AEROFLEX

XPDR/DME TCAS/ADS-B/TIS Test Set IFR 6000

Maintenance Manual

MAINTENANCE MANUAL

XPDR/DME/TCAS/ADS-B/TIS TEST SET

IFR 6000

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Subject to Export Control, see Cover Page for details.

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FOR QUALIFIED SERVICE PERSONNEL ONLY

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Electromagnetic Compatibility:

For continued EMC compliance, all external cables must be shielded and 3 meters or less in length.

Nomenclature Statement:

In this manual Test Set or Unit refers to the IFR 6000 XPDR/DME/TCAS/ADS-B/TIS Test Set.

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SAFETY FIRST: TO ALL OPERATIONS PERSONNEL

REFER ALL SERVICING OF UNIT TO QUALIFIED TECHNICAL PERSONNEL. THIS UNIT CONTAINS NO OPERATOR SERVICEABLE PARTS.

WARNING: USING THIS EQUIPMENT IN A MANNER NOT SPECIFIED BY THE ACCOMPANYING DOCUMENTATION MAY IMPAIR THE SAFETY PROTECTION PROVIDED BY THE EQUIPMENT.

CASE, COVER OR PANEL REMOVAL

Opening the Case Assembly exposes the operator to electrical hazards that can result in electrical shock or equipment damage. Do not operate this Test Set with the Case Assembly open.

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. (This symbol refers to specific CAUTIONS represented on the unit and clarified in the text.)

AC OR DC TERMINAL: Terminal that may supply or be supplied with AC or DC voltage.

DC TERMINAL: Terminal that may supply or be supplied with DC voltage.

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

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 Test Set 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, 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.

INTERNAL BATTERY

This unit contains a Lithium Ion Battery, serviceable only by a qualified technician.

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.

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INTRODUCTION

This manual contains the information necessary to test and repair the IFR 6000.

It is strongly recommended that personnel be thoroughly familiar with the contents of this manual before attempting to perform maintenance on this equipment.

Only qualified personnel should perform maintenance on this equipment.

ORGANIZATION

This manual is divided into the following Chapters and Sections:

CHAPTER 2 - MAINTENANCE

- Section 1 - SERVICING (preventive maintenance)
- Section 2 - TROUBLESHOOTING (theory of operation, troubleshooting procedures, calibration/verification, assembly drawings)
- Section 3 - DISASSEMBLY/REASSEMBLY
- Section 4 - PARTS LIST

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CHAPTER TWO

IFR 6000 XPDR/DME/TCAS/ADS-B/TIS TEST SET

MAINTENANCE MANUAL

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SECTION 1 - SERVICING

1. Preventive Maintenance Procedures

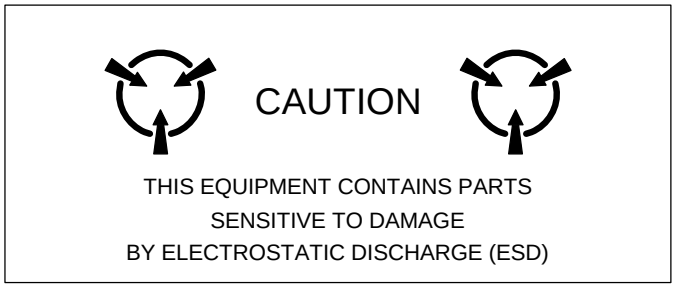
Contains routine maintenance instructions for cleaning and inspecting the Test Set.

CAUTION: DISCONNECT POWER FROM TEST SET TO AVOID POSSIBLE DAMAGE TO ELECTRONIC CIRCUITS.

A. External Cleaning

STEP	PROCEDURE
1.	Clean front panel and display face with soft lint-free cloth. If dirt is difficult to remove, dampen cloth with water and mild liquid detergent.
2.	Remove grease, fungus and ground-in dirt from surfaces with soft lint-free cloth dampened (not soaked) with isopropyl alcohol.
3.	Remove dust and dirt from connectors with soft-bristled brush.
4.	Cover connectors, not in use, with suitable dust cover to prevent tarnishing of connector contacts.
5.	Clean cables with soft lint-free cloth.
6.	Paint exposed metal surface to avoid corrosion.

B. Internal Cleaning



CAUTION: DO NOT MOVE COMPONENTS ON CIRCUIT BOARDS OR DISASSEMBLE CONNECTORS NEEDLESSLY TO AVOID POSSIBLE DAMAGE.

CAUTION: DO NOT OPEN COMPLEX INTERNAL MODULES FOR SOLE PURPOSE OF CLEANING AND INSPECTION.

Remove dust with hand-controlled dry air jet of 15 psi (1.054 kg/cm^2) and wipe internal chassis parts and frame with soft lint-free cloth moistened with isopropyl alcohol.

C. Visual Inspection

STEP	PROCEDURE

1. Inspect Chassis for:
   - Tightness of sub-assemblies and chassis mounted connectors.
   - Corrosion or damage to metal surfaces.
2. Inspect Capacitors for:
   - Loose mounting, deformities or obvious physical damage.
   - Leakage or corrosion around leads.
3. Inspect Connectors for:
   - Loose or broken parts, cracked insulation and bad contacts.
4. Inspect Circuit Boards for:
   - Corrosion or damage to connectors.
   - Damage to mounted components including crystals and ICs.
   - Freedom from foreign material.
5. Inspect Resistors for:
   - Cracked, broken, charred or blistered bodies.
   - Loose or corroded soldering connections.
6. Inspect Semiconductors for:
   - Cracked, broken, charred or discolored bodies.
   - Correct placement and condition of seals around leads.
7. Inspect Wiring for:
   - Broken or loose ends and connections.
   - Proper dress relative to other chassis parts.

   NOTE: Verify wrapped wiring is tight.

SECTION 2 - TROUBLESHOOTING

1. Theory of Operation

A. Power Supply PCB Assy

The Power Supply PCB Assy is responsible for supplying power to the internal modules for operation and for charging the internal batteries. The Power Supply PCB Assy operates from externally supplied DC power and provides simultaneous run and battery charge, or

The Power Supply Assy consists of a DC-DC Converter, ON/OFF Control circuitry and the Battery Charger circuitry. The external DC input is supplied from an External DC Power Supply (supplied).

The internal batteries are removable/replaceable Li Ion battery packs with an internal "gas-gauge" feature that allows accurate determination of remaining battery life. Maximum operating and storage temperature for Li Ion batteries is -20°C to +60°C and the maximum charging temperature is 0°C to +45°C.

The Power Supply PCB Assy contains a synchronous buck converter to convert the input voltage to a fixed output voltage (+10 Vdc). The Power Supply PCB Assy also contains a low-pass filter to reduce the amount of internal emissions. The Input Converter Assembly is capable of providing enough output current to charge the battery at full current and run the Test Set at the same time, as long as the input voltage is within range.

(1) Battery Charger

The battery charger is a boost type converter. This battery charger monitors the battery voltage and temperature to determine if the battery is capable of being recharged, and if it is safe to attempt to recharge the battery. The battery must be at least at a 9.2 V level and the temperature must be between 0° and 45°C before a charge cycle initiates.

(2) Output Circuitry

The output converters are comprised of a dual-phase synchronous buck converter for developing +3.3 and +5 V outputs. The converter also has an auxiliary output that is used to generate +16 V from the +VS source (either the battery or input converter). A separate buck/boost converter is used to generate the -5 V output. The primary converter provides dual phase control, as well as gate drive for the switching mosfets and over-current protection. The main converter runs at 220 kHz, while the auxiliary converter runs at 1.2 MHz.

Both +3.3 and +5 V outputs are capable of delivering up to 3 A of current and the 16 V output can deliver up to 80 mA. If any of these three outputs experience a severe over-current, the supply turns OFF.

The -5 V converter is a stand-alone buck/boost converter that runs at approximately 220 kHz and can deliver up to 400 mA of current before starting to fold back. If the supply experiences a severe over-current condition, the supply stays in fold-back mode until the short is removed.

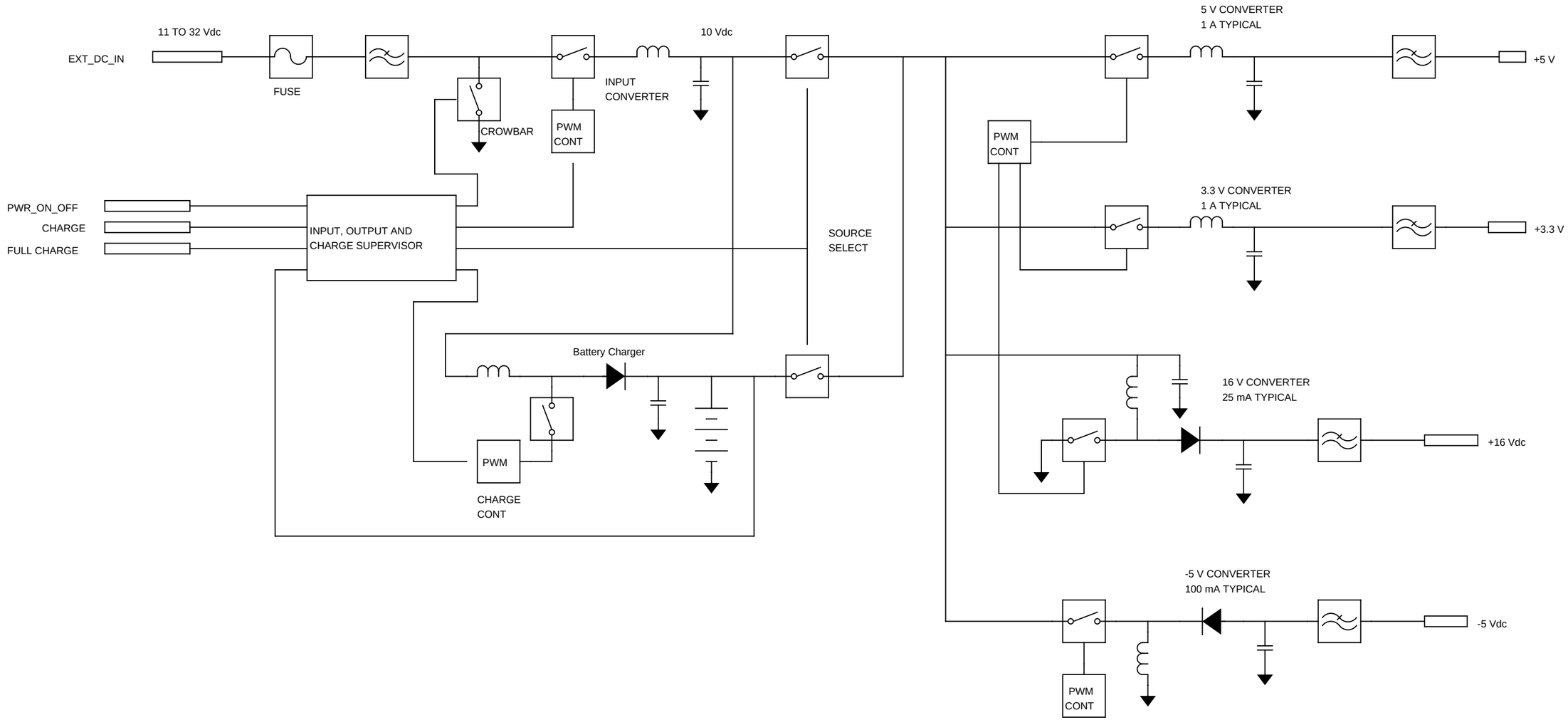
(3) Source Select Circuitry

The source select circuitry is designed to be a low-loss switch that selects the appropriate source when the output of the ON/OFF circuitry is high. The external DC (+Vdc) is selected if present. If external DC is not present, the battery (VBAT+) connects to +VS. If the Test Set is running on external DC or Line Voltage, and that power source is removed, the Test Set shuts OFF.

The second function of the switching circuitry is to prevent battery current from flowing into the input converter section when the Test Set is running on battery power. A low voltage cutoff is also incorporated into the ON/OFF circuitry.

(4) Protection Circuitry

The protection circuitry has four basic functions related to the DC input. The battery has internal protection circuitry. The external DC input has a fuse, an over-voltage crowbar and reverse protection diodes. The fuse is the primary disconnect to protect against any of the fault conditions. If the DC input is too high (>32 V), the over-voltage crowbar triggers and the SCR opens the fuse. If the DC input polarity is incorrect, the input clamp diodes forward bias and open the fuse. If the input converter fails and the output of the converter is above 12 V, the SCR triggers and opens the fuse. If the DC input voltage is too low, the input converter is disabled until the input voltage is within the allowable range.



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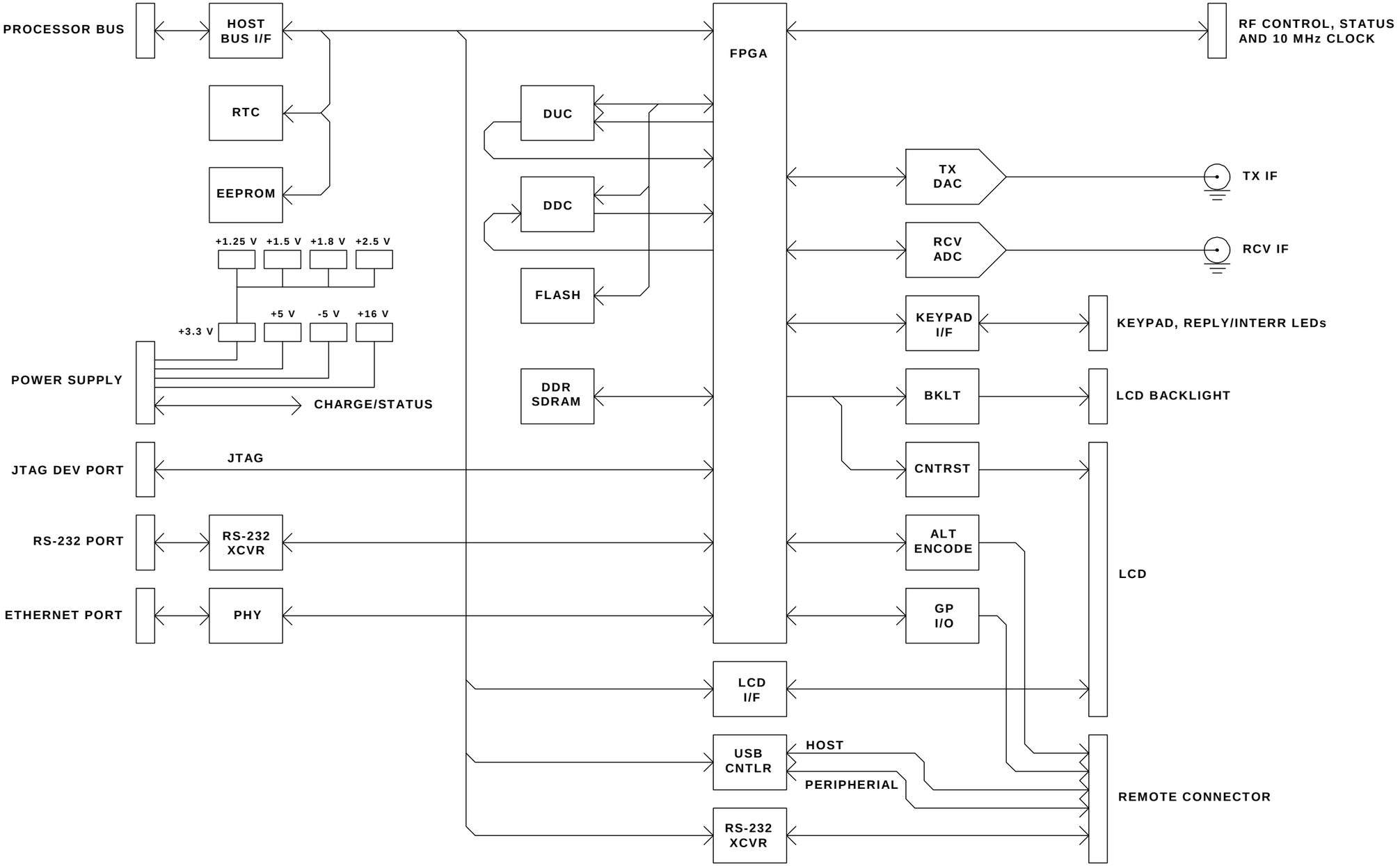
Power Supply PCB Assy Block Diagram
Figure 1



Multi-Function PCB Assy Block Diagram
Figure 2

B. Multi-Function PCB Assy

The Multi-Function PCB Assy contains all of the application specific circuits for the Test Set. The circuitry on the Multi-Function PCB Assy provides the interface between the Processor PCB Assy and the other assemblies, including the LCD Assy, Keypad PCB Assy, USB Connector, Power Supply Assy and RF Assy.

The DC supply voltages for the Multi-Function PCB Assy are; +5 V, +3.3 V, +2.5 V, +1.8 V, +1.5 V and +1.25 V. Two voltages (+5 V and +3.3 V) are provided by the Power Supply PCB Assy and the other voltages are generated locally on the Multi-Function PCB Assy.

There are six LEDs located on the Multi-Function PCB Assy:

DS1 - USB Traffic Activity (controlled by USB Controller)
DS2 - Goodlink Status (controlled by Ethernet PHY)
DS3 - TX Status (controlled by Ethernet PHY)
DS4 - RX Status (controlled by Ethernet PHY)
DS5 - General Purpose (controlled by Host Processor via FPGA Control Register)
DS6 - General Purpose (controlled by Host Processor via FPGA Control Register)

(1) Bus Interface

The Bus Interface communicates with the Processor PCB Assy and consists of address lines A0-A23, data lines D16-D31, R/W, /Reset, CPU Clock, DMA, Timer, Interrupt, I^2C bus and chip selects. The address, data, reset, clock and chip selects are buffered. Most of the DMA, timer, interrupt and I^2C type signals are not. The data bus buffer enable and direction is controlled via the CPLD on the Processor PCB Assy.

(2) LCD

The LCD has an on-board controller which is set up for bus interface with the Multi-Function PCB Assy. The LCD is a read/write device operating on a 16-bit word mode. The LCD backlight intensity and the contrast level are adjusted with a serial DAC.

The LCD backlight and contrast are controlled by a DAC. Output A is used for contrast adjustment and output B is used for backlight adjustment. The DAC is a serial device and is loaded with a 16-bit data word.

(3) Keypad

The keypad register provides the current status of the keypad. If a key is pressed, the corresponding row/column lines are driven high. Multiple keys can be pressed and are represented as an OR condition on the data inputs.

(4) RS-232

The Multi-Function PCB Assy contains an RS-232 level translator. The level translator is a +3.3 V device for performing the TTL to RS-232 level translation. The level translator has driver disable and shutdown control pins for low power modes.

(5) I^2C Bus

The I^2C bus is a two-wire bi-directional serial bus that is used to communicate with several assemblies in the 6000. All assemblies are connected in parallel to the clock and data lines, following a master/slave type protocol.

(6) PowerPC

The FPGA contains two PowerPC Processors responsible for encode/decode, up conversion/down conversion, all parametric measurements and control of the RF Assy.

(7) USB

The Multi-Function PCB Assy contains a Universal Serial Bus host and device controller, performing both host and peripheral functions, to communicate with an external PC for remote control or software downloads.

The USB controller is a 16-bit read/write device with two address lines. The address inputs are used for selecting command or data for the HC or DC registers. The USB two interrupt outputs, one for the host and one for the device, are connected to the interrupt register in the FPGA. An active low reset input pin is connected to the reset signal generated from the CPLD on the Processor PCB Assy.

There is a wake-up control input and a suspend indicator output for the host and device functions. These two inputs and two outputs are connected to the FPGA status register and control register. The wake-up signal is used to wake the device up from the low power suspend state and the suspend signal allows the processor to monitor current state (suspend or active).

The device function on the USB controller is an external PNP transistor circuit which provides the control of the +5 V source to the USB Connector. A low setting enables the +5 V output for the device connection. DS2 can be used to view USB activity. The LED defaults to ON and blinks OFF when USB traffic is present.

The USB controller requires a 6 MHz clock source for operation. An internal PLL, which generates an internal 48 MHz signal for a 4X data over-sampling clock is utilized. The clock generator provides the 6 MHz clock source. The clock can be shut down/enabled via the FPGA control register.

The device side interrupt is inverted and gated within the FPGA. The FPGA Control Register accessed by the ColdFire Processor can enable or disable the interrupt from the USB device. When enabled the interrupt is inverted and passed to the ColdFire Processor, and the interrupt to the ColdFire Processor is driven high when disabled.

(8) FPGA

The control register is a 16-bit read/write device contained within the FPGA. The version register is a 16-bit device that contains the version for the FPGA F/W. The status register is an 16-bit read-only device contained within the FPGA.

RF Assy Serial Bus

To send serial data. the control register is set up (length, clock polarity, latch pulse control), the device address is written to the Serial Data Write Register, the Start Command is sent to transmit the device address to the RF Start Register, the control register is set up (length, clock polarity, latch pulse control), the Data is written to the Data Write Register and the Start Command is sent to the RF Start Register to transmit the serial data.

To read serial data. the control register is set up (length, clock polarity, latch pulse control), the device address is written to the Serial Data Write Register, the Start Command is sent to transmit the device address to the RF Start Register, the control register is set up (length, clock polarity, latch pulse control), the Data is written to the Data Read Register and the serial data is read from the Serial Data Read Register.

Addresses associated with the RF Serial Bus include the PowerPC FPGA Control Register (Read/Write), PowerPC FPGA Status Register (Read Only), RF Serial Data Write Register (Read/Write), RF Serial Data Read Register (Read Only) and RF Start Register (Write Only).

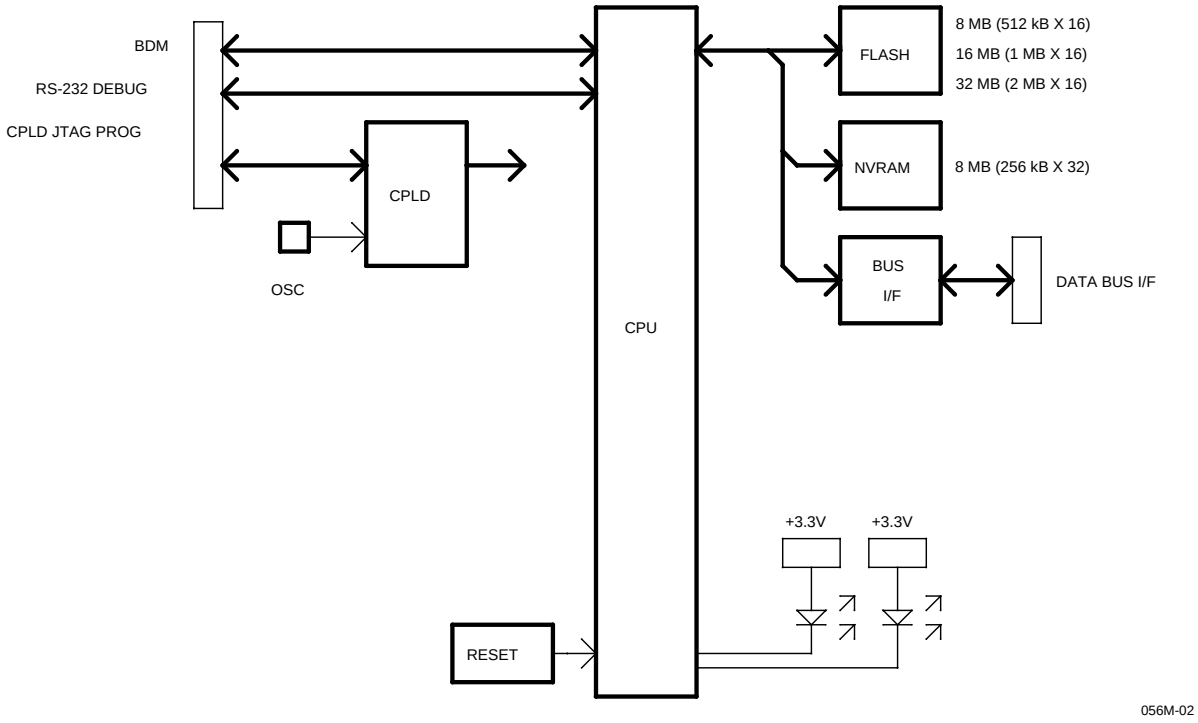
Altitude Encoder and General Purpose Inputs

There is a 16-bit data port available to the PowerPC Processors for reading the current state of the altitude encoder inputs, remote inputs and video input. The altitude encoder inputs and remote inputs are all received via the REMOTE Connector.

The video signal, generated in the RF Assy, is routed to other logic within the FPGA.

C. Processor PCB Assy

The Processor PCB Assy contains the processor, FLASH, NVRAM, Serial Ports and an interface bus for controlling the Test Set.



Processor PCB Assy Block Diagram
Figure 3

(1) CPU

The microprocessor used contains a DRAM controller, DMA controller, interrupt controller, timers, parallel and serial interfaces and on-chip debug support. The microprocessor contains 4 kB of cache and 8 kB of on-chip SRAM. The microprocessor runs at a maximum clock speed of 40 MHz. The Processor PCB Assy contains a 36.864 MHz oscillator, divided by two within the CPLD, and then provided to the CPU.

(2) External Memory (FLASH)

The Processor PCB Assy memory arrangement is 256k x 16, 512k x 16, 1M x 16 or 2M x 16.

During reset, the external interrupts are sampled to define the port size and wait-state generation for chip select CS0 (FLASH). The interrupts are strapped for a 16-bit port with 15 wait states to allow the start program execution from the FLASH.

(3) External Memory (NVRAM)

There is 256k x32 of NVRAM on the CPU board. It is accessible as bytes, words and long words (32 bit). The NVRAM is battery backed up by a battery located on the Multi-Function board. The power and chip select for the NVRAM is controlled by Uxx. This device monitors the +3.3 V supply voltage and will switch over to battery power and disable the SRAM chip enable when the supply voltage drops to 2.55 to 2.70 V. Uxx also provides a battery status output. This signal will go low when the battery voltage is below 2.5 V. It is checked at power up. This input is read via the status register in the CPLD.

(4) Reset Circuit

The Processor PCB Assy contains a voltage supervisory reset circuit. The voltage supervisory device (U5) provides a reset pulse at power-up and during “brown-out” conditions. If the +3.3 V drops below 2.55 to 2.70 V, the reset goes low until the voltage returns to normal. A reset is generated while the reset input is held low.

(5) CPLD

The CPLD controls chip select generation and buffer control for devices on the Processor PCB Assy and Multi-Function PCB Assy. The CPLD also contains a status register, F/W version register, clock divider and a FPGA programming port for the FPGA on the Multi-Function PCB Assy.

The version register is an 8-bit device that contains the version for the CPLD F/W. The status register is an 8-bit device that provides the H/W configuration, user definable jumpers and the NVRAM battery status.

The FPGA on the Multi-Function PCB Assy supports Slave Serial, Master Serial, Slave Parallel and Boundary Scan mode. In Master Serial, a local (local to the Multi-Function PCB Assy) serial PROM provides the configuration data. In Slave Parallel mode, the Processor PCB Assy provides the configuration data. Configuration resistors on the Multi-Function PCB Assy provide for selecting one of the two programming methods. If the Multi-Function PCB Assy is strapped for Master Serial mode, the Processor PCB Assy is not responsible for the FPGA configuration, but can monitor the status. If the Multi-Function PCB Assy is strapped for Slave Parallel Mode, the Processor PCB Assy loads the configuration data. There is a FPGA Control Register, Status Register and Configuration Data port for configuring the FPGA. The FPGA Configuration Data port accepts data and provides configuration data to the FPGA.

(6) Serial Ports

The Processor PCB Assy has two RS-232 ports. Both ports provide RX, TX, RTS and CTS capability. COMM Port 1 is available as the system port and can be accessed via the RS-232 Connector. COMM Port 2 is accessed via the TEST Connector. Both COMM Port signals are at a 3.3 V level.

(7) Bus Interface

The Bus Interface communicates with the Multi-Function PCB Assy and consists of address lines A0-A23, data lines D0-D31, R/W, /Reset, CPU Clock, DMA, Timer, Interrupt, I^2C bus, and chip selects. The address, data, reset, clock and chip selects are buffered. The data bus buffer enable and direction is controlled via the CPLD.

D. RF Assy

The RF Assy provides the RF interface between the digital system of the IFR 6000 and the Unit Under Test (UUT). The RF Assy is a transceiver that converts the 20 MHz Generate IF signal (from the Multi Function PCB Assy) to an RF signal between 962 and 1213 MHz to stimulate the UUT, as well as down-converting the incoming RF signal between 1025 to 1150 MHz to a 60 MHz IF for processing by the Multi Function PCB Assy. The RF Assy also provides level control and filtering for both the outgoing and incoming signal to achieve the appropriate levels for either over the air testing or direct connection to the UUT. The RF Assy is made up of the RF Controller PCB Assy and the RF Converter PCB Assy. The RF Converter is mounted inside an aluminum housing, and the RF Controller PCB Assembly is mounted on the exterior of the aluminum housing.

(1) RF Controller PCB Assy

The RF Controller PCB Assy provides the digital interface with the Multi Function PCB Assy (MF I/O) to control the RF Assy and provides the frequency reference, clock distribution, four local oscillators, video switching, calibration DAC's, an ADC and power supply filtering.

Digital Interface

A CPLD is the digital interface between the Multi-Function PCB Assy and the RF Assy. The CPLD takes serial data from the Multi-Function PCB Assy and routes the serial data to the appropriate device and provides discrete outputs for various circuitry. The CPLD also provides serial data back to the Multi-Function PCB Assy to report the status of the RF Assy.

Frequency Reference/Clock Distribution

A 40 MHz VCXO is the frequency reference for the IFR 6000. The VCXO (a 1 ppm temperature stable crystal oscillator) is buffered and divided for use by the local oscillators and provides a LVDS signal to the Multi-Function PCB Assy for all timing functions.

1st LO

The 1st LO Synthesizer (1457 to 1708 MHz Local Oscillator) is a combined PLL and VCO that provides the LO for both the Generator and Receiver. The 1st LO frequency is calculated by taking the transmit frequency of the IFR 6000 and adding 495 MHz to the transmit frequency. The frequency of the 1st LO is controlled by serial data from the Multi-Function PCB Assy through the CPLD on the RF Controller.

Generate 2nd LO

The Generate 2nd LO (628 MHz Local Oscillator) is a combined PLL and VCO that provides the LO for the second conversion in the Generate path frequency translation. The frequency of the Generate 2nd LO is controlled by serial data from the Multi-Function PCB Assy through the CPLD.

Receive 2nd LO

The Receive 2nd LO (492, 495 or 498 MHz Local Oscillator) is a combined PLL and VCO that provides the LO for the second conversion in the Receive path frequency conversions. The frequency of the LO is determined by the IFR 6000 Mode, and is 495 MHz for XPDR and TCAS operation. For DME operation, the Receive 2nd LO is 492 or 498 MHz, depending on the selected channel. The frequency of the Receive 2nd LO is controlled by serial data from the Multi-Function PCB Assy through the CPLD.

Generate 3rd LO

The Generate 3rd LO (fixed 113 MHz Local Oscillator) is an integrated PLL and clock divider device that is pre-programmed at the factory.

Measurement ADC

A low speed ADC is used to read the two temperature sensors located on the RF Assy, and sample the transmit and receive video signals for Self Test purposes. The temperature sensor on the RF Controller PCB Assy is used to determine the ambient temperature inside the IFR 6000. A second temperature sensor is located near the RF I/O attenuator to sense over-temperatures due to input power. The ADC is connected directly to the microprocessor on the Processor PCB Assy via the I^2C bus.

Video Switching

There are three different video signals generated internally in the RF Assy which can be selected for output to the VIDEO Connector. Generate Video is a detected version of the transmitted RF signal and Receive Video is a detected version of the Receive IF signal. The Receive Log Video is a logarithmic version of the input RF signal prior to any level control and is representative of the actual input RF signal in both timing and level. The Generate and Receive Video signals are summed together to provide a combined Receive and Generate Video signal. A multiplexer is used to select which video source is available at the VIDEO Connector. (Currently the combined Generate, and Receive Video signal is the only signal that is routed to the VIDEO Connector.) A high-speed comparator is used as a video slicer to provide TTL Video to the FPGA. (The FPGA Video signal is currently not used by the system.) A scope sync signal is buffered for use by an external oscilloscope or other signal monitoring equipment.

(2) RF Converter PCB Assembly

The RF Converter PCB Assy is divided into the following sections: Radio Interface, Generate and Receive.

Direct Connect Radio Interface

The RF I/O Connector is designed to handle the high peak output power delivered by a XPDR or DME. A 20 dB high power attenuator provides the termination for the UUT and reduces the signal level to a manageable level for the receive signal path. A directional coupler combines the Antenna path and the direct connect path, providing another 20 dB of attenuation for the direct connect Receive signal path, bringing the total difference between the ANT Connector and RF I/O Connector to 43 dB. The Transmit path also receives 43 dB of attenuation to the RF I/O Connector which sets the maximum signal level to approximately -45 dBm on the RF I/O Connector.

In the signal path common to both the Direct and ANT Connector, a bandpass filter is centered at 1085 MHz, with a bandwidth of 250 MHz, to filter unwanted harmonics and other out-of-band signals out of both the receive and generate signals. A ferrite circulator provides isolation between the generate and receive signal paths.

Over the Air Radio Interface

The ANT Connector provides the over-the-air radio interface and is designed for much lower level signals than the RF I/O Connector. The ANT Connector has a low loss port select switch to protect the ANT Connector when a signal >+40 dBm peak is applied.

Generate Signal Path

The 20 MHz Digital IF signal from the Multi-Function PCB Assy is filtered by a 45 MHz LPF. The input signal level is ≈+2 dBm and is attenuated by a 7 dB attenuator.

A 113 MHz LO signal from the RF Controller PCB Assy is filtered by a LPF, to remove the harmonics from the LO signal, and attenuated to approximately +7 dBm. The resultant 133 MHz IF signal is bandpass filtered by an 18 MHz bandwidth LC filter prior to being amplified by a variable gain amplifier. The bandwidth of the 133 MHz BPF sets the pulse rise time and is the main band limiting element of the IF signal. The variable gain amplifier has a nominal gain of 18 dB in the system and is adjusted to compensate for flatness of the RF system, for fine attenuator steps and for temperature compensation to maintain a constant output level at the ANT Connector and RF I/O Connector.

The conditioned 133 MHz IF signal is applied to the IF port of MXR3 to combine with the 628 MHz Generate 2nd LO to produce the 495 MHz 2nd IF. The 495 MHz IF is bandpass filtered with a 40 MHz BW LC filter before amplified by ≈20 dB to achieve the ≈-10 dBm signal level for the final conversion. The Generate 1st LO provides the 1457 to 1708 MHz LO signal to convert the 495 MHz IF to the final RF of 962 to 1213 MHz. Following the final conversion, the RF signal is passed through a 1200 MHz LPF and a 740 MHz HPF to minimize the images from the final conversion. Following the filtering, the RF signal is amplified by approximately 20 dB.

A splitter feeds a portion of the signal to the Generate Video detector. The amplified signal is then applied to three 0 to 31 dB programmable attenuators. Two programmable attenuators are used as 31 dB block attenuators and one programmable attenuator is used as a 1dB step attenuator from 0 to 31 dB attenuation. The signal receives a final 30 dB of amplification to achieve the final output level of the generate signal path. A small amount of attenuation is provided for additional protection of the final amplifier from damaging input signals, as well as coupling a portion of the reverse power to the Generate Alarm detector. The Generate Alarm circuit is designed to detect high level reverse power from the ANT Connector in the event of an input overload condition. The Generate Alarm signal is latched and must be reset by the processor to return to normal operation.

Receive Signal Path

The input RF signal is attenuated 6 dB prior to being applied to a -20 dB hybrid coupler that provides a sample of the input RF signal to for log video detection. The majority of the incoming signal is then applied to a group of four pin diode attenuators. The first attenuator is a 5 dB attenuator, followed by a 10 dB attenuator and two 20 dB attenuators for a total attenuation range of 55 dB. The attenuators are used to optimize the received signal for processing by the Multi-Function PCB Assy. Following the pin diode attenuators, a portion of the incoming signal is fed to the Receiver alarm circuitry. The Receiver alarm is used to notify the Multi-Function PCB Assy that the input signal level is too high, and to force the two 20 dB attenuator sections to be active to protect the Receiver. The Receiver alarm signal is latched and must be reset by the processor to return to normal operation.

The filtered and attenuated RF signal is then down converted with the Receive 1st LO to a 432, 435, 555, or 558 MHz IF. Since the 1st LO frequency is common between the Generator and Receiver, the Receive 1st IF frequency is determined by the IFR 6000 Mode. The formula for determining the actual frequency of the Receive 1st IF is:

$$f(if) = RFgenFreq + 495 - RFrecFreq$$

The Receive 1st IF frequency for the different modes (all frequencies in MHz) are shown in 2-2-1, Table 1:

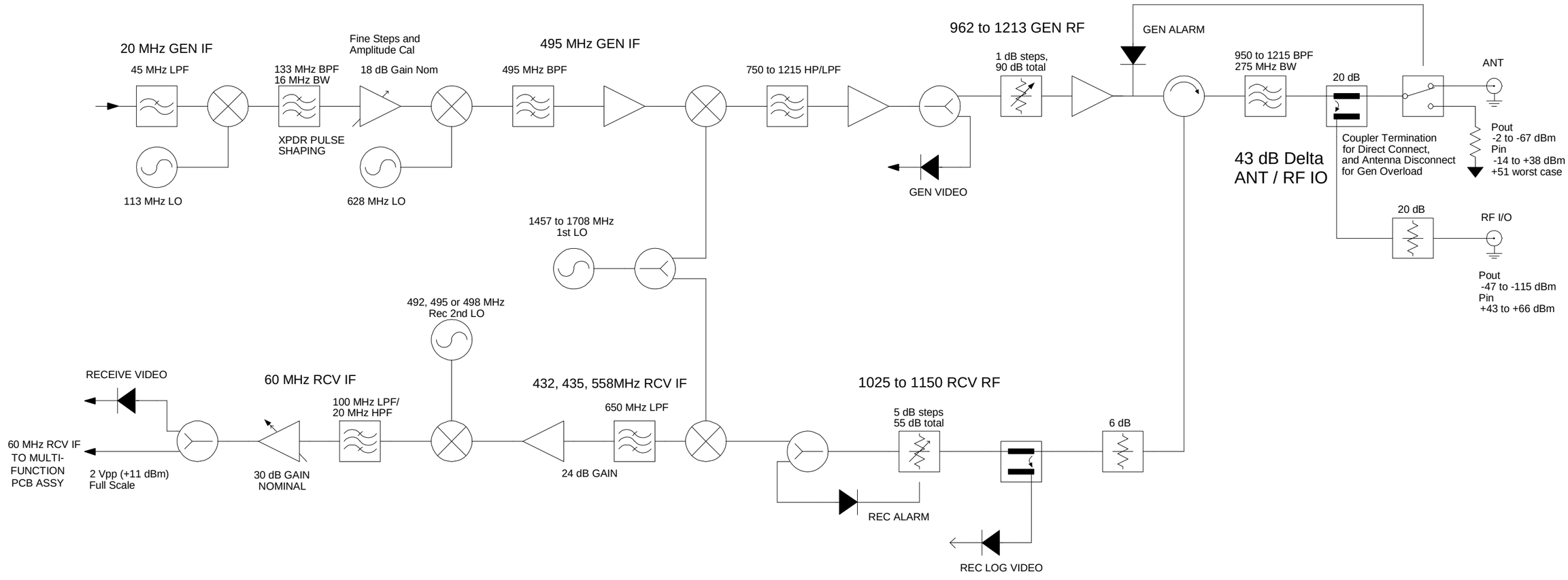
Mode	Gen RF	Rec RF	1st LO Freq	IF	Rec 2nd LO
XPDR	1030	1090	1525	435	495
TCAS	1090	1030	1585	555	495
DME X (TACAN CH 1-63X)	962-1024	1025-1087	1457-1519	432	492
DME X (TACAN CH 64-126X)	1151-1213	1088-1150	1646-1708	558	498
DME Y (TACAN CH 1-63Y)	1088-1150	1025-1087	1583-1645	558	498
DME Y (TACAN CH 64-126Y)	1025-1087	1088-1150	1520-1582	432	492

Receive IF Frequency
Table 1

The Receive 1st IF signal is filtered by a 650 MHz LPF before being amplified approximately 30 dB. After filtering and amplification, the Receive 1st IF signal is down converted by the Receive 2nd LO to a final IF frequency of 60 MHz. The frequency of the Receive 2nd LO is determined by the mode and frequency (2-2-1, Table 1). Following conversion to a 60 MHz IF, the final IF signal is filtered by a 30 MHz HPF and a 100 MHz LPF to remove the images from the down conversion process. Following filtering, the final IF signal is amplified approximately 34 dB by a variable gain amplifier, then goes through another HPF and LPF before being presented to the Multi-Function PCB Assy for digitization. The variable gain amplifier is used to calibrate the Receiver and to compensate for temperature variations in the Receiver chain. A second output of the variable gain amplifier is used to provide the Receive Video signal.

RF Converter Control Signals

The serial data from the RF Controller PCB Assy is used to set the generate and receive attenuators, the Antenna select switch, the reset signals for the Receive and Generate Alarms and the Power Down bit. The Power Down bit is used to turn off the higher current devices in the RF system between times when tests are running to improve the battery life of the system.



RF Assy Block Diagram
Figure 4

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2. Troubleshooting Procedures

A. Guidelines

Troubleshooting is divided into a Symptom Index and a Troubleshooting Table.

The Troubleshooting Table lists common malfunctions which may occur during operation of Test Set. Perform tests/inspections and corrective actions in order listed.

NOTE: This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions.

NOTE: If a malfunction is not listed or is not corrected by listed corrective actions, the troubleshooting technique (the formulation of a logical approach in locating the source of trouble) is left to the technician's discretion.

Following is a list of aids to be used when troubleshooting the Test Set:

- The Test Set has a built-in Self Test to assist the technician in troubleshooting.
- Many problems on Test Sets in service are caused by corrosion. Sometimes removing and reseating an affected cable or circuit card corrects the malfunction. Cleaning connector and/or switch contacts with alcohol repairs many types of digital and analog circuit malfunctions.
- The following inspection procedures are used to locate obvious malfunctions with the Test Set:
  - Inspect all external surfaces of the Test Set for physical damage, breakage, loose or dirty contacts and missing components.

    CAUTION: DO NOT DISCONNECT OR REMOVE ANY BOARD ASSEMBLIES IN THE TEST SET UNLESS THE UNIT IS REMOVED FROM ANY AC POWER SOURCES. SOME ASSEMBLIES CONTAIN DEVICES THAT CAN BE DAMAGED IF THE ASSEMBLY IS REMOVED WHEN POWER IS ON. SEVERAL COMPONENTS, INCLUDING MOS DEVICES, CAN BE DAMAGED BY ELECTROSTATIC DISCHARGE. USE CONDUCTIVE FOAM AND GROUNDING STRAPS WHEN SERVICING IS REQUIRED AROUND SENSITIVE COMPONENTS. USE CARE WHEN UNPLUGGING ICS FROM HIGH-GRIP SOCKETS.

  - Inspect printed circuit board surfaces for discoloration, cracks, breaks and warping and printed circuit board conductors for breaks, cracks. cuts, erosion or looseness.
  - Inspect all assemblies for burnt or loose components.
  - Inspect all chassis-mounted components for looseness, breakage, loose contacts or conductors.
  - Inspect Test Set for disconnected, broken, cut, loose or frayed cables or wires.

B. Precautions

(1) Safety

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

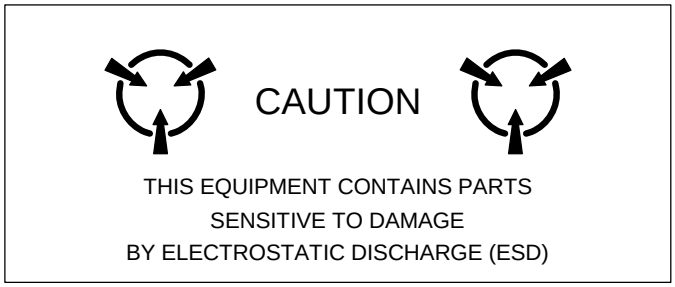
WARNING: WHEN WORKING WITH LIVE CIRCUITS OF HIGH POTENTIAL, KEEP ONE HAND IN POCKET OR BEHIND BACK TO AVOID SERIOUS SHOCK HAZARD.

WARNING: USE ONLY INSULATED TROUBLESHOOTING TOOLS WHEN WORKING WITH LIVE CIRCUITS.

WARNING: FOR ADDED INSULATION, PLACE RUBBER BENCH MAT UNDERNEATH ALL POWERED BENCH EQUIPMENT, AS WELL AS A RUBBER MAT UNDERNEATH TECHNICIAN'S CHAIR.

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

(2) ESD



CAUTION: THE POWER SUPPLY ASSY, MULTI-FUNCTION PCB ASSY, RF ASSY AND PROCESSOR PCB ASSY CONTAIN PARTS SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD). ALL PERSONNEL PERFORMING TROUBLESHOOTING PROCEDURES SHOULD HAVE KNOWLEDGE OF ACCEPTED ESD PRACTICES AND/OR BE ESD CERTIFIED.

(3) EMC and Safety Compliance

All assemblies, cables, connectors, plastic fasteners, gaskets, fingerstock and miscellaneous hardware within the Test Set are configured to satisfy the safety and EMC compliance standards.

CAUTION: UPON COMPLETION OF ANY MAINTENANCE ACTION; ALL ASSEMBLIES, CABLES, CONNECTORS, PLASTIC FASTENERS, GASKETS, FINGERSTOCK AND MISCELLANEOUS HARDWARE MUST BE CONFIGURED AS INSTALLED AT THE FACTORY.

SYMPTOM INDEX

TROUBLESHOOTING TABLE

NOTE: The Troubleshooting Table lists common malfunctions found during normal operation or maintenance of the Test Set or components. The tests or inspections and corrective actions should be performed in the order listed. Failure to do so may result in troubleshooting recommendations that replace working assemblies.

MALFUNCTION *TEST OR INSPECTION* *CORRECTIVE ACTION*	
1	**External DC Power Supply failure** Step 1. Connect External DC Power Supply to a verifiable AC Power Source. Step 2. Connect DMM to External DC Power Supply output. Step 3. Verify +18 Vdc (±1 Vdc) ◆ If incorrect, probable source of failure is the External DC Power Supply.
2	**POWER Indicator does not light** Probable sources of failure are the circuit between Power Supply PCB Assy and the LCD Assy and a short on the Multi-Function PCB Assy or the RF Assy.
3	**CHARGE Indicator does not light** Probable sources of failure are the Battery, Power Supply PCB Assy and the LCD Assy.
4	**Blows Fuse** Probable source of failure is the Power Supply PCB Assy .
5	**Battery does not charge** Probable source of failure is the Battery.
6	**Display is blank or abnormality exists in Display** Probable sources of failure are the Power Supply PCB Assy, Multi-Function PCB Assy, LCD Assy and the interconnecting cables.
7	**Keys Inoperable** Probable sources of failure are the Keypad PCB Assy, Multi-Function PCB Assy and the interconnecting cables.

3. Calibration/Verification

A. General

(1) Calibration/Verification Schedule

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

- Failure to Meet Specifications

  If, during the course of normal operation, the Test Set or any major function thereof fails to meet the performance specifications according to Appendix F, the Calibration/Verification Procedures should be performed.

  If any failure occurs during performance of the Verification Procedures, the user is instructed as to the pertinent Calibration Procedure or hardware failure associated with the failure.

- Module/Assembly Replacement

  If one or more of the Test Set assemblies are replaced, the Calibration Procedures should be performed.

- Annual Calibration/Verification

  Aeroflex recommends an annual Calibration/Verification on the Test Set to maintain proper testing standards.

(2) Controls, Connectors and Indicators

Refer to Appendix E for location of the Test Set Controls, Connectors and Indicators.

(3) Test Record

Verification Data Sheets are provided for recording the results obtained while performing the Verification Procedures.

NOTE: It is recommended the technician reproduce copies of the Verification Data Sheets, rather than use copies in this manual.

B. Precautions

The Calibration and Verification Procedures are performed with the Test Set Covers in place. No internal adjustments or probing points are required.

C. Requirements

(1) Performance

It is strongly recommended that personnel thoroughly read and understand all steps of the procedures prior to performing each procedure. Knowledge of external test equipment connections and operation is also recommended.

(2) Test Equipment

Appendix B contains a list of test equipment suitable for performing any procedure contained in this manual. Other equipment meeting specifications listed in Appendix B may be substituted in place of recommended models.

NOTE: For certain procedures in this manual, the equipment listed in Appendix B may exceed minimum required specifications.

(3) Disassembly

No disassembly is required to perform the Calibration and Verification Procedures.

(4) Environment

For best results, environmental conditions should be identical to the conditions at the normal operating location.

D. Verification

(1) Self Test

TEST EQUIPMENT: None

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the UUT to an appropriate AC power source with the External DC Power Supply. Press the POWER Key to turn the unit ON.
2. Press the SETUP Key until the SETUP-GENERAL Screen is displayed.
3. Press the H/W TOOLS Soft Key to display the SETUP-HARDWARE TOOLS Screen.
4. Press the SELF TEST Soft Key to display the SETUP-SELF TEST Screen.
5. Press the RUN TEST Soft Key to initiate the Self Test.
6. Verify all Tests pass.

(2) VSWR (ANT and RF I/O Connectors)

TEST EQUIPMENT: Spectrum Analyzer
VSWR Bridge

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the Tracking Generator to the VSWR Bridge Input Port.
2. Connect the Spectrum Analyzer Input to the VSWR Bridge Output Port.
3. Set up the Spectrum Analyzer as follows:

Tracking Generator:	0 dBm
Start Frequency:	950 MHz
Stop Frequency:	1230 MHz
Reference Level:	-10 dBm
Scale:	10 dB/div
Marker 1:	ON

4. Record the level readings from the Spectrum Analyzer at 962, 1030, 1090, 1150, and 1213 MHz using Marker 1.
5. Press the SETUP Key twice to display the SETUP-DME Screen.
6. Set the RF PORT to ANTENNA.
7. Press the DIAG Soft Key to display the DME DIAGNOSTICS Screen.
8. Press the SELECT Soft Key to display the DME DIAG- CW Screen.
9. Set up the UUT as follows:

FREQ:	1000 MHz
RVLVL:	-65 dBm

10. Connect the VSWR Bridge Device-Under-Test Port directly to the ANT Connector.
11. Record the level readings from the Spectrum Analyzer at 962, 1030, 1090, 1150, and 1213 MHz and calculate the return loss at each frequency.
12. From the return loss, calculate the VSWR as:

$\Gamma = 10 \wedge (- RL / 20)$
$VSWR = (1 + \Gamma) / (1 - \Gamma)$

Where: Γ = Reflection Coefficient
RL = Return Loss

13. Verify the VSWR is <1.7.
14. Disconnect the coaxial cable from the Spectrum Analyzer and connect the coaxial cable to the RF I/O Connector.
15. Record the level readings from the Spectrum Analyzer at 962, 1030, 1090, 1150, and 1213 MHz and calculate the return loss.
16. From the return loss, calculate the VSWR with the equation shown in Step 12.
17. Verify the VSWR is <1.3.

(3) Output Frequency Accuracy

TEST EQUIPMENT: Frequency Counter

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the Frequency Counter to the ANT Connector.
2. Press the SETUP Key until the SETUP-DME Screen is displayed.
3. Set the RF PORT to ANTENNA.
4. Press the DIAG Soft Key to display the DME DIAGNOSTICS Screen.
5. Press the SELECT Soft Key to display the DME DIAG- CW Screen.
6. Set the RFLVL to -2 dBm.
7. Set up the UUT for 962 MHz.
8. Press the RUN TEST Soft Key.
9. Verify 962 MHz (±10 kHz) on the Frequency Counter.
10. Press the STOP TEST Soft Key.
11. Set up the 6000 for 1030 MHz.
12. Press the RUN TEST Soft Key.
13. Verify 1030 MHz (±10 kHz) on the Frequency Counter.
14. Press the STOP TEST Soft Key.
15. Set up the 6000 for 1090 MHz.
16. Press the RUN TEST Soft Key.
17. Verify 1090 MHz (±10 kHz) on the Frequency Counter.
18. Press the STOP TEST Soft Key.
19. Set up the 6000 for 1150 MHz.
20. Press the RUN TEST Soft Key.
21. Verify 1150 MHz (±10 kHz) on the Frequency Counter.
22. Press the STOP TEST Soft Key.
23. Set up the UUT for 1213 MHz.
24. Press the RUN TEST Soft Key.
25. Verify 1213 MHz (±10 kHz) on the Frequency Counter.
26. Press the STOP TEST Soft Key.

(4) Output Level Accuracy (ANT Connector)

TEST EQUIPMENT: Power Meter
Power Sensor
Measuring Receiver
Receiver Sensor

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the Power Sensor to the Power Meter (Power REF Connector) and zero the Power Meter.
2. Disconnect the Power Sensor from the Power Meter (Power REF Connector) and connect the Power Sensor to the ANT Connector.
3. Press the SETUP Key until the SETUP-DME Screen is displayed.
4. Set the RF PORT to ANTENNA.
5. Press the DIAG Soft Key to display the DME DIAGNOSTICS Screen.
6. Press the SELECT Soft Key to display the DME DIAG- CW Screen.
7. Set up the UUT as follows:

FREQ:	962 MHz
RVLVL:	-30 dBm

8. Press the RUN TEST Soft Key.
9. Verify -30 dBm (±2 dB) on the Power Meter.
10. Press the STOP TEST Soft Key.
11. Set the FREQ to 1030 MHz.
12. Press the RUN TEST Soft Key.
13. Verify -30 dBm (±2 dB) on the Power Meter.
14. Press the STOP TEST Soft Key.
15. Set the FREQ to 1090 MHz.
16. Press the RUN TEST Soft Key.
17. Verify -30 dBm (±2 dB) on the Power Meter.
18. Press the STOP TEST Soft Key.
19. Set the FREQ to 1150 MHz.
20. Press the RUN TEST Soft Key.
21. Verify -30 dBm (±2 dB) on the Power Meter.
22. Press the STOP TEST Soft Key.
23. Set the FREQ to 1213 MHz.
24. Press the RUN TEST Soft Key.
25. Verify -30 dBm (±2 dB) on the Power Meter.
26. Press the STOP TEST Soft Key.
27. Set the FREQ to 1030 MHz.

STEP PROCEDURE

28. Set the RFLVL to the following settings and verify the Levels on the Power Meter:

RFLVL Setting	Level
-2 dBm	-2 dBm (±2 dB)
-12 dBm	-12 dBm (±2 dB)
-22 dBm	-22 dBm (±2 dB)
-32 dBm	-32 dBm (±2 dB)
-42 dBm	-42 dBm (±2 dB)
-52 dBm	-52 dBm (±2 dB)

29. Set the RFLVL to -65 dBm.
30. Disconnect the Power Meter Sensor from the ANT Connector.
31. Set up the Measuring Receiver for Tuned RF Level measurement at 1030 MHz with 3.8 Special selected.
32. Connect the Measuring Receiver Sensor directly to the ANT Connector.
33. Press the RUN TEST Soft Key.
34. Verify -65 dBm (±2 dB) on the Measuring Receiver.
35. Press the STOP TEST Soft Key.

(5) Output Level Accuracy (RF I/O Connector)

TEST EQUIPMENT: Power Meter
Power Sensor
Measuring Receiver
Receiver Sensor

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the Power Sensor to the Power Meter (Power REF Connector) and zero the Power Meter.
2. Disconnect the Power Sensor from the Power Meter and connect the Power Sensor to the RF I/O Connector.
3. Press the SETUP Key until the SETUP-DME Screen is displayed.
4. Set the RF PORT to DIRECT CONNECT.
5. Press the DIAG Soft Key to display the DME DIAGNOSTICS Screen.
6. Press the SELECT Soft Key to display the DME DIAG- CW Screen.
7. Set up the UUT as follows:

FREQ:	962 MHz
RVLVL:	-50 dBm

8. Press the RUN TEST Soft Key.
9. Verify -50 dBm (±1 dB) on the Power Meter.
10. Press the STOP TEST Soft Key.
11. Set the FREQ to 1030 MHz.
12. Press the RUN TEST Soft Key.
13. Verify -50 dBm (±1 dB) on the Power Meter.
14. Press the STOP TEST Soft Key.
15. Set the FREQ to 1090 MHz.
16. Press the RUN TEST Soft Key.
17. Verify -50 dBm (±1 dB) on the Power Meter.
18. Press the STOP TEST Soft Key.
19. Set the FREQ to 1150 MHz.
20. Press the RUN TEST Soft Key.
21. Verify -50 dBm (±1 dB) on the Power Meter.
22. Press the STOP TEST Soft Key.
23. Set the FREQ to 1213 MHz.
24. Press the RUN TEST Soft Key.
25. Verify -50 dBm (±1 dB) on the Power Meter.
26. Press the STOP TEST Soft Key.
27. Disconnect the Power Meter Sensor from the RF I/O Connector.

STEP PROCEDURE

28. Set the FREQ to 1090 MHz.
29. Set up the Measuring Receiver for Tuned RF Level measurement at 1090 MHz with 3.8 Special selected.
30. Connect the Measuring Receiver Sensor directly to the RF I/O Connector.
31. Set the RFLVL to the following settings and verify the Levels on the Measuring Receiver:

RFLVL Setting	Level
-47 dBm	-47 dBm (±1 dB)
-57 dBm	-57 dBm (±1 dB)
-67 dBm	-67 dBm (±1 dB)
-77 dBm	-77 dBm (±1 dB)
-87 dBm	-87 dBm (±1 dB)
-97 dBm	-97 dBm (±2 dB)
-107 dBm	-107 dBm (±2 dB)
-115 dBm	-115 dBm (±2 dB)

(6) DME Reply Pulse Characteristics

TEST EQUIPMENT: Oscilloscope
Pulse Detector (Refer to App. G, Herotek Detector)

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the Pulse Detector directly to the ANT Connector.
2. Connect the other end of the Pulse Detector to Oscilloscope CH1. (Pulse Detector characterized by Herotek Detector, App. G.)
3. Set the Oscilloscope CH1 to 50 Ω impedance, invert on.
4. Connect the Oscilloscope CH2 to the SYNC Connector.
5. Set the Oscilloscope to trigger off CH2 at 2 V.
6. Press the SETUP Key until the SETUP-DME Screen is displayed.
7. Set the RF PORT to ANTENNA.
8. Press the DIAG Soft Key to display the DME DIAGNOSTICS Screen.
9. Press the ▼ Key to highlight the FIXED PRF PULSES Line.
10. Press the SELECT Soft Key to display the DME DIAG- PULSES Screen.
11. Set up the UUT as follows:

FREQ:	978 MHz
RVLVL:	-2 dBm
CHAN:	X
PRF:	100

12. Press the RUN TEST Soft Key.
13. Verify the P1 to P2 pulse spacing is 12.0 µs (±0.1 µs).
14. Verify the P1 and P2 pulse width is 3.5 µs (±0.5 µs).
15. Verify the P1 rise and fall time is 2.5 µs (±0.25 µs).
16. Press the STOP TEST Soft Key.
17. Set the CHAN to Y.
18. Press the RUN TEST Soft Key.
19. Verify the P1 to P2 pulse spacing is 30.0 µs (±0.1 µs).
20. Press the STOP TEST Soft Key.

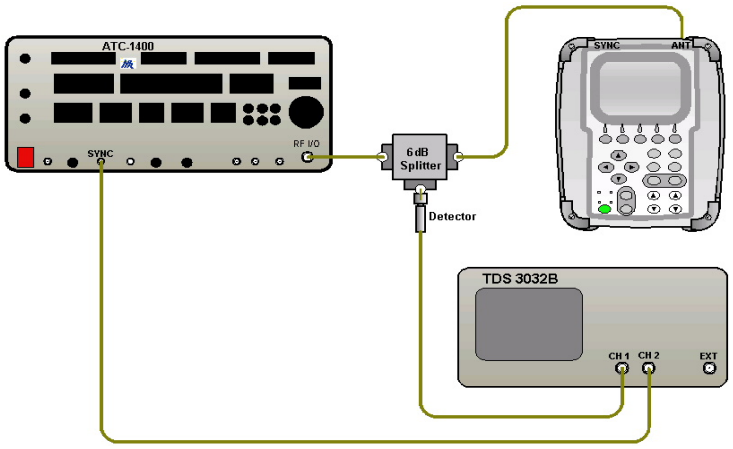
(7) DME Reply Delay and Range

TEST EQUIPMENT: Oscilloscope
ATC-1400A
6 dB Splitter
Pulse Detector

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP PROCEDURE

1. Make the connection as shown.



2. Set up the ATC-1400A as follows:

FREQ/Function Select:	1041 MHz X
MAN/AUTO/MAN STEP:	MAN
DME Reply Efficiency:	100%
SYNC:	TD
RF LEVEL:	-2 dBm
CW/NORM/OFF:	NORM
PRF/SQTR:	100
DME P2 Toggle Switch:	CAL
Self-Interrogation:	ON
Remaining Toggle Switches:	OFF/CAL position

3. Set the Oscilloscope to trigger off of CH2 at 2 V and set CH1 to 50 Ω impedance, invert on.
4. Press the SETUP Key until the SETUP-DME Screen is displayed.
5. Set the RF PORT to ANTENNA.
6. Press the DME Key to display the DME Screen.

STEP PROCEDURE

7. Set up the UUT as follows:

RVLVL:	-38.2 dBm (-2 dBm)
CHAN:	17X
PRF:	100
RATE:	STOP
RANGE:	0.0 nm
SQTR:	OFF
IDENT:	OFF
ECHO:	OFF
REPLY:	100%

8. Press the RUN TEST Soft Key and verify the spacing between the first pulse of interrogation and the first pulse of reply equals 50.0 µs (±0.1 µs).
9. Press the STOP TEST Soft Key.
10. Set up the ATC-1400 as follows:

FREQ/Function Select:	1041 MHz Y
DME P2 DEV:	6.0
DME P2 Flip Switch:	+Δ

11. Set the CHAN to 17Y.
12. Press the RUN TEST Soft Key and verify the spacing between the first pulse of interrogation and the first pulse of reply equals 56.0 µs (±0.1 µs).
13. Press the STOP TEST Soft Key.
14. Set up the ATC-1400 as follows:

FREQ/Function Select:	1041 MHz X
DME P2 Flip Switch:	CAL

15. Set the CHAN to 17X.
16. Set the RANGE to 10.0 nm.
17. Press the RUN TEST Soft Key and verify the range delay is 123.59 µs (±0.12359 µs) (Oscilloscope reading +50.0 µs Range Delay reading).
18. Press the STOP TEST Soft Key.

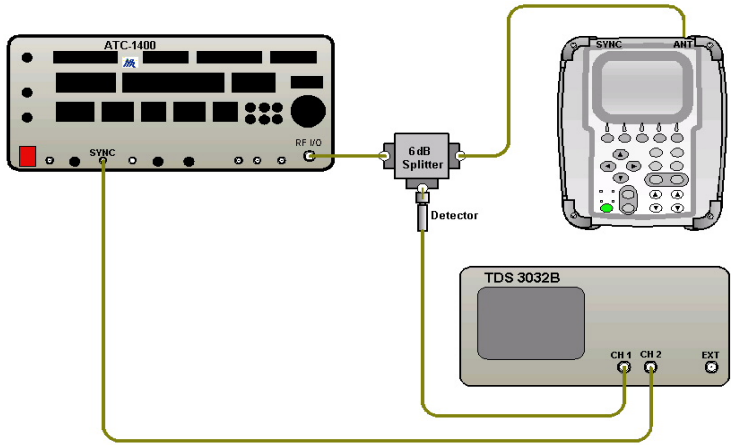
(8) DME Echo Reply Position and Amplitude

TEST EQUIPMENT: Oscilloscope
ATC-1400A
6 dB Splitter
Pulse Detector
Spectrum Analyzer

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP PROCEDURE

1. Connect Test Equipment as shown.



2. Set up the ATC-1400 as follows.

FREQ/Function Select:	1041 MHz X
MAN/AUTO/MAN STEP:	MAN
DME Reply Efficiency:	100%
SYNC:	TD
RF LEVEL:	-2 dBm
CW/NORM/OFF:	NORM
PRF/SQTR:	100
DME P2 Toggle Switch:	CAL
Self-Interrogation:	ON
Remaining Toggle Switches	OFF/CAL position

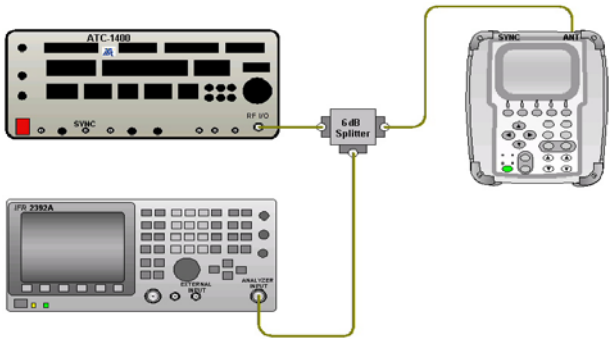
3. Press the SETUP Key until the SETUP-DME Screen is displayed.
4. Set the RF PORT to ANTENNA.
5. Press the DME Key to display the DME Screen.

STEP PROCEDURE

6. Set up the UUT as follows:

RVLVL:	-38.2 dBm (-2 dBm)
CHAN:	17X
PRF:	100
RATE:	STOP
RANGE:	0.0 nm
SQTR:	OFF
IDENT:	OFF
ECHO:	ON
REPLY:	100%

7. Press the RUN TEST Soft Key and verify the echo position is 370.77 µs (±12.359 µs) after P1 of the UUT Reply.
8. Make the connection as shown.



9. Set up the Spectrum Analyzer as follows:

Frequency:	978 MHz
Input Attn:	20 dB
RBW:	5 MHz
VBW:	None
Span:	0 Hz
REF:	-5 dB
Sweep:	5 µs
Trigger	Video
Trigger Mode:	Normal
Scale:	5 dB
Marker:	On

10. Measure and record the P1 reply pulse level.
11. Set the trigger delay to 370 µs.
12. Measure and record the P1 echo reply pulse level.
13. Verify the echo reply pulse level is -11 dB (±1 dB) less than the P1 reply level.
14. Press the STOP TEST Soft Key.
15. Set the ECHO to OFF.

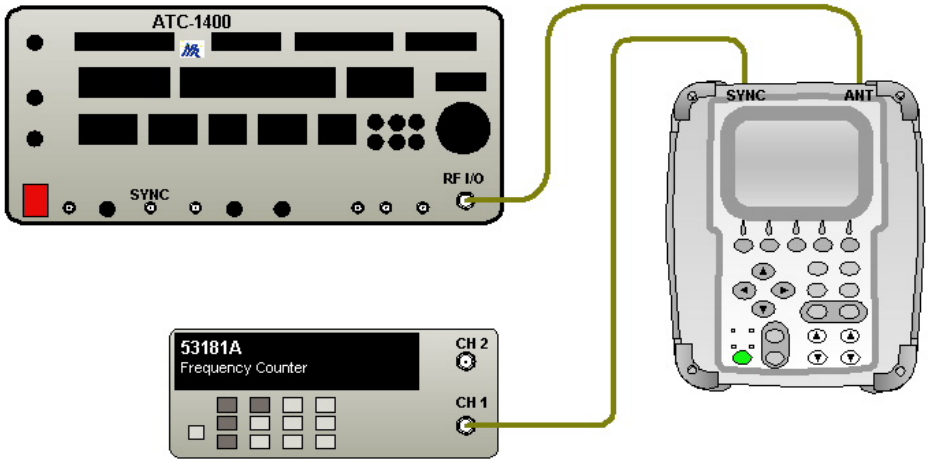
(9) DME Reply Efficiency

TEST EQUIPMENT: Frequency Counter
ATC-1400A

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect Test Equipment as shown.



2. Set up the ATC-1400A as follows:

FREQ/Function Select:	1041 MHz X
RF LEVEL:	-10 dBm NORM
PRF/SQTR:	300
DME P2 Toggle Switch:	CAL
Self-Interrogation:	ON
Remaining Toggle Switches:	OFF/CAL position

3. Press the SETUP Key until the SETUP-DME Screen is displayed.
4. Set the RF PORT to ANTENNA.
5. Set the ANT RANGE to 250 ft.
6. Press the DME Key to display the DME Screen.
7. Set up the UUT as follows:

RVLVL:	-2 dBm)
CHAN:	17X
RATE:	STOP
RANGE:	0.0 nm
SQTR:	OFF
IDENT:	OFF
ECHO:	OFF

8. Set the UUT REPLY to 10%.
9. Press the RUN TEST Soft Key.

STEP	PROCEDURE

10. Record the frequency displayed on the Frequency Counter.
11. Calculate the percent reply (Percent Reply = $\frac{\text{Measured Frequency}}{\text{Interrogation PRF}}$ x 100%).
12. Verify the Percent Reply equals the Reply Setting (±0.5%).
13. Press the STOP TEST Soft Key.
14. Set the REPLY to 40%.
15. Press the RUN TEST Soft Key.
16. Record the frequency displayed on the Frequency Counter.
17. Calculate the percent reply (Percent Reply = $\frac{\text{Measured Frequency}}{\text{Interrogation PRF}}$ x 100%).
18. Verify the Percent Reply equals the Reply Setting (±0.5%).
19. Press the STOP TEST Soft Key.
20. Set the REPLY to 70%.
21. Press the RUN TEST Soft Key.
22. Record the frequency displayed on the Frequency Counter.
23. Calculate the percent reply (Percent Reply = $\frac{\text{Measured Frequency}}{\text{Interrogation PRF}}$ x 100%).
24. Verify the Percent Reply equals the Reply Setting (±0.5%).
25. Press the STOP TEST Soft Key.
26. Set the UUT REPLY to 100%.
27. Press the RUN TEST Soft Key.
28. Record the frequency displayed on the Frequency Counter.
29. Calculate the percent reply (Percent Reply = $\frac{\text{Measured Frequency}}{\text{Interrogation PRF}}$ x 100%).
30. Verify the Percent Reply equals the Reply Setting (±0.5%).
31. Press the STOP TEST Soft Key.

(10) DME Squitter

TEST EQUIPMENT: Frequency Counter

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the Frequency Counter to the SYNC Connector.
2. Set the Frequency Counter for a 10 second gate time.
3. Press the DME Key to display the DME Screen.
4. Set up the UUT as follows:

CHAN:	17X
RATE:	STOP
RANGE:	0.0 nm
SQTR:	ON
IDENT:	OFF
ECHO:	OFF

5. Press the RUN TEST Soft Key.
6. Verify 2700 Hz (±54 Hz) on the Frequency Counter.
7. Press the STOP TEST Soft Key.

(11) DME Measurement - Interrogation Pulse Timing

TEST EQUIPMENT: ATC-1400A
Oscilloscope
Pulse Detector

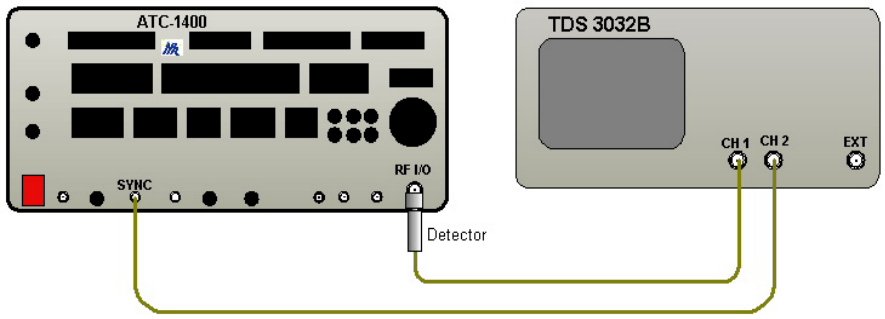
VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP PROCEDURE

1. Set up the ATC-1400A as follows:

FREQ/Function Select:	1041 MHz X
RF LEVEL Control:	-2 dBm
CW/NORM/OFF:	NORM
PRF:	200
DME P2 Switch:	CAL
SYNC:	T_D
Self Interrogation:	ON
Set other Toggle Switches:	OFF/CAL position

2. Connect Test Equipment as shown.



3. Set Oscilloscope to trigger off CH2 at 2 V and CH1 to 50-ohm impedance, invert on.
4. Measure and record the P1 and P2 pulse widths on the Oscilloscope.
5. Measure and record the P1 to P2 X Channel pulse spacing on the Oscilloscope.
6. Set up the ATC-1400A as follows:

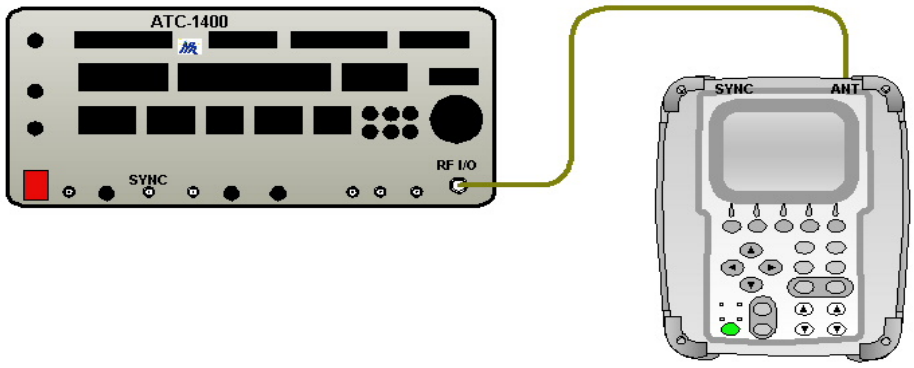
FREQ/Function Select:	1041 MHz X
DME P2 DEV:	6.0
DME P2 Switch:	+Δ

7. Measure and record the P1 to P2 Y Channel pulse spacing on the Oscilloscope.
8. Set up the ATC-1400A as follows:

FREQ/Function Select:	1041 MHz X
DME P2 Switch:	CAL
RF LEVEL Control:	-10 dBm

STEP PROCEDURE

9. Connect Test Equipment as shown.



10. Press the SETUP Key until the SETUP-DME Screen is displayed.
11. Set the RF PORT to ANTENNA.
12. Set the ANT RANGE to 250 ft.
13. Press the DME Key to display the DME Screen.
14. Set up the UUT as follows:

RFLVL:	-2 dBm
CHAN:	17X
Rate:	STOP
Range:	0.0 nm

15. Press the RUN TEST Soft Key.
16. Verify the P1 Pulse Width equals the recorded P1 value (±0.05 µs).
17. Verify the P2 Pulse Width equals the recorded P2 value (±0.05 µs).
18. Verify the P1 to P2 Pulse Spacing equals the recorded P1 to P2 X channel value (±0.02 µs).
19. Press the STOP TEST Soft Key.
20. Set up the ATC-1400A as follows:

FREQ/Function Select:	1041 MHz Y
DME P2 Switch:	+Δ

21. Set the CHAN to 17Y.
22. Press the RUN TEST Soft Key.
23. Verify the P1 to P2 pulse spacing equals the recorded P1 to P2 Y channel value (±0.02 µs).
24. Press the STOP TEST Soft Key.

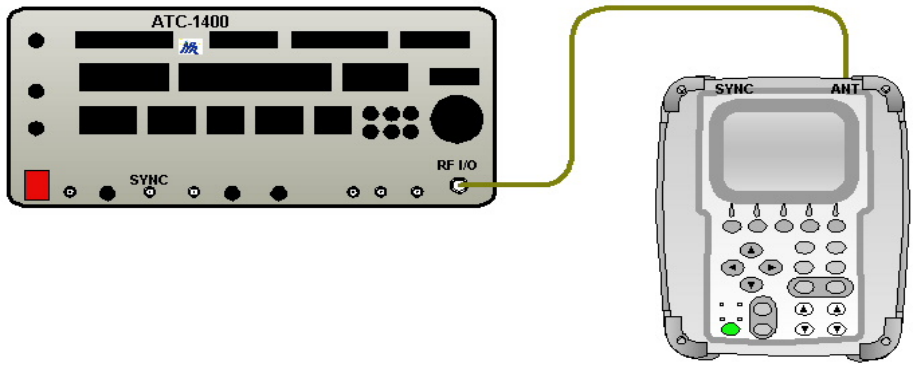
(12) DME Measurement - Interrogation PRF

TEST EQUIPMENT: ATC-1400A

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect Test Equipment as shown.



2. Set up the ATC-1400A as follows:

FREQ/Function Select:	1041 MHz X
RF LEVEL Control:	-10 dBm
CW/NORM/OFF:	NORM
DME P2 Switch:	CAL
Self Interrogation:	ON
Set other Toggle Switches:	OFF/CAL position

3. Press the SETUP Key until the SETUP-DME Screen is displayed.
4. Set the RF PORT to ANTENNA.
5. Set the ANT RANGE to 250 ft.
6. Press the DME Key to display the DME Screen.
7. Set up the UUT as follows:

CHAN:	17X
RFLVL:	-2 dBm
RATE:	STOP
RANGE:	0.0 nm

8. Press the RUN TEST Soft Key.
9. Set the PRF on the ATC-1400A to 10.
10. Verify the PRF is 10 (±2 Hz).
11. Press the STOP TEST Soft Key.
12. Press the RUN TEST Soft Key.
13. Set the PRF on the ATC-1400A to 101.
14. Verify the PRF is 101 (±2 Hz).
15. Press the STOP TEST Soft Key.
16. Press the RUN TEST Soft Key.

STEP	PROCEDURE

17. Set the PRF on the ATC-1400A to 201.
18. Verify the PRF is 201 (±2 Hz).
19. Press the STOP TEST Soft Key.
20. Press the RUN TEST Soft Key.
21. Set the PRF on the ATC-1400A to 300.
22. Verify the PRF is 300 (±2 Hz).
23. Press the STOP TEST Soft Key.

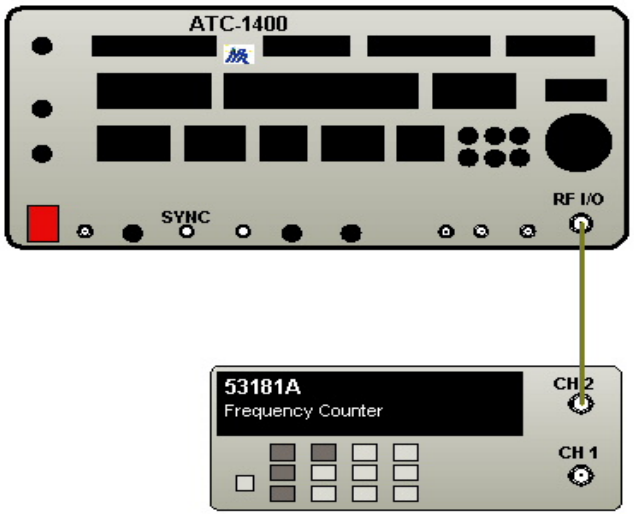
(13) DME Measurement - Interrogation Frequency

TEST EQUIPMENT: ATC-1400A
Frequency Counter

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP PROCEDURE

1. Connect Test Equipment as shown.



2. Set up the ATC-1400A as follows:

RF LEVEL Control:	-10 dBm
CW/NORM/OFF:	CW

3. Set the FREQ/Function Select on the ATC-1400A to 1025 MHz and record frequency on the Frequency Counter.
4. Set the FREQ/Function Select on the ATC-1400A to 1064 MHz and record frequency on the Frequency Counter.
5. Set the FREQ/Function Select on the ATC-1400A to 1110 MHz and record frequency on the Frequency Counter.
6. Set the FREQ/Function Select on the ATC-1400A to 1150 MHz and record frequency on the Frequency Counter.
7. Set up the ATC-1400A as follows:

FREQ/Function Select:	1025 MHz X
RF LEVEL Control:	-10 dBm
CW/NORM/OFF:	NORM
DME P2 Switch:	CAL
Self Interrogation:	ON
Set other Toggle Switches:	OFF/CAL position

8. Move the cable from the Frequency Counter to the ANT Connector.
9. Press the SETUP Key until the SETUP-DME Screen is displayed.

STEP	PROCEDURE

10. Set the RF PORT to ANTENNA.
11. Press the DME Key to display the DME Screen.
12. Set CHANNEL X to 1.
13. Press the RUN TEST Soft Key.
14. Verify the interrogation frequency displayed on the UUT equals the Recorded Frequency (±20 kHz) in Step 3.
15. Press the STOP TEST Soft Key.
16. Set the FREQ/Function Select on the ATC-1400A to 1064 MHz
17. Set CHANNEL X to 40.
18. Press the RUN TEST Soft Key.
19. Verify the interrogation frequency displayed on the UUT equals the Recorded Frequency (±20 kHz) in Step 4.
20. Press the STOP TEST Soft Key.
21. Set the FREQ/Function Select on the ATC-1400A to 1110 MHz
22. Set CHANNEL X to 86.
23. Press the RUN TEST Soft Key.
24. Verify the interrogation frequency displayed on the UUT equals the Recorded Frequency (±20 kHz) in Step 5.
25. Press the STOP TEST Soft Key.
26. Set the FREQ/Function Select on the ATC-1400A to 1150 MHz
27. Set CHANNEL X to 126.
28. Press the RUN TEST Soft Key.
29. Verify the interrogation frequency displayed on the UUT equals the Recorded Frequency (±20 kHz) in Step 6.
30. Press the STOP TEST Soft Key.

(14) XPDR Pulse Characteristics - ATCRBS

TEST EQUIPMENT: Oscilloscope
Pulse Detector

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the Pulse Detector directly to the ANT Connector.
2. Connect the other end of the Pulse Detector to the Oscilloscope CH1.
3. Connect the Oscilloscope CH2 to the SYNC Connector.
4. Set the Oscilloscope to trigger off CH2 at 2 V and CH1 to 50 Ω impedance, invert on.
5. Press the SETUP Key to display the SETUP-XPDR Screen.
6. Set the RF PORT to ANTENNA.
7. Press the DIAG Key to display the XPDR DIAGNOSTICS Screen.
8. Use the ▼ Key to highlight the ATCRBS MODE A Line.
9. Press the SELECT Soft Key to display the XPDR DIAG-ATCRBS MODE A Screen.
10. Set up the UUT as follows:

RFLVL:	-2 dBm
PRF:	100
SLS:	0 dB

11. Press the RUN TEST Soft Key.
12. Verify the P1 to P2 pulse spacing is 2.0 µs (±25 ns) on the Oscilloscope.
13. Verify the P1 to P3 pulse spacing is 8.0 µs (±25 ns) on the Oscilloscope.
14. Verify the P1 pulse width is 0.8 µs (±50 ns) on the Oscilloscope.
15. Verify the P1 rise time is between 50 and 100 ns on the Oscilloscope.
16. Verify the P1 fall time is between 50 and 200 ns on the Oscilloscope.
17. Press the STOP TEST Soft Key.
18. Set the SLS to OFF.
19. Press the NEXT TEST Soft Key to display the XPDR DIAG-ATCRBS MODE C Screen.
20. Press the RUN TEST Soft Key.
21. Verify the P1 to P3 pulse spacing 21.0 µs (±25 ns) on the Oscilloscope.
22. Press the STOP TEST Soft Key.
23. Press the NEXT TEST Soft Key to display the XPDR DIAG-ITM MODE A Screen.
24. Press the RUN TEST Soft Key.
25. Verify the P1 to P3 pulse spacing is 8.0 µs (±25 ns) on the Oscilloscope.
26. Verify the P1 to P4 pulse spacing is 10.0 µs (±25 ns) on the Oscilloscope.
27. Verify the P4 pulse width is 0.8 µs (±50 ns) on the Oscilloscope.

STEP	PROCEDURE

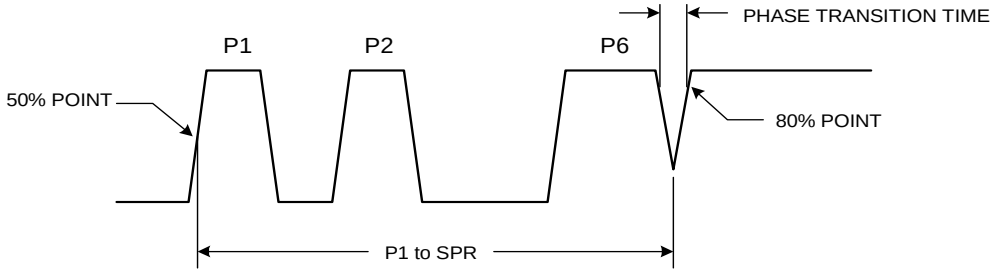
28. Press the STOP TEST Soft Key.
29. Press the NEXT TEST Soft Key to display the XPDR DIAG-ITM MODE C Screen.
30. Press the RUN TEST Soft Key.
31. Verify the P1 to P3 pulse spacing is 21.0 µs (±25 ns) on the Oscilloscope.
32. Verify the P1 to P4 pulse spacing is 23.0 µs (±25 ns) on the Oscilloscope.
33. Verify the P4 pulse width is 0.8 µs (±50 ns) on the Oscilloscope.
34. Press the STOP TEST Soft Key.
35. Press the NEXT TEST Soft Key to display the XPDR DIAG-ITM MODE A/S Screen.
36. Press the RUN TEST Soft Key.
37. Verify the P4 pulse width is 1.6 µs (±50 ns) on the Oscilloscope.
38. Press the STOP TEST Soft Key.
39. Press the NEXT TEST Soft Key to display the XPDR DIAG-ITM MODE C/S Screen.
40. Press the RUN TEST Soft Key.
41. Verify the P4 pulse width is 1.6 µs (±50 ns) on the Oscilloscope.
42. Press the STOP TEST Soft Key.

(15) XPDR Pulse Characteristics - Mode S

TEST EQUIPMENT: Oscilloscope
Pulse Detector

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP PROCEDURE



Mode S Interrogation

1. Connect the Pulse Detector directly to the ANT Connector.
2. Connect the other end of the Pulse Detector to the Oscilloscope CH1.
3. Connect the Oscilloscope CH2 to the SYNC Connector.
4. Set the Oscilloscope to trigger off CH2 at 2 V and CH1 to 50 Ω impedance, invert on.
5. Press the SETUP Key to display the SETUP-XPDR Screen.
6. Set the RF PORT to ANTENNA.
7. Press the DIAG Key to display the XPDR DIAGNOSTICS Screen.
8. Press the SELECT Soft Key to display the XPDR DIAG-FORMAT 0 Screen.
9. Set up the UUT as follows:

RFLVL:	-2 dBm
PRF:	100
ADDRESS:	000000
SLS:	OFF

10. Press the RUN TEST Soft Key.
11. Verify the P1 to P2 pulse spacing is 2.0 µs (±25 ns) on the Oscilloscope.
12. Verify the P1 to P6 pulse spacing is 3.5 µs (±25 ns) on the Oscilloscope.
13. Verify the P1 to SPR pulse spacing is 4.75 µs (±25 ns) on the Oscilloscope.
14. Verify the P1 pulse width is 0.8 µs (±50 ns) on the Oscilloscope.
15. Verify the P6 pulse width is 16.25 µs (±50 ns) on the Oscilloscope.
16. Verify the P1 rise time is between 50 and 100 ns on the Oscilloscope.
17. Verify the P1 fall time is between 50 and 200 ns on the Oscilloscope.

STEP	PROCEDURE

18. Verify the SPR phase transition time is <80 ns on the Oscilloscope.
19. Press the STOP TEST Soft Key.
20. Press the NEXT TEST Soft Key until the XPDR DIAG-FORMAT 16 Screen is displayed.
21. Press the RUN TEST Soft Key.
22. Verify the P6 pulse width is 30.25 µs (±50 ns).
23. Press the STOP TEST Soft Key.

(16) XPDR Interrogation PRF

TEST EQUIPMENT: Frequency Counter

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the Frequency Counter CH1 to the SYNC Connector.
2. Press the SETUP Key to display the SETUP-XPDR Screen.
3. Set the RF PORT Field to ANTENNA.
4. Press the DIAG Key to display the XPDR DIAGNOSTICS Screen.
5. Use the ▼ Key to highlight the ATCRBS MODE A Line.
6. Press the SELECT Soft Key to display the XPDR DIAG-ATCRBS MODE A Screen.
7. Set the PRF to 235.
8. Press the RUN TEST Soft Key.
9. Verify 235 Hz (±5 Hz) on the Frequency Counter.
10. Press the STOP TEST Soft Key.
11. Set the PRF to 118.
12. Press the RUN TEST Soft Key.
13. Verify 118 Hz (±5 Hz) on the Frequency Counter.
14. Press the STOP TEST Soft Key.
15. Set the PRF to 90.
16. Press the RUN TEST Soft Key.
17. Verify 90 Hz (±5 Hz) on the Frequency Counter.
18. Press the STOP TEST Soft Key.
19. Set the PRF to 70.
20. Press the RUN TEST Soft Key.
21. Verify 70 Hz (±5 Hz) on the Frequency Counter.
22. Press the STOP TEST Soft Key.
23. Set the PRF to 50.
24. Press the RUN TEST Soft Key.
25. Verify 50 Hz (±5 Hz) on the Frequency Counter.
26. Press the STOP TEST Soft Key.

(17) XPDR SLS Level

TEST EQUIPMENT: Spectrum Analyzer

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the Spectrum Analyzer Input to the ANT Connector.
2. Connect the Spectrum Analyzer External Input to the SYNC Connector.
3. Set the Spectrum Analyzer as follows:

Frequency=	1030 MHz
Input Attenuation=	20 dB
VBW=	None
RBW=	5 MHz
Span=	0 Hz
REF=	0 dB
Sweep=	1 µs
Trigger=	Ext Front
Trigger Mode=	Normal
Trigger Level=	2.5 V
Scale=	2 dB

4. Press the SETUP Key to display the SETUP-XPDR Screen.
5. Set the RF PORT Field to ANTENNA.
6. Press the DIAG Key to display the XPDR DIAGNOSTICS Screen.
7. Use the ▼ Key to highlight the ATCRBS MODE A Line.
8. Press the SELECT Soft Key to display the XPDR DIAG-MODE A Screen.
9. Set up the UUT as follows:

PRF:	235
RFLVL:	-2 dBm
SLS:	-9 dB

10. Press the RUN TEST Soft Key.
11. Verify the P2 level is less than the P1 level by 9 dB (-1/+0 dB).
12. Press the STOP TEST Soft Key.
13. Set the SLS to 0 dB.
14. Press the RUN TEST Soft Key.
15. Verify the P2 level equals the P1 level (-0/+1 dB).
16. Press the STOP TEST Soft Key.
17. Set the SLS to OFF.
18. Press the RUN TEST Soft Key.
19. Verify P2 is not present.
20. Press the STOP TEST Soft Key.

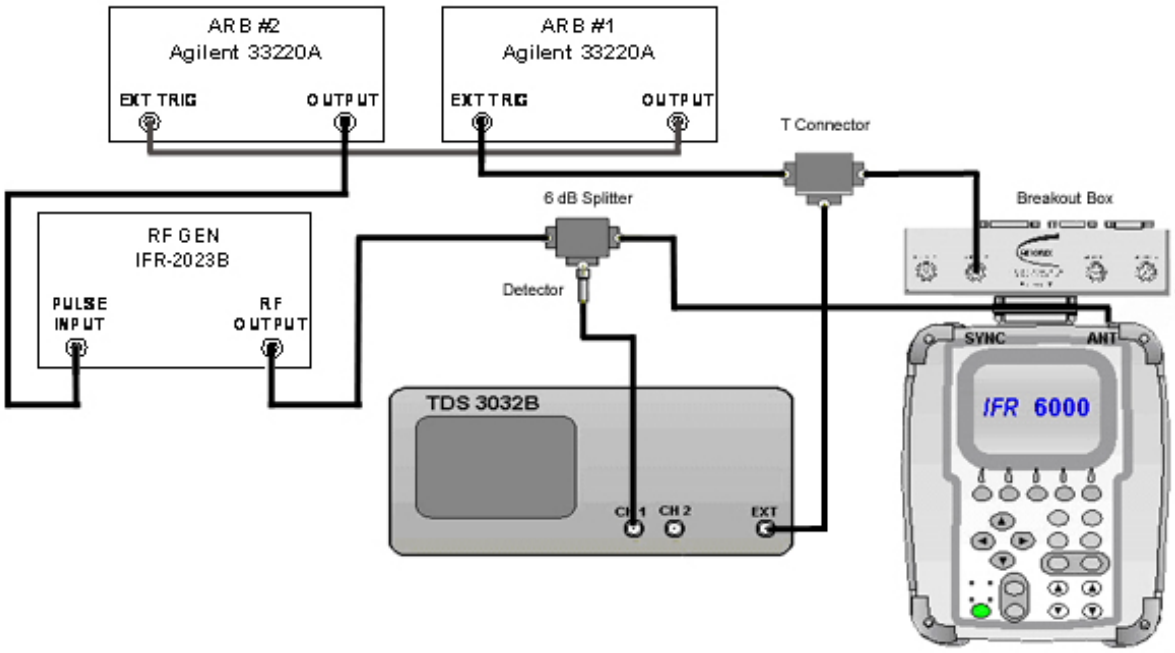
(18) XPDR Measurement - Reply Accuracy - ATCRBS

TEST EQUIPMENT: RF Generator
ARB Generator (2)
Oscilloscope
Computer with Tera Term Pro and Intuilink Software
Breakout Box
Pulse Detector

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP PROCEDURE

1. Connect Test Equipment as shown.



2. Set the RF Generator to -10 dBm at 1090 MHz, external pulse modulation.
3. Press the SETUP Key to display the SETUP-XPDR Screen.
4. Set the RF PORT to ANTENNA.
5. Set up the UUT as follows:

ANTENNA:	BOTTOM
ANT RANGE - BOTTOM:	12 ft
ANT HEIGHT - BOTTOM:	1 ft

6. Press the XPDR Key to display the XPDR Screen.
7. Set GENERIC ATCRBS on the XPDR-AUTO TEST.
8. Press the TEST LIST Soft Key to display the XPDR-TEST LIST Screen.
9. Use the ▼ Key to highlight the A/C F1/F2 SPACE/WIDTH Line.

STEP PROCEDURE

10. Press the SELECT TEST Soft Key to display the XPDR- A/C SPACE/WIDTH Screen.
11. Connect the Computer COMM Port to the RS-232 Connector on the Breakout Box.
12. Using the Tera Term Terminal Program, send the 'MTL_Disable' file (found on the IFR 6000 Maintenance Manual CD) to the UUT to override the MTL function. Press the LOCAL Soft Key to return the UUT to local mode.
13. Connect the ARB #2 to the Computer USB Port and start the Intuilink Software. Send the "ATCRBS.wvf" file (found on the IFR 6000 Maintenance Manual CD) to the ARB #2 Volatile Memory. Enter the required Frequency and Output Voltage from Step 14 when prompted.
14. Set up the ARB #1 and ARB #2 are follows:

Function	ARB #1	ARB #2
Frequency	1 kHz	48.192771 kHz
Output	Pulse, 5 Vpp, 0 V Offset	Arbitrary, 5 V high, 0 V
Trigger	External, Positive Slope	External, Negative Slope
Mode	Burst, 1 Cycle	Burst, 1 Cycle
Impedance	High Z	50 Ω

15. Set the pulse width on the ARB #1 to the first pulse width listed in Step 18.
16. Press the RUN TEST Soft Key.
17. Measure the pulse spacing between P3 of the interrogation and F1 of the reply using the Oscilloscope to verify the pulse spacing matches the first Reply Delay. If needed, adjust the pulse width of the ARB #1 until the Reply Delay is correct.
18. Verify the reply delay value on the UUT is:

Mode	ARB #1 Pulse Width	Reply Delay	Tolerance
A	9.8 µs 11.0 µs	1.8 µs 3.0 µs	0.05 µs
C	24.0 µs 28.0 µs	3.0 µs 7.0 µs	0.05 µs

19. Repeat Steps 15 to 18 for each Pulse Width and Reply Delay.
20. Set the pulse width on the ARB #1 to 11 µs. Measure the F1 to F2 pulse spacing, F1 pulse width and F2 pulse width on the Oscilloscope.
21. Verify the F1 to F2 pulse spacing, F1 pulse width and F2 pulse width on the UUT equal the Oscilloscope readings (±0.02 µs).
22. Press the STOP TEST Soft Key.
23. Connect the ARB #1 to the Computer USB Port and using the Intuilink Software, send the "JIT_1r0.wvf" file (found on the IFR 6000 Maintenance Manual CD) to the ARB #1 Volatile Memory. Enter the required Frequency and Output voltage from Step 24 when prompted.

STEP PROCEDURE

24. Set up the ARB #1 as follows:

Function	ARB #1
Frequency	0.222222 kHz
Output	Pulse, 4 Vpp, 0 V Offset
Trigger	External, Positive Slope
Mode	Burst, 1 Cycle
Impedance	High Z

25. Verify the reply delay jitter value on the UUT is 0.82 µs (±0.02 µs).
26. Press the STOP TEST Soft Key.
27. Disconnect the Coaxial Cable from the ANT Connector and connect to CH2 on the Frequency Counter.
28. Set the RF Generator for CW output and measure the frequency of the RF Generator at 1087, 1090 and 1093 MHz.
29. Disconnect the Coaxial Cable from the Frequency Counter and connect to the ANT Connector.
30. Set the RF Generator for external pulse modulation.
31. Press the NEXT TEST Soft Key to display the XPDR-POWER/FREQ Screen.
32. Press the RUN TEST Soft Key.
33. Verify the UUT displays the measured RF Generator Frequency (±50 kHz) at 1087, 1090 and 1093 MHz.
34. Press the STOP TEST Soft Key.

(19) XPDR Measurement - Reply Accuracy - Mode S

TEST EQUIPMENT: RF Generator
ARB Generator (2)
Oscilloscope
Computer with Tera Term Pro and Intuilink Software
Breakout Box
Pulse Detector

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP PROCEDURE

1. Connect Test Equipment as shown in 2-2-3, Figure 12 with the exception of using AUX OUT 1 instead of AUX OUT 2 on the Breakout Box.
2. Set the RF Generator to -10 dBm at 1090 MHz, external pulse modulation.
3. Press the SETUP Key to display the SETUP-XPDR Screen.
4. Set the RF PORT to ANTENNA.
5. Set up the UUT as follows:

ANTENNA:	BOTTOM
ANT RANGE - BOTTOM:	12 ft
ANT HEIGHT - BOTTOM:	1 ft
UUT ADDRESS:	MANUAL
MANUAL AA:	A92492

6. Press the XPDR Key to display the XPDR Screen.
7. Verify GENERIC Mode S is on the XPDR-AUTO TEST.
8. Press the TEST LIST Soft Key to display the XPDR-TEST LIST Screen.
9. Use the ▼ Key to highlight the S REPLY TIMING Line.
10. Press the SELECT TEST Soft Key to display the XPDR-S RPLY TIMING Screen.
11. Connect the Computer COMM Port to the RS-232 Connector on the Breakout Box.
12. Using the Tera Term Terminal Program, send the 'MTL_Disable' file (found on the IFR 6000 Maintenance Manual CD) to the UUT to override the MTL function. Press the LOCAL Soft Key to return the UUT to local mode.
13. Connect the ARB #2 to the Computer USB Port and start the Intuilink Software. Send the "DF4.wvf" file (found on the IFR 6000 Maintenance Manual CD) to the ARB #2 Memory #1. Enter the required Frequency and Output Voltage from Step 14 when prompted. Recall "DF4.wvf" file from memory #1.
14. Set up the ARB #1 and ARB #2 are follows:

Function	ARB #1	ARB #2
Frequency	1 kHz	15.625 kHz
Output	Pulse, 4 Vpp, 0 V Offset	Arbitrary, 5 V high, 0 V
Trigger	External, Positive Slope	External, Negative Slope
Mode	Burst, 1 Cycle	Burst, 1 Cycle
Impedance	High Z	50 Ω

STEP PROCEDURE

15. Set the pulse width on the ARB #1 to the first pulse width listed in Step 18.
16. Press the RUN TEST Soft Key.
17. Measure the pulse spacing between the SPR of the interrogation and P1 of the reply using the Oscilloscope to verify the pulse spacing matches the first Reply Delay. If needed, adjust the pulse width of ARB #1 until the Reply Delay is correct.
18. Verify the reply delay value on the UUT is:

Mode	ARB #1 Pulse Width	Reply Delay	Tolerance
A	129.75 µs 132.75 µs	125 µs 128 µs	0.05 µs

19. Repeat Steps 15 to 18 for each Pulse Width and Reply Delay.
20. Press the STOP TEST Soft Key.
21. Press the PREV TEST Soft Key to display the XPDR-S ALL CALL Screen.
22. Load the “DF11.wvf” file (found on the IFR 6000 Maintenance Manual CD) to Volatile Memory and set the ARB #2 for External Trigger.
23. Set the pulse width on the ARB #1 to the first pulse width listed in Step 27. Recall "DF4.waveform" from the ARB #2 Memory.
24. Press the RUN TEST Soft Key.
25. Wait until the UUT displays replies then select the DF11 waveform as an output from Volatile Memory on the ARB #2 while the test is running.
26. Measure the pulse spacing between the P4 of the interrogation and the P1 of the reply using the Oscilloscope to verify the pulse spacing matches the first Reply Delay. If needed, adjust the pulse width of the ARB #1 until the Reply Delay is correct.
27. Verify the reply delay value on the UUT is:

Mode	ARB #1 Pulse Width	Reply Delay	Tolerance
ITM A	135 µs 138 µs	125 µs 128 µs	0.05 µs

28. Repeat Steps 23 to 27 for the other Pulse Width and Reply Delays.
29. Press the STOP TEST Soft Key.
30. Press the NEXT TEST Soft Key until the XPDR-S REPLY Screen is displayed.
31. Set the pulse width on the ARB #1 to 132.75 µs.
32. Recall the DF4 waveform as an output from memory #1 on the ARB #2.
33. Press the RUN TEST Soft Key.
34. Wait until the UUT displays replies and select the DF11 waveform as an output from Volatile Memory on the ARB #2 while the test is running.
35. Set the ARB #1 to internal trigger.

STEP	PROCEDURE

36. Set the burst period on the ARB #1 to 0.1 sec.
37. Verify the PERIOD on the UUT equals 0.1 sec (±0.01 sec).
38. Set the burst period on the ARB #1 to 2.0 sec.
39. Verify the PERIOD on the UUT equals 2.0 sec (±0.01 sec).
40. Set the burst period on the ARB #1 to 4.88 sec.
41. Verify the PERIOD on the UUT equals 4.88 sec (±0.01 sec).
42. Press the STOP TEST Soft Key.

(20) Altitude Encoder

TEST EQUIPMENT: Breakout Box
Jumper Wire with Clips and two male Crimp Pins

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP PROCEDURE

1. Install the Breakout Box on the UUT.
2. Press the XPDR Key until the XPDR-Encoder Screen is displayed.
3. Set SOURCE to ENCODER.
4. Connect each end of the Jumper Wire to a Crimp Pin.
5. Insert one Crimp Pin into J6, Pin 13 on the Breakout Box.
6. Press the RUN TEST Soft Key.
7. Insert the other Crimp Pin into each of the J6 connector holes and verify the correct pulse shown on the UUT screen is unmasked when the Crimp Pin is inserted.

A1	**Pin 1**
A2	**Pin 2**
A4	**Pin 3**
B1	**Pin 4**
B2	**Pin 5**
B4	**Pin 6**
C1	**Pin 7**
C2	**Pin 8**
C4	**Pin 9**
D2	**Pin 11**
D4	**Pin 12**

8. Press the STOP TEST Soft Key.

(21) Generate Video

TEST EQUIPMENT: Oscilloscope

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the Oscilloscope CH1 to the VIDEO Connector.
2. Connect the Oscilloscope CH2 to the SYNC Connector.
3. Set the Oscilloscope to trigger off CH2 at 2 V and CH1 to 50 Ω impedance.
4. Press the SETUP Key to display the SETUP-XPDR Screen.
5. Set the RF PORT to ANTENNA.
6. Press the DIAG Key to display the XPDR DIAGNOSTICS Screen.
7. Use the ▼ Key to highlight the ATCRBS MODE A Line.
8. Press the SELECT Soft Key to display the XPDR DIAG-ATCRBS MODE A Screen.
9. Set up the UUT as follows:

RFLVL:	-67 dBm
PRF:	100
SLS:	OFF

10. Press the RUN TEST Soft Key.
11. Verify the baseline is 0 V (±0.5 V) on the Oscilloscope.
12. Verify the peak-to-peak level is 0.2 to 1.5 Vpp on the Oscilloscope.
13. Verify the P1 pulse width is 0.8 µs (±50 ns) on the Oscilloscope.
14. Verify the P1 to P3 pulse spacing is 8.0 µs (±25 ns) on the Oscilloscope.
15. Press the STOP TEST Soft Key.
16. Press the NEXT TEST Soft Key to display the XPDR DIAG-ATCRBS MODE C Screen.
17. Press the RUN TEST Soft Key.
18. Verify the P1 to P3 pulse spacing is 21.0 µs (±25 ns) on the Oscilloscope.
19. Press the STOP TEST Soft Key.
20. Press the PREV TEST Soft Key until the XPDR DIAG-FORMAT 0 Screen is displayed.
21. Press the RUN TEST Soft Key.
22. Verify the P1 to P2 pulse spacing is 2.0 µs (±25 ns) on the Oscilloscope.
23. Press the STOP TEST Soft Key.

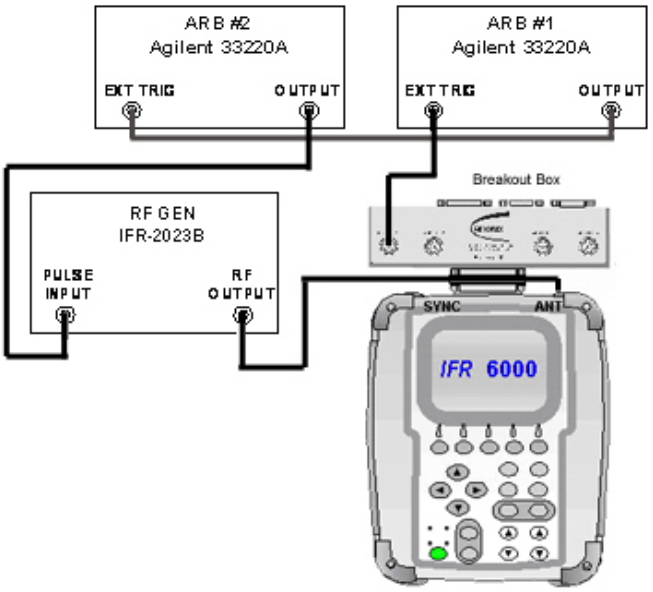
(22) ADSB Receive DF17 and DF20 - Squitter Period

TEST EQUIPMENT: RF Generator
ARB Generator (2)
Oscilloscope
Computer with Tera Term Pro and Intuilink Software
Breakout Box

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP PROCEDURE

1. Connect Test Equipment as shown using AUX OUT 1 on the Breakout Box.



2. Set the RF Generator to -10 dBm at 1090 MHz, external pulse modulation.
3. Set UUT for GENERIC MODE S and press the SETUP Key to display the SETUP-XPDR Screen.
4. Set the RF PORT to ANTENNA.
5. Set up the UUT as follows:

ANTENNA:	BOTTOM
ANT RANGE - BOTTOM:	12 ft
ANT HEIGHT - BOTTOM:	1 ft
UUT ADDRESS:	MANUAL
MANUAL AA:	A92492
CHECK CAP:	YES

6. Press the ADSB SETUP Key to display the SETUP-ADSB Screen.

STEP PROCEDURE

7. Set up the UUT as follows:

POS DECODE:	GLOBAL
LAT:	0 0 0 N
LONG:	0 0 0 E
ADSB GEN:	DF17
ADSB MON:	DF17
GICB:	DF20

8. Connect the Computer COMM Port to the RS-232 Connector on the Breakout Box.
9. Using the Tera Term Terminal Program, send the 'MTL_Disable' file (found on the IFR 6000 Maintenance Manual CD) to the UUT to override the MTL function. Press the LOCAL Soft Key to return the UUT to local mode.
10. Connect the ARB #2 to the Computer USB Port and start the Intuilink Software. Send the "DF4.wvf" file (found on the IFR 6000 Maintenance Manual CD) to the ARB #2 Memory #1 and the 'DF17.wvf' file (found on the IFR 6000 Maintenance Manual CD) to the ARB #2 Volatile Memory. Enter the required Frequency and Output Voltage from Step 14 when prompted. Recall the "DF4.wvf" file from memory #1.
11. Set up the ARB #1 and ARB #2 are follows:

Function	ARB #1	ARB #2
Frequency	1 kHz	15.625 kHz
Output	Pulse, 4 Vpp, 0 V Offset	Arbitrary, 5 V high, 0 V
Trigger	External, Positive Slope	External, Negative Slope
Mode	Burst, 1 Cycle	Burst, 1 Cycle
Impedance	High Z	50 Ω

12. Set pulse width on ARB #1 to 132.75 µs.
13. Press the XPDR Key until the ADS-B/GCIB MAIN Screen is displayed.
14. Press the ADS-B MON Soft Key to display the ADS-B MON DF17 Screen.
15. Select the ADSB MON Test #1 (0,5 AIRBORNE POS) and press the BDS DATA Soft Key to display the ADS-B MON BDS 0,5 Screen.
16. Press the RUN TEST Soft Key.
17. Wait until the UUT is showing replies and select the DF17 waveform as an output from the ARB #2 Volatile Memory while the test is running and set the ARB #2 frequency to 8.3333 kHz.
18. Set the ARB #1 to internal trigger.
19. Set the burst period on the ARB #1 to 0.1 sec.
20. Verify the PERIOD on the UUT equals 0.1 sec (±0.01 sec).
21. Set the burst period on the ARB #1 to 1.0 sec.
22. Verify the PERIOD on the UUT equals 1.0 sec (±0.01 sec).
23. Set the burst period on the ARB #1 to 5.0 sec.
24. Verify the PERIOD on the UUT equals 5.0 sec (±0.01 sec).

STEP PROCEDURE

25. Verify the UUT displays the following:

BDS=:	0,5 Airborne POS
TYPE=:	20
ME=:	A0084000000000
GNSS ALT=:	126700 ft

26. Press the STOP TEST Soft Key.
27. Press the SETUP Key to display the XPDR-SETUP Screen.
28. Set the CHECK CAP to NO.
29. Press the XPDR Key to display the ADS-B MON BDS 0,5 Screen.
30. Press the RETURN Soft Key until the ADS-B/GICB MAIN Screen is displayed.
31. Press the GICB Soft Key to display the GICB DF20 Screen.
32. Press the BDS DATA Soft Key to display the GICB BDS 0,5 Screen.
33. Load the “DF20_Air.wvf” file (found on the IFR 6000 Maintenance Manual CD) to ARB #2 Volatile Memory.
34. Recall the DF4 waveform from the ARB #2 Memory #1 and set the ARB #2 frequency to 15.625 kHz and to external negative trigger.
35. Set the ARB #1 to external trigger.
36. Press the RUN TEST Soft Key.
37. Wait until the UUT is showing replies and select the DF20_Air waveform as an output from ARB #2 Volatile Memory while the test is running and set the ARB #2 frequency to 8.3333 kHz.
38. Verify the UUT displays the following:

BDS=:	0,5 AIRBORNE POS.
TYPE=:	20
ME=:	A0011000000000
GNSS ALT =:	-975 ft

39. Press the STOP TEST Soft Key.
40. Load the “DF20_Sur.wvf” file (found on the IFR 6000 Maintenance Manual CD) to ARB #2 Volatile Memory.
41. Set the ARB #2 to external trigger.
42. Recall the DF4 waveform from the ARB #2 Volatile Memory #1 and set the ARB #2 frequency to 15.625 kHz and to external negative trigger.
43. Press the NEXT TEST Soft Key to display the GICB BDS 0,6 Screen.
44. Press the RUN TEST Soft Key.
45. Wait until the UUT is showing replies and select the DF20_Sur waveform as an output from ARB #2 Volatile Memory while the test is running and set the ARB #2 frequency to 8.3333 kHz.
46. Verify the UUT displays the following:

BDS=:	0,6 SURFACE POS.
TYPE=:	8
ME=:	47C00000000000
MOVEMENT=:	175 kt

47. Press the STOP TEST Soft Key.

(23) ADSB Generate DF17 and DF18 - Squitter Period

TEST EQUIPMENT: IFR 6000 with Option 3
Computer with Tera Term Software
Breakout Box

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP PROCEDURE

1. Connect the ANT Connector of the IFR 6000 to the ANT Connector of the UUT.
2. Press the SETUP Key on the IFR 6000 to display the SETUP-XPDR Screen.
3. Set the RF PORT to ANTENNA.
4. Connect the Breakout Box to the IFR 6000.
5. Connect the Computer to the Breakout Box with an RS-232 cable.
6. Using a Terminal Program, send the RCI command “I:ADSB:MTL SKIP” to the IFR 6000 to skip MTL.
7. Set up the IFR 6000 as follows:

ANTENNA:	BOTTOM
RANGE	100 ft
HEIGHT:	1 ft
UUT ADDRRESS:	MANUAL
AA MANUAL:	A92492
CHECK CAP:	YES

8. Press the SETUP Key on the IFR 6000 until the SETUP-ADSB Screen is displayed.
9. Set up the IFR 6000 as follows:

POS DECODE:	GLOBAL
LAT:	0 0 0 N
LONG:	0 0 0 E
ADSB GEN:	DF17
ADSB MON:	DF17
GICB:	DF20

10. Press the XPDR Key on the IFR 6000 until the ADS-B/GICB Main Screen is displayed.
11. Press the ADSB MON Soft Key to display the ADS-B MON DF17 Screen.
12. Press the BDS DATA Soft Key to display the ADS-B MON BDS 0,5 Screen.
13. Press the SETUP Key on the UUT to display the SETUP-XPDR Screen.
14. Set the RF PORT on the UUT to ANTENNA.
15. Set up the UUT as follows:

ANTENNA:	BOTTOM
RANGE	100 ft
HEIGHT:	1 ft
UUT ADDRRESS:	MANUAL
AA MANUAL:	A92492
CHECK CAP:	YES

16. Press the ADSB SETUP Key to display the SETUP-ADSB Screen.

STEP PROCEDURE

17. Set up the UUT as follows:

POS DECODE:	GLOBAL
LAT:	0 0 0 N
LONG:	0 0 0 E
ADSB GEN:	DF17
ADSB MON:	DF17
GICB:	DF20

18. Press the XPDR Key on the UUT until the ADS-B/GICB Main Screen is displayed.
19. Press the ADSB GEN Soft Key to display the ADS_B GEN DF17 Screen.
20. Press the BDS DATA Soft Key to display the ADS-B GEN BDS 0,5 Screen.
21. Set up the UUT as follows:

TYPE:	9
DF17 AA:	A92492
PERIOD:	0.50 sec
BARO PRES ALT:	1000 ft

22. Press the RUN TEST Soft Key on the IFR 6000 to run the ADSB MON Test #1 (0,5 AIRBORNE POS).
23. Press the BDS ON Soft Key on the UUT and press the RUN TEST Soft Key to run ADS-B GEN BDS 0,5.
24. To ensure the DF17 message from the UUT is decoded correctly on the IFR-6000, verify the following is displayed on the IFR 6000:

BDS=:	0,5 AIRBORNE POS
TYPE:	9
ME=:	480B0400000000
BARO PRES ALT:	1000 ft

25. Verify the PERIOD displays 0.5 sec (±0.2 sec).
26. Set the PERIOD on the UUT to 1.0 sec.
27. Verify the PERIOD displays 1.0 sec (±0.2 sec).
28. Set the PERIOD on the UUT to 5.0 sec.
29. Verify the PERIOD displays 5.0 sec (±0.2 sec).
30. Press the STOP TEST Soft Key on the UUT and the IFR 6000.
31. Press the SETUP Key on the IFR 6000 and the ADSB SETUP Soft Key to display the SETUP-ADSB Screen.
32. Set the ADSB MON to DF18.
33. Press the XPDR Key on the IFR 6000 to display the ADSB MON Test #1 (0,5 AIRBORNE POS).
34. Press the SETUP Key on the UUT and the ADSB SETUP Soft Key to display the SETUP-ADSB Screen.
35. Set the ADSB GEN to DF18.
36. Press the XPDR Key on the UUT to display the ADS-B GEN BDS 0,5 Screen.
37. Set up the UUT as follows:

TYPE:	10
DF18 AA:	A92492
PERIOD:	0.50 sec
BARO PRES ALT:	2000 ft

STEP	PROCEDURE

38. Press the RUN TEST Soft Key on the UUT and the IFR 6000.

39. To ensure the DF18 message from the UUT is decoded correctly on the IFR 6000, verify the following on the IFR 6000:

BDS=:	0,5 AIRBORNE POS
TYPE:	10
ME=:	500F8400000000
BARO PRES ALT:	2000 ft

40. Verify the PERIOD displays 0.5 sec (±0.2 sec).

41. Set the PERIOD on the UUT to 1.0 sec.

42. Verify the PERIOD displays 1.0 sec (±0.2 sec).

43. Set the PERIOD on the UUT to 5.0 sec.

44. Verify the PERIOD displays 5.0 sec (±0.2 sec).

45. Press the STOP TEST Soft Key on the UUT and the IFR 6000.

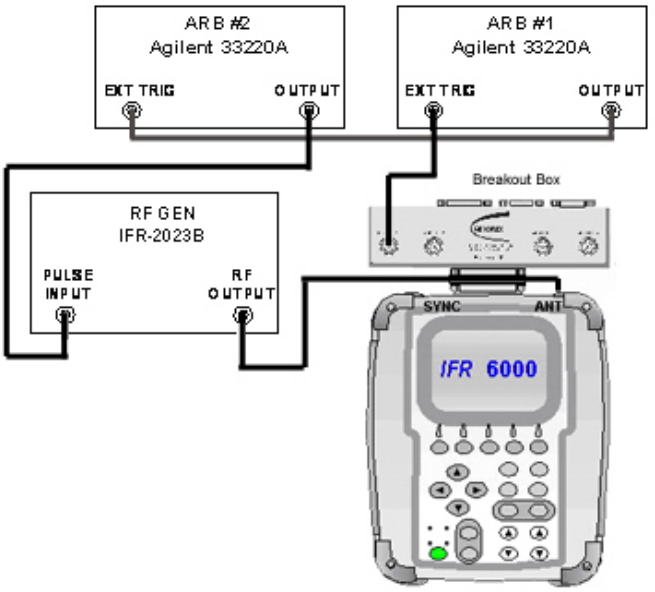
(24) TIS Receive

TEST EQUIPMENT: RF Generator
ARB Generator (2)
Oscilloscope
Computer with Tera Term Pro and Intuilink Software
Breakout Box

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect Test Equipment as shown using AUX OUT 1 on the Breakout Box.



2. Press the SETUP Key until the SETUP-TIS Screen is displayed.
3. Set the RF PORT to ANTENNA.
4. Set up the UUT as follows:

ANT RANGE:	12 ft
ANT HEIGHT:	1 ft
UUT ADDRESS:	MANUAL
MANUAL AA:	A92492

5. Press the TCAS Key until the TIS Screen is displayed.
6. Set the RF Generator to -10 dBm at 1090 MHz, external pulse modulation.
7. Connect the Computer COMM Port to the RS-232 Connector on the Breakout Box.
8. Using the Tera Term Terminal Program, send the 'MTL_Disable' file (found on the IFR 6000 Maintenance Manual CD) to the UUT to override the MTL function. Press the LOCAL Soft Key to return the UUT to local mode.

STEP PROCEDURE

9. Connect the ARB #2 to the Computer USB Port and start the Intuilink Software. Send the “TIS.wvf” file (found on the IFR 6000 Maintenance Manual CD) to the ARB #2 Volatile Memory. Enter the required Frequency and Output Voltage from Step 14 when prompted.

10. Set up the ARB #1 and ARB #2 are follows:

Function	ARB #1	ARB #2
Frequency	1 kHz	15.625 kHz
Output	Pulse, 5 Vpp, 0 V Offset	Arbitrary, 5 V high, 0 V
Trigger	External, Positive Slope	External, Negative Slope
Mode	Burst, 1 Cycle	Burst, 1 Cycle
Impedance	High Z	50 Ω

11. Set the pulse width on ARB #1 to 132.75 µs.

12. Press the RUN TEST Soft Key.

13. Verify the following is displayed on the UUT:

ADDR=:	A92492
ALT=:	31200
INFO=:	0400

14. Press the STOP TEST Soft Key.

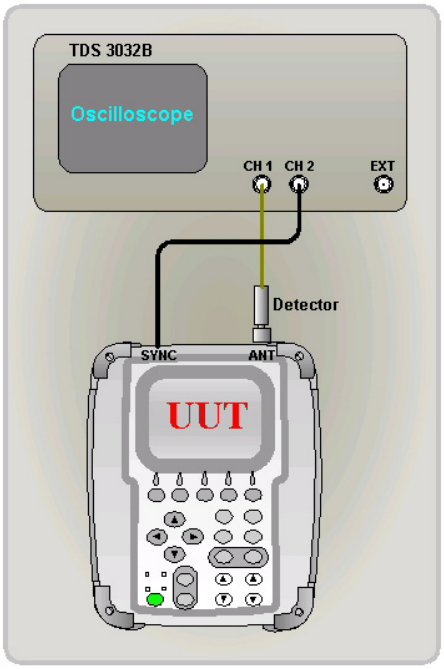
(25) TCAS Reply Pulse Characteristics

TEST EQUIPMENT: Oscilloscope
Pulse Detector

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

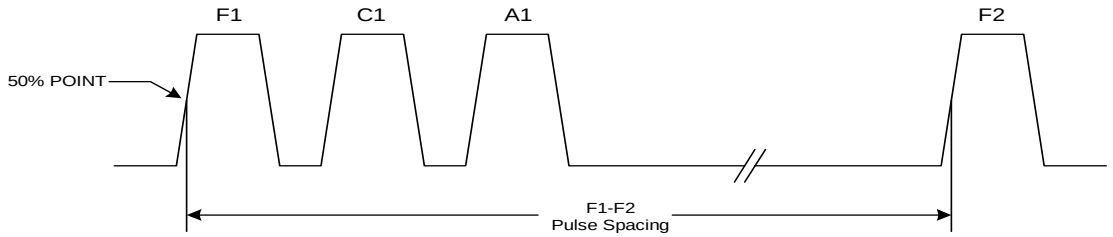
1. Connect Test Equipment as shown.



2. Set the Oscilloscope CH1 to 50 Ω impedance, invert on.
3. Set the Oscilloscope to trigger off CH2 at 2 V.
4. Press the TCAS Key and the SETUP Key to display the SETUP-TCAS Screen.
5. Set the RF PORT to ANTENNA.
6. Press the DIAG Soft Key to display the TCAS-DIAGNOSTICS Screen.
7. Press the SELECT Soft Key to display the TCAS-DIAG MODE C REPLY Screen.
8. Set up the UUT as follows:

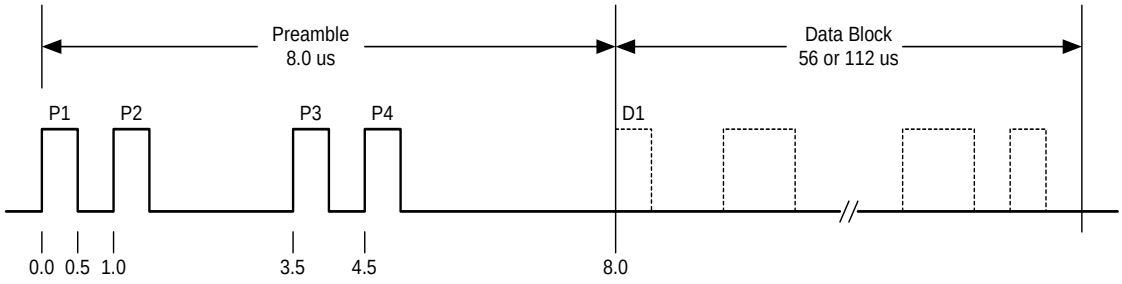
Level:	–2 dBm
ALT:	30300 ft

9. Press the RUN TEST Soft Key.



Reply Mode C

10. Verify the F1 to C1 pulse spacing is 1.45 µs (±25 ns) on the Oscilloscope.
11. Verify the F1 to A1 pulse spacing is 2.90 µs (±25 ns) on the Oscilloscope.
12. Verify the F1 to F2 pulse spacing is 20.30 µs (±25 ns) on the Oscilloscope.
13. Verify the F1 pulse width is 0.45 µs (±50 ns) on the Oscilloscope.
14. Verify the F1 rise time is 50 to 100 ns on the Oscilloscope.
15. Verify the F1 fall time is 50 to 200 ns on the Oscilloscope.
16. Press the STOP TEST Soft Key.
17. Press the NEXT TEST Soft Key until the TCAS DIAG-DF16 Screen is displayed.
18. Press the RUN TEST Soft Key.



Reply Mode C

19. Verify the P1 to P2 pulse spacing is 1.0 µs (±25 ns) on the Oscilloscope.
20. Verify the P1 to P3 pulse spacing is 3.5 µs (±25 ns) on the Oscilloscope.
21. Verify the P1 to P4 pulse spacing is 4.5 µs (±25 ns) on the Oscilloscope.
22. Verify the P1 to D1 pulse spacing is 8.0 µs (±25 ns) on the Oscilloscope.
23. Verify the P1 pulse width is 0.50 µs (±50 ns) on the Oscilloscope.
24. Verify the P1 rise time is 50 to 100 ns on the Oscilloscope.
25. Verify the P1 fall time is 50 to 200 ns on the Oscilloscope.
26. Press the STOP TEST Soft Key.

STEP	PROCEDURE

27. Press the PREV TEST Soft Key until the TCAS DIAG-MODE C REPLY Screen is displayed.
28. Set the ALT to -1000 ft.
29. Press the RUN TEST Soft Key.
30. Verify only the C2 pulse is displayed on the Oscilloscope between the F1 and F2 pulses and the F1 to C2 pulse spacing is 4.35 µs (±25 ns).
31. Press the STOP TEST Soft Key.
32. Set the ALT to 126700 ft.
33. Press the RUN TEST Soft Key.
34. Verify only the C4 and D2 pulses are displayed on the Oscilloscope between the F1 and F2 pulses, F1 to C4 pulse spacing is 7.25 µs (±25 ns) and the F1 to D2 pulse spacing is 15.95 µs (±25 ns).
35. Press the STOP TEST Soft Key.

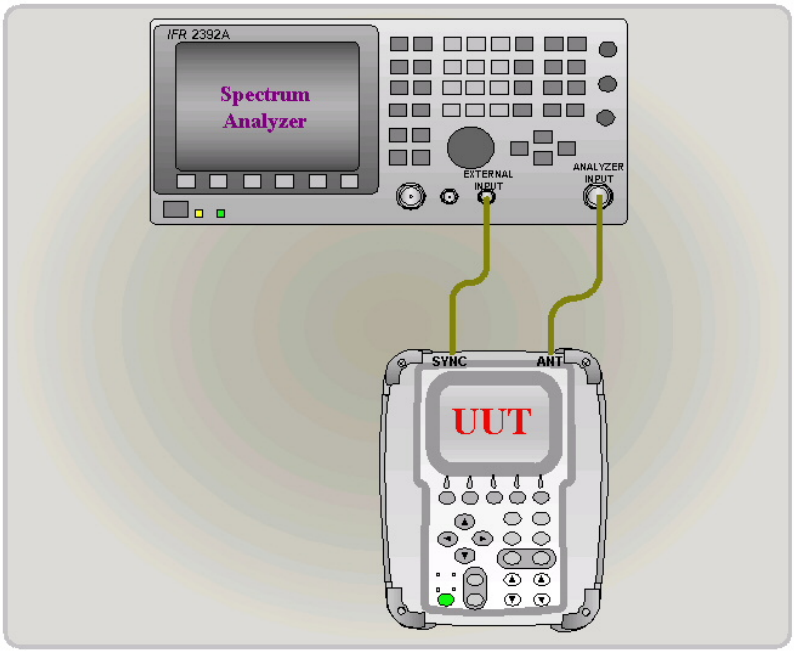
(26) TCAS Reply Pulse Amplitudes

TEST EQUIPMENT: Spectrum Analyzer

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect Test Equipment as shown.



2. Set up the Spectrum Analyzer as follows:

Center Freq:	1090 MHz
Span:	0 Hz
Input Attn.:	20 dB
RBW:	5 MHz
VBW:	None
REF:	0 dB
Sweep:	1 µs
Trigger:	Ext Front
Trig Mode:	Normal
Trig Level:	2.5 V
Scale:	5 dB

3. Press the TCAS Key and the SETUP Key to display the SETUP-TCAS Screen.
4. Set the RF PORT to ANTENNA.
5. Press the DIAG Soft Key to display the TCAS-DIAGNOSTICS Screen.
6. Press the SELECT Soft Key to display the TCAS DIAG-MODE C REPLY Screen.

STEP PROCEDURE

7. Set the UUT as follows:

Level:	-2 dBm
ALT:	30300 ft

8. Press the RUN TEST Soft Key.
9. Record the amplitude of F1.
10. Verify the C1 and A1 pulse amplitudes are equal to the F1 amplitude (±1 dB).
11. Press the STOP TEST Soft Key.
12. Press the NEXT TEST Soft Key until the TCAS DIAG-DF16 Screen is displayed.
13. Press the RUN TEST Soft Key.
14. Record the amplitude of P1.
15. Verify the P2, P3 and P4 pulse amplitudes are equal to the P1 amplitude (±1 dB).
16. Press the STOP TEST Soft Key.

(27) TCAS Squitter Period

TEST EQUIPMENT: Frequency Counter

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect the Frequency Counter CH1 to the SYNC Connector.
2. Set up the Frequency Counter as follows:

Measuring Type:	Period
Gate Time:	10 sec.
Auto Trigger:	Off
Trigger Level:	2.0 V

3. Press the TCAS Key and the SETUP Key to display the SETUP-TCAS Screen.
4. Set the SQUITTERS to ON.
5. Press the TCAS Key to display the TCAS Screen.
6. Set the INTRUDER TYPE to MODE S.
7. Press the RUN TEST Soft Key.
8. Verify the Squitter Period is 1.0 sec (±200 ms) on the Frequency Counter.
9. Press the STOP TEST Soft Key.

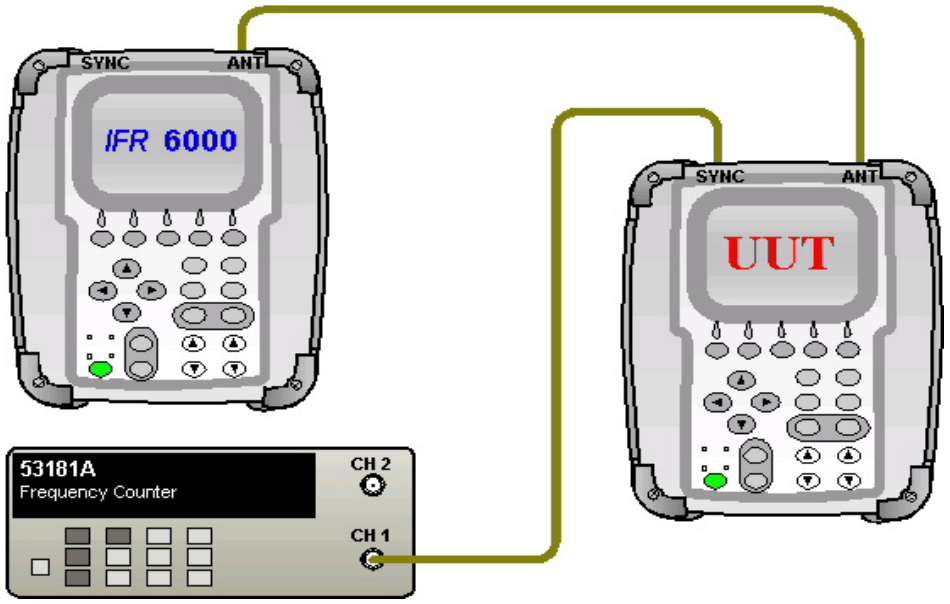
(28) TCAS Percent Reply

TEST EQUIPMENT: Frequency Counter
IFR 6000

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect Test Equipment as shown.



2. Press the SETUP Key on the IFR 6000 to display the SETUP-XPDR Screen.
3. Set the RF PORT Field to ANTENNA.
4. Press the DIAG Key to display the XPDR DIAGNOSTICS Screen.
5. Use the ▼ Key to highlight the ATCRBS MODE C Line.
6. Press the SELECT Soft Key to display the XPDR DIAG-ATCRBS MODE C Screen.
7. Set up the IFR 6000 as follows:

RF Level:	-10 dBm
PRF:	300
SLS:	OFF

8. Press the TCAS Key and the SETUP Key on the UUT to display the SETUP-TCAS Screen.
9. Set the RF PORT to ANTENNA.

STEP PROCEDURE

10. Set up the UUT as follows:

ANT RANGE:	250 ft
ANT HEIGHT:	1 ft
SQUITTERS	ON

11. Press the TCAS Key.
12. Set up the UUT as follows:

TCAS Type:	TCAS I
Intruder Type:	ATCRBS
Range Start:	0.35 nm
Range Rate:	0 kts
ALT Rate:	0 fpm
% REPLY:	10

13. Press the RUN TEST Soft Key on the IFR 6000 and the UUT.
14. Record the reply frequency displayed on the Frequency Counter.
15. Calculate the percent reply:

$$\text{Percent Reply} = \frac{\text{Measured Frequency}}{\text{Interrogation PRF}} \times 100\%$$

16. Verify Percent Reply is % Reply Setting (±1%).
17. Press the STOP TEST Soft Key on both IFR 6000 and the UUT.
18. Set the UUT % REPLY to 40.
19. Press the RUN TEST Soft Key on the IFR 6000 and the UUT.
20. Record the reply frequency displayed on the Frequency Counter.
21. Calculate the percent reply:

$$\text{Percent Reply} = \frac{\text{Measured Frequency}}{\text{Interrogation PRF}} \times 100\%$$

22. Verify Percent Reply is % Reply Setting (±1%).
23. Press the STOP TEST Soft Key on both IFR 6000 and the UUT.
24. Set the UUT % REPLY to 70.
25. Press the RUN TEST Soft Key on the IFR 6000 and the UUT.
26. Record the reply frequency displayed on the Frequency Counter.
27. Calculate the percent reply:

$$\text{Percent Reply} = \frac{\text{Measured Frequency}}{\text{Interrogation PRF}} \times 100\%$$

28. Verify Percent Reply is % Reply Setting (±1%).
29. Press the STOP TEST Soft Key on both IFR 6000 and the UUT.
30. Set the UUT % REPLY to 100.
31. Press the RUN TEST Soft Key on the IFR 6000 and the UUT.
32. Record the reply frequency displayed on the Frequency Counter.
33. Calculate the percent reply:

$$\text{Percent Reply} = \frac{\text{Measured Frequency}}{\text{Interrogation PRF}} \times 100\%$$

STEP	PROCEDURE

34. Verify Percent Reply is % Reply Setting (-1%/+0%).
35. Press the STOP TEST Soft Key on both IFR 6000 and the UUT.

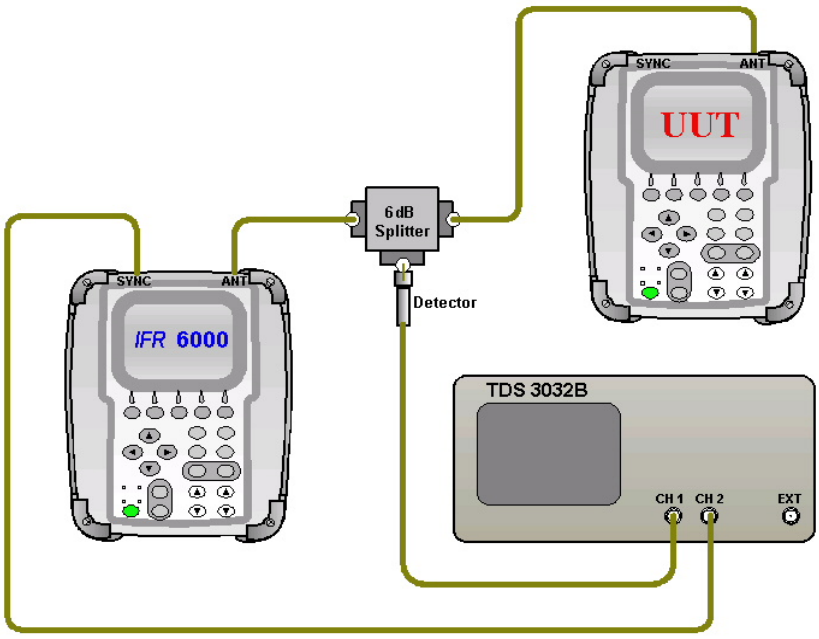
(29) TCAS Reply Delay and Range

TEST EQUIPMENT: Oscilloscope
IFR 6000
6 dB Splitter
Pulse Detector

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect Test Equipment as shown.



2. Press the SETUP Key on the IFR 6000 to display the SETUP-XPDR Screen.
3. Set the RF PORT to ANTENNA.
4. Press the DIAG Key to display the XPDR DIAGNOSTICS Screen.
5. Use the ▼ Key to highlight the ATCRBS MODE C Line.
6. Press the SELECT Soft Key to display the XPDR DIAG-ATCRBS MODE C Screen.
7. Set up the IFR 6000 as follows:

RF Level:	-2 dBm
PRF:	100
SLS:	OFF

8. Press the TCAS Key and the SETUP Key on the UUT to display the SETUP-TCAS Screen.
9. Set the RF PORT to ANTENNA.

STEP PROCEDURE

10. Set up the UUT as follows:

ANT RANGE:	250 ft
ANT HEIGHT:	1 ft
UUT ADDR:	AUTO
SQUITTERS:	OFF

11. Press the TCAS Key.

12. Set up the UUT as follows:

TCAS Type:	TCAS I
Intruder Type:	ATCRBS
Range Start:	0.35 nm
Range Rate:	0 kts
ALT Rate:	0 fpm
% REPLY:	100

13. Set the Oscilloscope to trigger off CH2 at 2 V and set CH1 to 50 Ω impedance, invert on.

14. Press the RUN TEST Soft Key on the IFR 6000 and the UUT.

15. Verify the pulse spacing between the second pulse of the interrogation (P3) and the first pulse of the reply (F1) on the Oscilloscope is 6.817µs (±0.05 µs) (Reply delay plus 3.817µs for Range and Antenna delay).

16. Press the STOP TEST Soft Key on the IFR 6000 and the UUT.

17. Press the PREV TEST Soft Key on the IFR 6000 until the FORMAT 0 Screen is displayed.

18. Set the ADDRESS to A92493.

19. Press the SETUP Key on the UUT to display the SETUP-TCAS Screen.

20. Set up the UUT as follows:

UUT ADDR:	MANUAL
MANUAL AA:	A92493

21. Press the TCAS Key on the UUT.

22. Set up the UUT as follows:

TCAS Type:	TCAS II
Intruder Type:	MODE S
Range Start:	0.00 nm
Range Stop:	0.00 nm

23. Press the RUN TEST Soft Key on the IFR 6000 and the UUT.

24. Verify the pulse spacing between the first SPR pulse of the interrogation and the first pulse of the reply (P1) is 127.49 µs (±0.05 µs).

25. Press the STOP TEST Soft Key on the IFR 6000 and the UUT.

26. Press the NEXT TEST Soft Key on the IFR 6000 until the ATCRBS MODE C Screen is displayed.

27. Set up the UUT as follows:

TCAS Type:	TCAS I
Intruder Type:	ATCRBS
Range Start:	5 nm

28. Press the RUN TEST Soft Key on the IFR 6000 and the UUT.

29. Verify the range delay is 5.0 nm (±0.02 nm) (64.286 µs [±247 ns]).

STEP	PROCEDURE

30. Press the STOP TEST Soft Key on the IFR 6000 and the UUT.

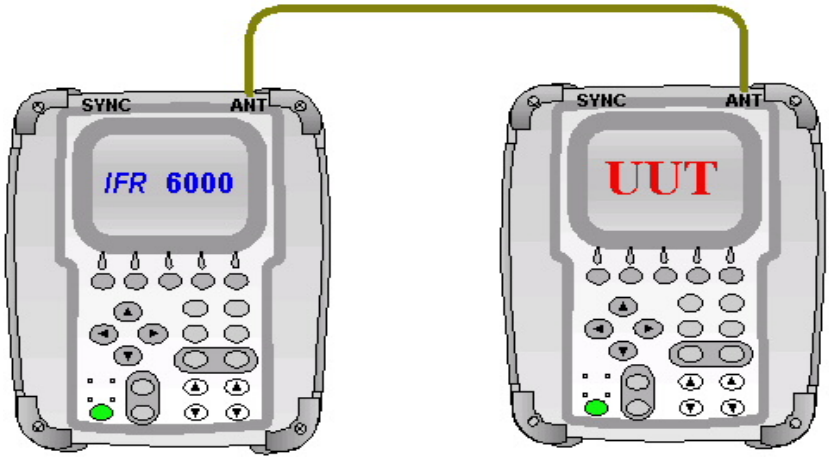
(30) TCAS Mode S Reply

TEST EQUIPMENT: IFR 6000

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect Test Equipment as shown.



2. Press the SETUP Key on the IFR 6000 to display the SETUP-XPDR Screen.
3. Set the RF PORT to ANTENNA.
4. Press the DIAG Key to display the XPDR DIAGNOSTICS Screen.
5. Use the ▼ Key to highlight the DOWNLINK FORMAT 0 Line.
6. Press the SELECT Soft Key to display the XPDR DIAG-DF0 Screen.
7. Set up the IFR 6000 as follows:

RX ATTEN:	30 dB
RFLVL:	-10 dBm
PRF:	100
SLS:	OFF
ADDRESS:	A92493

8. Press the TCAS Key and the SETUP Key on the UUT to display the SETUP-TCAS Screen.
9. Set the RF PORT to ANTENNA.
10. Set up the UUT as follows:

ANT Range:	250 ft
ANT Height:	1 f
Squitters:	OFF
UUT ADDRESS:	AUTO
MANUAL AA:	A92493
ALT Reporting	ON

STEP PROCEDURE

11. Press the TCAS Key on the UUT.
12. Set up the UUT as follows:

TCAS Type:	TCAS II
Intruder Type:	MODE S
% Reply:	100
Range Start:	0.00 nm
Range Rate:	0 kts
ALT START:	1000ft
ALT RATE:	0fpm
ALT Detect	OFF

13. Press the RUN TEST Soft Key on the IFR 6000 and the UUT.
14. Verify both units are replying and the IFR-6000 displays the following information replied from the UUT:

    DF=0, VS=0, CC=0, SL=0, RI=8, AC=1000 and AA=A92493
15. Press the STOP TEST Soft Key on the IFR 6000.
16. Press the NEXT TEST Soft Key until the XPDR DIAG-DF16 Screen is displayed on the IFR 6000.
17. Press the RUN TEST Soft Key on the IFR 6000.
18. Verify both units are replying and the IFR-6000 displays the following information replied from the UUT:

    DF=16, VS=0, SL=0, RI=3, MV=30000000000000, AC=1000ft and AA=A92493
20. Press the STOP TEST Soft Key on the IFR 6000.
21. Press the PREV TEST Soft Key until the XPDR DIAG-DF11 Screen is displayed on the IFR 6000.
22. Set the FORMAT 11 Address to FFFFFF on the IFR 6000.
23. Press the RUN TEST Soft Key on the IFR 6000.
24. Verify both units are replying and the IFR-6000 displays the following information replied from the UUT:

    DF=11, CA=0, and AA=A92493
25. Press the STOP TEST Soft Key on the IFR-6000 and the UUT.

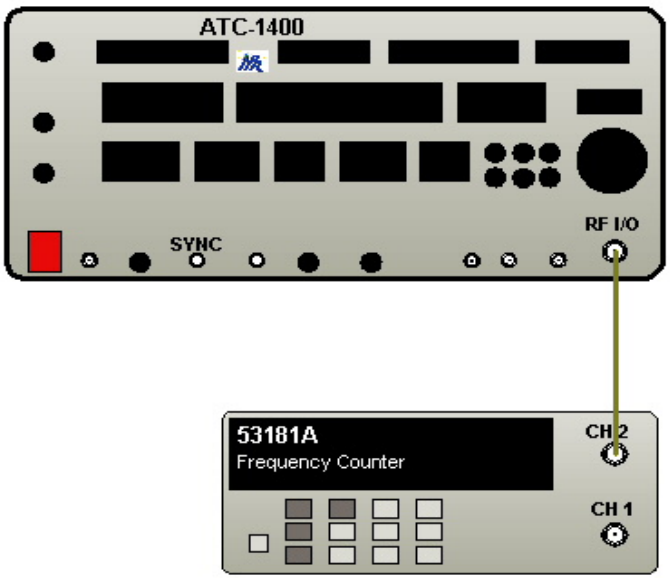
(31) TCAS Measurement - Interrogation Frequency

TEST EQUIPMENT: ATC-1400A
Frequency Counter

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

STEP	PROCEDURE

1. Connect Test Equipment as shown.



2. Set the ATC-1400A RF Output to -10 dBm, CW.
3. Set the ATC-1400A Frequency (in MHz) from 1029.90 to 1030.10 in 50 kHz Steps and record the Frequencies displayed on the Frequency Counter.
4. Set up the ATC-1400A as follows:

FREQ/Function Select:	1029.9 XPDR
XPDR Mode:	C
RF LEVEL Control:	-10 dBm
CW/NORM/OFF:	NORM
PRF:	235
PRF/Squitter:	ON
Set other Toggle Switches:	OFF/CAL position

5. On the UUT, press the TCAS Key and the SETUP Key to display the SETUP-TCAS Screen.
6. Set the RF PORT to ANTENNA.
7. Set up the UUT as follows:

ANT Range:	250 ft
ANT Height:	1 ft
Squitters:	OFF
UUT ADDRESS:	AUTO

STEP PROCEDURE

8. Press the TCAS Key.
9. Set up the UUT as follows:

TCAS Type:	TCAS I
Intruder Type:	ATCRBS
% Reply:	100
Range Start:	0.35 nm
Range Rate:	0 kts
ALT Rate:	0 fpm

10. Move the coaxial cable from the Frequency Counter to the ANT Connector.
11. Press the RUN TEST Soft Key.
12. Set the Frequency (in MHz) from 1029.90 to 1030.10 MHz in 50 kHz Steps and verify the Frequency displayed on the UUT equals the Recorded Frequency in Step 3 (±10 kHz).
13. Press the STOP TEST Soft Key.

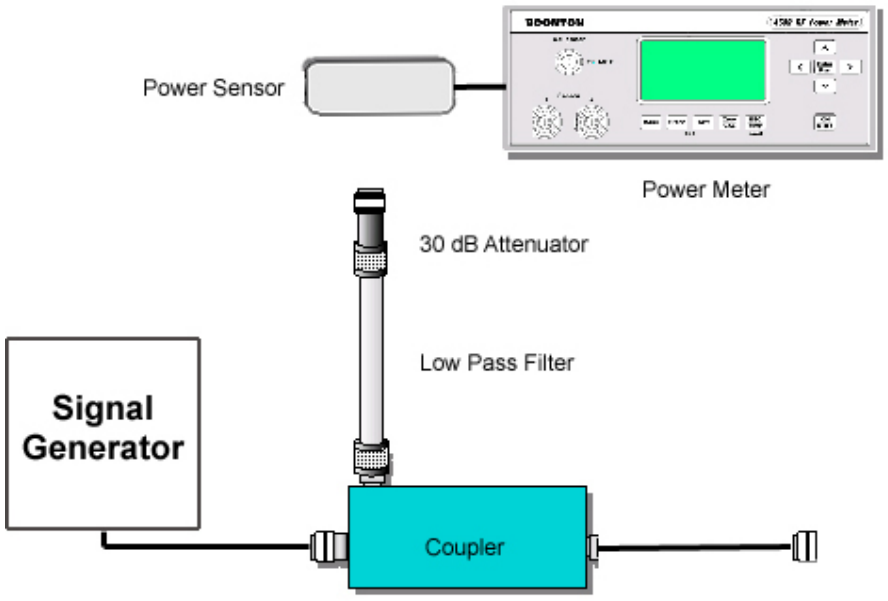
(32) RF Power Measurement

TEST EQUIPMENT: Power Meter w/ Peak Power Sensor
DME
20 dB Directional Coupler (N)
Low-Pass Filter
30 dB Attenuator
20 dB Attenuator
10 dB Attenuator
Coaxial Cable (4 ft) (N-N) (Armored)
Adapter (TNC-M to NF)

VERIFICATION FAILURE: If any step in this procedure fails or is out of tolerance, this indicates a failure in the Test Set. Refer to Troubleshooting for corrective action.

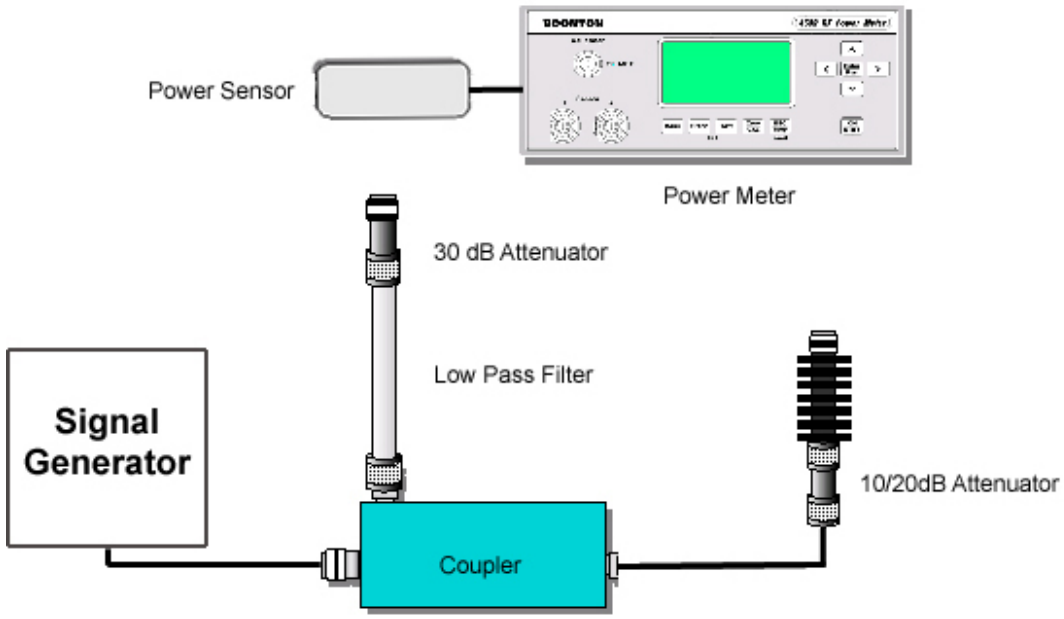
STEP	PROCEDURE

1. Characterize and record the loss of the Power Meter Calibration as shown, at 1025, 1055, 1090 and 1150 MHz:
   - Measure and record the loss between the Signal Generator and the 30 dB Attenuator on the Coupled Port of the Directional Coupler at each frequency. Record as A.
   - Measure and record the loss between the Signal Generator and the end of the Coaxial Cable going to the RF I/O Connector at each frequency. Record as B.



STEP PROCEDURE

- Subtract the Loss (B1) from the Loss (A) at each frequency and record as CF1.
- Put the 10 dB and 20 dB Attenuators on the end of the Coaxial Cable as shown, and repeat the above steps to find the loss difference between B2 and A. Record as CF2.

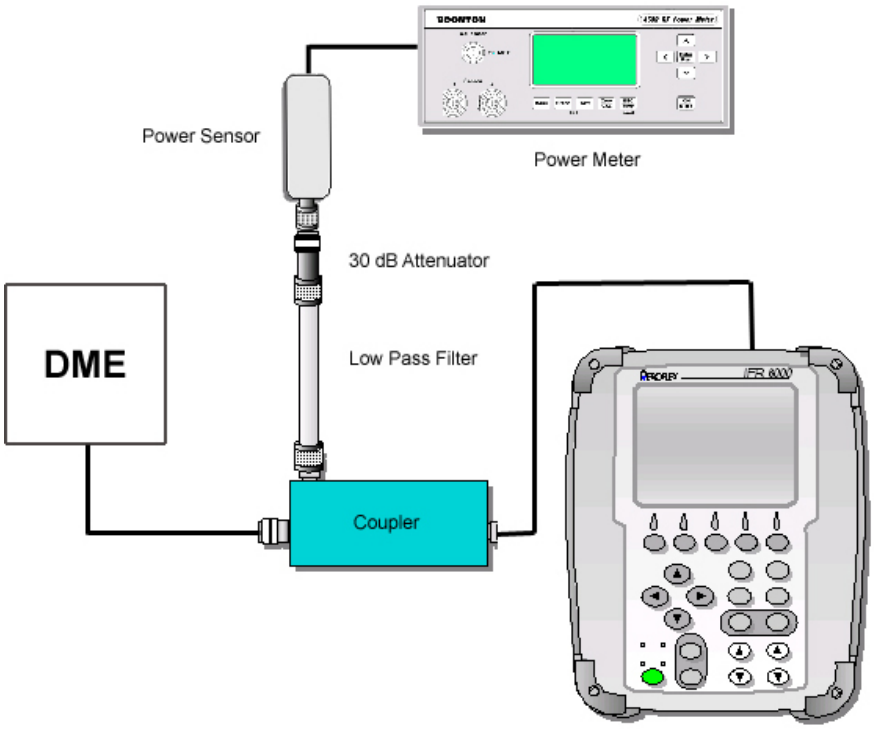


2. Connect the Power Sensor to the Power Meter Calibrator Port.
3. Start the Auto Cal Sequence on the Power Meter.

   NOTE: Wait for the Power Meter to complete the Auto Cal Sequence before disconnecting the Power Sensor.

4. Configure the Power Meter parameters as required to allow for accurate pulse power measurements.

5. Connect Test Equipment as shown.



6. Press the DME Key and the SETUP Key to display the SETUP-DME Screen.
7. Set up the UUT as follows:

RF PORT:	DIRECT CONNECT
DIR CABLE LOSS:	0.0 dB

8. Press the DME Key to display the DME Screen.
9. Set the UUT and the DME to Frequency Setting 1:

Setting	Channel	VOR	DME XMIT Frequency
1	1X	134.40 MHz	1025 MHz
2	31X	109.40 MHz	1055 MHz
3	66X	133.90 MHz	1090 MHz
4	126X	117.90 MHz	1150 MHz

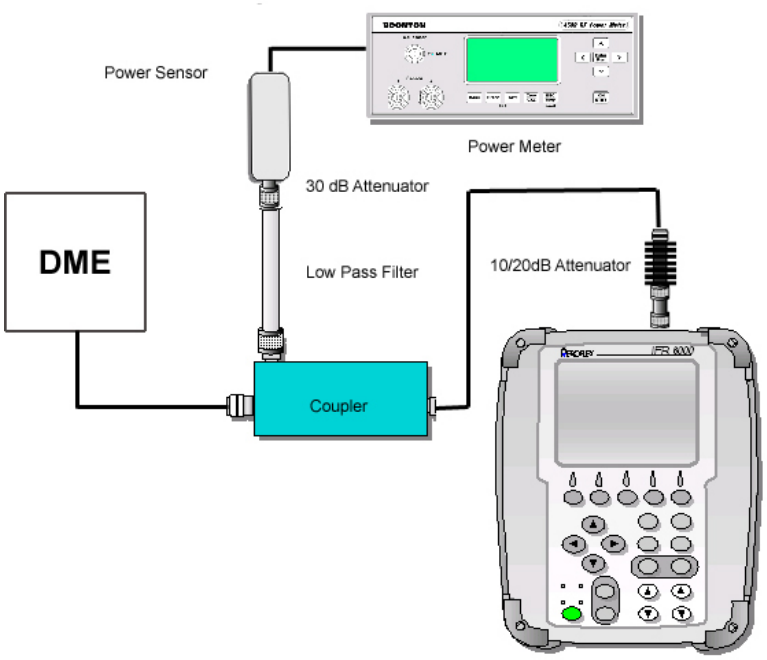
10. Enter the DME XMIT Frequency of the current DME setting into the Power Meter.
11. Enter the CF1 for the DME Frequency into the Power Meter for ‘dB offset’ and return the Power Meter to ‘Text’ display.
12. Switch the DME to ON from ‘Standby’ and press the RUN TEST Soft Key.
13. Verify the UUT ERP Reading is equal to the Power Meter ‘Peak Power’ Value (±1 dB).

STEP PROCEDURE

14. Press the STOP TEST Soft Key and set the DME to Standby.
15. Repeat Steps 9 through 14 for each Frequency Setting.
16. Press the DME Key and the SETUP Key to display the SETUP-DME Screen.
17. Set up the UUT as follows:

RF PORT:	ANTENNA
ANT RANGE:	6 ft
ANT HEIGHT:	1 ft
ANT CABLE LOSS:	0.0 dB
ANT GAIN (1.03GHz):	0.0 dB
ANT GAIN (1.09GHz):	0.0 dB

18. Press the DME Key to display the DME Screen.
19. Disconnect the Coaxial Cable from the RF I/0 Connector.
20. Connect the 10 dB Attenuator to the ANT Connector and the 20 dB Attenuator to the 10 dB Attenuator as shown, and connect the Coaxial Cable to the 20 dB Attenuator.



21. Set the DME and the UUT to the first setting as:

Setting	Channel	VOR	DME XMIT Frequency	Antenna ERP Path Loss
1	1X	134.40 MHz	1025 MHz	38.03
2	31X	109.40 MHz	1055 MHz	38.27
3	66X	133.90 MHz	1090 MHz	38.55
4	126X	117.90 MHz	1150 MHz	39.02

STEP PROCEDURE

22. Enter the DME XMIT Frequency of the current DME setting into the Power Meter.
23. Add the CF2 Loss at each frequency to the Antenna ERP Path Loss for the same frequency and enter the total into the Power Meter for the ‘dB offset’. Return the Power Meter to ‘Text’ display.
24. Switch the DME to ON from ‘Standby’ and press the RUN TEST Soft Key.
25. Verify the UUT ERP Reading is equal to the Power Meter ‘Peak Power’ Value (±2 dB).
26. Press the STOP TEST Soft Key and set the DME to Standby.
27. Repeat Steps 21 through 26 for each frequency setting.

Verification completed

E. Verification Data Sheet

Test Set S/N: _____ DATE: _____

TECHNICIAN: _____

STEP	DATA	RESULT
(1) Self Test		
6. Verify all tests pass		_____(✓)
(2) VSWR (ANT and RF I/O Connectors)		
4. Record levels:		
962 MHz		_____
1030 MHz		_____
1090 MHz		_____
1150 MHz		_____
1213 MHz		_____
ANT CONNECTOR		
11. Record levels:		
962 MHz		_____
1030 MHz		_____
1090 MHz		_____
1150 MHz		_____
1213 MHz		_____
13. Verify VSWR:		
962 MHz	<1.7	_____
1030 MHz	<1.7	_____
1090 MHz	<1.7	_____
1150 MHz	<1.7	_____
1213 MHz	<1.7	_____
RF I/O CONNECTOR		
15. Record levels:		
962 MHz		_____
1030 MHz		_____
1090 MHz		_____
1150 MHz		_____
1213 MHz		_____

STEP	DATA	RESULT
(2) VSWR (ANT and RF I/O Connectors) (cont)		
17. Verify VSWR:		
962 MHz	<1.3	_____
1030 MHz	<1.3	_____
1090 MHz	<1.3	_____
1150 MHz	<1.3	_____
1213 MHz	<1.3	_____
(3) Output Frequency Accuracy		
9. 962 MHz (±10 kHz)		_____
13. 1030 MHz (±10 kHz)		_____
17. 1090 MHz (±10 kHz)		_____
21. 1150 MHz (±10 kHz)		_____
25. 1213 MHz (±10 kHz)		_____
(4) Output Level Accuracy (ANT Connector)		
9. -30 dBm (±2 dB) at 962 MHz		_____
13. -30 dBm (±2 dB) at 1030 MHz		_____
17. -30 dBm (±2 dB) at 1090 MHz		_____
21. -30 dBm (±2 dB) at 1150 MHz		_____
25. -30 dBm (±2 dB) at 1213 MHz		_____
28. Verify levels:		
-2 dBm	-2 dBm (±2 dB)	_____
-12 dBm	-12 dBm (±2 dB)	_____
-22 dBm	-22 dBm (±2 dB)	_____
-32 dBm	-32 dBm (±2dB)	_____
-42 dBm	-42 dBm (±2 dB)	_____
-52 dBm	-52 dBm (±2 dB)	_____
34. -65 dBm (±2 dB)		_____
38. -3 dBm (±0.25 dB)		_____
42. -4 dBm	Level is 1 dB (±0.25 dB) less than Step 38	_____
46. -5 dBm	Level is 1 dB (±0.25 dB) less than Step 42	_____
50. -6 dBm	Level is 1 dB (±0.25 dB) less than Step 46	_____
54. -7 dBm	Level is 1 dB (±0.25 dB) less than Step 50	_____
58. -8 dBm	Level is 1 dB (±0.25 dB) less than Step 54	_____
62. -9 dBm	Level is 1 dB (±0.25 dB) less than Step 58	_____

STEP	DATA	RESULT
(5) Output Level Accuracy (RF I/O Connector)		
9. -50 dBm (±1 dB)	962 MHz	_____
13. -50 dBm (±1 dB)	1030 MHz	_____
17. -50 dBm (±1 dB)	1090 MHz	_____
21. -50 dBm (±1 dB)	1150 MHz	_____
25. -50 dBm (±1 dB)	1213 MHz	_____
31. Verify levels:		
-47 dBm	-47 dBm (±1 dB)	_____
-57 dBm	-57 dBm (±1 dB)	_____
-67 dBm	-67 dBm (±1 dB)	_____
-77 dBm	-77 dBm (±1 dB)	_____
-87 dBm	-87 dBm (±1 dB)	_____
-97 dBm	-97 dBm (±2 dB)	_____
-107 dBm	-107 dBm (±2 dB)	_____
-115 dBm	-115 dBm (±2 dB)	_____
(6) DME Reply Pulse Characteristics		
13. X Channel	P1 to P2 pulse spacing is 12.0 µs (±0.1 µs)	_____
14. X Channel	P1 pulse width is 3.5 µs (±0.5 µs)	_____
X Channel	P2 pulse width is 3.5 µs (±0.5 µs)	_____
15. X Channel	P1 rise time is 2.5 µs (±0.25 µs)	_____
X Channel	P1 fall time is 2.5 µs (±0.25 µs)	
19. Y Channel	P1 to P2 pulse spacing is 30.0 µs (±0.1 µs)	_____
(7) DME Reply Delay and Range		
8. X Channel	Reply spacing is 50.0 µs (±0.1 µs)	_____
12. Y Channel	Reply spacing is 56.0 µs (±0.1 µs)	_____
17. X Channel	Range Delay is 123.59 µs (±0.12359 µs)	_____
(8) DME Reply Position and Amplitude		
7. Echo position is 370.77 µs (±12.359 µs)		_____
5. Record P1 reply pulse level		_____
13. Echo reply pulse level is -11 dBm (±1 dB) < P1 reply level		_____

STEP	DATA	RESULT
(9) DME Reply Efficiency		
10. Record Frequency		_____
12. 10% (±0.5%)		_____
16. Record Frequency		_____
18. 40% (±0.5%)		_____
22. Record Frequency		_____
24. 70% (±0.5%)		_____
28. Record Frequency		_____
30. 100% (±0.5%)		_____
(10) DME Squitter		
5. 2700 Hz (±54 Hz)		_____
(11) DME Measurement - Interrogation Pulse Timing		
4. Record P1 pulse width		_____
Record P2 pulse width		_____
5. Record P1 to P2 X Channel pulse spacing		_____
7. Record P1 to P2 Y Channel pulse spacing		_____
16. P1 pulse width equals recorded P1 value (±0.05 µs)		_____
17. P2 pulse width equals recorded P2 value (±0.05 µs)		_____
18. P1 to P2 pulse spacing equals recorded P1 to P2 X channel value (±0.02 µs)		_____
23. P1 to P2 pulse spacing equals recorded P1 to P2 Y channel value (±0.02 µs)		_____
(12) DME Measurement - Interrogation PRF		
10. 10 Hz (±2 Hz)		_____
14. 101 Hz (±2 Hz)		_____
18. 201 Hz (±2 Hz)		_____
22. 300 Hz (±2 Hz)		_____
(13) DME Measurement - Interrogation Frequency		
3. 1025 MHz	Record frequency	_____
4. 1064 MHz	Record frequency	_____
5. 1110 MHz	Record frequency	_____
6. 1150 MHz	Record frequency	_____
14. 1025 MHz	Frequency equals frequency in Step 3 (±20kHz)	_____
19. 1064 MHz	Frequency equals frequency in Step 4 (±20kHz)	_____
24. 1110 MHz	Frequency equals frequency in Step 5 (±20kHz)	_____
29. 1150 MHz	Frequency equals frequency in Step 6 (±20kHz)	_____

STEP	DATA	RESULT
(14) XPDR Pulse Characteristics - ATCRBS		
12.	P1 to P2 pulse spacing is 2.0 µs (±25 ns)	_____
13.	P1 to P3 pulse spacing is 8.0 µs (±25 ns)	_____
14.	P1 pulse width is 0.8 µs (±50 ns)	_____
15.	P1 rise time is between 50 and 100 ns	_____
16.	P1 fall time is between 50 and 200 ns	_____
21.	P1 to P3 pulse spacing is 21.0 µs (±25 ns)	_____
25.	P1 to P3 pulse spacing is 8.0 µs (±25 ns)	_____
26.	P1 to P4 pulse spacing is 10.0 µs (±25 ns)	_____
27.	P4 pulse width is 0.8 µs (±50 ns)	_____
31.	P1 to P3 pulse spacing is 21.0 µs (±25 ns)	_____
32.	P1 to P4 pulse spacing is 23.0 µs (±25 ns)	_____
33.	P4 pulse width is 0.8 µs (±50 ns)	_____
37.	P4 pulse width is 1.6 µs (±50 ns)	_____
41.	P4 pulse width is 1.6 µs (±50 ns)	_____
(15) XPDR Pulse Characteristics - Mode S		
11.	P1 to P2 pulse spacing is 2.0 µs (±25 ns)	_____
12.	P1 to P6 pulse spacing is 3.5 µs (±25 ns)	_____
13.	P1 to SPR pulse spacing is 4.75 µs (±25 ns)	_____
14.	P1 pulse width is 0.8 µs (±50 ns)	_____
15.	P6 pulse width is 16.25 µs (±50 ns)	_____
16.	P1 rise time is between 50 and 100 ns	_____
17.	P1 fall time is between 50 and 200 ns	_____
18.	SPR phase transition time is <80 ns	_____
22.	P6 pulse width is 30.25 µs (±50 ns)	_____
(16) XPDR Interrogation PRF		
9.	PRF 235 — 235 Hz (±5 Hz)	_____
13.	PRF 118 — 118 Hz (±5 Hz)	_____
17.	PRF 90 — 90 Hz (±5 Hz)	_____
21.	PRF 70 — 70 Hz (±5 Hz)	_____
25.	PRF 50 — 50 Hz (±5 Hz)	_____
(17) XPDR SLS Level		
11.	P2 level is < the P1 level by 9 dB (-1/+0 dB)	_____
15.	P2 level equals the P1 level (-0/+1 dB)	_____
19.	P2 is not present	_____

STEP	DATA	RESULT

(18) XPDR Measurement - Reply Accuracy - ATCRBS

18. Reply Delay readings:

Mode A	1.8 µs (±50 ns)	_____
Mode A	3.0 µs (±50 ns)	_____
Mode C	3.0 µs (±50 ns)	_____
Mode C	7.0 µs (±50 ns)	_____

20. Record pulse spacing:

Record F1 to F2 pulse spacing	_____
Record F1 pulse width	_____
Record F2 pulse width	_____

21. Reply readings:

F1 to F2 pulse spacing is 20.3 µs (±20 ns)	_____
F1 pulse width is 0.45 µs (±20 ns)	_____
F2 pulse width is 0.45 µs (±20 ns)	_____

25. Reply Jitter is 0.82 µs (±0.02 µs) _____

28. Record RF Generator frequency:

1087 MHz	_____
1090 MHz	_____
1093 MHz	_____

33. Verify UUT frequency:

Recorded RF GEN 1087 MHz value (±50 kHz)	_____
Recorded RF GEN 1090 MHz value (±50 kHz)	_____
Recorded RF GEN 1093 MHz value (±50 kHz)	_____

(19) XPDR Measurement - Reply Accuracy - Mode S

18. Reply Delay readings - Mode A:

125.0 µs (±50 ns)	_____
128.0 µs (±50 ns)	_____

27. Reply Delay readings - ITM A:

125.0 µs (±50 ns)	_____
128.0sµs (±50 ns)	_____

37. 0.1 sec (±0.01 sec) _____

39. 2.0 sec (±0.01 sec) _____

41. 4.88 sec (±0.01 sec) _____

STEP	DATA	RESULT
(20) Altitude Encoder		
7. Pulse is unmasked		
A1	Pin 1	_____ (✓)
A2	Pin 2	_____ (✓)
A4	Pin 3	_____ (✓)
B1	Pin 4	_____ (✓)
B2	Pin 5	_____ (✓)
B4	Pin 6	_____ (✓)
C1	Pin 7	_____ (✓)
C2	Pin 8	_____ (✓)
C4	Pin 9	_____ (✓)
D2	Pin 11	_____ (✓)
D4	Pin 12	_____ (✓)
(21) Generate Video		
11. Baseline is 0 V (±0.5 V)		_____
12. Peak-to-Peak is 0.2 to 1.5 Vpp		_____
13. P1 pulse width is 0.8 µs (±50 ns)		_____
14. P1 to P3 pulse spacing is 8.0 µs (±25 ns)		_____
18. P1 to P3 pulse spacing is 21.0 µs (±25 ns)		_____
22. P1 to P2 pulse spacing is 2.0 µs (±25 ns)		_____
(22) ADS-B Receive DF17 and DF20		
20.	DF17 period is 0.5 sec (±0.01 sec)	_____
22.	DF17 period is 1.0 sec (±0.01 sec)	_____
24.	DF17 period is 5.0 sec (±0.01 sec)	_____
25.	DF17 message correctly decoded	_____ (✓)
38.	DF20 Airborne message correctly decoded	_____ (✓)
45.	DF20 Surface message correctly decoded	_____ (✓)
(23) ADS-B Generate DF17 and DF18		
24.	DF17 Airborne message correctly decoded	_____ (✓)
25.	DF17 period is 0.5 sec (±0.2 sec)	_____
25.	DF17 period is 1.0 sec (±0.2 sec)	_____
25.	DF17 period is 5.0 sec (±0.2 sec)	_____
39.	DF18 message correctly decoded	_____ (✓)
40.	DF18 period is 0.5 sec (±0.2 sec)	_____
42.	DF18 period is 1.0 sec (±0.2 sec)	_____
44.	DF18 period is 5.0 sec (±0.2 sec)	_____

STEP	DATA	RESULT
(24) TIS Receive		
13. Verify TIS readings:		
	ADDR: A92492	_____(✓)
	ALT: 31200	_____(✓)
	INFO: 0400	_____(✓)
(25) TCAS Reply Pulse Characteristics		
10. F1 to C1 pulse spacing is 1.45 µs (±25 ns)		_____
11. F1 to A1 pulse spacing is 2.90 µs (±25 ns)		_____
12. F1 to F2 pulse spacing is 20.30 µs (±25 ns)		_____
13. F1 pulse width is 0.45 µs (±50 ns)		_____
14. F1 rise time is 50 to 100 ns		_____
15. F1 fall time is 50 to 200 ns		_____
19. P1 to P2 pulse spacing is 1.0 µs (±25 ns)		_____
20. P1 to P3 pulse spacing is 3.5 µs (±25 ns)		_____
21. P1 to P4 pulse spacing is 4.5 µs (±25 ns)		_____
22. P1 to D1 pulse spacing is 8.0 µs (±25 ns)		_____
23. P1 pulse width is 0.50 µs (±50 ns)		_____
24. P1 rise time is 50 to 100 ns		_____
25. P1 fall time is 50 to 200 ns		_____
30. Only C2 pulse is displayed between F1 and F2 pulses		_____(✓)
F1 to C2 pulse spacing is 4.35 µs (±25 ns)		_____
34. Only C4 and D2 pulses are displayed between F1 and F2 pulses		_____(✓)
F1 to C4 pulse spacing is 7.25 µs (±25 ns)		_____
F1 to D2 pulse spacing is 15.95 µs (±25 ns)		_____
(26) TCAS Reply Pulse Amplitude		
8. Record F1 amplitude		_____
9. C1 pulse amplitude is equal to F1 amplitude (±1dB)		_____
A1 pulse amplitude is equal to F1 amplitude (±1dB)		_____
13. Record P1 amplitude		_____
14. P2 pulse amplitude is equal to P1 amplitude (±1dB)		_____
P3 pulse amplitude is equal to P1 amplitude (±1dB)		_____
P4 pulse amplitude is equal to P1 amplitude (±1dB)		_____
(27) TCAS Squitter Period		
8. Squitter period is 1.0 sec (±200 ms)		_____

STEP	DATA	RESULT
(28) TCAS Percent Reply		
14. Record reply frequency		_____
16. 10% (±1%)		_____
14. Record reply frequency		_____
16. 40% (±1%)		_____
14. Record reply frequency		_____
16. 70% (±1%)		_____
14. Record reply frequency		_____
16. 100% (-1%/+0%)		_____
(29) TCAS Reply Delay and Range		
15. P3 to F1 pulse spacing is 6.817µs (±0.05 µs)		_____
24. SPR to P1 pulse spacing is 127.49 µs (±0.05 µs)		_____
29 5.0 nm Range Delay is 64.286 µs (±247 ns)		_____
(30) TCAS Mode S Reply		
14. Correct information displayed		_____ (✓)
18. Correct information displayed		_____ (✓)
24. Correct information displayed		_____ (✓)
(31) TCAS Measurement - Interrogation Frequency		
3. Record readings:		
1029.90 MHz		_____
1029.95 MHz		_____
1030.00 MHz		_____
1030.05 MHz		_____
1030.10 MHz		_____
12. Verify readings:		
1029.90 MHz	Recorded reading (±10 kHz)	_____
1029.95 MHz	Recorded reading (±10 kHz)	_____
1030.00 MHz	Recorded reading (±10 kHz)	_____
1030.05 MHz	Recorded reading (±10 kHz)	_____
1030.10 MHz	Recorded reading (±10 kHz)	_____

STEP	DATA	RESULT

(32) RF Power Measurement

13. Record and verify readings at RF I/O Connector:

DME Power Meter reading at 1025 MHz	_____
UUT power reading at 1025 MHz: DME reading (±1dB)	_____
DME Power Meter reading at 1055 MHz	_____
UUT power reading at 1050 MHz: DME reading (±1dB)	_____
DME Power Meter reading at 1090 MHz	_____
UUT power reading at 1090 MHz: DME reading (±1dB)	_____
DME Power Meter reading at 1150 MHz	_____
UUT power reading at 1150 MHz: DME reading (±1dB)	_____

25. Record and verify readings at ANT Connector:

DME Power Meter reading at 1025 MHz	_____
UUT power reading at 1025 MHz: DME reading (±2dB)	_____
DME Power Meter reading at 1055 MHz	_____
UUT power reading at 1050 MHz: DME reading (±2dB)	_____
DME Power Meter reading at 1090 MHz	_____
UUT power reading at 1090 MHz: DME reading (±2dB)	_____
DME Power Meter reading at 1150 MHz	_____
UUT power reading at 1150 MHz: DME reading (±2dB)	_____

F. Calibration

(1) Test Setup

PREREQUISITES: Self Test (para 2-2-3D[1])

TEST EQUIPMENT:
Measuring Receiver and Sensor
External DC Power Supply
Coaxial Cable (N-N)
10 dB Attenuator (N-N)
Barrel Adapter (Female) (N-N)
Adapter (N-TNC)
Oscilloscope

STEP PROCEDURE

1. Allow 15 minute warmup for Test Set.
2. Connect the Measuring Receiver to the Signal Generator and calibrate the Measuring Receiver in Tuned RF Level Mode with the 3.8 Special entered at the following frequencies (storing the calibration in the storage locations indicated):

1	962.000 MHz
2	1030.000 MHz
3	1090.000 MHz
4	1150.000 MHz
5	1213.000 MHz

(2) RTC Calibration

PREREQUISITES: Self Test (para 2-2-3D[1])

TEST EQUIPMENT: None

STEP	PROCEDURE

1. Press the SETUP Key until the SETUP-GENERAL Screen is displayed.
2. Press the H/W TOOLS Soft Key to display the SETUP-HARDWARE TOOLS Screen.
3. Press the CAL Soft Key and enter the password ‘2531’ using the Soft Keys.
4. Press the SELECT Soft Key to display the RTC CALIBRATION Screen.
5. Press the START Soft Key.
6. Follow the instructions on the UUT screen.
7. When finished, the message ‘RTC CALIBRATED OK’ is displayed.
8. Press the SAVE Soft Key when finished with the Calibration.
9. Press the RETURN Soft Key to display the SETUP-CALIBRATION Screen.

(3) TCXO Calibration

PREREQUISITES: Self Test (para 2-2-3D[1])

TEST EQUIPMENT: Frequency Counter

STEP	PROCEDURE

1. Connect the Measuring Receiver to the ANT Connector. Enter 7.1 Special on the Measuring Receiver and press the FREQ Key.
2. Using the Arrow Keys, highlight the TCXO CAL Line and press the SELECT Soft Key to display the TCXO CALIBRATION Screen.
3. Press the START Soft Key.
4. Follow the instructions on the UUT screen. Set the frequency as close as possible to 1000 MHz; Frequency must be at least within ±300 Hz.
5. Press the SAVE Soft Key when finished with the Calibration.
6. Press the RETURN Soft Key to display the SETUP-CALIBRATION Screen.

(4) Video Calibration

PREREQUISITES: Self Test (para 2-2-3D[1])

TEST EQUIPMENT: None

STEP	PROCEDURE

1. Use the Arrow Keys to highlight the VIDEO CAL Line and press the SELECT Soft Key to display the VIDEO CALIBRATION Screen.
2. Press the START Soft Key.
3. Follow the instructions on the UUT screen.
4. When finished, the message 'VIDEO CALIBRATED OK' is displayed.
5. Press the SAVE Soft Key when finished with the Calibration.
6. Press the RETURN Soft Key to display the SETUP-CALIBRATION Screen.

(5) TX Level Calibration

PREREQUISITES: Self Test (para 2-2-3D[1])

TEST EQUIPMENT: Measuring Receiver and Sensor Adapter (N-TNC)

STEP	PROCEDURE

1. Use the Arrow Keys to highlight the TX LEVEL CAL and press the SELECT Soft Key to display the TX LVL CALIBRATION Screen.
2. Connect the Measuring Receiver Sensor to the ANT Connector using the Adapter.
3. Press the START Soft Key.
4. Follow the instructions on the UUT screen for the 28 Steps, recalling the required frequencies from the Measuring Receiver's stored memory.
5. Press the SAVE Soft Key when finished with the Calibration.
6. Press the RETURN Soft Key to display the SETUP-CALIBRATION Screen.

(6) RX Level Calibration

PREREQUISITES: Self Test (para 2-2-3D[1])

TEST EQUIPMENT: Measuring Receiver and Sensor
Signal Generator
Coaxial Cable (N-N) (Armored)
Barrel Adapter (Female) (N-N)
Adapter (N-TNC)
10 dB Attenuator (N-N)*

*6 dB Attenuator (N-N) may be used if the signal generator's RF output level does not go higher than +13 dBm.

STEP PROCEDURE

1. Use the Arrow Keys to highlight the RX LEVEL CAL and press the SELECT Soft Key to display the RX LVL CALIBRATION Screen.
2. Connect the Coaxial Cable directly to the Signal Generator output. Connect the 10 dB Attenuator and the Barrel Adapter between the Coaxial Cable output and the Measuring Receiver Sensor.
3. At each frequency listed, vary the Signal Generator output until the Measuring Receiver measures -20.0 dBm (±0.05 dB) in the Tuned RF Mode. Record the Signal Generator level at each frequency for later use.

1090 MHz	1025 MHz	1030 MHz	1055 MHz	1125 MHz	1150 MHz

4. Disconnect the Coaxial Cable from the Measuring Receiver Sensor and remove the Barrel Adapter. Connect the 10 dB Attenuator to the ANT Connector using the Adapter.
5. Press the START Soft Key.
6. Follow the instructions on the UUT screen.
7. Press the SAVE Soft Key when finished with the Calibration.
8. Press the RETURN Soft Key to display the SETUP-CALIBRATION Screen.

Calibration completed

4. Assembly Drawings

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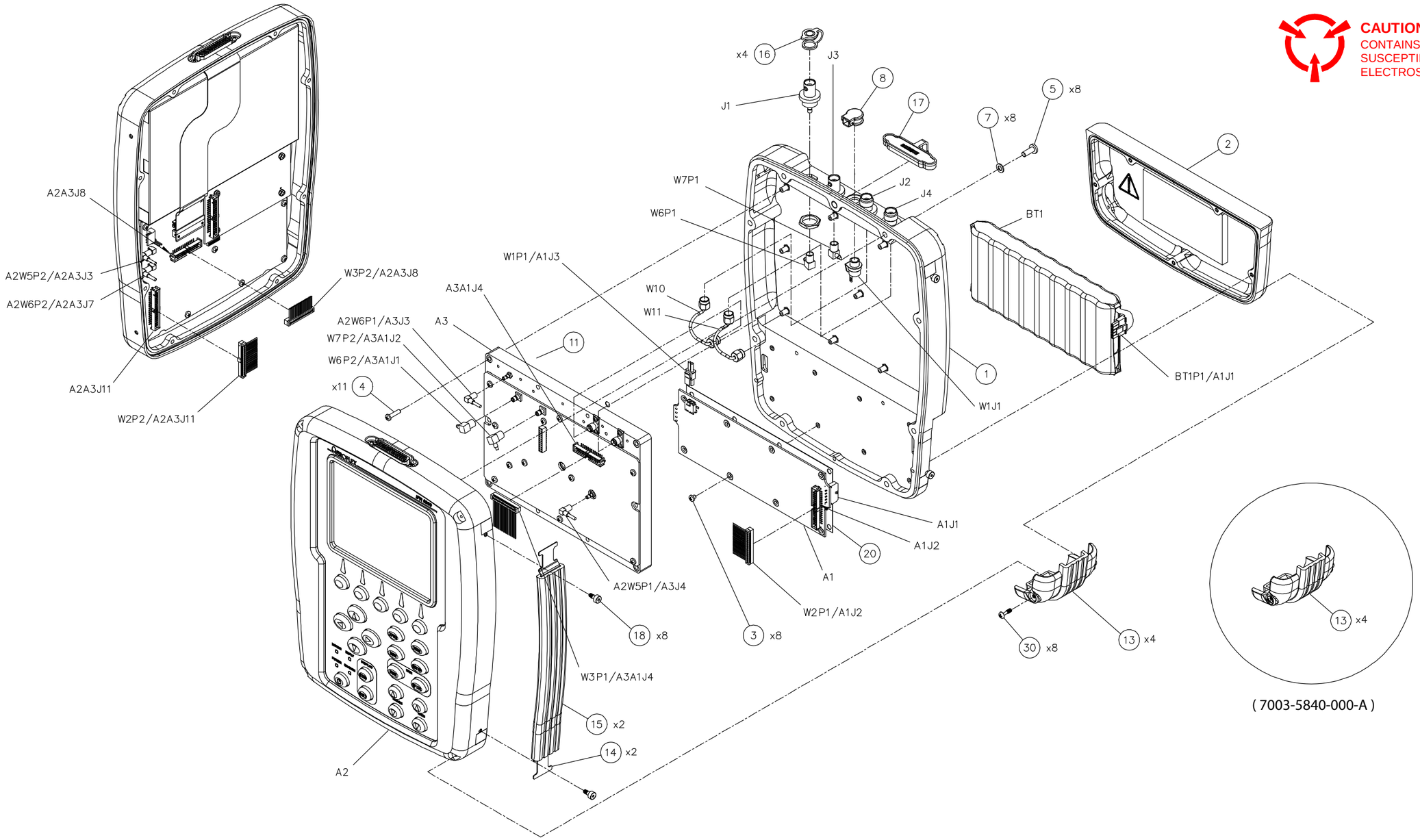
CAUTION:
CONTAINS PARTS AND ASSEMBLIES SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).

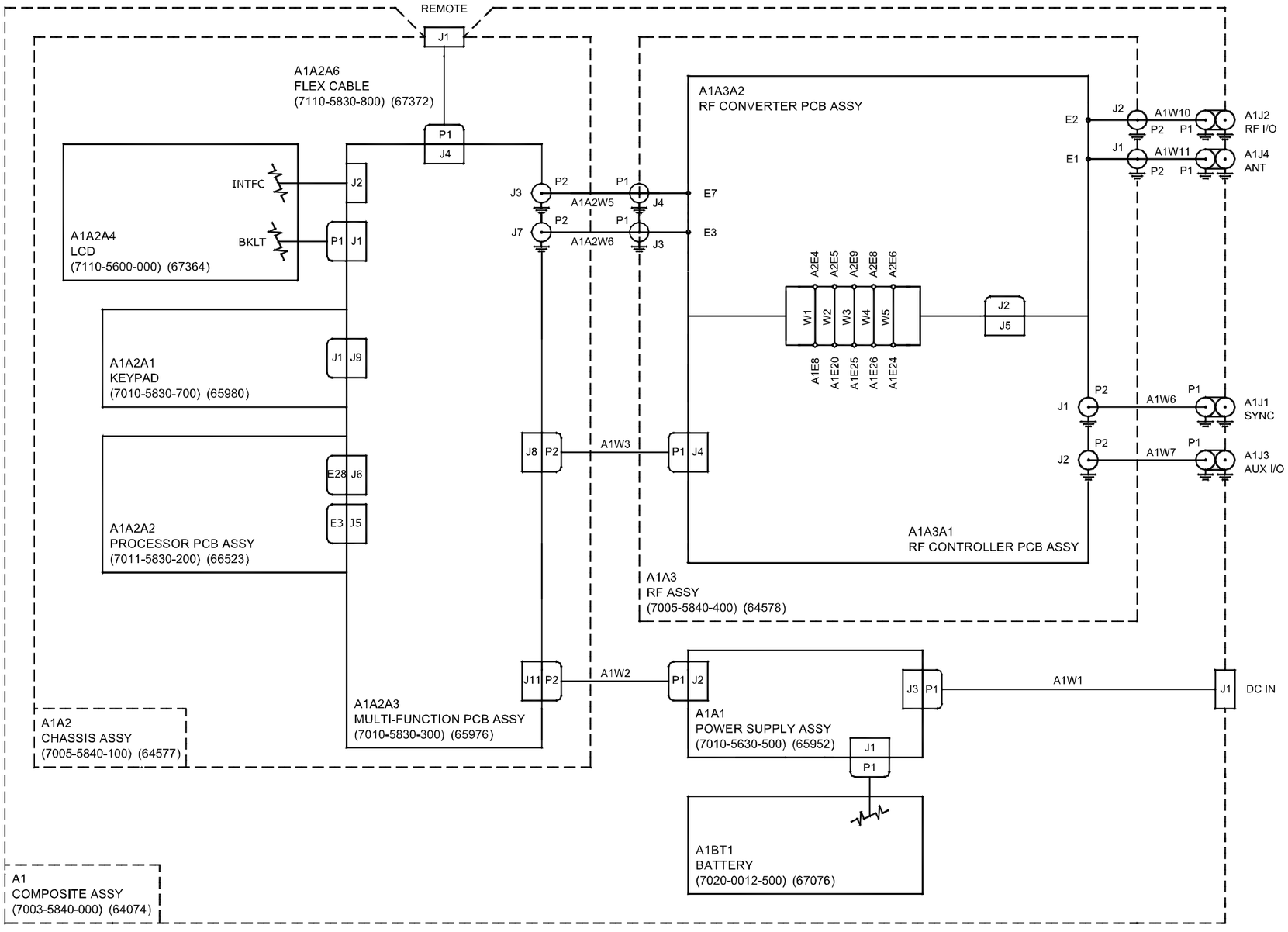


(7003-5840-000-A)

(7003-5840-000-B) (64074) / (7003-5842-000-A) (72422)

Composite Assy (58A1)
(Sheet 1 of 3)
Figure 5

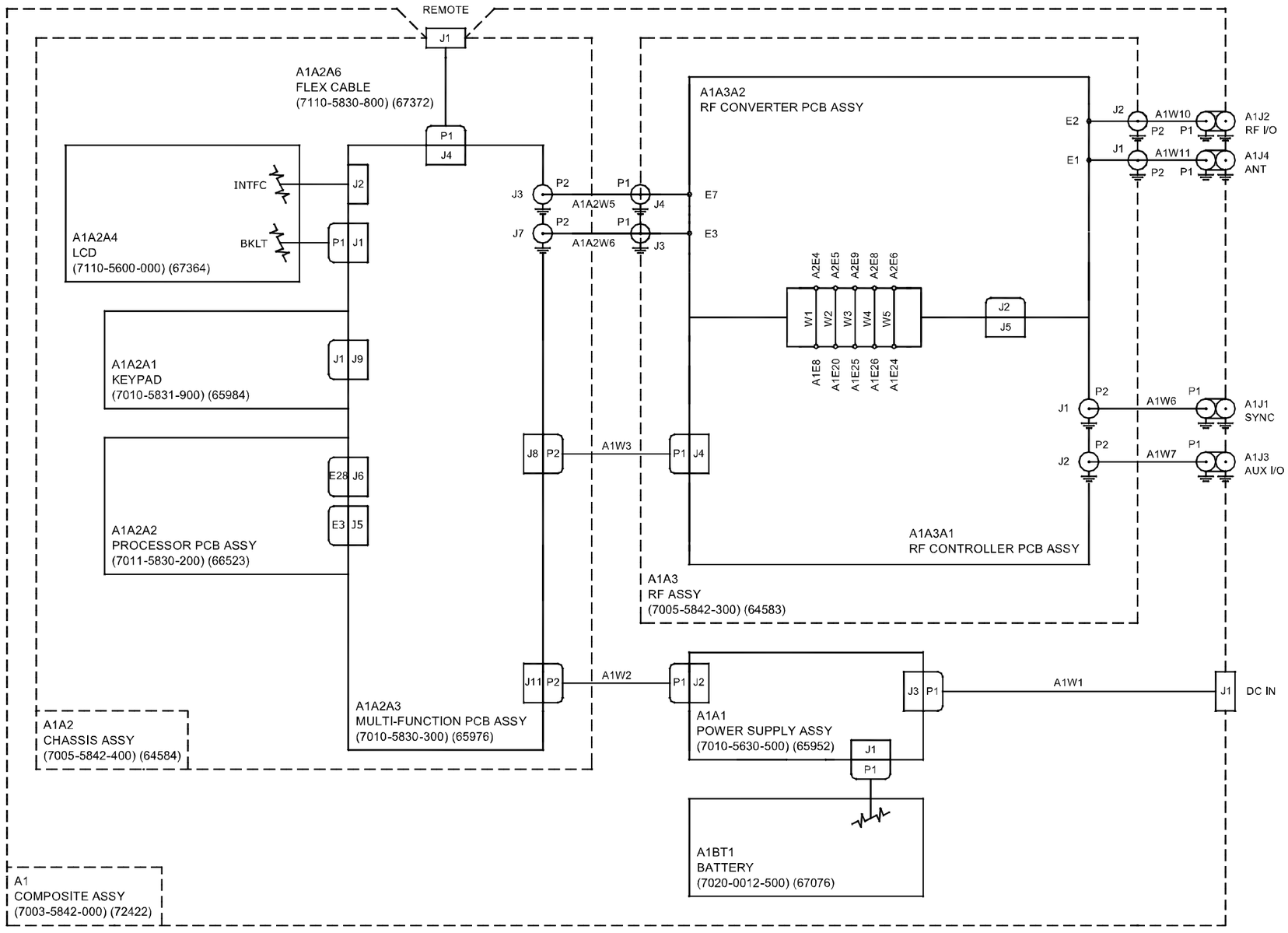
CAUTION:
CONTAINS PARTS AND ASSEMBLIES SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).



(0000-5840-000-A)

Composite Assy (58A1)
System Interconnect Diagram (Sheet 2 of 3)
Figure 5

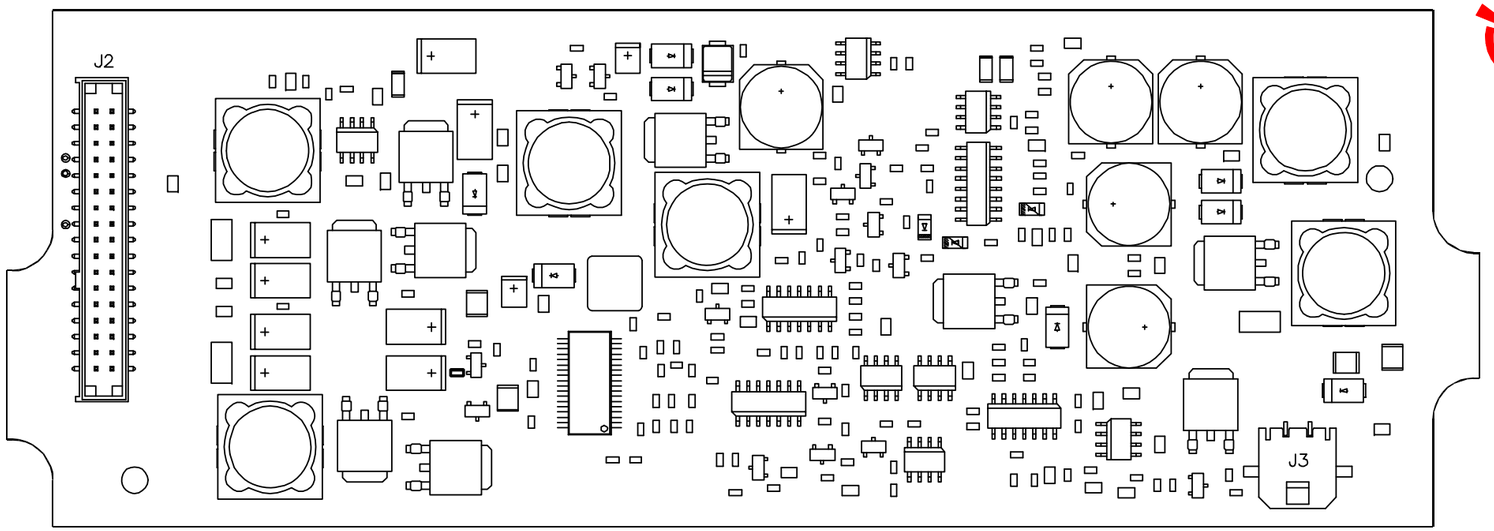
CAUTION:
CONTAINS PARTS AND ASSEMBLIES SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).



(0000-5840-000-B)

Composite Assy (58A1)
System Interconnect Diagram (Sheet 3 of 3)
Figure 5

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



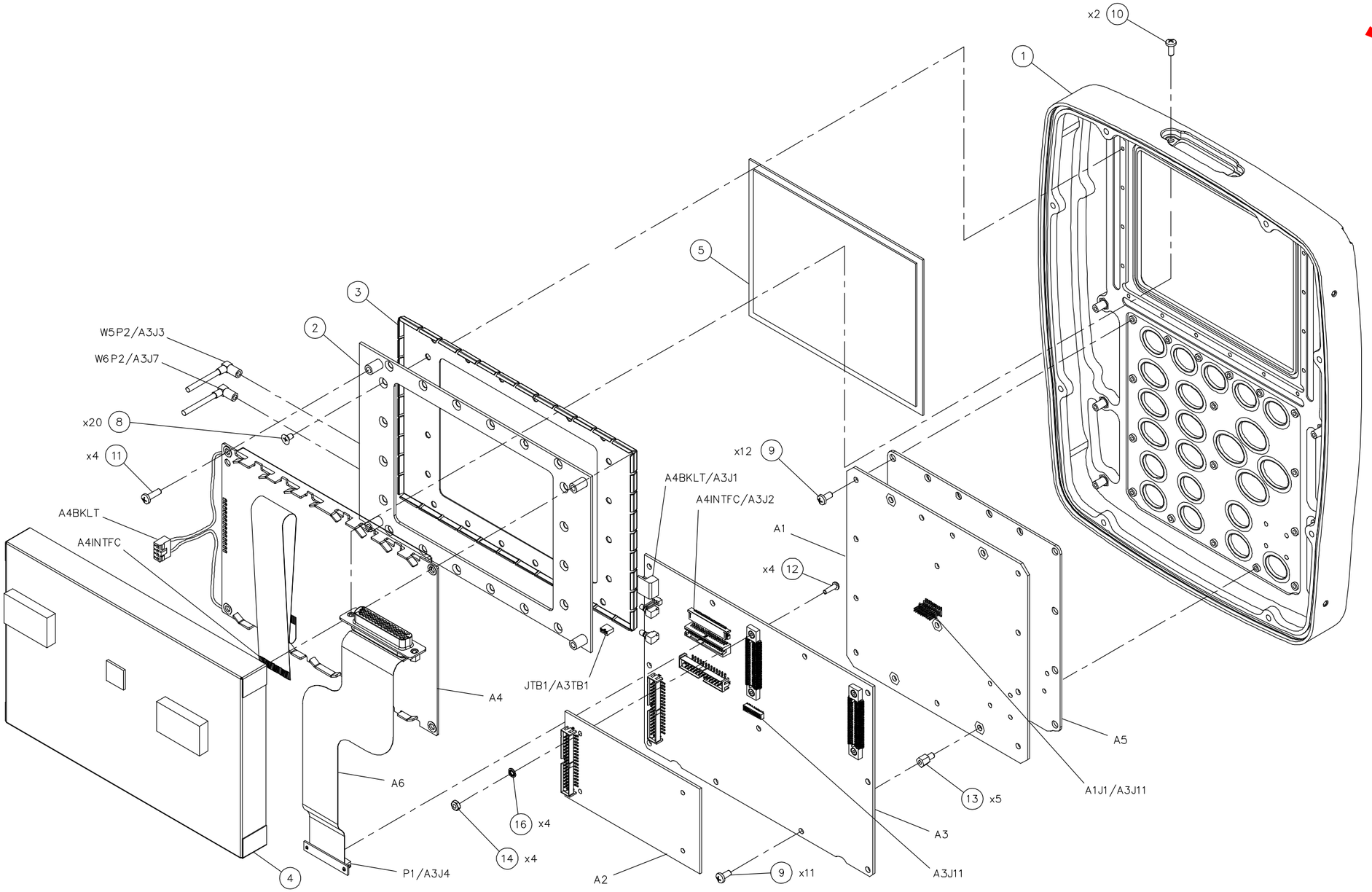
TOP VIEW

BOTTOM VIEW

(70100-5630-500-G) (65952-A0, B0)

Power Supply PCB Assy (58A1A4)
Figure 6

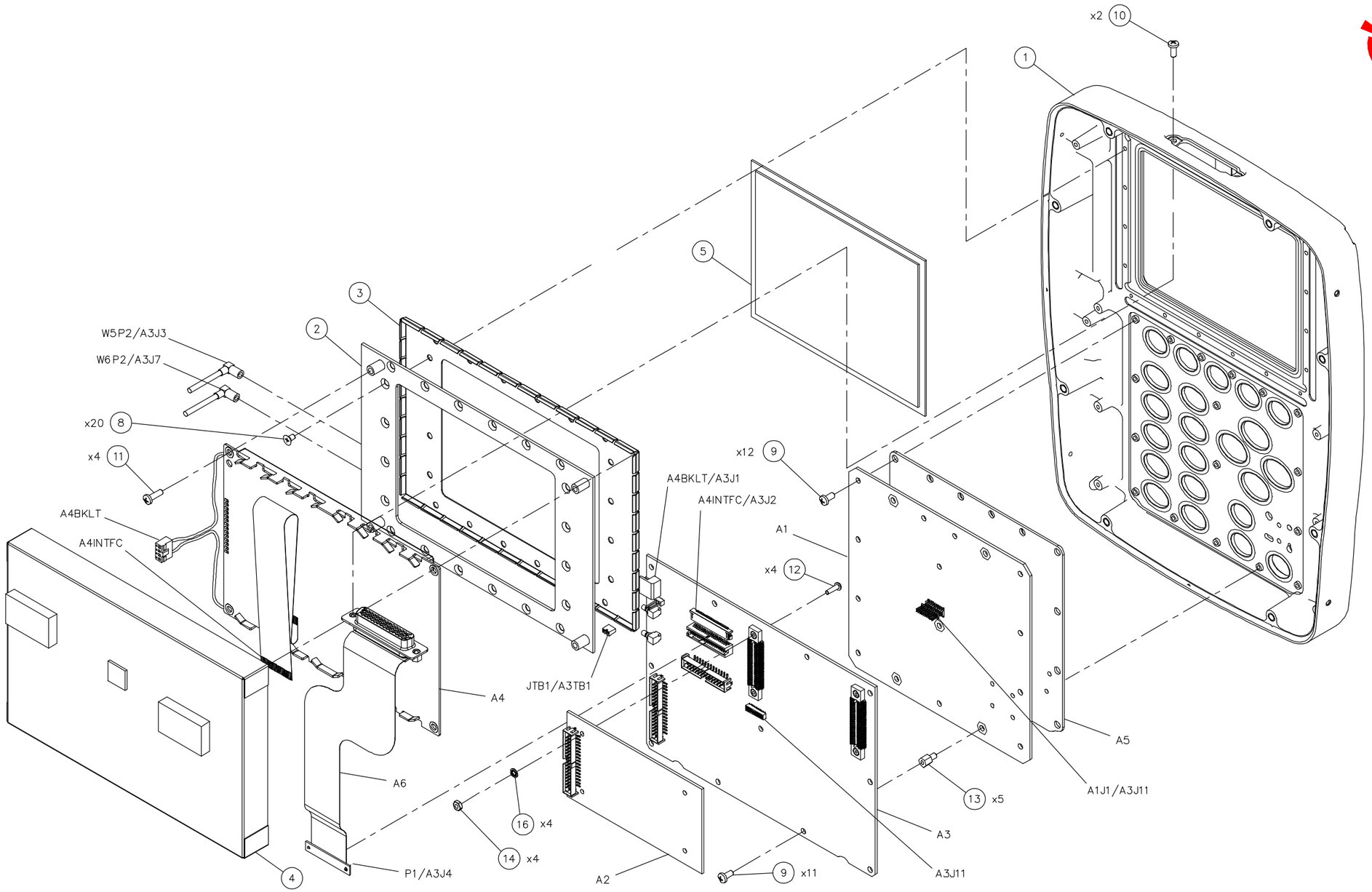
CAUTION:
CONTAINS PARTS AND ASSEMBLIES SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).



(7005-5840-100-A, A1) (64577)

Chassis Assy (58A1A2)
Page 1 of 2
Figure 7

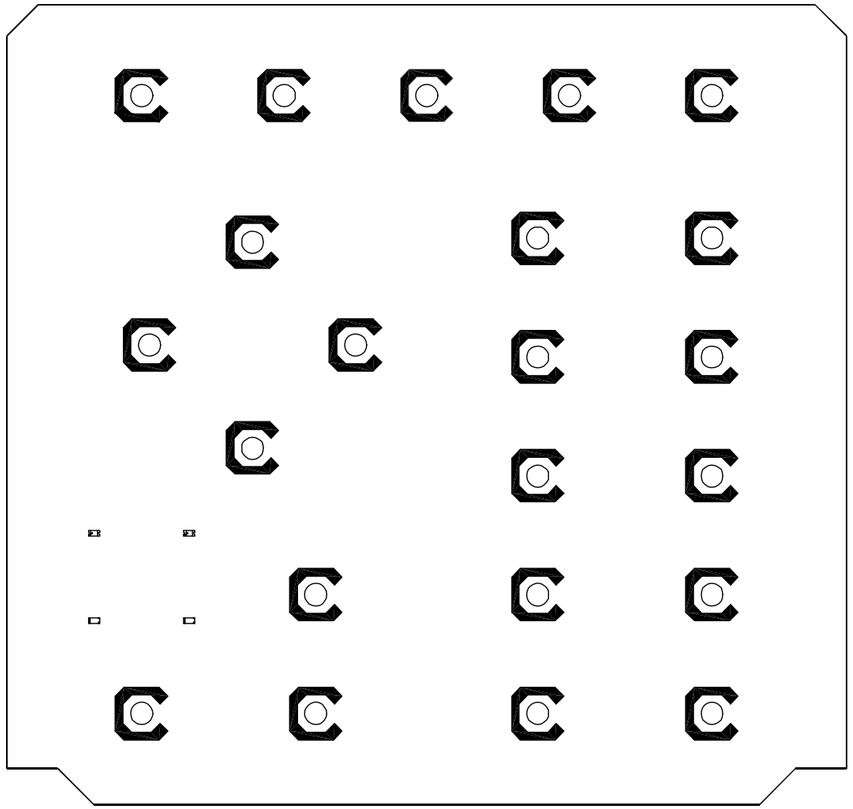
CAUTION:
CONTAINS PARTS AND ASSEMBLIES SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).



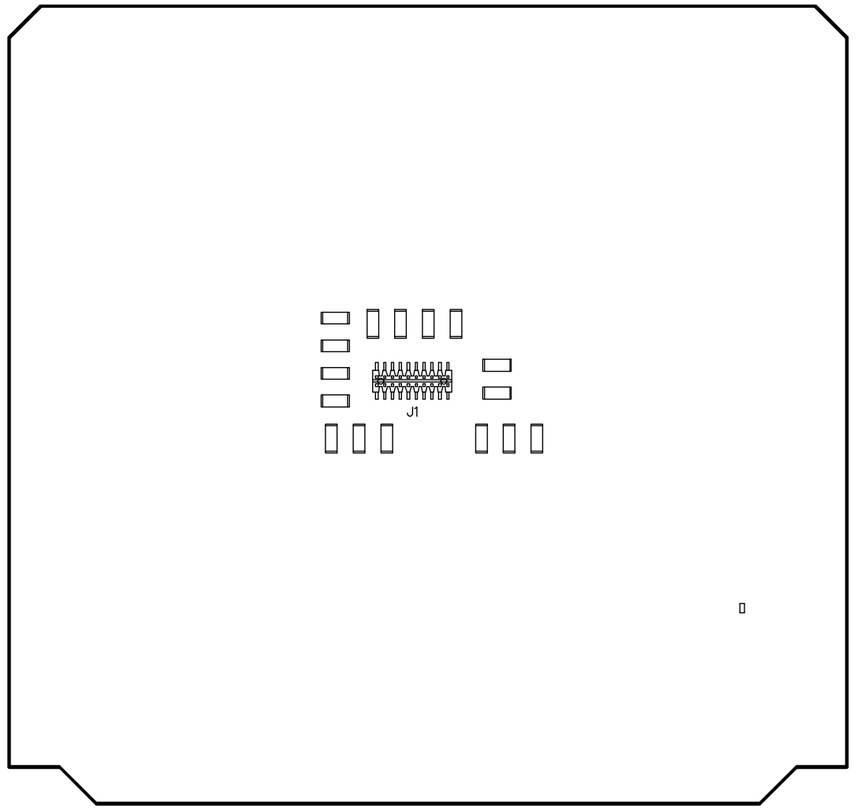
(7005-5842-400-A) (64584)

Chassis Assy (58A1A2)
Page 2 of 2
Figure 7

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



TOP VIEW

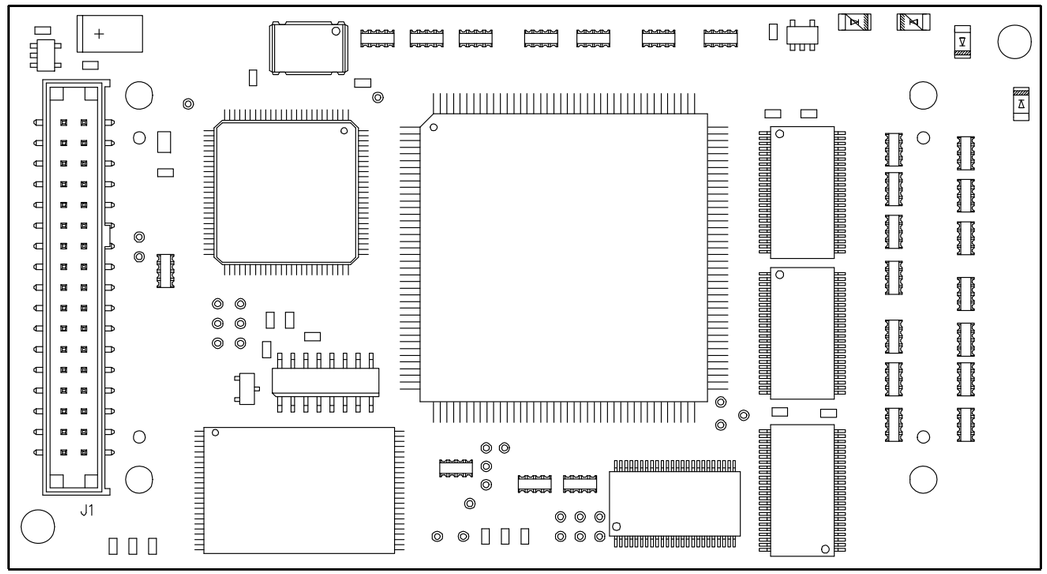


BOTTOM VIEW

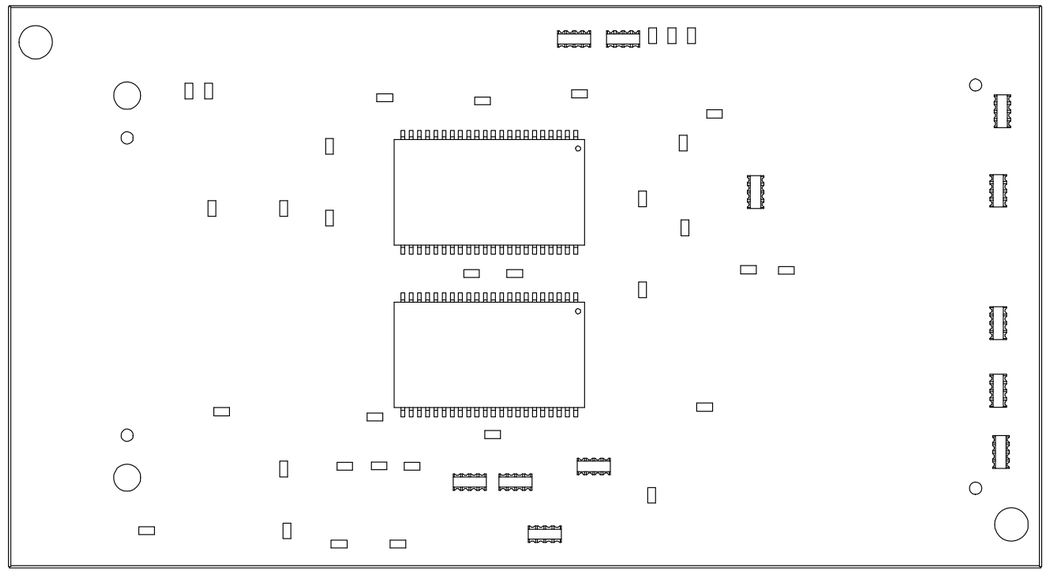
(7010-5830-700-A) (65980) / (7010-5831-900-A) (65984)

Keypad PCB Assy (58A1A2A1)
Figure 8

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



TOP VIEW

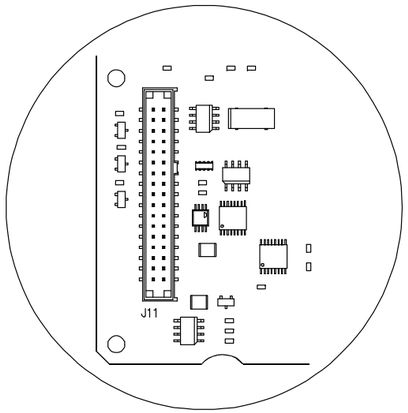


BOTTOM VIEW

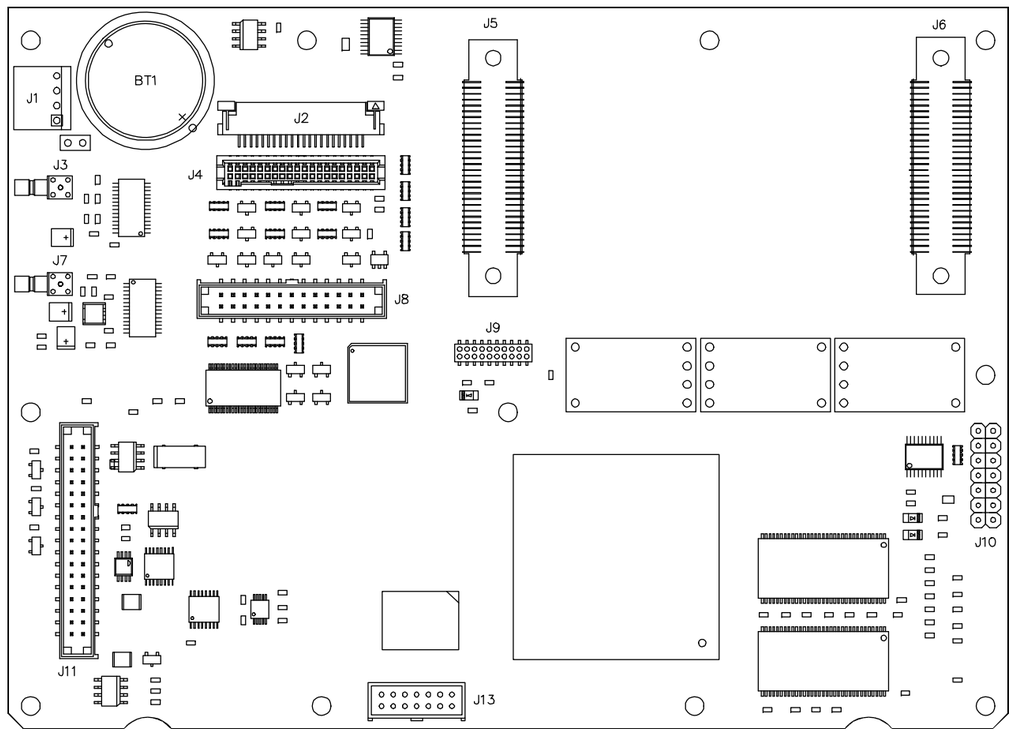
(7011-5830-200) (66523)

Processor PCB Assy (58A1A2A2)
Figure 9

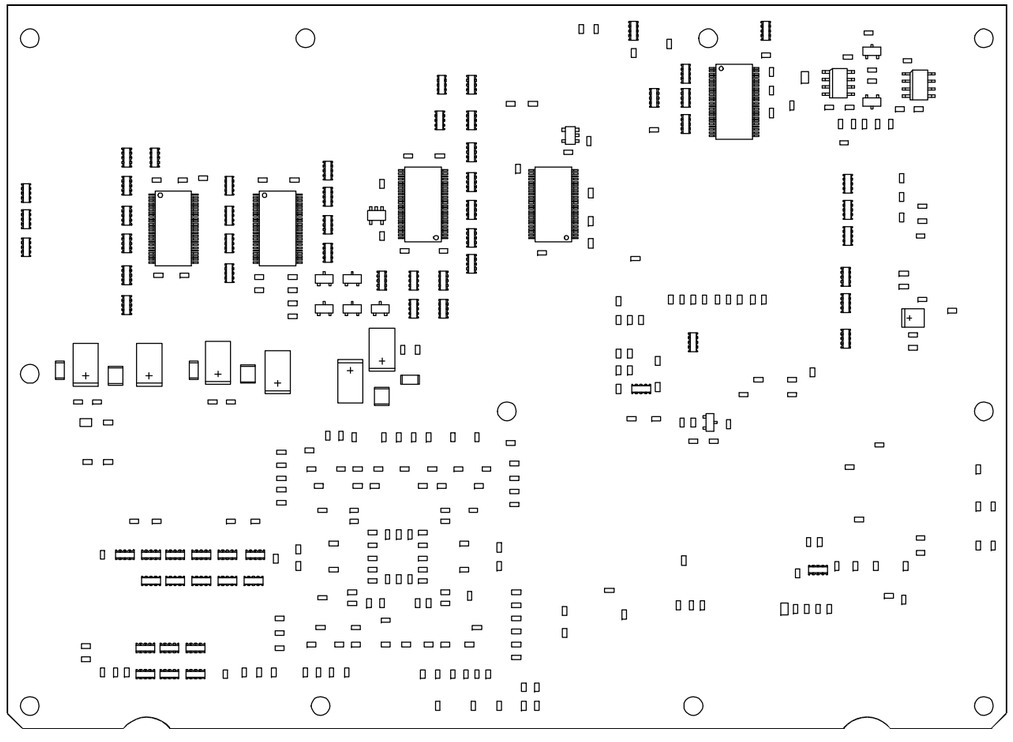
CAUTION:
CONTAINS PARTS AND ASSEMBLIES SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).



(7010-5830-300-B)



TOP VIEW

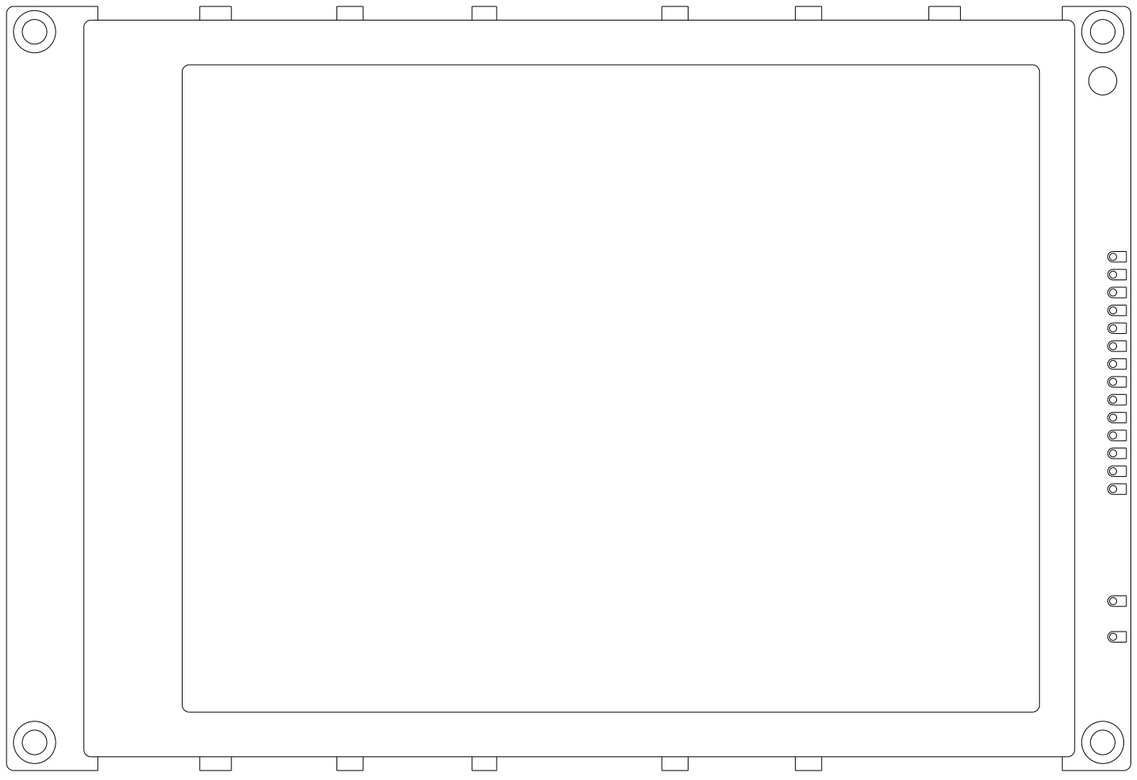


BOTTOM VIEW

(7010-5830-300-C) (65976)

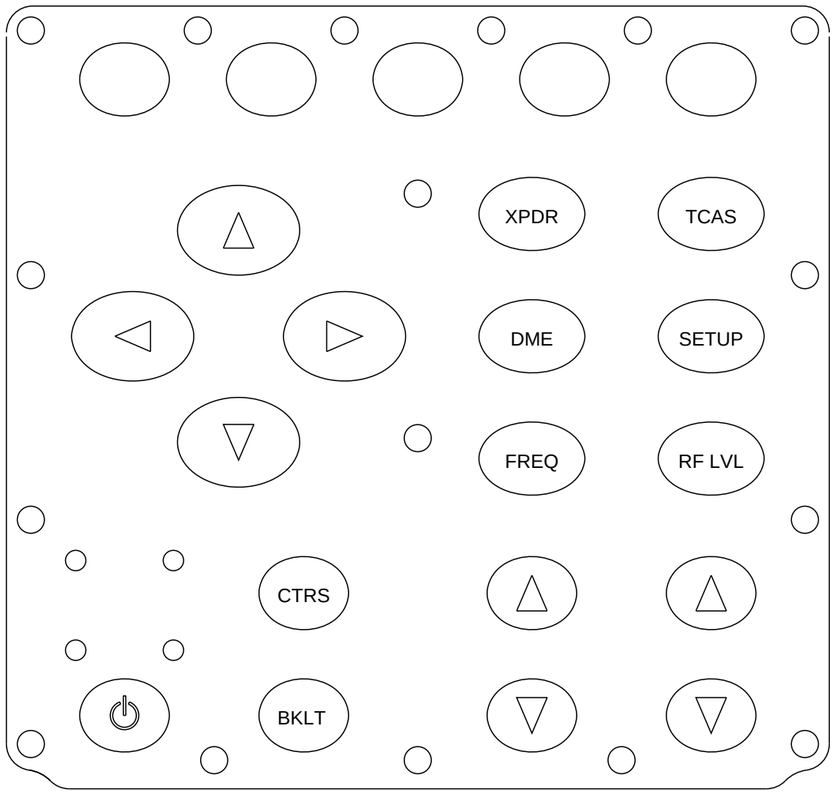
Multi-Function PCB Assy (58A1A2A3)
Figure 10

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



(7110-5600-000-B) (67364)

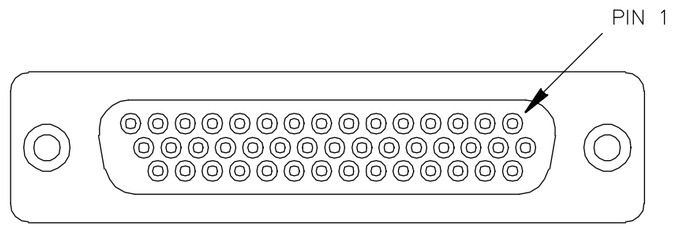
LCD Assy (58A1A2A4)
Figure 11



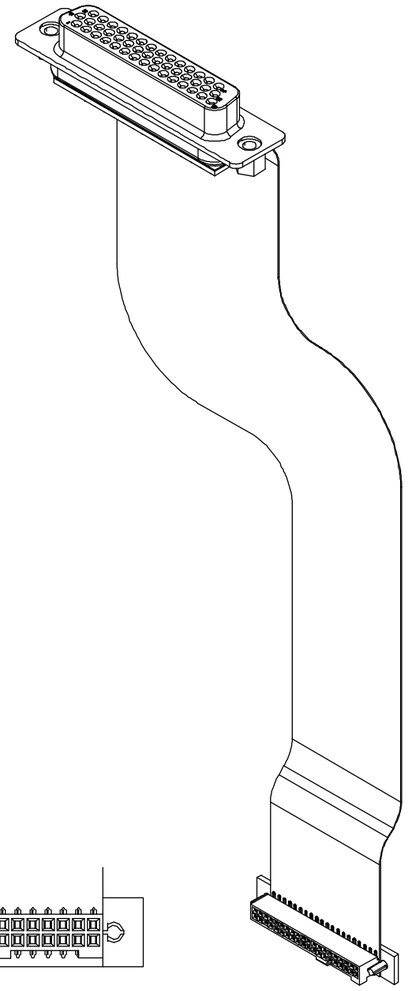
(7110-5800-100-A) (67368) / (7110-5800-600-A1) (67371-A)

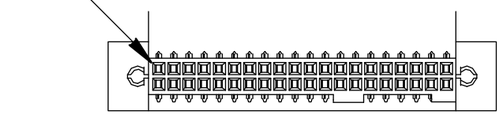
Keypad (58A1A2A5)
Figure 12

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



J1



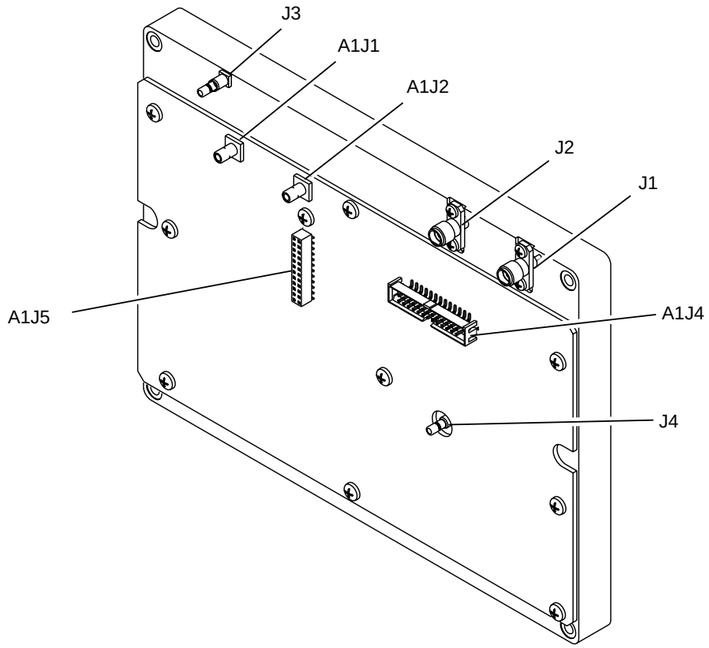


P1

(7110-5830-800-A) (67372)

Flex Cable (58A1A2A6)
Figure 13

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



(7005-5840-400-A) (64578) / (7005-5842-300-A) (64583-A0)

RF Assy (58A1A3)
Figure 14
Page 1 of 2

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SECTION 3 - DISASSEMBLY/REASSEMBLY

1. Disassembly

A. General

Contains instructions necessary to remove and disassemble assemblies within the 6000.

B. Preliminary Considerations

(1) Tools Required

TOOL	SIZE	DESCRIPTION
SCREWDRIVER	#2	PHILLIPS
SCREWDRIVER	#1	SLOTTED
WRENCH	5/32" 3/16"	SOCKET
PLIERS		NEEDLE-NOSE

(2) Disassembly Precautions

CAUTION: TAG EACH WIRE AND CABLE PRIOR TO REMOVAL.

CAUTION: AVOID BENDING OR TWISTING SEMI-RIGID COAXIAL CABLES.

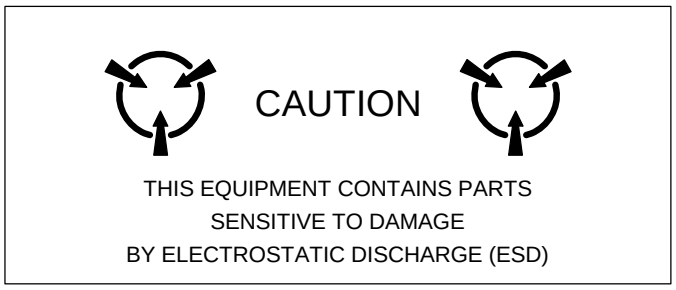
CAUTION: AVOID PLACING UNDUE STRAIN ON ANY WIRE OR CABLE.

CAUTION: AVOID DISCARDING LOOSE ITEMS (NUTS, SCREWS, WASHERS, ETC.).

CAUTION: AVOID EXPOSING COMPONENTS TO EXCESSIVE HEAT WHEN REMOVING SOLDER.

(3) ESD

CAUTION: THE POWER SUPPLY PCB ASSY, RF ASSY, KEYPAD PCB ASSY, PROCESSOR PCB ASSY, MULTI-FUNCTION PCB ASSY, LCD PCB ASSY AND KEYPAD PCB ASSY CONTAIN PARTS SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD). ALL PERSONNEL PERFORMING DISASSEMBLY SHOULD HAVE KNOWLEDGE OF ACCEPTED ESD PRACTICES.



(4) EMC and Safety Compliance

All assemblies, cables, connectors, plastic fasteners, gaskets, fingerstock and miscellaneous hardware within the Test Set are configured to satisfy the safety and EMC compliance standards.

CAUTION: UPON COMPLETION OF ANY MAINTENANCE ACTION; ALL ASSEMBLIES, CABLES, CONNECTORS, PLASTIC FASTENERS, GASKETS, FINGERSTOCK AND MISCELLANEOUS HARDWARE MUST BE CONFIGURED AS INSTALLED AT THE FACTORY.

C. Procedures

(1) Battery

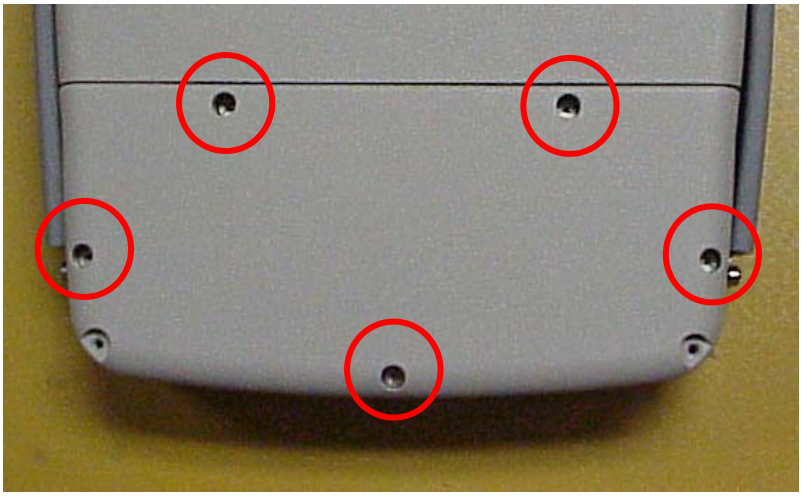
PRELIMINARY PROCEDURES: None

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

STEP	PROCEDURE

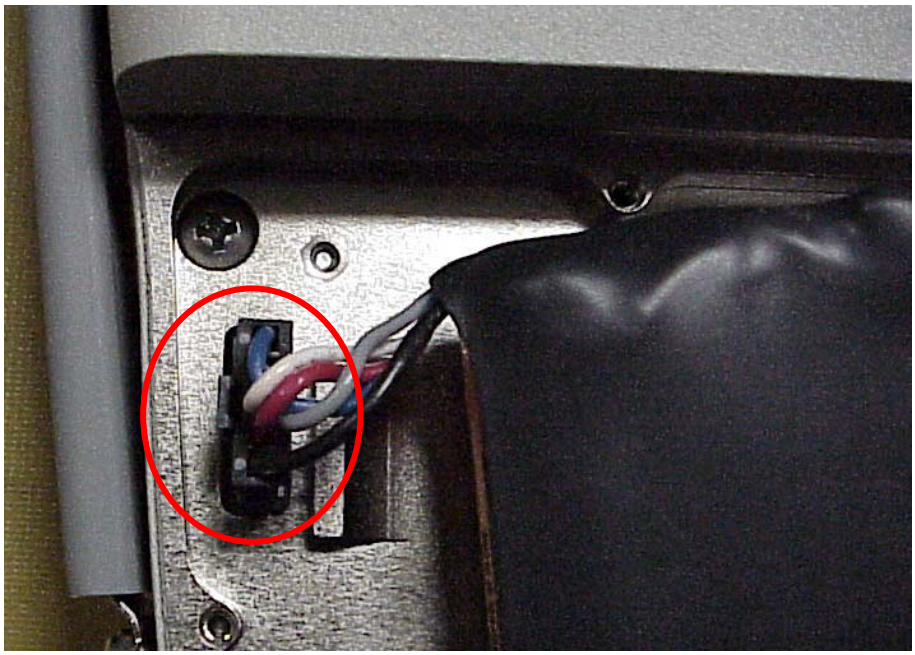
1. Remove external power sources and all external cables from the 6000.
2. Loosen the four captive screws holding bumpers (two in back and two in front). Remove bumpers.

3. Loosen five captive screws securing the Battery Cover. Remove the Battery Cover.



STEP PROCEDURE

4. Disconnect the Battery wire harness.



5. Remove the Battery.

(2) Fuse

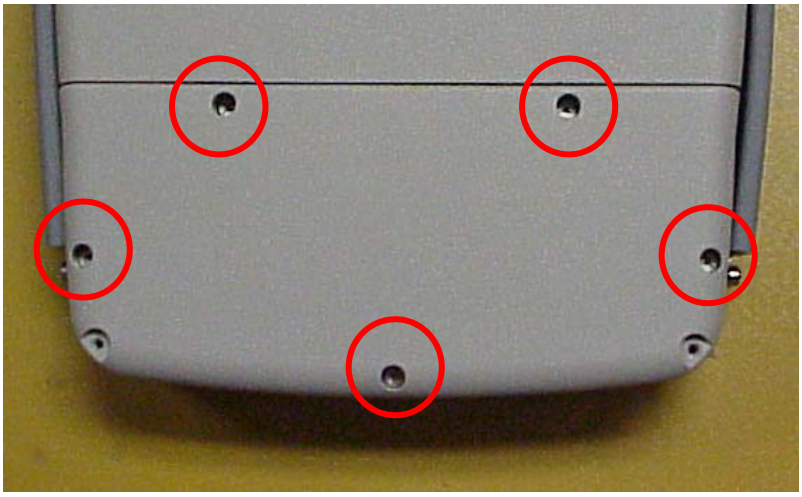
PRELIMINARY PROCEDURES: None

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 6000.
2. Loosen the four captive screws holding bumpers (two in back and two in front). Remove bumpers.

3. Loosen five captive screws securing the Battery Cover. Remove the Battery Cover.



STEP PROCEDURE

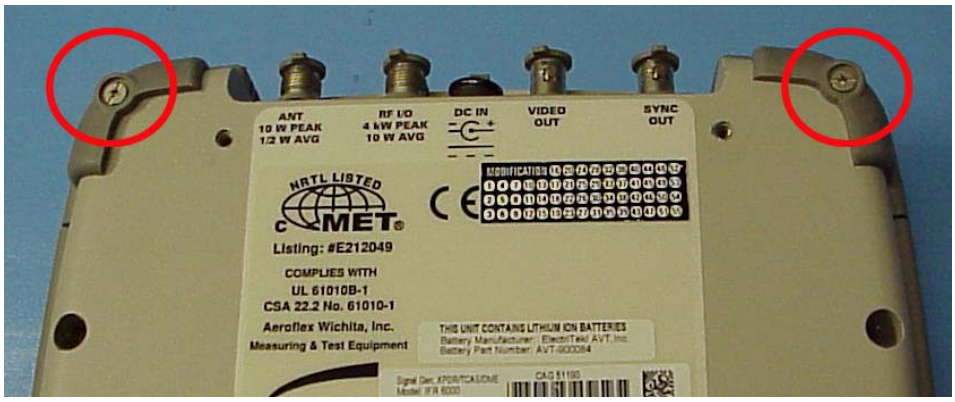
4. Remove the Fuse.

(3) Case Assy

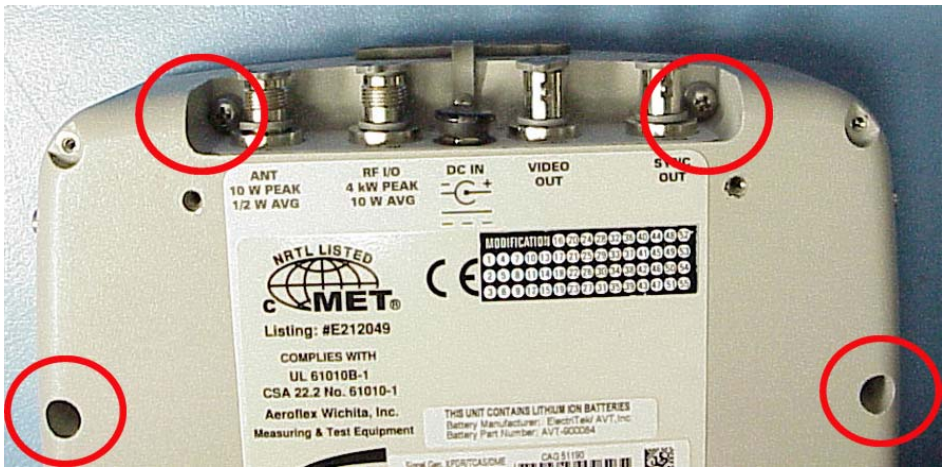
PRELIMINARY PROCEDURES: Battery (para 2-3-1C[1])

STEP	PROCEDURE

1. Loosen the four captive screws holding bumpers (two in back and two in front). Remove bumpers.

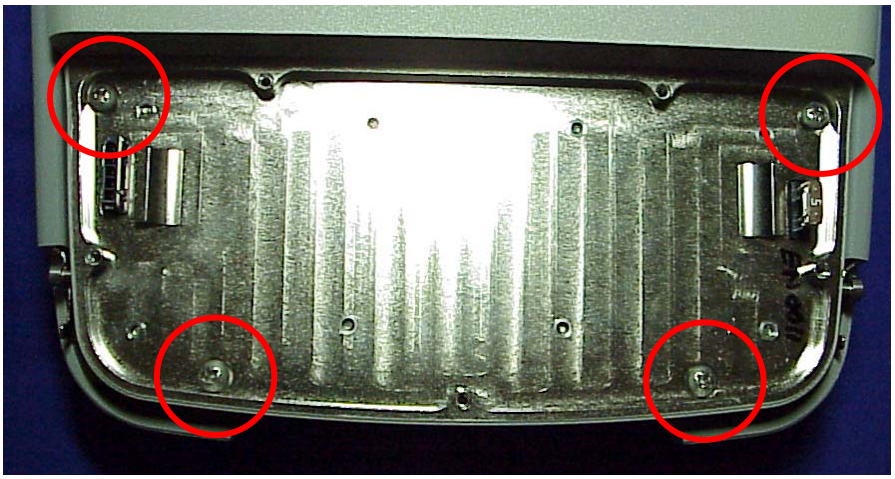


2. Remove four screws.

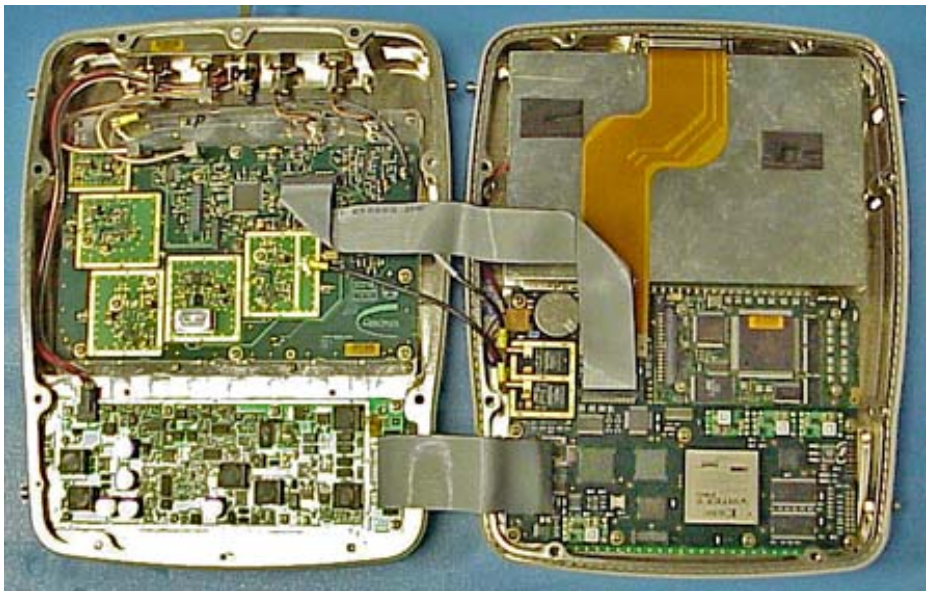


STEP PROCEDURE

3. Remove four screws.



4. Open the Case Assy.

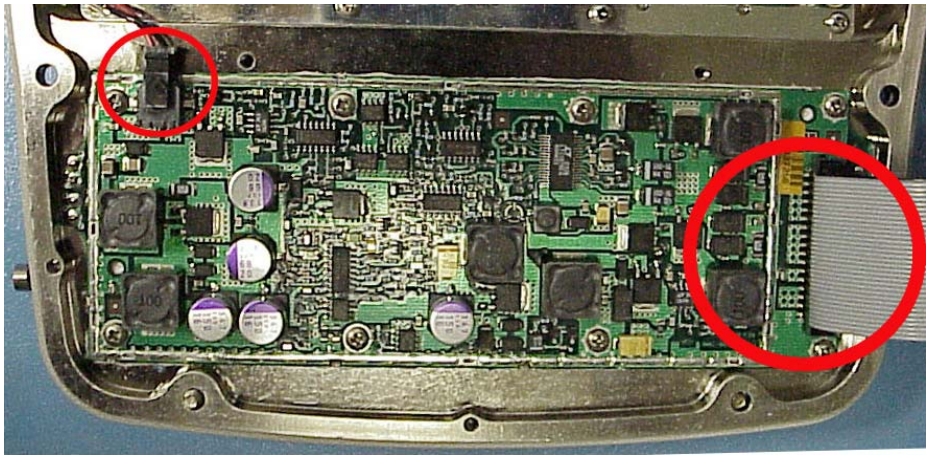


(4) Power Supply PCB Assy

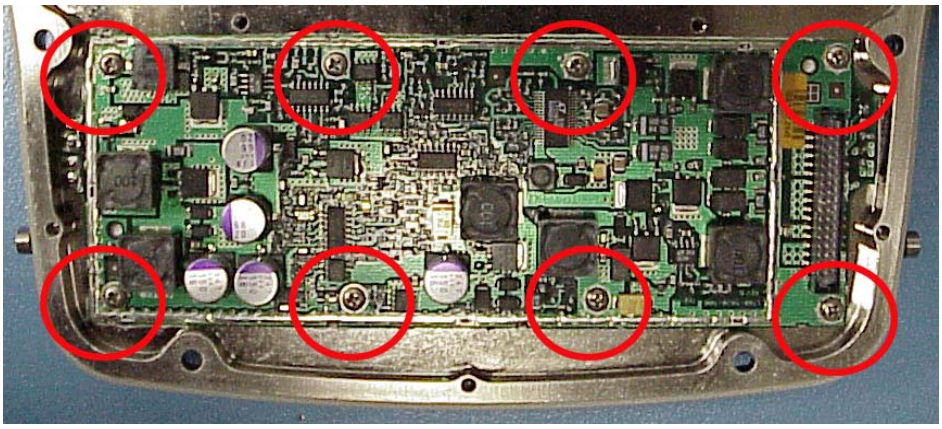
PRELIMINARY PROCEDURES: Case Assy (para 2-3-1C[3])

STEP	PROCEDURE

1. Disconnect wire cable and ribbon cable from the Power Supply PCB Assy.



2. Remove eight screws.



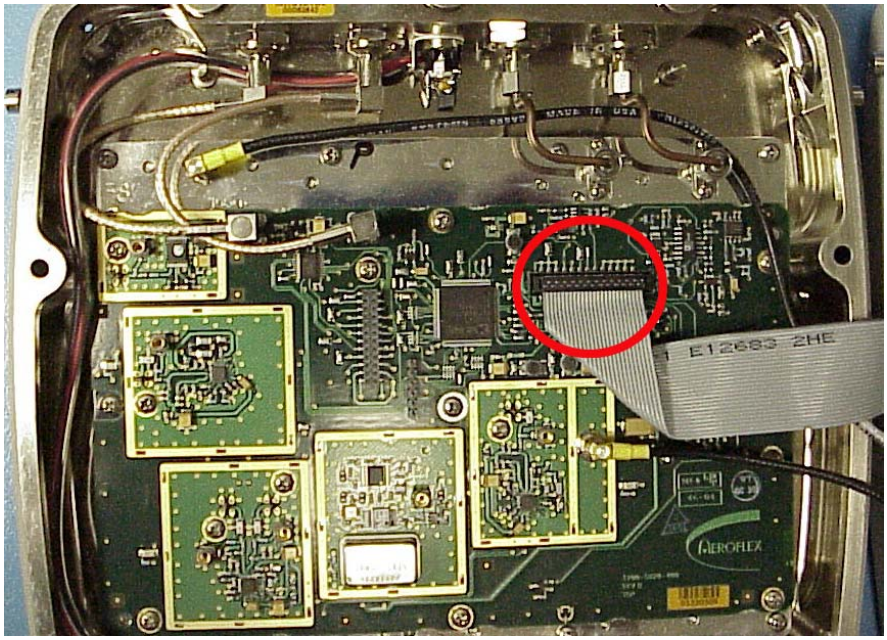
3. Remove Power Supply PCB Assy.

(5) RF Assy

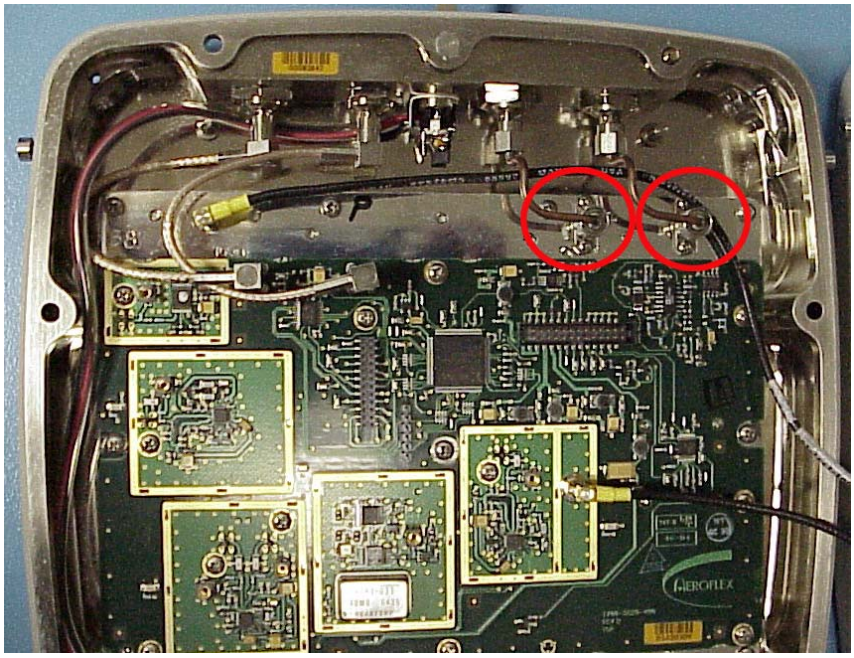
PRELIMINARY PROCEDURES: Case Assy (para 2-3-1C[3])

STEP	PROCEDURE

1. Disconnect ribbon cable from the RF Assy.

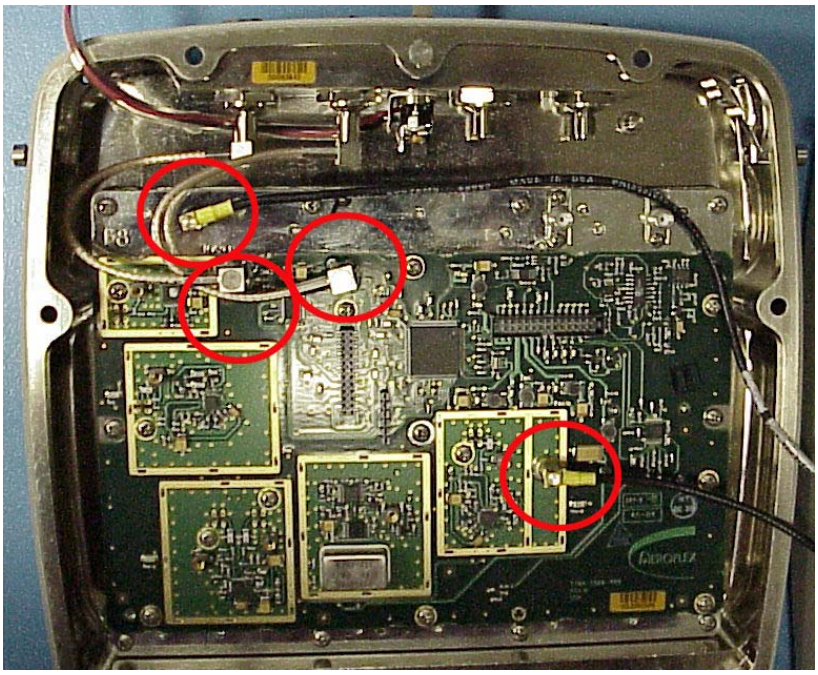


2. Remove two semi-rigid coaxial cables.

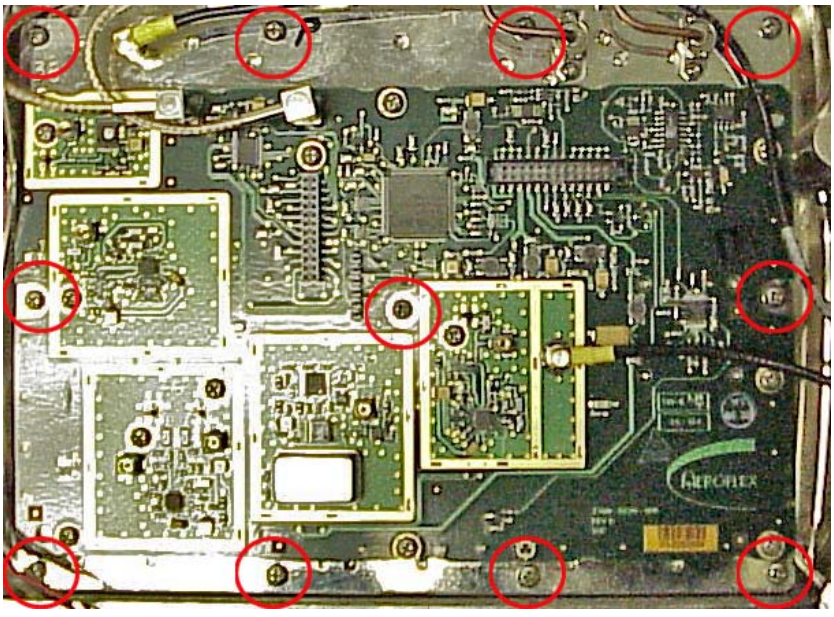


STEP PROCEDURE

3. Disconnect four coaxial cables from the RF Assy.



4. Remove 11 screws.



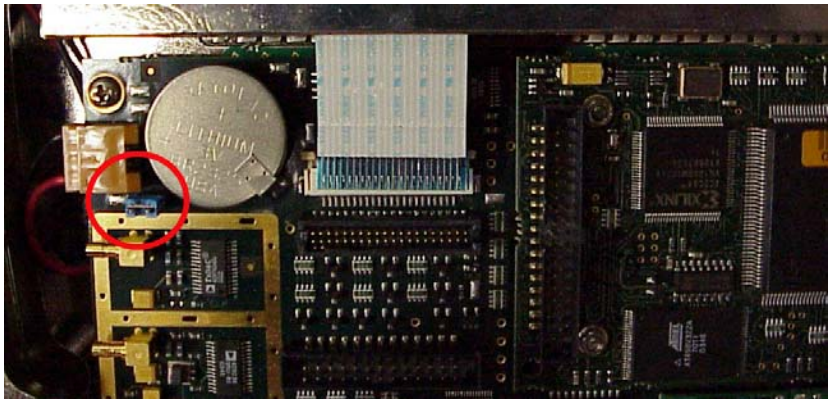
5. Remove the RF Assy.

(6) Processor PCB Assy

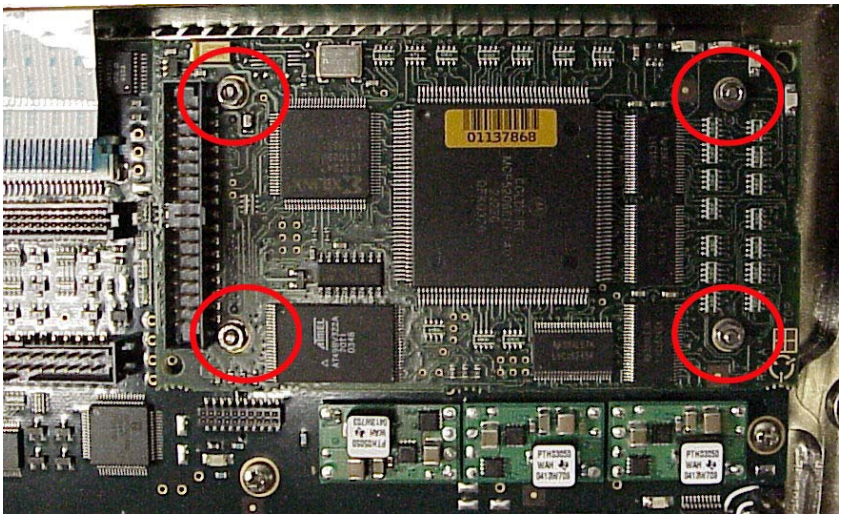
PRELIMINARY PROCEDURES: Case Assy (para 2-3-1C[3])

STEP	PROCEDURE

1. Remove jumper from Multi-Function PCB Assy.



2. Remove four nuts and four lock washers.



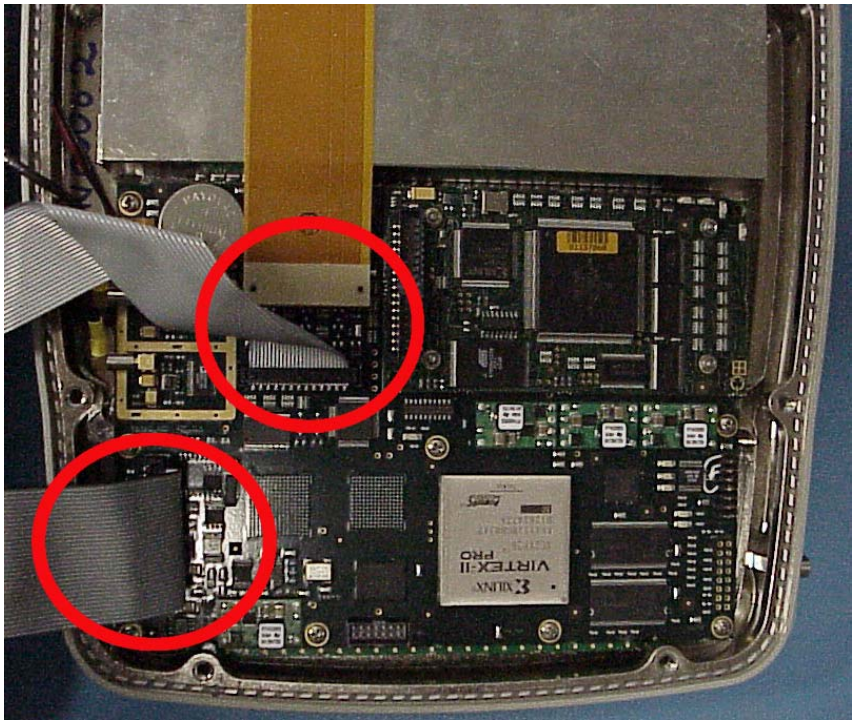
3. Remove the Processor PCB Assy.

(7) Multi-Function PCB Assy

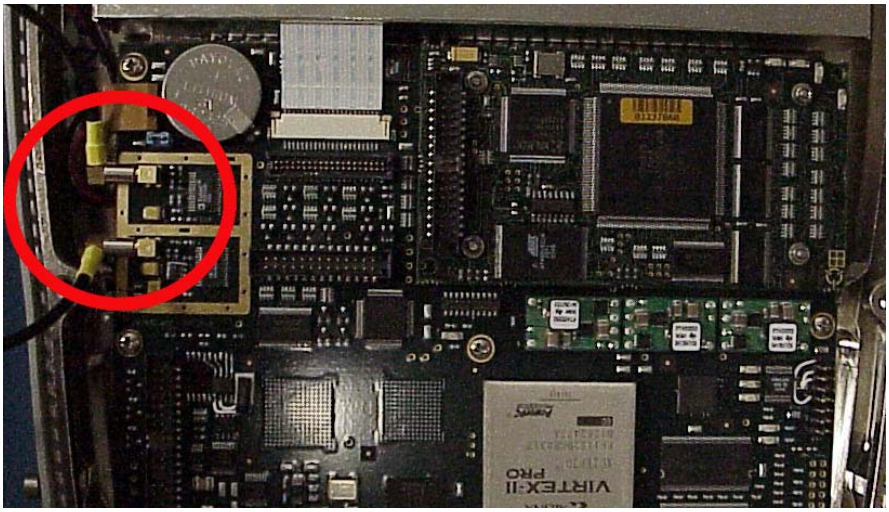
PRELIMINARY PROCEDURES: Case Assy (para 2-3-1C[3])
Processor PCB Assy (para 2-3-1C[6])

STEP	PROCEDURE

1. Disconnect three ribbon cables from the Multi-Function PCB Assy.



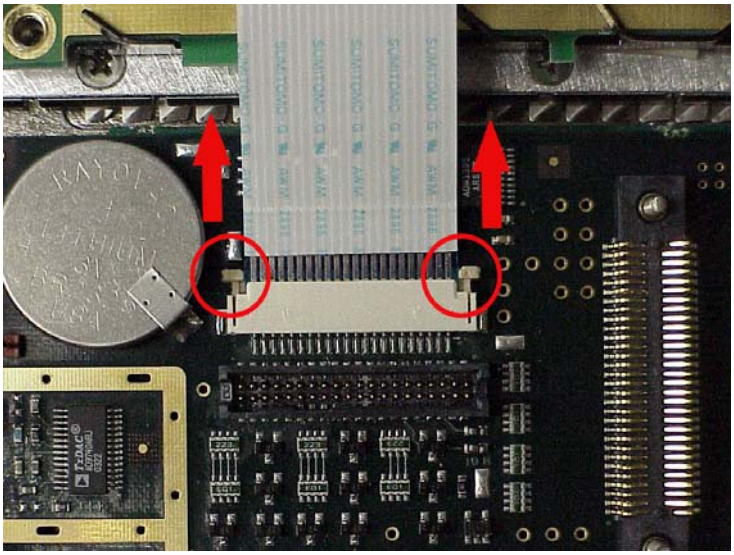
2. Disconnect the two coaxial cables from the Multi-Function PCB Assembly.



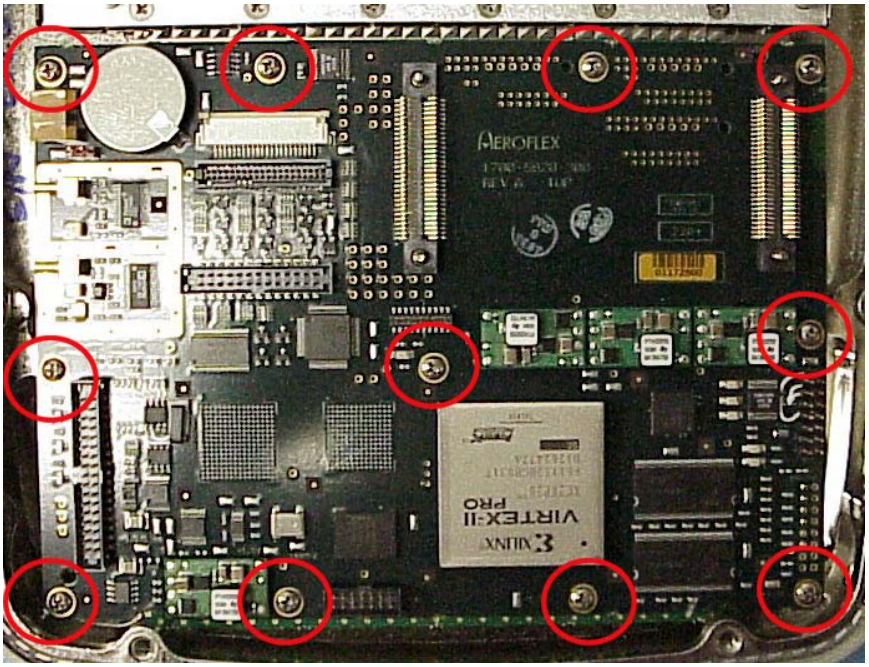
STEP PROCEDURE

3. Disconnect the ribbon cable by pushing the two brass levers on either side of the cable straight up from the white housing. This housing stays in place and is not removable. Lift the end of the ribbon cable out of the housing.

CAUTION: EXERCISE CAUTION WHEN REMOVING THE RIBBON CABLE FROM THE MULTI-FUNCTION PCB ASSY.



4. Remove 11 screws.



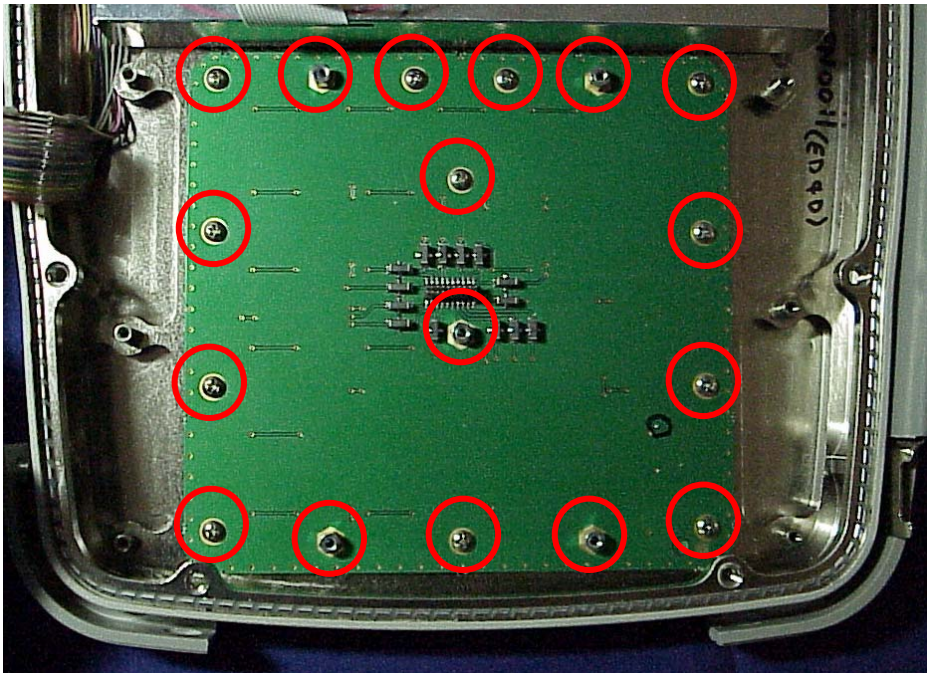
5. Remove Multi-Function PCB Assy.

(8) Keypad PCB Assy

PRELIMINARY PROCEDURES: Case Assy (para 2-3-1C[3])
Processor PCB Assy (para 2-3-1C[6])
Multi-Function PCB Assy (para 2-3-1C[7])

STEP	PROCEDURE

1. Remove 12 screws and five shell nuts.



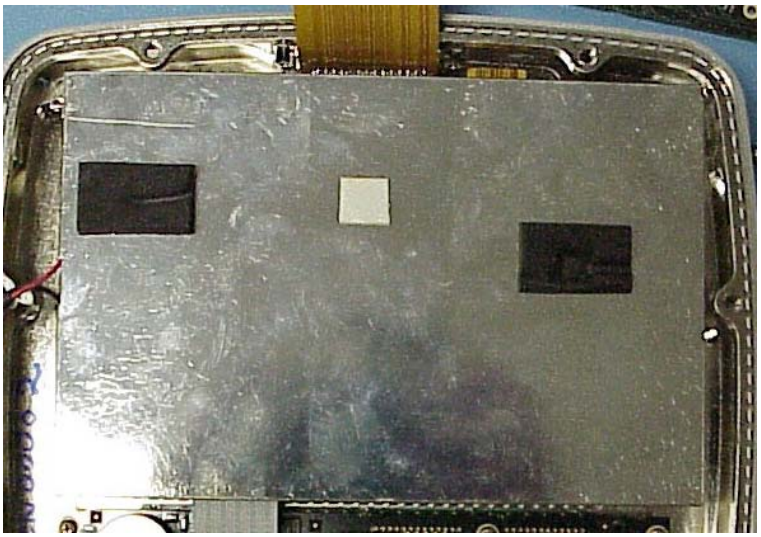
2. Remove Keypad PCB Assy.

(9) LCD PCB Assy

PRELIMINARY PROCEDURES: Case Assy (para 2-3-1C[3])

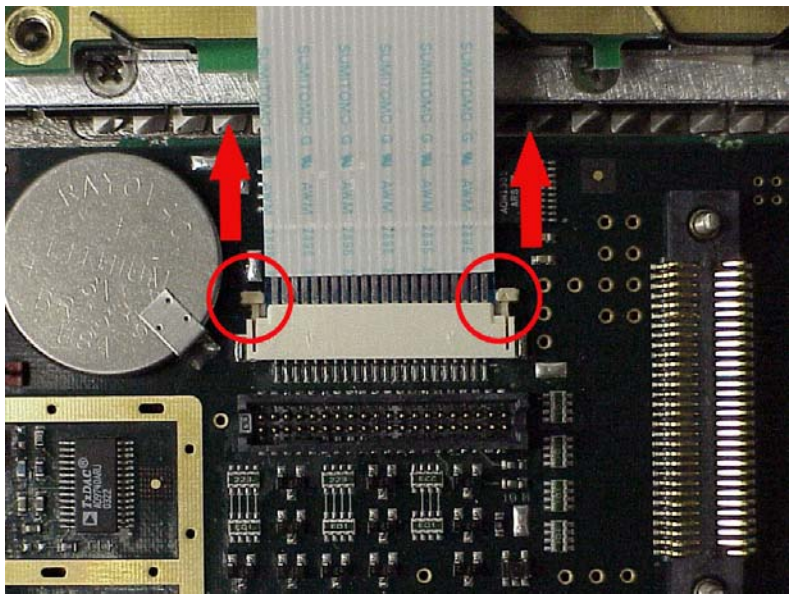
STEP	PROCEDURE

1. Disconnect ribbon cable from Multi-Function PCB Assy. Pry ribbon cable from cover by carefully separating ribbon cable from double sided tape holding cable in place.



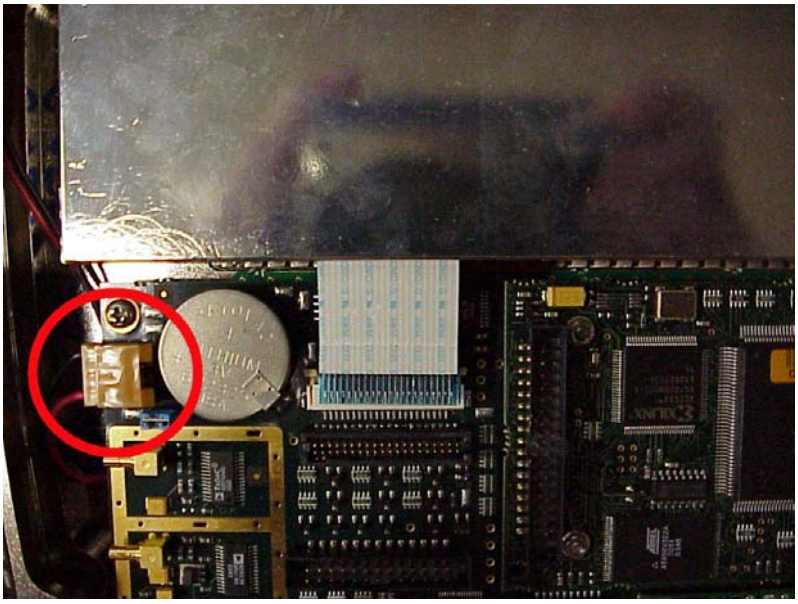
2. Disconnect ribbon cable by pushing the two brass levers on either side of the cable straight up from the white housing. This housing stays in place and is not removable. Lift the end of the ribbon cable out of the housing.

CAUTION: EXERCISE CAUTION WHEN REMOVING THE RIBBON CABLE FROM THE MULTI-FUNCTION PCB ASSY.

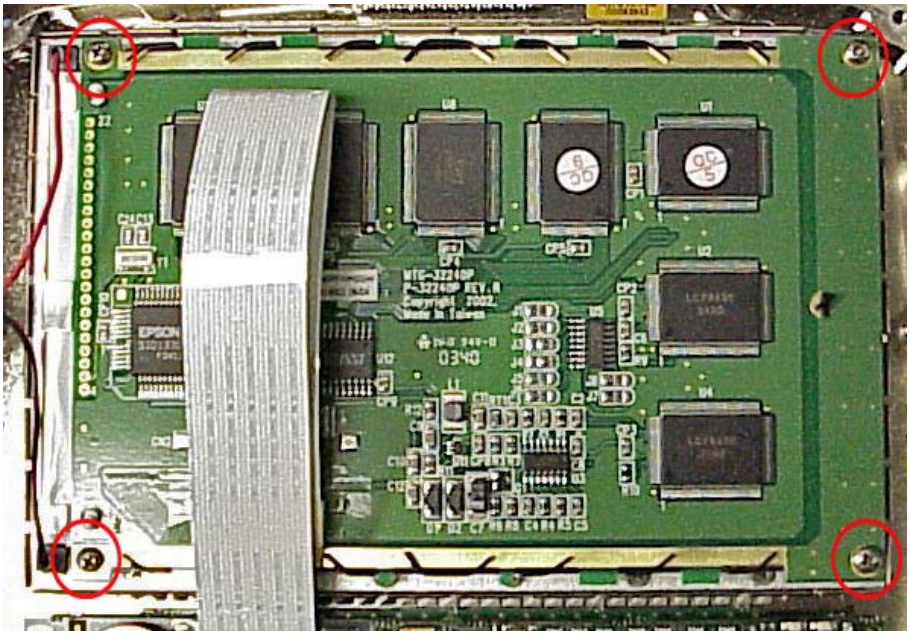


STEP PROCEDURE

3. Disconnect backlight wire connector from Multi-Function PCB Assy. Thread wires and connector through the opening in left side of cover and remove cover.



4. Remove 4 screws.



5. Remove LCD PCB Assy.

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2. Reassembly

A. General

Reassembly depends upon extent of disassembly and should be performed with normal repair and/or cleaning. Perform reassembly in reverse sequence of disassembly procedures unless otherwise specified.

B. Preliminary Considerations

(1) Tools Required

Reassembly requires the same tools required for disassembly unless otherwise specified.

(2) Reassembly Precautions

CAUTION: INSURE ALL COAXIAL CONNECTIONS ARE PROPERLY MATED.

CAUTION: AVOID BENDING OR TWISTING SEMI-RIGID COAXIAL CABLES.

CAUTION: PLACE ALL RIBBON CABLES TO LAY FLAT AND NEATLY FOLDED.

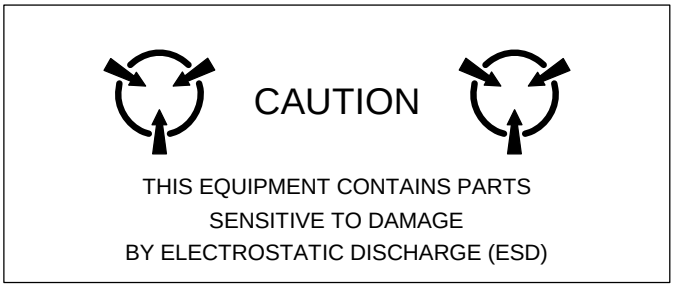
CAUTION: AVOID PLACING UNDUE STRAIN ON ANY WIRE OR CABLE.

CAUTION: AVOID OVERTIGHTENING SCREWS AND NUTS INCLUDING COAXIAL CONNECTORS.

CAUTION: REPLACE EACH REMOVED PLASTIC FASTENER IN SAME LOCATION AS MARKED AND CONFIGURED PRIOR TO REMOVAL.

CAUTION: AVOID EXPOSING COMPONENTS TO EXCESSIVE HEAT WHEN SOLDERING.

(3) ESD



CAUTION: THE POWER SUPPLY ASSY, MULTI-FUNCTION PCB ASSY, RF ASSY AND PROCESSOR PCB ASSY CONTAIN PARTS SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD). ALL PERSONNEL PERFORMING REASSEMBLY SHOULD HAVE KNOWLEDGE OF ACCEPTED ESD PRACTICES AND/OR BE ESD CERTIFIED.

(4) EMC and Safety Compliance

All assemblies, cables, connectors, plastic fasteners, gaskets, fingerstock and miscellaneous hardware within the Test Set are configured to satisfy the safety and EMC compliance standards.

CAUTION: UPON COMPLETION OF ANY MAINTENANCE ACTION, ALL ASSEMBLIES, CABLES, CONNECTORS, PLASTIC FASTENERS, GASKETS, FINGERSTOCK AND MISCELLANEOUS HARDWARE MUST BE CONFIGURED AS INSTALLED AT THE FACTORY.

C. Reassembly Procedures

(1) Battery

- Reassembly should be performed in reverse sequence of disassembly.
- Torque the five captive screws on the Battery Cover to 8 in/lbs.

(2) Fuse

- Reassembly should be performed in reverse sequence of disassembly.
- Torque the five captive screws on the Battery Cover to 8 in/lbs.

(3) Case Assy

- Reassembly should be performed in reverse sequence of disassembly.
- Torque the eight screws on the Case Assy to 17 in/lbs.

(4) Power Supply PCB Assy

- Reassembly should be performed in reverse sequence of disassembly.
- Install new gap pad between the Power Supply PCB Assy and the Chassis Assy.
- Torque the eight screws on the Power Supply PCB Assy to 6 in/lbs.

(5) RF Assy

- Reassembly should be performed in reverse sequence of disassembly.
- Replace RF gasket if torn or damaged.
- Torque the 11 screws on the RF Assy to 8 in/lbs.
- Torque the two semi-rigid coaxial cable connectors to 10 in/lbs.

(6) Processor PCB Assy

- Reassembly should be performed in reverse sequence of disassembly.
- Torque the 4 nuts on the Processor PCB Assy to 3 in/lbs.

(7) Multi-Function PCB Assy

CAUTION: EXERCISE CAUTION WHEN INSTALLING THE RIBBON CABLE FROM THE LCD ASSY TO THE MULTI-FUNCTION PCB ASSY.

- Reassembly should be performed in reverse sequence of disassembly.
- Torque the 11 screws on the Multi-Function PCB Assy to 6 in/lbs.

(8) Keypad PCB Assy

- Reassembly should be performed in reverse sequence of disassembly.
- Torque the 12 screws on the Keypad PCB Assy to 6 in/lbs.
- Torque the five shell nuts on the Keypad PCB Assy to 6 in/lbs.

(9) LCD PCB Assy

- Reassembly should be performed in reverse sequence of disassembly.
- Reapply new double-stick tape.
- Torque the four screws on the LCD PCB Assy to 6 in/lbs.

SECTION 4 - PARTS LIST

To order parts contact:

Aeroflex
Customer Service Department
10200 West York Street
Wichita, KS 67215

Telephone: (800) 835-2350
FAX: (316) 524-2623

Email: *americas.service@aeroflex.com*

MISCELLANEOUS

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
	1002-5800-2C0 (6093)	MANUAL,OP,CD,IFR 6000
	1002-5800-4C0 (6095)	MANUAL,MN,CD,IFR 6000
	1002-5800-8P0 (6096)	MANUAL,PP,GETTING STARTED,6000
	1412-5853-000 (10241)	TRANSIT CASE
	5106-0000-057 (56080)	FUSE, 5A, 32V, MINI BLADE
	6041-0001-000 (62302)	POWER CORD (US ONLY)
	6041-5880-800 (62401)	12 IN. COAXIAL CABLE
	6041-5880-900 (62402)	72 IN. COAXIAL CABLE
	7001-9903-000 (64020)	POWER CORD (EUROPEAN)
	7005-5840-500 (64579)	ANTENNA
	7005-5841-000 (64580)	BREAKOUT BOX, 6000
	7005-8142-200 (64749)	ANTENNA SHIELD
	7110-5600-200 (67366)	POWER SUPPLY
	86931	UNIVERSAL ANTENNA COUPLER,UC-584

7003-5840-000 (64074) **ASSY, COMPOSITE** **A**

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
1	1403-5850-100 (9842)	CHASSIS,REAR
2	1414-5650-800 (10602)	COVER,BATTERY
3	2803-0125-006 (35565)	SCREW,4-40 X 1/8 PPHM
4	2803-0500-006 (35611)	SCREW,4-40 X 1/2 PPHM
5	2805-0438-006 (35700)	SCREW,8-32 X 7/16 PPHM
7	2840-0000-060 (36272)	WASHER,NYL,.312OD,.171ID,.032T
8	1414-0000-008 (10259)	COVER,MINI POWER JACK
13	1421-5651-300 (11236)	BUMPER,CORNER
14	1407-5651-400 (10127)	HANDLE,EXTRUDED
15	1407-5651-500 (10128)	HANDLE,STRAP
16	1414-5651-700 (10603)	COVER,BNC/TNC
17	1414-5851-800 (10610)	COVER, REMOTE
18	2803-0125-005 (35564)	SCREW,4-40 X 1/8 SHOULDER
A1	7010-5630-500 (65952)	PCB ASSY,POWER SUPPLY
A2	7005-5840-100 (64577)	MECH ASSY,FRONT CHASSIS
A3	7005-5840-400 (64578)	MECH ASSY,RF
BT1	7020-0012-500 (67076)	PURCH ASSY,LIION BATTERY PACK
J1	2123-0000-110 (20953)	CONN,F,BNC,BH,ADP,SMB,WTRPRF
J2	2123-0000-109 (20952)	CONN,F,TNC,BH,ADP,SMA,WTRPRF
J3	2123-0000-110 (20953)	CONN,F,BNC,BH,ADP,SMB,WTRPRF
J4	2123-0000-109 (20952)	CONN,F,TNC,BH,ADP,SMA,WTRPRF
W1	7007-5680-100 (65007)	WIRE HARN ASSY,DC INPUT
W2	6045-5680-400 (62982)	RBN CA ASSY,28GA,34C,6.0L,2MM
W3	6045-5880-600 (62986)	RBN CA ASSY,28GA,26C,10.25L,2M
W6	6050-0040-500 (63140)	COAX ASSY, 316,R F SMB/R F SMB
W7	6050-0040-500 (63140)	COAX ASSY, 316,R F SMB/R F SMB
W10	6042-5880-500 (62623)	COAX ASSY,RF
W11	6042-5880-500 (62623)	COAX ASSY,RF

7003-5840-000 (64074) **ASSY, COMPOSITE** **B**

Contains all parts shown in Revision A with the following exceptions and additions:

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
13	1421-6256-900 (11238)	BUMPER,CORNER
30	2803-6256-500 (35642)	SCREW,CAPTIVE,4-40,.39L PH

7003-5842-000 (72422) **ASSY, COMPOSITE** **A**

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
1	1403-5854-400 (9844)	CHASSIS,REAR,4000/6000
2	7005-5642-500 (64575)	MECH ASSY,BATTERY COVER
3	2803-0156-006 (35566)	SCREW,4-40 X 5/32 PPHM
4	2803-0563-006 (35615)	SCREW,4-40 X 9/16 PPHM
5	2805-0438-006 (35700)	SCREW,8-32 X 7/16 PPHM
7	2840-0000-060 (36272)	WASHER,NYL,.312OD,.171ID,.032T
8	1414-0000-008 (10259)	COVER,MINI POWER JACK
13	1421-6256-900 (11238)	BUMPER,CORNER,SSHDW
14	1407-5651-400 (10127)	HANDLE,EXTRUDED
15	1407-5651-500 (10128)	HANDLE,STRAP
16	1414-5651-700 (10603)	COVER,BNC/TNC
17	1414-5851-800 (10610)	COVER, REMOTE
18	2803-0125-005 (35564)	SCREW,4-40 X 1/8 SHOULDER
30	2803-6256-500 (35642)	SCREW,CAPTIVE,4-40,.39L PH
A1	7010-5630-500 (65952)	PCB ASSY,POWER SUPPLY
A2	7005-5842-400 (64584)	MECH ASSY,FRONT CHASSIS 6000
A3	7005-5842-300 (64583)	MECH ASSY,RF
BT1	7020-0012-500 (67076)	PURCH ASSY,LIION BATTERY PACK
J1	2123-0000-110 (20953)	CONN,F,BNC,BH,ADP,SMB,WTRPRF
J2	2123-0000-109 (20952)	CONN,F,TNC,BH,ADP,SMA,WTRPRF
J3	2123-0000-110 (20953)	CONN,F,BNC,BH,ADP,SMB,WTRPRF
J4	2123-0000-109 (20952)	CONN,F,TNC,BH,ADP,SMA,WTRPRF
W1	7007-5680-100 (65007)	WIRE HARN ASSY,DC INPUT
W2	6045-5680-400 (62982)	RBN CA ASSY,28GA,34C,6.0L,2MM
W3	6045-5880-600 (62986)	RBN CA ASSY,28GA,26C,10.25L,2M
W6	6050-0040-500 (63140)	COAX ASSY, 316,R F SMB/R F SMB
W7	6050-0040-500 (63140)	COAX ASSY, 316,R F SMB/R F SMB
W10	6042-6282-400 (62628)	COAX ASSY,CONF,2.125 FLSH MNT
W11	6042-6282-400 (62628)	COAX ASSY,CONF,2.125 FLSH MNT

7005-5840-100 (64577) **ASSY, CHASSIS** **A**

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
1	1403-5850-000 (9841)	CHASSIS,FRONT
2	1400-5650-200 (9502)	BRACKET,DISPLAY
3	1414-5650-300 (10601)	COVER,DISPLAY
4	2508-5650-400 (33893)	SHIELD,DISPLAY
5	3900-5650-500 (46697)	LENS,DISPLAY
8	2803-0188-003 (35569)	SCREW,4-40 X 3/16 PFHM
9	2803-0188-006 (35571)	SCREW,4-40 X 3/16 PPHM
10	2803-0250-006 (35582)	SCREW,4-40 X 1/4 PPHM
11	2803-0375-006 (35600)	SCREW, 4-40 X 3/8 PPHM
12	2801-0375-006 (35536)	SCREW,2-56 X 3/8 PPHM
13	2818-0000-017 (35844)	STANDOFF,.188 HEX M/F,.187LG
14	2850-0000-012 (37773)	NUT,HEX,SMALL PAT,2-56
16	2840-0000-004 (36239)	WASHER,LOCK,INT TOOTH,2
A1	7010-5830-700 (65980)	PCB ASSY,KEYPAD
A2	7010-5830-200 (65975)	PCB ASSY,PROCESSOR
A3	7010-5830-300 (65976)	PCB ASSY,MULTIFUNCTION
A4	7110-5600-000 (67364)	PURCHASED ASSY,LCD
A5	7110-5800-100 (67368)	PURCH ASSY,KEYPAD
A6	7110-5830-800 (67372)	PURCHASED ASSY,FLEX
JTB1	2132-0004-000 (21440)	CONN,JUMPER BLOCK,.1C,.025 PIN
W5	6050-1990-500 (63312)	COAX ASSY,316,RFSSMB/RFSSMB
W6	6061-1991-100 (63366)	COAX ASSY,100,RFSSMB/RFSSMB

7005-5840-100 (64577) **ASSY, CHASSIS** **A1**

Contains all parts shown in Revision A with the following exception:

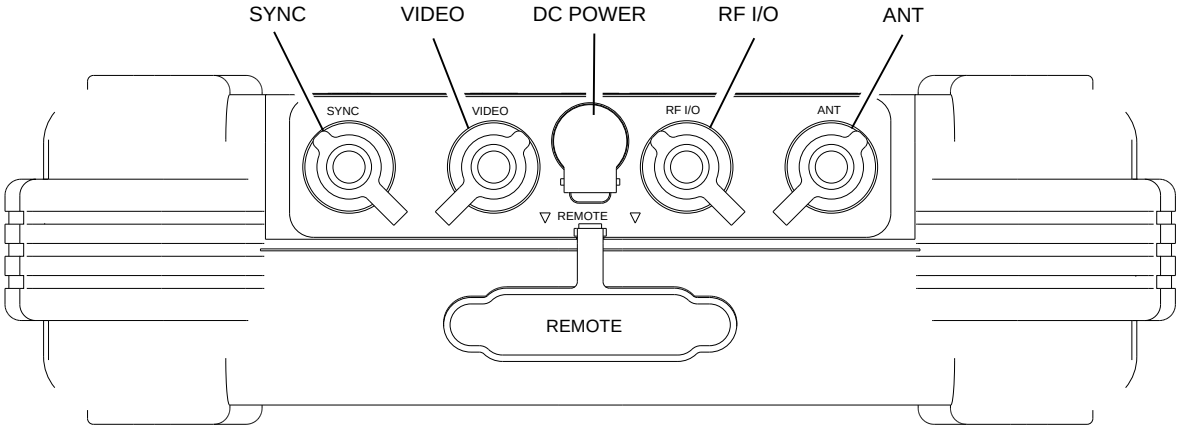
REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
A2	7011-5830-200 (66523)	FRMWR,PROCESSOR

7005-5842-400 (64584) **ASSY, CHASSIS** **A**

REFERENCE DESIGNATOR	PART NUMBER	DESCRIPTION
1	1403-5854-500 (9845)	CHASSIS,FRONT,4000/6000
2	1400-6255-300 (9516)	BRACKET,DISPLAY
3	1414-6255-200 (10623)	COVER,DISPLAY
4	2508-6255-400 (33903)	SHIELD,DISPLAY
5	3900-5650-500 (46697)	LENS,DISPLAY
8	2803-0188-003 (35569)	SCREW,4-40 X 3/16 PFHM
9	2803-0188-006 (35571)	SCREW,4-40 X 3/16 PPHM
10	2803-0250-006 (35582)	SCREW,4-40 X 1/4 PPHM
11	2803-0375-006 (35600)	SCREW, 4-40 X 3/8 PPHM
12	2801-0375-006 (35536)	SCREW,2-56 X 3/8 PPHM
13	2818-0000-017 (35844)	STANDOFF,.188 HEX M/F,.187LG
14	2850-0000-012 (37773)	NUT,HEX,SMALL PAT,2-56
16	2840-0000-004 (36239)	WASHER,LOCK,INT TOOTH,2
A1	7010-5831-900 (65984)	PCB ASSY,6000 KEYPAD
A2	7011-5830-200 (66523)	FRMWR ASSY,PROCESSOR
A3	7010-5830-300 (65976)	PCB ASSY,MULTIFUNCTION
A4	7110-5600-000 (67364)	PURCHASED ASSY,LCD
A5	7110-5800-300 (67369)	PURCH ASSY,6000 KEYPAD
A6	7110-5830-800 (67372)	PURCHASED ASSY,FLEX
JTB1	2132-0004-000 (21440)	CONN,JUMPER BLOCK,.1C,.025 PIN
W5	6050-1990-500 (63312)	COAX ASSY,316,RFSSMB/RFSSMB
W6	6061-1991-100 (63366)	COAX ASSY,100,RFSSMB/RFSSMB

APPENDIX A - CONNECTOR PIN-OUT TABLES

1. I/O CONNECTORS

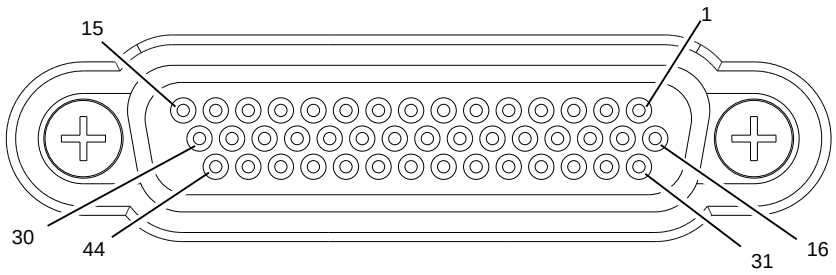


05806

CONNECTOR	TYPE	SIGNAL TYPE	INPUT/OUTPUT
SYNC	BNC	TTL	OUTPUT
VIDEO	BNC	TTL	OUTPUT
DC POWER	2.5 mm CIRCULAR (2.5 mm center, 5.5 mm outer diameter, center positive)	11 to 32 Vdc	INPUT
RF I/O	TNC	RF, 30 W CW MAX	INPUT/OUTPUT
ANT	TNC	RF, 0.5 W CW MAX	INPUT/OUTPUT
REMOTE	44-Pin Female	MIXED	INPUT/OUTPUT
	Refer to Appendix A, Table 2 for REMOTE Connector description.		

I/O Connectors
Table 1

2. REMOTE CONNECTOR PIN-OUT TABLE



05807

PIN NO.	SIGNAL NAME	SIGNAL TYPE	DESCRIPTION
1	VBUS_DN1	Supply	+5V supply for USB device port
2	GND_DN1	Ground	Ground for USB device port
3	VBUS_UP	Supply	+5V supply input from USB host
4	GND_UP	Ground	Ground for USB host port
5	GND	Ground	System Ground
6	HOST-RTS	Output	RS-232 Request to send
7	A2	Input	Altitude Encode Input
8	A4	Input	Altitude Encode Input
9	C2	Input	Altitude Encode Input
10	C4	Input	Altitude Encode Input
11	GND	Ground	System Ground
12	REM_IN1	Input	General Purpose Input
13	REM_OUT2	Output	General Purpose Output
14	GND	Ground	System Ground
15	GND	Ground	System Ground
16	H_D-	In/Out	USB Host Data Compliment
17	H_D+	In/Out	USB Host Data True
18	D_D-	In/Out	USB Host Data Compliment
19	D_D+	In/Out	USB Host Data True
20	GND	Ground	System Ground
21	HOST_TXD	Output	RS-232 Data Output
22	HOST_CTS	Input	RS-232 Clear to send
23	B1	Input	Altitude Encode Input
24	B2	Input	Altitude Encode Input
25	D2	Input	Altitude Encode Input

REMOTE Connector Pin-Out Table
Table 2

2. REMOTE CONNECTOR PIN-OUT TABLE (cont)

PIN NO.	SIGNAL NAME	SIGNAL TYPE	DESCRIPTION
26	GND	Ground	System Ground
27	REM_IN2	Input	General Purpose Input
28	REM_IN3	Input	General Purpose Input
29	REM_OUT4	Output	General Purpose Output
30	GND	Ground	System Ground
31	VBUS_DN1	Supply	+5V supply for USB device port
32	VBUS_DN1	Supply	+5V supply for USB device port
33	VBUS_UP	Supply	+5V supply input from USB host
34	GND_UP	Ground	Ground for USB host port
35	GND	Ground	System Ground
36	HOST_RXD	Input	RS-232 Data Input
37	A1	Input	Altitude Encode Input
38	B4	Input	Altitude Encode Input
39	C1	Input	Altitude Encode Input
40	REM_SP1		Spare Pin
41	D4	Input	Altitude Encode Input
42	REM_IN4	Input	General Purpose Input
43	REM_OUT1	Output	General Purpose Output
44	REM_OUT3	Output	General Purpose Output

REMOTE Connector Pin-Out Table (cont)
Table 2

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APPENDIX B - 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.

Name	Model
Frequency Counter	Agilent 53181A or Equivalent
Arbitrary Waveform Generator (2 ea)	Agilent 33220A or Equivalent
Spectrum Analyzer	Aeroflex 2392A w/ Option 2
Signal Generator	Aeroflex 2023B w/ Option 7
Measuring Receiver	Agilent 8902A or Equivalent
Measuring Receiver Sensor	Agilent 11722A or Equivalent
Power Meter	Agilent E4418B or Equivalent
Power Sensor	Agilent E4412A or Equivalent
Digital Oscilloscope	Tektronix TDS-3032B or Equivalent
RF Detector	Aerotek DTM180AB or Equivalent
Power Splitter (6 dB)	Weinschel 1506A or Equivalent
VSWR Bridge	Anritsu 60N50 or Equivalent
Transponder/DME Test Set	Aeroflex ATC-1400A-2
Computer (w/ RS-232, USB ports)	Capable of running Agilent's Intuilink Software
Intuilink Software	Refer to Agilent Website
Tera Term Terminal Software	Shareware
Ramp Test Set	Aeroflex IFR 6000 w/ Options 2 and 3
Breakout Box	Aeroflex 7005-5841-000 (64580)
RF Power Source	DME or Equivalent

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APPENDIX C - METRIC/BRITISH IMPERIAL CONVERSION TABLE WITH NAUTICAL DISTANCE CONVERSIONS

TO CONVERT:	INTO:	MULTIPLY BY:	TO CONVERT:	INTO:	MULTIPLY BY:
cm	feet	0.03281	meters	feet	3.281
cm	inches	0.3937	meters	inches	39.37
feet	cm	30.48	m/sec	ft/sec	3.281
feet	meters	0.3048	m/sec	km/hr	3.6
ft/sec	km/hr	1.097	m/sec	miles/hr	2.237
ft/sec	knots	0.5921	miles	feet	5280
ft/sec	miles/hr	0.6818	miles	km	1.609
ft/sec^2	cm/sec^2	30.48	miles	meters	1609
ft/sec^2	m/sec^2	0.3048	miles	nmi	0.8684
grams	ounces	0.03527	miles/hr	ft/sec	1.467
inches	cm	2.54	miles/hr	km/hr	1.609
kg	pounds	2.205	miles/hr	knots	0.8684
kg/cm^2	psi	0.0703	nmi	feet	6080.27
km	feet	3281	nmi	km	1.8532
km	miles	0.6214	nmi	meters	1853.2
km	nmi	0.5396	nmi	miles	1.1516
km/hr	ft/sec	0.9113	ounces	grams	28.34953
km/hr	knots	0.5396	pounds	kg	0.4536
km/hr	miles/hr	0.6214	psi	kg/cm^2	0.0703
knots	ft/sec	1.689	100 ft	km	3.048
knots	km/hr	1.8532	100 ft	miles	1.894
knots	miles/hr	1.1516	100 ft	nmi	1.645

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APPENDIX D - SPECIFICATIONS

NOTE: Allow a 5 minute warm-up period for all specifications.

DME MODE

RF Signal Generator

Output Frequency

Reply Frequency:

Range:	962 to 1213 MHz
Accuracy:	±10 kHz

Output Level

Antenna Connector:

Range:	-67 to -2 dBm at ANT Connector
Resolution:	1 dB
Accuracy:	±2 dB
Distance to UUT Antenna:	6 to 300 Ft with Supplied Antenna

RF I/O Connector:

Range:	-115 to -47 dBm
Resolution:	1 dB
Accuracy:	
-95 to -47 dBm:	±1 dB
-115 to <-95 dBm:	±2 dB

Reply Pulse Spacing

P1 to P2:	12 µs (±100 ns) (X Channel) at 50% Peak
P1 to P2:	30 µs (±100 ns) (Y Channel) at 50% Peak

Reply Pulse Width

P1/P2:	3.5 µs (±0.5 µs)

Echo Reply

Control:	ON/OFF
Position:	30 nmi (±1 nmi)
Amplitude:	-11 dB (±1 dB) relative to reply level

Reply Pulse Rise and Fall Times

All Pulses:

Rise Time:	2.5 µs (±0.25 µs) (10% to 90%)
Fall Time:	2.5 µs (±0.25 µs) (90% to 10%)

DME MODE (cont)

RF Signal Generator (cont)

Reply Delay

X Channel:

Fixed Reply Delay:	50 µs (±100 ns)

Y Channel:

Fixed Reply Delay:	56 µs (±100 ns)

Range Delay

X and Y Channel:

Range:	0 to 450.00 nmi
Resolution:	0.01 nmi
Accuracy:	±0.01 nmi

Range Rate

X and Y Channel:

Range:	10 to 6500 kts
Resolution:	1 kts
Accuracy:	±0.01% typical, tested to ±0.5%

Squitter

PRF:	2700 Hz
Accuracy:	±2%
Distribution:	Per ARINC 568

Reply Efficiency

Range:	0% to 100%
Resolution:	1% increments
Accuracy:	±0.5%

Ident Tone

Selection:	Selectable three letter code
Frequency:	1350 Hz
Accuracy:	±2 Hz

DME MODE (cont)

UUT Measurements

ERP

Range:	+47 to +64 dBm
Resolution:	0.1 dB
Accuracy:	±2 dB

Direct Connection Peak Pulse Power

Range:	+47 to +64 dBm
Resolution:	0.1 dB
Accuracy:	±1 dB

Frequency

Range:	1025.00 to 1150.00 MHz
Resolution:	10 kHz
Accuracy:	±20 kHz

Interrogation Pulse Width

P1 and P2 Pulse Widths:

Range:	2.00 to 5.00 µs
Resolution:	1 ns
Accuracy:	±50 ns

Interrogation Pulse Spacing

P1 to P2 Spacing:	10 to 14 µs (X Channel)
P1 to P2 Spacing:	34 to 38 µs (Y Channel)
Resolution:	10 ns
Accuracy:	±20 ns

Interrogation PRF

Range:	1 to 300 Hz
Resolution:	1 Hz
Accuracy:	±2 Hz

TRANSPONDER MODE

Signal Generator

RF Output Frequency

Interrogation Frequency:	1030 MHz
Accuracy:	±10 kHz

RF Output Level

ANT Connector:	MTL + 6 dB typical, automatically controlled for a MTL range of -83 to -68 dBm
Range:	-67 to -2 dBm at ANT Connector
Resolution:	0.5 dB
Accuracy:	±2 dB
Distance to UUT Antenna:	6 to 200 ft with Supplied Antenna
RF I/O Connector:	MTL + 6 dB typical, automatically controlled
Range:	-115 to -47 dBm
Resolution:	0.5 dB
Accuracy:	
-95 to -47 dBm:	±1 dB
-115 to <-95 dBm:	±2 dB

ATCRBS/Mode S Interrogation Pulse Spacing

Mode A:	
P1 to P2:	2.00 µs (±25 ns)
P1 to P3:	8.00 µs (±25 ns)
Mode C:	
P1 to P2:	2.00 µs (±25 ns)
P1 to P3:	21.00 µs (±25 ns)
Mode S:	
P1 to P2:	2.00 µs (±25 ns)
P1 to P6:	3.50 µs (±25 ns)
P1 to SPR:	4.75 µs (±25 ns)
P5 to SPR:	0.40 µs (±50 ns)

TRANSPONDER MODE (cont)

Intermode Interrogation Pulse Spacing

Mode A:	
P1 to P3:	8.00 µs (±25 ns)
P1 to P4:	10.00 µs (±25 ns)
Mode C:	
P1 to P3:	21.00 µs (±25 ns)
P1 to P4:	23.00 µs (±25 ns

Interrogation Pulse Widths

Mode A, C, S, Intermode:	
P1, P2, P3:	0.80 µs (±50 ns)
Mode S:	
P6 (Short DPSK Block):	16.25 µs (±50 ns)
P6 (Long DPSK Block):	30.25 µs (±50 ns)
P5:	0.80 µs (±50 ns)
Intermode:	
P4 (Short):	0.80 µs (±50 ns)
P4 (Long):	1.60 µs (±50 ns)

Interrogation Pulse Rise and Fall Times

All Modes:	
Rise Time:	50 to 100 ns
Fall Time:	50 to 200 ns

Phase Modulation

All Modes:	
Transition Time:	≤80 ns
Phase Shift:	180° (±10°)

SLS Levels

ATCRBS:	
SLS Level (P2):	-9 dB, -1 to +0 dB relative to P1 Level 0 dB, -0 to +1 dB relative to P1 Level OFF
Mode S:	
SLS Level (P5):	-12 dB, -1 to +0 dB relative to P6 Level +3 dB, -0 to +1 dB relative to P6 Level OFF

NOTE: SLS Level is automatically controlled in the SLS LEVEL Test.

TRANSPONDER MODE (cont)

Interrogation Test Signals

Mode S:

PRF:	50 Hz (±5 Hz)

ATCRBS:

PRF:	235 Hz (±5 Hz)

UUT Measurements

ERP (at 1090 MHz)

Range:	+45.5 to +59 dBm (35.5 to 800 W)
Resolution:	0.1 dB
Accuracy:	±2 dB
Direct Connection Peak Pulse Power (at 1090 MHz):	
Range:	+46.5 to +59 dBm (45 to 800 W)
Resolution:	0.1 dB
Accuracy:	±1 dB

Transmitter Frequency

Range:	1087.000 to 1093.000 MHz
Resolution:	10 kHz
Accuracy:	±50 kHz

Receiver Sensitivity, Radiated MTL

Range:	-79 to -67 dBm into 0 dBi Antenna
Resolution:	0.1 dB
Accuracy:	±2 dB, typical

Receiver Sensitivity, Direct Connection MTL

Range:	-79 to -67 dBm
Resolution:	0.1 dB
Accuracy:	±2 dB

Reply Delay

ATCRBS:

Range:	1.80 to 7.00 µs
Resolution:	10 ns
Accuracy:	±50 ns

Mode S and ATCRBS Mode S All-Call:

Range:	125.00 to 131.00 µs
Resolution:	10 ns
Accuracy:	±50 ns

TRANSPONDER MODE (cont)

Reply Delay Jitter

ATCRBS:

Range:	0.00 to 2.30 µs
Resolution:	1 ns
Accuracy:	±20 ns

Mode S and ATCRBS Mode S All-Call:

Range:	0.00 to 6.00 µs
Resolution:	1 ns
Accuracy:	±20 ns

Pulse Spacing

F1 to F2:

Range:	19.70 to 21.60 µs
Resolution:	1 ns
Accuracy:	±20 ns

Mode S Preamble:

Range, P1 to P2:	0.8 to 1.2 µs
Range, P1 to P3:	3.3 to 3.7 µs
Range, P1 to P4:	4.3 to 4.7 µs
Resolution:	1 ns
Accuracy:	±20 ns

Pulse Widths

F1 and F2:

Range:	0.25 to 0.75 µs
Resolution:	1 ns
Accuracy:	±20 ns

Mode S Preamble:

Range:	0.25 to 0.75 µs
Resolution:	1 ns
Accuracy:	±20 ns

Pulse Amplitude Variation

Range:

Mode S (Relative to P1):	-3 to +3 dB
ATCRBS (Relative to F1):	-3 to +3 dB
Resolution:	0.1 dB, (0.01 dB via RCI)
Accuracy:	±0.5 dB

TRANSPONDER MODE (cont)

DF 11 Squitter Period

Range:	0.10 to 4.88 sec
Resolution:	10 ms
Accuracy:	±10 ms

Diversity Isolation

Range:	0 to >20 dB (Depending on Test Distance)
Test Distance:	1.83 m (6 ft) to 28.96 m (95 ft)
Resolution:	0.1 dB
Accuracy:	±3 dB

TCAS MODE

Signal Generator

Output Frequency

Reply Frequency:	1090 MHz
Accuracy:	±10 kHz

Output Level (Simulated ERP)

ANT Connector:

Range:	-67 to -2 dBm at ANT Connector
Resolution:	0.5 dB
Accuracy:	±2 dB
Distance to UUT Antenna:	6 to 300 ft with supplied Antenna

NOTE: Radiated power at 0 dBi UUT Antenna, -68 dBm at 10 nmi Range, automatically controlled.

RF I/O Connector:

Automatic Mode:	-68 dBm at 10 nmi Range, automatically controlled
Manual Mode Range:	-115 to –47 dBm
Resolution:	0.5 dB
Accuracy:	
-95 to -47 dBm:	±1 dB
-115 to <-95 dBm:	±2 dB

Reply Pulse Spacing

Mode C:

F1 to F2:	20.30 µs (±25 ns)
F1 to C1:	1.45 µs (±25 ns)
F1 to A1:	2.90 µs (±25 ns)
F1 to C2:	4.35 µs (±25 ns)
F1 to A2:	5.80 µs (±25 ns)
F1 to C4:	7.25 µs (±25 ns)
F1 to A4:	8.70 µs (±25 ns)
F1 to B1:	11.60 µs (±25 ns)
F1 to D1:	13.05 µs (±25 ns)
F1 to B2:	14.50 µs (±25 ns)
F1 to D2:	15.95 µs (±25 ns)
F1 to B4:	17.40 µs (±25 ns)
F1 to D4:	18.85 µs (±25 ns)

TCAS MODE (cont)

Reply Pulse Spacing (cont)

Mode S:

P1 to P2:	1.00 µs (±25 ns)
P1 to P3:	3.50 µs (±25 ns)
P1 to P4:	4.50 µs (±25 ns)
P1 to D1:	8.00 µs (±25 ns)
D1 to Dn (n = 2 to 112):	1.00 µs times (n-1) (±25 ns)

Reply Pulse Widths

Mode C:

All Pulses:	0.45 µs (±50 ns)

Mode S:

P1 through P4:	0.50 µs (±50 ns)
D1 through D112:	0.50 µs (±50 ns), 1 µs chip width
Reply Modes:	TCAS I / II Mode C (with Altitude Reporting) TCAS II Mode S Formats 0, 11, 16

Reply Pulse Amplitudes

ATCRBS:	±1 dB relative to F1
Mode S:	±1 dB relative to P1

Reply Pulse Rise and Fall Times

All Modes:

Rise Time:	50 to 100 ns
Fall Time:	50 to 200 ns

Percent Reply

Range:	0% to 100%
Resolution:	10%
Accuracy:	±1%

Reply Delay

ATCRBS:	3.0 µs (±50 ns)
Mode S:	128 µs (±50 ns)

Range Delay

Range:	0 to 260 nmi
Resolution:	0.1 nmi
Accuracy:	±0.02 nmi

TCAS MODE (cont)

Range Rate

Range:	-1200 to +1200 kts
Resolution:	10 kts
Accuracy:	10%

Altitude Range

Range:	-1000 to 126,000 ft
Resolution, Mode C:	100 ft
Resolution, Mode S:	25 ft

Altitude Rate

Range:	-10,000 to +10,000 fpm
Resolution:	100 fpm
Accuracy:	10%

Squitter

Control:	ON/OFF
Rate:	0.8 to 1.2 sec, randomly distributed

TCAS MODE (cont)

Receiver

Pulse Spacing

ATCRBS (Mode C All Call):

S1 to P1:	2.0 µs
Accepts:	≤±200 ns
Rejects:	≥±1.0 µs
P1 to P3:	21.0 µs
Accepts:	≤±200 ns
Rejects (<10% Replies):	≥±1.0 µs
P1 to P4:	23.0 µs
Accepts:	≤±200 ns
Rejects (<10% Replies):	≥±1.0 µs

Mode S:

P1 to P2:	2.0 µs
Accepts:	≤±200 ns
Rejects (<10% Replies):	≥±1.0 µs
P1 to SPR:	4.75 µs
Accepts:	≤±200 ns
Rejects (<10% Replies):	≥±1.5 µs

Suppression

ATCRBS (P2 or S1):

>0.5 dB above level of P1:	<10% Replies

TCAS MODE (cont)

UUT Measurements

ERP (at 1030 MHz)

ATCRBS:	
Range:	+43 to +58 dBm (20 to 631 W)
Resolution:	0.1 dB
Accuracy:	±2 dB
Mode S:	
Range:	+43 to +58 dBm (20 to 631 W)
Resolution:	0.1 dB
Accuracy:	±2 dB

Direct Connection Peak Pulse Power (at 1030 MHz)

ATCRBS:	
Range:	+43 to +58 dBm (20 to 631 W)
Resolution:	0.1 dB
Accuracy:	±1 dB
Mode S:	
Range:	+43 to +58 dBm (20 to 631 W)
Resolution:	0.1 dB
Accuracy:	±1 dB

Frequency

Range:	1029.900 to 1030.100 MHz
Resolution:	1 kHz
Accuracy:	±10 kHz

TCAS Broadcast Interval

Range:	1.0 to 12.0 sec
Resolution:	0.1 sec
Accuracy:	±0.2 sec

MISCELLANEOUS INPUTS/OUTPUTS

RF I/O

Type:	Input/Output
Impedance:	50 Ω Typical
Maximum Input Level:	4 kW Peak, 10 W Average
VSWR:	<1.3:1

Antenna

Type:	Input/Output
Impedance:	50 Ω typical
Maximum Input Level:	10 W peak, 0.5 W average

Video

Type:	Output
Impedance:	50 Ω typical
Generate Video Level:	0.2 to 1.5 Vpp into 50 Ω (1030 MHz at –67dBm)
Receive Video Level:	Proportional to IF Level
Baseline:	±0.5 V referenced to Ground

Test Antenna

VSWR:	<1.5:1
Gain:	6 dB, Typical

Time Base (TCXO)

Temperature Stability:	±1 ppm
Aging:	±1 ppm per Year
Accuracy:	±1 ppm
Test Limit:	±0.3 ppm

Battery

Type:	Li Ion
Duration:	>4 hrs continuous operation >6 hrs, Typical

Input Power (Test Set)

Input Range:	11 to 32 Vdc
Power Consumption:	55 W Maximum 16 W Nominal at 18 Vdc with Charged Battery
Fuse Requirements:	5 A, 32 Vdc, Type F

MISCELLANEOUS (cont)

Input Power (Supplied External AC to DC Converter)

Input Range:	100 to 250 VAC, 1.5 A Max, 47 to 63 Hz
Mains Supply Voltage Fluctuations:	≤10% of Nominal Voltage
Transient Overvoltages:	According to Installation Category II

Environmental (Test Set)

Use:	Pollution Degree 2
Altitude:	≤4800 m
Operating Temperature:	-20°C to 55°C
Storage Temperature:	-30°C to 71°C
Relative Humidity:	95% (±5%) from 5°C to 30°C 75% (±5%) from 30°C to 40°C 45% (±5%) from 40°C to 55°C

Environmental (Supplied External AC to DC Converter)

Use:	Indoors
Altitude:	≤10,000 m
Operating Temperature:	0°C to 40°C
Storage Temperature:	-20°C to 71°C

Physical Characteristics (IFR 6000 Test Set)

Dimensions

Height:	11.2 in (28.5 cm)
Width:	9.1 in (23.1 cm)
Depth:	2.7 in (6.9 cm)
Weight (Test Set only):	<8 lbs. (3.6 kg)

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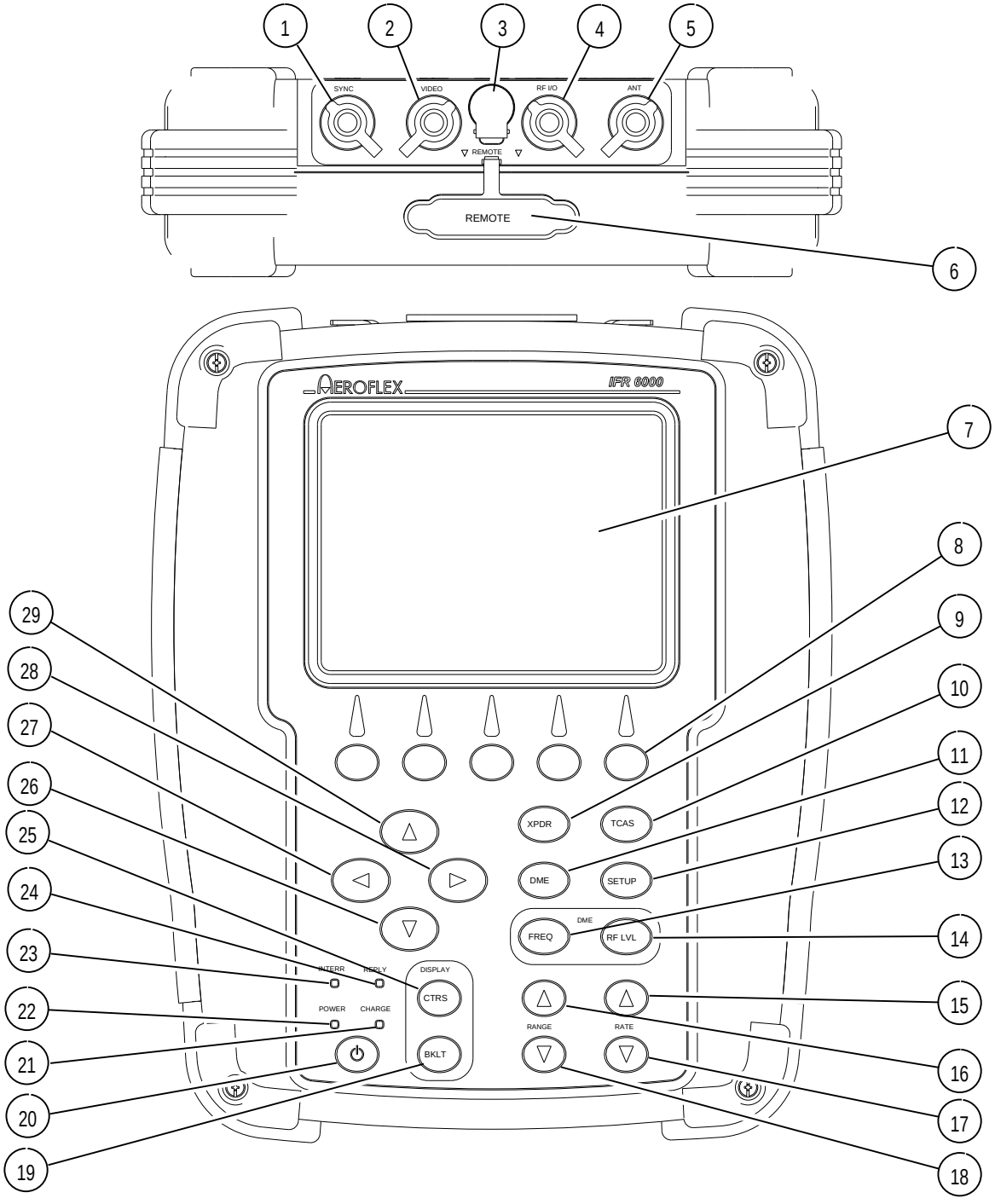
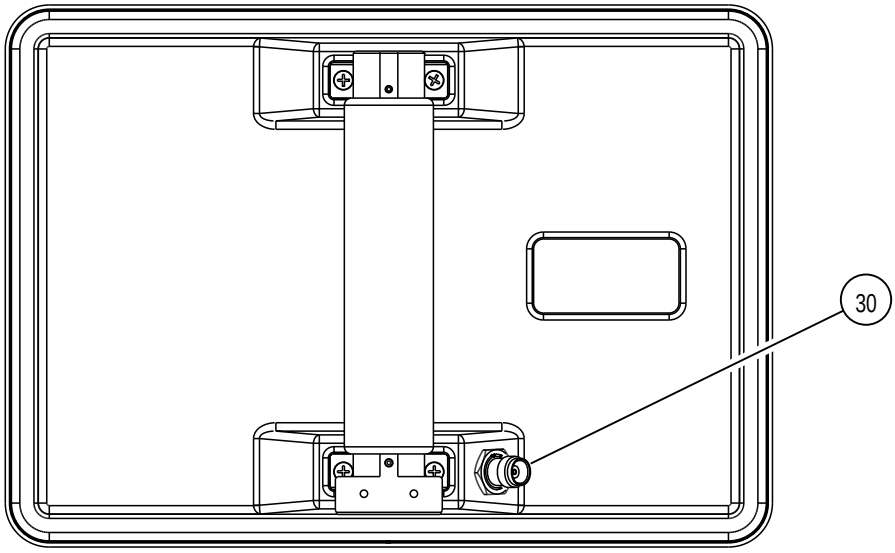
APPENDIX E - CONTROLS, CONNECTORS AND INDICATORS



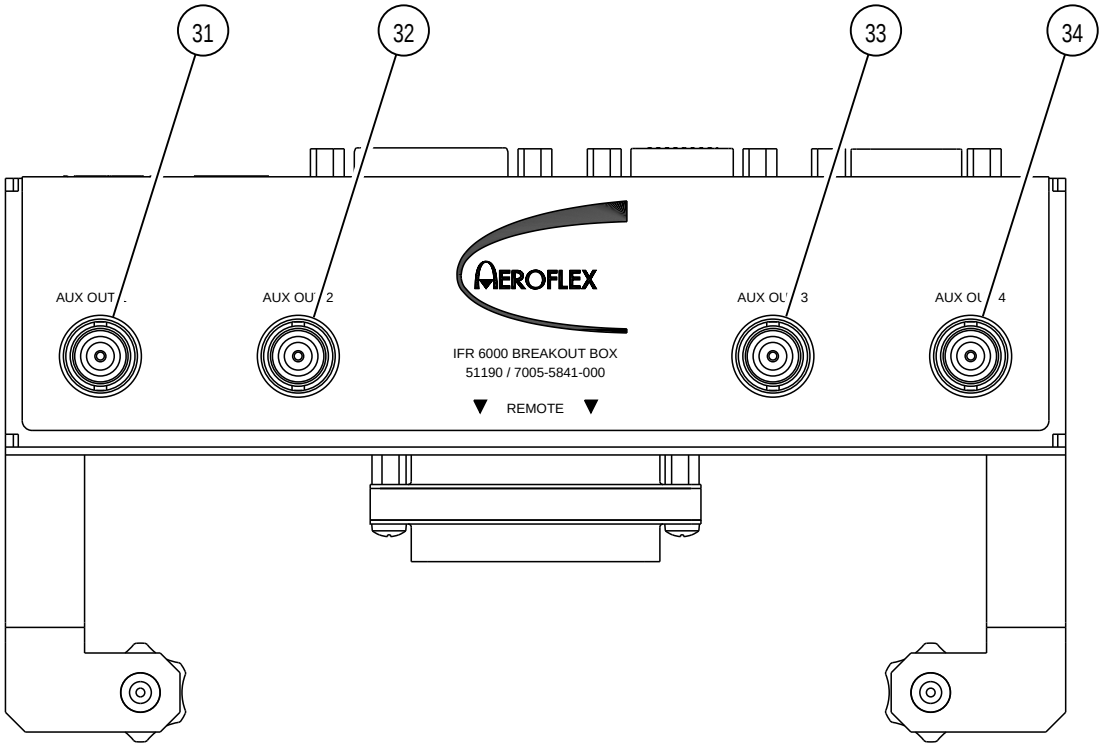
IFR 6000 Front Panel
Figure 1

NUMERICAL LOCATION LIST		ALPHABETICAL LOCATION LIST	
1.	SYNC Connector	ALTITUDE ENCODER Connector	37
2.	VIDEO Connector	ANT Connector	30
3.	DC POWER Connector	AUX IN Connector	38
4.	RF I/O Connector	AUX OUT Connector 1	31
5.	ANT Connector	AUX OUT Connector 2	32
6.	REMOTE Connector	AUX OUT Connector 3	33
7.	Display	AUX OUT Connector 4	34
8.	Multi-Function Soft Keys	BACKLIGHT Key	19
9.	XPDR Mode Select Key	CHARGE Indicator	21
10.	TCAS Mode Select Key	CONTRAST Key	25
11.	DME Mode Select Key	DC POWER Connector	3
12.	SETUP Select Key	DECREMENT/SELECT Data Key	26
13.	FREQ Select Key	RF LEVEL Key	14
14.	RF LVL Key	Display	7
15.	RATE INCREMENT Key	DME Mode Select Key	11
16.	RANGE INCREMENT Key	FREQ Select Key	13
17.	RATE DECREMENT Key	INCREMENT/SELECT Data Key	29
18.	RANGE DECREMENT Key	INTERR Indicator	23
19.	BACKLIGHT Key	Multi-Function Soft Keys	8
20.	POWER Key	POWER Indicator	22
21.	CHARGE Indicator	POWER Key	20
22.	POWER Indicator	RANGE DECREMENT Key	18
23.	INTERR Indicator	RANGE INCREMENT Key	16
24.	REPLY Indicator	RATE DECREMENT Key	17
25.	CONTRAST Key	RATE INCREMENT Key	15
26.	DECREMENT/SELECT Data Key	REMOTE Connector	6
27.	SELECT DATA UNIT MSB Key	REMOTE Connector	40
28.	SELECT DATA UNIT LSB Key	REPLY Indicator	24
29.	INCREMENT/SELECT Data Key	RF I/O Connector	4



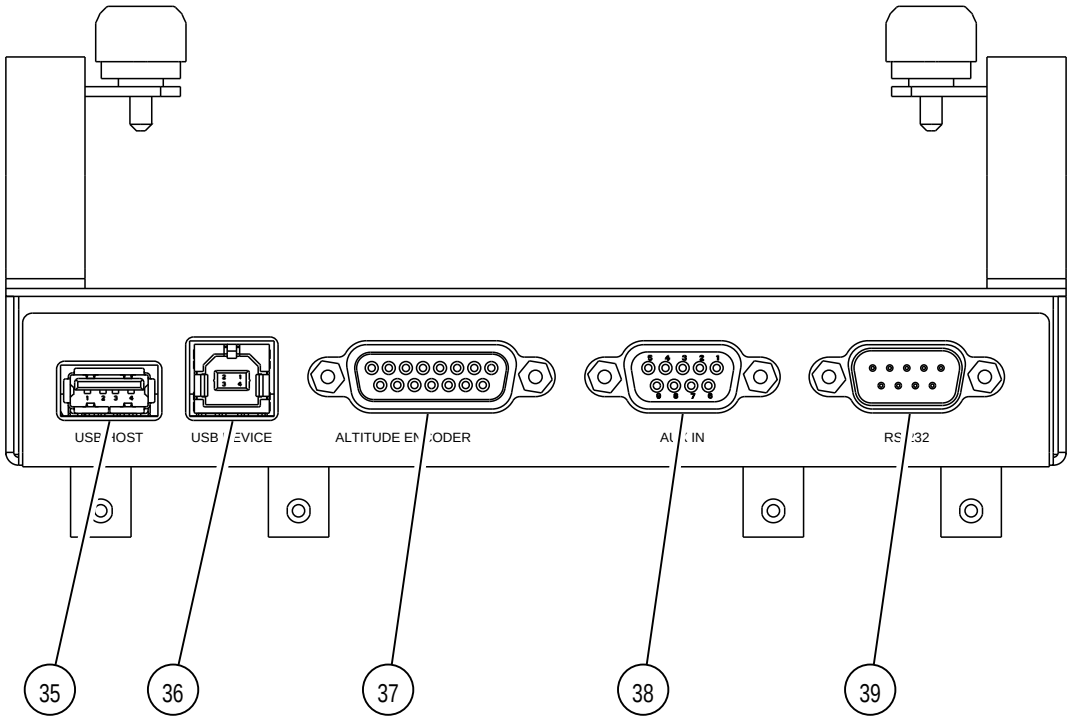
05822

Directional Antenna
Figure 2



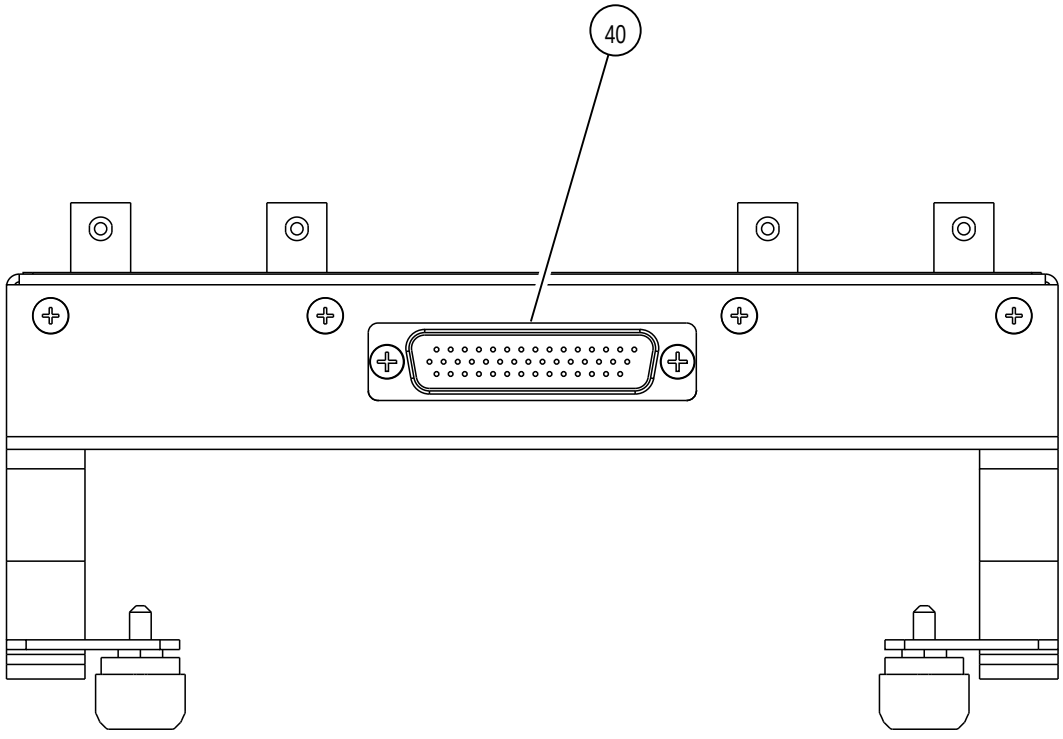
05815A

Breakout Box - Front View
Figure 3



05821A

Breakout Box - Top View
Figure 4



05821B

Breakout Box - Bottom View
Figure 5

NUMERICAL LOCATION LIST		ALPHABETICAL LOCATION LIST	
30.	ANT Connector	ALTITUDE ENCODER Connector	37
31.	AUX OUT Connector 1	ANT Connector	30
32.	AUX OUT Connector 2	AUX IN Connector	38
33.	AUX OUT Connector 3	AUX OUT Connector 1	31
34.	AUX OUT Connector 4	AUX OUT Connector 2	32
35.	USB HOST Connector	AUX OUT Connector 3	33
36.	USB DEVICE Connector	AUX OUT Connector 4	34
37.	Altitude Encoder Connector	REMOTE Connector	40
38.	AUX IN Connector	RS-232 Connector	39
39.	RS-232 Connector	USB DEVICE Connector	36
40.	REMOTE Connector	USB HOST Connector	35

ITEM DESCRIPTION

1. SYNC Connector

   Provides oscilloscope SYNC pulse for each interrogation.

2. VIDEO Connector

   Provides interrogation and reply pulses.

3. DC POWER Connector

   Used for battery charging or operation of the Test Set.

4. RF I/O Connector

   CAUTION: MAXIMUM INPUT TO THE RF I/O CONNECTOR MUST NOT EXCEED 5 KW PEAK OR 30 W AVERAGE.

   Used for direct connection to UUT Antenna Connector.

5. ANT Connector

   Used for connection to the IFR 6000 directional antenna for over the air testing.

6. REMOTE Connector

   Used for remote operation and software upgrades. Contains RS-232, USB Host and USB Peripheral connections (altitude encoder inputs and SYNC outputs).

7. Display (LCD)

   38 characters by 16 lines for main screen display with Soft Key boxes at the bottom of the screen.

8. Multi-Function Soft Keys

   Legends for the five soft keys are displayed in boxes at the bottom of the Display (LCD) screen.

9. XPDR MODE Select Key

   Selects Transponder Auto Test Screen.

10. TCAS MODE Select Key

    Selects TCAS Auto Test Screen.

11. DME MODE Select Key

    Selects DME Test Screen.

12. SETUP Key

    Displays the SETUP Menu.

13. FREQ Select Key

    Selects DME Frequency as VOR Paired, TACAN Channel or MHz.

14. RF LVL Key

    DME mode function only. Selects DME range reply and squitter RF level.

15. RATE INCREMENT Key

    Increments DME or TCAS range rate.

16. RANGE INCREMENT Key

    Increments DME or TCAS range.

ITEM DESCRIPTION

17. RATE DECREMENT Key

    Decrements DME or TCAS range rate.

18. RANGE DECREMENT Key

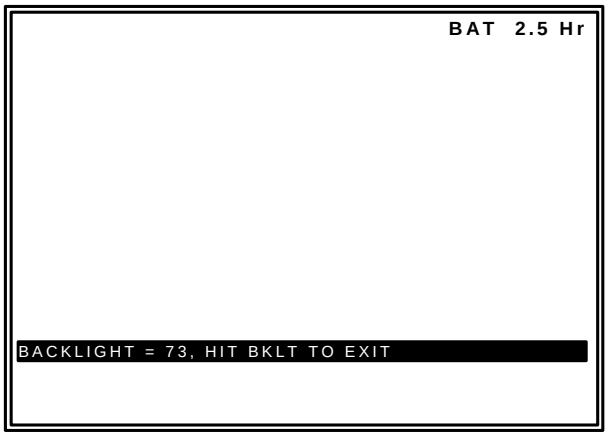
    Decrements DME or TCAS range.

19. BACKLIGHT Key

    Displays/exits the Backlight Adjust Field.

    INCREMENT/SELECT Data Key or DECREMENT/SELECT Data Key may be used to adjust the Backlight Intensity.

    The IFR 6000 powers up with the Backlight set to the setting of the previous session.



20. POWER Key

    Powers the IFR 6000 ON and OFF.

21. CHARGE Indicator

    Illuminated when external DC power is applied for Bench Operation or Battery charging.

    CHARGE Indicator is yellow when the battery is charging, flashing yellow when the battery needs replacing and green when the battery is fully charged.

22. POWER Indicator

    Illuminated when the IFR 6000 is operational.

23. INTERR Indicator

    Illuminated when Test Set is generating an interrogation signal (XPDR Mode) or receives an Interrogation (TCAS Mode) signal.

24. REPLY Indicator

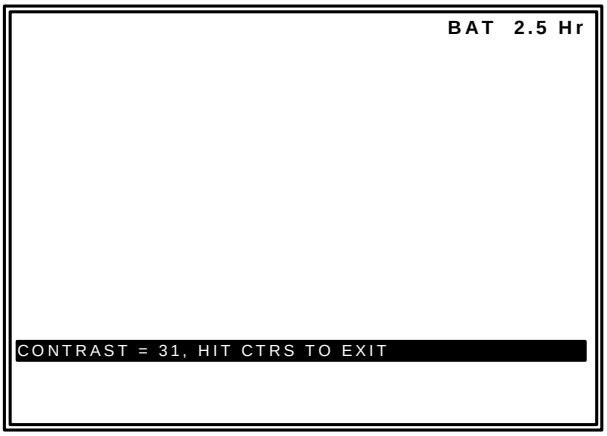
    Illuminated when the Test Set receives a valid reply signal (XPDR Mode) or generates a reply (TCAS Mode) signal.

ITEM DESCRIPTION

25. CONTRAST Key

    Displays/exits the Contrast Adjust Field.

    The INCREMENT/SELECT Data Key or the DECREMENT/SELECT Data Key may be used to adjust the Contrast.



26. DECREMENT/SELECT Data Key

    Decrements data in slewable fields, such as RF LVL. This Key also selects data in fields that have fixed functions, such as ECHO and SQUITTER.

27. SELECT DATA UNIT MSB Key

    Moves the slew cursor toward the MSB (Most Significant Bit) of the data field.

    Example: When DME or TCAS range is selected, the slew cursor can be moved from the 1.0 nm unit to the 10 nm, 0.1 nm or 0.01 nm unit.

28. SELECT DATA UNIT LSB Key

    This Key moves the slew cursor toward the LSB (Least Significant Bit) of the data field.

    Example: When DME or TCAS range is selected, the slew cursor can be moved from the 1.0 nm unit to the 10 nm, 0.1 nm or 0.01 nm unit.

29. INCREMENT/SELECT Data Key

    Increments data in slewable fields, such as RF LVL. This Key also selects data in fields that have fixed functions, such as ECHO and SQUITTER.

30. ANT Connector

    Used for connection to the IFR 6000 for over the air testing.

31. AUX OUT Connector 1

    ATCRBS interrogation trigger used for calibration.

32. AUX OUT Connector 2

    ATCRBS interrogation trigger used for calibration.

33. AUX OUT Connector 3

    Not Used

ITEM	DESCRIPTION

34. AUX OUT Connector 4

    Not Used

35. USB HOST Connector

    USB Jump Drive interface for software update and test data dump.

36. USB DEVICE Connector

    Remote Control Interface.

37. ALTITUDE ENCODER Connector

    Interface for external encoding altimeter.

38. AUX IN Connector

    Not Used

39. RS-232 Connector

    Used for remote control interface, software update and test data dump.

40. REMOTE Connector

    Used to interface with the IFR 6000.

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APPENDIX F - ABBREVIATIONS

A

A	Amperes
AC	Alternating Current
AF	Audio Frequency
AM	Amplitude Modulation
ANT	Antenna
AP	Address Parity
Assy	Assembly
ATTN	Attenuation
AUTO	Automatic
AUX	Auxiliary

B

BAT	Battery
bps	Bits per Second
BRG	Bearing

C

C	Celsius or Centigrade
CAL	Calibration
ccw	Counterclockwise
CDI	Course Deviation Indication
CHNL	Channel
cm	Centimeter (10^{-2} Meters)
COMM	Communication
Cont	Continued
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit
CTS	Clear To Send
cw	Clockwise

D

DAC	Digital to Analog Converter
dB	Decibel
dBc	Decibels below Carrier
dBm	Decibels above one Milliwatt
DC	Direct Current
DDM	Difference in Depth of Modulation
DDS	Direct Digital Synthesis
deg	Degrees
DEL	Delete
DEV	Deviation
DIAGS	Diagnostics
DMA	Direct Access Memory
DRAM	Dynamic Random Access Memory
DWN	Down

E

EMC	Electromagnetic Compatibility
EXT	External

F

FM	Frequency Modulation
FPGA	Field Programmable Gate Array
FREQ	Frequency
Ft	Foot/Feet
F/W	Firmware

G

GEN	Generator or Generate
GND	Ground
G/S	Glideslope

H

Hr	Hour
Hrs	Hours
H/W	Hardware
Hz	Hertz

I

IF	Intermediate Frequency
ILS	Instrument Landing System
I/O	Input/Output

K

kg	Kilogram (10^3 Grams)
kHz	Kilohertz (10^3 Hertz)
km	Kilometer (10^3 meters)
kt	Knots (Velocity)

L

LCD	Liquid Crystal Display
LED	Light Emitting Diode
LOC	Localizer
LPF	Low-Pass Filter
LSB	Least Significant Bit
LVL	Level

M

m	Meters
MAX	Maximum
MB	Message, COMM-B
MHz	Megahertz (10^6 Hertz)
MOD	Modulation
mm	Millimeter (10^{-3} Meters)
M MOD	Master Modulation
ms	Millisecond (10^{-3} Seconds)
MSB	Most Significant Bit
mV	Milliwatt
mW	Millivolt

N

N/A	Not Applicable
NAV	Navigation
nmi	Nautical Miles
ns	Nanosecond (10^{-9} Seconds)
NVRAM	Non-Volatile Random Access Memory

O

OUT	Output

P

para	Paragraph
PARAM	Parameter
PCB	Printed Circuit Board
PLL	Phase Lock Loop
ppm	Parts per Million
PREV	Previous
PROM	Programmable Read Only Memory
psi	Pounds per Square Inch
PWR	Power

R

RAM	Random Access Memory
RES	Resolution
RF	Radio Frequency
RMS	Root Mean Square
ROM	Read Only Memory
RTS	Request To Send
R/W	Read/Write
RX	Receive

S

Sec	Seconds
SELCAL	Selective Calling
SP	Spacing
SPM	Scans per Minute
SPR	Synchronous Phase Reversal
SQTR	Squitter
Sqtr	Squitter
SRAM	Static Random Access Memory
SRQ	Service Request
SRS	Segment Request Subfield
SSR	Secondary Surveillance Radar
STD	Standard
SWP	Sweep
SWR	Standing Wave Ratio
SYNC	Synchronous

T

TCXO	Temperature Compensated Crystal Oscillator
TX	Transmit
TTL	Transistor - Transistor Logic

U

UHF	Ultra High Frequency
USB	Upper Sideband
USB	Universal Serial Bus
UUT	Unit Under Test

V

V	Volt
VAC	Volts, Alternating Current
VAR	Variable
Vdc	Volts, Direct Current
VHF	Very High Frequency
VOR	VHF Omni-Directional Range
Vrms	Volts Root Mean Square
VSWR	Voltage Standing Wave Ratio

W

W	Watt

µA	Microamps
µs	Microseconds
µW	Microwatts
Ω	Ohm

APPENDIX G - HEROTEK DETECTOR CALIBRATION PROCEDURE

TEST EQUIPMENT: Signal Generator
Digital Multimeter

STEP PROCEDURE

1. Set up Signal Generator for 1060 MHz, and determine settings to obtain the following levels (using a Digital Multimeter to verify level):

   -2 dBm, -2.92 dBm, -8 dBm, -14 dBm, -22 dBm

   (-2 dBm is the output level used on the IFR 6000 during testing)

2. Connect detector input to Signal Generator output (terminate detector output into 50 Ω) and Digital Multimeter.

3. Using the settings determined from Step 1, obtain the following detector voltages:

Label	RF Level	-2 dBm Detector voltage mVdc	RF Level	-5 dBm Detector voltage mVdc
V1	-2 dBm		-5 dBm	
V2	-2.92 dBm		-5.92 dBm	
V3	-8 dBm		-11 dBm	
V4	-14 dBm		-17 dBm	

4. Compute the -2 dBm correction by the following formula:

   Correction = (V2/V1)*100 (90% point)

   Correction = (V3/V1)*100 (50% point)

   Correction = (V4/V1)*100 (10% point)

5. In order to find the 10%, 50% and 90% points of the pulse being measured, first measure the pulse amplitude and then use the corrections in Step 4 to find the correct point on the pulse to measure.

   EXAMPLE: If the pulse measures 50 mV in amplitude, the 90% point correction is 87.5% and the 10% point is 1.8%, then perform the following calculations to measure rise and fall times:

   50 mV * .875 (87.5%) = 43.75 mV
   50 mV * .018(1.85) = .841 mV

6. Find the amplitude points on the pulse and put the time cursors at these spots to find the rise and fall times. The pulse width is measured using the 50% point correction.

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