INSTRUCTION MANUAL

FOR THE

WJ-9546 FDM DEMULTIPLEXER

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

April 1990

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

EQUIPMENT MALFUNCTIONS

This unit was thoroughly inspected and factory adjusted for optimum performance prior to shipment. If an apparent malfunction is encountered after installation, verify that the correct input signals are present at the proper connectors. Prior to taking any corrective maintenance action or breaking any seals, contact your Watkins-Johnson representative, or the Watkins-Johnson Company Service Department to prevent the possibility of voiding the terms of the warranty. Contact the Watkins-Johnson Company via mail, telephone, wire, or cable at:

Watkins-Johnson Company
Company Service Department
700 Quince Orchard Road
Gaithersburg, Maryland 20878-1794

Toll Call: (301) 948-7550 Ext. 7201
TELEX: 89-8402
TWX: 710-828-0546
TELEFAX: (301) 921-9479
EASYLINK: 62928185

If reshipment is necessary, follow the instructions in the following paragraph (Preparation for Reshipment or Storage). Do not return the equipment until a Return for Maintenance Authorization (RMA) number has been obtained from the Watkins-Johnson Company's Customer Service Department. See Item 10 in the **General Terms and Conditions of Sale** paper (WJ Form # WJ-151-X) for more information on equipment returns.

PREPARATION FOR RESHIPMENT OR STORAGE

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

1. Wrap the unit in sturdy paper or plastic.

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

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

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

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

5. Ship to:

   Watkins-Johnson Company
   700 Quince Orchard Road
   Gaithersburg, Maryland 20878-1794
   U.S.A

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

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

WJ-9546 FDM DEMULTIPLEXER INSTRUCTION MANUAL
REVISION RECORD

Revision	Description	Date
A	Initial issue.	10/89
B	Reprint. Changes resulting from software version 2.00 are incorporated.	04/90

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SECTION I

GENERAL DESCRIPTION

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL CHARACTERISTICS

The WJ-9546 FDM Demultiplexer contains six Single Sideband (SSB) channel demodulators that are independently tunable over the frequency range of 0 to 20 MHz. The WJ-9546 accepts two baseband inputs that can be connected to any of the six channel demodulators. Demodulated baseband signals provide 150-3850 Hz audio signals to six front panel connectors, one for each channel demodulator. See Table 1-1 for a list of WJ-9546 specifications.

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).

The WJ-9546 is a fully remote controlled unit. RS-485 and RS-232C interfaces are provided which allow for remote bus communications between the WJ-9546 and compatible interface equipped remote controllers. The RS-232C interface also allows the unit to be controlled by the WJ-9546/HHC Hand Held Controller option. Both interfaces may be employed at the same time with equal priority. In the event of conflicting commands over these interfaces, the command processed last takes priority.

Except for a headphones volume control, all operator-selectable parameters, including programmable scan strategies, are controllable and accessible over the remote control interfaces. Additionally, a Built-In-Test (BITE) feature capable of isolating circuit faults to the module level is provided which is also implemented remotely.

The WJ-9546 internal power supply accepts +10 to +16 Vdc or 115/230, 50 to 60 Hz line power as its power source.

1.2 MECHANICAL CHARACTERISTICS

The WJ-9546 is 3.47 inches high, 8.25 inches wide, and 11.66 inches long as measured from the tips of the front panel protector posts to the tips of the rear panel heatsink. The main chassis, internal partitions, top and bottom covers, side panels, and front and rear panels are constructed of aluminum. Mounted on the front panel is a black anodized aluminum bezel with etched control markings. Mounted through the front panel is a power switch, power and error indicators, headphones audio level control, two circuit breakers, and all external connectors. Connector types used are multipin, BNC, and triax with the exception of the phones jack which is a subminiature stereo headphones jack.

The WJ-9546 contains a power supply assembly and fifteen printed circuit assemblies. Two extra slots are available for the addition of optional assemblies.

Table 1-1. WJ-9546 FDM Demultiplexer Specifications

Number of Inputs	Two analog basebands with independent, non-blocking connection (reduced performance below 8 kHz)
Baseband Input Range	150 Hz to 20 MHz
Input Impedance	75 ohms, unbalanced
Input Level	-30 to 0 dBm, composite baseband
Baseband Gain Control	Long time-constant AGC that optimizes input gain for basebands in the -30 to 0 dBm level range
Output Characteristics:	
Analog Output (Standard)	High-fidelity Audio; 16-bit DAC with 2X over-sampling
Number of Outputs	6 (BNC connectors)
Output Impedance	600 ohms, unbalanced
Nominal Output Level	1 VRMS into 600 ohms (AGC mode)
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)
PCM Output (Optional)	Primary level CEPT; 30 Channel capacity, 2.048 Mbps
Output Impedance	75 ohms, unbalanced
Output Connector	BNC
Line Code	HDB3 per CCITT G.703
Encoding Characteristic	A Law or linear (operator selectable)
Framing Format	CCITT G.704 or operator defined
Pulse Shape	Compliant with CCITT G.703
Headphone Audio (Standard)	Toll quality audio; channel selectable
Output Impedance	600 ohms, unbalanced
Nominal Output Level	Adjustable up to 8 dBm into 600 ohms
Control:	
Control Interfaces	RS-232C (3-wire) and RS-485; simultaneously active
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)

Table 1-1. WJ-9546 FDM Demultiplexer Specifications (Continued)

Output Characteristics: (Continued)	
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)
Frequency Reference:	
Internal Reference Stability	$\pm 2 \times 10^{-7}$ 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 impedance load. Automatically switches to external reference upon application of signal
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 or 10 to 16/Vdc
Power Consumption	24 watts, approximately
Size	3.5 inches high, 8.25 inches wide, and 11.75 inches long (including connectors, knos, and handles)
Weight	10 lbs., approximately

1.3 OVERALL FUNCTIONAL DESCRIPTION

See **Figure 1-1** for an overall functional block diagram of the WJ-9546.

The two external 0-20 MHz baseband input signals first encounter buffer and AGC circuits on the Baseband Input Assembly (A17). Both buffered basebands are then routed to the six Tuner Assemblies (A2 through A7), each of which is capable of independently selecting one of these inputs for further processing. This allows the two baseband input signals to be connected to the six 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 (A16).

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 (A10).

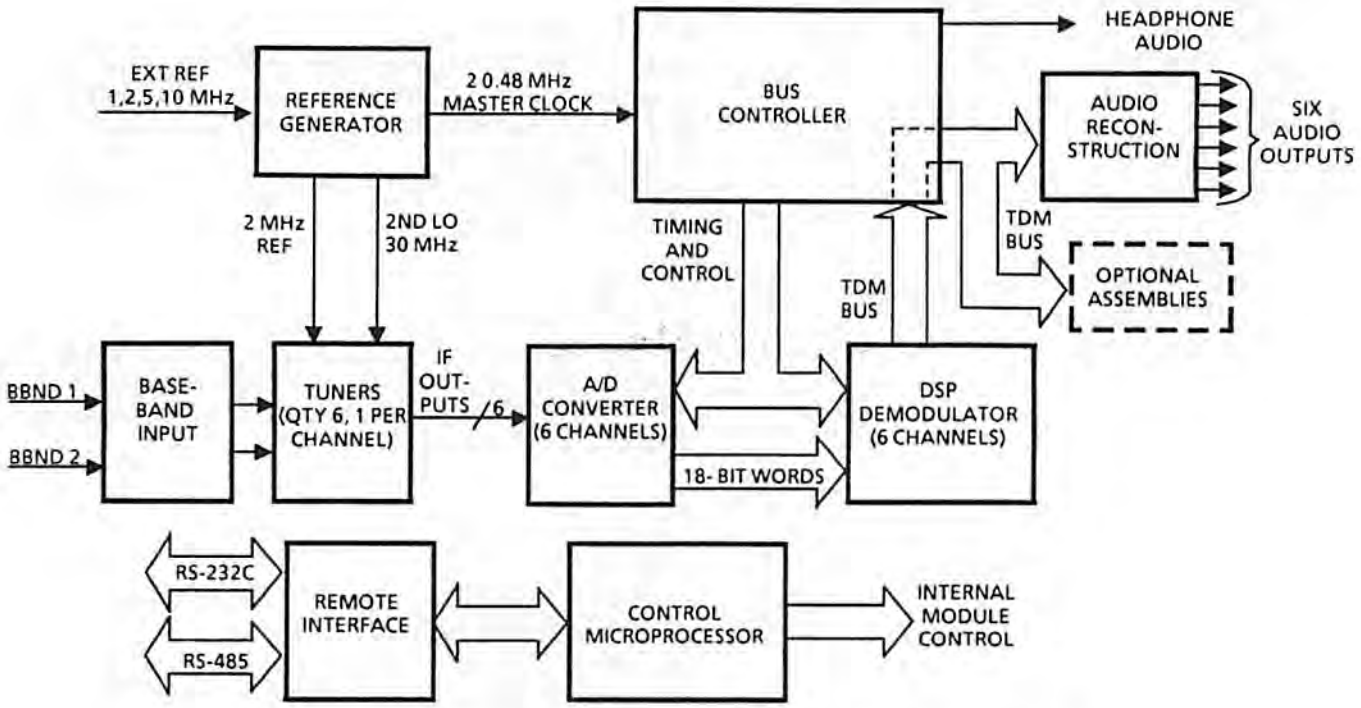


Figure 1-1. WJ-9546 Overall Functional Block Diagram

The 8 kHz IF signals from the six Tuners are then converted to digital form by the A/D Converter Assembly (A8). The six digital outputs of the A/D Converter 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 Assembly (A9).

The DSP Demodulator provides 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 (A10).

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 Converter, the DSP Demodulator, the Audio Reconstruction, and any assemblies installed in the option slots. The Bus Controller also reconstructs an operator-selected voice-grade channel (VGC) into audio form for the front panel headphone jack (J5). The Bus Controller uses the 20.48 MHz master clock from the Reference Generator to derive all the necessary tuning and control signals. This assembly also contains the circuitry necessary to the unit's built-in-test functions.

The Audio Reconstruction Assembly (A15) produces an analog audio signal from each voice-grade data channel on the TDM bus. The analog signals are routed to the six front panel AUDIO OUTPUTS connectors.

The Remote Interface Assembly (A12) provides the communication links between the RS-232C and RS-485 interface equipped controllers and the WJ-9546 Control Microprocessor. Both control interfaces are simultaneously active. The communications protocol incorporated into the RS-485 interface complies with the guidelines of the TELOS specification. Operational details of both control interfaces can be found in **Section II** of this manual.

The Control Microprocessor Assembly (A11) processes the data received from the Remote Interface Assembly and instructs the WJ-9546 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.

1.4 EQUIPMENT SUPPLIED

The standard equipment supplied consists of:

1) One WJ-9546 FDM Demultiplexer

2) One detachable AC Power Cable, P/N 282317-1

3) One detachable DC Power Cable, P/N 282318-1

4) One Instruction Manual

1.5 EQUIPMENT REQUIRED BUT NOT SUPPLIED

To obtain operational utilization of the WJ-9546, equipment from the following list should be used.

1) Audio monitoring equipment:

- 600 ohm headphone set
  or
- 600 ohm speaker panel

2) Controller Device:

- WJ-9546/HHC Hand Held Controller Option
  or
- Remote Controller equipped with RS-485 Interface
  or
- Remote Controller equipped with RS-232 Interface

To obtain complete maintenance capabilities for the WJ-9546, 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-9546/HHC HAND-HELD CONTROLLER OPTION

The WJ-9546/HHC Hand-Held Controller option provides additional remote control capabilities for the operation of the WJ-9546. This option consists of a 3 3/4" X 8 1/4" hand-held computer and an interconnecting RS-232C cable for connection to the WJ-9546's front panel. The hand-held computer contains a liquid crystal display, a 45-key keyboard, and preprogrammed ROM for operation control of the WJ-9546. See **Appendix A** for further details.

1.6.2 WJ-9548/ACT2 ACTIVITY MONITOR OPTION

The WJ-9548/ACT2 Activity Monitor option provides sort capability for differentiating among no activity, signaling tones, voice, data, phase-shift keying (PSK), and frequency-shift keying (FSK) activity 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-9546's chassis.

SECTION II

INSTALLATION AND OPERATION

SECTION II

INSTALLATION AND OPERATION

2.1 UNPACKING AND INSPECTION

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

2.2 INSTALLATION

The WJ-9546 is designed to be operated on a bench, table top, or any other secure surface. When selecting a location for the WJ-9546, allow sufficient space around the unit (approximately 1.75 inches) for air circulation.

Both left and right side panels of the WJ-9546 contain two, pre-tapped screw receptacles. These are provided for mounting the unit, if desired. The receptacles accept 6-32 machine screws. The length of the mounting screws to be used is determined by the thickness of the mounting hardware plus .25-inch maximum. The receptacles allow the screws to penetrate no further than .25-inch into the side panels. See **Figure 2-1** for the physical location of the screw receptacles.

2.2.1 POWER REQUIREMENTS

The WJ-9546 accepts 115/230 VAC (±10%), 50 to 60 Hz power or +10 to +16 Vdc power for operation. AC power is input at the AC INPUT front panel connector (J1). An AC power cable (WJ P/N 282317-1) is supplied with the unit and mates with this connector. DC power is input at the DC INPUT front panel connector (J2). A DC power cable (WJ P/N 282318-1) is supplied with the unit and mates with this connector.

Power may be applied to these connectors simultaneously, if desired, without incurring any damage to the unit. However, the power supply circuitry will only use the power source which provides a voltage closest to the nominal voltage level required by the circuitry in the unit. The power supply circuitry automatically switches between the two power sources as required.

Two front panel circuit breakers, CB1 and CB2 (one for each power source), provide for over-current protection to the unit. The DC source circuit breaker (CB2) opens if the input current to J2 exceeds 5 amps. The AC source circuit breaker (CB1) opens if the input current to J1 exceeds .5 amps RMS. To reset a circuit breaker, press the RESET button located at the left of the associated power connector. Refer to **Figure 2-2** for the location and pin assignments of connectors J1 and J2 and for the location of CB1 and CB2 RESET buttons.

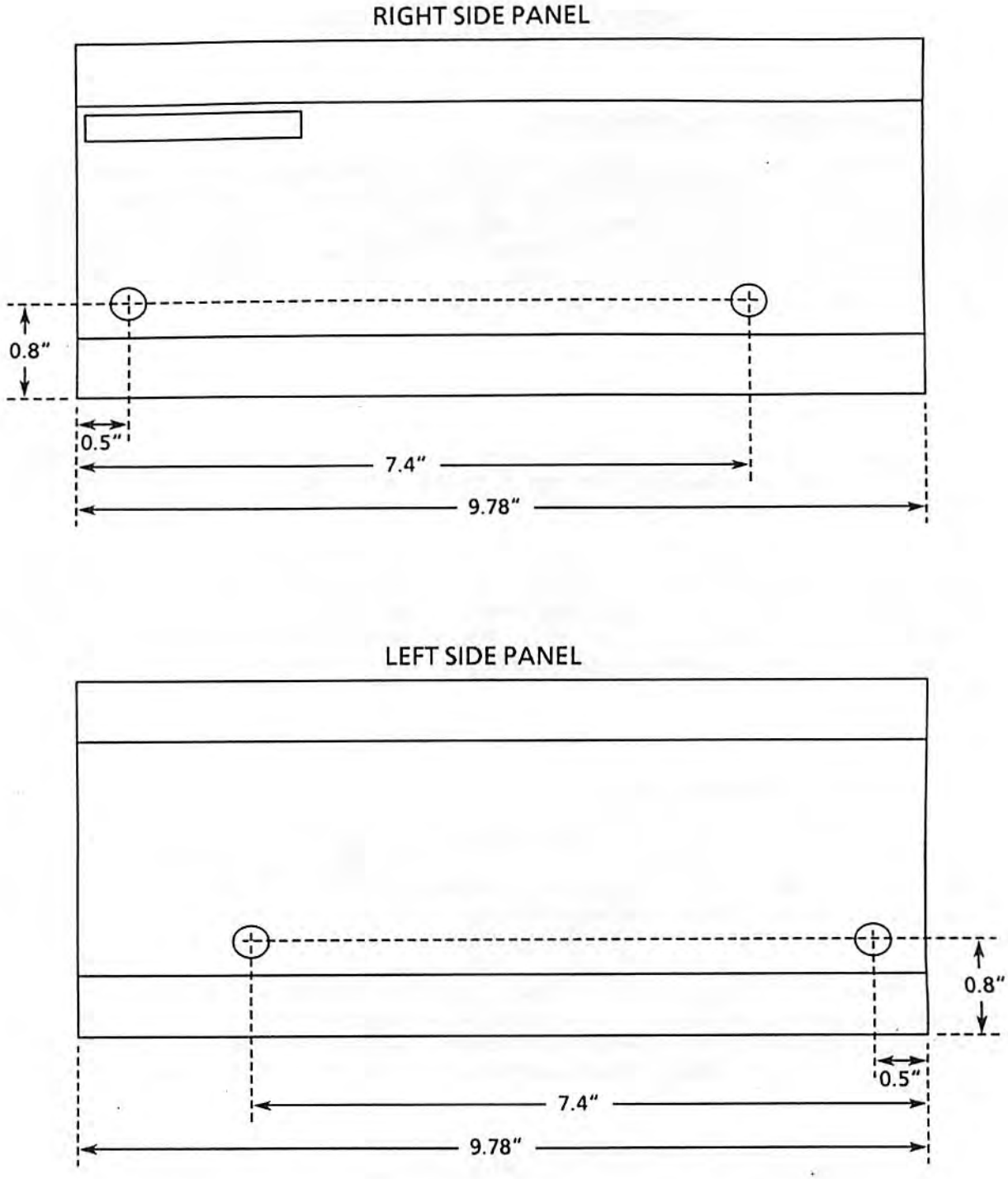
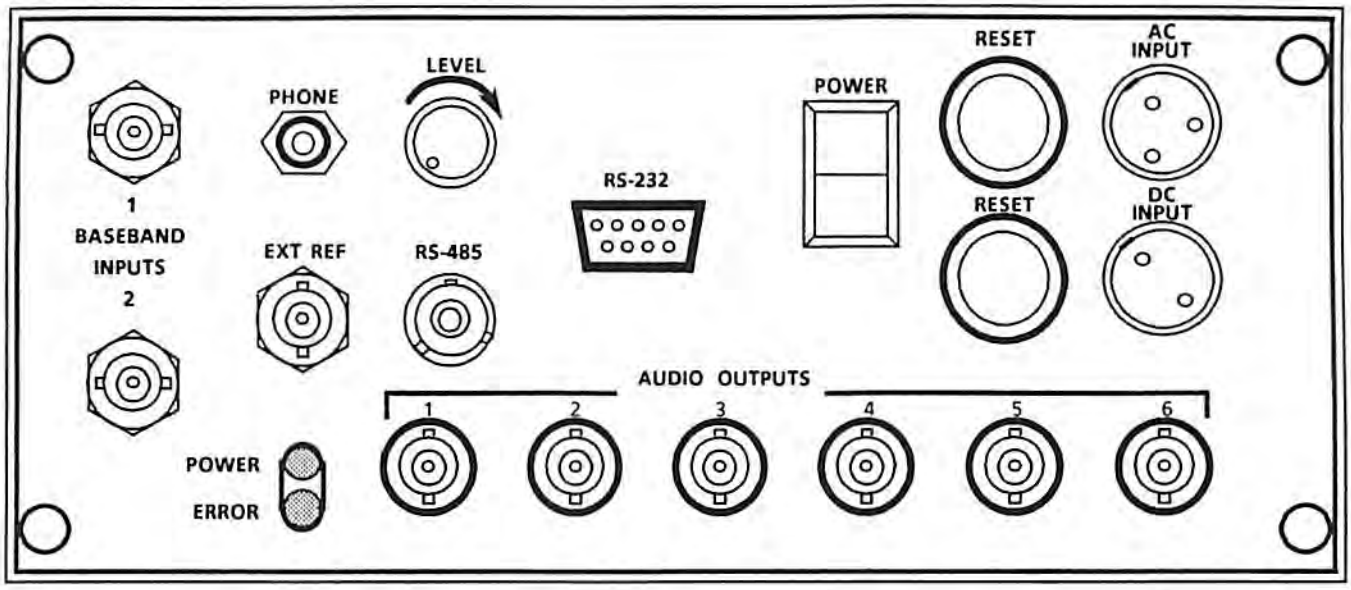
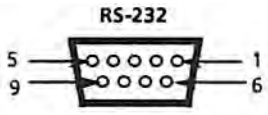
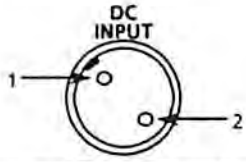


Figure 2-1. Physical Location of the Left and Right Side Panel's Mounting Screw Receptacles

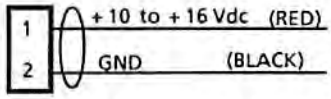




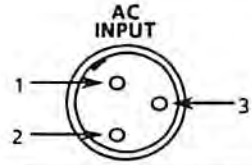
PIN #	FUNCTION
1	NOT USED
2	RS-232 RXD
3	RS-232 TXD
4	NOT USED
5	GROUND
6	NOT USED
7	NOT USED
8	NOT USED
9	NOT USED



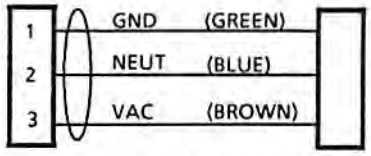
PIN #	FUNCTION
1	+10 to +16 Vdc
2	DC GROUND



DC POWER CABLE WJ P/N 282318-1



PIN #	FUNCTION
1	AC GROUND
2	AC NEUTRAL
3	115/230 VAC 50-60 HZ



AC POWER CABLE WJ P/N 282317-1

Figure 2-2. WJ-9546 Front Panel Connectors, Controls, and Indicators

2.2.2 CONNECTOR SIGNALS

All external connectors of the WJ-9546 are located on the front panel. **Table 2-1** is a list of these connectors and provides a brief description and the reference designation for each. **Figure 2-2** shows the location of the connectors. The following paragraphs provide details of the signals resident at these connectors.

Table 2-1. List of Connectors

Connector	Reference Designator	Function
BASEBAND INPUTS 1 and 2	A17J1 and A17J2	BNC female, accept baseband input signals of 0 to 20 MHz for demodulation.
PHONE	J5	Subminiature mono headphone jack, provides an audio output of the selected demodulator.
EXT REF	J6	BNC female, external reference input.
RS-485	J3	Triax male, allows control via an RS-485 equipped controller.
RS-232	J4	Nine-pin D-type female, allows control via an RS-232 equipped controller. Mates with WJ-9546/ HHC option.
AUDIO OUTPUTS 1 thru 6	A1J6 thru A1J11	BNC female, provide an audio output from each demodulator.
AC INPUT	J1	Three-pin female receptacle, provides connection for AC line power.
DC INPUT	J2	Two-pin female receptacle, provides connection for DC line power.

2.2.2.1 **BASEBAND INPUTS 1 and 2 (A17J1 and A17J2)** - These BNC female connectors accept FDM baseband input frequencies of 0 to 20 MHz with levels of -30 to 0 dBm. During operation the baseband signal connected to BASEBAND INPUTS 1 connector (A17J1) is considered baseband #1, while the baseband signal connected to BASEBAND INPUTS 2 (A17J2) is considered baseband #2. Input impedance at these connectors is 75 ohms, unbalanced.

2.2.2.2 **PHONE Jack (J5)** - This connector is a subminiature headphone jack which provides a mono audio output for the selected demodulator. The front panel LEVEL control provides adjustment of the output of this connector up to 10 dBm into a 600 ohm load.

2.2.2.3 **EXT REF Input (J6)** - This BNC female connector allows an external 1, 2, 5, or 10 MHz reference signal, having a nominal level of 0 dBm into 50 ohms, to be used as the time base for the unit. The unit automatically switches to the external reference upon sensing the external reference signal.

2.2.2.4 **RS-485 Interface (J3)** - This triax male connector provides the WJ-9546 with the capability to be controlled remotely by an RS-485 interface equipped remote controller. The RS-485 interface operates as a half duplex differential line interface at a baud rate of 2400 bps. The inner conductor is the noninverted (+) I/O line while the inner shield is the inverted (-) I/O line. See **paragraph 2.5.10** for more details on RS-485 interface operation.

2.2.2.5 **RS-232 Connector (J4)** - This multipin connector is used to connect the WJ-9546 to an RS-232C interface equipped remote controller. The WJ-9546/HHC Hand-Held Controller option, when used, connects to this connector. The RS-232C interface operates as a full duplex interface at a selectable baud rate of 300 to 9600 bps. Pin 2 of this connector is the receive data line (RXD), pin 3 is the transmit data line (TXD), and pin 5 is ground. See **paragraph 2.5.9** for more details on RS-232C interface operation.

2.2.2.6 **AUDIO OUTPUTS 1 thru 6 (A1J6 thru A1J11)** - Each of these six female BNC connectors provide a 600 ohm demodulated audio output (150-3850 Hz) at a 1 Vrms level from one of the six demodulators.

2.2.2.7 **AC INPUT Connector (J1)** - This three-pin female connector accepts 115 or 230 VAC (±10%) power at a frequency of 50 to 60 Hz. The WJ-9546 requires approximately 30 watts. The supplied AC Power Cable (WJ P/N 282317-1) mates with this connector.

2.2.2.8 **DC INPUT Connector (J2)** - This two-pin female connector accepts +10 to +16 Vdc power. The WJ-9546 requires approximately 30 watts. The supplied DC Power Cable (WJ P/N 282318-1) mates with this connector.

2.2.3 CONFIGURATION SWITCHES

The WJ-9546 contains two DIP switches which are used to configure the unit for operation. Both switches are located on the Remote Control Interface Assembly (A12) and are designated as A12S1 and A12S2. **Figure 2-3** illustrates the means of accessing and the location of A12S1 and A12S2.

The WJ-9546 reads the setting of these switches only at power-up. After any changes are made to the switches, the unit must be turned off and back on. The following paragraphs provide further details on setting these switches to configure the WJ-9546 for operation.

2.2.3.1 RS-485 Address Switch (A12S2)

DIP switch A12S2 is an eight-position switch that is used to set the WJ-9546 address for RS-485 interface bus operations (see **Figure 2-3**). Addresses available are from 1 to 255. The address is entered in binary code using switch position 1 for the least significant digit (LSB) and position 8 for the most significant digit (MSB). The unit will not respond to address 0. If the DIP switch is set for 0, all eight positions off, the unit automatically defaults to address 7.

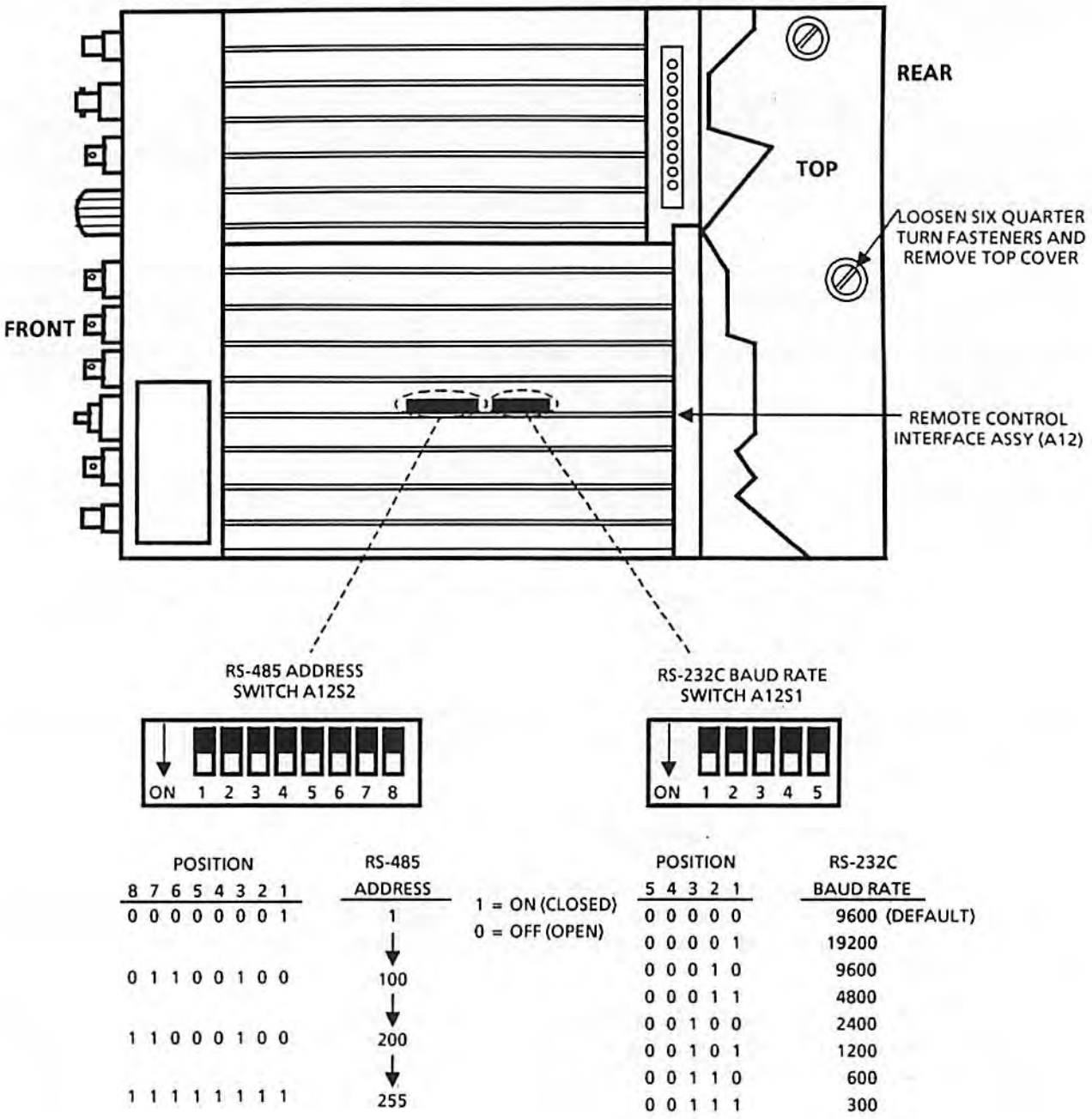


Figure 2-3. Location and Configurations of A12S1 and A12S2

2.2.3.2 **RS-232 Baud Rate Switch (A12S1)**

DIP switch A12S1 is a five-position switch that is used to set the baud rate of data transfers over the RS-232C interface (see **Figure 2-3**). The following baud rates in bits per second (bps) may be selected: 300, 600, 1200, 2400, 4800, and 9600. When the WJ-9546/HHC Hand-Held Controller option is used to control the WJ-9546, this switch must be set for 9600 bps.

2.3 EQUIPMENT MALFUNCTIONS

The WJ-9546 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 OPERATION

2.4.1 CONTROLS AND INDICATORS

All controls and indicators of the WJ-9546 are located on the front panel. Refer to **Figure 2-2** for their physical location. The following paragraphs provide details of the function of each control and indicator.

2.4.1.1 **POWER Pushbutton (S1)** - This rocker-type switch provides power that is available at the front panel AC INPUT or DC INPUT connectors to the internal power supply. Power is applied when the top half of the switch is pushed in.

2.4.1.2 **POWER Indicator (A1CR1A)** - When the POWER switch is pressed, this green LED lights indicating that line power is available to the unit and that the unit is energized. In the event that the front panel circuit breaker for the connected line power is open, this LED will remain unlit.

2.4.1.3 **ERROR Indicator (A1CR1B)** - This red LED, when lit, indicates an unlocked condition of either the internal reference generator or an internal LO.

2.4.1.4 **LEVEL Control (R1)** - This control knob varies the 600 ohm audio output level at the front panel PHONE jack for the selected demodulator. The control knob audio control range is approximately 40 dB.

2.4.1.5 **RESET Buttons** - A RESET button is located to the left of both power input connectors. The top RESET button is associated with circuit breaker CB1 and the bottom RESET button is associated with circuit breaker CB2. In the event that the circuit breaker is tripped, the RESET button is extended. To reset the circuit breaker, push the RESET button in until it locks into place.

2.4.2 OVERVIEW OF OPERATIONAL CAPABILITIES

The WJ-9546 is controlled by commands sent via the RS-232C and RS-485 interfaces. The operational capabilities of the WJ-9546 are identical whether the unit is controlled by an RS-232C equipped remote controller or an RS-485 equipped remote controller. Refer to **paragraph 2.5** for detailed information on operating the WJ-9546 via the RS-232C and RS-485 interfaces. The WJ-9546 may be controlled via the RS-232C interface using the WJ-9546/HHC Hand-Held Controller option. See **Appendix A** of this manual for details on using the WJ-9546/HHC Hand-Held Controller option to operate the WJ-9546 once a full understanding has been gained of the WJ-9546 remote operating procedures contained herein. The following paragraphs provide an overview of the operational capabilities of the WJ-9546 and apply to all three methods of remote control.

2.4.2.1 Initial Setup

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

- Assigning each demodulator to a baseband input
- Entering a PPM correction factor for the two baseband inputs as required
- Assigning a demodulator output to the headphones audio output jack
- Entering the time and date

The baseband inputs to the WJ-9546 are referred to as Baseband 1 and Baseband 2. Baseband 1 is the baseband input connected to the front panel BASEBAND INPUTS 1 connector (A17J1) and Baseband 2 is the baseband input connected to BASEBAND INPUTS 2 connector (A17J2).

Each demodulator may be individually connected to either of the baseband inputs. This allows all six demodulators or a combination of the six to simultaneously process the data on either of the baseband inputs.

A baseband correction factor adjustment is available which can be used to correct for frequency offsets between the transmitting device and the WJ-9546. The correction factor is in parts-per-million (PPM) of the tuned frequency and has a range of -50 to +50 PPM.

Any one out of the six demodulators may be assigned to provide the audio output at the front panel PHONE jack. Since the audio to the headphone jack is turned off upon reset, no audio is present at the PHONE jack until a demodulator is assigned. See **paragraph 2.5.5.5.**

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.

2.4.2.2 Manual Tuning Operation

Manual tuning operation provides a means to tune a selected demodulator channel 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.

2.4.2.2.1 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, the selection of upright or inverted single sideband demodulation is available.

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 2-4** illustrates channels within the baseband with upright and inverted sidebands. In each case, f_1 corresponds to the tuned frequency.

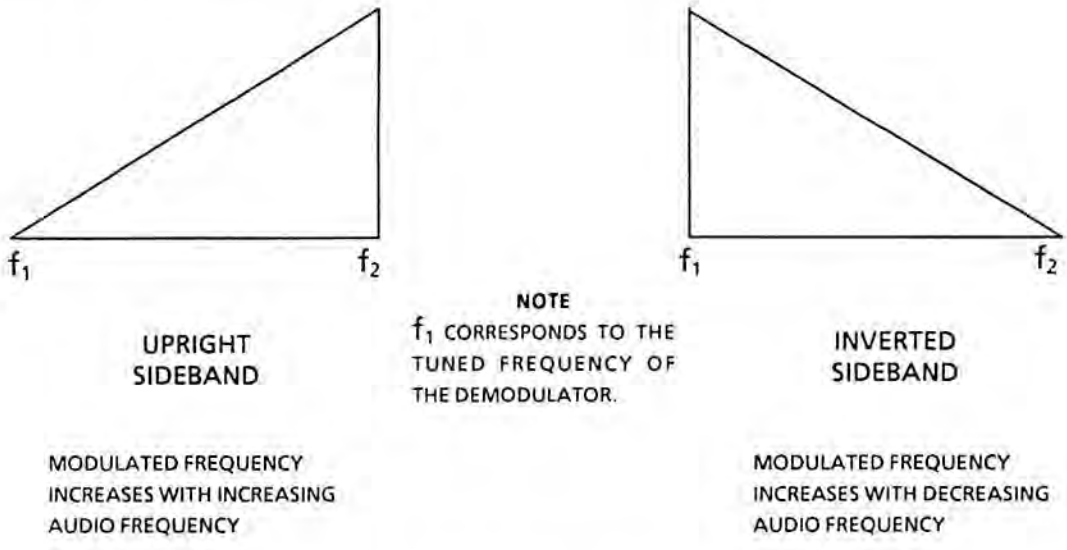


Figure 2-4. Upright and Inverted Sidebands

2.4.2.2.2 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 10.0000 MHz. Upright or inverted channel spectrum may be selected for demodulation. **Figure 2-4** illustrates channels with upright and inverted sidebands.

2.4.2.2.3 CCITT Plan Tuning

The WJ-9546 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 2-5** illustrates the structure of both plans.

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.

2.4.2.3 Scan Operation

The Scan operation of the WJ-9546 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 2.4.2.3.1.**through **2.4.2.3.3.**

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 2.4.2.4** 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-9546 takes when signal activity is detected. **Paragraph 2.4.2.3.5** 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 2.4.2.3.4.**

2.4.2.3.1 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. The scan increment may be defined from 1 kHz to 1 MHz steps. Additionally, upright or inverted frequency spectrum may be selected.

2.4.2.3.2 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.

2.4.2.3.3 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).

2.4.2.3.4 Suspending a Scan

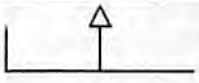
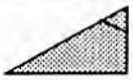
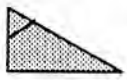
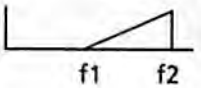
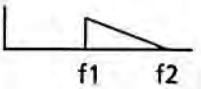
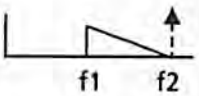
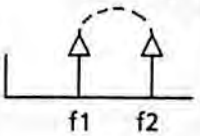
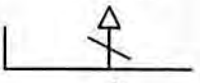
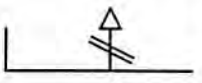
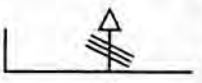
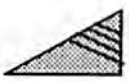
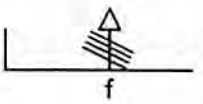
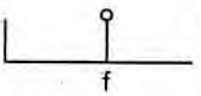
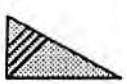
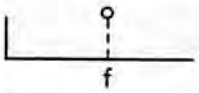
An active scan operation may be halted at any time by entering the Suspend mode. When the scan is suspended, scan setup parameters such as frequency, spectrum, gain mode/level, and the threshold level may be modified to optimize signal detection. After the adjustments are made, the scan may be resumed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

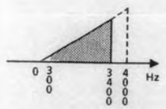
The selected demodulator may also be set to automatically enter the Suspend state at the end of a single scan sequence.

2.4.2.3.5 Dwell Timers

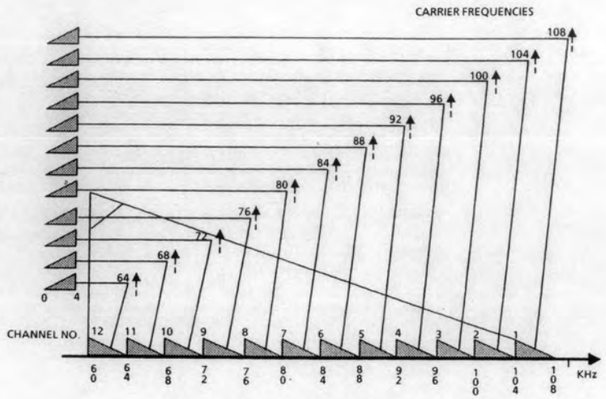
Three dwell timers are available that can be used to further control scan operations. The dwell timers are: Pre Dwell, Signal Dwell, and Post Loss Dwell.

Table 2-2. CCITT Symbols

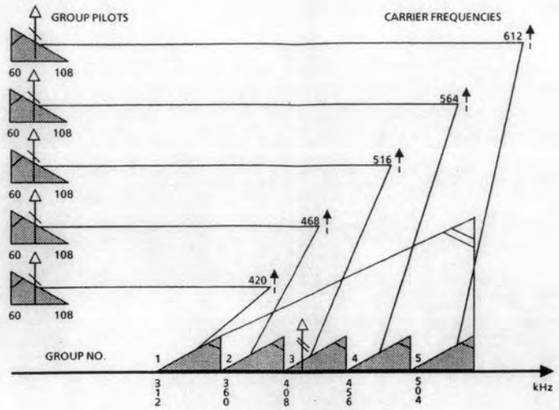
Description	Symbol	Description	Symbol
Carrier frequency		Group in which the channel sidebands are erect (group frequency increases with increasing audio frequency)	
Carrier frequency, suppressed		Group in which the channel sidebands are inverted (group frequency increases with decreasing audio frequency)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



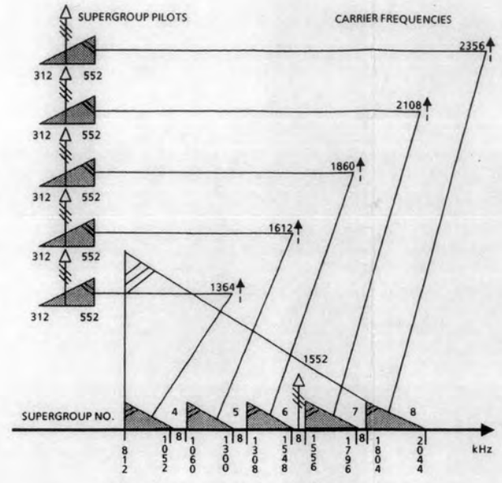
Frequency Band of a Telephone Channel



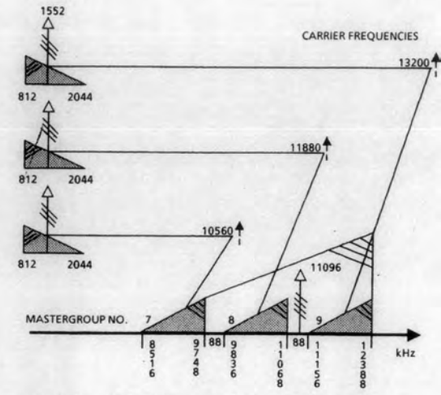
Constitution of the Basic Group



Constitution of the Basic Supergroup

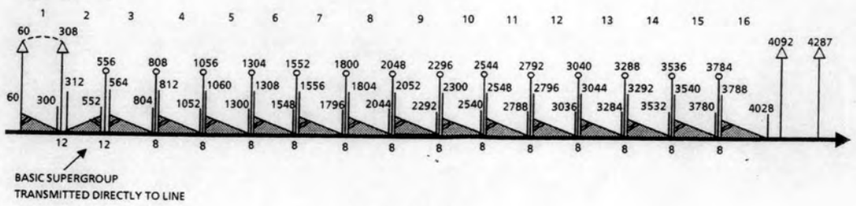


Constitution of the Basic Mastergroup

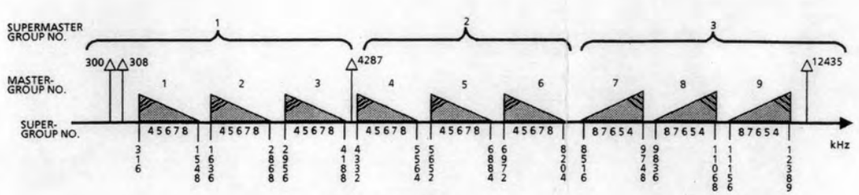


Constitution of the Basic Supermastergroup

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



CCITT 960 PLAN



CCITT 2700 PLAN

Figure 2-5. Structure of the CCITT 960 and CCITT 2700 Frequency Plans

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.

2.4.2.4 Gain and Threshold Settings

The WJ-9546 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 REMOTE OPERATION

The WJ-9546 is designed to communicate with RS-232C interface and RS-485 TELOS Format interface equipped controllers. It may also be controlled by the WJ-9546/HHC Hand-Held Controller option. See **Appendix A** of this manual for details of WJ-9546 remote operations using this option once a full understanding has been gained of the WJ-9546 remote operating procedures contained herein.

Because of their structure, there are some differences in the way that information is handled between the WJ-9546 and the two different types of interfaces. **Paragraph 2.5.10** provides details on RS-485 TELOS Format I/O operations. **Paragraph 2.5.9** details RS-232C I/O operations.

The WJ-9546 may be connected to both RS-232C and RS-485 interfaces at one time allowing for control of the unit from two controllers at different locations.

The ASCII mnemonic structure for controlling the operation of the WJ-9546 is the same when using either of the two available interfaces. The following paragraphs provide details of the procedures for controlling the operation of the unit including the commands and queries used.

2.5.1 COMMAND MESSAGE FORMAT

Due to the structures of the RS-232C interface and the RS-485 TELOS Format interface, command message formatting between the two are quite different. Refer to **paragraph 2.5.9** for complete details of command message formatting when using the RS-232C interface. Refer to **paragraph 2.5.10** for RS-485 TELOS Format command message formatting.

2.5.2 DETAILS ON NUMERIC DATA REPRESENTATION

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

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

nrf - forgiving numeric representation

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

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

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

nr1 - numeric response data - integers

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

nr2 - nr2 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.

2.5.3 MESSAGE CATEGORIES

The commands and queries used for remote operation of the WJ-9546 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-9546 and the remote controller, and other functions not directly related to the tactical operation of the unit. See **paragraph 2.5.4** 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: Demodulator Device Messages and 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 2.5.6** for more details on the use of these messages.

Frame Device Messages affect parameters of the unit that are not specifically directed to an individual 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 2.5.5** for more details on Frame Device Messages.

2.5.4 COMMUNICATION MESSAGES

Table 2-3 lists the Communication Messages that are used to establish communications protocol between the WJ-9546 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 2-3. Communication Messages

Command	Response	Description
RMU nrf		Selects the frame or a demodulator to be accessed by subsequent messages. Range: 0 to 6 Where RMU 0 is used to to indicate Frame Device messages and 1 to 6 for Demodulator Device messages (see **paragraph 2.5.4.1).**
*IDN?	*IDN WJ, 9546, 0, 1.00	Request manufacturer, model number, serial number (always 0) and software release level.

Table 2-3. Communication Messages (Continued)

Command	Response	Description
*SRE nrf		Set service request enable register. Range: 000 to 255 The appropriate bit(s) must be set to generate an interrupt. Bit — Function 0 Not Used 1 Enable DPE (dual port error) 2 Enable QYE (query error) 3 Not Used 4 Enable EXE (execution error) 5 Enable CME (command error) 6 Not Used 7 Not Used
*SRE?	*SRE nr1	Request service request enable register. Response example: *SRE 048 Default value: 000 Note: *SRE and *SRE? are used for RS-232C operations only. See **paragraph 2.5.9.**
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 2.5.8** for the bit evaluations. Reading the contents of the register has no effect on it.
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 2.5.8** 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 2.5.7** for more details on BITE operation.

Table 2-3. Communication Messages (Continued)

Command	Response	Description
*WAI		Wait until last command is processed before processing next command. Note: The *WAI command is available only with the RS-232C interface.
*OPT?	*OPT nr1,nr1	Request installed options. This query returns two 2-digit numeric arguments which represent the option(s) installed. The first argument is option slot #1 and the second argument is option slot #2. Range: 00 to 99 Argument — Description 00 — No option installed 01 — Single CEPT Formatter 02-04 — Reserved 05 — Audio Reconstruction (6 channel) 06-09 — Reserved 10 — Activity Monitor 11-14 — Reserved 15 — Single RS-232 Interface 16-19 — Reserved

2.5.4.1 **Directing Device Messages (RMU Command)**

The RMU command is used to direct WJ-9546 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 6.

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.

2.5.5 OPERATIONS CONTROLLED BY FRAME DEVICE MESSAGES

Table 2-4 lists all WJ-9546 Frame 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.

Table 2-4. Frame Device Messages

Command	Response	Description
DAT mm,dd,yy		Set the date; where mm is month, dd is day, and yy is year.
DAT?	DAT mm,dd,yy	Request the date; where mm is the month, dd is the day, and yy is the year. Response example: DAT 01,23,88
TIM hh,mm,ss		Set the time of day; where hh is the hour, mm is the minutes, and ss is the seconds.
TIM?	TIM hh,mm,ss	Request the time of day; where hh is the hour, mm is the minute, and ss is the seconds. Response example: TIM 13,01,15
BBN nr1		Select a baseband number for configuration operations. Range: 1 or 2
BBN?	BBN nr1	Request the current selected baseband number. Response example: BBN 2 Reset value: 1
BBC nrf		Set the baseband correction factor in parts-per-million (PPM) for selected baseband number. Range: -50 to +50
BBC?	BBC nrf	Request baseband correction factor for the selected baseband number. Response example: BBC -24 Reset value: +00
BBP?	BBP nr1	Request the power level in dBm of the selected baseband number. Range: +08 to -30 Response example: BBP -20
REF?	REF nr1	Request the reference generator source. 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

Table 2-4. 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.
FIR?	FIR nr1	Request the status of the forced internal reference. Range: 0 to 1 Response example: FIR 0 Reset value: 0
HPR nrf		Select demodulator channel number to provide headphones audio output. Range: 0 to 6; where 0 turns off headphones audio
HPR?	HPR nr1	Request demodulator channel number providing headphones audio output. Response example: HPR 1 Reset value: 1
*RST		Reset Frame Device parameters to reset values as listed in this table.

2.5.5.1 Setting the Time and Date

As part of the initial set-up, the time and date may be entered or adjusted as need be. The time is entered using the TIM command followed by hours, minutes, and seconds operands. The time setting may be checked by the TIM? query.

The date is entered using the DAT command followed by month, day, and year operands. The date setting may be checked by the DAT? query.

2.5.5.2 Selecting a Baseband Input for Configuration Changes

Before a baseband input may be assigned a correction factor (**paragraph 2.5.5.3**) or its power level to be monitored (**paragraph 2.5.5.4**), it must first be selected for configuration changes by using the BBN command. BBN 1 selects the baseband input connected at the front panel BASEBAND INPUTS 1 connector (A17J1). Similarly, BBN 2 selects the baseband input connected to BASEBAND INPUTS 2 connector (A17J2). The current baseband input selected for configuration may be checked by the BBN? query.

2.5.5.3 Entering a Correction Factor for the Baseband Inputs

A baseband correction factor adjustment is provided which is used to correct for frequency offsets between the transmitting device and the WJ-9546.

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

2.5.5.4 Monitoring the Power Level of the Baseband Inputs

The power level of the selected baseband input may be monitored by using the BBP? query. The response operand will be in 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.

2.5.5.5 Selecting the Source for Headphones Audio Output

The HPR command is used to assign a demodulator to provide the audio for the front panel PHONE jack (J5). The operand may be any digit from 0 to 6. HPR 1 selects demodulator one, HPR 6 selects demodulator six, and so on. Entering HPR 0 turns off the headphones audio output (no audio available at the PHONE jack).

The HPR? query is used to determine which demodulator is providing the headphones audio output. The response operand will be any digit from 0 to 6. A response operand of 0 indicates the headphones audio is turned off.

2.5.5.6 Timebase Reference Frequency

The WJ-9546 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 that the unit is currently locked on to is requested with the REF? query. The response operand will be any digit from 0 to 4; 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.

2.5.6 OPERATIONS CONTROLLED BY DEMODULATOR DEVICE MESSAGES

Table 2-5 lists all WJ-9546 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 2.5.4.1,** all messages listed in **Table 2-5** must be preceded by an RMU X command, where X is the demodulator channel for which the message is to be directed.

Table 2-5. Demodulator Device Messages

Command	Response	Description
DBB nrf		Connect demodulator to baseband input specified by nrf. Range: 0 to 2, where 0 represents no connection.
DBB?	DBB nr1	Request demodulator to baseband input connection. Response example: DBB 02 Reset value: 1
OPR nrf		Set the operating mode. See **paragraph 2.5.6.2.** nrf Operating Mode 0 Manual operation 1 Scan operation
OPR?	OPR nr1	Request the current operating mode. Response example: OPR 1 Reset value: 0
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

Table 2-5. Demodulator Device Messages (Continued)

Command	Response	Description
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: 01.000000
SPD nrf		Set frequency spectrum for Direct Frequency Tuning mode. nrf Frequency Spectrum 0 upright 1 inverted
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
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). 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

Table 2-5. Demodulator Device Messages (Continued)

Command	Response	Description
CTB nrf,nrf,nrf, nrf, nrf		Set CCITT 2700 Plan Supermastergroup (SMG), Mastergroup (MG), Supergroup (SG), Group (GP), and Channel (CH). 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
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: 10
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: -70
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

Table 2-5. Demodulator Device Messages (Continued)

Command	Response	Description
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 2.5.6.7.1** thru **2.5.6.7.4**) 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.
PDW nrf		Set Scan Pre Dwell timer in mSec. 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: +0050
SDW nrf		Set Scan Signal Dwell timer in Sec. Range: +000 to +600 Where: -1 sets infinite Signal Dwell
SDW?	SDW nr1	Request Scan Signal Dwell timer. Response example: SDW -1 Reset value: -1 (infinite)

Table 2-5. Demodulator Device Messages (Continued)

Command	Response	Description
LDW nrf		Set Scan Post Lost Dwell timer in Sec. 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: +001
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
SUS		Suspend the Scan operation. 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. 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.

Table 2-5. Demodulator Device Messages (Continued)

Command	Response	Description
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. nrf — SAC Operation 000 — Continuously repeat Scan 128 — Suspend on end of single pass
ADV		Advance to next step in the scan sequence if the scan is active.
SCS?	SCS nr1	Request Scan status. nr1 — Scan Status 0 — Scan off 1 — Scan active 2 — Scan suspended Response example: SCS 0
*LRN?	SPD nr1; FRQ nr2; CTA nr1, nr1,nr1;CTB nr1, nr1,nr1,nr1,nr1; SPC nr1;CHN nr1; AGC nr1;RFG nr1; TNM nr1	Request current demodulator operating parameters. Response example: SPD 0;FRQ 15.000000; CTA 01,3,05;CTB 1,7,4,1,02; SPC 0;CHN 0005;AGC 0;RFG 24; TNM 0
*RST		Reset Demodulator Device parameters to reset values as listed in this table.

2.5.6.1 Connecting a Demodulator to a Baseband Input

The demodulator may be directed to monitor the baseband input connected to BASEBAND INPUTS 1 connector (A17J1) or the input at BASEBAND INPUTS 2 connector (A17J2).

The DBB command is used to connect the demodulator to the baseband input. DBB 1 provides connection to baseband input 1 while DBB 2 provides connection to baseband input 2. If desired the demodulator may be disconnected from both baseband inputs by using DBB 0. The DBB? query is used to determine the baseband input connection for the selected demodulator.

2.5.6.2 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 of the Scan operations (OPR 1), the applicable Scan operation parameters must be previously set. See **paragraph 2.5.6.7** for details on Scan operations and setups.

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

2.5.6.3 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.

2.5.6.3.1 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.

2.5.6.3.2 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.

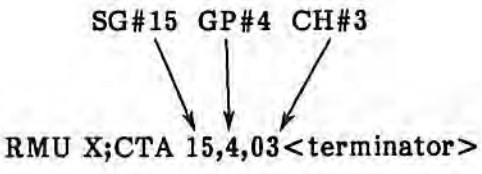
2.5.6.3.3 CCITT 960 Plan Tuning

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 2-5**). 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 6
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.

2.5.6.3.4 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 2-5**).

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.

2.5.6.4 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 2.5.6.7.6.2).**

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.

2.5.6.5 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.

2.5.6.6 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).

2.5.6.7 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 2.5.6.2,** 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:

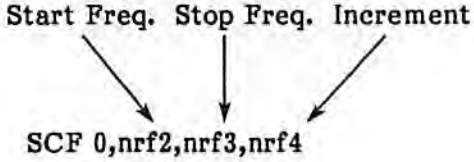
SCF 0 = Direct Frequency Scan
SCF 1 = CCITT 960 Group Scan
SCF 2 = CCITT 960 Supergroup Scan
SCF 3 = CCITT 2700 Group Scan
SCF 4 = CCITT 2700 Supergroup Scan
SCF 5 = CCITT 2700 Mastergroup Scan
SCF 6 = CCITT 2700 Supermastergroup Scan
SCF 7 = Channel Scan

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.

2.5.6.7.1 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.

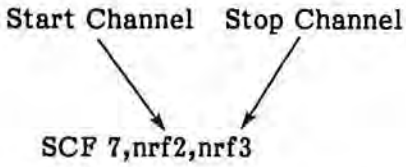
The scan increment setting determines the frequency steps of the scan from the start frequency to the stop frequency. The scan increment is entered in the third freq. specifier argument (nrf4) and consists of two digits, a decimal point, and three digits. The range of the scan increment (in MHz) is 00.001 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.

2.5.6.7.2 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.

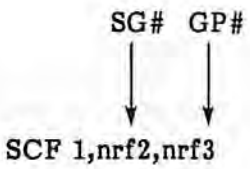
In Channel Scan operation the demodulator step tunes from channel to channel in 4 kHz increments. Therefore, no increment selection is used for this scan mode. The scan configuration setup can be checked with the SCF? query.

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.

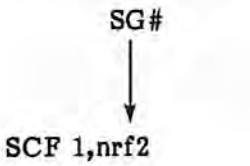
2.5.6.7.3 CCITT 960 Plan Scanning

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:

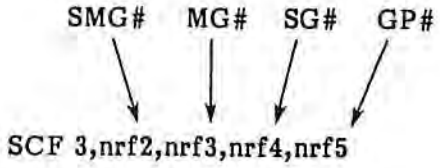


After the scan mode is set up, it may be initiated with the OPR 1 command. The scan configuration setup can be checked with the SCF? query.

2.5.6.7.4 CCITT 2700 Plan Scanning

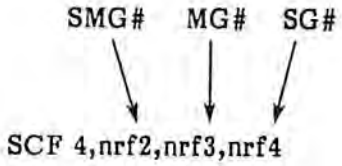
Four scan modes are available for scanning channels in the CCITT 2700 Plan: CCITT 2700 Group Scan, CCITT 2700 Supergroup Scan, CCITT 2700 Mastergroup Scan, and CCITT 2700 Supermastergroup Scan.

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:



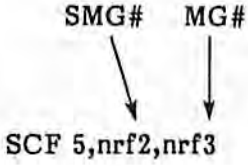
The Supermastergroup number is entered in the first freq. specifier argument (nrf2) and has a range of 1 to 3. The Mastergroup number is entered in the second freq. specifier argument (nrf3) and has a range of 7 to 9. The Supergroup number is entered in the third freq. specifier argument (nrf4) and has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



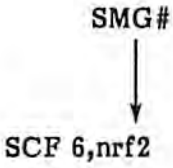
The Supermastergroup number is entered in the first freq. specifier argument (nrf2) and has a range of 1 to 3. The Mastergroup number is entered in the second freq. specifier argument (nrf3) and has a range of 7 to 9. The Supergroup number is entered in the third freq. specifier argument (nrf4) and has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

2.5.6.7.5 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, 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 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).

2.5.6.7.6 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.

2.5.6.7.6.1 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. A pre dwell of +0000 implies that the demodulator will perform a minimum dwell before moving to the next step in the scan. Any time greater than +0000 indicates the time in msec the demodulator will wait on the current scan step for a signal. 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.

2.5.6.7.6.2 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 reentry 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.

2.5.6.7.6.3 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.

2.5.7 BUILT-IN-TEST OPERATION

The Built-In-Test (BITE) operation is automatically performed at power-up. It can also be initiated when, the ERROR LED on the front panel becomes lit or 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 2-6.**

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 2.5.8** for information on determining device-dependent errors. The following paragraphs provide descriptions of the individual tests that are performed during the BITE sequence.

Table 2-6. 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 (A8) 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 (A10).

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-9546. 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 (A9).

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 standard WJ-9546 is equipped with a mono headphone jack which is internally connected to the right headphone circuitry. The Left Headphone Fault status is therefore not applicable.

The Tuner Signal Path Fault bit (bit 9), when set, is an indication of a fault in one or more of the Tuner Assemblies (A2 thru A7).

2.5.8 DETERMINING DEVICE-DEPENDENT ERRORS

The WJ-9546 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 the following paragraphs.

2.5.8.1 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 2-7** provides the bit evaluation of the frame device-dependent error register. Unused bits (3 and 6 thru 15) have a value of zero.

Table 2-7. Bit Evaluation of the Frame Device-Dependent Error Register

Bit	Description
0	Reference Generator unlocked
1	Bus Controller failure
2	Dual Port Interface failure
3	Not used
4	Option Slot 1 hardware failure
5	Option Slot 2 hardware failure
6-15	Not used

2.5.8.2 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 6. The response is a bit-mapped value of 8 bits. **Table 2-8** 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 and 7) have a value of zero.

Table 2-8. Bit Evaluation of the Demodulator Device-Dependent Error Register

Bit	Description
0	Tuner Board Run-time Error
1	Tuner Board BITE Error
2	A/D Converter Board Run-time Error
3	A/D Converter Board BITE Error
4	DSP Board Run-time Error
5	DSP Board BITE Error
6	Not used
7	Not used

The Tuner Board Run-time Error bit (bit 0) is set when the Tuner is 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 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 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.

2.5.9 DETAILS ON RS-232C INTERFACE I/O OPERATIONS

The RS-232C interface is implemented on the nine-pin, three-wire serial I/O port labeled RS-232 on the front panel of the WJ-9546. This interface is employed when the WJ-9546/HHC Hand-Held Controller Option is used. However, other controller devices equipped with an RS-232C interface may be used. The RS-232C interface has a full duplex operation implemented on the TXD (transmit data) and the RXD (receive data) lines.

The WJ-9546 supports software communications protocol only. Hardware handshake signals such as RTS, CTS, DTR or DSR are not supported. Data word format is fixed and comprised of the following:

- One start bit
- An eight-bit character
- No parity
- One stop bit

Baud rate is selectable from 300 to 9600 bps. See **paragraph 2.2.3.2** for information on selecting the RS-232C baud rate.

2.5.9.1 RS-232C Command Message Formatting

Command messages are exclusively ASCII-encoded data. Command headers consist of three-character mnemonics. "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-9546 must be separated with a semicolon (;) character. In addition, multiple arguments of a single command must be delimited with commas.

2.5.9.1.1 Message Processing

When the WJ-9546 receives a message, it is stored in the input buffer until a valid message termination is received (**paragraph 2.5.9.2.3**). Then the message is parsed and executed.

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

2.5.9.1.2 Query Response Format

A fixed field format is used for query responses. Query responses begin with the mnemonic in upper-case characters, followed by a numeric argument. Query responses separate the first argument and 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 positive or negative sign is always given. Single queries that require multiple arguments are delimited by commas. Responses due 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).

2.5.9.2 RS-232C Communications Protocol

The communications protocol implements both ENQ/ACK (ENQuire/ACKnowledge) and XON, XOFF (ctl Q,ctl S). The ENQ/ACK format allows the user to send an ENQ character to the WJ-9546 when an acknowledge is required. The WJ-9546 then responds with the ACK/NAK character indicating the validity of the data received in the input buffer and the fact that the unit has completed processing all current data thru the last received terminator. The XON/XOFF format supports both transmit and receive communications. This allows transmission based on the availability of buffer space.

Table 2-9 lists the supported communications control commands for RS-232C operation.

Table 2-9. Supported RS-232C Communications Control Commands

HEX	ASCII	Receive	Transmit	Function
11	DC1	x	x	XON, allow data transmission
13	DC3	x	x	XOFF, disallow data transmission
05	ENQ	x		Enquire, request acknowledge
06	ACK		x	Acknowledged, data received
15	NAK		x	Not acknowledged, data communications error
0A	LF	x	x	Line feed, start processing input buffer
0D	CR	x	x	Carriage return, no action
1B	ESC		x	Service Request character, always direct followed by status byte

2.5.9.2.1 XON/XOFF Protocol

The XON/XOFF communications protocol is always active in the WJ-9546. In the event the buffer has room for less than 16 additional characters the unit will output an XOFF character. When the unit empties its input buffer, it issues an XON character. The user must stop sending data within 15 characters after receiving the XOFF character. On each character that is received while the buffer is full, the unit issues an XOFF character. The user may start sending data to the unit after receiving the XON character.

The WJ-9546 responds to the XON and XOFF commands while outputting data to the user. If the unit receives an XOFF while sending, it stops transmitting within two characters. The unit will not transmit any further data until an XON is received. The WJ-9546 assumes the XON condition at power-up.

2.5.9.2.2 ENQ/ACK Protocol

When the ENQ character is sent to the WJ-9546, it responds to a valid message with an ACK, or to an invalid message with a NAK. An invalid message is indicated on a data communications error such as framing, noise, or overrun. The transmission of a NAK indicates that one or more of the bytes received after the last ENQ has a communications error. The ACK/NAK response is only sent after the unit has completed processing any previous messages in the input buffer and has output any response necessary. See Table 2-9.

The WJ-9546 internally maintains a communications error flag. The flag is cleared on power-up or the transmission of a NAK. The flag is set when a byte is received with a data communications error. Upon receiving an ENQ character, the unit responds with an ACK/NAK based on the condition of the communications flag, after any pending input and output operations are complete.

2.5.9.2.3 Terminator

The input buffer is processed on the receipt of a LF character (line feed). The WJ-9546 outputs messages terminated with CR,LF.

2.5.9.2.4 Handling of Communications Errors

The WJ-9546 reports four types of communications errors by generating a service request: dual port errors, command errors, execution errors, and query errors. A dual port error indicates that the processors attempted to retrieve data from memory but failed. A command error indicates that that the unit could not interpret the mnemonic in the input buffer. An execution error indicates that 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 is 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) if enabled. See **paragraph 2.5.9.2.5** for details on service requests.

2.5.9.2.5 Service Request (SRQ)

The WJ-9546 can send a one-byte control character (ESC) indicating a service request, followed by an eight-bit status byte if enabled. The SRQ sequence may be enabled or disabled with the *SRE command (see **Table 2-3**). The SRQ byte (ESC) indicates to the user that a requesting event has occurred. The status byte immediately follows the SRQ byte (ESC). This status byte identifies the reason for requesting service. The encoding of this byte is listed in **Table 2-10.**

The SRQ sequence either precedes or follows the output of a data string being transmitted from the output buffer. It does not interrupt the data string.

Table 2-10. Bit Evaluation of the SRQ Status Byte

Bit Number	Mnemonic	Description
0		Not used.
1	DPE	**Dual Port Error** - Set when a dual port error occurs (hardware error, processor could not read from memory).
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		Not used.
4	EXE	**Execution Error** - Set by a data element out of range, or by a message which could not be processed due to some device condition.
5	CME	**Command Error** - Set by an unrecognized remote mnemonic.
6		Not used.
7		Not used.

2.5.9.2.6 Buffer Handling

The WJ-9546 RS-232C interface handles buffers in circular fashion to allow full duplex operation of the serial I/O.

2.5.9.2.6.1 Input Buffer

The Input buffer is handled in circular fashion allowing simultaneous inputting and processing of data. The input buffer accepts up to 1024 bytes before overflowing. As data in the buffer is being processed, additional inputs can be accepted by the unit. Upon receiving a terminator character, the WJ-9546 processes any previous messages in the buffer. When the buffer has less than 16 unused bytes, XOFF is generated. XON is generated when the buffer is no longer full (empty or two messages removed). See **paragraph 2.5.9.2.1.**

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

2.5.9.2.6.2 Output Buffer

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

2.5.10 DETAILS ON RS-485 TELOS FORMAT INTERFACE OPERATIONS

The RS-485 interface is implemented on the triax male connector labeled RS-485 on the WJ-9546 front panel. This two-wire, half-duplex system supports a "speak only when spoken to" operation. The rate of data transfers is set to a standard baud rate of 2400 bps.

The WJ-9546 supports software communications only. Data word format is fixed and comprised of the following:

- One start bit
- A seven-bit character
- One parity bit (even)
- One stop bit

See **Table 2-11** for a summary of RS-485 interface specifications.

Table 2-11. Summary of RS-485 Interface Specifications

Baud Rate	2400 bps
Byte Timing	Asynchronous
Byte (Character) Format	ASCII
Byte Length	10-bit (one start bit seven data bits, one parity bit (even), and one stop bit)
Command Message Length	255 Characters (including stx and etx)
Command Instruction Length	17 Characters (does not include delimiters)
Response Message Length	247 Characters (includes stx and etx)
Response-to-Instruction Length	100 Characters (does not include delimiters)
Device Address Format	6 Characters (WJFXXX), 3 alphabetic permanently assigned (WJF for the WJ-9546) and 3 numeric as determined by configuration switch (A12S2)

2.5.10.1 **Command Message Format**

Command messages are exclusively ASCII-encoded data. Command headers consist of three-character mnemonics. "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-9546 must be separated with a semicolon (;) character. In addition, multiple arguments of a single command must be delimited with commas.

The command message consist of series strings of 10-bit asynchronous bytes, each consisting of one start bit, seven data bits, one parity bit, and one stop bit. Each message begins with an ASCII start byte (stx character), followed by the device address consisting of six bytes, a space character, the command bytes, and an end-of-text ASCII byte (etx character). See **Figure 2-6** for an illustration of the command message format.

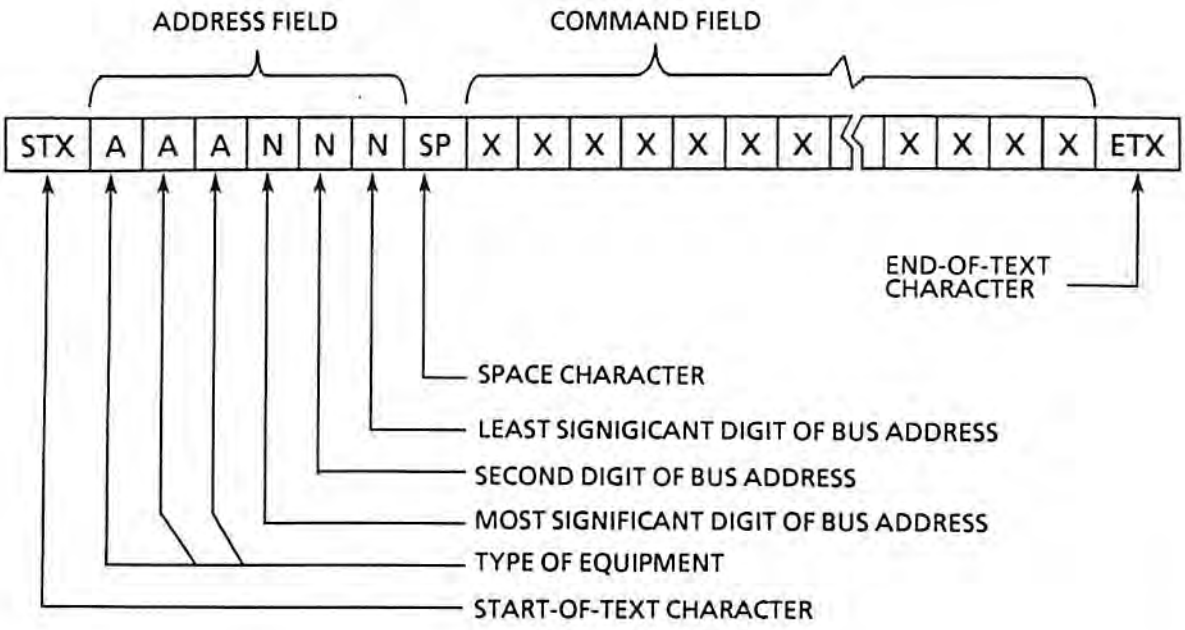
All communications over the bus are in ASCII. The WJ-9546 is to be assigned a unique address (**paragraph 2.5.10.2**) and responds only to commands with its address. The following is an example of a correctly formatted command message.

<stx>WJF005 FRQ=12.000000<etx>

This command message instructs a WJ-9546 which has been set to address 05 to tune to 12.000000 MHz. Note that the command instructions are formatted by the command item followed by an equal sign "=" and the parameter or setting. All commands are to be formatted using the equal sign.

2.5.10.1.1 **Response Message Format**

A response to a status command message consists of an ASCII start-of-text character (stx) followed by a hyphen (-), and then the command message is echoed up to the equals sign; at which point the WJ-9546 inserts the device status followed by an end-of-text character (etx). A single response message is limited to 247 characters (including stx and etx).



A = ALPHABETIC CHARACTER

N = NUMERIC CHARACTER

X = ALPHANUMERIC CHARACTER

STX = START-OF-TEXT CHARACTER (ASCII)

SP = SPACE CHARACTER (ASCII)

ETX = END-OF-TEXT CHARACTER (ASCII)

Figure 2-6. Format for Command Messages Sent Out on the RS-485 Interface

When the WJ-9546 responds to multiple command messages, a carriage return and a line feed are inserted followed by a semicolon and the next status statement. Each additional status statement is preceded by a series of carriage returns, line feeds, and semicolons.

This series of statements can continue until the 247 byte limit is reached, which includes the start-of-text (stx) and end-of-text (etx) characters. There is no set limit for the number of responses, but the limit of 100 bytes per response applies to multiple-response messages.

The response message is terminated with an end-of-text character following the CR and LF of the last status or parameter statement. The following is an example of a command message and a normal subsequent response.

Command Message: <stx>WJF005 FRQ=12.000000<etx>

Response Message: <stx>-WJF005 FRQ=12.000000<cr><lf><etx>

2.5.10.2 WJ-9546 RS-485 Address

The address when sending commands to the WJ-9546 is a six byte address code consisting of three alphabetic characters followed by three numeric characters. The alphabetic characters are "WJF", while the numeric characters may be any number from 001 to 255 as determined by the setting of the RS-485 address switch (000 is reserved). See **paragraph 2.2.3.1** for details on setting the RS-485 address.

2.5.10.3 Handling of Communication Errors

The WJ-9546 reports four types of communications errors by generating an error alert: dual port errors, command errors, execution errors, and query errors. A dual port error indicates that the processors attempted to retrieve data from memory but failed. A command error indicates that that the unit could not interpret the mnemonic in the input buffer. An execution error indicates that the data sent with the mnemonic is outside the range or acceptable format. A query error is generated when the output buffer overflows. 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 errors causes the WJ-9546 to respond with an error alert. The following is an example of an error alert for an execution error.

Command Message: <stx>WJF005 FRQ=22.000000<etx>

Response Message: <stx>-WJF005 FRQ=EXE<cr><lf><etx>

The error alert response mnemonic for a command error is CME. For a dual port error the response mnemonic is DPE. The query error alert response mnemonic is QYE.

2.5.10.4 Buffer Handling

The RS-485 buffers are handled in linear fashion. When a terminator has been received, the WJ-9546 will accept no further data until all data in the input buffer has been processed. Data in the output buffer is made available upon the completion of processing all queries in the input buffer. Upon reading the data from the output buffer, it becomes empty. The RS-485 input buffer holds up to 255 characters (including stx and etx). The RS-485 output buffer holds up to 247 characters (including stx and etx).

SECTION III

REPLACEMENT PARTS LIST

SECTION III

REPLACEMENT PARTS LIST

3.1 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.

3.2 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).

3.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address	Mfr. Code	Name and Address
00681	Catalyst Research Corporation 1421 Clarkview Road Baltimore, MD 21209	01295	Texas Instruments, Inc. Semiconductor-Components Div. 13500 North Central Expressway Dallas, TX 75231
00779	AMP, Incorporated P. O. Box 3608 Harrisburg, PA 17150	02735	RCA Corporation Solid State Division Route 202 Somerville, NJ 08876
01121	Allen-Bradley Company 1201 South 2nd Street Milwaukee, WI 53204	04713	Motorola, Incorporated Semiconductor Products Div. 5005 East McDowell Road Phoenix, AZ 85008

Mfr. Code	Name and Address
09021	Airco Inc. Airco Electronics Bradford, PA 17055
14632	Watkins-Johnson Company 700 Quince Orchard Road Gaithersburg, MD 20878
14949	Trompeter Electronics, Inc. 8936 Comanche Avenue Chatsworth, CA 91311
15542	Mini-Circuits Laboratories Division of Scientific Components Corp. 2625 E. 14th Street Brooklyn, NY 11235
15912	Thomas and Betts Corporation 4371 Valley Blvd. Los Angeles, CA 90032-3632
17856	Siliconix, Inc. 2201 Laurelwood Road Santa Clara, CA 95050
17858	Zeks Air Drier Corp. Industrial Park Pennsylvania Ave P.O. Box 396 Malvern, PA 19355
18178	EG and G Vactec Inc. 10900 Pace Ave St. Louis, MO 63132-1020
18324	Signetics Corporation 811 East Arques Avenue Sunnyvale, CA 94086
19505	Applied Eng. Products, Co. 1475 Whalley Ave. PO Box A-D New Haven, Connecticut 06525
2P953	Lemousa Inc. Santa Rosa, CA 95406
22526	Berg Electronics Divison Rt. 83 New Cumberland, PA 17070
24226	Gowanda Electronics Corp. No. 1 Industrial Pl. Gowanda, NY 14070-1409
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
25088	Siemens America, Inc. 186 Wood Avenue S. Iselin, NJ 08830
26742	Methode Electronics Inc. 7447 W. Wilson Ave. 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
31918	ITT Schadow, Inc. 8081 Wallace Road Eden Prairie, MN 55344

Mfr. Code	Name and Address
33095	Spectrum Control, Inc. 152 E. Main Street Fairview, PA 16415
34335	Advanced Micro Devices 901 Thompson Place Sunnyvale, CA 94086-4518
51642	Centre Engineering Inc. 2820 E. College Avenue State College, PA 16801-7515
52648	Plessey Semiconductors 1641 Kaiser Avenue Irvine, CA 92714
53387	Minnesota Mining & Mfg. Co. 11550 Stonehollow Drive P.O. Box 2963 St. Paul, MN. 55101
54483	TDK Electronics Corp. 755 Eastgate Blvd. Garden City, NY 11530
55233	Mohawk Western Plastics Inc. 1496 Arrow LA Vern, CA 91750-5219
55322	Samtec, Inc. 810 Progress Blvd. P.O. Box 1147 New Albany, IN 47150
61429	Fox Electronics 6225 Presidential Court Ft. Myers, FL 33905
61722	Epson America Inc. 3415 Kashiwa Street Torrance, CA. 90505
61772	Intergrated Device Technology 3236 Scott Blvd Santa Clara, CA 95051
62786	Hitachi America Ltd. 1800 Bering Drive San Jose, CA 95122
62839	Comlinear Corp 4800 Wheaton Dr. P.O. Box 20600 Ft. Collins, CO. 80522
67129	Minnesota Mining & Mfg. Co. Electronics Product Div. 9450 Pineneedle Dr. P.O. Box 270 Mentor, Ohio 44061-0270
71279	Cambridge Thermionic Corp. 445 Concord Avenue Cambridge, MA 02138
72982	Erie Technological Products 644 West 12th Street Erie, PA 16512
74193	Heinemann Electric Co. 2600 Brunswick Pike Rt. 1, P.O. Box 6800 Lawerenceville, NJ 08648-0800
77777	Kelso Gwendolyn 3731 39th St NW Washington, DC 20016-7399
80294	Bourns, Incorporated 6135 Magnolia Avenue Riverside, CA 92506
82389	Switchcraft, Inc. 5555 North Elston Avenue Chicago, IL 60630

Mfr. Code	Name and Address
9AA13	Maxim Integrated Products Sunnyvale, CA 94086
99800	American Precision Industries, Inc. Delevan Electronics Division 270 Quaker Road East Aurora, NY 14052-2114
99999	Department of Defense Ammunition Code assigned and promulgrated by cataloging Div Defense Logistics Service Center Battle Creek, MI 49016

3.4 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 3.3**, and the manufacturer's part number, provided in **paragraph 3.5**, 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 3.5** 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.

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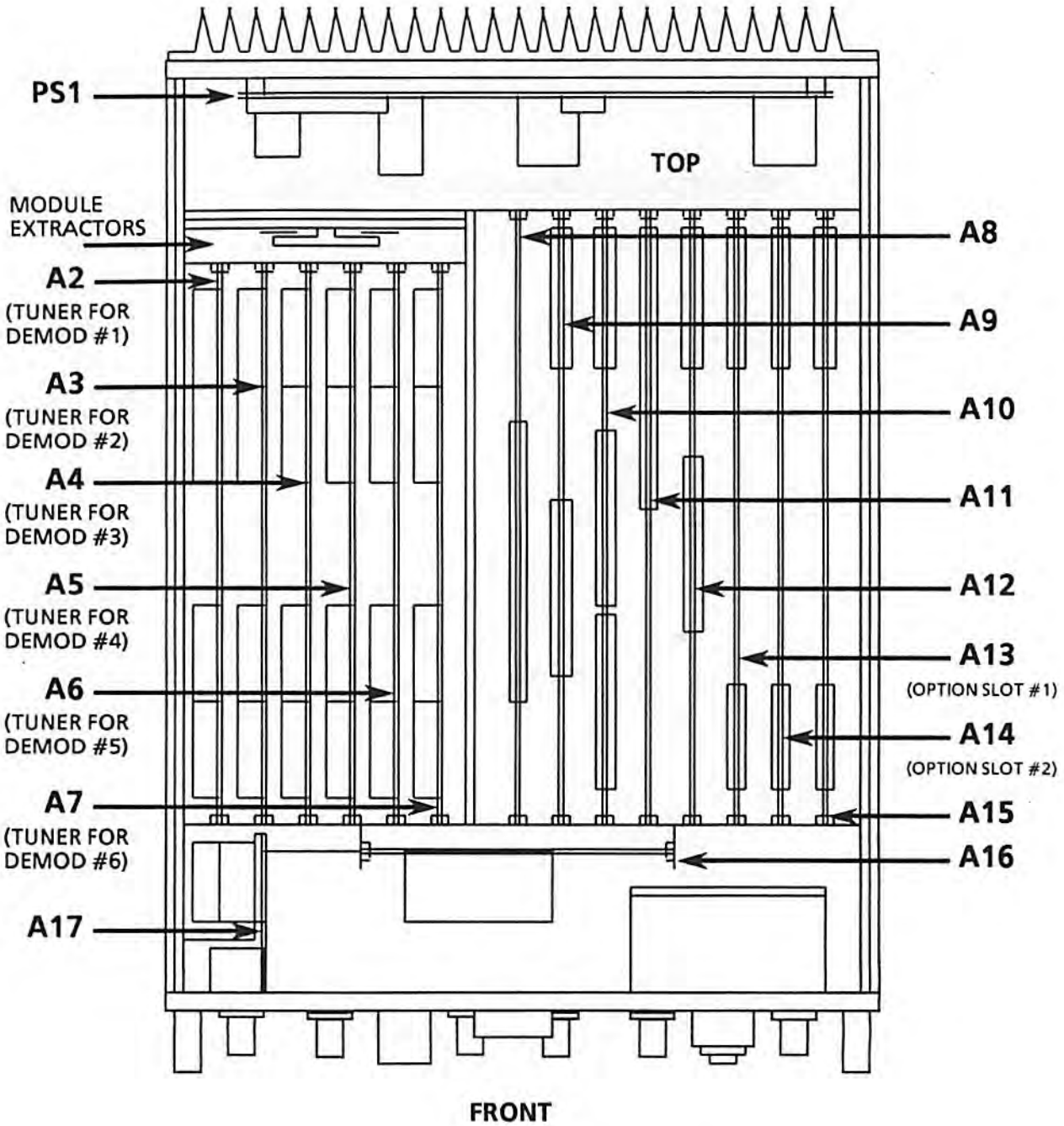

Figure 3-1. WJ-9546 FDM Demultiplexer Location of Assemblies

3.5 WJ-9546 FDM DEMULTIPLEXER

MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 07				
A1	Motherboard Assembly	1	796843-1	14632	
A2	Tuner Assembly	6	796804-1	14632	
A3 Thru A7	Same as A2				
A8	A/D Converter Assembly	1	796815-1	14632	
A9	DSP Demodulator Assembly	1	796812-1	14632	
A10	Bus Controller Assembly	1	796818-1	14632	
A11	Control Microprocessor Assembly	1	796816-2	14632	
A12	Remote Control Interface Assembly	1	796842-1	14632	
A13	Optional			14632	
A14	Optional			14632	
A15	Six Channel Audio Assembly	1	796844-2	14632	
A16	Reference Generator Assembly	1	796814-2	14632	
A17	Baseband Input Assembly	1	796802-2	14632	
AI-1	Connector, Plug	1	FHG2B303CNAD72	2P953	
AI-1	AC Power Cable	1	282317-1	14632	
AI-2	Connector, Plug	1	FHG2B302CNAD72	2P953	
AI-2	DC Power Cable	1	282318-1	14632	
AI-3	Connector, Gen	1	PL3155-29	14949	
C1	Capacitor, Ceramic, Feedthru: .05 µF, 300 V	1	54-785-005-503P	33095	
C2	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	1	34453-1	14632	
C3	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	1	34452-1	14632	
C4	Capacitor, Electrolytic, Tantalum: 18 µF, 10%, 20 V	1	199D186X9020DE3	56289	
CB1	Circuit Breaker	1	KDI-0.5	74193	
CB2	Circuit Breaker	1	KDI-5.0	74193	
E1	Terminal	2	572-4850-01-05-11	71279	
E2	Same as E1				
FBI	Ferrite Bead	1	56-590-65-4A	02114	
FL1	Capacitor, Feedthru	2	1202-075	12294	
FL2	Same as FL1				
J1	Connector, Receptacle	1	EGG2B303CNL	2P953	
J2	Connector, Receptacle	1	EGG2B302CNL	2P953	
J3	Jack, Bulkhead	1	BJ3150	14949	
J4	Connector/D	1	FDB9F2S500X	28198	
J5	Connector, Phone Jack	1	41	82389	
J6	Connector, Receptacle	1	1-225398-5	00779	
L1	Inductor: 100 µF, 10%	2	SPE 110	20462	
L2	Same as L1				
P1	Connector, Receptacle	1	102241-6	00779	

MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
P2	Connector, Housing	1	1-102241-0	00779	
P3	Connector, Plug		CLG-1005-00101B-CGH	53387	
PS1	Power Supply	1	766021-1	14632	
R1	Resistor, Variable, Composition: 20 kΩ, 10%, 1W	1	70A3N048R203A	01121	
RV1	Varistor: 275 V RMS 369 VDC	2	SNR-A275K20	7K104	
RV2	Same as RV1				
S1	Switch, Rocker	1	SEW202A01BB	31918	
W1	Cable Assembly	1	282302-3	14632	
W1P1	Connector, Plug, SMB	1	2105-7521-008	19505	
1	Module Extractors	2	180786	14632	

3.5.1 TYPE 796843-1 MOTHERBOARD PC ASSEMBLY REF DESIGN PREFIX A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 08				
BT1	Battery/Receptacle	1	B-400	00681	
C1	Capacitor, Tanatalum: 33 µF, 20%, 16 V	6	841293-22	14632	
C2 Thru C6	Same as C1				
C7 Thru C10	Not Used				
C11	Capacitor, Ceramic, Monolithic: 2200 pF, 2%, 100 V	6	200-100-NPO-222G	51642	
C12 Thru C16	Same as C11				
DS1	LED, Dual	1	5670H1/5;1/5	77777	
E1	Connector, Paddle Board	1	CL2-0101A1B-LGC	53387	
J1	Connector, Male	1	609-1637	15912	
J2	Connector	1	102202-5	00779	
J3	Connector, PC Board	1	102202-9	00779	
J4	Connector, Jack, BNC	6	227677-1	00779	
J5 Thru J9	Same as J4				
P1	Connector, Rib-Cable	1	CLG-1010-00101B-CGR	53387	
P2	Cable Plug Assembly	1	382207-1	14632	
R1	Resistor, Fixed, Film: 47Ω, 5%, 1/8 W	6	CF1/8-47 OHMS/J	09021	
R2 Thru R6	Same as R1				
R7	Resistor, Fixed, Film: 470Ω, 5%, 1/8 W	2	CF1/8-470 OHMS/J	09021	
R8	Same as R7				
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				
XA8	Connector, PC Board	2	236-21-100DS-23	26742	
XA11	Same as XA8				
XA16	Connector, Male	1	68513-015	22526	
XA2A	Connector, Plug	18	PB-2W-P0316#01	77777	
XA2B	Same as XA2A				
XA2C	Connector, Plug	6	PB-2W-P0320#01	77777	
XA2D	Same as XA2A				

REF DESIGN PREFIX A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
XA3A	Same as XA2A				
XA3B	Same as XA2A				
XA3C	Same as XA2C				
XA3D	Same as XA2A				
XA4A	Same as XA2A				
XA4B	Same as XA2A				
XA4C	Same as XA2C				
XA4D	Same as XA2A				
XA5A	Same as XA2A				
XA5B	Same as XA2A				
XA5C	Same as XA2C				
XA5D	Same as XA2A				
XA6A	Same as XA2A				
XA6B	Same as XA2A				
XA6C	Same as XA2C				
XA6D	Same as XA2A				
XA7A	Same as XA2A				
XA7B	Same as XA2A				
XA7C	Same as XA2C				
XA7D	Same as XA2A				
XA9A	Connector, PC Board	6	236-21-050DS-23	26742	
XA9B	Connector, PC Board	4	236-21-060DS-23	26742	
XA10A	Same as XA9A				
XA10B	Same as XA9B				
XA10C	Same as XA9B				
XA12A	Same as XA9A				
XA12B	Same as XA9B				
XA13A	Same as XA9A				
XA13B	Connector, PC Board	3	236-21-030DS-23	26742	
XA14A	Same as XA9A				
XA14B	Same as XA13B				
XA15A	Same as XA9A				
XA15B	Same as XA13B				

3.5.2 TYPE 796804-1 TUNER ASSEMBLY

REF DESIG PREFIX A2-A7

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 14				
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%, 50 VDC	2	TZB04Z250BA	72982	
C12	Capacitor, Ceramic: 3.3 pF, .1 pF, 50 V	1	841416-013	14632	
C13	Capacitor, Ceramic: 2.2 pF, .1 pF, 50 V	1	841416-009	14632	
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	7	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%, 6.3V	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				

REF DESIG PREFIX A2-A7

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C59	Capacitor, Ceramic: .10 µF, 10%, 50 VDC	4	841250-25	14632	
C60 Thru C62	Same as C59				
C63	Same as C1				
C64	Same as C1				
C65	Sameas 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	Same as C23				
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	Capacitor, Ceramic: 470 pF, 5%, 50 V	2	841415-011	14632	
C101	Same as C100				
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	

REF DESIG PREFIX A2-A7

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C111	Same as C26				
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-2810	28480	
CR2	Same as CR1				
CR3	Diode	3	MMBV109-T1	04713	
CR4	Same as CR1				
CR5	Same as CR3				
CR6	Diode	5	MMBD7000T1	04713	
CR7	Same as CR3				
CR8 Thru CR11	Same as CR6				
FL1	Filter, Bandpass	1	92525	14632	
L1	Inductor: 4.7 µH, ±20%	8	B82422-A1472-M	25088	
L2	Inductor: 1200 nH, ±5%	1	841438-051	14632	
L3	Inductor: 1000 nH, ±15%	2	841438-049	14632	
L4	Same as L1				
L5	Same as L3				
L6	Inductor: 470 nH, ±5%	1	841438-041	14632	
L7	Not Used				
L8	Same as L1				
L9	Inductor: 100 nH, ±5%	2	841438-025	14632	
L10	Inductor: 82 nH, ±5%	2	841438-023	14632	
L11	Same as L1				
L12	Same as L1				
L13	Same as L9				
L14	Same as L10				
L15	Same as L1				
L16	Same as L1				
L17	Inductor: 39 nH, ±5%	1	841438-015	14632	
L18	Inductor: 1000 µH, 10%	5	NLF453232-102K	54483	

REF DESIG PREFIX A2-A7

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
L19 Thru L22	Same as L18				
L23	Same as L1				
P1	Connector, Socket	3	PB-2W-D2816#01	77777	
P2	Same as P1				
P3	Connector, Socket	1	PB-2W-D2820#01	00SMK	
P4	Same as P1				
Q1	Transistor	3	MMBT3904LT1	04713	
Q2	Transistor	2	MMBR901	04713	
Q3	Transistor	2	SST310	17856	
Q4	Transistor	4	MMBT4261LT1	04713	
Q5 Thru Q7	Same as Q4				
Q8	Same as Q3				
Q9	Transistor	1	MMBR2857	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	6	841414-041	14632	
R5	Same as R4				
R6	Resistor, Fixed: 33Ω, 5%, .1 W	1	841414-037	14632	
R7	Same as R1				
R8	Sameas 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	
R21	Resistor, Fixed: 470Ω, 5%, .1 W	5	841414-065	14632	
R22	Resistor, Fixed: 47 kΩ, 5%, .1 W	8	841414-113	14632	

REF DESIG PREFIX A2-A7

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
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				
R64	Same as R10				

REF DESIG PREFIX A2-A7

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
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, 50%, .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, 50%, .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	1	DG538DN	17858	
U2	Integrated Circuit, CMOS	1	8674HC125S014U	14632	
U3	Integrated Circuit, CMOS	1	8674HC238S016U	14632	
U4	Integrated Circuit, CMOS	1	8674HC688S0L20U	14632	
U5	Integrated Circuit, CMOS	1	8674HC4094S016U	77777	
U6	Amplifier	1	LM6361M	27014	
U7	Mixer, Balanced	2	RMS-1	15542	
U8	Amplifier	2	MSA-0711	24539	

REF DESIG PREFIX A2-A7

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U9	Same as U8				
U10	Same as U7				
U11	Amplifier	3	NE5534D	18324	
U12	Integrated Circuit	2	CD74AC74M	02735	
U13	Integrated Circuit	1	8674AC00S014U	14632	
U14	Same as U11				
U15	Amplifier	1	8634002S08	14632	
U16	Mixer, Balanced	1	NE602D	18324	
U17	Integrated Circuit	2	MC145158DW-2	04713	
U18	Integrated Circuit, Divider	1	SP8799/MP	52648	
U19	Same as U11				
U20	Same as U17				
U21	Amplifier	2	86061S008	14632	
U22	Integrated Circuit	1	SP8795/MP	52648	
U23	Integrated Circuit	1	SP8792/MP	52648	
U24	Integrated Circuit	1	SN74AS109D	01295	
U25	Same as U21				
U26	Same as U12				
VR1	Diode, Zener	2	MMBZ5235BLT1	04713	
VR2	Same as VR1				

3.5.3 TYPE 796815-1 A/D CONVERTER ASSEMBLY REF DESIG PREFIX A8

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 09				
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				

REF DESIG PREFIX A8

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C64	Same as C48				
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				

REF DESIG PREFIX A8

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C116	Same as C90				
C117 Thru C120	Same as C1				
C121 Thru C123	Same as C104				
CR1	Diode		MMBD7000T1	04713	
J1	Connector, Header	8	92805-01-02-15	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	54483	
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				

REF DESIG PREFIX A8

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R37	Same as R35				
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%, 100 PPM, 1/8 W	1	841311-016	14632	
R66	Same as R45				
R67	Resistor, Fixed: 3.92 kΩ, 1%, 100 PPM, 1/8 W	1	841311-013	14632	
R68	Same as R45				
R69	Same as R49				
R70 Thru R72	Same as R45				
U1	Integrated Circuit, AD Converter	6	CS5014-KL14	0A384	
U2 Thru U6	Same as U1				
U7	Integrated Circuit	1	TL431CD	04713	
U8	Integrated Circuit, PAL	6	841481	14632	
U9 Thru U13	Same as U8				
U14	Integrated Circuit, DA Converter	6	AD7545AKP	24355	
U15	Amplifier	6	8634081S08	14632	
U16	Same as U14				
U17	Same as U15				
U18	Same as U14				
U19	Same as U15				
U20	Integrated Circuit, CMOS	6	8674HC173S016U	14632	

REF DESIG PREFIX A8

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U21 Thru U25	Same as U20				
U26	Integrated Circuit, PAL	1	841482	14632	
U27	Integrated Circuit, PAL	1	841483	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, CMOS	2	8674HC125S014U	14632	
U35	Integrated Circuit	2	8674HC32S014U	14632	
U36	Same as U35				
U37	Integrated Circuit, Inverter	1	8674HC04S014U	14632	
U38	Integrated Circuit, CMOS	1	8674HC85S016U	14632	
U39	Integrated Circuit, CMOS	3	8674HC367S016U	14632	
U40	Same as U39				
U41	Same as U39				
U42	Integrated Circuit, CMOS	2	8674HC4053S016U	14632	
U43	Same as U42				
U44	Integrated Circuit, PAL	1	841480	14632	
U45	Same as U34				
U46	Integrated Circuit, CMOS	1	8674HC86S014U	14632	
U47	Integrated Circuit	1	8674HC138S016U	14632	

3.5.4 TYPE 796812-1 DSP DEMODULATOR ASSEMBLY REF DESIG PREFIX A9

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 08				
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 Thru C39	Same as C1				
J1	Connector, Receptacle	1	68016-103	22526	
R1	Resistor, Fixed: 10 kΩ, 5%, .1 W	3	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				
TP1	Connector, Terminal	3	929805-01-10-15	53387	
TP2	Same as TP1				
TP3	Same as TP1				
U1	Integrated Circuit, Processor	1	XSP56001ZL20	04713	
U2	Integrated Circuit, RAM	4	67C4500-35NL	34335	
U3 Thru U5	Same as U2				
U6	Integrated Circuit: CMOS	6	MT5C6408DJ-35	MICRO	
U7 Thru U11	Same as U6				
U12	Integrated Circuit, CMOS	1	8674AC32S014U	14632	
U13	Integrated Circuit, CMOS	2	8674HC85S016U	14632	
U14	Integrated Circuit	1	8674HC08S014U	14632	
U15	Integrated Circuit, CMOS	1	8674HC86S014U	14632	
U16	Integrated Circuit	2	8674HC32S014U	14632	

REF DESIG PREFIX **A9**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U17	Integrated Circuit	2	8674HC74S014U	14632	
U18	Same as U13				
U19	Integrated Circuit, CMOS	1	8674HC125S014U	14632	
U20	Integrated Circuit	1	SN75155D	01295	
U21	Same as U17				
U22	Not Used				
U23	Integrated Circuit, CMOS	1	8674HC688S0L20U	14632	
U24	Integrated Circuit, Decoder	1	8674AC138S016U	14632	
U25	Integated Circuit, Inverter	1	8674HC04S014U	14632	
U26	Same as U16				
XU1	Socket, DSP	1	DSP56001SOCKET01	04713	U1

3.5.5 TYPE 796818-1 BUS CONTROLLER ASSEMBLY REF DESIG PREFIX A10

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 07				
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-2810	28480	

REF DESIG PREFIX A10

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
E1	Clip, Edge	AR	C1218-D06-C-SOC	NAS	
R1	Resistor, Fixed: 100 kΩ, 5%, .1 W	36	841414-121	14632	
R2	Same as R1				
R3	Same as R1				
R4	Resistor, Fixed: 30 kΩ, 5%, .1 W	6	841414-108	14632	
R5	Same as R4				
R6	Same as R4				
R7 Thru R11	Same as R1				
R12	Resistor, Fixed: 1.0 kΩ, 5%, .1 W	2	841414-073	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				

REF DESIG PREFIX **A10**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R45 Thru R48	Same as R15				
R49 Thru R54	Same as R1				
R55	Resistor, Fixed: 61.9 kΩ, 1%, 100 PPM, 1/8 W	2	841311-015	14632	
R56 Thru R60	Same as R1				
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 Thru R71	Same as R21				
U1	Integrated Circuit, Octal Tri-State	2	8674HC245S020W	14632	
U2	Integrated Circuit, CMOS	1	8674HC688S0L20U	14632	
U3	Integrated Circuit	7	8674HC378S016U	14632	
U4	Same as U3				
U5	Integrated Circuit, CMOS	8	8674HC40103S016U	14632	
U6	Integrated Circuit, DA Converter	2	AD7545AKP	24355	
U7	Amplifier	4	86062S08	14632	
U8	Same as U5				
U9	Integrated Circuit, CMOS	14	8674HC367S016U	14632	
U10	Same as U3				
U11	Same as U5				
U12	Integrated Circuit, Programmable	2	841484	14632	
U13	Integrated Circuit, CMOS	5	8674HC125S014U	14632	
U14	Integrated Circuit	3	8674HC138S016U	14632	
U15	Same as U13				
U16	Integrated Circuit, CMOS	5	8674HC259S016U	14632	
U17	Same as U16				
U18	Integrated Circuit, Inverter	2	8674HC04S014U	14632	
U19	Integrated Circuit	1	TL431CD	04713	
U20	Same as U6				
U21	Same as U7				
U22	Same as U5				
U23	Same as U14				

REF DESIG PREFIX **A10**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U24	Same as U14				
U25	Same as U3				
U26	Integrated Circuit, CMOS	2	8674HC164S014U	14632	
U27	Integrated Circuit	6	8674HC32S014U	14632	
U28	Integrated Circuit, CMOS	1	8674HC175S016U	14632	
U29	Same as U13				
U30	Same as U16				
U31	Same as U3				
U32	Same as U9				
U33	Same as U16				
U34	Integrated Circuit, CMOS	2	8674HC173S016U	14632	
U35	Integrated Circuit, CMOS	1	8674HC393S014U	14632	
U36	Integrated Circuit	9	8674HC74S014U	14632	
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, CMOS	1	8674HC86S014U	14632	
U46	Same as U16				
U47	Integrated Circuit	1	8674HC390S016U	14632	
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	2	8674HC574S0L20U	14632	
U54	Integrated Circuit, CMOS	1	8674HC174S016U	14632	
U55	Integrated Circuit, CMOS	1	8674AC00S014U	14632	
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	Same as U27				
U65	Integrated Circuit	2	8674HC00S014U	14632	
U66	Integrated Circuit, CMOS	1	8674HC85S016U	14632	

REF DESIG PREFIX A10

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U67	Integrated Circuit, CMOS	1	8674HC139S016U	14632	
U68	Integrated Circuit, Decoder	2	NE567D	18324	
U69	Same as U13				
U70	Same as U27				
U71	Same as U36				
U72	Same as U5				
U73	Same as U36				
U74	Integrated Circuit	2	8674HC08S014U	14632	
U75	Same as U7				
U76	Same as U65				
U77	Same as U5				
U78	Same as U27				
U79	Integrated Circuit, CMOS	1	8674HC157S016U	14632	
U80	Same as U74				
U81	Integrated Circuit	2	8674HC161S016U	14632	
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				

3.5.6 TYPE 796816-2 CONTROL MICROPROCESSOR ASSEMBLY

REF DESIG PREFIX A11

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 04				
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	1	HSMS-2812-T31	28480	
JP1	Connector, Header	2	68705-102	22526	
JP2	Connector, Header	1	68705-103	22526	
JP3	Same as JP1				
JW1	Not Used				
JW2	Same as JW1				
Q1	Transistor	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 A11

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: 1.0 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 R74	Same as R1				
TP1	Not Used				
TP33	Connector, Header	1	929805-01-02-15	67129	
TP34	Connector, Header	1	929805-01-07-15	67129	
U1	Integrated Circuit, M-Processor	1	HD68HC000CP8	62786	
U2	Integrated Circuit, M-Processor	1	MAX693CWE	9AA13	
U3	Integrated Circuit, CMOS	4	8662256LFP-12SLT	14632	
U4 Thru U6	Same as U3				
U7	Integrated Circuit, CMOS	3	8674HC165S016U	14632	
U8	Same as U7				
U9	Integrated Circuit, EPROM	1	841518	14632	
U10	Same as U7				
U11	Integrated Circuit, EPROM	1	841519	14632	
U12	Integrated Circuit, Decoder	1	8674AC139S016U	14632	
U13	Integrated Circuit	1	AD7828LP	24355	
U14	Integrated Circuit, PAL	1	841485-1	14632	
U15	Integrated Circuit	2	8674HC245S020W	14632	
U16	Same as U15				
U17	Integrated Circuit, Decoder	1	8674AC138S016U	14632	
U18	Integrated Circuit	3	8674HC32S014U	14632	
U19	Integrated Circuit, Inverter	1	8674HC04S014U	14632	
U20	Integrated Circuit, CMOS	4	8674HC21S014U	14632	
U21	Same as U20				
U22	Integrated Circuit, CMOS	2	8674HC191S016U	14632	
U23	Integrated Circuit	1	8674HC08S014U	14632	
U24	Integrated Circuit	1	8674HC574S0L20U	14632	
U25	Integrated Circuit, CMOS	3	8674HC367S016U	14632	
U26	Integrated Circuit, Real-Time Clock	1	RTC-72423B	61722	
U27	Same as U18				
U28	Integrated Circuit, CMOS	1	8674HC4020S016U	14632	
U29	Integrated Circuit	2	8674HC574SOL20U	14632	

REF DESIG PREFIX A11

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U30	Integrated Circuit, CMOS	1	8674AC04S014U	14632	
U31	Same as U25				
U32	Same as U25				
U33	Same as U20				
U34	Same as U20				
U35	Integrated Circuit, CMOS	1	8674HC174S016U	14632	
U36	Same as U18				
U37	Integrated Circuit, Encoder	1	8674HC148S016U	14632	
U38	Integrated Circuit	1	8674HC74S014U	14632	
U39	Same as U22				
U40	Same as U29				
XU1	Socket	1	213-068-601	26742	U1
XU9	Socket, Receptacle	4	SL-116-G-11	55322	U9
Y1	Crystal, Quartz	1	FPX-SM-8MHZ	61429	

3.5.7 TYPE 796842-1 REMOTE CONTROL INTERFACE ASSEMBLY REF DESIG PREFIX A12

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 06				
C1	Capacitor, Ceramic: .033 µF, 10%, 50 V	27	841415-022	14632	
C2 Thru C16	Same as C1				
C17	Capacitor, Tantalum: 15 µF, 20%, 10 V	1	841293-18	14632	
C18	Same as C1				
C19	Capacitor, Tantalum: 1.0 µF, 20%, 16 V	2	841293-04	14632	
C20	Same as C19				
C21	Same as C1				
C22	Same as C1				
C23	Capacitor, Ceramic: 22 pF, 5%, 50 V	2	841415-003	14632	
C24	Same as C23				
C25 Thru C32	Same as C1				
CR1	Diode	1	MMBD7000T1	04713	
R1	Resistor, Fixed: 220Ω, 5%, .1 W	1	841414-057	14632	
R2	Resistor, Fixed: 100 kΩ, 5%, .1 W	31	841414-121	14632	
R3	Same as R2				
R4	Same as R2				
R5	Same as R2				
R6	Resistor, Fixed: 100 kΩ, 5%, .1 W	4	841414-097	14632	
R7 Thru R19	Same as R2				
R20	Resistor, Fixed: 10 MΩ, 5%, .1 W	1	841414-169	14632	
R21 Thru R28	Same as R2				
R29	Same as R6				
R30	Same as R6				
R31	Resistor, Fixed: 22Ω, 5%, .1 W	1	841414-033	14632	
R32 Thru R36	Same as R2				
R37	Same as R6				
R38	Same as R2				
S1	Switch	1	ADP-05SA	77777	
S2	Switch, Dip	1	ADP-08SA	77777	
U1	Integrated Circuit, RAM	2	IDT71342L-70J	61772	
U2	Same as U1				
U3	Integrated Circuit, CMOS	3	8674HC365S016U	14632	
U4	Integrated Circuit, CMOS	1	8674HC541S020U	14632	

REF DESIG PREFIX A12

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U5	Not Used				
U6	Integrated Circuit, EPROM	1	841516	14632	
U7	Integrated Circuit, CMOS	1	8662256LFP-12SLT	14632	
U8	Integrated Circuit, DEC	2	8674AC139S016U	14632	
U9	Integrated Circuit, CMOS	1	8674AC32S014U	14632	
U10	Integrated Circuit	2	8674HC74S014U	14632	
U11	Integrated Circuit, UART	1	SCC2691AC1A28	18324	
U12	Integrated Circuit, CMOS	1	8674HC573S020U	14632	
U13	Same as U10				
U14	Integrated Circuit	2	8674HC245S020W	14632	
U15	Same as U14				
U16	Same as U3				
U17	Same as U3				
U18	Integrated Circuit, CMOS	1	8674HC125S014U	14632	
U19	Integrated Circuit	1	8674HC08S014U	14632	
U20	Integrated Circuit, CMOS	1	8674AC04S014U	14632	
U21	Integrated Circuit, DEC	1	8674AC138S016U	14632	
U22	Same as U8				
U23	Integrated Circuit, MCU	1	MC68HC11A0FN	04713	
U24	Integrated Circuit	1	8675176S08N	14632	
U25	Integrated Circuit	1	SN75155D	01295	
U26	Integrated Circuit, CMOS	1	8674HC4075S014U	14632	
U27	Integrated Circuit, CMOS	1	8674AC00S014U	14632	
XU6	Socket, Receptacle, PC MT	2	SL-114-G-11	55233	
XU23	52 POS PLCC	1	213-052-602	77777	
Y1	Crystal, Quartz	1	FPX-SM-7-3728MHZ	61429	

3.5.8 TYPE 796844-2 AUDIO RECONSTRUCTION ASSEMBLY REF DESIG PREFIX A15

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 03				
C1	Capacitor, Ceramic: .033 µF, 10%, 50 V	48	841415-022	14632	
C2	Capacitor, Ceramic: .10 µF, 10%	6	841250-25	14632	
C3 Thru C15	Same as C1				
C16	Capacitor, Ceramic: 22 pF, 2%, 50 V	6	841416-033	14632	
C17	Capacitor, Ceramic: 680 pF, 2%, 50 V	6	841416-069	14632	
C18	Same as C2				
C19	Same as C1				
C20	Same as C2				
C21	Same as C16				
C22	Same as C17				
C23 Thru C26	Same as C1				
C27	Same as C16				
C28	Same as C1				
C29	Same as C1				
C30	Same as C17				
C31	Same as C1				
C32	Same as C2				
C33	Same as C16				
C34	Same as C17				
C35 Thru C42	Same as C1				
C43	Capacitor, Tantalum: 3.3 µF, 20%, 16 V	2	841293-10	14632	
C44	Same as C2				
C45 Thru C48	Same as C1				
C49	Same as C43				
C50	Capacitor, Tantalum: 6.8 µF, 20%, 6.3 V	3	841293-14	14632	
C51	Same as C50				
C52	Same as C16				
C53	Same as C1				
C54	Same as C17				
C55	Same as C1				
C56	Same as C2				
C57	Same as C16				
C58	Same as C17				
C59 Thru C61	Same as C1				
C62	Same as C50				

REF DESIG PREFIX A15

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C63	Same as C1				
C64	Same as C1				
C65	Capacitor, Tantalum: 1.0 µF, 20%, 16 V	4	841293-04	14632	
C66 Thru C71	Same as C1				
C72 Thru C74	Same as C65				
C75 Thru C123	Not Used				
C124	Same as C1				
CR1	Diode	1	MMBD7000T1	04713	
J1	Connector, Strip	1	282315-1	14632	
J2	Connector, Header	1	68705-103	22526	
R1	Resistor, Fixed: 470 kΩ, 5%, .1 W	6	841414-137	14632	
R2	Resistor, Fixed: 100 kΩ, 5%, .1 W	28	841414-121	14632	
R3	Same as R2				
R4	Same as R2				
R5	Resistor, Fixed: 560Ω, 5%, .1 W	6	841414-067	14632	
R6 Thru R9	Same as R5				
R10	Resistor, Fixed: 1.5 MΩ, 5%, .1 W	6	841414-149	14632	
R11	Same as R10				
R12 Thru R16	Same as R2				
R17	Same as R5				
R18	Resistor, Fixed: 270 kΩ, 5%, .1 W	6	841414-131	14632	
R19	Resistor, Fixed: 68 kΩ, 5%, .1 W	6	841414-117	14632	
R20	Resistor, Fixed: 27 kΩ, 5%, .1 W	6	841414-107	14632	
R21	Same as R1				
R22	Same as R1				
R23	Same as R10				
R24	Same as R18				
R25	Same as R20				
R26	Same as R19				
R27 Thru R33	Same as R2				
R34	Same as R18				
R35	Same as R20				
R36	Same as R10				
R37	Same as R1				

REF DESIG PREFIX A15

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R38	Same as R18				
R39	Same as R20				
R40 Thru R45	Same as R2				
R46	Same as R19				
R47	Same as R1				
R48	Same as R10				
R49	Same as R19				
R50 Thru R54	Same as R2				
R55	Not Used				
R56	Same as R2				
R57	Resistor, Fixed: 10 kΩ, 5%, .1 W	1	841414-097	14632	
R58	Resistor, Fixed: 10Ω, 5%, .1 W	2	841414-025	14632	
R59	Same as R58				
R60	Resistor, Fixed: 2.2Ω, 5%, .1 W	2	841414-009	14632	
R61	Same as R60				
R62	Same as R18				
R63	Same as R19				
R64	Same as R20				
R65	Same as R10				
R66	Same as R1				
R67	Same as R18				
R68	Same as R20				
R69	Same as R19				
R70	Same as R2				
R71	Resistor, Fixed: 22Ω, 5%, .1 W	1	841414-033	14632	
R72 Thru R111	Not Used				
U1	Integrated Circuit, CMOS	2	MT5C6408DJ-35	MICRO	
U2	Same as U1				
U3	Integrated Circuit	6	XR-1016D	77777	
U4	Amplifier	3	8634002S08	14632	
U5	Same as U3				
U6	Integrated Circuit, EPROM	1	841517	14632	
U7	Integrated Circuit, CMOS	1	8674HC125S014U	14632	
U8	Integrated Circuit, CMOS	1	8674AC86S014U	14632	
U9	Integrated Circuit	3	8674HC74S014U	14632	
U10	Integrated Circuit	1	SN75155D	01295	
U11	Integrated Circuit, CMOS	1	8674AC32S014U	14632	

REF DESIG PREFIX **A15**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U12	Same as U9				
U13	Integrated Circuit	1	8674HC00S014U	14632	
U14	Integrated Circuit, CMOS	2	8674HC393S014U	14632	
U15	Same as U3				
U16	Same as U4				
U17	Same as U3				
U18	Integrated Circuit, Processor	1	XSP56001ZL20	04713	
U19	Integrated Circuit, CMOS	1	8674HC85S016U	14632	
U20	Integrated Circuit, Inverter	1	8674HC04S014U	14632	
U21	Same as U9				
U22	Integrated Circuit, CMOS	1	8674HC137S016U	14632	
U23	Same as U3				
U24	Same as U4				
U25	Same as U3				
U26	Integrated Circuit, CMOS	1	8674HC365S016U	14632	
U27	Same as U14				
U28	Integrated Circuit, CMOS	1	IDT7143L70J	61772	
U29	Integrated Circuit, DAC	1	AD1856R	24355	
U30	Integrated Circuit, CMOS	2	8674HC4053S016U	14632	
U31	Same as U30				
U32	Integrated Circuit, CMOS	1	8674HC30S014U	14632	
U33 Thru U45	Not Used				

3.5.9 TYPE 796814-1 REFERENCE GENERATOR ASSEMBLY REF DESIG PREFIX A16

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 11				
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: 2.2 pF, .1 pF, 50 V	1	841416-009	14632	
C14	Same as C1				
C15	Not Used				
C16	Not Used				
C17	Capacitor, Ceramic, Varaible: 2-6 pF, ±50%, 50 VDC	1	TZB04Z060BA	72982	
C18	Capacitor, Ceramic: 22 pF, 5%, 50 V	1	8414116-035	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 A16

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	MMBD7000T1	04713	
CR2 Thru CR4	Same as CR1				
CR5	Diode	1	MMBV109-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%, @7.96 MHZ	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	MMBT3906	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: 680Ω, 5%, .1 W	8	841414-069	14632	
R2	Resistor, Fixed: 1.0 kΩ, 5%, .1 W	4	841414-073	14632	
R3	Same as R1				

REF DESIG PREFIX **A16**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R4	Same as R1				
R5	Resistor, Fixed: 100 kΩ, 5%, .1W	13	841414-121	14632	
R6	Same as R5				
R7	Same as R2				
R8	Resistor, Fixed: 15 kΩ, 5%, .1W	2	841414-101	14632	
R9	Resistor, Fixed: 10 kΩ, 5%, .1W	9	841414-097	14632	
R10	Resistor, Fixed: 2.2 MΩ, 5%, .1W	1	841414-153	14632	
R11	Same as R9				
R12	Resistor, Fixed: 1.5 M, 5%, .1 W	5	841414-149	14632	
R13	Same as R5				
R14	Resistor, Fixed: 2.2 M, 5%, .1 W	1	841414-153	14632	
R15	Resistor, Fixed: 47 kΩ, 5%, .1W	2	841414-113	14632	
R16	Resistor, Fixed: 1.0 MΩ, 5%, .1W	2	841414-145	14632	
R17	Resistor, Fixed: 68 kΩ, 5%, .1W	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%, .1W	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%, .1W	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%, .1W	4	841414-049	14632	
R45	Resistor, Fixed: 6.8 kΩ, 5%, .1W	1	841414-093	14632	
R46	Same as R25				
R47	Same as R8				
R48	Same as R5				

REF DESIG PREFIX A16

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R49	Same as R44				
R50	Resistor, Fixed: 33 kΩ, 5%, .1 W	1	841414-109	14632	
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, 300 VDC	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	1	841417	14632	
R75	Same as R5				
R76	Same as R73				
TP1	Test Point	3	TBD		
TP2	Same as TP1				
TP3	Same as TP1				
U1	Integrated Circuit	1	8674HC00S014U	14632	
U2	Not Used				
U3	Integrated Circuit, CMOS	1	8674HC365S016U	14632	
U4	Integrated Circuit, CMOS	1	8674HC4094S016U	14632	
U5	Not Used				
U6	Amplifier	5	86061S008	14632	
U7	Same as U6				
U8	Not Used				
U9	Integrated Circuit	1	8674HC32S014U	14632	
U10	Not Used				
U11	Integrated Circuit, CMOS	2	8674AC00S014U	14632	

REF DESIG PREFIX **A16**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U12	Integrated Circuit	1	8674HC390S016U	14632	
U13	Integrated Circuit, CMOS	1	8674AC86S014U	14632	
U14	Not Used				
U15	Same as U6				
U16	Same as U11				
U17	Integrated Circuit	1	CD74AC74M	02735	
U18	Integrated Circuit	2	MC145151FN-2	04713	
U19	Same as U18				
U20	Same as U6				
U21	Same as U6				
U22	Integrated Circuit	1	TL431CD	04713	
U23	Crystal VCXO	1	92549	14632	
Y1	Crystal: 20.48 MHZ	1	92567	14632	

3.5.10 TYPE 796802-2 BASEBAND INPUT ASSEMBLY REF DESIG PREFIX A17

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 06				
C1	Capacitor, Tantalum: 3.3 µF, 20%, 16 V	16	841293-10	14632	
C2	Capacitor, Ceramic: .10 µF, 10%, 50 VDC	6	841250-25	14632	
C3	Capacitor, Ceramic: .01 µF, 10%, 50 V	11	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 A17

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	Same as C3				
CR1	Dual Switching Diode	6	MMBD7000T1	04713	
CR2	Diode	4	HSMS-2810	28480	
CR3	Same as CR1				
CR4	Same as CR2				
CR5	Same as CR2				
CR6	Same as CR1				
CR7	Same as CR2				
CR8	Same as CR1				
CR9	Same as CR1				
CR10	Not Used				
CR11	Same as CR1				
E1	Connector, Rib-Cable	1	609-1653	15912	
J1	Connector, Jack, BNC	2	227677-1	00779	
J2	Not Used				
J3	Same as J1				
J4	Not Used				
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 A17

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	Resistor, Fixed: 15Ω, 5%, .1 W	2	841414-029	14632	
R13	Resistor, Fixed: 10 kΩ, 5%, .1 W	4	841414-097	14632	
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	Same as R12				
R24	Same as R13				
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	Resistor, Fixed: 6.8 kΩ, 5%, .1 W	2	841414-093	14632	
R40	Same as R39				
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	Same as R13				
R45	Same as R6				
R46	Same as R41				
R47	Same as R42				
R48	Same as R43				
R49	Same as R13				
R50	Same as R6				

REF DESIG PREFIX A17

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
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	Resistor, Fixed: 470 kΩ, 5%, .1 W	2	841414-137	14632	
R59	Resistor, Fixed: 2.2 MΩ, 5%, .1 W	2	841414-153	14632	
R60	Same as R51				
R61	Same as R41				
R62	Same as R3				
R63	Same as R56				
R64	Same as R56				
R65	Same as R58				
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%, .5 W	2	3325X-1-501	80294	
R74 Thru R85	Same as R19				
R86	Same as R73				
TP12	Pin, Test Point	2	460-2976-02-0400	71279	
TP24	Same as TP12				
U1	OP AMP	6	CLC400AJE	62839	
U2	Same as U1				
U3	Isolator	2	VTL5C4/2	18178	
U4 Thru U6	Same as U1				
U7	Same as U3				
U8	Same as U1				
U9	Amplifier	3	86062S08	14632	
U10	Same as U9				
U11	Same as U9				

3.5.11 TYPE 766021-1 POWER SUPPLY ASSEMBLY

REF DESIG PREFIX PS1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 10				
C1	Capacitor, Ceramic, Disc: .002 µF, 20%	2	125LD20	56289	
C2	Same as C1				
C3	Capacitor, Aluminum, Electronic: 330 µF, 200 V, ±20%	2	LGK2D331MHSA	77777	
C4	Same as C3				
C5	Capacitor, Tantalum: 15 µF, 20%, 25 V	4	841293-19	14632	
C6	Capacitor, Ceramic: .033 µF, 10%, 50 V	19	841415-022	14632	
C7	Same as C5				
C8	Same as C5				
C9	Same as C6				
C10	Capacitor, Ceramic: 4700 pF, 10%, 50 V	1	841315-017	14632	
C11	Capacitor, Ceramic: 100 pF, 5%, 50 V	1	841415-007	14632	
C12	Capacitor, Ceramic: 330 pF, 5%, 50 V	4	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, Ceramic: 1.0 µF, 20%, 35 V	6	841293-05	14632	
C18	Same as C14				
C19	Same as C17				
C20	Same as C17				
C21	Capacitor, Mica, Dipped: 2200 pF, 2%, 500 V	2	CM06FD222G03	81349	
C22	Same as C21				
C23	Capacitor, Ceramic, Disc: .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	5	SK043E106MAR	90201	
C31	Same as C30				
C32	Same ad C30				
C33 Thru C39	Same as C6				
C40	Capacitor, Tantalum: 33 µF, 20%, 16 V	5	841293-22	610288	
C41	Same as C40				
C42	Same as C23				
C43	Same as C40				
C44	Same as C40				
C45	Same as C6				
C46	Same as C6				

REF DESIG PREFIX **PS1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C47	Capacitor, Tantalum: 6.8 µF, 20%, 6.3 V	1	841293-14	14632	
C48	Same as C6				
C49	Same as C6				
C50	Same as C30				
C51	Capacitor, Electronic, Aluminum: 2200 µF, 25 V	1	UPF1E222MRH6		
C52	Same as C40				
C53	Same as C6				
C54	Same as C17				
C55	Same as C14				
C56	Same as C17				
C57	Same as C12				
C58	Same as C12				
C59	Same as C5				
C60	Not Used				
C61	Not Used				
C62	Same as C30				
C63	Capacitor, Ceramic: .10 µF, 10%, 50 VDC	16	841250-25	14632	
C64 Thru C78	Same as C63				
C79 Thru C81	Same as C6				
CR1	Diode	12	FDSO-1203	27014	
CR2	Rectifier	1	MBR2545	04718	
CR3	Rectifier	2	MBR2045PT	04713	
CR4 Thru CR6	Same as CR1				
CR7	Diode	8	1N5819	80131	
CR8	Same as CR7				
CR9	Diode	2	MUR450	04713	
CR10	Same as CR9				
CR11	Same as CR1				
CR12	Same as CR1				
CR13	Same as CR3				
CR14	Same as CR7				
CR15	Same as CR7				
CR16	Diode, Rectifier	1	MBRD650CT	04713	
CR17	Same as CR7				
CR18	Same as CR7				
CR19 Thru CR23	Same as CR1				

REF DESIG PREFIX **PS1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
CR24	Same as CR7				
CR25	Same as CR7				
CR26	Same as CR1				
CR27	Diode, Rectifier	2	MBR1645	04713	
CR28	Same as CR27				
J1	Connector, Header	1	CLK-1005-L01A10-JPD	53387	
J2	Connector, Header	1	CKL-1010-L01A10-JPD	53387	
L1	Inductor: 5.6 µH	1	96167	14632	
L2	Not Used				
L3	Inductor: 1.5 µH	1	SPE100-0	20462	
L4	Inductor: 28 µH	2	SPE 107-A	20462	
L5	Same as L4				
Q1	Triac, Silicon Bidirectional, Thyristor	1	MAC223A6FP	04713	
Q2	Xstr	3	MMBT2222A	04713	
Q3	Transistor	1	TIP50	04713	
Q4	Same as Q2				
Q5	Transistor: 500 V, 1.5 HM	2	IRFI830	81433	
Q6	Same as Q5				
Q7	Transistor	3	IRFZ22	81433	
Q8	Transistor	2	IRF9531	81433	
Q9	Same as Q7				
Q10	Xstr	2	MMBT2907ALT1	04713	
Q11	Same as Q7				
Q12	Not Used				
Q13	Same as Q8				
Q14	Same as Q10				
Q15	Same as Q2				
Q16	Transistor	2	IRFZ40	04713	
Q17	Same as Q16				
Q18	Not Used				
R1	Resistor, Fixed: 10 kΩ, 5%, 1/10 W	13	841414-097	14632	
R2	Resistor, Fixed: 330 kΩ, 5%, .1 W	4	841414-133	14632	
R3	Same as R2				
R4	Resistor, Fixed, Composition: 22 kΩ, 5%, 1/2 W	1	RCR20G223JS	81349	
R5	Not Used				
R6	Resistor, Fixed: 1%, 475 kΩ	2	841311-018	14632	
R7	Same as R6				
R8	Resistor, Fixed: 1.82 kΩ, 1%	1	841311-019	14632	
R9	Resistor, Fixed: 7.5 kΩ, 1%	3	841311-020	14632	
R10	Resistor, Fixed: 330 kΩ, 1%, 100 PPM	2	841311-004	14632	
R11	Same as R2				
R12	Resistor, Fixed: 47 kΩ, 5%, 1/10 W	5	841414-113	14632	

REF DESIG PREFIX **PS1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R13	Same as R12				
R14	Same as R12				
R15	Not Used				
R16	Not Used				
R17	Resistor, Fixed: 1 kΩ, 5%, .1 W	1	841414-073	14632	
R18	Same as R1				
R19	Resistor, Fixed: 22.1 kΩ, 1%, 1/8 W	3	841311-007	14632	
R20	Resistor, Fixed: 27.4 kΩ, 1%, 1/8 W	1	1841311-008	14632	
R21	Resistor, Fixed: 220 kΩ, 5%, .1 W	1	841414-129	14632	
R22	Resistor, Fixed: 100 Ω, 5%, .1 W	3	841414-121	14632	
R23	Same as R22				
R24	Resistor, Fixed: 470 Ω, 5%, 1/10 W	5	841414-065	14632	
R25	Resistor, Fixed: 3.3 kΩ	1	841414-085		
R26	Resistor, Fixed: 68 kΩ, 5%, 1/10 W	1	841414-117	14632	
R27	Same as R22				
R28	Same as R2				
R29	Same as R12				
R30	Same as R1				
R31	Resistor, Fixed: 22 kΩ, 5%, 1/10 W	3	841414-105	14632	
R32	Same as R1				
R33	Same as R31				
R34	Resistor, Fixed: 4.7 Ω, 5%, 1/10 W	7	841414-017	14632	
R35	Same as R34				
R36	Same as R34				
R37	Resistor, Fixed: 6.81 kΩ, 1%	5	841311-002	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: 2.2 MΩ, 5%, 1/10 W	2	841414-153	14632	
R42	Same as R41				
R43	Same as R37				
R44	Same as R37				
R45	ame as R34				
R46	Resistor, Fixed: 15 kΩ, 1%, 1/8 W	1	841311-005	14632	
R47	Same as R10				
R48	Same as R24				
R49 Thru R51	Same as R1				
R52	Same as R24				
R53	Same as R37				
R54	Same as R1				

REF DESIG PREFIX **PS1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R55	Same as R19				
R56	Resistor, Fixed: 100 Ω	1	841414-049	14632	
R57	Same as R1				
R58	Resistor, Fixed: 4.7 kΩ	2	841414089		
R59	Same as R1				
R60	Resistor, Wire Wound: 0.47 Ω, 5%, 1 W	2	SP-30-.47OHMS-5%	81433	
R61	Same as R60				
R62	Resistor, Wire Wound: 0.1 Ω, 5%, 1 W	1	SP-20-.1OHMS-5%	81433	
R63	Resistor, Fixed: 370 Ω, 5%, 1/10 W	1	841414-059	14632	
R64	Same as R1				
R65	Resistor, Fixed: 470 kΩ	1	TBD		
R66	Same as R24				
R67	Resistor, Fixed: 33 Ω, 5%, 1/10 W	1	841414-037	14632	
R68	Resistor, Fixed: 220 Ω, 5%, 1/10 W	1	841414-057	14632	
R69	Resistor, Fixed: 33 kΩ, 5%, .1 W	1	841414-109	14632	
R70	Same as R24				
R71	Same as R25				
R72	Same as R34				
R73	Same as R1				
R74	Same as R31				
R75	Same as R31				
R75	Same as R34				
R76	Same as R34				
R77	Same as R19				
R78	Resistor, Fixed: 10 kΩ, 1%	1	841311-003	14632	
R79	Same as R12				
R80	Same as R1				
R81 Thru R86	Not Used				
RT1	Thermistor: 50 Ω	2	CL-140	75263	
RT2	Same as RT1				
RV1	Varistor: 275 VAC RMS , 369 VDC	1	V275LA20A	89473	
T1	Transformer	3	5761	77777	
T2	Transformer	1	382242-1	14632	
T3	Same as T1				
T4	Transformer	1	382243-1	14632	
T5	Same as T1				
TP1	Jack, Test, Red Vertical	2	SPCJ-123-02	77777	
TP2	Same as TP1				
U1	Rectifier: 600 Volts, 8-0 Amps	1	KBU8J	11711	
U2	Integrated Circuit	2	REF-02CS	06665	

REF DESIG PREFIX **PS1**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U3	Integrated Circuit	1	86339S014U	14632	
U4	Integrated Circuit	1	8674HC00S014U	14632	
U5	Integrated Circuit	1	8674HC74SO14U	14632	
U6	Integrated Circuit, CMOS	1	8674HC123S016N	14632	
U7	Integrated Circuit, Optional	1	MOC217	04713	
U8	Integrated Circuit, Linear	2	UC3860Q	12969	
U9	Volt, Regulator	1	MC78M12CDT	77777	
U10	Amplifier	3	MC33172D	04713	
U11	Amplifier	3	MC33171D	04713	
U12	Same as U11				
U13	Same as U2				
U14	Same as U10				
U15	Integrated Circuit	1	TL431CD	04713	
U16	Same as U10				
U17	Not Used				
U18	Same as U8				
U19	Same as U11				
VR1	Zener, Diode	1	MMBZ5250BLT1	04713	
VR2	Diode, Zener	1	1N6278	04713	
VR3	Not Used				
VR4	Zener, Diode	1	MMBZ5240BLT1	04713	

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.

FUNCTION TABLE

SLOTS	USAGE BOARD	TYPE	R/D	SCHEM	NOTES
XA11	CONTROL MICROPROCESSOR	796816-1	A11	580966	
XA10A,B,C	BUS CONTROLLER	796810-1	A10	580960	
XA9A,B	DSP DEMODULATOR	796812-1	A9	580963	
XA8	A/D CONVERTER	796815-1	A8	580965	
XA16	REFERENCE GENERATOR	796814-1	A16	580964	
XA12A,B	REMOTE CNTRL INTERFACE	796842-1	A12	580982	RS-232, RS-485
XA2A-D	TUNER 1	796804-1	A2	580933	
XA3A-D	TUNER 2	796804-1	A3	580933	
XA4A-D	TUNER 3	796804-1	A4	580933	
XA5A-D	TUNER 4	796804-1	A5	580933	
XA6A-D	TUNER 5	796804-1	A6	580933	
XA7A-D	TUNER 6	796804-1	A7	580933	
XA13A,B	OPTION 1		A13		
XA14A,B	OPTION 2		A14		
XA15A,B	AUDIO RECONSTRUCTION	796844-2	A15	580984	SIX CHANNELS

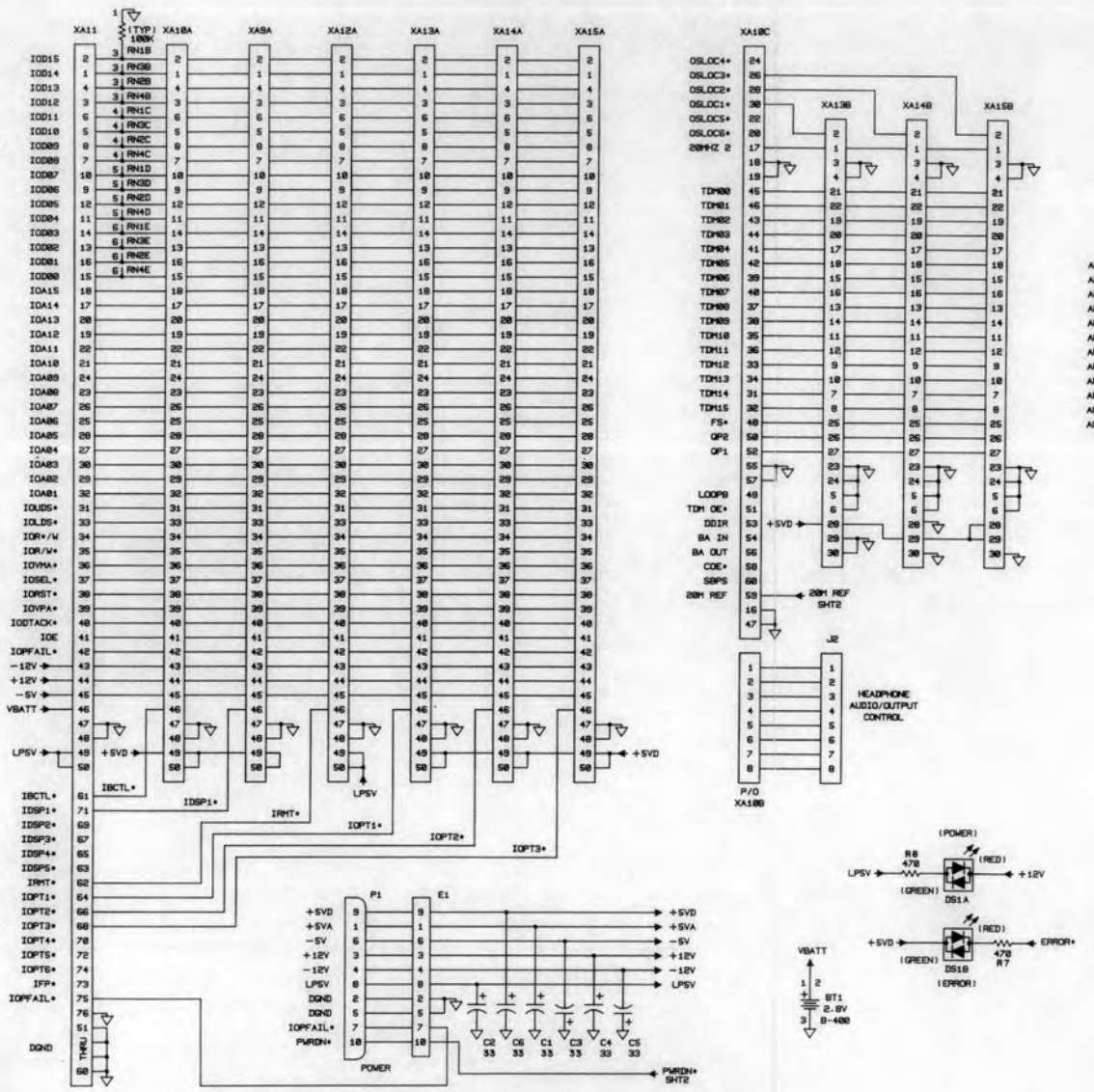

Figure 4-1. Type 796843-1, Motherboard Assembly (A1), Schematic Diagram 580983 (Sheet 1 of 2) (03)

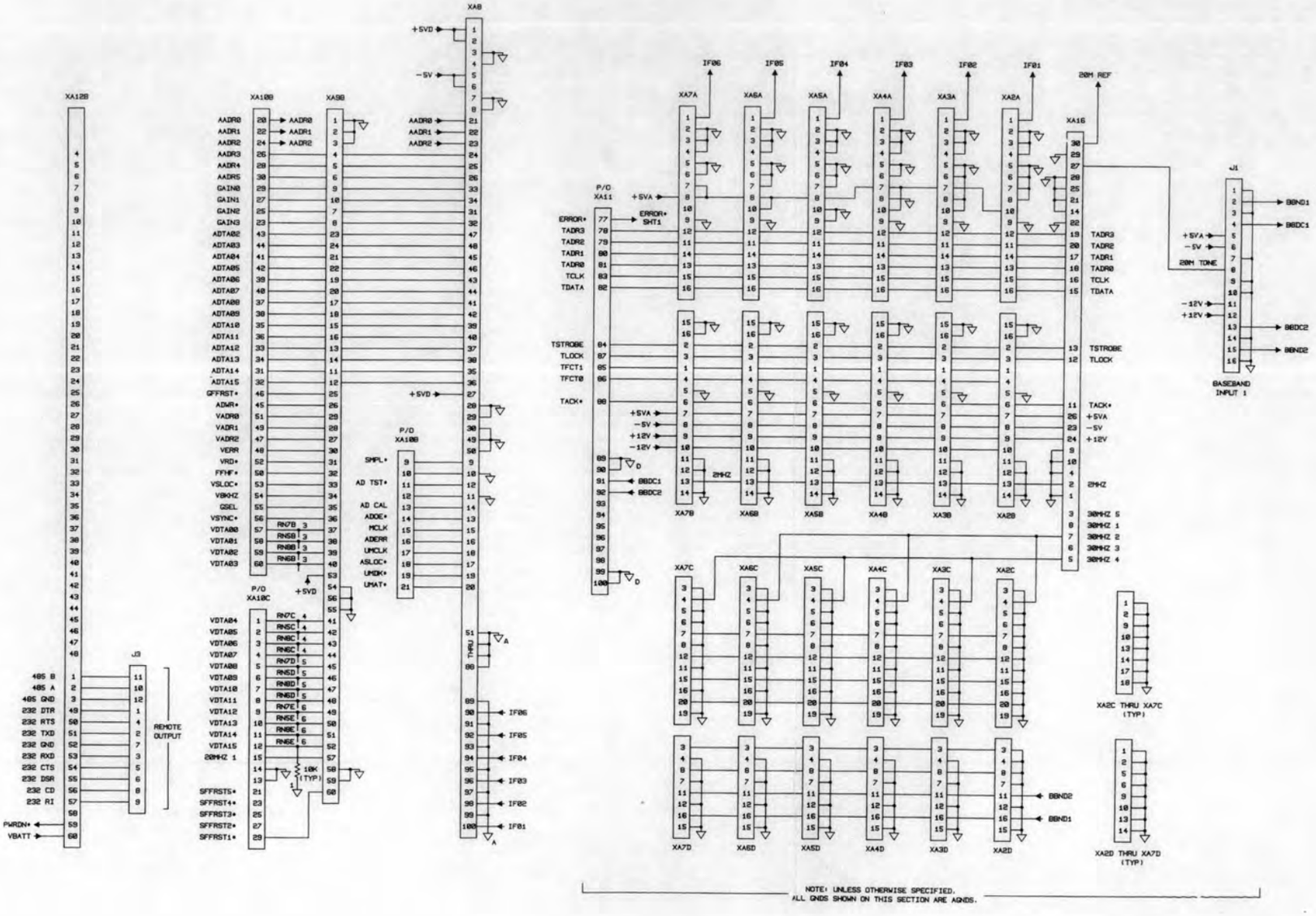

Figure 4-1. Type 796843-1, Motherboard Assembly (A1), Schematic Diagram 580983 (Sheet 2 of 2) (03)

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

DIAL FREQUENCY	FINE SYNTHESIZER FREQUENCY	TP6 VOLTAGE RANGE
.240 MHZ	120 MHZ	−8.3 TO −9.3VDC
.2395 MHZ	−159.92 MHZ	0 TO −2.7 VDC

DIAL FREQUENCY	COARSE SYNTHESIZER FREQUENCY	TP9 VOLTAGE RANGE	TP8 VOLTAGE RANGE
.2395 MHZ	58.5 MHZ	−9.6 TO −10.2VDC	−7.9 TO −8.7VDC
20.000MHZ	98.5 MHZ	0 TO +1.8 VDC	+2.8 TO +8.2VDC

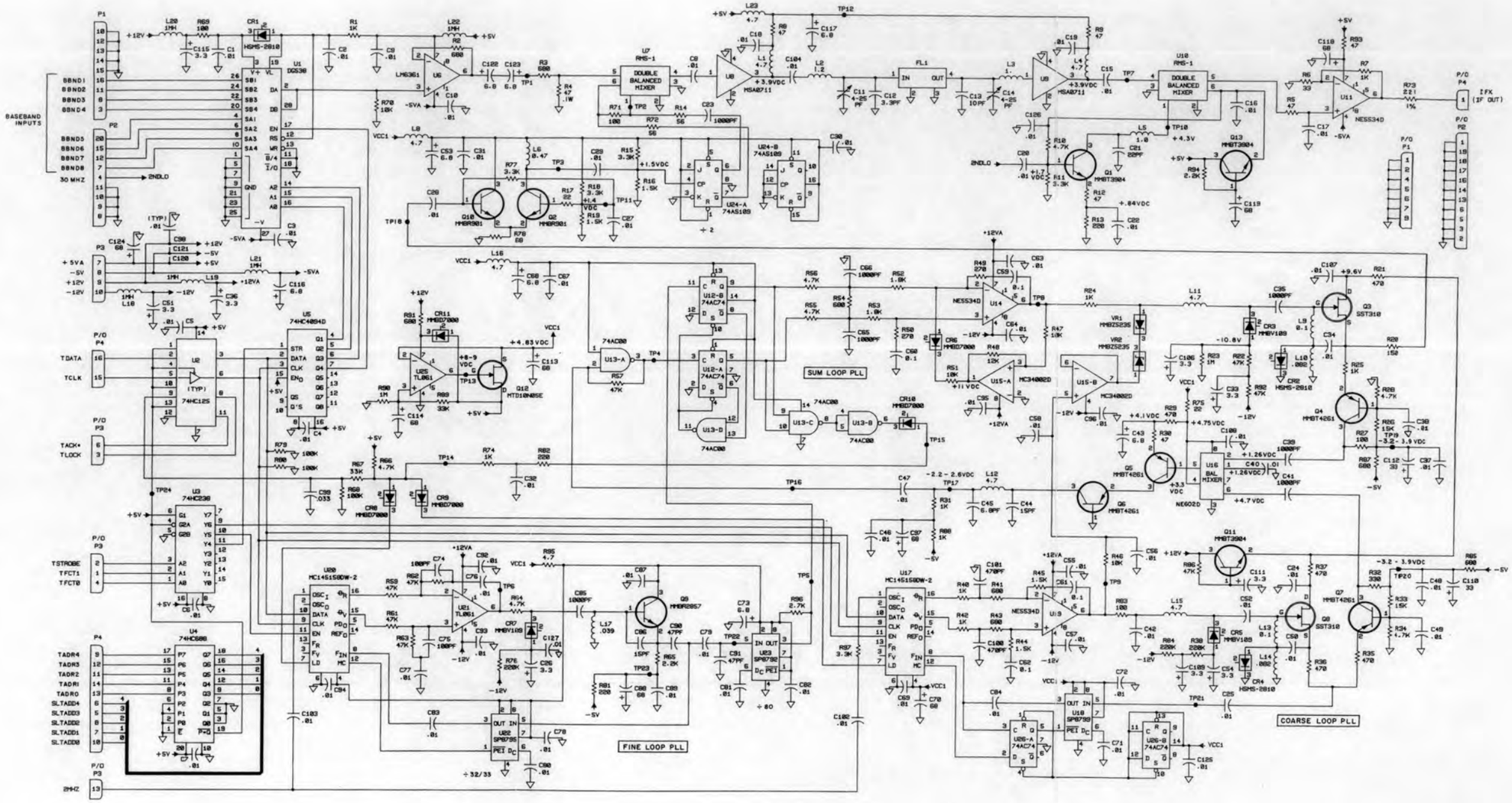

Figure 4-2. Type 796804-1, Tuner Assembly (A2-A7), Schematic Diagram 580933 (07)

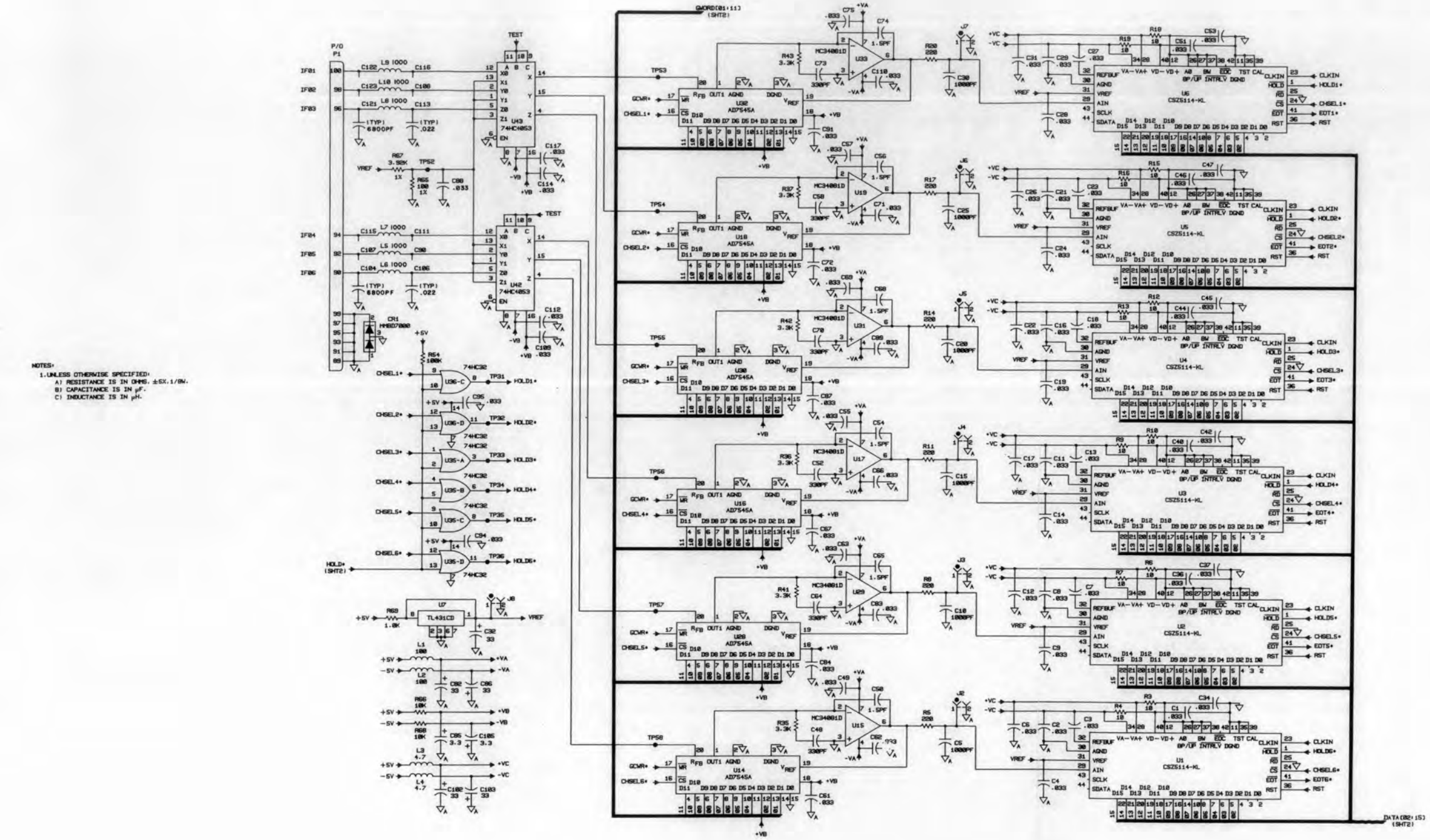

Figure 4-3. Type 796815-1, A/D Converter Assembly (A8), Schematic Diagram 580965 (Sheet 1 of 2) (03)

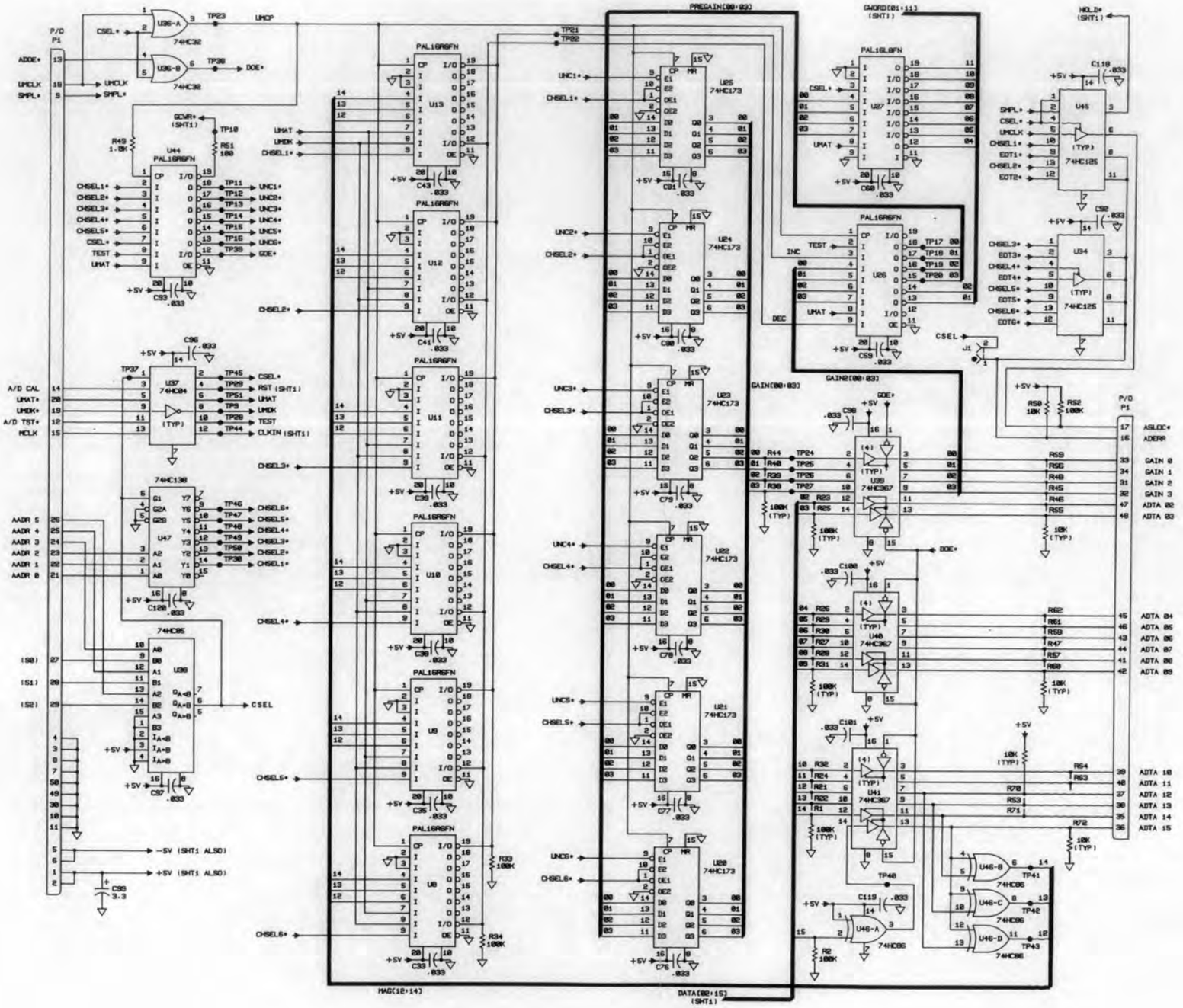

Figure 4-3. Type 796815-1, A/D Converter Assembly (A8), Schematic Diagram 580965 (Sheet 2 of 2) (03)

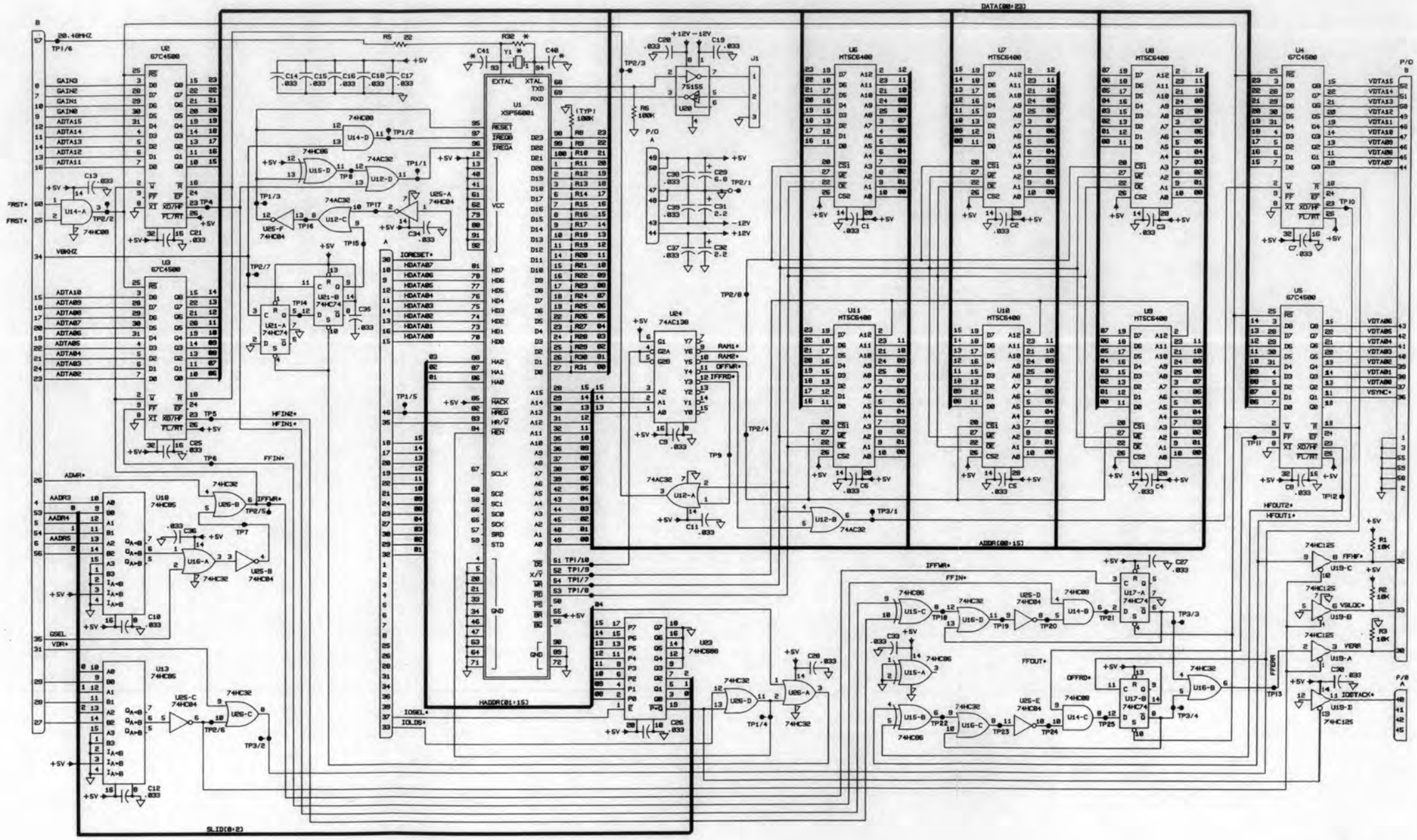

Figure 4-4. Type 796812-1, DSP Demodulator Assembly (A9), Schematic Diagram 580963 (03)

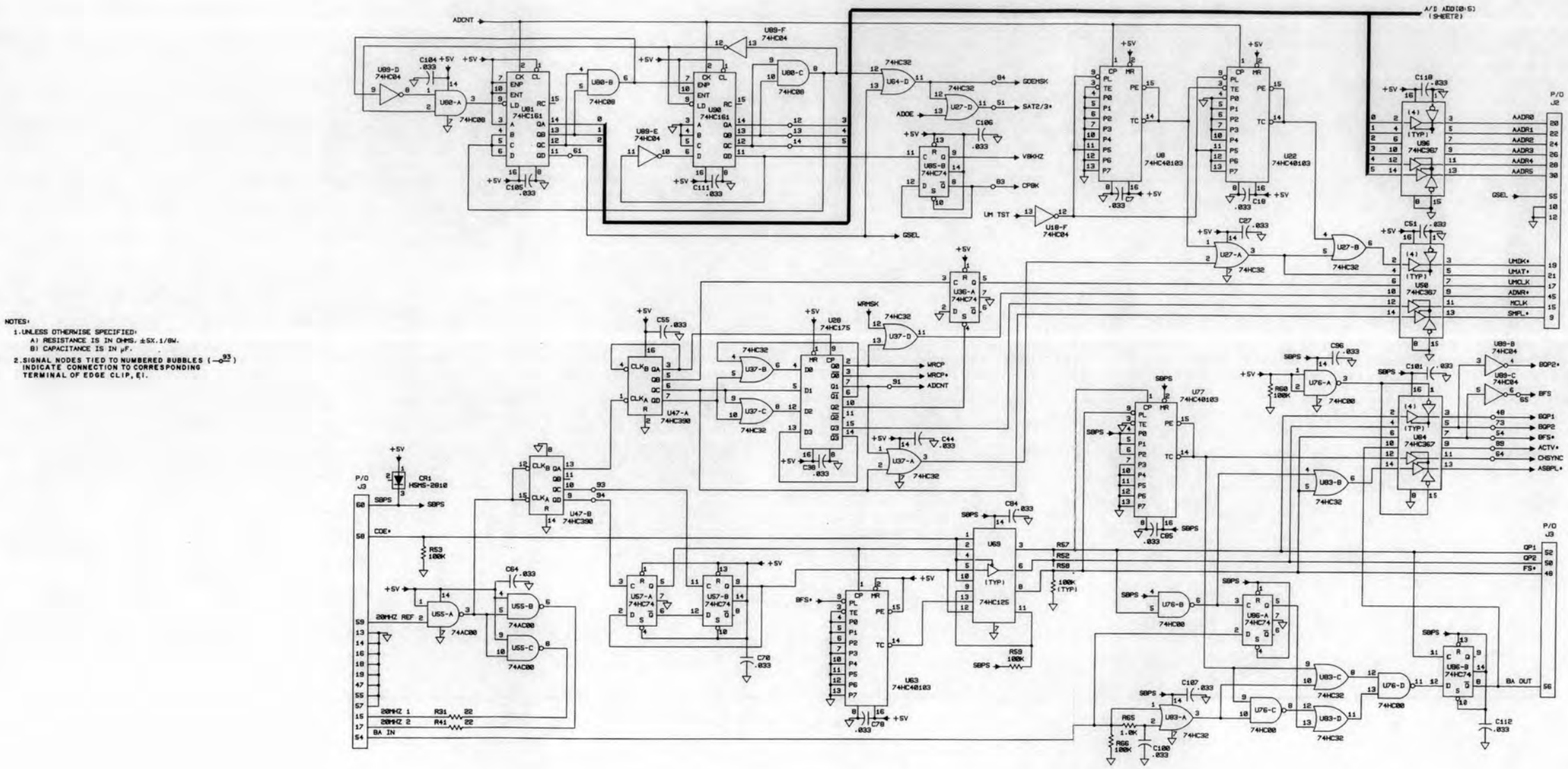

Figure 4-5. Type 796818-1, Bus Controller (A10), Schematic Diagram 580968 (Sheet 1 of 4) (02)

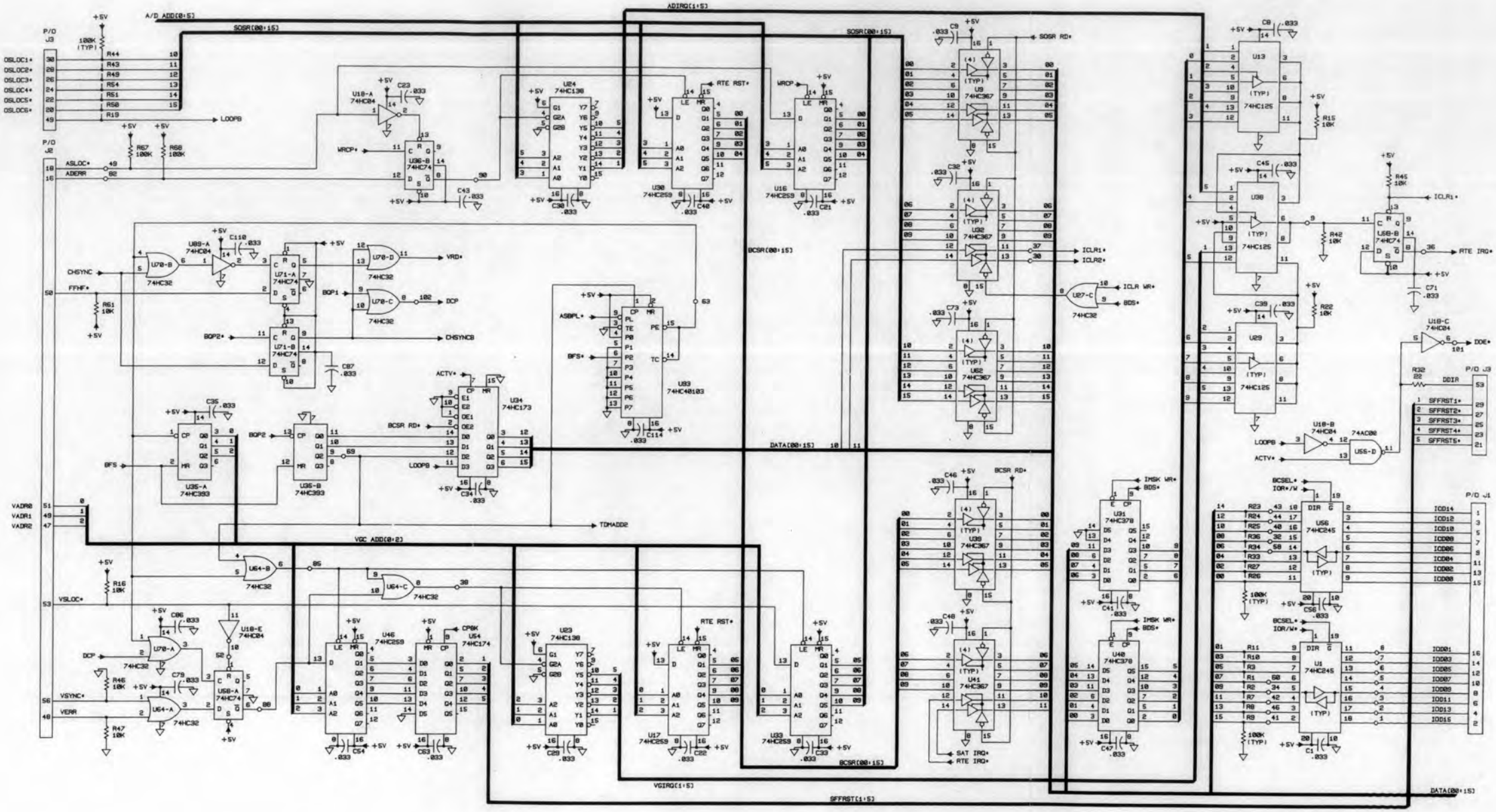

Figure 4-5. Type 796818-1, Bus Controller (A10), Schematic Diagram 580968 (Sheet 2 of 4) (02)

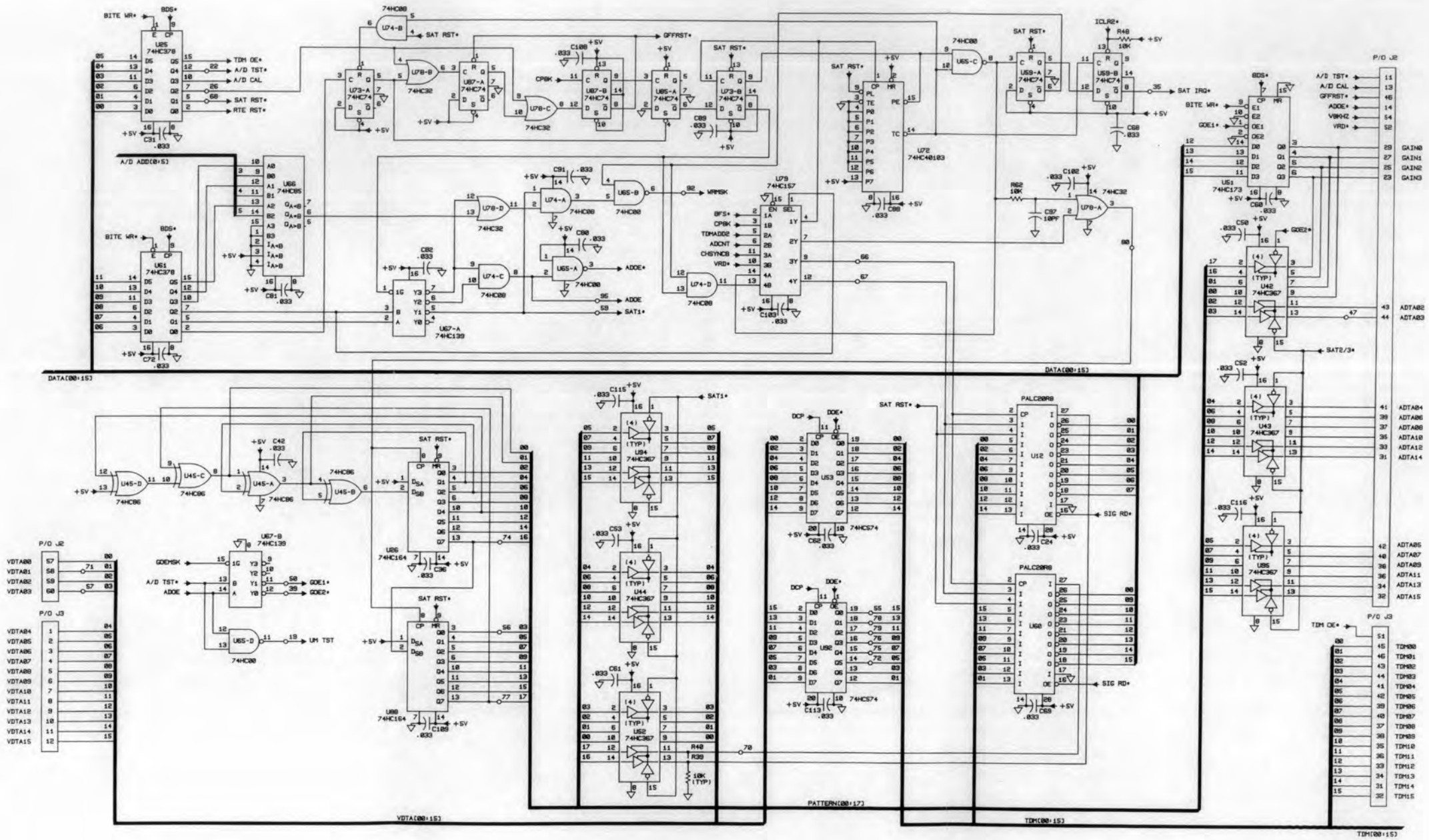

Figure 4-5. Type 796818-1, Bus Controller (A10), Schematic Diagram 580968 (Sheet 3 of 4) (02)

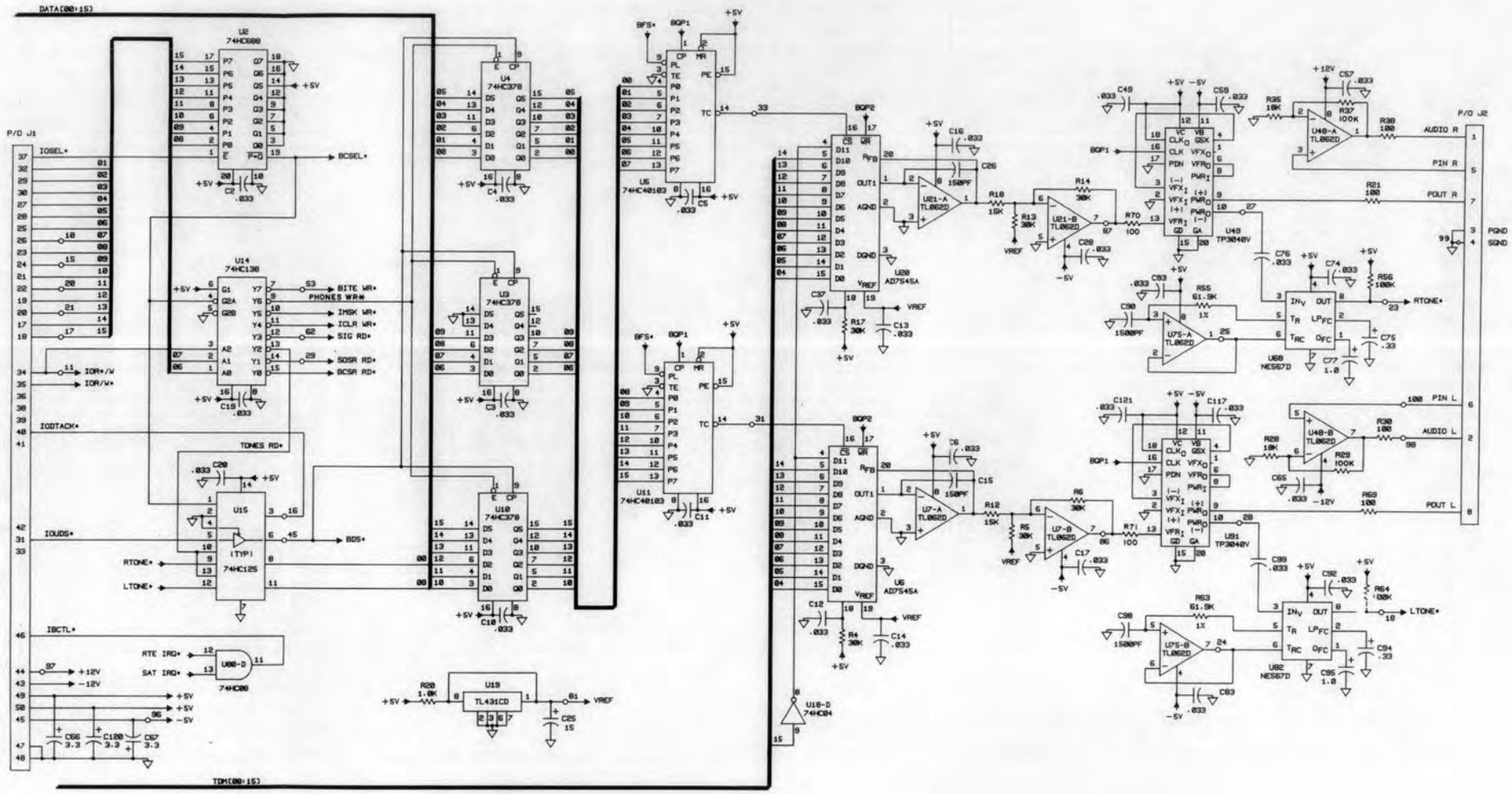

Figure 4-5. Type 796818-1, Bus Controller (A10), Schematic Diagram 580968 (Sheet 4 of 4) (02)

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

JUMPER PINS	
JP1	1-2
JP2	N/U
JP3	N/U

Figure 4-6. Type 796816-1, Control Microprocessor Assembly (A11), Schematic Diagram 580966 (Sheet 1 of 2) (06)

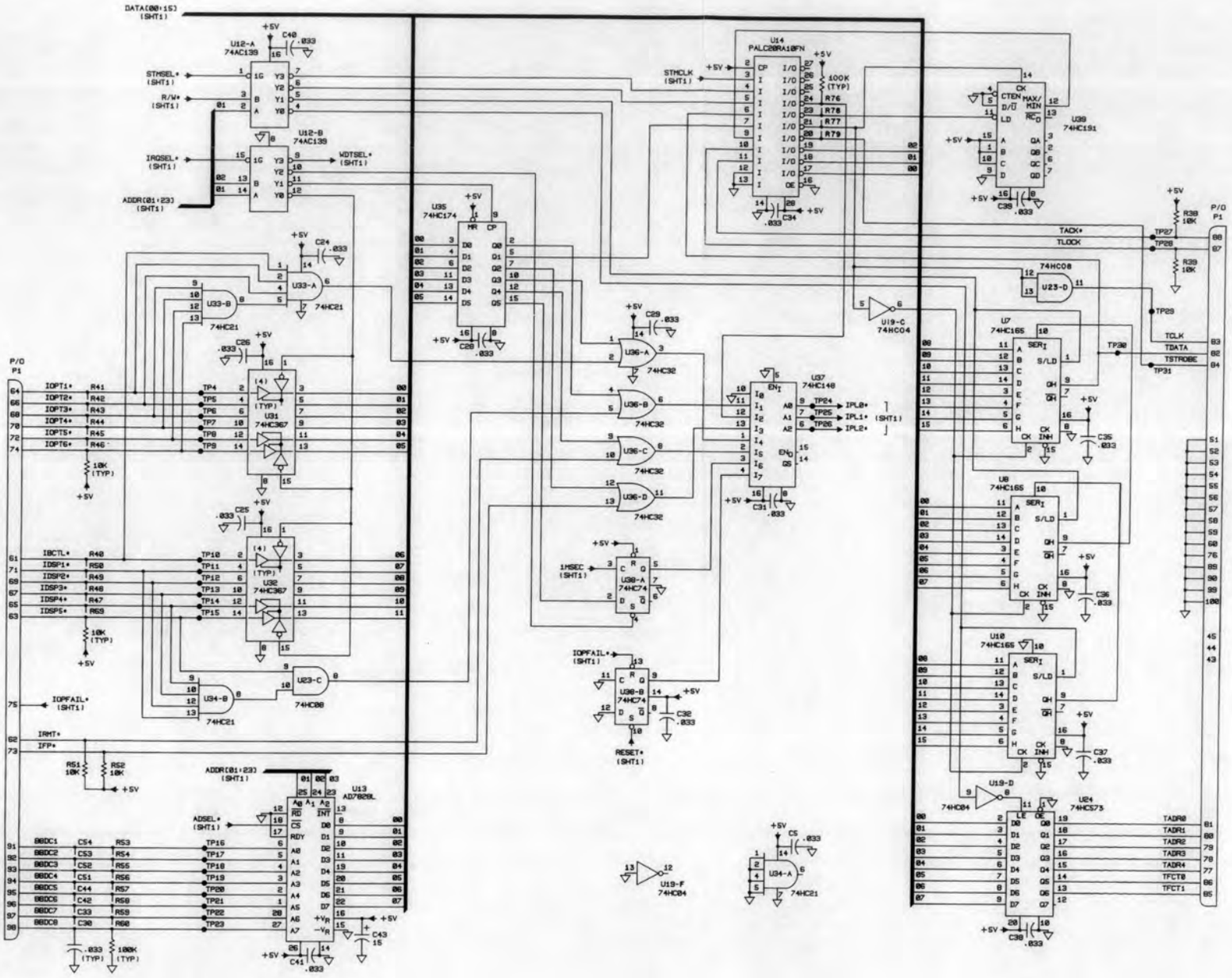

Figure 4-6. Type 796816-1, Control Microprocessor Assembly (A11), Schematic Diagram 580966 (Sheet 2 of 2) (06)

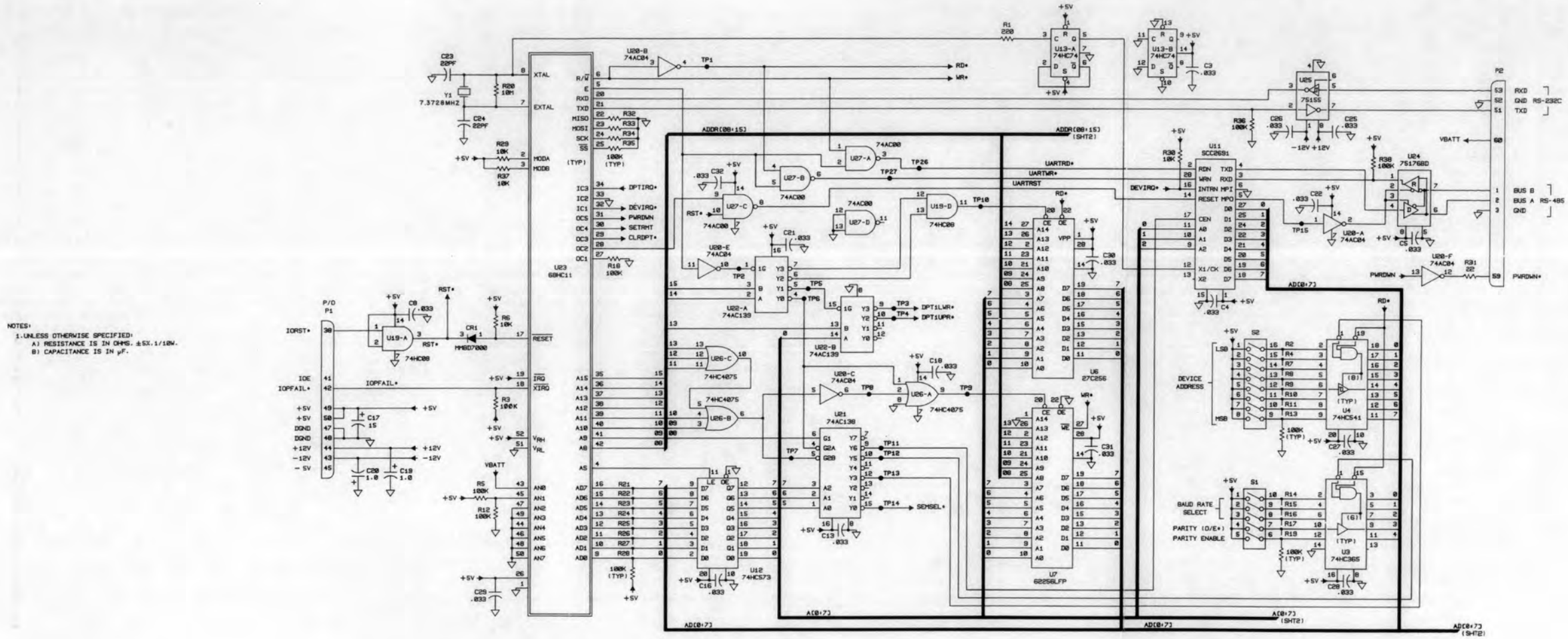

Figure 4-7. Type 796842-1, Remote Control Assembly (A12), Schematic Diagram 580982 (Sheet 1 of 2) (03)

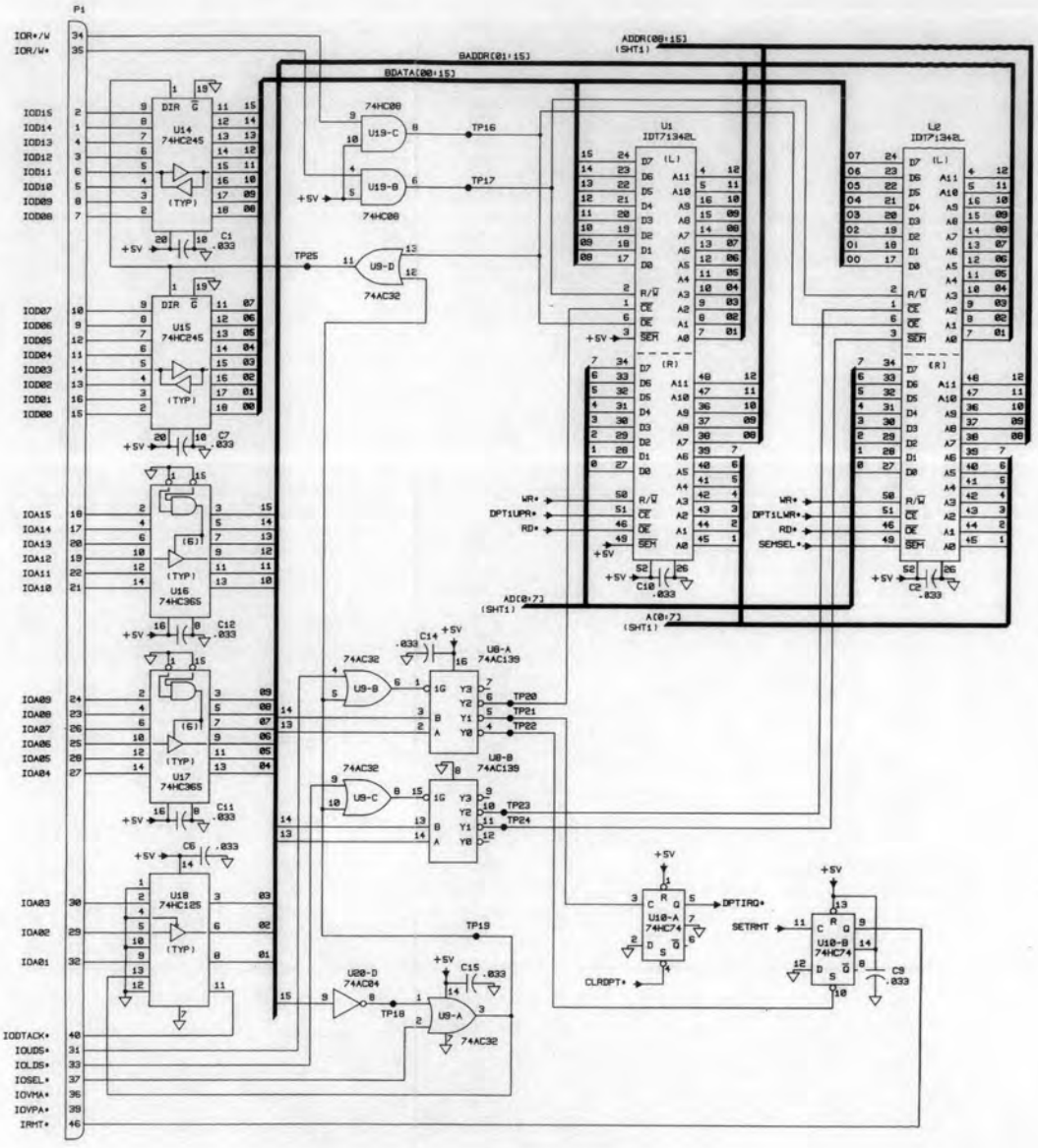

Figure 4-7. Type 796842-1, Remote Control Assembly (A12), Schematic Diagram 580982 (Sheet 2 of 2) (03)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A) RESISTANCE IS IN OHMS, ±5%, 1/10W.
   B) CAPACITANCE IS IN μF.
2. * DENOTES COMPONENTS NOT USED IN -2 VERSION.

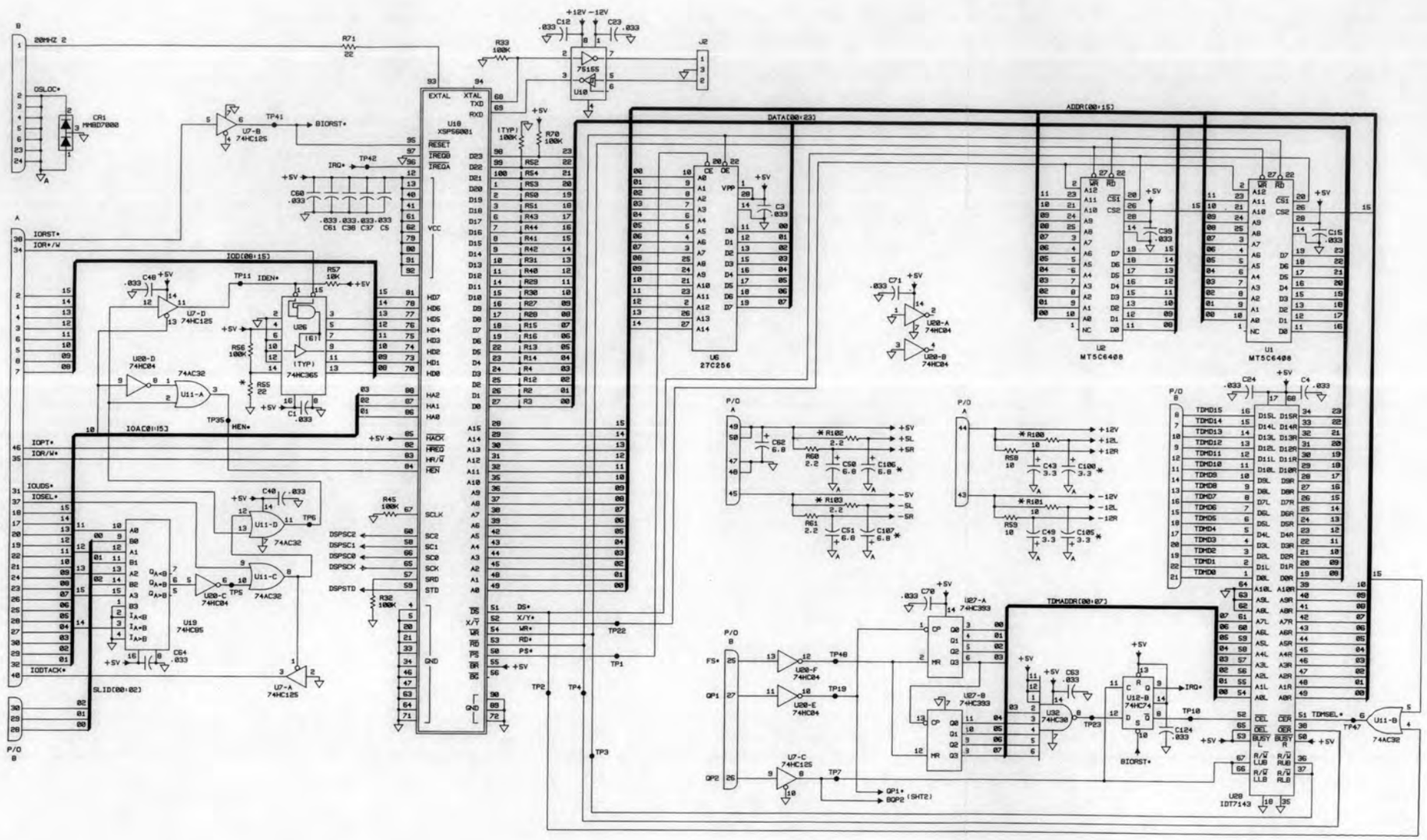

Figure 4-8. Type 796844-2, Audio Reconstruction Assembly (A15), Schematic Diagram 580984 (Sheet 1 of 2) (03)

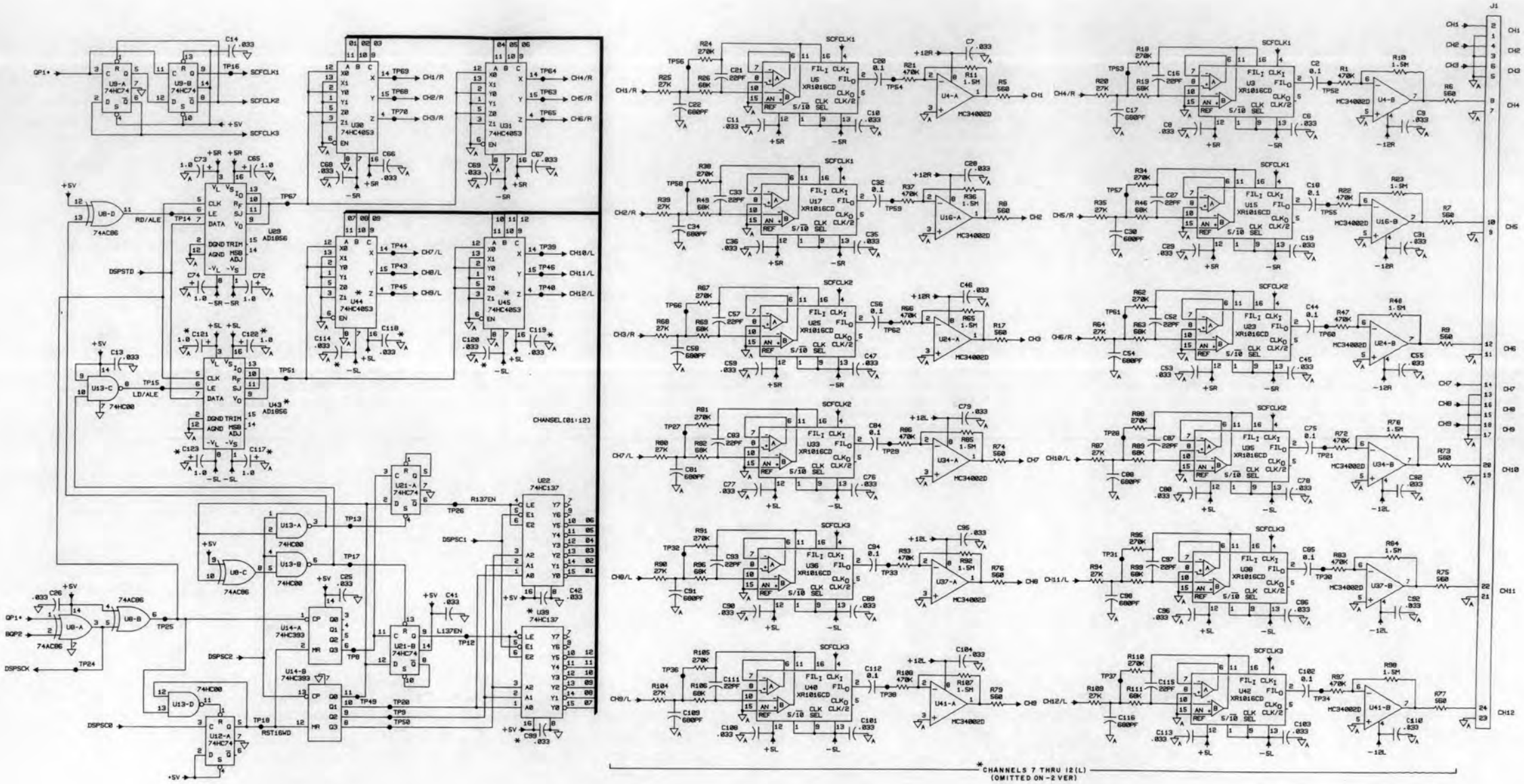

Figure 4-8. Type 796844-2, Audio Reconstruction Assembly (A15), Schematic Diagram 580984 (Sheet 2 of 2) (03)

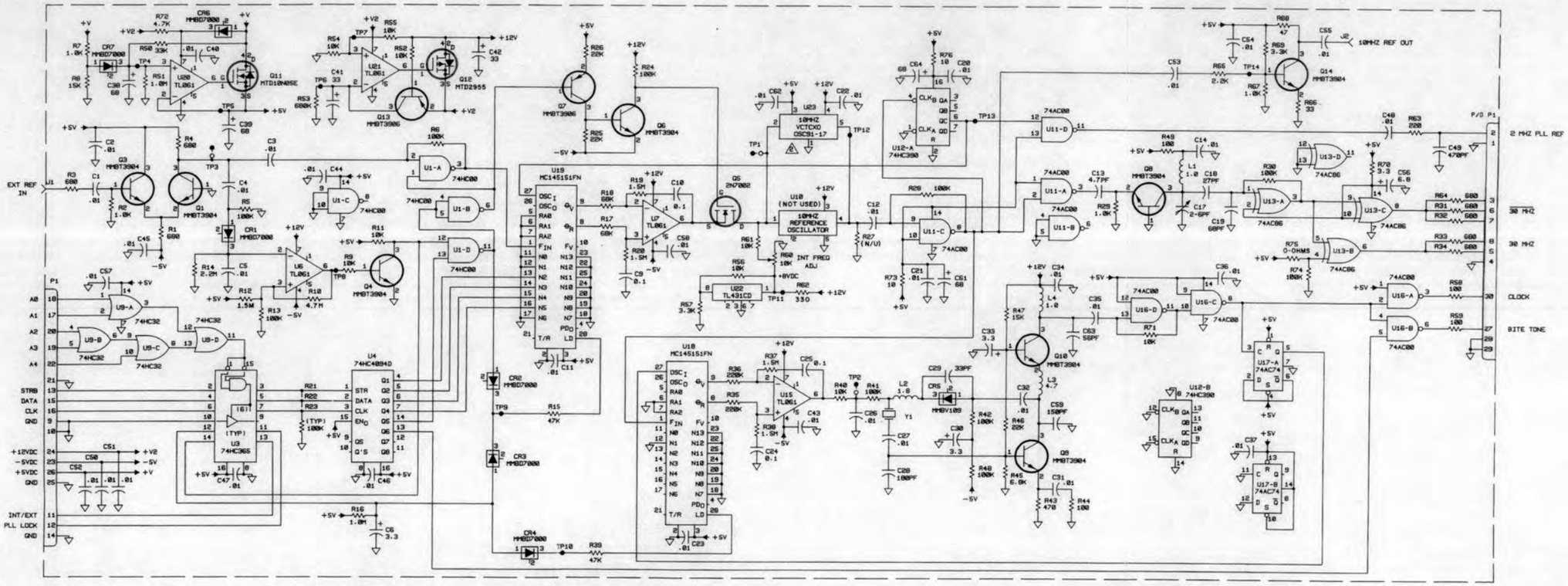

Figure 4-9. Type 796814-1, Reference Generator Assembly (A16), Schematic Diagram 580964 (07)

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

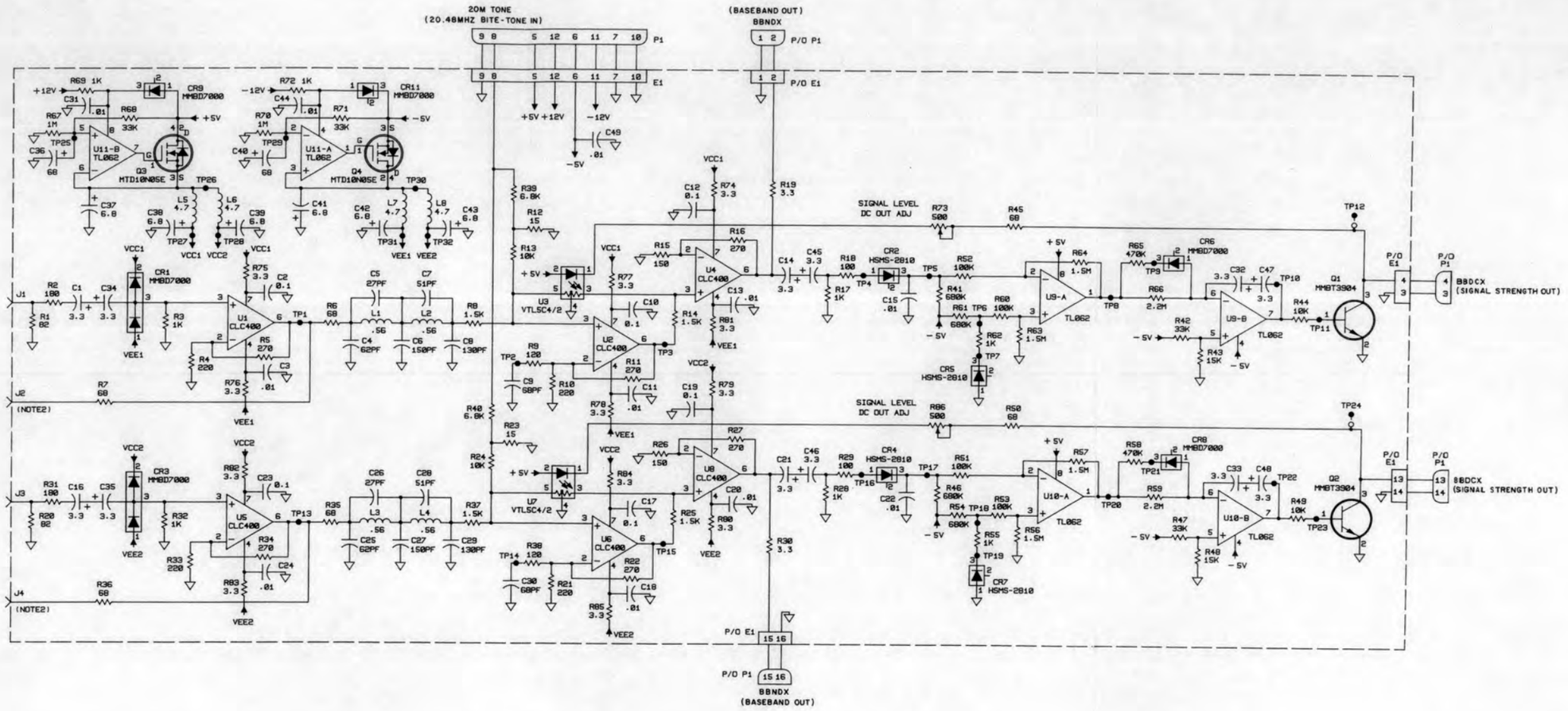

Figure 4-10. Type 796802-2, Baseband Input Assembly (A17), Schematic Diagram 481563 (05)

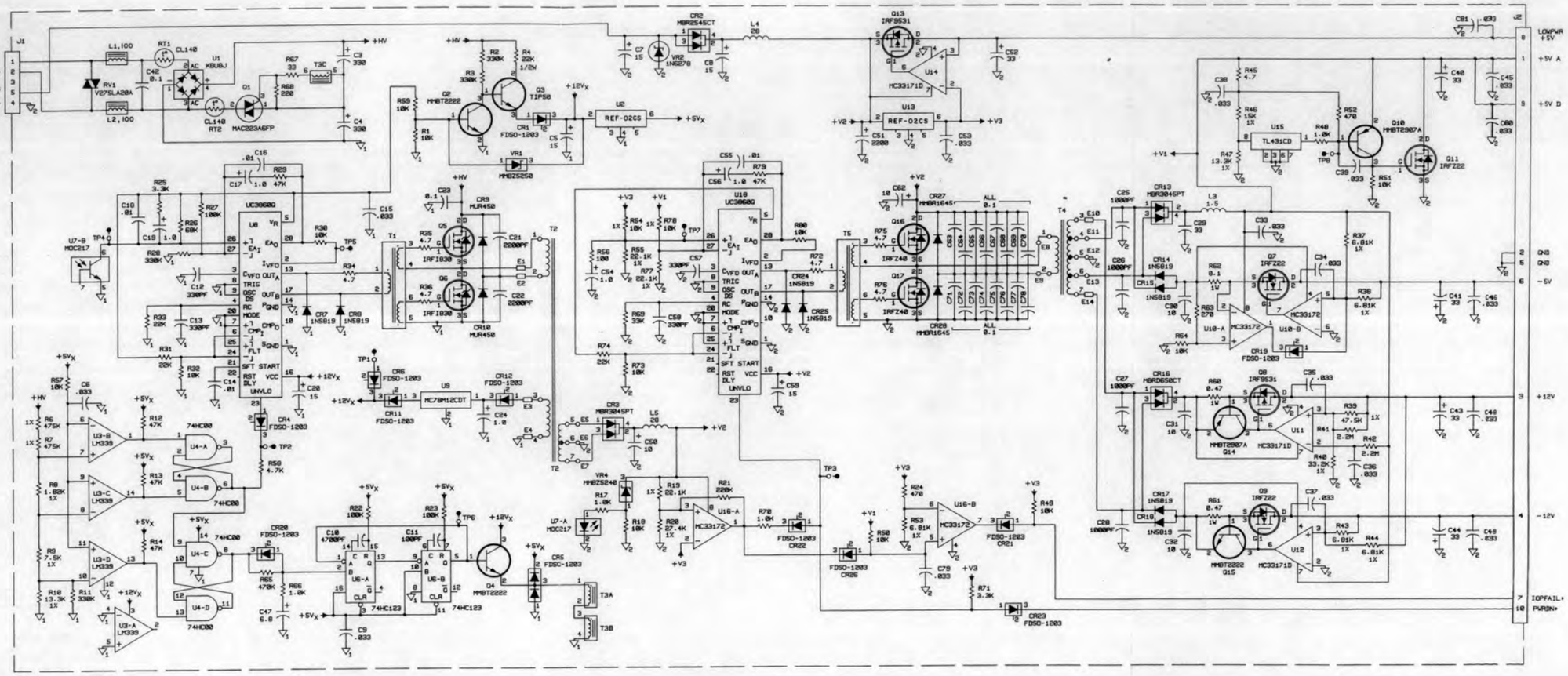

Figure 4-11. Type 766021-1, Power Supply (PS1), Schematic Diagram 581021 (05)

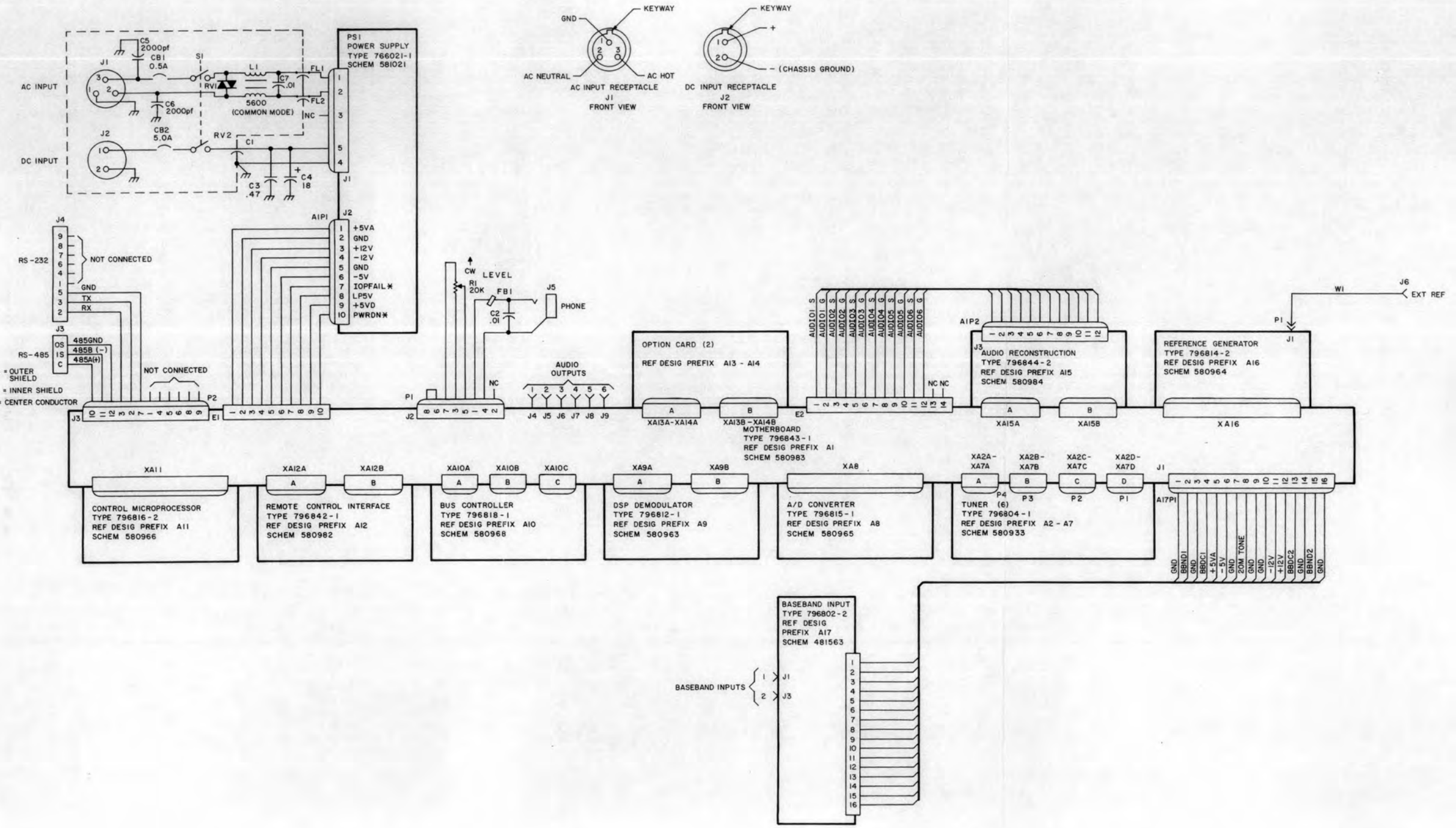

Figure 4-12. Type WJ-9546 Digital FDM Demultiplexer, Main Chassis Schematic Diagram 581030 (04)

APPENDIX A

WJ-9546/HHC HAND-HELD CONTROLLER OPTION

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

April 1990

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

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WJ-9546/HHC HAND-HELD CONTROLLER OPTION

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APPENDIX A

APPENDIX A

WJ-9546/HHC HAND-HELD CONTROLLER OPTION

A.1 GENERAL DESCRIPTION

The WJ-9546/HHC Hand-Held Controller Option provides remote control capability for the WJ-9546 FDM Demodulator via an RS-232C bus. This option consists of the following:

- One Corvallis Microtechnology, Inc. CMT MC-II Computer
- Keyboard Overlay
- One Controller Cable Assembly, WJ P/N 382228-1
- Operating Program, contained in preprogrammed ROM

The CMT MC-II is a hand-held computer weighing 1 lb. 4 oz. and having a size of 8.25 X 3.75 X 1.75 inches. The CMT MC-II contains an eight-line by 21-characters liquid crystal display and a 45-character keyboard. The CMT MC-II may be battery powered, or powered by its provided AC adapter.

The keyboard overlay defines functions for the applicable keys on the keyboard that are unique to the operation of the WJ-9546.

The controller cable assembly provides the RS-232C communications link between the CMT MC-II and the WJ-9546. One end of the cable attaches to a Com Port 2 on the CMT MC-II while the other end attaches to the RS-232 connector on the front panel of the WJ-9546.

The operating program for the control of the WJ-9546 with the CMT MC-II is preprogrammed in a ROM module provided with this option.

A.2 CONNECTING THE CMT MC-II WITH THE WJ-9546

Perform the following steps to connect the CMT MC-II to the WJ-9546 in preparation for operation:

NOTE

Before making any equipment connections, the operator should become familiar with the general operation of the CMT MC-II and the WJ-9546. Refer to the WJ-9546 FDM Demultiplexer Instruction Manual and the CMT MC-II Operator's Manual.

1. Verify that the WJ-9546 is set for a baud rate of 9600 bps. See **Section II** in the WJ-9546 Instruction Manual for information on setting the RS-232 baud rate.

2. Connect the 9-pin D-type connector of the Controller Cable Assembly (WJ P/N 382228) to the WJ-9546 at the front panel RS-232 connector (J4). See **Figure A-1.** Hand tighten the connector retaining screws.

3. Connect the 6-pin modular telephone connector of the Controller Cable Assembly to the CMT MC-II at its COM 2 port. Push this connector in until it clicks into place.

4. Power up the WJ-9546.

5. On the CMT MC-II, press the ON key. After the controller is initialized press the Return key to enter the Menu mode. If the unit does not initialize, it must be reset. See **paragraph A.4** for details on resetting the CMT MC-II.

6. On the CMT MC-II, select Drive E in the Menu mode by entering E: and pressing the Return key.

7. Select file WJ9546.X by highlighting it using the scroll up (∧) or scroll down key (∨) as required. Press F5 to run the program. The controller automatically goes into the Background Monitor Display.

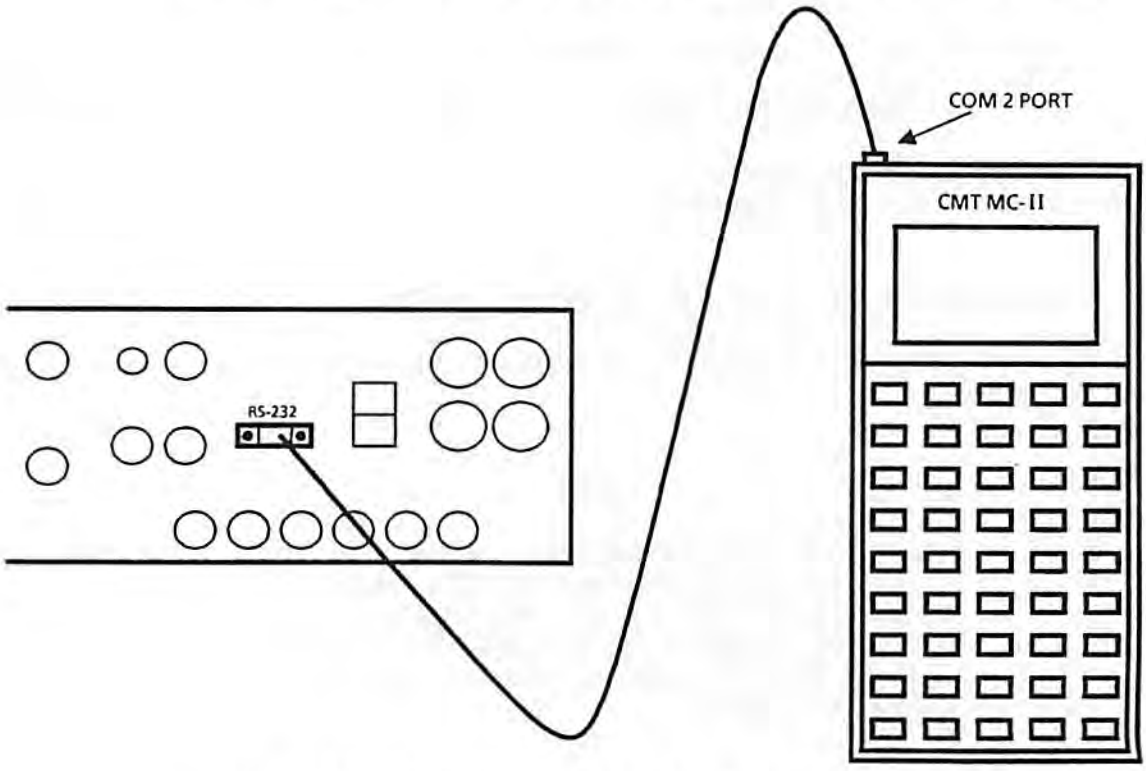

Figure A-1. Connecting the CMT MC-II to the WJ-9546

A.3 OPERATION

NOTE

Before attempting to operate the WJ-9546 with the CMT MC-II, the operator should become familiar with the modes of operation available in the WJ-9546 and the instructions for remote operation of the unit including the mnemonics used. They should also be familiar with the general operation of the CMT MC-II. Refer to the operations section in the WJ-9546 FDM Demultiplexer Instruction Manual and the CMT MC-II Operators Manual.

A.3.1 CMT MC-II CONTROLS AND DISPLAY

The following paragraphs provide information describing the controls and display of the CMT MC-II which are applicable to the remote operation of the WJ-9546. Refer to **Figure A-2** during the following discussions.

A.3.1.1 Liquid Crystal Display

The Liquid Crystal Display (LCD) is an eight-line by 21-characters alphanumeric display. The information displayed is dependent on the current operating mode of the WJ-9546 and the CMT MC-II. Several examples of displays are provided throughout the operations section of this appendix, where applicable. The contrast of the display may be adjusted with the control wheel on the right-hand side of the CMT MC-II.

A.3.1.2 Keyboard

The CMT MC-II's keyboard contains 45 keys, and operates in two keyboard modes. The keyboard overlay defines keys that are dedicated to the remote operation of the WJ-9546. As seen on the overlay some keys provide two functions. Two-function keys have labels on the overlay with gold lettering and white lettering. Gold-lettered functions are available when the keyboard is in the Shift mode. White-lettered functions are available when the keyboard is in the Numeric mode.

The CMT MC-II automatically defaults to the Keyboard Shift mode upon power-up. The Keyboard Numeric mode is entered by pressing the Numeric key, which is the white key in the right-hand column of keys on the keyboard. The Keyboard Numeric mode makes available keys for entering numeric values. This key toggles the keyboard in and out of the Keyboard Numeric mode. The Keyboard Numeric mode may also be exited by pressing the Shift key. The Shift key is the gold-colored key in the left-hand column of keys on the keyboard.

Eleven functions of the controller are not defined by the overlay, but by the labeling on the keys. **Figure A-2** shows these function keys and does not show key labels that do not apply to WJ-9546 operations. The F1-F5, ON/OFF, and the Return keys are always active. The Return key is located on the bottom row of keys to the left of the ON/OFF key. The arrow keys ($\wedge$, $\vee$, $<$, and $>$) are only active in the Keyboard Shift mode.

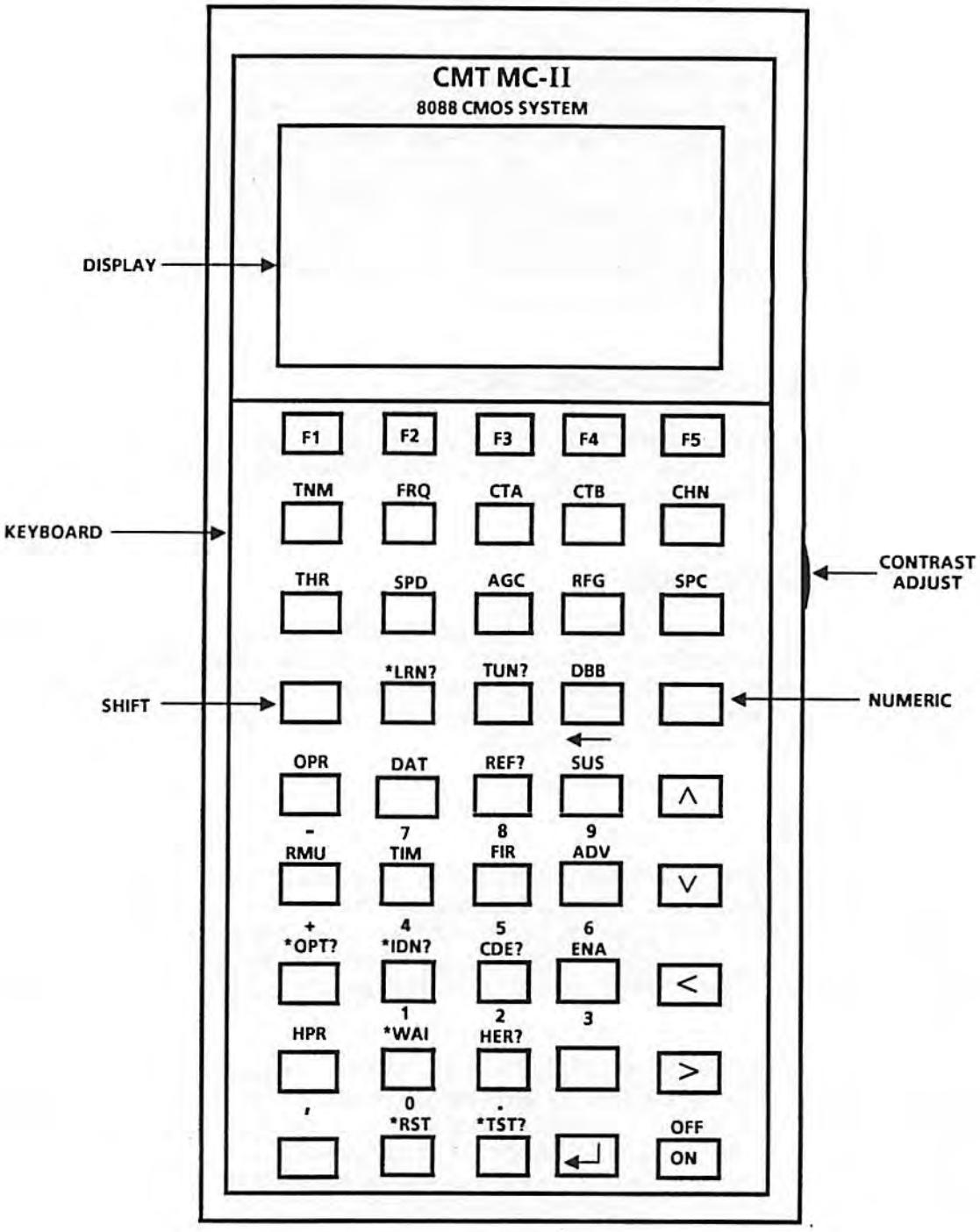

Figure A-2. CMT MC-II

Five special function keys, referred to as softkeys, are provided. These keys (labeled F1-F5) are located on the top row of keys on the keyboard. The function of these keys vary as particular softkey functions become active or inactive. The current function of a softkey is displayed on the last line of the alphanumeric display directly above the softkey.

Table A-1 lists the dedicated WJ-9546 function keys of the CMT MC-II and provides a brief description of their function. Gold-lettered functions are directly related to ASCII commands used to control the WJ-9546 from an RS-232C controller. For more detailed descriptions of the functions, refer to the operations section of the WJ-9546 Instruction Manual. Key labels take the form of WJ-9546 command mnemonics.

Table A-1. WJ-9546 Dedicated Function Keys on the CMT MC-II

Key	Description
OFF	Toggles the CMT MC-II on and off.
Return	Invokes the sending of the command and parameters on the command line to the WJ-9546.
Numeric	White key. Selects the CMT MC-II in and out of the keyboard Numeric mode. White-lettered functions available. Allows for numeric entries.
Numeric Entries	White-lettered functions available only in Keyboard Numeric mode. Digits from 0 to 9 including plus (+) and minus (-) signs, a comma, a decimal point, and a backspace key.
Shift	Gold colored key. Toggles the CMT MC-II Keyboard Shift mode. Gold-lettered functions available.
TNM	Select the demodulator manual tuning mode.
FRQ	Set the tuned frequency in manual Direct Frequency tuning mode.
CTA	Set up the CCITT 960 Plan in manual and scan modes.
CTB	Set up the CCITT 2700 Plan in manual and scan modes.
CHN	Set up the Channel in manual mode.
THR	Set the threshold level.
SPD	Set the Direct Frequency spectrum in manual and scan modes.
AGC	Set the gain control mode.
RFG	Set the gain level in manual gain mode.
SPC	Set the Channel spectrum in manual and scan modes.
*LRN?	Request parameter settings.

Table A-1. WJ-9546 Dedicated Function Keys on the CMT MC-II (Continued)

Key	Description
TUN?	Request actual tuned frequency, nominal tuned frequency, and spectrum.
DBB	Assign demodulator to baseband input.
OPR	Set the demodulator operating mode. Entering a zero "0" after pressing this key enables the manual operating mode. Entering a one "1" after pressing this key enables the scan operating mode.
DAT	Set the date.
REF?	Request the timebase reference.
SUS	Suspend an active scan.
RMU	Address frame or demodulator for parameters.
TIM	Set the time.
FIR	Set forced internal reference.
ADV	Advance suspended scan to next step.
*OPT?	Request installed options.
*IDN?	Request WJ-9546 identity.
CDE?	Request current device-dependent errors.
ENA	Enable a suspended scan.
HPR	Headphone audio assignment.
*WAI	Not used.
HER?	Request latched device-dependent errors.
*RST	Set parameters to reset values.
*TST?	Initiate built-in-test and request status.
>, <, ∧, ∨	Move cursor on the command line right (>), move cursor left (<). Increment (∧) or decrement (∨) the numerical value located in the cursor position.

A.3.2 CONTROLLING THE WJ-9546

Four types of operation displays are available on the CMT MC-II: the Background Monitor display, the Baseband display, the Help display, and the Scan Setup display.

When the WJ-9546.X file is run, the CMT MC-II defaults to the Background Monitor display. This display is used to monitor and control a particular demodulator. The display shows the demodulator currently being monitored and the baseband input that it is connected to. When the CMT MC-II is first initialized, the Background Monitor display defaults to monitor demodulator #1. If demodulator #1 is not installed, the display defaults to demodulator #2, and so on.

The Background Monitor display also shows the demodulator's nominal and actual tuned frequencies, its spectrum setting (while in Direct Frequency and Channel tuning modes), its gain control setting, its threshold setting, and the signal strength of the current signal. The signal strength reading on the display is continuously updated as the strength of the signal changes. When the strength of the signal is above the threshold setting, an asterisk appears to the right of the signal strength reading.

When the WJ-9548/ACT Activity Monitor Option is installed in the WJ-9546, the current activity type for the demodulator is also displayed in the Background Monitor display. This option is capable of classifying six different types of signal activity for display, which are: no activity, voice, data, signalling tones, phase-shift keying (PSK), and frequency-shift keying (FSK).

Parameter modifications for the demodulators are carried out while in the Background Monitor display. When a new parameter is entered, the display is refreshed and all parameters are updated.

The Baseband display is used to enter or edit correction factors for the baseband inputs of the WJ-9546.

The Help display is provided as an operator aid which can be used to obtain descriptive information for a WJ-9546 dedicated CMT MC-II function key.

The Scan Setup display is used to setup a scan operation for a selected demodulator.

A.3.2.1 Sending Commands to the WJ-9546

A function is performed by pressing the key that is directly below the mnemonic stamped on the Keyboard overlay. When a key is pressed in the Keyboard Shift mode of the Background Monitor display, the command mnemonic and current parameter is displayed on the command line (next to last line of the display). See **Figure A-3** for an example of a typical Background Monitor display.

If there is an associated query to the command, the query is sent to the WJ-9546 and the response is displayed next to the mnemonic on the display as a prompt for the operator.

If desired, the operator may modify the value displayed by using either of two methods.

One method is to use the move left (<) or move right (>) key to place the cursor in the character position to be modified. The cursor position, while in the Keyboard Shift mode, is identified with an underline. The scroll up (∧) or scroll down (∨) key may then be used to increment or decrement the numerical value. After the new value is entered and displayed, the Return key is pressed to invoke the sending of the command line.

The other method is to press the Numeric key to enter the Keyboard Numeric mode. When the Numeric key is pressed the entire value is erased. The numeric keys may then be used to enter the new value. A square cursor (□) is present in the character position at which the numeric entry is placed. Each character position entry causes the cursor to move to next character position. If an improper entry is made the backspace key (←) may be used to move the cursor over the incorrect character. The backspace key is located just to the left of the scroll up (∧) key.) The correct character may then be entered. After the correct value is entered and displayed, the Return key is pressed to invoke the sending of the command line.

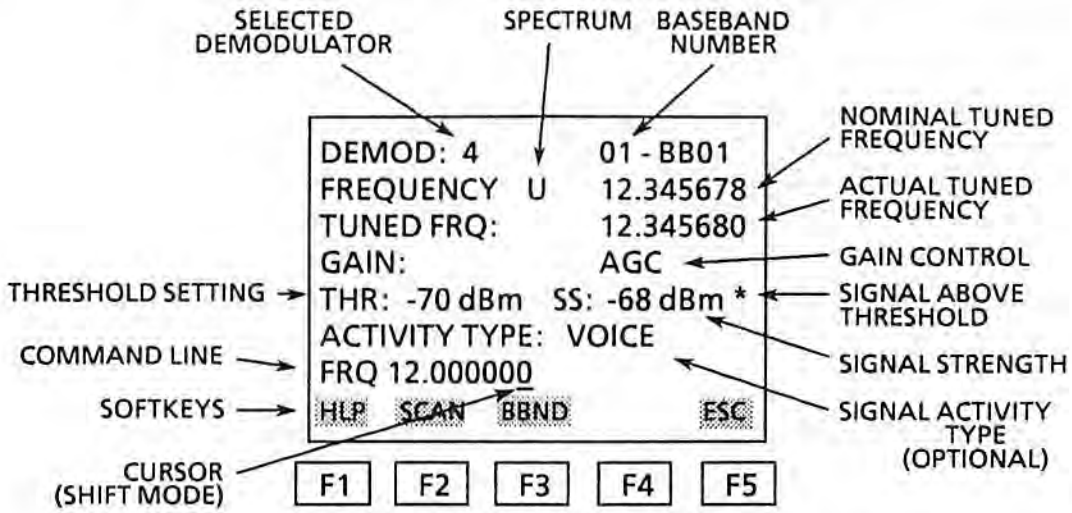

Figure A-3. Example of a Typical Background Monitor Display

The RMU key is used to access a demodulator in the WJ-9546. Pressing the RMU key, entering a number from 1 to 6, and pressing the Return key displays the active status of the demodulator. A command key is then pressed to query and to modify parameters.

If at any time during operation the controller seems to "hang up", a soft or hard reset should be performed. See **paragraph A.4** for details on resetting the CMT MC-II.

A.3.2.2 Entering or Editing Baseband Correction Factors

The Baseband display is entered by pressing the BBND softkey (F3) associated with the Background Monitor display. **Figure A-4** shows an example of the Baseband display. Entering the Baseband mode displays the current correction factor settings and power levels for the two baseband inputs. It also makes available HLP, CORR1, CORR2, and ESC softkeys.

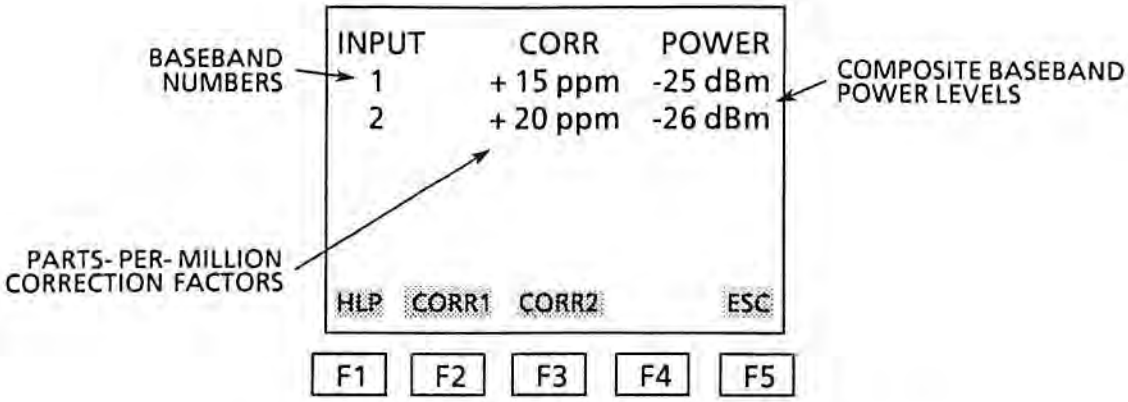

Figure A-4. Example of a Typical Baseband Display

Pressing the CORR1 softkey (F2) allows for entering or editing the correction factor, in parts-per-million (PPM), for baseband input 1 (baseband connected to A17J1 on the WJ-9546 front panel). The CORR2 softkey (F3) is used to set the correction factor for baseband input 2. The baseband correction factor field ranges from -50 to +50 PPM.

Pressing either CORR softkey displays the prompt CORR X: sxx, where "X" is the baseband number selected, "s" is a plus or minus sign, and "xx" is the correction factor in PPM. The correction factor may then be edited by using the >, <, ∧, and ∨ keys or by entering the Keyboard Numeric mode and using the numeric entry keys.

Pressing Return accepts the new correction factor and exits the correction factor editing mode. The other CORR softkey may then be pressed and the same procedure performed to edit the other baseband correction factor. Pressing the ESC softkey (F5) exits the Baseband display and returns to the Background Monitor display.

The composite baseband power level in dBm is displayed for each baseband. This allows the operator to set the baseband input level to an appropriate level for the WJ-9546. The baseband power sensing circuitry does not measure baseband power levels below -30 dBm. Therefore, a reading of -30 dBm indicates the baseband power is too low. A reading in excess of 0 dBm indicates the baseband power is too high and should be reduced.

Additionally, the command line is available while in the Baseband display allowing for continuous control of the accessed demodulator.

A.3.2.3 Entering the Help Display

The Help display may be used as a quick reference to the definitions of the dedicated WJ-9546 keys on the CMT MC-II. The Help display is entered by pressing the HLP softkey (F1) while in either the Background Monitor or Baseband displays.

After the HLP softkey is pressed, press the function key for which help is required. The display then displays descriptive information associated with the function key. If desired, another function key may be pressed to display its descriptive information.

Pressing the ESC softkey (F5) exits the Help display and returns to the last display before entering Help, either Baseband or Background Monitor.

A.3.2.4 Examples of Controlling the WJ-9546 in the Manual Mode

The following paragraphs provide examples of methods of controlling the WJ-9546 in the Manual mode with the CMT MC-II, including examples of typical Background Monitor displays. Manual tuning modes are activated by pressing the OPR key and entering a 0 (zero).

A.3.2.4.1 Manual Direct Frequency Mode

Figure A-5 shows a display that reflects the status of a demodulator that is in the Manual Direct Frequency Tuning mode. Direct Frequency Tuning Mode is selected by pressing the TNM key, entering 0, and then pressing the Return key. Once in this mode, the FRQ and SPD keys are used to manipulate frequency and upright/inverted spectrum processing, respectively (SPD 0 = upright, SPD 1 = inverted).

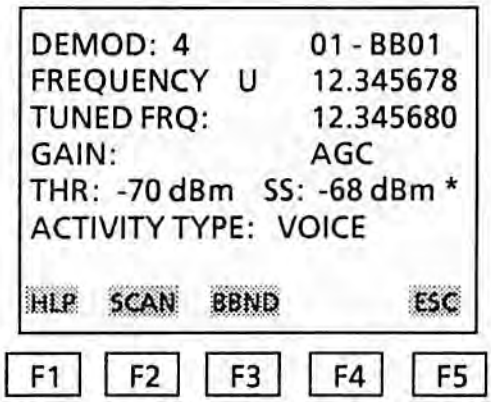

Figure A-5. Display for a Demodulator in Manual Direct Frequency Tuning Mode

A.3.2.4.2 Manual CCITT 960 Tuning Mode

Figure A-6 shows a display that reflects the status of a demodulator that is in the CCITT 960 Plan. This tuning mode is selected by pressing the TNM key, entering 1 and then pressing the Return key. Once in this mode, the CTA key is used to enter the Supergroup, Group and Channel parameters. See the WJ-9546 Instruction Manual for order and range of parameters. These entries are separated by commas. Since the upright/inverted spectrum is dictated by the CCITT 960 Frequency plan, no operator selection of this parameter is available.

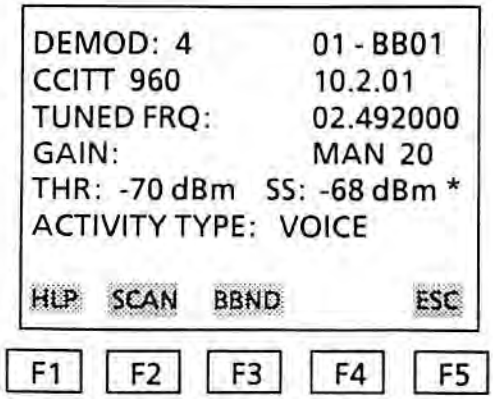

Figure A-6. Display for a Demodulator in Manual CCITT 960 Tuning Mode

A.3.2.4.3 Manual CCITT 2700 Tuning Mode

Figure A-7 shows a display that reflects the status of a demodulator that is in the CCITT 2700 Plan. This tuning mode is selected by pressing the TNM key, entering 2 and then pressing the Return key. Once in this mode the CTB key is used to enter the Supermastergroup, Mastergroup, Supergroup, Group and Channel. See the WJ-9546 Instruction Manual for range and order of parameters. The numeric entries are separated by commas. Since the upright/inverted spectrum is dictated by the CCITT 2700 Frequency plan, no operator selection of this parameter is available.

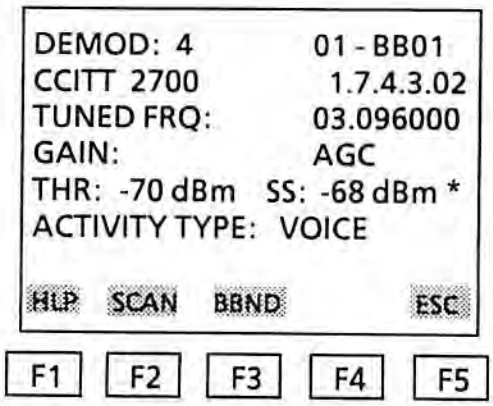

Figure A-7. Display for a Demodulator in Manual CCITT 2700 Tuning Mode

A.3.2.4.4 Manual Channel Tuning Mode

Figure A-8 shows a display that reflects the status of a demodulator that is in the Channel Tuning mode. This tuning mode is selected by pressing the TNM key, entering 3 and then pressing Return. Pressing the CHN key allows for entering or editing the channel number. Four digits are used when entering the channel number. Pressing the SPC key allows selection of upright or inverted channel spectrum (SPC 0 = upright, SPC 1 = inverted).

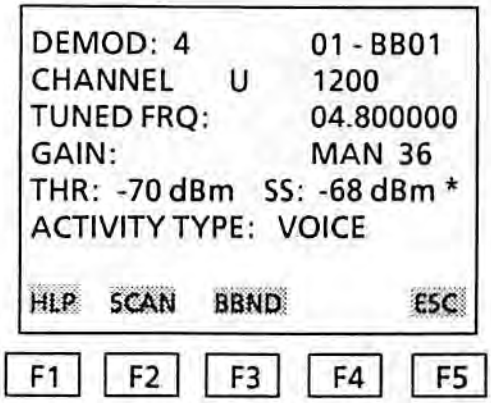

Figure A-8. Display for a Demodulator in Manual Channel Tuning Mode

A.3.2.5 Examples of Setting Up the WJ-9546 for Scan Operations

Scan operations can also be implemented from the CMT MC-II. Before a scan operation can be initiated, however, one out of the following eight scan setups must be performed if not already:

- Frequency Scan Setup
- CCITT 960 Group Scan Setup
- CCITT 960 Supergroup Scan Setup
- CCITT 2700 Group Scan Setup
- CCITT 2700 Supergroup Scan Setup
- CCITT 2700 Mastergroup Scan Setup
- CCITT 2700 Supermastergroup Scan Setup
- Channel Scan Setup

A SCAN softkey is available while in the Background Monitor display (refer to **Figure A-8**). Pressing this softkey (F2) accesses a scan setup display. When the key is pressed, the setup display for the last previous accessed scan mode of the demodulator is displayed.

For example, if the selected demodulator had previously been set up to scan in the Channel Scan mode, via either the CMT MC-II or any external controller, the Channel Scan Setup display will appear when the SCAN soft key is pressed. See **Figure A-9** for an example of a scan setup display.

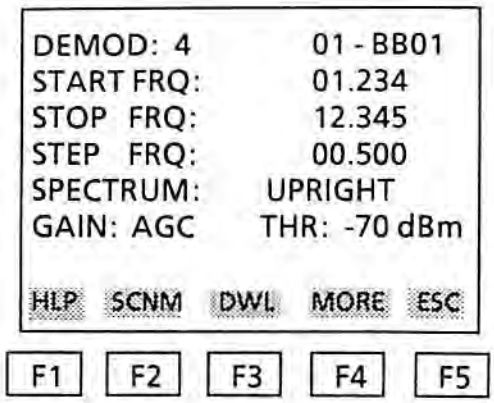

Figure A-9. Example of a Scan Setup Display

As shown in **Figure A-9**, the softkeys of the CMT MC-II take on new definitions when a scan setup display is accessed. The SCNM softkey (F2) is present in each of the eight available scan setup displays. This softkey is used to enable a selection of a different scan setup display, if desired. Pressing the SCNM softkey causes the current type of scan setup display to be listed on the command line (see **Figure A-10**).

To select a different scan setup display, use the scroll up (∧) or scroll down (∨) key to toggle through the selections until the desired type of scan setup display is listed on the command line. Next, press the Return key to access the selected type of scan setup display. The new scan setup display appears and the command line is erased.

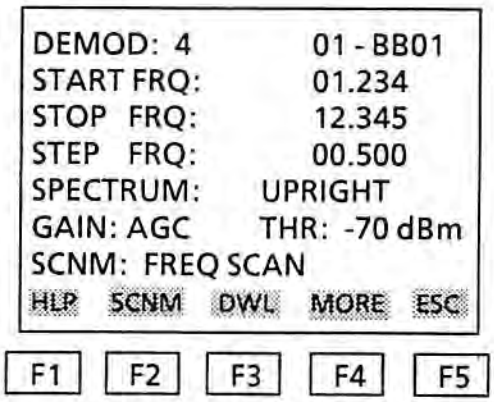

Figure A-10. Selecting a Scan Setup Display

The following paragraphs provide examples of the methods of entering scan setups. Once the scan has been setup, pressing the OPR key and entering a 1 and Return initiates the setup scan operation for the selected demodulator and returns the CMT MC-II to the Background Monitor display. The Background Monitor display now shows SCANNING: SCN on the third line of the display. **Figure A-11** is an example of a Background Monitor display for a scanning demodulator. Pressing the ESC softkey while in a scan setup display, automatically returns the controller to the "manual" Background Monitor display. Once a scan setup has been entered for a demodulator, it is maintained in memory until a new scan setup for the demodulator is entered.

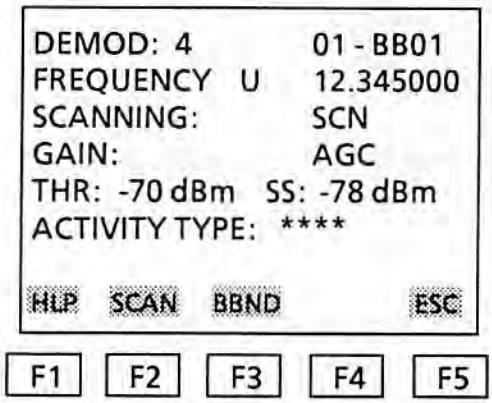

Figure A-11. Example of a Background Monitor Display for a Scanning Demodulator

A.3.2.5.1 **Frequency Scan Setup**

The Frequency Scan Setup display is accessed when FREQ SCAN is displayed on the command line and the Return key is pressed. **Figure A-9** is an example of a typical Frequency Scan Setup display. The first line on the display shows the selected demodulator and the connected baseband number. The second line shows the current start frequency for the scan while the third line shows the stop frequency. The step frequency for the scan is shown on the fourth line. The spectrum setting is on the fifth line and the gain and threshold settings are on the sixth line of the display.

The DWL softkey is used to set up the dwell timers for the scan operation. See **paragraph A.3.2.5.9** for details on setting up the dwell timers for scan operation.

Pressing the MORE softkey (F4) makes available new softkeys for the setup display (see **Figure A-12**). The FRA and FRB softkeys (F2 and F3) are used to enable start and stop frequency entries, respectively.

To enter a start frequency, press the FRA softkey (F2). The current start frequency is displayed on the command line. The range of this parameter , in MHz, is 00.000 to 19.999. Enter the new start frequency and press Return. The new start frequency is entered and displayed on the second line of the setup display.

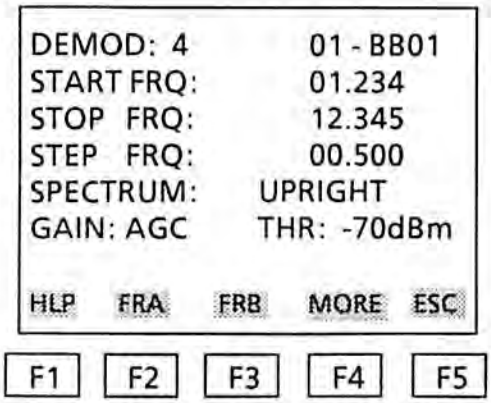

Figure A-12. Second Level of Frequency Scan Setup Display Softkeys

To enter the stop frequency, press the FRB softkey (F3). The current stop frequency is displayed on the command line. The range of this parameter, in MHz, is 00.001 to 20.000. Enter the new stop frequency and press Return. The new stop frequency is entered and displayed on the third line of the setup display.

NOTE

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

The step frequency for the scan is entered by first pressing the MORE softkey. The SCI softkey (F2) is now available (see **Figure A-13**). To enter the step frequency, press the SCI softkey. The current step frequency is displayed on the command line. The range of this parameter , in MHz, is 00.001 to 01.000. Enter the new step frequency and press Return. The new step frequency is entered and displayed on the fourth line of the setup display.

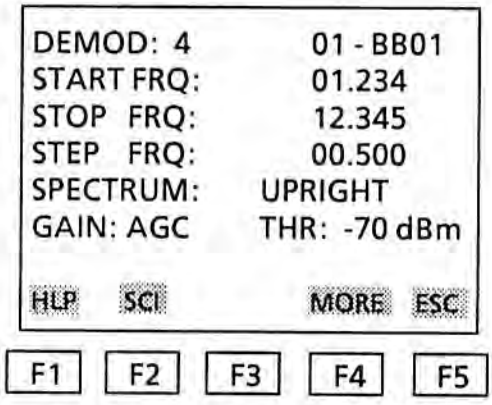

Figure A-13. Third Level of Frequency Scan Setup Display Softkeys

The frequency spectrum for demodulation is selected by pressing the SPD key and entering a zero (0) for upright spectrum or a one (1) for inverted spectrum. Press Return to enter and display the selected parameter on the fifth line of the setup display.

Once all scan setup parameters have been entered, the scan operation can be initiated by pressing the OPR key and entering a 1. The display automatically returns to the Background Monitor display for the selected demodulator.

A.3.2.5.2 CCITT 960 Group Scan Setup

The CCITT 960 Group Scan Setup display is accessed when CCITT 960 GP is displayed on the command line and the Return key is pressed. **Figure A-14** is an example of a typical CCITT 960 Group Scan Setup display. The first line on the display shows the selected demodulator and the connected baseband number. The second line shows the current CCITT 960 Group Scan parameters. The gain setting is on the third line and the threshold setting is on the fourth line of the display.

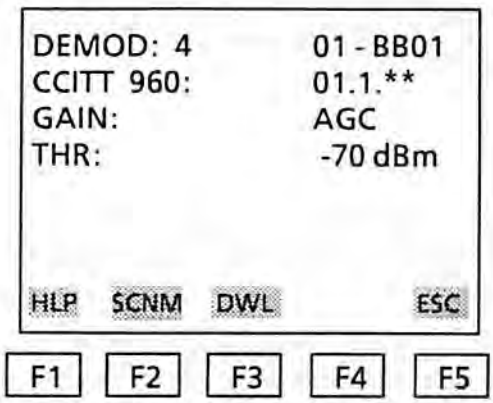

Figure A-14. Example of a CCITT 960 Group Scan Setup Display

As shown in **Figure A-14** the Channel field in the scan setup parameters contain asterisks (**). This indicates that it is a non-editing field. To enter a new CCITT 960 Group Scan parameter, press the CTA key. The current parameter is displayed on the command line. Enter only the new Supergroup number (01 thru 16) and the Group number (1 thru 5), separated by a comma and press the Return key. The new parameter is entered and displayed on the second line of the setup display.

The DWL softkey is used to set up the dwell timers for the scan operation. See **paragraph A.3.2.5.9** for details on setting up the dwell timers for scan operation.

Once all scan setup parameters have been entered, the scan operation can be initiated by pressing the OPR key and entering a 1. The display automatically returns to the Background Monitor display for the selected demodulator.

A.3.2.5.3 CCITT 960 Supergroup Scan Setup

The CCITT 960 Supergroup Scan Setup display is accessed when CCITT 960 SG is displayed on the command line and the Return key is pressed. **Figure A-15** is an example of a typical CCITT 960 Supergroup Scan Setup display. The first line on the display shows the selected demodulator and the connected baseband number. The second line shows the current CCITT 960 Supergroup Scan parameters. The gain setting is on the third line and the threshold setting is on the fourth line of the display.

As shown in **Figure A-15** the Group and Channel fields in the scan setup parameters contain asterisks (*.**). This indicates that they are non-editing fields. To enter a new CCITT 960 Supergroup Scan parameter, press the CTA key. The current parameter is displayed on the command line. Enter only the new Supergroup number (01 thru 16) and press the Return key. The new parameter is entered and displayed on the second line of the setup display.

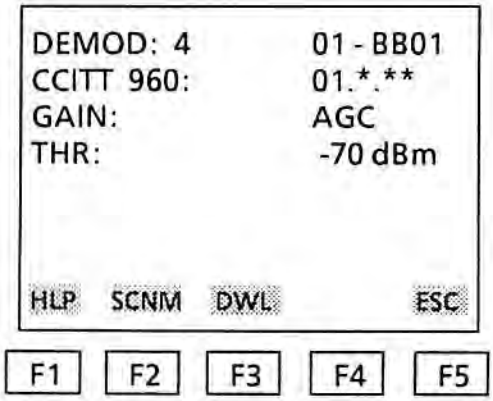

Figure A-15. Example of a CCITT 960 Supergroup Scan Setup Display

The DWL softkey is used to set up the dwell timers for the scan operation. See **paragraph A.3.2.5.9** for details on setting up the dwell timers for scan operation.

Once all scan setup parameters have been entered, the scan operation can be initiated by pressing the OPR key and entering a 1. The display automatically returns to the Background Monitor display for the selected demodulator.

A.3.2.5.4 CCITT 2700 Group Scan Setup

The CCITT 2700 Group Scan Setup display is accessed when CCITT 2700 GP is displayed on the command line and the Return key is pressed. **Figure A-16** is an example of a typical CCITT 2700 Group Scan Setup display. The first line on the display shows the selected demodulator and the connected baseband number. The second line shows the current CCITT 2700 Group Scan parameters. The gain setting is on the third line and the threshold setting is on the fourth line of the display.

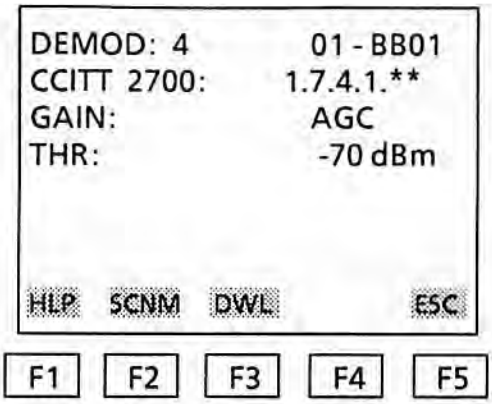

Figure A-16. Example of a CCITT 2700 Group Scan Setup Display

As shown in **Figure A-16** the Channel field in the scan setup parameters contain asterisks (**). This indicates that it is a non-editing field. To enter a new CCITT 2700 Group Scan parameter, press the CTB key. The current parameter is displayed on the command line. Enter only the new Supermastergroup number (1 thru 3), the Mastergroup number (7 thru 9), the Supergroup number (4 thru 8), and the Group number (1 thru 5), each separated by a comma. Press the Return key. The new parameter is entered and displayed on the second line of the setup display.

The DWL softkey is used to set up the dwell timers for the scan operation. See **paragraph A.3.2.5.9** for details on setting up the dwell timers for scan operation.

Once all scan setup parameters have been entered, the scan operation can be initiated by pressing the OPR key and entering a 1. The display automatically returns to the Background Monitor display for the selected demodulator.

A.3.2.5.5 CCITT 2700 Supergroup Scan Setup

The CCITT 2700 Supergroup Scan Setup display is accessed when CCITT 2700 SG is displayed on the command line and the Return key is pressed. **Figure A-17** is an example of a typical CCITT 2700 Supergroup Scan Setup display. The first line on the display shows the selected demodulator and the connected baseband number. The second line shows the current CCITT 2700 Supergroup Scan parameters. The gain setting is on the third line and the threshold setting is on the fourth line of the display.

As shown in **Figure A-17** the Group and Channel fields in the scan setup parameters contain asterisks (*.**). This indicates that they are non-editing fields. To enter a new CCITT 2700 Supergroup Scan parameter, press the CTB key. The current parameter is displayed on the command line. Enter only the new Supermastergroup number (1 thru 3), the Mastergroup number (7 thru 9), and the Supergroup number (4 thru 8), each separated by a comma. Press the Return key. The new parameter is entered and displayed on the second line of the setup display.

The DWL softkey is used to set up the dwell timers for the scan operation. See **paragraph A.3.2.5.9** for details on setting up the dwell timers for scan operation.

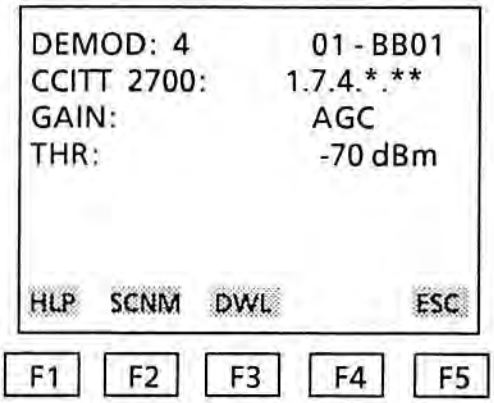

Figure A-17. Example of a CCITT 2700 Supergroup Scan Setup Display

Once all scan setup parameters have been entered, the scan operation can be initiated by pressing the OPR key and entering a 1. The display automatically returns to the Background Monitor display for the selected demodulator.

A.3.2.5.6 CCITT 2700 Mastergroup Scan Setup

The CCITT 2700 Mastergroup Scan Setup display is accessed when CCITT 2700 MG is displayed on the command line and the Return key is pressed. **Figure A-18** is an example of a typical CCITT 2700 Mastergroup Scan Setup display. The first line on the display shows the selected demodulator and the connected baseband number. The second line shows the current CCITT 2700 Mastergroup Scan parameters. The gain setting is on the third line and the threshold setting is on the fourth line of the display.

As shown in **Figure A-18** the Group, Channel, and Supergroup fields in the scan setup parameters contain asterisks (*.*.**). This indicates that they are non-editing fields. To enter a new CCITT 2700 Mastergroup Scan parameter, press the CTB key. The current parameter is displayed on the command line. Enter only the new Supermastergroup number (1 thru 3) and the Mastergroup number (7 thru 9), separated by a comma. Press the Return key. The new parameter is entered and displayed on the second line of the setup display.

The DWL softkey is used to set up the dwell timers for the scan operation. See **paragraph A.3.2.5.9** for details on setting up the dwell timers for scan operation.

Once all scan setup parameters have been entered, the scan operation can be initiated by pressing the OPR key and entering a 1. The display automatically returns to the Background Monitor display for the selected demodulator.

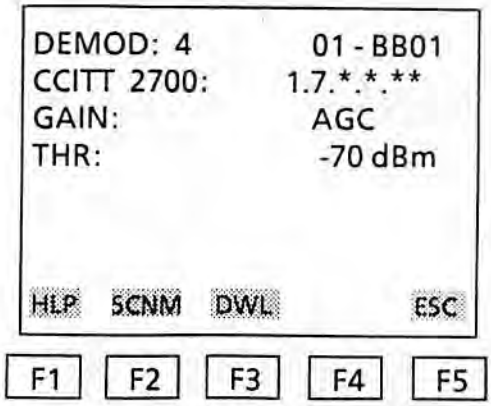

Figure A-18. Example of a CCITT 2700 Mastergroup Scan Setup Display

A.3.2.5.7 CCITT 2700 Supermastergroup Scan Setup

The CCITT 2700 Supermastergroup Scan Setup display is accessed when CCITT 2700 SMG is displayed on the command line and the Return key is pressed. **Figure A-19** is an example of a typical CCITT 2700 Supermastergroup Scan Setup display. The first line on the display shows the selected demodulator and the connected baseband number. The second line shows the current CCITT 2700 Supermastergroup Scan parameters. The gain setting is on the third line and the threshold setting is on the fourth line of the display.

As shown in **Figure A-19** the Group, Channel, Supergroup, and Mastergroup fields in the scan setup parameters contain asterisks (*.*.*.**). This indicates that they are non-editing fields. To enter a new CCITT 2700 Mastergroup Scan parameter, press the CTB key. The current parameter is displayed on the command line. Enter only the new Supermastergroup number (1 thru 3) and press the Return key. The new parameter is entered and displayed on the second line of the setup display.

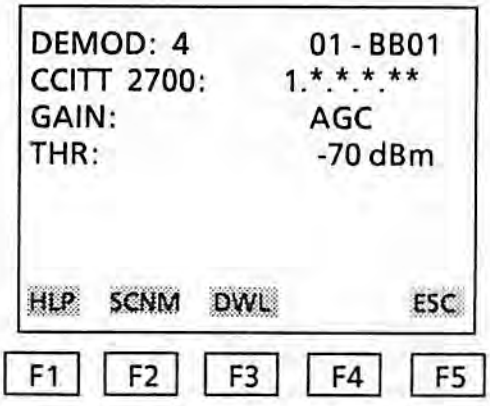

Figure A-19. Example of a CCITT 2700 Supermastergroup Scan Setup Display

The DWL softkey is used to set up the dwell timers for the scan operation. See **paragraph A.3.2.5.9** for details on setting up the dwell timers for scan operation.

Once all scan setup parameters have been entered, the scan operation can be initiated by pressing the OPR key and entering a 1. The display automatically returns to the Background Monitor display for the selected demodulator.

A.3.2.5.8 Channel Scan Setup

The Channel Scan Setup display is accessed when CHAN SCAN is displayed on the command line and the Return key is pressed. **Figure A-20** is an example of a typical Channel Scan Setup display. The first line on the display shows the selected demodulator and the connected baseband number. The second line shows the current start channel for the scan while the third line shows the stop channel. The spectrum setting is on the fourth line. The gain setting is on the fifth line and the threshold setting is on the sixth line of the display.

The DWL softkey is used to set up the dwell timers for the scan operation. See **paragraph A.3.2.5.9** for details on setting up the dwell timers for scan operation.

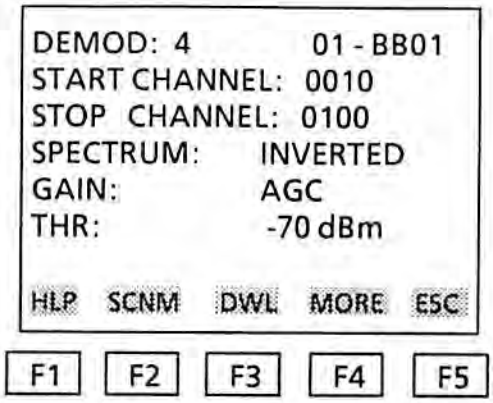

Figure A-20. Example of a Channel Scan Setup Display

Pressing the MORE softkey makes available new softkeys for the setup display (see **Figure A-21**). To enter a start channel for the scan setup, press the CHA softkey (F2). The current start channel is displayed on the command line. The range of this parameter is 0000 to 4999. Enter the new start channel and press Return. The new start channel is entered and displayed on the second line of the setup display.

The CHB softkey (F3) is used to enter a stop channel. To enter the stop channel, press the CHB softkey. The current stop frequency is displayed on the command line. The range of this parameter is 0001 to 5000. Enter the new stop channel and press Return. The new stop channel is entered and displayed on the third line of the setup display.

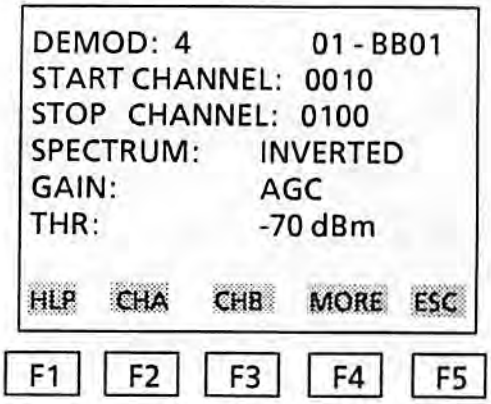

Figure A-21. Second Level of Channel Scan Setup Display Softkeys

NOTE

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

The frequency spectrum for demodulation is selected by pressing the SPC key and entering a zero (0) for upright spectrum or a one (1) for inverted spectrum. Press Return to enter and display the selected parameter on the fourth line of the setup display.

Once all scan setup parameters have been entered, the scan operation can be initiated by pressing the OPR key and entering a 1. The display automatically returns to the Background Monitor display for the selected demodulator.

A.3.2.5.9 Setting Up the Dwell Timers and Single Pass Function

The DWL softkey shown in **Figures A-9,** and **A-14** thru **A-20** is used to setup the dwell timers for the scan operation. Three dwell timers are available: pre-dwell, signal dwell, and loss dwell. See **Section II** in the base manual for further discussion on the definitions and use of these timers.

To set up the dwell timers, press the DWL softkey to access the Dwell Timer Setup display. See **Figure A-22** for a typical example of a Dwell Timer Setup display.

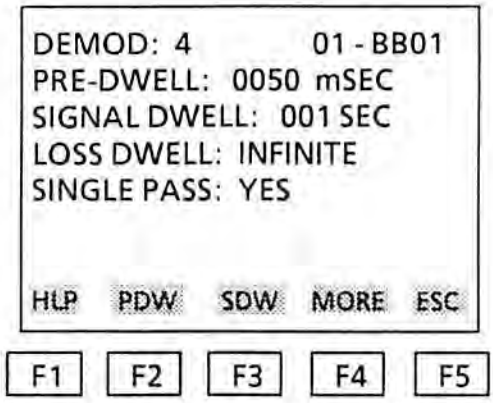

Figure A-22. Example of a Dwell Timer Setup Display

The first line on the display shows the selected demodulator and the connected baseband number. The second line shows the current pre-dwell timer value. The third line of the display shows the current signal dwell timer value. The fourth line shows the loss dwell timer value. The fifth line of the display shows the single pass scan selection.

As shown in **Figure A-22** the PDW and SDW softkeys are immediately available when the Dwell Timer Setup display is accessed. These softkeys are used to enable pre-dwell and signal dwell timer entries, respectively.

To enter a pre-dwell timer value, press the PDW softkey (F2). The current pre-dwell timer value is displayed on the command line. The range of this value, in milliseconds, is +0050 to +9975 in 0025 msec increments. This timer can also be set to infinite by entering -1. When the desired value is entered press the Return key. The new value is entered and displayed on the second line of the display.

To enter a signal dwell timer value, press the SDW softkey (F3). The current signal dwell timer value is displayed on the command line. The range of this value, in seconds, is +001 to +600 in 1 second increments. This timer can also be set to infinite by entering -1. When the desired value is entered press the Return key. The new value is entered and displayed on the third line of the display.

Pressing the MORE softkey makes available two new softkeys (LDW and SP) for use in the setup display (see **Figure A-23**). To enter a loss dwell timer value, press the LDW softkey (F2). The current loss dwell timer value is displayed on the command line. The range of this value, in seconds, is +000 to +200 in 1 second increments. This timer can also be set to infinite by entering -1. When the desired value is entered press the Return key. The new value is entered and displayed on the fourth line of the display.

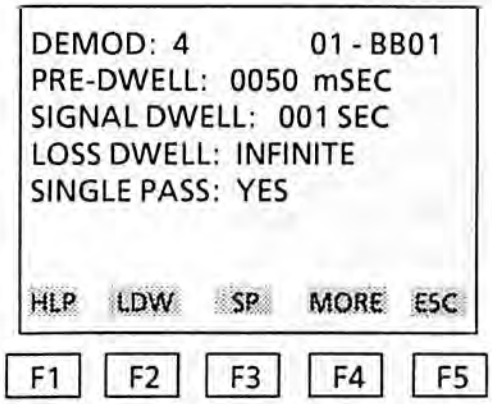

Figure A-23. Second Level of Dwell Timer Setup Display Softkeys

The SP softkey (F3) is used to allow enabling or disabling of single pass scan operation. To change the current setting, press the SP softkey. The current setting is displayed on the command line. When YES is displayed, the "single pass scan only" function is enabled. When NO is displayed, the function is disabled. Use the scroll down key to change YES to NO, or the scroll up key to change NO to YES as required. When the desired selection is displayed press the Return key. The new selection is entered and displayed on the fifth line of the display.

A.3.2.5.10 Suspending an Active Scan

An active scan operation may be interrupted in order to perform signal evaluation or to adjust parameters in a scan setup display. This is referred to as the Suspend mode.

To suspend a scan, press the SUS key. The third line of the Background Monitor display for the demodulator will now show SCANNING: SUS. Once suspended, the scan operation can be restarted by pressing the ENA key. The scan restarts at the next point in the scan after which it was suspended.

Also, while suspended, pressing the ADV key causes the demodulator to tune to the next step in the scan sequence after the point at which it was interrupted.

A.3.3 ERROR MESSAGES

Any time the CMT MC-II receives an error indication from the WJ-9546, it will decode the error and display the error description on the display. While an error message is displayed, the softkeys are redefined to include only the ESC softkey (F5). Pressing the ESC softkey clears the command line, exits the error display and returns the display to the previous function that was displayed when the error occurred.

Five error conditions can occur, each with a corresponding error message. They are: Invalid Command error, Execution error, Query error, Dual Port error, and COM Port error. These error conditions are further explained in the following paragraphs.

A.3.3.1 Invalid Command Error

When a command entry that is not supported by the WJ-9546 is attempted, an Invalid Command error is generated. In the event that an Invalid Command error occurs, the error message in **Figure A-24** is displayed.

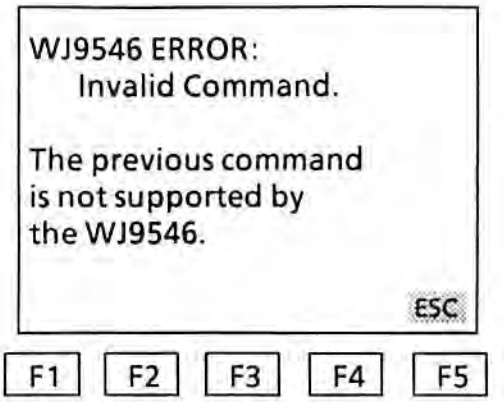

Figure A-24. Invalid Command Error Message

A.3.3.2 Execution Error

An Execution error is generated when a parameter entry that is out of the acceptable range of the WJ-9546 is attempted. For example, attempting to tune to channel 5005 in the Channel tuning mode generates an Execution error, since the acceptable channel entry ranges from 0000 to 5000. In the event that an Execution error occurs, the error message shown in **Figure A-25** is displayed.

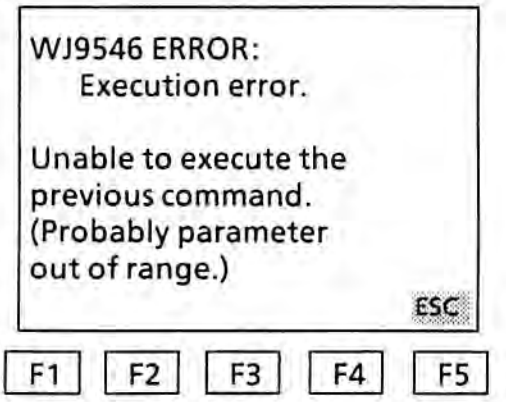

Figure A-25. Execution Error Message

A.3.3.3 Query Error

When a query entry that is not supported by the WJ-9546 is attempted, a Query error is generated. In the event that a Query error occurs, the error message in **Figure A-26** is displayed.

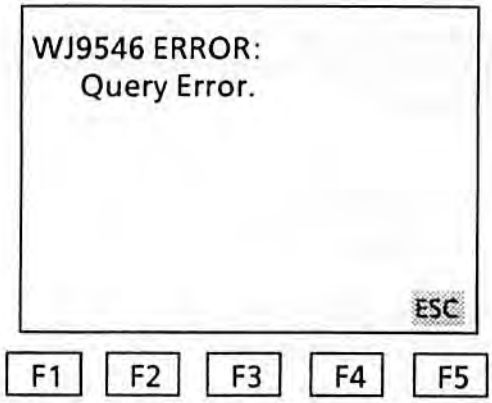

Figure A-26. Query Error Message

A.3.3.4 Dual Port Error

A Dual Port error is an indication that the processors in the WJ-9546 are not responding. Therefore, this error condition denotes a hardware failure. When a Dual Port error occurs, the message in **Figure A-27** is displayed. In some cases this error may be cleared by cycling the WJ-9546 power off then back on.

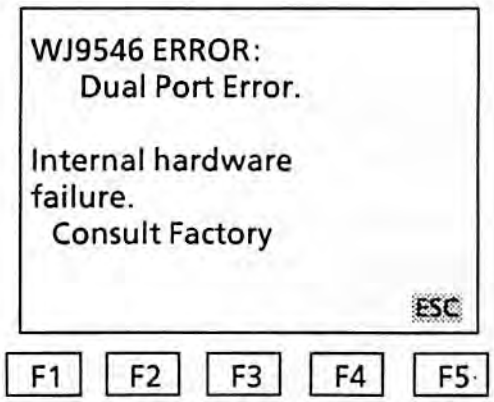

Figure A-27. Dual Port Error Message

A.3.3.5 Com Port Error

A Com Port error is an indication that the WJ-9546 and the CMT MC-II are not communicating. **Figure A-28** shows the Com Port error message. If this error occurs, ensure that the CMT MC-II is properly linked to the WJ-9546. See the procedure in **paragraph A.2.**

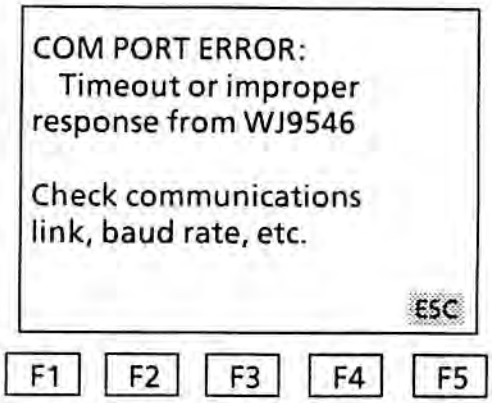

Figure A-28. Com Port Error Message

A.4 RESETTING THE CMT MC-II

If the CMT MC-II does not respond to keystrokes in any manner, it is in a "hung" state and needs to be reset. This can be accomplished using a soft reset or a hard reset.

A soft reset on the CMT MC-II is performed by pressing one of the following pairs of keys simultaneously: [F1][ON], [F2][ON], or [F3][ON]. [F1][ON] creates a "break" condition and will usually reset the CMT MC-II. [F2][ON] stops execution of the currently running program. [F3][ON] performs a software reboot of the operating system.

If all three of the above software reset attempts do not work, a hard reset is necessary. To perform a hard reset, remove the battery door from the CMT MC-II (see **Figure A-29**). The hard reset is a recessed silver button located near the upper left corner of the battery compartment. Using a pointed object, such as a ball point pen, gently push down on the hard reset button to reset the CMT MC-II.

Pressing [F1][ON] or [F2][ON] causes the controller to return to the Menu mode in Drive E. To restart the program, select file WJ9546.X by highlighting it using the scroll up (∧) or scroll down key (∨) as required. Press F5 to run the program.

Pressing [F3][ON] or performing a hard reset causes the controller to return to the Menu mode in Drive F. Select Drive E by entering E: and pressing the Return key. To restart the program, select file WJ-9546.X by highlighting it using the scroll up (∧) or scroll down key (∨) as required. Press F5 to run the program.

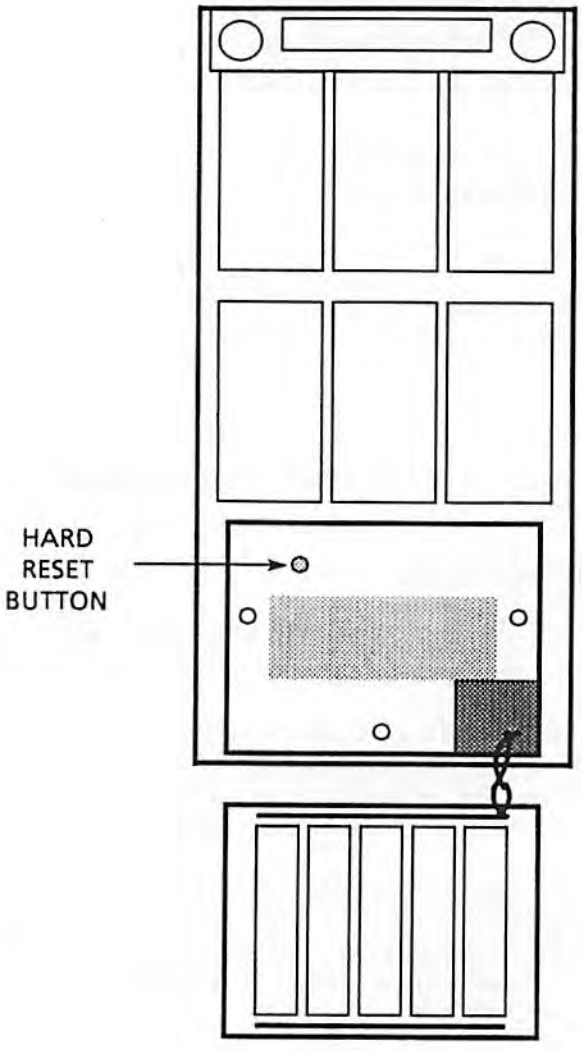

Figure A-29. Location of CMT MC-II's Hard Reset Button

A.5 LIST OF MANUFACTURERS

Mfr. Code	Name and Address	Mfr. Code	Name and Address
0BDE0	Illinois Computer Cable Corp. 5207 Walnut Avenue Downers Grove, IL 60515	44476	Corvallis Microtechnology Inc. 33815 Eastgate Circle Corvallis, OR 97333
14632	Watkins-Johnson Company 700 Quince Orchard Road Gaithersburg, MD 20878	71468	ITT Cannon 666 E. Dyer Road Santa Ana, CA 92702

A.6 PARTS LISTS

Paragraph A.5.1 lists the replaceable parts for the WJ-9546/HHC Hand-Held Controller Option.

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A.6.1 WJ-9546/HHC HAND-HELD CONTROLLER OPTION

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 01				
MP1	Hand-Held Computer	1	CMT MC-II	44476	
MP2	Overlay, Keyboard	1	382227-1	14632	
MP3	Cable Assembly, Controller	1	382228-1	14632	
MP3MP1	Connector, 9 Pin, D Submin.	1	DEM-9P	71468	
MP3MP2	Connector Hood	1	CH-HD09PG	0BDE0	
MP3MP3	Cord, Modular Telephone, 6 Cond.	1	MCII-CABLE 1	44476	
MP4	EPROM Module, 64 K, Preprogrammed	1	841535-1	14632	

APPENDIX B

WJ-9548/ACT2 ACTIVITY MONITOR OPTION

FOR THE

WJ-9546 FDM DEMULTIPLEXER

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

April 1990

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

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FOR THE

WJ-9546 FDM DEMULTIPLEXER

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APPENDIX B

APPENDIX B

WJ-9548/ACT2 ACTIVITY MONITOR OPTION

B.1 GENERAL DESCRIPTION

The WJ-9548/ACT2 Activity Monitor Option provides a signal classification capability for the WJ-9546 FDM Demultiplexer. Voice grade signals can be categorized as voice, data, signalling tones, phase-shift keyed (PSK) data, frequency-shift keyed (FSK) data, or no activity.

The output of each of the six demodulators in the WJ-9546 are simultaneously monitored for signal classification, which can then be monitored by the operator.

The WJ-9548/ACT2 option consists of an Activity Monitor PC Assembly (WJ P/N 796845-1) which plugs into one of the vacant option slots in the WJ-9546's chassis.

B.2 OPERATION

The signal classification for a demodulator can be monitored by the operator either by using the WJ-9546/HHC Hand-Held Controller Option or via an RS-232C or RS-485 remote controller. Refer to **paragraph B.2.1** for details on using this option with the WJ-9546/HHC option. Refer to **paragraph B.2.2** for details on using this option with an RS-232C or RS-485 remote controller.

B.2.1 OPERATION WITH THE WJ-9546/HHC OPTION

When the WJ-9548/ACT2 option is installed in the WJ-9546, the Background Monitor display of the hand-held controller lists the current type of signal activity present on the output of the selected demodulator. See **Figure B-1** for an example of a Background Monitor display. One out of the following activity types can be shown next to ACTIVITY TYPE: on the sixth line of the display:

NO ACTV	(no activity)
VOICE	(voice type activity)
TONES	(signalling tones activity)
PSK	(phase-shift keyed data activity)
FSK	(frequency-shift keyed data activity)

The activity type displayed is automatically updated as new activity types become present on the output of the selected demodulator. Refer to Appendix A of the WJ-9546 FDM Demultiplexer Instruction Manual for more details on the operation of the WJ-9546/HHC option.

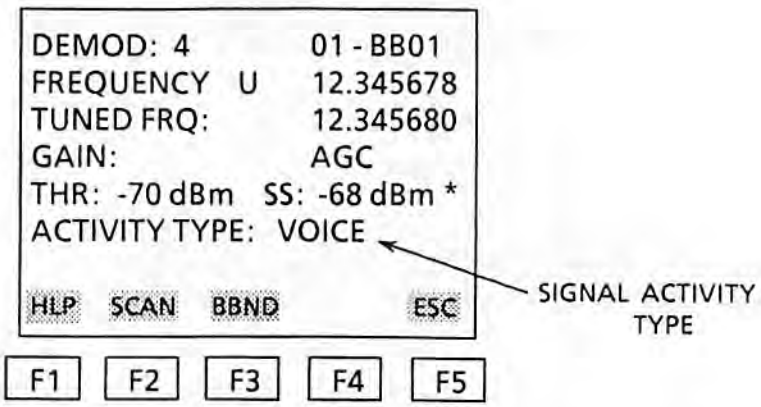

Figure B-1. Example of the WJ-9546/HHC Option's Background Monitor Display

B.2.2 OPERATION WITH AN RS-232C OR RS-485 REMOTE CONTROLLER

The activity type present on the output of a demodulator can be requested, via an RS-232C or RS-422A remote controller, by sending the ACT nrf? query; where nrf is the demodulator number from 1 to 6. When the unit receives the ACT nrf? query, it responds with the demodulator number, a comma, and the activity type. The activity type response is a bit mapped value of sixteen bits. See **Table B-1** for the bit evaluation.

Table B-1. ACT nrf? Query Description

Command	Response	Description
ACT nrf?	ACT nr1, nr1	Request the activity type of the demodulator specified by nrf. Range: 000 to 255 Response example: ACT 01, 001 The first nr1 is the demodulator number. The second nr1 is a bit mapped value representing the activity type as follows: Bit — Description 0 — Voice type of activity 1 — Not used 2 — Signalling tones activity 3 — Frequency-shift keyed data 4 — Phase-shift keyed data 5-15 — Not Used

B.3 REFERENCE DESIGNATION PREFIX

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

B.4 LIST OF MANUFACTURERS

No additional manufacturers are required for the parts covered in this appendix, compared to those that are used for the base unit. See the base manual for a complete list of manufacturrs, including those associated with the replacement parts listed in this appendix.

B.5 PARTS LIST

The following parts lists contain all the electrical components used in this option, along with mechanical parts which may be subject to unusual wear or damage. For a comprehensive listing of all parts and a list of manufacturers, refer also to the base manual. 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 B.4**, and the manufacturer's part number, provided in **paragraph B.6**, are supplied as a guide to aid the user of the equipment while in the field. The parts listed may not necessarily be identical with the parts installed in the unit. The parts listed in **paragraph B.6** will provide for satisfactory unit operation.

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

NOTE

As 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.

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B.6 TYPE 796845-1 ACTIVITY MONITOR PC ASSEMBLY

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
	Revision 05				
C1	Capacitor, Ceramic: .033 µF, 10%, 50 V	28	841415-022	14632	
C2 Thru C18	Same as C1				
C19	Capacitor, Tantalum: 2.2 µF, 20%, 20 V	2	841293-09	14632	
C20	Same as C1				
C21	Same as C19				
C22	Same as C1				
C23	Capacitor, Tantalum: 6.8 µF, 20%, 6.3 V	1	841293-14	14632	
C24 Thru C30	Same as C1				
C31	Not Used				
C32	Not Used				
C33	Same as C1				
J1	Connector, Receptacle	1	68016-103	22526	
R1	Resistor, Fixed: 100 kΩ, 5%, .1 W	26	841414-121	14632	
R2 Thru R26	Same as R1				
R27	Not Used				
R28	Resistor, Fixed: 22Ω, 5%, .1 W	1	841414-033	14632	
R29	Resistor, Fixed: 1.0 kΩ, 5%, .1 W	1	841414-073	14632	
TP1	Pin, Test Point	24	460-2976-02-0400	71279	
TP2 Thru TP24	Same as TP1				
U1	Integrated Circuit	2	8674HC74S014U	14632	
U2	Same as U1				
U3	Integrated Circuit, SRAM	3	MT5C2568DJ-35	MICRN	
U4	Integrated Circuit, EPROM	1	841529	14632	
U5	Integrated Circuit	1	SN75155D	01295	
U6	Integrated Circuit	1	8674HC32S014U	14632	
U7	Integrated Circuit, CMOS	1	8674HC125S014U	14632	
U8	Integrated Circuit, CMOS	1	8674AC125S014U	77777	
U9	Integrated Circuit, CMOS	1	8674AC04S014U	14632	
U10	Same as U3				
U11	Integrated Circuit, CMOS	1	8674AC08S014U	14632	
U12	Integrated Circuit, CMOS	1	8674AC32S014U	14632	
U13	Same as U3				
U14	Integrated Circuit, CMOS	1	IDT7143L70J	61772	
U15	Integrated Circuit, Processor	1	XSP56001ZL20	04713	
U16	Integrated Circuit, CMOS	1	8674HC365S016U	14632	

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U17	Integrated Circuit, CMOS	1	8674HC85S016U	14632	
U18	Integrated Circuit, CMOS	1	8674HC590S016W	77777	
U19	Integrated Circuit, CMOS	1	8674HC30S014	77777	
XU4	Socket, Receptacle PC MT	2	SL-114-G-11	55233	
XU15	Socket, Display	1	DSP56001SOCKET01	04713	

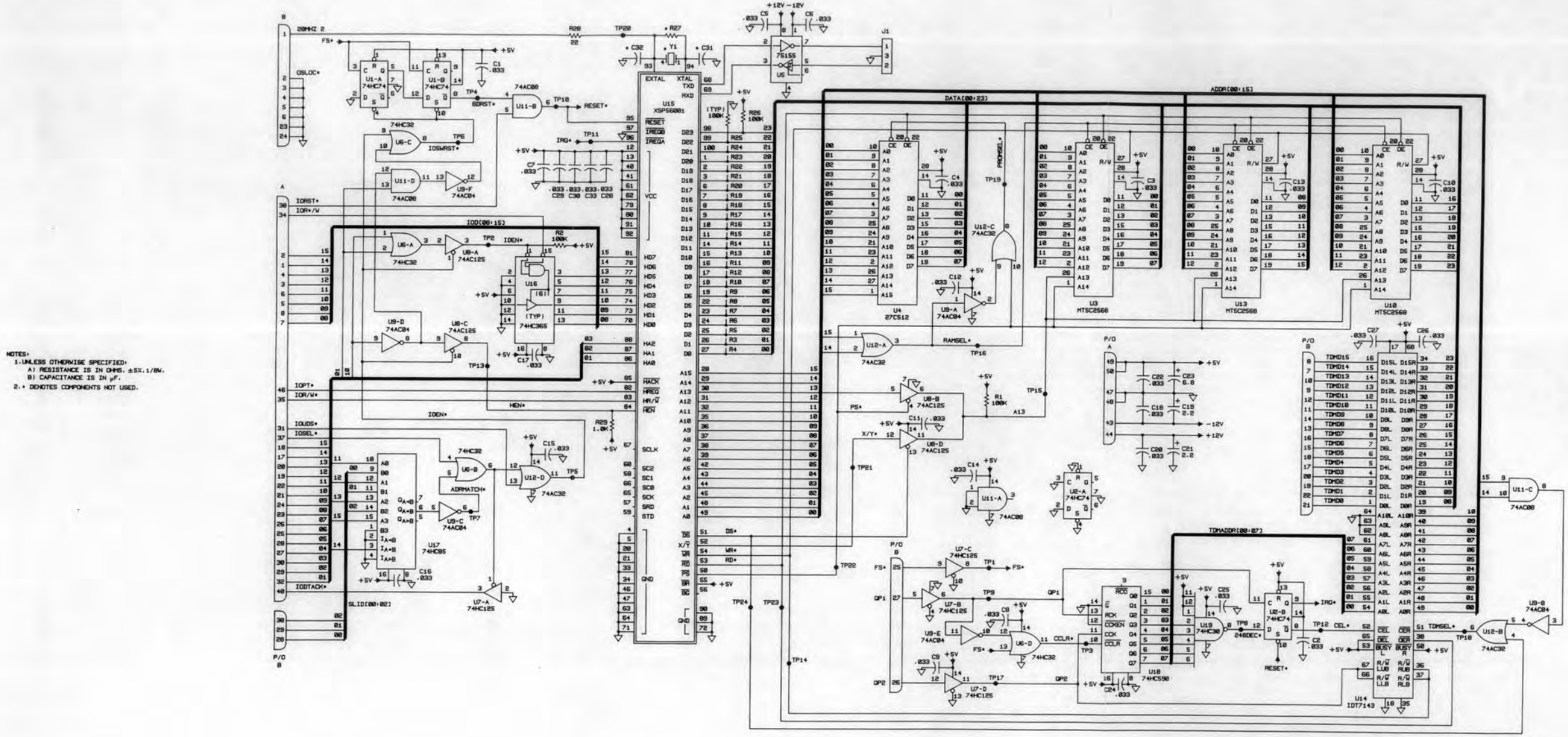

Figure B-2. Type 796845-1, Activity Monitor Assembly Schematic Diagram 580985 (03)

APPENDIX C

WJ-9546/CSW CONTROL SOFTWARE OPTION

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

January 1991

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

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APPENDIX C

WJ-9546/CSW CONTROL SOFTWARE OPTION

C.1 GENERAL DESCRIPTION

The WJ-9546/CSW Control Software Option provides remote control capability for the WJ-9546 FDM Demodulator via an RS-232C interface. This option consists of the following:

One Controller Cable Assembly, WJ P/N 382636-1.

Operating Program, contained in one preprogrammed diskette, WJ P/N 841642.

The WJ-9546/CSW Option is designed to run on a GRiD Computer Model 1307 with a minimum of 640k bytes of RAM, one 3.5-inch floppy drive, and the COM1 port installed. This computer provides a nine-inch electroluminescent screen (EL) on which the demodulator status is displayed in several different formats. The operational description of the WJ-9546/CSW that follows assumes that the GRiD Model 1307 Computer is used.

The controller cable assembly provides the RS-232C communications link between the GRiD Computer and the WJ-9546. One end of the cable attaches to the COM1 Serial RS-232C connector on the GRiD while the other end attaches to the 9-pin female RS-232 connector on the front panel of the WJ-9546.

The operating program for the control of the WJ-9546 with the GRiD Computer is preprogrammed on a 3.5-inch diskette provided with this option.

C.2 INSTALLING AND INITIALIZING THE GRiD/WJ-9546 SYSTEM

Perform the following steps to connect the GRiD Computer to the WJ-9546 in preparation for operation:

NOTE

Before making any equipment connections, the operator should be familiar with the general operation of the GRiD Computer and the WJ-9546. Refer to the WJ-9546 FDM Demodulator Instruction Manual and the GRiD Operator's Manual.

1. Verify that the WJ-9546 is set for a baud rate of 9600 bps. (This is the same baud rate setting required when using the WJ-9546/HHC Hand-Held Controller to control the WJ-9546.) See **Section II** in the WJ-9546 Instruction Manual for information on setting the RS-232 baud rate.

2. Connect the 9-pin D-type connector of the Controller Cable Assembly (WJ P/N 382636-1) to the WJ-9546 at the front panel RS-232 connector (J4). See **Figure C-1.** Hand tighten the connector retaining screws.

3. Connect the 25-pin D-type connector of the Controller Cable Assembly to the GRiD Computer at the COM1 Serial RS-232C Connector. Hand tighten the connector retaining screws.

4. Power up the GRiD Computer.

5. Power up the WJ-9546.

6. After the computer has completed its initialization routine, insert the diskette provided. A backup copy of the diskette provided should be made at this time. If this has already been done, proceed with step 7.

7. Type **WJ9546** and press ENTER to start the WJ-9546/CSW Control Software program.

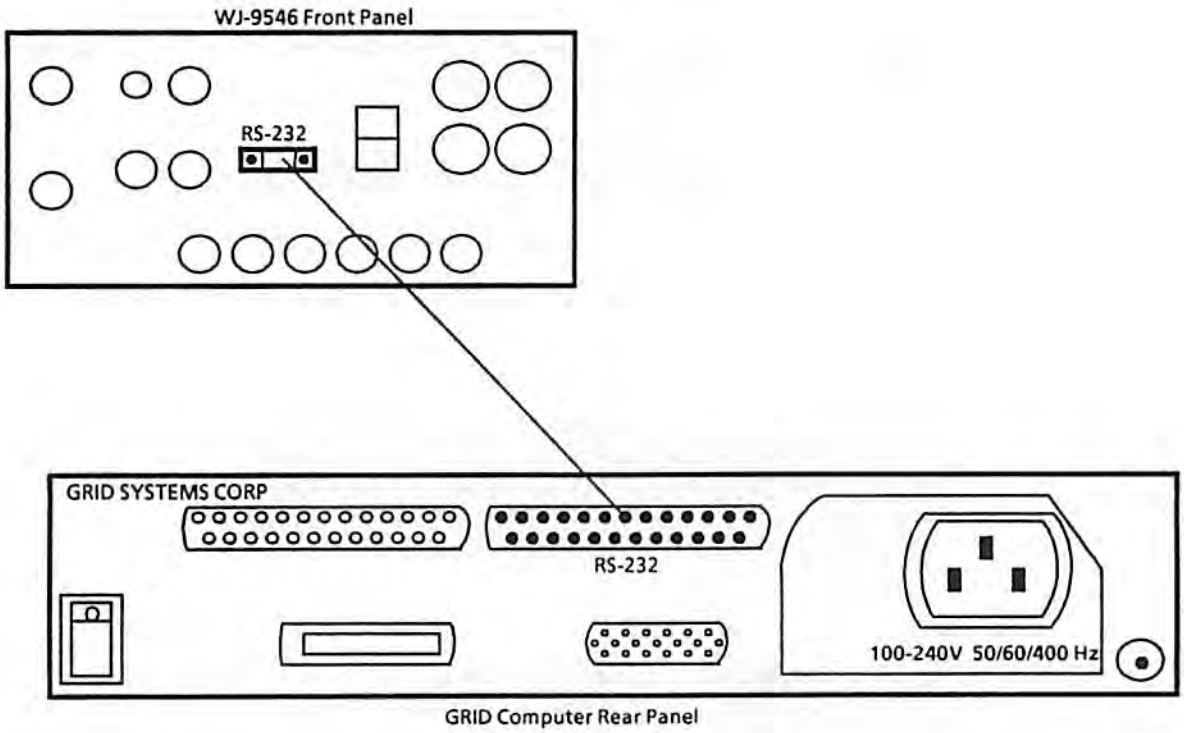

Figure C-1. Connecting the GRID Computer to the WJ-9546

C.3 OPERATION

NOTE

Before attempting to operate the WJ-9546 with the GRiD Computer, the operator should become familiar with the modes of operation available in the WJ-9546 and the instructions for remote operation of the unit. They should also be familiar with the general operation of the GRiD Computer. Refer to the operations section in the WJ-9546 FDM Demodulator Instruction Manual and the GRiD Operators Manual.

C.3.1 GRiD CONTROLS AND DISPLAYS

The GRiD controller displays the status of the WJ-9546 while simultaneously providing control via the keyboard. All parameters are modified by editing the desired data fields on the display. Range checking is performed on all data fields prior to sending the command to the WJ-9546.

There are four basic displays in the GRiD controller. These displays include the Status Display Table, the Demod Control Display, a miscellaneous functions Menu, and the Configuration Display. The following paragraphs describe these displays and their associated softkeys. Listed along the bottom edge of the display of the EL display is a softkey menu which defines the functions of each softkey for that display.

C.3.1.1 General Edit Functions

The cursor can be moved up, down, to the left , and to the right using the arrow keys. Pressing the PAGE DOWN key moves the cursor to the last field entry on the screen that can be edited. The highlighted field indicates the location of the cursor. **Table C-1** lists the special function keys and their functions.

Table C-1. Special Functions Keys and Functions

ENTER	Exits the editor.
BACKSPACE	Deletes the character to the left of the cursor.
DELETE	Deletes the character the cursor is on.
ESCAPE	Exits the editor or removes any out-of-range messages from the screen.
INSERT	No function.
UP ARROW	Move cursor to up one line to previous field.
DOWN ARROW	Move cursor down one line to next lower field.
LEFT ARROW	Move cursor one field to the left or one character to the left while in the editing mode.
RIGHT ARROW	Move cursor one field to the right or one character to the right while in the editing mode.
HOME	While in the editing mode, the cursor is moved to the first character in the highlighted field.
END	While in the editing mode, the cursor is moved to the last character in the highlighted field.
PAGE DOWN	Moves the cursor the last field that can be edited on the displayed screen.

To enter the editing mode, press ENTER. The editing mode allows the operator to change the value of the highlighted field. There are different ways to edit the various fields. These include toggling between two choices, entering a completely new number, selecting a choice from a menu, and incrementing or decrementing a displayed value. Some fields may be edited in more than one way. Refer to **Table C-2.**

Table C-2. Different Ways to Edit the Various Fields

Field	Edit Method(s)	Notes
Headphone	Toggle	1
Baseband	Toggle or Enter number	1,2
Scan/Tune Mode	Choice from menu or Inc/Dec or First letter	1
Nominal Frequency	Enter number or Inc/Dec	1
Spectrum	Toggle or First letter	1,2
Baseband 1 Corr	Enter number or Inc/Dec	1
Baseband 2 Corr	Enter number or Inc/Dec	1
Demodulator	Enter number or Inc/Dec	2
Mode	Menu choice or Inc/Dec or First Letter	2
Frequency	Enter number or Inc/Dec	2
Step	Enter number or Inc/Dec	2
Gain	Toggle or First Letter	2
Manual Gain Amount	Enter number or Inc/Dec	2
Threshold	Enter number or Inc/Dec	2
Scan Mode	Menu choice or Inc/Dec or First letter	3
Pre Dwell	Enter number or Inc/Dec	3
Signal Dwell	Enter number or Inc/Dec	3
Post Dwell	Enter number or Inc/Dec	3
Single Pass	Toggle or First letter	3
Start Freq	Enter number or Inc/Dec	3
Stop Freq	Enter number or Inc/Dec	3
Step Freq	Enter number of Inc/Dec	3
Scan Spectrum	Toggle or First letter	3
Freq	Enter number or Inc/Dec	3
Start Chan	Enter number or Inc/Dec	3
Stop Chan	Enter number of Inc/Dec	3
Time	Enter number	4
Date	Enter number	4

NOTES:

1. This field is displayed on the Status Display Table.
2. This field is displayed on the Demod Control Display.
3. This field is displayed in the Scan Parameters Setup window on the Demod Control Display.
4. This field is displayed on the Configuration Display.

For the fields using the Toggle method, these fields only have two choices. The highlighted field may be toggled between the two choices using the INC (F10) or the DEC (F9) softkeys.

For fields using the First Letter method, the first letter of the new choice may be pressed. The contents of the highlighted field changes to the new selection. Press ENTER to confirm the new choice and exit the editing mode. For example, to enter Channel into the Scan/Tune Mode field, press C. The choice menu is displayed and the word CHANNEL is highlighted in the choice menu. Press ENTER to confirm Channel as the new scan/tune mode and exit the editing mode.

For fields using the Inc/Dec method, press the F10 (INC) or F9 (DEC) softkeys to either increment or decrement the value of the highlighted field.

For fields using the Enter Number method, press ENTER to enter the editing mode. The new value may then be entered into the field. Press ENTER to confirm the newly entered value and exit the editing mode.

The fields using the Menu Choice method have a selection menu associated with the highlighted field. By pressing ENTER, the selection menu is displayed. The selection may be made using the up and down arrow keys to move the cursor up and down the selection list. When the cursor is on the new selection, press ENTER to confirm the new selection and exit the editing mode.

The out-of-range message appears whenever an incorrect value is entered into a field. The message indicates the incorrect number and the range of the selected field. To continue editing, the operator must press ESC (Escape) to remove the message from the screen. The cursor is then returned to the field in question. The operator must then enter a value within the range of that field and press ENTER.

C.3.1.2 Status Display Table

The Status Display Table is the first screen displayed after initialization of the GRiD Controller. The Status Display Table, shown in **Figure C-2,** summarizes the status of all six demodulators in the WJ-9546 FDM Demodulator. The headphone selection, baseband correction factors, and some demodulator parameters can be modified from this display.

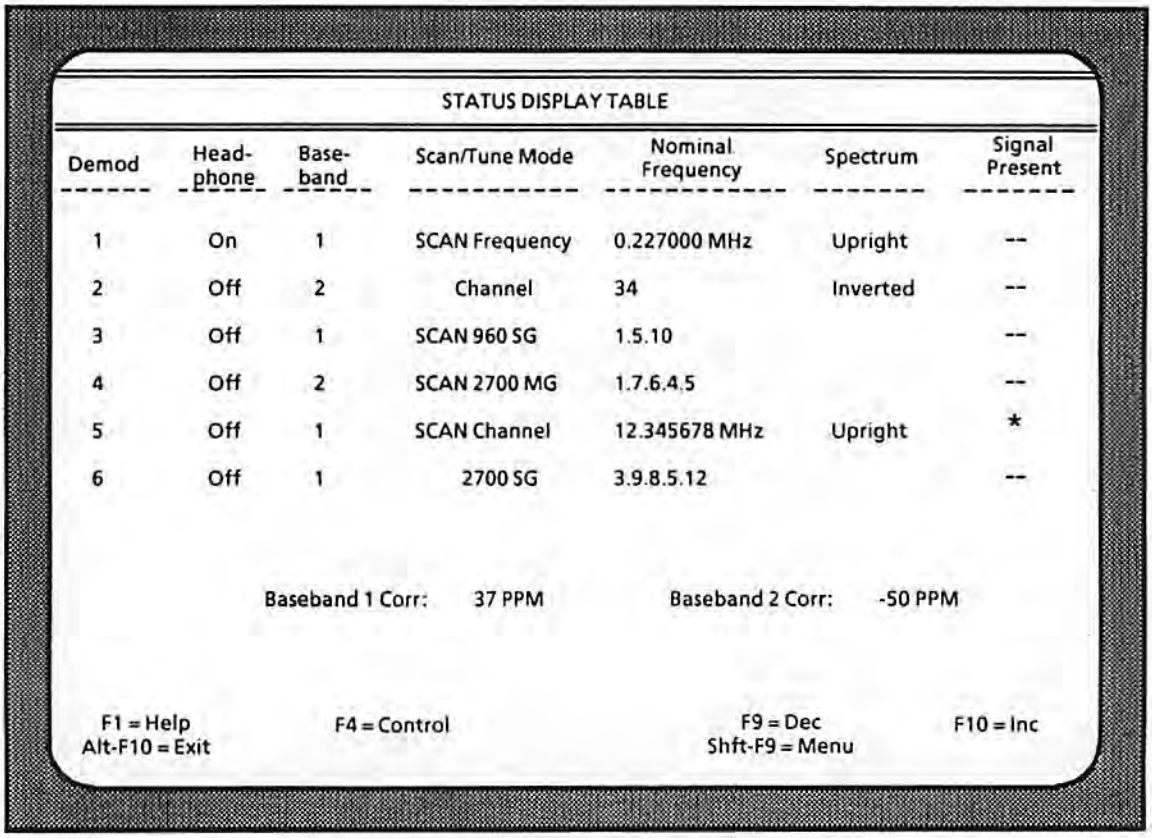

Figure C-2. Status Display Table

The Status Display Table may be entered from any other display at any time by pressing the STATUS softkey (F2). The Status Display Table is then displayed.

The following fields are displayed on the Status Display Table: Demodulator, Headphone, Baseband, Scan/Tune Mode, Nominal Frequency, Spectrum, Signal Present (or Activity), Baseband 1 Correction, and Baseband 2 Correction. All of the above fields may be edited except the demodulator number and the signal present or activity field. In the event that an Optional Activity Monitor is installed in the WJ-9546, the Signal Present field is replaced by a field entitled "Activity" which displays the signal classification as determined by the Activity Monitor. The following softkeys are provided: HELP, CONTROL, DECREMENT, INCREMENT, EXIT, and MENU.

The Headphone, Baseband 1 Corr, and Baseband 2 Corr fields can be edited at any time including during a scan. The Demodulator Number and Signal Present fields cannot be edited. The remaining fields (Baseband, Scan/Tune Mode, Nominal Frequency,and Spectrum) may be edited only when the selected demodulator is not scanning. The data line of a scanning demodulator cannot be edited except for the headphone field. However, the data line of a non-scanning demodulator may be edited. Refer to **Figure C-2.** Refer to **paragraph C.3.1.3** for details on stopping a scan.

The fields are described below:

DEMOD: The DEMOD field cannot be edited. It displays the number of the demodulator in the WJ-9546 FDM Demodulator.

HEADPHONE: The HEADPHONE field indicates which demodulator is connected to the headphone jack. This field may be either ON or OFF. Only one demodulator can be ON (routed through the headphone jack) at any given time.

BASEBAND: The BASEBAND field indicates which baseband input is connected to the associated demodulator. This field may be either 1 (baseband 1) or 2 (baseband 2).

SCAN/TUNE MODE: The SCAN/TUNE MODE field indicates if the associated demodulator is scanning and the type of frequency tuning that is used. If the demodulator is scanning, SCAN appears prior to the tuning selection. The types of tuning modes are: Frequency, CCITT 960, CCITT 2700, and Channel.

NOMINAL FREQUENCY: The NOMINAL FREQUENCY field indicates the frequency of associated demodulator. The frequency is displayed in the format appropriate to the Tune or Scan Mode selected. The ranges of the frequency selections are listed below.

Frequency	00.000000 to 20.000000 MHz
CCITT 960	xx.x.xx 3 separate fields (supergroups,groups, and channels). Supergroups: 1 to 16 Groups: 1 to 5 Channels: 1 to 12

CCITT 2700	x.x.x.x.xx 5 separate fields (supermastergroups, mastergroups, supergroups, groups, and channels) Supermastergroups: 1 to 3 Mastergroups: 7 to 9 Supergroups: 4 to 8 Groups: 1 to 5 Channels: 1 to 12
Channel	0 to 5000

SPECTRUM: The SPECTRUM field indicates the inversion of the sideband. This field is only displayed when the SCAN/TUNE MODE is either Frequency or Channel. Otherwise, this field is left blank. This field contains either Upright or Inverted.

SIGNAL PRESENT: The SIGNAL PRESENT field cannot be edited. If a signal is present and above threshold, an asterisk (*) appears in the field. Otherwise, this field is left blank.

This field changes to ACTIVITY when the activity monitor option (ACT1 or ACT2) is installed. If the activity monitor is installed, this field indicates the type of activity detected. The types of activity displayed are: Voice, Data (for ACT1), FSK (for ACT2), PSK (for ACT2), Tones, and No Activity.

BASEBAND 1 CORR: The BASEBAND 1 CORRECTION Factor field indicates the parts per million frequency correction applied to all demodulators connected to baseband 1. This value may range from -50 to +50.

BASEBAND 2 CORR: The BASEBAND 2 CORRECTION Factor field indicates the parts per million frequency correction applied to all demodulator s connected to baseband 2. This value may range from -50 to +50.

The softkeys associated with the Status Display Table are described below.

F1=HELP - The F1 softkey invokes the help displays. By pressing this softkey, a help screen appears describing the function of the particular field indicated by the cursor. To continue to the next page of the help screen, press the PAGE DOWN key. To exit the Help screen, press the ESC (Escape) key.

F4=CONTROL - The F4 softkey returns one of six DEMOD CONTROL DISPLAYs to the screen. This softkey may be pressed at any time to display the last displayed demodulator's parameters on the DEMOD CONTROL DISPLAY. The DEMOD CONTROL DISPLAY related to the demodulator that is connected to the headphones appears.

F9=DEC - The F9 softkey permits the operator to decrement the field being edited. Successive presses of this softkey continue to decrement the field until the lower limit is reached.

F10=INC - The F10 softkey permits the operator to increment the field being edited. Successive presses of this softkey continue to increment the field until the upper limit is reached.

ALT F10=EXIT - By pressing the ALT key and the F10 softkey simultaneously, the operator can exit the WJ9546 program. The operator is prompted to confirm the exit command. If NO is selected, the program returns to the last display. If YES is selected, the WJ9546 program is exited and the GRiD waits for a DOS command. To re-enter the WJ9546 program, type WJ9546 and press ENTER. This sequence may be used at any time to exit the program.

SHFT F9=MENU - By pressing the Shift key and the F9 softkey simultaneously, the miscellaneous functions MENU is displayed. This sequence may be used at any time to display the miscellaneous functions MENU.

C.3.1.3 Demod Control Display

The Demod Control Display, shown in **Figure C-3** contains all of the parameters for a single demodulator. Each demodulator has it own control display. The tune parameters can be modified from this display. From this display, the operator can also modify the scan parameters such as scan mode, dwell times, and start and stop frequencies.

The Demod Control Display may be entered from any other display at any time by pressing the CONTROL softkey (F4). The parameters of the demodulator to which the headphones are connected (ON) are displayed. If the headphones are off, then the parameters of the last addressed demodulator are displayed. The operator can choose to display a different demodulator's parameters by modifying the DEMOD data field.

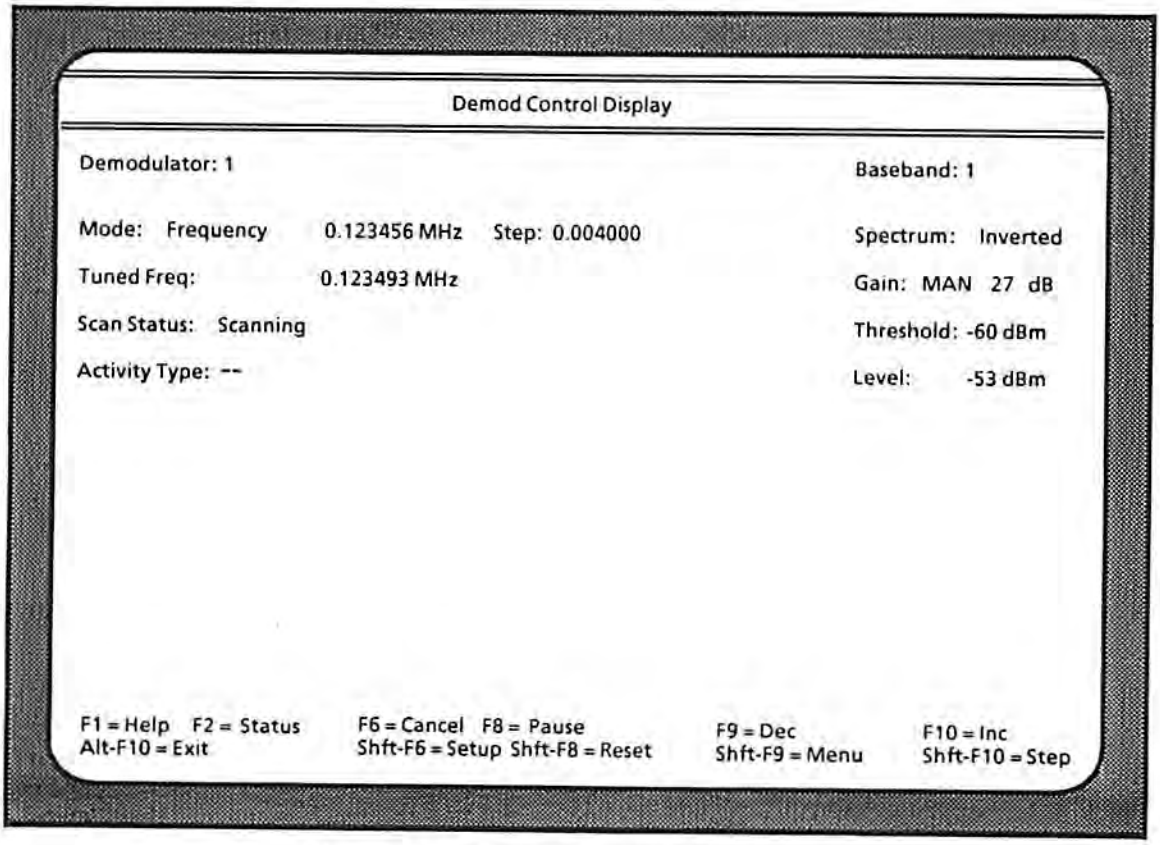

Figure C-3. Demod Control Display

The following fields are displayed on the Demod Control Display: Demodulator, Baseband, Mode, Step, Spectrum, Tuned Frequency, Gain, Scan Status, Threshold, and Level. The Activity Type field is displayed when the ACT1 or ACT2 options are installed. All of the above fields may be edited except the tuned frequency, scan status, activity type, and level fields. The following softkeys are provided: HELP, STATUS, SCAN, DECREMENT, INCREMENT, EXIT, SETUP, RESET, MENU and STEP. When a demodulator is scanning, the following additional softkeys are provided: ADV, CANCEL, and PAUSE or CONT.

The fields are described below:

DEMODULATOR The DEMODULATOR field indicates which demodulator's parameters are being displayed. This number may range from 1 to 6. The operator can choose to display a different demodulator's parameters by changing this number.

BASEBAND: The BASEBAND field indicates which baseband input is connected to the associated demodulator. This field may contain a 1 (baseband 1) or a 2 (baseband 2).

MODE: The MODE field indicates the type of frequency tuning that is used. The types are: Frequency, CCITT 960, CCITT 2700, and Channel.

NOMINAL FREQUENCY: The NOMINAL FREQUENCY field indicates the frequency of associated demodulator. The frequency is displayed in the format appropriate to the Tune Mode selected. The ranges of the frequency selections are listed below.

Frequency	00.000000 to 20.000000 MHz
CCITT 960	xx.x.xx 3 separate fields (supergroups,groups, and channels). Supergroups: 1 to 16 Groups: 1 to 5 Channels: 1 to 12
CCITT 2700	x.x.x.x.xx 5 separate fields (supermastergroups, mastergroups, supergroups, groups, and channels) Supermastergroups: 1 to 3 Mastergroups: 7 to 9 Supergroups: 4 to 8 Groups: 1 to 5 Channels: 1 to 12
Channel	0 to 5000

STEP: The STEP field allows the operator to enter a step size in MHz. This value is used only in the frequency tune mode. When the STEP softkey sequence is pressed, the tuned frequency is incremented by this value. The default value is .004 MHz (4 kHz). The step frequency range is 0.001 thru 1.000 MHz.

SPECTRUM: The SPECTRUM field indicates the inversion of the side band. This field is only displayed when the SCAN/TUNE MODE is either Frequency or Channel. Otherwise, this field is left blank. This field contains either Upright or Inverted.

TUNED FREQ: The TUNED FREQUENCY field indicates the actual frequency to which the demodulator is tuned. The tuned frequency value reflects the adjustments resulting from a non-zero baseband correction factor. This field cannot be edited.

GAIN: The GAIN field indicates whether AGC or MANual gain is used. This field toggles between AGC and MAN. If manual gain is selected, the amount of manual gain in dB is also displayed. The amount of manual gain is adjustable from 0 to 36 dB.

SCAN STATUS: The SCAN STATUS field indicates whether the selected demodulator is scanning. SCANNING appears in this field if a scan has been initiated. OFF appears in this field when the demodulator is not scanning. PAUSE appears when a scan has paused. This field cannot be edited.

THRESHOLD: The THRESHOLD field allows the operator to set the signal threshold level in dBm. This range of the threshold is from -90 to 0 dBm.

ACTIVITY: The ACTIVITY field is only displayed when the Activity Monitor Option is installed. This field indicates the type of activity detected. This field cannot be edited.

LEVEL: The LEVEL field indicates the signal level in dBm. An asterisk (*) is displayed when the signal level is above the threshold value. This field cannot be edited.

The softkeys associated with the Control Demod Display are described below.

F1=HELP - The F1 softkey invokes the help displays. By pressing this softkey, a help screen appears describing the function of the particular field indicated by the cursor. To continue to the next page of the help screen, press the PAGE DOWN key. To exit the Help screen, press the ESC (Escape) key.

F2=STATUS - The F2 softkey returns the STATUS DISPLAY TABLE to the screen. This softkey may be pressed at any time to display the STATUS DISPLAY TABLE.

F4=ADV - The F4 softkey appears only if the scan of the selected demodulator has been paused. This softkey allows the operator to advance the selected demodulator to the next step in the scan sequence. For example, if a signal has been found and the dwell period is very long, pressing this softkey advances the demodulator to the next step in the scan sequence to continue scanning. None of the scan parameters may be changed.

This softkey has a second function. If an infinite pre dwell is set, this softkey advances the demodulator to the next step to continue scanning.

F6=SCAN/CANCEL - The F6 softkey enables the operator to start a scan. Once a scan has been started, this softkey changes to CANCEL. By pressing this softkey a second time, the scan is stopped and the softkey name returns to SCAN. When a demodulator is scanning, only the demodulator number field can be modified. To make any other changes the scan must be stopped. Once a scan has been started, one additional softkey appears, the PAUSE softkey (F8).

F8=PAUSE/CONT - The F8 softkey only appears if a scan has been started. This softkey allows the operator to suspend or pause a scan in progress. Once a scan has been suspended, this softkey changes to CONT (continue). By pressing this softkey a second time, the scan resumes. While a scan is suspended, only the tune functions may be changed. None of the scan parameters can be changed until the scan is completely stopped. After the PAUSE softkey has been pressed once, one additional softkey, the ADV softkey (F4), appears on the display.

F9=DEC - The F9 softkey permits the operator to decrement the field being edited. Successive presses of this softkey continue to decrement the field until the lower limit is reached.

F10=INC - The F10 softkey permits the operator to increment the field being edited. Successive presses of this softkey continue to increment the field until the upper limit is reached.

ALT F10=EXIT - By pressing the ALT key and the F10 softkey simultaneously, the operator can exit the WJ9546 program. The operator is prompted to confirm the exit command. If NO is selected, the program returns to the last display. If YES is selected, the WJ9546 program is exited and the GRiD then waits for a DOS command. To re-enter the WJ9546 program, type WJ9546 and press ENTER. This sequence may be used at any time to exit the program.

SHFT F6=SETUP - By pressing the Shift key and the F6 softkey simultaneously, the scan setup parameter data is displayed. When this sequence is used a second time, the scan setup parameter data is removed from the display. This sequence must be used to set up any scan parameters.

SHFT F8=RESET - By pressing the Shift key and the F8 softkey simultaneously, the parameters of the selected demodulator are reset to the default values. This sequence may be used at any time to reset a selected demodulator's parameters.

SHFT F9=MENU - By pressing the Shift key and the F9 softkey simultaneously, the miscellaneous functions MENU is displayed. This sequence may be used at any time to display the miscellaneous functions MENU.

SHFT F10=STEP - By pressing the Shift key and the F10 softkey simultaneously, the tuned frequency is incremented by the value in the STEP SIZE field. This function is only operable when the FREQUENCY mode is selected and the demodulator is not scanning.

C.3.1.3.1 **Scan Parameters Setup**

The scan parameters are displayed when the Shift key and F6 softkey have been pressed simultaneously. The scan parameters cannot be modified once a scan has been started or paused. The scan parameters fields are displayed in a window in the center of the DEMOD CONTROL DISPLAY screen. Refer to **Figure C-4** for frequency scan setup parameters. Refer to **Figure C-5** for CCITT 960 SG scan setup parameters. Refer to **Figure C-6** for CCITT 2700 MG scan setup parameters. Refer to **Figure C-7** for channel scan setup parameters. The softkeys are the same as with the DEMOD CONTROL DISPLAY screen. A second press of the Shift F6 sequence removes the scan parameters from the screen. The entered values do not change when the parameters are removed from the screen. The scan parameter fields are described below:

SCAN MODE: The SCAN MODE field indicates the type of frequency tuning used when the selected demodulator scans. The type of tuning methods are: Frequency, CCITT 960 GP (Group), CCITT 960 SG (Supergroup), CCITT 2700 GP (Group), CCITT 2700 SG (Supergroup), CCITT 2700 MG (Mastergroup), CCITT 2700 SMG (Supermastergroup), and Channel.

PRE DWELL: The PRE DWELL field indicates the amount of time in msec that the demodulator initially waits on a scan step for signal activity. The range is 50 to 9975 msec in 25 msec steps with a -1 indicating an infinite dwell time. If -1 is selected, INF is displayed in place of msec.

SIGNAL DWELL: The SIGNAL DWELL field indicates the amount of time the selected demodulator stays tuned to an active signal. The range is 0 to 600 sec with a -1 indicating an infinite dwell time. If -1 is selected, INF is displayed in place of sec.

POST DWELL: The POST DWELL field indicates the amount of time the selected demodulator waits for the return of a lost signal before tuning the the next scan step. The range is from 0 to 200 sec with a -1 indicating an infinite post dwell time. If -1 is selected, INF is displayed in place of sec.

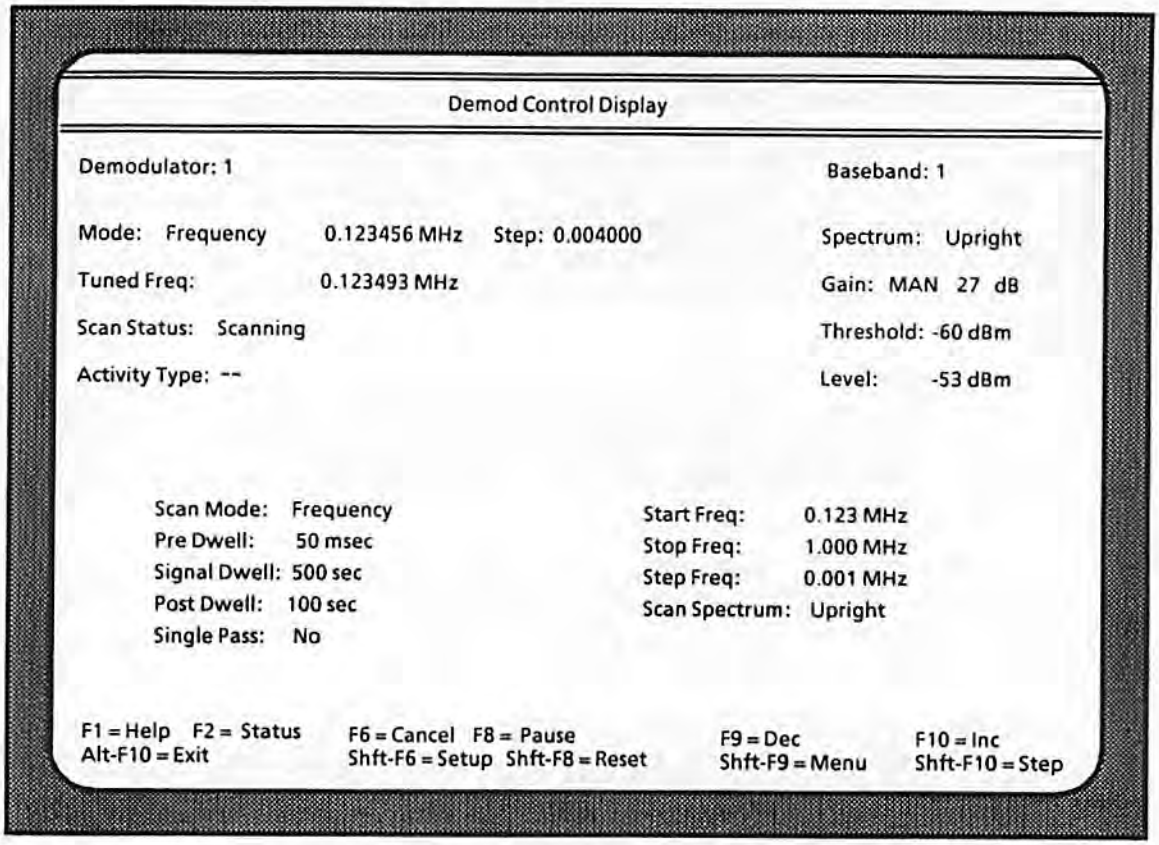

Figure C-4. Demod Control Display with Frequency Scan Setup Parameters

SINGLE PASS: The SINGLE PASS field allows the operator to select whether the scan is automatically suspended after a single pass or continuously repeated. A NO selection continuously repeats the scan. A YES selection automatically suspends the scan after a single pass.

START FREQ: The START FREQ field is only displayed when the SCAN MODE is set to frequency. This field allows the operator to enter a scan start frequency for the selected demodulator. The start frequency range is 00.000 to 19.999 MHz. The start frequency must be less than the stop frequency.

STOP FREQ: The STOP FREQ field is only displayed when the SCAN MODE is set to frequency. This field allows the operator to enter a scan stop frequency for the selected demodulator. The stop frequency range is between 00.001 to 20.000 MHz. The stop frequency must be greater than the start frequency.

STEP FREQ: The STEP FREQ field is only displayed when the SCAN MODE is set to frequency. This field allows the operator to enter a scan step frequency for the selected demodulator. The scan step range is 00.001 to 01.000 MHz.

SCAN SPECTRUM: The SCAN SPECTRUM field is only displayed when the SCAN MODE is set to frequency or channel. This field allows the operator to select the

scan frequency spectrum for the selected demodulator. The choices are inverted or upright.

START CHAN: The START CHAN field is only displayed when the SCAN MODE is set to channel. This field allows the operator to enter a scan start channel for the selected demodulator. The start channel range is from 0 to 4999. The start channel must be less than the stop channel.

STOP CHAN: The STOP CHAN field is only displayed when the SCAN MODE is set to channel. This field allows the operator to enter a scan stop channel for the selected demodulator. The stop channel range is from 1 to 5000. The stop channel must be greater than the start channel.

FREQ: The FREQ field is only displayed when the SCAN MODE is set to CCITT 960 or CCITT 2700 scanning plans. This field allows the operator to set the CCITT 960 or 2700 scanning plan. This field is displayed in the format compatible with the scan mode selection. The format of this field is as follows:

CCITT 960 GP	x.x.*
CCITT 960 SG	x.*.*
CCITT 2700 GP	x.x.x.x.*
CCITT 2700 SG	x.x.x.*.*
CCITT 2700 MG	x.x.*.*.*
CCITT 2700 SMG	x.*.*.*.*

The asterisk portions of the data field cannot be entered by the operator. The ranges of the above fields are:

CCITT 960	Groups: 1 to 5 Supergroups: 1 to 16
CCITT 2700	Groups: 1 to 5 Supergroups: 4 to 8 Mastergroups: 7 to 9 Supermastergroups: 1 to 3

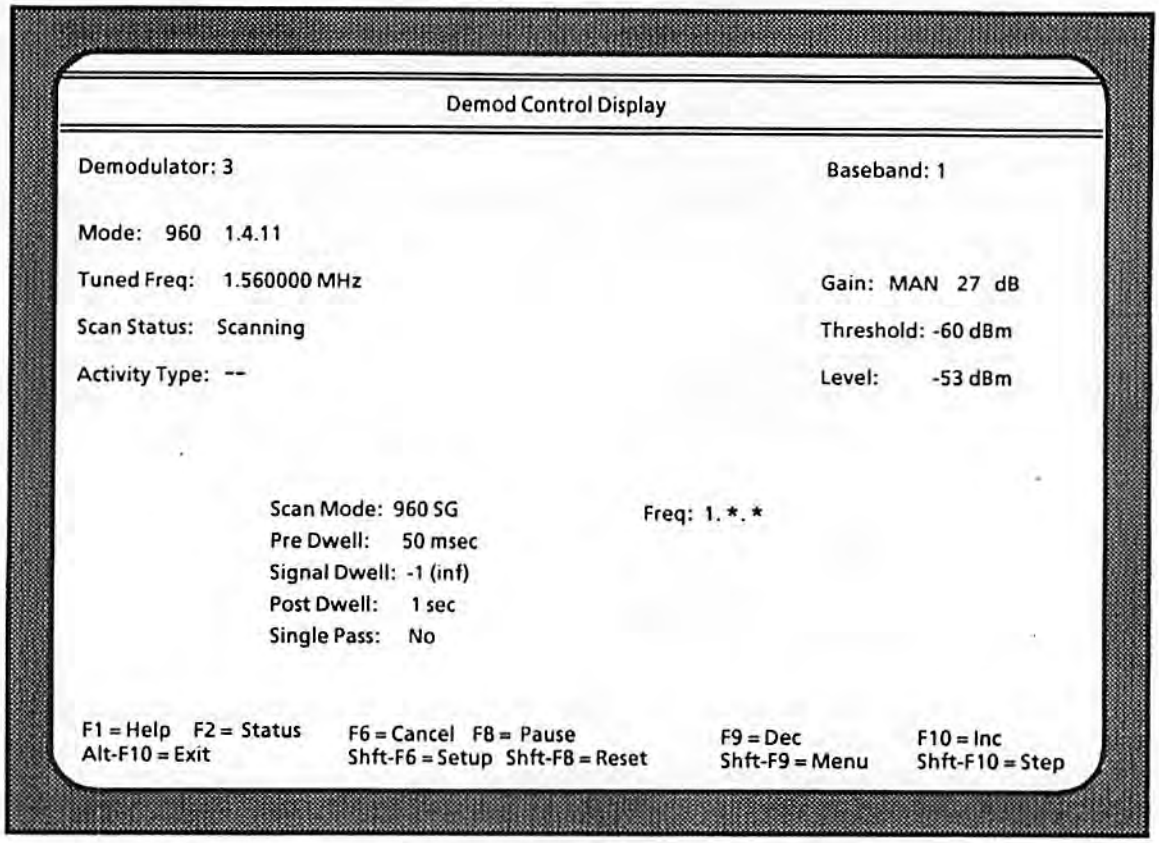

Figure C-5. Demod Control Display with CCITT 960 SG Scan Setup Parameters

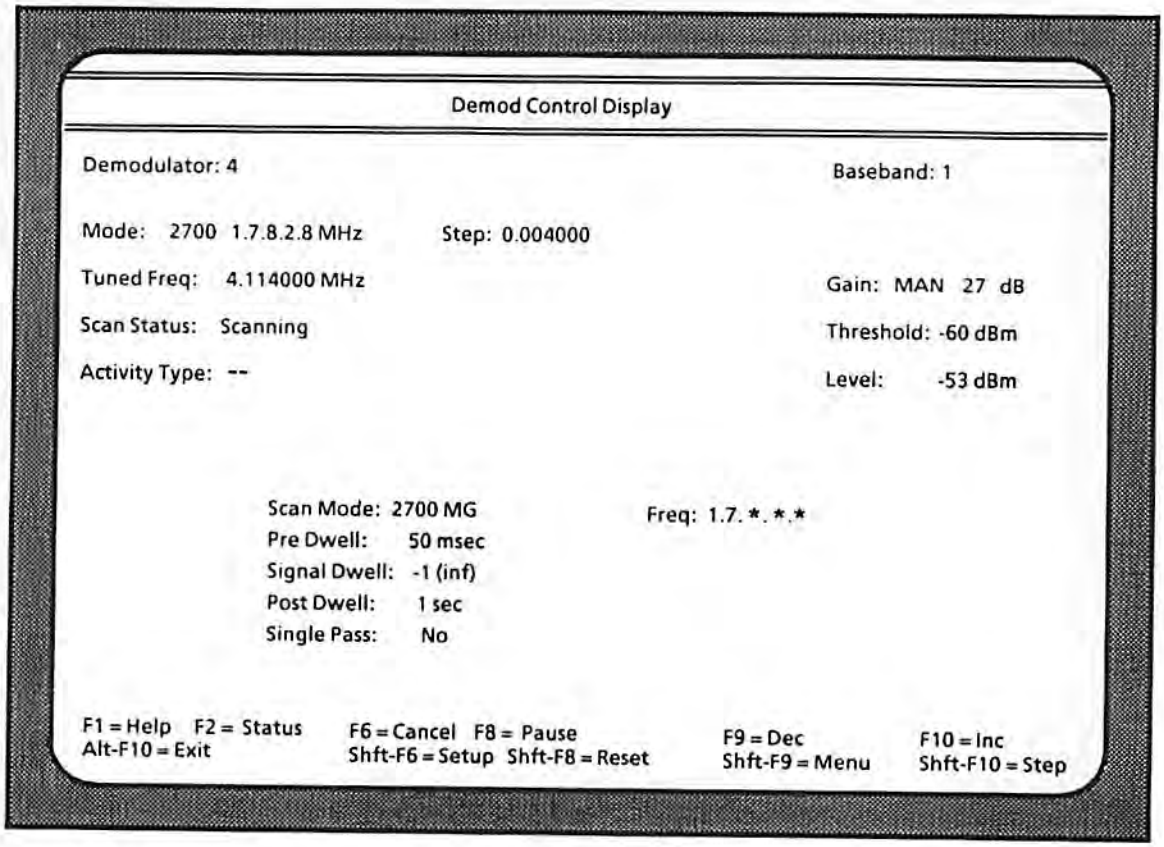

Figure C-6. Demod Control Display with CCITT 2700 MG Scan Setup Parameters

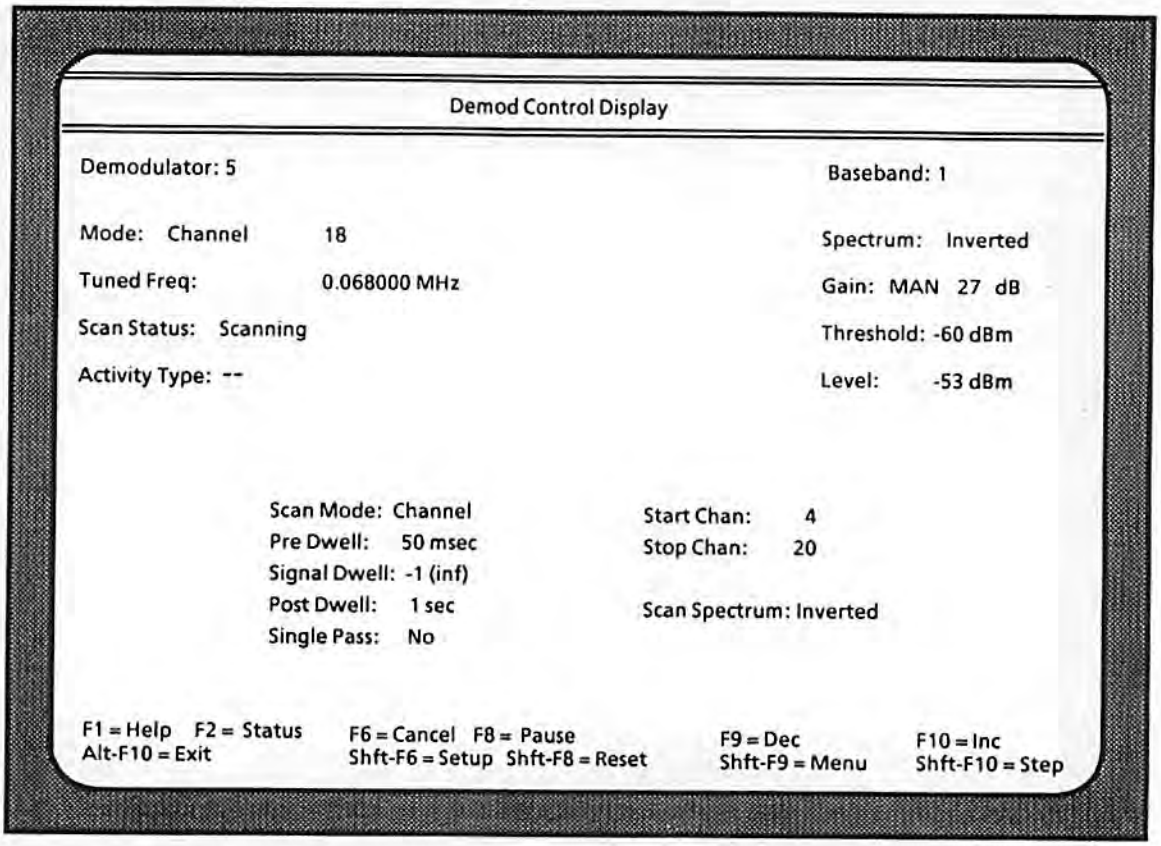

Figure C-7. Demod Control Display with Channel Scan Setup Parameters

C.3.1.4 Miscellaneous Functions Menu

The miscellaneous functions Menu displays the miscellaneous functions that are available. Refer to **Figure C-8.** These functions include the ability to reset all of the demodulators, to perform a self test, to show the current errors, and to show the latched errors. Also included is a Configuration Display.

The miscellaneous functions Menu may be entered from any other display at any time by pressing the SHIFT key and the MENU softkey (F9) simultaneously. The miscellaneous functions Menu is then displayed.

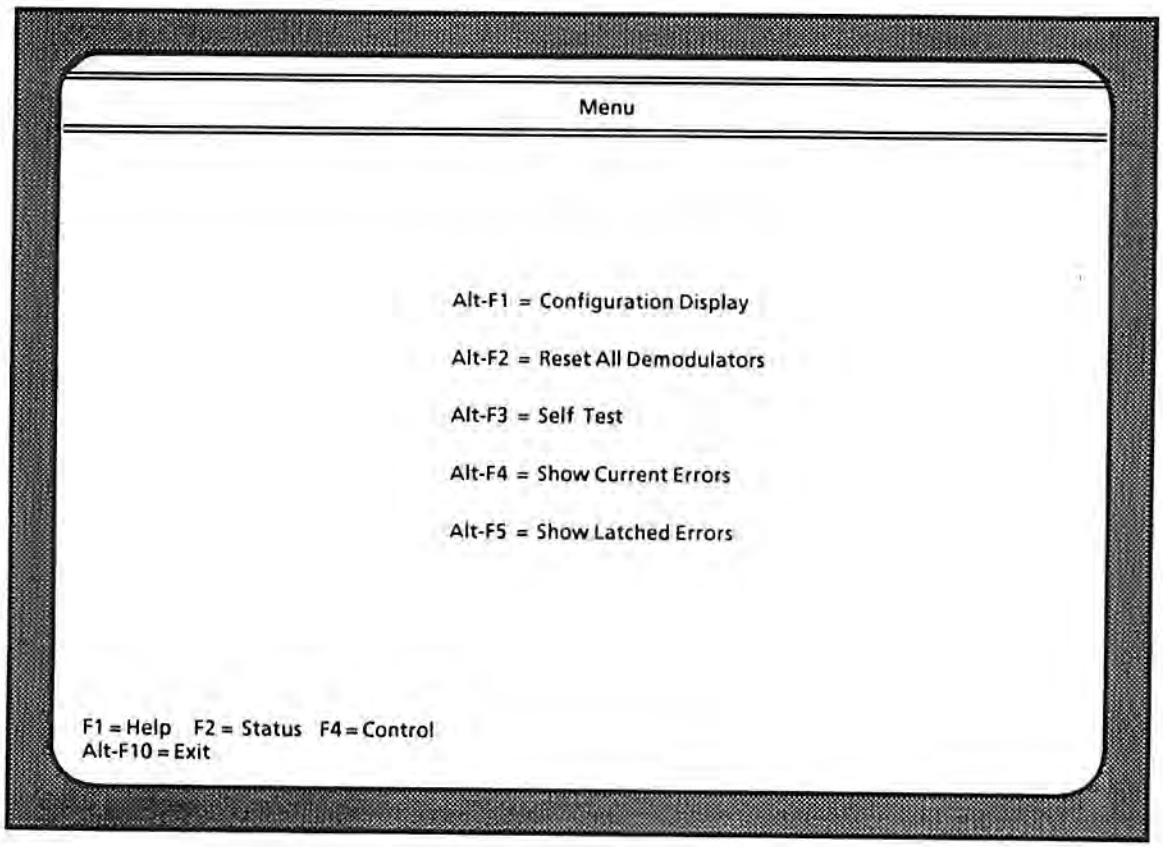

Figure C-8. Miscellaneous Functions Menu

The following selections are provided on the Miscellaneous Functions Menu: Configuration Display, Reset All Demodulators, Self Test, Show Current Errors, and Show Latched Errors. The following softkeys are provided: HELP, STATUS, CONTROL, and EXIT. The following paragraphs describe the menu selections.

C.3.1.4.1 **Configuration Display**

This menu selection displays the configuration parameters of the WJ-9546 FDM Demodulator. This display is entered by pressing the ALT key and the F1 softkey simultaneously. Refer to **paragraph C.3.1.5** for more information.

C.3.1.4.2 **Reset All Demodulators**

This menu selection allows the operator to reset all of the demodulators in the WJ-9546 to their default values. This function is performed by pressing the ALT key and the F2 softkey simultaneously.

C.3.1.4.3 **Self Test**

This menu selection allows the operator to initiate self test on the WJ-9546 FDM Demodulator. This function is performed by pressing the ALT key and the F3 softkey simultaneously.

C.3.1.4.4 **Show Current Errors**

This menu selection allows the operator to request and display the current errors. This function reads current device dependent errors in the error register. This function is performed by pressing the ALT key and the F4 softkey simultaneously. See the description of the WJ-9546 status registers in the WJ-9546 Instruction Manual.

C.3.1.4.5 **Show Latched Errors**

This menu selection allows the operator to request and display the latched errors. This function requests the latched contents of the device dependent error register. This function is performed by pressing the ALT key and the F5 softkey simultaneously. See the description of the WJ-9546 status registers in the WJ-9546 Instruction Manual.

C.3.1.4.6 **Miscellaneous Functions Menu Softkeys**

The softkeys associated with the miscellaneous functions Menu are described below.

F1=HELP - The F1 softkey invokes the help displays. By pressing this softkey, a help screen appears describing the function of the softkeys and menu selection keys. To exit the Help screen, press the ESC (Escape) key.

F2=STATUS - The F2 softkey returns the STATUS DISPLAY TABLE to the screen. This softkey may be pressed at any time to display the STATUS DISPLAY TABLE.

F4=CONTROL - The F4 softkey returns on of six DEMOD CONTROL DISPLAYs to the screen. This softkey may be pressed at any time to display the last displayed demodulator's parameters on the DEMOD CONTROL DISPLAY. The DEMOD CONTROL DISPLAY related to the demodulator that is connected to the headphones appears.

ALT F10=EXIT - By pressing the ALT key and the F10 softkey simultaneously, the operator can exit the WJ9546 program. The operator is prompted to confirm the exit command. If NO is selected, the program returns to the last display. If YES is selected, the WJ9546 program is exited and the GRiD then waits for a DOS command. To re-enter the WJ9546 program, type WJ9546 and press ENTER. This sequence may be used at any time to exit the program.

C.3.1.5 Configuration Display

The Configuration Display summarizes the WJ-9546 frame configuration. Refer to **Figure C-9.** The date, time, and internal reference parameters are the only parameters that can be changed on this display. The remaining information is for reference only.

The Configuration Display may be entered from any other display at any time by pressing the ALT key and the F1 softkey simultaneously. The Configuration Display is then displayed.

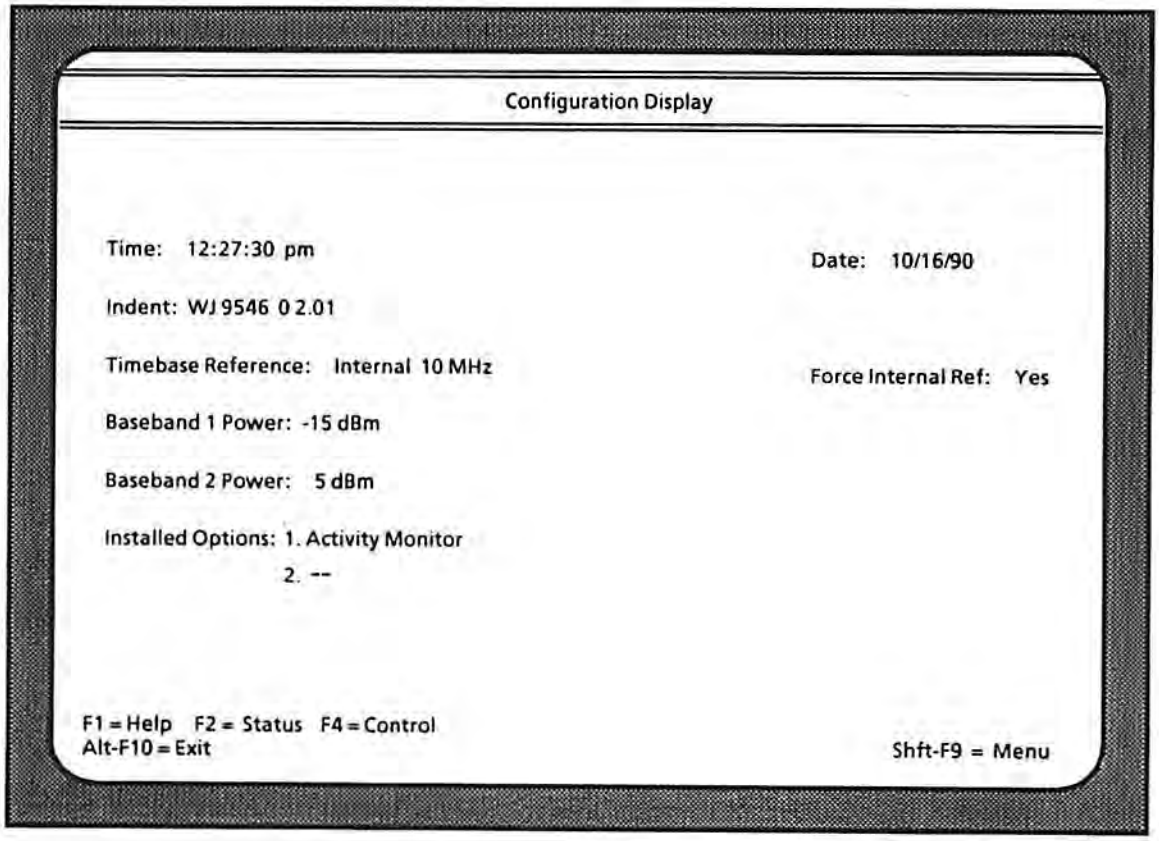

Figure C-9. Configuration Display

The following fields are displayed on the Configuration Display: Time, Date, Identification, Timebase Reference, Force Internal Reference, Baseband 1 Power, Baseband 2 Power, and the Installed Options. Only the Time, Date, and Force Internal Reference fields may be edited. The remaining fields are for information only. The following softkeys are provided: HELP, STATUS, CONTROL, EXIT, and MENU.

The fields are described below:

TIME: The TIME field allows the operator to enter the current time in HH:MM:SS. The hours may range from 0 to 24. The minutes and seconds may range from 0 to 60.

DATE: The DATE field allows the operator to enter the current date in MM/DD/YY. The month may range from 1 to 12, the day from 1 to 31, and the year from 0 to 99.

IDENT: The IDENTification field indicates the manufacturer, the model number, the serial number, and the software release level. This field cannot be edited.

TIMEBASE REFERENCE: The TIMEBASE REFERENCE field indicates the reference generator source. The types of reference generators are: External 1, 2, 5, or 10 MHz and Internal 10 MHz. This field cannot be edited.

FORCE INTERNAL REF: The FORCE INTERNAL REFerence field allows the operator to select whether the timebase reference is forced to internal. The choices are: Yes or NO. If YES is selected, the timebase reference is forced to internal. If NO is selected, the timebase reference is internal until a suitable external reference is applied at which time, the time base switches to the external reference automatically.

BASEBAND 1 POWER: The BASEBAND 1 POWER field indicates the power level in baseband 1. This field cannot be edited.

BASEBAND 2 POWER: The BASEBAND 2 POWER field indicates the power level in baseband 2. This field cannot be edited.

INSTALLED OPTIONS: The INSTALLED OPTIONS field indicates the options which are installed in the WJ-9546 FDM Demodulator. This field cannot be edited.

The softkeys associated with the Configuration Display are described below.

F1=HELP - The F1 softkey invokes the help displays. By pressing this softkey, a help screen appears describing the function of the particular field indicated by the cursor. To continue to the next page of the help screen, press the PAGE DOWN key. To exit the Help screen, press the ESC (Escape) key.

F2=STATUS - The F2 softkey returns the STATUS DISPLAY TABLE to the screen. This softkey may be pressed at any time to display the STATUS DISPLAY TABLE.

F4=CONTROL - The F4 softkey returns the DEMOD CONTROL DISPLAY to the screen. This softkey may be pressed at any time to display the last displayed demodulator's parameters on the DEMOD CONTROL DISPLAY. The demodulator to which the headphones are connected is displayed on the DEMOD CONTROL DISPLAY.

ALT F10=EXIT - By pressing the ALT key and the F10 softkey simultaneously, the operator can exit the WJ9546 program. The operator is prompted to confirm the exit command. If NO is selected, the program returns to the last display. If YES is selected, the WJ9546 program is exited and the GRiD then waits for a DOS command. To re-enter the WJ9546 program, type WJ9546 and press ENTER. This sequence may be used at any time to exit the program.

SHFT F9=MENU - By pressing the Shift key and the F9 softkey simultaneously, the MISCELLANEOUS FUNCTIONS MENU is displayed. This sequence may be used at any time to display the MISCELLANEOUS FUNCTIONS MENU.