AEROFLEX

Radio Test Set IFR 2975

Maintenance Manual

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Issue-3

MAINTENANCE MANUAL

RADIO TEST SET

IFR 2975

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WARNING:

HIGH VOLTAGE EQUIPMENT

THIS EQUIPMENT CONTAINS CERTAIN CIRCUITS AND/OR COMPONENTS OF EXTREMELY HIGH VOLTAGE POTENTIALS, CAPABLE OF CAUSING SERIOUS BODILY INJURY OR DEATH. WHEN PERFORMING ANY OF THE PROCEDURES CONTAINED IN THIS MANUAL, HEED ALL APPLICABLE SAFETY PRECAUTIONS.

SAFETY FIRST: TO ALL SERVICE PERSONNEL

REFER ALL SERVICING OF UNIT TO QUALIFIED TECHNICAL PERSONNEL.

CASE, COVER OR PANEL REMOVAL

Removing protective covers, casings or panels from this unit exposes the technician to electrical hazards that can result in electrical shock or equipment damage.

SAFETY IDENTIFICATION IN TECHNICAL MANUAL

This manual uses the following terms to draw attention to possible safety hazards, that may exist when operating or servicing this equipment.

CAUTION: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN EQUIPMENT OR PROPERTY DAMAGE (e.g., FIRE).

WARNING: THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN PERSONAL INJURY OR DEATH.

SAFETY SYMBOLS IN MANUALS AND ON UNITS


CAUTION: Refer to accompanying documents.

AC TERMINAL: Terminal that may supply or be supplied with ac or alternating voltage.


SWITCH OFF: AC line power to the device is OFF.

SWITCH ON: AC line power to the device is ON.


DANGEROUS VOLTAGE: Indicates electrical shock hazard due to high voltage levels.

EQUIPMENT GROUNDING PRECAUTION

Improper grounding of equipment can result in electrical shock.

USE OF PROBES

Check the specifications for the maximum voltage, current and power ratings of any connector on the unit before connecting it with a probe from a terminal device. Be sure the terminal device performs within these specifications before using it for measurement, to prevent electrical shock or damage to the equipment.

POWER CORDS

Power cords must not be frayed or broken nor expose bare wiring when operating this equipment.

USE RECOMMENDED FUSES ONLY

Use only fuses specifically recommended for the equipment at the specified current and voltage ratings.

CAUTION: INTEGRATED CIRCUITS AND SOLID STATE DEVICES SUCH AS MOS FETS, ESPECIALLY CMOS TYPES, ARE SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGES RECEIVED FROM IMPROPER HANDLING, THE USE OF UNGROUNDED TOOLS AND IMPROPER STORAGE AND PACKAGING. ANY MAINTENANCE TO THIS UNIT MUST BE PERFORMED WITH THE FOLLOWING PRECAUTIONS:

- BEFORE USE IN A CIRCUIT, KEEP ALL LEADS SHORTED TOGETHER EITHER BY THE USE OF VENDOR-SUPPLIED SHORTING SPRINGS OR BY INSERTING LEADS INTO A CONDUCTIVE MATERIAL.
- WHEN REMOVING DEVICES FROM THEIR CONTAINERS, GROUND THE HAND BEING USED WITH A CONDUCTIVE WRISTBAND.
- TIPS OF SOLDERING IRONS AND/OR ANY TOOLS USED MUST BE GROUNDED.
- DEVICES MUST NEVER BE INSERTED INTO NOR REMOVED FROM CIRCUITS WITH POWER ON.
- PC BOARDS, WHEN TAKEN OUT OF THE SET, MUST BE LAID ON A GROUNDED CONDUCTIVE MAT OR STORED IN A CONDUCTIVE STORAGE BAG. REMOVE ANY BUILT-IN POWER SOURCE, SUCH AS A BATTERY, BEFORE LAYING PC BOARDS ON A CONDUCTIVE MAT OR STORING IN A CONDUCTIVE BAG.
- PC BOARDS, IF BEING SHIPPED TO THE FACTORY FOR REPAIR, MUST BE PACKAGED IN A CONDUCTIVE BAG AND PLACED IN A WELL-CUSHIONED SHIPPING CONTAINER.

CAUTION: SIGNAL GENERATORS CAN BE A SOURCE OF ELECTROMAGNETIC INTERFERENCE (EMI) TO COMMUNICATION RECEIVERS. SOME TRANSMITTED SIGNALS CAN CAUSE DISRUPTION AND INTERFERENCE TO COMMUNICATION SERVICES OUT TO A DISTANCE OF SEVERAL MILES. USERS OF THIS EQUIPMENT SHOULD SCRUTINIZE ANY OPERATION THAT RESULTS IN RADIATION OF A SIGNAL (DIRECTLY OR INDIRECTLY) AND SHOULD TAKE NECESSARY PRECAUTIONS TO AVOID POTENTIAL COMMUNICATION INTERFERENCE PROBLEMS.

CAUTION: KEEP ALL VENT OPENINGS CLEAR AND UNOBSTRUCTED FOR PROPER EQUIPMENT COOLING AND CONTINUED RELIABILITY. DO NOT OPERATE EQUIPMENT IN THE VERTICAL POSITION ON PLUSH CARPET OR UPHOLSTERY TO AVOID IMPAIRING THE AIR EXHAUST. WHEN OPERATING THE TEST SET IN THE NORMAL HORIZONTAL OR TILT BAIL POSITION, MAINTAIN AT LEAST 1.6 INCHES (FOUR CENTIMETERS) OF CLEARANCE BETWEEN THE EQUIPMENT REAR EXHAUST FAN SCREEN AND OBJECTS OR WALLS.

PREFACE

SCOPE

This manual contains maintenance instructions for the 2975. The information in this manual enables servicing technicians to:

- Service, test or replace any major assembly within the 2975.
- Maintain operating conditions of the 2975 to the expected performance standards.
- Understand principles of operation, relating to the overall operation of the 2975 as well as functional operation within the major assemblies.

ORGANIZATION

The 2975 Maintenance Manual is composed of the following sections:

SECTION 1 - THEORY OF OPERATION

Describes how the 2975 operates on three levels of complexity: system level, functional level and functionally at a module (assembly) level.

SECTION 2 - CALIBRATION/VERIFICATION

Provides the step by step procedures for calibrating and verifying the performance of the 2975.

SECTION 3 - REPLACEMENT PROCEDURES

Provides step by step procedures for removing and installing major assemblies within the 2975.

SECTION 4 - PARTS LIST

Provides part lists and diagrams for ordering replaceable parts within the 2975.

SECTION 5 - ASSEMBLIES

Contains the 2975 system interconnect diagram and diagrams of all major assemblies.

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SECTION 1 - THEORY OF OPERATION

1-1 GENERAL

The 2975 digital radio test platform integrates over 20 radio-testing instruments into a single user-friendly instrument that offers the interconnectivity normally expected from a personal computer.

The 2975 digital test platform, created with modular design, is simple to support and upgrade. The 2975 provides comprehensive transmitter and receiver testing, while the full-range spectrum analyzer and tracking generator make possible base site component testing. The dual channel oscilloscope and internal DEMOD scope provide comprehensive viewing of signals.

This following sections, System Overview and Module Overview, provide the maintenance technician with a concept of how the 2975 operates.

1-2 SYSTEM OVERVIEW

RECEIVE SYSTEM OVERVIEW

The 2975 is capable of receiving modulated or unmodulated signals ranging form 1 MHz to 2.7 GHz. Signals are received through the Power Termination Assy at the ANT Connector (low power signals, <-10 dBm) or T/R Connector (high power signals, >-10 to +50 dBm). A diode detector serves to measure RF power applied to the T/R Connector. The ANT Connector and GEN Connector are protected from high power levels by a limiter circuit. Refer to the Generate System Overview for more details on the GEN Connector. The RF signal is routed to the Receiver Assy.

The Receiver Assy has selectable attenuators and provides reference signals of 10, 40, 80 and 400 MHz to the system. External 10 MHz I/O is routed from the Receiver Assy to the Rear Panel Assy. In the Receiver Assy, the incoming signal is converted to an IF (immediate frequency) of 10.7 MHz and signal conditioning is started. The 10.7 MHz IF signal is passed on to the Video/IF PCB Assy.

The IF/Video PCB Assy has selectable 10.7 MHz IF filtering of 30 kHz, 300 kHz and 6 MHz. Both the CAI (Common Air Interface) PCB Assy and the IF/Video PCB Assy work together to provide the AGC (automatic gain control) for the Receiver Assy. The CAI PCB Assy sends data to the IF/Video PCB Assy to increase or decrease the gain automatically, providing the correct level to the CAI PCB Assy. The IF/Video PCB Assy also is responsible for Analyzer resolution bandwidth filters in the “Look and Listen” mode of 300 Hz, 3 kHz and 60 kHz. When the dedicated Analyzer mode is selected, all combinations of IF filtering are used to provide a fully functional Spectrum Analyzer. Additional functions of the IF/Video PCB Assy are: 10.7 MHz IF output to the Rear Panel Assy, Video output to the Rear Panel Assy and IF Count to the Multifunction PCB Assy. The final destination of the 10.7 MHz IF signal is routed to the CAI PCB Assy.

The CAI PCB Assy receives the 10.7 MHz IF signal and digitally performs the demodulation process. Demodulation types include FM, AM, P25 and P25Encr. During the demodulation process, the signal is measured for correct power strength. If the incoming power is incorrect, data is provided back to the IF/Video PCB Assy for AGC control as previously discussed in the IF/Video PCB section above. The CAI PCB Assy provides digitally demodulated signals to the system for meter functions such as: Receiver Level Meter, Deviation Meter, C4FM Meter, Demod Output, Internal Demod Scope and Speaker. Other CAI PCB Assy functions are discussed in the Generate System Overview.

GENERATE SYSTEM OVERVIEW

The Generate System path starts with the CAI PCB Assy. The CAI PCB Assy digitally modulates an 11.4 MHz IF signal. The Modulation sources are M1, M2, Mic and Audio. The Modulation types include FM, AM, P25 and P25Encr.

Primarily Digital audio sources begin in the Multifunction PCB Assy and are transferred to the CAI PCB Assy, however; the CAI PCB Assy provides P25 and P25Encr (encrypted) digital audio sources. The 11.4 MHz IF signal is routed to the Generator Assy.

The Generator Assy is designed to convert the 11.4 MHz IF signal to the desired output frequency between 1 MHz to 2.7 GHz. The variable attenuator in the Generator Assy provides 9.9 dB attenuation in 0.1 dB steps between the 10 dB steps of the Attenuator Assy. The signal is amplified to a level high enough to overcome the losses of the Attenuator Assy and Power Termination Assy and to meet the specified maximum output power level. The desired RF signal is then routed to the Attenuator Assy.

The Attenuator Assy consists of six relay-attenuator sections and a driver board. One relay-attenuator section is 10 dB and the other five relay-attenuator sections are 20 dB for a total attenuation of 110 dB. After the Attenuator Assy, the RF signal goes to the Power Termination Assy.

The RF signal can be routed out the GEN Connector or the T/R Connector in the Power Termination Assy. The GEN Connector provides a maximum output signal of +10 dBm and the T/R Connector provides a maximum output signal of -30 dBm over the 1 MHz to 2.7 GHz range.

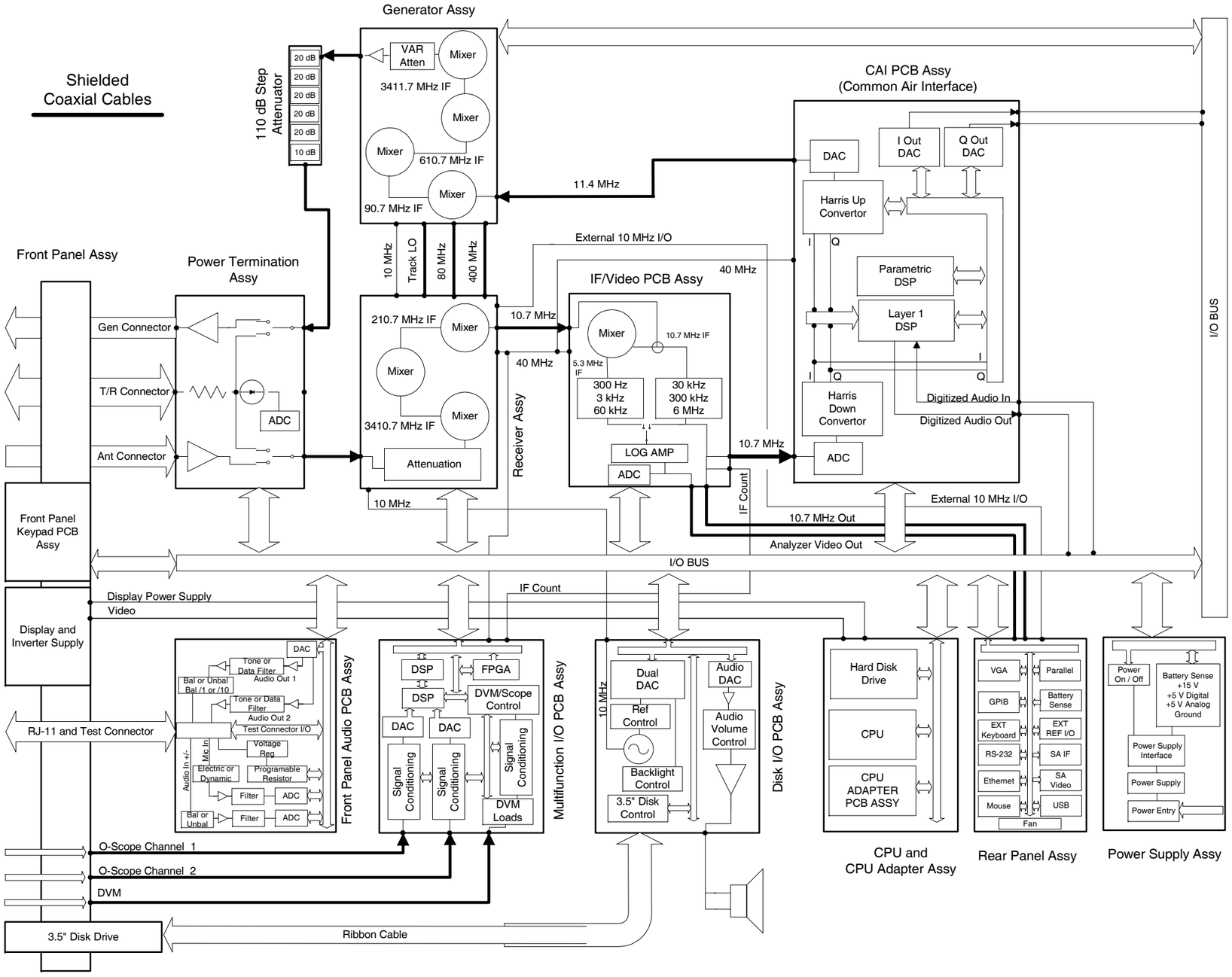

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Figure 1-1 2975 System Overview

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1-3 MODULE OVERVIEW

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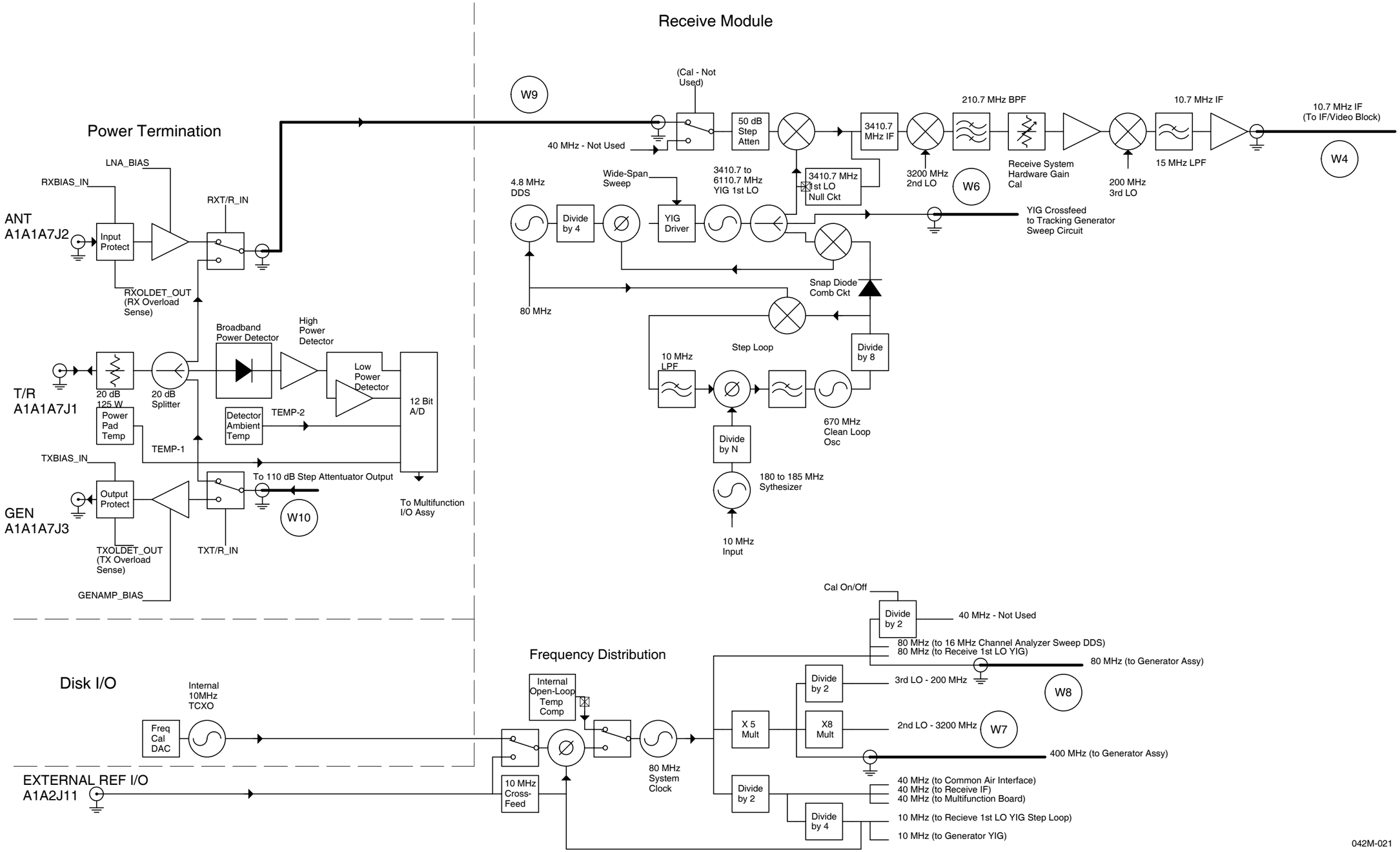

Figure 1-2 2975 Module Overview

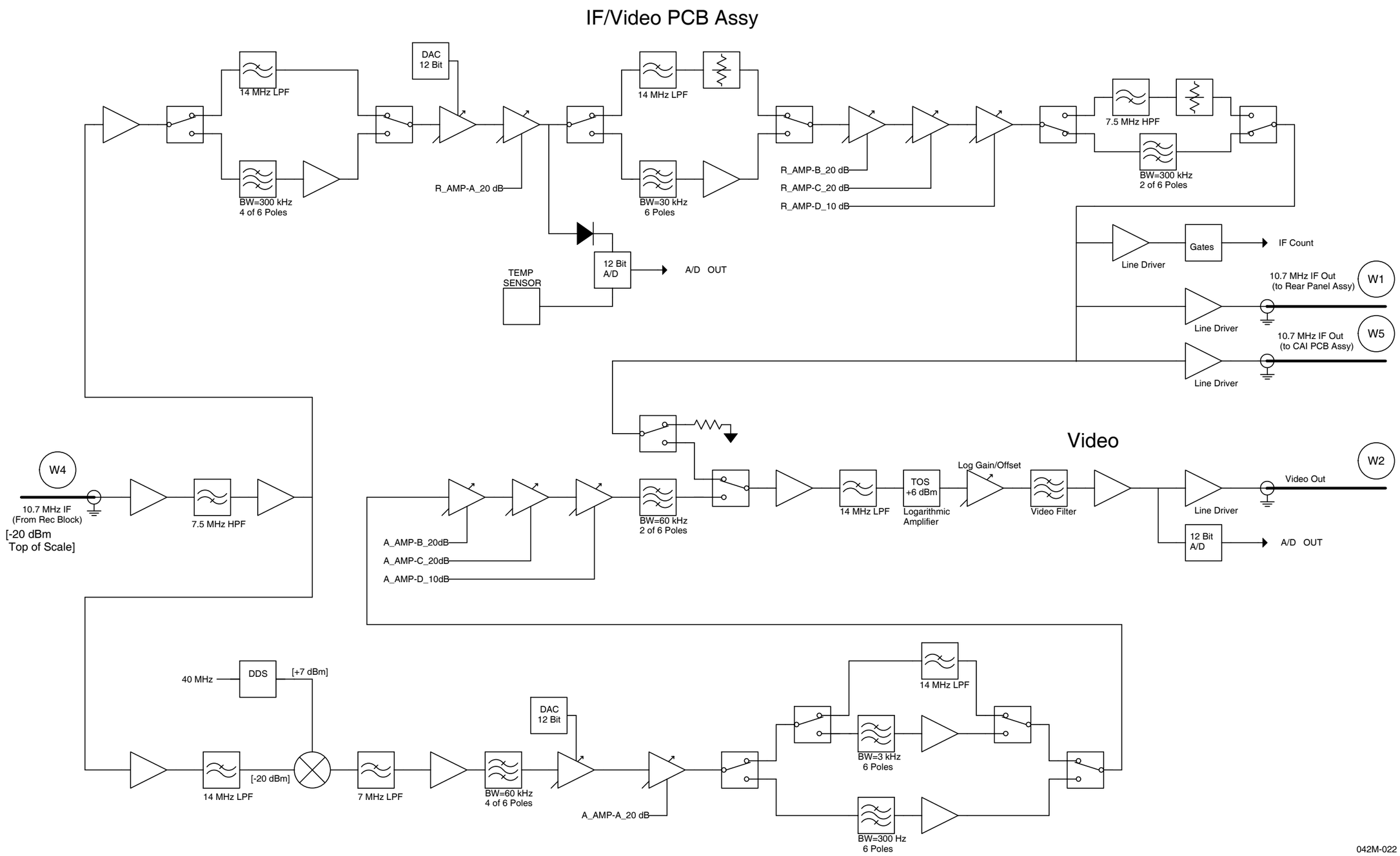

Figure 1-2 2975 Module Overview (cont)

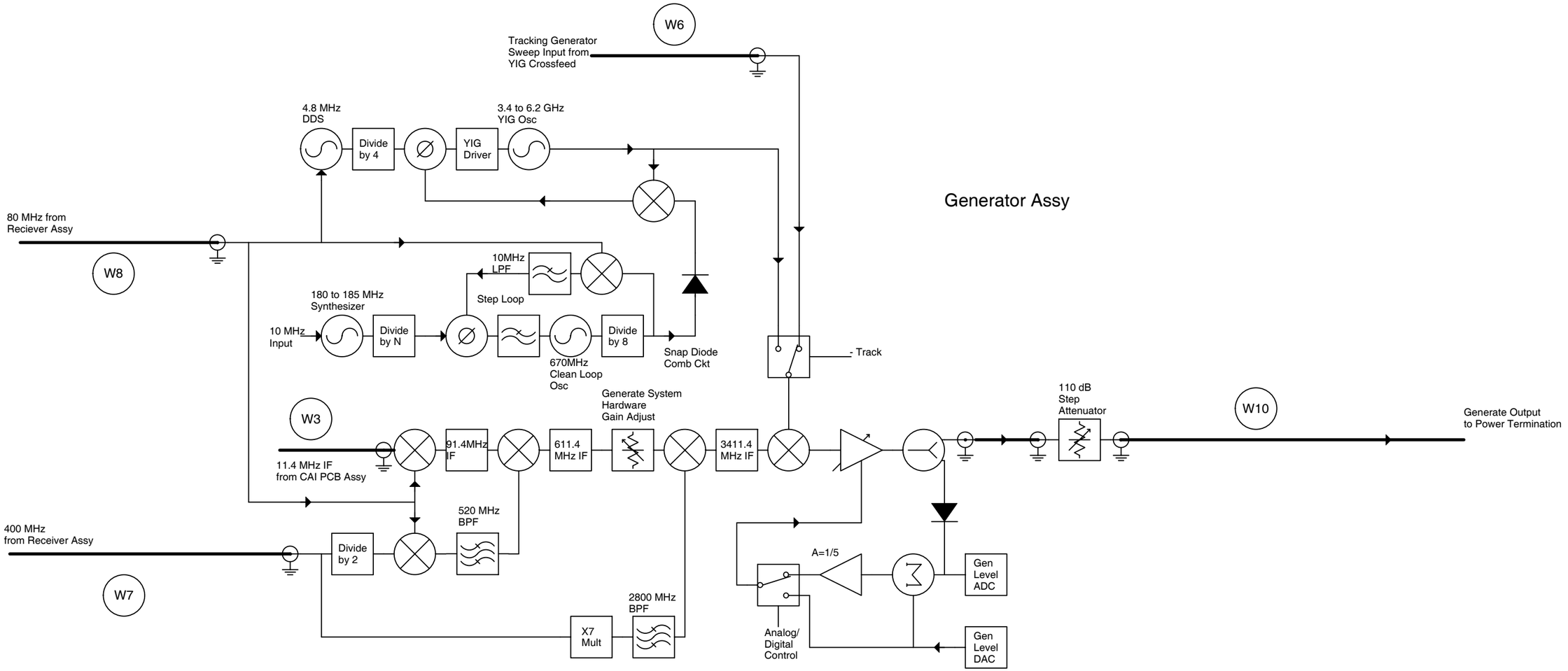

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Figure 1-2 2975 Module Overview (cont)

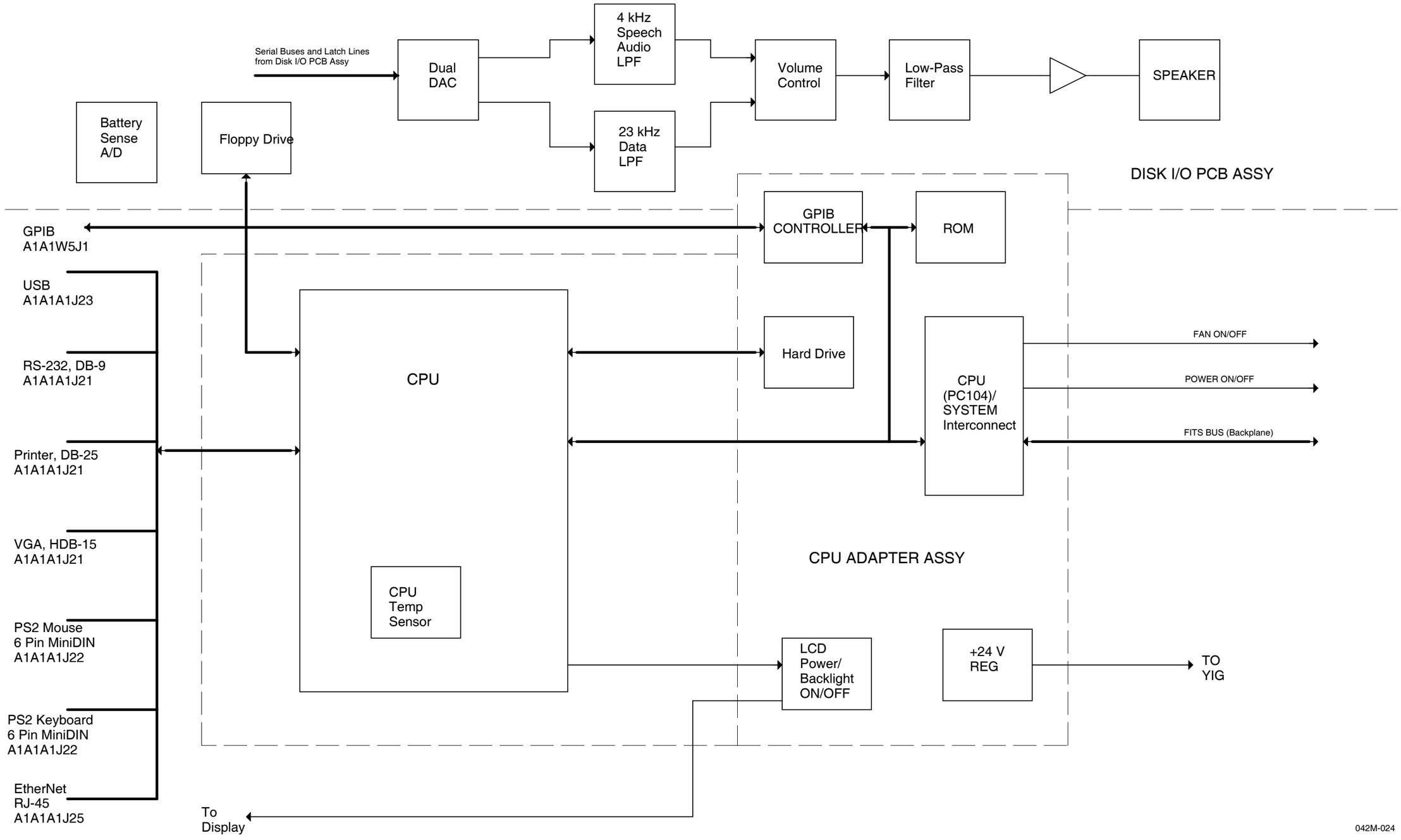

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Figure 1-2 2975 Module Overview (cont)

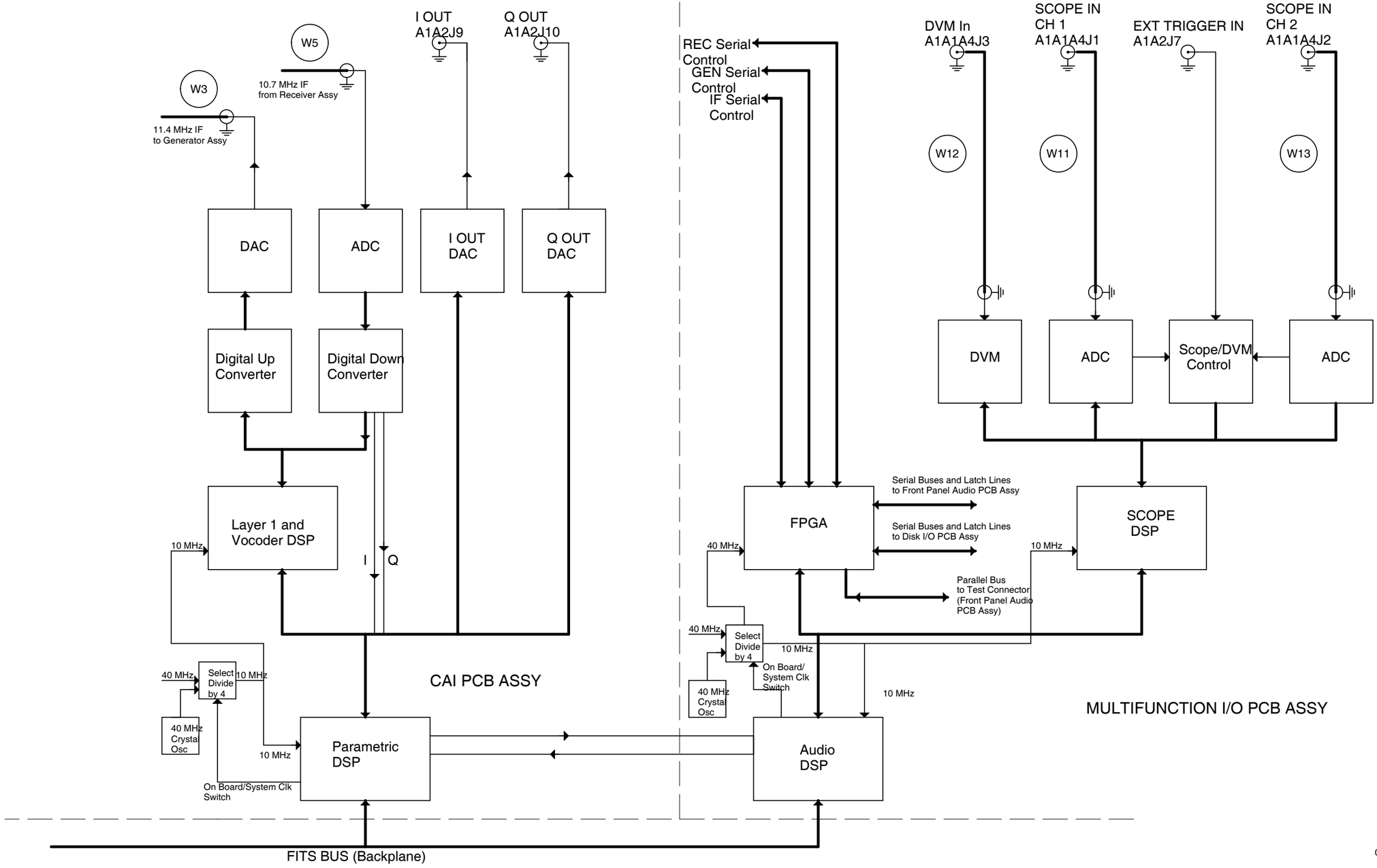
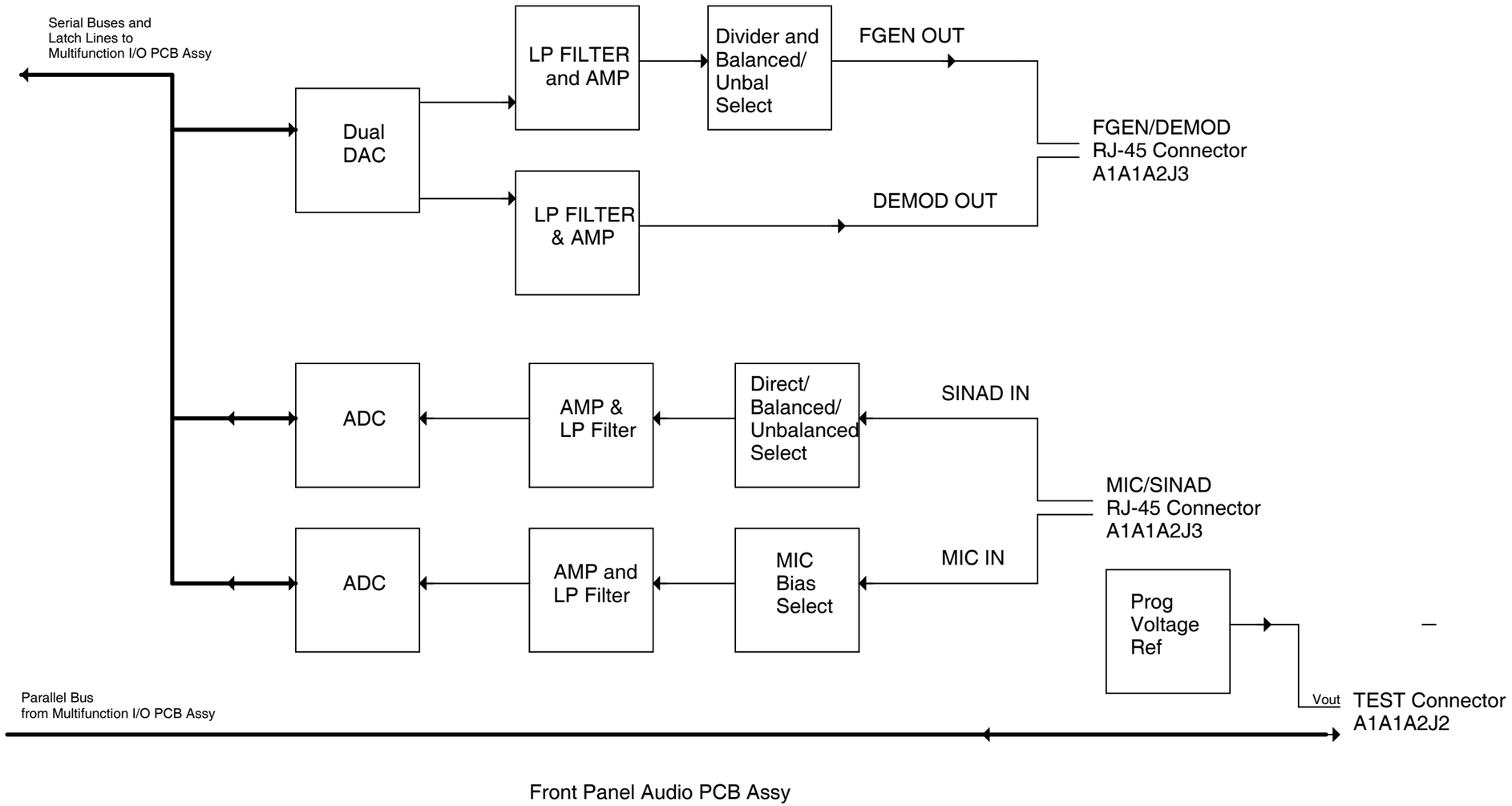


Figure 1-2 2975 Module Overview (cont)



Front Panel Audio PCB Assy

042M-026

Figure 1-2 2975 Module Overview (cont)

1-3-1 BACKPLANE PCB ASSY (42A1A1A1)

Refer to Figure 1-2.

The Backplane PCB Assy provides the mechanism that routes electrical signals between the various system assemblies:

- 32-Pin Connector provides connection to the Power Termination Assy
- 10 Pin Header provides ribbon cable connection to the Front Panel Assy
- 10 Pin Header provides ribbon cable connection to the Attenuator Assy
- 24 Pin Header provides ribbon cable connection to the GPIB Connector
- 40 Pin Header provides ribbon cable connection to the CRYPTION Connector
- 44 Pin Header provides connection to the Front Panel Audio PCB Assy
- 48 Pin DIN Connectors for:
  - Disk I/O PCB Assy
  - Rear Panel PCB Assy
  - IF/Video PCB Assy
  - Generator Assy
  - Receiver Assy
- 96 Pin DIN Connectors for:
  - Power Supply Assy
  - CAI PCB Assy
  - CPU Adapter Assy (3)
  - Multifunction IO PCB Assy (3)

The Backplane PCB Assy layout utilizes RF techniques on all signals >33 MHz and on all low level signals.

1-3-2 FRONT PANEL AUDIO PCB ASSY (42A1A1A2)

Refer to Figures 1-2 and 1-3.

The Front Panel Audio PCB Assy plugs into the Backplane PCB Assy and supports the RJ-11 and Test Connector of the 2975 Front Panel. The Front Panel Audio PCB Assy converts analog audio signals from the RJ-11 Connector (Audio Input) to digital signals for the system. The Front Panel Audio PCB Assy also provides output analog audio signals to the RJ-11 Connector (Audio Output) by converting digital signals from the system. Signal Tone or Data filtering, in addition to the balanced or unbalanced switches, are preformed by the Front Panel Audio PCB Assy. Output signals from the Front Panel Audio PCB Assy are the audio function generator signals and the demodulated audio signal (Demod). Audio Input signals to the Front Panel Audio PCB Assy are the microphone and Sinad In signals.

The Front Panel Audio PCB Assy generates a digitally controlled output voltage for the Test Connector and routes input/output signals to/from the Test Connector.

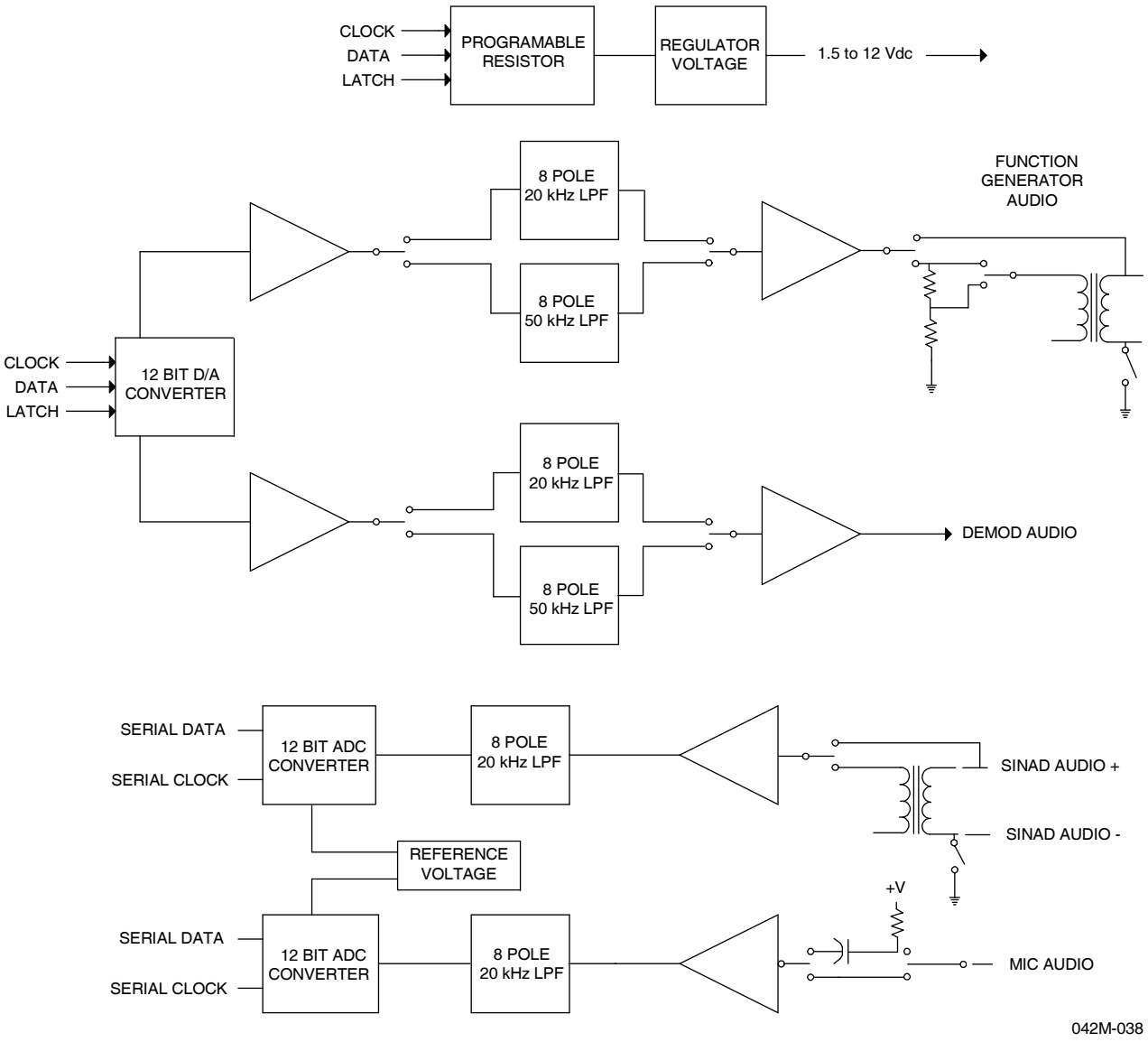


Figure 1-3 Front Panel Audio PCB Assy Block Diagram

1-3-3 CPU ADAPTER ASSY (42A1A1A5)

Refer to Figure 1-2.

The CPU Adapter PCB Assy provides a convenient mechanism by which all CPU generated signals are distributed through the Backplane PCB Assy to other system assemblies. A single board computer is mounted to the CPU Adapter PCB Assy. Flat ribbon cables are used to interconnect the PCB assemblies together. The Backplane PCB Assy interface consists of three 96 Pin DIN Connectors.

1-3-4 POWER SUPPLY ASSY (42A1A1A6)

Refer to Figures 1-2 and 1-4.

AC power for the Power Supply Assy is provided by an IEC universal 3-prong power entry module with an integrated power switch, fuses and EMI filter. This feeds the 225 W power supply with an input range of 85 to 264 VAC at a 47 to 63 Hz rate. The Power Supply Assembly is responsible for generating all internal voltages required to operate the 2975.

Four different voltages are generated by the Power Supply Assy and distributed through the Backplane PCB Assy:

+5 V (Analog and Digital)

+12 V

-12 V

+5.1 VA (a 'keep alive' voltage for turn-on circuitry)

The filter array on the V1 (5 V) power supply output isolates the digital and analog +5 V circuitry.

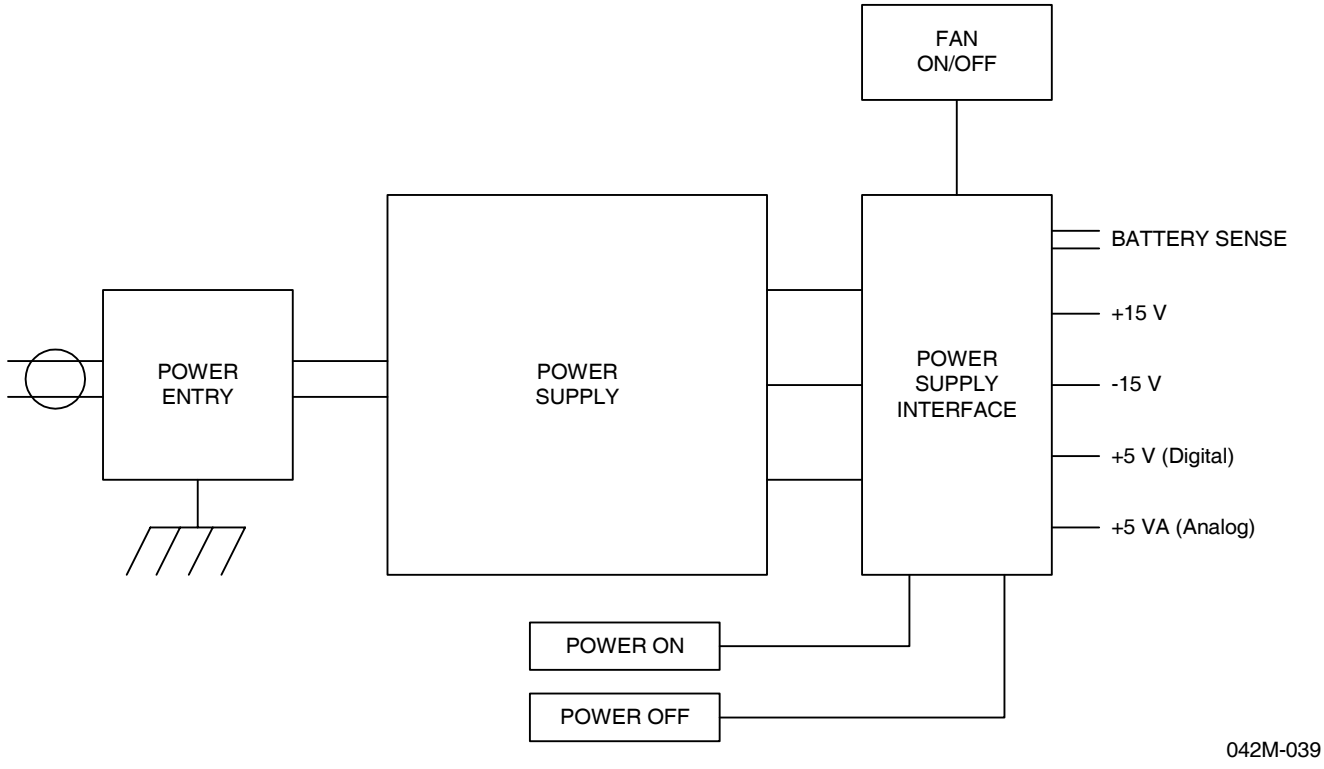


Figure 1-4 Power Supply Assy Block Diagram

1-3-5 POWER TERMINATION ASSY (42A1A1A7)

Refer to Figures 1-2 and 1-5.

The Power Termination Assy consists of four PCB Assemblies: LNA, GEN Buffer, RF Power and Controller. The assembly housing provides circuit isolation, which must be very high for the tracking generator function, as well as providing heat sink cooling for the high power RF input. The cooling fan is turned on and off by the processor control based on the temperature of the Power Termination Assy.

The Power Termination Assy provides the focal point through which RF signals pass between the UUT and the 2975. There are three RF user interface connectors (on the front of the unit) (ANTENNA IN, GEN OUT, T/R) and two internal coaxial cable connections (Receiver Assy and Generator Assy).

POWER TERMINATION RF I/O

The Power Termination Assy has three RF inputs, one output and one bi-directional connector. The main RF T/R (transmit/receive) connector is a type “N” connector which can be used for full duplex operation and is the primary power measurement connector. The ANT (or Antenna) and GEN (or Generator) connectors are TNC connectors. The T/R Connector is designed to accept input RF signals from DC to 2.7 GHz at power levels up to 150 W. At power levels >50 W, the input power must maintain a duty cycle of 20% on and 80% off.

The ANT Connector provides low signal level operation through a LNA (Low Noise Amplifier) which improves the sensitivity and can be used to monitor low level signals with the application of an external antenna. The ANT Connector is protected from high power levels by a limiter circuit.

The GEN Connector provides an output signal of +10 dBm over the 1 to 2700 MHz range, and can be used in conjunction with the ANT Connector to do scalar measurements in the tracking generator operation mode.

The final two RF SSMB connectors are the receive output to the Receive IF Assy and the input from the Generator Assy.

RF POWER DETECTOR

A diode detector on the RF Power PCB Assy at the output of a four-way power splitter serves to measure RF power applied to the T/R Connector.

TEMPERATURE SENSORS

There are two temperature sensors on the RF Power PCB Assy. Sensor 1 is used to monitor the temperature of the 20 dB RF power attenuator. Sensor 2 is used to monitor the ambient temperature of the diode detector to enable temperature correction of the power meter.

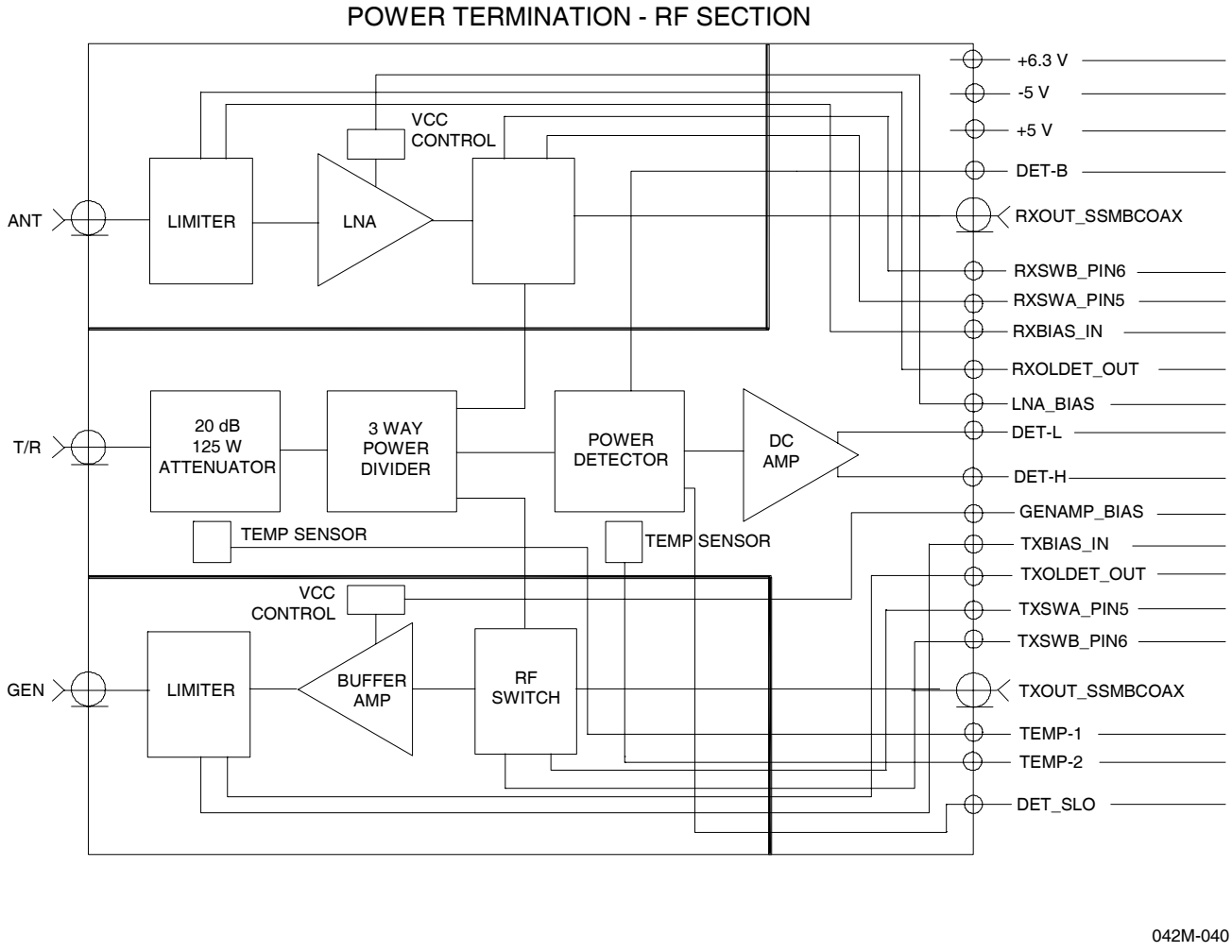


Figure 1-5 Power Termination Assy Block Diagram

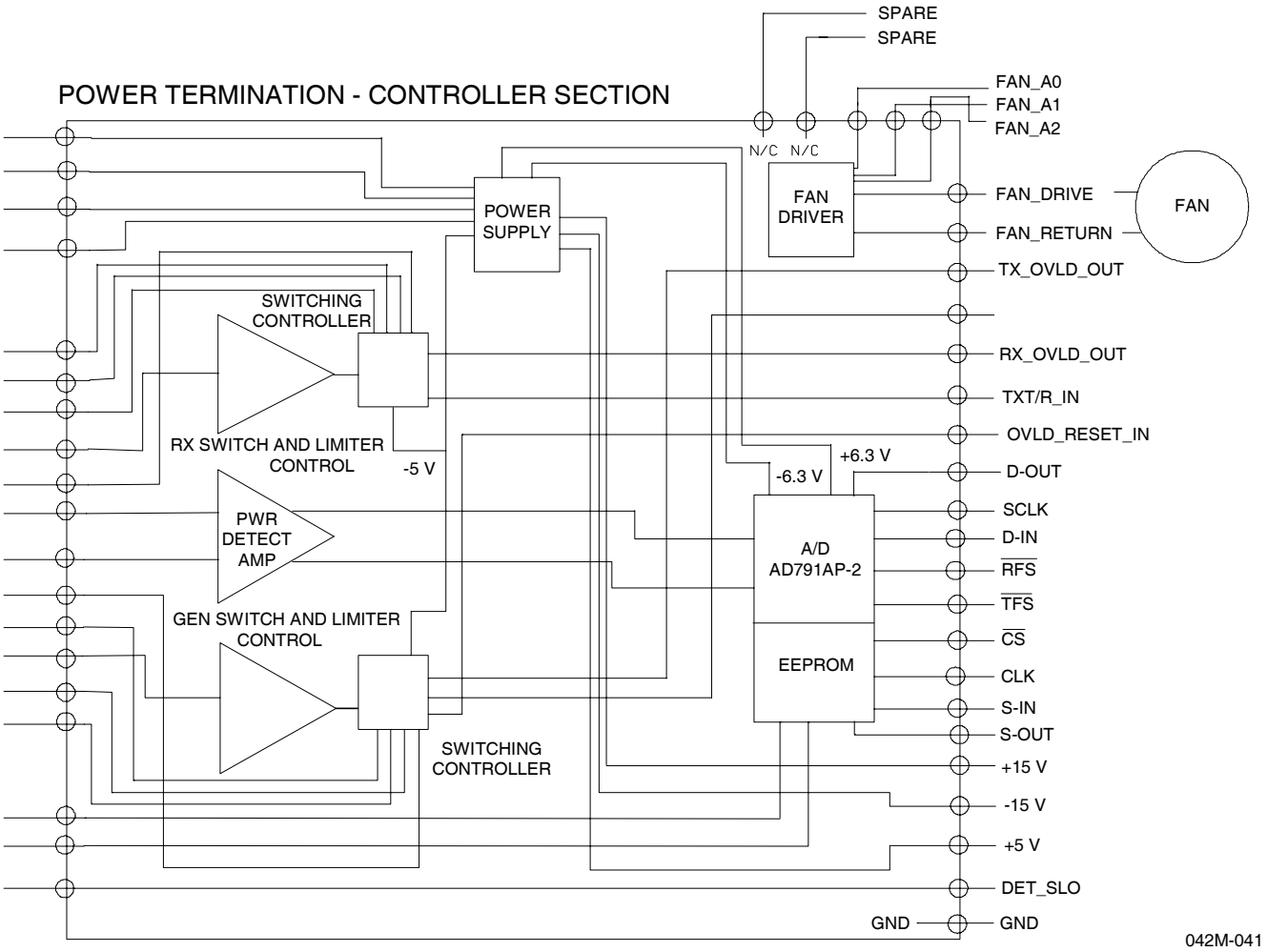


Figure 1-5 Power Termination Assy Block Diagram (cont)

1-3-6 DISK I/O PCB ASSY (42A1A1A9)

Refer to Figures 1-2 and 1-6.

CPU I/O signals are routed to the Disk I/O PCB Assy plug-in slot through the Backplane PCB Assy. The floppy signals go directly to a 26-pin flex cable header, providing a convenient connection to a 3.5" half-height floppy disk drive. Located on the Disk I/O PCB Assy is the OCXO oscillator, providing a very stable and accurate 10 MHz reference frequency for the system. A DAC, driven by the Multifunction I/O PCB Assy provides voltage tuning of the OCXO. A serial EEPROM stores the factory calibrated tuning voltage for the oscillator. A dual DAC drives the speaker amplifier after it is filtered by a 4.6 kHz filter. A differential A-D converter, driven by the Multifunction I/O PCB Assy monitors the battery voltage.

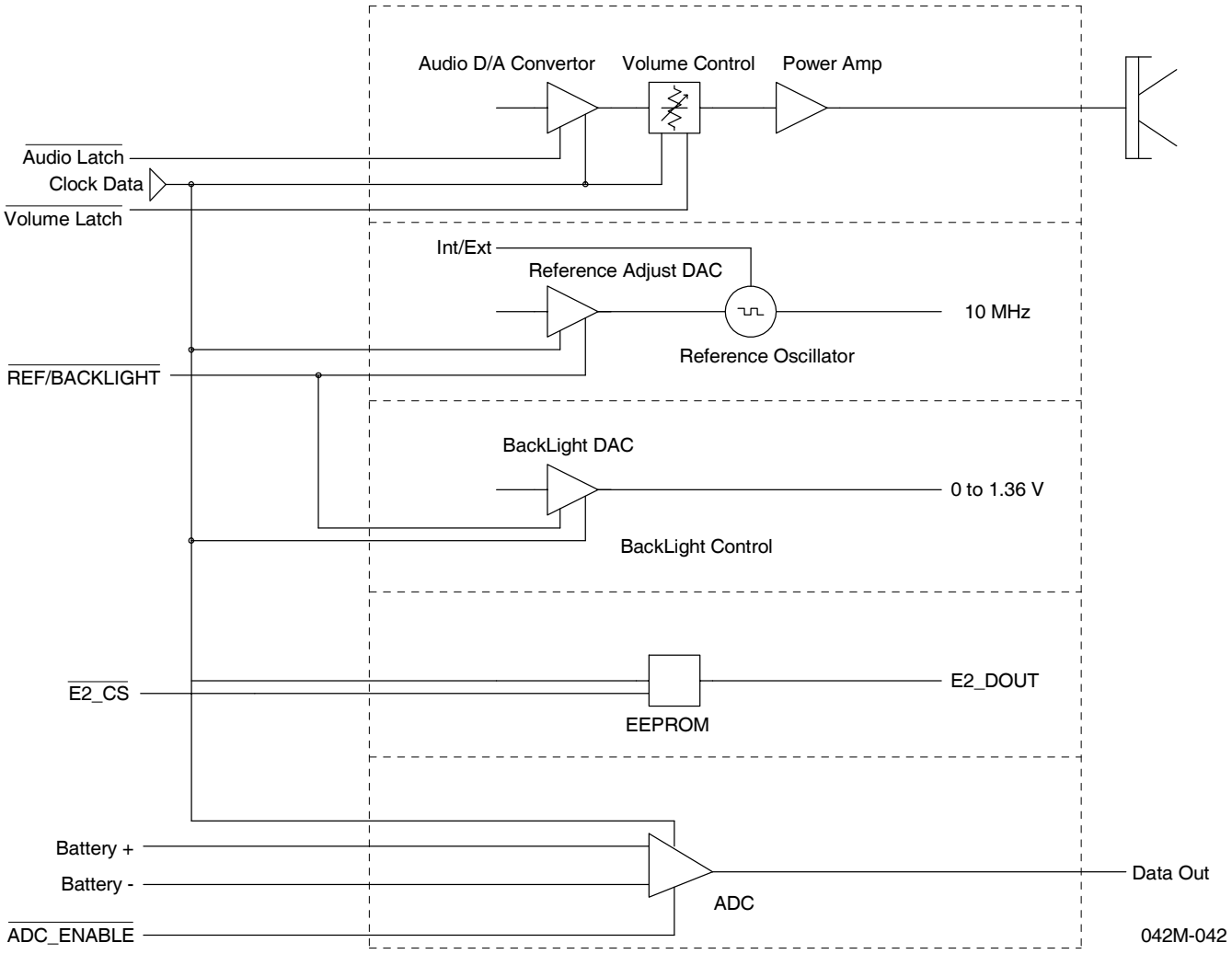


Figure 1-6 Disk I/O PCB Assy Block Diagram

1-3-7 ATTENUATOR ASSY (42A1A3)

Refer to Figures 1-2 and 1-7.

The attenuator consists of six relay-attenuator sections and a driver board. One relay-attenuator section is 10 dB, and the other five relay-attenuator sections are 20 dB; for a total attenuation of 110 dB. The driver board contains a serial to parallel converter and six transistor driver stages, which drive the attenuator relays with the required current. The module uses 5 V for the supply and relay drives.

Each individual stage has an accuracy (±0.5 dB) to its rated value. The attenuator has a frequency response flatness (slope) from 0 to 2.7 GHz of <3 dB. This slope remains constant (±0.5 dB) with different stages of attenuation on or off. This error is removed when the 2975 is calibrated.

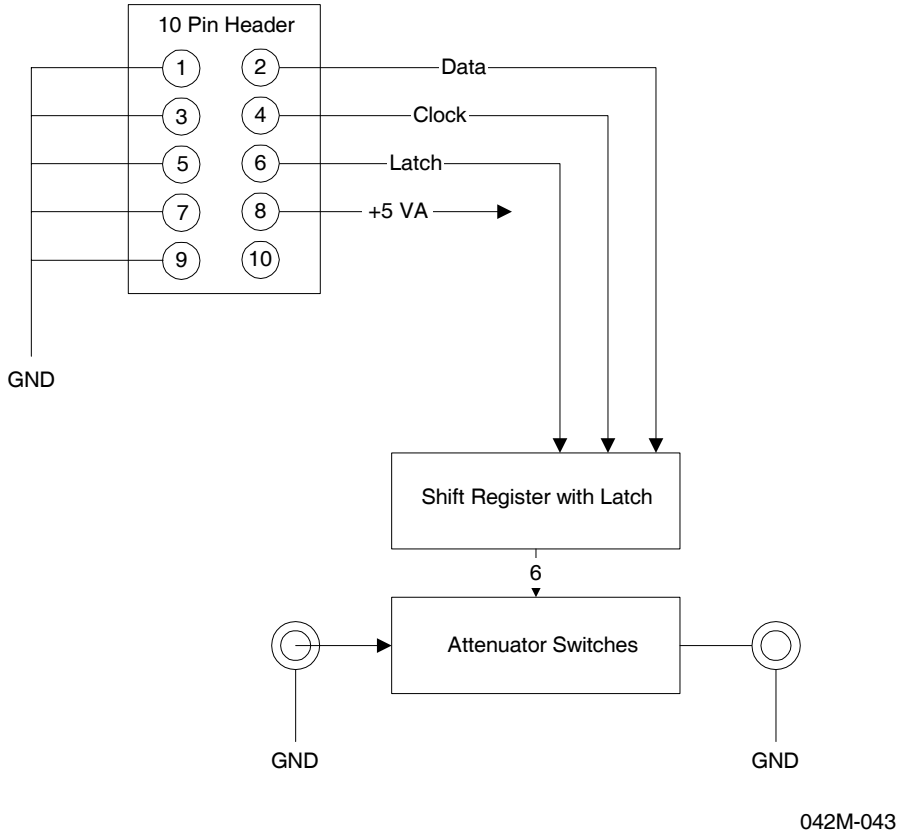


Figure 1-7 Attenuator Assy Block Diagram

1-3-8 GENERATOR ASSY (42A1A4)

Refer to Figure 1-2.

The CAI PCB Assy provides 11.4 MHz IF to the Generator Assy for frequency conversion to the desired output frequency. The Generator Assy provides 0.1 dB steps between the 10 dB steps of the step attenuator attached to the top of the Generator Assy. The Generator Assy is also used as the tracking generator, allowing for swept measurements such as filter response. The Generator Assy consists of two separate PCB Assemblies: RF/Microwave PCB Assy and the Synthesizer/Control PCB Assy. The lower frequency functions reside on the Synthesizer/Control PCB Assy, while the higher frequency functions reside on the RF/Microwave PCB Assy.

RF/MICROWAVE PCB ASSY

The RF/Microwave PCB Assy is designed to convert a 11.4 MHz IF input to any frequency from 1 MHz to 2.7 GHz. The 11.4 MHz IF signal is converted to 3 increasingly higher IF frequencies: 91.4, 611.4 and 3411.4 MHz respectively. At each IF, a considerable amount of filtering is performed in order to remove the images resulting from the previous up-conversion. Finally, the 3411.4 MHz signal is down-converted to the desired frequency. The signal is then leveled and amplified up to a level high enough to overcome the losses of the step attenuator and power termination and still meet the specified maximum output power level.

POWER AMPLIFIER / POWER DETECTION

The output of the ALC gain control element serves as input to the power amplifier. The total gain across the power amplifier strip is approximately 46 dB. Roughly -26 dBm out of the voltage variable attenuator produces full power (+20 dBm) at the output connector of the RF/Microwave PCB Assy.

The resistive tap just before the output attenuator provides the sample point for output power detection. The detected power voltage undergoes an inversion and is passed through a log linearization circuit. The power detect output is passed over to the ALC functions on the Synthesizer/Control PCB Assy for generator output leveling.

SYNTHESIZER/CONTROL PCB ASSY

The Synthesizer/Control PCB Assy consists of 3 major loops: DDS, main and comb driver. This structure locks a YIG oscillator by mixing the output with that of the comb frequency coming from the clean loop. The comb moves in approximately 0.4 MHz steps providing a coarse tune. The DDS, which is tunable in extremely fine steps, drives the main loop, giving the Synthesizer/Control PCB Assy sub-hertz resolution. The comb driver has 2 loops that generate an exceptionally clean signal that is multiplied up to the YIG frequency. The step loop provides all of the step size for the comb driver and is followed by the clean loop which tracks the step loop changes.

The frequencies of 80 and 400 MHz that exist in the Receiver Assy are reused to generate the LOs used for the up-converter block. This is what determined the choice of IF frequencies. In order to convert 11.4 to 91.4 MHz, 11.4 MHz is mixed with 80 MHz and the sum product taken. The 520 MHz LO needed for the 611.4 MHz IF is generated by dividing 400 MHz by 2. This 200 MHz signal is mixed with the 80 MHz in a mixer that has poor third order LO performance. The 3rd LO minus the IF produces 600 MHz. Subtract 80 MHz for a sum of 520 MHz. Finally, the 2800 MHz LO needed to convert 611.4 to 3411.4 MHz is generated by multiplying 400 MHz by 7.

1-3-9 IF/VIDEO PCB ASSY (42A1A5)

Refer to Figure 1-2.

The IF/Video PCB Assy conditions incoming signals from the Receive IF Assy for the CAI PCB Assy and provides a squared IF signal to the Multifunction I/O PCB Assy for frequency counter circuitry. The IF/Video PCB Assy provides the analyzer gain adjustment when adjusting the Reference level dBm on the Spectrum Analyzer, and acts as the receiver Automatic Gain Control (AGC) when in the Receiver mode. As well, providing a digitized logarithmic representation of the incoming signal amplitude for both the “channel” and “widescan” analyzer modes.

The IF/Video PCB Assy also provides a buffered 10.7 MHz IF signal and spectrum analyzer video to the rear of the 2975. Finally, the IF/Video PCB Assy provides a temperature sensor for sensing the internal ambient unit temperature.

IF/VIDEO - 10.7 MHZ IF FILTERS

The 10.7 MHz IF path provides gain adjustment and hardware bandwidth restriction of the incoming signal from the Receive IF Assy to be used by the CAI PCB Assy Digital Signal Processor (DSP). From this path, all signal processing, decoding and metering functions are performed. The IF is also squared up for the IF frequency counter circuitry for the Multifunction I/O PCB Assy. The 10.7 MHz filter bandwidth selections include: 6 MHz, 300 kHz and 30 kHz.

IF/VIDEO - 5.3 MHZ IF FILTERS “CHANNEL” IF

The Spectrum Analyzer 5.3 MHz IF functions to provide a fixed frequency down-conversion of the CAI 10.7 MHz IF signal for the “Look and Listen Mode” in the Channel Analyzer screens. The 5.3 MHz filter bandwidth selections include: 60 kHz, 3 kHz and 300 Hz.

1-3-10 MULTIFUNCTION I/O PCB ASSY (42A1A6)

Refer to Figures 1-2 and 1-8.

The Multifunction I/O PCB Assy consists of two independent subsystems: Scope/DVM Subsystem and Audio Subsystem. The Multifunction I/O PCB Assy performs the following functions:

- Two Channel Scope with external trigger capability
- Digital Voltmeter
- Digital Audio to Front Panel PCB Assy for the Function Generator and DEMOD outputs
- Speaker Driver circuit
- Digital Audio inputs from Front Panel PCB Assy
- RF Subsystem Control I/O
- Digital Function Generator for modulation formats

The main components of the Multifunction I/O module are two Motorola DSP's. One is an Altera FPGA, which performs the actual control of the RF subsystems. The other is a dual channel scope. One DSP functions as the Scope/DVM subsystem and the other performs the Audio and RF control subsystems.

The primary purpose of the master DSP is to control and read the RF subytems. It must also act as the interface to the host CPU for itself and the Scope/DVM DSP. A bi-directional, high speed serial data channel to the CAI PCB Assy is also provided for demodulated audio data input and audio data output that is to be modulated.

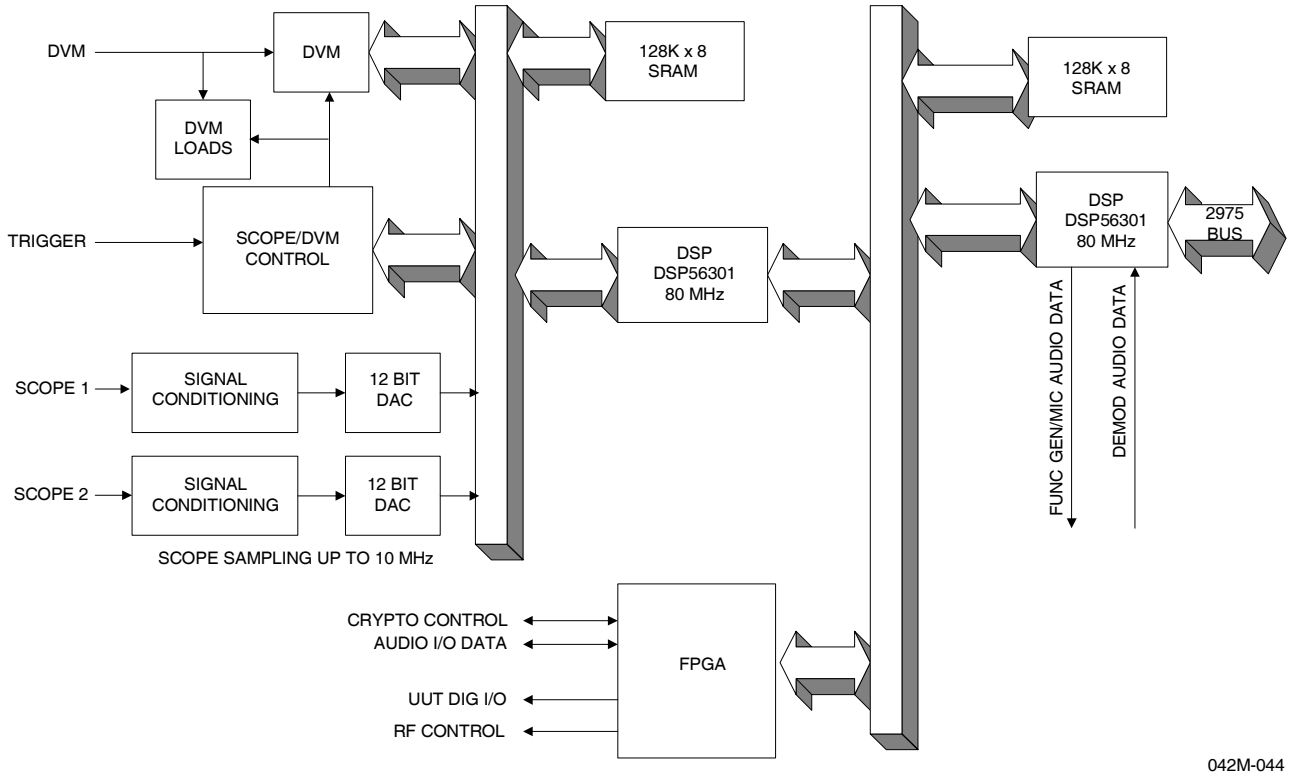


Figure 1-8 Multifunction I/O PCB Assy Block Diagram

1-3-11 RECEIVER ASSY (42A1A7)

Refer to Figure 1-2.

The Receiver Assy is a self contained wideband triple conversion receiver that is designed to convert incoming frequencies (9 kHz to 2.7 GHz) to an output IF frequency of 10.7 MHz. The module consists of two separate PCB Assemblies: Receiver PCB Assy and the Synthesizer PCB Assy.

RECEIVER PCB ASSY

The Receiver PCB Assy converts incoming frequencies (9 kHz to 2.7 GHz) to an output IF frequency of 10.7 MHz. The Receiver PCB Assy provides all the necessary LO's for the conversion to 10.7 MHz IF. The 10.7 MHz IF is routed to the IF/Video PCB Assy for additional filtering and signal conditioning.

SYNTHESIZER PCB ASSY

The Synthesizer PCB Assy consists of 3 major loops: the DDS, main, and comb driver. This structure locks a YIG oscillator by mixing its output with that of the comb frequency coming from the clean loop. The comb itself moves in approximately 0.4 MHz steps providing a coarse tune. The DDS which is tunable in extremely fine steps, drives the main loop gives the synthesizer its sub-hertz resolution. The comb driver has 2 loops that generate an exceptionally clean signal that is multiplied up to the YIG frequency. The step loop provides all of the step size for the comb driver and is followed by the clean loop which tracks the step loop changes. The synthesizer/control board provide both 80 MHz and 400MHz reference for the Generator Module.

1-3-12 CAI PCB ASSY (42A1A8)

Refer to Figures 1-2 and 1-9.

The CAI (Common Air Interface) PCB Assy contains two DSP's and the digital up/down converter chipset. The main responsibility of the CAI PCB Assy is to provide the interface between the IF and the host CPU.

- Digitally perform modulation and demodulation of IF signal using chipset and DSP.
- Perform parametric measurements from the I and Q data that is generated by the chipset.
- Perform voice Encoder/Decoder function in the Motorola DSP.
- Generate received I and Q outputs.
- Controlled by the host CPU over the ISA bus in which part of the address decoding has been performed external to the CAI PCB Assy.

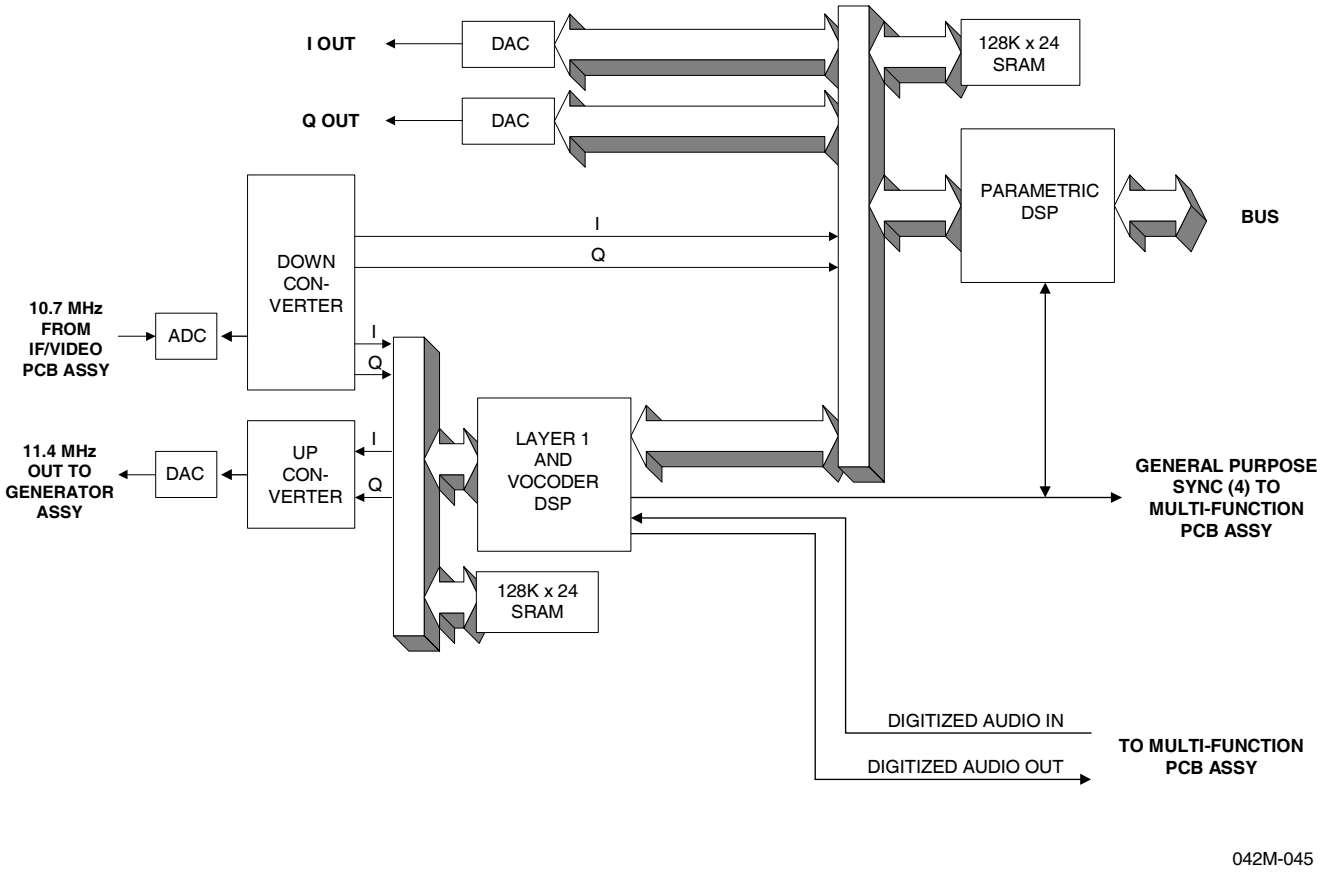


Figure 1-9 CAI PCB Assy Block Diagram

SECTION 2 - CALIBRATION/VERIFICATION

2-1 GENERAL

This section provides the maintenance technician with Calibration and Verification Procedures.

The Calibration/Verification Procedures should only be performed by Technicians familiar with the setup and operation of the recommended test equipment.

2-1-1 CALIBRATION/VERIFICATION SCHEDULE

The Calibration/Verification Procedures should be performed as a result of one or more of the following conditions:

- The 2975 fails to meet the performance specifications
- One or more assemblies are replaced
- The recommended 12 month calibration interval is due

2-1-2 CONTROLS AND CONNECTORS

Refer to Appendix C for the location of the controls and connectors specified in the Calibration/ Verification Procedures.

2-1-3 TEST EQUIPMENT REQUIREMENTS

Appendix E contains a list of Test Equipment suitable for performing the Calibration/ Verifications Procedures. Other equipment meeting the Test Equipment specifications listed in Appendix E may be substituted in place of the recommended models.

2-1-4 TEST RECORD

Make copies of the Calibration and Verification Data Sheets to record results obtained while performing the Calibration and Verification Procedures.

NOTE: Calibration Results for the Generator and Analyzer Calibration process are stored in an electronic file on the PC.

2-1-5 VERIFICATION SETUP FILES

There are 28 Verification Setup Files stored in the 2975. When performing the Verification Procedures, the Recall feature of the 2975 is used to recall the Verification Setup File needed.

NOTE: The Verification Setup Files are also included on the Calibration Software CD-ROM.

2-1-6 CALIBRATION SOFTWARE

The Calibration Software CD-ROM includes the Calibration Software, Verification Setup Files and System Software.

NOTE: The 2975 should be running System Software Version 1.9 or higher before the Calibration is performed.

2-2 PRECAUTIONS

2-2-1 SAFETY

As with any piece of electronic equipment, take extreme caution when working with “live” circuits. Observe the following precautions when performing the Calibration/Verification Procedures:

WARNING: REMOVE ALL JEWELRY OR OTHER COSMETIC APPAREL BEFORE PERFORMING ANY PROCEDURES INVOLVING “LIVE” CIRCUITS.

WHEN WORKING WITH LIVE CIRCUITS OF HIGH POTENTIAL, KEEP ONE HAND IN POCKET OR BEHIND BACK TO AVOID SERIOUS SHOCK HAZARD.

USE ONLY INSULATED TROUBLESHOOTING TOOLS WHEN WORKING WITH LIVE CIRCUITS.

FOR ADDED INSULATION, PLACE RUBBER BENCH MATS UNDER ALL POWERED BENCH EQUIPMENT AND TECHNICIAN CHAIRS.

HEED ALL WARNINGS AND CAUTIONS CONCERNING MAXIMUM VOLTAGES AND POWER INPUTS.

2-2-2 ESD

CAUTION: ONLY PERFORM CALIBRATION/VERIFICATION PROCEDURES IN AN ESD ENVIRONMENT. ALL PERSONNEL PERFORMING THE CALIBRATION/ VERIFICATION PROCEDURES SHOULD HAVE KNOWLEDGE OF ACCEPTED ESD PRACTICES AND/OR BE ESD CERTIFIED.

2-3 DISASSEMBLY REQUIREMENTS

Remove the Case Assy from the 2975 to perform the Power Supply Voltages Calibration Procedures.

Refer to the individual Calibration Procedures for additional disassembly requirements.

The Case Assy should be reassembled prior to performing the TXCO and Generator / Analyzer Calibration Procedures.

2-4 VERIFICATION PROCEDURES

To perform a Calibration Verification, perform para 2-4-2 through 2-4-9.

To perform a System Verification, perform para 2-4-2 through 2-4-29.

2-4-1 INITIAL SETUP

PREREQUISITES: None

EQUIPMENT REQUIRED: 10 MHz Frequency Standard

STEP	PROCEDURE

1. Connect the 2975 to an appropriate external power source.
2. Set the MAIN POWER Switch (Rear Panel) to the ON position.
3. Connect the 10 MHz Frequency Standard to the EXTERNAL RF I/O Connector.
4. When the Opening Screen is displayed, press **MODE** Key, "**7**" Key and "**1**" Key to display the Configuration Screen.
5. Press **MODE** Key, "**7**" Key and "**7**" Key to display the Recall Menu.

The 2975 system parameters are now ready to be verified.

2-4-2 GENERATOR OUTPUT FREQUENCY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Universal Counter

STEP PROCEDURE

1. Recall Verification Setup File #1.
2. Disconnect the 10 MHz Frequency Standard from the EXTERNAL RF I/O Connector.
3. Connect the Universal Counter to the GEN Connector.
4. Verify 1 GHz (±10 Hz) on the Universal Counter.
   - If reading is correct, go to Step 5.
   - If reading is out of tolerance, perform the 2975 Calibration Procedures (para 2-6).
5. Perform one of the following:
   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.
   - If this procedure is performed as part of a complete Verification, reconnect the 10 MHz Frequency Standard to the EXTERNAL RF I/O Connector and proceed with the next Verification Procedure.

2-4-3 GENERATOR OUTPUT POWER

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Power Meter

STEP PROCEDURE

1. Recall Verification Setup File #2.
2. Connect the Power Meter to the GEN Connector.
3. Set the Power Meter to 501 MHz at +10.0 dBm.
4. Verify the following levels on the Power Meter:

2975 GENERATOR LEVEL	POWER METER LEVEL
+10 dBm	+10 dBm (±1.5 dB)
0 dBm	0 dBm (±1.5 dB)
-10 dBm	-10 dBm (±1.5 dB)
-20 dBm	-20 dBm (±1.5 dB)
-30 dBm	-30 dBm (±1.5 dB)
-40 dBm	-40 dBm (±1.5 dB)
-50 dBm	-50 dBm (±1.5 dB)
-60 dBm	-60 dBm (±1.5 dB)

- If all readings are correct, go to Step 5.
- If any reading is out of tolerance, perform the 2975 Calibration Procedures (para 2-6).

5. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

  Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

  Press **10 MHz REFERENCE** to select Internal reference.

  Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

- If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-4 GENERATOR LEVEL FLATNESS

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Power Meter

STEP PROCEDURE

1. Recall Verification Setup File #3.
2. Connect the Power Meter to the GEN Connector.
3. Set the 2975 to the following frequencies and verify 0 dBm (±1.5 dB) on the Power Meter:

170 MHz	1470 MHz
220 MHz	1520 MHz
270 MHz	1570 MHz
320 MHz	1620 MHz
370 MHz	1670 MHz
420 MHz	1720 MHz
470 MHz	1770 MHz
520 MHz	1820 MHz
570 MHz	1870 MHz
620 MHz	1920 MHz
670 MHz	1970 MHz
720 MHz	2020 MHz
770 MHz	2070 MHz
820 MHz	2120 MHz
870 MHz	2170 MHz
920 MHz	2220 MHz
970 MHz	2270 MHz
1020 MHz	2320 MHz
1070 MHz	2370 MHz
1120 MHz	2420 MHz
1170 MHz	2470 MHz
1220 MHz	2520 MHz
1270 MHz	2570 MHz
1320 MHz	2620 MHz
1370 MHz	2670 MHz
1420 MHz	2700 MHz

- If all readings are correct, go to Step 4.
- If any reading is out of tolerance, perform the 2975 Calibration Procedures (para 2-6).

4. Perform one of the following:
   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-5 GENERATOR T/R POWER LEVEL ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Power Meter

STEP PROCEDURE

1. Recall Verification Setup File #4.
2. Connect the Power Meter to the T/R Connector.
3. Verify the following levels on the Power Meter:

2975 POWER LEVEL	POWER METER LEVEL
-30.0 dBm	-30 dBm (±1 dB)
-40.0 dBm	-40 dBm (±1 dB)
-50.0 dBm	-50 dBm (±1 dB)
-60.0 dBm	-60 dBm (±1 dB)

- If all readings are correct, go to Step 4.
- If any reading is out of tolerance, perform the 2975 Calibration Procedures (para 2-6).

4. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

  Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

  Press **10 MHz REFERENCE** to select Internal reference.

  Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

- If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-6 GENERATOR T/R POWER LEVEL FLATNESS

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Power Meter

STEP PROCEDURE

1. Recall Verification Setup File #5.
2. Connect the Power Meter to the T/R Connector.
3. Set the 2975 to the following frequencies and verify -30 dBm (±1 dB) on the Power Meter:

50 MHz	1400 MHz
100 MHz	1450 MHz
150 MHz	1500 MHz
200 MHz	1550 MHz
250 MHz	1600 MHz
300 MHz	1650 MHz
350 MHz	1700 MHz
400 MHz	1750 MHz
450 MHz	1800 MHz
500 MHz	1850 MHz
550 MHz	1900 MHz
600 MHz	1950 MHz
650 MHz	2000 MHz
700 MHz	2050 MHz
750 MHz	2100 MHz
800 MHz	2150 MHz
850 MHz	2200 MHz
900 MHz	2250 MHz
950 MHz	2300 MHz
1000 MHz	2350 MHz
1050 MHz	2400 MHz
1100 MHz	2450 MHz
1150 MHz	2500 MHz
1200 MHz	2550 MHz
1250 MHz	2600 MHz
1300 MHz	2650 MHz
1350 MHz	2700 MHz

- If all readings are correct, go to Step 4.
- If any reading is out of tolerance, perform the 2975 Calibration Procedures (para 2-6).

4. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

  Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

  Press **10 MHz REFERENCE** to select Internal reference.

  Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

- If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-7 RF POWER METER ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: RF Generator

STEP PROCEDURE

1. Recall Verification Setup File #6.
2. Press **ZERO** on the 2975 Power Meter.
3. Connect the RF Generator to the T/R Connector.
4. Set the RF Generator to 500 MHz at 10.5 dBm.
5. Verify 10.5 dBm (±1.05 dB) on the 2975 Power Meter.
   - If reading is correct, go to Step 5.
   - If reading is out of tolerance, perform the 2975 Calibration Procedures (para 2-6).
6. Perform one of the following:
   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.
   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-8 RSSI METER ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: RF Generator

STEP PROCEDURE

1. Recall Verification Setup File #7.
2. Calibrate the 2975 RSSI Meter (press the RSSI Meter CAL Button and follow the on-screen prompts).
3. Connect the RF Generator to the ANT Connector.
4. Verify the following levels on the 2975 RSSI Meter:

RF GENERATOR SETTINGS	2975 RSSI METER
10 MHz at -70 dBm	-70.0 dBm (±2.5 dB)
10 MHz at -60 dBm	-60.0 dBm (±2.5 dB)
10 MHz at -50 dBm	-50.0 dBm (±2.5 dB)
10 MHz at -40 dBm	-40.0 dBm (±2.5 dB)
10 MHz at -30 dBm	-30.0 dBm (±2.5 dB)
10 MHz at -20 dBm	-20.0 dBm (±2.5 dB)

- If all readings are correct, go to Step 5.
- If any reading is out of tolerance, perform the 2975 Calibration Procedures (para 2-6).

5. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

  Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

  Press **10 MHz REFERENCE** to select Internal reference.

  Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

- If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-9 ANALYZER LEVEL ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: RF Generator

STEP PROCEDURE

1. Recall Verification Setup File #8.
2. Press **NORMAL** (F5) on the 2975 Spectrum Analyzer to normalize the 2975 Spectrum Analyzer. (This may take a few minutes.)
3. Connect the RF Generator to the ANT Connector.
4. Set the RF Generator to 1 MHz at -30.0 dBm.
5. Set the RF Generator and the 2975 to the following frequencies and verify -30 dBm (±2 dB) Analyzer peak level on the 2975 Spectrum Analyzer:

1 MHz	1400 MHz
50 MHz	1450 MHz
100 MHz	1500 MHz
150 MHz	1550 MHz
200 MHz	1600 MHz
250 MHz	1650 MHz
300 MHz	1700 MHz
350 MHz	1750 MHz
400 MHz	1800 MHz
450 MHz	1850 MHz
500 MHz	1900 MHz
550 MHz	1950 MHz
600 MHz	2000 MHz
650 MHz	2050 MHz
700 MHz	2100 MHz
750 MHz	2150 MHz
800 MHz	2200 MHz
850 MHz	2250 MHz
900 MHz	2300 MHz
950 MHz	2350 MHz
1000 MHz	2400 MHz
1050 MHz	2450 MHz
1100 MHz	2500 MHz
1150 MHz	2550 MHz
1200 MHz	2600 MHz
1250 MHz	2650 MHz
1300 MHz	2700 MHz
1350 MHz	

- If all readings are correct, go to Step 5.
- If any reading is out of tolerance, perform the 2975 Calibration Procedures (para 2-6).

6. Perform one of the following:

   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-10 GENERATOR FM RESIDUAL

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Modulation Analyzer

STEP	PROCEDURE

1. Recall Verification Setup File #9.
2. Connect the Modulation Analyzer to the GEN Connector.
3. Set the Modulation Analyzer for 300 Hz to 3 kHz post-detection filtering. Measure FM level.
4. Verify <15 Hz RMS on the Modulation Analyzer. Record level.

   - If reading is correct, go to Step 5.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Generator Assy. Return the 2975 to Aeroflex for repair.

5. Perform one of the following:

   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-11 GENERATOR AM RESIDUAL

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Modulation Analyzer

STEP PROCEDURE

1. Recall Verification Setup File #10.
2. Connect the Modulation Analyzer to the GEN Connector.
3. Set the Modulation Analyzer for 300 Hz to 3 kHz post-detection filtering. Measure AM level.
4. Verify <0.1% on the Modulation Analyzer. Record level.

   - If reading is correct, go to Step 5.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Generator Assy. Return the 2975 to Aeroflex for repair.

5. Perform one of the following:

   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-12 GENERATOR FM DEVIATION ACCURACY

PREREQUISITES: 2-4-1 Initial Setup
2-4-5 Generator FM Residual

EQUIPMENT REQUIRED: Modulation Analyzer

STEP PROCEDURE

1. Recall Verification Setup File #11.
2. Connect the Modulation Analyzer to the GEN Connector.
3. Set the Modulation Analyzer to measure FM with the 15 kHz LP Filter selected.
4. Record the FM deviation shown on the Modulation Analyzer.
5. Subtract the reading recorded in para 2-4-10 from the reading recorded in Step 4. Verify FM deviation is 10 kHz (±0.30 kHz).

   - If reading is correct, go to Step 5.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy or Generator Assy. Return the 2975 to Aeroflex for repair.

6. Perform one of the following:

   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-13 GENERATOR FM MODULATION RATE

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Modulation Analyzer

STEP PROCEDURE

1. Recall Verification Setup File #12.
2. Connect the Modulation Analyzer to the GEN Connector.
3. Set the Modulation Analyzer to measure FM with the 15 kHz LP Filter selected.
4. Record the FM deviation level for the following AF Field settings. Subtract the FM Residual reading recorded in para 2-4-10 and verify the FM deviation for the following AF Field settings on the Modulation Analyzer:

2975 (M1) AF FIELD	FM DEVIATION
50.0 Hz	6 kHz (±0.18 kHz)
300.0 Hz	6 kHz (±0.18 kHz)
10000.0 Hz	6 kHz (±0.18 kHz)

- If all readings are correct, go to Step 5.
- If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy or Generator Assy. Return the 2975 to Aeroflex for repair.

5. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

  Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

  Press **10 MHz REFERENCE** to select Internal reference.

  Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

- If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-14 GENERATOR FM MODULATION DISTORTION

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Modulation Analyzer
Audio Analyzer

STEP	PROCEDURE

1. Recall Verification Setup File #13.
2. Connect the Modulation Analyzer to the GEN Connector.
3. Set the Modulation Analyzer to measure FM with the 3 kHz LP Filter selected.
4. Connect the Audio Analyzer to the Modulation Analyzer Modulation Output Connector.
5. Verify the modulation distortion is <1% on the Audio Analyzer.
   - If reading is correct, go to Step 6.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy or Generator Assy. Return the 2975 to Aeroflex for repair.
6. Perform one of the following:
   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.
   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-15 GENERATOR AM MODULATION ACCURACY

PREREQUISITES: 2-4-1 Initial Setup
2-4-6 Generator AM Residual

EQUIPMENT REQUIRED: Modulation Analyzer

STEP PROCEDURE

1. Recall Verification Setup File #14.
2. Connect the Modulation Analyzer to the GEN Connector.
3. Set the Modulation Analyzer to measure AM.
4. Record the AM Modulation shown on the Modulation Analyzer.
5. Subtract the reading recorded in para 2-4-11 from the reading recorded in Step 4. Verify the AM Modulation is 30% (±5%).

   - If reading is correct, go to Step 6.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy or Generator Assy. Return the 2975 to Aeroflex for repair.

6. Perform one of the following:

   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-16 RF ERROR METER ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: RF Generator

STEP PROCEDURE

1. Recall Verification Setup File #15.
2. Connect the RF Generator to the T/R Connector.
3. Set the RF Generator to the following settings and verify the following readings on the 2975 RF Error Meter:

RF GENERATOR SETTINGS	2975 RF ERROR METER
1000.01 MHz at -20 dBm	+10000 Hz (±1 Hz)
999.99 MHz at -20 dBm	-10000 Hz (±1 Hz)

- If all readings are correct, go to Step 4.
- If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy or Receiver Assy. Return the 2975 to Aeroflex for repair.

4. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

  Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

  Press **10 MHz REFERENCE** to select Internal reference.

  Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

- If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-17 AF METER ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: RF Generator

STEP PROCEDURE

1. Recall Verification Setup File #16.
2. Connect the RF Generator to the ANT Connector.
3. Set the RF Generator to 100 MHz at -10.0 dBm.
4. Set the RF Generator to output a 6 kHz FM signal at a 1 kHz rate.
5. Verify 1000 Hz (±1 Hz) on the 2975 AF Counter.
   - If reading is correct, go to Step 6.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy or Receiver Assy. Return the 2975 to Aeroflex for repair.
6. Perform one of the following:
   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.
   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-18 FM DEVIATION METER ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: RF Generator

STEP PROCEDURE

1. Recall Verification Setup File #17.
2. Connect the RF Generator to the ANT Connector.
3. Set the RF Generator to 100 MHz at -10.0 dBm.
4. Record the level on the 2975 Deviation Meter.
5. Set the RF Generator to output a 10 kHz FM signal at a 1 kHz rate.
6. Record the level on the 2975 Deviation Meter.
7. Subtract the deviation level in Step 4 from the deviation level in Step 6 and verify the deviation level is 10 kHz (±0.52 kHz).

   - If reading is correct, go to Step 8.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy or Receiver Assy. Return the 2975 to Aeroflex for repair.

8. Perform one of the following:

   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-19 AM MODULATION METER ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: RF Generator

STEP	PROCEDURE

1. Recall Verification Setup File #18.
2. Connect the RF Generator to the ANT Connector.
3. Set the RF Generator to 100 MHz at -20.0 dBm.
4. Record the level on the 2975 Modulation Meter.
5. Set the RF Generator to output an AM signal at 50% depth.
6. Record the level on the 2975 Modulation Meter.
7. Subtract the modulation level in Step 4 from the modulation level in Step 6 and verify the modulation level is 50% (±5%).

   - If reading is correct, go to Step 8.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy or Receiver Assy. Return the 2975 to Aeroflex for repair.

8. Perform one of the following:

   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-20 ANALYZER FREQUENCY AND SPAN ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: RF Generator

STEP PROCEDURE

1. Recall Verification Setup File #19.
2. Connect the RF Generator to the ANT Connector.
3. Set the RF Generator to 1.5 GHz at -20.0 dBm.
4. Measure the 20 dB bandwidth of the displayed signal; calculate the center frequency and record the peak frequency of the displayed signal.
5. Subtract 1.5 GHz from the peak frequency in Step 4 and verify the peak frequency is 0 kHz (±2.5 kHz).

   - If reading is correct, go to Step 6.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: IF/Video PCB Assy or Receiver Assy. Return the 2975 to Aeroflex for repair.

6. Adjust the RF Generator frequency until the -30 dBm point on the left side of the signal response rests on the 1st major division from the left of the display.
7. Increase the RF Generator frequency 80 kHz and verify the -30 dBm point is within 1/2 minor division of the 9th major division from the left of the display.

   - If reading is correct, go to Step 8.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: IF/Video PCB Assy or Receiver Assy. Return the 2975 to Aeroflex for repair.

8. Perform one of the following:

   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-21 ANALYZER BANDWIDTH SWITCHING ERROR

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: RF Generator

STEP PROCEDURE

1. Recall Verification Setup File #20.
2. Press **NORMAL** (F5) on the 2975 Spectrum Analyzer to normalize the 2975 Spectrum Analyzer. (This may take a few minutes.)
3. Connect the RF Generator to the ANT Connector.
4. Set the RF Generator to 500 MHz at -30.0 dBm.
5. Set the AUTO/MAN Field to MAN (to switch the 2975 Spectrum Analyzer to Manual Mode.
6. Using the following settings, record the peak level of the trace data for each RBW Filter and verify the absolute difference between the maximum and minimum levels is ≤2 dB:

SPAN	RBW	VBW
5 kHz	300 Hz	100 Hz
50 kHz	3 kHz	100 Hz
500 kHz	30 kHz	3 kHz
1 MHz	60 kHz	3 kHz
5 MHz	300 kHz	3 kHz
20 MHz	6 MHz	3 kHz

- If all readings are correct, go to Step 7.
- If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: IF/Video PCB Assy or Receiver Assy. Return the 2975 to Aeroflex for repair.

7. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

  Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

  Press **10 MHz REFERENCE** to select Internal reference.

  Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

- If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-22 OSCILLOSCOPE AMPLITUDE ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Arbitrary Waveform Generator

STEP PROCEDURE

1. Recall Verification Setup File #21.
2. Connect the Arbitrary Waveform Generator to the SCOPE CH1 Connector.
3. Set the Arbitrary Waveform Generator frequency to 1 kHz Sinewave.
4. Using the following settings, verify the peak to peak level on the 2975 Oscilloscope is between 7 to 9 major divisions. Select VPOS (Vertical Position) and use the Spinner to position the no-signal trace on the center graticule.

ARBITRARY WAVEFORM GENERATOR LEVEL	2975 OSCILLOSCOPE VOLTS/DIV
160 mVp-p	0.02 V/Div
400 mVp-p	0.05 V/Div
800 mVp-p	0.1 V/Div
1.6 Vp-p	0.2 V/Div
4 Vp-p	0.5 V/Div
8 Vp-p	1.0 V/Div
16 Vp-p	2.0 V/Div

- If all readings are correct, go to Step 5.
- If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy. Return the 2975 to Aeroflex for repair.

5. Disconnect the Arbitrary Waveform Generator from the SCOPE CH1 Connector. Connect the Arbitrary Waveform Generator to the SCOPE CH2 Connector.
6. Set the SOURCE Field on the 2975 Oscilloscope to CH2.

7. Using the following settings, verify the peak to peak level on the 2975 Oscilloscope is between 7 to 9 major divisions. Select VPOS (Vertical Position) and use the Spinner to position the no-signal trace on the center graticule.

FUNCTION GENERATOR LEVEL	2975 OSCILLOSCOPE VOLTS/DIV
160 mVp-p	0.02 V/Div
400 mVp-p	0.05 V/Div
800 mVp-p	0.1 V/Div
1.6 Vp-p	0.2 V/Div
4 Vp-p	0.5 V/Div
8 Vp-p	1.0 V/Div
16 Vp-p	2.0 V/Div

- If all readings are correct, go to Step 8.
- If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy. Return the 2975 to Aeroflex for repair.

8. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

  Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

  Press **10 MHz REFERENCE** to select Internal reference.

  Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

- If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-23 DIGITAL VOLTMETER DC ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Voltage Calibrator

STEP	PROCEDURE

1. Recall Verification Setup File #22.
2. Connect the Voltage Calibrator to the DVM Connector.
3. Set the Voltage Calibrator to 200 mV.
4. Verify 200 mV (±10 mV) on the 2975 Digital Voltmeter.
   - If reading is correct, go to Step 5.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy. Return the 2975 to Aeroflex for repair.
5. Perform one of the following:
   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.
   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-24 DIGITAL VOLTMETER AC ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Voltage Calibrator

STEP PROCEDURE

1. Recall Verification Setup File #23.
2. Connect the Voltage Calibrator to the DVM Connector.
3. Set the Voltage Calibrator to 200 mV.
4. Set the Voltage Calibrator to the following levels and verify 200 mV (±30 mV) on the 2975 Digital Voltmeter.

   50 Hz
   100 Hz
   1 kHz
   10 kHz
   20 kHz

   - If all readings are correct, go to Step 5.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Multifunction I/O PCB Assy. Return the 2975 to Aeroflex for repair.

5. Perform one of the following:

   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-25 FUNCTION GENERATOR LEVEL ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Microphone Adapter
Digital Multimeter
10 kΩ Load

STEP PROCEDURE

1. Recall Verification Setup File #24.
2. Connect the Microphone Adapter to the MIC Connector and AUDIO I/O Connector.
3. Connect the Digital Multimeter, through a 10 kΩ Load, to the Microphone Adapter AUDIO OUT 1 Connector.
4. Set the Digital Multimeter to measure AC Volts.
5. Verify the level is 7.070 Vrms (±350 mVrms) on the Digital Multimeter.
   - If reading is correct, go to Step 6.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Front Panel Audio PCB Assy. Return the 2975 to Aeroflex for repair.
6. Perform one of the following:
   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.
   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-26 FUNCTION GENERATOR FREQUENCY ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Microphone Adapter
Universal Counter
10 kΩ Load

STEP PROCEDURE

1. Recall Verification Setup File #25.
2. Connect the Microphone Adapter to the MIC Connector and AUDIO I/O Connector.
3. Connect the Universal Counter, through a 10 kΩ Load, to the Microphone Adapter AUDIO OUT 1 Connector.
4. Verify the frequency is 5000 Hz (±1 Hz) on the Universal Counter.
   - If reading is correct, go to Step 5.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Front Panel Audio PCB Assy. Return the 2975 to Aeroflex for repair.
5. Perform one of the following:
   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.
   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-27 FUNCTION GENERATOR TOTAL HARMONIC DISTORTION

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Microphone Adapter
Audio Analyzer
10 kΩ Load

STEP	PROCEDURE

1. Recall Verification Setup File #26.
2. Connect the Microphone Adapter to the MIC Connector and AUDIO I/O Connector.
3. Connect the Audio Analyzer Audio Input, through a 10 kΩ Load, to the Microphone Adapter AUDIO OUT 1 Connector.
4. Verify the total harmonic output is <0.5%.
   - If reading is correct, go to Step 5.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Front Panel Audio PCB Assy. Return the 2975 to Aeroflex for repair.
5. Perform one of the following:
   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.
   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-28 AF COUNTER ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Microphone Adapter
Arbitrary Waveform Generator

STEP	PROCEDURE

1. Recall Verification Setup File #27.
2. Connect the Microphone Adapter to the MIC Connector and AUDIO I/O Connector.
3. Connect the Arbitrary Waveform Generator to the Microphone Adapter AUDIO IN Connector.
4. Set the Arbitrary Waveform Generator to 5 Vp-p at 5000 Hz.
5. Verify the frequency is 5000 Hz (±1 Hz) on the 2975 AF Counter.
   - If reading is correct, go to Step 6.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Front Panel Audio PCB Assy. Return the 2975 to Aeroflex for repair.
6. Perform one of the following:
   - If this procedure is performed as a stand-alone procedure, perform the following key sequences to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

     Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

     Press **10 MHz REFERENCE** to select Internal reference.

     Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.
   - If this procedure is performed as part of a complete Verification, proceed with the next Verification Procedure.

2-4-29 SINAD/DISTORTION METER ACCURACY

PREREQUISITES: 2-4-1 Initial Setup

EQUIPMENT REQUIRED: Microphone Adapter
Arbitrary Waveform Generator

NOTE: If an Arbitrary Waveform Generator is used other than the model specified In Appendix B, an residual measurement needs to be accomplished prior to verifying the Distortion level in Step 7.

STEP	PROCEDURE

1. Recall Verification Setup File #28.
2. Connect the Microphone Adapter to the MIC Connector and AUDIO I/O Connector.
3. Connect the Arbitrary Waveform Generator to the Microphone Adapter AUDIO IN Connector.
4. Set the Arbitrary Waveform Generator for a 1 kHz sinewave carrier at 10.0 Vp-p. Set the AM Modulation on the Arbitrary Waveform Generator to 37% at a 1500.0 Hz rate.
5. Verify the level is 12 dB (±1.1 dB) on the 2975 SINAD Meter.
   - If reading is correct, go to Step 6.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Front Panel Audio PCB Assy. Return the 2975 to Aeroflex for repair.
6. Switch OFF the AM Modulation on the Arbitrary Waveform Generator and record the Residual Distortion on the 2975 Distortion Meter.
7. Set the AM Modulation on the Arbitrary Waveform Generator to 7% at a 1500.0 Hz rate.
8. Subtract the Residual Distortion reading in Step 6 from the level on the Arbitrary Waveform Generator and verify the level is 5% (±0.09%) on the 2975 Distortion Meter.
   - If reading is correct, go to Step 9.
   - If reading is out of tolerance, this indicates a hardware failure in the 2975. Probable source of failure: Front Panel Audio PCB Assy. Return the 2975 to Aeroflex for repair.
9. If this procedure is performed as a stand-alone procedure or as part of a complete Verification, perform the following key sequence to reset Factory Default Settings, then remove power from the Unit and disconnect the test equipment.

   Press **MODE** Key, **7** Key, **1** Key to display the Configuration Screen.

   Press **10 MHz REFERENCE** to select Internal reference.

   Press **FACTORY DEFAULT** (F2) to restore the Unit to Factory Defaults.

2-5 VERIFICATION DATA SHEET

TECHNICIAN: _____ DATE: _____

2975 S/N: _____

STEP	DATA	RESULT
GENERATOR OUTPUT FREQUENCY (2-4-2)		
4.	1 GHz (±10 Hz)	_____
GENERATOR OUTPUT POWER (2-4-3)		
4.	+10 dBm +10 dBm (±1.5 dB)	_____
	0 dBm 0 dBm (±1.5 dB)	_____
	-10 dBm -10 dBm (±1.5 dB)	_____
	-20 dBm -20 dBm (±1.5 dB)	_____
	-30 dBm -30 dBm (±1.5 dB)	_____
	-40 dBm -40 dBm (±1.5 dB)	_____
	-50 dBm -50 dBm (±1.5 dB)	_____
	-60 dBm -60 dBm (±1.5 dB)	_____
GENERATOR LEVEL FLATNESS (2-4-4)		
3.	170 MHz 0 dBm (±1 dB)	_____
	220 MHz 0 dBm (±1 dB)	_____
	270 MHz 0 dBm (±1 dB)	_____
	320 MHz 0 dBm (±1 dB)	_____
	370 MHz 0 dBm (±1 dB)	_____
	420 MHz 0 dBm (±1 dB)	_____
	470 MHz 0 dBm (±1 dB)	_____
	520 MHz 0 dBm (±1 dB)	_____
	570 MHz 0 dBm (±1 dB)	_____
	620 MHz 0 dBm (±1 dB)	_____
	670 MHz 0 dBm (±1 dB)	_____
	720 MHz 0 dBm (±1 dB)	_____
	770 MHz 0 dBm (±1 dB)	_____
	820 MHz 0 dBm (±1 dB)	_____
	870 MHz 0 dBm (±1 dB)	_____
	920 MHz 0 dBm (±1 dB)	_____
	970 MHz 0 dBm (±1 dB)	_____
	1020 MHz 0 dBm (±1 dB)	_____
	1070 MHz 0 dBm (±1 dB)	_____
	1120 MHz 0 dBm (±1 dB)	_____
	1170 MHz 0 dBm (±1 dB)	_____
	1220 MHz 0 dBm (±1 dB)	_____
	1270 MHz 0 dBm (±1 dB)	_____
	1320 MHz 0 dBm (±1 dB)	_____
	1370 MHz 0 dBm (±1 dB)	_____
	1420 MHz 0 dBm (±1 dB)	_____

STEP	DATA	RESULT

GENERATOR LEVEL FLATNESS (2-4-4) (cont)

3.	1470 MHz	0 dBm (±1 dB)	_____
	1520 MHz	0 dBm (±1 dB)	_____
	1570 MHz	0 dBm (±1 dB)	_____
	1620 MHz	0 dBm (±1 dB)	_____
	1670 MHz	0 dBm (±1 dB)	_____
	1720 MHz	0 dBm (±1 dB)	_____
	1770 MHz	0 dBm (±1 dB)	_____
	1820 MHz	0 dBm (±1 dB)	_____
	1870 MHz	0 dBm (±1 dB)	_____
	1920 MHz	0 dBm (±1 dB)	_____
	1970 MHz	0 dBm (±1 dB)	_____
	2020 MHz	0 dBm (±1 dB)	_____
	2070 MHz	0 dBm (±1 dB)	_____
	2120 MHz	0 dBm (±1 dB)	_____
	2170 MHz	0 dBm (±1 dB)	_____
	2220 MHz	0 dBm (±1 dB)	_____
	2270 MHz	0 dBm (±1 dB)	_____
	2320 MHz	0 dBm (±1 dB)	_____
	2370 MHz	0 dBm (±1 dB)	_____
	2420 MHz	0 dBm (±1 dB)	_____
	2470 MHz	0 dBm (±1 dB)	_____
	2520 MHz	0 dBm (±1 dB)	_____
	2570 MHz	0 dBm (±1 dB)	_____
	2620 MHz	0 dBm (±1 dB)	_____
	2670 MHz	0 dBm (±1 dB)	_____
	2700 MHz	0 dBm (±1 dB)	_____

GENERATOR T/R POWER LEVEL ACCURACY (2-4-5)

3.	-30 dBm	-30 dBm (±1 dB)	_____
	-40 dBm	-40 dBm (±1 dB)	_____
	-50 dBm	-50 dBm (±1 dB)	_____
	-60 dBm	-60 dBm (±1 dB)	_____

GENERATOR T/R POWER LEVEL FLATNESS (2-4-6)

3.	50 MHz	-30 dBm (±1 dB)	_____
	100 MHz	-30 dBm (±1 dB)	_____
	150 MHz	-30 dBm (±1 dB)	_____
	200 MHz	-30 dBm (±1 dB)	_____
	250 MHz	-30 dBm (±1 dB)	_____
	300 MHz	-30 dBm (±1 dB)	_____
	350 MHz	-30 dBm (±1 dB)	_____
	400 MHz	-30 dBm (±1 dB)	_____
	450 MHz	-30 dBm (±1 dB)	_____
	500 MHz	-30 dBm (±1 dB)	_____
	550 MHz	-30 dBm (±1 dB)	_____
	600 MHz	-30 dBm (±1 dB)	_____
	650 MHz	-30 dBm (±1 dB)	_____
	700 MHz	-30 dBm (±1 dB)	_____
	750 MHz	-30 dBm (±1 dB)	_____
	800 MHz	-30 dBm (±1 dB)	_____

STEP	DATA	RESULT

GENERATOR T/R POWER LEVEL FLATNESS (2-4-6) (cont)

3.	850 MHz	-30 dBm (±1 dB)	_____
	900 MHz	-30 dBm (±1 dB)	_____
	950 MHz	-30 dBm (±1 dB)	_____
	1000 MHz	-30 dBm (±1 dB)	_____
	1050 MHz	-30 dBm (±1 dB)	_____
	1100 MHz	-30 dBm (±1 dB)	_____
	1150 MHz	-30 dBm (±1 dB)	_____
	1200 MHz	-30 dBm (±1 dB)	_____
	1250 MHz	-30 dBm (±1 dB)	_____
	1300 MHz	-30 dBm (±1 dB)	_____
	1350 MHz	-30 dBm (±1 dB)	_____
	1400 MHz	-30 dBm (±1 dB)	_____
	1450 MHz	-30 dBm (±1 dB)	_____
	1500 MHz	-30 dBm (±1 dB)	_____
	1550 MHz	-30 dBm (±1 dB)	_____
	1600 MHz	-30 dBm (±1 dB)	_____
	1650 MHz	-30 dBm (±1 dB)	_____
	1700 MHz	-30 dBm (±1 dB)	_____
	1750 MHz	-30 dBm (±1 dB)	_____
	1800 MHz	-30 dBm (±1 dB)	_____
	1850 MHz	-30 dBm (±1 dB)	_____
	1900 MHz	-30 dBm (±1 dB)	_____
	1950 MHz	-30 dBm (±1 dB)	_____
	2000 MHz	-30 dBm (±1 dB)	_____
	2050 MHz	-30 dBm (±1 dB)	_____
	2100 MHz	-30 dBm (±1 dB)	_____
	2150 MHz	-30 dBm (±1 dB)	_____
	2200 MHz	-30 dBm (±1 dB)	_____
	2250 MHz	-30 dBm (±1 dB)	_____
	2300 MHz	-30 dBm (±1 dB)	_____
	2350 MHz	-30 dBm (±1 dB)	_____
	2400 MHz	-30 dBm (±1 dB)	_____
	2450 MHz	-30 dBm (±1 dB)	_____
	2500 MHz	-30 dBm (±1 dB)	_____
	2550 MHz	-30 dBm (±1 dB)	_____
	2600 MHz	-30 dBm (±1 dB)	_____
	2650 MHz	-30 dBm (±1 dB)	_____
	2700 MHz	-30 dBm (±1 dB)	_____

RF POWER METER ACCURACY (2-4-7)

5.	10.5 dBm (±1.05 dB)		_____

RSSI METER ACCURACY (2-4-8)

4.	-70 dBm	-70.0 dBm (±2.5 dB)	_____
	-60 dBm	-60.0 dBm (±2.5 dB)	_____
	-50 dBm	-50.0 dBm (±2.5 dB)	_____
	-40 dBm	-40.0 dBm (±2.5 dB)	_____
	-30 dBm	-30.0 dBm (±2.5 dB)	_____
	-20 dBm	-20.0 dBm (±2.5 dB)	_____

STEP	DATA	RESULT

ANALYZER LEVEL ACCURACY (2-4-9)

5.	1 MHz	-30.0 dBm (±2 dB)	_____
	50 MHz	-30.0 dBm (±2 dB)	_____
	100 MHz	-30.0 dBm (±2 dB)	_____
	150 MHz	-30.0 dBm (±2 dB)	_____
	200 MHz	-30.0 dBm (±2 dB)	_____
	250 MHz	-30.0 dBm (±2 dB)	_____
	300 MHz	-30.0 dBm (±2 dB)	_____
	350 MHz	-30.0 dBm (±2 dB)	_____
	400 MHz	-30.0 dBm (±2 dB)	_____
	450 MHz	-30.0 dBm (±2 dB)	_____
	500 MHz	-30.0 dBm (±2 dB)	_____
	550 MHz	-30.0 dBm (±2 dB)	_____
	600 MHz	-30.0 dBm (±2 dB)	_____
	650 MHz	-30.0 dBm (±2 dB)	_____
	700 MHz	-30.0 dBm (±2 dB)	_____
	750 MHz	-30.0 dBm (±2 dB)	_____
	800 MHz	-30.0 dBm (±2 dB)	_____
	850 MHz	-30.0 dBm (±2 dB)	_____
	900 MHz	-30.0 dBm (±2 dB)	_____
	950 MHz	-30.0 dBm (±2 dB)	_____
	1000 MHz	-30.0 dBm (±2 dB)	_____
	1050 MHz	-30.0 dBm (±2 dB)	_____
	1100 MHz	-30.0 dBm (±2 dB)	_____
	1150 MHz	-30.0 dBm (±2 dB)	_____
	1200 MHz	-30.0 dBm (±2 dB)	_____
	1250 MHz	-30.0 dBm (±2 dB)	_____
	1300 MHz	-30.0 dBm (±2 dB)	_____
	1350 MHz	-30.0 dBm (±2 dB)	_____
	1400 MHz	-30.0 dBm (±2 dB)	_____
	1450 MHz	-30.0 dBm (±2 dB)	_____
	1500 MHz	-30.0 dBm (±2 dB)	_____
	1550 MHz	-30.0 dBm (±2 dB)	_____
	1600 MHz	-30.0 dBm (±2 dB)	_____
	1650 MHz	-30.0 dBm (±2 dB)	_____
	1700 MHz	-30.0 dBm (±2 dB)	_____
	1750 MHz	-30.0 dBm (±2 dB)	_____
	1800 MHz	-30.0 dBm (±2 dB)	_____
	1850 MHz	-30.0 dBm (±2 dB)	_____
	1900 MHz	-30.0 dBm (±2 dB)	_____
	1950 MHz	-30.0 dBm (±2 dB)	_____
	2000 MHz	-30.0 dBm (±2 dB)	_____
	2050 MHz	-30.0 dBm (±2 dB)	_____
	2100 MHz	-30.0 dBm (±2 dB)	_____
	2150 MHz	-30.0 dBm (±2 dB)	_____
	2200 MHz	-30.0 dBm (±2 dB)	_____
	2250 MHz	-30.0 dBm (±2 dB)	_____
	2300 MHz	-30.0 dBm (±2 dB)	_____
	2350 MHz	-30.0 dBm (±2 dB)	_____
	2400 MHz	-30.0 dBm (±2 dB)	_____
	2450 MHz	-30.0 dBm (±2 dB)	_____

STEP	DATA	RESULT
ANALYZER LEVEL ACCURACY (2-4-9) (cont)		
5.	2500 MHz -30.0 dBm (±2 dB)	_____
	2550 MHz -30.0 dBm (±2 dB)	_____
	2600 MHz -30.0 dBm (±2 dB)	_____
	2650 MHz -30.0 dBm (±2 dB)	_____
	2700 MHz -30.0 dBm (±2 dB)	_____
GENERATOR FM RESIDUAL (2-4-10)		
4.	<15 Hz rms	_____
GENERATOR AM RESIDUAL (2-4-11)		
4.	<0.1%	_____
GENERATOR FM DEVIATION ACCURACY (2-4-12)		
4.	Record FM deviation	_____
5.	Subtract reading in para 2-4-10 from reading in Step 4	_____
	FM deviation is 10 kHz (±0.31 kHz)	_____
GENERATOR FM MODULATION RATE (2-4-13)		
4.	50.0 Hz 6 kHz (±0.18 kHz)	_____
	300.0 Hz 6 kHz (±0.18 kHz)	_____
	10000.0 Hz 6 kHz (±0.18 kHz)	_____
GENERATOR FM MODULATION DISTORTION (2-4-14)		
5.	Modulation Distortion is <1%	_____
GENERATOR AM MODULATION ACCURACY (2-4-15)		
4.	Record AM Modulation	_____
5.	Subtract reading in para 2-4-11 from reading in Step 4	_____
	AM Modulation is 30% (±5%)	_____
RF ERROR METER ACCURACY (2-4-16)		
3.	1000.01 MHz +10000 Hz (±1 Hz)	_____
	999.99 MHz -10000 Hz (±1 Hz)	_____
AF METER ACCURACY (2-4-17)		
5.	1000 Hz (±1 Hz)	_____
FM DEVIATION METER ACCURACY (2-4-18)		
4.	Record deviation level	_____
6.	Record deviation level	_____
7.	Subtract Step 4 from Step 6	_____
	Deviation level is 10 kHz (±0.52 kHz)	_____

STEP	DATA	RESULT

AM MODULATION METER ACCURACY (2-4-19)

4. Record modulation level _____

6. Record modulation level _____

7. Subtract Step 4 from Step 6 _____

Modulation level is 50% (±5%) _____

ANALYZER FREQUENCY AND SPAN ACCURACY (2-4-20)

4. Measure 20 dB bandwidth of displayed signal _____

Calculate center frequency _____

Record peak frequency of displayed signal _____

5. Subtract 1.5 GHz from peak frequency in Step 4 _____

Peak frequency is 0 kHz (±2.5 kHz) _____

7. -30 dBm point is within 1/2 minor division of 9th major division from left _____

ANALYZER BANDWIDTH SWITCHING ERROR (2-4-21)

6.

SPAN	RBW	VBW	TOLERANCE	
5 kHz	300 Hz	100 Hz	≤2 dB	_____
50 kHz	3 kHz	100 Hz	≤2 dB	_____
500 kHz	30 kHz	3 kHz	≤2 dB	_____
1 MHz	60 kHz	3 kHz	≤2 dB	_____
5 MHz	300 kHz	3 kHz	≤2 dB	_____
20 MHz	6 MHz	3 kHz	≤2 dB	_____

OSCILLOSCOPE AMPLITUDE ACCURACY (2-4-22)

4.

GEN LEVEL	2975 OSC	TOLERANCE	
160 mVp-p	0.02 V/Div	7 to 9 major divisions	_____
400 mVp-p	0.05 V/Div	7 to 9 major divisions	_____
800 mVp-p	0.1 V/Div	7 to 9 major divisions	_____
1.6 Vp-p	0.2 V/Div	7 to 9 major divisions	_____
4 Vp-p	0.5 V/Div	7 to 9 major divisions	_____
8 Vp-p	1.0 V/Div	7 to 9 major divisions	_____
16 Vp-p	2.0 V/Div	7 to 9 major divisions	_____

7.

GEN LEVEL	2975 OSC	TOLERANCE	
160 mVp-p	0.02 V/Div	7 to 9 major divisions	_____
400 mVp-p	0.05 V/Div	7 to 9 major divisions	_____
800 mVp-p	0.1 V/Div	7 to 9 major divisions	_____
1.6 Vp-p	0.2 V/Div	7 to 9 major divisions	_____
4 Vp-p	0.5 V/Div	7 to 9 major divisions	_____
8 Vp-p	1.0 V/Div	7 to 9 major divisions	_____
16 Vp-p	2.0 V/Div	7 to 9 major divisions	_____

DIGITAL VOLTMETER DC ACCURACY (2-4-23)

4. 200 mV (±10 mV) _____

STEP	DATA	RESULT
DIGITAL VOLTMETER AC ACCURACY (2-4-24)		
4. 50 Hz	200 mV (±30 mV)	_____
100 Hz	200 mV (±30 mV)	_____
1 kHz	200 mV (±30 mV)	_____
10 kHz	200 mV (±30 mV)	_____
20 kHz	200 mV (±30 mV)	_____
FUNCTION GENERATOR LEVEL ACCURACY (2-4-25)		
5. 7.070 Vrms (±350 mVrms)		_____
FUNCTION GENERATOR FREQUENCY ACCURACY (2-4-26)		
4. 5000 Hz (±1 Hz)		_____
FUNCTION GENERATOR TOTAL HARMONIC DISTORTION (2-4-27)		
4. Total harmonic output is <0.5%		_____
AF COUNTER ACCURACY (2-4-28)		
5. 5000 Hz (±1 Hz)		_____
SINAD/DISTORTION METER ACCURACY (2-4-29)		
5. 12 dB (±1.1 dB)		_____
6. Record Residual Distortion		_____
8. 5% (±0.09%)		_____

2-6 CALIBRATION PROCEDURES

2-6-1 POWER SUPPLY VOLTAGES

PREREQUISITES: None

EQUIPMENT REQUIRED: Digital Multimeter

STEP PROCEDURE

1. Remove Case Assy (para 3-3-1).

VERIFY RESISTANCE

2. Using the Digital Multimeter, verify resistance between the locations shown and chassis ground.

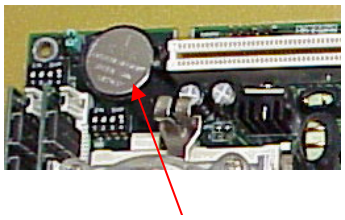
RESISTANCE	LOCATION
>100 Ω	42A1A1A1J19, Pin B2
>12 Ω	42A1A1A1J19, Pin B25
>12 Ω	42A1A1A1J19, Pin B28
>400 Ω	42A1A1A1J19, Pin B31
>2 kΩ	42A1A1A1J19, Pin C14

- If readings are correct, go to Step 3.
- If any of the resistance measurements are out of tolerance, return the 2975 to the factory for fault diagnosis and repair.

3. Remove CPU Adapter Assy (para 3-3-9).
4. Using the Digital Multimeter, verify the battery voltage on the back side of the CPU Adapter Assy is ≥2.8 Vdc.

- If reading is correct, reinstall CPU Adapter Assy (para 3-3-9) and go to Step 5.
- If reading is out of tolerance, replace the CPU Battery and go to Step 5.

(BACK SIDE)
(7005-4243-500)

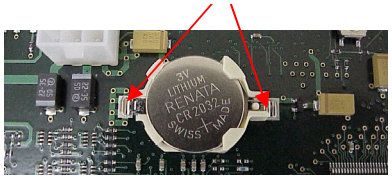


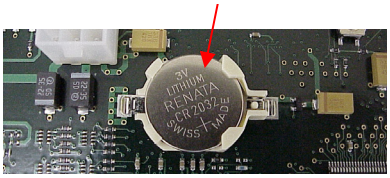
(TOP SIDE)
(7005-4243-500)

Measure Battery Voltage Here

CPU Battery

(TOP SIDE)
(7010-4238-800)





VERIFY VOLTAGES

5. Apply power to the 2975 from an appropriate power source.
6. Using the Digital Multimeter, verify the following voltages between the locations shown and chassis ground.

VOLTAGE	LOCATION
14.8 to 15.2 Vdc	42A1A1A1J19, Pin B2
4.9 to 5.3 Vdc	42A1A1A1J19, Pin B25
4.9 to 5.3 Vdc	42A1A1A1J19, Pin B28
14.8 to 15.2 Vdc	42A1A1A1J19, Pin B31
4.9 to 5.3 Vdc	42A1A1A1J19, Pin C14

- If readings are correct, go to Step 7.
- If any of the supply voltages are out of tolerance, return the 2975 to the factory for fault diagnosis and repair.

7. Allow a 15-minute warm-up period before proceeding with the Calibration Procedures.

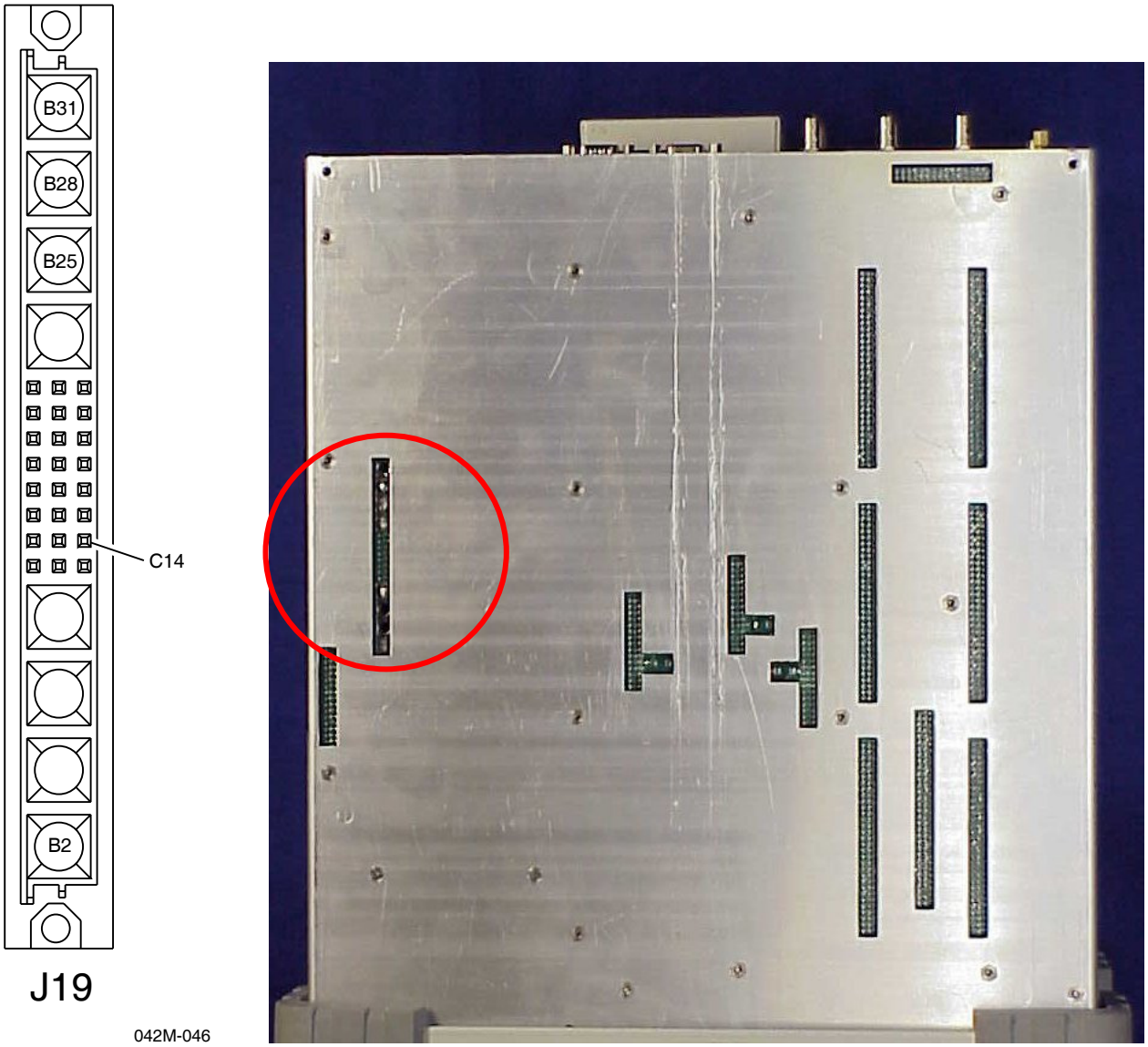


Figure 2-1 Power Supply Voltages

2-6-2 GENERATOR / ANALYZER / TCXO

PREREQUISITES: 2-6-1 Power Supply Voltages

EQUIPMENT REQUIRED:
PC w/ Ethernet Card and GPIB Card
Power Meter
Power Meter Sensor Head “A”
Power Meter Sensor Head “B”
Signal Generator
Universal Counter
Ethernet Crossover Cable
GPIB Cables

NOTE: The Case Assy should be reassembled prior to performing the Generator / Analyzer Calibration Procedure.

NOTE: Refer to Figures 2 through 5 for the Calibration Test Equipment Configuration Setups, including cable hookups and GPIB addresses.

STEP	PROCEDURE

ETHERNET CARD SETUP

1. With the PC operating in Windows 95, 98, 2000 or NT, right click on the Network icon and select **Properties**.
2. Select **TCP/IP** and **Specify An IP Address**.
3. Enter PC IP Address: **10, 200, 126, 77**
4. Enter PC Subnet Mask: **255, 255, 0, 0**
5. After the PC reboots, connect the Ethernet Crossover Cable to the 2975 and the PC Ethernet Card.
6. Power up the 2975.
7. Enter 2975 IP Address: **10, 200, 126, 76**
8. Enter 2975 Subnet Mask: **255, 255, 0, 0**

CALIBRATION SOFTWARE SETUP

9. Insert Calibration Software CD-ROM into PC.
10. Run “Setup” to install the Calibration Software onto the PC.

    NOTE: The drive designation can be changed to the desired drive letter by the user. DO NOT use “X” as the drive letter.

11. Follow the on-screen prompts through the installation process.

RUNNING THE CALIBRATION SOFTWARE

12. Select the **2975 Auto Calibration** icon.
13. Enter the following when prompted: Badge - **1112** Password - **1112**
14. With the Calibration Main Screen displayed, select **Test Menu**, **IFR-2975 (FITS)** and **Complete Calibration**.
15. Select **Run All Tests**.

16. Follow the on-screen prompts through the Calibration process.

    NOTE: When the “Connect To UUT” pop-up window is displayed, the IP Address entered must match the IP Address of the 2975.

    NOTE: The Calibration process can be halted at anytime by selecting **Pause/Abort** on the Calibration Main Screen.

17. When the Calibration is completed, the Calibration Results for the Generator and Analyzer Calibration process are stored in an electronic file on the PC, accessed by selecting **Report**.

2-7 CALIBRATION DATA SHEET

TECHNICIAN: _____ DATE: _____

2975 S/N: _____

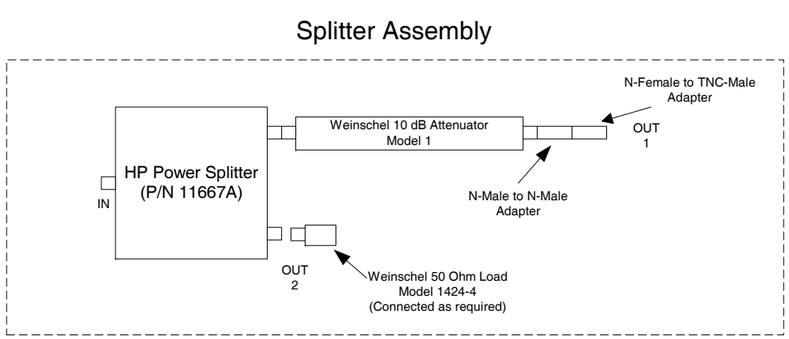
STEP	DATA	RESULT
POWER SUPPLY VOLTAGES (2-6-1)		
2.	>100 Ω at 42A1A1A1J19, Pin B2	_____(√)
	>12 Ω at 42A1A1A1J19, Pin B25	_____(√)
	>12 Ω at 42A1A1A1J19, Pin B28	_____(√)
	>400 Ω at 42A1A1A1J19, Pin B31	_____(√)
	>2 kΩ at 42A1A1A1J19, Pin C14	_____(√)
4.	Battery Voltage is ≥2.8 Vdc	_____
6.	14.8 to 15.2 Vdc at 42A1A1A1J19, Pin B2	_____(√)
	4.9 to 5.3 Vdc at 42A1A1A1J19, Pin B25	_____(√)
	4.9 to 5.3 Vdc at 42A1A1A1J19, Pin B28	_____(√)
	14.8 to 15.2 Vdc at 42A1A1A1J19, Pin B31	_____(√)
	4.9 to 5.3 Vdc at 42A1A1A1J19, Pin C14	_____(√)

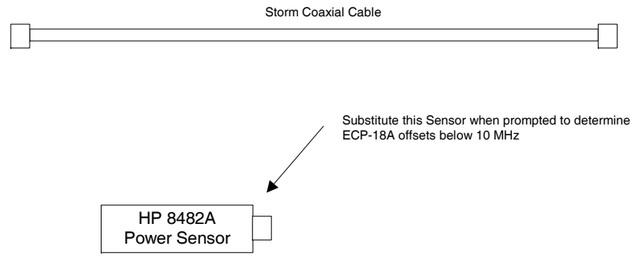
GENERATOR / ANALYZER / TCXO (2-6-2)

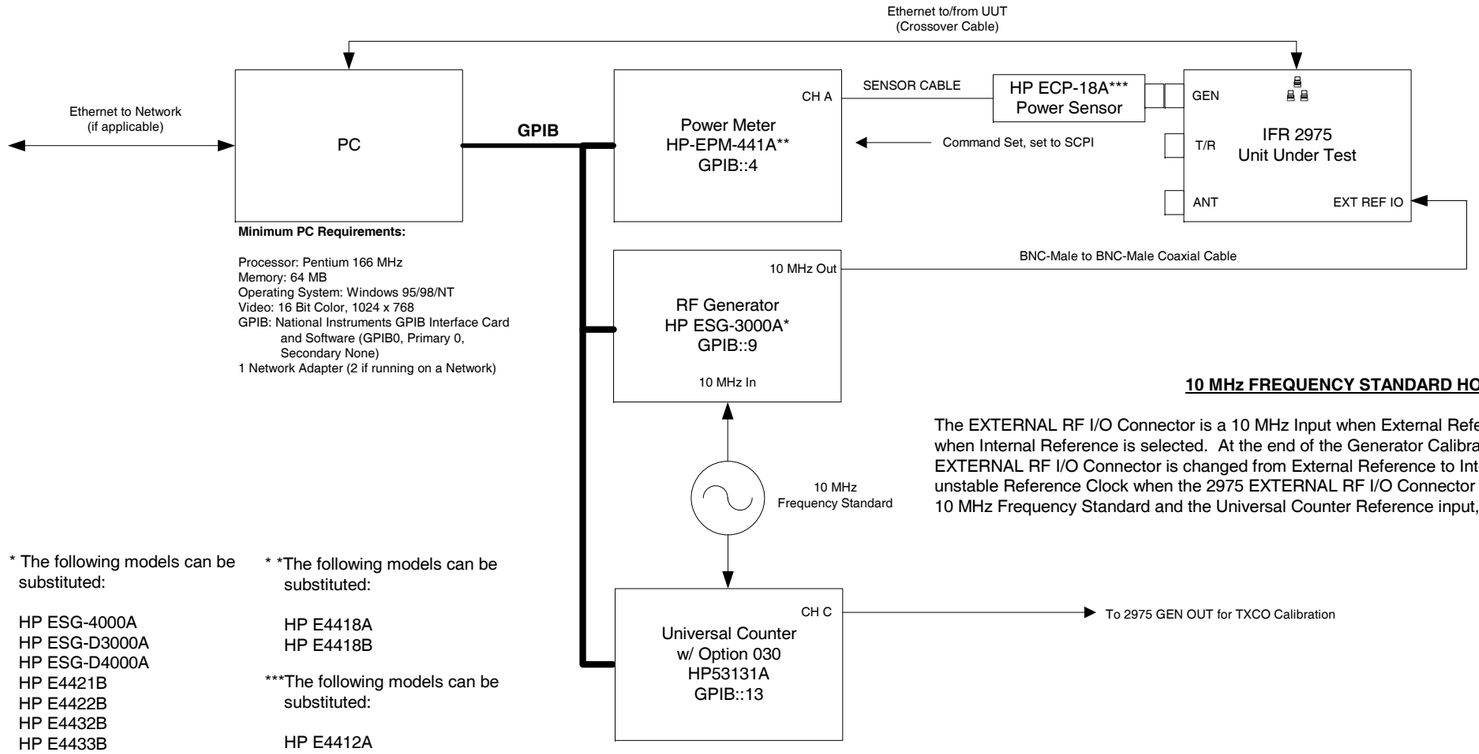
Calibration Results for the Generator / Analyzer / TCXO Calibration process are stored in an electronic file on the PC when the Calibration is completed.

EXAMPLE: C:\2975CALIBRATIONV1.8\TESTREPORT\442215.RPT

2975 Calibration Test Equipment Configuration







10 MHz FREQUENCY STANDARD HOOKUP

The EXTERNAL RF I/O Connector is a 10 MHz Input when External Reference is selected and a 10 MHz Output when Internal Reference is selected. At the end of the Generator Calibration, during the TXCO Calibration, the EXTERNAL RF I/O Connector is changed from External Reference to Internal Reference. This can cause an unstable Reference Clock when the 2975 EXTERNAL RF I/O Connector is connected with a T-Connector to the 10 MHz Frequency Standard and the Universal Counter Reference input, causing the TXCO Calibration to fail.

042M-047

* The following models can be substituted:

HP ESG-4000A
HP ESG-D3000A
HP ESG-D4000A
HP E4421B
HP E4422B
HP E4432B
HP E4433B

* *The following models can be substituted:

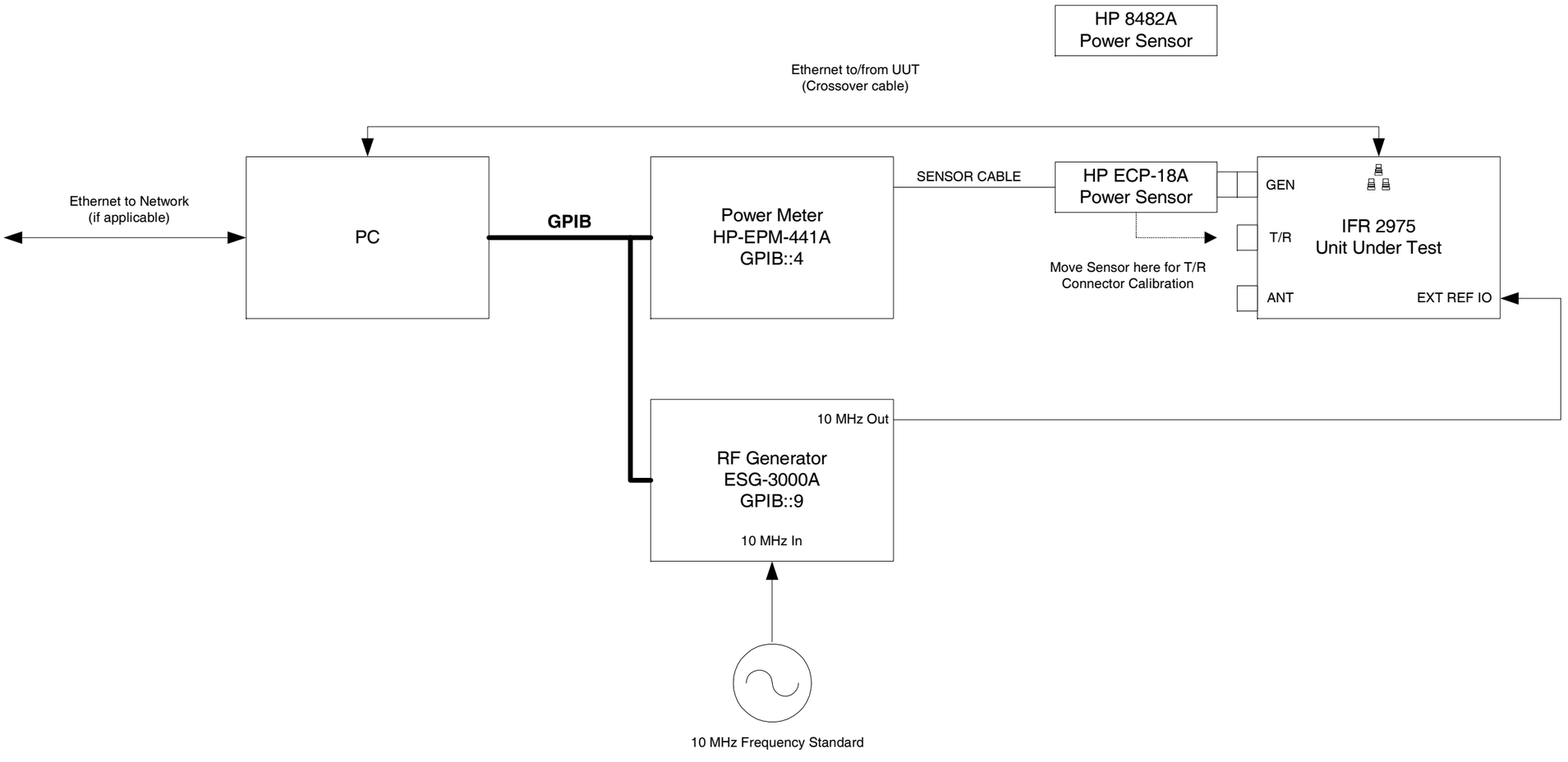
HP E4418A
HP E4418B

***The following models can be substituted:

HP E4412A

Figure 2-2 2975 Calibration Test Equipment Configuration

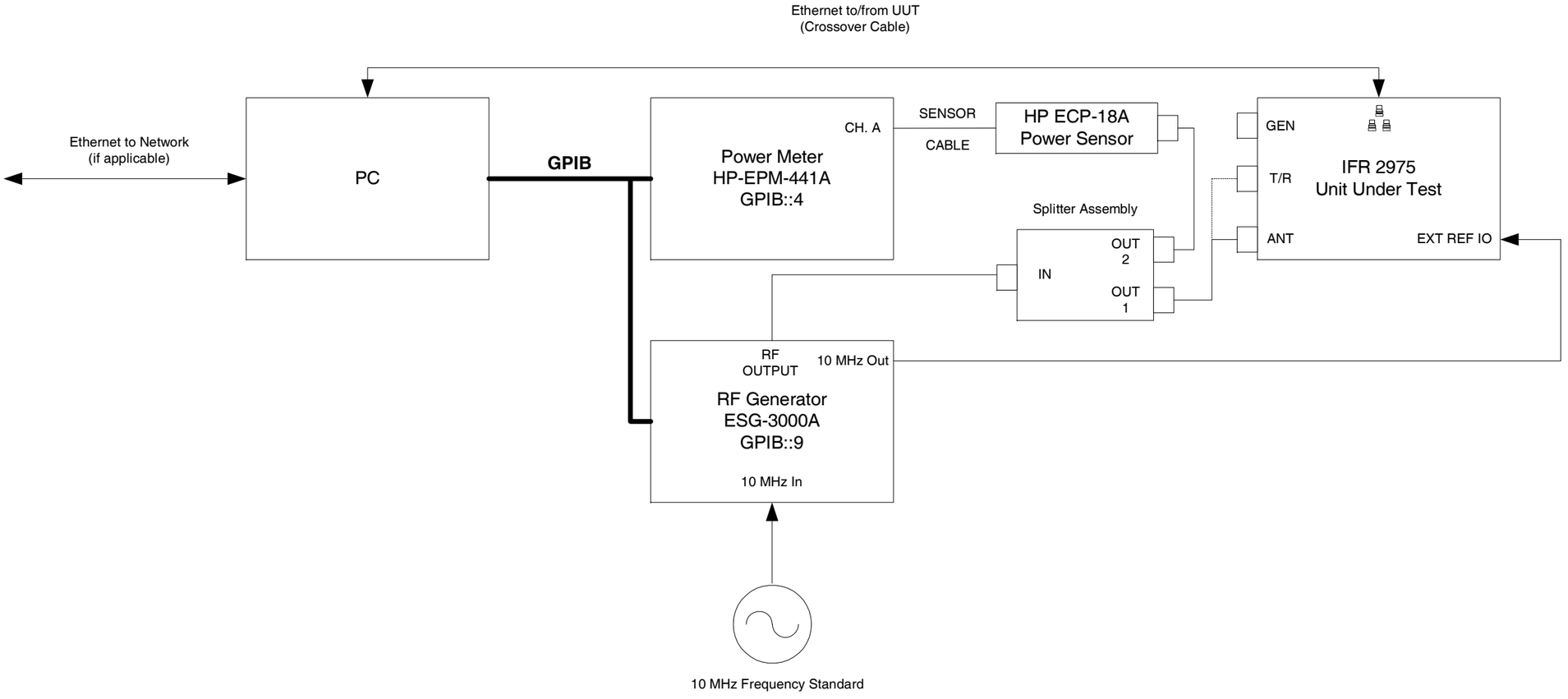
Generator Calibration Setup



042M-048

Figure 2-3 Generator Calibration Setup

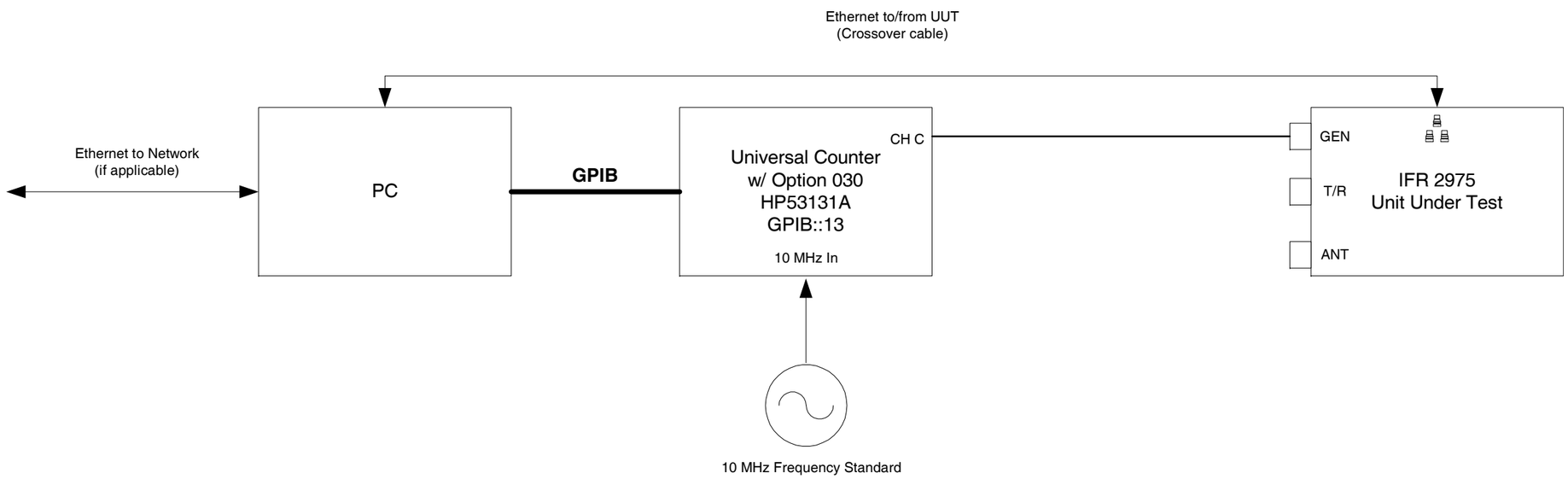
Analyzer Calibration Setup



042M-049

Figure 2-4 Analyzer Calibration Setup

TCXO Calibration Setup



10 MHz FREQUENCY STANDARD HOOKUP

The EXTERNAL RF I/O Connector is a 10 MHz Input when External Reference is selected and a 10 MHz Output when Internal Reference is selected. At the end of the Generator Calibration, during the TXCO Calibration, the EXTERNAL RF I/O Connector is changed from External Reference to Internal Reference. This can cause an unstable Reference Clock when the 2975 EXTERNAL RF I/O Connector is connected with a T-Connector to the 10 MHz Frequency Standard and the Universal Counter Reference input, causing the TXCO Calibration to fail.

042M-050

Figure 2-5 TCXO Calibration Setup

SECTION 3 - REPLACEMENT PROCEDURES

3-1 GENERAL

This section contains instructions for replacement of any assembly contained in the 2975. The instructions given are for removal of each assembly. Prerequisite instructions are listed as needed. Reassembly is in reverse order of removal instructions unless otherwise noted.

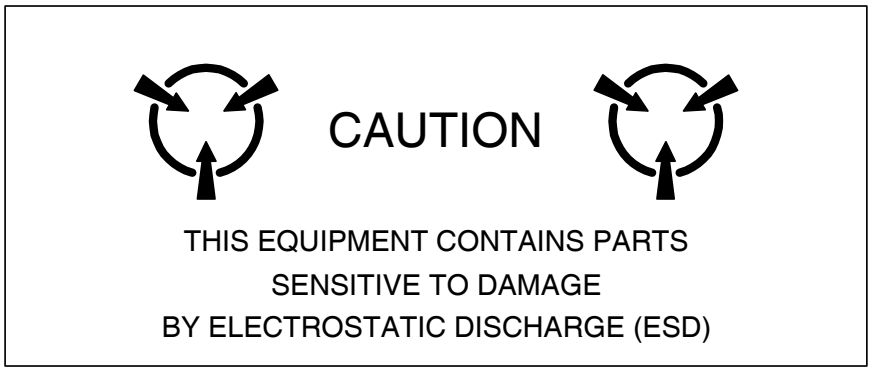
3-1-1 SAFETY PRECAUTIONS

Power should be removed from the unit before any replacement procedure is initiated.

WARNING: DANGEROUS VOLTATES ARE PRESENT WITH CASE ASSEMBLIES REMOVED IF POWER IS PRESENT.

3-1-2 ESD PRECAUTIONS

CAUTION: THE REPLACEMENT PROCEDURES FOR THE 2975 SHOULD ONLY BE PERFORMED IN AN ESD ENVIRONMENT AND ALL PERSONNEL PERFORMING THE REPLACEMENT PROCEDURES SHOULD HAVE KNOWLEDGE OF ACCEPTED ESD PRACTICES AND/OR BE ESD CERTIFIED.



3-2 TOOL REQUIREMENTS

TOOL	SIZE
WRENCH, OPEN END	5/16”
RATCHET / SOCKET	3/16” 1/4”
RATCHET / DEEP SOCKET	9/16”
SCREWDRIVER	Phillips

3-3 REPLACEMENT PROCEDURES

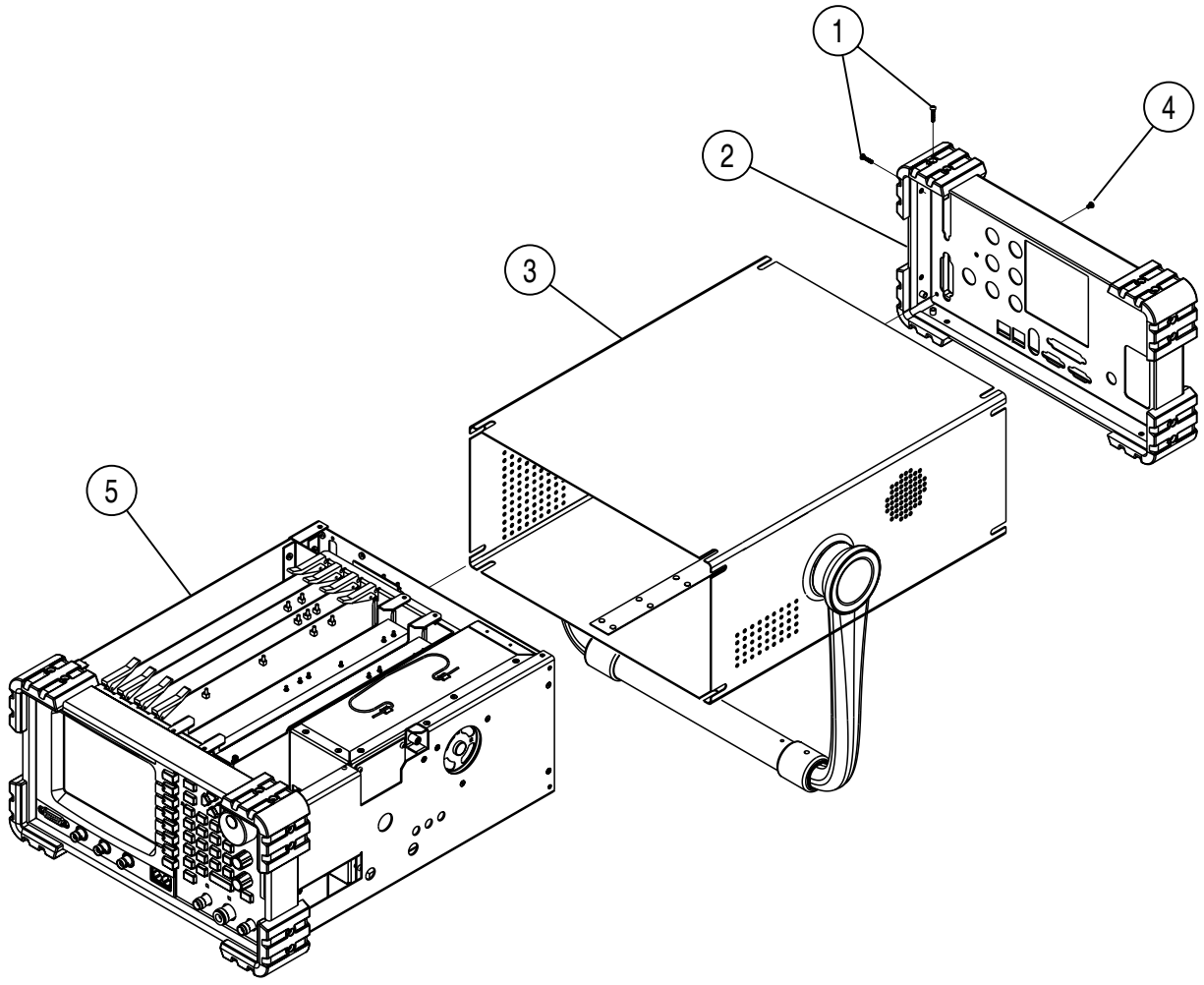
3-3-1 REMOVE CASE ASSY

PRELIMINARY PROCEDURES: None

WARNING: DANGEROUS VOLTAGES ARE PRESENT WITH CASE ASSY REMOVED IF POWER IS PRESENT.

STEP	PROCEDURE

1. Remove external power sources and all external cables from the 2975.
2. Remove two screws (1) from each corner securing the Rear Panel Assy (2) to the Case Assy (3).
3. Remove six screws (4) securing the Rear Panel Assy (2) to the Chassis Assy (5).
4. Remove the Case Assy (3).

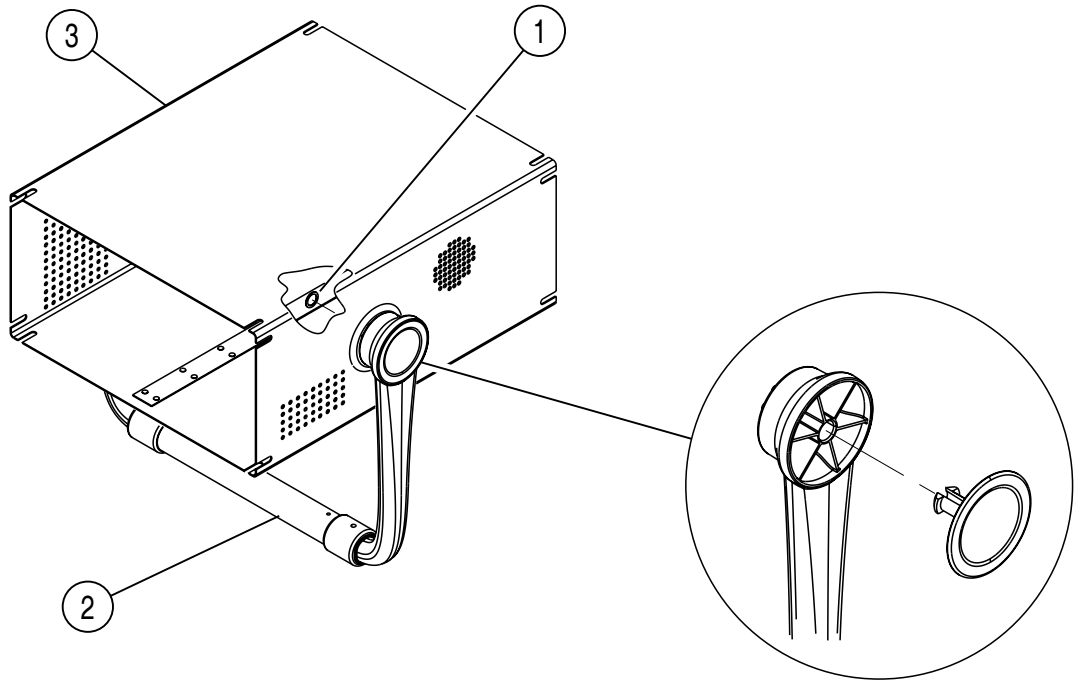


3-3-2 REPLACE HANDLE

PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)

STEP	PROCEDURE

1. Remove washers (1) securing the Handle (2) to the Case Assy (3).
2. Remove the Handle (2) from the Case Assy (3).



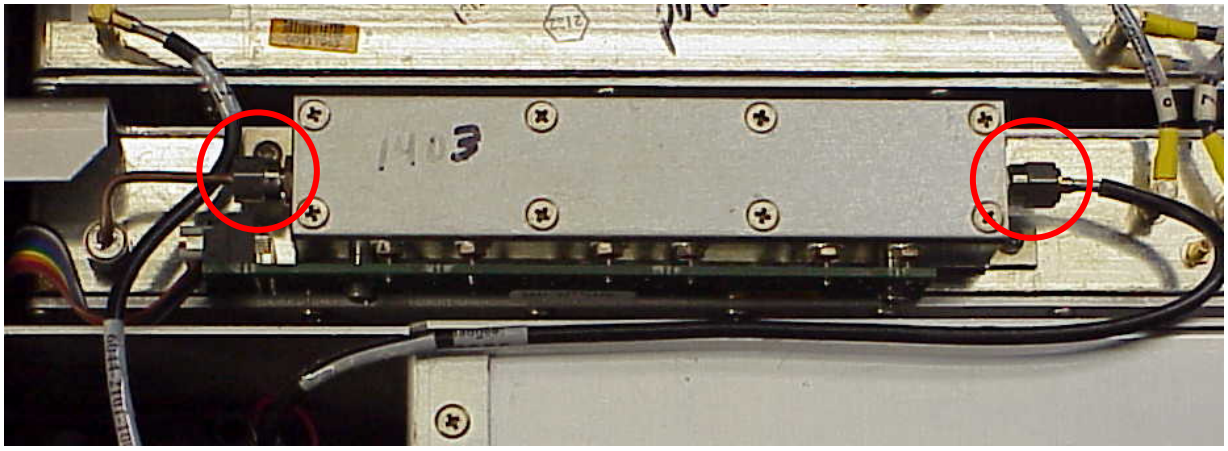
042M-029

3-3-3 REPLACE ATTENUATOR ASSY

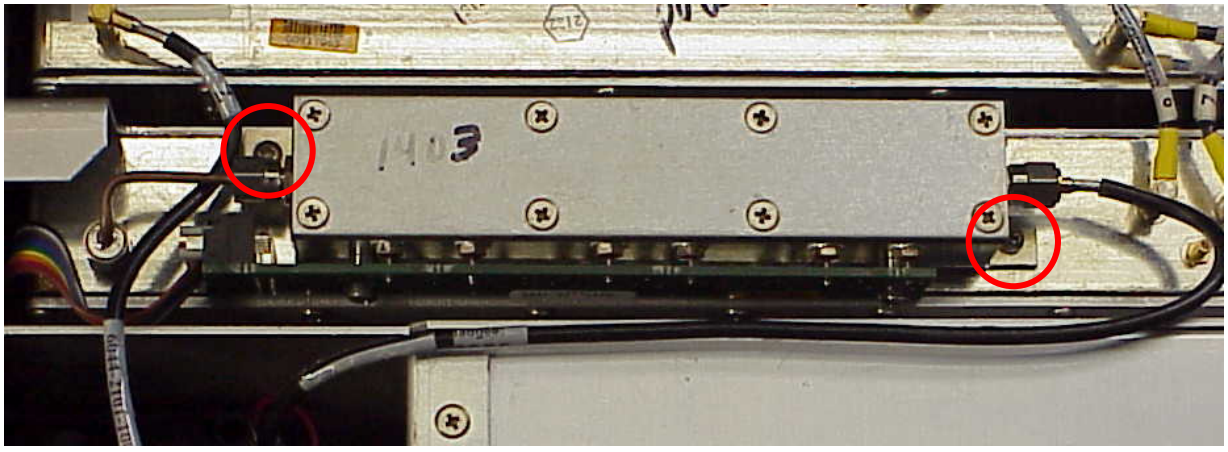
PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)

STEP	PROCEDURE

1. Disconnect the coaxial cable from each end of the Attenuator Assy.



2. Remove two screws securing the Attenuator Assy to the Generator Assy.



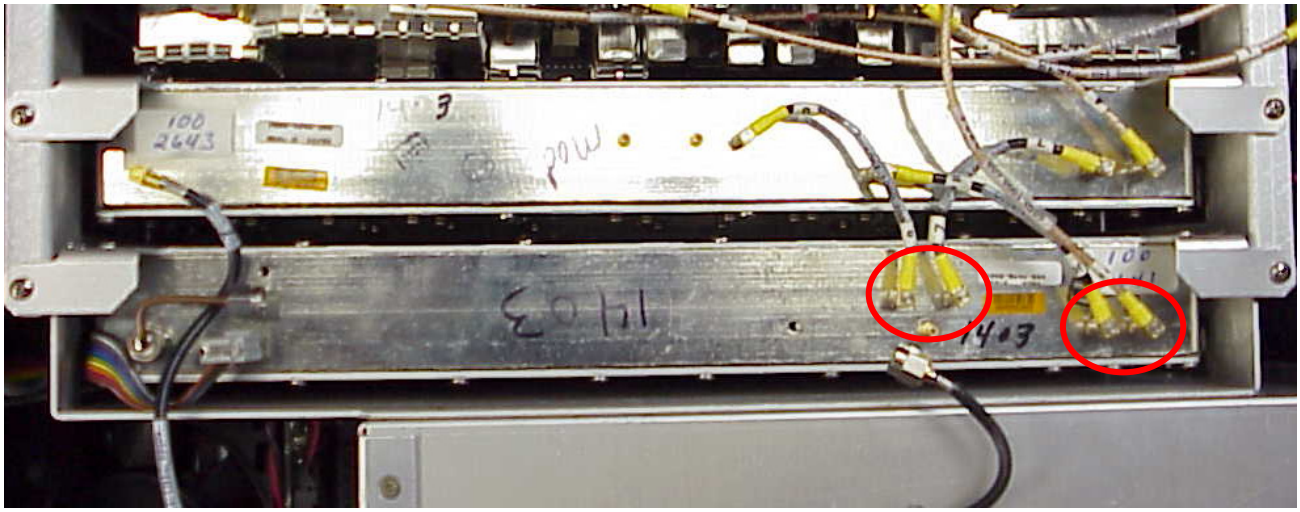
3. Remove the Attenuator Assy.

3-3-4 REPLACE GENERATOR ASSY

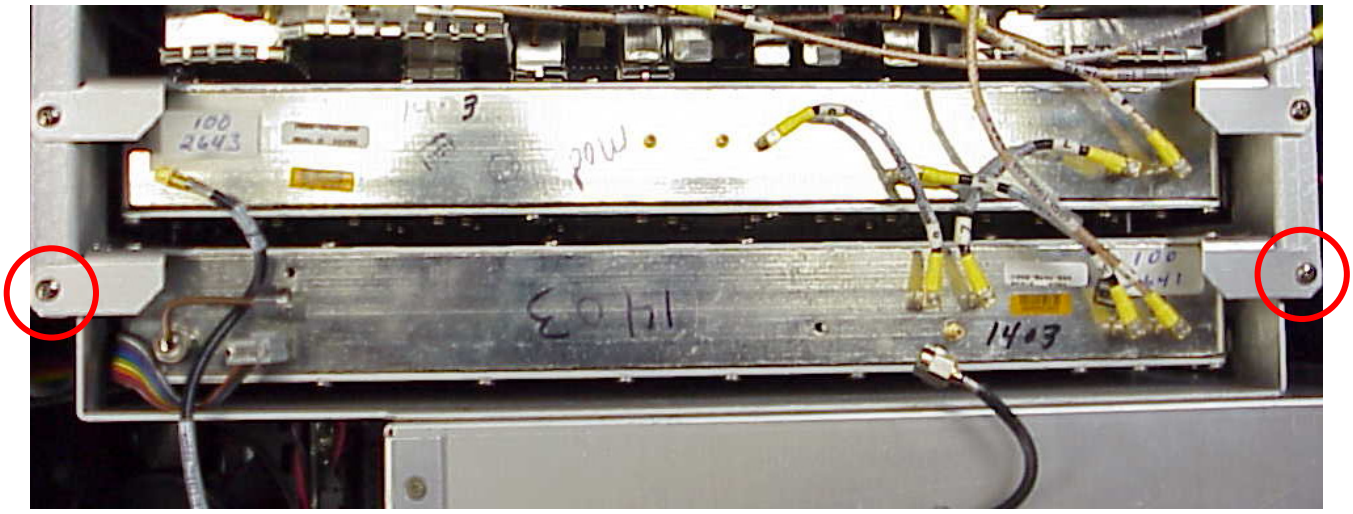
PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)
Remove Attenuator Assy (para 3-3-1)

STEP PROCEDURE

1. Disconnect four coaxial cables from the Generator Assy.



2. Remove two screws securing the Generator Assy to the Chassis Assy.



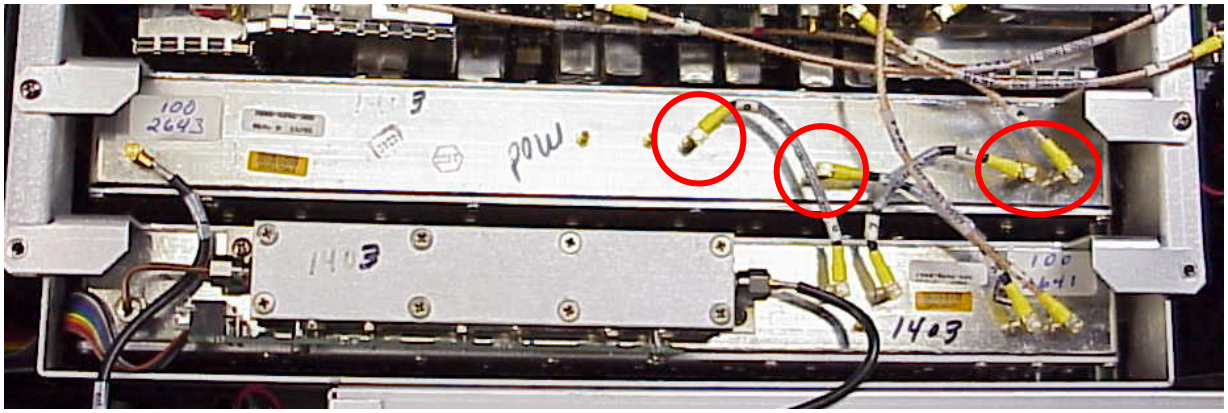
3. Remove the Generator Assy.

3-3-5 REPLACE RECEIVER ASSY

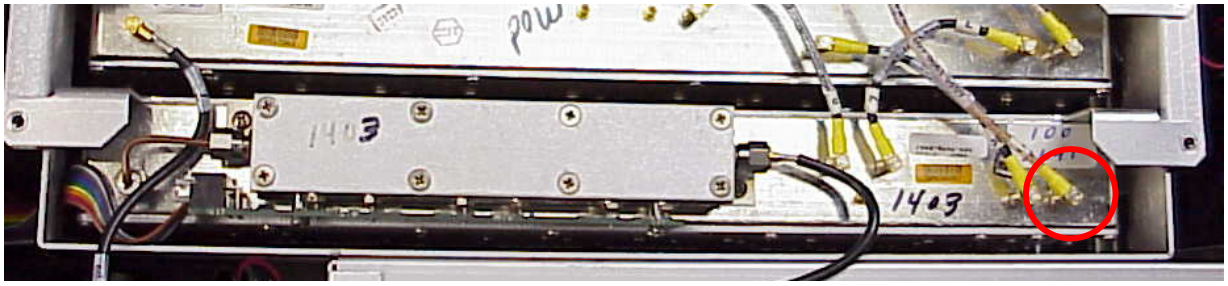
PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)

STEP PROCEDURE

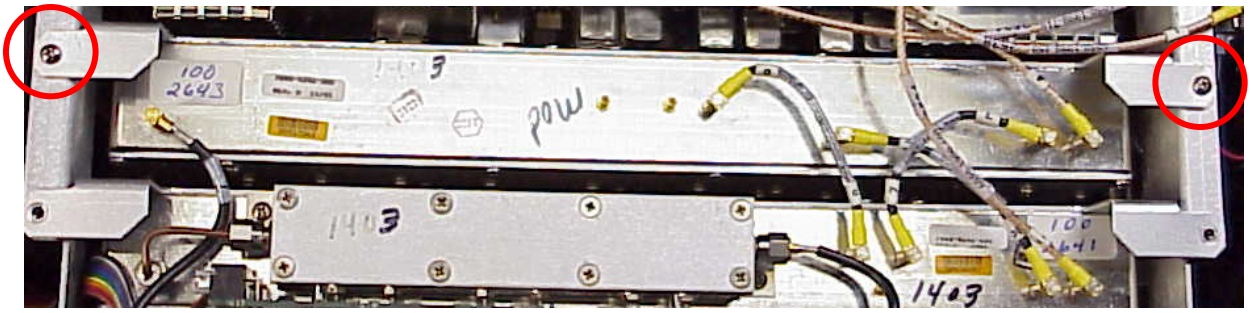
1. Disconnect four coaxial cables from the Receiver Assy.



2. Disconnect the coaxial cable from the Generator Assy.



3. Remove two screws securing the Receiver Assy to the Chassis Assy.



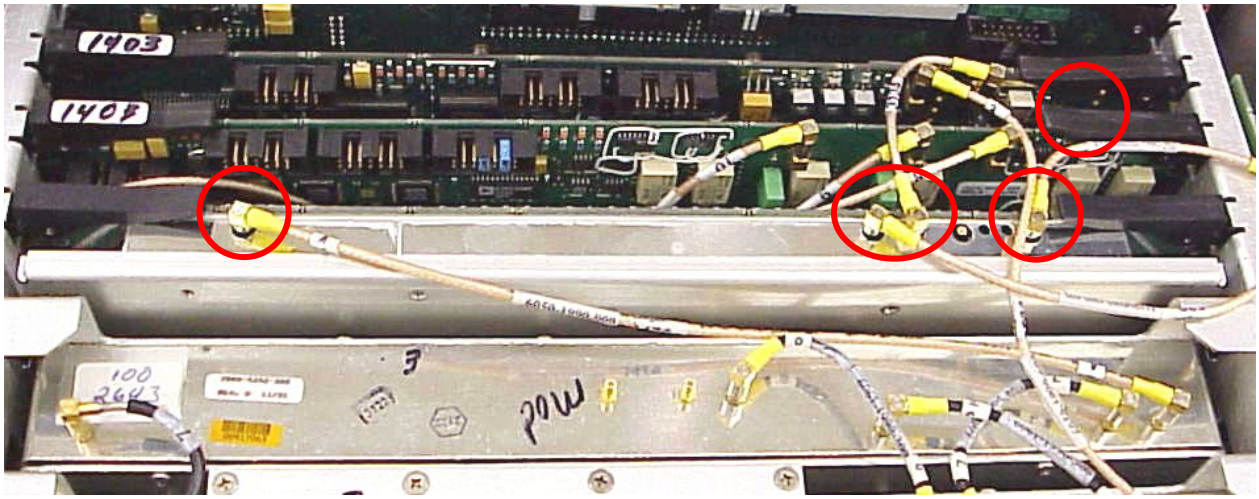
4. Remove the Receiver Assy.

3-3-6 REPLACE IF/VIDEO PCB ASSY

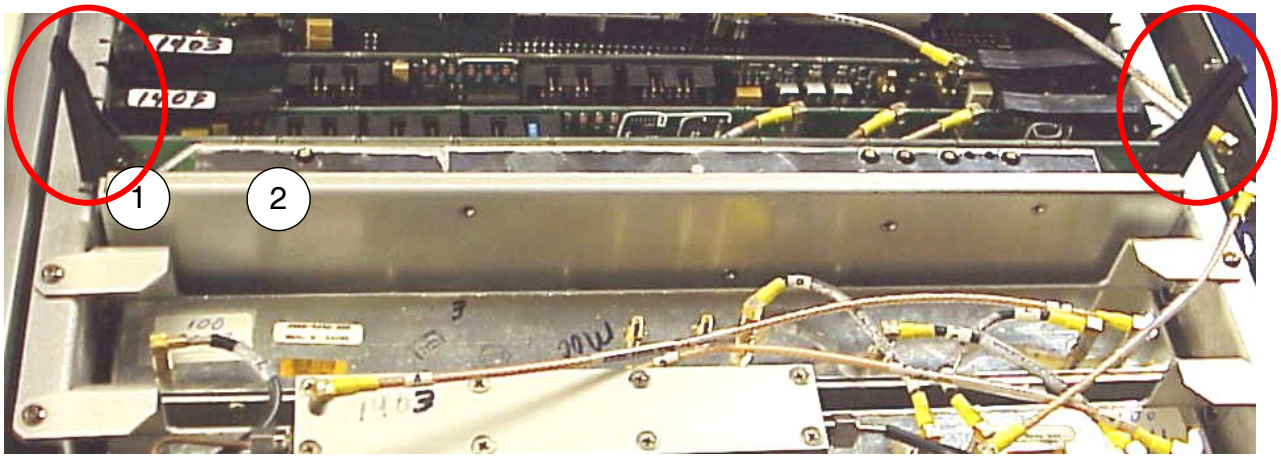
PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)

STEP PROCEDURE

1. Disconnect four coaxial cables from the IF/Video PCB Assy.



2. Lift up on the card ejectors and remove the IF/Video PCB Assy from the Chassis Assy.

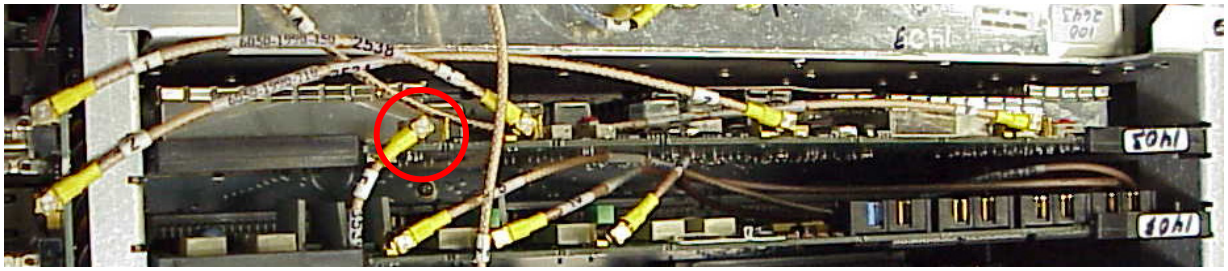


3-3-7 REPLACE MULTIFUNCTION I/O PCB ASSY

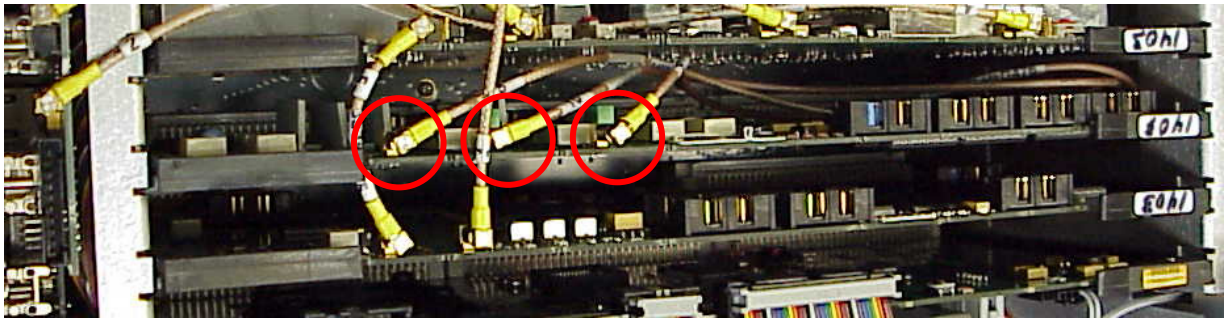
PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)

STEP	PROCEDURE

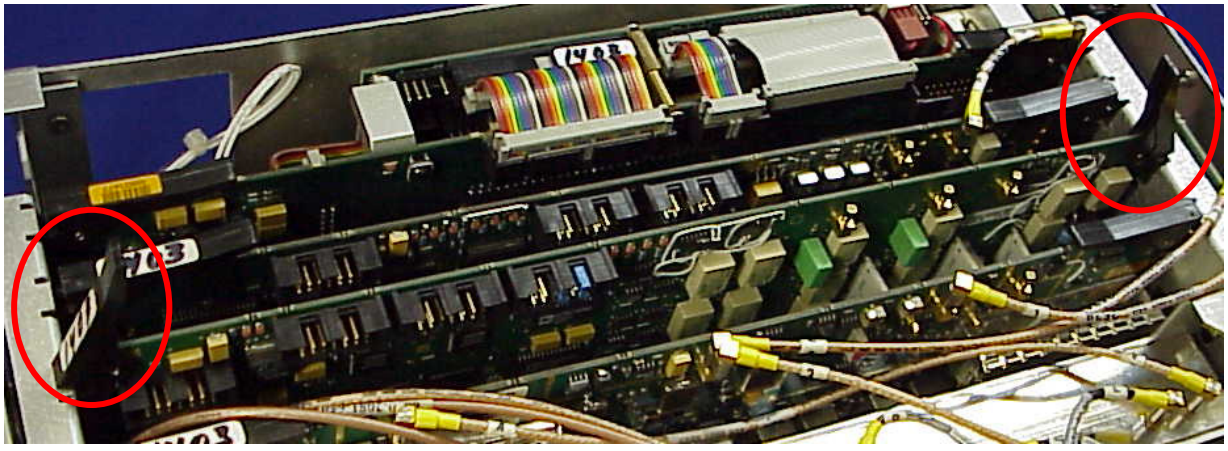
1. Disconnect the coaxial cable from the IF/Video PCB Assy.



2. Disconnect three coaxial cables from the Multifunction I/O PCB Assy.



3. Lift up on the card ejectors and remove the Multifunction I/O PCB Assy from the Chassis Assy.

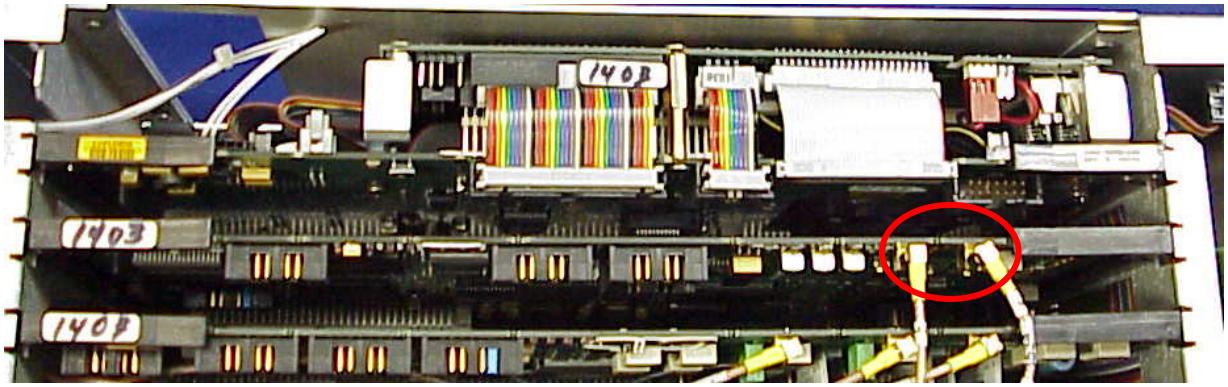


3-3-8 REPLACE CAI PCB ASSY

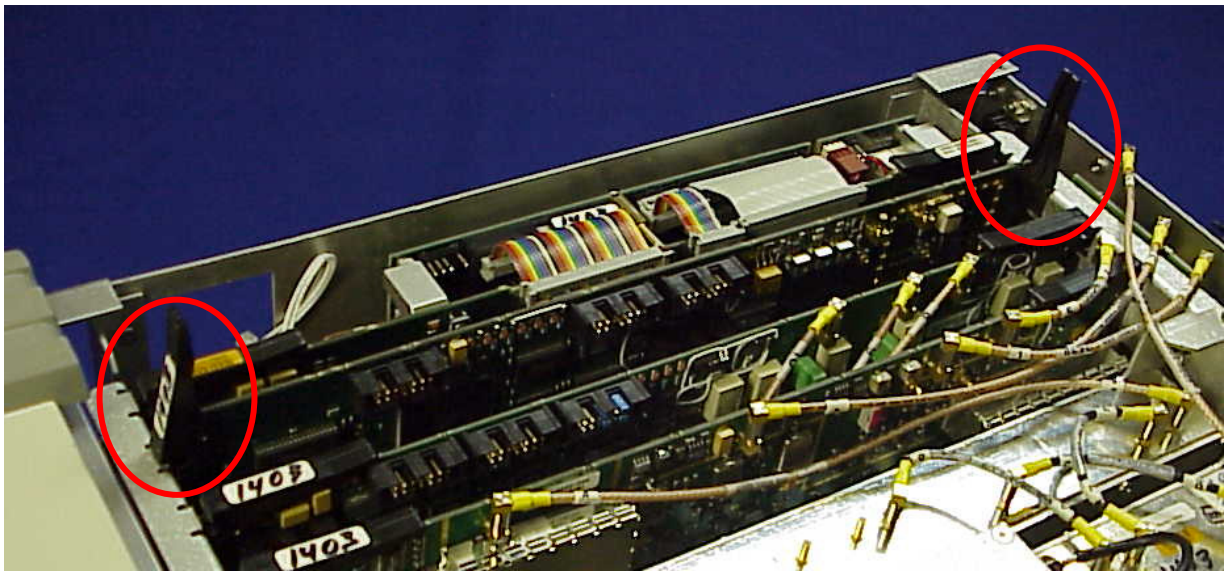
PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)

STEP	PROCEDURE

1. Disconnect two coaxial cables from the CAI PCB Assy.



2. Lift up on the card ejectors and remove the CAI PCB Assy from the Chassis Assy.

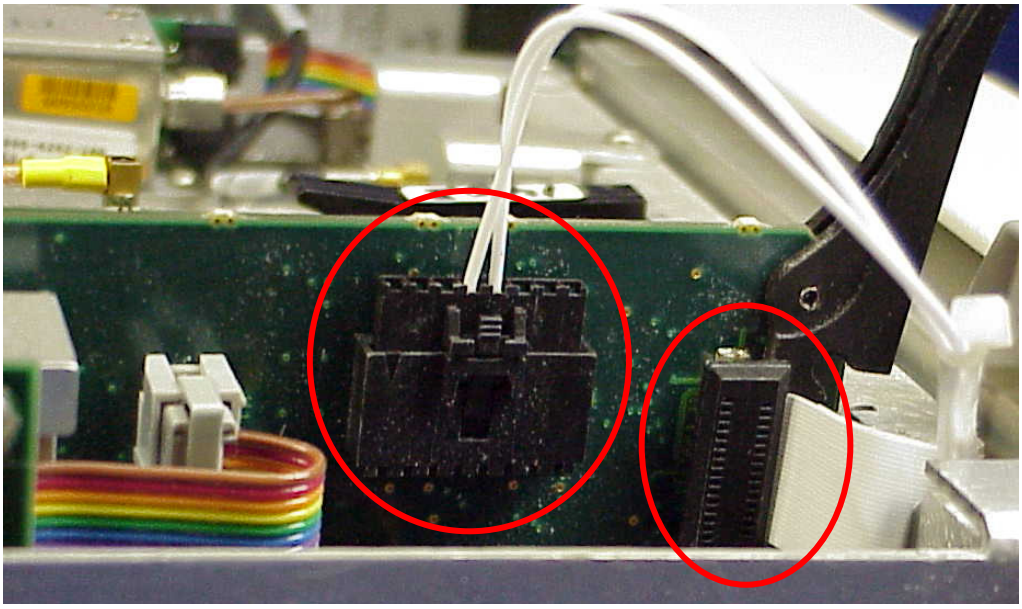


3-3-9 REPLACE CPU ADAPTER ASSY

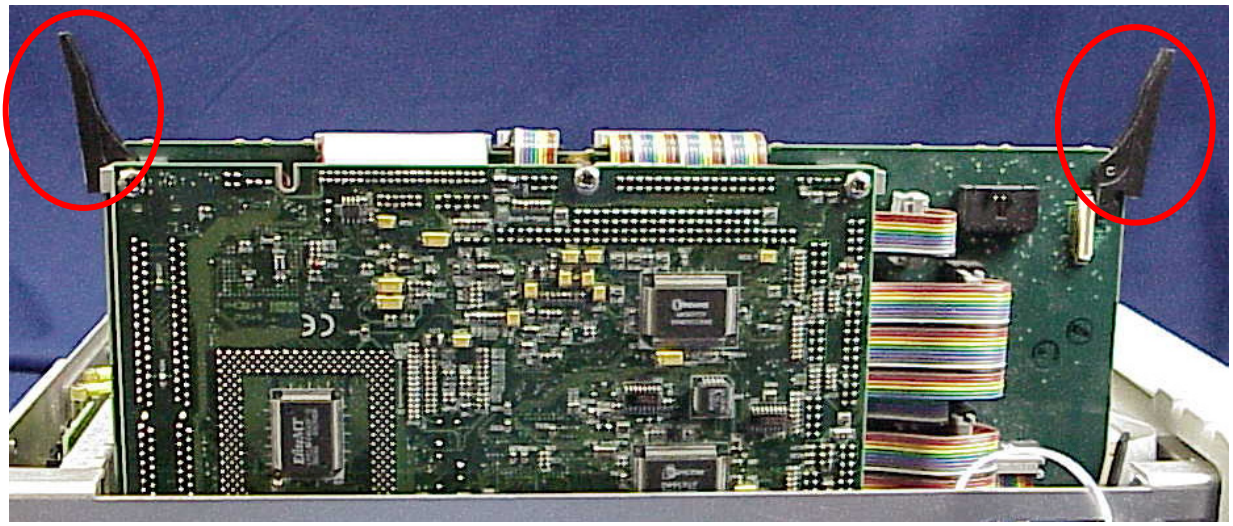
PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)

STEP PROCEDURE

1. Disconnect the wire cable and ribbon cable from the CPU Adapter PCB Assy.



2. Lift up on the card ejectors and remove the CPU Adapter PCB Assy from the Chassis Assy.

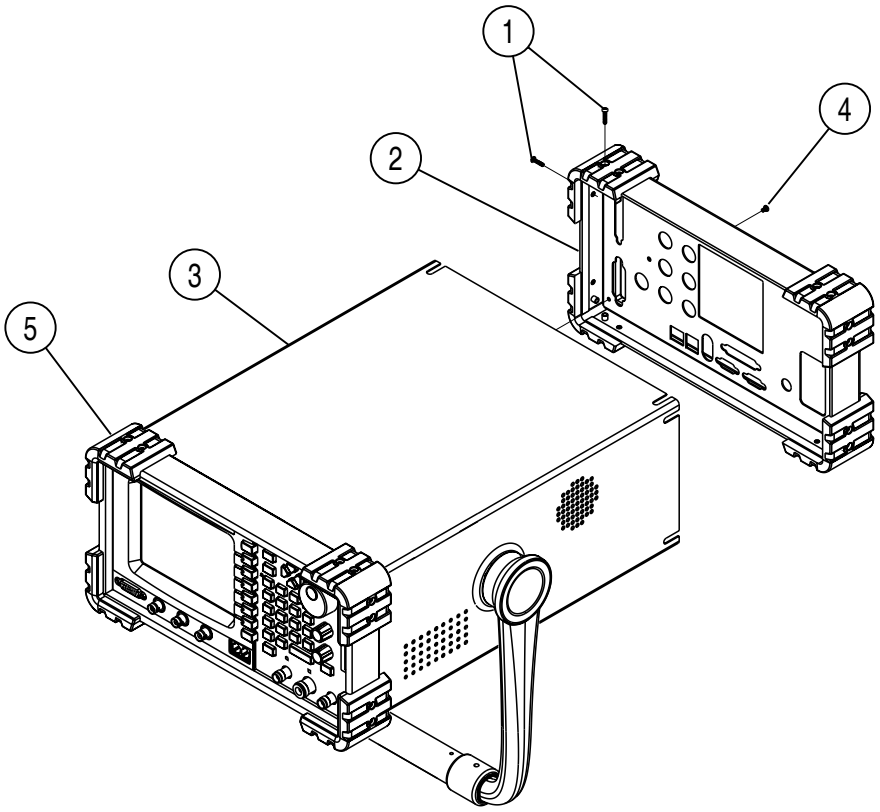


3-3-10 REPLACE REAR PANEL ASSY

PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)

STEP	PROCEDURE

1. Remove external power sources and all external cables from the 2975.
2. Remove two screws (1) from each corner securing the Rear Panel Assy (2) to the Case Assy (3).
3. Remove six screws (4) securing the Rear Panel Assy (2) to the Chassis Assy (5).
4. Remove the Rear Panel Assy (2).



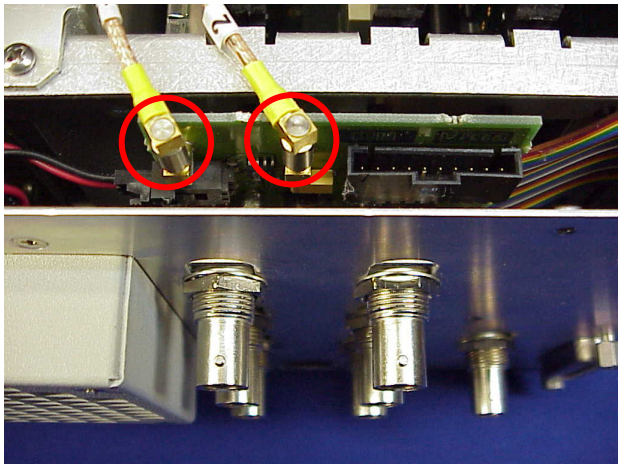
042M-028

3-3-11 REPLACE REAR PANEL PCB ASSY

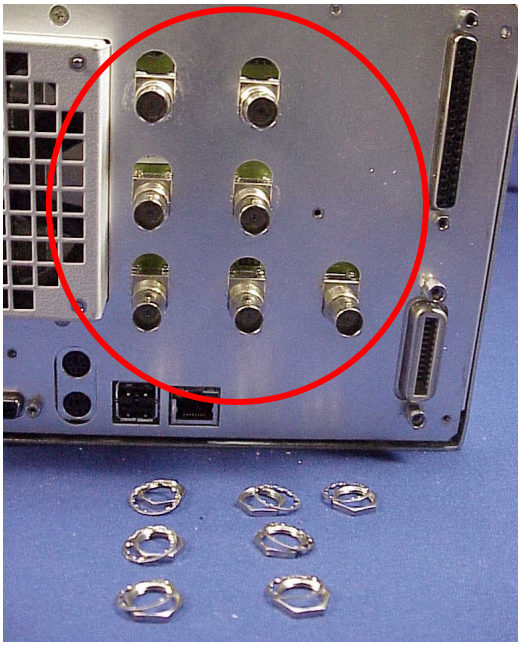
PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)

STEP	PROCEDURE

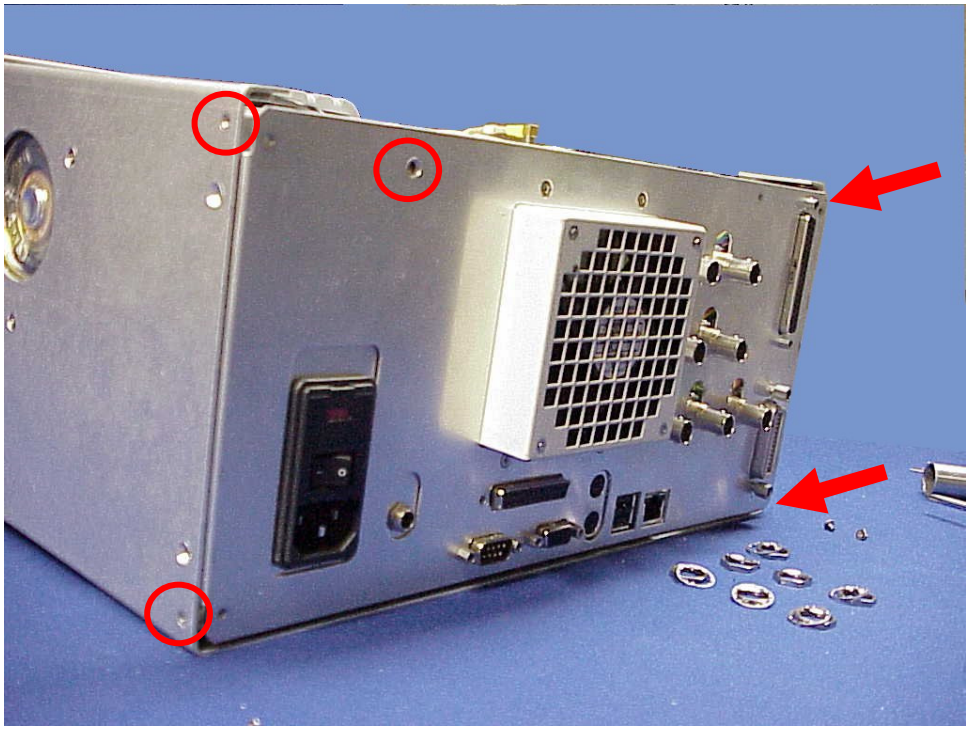
1. Remove two coaxial cables from the Rear Panel PCB Assy.



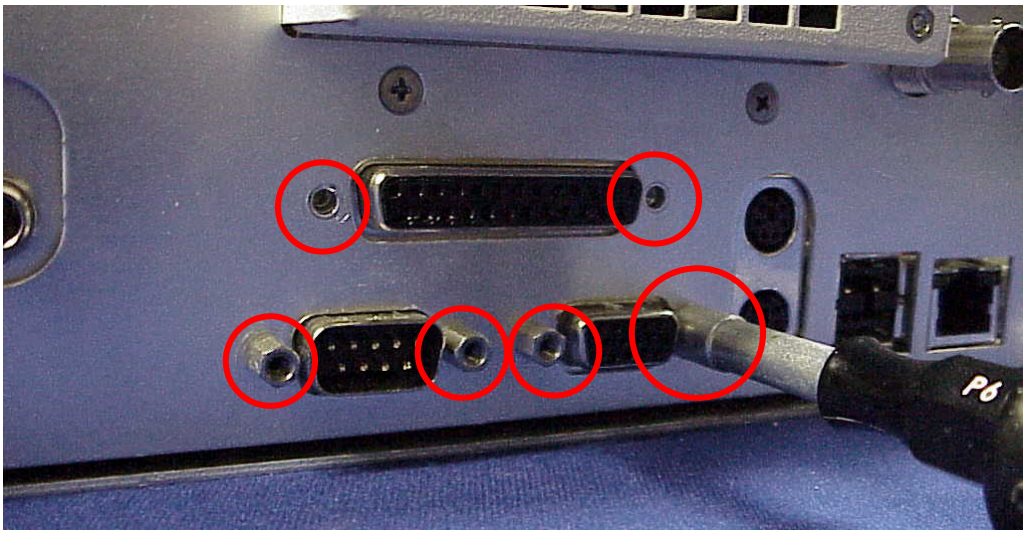
2. Remove the nut and washer from the seven coaxial connectors on the Rear Panel PCB Assy.



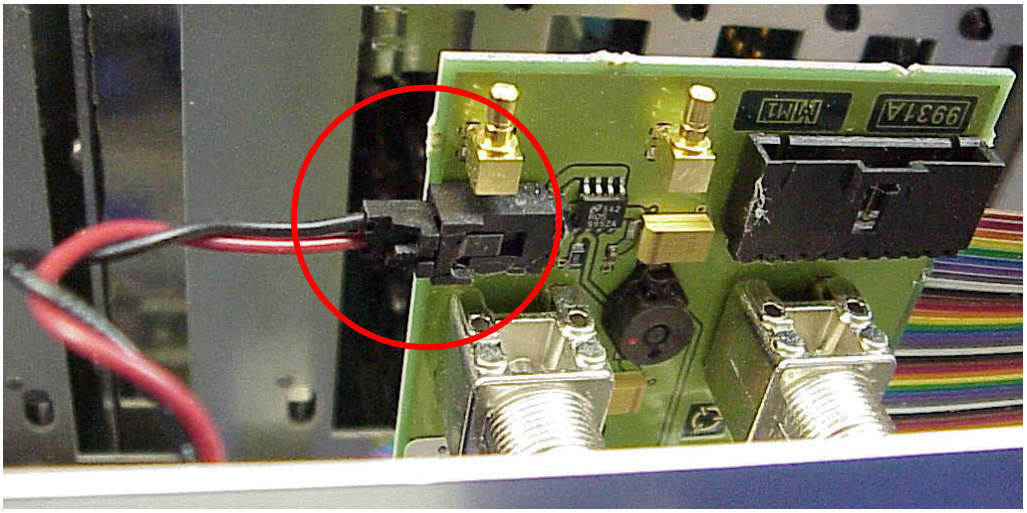
3. Remove five screws.



4. Remove nuts (2 each) from three connectors.



5. Remove the wire cable (Fan) from the Rear Panel PCB Assy.



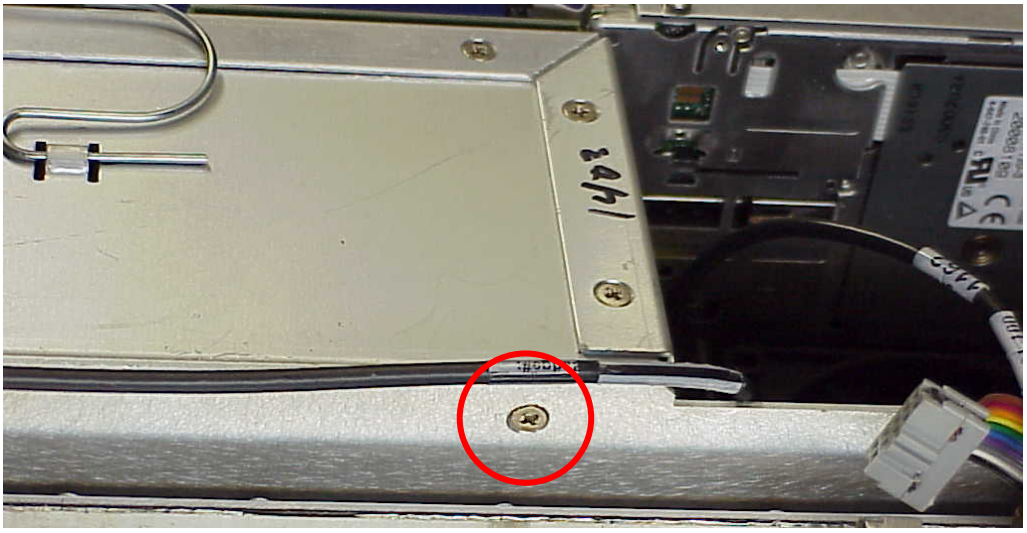
6. Remove the Rear Panel PCB Assy.

3-3-12 REPLACE POWER SUPPLY ASSY

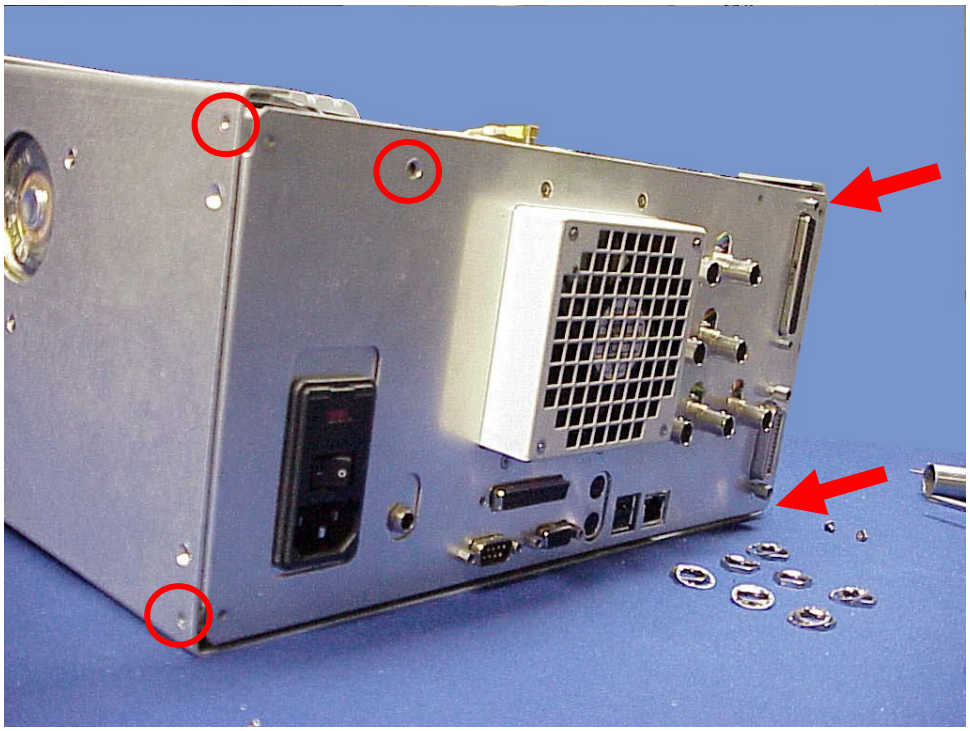
PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)
Remove Attenuator Assy (para 3-3-3)

STEP PROCEDURE

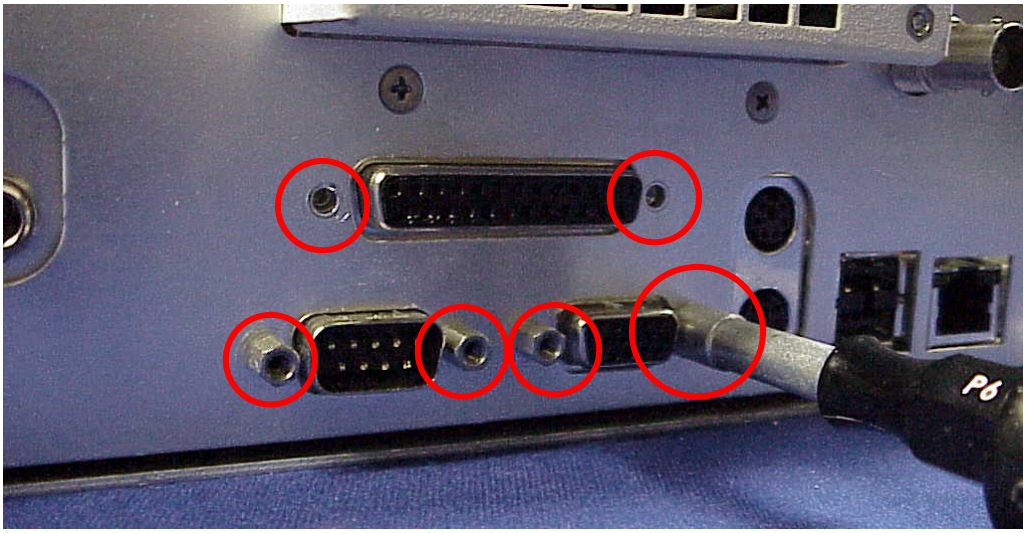
1. Remove the screw securing the Power Supply Assy to the Cardcage Assy.



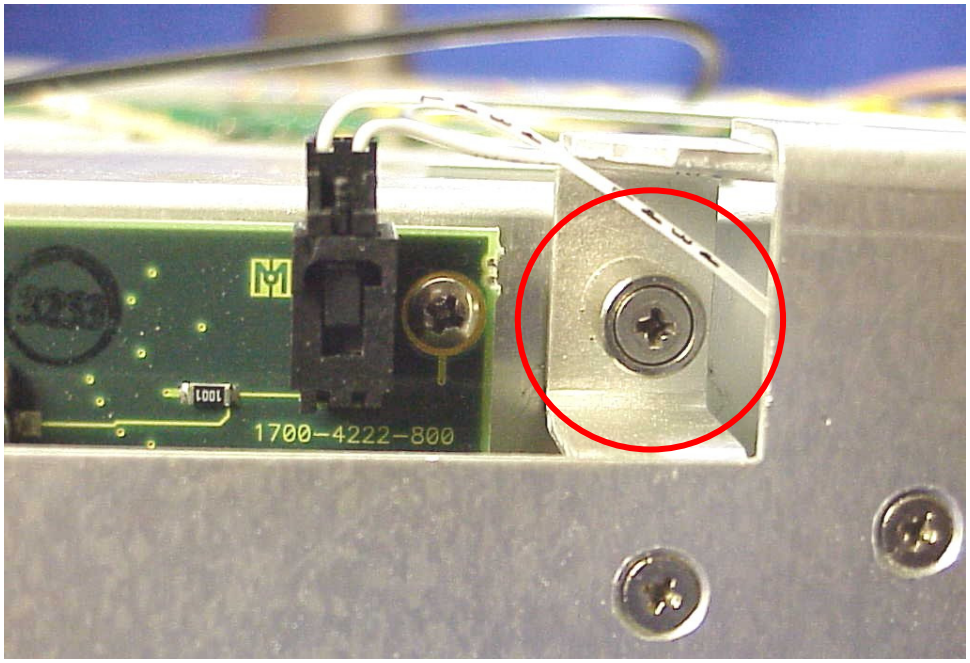
2. Remove five screws.



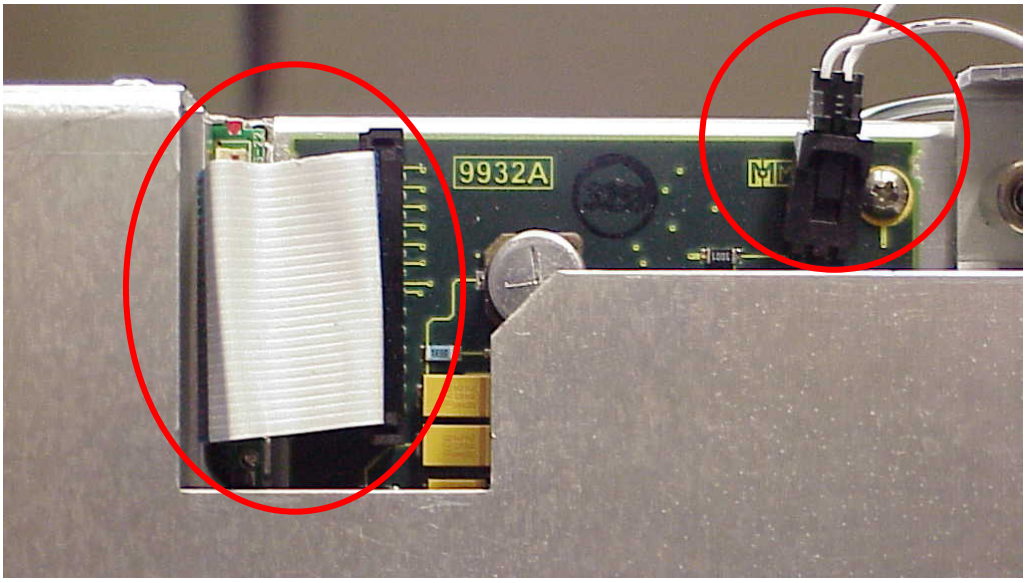
3. Remove nuts (2 each) from three connectors.



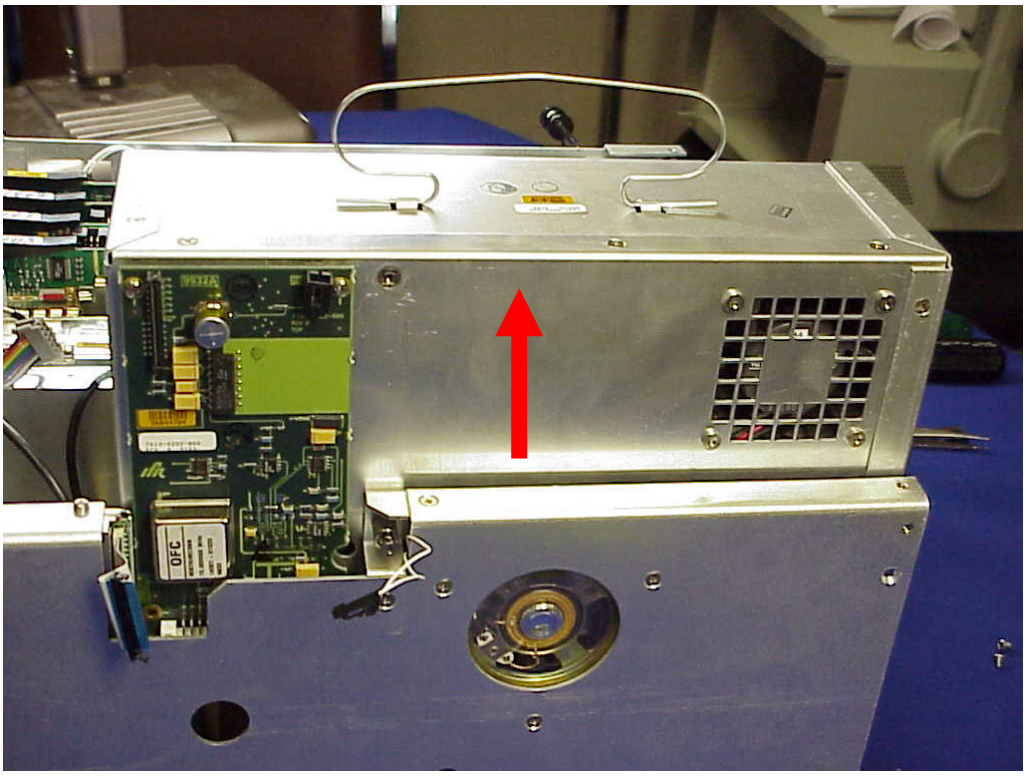
4. Fully loosen the captive screw securing the Power Supply Assy to the Chassis Assy.



5. Disconnect the wire cable and ribbon cable from the Power Supply Assy.



6. Raise the Power Supply Assy straight up and out of the Chassis Assy.

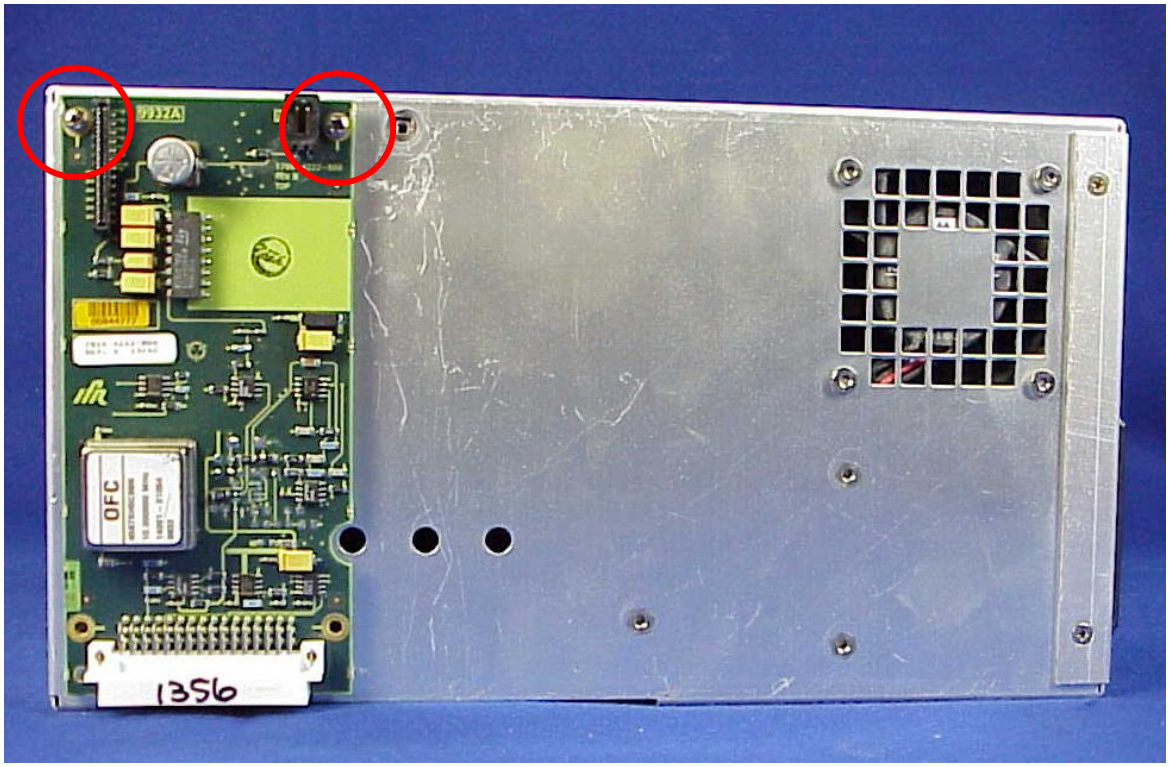


3-3-13 REPLACE DISK I/O PCB ASSY

PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)
Remove Power Supply Assy (para 3-3-12)

STEP PROCEDURE

1. Remove two screws securing the Disk I/O PCB Assy to the Power Supply Assy.



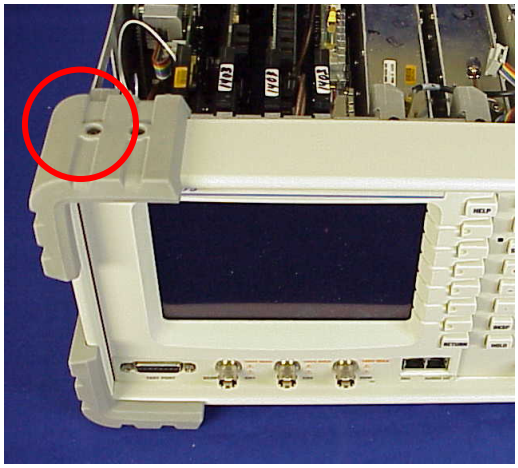
2. Remove the Disk I/O PCB Assy.

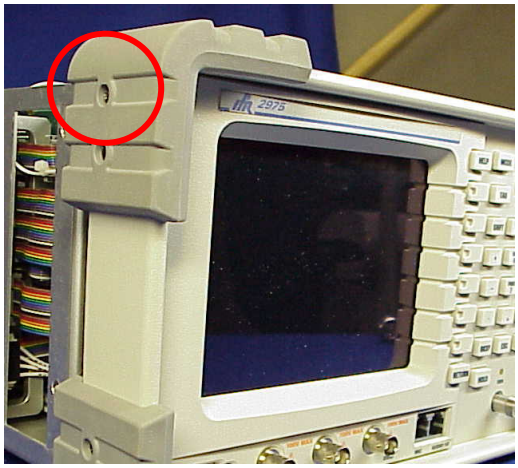
3-3-14 REPLACE FRONT PANEL ASSY

PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)

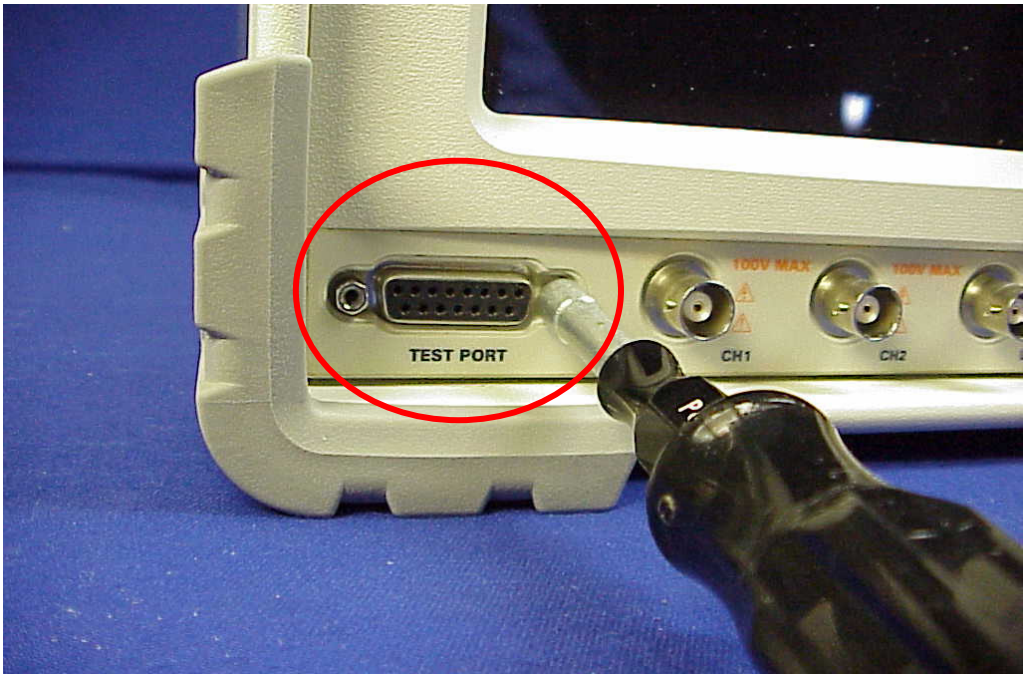
STEP	PROCEDURE

3. Remove two screws from each corner of the Front Panel Assy.

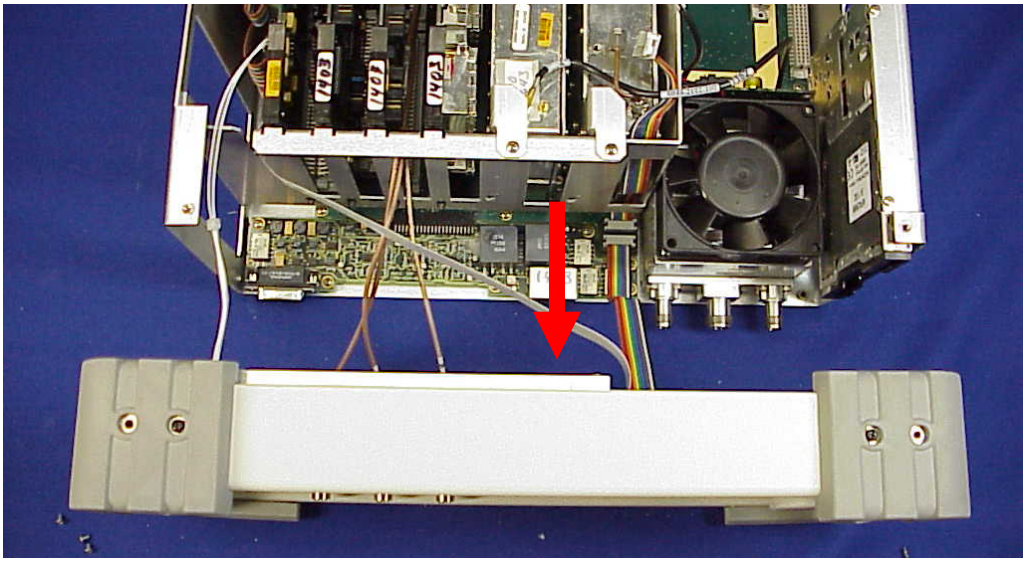




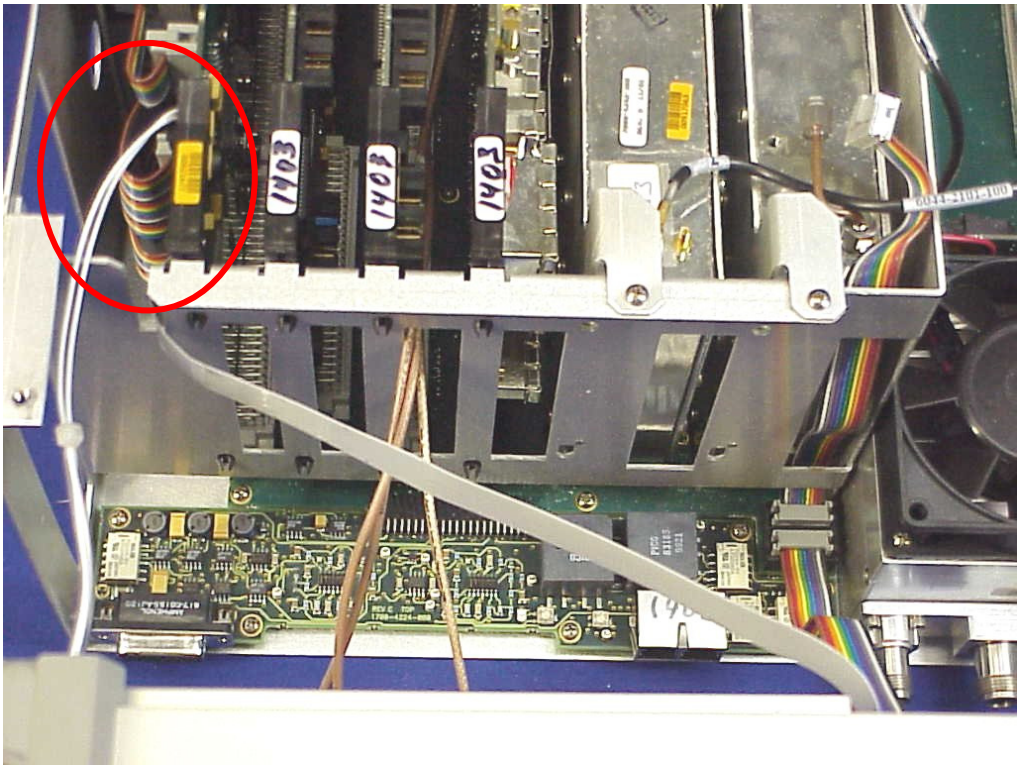
4. Remove two nuts from connector.



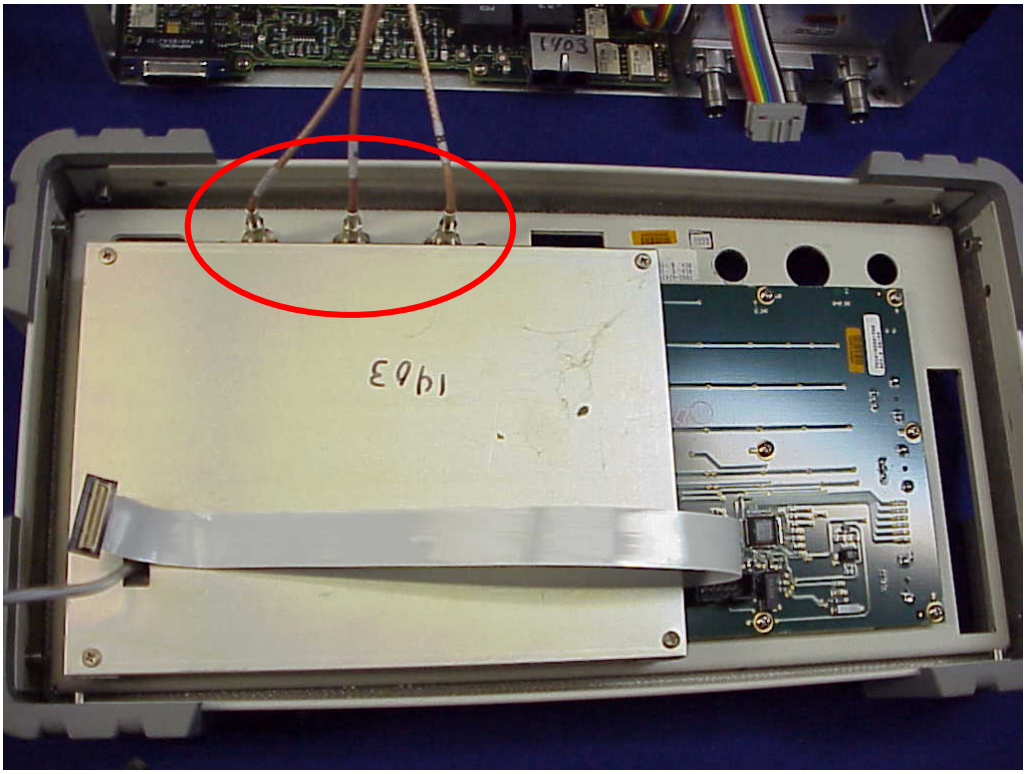
5. Separate the Front Panel Assy from the Chassis Assy.



6. Disconnect the wire cable and ribbon cable from the CPU Adapter PCB Assy.



7. Disconnect three coaxial cables from the Front Panel Assy.

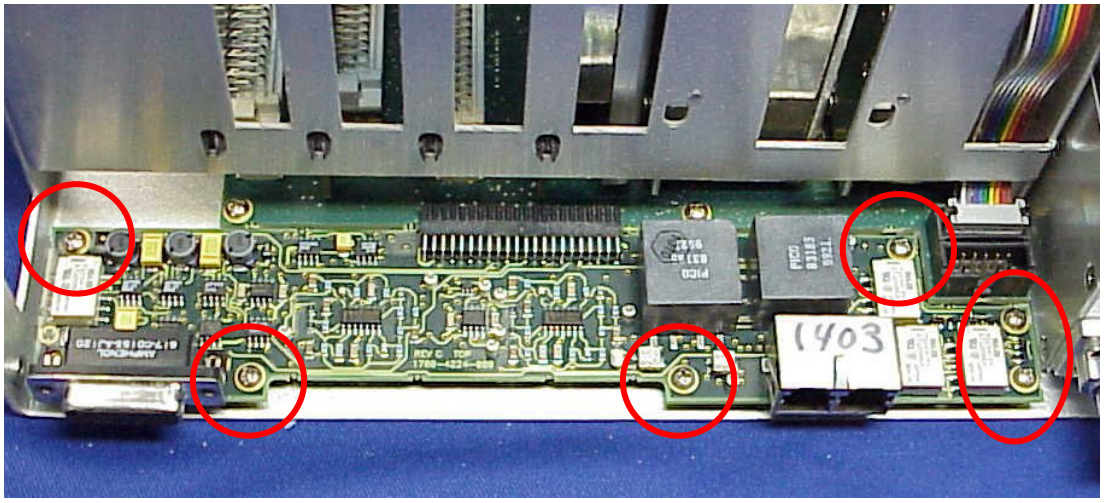


3-3-15 REPLACE FRONT PANEL AUDIO PCB ASSY

PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)
Remove Front Panel Assy (para 3-3-14)

STEP	PROCEDURE

1. Remove six screws securing the Front Panel Audio PCB Assy to the Chassis Assy.



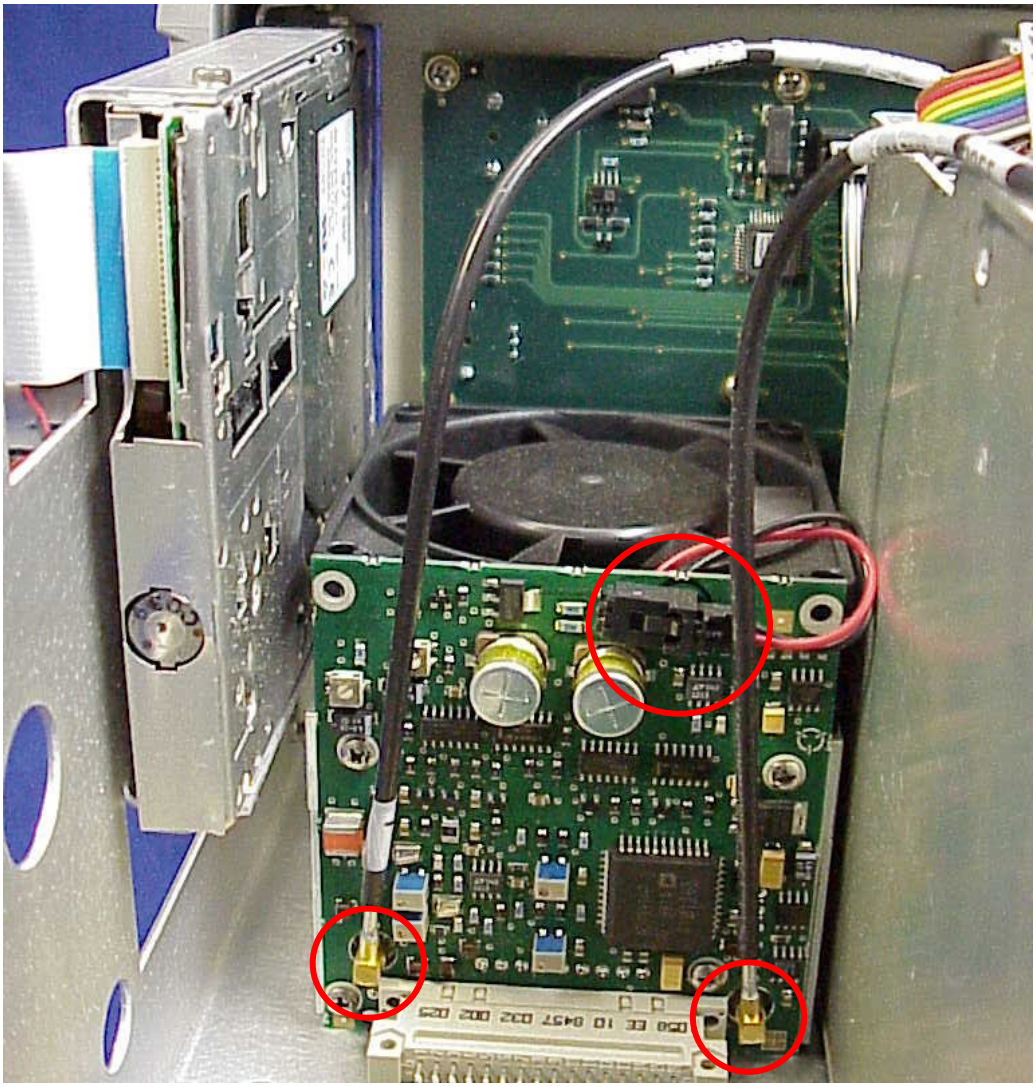
2. Remove the Front Panel Audio PCB Assy.

3-3-16 REPLACE POWER TERMINATION ASSY

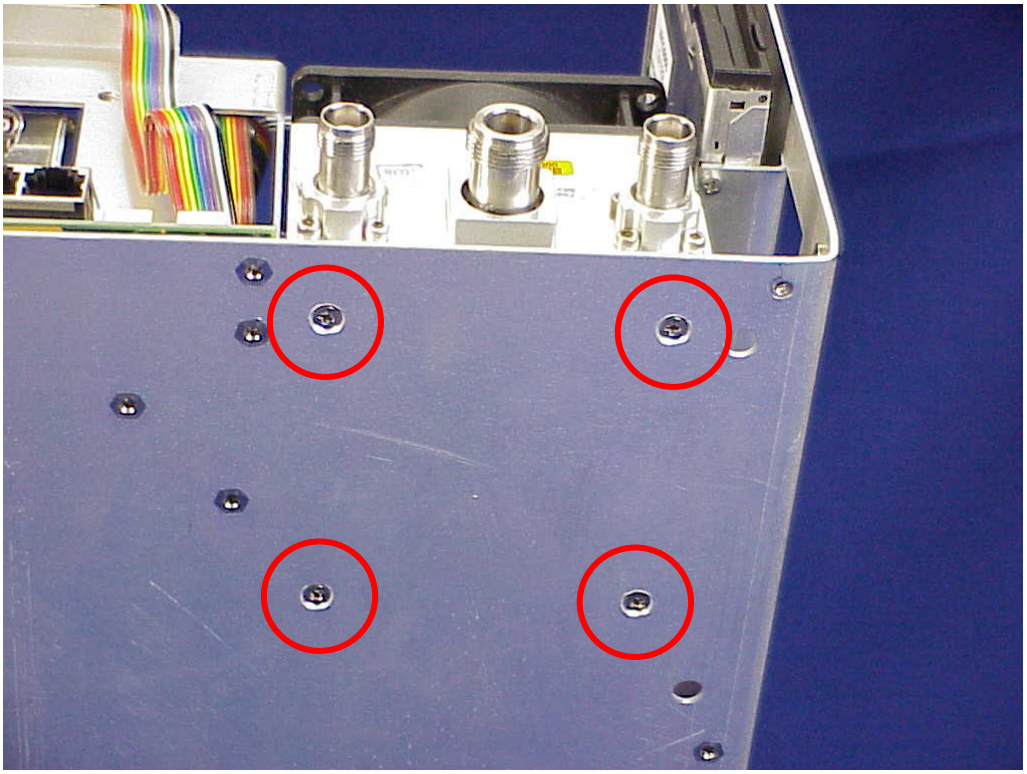
PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)
Remove Power Supply Assy (para 3-3-12)

STEP	PROCEDURE

1. Remove the wire cable and two coaxial cables from the Power Termination Assy.



2. Remove four screws securing the Power Termination Assy to the Chassis Assy.



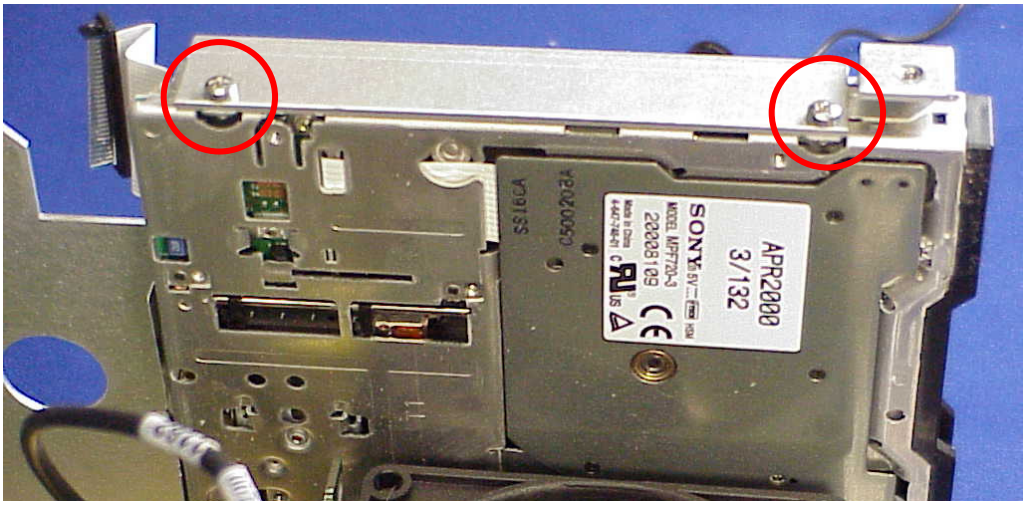
3. Remove the Power Termination Assy.

3-3-17 REPLACE FLOPPY DRIVE ASSY

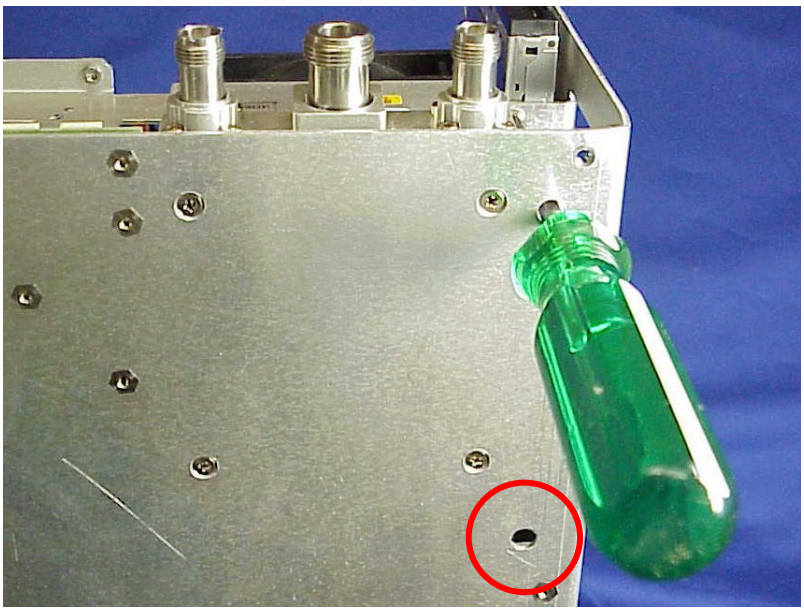
PRELIMINARY PROCEDURES: Remove Case Assy (para 3-3-1)
Remove Front Panel Assy (para 3-3-14)

STEP PROCEDURE

1. Remove two screws securing the Floppy Drive Assy to the Chassis Assy.



2. Remove two screws (through the access holes) securing the Floppy Drive Assy to the Chassis Assy.



3. Remove the Floppy Drive Assy.

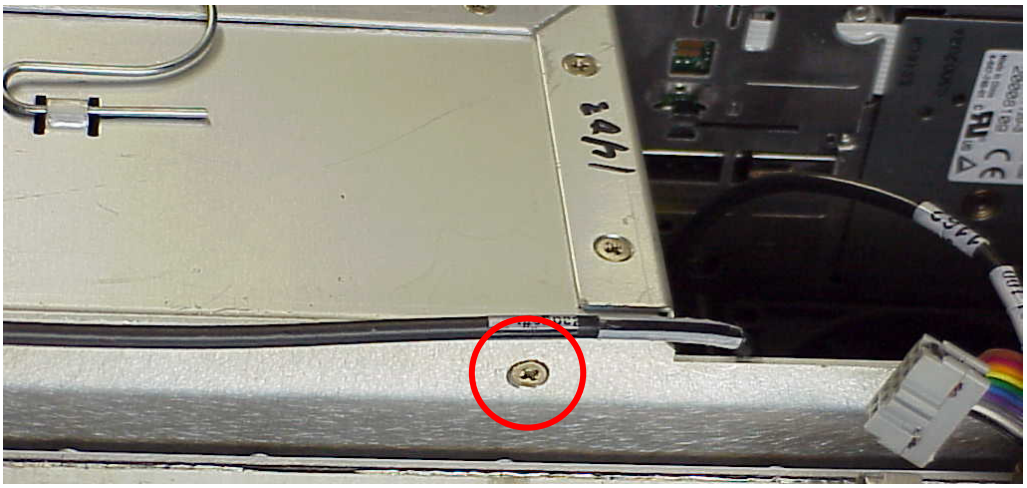
3-3-18 REPLACE BACKPLANE PCB ASSY

PRELIMINARY PROCEDURES:

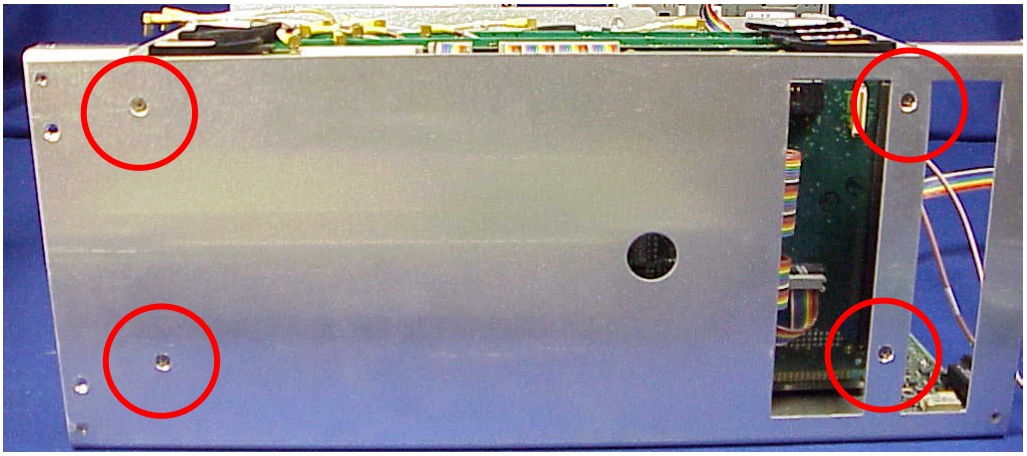
Remove Case Assy (para 3-3-1)
Remove Attenuator Assy (para 3-3-3)
Remove Generator Assy (para 3-3-4)
Remove Receiver Assy (para 3-3-5)
Remove IF/Video PCB Assy (para 3-3-6)
Remove Multifunction I/O PCB Assy (para 3-3-7)
Remove CAI PCB Assy (para 3-3-8)
Remove CPU Adapter Assy (para 3-3-9)
Remove Power Supply Assy (para 3-3-12)
Remove Power Termination Assy (para 3-3-16)

STEP	PROCEDURE

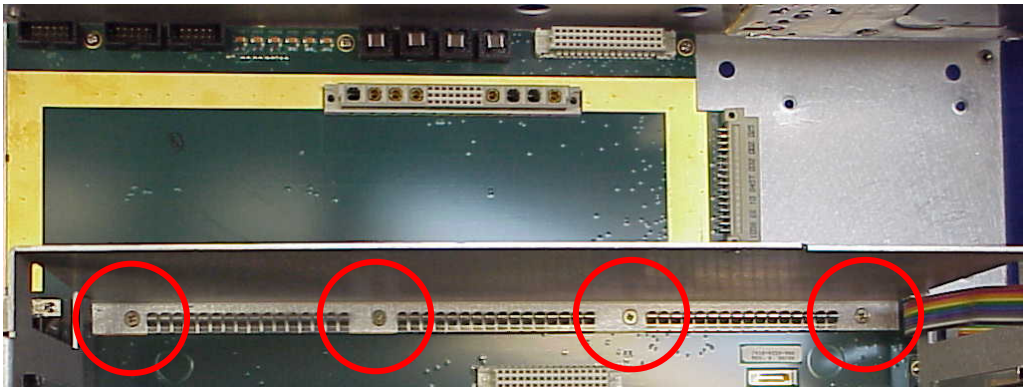
1. Remove screw.



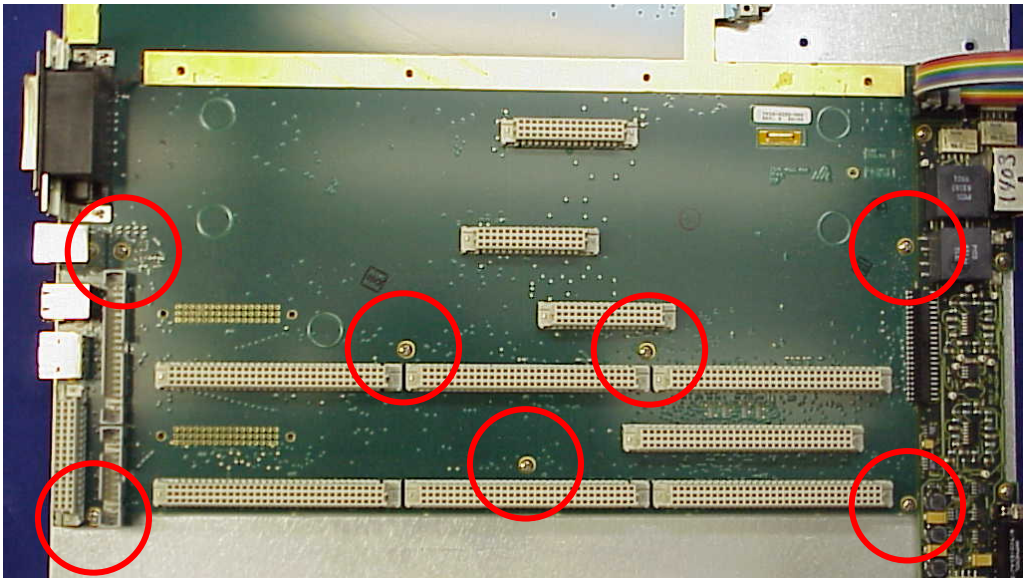
2. Remove four screws securing the Cardcage Assy to the Chassis Assy.



3. Remove four screws securing the Cardcage Assy to the Chassis Assy.



4. Remove the Cardcage Assy from the Chassis Assy.
5. Remove seven screws securing the Backplane PCB Assy to the Chassis Assy.



6. Remove the Backplane PCB Assy from the Chassis Assy.

SECTION 4 - PARTS LIST

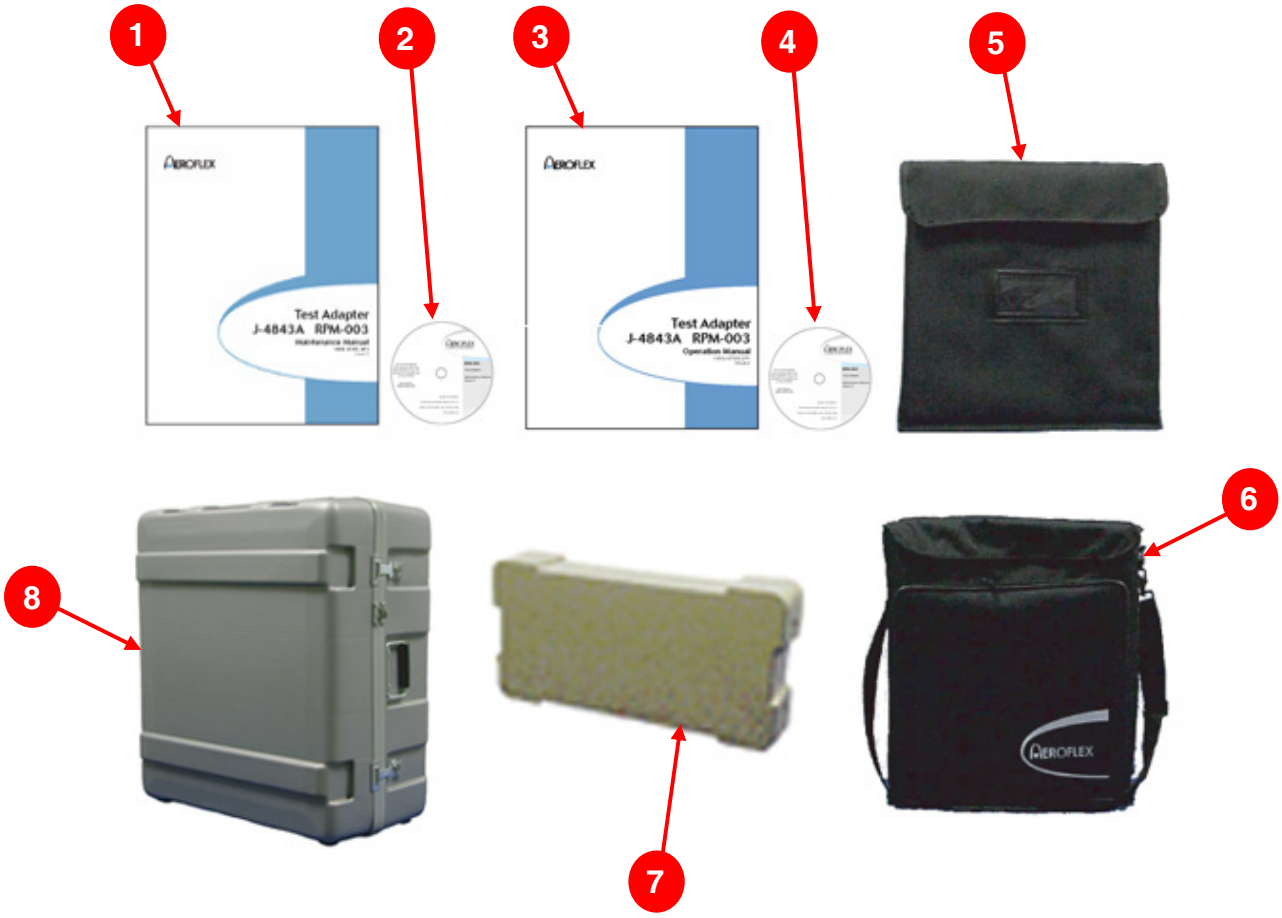
4-1 GENERAL

This section contains the part numbers and descriptions for replaceable parts in the 2975.

4-2 PARTS LISTS

4-2-1 ACCESSORIES (Figure 4-1)

REFERENCE DESIGNATOR	PART NUMBER	MFR CODE	DESCRIPTION
1	1002-4250-4P0	51190	MANUAL, MAINTENANCE, 2975
2	1002-4250-4C0	51190	CD-ROM, MANUAL, MAINTENANCE, 2975
3	1002-4202-2P0	51190	MANUAL, OPERATION, 2975
4	1002-4202-2C0	51190	CD-ROM, MANUAL, OPERATION, 2975
5	1412-4752-000	51190	ACCESSORY POUCH
6	1412-4400-500	51190	CASE, SOFT-PADDED, CARRYING
7	1414-4452-900	51190	COVER, LID
8	1412-4200-300	51190	CASE, TRANSIT w/ WHEELS
9	6041-0001-200	51190	CORD,AC,NEMA5-15,IEC320-C13,RA
10	2113-0000-004	51190	CONN,ADAPT BNC JACK/N PLUG
11	2200-0410-700	51190	CONN,ADAPT BNC JACK - TNC PLUG
12	1201-0909-900	51190	ANTENNA
13	5106-0000-055	51190	FUSE,3AMP,FAST,5MMX20MM,250V
14	2113-0000-013	51190	CONN,ADAPT,M2F BNC,RT.ANGLE
15	6045-4283-300	51190	CABLE, RJ12,6 COND, FLAT, 1-1
16	6041-4201-200	51190	CABLE ASSY, OPT12 KVL INTERFACE
17	7005-4247-800	51190	MICROPHONE



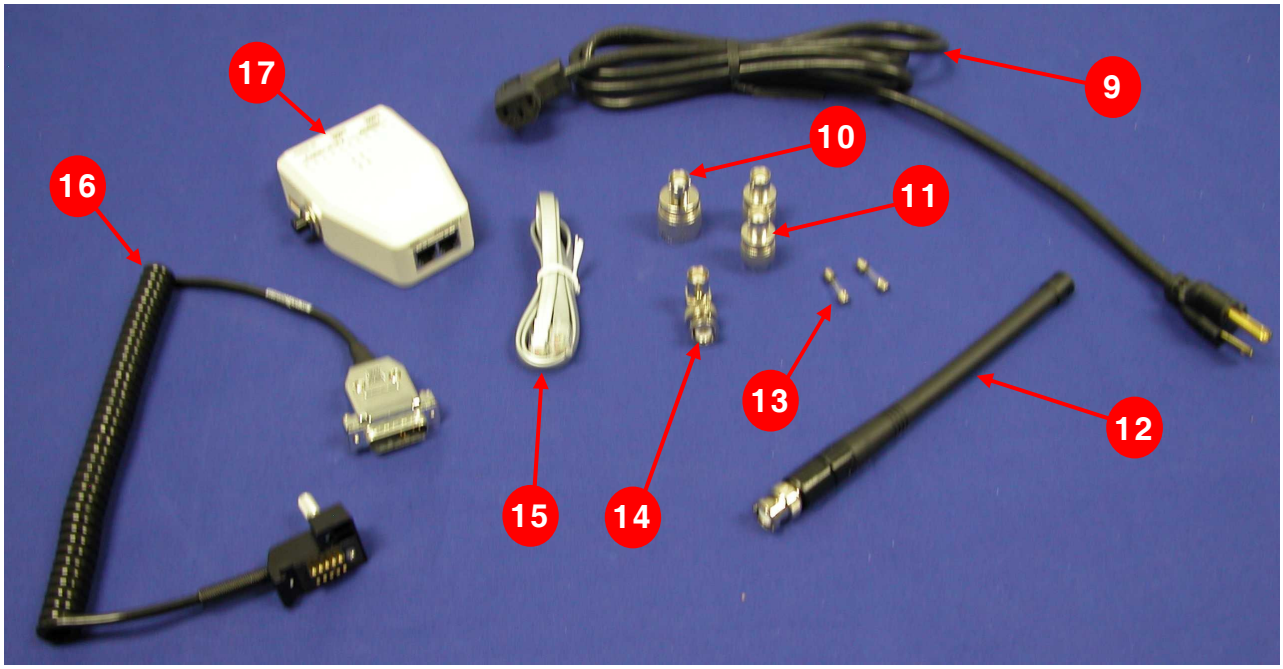


Figure 4-1 Accessories

4-2-2 COMPOSITE ASSY (7003-4248-500) (Figure 4-2)

(REV C)

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
1	1412-4254-900	CASE,WRAP
2	2803-0188-012	SCREW,4-40 X 3/16 PPHM,BLACK
3	2803-0188-006	SCREW,4-40 X 3/16 PPHM
4	2803-0563-012	SM,4-40X9/16,PPH,SS,BK
5	2840-0000-034	WASHER, FLAT .505ID,.6850D,.02
6	2400-9924-600	LABEL,S/N,RCTS-P25
A1	7005-4243-900	MECH ASSY,CHASSIS
A2	7005-4248-400	MECH ASSY,REAR PANEL
A3	7005-4243-100	MECH ASSY,ATTENUATOR
A4	7005-4442-500	MECH ASSY,GENERATOR
A5	7010-4236-800	PCB ASSY,IF VIDEO
A6	7010-4236-700	PCB ASSY,MULTIFUNCTION I/O
A7	7005-4248-100	MECH ASSY,RECEIVER
A8	7010-4232-900	PCB ASSY,CAI
A9	7110-4246-800	MOLDED HANDLE
W1	6050-1990-500	COAX ASSY,316,RFSSMB/RFSSMB
W2	6050-1990-350	COAX ASSY,316,RFSSMB/RFSSMB
W3	6050-1990-600	COAX ASSY,316,RFSSMB/RFSSMB
W4	6050-1990-950	COAX ASSY,316,SSMB RA/SSMB RA
W5	6050-1990-300	COAX ASSY,316,RFSSMB/RFSSMB
W6	6061-1990-300	COAX ASSY,100,RFSSMB/RFSSMB
W7	6061-1990-300	COAX ASSY,100,RFSSMB/RFSSMB
W8	6061-1990-300	COAX ASSY,100,RFSSMB/RFSSMB
W9	6042-4283-100	COAX ASSY,ATT/GEN

(REV D) CONTAINS ALL PARTS IN REV C WITH THE FOLLOWING EXCEPTIONS:

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
A4	7005-4444-200	MECH ASSY,GENERATOR

(REV E) CONTAINS ALL PARTS IN REV D WITH THE FOLLOWING EXCEPTIONS:

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
A4	7005-4249-000	MECH ASSY,GENERATOR

4-2-3 CHASSIS ASSY (7005-4243-900) (Figure 4-3)

(REV G)

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
1	1403-4255-000	CHASSIS,MAIN
2	1400-4266-700	BRACKET,CARD CAGE
3	1405-4266-800	PANEL,CHASSIS REAR
4	1400-4259-300	BRACKET,SPEAKER
5	1400-4259-400	BRACKET,POWER SUPPLY MTG
6	2803-0188-003	SCREW,4-40 X 3/16 PFHM
7	2803-0250-003	SCREW,4-40 X 1/4 PFHM
8	2803-0250-006	SCREW,4-40 X 1/4 PPHM
9	2803-0188-006	SCREW,4-40 X 3/16 PPHM
10	1400-4255-500	BRACKET,FAN
11	2850-1692-600	SCREW,.340L35-6.25HH,4-40X.410
12	2850-7866-300	STANDOFF,HEX,MALE-FEMALE
13	2840-7873-000	WASHER, LOCK .50ID INT STAR
14	2807-0157-006	SM,M2.5X4MM,PPH,SS,PA
15	2803-0563-012	SM,4-40X9/16,PPH,SS,BK
16	2850-7800-100	NUT, JAM 1/2" SMALL PROFILE
17	2803-1000-006	SCREW 4-40 X 1 PBHMS
18	2845-0000-008	FINGERSTOCK,97-0611-17
19	4503-0002-010	RETAINER CLIP,10P RIBBON CONN
20	2525-4269-400	GASKET, POWER TERM/FT PNL
21	2525-4269-200	GASKET, REAR PANEL I/O
A1	7010-4236-100	PCB ASSY,BACKPLANE
A2	7010-4238-700	PCB ASSY,FRONT PANEL AUDIO
A3	7010-4233-800	PCB ASSY,REAR PANEL
A4	7005-4243-700	MECH ASSY,FRONT PANEL
A5	7005-4243-500	MECH ASSY,CPU ADAPTER
A6	7005-4243-400	MECH ASSY,POWER SUPPLY
A7	7005-4242-500	MECH ASSY,POWER TERM
A8	7110-4244-400	PURCH,ASSY,FLOPPY DRIVE
A9	7010-4232-800	PCB ASSY,DISK I/O
B1	7005-4244-600	MECH ASSY,FAN
LS1	7007-4282-700	WIRE HARN ASSY,SPEAKER
W1	6045-4282-600	RIBBON CA ASSY,10-C,8.3LG
W2	6045-4282-600	RIBBON CA ASSY,10-C,8.3LG
W4	6045-4282-800	RIBBON CA ASSY,TYPE 1
W5	6045-4282-900	RIBBON CA ASSY,GPIB
W6	6044-2111-400	COAX ASSY,CONF,SMSMA/RFSSMB
W7	6044-2101-100	COAX ASSY,CONF,RFSSMB/RFSSMB
W8	6050-2081-650	COAX ASSY,316,RFSSMB/SFSMB
W9	6050-2081-650	COAX ASSY,316,RFSSMB/SFSMB

4-2-3 CHASSIS ASSY (7005-4243-900) (Figure 4-3) (cont)

(REV G) (cont)

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
W10	6050-2081-650	COAX ASSY,316,RFSSMB/SFSMB
W11	6048-0000-100	CABLE ASSY,FFC,TYPE D,38MM

(REV H) CONTAINS ALL PARTS IN REV G WITH THE FOLLOWING EXCEPTIONS:

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
A5	7010-4238-800	PCB ASSY,CPU ADAPTER

(REV J) CONTAINS ALL PARTS IN REV H WITH THE FOLLOWING EXCEPTIONS:

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
22	1414-9950-500	PLATE,37P,D-SUB
W4	6045-4282-800	RIBBON CA ASSY,TYPE 1 **(Removed)**

4-2-4 CPU ADAPTER ASSY (Figure 4-4)

(7005-4243-500) (REV F)

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
BT1	4000-0014-000	BATTERY, LITHIUM, 3 V

(7010-4238-800) (REV C)

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
BT1	4000-0014-000	BATTERY, LITHIUM, 3 V

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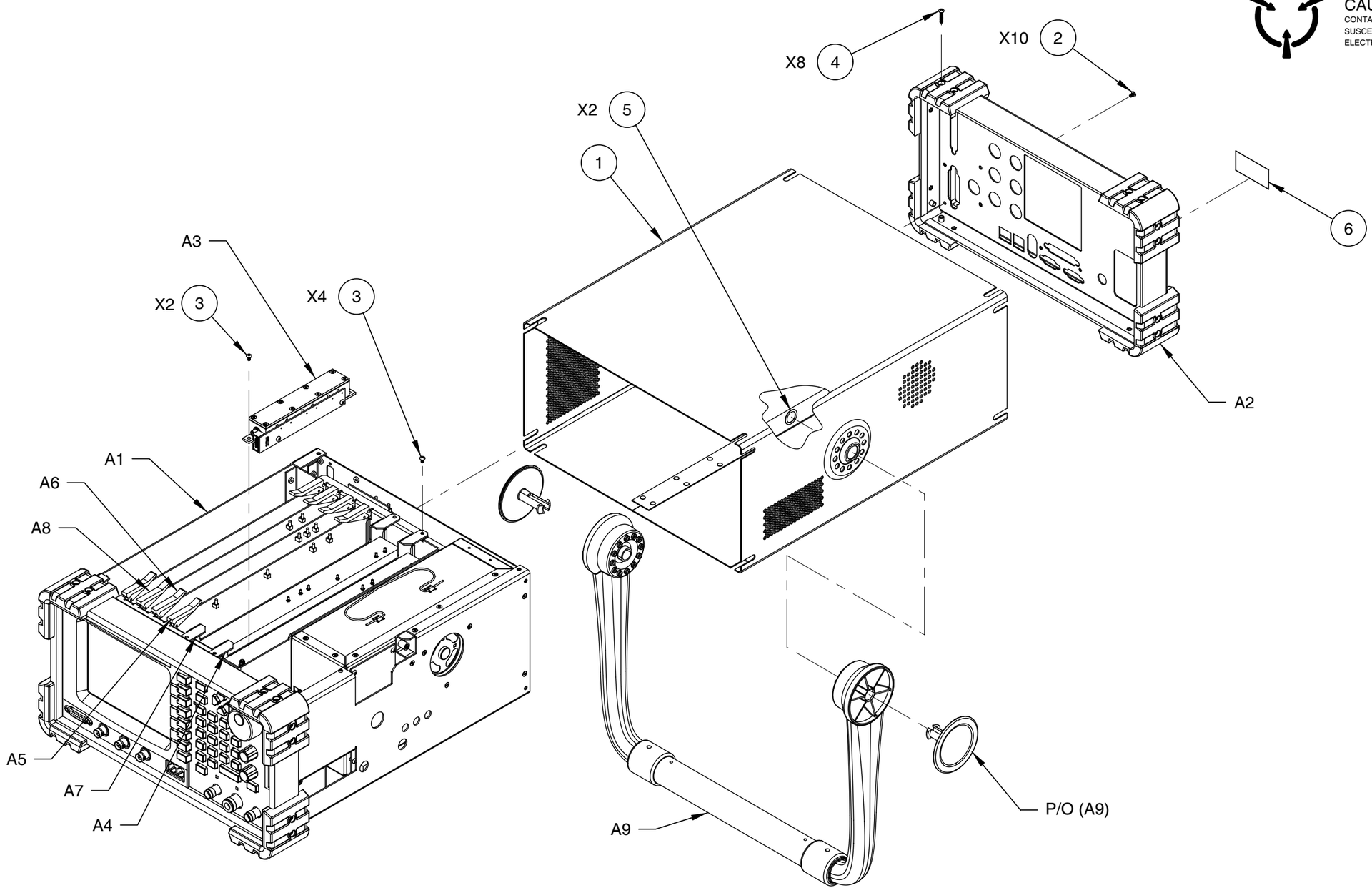
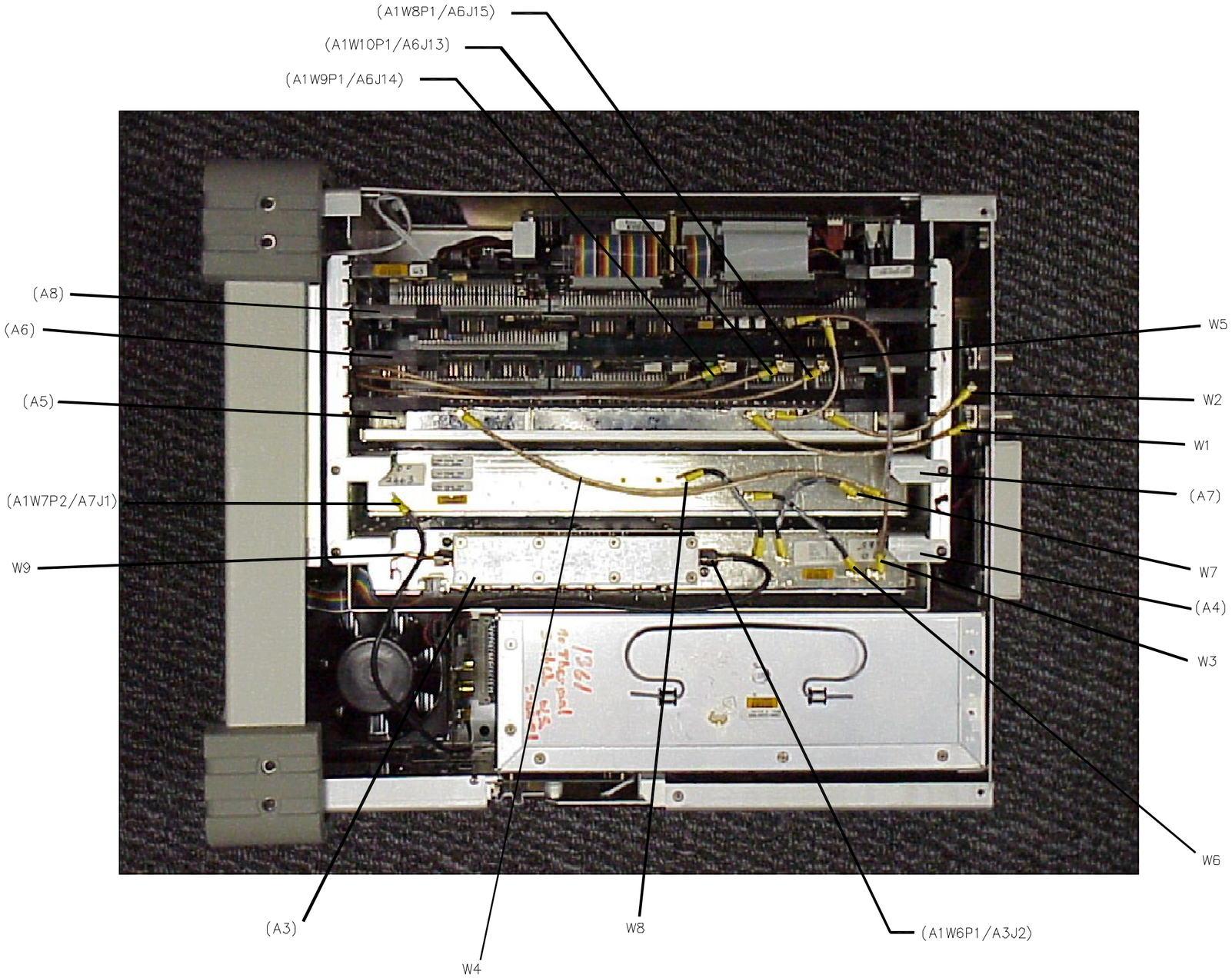
CAUTION:
CONTAINS PARTS AND ASSEMBLIES SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).



042M-036

Figure 4-2 2975 Composite Assy



COAX RUNNING LIST		
DESG	FROM	TO
W1	A5J5	A1A3J2
W2	A5J7	A1A3J3
W3	A8J7	A4J4
W4	A5J3	A7J8
W5	A8J6	A5J5
W6	A7J4	A4J3
W7	A7J7	A4J6
W8	A7J3	A4J5

042M-035

Figure 4-2 2975 Composite Assy (cont)

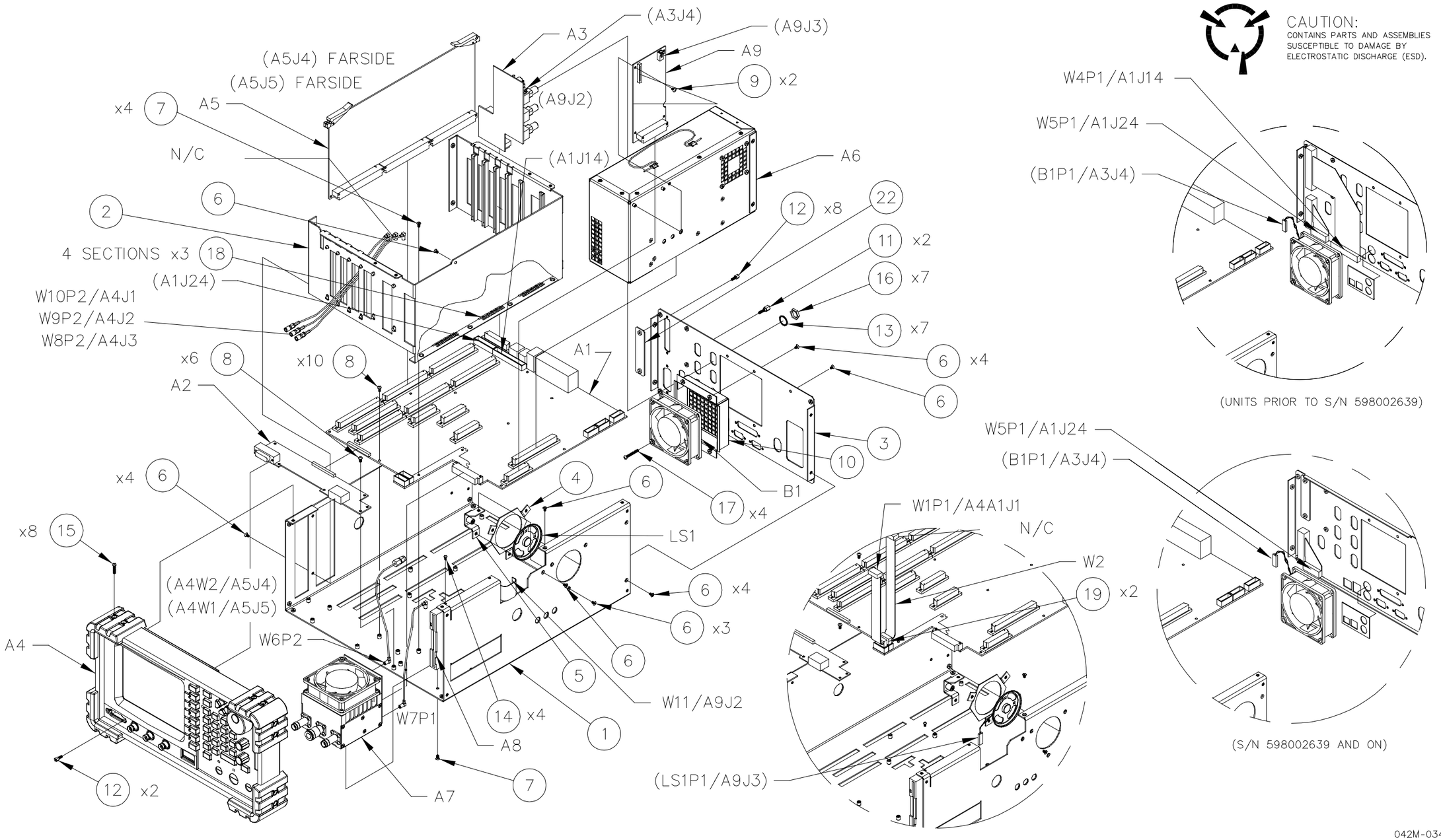
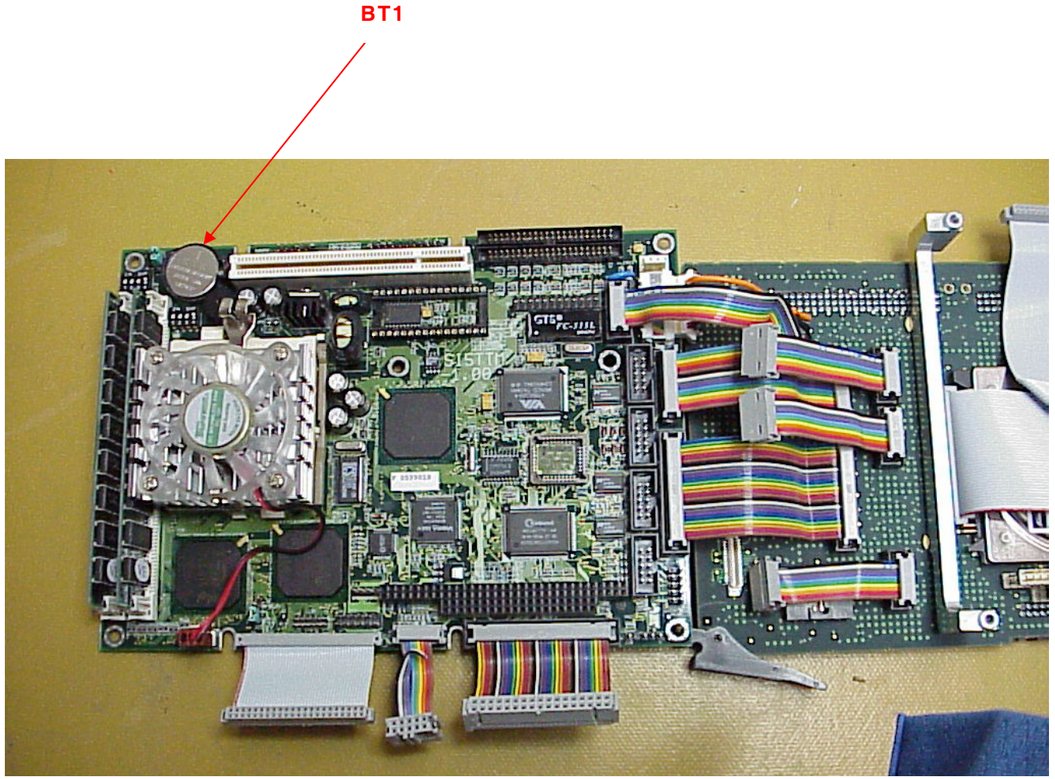
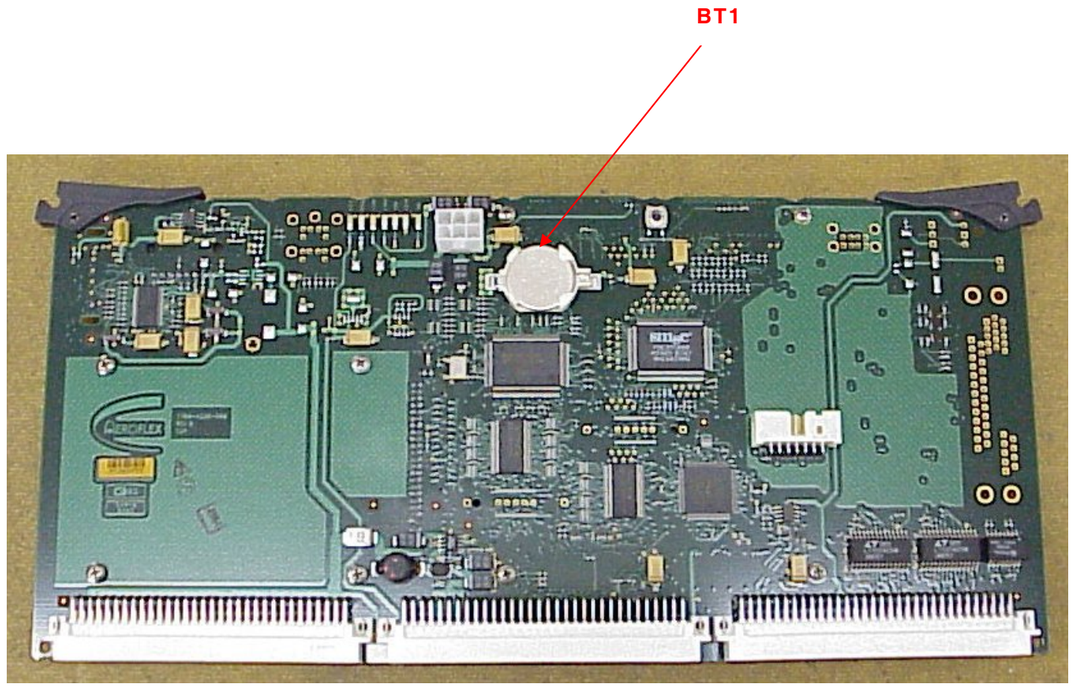


Figure 4-3 2975 Chassis Assy



(7005-4243-500)



(7010-4238-800)

Figure 4-4 CPU Adapter Assy

SECTION 5 - ASSEMBLIES

NOTE: Asterick (*) indicates an Assy that is obsolete or has been replaced.

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GENERATOR ASSY
7005-4442-500
(A4)
J2
A1J1
(REV D, E, F)

FRONT PANEL AUDIO
PCB ASSY
7010-4234-000
(A1A2)
(REV E)

CPU ADAPTER ASSY
7010-4243-500
(A1A5)
(REV F)

FLOPPY DRIVE ASSY
7110-4244-400
(A1A8)
A1A8J1
A1W11

CHAN 1
A1W10
A1A4J1
CHAN 2
A1W9
A1A4J2
DVM
A1W8
A1A4J3

FRONT PANEL ASSY
7005-4243-700
(A1A4)
A1A4A2
A1A4W1
A1A4A4
A1A4W2P2
A1A4W2P1

A1A4A1J1
A1W1P1

FRONT PANEL AUDIO
PCB ASSY
7010-4238-700
(A1A2)

UUT
A1A2J2
MIC/
AUDIO
A1A2J3

A1A2J1
A1A1J26
A1A7A2J1
A1A1J5

POWER TERMINATION
ASSY
7005-4242-500
(A1A7)
A1A7J1
T/R
A1A7E15
A1A7J3
GEN
A1A7E19
A1A7J2
ANT
A1A7E14

A1W2P2
A1A1J9
A1W2P1
A3A2J1

ATTENUATOR ASSY
7005-4243-100
(A3)

A1W7
A1A7J4
A1A7E1
A1W6
A1A7J5
A1A7E7
A1W6
A3J2
A3A1E2
W9
A3J1
A3A1E1

A1W1P2
A1A1J10

A4A2E22
RF-OUT
A4A2E24
10.7-GEN
A4A2E20
YIG
A4A2E5
TRACK
A4A1E6
80 MHz
A4A1E5
400 MHz

W9
A4J1
W3
A4J4
A4J2
W6
A4J3
W8
A4J5
W7
A4J6

A5J1
A1A1J17
A5J2
A1A1J8
A5J3
A1A1J20

A1A4W2P2
A1A4W1
A5A1J4
A5A1J5

CPU ADAPTER ASSY
7010-4238-800
(A1A5)

GENERATOR ASSY
7005-4249-000
(A4)

A1A1J2
A4A1J1

A7A2EJ5
400 MHz
A7A1EJ5
80 MHz
A7A2EJ4
YIG
A7A1EJ2
RF-IO
A7A1EJ6
HS
A7A2EJ1
RF IN
A7A2EJ2
10.7 MHz

W7
A7J7
W8
A7J3
W6
A7J4
A7J2
A7J6
A1W7
A7J1
W4
A7J8

A1W8
A6J15
A1W9
A6J14
A1W10
A6J13
DVM
CHAN 2
CHAN 1

A6J1
A1A1J15
A6J7
A1A1J4
A6J8
A1A1J6

MULTI FUNCTION I/O PCB ASSY
7010-4236-700
(A6)

A1W11
A1A9J2
A1LS1P1
A1A9J3

SPEAKER
7007-4282-700
(A1LS1)

A1A9J1
A1A1J7

DISK I/O PCB ASSY
7010-4232-800
(A1A9)

BACKPLANE PCB ASSY
7010-4236-100
(A1A1)

A1A1J1
A7A1J1

RECEIVER ASSY
7005-4248-100
(A7)

A1A1J16
A8J1

CAI PCB ASSY
7010-4232-900
(A8)

A8J7
10.7-GEN
A8J9
10.7-CAI
W3
A8J7
W5
A8J9

A1A1J3
A5J1

IF/VIDEO PCB ASSY
7010-4236-800
(A5)

A5J6
10.7-CAI
A5J3
10.7 MHz
A5J5
IF-RP
A5J7
VIDEO-RP
W5
A5J6
W4
A5J3
W1
A5J5
W2
A5J7

AC IN
A1A6A3J1

POWER SUPPLY ASSY
7005-4243-400
(A1A6)

A1A6A2P1
A1A1J19

FAN
7005-4244-600
(A1B1)

A1W5P1
A1A1J24
A1W5J1
GPIB

A1A1J25
ETH
A1A1J23
USB
A1A1J22
KEY/MOUSE
A1A1J21
LPT/COM/VGA

A1A1J18
A1A3J1
PC
AUDIO
A1A3J12
A1B1P
A1A3J4

REAR PANEL
ASSY
7010-4233-800
(A1A3)

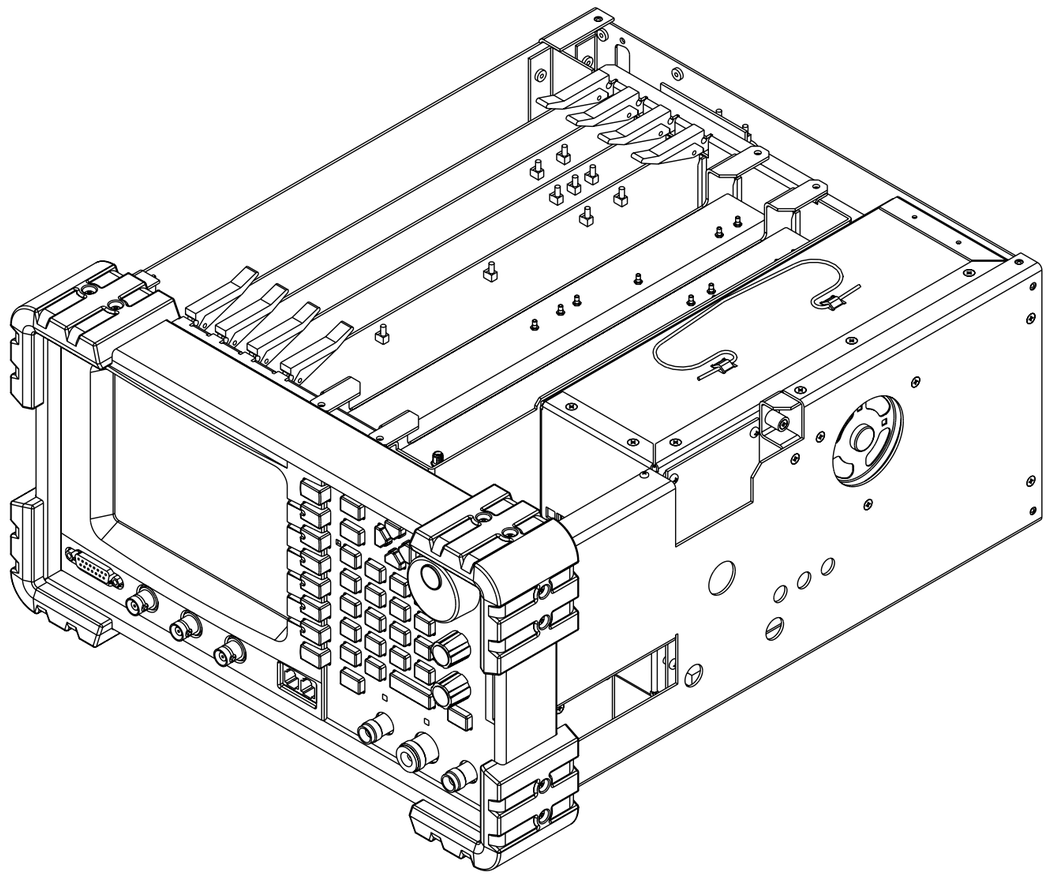
A1A3J11
EXT-REF I/O
A1A3J10
B OUT
A1A3J9
A OUT
A1A3J8
SYNC
A1A3J7
EXT-TRIG
A1A3J6
SA VIDEO
A1A3J5
10.7 MHz IF

VIDEO-RP
IF-RP
W2
A1A3J3
W1
A1A3J2

042M-016

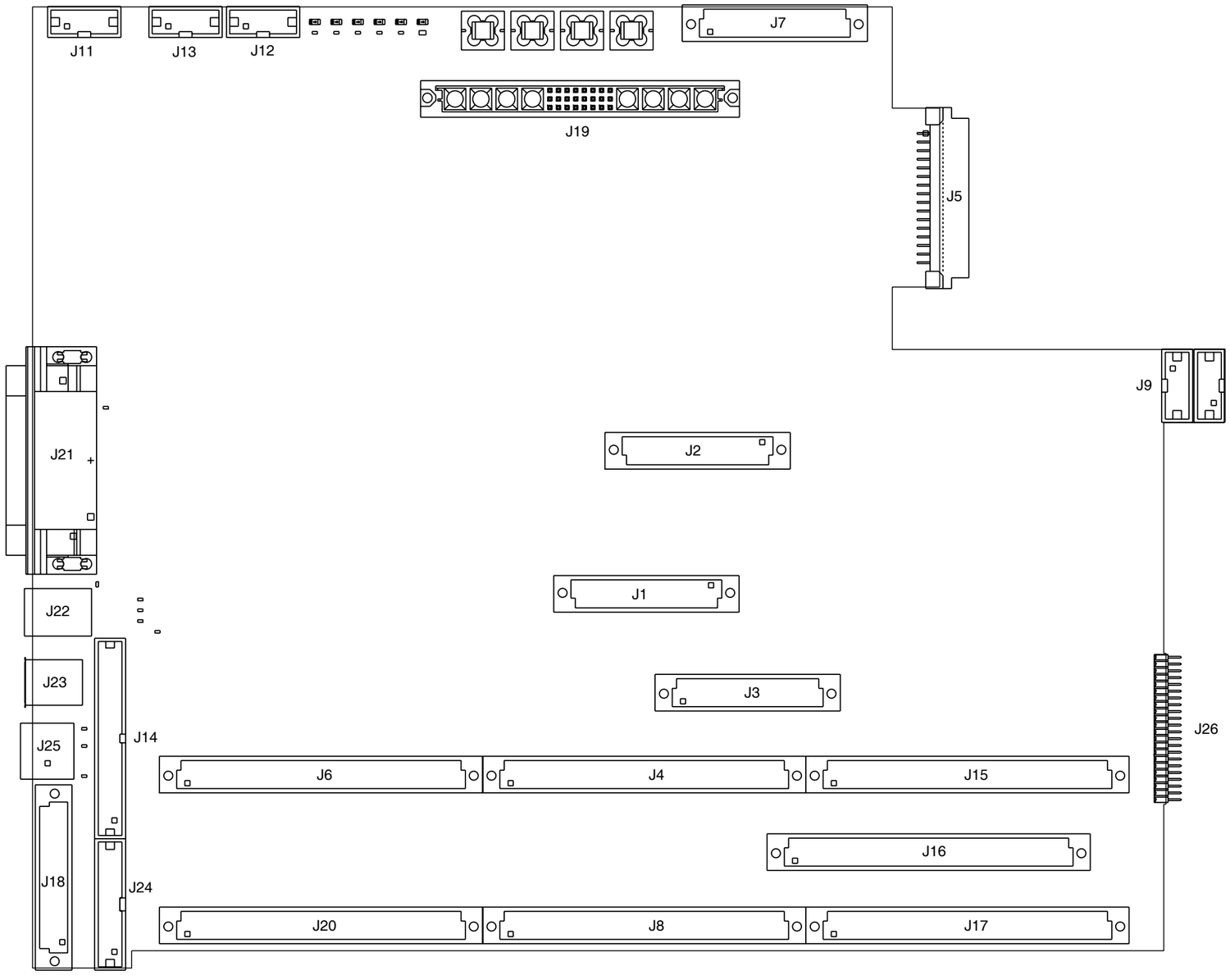
Figure 5-1 2975 System Interconnect
(0000-4242-000-G)

CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).



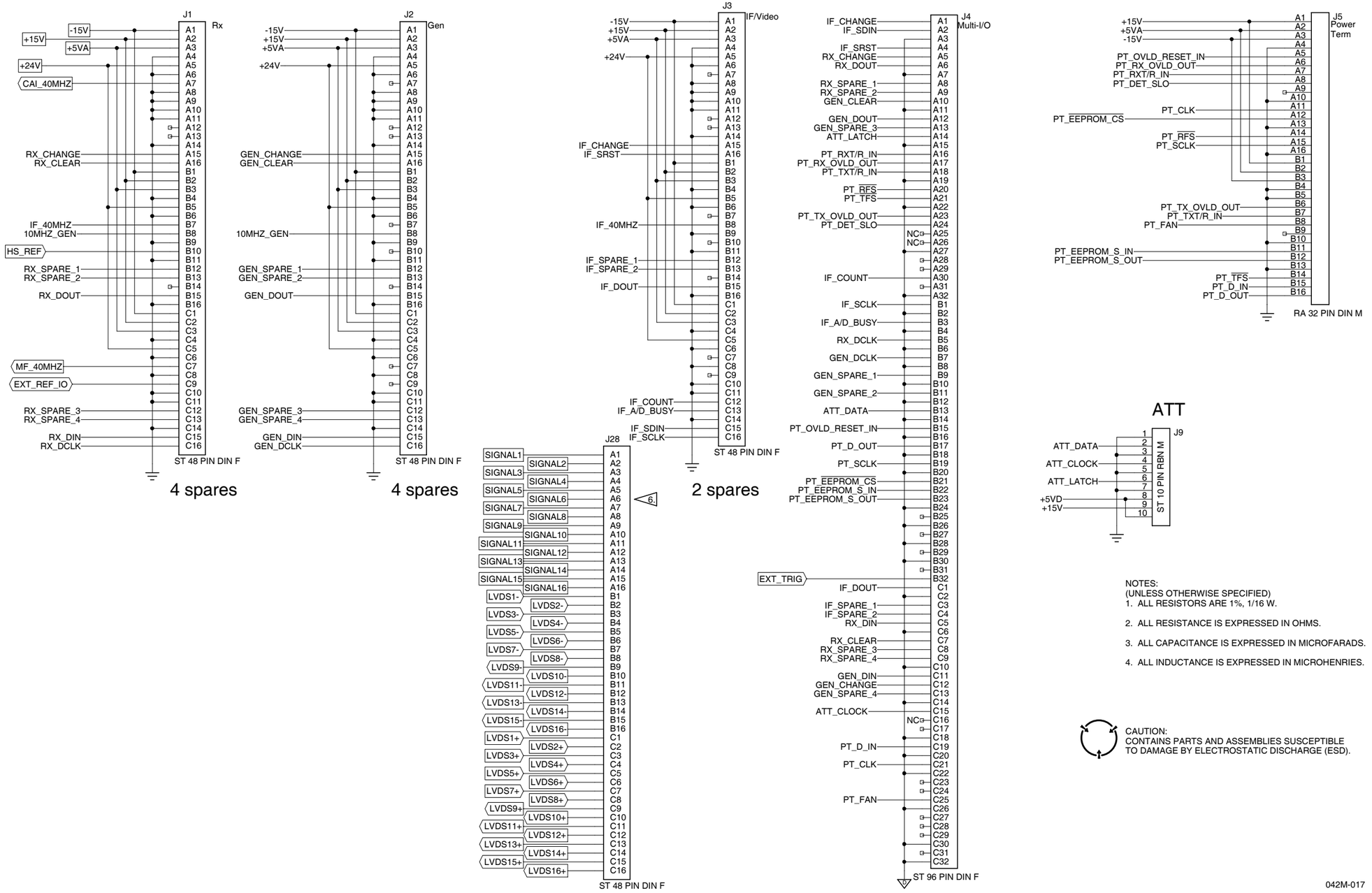
042-005

Figure 5-2 Chassis Assy
(7005-4243-900-G) (42A1A1)



042M-030

Figure 5-3 Backplane PCB Assy
(7010-4236-100-B) (42A1A1A1)



NOTES:
(UNLESS OTHERWISE SPECIFIED)
1. ALL RESISTORS ARE 1%, 1/16 W.
2. ALL RESISTANCE IS EXPRESSED IN OHMS.
3. ALL CAPACITANCE IS EXPRESSED IN MICROFARADS.
4. ALL INDUCTANCE IS EXPRESSED IN MICROHENRIES.

CAUTION:
CONTAINS PARTS AND ASSEMBLIES SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).

042M-017

Figure 5-3 Backplane PCB Assy (cont)
(0000-4236-100-A) (42A1A1A1)

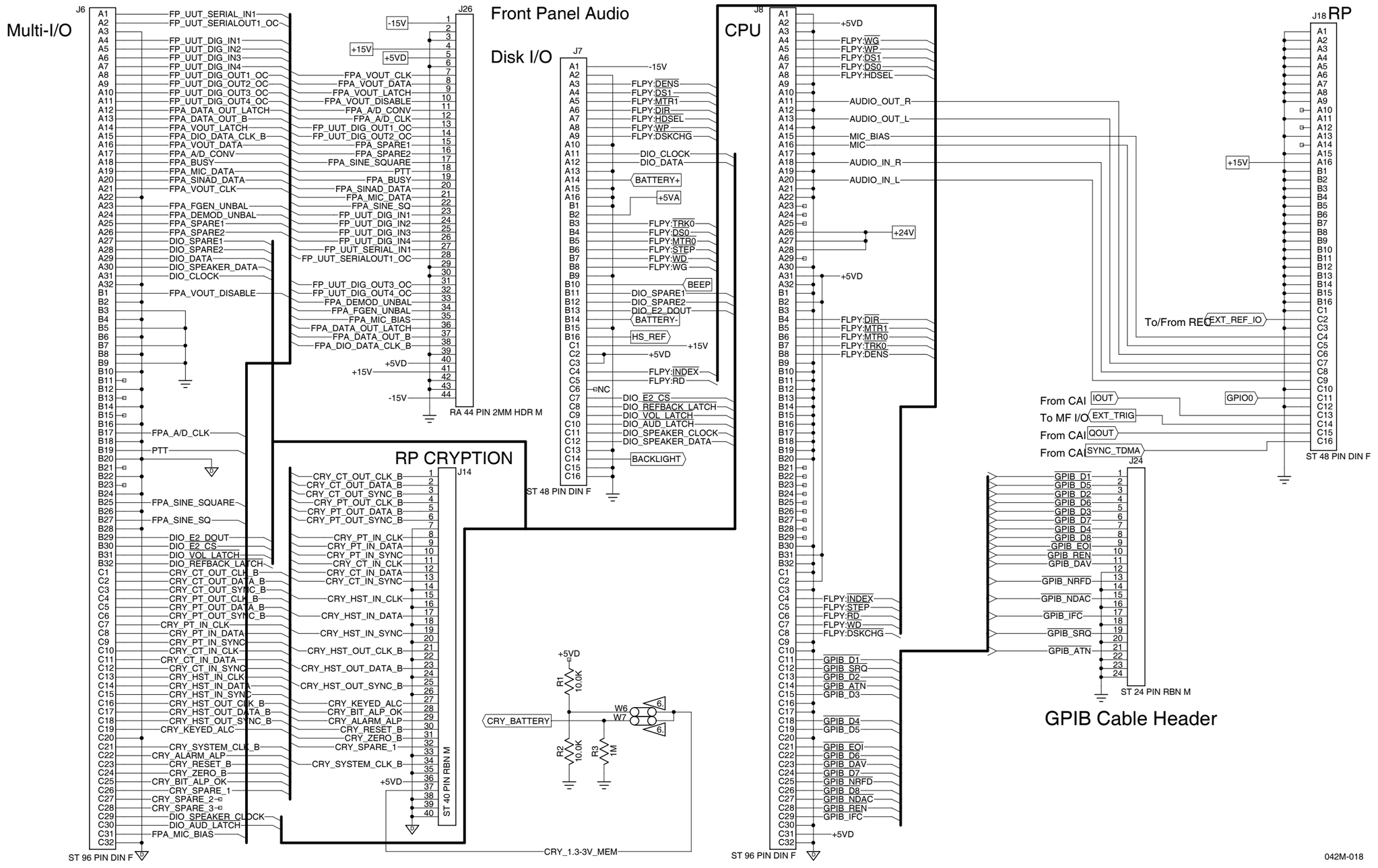
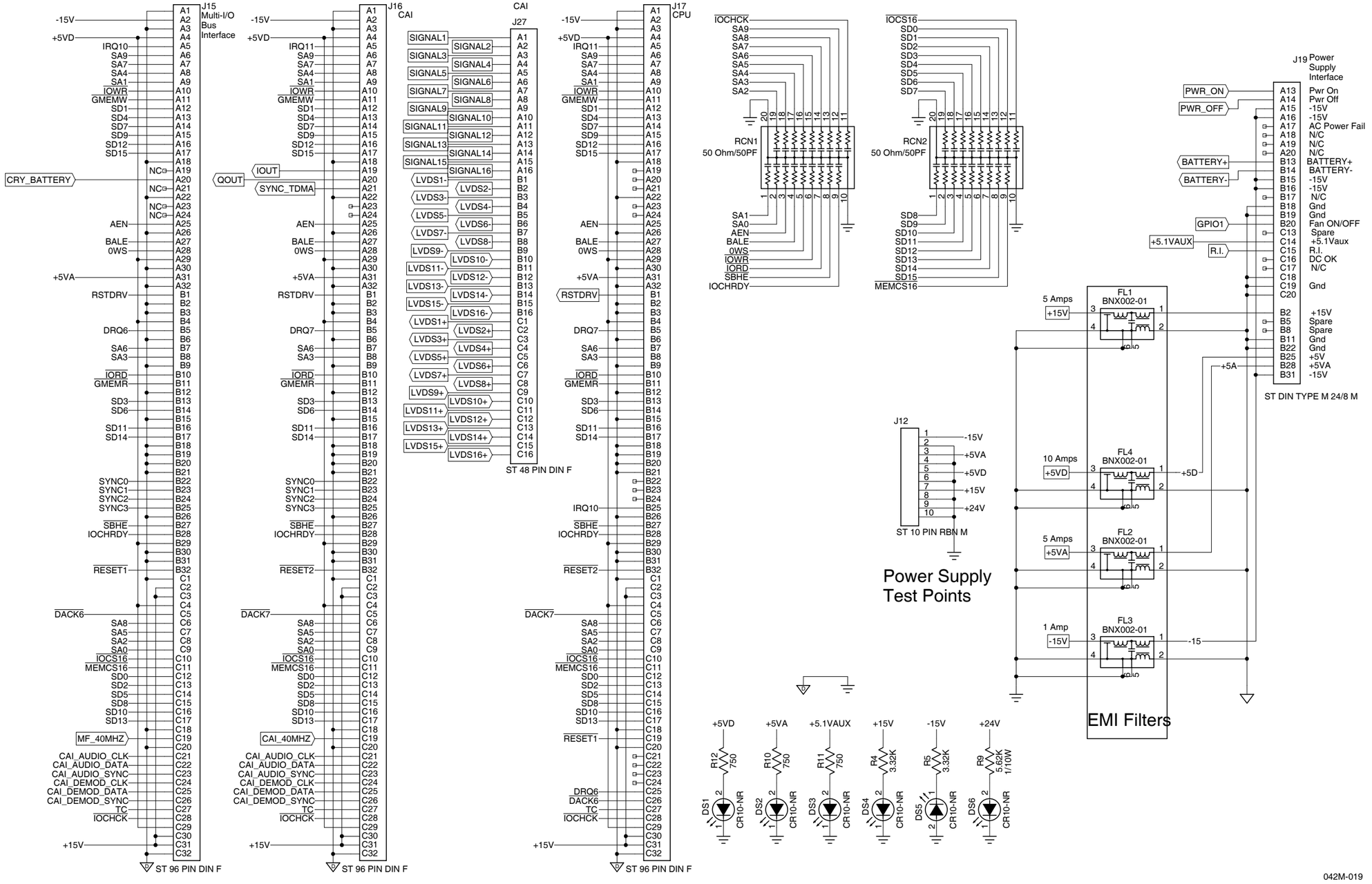
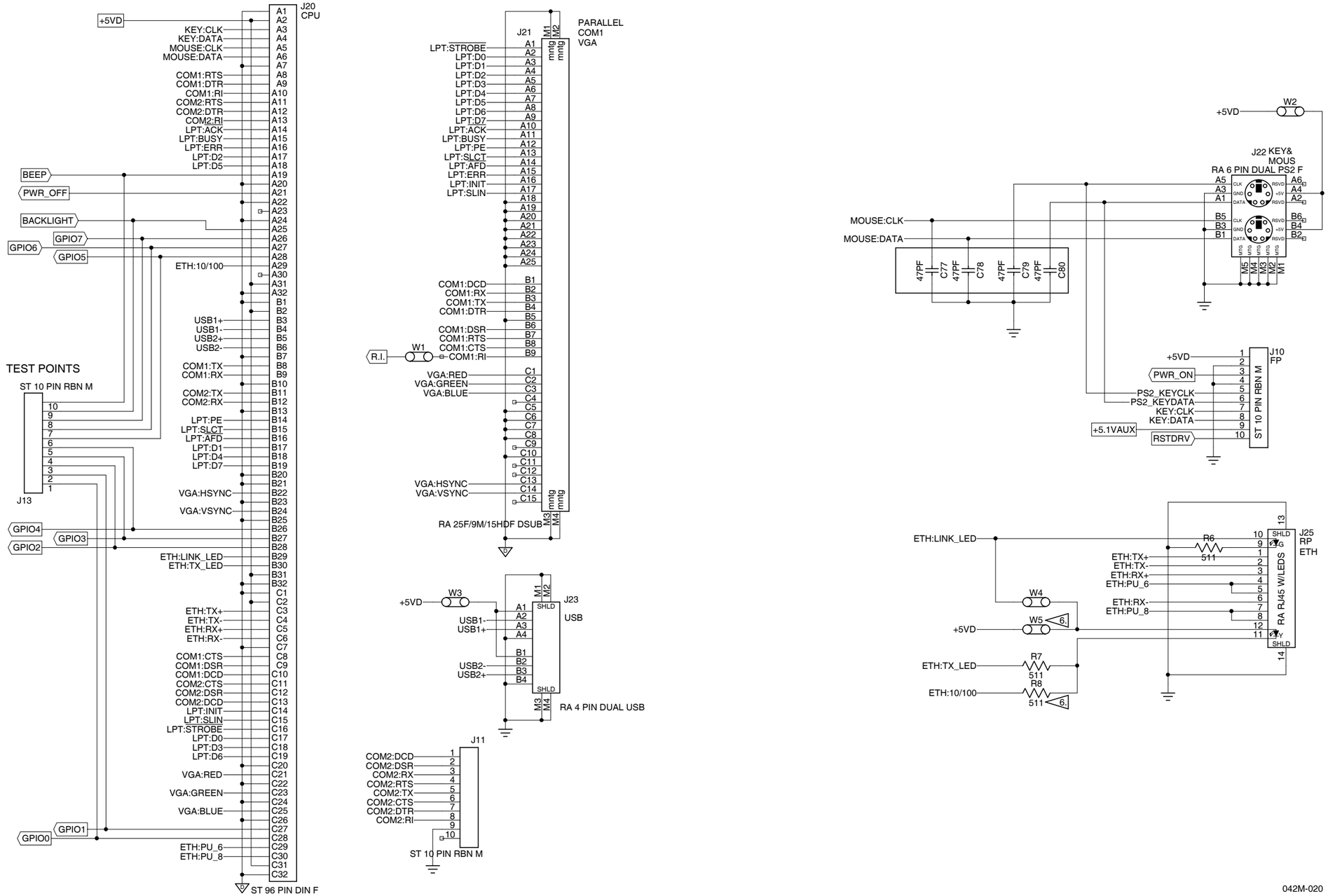


Figure 5-3 Backplane PCB Assy (cont)
(0000-4236-100-A) (42A1A1A1)



042M-019

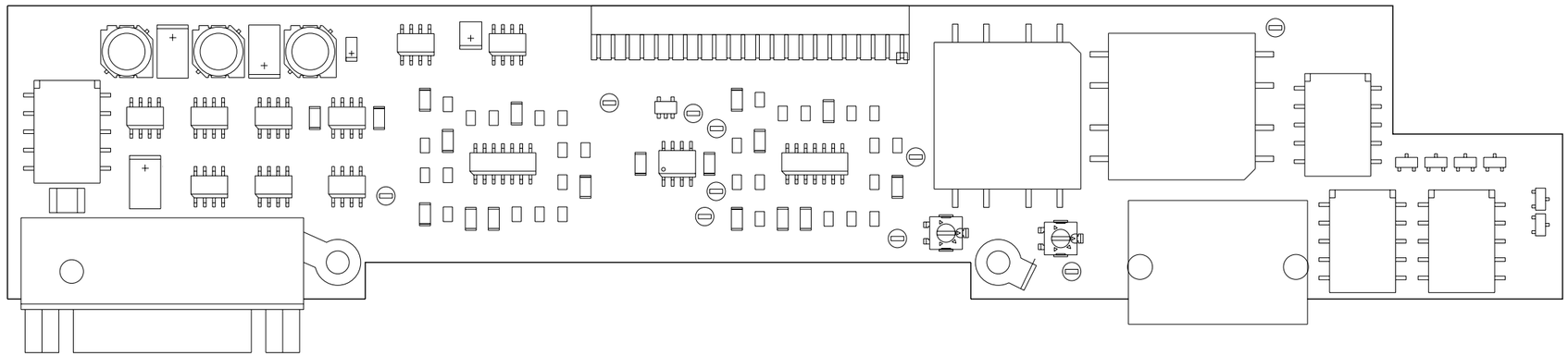
Figure 5-3 Backplane PCB Assy (cont)
(0000-4236-100-A) (42A1A1A1)



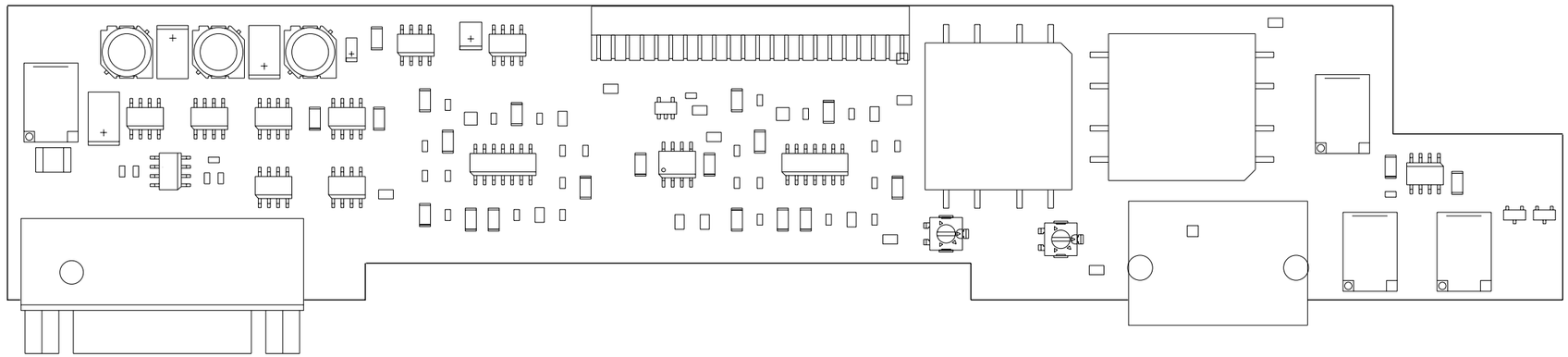
042M-020

Figure 5-3 Backplane PCB Assy (cont)
(0000-4236-100-A) (42A1A1A1)

CAUTION:
CONTAINS PARTS AND ASSEMBLIES SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).



(7010-4234-000)

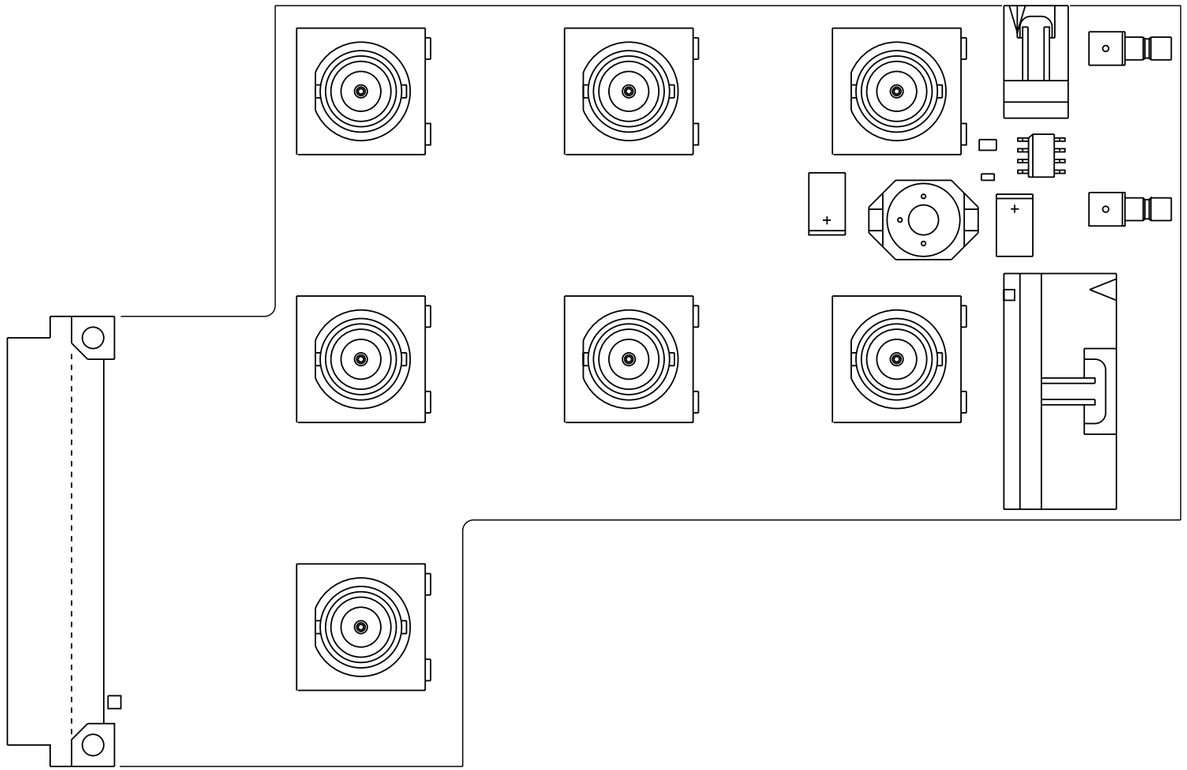


(7010-4238-700)

042M-010

Figure 5-4 Front Panel Audio PCB Assy
(7010-4234-000-H) (7010-4238-700-A) (42A1A1A2)

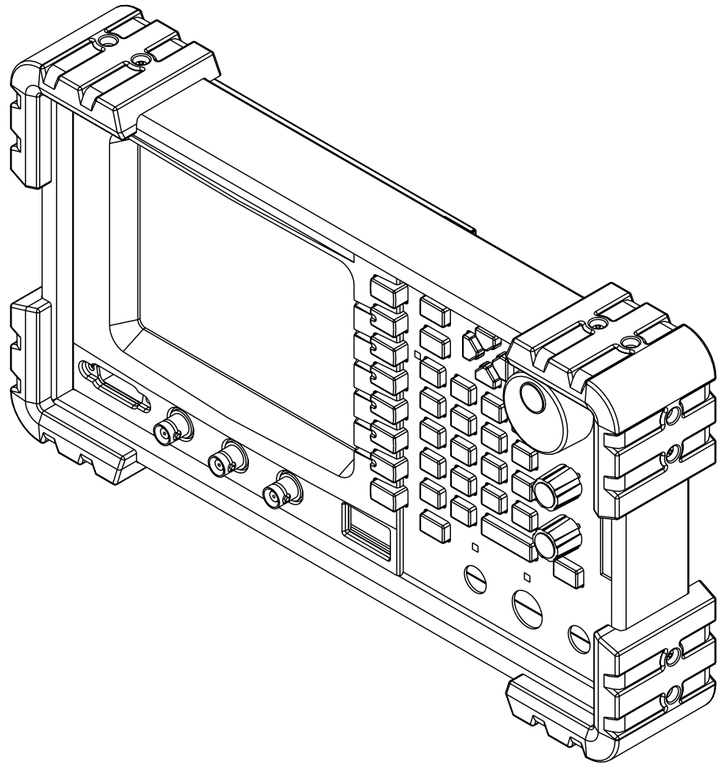
CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).



042M-011

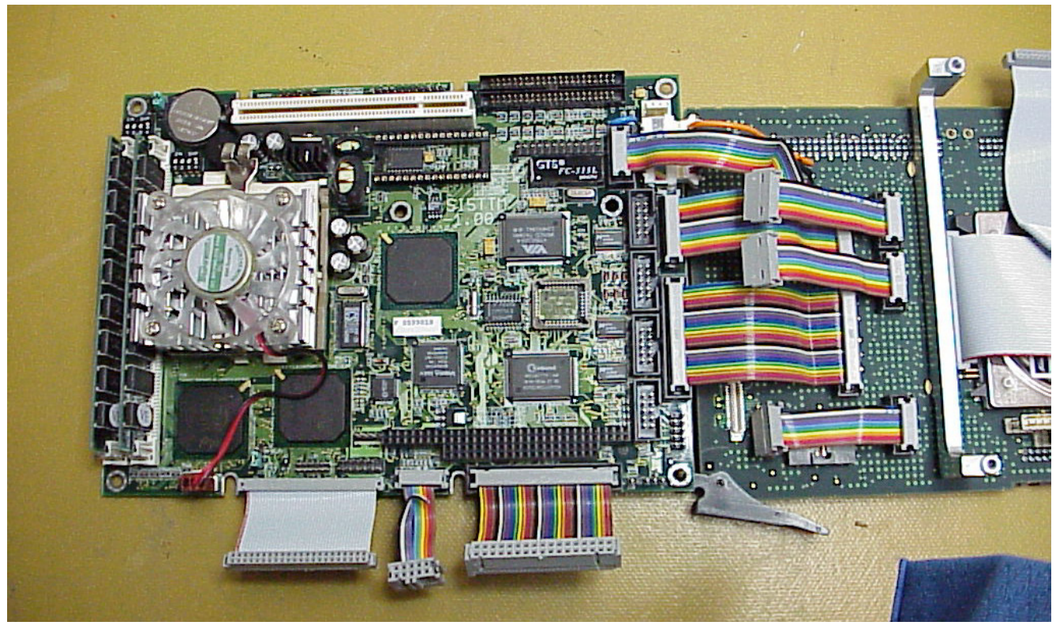
Figure 5-5 Rear Panel PCB Assy
(7010-4233-800-B) (42A1A1A3)

CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).

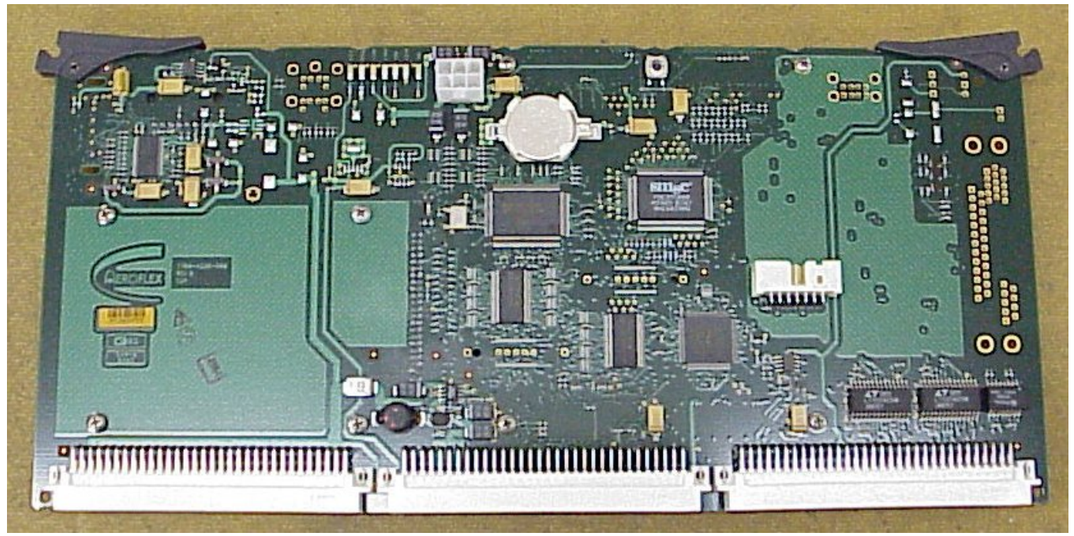


042M-013

Figure 5-6 Front Panel Assy
(7005-4243-700-F) (42A1A1A4)



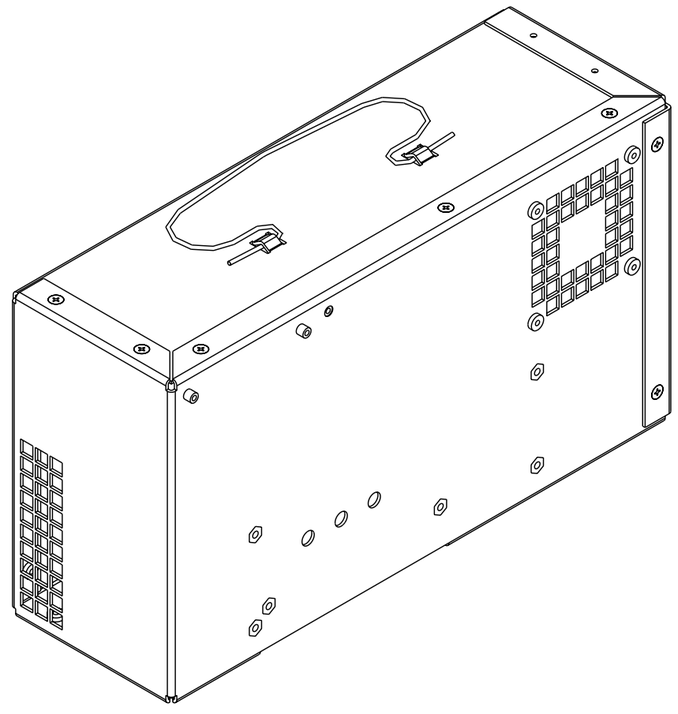
(7005-4243-500)



(7010-4238-800)

Figure 5-7 CPU Adapter Assy
(7005-4243-500-F) (7010-4238-800-C) (42A1A1A5)

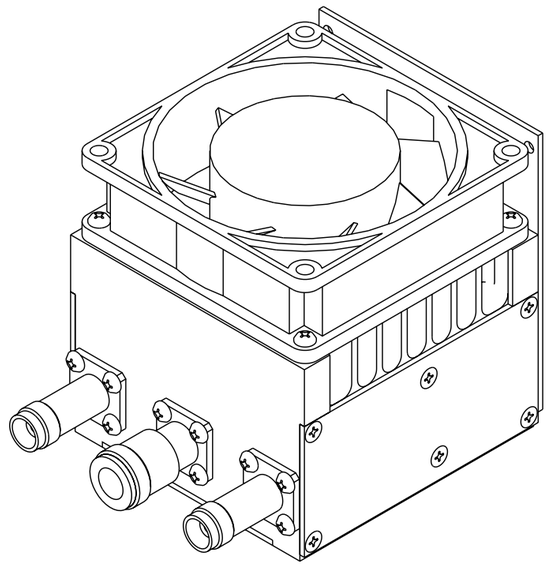
CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).



042M-013

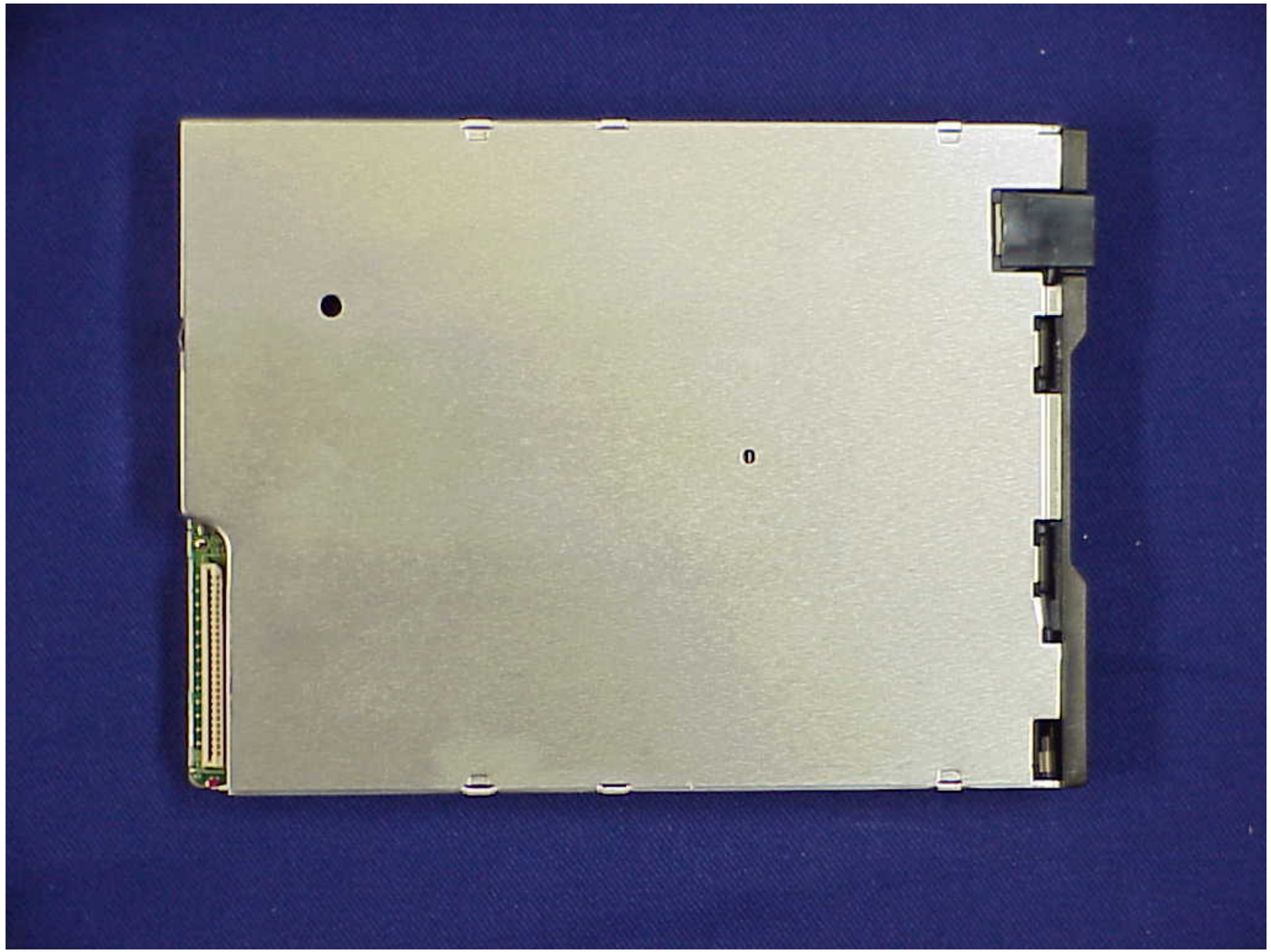
Figure 5-8 Power Supply Assy
(7005-4243-400-D) (42A1A1A6)

CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).



042M-013

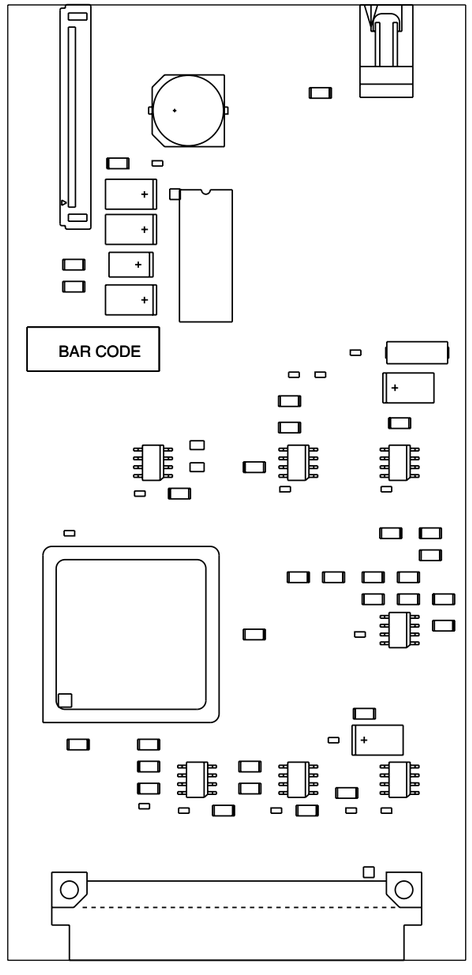
Figure 5-9 Power Termination Assy
(7005-4242-500-K) (42A1A1A7)



042M-032

Figure 5-10 Floppy Drive Assy
(7110-4244-400-A) (42A1A1A8)

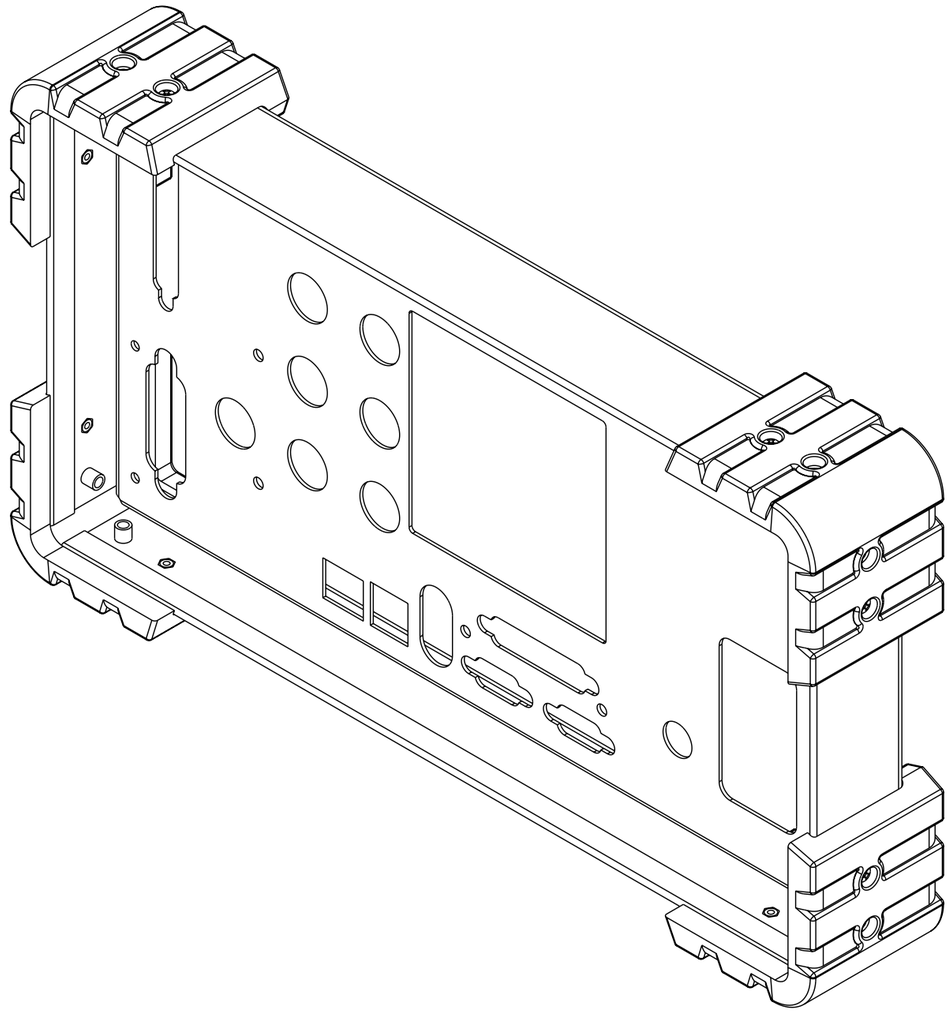
CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).



042M-012

Figure 5-11 Disk I/O PCB Assy
(7010-4232-800-D) (42A1A1A9)

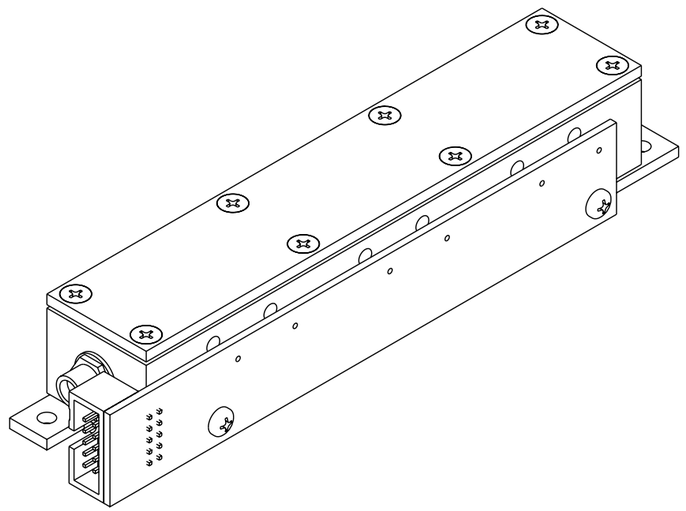
CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).



042M-007

Figure 5-12 Rear Panel Assy
(7005-4243-800-D) (42A1A2)

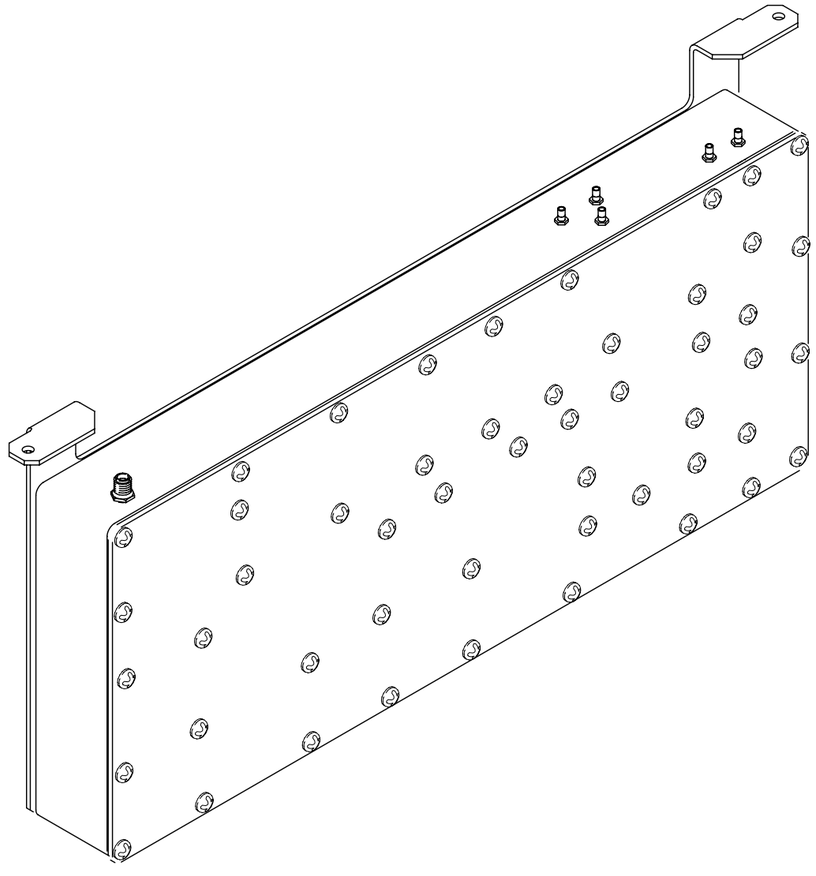
CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).



042M-006

Figure 5-13 Attenuator Assy
(7005-4243-100-F) (42A1A3)

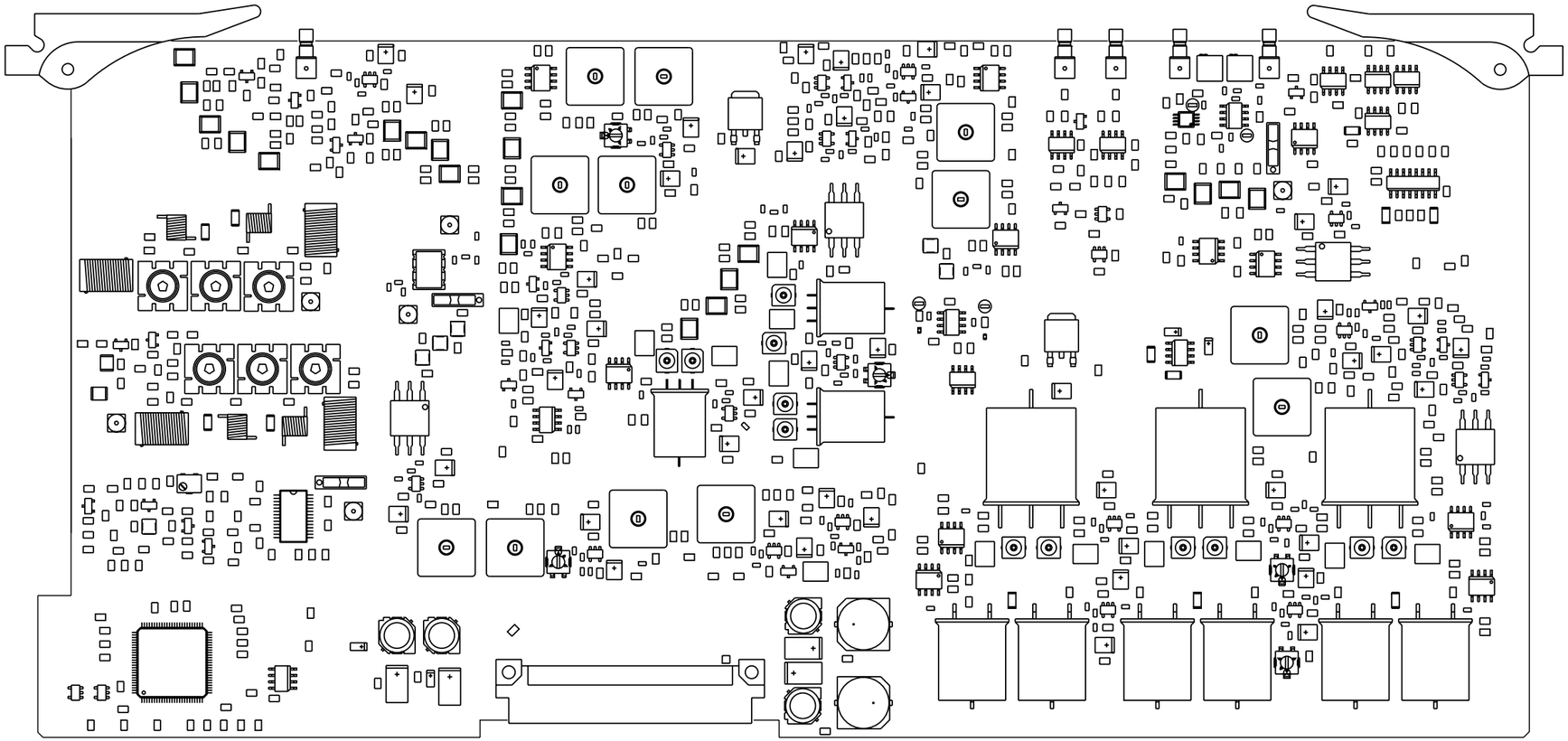
CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).



042M-009

Figure 5-14 Generator Assy
(7005-4242-600-E) (7005-4442-500-A) (7005-4444-200-A) (7005-4249-000-A) (42A1A4)

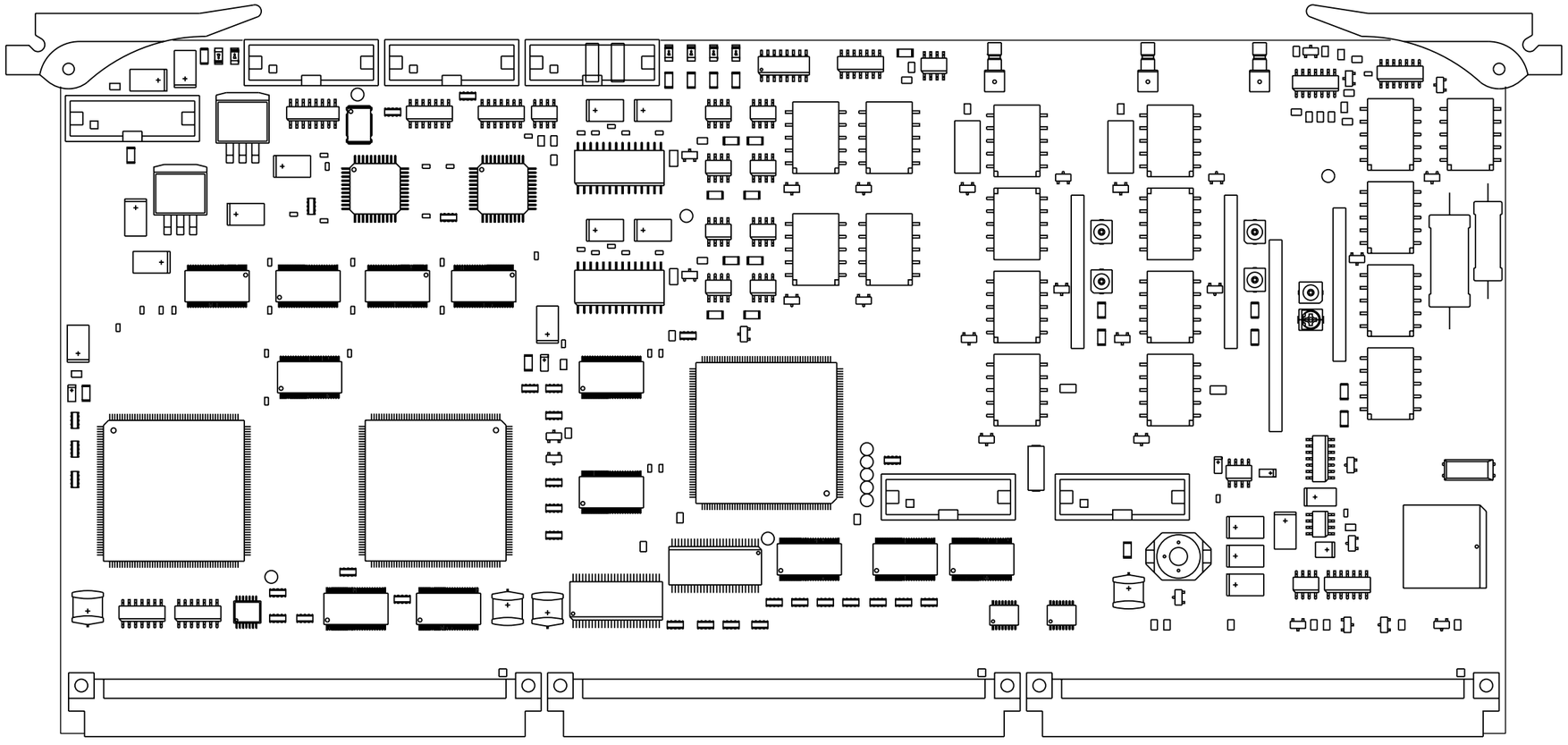
CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).



042M-004

Figure 5-15 IF/Video PCB Assy
(7010-4236-800-D) (42A1A5)

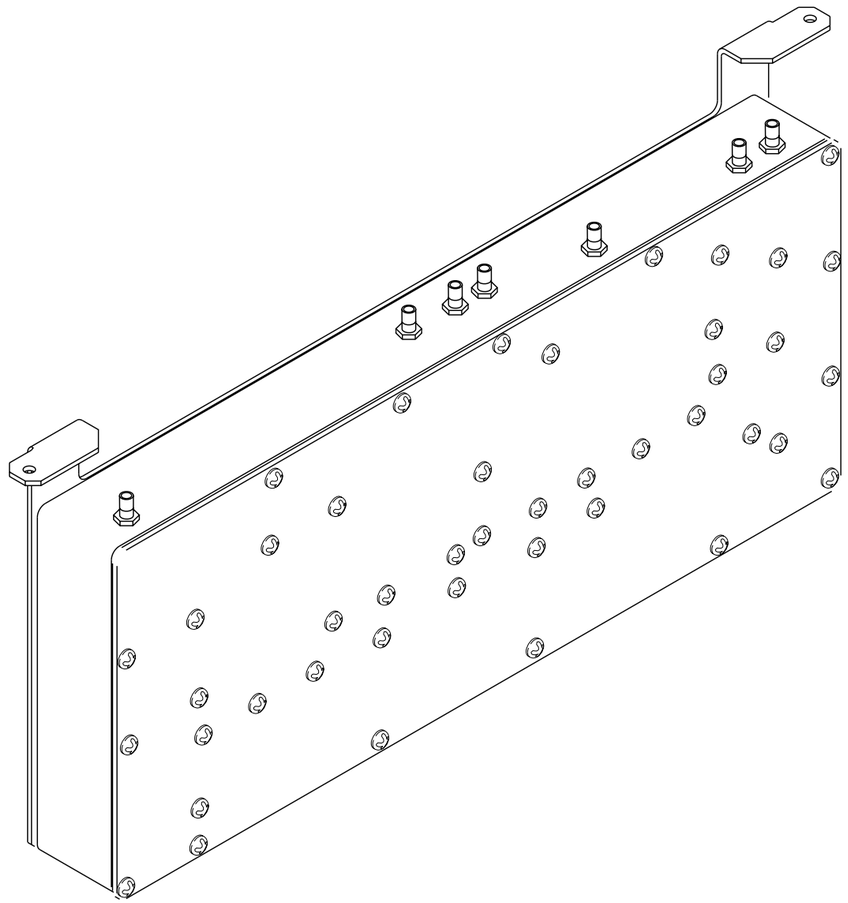
CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).



042M-003

Figure 5-16 Multifunction I/O PCB Assy
(7010-4236-700-D) (42A1A6)

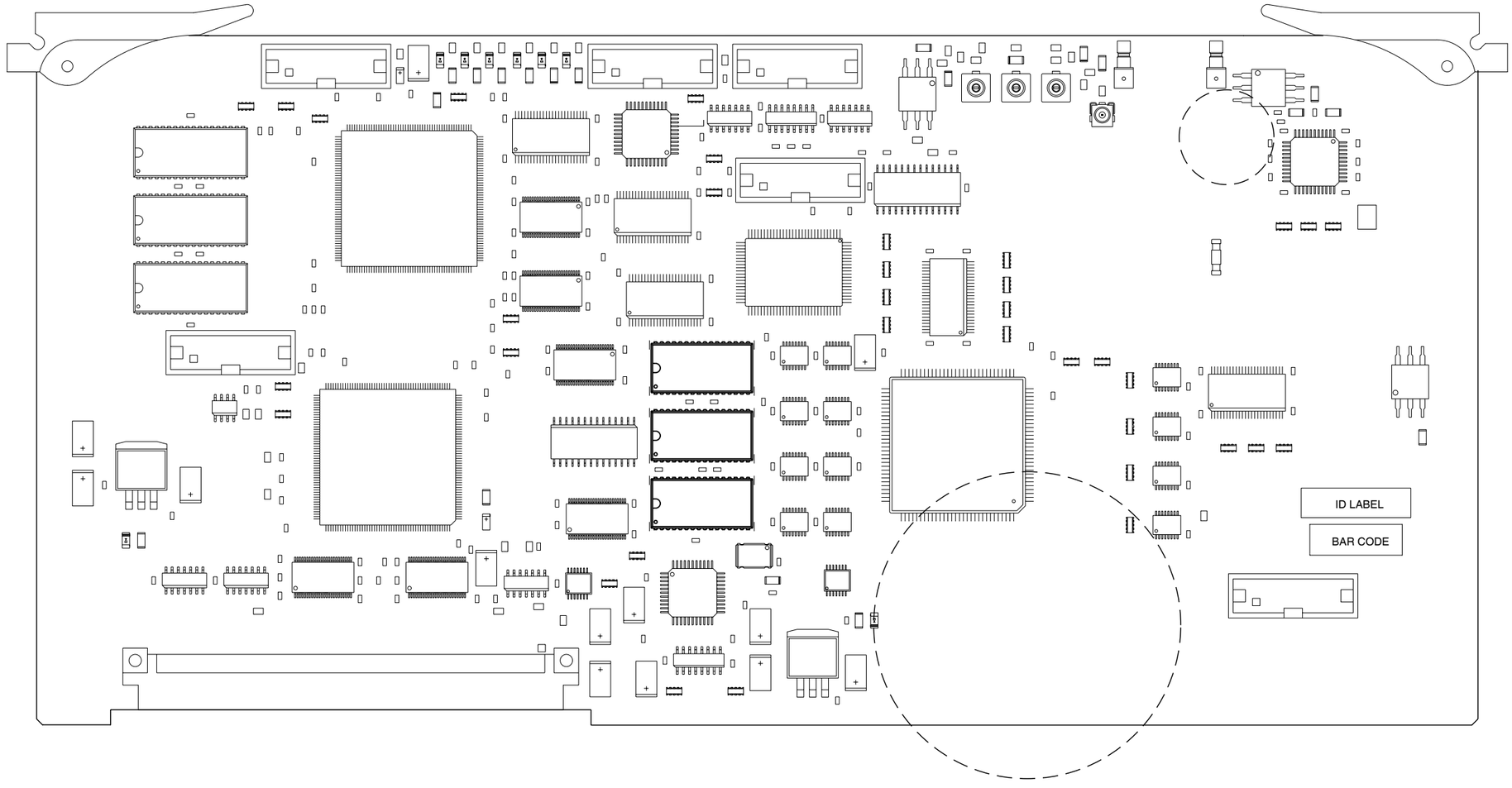
CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).

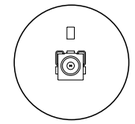


042M-008

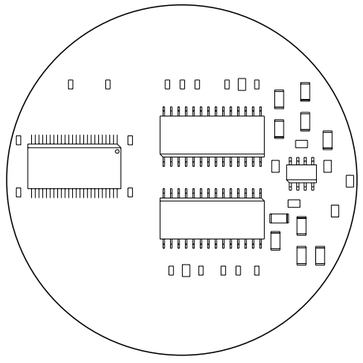
Figure 5-17 Receiver Assy
(7005-4248-100-B) (42A1A7)

CAUTION:
CONTAINS PARTS AND ASSEMBLIES SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).





(REV F)

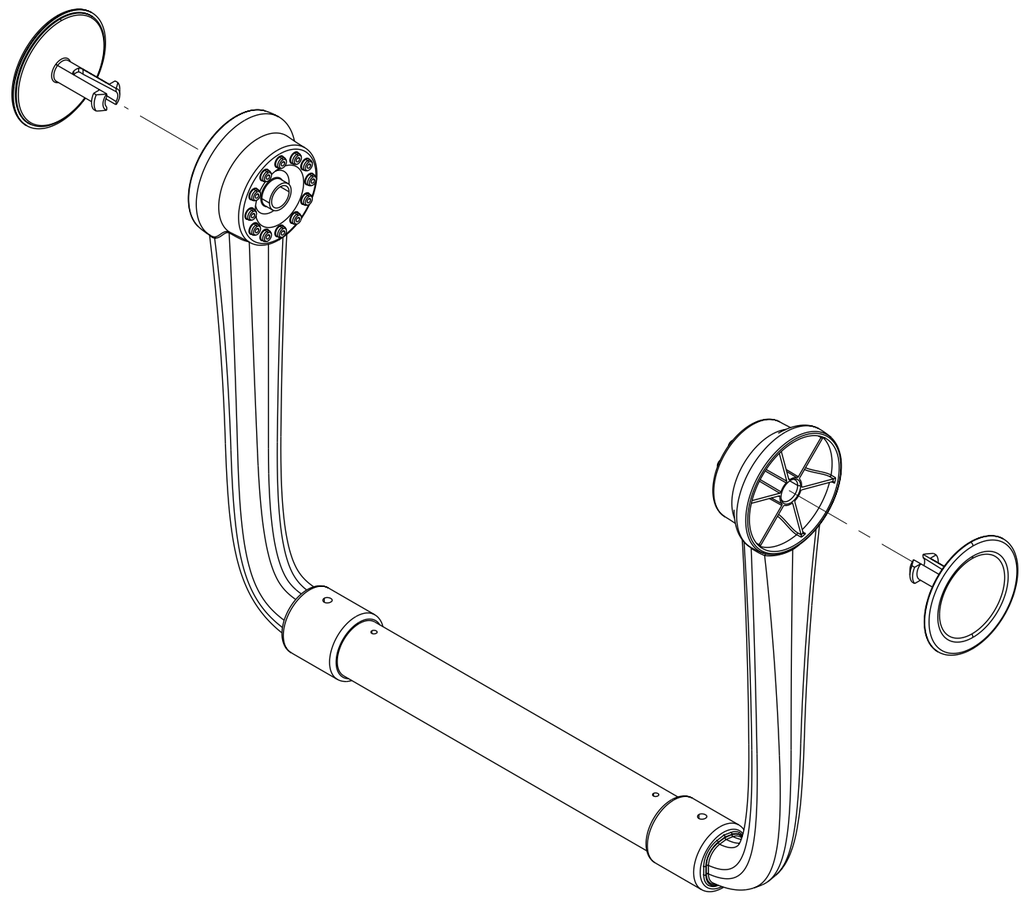


(REV F)

042M-002

Figure 5-18 CAI PCB Assy (7010-4232-900-K) (42A1A8)

CAUTION:
CONTAINS PARTS AND ASSEMBLIES
SUSCEPTIBLE TO DAMAGE BY
ELECTROSTATIC DISCHARGE (ESD).



042M-001

Figure 5-19 Handle Assy
(7110-4246-800-C) (42A1A9)

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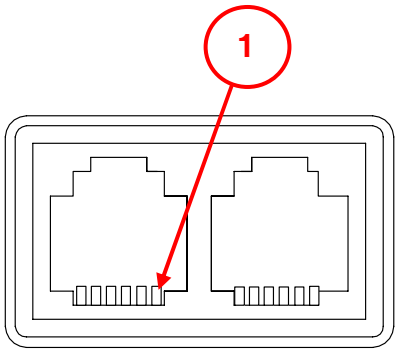
APPENDIX A - I/O CONNECTORS AND PIN-OUT TABLES

A-1 TABLE OF I/O CONNECTORS

CONNECTOR NAME	CONNECTOR TYPE	SIGNAL IN/OUT	SIGNAL TYPE
MIC/ACC	8 Pin DIN	IN/OUT	See Pin-Out Table
AUX RF OUT	BNC	OUT	RF
ANTENNA	TNC	IN	RF, 0.25 W CW MAX
AC LINE IN	AC Power	IN	120/240 VAC
DC IN		OUT	12 Vdc, 24 to 30 Vdc
GPIB (IEEE-488)	24 Pin Champ	IN/OUT	See Pin-Out Table
SA IF	BNC	OUT	SPECTRUM ANALYZER IF
SA VIDEO	BNC	OUT	SPECTRUM ANALYZER DETECTOR OUT
Q OUT	BNC	OUT	NOT USED
I OUT	BNC	OUT	NOT USED
SYNC	BNC	IN	
EXT TRIG	BNC	IN	AUX OSCILLOSCOPE TRIGGER IN
EXT REF IO	BNC	IN/OUT	FREQ STD IN/OUT

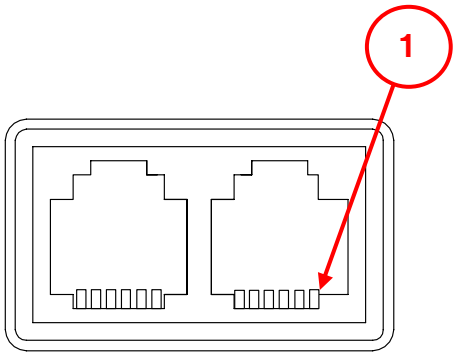
A-2 PIN-OUT TABLE FOR MIC CONNECTOR

PIN NUMBER	SIGNAL NAME	SIGNAL TYPE	I/O
1	GND	GND	GND
2	GND	GND	GND
3	MIC IN	IN	DYNAMIC/ELECTRET
4	PTT	IN	GND=PUSH
5	AUDIO 2(+)	OUT	AUDIO FREQ OUT #2
6	AUDIO 2 GND	GND	AUDIO FREQ OUT #2 GND



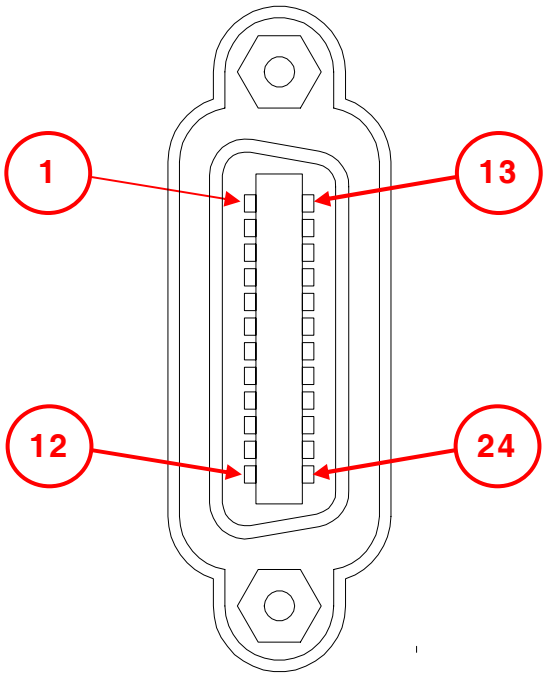
A-3 PIN-OUT TABLE FOR AUDIO I/O CONNECTOR

PIN NUMBER	SIGNAL NAME	SIGNAL TYPE	I/O
1	AUDIO IN (+)	IN	AUDIO FREQ IN, BAL/UNBAL, (+)
2	AUDIO IN (-)	IN/GND	AUDIO FREQ IN, BAL/UNBAL, (-)/GND
3	AUDIO 1 (+)	OUT	AUDIO FREQ OUT #1, BAL/UNBAL, (+)
4	AUDIO 1 (-)	OUT/GND	AUDIO FREQ OUT #1, BAL/UNBAL, (-)/GND
5	AUDIO 2 (+)	OUT	AUDIO FREQ OUT #2
6	AUDIO 2 GND	GND	AUDIO FREQ OUT #2 GND



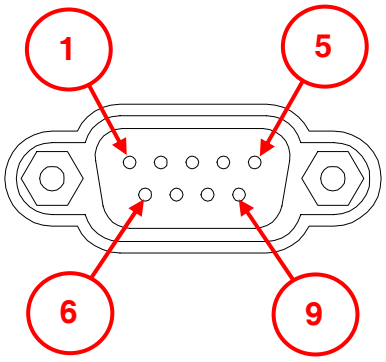
A-4 PIN-OUT TABLE FOR GPIB CONNECTOR

PIN NUMBER	ASSIGNMENT	PIN NUMBER	ASSIGNMENT
1	DIO 1	13	DIO 5
2	DIO 2	14	DIO 6
3	DIO 3	15	DIO 7
4	DIO 4	16	DIO 8
5	EOI	17	REN
6	DAV	18	DIGITAL GND
7	NFRD	19	DIGITAL GND
8	NDAC	20	DIGITAL GND
9	IFC	21	DIGITAL GND
10	SRO	22	DIGITAL GND
11	ATN	23	DIGITAL GND
12	DIGITAL GND	24	DIGITAL GND



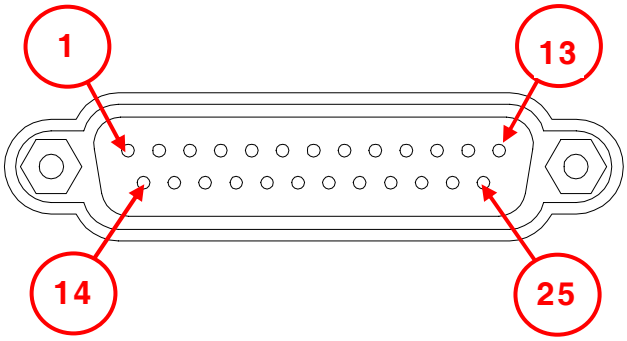
A-5 PIN-OUT TABLE FOR RS-232 CONNECTOR

PIN NUMBER	ASSIGNMENT	SIGNAL NAME
1	INPUT	DATA CARRIER DETECT (DCD)
2	INPUT	RECEIVE DATA (RX)
3	OUTPUT	TRANSMIT DATA (TX)
4	OUTPUT	DATA TERMINAL READY (DTR)
5	POWER	DIGITAL GND
6	INPUT	DATA SET READY (DSR)
7	OUTPUT	REQUEST TO SEND (RTS)
8	INPUT	CLEAR TO SEND (CTS)
9	INPUT	RING INDICATOR (RI0)



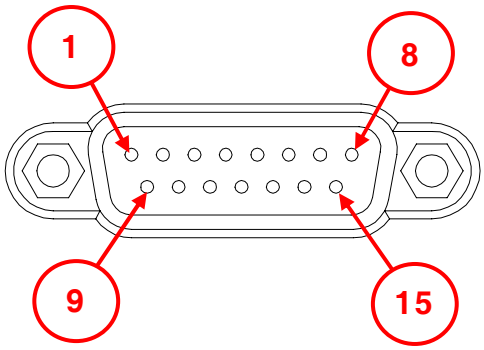
A-6 PIN-OUT TABLE FOR PRINTER CONNECTOR

PIN NUMBER	ASSIGNMENT	SIGNAL NAME
1	BI-DIRECTIONAL	/STROBE
2	BI-DIRECTIONAL	PD0
3	BI-DIRECTIONAL	PD1
4	BI-DIRECTIONAL	PD2
5	BI-DIRECTIONAL	PD3
6	BI-DIRECTIONAL	PD4
7	BI-DIRECTIONAL	PD5
8	BI-DIRECTIONAL	PD6
9	BI-DIRECTIONAL	PD7
10	INPUT	/ACK
11	INPUT	BUSY
12	INPUT	PE
13	INPUT	SLCT
14	BI-DIRECTIONAL	/AFD
15	INPUT	/ERR
16	BI-DIRECTIONAL	/INIT
17	BI-DIRECTIONAL	/SLIN
18	POWER	GND
19	POWER	GND
20	POWER	GND
21	POWER	GND
22	POWER	GND
23	POWER	GND
24	POWER	GND



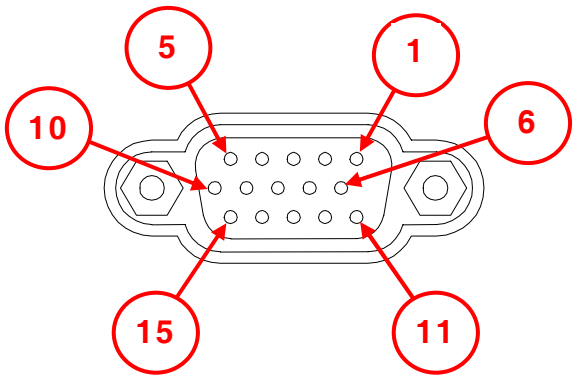
A-7 PIN-OUT TABLE FOR TEST PORT CONNECTOR

PIN NUMBER	ASSIGNMENT	PIN NUMBER	ASSIGNMENT
1	DIGITAL IN 1	9	DIGITAL OUT 1
2	DIGITAL IN 2	10	DIGITAL OUT 2
3	DIGITAL IN 3	11	DIGITAL OUT 3
4	DIGITAL IN 4	12	DIGITAL OUT 4
5	DIGITAL IN 5	13	SERIAL OUT
6	N/C	14	N/C
7	GND	15	GND
8	PGM V+ OUT		



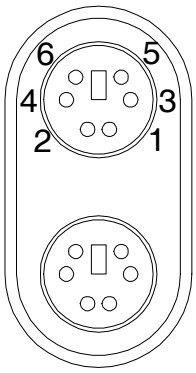
A-8 PIN-OUT TABLE FOR VGA CONNECTOR

PIN NUMBER	ASSIGNMENT	PIN NUMBER	ASSIGNMENT
1	RED VIDEO	9	N/C
2	GREEN VIDEO	10	SYNC RETURN
3	BLUE VIDEO	11	MONITOR ID 0
4	MONITOR ID 2	12	MONITOR ID 1
5	GND	13	HORIZONTAL SYNC
6	RED RETURN	14	VERTICAL SYNC
7	GREEN RETURN	15	MONITOR ID 3
8	BLUE RETURN		



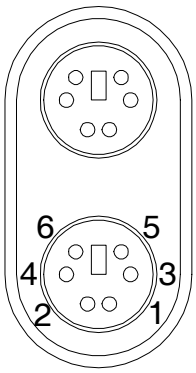
A-9 PIN-OUT TABLE FOR MOUSE CONNECTOR

PIN NUMBER	SIGNAL NAME	SIGNAL TYPE	I/O
1	MDATA	Bi-Directional	Mouse Data
2		N/C	
3	GND	Power	GND
4	+5 V	Power	Supply Voltage
5	MCLK	Bi-Directional	Mouse Clock
6		N/C	
Shell		Earth Ground	Chassis Ground



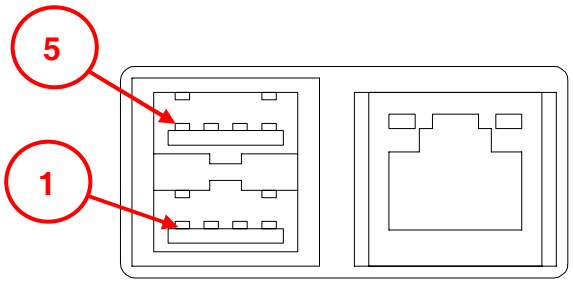
A-10 PIN-OUT TABLE FOR KEYBOARD CONNECTOR

PIN NUMBER	SIGNAL NAME	SIGNAL TYPE	I/O
1	KBDATA	Bi-Directional	Keyboard Data
2		N/C	
3	GND	Power	GND
4	+5 V	Power	Supply Voltage
5	KBCLK	Bi-Directional	Keyboard Clock
6		N/C	
Shell		Earth Ground	Chassis Ground



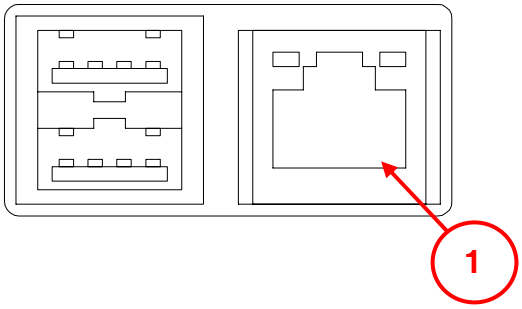
A-11 PIN-OUT TABLE FOR USB CONNECTOR

PIN NUMBER	SIGNAL NAME	SIGNAL TYPE	I/O
1	VCC	PWR	
2	(-) DATA	DATA	I/O
3	(+) DATA	DATA	I/O
4	GND	PWR	
5	VCC	PWR	
6	(-) DATA	DATA	I/O
7	(+) DATA	DATA	I/O
8	GND	PWR	



A-12 PIN-OUT TABLE FOR ETHERNET CONNECTOR

PIN NUMBER	SIGNAL NAME	SIGNAL TYPE	I/O
1	TX (+)	DATA	OUT
2	TX (-)	DATA	OUT
3	RX (+)	DATA	IN
4	RX (-)	DATA	IN
5	GND	GND	GND
6	GND	GND	GND
7	GND	GND	GND
8	GND	GND	GND



APPENDIX B - REPACKING FOR SHIPMENT

REPACKING FOR SHIPPING

Aeroflex Test Sets returned to factory for calibration, service or repair must be repackaged and shipped subject to the following conditions:

AUTHORIZATION

Do not return any products to factory without authorization from Aeroflex Customer Service Department.

CONTACT: Aeroflex
Customer Service Dept.
10200 West York Street
Wichita, Kansas 67215

Telephone: (800) 835-2350
FAX: (316) 524-2623
Email: *service@aeroflex.com*

TAGGING TEST SETS

All test sets must be tagged with:

- Owner's identification and address.
- Nature of service or repair required.
- Model No. and Serial No.

SHIPPING CONTAINERS

Test Sets must be repackaged in original shipping containers using Aeroflex packing materials. If original shipping containers and materials are not available, contact Aeroflex Customer Service Department for shipping instructions.

FREIGHT COSTS

All freight costs on non-warranty shipments are assumed by the customer. (See "Warranty Packet" for freight charge policy on warranty claims.)

REPACKING PROCEDURE

- Make sure bottom packing mold is seated on floor of shipping container.
- Adjust handle to lay unlocked against Test Set as shown.
- Carefully wrap Test Set with polyethylene sheeting.
- Place Test Set into shipping container, making sure Test Set is securely seated in bottom packing mold.
- Place top packing mold over top of Test Set and press down until mold rests solidly on bottom packing mold.
- Close shipping container lids and seal with shipping tape or an industrial stapler. Tie all sides of container with break resistant rope, twine or equivalent.

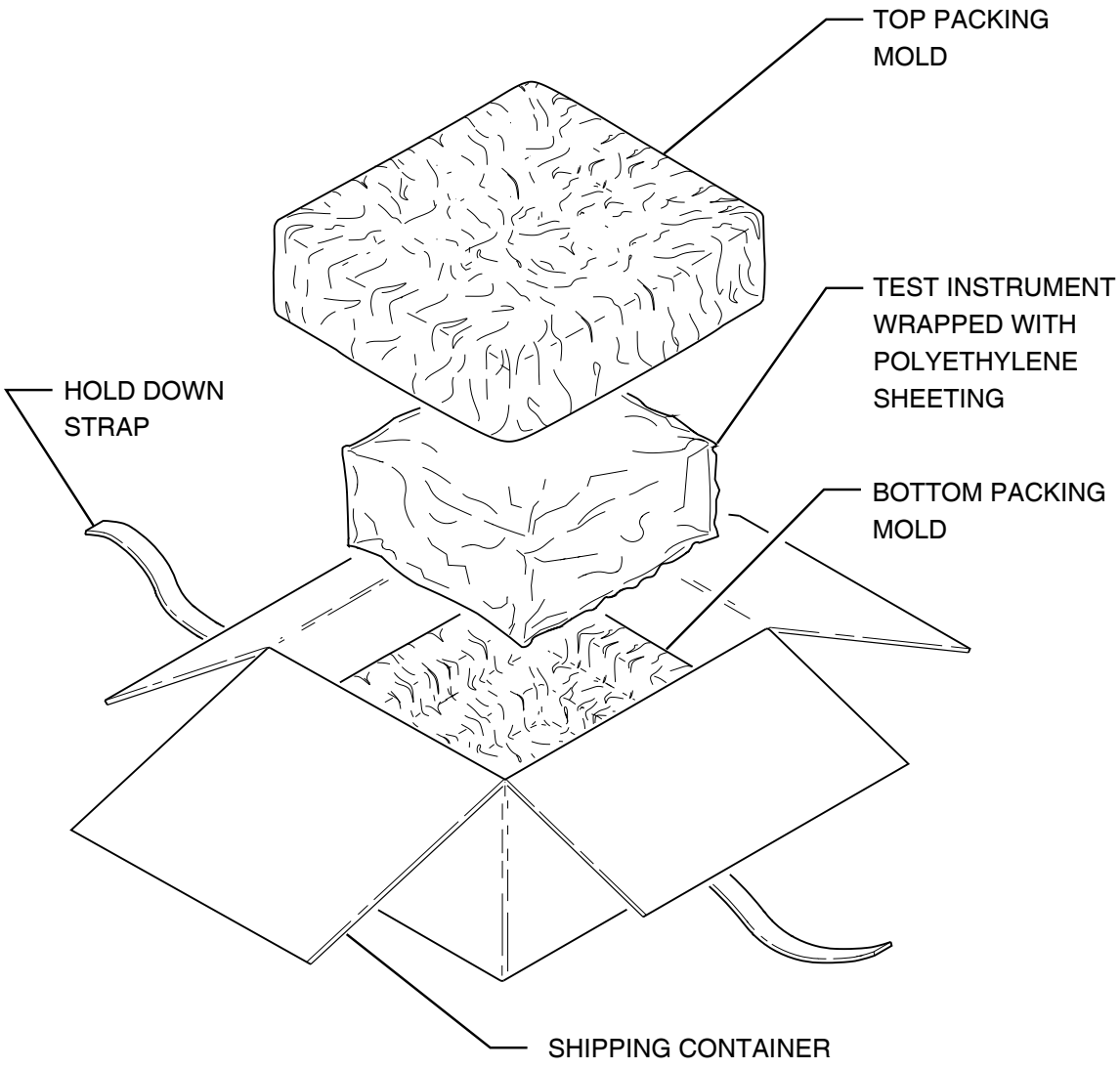
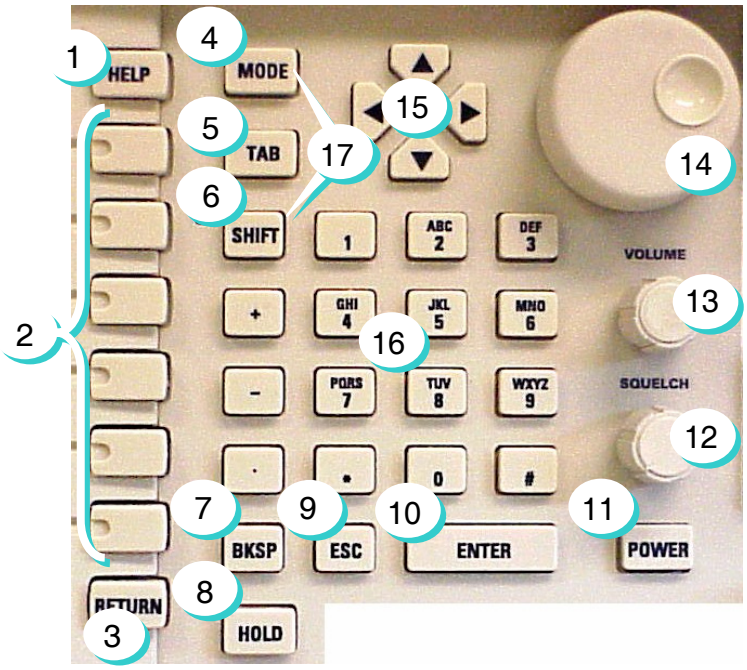


Figure B-1 Repacking for Shipment

APPENDIX C - CONTROLS AND CONNECTORS

C-1 CONTROLS

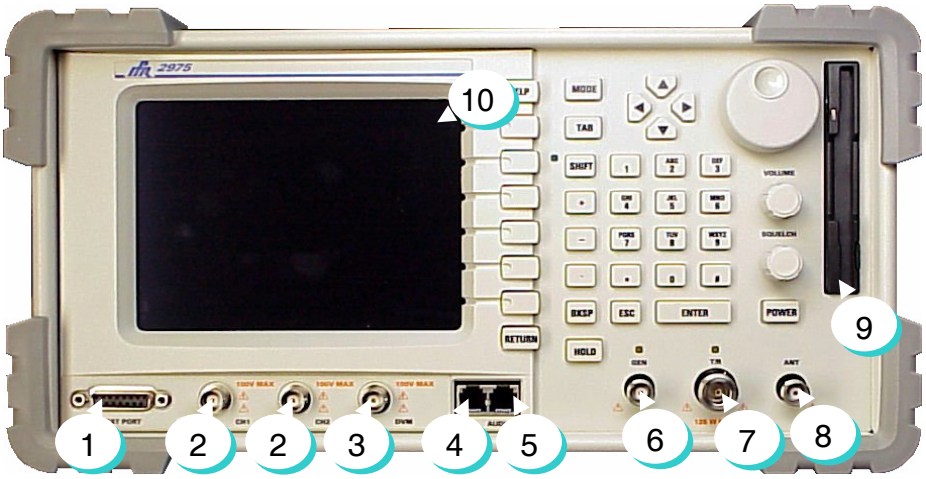


1	**HELP Key** Future Use: Context Sensitive Help on Screen.
2	**SOFT FUNCTION Keys** F1 through F7, screen dependent keys whose functions are displayed immediately adjacent to each key on the LCD.
3	**RETURN Key** Used in field select mode to return to the previous menu.
4	**MODE Key** Displays a list of major test set operations for the user to select.
5	**TAB** Moves the field cursor to the next editable field on the screen when field selection is active.
6	**SHIFT Key** Allows the alternate value of a key to be selected. Shift LED illuminates when alternative value is active.
7	**BKSP** Backspaces the present cursor position and deletes one space.
8	**HOLD Key** Future Use

9	**ESC Key** Escapes the active edit field without saving the new data entry.
10	**ENTER Key** Generates a new line when pressed in a text entry field. If pressed in a data edit field, the data value is evaluated, set and the edit process is ended.
11	**POWER** Powers the 2975 ON/OFF when the Main Power Switch is in the ON position.
12	**SQUELCH KNOB** Adjust the threshold for receiver squelch.
13	**VOLUME KNOB** Rotate clockwise (cw) or counterclockwise (ccw) to adjust audio volume level on the speaker.
14	**SPINNER KNOB** Used to increment and decrement data values in an active edit field and change cursor fields. Rotates clockwise (cw) and counterclockwise (ccw).
15	**ARROW Keys** Moves the cursor to a new field when pressed in field select mode. Up and down arrow keys increments or decrements the current digit in edit mode respectively. Left and right keys move the selected character cursor left or right respectively.
16	**DATA ENTRY Keys** Used to enter valid data entry depending on the field being edited.
17	**SHIFT, MODE KEY combination** Accesses a pull-down menu for display option selection.

C-2 CONNECTORS

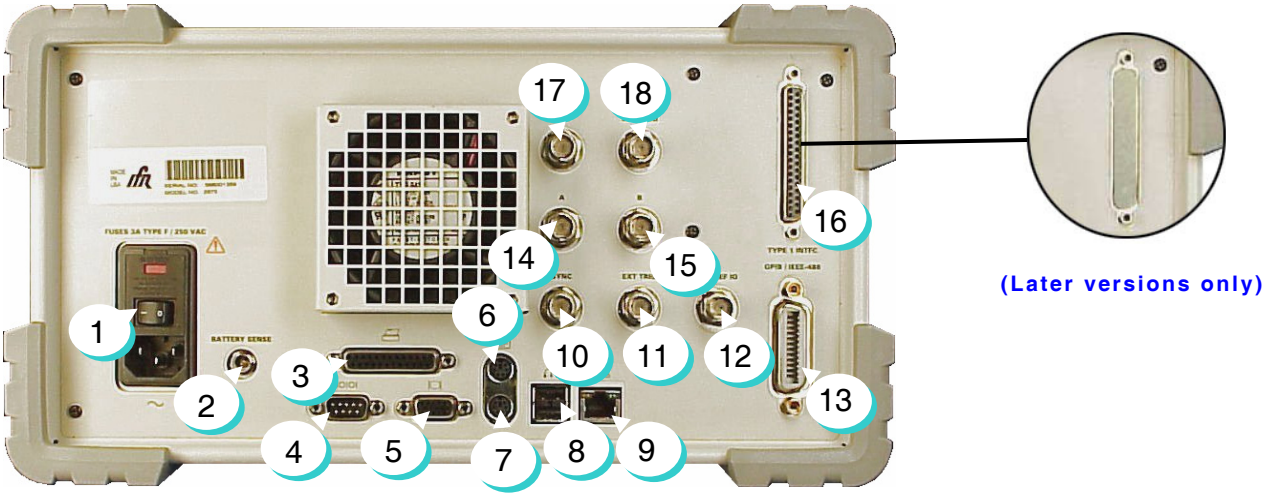
C-2-1 2975 FRONT PANEL



1	**TEST** Future Use: Custom Radio Interfacing
2	**SCOPE CH1 and CH2** Inputs to the Oscilloscope ⚠ 100V maximum input! ⚠ Use caution when probing live circuits! DO NOT connect to AC line!
3	**DVM** Input to the Digital Voltmeter ⚠ 100V maximum input! ⚠ Use caution when probing live circuits! DO NOT connect to AC line!
4	**MIC** Input to the 2975 Audio System
5	**AUDIO I/O** Input and Output to the 2975 Audio System
6	**GEN** RF Generator Output. LED indicates port selected for generator output. ⚠ DO NOT transmit RF into this connector!
7	**T/R** RF Generator Output and RF Receiver Input (Full Duplex). LED indicates T/R Connector selected for generator output. ⚠ DO NOT exceed 50 W continuous RF power! ⚠ Use caution when connecting high power transmitters!

8	**ANT** RF Receiver Input (50 W for 30 seconds maximum) ⚠ DO NOT transmit RF into this connector!
9	**FLOPPY DISK DRIVE** 3½" floppy disk drive for copying data and program files to/from the 2975 system.
10	**LCD** Liquid Crystal Display for user displays and feedback

C-2-2 2975 REAR PANEL



1	**MAIN POWER SWITCH** System AC Input
2	**BATTERY SENSE** Future Use
3	**PARALLEL** Future Use
4	**RS-232** Serial I/O Connection with the IFR 2975
5	**VIDEO** External VGA Monitor Connector
6	**MOUSE** Control connection designed for PS-2 compatible mouse. Mouse controls cursor for point and click control of screen items in addition to front panel keyboard operation.
7	**KEYBOARD** Control connection designed for PS-2 compatible keyboard. Keyboard controls function of unit in addition to front panel keyboard operation.
8	**USB** Future Use: Serial connection with the IFR 2975
9	**ETHERNET** Network connection with the IFR 2975
10	**SYNC** Future Use

11	**EXT TRIG** External Oscilloscope Trigger
12	**EXTERNAL RF I/O** 10 MHz Timebase In and Out
13	**GPIB** Future Use
14	**A** Future Use
15	**B** Future Use
16	**TYPE I INTERFACE** Not Used
17	**SPECTRUM ANALYZER IF** Intermediate Frequency Output (10.7 MHz)
18	**SPECTRUM ANALYZER VIDEO** Video Output

APPENDIX D - SPECIFICATIONS

- A warm-up time of 5 minutes is required for the following performance requirements.
- RF measurements are referenced to 50 Ω.
- Accuracy and Resolution stated in percent are referenced to measured or selected value unless otherwise stated.
- Where resolution exceeds accuracy, resolution takes precedence.
- Specifications and features are subject to change without notice.

D-1 GENERATOR (Receiver Test)

FREQUENCY:

Range:	1 MHz to 2.7 GHz
Resolution:	1 Hz
Accuracy:	Same as Time Base

D-2 AMPLITUDE

GEN CONNECTOR:

Range:	+10 to -110 dBm
Resolution:	0.1 dB
Accuracy:	±1.5 dB

T/R CONNECTOR:

Range:	-30 to -137 dBm
Resolution:	0.1 dB
Accuracy:	±1 dB (<1.3 GHz >-120 dBm, >1.3 GHz >-110 dBm)

SPECTRAL PURITY:

Harmonic Spurious:	-25 dBc max
Non-Harmonic Spurious:	-50 dBc max <1.5 GHz -30 dBc max >1.5 GHz
Residual FM:	<15 Hz rms (Post Detection BW = 300 Hz to 3 kHz)
SSB Phase Noise (20 kHz offset):	-100 dBc/Hz typical -92 dBc/Hz max
Residual AM:	0.1% (Post Detection BW = 300 Hz to 3 kHz)

FREQUENCY AGILITY:	10 ms <100 MHz step (to <100 Hz frequency error)

GEN Connector:

Connector Protection:	50 W (+47 dBm) for 30 sec.
Threshold:	+20 dBm (nominal)

D-3 GENERATOR MODULATOR

FM:

Deviation Accuracy:	3%, + residual, ± LSD (1 kHz through 20 kHz deviation, 1 through 10 kHz rate) 5%, + residual, ± LSD (>20 kHz deviation, 1 through 20 kHz rate)
Deviation Range:	Off, 10 Hz - 40 kHz deviation
Deviation Resolution:	10 Hz
Modulation Rate Bandwidth:	DC to 20 kHz (MOD 1, MOD 2, and Audio in [SINAD] unbalanced) 50 Hz to 20 kHz (Audio in [SINAD] balanced and Mic in)
Modulation Distortion (THD):	1% (1 to 10 kHz, 6 kHz dev.) 2% (10 to 20 kHz, 6 kHz dev.)
External Modulation Sensitivity:	1 Vpp = 4 kHz Deviation ±10%
Digital Modulation Formats:	C4FM at 9.6 kbits/s
FSK Error:	<1% typical, <2% max
Project 25 Compliant Signals:	1011 Hz tone 5% BER calibration tone Speech (repeated test phrases) Silence Voice from audio inputs

D-4 RECEIVER (Transmitter Test)

T/R CONNECTOR:

VSWR - T/R Connector:	<1.2:1 to 1 GHz, <1.25:1 (typical) >1 GHz to 2.7 GHz, 1.3:1 max
Maximum Power:	50 W continuous, 125 W 1 min/4 min off
Alarm:	Alert sounds at 100°C Pad Temp or 135 W

BROADBAND POWER METER FUNCTIONS (T/R CONNECTOR):

Frequency Range:	1 MHz to 2.7 GHz
Accuracy:	10% ±LSD
Dynamic Range:	10 mW to 125 W
Resolution:	3 digits

NARROWBAND POWER METER FUNCTIONS (T/R CONNECTOR):

Frequency Range:	1 MHz to 2.7 GHz
Range:	1 µW (-30 dBm) to 125 W (+53 dBm)
Resolution:	3 digits
Alarm:	Alert sounds at 100°C Pad Temp or 135 W

ANT CONNECTOR

ANT Connector Protection:	+50 dBm for 30 sec.
Threshold:	+20 dBm (nominal)

ANTENNA RECEIVE LEVEL METER:

Range:	-100 to -10 dBm (25 kHz BW, no input attenuation selected - +10 dBm max) -80 to -10 dBm (200 kHz BW, no input attenuation selected - +10 dBm max)
Resolution:	0.1 dB
Accuracy:	±1.5 dB (after CAL and no UNCAL indication)
Frequency Range:	10 MHz to 2.7 GHz

FILTERS

IF Filters:	200 kHz wide band 25 kHz medium band 12.5 kHz narrow band

FREQUENCY COUNTER/FREQUENCY ERROR METER:

Accuracy:	Same as timebase ± LSD
In-Band Frequency Range:	½ selected receive bandwidth
Resolution:	1 Hz

DYNAMIC RANGE LEVEL:

ANT Connector:	Input Level >-60 dBm
T/R Connector:	Input Level >-20 dBm
Broadband Frequency Response:	10 MHz to 2.7 GHz

FM DEVIATION METER:

Resolution:	10 Hz
Accuracy:	±5%, ±2 LSD + residual (12.5 kHz IF, 1 kHz rate, deviation >1 kHz and ≤5 kHz) ±5%, ±2 LSD + residual (25 kHz IF, 1 kHz rate, deviation >1 kHz and ≤10 kHz) ±7%, ±2 LSD + residual (200 kHz IF, 50 to 20 kHz rate, deviation >5 kHz and ≤40 kHz)

DYNAMIC RANGE:

Meter Ranges:	5 kHz, 10 kHz, 20 kHz, 50 kHz, 100 kHz

LEVEL:

T/R Connector:	Input Level >-20 dBm
ANT Connector:	Input Level >-60 dBm
Audio Frequency Bandwidth:	DC to 20 kHz
RF Bandwidth:	10 MHz to 2.7 GHz
Demod Output Sensitivity:	5 kHz deviation = 1 Vpp ± 15%

RECEIVE AUDIO FREQUENCY COUNTER INPUT LEVEL RANGE:

ANT Connector:	Input Level >-60 dBm
T/R Connector:	Input Level >-20 dBm

MODULATION LEVEL RANGE:

FM:	500 Hz to 40 kHz deviation

FREQUENCY RANGE:

FM:	50 Hz to 20 kHz
Accuracy:	Same as time base ±1 count
Resolution:	0.1 Hz/1 Hz

RECEIVE SINAD METER INPUT LEVEL RANGE:

ANT Connector:	Input Level >-60 dBm
T/R Connector:	Input Level >-20 dBm

MODULATION LEVEL RANGE:

FM:	500 Hz to 40 kHz deviation
Test Frequency:	1000 Hz
Meter Range:	20 and 40 dB full scale
Accuracy:	±1 dB ±1 LSD at 1 kHz rate and 12 dB SINAD
Resolution:	0.1 dB

RECEIVE DISTORTION METER INPUT LEVEL RANGE:

ANT Connector:	Input Level >-60 dBm
T/R Connector:	Input Level >-20 dBm

MODULATION LEVEL RANGE:

FM:	500 Hz to 100 kHz deviation
Test Frequency:	1000 Hz
Meter Range:	5%, 10%, 20%, 50%, 100% full scale ranges
Accuracy:	±1.5% ±1 LSD at 1 kHz rate at 5% distortion
Resolution:	0.1%

DIGITAL DEMODULATION METERS (C4FM FSK ERROR) INPUT LEVEL RANGE:

ANT Connector:	Input Level >-60 dBm
T/R Connector:	Input Level >-20 dBm
FSK Error:	<2% from ideal, 3% to 10% reading, 400 symbols

D-5 AUDIO FREQUENCY GENERATOR

WAVE SHAPE FORMATS:

Wave Shapes:	Sine, Square, Triangle, Ramp
Amplitude Level:	(The combination of FGEN 1 and FGEN 2 cannot exceed the following connector limitations.)
Unbalanced:	0 to 20 Vpp into 10 kΩ (Audio Out 1 [FGEN] and Audio Out 2 [DEMOD])
Balanced - High Range:	0 to 6 Vrms into 10 kΩ (Audio Out 1 [FGEN] only)
Balanced - Low Range:	0 to 600 mVrms into 10 kΩ (Audio Out 1 [FGEN] only)

RESOLUTION:

High Range:	1 mV (Audio Out 1 [FGEN] and Audio Out 2 [DEMOD])
Low Range:	0.1 mV (Audio Out 1 [FGEN] only)

ACCURACY (SINE WAVE):

Unbalanced:	3% (20 Hz through 3 kHz) (Audio 1 or 2, level >0.5 Vpp)
Balanced:	
High Range:	10% (frequency at 1 kHz, level >0.5 Vpp)
Low Range:	10% (frequency at 1 kHz, level >0.05 Vpp)
Distortion (THD, sine wave):	<0.5% (1 kHz, 3 Vpp) <2% (20 Hz to 20 kHz, 1 through 15 Vpp)
Distortion (THD):	<0.5% (1 kHz, 3 Vpp) <2% (20 Hz to 20 kHz, 1 through 15 Vpp)

FREQUENCY RANGE:

Unbalanced:	DC to 20 kHz (Audio Out 1 [FGEN] and Audio Out 2 [DEMOD])
Balanced:	50 Hz to 20 kHz (Audio Out 1 [FGEN[only)
Resolution:	0.1 Hz
Accuracy:	±0.1 Hz

D-6 BASE-BAND AUDIO FUNCTIONS

Input Level Range:	100 mVpp to 20 Vpp
Frequency Range:	
Audio IN (SINAD) input:	50 Hz to 20 kHz (unbalanced)
Audio IN (SINAD) input:	50 Hz to 20 kHz (balanced)
Mic (MIC) input:	50 Hz to 20 kHz (unbalanced)
Input Impedance:	Audio In (SINAD) Low impedance input: 600 Ω (balanced)
High Impedance Input:	10 kΩ (unbalanced)

MIC IN (MIC) HIGH IMPEDANCE ONLY:

Phantom Power	+5 V through 5 kΩ

AUDIO FREQUENCY COUNTER INPUT LEVEL RANGE (DEMOD SELECTED):

ANT Connector:	Input Level >-60 dBm
T/R Connector:	Input Level >-20 dBm
Input Sources:	Demodulated Audio, MIC Input, Audio (SINAD) Input
Ranges:	200, 500, 1 k, 2 k, 5 k, 10 k, 20 k
Accuracy:	±1 count
Resolution:	0.1 Hz

MICROPHONE AUDIO INPUT:

Modes:	Electret - +5 V through 5 kΩ Dynamic

D-7 SPECTRUM ANALYZER FUNCTIONS

SWEEP (HORIZONTAL) ACCURACY:

Frequency Range:	1 MHz to 2.7 GHz
Frequency Resolution:	1 Hz

FREQUENCY SPAN WIDTH RANGE:

Analyzer Screen:	Zero Span, 1 kHz to 2 GHz in a 1/2/5 sequence, plus Full Span
Generate and Receive Screens:	Zero Span, 1 kHz to 5 MHz in a 1/2/5 sequence
Span Accuracy:	±1% of (total) Span Width
Frequency Display:	Span accuracy + Frequency Standard accuracy + 50% of RBW
Sweep Rate Range:	10 ms to 5 sec.
Sweep Rate Accuracy:	1%
1 dB Compression:	>-10 dBm (ANT Connector, No input attenuation)
Harmonic Spurious:	-55 dBc at -40 dBm (ANT Connector, No input attenuation)
Non-Harmonic Spurious:	-60 dBc (10 MHz to 2.7 GHz) (ANT Connector, No input attenuation)
Residual Spurious:	≤85 dBm (Input terminated, ANT Connector, No input attenuation)

AMPLITUDE (VERTICAL):

Level Accuracy:	±1.5 dB at -20 dBm, ANT Connector, No input attenuation (typical)
Scales:	2 dB/div, 5 dB/div, 10 dB/div
LOG Linearity:	±2 dB
Reference Level Resolution:	1 dB

ATTENUATOR:

Range:	0 to 50 dB (Selectable manually or auto coupled to reference level.)
Accuracy:	±0.5 dB/step, up to ±1 dB max

DYNAMIC RANGE:

ANT Connector:	<-70 dBm
T/R Connector:	<-30 dBm
Typical Noise Floor Performance:	-110 dBm, 10 MHz to 2.7 GHz (300 Hz Resolution Bandwidth selected)
Residual Phase Noise:	-92 dBc/Hz at 20 kHz offset

RESOLUTION BANDWIDTH:

Analyzer Screen:	300 Hz, 3 kHz, 30 kHz, 60 kHz, 300 kHz, 3 MHz
Generate and Receive Screens:	300 Hz, 3 kHz, 60 kHz
Selectivity:	60 dB/3 dB ratio <15:1
Bandwidth Switching Error:	±1 dB
Video Bandwidths:	None, 10 Hz to 3 MHz in 1-3-10 steps

SPECIAL FUNCTIONS:

Display Modes:	Live, Coupled/Uncoupled (span/sweep time/RBW)

SPECTRUM ANALYZER VIDEO OUTPUT:

Reference Level:	= +5 V
Bottom-of-Screen:	= -5 V

D-8 OSCILLOSCOPE FUNCTIONS

Vertical Inputs:	2 input channels (CH1 and CH2), MIC Input, Audio I/O Input, Internal Demodulation
Input Impedance:	1 MΩ
External Coupling:	AC, DC, GND
Range:	20 mV to 20 V/div in a 1, 2, 5 sequence
Accuracy:	10% of full scale (DC to 50 kHz)
Bandwidth:	500 kHz usable

HORIZONTAL SWEEP:

Range:	10 μs to 1 sec per division
Accuracy:	1% of full scale
Trigger Source:	Channel 1, Channel 2, Internal or External Trigger External Trigger: expects a TTL level (2 V - trigger level)

Special Functions:

Modes:	Live, Triggered Mode (Auto, Normal, Single shot trigger)

D-9 DVM FUNCTIONS

AC:

Input Impedance:	1 MΩ 600 Ω 150 Ω
Range:	400 mV to 100 V in a 1, 2, 4 sequence
Resolution:	1 mV through 5 V scale, 10 mV on the 10 through 100 V scales
Accuracy:	6% of full scale (50 Hz to 20 kHz) ±1 LSB

DC:

Range:	400 mV to 100 V in a 1, 2, 4 sequence
Resolution:	0.1 m 0.4 V scale 10 MV 10 V, 20 V and 40 V scales 1 mV 1 V, 2 V and 4 V scales 100 mV 100V scale
Accuracy:	2% of full scale ± 1 LSB
Input Impedance:	10 MΩ

D-10 TIME BASE

ACCURACY:

Output Frequency:	10 MHz
Time Base Stability:	±0.01 ppm
Time Base Aging:	±0.1 ppm per year

LEVEL:

Output Level:	1 to 5 Vpp into 10 kΩ
Warm-Up:	<5 min.
Time Base Capture:	1 to 5 Vpp input (sine or square wave)

D-11 DIGITAL I/O

Parallel Printer Connector

Serial Connector (RS-232)

Video Monitor Connector (VGA)

Mouse Connector (PS2 Compatible)

Keyboard Connector

Ethernet Connector (10T/100T)

Front Panel Test Connector

3.5 inch Floppy Drive

D-12 AC POWER

Input Range:	100 to 120 VAC, 60 Hz, 220 to 240 VAC, 50 Hz
Maximum Power Consumption:	220 W
Main Supply Fluctuations:	<10% of nominal voltage
Transient Over-Voltage Installation:	Category II

D-13 ENVIRONMENTAL/MECHANICAL

Weight:	33 lbs.
Volume:	7.75” (H) x 14” (W) x 19” (D)
Operating Temperature Range:	0° to 40°C
Storage Temperature Range:	-25° to 70°C
Pollution:	Pollution Degree 2
Altitude:	3000 meters

D-14 MISCELLANEOUS

Warranty	2 years
	(Extended Warranty available upon request)

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APPENDIX E - TEST EQUIPMENT REQUIREMENTS

This Appendix contains a list of test equipment suitable for performing all testing procedures contained in this manual. Other equipment meeting specifications listed in this Appendix may be substituted in place of recommended models. Equipment listed in this Appendix may exceed minimum required specifications for some procedures contained in this manual.

TYPE	MODEL	EQUIVALENT / SPECS
Digital Multimeter (DMM)	HP 34401A	
Universal Counter	HP 53131A w/ Option 030	Frequency: 30 GHz Resolution: 10 digits
Voltage Calibrator (AC/DC)	Fluke 5100B	
Modulation Analyzer	HP 8901A	
Audio Analyzer	HP 8903A	
Power Meter	HP EPM-441A	HP E4418A HP E4418B
Power Meter Sensor Head	HP 8482A	
Power Meter Sensor Head	HP ECP-18A	HP E4412A
Arbitrary Waveform Generator	HP 33120A	
10 MHz Standard	N/A	
RF Generator	HP ESG-3000A	HP ESG-4000A HP ESG-D3000A HP ESG-D4000A HP E4421B HP E4422B HP E4432B HP E4433B
Personal Computer	N/A	Pentium 166 64 MB RAM Windows 95/98/NT 16-Bit Color GPIB Interface Card Ethernet Card Network Adapter
Attenuator	Weinschel Model 1	10 dB
10 kΩ Load		
50 Ω Load	Weinschel Model 1424-4	
MIC/AUDIO Adapter	Aeroflex AC25007	
Power Splitter	HP 11667A	
RF Coaxial Cable	STORM A90-2000-001	
GPIB Cables		
Ethernet Crossover Cable	(See Appendix F)	
Calibration Software CD-ROM	Aeroflex AC25031	

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APPENDIX F - ETHERNET CROSSOVER CABLE

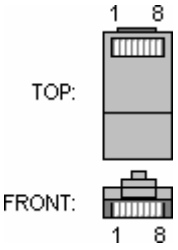
This cable can be used to cascade hubs or for connecting two Ethernet stations back-to-back without a hub.

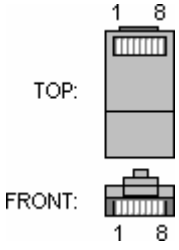
NOTE: It is important that each pair is kept as a pair: TX+ and TX- must be in a pair and RX+ and RX- must be together in another pair. (See following table)

NOTE: The “+” side of each pair is called the "tip" and the “-“ side of each pair is called the "ring."

TO NETWORK INTERFACE CARD 1		
COMMON COLOR	**SIGNAL NAME**	**PIN**
WHT/ORN	TX+	1
ORN	TX–	2
WHT/GRN	RX+	3
BLU		4
WHT/BLU		5
GRN	RX–	6
WHT/BRN		7
BRN		8

TO NETWORK INTERFACE CARD 2		
PIN	**SIGNAL NAME**	**COMMON COLOR**
3	RX+	WHT/GRN
6	RX–	GRN
1	TX+	WHT/ORN
4		BLU
5		WHT/BLU
2	TX–	ORN
7		WHT/BRN
8		BRN





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