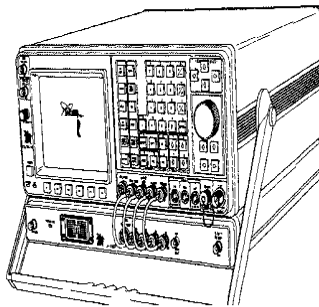


## TECHNICAL MANUAL

### GENERAL SUPPORT MAINTENANCE MANUAL



### RADIO TEST SET AN/GRM-114B (NSN 6625-01-309-2824) (EIC: KN2)

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**5**

**SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK:**

**1**

**DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL.**

**2**

**IF POSSIBLE, TURN OFF THE ELECTRICAL POWER.**

**3**

**IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL.**

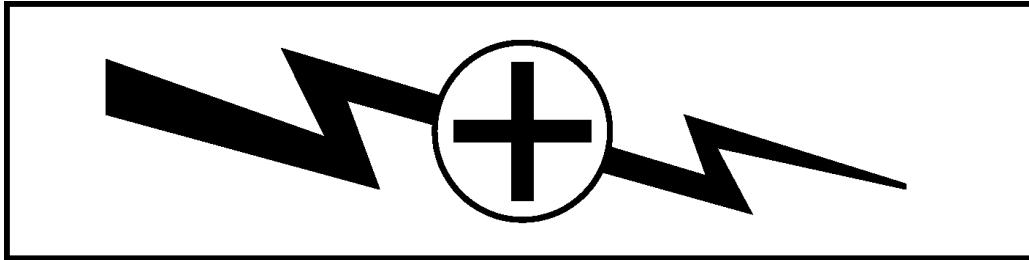
**4**

**SEND FOR HELP AS SOON AS POSSIBLE.**

**5**

**AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION.**

**WARNING**



**HIGH VOLTAGE**

is used in the operation of this equipment.

**DEATH ON CONTACT**

may result if personnel fail to observe safety precautions.

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When technicians are aided by operators, they must warn them about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections of 115-volt or 220-volt ac input when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

**WARNING**

Do not be misled by the term "LOW VOLTAGE." Potentials as low as 50 volts may cause death under certain conditions.

For First Aid, refer to FM 4-25.11.



# CAUTION



THIS EQUIPMENT CONTAINS PARTS  
AND ASSEMBLIES SENSITIVE TO  
DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).  
USE ESD PRECAUTIONARY PROCEDURES WHEN TOUCHING,  
REMOVING OR INSERTING PRINTED CIRCUIT BOARDS.

## ESD CLASS 1

### NOTE

The symbol for static sensitive devices in military inventory is as depicted in the caution block above.

### GENERAL HANDLING PROCEDURES FOR ESD ITEMS

- USE WRIST GROUND STRAPS OR MANUAL GROUNDING PROCEDURES.
- KEEP ESD ITEMS IN PROTECTIVE COVERING WHEN NOT IN USE.
- GROUND ALL ELECTRICAL TOOLS AND TEST EQUIPMENT.
- PERIODICALLY CHECK CONTINUITY AND RESISTANCE OF GROUNDING SYSTEM.
- USE ONLY METALIZED SOLDER SUCKERS.
- HANDLE ESD ITEMS ONLY IN PROTECTED AREAS.

### MANUAL GROUNDING PROCEDURES

- MAKE CERTAIN EQUIPMENT IS POWERED DOWN.
- TOUCH GROUND PRIOR TO REMOVING ESD ITEMS.
- TOUCH PACKAGE OF REPLACEMENT ESD ITEM TO GROUND BEFORE OPENING.
- TOUCH GROUND PRIOR TO INSERTING REPLACEMENT ESD ITEMS.

### ESD PROTECTIVE PACKAGING AND LABELING

- INNER COVERING OF ANTISTATIC MATERIAL WITH AN OUTER WRAP OF EITHER TYPE 1 ALUMINIZED MATERIAL OR CONDUCTIVE PLASTIC FILM OR HYBRID LAMINATED BAGS HAVING AN INTERIOR OF ANTISTATIC MATERIAL WITH AN OUTER METALIZED LAYER.
- LABEL WITH SENSITIVE ELECTRONIC SYMBOL AND CAUTION NOTE.

**CAUTION**

Devices such as CMOS, MNOS, NMOS, VMOS, HMOS, thin-film resistors PMOS, and MOSFET used in many equipments can be damaged by static voltages present in most repair facilities. Most of the components contain internal gate protection circuits that are partially effective, but sound maintenance practice and the cost of equipment failure in time and money dictate careful handling of all electrostatic sensitive components.

The following precautions should be observed when handling all electrostatic sensitive components and units containing such components.

**CAUTION**

Failure to observe all of these precautions can cause permanent damage to the electrostatic sensitive device. This damage can cause the device to fail immediately or at a later date when exposed to an adverse environment.

- STEP 1. Turn off and/or disconnect all power and signal sources and loads used with the unit.
- STEP 2. Place the unit on grounded conductive work surfaces.
- STEP 3. Ground the repair operator using a conductive wrist strap or other device using a 1-M series resistor to protect the operator.
- STEP 4. Ground any tools (including soldering equipment) that will contact the unit. Contact with the operator's hand provides a sufficient ground for tools that are otherwise electrically isolated.
- STEP 5. All electrostatic sensitive replacement components are shipped in conductive foam or tubes and must be stored in the original shipping container until installed.
- STEP 6. When these devices and assemblies are removed from the unit, they should be placed on the conductive work surface or in conductive containers.
- STEP 7. When not being worked on, wrap disconnected circuit boards in aluminum foil or in plastic bags that have been coated or impregnated with a conductive material.
- STEP 8. Do not handle these devices unnecessarily or remove from their packages until actually used or tested.

CHANGE }  
No. 2 }

Headquarters  
Department of the Army  
Washington, D.C., 25 May 2007

**GENERAL SUPPORT MAINTENANCE MANUAL  
FOR  
RADIO TEST SET  
AN/GRM-114B  
TS-4358/G  
(NSN 6625-01-309-2824) (EIC: KN2)**

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**TM 11-6625-3245-40**  
**C2**

2-5 and 2-6  
A-1/(A-2 blank)  
B-1 and B-2  
DA Forms 2028-2  
Cover

2-5 and 2-6  
A-1 and A-2  
B-1 and B-2  
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Cover

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Change

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AND HEADQUARTERS, MARINE CORPS  
Washington, DC, 1 August 1996

No. 1

**General Support Maintenance Manual  
For  
RADIO TEST SET AN/GRM-1 14B  
(NSN 6625-01-309-2824) (EIC: KN2)**

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2-117 and 2-118  
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2-191 and 2-192  
2-201 and 2-202  
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2-63 through 2-70  
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2-83 and 2-84  
2-92 and 2-92  
2-113 and 2-114  
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2-191 and 2-192  
2-201 and 2-202  
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Change	2	25 May 2007

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**TECHNICAL MANUAL  
NO. 11-6625-3245-40**

**HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 05 April 1994**

**GROUND SUPPORT MAINTENANCE MANUAL  
FOR  
RADIO TEST SET  
AN/GRM-114B  
(NSN 6625-01-309-2824) (EIC: KN2)**

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to: Commander, U. S. Army Aviation and Missile Command, AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000. A reply will be furnished to you. You may also provide DA Form 2028 information to AMCOM via email, fax or the World Wide Web. Our fax number is: DSN 788-6546 or Commercial 256-842-6546. Our email address is: [2028@redstone.army.mil](mailto:2028@redstone.army.mil). Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hardcopy 2028. For the World Wide Web use: <https://amcom2028.redstone.army.mil>.

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---

### HOW TO USE THIS MANUAL

This manual tells you about the Radio Test Set AN/GRM-114B and contains instructions on how to test and maintain it.

When the Radio Test Set is first received, start at the front of the manual and go all the way through to the back. Become familiar with every part of the manual and the Radio Test Set.

---





**CHAPTER 1  
INTRODUCTION**

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**Section I. GENERAL INFORMATION**

**1-1. SCOPE.**

- a. Type of Manual. General Support Maintenance Manual.
- b. Equipment Name and Model Number. Radio Test Set AN/GRM-114B.
- c. Purpose of Equipment. The Radio Test Set AN/GRM-114B is a general-purpose communications test set for testing radios and related equipment.

**1-2. CONSOLIDATED ARMY PUBLICATIONS AND FORMS INDEX.**

Refer to the latest issue of DA Pam 25-30 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

**1-3. MAINTENANCE FORMS, RECORDS AND REPORTS.**

**a. Reports of Maintenance and Unsatisfactory Equipment.** Department of the Army forms and procedures used for equipment maintenance are prescribed in DA Pam 750-8 as contained in The Army Maintenance Management System (TAMMS) Users Manual.

**b. Report of Item and Packaging Deficiencies.** Fill out and forward SF 364, Report of Discrepancy (ROD), as prescribed in AR 735-11-2/DLAI 4140.55/SECNAVINST 4355.18A/AFJMAN 23-215.

**c. Transportation Discrepancy Report (TDR) (SF 361).** Fill out and forward SF 361, Report of Discrepancy (ROD), as prescribed in DA Pam 25-30.

**1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.**

Destruction of Army materiel to prevent enemy use is described in TM 750-244-2.

**1-5. NOMENCLATURE CROSS-REFERENCE LIST.**

Common names are used when the Radio Test Set AN/GRM-114B is mentioned in this manual.

**NOTE**

**Official Nomenclature must be used when filling out report forms or looking up technical manuals.**

**Common Name**

Radio Test Set  
Test Set  
Test Adapter

**Official Nomenclature**

Radio Test Set, AN/GRM-114B  
Radio Test Set, TS-4317/GRM  
Test Adapter, J-4843/GRM-114B

**1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).**

If the AN/GRM-114B needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to us at: Commander, US Army Aviation and Missile Command, AMSAM-MMC-MA-NM, Redstone Arsenal, AL 35898-5000. We'll send you a reply.

**1-7. WARRANTY INFORMATION.**

The Radio Test Set is warranted by Aeroflex, Incorporated for 24 months from date of government acceptance, found in Block 21, DD form 250. Report all defects in material or workmanship to your supervisor, who will take appropriate action.

**Section II. EQUIPMENT DESCRIPTION AND DATA****1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.**

Refer to TM 11-6625-3245-12, Chapter 1, Section II for this information.

**1-9. EQUIPMENT DATA.**

Refer to TM 11-6625-3245-12, Chapter 1, Section II for this information.

**1-10. SAFETY, CARE AND HANDLING.**

Observe all WARNINGS, CAUTIONS and NOTES in this manual. This equipment can be extremely dangerous if these instructions are not followed.

**SECTION III. PRINCIPLES OF OPERATION****1-11. GENERAL FUNCTIONAL DESCRIPTION.**

Refer to TM 11-6625-3245-12, Chapter 1, Section III for this information.

**1-12. DETAILED FUNCTIONAL DESCRIPTION.**

The Radio Test Set Functional Block Diagram (fig. FO-1) shows the relationship of all assemblies. The following is a detailed description of the Radio Test Set assemblies.

(1)

a. **78A1A16 Power Supply (fig. 1-2).** When ac power is applied, it is passed to the PWR APPLIED CIRCUIT where it is regulated to form the PWR APPLIED LED Signal to activate the POWER APPLIED Indicator.

When dc power is applied, it is passed to the +15 V REG (Regulator). The 15 V Regulator provides +15 V to the PWR APPLIED CIRCUIT to generate the POWER APPLIED LED Signal to activate the POWER APPLIED Indicator.

Once the POWER Switch is pressed, the PWR ON SW Signal is sent to the PWR ON CIRCUIT. This Circuit activates the POWER ON LED Signal to illuminate the POWER ON Indicator.

If ac power is used, the POWER ON CIRCUIT also passes a signal to the RELAY DRIVER to activate the RELAY DRIVER, closing the AC IN RELAY. The ac voltage is passed to the LINE RECTIFIER & VOLTAGE DOUBLER. The LINE RECTIFIER & VOLTAGE DOUBLER provides approximately +300 Vdc to the POWER MOSFET Switcher.

If dc power is used, pressing the POWER Switch activates the DC/DC CONVERTOR CIRCUIT, which generates approximately +300 Vdc to the POWER MOSFET Switcher.

The POWER MOSFET Switcher passes a 300 Vp-p square wave to the TRANSFORMER & RECTIFIER Circuit. The TRANSFORMER & RECTIFIER Circuit has +15 V, +5 V and -15 V as outputs.

One of the +15 V supply lines is passed through the SCOPE +12V REG (Regulator) to provide +12 Vdc to A15 CRT. All other supply lines are passed to all assemblies as required.

The FAN is also powered by +15 V, which is passed through the FAN CONTROL Circuit. The FAN is a two speed fan. If the FAN ON HIGH Signal is active, the FAN CONTROL Circuit switches the FAN to the highest speed.

Current and voltage requirements are passed from the TRANSFORMER AND RECTIFIER CIRCUIT to the POWER MOSFET through the OPTO-COUPLER and the PULSE WIDTH MODULATOR (PWM). When a high current condition is detected by the OPTO- COUPLER and PULSE WIDTH MODULATOR, the POWER MOSFET shuts down, turning off the voltage output of the A16 Power Supply.

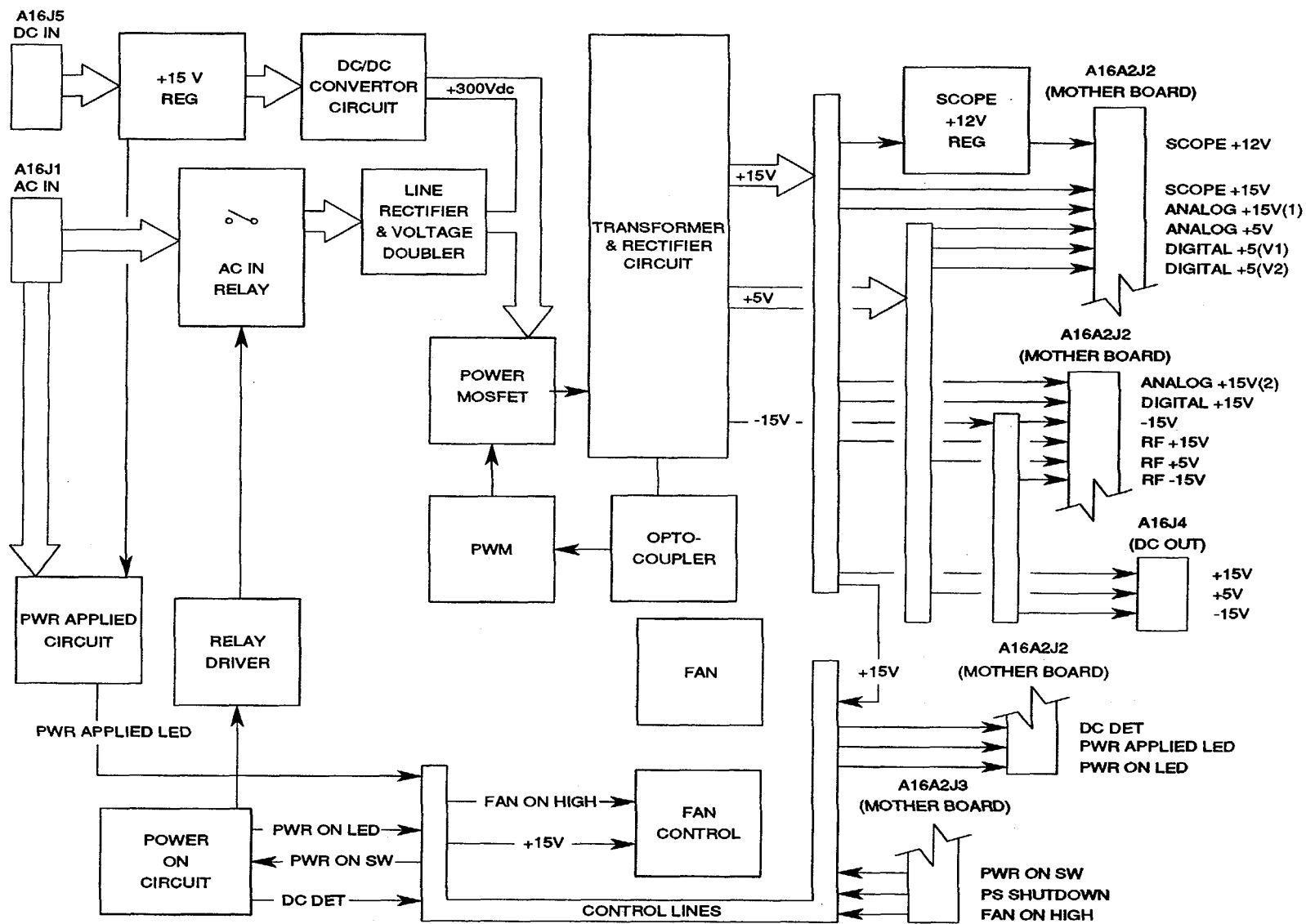


Figure 1-2. A16 Power Supply Functional Block Diagram.

(2)

**b. 78A1A19 Processor (fig. 1-3).** The A19 Processor provides the overall control for the system. The CPU is an 80376 embedded microcontroller. The 80376 is a 32 bit processor with a 24 bit address bus and 16 bit data bus. To speed up the system, an 82370 Integrated System Peripheral Device is attached to provide supervision for DMA and Interrupt Requests and Acknowledges. Additional controller circuits include the following:

- MAX 690 Supervisory Circuit controls power-up RESET and Nonmaskable Interrupt actions. RESET affects the 80376, the 82370 and other 110 Devices. The RESET signal from the MAX 690 becomes the RESDRV signal on the NAT-BUS.
- Memory Select Circuit controls what section of memory is being used.
- Wait State Circuit inserts 1 to 16 wait states into I/O processing, as needed.
- Real-time clock containing time-of-day clock, alarm, 100 year calendar, programmable interrupt, square wave generator and 50 bytes of memory. A lithium power source is included in the package to keep the clock updated when power is not applied.

Memory available on the A19 Processor includes 128kX8 ROM and 64kX8 RAM. The ROM is used for part of the system code. The RAM is used for storing program global parameters.

The AT Compatible I/O Channel (NAT-BUS) contains:

- 16 bit bi-directional data bus.
- 24 bit address line bus.
- 9 levels of interrupt.
- Memory and I/O Read/Write lines.
- Clock and timing lines.
- 5 channels of DMA control lines.
- 7 memory refresh timing control lines.

Data in and out of the NAT-BUS is controlled by the NAT-BUS Buffer.

The RS-232 INTERFACE is attached directly to the RS-232 Connector. The RS-232 INTERFACE translates both directions between the microprocessor and the device attached to the RS-232 connector.

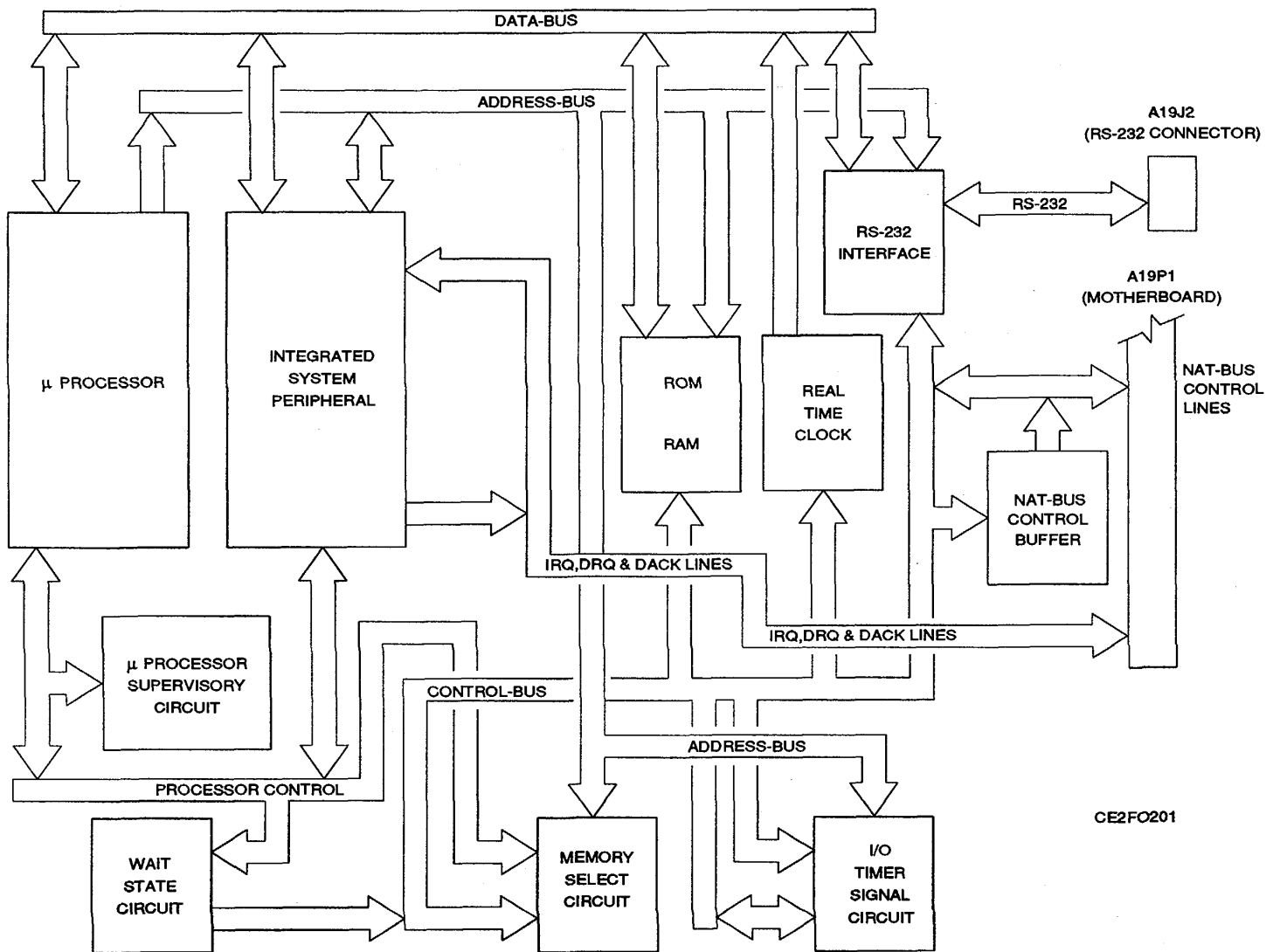


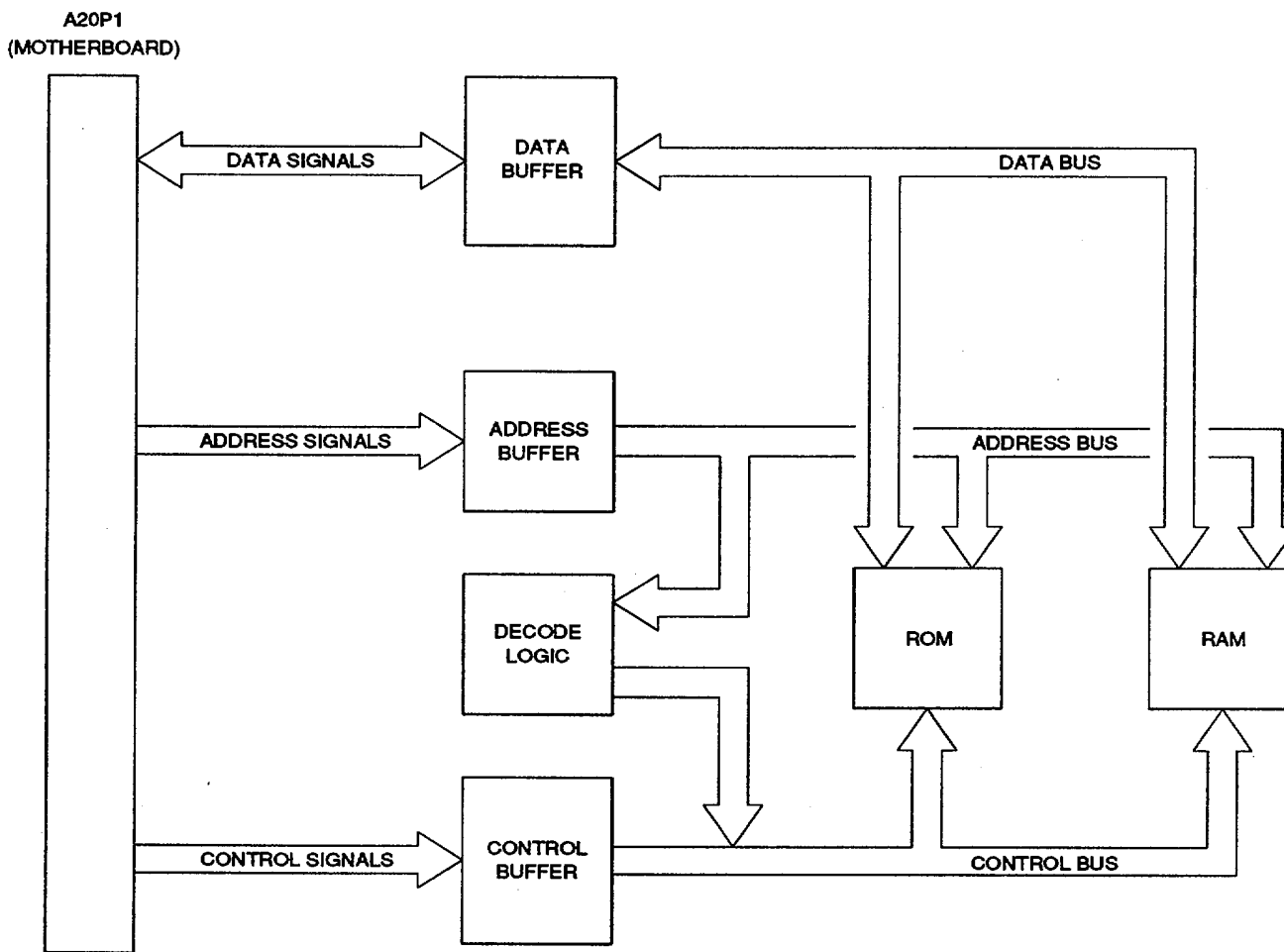
Figure 1-3. A19 Processor Functional Block Diagram.

(3)

c. **78A1A20 Memory (fig. 1-4).** The ADDRESS, DATA and CONTROL Signals, passed to the A20 Memory, are buffered before being made available to the A20 Memory. The ADDRESS BUS is accessed by the DECODE LOGIC Circuitry. The DECODE LOGIC Circuitry generates control signals enabling the proper memory device.

Memory devices consist of RAM and ROM. The RAM is Static Protected. The ROM is EEPROM.





CE2FO202

Figure 1-4. A20 Memory Functional Block Diagram.

CE2FO202

**(4)**

**d. 78A1A21 Video Controller (fig. 1-5).** The A21 Video Controller is responsible for processing digital video information before passing it on to the **A15** CRT. The A21 Video Controller is composed of the following sections:

- Video Graphics Array (VGA).
- Video RAM (256k in 8-64X4 bit configuration).
- Monitor Interface.
- Video Setup Circuitry.

The controller of the A21 Video Controller is the Video Graphics Array. Upon power-up, the Video Setup Circuitry initializes the Video Graphics Array. The A21 Video Controller interprets data and passes the appropriate signals to the A15 CRT through the Monitor Interface. Signals provided to the A15 CRT are Color Data, V Sync and H Sync. Color Data consists of the following signals:

- Primary Blue.
- Primary Green.
- Primary Red.
- Secondary Blue.
- Secondary Green.
- Secondary Red.

Data storage is provided by the VRAM. This is dynamic memory requiring refreshing.

Clocking for the Video Graphics Array is provided by a 16.257 MHz Clock.

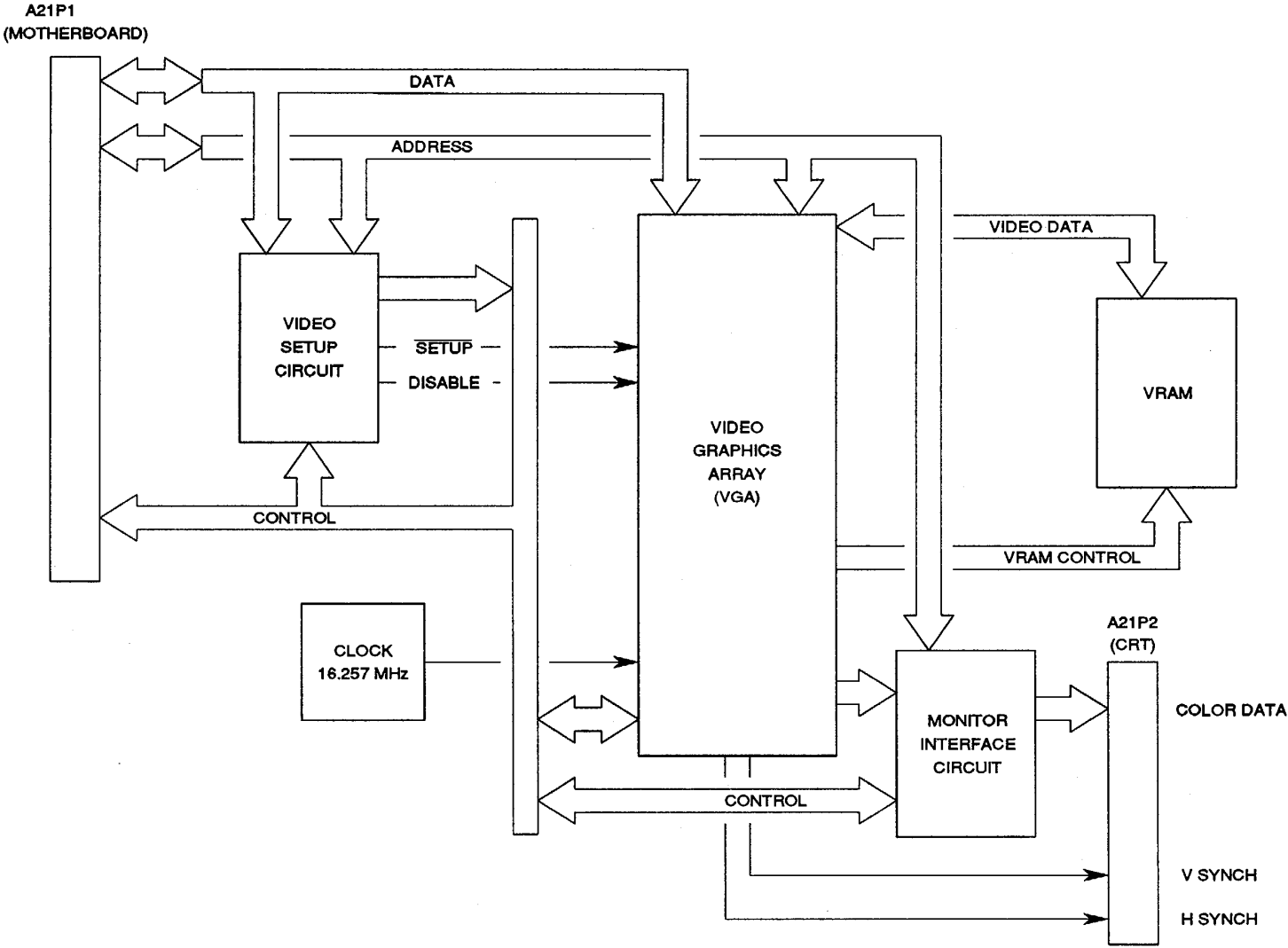


Figure 1-5. A21 Video Controller Functional Block Diagram.

(5)

e. **78A21A15 CRT (7005-7840-600) (fig. 1-6).** The Color Signals, Vertical Sync (VERT SYNC) and Horizontal Sync (HORIZ SYNC) signals are passed from the A21 Video Controller to the A15 CRT.

The primary and secondary colors are buffered and then passed to the PRIMARY/SECONDARY COLORS RESISTER NETWORK where they are divided by resistors and mixed into three color signals. The three color signals are passed through the COLOR/BLANKING CONTROLLER to the CRT. Between the COLOR/BLANKING CONTROLLER and the CRT, the colors are amplified and passed through the Cutoff Adjustment Circuitry.

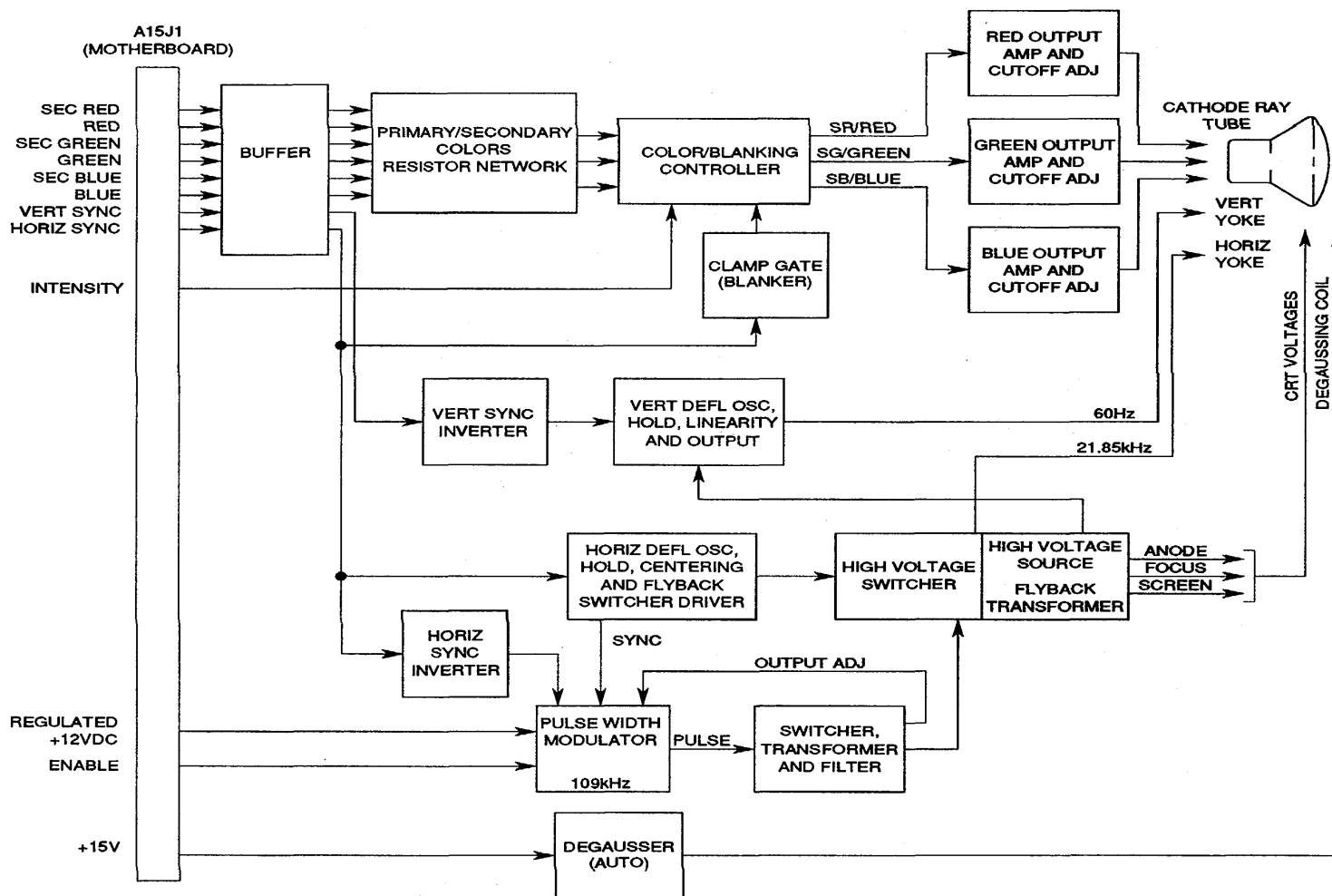
The VERT SYNC Signal from the A21 Video Controller is inverted and passed to the Vertical Deflection Oscillator. The Vertical Deflection Oscillator then generates the signal to deflect the image vertically and passes it to the Vertical Yoke. The HORIZ SYNC Signal from the A21 Video Controller is used to:

- Create the BLANKING signal for the CRT.
- Deflect the image horizontally on the CRT.
- Clock the PULSE WIDTH MODULATOR.

Deflecting the image horizontally is done by passing the HORIZ SYNC signal to the Horizontal Deflection Oscillator which generates the Horizontal Deflection Signal and passes it to the Horizontal Yoke. Feedback returns from the Horizontal Yoke to the Flyback Transformer. The Flyback Transformer then supplies the ANODE, FOCUS and SCREEN Voltages to the CRT.

Another use of the HORIZ SYNC Signal is to create the Blanking Signal. The HORIZ SYNC Signal is passed to the CLAMP GATE to generate the Blanking Signal to the COLOR/BLANKING CONTROLLER.

The HORIZ SYNC Signal is also used to clock the PULSE WIDTH MODULATOR which controls the HIGH POWER SWITCHER and FLYBACK TRANSFORMER. The HORIZ SYNC Signal supplied by the A21 Video Controller is Inverted before being passed to the PULSE WIDTH MODULATOR.



CE2FO001

CE2FO001

Figure 1-6. A15 CRT Functional Block Diagram.

(5)

f. **78A1A15 CRT (7005-8644-300) (fig. 1-7).** The Color Signals, Vertical Sync (VERT SYNC) and Horizontal Sync (HORIZ SYNC) signals are passed from the A21 Video Controller to the A15 CRT.

The primary and secondary colors are buffered and then passed to the PRIMARY/SECONDARY COLORS RESISTER NETWORK where they are divided by resistors and mixed into three color signals. The three color signals are passed through the VIDEO AMPLIFIER to the CRT. Between the VIDEO AMPLIFIER and the CRT, the colors are amplified and passed through the Cutoff Adjustment Circuitry.

The VERT SYNC Signal from the A21 Video Controller is inverted and passed to the HORIZ/VERT DEFLECTION OSCILLATOR. The HORIZ/VERT DEFLECTION OSCILLATOR then generates the signal to deflect the image vertically and passes it to the Vertical Yoke.

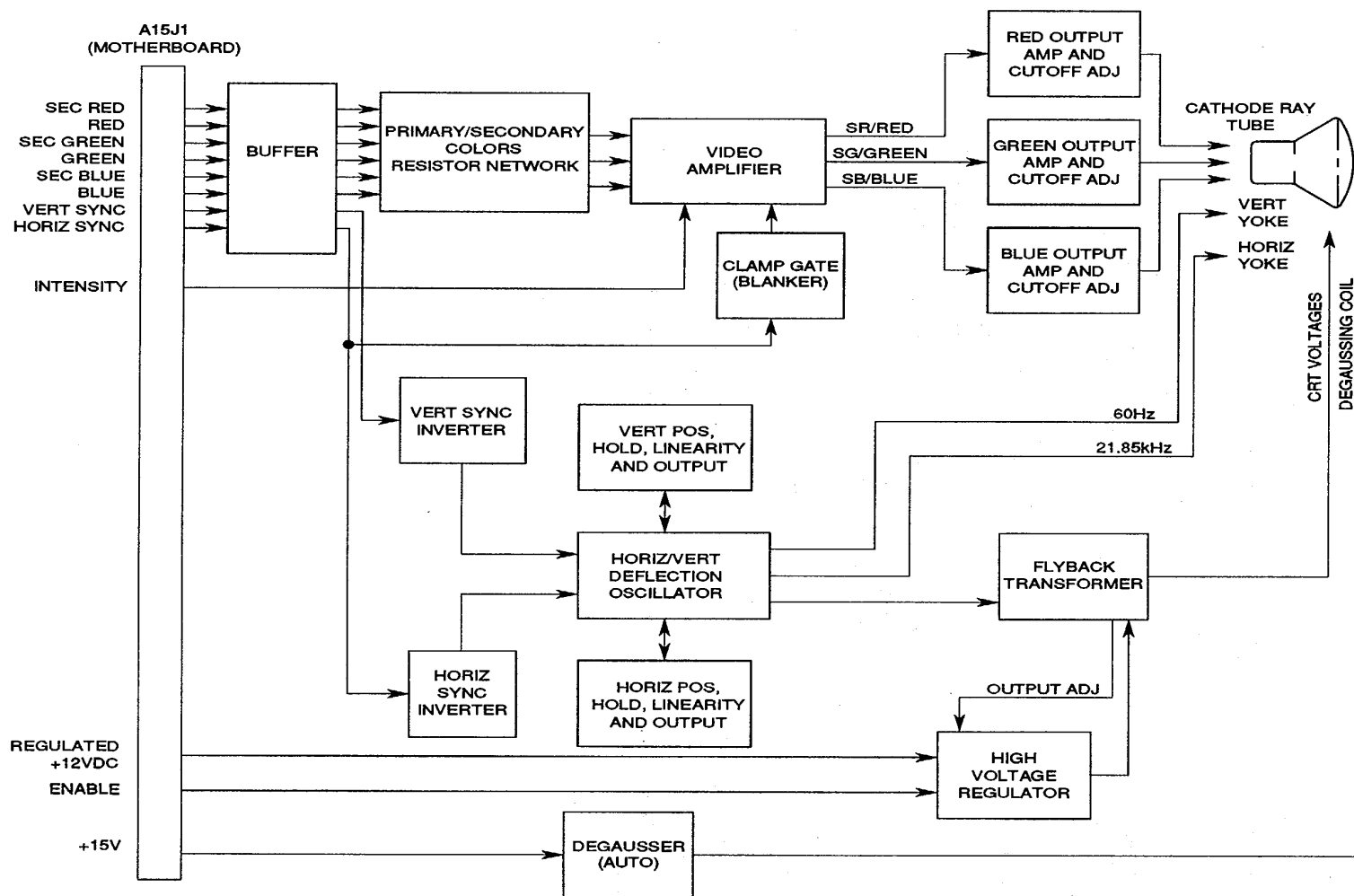
Adjustments are provided by the VERT POS, HOLD, LINEARITY and OUTPUT Circuitry.

Deflecting the image horizontally is done by passing the HORIZ SYNC signal to the HORIZ/VERT DEFLECTION OSCILLATOR which generates the Horizontal Deflection Signal and passes it to the Horizontal Yoke. Adjustments are provided by the HORIZ POS, HOLD, LINEARITY and OUTPUT Circuitry.

The HORIZ SYNC Signal is also used for the CLAMP GATE in generating the Blanking signal.

The HORIZ/VERT DEFLECTION OSCILLATOR also feeds the FLYBACK TRANSFORMER. The FLYBACK TRANSFORMER is also fed by the HIGH VOLTAGE REGULATOR. The FLYBACK TRANSFORMER then supplies High Voltage signals to the CRT.

The Degausser passes the Degaussing Signal to the Degaussing Coil. The Degausser is supplied by +15 V.



CE2FO234

Figure 1-7. A15 CRT Functional Block Diagram.

CE2FO234

(6)

g. **78A1A24 Function Generator (fig. 1-8).** The A24 Function Generator synthesizes the audio signals and serial data that the TEST SET generates. The A24 Function Generator is microprocessor controlled with an interface to the A19 Processor. The microprocessor, a Zilog Super 8, serves as slave processor to the A19 Processor. The A24 Function Generator processes the following signals:

- GEN1 Output.
- GEN2 Output.
- Serial Data.
- EXT MOD IN Connector input.
- MIC/ACC Connector input.
- DTMF.

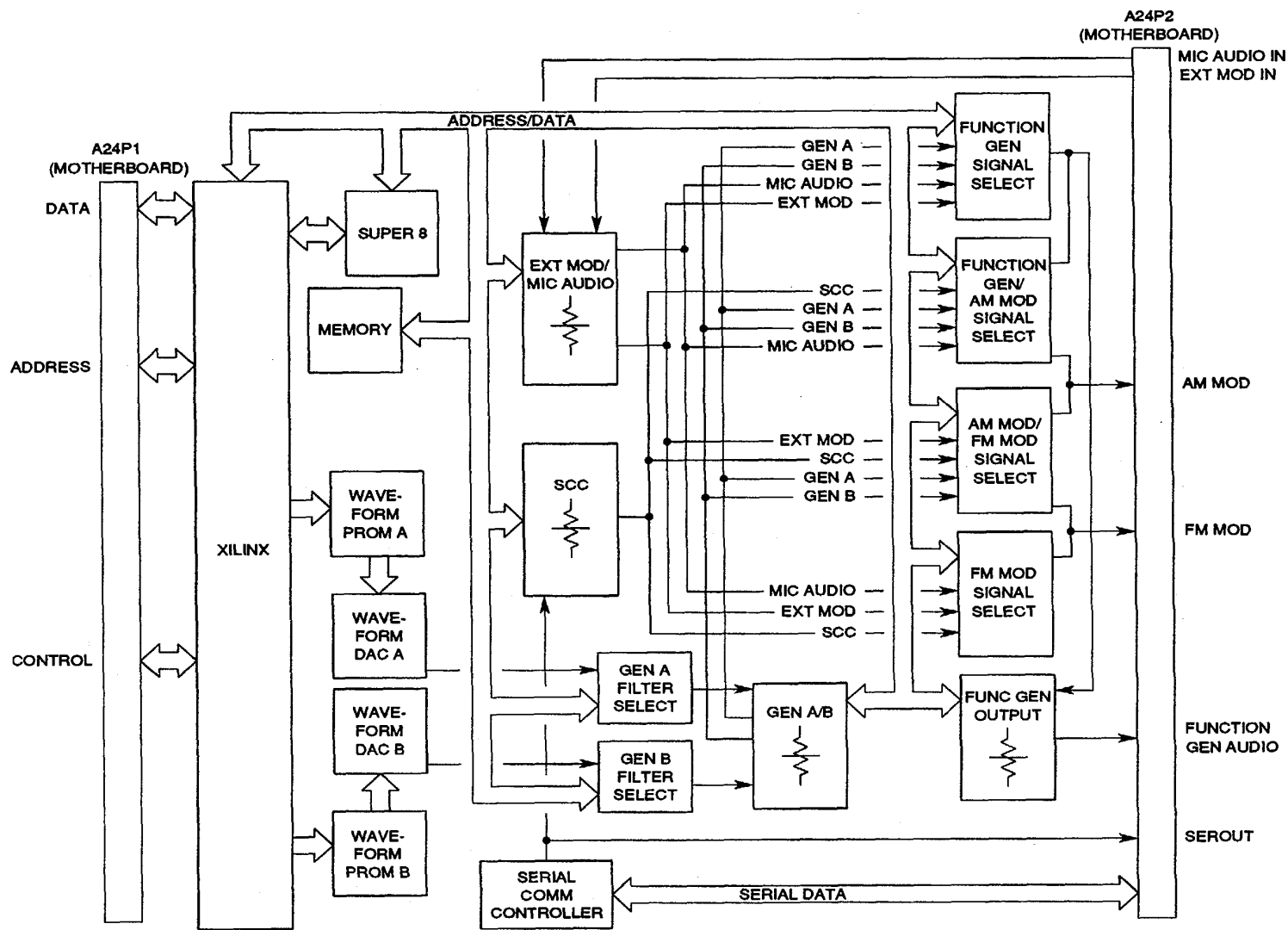
The two audio generators use a procedure that encompasses both analog and digital processes. The A19 Processor passes requirements to the Super 8 Microprocessor. The Super 8 Microprocessor passes information to the XILINX concerning wave shape, frequency and required synthesizer for generating audio tones. The XILINX instructs the proper PROM (one for each audio generator) which wave shape to write and provides the clock for the selected frequency. The output from the PROM is processed by a D/A Converter as the first step of the analog process. The resulting signal is then filtered by a Wave Shaping Filter selected by the Super 8 Microprocessor. The signal level is 5 Vp-p. The Generator Attenuator attenuates the signal to the required output level. The final output location for this signal is selected by the Audio Switching Matrix.

Both EXT MOD IN Connector signals and MIC/ACC Connector signals are imported and passed through an attenuator for setting the signal level. The resulting signals are passed to the Audio Switching Matrix for output selection.

Data signals can be generated by either the Super 8 Microprocessor or the SERIAL COMMUNICATION CONTROLLER. The resulting signal can be passed as raw data or filtered and attenuated. The filtered signal is sent to the Audio Switching Matrix. The unaltered signal is available directly for output. Level changing to bipolar ( $\pm 6$  V) and TTL levels is also available at the same time filtering is done. The Filter available is a 300 Hz Low-Pass Filter for use in signaling formats.

The Audio Switching Matrix is presented with five different inputs and selects three different outputs for each. For each input, only one output can be selected, however, all five inputs can be active simultaneously. The three outputs available include: FM MOD OUT, AM MOD OUT and FUNCTION GENERATOR AUDIO OUT to the AUDIO OUT Connector (A17J6). The FM MOD OUT and AM MOD OUT signals are available directly to the A9 90 MHz Generator from the Audio Switching Matrix. The FUNCTION GENERATOR AUDIO OUT is processed by another attenuator, giving a wider dynamic range and then filtered by a 60 kHz Low-Pass Filter. This signal is then presented to the AUDIO OUT Connector (A17J6). Selections for the Audio Switching Matrix are passed from A19 Processor to the Super 8 Microprocessor for processing.





CE2FO204

Figure 1-8. A24 Function Generator Functional Block Diagram.

CE2FO204

(7)

**h. 78A1A26 Monitor Control (fig. 1-9).** The A26 Monitor Control is the controller for the A3 Monitor. It provides control signals and clocking signals for the A3 Monitor. Additionally, the A26 Monitor Control contains the DVM (Digital Voltmeter), which measures the input selected in the A3 Monitor. Other functions contained in the A26 Monitor Control include a Serial Communication Controller for converting serial data to parallel and a DTMF Transceiver for decoding and encoding DTMF Signals. The A26 Monitor Control is controlled by the A19 Processor.

Communication between the A19 Processor and the A26 Monitor Control is through the NAT-BUS. Information passed between the assemblies is either data or control and address signals. Information is bi-directional through the Data Lines (SDO-SD7). Data is conditioned by circuitry internal to the A26 Monitor Control depending on the information type. Raw data is passed through the DATA INTERFACE. Requests for data to and from the A26 Monitor Control pass through the DATA REQUEST LOGIC. Status Signals are returned to the A19 Processor after passing through the STATUS BUFFER. The DTMF XCVR (Transceiver) is also tied to the Data Lines and processes both data in and out. DTMF signals coming in are from the A3 Monitor. DTMF Signals generated are also passed to the A3 Monitor.

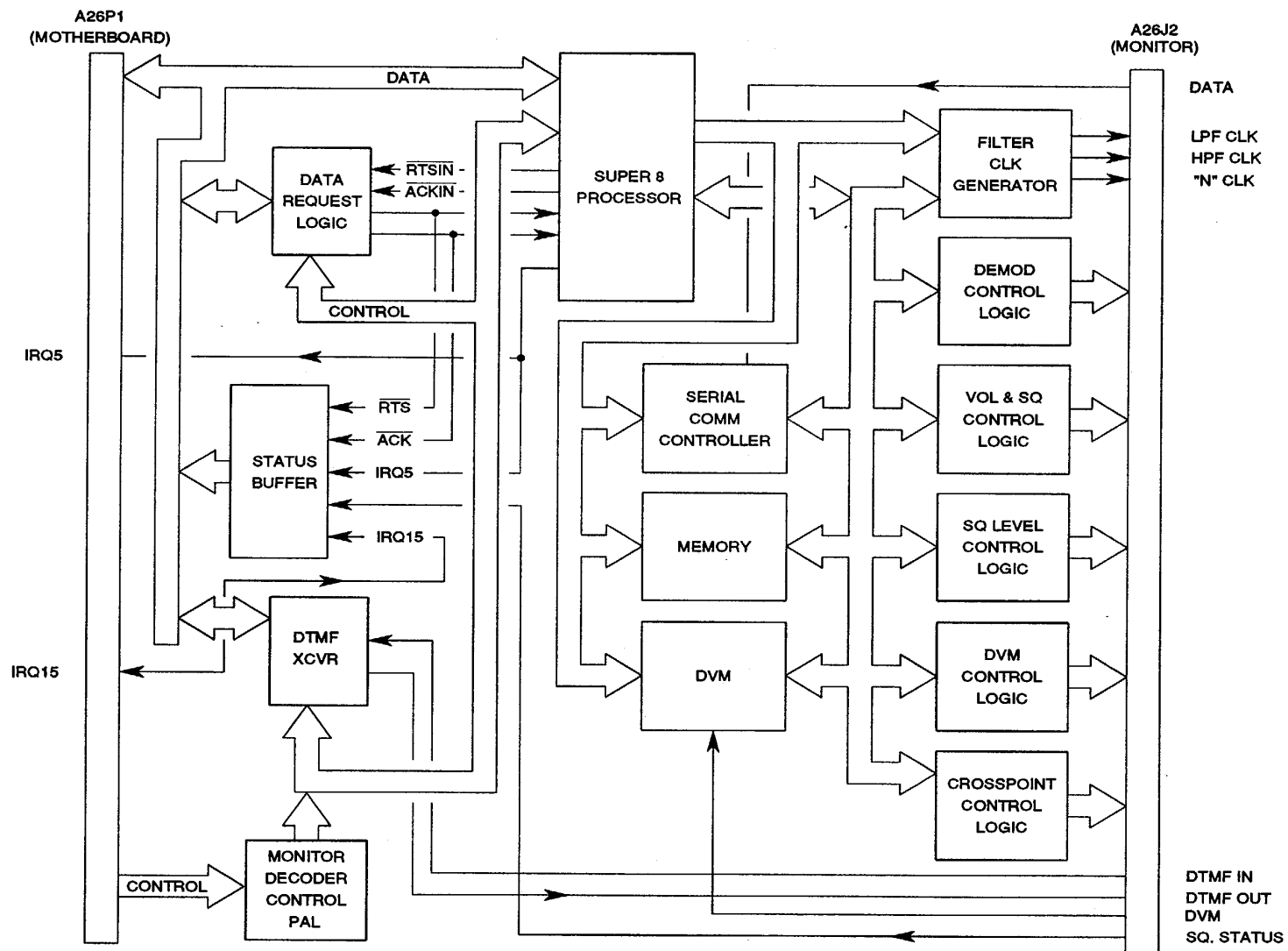
Control for these circuits and the Super 8 Processor is provided by the MONITOR DECODER CONTROL PAL. The inputs for THE MONITOR DECODER CONTROL PAL are passed from the NAT-BUS through the ADDRESS And CONTROL BUFFER.

As previously stated, the primary responsibility of the A26 Monitor Control is to control the A3 Monitor. The A19 Processor passes the requirements to the A26 Monitor Control. The Super 8 Processor then sets the required controls. Subordinate elements for the Super 8 Processor include RAM and EPROM Memory, MEMORY MAP DECODER PALS, SERIAL COMMUNICATION CONTROLLER and a Filter Clock Generator. The areas that the A26 Monitor Control controls include the following:

- DEMODO CONTROL (select demodulation type).
- VOL & SQ CONTROL (control volume level and squelch on/off).
- SQUELCH LEVEL CONTROL.
- DVM CONTROL (select DVM input).
- CROSSPOINT CONTROL (control settings of crosspoint switches).

Another action performed in the A26 Monitor Control is that performed by the DVM (Digital Voltmeter). The DVM measures the dc voltage of the signal passed by the A3 Monitor and passes the measurement data to the Super 8 Processor. Control signals for the, DVM are Memory Mapped and decoded by the MEMORY MAP DECODER PALS. Data is passed from the DVM through the Address/Data Bus. Address lines (A0-A2), from the Super 8 Processor, are used to calibrate the DVM.

The filters used on the A3 Monitor require clocks to function properly. The FILTER CLK GENERATOR provides the clocks required for the filters on the A3 Monitor.



CE2FO205

Figure 1-9. A26 Monitor Control Functional Block Diagram.

CE2FO205

(8)

I. **78A1A23 Counter (fig. 1-10).** The A23 Counter performs the following functions:

- Counts Audio and IF Frequencies.
- Monitors and Controls the A8 DMM.
- Monitors DATA ENTRY Keypad and DATA SCROLL Spinner and provides data to A19 Processor.

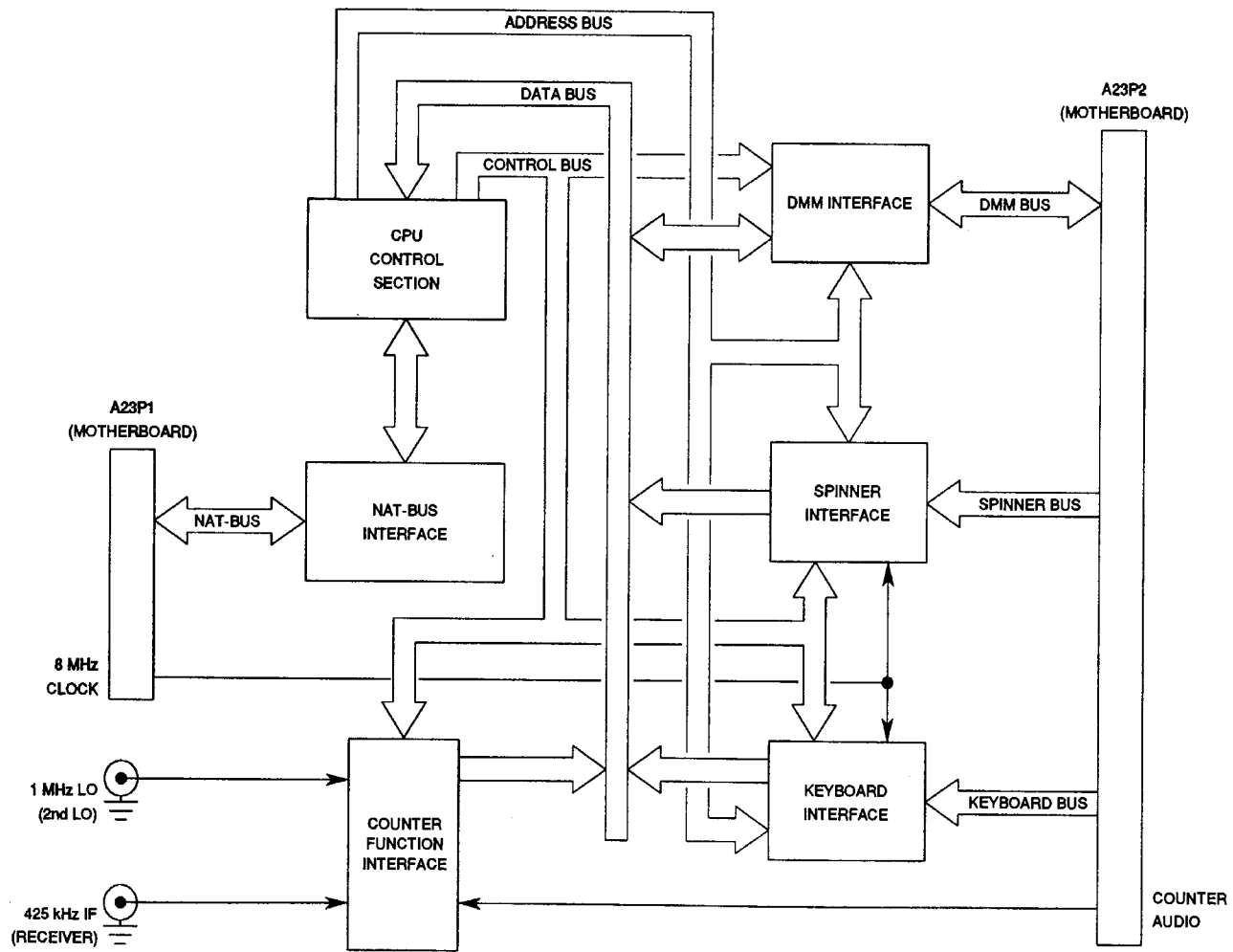
The A23 Counter acts as a slave controller to the A19 Processor. It performs the above functions on command and interrupts the A19 Processor as needed with Keyboard/Spinner information.

The CPU CONTROL SECTION controls the actions of all other major sections of the A23 Counter. The CPU CONTROL SECTION consists of the Zilog Super 8 Microprocessor, ROM, SRAM and a decoder for translating address and data signals into control signals for the various sections of the A23 Counter. The NAT-BUS INTERFACE provides the connection between the A19 Processor (through the NAT-BUS) and the CPU CONTROL SECTION.

The COUNTER FUNCTION INTERFACE counts the frequency of the Audio and the 425 kHz IF Signals. Counting the 425 kHz IF Signal provides the RF Error from the frequency of the A6 Receiver. The COUNTER FUNCTION uses the 1 MHz Reference Signal from the All 2<sup>nd</sup> LO as the frequency time base for counting frequency. Control signals are passed to the COUNTER FUNCTION INTERFACE by the CPU CONTROL SECTION through the CONTROL BUS. Data from the COUNTER FUNCTION INTERFACE is returned through the DATA BUS to the CPU CONTROL SECTION, which passes the data through the NAT-BUS to the A19 Processor.

The A23 Counter both reads and writes to the A8 DMM. Communication with the A8 DMM is conducted through the DMM INTERFACE. Data to and from the A8 DMM is in serial format, therefore a clock and latch system is required as well as a data line in and a data line out.

The A23 Counter also reads the DATA ENTRY Keypad and the DATA SCROLL Spinner. Reading Spinner counts requires SPINA and SPINB signals from the DATA SCROLL Spinner and a 2 MHz clock derived from the 8 MHz Clock on the NAT-BUS. Use of a key on the DATA ENTRY Keypad or the DATA SCROLL Spinner causes an interrupt in the CPU CONTROL SECTION Control. This Interrupt alerts the A19 Processor that new data has been entered. Enable signals for reading the DATA ENTRY Keypad are provided by the CPU CONTROL SECTION to the KEYBOARD INTERFACE. Enable signals for reading the DATA SCROLL Spinner are provided by the CPU CONTROL SECTION to the SPINNER INTERFACE. Data resulting from reading either the DATA SCROLL Spinner or the DATA ENTRY Keypad is returned to the CPU CONTROL SECTION through the DATA BUS.



CE2FO215

Figure 1-10. A23 Counter Functional Block Diagram.

(9)

**j. 78A1A17 Front Panel (fig. 1-11).** The A17 Front Panel provides the interface between the operator and the Test Set and provides the RF and Audio/Data link between the UUT and Test Set.

The A17A2A1 Function Keyboard is composed of the Soft Function Keys, the APPLIED and ON Indicators and the Power Switch. Soft Function Keys are mechanical momentary switches that are normally open. Switch closure connects a Row and Column signal. Each Switch connects a Row and Column signal to provide a signature signal to the A23 Counter.

Additional Components on the A17A2A1 Function Keyboard include the APPLIED and ON Indicators and the POWER Switch. The APPLIED Indicator is lit whenever power is applied to the Test Set. The signal that lights this LED is provided by the A16 Power Supply. The POWER Switch applies power to the Test Set when depressed. The POWER Switch grounds the POWER Switch signal, activating the Power On circuitry in the A16 Power Supply. The ON Indicator is activated by the Power On circuitry of the A16 Power Supply.

The A17A2 Keyboard is composed of all other keys and the DATA SCROLL Spinner. The Front Panel keys are mechanical momentary switches that are normally open. Switch closure connects a Row and Column signal. Each Switch connects a Row and Column signal to provide a signature signal to the A23 Counter.

The DATA SCROLL Spinner provides an increment and decrement function for editing data. The two signals generated, SPIN A and SPIN B, provide the A23 Counter with data change and direction information.

The A17A1 Connector provides the audio interface between the Test Set and the UUT. Connections available are EXT MOD IN Connector, SINAD BER IN Connector, AUDIO OUT Connector, DEMOD OUT Connector and MIC/ACC IN/OUT Connector.

The MIC/ACC IN/OUT Connector allows connection of a microphone or other peripheral device.

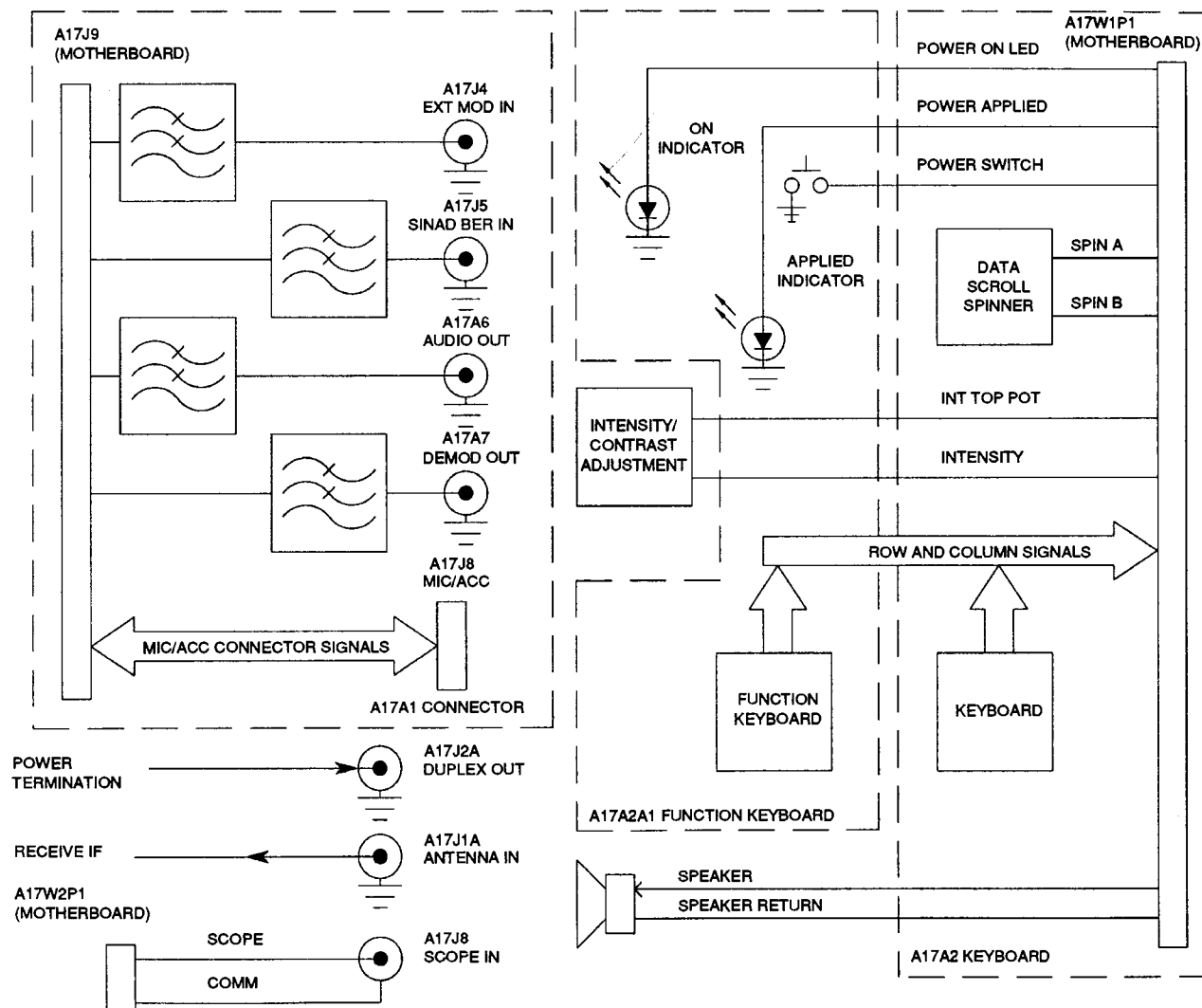
The DUPLEX OUT Connector is a BNC type connector providing an RF path for the signal generated during duplex operation. This connector is the alternative for generating out the T/R Connector during Duplex Operation. The DUPLEX OUT Connector is connected to the A14 Power Termination.

The ANTENNA IN Connector provides RF path for receiving signals during Receive and Duplex Operation. The ANTENNA IN Connector is connected to the Receive IF Assembly. During Duplex Operation, the alternative connector for receiving RF is the T/R Connector.

The SCOPE IN Connector provides direct access to the Oscilloscope Function, bypassing all other routings and filters. The SCOPE IN Connector is a BNC Connector.

The Speaker provides audio for the operator. The Speaker is connected to the A17A2 Keyboard. Signals provided for the speaker include SPEAKER and SPEAKER RETURN.

The INTENSITY/Contrast Adjustment is a potentiometer that allows the operator to set the intensity level of the A15 CRT. The potentiometer is configured with the INT POT TOP signal tied to one leg, the INTENSITY signal tied to the center tap and the second leg left floating. Signals for the INTENSITY/Contrast Adjustment originate in the A15 CRT.



CE2FO160

Figure 1-11. A17 Front Panel Functional Block Diagram.

(10)

**k. 78A1A14 Power Termination (fig. 1-12).** The primary purpose of the A14 Power Termination is to isolate the signal coming into the T/R Connector (W2J1) from the rest of the TEST SET. Additionally the A14 Power Termination is used to pass the RF Signal from the A28 Attenuator out through either the T/R Connector (W2J1) or the DUPLEX OUT Connector (A17J2A). Switching between the DUPLEX OUT Connector (A17J2A) and the T/R Connector (W2J1) for Duplex Operation is performed in the A14 Power Termination.

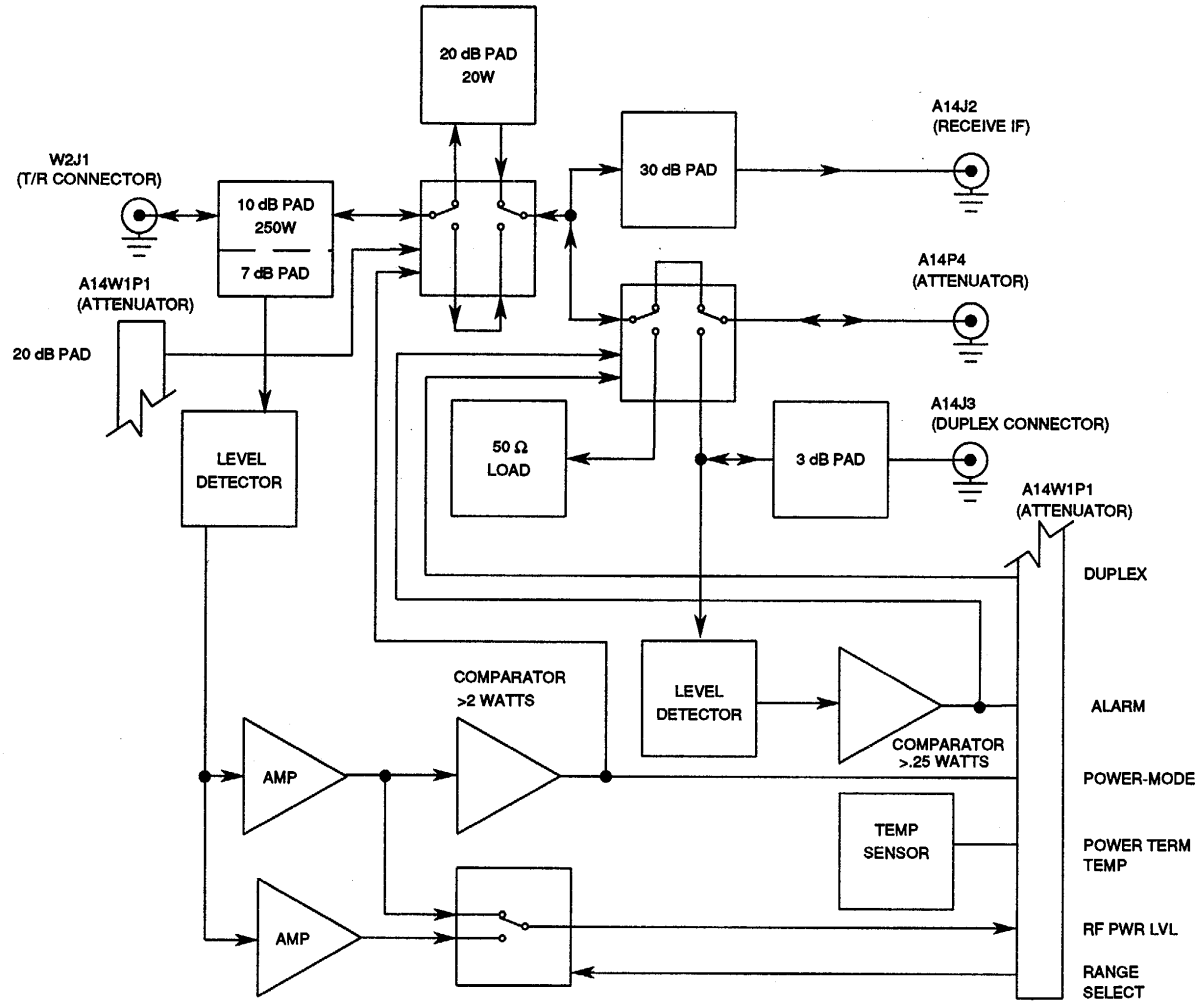
If the T/R Connector (W2J1) is selected for input, then the signal is processed by the A14 Power Termination before being passed to the A12 Receive IF. The signal from the T/R Connector (W2J1) is attenuated by a 10 dB Pad. The attenuated signal is then either processed by a switchable 20 dB Pad or passed on without attenuation. Selection is provided by the 20 dB PAD Signal from the A28 Attenuator. The Signal then passes through a 30 dB Pad. This attenuated signal is passed to the A12 Receive IF for processing.

Additionally, when the signal passes through the 10 dB Pad, the input is split and passed through a 7 dB Pad to the LEVEL DETECTOR. The LEVEL DETECTOR passes the signal as a dc voltage to both the LOW PWR AMP and the HIGH PWR AMP. The selection of the path used is determined by the level of the signal. The LOW PWR AMP is used for signals <2 W. The level is sensed by the COMPARATOR that follows the LOW POWER AMP. If a level exceeding 2 W is sensed, the COMPARATOR passes a low voltage signal to the A22 RF I/O which causes the A22 RF I/O to send a RANGE SELECT Signal that selects the HIGH PWR AMP Path. Additionally, if the 20 dB PAD is bypassed in the routing from the T/R Connector (W2J1) to the A12 Receive IF, it is switched in to attenuate the signal and protect the circuitry internal to the TEST SET. The output of the switch is passed to the A3 Monitor for measuring RF Power of the incoming signal.

The A14 Power Termination is also where the output signal is connected to the appropriate connector for Duplex Operation. For Generate Operation, the T/R Connector (W2J1) is the only selection. The DUPLEX Signal sets the Switch to route the source from the A28 Attenuator to the DUPLEX OUT Connector (A17J2A) and routes the T/R Connector (W2J1) to a 50 L Termination. This signal is also sampled by a LEVEL DETECTOR, which converts the signal to a dc voltage. This dc voltage is passed to a COMPARATOR to determine if the signal exceeds 0.25 W. If the signal exceeds 0.25 W, the COMPARATOR outputs a voltage level that disconnects the input from the A28 Attenuator and the 3 dB Pad becomes the load for the DUPLEX OUT Connector (A17J2A). Additionally, the voltage is passed as an ALARM Signal, to let the A19 Processor know that the power level exceeded limitations. The A19 Processor generates an error message to alert the operator. The 3 dB Pad between the Switch and the DUPLEX OUT Connector (A17J2A) is present for VSWR matching and input protection.

Because of the heat generated when high level signals are attenuated by the various attenuators in the A14 Power Termination, a TEMP (Temperature) SENSOR monitors the temperature within the A14 Power Termination. The sensed temperature is passed to the A3 Monitor in the form of a dc voltage. If the temperature exceeds certain limitations, the unit will provide operator warnings.





CE2FO206

Figure 1-12. A14 Power Termination Functional Block Diagram.

(11)

**I. 78A1A12 Receive IF (fig. 1-13).** Signals can be received into the TEST SET through two connectors, the ANTENNA IN Connector (A17J1A) and the T/R Connector (W2J1). These signals are processed differently until they reach the A12 Receive IF where the two channels merge into one. Signals received through the ANTENNA IN Connector (A17J1A) are passed directly to the A12 Receive IF where the incoming signal is attenuated by a 3 dB pad, primarily for impedance matching. The signal passing through the T/R Connector (W2J1) is processed by the A14 Power Termination. From the A14 Power Termination, the signal passes to the A12 Receive IF where the two Receive Channels merge.

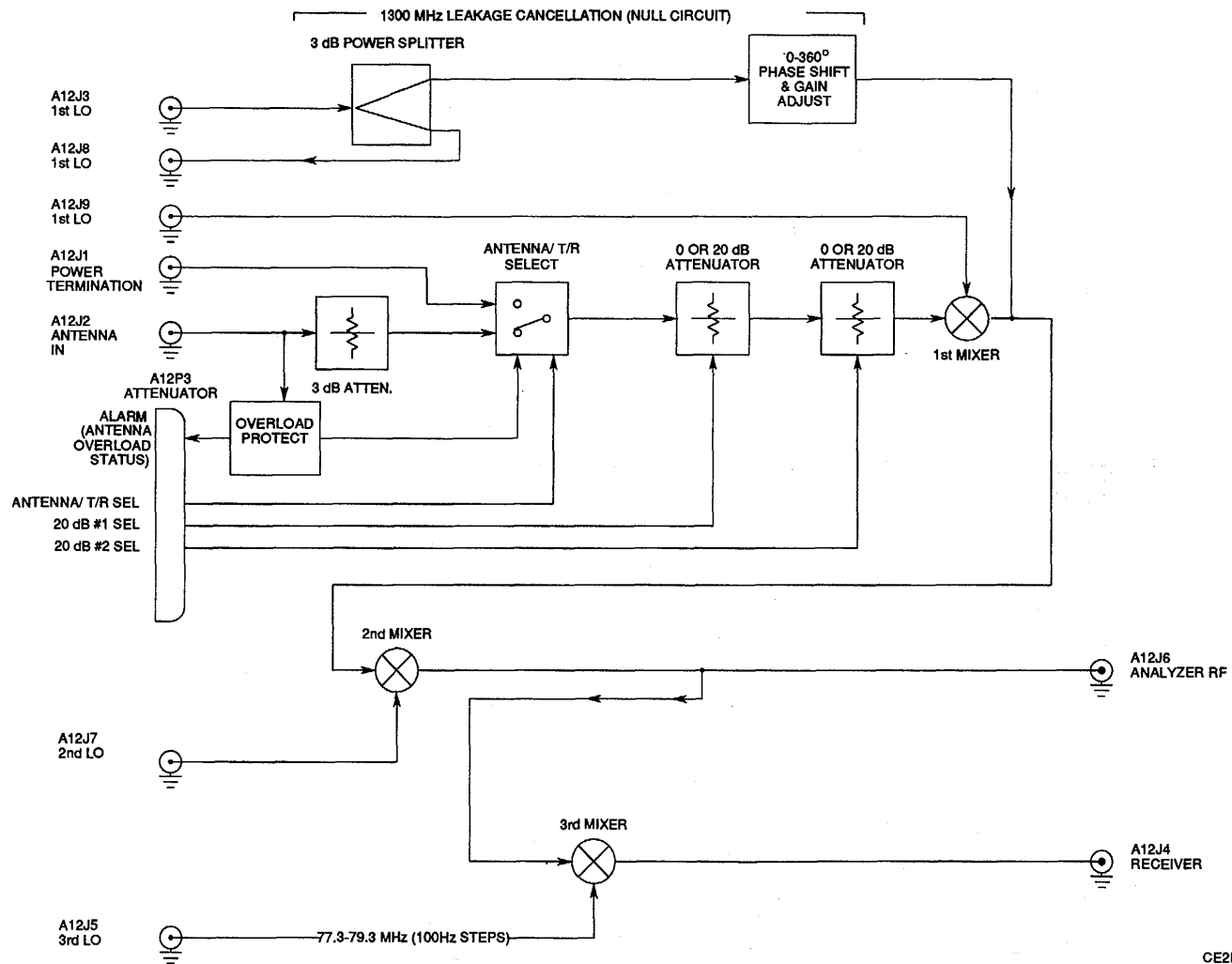
Selection of the connector to be used starts in the A19 Processor. The data is passed to the A22 RF I/O to place on the RF I/O BUS. The data passes through the A29 Auxiliary Power Supply to the A28 Attenuator. The serial data is converted to control signals and become the Antenna/(T/R) SEL Signal. If the switch is set for the ANTENNA IN Connector (A17J1A) and the signal is too high in level, the switch automatically changes to select the T/R Connector (W2J1) and return an ALARM Signal to the A19 Processor through the path described in reverse order.

In the A12 Receive IF, the RF Signal is attenuated as selected by the operator. Attenuation is set using two 20 dB attenuators. The amount of attenuation selected is passed to the A12 Receive IF in the same manner as described for the ANTENNA/(T/R) SELECT Signal. These switchable attenuators are used to reduce signal level above -30 dBm.

The attenuated signal is presented to the 1st Mixer. The 1st Mixer transforms the RF signal into a 1300 MHz IF signal. The LO signal is from the A10 1st LO (1300-2298 MHz). For RF signals below 10 MHz, the 1st LO signal is 1300-1310 MHz. To remove leakage to the IF output, a null circuit splits, attenuates and phase shifts the LO signal to place in the IF signal path. This null signal cancels out the LO input from the A10 1st LO.

The 1300 MHz IF Signal from the 1st Mixer is passed to the 2nd Mixer. The 2nd Mixer transforms the 1300 MHz IF Signal into a 88-90 MHz IF Signal. This signal is amplified and passed to the A5 Analyzer RF and the 3rd Mixer of the A12 Receive IF. The LO Signal for the 2nd Mixer is generated by the A11 2nd LO at a frequency of 1210 MHz.

The 3rd Mixer mixes the 88-90 MHz IF Signal with the 77.3-79.3 MHz LO Signal from the A7 3rd LO to form the final 10.7 MHz IF Signal. This signal is then passed to the A6 Receiver.



CE2FO236

Figure 1-13. A12 Receive IF Functional Block Diagram.

(12)

**m. 78A1A10 1st LO (fig. 1-14).** The A10 1st LO is passed the frequency information from the A22 RF I/O through the A29 Auxiliary Power Supply. The data signals originate in the A19 Processor and are passed to the A22 RF I/O through the NAT-BUS. The A22 RF I/O converts the parallel format data to serial format and passes the data to the appropriate section of the A10 1st LO. The received data is converted back to parallel format in the SERIAL DATA INTERFACE. In the parallel format, this data represents the frequency of the required LO Signal and is used to set the DIGITAL PLL DIVIDER & COMPARATOR and the DIGITAL PLL LOOP FILTER frequencies.

The LO signal is based on a VCO which is tuned by DC TUNE and AC TUNE Signals. The DC TUNE Signal provides the coarse tune, while the AC TUNE Signal is used to fine tune the VCO. The data from the A19 Processor presets the DIGITAL PLL DIVIDER & COMPARATOR to a frequency that is close to the required frequency. The Reference for the DIGITAL PLL DIVIDER & COMPARATOR is a 1 MHz signal derived from the 10 MHz Standard Signal. The 10 MHz Signal passes through a 10 Divider to form a 1 MHz Signal. This 1 MHz Signal is phase shifted as needed to correct phase shift error. The signal generated by the DIGITAL PLL DIVIDER & COMPARATOR passes through the DIGITAL PLL LOOP FILTER at high gain. From the DIGITAL PLL LOOP FILTER, the signal is presented as the DC TUNE Signal to the VCO. Once the VCO has locked on to the Operating Frequency, the DIGITAL PLL LOOP FILTER switches to low gain operation, to reduce conflict with the AC TUNE Signal. Additionally, a 1ST STATUS Signal (one for Receive and one for Generate) is generated to the A29 Auxiliary Power Supply.

Feedback is routed to two areas within the A10 1st LO to establish a phase-lock condition. The first signal is the VCO TO DIVIDER Signal. The VCO TO DIVIDER Signal is passed through a +256/+272 Prescaler before being presented to the DIGITAL PLL DIVIDER & COMPARATOR. The MOD (Modulus) CONTROL Signal determines the prescale value used. Using the 1 MHz Reference, the DIGITAL PLL DIVIDER & COMPARATOR adjusts the output to correct the final output signal.

After a period of time, the second signal, the VCO TO SAMPLER Signal, is amplified and passed through the sampler, which is clocked by the PULSE GENERATOR. The PULSE GENERATOR uses the 2 MHz signal from the REFERENCE DIVIDER as a reference. The sampled signal is then amplified by the SAMPLER ERROR AMPLIFIER. The signal is then amplified by the SAMPLER LOOP GAIN Amplifier. The GAIN BAND CONTROL Signal sets the Amplifier according to the frequency of the required signal. This signal is the AC TUNE SIGNAL. The signal from the SAMPLER LOOP GAIN Amplifier is also passed through the PHASE ERROR DETECT Circuitry which controls the Reference Phase Shift. The Reference Phase Shift adjusts the phase of the 1 MHz Reference to match the phase of the AC TUNE Signal and the DC TUNE Signal.

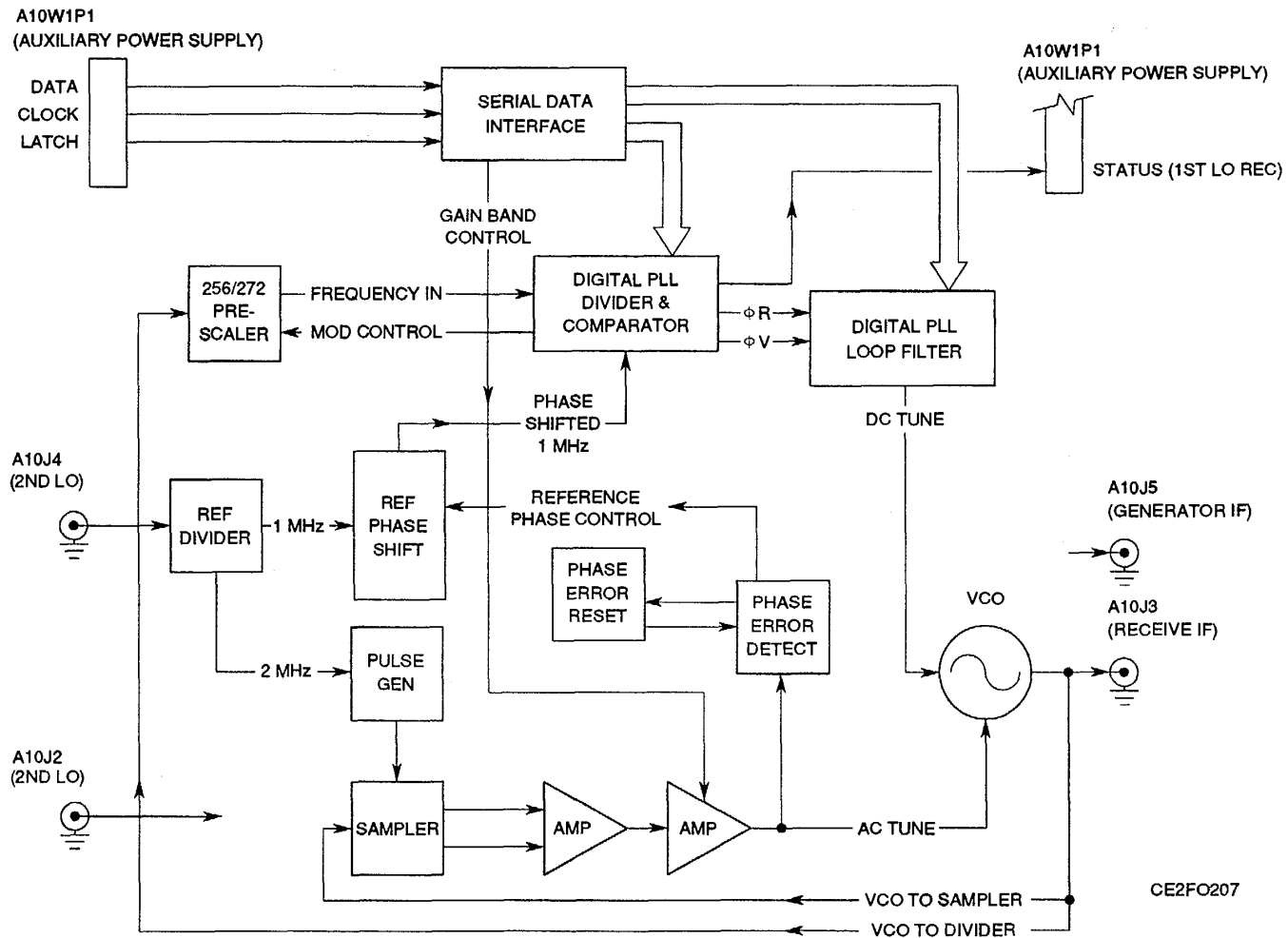


Figure 1-14. A10 1st LO Functional Block Diagram.

(13)

n. 78A1A11 2nd LO (fig. 1-15). The All 2nd LO is used to generate the 1210 MHz signal used by the A12 Receive IF and A13 Generator IF. The All 2nd LO is passed a 10 MHz signal for a reference signal. The All 2nd LO has a possibility of two sources for that 10 MHz signal. The default is the TCXO (G1) contained in the unit. The second choice is an external 10 MHz Reference. If the All 2nd LO detects the presence of an external standard, it switches to this signal and disables TCXO Power.

The 10 MHz signal is amplified and passed through a xll Multiplier to generate a 110 MHz signal. The 110 MHz signal is then multiplied by a xll Multiplier to generate a 1210 MHz signal. The resulting signal (1210 MHz LO) is amplified and used by both the A12 Receive IF and the A13 Generator IF.

The signal from the 10 MHz Standard is also used by the A10 1st LO. After the signal is amplified for the first xl 1 Multiplier, it is amplified, again, and split into three 10 MHz Signals. Two signals pass through a 10 MHz Bandpass Filter and are sent to the A10 1st LO, one signal for the Receive function and one for the Generate function.

The Third 10 MHz Signal is passed through a +10 Frequency Divider to create a 1 MHz Reference signal. This 1 MHz Reference signal is applied to five Buffers to create five 1 MHz Reference signals. The 1 MHz Reference signals are used by the following: A23 Counter.

- A5 Analyzer RF.
- A7 3rd LO.
- A9 90 MHz Generator.
- A6 Receiver.

In addition to the generated signals mentioned, the All 2nd LO passes the TCXO PWR Signal to the TCXO and to the A29 Auxiliary Power Supply. This is an analog signal that enables the TCXO output and also is used as a status signal to pass back to the A19 Processor.

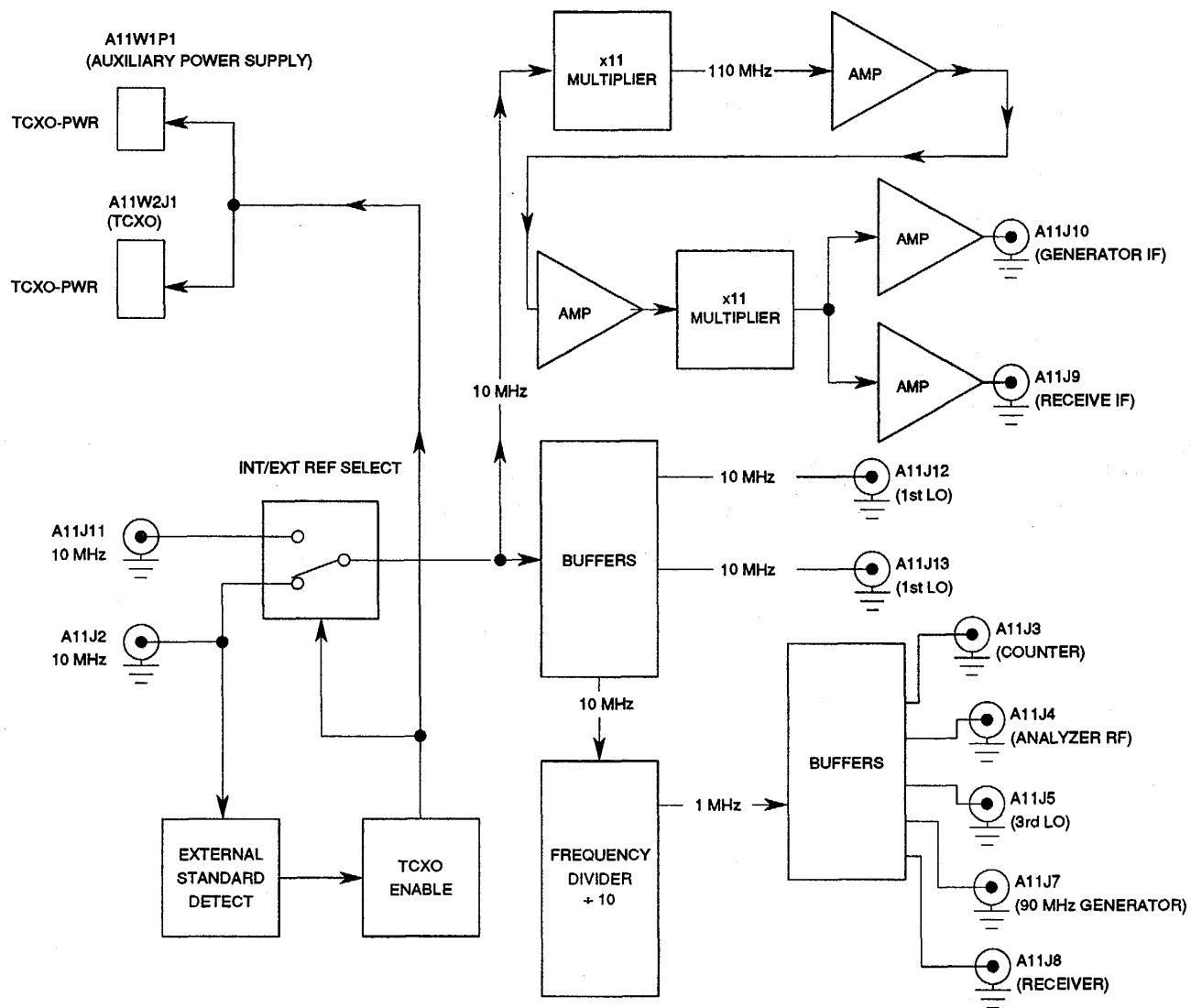


Figure 1-15. All 2nd LO Functional Block Diagram.

(14)

**o. 78A1A7 3rd LO (fig. 1-16).** The output for the A7 3rd LO is a 77.3-79.3 MHz Signal to the A12 Receive IF and A5 Analyzer RF. The inputs for the A7 3rd LO include the 1 MHz Standard from the A11 2nd LO and frequency data from the A22 RF I/O. The data from the A22 RF I/O is initiated in the A19 Processor. The A22 RF I/O receives the data from the A19 Processor through the NAT-BUS and converts the data from parallel format to serial format and passes the data to the A7 3rd LO. The internal mechanism of the A7 3rd LO consists of three major loops.

The first loop is the 780.125-800 MHz Coarse Loop. The 780-800 MHz VCO is pretuned by the data passed by the A22 RF I/O. This data is converted by a D/A Converter to an analog voltage and passed to the 780-800 MHz VCO. The same analog voltage is used to pre-position the 77.3-79.3 MHz VCO in the Summation Loop. The signal generated by the 780-800 MHz VCO takes two paths. First, the signal is passed back through a +64/165 Divider and compared to a Phase Lock Loop 125 kHz Reference which uses the 1 MHz Reference as a clock. The comparison initiates a Phase Lock Loop after proper adjustment of the VCO frequency. The PLL comparator outputs a LOCK DETECT signal to the Lock Detect Circuit once the Phase Lock Loop condition exists.

The second path for the 780-800 MHz signal is through a +10 Divider for an effective range of 78.0125-80 MHz with an increment of 12.5 kHz. This signal is mixed with the output of the Summation Loop creating a 700-712.4 kHz signal which is presented to a Phase Detector. The phase detector compares the output of this signal with the signal presented by the 350-356.2 MHz Fine Loop.

The 350-356.2 MHz Fine Loop Operates similar to the 780-800 MHz Coarse Loop. The 350 MHz VCO is pretuned by the data passed by the A22 RF I/O after it is passed through a D/A Converter. The analog voltage created is used to pretune the 350 MHz VCO. The signal generated by the 350 MHz VCO takes two paths. First, the signal is passed back through a +64/+65 Divider and compared to a Phase Lock Loop 50 kHz Reference which uses the 1 MHz Reference as a clock. The comparison initiates a Phase Lock Loop after proper adjustment of the VCO frequency. The PLL comparator outputs a LOCK DETECT signal to the Lock Detect Circuit once the Phase Lock Loop condition exists.

The other path for the output of the 350 MHz VCO is through a +5 Divider and a +100 Divider to divide the 350-356.2 VCO signal by 500. The resulting signal (700-712.4 kHz) is passed to the PHASE DETECTOR.

The output of the Summation VCO is mixed with the output of the Coarse Loop to form a 700-712.4 kHz signal for input to the Phase Detector. This signal is compared against the output of the Fine Loop. This Phase Detect/Charge Pump output tunes the Summation VCO to the correct frequency. If the Summation VCO frequency exceeds the Coarse Loop frequency, the Summation VCO is railed low by a comparator. The Summation VCO is then freed and the system is allowed to function normally. Once the Summation VCO is properly tuned and phase lock is achieved, the Phase Detector outputs a Summation Loop Lock Detect signal to the Lock Detect Circuit.

Once all three loops are phase locked and Lock Detect signals are available, the Lock Detect Circuit outputs a 3rd LO Status Signal and extinguishes the Lock LED.



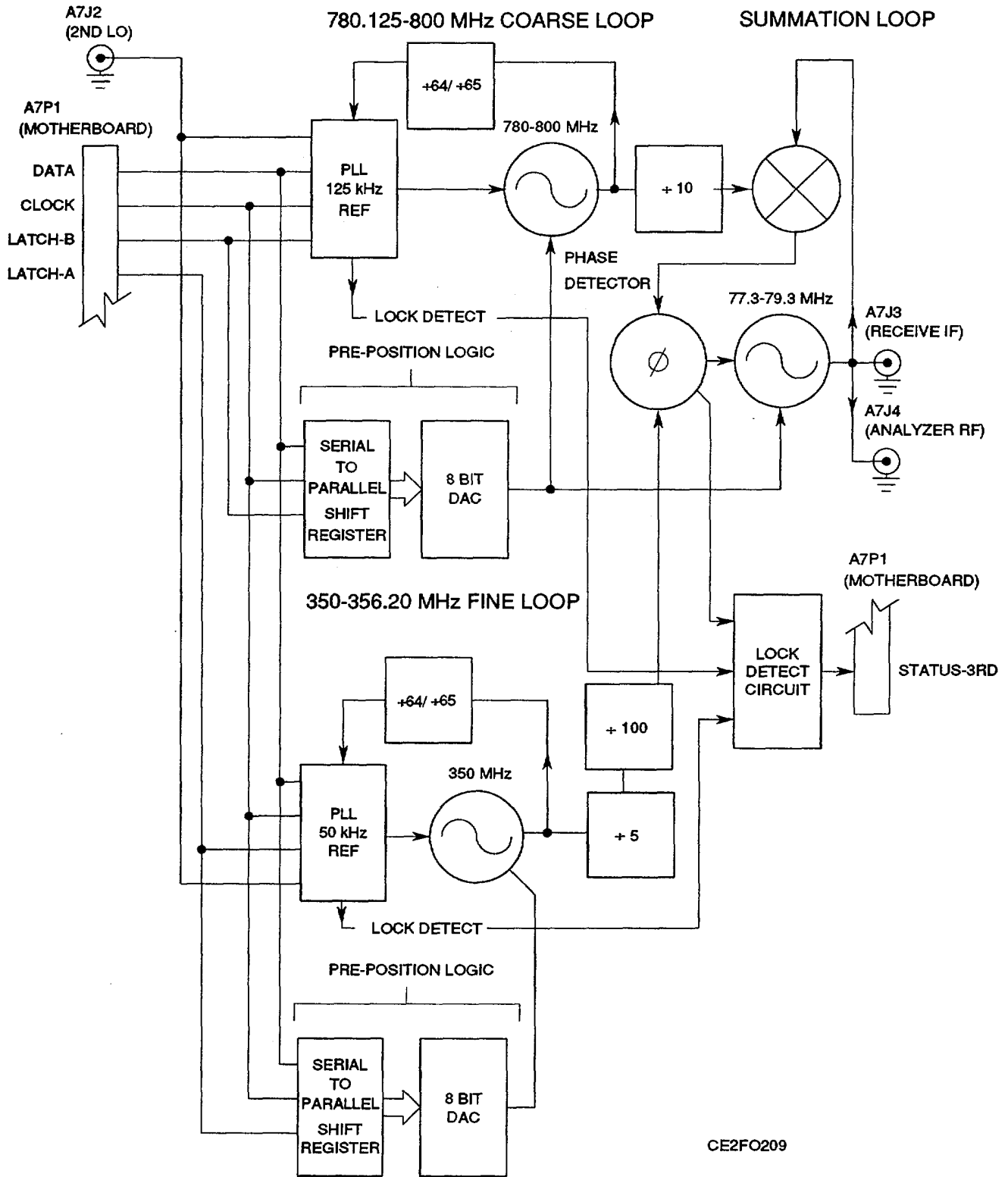


Figure 1-16. A7 3rd LO Functional Block Diagram.

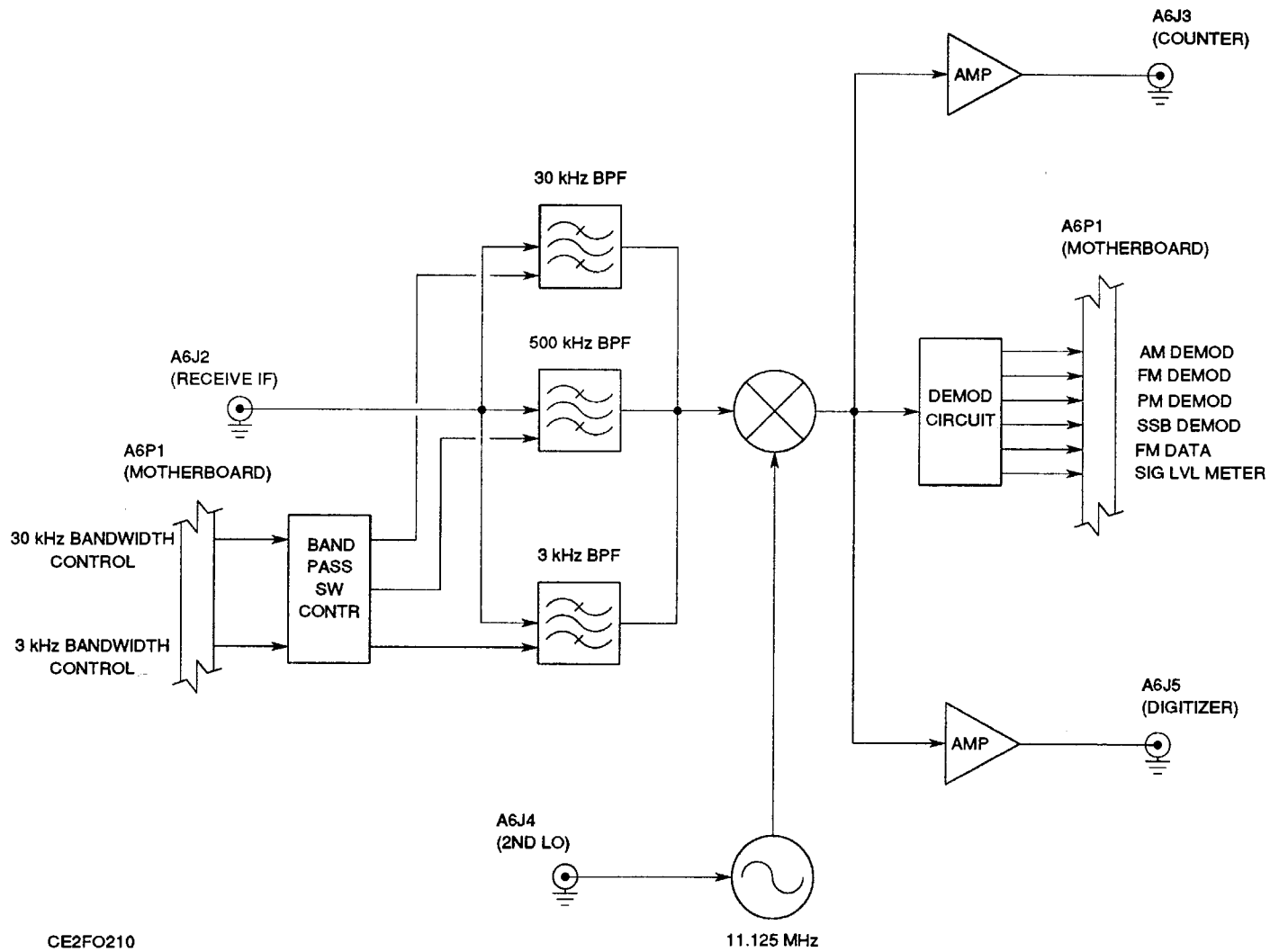
(15)

p. 78A1A6 Receiver (fig. 1-17). The 10.7 MHz IF Signal, passed to the A6 Receiver from the A12 Receive IF, is initially filtered by an IF Bandpass Filter. The filter is selected by control signals from the A22 RF I/O that are enabled by the A19 Processor. If no filter selection signal is active, the 10.7 MHz Signal passes through a 500 kHz Bandwidth Bandpass Filter. The control signals select either a 30 kHz Bandwidth Bandpass filter with the 30 kHz BANDWIDTH CONTROL Signal or a 3 kHz Bandwidth Bandpass Filter with the 3 kHz BANDWIDTH CONTROL Signal.

Once filtered, the 10.7 MHz IF Signal then sent to a Mixer and mixed with an 11.125 MHz Phase Locked Oscillator to obtain a 425 kHz IF Signal.

The 425 kHz signal is passed to the A25 Digitizer and A23 Counter as well as Demodulation Circuitry. The Demodulation Circuitry produces the following signals:

- AM Demod.
- FM Demod.
- SSB Demod.
- FM Data Demod.
- Signal Strength Signal.



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Figure 1-17. A6 Receiver Functional Block Diagram.

(16)

**q. 78A1A3 Monitor (fig. 1-18).** The A3 Monitor acts as a switching network to switch audio and analog signals through selected filters to desired outputs. The A26 Monitor Control provides control of the A3 Monitor in selecting the required path. Input Signals accepted by the A3 Monitor include:

- AM DEMOD.
- FM DEMOD.
- PM DEMOD.
- SSB DEMOD.
- FM DATA.
- RF PWR LVL.
- SINAD/BER IN Connector.
- Function Generator Audio.
- EXT MOD IN Connector.
- DTMF IN.
- Analog Signals.

After filtering, amplifying and/or attenuating, the input signal is switched to the selected output. Outputs available include:

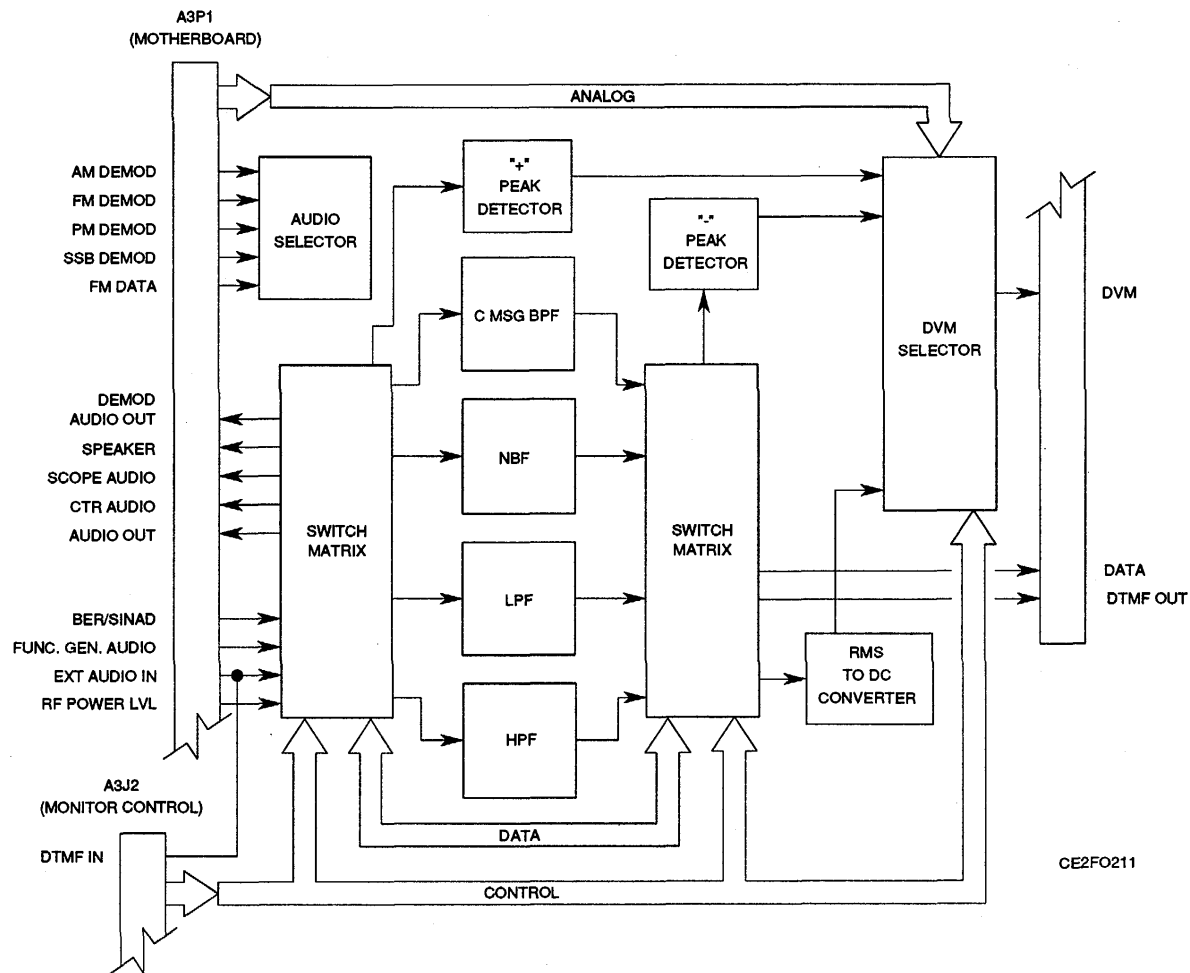
- DVM (Digital Voltmeter on A26 Monitor Control).
- DATA (A26 Monitor Control).
- DTMF OUT (A26 Monitor Control).
- SPEAKER.
- DEMOD AUDIO OUT (DEMOD OUT Connector [AI 7J7]).
- SCOPE AUDIO (A25 Digitizer).
- COUNTER AUDIO (A25 Digitizer).
- AUDIO OUT (AUDIO OUT Connector [A17J6]).

The switching within the A3 Monitor is done with Crosspoint Switches which form a SWITCH MATRIX. The SWITCH MATRIX sets routings that pass signals straight to outputs listed above or through one or more of the following:

- "+" PEAK DETECTOR.
- "-" PEAK DETECTOR.
- C MSG BPF (C-Message Weighted Bandpass Filter).
- NBF (Notch Band Filter).
- LPF (Low-Pass Filter).
- HPF (High-Pass Filter).

The DVM Selector chooses the DVM input signal. Sole output is to the DVM on the A26 Monitor Control. DVM Selector inputs include:

- "+" PEAK LEVEL Analog Signals.
- "-" PEAK LEVEL RMS (converted to DC)
- Analog Signals include:
  - RF PWR LVL.
  - Unit Ambient Temperature (A26 Monitor Control).
  - SIG LVL MTR (A6 Receiver)
  - Power Term Temperature (A14 Power Termination).
  - +15V (A16 Power Supply).
  - +5V (A16 Power Supply).
  - 15V (A16 Power Supply).



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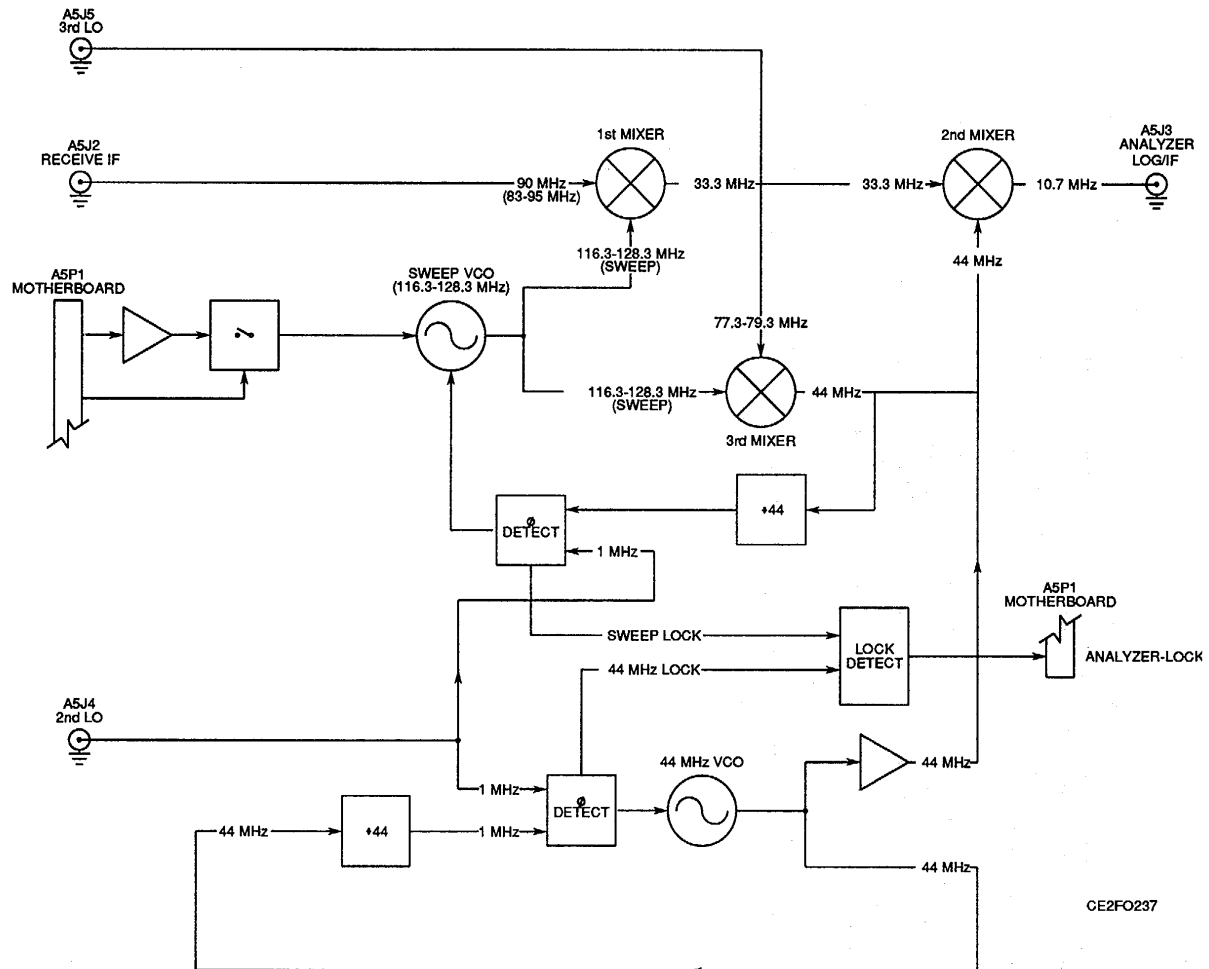
Figure 1-18. A3 Monitor Functional Block Diagram.

(17)

r. **78A1A5 Analyzer RF (fig. 1-19).** In the A5 Analyzer RF, the 89 MHz IF Wideband Signal is converted to a 10.7 MHz IF Signal for the A4 Analyzer Log/IF. Input signals used for conversion include a 77.3-79.3 MHz Signal from the A7 3rd LO and 1 MHz Reference Signal from the All 2nd LO. Signals generated in the A25 Digitizer are used to sweep and phase lock the Sweep VCO. Signals from the A25 Digitizer include ANLZR BLANK and ANLZR SWEEP.

The 89 MHz IF Wideband Signal is presented to the A5 Analyzer RF by the A12 Receive IF. The incoming signal is passed to the 1st Mixer, where it is mixed with the signal from the Sweep VCO to form the 33.3 MHz IF Signal. The signal is then passed to the 2nd Mixer. The 2nd Mixer converts the 33.3 MHz IF Signal to a 10.7 MHz IF Signal using the signal generated by the 44 MHz VCO. The 10.7 MHz IF Signal is then passed to the A4 Analyzer Log/IF.

The Sweep VCO Signal is also passed to the 3rd Mixer as the first stage of the phase lock system for the Sweep VCO. Using the 77.3-79.3 LO Signal from the A7 3rd LO, the 3rd Mixer converts the Sweep VCO Signal to a 44 MHz Signal.



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Figure 1-19. AS Analyzer RF Functional Block Diagram.

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**S. 78A1A4 Analyzer Log/IF (fig. 1-20).** The 10.7 MHz IF Signal is sent to the A4 Analyzer Log/IF from the A5 Analyzer RF. The A19 Processor sends information on Resolution Bandwidth through the NAT-BUS to the A22 RF I/O where the data is converted to serial format. The A22 RF I/O passes the serial data to the A4 Analyzer Log/IF where the information is decoded in the Bandwidth Select Area into signals for setting the Pin Diode Switches to proper settings. Select lines are sent to the specified filter, attenuator or amplifier which generates the conditions to set the Pin Diode Switches to proper settings. The first switch selects the input path for the second switch. Selections include:

- Wide Band Attenuator.
- 300 kHz Bandpass Filter.
- 30 kHz Bandpass Filter.

The output of the second switch is the input of the third switch which selects the input path for the fourth switch. Selections include:

- 3 kHz Bandpass Filter.
- 300 Hz Bandpass Filter.
- Broadband Amplifier.

Once the signal passes through the last Pin Diode Switch, it goes to a Logarithmic Amplifier. The amplified signal then passes to an AM Detector. The AM Detector converts the 10.7 MHz IF to a voltage level. This voltage is amplified and passed to the A25 Digitizer as the ANLZR VIDEO Signal.



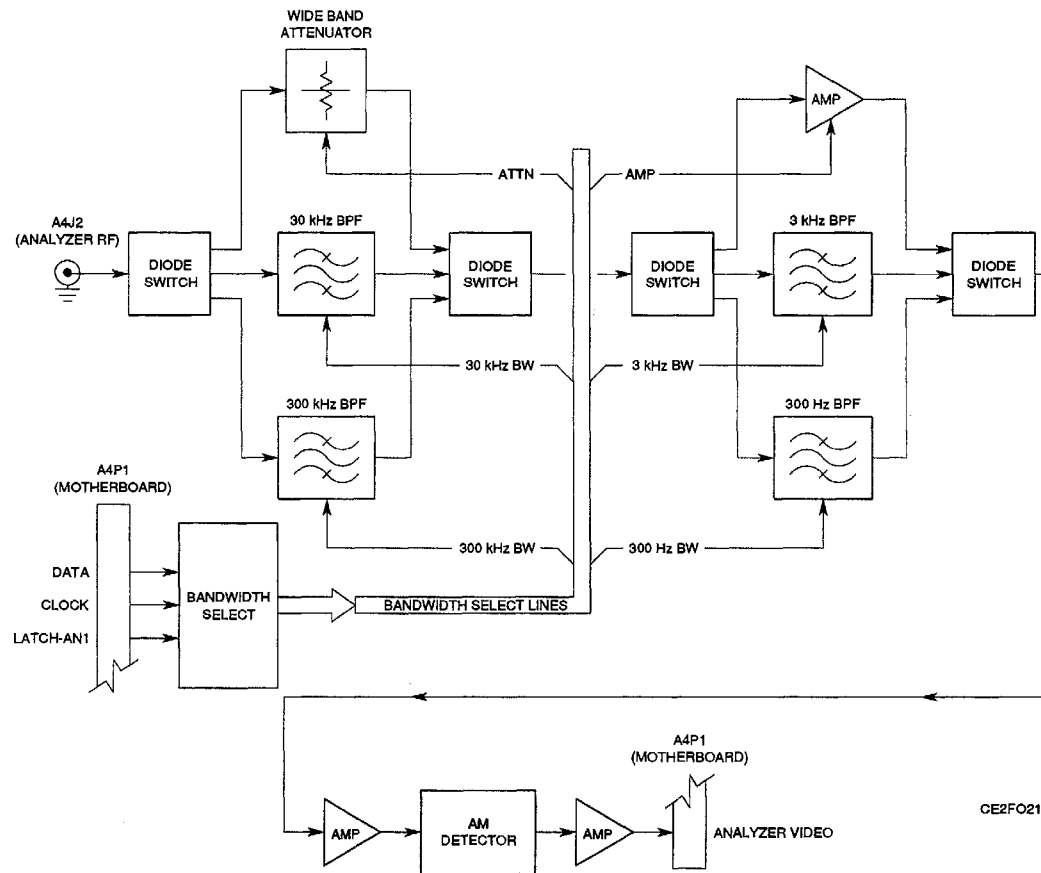


Figure 1-20. A4 Analyzer Log/IF Functional Block Diagram.

(19)

**t. 78A1A25 Digitizer (fig. 1-21).** The primary operation of the A25 Digitizer is the conversion of analog data into digital data to be passed to the A19 Processor. Additionally the A25 Digitizer generates the ANLZR SWEEP Signal and ANLZR BLANK Signal used by the A5 Analyzer RF to sweep the 89 MHz IF Signal. Inputs for the Digitizer are:

- SCOPE IN Connector.
- Receive IF (425 kHz).
- Analyzer Video.
- Scope Audio.

Input signals are processed differently, but once processed, follow the same basic path. The signal, once selected, is scaled by the +1/+2/+5 Scaling Circuit, amplified and converted to digital data in a Flash A/D Converter. The digital data is then stored in on-board RAM until it is passed to the A19 Processor through the NAT-BUS.

Scope Audio, Analyzer Video and Receiver IF Input Signals are selections for the SCOPE/IF/ANALYZER Selector. The selected signal is routed to the SCOPE/INTERNAL SELECTOR. The signal, once selected, is scaled by the +1/+2/+5 Scaling Circuit as required, amplified and converted to digital data in a FLASH A/D CONVERTER. The digital data is then stored in on-board SRAM until it is passed to the A19 Processor through the NAT-BUS. If an offset of vertical position of signal is desired, an offset voltage is applied to the Amplifier before being passed to the FLASH A/D CONVERTER.

The other selection of the SCOPE/INTERNAL SELECTOR is the processed SCOPE IN Connector. The SCOPE IN Connector Signal can be AC, DC or GND (Ground) coupled. The Coupled signal can be sent through a SCOPE PREAMP if 1 mV/Div sensitivity is required. The signal then goes through a 1/+10/+100/+1000 Scaling Attenuator. The signal then is passed to the SCOPE/INTERNAL SELECTOR. The signal is processed as described for the internal signals.

The ANLZR SWEEP Signal is generated by the SWEEP RAMP GENERATOR. The SWEEP COUNTER counts up the value for the SWEEP RAMP GENERATOR which builds the ANALYZER SWEEP Signal. The SWEEP COUNTER is disabled by the ANALYZER BLANKING Signal.

The ANALYZER BLANKING Signal is generated by the COUNTER/TIMER. The ANALYZER BLANKING Signal is used both internally to reset the SWEEP COUNTER and passed to the A5 Analyzer RF for use in sweeping the 89 MHz IF Signal.

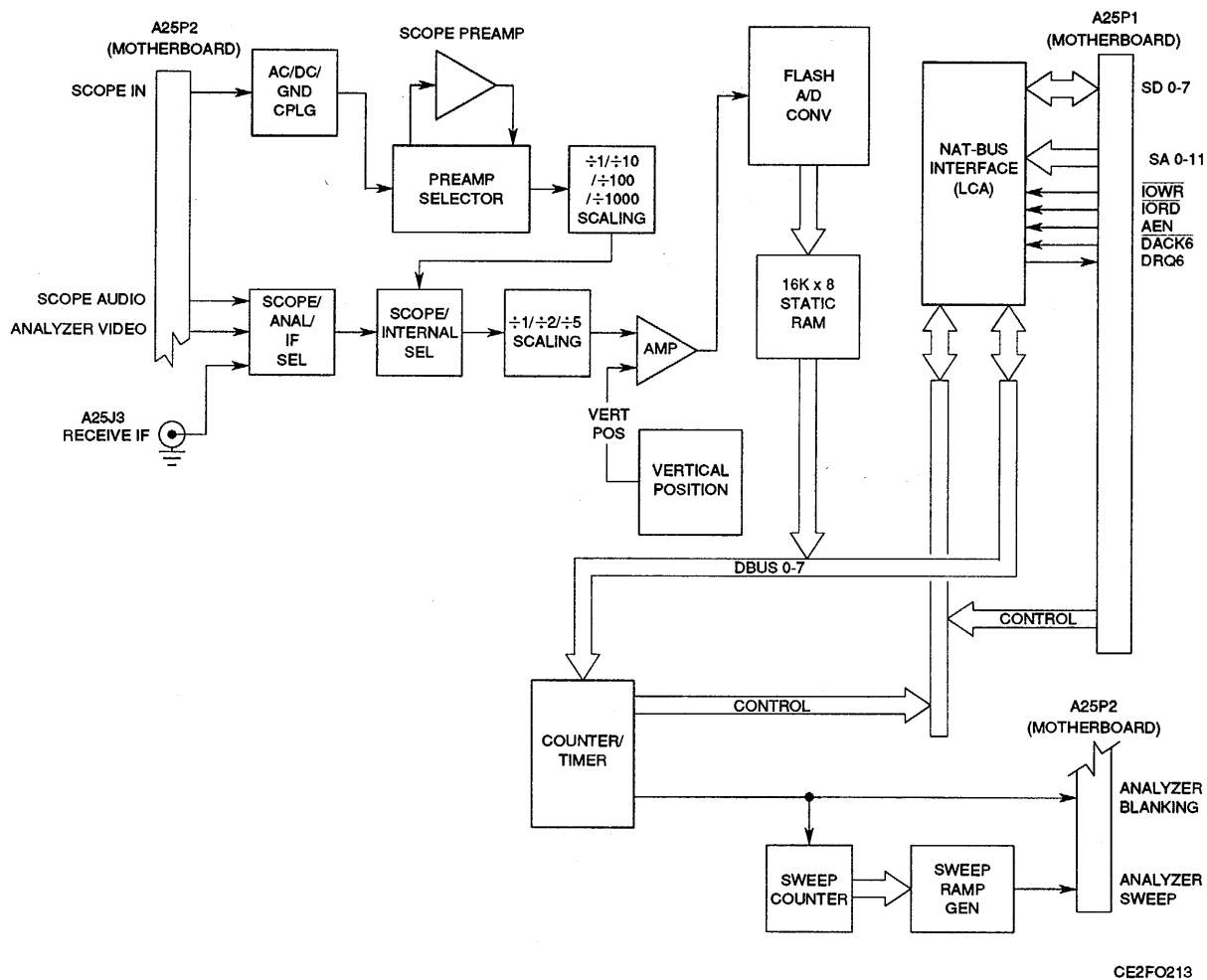


Figure 1-21. A25 Digitizer Functional Block Diagram.

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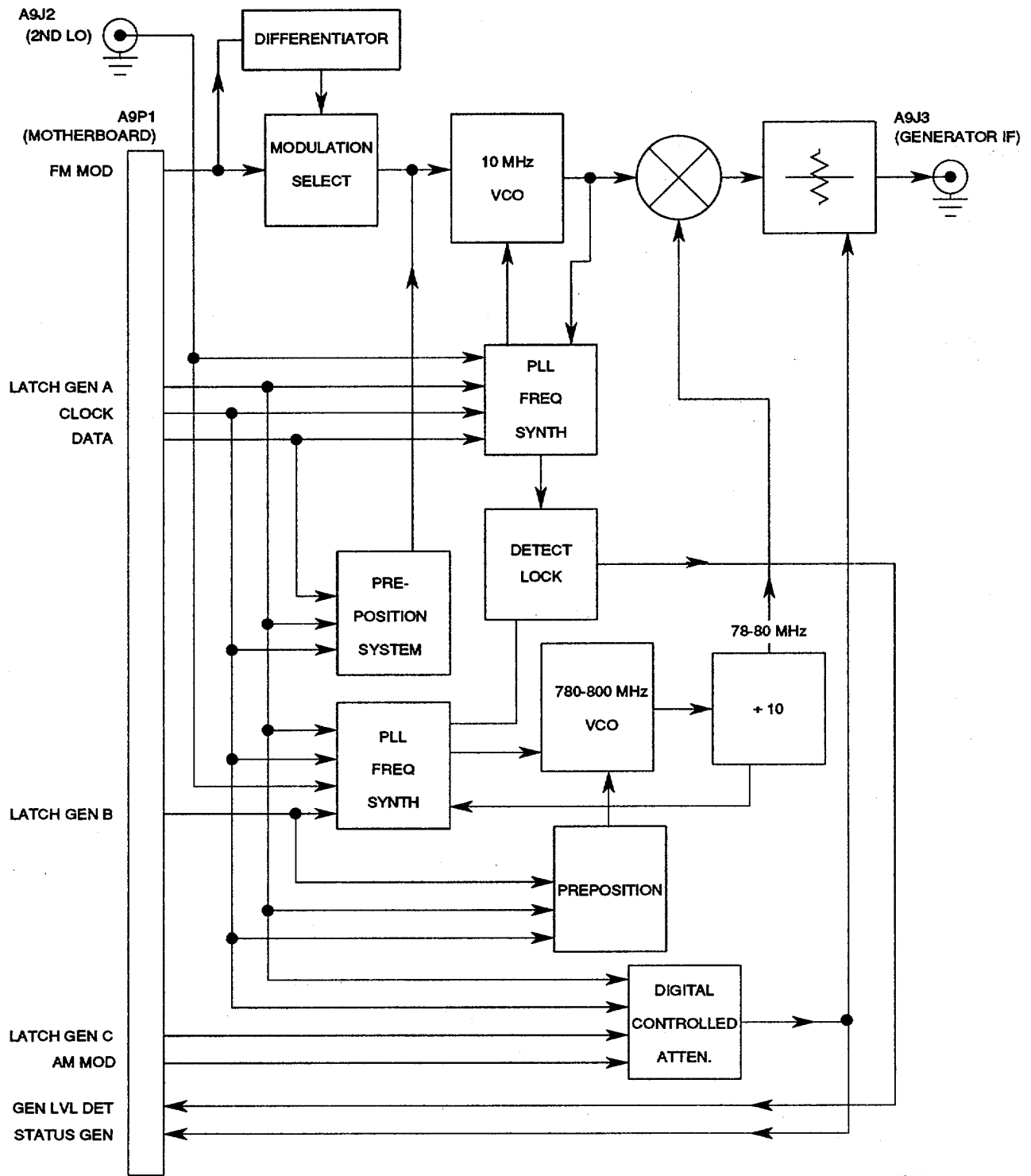
**u. 78AIA9 90 MHz Generator (fig. 1-22).** The A9 90 MHz Generator provides an 88.0001-90 MHz Modulated IF signal to the A13 Generator IF. The A9 90 MHz Generator consists of two loops, of which the outputs are summed to make a final signal. This signal is attenuated and filtered before being provided to the A13 Generator IF. In the process, modulation is added to the signal. The location where modulation is added is dependent on modulation type.

The Coarse Loop is passed data by the A22 RF I/O from data generated in the A19 Processor. The LATCH GEN B Signal is used to identify the Coarse Loop PLL FREQ Synthesizer. This data is integrated and used to tune a 780-800 MHz VCO. The VCO output is fed back to the Coarse Loop PLL FREQ Synthesizer, through a +64/+65 Divider, to establish a phase lock condition. Once the VCO is phase locked, the Coarse Loop PLL FREQ Synthesizer passes a signal to the LOCK DETECT Circuit. The output of the 780-800 MHz VCO is passed through a +10 Divider and sent to a mixer for mixing with the output of the Fine Loop. For speed, a preposition system is in place for initializing the 780-800 MHz VCO close to the required frequency. Data used is the same data used by the Coarse Loop PLL FREQ Synthesizer.

The Fine Loop is passed data by the A22 RF I/O from data generated in the A19 Processor. The LATCH GEN A Signal is used to identify the Fine Loop PLL FREQ Synthesizer. This data is integrated and used to tune a 10 MHz VCO. The VCO output is fed back to the Fine Loop PLL FREQ Synthesizer, through a +128/+129 Divider, to establish a phase lock condition. Once the VCO is phase locked, the Fine Loop PLL FREQ Synthesizer passes a signal to the LOCK DETECT Circuit. An additional signal added to the 10 MHz VCO is either the FM Modulation or Phase Modulation signal. FM Modulation from the Function Generator is differentiated to produce a Phase Modulation signal. Data from the A22 RF I/O selects between the two. This signal is added to the 10 MHz VCO signal to produce a 10 MHz IF Signal. The final product is mixed with the output from the 78-80 MHz LO produced in the Coarse Loop. This 88-90 MHz IF Signal is passed to the Attenuator.

The Attenuator is digitally controlled by the signals passed by the A22 RF I/O. The LATCH GEN C Signal is used to identify the data as being for the Digital Controlled Attenuator. AM Modulation from the A24 Function Generator is also summed with the Attenuator. The GEN LVL DET Signal is fed back from the A13 Generator IF to maintain the proper RF Output Level. The final product is passed through a 90 MHz Low-pass Filter and to the A13 Generator IF.

Once both the Fine Loop and the Coarse Loop are phase locked, both loops pass signals to the LOCK DETECT Circuit. When both signal are present, the LOCK DETECT generates a STATUS-GEN Signal, signifying that the A9 90 MHz Generator is in a phase locked condition.



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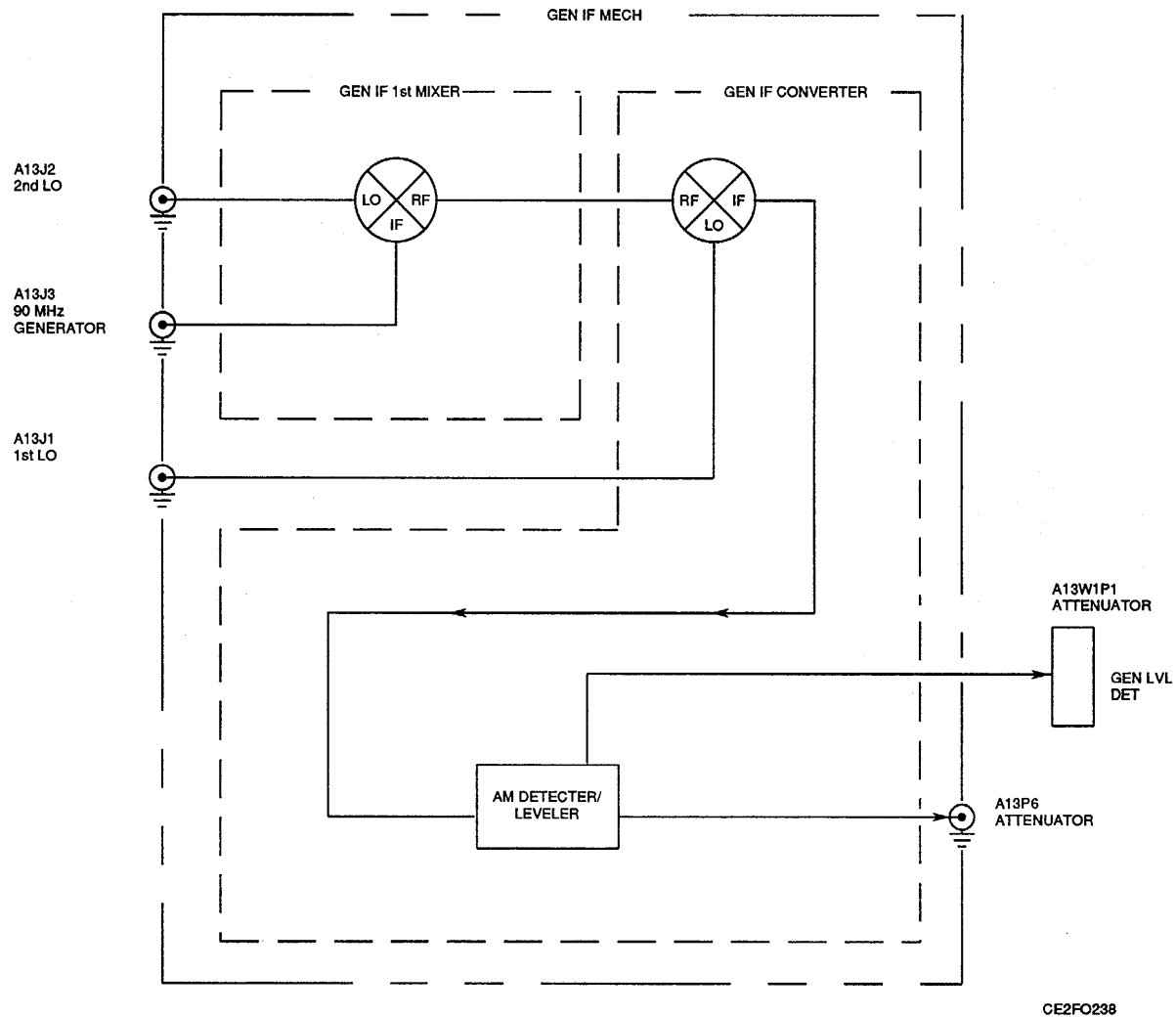
Figure 1-22. A9 90 MHz Generator Functional Block Diagram.

(21)

v. **78A1A13 Generator IF (fig. 1-23)**. The A13 Generator IF is responsible for taking the 88-90 MHz IF Signal from the A9 90 MHz Generator and transforming it into the final RF Signal. Signals from the A10 1st LO (1.3-2.298 GHz LO) and the All 2nd LO (1210 MHz LO) are used to transform the signal.

The 88-90 MHz IF Signal passed from the A9 90 MHz Generator is presented to the GEN IF 1st Mixer. The GEN IF 1st Mixer adds the 1210 MHz LO Signal (All 2nd LO) with this signal to produce a 1300-2298 MHz IF signal. The 1298-1300 MHz IF Signal is passed to the second mixer where it is combined with a 1300-2298 MHz LO (A10 1st LO). This mixer converts the signal to the final output frequency (0.250-1000 MHz). The RF Signal is amplified for +10-+20 dBm level required and passed to the A28 Attenuator.

The RF Signal also passes through a coupler where the output level is detected. This circuit produces the GEN LVL DET Signal and is routed through channels to the A9 90 MHz Generator where it is used for setting the Attenuator.



CE2FO238

Figure 1-23. A13 Generator IF Functional Block Diagram.

(22)

w. **78A1A28 Attenuator (fig. 1-24).** The A28 Attenuator distributes f15 and +5 Vdc from the A29 Auxiliary Power Supply to the A13 Generator IF, A12 Receive IF and A14 Power Termination.

Control signals for the A28 Attenuator originate in the A19 Processor. The A22 RF I/O converts the data into a serial format and passes the data to the A28 Attenuator through the A29 Auxiliary Power Supply. The data is accepted by the A28 Attenuator when the appropriate Latching signal (LATCH-ATTEN) is generated. The serial data is converted to parallel format and split into control signals. Decoder #1 passes control signals to the A14 Power Termination and A12 Receive IF. It also passes the control signal for the 1 dB setting of Attenuator. Decoder #2 is used to control the remainder of the Attenuator settings. The A28 Attenuator both passes control signals and accepts status signals for the A14 Power Termination. The A28 Attenuator decodes the following control lines for the A14 Power Termination:

- DUPLEX (sets DUPLEX OUT Connector (A17J2A) as output connector).
- RANGE SELECT (sets switch selecting signal for RF PWR LVL Signal).
- 20dB PAD (activates 20 dB attenuator in signal path from T/R Connector (W2J1)).

The status signals accepted from the A14 Power Termination include:

- ALARM (T/R Connector [WIJ1] Overload).
- POWER TERM TEMP.
- POWER-MODE.
- RF POWER LEVEL.

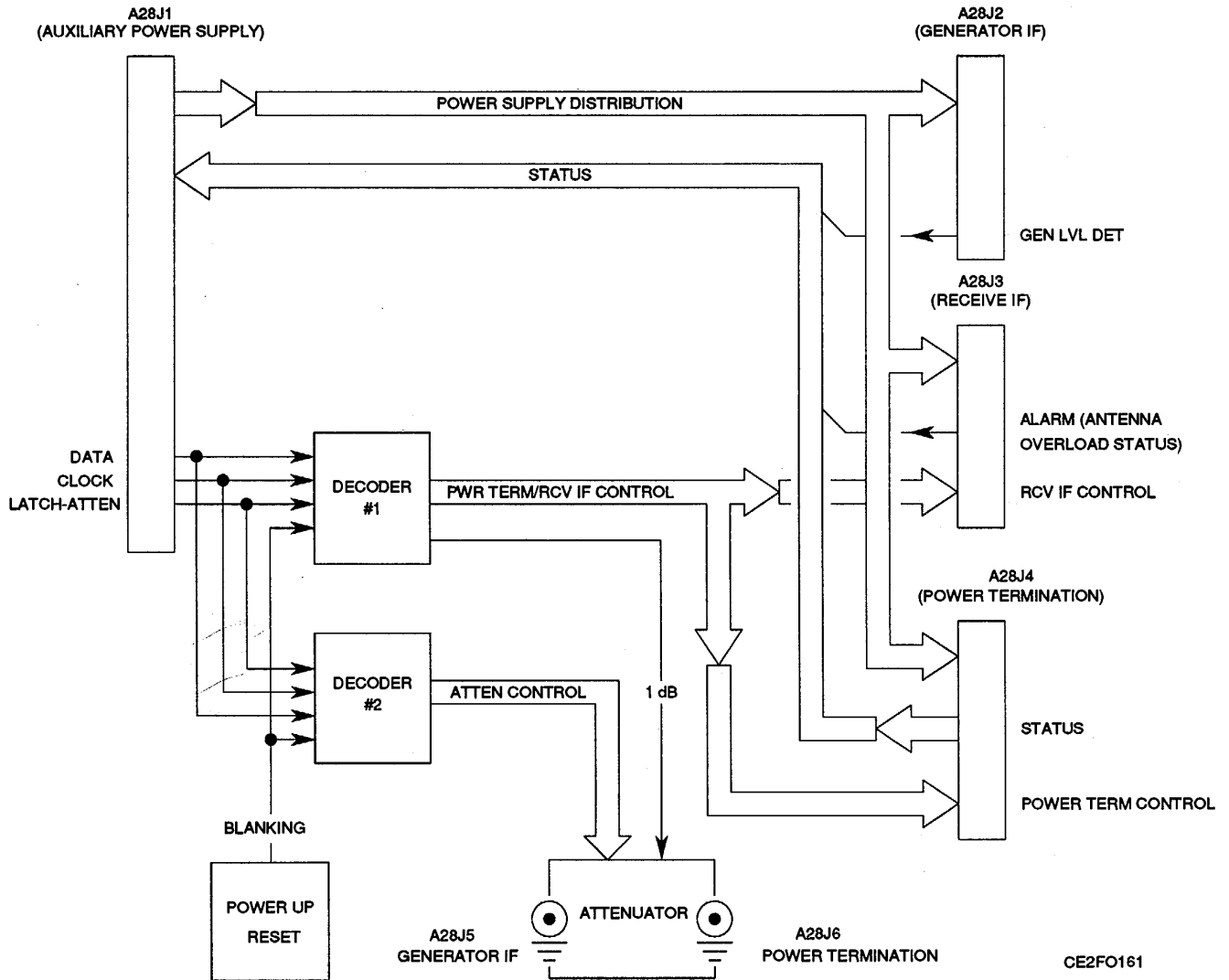
Status signals are also accepted from the A12 Receive IF and A13 Generator IF. The A13 Generator IF passes the GEN LEVEL DET Signal for eventual use by the A9 90 MHz Generator. ANTENNA OVERLOAD STATUS is provided for the A19 Processor by the A12 Receive IF.

Control signals provided to the A12 Receive IF include:

- ANTENNA  $\overline{\text{T/R}}$  SEL
- 20 dB PAD #1 SEL
- 20 dB PAD #2 SEL.

The A28 Attenuator is responsible for attenuating the RF signal from the A13 Generator IF before entering the A14 Power Termination. Attenuation settings are 0-127 dB.





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Figure 1-24. A28 Attenuator Functional Block Diagram.

(23)

x. **78A1A22 RF I/O (fig. 1-25).** The A22 RF I/O performs one primary function and several secondary functions. The primary function is to convert the data presented by the A19 Processor from parallel to serial format, using the Parallel-To-Serial Converter, for the modules attached to the RF I/O BUS. Included in that function are clock and latch functions for the transmission of serial data. Clock and Data Signals are presented to all attached assemblies simultaneously, however, Latch Signals are unique to each assembly. Selection of a latch line by the A19 Processor Data attaches the Serial Data Bus to the specific assembly. The Latch Decoder is used to decode the upper byte (D8-D15) of data from the processor to determine the specified I/O device. The Parallel-To-Serial Converter passes the serial data to the Latch Decoder to place on the RF I/O Bus.

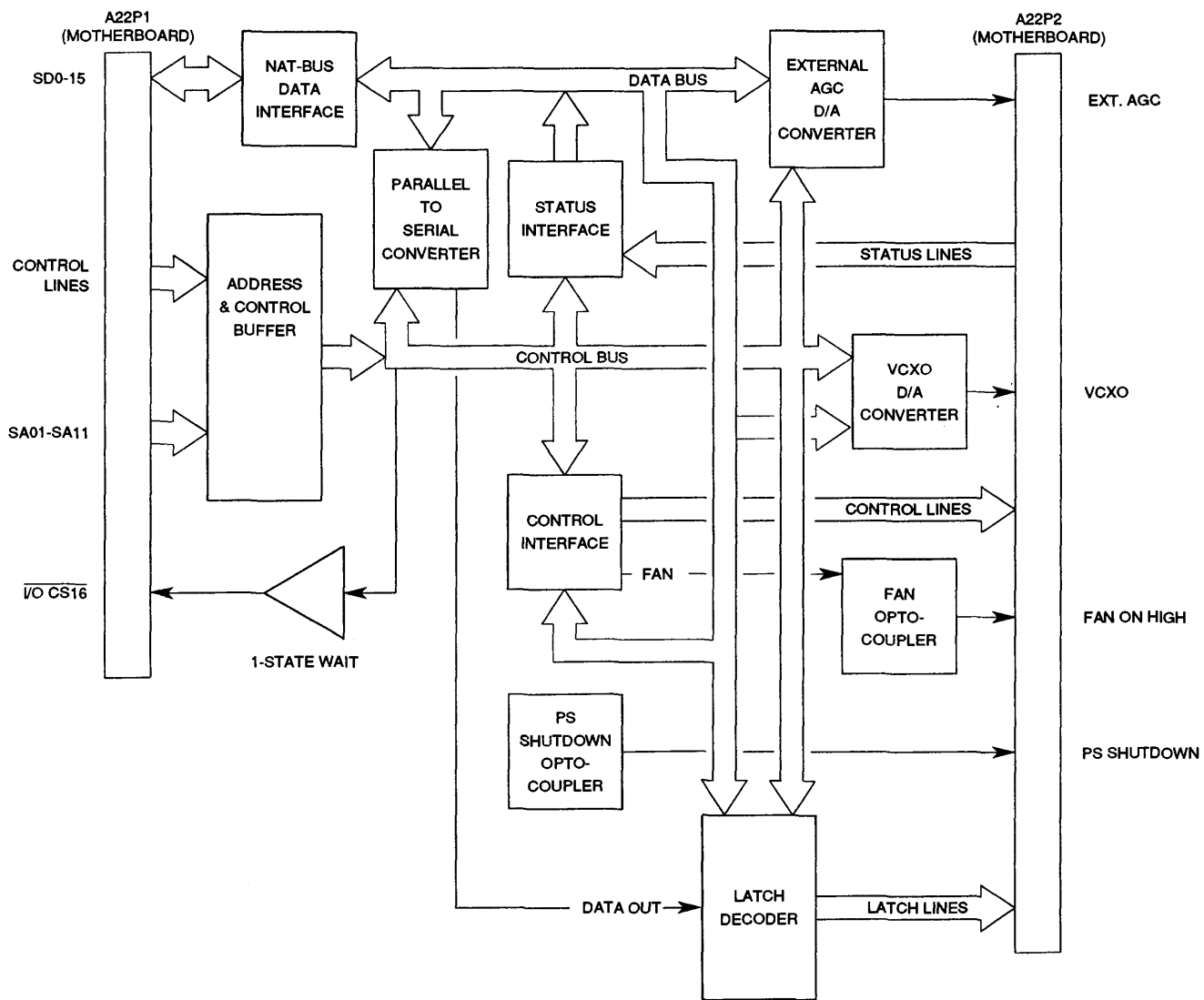
The second function of the A22 RF I/O is to provide a return path to the A19 Processor from the assemblies attached to the RF I/O BUS. Status signals provided to the A22 RF I/O through the RF I/O BUS by the separate assemblies are assembled and latched to the NAT-BUS as a 16 bit word. Status lines returned to the A22 RF I/O include:

- STATUS-1stA (1st LO Receive).
- STATUS-1stB (1st LO Generate).
- STATUS-3rd (3rd LO).
- STATUS-2nd.
- STATUS-GEN.
- ANLZR-LOCK (Analyzer Phase Lock).
- ALARM
- POWERMODE.
- SPR
- DC DET (A16 Power Supply).
- MIC-SW.
- ACC-1.
- ACC-2.

The A22 RF I/O receives inputs from both the NAT-BUS and the RF I/O BUS. The signals provided by the NAT-BUS that are used by the A22 RF I/O include:

- Address Lines (SAO-SA11).
- Data Lines (SDO-SD15).
- I/O Read ( $\overline{\text{IORD}}$ ).
- Upper Byte Enable ( $\overline{\text{SHBE}}$ ).
- Address Latch Enable (BALE).
- I/O Write ( $\overline{\text{IOWR}}$ ).

The EXTERNAL AGC D/A Converter creates the EXT AGC signal for the A6 Receiver. The VCXO D/A Converter provides the digital information needed to create the analog VCXO Signal. The FAN OPTO-COUPLER provides the FAN ON HIGH Signal. The PS SHUTDOWN OPTO-COUPLER provides the PS SHUTDOWN Signal.



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Figure 1-25. A22 RF I/O Functional Block Diagram.

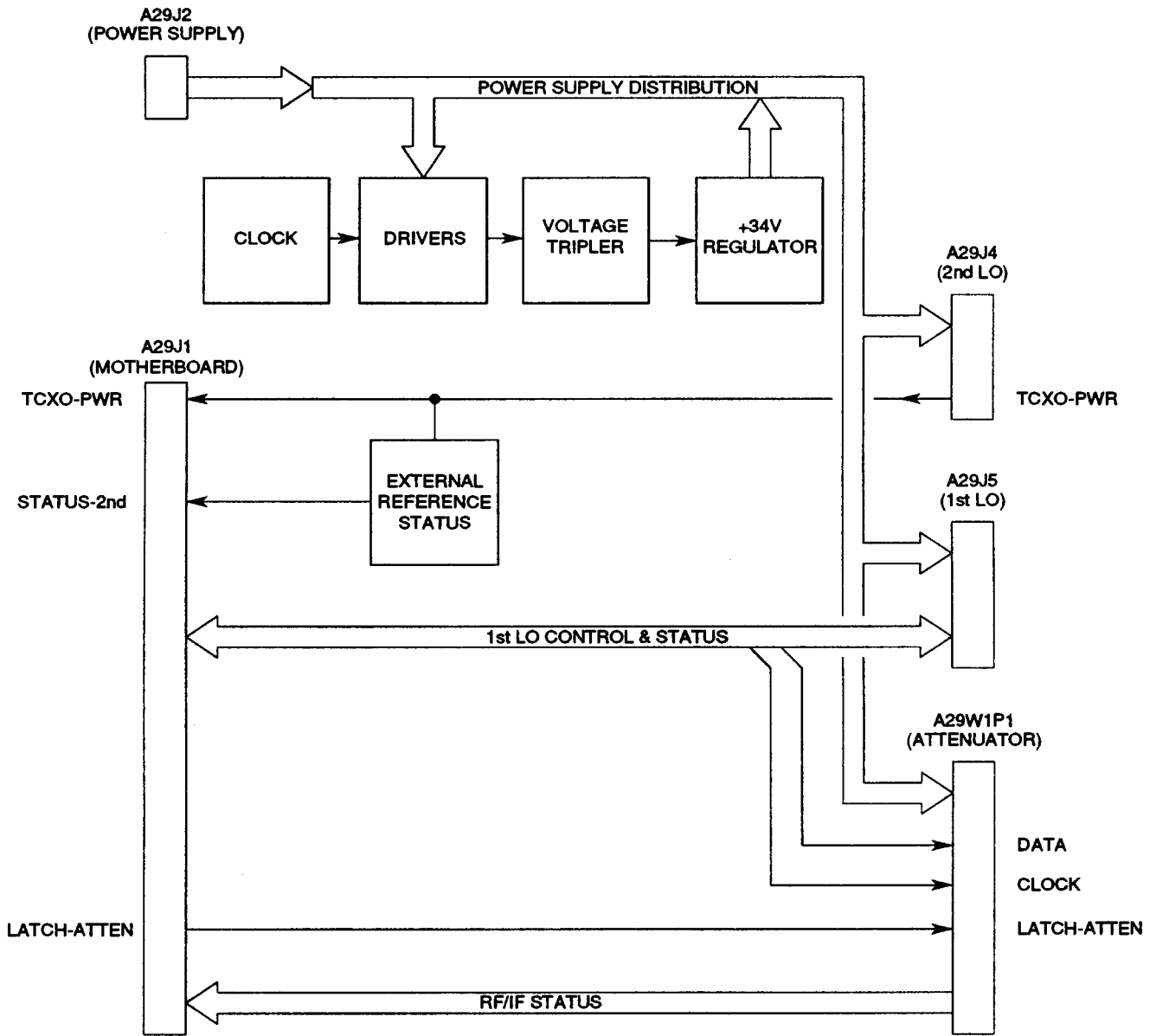
(24) y. **78AIA29 Auxiliary Power Supply (fig. 1-26).** The A29 Auxiliary Power Supply performs four functions:

- Provides interface from A10 1st LO, All 2nd LO and A28 Attenuator to the A22 RF I/O.
- Disperses +5 and  $\pm 15$  Vdc from the A16 Power Supply to the A10 1st LO, All 2nd LO and A28 Attenuator.
- Provides 34 Vdc to A10 1st LO.
- Takes TCXO-PWR line from All 2nd LO and generates an appropriate signal for STATUS-2ND (2nd LO status line).

The A29 Auxiliary Power Supply provides a feed thru interface for the A10 1st LO and A28 Attenuator to and from the A22 RF I/O through the RF I/O BUS. Information passed from the RF I/O BUS includes latch, clock and serial data signals. Information passed to the RF I/O BUS are status signals from the A10 1st LO and A28 Attenuator.

The A29 Auxiliary Power Supply also passes +5 and  $\pm 15$  V to the A10 1st LO, All 2nd LO and A28 Attenuator. The A10 1st LO also requires a +34 V source. This is generated in the A29 Auxiliary Power Supply and is not used by any other assembly.

The All 2nd LO passes TCXO-PWR Signal to the A29 Auxiliary Power Supply which passes the signal to the RF I/O BUS and also sets the appropriate signal for a status signal for the All 2nd LO. If the TCXO-PWR Signal is high, the STATUS-2ND Line is high.



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Figure 1-26. A29 Auxiliary Power Supply Functional Block Diagram.

(25)

**z. A27 External 110 (fig. 1-27).** The A27 External I/O provides the bidirectional communication link between the A19 Processor and the GPIB and SCSI Connectors. Data and Control signals are passed to the A27 External I/O through the NAT-BUS. Signals are returned to the A19 Processor from the A27 External I/O in the same manner. Control signals select which connector will be active and which controlling circuitry to use. The control and data signals are translated and passed through the appropriate connector. Return data takes the same path in reverse.

The GPIB Connector uses the GPIB CONTROLLER as the controlling device for remote operation. Use of this connector is in accordance with IEEE-488. The GPIB CONTROLLER accepts and passes data through the GPIB DATA TRANSCEIVER. Likewise, control signals pass through the GPIB CONTROL TRANSCEIVER. Clock signals for the GPIB CONTROLLER are provided by a clock within the assembly. Interrupt and DMA requests for GPIB are passed through the NAT-BUS INTERFACE to the NAT-BUS. DMA Acknowledge signals are returned along the same path in reverse.

The SCSI Connector uses the SCSI PROCESSOR as the controlling device for remote operation.

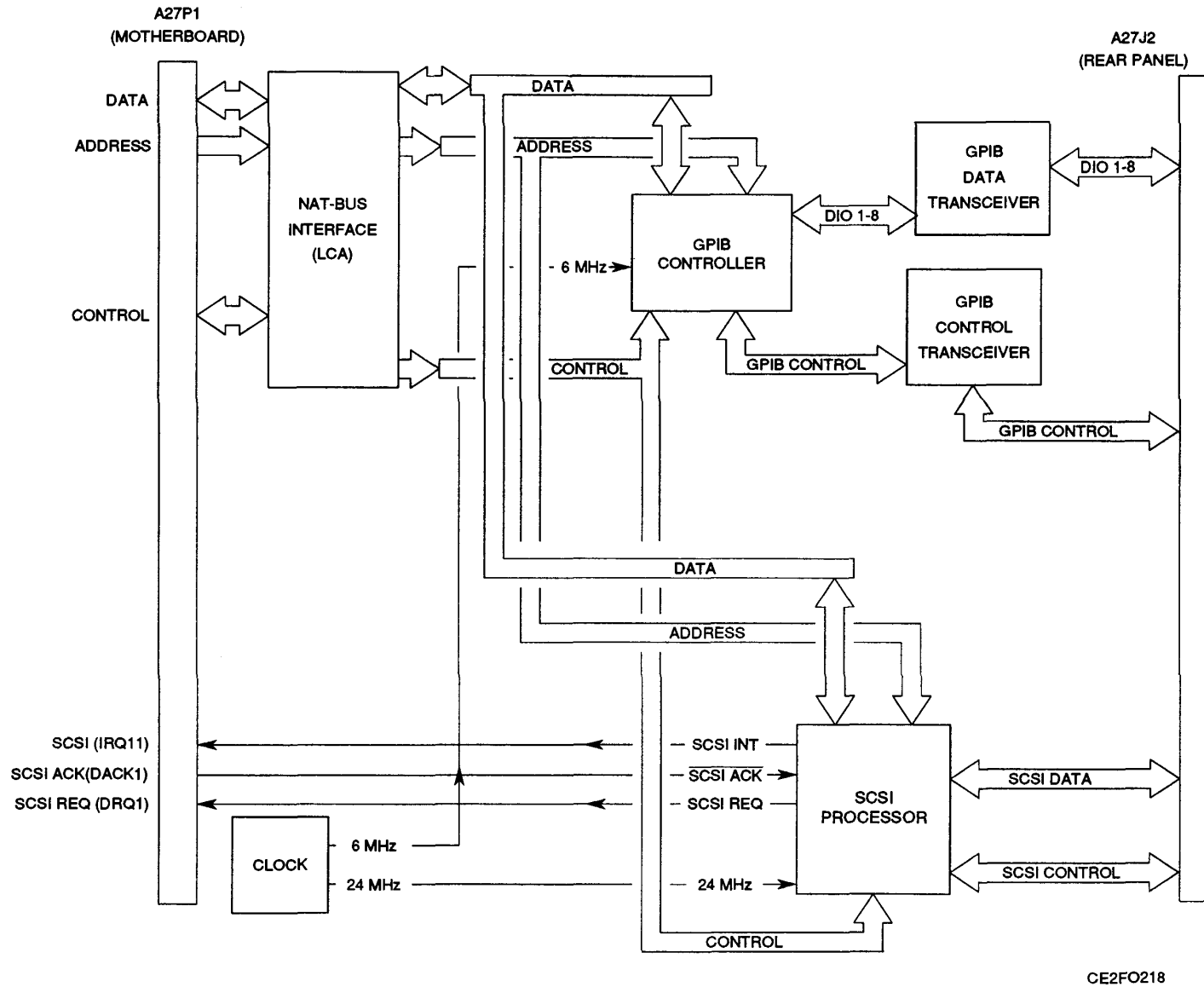


Figure 1-27. A27 External I/O Functional Block Diagram.

(26)

**aa. 78A1A8 DMM (fig. 1-28).** The A8 DMM converts current, voltage or resistance into digital data for the A23 Counter. The A23 Counter interprets the data and passes the measurement to the A1 9 Processor. Resolution of the A8 DMM is  $31/2$  digits. Control data from the A23 Counter is passed to the A8 DMM in serial format. Required signals are DMM CLOCK Signal, DMM/INEN Signal (Enable) and DATA TO DMM Signal. This data is passed to the Serial To Parallel Relay Driver and the Serial To Parallel Converter. Both sets of circuitry convert the serial data into parallel format. This data is used to control:

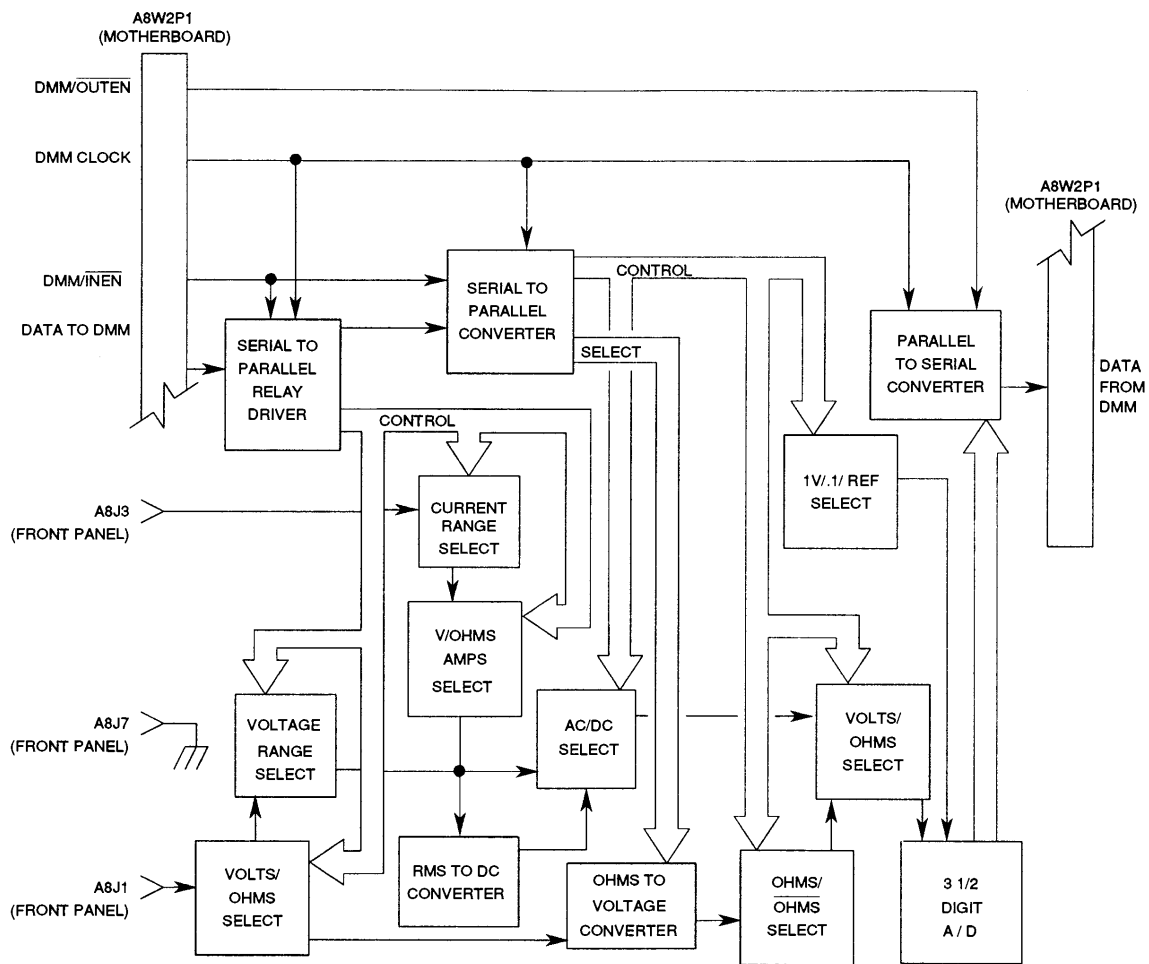
CURRENT RANGE SELECT Switch.  
 (V/OHMS)/AMPS SELECT Switch.  
 VOLTS/OHMS SELECT Switch.  
 OHMS/OHMS SELECT Switch.  
 VOLTAGE RANGE SELECT Switch.  
 OHMS TO VOLTAGE CONVERTER.  
 AC/DC SELECT Switch.  
 VOLTS/OHMS SELECT Switch.  
 1V/.1V REF SELECT Switch.

The path taken by the signal to be measured is dependent on the SELECT Switches. Different paths are taken based on whether the measurement is voltage, current or resistance. The path for measuring current starts at the DMM AMP Connector. Signals then pass through the CURRENT RANGE SELECT circuitry where the current signal is passed through a fixed resistance and a voltage level is extracted. The (V/OHMS)/AMPS SELECT Switch passes the analog voltage. The analog voltage then has two paths available. If the measurement to be made is for ac current measurement, the RMS voltage passes through the RMS TO DC CONVERTER, converting the RMS voltage to a dc voltage. If the analog voltage is already a dc voltage (dc current measurement is required), then the RMS TO DC CONVERTER is bypassed. The AC/DC SELECT Switch passes the required analog signal. This analog signal is routed to the VOLTS/OHMS SELECT Switch where the signal is passed to the A/D Converter and the dc voltage level is converted to digital data. This digital data is converted from parallel to serial format and passed to the A23 Counter.

Voltage signals enter from the DMM VQ Connector and are switched to the Voltage Range Select by the Volts/ohms Select Switch. The VOLTAGE Range Select produces an analog signal based on the incoming voltage being referenced to ground through a load that is dependent on the range selected for the measurement. If the measurement to be made is for ac current measurement, the RMS voltage passes through the RMS To DC Converter, converting the RMS voltage to a dc voltage. If the analog voltage is already a dc voltage (dc current measurement is required), then the RMS To DC Converter is bypassed. The AC/DC SELECT Device passes the required analog signal. This analog signal is routed to the VOLTS/OHMS Select Device where the signal is passed to the A/D Converter where the dc voltage level is converted to digital data. This digital data is converted from parallel to serial format and passed to the A23 Counter.

Resistance is measured between the DMM VQ Connector and the DMM COM Connector. A small current is passed out the DMM VQ Connector and back in the DMM COM Connector. The resulting voltage between the two connectors is read by the Ohms To Voltage Converter and switched to the A/D Converter. The parallel format digital data is converted to serial data and passed to the A23 Counter.





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Figure 1-28. A8 DMM Functional Block Diagram.

(27) **ab. 83A1A7 UUT Interface (fig. 1-29).** The A7 UUT Interface provides the interface between the Test Set and the UUT. The Digital section interfaces Address, Data, and Control signals from the A8 Processor to each individual test section. Each test section is designed to perform a specific test for a specific radio module or LRU.

The Digital Section also provides control data to the A3 RF Amplifier.

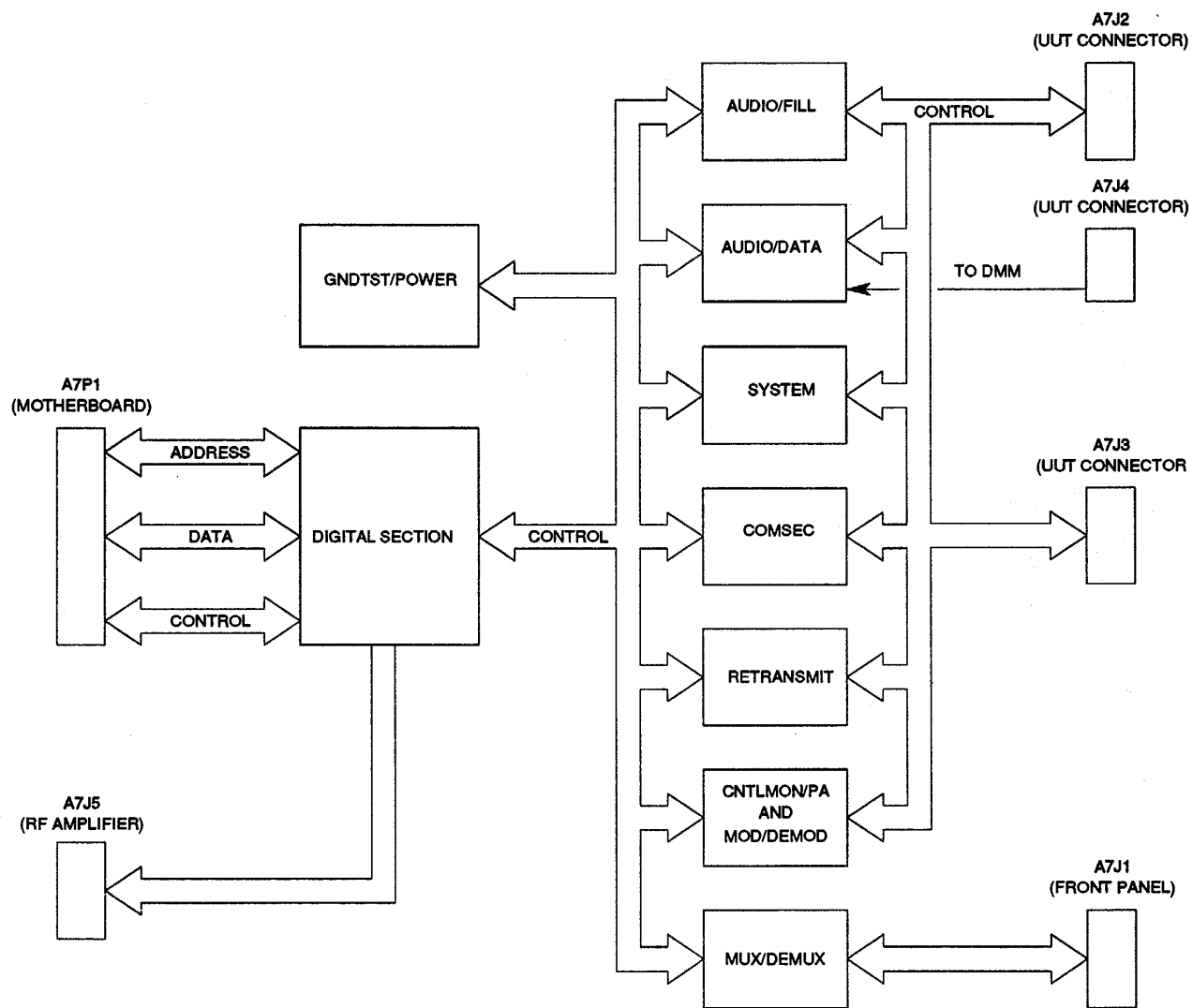


Figure 1-29. A7 UUT Interface Functional Block Diagram.

(28)

**ac. 83A1A3 RF Amplifier (fig. 1-30).** The A3 RF Amplifier simulates the SINCGARS manpack transmitter and drives the SINCGARS 50 W power amplifier.

The A9 90 MHz Generator serves as the driver to the A3 RF Amplifier. The generator output power is switched through the 78A1A14 Power Termination to the DUPLEX OUT Connector on the Test Set, to the DUPLEX IN Connector on the Test Adapter, to the A3 RF Amplifier.

The RF Amplifier input stage is comprised of a wide band linear RF amplifier (83A1A3U1). Input power is approximately 1 mW (0 dBm). The input stage amplifies power to approximately 0.8 W. The amplified RF signal drives the wide band (30-88 MHz) class C power amplifier, comprised of two balanced transistors (A3Q1 and A3Q2). The DC bias voltage is applied to the transistor gates from the ALC circuit controlling DC bias to produce stage gain.

The 5 W amplified RF signal is routed to the two switched low-pass filters, where the 2nd and higher harmonics of the amplified signal are filtered out. For signals from 30-51.400 MHz, the first low-pass filter is activated; from 51.425-87.975 MHz, the second low-pass filter is activated.

Selection of the appropriate low-pass filter is done by the logic signal in the band control input. A low logic level activates the 30-51.400 MHz low-pass filter, and a high logic level activates the 51.425-87.975 MHz low-pass filter. The standard logic levels (0 and 5 V) of the band control input, are transformed to +5 and -50 V logic levels by the Pin Diode Driver circuit. The Pin Diode Driver circuit supplies adequate current levels to switch the pin diodes. The pin diodes switch in and out the appropriate low-pass filter.

The RF power, after filtering, is routed to a directional coupler (A3A2DC1). A3A2DC1 is a 4-port element. The RF power enters through the 1st port, and the load is connected to the 2nd port. The 3rd port samples (-17 dB coupling approximate) the incident RF power delivered by the amplifier output stage to load. The 4th port samples (-17 dB coupling approximate) the RF power reflected from the load back to the output stage. The ratio of reflected power to incident power gives the indication on load VSWR. The two sampled RF powers are detected by schottky diodes (A3A2CR5 and A3A2CR6) to form equivalent DC voltages. The two DC voltages are compared, and if close in value, indicating high load VSWR, the output RF power is reduced to prevent damage to the power amplifier.

The detected - sampled incident RF power is compared to the DC voltage which exists at the same point when the incident RF power is equal to 5 W. The error voltage is amplified and integrated by a high gain operational amplifier (A3A2U3). The amplified - integrated voltage is routed to the gain control lines of the RF power amplifier. The RF amplifier gain is adjusted automatically by the control lines to minimize error voltage and keep the output RF power close to 5 W. The detected - sampled incident RF power output is connected to A3A2J6, pin 7 for RF power output monitoring.

The -50 VDC power supply is a switching power regulator, with input voltage of -15 VDC and output voltage of -50 VDC. To activate the RF amplifier only when needed, and to save current when RF power is not needed, the amplifier system includes an electronic switch, controlled from the DC Connector. The control line is the ON/OFF designated pin. When the ON/OFF voltage is 0 VDC, the DC supply line for the power amplifier is disconnected and the amplifier is off. +5 VDC activates the amplifier.

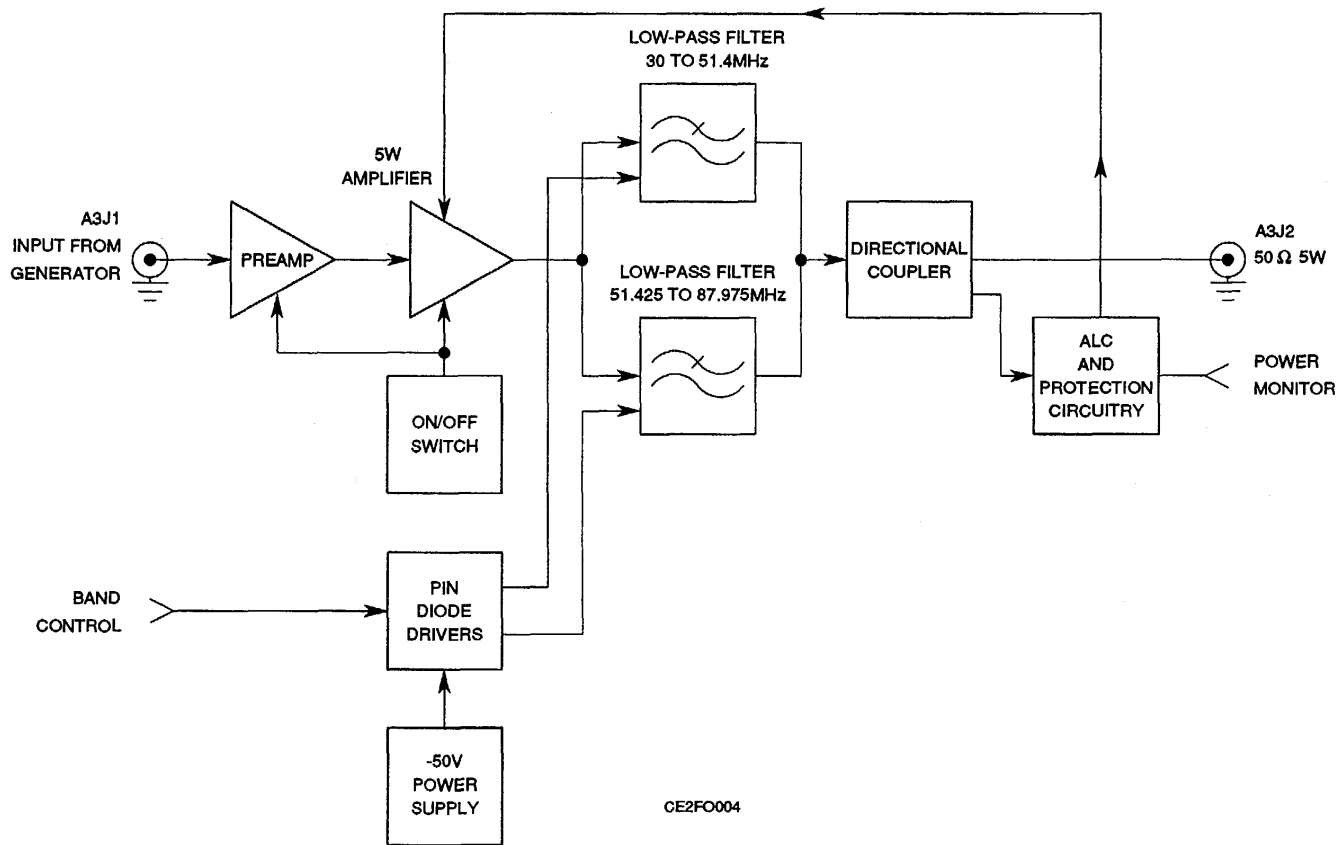


Figure 1-30. A3 RF Amplifier Functional Block Diagram.

(29)

**ad. 83A1A4 Front Panel (fig. 1-31).** The A4 Front Panel provides an interface between the UUT and the Test Set.

The A4 Front Panel provides an analog interface between the Test Adapter and the Test Set, provides a connector (SNAP OUTPUT) for testing SNAP Tune Word, connects the Input RF to the A3 RF Amplifier and passes out the output from the A3 RF Amplifier and provides the operator visual indication that power is applied to the Test Adapter.

Connection to the UUT is provided by the UUT Connector. This connector provides all input and output lines required to test the UUT other than the Power Supply. This connector is tied directly to the A7 UUT Interface.

In addition to the UUT Connector, the signal for the POWER ON Indicator for the Test Adapter is supplied by the A7 UUT Interface.

The Analog interface between the Test Set and Test Adapter is provided by connecting the following connectors using coaxial cables:

Test Adapter	Test Set
EXT MOD OUT	EXT MOD IN
SINAD/BER OUT	SINAD/BER IN
AUDIO IN	AUDIO OUT
DEMOM IN	DEMOM OUT

Additionally, the DMM OUT Connector is connected to the V/Q and COMM Connectors using a twin coaxial to banana connector cable.

These connectors are on the A4A2 Audio. All signals are low-pass filtered on the A4A2 Audio before being transmitted or immediately upon receipt from the Test Set. The A4A2 Audio is connected to the A7 UUT Interface.

The A4 Front Panel also provides the interface from the Test Set to the A3 RF Amplifier. The DUPLEX OUT Connector on the Test Set is connected to the Test Adapter DUPLEX IN Connector. The Test Adapter DUPLEX IN Connector is connected to the A3 RF Amplifier, providing the RF stimulus for high power testing. The output of the A3 RF Amplifier is connected to the A4 Front Panel, terminating at the RF AMP OUT Connector.

The SNAP OUTPUT Connector is used to provide SNAP Tune Word information for testing applicable LRUs.

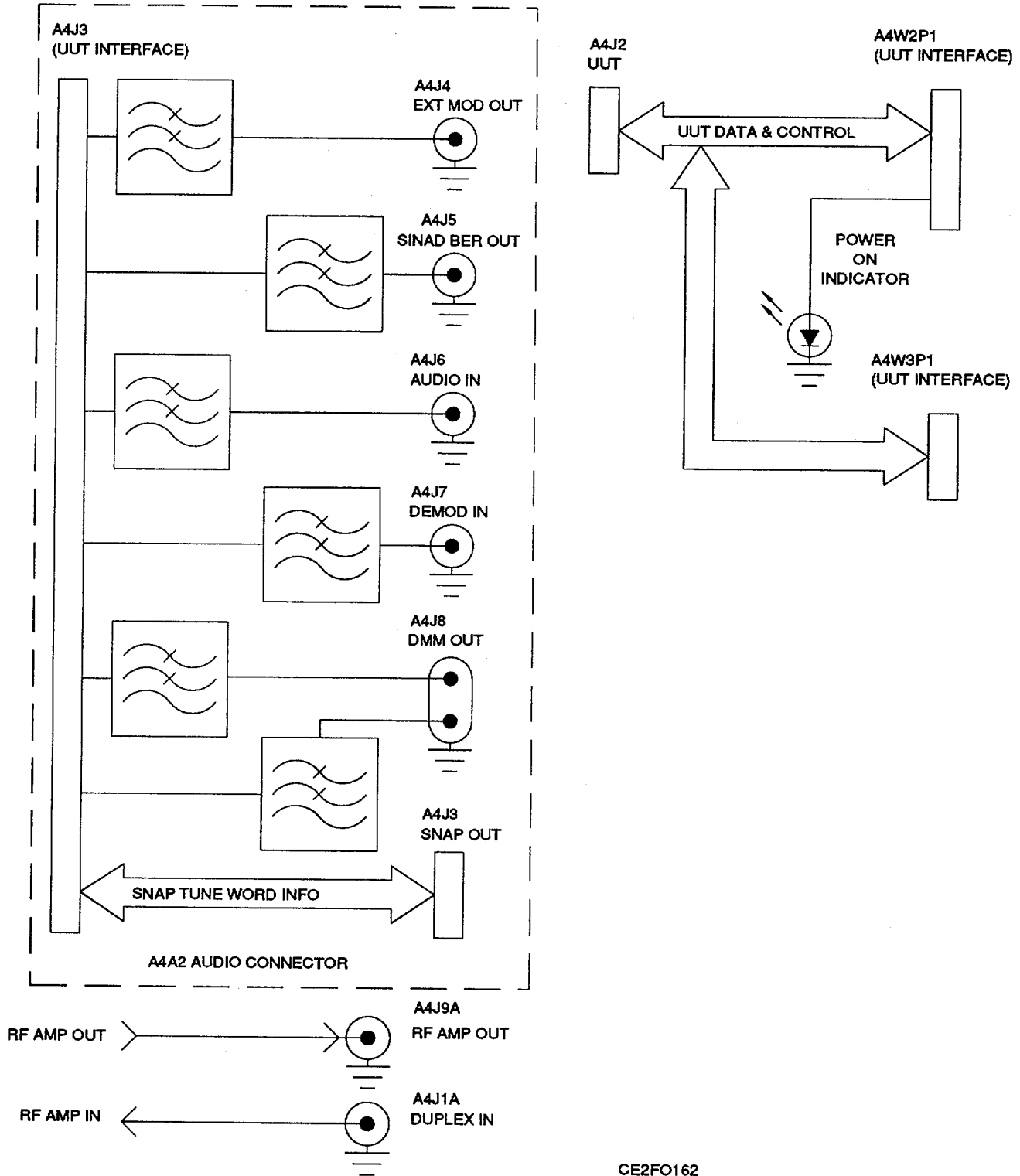


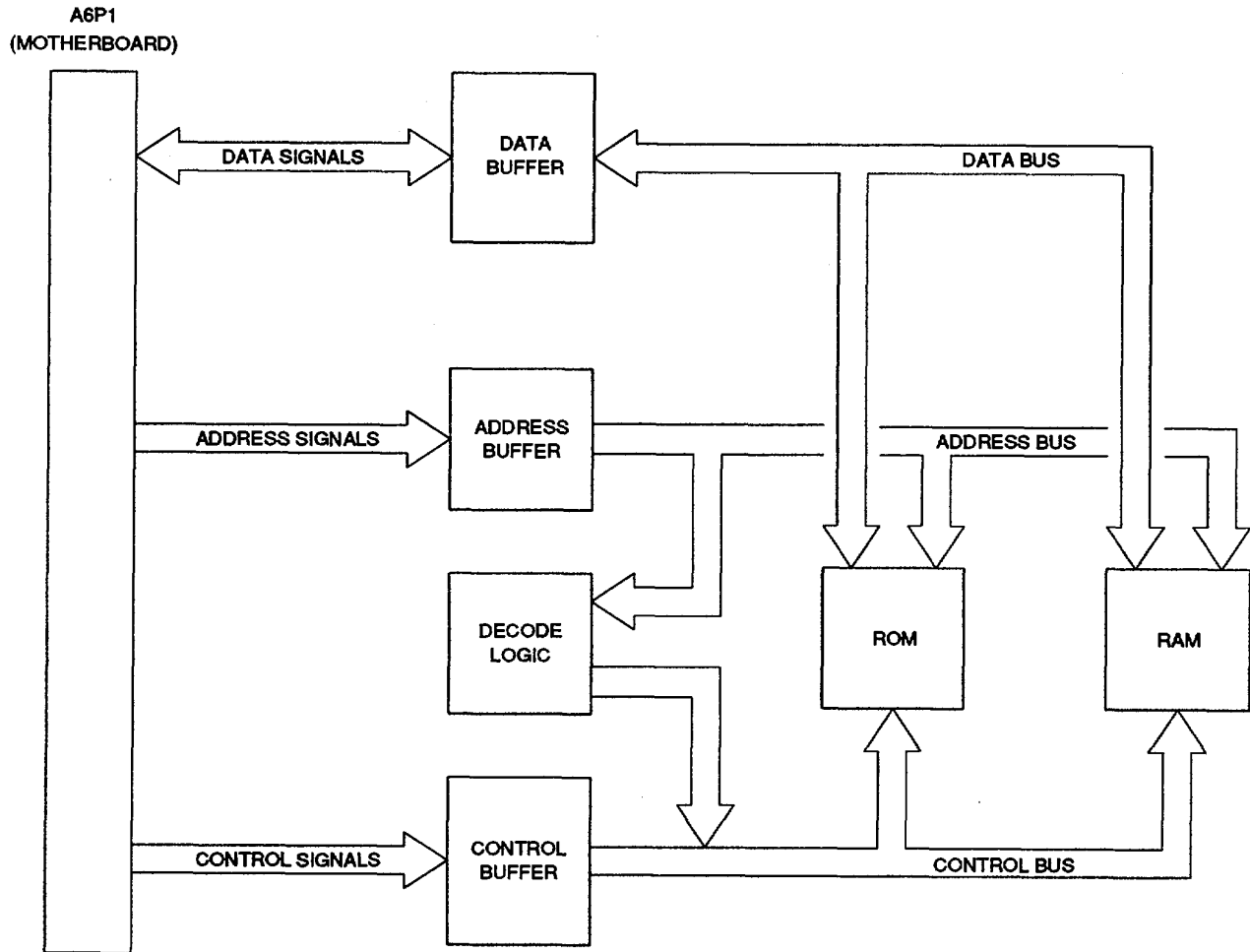
Figure 1-31. A4 Front Panel Functional Block Diagram.

(30)

**ae. 83A1A6 Memory (fig. 1-32).** The ADDRESS, DATA and CONTROL Signals, passed to the A6 Memory, are buffered before being made available to the A6 Memory. The ADDRESS BUS is accessed by the DECODE LOGIC Circuitry. The DECODE LOGIC Circuitry generates control signals enabling the proper memory device.

Memory devices consist of RAM and ROM. The RAM is Static Protected. The ROM is EEPROM.





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Figure 1-32. A6 Memory Functional Block Diagram.

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**af. 83A1A8 Processor (fig. 1-33).** The A8 Processor provides the overall control for the system. The CPU is an 80376 embedded microcontroller. The 80376 is a 32 bit processor with a 24 bit address bus and 16 bit data bus. To speed up the system, an 82370 Integrated System Peripheral Device is attached to provide supervision for DMA and Interrupt Requests and Acknowledges. Additional controller circuits include the following:

- MAX 690 Supervisory Circuit controls power-up RESET and Nonmaskable Interrupt actions. RESET affects the 80376, the 82370 and other I/O Devices. The RESET signal from the MAX 690 becomes the RESDRV signal on the NAT-BUS.
- Memory Select Circuit controls what section of memory is being used.
- Wait State Circuit inserts 1 to 16 wait states into I/O processing, as needed.
- Real-time clock containing time-of-day clock, alarm, 100 year calendar, programmable interrupt, square wave generator and 50 bytes of memory. A lithium power source is included in the package to keep the clock updated when power is not applied.

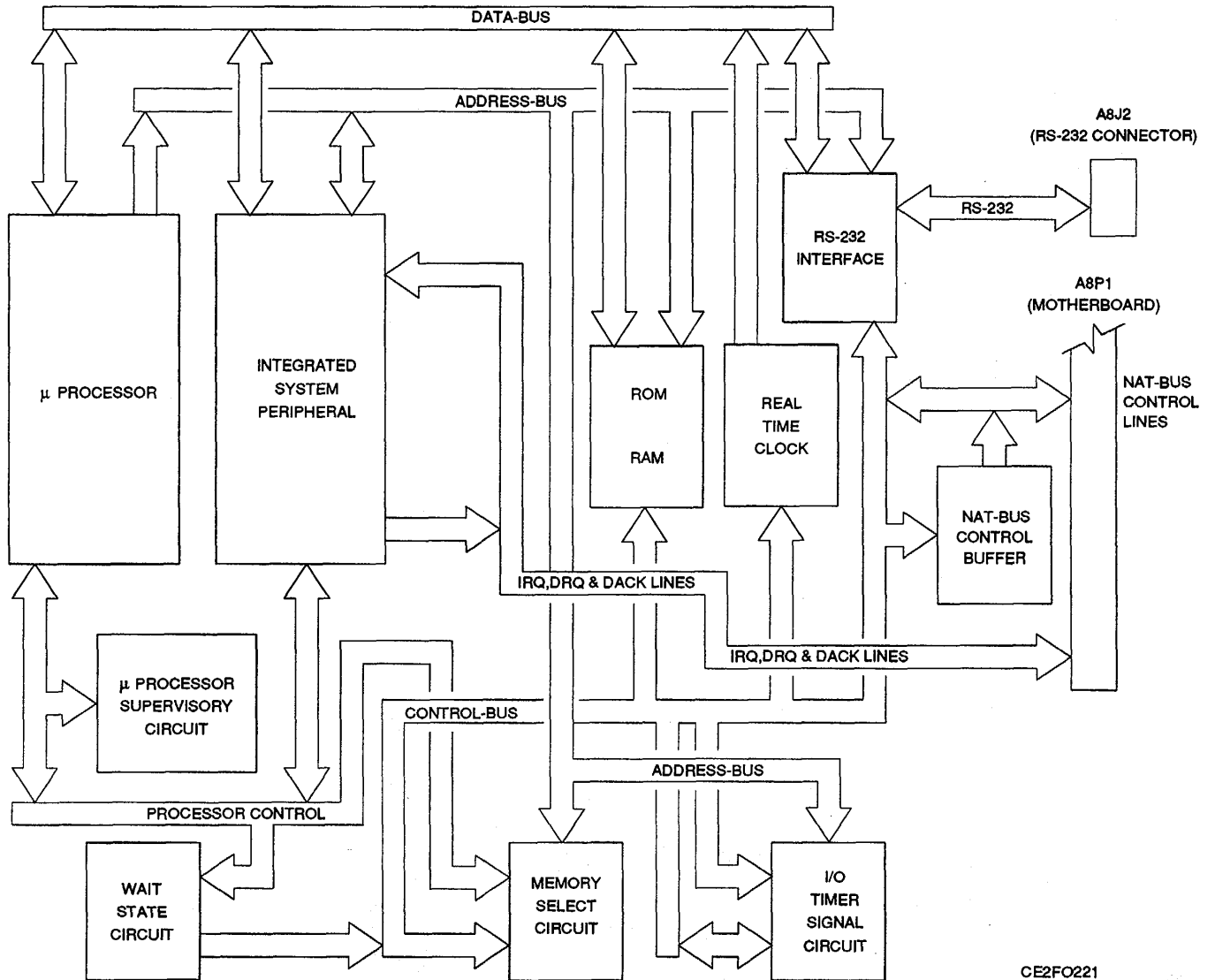
Memory available on the A8 Processor includes 128kX8 ROM and 64kX8 RAM. The ROM is used for part of the system code. The RAM is used for storing program global parameters.

The AT Compatible I/O Channel (NAT-BUS) contains:

- 16 bit bidirectional data bus.
- 24 bit address line bus.
- 9 levels of interrupt.
- Memory and I/O Read/Write lines.
- Clock and timing lines.
- 5 channels of DMA control lines.
- 7 memory refresh timing control lines.

Data in and out of the NAT-BUS is controlled by the NAT-BUS Buffer.

The RS-232 INTERFACE is attached directly to the RS-232 Connector. The RS-232 INTERFACE translates both directions between the microprocessor and the device attached to the RS-232 connector.



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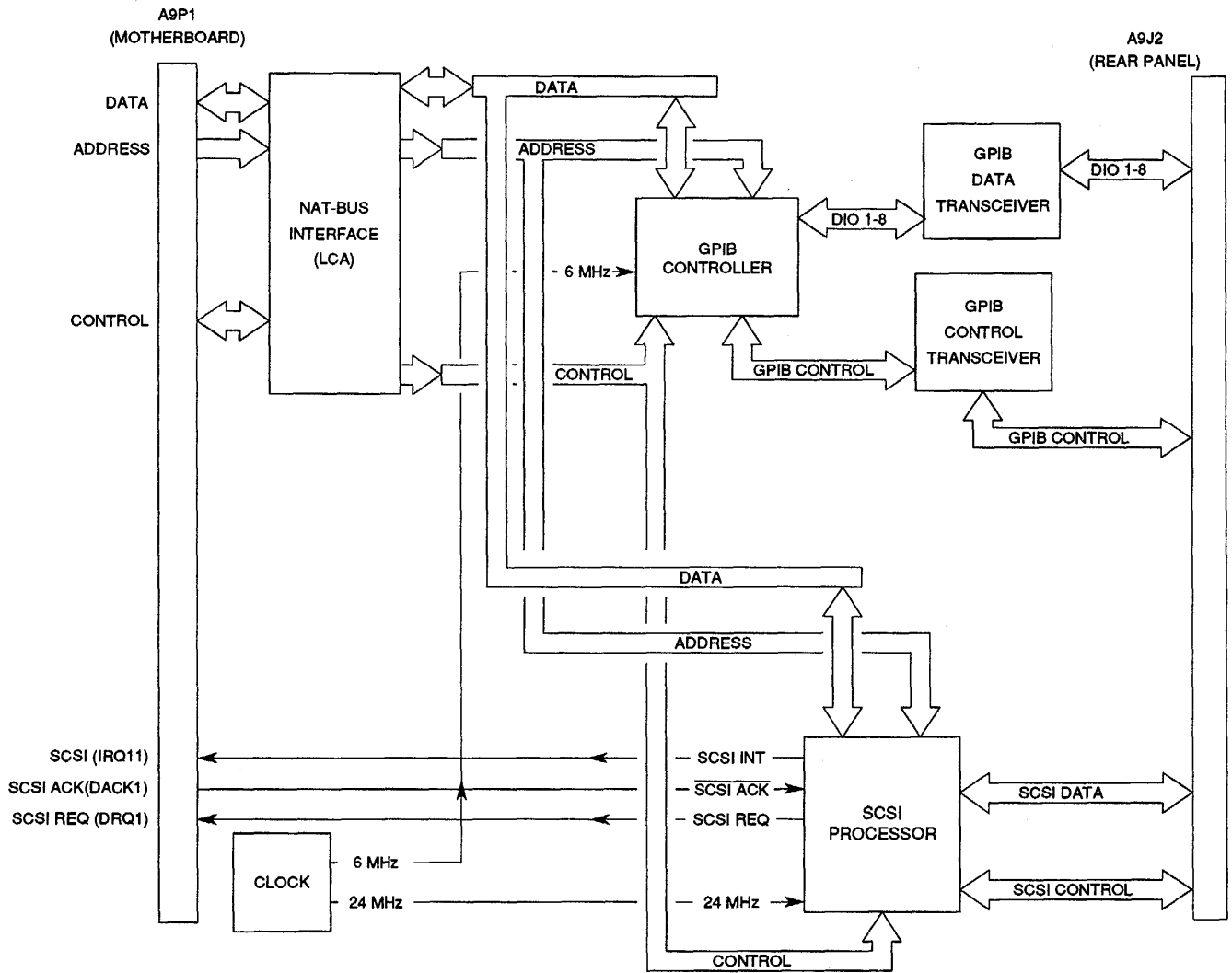
Figure 1-33. A8 Processor Functional Block Diagram.

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**ag. 83A1A9 External I/O (fig. 1-34).** The A9 External I/O provides the bidirectional communication link between the A8 Processor and the GPIB and SCSI Connectors. Data and Control signals are passed to the A9 External I/O through the NAT-BUS. Signals are returned to the A8 Processor from the A9 External I/O in the same manner. Control signals select which connector will be active and which controlling circuitry to use. The control and data signals are translated and passed through the appropriate connector. Return data takes the same path in reverse.

The GPIB Connector uses the GPIB CONTROLLER as the controlling device for remote operation. Use of this connector is in accordance with IEEE-488. The GPIB CONTROLLER accepts and passes data through the GPIB DATA TRANSCEIVER. Likewise, control signals pass through the GPIB CONTROL TRANSCEIVER. Clock signals for the GPIB CONTROLLER are provided by a clock within the assembly. Interrupt and DMA requests for GPIB are passed through the NAT-BUS INTERFACE to the NAT-BUS. DMA Acknowledge signals are returned along the same path in reverse.

The SCSI Connector uses the SCSI PROCESSOR as the controlling device for remote operation.



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Figure 1-34. A9 External I/O Functional Block Diagram.

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MAINTENANCE INSTRUCTIONS**

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## Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

### 2.1. COMMON TOOLS AND EQUIPMENT.

Common tools and equipment required for Maintenance Instructions of Radio Test Set are listed in Maintenance Allocation Chart (MAC) (Appendix B) of Operator's and Unit Maintenance Manual, TM 11-6625-3245-12.

### 2.2. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT.

There are no special tools, TMDE or support equipment required.

### 2.3. REPAIR PARTS.

Repair parts are listed and illustrated in the Repair Parts and Special Tools Lists, TM 9-6625-3244-24P (TS-4317/GRM) and TM 9-6625-3246-24P (J-4843/GRM-114B).

## Section II. SERVICE UPON RECEIPT

### 2.4. SERVICE UPON RECEIPT OF MATERIEL.

**a. Unpacking.** Special design packing material inside this shipping carton provides maximum protection for Radio Test Set. Avoid damaging carton and packing material during equipment unpacking. Use the following steps for unpacking Radio Test Set.

- Cut and remove sealing tape on carton top and open carton.
- Grasp Radio Test Set firmly while restraining shipping carton and lift equipment and packing vertically.

#### CAUTION

**Two people are required to lift and/or carry Radio Test Set.**

- Place Radio Test Set and end cap packing on a suitable flat, clean and dry surface.
- Remove protective plastic bag from Radio Test Set. Place desiccant bags back inside protective plastic bag.
- Place protective plastic bag and end cap packing material inside shipping carton.
- Return shipping carton to supply system.

### **b. Checking Unpacked Equipment.**

- Inspect the equipment for damage incurred during shipment. If equipment has been damaged, report damage on SF 364, Report of Discrepancy (ROD).
- Check equipment against packing slip to see if shipment is complete. Report all discrepancies in accordance with instructions of DA Pam 750-8.
- Check to see whether equipment has been modified.

### 2.5. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT.

Refer to TM 11-6625-3245-12, Chapter 3, Section 2 for this information.

Section III. TROUBLESHOOTING

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**2-6. GENERAL TROUBLESHOOTING INFORMATION.**

Troubleshooting at general support maintenance level requires locating any malfunction as quickly as possible. The amount of troubleshooting to be accomplished is based on what the Maintenance Allocation Chart indicates. Because of this, the only trouble symptoms here are those that could be caused by faulty items general support maintenance level is allowed to fix.

**NOTE**

- **Before using troubleshooting table, check work order and talk to unit maintenance, if possible, for description of symptoms and steps taken to correct them.**
- **Check all forms and tags attached to, or accompanying, equipment to determine reason for removal from service.**

**2-7. TROUBLESHOOTING GUIDELINES.**

Following is a list of aids to be used when troubleshooting Radio Test Sets.

a. Radio Test Set has built-in self tests used in troubleshooting. Procedures for self-tests are specified in troubleshooting procedures.

b. Refer to principles of operation, Chapter 1, Section III as required. This provides circuit theory of each section with references to functional block diagrams. Radio Test Set Functional Block Diagram is located on figure FO-1. Radio Test Set Assembly and Cable Locator Diagram is located on figure FO-2. Assembly component locators are located on figures FO-3 through FO-23.

c. Many problems on Radio Test Sets in service are caused by corrosion. Sometimes removing and reseating affected cable or circuit card will correct malfunction. Cleaning connector and/or switch contacts with alcohol (Appendix B, item 1) will repair many types of digital and analog circuit malfunctions.

d. When the A3 Monitor or A26 Monitor Control is installed on an extender board in the troubleshooting procedures, the Monitor/Monitor Control Extended Ribbon Cable (Appendix C) needs to be fabricated and used.

e. Perform Turn-On Procedure (para 2-8, TM 11-6625-3245-12), Self Test and Performance Test (para 2-19) in order to troubleshoot Radio Test Set.

f. To eliminate the possibility of replacing good assemblies, refer to para 2-95 and perform required adjustment procedures to determine whether assembly is maladjusted or faulty.

**2-8. EQUIPMENT INSPECTION.**

The following inspection procedures are used to locate obvious malfunctions with Radio TestSet.

a. Inspect all external surfaces of Radio Test Set for physical damage, breakage, loose or dirty contacts and missing components.

**WARNING**

**Dangerous voltages are present with covers removed.**

b. Remove 78A2 Top Case (para 2-22) and 78A3 Bottom Case (para 2-23) on Test Set and 83A1A1 Bottom Case (para 2-76) on Test Adapter as required to access components.

**CAUTION**

**Do not disconnect or remove any board assemblies in Radio Test Set unless instrument is unplugged. Some assemblies contain devices that can be damaged if board 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.**

c. Inspect printed circuit board surfaces for discoloration, cracks, breaks and warping and printed circuit board conductors for breaks, cracks, cuts, erosion or looseness.

e. Inspect all assemblies for burnt or loose components.

f. Inspect all chassis-mounted components for looseness, breakage, loose contacts or conductors.

g. Inspect all motherboard connectors for missing, broken or corroded contacts.

h. Inspect Radio Test Set for disconnected, broken, cut, loose or frayed cables or wires.

**2-9. TROUBLESHOOTING TABLE.**

Table 2-1 lists common malfunctions found during normal operation or maintenance of Radio Test Set or components. Perform tests or inspections and corrective actions in order listed.

**NOTE**

- **Voltage readings referenced to analog ground unless otherwise specified.**
- **See figure FO-2 for assembly and cable location diagram.**

Table 2-1. Troubleshooting.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION						
1.	APPLIED Indicator does not light.							
	Step 1. Locate A1A1W1 (fig. FO-2, Sheet 2 of 5) and verify 8.5 Vdc (±1.5 Vdc) at A1A1W1P1, Pin 4 (fig. FO-3, Sheet 1 of 2).	<ul style="list-style-type: none"> <li>• Replace A16 Power Supply (para 2-48).</li> </ul>						
	Step 2. Verify continuity between A17A2 Keyboard and A16 Power Supply (fig. FO-3, Sheet 2 of 2).	<ul style="list-style-type: none"> <li>• If incorrect, replace A1A1 Motherboard (para 2-74).</li> <li>• If correct, replace A17A2 Keyboard (para 2-55).</li> </ul>						
2.	ON Indicator does not light.							
	Step 1. Verify ON Indicator lights or lights momentarily when POWER Switch is pressed.	<ul style="list-style-type: none"> <li>• Perform Steps 3-4.</li> </ul>						
	Step 2. Locate A16 Power Supply (fig. FO-2, Sheet 1 of 5). Press POWER Switch and verify voltages with DMM at A16J4 (fig. FO-14) with DMM.	<table border="0"> <tr> <td style="padding-left: 40px;">A16J4, Pin 1</td> <td style="padding-left: 100px;">+5 Vdc (±0.5 Vdc)</td> </tr> <tr> <td style="padding-left: 40px;">A16J4, Pin 3</td> <td style="padding-left: 100px;">+15 Vdc (±2 Vdc)</td> </tr> <tr> <td style="padding-left: 40px;">A16J4, Pin 5</td> <td style="padding-left: 100px;">-15 Vdc (±2 Vdc)</td> </tr> </table> <ul style="list-style-type: none"> <li>• If any voltage is incorrect, perform Power Faults Test (para 2-10).</li> </ul>	A16J4, Pin 1	+5 Vdc (±0.5 Vdc)	A16J4, Pin 3	+15 Vdc (±2 Vdc)	A16J4, Pin 5	-15 Vdc (±2 Vdc)
A16J4, Pin 1	+5 Vdc (±0.5 Vdc)							
A16J4, Pin 3	+15 Vdc (±2 Vdc)							
A16J4, Pin 5	-15 Vdc (±2 Vdc)							
	Step 3. Locate A1A1W1 (fig. FO-2, Sheet 2 of 5) and verify 8.5 Vdc (±1.5 Vdc) at A1A1W1P1, Pin 3 (fig. FO-3, Sheet 1 of 2).	<ul style="list-style-type: none"> <li>• Perform Step 5.</li> </ul>						
	Step 4. Verify continuity between A17A2 Keyboard and A16 Power Supply (fig. FO-3, Sheet 2 of 2).	<ul style="list-style-type: none"> <li>• If incorrect, replace A1A1 Motherboard (para 2-74).</li> <li>• If correct, replace A1 7A2 Keyboard (para 2-55).</li> </ul>						
	Step 5. Disconnect power source from Test Set. Locate A17 Front Panel (fig. FO-2, Sheet 1 of 5) and verify <100 Q resistance with DMM between A17A2A1E1, Pin 13 (fig. FO-15, Sheet 1 of 2) and Chassis Ground when POWER Switch is pressed.	<ul style="list-style-type: none"> <li>• If incorrect, replace A17A2 Keyboard (para 2-55).</li> <li>• If correct, replace A16 Power Supply (para 2-48).</li> </ul>						

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
3.	Fan does not work.	Check Fan for obstructions. <ul style="list-style-type: none"> <li>• If obstructions are present, remove obstructions.</li> <li>• If obstructions are not present, replace A16 Power Supply (para 2-48).</li> </ul>
4.	Beep Sequence does not occur. Verify Logo Screen is displayed on CRT.	<ul style="list-style-type: none"> <li>• If incorrect, perform Beep Sequence Test (para 2-11).</li> <li>• If correct, perform Malfunction 11 - Speaker Inoperable.</li> </ul>
5.	Blows Fuses.	Step 1. Fuse blows when Radio Test Set is connected to external power source. <ul style="list-style-type: none"> <li>• Replace A16 Power Supply (para 2-48).</li> </ul> Step 2. Fuse blows when POWER Switch is pressed. <ul style="list-style-type: none"> <li>• Perform Power Faults Test (para 2-10).</li> </ul>
6.	CRT is blank or display abnormality exists.	Perform CRT Abnormality Test (para 2-12). <ul style="list-style-type: none"> <li>• Replace faulty assembly.</li> </ul>
7.	INTENSITY/Contrast Adjustment Inoperable.	Step 1. Rotate INTENSITY/Contrast Adjustment fully ccw. Step 2. Locate A1A1W2 (fig. FO-2, Sheet 2 of 5) and verify resistance changes from approximately 10 KQ to $<1$ KQ with DMM between A1A1W2P1, Pins 10 and 11 (fig. FO-3, Sheet 1 of 2) when INTENSITY/Contrast Adjustment is rotated fully cw. <ul style="list-style-type: none"> <li>• If incorrect, remove A17 Front Panel (para 2-49) and replace A17R1 (fig. FO-15, Sheet 1 of 2).</li> <li>• If correct, perform A15 CRT (7005-7840-600) Test (para 2-16) or A15 CRT (7005-8644-300) Test (para 2-17).</li> </ul>



Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
8.	CRT Error Messages are displayed.	<p><b>Inactive Func Gen Board</b>                      * Replace A24 Function Generator (para 2-33).</p> <p><b>Inactive RF-I/O Board</b>                      * Replace A22 RF I/O (para 2-34).</p> <p><b>Inactive Counter Board</b>                      * Replace A23 Counter (para 2-25).</p> <p><b>Inactive Monitor Cntl Board</b>                      • Replace A26 Monitor Control (para 2-32).</p> <p><b>Inactive SCSI Interface</b>                      • Replace A27 External I/O (para 2-38).</p> <p><b>Input or Overload on Ant or Duplex Port</b></p>
	Locate A14W1 (fig. FO-2, Sheet 2 of 5), disconnect A14W1P1 (fig. FO-11), press POWER Switch and verify error message.	<ul style="list-style-type: none"> <li>• If incorrect, replace A14 Power Termination (para 2-71).</li> <li>• If correct, replace A12 Receive IF (para 2-66).</li> </ul>
	<b>Overload on T/R Port</b>	
	Locate A14W1 (fig. FO-2, Sheet 2 of 5), disconnect A14W1P1 (fig. FO-11), press POWER Switch and verify error message.	<ul style="list-style-type: none"> <li>• If incorrect, replace A14 Power Termination (para 2-71).</li> <li>• If correct, replace A3 Monitor (para 2-31).</li> </ul>
	<b>Power Term Overload</b>	
	Remove A26 Monitor Control (para 2-32) and install on PC Board Assembly Extender (Tool Code 6 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31). Verify >1.5 V with DMM at W31P1, Pin 47 (fig. FO-16, Sheet 3 of 3).	<ul style="list-style-type: none"> <li>• If incorrect, replace A26 Monitor Control (para 2-32).</li> <li>• If correct, replace A3 Monitor (para 2-31).</li> </ul>

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
9.	Keyboard Keys Inoperable.	Perform Keyboard Key Test (para 2-13).
		<ul style="list-style-type: none"> <li>• Replace faulty assembly.</li> </ul>
10.	DATA SCROLL Spinner Inoperable.	Step 1. Remove A23 Counter (para 2-25) and install on PC Board Assembly Extender (Tool Code 7 in Appendix B of TM 11-6625-3245-12) in Test Set.
	Step 2. Verify level alternates between 0 Vdc and +5 Vdc with Oscilloscope at A23P2, Pin 8B and 8C (fig. FO-16, Sheet 2 of 3) when DATA SCROLL Spinner is rotated.	<ul style="list-style-type: none"> <li>• If incorrect, perform Steps 3-4.</li> <li>• If correct, replace A23 Counter (para 2-25).</li> </ul>
	Step 3. Verify reading fluctuates between a short and an open with DMM between A23P2, Pin 8B and Ground (fig. FO-16, Sheet 2 of 3).	<ul style="list-style-type: none"> <li>• Replace A17RE1 (para 2-55).</li> </ul>
	Step 4. Verify reading fluctuates between a short and an open with DMM between A23P2, Pin 8C and Ground (fig. FO-16, Sheet 2 of 3).	<ul style="list-style-type: none"> <li>• If incorrect, replace A17RE1 (para 2-55). J</li> <li>• If correct, replace A23 Counter (para 2-25).</li> </ul>
11.	Speaker Inoperable.	Step 1. Remove A3 Monitor (para 2-31) and install on PC Board Assembly Extender (Tool Code 8 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).
	Step 2. Press AF GEN MODE Key.	
	Step 3. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to select On.	
	Step 4. Locate W31 (fig. FO-2, Sheet 2 of 5) and verify +4 Vdc (+1 Vdc) logic switching with Oscilloscope at W31P2, Pins 1, 2 and 4 (fig. FO-4) when VOL CONTROL Keys are pressed.	<ul style="list-style-type: none"> <li>• If any voltage is incorrect, replace A26 Monitor Control (para 2-32).</li> </ul>
	Step 5. Verify 1 kHz sine wave with Oscilloscope at A3P1, Pin 16B.	<ul style="list-style-type: none"> <li>• If incorrect, replace A3 Monitor (para 2-31).</li> <li>• If correct, replace A17LS1 (para 2-55).</li> </ul>

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
12. Self Test Failure.		
Step 1	Verify "Test Running" was displayed in lower left corner of CRT.	<ul style="list-style-type: none"> <li>• Perform para 2-13 for keys: "AUX" F6, 4 and ENTER.</li> </ul>
Step 2	Verify Self Test completed all tests in <3 minutes.	<ul style="list-style-type: none"> <li>• Replace A25 Digitizer (para 2-24).</li> </ul>
Step 3	Verify Self Test displays "P" for all tests.	<ul style="list-style-type: none"> <li>• Perform Self Test Failure Test (para 2-14).</li> </ul>
13. Squelch Inoperable/Squelch Failure.		
Step 1	Remove A26 Monitor Control (para 2-32) and install on PC Board Assembly Extender (Tool Code 6 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).	
Step 2	Verify negative pulse from 0 to -5 Vdc with Oscilloscope at A26J2, Pin 3 (fig. FO-16, Sheet 3 of 3) when DATA SCROLL Spinner is rotated.	<ul style="list-style-type: none"> <li>• Replace A26 Monitor Control (para 2-32).</li> </ul>
Step 3	Verify 0-5 V logic switching with Oscilloscope at A26J2, Pin 33 when DATA SCROLL Spinner is rotated.	<ul style="list-style-type: none"> <li>• If incorrect, replace A3 Monitor (para 2-31).</li> <li>• If correct, replace A26 Monitor Control (para 2-32).</li> </ul>
14. AF GEN 1 Frequency and Level Accuracy Failure.		
Step 1	Remove A24 Function Generator (para 2-33) and install on PC Board Assembly Extender (Tool Code 29 in Appendix B of TM 11-6625-3245-12) in Test Set.	
Step 2	Verify 1 kHz ( $\pm 1$ Hz) with Frequency Counter at A24P2, Pin 2B (fig. FO-16, Sheet 2 of 3).	<ul style="list-style-type: none"> <li>• Replace A24 Function Generator (para 2-33).</li> </ul>
Step 3	Verify 0.707 VRMS ( $\pm 3\%$ ) with DMM at A24P2, Pin 2B.	<ul style="list-style-type: none"> <li>• Replace A24 Function Generator (para 2-33).</li> </ul>
Step 4	Install A24 Function Generator (para 2-33). Remove A3 Monitor (para 2-31) and install on PC Board Assembly Extender (Tool Code 8 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).	
Step 5	Verify 0.707 VRMS ( $\pm 3\%$ ) with DMM at A3P1, Pin 1A (fig. FO-4).	<ul style="list-style-type: none"> <li>• If incorrect, replace A3 Monitor (para 2-31).</li> <li>• If correct, replace A17A1 Connector (para 2-54).</li> </ul>

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
15. AF GEN 1 Distortion Threshold Failure.		
Step 1	Remove A3 Monitor (para 2-31) and install on PC Board Assembly Extender (Tool Code 8 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).	
Step 2.	Connect Oscilloscope Probe to Distortion Analyzer input. Verify >0.25% distortion with Distortion Analyzer at A3P1, Pin 3A (fig. FO-4). <ul style="list-style-type: none"> <li>• Replace A24 Function Generator (para 2-33).</li> </ul>	
Step 3	Connect Oscilloscope Probe to Distortion Analyzer input. Verify >0.25% distortion with Distortion Analyzer at A3P1, Pin 1A (fig. FO-4). <ul style="list-style-type: none"> <li>• If incorrect, replace A3 Monitor (para 2-31).</li> <li>• If correct, replace A17A1 Connector (para 2-54).</li> </ul>	
16. AF GEN 2 Frequency and Level Accuracy Failure.		
Step 1	Remove A24 Function Generator (para 2-33) and install on PC Board Extender (Tool Code 29 in Appendix B of TM 11-6625-3245-12) in Test Set.	
Step 2	Verify 1 kHz ( $\pm 1$ Hz) with Frequency Counter at A24P2, Pin 2B (fig. FO-16, Sheet 2 of 3). <ul style="list-style-type: none"> <li>• Replace A24 Function Generator (para 2-33).</li> </ul>	
Step 3	Verify 0.707 VRMS ( $\pm 3\%$ ) with DMM at A24P2, Pin 2B. <ul style="list-style-type: none"> <li>• If incorrect, replace A24 Function Generator (para 2-33).</li> <li>• If correct, replace A17A1 Connector (para 2-54).</li> </ul>	
17. AF GEN 2 Distortion Threshold Failure.		
Step 1	Remove A3 Monitor (para 2-31) and install on PC Board Assembly Extender (Tool Code 8 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).	
Step 2.	Connect Oscilloscope Probe to Distortion Analyzer input. Verify >0.25% distortion with Distortion Analyzer at A3P1, Pin 3A (fig. FO-4). <ul style="list-style-type: none"> <li>• Replace A24 Function Generator (para 2-33).</li> </ul>	
Step 3	Connect Oscilloscope Probe to Distortion Analyzer input. Verify >0.25% distortion with Distortion Analyzer at A3P1, Pin 1A (fig. FO-4). <ul style="list-style-type: none"> <li>• If incorrect, replace A3 Monitor (para 2-31).</li> <li>• If correct, replace A17A1 Connector (para 2-54).</li> </ul>	

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
18. External Modulation Failure.		
Step 1	Remove A24 Function Generator (para 2-33) and install on PC Board Assembly Extender (Tool Code 29 in Appendix B of TM 11-6625-3245-12) in Test Set.	
Step 2	Verify 3.3 VRMS (+0.3 V) with DMM at A24P2, Pin IB (fig. FO-16, Sheet 2 of 3). <ul style="list-style-type: none"> <li>• If incorrect, replace A17A1 Connector (para 2-54).</li> <li>• If correct, replace A24 Function Generator (para 2-33).</li> </ul>	
19. MIC/ACC IN/OUT Connector Modulation Failure.		
Step 1	Remove A24 Function Generator (para 2-33) and install on PC Board Assembly Extender (Tool Code 29 in Appendix B of TM 11-6625-3245-12) in Test Set.	
Step 2	Verify deflection of Oscilloscope trace coincident with tapping on Microphone at A24P2, Pin 1A (fig. FO-16, Sheet 2 of 3). <ul style="list-style-type: none"> <li>• If incorrect, replace A17A1 Connector (para 2-54).</li> <li>• If correct, replace A24 Function Generator (para 2-33).</li> </ul>	
20. RF GEN Level Flatness Failure.		
Step 1	Locate A28 Attenuator (fig. FO-2, Sheet 1 of 5). Verify signals switch high and low with Oscilloscope at A28AT1, Pin 1 (fig. FO-17) when Test Set attenuation is varied from 1 to 0 dB. <ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U2.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and troubleshoot A28U2 and A28CR1.</li> </ul>	
Step 2	Verify signals switch high and low with Oscilloscope at A28AT1, Pin 2 (fig. FO-17) when Test Set attenuation is varied from 2 to 1 dB. <ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U1.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and troubleshoot A28U1 and A28CR1.</li> </ul>	
Step 3	Verify signals switch high and low with Oscilloscope at A28AT1, Pin 4 (fig. FO-17) when Test Set attenuation is varied from 4 to 3 dB. <ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U1.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and troubleshoot A28U1 and A28CR2.</li> </ul>	

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
20. RF GEN Level Flatness Failure - Continued.		
Step 4	Verify signals switch high and low with Oscilloscope at A28AT1, Pin 8 (fig. FO-17) when Test Set attenuation is varied from 8 to 7 dB.	<ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U 1.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and troubleshoot A28U1 and A28CR3.</li> </ul>
Step 5	Verify signals switch high and low with Oscilloscope at A28AT1, Pin 16 (fig. FO-17) when Test Set attenuation is varied from 16 to 15 dB.	<ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U 1.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and troubleshoot A28U1 and A28CR4.</li> </ul>
Step 6	Set Test Set to generate 100 MHz at 0 dBm.	
Step 7	Disconnect W20 (fig. FO-2, Sheet 2 of 5) from A9 90 MHz Generator (fig. FO-2, Sheet 1 of 5), connect Oscilloscope to W20 (fig. FO-2, Sheet 2 of 5) and verify 0-4 V square wave at 1 MHz (slightly distorted).	
Step 8	Reconnect W20. Disconnect W14 from A10 1st LO (fig. FO-2, Sheet 1 of 5), connect Power Meter to W14 (fig. FO-2, Sheet 2 of 5) and verify 7 dBm (±2 dB).	
Step 9	Reconnect W14. Disconnect W11 from A13 Generator IF (fig. FO-2, Sheet 1 of 5), connect Power Meter to W11 (fig. FO-2, Sheet 2 of 5) and verify 20 dBm. Replace All 1 2nd LO (para 2-62).	
Step 10.	Reconnect W11. Disconnect W12 from A13 Generator IF (fig. FO-2, Sheet 1 of 5), connect Power Meter to W12 (fig. FO-2, Sheet 2 of 5) and verify >7 dBm. Replace A10 1st LO (para 2-63).	
Step 11.	Reconnect W12. Disconnect W13 from A9 90 MHz Generator (fig. FO-2, Sheet 1 of 5), connect T-Connector to W13 (fig. FO-2, Sheet 2 of 5), connect Power Meter to T-Connector, connect T-Connector to A9J3 (fig. FO-6) and verify -20 dBm (±10 dB). Replace A9 90 MHz Generator (para 2-29).	

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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20. RF GEN Level Flatness Failure - Continued.

- Step 12. Reconnect W13 (fig. FO-2, Sheet 2 of 5). Locate A14 Power Termination (fig. FO-2, Sheet 1 of 5) and disconnect A14P4 (fig. FO-11). Remove A28 Attenuator (para 2-70). Reconnect A28J1, A28J2, A28J3 and A28J4 (fig. FO-17).
- Step 13. Locate A13 Generator IF (fig. FO-2, Sheet 1 of 5) and verify 11.5 dBm ( $\pm 3$  dB) with Power Meter at A13P6 (fig. FO-10).
  - Replace A13 Generator IF (para 2-68).
- Step 14. Connect 50 n Load to A13P6 (fig. FO-10).
- Step 15. Connect Signal Generator to A28J5 (fig. FO-17). Set Signal Generator for 100 MHz, +7 dBm. Record reference level.
- Step 16. Verify insertion loss is 3 dB maximum (+0, -3 dB) with Power Meter at A28J6.
  - If incorrect, remove A28 Attenuator (para 2-70) and replace A28AT1.
  - If correct, replace A14 Power Termination (para 2-71).

21. RF GEN Frequency Accuracy Failure.

- Step 1. Disconnect W12 (fig. FO-2, Sheet 2 of 5) from A13 Generator IF (fig. FO-2, Sheet 1 of 5) and connect Frequency Counter to W12 (fig. FO-2, Sheet 2 of 5). Enter frequencies in Test Set RF Field and verify readings on Frequency Counter.

50 MHz	1350 MHz (25 Hz)
200 MHz	1500 MHz (100 Hz)
400 MHz	1700 MHz (200Hz)
600 MHz	1900 MHz (300 Hz)
800 MHz	2100 MHz (400 Hz)

- Replace A10 1st LO (para 2-63).
- Step 2. Reconnect W12. Disconnect W13 from A13 Generator IF (fig. FO-2, Sheet 1 of 5) and connect Frequency Counter to W13 (fig. FO-2, Sheet 2 of 5). Verify 88.0001 MHz ( $\pm 44$  Hz).
  - If incorrect, replace A9 90 MHz Generator (para 2-29).
  - If correct, replace All 1 2nd LO (para 2-62).

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
22. RF GEN Level Accuracy Failure.		
Step 1	Locate A28 Attenuator (fig. FO-2, Sheet 1 of 5). Verify signals switch voltages at 13 Vdc ( $\pm 1$ Vdc) with DMM at A28AT1, Pin 1 (fig. FO-17) when Test Set attenuation is set to 1 dB.	<ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U2 and A28CR1.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and replace A28AT1.</li> </ul>
Step 2	Verify signals switch voltages at 13 Vdc ( $\pm 1$ Vdc) with DMM at A28AT1, Pin 2 when Test Set attenuation is set to 2 dB.	<ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U1 and A28CR3.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and replace A28AT1.</li> </ul>
Step 3	Verify signals switch voltages at 13 Vdc ( $\pm 1$ Vdc) with DMM at A28AT1, Pin 4 when Test Set attenuation is set to 4 dB.	<ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U1 and A28CR3.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and replace A28AT1.</li> </ul>
Step 4	Verify signals switch voltages at 13 Vdc ( $\pm 1$ Vdc) with DMM at A28AT1, Pin 8 when Test Set attenuation is set to 8 dB.	<ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U1 and A28CR3.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and replace A28AT1.</li> </ul>
Step 5	Verify signals switch voltages at 13 Vdc ( $\pm 1$ Vdc) with DMM at A28AT1, Pin 16 when Test Set attenuation is set to 16 dB.	<ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U1 and A28CR4.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and replace A28AT1.</li> </ul>
Step 6	Verify signals switch voltages at 13 Vdc ( $\pm 1$ Vdc) with DMM at A28AT1, Pin 32 when Test Set attenuation is set to 32 dB.	<ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U1 and A28CR4.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and replace A28AT1.</li> </ul>



Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
22. RF GEN Level Accuracy Failure - Continued.		
Step 7	Verify signals switch voltages at 13 Vdc ( $\pm 1$ Vdc) with DMM at A28AT1, Pin 32 and 32b when Test Set attenuation is set to 64 dB.	<ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U1 and A28CR1.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and replace A28AT1.</li> </ul>
Step 8	Verify signals switch voltages at 13 Vdc ( $\pm 1$ Vdc) with DMM at A28AT1, Pin 32, 32a and 32b when Test Set attenuation is set to 96 dB.	<ul style="list-style-type: none"> <li>• If constant low, remove A28 Attenuator (para 2-70) and troubleshoot A28U1 and A28CR2.</li> <li>• If constant high, remove A28 Attenuator (para 2-70) and replace A28AT1.</li> <li>• If correct, remove A28 Attenuator (para 2-70) and replace A28AT1.</li> </ul>
23. RF GEN Residual FM Failure.		
Step 1	Disconnect W12 (fig. FO-2, Sheet 2 of 5) from A13 Generator IF (fig. FO-2, Sheet 1 of 5) and connect Measuring Receiver to W12 (fig. FO-2, Sheet 2 of 5).	
Step 2	Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 500 kHz. Press ENTER Key.	
Step 3	Verify <70 Hz RMS on Measuring Receiver.	<ul style="list-style-type: none"> <li>• Replace A10 1st LO (para 2-63).</li> </ul>
Step 4	Reconnect W12. Disconnect W11 from A13 Generator IF (fig. FO-2, Sheet 1 of 5) and connect Measuring Receiver to W11 (fig. FO-2, Sheet 2 of 5).	
Step 5	Verify <70 Hz RMS on Measuring Receiver.	<ul style="list-style-type: none"> <li>• If incorrect, replace All 2nd LO (para 2-62).</li> <li>• If correct, replace A9 90 MHz Generator (para 2-29).</li> </ul>
24. RF GEN AM Failure.		
Step 1	Remove A24 Function Generator (para 2-33) and install on PC Board Assembly Extender (Tool Code 29 in Appendix B of TM 11-6625-3245-12) in Test Set.	
Step 2	Set Test Set for 1 kHz with 90% modulation tone.	
Step 3	Verify 0 Vdc ( $\pm 10$ mVdc) with DMM at A24P2, Pin 4A (fig. FO-16, Sheet 2 of 3).	

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
24. RF GEN AM Failure - Continued.		
Step 4	Verify 1 kHz ( $\pm 10$ Hz) with $<0.25\%$ distortion with Frequency Counter and Distortion Analyzer at A24P2, Pin 2B.	<ul style="list-style-type: none"> <li>• Replace A24 Function Generator (para 2-33).</li> </ul>
Step 5	Disconnect W13 (fig. FO-2, Sheet 2 of 5) from A9 90 MHz Generator (fig. FO-2, Sheet 1 of 5), connect T-Connector between W13 (fig. FO-2, Sheet 2 of 5) and A9J3 (fig. FO-6) and connect Measuring Receiver to T-Connector.	
Step 6	Set Measuring Receiver Low-Pass Filter to 15 kHz and High-Pass Filter to 300 Hz.	
Step 7	Set Test Set for 1 kHz with 90% modulation tone.	
Step 8	Verify 1 kHz ( $\pm 10$ Hz) at 90% ( $\pm 5\%$ ) modulation with Measuring Receiver.	<ul style="list-style-type: none"> <li>• If incorrect, replace A9 90 MHz Generator (para 2-29).</li> <li>• If correct, replace A13 Generator IF (para 2-68).</li> </ul>
25. RF GEN FM Failure.		
Step 1	Remove A24 Function Generator (para 2-33) and install on PC Board Assembly Extender (Tool Code 29 in Appendix B of TM 11-6625-3245-12) in Test Set.	
Step 2	Use FIELD SELECT Keys to move cursor to AF FREQ. Press ENTER Key. Use DATA ENTRY Keypad to enter 1000.0 Hz. Press ENTER Key.	
Step 3	Use FIELD SELECT Keys to move cursor to DEVIATION. Press ENTER Key. Use DATA ENTRY Keypad to enter 5.0 kHz. Press ENTER Key.	
Step 4	Set Test Set for 1 kHz with 5 kHz deviation.	
Step 5	Verify 0.67 VAC ( $\pm 0.03$ VAC) with DMM at A24P2, Pin 3B (fig. FO-16, Sheet 2 of 3).	<ul style="list-style-type: none"> <li>• Replace A24 Function Generator (para 2-33).</li> </ul>
Step 6	Verify 1 kHz ( $\pm 10$ Hz) with $<0.25\%$ distortion with Frequency Counter and Distortion Analyzer at A24P2, Pin 3B.	<ul style="list-style-type: none"> <li>• Replace A24 Function Generator (para 2-33).</li> </ul>
Step 7	Disconnect W13 (fig. FO-2, Sheet 2 of 5) from A9 90 MHz Generator (fig. FO-2, Sheet 1 of 5), connect T-Connector between W13 (fig. FO-2, Sheet 2 of 5) and A9J3 (fig. FO-6) and connect Measuring Receiver to T-Connector.	
Step 8	Set Measuring Receiver Low-Pass Filter to 15 kHz and High-Pass Filter to 300 Hz.	
Step 9	Use FIELD SELECT Keys to move cursor to AF FREQ. Press ENTER Key. Use DATA ENTRY Keypad to enter 100.00 Hz. Press ENTER Key.	
Step 10.	Use FIELD SELECT Keys to move cursor to DEVIATION. Press ENTER Key. Use DATA ENTRY Keypad to enter 5.0 kHz. Press ENTER Key.	

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
25. RF GEN FM Failure - Continued.		
Step 11.	Verify 1 kHz ( $\pm 10$ Hz) at 5 kHz ( $\pm 10\%$ ) modulation with Measuring Receiver.	<ul style="list-style-type: none"> <li>• Replace A9 90 MHz Generator (para 2-29).</li> </ul>
Step 12.	Disconnect W12 (fig. FO-2, Sheet 2 of 5) from A13 Generator IF (fig. FO-2, Sheet 1 of 5) and connect Measuring Receiver to W12 (fig. FO-2, Sheet 2 of 5).	
Step 13.	Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.2500 MHz. Press ENTER Key.	
Step 14.	Set Measuring Receiver to measure RMS FM Deviation and verify <100 Hz RMS FM Deviation.	<ul style="list-style-type: none"> <li>• If incorrect, replace A10 1st LO (para 2-63).</li> </ul>
Step 15.	Disconnect W11 from A13 Generator IF (fig. FO-2, Sheet 1 of 5), connect Measuring Receiver to W11 (fig. FO-2, Sheet 2 of 5) and verify <100 Hz RMS FM Deviation.	<ul style="list-style-type: none"> <li>• If incorrect, replace A11 2nd LO (para 2-62).</li> <li>• If correct, replace A13 Generator IF (para 2-68).</li> </ul>
26. RF GEN Harmonic/Non-Harmonic Level Failure.		
Step 1	Disconnect W12 (fig. FO-2, Sheet 2 of 5) from A13 Generator IF (fig. FO-2, Sheet 1 of 5) and connect Spectrum Analyzer to W12 (fig. FO-2, Sheet 2 of 5).	
Step 2	Set Spectrum Analyzer to 1922 MHz and Full Span.	
Step 3	Verify Harmonics are <-26 dBc and Non-Harmonics are <-50 dBc.	<ul style="list-style-type: none"> <li>• If incorrect, replace A10 1st LO (para 2-63).</li> <li>• If correct, replace A13 Generator IF (para 2-68).</li> </ul>
27. Frequency/Frequency Error Meter Failure.		
Step 1	Disconnect W24 (fig. FO-2, Sheet 2 of 5) from A23 Counter (fig. FO-2, Sheet 1 of 5) and connect Frequency Counter to W24 (fig. FO-2, Sheet 2 of 5).	
Step 2	Set Frequency to 800 MHz on Signal Generator.	
Step 3	Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 800.0000 MHz. Press ENTER Key.	
Step 4	Verify 425 kHz ( $\pm 200$ Hz).	<ul style="list-style-type: none"> <li>• If incorrect, replace A6 Receiver (para 2-30).</li> <li>• If correct, replace A23 Counter (para 2-25).</li> </ul>

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
28. AGC Failure.		
Step 1	Remove A22 RF I/O (para 2-34) and install on PC Board Assembly Extender (Tool Code 7 in Appendix B of TM 11-6625-3245-12) in Test Set.	
Step 2	Press RCVR MODE Key.	
Step 3	Verify 5 Vdc ( $\pm 0.5$ Vdc) with DMM at A22P2, Pin IC (fig. FO-16, Sheet 2 of 3). If incorrect, replace A22 RF I/O (para 2-34). If correct, replace A6 Receiver (para 2-30).	
29. Receiver Sensitivity Failure.		
Step 1	Set Signal Generator for -36 dBm FM with no modulation.	
Step 2	Set Test Set to Receive mode.	
Step 3	Set Spectrum Analyzer to 10.7 MHz.	
Step 4	Disconnect W8 (fig. FO-2, Sheet 2 of 5) from A6 Receiver (fig. FO-2, Sheet 1 of 5), connect Spectrum Analyzer to W8 (fig. FO-2, Sheet 2 of 5) and verify -36 dBm ( $\pm 5$ dB). If incorrect, perform Steps 5-6. If correct, replace A6 Receiver (para 2-30).	
Step 5	Set frequency on Spectrum Analyzer to 79.3 MHz.	
Step 6	Disconnect W10 from A7 3rd LO (fig. FO-2, Sheet 1 of 5), connect Spectrum Analyzer to A7J3 (fig. FO-4) and verify +10 dBm ( $\pm 3$ dB). If incorrect, replace A7 3rd LO (para 2-28). If correct, replace A12 Receive IF (para 2-66).	
30. Receiver Selectivity Failure.		
Step 1	Remove A22 RF I/O (para 2-34) and install on PC Board Assembly Extender (Tool Code 7 in Appendix B of TM 11-6625-3245-12) in Test Set.	
Step 2	Set Signal Generator for 80 MHz signal at -60 dBm with no modulation.	
Step 3	Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 80.0000 MHz. Press ENTER Key.	
Step 4	Use FIELD SELECT Keys to move cursor to MODPress ENTER Key. Use DATA SCROLL Keys to select FM4. Press ENTER Key.	
Step 5	Use FIELD SELECT Keys to cursor to Deviation Meter. Press ENTER Key. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Keys to select 100 kHz. Press ENTER Key.	
Step 6	Press "Ret" F6.	

Table 2-1. Troubleshooting - Continued.

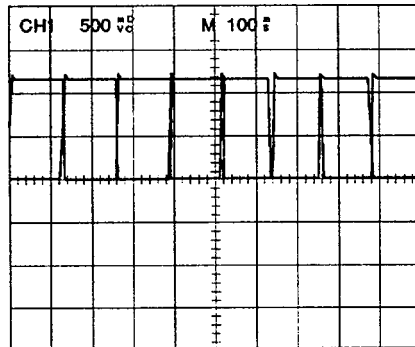
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
30. Receiver Selectivity Failure - Continued.		
Step 7	Use FIELD SELECT Keys to move cursor to Attn. Press ENTER Key. Use DATA SCROLL Keys to select 20 dB. Press ENTER Key.	
Step 8	Adjust UUT Squelch Controls for lowest setting where signal from Signal Generator breaks squelch.	
Step 9	Set Signal Generator to 80.1 MHz at -57 dBm. Verify Receiver breaks squelch. <ul style="list-style-type: none"> <li>• If incorrect, perform Step 10.</li> <li>• If correct, replace A6 Receiver (para 2-30).</li> </ul>	
Step 10.	Verify 0 Vdc ( $\pm 0.5$ Vdc) with DMM at A22P2, Pin 15A and Pin 16A (fig. FO-16, Sheet 2 of 3). <ul style="list-style-type: none"> <li>• If incorrect, replace A22 RF I/O (para 2-34).</li> <li>• If correct, replace A6 Receiver (para 2-30).</li> </ul>	
31. ANTENNA IN or DUPLEX OUT Connector Overload Protection Failure.		
Connect coaxial cable between AUDIO OUT Connector and ANTENNA IN Connector, then AUDIO OUT Connector and DUPLEX OUT Connector, and verify warning tone sounds and input overload message is displayed.		
<ul style="list-style-type: none"> <li>• If warning tone sounds and input overload message is displayed only for AUDIO OUT Connector - ANTENNA IN Connector, replace A12 Receive IF (para 2-66).</li> <li>• If warning tone sounds and input overload message is displayed only for AUDIO OUT Connector - DUPLEX OUT Connector, replace A14 Power Termination (para 2-71).</li> <li>• If warning tone does not sound and input overload message is not displayed for AUDIO OUT Connector - ANTENNA IN Connector and AUDIO OUT Connector - DUPLEX OUT Connector, replace A22 RF I/O (para 2-34).</li> </ul>		
32. BER Meter Failure.		
Step 1	Remove A24 Function Generator (para 2-33) and install on PC Board Assembly Extender (Tool Code 29 in Appendix B of TM 11-6625-3245-12) in Test Set.	
Step 2	Press MTRS MODE Key.	
Step 3	Use FIELD SELECT Keys to move cursor to "9. Bit Error Rate (BER) Func.". Press ENTER Key.	
Step 4	Press "Run" F5.	

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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32 BER Meter Failure - Continued.

- Step 5 Verify series of pulses at 5 Vdc ( $\pm 0.5$  Vdc) with Oscilloscope at A24P2, Pin 10A (fig. FO-16, Sheet 2 of 3) as shown.



- If incorrect, replace A24 Function Generator (para 2-33).
- If correct, replace A3 Monitor (para 2-31).

33. DUPLEX OUT Connector Level Failure.

- Step 1 Remove A28 Attenuator (para 2-70).
- Step 2 Connect Signal Generator output to Measuring Receiver. Set Signal Generator for 100 MHz. Set Measuring Receiver to RF Level. Adjust Signal Generator output for -110 dBm on Measuring Receiver.
- Step 3 Locate A14 Power Termination (fig. FO-2, Sheet 1 of 5). Connect Signal Generator to A14P4 (fig. FO-11).
- Step 4 Disconnect W3 (fig. FO-2, Sheet 2 of 5) from A14 Power Termination (fig. FO-2, Sheet 1 of 5) and connect Measuring Receiver to W3 (fig. FO-2, Sheet 2 of 5).
- Step 5 Verify -110 dBm ( $\pm 2.5$  dBm) on Measuring Receiver.
- If incorrect, replace A14 Power Termination (para 2-71).
  - If correct, replace A17J2A/A17J2B (para 2-51).

34. DTMF Failure.

- Step 1 Press "More" F6 until "RX" F2 appears. Press "RX" F2.
- Step 2 Use FIELD SELECT Keys to move cursor to 123456789\*0#. Press ENTER Key. Press and hold "1" Key on DATA ENTRY Keypad.
- Step 3 Locate A26 Monitor Control (fig. FO-2, Sheet 1 of 5). Verify 0.50 VAC ( $\pm 0.05$  VAC) with DMM at A26J2, Pin 44 (fig. FO-16, Sheet 3 of 3).
- Replace A26 Monitor Control (para 2-32).

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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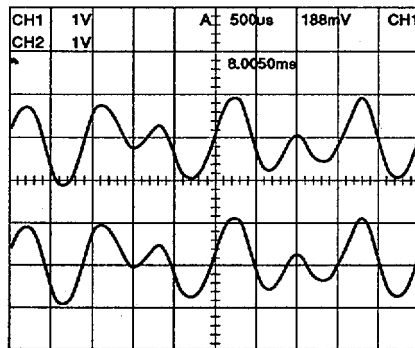
34. DTMF Failure - Continued.

- Step 4 Release "1" Key on DATA ENTRY Keypad. Use DATA ENTRY Keypad to enter "1111111111". Press ENTER Key.
- Step 5 Press "More" F6 until "TX" F2 appears. Press "TX" F2.
- Step 6 Press "More" F6 until "Decode" F2 appears. Press "Decode" F2.
- Step 7 Press GO Key.
- Step 8 Set Oscilloscope controls.

Channel 1 Scale	1 V (100 mV with x10 Probe)
Channel 1 Coupling	DC
Channel 2 Scale	1 V (100 mV with x10 Probe)
Channel 2 Coupling	DC
Sweep	500 $\mu$ s
Trigger Source	Channel 1
Trigger Mode	Auto

- Step 9 Connect Oscilloscope Channel 1 to A26J2, Pin 43. Connect Oscilloscope Channel 2 to A26J2, Pin 44.

- Step 10. Verify Channel 1 and Channel 2 waveforms are identical and are similar to waveforms as shown.



- If incorrect, replace A3 Monitor (para 2-31).
- If correct, replace A26 Monitor Control (para 2-32).

35. DMM Failure.

- Perform DMM Test (para 2-15).
  - Repair faulty assembly.

Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
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36 Power Meter High Power Failure.

Locate A14 Power Termination (fig. FO-2, Sheet 1 of 5) and verify 0.5 Vdc ( $\pm 0.5$  Vdc) with DMM at A14FL8 (fig. FO-11).

- If incorrect, remove A28 Attenuator (para 2-70) and troubleshoot A28U2 (fig. FO-17).
- If correct, replace A14 Power Termination (para 2-71).

37. Oscilloscope Vertical Accuracy Failure.

Step 1. Remove A25 Digitizer (para 2-30) and install on PC Board Assembly Extender (Tool Code 29 in Appendix B of TM 11-6625-3245-12) in Test Set.

Step 2 Verify 2 Vdc ( $\pm 0.4$  Vdc) with DMM at A25P2, Pin 1B (fig. FO-16, Sheet 3 of 3).

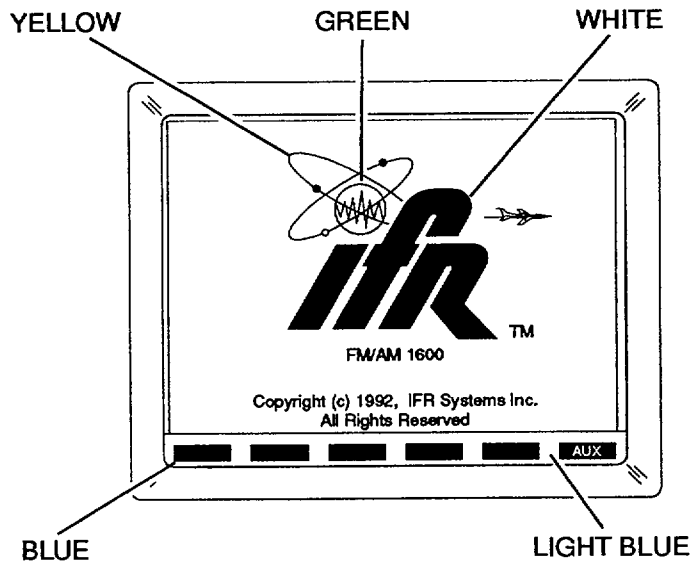
- If incorrect, replace A17A1 Connector (para 2-54).
- If correct, replace A25 Digitizer (para 2-24).

38. DC Power Failure.

Step 1 Set DC Power Source to OFF and disconnect DC Power Cable. Connect AC Power Cable to AC LINE IN Connector.

Step 2 Press POWER Switch to On.

Step 3 Rotate INTENSITY/Contrast fully cw and verify IFR Logo Screen is displayed as shown.



- If incorrect, perform CRT Abnormality Test (para 2-12).
- If correct, replace A16 Power Supply (para 2-48).



Table 2-1. Troubleshooting - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
39. Frequency Agility Procedure Failure.	Step 1	If A7 3rd LO was replaced assembly, replace A7 3rd LO (para 2-28).
	Step 2	If A9 90 MHz Generator was replaced assembly, replace A9 90 MHz Generator (para 2-29).
	Step 3.	If A10 1st LO was replaced assembly, replace A10 1st LO (para 2-63).
40. RF Amplifier Failure.	Perform A3 RF Amplifier Test (para 2-18).	<ul style="list-style-type: none"> <li>• Repair faulty assembly.</li> </ul>
41. Test Adapter Test Plug Failure.	Inspect A4A2 Audio Connector (fig. FO-22) for cracked, broken or frayed ribbon cables.	<ul style="list-style-type: none"> <li>• If incorrect, replace A7 UUT Interface (para 2-90).</li> <li>• If correct, replace A4A2 Audio Connector (para 2-82).</li> </ul>

**2-10. POWER FAULTS TEST.**

**DESCRIPTION**

This test determines whether a power fault is contained within the A16 Power Supply or outside of the A16 Power Supply. If the power fault is outside of the A16 Power Supply, the test determines the assembly causing the fault.

**NOTE**

**Perform this test only when instructed from table 2-1 or another troubleshooting test. Do not perform this troubleshooting test as a separate procedure unless otherwise instructed. Certain conditions have been established and/or tested prior to performing this test.**

1. Disconnect A1AIW1 and A1A1W3 (fig. FO-2, Sheet 2 of 5).
2. Verify readings with DMM at following locations (fig. FO-3, Sheet 1 of 2) with DMM.

Location	Reading	If incorrect
A1A1W1P1, Pins 14 (+) and 13 (-)	>10 kΩ	Perform Step 5
A1A1W1P1, Pins 10 (+) and 13 (-)	>400 kΩ	Perform Steps 13-14
A1A1W1P1, Pins 16 (+) and 15 (-)	>200 kΩ	Perform Step 7
A1A1W1P1, Pins 12 (+) and 15 (-)	>20 kΩ	Perform Step 8
A1A1W3P1, Pins 9 (+) and 10 (-)	>20 Ω	Perform Step 3
A1A1W3P1, Pins 11 (+) and 12 (-)	>10 kΩ	Perform Step 4
A1A1W3P1, Pins 13 (+) and 15 (-)	>15 Ω	Perform Step 9
A1A1W3P1, Pins 7 (+) and 14 (-)	>5 kΩ	Perform Step 12
A1A1W3P1, Pins 14 (+) and 6 (-)	>5 kΩ	Perform Step 10
A1A1W3P1, Pins 1 (+) and 8 (-)	>500 Ω	Perform Step 11
A1A1W3P1, Pins 10 (+) and 13 (-)	>500 Ω	Perform Step 6

- If correct, replace A16 Power Supply (para 2-48).
3. Verify >20 Ω at A1A1W3P1, Pins 9 (+) and 10 (-) with DMM when assembly is pulled. Reinstall assembly if reading is correct.

Remove	If incorrect, replace
A24 Function Generator (para 2-33)	A24 Function Generator (para 2-33)
A3 Monitor (para 2-31)	A3 Monitor (para 2-31)
A6 Receiver (para 2-30)	A6 Receiver (para 2-30)
A9 90 MHz Generator (para 2-29)	A9 90 MHz Generator (para 2-29)
A22 RF I/O (para 2-34)	A22 RF I/O (para 2-34)

4. Verify >1 Ω at A1AIW3P1, Pins 11 (+) and 12 (-) with DMM when assembly is pulled. Reinstall assembly if reading is correct.

Remove	If incorrect, replace
A26 Monitor Control (para 2-32)	A26 Monitor Control (para 2-32)
A3 Monitor (para 2-31)	A3 Monitor (para 2-31)

**2-10. POWER FAULTS TEST - Continued.**

5. Verify >1 kΩ at A1A1WIP1, Pins 14 (+) and 13 (-) with DMM when assembly is pulled. Reinstall assembly if reading is correct.

Remove	If incorrect, replace
A25 Digitizer (para 2-24)	A25 Digitizer (para 2-24)
A5 Analyzer RF (para 2-25)	A5 Analyzer RF (para 2-25)
A7 3rd LO (para 2-28)	A7 3rd LO (para 2-28)
A4 Analyzer-Log/IF (para 2-26)	A4 Analyzer Log/IF (para 2-26)

Locate/Disconnect	If incorrect, replace
Locate A8 DMM (fig. FO-2, Sheet 1 of 5) and Disconnect A8W2P1 (fig. FO-5)	A8A2 DMM/Digital (para 2-60)

6. Verify >100 Ω at A1A1W3P1, Pins 10 (+) and 13 (-) with DMM when assembly is pulled or disconnected. Reinstall assembly or connection if reading is correct.

Remove	If incorrect, replace
A24 Function Generator (para 2-33)	A24 Function Generator (para 2-33)
A3 Monitor (para 2-31)	A3 Monitor (para 2-31)
A6 Receiver (para 2-30)	A6 Receiver (para 2-30)
A9 90 MHz Generator (para 2-29)	A9 90 MHz Generator (para 2-29)
A22 RF I/O (para 2-34)	A22 RF I/O (para 2-34)
A25 Digitizer (para 2-24)	A25 Digitizer (para 2-24)
A5 Analyzer RF (para 2-27)	A5 Analyzer RF (para 2-27)
A7 3rd LO (para 2-28)	A7 3rd LO (para 2-28)
A4 Analyzer Log/IF (para 2-26)	A4 Analyzer Log/IF (para 2-26)

Locate/Disconnect	If incorrect, replace
Locate A8 DMM (fig. FO-2, Sheet 1 of 5) and Disconnect A8W2P1 (fig. FO-5)	A8A2 DMM/Digital (para 2-60)

7. Verify >100 Ω at A1AIW1P1, Pins 16 (+) and 15 (-) with DMM when assembly is pulled. Reinstall assembly if reading is correct.

Remove	If incorrect, replace
A25 Digitizer (para 2-24)	A25 Digitizer (para 2-24)
A23 Counter (para 2-25)	A23 Counter (para 2-25)
A26 Monitor Control (para 2-32)	A26 Monitor Control (para 2-32)
A24 Function Generator (para 2-33)	A24 Function Generator (para 2-33)
A22 RF I/O (para 2-34)	A22 RF I/O (para 2-34)

8. Verify >15 Ω at A1A1WIP1, Pins 12 (+) and 15 (-) with DMM when assembly is pulled. Reinstall assembly if reading is correct.

Remove	If incorrect, replace
A21 Video Controller (para 2-37)	A21 Video Controller (para 2-37)
A27 External I/O (para 2-38)	A27 External I/O (para 2-38)
A20 Memory (para 2-35)	A20 Memory (para 2-35)
A19 Processor (para 2-36)	A19 Processor (para 2-36)

**2-10 POWER FAULTS TEST - Continued.**

9 Verify >15 Ω, at A1A1W3P1, Pins 13 (+) and 14 (-) with DMM when assembly is disconnected. Reinstall connection if reading is correct.

Locate/Disconnect	If incorrect, replace
Disconnect A13W1 (fig. FO-2, Sheet 2 of 5) from A28 Attenuator (fig. FO-2, Sheet 1 of 5)	A13 Generator IF (para 2-68)
Disconnect A12W1 (fig. FO-2, Sheet 2 of 5) from A28 Attenuator (fig. FO-2, Sheet 1 of 5)	A12 Receive IF (para 2-66)
Disconnect A14W1 (fig. FO-2, Sheet 2 of 5) from A28 Attenuator (fig. FO-2, Sheet 1 of 5)	A14 Power Termination (para 2-71)
Disconnect A11W1 (fig. FO-2, Sheet 2 of 5) from A29 Auxiliary Power Supply (fig. FO-2, Sheet 1 of 5)	A11 2nd LO (para 2-62)
Locate A13 Generator IF and Disconnect A13P6 (fig. FO-10)	A10 1st LO (para 2-63)

10 Verify >1 kΩ at A1A1W3P1, Pins 14 (+) and 6 (-) with DMM when assembly is disconnected. Reinstall connection if reading is correct.

Disconnect	If incorrect, replace
Disconnect A13W1 (fig. FO-2, Sheet 2 of 5) from A28 Attenuator (fig. FO-2, Sheet 1 of 5)	A13 Generator IF (para 2-68)
Disconnect A14W1 (fig. FO-2, Sheet 2 of 5) from A28 Attenuator (fig. FO-2, Sheet 1 of 5)	A14 Power Termination (para 2-71)
Disconnect A10W1 (fig. FO-2, Sheet 2 of 5) from A29 Auxiliary Power Supply (fig. FO-2, Sheet 1 of 5)	A10 1st LO (para 2-63)
Disconnect A11W1 (fig. FO-2, Sheet 2 of 5) from A29 Auxiliary Power Supply (fig. FO-2, Sheet 1 of 5)	All 2nd LO (para 2-62)

11 Verify >500 Ω at A1A1W3P1, Pins 1 (+) and 8 (-) with DMM when assembly is pulled. Reinstall assembly if reading is correct.

Disconnect	If incorrect, replace
A3 Monitor (para 2-31)	A3 Monitor (para 2-31)
A22 RF I/O (para 2-34)	A22 RF I/O (para 2-34)
A4 Analyzer Log/IF (para 2-26)	A4 Analyzer Log/IF (para 2-26)
A7 3rd LO (para 2-28)	A7 3rd LO (para 2-28)
A9 90 MHz Generator (para 2-29)	A9 90 MHz Generator (para 2-29)
A25 Digitizer (para 2-24)	A25 Digitizer (para 2-24)
A6 Receiver (para 2-30)	A6 Receiver (para 2-30)

12 Verify >1 kΩ at A1A1W3P1, Pins 7 (+) and 14 (-) with DMM when A14W1 (fig. FO-2, Sheet 2 of 5) is disconnected from A28 Attenuator (fig. FO-2, Sheet 1 of 5).

- If incorrect, replace A14 Power Termination (para 2-71).

**2-10 POWER FAULTS TEST - Continued.**

13. Locate A16 Power Supply (fig. FO-2, Sheet 1 of 5) and disconnect DC Power Cable from A16J4 (fig. FO-14). Verify readings with DMM at following locations on DC Power Cable.

DC Power Cable, Pins 1 (+) and 2 (-)	<20 Ω
DC Power Cable, Pins 3 (+) and 4 (-)	<1 kΩ
DC Power Cable, Pins 5 (+) and 6 (-)	<1 kΩ

- If incorrect, replace 83A1A9 External I/O (para 2-89)

14. Pull following assemblies and verify faulty assemblies with DMM on DC Power Cable.

Location	Disconnect	If faulty, perform/replace
DC Power Cable, Pin 1	83A1A3 RF Amplifier	83A1A3 RF Amplifier Test (para 2-18)
DC Power Cable, Pin 1	83A1A7 UUT Interface	83A1A7 UUT Interface (para 2-90)
DC Power Cable, Pin 1	83A1A9 External I/O	83A1A9 External I/O (para 2-89)
DC Power Cable, Pin 1	83A1A8 Processor	83A1A8 Processor (para 2-91)
DC Power Cable, Pin 1	83A1A6 Memory	83A1A6 Memory (para 2-92)
DC Power Cable, Pin 3	83A1A3 RF Amplifier	83A1A3 RF Amplifier (para 2-77)
DC Power Cable, Pin 3	83A1A7 UUT Interface	83A1A7 UUT Interface (para 2-90)
DC Power Cable, Pin 3	83A1A6 Memory	83A1A6 Memory (para 2-92)
DC Power Cable, Pin 5	83A1A3 RF Amplifier	83A1A3 RF Amplifier (para 2-77)
DC Power Cable, Pin 5	83A1A7 UUT Interface	83A1A7 UUT Interface (para 2-90)
DC Power Cable, Pin 5	83A1A6 Memory	83A1A6 Memory (para 2-92)
DC Power Cable, Pin 5	83A1A5W3P1 (fig. FO-2, Sheet 3 of 5)	83A1A2A1 Motherboard (para 2-93)

- If correct, replace DC Power Cable.

**2-11. BEEP SEQUENCE TEST.**

**DESCRIPTION**

This test isolates the fault depending upon the Beep Sequence heard at Power-Up.

**NOTE**

**Perform this test only when instructed from table 2-1 or another troubleshooting test. Do not perform this troubleshooting test as a separate procedure unless otherwise instructed. Certain conditions have been established and/or tested prior to performing this test.**

**0 BEEPS**

Locate A21 Video Controller (fig. FO-2, Sheet 1 of 5). Pull up A21 Video Controller, press POWER Switch and verify 1 Beep.

- If incorrect, replace A19 Processor (para 2-36).
- If correct, replace A21 Video Controller (para 2-37).

**2-11 BEEP SEQUENCE TEST - Continued.**

**0 BEEPS - ON INDICATOR LIGHTS - NO FAN**

Locate A22 RF I/O (fig. FO-2, Sheet 1 of 5). Pull up A22 RF I/O, press POWER Switch and verify 1 Beep.

- If incorrect, replace A22 RF I/O (para 2-34).
- If correct, replace A16 Power Supply (para 2-48).

**1 BEEP**

Locate A16 Power Supply (fig. FO-2, Sheet 1 of 5). Press POWER Switch and verify voltages with DMM at A16J4 (fig. FO-14).

A16J4, Pin 1	+5 Vdc ( ± 0.5 Vdc)
A16J4, Pin 3	+15 Vdc ( ± 2 Vdc)
A16J4, Pin 5	-15 Vdc ( ± 2 Vdc)

- If any reading is incorrect, replace A16 Power Supply (para 2-48).
- If all readings are correct, perform Power Faults Test (para 2-10).

**1 BEEP - CONTINUOUSLY LOOPING**

1 Pull up following assemblies (fig. FO-2, SheetS1 of 5). Install assemblies one at a time, press POWER Switch and verify 1 Beep - Continuously looping. Remove assembly if 1 Beep - Continuously looping is not present.

Assembly	If 1 Beep - Continuously looping, replace
A20 Memory	A20 Memory (para 2-35)
A23 Counter	A23 Counter (para 2-25)
A22 RF I/O	A22 RF I/O (para 2-34)
A25 Digitizer	A25 Digitizer (para 2-24)
A24 Function Generator	A24 Function Generator (para 2-33)
A26 Monitor Control	A26 Monitor Control (para 2-32)
A27 External I/O	A27 External I/O (para 2-38)

2 Install assemblies in groups and fault isolate 1 Beep - Continuously looping. Replace faulty assemblies.

**2 BEEPS**

1. Pull up following assemblies (fig. FO-2, Sheet 1 of 5). Install assemblies one at a time, press POWER Switch and verify 2 Beeps. Remove assembly if 2 Beeps is not present.

Assembly	If 2 Beeps, replace
A23 Counter	A23 Counter (para 2-25)
A22 RF I/O	A22 RF I/O (para 2-34)
A25 Digitizer	A25 Digitizer (para 2-24)
A24 Function Generator	A24 Function Generator (para 2-33)
A26 Monitor Control	A26 Monitor Control (para 2-32)
A27 External I/O	A27 External I/O (para 2-38)

2 Install assemblies in groups and fault isolate 2 Beeps. Replace faulty assemblies.

**2-11. BEEP SEQUENCE TEST - Continued.****2 BEEPS - CONTINUOUSLY LOOPING**

Locate A21 Video Controller (fig. FO-2, Sheet 1 of 5). Pull up A21 Video Controller, press POWER Switch and verify 1 Beep.

- If incorrect, replace A19 Processor (para 2-36).
- If correct, replace A21 Video Controller (para 2-37).

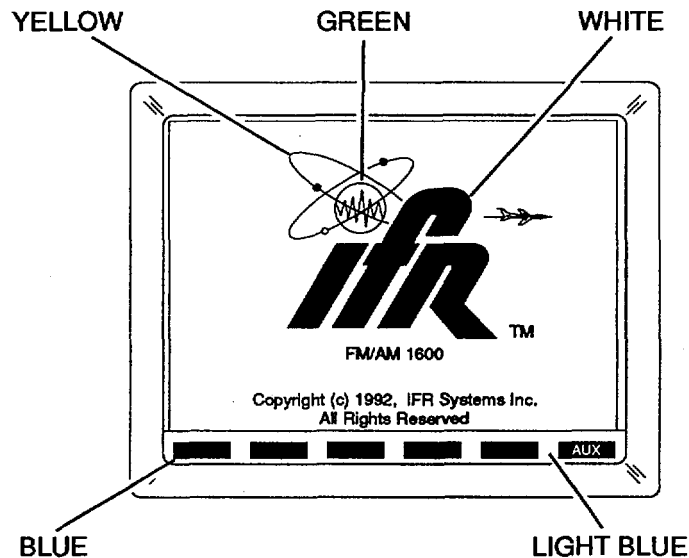
**2-12. CRT ABNORMALITY TEST.****DESCRIPTION**

This test checks for proper pulse trains from the A21 Video Controller to the A15 CRT and that +12 Vdc is present from the A16 Power Supply to the A15 CRT.

**NOTE**

**Perform this test only when instructed from table 2-1 or another troubleshooting test. Do not perform this troubleshooting test as a separate procedure unless otherwise instructed. Certain conditions have been established and/or tested prior to performing this test.**

1. Press POWER Switch, rotate INTENSITY/Contrast Adjustment fully cw and verify CRT as shown.



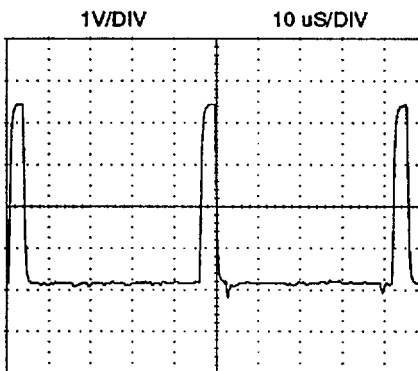
- If CRT is blank, distorted or rolling, perform Steps 3-9.
- If CRT is stable with colors missing, perform Step 2.

**2-12 CRT ABNORMALITY TEST - Continued.**

- 2 Locate External Video Connector (Figure 2-2, TM 11-6625-3245-12). Verify signals are constant low or high with Oscilloscope at External Video Connector, Pins 3-9 (TM 11-6625-3245-12, Appendix H).
  - If incorrect, perform A15 CRT (7005-7840-600) Test (para 2-16) or A15 CRT (7005-8644-300) Test (para 2-17).
  - If correct, replace A21 Video Controller (para 2-37).
- 3 Disconnect A1A1W2 (fig. FO-2, Sheet 2 of 5).
- 4 Press POWER Switch.
- 5 Locate A1A1W2 and A1A1W1. Verify +12 Vdc (+1 Vdc) with DMM at following pins on A1A1W2P1 and A1A1W1P1 (fig. FO-3, Sheet 1 of 2).

Location	Correct	Action
A1AIW2P1, Pin 12 (+) to Pin 14 (-) A1AIW1P1, Pin 6 (+) to Pin 7 (-)	NO NO	Replace A16 Power Supply (para 2-48)
A1A1W2P1, Pin 12 (+) to Pin 14 (-) A1A1W1P1, Pin 6 (+) to Pin 7 (-)	NO YES	Repair fault between A16 Power Supply and A15 CRT (fig. FO-3, Sheet 2 of 2)
A1A1W2P1, Pin 12 (+) to Pin 14 (-) A1A1W1P1, Pin 6 (+) to Pin 7 (-)	YES YES	Perform Steps 6-9

- 6 Rotate INTENSITY/Contrast Adjustment fully ccw.
- 7 Verify resistance changes from approximately 10 K $\Omega$  to <1 K $\Omega$  with DMM between A1A1W2P1, Pins 10 and 11 when INTENSITY/Contrast Adjustment is rotated fully cw.
  - If incorrect, remove A17 Front Panel (para 2-49) and replace A17R1 (fig. FO-15, Sheet 1 of 2).
- 8 Locate External Video Connector (Figure 2-2, TM 11-6625-3245-12). Verify 0 to 4 V square waveform continuous pulse trains are present. Verify approximately 46  $\mu$ s between pulses. Verify pulse width of approximately 3.3  $\mu$ s and 0 Vdc offset (top of waveform is random looking modulation) with Oscilloscope at External Video Connector, Pin 8 (Horizontal Sync) (TM 11-6625-3245-12, Appendix H) as shown.

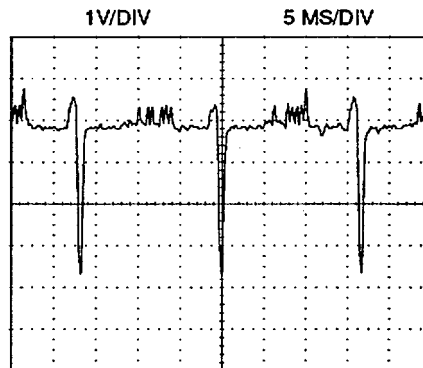


- If incorrect, replace A21 Video Controller (para 2-37).



**2-12. CRT ABNORMALITY TEST - Continued.**

9. Verify 0 to 4 V square waveform continuous pulse trains are present. Verify approximately 16.7 ms between pulses. Verify pulse width of approximately 760  $\mu$ s and 0 Vdc offset (top of waveform is random looking modulation) with Oscilloscope at External Video Connector, Pin 9 (Vertical Sync) as shown.



- If incorrect, replace A21 Video Controller (para 2-37).
- If correct, perform A15 CRT (7005-7840-600) Test (para 2-16) or A15 CRT (7005-8644-300) Test (para 2-17).

**2-13. KEYBOARD KEY TEST.****DESCRIPTION**

This test checks the status of each key on the A17A2 Keyboard through the A23 Counter connection (A23P2) on the A1A1 Motherboard.

**NOTE**

**Perform this test only when instructed from table 2-1 or another troubleshooting test. Do not perform this troubleshooting test as a separate procedure unless otherwise instructed. Certain conditions have been established and/or tested prior to performing this test.**

1. Remove A23 Counter (para 2-25) and install on PC Board Assembly Extender (Tool Code 7 in Appendix B of TM 11-6625-3245-12) in Test Set.
2. Verify  $>10 \text{ k}\Omega$  (open) initially and  $<100 \Omega$  between pins with DMM at following locations (fig. FO-16, Sheet 2 of 3) when keys are pressed.

2-13 KEYBOARD KEY TEST - Continued.

Location	Key	Location	Key
A23P2, Pins 14B and 9C	F1	A23P2, Pins 14B and 14C	8
A23P2, Pins 13B and 9C	F2	A23P2, Pins 13B and 14C	5
A23P2, Pins 12B and 9C	F3	A23P2, Pins 12B and 14C	2
A23P2, Pins 11B and 9C	F4	A23P2, Pins 11B and 14C	0
A23P2, Pins 10B and 9C	F5	A23P2, Pins 10B and 14C	CE
A23P2, Pins 9B and 9C	F6	A23P2, Pins 9B and 14C	DEL
A23P2, Pins 14B and 10C	RF GEN	A23P2, Pins 14B and 15C	9
A23P2, Pins 13B and 10C	RCVR	A23P2, Pins 13B and 15C	6
A23P2, Pins 12B and 10C	DPLX	A23P2, Pins 12B and 15C	3
A23P2, Pins 11B and 10C	AF GEN	A23 P2, Pins 1 1 B and 15C	#
A23P2, Pins 10B and 10C	SCOPE/ANLZ	A23P2, Pins 10B and 15C	↑ (SQLCH)
A23P2, Pins 9B and 10C	MTRS	A23P2, Pins 9B and 15C	↓ (SQLCH)
A23P2, Pins 14B and 11C	AUTO	A23P2, Pins 14B and 16C	+/-
A23P2, Pins 13B and 1 1C	SGL STEP	A23P2, Pins 13B and 16C	M/μ
A23P2, Pins 12B and 11C	GO	A23P2, Pins 12B and 16C	K/m
A23P2, Pins 11B and 11C	STOP	A23P2, Pins 11B and 16C	ENTER
A23P2, Pins 10B and 11C	PRINT SCRN	A23P2, Pins 10B and 16C	↑ (VOL)
A23P2, Pins 9B and 11C	HOLD SCRN	A23P2, Pins 9B and 16C	↓ (VOL)
A23P2, Pins 11B and 12C	•	A23P2, Pins 16C and 15B	↑ (FIELD SELECT)
A23P2, Pins 10B and 12C	SETUP	A23P2, Pins 15C and 15B	→ (FIELD SELECT)
A23P2, Pins 9B and 12C	STORE	A23P2, Pins 14C and 15B	→ (DATA SCROLL)
A23P2, Pins 14B and 13C	7	A23P2, Pins 13C and 15B	← (DATA SCROLL)
A23P2, Pins 13B and 13C	4	A23P2, Pins 16C and 16B -	← (FIELD SELECT)
A23P2, Pins 12B and 13C	1	A23P2, Pins 15C and 16B	↓ (FIELD SELECT)
A23P2, Pins 11B and 13C	*	A23P2, Pins 14C and 16B	↓ (DATA SCROLL)
A23P2, Pins 10B and 13C	SHIFT	A23P2, Pins 13C and 16B	↑ (DATA SCROLL)
A23P2, Pins 9B and 13C	RCL		

- If any reading is incorrect, replace A17A2 Keyboard (para 2-54).
- If all readings are correct, replace A23 Counter (para 2-25).

**2-14. SELF TEST FAILURE TEST.**

**DESCRIPTION**

This test isolates faults based upon failures in Self Test.

**NOTE**

**Perform this test only when instructed from table 2-1 or another troubleshooting test. Do not perform this troubleshooting test as a separate procedure unless otherwise instructed. Certain conditions have been established and/or tested prior to performing this test.**

	Page
2. TIME OF DAY CLOCK .....	2-37
7. VOLTAGE .....	2-38
8. TEMPERATURE .....	2-39
9. AUDIO SINAD .....	2-40
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13. CWT FILTER .....	2-44
14. HP FILTER .....	2-44
15. PHASELOCK LOOPS .....	2-45
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17. ANALYZER LEVEL .....	2-48
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23. RECEIVER SELECTIVITY .....	2-53
24. AUXILIARY BOX .....	2-53

**2. TIME OF DAY CLOCK**

Replace A19 Processor (para 2-36).

**NOTE**

**Failure Indications (F) for Self Tests 3 through 6 do not appear on the Self Test Menu. Failures for Self Tests 3 through 6 are catastrophic failures which are detected during the Power-Up (Beep) Sequence.**

**2-14. SELF TEST FAILURE TEST - Continued.**

**7. VOLTAGE**

1. Run Self Test 7 in Extended Mode until failure is detected.
2. Locate A26 Monitor Control (fig. FO-2, Sheet 1 of 5) and verify 3.3 Vdc (±0.1 Vdc) with DMM at A26J2, Pin 47 (fig. FO-16, Sheet 3 of 3).
  - If incorrect, perform Steps 3-6.
  - If correct, replace A26 Monitor Control (para 2-32).
3. Remove A26 Monitor Control (para 2-32) and install on PC Board Assembly Extender (Tool Code 6 in Appendix C of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).
4. Verify voltages with DMM at A26J2 for failed test.

5 VOLTS TEST FAILURE

A26J2, Pin 18	0 Vdc ( ± 0.5 Vdc)
A26J2, Pin 19	5 Vdc ( ± 0.5 Vdc)
A26J2, Pin 20	0 Vdc ( ± 0.5 Vdc)
A26J2, Pin 21	5 Vdc ( ± 0.5 Vdc)
A26J2, Pin 22	5 Vdc ( ± 0.5 Vdc)

15 VOLTS TEST FAILURE

A26J2, Pin 18	0 Vdc ( ± 0.5 Vdc)
A26J2, Pin 19	0 Vdc ( ± 0.5 Vdc)
A26J2, Pin 20	0 Vdc ( ± 0.5 Vdc)
A26J2, Pin 21	5 Vdc ( ± 0.5 Vdc)
A26J2, Pin 22	5 Vdc ( ± 0.5 Vdc)

-15 VOLTS TEST FAILURE

A26J2, Pin 18	5 Vdc ( ± 0.5 Vdc)
A26J2, Pin 19	0 Vdc ( ± 0.5 Vdc)
A26J2, Pin 20	0 Vdc ( ± 0.5 Vdc)
A26J2, Pin 21	5 Vdc ( ± 0.5 Vdc)
A26J2, Pin 22	5 Vdc ( ± 0.5 Vdc)

- If any voltage is incorrect, replace A26 Monitor Control (para 2-32).

5. Install A26 Monitor Control (para 2-32). Remove A3 Monitor (para 2-31) and install on PC Board Assembly Extender (Tool Code 8 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).

6. Verify voltages with DMM at A3P1 (fig. FO-4).

A3P1, Pin 5A	+15 Vdc ( ± 1.0 Vdc)
A3P1, Pin 7A	+5 Vdc ( ± 0.5 Vdc)
A3P1, Pin 4B	-15 Vdc ( ± 1.0 Vdc)

- If any voltage is incorrect, replace A16 Power Supply (para 2-48).
- If all voltages are correct, replace A3 Monitor (para 2-31).

**2-14. SELF TEST FAILURE TEST - Continued.**

**8. TEMPERATURE**

1. Run Self Test 8 in Extended Mode and verify 8.1 Ambient Test displays <100.
  - If incorrect, perform Steps 2-4.
  - If correct, perform Steps 5-6.
2. Locate A26 Monitor Control (fig. FO-2, Sheet 1 of 5) and verify 3.0 Vdc (±0.5 Vdc) with DMM at A26J2, Pin 34 (fig. FO-16, Sheet 3 of 3).
  - If incorrect, replace A26 Monitor Control (para 2-32).
3. Verify 2.5 Vdc (±0.5 Vdc) with DMM at A26J2, Pin 47.
  - If incorrect, perform Step 4.
  - If correct, replace A26 Monitor Control (para 2-32).

4. Verify voltages with DMM at A26J2.

A26J2, Pin 18	5 Vdc (±0.5 Vdc)
A26J2, Pin 19	0 Vdc (±0.5 Vdc)
A26J2, Pin 20	0 Vdc (±0.5 Vdc)
A26J2, Pin 21	0 Vdc (±0.5 Vdc)

- If any voltage is incorrect, replace A26 Monitor Control (para 2-32).
- If all voltages are correct, replace A3 Monitor (para 2-31).

5. Run Extended Self Test 8.2 (RF Test).
6. Locate A26 Monitor Control (fig. FO-2, Sheet 1 of 5) and verify 0.250 Vdc (±0.05 Vdc) with DMM at A26J2, Pin 47 (fig. FO-16, Sheet 3 of 3).
  - If incorrect, perform Steps 7-8.
  - If correct, replace A26 Monitor Control (para 2-32).

7. Locate A14 Power Termination (fig. FO-2, Sheet 1 of 5) and verify 0.300 Vdc (± 0.05 Vdc) with DMM at A14FL1 (fig. FO-11).
  - If incorrect, replace A14 Power Termination (para 2-71).

8. Locate A26 Monitor Control (fig. FO-2, Sheet 1 of 5) and verify voltages with DMM at A26J2 (fig. FO-16, Sheet 3 of 3).

A26J2, Pin 18	0 Vdc ( ± 0.5 Vdc)
A26J2, Pin 19	5 Vdc (±0.5 Vdc)
A26J2, Pin 20	0 Vdc (±0.5 Vdc)
A26J2, Pin 21	0 Vdc ( ± 0.5 Vdc)

- If any voltage is incorrect, replace A26 Monitor Control (para 2-32).
- If all voltages are correct, replace A3 Monitor (para 2-31).

**2-14. SELF TEST FAILURE TEST - Continued.**

**9. AUDIO SINAD**

1. Locate A26 Monitor Control (fig. FO-2, Sheet 1 of 5). Run Self Test 9 in Extended Mode and verify 1 Vdc (+0.1 Vdc) with DMM at A26J2, Pin 47 (fig. FO-16, Sheet 3 of 3).

- If incorrect, perform Steps 2-5.
- If correct, replace A26 Monitor Control (para 2-32).

2. Connect Distortion Analyzer to AUDIO OUT Connector. Set Distortion Analyzer to measure SINAD.

3. Verify 10 dB ( $\pm 1$  dB) with Distortion Analyzer.

- If incorrect, replace A24 Function Generator (para 2-33).

4. Verify voltages with DMM at A26J2.

A26J2, Pin 18	0 Vdc (i0.5 Vdc)
A26J2, Pin 19	0 Vdc (f0.5 Vdc)
A26J2, Pin 20	5 Vdc (i0.5 Vdc)
A26J2, Pin 21	5 Vdc (+0.5 Vdc)

- If any voltage is incorrect, replace A26 Monitor Control (para 2-32).

5. Loop Self Test 9 and verify signals with Oscilloscope are not stuck at -7.5 Vdc or 7.5 Vdc at A26J2.

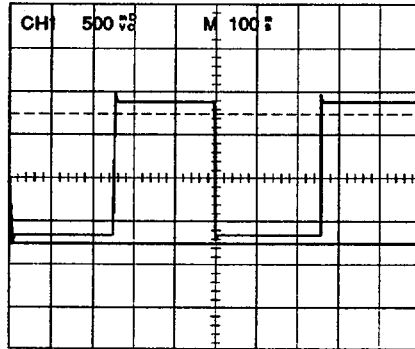
A26J2, Pin 8	A26J2, Pin 9	A26J2, Pin 10
A26J2, Pin 11	A26J2, Pin 12	A26J2, Pin 13
A26J2, Pin 14	A26J2, Pin 15	A26J2, Pin 16
A26J2, Pin 17		

- If any signal is incorrect, replace A26 Monitor Control (para 2-32).
- If all signals are correct, replace A3 Monitor (para 2-31).

2-14. SELF TEST FAILURE TEST - Continued.

10. SCOPE PERIOD AND LEVEL

1. Remove A3 Monitor (para 2-31) and install on PC Board Assembly Extender (Tool Code 8 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).
2. Run Self Test 10 and verify 2 kHz ( $\pm 20$  Hz) square wave at 6 Vp-p ( $\pm 0.6$  V) with Oscilloscope at A3P1, Pin 3A (fig. FO-4) as shown.



- If incorrect, replace A24 Function Generator (para 2-33).
3. Verify 2 kHz ( $\pm 20$  Hz) square wave at 6 Vp-p ( $\pm 0.6$  V) with Oscilloscope at A3P1, Pin 2B.
    - If incorrect, perform Steps 4-5.
    - If correct, replace A25 Digitizer (para 2-24).
  4. Install A3 Monitor (para 2-31). Remove A26 Monitor Control (para 2-32) and install on PC Board Assembly Extender (Tool Code 6 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).
  5. Loop Self Test 10 and verify signals with Oscilloscope are not stuck at -7.5 Vdc or 7.5 Vdc at A26J2 (fig. FO-16, Sheet 3 of 3).

A26J2, Pin 8  
 A26J2, Pin 11  
 A26J2, Pin 14  
 A26J2, Pin 17

A26J2, Pin 9  
 A26J2, Pin 12  
 A26J2, Pin 15

A26J2, Pin 10  
 A26J2, Pin 13  
 A26J2, Pin 16

- If any signal is incorrect, replace A26 Monitor Control (para 2-32).
- If all signals are correct, replace A3 Monitor (para 2-31).

**2-14. SELF TEST FAILURE TEST - Continued.**

**11. AF COUNTER**

1. Remove A3 Monitor (para 2-31) and install on PC Board Assembly Extender (Tool Code 8 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).
2. Run Self Test 11.
3. Verify 37.890 kHz ( $\pm 40$  Hz) signal with Frequency Counter at A3P1, Pin 3A (fig. FO-4).
  - If incorrect, replace A24 Function Generator (para 2-32).
4. Verify 37.890 kHz ( $\pm 40$  Hz) signal with Frequency Counter at A3P1, Pin 3B.
  - If incorrect, perform Steps 5-6.
  - If correct, replace A23 Counter (para 2-25).
5. Install A3 Monitor (para 2-31). Remove A26 Monitor Control (para 2-32) and install on PC Board Assembly Extender (Tool Code 6 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).
6. Loop Self Test 11 and verify signals with Oscilloscope are not stuck at -7.5 Vdc or 7.5 Vdc at A26J2 (fig. FO-16, Sheet 3 of 3).

A26J2, Pin 8  
 A26J2, Pin 11  
 A26J2, Pin 14  
 A26J2, Pin 17

A26J2, Pin 9  
 A26J2, Pin 12  
 A26J2, Pin 15

A26J2, Pin 10  
 A26J2, Pin 13  
 A26J2, Pin 16

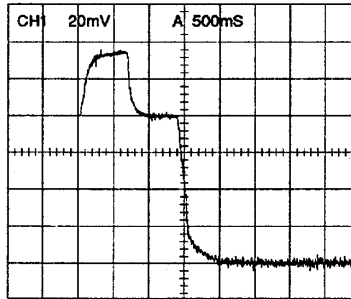
- If any signal is incorrect, replace A26 Monitor Control (para 2-32).
- If all signals are correct, replace A3 Monitor (para 2-31).



2-14. SELF TEST FAILURE TEST - Continued.

12. LP FILTER

1. Locate A26 Monitor Control (fig. FO-2, Sheet 1 of 5). Run Self Test 12 and verify signal with Oscilloscope and x10 Probe at A26J2, Pin 47 (fig, FO-16, Sheet 3 of 3) as shown.



2. Verify level of Region 1 is 1 Vdc ( $\pm 0.2$  V).
  - If incorrect, perform Step 5.
3. Verify level of Region 2 is 50% to 90% of level in Region 1.
  - If incorrect, perform Step 5.
4. Verify level of Region 3 is  $<10\%$  of Region 1.
  - If incorrect, perform Step 5.
  - If correct, replace A26 Monitor Control (para 2-32).
5. Verify voltages with DMM at A26J2.
 

A26J2, Pin 18	0 Vdc ( $\pm 0.5$ Vdc)
A26J2, Pin 19	0 Vdc ( $\pm 0.5$ Vdc)
A26J2, Pin 20	5 Vdc ( $\pm 0.5$ Vdc)
A26J2, Pin 21	5 Vdc ( $\pm 0.5$ Vdc)
A26J2, Pin 31	0 Vdc ( $\pm 0.5$ Vdc)

  - If any voltage is incorrect, replace A26 Monitor Control (para 2-32).
6. Loop Self Test 12 and verify signals with Oscilloscope are not stuck at -7.5 Vdc or
7. Vdc at A26J2.
 

A26J2, Pin 8	A26J2, Pin 9	A26J2, Pin 10
A26J2, Pin 11	A26J2, Pin 12	A26J2, Pin 13
A26J2, Pin 14	A26J2, Pin 15	A26J2, Pin 16
A26J2, Pin 17		

  - If any signal is incorrect, replace A26 Monitor Control (para 2-32).
  - If all signals are correct, replace A3 Monitor (para 2-31).

2-14. SELF TEST FAILURE TEST - Continued.

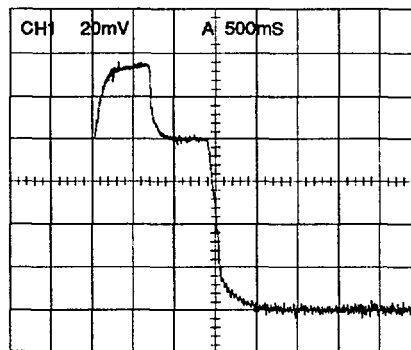
13. CWT FILTER

**NOTE**

Failures for Self Test 13 are detected as multiple failures.  
Failures for Self Test 13 are indicated and cleared on previous Self Test procedures.

14. HP FILTER

1. Locate A26 Monitor Control (fig. FO-2, Sheet 1 of 5). Run Self Test 14 and verify signal with Oscilloscope and x10 Probe at A26J2, Pin 47 (fig, FO-16, Sheet 3 of 3) as shown.



2. Verify level of Region 1 is 1 Vdc (±0.2 V).
  - If incorrect, perform Step 5.
3. Verify level of Region 2 is 50% to 90% of level in Region 1.
  - If incorrect, perform Step 5.
4. Verify level of Region 3 is <10% of Region 1.
  - If incorrect, perform Step 5.
  - If correct, replace A26 Monitor Control (para 2-32).
5. Verify voltages with DMM at A26J2.
 

A26J2, Pin 18	0 Vdc (± 0.5 Vdc)
A26J2, Pin 19	0 Vdc (± 0.5 Vdc)
A26J2, Pin 20	5 Vdc (± 0.5 Vdc)
A26J2, Pin 21	5 Vdc (± 0.5 Vdc)

  - If any voltage is incorrect, replace A26 Monitor Control (para 2-32).

**2-14. SELF TEST FAILURE TEST - Continued.**

**14. HP FILTER - Continued**

6. Loop Self Test 12 and verify signals with Oscilloscope are not stuck at -7.5 Vdc or 7.5 Vdc at A26J2.

A26J2, Pin 8	A26J2, Pin 9	A26J2, Pin 10
A26J2, Pin 11	A26J2, Pin 12	A26J2, Pin 13
A26J2, Pin 14	A26J2, Pin 15	A26J2, Pin 16
A26J2, Pin 17		

- If any signal is incorrect, replace A26 Monitor Control (para 2-32).

7. Verify frequency is 300 kHz (±5 kHz) with Frequency Counter at A26J2, Pin 6.

- If incorrect, replace A26 Monitor Control (para 2-32).
- If correct, replace A3 Monitor (para 2-31).

**15. PHASELOCK LOOPS**

1. Remove A22 RF I/O (para 2-34) and install on PC Board Assembly Extender (Tool Code 7 in Appendix B of TM 11-6625-3245-12) in Test Set.
2. Run Self Test 15 in Extended Mode until failure is detected.
3. Verify voltage for failed test with DMM at A22P2 (fig. FO-16, Sheet 2 of 3).

Failed Test	Location	Voltage	If incorrect, perform
15.1	A22P2, Pin 11B	5 Vdc (± 0.5 Vdc)	Step 4
15.2	A22P2, Pin 2C	5 Vdc (± 0.5 Vdc)	Step 5
15.3	A22P2, Pin 3C	5 Vdc (± 0.5 Vdc)	Step 6
15.4	A22P2, Pin 12C	5 Vdc (± 0.5 Vdc)	Step 7
15.5	A22P2, Pin 14C	<0.4 Vdc	Step 8

- If correct, replace A22 RF I/O (para 2-34).

4. Disconnect W20 (fig. FO-2, Sheet 2 of 5) from A9 90 MHz Generator (fig. FO-2, Sheet 1 of 5), connect Frequency Counter to W20 (fig. FO-2, Sheet 2 of 5) and verify 1 MHz (± 0.5 Hz).

- If incorrect, perform Step 9.
- If correct, replace A9 90 MHz Generator (para 2-29).

5. Disconnect W14 (fig. FO-2, Sheet 2 of 5) from A10 1st LO (fig. FO-2, Sheet 1 of 5), connect Frequency Counter to W14 (fig. FO-2, Sheet 2 of 5) and verify 10 MHz (± 5 Hz).

- If incorrect, perform Step 9.
- If correct, replace A10 1st LO (para 2-63).

6. Disconnect W15 (fig. FO-2, Sheet 2 of 5) from A10 1st LO (fig. FO-2, Sheet 1 of 5), connect Frequency Counter to W15 (fig. FO-2, Sheet 2 of 5) and verify 10 MHz (± 5 Hz).

- If incorrect, perform Step 9.
- If correct, replace A10 1st LO (para 2-63).

**2-14. SELF TEST FAILURE TEST - Continued.**

**15. PHASELOCK LOOPS - Continued**

7. Disconnect W19 (fig. FO-2, Sheet 2 of 5) from A7 3rd LO (fig. FO-2, Sheet 1 of 5), connect Frequency Counter to W19 (fig. FO-2, Sheet 2 of 5) and verify 1 MHz ( $\pm 0.5$  Hz).
  - If incorrect, perform Step 9.
  - If correct, replace A7 3rd LO (para 2-28).
8. Disconnect W18 (fig. FO-2, Sheet 2 of 5) from A5 Analyzer RF (fig. FO-2, Sheet 1 of 5), connect Frequency Counter to W18 (fig. FO-2, Sheet 2 of 5) and verify 1 MHz ( $\pm 0.5$  Hz).
  - If incorrect, perform Step 9.
  - If correct, replace A5 Analyzer RF (para 2-27).
9. Reconnect coaxial cable. Disconnect W16 from All 2nd LO (fig. FO-2, Sheet 1 of 5), connect Frequency Counter to W16 (fig. FO-2, Sheet 2 of 5) and verify 10 MHz ( $\pm 5$  Hz).
  - If incorrect, replace G1 (para 2-73).
  - If correct, replace All 1 2nd LO (para 2-62).

**16. POWER METER**

1. Run Self Test 16.
2. Connect Measuring Receiver to T/R Connector. Set Measuring Receiver to measure RF Power.
3. Verify 0 dBm ( $\pm 2$  dB) with Measuring Receiver.
  - If incorrect, perform Steps 7-16.
4. Locate A14 Power Termination (fig. FO-2, Sheet 1 of 5) and verify 0.25 Vdc ( $\pm 0.05$  Vdc) with DMM at A14FL9 (fig. FO-11).
  - If incorrect, replace A14 Power Termination (para 2-71).
5. Locate A26 Monitor Control (fig. FO-2, Sheet 1 of 5) and verify 0.21 Vdc ( $\pm 0.05$  Vdc) with DMM at A26J2, Pin 47 (fig. FO-16, Sheet 3 of 3).
  - If incorrect, perform Step 6.
  - If correct, replace A26 Monitor Control (para 2-32).
6. Verify voltages with DMM at A26J2.
 

A26J2, Pin 18	5 Vdc ( $\pm 0.5$ Vdc)
A26J2, Pin 19	0 Vdc ( $\pm 0.5$ Vdc)
A26J2, Pin 20	5 Vdc ( $\pm 0.5$ Vdc)
A26J2, Pin 21	5 Vdc ( $\pm 0.5$ Vdc)

  - If any voltage is incorrect, replace A26 Monitor Control (para 2-32).
  - If all voltages are correct, replace A3 Monitor (para 2-31).
7. Locate A13 Generator IF (fig. FO-2, Sheet 1 of 5) and verify -2.5 Vdc ( $\pm 1$  Vdc) with DMM at A13W1P1, Pin 4 (fig. FO-10).
  - If incorrect, perform Steps 17-19.

**2-14. SELF TEST FAILURE TEST - Continued.**

**16. POWER METER - Continued**

8. Disconnect W13 (fig. FO-2, Sheet 2 of 5) from A13 Generator IF (fig. FO-2, Sheet 1 of 5), connect Measuring Receiver to W13 (fig. FO-2, Sheet 2 of 5) and verify >-20 dBm.
  - If incorrect, replace A9 90 MHz Generator (para 2-29).
9. Reconnect W13. Disconnect W12 (fig. FO-2, Sheet 2 of 5) from A13 Generator IF (fig. FO-2, Sheet 1 of 5), connect Measuring Receiver to W12 (fig. FO-2, Sheet 2 of 5) and verify >5 dBm.
  - If incorrect, replace A10 1st LO (para 2-63).
10. Reconnect W12. Disconnect W1 (fig. FO-2, Sheet 2 of 5) from A13 Generator IF (fig. FO-2, Sheet 1 of 5), connect Measuring Receiver to W11 (fig. FO-2, Sheet 2 of 5) and verify >-4 dBm.
  - If incorrect, replace All 2nd LO (2-62).
11. Locate A28 Attenuator (fig. FO-2, Sheet 1 of 5) and verify 0 Vdc (00.5 Vdc) with DMM at A28AT1 (fig. FO-17).

Location	If incorrect
A28AT1, Pin 1	Remove A28 Attenuator (para 2-70) and troubleshoot A28U2
A28AT1, Pin 2	Remove A28 Attenuator (para 2-70) and troubleshoot A28U1
A28AT1, Pin 4	Remove A28 Attenuator (para 2-70) and troubleshoot A28U1
A28AT1, Pin 8	Remove A28 Attenuator (para 2-70) and troubleshoot A28U1
A28AT1, Pin 16	Remove A28 Attenuator (para 2-70) and troubleshoot A28U1
A28AT1, Pin 32	Remove A28 Attenuator (para 2-70) and troubleshoot A28U1
A28AT1, Pin 32a	Remove A28 Attenuator (para 2-70) and troubleshoot A28U1
A28AT1, Pin 32b	Remove A28 Attenuator (para 2-70) and troubleshoot A28U1

12. Locate A14 Power Termination (fig. FO-2, Sheet 1 of 5) and verify 13.5 Vdc ( $\pm 1$  Vdc) with DMM at A14FL2 (fig. FO-11).
  - If incorrect, replace A22 RF I/O (para 2-34).
13. Remove A28 Attenuator (para 2-70). Reconnect A28J1, A28J2, A28J3 and A28J4 (fig. FO-17).
14. Locate A13 Generator IF (fig. FO-2, Sheet 1 of 5) and verify level is +11.5 dBm ( $\pm 2$  dB) with Measuring Receiver at A13P6 (fig. FO-10).
  - If incorrect, replace A13 Generator IF (para 2-68).
15. Connect coaxial cable between A13P6 and A28J5 (fig. FO-17).
16. Verify level is +8 to +11 dBm with Measuring Receiver at A28J6.
  - If incorrect, remove A28 Attenuator (para 2-70) and replace A28AT1.
  - If correct, replace A14 Power Termination (para 2-71).
17. Disconnect W13 (fig. FO-2, Sheet 2 of 5) from A13 Generator IF (fig. FO-2, Sheet 1 of 5), connect Measuring Receiver to W13 (fig. FO-2, Sheet 2 of 5) and verify >-20 dBm.
  - If incorrect, replace A9 90 MHz Generator (para 2-29).

**2-14. SELF TEST FAILURE TEST - Continued.**

**16. POWER METER - Continued**

18. Reconnect W13. Disconnect W12 (fig. FO-2, Sheet 2 of 5) from A13 Generator IF (fig. FO-2, Sheet 1 of 5), connect Measuring Receiver to W12 (fig. FO-2, Sheet 2 of 5) and verify >5 dBm.
  - If incorrect, replace A10 1st LO (para 2-63).
19. Reconnect W12. Disconnect W11 (fig. FO-2, Sheet 2 of 5) from A13 Generator IF (fig. FO-2, Sheet 1 of 5), connect Measuring Receiver to W11 (fig. FO-2, Sheet 2 of 5) and verify >-4 dBm.
  - If incorrect, replace All 2nd LO (para 2-62).
  - If correct, replace A13 Generator IF (para 2-68).

**17. ANALYZER LEVEL**

1. Disconnect W4 (fig. FO-2, Sheet 2 of 5) from A12 Receive IF (fig. FO-2, Sheet 1 of 5) and connect Spectrum Analyzer to W4 (fig. FO-2, Sheet 2 of 5).
2. Set Spectrum Analyzer Frequency to 10 MHz.
3. Run Self Test 17 in Extended Mode and verify level is -20 dBm ( ± 3 dB).
  - If incorrect, replace A14 Power Termination (para 2-71).
4. Reconnect W4. Disconnect W9 from A5 Analyzer RF (fig. FO-2, Sheet 1 of 5), connect Spectrum Analyzer to W9 (fig. FO-2, Sheet 2 of 5) and verify -37 dBm (i10 dB) RF Power and Frequency for failed test.

10 MHz	90 MHz (±45 Hz)
64 MHz	90 MHz (±45 Hz)
578 MHz	88.0001 MHz (±45 Hz)
918 MHz	89.9875 MHz (±45 Hz)

- If any frequency is incorrect, perform Step 17.
5. Reconnect W9.
  6. Press MTRS MODE Key, "AUX" F6 and RCL Key.
  7. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
  8. Press SCOPE/ANLZ MODE Key to access Analyzer Operation Screen.
  9. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 500.0000 MHz. Press ENTER Key.
  10. Use FIELD SELECT Keys to move cursor to Scan. Press ENTER Key. Use DATA SCROLL Keys to select 0 kHz. Press ENTER Key.
  11. Set Signal Generator for 500 MHz signal at -40 dBm with no modulation. Connect Signal Generator to ANTENNA IN Connector.
  12. Disconnect W25 from A4 Analyzer Log/IF (fig. FO-2, Sheet 1 of 5) and connect Spectrum Analyzer to W25 (fig. FO-2, Sheet 2 of 5). Set Spectrum Analyzer for 10.7 MHz.

**2-14. SELF TEST FAILURE TEST - Continued.**

**17. ANALYZER LEVEL - Continued**

13. Verify level is -27 dBm ( ± 5 dB) at 10.7 MHz (±1 Hz).
  - If incorrect, perform Step 18.
14. Reconnect W25. Remove A25 Digitizer (para 2-24) and install on PC Board Assembly Extender (Tool Code 29 in Appendix B of TM 11-6625-3245-12) in Test Set.
15. Press SCOPE/ANLZ MODE Key to access Analyzer Operation Screen.
16. Locate A25 Digitizer (fig. FO-2, Sheet 1 of 5) and verify 1.4 Vdc (±0.1 Vdc) with DMM at A25P2, Pin 8B (fig. FO-16, Sheet 1 of 3).
  - If incorrect, replace A4 Analyzer Log/IF (para 2-26).
  - If correct, replace A25 Digitizer (para 2-24).
17. Reconnect W9. Disconnect W6 (fig. FO-2, Sheet 2 of 5) from A12 Receive IF (fig. FO-2, Sheet 1 of 5), connect Spectrum Analyzer to W6 (fig. FO-2, Sheet 2 of 5) and verify >5 dBm RF Power and Frequency for failed test.

10 MHz	1310 MHz (±655 Hz)
64 MHz	1364 MHz (±682 Hz)
578 MHz	1876 MHz (±938 Hz)
918 MHz	2218 MHz (±1109 Hz)

- If any frequency is incorrect, replace A10 1st LO (para 2-63).
- If all frequencies are correct, replace A12 Receive IF (para 2-66).

18. Reconnect W25. Disconnect W26 from A5 Analyzer RF (fig. FO-2, Sheet 1 of 5), connect Spectrum Analyzer to W26 (fig. FO-2, Sheet 2 of 5) and verify >3 dBm RF Power and Frequency for failed test.

10 MHz	79.3000 MHz (±40 Hz)
64 MHz	79.3000 MHz (±40 Hz)
578 MHz	77.3001 MHz (±40 Hz)
918 MHz	79.2875 MHz (±40 Hz)

- If any frequency is incorrect, replace A7 3rd LO (para 2-28).
- If all frequencies are correct, replace A5 Analyzer RF (para 2-27).

**18. AM MODULATION**

1. Connect Measuring Receiver to T/R Connector. Select AM Detector on Measuring Receiver.
2. Run Self Test 18 and verify 100 MHz (±100 Hz) at -10 dBm (±2 dB) with 30% (±5%) AM and 1 kHz Audio tone with Measuring Receiver.
  - If incorrect, perform Steps 7-10.
3. Remove A3 Monitor (para 2-31) and install on PC Board Assembly Extender (Tool Code 8 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).

**2-14. SELF TEST FAILURE TEST - Continued.****18. AM MODULATION - Continued**

4. Run Self Test 18 and verify 1 kHz sine wave at 1 Vp-p ( $\pm 0.1$  V) with Oscilloscope at A3P1, Pin 8A (fig. FO-4).
  - If incorrect, replace A6 Receiver (para 2-30).
5. Install A3 Monitor (para 2-31). Remove A26 Monitor Control (para 2-32) and install on PC Board Assembly Extender (Tool Code 6 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).
6. Verify 5.0 Vdc ( $\pm 0.5$  Vdc) with DMM at A26J2, Pin 23 (fig. FO-16, Sheet 3 of 3).
  - If incorrect, replace A26 Monitor Control (para 2-32).
  - If correct, replace A3 Monitor (para 2-31).
7. Remove A9 90 MHz Generator (para 2-29) and install on PC Board Assembly Extender (Tool Code 9 in Appendix B of TM 11-6625-3245-12) in Test Set.
8. Verify 0.8 VAC ( $\pm 0.04$  VAC) with DMM at A9P1, Pin 1A (fig. FO-6).
  - If incorrect, replace A24 Function Generator (para 2-33).
9. Disconnect W13 (fig. FO-2, Sheet 2 of 5) from A9 90 MHz Generator (fig. FO-2, Sheet 1 of 5) and connect Signal Generator to W13 (fig. FO-2, Sheet 2 of 5). Set Signal Generator for 90 MHz at -25 dBm with 30% AM.
10. Verify -2.5 Vdc ( $\pm 1$  Vdc) with DMM at A9P1, Pin 2B (fig. FO-6).
  - If incorrect, replace A13 Generator IF (para 2-68).
  - If correct, replace A9 90 MHz Generator (para 2-29).

**19. SYNTHESIZER RESPONSE****NOTE**

**Failures for Self Test 19 are detected as multiple failures.**

**Failures for Self Test 19 are indicated and cleared on previous Self Test procedures.**

**20. RF COUNTER**

1. Disconnect W24 (fig. FO-2, Sheet 2 of 5) from A23 Counter (fig. FO-2, Sheet 1 of 5) and connect Frequency Counter to W24 (fig. FO-2, Sheet 2 of 5).
2. Run Self Test 20 and verify 425 kHz ( $\pm 50$  Hz).
  - If incorrect, replace A6 Receiver (para 2-30).
  - If correct, replace A23 Counter (para 2-25).



**2-14. SELF TEST FAILURE TEST - Continued.****21. FM DEVIATION**

1. Connect Measuring Receiver to T/R Connector. Set Low-Pass Filter to 15 kHz and select FM Detector on Measuring Receiver.
2. Run Self Test 21 and verify 100 MHz ( $\pm 100$  Hz) at 0 dBm ( $\pm 2$  dB) with 5 kHz ( $\pm 1$  kHz) Deviation and 1 kHz Audio tone with Measuring Receiver.
  - If incorrect, perform Steps 6-13.
3. Remove A3 Monitor (para 2-31) and install on PC Board Assembly Extender (Tool Code 8 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).
4. Run Self Test 21 and verify 1 kHz sine wave at 1 Vp-p (iO.1 V) with Oscilloscope at A3P1, Pin 8B (fig. FO-4).
  - \* If incorrect, replace A6 Receiver (para 2-30).
5. Install A3 Monitor (para 2-31). Remove A26 Monitor Control (para 2-32) and install on PC Board Assembly Extender (Tool Code 6 in Appendix B of TM 11-6625-3245-12) in Test Set. Install Monitor/Monitor Control Extended Ribbon Cable (Appendix C) in place of Monitor/Monitor Control Ribbon Cable (W31).
6. Verify 5.0 Vdc ( $\pm 0.5$  Vdc) with DMM at A26J2, Pin 24 (fig. FO-16, Sheet 1 of 3).
  - If incorrect, replace A26 Monitor Control (para 2-32).
  - If correct, replace A3 Monitor (para 2-31).
7. Remove A9 90 MHz Generator (para 2-29) and install on PC Board Assembly Extender (Tool Code 9 in Appendix B of TM 11-6625-3245-12) in Test Set.
8. Verify 0.67 VAC ( $\pm 0.035$  VAC) with DMM at A9P1, Pin 2A (fig. FO-6).
  - If incorrect, replace A24 Function Generator (para 2-33).
9. Disconnect W13 (fig. FO-2, Sheet 2 of 5) from A9 90 MHz Generator (fig. FO-2, Sheet 1 of 3), connect Measuring Receiver to A9J3 (fig. FO-6) and verify 90 MHz with 5 kHz ( $\pm 1$  kHz) deviation.
  - If incorrect, replace A9 90 MHz Generator (para 2-29).
10. Reconnect W13 (fig. FO-2, Sheet 2 of 5). Disconnect W12 from A13 Generator IF (fig. FO-2, Sheet 1 of 5) and connect Measuring Receiver to W12 (fig. FO-2, Sheet 2 of 5). Set Measuring Receiver for FM Measurement, High-Pass Filter to 50 Hz, Low-Pass Filter to 15 kHz and RMS measurement.
11. Press RF GEN MODE Key.
12. Use Field Select Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.2500 MHz. Press ENTER Key.
13. Verify reading of  $<100$  Hz RMS.
  - If incorrect, replace A10 1st LO (para 2-63).

**2-14. SELF TEST FAILURE TEST - Continued.**

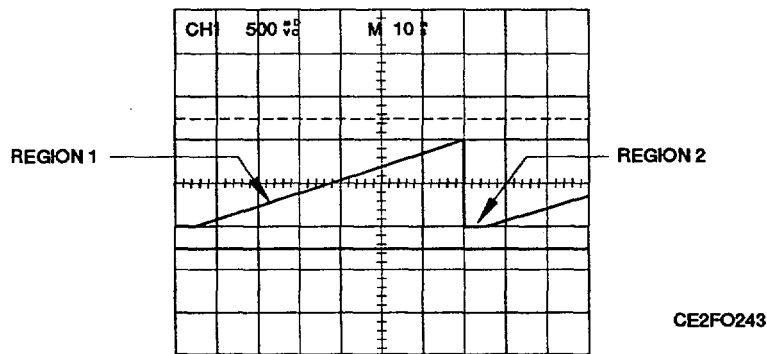
**21. FM DEVIATION - Continued**

14. Reconnect W12. Disconnect W11 from A13 Generator IF (fig. FO-2, Sheet 1 of 5), connect Measuring Receiver to W11 (fig. FO-2, Sheet 2 of 5) and verify reading of <100 Hz RMS.
  - If incorrect, replace A11 2nd LO (para 2-62).
  - If correct, replace A13 Generator IF (para 2-68).

**22. ANALYZER DISPERSION**

1. Remove A25 Digitizer (para 2-24) and install on PC Board Assembly Extender (Tool Code 29 in Appendix B of TM 11-6625-3245-12) in Test Set.
2. Press SCOPE/ANLZ MODE Key to access Analyzer Operation Screen.
3. Press "More" F6 until "Scan" F3 appears. Press "Scan" F3. Enter Scan Rates and verify Region 1 Duration is 64 ms ( ± 3.2 ms) and Region 2 Duration is 10 ms (±5 ms) as shown. Verify Region 1 Level with Oscilloscope at A25P2, Pin 9B (fig. FO-16, Sheet 3 of 3) as shown.

SCAN RATE	REGION 1 LEVEL
100 kHz	-5 to +5 V ( ± 10%)
200 kHz	-1 to +1 V (±10%)
500 kHz	-2.5 to +2.5 V (±10%)



- If any output is incorrect, replace A25 Digitizer (para 2-34).
- If all outputs are correct, replace A5 Analyzer RF (para 2-27).

**2-14. SELF TEST FAILURE TEST - Continued.**

**23. RECEIVER SELECTIVITY**

1. Remove A22 RF I/O (para 2-34) and install on PC Board Assembly Extender (Tool Code 7 in Appendix B of TM 11-6625-3245-12) in Test Set.
2. Run Self Test 23 and verify voltage with DMM at A22P2 (fig. FO-16, Sheet 2 of 3).

A22P2, Pin 15A	0 Vdc ( ± 0.5 Vdc)
A22P2, Pin 16A	5 Vdc ( ± 0.5 Vdc)

- If any voltage is incorrect, replace A22 RF I/O (para 2-34).
- If all voltages are correct, replace A6 Receiver (para 2-30).

**24. AUXILIARY BOX**

1. Disconnect SCSI Cable from Test Adapter.
2. Locate A16 Power Supply (fig. FO-2, Sheet 1 of 5). Disconnect DC Power Cable from A16J4 (fig. FO-14) and verify readings with DMM on DC Power Cable.

DC Power Cable, Pins 1 (+) and 2 (-)	>10 Ω
DC Power Cable, Pins 3 (+) and 4 (-)	>500 Ω
DC Power Cable, Pins 5 (+) and 6 (-)	>500 Ω

- If any reading is incorrect, perform Step 3.
- If all readings are correct, perform Steps 4-20.

3. Pull following assemblies and verify faulty assemblies with DMM on DC Power Cable.

Location	Disconnect	If faulty, perform/replace
DC Power Cable, Pin 1 (+) and Pin 2 (-)	A3 RF Amplifier A7 UUT Interface A9 External I/O A8 Processor A6 Memory	83A1A3 RF Amplifier Test (para 2-18) A7 UUT Interface (para 2-90) A9 External I/O (para 2-89) A8 Processor (para 2-91) A6 Memory (para 2-92)
DC Power Cable, Pin 3 (+) and Pin 4 (-)	A3 RF Amplifier A7 UUT Interface A6 Memory	83A1A3 RF Amplifier Test (para 2-18) A7 UUT Interface (para 2-90) A6 Memory (para 2-92)
DC Power Cable, Pin 5 (+) and Pin 6 (-) (fig. FO-2, Sheet 3 of 5)	A3 RF Amplifier A7 UUT Interface A6 Memory A5W3P1	83A1A3 RF Amplifier Test (para 2-18) A7 UUT Interface (para 2-90) A6 Memory (para 2-92) A2AI Motherboard (para 2-93)

- If correct, replace DC Power Cable.

4. Press "AUX" F6.
5. Use FIELD SELECT Keys to move cursor to "5. External I/O". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "3. SCSI port". Press ENTER Key. Press ENTER Key to select On.
6. Press "ESC" F6 twice.

2-14. SELF TEST FAILURE TEST - Continued.

24. AUXILIARY BOX - Continued

7. Use FIELD SELECT Keys to move cursor to "4. Self Test". Press ENTER Key. Use DATA SCROLL Keys to move cursor to "24. Auxiliary Box". Press "Extend" F1. Press ENTER Key on each Extended Test and evaluate Test results. If two or more Extended Tests fail, perform Steps 8-14.

Test 24 Extended	If Failed, replace
1. SCSI Bus	A9 External I/O (para 2-89)
2. Memory RAM	A6 Memory (para 2-92)
3. CPU RAM	A8 Processor (para 2-91)
4. Memory ROM	A6 Memory (para 2-92)
5. CPU ROM	As Processor (para 2-91)
6. Time of Day Clock	A8 Processor (para 2-91)
7. Wait State Generator	AS Processor (para 2-91)
8. UUT Interface	A7 UUT Interface (para 2-90)

8. Connect Serial Interface Cable from Test Set RS-232 Connector to Test Adapter RS-232 Connector.

9. Press MTRS MODE Key and "AUX" F6.

10. Use FIELD SELECT Keys to move cursor to "5. External I/O". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. RS-232 port". Press ENTER Key. Press ENTER Key to select On. Set following Fields.

Operation Mode	Off
Baud Rate	19200
Data Bits	8
Stop Bits	1
Parity	None
Handshake	Xon/Xoff
Echo	Off

11. Press ESC Key twice.

12. Press "TERM" F5 and ENTER Key.

13. Verify CRT displays "?" within 1 second.

- If incorrect, perform Steps 15-21.

14. Press SHIFT, T, E, S, T, C, O, N, N, SHIFT and ENTER Keys. Verify results.

Displayed Test Result	If incorrect, replace
bxtest8ram8cpu? passed	AS Processor (para 2-91)
test8rom8cpu? passed	AS Processor (para 2-91)
test8ram8mem? passed	As Memory (para 2-92)
test8rom8mem? passed	A6 Memory (para 2-92)
test8ram8add? 0	Perform Steps 15-21
test8waits? passed	AS Processor (para 2-91)
test8tod? passed	AS Processor (para 2-91)
test8uut? passed	A8 Processor (para 2-91)
test8extio? passed	A9 External I/O (para 2-89)
test8scsi? passed	A9 External I/O (para 2-89)
	78A1A27 External I/O (para 2-38)
ptest? 0	Perform Steps 15-21

- If correct, replace A9 External I/O (para 2-89).

**2-14. SELF TEST FAILURE TEST - Continued.****24. AUXILIARY BOX - Continued**

15. Install PC Board Assembly Extender (Tool Code 6 in TS-4317/GRM MAC) in spare Test Adapter memory slot.
16. Connect Logic Analyzer channels 0 through 15 to NAT BUSS SDO through SD15. Connect Logic Analyzer channels 16 through 39 to NAT BUSS SAO through SA19 and LA20 through LA23.
17. Trigger on active low of memory write signal at Pin 11A ( $\overline{\text{MEMW}}$ ) connected to channel 41.
18. Set Logic Analyzer to Asynchronous Clock at 100 ns rate.
19. Using Logic Analyzer, verify pattern of AAAA hex is written to A6 Memory, triggered at address 250000 hex, when A8 Processor initializes at power on.
  - If incorrect, replace A8 Processor (para 2-91).
20. Trigger on active low of memory read signal at Pin 12A ( $\overline{\text{MEMR}}$ ) connected to channel 40.
21. Using Logic Analyzer, verify pattern of AAAA hex is read from A6 Memory, triggered at address 250000 hex, when A8 Processor initializes at power on.
  - If incorrect, replace A6 Memory (para 2-92).

2-15. DMM TEST.

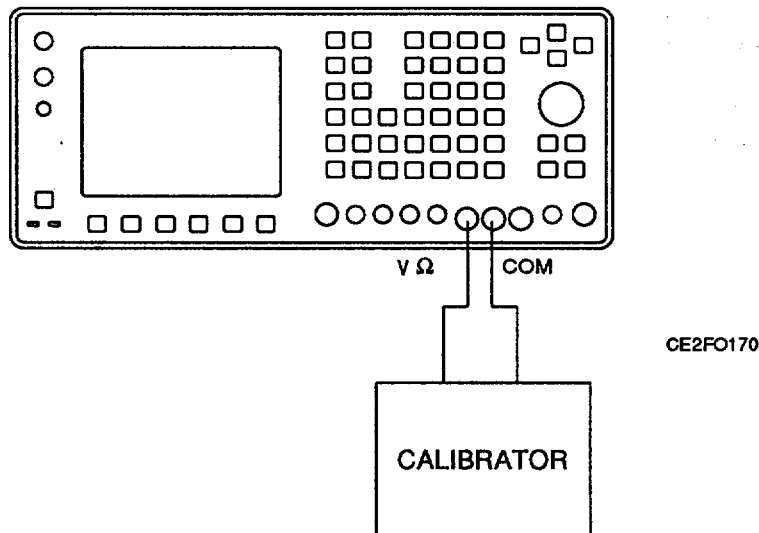
**DESCRIPTION**

This test determines fault in the A8 DMM by measuring the response to known voltage, current and resistive loads.

**NOTE**

**Perform this test only when instructed from table 2-1 or another troubleshooting test. Do not perform this troubleshooting test as a separate procedure unless otherwise instructed. Certain conditions have been established and/or tested prior to performing this test.**

1. Connect external test equipment as shown.



2. Press MTRS MODE Key.
3. Use FIELD SELECT Keys to move cursor to "10. Digital Multimeter (DMM)." Press ENTER Key.
4. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select DCV. Press ENTER Key.
5. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Select DCV ranges and verify values on DMM.

Range	Calibrator	DMM Value	If incorrect, replace/perform
200 mV	150 mVdc	150 mVdc ( ± 2.1 mVdc)	Perform Steps 22-28 A8A1 DMM/Relay (para 2-61) A8A1 DMM/Relay (para 2-61) A8A1 DMM/Relay (para 2-61) A8A1 DMM/Relay (para 2-61)
2 V	1.5 Vdc	1.5 Vdc (±21 mVdc)	
20 V	15 Vdc	15 Vdc (±0.21 Vdc)	
200 V	150 Vdc	150 Vdc (±2.1 Vdc)	
2000 V	500 Vdc	500 Vdc (±21 Vdc)	

**2-15. DMM TEST - Continued.**

6. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key, Use DATA SCROLL Keys to select ACV. Press ENTER Key.

7. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Select ACV ranges and verify values on DMM. (When Multimeter readout exceeds 500 VAC, Test Set beeps and displays Multimeter Readout Bar in red.)

Range	Calibrator	DMM Value
200 mV	150 mVAC at 100 Hz	150 mVAC ( ± 10.1 mVAC)
2.0 V	1.5 VAC at 100 Hz	1.5 VAC (±101 mVAC)
20 V	15 VAC at 100 Hz	15 VAC (±1.01 VAC)
200 V	150 VAC at 100 Hz	150 VAC (±10.1 VAC)
2000 V	500 VAC at 100 Hz	500 VAC (±101 VAC)

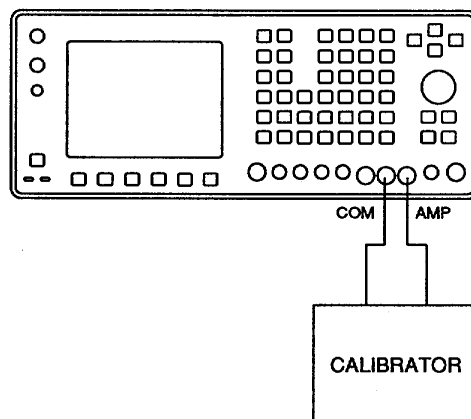
- If any reading is incorrect, replace A8A2 DMM/Digital (para 2-60).

8. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select Ohm. Press ENTER Key.

9. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Select Ohm ranges and verify values on DMM.

Range	Calibrator	DMM Value	If incorrect, replace/perform
200 OHM	100 Ω	100 Ω ( ± 10 Ω)	Perform Step 15
2 K OHM	1000 Ω	1000 Ω (±100 Ω)	A8A2 DMM/Digital (para 2-60)
20 K OHM	10 KΩ	10 KΩ (±1 KΩ)	A8A2 DMM/Digital (para 2-60)
200 K OHM	100 KΩ	100 KΩ (±10 KΩ)	A8A2 DMM/Digital (para 2-60)
2 M OHM	1 MΩ	1 MΩ (±100 KΩ)	A8A2 DMM/Digital (para 2-60)
20 M OHM	10 MΩ	10 MΩ (±1 MΩ)	A8A2 DMM/Digital (para 2-60)

10. Connect external test equipment as shown.



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11. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select DCC. Press ENTER Key.

**2-15. DMM TEST - Continued.**

12. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Select DCC ranges and verify values on DMM.

Range	Calibrator	DMM Value	If incorrect, replace/perform
20 mA 200 mA 2 A	15 mA 150 mA 1.5 A	15 mA ( $\pm 1.01$ mA) 150 mA ( $\pm 10.1$ mA) 1.5 A ( $\pm 101$ mA)	Perform Steps 16-20 A8A1 DMM/Relay (para 2-61) A8A1 DMM/Relay (para 2-61)

13. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select ACC. Press ENTER Key.

14. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Select ACC ranges and verify values on DMM.

Range	Calibrator	DMM Value
20 mA 200 mA 2 A	15 mA at 100 Hz 150 mA at 100 Hz 1.5 A at 100 Hz	15 mA ( $\pm 1.01$ mA) 150 mA ( $\pm 10.1$ mA) 1.5 A ( $\pm 101$ mA)

- If any value is incorrect, replace A8A1 DMM/Relay (para 2-61).

15. Connect DMM to DMM V Q Connector and DMM "COM" Connector and verify 5.5 V ( $\pm 0.5$  V).

- If incorrect, replace A8A1 DMM/Relay (para 2-61).
- If correct, replace A8A2 DMM/Digital (para 2-60).

16. Press ENTER Key. Use DATA SCROLL Keys to select 200 mA. Press ENTER Key.

17. Set Calibrator for 150 mA.

18. Verify DMM displays 150 mA ( $\pm 10.1$  mA).

- If incorrect, perform Steps 19-20.
- If correct, replace A8A1 DMM/Relay (para 2-61).

19. Remove A8 DMM (para 2-58). Remove A8A2 DMM/Digital (para 2-60) and A8A1 DMM/Relay (para 2-61).

20. Connect DMM across A8A1 F1 (fig. FO-5) and verify  $<5 \Omega$ .

- If incorrect, replace A8A1 F1 (para 2-59).
- If correct, replace A8A1 DMM/Relay (para 2-61).

21. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select Ohm. Press ENTER Key.

22. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Select 200 OHM range. Set Calibrator to 100  $\Omega$  and verify 100  $\Omega$  ( $\pm 10 \Omega$ ) on DMM.

- If incorrect, perform Steps 29-30.

23. Remove A8 DMM (para 2-58). Remove A8A2 DMM/Digital (para 2-60) and A8A1 DMM/Relay (para 2-61).

24. Reconnect A8A1W2P1 (fig. FO-5).



**2-15. DMM TEST - Continued.**

25. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select DCV. Press ENTER Key.
26. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Key to select 200 mV.
27. Connect DMM to DMM V Q Connector and A8A1W1E1, Pin 31 (fig. FO-5).
28. Verify 120 Q (+12 Q) on DMM.
  - If incorrect, replace A8A1 DMM/Relay (para 2-61).
  - If correct, replace A8A2 DMM/Digital (para 2-60).

29. Remove A23 Counter (para 2-25) and install on PC Board Assembly Extender (Tool Code 7 in Appendix B of TM 11-6625-3245-12) in Test Set.

30. Enter RANGE Field values and verify TTL pulses or pulse trains are present with Oscilloscope at A23P2 (fig. FO-16, Sheet 2 of 3) when cycling through ranges, pressing ENTER Key at each range.

A23P2, Pin 1c  
A23P2, Pin 4C

A23P2, Pin 2C

A23P2, Pin 3C

- If any reading is incorrect, replace A23 Counter (para 2-25).
31. Enter RANGE Field values and verify TTL pulses or pulse trains are present with Oscilloscope at A23P2, Pin 1B when cycling through ranges, pressing ENTER Key at each range.
    - If incorrect, perform Steps 32-37.
    - If correct, replace A23 Counter (para 2-25).

32. Remove A8 DMM (para 2-58). Remove A8A2 DMM/Digital (para 2-60) and A8A1 DMM/Relay (para 2-61).

33. Reconnect A8A1W2P1 (fig. FO-5).

34. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select DCV. Press ENTER Key.

35. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Key to select 2 V. Press ENTER Key.

36. Enter RANGE Field values and verify TTL switching is present with Oscilloscope at A8A1W1E1 (fig. FO-5) when cycling through ranges, pressing ENTER Key at each range.

A8A1W1E1, Pins 35 and 37 (GND)  
A8A1W1E1, Pins 38 and 37 (GND)

A8A1W1E1, Pins 36 and 37 (GND)  
A8A1W1E1, Pins 40 and 37 (GND)

- If any reading is incorrect, replace A8A1 DMM/Relay (para 2-61).
37. Enter RANGE Field values and verify TTL switching is present with Oscilloscope at A8A1W1E1, Pins 24 and 37 (GND) when cycling through ranges, pressing ENTER Key at each range.
    - If incorrect, replace A8A1 DMM/Relay (para 2-61).
    - If correct, replace A8A2 DMM/Digital (para 2-60).

**2-16. 78A1A15 CRT (7005-7840-600) TEST.**

**DESCRIPTION**

Isolates problem in A15 CRT to malfunctioning component.

**WARNING**

**Voltages in excess of 100 Vdc are present in the A15 CRT.**

**NOTE**

**Perform this test only when instructed from table 2-1 or another troubleshooting test. Do not perform this troubleshooting test as a separate procedure unless otherwise instructed. Certain conditions have been established and/or tested prior to performing this test.**

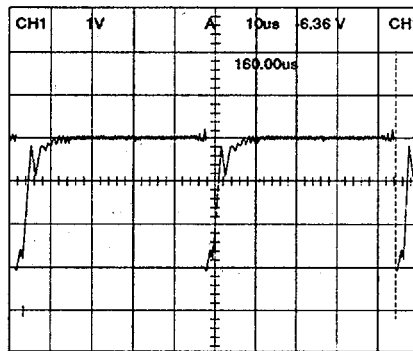
1. Remove A15 CRT (para 2-39).
2. Remove top cover from A15 CRT (para 2-40).
3. Reconnect A1A1W2 (fig. FO-2, Sheet 2 of 5) to A15 CRT and set POWER Switch to On.
4. Verify waveforms (fig. FO-12, Sheet 3 of 3) with Oscilloscope at Test Locations (fig. FO-12, Sheet 2 of 3).

Location	If incorrect, troubleshoot components (fig. FO-12, Sheet 1 of 3) and associated circuitry (fig. FO-12, Sheet 2 of 3 )	Status	Maintenance Action
1	Replace A21 Video Controller (para 2-36)		
2	A1Q1 and A1U5		
3	A1U1 or Replace A15V1 (para 2-40)		
4	A1U1 or Replace A15V1 (para 2-40)		
5	Replace A21 Video Controller (para 2-36)		
6	A1U5 and A1U8		
7	A1T4, A12, A1U8, A1Q3 or Replace A15V1 (para 2-40)		
8	Verify A1 Q4 is shorted	YES NO	Repair short on A1Q4 Troubleshoot A1U3 and A10Q7
9	A1 Q4 and A15A1T1		
10	Verify open on A1Q3	YES NO	Repair open on A1Q3 Troubleshoot A1U3, A1CR3,
11	A1CR4, A1 CR5, A1 CR6 and A1Q4		
	Verify open on A1Q3	YES NO	Repair open on A Q3 Troubleshoot A1U3 and A1Q4

5. Rotate INTENSITY/CONTRAST Adjustment fully ccw, connect DMM to A15A2U1, Pin 16 (fig. FO-12, Sheet 1 of 3) and record voltage reading in Vdc.

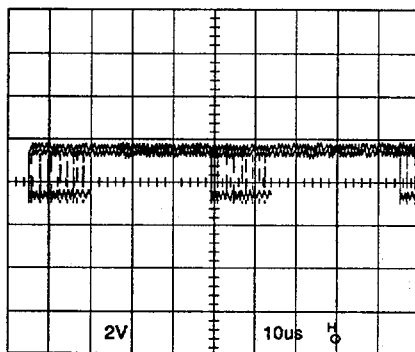
2-16. 78A1A15 CRT (7005-7840-600) TEST - Continued.

6. Rotate INTENSITY/CONTRAST Adjustment cw and verify voltage increases from level recorded in Step 5.
  - If incorrect, remove A15A2 CRT Color (para 2-40), troubleshoot A15A2U1 and associated circuitry (fig. FO-2, Sheet 2 of 3).
7. Verify voltage alternates between 0 and 3 Vdc with Oscilloscope at A15A2R4 as shown.

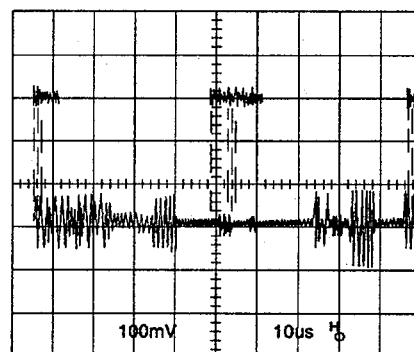


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- If incorrect, remove A15A2 CRT Color (para 2-40), troubleshoot A15A2Q1 and associated circuitry (fig. FO-12, Sheet 2 of 3).
8. Press "AUX" F6.
  9. Use FIELD SELECT Keys to move cursor to "3. Color Selection Menu". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "3. Monochrome Display Set". Press ENTER Key to select On.
  10. Press AUX" F6 and verify red, green and/or blue colors are absent on CRT.
    - If incorrect, perform Step 12.
  11. Verify waveform, as shown below, with Oscilloscope on A15A2 CRT Color.



A2R5, A2R17, A2R26



A2U1, Pins 16, 20, 25

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**2-16. 78A1A15 CRT (7005-7840-600) TEST - Continued.**

<b>RED COLOR FAILED</b>		
<b>Location</b>	<b>If incorrect, troubleshoot components (fig. FO-12, Sheet 1 of 3) and associated circuitry (fig. FO-12, Sheet 2 of 3)</b>	<b>If all locations are correct, troubleshoot</b>
A2U1, Pin 25 A2R5	A1U5 and A2U1 A2Q3 and A2Q4	A2R5 and A1 5V1
<b>GREEN COLOR FAILED</b>		
<b>Location</b>	<b>If incorrect, troubleshoot components (fig. FO-12, Sheet 1 of 3) and associated circuitry (fig. FO-12, Sheet 2 of 3)</b>	<b>If all locations are correct, troubleshoot</b>
A2U1, Pin 20 A2R17A2Q7 and A2Q8	A1U5 and A2U1 A2R17 and A15V1	A2R17 and A15V1
<b>BLUE COLOR FAILED</b>		
<b>Location</b>	<b>If incorrect, troubleshoot components (fig. FO-12, Sheet 1 of 3) and associated circuitry (fig. FO-12, Sheet 2 of 3)</b>	<b>If all locations are correct, troubleshoot</b>
A2U1, Pin 16 A2R26A2Q9 and A2Q10	A1U5 and A2U1 A2R26 and A15V1	A2R26 and A15V1

12. Perform A15 CRT (7005-7840-600) Adjustment Procedure (para 2-114).

**2-1778A1A15 CRT (7005-8644-300) TEST**

**DESCRIPTION**

Isolates problem in A15 CRT to malfunctioning PC Board, tube, fuse or wire harness.

**WARNING**

Voltages in excess of 100 Vdc are present in the A15 CRT.

**NOTE**

Perform this test only when instructed from table 2-1 or another troubleshooting test. Do not perform this troubleshooting test as a separate procedure unless otherwise instructed. Certain conditions have been established and/or tested prior to performing this test.

1. Remove A15 CRT (para 2-42).
2. Remove top cover from A15 CRT (para 2-43).
3. Verify A15A2F1 (fig. FO-13, Sheet 2 of 2) is not blown.
  - If incorrect, replace A15A2F1 (para 2-47).

**2-17. 78A1A15 CRT (7005-8644-300) TEST - Continued.**

4. Verify continuity of A15W1 with DMM.

\* If fault is present, replace A15W1 (para 2-44).

5. Reconnect A1A1W2 (fig. FO-2, Sheet 2 of 5) to A15 CRT and set POWER Switch to On.

6. Verify 1.5 Vdc ( $\pm 0.5$  Vdc) with DMM on A15A1 Video (fig. FO-13, Sheet 2 of 2).

Q112 Emitter

0116 Emitter

Q120 Emitter

- If any voltage is incorrect, replace A15A1 Video (para 2-43).

7. Verify voltages with DMM and High Voltage Probe (\*) at locations on A15A2 Deflection (Socket).

Pin 3\*

500 Vdc ( $\pm 150$  Vdc)

Pin 6

-22 VAC ( $\pm 5$  VAC)

Pin 8

4.3 VRMS ( $\pm 1.5$  V)

- If any voltage is incorrect, replace A15A2 Deflection (para 2-45).
- If all voltages are correct, replace A15V1 (7005-8644-300) (para 2-46).

8. Perform A15 CRT (7005-8644-300) Adjustment Procedure (para 2-115).

**2-18. 83A1A3 RF AMPLIFIER TEST.**

**DESCRIPTION**

Isolates problem in A3 RF Amplifier to malfunctioning component.

**NOTE**

**Perform this test only when instructed from table 2-1 or another troubleshooting test. Do not perform this troubleshooting test as a separate procedure unless otherwise instructed. Certain conditions have been established and/or tested prior to performing this test.**

1. Remove A3 RF Amplifier (para 2-77). Remove cover from A3 RF Amplifier (para 2-78).
2. Disconnect coaxial cable from A3A2J1 (fig. FO-21, Sheet 1 of 2) and A3A2J2. Disconnect coaxial cable from A3A2J3 and A3A2J4. Verify  $>50$  Q with DMM at A3A2J6, Pins 1-3 and A3A2J6, Pins 5-8. Verify A3A2J6, Pin 4 is shorted to ground with DMM.
  - If incorrect, repair short on respective line.

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**2-18. 83A1A3 RF AMPLIFIER TEST - Continued.**

3. Connect RF Amplifier Test Cable Connector to A3A2J6. Connect RF Amplifier Test Cable wires to Power Supply as follows:

Black Wire	Ground
Red Wire	+15 Vdc
Yellow Wire	-15 Vdc
Orange Wire	+5 Vdc

Set RF Amplifier Test Cable BAND Switch to LO and RF Amplifier Test Cable RF AMP Switch to OFF. Activate Power Supply. Verify -50 Vdc ( $\pm 7$  Vdc) with DMM at A3A2R57.

- If incorrect, perform Step 4.
  - If correct, perform Steps 6-16.
4. Set RF Amplifier Test Cable BAND Switch to HI. Verify -50 Vdc ( $\pm 7$  Vdc) with DMM at A3A2R57.
- If incorrect, perform Step 5.
  - If correct, troubleshoot A3A2Q12 and associated circuitry (fig. FO-21, Sheet 2 of 2).
5. Remove A3A2R59. Verify -50 Vdc ( $\pm 7$  Vdc) with DMM at A3A2R57.
- If incorrect, troubleshoot A3A2U4, A3A2CR8, A3A2CR9 and associated circuitry. Install A3A2R59 (fig. FO-21, Sheet 1 of 2).
  - If correct, troubleshoot A3A2Q13, A3A2CR3, A3A2CR4 and associated circuitry. Install A3A2R59 (fig. FO-21, Sheet 1 of 2).
6. Verify +5 Vdc ( $\pm 1$  Vdc) with DMM at A3A2TP3.
- If incorrect, troubleshoot A3A2Q9, A3A2Q12, A3A2Q8, A3A2Q6, A3A2Q4 and associated circuitry (fig. FO-21, Sheet 2 of 2).
7. Verify -50 Vdc ( $\pm 7$  Vdc) with DMM at A3A2TP4.
- If incorrect, troubleshoot A3A2Q7, A3A2Q10, A3A2Q11, A3A2Q13 and associated circuitry (fig. FO-21, Sheet 2 of 2).
8. Set RF Amplifier Test Cable BAND Switch to HI. Verify -50 Vdc ( $\pm 7$  Vdc) with DMM at A3A2TP3.
- If incorrect, troubleshoot A3A2Q9, A3A2Q12, A3A2Q8, A3A2Q4 and associated circuitry (fig. FO-21, Sheet 2 of 2).
9. Verify +5 Vdc ( $\pm 1$  Vdc) with DMM at A3A2TP4.
- If incorrect, troubleshoot A3A2Q7, A3A2Q10, A3A2Q11, A3A2Q13 and associated circuitry (fig. FO-21, Sheet 2 of 2).
10. Set Spectrum Analyzer Tracking Generator Output to -5 dBm, Center Frequency to 70 MHz, MHz/Division to 20, Bandwidth to Normal Detent, Attenuator to 30 dBm and dB/Division to 10 dBm.
11. Connect Tracking Generator output to A3A2J2. Connect Spectrum Analyzer input to A3A2J3. Verify display signal is  $< -30$  dBm at 170 MHz.
- If incorrect, troubleshoot A3A2CR3, A3A2CR4 and associated circuitry (fig. FO-21, Sheet 2 of 2).

**2-18. 83A1A3 RF AMPLIFIER TEST - Continued.**

12. Set RF Amplifier Test Cable BAND Switch to LO. Verify second display signal is  $\leq -30$  dBm at 100 MHz.
  - If incorrect, troubleshoot A3A2L16, A3A2L15, A3A2L11, A3A2L12, A3A2L19 and associated circuitry (fig. FO-21, Sheet 2 of 2).
13. Set DMM to measure +15 Vdc. Verify 0 Vdc with DMM at drain (center pin) of A3A2Q3 and ground.
  - If incorrect, troubleshoot A3A2U2, A3A2Q3 and associated circuitry (fig. FO-21, Sheet 2 of 2).
14. Set RF Amplifier Test Cable RF AMP Switch to ON. Verify +15 Vdc ( $\pm 1$  Vdc) with DMM at drain of A3A2Q3 and ground.
  - If incorrect, troubleshoot A3A2U2 and associated circuitry (fig. FO-21, Sheet 2 of 2).
15. Connect 30 dB (10 W) Attenuator to A3A2J5. Connect Power Meter to unused port on 30 dB (10 W) Attenuator. Reconnect coaxial cables to A3A2J1/A3A2J2 and A3A2J3/A3A2J4.
16. Connect Signal Generator to A3A1J1. Set Signal Generator for 35 MHz at 0 dBm. Verify indication is  $> +6$  dBm with Power Meter.
  - If incorrect, perform Steps 17-18.
  - \* If correct, perform 83A1A3 RF Amplifier Adjustment Procedure (para 2-116).
17. Connect RF Probe to Spectrum Analyzer. Verify level is 30 dBm ( $\pm 3$  dB) with Spectrum Analyzer and RF Probe at A3A1E5.
  - If incorrect, troubleshoot and replace defective A3A1U1.
18. Verify voltage is  $< +10$  Vdc and  $> 0.5$  Vdc with DMM at A3A2TP5.
  - If incorrect ( $> +10$  Vdc), troubleshoot A3A2Q1 and A3A2Q2 \* If incorrect ( $< 0.5$  Vdc), troubleshoot A3A2DC1, A3A2U3 and A3A2U5.
  - If correct, perform 83A1A3 RF Amplifier Adjustment Procedure (para 2-116).

**Change 1 2-65**

**Section IV. MAINTENANCE****2-19. PERFORMANCE TEST.**

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**DESCRIPTION**

This procedure covers:

- Intensity/Contrast
- Keyboard
- Data Scroll Spinner
- Squelch
- AF Gen 1 Frequency and Level
- AF Gen 1 Distortion Threshold
- Speaker/Speaker Control
- AF Gen 2 Frequency And Level
- AF Gen 2 Distortion Threshold
- External Modulation
- MIC/ACC IN/OUT Connector Modulation
- RF Gen Level Flatness
- RF Gen Frequency Accuracy
- RF Gen Level Accuracy
- RF Gen AM
- RF Gen FM
- RF Gen AM Test
- RF Gen FM Test
- RF Gen Harmonic/Non-Harmonic Level
- Frequency/Frequency Error Meter
- AGC
- Receiver Sensitivity Test
- Receiver Selectivity Test
- Antenna In Connector Overload Protection
- Duplex Out Connector Overload Protection
- BER Meter
- Duplex Out Connector Level
- DTMF
- DMM
- Power Meter High Power
- Oscilloscope Vertical Accuracy
- DC Power
- RF Amplifier
- Test Adapter Test Plug

**NOTE**

- **Performance Test must be performed in order shown.**
- **Allow 30 minute warm-up period for Radio Test Set prior to performing the Performance Test.**



**2-19. PERFORMANCE TEST - Continued.**

**INITIALIZED SETUP**

---

1. Perform Turn-On Procedure (para 2-8, TM 11-6625-3245-12).
2. Perform Self Test (para 2-9, TM 11-6625-3245-12).

**INTENSITY/CONTRAST**

Turn CRT INTENSITY/Contrast cw and cow through full range of control and verify CRT Intensity changes with control movement from a dim display to full brightness.

**KEYBOARD**

---

1. Press MODE Keys and verify Operation Screen appears.

RF GEN	RF Generator Operation Screen
RCVR	Receiver Operation Screen
DPLX	Duplex Operation Screen
AF GEN	AF Generator Operation Screen
SCOPE/ANLZ	Oscilloscope or Spectrum Analyzer Operation Screen
MTRS	Meters Operation Screen

2. Press "AUX" F6 and verify Auxiliary Functions Menu appears.
3. Use FIELD SELECT Keys to move cursor to "5. External I/O". Press ENTER Key and verify Configure Menu appears.
4. Use FIELD SELECT Keys to move cursor to "1. RS-232 port". Press ENTER Key and verify Configure RS-232 Menu appears.
5. Use FIELD SELECT Keys to move cursor to "7. Echo". Press ENTER Key to select On.
6. Press "TERM" F5 and verify RS-232 Monitor Screen appears.
7. Press SHIFT Key and verify "S" appears between F1 and F2 definitions.
8. Press Alphabetic Keys in sequence and verify each letter appears on RS-232 Monitor Screen.
9. Press "?" F1, "/" F2, "+" F3, "=" F4 and "," F5 and verify special characters appear on RS-232 Monitor Screen.
10. Press RF GEN MODE Key.
11. Press each FIELD SELECT Key and verify cursor moves with each key pressed.
12. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 500 MHz. Press ENTER Key.
13. Press each DATA SCROLL Keys and verify cursor moves with each key pressed. Press ENTER Key.
14. Press SCOPE/ANLZ MODE Key to access Oscilloscope Operation Screen.

**2-19. PERFORMANCE TEST - Continued.****KEYBOARD - Continued**

15. Press HOLD SCRNB Key and verify Trace stops all motion and "HOLD" Window appears over F3 and F4 definitions.
16. Press MTRS MODE Key and "AUX" F6.
17. Press STORE Key and verify Store Parameters Menu appears.
18. Press "AUX" F5.
19. Press RCL Key and verify Recall Parameters Menu appears.
20. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults." Press ENTER Key and verify "10. Factory Defaults Recall?" prompt appears.
21. Press ENTER Key and "AUX" F5.

**DATA SCROLL SPINNER**

---

1. Press RF GEN MODE Key.
2. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 500.0000 MHz. Press ENTER Key.
3. Rotate DATA SCROLL Spinner cw and ccw and verify value increases and decreases.

**SQUELCH**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect Signal Generator to ANTENNA IN Connector.
4. Set Signal Generator for 80 MHz signal at -40 dBm with FM Modulation (1 kHz tone, 2.5 kHz deviation).
5. Press RCVR MODE Key.
6. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 80.0000 MHz. Press ENTER Key.
7. Use FIELD SELECT Keys to move cursor to OdB. Press ENTER Key. Use DATA SCROLL Keys to select 40 dB. Press ENTER Key.
8. Press SQLCH Key and verify Squelch Indicator Bar appears with white inner bar indicating amount of rejection.
9. Turn DATA SCROLL Spinner ccw until white bar disappears and verify readings are present for Receiver Operation Screen.

**2-19. PERFORMANCE TEST - Continued.**

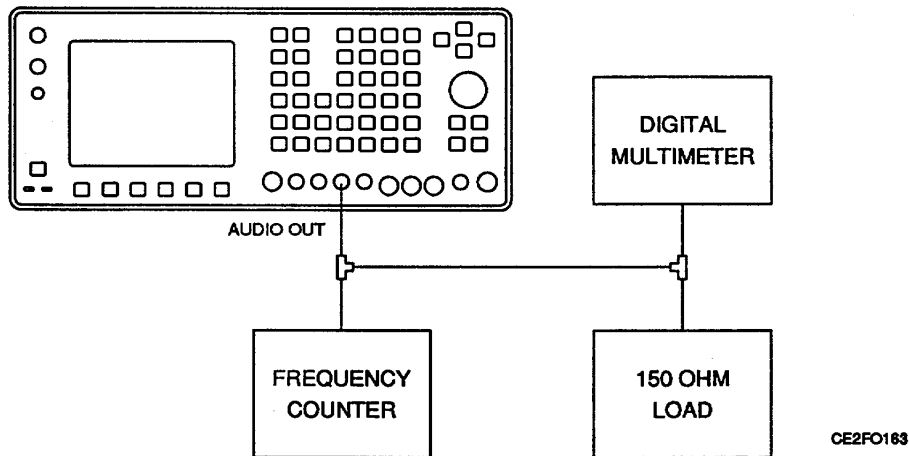
**SQUELCH - Continued**

10. Turn DATA SCROLL Spinner cw until white bar extends from limit to limit and verify readings are replaced by "---".
11. Turn DATA SCROLL Spinner ccw until white bar disappears. Press ENTER Key.
12. Disconnect external test equipment.

**AF GEN 1 FREQUENCY AND LEVEL ACCURACY**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Press AF GEN MODE Key.
4. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to select On.
5. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.7070 V. Press ENTER Key.
6. Connect external test equipment as shown.



7. Verify 1000.0 Hz ( $\pm 1$  Hz) on Frequency Counter and 0.707 VRMS ( $\pm 3\%$ ) on DMM.
8. Use FIELD SELECT Keys to move cursor to Scale. Press ENTER Key. Use DATA SCROLL Keys to select 500 mV. Press ENTER Key.
9. Use FIELD SELECT Keys to move cursor to Sweep. Press ENTER Key. Use DATA SCROLL Keys to select 100 us. Press ENTER Key. Verify sine wave on Oscilloscope.
10. Disconnect external test equipment.

**2-19. PERFORMANCE TEST - Continued.****AF GEN 1 DISTORTION THRESHOLD**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect Distortion Analyzer to AUDIO OUT Connector.
4. Press AF GEN MODE Key.
5. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to select On.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 1.0000 V. Press ENTER Key.
7. Verify <0.25% is displayed on Distortion Analyzer.
8. Disconnect external test equipment.

**SPEAKER/SPEAKER CONTROL**

---

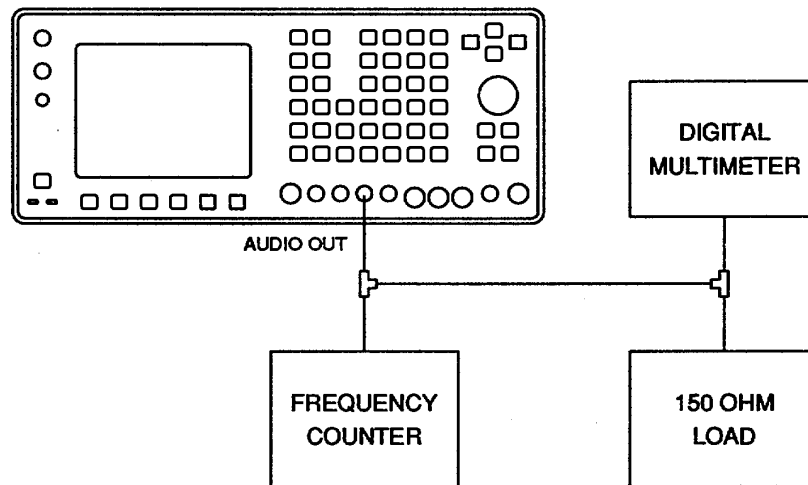
1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Press AF GEN MODE Key.
4. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to select On.
5. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 1.0000 V. Press ENTER Key.
6. Press SETUP Key.
7. Use FIELD SELECT Keys to move cursor to "5. AF Output Setup". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. To Speaker". Press ENTER Key to select On.
8. Press "Ret" F5.
9. Press T VOL Control Key until Volume Bar appears and audible tone is present.
10. Press each VOL Control Keys and verify speaker volume increases and decreases.
11. Press SETUP Key.
12. Use FIELD SELECT Keys to move cursor to "5. AF Output Setup". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. To Speaker". Press ENTER Key to select Off.
13. Press "Ret" F5.

**2-19. PERFORMANCE TEST - Continued.**

**AF GEN 2 FREQUENCY AND LEVEL ACCURACY**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Press AF GEN MODE Key.
4. Use FIELD SELECT Keys to move cursor to GEN 2. Press ENTER Key to select On.
5. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.7070 V. Press ENTER Key.
6. Connect external test equipment as shown.



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7. Verify 1000.0 Hz ( $\pm 1$  Hz) on Frequency Counter and 0.707 VRMS ( $\pm 3\%$ ) on DMM.
8. Use FIELD SELECT Keys to move cursor to Scale. Press ENTER Key. Use DATA SCROLL Keys to select 500 mV. Press ENTER Key.
9. Use FIELD SELECT Keys to move cursor to Sweep. Press ENTER Key. Use DATA SCROLL Keys to select 100 ps. Press ENTER Key. Verify Test Set Oscilloscope displays sine wave.
10. Disconnect external test equipment.

**AF GEN 2 DISTORTION THRESHOLD**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.

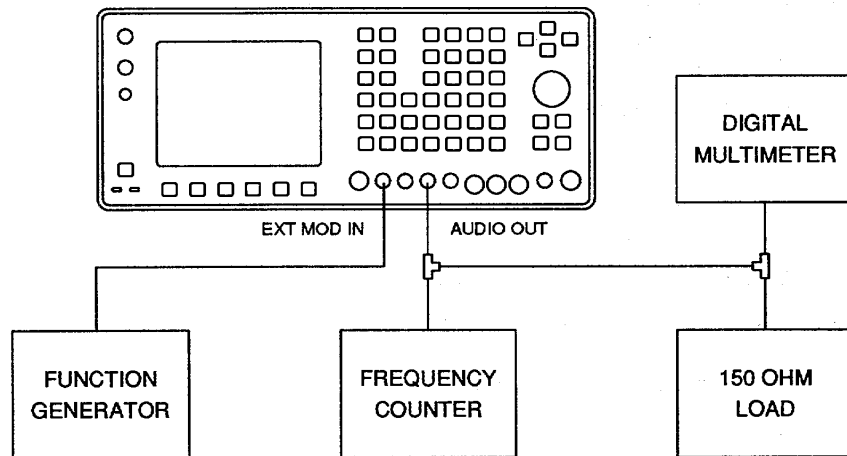
**2-19. PERFORMANCE TEST - Continued.**

**AF GEN 2 DISTORTION THRESHOLD - Continued**

3. Connect Distortion Analyzer to AUDIO OUT Connector.
4. Press AF GEN MODE Key.
5. Use FIELD SELECT Keys to move cursor to GEN 2. Press ENTER Key to select On.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 1.0000 V. Press ENTER Key.
7. Verify <0.25% is displayed on Distortion Analyzer.
8. Disconnect external test equipment.

**EXTERNAL MODULATION**

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect external test equipment as shown.



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4. Set Function Generator for 1 kHz sine wave at 3.5 VRMS.
5. Press AF GEN MODE Key.
6. Use FIELD SELECT Keys to move cursor to EXT. Press ENTER Key to select On.
7. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 1.0000 V. Press ENTER Key.
8. Verify Function Generator frequency on Frequency Counter. Note level on DMM.

**2-19. PERFORMANCE TEST - Continued.**  
**EXTERNAL MODULATION - Continued**

9. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 2.0000 V. Press ENTER Key.
10. Verify change in level on DMM.
11. Disconnect external test equipment.

**MIC/ACC IN/OUT CONNECTOR MODULATION**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect Microphone to MIC/ACC IN/OUT Connector.
4. Press AF GEN MODE Key.
5. Use FIELD SELECT Keys to move cursor to MIC. Press ENTER Key to select On.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 3.1000 V. Press ENTER Key.
7. Key Microphone, tap on Microphone Grill and verify deflection of Oscilloscope Trace coincident with tapping.
8. Disconnect external test equipment.

**RF GEN LEVEL FLATNESS**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect Measuring Receiver to T/R Connector.
4. Press RF GEN MODE Key.
5. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.0 dBm. Press ENTER Key.
6. Enter frequencies in RF Field and verify levels on Measuring Receiver.

0 dBm (±2 dB) for:	250 kHz	499 kHz	500 kHz
	999 kHz	1 MHz	49 MHz
	50 MHz	124 MHz	125 MHz
	199 MHz	200 MHz	399 MHz
0 dBm (i3.5 dB) for:	400 MHz	599 MHz	600 MHz
	799 MHz	800 MHz	999 MHz

7. Disconnect external test equipment.

**2-19. PERFORMANCE TEST - Continued.**

**RF GEN FREQUENCY ACCURACY**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect Frequency Counter to T/R Connector.
4. Press RF GEN MODE Key.
5. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Enter frequencies and verify readings on Frequency Counter.

50 MHz	50 MHz ( $\pm 25$ Hz)
200 MHz	200 MHz ( $\pm 100$ Hz)
400 MHz	400 MHz (200 Hz)
600 MHz	600 MHz ( $\pm 300$ Hz)
800 MHz	800 MHz ( $\pm 400$ Hz)

6. Disconnect external test equipment.

**RF GEN LEVEL ACCURACY**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect Measuring Receiver to T/R Connector.
4. Press RF GEN MODE Key.
5. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 100.0000 MHz. Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.0 dBm. Press ENTER Key.
7. Enter Frequency of 100 MHz on Measuring Receiver. Press TUNED RF and RATIO Keys on Measuring Receiver.



**2-19. PERFORMANCE TEST - Continued.**

**RF GEN LEVEL ACCURACY - Continued**

8. Enter levels and verify levels on Measuring Receiver.

0 dSm	0 dBm ( $\pm 1.5$ dB)	-90 dBm	-90 dBm ( $\pm 1.5$ dB)
-1 dBm	-1 dBm ( $\pm 1.5$ dB)	-110 dBm	-110 dBm ( $\pm 2.5$ dB)
-2 dBm	-2 dBm ( $\pm 1.5$ dB)	-111 dBm	-111 dBm ( $\pm 2.5$ dB)
-3 dBm	-3 dBm ( $\pm 1.5$ dB)	-112 dBm	-112 dBm ( $\pm 2.5$ dB)
-4 dBm	-4 dBm ( $\pm 1.5$ dB)	-113 dBm	-113 dBm ( $\pm 2.5$ dB)
-5 dBm	-5 dBm ( $\pm 1.5$ dB)	-114 dBm	-114 dBm ( $\pm 2.5$ dB)
-6 dBm	-6 dBm ( $\pm 1.5$ dB)	-115 dBm	-115 dBm ( $\pm 2.5$ dB)
-7 dBm	-7 dBm ( $\pm 1.5$ dB)	-116 dBm	-116 dBm ( $\pm 2.5$ dB)
-8 dBm	-8 dBm ( $\pm 1.5$ dB)	-117 dBm	-117 dBm ( $\pm 2.5$ dB)
-9 dBm	-9 dBm ( $\pm 1.5$ dB)	-118 dBm	-118 dBm ( $\pm 2.5$ dB)
-16 dBm	-16 dBm ( $\pm 1.5$ dB)	-119 dBm	-119 dBm ( $\pm 2.5$ dB)
-32 dBm	-32 dBm ( $\pm 1.5$ dB)	-120 dBm	-120 dBm ( $\pm 2.5$ dB)
-40 dBm	-40 dBm ( $\pm 1.5$ dB)	-121 dBm	-121 dBm ( $\pm 2.5$ dB)
-64 dBm	-64 dBm ( $\pm 1.5$ dB)	-122 dBm	-122 dBm ( $\pm 2.5$ dB)
-80 dBm	-80 dBm ( $\pm 1.5$ dB)		

9. Set Measuring Receiver to measure 800 MHz at RF Level down to -122 dBm.

10. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 800.0000 MHz. Press ENTER Key.

11. Verify output of -122 dBm ( $\pm 3.5$  dB) on Measuring Receiver.

12. Disconnect external test equipment.

**RF GEN RESIDUAL FM**

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.

2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.

3. Connect Measuring Receiver to T/R Connector.

4. Set Measuring Receiver to measure FM Deviation.

5. Press RF GEN MODE Key.

6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter -10.0 dBm. Press ENTER Key.

7. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Enter frequencies and verify readings on Measuring Receiver.

80 MHz	<45 Hz RMS
500 kHz	<140 Hz RMS
500 MHz	<140 Hz RMS

8. Disconnect external test equipment.

**2-19. PERFORMANCE TEST - Continued.****RF GEN AM**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect Measuring Receiver to T/R Connector.
4. Set Measuring Receiver to measure AM on Positive Peak and activate 15 kHz Low-Pass Filter.
5. Press RF GEN MODE Key.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.0 dBm. Press ENTER Key.
7. Use FIELD SELECT Keys to move cursor to SOURCE. Press ENTER Key. Use DATA SCROLL Keys to select AM. Press ENTER Key.
8. Use FIELD SELECT Keys to move cursor to MODULATION. Press ENTER Key. Use DATA ENTRY Keypad to enter 90%. Press ENTER Key.
9. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Enter 80 MHz and 500 kHz frequencies and verify 90% (±5%) AM Modulation on Measuring Receiver.
10. Disconnect external test equipment.

**RF GEN FM**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect Measuring Receiver to T/R Connector.
4. Set Measuring Receiver to measure FM on the Positive Peak and activate 3 kHz Low-Pass Filter.
5. Press RF GEN MODE Key.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.0 dBm. Press ENTER Key.
7. Use FIELD SELECT Keys to move cursor to SOURCE. Press ENTER Key. Use DATA SCROLL Keys to select FM. Press ENTER Key.
8. Use FIELD SELECT Keys to move cursor to DEVIATION. Press ENTER Key. Enter frequencies and verify readings on Measuring Receiver.
 

5 kHz	5 kHz (±250 Hz)
20 kHz	20 kHz (±1 kHz)
9. Disconnect external test equipment.

**2-19. PERFORMANCE TEST - Continued.**

**RF GEN HARMONIC/NON-HARMONIC LEVEL**

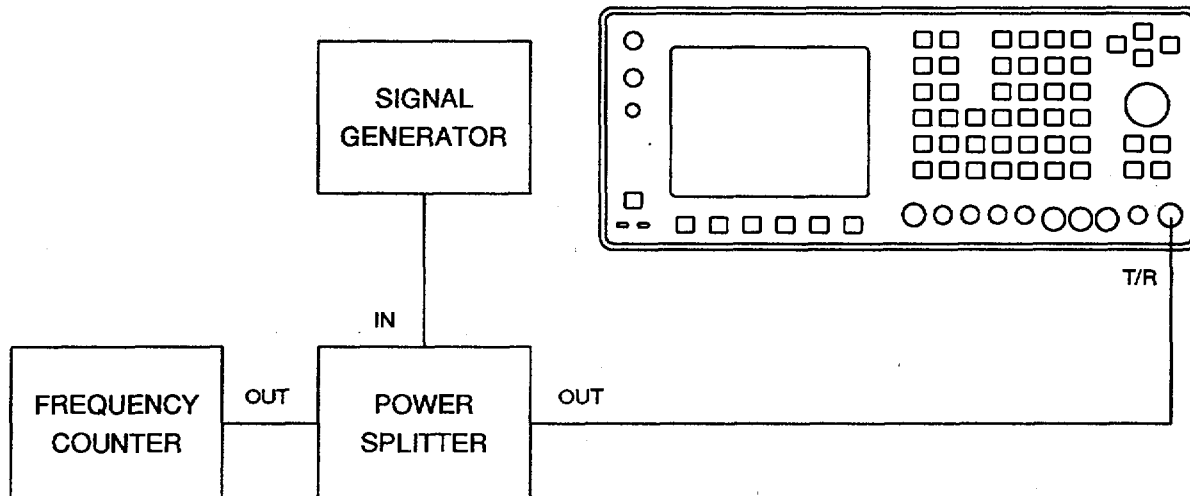
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1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect Spectrum Analyzer to T/R Connector.
4. Set Spectrum Analyzer Center Frequency to 500 MHz and Span Width to 100 MHz/Div.
5. Press RF GEN MODE Key.
6. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 100.0000 MHz. Press ENTER Key.
7. Verify Harmonics are <-26 dBc and Non-Harmonics are <-50 dBc.
8. Disconnect external test equipment.

**FREQUENCY/FREQUENCY ERROR METER**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Press RCVR MODE Key.
4. Use FIELD SELECT Keys to move cursor to ANT. Press ENTER Key to select T/R.
5. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 50.0000 MHz. Press ENTER Key.
6. Connect external test equipment as shown.



**2-19. PERFORMANCE TEST - Continued.**

**FREQUENCY/FREQUENCY ERROR METER - Continued**

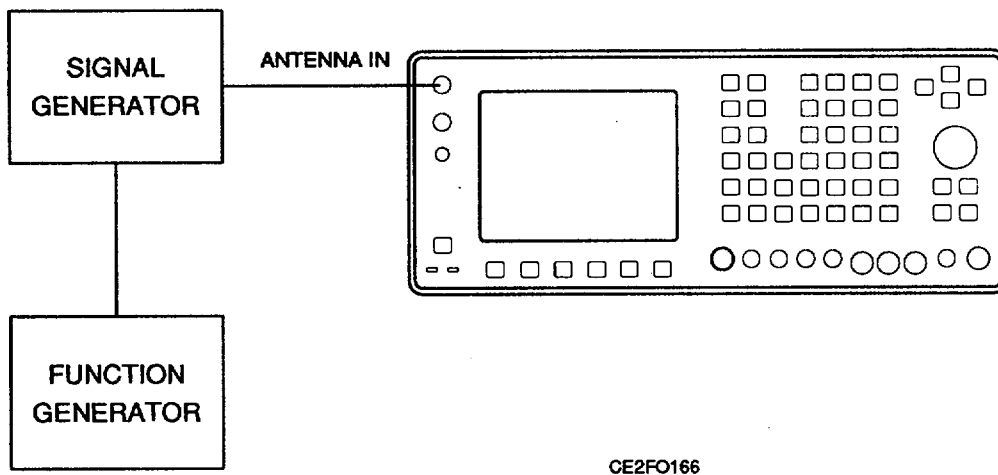
7. Set Signal Generator and Radio Test Set for following signals and verify readings match Frequency Counter readings.

Signal Generator for	Radio Test Set for	Matches Frequency Counter Reading
50 MHz signal at 0 dB (with no modulation)	50 MHz signal at 0 dB (with no modulation)	Frequency Count Readout ( $\pm 25$ Hz)
200 MHz signal at 0 dB (with no modulation)	200 MHz signal at 0 dB (with no modulation)	Frequency Count Readout ( $\pm 100$ Hz)
400 MHz signal at 0 dB (with no modulation)	400 MHz signal at 0 dB (with no modulation)	Frequency Count Readout ( $\pm 200$ Hz)
600 MHz signal at 0 dB (with no modulation)	600 MHz signal at 0 dB (with no modulation)	Frequency Count Readout ( $\pm 300$ Hz)
800 MHz signal at 0 dB (with no modulation)	800 MHz signal at 0 dB (with no modulation)	Frequency Count Readout ( $\pm 400$ Hz)

8. Disconnect external test equipment.

**AGC**

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect external test equipment as shown.

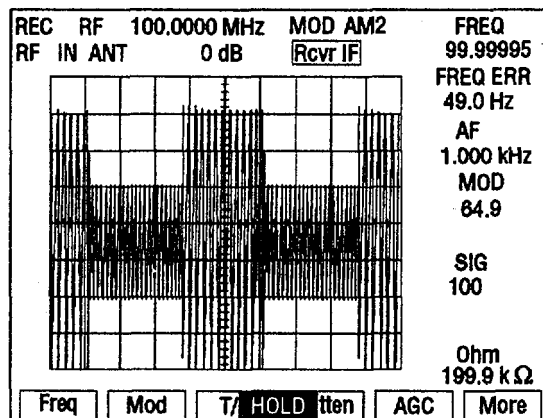


4. Set Signal Generator for 100 MHz signal at -30 dBm. Select External AM Modulation at 50%.
5. Set Function Generator for 1 kHz square wave.

2-19. PERFORMANCE TEST - Continued.

AGC - Continued

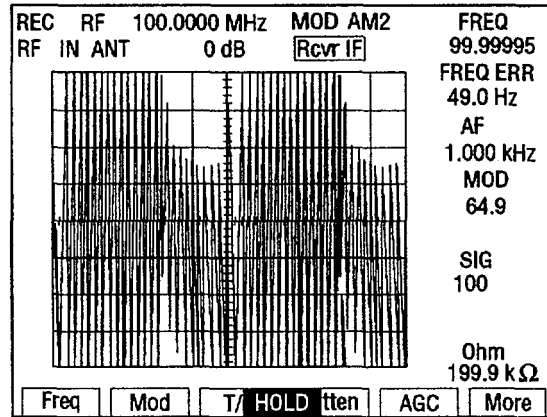
- 6 Press RCVR MODE Key.
- 7 Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 100.0000 MHz. Press ENTER Key.
- 8 Use FIELD SELECT Keys to move cursor to MOD. Press ENTER Key. Use DATA SCROLL Keys to select AM2. Press ENTER Key.
9. Press "MORE" F6 until "DISP" F1 appears. Press "DISP" F1.
10. Use FIELD SELECT Keys to move cursor to "4. Full Scope". Press ENTER Key.
11. Press "Input" F3. Use DATA SCROLL Keys to select Rcvr iF. Press ENTER Key.
12. Press SETUP Key.
13. Use FIELD SELECT Keys to move cursor to "5. Select AGC Type". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Manual". Press ENTER Key. Use DATA ENTRY Keypad to enter 1. Press ENTER Key.
14. Press "Ret" F5.
15. Verify flat line on Oscilloscope.
16. Press "More" F6 until "AGC" F5 appears.
17. Press "AGC" F5.
18. Rotate DATA SCROLL Spinner cw and verify waveform as shown.



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**2-19. PERFORMANCE TEST - Continued.****AGC - Continued**

19. Rotate DATA SCROLL Spinner cw and verify waveform.



20. Press ENTER Key.
21. Disconnect external test equipment.

**RECEIVER SENSITIVITY**

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect Signal Generator to ANTENNA IN Connector.
4. Set Signal Generator for 80 MHz signal at 2 ILV with FM Modulation (1 kHz tone, 3 kHz Deviation).
5. Press RCVR MODE Key.
6. Use SQLCH CONTROL Keys and VOL CONTROL Keys to set Squelch to minimum rejection and Volume to audible.
7. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 80. MHz. Press ENTER Key.
8. Press "More" F6 until "Meters" F4 appears. Press "Meters" F4.
9. Use FIELD SELECT Keys to move cursor to "2. SINAD". Press ENTER Key.
10. Verify SINAD Meter reads >10 dB.

**2-19. PERFORMANCE TEST - Continued.****RECEIVER SENSITIVITY - Continued**

11. Set Signal Generator for 80 MHz signal at 5  $\mu$ V with FM Modulation (1 kHz tone, 3 kHz Deviation).
12. Use FIELD SELECT Keys to move cursor to MOD. Press ENTER Key. Use DATA SCROLL Keys to select FM2. Press ENTER Key.
13. Verify SINAD Meter reads >10 dB.
14. Disconnect external test equipment.

**RECEIVER SELECTIVITY**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Set Signal Generator for 80 MHz signal at -60 dBm with no modulation. Connect Signal Generator to ANTENNA IN Connector.
4. Press RCVR MODE Key.
5. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 80.MHz. Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to MOD. Press ENTER Key. Use DATA SCROLL Keys to select FM4. Press ENTER Key.
7. Use FIELD SELECT Keys to move cursor to Deviation Meter. Press ENTER Key. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Keys to select 100 kHz. Press ENTER Key.
8. Press "Ret" F6.
9. Use FIELD SELECT Keys to move cursor to OdB. Press ENTER Key. Use DATA SCROLL Keys to select 20 dB. Press ENTER Key.
10. Adjust SQLCH Control Keys for maximum squelch setting on Squelch Level Indicator. Use SQLCH Control Keys to decrease squelch until values appear on the meters.
11. Set Signal Generator to 80.1 MHz at -57 dBm. Verify numeric values are displayed on Receiver Meters.
12. Set Signal Generator to 80.485 MHz. Increase Signal Generator level until Squelch Indicator appears and verify Signal Generator level is -30 dBm or greater.
13. Set Signal Generator for 80 MHz signal at -60 dBm with no modulation.
14. Use FIELD SELECT Keys to move cursor to MOD. Press ENTER Key. Use DATA SCROLL Keys to select FM2. Press ENTER Key.
15. Adjust SQLCH Control Keys for maximum squelch setting on Squelch Level Indicator. Use SQLCH Control Keys to decrease squelch until values appear on the meters.

**2-19. PERFORMANCE TEST - Continued.****RECEIVER SELECTIVITY - Continued**

16. Set Signal Generator to 80.052 MHz. Increase Signal Generator level until Squelch Indicator appears and verify Signal Generator level is -30 dBm or greater.
17. Disconnect external test equipment.

**ANTENNA IN CONNECTOR OVERLOAD PROTECTION**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Press AF GEN MODE Key.
4. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to select On.
5. Use FIELD SELECT Keys to move cursor to GEN 1 AF. Press ENTER Key. Use DATA ENTRY Keypad to enter 25000. Hz. Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 3.1000 V. Press ENTER Key.
7. Press RF GEN MODE Key.
8. Connect coaxial cable from AUDIO OUT Connector to ANTENNA IN Connector and verify warning tone and input overload message appears.
9. Disconnect coaxial cable.

**DUPLEX OUT CONNECTOR OVERLOAD PROTECTION**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Press AF GEN MODE Key.
4. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to select On.
5. Use FIELD SELECT Keys to move cursor to GEN 1 AF. Press ENTER Key. Use DATA ENTRY Keypad to enter 25000.Hz. Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 3.1000 V. Press ENTER Key.
7. Press RF GEN MODE Key.
8. Connect coaxial cable from AUDIO OUT Connector to DUPLEX OUT Connector and verify warning tone and input overload message is displayed.
9. Disconnect coaxial cable.



**2-19. PERFORMANCE TEST - Continued.****BER METER**

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect AUDIO OUT Connector to SINAD/BER IN Connector using coaxial cable.
4. Press MTRS MODE Key.
5. Use FIELD SELECT Keys to move cursor to "9. Bit Error Rate (BER) Func". Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to BER TYPE. Press ENTER Key. Use FIELD SELECT Keys to move cursor to "3. Baseband". Press ENTER Key.
7. Use FIELD SELECT Keys to move cursor to DATA RATE. Press ENTER Key. Use FIELD SELECT Keys to move cursor to "8. 16 kbps". Press ENTER Key.
8. Use FIELD SELECT Keys to move cursor to DATA PATTERN SIZE. Press ENTER Key. Use DATA ENTRY Keypad to enter 10000 bits. Press ENTER Key.
9. Use FIELD SELECT Keys to move cursor to DATA POLARITY. Press ENTER Key. Use DATA SCROLL Keys to select Neg. SINAD/BER. Press ENTER Key.
10. Use FIELD SELECT Keys to move cursor to DATA PATTERN TYPE. Press ENTER Key Use FIELD SELECT Keys to move cursor to "2. Fixed". Press ENTER Key.
11. Press "Run" F5 and verify BER Meter completes 100 passes with maximum error count of 1.
12. Press "Stop" F5.
13. Disconnect coaxial cable.

**DUPLEX OUT CONNECTOR LEVEL**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect Measuring Receiver to DUPLEX OUT Connector.
4. Set Measuring Receiver to measure dBm.
5. Press DPLX MODE Key and "RX" F2.
6. Use FIELD SELECT Keys to move cursor to RX. Press ENTER Key. Use DATA ENTRY Keypad to enter 500.MHz frequency. Press ENTER Key.
7. Use FIELD SELECT Keys to move cursor to T/R. Press ENTER Key to select DPL.
8. Press TUNED RF Key on Measuring Receiver.

**2-19. PERFORMANCE TEST - Continued.****DUPLEX OUT CONNECTOR LEVEL - Continued**

9. Use FIELD SELECT Keys to move cursor to dBm. Press ENTER Key. Use DATA ENTRY Keypad to enter 0. dBm. Press ENTER Key.
10. Verify 0 dBm ( $\pm 3.5$  dB) on Measuring Receiver.
11. Set Measuring Receiver to measure -40 dBm.
12. Press ENTER Key. Use DATA ENTRY Keypad to enter -40.0 dBm. Press ENTER Key.
13. Set Measuring Receiver to measure -80 dBm.
14. Press ENTER Key. Use DATA ENTRY Keypad to enter -80.0 dBm. Press ENTER Key.
15. Press ENTER Key. Use DATA ENTRY Keypad to enter -110.0 dBm. Press ENTER Key.
16. Verify -110 dBm ( $\pm 3.5$  dB) on Measuring Receiver.
17. Disconnect external test equipment.

**DTMF**

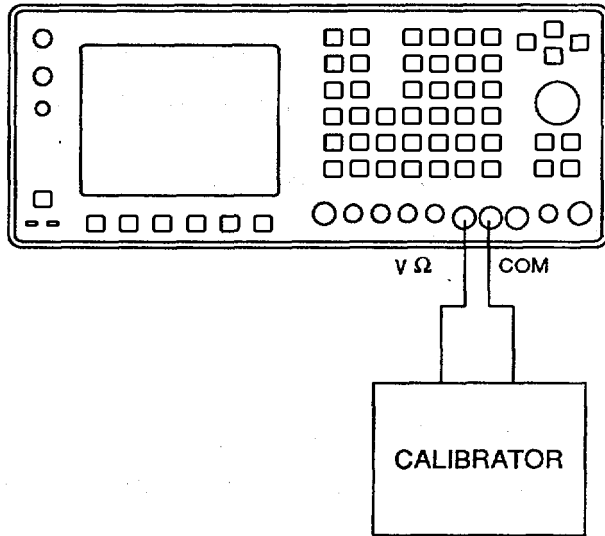
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1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Keytwice.
3. Press DPLX MODE Key.
4. Use FIELD SELECT Keys to move cursor to OUT. Press ENTER Key to select TIR.
5. Use FIELD SELECT Keys to move cursor to SOURCE. Press ENTER Key. Use DATASCROLL Keys to move cursor to 3. Use DATA SCROLL Keys to select FM. Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to DEV. Press ENTER Key. Use DATA ENTRY Keypad to enter 5.kHz. Press ENTER Key.
7. Use FIELD SELECT Keys to move cursor to PROGRAM # or DIRECT ENTRY. Press ENTER Key to select DIRECT ENTRY. Use FIELD SELECT Keys to move cursor down one line. Press ENTER Key. Use DATA ENTRY Keypad to enter "123456789\*0#". Press ENTER Key.
8. Press "TX" F1.
9. Use FIELD SELECT Keys to move cursor to ANT. Press ENTER Key to select T/R.
10. Press "More" F6 until "Decode" F2 appears. Press "Decode" F2.
11. Press GO Key.
12. Verify "123456789\*0#" appears on screen and repeats.
13. Press STOP Key.

2-19. PERFORMANCE TEST - Continued.

DMM

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect external test equipment as shown.



4. Press MTRS MODE Key.
5. Use FIELD SELECT Keys to move cursor to "10. Digital Multimeter (DMM)." Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select DCV. Press ENTER Key.
7. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Select DCV ranges and verify values on DMM.

Set Range to	Set Calibrator for	DMM displays
200 mV	150 mVdc	150 mVdc (i2.1 mVdc)
2 V	1.5 Vdc	1.5 Vdc (i21 mVdc)
20 V	15 Vdc	15 Vdc (i0.21 Vdc)
200 V	150 Vdc	150 Vdc (i2.1 Vdc)
2000 V	500 Vdc	500 Vdc (i21 Vdc)

8. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select ACV. Press ENTER Key.

**2-19. PERFORMANCE TEST - Continued.**

**DMM - Continued**

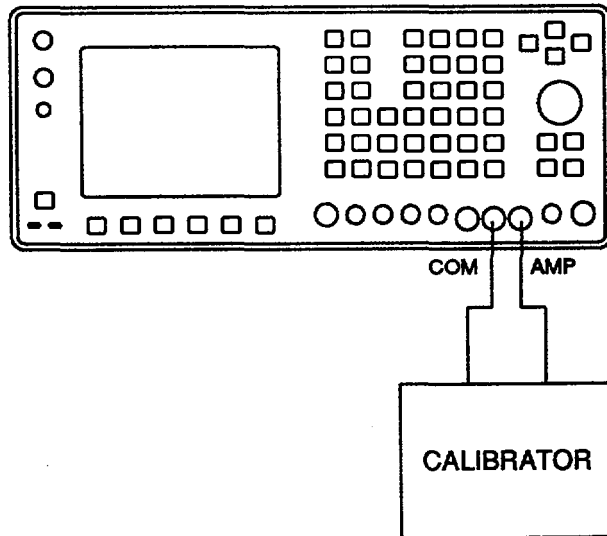
- Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Select ACV ranges and verify values on DMM. (When Multimeter readout exceeds 500 VAC, Radio Test Set beeps and displays Multimeter Readout Bar in red.

Set Range to	Set Calibrator for	DMM displays
200 mV	150 mVAC at 100 Hz	150 mVAC (i10.1 mVAC)
2 V	1.5 VAC at 100 Hz	1.5 VAC (O101 mVAC)
20 V	15 VAC at 100 Hz	15 VAC (i1.01 VAC)
200 V	150 VAC at 100 Hz	150 VAC (i10.1 VAC)
2000 V	500 VAC at 100 Hz	500 VAC (i1 01 VAC)

- Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select Ohm. Press ENTER Key.
- Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Select Ohm ranges and verify values on DMM.

Set Range to	Set Calibrator for	DMM displays
200 OHM	100 L	100 Q ( $\pm 0$ Q)
2 K OHM	1000 I	1000 L ( $\pm 100$ it)
20 K OHM	10 Kg	10 K ( $\pm$ KQ)
200 K OHM	100 KQ	100 KD ( $\pm 10$ KD)
2 M OHM	1 MD	1 M1 ( $\pm 100$ KQ)
20 M OHM	10 M0	10 Ma ( $\pm i$ M2)

- Connect external test equipment as shown.



- Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select DCC. Press ENTER Key.

**2-19. PERFORMANCE TEST - Continued.**

**DMM - Continued**

14. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Select DCC ranges and verify values on DMM.

Set Range to	Set Calibrator for	DMM displays
20 mA 200 Ma 2A	15 mA 150 mA 1.5a	15 mA (i1mA) 150 mA (i10mA) 1.5A(i101 mA)

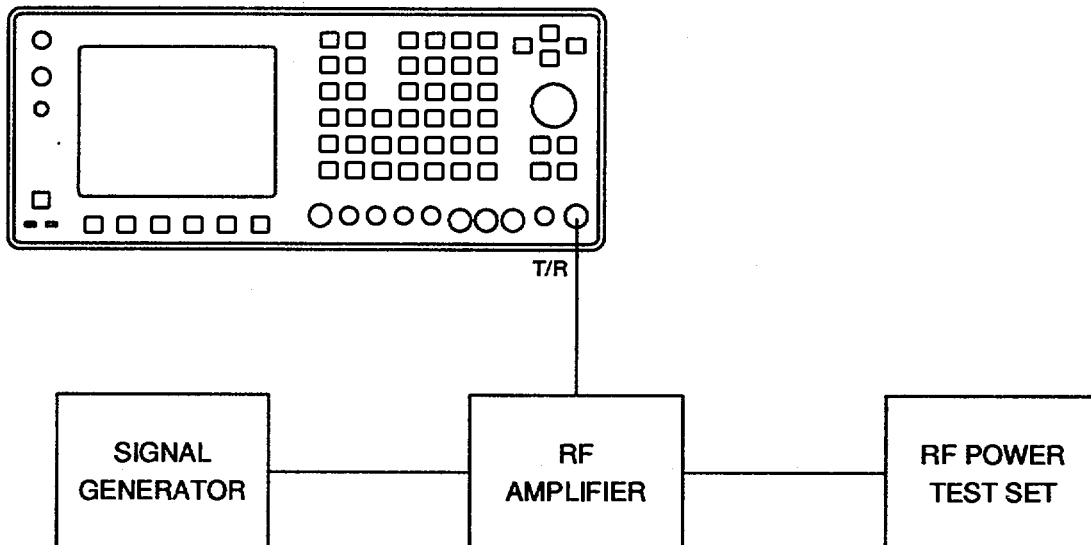
15. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select ACC.Press ENTER Key.
16. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Select ACC ranges and verify values on DMM.

Set Range to	Set Calibrator for	DMM displays
20 mA 200 mA 2 A	15 mA at 100 Hz 150 mA at 100 Hz 1.5 A at 100 Hz	15 mA (i1mA) 150 mA (i10mA) 1.5 A (±101 mA)

17. Disconnect external test equipment.

**POWER METER HIGH POWER**

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect external test equipment as shown.



CE2FO174

**2-19. PERFORMANCE TEST - Continued.**

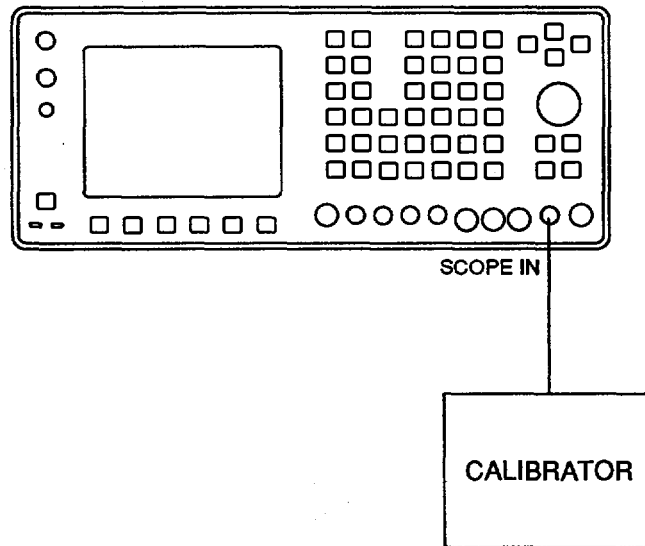
**POWER METER HIGH POWER - Continued**

4. Press MTRS MODE Key.
5. Use FIELD SELECT Keys to move cursor to "3. Pwr Meter (Pulse/CW)". Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Keys to select 20 W. Press ENTER Key.
7. Set Signal Generator and RF Amplifier for 100 MHz signal at 10 W with no modulation using RF Power Test Set for reference.
8. Verify Test Set Power Meter reading matches Power Meter reading (+20%).
9. Disconnect external test equipment.

**OSCILLOSCOPE VERTICAL ACCURACY**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Connect external test equipment as shown.



4. Press AF GEN MODE Key.
5. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to select On.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 1.0000 V. Press ENTER Key.
7. Press SCOPE/ANLZ MODE Key to access Oscilloscope Operation Screen.

**2-19. PERFORMANCE TEST - Continued.**

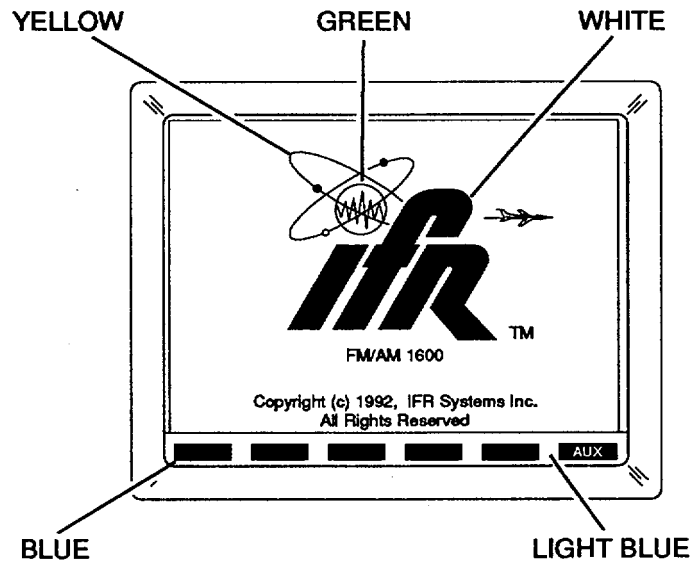
**OSCILLOSCOPE VERTICAL ACCURACY - Continued**

8. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Use FIELD SELECT Keys to move cursor to "9. GND". Press ENTER Key.
9. Press "More" F6 until "Scale" F1 appears. Press "Scale" F1. Use DATA SCROLL Keys to select 2 V. Press ENTER Key.
10. Use FIELD SELECT Keys to move cursor to VERT. Press ENTER Key. Use DATA SCROLL Keys to center trace. Press ENTER Key.
11. Set Calibrator for 4 Vdc reading.
12. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Use FIELD SELECT Keys to move cursor to "8. DC". Press ENTER Key.
13. Verify trace is on second major division above center (i2 minor divisions).
14. Disconnect external test equipment.

**DC POWER**

---

1. Press POWER Switch to Off.
2. Disconnect AC Power Cable from AC LINE IN Connector.
3. Set DC Power Source for 24 Vdc. Connect Power Cord from DC Power Source to External DC Power Source Connector. (Red is "+", White is "+", Green is "-", Black is "-").
4. Press POWER Switch to On.
5. Rotate INTENSITY/Contrast Adjustment fully cw and verify IFR Logo Screen is displayed as shown.

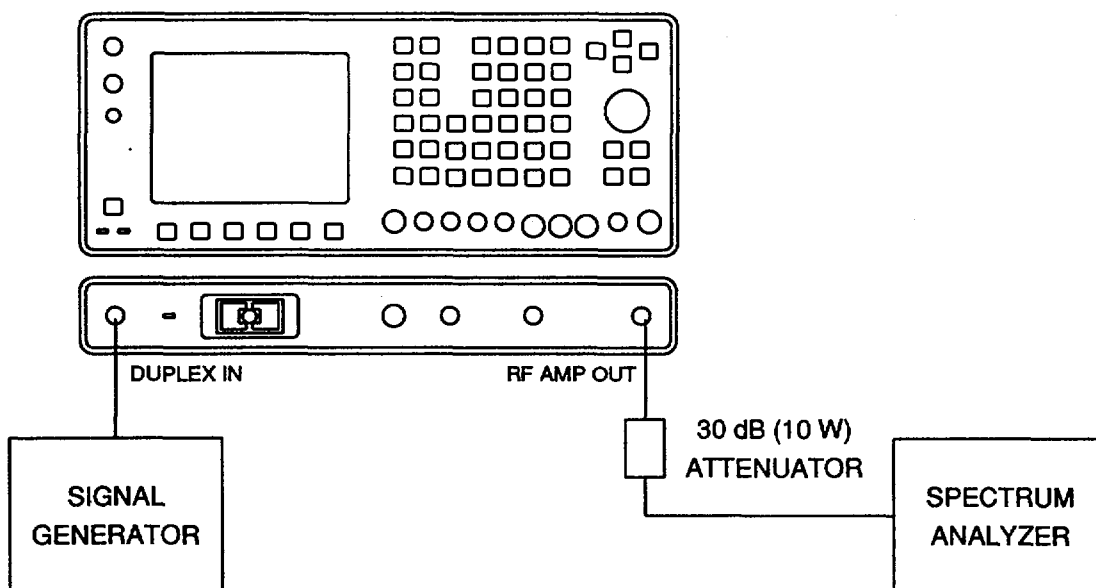


**2-19. PERFORMANCE TEST - Continued.****DC POWER - Continued**

6. Verify Fan is operating.
7. Press POWER Switch to Off.
8. Set DC Power Source to OFF and disconnect DC Power Cable.
9. Connect AC Power Cable to AC LINE IN Connector.
10. Press POWER Switch to On.

**RF AMPLIFIER**

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Press RCVR MODE Key.
4. Press "More" F6 until "Sp Tst" F5 appears. Press "Sp Tst" F5.
5. Press "OPER" FI.
6. Press "More" F6 until "7238" F1 appears. Press "7238" FI. Press ENTER Key.
7. Press ENTER Key for next five operator instruction screens and wait for Debug screen to appear.



CE2F0183

8. Connect external test equipment as shown.



**2-19. PERFORMANCE TEST - Continued.**

**RF AMPLIFIER - Continued**

9. Set Signal Generator for 35 MHz signal at 0 dBm with no modulation.
10. Press "Debug" F2, F6 and "Key" F1.
11. Verify 6 dBm (i1 dB) at 35 MHz on Spectrum Analyzer. Record level.
12. Set Spectrum Analyzer to 70 MHz.
13. Verify 2nd Harmonic at <-20 dBc from level in Step 11 on Spectrum Analyzer.
14. Press "Unkey" F2 and "Exit" F5.
15. Disconnect external test equipment.

**TEST ADAPTER TEST PLUG**

---

1. Press MTRS MODE Key, "AUX" F6 and RCL Key.
2. Use FIELD SELECT Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
3. Press MTRS MODE Key.
4. Press "AUX" F6.
5. Use FIELD SELECT Keys to move cursor to "5. External I/O". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. RS-232". Press ENTER Key. Set following Fields.

Operation Mode	Host
Baud Rate	19200
Data Bits	8
Stop Bits	1
Parity	None
Handshake	Xon/Xoff
Echo	Off

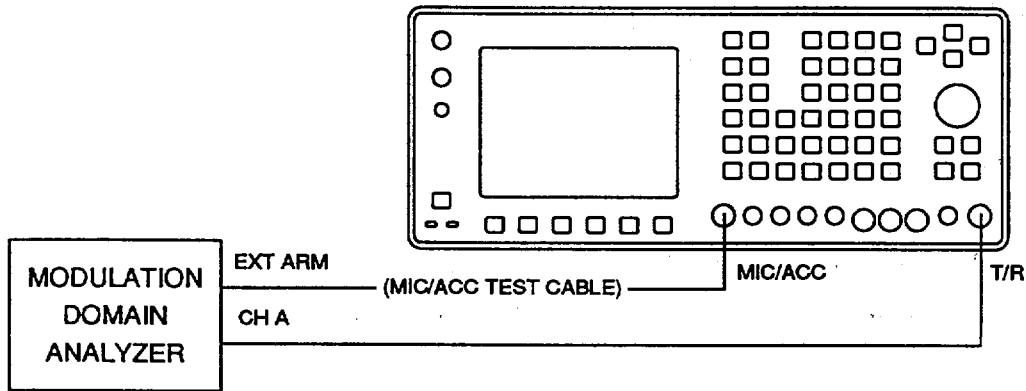
6. Press "ESC" F6 twice and "TERM" F5.
7. Connect Serial Interface Cable Assembly (Tool Code 10 in Appendix B of TM 11-6625-3245-12) between Test Set RS-232 Connector and Test Adapter RS-232 Connector. Connect Test Plug Adapter (TF-119) (Tool Code 23 in Appendix B of TM 11-6625-3245-12) to Test Adapter.
8. Press SHIFT, T, E, S, T, C, O, N, N, SHIFT and ENTER Keys.
9. Press 1 on DATA ENTRY Keypad. (Test is performed automatically with user instructions given as needed. External test equipment to be used includes a Function Generator and Oscilloscope.)
10. Disconnect external test equipment.

**2-20. FREQUENCY AGILITY TEST.**

**DESCRIPTION**

This procedure is used to verify the Radio Test Set synthesizer response is in specification after A7 3rd LO, A9 90 MHz Generator or A10 1st LO has been replaced.

1. Connect external test equipment as shown.



CE2FO260

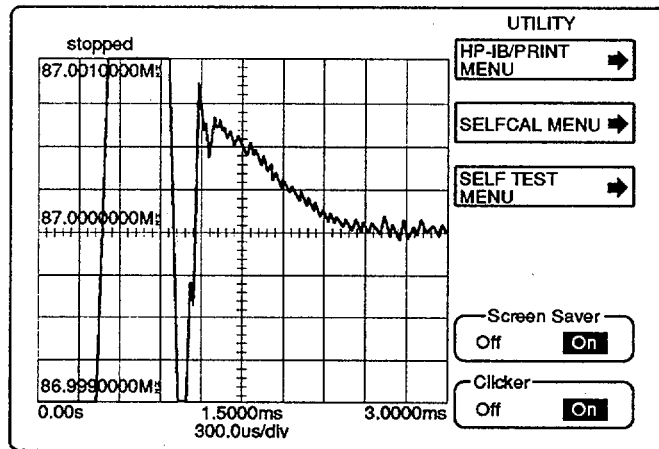
2. Set Modulation Domain Analyzer controls.

Function	Frequency Channel A
Vertical	Center/Span
Center	87 MHz
Span	2 kHz
Trigger	Ext Edge, Arm Only, Rising Edge
Time Base	300 Ls
Reference	Left
Delay	0 s
Panorama	Off
Display	vs Time, Axes
Connect Real Time	On
Persistence	Single
Histogram Accumulate	Off
Time Markers	Off
Freq Markers	Off
vs Time Histogram Accumulate	Off
Sampling	Auto
Interval at Ctr	Auto
Clicker	On

3. Press MTRS MODE Key, "AUX" F6 and RCL Key.
4. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
5. Press RCVR MODE Key and SETUP Key.
6. Use FIELD SELECT Keys to move cursor to "1. Set Rcvr Freq." Press ENTER Key. Use DATA ENTRY Keys to enter 87.0000 MHz. Press ENTER Key.

**2-20. FREQUENCY AGILITY TEST - Continued.**

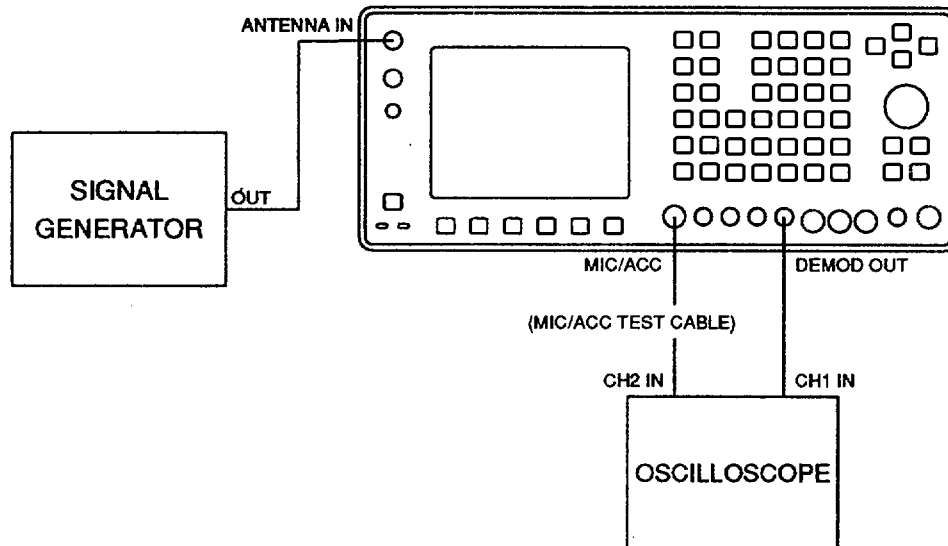
7. Use FIELD SELECT Keys to move cursor "2. Select Mod. Press ENTER Key. Use FIELD SELECT Keys to move cursor to "11. User Defined". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2.IF Filters". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "3. 300 kHz". Press ENTER Key.
8. Press "ESC" F6.
9. Use FIELD SELECT Keys to move cursor to "5. Select AGC Type". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Manual". Press ENTER Key. Use DATA ENTRY Keypad to enter 255. Press ENTER Key.
10. Use FIELD SELECT KEYS to move cursor to "6. Rcvr Out Speaker". Press ENTER Key to select Off.
11. Press RF GEN MODE Key and SETUP Key.
12. Use FIELD SELECT Keys to move cursor to "5. RF Gen Setup". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. RF Gen Freq". Press ENTER Key. Use DATA ENTRY Keypad to enter 30. MHz. Press ENTER Key.
13. Use FIELD SELECT Keys to move cursor to 2. RF Gen Level. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.0 dBm. Press ENTER Key.
14. Press "ESC" F6, "AUX" F6 and "S.R." F1.
15. Verify signal is within 1 kHz of 87 MHz in <1.5 ms from Trigger with Modulation Domain Analyzer as shown.



16. Press "\*" F1.
17. Disconnect external test equipment.

**2-20. FREQUENCY AGILITY TEST - Continued.**

18. Connect external test equipment as shown.



19. Set Signal Generator for 30.000 MHz signal at -30 dBm with 4 kHz deviation and 1 kHz tone.

20. Set Oscilloscope controls.

Channel 1 Vertical Scale	5 V/Div
Channel 2 Vertical Scale	5 V/Div
Horizontal Sweep	2 ms/Div
Trigger	Channel 2
Trigger Type	Normal
Trigger Slope	Negative
Trigger Coupling	AC
Channel 1 Coupling	DC
Channel 2 Coupling	DC
Bandwidth	20 MHz

21. Press RF GEN MODE Key and SETUP Key.

22. Use FIELD SELECT Keys to move cursor to "5. RF Gen Setup". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. RF Gen Freq". Press ENTER Key. Use DATA ENTRY Keypad to enter 87. MHz. Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. RF Gen Level". Press ENTER Key. Use DATA ENTRY Keypad to enter -30. dBm. Press ENTER Key.

23. Press "ESC" F6.

24. Press RCVR MODE Key and SETUP Key.

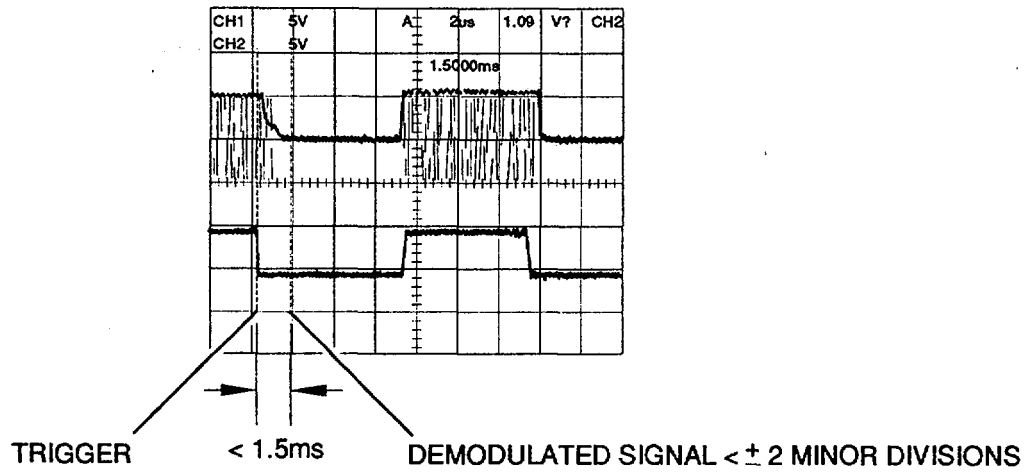
25. Use FIELD SELECT Keys to move cursor to "1. Set Rcvr Freq". Press ENTER Key. Use DATA ENTRY Keypad to enter 30.MHz. Press ENTER Key.

26. Press "Ret" F5.

27. Press SETUP Key, "AUX" F6 and "S.R." F1.

**2-20. FREQUENCY AGILITY TEST - Continued.**

28. Select Channel 2 only for Oscilloscope Display. Adjust trigger level until Oscilloscope is triggered by clock pulse.
29. Set Oscilloscope to view both Channel 1 and 2 as shown.



30. Verify demodulated signal level varies  $< 2$  Minor Divisions within 1.5 ms of trigger.
31. Press "\*" F1.
32. Disconnect external test equipment.

**2-21. REMOVE 83A1 TEST ADAPTER.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****WARNING**

**Dangerous voltages are present with case assemblies removed.**

**CAUTION**

**Do not disconnect or remove any assemblies in Radio Test Set unless instrument is unplugged.**

**PRELIMINARY PROCEDURES**

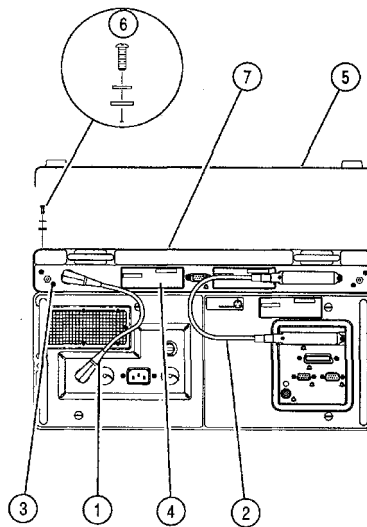
- Perform required Adjustments (para 2-95).

**REMOVE**

1. Disconnect do power cable (1) and SCSI cable (2).
2. Remove 4 screws (3).
3. Slide 83A1A5 Rear Panel (4) to rear and remove 83A1A1 Bottom Case (5).
4. Remove 4 screws, 4 lock washers and 4 flat washers (6).
5. Remove 83A1 Test Adapter (7).

**INSTALL**

1. Install 83A1 Test Adapter (7).
2. Install 4 screws, 4 lock washers and 4 flat washers (6).
3. Install 83A1A1 Bottom Case (5) and slide 83A1A5 Rear Panel (4) to front.
4. Install 4 screws (3).
5. Reconnect SCSI cable (2) and do power cable (1).



CE2FO147

**END OF TASK**

**2-22.REPLACE 78A2 TOP CASE.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****WARNING**

Dangerous voltages are present with case assemblies removed.

**CAUTION**

Do not disconnect or remove any assemblies in Radio Test Set unless instrument is unplugged.

**NOTE**

After any screw or nut is loosened or removed 5 times, the use of Torque Seal (Appendix B, item 11) is required.

**PRELIMINARY PROCEDURES**

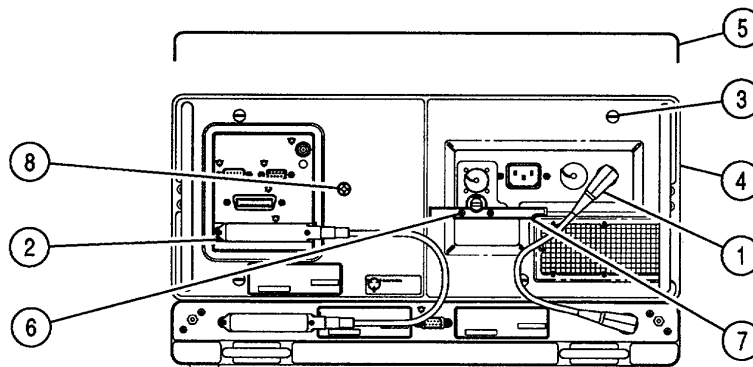
- Perform required Adjustments (para 2-95).

**REMOVE**

1. Disconnect dc power cable (1) and SCSI cable (2).
2. Loosen 4 captive screws (3).
3. Remove 2 screws (6) and drawbar (7).
4. Remove screw (8).
5. Slide 78A1A2 Rear Panel (4) toward rear.
6. Remove 78A2 Top Case (5).

**INSTALL**

1. Install 78A2 Top Case (5).
2. Slide 78A1A2 Rear Panel (4) toward front.
3. Tighten 4 captive screws (3).
4. Install screw (8).
5. Install 2 screws (6) and drawbar (7).
6. Reconnect SCSI cable (2) and do power cable (1).



CE2FO015

**END OF TASK**

**2-23.REPLACE 78A3 BOTTOM CASE.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****WARNING**

Dangerous voltages are present with case assemblies removed.

**NOTE**

After any screw or nut is loosened or removed 5 times, the use of Torque Seal (Appendix B, item 11) is required.

**PRELIMINARY PROCEDURES:**

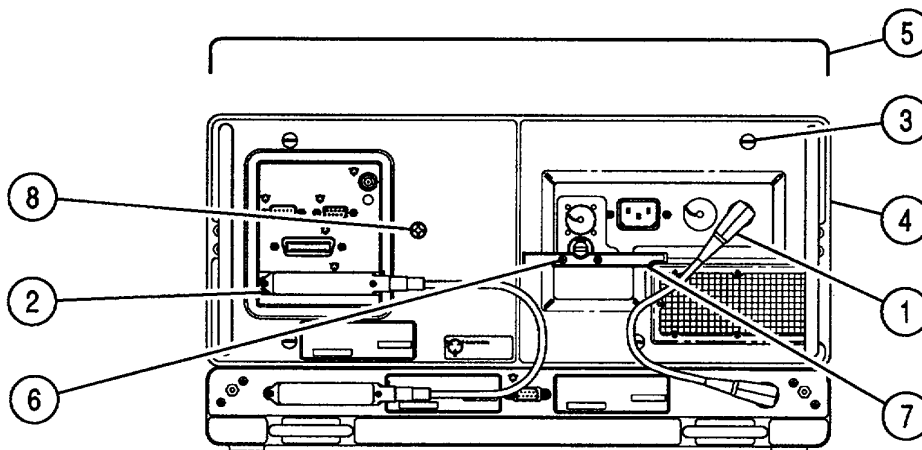
- Remove 83A1 Test Adapter (para 2-21).

**REMOVE**

1. Loosen 4 captive screws (1).
2. Remove 2 screws (4) and drawbar (5).
3. Remove screw (6).
4. Slide 78A1A2 Rear Panel (2) toward rear.
5. Remove 78A3 Bottom Case (3).

**INSTALL**

1. Install 78A3 Bottom Case (3).
2. Slide 78A1A2 Rear Panel (2) toward front.
3. Tighten 4 captive screws (1).
4. Install screw (6).
5. Install 2 screws (4) and drawbar (5).



CE2FO015

**FOLLOW-ON MAINTENANCE:**

- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**



**2-24.REPLACE 78A1A25 DIGITIZER.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

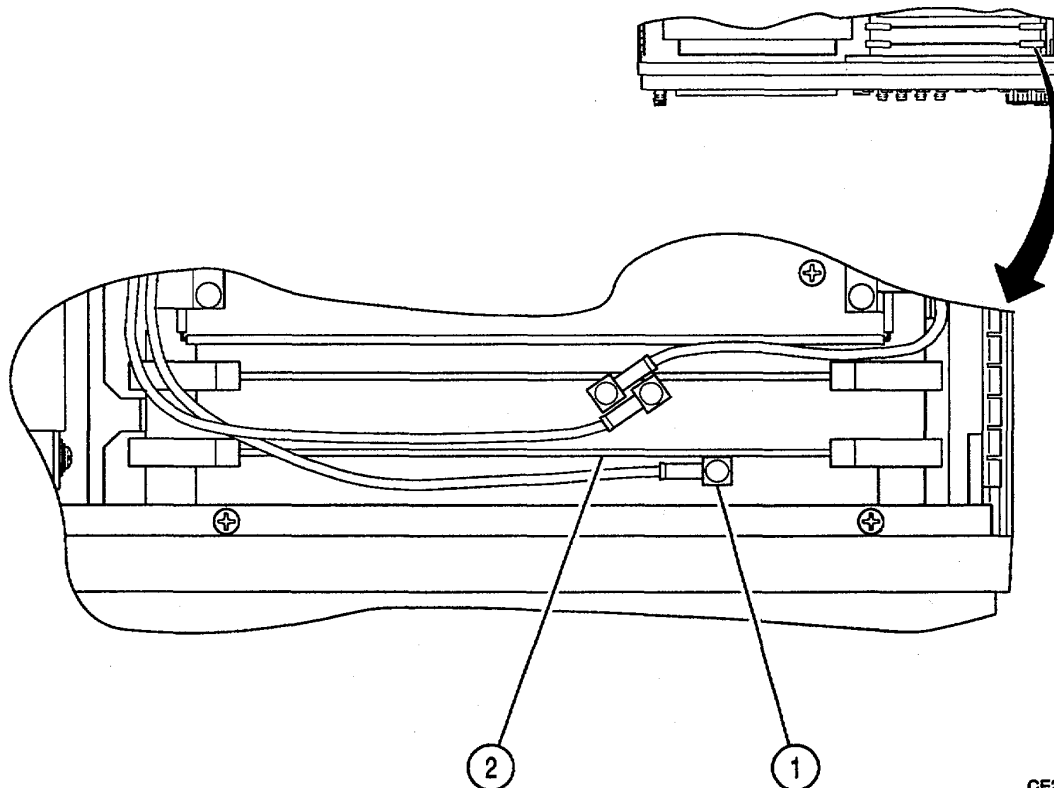
- Remove 78A2 Top Case (para 2-22).

**REMOVE**

1. Disconnect coaxial cable (1)
2. Raise card ejectors and remove 78A1A25 Digitizer (2)

**INSTALL**

1. Install 78A1A25 Digitizer (2) in guides and close card ejectors.
2. Reconnect coaxial cable (1)



CE2FO017

**FOLLOW-ON MAINTENANCE:**

- Perform Adjustments (para 2-95).
- Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-25.REPLACE 78A1A23 COUNTER.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP**

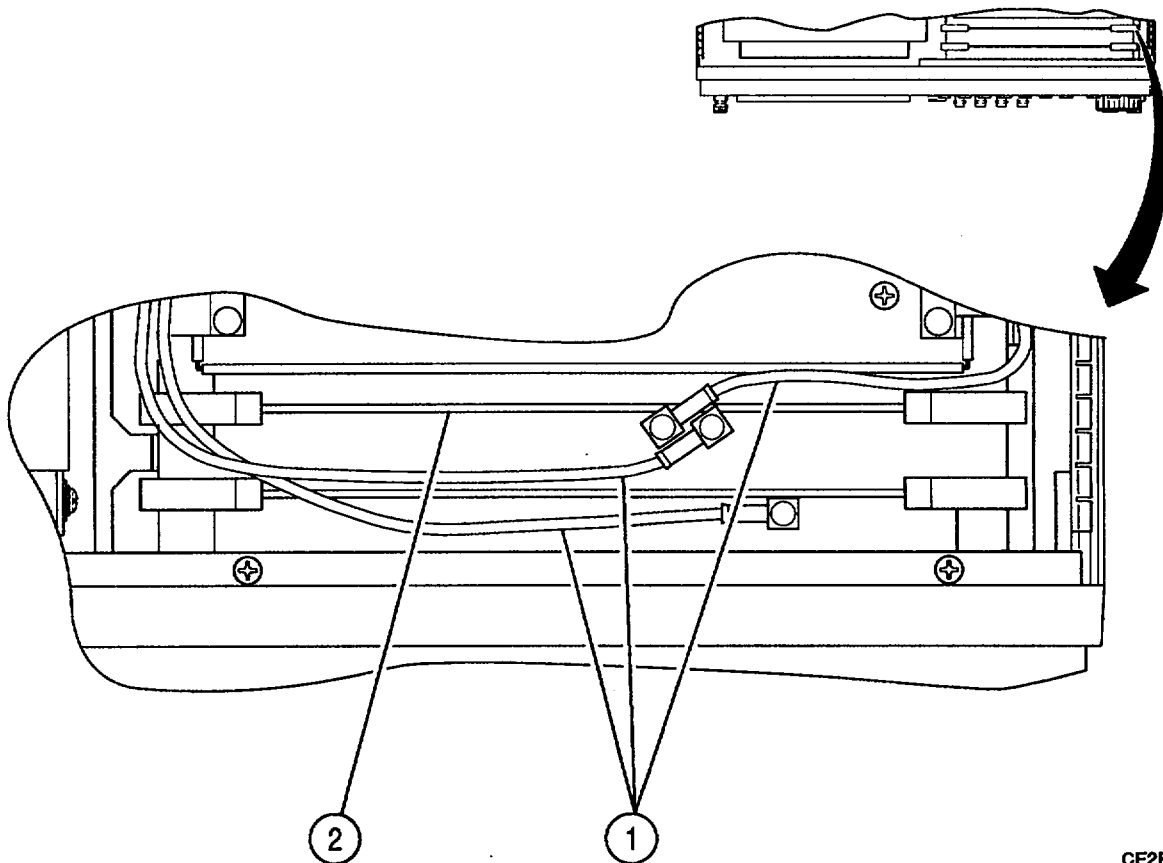
- PRELIMINARY PROCEDURES:
- Remove 78A2 Top Case (para 2-22).

**REMOVE**

1. Disconnect 3 coaxial cables (1).
2. Raise card ejectors and remove 78A1A23 Counter (2).

**INSTALL**

1. Install 78A1A23 Counter (2) in guides and close card ejectors.
2. Reconnect 3 coaxial cables (1).



CE2FO018

**FOLLOW-ON MAINTENANCE:**

- Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-26.REPLACE 78A1A4 ANALYZER LOG/IF.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

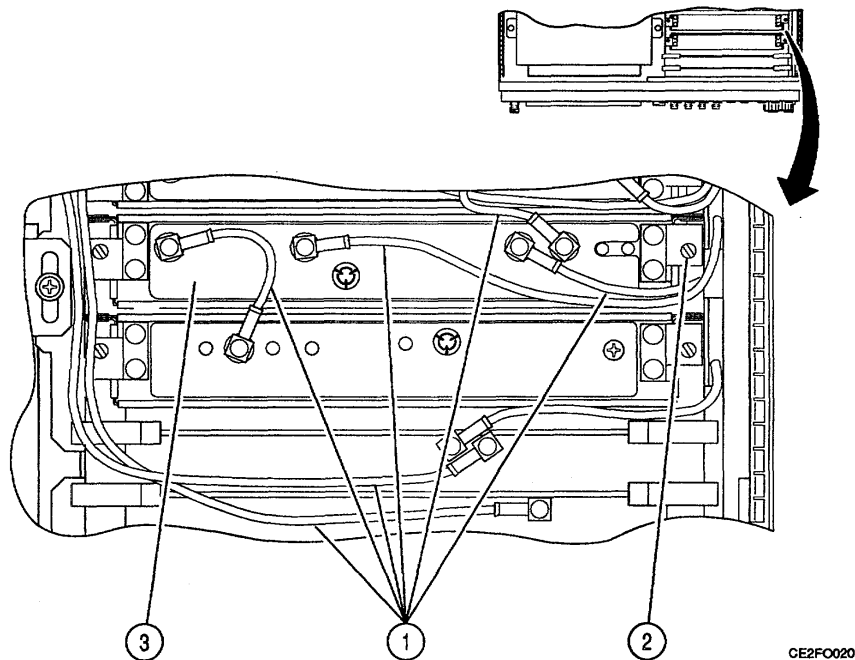
- Remove 78A2 Top Case (para 2-22).
- Remove 78A1A5 Analyzer RF (para 2-27).

**REMOVE**

1. Disconnect 3 coaxial cables (1).
2. Loosen 2 captive screws (2).
3. Remove 78A1A4 Analyzer Log/IF (3).

**INSTALL**

1. Install 78A1A4 Analyzer Log/IF (3)
2. Tighten 2 captive screws (2).
3. Reconnect 3 coaxial cables (1).



CE2FO020

**FOLLOW-ON MAINTENANCE:**

- Install 78A1 A5 Analyzer RF (para 2-27).
- Perform Adjustments (para 2-95).
- Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-27. REPLACE 78A1A5 ANALYZER RF.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

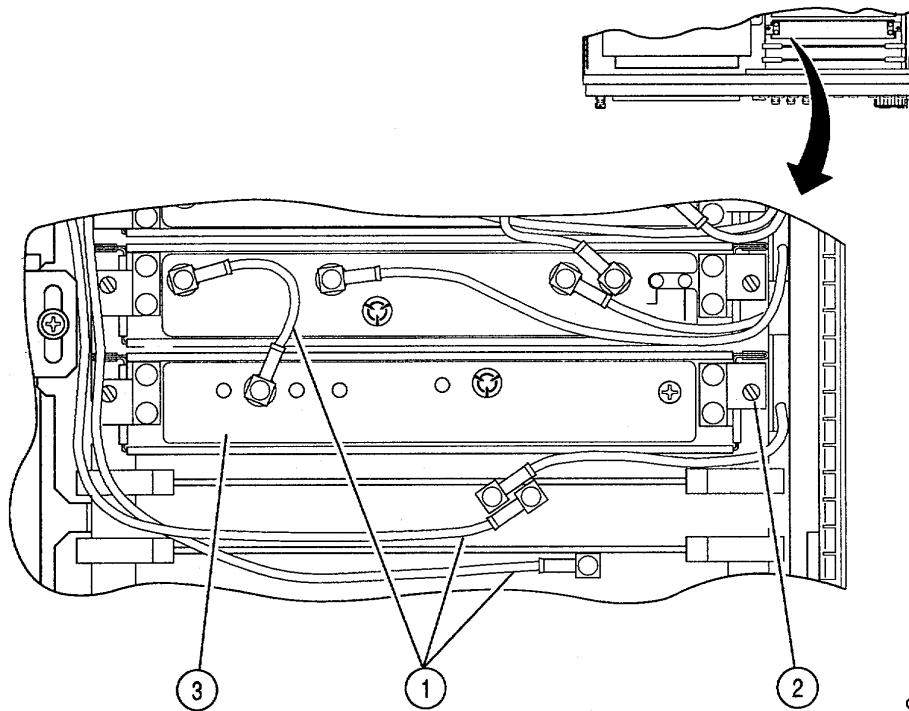
- Remove 78A2 Top Case (para 2-22).

**REMOVE**

1. Disconnect 6 coaxial cables (1).
2. Loosen 2 captive screws (2).
3. Remove 78A1A5 Analyzer RF (3).

**INSTALL**

1. Install 78A1A5 Analyzer RF (3)
2. Tighten 2 captive screws (2).
3. Reconnect 6 coaxial cables (1).



CE2FO019

**FOLLOW-ON MAINTENANCE:**

- Perform Adjustments (para 2-95).
- Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-28. REPLACE 78A1A7 3rd LO.****DESCRIPTION**

This procedure covers: Remove. Install.

**PRELIMINARY PROCEDURES:**

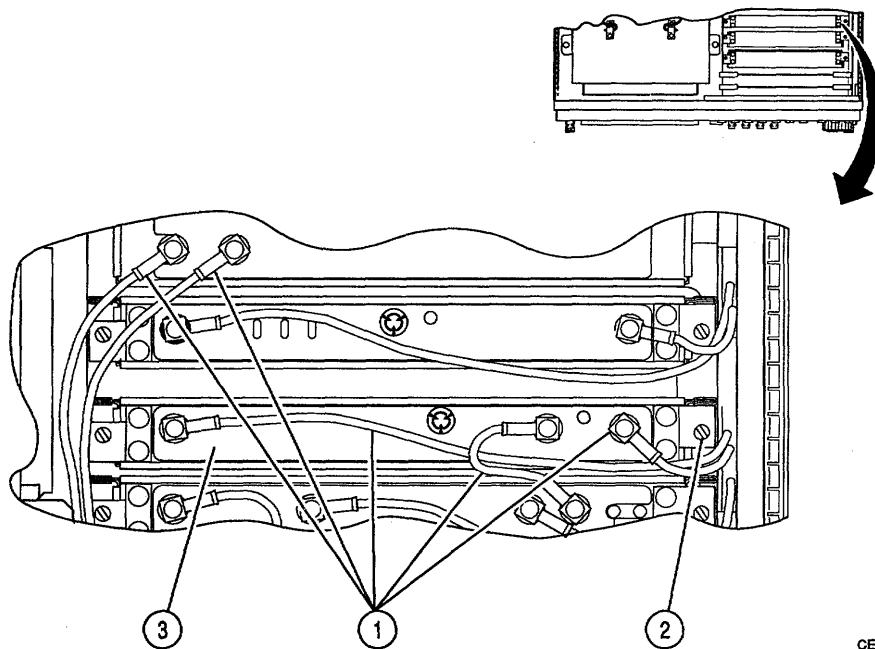
- Remove 78A2 Top Case (para 2-22).
- Remove 78A1A5 Analyzer RF (para 2-27).

**REMOVE**

1. Disconnect 5 coaxial cables (1).
2. Loosen 2 captive screws (2).
3. Remove 78A1A7 3rd LO (3).

**INSTALL**

1. Install 78A1A7 3rd LO (3).
2. Tighten 2 captive screws (2).
3. Reconnect 5 coaxial cables (1).



CE2FO021

**FOLLOW-ON MAINTENANCE:**

- .. Install 78A1A5 Analyzer RF (para 2-27).
- .. Perform Adjustments (para 2-95).
- .. Perform Frequency Agility Test (para 2-20).
- .. Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-29. REPLACE 78A1A9 90 MHz GENERATOR.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

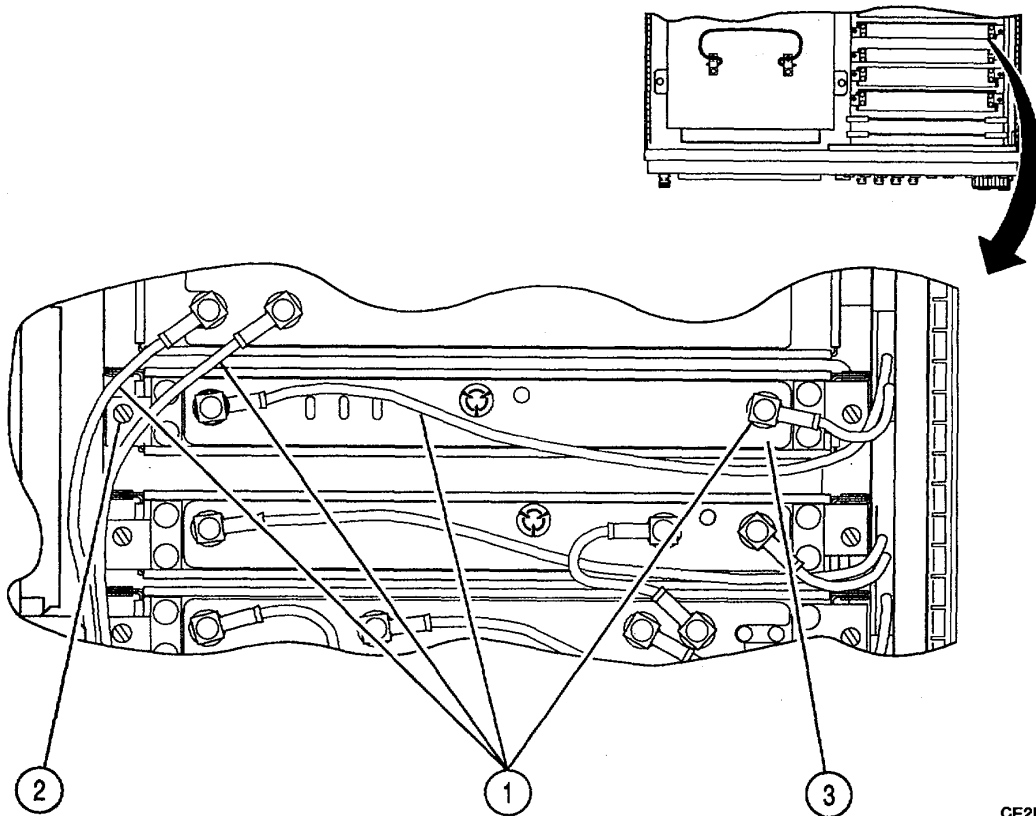
- .. Remove 78A2 Top Case (para 2-22).

**REMOVE**

1. Disconnect 4 coaxial cables (1).
2. Loosen 2 captive screws (2).
3. Remove 78A1A9 90 MHz Generator (3).

**INSTALL**

1. Install 78A1A9 90 MHz Generator (3).
2. Tighten 2 captive screws (2).
3. Reconnect 4 coaxial cables (1).



CE2FO022

**FOLLOW-ON MAINTENANCE:**

- .. Perform Adjustments (para 2-95).
- .. Perform Frequency Agility Test (para 2-20).
- .. Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-30. REPLACE 78A1A6 RECEIVER.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

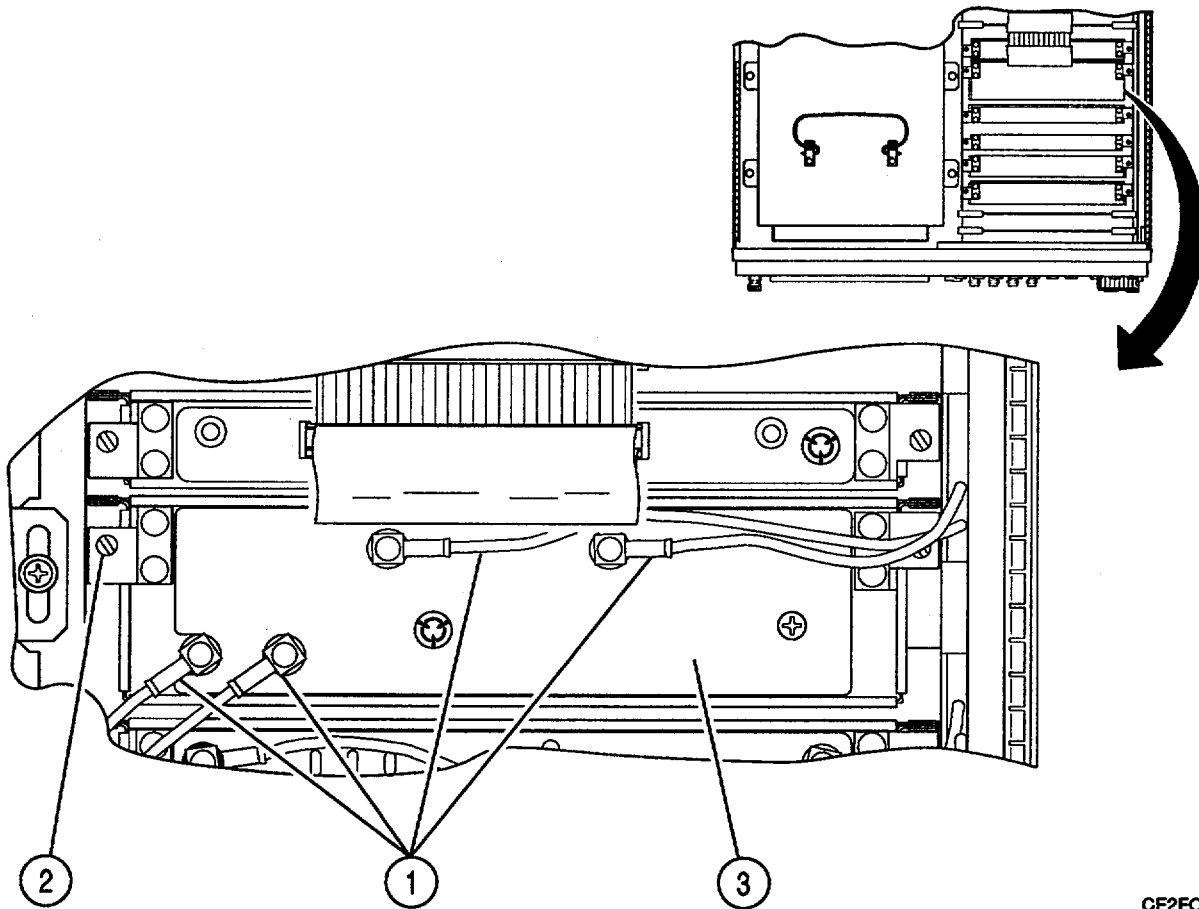
- .. Remove 78A2 Top Case (para 2-22).

**REMOVE**

1. Disconnect 4 coaxial cables (1).
2. Loosen 2 captive screws (2).
3. Remove 78A1A6 Receiver (3).

**INSTALL**

1. Install 78A1A6 Receiver (3).
2. Tighten 2 captive screws (2).
3. Reconnect 4 coaxial cables (1).



CE2FO023

**FOLLOW-ON MAINTENANCE:**

- .. Perform Adjustments (para 2-95).
- .. Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-31. REPLACE 78A1A3 MONITOR.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

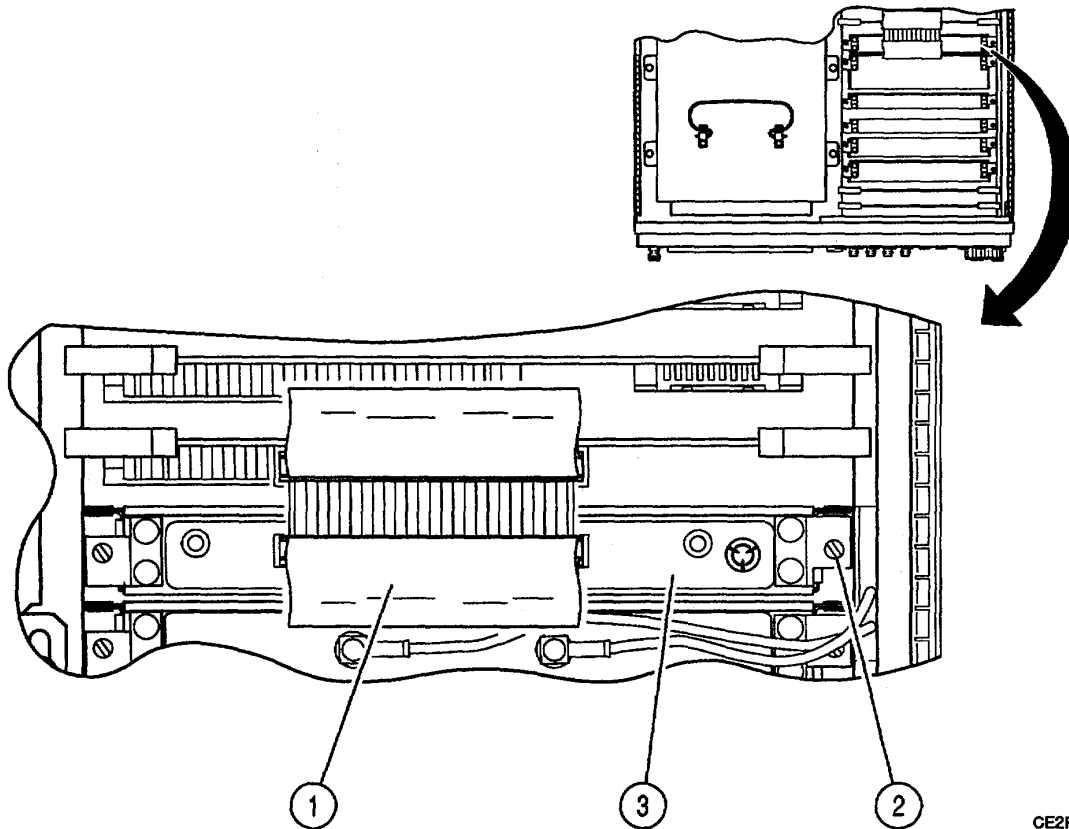
- .. Remove 78A2 Top Case (para 2-22).

**REMOVE**

1. Disconnect ribbon cable connector (1).
2. Loosen 2 captive screws (2).
3. Remove 78A1A3 Monitor (3).

**INSTALL**

1. Install 78A1A3 Monitor (3).
2. Tighten 2 captive screws (2).
3. Reconnect ribbon cable connector (1).



GE2FO024

**FOLLOW-ON MAINTENANCE:**

- .. Perform Adjustments (para 2-95).
- .. Install 78A2 Top Case (para 2-22).

**END OF TASK**



**2-32. REPLACE 78A1A26 MONITOR CONTROL.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

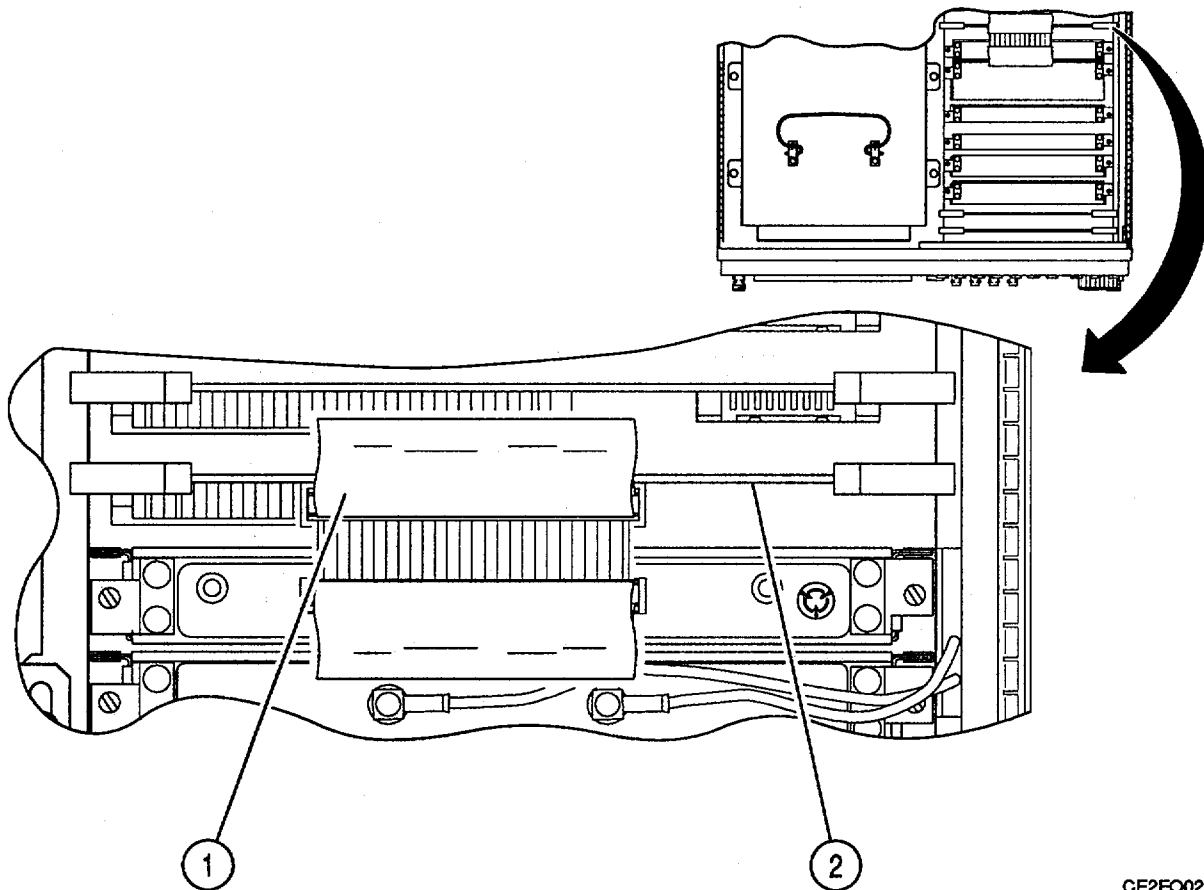
- .. Remove 78A2 Top Case (para 2-22).

**REMOVE**

1. Disconnect ribbon cable connector (1).
2. Raise card ejectors and remove 78A1A26 Monitor Control (2).

**INSTALL**

1. Install 78A1A26 Monitor Control (2) in guides and close card ejectors.
2. Reconnect ribbon cable connector (1).



CE2FO025

**FOLLOW-ON MAINTENANCE:**

- .. Perform Adjustments (para 2-95).
- .. Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-33. REPLACE 78A1A24 FUNCTION GENERATOR.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

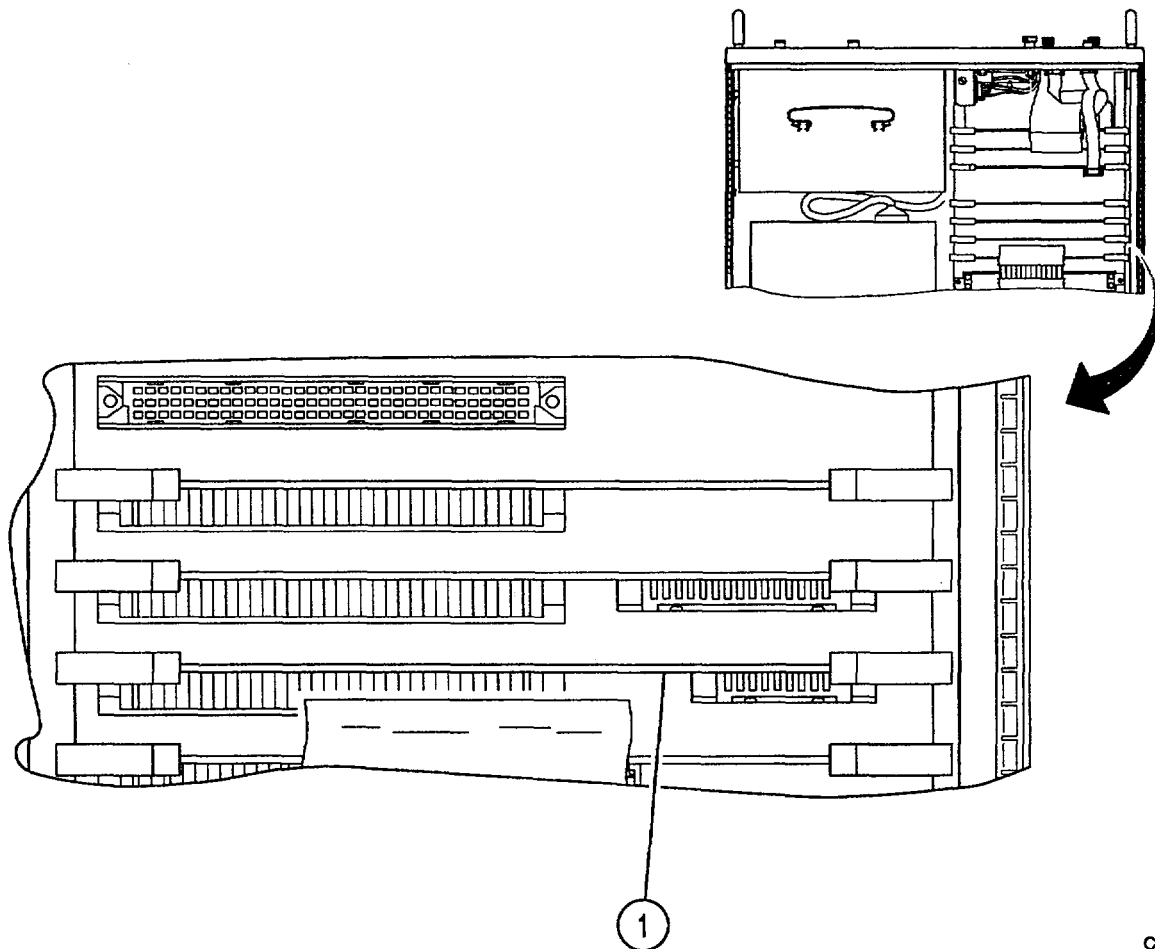
- .. Remove 78A2 Top Case (para 2-22).

**REMOVE**

Raise card ejectors and remove 78A1A24 Function Generator (1).

**INSTALL**

Install 78A1A24 Function Generator (1) in guides and close card ejectors.



CE2FO026

**FOLLOW-ON MAINTENANCE:**

- .. Perform Adjustments (para 2-95).
- .. Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-34. REPLACE 78A1A22 RF I/O.**

**DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP**

**PRELIMINARY PROCEDURES:**

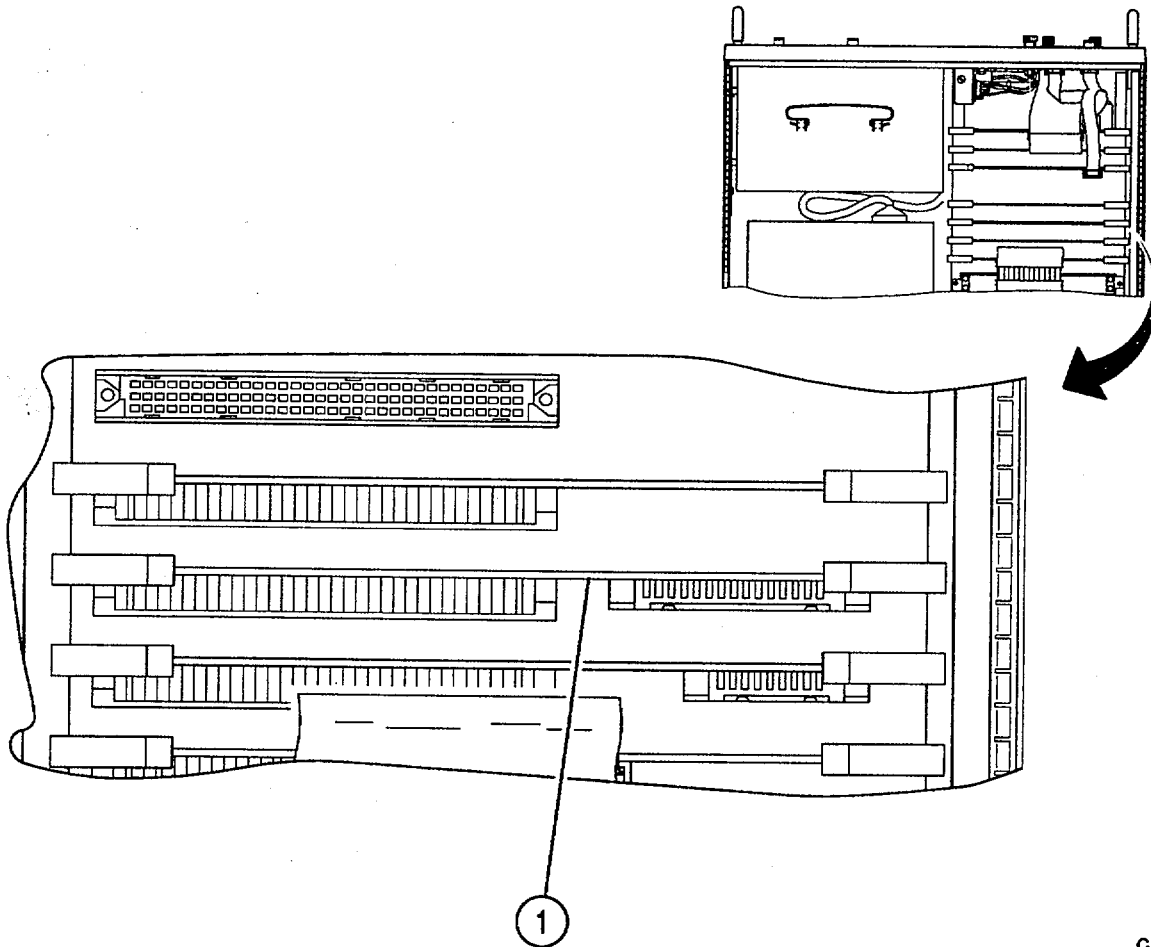
- .. Remove 78A2 Top Case (para 2-22).

**REMOVE**

Raise card ejectors and remove 78A1A22 RF I/O (1).

**INSTALL**

Install 78A1A22 RF I/O (1) in guides and close card ejectors.



CE2FO027

**FOLLOW-ON MAINTENANCE:**

- .. Perform Adjustments (para 2-95).
- .. Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-35. REPLACE 78A1A20 MEMORY.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP**

PRELIMINARY PROCEDURES:

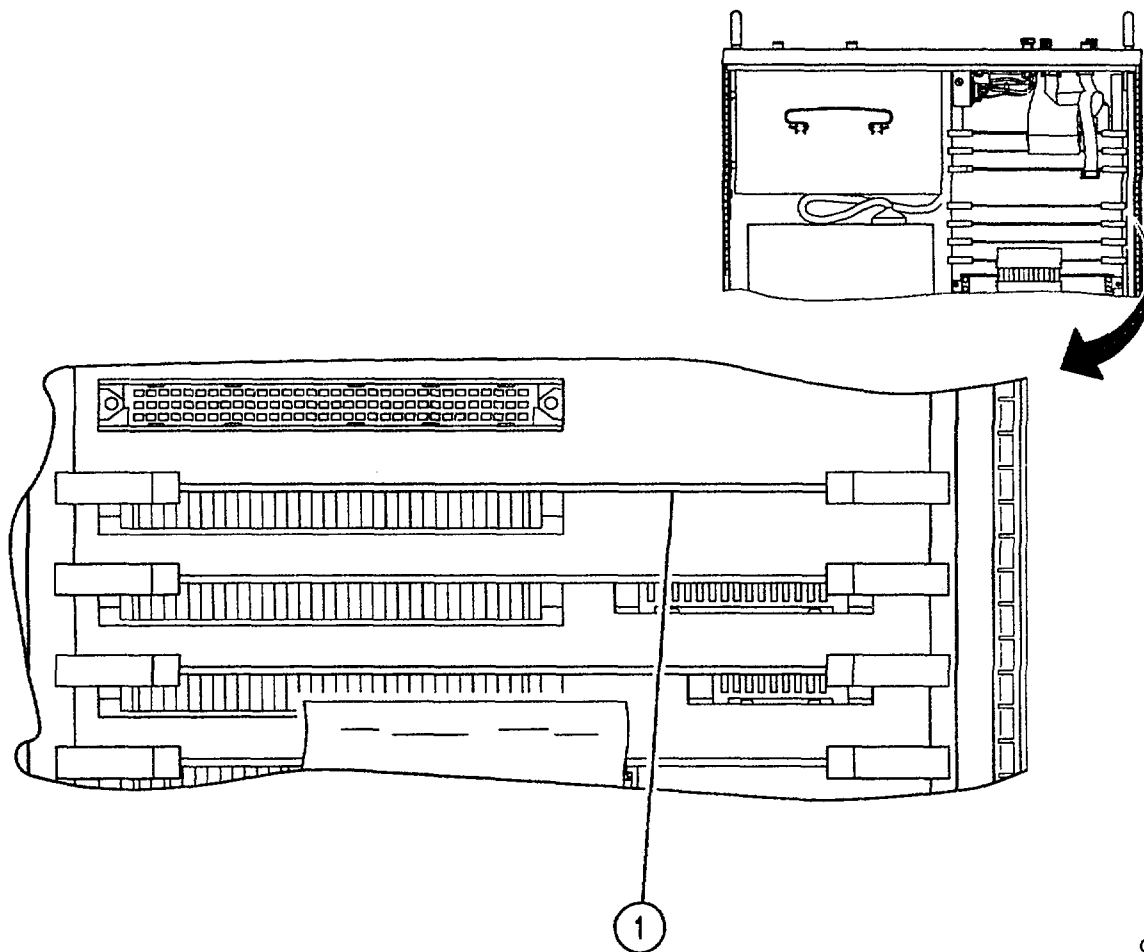
- Remove 78A2 Top Case (para 2-22).

**REMOVE**

Raise card ejectors and remove 78A1A20 Memory (1).

**INSTALL**

Install 78A1A20 Memory (1) in guides and close card ejectors.



CE2FO028

**FOLLOW-ON MAINTENANCE:**

- .. Perform Upload Interface Software Procedure (para 2-94).
- .. Perform Adjustments (para 2-95).
- .. Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-36. REPLACE 78A1A19 PROCESSOR.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

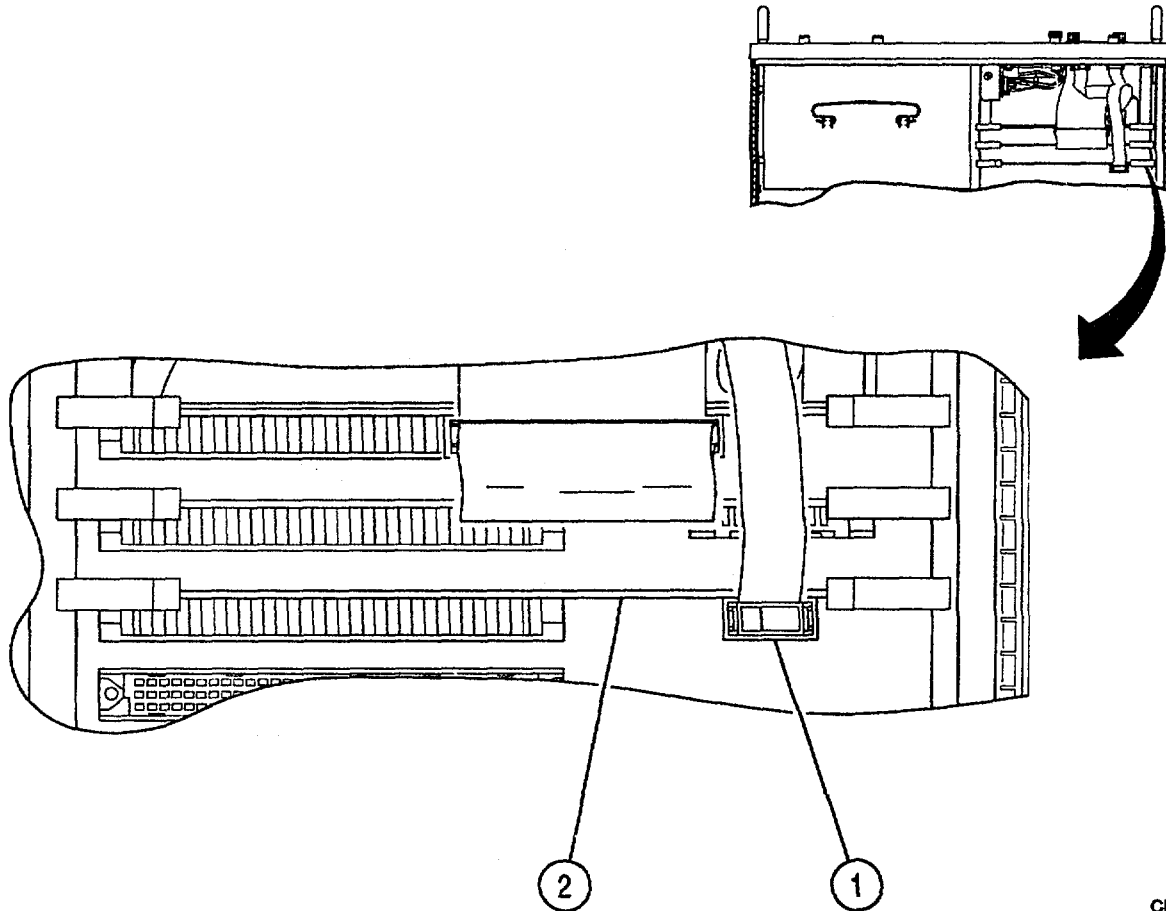
- Remove 78A2 Top Case (para 2-22).

**REMOVE**

1. Disconnect ribbon cable connector (1).
2. Raise card ejectors and remove 78A1A19 Processor (2).

**INSTALL**

1. Install 78A1A19 Processor (2) in guides and close card ejectors.
2. Reconnect ribbon cable connector (1).



CE2FO029

**FOLLOW-ON MAINTENANCE:**

- Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-37. REPLACE 78A1A21 VIDEO CONTROLLER.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

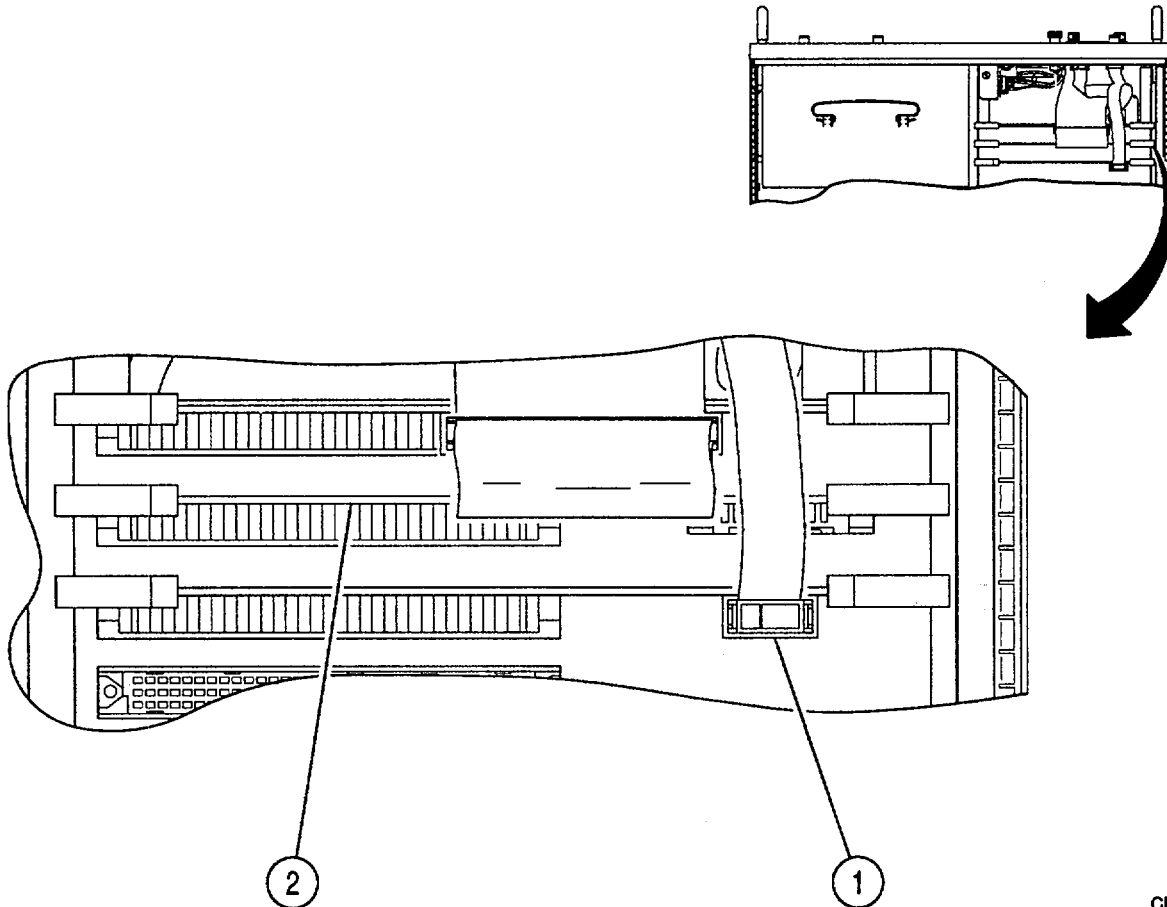
- Remove 78A2 Top Case (para 2-22).

**REMOVE**

1. Disconnect ribbon cable connector (1).
2. Raise card ejectors and remove 78A1A21 Video Controller (2).

**INSTALL**

1. Install 78A1A21 Video Controller (2) in guides and close card ejectors.
2. Reconnect ribbon cable connector (1).



CE2FO030

**FOLLOW-ON MAINTENANCE:**

- Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-38. REPLACE 78A1A27 EXTERNAL I/O.**

**DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP**

**PRELIMINARY PROCEDURES:**

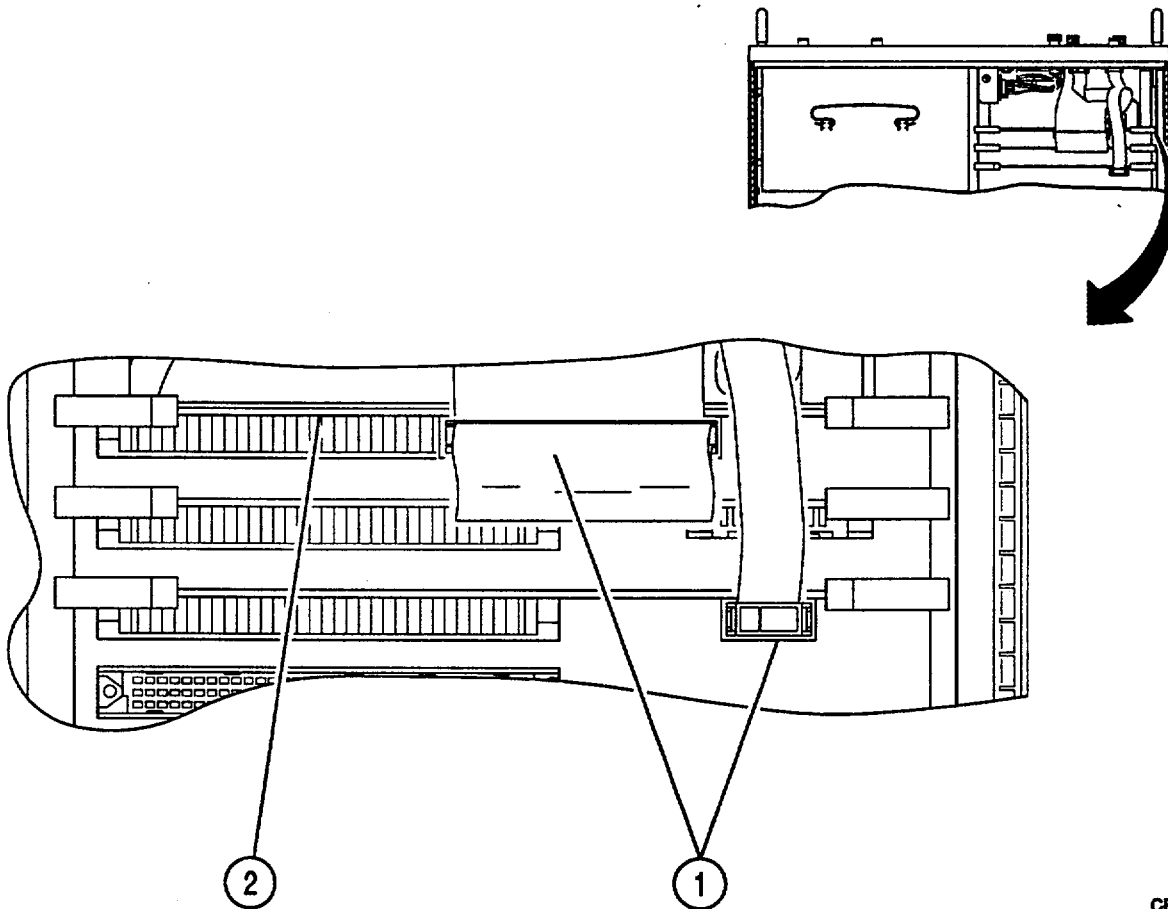
- Remove 78A2 Top Case (para 2-22).

**REMOVE**

1. Disconnect 2 ribbon cable connectors (1).
2. Raise card ejectors and remove 78A1A27 External I/O (2).

**INSTALL**

1. Install 78A1A27 External I/O (2) in guides and close card ejectors.
2. Reconnect 2 ribbon cable connectors (1).



CE2FO031

**FOLLOW-ON MAINTENANCE:**

- Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-39. REMOVE 78A1A15 CRT (7005-7840-600).**

**DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP**

**PRELIMINARY PROCEDURES:**

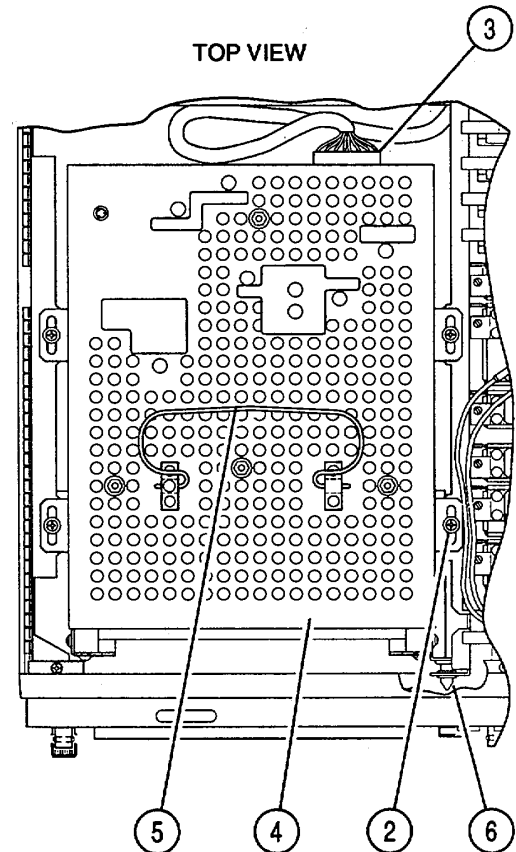
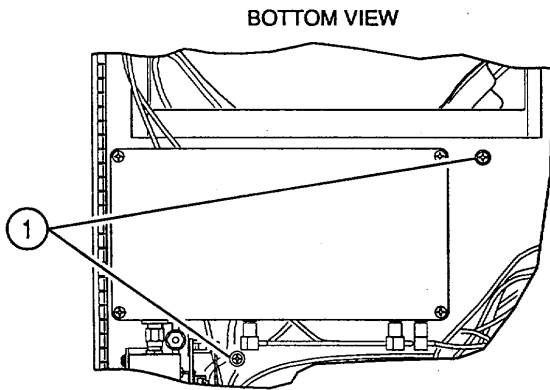
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Remove 2 screws and 4 washers (1).
2. Remove 4 screws and 8 washers (2).
3. Disconnect wire cable connector (3).
4. Slide 78A1A15 CRT (4) toward rear.
5. Raise handle (5) and remove 78A1A15 CRT (4).

**INSTALL**

1. Perform Adjustments (para 2-95).
2. Install 78A1A15 CRT (4) on chassis aligning screw holes.
3. Slide 78A1A15 CRT (4) toward front until guide pins (6) are seated in grommets.
4. Reconnect wire cable connector (3).
5. Install 4 screws and 8 washers (2).
6. Install 2 screws and 4 washers (1).



CE2FO032

**FOLLOW-ON MAINTENANCE:**

- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**



**2-40. REMOVE 78A1A15A1 CRT H/V AND 78A1A15A2 CRT COLOR.**

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**DESCRIPTION**

This procedure covers: Remove. Install.

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**INITIAL SETUP****PRELIMINARY PROCEDURES:**

- Remove 83A1 Test Adapter (para 2-21).
  - Remove 78A2 Top Case (para 2-22).
  - Remove 78A3 Bottom Case (para 2-23).
  - Remove 78A1A15 CRT (para 2-39).
- 

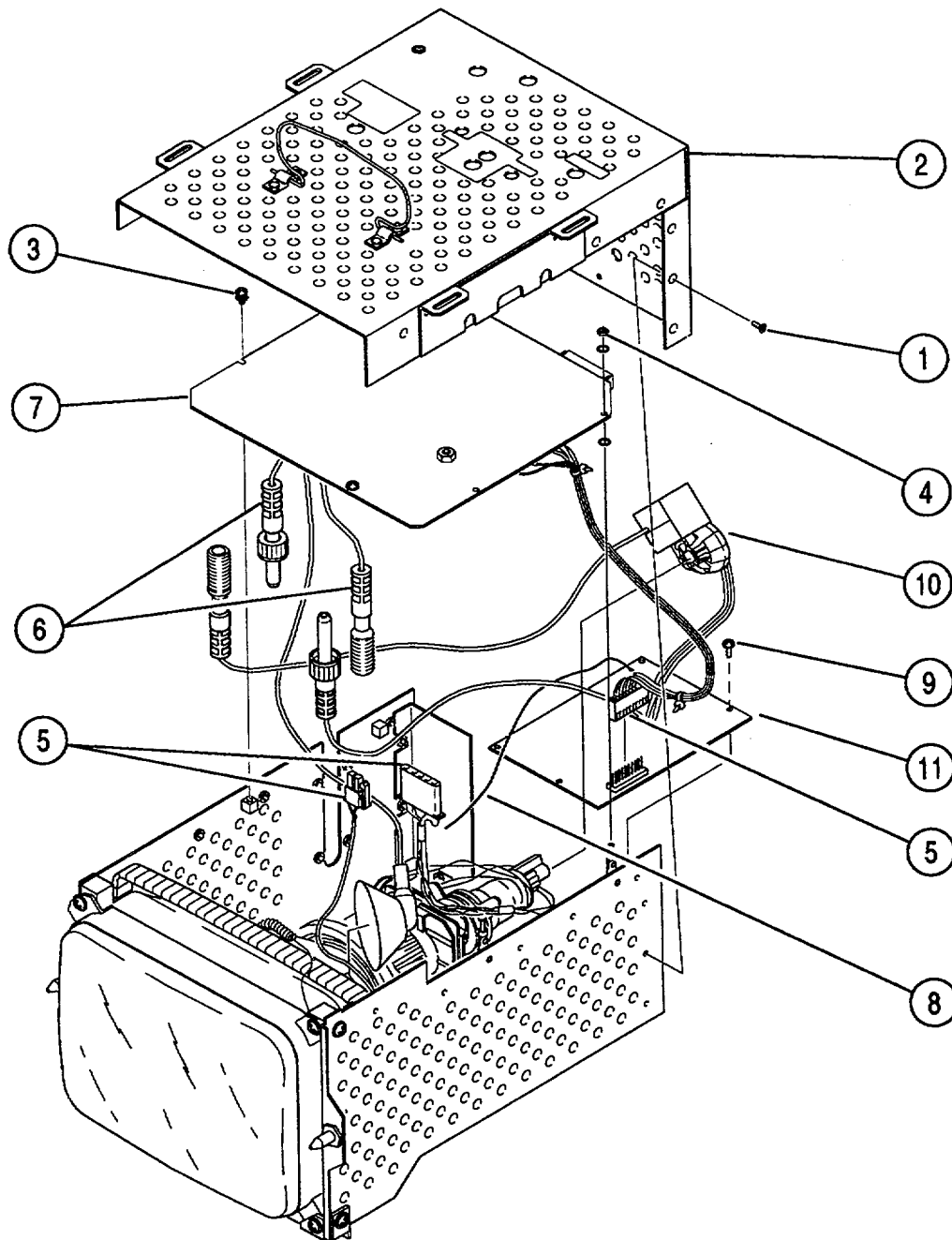
**REMOVE**

1. Remove 23 screws (1).
2. Remove top cover (2).
3. Remove 2 screws with washers (3).
4. Remove 2 nuts and 2 washers (4).
5. Lift 78A1A15A1 CRT H/V (7) and remove 2 washers (4).
6. Disconnect 3 wire cable connectors (5).
7. Disconnect 3 cable connectors (6).
8. Remove 78A1A15A1 CRT H/V (7).
9. Unsolder ground wire (8).
10. Remove 4 screws with washers (9).
11. Disconnect wire cable connector (10).
12. Remove 78A1A15A2 CRT Color (11).

**INSTALL**

1. Install 78A1A15A2 CRT Color (11).
2. Install wire cable connector (10).
3. Install 4 screws (9).
4. Solder ground wire (8).
5. Install 2 washers (4) and 78A1A15A1 CRT H/V (7).
6. Reconnect 3 cable connectors (6).
7. Reconnect 3 wire cable connectors (5).
8. Install 2 nuts and 2 washers (4).
9. Install 2 screws with washers (3).
10. Install top cover (2).
11. Install 23 screws (1).

2-40. REMOVE 78A1A15A1 CRT H/V AND 78A1A15A2 CRT COLOR - Continued.



FOLLOW-ON MAINTENANCE:

- Install 78A1A15 CRT (para 2-39).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-41. REPLACE 78A1A15V1 (7005-7840-600).****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

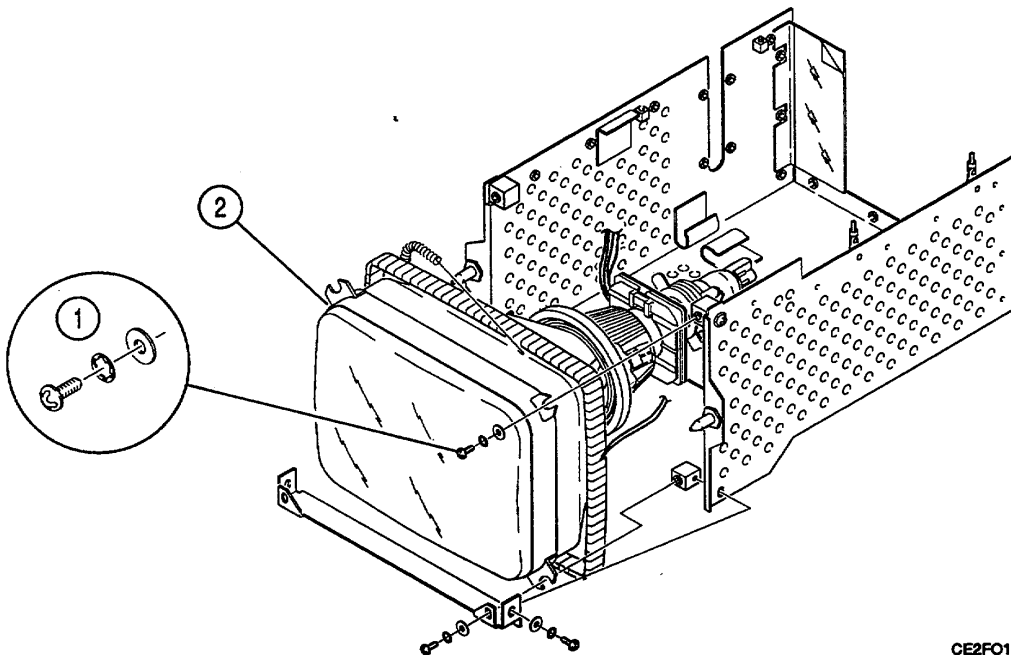
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A15 CRT (para 2-39).
- Remove 78A1A15A1 CRT H/V (para 2-40).
- Remove 78A1A15A2 CRT Color (para 2-40).

**REMOVE**

1. Remove 6 screws, 6 lock washers and 6 flat washers (1).
2. Remove 78A1A15V1 (2).

**INSTALL**

1. Install 78A1A15V1 (2).
2. Install 6 screws, 6 lock washers and 6 flat washers (1).



CE2FO138

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A15A2 CRT Color (para 2-40).
- Install 78A1A15A1 CRT H/V (para 2-40).
- Install 78A1A15 CRT (para 2-39).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-42. REMOVE 78A1A15 CRT (7005-8644-300).****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

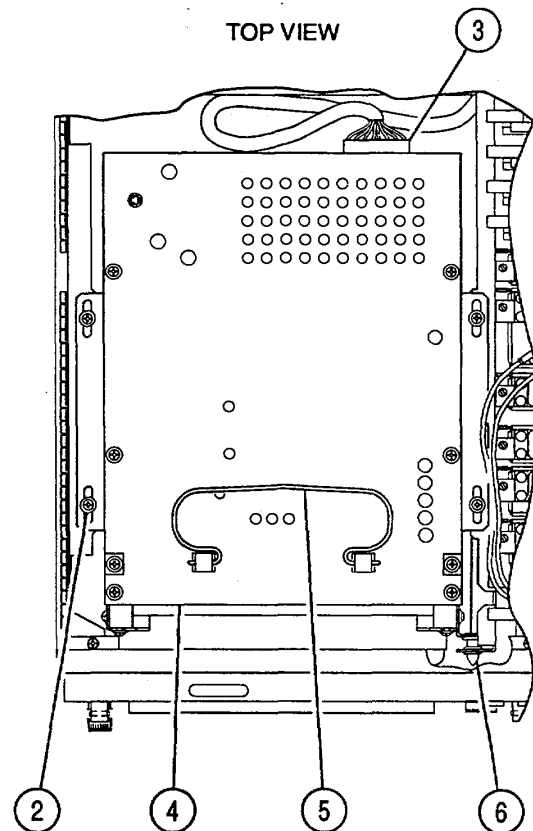
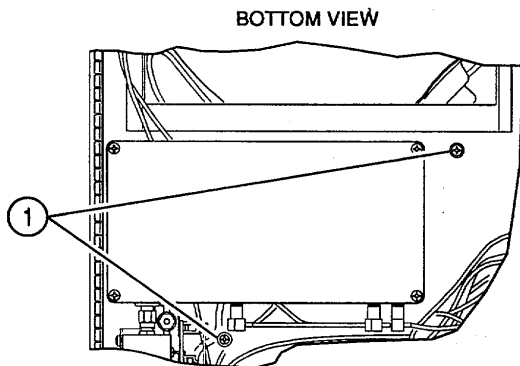
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Remove 2 screws and 4 washers (1).
2. Remove 4 screws and 8 washers (2).
3. Disconnect wire cable connector (3).
4. Slide 78A1A15 CRT (4) toward rear.
5. Raise handle (5) and remove 78A1A15 CRT (4).

**INSTALL**

1. Perform Adjustments (para 2-95).
2. Install 78A1A15 CRT (4) on chassis aligning screw holes.
4. Slide 78A1A15 CRT (4) toward front until guide pins (6) are seated in grommets.
4. Disconnect wire cable connector (3).
5. Install 4 screws and 8 washers (2).
6. Install 2 screws and 4 washers (1).



CE2FO230

**FOLLOW-ON MAINTENANCE:**

- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

Change 1 2-118

**2-43. REPLACE 78A1A15A1 VIDEO.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

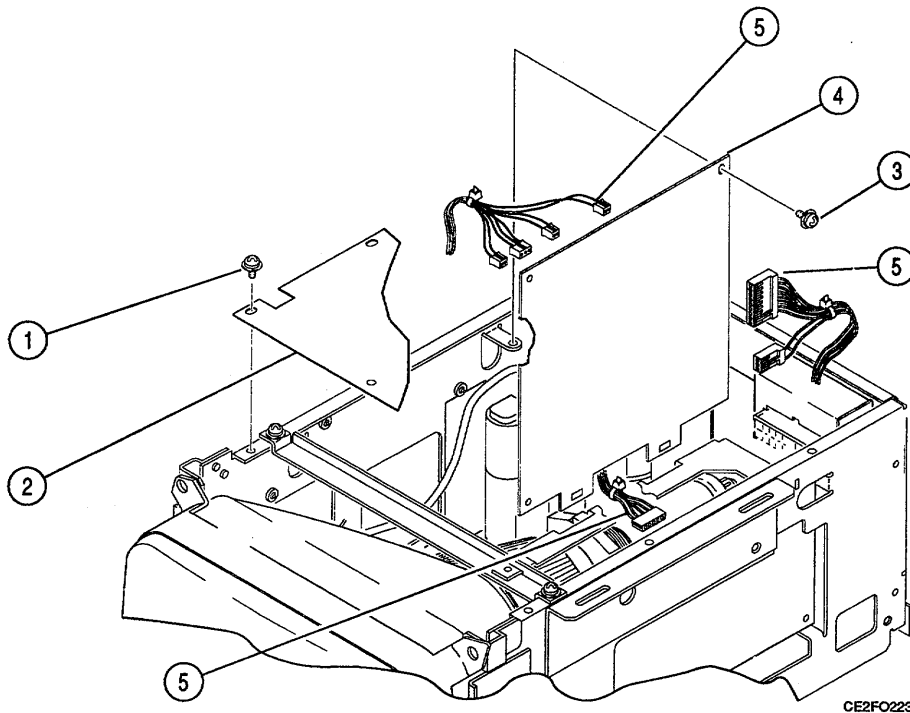
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A15 CRT (para 2-42).

**REMOVE**

1. Remove 6 screws with captive washers (1) and top cover (2).
2. Remove 2 screws with captive washers (3).
3. Raise 78A1A15A1 Video (4) <sup>90°</sup> disconnect 7 wire cable connectors (5).

**INSTALL**

1. Reconnect 7 wire cable connectors (5).
2. Install 78A1A15A1 Video (4).
3. Install 2 screws with captive washers (3).
4. Install top cover (2) and 6 screws with captive washers (1).

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A15 CRT (para 2-42).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-44. REPLACE 78A1A15W1.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

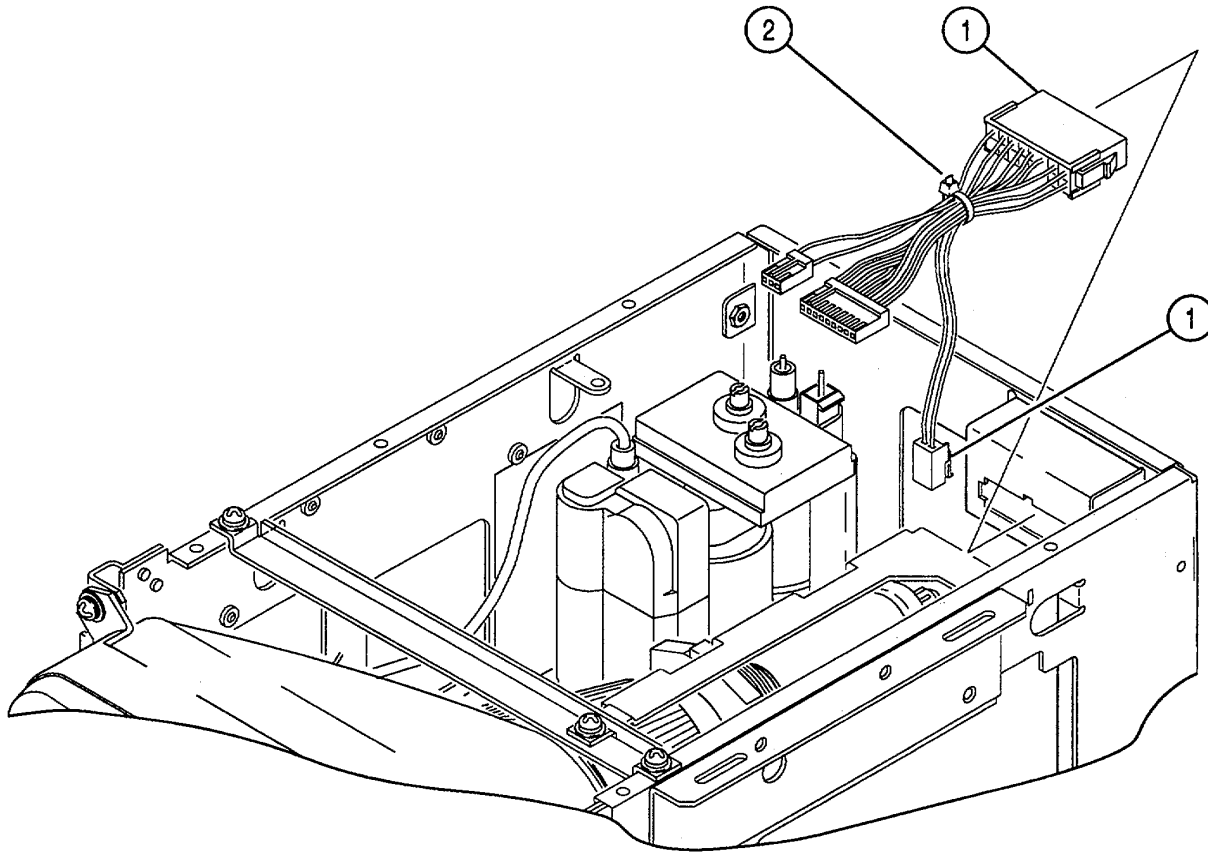
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A15 CRT (para 2-42).
- Remove 78A1A15A1 Video (para 2-43).

**REMOVE**

1. Remove 2 wire cable connectors (1).
2. Remove 78A1A15W1 (2).

**INSTALL**

1. Install 78A1A15W1 (2).
2. Install 2 wire cable connectors (1).



CE2FO225

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A15A1 Video (para 2-43).
- Install 78A1A15 CRT (para 2-42).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-45. REPLACE 78A1A15A2 DEFLECTION.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A15 CRT (para 2-42).
- Remove 78A1A15A1 Video (para 2-43).

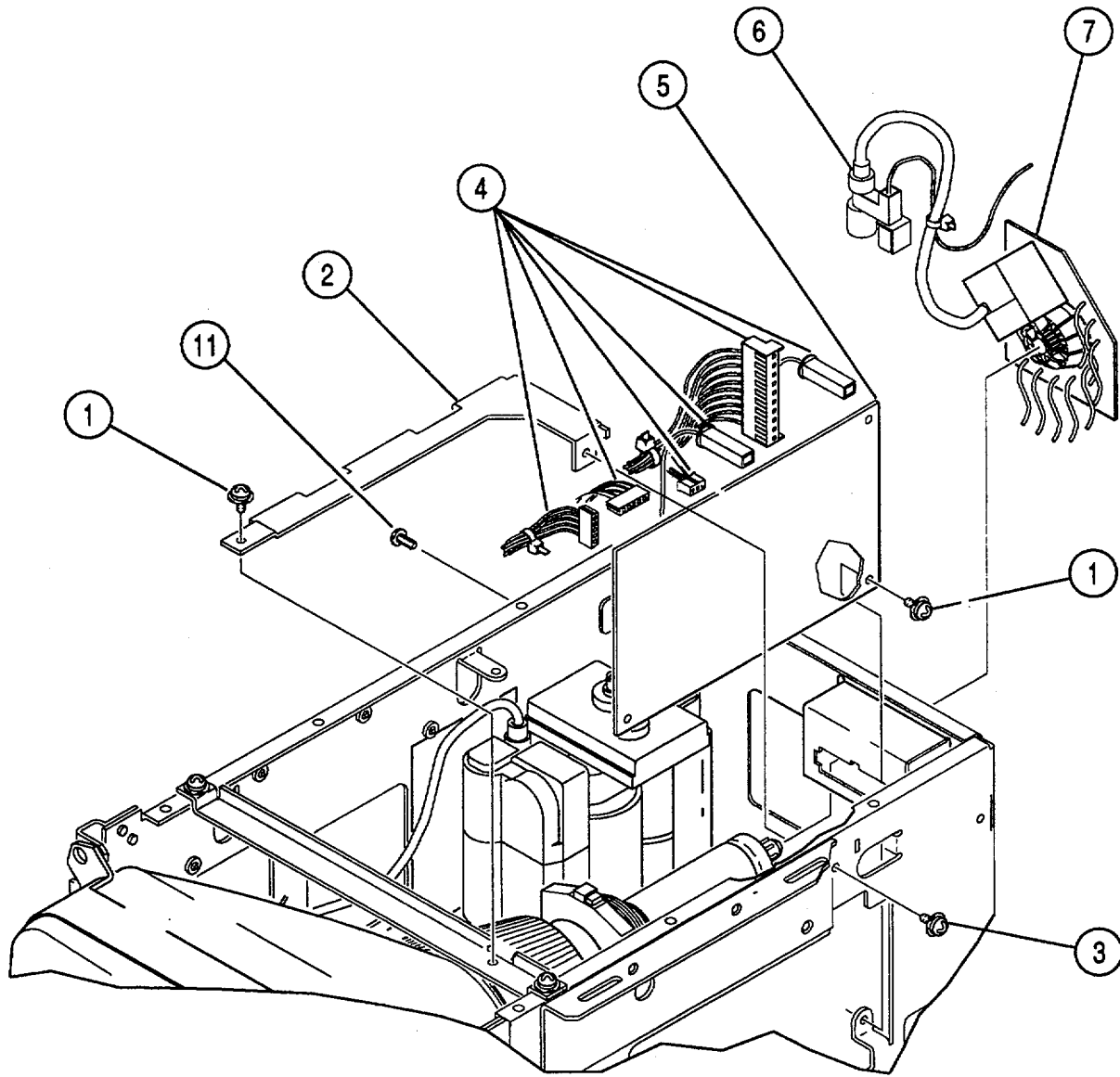
**REMOVE**

1. Remove 2 screws with captive washers (1) and bracket (2).
2. Remove 4 screws with captive washers (3).
3. Raise 78A1A15A2 Deflection (Sub) (5) and disconnect 5 wire cable connectors (4).
4. Remove 78A1A15A2 Deflection (Sub) (5).
5. Remove wire cable connector (6).
6. Remove 78A1A15A2 Deflection (Socket) (7).
7. Remove 4 screws with captive washers (8) and bottom cover (9).
8. Remove 4 screws with captive washers (10), mylar sheeting and 2 screws with captive washers (10).
9. Remove screw with captive washer (11).
10. Remove 4 wire cable connectors (12).
11. Remove 78A1A15A2 Deflection (13).

**INSTALL**

1. Install 78A1A15A2 Deflection (13).
2. Install 4 wire cable connectors (12).
3. Install 2 screws with captive washers (11), mylar sheeting and 4 screws with captive washers (10).
4. Install screw with captive washer (11).
5. Install bottom cover (9) and 4 screws with captive washers (8).
6. Install 78A1A15A2 Deflection (Socket) (7).
7. Install wire cable connector (6).
8. Reconnect 5 wire cable connectors (4).
9. Install 78A1A15A2 Deflection (Sub) (5).
10. Install 4 screws with captive washers (3).
11. Install bracket (2) and 2 screws with captive washers (1).

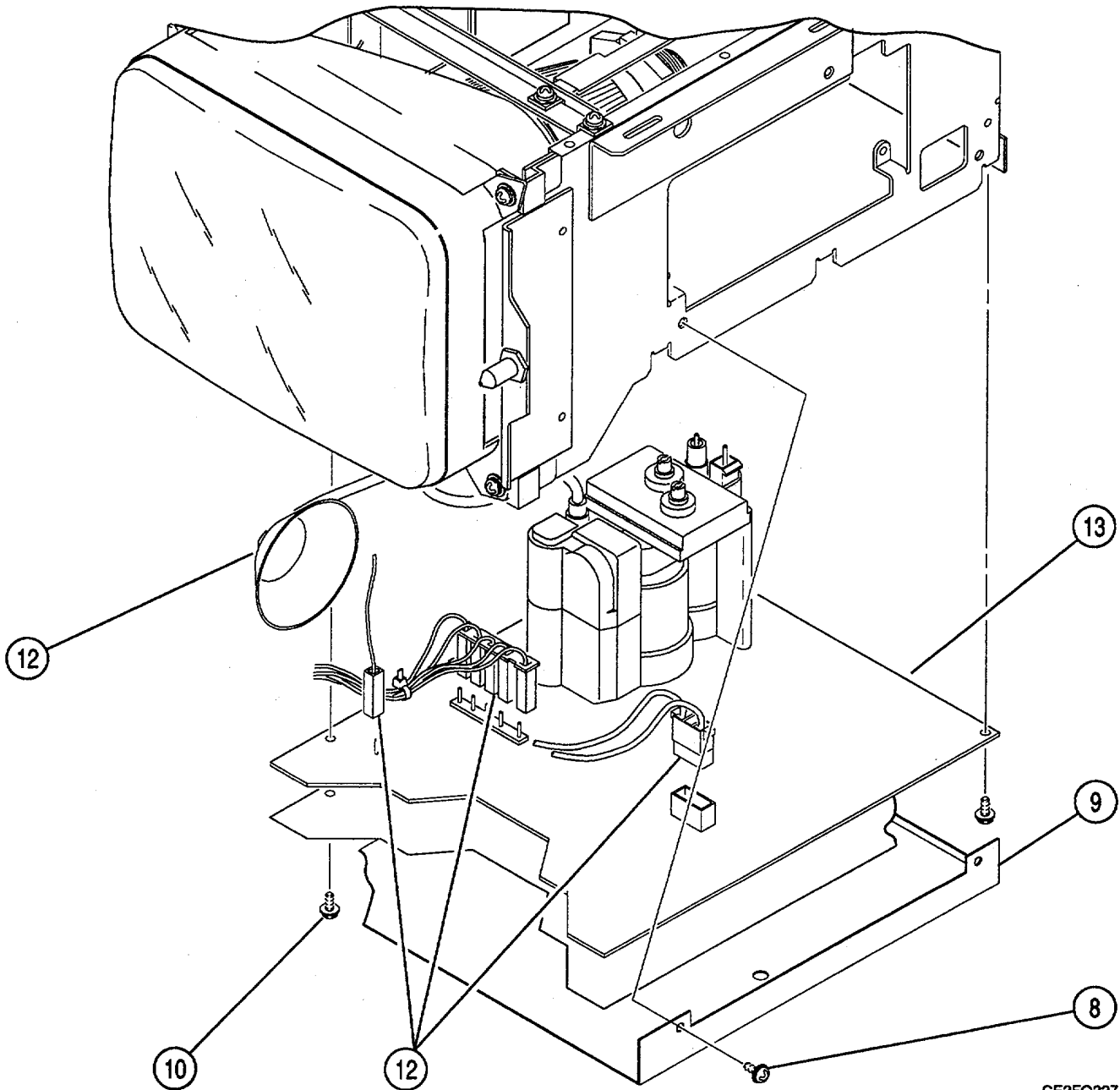
2-45. REPLACE 78A1A15A2 DEFLECTION - Continued.



CE2FO224



## 2-45. REPLACE 78A1A15A2 DEFLECTION - Continued.



CE2FO227

## FOLLOW-ON MAINTENANCE:

- Install 78A1A15A1 Video (para 2-43).
- Install 78A1A15 CRT (para 2-42).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

END OF TASK

**2-46. REPLACE 78A1A15V1 (7005-8644-300).****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

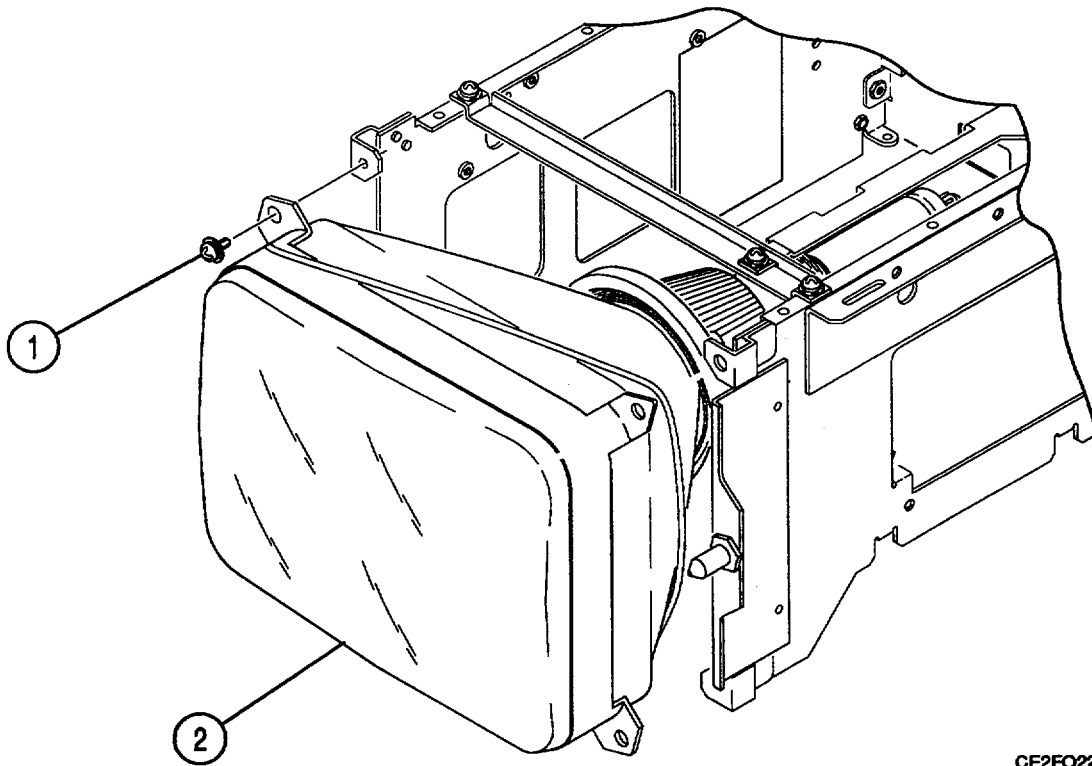
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A15 CRT (para 2-42).
- Remove 78A1A15A1 Video (para 2-43).
- Remove 78A1A15A2 Deflection (para 2-45).

**REMOVE**

1. Remove 4 screws with captive washers (1).
2. Remove 78A1A15V1 (2).

**INSTALL**

1. Install 78A1A15V1 (2).
2. Install 4 screws with captive washers (1).



CE2FO228

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A15A2 Deflection (para 2-45).
- Install 78A1A15A1 Video (para 2-43).
- Install 78A1A15 CRT (para 2-42).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-47. REPLACE 78A1A15A2F1.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

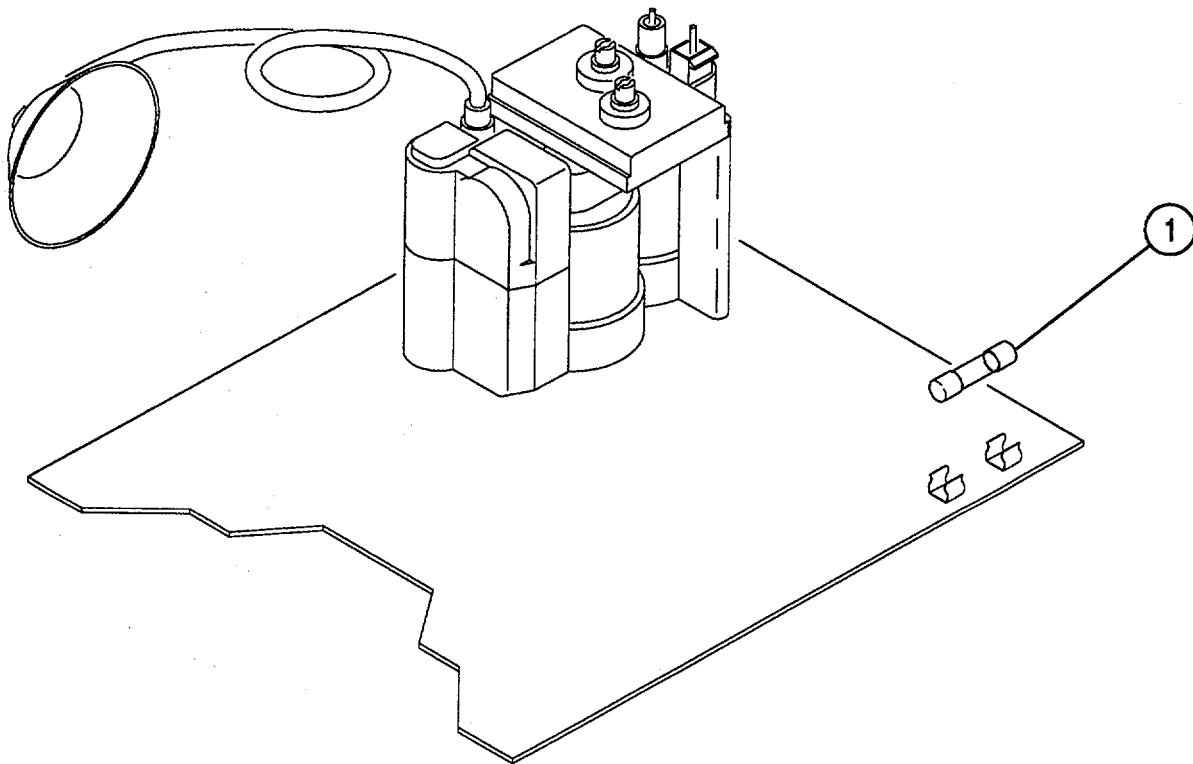
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A15 CRT (para 2-42).
- Remove 78A1A15A2 Deflection (para 2-45).

**REMOVE**

Remove 78A1A15A2F1 (1).

**INSTALL**

Install 78A1A15A2F1 (1).



CE2FO229

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A15A2 Deflection (para 2-45).
- Install 78A1A15 CRT (para 2-42).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-48. REPLACE 78A1A16 POWER SUPPLY.**

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**DESCRIPTION**

This procedure covers: Remove. Install.

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**INITIAL SETUP****PRELIMINARY PROCEDURES:**

- Remove 83A1 Test Adapter (para 2-21).
  - Remove 78A2 Top Case (para 2-22).
  - Remove 78A3 Bottom Case (para 2-23).
- 

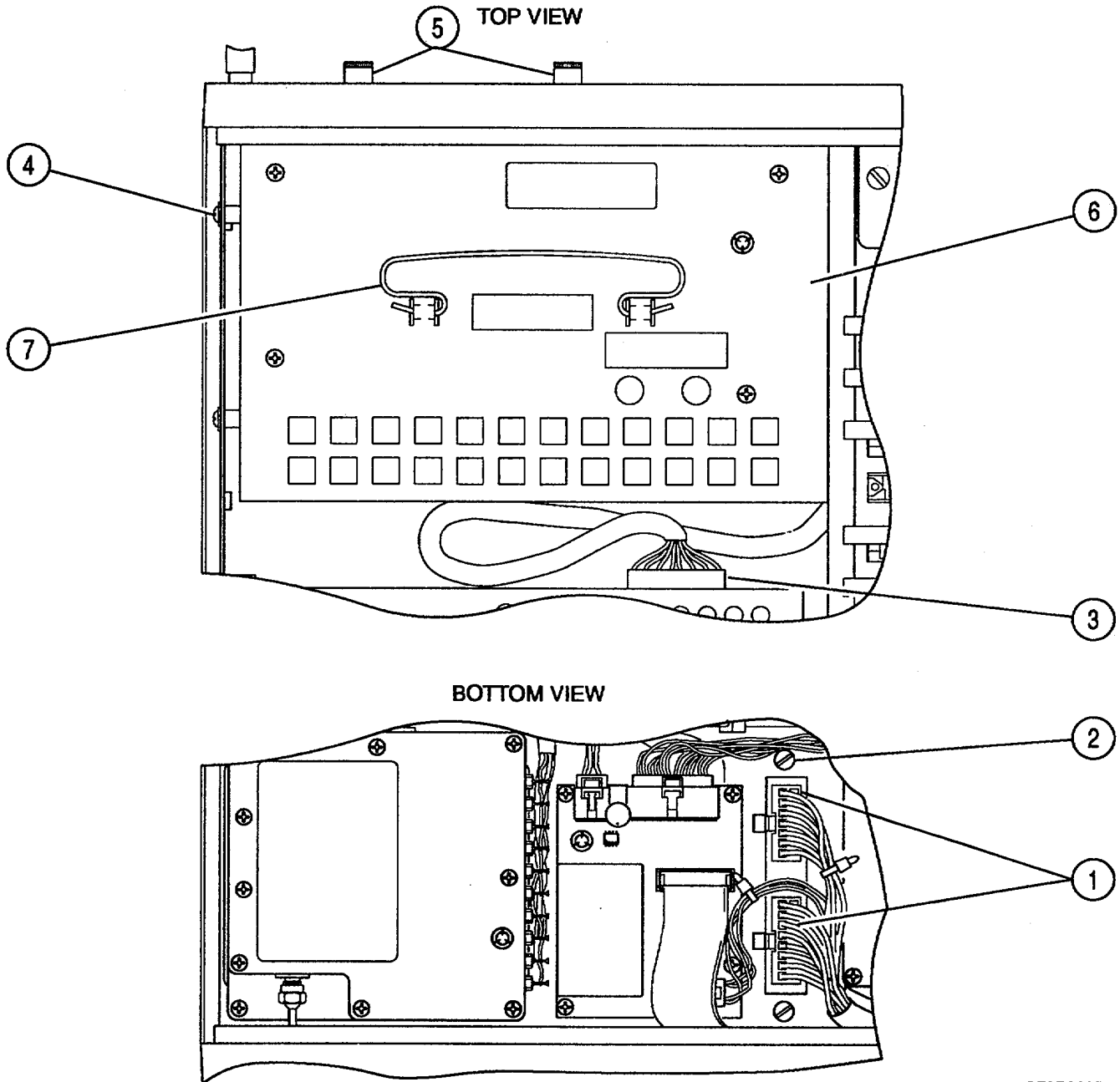
**REMOVE**

1. Disconnect 2 wire cable connectors (1).
2. Loosen 2 captive screws (2).
3. Disconnect wire cable connector (3).
4. Remove 2 screws and 4 washers (4).
5. Remove 2 covers (5).
6. Slide 78A1A16 Power Supply (6) toward front.
7. Raise handle (7) and remove 78A1A16 Power Supply (6).

**INSTALL**

1. Install 78A1A16 Power Supply (6).
2. Slide 78A1A16 Power Supply (6) toward rear.
3. Install 2 covers (5).
4. Install 2 screws and washers (4).
5. Reconnect wire cable connector (3).
6. Tighten 2 captive screws (2).
7. Reconnect 2 wire cable connectors (1).

2-48. REPLACE 78A1A16 POWER SUPPLY - Continued.



CE2FO035

FOLLOW-ON MAINTENANCE:

- Perform Adjustments (para 2-95).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

END OF TASK

**2-49. REMOVE 78A1A17 FRONT PANEL.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

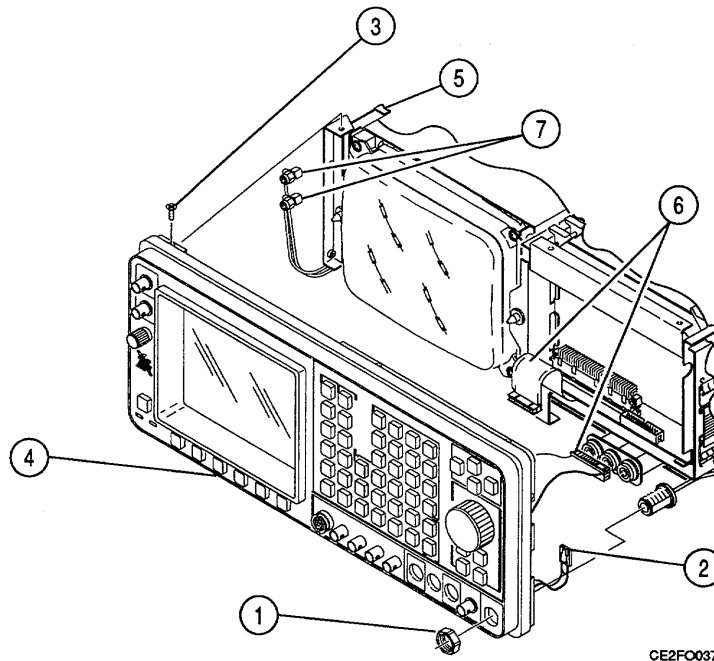
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Remove nut (1).
2. Disconnect wire cable connector (2).
3. Remove 8 screws (3).
4. Lift 78A1A17 Front Panel (4) and disconnect  
2 Ribbon cable connectors (6) and 2 coaxial  
cable connectors (7).

**INSTALL**

1. Hold 78A1A17 Front Panel (4) and reconnect  
2 ribbon cable connectors (6) and 2 coaxial  
cable connectors (7).
2. Install 78A1A17 Front Panel (4) on 78A1A1  
Chassis (5).
3. Install 8 screws (3).
4. Reconnect wire cable connector (2).
5. Install nut (1). Torque to 120 in/lbs.

**FOLLOW-ON MAINTENANCE:**

- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-50. REPLACE 78A1A17J1A/78A1A17J1B.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

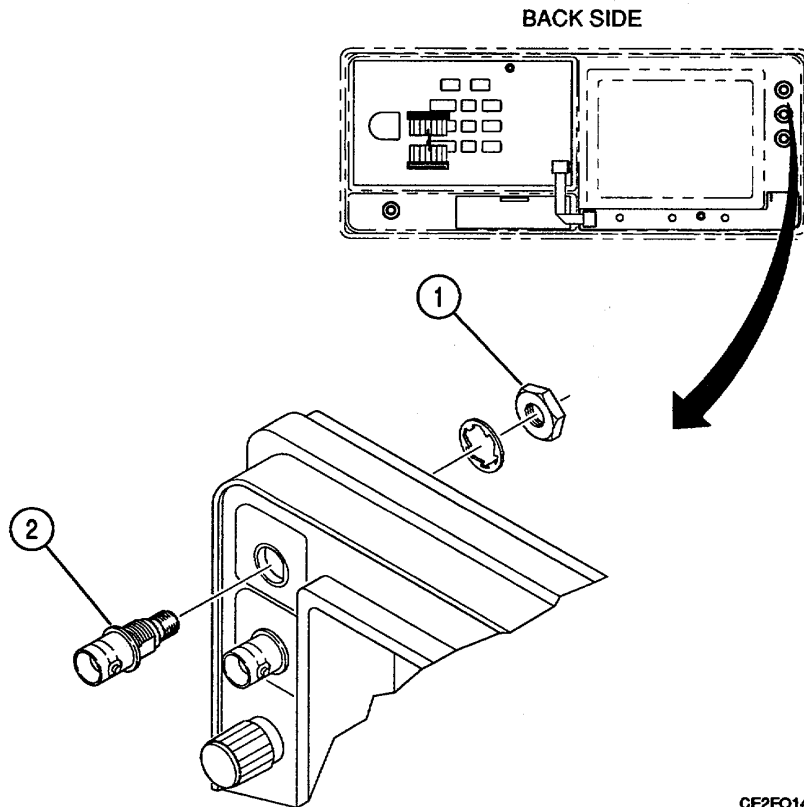
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A17 Front Panel (para 2-49).

**REMOVE**

1. Remove nut and lock washer (1).
2. Remove 78A1A17J1A/78A1A17J1B (2).

**INSTALL**

1. Install 78A1 A17J1 A/78A1 A17J1 B (2).
2. Install nut and lock washer (1) with Loctite 290 (Appendix B).



CE2FO142

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A17 Front Panel (para 2-49).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-51. REPLACE 78A1A17J2A/78A1A17J2B.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

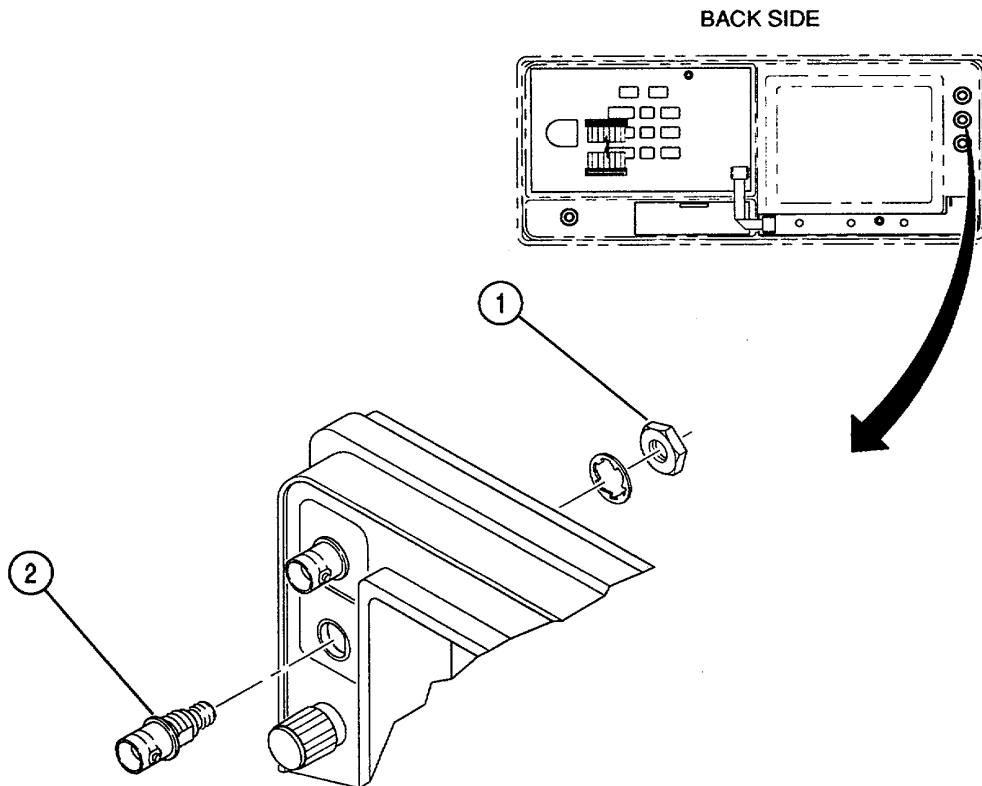
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A17 Front Panel (para 2-49).

**REMOVE**

1. Remove nut and lock washer (1).
2. Remove 78A1 A17J2A/78A1 A17J2B (2).

**INSTALL**

1. Install 78A1A17J2A/78A1A17J2B (2).
2. Install nut and lock washer (1) with Loctite 290 (Appendix B).



CE2FO143

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A17 Front Panel (para 2-49).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**



**2-52. REPLACE 78A1A17R1.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

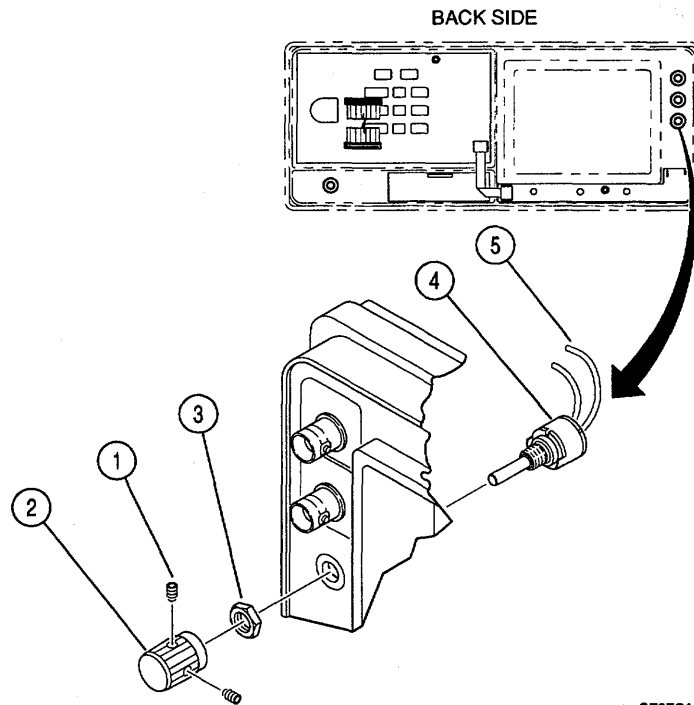
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A17 Front Panel (para 2-49).

**REMOVE**

1. Loosen 2 set screws (1).
2. Remove knob (2).
3. Remove nut (3).
4. Remove 78A1A17R1 (4).
5. Tag and unsolder 2 wires (5).

**INSTALL**

1. Install 78A1A17R1 (4).
2. Install nut (3).
3. Install knob (2).
4. Tighten 2 set screws (1).
5. Install and solder 2 wires (5).



CE2FO144

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A17 Front Panel (para 2-49).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-53. REPLACE 78A1A17J8.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

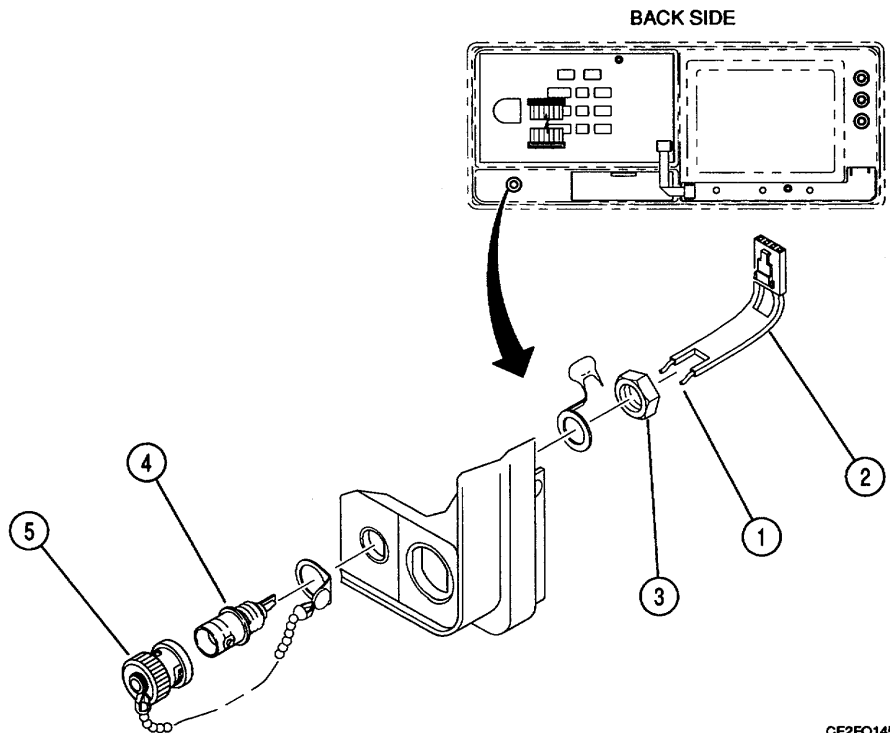
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A17 Front Panel (para 2-49).

**REMOVE**

1. Tag and unsolder 2 wires (1).
2. Remove wire connector assembly (2).
3. Remove nut and lock washer (3).
4. Remove 78A1A17J8 (4) and cap (5).

**INSTALL**

1. Install 78A1A17J8 (4) and cap (5).
2. Install nut and lock washer (3).
3. Install wire connector assembly (2).
4. Install and solder 2 wires (1).

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A17 Front Panel (para 2-49).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-54. REPLACE 78A1A17A1 CONNECTOR.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

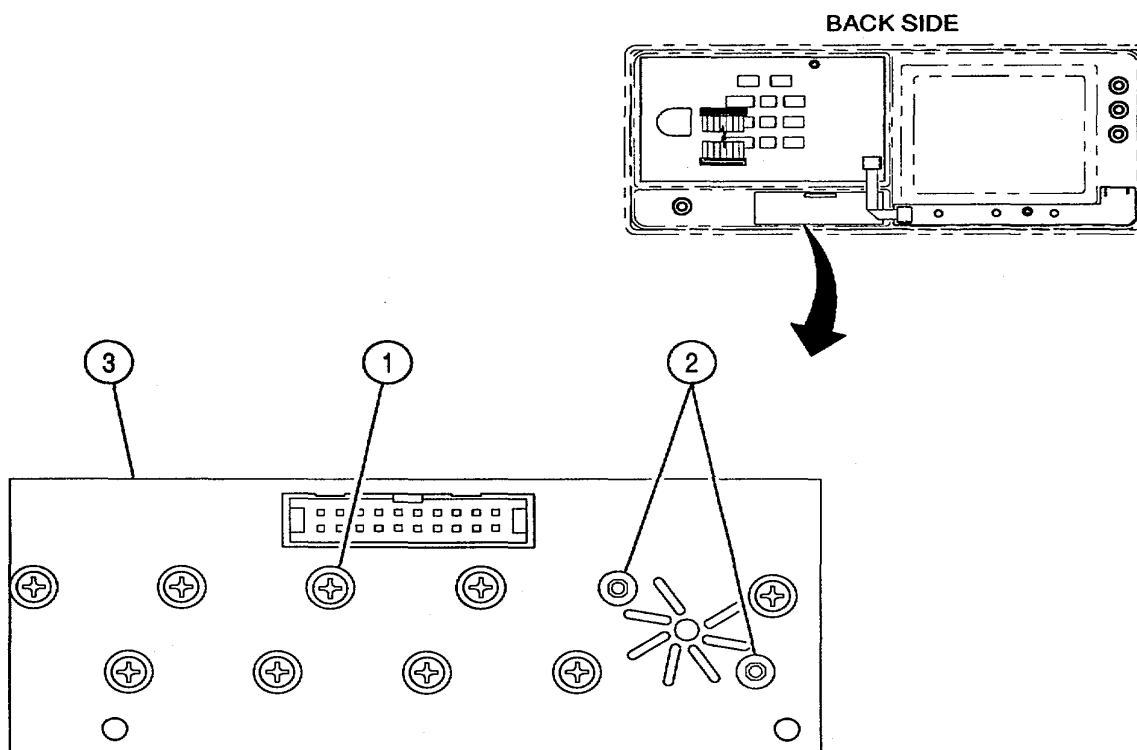
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A17 Front Panel (para 2-49).

**REMOVE**

1. Remove 9 screws (1).
2. Remove 2 nuts and 2 lock washers (2).
3. Remove 78A1A17A1 Connector (3).

**INSTALL**

1. Install 78A1A17A1 Connector (3).
2. Install 9 screws (1).
3. Install 2 nuts and 2 lock washers (2).

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A17 Front Panel (para 2-49).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-55. REPLACE 78A1A17A2 KEYBOARD.**

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**DESCRIPTION**

This procedure covers: Remove. Install.

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**INITIAL SETUP****PRELIMINARY PROCEDURES:**

- Remove 83A1 Test Adapter (para 2-21).
  - Remove 78A2 Top Case (para 2-22).
  - Remove 78A3 Bottom Case (para 2-23).
  - Remove 78A1A17 Front Panel (para 2-49).
- 

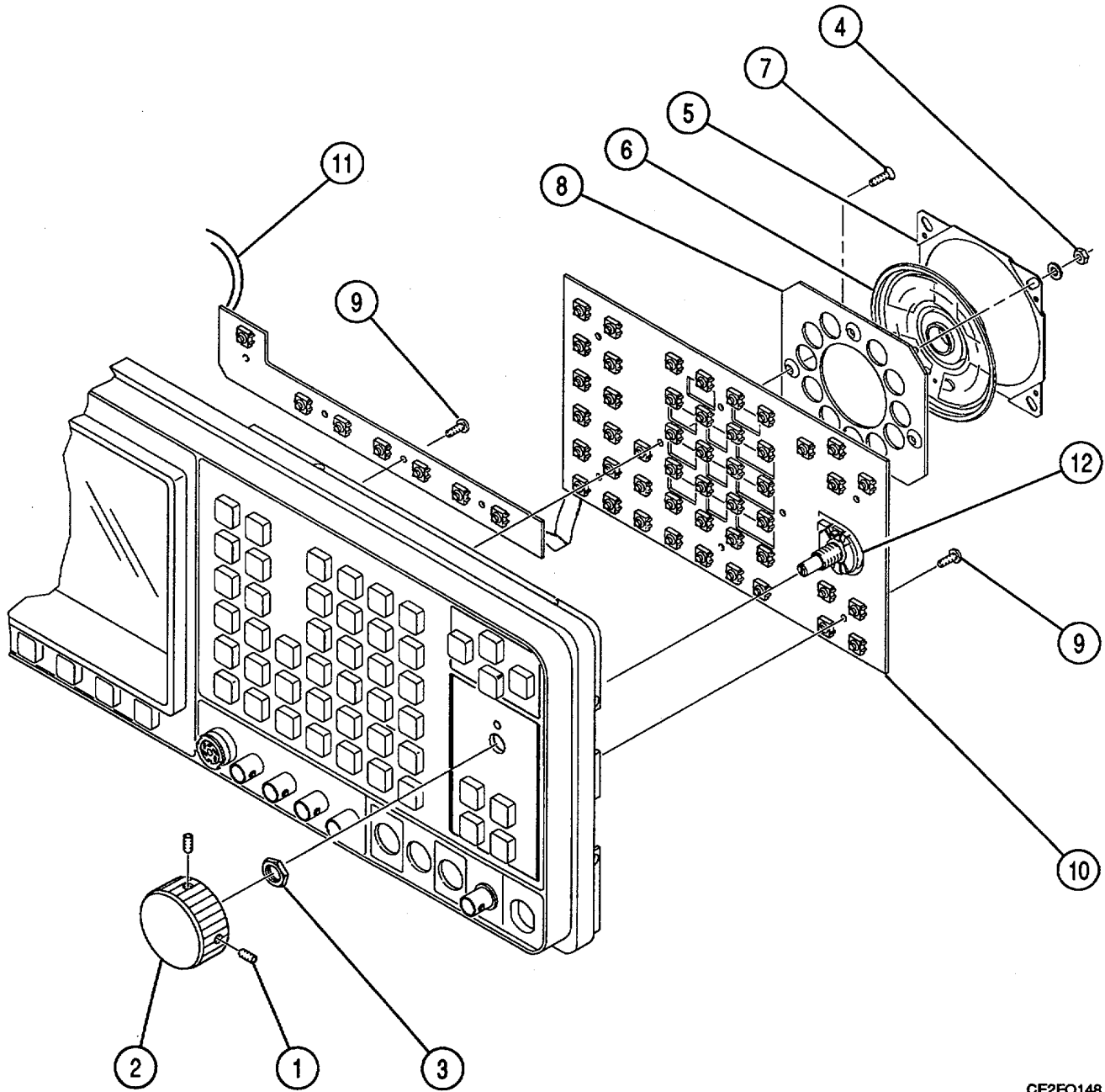
**REMOVE**

1. Loosen 2 set screws (1).
2. Remove knob (2) and nut (3).
3. Unsolder 2 wires on speaker (6).
4. Remove 4 nuts and 4 washers (4).
5. Remove top speaker bracket (5) and speaker (78A1A17LS1) (6).
6. Remove 4 screws (7).
7. Remove bottom speaker bracket (8).
8. Remove 8 screws (9).
9. Unsolder 2 wires (11) on 78A1A17A2 Keyboard (10).
10. Remove 78A1A17A2 Keyboard (10).
11. Unsolder DATA SCROLL Spinner (78A1A17RE1) (12) from 78A1A17A2 Keyboard (10).

**INSTALL**

1. Solder DATA SCROLL Spinner (78A1A17RE1) (12) to 78A1A17A2 Keyboard (10).
2. Install 78A1A17A2 Keyboard (10).
3. Solder 2 wires (11) to 78A1A17A2 Keyboard (10).
4. Install 8 screws (9).
5. Install bottom speaker bracket (8).
6. Install 4 screws (7).
7. Install top speaker bracket (5) and speaker (78A1A17LS1) (6).
8. Install 4 nuts and 4 washers (4).
9. Solder 2 wires to speaker (6).
10. Install nut (3) and knob (2).
11. Tighten 2 set screws (1).

2-55. REPLACE 78A1A17A2 KEYBOARD - Continued.



CE2FO148

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A17 Front Panel (para 2-49).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-56. REPLACE 78A1A30 REAR PANEL CONNECTOR.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

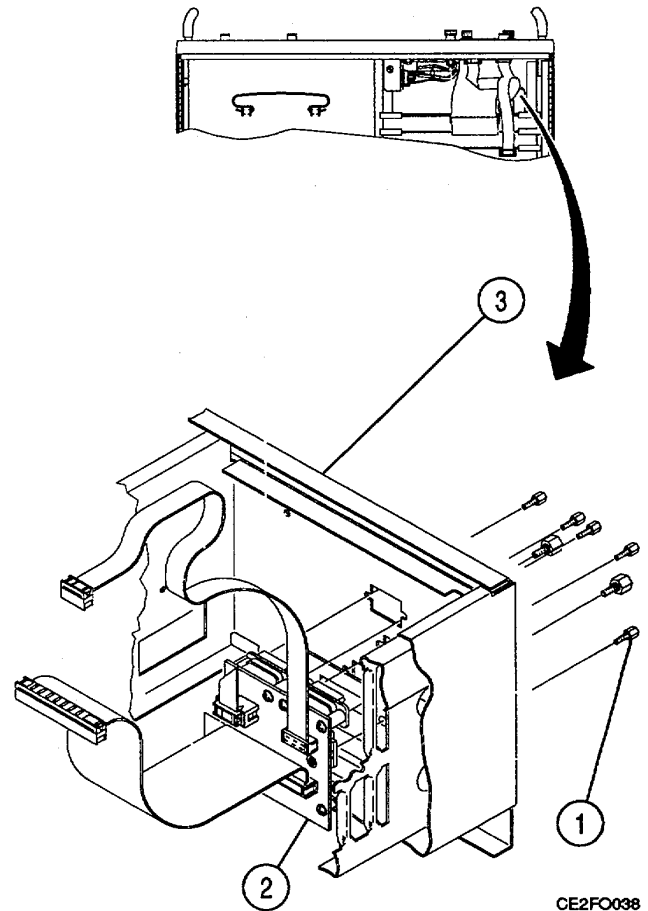
- Remove 78A2 Top Case (para 2-22).
- Remove 78A1A19 Processor (para 2-36).
- Remove 78A1A21 Video Controller (para 2-37).
- Remove 78A1A27 External I/O (para 2-38).

**REMOVE**

1. Remove ESD Covers from connectors.
2. Remove 8 shell nuts (1).
3. Remove 78A1A30 Rear Panel Connector (2).

**INSTALL**

1. Install 78A1A30 Rear Panel Connector (2) on 78A1A2 Rear Panel (3).
2. Install 8 shell nuts (1) with Loctite 290 (Appendix B).
3. Install ESD Covers on connectors.

**FOLLOW-ON MAINTENANCE:**

- Remove 78A1A27 External I/O (para 2-38).
- Remove 78A1A21 Video Controller (para 2-37).
- Remove 78A1A19 Processor (para 2-36).
- Install 78A2 Top Case (para 2-22).

**END OF TASK**

**2-57. REPLACE 78A1A2 REAR PANEL.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

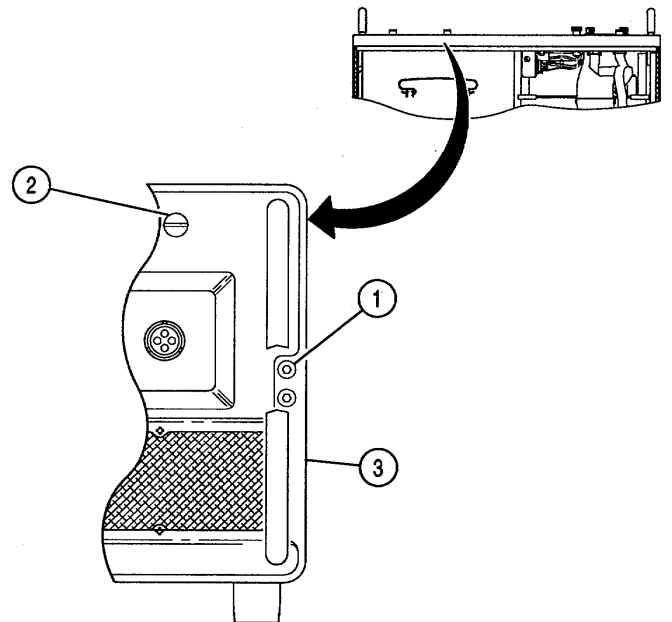
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-23).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Remove 4 screws (1).
2. Loosen 4 captive screws (2).
3. Remove 78A1A2 Rear Panel (3).

**INSTALL**

1. Install 78A1A2 Rear Panel (3).
2. Tighten 4 captive screws (2).
3. Install 4 screws (1).



CE2FO039

**FOLLOW-ON MAINTENANCE:**

- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-58. REMOVE 78A1A8 DMM.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

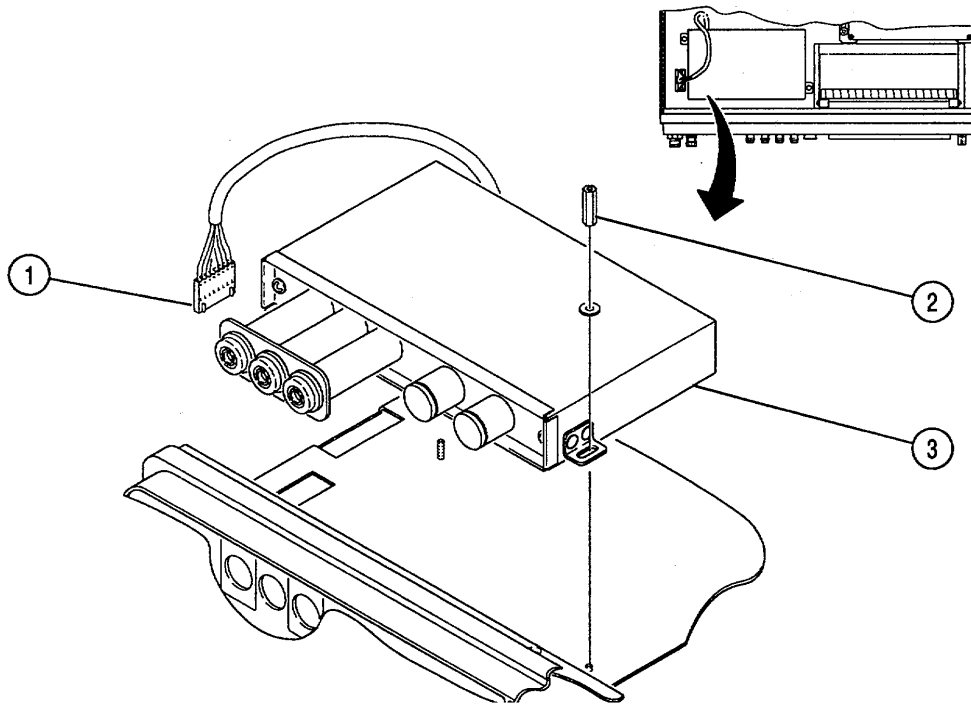
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Disconnect wire cable connector (1).
2. Remove 2 spacer nuts and 2 washers (2).
3. Slide 78A1A8 DMM (3) to rear and remove.

**INSTALL**

1. Install 78A1A8 DMM (3) and slide forward until tight against 78A1A17 Front Panel.
2. Reconnect wire cable connector (1).
3. Install 2 spacer nuts and 2 washers (2).



CE2F0040

**FOLLOW-ON MAINTENANCE:**

- Perform Adjustments (para 2-95).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**



**2-59. REPLACE 78A1A8F2, 78A1A8F3 AND 78A1A8A1F1.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

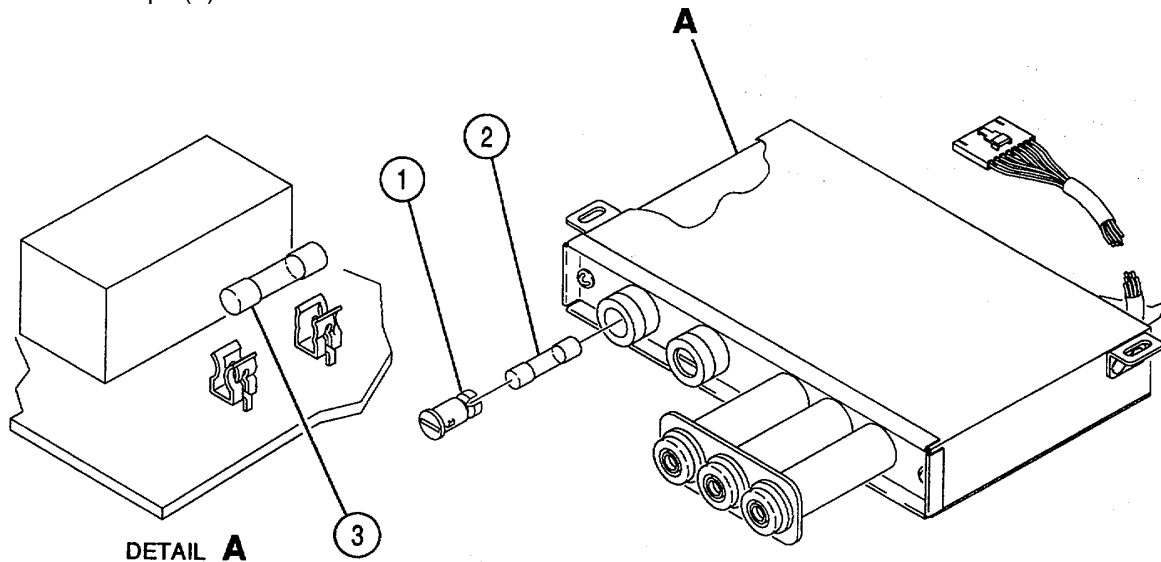
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A8 DMM (para 2-58).

**REMOVE**

1. Remove 2 fuse caps (1).
2. Remove 78A1A8F2 and 78A1A8F3 (2).
3. Remove 78A1A8A2 DMM/Digital and 78A1A8A1 DMM/Relay (para 2-60 or 2-61).
4. Remove 4 screws (para 2-60 or 2-61).
5. Remove 78A1A8A1F1 (3).

**INSTALL**

1. Install 78A1A8A1F1 (3).
2. Install 4 screws (para 2-60 or 2-61).
3. Install 78A1A8A2 DMM/Digital and 78A1A8A1 DMM/Relay (para 2-60 or 2-61).
4. Install 78A1A8F2 and 78A1A8F3 (2).
5. Install 2 fuse caps (1).



CE2FO139

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A8 DMM (para 2-58).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-60. REPLACE 78A1A8A2 DMM/DIGITAL.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

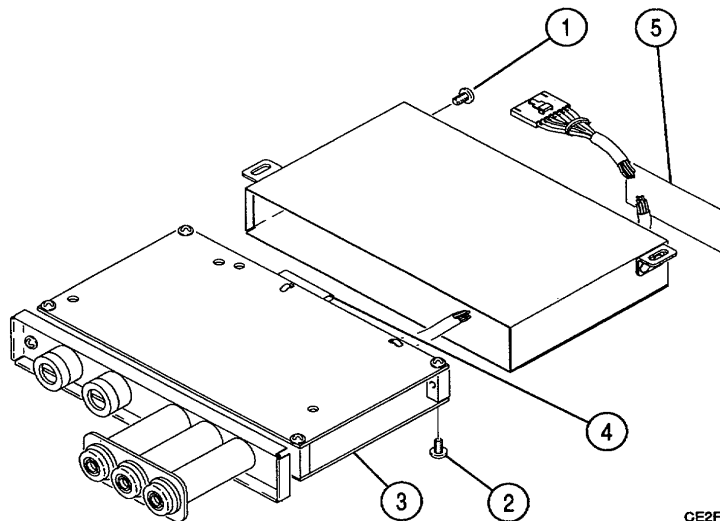
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A8 DMM (para 2-58).

**REMOVE**

1. Remove aluminum tape (5).
2. Remove 2 screws (1).
3. Remove 78A1A8A2 DMM/Digital and 78A1A8A1 DMM/Relay.
4. Remove 4 screws (2).
5. Lift up 78A1A8A2 DMM/Digital (3) 90°.
6. Unsolder ribbon connector (4).
7. Remove 78A1A8A2 DMM/Digital (3).

**INSTALL**

1. Install 78A1A8A2 DMM/Digital (3).
2. Install and solder ribbon connector (4).
3. Install 4 screws (2).
4. Install 78A1A8A2 DMM/Digital and 78A1A8A1 DMM/Relay.
5. Install 2 screws (1). Torque to 4 in/lbs.
6. Install aluminum tape (5).

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A8 DMM (para 2-58).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-61. REPLACE 78A1A8A1 DMM/RELAY.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

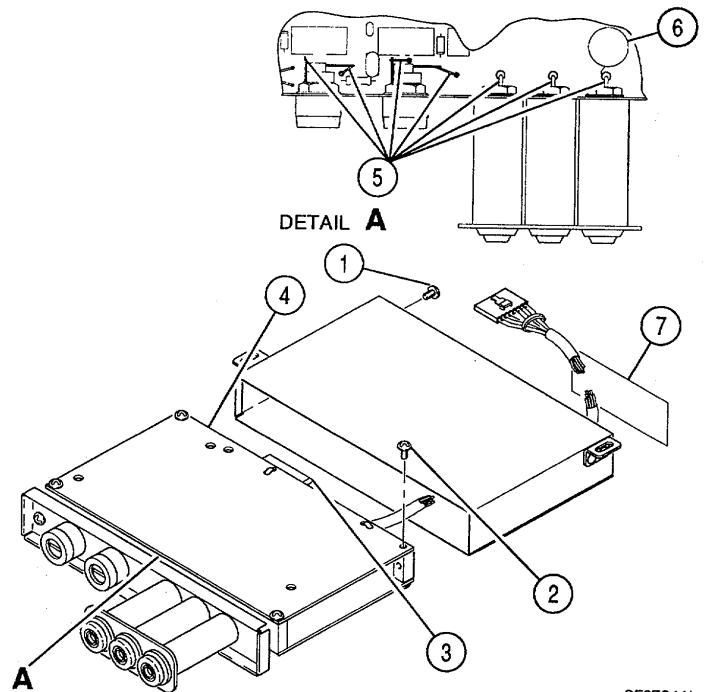
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A8 DMM (para 2-58).

**REMOVE**

1. Remove aluminum tape (7).
2. Remove 2 screws (1).
3. Remove 78A1A8A2 DMM/Digital and 78A1A8A1 DMM/Relay.
4. Remove 4 screws (2).
5. Unsolder ribbon connector (3).
6. Remove 78A1A8A1 DMM/Relay (4).
7. Unsolder 7 wires (5) and ground lug (6).

**INSTALL**

1. Solder 7 wires (5) and ground lug (6).
2. Install 78A1A8A1 DMM/Relay (4).
3. Install and solder ribbon connector (3).
4. Install 4 screws (2).
5. Install 78A1A8A2 DMM/Digital and 78A1A8A1 DMM/Relay.
6. Install 2 screws (1). Torque to 4 in/lbs.
7. Install aluminum tape (7).



CE2FO141

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A8 DMM (para 2-58).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-62. REPLACE 78A1A11 2nd LO.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

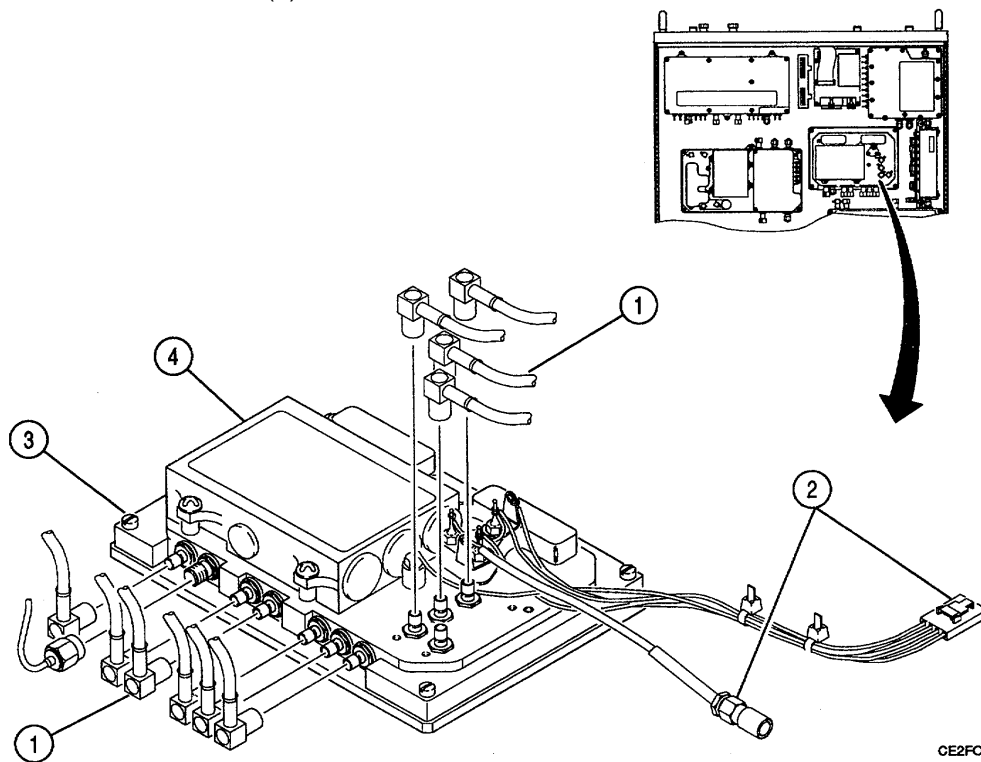
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Disconnect 11 coaxial connectors (1).
2. Disconnect 2 wire cable connectors (2).
3. Loosen 4 captive screws (3).
4. Remove 78A1A11 2nd LO (4).

**INSTALL**

1. Install 78A1A11 2nd LO (4).
2. Tighten 4 captive screws (3).
3. Reconnect 2 wire cable connectors (2).
4. Reconnect 11 coaxial connectors (1).



CE2FO041

**FOLLOW-ON MAINTENANCE:**

- Perform Adjustments (para 2-95).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-63. REPLACE 78A1A10 1st LO.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

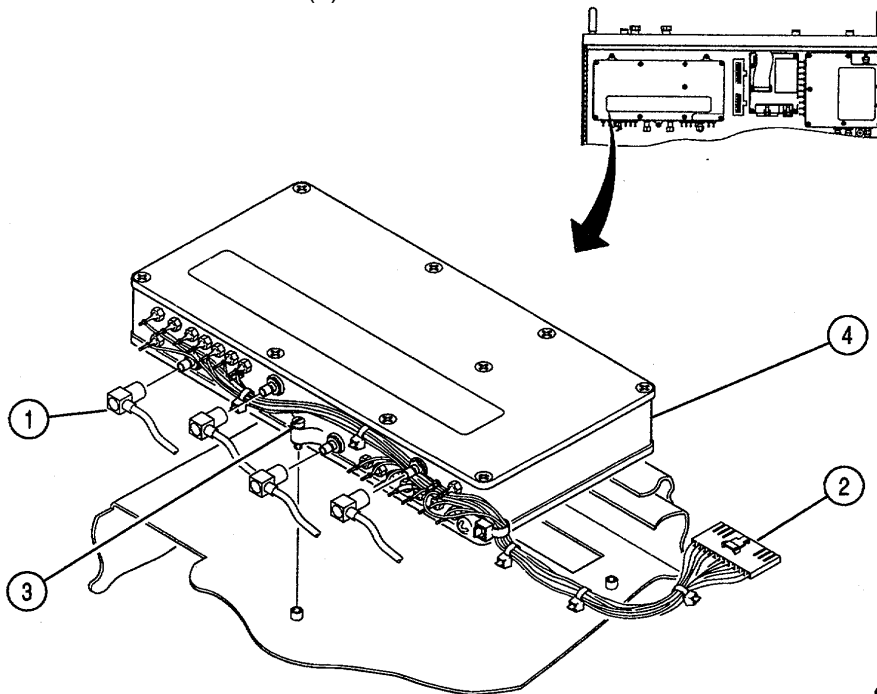
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Disconnect 4 coaxial cable connectors (1).
2. Disconnect wire cable connector (2).
3. Loosen 3 captive screws (3).
4. Remove 78A1A10 1st LO (4).

**INSTALL**

1. Install 78A1A10 1st LO (4).
2. Tighten 3 captive screws (3).
3. Reconnect wire cable connector (2).
4. Reconnect 4 coaxial cable connectors (1).



CE2FO043

**FOLLOW-ON MAINTENANCE:**

- Perform Adjustments (para 2-95).
- Perform Frequency Agility Test (para 2-20).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-64. REPLACE 78A1A10W1.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

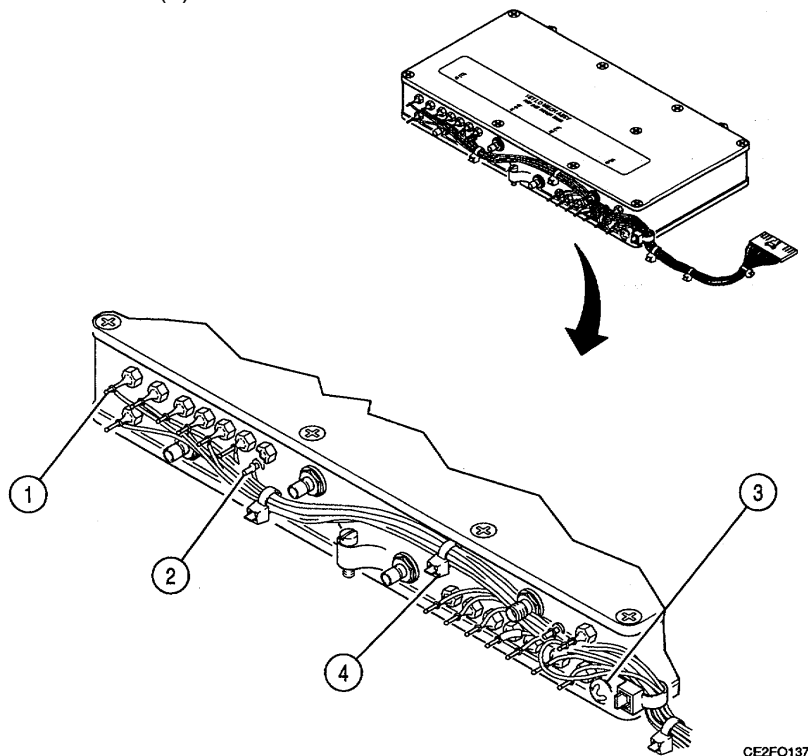
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A10 1st LO (para 2-63).

**REMOVE**

1. Remove screw (3).
2. Unsolder 10 wires from 10 feedthrus (1).
3. Unsolder 2 wires from 2 ground lugs (2).
4. Remove 78A1A10W1 (4).

**INSTALL**

1. Install 78A1A10W1 (4).
2. Install screw (3).
3. Solder 2 wires to 2 ground lugs (2).
4. Solder 10 wires to 10 feedthrus (1).



CE2FO137

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A10 1st LO (para 2-63).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-65. REPLACE 78A1A29 AUXILIARY POWER SUPPLY.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

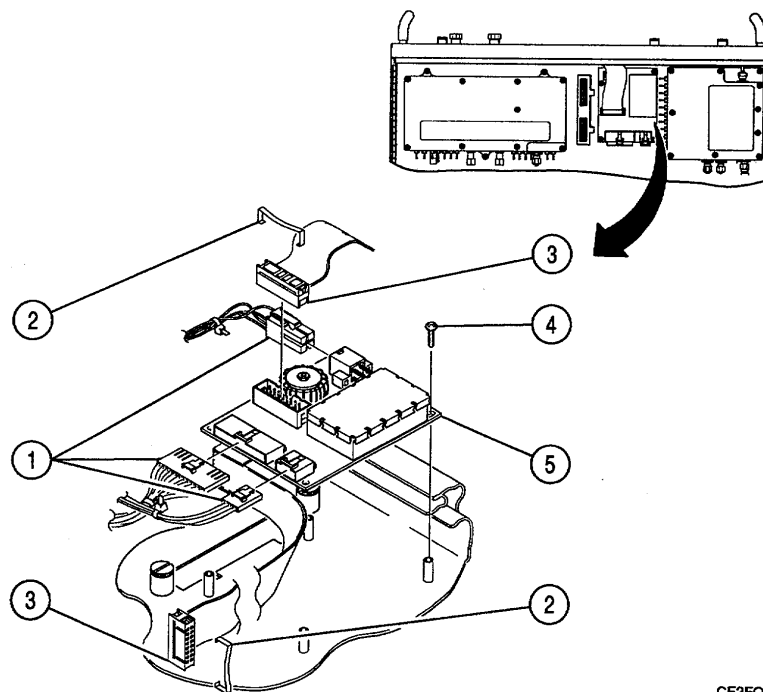
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Disconnect 3 wire cable connectors (1).
2. Remove 2 ribbon cable retainers (2).
3. Disconnect 2 ribbon cable connectors (3).
4. Remove 4 screws (4).
5. Remove 78A1A29 Auxiliary Power Supply (5).

**INSTALL**

1. Install 78A1A29 Auxiliary Power Supply (5).
2. Install 4 screws (4).
3. Reconnect 2 ribbon cable connectors (3).
4. Install 2 ribbon cable retainers (2).
5. Reconnect 5 wire cable connectors (1).



CE2FO044

**FOLLOW-ON MAINTENANCE:**

- Perform Adjustments (para 2-95).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-66. REPLACE 78A1A12 RECEIVE IF.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

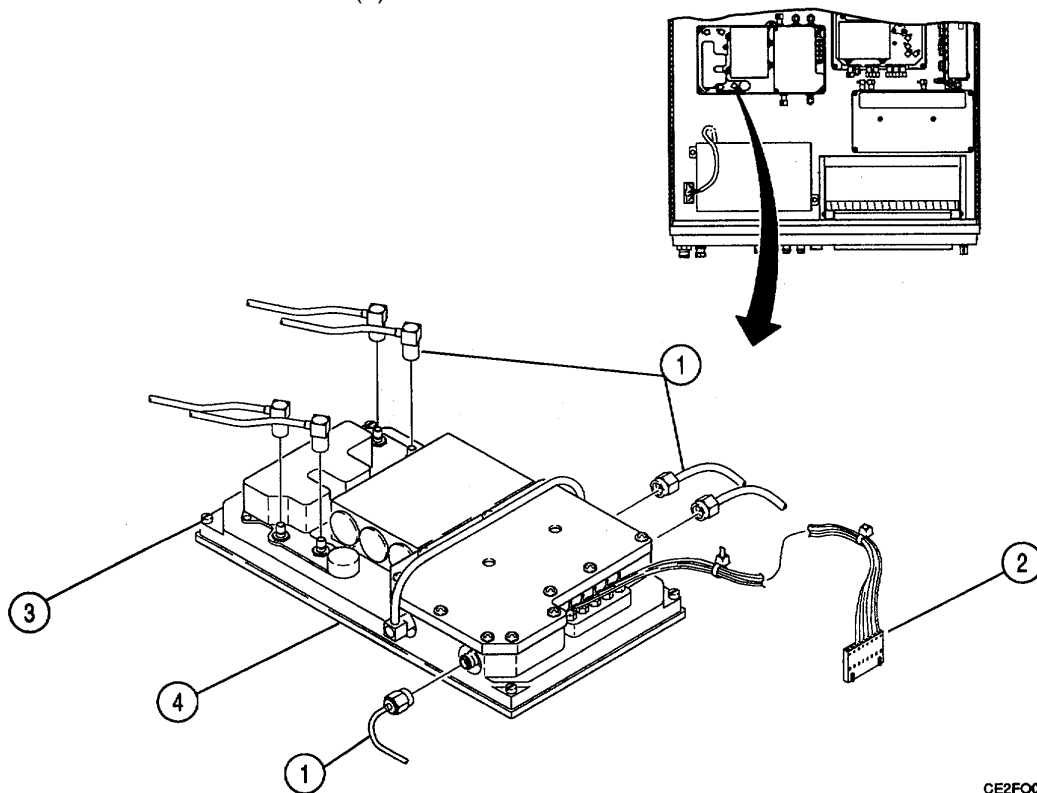
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Disconnect 7 coaxial cable connectors (1).
2. Disconnect wire cable connector (2).
3. Loosen 4 captive screws (3).
4. Remove 78A1A12 Receive IF (4).

**INSTALL**

1. Install 78A1A12 Receive IF (4).
2. Tighten 4 captive screws (3).
3. Reconnect wire cable connector (2).
4. Reconnect 7 coaxial cable connectors (1).



CE2FO045

**FOLLOW-ON MAINTENANCE:**

- Perform Adjustments (para 2-95).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**



## 2-67. REPLACE 78A1A12W1.

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### DESCRIPTION

This procedure covers: Remove. Install.

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### INITIAL SETUP

#### PRELIMINARY PROCEDURES:

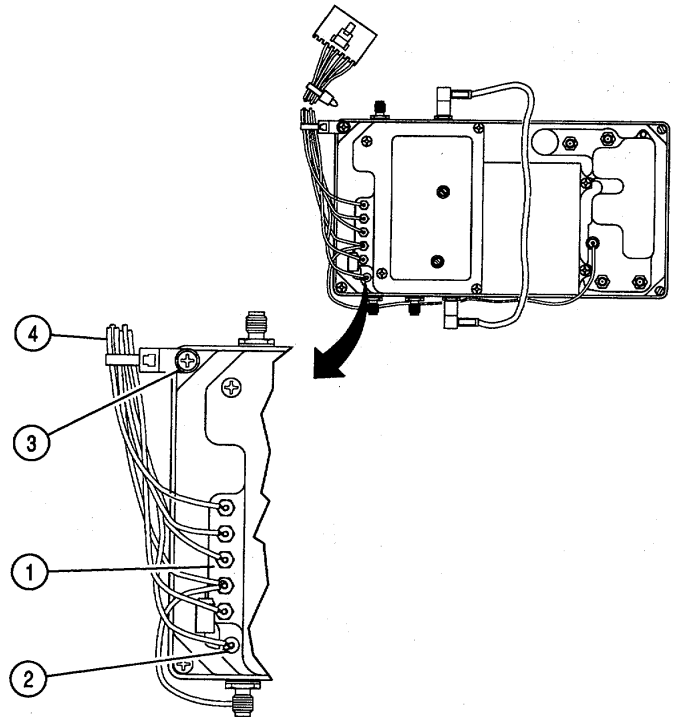
- Remove 83A1 Test Adapter (para 2-21).
  - Remove 78A3 Bottom Case (para 2-23).
  - Remove 78A1A10 Receive IF (para 2-66).
- 

### REMOVE

1. Unsolder 5 wires from 5 feedthrus (1).
2. Unsolder wire from ground lug (2).
3. Remove screw (3).
4. Remove 78A1A10W1 (4).

### INSTALL

1. Install 78A1A10W1 (4).
2. Install screw (3).
3. Solder wire to ground lug (2).
4. Solder 5 wires to 5 feedthrus (1).



CE2FO136

#### FOLLOW-ON MAINTENANCE:

- Install 78A1A12 Receive IF (para 2-66).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

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### END OF TASK

**2-68. REPLACE 78A1A13 GENERATOR IF.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

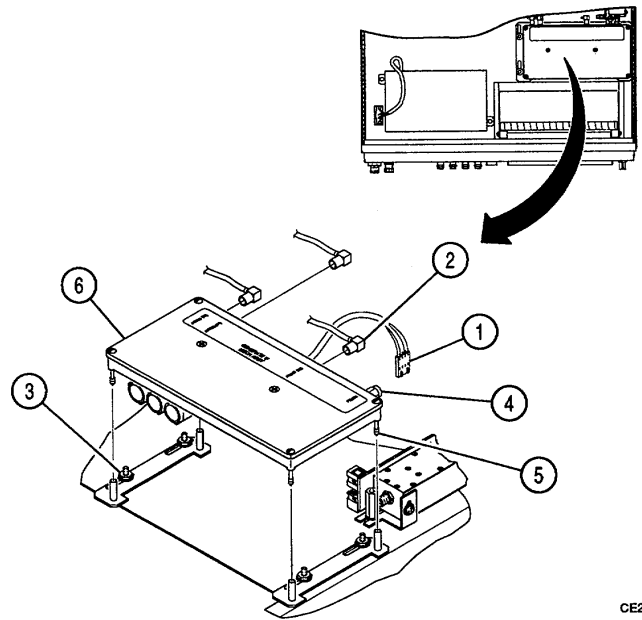
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Disconnect wire cable connector (1).
2. Disconnect 3 coaxial cable connectors (2).
3. Loosen 4 nuts (3) securing each bracket.
4. Loosen connector (4).
5. Loosen 4 captive screws (5).
6. Remove 78A1A13 Generator IF (6).

**INSTALL**

1. Install 78A1A13 Generator IF (6).
2. Tighten 4 captive screws (5).
3. Tighten connector (3) to Torque of 10 in/lbs.
4. Tighten 4 nuts (3) securing each bracket.
5. Reconnect 3 coaxial cable connectors (2).
6. Reconnect wire cable connector (1).



CE2FO046

**FOLLOW-ON MAINTENANCE:**

- Perform Adjustments (para 2-95).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-69. REPLACE 78A1A13W1.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

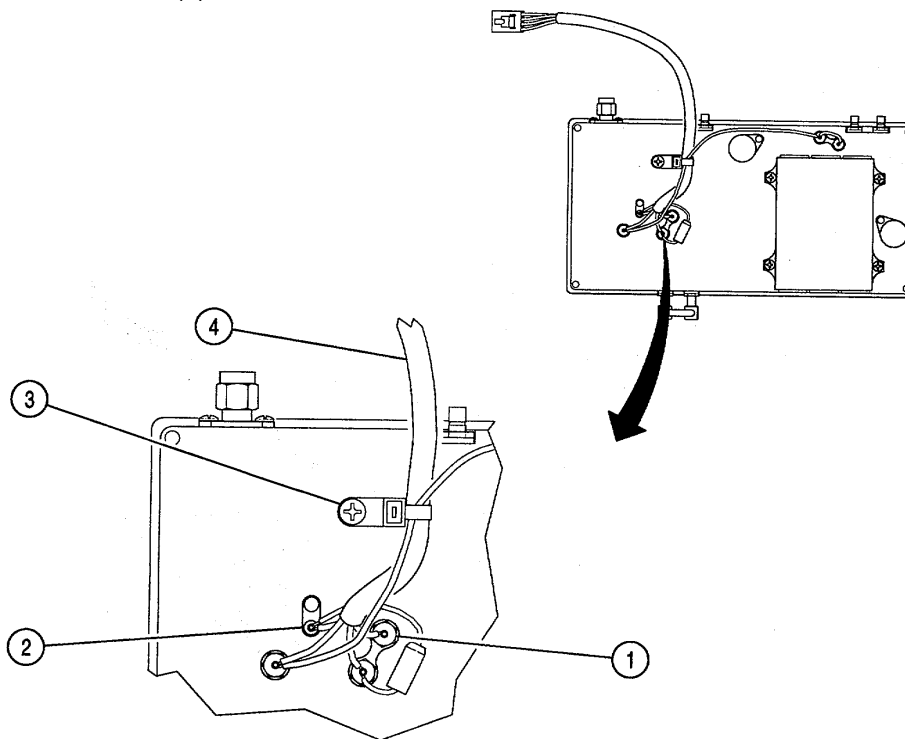
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A13 Generator IF (para 2-68).

**REMOVE**

1. Unsolder 3 wires on 3 feedthrus (1).
2. Unsolder wire on ground lug (2).
3. Remove screw (3).
4. Remove 78A1A13W1 (4).

**INSTALL**

1. Install 78A1A13W1 (4).
2. Install screw (3).
3. Solder wire on ground lug (2).
4. Solder 3 wires to 3 feedthrus (1).



CE2FO135

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A13 Generator IF (para 2-68).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-70. REPLACE 78A1A28 ATTENUATOR.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

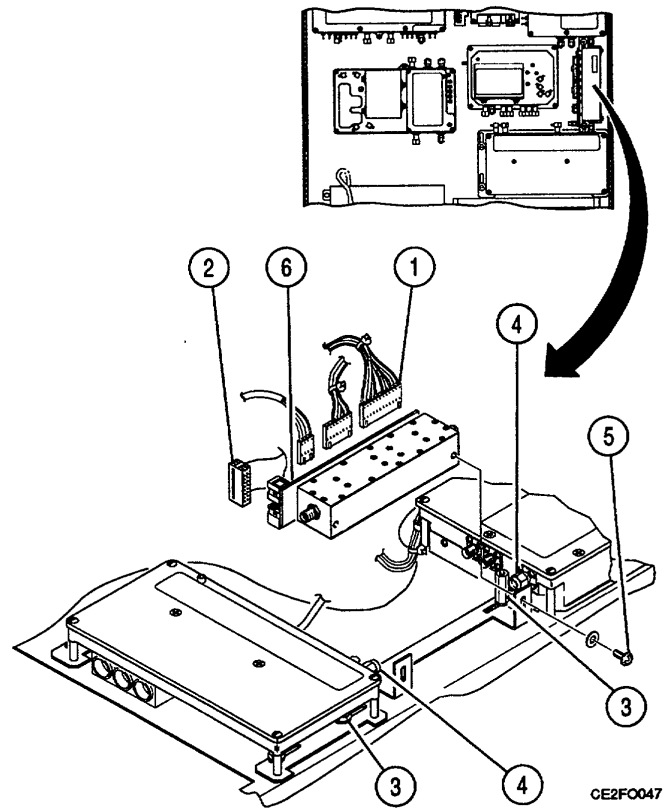
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Disconnect 3 wire cable connectors (1).
2. Loosen 6 nuts (3) securing each bracket on 78A1A13 Generator IF and 78A1A28 Attenuator.
3. Disconnect 2 coaxial cable connectors (4).
4. Slide 78A1A13 Generator IF to front.
5. Remove 2 screws and 2 washers (5).
6. Disconnect retainer and ribbon cable connector (2).
7. Remove 78A1A28 Attenuator (6).

**INSTALL**

1. Install 78A1A28 Attenuator (6).
2. Reconnect retainer and ribbon cable connector (2).
3. Install 2 screws and 2 washers (5).
4. Slide 78A1A13 Generator IF to rear.
5. Reconnect 2 coaxial cable connectors (4).
6. Tighten 6 nuts (3) securing each bracket on 78A1A13 Generator IF and 78A1A28 Attenuator.
7. Reconnect 3 wire cable connectors (1).

**FOLLOW-ON MAINTENANCE:**

- Perform Adjustments (para 2-95).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-71. REPLACE 78A1A14 POWER TERMINATION.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

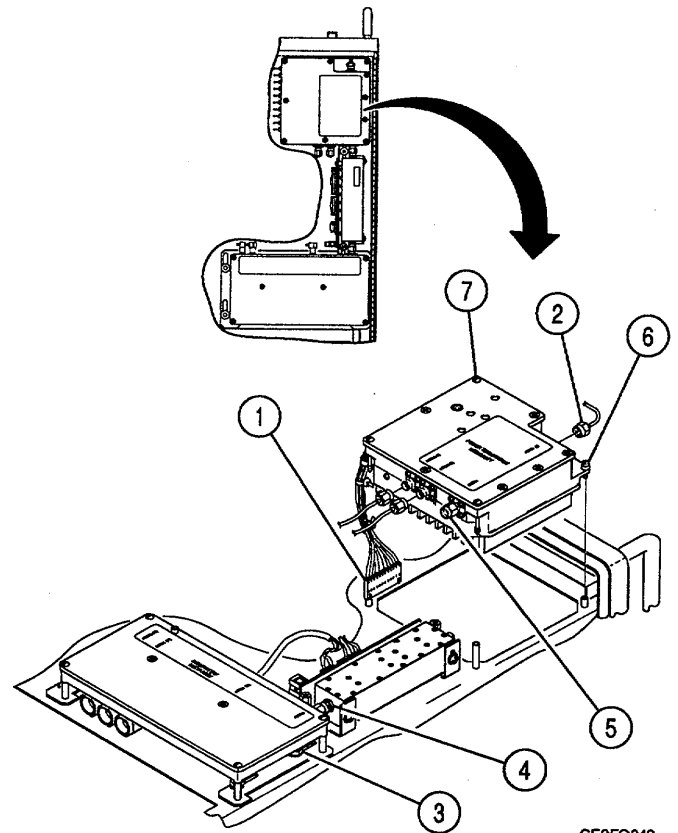
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).

**REMOVE**

1. Remove wire cable connector (1).
2. Disconnect 3 coaxial cable connectors (2).
3. Loosen 4 nuts (3) securing each bracket on 78A1A13 Generator IF and 2 nuts (4) securing each bracket on 78A1A28 Attenuator.
4. Disconnect coaxial cable connector (5).
5. Slide 78A1A13 Generator IF and 78A1A28 Attenuator to front.
6. Loosen 4 captive screws (6).
7. Remove 78A1A14 Power Termination (7).

**INSTALL**

1. Install 78A1A14 Power Termination (7).
2. Tighten 4 captive screws (6).
3. Slide 78A1A13 Generator IF and 78A1A28 Attenuator to rear.
4. Reconnect coaxial cable connector (5).
5. Tighten 4 nuts (3) securing each bracket on 78A1A13 Generator IF and 2 nuts (4) securing each bracket on 78A1A28 Attenuator.
6. Reconnect 3 coaxial cable connectors (2).
7. Reconnect wire cable connector (1).



CE2FO048

**FOLLOW-ON MAINTENANCE:**

- Perform Adjustments (para 2-95).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-72. REPLACE 78A1A14W1.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

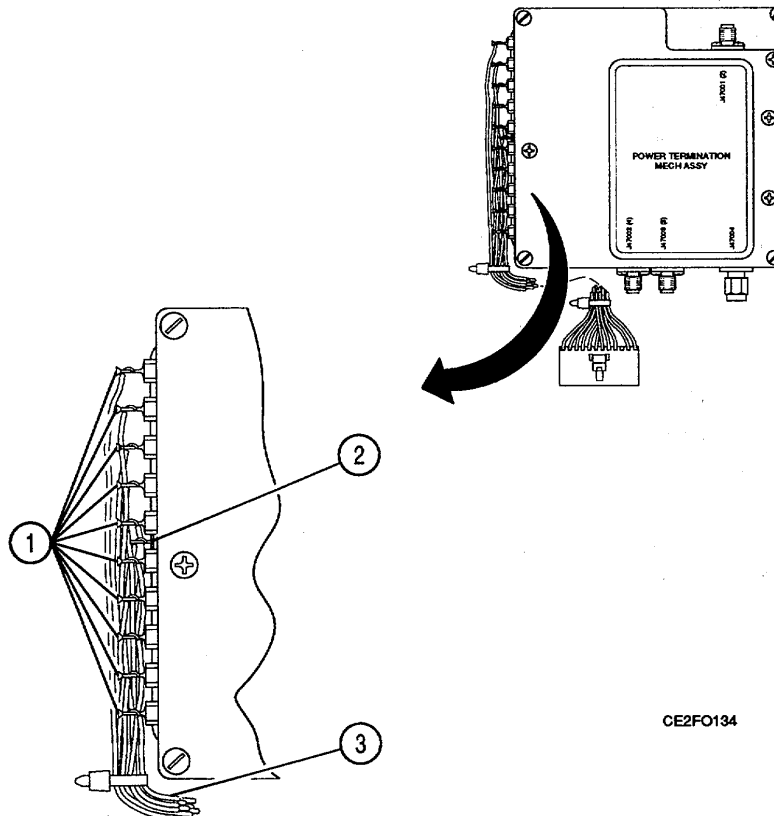
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A14 Power Termination (para 2-71).

**REMOVE**

1. Unsolder 10 wires on 10 feedthrus (1).
2. Unsolder wire on ground lug (2).
3. Remove 78A1A14W1 (3).

**INSTALL**

1. Install 78A1A14W1 (3).
2. Solder wire on ground lug (2).
3. Solder 10 wires to 10 feedthrus (1).



CE2FO134

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A14 Power Termination (para 2-71).
- Install 78A3 Bottom Case (para 2-23).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-73. REPLACE 78A1G1.**

---

**DESCRIPTION**

This procedure covers: Remove. Install.

---

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

- Remove 83A1 Test Adapter (para 2-21).
  - Remove 78A2 Top Case (para 2-22).
  - Remove 78A3 Bottom Case (para 2-23).
  - Remove 78A1A2 Rear Panel (para 2-57).
- 

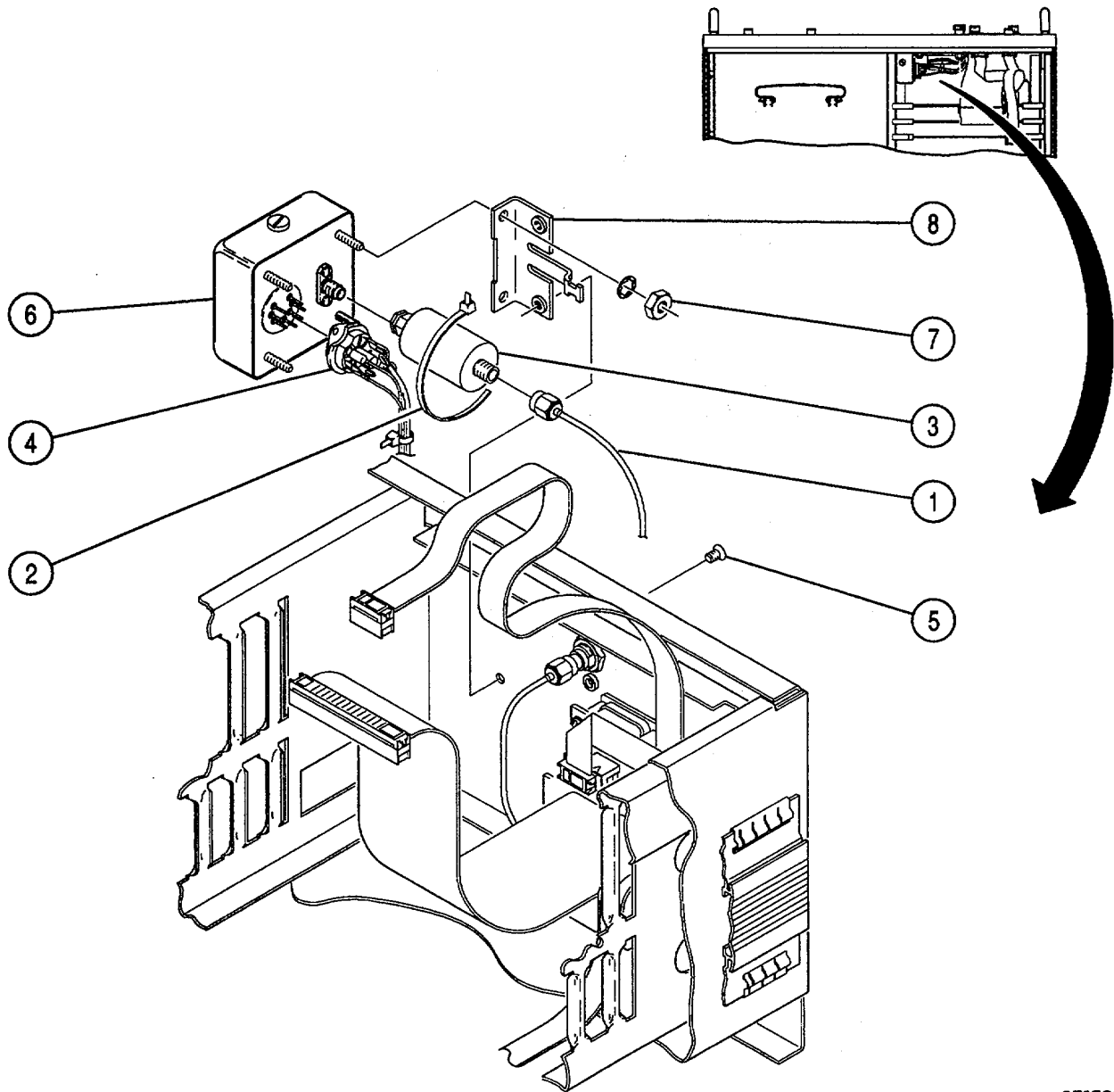
**REMOVE**

1. Disconnect coaxial cable connector (1).
2. Remove tyrap (2).
3. Disconnect filter (3).
4. Disconnect wire cable connector (4).
5. Remove 2 screws (5).
6. Remove 78A1G1 (6).
7. Remove 2 nuts and 2 washers (7).
8. Remove bracket (8) from 78A1G1 (6).

**INSTALL**

1. Install bracket (8) on 78A1G1 (6).
2. Install 2 nuts and 2 washers (7).
3. Install 78A1G1 (6).
4. Install 2 screws (5).
5. Reconnect wire cable connector (4).
6. Reconnect filter (3).
7. Install tyrap (2).
8. Reconnect coaxial cable connector (1).

2-73. REPLACE 78A1G1 - Continued.



CE2FO049

**FOLLOW-ON MAINTENANCE:**

- Perform Adjustments (para 2-95).
- Install 78A1A2 Rear Panel (para 2-57).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**



**2-74. REPLACE 78A1A1A1 MOTHERBOARD.**

---

**DESCRIPTION**

This procedure covers: Remove. Install.

---

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A25 Digitizer (para 2-24).
- Remove 78A1A23 Counter (para 2-25).
- Remove 78A1A4 Analyzer Log/IF (para 2-26).
- Remove 78A1A5 Analyzer RF (para 2-27).
- Remove 78A1A7 3rd LO (para 2-28).
- Remove 78A1A9 90 MHz Generator (para 2-29).
- Remove 78A1A6 Receiver (para 2-30).
- Remove 78A1A3 Monitor (para 2-31).
- Remove 78A1A26 Monitor Control (para 2-32).
- Remove 78A1A24 Function Generator (para 2-33).
- Remove 78A1A22 RF I/O (para 2-34).
- Remove 78A1A20 Memory (para 2-35).
- Remove 78A1A19 Processor (para 2-36).
- Remove 78A1A21 Video Controller (para 2-37).
- Remove 78A1A27 External I/O (para 2-38).
- Remove 78A1A16 Power Supply (para 2-48).
- Remove 78A1A8 DMM (para 2-58).
- Remove 78A1A10 1st LO (para 2-63).
- Remove 78A1A12 Receive IF (para 2-66).

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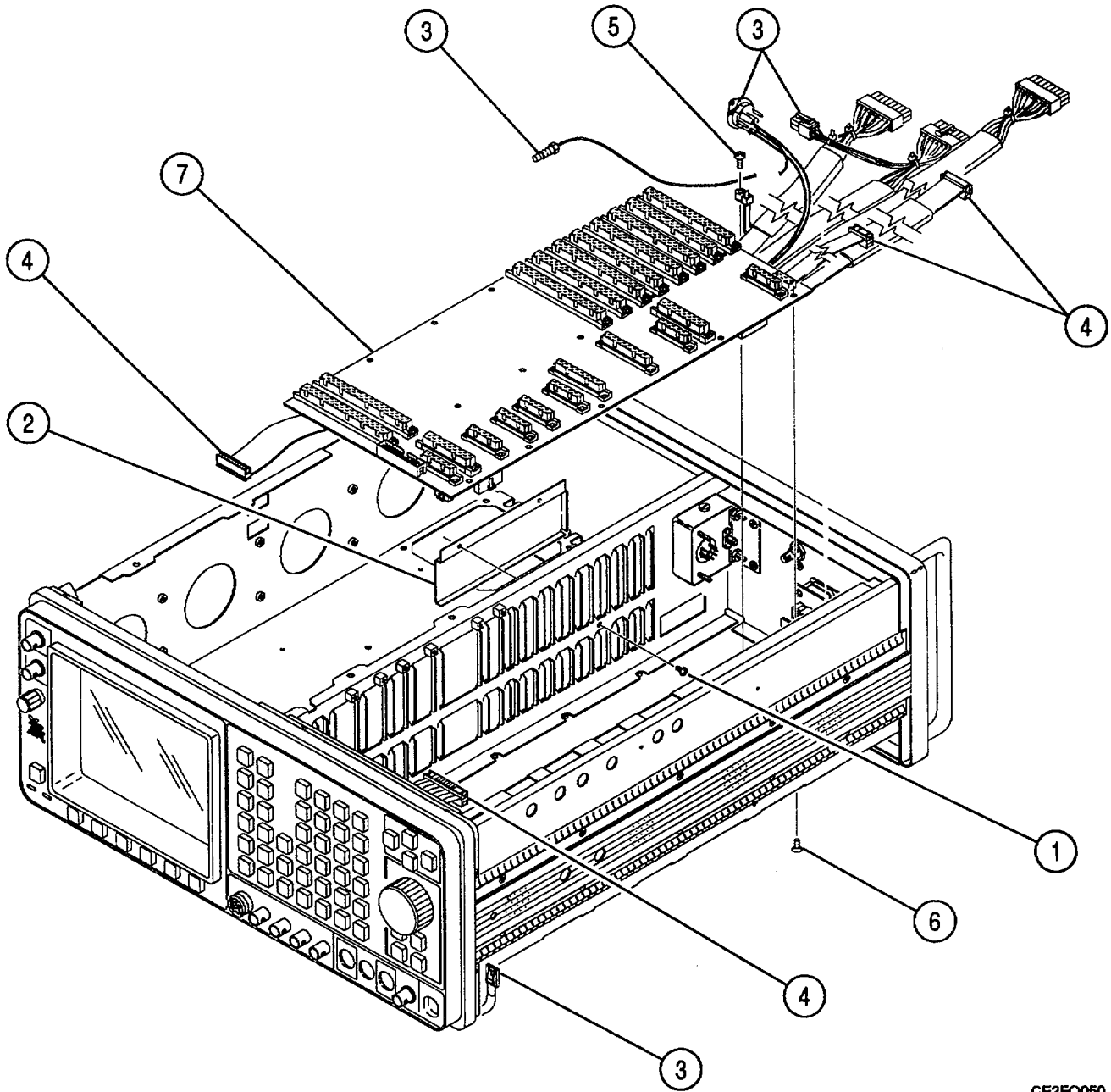
**REMOVE**

1. Remove 2 screws (1).
2. Remove video cable panel (2).
3. Disconnect 4 wire cable connectors (3).
4. Disconnect 4 ribbon cable connectors (4).
5. Remove 2 screws and 2 tyrap (5).
6. Remove 18 screws (6).
7. Remove 78A1A1A1 Motherboard (7).

**INSTALL**

1. Install 78A1A1A1 Motherboard (7).
2. Install 18 screws (6).
3. Install 2 screws and 2 tyrap (5).
4. Reconnect 4 ribbon cable connectors (4).
5. Reconnect 4 wire cable connectors (3).
6. Install video cable panel (2).
7. Install 2 screws (1).

2-74. REPLACE 78A1A1A1 MOTHERBOARD - Continued.



CF2FO050

**2-74. REPLACE 78A1A1A1 MOTHERBOARD - Continued.****FOLLOW-ON MAINTENANCE:**

- Install 78A1A12 Receive IF (para 2-66).
- Install 78A1A10 1st LO (para 2-63).
- Install 78A1A8 DMM (para 2-58).
- Install 78A1A16 Power Supply (para 2-48).
- Install 78A1A27 External I/O (para 2-38).
- Install 78A1A21 Video Controller (para 2-37).
- Install 78A1A19 Processor (para 2-36).
- Install 78A1A20 Memory (para 2-35).
- Install 78A1A22 RF I/O (para 2-34).
- Install 78A1A24 Function Generator (para 2-33).
- Install 78A1A26 Monitor Control (para 2-32).
- Install 78A1A3 Monitor (para 2-31).
- Install 78A1A6 Receiver (para 2-30).
- Install 78A1A9 90 MHz Generator (para 2-29).
- Install 78A1A7 3rd LO (para 2-28).
- Install 78A1A5 Analyzer RF (para 2-27).
- Install 78A1A4 Analyzer Log/IF (para 2-26).
- Install 78A1A23 Counter PC Board (para 2-25).
- Install 78A1A25 Digitizer PC Board (para 2-24).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

---

**END OF TASK**

**2-75. REPLACE 78A1J1A/78A1J1B.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

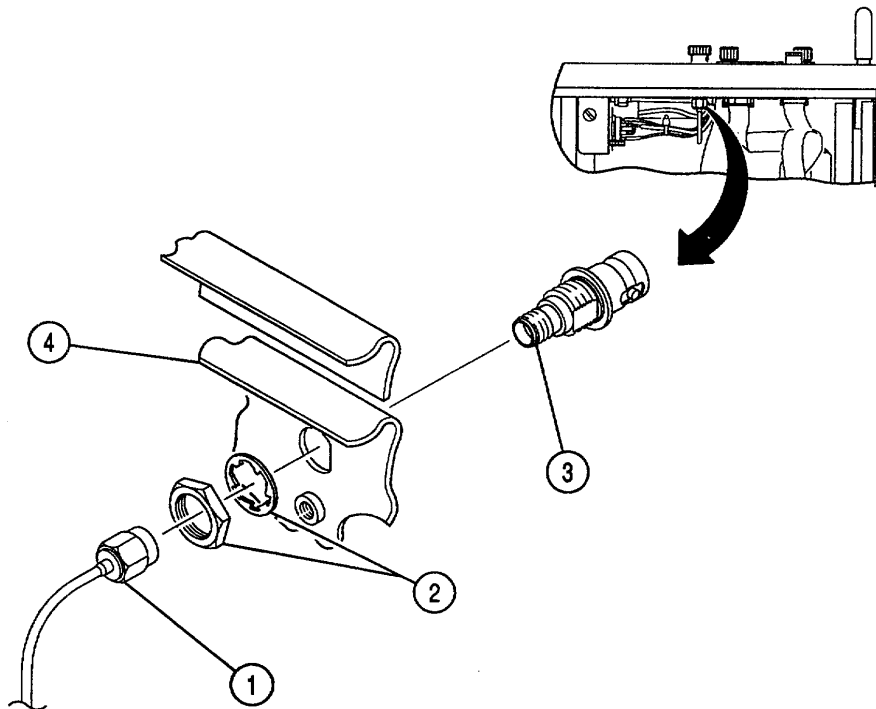
- Remove 83A1 Test Adapter (para 2-21).
- Remove 78A2 Top Case (para 2-22).
- Remove 78A3 Bottom Case (para 2-23).
- Remove 78A1A2 Rear Panel (para 2-57).

**REMOVE**

1. Disconnect coaxial cable connector (1).
2. Remove nut and lock washer (2).
3. Remove 78A1J1A/78A1J1B (3).

**INSTALL**

1. Install 78A1J1A/78A1J1B (3) on 78A1A1 Chassis (4).
2. Install nut and lock washer (2) with Loctite 290 (Appendix B).
3. Reconnect coaxial cable connector (1).



CE2FO051

**FOLLOW-ON MAINTENANCE:**

- Install 78A1A2 Rear Panel (para 2-57).
- Install 78A3 Bottom Case (para 2-23).
- Install 78A2 Top Case (para 2-22).
- Install 83A1 Test Adapter (para 2-21).

**END OF TASK**

**2-76. REPLACE 83A1A1 BOTTOM CASE.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****WARNING**

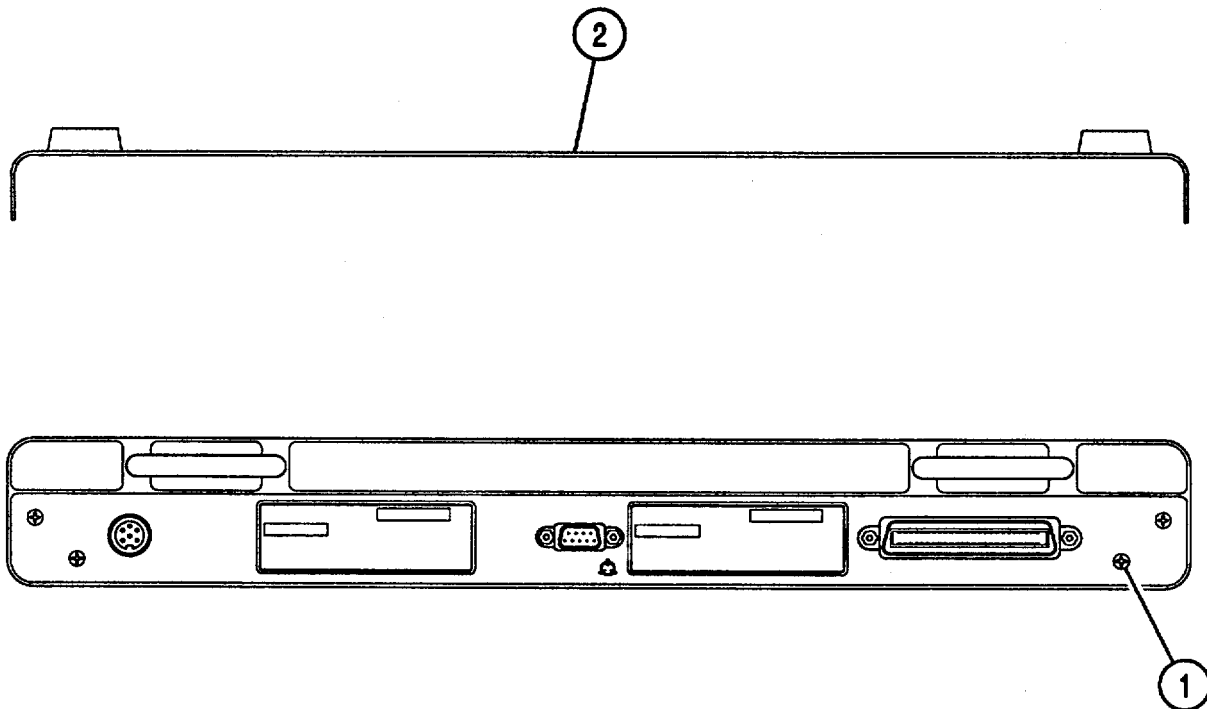
**Dangerous voltages are present with case assemblies removed.**

**REMOVE**

1. Remove 4 screws (1).
2. Slide 83A1A5 Rear Panel toward rear.
3. Remove 83A1A1 Bottom Case (2).

**INSTALL**

1. Install 83A1A1 Bottom Case (2).
2. Slide 83A1A5 Rear Panel toward front.
3. Install 4 screws (1).



CE2FO052

**END OF TASK**

**2-77. REMOVE 83A1A3 RF AMPLIFIER.**

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**DESCRIPTION**

This procedure covers: Remove. Install.

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**INITIAL SETUP****PRELIMINARY PROCEDURES:**

- Remove 83A1A1 Bottom Case (para 2-76).
- 

**REMOVE**

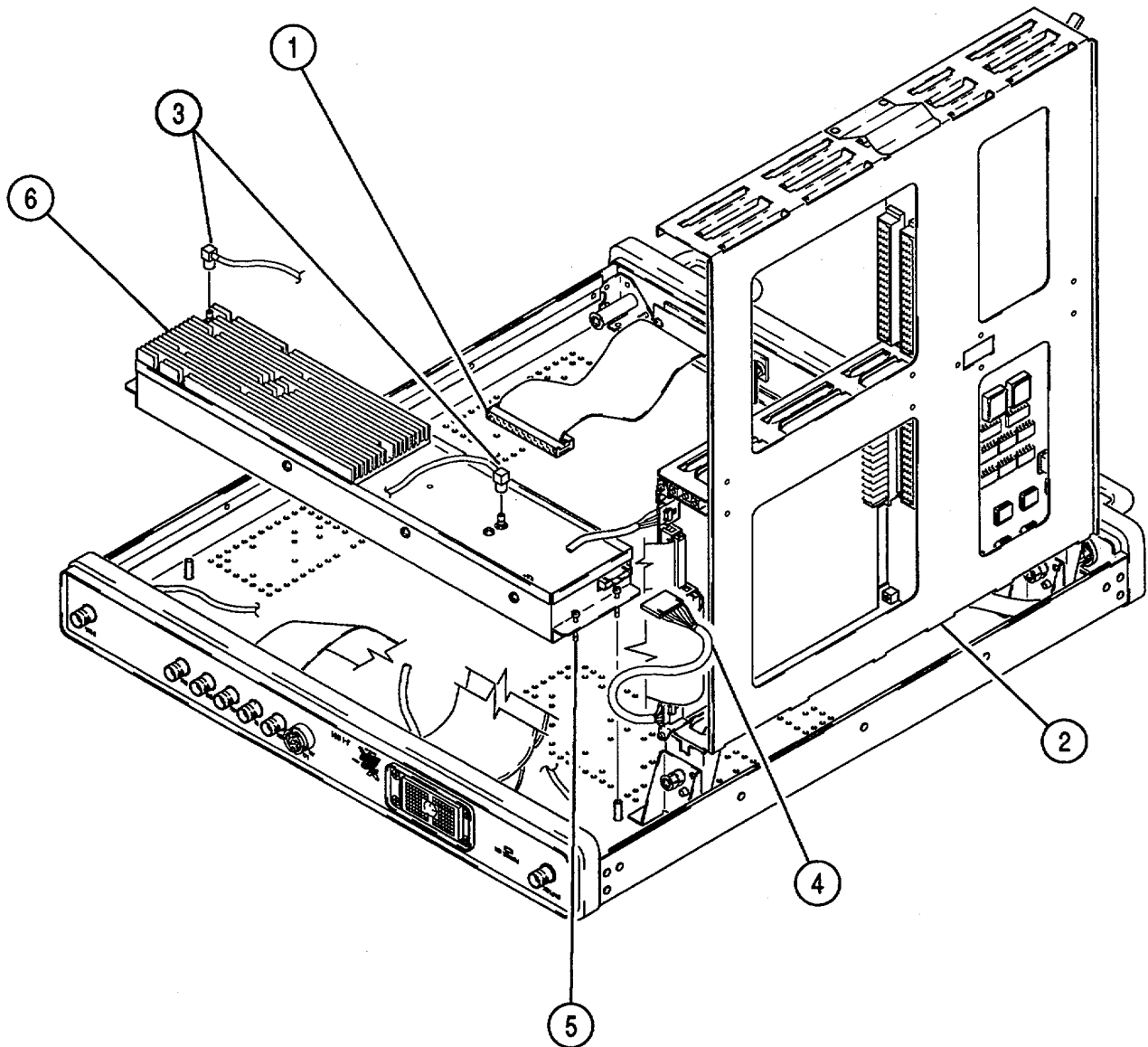
1. Release cardcage latch and raise cardcage (2) 30°.
2. Disconnect ribbon cable connector (1).
3. Raise cardcage (2) 60°.
4. Disconnect 2 coaxial cable connectors (3).
5. Disconnect wire cable connector (4).
6. Loosen 4 captive screws (5).
7. Remove 83A1A3 RF Amplifier (6).

**INSTALL**

1. Perform Adjustments (para 2-95).
2. Install 83A1A3 RF Amplifier (6).
3. Tighten 4 captive screws (5).
4. Reconnect wire cable connector (4).
5. Reconnect 2 coaxial cable connectors (3).
6. Lower cardcage (2) 60°.
7. Reconnect ribbon cable connector (1).
8. Lower cardcage (2) until cardcage latch locks.

**Change 1 2-160**

2-77. REMOVE 83A1A3 RF AMPLIFIER - Continued.



CE2FO053

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-78. REMOVE 83A1A3A2 AMPLIFIER.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

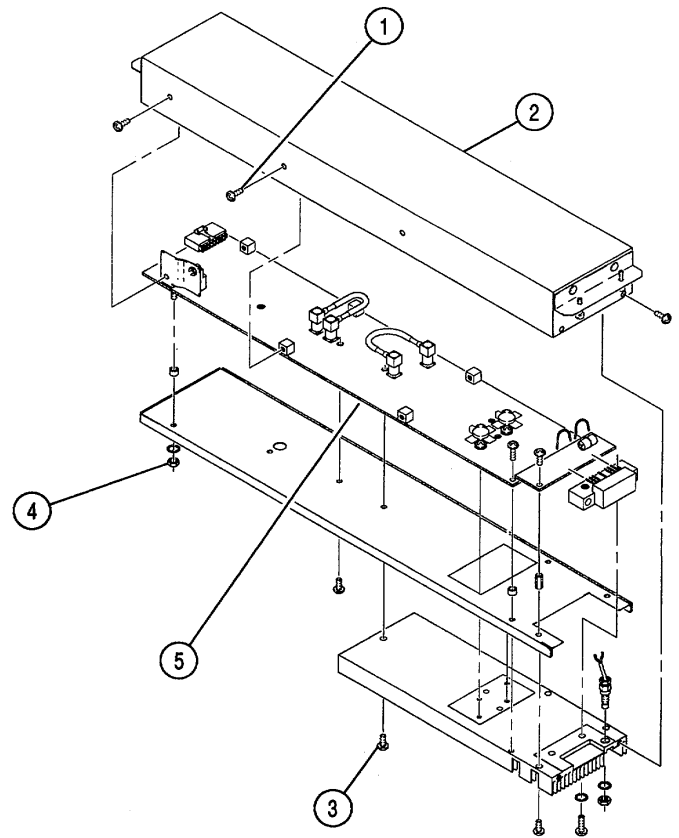
- Remove 83A1A1 Bottom Case (para 2-76).
- Remove 83A1A3 RF Amplifier (para 2-77).

**REMOVE**

1. Remove 8 screws (1).
2. Remove cover (2).
3. Remove 17 screws (3).
4. Remove 2 nuts and 2 washers (4).
5. Remove 83A1A3A2 Amplifier (5).

**INSTALL**

1. Install 83A1A3A2 Amplifier (5).
2. Install 2 nuts and 2 washers (4).
3. Install 17 screws (3).
4. Install cover (2).
5. Install 8 screws (1).



CE2FO054

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A3 RF Amplifier (para 2-77).
- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**



**2-79. REMOVE 83A1A3A1 PREAMP.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

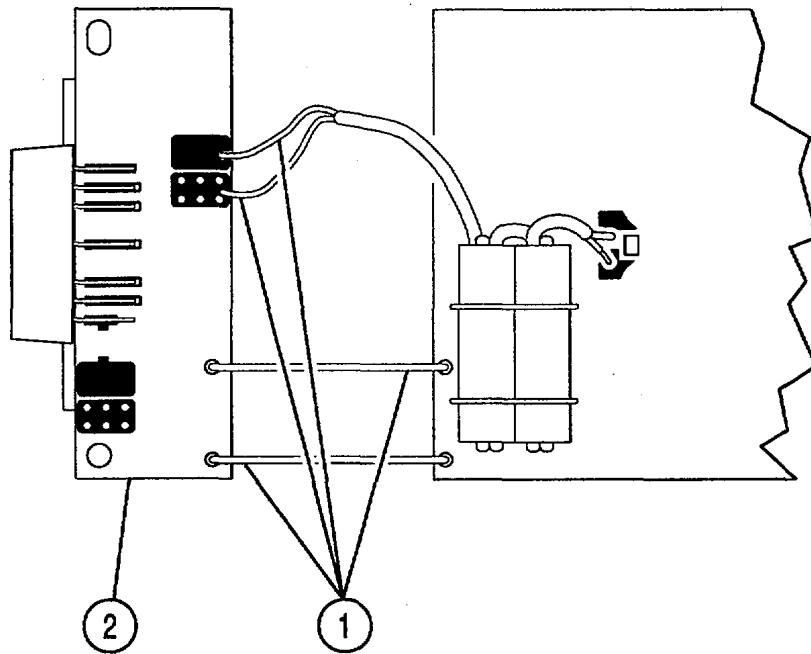
- Remove 83A1A1 Bottom Case (para 2-76).
- Remove 83A1A3 RF Amplifier (para 2-77).
- Remove 83A1A3A2 Amplifier (para 2-78).

**REMOVE**

1. Unsolder 4 wires (1).
2. Remove 83A1A3A1 Preamp (2).

**INSTALL**

1. Install 83A1A3A1 Preamp (2).
2. Solder 4 wires (1).

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A3A2 Amplifier (para 2-78).
- Install 83A1A3 RF Amplifier (para 2-77).
- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-80. REMOVE 83A1A4 FRONT PANEL.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

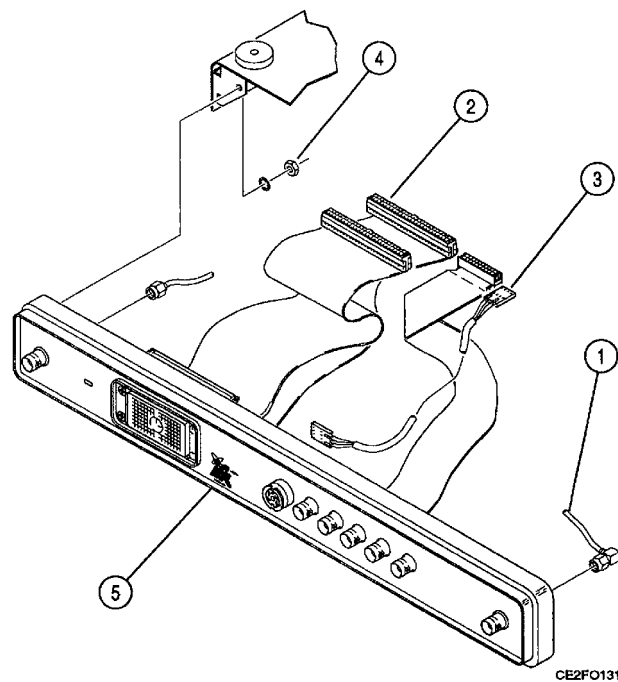
- Remove 83A1A1 Bottom Case (para 2-76).

**REMOVE**

1. Disconnect 2 coaxial cable connectors (1).
2. Disconnect 3 ribbon cable connectors (2).
3. Disconnect wire cable connector (3).
4. Remove 4 nuts and 4 lock washers (4).
5. Remove 83A1A4 Front Panel (5).

**INSTALL**

1. Install 83A1A4 Front Panel (5).
2. Install 4 nuts and 4 lock washers (4).
3. Reconnect wire cable connector (3).
4. Reconnect 3 ribbon cable connectors (2).
5. Reconnect 2 coaxial cable connectors (1).

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-81. REPLACE 83A1A4A1 UUT CONNECTOR.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

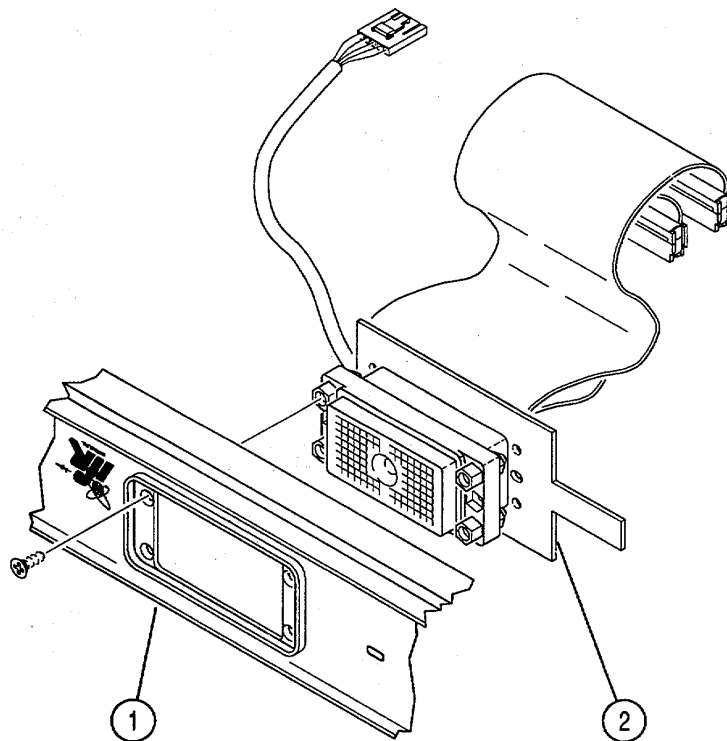
- Remove 83A1A1 Bottom Case (para 2-76).
- Remove 83A1A4 Front Panel (para 2-80).

**REMOVE**

1. Remove 4 screws (1).
2. Remove 83A1A4A1 UUT Connector (2).

**INSTALL**

1. Install 83A4A1 UUT Connector (2).
2. Install 4 screws (1).



CE2FO055

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A4 Front Panel (para 2-80).
- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-82. REPLACE 83A1A4A2 AUDIO CONNECTOR.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

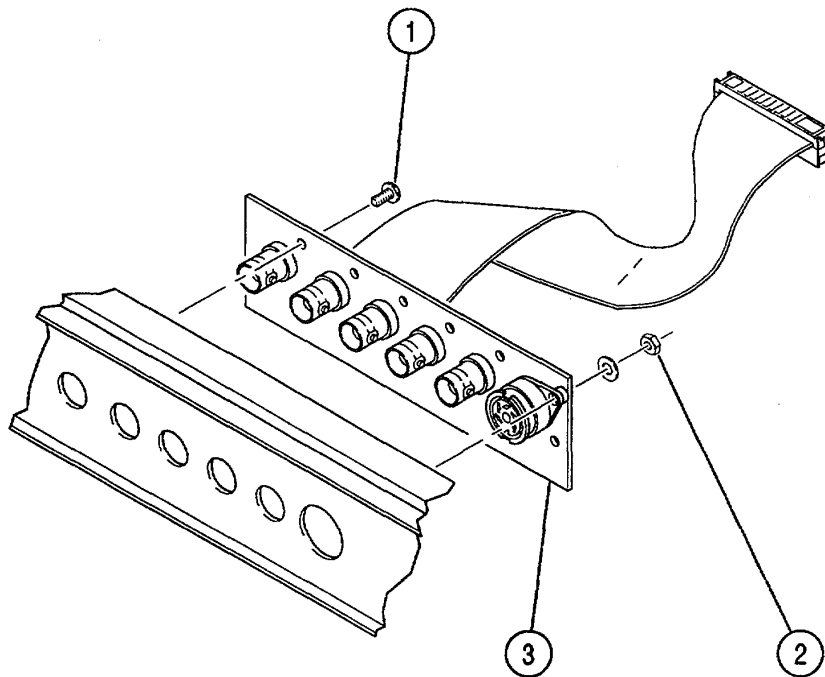
- Remove 83A1A1 Bottom Case (para 2-76).
- Remove 83A1A4 Front Panel (para 2-80).

**REMOVE**

1. Remove 11 screws (1).
2. Remove 2 nuts and 2 washers (2).
3. Remove 83A1A4A2 Audio Connector (3).

**INSTALL**

1. Install 83A1A4A2 Audio Connector (3).
2. Install 2 nuts and 2 washers (2).
3. Install 11 screws (1).

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A4 Front Panel (para 2-80).
- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-83. REPLACE 83A1A4J1A/83A1A4J1B. TM 11-6625-3245-40****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

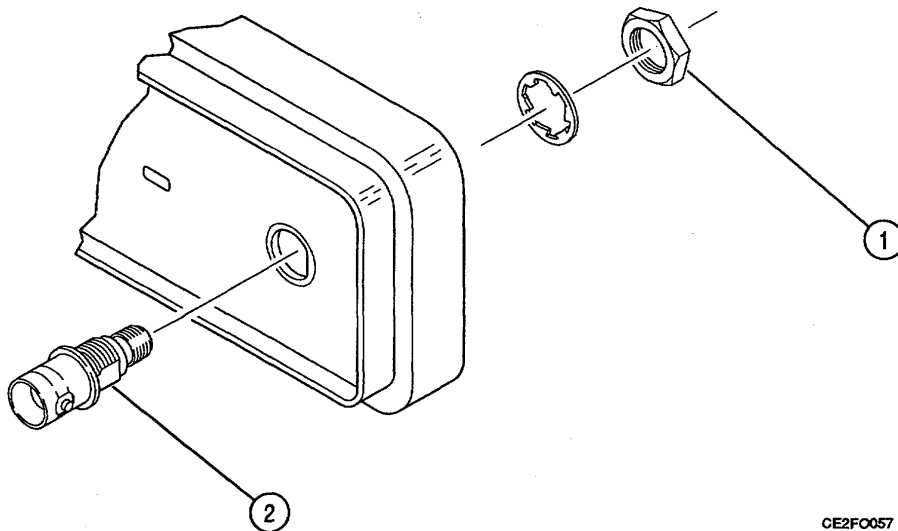
- Remove 83A1A1 Bottom Case (para 2-76).
- Remove 83A1A4 Front Panel (para 2-80).

**REMOVE**

1. Remove nut and lock washer (1).
2. Remove 83A1A4J1A/83A1A4J1B (2).

**INSTALL**

1. Install 83A1A4J1A/83A1A4J1B (2).
2. Install nut and lock washer (1) with Loctite 290 (Appendix B).



CE2FO057

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A4 Front Panel (para 2-80).
- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-84. REPLACE 83A1A4J9A/83A1A4J9B.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

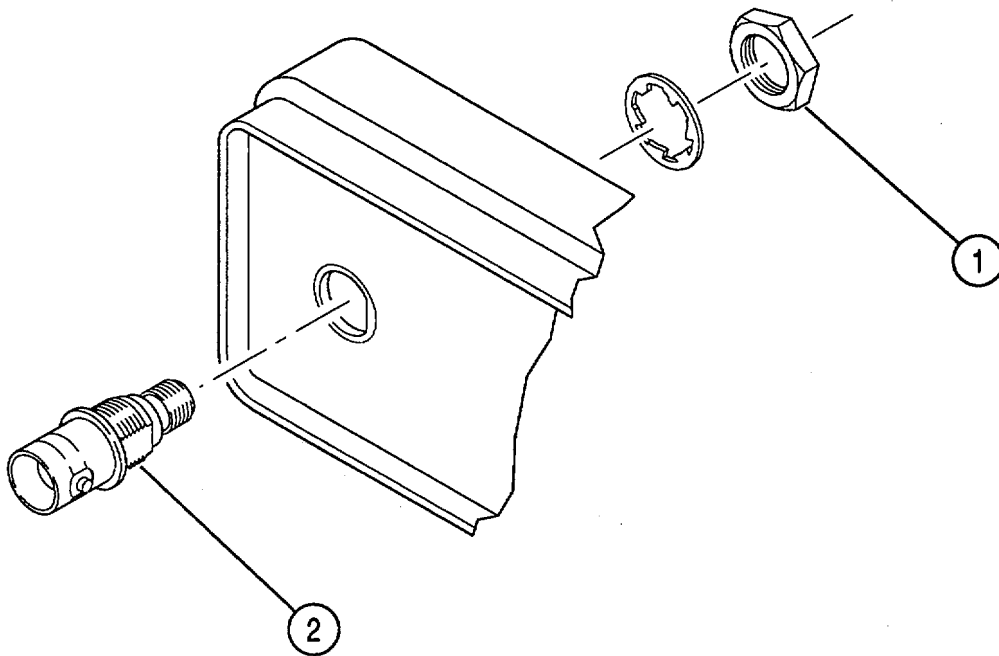
- Remove 83A1A1 Bottom Case (para 2-76).
- Remove 83A1A4 Front Panel (para 2-80).

**REMOVE**

1. Remove nut and lock washer (1).
2. Remove 83A1A4J9A/83A1A4J9B (2).

**INSTALL**

1. Install 83A1A4J9A/83A1A4J9B (2).
2. Install nut and lock washer (1) with Loctite 290 (Appendix B).



CE2FO058

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A4 Front Panel (para 2-80).
- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-85. REMOVE 83A1A5 REAR PANEL.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

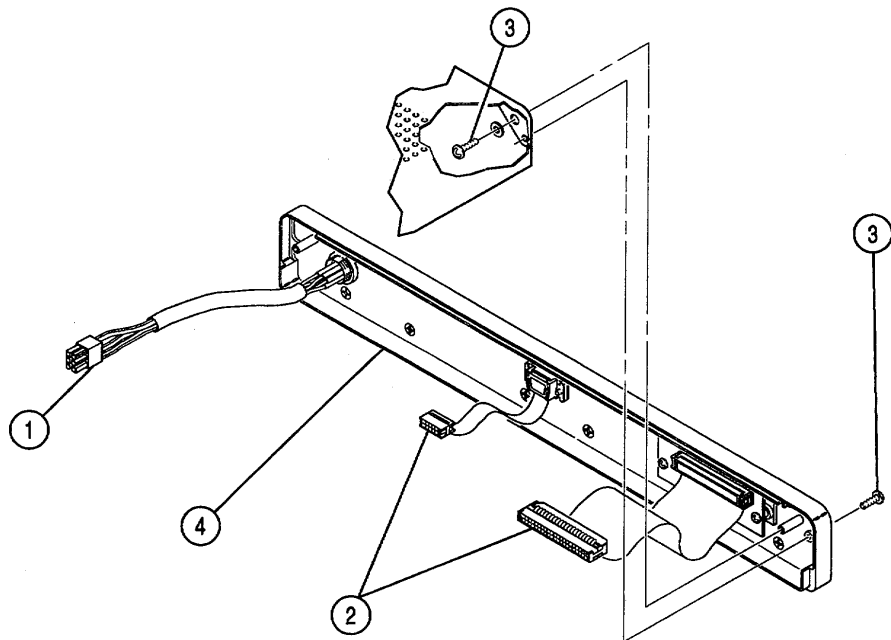
- Remove 83A1A1 Bottom Case (para 2-76).

**REMOVE**

1. Remove wire cable connector (1).
2. Remove 2 ribbon cable connectors (2).
3. Remove 6 screws and 2 washers (3).
4. Remove 83A1A5 Rear Panel (4).

**INSTALL**

1. Install 83A1A5 Rear Panel (4).
2. Install 6 screws and 2 washers (3).
3. Install 2 ribbon cable connectors (2).
4. Install wire cable connector (1).



CE2FO132

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-86. REPLACE 83AIA5A1 REAR PANEL.**

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**DESCRIPTION**

This procedure covers: Remove. Install.

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**INITIAL SETUP****PRELIMINARY PROCEDURES:**

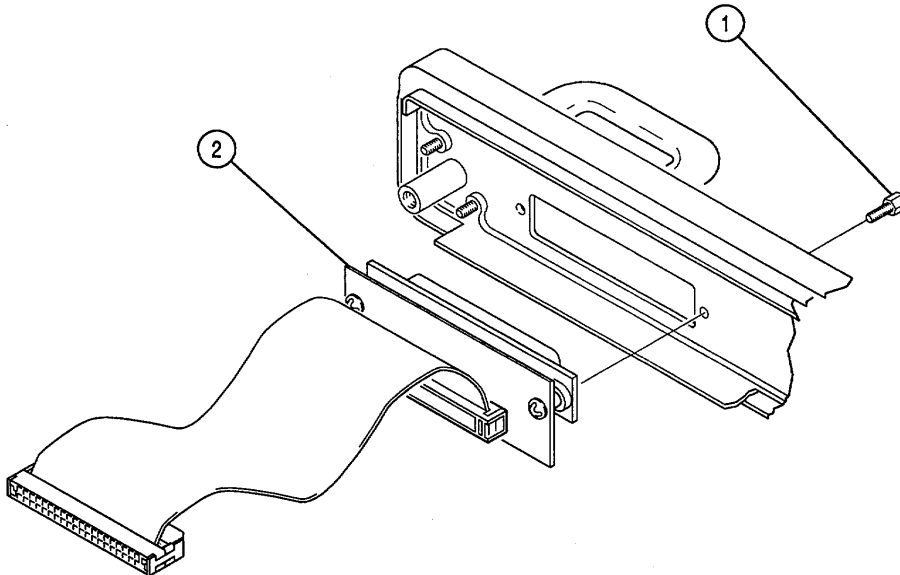
- Remove 83A1A1 Bottom Case (para 2-76).
  - Remove 83A1A5 Rear Panel (para 2-85).
- 

**REMOVE**

1. Remove 2 screws (1).
2. Remove 83A1A5A1 Rear Panel (2).

**INSTALL**

1. Install 83AIA5A1 Rear Panel (2).
2. Install 2 screws (1).



CE2FO059

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A5 Rear Panel (para 2-85).
- Install 83A1A1 Bottom Case (para 2-76).

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**END OF TASK**



**2-87. REPLACE 83A1A5W2.**

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**DESCRIPTION**

This procedure covers: Remove. Install.

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**INITIAL SETUP****PRELIMINARY PROCEDURES:**

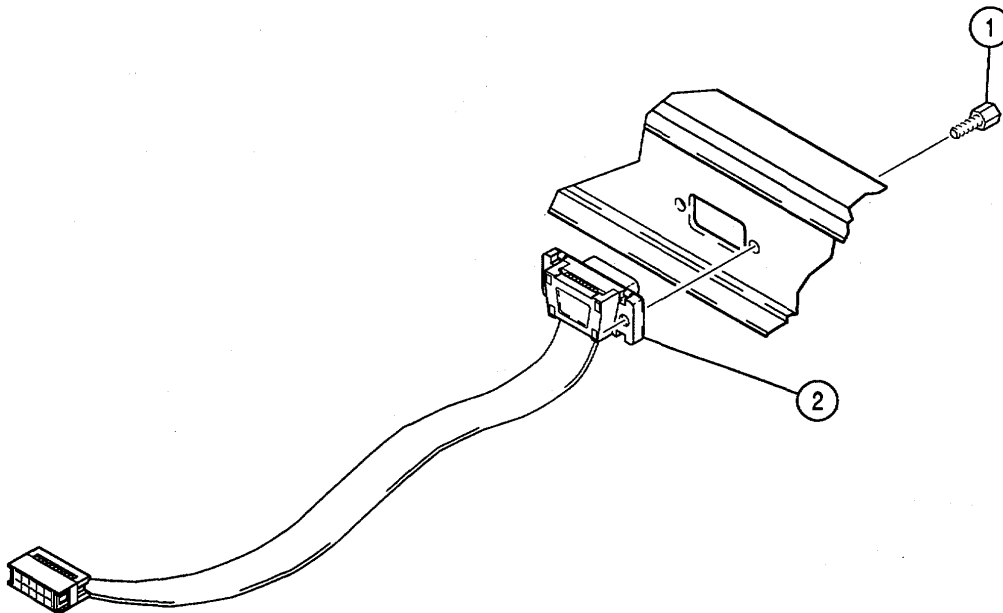
- Remove 83A1A1 Bottom Case (para 2-76).
  - Remove 83A1A5 Rear Panel (para 2-85).
- 

**REMOVE**

1. Remove 2 screws (1).
2. Remove 83AIA5W2 (2).

**INSTALL**

1. Install 83AIA5W2 (2).
2. Install 2 screws (1).

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A5 Rear Panel (para 2-85).
- Install 83AIA1 Bottom Case (para 2-76).

---

**END OF TASK**

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**2-88. REPLACE 83A1A5W3.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

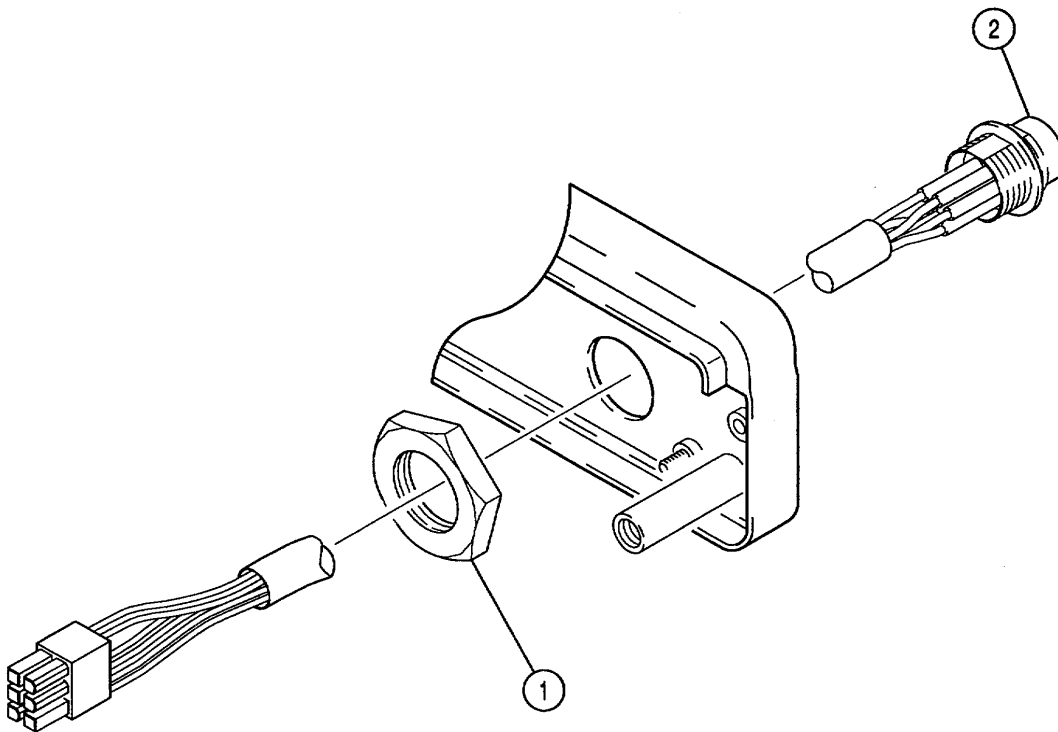
- Remove 83A1A1 Bottom Case (para 2-76).
- Remove 83A1A5 Rear Panel (para 2-85).

**REMOVE**

1. Remove nut (1).
2. Remove 83A1A5W3 (2).

**INSTALL**

1. Install 83A1A5W3 (2).
2. Install nut (1).



CE2FO061

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A5 Rear Panel (para 2-85).
- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-89. REPLACE 83A1A9 EXTERNAL I/O.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

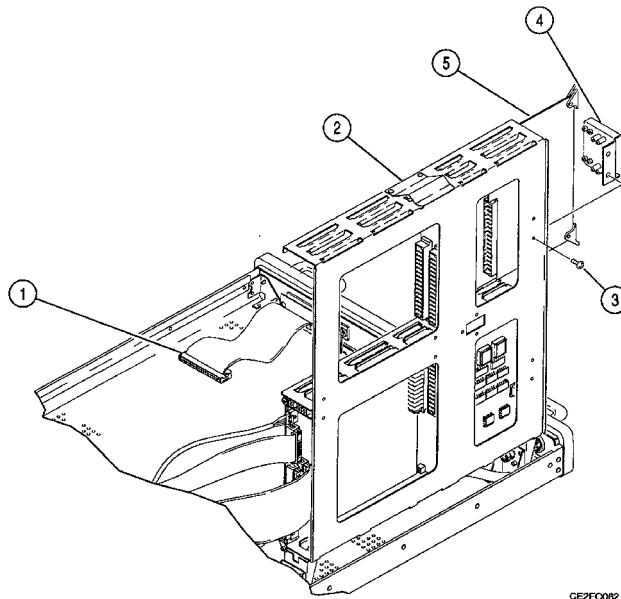
- Remove 83A1A1 Bottom Case (para 2-76).

**REMOVE**

1. Release cardcage latch and raise cardcage (2) 30°.
2. Disconnect ribbon cable connector (1).
3. Raise cardcage (2) 60°.
4. Remove 2 screws (3) and PC Board retainer (4).
5. Raise card ejectors and remove 83A1A9 External I/O (5).

**INSTALL**

1. Install 83A1A9 External I/O (5) in guides and close card ejectors.
2. Install PC Board retainer (4) and 2 screws (3).
3. Lower cardcage (2) 60°.
4. Reconnect ribbon cable connector (1).
5. Lower cardcage (2) until cardcage latch locks.



GE2F0082

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-90. REPLACE 83A1A7 UUT INTERFACE.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

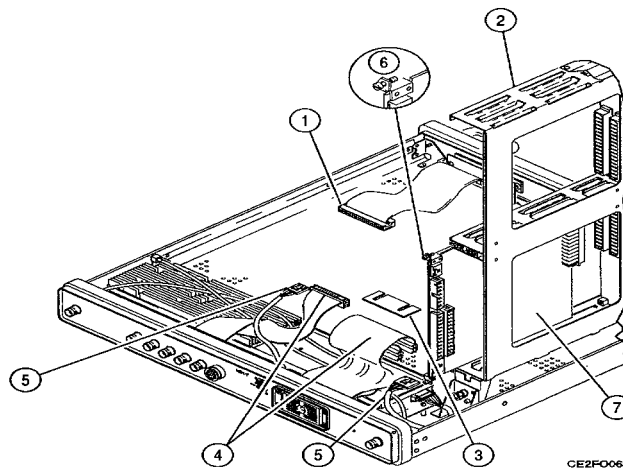
- Remove 83A1A1 Bottom Case (para 2-76).

**REMOVE**

1. Release cardcage latch and raise cardcage (2) 30°.
2. Disconnect ribbon cable connector (1).
3. Raise cardcage (2) 60°.
4. Disconnect 3 ribbon cable connectors (4) and 2 wire cable connectors (5).
5. Remove spacer (3).
6. Loosen 2 captive screws (6).
7. Remove 83A1A7 UUT Interface (7).

**INSTALL**

1. Install 83A1A7 UUT Interface (7).
2. Tighten 2 captive screws (6).
3. Install spacer (3).
4. Reconnect 2 wire cable connectors (5) and 3 ribbon cable connectors (4).
5. Lower cardcage (2) 60°.
6. Reconnect ribbon cable connector (1).
7. Lower cardcage (2) until cardcage latch locks.

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-91. REPLACE 83A1A8 PROCESSOR.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

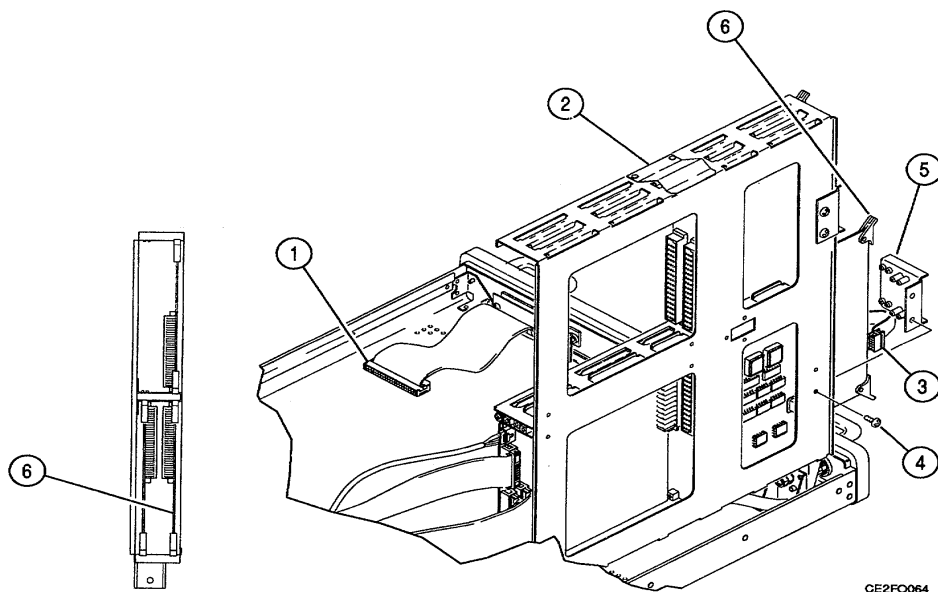
- Remove 83A1A1 Bottom Case (para 2-76).

**REMOVE**

1. Release cardcage latch and raise cardcage (2) 30°.
2. Disconnect ribbon cable connector (1).
3. Raise cardcage (2) 60°.
4. Disconnect ribbon cable connector (3).
5. Remove 2 screws (4) and PC Board retainer (5).
6. Raise card ejectors and remove 83A1A8 Processor (6).

**INSTALL**

1. Install 83A1A8 Processor (6) in guides and close card ejectors.
2. Install 2 screws (4) and PC Board retainer (5).
3. Reconnect ribbon cable connector (3).
4. Lower cardcage (2) 60°.
5. Reconnect ribbon cable connector (1).
6. Lower cardcage (2) until cardcage latch locks.



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**FOLLOW-ON MAINTENANCE:**

- Install 83A1A1 Bottom Case (para 2-76).

**END OF TASK**

**2-92. REPLACE 83A1A6 MEMORY.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

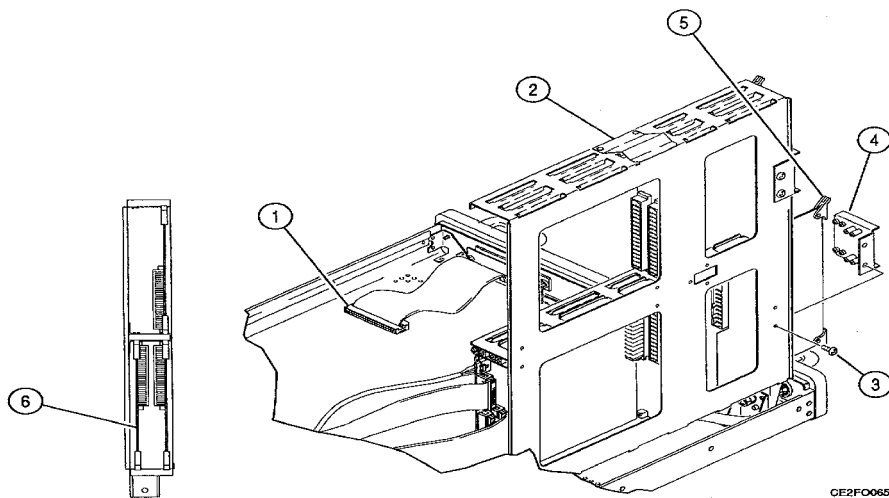
- Remove 83A1A1 Bottom Case (para 2-76).

**REMOVE**

1. Release cardcage latch and raise cardcage (2) 30°.
2. Disconnect ribbon cable connector (1).
3. Raise cardcage (2) 60°.
4. Remove 2 screws (3) and PC Board retainer (4).
5. Raise card ejectors and remove 83A1A6 Memory (5).

**INSTALL**

1. Install 83AiA6 Memory (5) in guides and close card ejectors.
2. Install PC Board retainer (4) and 2 screws (3).
3. Lower cardcage (2) 60°.
4. Reconnect ribbon cable connector (1).
5. Lower cardcage (2) until cardcage latch locks.

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A1 Bottom Case (para 2-76).
- Perform Upload Interface Software Procedure (para 2-93c).

**END OF TASK**

**2-93. REPLACE 83A1A2A1 MOTHERBOARD.****DESCRIPTION**

This procedure covers: Remove. Install.

**INITIAL SETUP****PRELIMINARY PROCEDURES:**

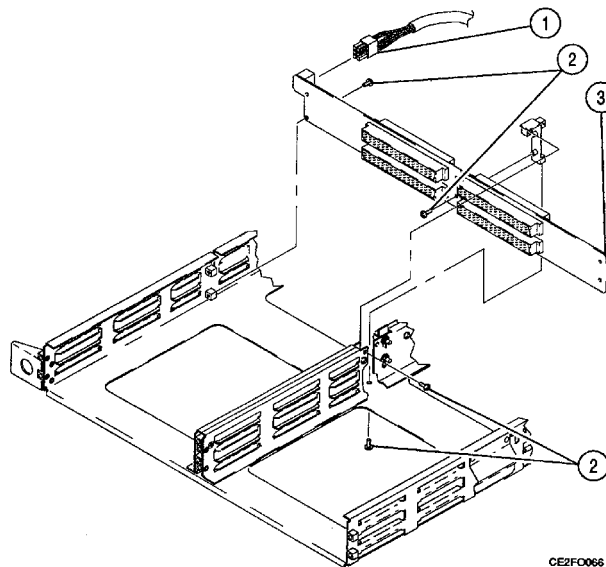
- Remove 83A1A1 Bottom Case (para 2-76).
- Remove 83A1A9 External I/O (para 2-89).
- Remove 83A1A7 UUT Interface (para 2-90).
- Remove 83A1A8 Processor (para 2-91).
- Remove 83A1A6 Memory (para 2-92).

**REMOVE**

1. Disconnect wire cable connector (1).
2. Remove 7 screws (2).
3. Remove 83A1A2A1 Motherboard (3).

**INSTALL**

1. Install 83A1A2A1 Motherboard (3).
2. Install 7 screws (2).
3. Reconnect wire cable connector (1).

**FOLLOW-ON MAINTENANCE:**

- Install 83A1A6 Memory (para 2-92).
- Install 83A1A8 Processor (para 2-91).
- Install 83A1A7 UUT Interface (para 2-90).
- Install 83A1A9 External I/O (para 2-89).
- Install 83A1A1 Bottom Case (para 2-76).

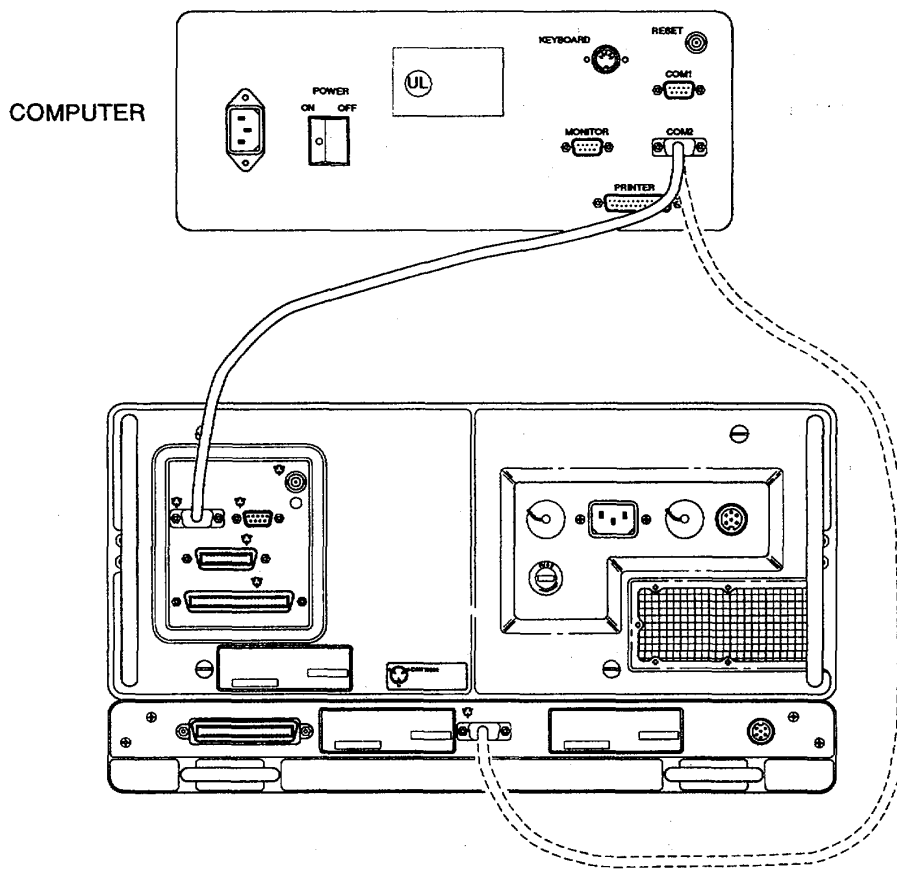
**END OF TASK**

2-94. UPLOAD INTERFACE SOFTWARE PROCEDURE.

DESCRIPTION

This procedure is used, after replacement of 78A1A20 Memory and/or 83A1A6 Memory, to automatically upload system software. After completion of the following steps, the Computer begins execution of Upload Interface Software. The User is kept informed of the status of the program and of the actions required through a series of menus that appear during program execution.

1. Press Computer Power Switch to ON.
2. Insert Upload Interface Software Disk (TS-4317/GRM or J-4843/GRM-114B) into PC Disk Drive A. At operating prompt, type A: , press ENTER Key and follow instructions on Computer Display.
3. Disconnect external test equipment.



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**2-95. ADJUSTMENTS.****DESCRIPTION**

This procedure is used to adjust the Radio Test Set before and after an assembly is replaced. These adjustment procedures cover:

- Power Supply Adjustment (para 2-96)
- VCXO Adjustment (para 2-97)
- Metering DVM Adjustment (para 2-98)
- Func Gen Level And VRMS Meter Adjustment (para 2-99)
- Gen Output Level Adjustment (para 2-100)
- RF Null Adjustment (para 2-101)
- Signal Meter Adjustment (para 2-102)
- FM Adjustment (para 2-103)
- Deviation Meter Adjustment (para 2-104)
- Modulation Meter Adjustment (para 2-105)
- Phase Meter Adjustment (para 2-106)
- Distortion Meter Adjustment (para 2-107)
- Sinad Meter Adjustment (para 2-108)
- Gen Modulation Adjustment (para 2-109)
- Scope Adjustment (para 2-110)
- Spectrum Analyzer Adjustment (para 2-111)
- Digital Multimeter Adjustment (para 2-112)
- Power Meter Adjustment (para 2-113)
- 78A1A15 CRT (7005-7840-600) Adjustment (para 2-114)
- 78A1A15 CRT (7005-8644-300) Adjustment (para 2-115)
- 83A1A3 RF Amplifier Adjustment (para 2-116)

**WARNING**

**Dangerous voltages are present with covers removed.**

**CAUTION**

**Do not disconnect or remove any board assemblies in Radio Test Set unless instrument is unplugged.**

**NOTE**

- The adjustments required after repair/replacement of specific assemblies are shown in Table 2-2.
- Do not adjust components unless instructed to do so in the procedures.
- All indications and waveforms are referenced to chassis ground unless otherwise noted.
- If internal cal factors change when performing the Radio Test Set Adjustment Procedure, a "Backup Cal Data" Submenu appears. A key sequence reply (Y=Yes, N=No) must be initiated in order to proceed with the procedure.

Table 2-2. Post Repair/Replace Adjustments.

REPAIRED/REPLACED ASSEMBLIES	ADJUSTMENT
78A1G1	Gen Output Level Adjustment (para 2-100) RF Null Adjustment (para 2-101) Signal Meter Adjustment (para 2-102) FM Adjustment (para 2-103) Deviation Meter Adjustment (para 2-104) Modulation Meter Adjustment (para 2-105) Phase Meter Adjustment (para 2-106) Distortion Meter Adjustment (para 2-107) Sinad Meter Adjustment (para 2-108) Gen Modulation Adjustment (para 2-109) Scope Adjustment (para 2-110) Spectrum Analyzer Adjustment (para 2-111) Power Meter Adjustment (para 2-113)
78A1A1A1 Motherboard	None
78A1A2 Rear Panel	None
78A1A3 Monitor	Func Gen Level and VRMS Meter Adjustment (para 2-99) Signal Meter Adjustment (para 2-102) FM Adjustment (para 2-103) Deviation Meter Adjustment (para 2-104) Modulation Meter Adjustment (para 2-105) Phase Meter Adjustment (para 2-106) Distortion Meter Adjustment (para 2-107) Sinad Meter Adjustment (para 2-108) Power Meter Adjustment (para 2-113)
78A1A4 Analyzer Log/IF	Spectrum Analyzer Adjustment (para 2-111)
78A1A5 Analyzer RF	Spectrum Analyzer Adjustment (para 2-111)
78A1A6 Receiver	Signal Meter Adjustment (para 2-102) FM Adjustment (para 2-103) Deviation Meter Adjustment (para 2-104) Modulation Meter Adjustment (para 2-105)
78A1A7 3rd LO	Phase Meter Adjustment (para 2-106) Signal Meter Adjustment (para 2-102) FM Adjustment (para 2-103) Deviation Meter Adjustment (para 2-104) Modulation Meter Adjustment (para 2-105) Phase Meter Adjustment (para 2-106)
78A1 A8 DMM	Digital Multimeter Adjustment (para 2-112)
78A1A9 90 MHz Generator	Gen Output Level Adjustment (para 2-100) Gen Modulation Adjustment (para 2-109)
78A1A10 1st LO	Gen Output Level Adjustment (para 2-100) RF Null Adjustment (para 2-101) Signal Meter Adjustment (para 2-102) Gen Modulation Adjustment (para 2-109)
78A1A11 2nd LO	VCXO Adjustment (para 2-97) Gen Output Level Adjustment (para 2-100) Gen Modulation Adjustment (para 2-109)

Table 2-2. Post Repair/Replace Adjustments - Continued.

REPAIRED/REPLACED ASSEMBLIES	ADJUSTMENT
78A1A12 Receive IF	RF Null Adjustment (para 2-101) Signal Meter Adjustment (para 2-102) FM Adjustment (para 2-103) Deviation Meter Adjustment (para 2-104) Modulation Meter Adjustment (para 2-105) Phase Meter Adjustment (para 2-106) Spectrum Analyzer Adjustment (para 2-111)
78A1A13 Generator IF	Gen Output Level Adjustment (para 2-100) Gen Modulation Adjustment (para 2-109)
78A1A14 Power Termination	Gen Output Level Adjustment (para 2-100) Power Meter Adjustment (para 2-113)
78A1A15 CRT (7005-7840-600)	78A1A15 CRT (7005-7840-600) Adjustment (para 2-114)
78A1A15 CRT (7005-8644-300)	78A1A15 CRT (7005-8644-300) Adjustment (para 2-115)
78A1A16 Power Supply	Power Supply Adjustment (para 2-96) VCXO Adjustment (para 2-97) Metering DVM Adjustment (para 2-98) Func Gen Level and VRMS Meter Adjustment (para 2-99) Gen Output Level Adjustment (para 2-100) RF Null Adjustment (para 2-101) Signal Meter Adjustment (para 2-102) FM Adjustment (para 2-103) Deviation Meter Adjustment (para 2-104) Modulation Meter Adjustment (para 2-105) Phase Meter Adjustment (para 2-106) Distortion Meter Adjustment (para 2-107) Sinad Meter Adjustment (para 2-108) Gen Modulation Adjustment (para 2-109) Scope Adjustment (para 2-110) Spectrum Analyzer Adjustment (para 2-111) Digital Multimeter Adjustment (para 2-112) Power Meter Adjustment (para 2-113)
78A1A17 Front Panel	None
78A1A19 Processor	None
78A1A20 Memory	Power Supply Adjustment (para 2-96) VCXO Adjustment (para 2-97) Metering DVM Adjustment (para 2-98) Func Gen Level and VRMS Meter Adjustment (para 2-99) Gen Output Level Adjustment (para 2-100) Signal Meter Adjustment (para 2-101) FM Adjustment (para 2-103) Deviation Meter Adjustment (para 2-104) Modulation Meter Adjustment (para 2-105) Phase Meter Adjustment (para 2-106) Distortion Meter Adjustment (para 2-107) Sinad Meter Adjustment (para 2-108) Gen Modulation Adjustment (para 2-109) Spectrum Analyzer Adjustment (para 2-111) Power Meter Adjustment (para 2-113)

Table 2-2. Post Repair/Replace Adjustments - Continued.

REPAIRED/REPLACED ASSEMBLIES	ADJUSTMENT
78A1A21 Video Controller	None
78A1A22 RF I/O	VCXO Adjustment (para 2-97)
78A1A23 Counter	None
78A1A24 Function Generator	Func Gen Level and VRMS Meter Adjustment (para 2-99) Gen Modulation Adjustment (para 2-109)
78A1A25 Digitizer	Scope Adjustment (para 2-110) Spectrum Analyzer Adjustment (para 2-111)
78A1A26 Monitor Control	Metering DVM Adjustment (para 2-98) Func Gen Level and VRMS Meter Adjustment (para 2-99) Signal Meter Adjustment (para 2-102) FM Adjustment (para 2-103) Deviation Meter Adjustment (para 2-104) Modulation Meter Adjustment (para 2-105) Phase Meter Adjustment (para 2-106) Distortion Meter Adjustment (para 2-107) Sinad Meter Adjustment (para 2-108) Power Meter Adjustment (para 2-113)
78A1A27 External I/O	None
78A1A28 Attenuator	Gen Output Level Adjustment (para 2-100)
78A1A29 Auxiliary Power Supply	Power Supply Adjustment (para 2-96)
78A1A30 Rear Panel Connector	None
83A1A2AI Motherboard	None
83A1 A3 RF Amplifier	83A1A3 RF Amplifier Adjustment (para 2-116)
83A1A4 Front Panel	None
83A1A5 Rear Panel	None
83A1A6 Memory	None
83A1A7 UUT Interface	None
83A1A8 Processor	None
83A1A9 External I/O	None

**2-96. POWER SUPPLY ADJUSTMENT.****DESCRIPTION**


---

This procedure is used to adjust the +5 Vdc and +15 Vdc supplies.

---

1. Press POWER Switch to On and allow 5 minute warmup period.
2. Press MTRS MODE Key, "AUX" F6 and RCL Key.
3. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
4. Locate A19 Processor (fig. FO2, Sheet 1 of 5) and verify +5.05 Vdc (i0.05 Vdc) with DMM positive lead at A19RN2, Pin 1 (fig. FO16, Sheet 1 of 3) and ground lead at chassis ground. Locate A16 Power Supply (fig. FO2, Sheet 1 of 5) and adjust A16A2R37 (+5 Vdc ADJUST) (fig. FO14) as required.
5. Locate All 2nd LO (fig. FO2, Sheet 1 of 5) and verify +15.05 Vdc (f0.05 Vdc) with DMM positive lead at A11FL1 (Red Wire) (fig. FO8) and negative lead at A11GL1 (Black Wire). Locate A16 Power Supply (fig. FO2, Sheet 1 of 5) and adjust A16A2R25 (+15 Vdc ADJUST) (fig. FO14) as required.
6. Disconnect test equipment.

**2-97. VCXO ADJUSTMENT.****DESCRIPTION**


---

This procedure is used to adjust the VCXO used as the 10 MHz reference for the Test Set.

---

1. Press POWER Switch to On and allow 5 minute warmup period.
2. Press MTRS MODE Key, "AUX" F6 and RCL Key.
3. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
4. Connect Frequency Counter to T/R Connector.
5. Press RF GEN MODE Key.
6. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 900.0000 MHz. Press ENTER Key.
7. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.0 dBm. Press ENTER Key.
8. Verify 900 MHz ( $\pm 450$  Hz) with Frequency Counter.
  - If incorrect, perform Steps 915.
  - If correct, perform Step 15.
9. Press SETUP Key and "AUX" F6.
10. Press ENTER Key to access Calibration Menu.

**2-97. VCXO ADJUSTMENT - Continued.**

11. Use FIELD SELECT Keys to move cursor to "12. VCXO Calibration". Press ENTER Key.
12. Use DATA SCROLL Keys to move cursor to least significant digit.
13. Use DATA SCROLL Keys to adjust for 900 MHz on Frequency Counter. Press ENTER Key.
14. Press "AUX" F6.
15. Disconnect test equipment.

**2-98. METERING DVM ADJUSTMENT.****DESCRIPTION**

This procedure is used to adjust the parameters for the internal DVM.

1. Press POWER Switch to On and allow 5 minute warmup period.
2. Press MTRS MODE Key, "AUX" F6 and RCL Key.
3. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
4. Locate A26 Monitor Control (fig. FO2, Sheet 1 of 5) and verify 4.0960 Vdc (±0.002 Vdc) with DMM negative lead at A26TP3 (fig. FO16, Sheet 3 of 3) and positive lead at A26R18 as required.
5. Disconnect test equipment.

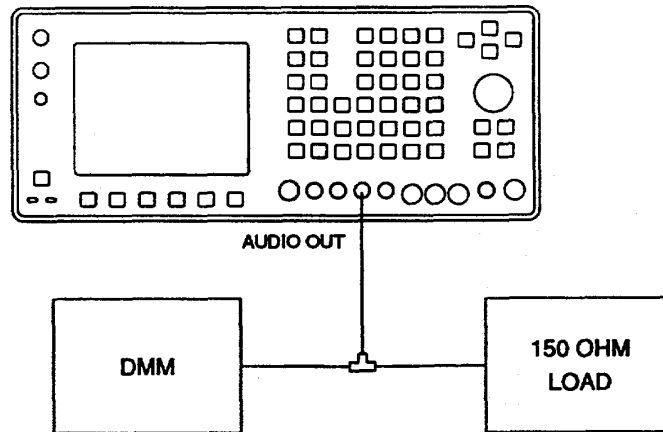
**2-99. FUNC GEN LEVEL AND VRMS METER ADJUSTMENT.****DESCRIPTION**

This procedure is used to adjust the output of the Audio Function Generators and the VRMS Meter on the Audio Function Generator screen.

1. Remove A24 Function Generator (para 233) and install on PC Board Assembly Extender (Tool Code 29 in Appendix B of TM 116625324512) in Test Set.
2. Press POWER Switch to On and allow 5 minute warmup period.
3. Press MTRS MODE Key, "AUX" F6 and RCL Key.
4. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
5. Press AF GEN MODE Key and SETUP Key.
6. Use FIELD SELECT Keys to move cursor to "5. AF Output Setup". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. To Speaker". Press ENTER Key to select On. Press "ESC" F6.

**2-99. FUNC GEN LEVEL AND VRMS METER ADJUSTMENT - Continued.**

7. Press AF GEN MODE Key.
8. Connect external test equipment as shown.



9. Set DMM to VAC.
10. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to select On.
11. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 2.5000 V. Press ENTER Key.
12. Verify 2.5 VRMS (i0.5 mVRMS).
  - If correct, perform Step 34.
13. Press SETUP Key and 'AUX' F6.
14. Press ENTER Key to access Calibration Menu.
15. Use FIELD SELECT Keys to move cursor to "15. Func Gen Level". Press ENTER Key.
16. Use FIELD SELECT Keys to move cursor to "1. 199.9 mV". Press ENTER Key.
17. Use DATA SCROLL Keys to edit value until DMM equals 199.9 mVAC (i0.03 mVAC). Press ENTER Key.
  - If unable to adjust, perform Steps 2033.
18. Use FIELD SELECT Keys to move cursor to "2. 2.5 V". Press ENTER Key.
19. Use DATA SCROLL Keys to edit value until DMM equals 2.500 VAC (i0.5 mVAC). Press ENTER Key.
  - If unable to adjust, perform Steps 2033.
  - If able to adjust, perform Step 34.
20. Press "ESC" F6, "AUX" F6, AF GEN MODE Key and SETUP Key.
21. Use FIELD SELECT Keys to move cursor to "1. AF Gen #1 Setup". Press ENTER Key.

**2-99. FUNC GEN LEVEL AND VRMS METER ADJUSTMENT - Continued.**

22. Use FIELD SELECT Keys to move cursor to "3. Wave Form". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "7. 0 Lvl". Press ENTER Key. Press "ESC" F6
23. Use FIELD SELECT Keys to move cursor to "2. AF Gen #2 Setup". Press ENTER Key.
24. Use FIELD SELECT Keys to move cursor to "1. Func Gen 2". Press ENTER Key to select On. Use FIELD SELECT Keys to move cursor to "3. Waveform". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "7. 0 Lvl". Press ENTER Key. Press "ESC" F6.
25. Press AF GEN MODE Key.
26. Connect DMM positive lead to A24P2, Pin 2B (fig. FO16, Sheet 2 of 3) and DMM negative lead to A24P2, Pin 6B.
27. Set DMM to Vdc.
28. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 3.100 V. Press ENTER Key.
29. Verify 0.000 Vdc with DMM. Adjust A24R22 as required.
30. Use FIELD SELECT Keys to move cursor to GEN 2. Press ENTER Key to select Off.
31. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to select Off.
32. Verify 0.000 Vdc with DMM. Adjust A24R23 as required.
33. Use FIELD SELECT Keys to move cursor to WAVE (GEN 1). Press ENTER Key. Use DATA SCROLL Keys to select "Sine". Use FIELD SELECT Keys to move cursor to WAVE (GEN 2). Press ENTER Key. Use DATA SCROLL Keys to select "Sine". Repeat Steps 9 through 19.
34. Press AF GEN MODE Key. Verify VRMS Meter matches (10%) DMM.
  - If incorrect, perform Steps 3539.
  - If correct, perform Step 39.
35. Press SETUP Key and "AUX" F6.
36. Press ENTER Key to access Calibration Menu.
37. Use FIELD SELECT Keys to move cursor to "8. VRMS Meter". Press ENTER Key twice. Use DATA ENTRY Keypad to enter DMM VRMS reading. Press ENTER Key.
38. Press "AUX" F6.
39. Disconnect test equipment and install A24 Function Generator (para 233).

**2100. GEN OUTPUT LEVEL ADJUSTMENT.****DESCRIPTION**


---

This procedure is used to adjust the output of the RF Generator.

---

1. Press POWER Switch to On and allow 5 minute warm-up period.



**2-100. GEN OUTPUT LEVEL ADJUSTMENT - Continued.**

2. Press MTRS MODE Key, "AUX" F6 and RCL Key.
3. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
4. Connect Measuring Receiver to T/R Connector.
5. Press RF GEN MODE Key.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.0 dBm. Press ENTER Key.
7. Press SETUP Key and "AUX" F6.
8. Press ENTER Key to access Calibration Menu.
9. Use FIELD SELECT Keys to move cursor to "14. Gen Output Level". Press ENTER Key.
10. Perform Steps 1116 for following ranges.

RANGE	LOW FREQUENCY	HIGH FREQUENCY
1	250 kHz	499 kHz
2	500 kHz	999 kHz
3	1 MHz	49 MHz
4	50 MHz	124 MHz
5	125 MHz	199 MHz
6	200 MHz	399 MHz
7	400 MHz	599 MHz
8	600 MHz	799 MHz
9	800 MHz	999 MHz

11. Use FIELD SELECT Keys to move cursor to Low Frequency Range. Verify Low Frequency and note output level in dBm using Measuring Receiver.
12. Press "High" Fl. Verify High Frequency and note output level in dBm using Measuring Receiver. Press "Low" Fl.
13. Verify Step 11 output is above 0.0 dBm and Step 12 output is below 0.0 dBm. If Step 11 output plus Step 12 output is <+0.30 dBm, continue with next Range.
14. Press ENTER Key.
15. Use DATA SCROLL Keys to move cursor to least significant digit in data field and edit data. While monitoring Measuring Receiver, adjust level until value is within tolerance.
16. Repeat Steps 12 through 15 until levels match as closely as Radio Test Set allows. Continue with next Range.
17. Press "ESC" F6 and "AUX" F6.
18. Disconnect test equipment.

**Change 1 2-187**

**2-101. RF NULL ADJUSTMENT.**

---

**DESCRIPTION**

This procedure is used to adjust the mixer null for the Spectrum Analyzer.

---

1. Press POWER Switch to On and allow 5 minute warmup period.
2. Press MTRS MODE Key, "AUX" F6 and RCL Key.
3. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
4. Press SCOPE/ANLZ MODE Key to access Analyzer Operation Screen.
5. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.2500 MHz. Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to RF ATTEN. Press ENTER Key. Use DATA SCROLL Keys to select 40 dB. Press ENTER Key.
7. Use FIELD SELECT Keys to move cursor to 1 kHz. Press ENTER Key. Use DATA SCROLL Keys to select 1 MHz. Press ENTER Key.

**NOTE**

**A12A4R2 and A12A4R3 are interactive and adjustment is extremely sensitive.**

8. Verify Null signal is <0 dBm. Locate A12 Receive IF (fig. FO2, Sheet 1 of 5) and alternately adjust A12A4R2 (fig. FO9) and A12A4R3 as required.

**2-102. SIGNAL METER ADJUSTMENT.**

---

**DESCRIPTION**

This procedure is used to adjust the Signal Meter on the RF Receive screen.

---

1. Press POWER Switch to On and allow 5 minute warmup period.
2. Press MTRS MODE Key, "AUX" F6 and RCL Key.
3. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
4. Press RCVR MODE Key.
5. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 121.1000 MHz. Press ENTER Key.
6. Connect Signal Generator to ANTENNA IN Connector. Set Signal Generator output for 121.100000 MHz at -30 dB.

**2-102. SIGNAL METER ADJUSTMENT - Continued.**

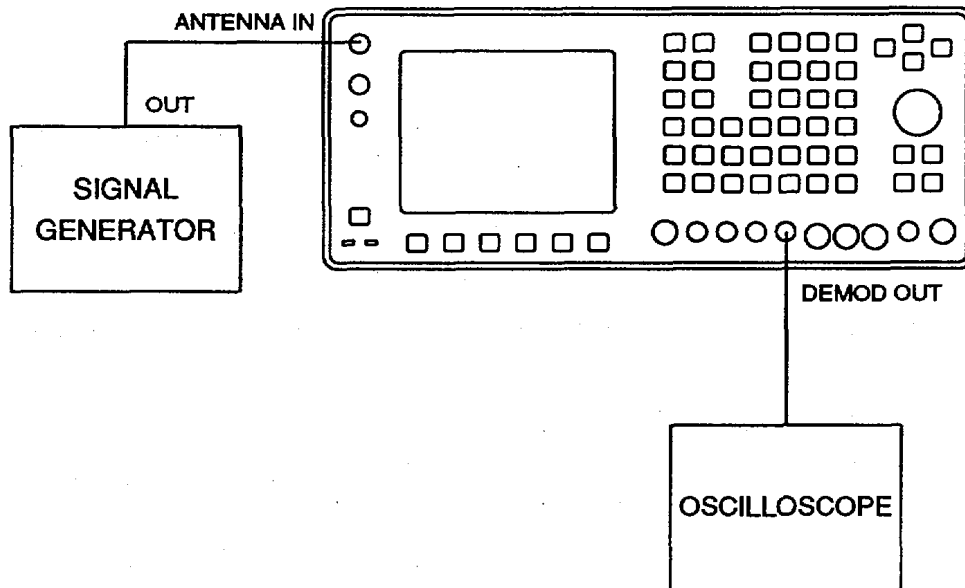
7. Verify Signal Strength Meter displays 100.
  - If incorrect, perform Steps 812.
  - If correct, perform Step 12.
8. Press SETUP Key and "AUX" F6.
9. Press ENTER Key to access Calibration Menu.
10. Use FIELD SELECT Keys to move cursor to "7. Signal Meter". Press ENTER Key twice. Use DATA ENTRY Keypad to enter 100. Press ENTER Key.
11. Press "Ret" F5 and "AUX" F6.
12. Disconnect test equipment.

**2-103. FM ADJUSTMENT.**

**DESCRIPTION**

This procedure is used to adjust the FM demodulation circuit.

1. Press POWER Switch to On and allow 5 minute warmup period.
2. Press MTRS MODE Key, "AUX" F6 and RCL Key.
3. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
4. Connect external test equipment as shown.



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5. Set RF Signal Generator output for 121.100000 MHz at -30 dBm.

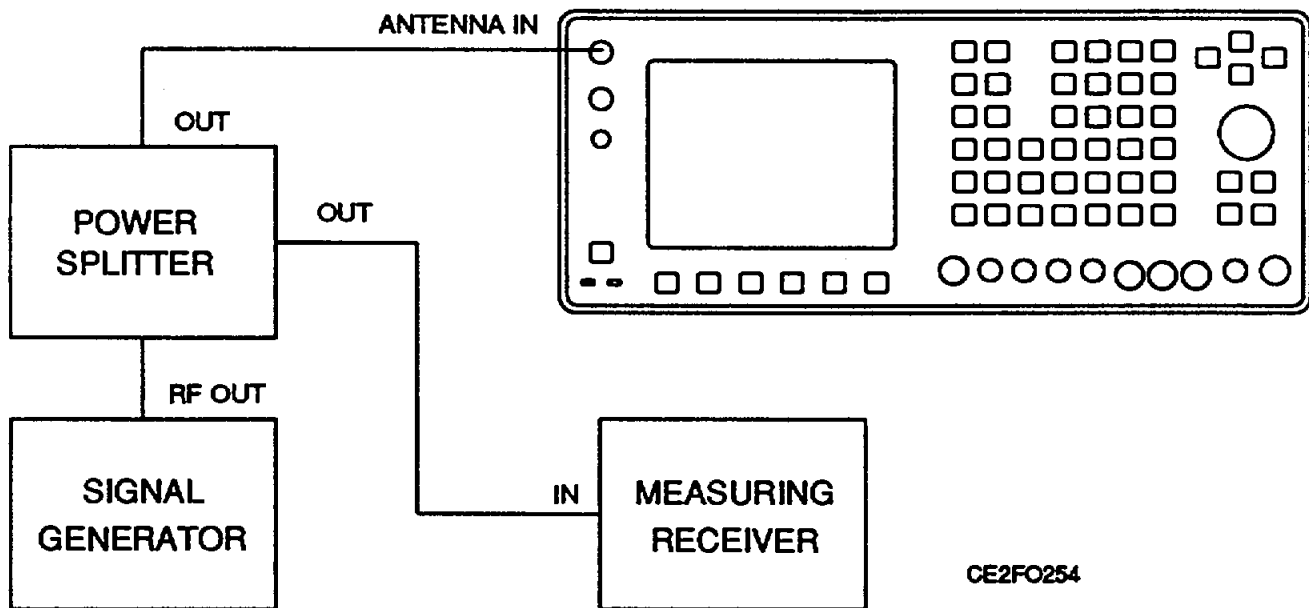
**2-103. FM ADJUSTMENT - Continued.**

6. Set Oscilloscope Trigger to Auto, Sweep to 500 ILs, Coupling to DC and V/Div to 20 mV.
7. Press RCVR MODE Key.
8. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 121.1000 MHz. Press ENTER Key.
9. Press SETUP Key.
10. Use FIELD SELECT Keys to move cursor to "5. Select AGC Type". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. User Defined". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. Measurement". Press ENTER Key.
11. Press RCVR MODE Key.
12. Verify FREQ ERR is  $<\pm 10$  Hz. Adjust Signal Generator frequency as required.
13. Press SETUP Key and "AUX" F6.
14. Press ENTER Key to access Calibration Menu.
15. Use FIELD SELECT Keys to move cursor to "11. FM Calibration". Press ENTER Key.
16. Use DATA SCROLL Keys to move cursor to least significant digit.
17. Use DATA SCROLL Keys to adjust Frequency Offset for 0 Vdc ( $\pm 40$  mVdc) on Oscilloscope. Press ENTER Key.
18. Press "AUX" F6.
19. Disconnect test equipment.

**2-104. DEVIATION METER ADJUSTMENT.****DESCRIPTION**

This procedure is used to adjust the Deviation Meter for the Receive function.

1. Press POWER Switch to On and allow 5 minute warmup period.
2. Press MTRS MODE Key, "AUX" F6 and RCL Key.
3. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
4. Connect external test equipment as shown.



5. Set Signal Generator output for 121.100000 MHz at 0 dBm with no modulation.
6. Set Measuring Receiver Measurement to FM, Detector to Peak+ and LowPass Filter to 3 kHz.
7. Adjust Signal Generator for FREQ ERR reading of  $<\pm 10$  Hz.
8. Press RCVR MODE Key.
9. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 121.1000 MHz. Press ENTER Key.
10. Use FIELD SELECT Keys to move cursor to OdB. Press ENTER Key. Use DATA SCROLL Keys to select 40 dB. Press ENTER Key.
11. Press SETUP Key.

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**2-104. DEVIATION METER ADJUSTMENT - Continued.**

12. Use FIELD SELECT Keys to move cursor to "2. Select Mod". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "11. User Defined". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. IF Filters". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "3. 300 kHz". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "3. Post Detection". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Low Pass". Press ENTER Key. Use DATA ENTRY Keypad to enter 3.000 kHz. Press ENTER Key.
13. Press RCVR MODE Key.
14. Verify plus (+) and minus (-) deviation is within 200 Hz.
  - If deviation error is >200 Hz, remove external test equipment and perform FM Adjustment (para 2103).
15. Press SETUP Key and "AUX" F6.
16. Press ENTER Key to access Calibration Menu.
17. Use FIELD SELECT Keys to move cursor to "2. Dev Meter (Peak)". Press ENTER Key.
18. Set Signal Generator output to 8 kHz deviation.
19. Press "Range" F1 until +10 kHz Range is displayed with AR (Auto Range) Off. Press ENTER Key.
20. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press ENTER Key.
21. Set Measuring Receiver Detector to Peak.
22. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press +/- Key and ENTER Key.
23. Press "Range" F1 to set Range to 20 kHz.
24. Set Signal Generator output for 16 kHz deviation.
25. Set Measuring Receiver Detector to Peak+.
26. Press ENTER Key. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press ENTER Key.
27. Set Measuring Receiver Detector to Peak.
28. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press +/- Key and ENTER Key.
29. Press "Range" F1 to set Range to 50 kHz.
30. Set Signal Generator output for 40 kHz deviation.
31. Set Measuring Receiver Detector to Peak+.
32. Press ENTER Key. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press ENTER Key.
33. Set Measuring Receiver Detector to Peak.
34. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press +/- Key and ENTER Key.

**2-104. DEVIATION METER ADJUSTMENT - Continued.**

35. Press "Range" F1 to set Range to 100 kHz.
36. Set Signal Generator output for 80 kHz deviation.
37. Set Measuring Receiver Detector to Peak+.
38. Press ENTER Key. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press ENTER Key.
39. Set Measuring Receiver Detector to Peak-.
40. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press +/- Key and ENTER Key.
41. Press "Ret" F5 and "AUX" F6.
42. Set Signal Generator output for 11 kHz deviation.
43. Set Measuring Receiver Detector to RMS.
44. Press MTRS MODE Key.
45. Use FIELD SELECT Keys to move cursor to "12. Dev Meter (RMS)". Press ENTER Key.
46. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Keys to select 10 kHz. Press ENTER Key.
47. Verify Deviation Meter (RMS) matches Measuring Receiver ( $\pm 10\%$  i1 count).
  - If out of tolerance, perform Steps 48-52.
  - If in tolerance, perform Modulation Meter Adjustment (para 2-105).
48. Press SETUP Key and "AUX" F6.
49. Press ENTER Key to access Calibration Menu.
50. Use FIELD SELECT Keys to move cursor to "3. Dev Meter (RMS)". Press ENTER Key.
51. Press ENTER Key. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press ENTER Key.
52. Press "Ret" F5 and "AUX" F6.

**2-105. MODULATION METER ADJUSTMENT.****DESCRIPTION**

---

This procedure is used to adjust the Modulation Meter for the Receive function.

---

1. Set Signal Generator output for 121.100000 MHz at 0 dBm with 80% AM modulation and 1 kHz tone.
2. Set Measuring Receiver Detector to Peak+, Low-Pass Filter to 15 kHz and Detector AM.
3. Press RCVR MODE Key.
4. Use FIELD SELECT Keys to move cursor to MOD. Press ENTER Key. Use DATA SCROLL Keys to select AM2 Press ENTER Key.
5. Use FIELD SELECT Keys to move cursor to MOD Meter Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Keys to select 100%. Press ENTER Key.
7. Press SETUP Key and "AUX" F6.
8. Press ENTER Key to access Calibration Menu.
9. Use FIELD SELECT Keys to move cursor to "4. Modulation Meter". Press ENTER Key.
10. Press ENTER Key. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press ENTER Key.
11. Press "Ret" F5 and "AUX" F6.



**2-106. PHASE METER ADJUSTMENT.****DESCRIPTION**

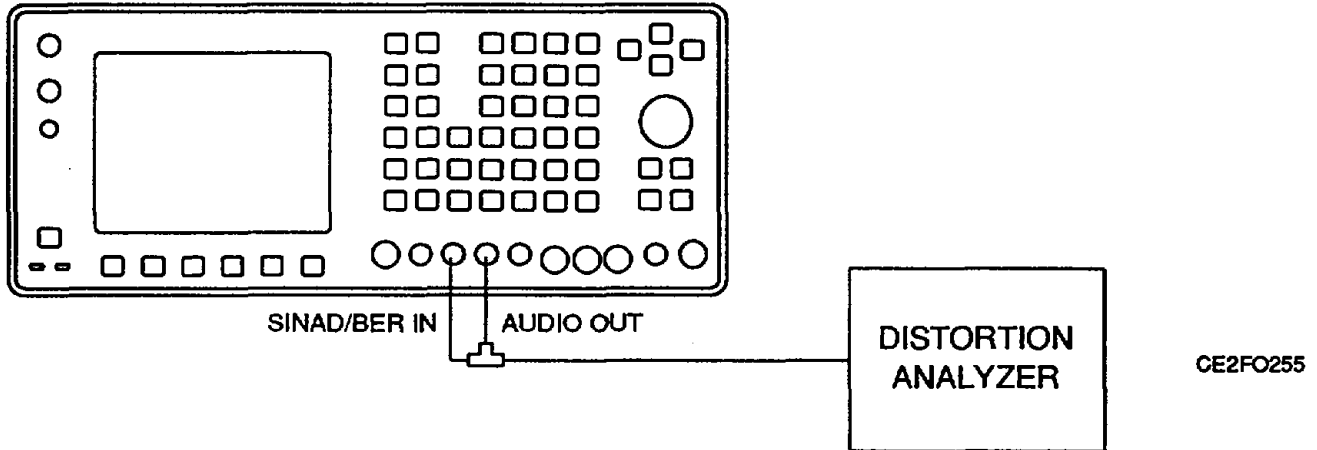
This procedure is used to adjust the Phase Meter for the Receive function.

1. Set Signal Generator output for 121.100000 MHz at 0 dBm with 6 kHz of deviation and 1 kHz rate.
2. Set Measuring Receiver Measurement to -M (Phase).
3. Press RCVR MODE Key.
4. Use FIELD SELECT Keys to move cursor to MOD. Press ENTER Key. Use DATA SCROLL Keys to select PM Press ENTER Key.
5. Verify phase reading is within 3% ( $\pm 1$  Count) of reading on Measuring Receiver.
  - If out of tolerance, perform Steps 6-15.
  - If in tolerance, perform Steps 11-15.
6. Press SETUP Key and "AUX" F6.
7. Press ENTER Key to access Calibration Menu.
8. Use FIELD SELECT Keys to move cursor to "9 Phase Meter" Press ENTER Key.
9. Press ENTER Key. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press ENTER Key.
10. Press "Ret" F5 and "AUX" F6.
11. Set Signal Generator output for 8.5 kHz deviation.
12. Set Measuring Receiver Detector to RMS.
13. Press MTRS MODE Key.
14. Use FIELD SELECT Keys to move cursor to "13 Phase Meter (RMS)" Press ENTER Key.
15. Verify Phase Meter (RMS) matches Measuring Receiver ( $\pm 10\%$  i1 count).
  - If out of tolerance, perform Steps 16-21.
  - If in tolerance, perform Step 21.
16. Press SETUP Key and "AUX" F6.
17. Press ENTER Key to access Calibration Menu.
18. Use FIELD SELECT Keys to move cursor to "10 Phase Meter (RMS)". Press ENTER Key.
19. Press ENTER Key. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press ENTER Key.
20. Press "Ret" F5 and "AUX" F6.
21. Disconnect test equipment.

**2-107. DISTORTION METER ADJUSTMENT.****DESCRIPTION**

This procedure is used to adjust the Distortion Meter for the Receive function.

1. Connect external test equipment.



2. Set Distortion Analyzer to DIST and Low-Pass Filter to 80 kHz.
3. Press POWER Switch to On and allow 5 minute warm-up period.
4. Press MTRS MODE Key, "AUX" F6 and RCL Key.
5. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
6. Press AF GEN MODE Key.
7. Press SETUP Key.
8. Use FIELD SELECT Keys to move cursor to "5 .AF Output Setup". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "5. Proportional Output" Press ENTER Key to select On.
9. Press AF GEN MODE Key.
10. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key. Use DATA ENTRY Keypad to enter 100%. Press ENTER Key.
11. Use FIELD SELECT Keys to move cursor to GEN 2. Press ENTER Key. Use DATA ENTRY Keypad to enter 10%. Press ENTER Key.
12. Use FIELD SELECT Keys to move cursor to GEN 2 AF. Press ENTER Key. Use DATA ENTRY Keypad to enter 2400.0 Hz. Press ENTER Key.

**2-107. DISTORTION METER ADJUSTMENT - Continued.**

13. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 1.0000 V. Press ENTER Key.

**NOTE**

**To center waveform on CRT, select "Vert" F3 and use DATA SCROLL Spinner.**

14. Press MTRS MODE Key.
15. Use FIELD SELECT Keys to move cursor to "6. Dist Meter". Press ENTER Key.
16. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Use DATA SCROLL Keys to select SINAD/BER. Press ENTER Key.
17. Use FIELD SELECT Keys to move cursor to NOTCH FREQ. Press ENTER Key. Use DATA ENTRY Keys to enter 1000 Hz. Press ENTER Key.
18. Press SETUP Key.
19. Use FIELD SELECT Keys to move cursor to "10. Filter Select". Press ENTER Key. Use DATA ENTRY Keypad to enter 4.000 kHz. Press ENTER Key.
20. Press "Ret" F5.
21. Verify distortion reading is within  $\pm 0.5\%$  ( $\pm 1$  Count) of Distortion Analyzer.
- If out of tolerance, perform Steps 22-26.
  - If in tolerance, perform SINAD Meter Adjustment.
22. Press SETUP Key and "AUX" F6.
23. Press ENTER Key to access Calibration Menu.
24. Use FIELD SELECT Keys to move cursor to "5. Distortion Meter". Press ENTER Key.
25. Press ENTER Key. Use DATA ENTRY Keypad to enter value from Distortion Analyzer. Press ENTER Key.
26. Press "Ret" F5 and "AUX" F6.

**2-108. SINAD METER ADJUSTMENT.****DESCRIPTION**

This procedure is used to adjust the Sinad Meter for the Receive function.

1. Set Distortion Analyzer Measurement to SINAD.
2. Press AF GEN MODE Key.
3. Use FIELD SELECT Keys to move cursor to GEN 2. Press ENTER Key. Use DATA ENTRY Keypad to enter 32%. Press ENTER Key.
4. Press MTRS MODE Key.
5. Use FIELD SELECT Keys to move cursor to "7. SINAD Meter". Press ENTER Key.

**2-108. SINAD METER ADJUSTMENT - Continued.**

6. Press SETUP Key.
7. Use FIELD SELECT Keys to move cursor to "10. Readout Res.". Press ENTER Key to select .1 dB. Press "Ret" F5.
8. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Use DATA SCROLL Keys to select SINAD/BER. Press ENTER Key.
9. Press SETUP Key.
10. Use FIELD SELECT Keys to move cursor to "9. Filter Select". Press ENTER Key. Use DATA ENTRY Keypad to enter 4.000 kHz. Press ENTER Key.
11. Press "Ret" F5.
12. Verify SINAD reading is within  $\pm 1$  dB ( $\pm 1$  Digit) of Distortion Analyzer.
  - If out of tolerance, perform Steps 14-18.
  - If in tolerance, perform Step 18.
13. Press SETUP Key and "AUX" F6.
14. Press ENTER Key to access Calibration Menu.
15. Use FIELD SELECT Keys to move cursor to "6. SINAD Meter". Press ENTER Key.
16. Press ENTER-Key. Use DATA ENTRY Keypad to enter value from Distortion Analyzer. . Press ENTER Key.
17. Press "Ret" F5 and "AUX" F6.
18. Disconnect test equipment.

**2-109. GEN MODULATION ADJUSTMENT.****DESCRIPTION**

This procedure is used to adjust the RF Generator modulation levels.

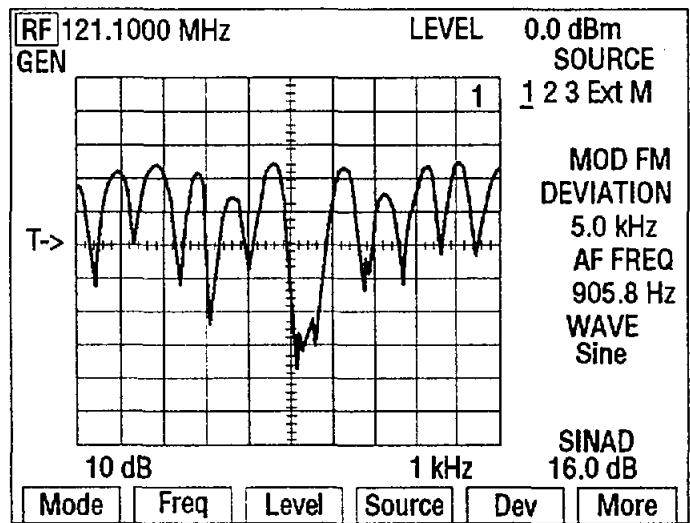
1. Connect Measuring Receiver to T/R Connector.
2. Set Measuring Receiver Measurement to AM, Low-Pass Filter to 15 kHz and Detector.. to Peak+.
3. Press POWER Switch to On and allow 5 minute warm-up period.
4. Press MTRS MODE Key, "AUX" F6 and RCL Key.
5. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
6. Press RF GEN MODE Key.
7. Press "More" F6 until "Disp" Fl is displayed. Press "Disp" Fl.
8. Use FIELD SELECT Keys to move cursor to "2. Full Anlz". Press ENTER Key.

**2-109. GEN MODULATION ADJUSTMENT - Continued.**

9. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 121.. MHz. Press ENTER Key.
10. Record Peak Residual AM on Measuring Receiver.
11. Use FIELD SELECT Keys to move cursor to SOURCE. Press ENTER Key. Use DATA . SCROLL Keys to select AM in MOD field 1.. Press ENTER Key.
12. Use FIELD SELECT Keys to move cursor to MODULATION. Press ENTER Key. Use DATA ENTRY Keypad to enter 90%.. Press ENTER Key.
13. Verify AM Modulation reading on Measuring Receiver is within  $\pm 5\%$  of Test Set setting less Peak Residual AM.
  - If out of tolerance, perform Steps 14-27.
  - If in tolerance, perform Steps 21-27.
14. Press SETUP Key and "AUX" F6.
15. Press ENTER Key to access Calibration Menu.
16. Use FIELD SELECT Keys to move cursor to "13. Gen Modulation". Press ENTER Key.
17. Use FIELD SELECT Keys to move cursor to "1. AM Modulation (90%)". Press ENTER Key.. Use DATA SCROLL Keys to set modulation reading on Measuring Receiver to "90%" plus Peak Residual AM reading recorded in Step 10.
  - If AM Modulation setting is out of tolerance and adjustment range is  $<175$  or  $>180$ , perform Steps 18-27.
  - • If AM Modulation setting is in tolerance, perform Steps 20-27.
18. Press ENTER Key. Use DATA ENTRY Keypad to enter 180. Press ENTER Key.
19. Locate A9 90 MHz Generator (fig. FO-2, Sheet 1 of 5). and adjust AM MOD ADJ (fig. FO-6). to set modulation reading on Measuring Receiver to 90% plus Residual AM recorded in Step 10.
20. Press RF GEN MODE Key.
21. Set Measuring Receiver to measure FM and set Low-Pass Filter to 3 kHz.
22. Use FIELD SELECT Keys to move cursor to SOURCE. Press ENTER Key. Use DATA . SCROLL Keys to select OFF in MOD 1. Press ENTER Key.
23. Record Peak Residual FM on Measuring Receiver.
24. Press ENTER Key. Use DATA SCROLL Keys to select FM in MOD 1. Press ENTER Key.
25. Use FIELD SELECT Keys to move cursor to DEVIATION. Press ENTER Key. Use DATA ENTRY Keypad to enter 5. kHz. Press ENTER Key.
26. Use FIELD SELECT Keys to move cursor to AF FREQ. Press ENTER Key. Use DATA ENTRY Keypad to enter 905. Hz. Press ENTER Key.

**2-109. GEN MODULATION ADJUSTMENT - Continued.**

27. Verify 5 kHz deviation reading on Measuring Receiver is within 5% of deviation setting less Peak Residual FM.
  - If deviation is not in tolerance, perform Steps 28-32..
  - If deviation is in tolerance, perform Steps 41-46.
28. Press SETUP Key and "AUX" F6.
29. Press ENTER Key to access Calibration Menu.
30. Use FIELD SELECT Keys to move cursor to "13. Gen Modulation". Press ENTER Key.
31. Use FIELD SELECT Keys to move cursor to "2. FM Deviation (20 kHz)". Press ENTER Key.
32. Use DATA SCROLL Keys to set FM Deviation on Measuring Receiver to 20 kHz plus Peak Residual FM reading recorded in Step 23. Press ENTER Key.
  - If FM Modulation setting is out of tolerance and adjustment range is <195 or >205, perform Steps 33-46.
  - If FM Modulation setting is in tolerance, perform Steps 35-46.
33. Press ENTER Key. Use DATA ENTRY Keypad to enter 200. Press ENTER Key.
34. Press RF GEN MODE Key. Adjust FM MOD ADJ for minimum amplitude of carrier (<-dBc on Analyzer Display) as shown.



35. Press SETUP Key and "AUX" F6.
36. Press ENTER Key to access Calibration Menu.
37. Use FIELD SELECT Keys to move cursor to "13. Gen Modulation". Press ENTER Key.
38. Use FIELD SELECT Keys to move cursor to "3. FM Deviation (80 kHz)". Press ENTER Key.
39. Use DATA SCROLL Keys to set FM Deviation on Measuring Receiver to 80 kHz plus Peak Residual FM reading recorded in Step 23. Press ENTER Key.
40. Press RF GEN MODE Key.
41. Set Measuring Receiver Measurement to PM and High-Pass Filter to 300 Hz

**2-109. GEN MODULATION ADJUSTMENT - Continued.**

42. Use FIELD SELECT Keys to move cursor to SOURCE. Press ENTER Key. Use DATA SCROLL Keys to select OFF in MOD 1. Press ENTER Key.
43. Record Residual PM on Measuring Receiver.
44. Press ENTER Key. Use DATA SCROLL Keys to select PM in MOD 1. Press ENTER Key.
45. Use FIELD SELECT Keys to move cursor to MODULATION. Press ENTER Key. Use DATA ENTRY Keypad to enter 6.0 Rad. Press ENTER Key.
46. Verify 6 Rad reading on Measuring Receiver is within 5% of Rad setting less Residual PM reading from Step 43.
  - If not in tolerance, perform Steps 47-53.
  - If in tolerance, perform Step 53.
47. Press SETUP Key. Press "AUX" F6.
48. Press ENTER Key to access Calibration Menu.
49. Use DATA SCROLL Keys to move cursor to "13. Gen Modulation". Press ENTER Key.
50. Use FIELD SELECT Keys to move cursor to "4. Phase Modulation (6 Rad)". Press ENTER Key.
51. Use DATA SCROLL Keys to adjust data value until Phase Modulation on Measuring Receiver is 6 Rad plus Residual PM recorded in Step 43. Press ENTER Key.
52. Press "ESC" F6 and "AUX" F6.
53. Disconnect test equipment.

**2-110. SCOPE ADJUSTMENT.**

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**DESCRIPTION**

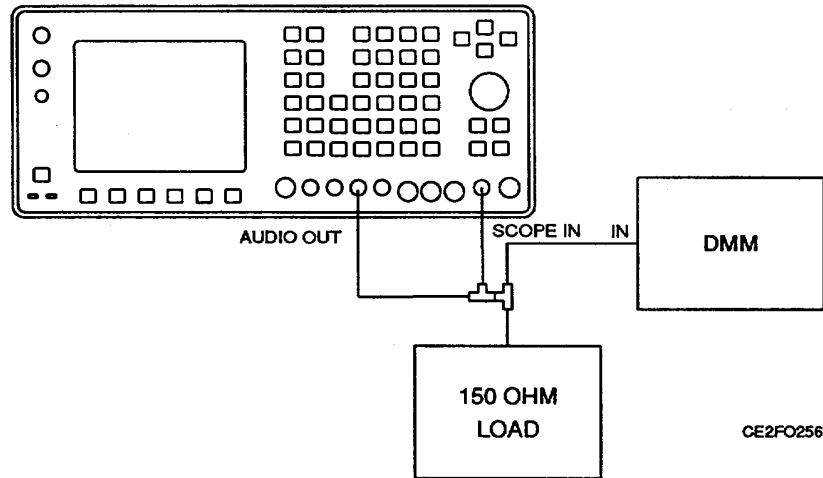
This procedure is used to adjust the Oscilloscope for external signals at the SCOPE IN Connector.

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1. Remove A25 Digitizer (para 2-24) and install on PC Board Assembly Extender (Tool Code 29 in Appendix B of TM 11-6625-3245-12) in Test Set.
2. Press POWER Switch to On and allow 5 minute warm-up period.
3. Press MTRS MODE Key, "AUX" F6 and RCL Key.
4. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
5. Press SCOPE/ANLZ MODE Key to access Oscilloscope Operation Screen.
6. Connect DMM positive lead to A25TP4 (fig. FO-16, Sheet 3 of 3) and DMM negative lead to A25TP16.
7. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Use FIELD SELECT Keys to move cursor to "9. GND". Press ENTER Key.

**2-110. SCOPE ADJUSTMENT - Continued.**

8. Use FIELD SELECT Keys to move cursor to Scale. Press ENTER Key. Use DATA SCROLL Keys to select 10 mV. Press ENTER Key.
9. Adjust A25R44 for 0.000 Vdc (00.01 Vdc) on DMM.
10. Press ENTER Key. Use DATA SCROLL Keys to select 2 mV. Press ENTER Key.
11. Adjust A25R39 for 0.000 Vdc (i0.01 Vdc) on DMM.
12. Disconnect external test equipment. Install A25 Digitizer (para 2-24).
13. Connect external test equipment as shown.



14. Press AF GEN MODE Key.
15. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to select On.
16. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.0424 V. Press ENTER Key.
17. Press ENTER Key. Use DATA SCROLL Keys to move cursor to least significant digit.
18. Use DATA SCROLL Keys to adjust output for 42.43 mVRMS (i0.12 mVRMS) on DMM. Press ENTER Key.
19. Press SCOPE/ANLZ MODE Key.
20. Press "More" F6 until "Scale" FI appears. Press "Scale" FI. Use DATA SCROLL Keys to select 20 mV. Press ENTER Key.
21. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Use FIELD SELECT Keys to move cursor to "7. AC". Press ENTER Key.
22. Press "Sweep" F3. Use DATA SCROLL Keys to select 100  $\mu$ s. Press ENTER Key.
23. Use FIELD SELECT Keys to move cursor to VERT. Press ENTER Key. Use DATA SCROLL Keys to center waveform. Press ENTER Key.

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**2-110. SCOPE ADJUSTMENT - Continued.**

24. Use FIELD SELECT Keys to move cursor to TRIG LVL. Press ENTER Key. Use DATA SCROLL Keys to position trace start on center graticule.
25. Verify one cycle is displayed. Press ENTER Key.
26. Press "More" F6 until "Mkr 1" F3 appears. Press "Mkr 1" F3.
27. Use FIELD SELECT Keys to move cursor to MARKER. Press ENTER Key. Use DATA ENTRY Keypad to enter 250.000. Press ENTER Key.
28. Press "Mkr 2" F4.
29. Press ENTER Key. Use DATA ENTRY Keypad to enter 750.000. Press ENTER Key.
30. Verify DELTA is 500  $\mu$ s and 120 mV ( $\pm$ 8 mV) . Adjust A25R25 as required.
31. Disconnect test equipment.

**2-111. SPECTRUM ANALYZER ADJUSTMENT.****DESCRIPTION**

This procedure is used to adjust the parameters of the Spectrum Analyzer.

1. Press POWER Switch to On and allow 5 minute warm-up period.
2. Press MTRS MODE Key, "AUX" F6 and RCL Key.
3. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
4. Press SCOPE/ANLZ MODE Key to access Analyzer Operation Screen.
5. Connect Signal Generator to ANTENNA IN Connector. Set Signal Generator output frequency to 121.1 MHz at -40 dBm with no modulation.
6. Press SETUP Key.
7. Use FIELD SELECT Keys to move cursor to "2. Analyzer". Press ENTER Key to select On.
8. Use FIELD SELECT Keys to move cursor to "4. Setup Analyzer". Press ENTER Key.
9. Use FIELD SELECT Keys to move cursor to "2. Frequency". Press ENTER Key. Use DATA ENTRY Keypad to enter 121.1 MHz. Press ENTER Key.
10. Use FIELD SELECT Keys to move cursor to "6. Scan Width". Press ENTER Key. Use FIELD SELECT Keys to move cursor to 20 kHz. Press ENTER Key.
11. Press SCOPE/ANLZ MODE Key.
12. Locate A5 Analyzer RF (fig. FO-2, Sheet 1 of 5) and adjust ANLZR CENTER (fig. FO-4) to center trace on Analyzer Operation Screen.
13. Press "More" F6 until "Scan" F3 appears. Press "Scan" F3. Use DATA SCROLL Keys to alternate Scan Width between 20 kHz and 200 kHz, making adjustments to ANLZR CENTER to minimize centering error.

**2-111. SPECTRUM ANALYZER ADJUSTMENT - Continued.**

14. Use DATA SCROLL Keys to set Scan Width to 1 kHz. Press ENTER Key.
15. Verify trace is centered on center graticule (i1 Minor Division).
  - If trace out of tolerance, perform Steps 16-19.
  - If trace in tolerance, perform Steps 20-27.
16. Press SETUP Key. Press "AUX" F6.
17. Press ENTER Key to access Calibration Menu.
18. Use FIELD SELECT Keys to move cursor to "16. Anlz Horz Offset". Press ENTER Key.

Use DATA ENTRY Keypad to increase or decrease value by 1. Press ENTER Key.

19. Press SCOPE/ANLZ MODE Key and perform Step 15.
20. Set Signal Generator for 5 kHz deviation with 1 kHz audio rate.
21. Verify signal peaks are over vertical Major Divisions. Adjust A5R28 (DISP ADJ) as required.
22. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 500 MHz.. Press ENTER Key.
23. Press "Scan" F3. Use DATA SCROLL Keys to select 200 kHz. Press ENTER Key.
24. Set Signal generator to 500 MHz at -40 dBm with no modulation.
25. Verify center frequency peak is -40 dBm on CRT. Locate A4 Analyzer Log/IF (fig. FO-2, Sheet 1 of 5) and adjust A4R5 (fig. FO-4) as required.
26. Press "Scan" F3. Use DATA SCROLL Keys to step through the following Scan Width settings and verify center frequency peak level, between all ranges, varies <2 dB. If individual Scan Width is not within tolerance, adjust Resolution Bandwidth Adjustment on A4 Analyzer Log/IF.

SCAN WIDTH	RESOLUTION BANDWIDTH ADJUSTMENT
1 MHz	A4R24 (300 kHz)
20 kHz	A4R57 (3 kHz)
10 kHz	A4R57 (3 kHz)
5 kHz	A4R57 (3 kHz)
2 kHz	A4R96 (300 Hz)
1 kHz	A4R96 (300 Hz)

27. Perform Step 26 until no further adjustments are required.
28. Disconnect test equipment.

**2-112. DIGITAL MULTIMETER ADJUSTMENT.****DESCRIPTION**

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This procedure is used to adjust the parameters of the Digital Multimeter (DMM).

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1. Remove A8 DMM (para 2-58).
2. Remove A8A1 DMM/Relay and A8A2 DMM/Digital (para 2-60, Steps 1-5).
3. Reconnect A8A1W2P1 (fig. FO-5).
4. Connect DMM positive lead to A8A2TP1 and negative lead to A8A2TP3.
5. Press POWER Switch to On and allow 5 minute warm-up period.
6. Press MTRS MODE Key, "AUX" F6 and RCL Key.
7. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
8. Press MTRS MODE Key.
9. Use FIELD SELECT Keys to move cursor to "10. Digital Multimeter (DMM)" field. Press ENTER Key.
10. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select Ohm. Press ENTER Key.
11. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Keys to select 20 K $\Omega$ . Press ENTER Key.
12. Verify 1.000 Vdc ( $\pm 0.05$  Vdc) with DMM. Adjust A8A2R13 as required.
13. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select DCV. Press ENTER Key.
14. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Keys to select 20 V. Press ENTER Key.
15. Verify 100 mV ( $\pm 0.5$  mV) with DMM. Adjust A8A2R16 as required.
16. Connect DMM V 9Z Connector to Calibrator. Set Calibrator to 100  $\kappa\Omega$
17. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select Ohm. Press ENTER Key.
18. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Keys to select 200 K $\Omega$  Press ENTER Key.
19. Verify 100 k $\Omega$ ( $\pm 10$  K $\Omega$ ) on Digital Multimeter. Adjust A8A2R8 as required.
20. Set Calibrator to 1 k $\Omega$ .
21. Press ENTER Key. Use DATA SCROLL Keys to select 2 k $\Omega$  Press ENTER Key.
22. Verify 1 K $\Omega$  (100 Q) on Digital Multimeter. Adjust A8A2R8 as required.
23. Perform Steps 16-19 until no further adjustments are required.
24. Set Calibrator to 20 kHz sine wave at 7 VRMS.

**2-112. DIGITAL MULTIMETER ADJUSTMENT - Continued.**

25. Use FIELD SELECT Keys to move cursor to MULTIMETER. Press ENTER Key. Use DATA SCROLL Keys to select ACV. Press ENTER Key.
26. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Keys to select 20 V. Press ENTER Key.
27. Verify 7 VAC (+1 VAC) on Digital Multimeter. Adjust A8A1C11 as required.
28. Set Calibrator to 20 kHz sine wave at 1 VRMS.
29. Press ENTER Key. Use DATA SCROLL Keys to select 2 V. Press ENTER Key.
30. Verify 1 VAC (i0.1 VAC) on Digital Multimeter. Adjust A8A1C10 as required.
31. Perform Steps 24 through 30 for best overall response.
32. Disconnect test equipment.
33. Install A8Ai DMM/Relay and A8A2 DMM/Digital (para 260, Step 36).
34. Install A8 DMM (para 258).

**2-113. POWER METER ADJUSTMENT.**

---

**DESCRIPTION**

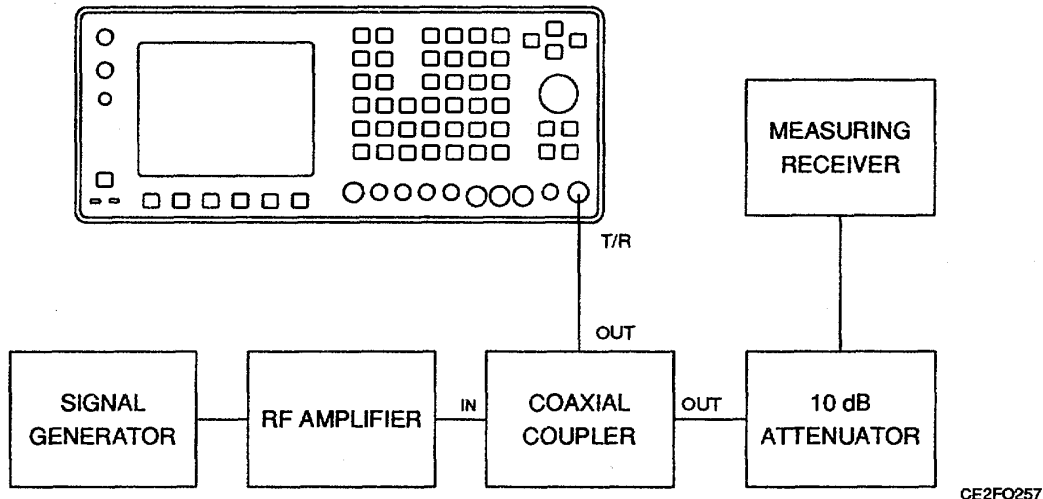
This procedure is used to adjust the parameters of the Power Meter.

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1. Press POWER Switch to On and allow 5 minute warm-up period.
2. Press MTRS MODE Key, "AUX" F6 and RCL Key.
3. Use Field Select Keys to move cursor to "10. Factory Defaults" and press ENTER Key twice.
4. Locate A14 Power Termination (fig. FO-2, Sheet 1 of 5) and connect DMM positive lead to A14FL9 (fig. FO-11) and DMM negative lead to A14GL1.
5. Set Signal Generator RF output to 150 MHz.

2-113. POWER METER ADJUSTMENT - Continued. TM 11-6625-3245-40

6. Connect external test equipment as shown.



CE2FO257

7. Use following formula to calculate and record power level at 0.2, 1400, 2000 and 10000 mW:  

$$\text{Log (milliwatts) X 10 - (Coupler Attenuation) = dBm (Power Level)}$$
8. Reference Measuring Receiver RF Power reading to TRUE attenuation of 10 dB Attenuation.
9. Set Signal Generator RF output to OFF.
10. Press RF GEN MODE Key.
11. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to enter -137 dBm. Press ENTER Key.
12. Press RCVR MODE Key.
13. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter 150. MHz. Press ENTER Key.
14. Use FIELD SELECT Keys to move cursor to ANT. Press ENTER Key to select T/R.
15. Use FIELD SELECT Keys to move cursor to PWR. Press ENTER Key. Use FIELD SELECT Keys to move cursor to RANGE. Press ENTER Key. Use DATA SCROLL Keys to select 20 mW. Press ENTER Key.
16. Verify 0 V ( $\pm 1$  mV) DMM. Remove aluminum tape from A14 Power Termination and adjust A14A1R21 as required.
17. Press ENTER Key. Use DATA SCROLL Keys to select 20 W. Press ENTER Key.
18. Verify 0 V ( $\pm 1$  mV) with DMM. Adjust A14A1R18 as required.
19. Press ENTER Key. Use DATA SCROLL Keys to select 2 W. Press ENTER Key.

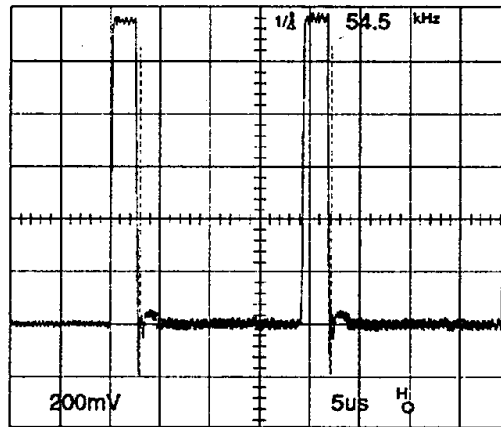
**2-113. POWER METER ADJUSTMENT - Continued.**

20. Set Signal Generator RF output to ON. Adjust Signal Generator RF output level until reading on Measuring Receiver is equal to calculated power level in Step 7 for 2000 mW.
21. Verify 4.025 V ( $\pm 0.025$  V) with DMM and 2.0 W ( $\pm 0.2$  W) on CRT. Adjust A14A1R58 as required.
22. Press ENTER Key. Use DATA SCROLL Keys to select 20 W. Press ENTER Key.
23. Adjust Signal Generator RF output level until reading on Measuring Receiver is equal to calculated power level in Step 7 for 10000 mW.
24. Verify 10 W ( $\pm 1$  W) on CRT. Adjust A14A1R46 as required.
25. Perform Steps 15-24 until no further adjustments are required.
26. Press SETUP Key and "AUX" F6.
27. Press ENTER Key to access Calibration Menu.
28. Use FIELD SELECT Keys to move cursor to "1. Power Meter". Press ENTER Key.
29. Press "Range" F1 to select 20 mW with AR Off.
30. Set Signal Generator RF output to OFF, press "Zero" F2 and verify Power Meter Zero raw data Zero value is momentarily displayed.
31. Press "Range" F1 to select 20 W.
32. Press "Zero" F2 and verify Power Meter Zero raw data Zero value is momentarily displayed.
33. Press "Range" F1 to select 2 W.
34. Adjust Signal Generator RF output level until reading on Measuring Receiver is equal to calculated power level in Step 7 for 1400 mW.
35. Press ENTER Key. Use DATA ENTRY Keypad to enter 1.40 W. Press ENTER Key.
36. Adjust Signal Generator RF output level until reading on Measuring Receiver is equal to calculated power level in Step 7 for 0.2 mW.
37. Press "Range" F1 to select 20 mW.
38. Press ENTER Key. Use DATA ENTRY Keypad to enter 0.2 mW. Press ENTER Key.
39. Verify 0.2 mW ( $\pm 0.1$  mW) on Power Meter.
40. Perform Steps 28 through 38 until no further adjustments are required.
41. Press "Ret" F5 and "AUX" F6.
42. Disconnect test equipment. Install aluminum tape on A14 Power Termination.

**2-114. 78A1A15 CRT (7005-7840-600) ADJUSTMENT PROCEDURE.****DESCRIPTION**

This procedure is used, after repair of A15 CRT, to align the colors and horizontal and vertical dimensions.

1. Remove A15 CRT (para 2-39). Remove top cover from A15 CRT (para 2-40, Steps 1-2).
2. Set POWER Switch to ON.
3. Rotate INTENSITY/Contrast Adjustment fully cw.
4. Adjust A15A1R83 for 54.5 kHz or 18.34  $\mu$ s with Oscilloscope probe channel 1 at A15A1TP1 (fig. FO-12, Sheet 1 of 3) (sync Oscilloscope to channel 1) as shown.



5. Verify voltage is 95 Vdc with DMM and High Voltage Probe at junction of A15A1L2 and A15A1C42. Adjust A15A1R68 as required.
6. Adjust A15A1R92 to remove horizontal roll and to square green lines on Logo Screen.
7. Adjust A15A1R14 to remove vertical roll.
8. Verify 69 V with DMM and High Voltage Probe (x1000) at A15A2E8. Adjust A15A1T2 (ES) (SCREEN) as required.
9. Adjust A15A1T2 (EF) (FOCUS) for sharpest possible picture.
10. Set POWER Switch to OFF and wait ten seconds.
11. Set POWER Switch to ON and verify no Horizontal foldover. Adjust A15A1R92 as required.
12. Adjust A15A2R8 (RED CUTOFF), A15A2R23 (GREEN CUTOFF) and A15A2R32 (BLUE CUTOFF) fully ccw. Adjust A15A2R2 (RED DRIVE) and A15A2R15 (GREEN DRIVE) to center pot. Adjust A15A2R29 (BRIGHT) to full brightness.
13. Press "AUX" F6.

**2-114. 78A1A15 CRT (7005-7840-600) ADJUSTMENT PROCEDURE - Continued.**

14. Use FIELD SELECT Keys to move cursor to "3. Color Selection Menu". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Selectable Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Scope/Analyzer Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. Background". Press ENTER Key. Use FIELD SELECT Keys to move cursor to red square. Press ENTER Key.
15. Press SCOPE/ANLZ MODE Key.
16. Adjust A15A2R2 (RED DRIVE) for maximum red in graticule area.
17. Adjust A15A2R8 (RED CUTOFF) until red haze appears outside graticule area. Readjust A15A2R8 (RED CUTOFF) until red haze just disappears.
18. Press SETUP Key and "AUX" F6.
19. Use FIELD SELECT Keys to move cursor to "3. Color Selection Menu". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Selectable Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Scope/Analyzer Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. Background". Press ENTER Key. Use FIELD SELECT Keys to move cursor to green square. Press ENTER Key.
20. Press SCOPE/ANLZ MODE Key.
21. Adjust A15A2R15 (GREEN DRIVE) for maximum green in graticule area.
22. Adjust A15A2R23 (GREEN CUTOFF) until green haze appears outside graticule area. Readjust A15A2R23 (GREEN CUTOFF) until green haze just disappears.
23. Press SETUP Key and "AUX" F6.
24. Use FIELD SELECT Keys to move cursor to "3. Color Selection Menu". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Selectable Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Scope/Analyzer Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. Background". Press ENTER Key. Use FIELD SELECT Keys to move cursor to blue square. Press ENTER Key.
25. Press SCOPE/ANLZ MODE Key.
26. Adjust A15A2R32 (BLUE CUTOFF) until blue haze appears outside graticule area. Readjust A15A2R32 (BLUE CUTOFF) until blue haze just disappears.
27. Press SETUP Key and "AUX" F6.
28. Use FIELD SELECT Keys to move cursor to "3. Color Selection Menu". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Selectable Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Scope/Analyzer Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. Background". Press ENTER Key. Use FIELD SELECT Keys to move cursor to gray square. Press ENTER Key.
29. Press SCOPE/ANLZ MODE Key.
30. Verify gray color when rotating INTENSITY/Contrast Adjustment fully ccw and fully cw. Adjust A15A2R15 and A15A2R2 as required.



**2-114. 78A1A15 CRT (7005-7840-600) ADJUSTMENT PROCEDURE - Continued.**

31. Adjust A15A1R36 (HOR CENTER) for Horizontal center. Adjust A15AIR16 (SIZE) for Vertical size. Adjust A15A1R25 (VERT LINEARITY) for Vertical linearity. Wait 15 minutes.
32. Verify all graticule squares are equal. Adjust A15AIR25 as required.
33. Verify no distorted graticule squares, display tearing, display foldover or excessive picture width.
  - If CRT abnormalities exist, repeat Steps 3-33.
34. Press SETUP Key and "AUX" F6.
35. Use FIELD SELECT Keys to move cursor to "3. Color Selection Menu". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. Defaulted/ Manufacturer Set." Press ENTER Key to select ON.
36. Press "AUX" F6.
37. Install top cover on A15 CRT (para 2-40, Steps 10-11). Install A15 CRT (para 2-39).

**2-115. 78AIA15 CRT (7005-8644-300) ADJUSTMENT PROCEDURE.****DESCRIPTION**

This procedure is used, after repair of A15 CRT to align the colors and horizontal and vertical dimensions.

1. Remove A15 CRT (para 2-42). Remove top cover from A15 CRT (para 2-43, Step 1).
2. Set POWER Switch to ON and allow 20 minute warm-up period.
3. Verify input voltage is 12 Vdc (0.3 Vdc) with DMM at A1A1W2P1, Pin 12 (fig. FO-3, Sheet 1 of 2).
4. Rotate INTENSITY/Contrast Adjustment fully ccw to display black on CRT.
5. Measure voltage at A15A2TP-B2 (fig. FO-13, Sheet 2 of 2). Verify voltage is 10.6 Vdc. Adjust A15A2R803 (B.ADJ) as required.
6. Adjust black raster so as to be slightly visible by means of A15A2R338.
7. Verify black raster is in center of CRT screen horizontally. Adjust A15A2R332 (H. CENTER) as required.
8. Rotate INTENSITY/Contrast Adjustment fully cw.
9. Verify picture is not rolling horizontally. Adjust A15A2R310 (H. HOLD) as required.
10. Verify screen is centered horizontally. Adjust A15A2R314 (H. POSI) as required.
11. Verify Width of screen is 5.3 in (135 mm). Adjust A15A2L304 (H. WIDTH) as required.
12. Verify Screen is not rolling vertically. Adjust A15A2R207 (V. HOLD) as required.
13. Verify 600 Vdc with DMM and High Voltage Probe at A15A2G2. Adjust SCREEN on A15A2T302 as required.

**2-115. 78A1A15 CRT (7005-8644-300) ADJUSTMENT PROCEDURE - Continued.**

14. Verify length from top to bottom of screen is 3.75 in (95 mm). Adjust A15A2R211 (V. HEIGHT) as required.
15. Verify picture is centered vertically. Adjust A15A2R219 (V. CENTER) as required.
16. Adjust FOCUS on A15A2T302 for sharpest picture.
17. Adjust A15A1R186 (R. DRIVE), A15A1R187 (G. DRIVE) and A15A1R188 (B. DRIVE) to minimum. Adjust A15A1R183 (R. CUTOFF), A15A1R184 (G. CUTOFF) and A15A1R185 (B. CUTOFF) to center. Adjust A15A1R337 to full brightness.
18. Press "AUX" F6.
19. Use FIELD SELECT Keys to move cursor to "3. Color Selection Menu". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Selectable Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Scope/Analyzer Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. Background". Press ENTER Key. Use FIELD SELECT Keys to move cursor to red square. Press ENTER Key.
20. Press SCOPE/ANLZ MODE Key.
21. Adjust A15A1R183 (R. CUTOFF) for maximum red in graticule area.
22. Adjust A15A1R186 (R. DRIVE) until red haze appears outside graticule area. Readjust A15A1R186 (R. DRIVE) until red haze just disappears.
23. Press SETUP Key and "AUX" F6.
24. Use FIELD SELECT Keys to move cursor to "3. Color Selection Menu". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Selectable Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Scope/Analyzer Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. Background". Press ENTER Key. Use FIELD SELECT Keys to move cursor to green square. Press ENTER Key.
25. Press SCOPE/ANLZ MODE Key.
26. Adjust A15A1R184 (G. CUTOFF) for maximum green in graticule area. 27. Adjust A15A1R187 (G. DRIVE) until green haze appears outside graticule area. Readjust A15A1R187 (G. DRIVE) until green haze just disappears.
28. Press SETUP Key and "AUX" F6.
29. Use FIELD SELECT Keys to move cursor to "3. Color Selection Menu". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Selectable Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Scope/Analyzer Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. Background". Press ENTER Key. Use FIELD SELECT Keys to move cursor to blue square. Press ENTER Key.
30. Press SCOPE/ANLZ MODE Key.
31. Adjust A15A1R185 (B. CUTOFF) for maximum blue in graticule area. 32. Adjust A15A1R188 (B. DRIVE) until blue haze appears outside graticule area. Readjust A15A1R188 (B. DRIVE) until blue haze just disappears. 33. Press SETUP Key and "AUX" F6.

**2-115. 78A1A15 CRT (7005-8644-300) ADJUSTMENT PROCEDURE - Continued.**

34. Use FIELD SELECT Keys to move cursor to "3. Color Selection Menu". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Selectable Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "2. Scope/Analyzer Color Set". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. Background". Press ENTER Key. Use FIELD SELECT Keys to move cursor to gray square. Press ENTER Key.
35. Press SCOPE/ANLZ MODE Key.
36. Verify gray color when rotating INTENSITY/ Contrast Adjustment fully ccw and fully cw. Adjust A15A1R186 (R.DRIVE), A15A1R187 (G. DRIVE) and A15A1R188 (B. DRIVE) as required.
37. Verify all graticule squares are equal. Adjust A15A2R209 (V. LIN) as required.
38. Verify no distorted graticule squares, display tearing, display foldover or excessive picture width.
  - If CRT abnormalities exist, repeat Steps 3-38.
39. Use FIELD SELECT Keys to move cursor to "3. Color Selection Menu". Press ENTER Key. Use FIELD SELECT Keys to move cursor to "1. Defaulted/ Manufacturer Set." Press ENTER Key to select ON.
40. Press "AUX" F6.
41. Install top cover on A15 CRT (para 2-43, Step 4). Install A15 CRT (para 2-42).

**2-116. 83A1A3 RF AMPLIFIER ADJUSTMENT PROCEDURE.****DESCRIPTION**

This procedure is used, after repair of A3 RF Amplifier, to adjust the A3 RF Amplifier filters and output levels.

1. Remove A3 RF Amplifier (para 2-77). Remove cover from A3 RF Amplifier (para 2-77, Step 1-2).
2. Set RF Amplifier Test Cable BAND Switch to LO and RF Amplifier Test Cable RF AMP Switch to OFF. Activate Power Supply.
3. Verify voltage with DMM at following locations (fig. FO-21).
 

A3A2R57	-50 Vdc (f7 Vdc)
A3A2TP3	+5 Vdc (f1 Vdc)
A3A2TP4	-50 Vdc (f7 Vdc)

  - If any voltage is incorrect, perform 83A1A3 RF Amplifier Test (para 2-18).
4. Set RF Amplifier Test Cable BAND Switch to HI.
5. Verify voltage with DMM at following locations (fig. FO-21).
 

A3A2TP3	+5 Vdc (i1 Vdc)
A3A2TP4	-50 Vdc (f7 Vdc)

  - If any voltage is incorrect, perform 83A1A3 RF Amplifier Test (para 2-18).

**2-116. 83A1A3 RF AMPLIFIER ADJUSTMENT PROCEDURE - Continued.**

6. Set RF Amplifier Test Cable BAND Switch to LO.
7. Set DMM to measure +15 Vdc. Verify 0 Vdc with DMM at drain of A3A2Q3 and ground.
  - If incorrect, perform 83A1A3 RF Amplifier Test (para 2-18).
8. Set RF Amplifier Test Cable RF AMP Switch to ON.
9. Verify +15 Vdc (+1 Vdc) with DMM at drain of A3A2Q3 and ground.
  - If incorrect, perform 83A1A3 RF Amplifier Test (para 2-18).
10. Switch A3A2S1 and A3A2S2 to off. Connect DMM in series with +15 Vdc from Power Supply and set to measure Amps. Verify 350 mA (i50 mA) with DMM.
  - If incorrect, perform 83A1A3 RF Amplifier Test (para 2-18).
11. Connect jumper from drain of A3A2Q3 to A3A2TP1.
12. Verify 650 mA with DMM. Adjust A3A2R5 as required.
13. Disconnect jumper from A3A2TP1. Connect jumper to A3A2TP2.
14. Verify 650 mA with DMM. Adjust A3A2R6 as required.
15. Disconnect jumper from A3A2TP2 and drain of A3A2Q3. Switch A3A2S1 and A3A2S2 to ON.
16. Disconnect A3W1P2 and A3W2P1.
17. Connect Tracking Generator to A3A2J2. Connect Spectrum Analyzer input to A3A2J3. Disconnect +5 Vdc Power Supply line from A3A2J6, Pin 3. Connect ground to A3A2J6, Pin 3. Set Tracking Generator output to -5 dBm. Set Spectrum Analyzer Center Frequency to 52 MHz, MHz/Division to 5, Bandwidth to Normal Detent, Attenuator to 30 dBm, dB/Division to 1 or 2 dBm and Reference Level to 0 dBm.
18. Set 1 dB point of filter knee to 51-57 MHz by adjustment of windings on A3A2L11 and A3A2L12.
19. Set Spectrum Analyzer MHz/Division to 5.
20. Verify filter flatness is <1 dB.
  - If incorrect, adjust windings on A3A2L11 and A3A2L12. Perform Steps 5-9.
21. Using Permabond (Appendix B, item 10), seal A3A2L11 and A3A2L12.
22. Set RF Amplifier Test Cable BAND Switch to HI. Set Spectrum Analyzer Center Frequency to 88 MHz.
23. Set 1 dB point of filter knee to 87-93 MHz by adjustment of windings on A3A2L13 and A3A2L14.
24. Set Spectrum Analyzer MHz/Division to 5.
25. Verify filter flatness is <1 dB.
  - If incorrect, adjust windings on A3A2L13 and A3A2L14. Perform Steps 5-13.
26. Using Permabond (Appendix B, item 10), seal A3A2L13 and A3A2L14.
27. Reconnect A3W1P2 and A3W2P1. Set RF Amplifier Test Cable BAND Switch to LO.

**2-116. 83A1A3 RF AMPLIFIER ADJUSTMENT PROCEDURE - Continued.**

28. Connect 30 dB (10 W) Attenuator to A3A2J5. Connect Spectrum Analyzer to 30 dB (10 W) Attenuator. Connect Signal Generator to A3A1J1. Set Spectrum Analyzer Center Frequency to 50 MHz, Attenuator to 40 dB and MHz/Div to 5. Set Signal Generator for 35 MHz signal at -5 dBm with no modulation.
29. Adjust A3A2R5 or A3A2R6 to null second harmonic at 70 MHz to <30 dBc.
30. Set RF Generator to 40 MHz at 0 dBm. Connect Power Meter to 30 dB (10 W) Attenuator.
31. Adjust A3A2R32 for 36.5 dBm minus true attenuation of 30 dB Pad (5 to 8 dBm).
32. Using DMM on A3A2TP5, step RF Generator through 31-51 MHz. Verify output level is constant ( $\pm 1$  dB) and leveler voltage does not rail to +10 or -6 Vdc.
  - If incorrect, adjust A3A2DC1 to flatten band output level.
  - If incorrect, perform 83A1A3 RF Amplifier Test (para 2-18).
33. Set RF Amplifier Test Cable BAND Switch to HI.
34. Using DMM on A3A2TP5, step RF Generator through 51-88 MHz. Verify output level is constant ( $\pm 1$  dB) and leveler voltage does not rail to -6 or +10 Vdc.
  - If incorrect, adjust A3A2DC1 to flatten band output level.
  - If incorrect, perform 83A1A3 RF Amplifier Test (para 2-18).
35. Install cover on A3 RF Amplifier (para 2-78, Steps 4-5). Install A3 RF Amplifier (para 2-77).

**Section V. PREPARATION FOR STORAGE OR SHIPMENT**

**2-117. PACKAGING.**

Package Radio Test Set in original shipping container. When using packing materials other than original, use following guidelines:

- Wrap Test Set in plastic packing material.
- Use double-wall cardboard shipping container.
- Protect all sides with shock-absorbing material to prevent Test Set movement within container.
- Seal shipping container with approved sealing tape.
- Mark "FRAGILE" on all sides, top and bottom of shipping container.

**2-118. TYPES OF STORAGE.**

- Short-Term (administrative) = 1 to 45 days.
- Intermediate = 46 to 180 days.
- Long-term = over 180 days. After long-term storage, perform Turn-On Procedure (para 2-8, TM 11-6625-3245-12) and Self Test (para 2-9a, TM 11-6625-3245-12). If these tests fail, refer to table 2-1 for any reported errors.

**2-119. ENVIRONMENT.**

The Test Set should be stored in a clean, dry environment. In high humidity environments, protect Radio Test Set from temperature variations that could cause internal condensation. The following environmental conditions apply to both shipping and storage:

Temperature.....	-40' to +158' F (-40' to +70' C)
Relative Humidity.....	0%-95%
Altitude.....	0 to 40,000 ft (0 to 12,192 m)
Vibration .....	<2.0 g
Shock .....	<40 g

## APPENDIX A REFERENCES

### A-1. SCOPE.

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publication references in this manual.

### A-2. FORMS.

Equipment Control Record .....	Form 2408-9
Product Quality Deficiency Report.....	Form SF 368
Recommended Changes to Publications and Blank Forms .....	Form 2028
Report of Discrepancy (ROD).....	Form SF 364
Transportation Discrepancy Report (TDR) .....	Form SF 361

### A-3. TECHNICAL MANUALS.

Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools List (including Depot Maintenance Repair Parts and Special Tools) for Test Set, Radio TS-4317/GRM (NSN 6625-01-309-2825) (EIC: QVK) .....	TM 9-6625-3244-24P
Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Test Adapter J-4843/GRM-114B (NSN 6625-01-309-2827) .....	TM 9-6625-3246-24P
Operator's and unit maintenance manual for Radio Test Set AN/GRM-114 (NSN 6625-01-309-2824) (EIC: KN2) .....	TM 11-6625-3245-12
Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command) .....	TM 750-244-2

### A-4. TECHNICAL BULLETINS.

Interactive Electronic Technical Manual (IETM) for Calibration and Repair Requirements for the Maintenance of Army Materiel .....	TB 43-180
Safety Requirements for Maintenance of Electrical and Electronic Equipment.....	TB 385-4

## APPENDIX A REFERENCES - Continued

### A-5. MISCELLANEOUS PUBLICATIONS.

Common Table of Allowance, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items) .....	CTA 50-970
Consolidated Army Publications and Forms Index .....	DA Pam 25-30
First Aid .....	FM 4-25.11
Reporting of Supply Discrepancies .....	AR 735-11-2
The American Society of Mechanical Engineers, Abbreviations and Acronyms .....	ASME Y14.38
The Army Maintenance Management System (TAMMS) Users Manual .....	DA Pam 750-8



## APPENDIX B EXPENDABLE SUPPLIES AND MATERIALS LIST

### Section I. INTRODUCTION

#### B-1. SCOPE.

This appendix lists expendable supplies you will need for maintenance on the Radio Test Set. These items are authorized to you by CTA 50-970, Expendable/Durable items (Except Medical, Class V, Repair Parts and Heraldic Items).

#### B-2. EXPLANATION OF COLUMNS.

**a. Column (1) - Item Number.** This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, App. B").

**b. Column (2) - Level.** This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew  
O - Unit Maintenance  
H - General Support Maintenance

**c. Column (3) - National Stock Number.** This column indicates the National Stock Number assigned to the item and will be used for requisitioning purposes.

**d. Column (4) - Description.** This column indicates the Federal item name and, if required, a minimum description to identify the item. The last line for each item gives the Commercial and Government Entity Code (CAGE), in parentheses, followed by the part number.

**e. Column (5) - Unit of Measure (U/M).** This column indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., EA, IN, PR). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

**Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST**

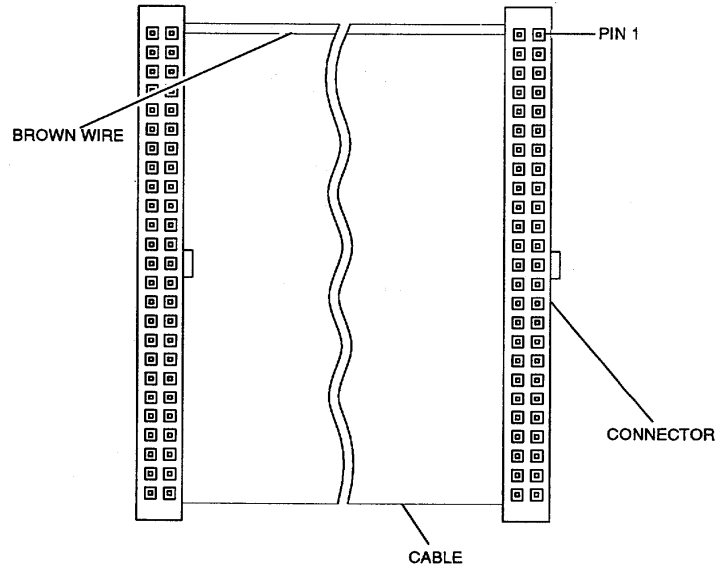
(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	O	6810-01-382-2904	Alcohol, Isopropyl, 1.01 Fluid oz, Bottle, ASTM D 770 (81346)	BX
2	O	8305-00-818-4567	Cloth, Cheesecloth, Cotton, Lintless, CCC-C-440, Type 2, Class 1 (81348)	YD
3	O		Detergent, Mild, Liquid	OZ
4	O		Swab. Cotton	BX
5	H		Adhesive, Loctite 290	OZ
6	H		Sealer, Non-Conductive, Q-Dope	OZ
7	H		Conformal Coating	OZ
8	H		Aluminum Tape	IN
9	H		Thermal Compound	OZ
10	H		Permabond	OZ
11	H		Torque Seal	OZ

APPENDIX C

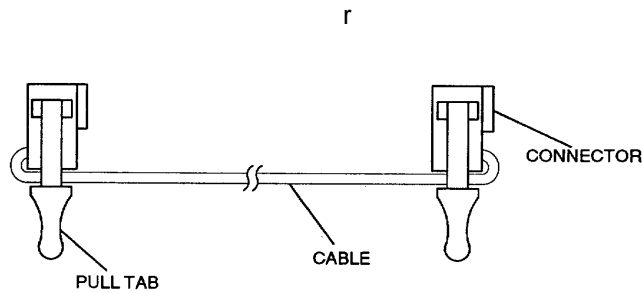
FABRICATION INSTRUCTIONS FOR MONITOR/MONITOR  
CONTROL EXTENDED RIBBON CABLE

NOMENCLATURE	PART NO	VENDOR	QUANTITY
CONNECTOR (50 PIN)	3425-6606	3M	2 EA.
RIBBON CABLE (50 CONDUCTOR)	3302/50	3M	14 IN.
PULL TAB	3490-5	3M	2 EA.

Assemble Connectors and Cable as shown, compressing Connectors until locked.



Roll Connectors onto Cable and attach Pull Tabs as shown.



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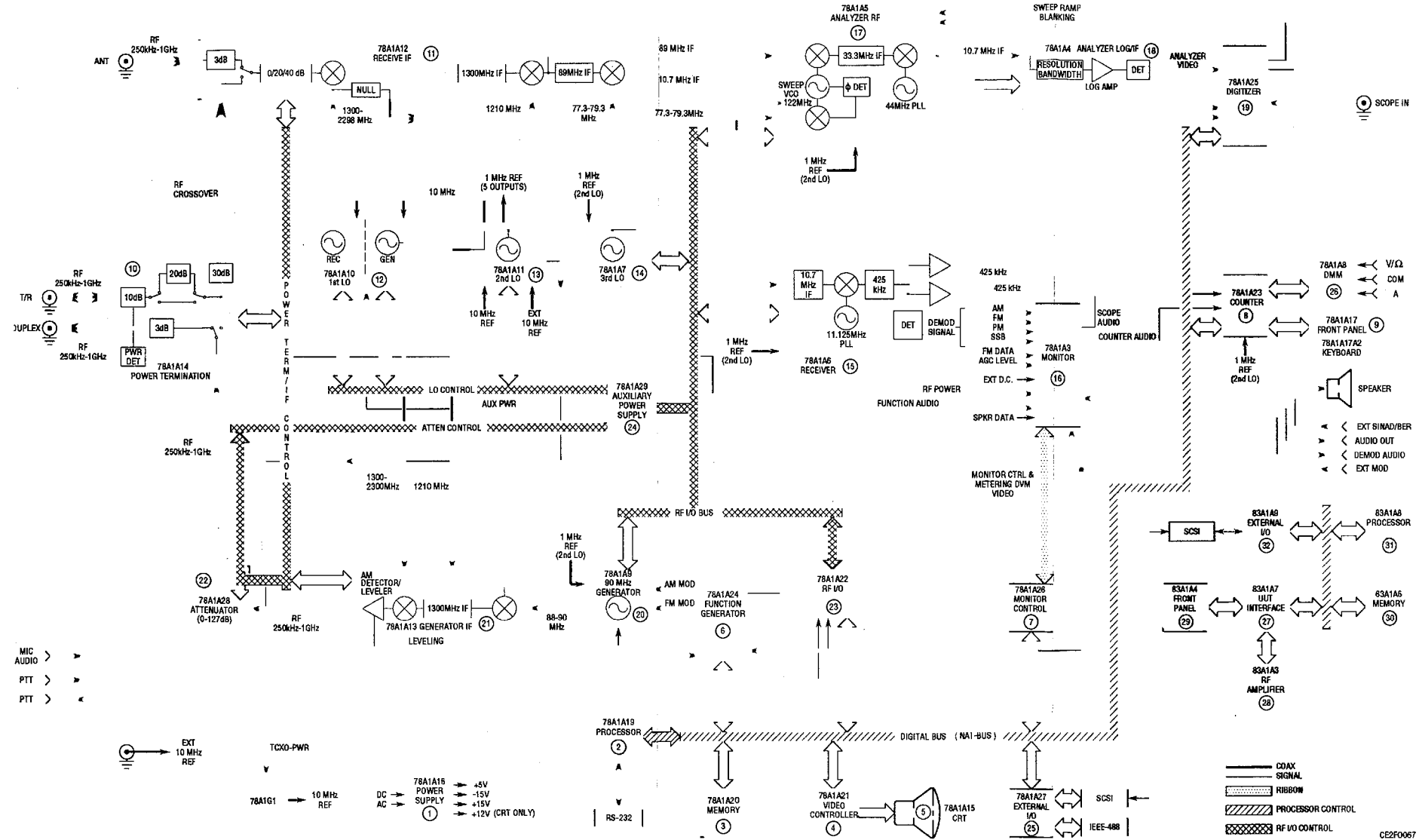


Figure FO-1. Radio Test Set AN/GRM-114B Functional Block Diagram.

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

REFERENCE DESIGNATOR	NOMENCLATURE
A1	CHASSIS
A2	REAR PANEL
A3	MONITOR
A4	ANALYZER LOG/IF
A5	ANALYZER RF
A6	RECEIVER
A7	3RD LO
A8	DMM
A9	90 MHz GENERATOR
A10	1ST LO
A11	2ND LO
A12	RECEIVE IF
A13	GENERATOR IF
A14	POWER TERMINATION
A15	CRT
A16	POWER SUPPLY
A17	FRONT PANEL
A19	PROCESSOR
A20	MEMORY
A21	VIDEO CONTROLLER
A22	RF I/O
A23	COUNTER
A24	FUNCTION GENERATOR
A25	DIGITIZER
A26	MONITOR CONTROL
A27	EXTERNAL I/O
A28	ATTENUATOR
A29	AUXILIARY POWER SUPPLY
A30	REAR PANEL CONNECTOR

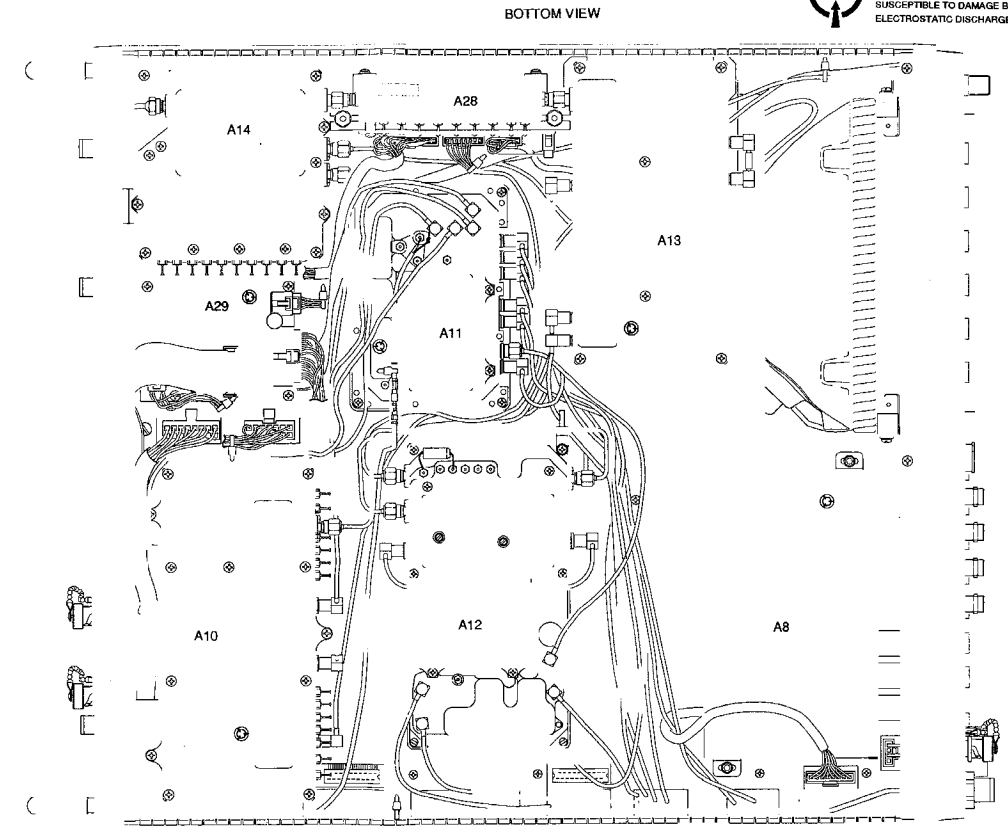
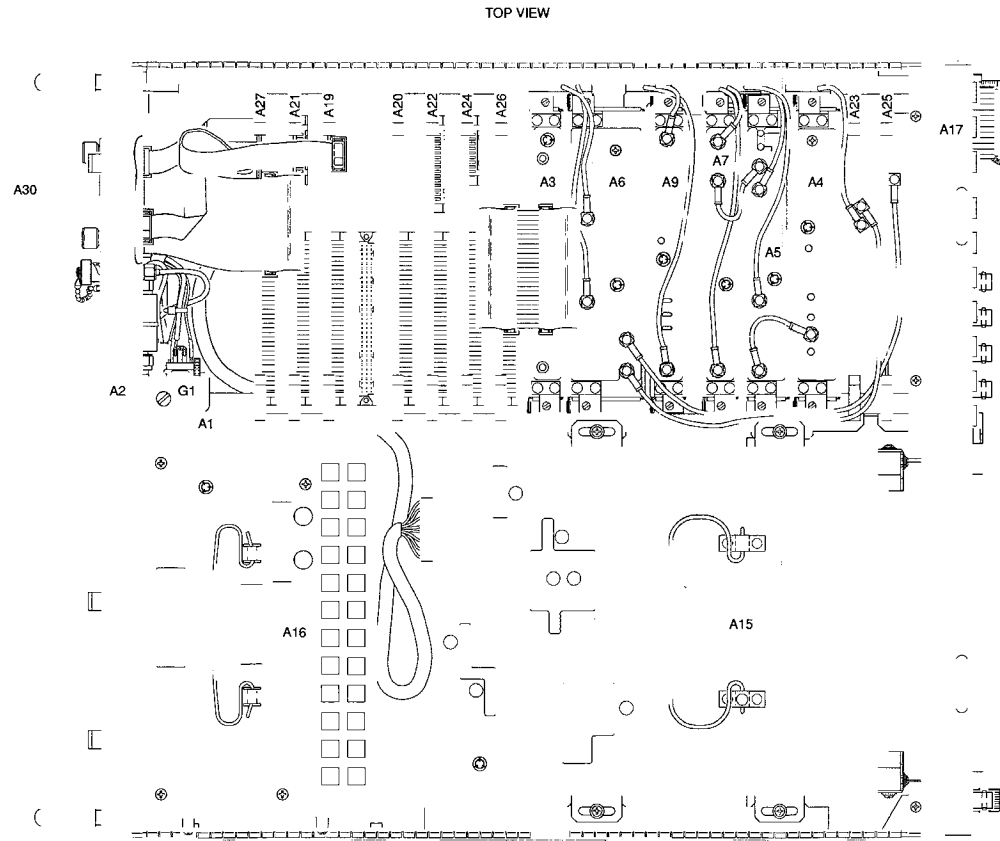


Figure FO-2. Radio Test Set (78A1 and 83A1) Assembly and Cable Locator and Interconnect Diagram (Sheet 1 of 5).

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

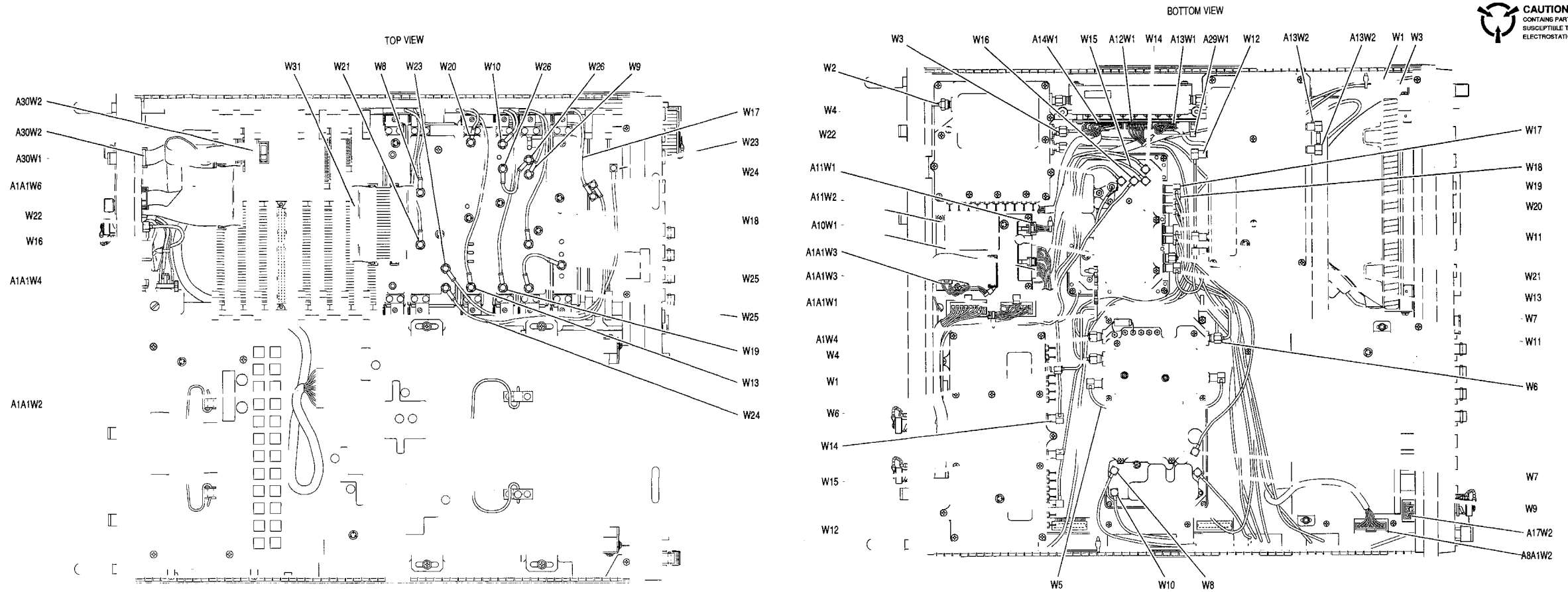


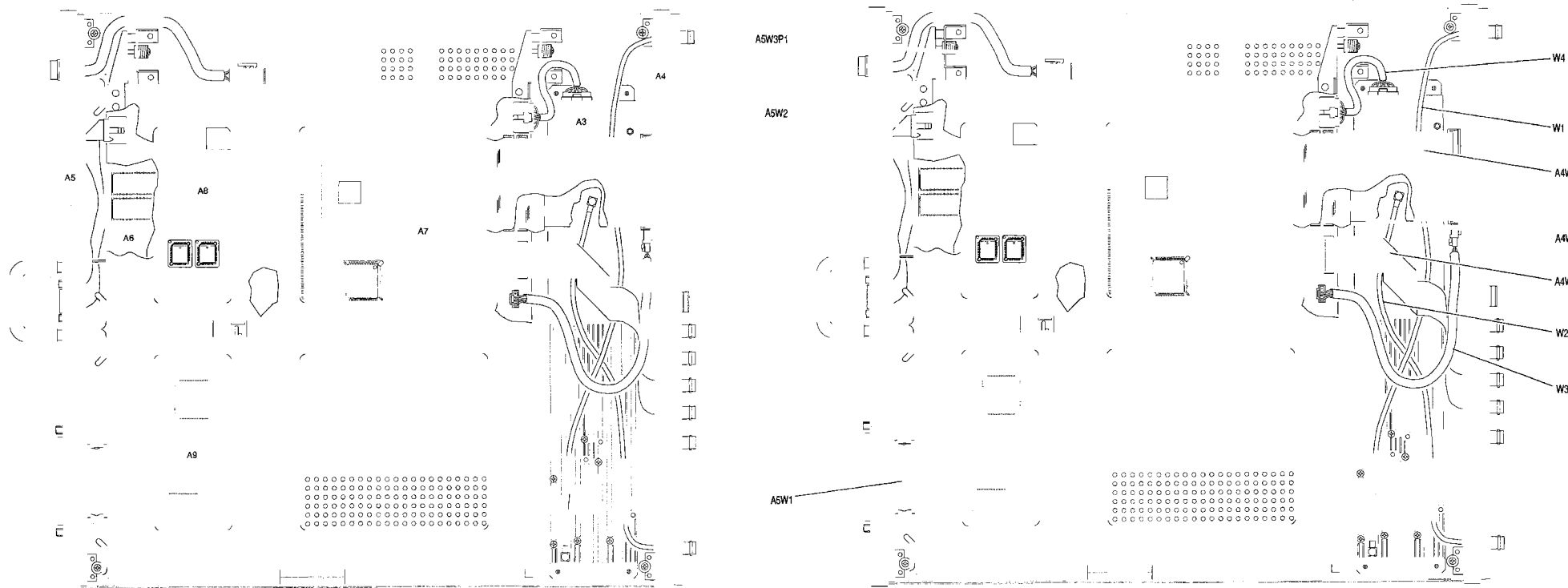
Figure FO-2. Radio Test Set (78A1 and 83A1) Assembly and Cable Locator and Interconnect Diagram (Sheet 2 of 5).

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

REFERENCE DESIGNATOR	NOMENCLATURE
A3	RF AMPLIFIER
A4	FRONT PANEL
A5	REAR PANEL
A6	MEMORY
A7	UUT INTERFACE
A8	PROCESSOR
A9	EXTERNAL I/O



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Figure FO-2. Radio Test Set (78A1 and 83A1) Assembly and Cable Locator and Interconnect Diagram (Sheet 3 of 5).

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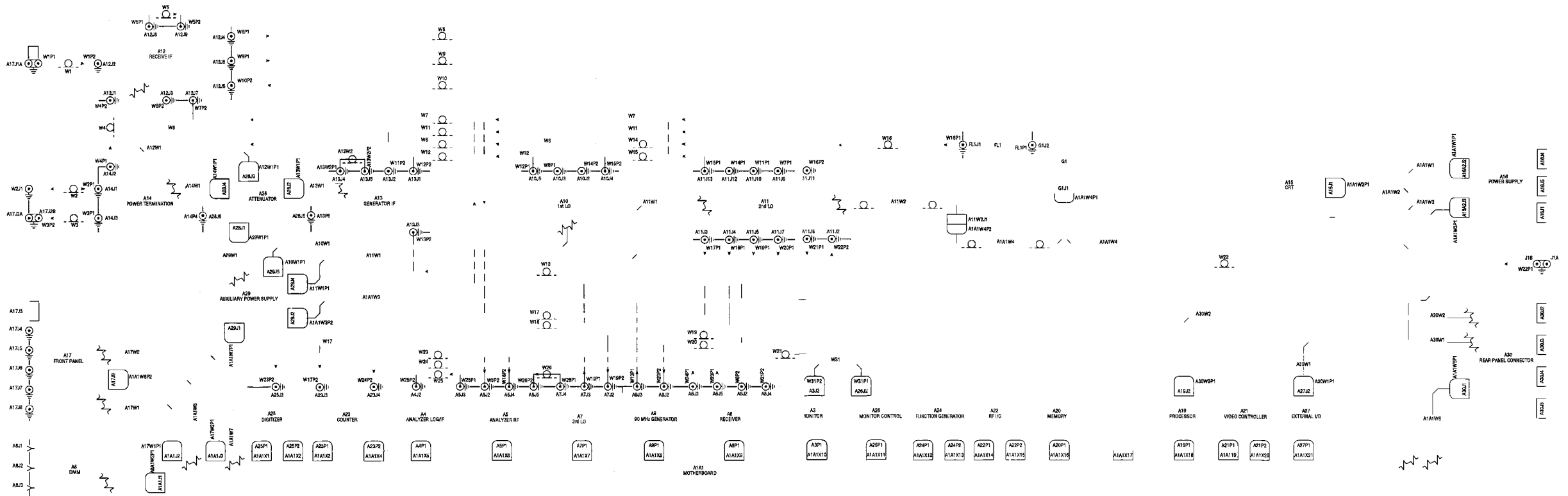


Figure FO-2. Radio Test Set (78A1 and 83A1) Assembly and Cable Locator and Interconnect Diagram (Sheet 4 of 5).

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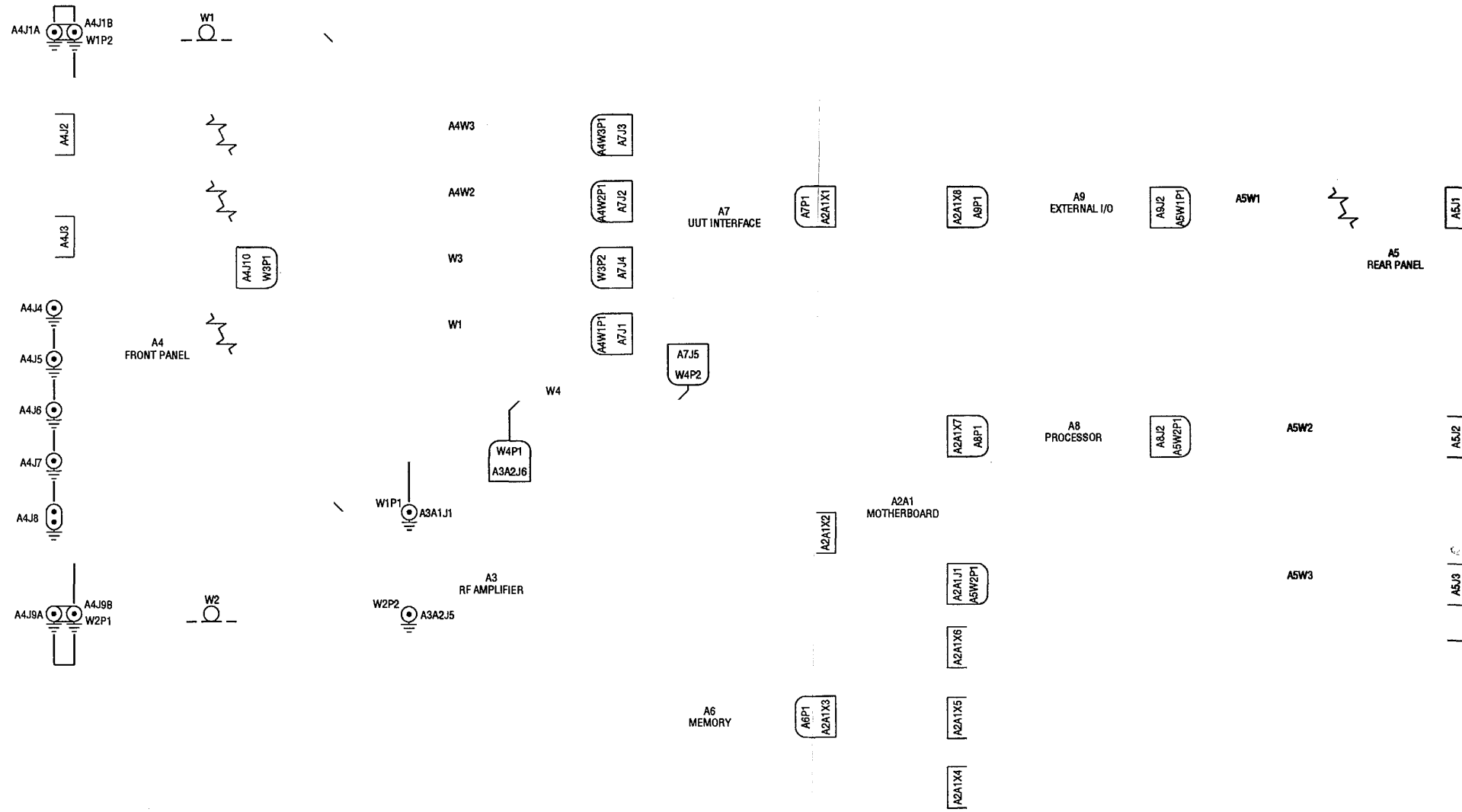


Figure FO-2. Radio Test Set (78A1 and 83A1) Assembly and Cable Locator and Interconnect Diagram (Sheet 5 of 5).

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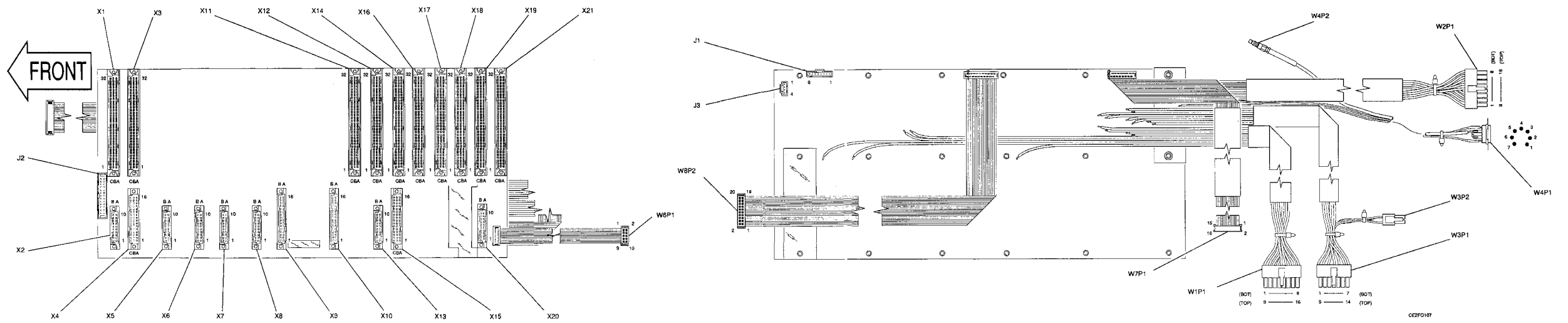
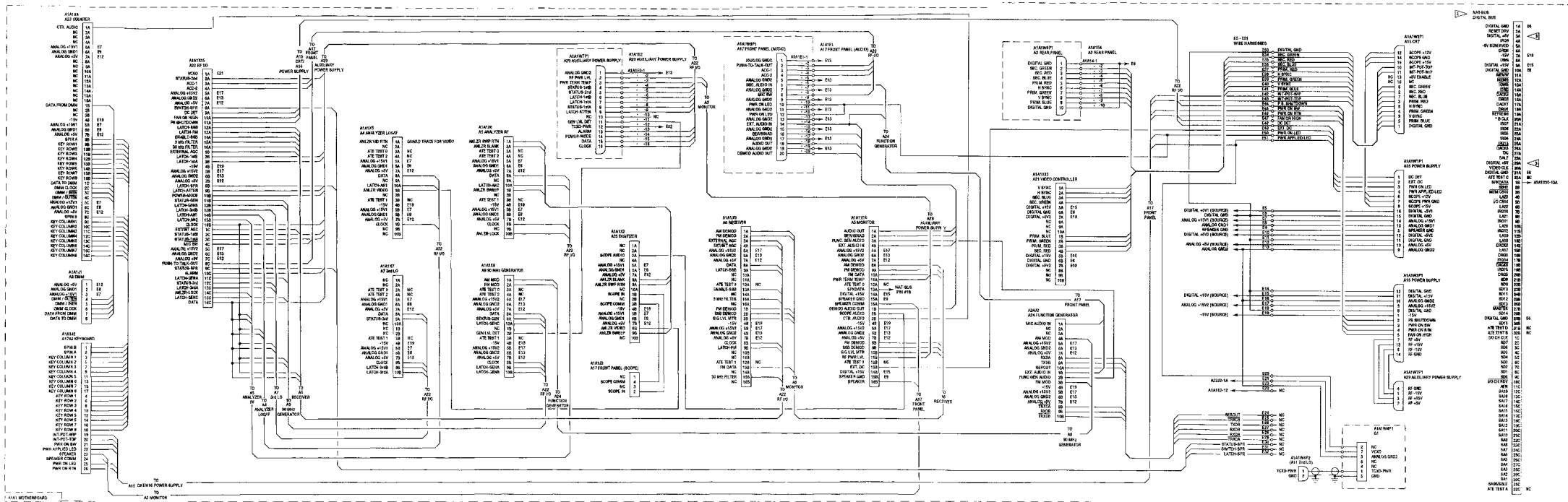


Figure FO-3. 78A1A1A1 Motherboard Assembly Component Locator and Wiring Diagram (Sheet 1 of 2).

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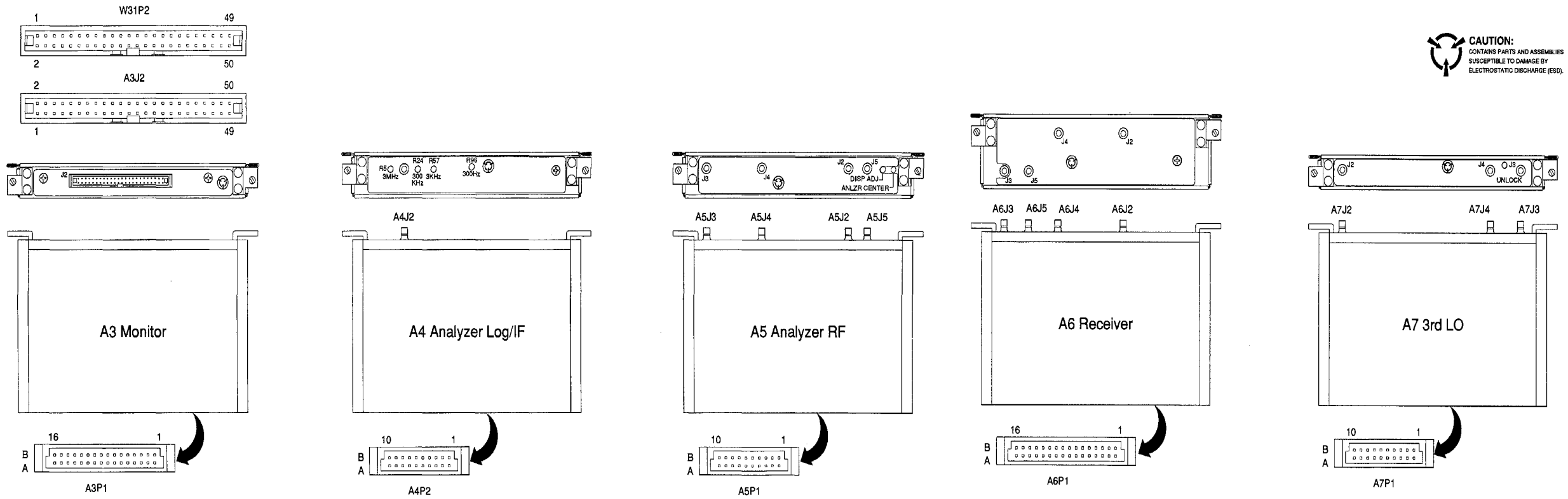


NOTES:  
(UNLESS OTHERWISE SPECIFIED)  
1. ALL REFERENCE NUMBERS CARRY AN ASSIGNED DESIGNATOR SERIES. THIS ASSEMBLY CARRIES SERIES: A. A1A1 (e.g. J1 IS A1A1J1)  
"NAT BRG" REPRESENTS THE PIN OUT OF THE DIGITAL BUS FOR THE FOLLOWING ASSEMBLIES:  
ASB DIGITIZER = (A1A2S41)  
ASB COUNTER = (A1A2S11)  
ASB MONITOR CONTROL = (A1A2S11)  
ASB FUNCTION GENERATOR = (A1A2S11)  
ASB I/O = (A1A2S11)  
ASB MEMORY = (A1A2S11)  
ASB PROCESSOR = (A1A2S11)  
ASB VIDEO CONTROLLER = (A1A2S11)  
ASB EXTERNAL I/O = (A1A2S11)  
NAT BRG SPARE = (A1A2X1)  
ALL PINS ARE COMMON TO THESE CONNECTORS (e.g. ASB). PIN 14 IS CONNECTED TO ALL OTHER PINS 14, EXCEPTIONS ARE LISTED IN FLAG NOTE 3).  
2. THE DIGITAL +5V SUPPLY IS DIVIDED INTO 2 SEPARATE LINES: DIGITAL +5V1  
DIGITAL +5V2  
DIGITAL +5V1 IS ROUTED TO:  
ASB DIGITIZER  
ASB COUNTER  
ASB MONITOR CONTROL  
ASB FUNCTION GENERATOR  
ASB I/O  
DIGITAL +5V2 IS ROUTED TO:  
ASB MEMORY  
ASB PROCESSOR  
ASB VIDEO CONTROLLER  
ASB EXTERNAL I/O  
NAT BRG SPARE  
3. PREFIX ALL REFERENCE DESIGNATORS WITH 78A1.

Figure FO-3. 78A1A1A1 Motherboard Assembly Component Locator and wiring Diagram (Sheet 2 of 2).

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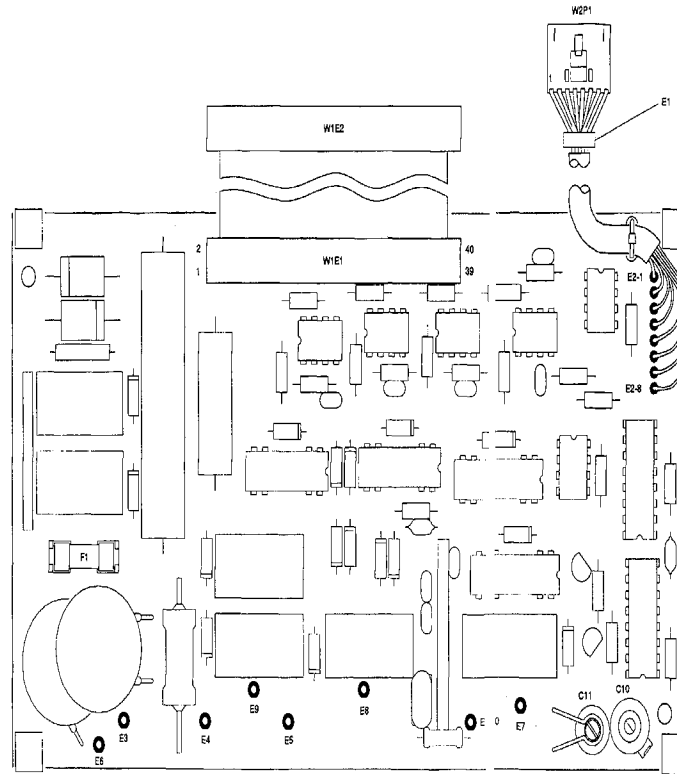
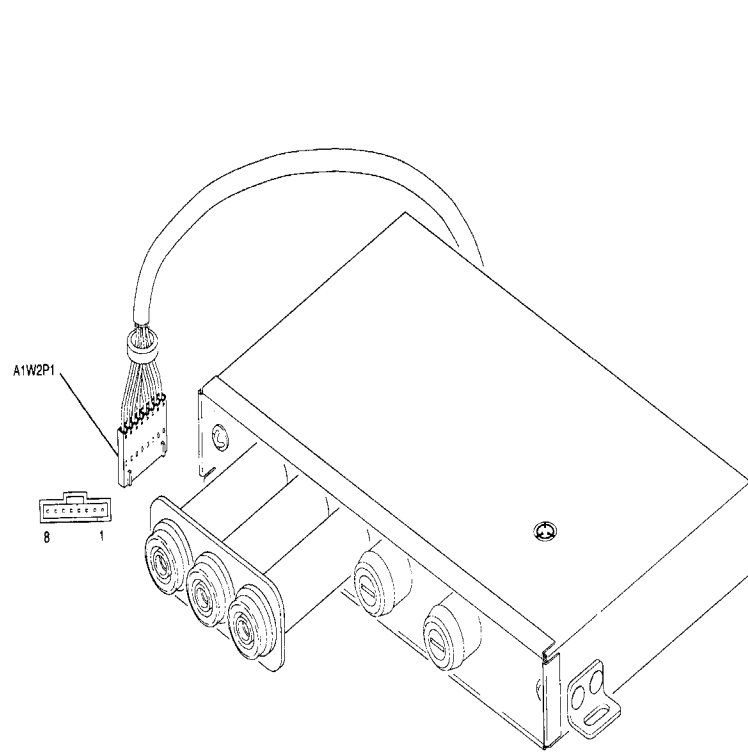


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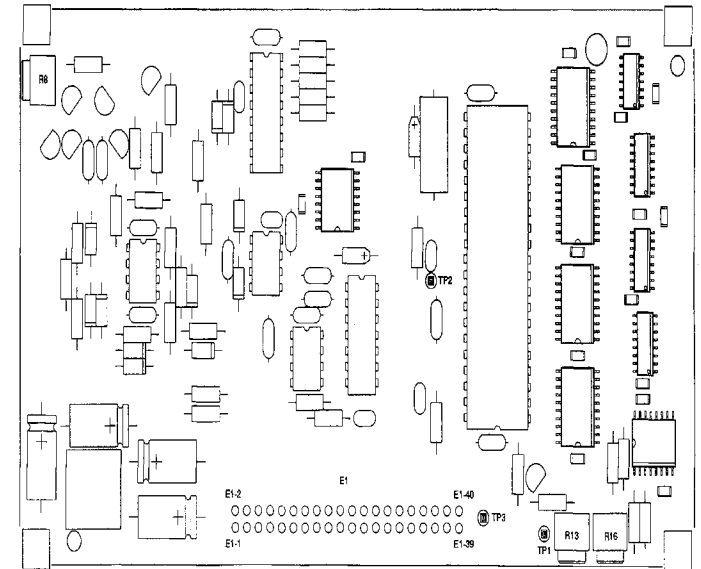
Figure FO-4. 78A1A3, 78A1A, 78A1A6, and 781A7 Assemblies Component Locator Diagram.

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A1 DMM/Relay



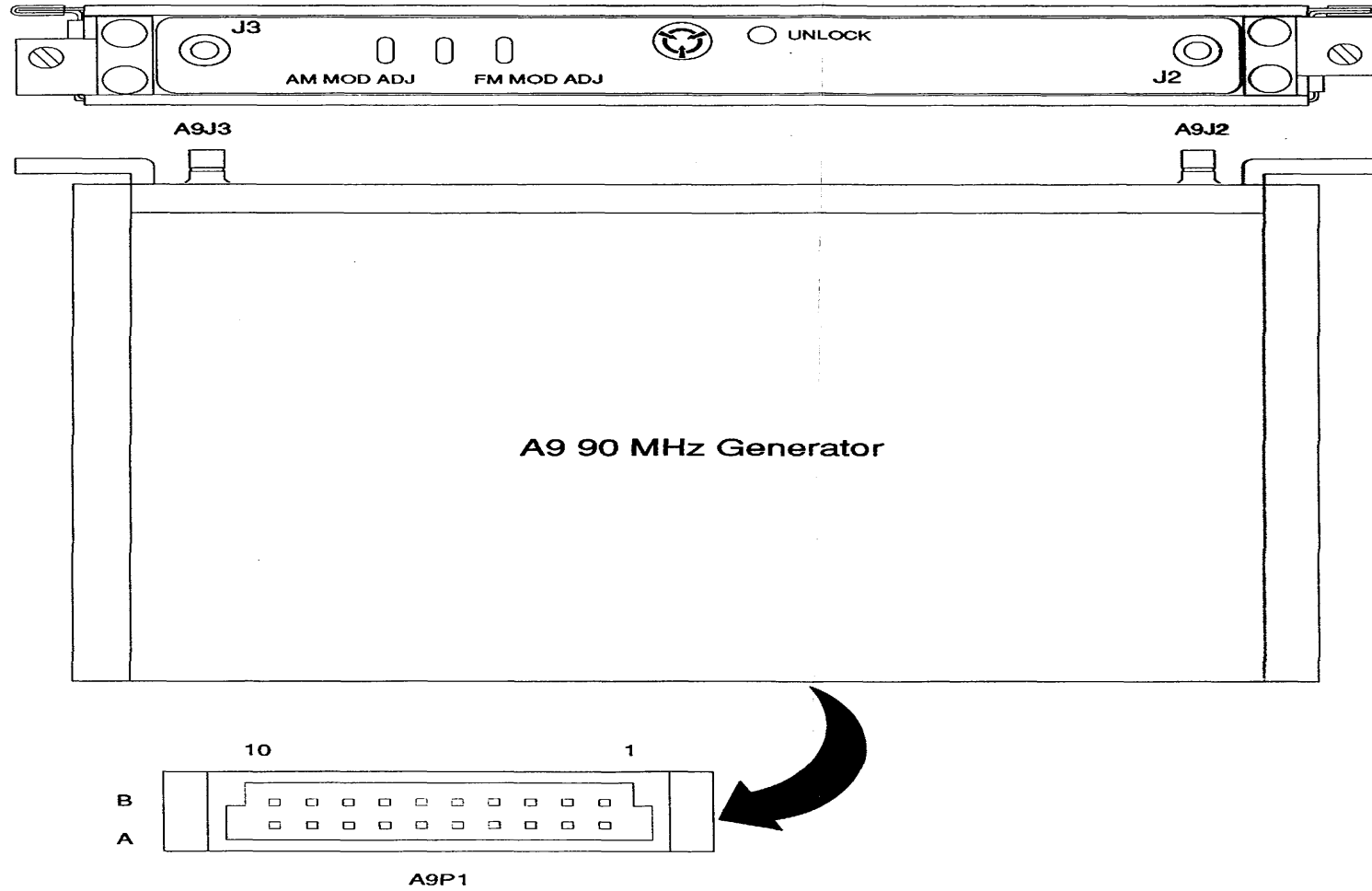
A2 DMM/Digital

Figure FO-5. 78A1A8 DMM Assembly Component Locator Diagram.

FP-19/(FP-20 blank)







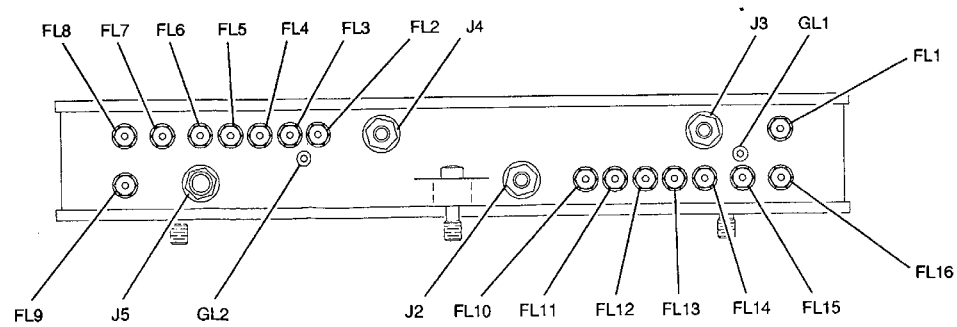
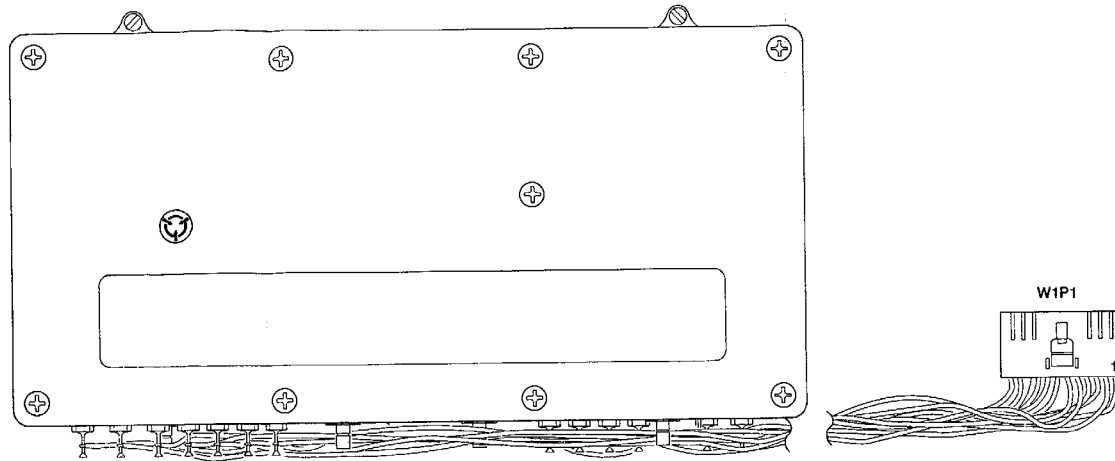
CE2FO239

Figure FO-6. 78A1A9 90 MHz Generator Assembly Component Locator Diagram.

FP-21/(FP-22 blank)



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



CONNECTION	WIRE COLOR	FUNCTION	DESTINATION
FL1 (REC)	RED	15 V	W1P1, PIN 5
FL2 (REC)	BLACK/WHITE	STATUS A	W1P1, PIN 10
FL3	RED/WHITE	DATA	W1P1, PIN 12
FL4 (REC)	VIOLET/WHITE	LATCH 1ST A	W1P1, PIN 9
FL5	BROWN/WHITE	CLOCK	W1P1, PIN 11
FL6 (REC)	RED	15 V	W1P1, PIN 5
FL7	YELLOW	-15 V	W1P1, PIN 3
FL8	VIOLET	34 V	W1P1, PIN 1
FL9 (GEN)	RED	15 V	W1P1, PIN 6
FL10 (GEN)	GREEN/WHITE	STATUS B	W1P1, PIN 7
FL11	RED/WHITE	DATA	W1P1, PIN 12
FL12 (GEN)	GRAY/WHITE	LATCH 1ST B	W1P1, PIN 8
FL13	BROWN/WHITE	CLOCK	W1P1, PIN 11
FL14 (GEN)	RED	15 V	W1P1, PIN 6
FL15	YELLOW	-15 V	W1P1, PIN 3
FL16	VIOLET	34 V	W1P1, PIN 1
GL1	BLACK	GND	W1P1, PIN 2
GL2	BLACK	GND	W1P1, PIN 4

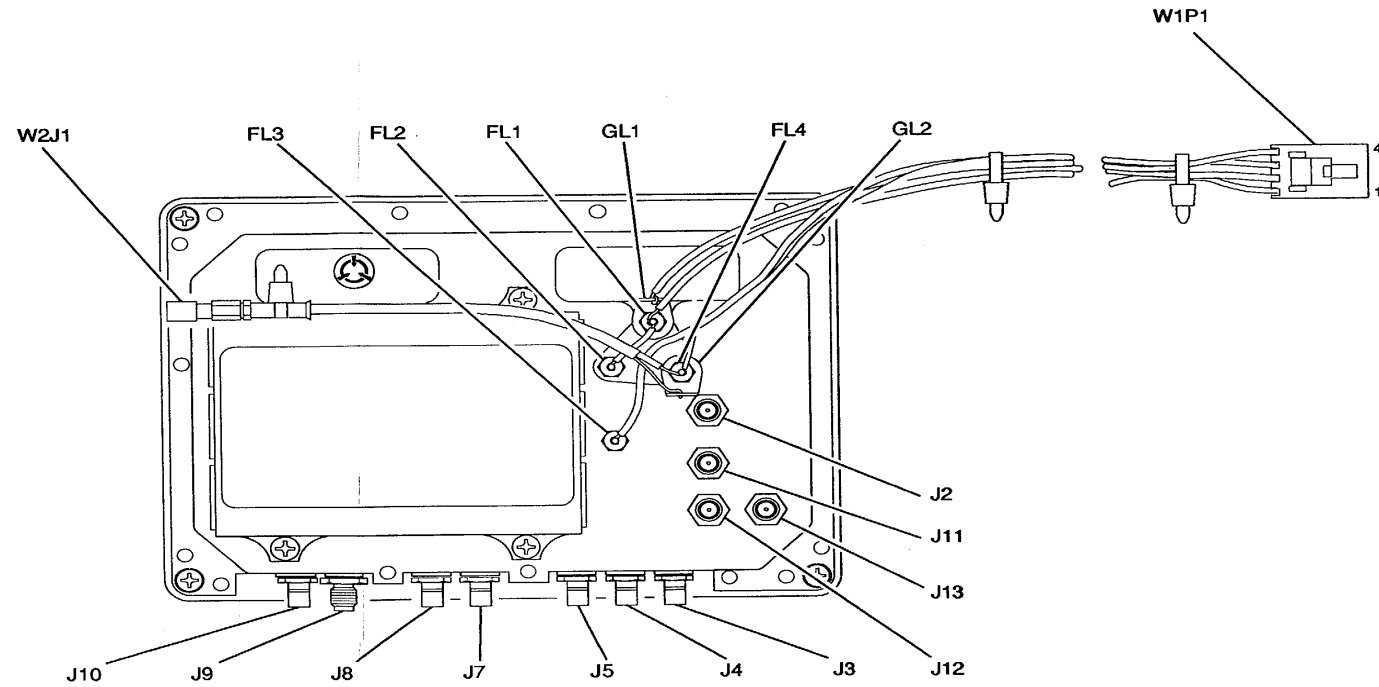
CE2F0085

Figure FO-7. 78A1A10 1st LO Assembly Component Locator and Wiring Diagram

FP-23/(FP-24 blank)



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



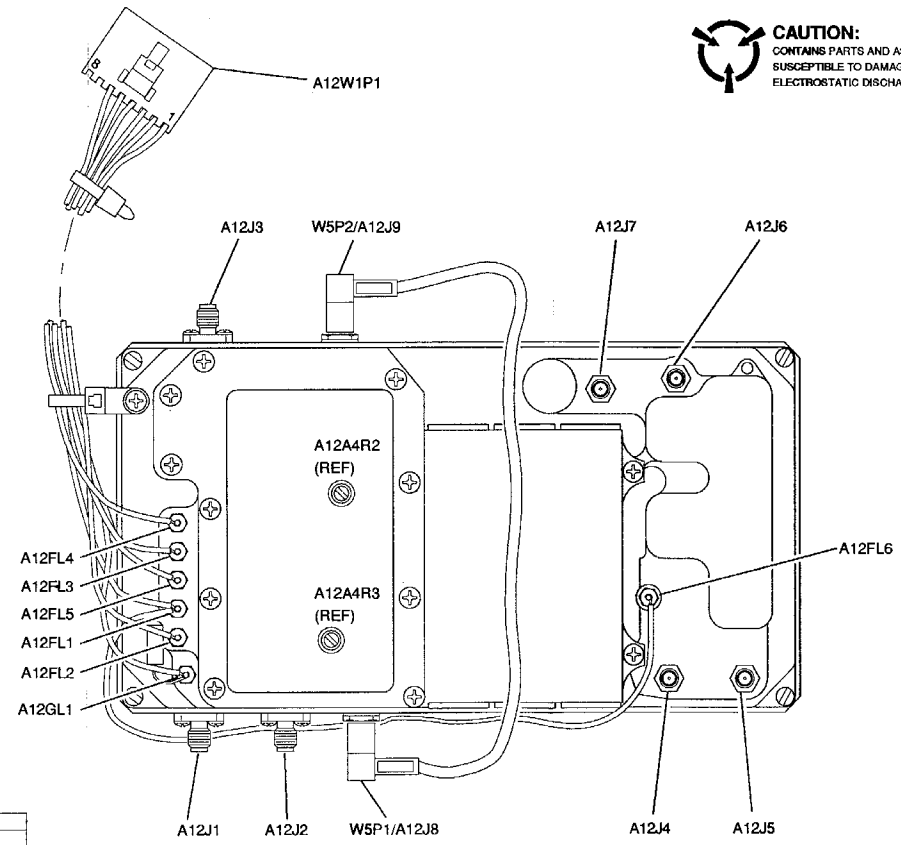
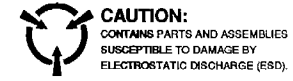
CONNECTION	WIRE COLOR	FUNCTION	DESTINATION
FL1	RED	15 V	W1P1, PIN2
FL2	RED	15 V	FL1
FL3	YELLOW	-15 V	W1P1, PIN3
FL4	RED/WHITE	TCXO PWR	W1P1, PIN1
FL4	CENTER	CONDUCTOR	W2J1, PIN1
GL1	BLACK	GND	W1P1, PIN4
GL2	SHIELD	GND	W2J1, PIN2

CE2FO084

Figure FO-8.. 78A1A11 2<sup>ND</sup> LO Assembly Component Locator and Wiring Diagram.

FP-25/(FP-26 blank)





CONNECTION	WIRE COLOR	FUNCTION	DESTINATION
A12GL1	BLACK	GND	A12W1P1, PIN 1
A12FL1	RED	15 V	A12W1P1, PIN 2
A12FL2	GREEN/WHITE	ANT/TR	A12W1P1, PIN 6
A12FL3	BLUE/WHITE	20 dB #1	A12W1P1, PIN 3
A12FL4	ORANGE/WHITE	20 dB #2	A12W1P1, PIN 4
A12FL5	GRAY/WHITE	ALARM	A12W1P1, PIN 5
A12FL6	RED	15 V	A12W1P1, PIN 2
A12NC	NA	NA	A12W1P1, PIN 7
A12NC	NA	NA	A12W1P1, PIN 8

CE2F0086

Figure FO-9. 78A1A12 Receive IF Assembly Component Locator and Wiring Diagram.

FP-27/(FP-28 blank)





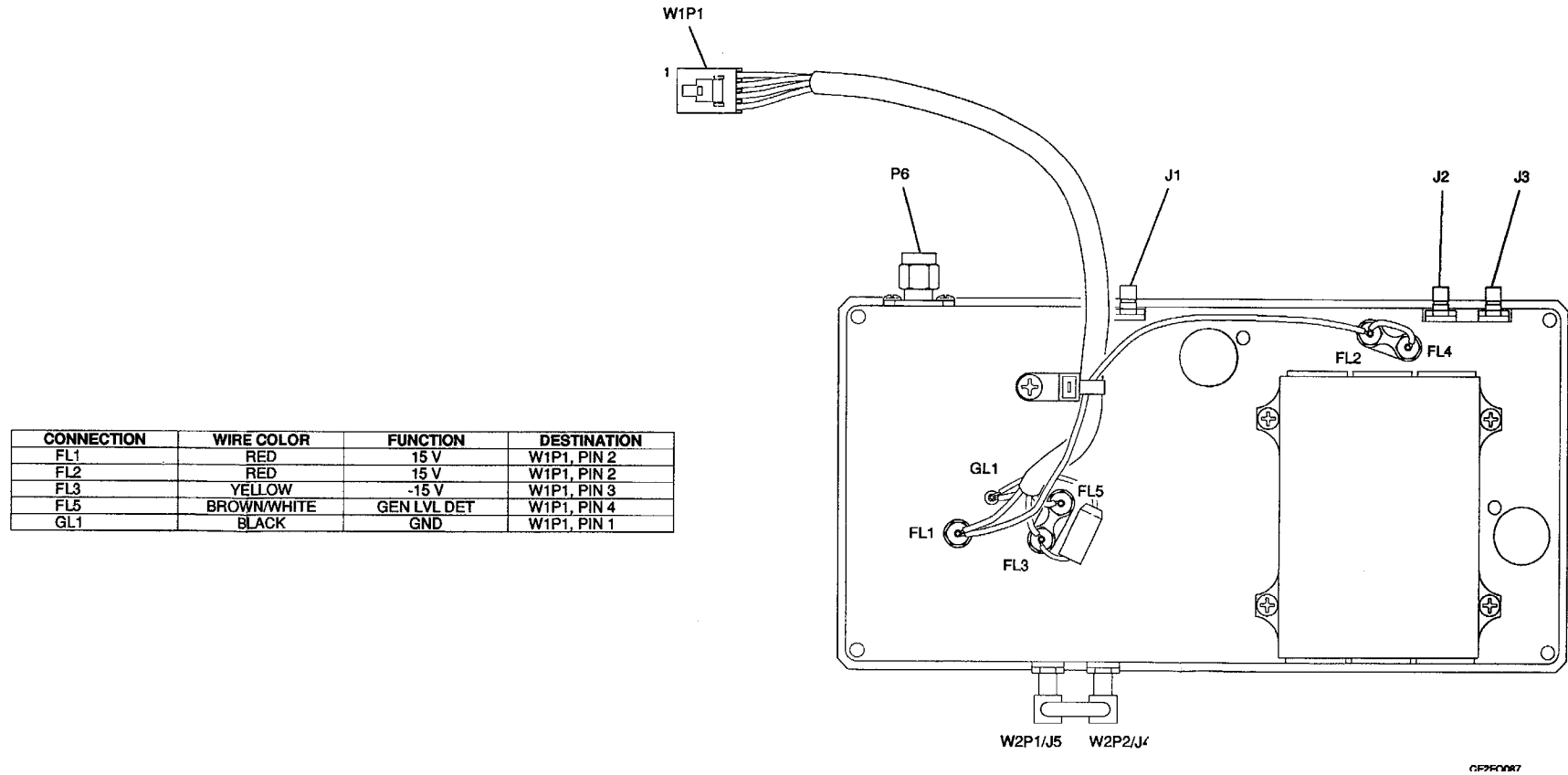


Figure FO-10. 78A1A13 Generator IF Assembly Component Locator and Wiring Diagram.

FP-29/(FP-30 blank)



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

CONNECTION	WIRE COLOR	FUNCTION	DESTINATION
FL1	BLUE/WHITE	PWR TERM TEMP	W1P1, PIN 5
FL2	VIOLET/WHITE	20 dB PAD	W1P1, PIN 8
FL3	YELLOW/WHITE	DUPLEX	W1P1, PIN 11
FL4	ORANGE	5 V	W1P1, PIN 3
FL5	RED	15 V	W1P1, PIN 2
FL6	YELLOW	-15 V	W1P1, PIN 12
FL7	BLACK/WHITE	PWR MODE	W1P1, PIN 4
FL8	GRAY/WHITE	RANGE SEL	W1P1, PIN 9
FL9	BROWN/WHITE	RF PWR LVL	W1P1, PIN 7
FL10	ORANGE/WHITE	ALARM	W1P1, PIN 10
GL1	BLACK	GND	W1P1, PIN 1

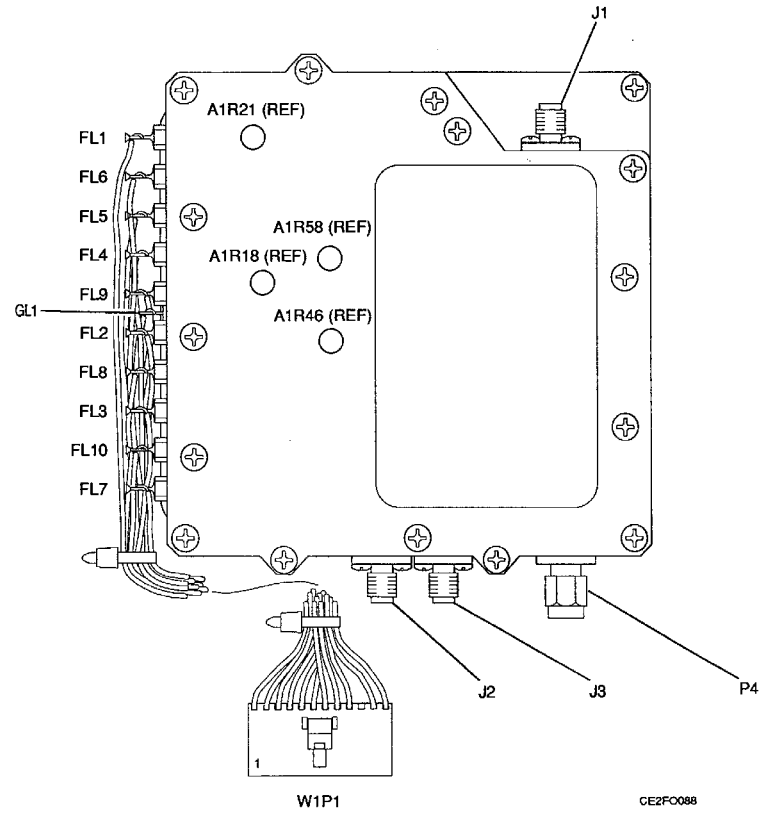
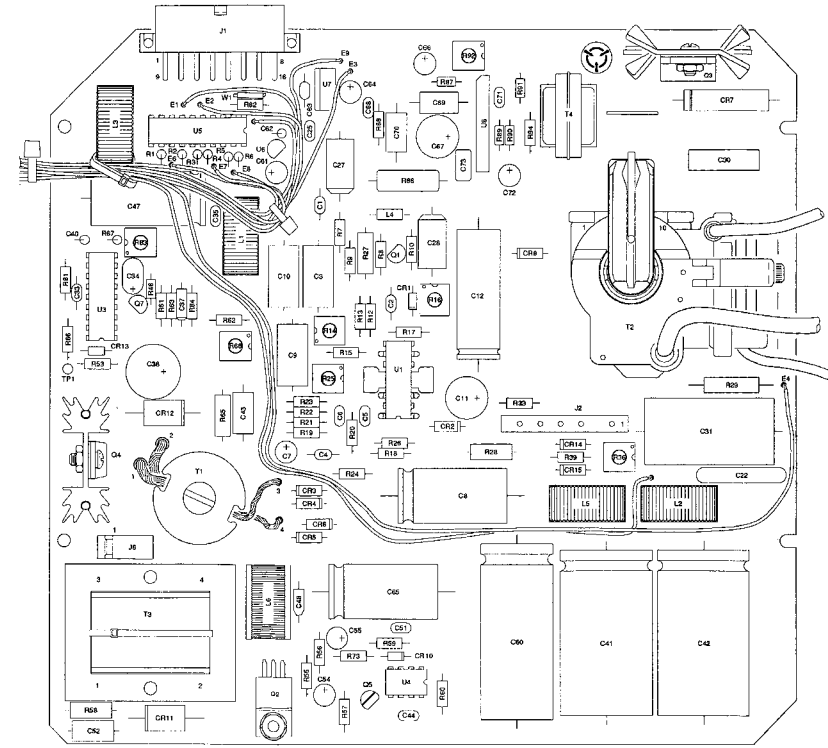
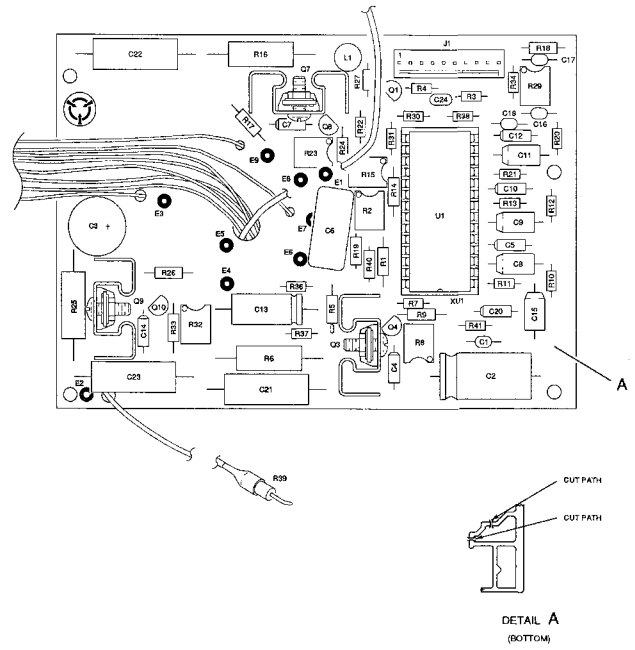
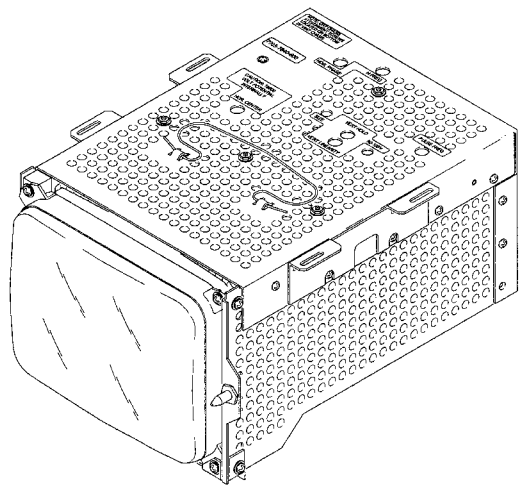


Figure FO-11. 78A1A14 Power Termination Assembly Component Locator and Wiring Diagram

FP-31/(FP-32 blank)



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

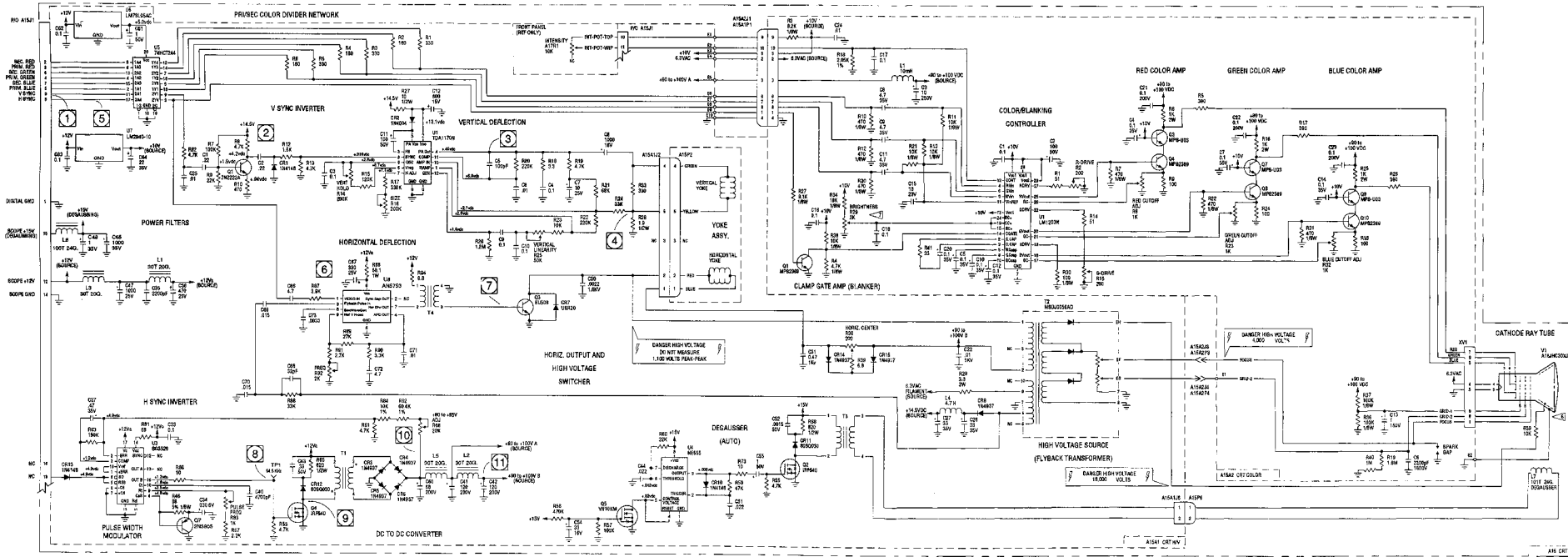


CE2F0101

Figure FO-12. 781A15 CRT Assembly (7005-7840-600) Component Locator and Schematic Diagram (Sheet 1 of 3)

FP-33/(FP-34 blank)





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

NOTES:  
(UNLESS OTHERWISE SPECIFIED):

- ALL REFERENCE NUMBERS CARRY AN ASSIGNED DESIGNATOR SERIES. THIS ASSEMBLY CARRIES SERIES:  
A. A15 (e.g. R1 IS A15R1)  
B. A15A1 (e.g. R1 IS A15A1R1)  
C. A15K (e.g. R1 IS A15K1)
- ALL RESISTORS ARE 1/4W. 5% TOLERANCE.
- ALL RESISTANCE IS EXPRESSED IN OHMS.
- ALL CAPACITANCE IS EXPRESSED IN MICROFARADS.
- ALL INDUCTANCE IS EXPRESSED IN MICROHENRYS.
- DAMAGE TO COMPONENTS WILL RESULT IF SPRING WIRE IS NOT CONNECTED TO A15E.
- SETTING BRIGHTNESS CONTROL A15A2D WILL ALTER HIGH VOLTAGE LINE. SET FOR 17.5 kV MAXIMUM.
- ALL VOLTAGES TAKEN WITH PULS. VIDEO, AND NO DEGAUSS.
- THIS SYMBOL CORRELATES TO WAVE FORMS ON SHEET 3.
- A15A1D2 AND A15A1D3 ARE NOT USED.
- PREFIX ALL REFERENCE DESIGNATORS WITH 78A1.

Figure FO-12. 781A15 CRT Assembly (7005-7840-600) Component Locator and Schematic Diagram (Sheet 2 of 3)

FP-35/(FP-36 blank)





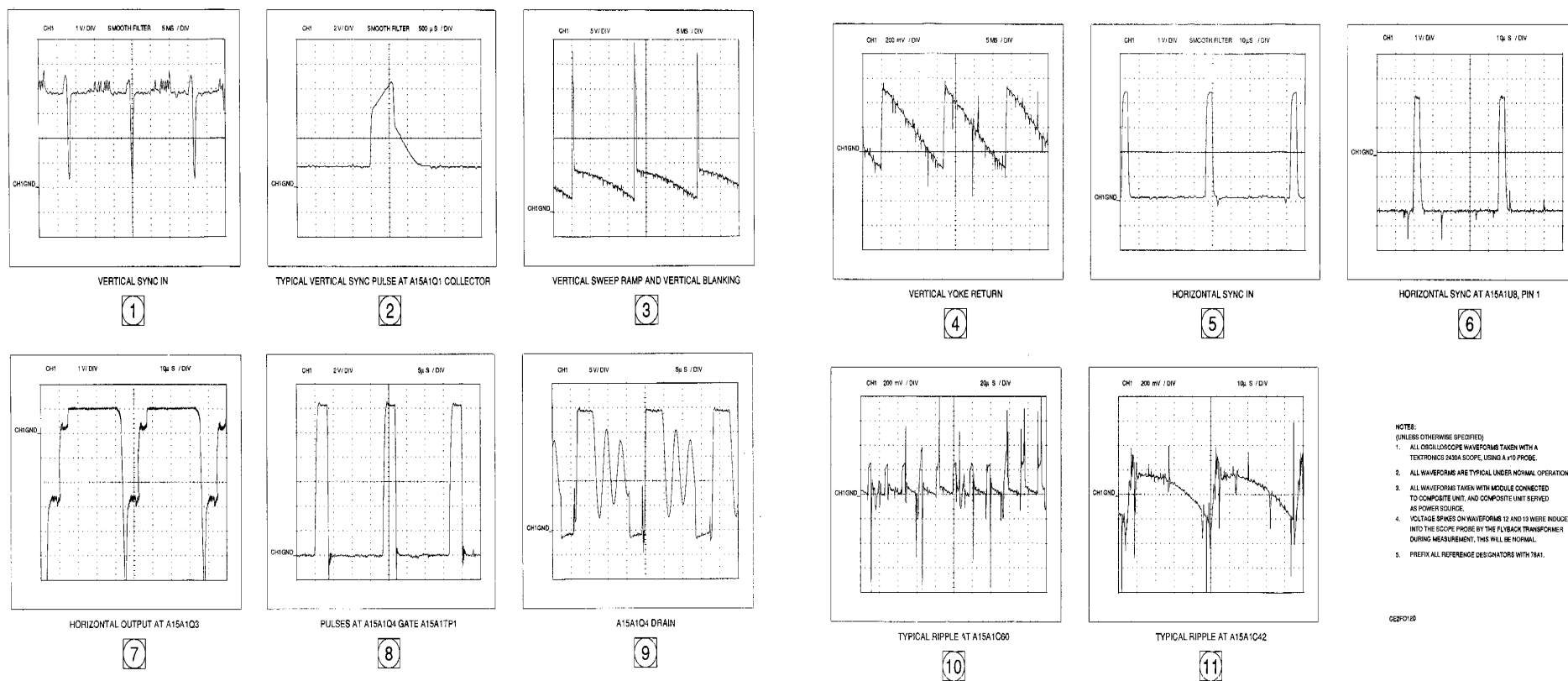
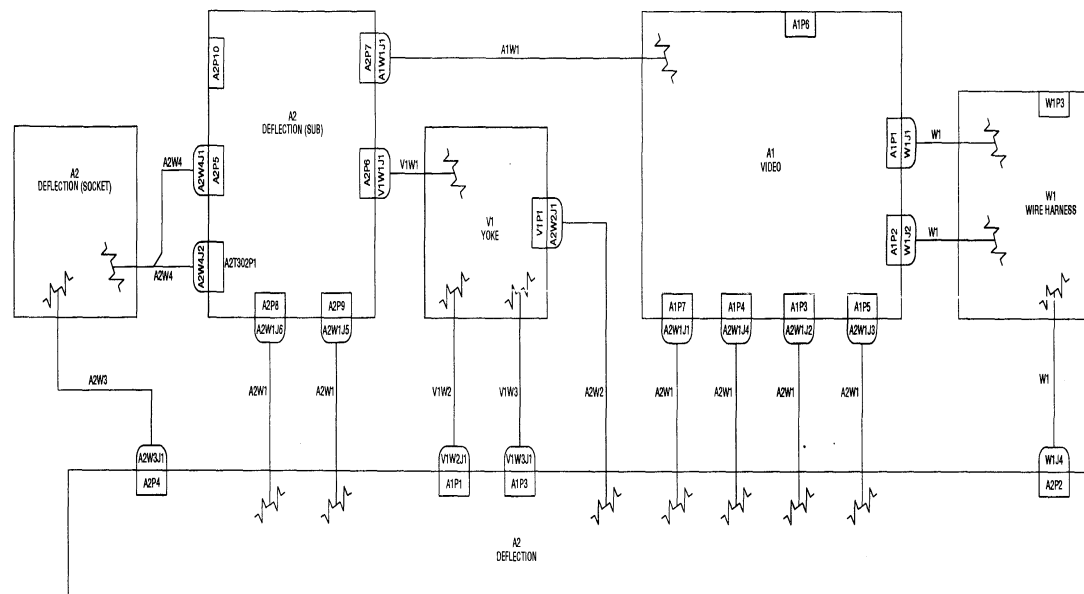
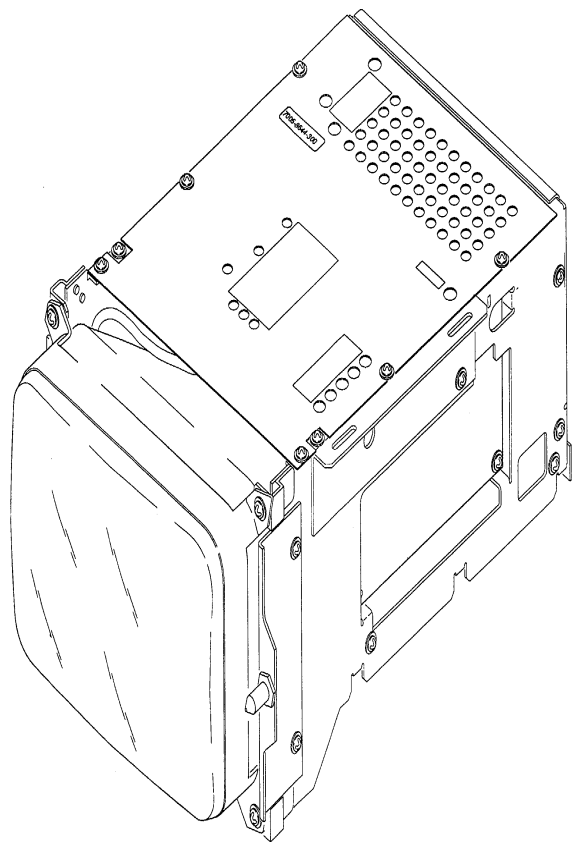


Figure FO-12. 78A1A15 CRT Assembly (7005-7840-600) Component Locator and Schematic Diagram (Sheet 3 of 3).

FP-37/(FP-38 blank)





CE2F025

PREFIX ALL REFERENCE DESIGNATORSS WITH 78A1A15.

Figure FO-13. 78A1A15 CRT Assembly (7005-8644-300) Component Locator and Interconnect Diagram (Sheet 1 of 2).

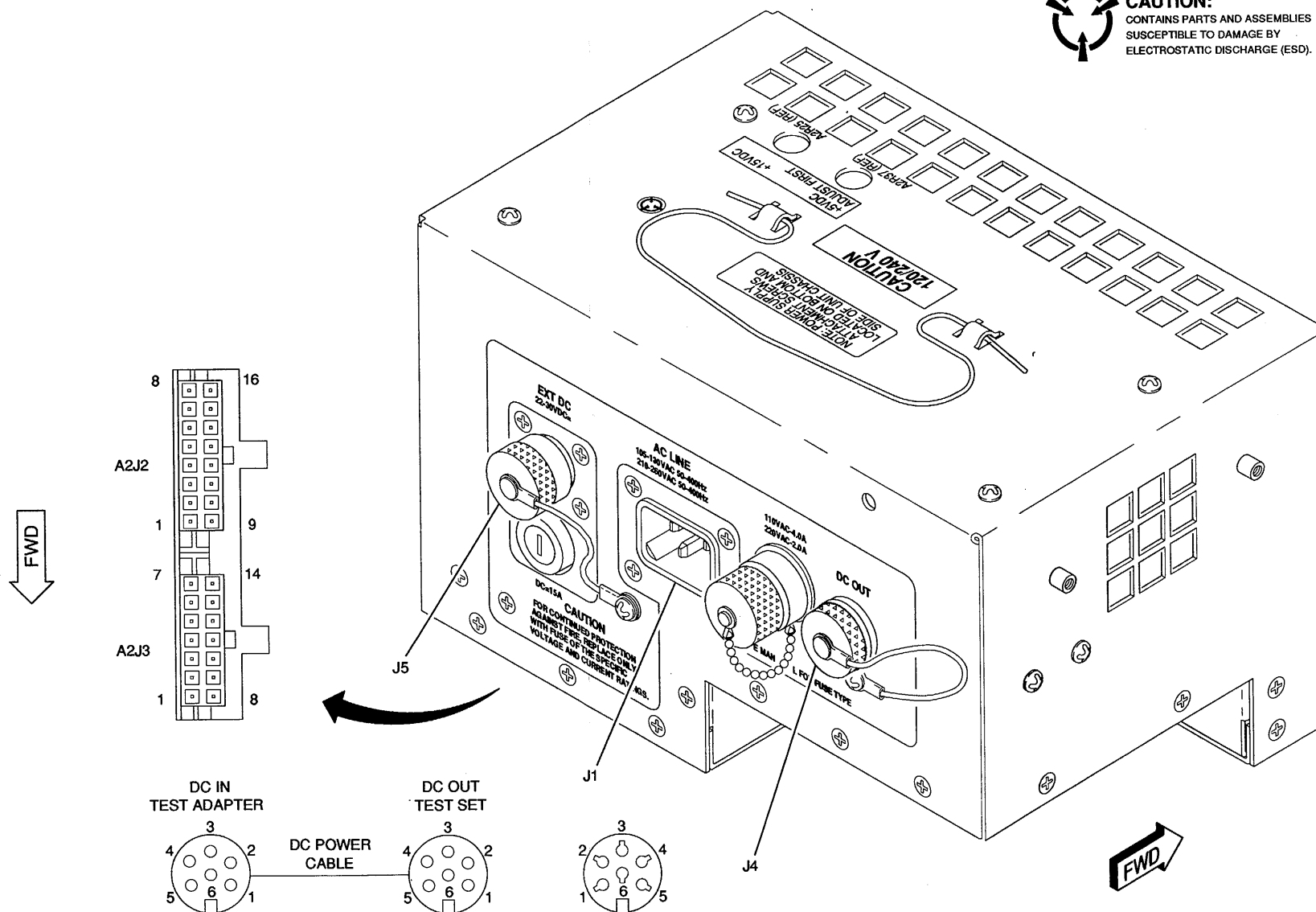
FP-39/(FP-40 blank)







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



CE2FO080

Figure FO-14. 78A1A16 Power Supply Assembly Component Locator Diagram.

FP-43/(FP-44 blank)





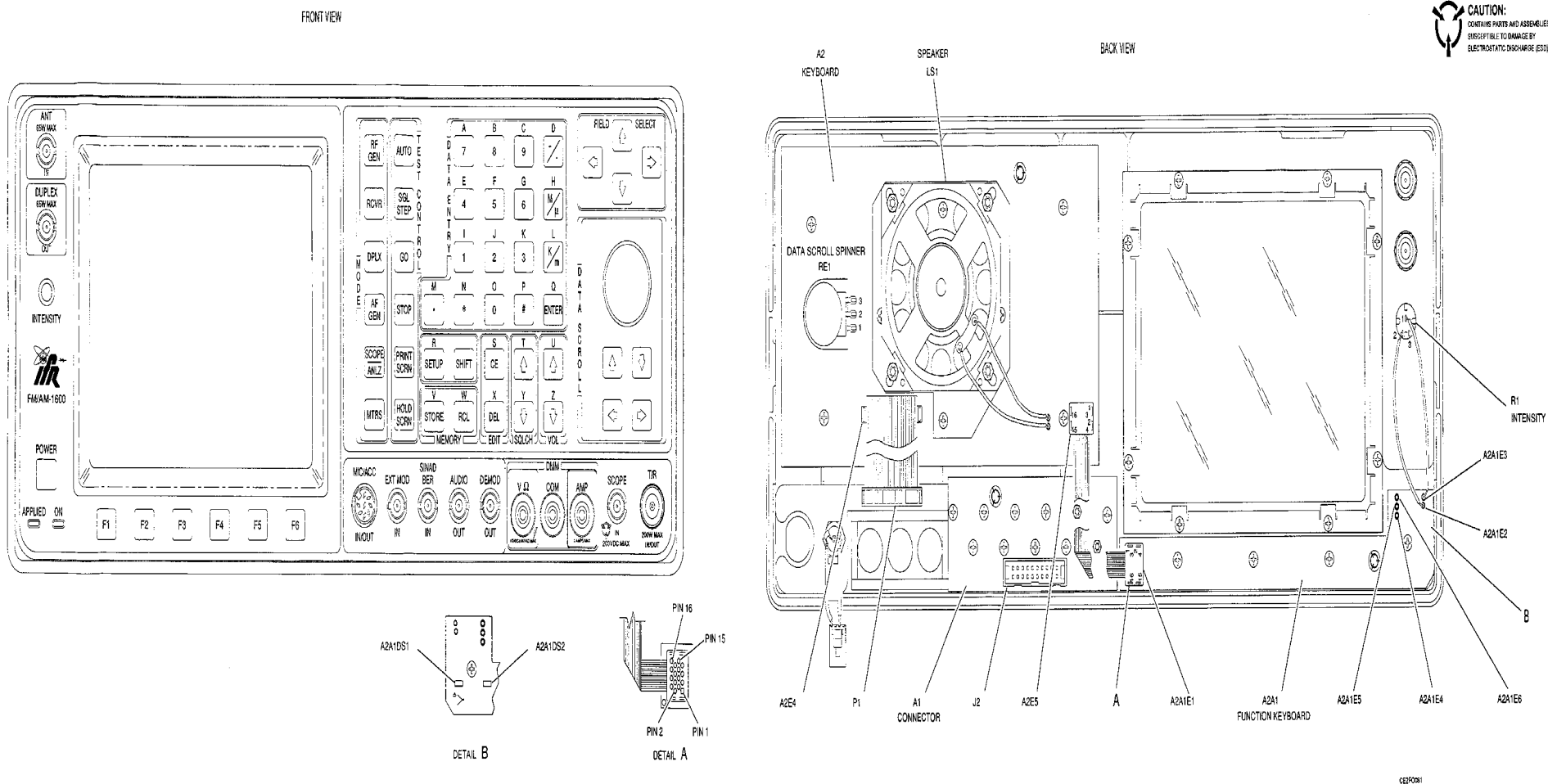
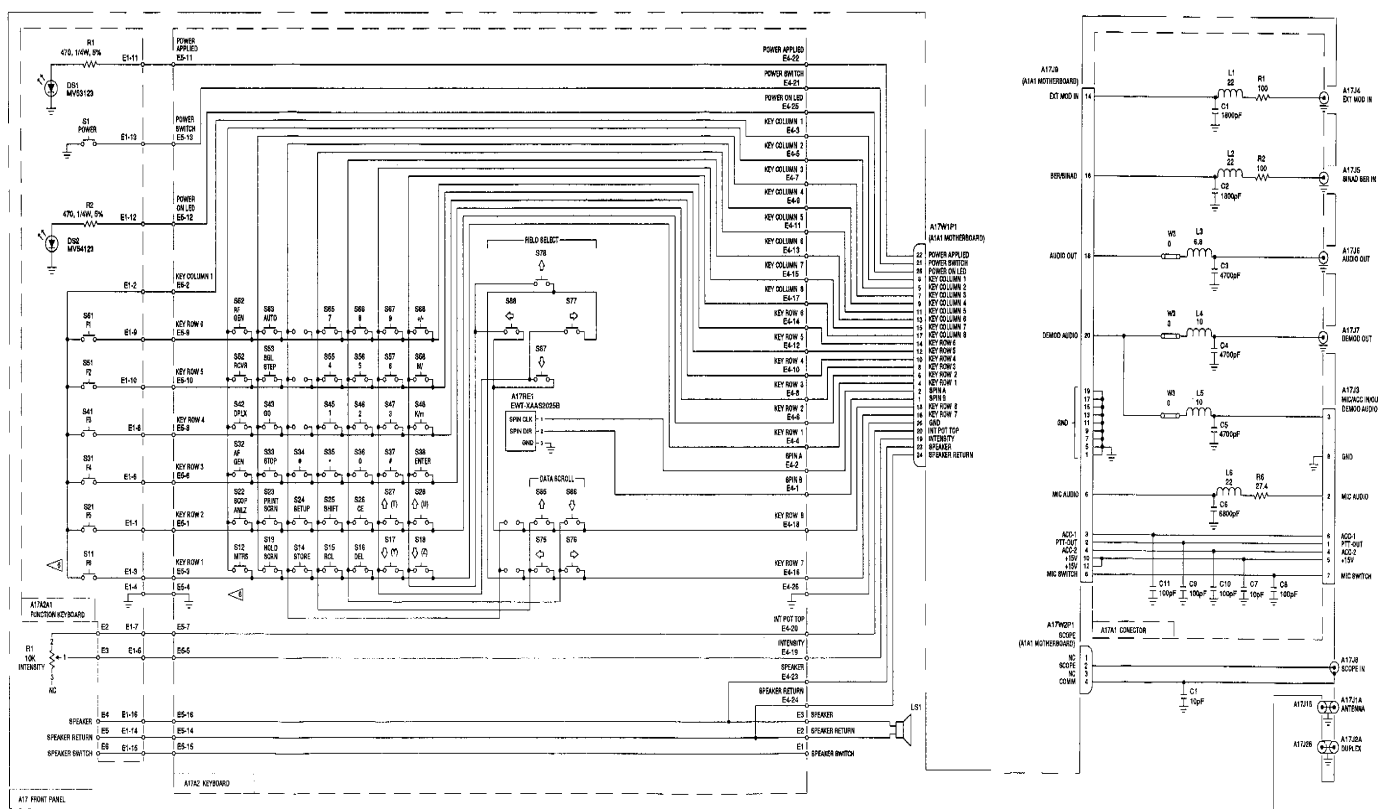


Figure FO-15. 78A1A17 Front Panel Assembly Component Locator and Schematic Diagram (Sheet 1 of 2).

FP-45/(FP-46 blank)





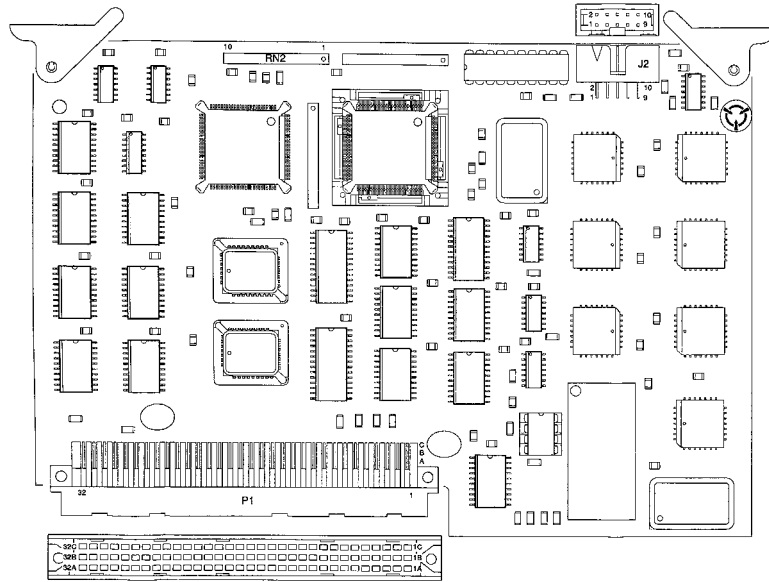
**CAUTION:**  
CONTAINS PARTS AND ASSEMBLIES  
SUSCEPTIBLE TO DAMAGE BY  
ELECTROSTATIC DISCHARGE (ESD).

NOTES:  
(UNLESS OTHERWISE SPECIFIED)  
1. ALL REFERENCE NUMBERS CARRY AN ASSIGNED DESIGNATOR SERIES. THIS ASSEMBLY CARRIES SERIES:  
A. A17 (e.g. R1 IS A17R1)  
B. A17A1 (e.g. R1 IS A17A1R1)  
C. A17A2 (e.g. J1 IS A17A2J2)  
D. A17A2A1 (e.g. J1 IS A17A2A1J1)  
2. ALL RESISTORS ARE 1/8W, 1% TOLERANCE.  
3. ALL RESISTANCE IS EXPRESSED IN OHMS.  
4. ALL CAPACITANCE IS EXPRESSED IN MICROFARADS.  
5. ALL INDUCTANCE IS EXPRESSED IN MICROHENRYS.  
6. SWITCHES ARE NUMBERED IN THE FOLLOWING MANNER:  
S11 IS CONNECTED TO KEY ROW 1 AND KEY COLUMN 1.  
7. PREFIX ALL REFERENCE DESIGNATORS WITH 78A1.

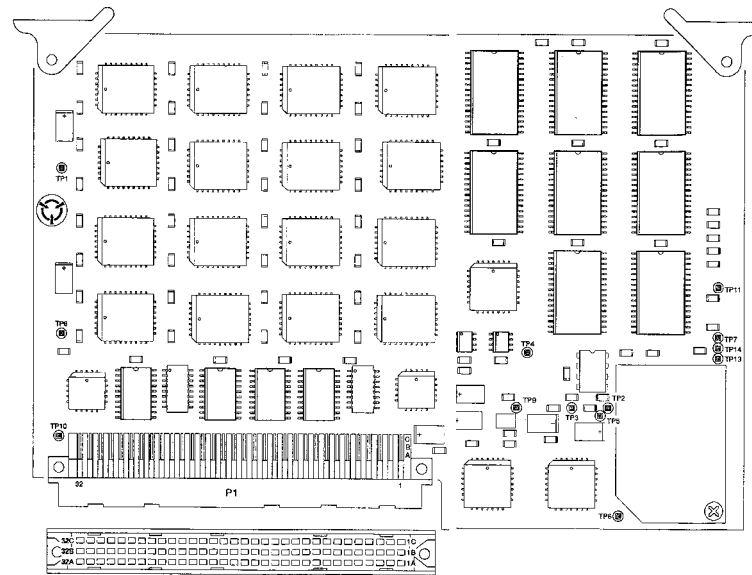
Figure FO-15. 78A1A17 Front Panel Assembly Component Locator and Schematic Diagram (Sheet 2 of 2).

FP-47/(FP-48 blank)

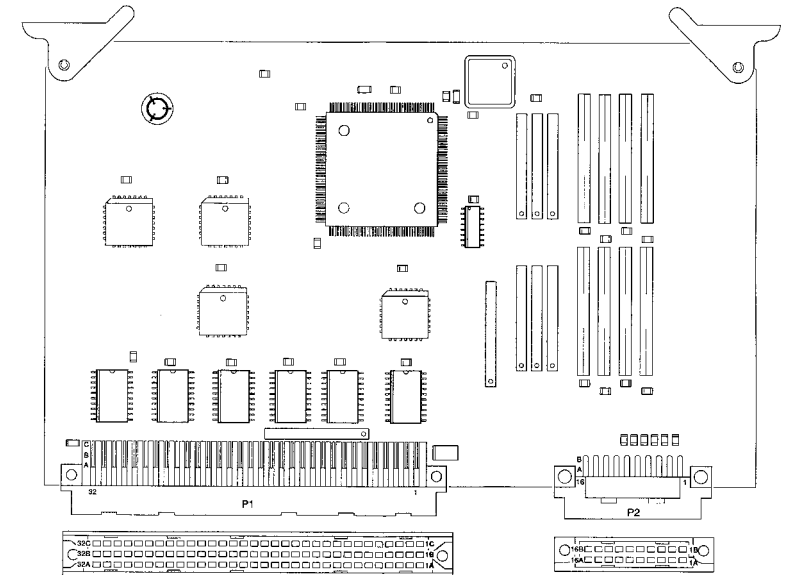




**A19 Processor**



**A20 Memory**

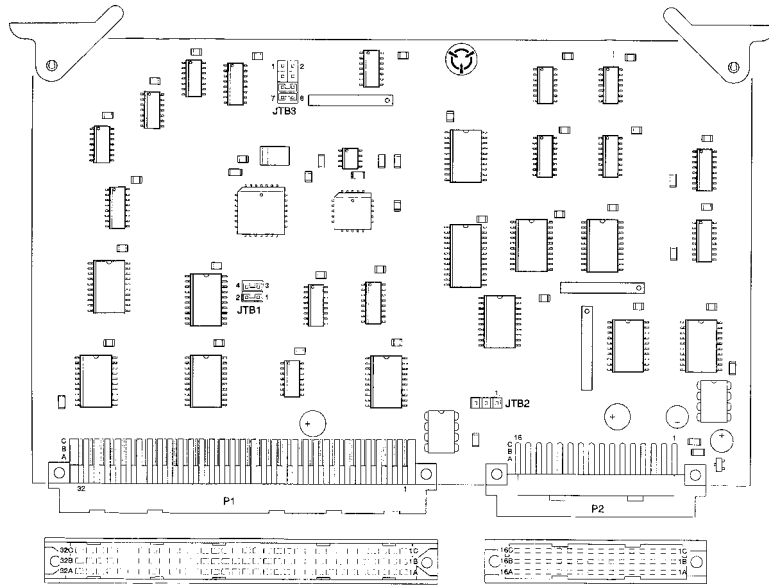


**A21 Video Controller**

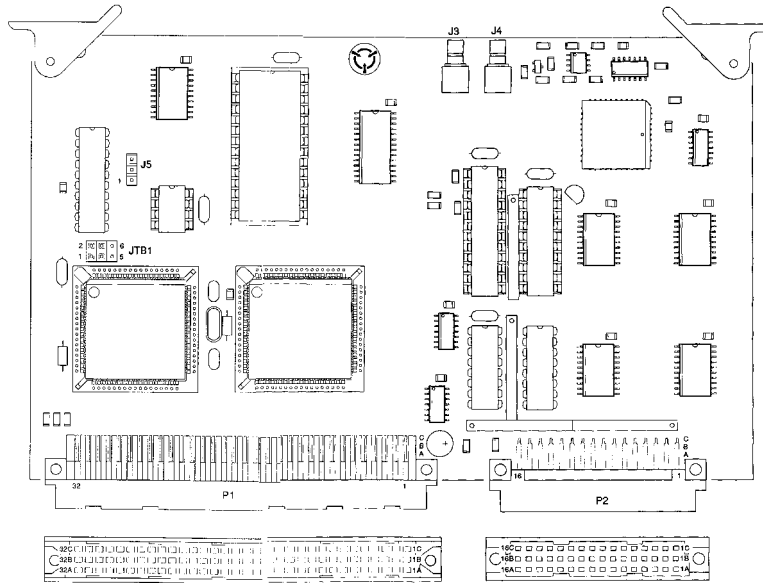
Figure FO-16. 78A1A19, 78A1A20, 78A1A21, 78A1A22, 78A1A23, 78A1A24, 78A1A25, 78A1A26 and 78A1A27 PC Board Assemblies Component Locator Diagrams (Sheet 1 of 3).

FP-49/(FP-50 blank)

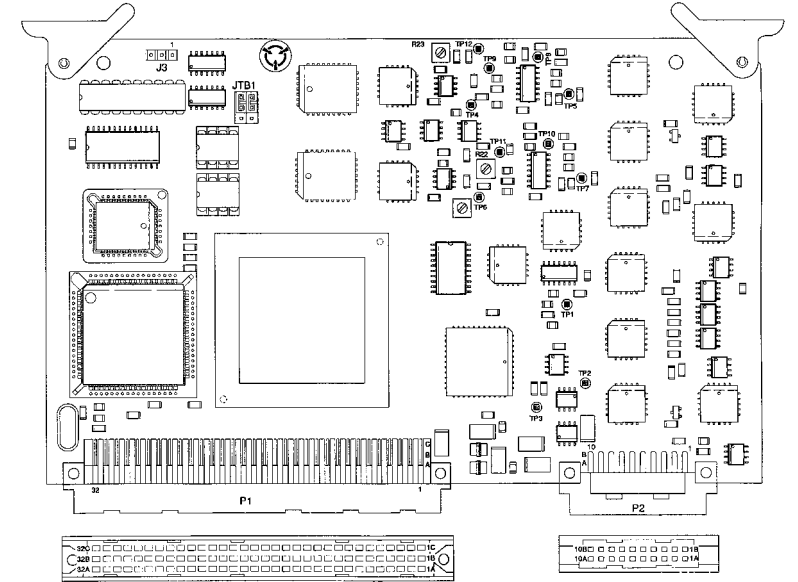




A22 RF I/O



A23 Counter




A24 Function Generator

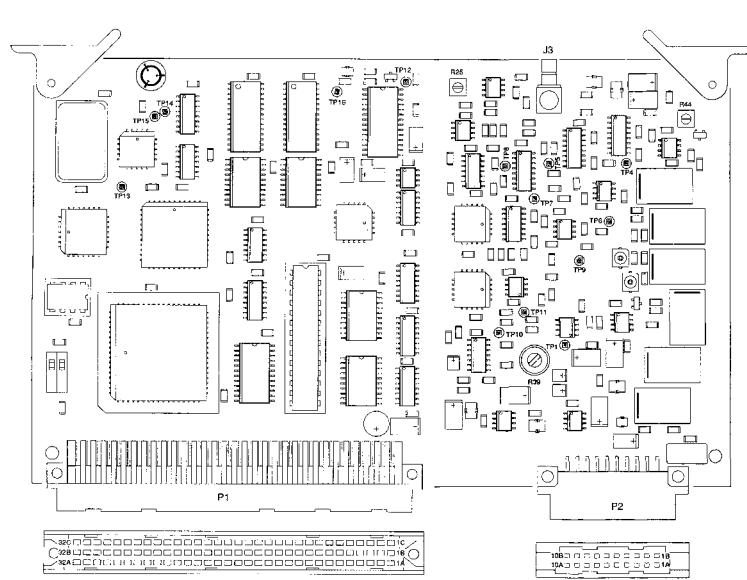
Figure FO-16. 78A1A19, 78A1A20, 78A1A21, 78A1A22, 78A1A23, 78A1A24, 78A1A25, 78A1A26 and 78A1A27 PC Board Assemblies Component Locator Diagrams (Sheet 2 of 3).

FP-51/(FP-52 blank)

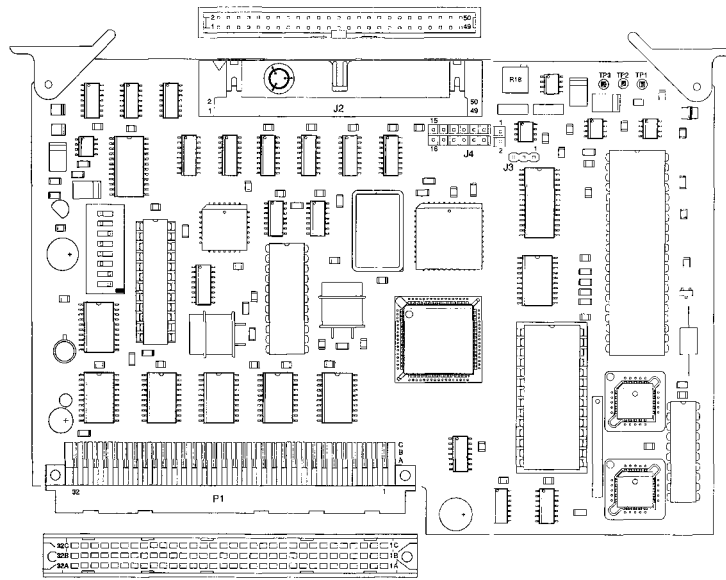




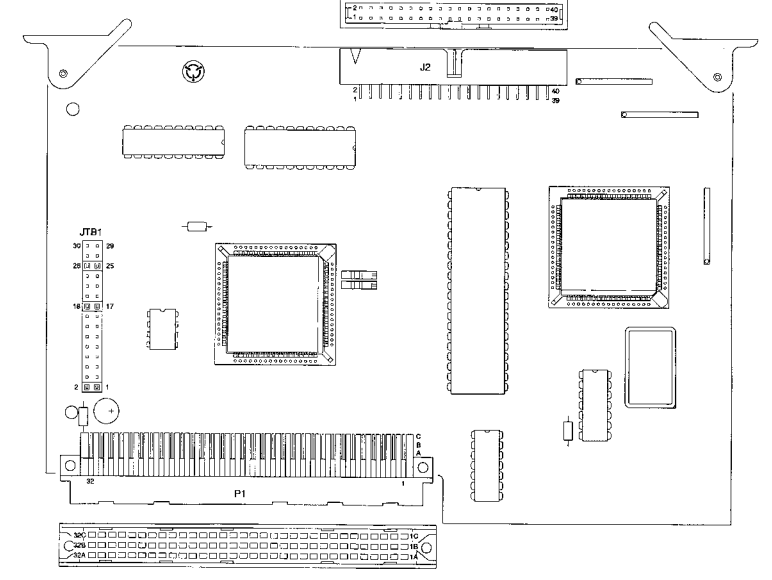
 CAUTION:  
CONTAINS PARTS AND ASSEMBLIES  
SUSCEPTIBLE TO DAMAGE BY  
ELECTROSTATIC DISCHARGE (ESD).



A25 Digitizer



A26 Monitor Control



A27 External I/O

02ZF0164

Figure FO-16. 78A1A19, 78A1A20, 78A1A21, 78A1A22, 78A1A23, 78A1A24, 78A1A25, 78A1A26 and 78A1A27 PC Board Assemblies Component Locator Diagrams (Sheet 3 of 3).

FP-53/(FP-54 blank)



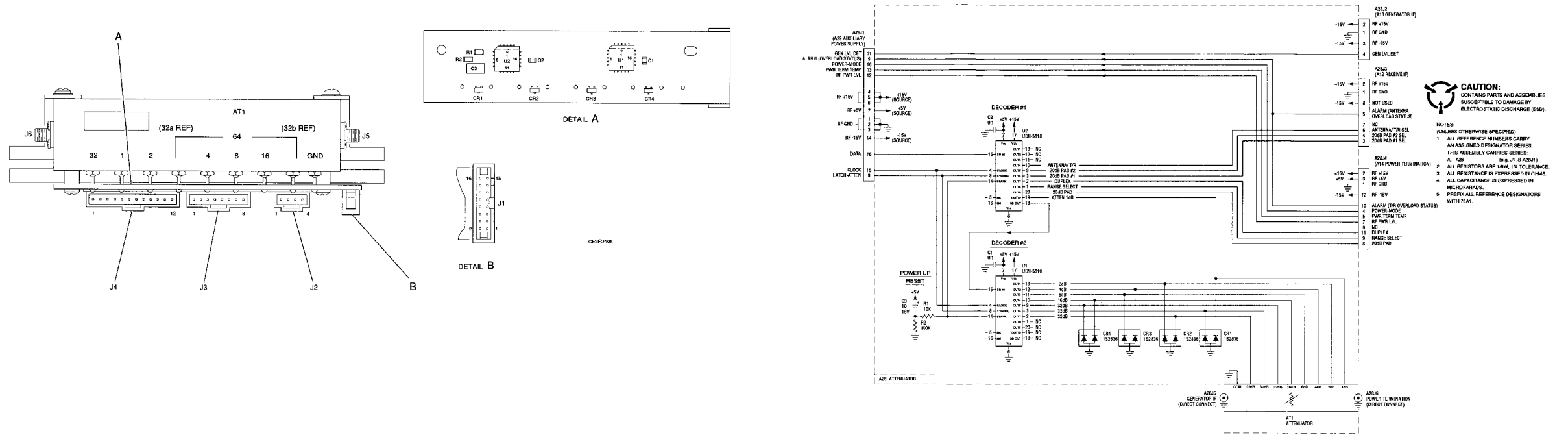
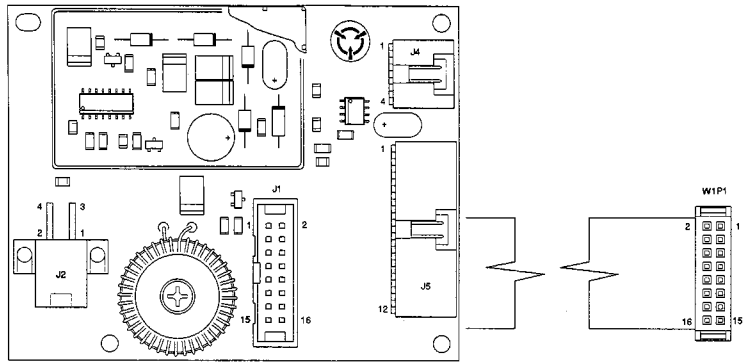


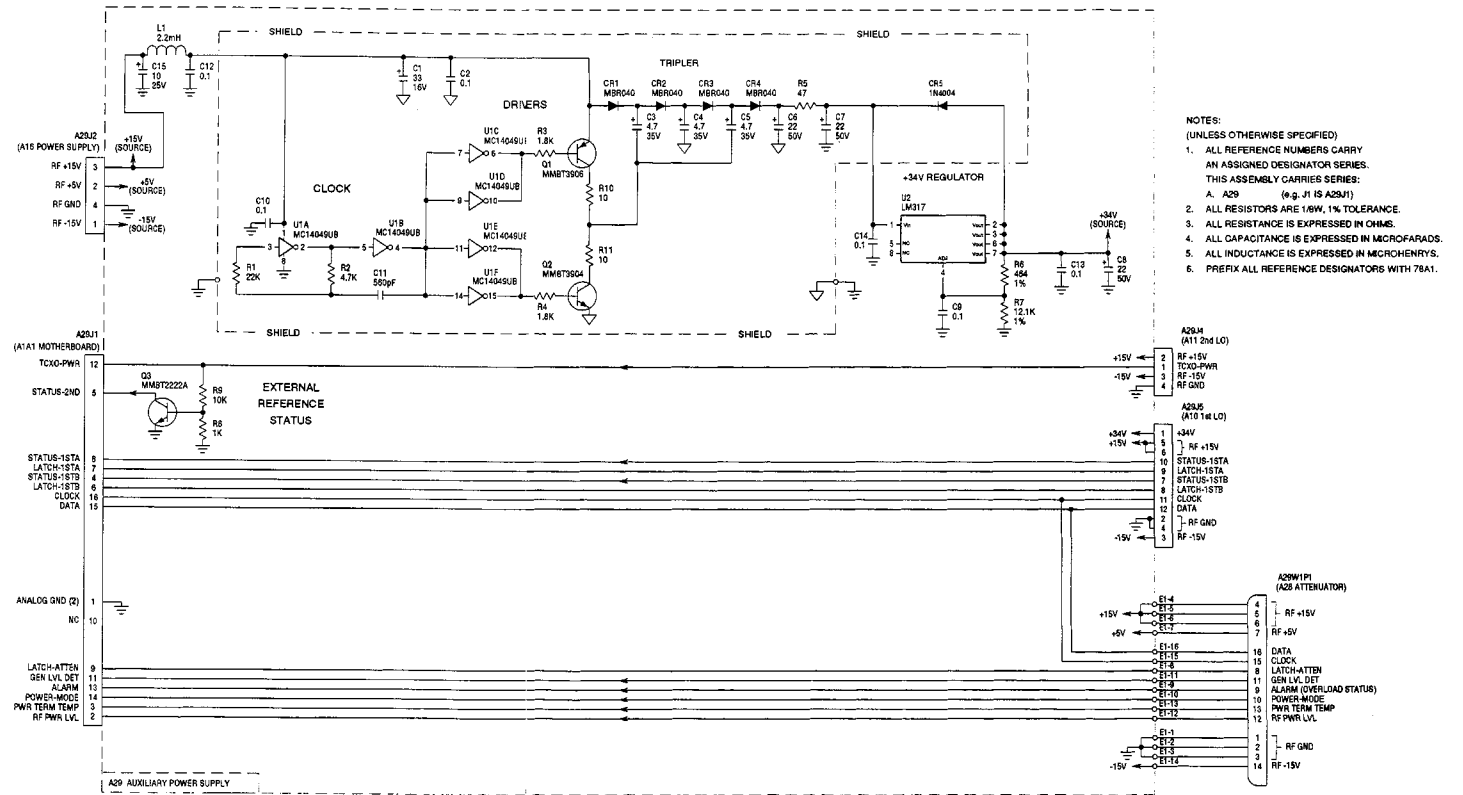
Figure FO-17. 78A1A28 Attenuator Assembly Component Locator and Schematic Diagram.

FP-55/(FP-56 blank)





PREFIX ALL REFERENCE DESIGNATORS WITH 78A1A29



CE2FO124

CE2FO124

Figure FO-18. 78A1A29 Auxiliary Power Supply Assembly Component Locator and Schematic Diagram.

FP-57/(FP-58 blank)



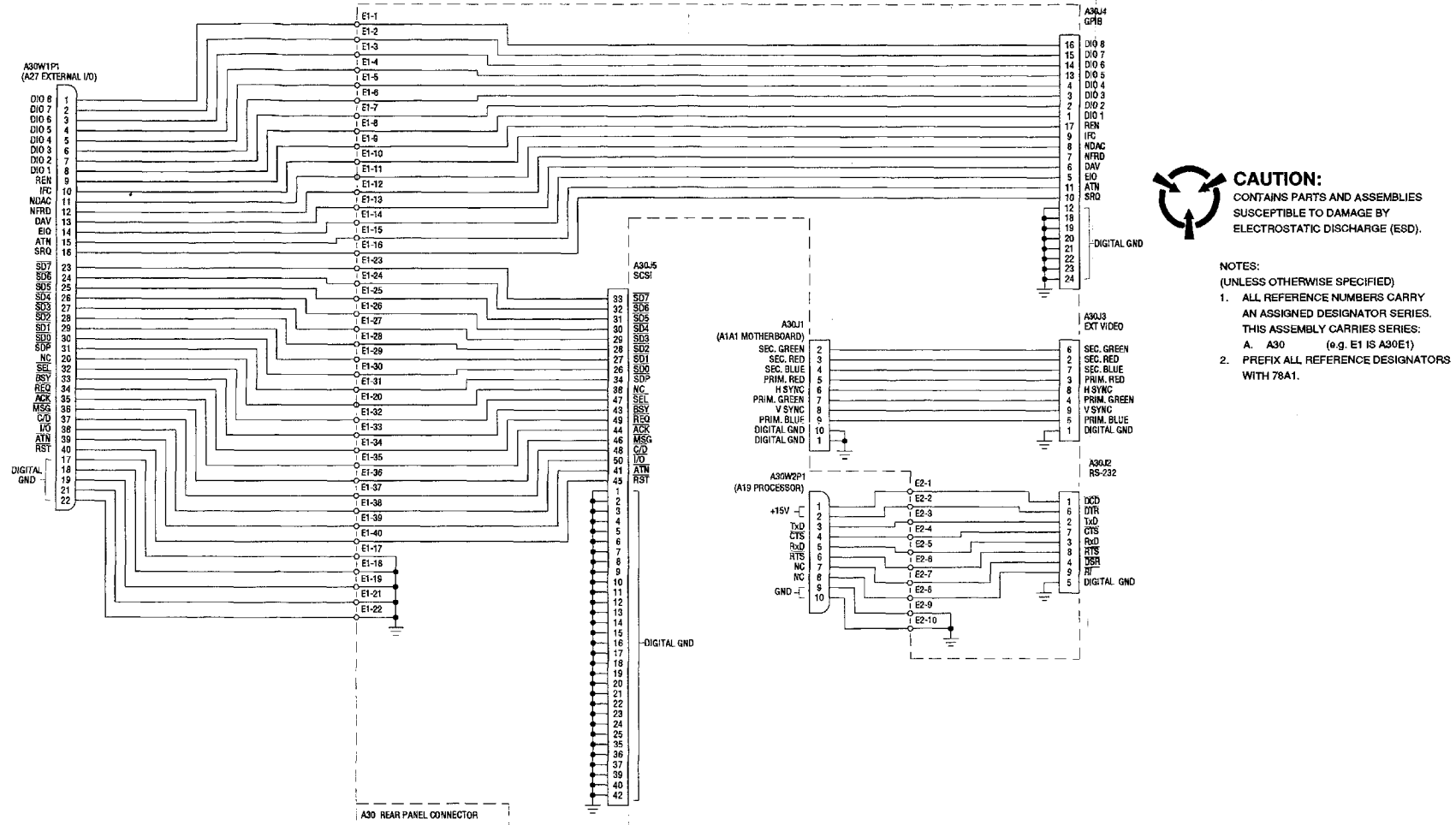


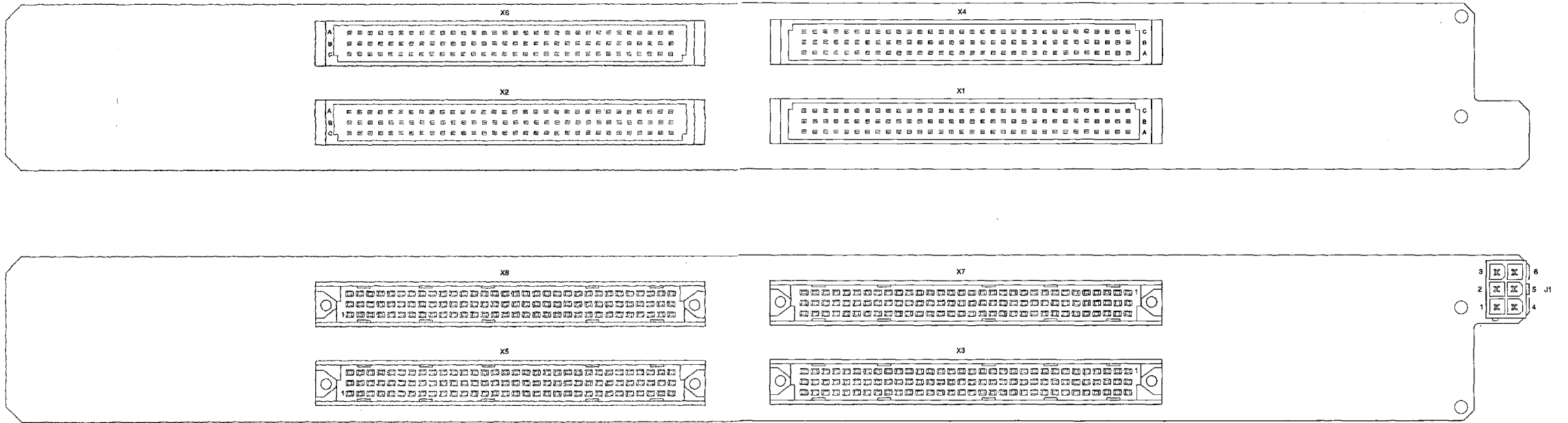
Figure FO-19. 78A1A30 Rear Panel Connector PC Board Assembly Wiring Diagram.

FP-59/(FP-60 blank)





 **CAUTION:**  
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ELECTROSTATIC DISCHARGE (ESD).

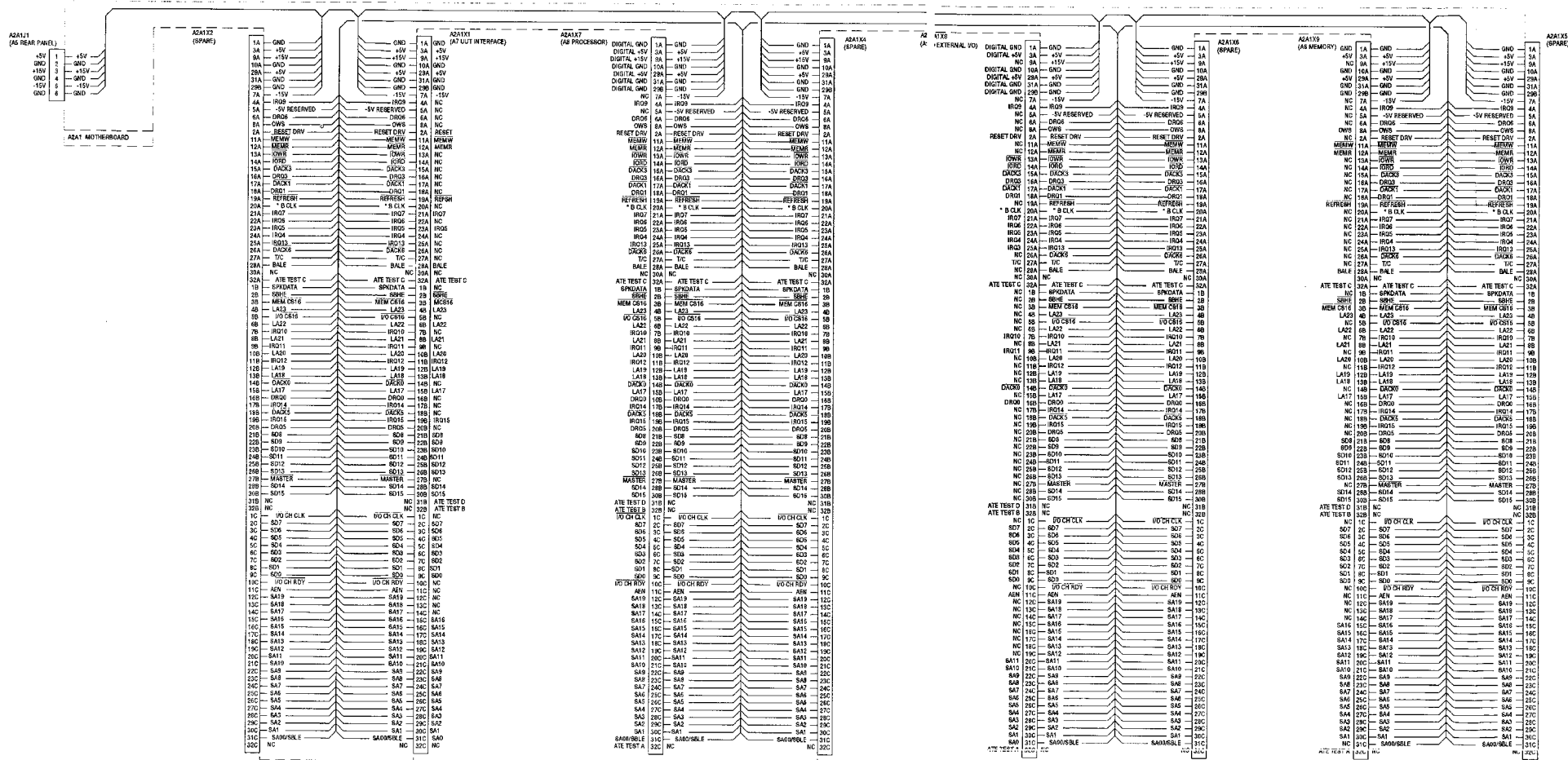


PREFIX ALL REFERENCE DESIGNATORS WITH 83A1A2A1

Figure FO-20. 83A1A2A1 Motherboard Assembly Component Locator and Wiring Diagram ( Sheet 1 of 2)/

FP-61/(FP-62 blank)





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

NOTES:  
(UNLESS OTHERWISE SPECIFIED)

- ALL REFERENCE NUMBERS CARRY AN ASSIGNED PREFIXATOR PREFIX. THIS ASSEMBLY CARRIES PREFIX A. AZA1 (e.g. J1 IS AZA1J1)
- PREFIX ALL REFERENCE DESIGNATORS WITH 85A1.

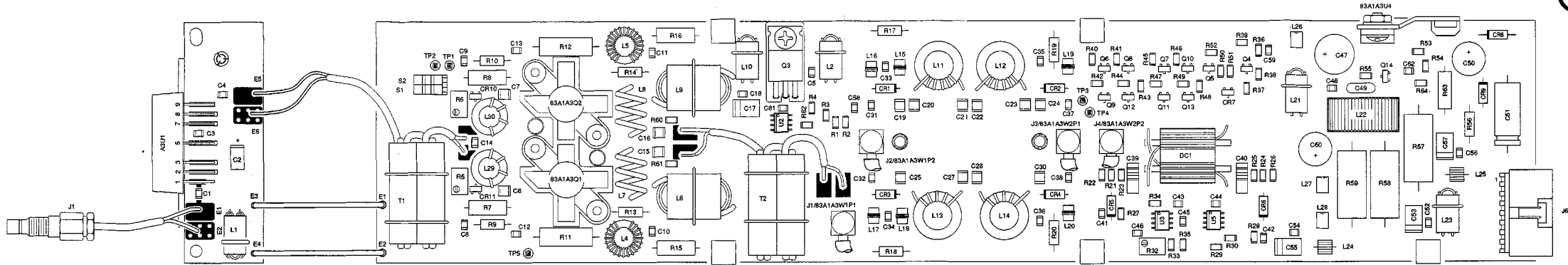
Figure FO-20. 83A1A2A1 Motherboard Assembly Component Locator and Wiring Diagram ( Sheet 2 of 2).

FP-63/(FP-64 blank)



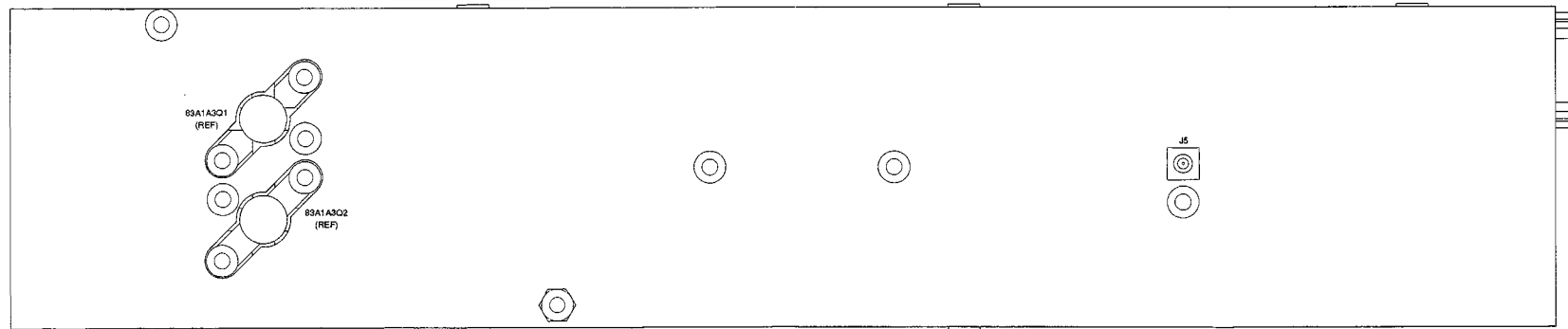


PREFIX ALL REFERENCE DESIGNATORS WITH 83A1.



TOP VIEW

A3A1 Preamp



BOTTOM VIEW

A3A2 Amplifier

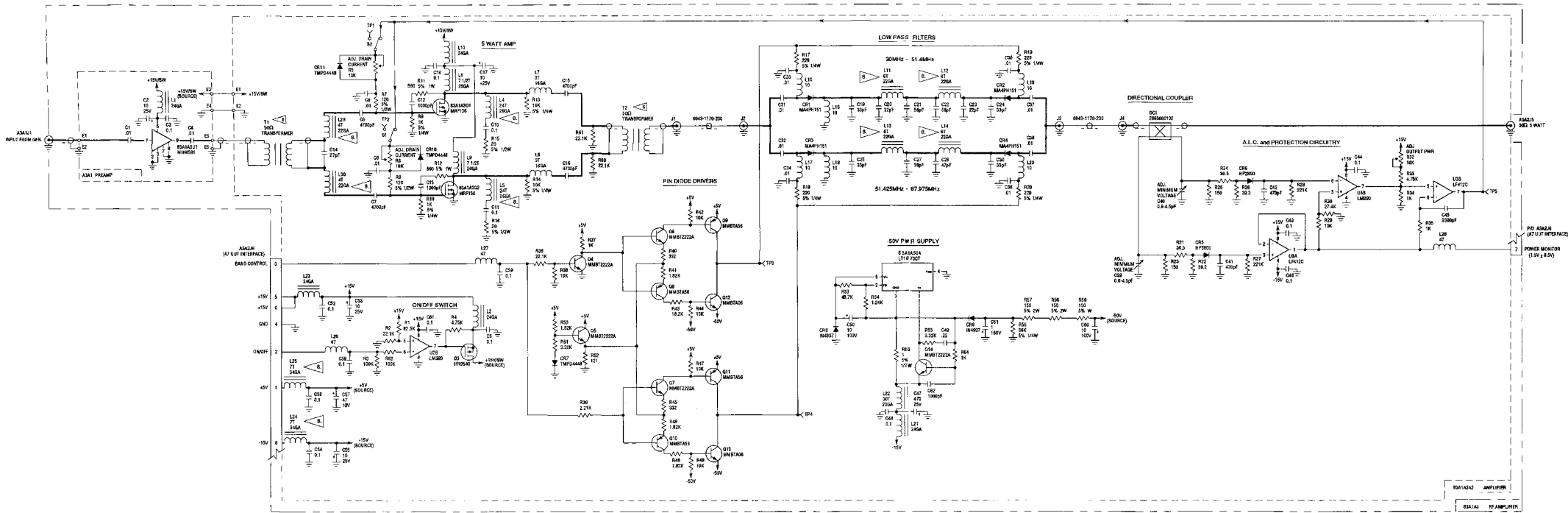
GE2FO109

CE2FO109

Figure FO-21. 83A1A3 RF Amplifier Assembly Component Locator and Schematic Diagram (Sheet 1 of 2).

FP-65/(FP-66 blank)





**CAUTION:**  
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SUSCEPTIBLE TO DAMAGE BY  
ELECTROSTATIC DISCHARGE (ESD).

NOTES:  
(UNLESS OTHERWISE SPECIFIED)  
1. ALL REFERENCE NUMBERS CARRY AN ASSIGNED DESIGNATOR SERIES, THIS ASSEMBLY CARRIES SERIES:  
A. ASA1 (e.g. R1 IS ASAR1)  
B. ASA2 (e.g. R1 IS ASAR1)  
C. AS (e.g. C1 IS AS1)  
2. ALL RESISTORS ARE 1%W, 1% TOLERANCE.  
3. ALL RESISTANCE IS EXPRESSED IN OHMS.  
4. ALL CAPACITANCE IS EXPRESSED IN MICROFARADS.  
5. ALL INDUCTANCE IS EXPRESSED IN MICROHENRYS.  
6. SOD UNBALANCED TO BALANCED TRANSFORMER ON 28010662 BEAD CONSTRUCTED FROM A SINGLE COAX, (R5, T5).  
7. PREFIX ALL REFERENCE DESIGNATORS WITH 83A1.  
L4, L5, L11, L12, L13, L14, L24, L25, L29 AND L30 ARE FASTENED TO PC BOARD WITH PERMABOND (PARTNOX 1, ITEM 10).

Figure FO-21. 83A1A3 RF Amplifier Assembly Component Locator and Schematic Diagram (Sheet 2 of 2).

FP-67/(FP-68 blank)

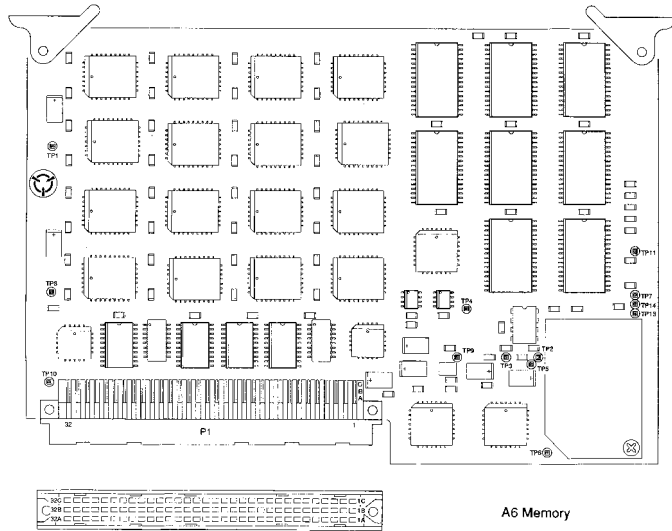








CAUTION:  
CONTAINS PARTS AND ASSEMBLIES  
SUSCEPTIBLE TO DAMAGE BY  
ELECTROSTATIC DISCHARGE (ESD).





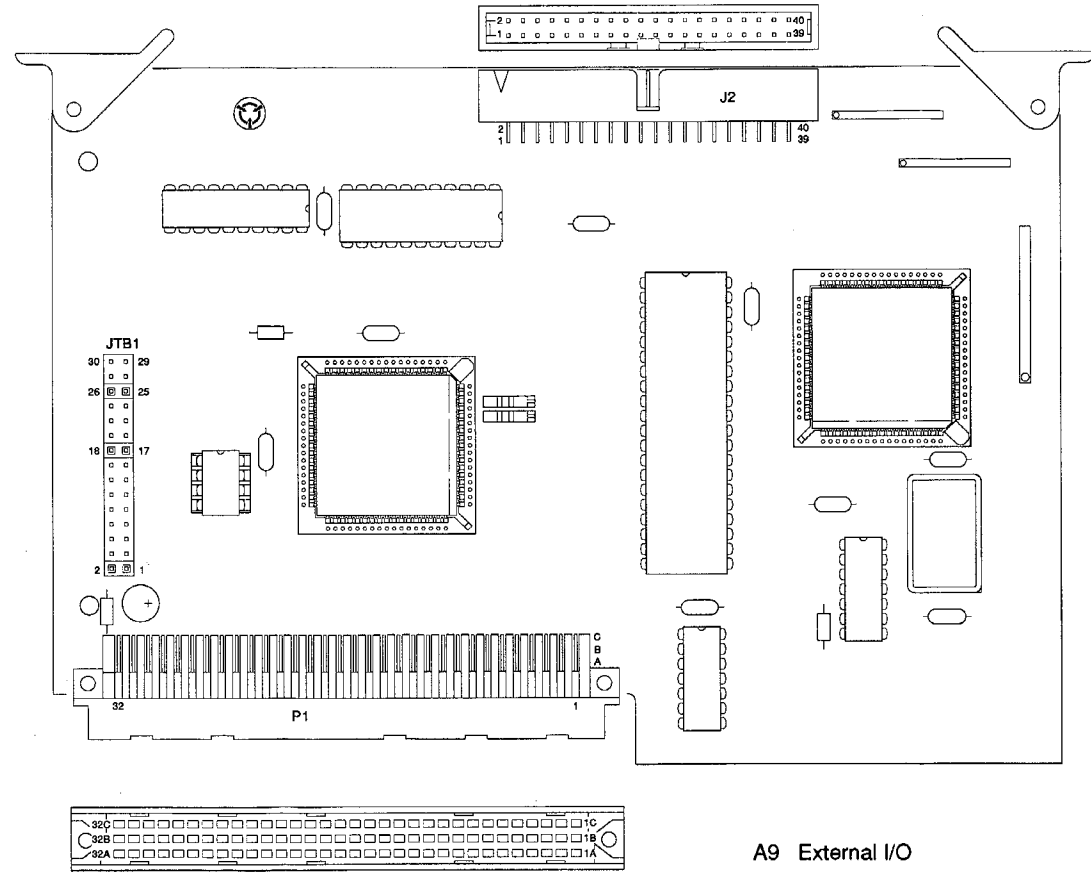
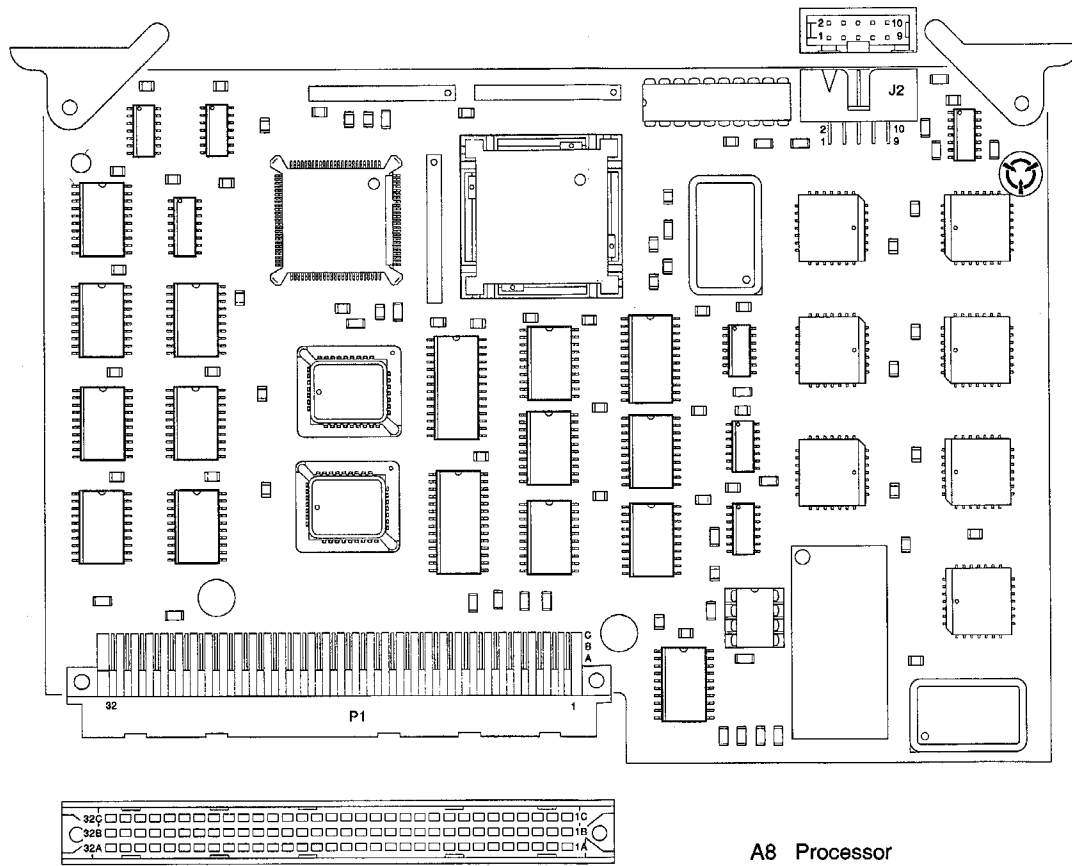


Figure FO-23. 83A1A6, 83A1A7, 83A1A8 and 83A1A9 PC Board Assemblies Component Locator Diagrams (Sheet 2 of 2).

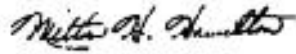
FP-73/(FP-74 blank)



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- 10. Publication Date: 04-JUL-85**
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PUBLICATION NUMBER			DATE	TITLE				
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

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**EXAMPLE**

TYPED NAME, GRADE OR TITLE MSG, Jane Q. Doe, SFC	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION 788-1234	SIGNATURE
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<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is ODISC4.						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM)	DATE
TO: (Forward to proponent of publication or form)(Include ZIP Code)						FROM: (Activity and location)(Include ZIP Code)	
<b>PART 1 - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER						DATE	TITLE
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO. *	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON	
<i>* Reference to line numbers within the paragraph or subparagraph.</i>							
TYPED NAME, GRADE OR TITLE						TELEPHONE EXCHANGE/ AUTOVON, PLUS EXTENSION	SIGNATURE

<b>TO:</b> (Forward direct to addressee listed in publication)	<b>FROM:</b> (Activity and location) (Include ZIP Code)	<b>DATE</b>
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**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

PUBLICATION NUMBER	DATE	TITLE
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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

**PART III - REMARKS** (Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)

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