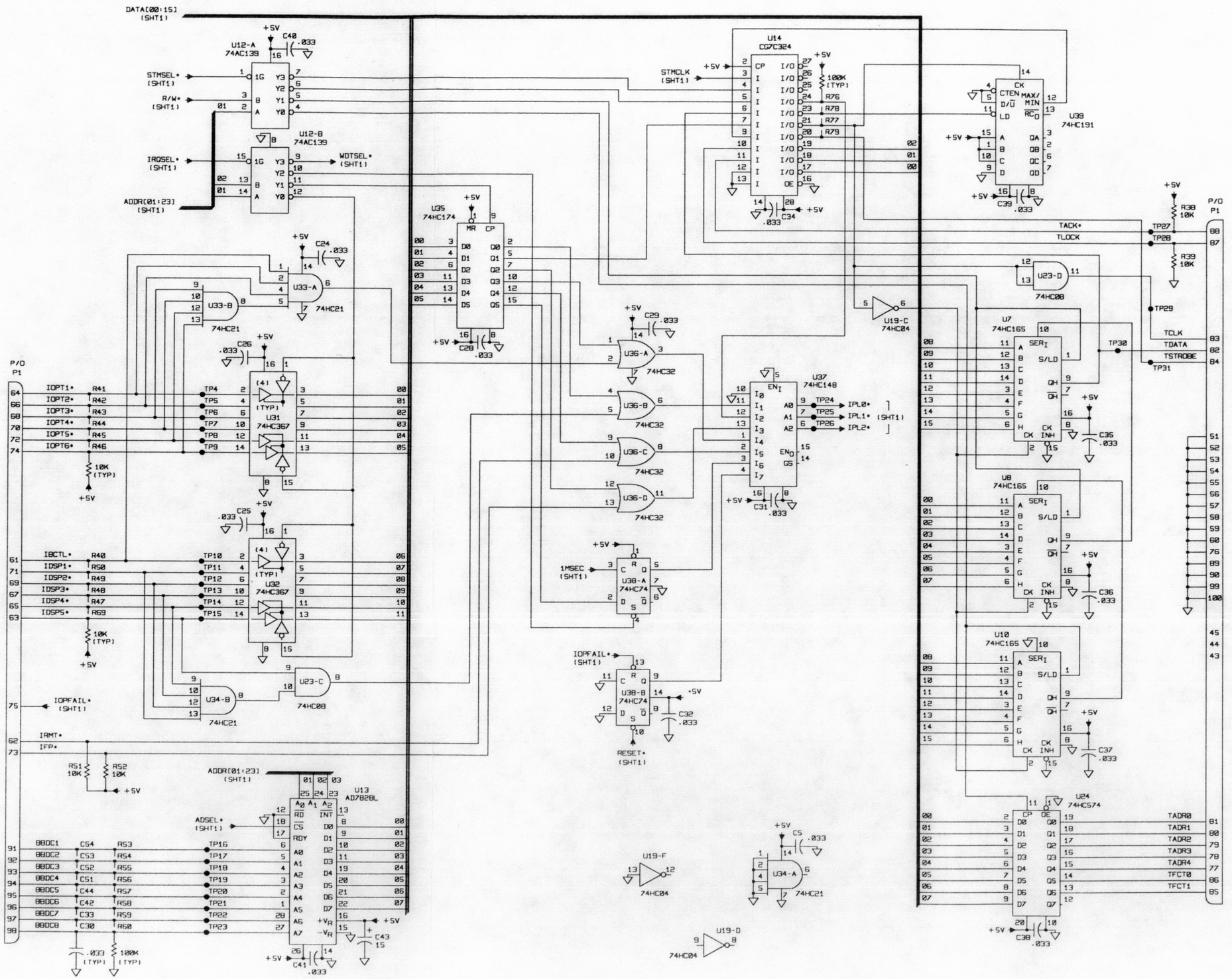


Figure 6-3. Type 796816-3, Control Microprocessor Assembly (A3), Schematic Diagram 580966 (Sheet 2 of 2) (H)

Figure 6-4. Type 796818-1, Bus Controller Assembly (A4), Schematic Diagram 580968 (Sheet 1 of 4) (C)

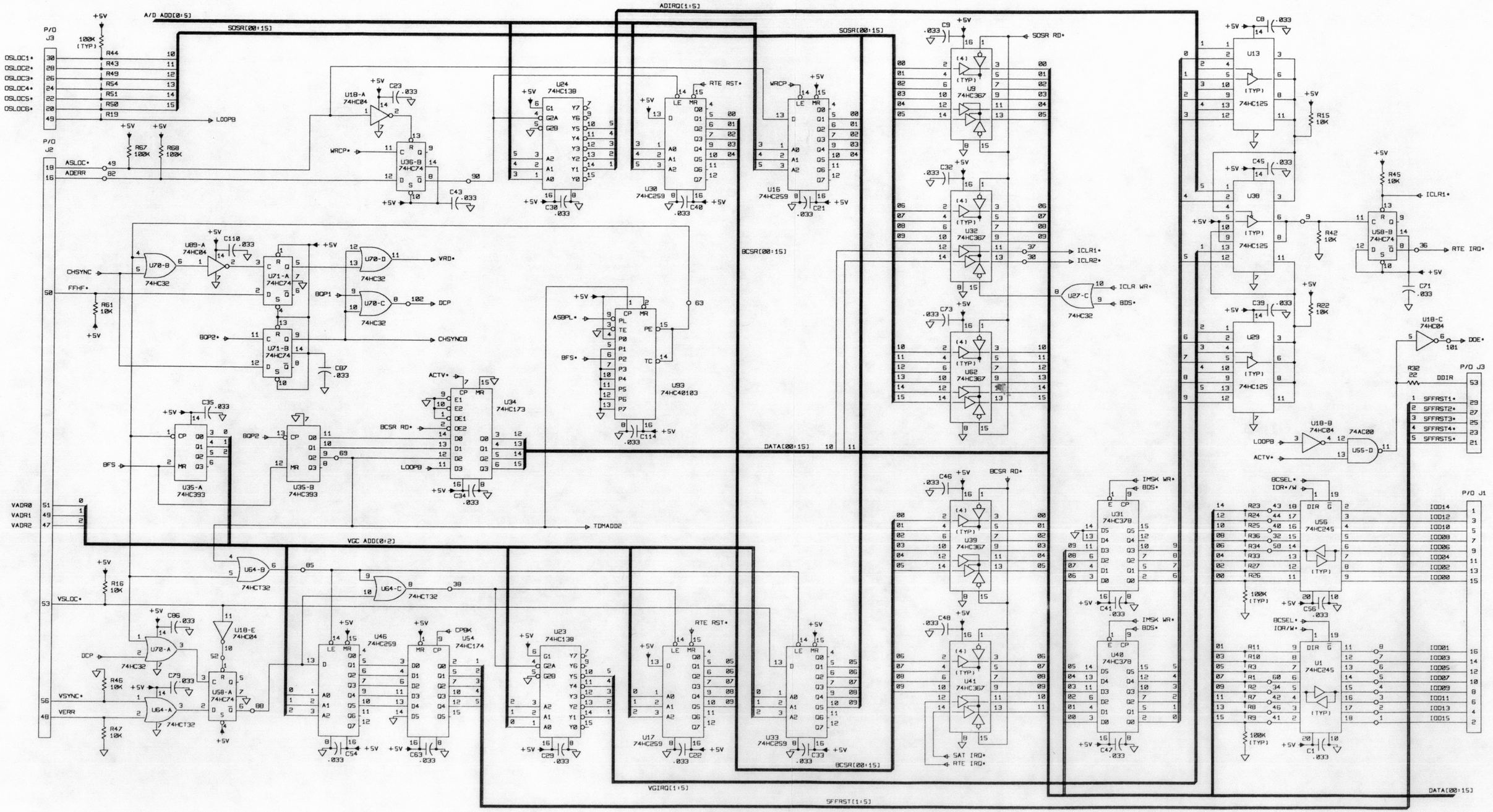


Figure 6-4. Type 796818-1, Bus Controller Assembly (A4), Schematic Diagram 580968 (Sheet 2 of 4) (C)

Figure 6-4. Type 796818-1, Bus Controller Assembly (A4), Schematic Diagram 580968 (Sheet 3 of 4) (C)

Figure 6-4. Type 796818-1, Bus Controller Assembly (A4), Schematic Diagram 580968 (Sheet 4 of 4) (C)

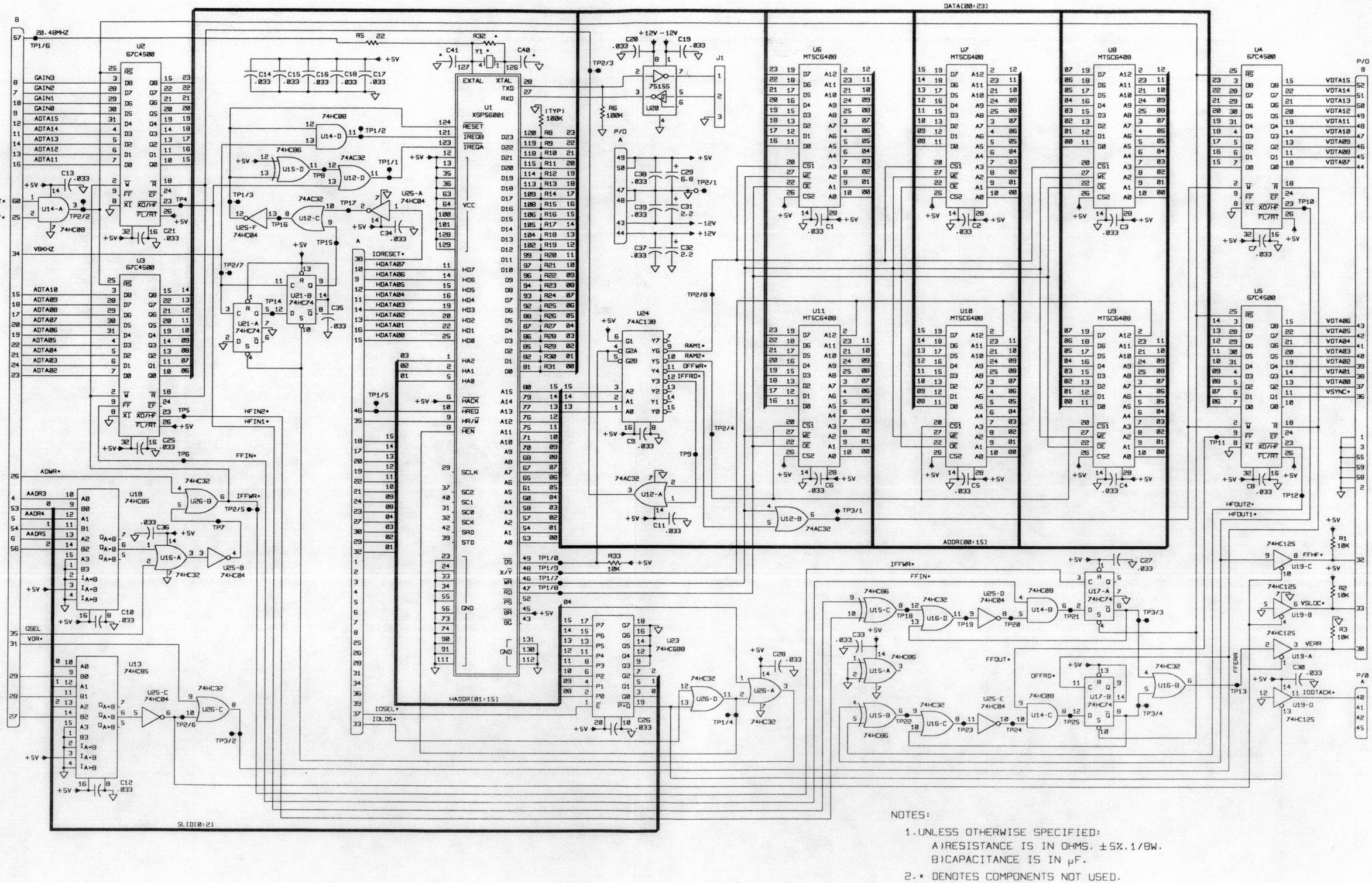


Figure 6-5. Type 796812-1, DSP Demodulator Assembly (A5-A8), Schematic Diagram 580963 (B)

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.

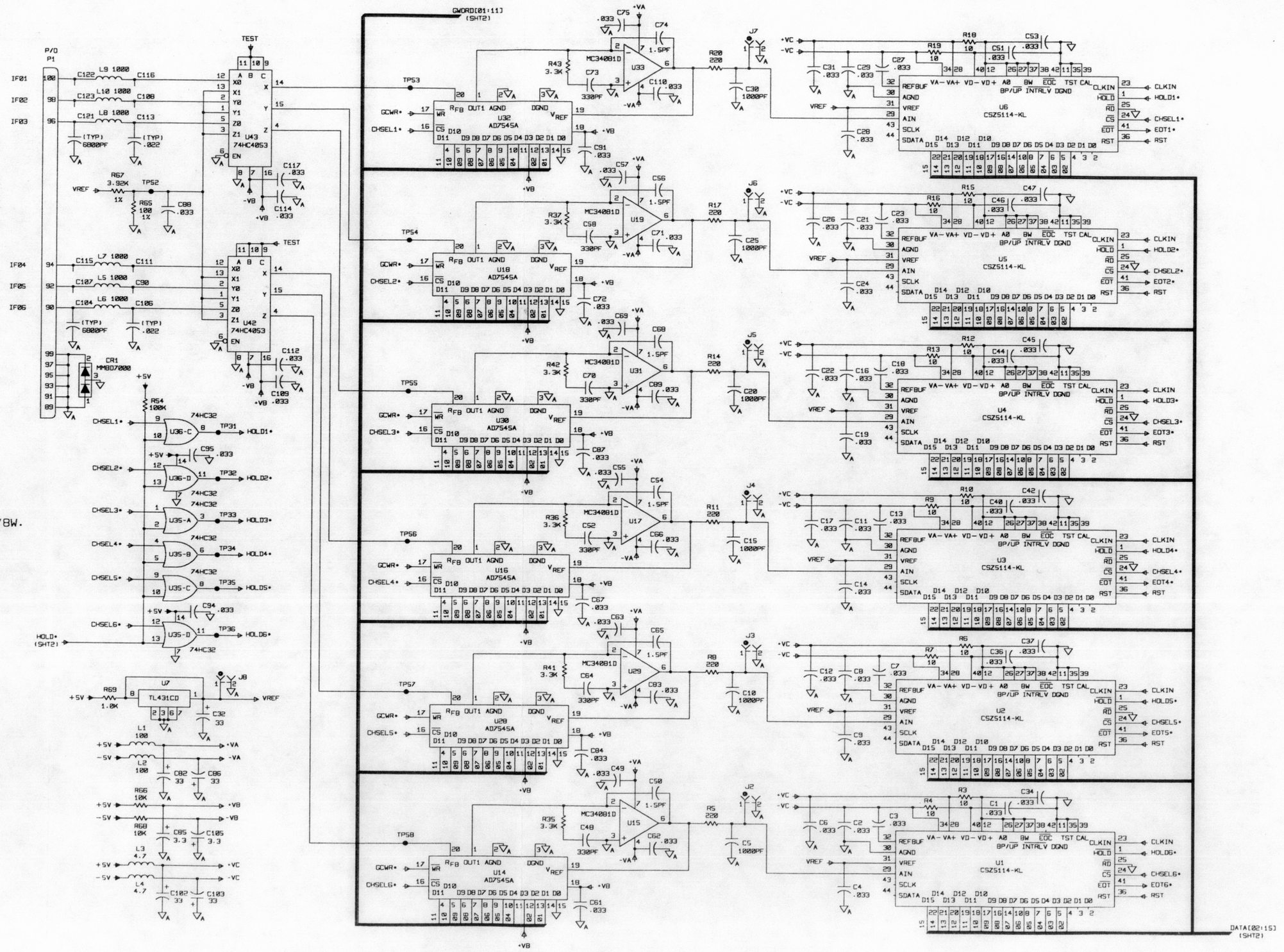


Figure 6-6. Type 796815-1, A/D Converter Assembly (A9-A12), Schematic Diagram 580965 (Sheet 1 of 2) (A)

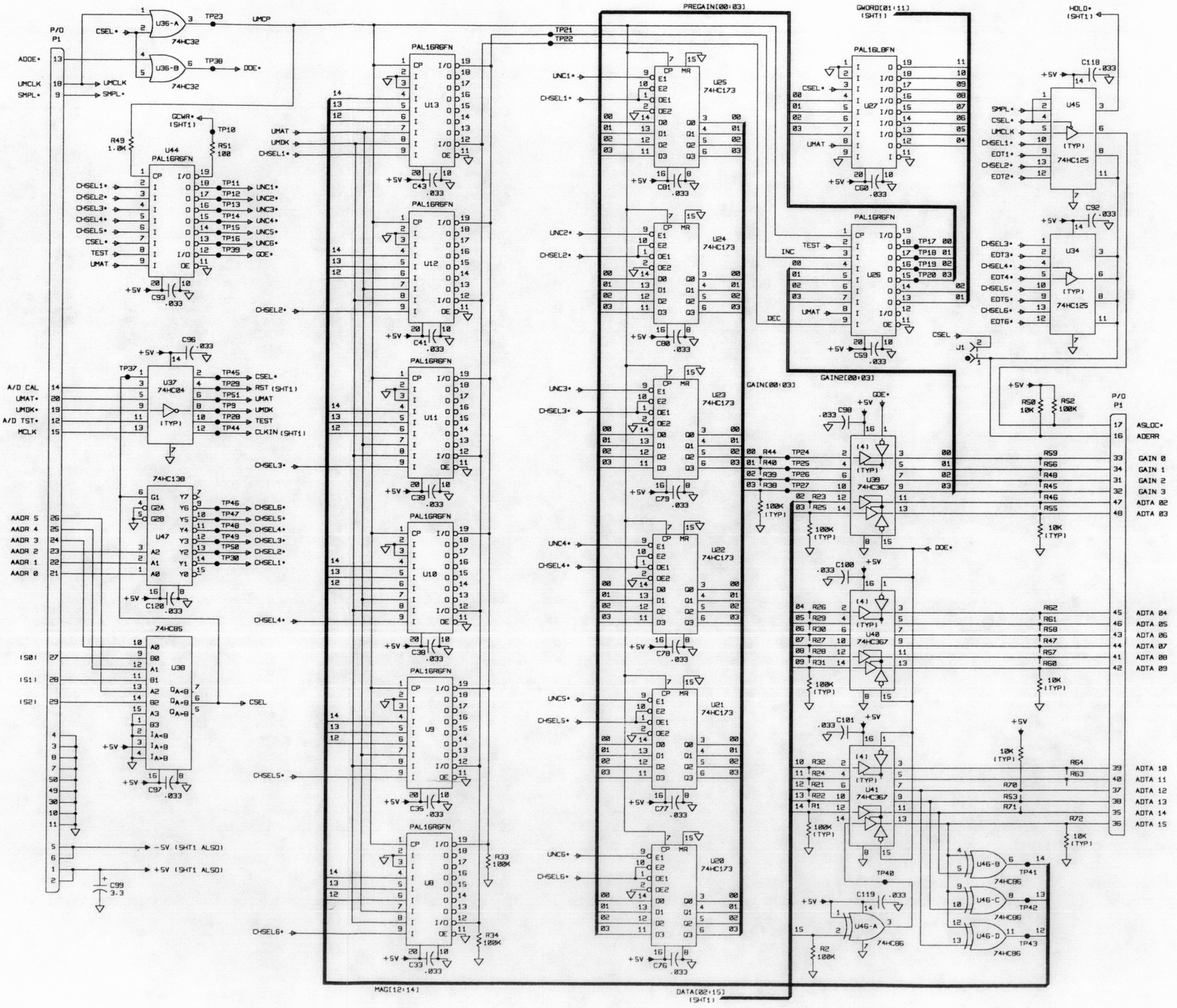


Figure 6-6. Type 796815-1, A/D Converter Assembly (A9-A12), Schematic Diagram 580965 (Sheet 2 of 2) (A)

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±5%.1/8W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.

2. FOR DIFFERENCES BETWEEN DASH NO.S SEE TABLE. DRAWING SHOWN IN -1 VERSION.

-1 DIAL FREQUENCY	-2 DIAL FREQUENCY	FINE SYNTHESIZER FREQUENCY	TP6 VOLTAGE RANGE
.240 MHZ	.130 MHZ	120 MHZ	-8.3 TO -9.3 VDC
.2395 MHZ	.1295 MHZ	-159.92 MHZ	0 TO -2.7 VDC

-1 DIAL FREQUENCY	-2 DIAL FREQUENCY	FINE SYNTHESIZER FREQUENCY	TP9 VOLTAGE RANGE	TP8 VOLTAGE RANGE
.2395 MHZ	.1295 MHZ	58.5 MHZ	-9.6 TO -10.2 VDC	-7.9 TO -8.7 VDC
20.000 MHZ	19.890 MHZ	98.5 MHZ	0 TO +1.8 VDC	+2.8 TO +8.2 VDC

TABLE A

TYPE	C11	C14	C17	FL1	R3	R5	R6	R98
796804-1	4-25	4-25	.01	92749	680	47	33	N/I
796804-2	2-6	2-6	1000PF	92732	1K	100	68	100

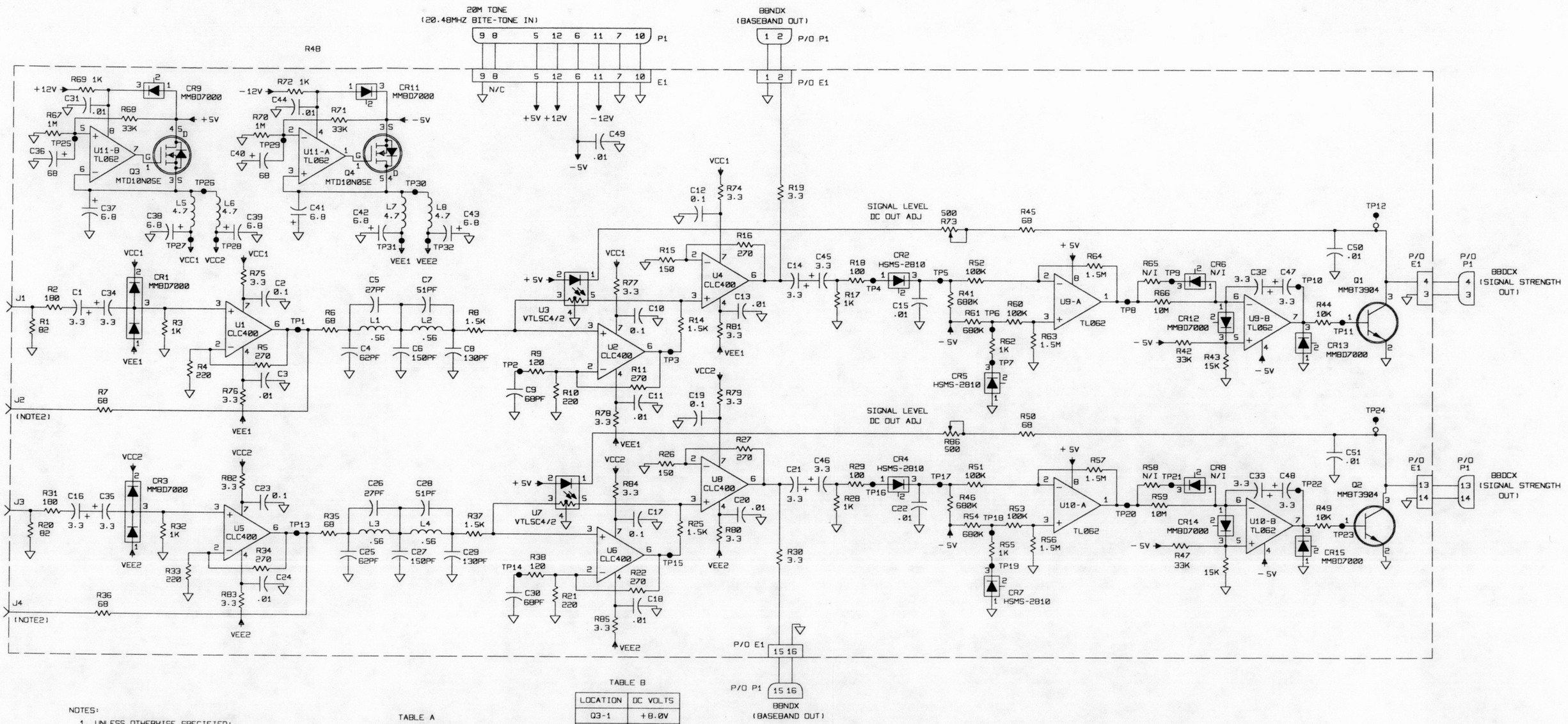
Figure 6-7. Type 796804-1, Tuner Assembly (A13-A36), Schematic Diagram 580933 (H)

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±5%.1/8W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.

(2) DIFFERENCE BETWEEN TYPES
IS AT U23: NOT USED ON 796814-1
USED ON 796814-2
AND R27: NOT USED ON 796814-1
USED ON 796814-2

Figure 6-8. Type 796814-1, Reference Generator Assembly (A37), Schematic Diagram 580964 (B)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   B) CAPACITANCE IS IN μF.
   C) INDUCTANCE IS IN μH.
2. DIFFERENCE BETWEEN TYPES IS LISTED IN TABLE A.
3. VOLTAGE SHOWN IN TABLE B ARE UNDER NO SIGNAL CONDITIONS.

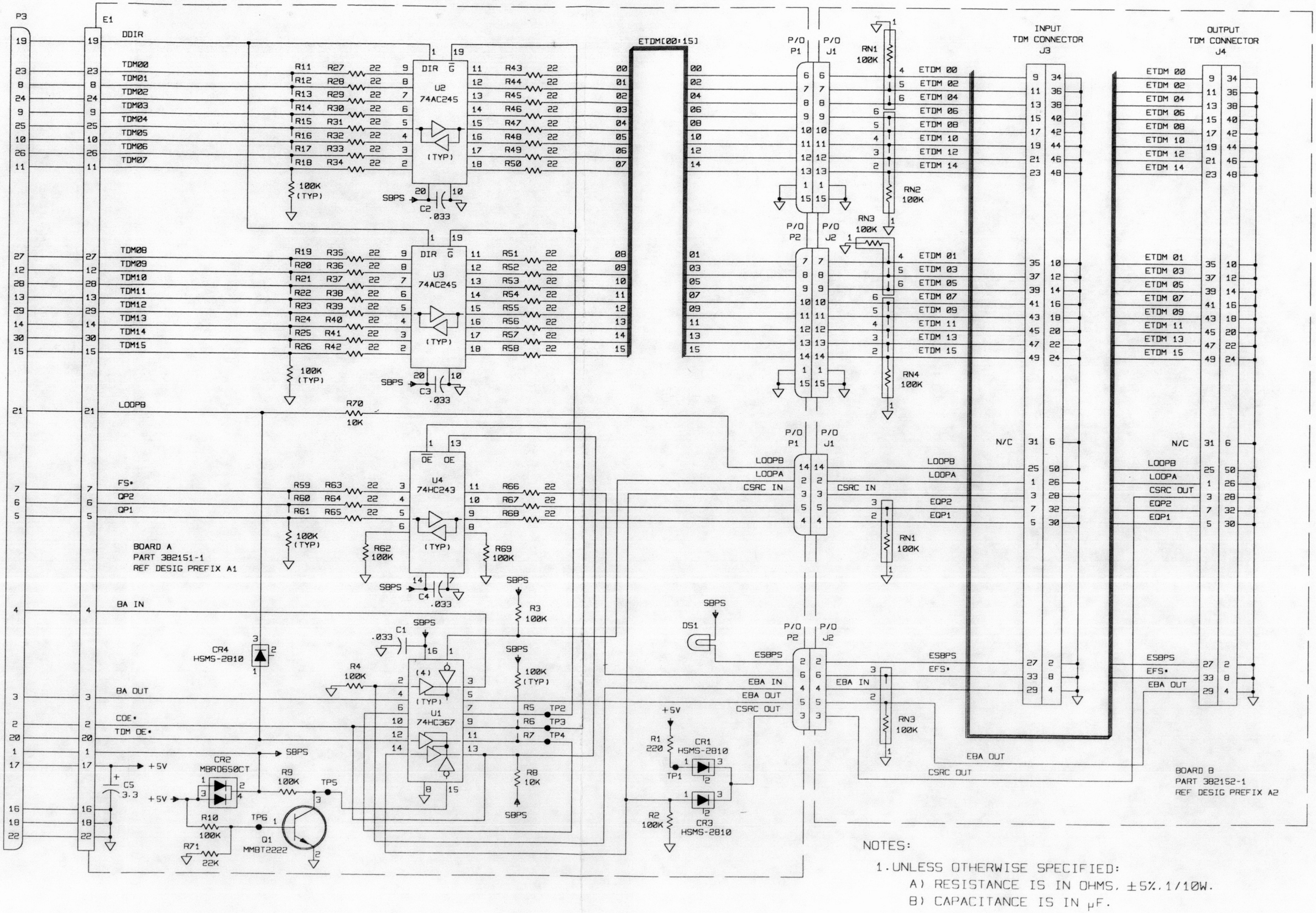
TABLE A

TYPE	J2	J4
-1	USED	USED
-2	N/U	N/U

TABLE B

LOCATION	DC VOLTS
Q3-1	+8.0V
Q4-1	-1.7V
TP26	+4.85V
TP28	+4.75V
TP30	-4.85V
TP32	-4.75V
TP5,TP17	-0.2V
U9,U10-3	-0.17V
U9,U10-5	-1.6V
U9,U10-7	-4.4V

Figure 6-9. Type 796802-1, Baseband Input Assembly (A38-A39), Schematic Diagram 481563 (C1)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±5%, 1/10W.
   B) CAPACITANCE IS IN μF.

Figure 6-10. Type 796819-1, TDM Connector Interface Assembly (A42), Schematic Diagram 580969 (A)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS. ±5%.1/10W.
   B) CAPACITANCE IS IN µF.

⚠2 SEE TABULATION FOR DIFFERENCES BETWEEN TYPE NUMBERS.

TYPE	U29(EPROM)			U33(EPROM)			USED ON
	SCD NO.	PART NO.	ORG.	SCD NO.	PART NO.	ORG.	
796959-1	841707	27C256	64K X 8	841708	27C256	64K X 8	WJ-9548
796959-2	841764	27C256	64K X 8	841765	27C256	64K X 8	WJ-9547
796959-3	841734	27C256	64K X 8	841733	27C256	64K X 8	WJ-8698/91
796959-4	841786	27C256	64K X 8	841787	27C256	64K X 8	WJ-9492
796959-5	841812	27C256	64K X 8	841813	27C256	64K X 8	WJ-9424
796959-6	841936	27C256	64K X 8	841937	27C256	64K X 8	WJ-9543
796959-7	841959	27C256	64K X 8	841960	27C256	64K X 8	WJ-9548-1

Figure 6-11. Type 796959-1, Remote Interface (A43), Schematic Diagram 581214 (Sheet 1 of 2) (H)

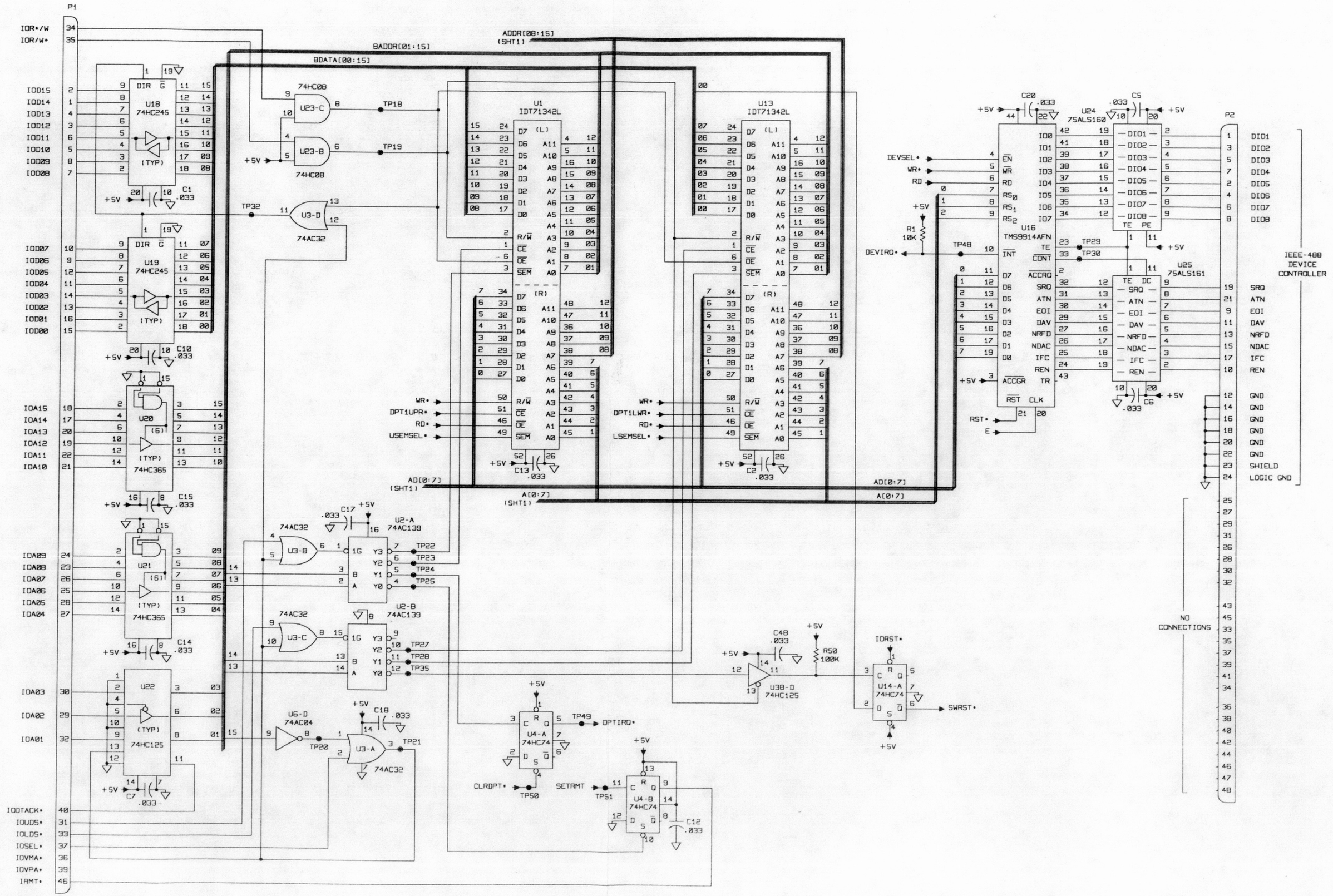
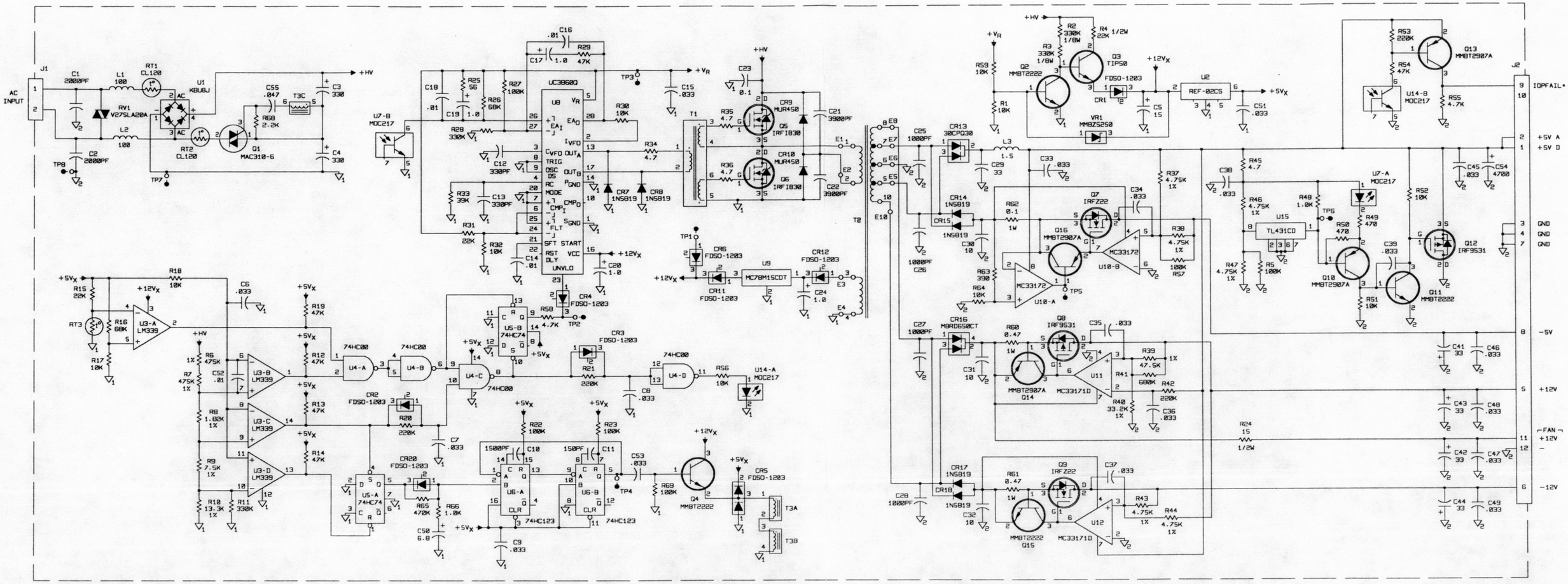


Figure 6-11. Type 796959-1, Remote Interface (A43), Schematic Diagram 581214 (Sheet 2 of 2) (H)



NOTES:

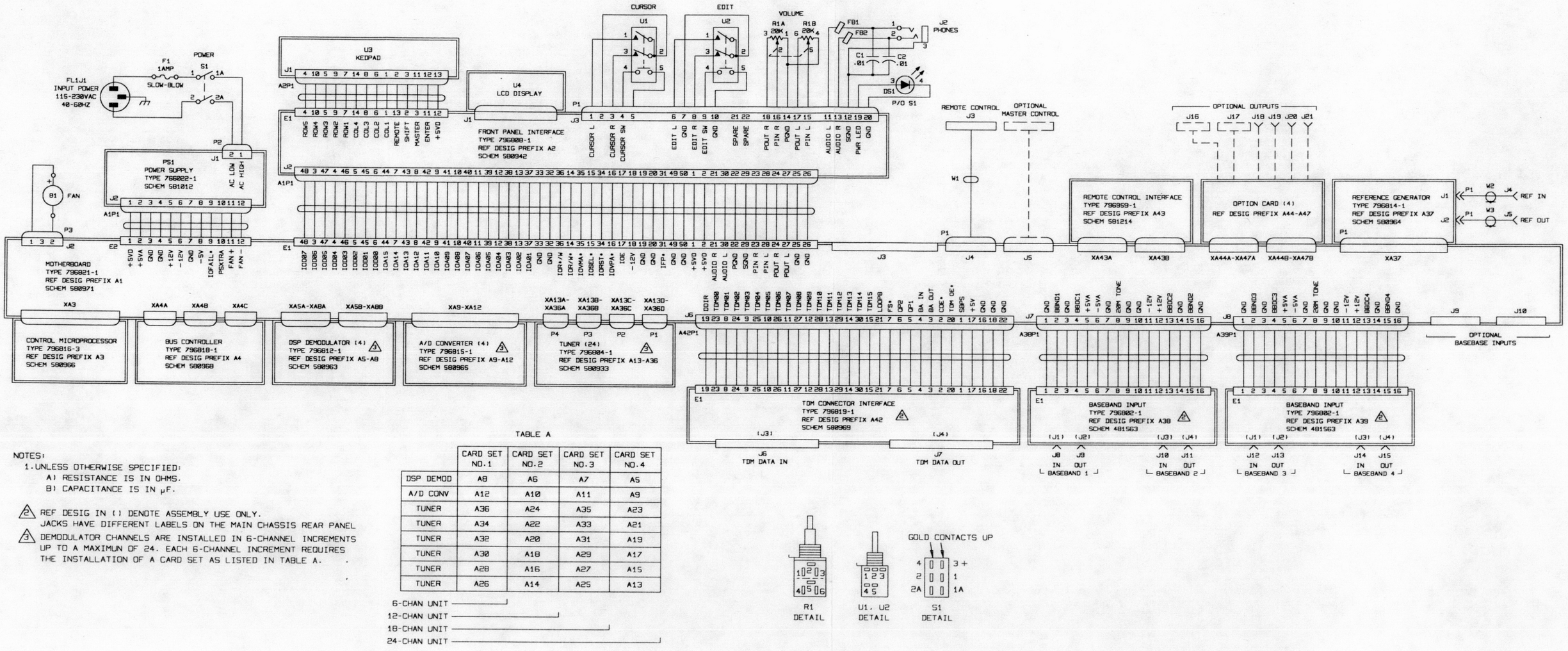
1. UNLESS OTHERWISE SPECIFIED:
   - A) RESISTANCE IS IN OHMS, ±5%, 1/10W.
   - B) CAPACITANCE IS IN μF.
   - C) INDUCTANCE IS IN μH.

△2 N/I = NOT INSTALLED

** WARNING:

1. GND1 (▽1) IS THE HIGH VOLTAGE GROUND AND FLOATING WITH RESPECT TO CHASSIS GROUND.
2. GND2 (▽2) IS THE LOW VOLTAGE GROUND AND IS CONNECTED TO THE CHASSIS WHEN INSTALLED IN THE WJ-9548.
3. AN ISOLATION TRANSFORMER SHOULD ALWAYS BE USED ON THE HIGH VOLTAGE AC INPUT WHEN TESTING OR TROUBLESHOOTING THIS PC ASSY.

Figure 6-12. Type 766022-1, Power Supply Assembly (PS1), Schematic Diagram 581012 (G)



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS.
   B) CAPACITANCE IS IN μF.

(2) REF DESIG IN ( ) DENOTE ASSEMBLY USE ONLY. JACKS HAVE DIFFERENT LABELS ON THE MAIN CHASSIS REAR PANEL

(3) DEMODULATOR CHANNELS ARE INSTALLED IN 6-CHANNEL INCREMENTS UP TO A MAXIMUN OF 24. EACH 6-CHANNEL INCREMENT REQUIRES THE INSTALLATION OF A CARD SET AS LISTED IN TABLE A.

TABLE A

	CARD SET NO.1	CARD SET NO.2	CARD SET NO.3	CARD SET NO.4
DSP DEMOD	A8	A6	A7	A5
A/D CONV	A12	A10	A11	A9
TUNER	A36	A24	A35	A23
TUNER	A34	A22	A33	A21
TUNER	A32	A20	A31	A19
TUNER	A30	A18	A29	A17
TUNER	A28	A16	A27	A15
TUNER	A26	A14	A25	A13

6-CHAN UNIT
12-CHAN UNIT
18-CHAN UNIT
24-CHAN UNIT

Figure 6-13. Type WJ-9548 Digital FDM Demultiplexer, Main Chassis Schematic Diagram 581011 (E)