TECHNICAL MANUAL

GENERAL SUPPORT MAINTENANCE MANUAL

FOR

SPECTRUM ANALYZER SYSTEM

AN/USM-620

NSN 6625-01-312-9513

(EIC: N/A)

HEADQUARTERS, DEPARTMENT OF THE ARMY

25 JULY 1994

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

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

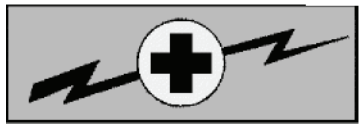
2 IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

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

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 the technician is aided by operators, they must be warned about dangerous areas.

A periodic review of safety precautions in TB 385-4, Safety Precautions for Maintenance of Electrical/Electronic Equipment, is recommended. When the equipment is operated with covers removed, DO NOT TOUCH exposed connections or components. MAKE CERTAIN you are not grounded when making connections or adjusting components inside the test instrument.

Be careful not to contact high-voltage connections or 115 volt AC input connections 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 the body.

WARNING

Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions.

For Artificial Respiration, 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
GENERAL HANDLING PROCEDURES FOR ESDS ITEMS

- USE WRIST GROUND STRAPS OR MANUAL GROUNDING PROCEDURES
- KEEP ESDS ITEMS IN PROTECTIVE COVER-ING 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 ESDS ITEMS ONLY IN PROTECTED AREAS

MANUAL GROUNDING PROCEDURES

- MAKE CERTAIN EOUIPMENT IS POWERED DOWN
- TOUCH GROUND BEFORE REMOVING ESDS ITEMS
- TOUCH PACKAGE OF REPLACEMENT ITEM TO GROUND BEFORE OPENING
- TOUCH GROUND BEFORE INSERTING PLACEMENT ESDS ITEMS

ESD PROTECTIVE PACKAGING AND LABELING

- PROTECTIVE COVERING OF ANTISTATIC MATERIAL WITH AN OUTER WRAP OF EITHER TYPE 1ALUMINIZED 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

Many components within AN/USM-620 are extremely susceptible to static-discharge damage. Service ANIUSM-620 only in a static-free environment and always wear a grounded wrist and foot strap. Always observe standard handling precautions for static-sensitive devices.

The following precautions should be observed when handling all electrostatic sensitive components and unit 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.

WARNING

Isopropyl Alcohol is flammable and toxic to eyes, skin, and respiratory tract. Wear protective gloves and goggles/face shield. Avoid repeated or prolonged contact. Use only in well-ventilated areas (or use approved respirator as determined by local safety/industrial hygiene personnel). Keep away from open flames, sparks or other sources of ignition.

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 MO 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 them from their packages until actually used or tested.

CHANGE)
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No. 1)

Headquarters
Department of the Army
Washington, D.C., 15 February 2006

GENERAL SUPPORT MAINTENANCE MANUAL
FOR
SPECTRUM ANALYZER SYSTEM
AN/USM-620
NSN 6625-01-312-9513
(EIC: N/A)

HAZARDOUS MATERIAL INFORMATION – This document has been reviewed for the presence of solvents containing hazardous materials as defined by the EPCRA 302 and 313 lists by the AMCOM G-4 (Logistics) Environmental Division. As of the base document, dated 25 July 1994, all references to solvents containing hazardous materials have been removed from this document by substitution with non-hazardous or less hazardous materials where possible.

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a through d	a through d
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Original	0	25 July 1994
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c	0	FP-37/(FP-38 blank)	0
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A/(B blank)	1	FP-41/(FP-42 blank)	0
i through iii	1	FP-43/(FP-44 blank)	0
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2-1 through 2-6	0	FP-49/(FP-50 blank)	0
2-7 and 2-8	1	FP-51/(FP-52 blank)	0
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Glossary 1 and 2	0	FP-67/(FP-68 blank)	0
Index-1 through Index-14	0	FP-69/(FP-70 blank)	0
FP-1/(FP-2 blank)	0	FP-71/(FP-72 blank)	0
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FP-7/(FP-8 blank)	0	FP-77/(FP-78 blank)	0
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FP-11/(FP-12 blank)	0	FP-81/(FP-82 blank)	0
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Technical Manual)
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No. 11-6625-3278-40)

Headquarters
Department of the Army
Washington, D.C., 25 July 1994

GENERAL SUPPORT MAINTENANCE MANUAL SPECTRUM ANALYZER SYSTEM AN/USM-620 (NSN 6625-01-312-9513) (EIC: N/A)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can 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. Instruction 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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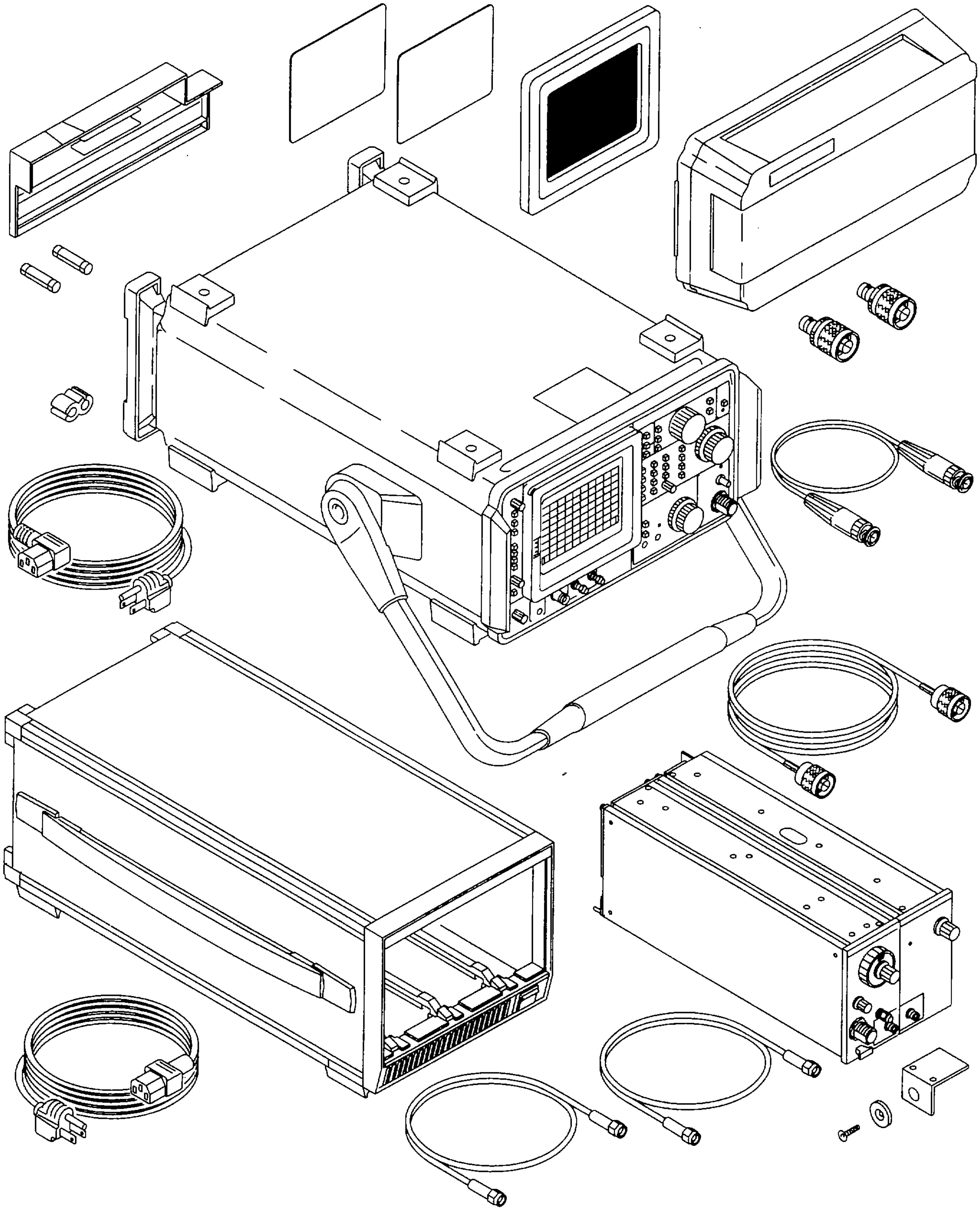

Figure 1-1. Spectrum Analyzer System AN/USM-620

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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.** Spectrum Analyzer System AN/USM-620.

c. **Purpose of the Equipment.** 495P Spectrum Analyzer measures the frequency and level of electrical signals. It is used to test and troubleshoot other electrical equipment. TR 503 Tracking Generator provides a swept RF source.

1-2. CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS.

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.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 750-8, Manual for the Army Maintenance Management System (TAMMS) Users Manual.

1-4. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your equipment 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 to: US AMCOM, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000. We'll send you a reply.

1-5. ADMINISTRATIVE STORAGE.

Administrative storage of equipment issued to and used by Army activities will have Preventive Maintenance Checks and Services (PMCS) performed before storing. When removing the equipment from administrative storage, the PMCS checks should be performed to assure operational readiness.

1-6. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Destruction of Army materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1-7. PREPARATION FOR STORAGE OR SHIPMENT.

Preparation instructions for storage and shipment are found in Chapter 2, Section V.

1-8. NOMENCLATURE CROSS-REFERENCE LIST.

Common names will be used when Spectrum Analyzer System AN/USM-620 is mentioned in this manual.

NOTE

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

Spectrum Analyzer System	Spectrum Analyzer System AN/USM-620
AN/USM-620	Spectrum Analyzer System AN/USM-620

1-9. WARRANTY INFORMATION.

Spectrum Analyzer System AN/USM-620 is warranted by Tektronix, Inc. for one (1) year. The warranty starts on the date found on DA Form 2410 or DA Form 2408-16 in the logbook. Report all defects in material or workmanship to your supervisor who will take appropriate action.

Section II. EQUIPMENT DESCRIPTION

1-10. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

For information on equipment characteristics, capabilities, and features of the equipment covered in this manual, refer to TM 11-6625-3278-12.

1-11. EQUIPMENT DATA.

For equipment data on the equipment covered in this manual, refer to TM 11-6625-3278-12.

Section III. PRINCIPLES OF OPERATION

1-12. FUNCTIONAL DESCRIPTION.

Spectrum Analyzer System AN/USM-620 measures electrical signals in the 100 Hz to 1.8 GHz frequency range. Signal levels between +30 dBm and -131 dBm are displayed. A tracking generator provides a constant-level, swept RF source to make swept measurements.

495P Spectrum Analyzer operates as a swept, narrow-band receiver. The CRT beam sweeps from left to right to scan the selected frequency range. When an input signal is found, the beam moves vertically to show the strength of the signal.

Operation is simplified by the marked control panel and built-in HELP mode. The three large knobs are used to select major user settings. Settings may also be entered using the **DATA ENTRY** keypad. HELP mode provides readout displays that describe the function of each control.

The following discussion explains AN/USM-620 sections in Figure 1-2.

(1) The RF Section converts all input signals (100 Hz to 1.8 GHz) to a fixed intermediate frequency (IF) of 10 MHz. This IF signal is sent to the IF Section for further processing. Control signals are supplied by the Counter and Phase Lock and the Frequency Control Sections.

The First Converter converts input signals (100 Hz to 1.8 GHz) to a 2.072 GHz IF. This circuit contains a Step Attenuator that provides RF input signal level control from 0 to 60 dB.

The Second and Third Converters convert the 2.072 GHz first IF to a 10 MHz third IF for further processing.

- The 2.072 GHz first IF is converted to a 110 MHz second IF.
- The 110 MHz second IF is converted to a 10 MHz third IF.

The 100 MHz third Local Oscillator (LO) provides the CAL OUT signal to the front panel. It also provides a frequency reference for other circuits.

The Reference circuit locks the local oscillators to a precision reference. Either the internal 10 MHz reference or an external signal may be used.

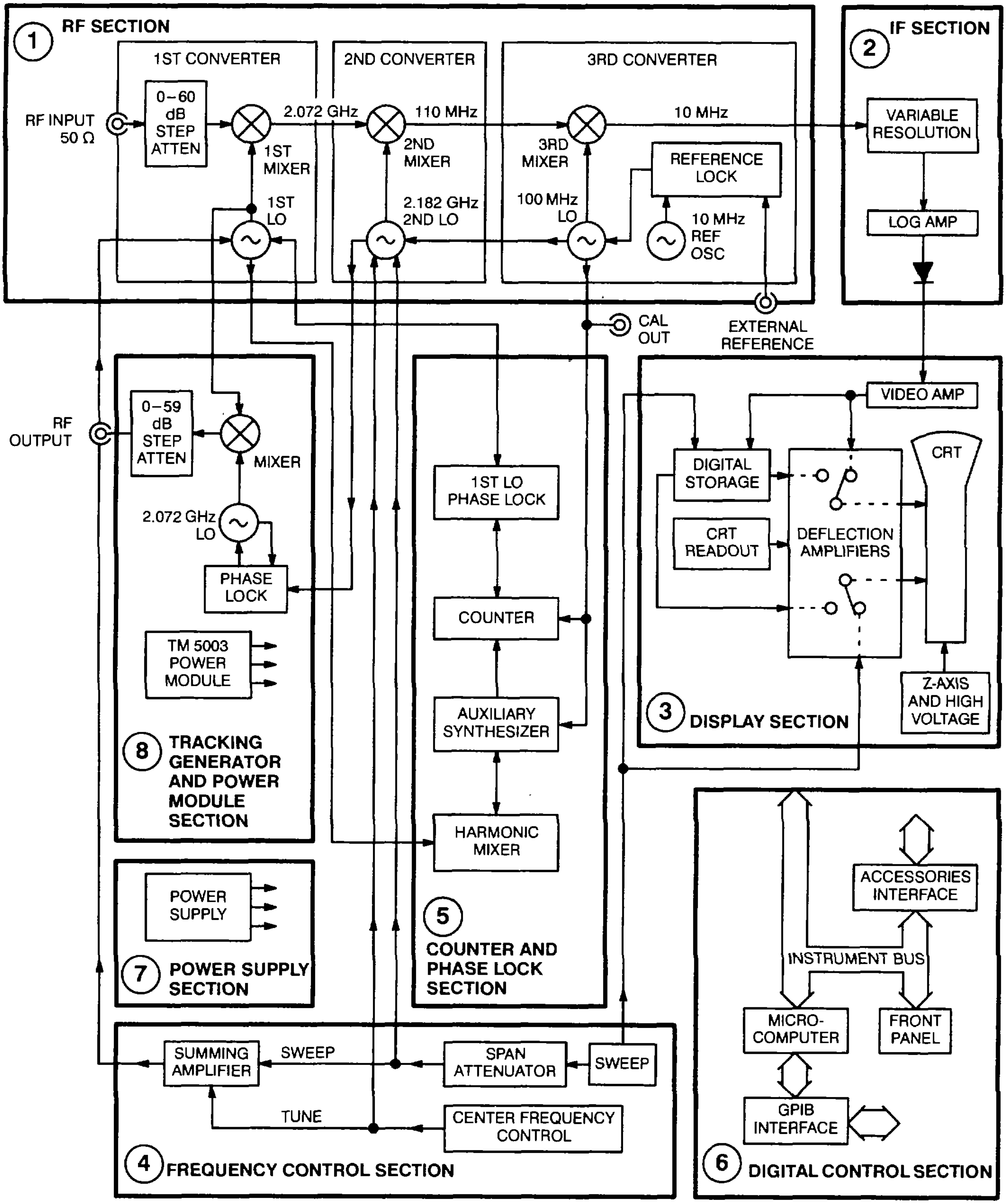

Figure 1-2. Spectrum Analyzer System AN/USM-620 Simplified Block Diagram

(2) The IF Section processes the 10 MHz IF signal from the RF Section. This section performs these functions:

- Filtering to a bandwidth chosen by the resolution bandwidth control.
- Signal gain to maintain reference level accuracy.
- Logarithmic amplification.
- Signal detection.

The resulting video signal drives the Display Section.

(3) The Display Section draws the signal on the CRT screen. This section contains these circuits:

- The Video Amp sets the vertical scale factor. Logarithmic or linear scales may be chosen.
- The Deflection Amplifiers drive the CRT. Vertical deflection of the beam (Y axis) occurs as the video signal level increases. Horizontal deflection (X axis) is controlled by a ramp signal from the Frequency Control Section.
- The Z-Axis and High Voltage circuit controls CRT screen brightness and focus.
- The CRT Readout produces on-screen characters that display control settings and measurement data. Readout data is received from the Digital Control Section.
- The Digital Storage converts the video signal from the IF Section to a digital signal. Then the signal can be stored in memory or sent to a computer. A digitized signal reduces flicker that occurs on the screen at slow sweep rates.

(4) The Frequency Control Section controls the frequency range scanned by 495P Spectrum Analyzer. This section selects the frequency of the first and second LOs to control the center frequency of the CRT display. This section also sets the frequency range over which the LOs are swept. The Frequency Control Section contains these circuits:

- The Sweep Generator produces two ramp signals. One output drives the CRT for horizontal deflection. The other ramp output sweeps the first and second LOs.
- The Span Attenuator scales the sweep ramp size. Once scaled, the ramp will cause the first and second LOs to scan a specific frequency range (span).
- The Center Frequency Control produces a tune voltage that sets the center frequency of the display. This voltage is summed with the scaled sweep ramp to control the LO frequencies.

(5) The Counter and Phase Lock Section has these functions:

- The Counter counts the first LO, second LO, and third IF frequencies for precise frequency displays. The Harmonic Mixer and Auxiliary Synthesizer convert the first LO frequency so it may be counted. The 100 MHz third LO is the Counter reference.
- The Phase Lock stabilizes the first LO at span per division settings below 210 kHz. This reduces display jitter and improves display resolution.

(6) The Digital Control Section selects operating modes and parameters. This section has these functions:

- The Microcomputer performs instrument control tasks. This circuit communicates with most circuits over the instrument bus.

- The Front Panel receives user inputs for changing control settings. This circuit informs the Microcomputer when new control settings are chosen.

- The GPIB Interface connects the Microcomputer to the GPIB (General Purpose Interface Bus). It is possible to plot the display of 495P Spectrum Analyzer and control most front panel settings using the GPIB.

- The Accessories Interface sends most Microcomputer signals to the rear panel. This circuit also provides input paths for signals used to adjust 495P Spectrum Analyzer.

(7) The Power Supply Section provides DC power and forced aircooling. This section supplies regulated DC power over a wide range of input line frequencies and voltages.

(8) The Tracking Generator and Powe r Module Section produces an RF signal that tracks the sweep of 495P Spectrum Analyzer. This section needs the first LO and second LO signals from 495P Spectrum Analyzer to maintain tracking. This section has the following circuits:

- The Mixer converts the first LO signal. A 2.072 GHz signal mixes with the first LO signal to produce output signals from 100 kHz to 1.8 GHz. A leveling loop maintains constant output signal level.
- The Step Attenuator provides calibrated output level control.

- The 2.072 GHz LO mixes with the first LO signal. Both signals are applied to the Mixer.

- The Phase Lock controls the 2.072GHz LO frequency. Tracking occurs only when the second LO input signal is connected.

- TM 5003 Power Module provides DC power and forced air cooling for TR 503 Tracking Generator.

1-13. DETAILED FUNCTIONAL DESCRIPTION.

The following is a detailed description of circuits used in AN/USM-620. Refer to paragraphs 1-14 through 1-22 for descriptions of each section.

1-14. RF SECTION DESCRIPTION.

The RF Section contains three mixers that convert input signals to intermediate frequency (IF) signals. The first mixer produces a 2.072 GHz IF. The second mixer produces a 110 MHz IF. The third mixer produces a 10 MHz IF. This section describes each module within the RF Section. Refer to fig FO-1, fig FO-2, fig FO-3, and fig FO-7 for component locators and schematic diagrams.

a. A1AT10 Step Attenuator. Limits input power to A1A12 Mixer. Attenuation range is 0-60 dB in 10 dB steps.

b. A1FL10 Lowpass Filter. Prevents signals above 1.8 GHz from reaching A1A12 Mixer.

c. A1FL16 Directional Filter. Passes input signals to A1A12 Mixer and sends the 2.072 GHz IF from A1A12 Mixer to A1A18 Second Converter.

d. A1A12 Mixer. Converts signals between 100 Hz and 1.8 GHz to a 2.072 GHz IF. A signal from AlA1A16 1st LO Assembly mixes with input signals to produce 2.072 GHz. Typical conversion loss is 11 dB. A1AT124 Attenuator and A1AT126 Variable Load Assembly balance AlA12 Mixer to reduce amplitude of the 0 Hz response. A1AT12 Attenuator matches impedance and protects AlA12 Mixer from damage.

e. A1FL11 Lowpass Filter. Removes unwanted mixer products from signal path.

f. A1A16 1st LO Assembly. Produces frequencies within 2-3.8 GHz range. Ramp signals from three circuits provide tuning current for control of SPAN/DIV setting. See the following table. A1A16A1 1st LO Interface (Circuit Card Assembly) CCA controls signal path switching.

CIRCUIT PRODUCING RAMP	FREQUENCY SPAN/DIV SETTING
A1A44 1st LO Driver CCA	>5 MHz
A1A48 Span Attenuator CCA	210 kHz to 5 MHz
A1A50A4 Error Amplifier CCA	**£** 200 kHz

A1A16 1st LO Assembly has two outputs. One output sends signals through A1A15 Bias Return to A1A12 Mixer. The second output connects to A1A24 Phase Gate Assembly. This signal drives the microwave counter, 1st LO phase lock, and TR 503 Tracking Generator.

g. A1A15 Bias Return. Terminates one port of A1A12 Mixer into 50 Q. The device also connects 2-3.8 GHz from A1A16 1st LO Assembly to A1A12 Mixer.

h. A1A18 2nd Converter Assembly. Converts the 2.072 GHz IF signal to 110 MHz. The assembly mixes 2.072 GHz with 2.182 GHz from A1A22 Phase Locked 2nd LO. Typical conversion loss is 8 dB. The 110 MHz mixer product drives A1A32 IF Amplifier.

i. A1A22 Phase Locked 2nd LO. Produces a stable, 2.182 GHz signal used to convert the 2.072 GHz IF to 110 MHz. The 2.182 GHz source is swept when A1A16 1st LO Assembly is phase locked (SPAN/DIV < 200 kHz). The module contains four circuit card assemblies.

- A1A22A1 16-20 MHz Phase Lock CCA produces a swept, 16-20 MHz signal that controls the 2.182 GHz oscillator frequency. A ramp signal and DC tune voltage control the 16-20 MHz frequency. A control line from A1A48 Span Attenuator CCA reduces sweep sensitivity when SPAN/DIV is <20 kHz. A phase/frequency detector compares the 16-20 MHz signal with an input from A1A22A2A3 Mixer CCA. The resulting error signal controls the frequency of A1A22A2A1 Oscillator CCA. The 16-20 MHz signal also connects to A1A51 Counter CCA for frequency control and counting functions.

- A1A22A2A1 Oscillator CCA produces a tunable, 2.182 GHz signal. Signal frequency is controlled by A1A22A1 16-20 MHz Phase Lock CCA. The oscillator signal drives A1A18 2nd Converter Assembly, A1A22A2A3 Mixer CCA, and TR 503 Tracking Generator. A1A18 2nd Converter Assembly mixes 2.182 GHz with the 2.072 GHz IF to produce 110 MHz. A1A22A2A3 Mixer CCA mixes the A1A22A2A1 Oscillator CCA output with 2200 MHz signal. The result is a 16-20 MHz product that is used by the phase lock loop. TR 503 Tracking Generator receives 2.182 GHz from A1 A22A2A1 Oscillator CCA through a coaxial cable connected between the 2ND LO OUTPUT and 2nd LO IN connectors.

- AlA22A2A2 Reference CCA produces a stable, 2200 MHz reference signal. This circuit multiplies 100 MHz from A1A34 3rd Converter Assembly times 22. The resulting 2200 MHz signal drives A1A22A2A3 Mixer CCA.

- A1A22A2A3 Mixer CCA produces a 16-20 MHz signal for use within the phase lock loop. This circuit mixes 2200 MHz with 2.182 GHz. The resulting 16-20 MHz mixer products drive a phase/frequency detector on A1A22A1 16-20 MHz Phase Lock CCA. The phase/frequency detector compares outputs from A1A22A2A3 Mixer CCA and A1A22A1 16-20 MHz Phase Lock CCA to produce an error signal that controls the 2.182 GHz oscillator frequency.

j. A1A32 IF Amplifier. Increases the 110 MHz IF level. Typical gain is 20 dB. A1Al8 2nd Converter Assembly provides the input signal. The output drives A1FL36 Bandpass Filter.

k. A1FL36 Bandpass Filter. Determines the 3 MHz resolution bandwidth filter shape. This filter limits the level of noise on the CRT.

l. A1FL37 Lowpass Filter. Removes unwanted signals that may pass through AlFL36 Bandpass Filter.

m. A1A34 3rd Converter Assembly. Converts the 110 MHz IF to a 10 MHz IF. The assembly also produces a stable, 100 MHz reference signal. Five circuits use the 100 MHz reference. Refer to the following table. The 100 MHz oscillator is phase locked to either AlA37 10 MHz Reference, or to a signal connected to the EXT REF input.

A1A34 3RD CONVERTER ASSEMBLY OUTPUT CONNECTOR	CIRCUIT DESTINATION
A1A34J1011	CAL OUT connector
A1A34J1012	A1A36 Reference Lock
A1A34J1032	A1A50 Phase Lock Assembly
A1A34J3011	A1A26 Auxiliary Synthesizer CCA
A1A34J3019	A1A22 Phase Locked 2nd LO

n. A1A36 Reference Lock. Contains a phase lock loop that locks the 100 MHz oscillator within A1A34 3rd Converter Assembly. Reference signals from A1A37 10 MHz Reference or the EXT REF input are used. A1A36 Reference Lock informs the microcomputer of lock status and reference source through an interface on A1A72 Sweep CCA.

o. A1A37 10 MHz Reference. Produces a stable, 10 MHz signal. The signal is used to phase lock the 100 MHz oscillator within A1A34 3rd Converter Assembly. The 10 MHz output drives a phase lock loop within A1A36 Reference Lock.

1-15. IF SECTION DESCRIPTION.

The IF Section selects the resolution bandwidth and provides signal gain. This circuit contains switchable bandpass filters and 10 dB gain stages, a logarithmic amplifier, a detector, and a vertical display scaling amplifier. This section describes each module within the IF Section. Refer to fig FO-1, fig FO-13, and fig FO-1 5 through fig FO-1 8 for schematic diagrams and component locators.

a. A1A68 Variable Resolution Module. Selects resolution bandwidth filters and provides signal gain. Bandpass filtering for 1 kHz-3 MHz filters occurs within module. Signals are sent to A1A69 10/100 Hz Filter for processing when 10 Hz and 100 Hz filters are selected. The module provides about 41 dB of gain (MIN DISTORTION mode and -30 dBm REFERENCE LEVEL). The nominal input signal level is -35 dBm. Nominal output level is +6 dBm. The module also provides 40 dB of selectable gain in three +10 dB stages and one -10 dB stage. These gain stages are selected to adjust gain for REFERENCE LEVEL, MIN NOISE, and MIN DISTORTION modes. The module contains nine circuit card assemblies.

- A1A68A1 Mother #1 CCA provides main interface for power and control signals within module.
- A1A68A2 Mother #2 CCA decodes microcomputer interface data to produce control signals. Three outputs (D0-D2) control filter selection on AlA68A4 1st Filter Select CCA and AlA68A8 2nd Filter Select CCA. Three TTL level output signals control gain switching on A1A68A3 Input CCA, A1A68A5 10 dB Gain CCA, and A1A68A6 20 dB Gain CCA. DC voltages at pins BB and DD control the gain of A1A68A7 Band Leveling CCA.

- A1A68A3 Input CCA provides 16 dB or 26 dB gain for the 10 MHz IF signal. A TTL level signal at pin Y' controls the switchable 10 dB gain stage.

- A1A68A4 1st Filter Select CCA routes signals through the selected bandpass filter. The circuit contains five filters (3 MHz, 1 MHz, 100 kHz, 10 kHz, 1 kHz). They combine with filters on A1A68A8 2nd Filter Select CCA to achieve filter bandwidth and shape. The signal is sent to A1A69 10/100 Hz Filter for 10 Hz and 100 Hz bandwidths. Control signals DO-D2 select filter switching. Typical loss through each filter is 6 dB. An adjustment matches the amplitude of the 1 MHz filter to the 100 kHz filter amplitude.

- A1A68A5 10 dB Gain CCA provides variable signal gain. Nominal gain is 23 dB (MIN DISTORTION mode and -30 dBm REFERENCE LEVEL). A TTL level signal at pin N controls the switchable 10 dB gain stage. For 10 Hz filter mode, a control signal at pin L switches low to increase signal gain. An adjustment matches 10 Hz filter gain to that of the 100 kHz filter. A DC voltage at pin T sets gain due to setting of the AMPL CAL control.

- A1A68A6 20 dB Gain CCA provides -8 dB or +12 dB of gain for the 10 MHz signal. A TTL level signal at pin V controls the switchable 20 dB gain stage.

- A1A68A7 Band Leveling CCA provides variable signal gain. Nominal gain is 8 dB (MIN DISTORTION mode and -30 dBm REFERENCE LEVEL). Gain is controlled by DC voltages at

- A1 A68A7J2024 and A1 A68A7J2036.

- A1A68A8 2nd Filter Select CCA routes signals through the selected bandpass filter. The circuit contains four filters (100 kHz, 10 kHz, 1 kHz, and 10/100 Hz). They combine with filters on A1A68A4 1st Filter Select CCA to achieve filter bandwidth and shape. Signals for 3 MHz and 1 MHz filters pass through an attenuator. Control signals DO-D2 select signal path switching. Typical loss through each filter is 11 dB. Gain adjustments match the amplitude of 3MHz, 1 MHz, 10 kHz, 1 kHz, and 10/100 Hz filters to the 100 kHz filter amplitude.

- A1A68A9 Amplifier CCA provides adjustable signal gain. Nominal gain is 20 dB (MIN DISTORTION mode and -30 dBm REFERENCE LEVEL).

b. AlA69 10/100 Hz Filter. Limits bandwidth to either 10 Hz or 100 Hz. The 10 MHz input signal is converted to 250 kHz, filtered, and then converted to 10 MHz. Bandwidth is controlled by a DC voltage from A1A68A4 1st Filter Select CCA. This voltage connects to A1A69 10/100 Hz Filter through coaxial cable A1W694. The module contains f6ur circuit card assemblies.

- A1A69A1 1st Mixer CCA converts 10 MHz to 250 kHz. The 10 MHz signal is applied to A1A69J697. A 9.75 MHz oscillator signal is also applied to the mixer. The 250 kHz mixer product connects to A1A69A2 Filter CCA.

- A1A69A2 Filter CCA reduces bandwidth to either 10 Hz or 100 Hz. Six capacitors are adjusted for filter shape and bandwidth. A DC voltage from A1A68A4 1st Filter Select CCA selects the bandwidth. The DC voltage is high (+12 V) to select 10 Hz mode'. The output signal connects to A1A69A3 2nd Mixer CCA.

- A1A69A3 2nd Mixer CCA converts the 250 kHz IF to 10 MHz. A 9.75 MHz oscillator signal from A1A69A4 Oscillator CCA also connects to the mixer. The 10 MHz mixer product returns to A1 A68 Variable Resolution Module through coaxial cable A1 W696.

- A1A69A4 Oscillator CCA produces a 9.75 MHz local oscillator signal. The oscillator drives A1A69A1 1st Mixer CCA and A1A69A3 2nd Mixer CCA.

c. A1A62 Log Amplifier CCA. Logarithmically amplifies and detects the 10 MHz IF. A summing amplifier adds offsets for resolution bandwidth filter gain corrections, flatness corrections, and REFERENCE LEVEL settings. The signal is then scaled for the selected VERTICAL DISPLAY mode (logarithmic or linear). An output amplifier controls PULSE STRETCHER and IDENT modes.

- The logarithmic amplifier provides signal gain in proportion to input amplitude. A1A68 Variable Resolution Module provides a 10 MHz, +6 dBm nominal input signal (MIN DISTORTION mode and -30 dBm REFERENCE LEVEL). The amplifier output drives the detector circuit and AlA51 Counter CCA. A -5 dBm signal connects to 10 MHZ IF connector on rear panel.

- A summing amplifier combines the detected video signal, the flatness correction signal, and microcomputer interface signals. The flatness correction signal improves frequency response for input signals to 1.8 GHz. Microcomputer interface signals control gain for resolution bandwidth filter gain corrections and REFERENCE LEVEL settings.

- Microcomputer interface signals select, between logarithmic and linear VERTICAL DISPLAY scales.

- The output amplifier selects PULSE STRETCHER and IDENT modes. PULSE STRETCHER mode increases the fall-time of pulse signals. IDENT mode moves the vertical position of the trace by one division on alternate sweeps. The video output signal connects to **LOG CAL** control on A1A38 Front Panel CCA.

1-16. DISPLAY SECTION DESCRIPTION.

The Display Section draws signals on the CRT. This section describes each module within the Display Section. Refer to fig FO-1, fig FO-9, fig FO-12, fig FO-13, fig FO-14, and fig FO-19 for schematic diagrams and component locators.

a. A1A40 Video Processor CCA. Selects source for video signal to be displayed on CRT. Filters noise from video signal when WIDE or NARROW VIDEO FILTER modes are turned on. Produces flatness correction signal to improve frequency response for input signals to 1.8 GHz.

- The input signal is either the internal video (from A1A38 Front Panel CCA) or an external video signal (from A1A30A76 Accessories Interface CCA). A TTL level control line selects between input signals. Output signals are routed to A1A61 Vert Digital Storage CCA, A1A64 Deflection Amplifiers CCA, and A1A72 Sweep CCA.

- Lowpass filters switch into signal path when WIDE VIDEO FILTER and NARROW VIDEO FILTER modes are turned on. The range is 0.3 Hz to 300 kHz.

- Flatness correction circuit produces a signal that improves frequency response for input signals to 1.8 GHz. A ramp signal that also drives A1A16 1st LO Assembly is shaped to offset amplitude differences. The resulting signal is summed with the video signal on A1A62 Log Amplifier CCA.

b. A1A60 Horiz Digital Storage CCA. Produces a digitized sweep ramp and timing signals required to digitize the video signal. This circuit produces markers for display on the CRT and receives control signals from the microcomputer interface to select VIEW A, VIEW B, SAVE A, and B-SAVE A modes.

- A ramp signal from A1A72 Sweep CCA drives A1A60 Horiz Digital Storage CCA. The ramp is digitized and then routed to AlA64 Deflection Amplifiers CCA. The CRT has 1000-bit horizontal resolution.

- Markers appear as bright dots on the trace. When a marker is on, the sweep is delayed at the marker location to draw a marker dot on the CRT. A1A60 Horiz Digital Storage CCA produces a signal to control CRT blanking for marker displays.

- Several TTL level signals provide timing to A1A61 Vert Digital Storage CCA for digitizing the video signal. A1A61 Vert Digital Storage CCA then routes serial video signal data to RAM located on A1A60 Horiz Digital Storage CCA.

c. A1A61 Vert Digital Storage CCA. Digitizes the video signal. This circuit also controls PEAK/AVERAGE knob cursor position, MAX HOLD mode, B-SAVE A offset, and CRT blanking.

- A video signal from A1A40 Video Processor CCA drives A1A61 Vert Digital Storage CCA. After the signal is digitized it is stored in RAM located on A1A60 Horiz Digital Storage CCA. TTL level signals provide timing. Digitized video signals to be displayed drive A1A64 Deflection Amplifiers CCA. The CRT has 256-bit vertical resolution.

- A DC voltage from A1A38 Front Panel CCA controls CRT position of the PEAK/AVERAGE cursor.

- Main processor interface signals select MAX HOLD mode. B-SAVE A offset is set using 8-bit switch A1A61 S1015.

- A TTL level signal drives A1A70 Z-Axis CCA to control CRT blanking when digital storage modes are on.

d. A1A64 Deflection Amplifiers CCA. Drives horizontal and vertical deflection plates of the CRT. A TTL level output drives A1A70 Z-Axis CCA for BASELINE CLIP mode.

- Sweep signals from A1A72 Sweep CCA or A1A60 Horiz Digital Storage CCA drive the horizontal section. A TTL level control signal selects between analog or digital signals. A1A66 CRT Readout CCA provides readout signals. Drive signals to the CRT are about 220 Vp-p. A sample of the horizontal signal drives HORIZ OUTPUT connector. A DC voltage from A1A38 Front Panel CCA adjusts beam position on the CRT.

- Video signals from AlA40 Video Processor CCA or A1A61 Vert Digital Storage CCA drive the vertical section. A TTL level control signal selects between analog or digital signals. A1A66 CRT Readout CCA provides readout signals. Drive signals to the CRT are about 240 Vp-p. A sample of the vertical signal drives VERT OUTPUT connector. A DC voltage from A1A38 Front Panel CCA adjusts beam position on the CRT.

e. A1A66 CRT Readout CCA. Produces signals for readout display. The main processor interface loads readout data into RAM for display on the CRT. A clock signal from A1A58 Processor CCA controls timing. Output signals drive A1A64 Deflection Amplifiers CCA for display of characters, and A1A70 Z-Axis CCA for CRT blanking. A DC voltage from A1A72 Sweep CCA positions the MAX SPAN mode dot marker on the CRT.

f. A1A70 Z-Axis CCA. Controls the CRT display, switches AlAT10 Step Attenuator, and senses power supply voltages.

- Six input signals control CRT blanking. These signals are routed from A1A61 Vert Digital Storage CCA, AlA64 Deflection Amplifiers CCA, A1A66 CRT Readout CCA, and A1A72 Sweep CCA. A DC voltage from A1A38 Front Panel CCA controls CRT brightness. A signal from A1A70 Z-Axis CCA drives A1 A74 High Voltage CCA to control the CRT grid.

- A1AT10 Step Attenuator has six signal lines that switch 10 dB, 20 dB, and 30 dB attenuators. Two lines for each attenuator supply a high-current pulse and ground return path to switch settings.

- A power status indicator senses the +5, +9, +15, +17, +100, -5, -7, and -15 V supplies. An LED indicator turns green when supplies are within limits. The indicator turns red when a supply fails. A1A70 Z-Axis CCA routes a TTL level control signal to A1A58 Processor CCA to indicate power supply status.

g. A1A74 High Voltage CCA. Supplies cathode, control grid, and focus voltages to the CRT.

- Cathode supply is -3860 V. Measure voltage at A1A74J742 pin 4.

- Control grid supply is approximately -3900 V. A blanking signal from A1A70 Z-Axis CCA modulates the cathode potential to set grid voltage. Measure voltage at A1A74J742 pin 3. Measured value depends on **INTENSITY** knob setting and CRT display modes.

- Focus supply range is -2550 to -3550 V. Measure voltage at A1A74J742 pin 1.

1-17. FREQUENCY CONTROL SECTION DESCRIPTION.

The Frequency Control Section produces drive signals to sweep and tune A1A16 1st LO Assembly and A1A22 Phase Locked 2nd LO. This section describes each module within the Frequency Control Section. Refer to fig FO-1, fig FO-9, and fig FO-19 for schematic diagrams and component locators.

a. A1A72 Sweep CCA. Produces ramp signals to sweep oscillators and drive the horizontal deflection amplifier. Produces a TTL level signal to report sweep status to other circuits. Receives external signals for TRIGGERING, MANUAL SCAN, and EXTERNAL SWEEP modes. Senses status signals from A1A36 Reference Lock and routes lock status data to microcomputer interface. Produces a voltage for the MAX SPAN dot marker position.

- Two ramp signals are produced. One output drives AlA60 Horiz Digital Storage CCA and A1A64 Deflection Amplifiers CCA to control the CRT display. The second output drives A1A48 Span Attenuator CCA to control frequency of A1A16 1st LO Assembly and AlA22 Phase Locked 2nd LO.

- The TTL level signal is high during sweep time and low during retrace. This signal provides sweep status to A1A60 Horiz Digital Storage CCA and AlA70 Z-Axis CCA for CRT blanking. A1A58 Processor CCA also receives the sweep status signal. The microcomputer performs tasks such as frequency corrections during retrace.

- Three input signals may trigger a sweep. A1A70 Z-Axis CCA provides signal for LINE TRIGGER mode. HORIZ/TRIG connectors provides signal to trigger sweep in EXTERNAL TRIGGER mode. This connector also supplies sweep voltage in EXTERNAL SWEEP mode. A1A40 Video Processor CCA provides signal for INTERNAL TRIGGER mode. A DC voltage from A1A38 Front Panel CCA controls MANUAL SCAN mode.

b. A1A48 Span Attenuator CCA. Produces three scaled ramp signals to sweep A1A16 1st LO Assembly and A1A22 Phase Locked 2nd LO. A1A72 Sweep CCA provides the input sweep ramp signal.

- One ramp output signal connects to A1A44 1st LO Driver CCA. This signal controls SPAN/DIV settings > 5 MHz.

- The second ramp output signal connects to A1A16 1st LO Assembly. This signal controls SPAN/DIV settings $\leq$ 5 MHz and $\geq$ 210 kHz.

- The third ramp output signal connects to A1A22A1 16-20 MHz Phase Lock CCA. This signal controls SPAN/DIV settings $\leq$ 200 kHz. A TTL level control signal changes gain of A1A22A1 16-20 MHz Phase Lock CCA to control SPAN/DIV settings $\leq$ 20 kHz.

c. A1A46 Center Freq Control CCA. Produces two ±9.75 V outputs that control CENTER FREQUENCY. One voltage tunes the frequency of A1A16 1st LO Assembly. The second voltage tunes the frequency of AlA22 Phase Locked 2nd LO. The microcomputer interface supplies tune voltage data when a new CENTER FREQUENCY is chosen. A -10 V reference from A1A44 1st LO Driver CCA is required to produce output voltages.

d. A1A44 1st LO Driver CCA. Adds ramp and tune signals from A1A48 Span Attenuator CCA and A1A46 Center Freq Control CCA. The resulting output signal is a ramp with DC component. This signal connects to A1A16 1st LO Assembly for SPAN/DIV settings >5 MHz. The DC component controls the center frequency of A1A16 1st LO Assembly for all SPAN/DIV settings. A1A44 1st LO Driver CCA also generates the following output signals:

- A -10 V reference for A1 A46 Center Freq Control CCA to produce tune voltages.

- A ramp with DC component for A1A40 Video Processor CCA to control flatness corrections.

- A TTL level control signal for A1A16A1 1st LO Interface CCA. This signal switches a capacitor across the main oscillator tuning coil at SPAN/DIV settings < 5 MHz.

1-18. COUNTER AND PHASE LOCK SECTION DESCRIPTION.

The Counter and Phase Lock Section contains a microwave frequency counter and phase lock loop. The frequency counter has two functions. First, it counts the frequency of internal signals to determine errors. This allows corrections to be made for improved frequency accuracy. Second, it counts the frequency of local oscillators and the 10 MHz IF. From this data, the microcomputer can calculate and display input signal frequencies. The phase lock circuit stabilizes A1A16 1st LO Assembly to reduce residual FM at SPAN/DIV settings $\leq$ 200 kHz. This section describes each module within the Counter and Phase Lock Section. Refer to fig FO-1, fig FO-4, fig FO-10, and fig FO-11 for schematic diagrams and component locators.

a. A1A25 Harmonic Mixer. Functions as part of the frequency counter. Combines with A1A26 Auxiliary Synthesizer CCA to convert the 2-3.8 GHz 1st LO signal to a low frequency signal that can be counted. The 2-3.8 GHz 1st LO signal connects to A1A25 Harmonic Mixer at A1A25P253. A 200-220 MHz signal from A1A26 Auxiliary Synthesizer CCA drives A1A25P251. A1A25P252 routes the resulting 10-80 MHz mixer product to A1 A26 Auxiliary Synthesizer CCA for further processing.

b. A1A26 Auxiliary Synthesizer CCA. Functions as part of the frequency counter. Produces three output signals: TTL level signal related to frequency of A1A16 1st LO Assembly, 200-220 MHz oscillator, and 100 MHz reference.

The TTL level signal frequency is between 100 kHz and 800 kHz. This signal is produced by dividing by 100 an output signal from A1A25 Harmonic Mixer. The resulting 100 kHz to 800 kHz signal connects to A1A51 Counter CCA.

- The 200-220 MHz oscillator signal drives A1A25 Harmonic Mixer. Within A1A25 Harmonic Mixer, a harmonic of the 200-220 MHz signal mixes with the 2-3.8 GHz 1st LO signal. A 10-80 MHz mixer product from AlA25 Harmonic Mixer returns to A1A26 Auxiliary Synthesizer CCA for further processing.

- The 100 MHz reference output is a sample of the 100 MHz oscillator within A1A34 3rd Converter Assembly. This signal connects to A1A51 Counter CCA.

c. A1A24 Phase Gate Assembly. Functions as part of phase lock loop for A1A16 1st LO Assembly. Compares phase and frequency of the 2-3.8 GHz 1st LO signal to a stable, low-frequency signal. The resulting voltage corrects the frequency of A1A16 1st LO Assembly. The 2-3.8 GHz 1st LO signal connects to A1A24P241. The 5.006-5.019 MHz low-frequency signal connects to A1A24P243. The resulting voltage connects to A1A50A4 Error Amplifier CCA. A1A24P240 routes the 2-3.8 GHz 1st LO signal to A1A25 Harmonic Mixer.

d. A1A51 Counter CCA. Provides the microcomputer interface forA1A50 Phase Lock Assembly and counts input signals. Count data is returned to the microcomputer. This data is used to calculate frequency corrections and to display input signal frequencies on CRT. A1A26 Auxiliary Synthesizer CCA provides the 100 MHz counter reference signal. AlA51 Counter CCA receives and counts four input signals. The 1st LO phase lock loop error from A1A50A4 Error Amplifier CCA is used to establish and maintain phase lock mode. A 100-800 kHz signal from A1A26 Auxiliary Synthesizer CCA is used to calculate frequency of A1A16 1st LO Assembly. A 16-20 MHz signal from A1A22 Phase Locked 2nd LO is used to calculate 2nd LO frequency. A 10 MHz IF signal from A1A62 Log Amplifier CCA is used to calculate input signal frequency.

e. A1A50 Phase Lock Assembly. Functions as part of A1A16 1st LO Assembly phase lock loop. The module contains five circuit card assemblies.

- A1A50A1 Synthesizer CCA produces two reference signals. A 100 MHz input signal connects to A1A50P501. Output pin K routes a 25 MHz reference signal to A1A50A3 Mixer CCA. Output pin G routes a 32-94 kHz signal to A1A50A3 Mixer CCA. The microcomputer calculates the desired signal frequency at pin G. Control data is then loaded using the microcomputer interface on A1A51 Counter CCA.

- A1A50A2 Strobe Driver CCA produces a stable, low-frequency signal between 5.006 MHz and 5.019 MHz. This signal connects to A1A24 Phase Gate Assembly. A1A50A5 Oscillator CCA provides a25.032-25.094 MHz input signal for A1A50A2 Strobe Driver CCA. This signal is divided by five and then amplified to produce the 5.006-5.019 MHz output.

- A1A50A3 Mixer CCA converts 25.032-25.094 MHz from A1A50A5 Oscillator CCA to a frequency between 32 kHz and 94 kHz. The 25.032-25.094 MHz signal connects to one mixer input. A 25 MHz reference signal connects to the other mixer input. The resulting 32-94 kHz mixer product connects to a phase/frequency detector which compares it to the 32-94 kHz reference signal from A1A50A1 Synthesizer CCA. The resulting error signals adjust the frequency of AlA50A5 Oscillator CCA to be exactly 25 MHz greater than the 32-94 kHz reference signal frequency.

- A1A50A4 Error Amplifier CCA contains the microcomputer interface, two error amplifiers, and frequency feedback to A1A51 Counter CCA. Microcomputer interface signals are received from A1A51 Counter CCA. Phase lock mode is active when SPAN/DIV **£** 200 kHz. In this mode input pins J and L receive error signals from A1A50A3 Mixer CCA to drive one error amplifier. Pin H connects the resulting correction voltage to A1A50A5 Oscillator CCA. A1A24 Phase Gate Assembly provides signal to drive the second error amplifier. The resulting correction voltage drives A1A16 1st LO Assembly. A TTL level output signal connects to A1A51 Counter CCA. This signal is used to count frequency errors within phase lock loop.

- A1A50A5 Oscillator CCA produces a 25.032-25.094 MHz signal. Pin D drives A1A50A3 Mixer CCA. Pin A drives A1A50A2 Strobe Driver CCA. Pin B receives correction voltages from A1A50A4 Error Amplifier. Typical range at pin B is +5 to +12 VDC.

1-19. DIGITAL CONTROL SECTION DESCRIPTION.

The Digital Control Section contains the microcomputer, memory, GPIB, and front panel functions. This section describes each module within the Digital Control Section. Refer to fig FO-1, fig FO-6, fig FO-8, fig FO-11, fig FO-12, and fig FO-19 for schematic diagrams and component locators.

a. A1A58 Processor CCA. Directs most instrument functions. The microcomputer contains two signal buses. The processor bus links the microcomputer with memory and GPIB circuits. The instrument bus links the microcomputer with most other circuits. The microcomputer produces two clock signals to control timing on A1A54 Memory CCA, A1A56 GPIB CCA, A1A60 Horiz Digital Storage CCA, and A1A66 CRT Readout CCA. Interrupt signals return to the microcomputer when circuits need to report important data.

- The processor bus contains 16 address lines, eight data lines, and control lines for data transfer. Two signals communicate with A1A56 GPIB CCA during GPIB transfers.

- The instrument bus contains eight address lines, eight data lines, and control lines for data transfer.

- Interrupt signals are produced by six circuits. Refer to the following table for descriptions.

INTERRUPT SIGNAL SOURCE	DESCRIPTION
A1A38 Front Panel CCA	Indicates when front panel controls have been changed
A1A51 Counter CCA	Indicates when 1st LO phase lock loop requires attention
A1A56 GPIB CCA	Indicates when a GPIB function must be performed
A1A70 Z-Axis CCA	Indicates when two or more cycles of AC power are missing; forces microcomputer to shut down
A1A72 Sweep CCA	Indicates change to reference lock status
A1A72 Sweep CCA	Indicates when end of each sweep occurs

b. A1A54 Memory CCA. Contains operating system ROM and RAM, and non-volatile RAM (NVRAM). NVRAM stores corrections data, waveforms, setups, and macros. The processor bus and clock signals are used for data transfer to and from memory. Sections of memory are decoded using TTL level control signals from A1A58 Processor CCA and A1A56 GPIB CCA.

c. A1A56 GPIB CCA. Contains operating system ROM and a General Purpose Interface Adapter. This circuit also generates TTL level signals used for memory decoding on A1A54 Memory CCA. GPIB signals connect to A1A30A57 GPIB Interface CCA. A1A56 GPIB CCA produces two interrupt request signals to communicate with A1A58 Processor CCA.

d. A1A30A57 GPIB Interface CCA. Routes GPIB signals between rear panel IEEE-488 connector and A1A56 GPIB CCA. A switch selects GPIB address and operating modes.

e. A1A30A76 Accessories Interface CCA. Connects microcomputer bus to J104 ACCESSORY connector. This circuit also controls switching of the display source for signals on the CRT.

- Microcomputer bus signals connect to pins 6-25. The signal at pin 4 determines whether microcomputer bus lines are outputs or inputs.

- The EXT VIDEO SELECT input (pin 1) selects the signal source for signals displayed on CRT. Pin 1 controls a switch located on A1A40 Video Processor CCA. Pin 1 is at TTL level high under normal conditions. When pin 1 is high, signals from A1A62 Log Amplifier CCA are displayed on CRT. When pin 1 is low, signals applied to MARKER I VIDEO INPUT are displayed on CRT.

f. A1A38 Front Panel CCA. Provides interface between user and 495P Spectrum Analyzer. The CCA contains four functional circuits: graticule lights, switches, LEDs, and potentiometers.

- A1A38 Front Panel CCA produces +5.7 VDC to power graticule lights. When graticule lights are turned on, +5.7 V appears at A1A38P5090 pin 1.

- Switches change control values or turn operating modes on and off. CENTER/MARKER FREQUENCY switch A1A38S2035 produces two TTL level outputs when rotated. Lamp A1A38DS1029 must be on to produce output signals from A1A38S2035. FREQUENCY SPAN/DIV and RESOLUTION BANDWIDTH switch A1A38S3020, TIME/DIV switch A1A38S6118, and REFERENCE LEVEL switch A1A38S6035B have no internal stops. These switches may be rotated continuously. MIN RF ATTEN switch A1A38S6035A has seven positions with stops at both ends. All pushbutton switches (such as Blue-SHIFT switch A1A38S1054) are momentary contact switches. When pressed, they connect contacts on the circuit board surface.

- LED indicators show the status of front panel controls. POWER ON LED A1A38DS5015 is lit when power is on. All other LEDs are controlled by microcomputer interface. The +5 V1 power supply connects to the anode lead of each LED through a resistor. The LEDs light when the microcomputer sends a TTL low to the cathode lead.

- Potentiometers route analog signals to other circuits. These controls are not programmable. Refer to following table for descriptions.

POTENTIOMETER	FUNCTION	DESCRIPTION
A1A38R1121	INTENSITY	Connects between +5 V1 and chassis ground; routes DC voltage to A1A70 Z-Axis CCA for CRT brightness control
A1A38R4043	PEAK/AVERAGE	Connects between +15 V and -15 V; sends DC voltage to A1A61 Vert Digital Storage CCA for control of vertical position of cursor
A1A38R4121	MANUAL SCAN	Connects between -15 V and chassis ground; routes DC voltage to A1A72 Sweep CCA to scan CRT in MANUAL SCAN mode
A1A38R6104	VERTICAL POSITION	Connects between +15 V and -15 V; routes DC voltage to A1A64 Deflection Amplifiers CCA to control trace position on CRT
A1A38R6106	HORIZONTAL POSITION	Connects between +15 V and -15 V; routes DC voltage to AlA64 Deflection Amplifiers CCA to control trace position on CRT
A1A38R6049	AMPL CAL	Connects between +15 V and chassis ground; routes DC voltage to A1A68A1 Mother #1 CCA to control signal gain
A1A38R6051	LOG CAL	Connects between A1A62 Log Amplifier CCA and A1A40 Video Processor CCA; adjusts logarithmic scaling

g. A1A77 Graticule Lights CCA. Contains lamps to illuminate the CRT. When the graticule lights are on, A1A38 Front Panel CCA sends +5.7 VDC to A1A77P770.

1-20. POWER SUPPLY SECTION DESCRIPTION.

The Power Supply Section provides DC power supplies and forced air cooling for 495P Spectrum Analyzer. This circuit also sends a sample of the AC power signal to trigger and power status circuits. This section describes each module within the Power Supply Section. Refer to fig FO-1 and fig FO-6 for schematic diagrams and component locators.

a. A1A30A1 Power Supply CCA. Produces DC power supplies. The power supply is divided into three functional circuits. The primary circuit converts AC power to a 33 kHz signal. The secondary circuit transforms the 33 kHz signal to DC voltages. The interface circuit routes signals to rear panel connectors.

- The primary circuit converts input AC power to a 33 kHz signal. The circuit contains chassis-mounted parts and circuitry on A1A30A1 Power Supply CCA. AC power connects to the rear receptacle. Line fuse A1A30F301 limits current to switches A1A30S300 and A1A30S303. Voltage select switch A1 A30S302 selects either 115V or 230V operation. Thermal fuse A1A30A1S2103 opens when temperature within A1A30 Power Supply reaches 217.4 °F (103 °C). After the AC voltage is rectified and filtered, the resulting DC voltage sources current through two switching transistors. These transistors drive a transformer at a 33 kHz switching rate. Feedback from secondary and current sense circuits controls the duty cycle of the switching signal. This feedback causes regulation of secondary voltages. A sample of the AC power signal connects to two other circuits. A1A70 Z-Axis CCA senses the signal to inform the microcomputer of power failures. A1A72 Sweep CCA controls LINE TRIGGER mode using the signal.

- The secondary circuit converts the 33 kHz signal to DC voltages. Four voltages (-15, -5, +5, and +15 V) are produced by voltage regulator circuits. The voltage regulators have no fuse. Unregulated voltages are -17, -7, +7, +9, +17, +100, and +300 V. The following table shows which fuse protects each power supply.

POWER SUPPLY	FUSE	POWER SUPPLY	FUSE
-17 V	A1A30A1F3038	+17 V1	A1A30A1F2013
-7 V	A1A30A1F1013	+100 V	A1A30A1F1035
+9 V	A1A30A1F1017	+300 V	A1A30A1F1033

- The interface circuit routes signals to rear panel connectors. The following table describes the function of each connector.

CONNECTOR	FUNCTION
HORIZ OUT	Provides sample of sweep ramp from A1A64 Deflection Amplifiers CCA
VERT OUT	Provides sample of video signal from A1A64 Deflection Amplifiers CCA
PEN LIFT	Provides TTL level sweep status indicator from A1A72 Sweep CCA
PROBE POWER	+5 V, +15V, CHAS GND, and -15 V for use with active probes
HORIZ/TRIG	Connects DC voltage for external sweep or trigger signal for external trigger modes

b. A1A30A2 Fan Driver CCA. Drives fan A1A30B100 and provides overvoltage protection for the +5 V supply. The assembly generates a three-phase signal that connects to A1A30B100 at A1A30A2J2020. A control circuit adjusts fan speed as a function of temperature.

1-21. TRACKING GENERATOR SECTION DESCRIPTION.

The Tracking Generator Section produces an RF signal that tracks the sweep of 495P Spectrum Analyzer. This section describes each module within TR 503 Tracking Generator. Refer to fig FO-20, fig FO-21, and fig FO-22 for schematic diagrams and component locators.

a. A2A6 1st LO Amplifier. Amplifies the 2-3.8 GHz 1ST LO OUT signal from 495P Spectrum Analyzer. The signal connects to 1st LO IN connector through a coaxial cable. This amplifier compensates for amplitude changes of the input signal.

b. A2A7 Isolator. Prevents signals from returning to 495P Spectrum Analyzer. Terminates A2A6 1st LO Amplifier and A2A9 Bandpass Filter.

c. A2A8 Lowpass Filter. Blocks high-frequency signals that may pass through A2A9 Bandpass Filter.

d. A2A9 Bandpass Filter. Blocks harmonics of the 2-3.8 GHz 1st LO signal from signal path.

e. A2A10 Isolator. Prevents signals from returning to 495P Spectrum Analyzer. Terminates A2A6 1st LO Amplifier and A2A9 Bandpass Filter.

f. A2A11 Mixer. Converts the 2-3.8 GHz 1st LO signal to 0.1-1800 MHz. The 1st LO signal mixes with a 2.072 GHz signal from A2A14 Amplitude Control. The 0.1-1800 MHz mixer product connects to A2A12 Amplifier and Detector.

g. A2A12 Amplifier and Detector. Contains amplifier, detector, and temperature compensation circuits. The amplifier provides signal gain within the 0.1-1800 MHz range. The detector provides feedback to control output flatness. The temperature compensation circuit controls output flatness over temperature range.

- The amplifier provides gain of 30 dB to signal from A2A11 Mixer. Amplifiers within A2A12 Amplifier and Detector receive DC bias from A2A15 Leveling Loop and Bias CCA to control gain. Gain control signals connect to A2A15P160 pins 1-4 and A2A15P190 pins 3-7. The amplifier produces two output signals. One output connects to AUX RF OUT connector. A second output connects to A2A13 Step Attenuator.

- The detector rectifies the 0.1-1800 MHz signal to produce a DC voltage. The voltage connects to A2A15 Leveling Loop and Bias CCA to control output flatness.

- The temperature compensation circuit produces a DC voltage. The voltage connects to A2A15 Leveling Loop and Bias CCA to control output flatness over temperature range.

h. A2A13 Step Attenuator. Provides output level control of 0.1-1800 MHz, 0 dBm signal from A2A12 Amplifier and Detector. Range is 59 dB in 10 dB and 1 dB steps. A2A13 Step Attenuator connects to the front panel **OUTPUT LEVEL** knob.

i. A2A14 Amplitude Control. Contains a 2.072 GHz oscillator, directional coupler, normalizing attenuator, leveling attenuator, and isolation amplifier. The 2.072 GHz output signal from A2A14 Amplitude Control connects to A2A11 Mixer.

- The 2.072 GHz oscillator signal connects to a directional coupler within A2A14 Amplitude Control. The oscillator is phase locked to a 55 MHz reference from A2A35A3 55 MHz Oscillator CCA. This allows for frequency adjustment using the **TRACKING ADJUST** knob. The **TRACKING ADJUST** knob controls the 55 MHz reference, which then controls the 2.072 GHz oscillator frequency. Oscillator current and tune voltage are supplied by A2A35A1 Mother Board CCA. These signals pass through A2A15 Leveling Loop and Bias CCA before they connect to A2A14 Amplitude Control.

- Directional coupler routes signals to three circuits. A 2.072 GHz signal passes through the directional coupler to A2A31 Balanced Mixer, and to the normalizing attenuator within A2A14 Amplitude Control. The directional coupler also routes 110 MHz from A2A31 Balanced Mixer to A2A35 Control Assembly.

- Normalizing attenuator controls amplitude of 2.072 GHz signal that connects to A2A11 Mixer. A2A15 Leveling Loop and Bias CCA provides a DC voltage to adjust 2.072 GHz amplitude.

- Leveling attenuator controls the amplitude of 2.072 GHz signal that connects to A2A11 Mixer as a function of frequency. A2A15 Leveling Loop and Bias CCA provides a feedback signal from A2A12 Amplifier and Detector to adjust 2.072 GHz amplitude. The feedback voltage is summed with voltage from the VAR dB knob.

- Isolation amplifier boosts the amplitude of 2.072 GHz signal that connects to A2A11 Mixer. The amplifier also prevents mixer products from returning to A2A14 Amplitude Control. A2A15 Leveling Loop and Bias CCA provides DC bias voltages.

j. A2A15 Leveling Loop and Bias CCA. Produces the following bias voltages.

- A2A15P160 pins 1-4 connect DC bias to A2A12 Amplifier and Detector for gain control.

- A2A15P190 pins 3-7 connect DC bias to A2A12 Amplifier and Detector for gain control.

- A2A15P200 pins 1 and 2 connect DC bias to A2A14 Amplitude Control isolation amplifier circuit.

- A2A15P200 pin 3 connects to A2A14 Amplitude Control leveling attenuator circuit. Three signals are summed to produce signal at pin 3. They are a DC voltage from VAR dB knob, and two feedback signals from A2A12 Amplifier and Detector.

- A2A15P200 pin 4 connects DC bias to normalizing attenuator circuit within A2A14 Amplitude Control.

- A2A1 5P200 pins 5 and 8 connect oscillator current and tune signals to 2072 MHz oscillator within A2A14 Amplitude Control. These signals are produced by A2A35A1 Mother Board CCA.

k. A2A31 Balanced Mixer. Converts the 2nd LO IN signal to 110 MHz IF. A2A31 Balanced Mixer mixes 2.072 GHz from A2A14 Amplitude Control with 2.182 GHz from A2A32 2nd LO Filter. The resulting 110 MHz IF drives the directional coupler within A2A14 Amplitude Control. The 110 MHz and 2.072 GHz signals use the same path between A2A31 Balanced Mixer and A2A14 Amplitude Control. The 110 MHz IF drives a phase lock loop within A2A35 Control Assembly.

l. A2A32 2nd LO Filter. Routes the 2.182 GHz 2nd LO signal to A2A31 Balanced Mixer. The 2nd LO IN connector is the input to the filter. Lowpass and bandpass filters within A2A32 2nd LO Filter reject unwanted signals.

m. A2A35 Control Assembly. Contains a phase lock loop, the 2.072 GHz oscillator current source, and the tracking adjust circuit. The assembly contains four circuit card assemblies.

- A2A35A1 Mother Board CCA contains voltage regulators, the tracking adjust circuit, a phase lock loop error amplifier, and the 2.072 GHz oscillator current source. This circuit also provides a path for the 110 MHz IF signal. Voltage regulators are-15, +5.1, +15, and +20 V. The +5.1 and +15V regulators use series-pass transistors mounted within TM 5003 Power Module. The +5.1 V supply drives POWER ON LED A2DS10. The tracking adjust circuit provides tuning voltage forA2A35A3 55 MHz Oscillator CCA. DC voltage from **TRACKING ADJUST** knob (+3.6 to +15 V) connects to A2A35A3 pin H. The phase lock loop error amplifier converts error signals from A2A35A4 Phase/Freq Detector CCA to a tune voltage. Typical level is +8 V. The voltage controls the frequency of 2.072 GHz oscillator within A2A14 Amplitude Control. A current source for the 2.072 GHz oscillator produces -1.7 V at A2A35A1P370 pin 3.

- A2A35A2 110 MHz Amplifier CCA amplifies the 110 MHz signal from A2A14 Amplitude Control. Signal gain is 60 dB for input signals of -45 dBm or less. Gain decreases as input signal level increases above -45 dBm. Output signals drive A2A35A4 Phase/Freq Detector CCA.

- A2A35A3 55 MHz Oscillator CCA produces a 55 MHz reference signal for the phase lock loop. The 55 MHz signal drives A2A35A4 Phase/Freq Detector CCA. A DC voltage from **TRACKING ADJUST** knob sets the oscillator frequency. Tuning range is $\leq$49.998 MHz to $\geq$ 55.002 MHz.

- A2A35A4 Phase/Freq Detector CCA compares the phase and frequency of 55 MHz oscillator and 110 MHz signals. This circuit develops a tune voltage that controls the 2.072 GHz oscillator frequency. A2A35A3 55 MHz Oscillator CCA provides the 55 MHz input. A2A35A2 110 MHz Amplifier CCA provides the 110 MHz input. Two resulting error voltages connect to phase lock loop error amplifier on A2A35A1 Mother Board CCA. This error amplifier generates the tune voltage to control the 2.072 GHz oscillator frequency.

1-22. POWER MODULE SECTION DESCRIPTION.

The Power Module Section provides DC voltages and forced air cooling for TR 503 Tracking Generator. This section describes each module within TM 5003 Power Module. Refer to fig FO-23 through fig FO-26 for schematic diagrams and component locators.

a. A3A10 Main Interface CCA. Sends DC and AC voltages, and the PWR signal, to each of three plug-in sockets. PWR indicates when the main power supply is operating.

- DC Voltages are +8, +26, and -26 V. Transformer A3T500 couples AC power from A3A14 Line Filter CCA to secondary voltage taps. AC voltages are 25 and 18 V. A 16 VAC feedback signal connects to A3A10J1110. This signal is rectified by A3A11CR1561 to supply power for A3A11U1550. The current sense input to A3A11U1550 also uses this supply.

- The PWR signal from A3A10Q1125 drives pin 6 of each plug-in socket. The signal is normally high when power is on. A3A11U1850 pin 7 controls the status of PWR. Pin 7 is normally low. A3A11U1850 pin 7 toggles high when triggered by A3A11U1720A or by A3A11U1550.

b. A3A11 Secondary Supply CCA. Contains a secondary rectifier circuit, a control logic and drivers circuit, an over-voltage and over-current detectors circuit, and a control circuit regulator. The secondary rectifier circuit produces DC voltages. The control logic and drivers circuit produces a 20 kHz drive signal. The output regulator circuit produces a 40 kHz clock signal and sets the +8 V output level. The over-voltage and over-current detectors circuit limits duty cycle when output voltage or current is too high. The control circuit regulator produces reference voltages and the PWR signal.

- The secondary rectifier circuit produces +26, +8, and -26 VDC supplies. Each supply connects to plug-in sockets on A3A10 Main Interface CCA. Transformer A3A11T1210 couples the 20 kHz drive signal to diode rectifiers. Diodes A3A11CR1010 and A3A11CR1020 produce the +26 V supply. Diode A3A11CR500 produces the +8 V supply. Diodes A3A11CR1021 and A3A11CR1120 produce the -26 V supply. Transformer A3A11T1000 regulates power by producing over-voltage feedback that controls the duty cycle of the 20 kHz drive signal. Diodes A3A11CR1502, A3A11CR1510, A3A11CR1511, and A3A11CR1512 rectify the output of A3A11T1000. The resulting DC voltage drives A3A11U1540B, a comparator within the over-voltage and over-current detectors circuit.

- The control logic and drivers circuit produces a 20 kHz drive signal for the 20 kHz output amplifier. Transistors A3A11Q1400 and A3A11Q1401 produce the 20 kHz output. Current is supplied by the +10 V source (A3A11U1550 pin 10). Duty cycle of the 20 kHz signal changes to control regulation. Gates A3A11 U161 OA and A3A11U1 610B receive four input signals to control 20 kHz switching. A high on any input causes A3A11Q1400 and A3A11Q1401 to conduct. During power on or power off, A3AllQ1650 also controls A3A11Q1400 and A3A11Q1401 through A3A11R1511 and A3A11R1520. Flip-flop A3A11U1720A controls A3A11U1610 pins 5 and 10. This signal is normally high. Refer to over-voltage and over-current detectors circuit description for details of operation. Multivibrator A3A11U1720B drives A3A11 U1610 pins 3 and 12. A3A11U1720B ensures that A3A11Q1400 and A3A11Q1401 never conduct at the same time. The minimum dead time (time when A3A11Q1400 and A3A11Q1401 are both off) is controlled by the time constant of A3A11R1610 and A3A11C1710. The voltage charge on A3A11C1730 and A3A11C1831 also affects dead time. During turn on, current from the supply is limited until these capacitors reach full charge. The 40 kHz clock signal drives A3A11U1720B pin 11 to provide timing. Monostable A3A11U1600A drives A3A11U1610 pins 4 and 11. A3A11U1600A limits duty cycle when output voltages are too high. Refer to output regulator circuit description for details of operation. Divide-by-two flip-flop A3A11U1600B drives A3A11U1610 pins 2 and 9. A3A11U1600B converts the drive signal from 40 kHz to 20 kHz. This circuit provides equal but opposite drive signals for A3A11Q1400 and A3A11Q1401.

- The output regulator circuit produces a 40 kHz clock signal and sets the +8 V output level. Gates A3A11 U1620A, A3A11 U1620B, and A3A11 U1620C form the clock circuit. Resistor A3A1 1 R1615 adjusts the clock frequency. Comparator A3A1 1 U1540A drives A3A1 1 U1600A pin 6 to control the 20 kHz duty cycle and set the +8 V output level. A ramp signal is generated to detect the required duty cycle. Positive-going output pulses from the clock charge A3A11C1450 through A3A11CR1610. When the pulse at A3A11U1620B pin 4 drops to 0 V, A3A11C1450 discharges through A3A11R1452. This produces a 50 mVp.p falling ramp waveform at A3A11U1540A pin 4. The +7.15 V reference (A3A11U1550 pin 6) is summed with the ramp at A3A11U1540A pin 4. On the rising edge of each clock pulse, the ramp goes positive rapidly. At this time A3A11U1540A pin 2 is low, allowing the 20 kHz drive signal to pass through A3A11U1610A and A3A11U1610B. Outputs from the +26V and +8 V rectifiers, and A3A11R1530, are summed through A3A11R1442 and A3A11R1540. The resulting voltage is then applied to A3A11U1540A pin 5. As the ramp (pin 4) decays, the ramp voltage and feedback voltage at pin 5 are equal. At this point, pin 2 goes high to turn off the 20 kHz drive signal. Higher +8 V and +26 V levels cause A3A11U1540A to trigger A3A11U1600A earlier within the cycle. This reduces the 20 kHz duty cycle until the +8 V and +26 V supplies decrease within limits.

- The over-voltage and over-current detectors circuit limits the duty cycle when output voltage or current levels are too high. Flip-flop A3A11U1720A controls A3A11U1610 pins 5 and 10. A3A11U1720A blocks the 20 kHz drive signal to A3A13 Primary Supply CCA when input pin 4 is low. Comparators A3A11U1540B, A3A11U1540C, and A3A11U1540D control A3A11U1720A pin 4 by comparing DC voltages with the +7.15 V reference from A3A11U1550 pin 6. A3A11U1540B compares the DC voltage from A3A11CR1511 with +7.15 V. A3A11U1540C compares +26 V and +8 V with +7.15 V. A3A11U1540D compares -26 V with +7.15 V. The 40 kHz clock signal drives A3A11U1720A pin 5 to provide timing.

- The control circuit regulator produces reference voltages and the PWR signal. A 16 VAC output from A3T500 is detected by A3A11 CR1560 and A3A11CR1561 to produce +20 VDC. The +20 V supply powers A3A11 U1550 and A3A11Q1650. A3A11U1550 then produces +10 V and +7.15 V output supplies. Transistor A3A11Q1650 detects when AC power is missing. Zener Diode A3A11 VR1753 sets base current for A3A11Q1650 to ensure the transistor saturates. If the AC signal from A3T500 is low or missing, A3A11Q1650 no longer saturates. As a result its collector voltage rises above +0.2 V. This voltage is coupled to A3A11Q1400 and A3A11Q1401 to shut down the 20 kHz drive signal. A3A11U1550 pin 3 is a current sense input. Resistors A3A11R1652 and A3A11R1653 sense current draw from the 16 VAC signal. When voltage at A3A11U1550 pin 3 is too high, A3A11U1550 shuts down its internal voltage regulators. Fuse A3A11 F1660 limits current to 1 Amp. The PWR signal informs plug-in units of the power supply status. A3A11U1850 pin 7 controls A3A10Q1125 and the PWR signal. When AC power is low or missing, A3A11U1550 pin 13 goes low. This triggers A3A11U1850 to toggle pin 7 high and force PWR low. Capacitors A3A11C1730 and A3A11C1831 also control the PWR signal. They charge to provide a soft start feature that triggers A3A11U 1850 when the power supply is turned on.

c. A3A13 Primary Supply CCA. Rectifies and filters AC power, and amplifies the 20 kHz signal to couple energy to the secondary circuits.

- AC power connects to A3A13J1000 from A3A14 Line Filter CCA. Pin 1 connects to fused (hot) input from power cord. Pin 3 connects to ground input from power cord. Pin 2 provides power to fan A3B500 and a common return path in 115 V mode. The rectifier produces about +160 VDC to power the 20 kHz output amplifier.

- The 20 kHz output amplifier drives A3A11T1000 and A3A11T1210. A3A13J1430 receives the 20 kHz drive signal from A3A11 Secondary Supply CCA. The 20 kHz output signal connects to A3A11 P1420 pins 1 and 3.

d. A3A14 Line Filter CCA. Selects between 115 V and 230 V operation and provides operating voltage for fan A3B500. The circuit also connects AC power to A3T500 which couples AC voltages to plug-in sockets A3A10OJ1000, A3A10J1200, and A3A10OJ1300.

e. A3A16 GPIB Interface CCA. Provides path between rear panel IEEE-488 connector and plug-in slots. A3A16 GPIB Interface CCA contains no electrical components.

CHAPTER 2
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 general support of Spectrum Analyzer System AN/USM-620 are listed in the Maintenance Allocation Chart (MAC), TM 11-6625-3278-12, Appendix B.

2-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

Special tools, TMDE, and support equipment required for general support are listed in the Maintenance Allocation Chart (MAC), TM 11-6625-3278-12, Appendix B.

2-3. REPAIR PARTS.

Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 11 -6625-3278-24P.

Section II. SERVICE UPON RECEIPT

2-4. SERVICE UPON RECEIPT OF MATERIAL.

a. Unpacking. Specially designed, reusable packing material inside three shipping cartons provides maximum protection for the Spectrum Analyzer System. Unpack carefully and do not damage the containers. Use the following steps for unpacking AN/USM-620.

495P Spectrum Analyzer:

- Remove tape from top of carton. Open top flaps of carton.
- Grasp and lift accessories tray from carton.
- Grasp and remove packing cover.
- Grasp 495P Spectrum Analyzer (sealed inside barrier bag) firmly while restraining shipping carton. Lift to remove 495P Spectrum Analyzer from carton.
- Place 495P Spectrum Analyzer on a suitable flat, clean, and dry surface.
- Remove protective barrier bag from 495P Spectrum Analyzer.
- Place barrier bag and top tray packing materials inside shipping carton.
- Return shipping carton to supply system.

TR 503 Tracking Generator:

- Remove tape from top of carton. Open top flaps of carton.
- Remove accessories from carton.
- Grasp TR 503 Tracking Generator with surrounding packing material firmly while restraining shipping carton. Lift to remove TR 503 Tracking Generator with packing material from carton.
- Place TR 503 Tracking Generator on a suitable flat, clean, and dry surface.
- Remove tape that secures packing material and unfold from around TR 503 Tracking Generator.
- Remove protective plastic bag from TR 503 Tracking Generator.
- Place plastic bag and packing materials inside shipping carton.
- Return shipping carton to supply system.

TM 5003 Power Module:

- Remove tape from top of carton. Open top flaps of carton.
- Grasp TM 5003 Power Module with surrounding packing material firmly while restraining shipping carton. Lift to remove

TM 5003 Power Module with packing material from carton.

- Place TM 5003 Power Module on a suitable flat, clean, and dry surface.
- Remove end caps from TM 5003 Power Module.

NOTE
Power cord is packed inside TM 5003 Power Module.

* Place packing materials inside shipping carton. · * Return shipping carton to supply system.

b. Checking Unpacked Equipment.

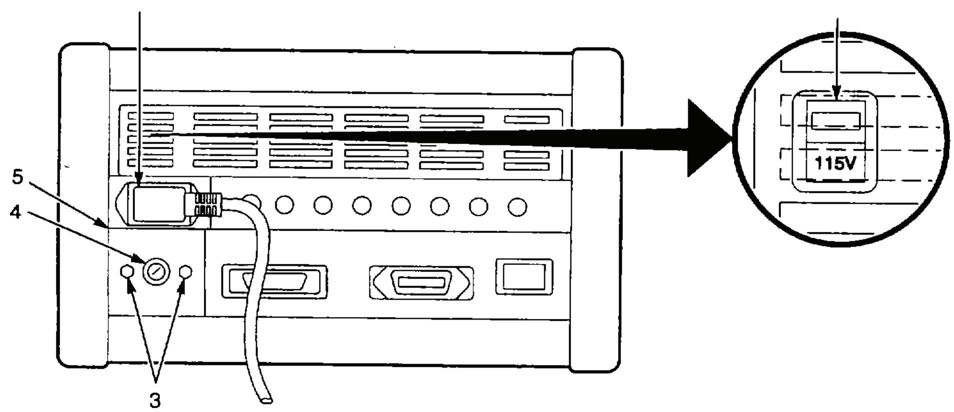
· * Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 364, Report of Discrepancy (ROD).

· * Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 750-8.

· * Check to see whether the equipment has been modified.

2-5. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT.

a. Inspect rear panel line voltage indicators to ensure that the Spectrum Analyzer System is set correctly (115 V or 230 V). If not correct, change to correct line voltage value using the following procedures.



495P Spectrum Analyzer:

1. Remove power cord (1).

2. Insert screwdriver into slot on red, line voltage selector switch (2) (behind plastic grille). Move switch to desired setting.
   · * Move switch up to select 115 V.
   · * Move switch down to select 230 V.

3. Check voltage indicator panel (5) for voltage setting.

4. If voltage indicator panel does not match voltage setting:

   - Remove two nuts (3).
   - Turn over the voltage indicator panel (5).
   - Reinstall nuts.

5. Replace fuse (4) with appropriate fuse for voltage range selected.
   110 V Operation .... 4A Fast-blow
   220 V Operation .... 2A Slow-blow

6. Reinstall power cord (1).

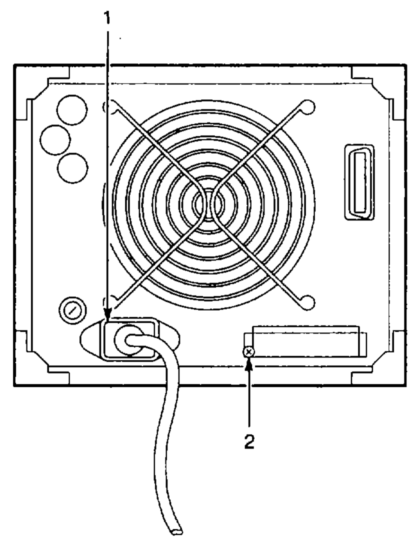
TM 5003 Power Module:

1. Remove power cord (1).

2. Remove bottom cover from TM 5003 Power Module (para 2-241).

3. Move two jumpers on A3A14J1100through A3A14J1104 (fig FO-26) to select desired line voltage.

   - Install jumper on A3A14J1103 to choose 115 V or on A3A14J 1104 to choose 230 V operation.
   - Install jumper on A3A14J1100 (LOW, 110 V or 220 V), A3A14J1101 (MEDIUM, 115 V or 230 V), or A3A14J1102 (HIGH, 120 V or 240V) to choose voltage level in your area.



4. Verify position of voltage selection indicator (2). If necessary, remove screw and install next to actual voltage setting.

5. Reinstall bottom cove[and power cord (1).

b. Perform Assembly and Preparation for Use procedure (TM 11-6625-3278-12, para 2-5).

c. Perform Turn-On Procedure (TM 11-6625-3278-12, para 2-6).

d. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7).

e. Perform performance tests (para 2-56 through 2-84).

Section III. TROUBLESHOOTING

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2-6. GENERAL

Troubleshooting at the intermediate general support maintenance level requires you to locate any fault as quickly as possible. The amount of troubleshooting you can do is based on what the Maintenance Allocation Chart says you can fix. Because of this, the only trouble symptoms in this manual are those that could be caused by faulty items you can fix.

NOTE

- Before using Troubleshooting table, check your work order and talk to unit Maintenance, if possible. Ask for a description of symptoms and steps that have been taken to correct them.

- Check all forms and tags attached to, or accompanying, the equipment to Determine the reason for removal from service.

2-7. Troubleshooting Guidelines.

The following is a list of aids for use when troubleshooting AN/USM-620.

a. 495P Spectrum Analyzer has built-in-self-tests and diagnostics that are used in troubleshooting. A self-test is automatically performed at turn on.

b. Refer to the Principles of Operation, Chapter 1, Section III, as required. This provides circuit theory of each section with reference to the schematic diagrams, AN/USM-620 assembly and cable locator diagrams are found in fig FO-1 (495P Spectrum Analyzer), fig FO-20 (TR 503 Tracking Generator), and fig FO-23 (TM 5003 Power Module). Schematic diagrams and component locator diagrams for all repairable assemblies are found on diagrams fig FO-2 through fig FO-26.

c. Circuit cooler spray (Appendix B, Item 9) can be used to isolate some faults. This spray is often used to cool suspected circuits or components to see if the fault is temporarily fixed. This method will not work all the time, but it can be great time saver. It is most helpful in finding intermittent faults that get worse as temperature rises. However, use this spray sparingly. Too much spray on operational amplifiers, for example, can create a feedback path around the amplifier that will be detrimental to circuit malfunctions.

WARNING

Isopropyl Alcohol is Flammable and Toxic to Eyes, skin, and respiratory tract. Wear protective gloves and goggles/face shield. Avoid repeated or prolonged contact. Use only in well-ventilated areas (or use approved respirator as local safety/industrial hygiene personnel). Keep away from open flames, sparks or other sources of ignition.

d. Many faults on equipment that has been in series for awhile are caused by corrosion. Sometimes removing and reseating the affected plug-in assembly or cable will correct the problem. Cleaning connector pins and/or switch contacts with alcohol (Appendix B, Item 2) will repair many types of malfunction.

e. For microcircuit and connector orientation, pin one is identified by a "▼" on the printed circuit board, or by a square solder pad.

2-8 EQUIPMENT INSPECTIONS.

The following inspection procedures shall be used to locate obvious malfunctions within the Spectrum Analyzer System.

a. Inspect all external surfaces of AN/USM-620 for physical damage, breakage, loose or duty contacts, and missing components.

WARNING

Hazardous voltages are present when covers are removed. Where maintenance can be performed without having power applied, power should be removed.

CAUTION

- Do not disconnect or remove and circuit card assemblies (CCA) from AN/USM-620 unless power is turned off. Permanent damage may occur if an assembly is removed when power is on.

- Several components, including MOS devices, can be damaged by electrostatic discharge. Use conductive foam and grounding straps when serving is required around sensitive components. Use care when unplugging ICs from high-grip sockets.

b. Remove cabinet, shields, and cover (para 2-118, para 2-218, para 2-241) as required to gain access to components.

c. Inspect CCA surfaces for discoloration, cracks, break, and warping.

d. Inspect CCA 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, and loose contacts or conductors.

g. Inspect equipment for disconnected, broken, cut, loose, or frayed cables or wires.

2-9. TROUBLESHOOTING PROCEDURES.

The Troubleshooting table (Table 2-1) lists common malfunctions which may be found during normal operation or maintenance of Spectrum Analyzer System AN/USM-620. Always perform tests or inspections and corrective actions in the order listed.

CAUTION

Use caution when probing test points or connectors during troubleshooting. Some test points, if shorted to chassis ground or other levels, can cause permanent damage.

NOTE

- **After repair of Spectrum Analyzer System AN/USM-620, verify that malfunction is cleared. If not, the proper adjustment should be performed (Table 2-2).**
- **When performing fault isolation tests, always disconnect equipment from AN/USM-620 and install all removed assemblies and cables after repairs are complete.**
- **After replacing any component(s), repeat the step which isolated that particular defect.**
- **All voltage readings reference chassis ground unless otherwise specified.**
- **All voltages have a tolerance of ± 10%, unless otherwise noted, or unless given as a range with specific limits.**
- **TTL low logic level is $\leq$+0.8 V. TTL high logic level is $\geq$ +2.0 V.**

Table 2-1. Troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. CRT DISPLAY NOT CENTERED.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **When testing A1A40 Video Processor CCA (para 2-119) or A1A66A1 CRT Readout CCA (para 2-145), the assemblies must be placed on circuit card extenders using the extender kit.**

Step 1. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7).
- If procedure passes, equipment is operational.
- If procedure fails, perform Step 2.

Step 2. Perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).
- If power supplies correct, perform Step 3.
- If power supplies not correct, replace faulty component.

Step 3. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys. Select the following settings. Verify that display is centered on CRT.

INTENSITY .... CENTERED
VIEW A AND VIEW B .... OFF
TIME/DIV .... AUTO

- If display centered, perform Digital Storage Fault Isolation Test (para 2-18).
- If display not centered, perform Step 4.

Step 4. Look at readout on CRT display.
- If only readout characters not centered, perform Step 5.
- If readout and/or trace not centered, perform Step 6.

Step 5. Make measurement at A1A66A1 P66 pins 4 and 5 (fig FO-14, waveforms 8 and 9).
- If waveforms correct, perform Step 6.
- If waveforms not correct, replace A1A66A1 CRT Readout CCA (para 2-145).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 6. Adjust Deflection Amplifier Gain and Frequency Response (para 2-90).

- If display correct, equipment is operational.
- If display not correct, perform Step 7.

Step 7. Perform Front Panel Potentiometer Fault Isolation Test (para 2-42) for A1A38R6104 and A1A38R6106.

- If test passes, perform Step 8.
- If test fails, replace faulty component.

Step 8. Make measurement at A1A72TP2 (fig FO-19, waveform 6).

- If waveform correct, perform Step 9.
- If waveform not correct, replace Al A72 Sweep CCA (para 2-141).

Step 9. Select the following control settings. After selecting settings, make measurements at A1A64A1 P1010 pins 1 and 4, and A1A64A1P2100 pins 1 and 4 (fig FO-14, waveforms 1-4).
SPAN/DIV 1MHZ
RESOLUTION BANDWIDTH 1MHZ
VIEW A AND B .... OFF

- If waveforms correct, replace Al V100 Cathode Ray Tube (para 2-187).
- If waveforms 1 or 2 not correct, replace A1A64 Deflection Amplifiers CCA (para 2-144).
- If waveforms 3 or 4 not correct, perform Step 10.

Step 10. Make measurement at Al A40TP4067 (fig FO-9, waveform 1).

- If waveform correct, replace A1 A64 Deflection Amplifiers CCA (para 2-144).
- If waveform not correct, perform RF Signal Path Fault Isolation Test (para 2-14).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

2. LEVEL READINGS NOT ACCURATE.

Step 1. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7).
- If procedure passes and level readings are accurate, equipment is operational.
- If procedure fails, perform Step 2.

Step 2. Perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).
- If power supplies correct, perform Step 3.
- If power supplies not correct, replace faulty component.

Step 3. Perform Check System Flatness Test (para 2-83).
- If test passes, perform Step 4.
- If test fails, perform malfunction 33.

Step 4. Perform CAL OUT Amplitude Test (para 2-66).
- If test passes, perform Step 5.
- If test fails, perform malfunction 7.

Step 5. Perform Check Output Level Test (para 2-82).
- If test passes, perform Step 6.
- If test fails, perform malfunction 32.

Step 6. Perform RF Signal Path Fault Isolation Test (para 2-14).
- If test passes, perform Step 7.
- If test fails, replace faulty component.

Step 7. Perform Frequency Response Test (495P Spectrum Analyzer) (para 2-67).
- If test passes, perform Step 8.
- If test fails, perform malfunction 17.

Step 8. Perform Dynamic Range and Accuracy Tes t (para 2-68).
- If test passes, perform Step 9.
- If test fails, perform malfunction 18.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 9. Perform Gain Variation Between Resolution Bandwidths Test (para 2-71).
- If test passes, perform Step 10.
- If test fails, perform malfunction 21.

Step 10. Perform IF Gain Accuracy Test (para 2-70).
- If test passes, perform Step 11.
- If test fails, perform malfunction 20.

Step 11. Perform RF Attenuator Accuracy Test (para 2-69).
- If test passes, perform Step 12.
- If test fails, perform malfunction 19.

Step 12. Perform Residual Spurious Response Test (para 2-73).
- If test passes, perform Step 13.
- If test fails, perform malfunction 23.

Step 13. Perform Intermodulation Distortion Test (para 2-74).
- If test passes, perform Step 14.
- If test fails, perform malfunction 24.

Step 14. Perform Harmonic Distortion Test (para 2-75).
- If test passes, perform Step 15.
- If test fails, perform malfunction 25.

Step 15. Perform Check For Spurious Signals Test (para 2-84).
- If test passes, equipment is operational.
- If test fails, perform malfunction 34.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. CRT SCREEN BLANK.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **When testing A1A70 Z-Axis CCA (para 2-142), the assembly must be placed on circuit card extenders using the extender kit.**

Step 1. Perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).
- If power supplies correct, perform Step 2.
- If power supplies not correct, replace faulty component.

Step 2. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys. Select the following settings. Check display on CRT.

INTENSITY .... FULLY CLOCKWISE
VIEW A AND VIEW B .... OFF
TIME/DIV .... AUTO

- If display correct, perform Digital Storage Fault Isolation Test (para 2-18).
- If unable to change control settings, perform Digital Control Fault Isolation Test (para 2-43).
- If display still blank but controls are operational, perform Step 3.

Step 3. Make measurement at metal tab of A1A70Q4058 (fig FO-19, waveform 2).
- If waveform correct, perform Step 6.
- If waveform not correct, perform Step 4.

Step 4. Perform Front Panel Potentiometer Fault Isolation Test (para 2-42) for A1A38R1121.
- If test passes, perform Step 5.
- If test fails, replace faulty component.

Step 5. Adjust Z-Axis an d High Voltage Circuits (para 2-89).
- If able to adjust, equipment is operational.
- If not able to adjust, perform Step 6.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

NOTE
Measurements can be made on A1A70 Z-Axis CCA when multiwire cables are disconnected.

Step 6. Measure between +180 and +220 VDC at A1A70P70 pin 3. Make measurement at metal tab of A1A70Q4058 (fig FO-19, waveform 2).

- If voltage and waveform correct, perform Step 7.
- If voltage or waveform not correct, replace A1A70 Z-Axis CCA (para 2-142).

Step 7. Connect high voltage probe to DMM. Measure high voltage levels in truth table at A1A74J742 pins 1-6 (fig FO-19).

- If voltages correct, replace Al V100 Cathode Ray Tube (para 2-187).
- If voltages not correct, replace A1 A74 High Voltage CCA (para 2-143).

4. FAILS TURN-ON PROCEDURE.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0**.
- **When testing A1A66A1 CRT Readout CCA (para 2-145) and A1A70 Z-Axis CCA (para 2-142), the assemblies must be placed on circuit card extenders using the extender kit**.

Step 1. Perform Turn-On Procedure (TM 11-6625-3278-12, para 2-6).

- If TM 5003 Power Module fails, perform Step 9.
- If 495P Spectrum Analyzer fails, perform Step 2.

Step 2. Verify that CRT displays normal trace and readouts. On 495P Spectrum Analyzer, exercise front panel controls and verify normal operation. Verify that front panel indicators light when associated function is turned on.

- If POWER ON indicator not lit, perform Front Panel Fault Isolation Test (para 2-40).
- If display blank, perform malfunction 3.
- If display shows error message, perform malfunction 6.
- If front panel controls do not work, perform Digital Control Fault Isolation Test (para 2-43).
- If only trace missing or distorted, perform Step 3.
- If only readout missing or distorted, perform Step 7.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 3. Press **Blue-SHIFT** and **RESET** keys. Set **INTENSITY** fully clockwise. Verify that display on CRT matches Turn-On Procedure (TM 11-6625-3278-12, para 2-6).

- If display correct, perform Digital Storage Fault Isolation Test (para 2-18).
- If display missing or distorted, perform Step 4.

Step 4. Select the following settings. Make measurement at A1A72P72 pin 2 (fig FO-19, waveform 4).

SPAN/DIV 1MHZ
RESOLUTION BANDWIDTH 1MHZ
VIEW A AND VIEW B .... OFF

- If waveform correct, perform Step 5.
- If waveform not correct, replace Al A72 Sweep CCA (para 2-141).

Step 5. Make measurements at A1A64A1P1010 pins 1 and 4, and A1A64A1P2100 pins 1 and 4 (fig FO-14, waveforms 1-4).

- If waveforms correct, perform Step 6.
- If only waveforms 1 or 2 not correct, replace A1A64 Deflection Amplifiers CCA (para 2-144).
- If only waveforms 3 or 4 not correct, perform RF Signal Path Fault Isolation Test (para 2-14).

Step 6. Measure TTL low at A1A70U3046 pin 19 (fig FO-19).

- If signal low, replace A1A70 Z-Axis CCA (para 2-142).
- If signal not low, replace A1A64 Deflection Amplifiers CCA (para 2-144).

Step 7. Make measurements at A1A66A1 P66 pins 3, 4, 5, and 15 (fig FO-14, waveforms 6-9).

- If waveforms correct, perform Step 8.
- If waveforms not correct, replace A1A66A1 CRT Readout CCA (para 2-145).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 8. Select the following settings. After selecting settings, make measurements at A1A64A1P1010 pins 1 and 4, and A1A64A1 P2100 pins 1 and 4. (fig FO-14, waveforms 1-4).

SPAN/DIV 1MHZ
RESOLUTION BANDWIDTH 1MHZ
VIEW A AND VIEW B .... OFF

- If waveforms correct, replace A1A70 Z-Axis CCA (para 2-142).
- If waveforms not correct, replace A1A64 Deflection Amplifiers CCA (para 2-144).

Step 9. Remove TM 5003 side panel (para 2-241). Connect (+) DMM lead to A2A35A1 P400 pin 2 (fig FO-22). Connect (-) lead to chassis ground. Measure between +2.5 V and +3.5 V on DMM display.

- If voltage correct, replace A2DS10.
- If voltage not correct, perform Tracking Generator Power Supply Fault Isolation Test (para 2-50).

5. FAILS ALIGNMENT (CAL) PROCEDURE.

Step 1. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7) to determine which equipment will not align.

- If 495P Spectrum Analyzer does not align, perform Step 2.
- If TR 503 Tracking Generator does not align, perform Step 10.

Step 2. Perform CAL OUT Amplitude Test (para 2-66).

- If test fails, perform 3rd LO Fault Isolation Test (para 2-12).
- If test passes, perform Step 3.

Step 3. Perform Front Panel Potentiometer Fault Isolation Test (para 2-42) for A1A38R6104, A1A38R6106, A1A38R6049, and A1A38R6051.

- If tests pass, perform Step 4.
- If tests fail, replace faulty component.

Step 4. Perform Gain Variation Between Resolution Bandwidths Test (para 2-71).

- If test passes, perform Step 5.
- If test fails, perform malfunction 21.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 5. Perform Residual FM Test (para 2-61).
- If test passes, perform Step 6.
- If test fails, perform malfunction 11.

Step 6. Perform Center Frequency Stability Test (para 2-60).
- If test passes, perform Step 7.
- If test fails, perform malfunction 10.

Step 7. Adjust Frequency Control System (para 2-93).
- If able to adjust, perform Step 8.
- If not able to adjust and an error message appears, perform malfunction 6.
- If not able to adjust, perform Counter Fault Isolation Test (para 2-38).

Step 8. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7).
- If procedure passes, equipment is operational.
- If procedure fails, perform Step 9.

Step 9. Perform RF Signal Path Fault Isolation Test (para 2-14).
- If test passes, equipment is operational.
- If test fails, replace faulty component.

Step 10. Perform Control Assembly Fault Isolation Test (para 2-49, Steps 6 and 7) to test A2R10.
- If test passes, perform Step 11.
- If test fails, replace A2R10 Tracking Adjust Variable Resistor (para 2-235).

Step 11. Perform 2nd LO Output Fault Isolation Test (para 2-15).
- If test passes, perform Step 12.
- If test fails, perform 2nd LO Fault Isolation Test (para 2-16).

Step 12. Perform 1 st LO Output Fault Isolation Test (para 2-19).
- If test passes, perform Tracking Generator 1 st LO Fault Isolation Test (para 2-47).
- If test fails, perform 1 st LO Fault Isolation Test (para 2-20).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

6. ERROR MESSAGE ON CRT SCREEN.

NOTE
Built-in diagnostics cause these messages to be displayed automatically.

Message POWER SUPPLY OUT OF REGULATION is displayed.
Perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).
- If test passes, equipment is operational.
- If test fails, replace faulty component.

Message TUNING FAILURE - 1ST LO is displayed.
Perform 1st LO Fault Isolation Test (para 2-20).
- If test passes, equipment is operational.
- If test fails, replace faulty component.

Message TUNING FAILURE - 2ND LO is displayed.
Step 1. Perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).
- If power supplies correct, perform Step 2.
- If power supplies not correct, replace faulty component.

Step 2. Adjust Frequency Control System (para 2-93).
- If message is no longer displayed, 495P Spectrum Analyzer is operational.
- If message remains, perform Step 3.

Step 3. On 495P Spectrum Analyzer, set SPAN/DIV to MAX. Unplug A1W224 from A1A22P224 (fig FO-3). Connect coaxial cable between oscilloscope and A1A22P224. Make measurement at A1A22P224 (fig FO-3, waveform 2).
- If waveform correct, connect A1W224 to A1A22P224 and perform Step 4.
- If waveform not correct, perform 2nd LO Fault Isolation Test (para 2-16).

Step 4. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 2=2ND LO CONTROL. Compare COUNTED and DESIRED values for 2ND LO FREQ. See example display (fig FO-3).
- If 2ND LO FREQ within OFFSET SETTING ACCURACY, perform 2nd LO Fault Isolation Test (para 2-16).
- If 2ND LO FREQ not within OFFSET SETTING ACCURACY, perform Counter Fault Isolation Test (para 2-38).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Message PHASE LOCK FAILURE -1ST LO is displayed.
Perform A1A50 Phase Lock Assembly Fault Isolation Test (para 2-35).
- If test passes, equipment is operational.
- If test fails, replace faulty component.

Message ROM XX FAILURE. PUSH A BUTTON TO CONT. is displayed.
Perform MIPRCS System Fault Isolation Test (para 2-44).
- If test passes, replace Al A56 GPIB CCA (para 2-135).
- If test fails, replace faulty component.

Message ROM XX MISPLACED. PUSH A BUTTON TO CONT. is displayed.
Perform MIPRCS System Fault Isolation Test (para 2-44).
- If test passes, replace A1A56 GPIB CCA (para 2-135).
- If test fails, replace faulty component.

Message RAM XX FAILURE. PUSH A BUTTON TO CONT. is displayed.
- Replace Al A54 Memory CCA (para 2-134).

Message TIMER TESTS BAD. PUSH A BUTTON TO CONT. is displayed.
- Replace A1 A58 Processor CCA (para 2-136).

Message MARKER CONTROL ERROR. is displayed.
Step 1. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys. Set TIME/DIV to AUTO. Connect (+) DMM lead to Al A72P72 pin 60 (fig FO-19). Connect (-) lead to chassis ground. Verify that voltage range is >+2.5 V and more negative than -2.5 V as **CENTER/MARKER FREQUENCY** knob is tuned.
- If correct, perform Step 2.
- If not correct, replace Al A72 Sweep CCA (para 2-141).

NOTE

Waveform measured in next step should have a pulse located just before the sweep ramp. This pulse occurs when the marker frequency is counted.

Step 2. Select the following control settings. After selecting settings, press **TUNE** and **COUNT** keys. Make measurement at A1A72TP2 (fig FO-19, waveform 8).
SPAN/DIV 10MHZ
TIME/DIV 1MS
- If waveform correct, replace A1 A60 Horiz Digital Storage CCA (para 2-137).
- If waveform not correct, replace Al A72 Sweep CCA (para 2-141).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

7. CAL OUT SIGNAL FREQUENCY TEST FAILURE.

NOTE
Allow 30-minute warm-up after Turn-On Procedure.

Step 1. Read REF OSC readout on CRT.
- If INT, perform Step 2.
- If I-U, EXT, or E-U, perform 3rd LO Fault Isolation Test (para 2-12).

Step 2. Adjust 10 MHz Reference Oscillator (para 2-107). Perform CAL OUT Signal Frequency Test (para 2-57).
- If test passes, equipment is operational.
- If test fails, perform 3rd LO Fault Isolation Test (para 2-12).

8. CENTER/MARKER FREQUENCY TEST (1ST LO LOCKED) FAILURE.

NOTE
Allow 30-minute warm-up after Turn-On Procedure.

Step 1. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7). Perform Center/Marker Frequency Test (1st LO Locked) (para 2-58).
- If test passes, equipment is operational.
- If test fails, perform Step 2.

Step 2. Adjust 10 MHz Reference Oscillator (para 2-107). Perform Center/Marker Frequency Test (1st LO Locked) (para 2-58).
- If test passes, equipment is operational.
- If test fails, perform Step 3.
- If not able to adjust 10 MHz Reference Oscillator, perform 3rd LO Fault Isolation Test (para 2-12).

Step 3. Perform Residual FM Test (para 2-61).
- If test passes, perform Step 4.
- If test fails, perform malfunction 11.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 4. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 2=2ND LO CONTROL. Compare OFFSET FREQ COUNTED and OFFSET FREQ DESIRED values. See example display (fig FO-3).

- If difference is within range of OFFSET SETTING ACCURACY, perform 1st LO Fault Isolation Test (para 2-20).
- If difference is not within range of OFFSET SETTING ACCURACY, perform 2nd LO Fault Isolation Test (para 2-16).

9. COUNTER ACCURACY TEST FAILURE.

NOTE
Allow 30-minute warm-up after Turn-On Procedure.

Step 1. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7). Perform Counter Accuracy Test (para 2-59).

- If test passes, equipment is operational.
- If test fails, perform Step 2.

Step 2. Perform Center/Marker Frequency Test (1st LO Locked) (para 2-58).

- If test passes, perform Counter Fault Isolation Test (para 2-38).
- If test fails, perform malfunction 8.

10. CENTER FREQUENCY STABILITY FAILURE.

NOTE
Allow one-hour warm-up after Turn-On Procedure.

Step 1. Perform Center Frequency Stability Test (para 2-60).

- If test passes, equipment is operational.
- If test fails, perform Step 2.

Step 2. Co nnect (+) DMM lead to A1A46A1TP5 (fig FO-9). Connect (-) lead to chassis ground. On 495P Spectrum Analyzer, set SPAN/DIV to 10 kHz. Adjust **CENTER/MARKER FREQUENCY** knob for ≤50 mV and write value on paper. Wait 60 seconds and repeat measurement at A1A46A1TP5.

- If voltage changes ≥ 0.5 mV, replace A1A46 Center Freq Control CCA (para 2-121).
- If voltage changes ≤0.5 mV, replace A1A22A1 16-20 MHz Phase Lock CCA (para 2-207).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

11. RESIDUAL FM TEST FAILURE.

NOTE

Allow 30-minute warm-up after Turn-On Procedure.

Step 1. Perform Residual FM Test (para 2-61).
- If test passes, equipment is operational.
- If test fails, perform Step 2.

Step 2. With power off, unsolder brown wire (fig FO-1, Sheet 2) from ground lug on A1A22 Phase Locked 2nd LO. Connect DMM between A1A46A1TP4 (fig FO-9) and brown wire. Measure approximately 0 Ω.
- If resistance correct, perform Step 3.
- If resistance not correct, repair wire connection at A1A28 Mother CCA.

Step 3. Connect DMM between A1A46A1TP4 and chassis ground. Measure 95-105 Ω.
- If resistance correct, resolder brown wire and notify next higher level of maintenance.
- If resistance not correct, resolder brown wire and replace A1A46 Center Freq Control CCA (para 2-121).

12. FREQUENCY SPAN/DIV ACCURACY TEST FAILURE.

Step 1. Adjust Frequency Span/Div and Dot Marker Position (para 2-94). Perform Frequency Span/Div Accuracy Test (para 2-62).
- If test passes, equipment is operational.
- If test fails, perform Step 2.

Step 2. On 495P Spectrum Analyzer, rotate **FREQUENCY SPAN/DIV** knob. Verify that CRT readout changes for each position of knob.
- If readout changes, perform Step 3.
- If readout does not change, perform Front Panel Fault Isolation Test (para 2-40) for **FREQUENCY SPAN/DIV** knob.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 3. Perform Frequency Span/Div Accuracy Test an d note which settings fail.
- If one or more settings are nonlinear, perform Step 5.
- If only settings between 100 MHz and 500 kHz fail, perform 1st LO Fault Isolation Test (para 2-20, Step 13).
- If only settings between 200 kHz and 50 kHz fail, perform 2nd LO Fault Isolation Test (para 2-16).
- If only settings between 20 kHz and 50 Hz fail, perform Step 4.
- If random settings fail, replace A1A48 Span Attenuator CCA (para 2-122).

Step 4. Set SPAN/DIV to 20 kHz. Measure TTL high at A1A22C220 (fig FO-3).
- If high, replace A1A22A1 16-20 MHz Phase Lock CCA (para 2-207).
- If low, replace A1A48 Span Attenuator CCA (para 2-122).

Step 5. Perform Frequency Span/Div Accuracy Test and note which settings are nonlinear.
- If all settings or random settings nonlinear, perform Step 6.
- If only settings -500 kHz nonlinear, replace A1A16 1st LO Assembly (para 2-201).
- If only settings between 200 kHz and 50 Hz nonlinear, perform Step 7.

Step 6. Perform Sweep Time Accuracy Test (para 2-63).
- If test passes, replace A1A48 Span Attenuator CCA (para 2-122).
- If test fails, replace A1A72 Sweep CCA (para 2-141).

Step 7. Toggle SPAN/DIV between 20 kHz and 50 kHz. Verify that TTL level at Al A22C220 (fig FO-3) toggles between low and high.
- If signal toggles, replace A1A22A1 16-20 MHz Phase Lock CCA (para 2-207).
- If signal does not toggle, replace A1A48 Span Attenuator CCA (para 2-122).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

13. SWEEP TIME ACCURACY TEST FAILURE.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **When testing A1 A40 Video Processor CCA (para 2-119), the assembly must be placed on circuit card extenders using the extender kit**.

Step 1. On 495P Spectrum Analyzer, press **ZERO SPAN** key. Rotate **TIME/DIV** knob. Verify that CRT readout changes for each position of knob.
- If readout changes, perform Step 2.
- If readout does not change, perform Front Panel Fault Isolation Test (para 2-40) for **TIME/DIV** knob.

Step 2. Perform Sweep Time Accuracy Test (para 2-63) and check CRT for time markers.
- If time markers displayed, perform Step 6.
- If time markers not displayed, perform Step 3.

Step 3. Verify that pin 1 is connected to pin 5 on J104 ACCESSORY connector. Verify that calibration generator is connected to MARKER I VIDEO connector. Perform Sweep Time Accuracy Test (para 2-63) and check CRT for time markers.
- If time markers displayed, equipment is operational.
- If time markers not displayed, perform Step 4.

Step 4. Measure TTL low at A1A40TP3069 (fig FO-9).
- If low, perform Step 5.
- If high, replace A1A30A76 Accessories Interface CCA (para 2-172).

Step 5. With power off, connect DMM between A1A40TP3067 and center conductor of MARKER I VIDEO connector. Measure approximately 0 Ω.
- If resistance correct, replace A1A40 Video Processor CCA (para 2-119).
- If resistance not correct, repair A1W1021.

Step 6. Adjust Sweep Timing (para 2-92). Perform Sweep Time Accuracy Test (para 2-63).
- If test passes, equipment is operational.
- If test fails, replace A1A72 Sweep CCA (para 2-141).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

14. RESOLUTION BANDWIDTH AND SHAPE FACTOR TEST FAILURE.

Step 1. On 495P Spectrum Analyzer, press **AUTO RESOLN** key to turn off AUTO RESOLN mode. Rotate **RESOLUTION BANDWIDTH** knob. Verify that CRT readout changes for each position of knob.

- If readout changes, perform Step 2.
- If readout does not change, perform Front Panel Fault Isolation Test (para 2-40) for **RESOLUTION BANDWIDTH** knob.

NOTE
Allow 30-minute warm-up after Turn-On Procedure.

Step 2. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7). Perform Resolution Bandwidth and Shape Factor Test (para 2-64).

- If test passes, equipment is operational.
- If test fails, perform Variable Resolution Fault Isolation Test (para 2-26).

15. NOISE SIDEBAND AMPLITUDE TEST FAILURE.

NOTE
Allow 30-minute warm-up after Turn-On Procedure.

Step 1. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7). Perform Noise Sideband Amplitude Test (para 2-65).

- If test passes, equipment is operational.
- If test fails, perform Step 2.

Step 2. Perform Sensitivity Test (para 2-72).

- If test passes, perform Step 3.
- If test fails, perform malfunction 22.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 3. On 495P Spectrum Analyzer, select the following settings. After selecting settings, connect CAL OUT signal to RF INPUT. Press **SAVE A** key. Verify that trace is saved on CRT.

CENTER/MARKER FREQUENCY	100MHZ
SPAN/DIV	200KHZ
VERTICAL SCALE	10DB/
RESOLUTION BANDWIDTH	10KHZ
AUTO RESOLN	OFF
REFERENCE LEVEL	-40DBM
WIDE VIDEO FILTER	ON

- If trace saved, perform Step 4.
- If trace not saved, perform Digital Storage Fault Isolation Test (para 2-18).

Step 4. Set SPAN/DIV to 210 kHz. Compare noise amplitude of active t race to SAVE A trace.

- If noise amplitude on SAVE A trace is higher than noise on active trace, press SAVE A key and perform Step 7.
- If noise amplitude on **SAVE A** trace is not higher than noise on active trace, perform Step 5.

Step 5. Disconnect coaxial cable or termination from 1ST LO OUTPUT. Select MANUAL SCAN mode. Connect coaxial cable between test spectrum analyzer and 1ST LO OUTPUT connector. Select test spectrum analyzer settings shown below. After selecting settings, tune signal to center of test spectrum analyzer CRT.

CENTER FREQUENCY	2.172GHZ
SPAN/DIV	1OMHZ
REFERENCE LEVEL	+10DBM
WIDE VIDEO FILTER	ON

- If signal is displayed on CRT of test spectrum analyzer, perform Step 6.
- If signal is not displayed on CRT of test spectrum analyzer, perform 1 st LO Output Fault Isolation Test (para 2-19).

Step 6. On test spectrum analyzer, reduce SPAN/DIV to 10 kHz. Make measurement of signal at 1ST LO OUTPUT. Compare noise on 1ST LO OUTPUT signal to noise around signal on CRT of 495P Spectrum Analyzer.

- If noise around 1ST LO OUTPUT signal is higher than noise on CRT of 495P Spectrum Analyzer, replace A1 A16 1st LO Assembly (para 2-201).
- If noise around 1ST LO OUTPUT signal is lower than noise on CRT of 495P Spectrum Analyzer, notify next higher level of maintenance.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 7. Adjust Phase Lock Assembly (para 2-109). Perform Noise Sideband Amplitude Test (para 2-65).
- If test passes, equipment is operational.
- If test fails, perform Step 8.

Step 8. Perform A1A24 Phase Gate Assembly Fault Isolation Test (para 2-37).
- If test passes, notify next higher level of maintenance.
- If test fails, replace faulty component.

16. CAL OUT AMPLITUDE TEST FAILURE.

Perform 3rd LO Fault Isolation Test (para 2-12).
- If test passes, equipment is operational.
- If test fails, replace faulty component.

17. FREQUENCY RESPONSE TEST (495P SPECTRUM ANALYZER) FAILURE.

NOTE

Frequency Response Test (495P Spectrum Analyzer) can fail when 1ST LO OUTPUT and 2ND LO OUTPUT connectors are not terminated. These connectors are terminated by installing 50 Ω terminators or by connecting to TR 503 Tracking Generator.

Step 1. Adjust Baseline Leveling (para 2-106). Perform Frequency Response Test (495P Spectrum Analyzer) (para 2-67).
- If test passes, equipment is operational.
- If test fails, perform Step 2.

Step 2. On 495P Spectrum Analyzer, set SPAN/DIV to MAX. Make measurement at A1A40P3035 (fig FO-9, waveform 2).
- If waveform correct, perform Step 4.
- If waveform not correct, perform Step 3.

Step 3. Make measurement at A1A44A1TP1058 (fig FO-9, waveform 4).
- If waveform correct, replace A1A40 Video Processor CCA (para 2-119).
- If waveform not correct, replace A1A44 1st LO Driver CCA (para 2-120).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 4. Press FINE key and set VERTICAL DISPLAY to 10 dB per division. Change REFERENCE LEVEL between -10 dBm and -19 dBm. Verify that signal on CRT increases approximately 0.1 division per step.
- If signal increases, perform Step 5.
- If signal does not increase, replace A1A62A1 Log Amplifier CCA (para 2-140).

Step 5. Perform 1st LO Fault Isolation Test (para 2-20).
- If 1st LO amplitude within limits, perform Step 6.
- If 1 st LO amplitude not within limits, replace faulty component.

Step 6. Disconnect A1W101 from A1AT10P101 (fig FO-2). Connect sweep oscillator directly to A1AT10P101. With sweep oscillator connected to A1 AT10P101, perform Frequency Response Test (495P Spectrum Analyzer) (para 2-67).
- If test passes, replace A1W101 (fig FO-1, Sheet 2).
- If test fails, perform Step 7.

Step 7. Remove A1AT10 (para 2-212). Connect sweep oscillator directly to A1W100. With sweep oscillator connected to A1W100, perform Frequency Response Test (495P Spectrum Analyzer) (para 2-67).
- If test passes, replace Al AT10 Step Attenuator (para 2-212).
- If test fails, perform Step 8.

Step 8. Disconnect A1W100 fro m A1FL10P109. Connect sweep oscillator directly to Al FL1 OP109. With sweep oscillator connected to A1FL10P109, perform Frequency Response Test (495P Spectrum Analyzer) (para 2-67).
- If test passes, replace A1W100 (fig FO-1, Sheet 2).
- If test fails, perform Step 9.

Step 9. Disconnect A1W105 from A1FL10P105. Connect sweep oscillator directly to A1W105. With sweep oscillator connected to A1W105, perform Frequency Response Test (495P Spectrum Analyzer) (para 2-67).
- If test passes, replace Al FL10 Lowpass Filter (para 2-197).
- If test fails, perform Step 10.

Step 10. Disconnect A1W105 from A1AT12P121. Connect sweep oscillator directly to Al AT12P121. With sweep oscillator connected to Al AT12P121, perform Frequency Response Test (495P Spectrum Analyzer) (para 2-67).
- If test passes, replace AIW105 (fig FO-1, Sheet 2).
- If test fails, perform Step 11.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 11. Install all removed ass emblies and cables. Adjust 0 Hz Response (para 2-102).
- If able to adjust, perform Step 12.
- If not able to adjust, perform Step 13.

Step 12. Perform RF Components Fault Isolation Test (para 2-13). Test A1AT12 Attenuator, A1FL16 Directional Filter, A1P164 50 n Coaxial Termination, and A1W161 Cable Assembly.
- If tests pass, replace A1A12 Mixer (para 2-213).
- If tests fail, replace faulty component.

Step 13. Perform A1AT126 Variable Load Assembly Fault Isolation Test (para 2-11).
- If test passes, perform Step 14.
- If test fails, replace A1AT126 Variable Load Assembly (para 2-214).

Step 14. Perform RF Components Fault Isolation Test (para 2-13). Test A1AT124 Attenuator and A1W124 Cable Assembly.
- If tests pass, replace A1A12 Mixer (para 2-213).
- If tests fail, replace faulty component.

18. DYNAMIC RANGE AND ACCURACY TEST FAILURE.

Step 1. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7). Perform Dynamic Range and Accuracy Test (para 2-68).
- If test passes, equipment is operational.
- If test fails, perform Step 2.

Step 2. Adjust Digital Storage (para 2-91). Perform Dynamic Range and Accuracy Test (para 2-68).
- If test passes, equipment is operational.
- If test fails, perform Step 3.
- If not able to adjust, perform Digital Storage Fault Isolation Test (para 2-18).

Step 3. Adjust Log Amplifier (para 2-95). Perform Dynamic Range and Accuracy Test (para 2-68).
- If test passes, equipment is operational.
- If test fails, perform Step 4.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 4. Adjust Deflection Amplifier Gain and Frequency Response (para 2-90). Perform Dynamic Range and Accuracy Test (para 2-68).
- If test passes, equipment is operational.
- If test fails, replace A1A62A1 Log Amplifier CCA (para 2-140).
- If not able to adjust, perform RF Signal Path Fault Isolation Test (para 2-14).

19. RF ATTENUATOR ACCURACY TEST FAILURE.

Step 1. On 495P Spectrum Analyzer, set REFERENCE LEVEL to -30 dBm. Rotate **MIN RF ATTEN** knob. Verify that CRT readout changes for each position of knob.
- If readout changes, perform Step 2.
- If readout does not change, perform Front Panel Fault Isolation Test (para 2-40) for **MIN RF ATTEN** knob.

Step 2. Perform Step Attenuator Fault Isolation Test (para 2-39).
- If test passes, replace A1AT10 Step Attenuator (para 2-212).
- If test fails, replace faulty component.

20. IF GAIN ACCURACY TEST FAILURE.

Step 1. On 495P Spectrum Analyzer, rotate **REFERENCE LEVEL** knob. Verify that CRT readout changes for each position of knob.
- If readout changes, perform Step 2.
- If readout does not change, perform Front Panel Fault Isolation Test (para 2-40) for **REFERENCE LEVEL** knob.

Step 2. Perform Check Output Level Test (para 2-82).
- If test passes, perform Step 3.
- If test fails, perform malfunction 32.

Step 3. With power meter connected to RF OUTPUT, set OUTPUT LEVEL to -20 dBm. Verify that power meter displays between-17 dBm and -23 dBm.
- If power correct, perform Step 4.
- If power not correct, replace A2A13 Step Attenuator (para 2-223).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 4. Adjust Log Amplifier (para 2-95). Perform IF Gain Accuracy Test (para 2-70).
- If test passes, equipment is operational.
- If test fails, perform Step 5.
- If not able to adjust, replace A1A62A1 Log Amplifier CCA (para 2-140).

Step 5. Adjust Variable Resolution Gain Steps (para 2-98). Perform IF Gain Accuracy Test (para 2-70).
- If test passes, equipment is operational.
- If test fails, replace A1A62A1 Log Amplifier CCA (para 2-140).
- If not able to adjust, perform Variable Resolution Gain Steps Fault Isolation Test (para 2-28).

21. GAIN VARIATION BETWEEN RESOLUTION BANDWIDTHS TEST FAILURE.

Step 1. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7). Perform Gain Variation Between Resolution Bandwidths Test (para 2-71).
- If test passes, equipment is operational.
- If test fails, perform Step 2.

Step 2. Adjust Resolution Bandwidth and Shape Factor (para 2-96). Perform Gain Variation Between Resolution Bandwidths Test (para 2-71). Note which RESOLUTION BANDWIDTH setting(s) is not within limits.
- If test passes, equipment is operational.
- If only 10 Hz and/or 100 Hz filters not within limits, perform Step 3.
- If filters between 3 MHz and 1 kHz not within limits, perform Variable Resolution Fault Isolation Test (para 2-26).

Step 3. Adjust 10/100 Hz Filter (para 2-97). Perform Gain Variation Between Resolution Bandwidths Test (para 2-71). Note which RESOLUTION BANDWIDTH setting(s) is not within limits.
- If test passes, equipment is operational.
- If 10 Hz and/or 100 Hz filters not within limits, perform 10/100 Hz Filter Fault Isolation Test (para 2-34).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

22. SENSITIVITY TEST FAILURE.

Step 1. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7). Perform Sensitivity Test (para 2-72). Note CENTER FREQUENCY setting where test fails.

- If test passes, equipment is operational.
- If test fails at CENTER FREQUENCY settings below 1 MHz, perform Step 3.
- If test fails at CENTER FREQUENCY settings above 1 MHz, perform Step 2.

Step 2. Adjust 10/100 Hz Filter (para 2-97). Perform Sensitivity Test (para 2-72).

- If test passes, equipment is operational.
- If test fails, perform RF Signal Path Fault Isolation Test (para 2-14).
- If not able to adjust, perform Bandpass Filter Fault Isolation Test (para 2-32).

Step 3. Adjust 0 Hz Response (para 2-102). Perform Sensitivity Test (para 2-72).

- If test passes, equipment is operational.
- If test fails, perform Step 4.
- If not able to adjust, perform Step 6.

Step 4. Perform Noise Sideband Amplitude Test (para 2-65).

- If test passes, perform Step 5.
- If test fails, perform malfunction 15.

Step 5. Perform Frequency Response Test (495P Spectrum Analyzer) (para 2-67).

- If test passes, replace Al A12 Mixer (para 2-213).
- If test fails, perform malfunction 17.

Step 6. Perform A 1AT126 Variable Load Assembly Fault Isolation Test (para 2-11).

- If test passes, perform Step 7.
- If test fails, replace A1AT126 Variable Load Assembly (para 2-214).

Step 7. Perform RF Components Fault Isolation Test (para 2-13). Test A1AT124 Attenuator and A1W124 Cable Assembly.

- If tests pass, replace A1A12 Mixer (para 2-213).
- If tests fail, replace faulty component.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

23. RESIDUAL SPURIOUS RESPONSE TEST FAILURE.

NOTE

Spurious signals are usually caused by loose or damaged coaxial cables, or RF assemblies that are not sealed properly. Faulty components may otherwise operate normally.

Step 1. Inspect for loose or damaged semirigid cables. Look for cracked solder connections where cables attach to SMA connectors.

- Tighten loose connectors to 8 inch pounds and perform Step 2.
- Replace damaged cables and perform Step 2.

Step 2. Perform Residual Spurious Response Test (para 2-73).

- If test passes, equipment is operational.
- If test fails, perform Step 3.

Step 3. Inspect for loose covers or damaged seals to RF assemblies.

- Tighten loose covers and perform Step 4.
- Replace damaged assemblies and perform Step 4.

Step 4. Perform Residual Spurious Response Test (para 2-73).

- If test passes, equipment is operational.
- If test fails, tighten mounting hardware for RF assemblies and perform Step 5.

Step 5. Perform Residual Spurious Response Test (para 2-73).

- If test passes, equipment is operational.
- If test fails, notify next higher level of maintenance.

24. INTERMODULATION DISTORTION TEST FAILURE.

Step 1. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7). Perform Intermodulation Distortion Test (para 2-74).

- If test passes, equipment is operational.
- If test fails, perform Step 2.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 2. Unplug A1W320 from A1A32J320 (fig FO-7). Connect variable attenuator (1 dB steps) between A1W320 and A1A32J320. Set variable attenuator to 0 dB. Perform Intermodulation Distortion Test (para 2-74). On 495P Spectrum Analyzer, press **SAVE A** key. Verify that trace is saved on CRT.

- If trace saved, perform Step 3.
- If trace not saved, perform Digital Storage Fault Isolation Test (para 2-18).

Step 3. Set variable attenuator to 3 dB. Perform Intermodulation Distortion Test (para 2-74). Compare amplitude of distortion products on active and SAVE A traces.

- If distortion on active trace is $\leq$ 3 dB lower than SAVE A trace, replace A1A32 IF Amplifier (para 2-203).
- If distortion on active trace is approximately 6 dB lower than SAVE A trace, perform Step 4.

Step 4. Adjust Variable Resolution Gain Steps (para2-98). Adjust 110 MHz IF Gain (para 2-100). Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7). Perform Intermodulation Distortion Test (para 2-74).

- If test passes, equipment is operational.
- If test fails, replace AlA34 3rd Converter Assembly (para 2-200).

25. HARMONIC DISTORTION TEST FAILURE.

Perform 1st LO Fault Isolation Test (para 2-20).

- If test passes, replace A1A12 Mixer (para 2-213).
- If test fails, replace faulty component.

26. INTERNAL TRIGGER OPERATION TEST FAILURE.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **When testing A1 A40 Video Processor CCA (para 2-119), the assembly must be placed on circuit card extenders using the extender kit.**

Step 1. Verify that jumper is installed between pins 1 and 5 of J104 ACCESSORY connector. Measure TTL low at A1A40TP3069 (fig FO-9).

- If low, perform Step 2.
- If high, replace A1A30A76 Accessories Interface CCA (para 2-172).

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 2. Connect DMM between A1A40TP3067 and center conductor of MARKER I VIDEO connector. Measure approximately 0 Ω.

- If resistance correct, perform Step 3.
- If resistance not correct, repair A1W1021 (Appendix C).

Step 3. Disconnect equipment from 495P Spectrum Analyzer. Press **Blue-SHIFT** and **RESET** keys. Select the following settings. Verify that sweep is active.

CENTER/MARKER FREQUENCY 0MHZ
SPAN/DIV 1MHZ
RESOLUTION BANDWIDTH 1MHZ
VIEWAAND B .... OFF
TIME/DIV .... AUTO
TRIGGER MODE .... INT

- If sweep active, replace A1A40 Video Processor CCA (para 2-119).
- If sweep not active, replace A1A72 Sweep CCA (para 2-141).

27. EXTERNAL TRIGGER OPERATION TEST FAILURE.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **When testing A1A72 Sweep CCA (para 2-141), the assembly must be placed on circuit card extenders using the extender kit.**

Step 1. Perform External Trigger Operation Test (para 2-77, Steps 1-7). Press **VIEW A** and **VIEW B** keys. Check CRT for triggered (active) sweep.

- If sweep triggered, perform Digital Storage Fault Isolation Test (para 2-18).
- If sweep not triggered, perform Step 2.

Step 2. Make measurement at A1A72P72 pin 57 (fig FO-19, waveform 3).

- If waveform correct, replace A1A72 Sweep CCA (para 2-141).
- If waveform not correct, perform Step 3.

Step 3. Remove A1A30 Power Supply (para2-165) and A1A30 Power Supply Shield (para 2-166). Verify that multiwire cable is plugged onto A1A30A1 P5042 (fig FO-6, Sheet 1).

- If cable connected, repair HORIZITRIG (EXT IN) connector (Appendix C).
- If cable not connected, install onto A1A30A1 P5042.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

28. EXTERNAL SWEEP OPERATION TEST FAILURE.

Step 1. With power off, remove A1A72 Sweep CCA (para 2-141). Connect DMM between center conductor of HORIZITRIG (EXT IN) connector and A1A28J72 pin 57 (fig FO-5). Measure approximately 0 Ω.

- If resistance correct, replace A1A72 Sweep CCA (para 2-141).
- If resistance not correct, perform Step 2.

Step 2. Remove A1A30 Power Supply (para2-165) and A1A30 Power Supply Shield (para 2-166). Verify that multiwire cable is plugged onto A1A30A1 P5042 (fig FO-6, Sheet 1).

- If cable connected, repair HORIZITRIG (EXT IN) connector (Appendix C).
- If cable not connected, install onto A1A30A1 P5042.

29. VERT OUTPUT SIGNAL TEST FAILURE.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **When testing A1A64 Deflection Amplifiers CCA (para 2-144), the assembly must be placed on circuit card extenders using the extender kit.**

Step 1. Perform VERT Output Signal Test (para 2-79, Steps 1-8).

- If signal aligns with top graticule line, perform Step 2.
- If signal does not align with top graticule line, perform RF Signal Path Fault Isolation Test (para 2-14).

Step 2. Make measurement at A1A64A1 P64 pin 46 (fig FO-14, waveform 5).

- If waveform correct, perform Step 3.
- If waveform not correct, replace A1A64 Deflection Amplifiers CCA (para 2-144).

Step 3. Remove A1A30 Power Supply (para 2-165) and A1A30 Power Suppl y Shield (para 2-166). Verify that multiwire cable is plugged onto A1A30A1 P5042 (fig FO-6, Sheet 1).

- If cable connected, repair VERT (OUTPUT) connector (Appendix C).
- If cable not connected, install onto A1A30A1 P5042.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

30. HORIZ OUTPUT SIGNAL TEST FAILURE.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **When testing A1A64 Deflection Amplifiers CCA (para 2-144), the assembly must be placed on circuit card extenders using the extender kit.**

Step 1. Perform HORIZ Output Signal Test (para 2-80, Steps 1-6). Rotate **MANUAL SCAN** knob and check CRT of 495P Spectrum Analyzer for movement of beam.
- If beam moves, perform Step 4.
- If beam does not move, perform Step 2.

Step 2. Perform Front Panel Potentiometer Fault Isolation Test (para 2-42) for A1A38R4121.
- If test passes, perform Step 3.
- If test fails, replace faulty component.

Step 3. Connect (+) DMM lead to A1A72TP2 (fig FO-19). Connect (-) lead to chassis ground. Measure -5 V to +5 V while rotating **MANUAL SCAN** knob through range.
- If range correct, perform Step 4.
- If range not correct, replace A1A72 Sweep CCA (para 2-141).

Step 4. Connect (+) DMM lead to A1A64A1P64 pin 48 (fig FO-14). Connect (-) lead to chassis ground. Measure -2.5 V to +2.5 V while rotating MANUAL SCAN knob through range.
- If range correct, perform Step 5.
- If range not correct, replace A1A64 Deflection Amplifiers CCA (para 2-144).

Step 5. Remove A1A30 Power Supply (para2-165) and A1A30 Power Supply Shield (para 2-166). Verify that multiwire cable is plugged onto A1A30A1 P5042 (fig FO-6, Sheet 1).
- If cable connected, repair HORIZ (OUTPUT) connector (Appendix C).
- If cable not connected, install onto A1A30A1 P5042.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

31. CHECK FREQUENCY RANGE TEST FAILURE.

Perform malfunction 5.

32. CHECK OUTPUT LEVEL TEST FAILURE.

Step 1. Perform 2nd LO Output Fault Isolation Test (para 2-15).
- If test passes, perform Step 2.
- If test fails, perform 2nd LO Fault Isolation Test (para 2-16).

Step 2. Perform 1st LO Output Fault Isolation Test (para 2-19).
- If test passes, perform Step 3.
- If test fails, perform 1 st LO Fault Isolation Test (para 2-20).

Step 3. On TR 503 Tracking Generator, remove termination from AUX RF OUT connector. Set OUTPUT LEVEL to -20 dBm. Using power meter, measure $\geq$-6 dBm at AUX RF OUT connector.
- If power correct, replace A2A13 Step Attenuator (para 2-223).
- If power not correct, perform Step 4.

Step 4. Adjust Normalizing Attenuator (para 2-112). Perform Check Output Level Test (para 2-82).
- If test passes, equipment is operational.
- If test fails, perform Step 5.

Step 5. Adjust Output Level (para 2-113). Perform Check Output Level Test (para 2-82).
- If test passes, equipment is operational.
- If test fails, perform Tracking Generator 1 st LO Fault Isolation Test (para 2-47).

33. CHECK SYSTEM FLATNESS TEST FAILURE.

Step 1. Perform Frequency Response Test (495P Spectrum Analyzer) (para 2-67).
- If test passes, perform Step 2.
- If test fails, perform malfunction 17.

Step 2. Adjust Normalizing Attenuator (para 2-112).
- If able to adjust, equipment is operational.
- If not able to adjust, perform Step 3.

Table 2-1. Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 3. Per form 2nd LO Output Fault Isolation Test (para 2-15).
- If test passes, perform Step 4.
- If test fails, perform 2nd LO Fault Isolation Test (para 2-16).

Step 4. Perform 1st LO Output Fault Isolation Test (para 2-19).
- If test passes, perform Tracking Generator 1 st LO Fault Isolation Test (para 2-47).
- If test fails, perform 1st LO Fault Isolation Test (para 2-20).

34. CHECK FOR SPURIOUS SIGNALS TEST FAILURE.

NOTE

Spurious signals are usually caused by loose or damaged coaxial cables, or RF assemblies that are not sealed properly. Faulty components may otherwise operate normally.

Step 1. Inspect for loose or damaged semirigid cables. Look for cracked solder connections where cables attach to SMA connectors.
- Tighten loose connectors to 8 inch pounds and perform Step 2.
- Replace damaged cables and perform Step 2.

Step 2. Perform Residual Spurious Response Test (para 2-73).
- If test passes, equipment is operational.
- If test fails, perform Step 3.

Step 3. Inspect for loose covers or damaged seals to RF a ssemblies.
- Tighten loose covers and perform Step 4.
- Replace damaged assemblies and perform Step 4.

Step 4. Perform Residual Spurious Response Test (para 2-73).
- If test passes, equipment is operational.
- If test fails, tighten mounting hardware for RF assemblies and perform Step 5.

Step 5. Perform Residual Spurious Response Test (para 2-73).
- If test passes, equipment is operational.
- If test fails, notify next higher level of maintenance.

2-10. 495P SPECTRUM ANALYZER POWER SUPPLY FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A18 2nd Converter Assembly, A1A26 Auxiliary Synthesizer CCA, A1A30A1 Power Supply CCA, A1A30A2 Fan Driver CCA, A1A30A57 GPIB Interface CCA, A1A30A76 Accessories Interface CCA, A1A32 IF Amplifier, A1A34 3rd Converter Assembly, A1A36 Reference Lock, Al A37 10 MHz Reference, A1A38 Front Panel CCA, A1A40 Video Processor CCA, A1A44 1st LO Driver CCA, A1A46 Center Freq Control CCA, A1A48 Span Attenuator CCA, A1A51 Counter CCA, A1A54 Memory CCA, A1A56 GPIB CCA, A1A58 Processor CCA, A1A60 Horiz Digital Storage CCA, A1A61A1 Vert Digital Storage CCA, A1A62A1 Log Amplifier CCA, A1A64 Deflection Amplifiers CCA, A1A66A1 CRT Readout CCA, A1A70 Z-Axis CCA, A1A72 Sweep CCA, A1A74 High Voltage CCA, and chassis-mounted components within A1 A30 Power Supply.

NOTE

- **All voltages are measured with respect to chassis ground.**
- **Red Power Status LED A1A70DS1062 (fig FO-19) shows when one or more supplies exceed limits by - $\geq$ 20%.**

1. Remove Front CCA Bracket (para 2-139).

2. Check each voltage on Al A70 Z-Axis CCA (fig FO-19) against those in following table.
   - If voltages within limits, perform Step 5.
   - If all voltages are missing, perform Step 3.
   - If +15 V supply exceeds limits, perform Step 4.
   - If one or more voltages exceeds limits or is missing, perform Step 7.
   - If all supplies exceed limits, replace A1A30A1 Power Supply CCA (para 2-169).

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+9 V	+8.92 V to +10.1 V	A1A70TP1011
-15 V	-14.84 V to -15.16 V	A1A70TP1035
-5 V	-4.96 V to -5.05 V	A1A70TP1036
-7 V	-7 V to -8.5 V	A1A70TP1037
+5 V	+4.73 V to +5.23 V	A1A70TP1044
+15 V	+14.99 V to +15.01 V	A1A70TP1046
+17 V	+16.81 V to +18.6 V	A1A70TP1047
+100 V	+95 V to +105 V	A1A70TP1048
+300 V	+280 V to +310 V	A1A70TP1052

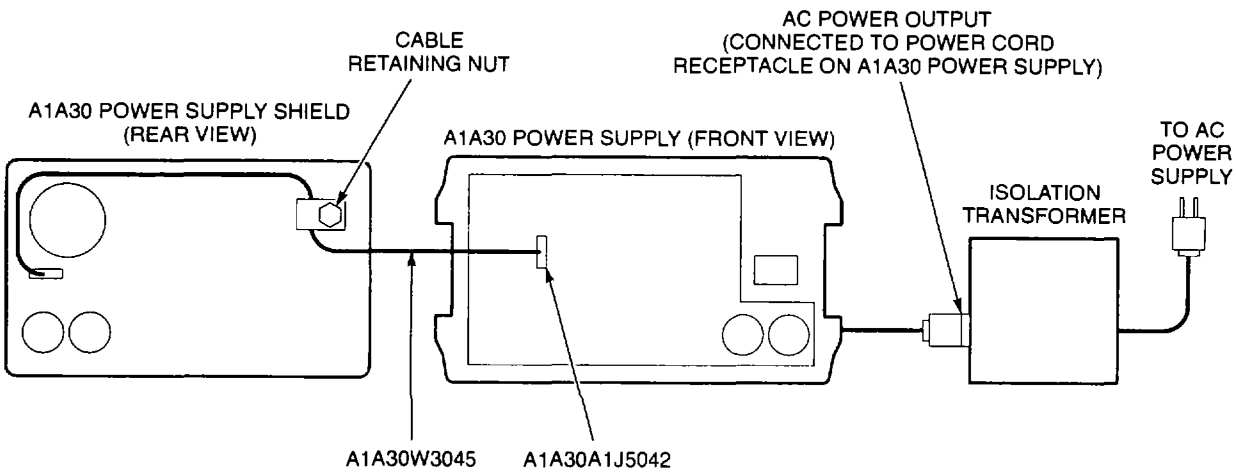
3. Use DMM to test fuses A1A30F301 and A1A30A1S2103, and switches A1A30S300 and A1A30S303.
   - If all components are functional, replace A1A30A1 Power Supply CCA (para 2-169).
   - If A1A30F301, A1A30S300 or A1A30S303 (para2-170), or A1A30AlS2103 (para 2-177) not functional, replace faulty component.

4. Check and Adjust Low-Voltage Power Supply (495P Spectrum Analyzer) (para 2-87).
   - If able to adjust, repeat Step 2.
   - If not able to adjust, perform Step 7.

5. Connect (+) DMM lead to A1A70TP1068. Connect (-) lead to A1A70TP1069.

6. Adjust A1A70R1065 for +0.19 V to +0.21 V on DMM display. Verify that A1A70DS1062 LED is green.
   - If A1A70DS1062 LED is red, replace A1A70 Z-Axis CCA (para 2-142).
   - If A1A70DS1062 LED is green, A1A30 Power Supply is operational.

7. Remove A1A30 Power Supply (para 2-165) and A1A30 Power Supply Shield (para 2-166).



8. Connect equipment as shown.
   - Connect AC power cord between isolation transformer and A1A30 Power Supply.
   - Remove cable retaining nut on A1A30 Power Supply shield. Dress multiwire cable A1A30W3045 so shield and A1A30A1 Power Supply CCA do not touch.
   - Plug A1A30W3045 onto A1A30A1 P3045 (fig FO-6, Sheet 1).

NOTE

Fan A1A30B100 runs when power switches are closed.

9. Slide plastic tool between power switches A1A30S300 and A1A30S303 to turn power on.

10. Check each voltage at A1A30A1 J5041 against those in following table.

NOTE
Blown fuses indicate possible short circuits on other assemblies.

- If -7, +9, +17, +100, or +300 V supplies missing, replace appropriate fuse (para 2-176) and perform Step 11.
- If +5 V supply exceed limits, perform Step 12.
- If +15, -5, or -15 V supplies exceed limits, replace Al A30A1 Power Supply CCA (para 2-169).
- If supplies within limits, perform Step 16.

POWER SUPPLY	A1A30A1J5041 CONNECTOR PINS	VOLTAGE LIMITS
+15 V	3	$\geq$+14.99 V
-15 V	6	$\geq$-14.84 V
+5 V	14	$\geq$+4.73 V
+9 V	16	$\geq$+8.92 V
-7 V	17	$\geq$-7 V
+100 V	20	$\geq$+95 V
-5 V	27	$\geq$-4.96 V
+17 V	37	$\geq$+16.81 V
+300 V	39	$\geq$+280 V

11. Repeat Step 10 for -7, +9, +17, +100, or +300 V supplies.
    - If supplies within limits, perform Step 16.
    - If supplies not within limits, replace A1A30A1 Power Supply CCA (para 2-169).

12. Disconnect AC power cord from Al A30 Power Supply. Unplug one multiwire cable from connectors shown in following table.

13. Connect power cord to Al A30 Power Supply.

14. Measure +5 V at A1A30J5041 pin 14.
    - If supply exceeds limits, perform Step 15.
    - If supply within limits, replace component under test in table.

UNPLUG MULTIWIRE CABLE	COMPONENT UNDER TEST
A1A30A1P3045	A1A30A2 Fan Driver CCA (para 2-168)
A1A30A1P5033	A1A30A57 GPIB Interface CCA (para 2-173)
A1A30A1P5042	A1A30A76 Accessories Interface CCA (para 2-172)

15. Repeat Steps 12-14 until all multiwire cables have been unplugged or fault is located.
    - If supply exceeds limits, replace A1A30A1 Power Supply CCA (para 2-169).
    - If supply within limits, replace component under test.

16. Install A1A30 Power Supply Shield (para 2-166) and AIA30 Power Supply (para 2-165).

17. Connect AC power cord to 495P Spectrum Analyzer.

NOTE

The following table is used to isolate faulty assembly. The symbol ◆ shows power supplies used by each assembly.

18. Remove one assembly associated with faulty power supply. See following table.

19. If fuses are blown, replace blown fuses (para 2-176).

20. Press **POWER** switch to turn power on.

ASSEMBLY	FOLDOUT	–15 V	–7 V	–5 V	+5 V	+9 V	+15 V	+17 V	+100 V	+300 V
A1A16	fig FO-2		◆		◆		◆	◆		
A1A18	fig FO-2	◆					◆			
A1A22	fig FO-3	◆				◆	◆			
A1A24	fig FO-4	◆					◆			
A1A25	fig FO-4	◆					◆			
A1A26	fig FO-4				◆	◆	◆			
A1A32	fig FO-7	◆					◆			
A1A34	fig FO-7	◆						◆		
A1A36	fig FO-7	◆				◆	◆	◆		
A1A37	fig FO-7				◆		◆	◆		
A1A38	fig FO-8	◆			◆	◆	◆			
A1A40	fig FO-9	◆			◆		◆			
A1A44	fig FO-9	◆			◆		◆			
A1A46	fig FO-9	◆			◆		◆			
A1A48	fig FO-9	◆			◆		◆			
A1A50	fig FO-10	◆		◆		◆	◆			
A1A51	fig FO-11	◆			◆		◆			
A1A54	fig FO-11			◆	◆					
A1A56	fig FO-11				◆					
A1A58	fig FO-12				◆					
A1A60	fig FO-12	◆			◆		◆			
A1A61A1	fig FO-13	◆		◆	◆		◆			
A1A62A1	fig FO-13	◆		◆	◆		◆			
A1A64	fig FO-14	◆			◆		◆			◆
A1A66A1	fig FO-14	◆			◆		◆			
A1A68	fig FO-15	◆			◆	◆	◆			
A1A69	fig FO-18	◆						◆		
A1A70	fig FO-19	◆	◆	◆	◆	◆	◆	◆	◆	◆
A1A72	fig FO-19	◆		◆	◆		◆			
A1A74	fig FO-19	◆					◆		◆	

21. Measure voltages at test points on A1A70 Z-Axis CCA (fig FO-19).

    - If power supplies correct, the removed assembly is faulty.

    - If power supplies not correct, perform Step 22.

22. Press **POWER** switch to turn power off.

23. Repeat Steps 18-22 until faulty assembly is removed.

    - If A1A16 1st LO Assembly faulty, perform 1st LO Interface CCA Fault Isolation Test (para 2-24).

    - If A1A22 Phase Locked 2nd LO faulty, perform 2nd LO Fault Isolation Test (para 2-16).

    - If A1A24 Phase Gate Assembly or A1A25 Harmonic Mixer faulty, perform Input CCA Fault Isolation Test (para 2-25).

    - If A1A50 Phase Lock Assembly faulty, perform A1A50 Phase Lock Assembly Fault Isolation Test (para 2-35).

    - If A1A68 Variable Resolution Module faulty, perform Variable Resolution Power Supply Fault Isolation Test (para 2-27).

    - If A1A69 10/100 Hz Filter faulty, perform 10/100 Hz Filter Fault Isolation Test (para 2-34).

    - If any other assembly is faulty, replace assembly.

24. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-11. A1AT126 VARIABLE LOAD ASSEMBLY FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to A1AT126 Variable Load Assembly.

1. Remove A1AT126 Variable Load Assembly (para 2-214).

2. Remove end cap from A1AT126 Variable Load Assembly (fig FO-2).

3. Connect DMM lead to center conductor of SMA connector. Connect second DMM lead to metal body of assembly.

4. Measure $0\ \Omega$ to $\geq 150\ \Omega$ while rotating adjustment through range.

    - If resistance correct, A1AT126 Variable Load Assembly is operational.

    - If resistance not correct, replace A1AT126 Variable Load Assembly (para 2-214).

5. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-12. 3RD LO FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A34 3rd Converter Assembly, A1A36 Reference Lock, A1A37 10 MHz Reference, and A1A72 Sweep CCA.

NOTE

Signals must be disconnected from EXT REF connector before power supplies are measured.

1. Measure power supplies for A1A34 3rd Converter Assembly, A1A36 Reference Lock, and A37 10 MHz Reference (fig FO-5 and FO-7).

   - If power supplies correct, perform Step 3.

   - If +17, +15 (A1A28J2024 pin 4), +9, or -15 V not correct, perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).

   - If only +5 V not correct, perform Step 18.

   - If +15 V (A1A28J2024 pin 4) correct but +15 V (A1A36P1026 pin 3) not correct, perform Step 2.

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+15 V	+14.84 V to +15.16 V	A1A28J2024 pin 4
+9 V	+8.92 V to +10.1 V	A1A28J2024 pin 5
-15 V	-14.84 V to -15.16 V	A1A28J2025 pin 4
+17 V	+16.81 V to +18.6 V	A1A28J2025 pin 5
+17 V	+16.81 V to +18.6 V	A1A34A2P1036 pin 2
-15 V	-14.84 V to -15.16 V	A1A34A2P1036 pin 3
+17 V	+16.81 V to +18.6 V	A1A36P1026 pin 1
+5 V	+4.6 V to +5.4 V	A1A36P1026 pin 2
+15 V	³ +14.4 V	A1A36P1026 pin 3

2. Unplug multiwire cable from A1A36P1026. Connect DMM between pin 3 of A1W1026 and chassis ground. Measure >5 k **W**.

   - If resistance correct, replace A1A36 Reference Lock (para 2-190).

   - If resistance not correct, replace A1A37 10 MHz Reference (para 2-188).

3. Adjust CAL OUT Level (para 2-99).

   - If able to adjust, perform Step 6.

   - If not able to adjust, perform Step 4.

4. Perform Coaxial Cable Assembly Fault Isolation Test (para 2-22) for A1W340 (fig FO-1, Sheet 2).

• If test passes, perform Step 5.

• If test fails, repair A1W340 (Appendix C).

5. Short A1A36P1017 pin 1 (fig FO-7) to chassis ground. Adjust CAL OUT Level (para 2-99).

• If able to adjust, replace A1A36 Reference Lock (para 2-190).

• If not able to adjust, replace A1A34 3rd Converter Assembly (para 2-200).

6. Perform CAL OUT Signal Frequency Test (para 2-57).

• If test passes, perform Step 8.

• If test fails, perform Step 7.

7. Adjust 10 MHz Reference Oscillator (para 2-107).

• If able to adjust, perform Step 6.

• If not able to adjust, perform Step 8.

8. Connect 0 dBm, 1, 2, 5, or 10 MHz +5 PPM signal to EXT REF connector. Read REF OSC readout on CRT.

• If readout is EXT and 10 MHz Reference Oscillator could be adjusted, equipment is operational.
• If readout is E-U, perform Step 9.
• If readout is EXT and 10 MHz Reference Oscillator could not be adjusted, perform Step 13.
• If readout is INT or I-U, perform Step 18.

9. Adjust Reference Lock (para 2-108). Connect 0 dBm, 1, 2, 5, or 10 MHz ±+5 PPM signal to EXT REF connector.

• If able to adjust (readout changes to EXT), equipment is operational.
• If not able to adjust, perform Step 10.

10. Short A1A36P1017 pin 1 to chassis ground.

11. Unplug A1W342 from A1A34J1012 (fig FO-7). Connect coaxial cable between oscilloscope and A1A34J1012. Make measurement atA1A34J1012 (fig FO-7, waveform 1).

• If waveform correct, perform Step 12.
• If waveform not correct, replace A1A34 3rd Converter Assembly (para 2-200).

12. Perform Coaxial Cable Assembly Fault Isolation Test (para 2-22) for A1W342 (fig FO-1, Sheet 2).

• If test passes, replace A1A36 Reference Lock (para 2-190).

• If test fails, repair A1W342 (Appendix C).

13. Disconnect signal from EXT REF input. Unplug A1W260 from A1A37P260. Connect coaxial cable between oscilloscope and A1A37P260. Make measurement at A1A37P260 (fig FO-7, waveform 2).

   • If signal correct, connect A1W260 to A1A37P260 and perform Step 14.

   • If signal not correct, replace A1A37 10 MHz Reference (para 2-188).

14. Connect 10.000,000 MHz signal from signal generator to EXT REF connector. Connect (+) DMM lead to A1A36P1017 pin 1. Connect (-) lead to chassis ground. Write measured voltage on paper.

15. Using frequency counter, measure and write on paper the CAL OUT signal frequency.

16. Set signal generator frequency to 10.000,010 MHz.

17. Measure CAL OUT frequency and voltage at A1A36P1017 pin 1. Compare frequency and voltage to written values.

   • If only voltage changes, replace A1A34 3rd Converter Assembly (para 2-200).

   • If voltage does not change, replace A1A36 Reference Lock (para 2-190).

   • If voltage and frequency change, replace A1A37 10 MHz Reference (para 2-188).

18. Measure TTL levels at A1A36P1021 pins 2 and 3.

   • If pin 2 is low and pin 3 is high, replace A1A72 Sweep CCA (para 2-141).

   • If pin 3 is low, replace A1A36 Reference Lock (para 2-190).

   • If pins 2 and 3 are high, perform Step '19.

19. Unplug multiwire cable from A1A36P1026. Connect DMM between pin 2 of A1W1026 (fig FO-1, Sheet 2) and chassis ground. Measure >5 k W.

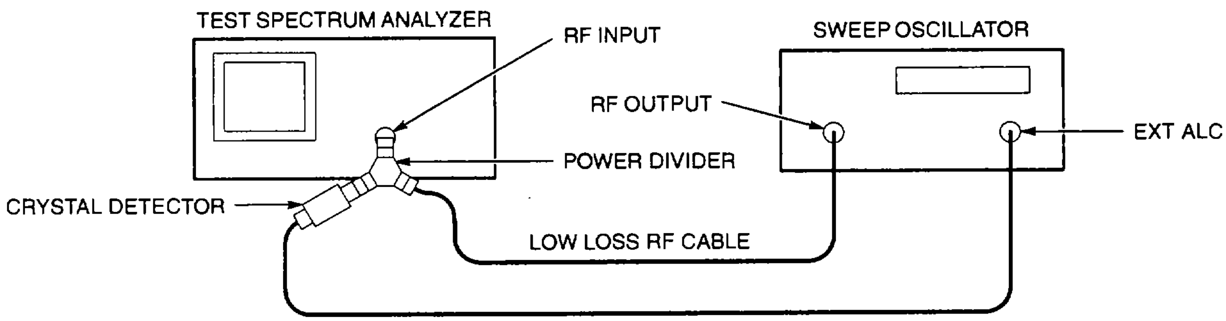
   • If resistance correct, replace A1A36 Reference Lock (para 2-190).

   • If resistance not correct, replace A1A37 10 MHz Reference (par a 2-188).

20. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-13. RF COMPONENTS FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to A1AT12 Attenuator, A1AT124 Attenuator, A1FL16 Directional Filter, A1P164 50 C Coaxial Termination, A1W124 Cable Assembly, and A1W161 Cable Assembly.



1. Connect equipment as shown.

   • Sweep oscillator may consist of RF plug-in and oscillator mainframe.

   • Connect low loss RF cable between power divider and sweep oscillator.

2. Select the following sweep oscillator settings.

   FREQUENCY 900MHZ
   RF AMPLITUDE .... -20DBM
   MODE............................... .... CW

3. On test spectrum analyzer, select the following settings.

   CENTER FREQUENCY 900MHZ
   SPAN/DIV 180MHZ
   REFERENCE LEVEL .... -15DBM
   VERTICAL DISPLAY 2DB/
   DETECT MODE .... PEAK

4. Adjust REFERENCE LEVEL until signal peak is approximately four divisions below top graticule line.

5. Turn on MAX HOLD mode.

6. Select the following sweep oscillator settings.

   SWEEP RANGE .... 0.01GHZ TO 1.8GHZ
   SWEEP TIME .... MAXIMUM
   TRIGGER MODE .... SINGLE SWEEP

7. Begin a sweep. Wait for sweep to complete.
8. On test spectrum analyzer, turn on SAVE A mode.
9. Turn off MAX HOLD mode.
10. Disconnect power divider from test spectrum analyzer.

NOTE

When testing A1FL16 Directional Filter, A1P164 50 Ω Coaxial Termination should be installed (fig FO-2).

11. Install component to be tested between test s pectrum analyzer and power divider. If A1FL16 Directional Filter is being tested, connect A1FL16P120 to power divider and A1FL16P161 to test spectrum analyzer.

12. Repeat Steps 5-7. Compare flatness of top edges on MAX HOLD and SAVE A traces. Flatness of MAX HOLD trace must be within two minor divisions of SAVE A trace.

   • If flatness correct, component under test is operational.

   • If flatness not correct, and test is for A1FL16 Directional Filter, perform Step 13.

   • If flatness not correct and test is not for A1FL16 Directional Filter, replace component under test.

13. On test spectrum analyzer, select the following settings.

CENTER FREQUENCY	2.072GHZ
SPAN/DIV	10MHZ
SAVE A	OFF
MAX HOLD	OFF

14. Select the following sweep oscillator settings.

FREQUENCY	2.072GHZ
RF AMPLITUDE	-20DBM
MODE................................	CW

15. Connect equipment as shown in Step 1.

16. On test spectrum analyzer, adjust REFERENCE LEVEL until signal peak is approximately four divisions below top graticule line. Turn on SAVE A mode.

17. Disconnect power divider from test spectrum analyzer. Connect power divider to A1FL16P161. Connect test spectrum analyzer to A1FL16P160. Verify that signal on CRT of test spectrum analyzer is within two divisions of SAVE A trace.

   • If signal correct, A1P164 50 W Coaxial Termination and A1FL1 6 Directional Filter are operational.

   • If signal not correct, perform Step 18.

18. Remove A1P164 50 W Coaxial Termination (para 2-196) from A1FL16 Directional Filter.

19. Connect DMM lead to center pin of A1P 164 50 W Coaxial Termination. Connect other DMM lead to metal component body. Measure between 47 W and 53 W.

   • If resistance correct, replace A1FL16 Directional Filter (para 2-195).

   • If resistance not correct, replace A1P164 50 W Coaxial Termination (para 2-196).

20. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-14. RF SIGNAL PATH FAULT ISOLATION TEST.

DESCRIPTION

This procedure isolates faults to A1A18 2nd Converter Assembly, A1A30A76 Accessories Interface CCA, A1A32 IF Amplifier, A1A34 3rd Converter Assembly, A1A40 Video Processor CCA, A1A62A1 Log Amplifier CCA, A1A64 Deflection Amplifiers CCA, A1FL10 Lowpass Filter, A1FL11 Lowpass Filter, A1FL36 Bandpass Filter, A1FL37 Lowpass Filter, A1AT12 Attenuator, A1V100 Cathode Ray Tube, and the following cable assemblies: A1W100, A1W105, A1W110, A1W160, A1W182, A1W222, A1W320, A1W344, A1W360, and A1W370.

NOTE

- If power is turned off during this test, power down settings can be restored by pressing **RECALL SETTINGS** key and selecting register 0.

- When testing A1A40 Video Processor CCA (para 2-119), the assembly must be placed on circuit card extenders using the extender kit.

- Be sure that pins 1 and 5 of J104 ACCESSORY connector are not shorted together. If shorted, there will be no signal on CRT.

- Signal levels within this procedure are approximate values. Components are faulty only when they reduce signal by displayed amount. For example, if 495P Spectrum Analyzer displays signals 20 dB lower than normal, a faulty component will reduce displayed signal by approximately 20 dB.

1. Perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).

   - If power supplies correct, perform Step 2.

   - If power supplies not correct, replace faulty component.

2. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys. Select the following settings.

   CENTER/MARKER FREQUENCY 100MHZ
   REFERENCE LEVEL .... -20DBM
   ZERO SPAN .... ON
   VERTICAL SCALE 2DB/
   TIME/DIV .... AUTO
   MIN RF ATTEN .... ODB

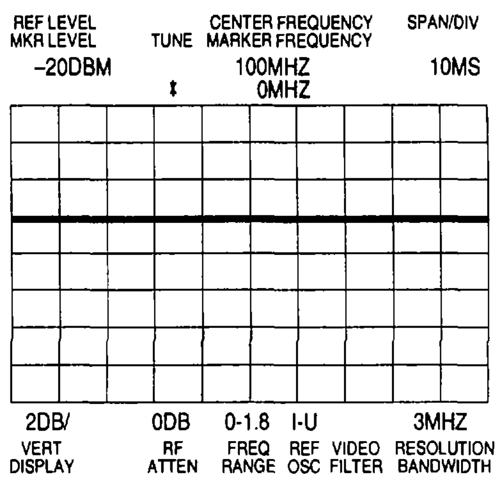
3. Unplug A1W344 from A1A68J693 (fig FO-15). Connect signal generator to A1A68J693. Select the following signal generator settings.

   FREQUENCY .... .10MHZ
   AMPLITUDE ....-25DBM

4. Set **AMPL CAL** fully counterclockwise. Verify that trace is between two and four divisions below top graticule line. See example waveform.

   - If display correct, set **AMPL CAL** to align trace with top graticule line. Connect A1W344 to A1A68J693 and perform Step 5.

   - If display is low or missing, perform Step 26.



5. Unplug cable or assembly shown in following table. Begin with A1W370 (fig FO-1, Sheet 2) and work sequentially through table.
6. Connect signal generator to connector (fig FO-7) shown in following table.
7. Select signal generator frequency and amplitude settings shown in following table.
8. Verify that trace on CRT of 495P Spectrum Analyzer is within 0.5 division of top graticule line.

- If display correct, install removed assembly and perform Step 10.

- If display not correct, perform Step 9.

9. Perform Coaxial Cable Assembly Fault Isolation Test (para 2-22) for cable assemblies listed in components under test column.

- If test passes, replace assembly in components under test column.

- If test fails, replace faulty component.

10. Repeat Steps 5-8 until fault is located or all components have been tested.

- If display correct for all components under test, perform Step 11.

- If display not correct, replace faulty component.

REMOVE CABLE OR ASSEMBLY	CONNECT GENERATOR	GENERATOR FREQUENCY AND AMPLITUDE	COMPONENTS UNDER TEST
A1W370	A1A34J3054	110 MHz/-17 dBm	A1W344 (fig FO-1, Sheet 2) A1A34 3rd Converter Assembly (para 2-200)
A1W360	A1FL37P371	110 MHz/-17 dBm	A1W370 (fig FO-1, Sheet 2) A1FL37 Lowpass Filter (para 2-204)
A1W320	A1FL36P365	110 MHz/-14 dBm	A1W360, A1W320 (fig FO-1, Sheet 2) A1FL36 Bandpass Filter (para 2-205)

11. Unplug A1W182 from A1A32J321. Set A1A32R1015 fully counterclockwise. Conne ct signal generator to A1A32J321. Select the following signal generator settings. Verify that trace on CRT is within 0.5 division of top graticule line.

FREQUENCY 110MHZ
AMPLITUDE .... -25DBM

- If signal correct, perform Step 12.
- If signal not correct, replace A1A32 IF Amplifier (para 2-203).

12. Set A1A32R1015 fully clockwise. Set signal generator output amplitude for -40 dBm. Verify that trace on CRT is within 0.5 division of top graticule line.

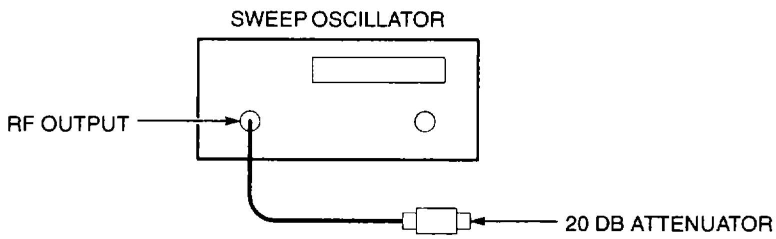
- If signal correct, perform Step 13.

- If signal not correct, replace A1A32 IF Amplifier (para 2-203).

13. Set signal generator output amplitude for -37 dBm. Adjust A1A32R1015 to align trace with top graticule line.

- If able to adjust, perform Step 14.

- If not able to adjust, replace A1A32 IF Amplifier (para 2-203).



14. Connect equipment as shown. On 495P Spectrum Analyzer, disconnect cable or assembly shown in following table. Begin with A1W110 and work sequentially through table.
15. Connect signal generator to connector shown in following table.

NOTE

Sweep oscillator amplitude in table is measured at output of 20 dB attenuator.

16. Select sweep oscillator frequency and amplitude settings shown in following table.
17. Verify that trace on CRT of 495P Spectrum Analyzer is within 0.5 division of top graticule line.

- If display correct, install removed assembly and perform Step 19.
- If display not correct, perform Step 18.

18. Perform Coaxial Cable Assembly Fault Isolation Test (para 2-22) for cable assemblies in components under test column.

- If test passes and a lowpass filter is shown in components under test column, replace filter.
- If test passes and no assembly is shown in components under test column, perform step listed.
- If test fails, replace faulty component.

19. Repeat Steps 14-17 until fault is located or all components have been tested.

- If display correct for all components under test, perform Step 20.
- If display not correct, replace faulty component.

REMOVE CABLE OR ASSEMBLY	CONNECT GENERATOR	SWEEP OSCILLATOR FREQUENCY AND AMPLITUDE	COMPONENTS UNDER TEST
A1W110	A1A18P141 (fig FO-2)	2.072 GHz/-31 dBm	A1W182 (fig FO-1, Sheet 2); perform Step 21
A1W160	A1FL11P110 (fig FO-2)	2.072 GHz/-31 dBm	A1W110 (fig FO-1, Sheet 2); A1FL11 Lowpass Filter (para 2-198)
A1W105	A1AT12P121 (fig FO-2)	100 MHz/-17 dBm	A1W160 (fig FO-1, Sheet 2); perform Step 23
A1AT10	A1W100 (fig FO-1, Sheet 2)	100 MHz/-17 dBm	A1W100, A1W105 (fig FO-1, Sheet 2); A1FL10 Lowpass Filter (para 2-197)

20. Perform Step Attenuator Fault Isolation Test (para 2-39).

 • If test passes, RF signal path is operational.

 • If test fails, replace faulty component.

21. Disconnect A1W222 from A1A22P222 (fig FO-3). Connect test spectrum analyzer to A1A22P222. Make measurement at A1A22P222 (fig FO-3, waveform 4).

 • If signal correct, perform Step 22.

 • If signal not correct, perform 2nd LO Fault Isolation Test (para 2-16).

22. Perform Coaxial Cable Assembly Fault Isolation Test (para 2-22) for A1W222.

 • If test passes, replace A1A18 2nd Converter Assembly (para 2-216).

 • If test fails, replace A1W222 (fig FO-1, Sheet 2).

23. Disconnect A1W150 from A1A15P134. Connect test spectrum analyzer to A1A15P134. Make measurement at A1A15P134 (fig FO-2, waveform 1).

 • If signal correct, perform Step 25.

 • if signal not correct, perform Step 24.

24. Perform Coaxial Cable Assembly Fault Isolatio n Test (para 2-22) for A1W150.

 • If test passes, perform 1st LO Fault Isolation Test (para 2-20).

 • If test fails, replace A1W150 (fig FO-1, Sheet 2).

25. Perform RF Components Fault Isolation Test (para 2-13) for A1FL16 Directional Filter and A1AT12 Attenuator.

 • If test passes, replace A1A12 Mixer (para 2-213).

 • If test fails, replace faulty component.

26. On 495P Spectrum Analyzer, press **VIEW A** and **VIEW B** keys to turn digital storage off. Verify that trace is between two and four divisions below top graticule line.

 • If display correct, perform Digital Storage Fault Isolation Test (para 2-18).

 • If low or missing, perform Step 27.

27. Unplug A1W682 from A1A62J621 (fig FO-13). Connect signal generator to A1A62J621.

28. Select the following signal generator settings. Verify that trace is near top graticule line on CRT.

 FREQUENCY 10MHZ
 AMPLITUDE .... +6DBM

 • If display correct, perform Step 29.

 • If low or missing, perform Step 30.

29. Perform Coaxial Cable Assembl y Fault Isolation Test (para 2-22) for A1W682 (fig FO-1, Sheet 2).

- If test passes, perform Variable Resolution Fault Isolation Test (para 2-26).
- If test fails, repair A1W682 (Appendix C).

30. Adjust Deflection Amplifier Gain and Frequency Response (para 2-90).

- If able to adjust, perform Step 31.
- If not able to adjust, perform Step 33.

31. Adjust Log Amplifier (para 2-95).

- If able to adjust, equipment is operational.
- If not able to adjust, perform Step 32.

32. Perform Front Panel Pote ntiometer Fault Isolation Test (para 2-42) for A1A38R6051.

- If test passes, perform Step 33.
- If test fails, replace faulty component.

33. Connect CAL OUT signal to RF INPUT. On 495P Spectrum Analyzer, select the following settings.

CENTER/MARKER FREQUENCY	100MHZ
SPAN/DIV	1MHZ
REFERENCE LEVEL	-20DBM
RESOLUTION BANDWIDTH	1MHZ
VERTICAL SCALE	10DB/
VIEW A AND VIEW B	OFF

34. Make measurements at A1A40TP4065 and A1A40TP4067 (fig FO-9, waveform 1).

- If waveforms correct, perform Step 35.
- If waveform at A1A40TP4065 not correct, replace A1A62A1 Log Amplifier CCA (para 2-140).
- If waveform at A1A40TP4065 correct but waveform at A1A40TP4067 not correct, replace A1A40 Video Processor CCA (para 2-119).

35. Make measurement at A1A64A1P2100 pins 1 and 4 (fig FO-14, waveforms 3 and 4).

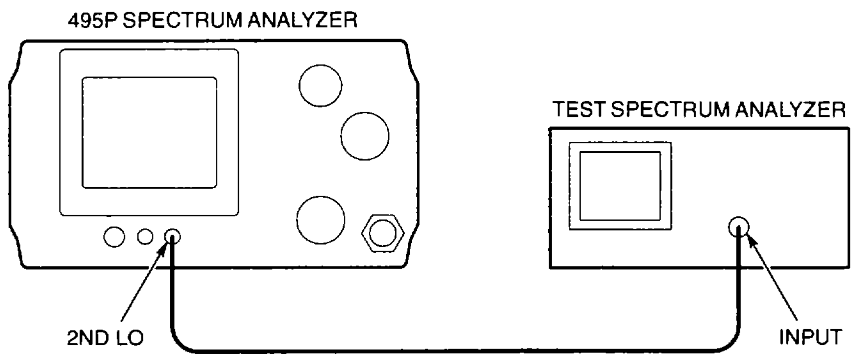
- If waveforms correct, replace A1V100 Cathode Ray Tube (para 2-187).
- If waveforms not correct, replace A1A64 Deflection Amplifiers CCA (para 2-144).

36. Disconnect equipment from AN/USM-620 and install all removed ass emblies and cables.

2-15. 2ND LO OUTPUT FAULT ISOLATION TEST.

DESCRIPTION

This procedure isolates faults to the 2ND LO OUTPUT signal.



1. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys.
2. Connect equipment as shown.
3. Select the following test spectrum analyzer settings.

CENTER FREQUENCY	2.182GHZ
SPAN/DIV	5MHZ
REFERENCE LEVEL	+20DBM
VERTICAL DISPLAY	10DB/

4. Verify t hat signal on CRT of test spectrum analyzer is 2.182 GHz (±7 MHz) and $\geq$-10 dBm.

- If amplitude and frequency are correct, perform Step 5.
- If amplitude or frequency are not correct, perform 2nd LO Fault Isolation Test (para 2-16).

5. On test spectrum analyzer, tune 2.182 GHz signal to center of CRT. Set SPAN/DIV to 1 MHz.
6. On 495P Spectrum Analyzer, select the following settings.

SPAN/DIV	200KHZ
VIEW A AND VIEW B	OFF
TIME/DIV	MAN

NOTE

Tune range of signal at 2ND LO OUTPUT should be approximately 2 MHz.

7. Slowly rotate **MANUAL SCAN** knob from stop to stop. Verify that 2ND LO OUTPUT signal moves approximately two divisions on CRT of test spectrum analyzer. Verify that amplitude is $\geq$ -10 dBm.

- If signal amplitude and-frequency range are correct, 2ND LO OUTPUT signal is functional.
- If signal amplitude or frequency range are not correct, perform 2nd LO Fault Isolation Test (para 2-16).

8. Disconnect equipment from AN/USM-620.

2-16. 2ND LO FAULT ISOLATION TEST.

DESCRIPTION
This procedure isolates faults to A1A22A1 16-20 MHz Phase Lock CCA, A1A22A2A1 Oscillator CCA, A1A22A2A2 Reference CCA, A1A46 Center Freq Control CCA, A1A48 Span Attenuator CCA, A1A72 Sweep CCA, and A1W220 Cable Assembly.

1. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys.
2. Measure power supplies for A1A22 Phase Locked 2nd LO (fig FO-3).

- If voltages correct, perform Step 9.
- If +15 V, +9 V, or -15 V not correct, perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).
- If only +5.2 V not correct, replace A1A22A1 16-20 MHz Phase Lock CCA (para 2-207).
- If +12 V not correct, perform Step 3.
- If -12 V not correct, perform Step 7.

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+9 V	+8.92 V to +10.1 V	A1A22C221
-15 V	-14.84 V to -15.16 V	A1A22C226
+15 V	+14.84 V to +15.16 V	A1A22C227
+12 V	>+11.7 V	A1A22C2200, A1A22C2201
-12 V	>-11.7 V	A1A22C2202
+5.2 V	>+4.8 V	A1A22A1TP1019

3. With power off, unsolder wire attached to A1A22C2200 (fig FO-3).
4. Press **POWER** switch to turn power on. Measure +12 V at wire unsoldered from A1A22C2200.

- If voltage correct, replace A1A22A2A2 Reference CCA (para 2-210).
- If voltage not correct, perform Step 5.

5. With power off, unsolder wire attached to A1A22C2201.
6. Press **POWER** switch to turn power on. Measure +12 Vat wire unsoldered from A1A22C2201.

- If voltage correct, replace A1A22A2A1 Oscillator CCA (para 2-209).
- If voltage not correct, replace A1A22A1 16-20 MHz Phase Lock CCA (para 2-207).

7. With power of f, unsolder wire attached to A1A22C2202.

8. Press **POWER** switch to turn power on. Measure -12 V at wire unsoldered from A1A22C2202.

   • If voltage correct, replace A1A22A2A1 Oscillator CCA (para 2-209).

   • If voltage not correct, replace A1A22A1 16-20 MHz Phase Lock CCA (para 2-207).

9. Perform 2ND LO OUTPUT Fault Isolation Test (para 2-15).

   • If test passes, set TIME/DIV to AUTO and perform Step 11.

   • If frequency not within limits or will not tune, set TIME/DIV to AUTO and perform Step 12.

   • If signal low or missing, perform Step 10.

10. Perform Coaxial Cable Assembly Fault Isolation Test (para 2-22) for A1W220 (fig FO-1, Sheet 2).

   * If test passes, replace A1A22A2A1 Oscillator CCA (para 2-209).

   • If test fails, replace A1W220 (fig FO-1, Sheet 2).

11. Press **Blue-SHIFT** and **RESET** keys. Disconnect A1W222 from A1A22P222. Connect test spectrum analyzer to A1A22P222. Make measurement at A1A22P222 (fig FO-3, waveform 4).

   • If signal correct, A1A22 Phase Locked 2nd LO is operational.

   • If signal low or missing, replace A1A22A2A1 Oscillator CCA (para 2-209).

12. Make measurement at A1A22C222 (fig FO-3, waveform 1).

   • If waveform correct, perform Step 15.

   • If waveform not correct, perform Step 13.

13. Make measurement at A1A72P72 pin 48 (fig FO-19, waveform 5).

   • If waveform correct, perform Step 14.

   • If waveform not correct, replace A1A72 Sweep CCA (para 2-141).

14. Rotate FREQUENCY SPAN/DIV knob clockwise until setting is MAX SPAN. Verify that CRT readout c hange for each setting of knob.

   • If CRT readout correct, replace A1A48 Span Attenuator CCA (para 2-122).

   • If CRT readout not correct, perform Front Panel Fault Isolation Test (para 2-40) for n. **FREQUENCY SPAN/DIV** knob.

15. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 2=2ND LO CONTROL. Compare OFFSET FREQ DESIRED and COUNTED values on CRT. See example display (fig FO-3).

   • If difference between OFFSET FREO DESIRED and COUNTED values is within OFFSET SETTING ACCURACY, perform Step 18.

   • If difference between OFFSET FREQ DESIRED and COUNTED values is not within OFFSET SETTING ACCURACY, perform Step 16.

16. Connect 1X probe between frequency counter and center conductor of A1A51J511 (fig FO-11). Measure frequency at center conductor of A1A51J511. Compare frequency counter display to OFFSET FREQ DESIRED.

   • If frequency difference within OFFSET SETTING ACCURACY, perform Counter Fault Isolation Test (para 2-38).

   • If frequency difference not within OFFSET SETTING ACCURACY, perform Step 17.

17. Use DMM to measure TUNE VOLTS at A1A46A1TP5 (fig FO-9).

   • If TUNE VOLTS within i 200 mV of displayed DAC SET value, perform A1A22A2 Fault Isolation Test (para 2-17).

   • If TUNE VOLTS not correct, replace A1A46 Center Freq Control CCA (para 2-121).

18. On 495P Spectrum Analyzer, set SPAN/DIV to 200 kHz. Press **Blue-SHIFT** and **10dB/DIV** keys.

19. Measure approximately ±9 VDC at A1A46A1TP5 (fig FO-9) while rotating **CENTER/MARKER FREQUENCY** knob. Verify that CRT readout changes while rotating knob.

   • If CRT readout changes and voltage correct, replace A1A22A1 16-20 MHz Phase Lock CCA (para 2-207).

   • If CRT readout changes but voltage not correct, replace A1A46 Center Freq Control CCA (para 2-121).

   • If CRT readout does not change, perform Front Panel Fault Isolation Test (para 2-40) for **CENTER/MARKER FREQUENCY** knob.

20. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-17. A1A22A2 FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to A1A22A1 16-20 MHz Phase Lock CCA, A1A22A2A1 Oscillator CCA, A1A22A2A2 Reference CCA, A1A22A2A3 Mixer CCA, A1A34 3rd Converter Assembly, and A1W346 Cable Assembly.

1. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys.

2. Unplug A1W346 from A1A34J3019 (fig FO-7). Connect coaxial cable between oscilloscope and A1A34J3019. Make measurement at A1A34J3019 (fig FO-7, waveform 1).

   • If waveform correct, perform Step 4.

   • If waveform not correct, perform Step 3.

3. Perform 3rd LO Fault Isolation Test (para 2-12).

   • If test passes, replace A1A34 3rd Converter Assembly (para 2-200).

   • If test fails, replace faulty component.

4. Perform Coaxial Cable Assembly Fault Isolation Test (para 2-22) for A1W346 (fig FO-1, Sheet 2).

   • If test passes, install A1W346 and perform Step 5.

   • If test fails, repair A1W346 (Appendix C).

5. Perform 2ND LO OUTPUT Fault Isolation Test (para 2-15, Steps 1-4).

6. With power off, remove 2nd LO top cover (para 2-207). Unsolder wire connected to A1A22C2203 (fig FO-3).

7. With power on, verify that 2ND LO OUTPUT signal is not on CRT of test spectrum analyzer.

8. Connect jumper between A1A16A1P1017 pin 1 (fig FO-2) and A1A22C2203. Verify that 2ND LO OUTPUT signal is now on CRT of test spectrum analyzer.

   • If signal correct, remove jumper, solder wire to A1A22C2203, and perform Step 9.

   • If signal not correct, replace A1A22A2A1 Oscillator CCA (para 2-209).

9. Adjust 2182 MHz 2nd LO Frequency (para 2-110, Steps 1-16).

   • If able to adjust, perform Step 10.

   • If not able to adjust, replace A1A22A2A1 Oscillator CCA (para 2-209).

10. Perform 2ND LO OUTPUT Fault Isolation Test (para 2-15).

   • If test passes, A1A22 Phase Locked 2nd LO is operational.

   • If test fails, perform Step 11.

11. With power on, connect 1X probe between test spectrum analyzer and A1A22C2204 (fig FO-3). Make measurement at A1A22C2204 (fig FO-3, waveform 3).

- If signal correct, replace A1A22A1 16-20 MHz Phase Lock CCA (para 2-207).

- If signal not correct, perform Step 12.

CAUTION

When performing Steps 12 and 13, top cover of A1A22 Phase Locked 2nd LO should be installed. Otherwise, damage to A1A22A1 16-20 MHz Phase Lock CCA may occur.

NOTE

• When performing Steps 12 and 13, A1A22W1046 and A1A22W1048 must be connected to A1A28J1046 and A1A28J1048. A1W346 must connect to A1A22P221. A1l remaining cable assemblies may be disconnected from A1A22 Phase Locked 2nd LO.

• The amplitude of signals for Steps 12 and 13 are approximate values only.

12. Install 2nd LO top cover (para 2-207). Remove 2nd LO bottom cover (para 2-208). Connect 1X probe between test spectrum analyzer and anode terminal of A1A22A2A3CR1011. Make measurement at anode terminal of A1A22A2A3CR1011 (fig FO-3, waveform 4).

- If signal correct, perform Step 13.

- If signal not correct, replace A1A22A2A1 Oscillator CCA (para 2-209).

13. Connect 1X probe between test spectrum analyzer and A1A22A2A2C3015. Make measur ement at A1A22A2A1C3015 (fig FO-3, waveform 5).

- If signal correct, replace A2A22A3 Mixer CCA (para 2-211).

- If signal not correct, replace A1A22A2A2 Reference CCA (para 2-210).

14. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-18. DIGITAL STORAGE FAULT ISOLATION TEST.

DESCRIPTION
This procedure isolates faults to A1A58 Processor CCA, A1A60 Horiz Digital Storage CCA, A1A61A1 Vert Digital Storage CCA, A1A64 Deflection Amplifiers CCA, and A1A72 Sweep CCA.

NOTE

- If power is turned off during this test, power down settings can be restored by pressing **RECALL SETTINGS** key and selecting register 0.

- When testing A1A40 Video Processor CCA (para 2-119), A1A60 Horiz Digital Storage CCA (para 2-137), and A1A61A1 Vert Digital Storage CCA (para 2-138), the assemblies must be placed on circuit card extenders using the extender kit.

1. Measure power supplies for A1A60 Horiz Digital Storage CCA (fig FO-12) and A1A61 A1 Vert Digital Storage CCA (fig FO-13).

   - If voltages correct, perform Step 2.

   - If voltages not correct, perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+15 V	+14.84 V to +15.16 V	A1A60P60 pin 36
+5 V	+4.73 V to +5.23 V	A1A60P60 pin 41
-15 V	-14.84 V to -15.16 V	A1A60P60 pin 44
+15 V	+14.84 V to +15.16 V	A1A61A1P61 pin 36
+5 V	+4.73 V to +5.23 V	A1A61A1P61 pin 41
-5 V	-4.96 V to -5.05 V	A1A61A1P61 pin 43
-15 V	-14.84 V to -15.16 V	A1A61A1P61 pin 44

2. Adjust Digital Storage (para 2-91).

   - If display adjusts, A1A60 Horiz Digital Storage CCA and A1A61A1 Vert Digital Storage, CCA are operational.

   - If only A1A60 Horiz Digital Storage CCA adjusts, replace A1A61A1 Vert Digital Storage CCA (para 2-138).

   - If only A1A61A1 Vert Digital Storage CCA adjusts, replace A1A60 Horiz Digital Storage CCA (para 2-137).

   - If display does not adjust, perform Step 3.

3. Make measurement at A1A60P60 pin 1 (fig FO-12, waveform 19).

   - If waveform correct, perform Step 4.

   - If waveform not correct, replace A1A58 Processor CCA (para 2-136).

4. Measure TTL low at A1A61A1 P61 pin 49 (fig FO-13).

   • If low, perform Step 6.

   • If high, perform Step 5.

5. Press **B-SAVE A** key. Measure TTL high at A1A61A1P61 pins 51, 52, and 54.

   • If low, replace A1A60 Horiz Digital Storage CCA (para 2-137).

   • If high, replace A1A61A1 Vert Digital Storage CCA (para 2-138).

6. Press **SAVE A** key to turn off **B-SAVE A** mode. Connect CAL OUT signal to RF INPUT.

7. On 495P Spectrum Analyzer, select the following settings.

CENTER/MARKER FREQUENCY	100MHZ
SPAN/DIV	1MHZ
REFERENCE LEVEL	-20DBM
RESOLUTION BANDWIDTH	1MHZ
PEAK/AVERAGE KNOB	FULLY COUNTERCLOCKWISE

8. Make measurement at A1A60P60 pin 59 (fig FO-12, waveform 18).

   • If waveform correct, perform Step 9.

   • If waveform not correct, perform Step 11.

9. Make measurement at A1A61A1P61 pin 59 (fig FO-13, waveform 1).

   • If waveform correct, replace A1A64 Deflection Amplifiers CCA (para 2-144).

   • If waveform not correct, perform Step 10.

10. Make measurement at A1A40TP4067 (fig FO-9, waveform 1).

    • If waveform correct, replace A1A61A1 Vert Digital Storage CCA (para 2-138).

    • If waveform not correct, perform RF Signal Path Fault Isolation Test (para 2-14).

11. Make measurement at A1A72TP2 (fig FO-19, waveform 6).

    • If waveform correct, perform Step 12.

    • If waveform not correct, replace A1A72 Sweep CCA (para 2-141).

12. Measure TTL level high at A1A60P60 pin 56 (fig FO-12).

    • If high, perform Step 13.

    • If low, replace A1A61 A1 Vert Digital Storage CCA (para 2-138).

13. Make measurement at A1A72P72 pin 2 (fig FO-19, waveform 4).

    • If waveform correct, perform Step 14.
    • If waveform not correct, replace A1A72 Sweep CCA (para 2-141).

14. Use oscilloscope to measure TTL level signals shown in following table.

• If TTL levels correct, perform Step 15.

• If TTL levels not correct, replace A1A60 Horiz Digital Storage CCA (para 2-137).

TEST POINT	SIGNAL TYPE
A1A60P60 pin 9	Toggling TTL Level
A1A60P60 pin 10	Toggling TTL Level
A1A60P60 pin 11	Toggling TTL Level
A1A60P60 pin 12	TTL High
A1A60P60 pin 13	Toggling TTL Level
A1A60P60 pin 14	Toggling TTL Level
A1A60P60 pin 15	TTL High
A1A60P60 pin 16	Toggling TTL Level
A1A60P60 pin 45	TTL Low
A1A60P60 pin 47	Toggling TTL Level

15. Use oscilloscope to measure TTL level signals shown in following table.

• If TTL levels correct, perform Step 16.

• if TTL levels not correct, replace A1A61A1 Vert Digital Storage CCA (para 2-138).

TEST POINT	SIGNAL TYPE
A1A60P60 pin 3	Toggling TTL Level
A1A60P60 pin 5	Toggling TTL Level
A1A60P60 pin 6	Toggling TTL Level
A1A60P60 pin 7	Toggling TTL Level
A1A60P60 pin 8	TTL High
A1A60P60 pin 46	TTL High

16. Measure TTL level high at A1A60P60 pin 48.

• If high, perform Step 17.

• If low, replace A1A60 Horiz Digital Storage CCA (para 2-137).

17. Measure toggling TTL level at A1A60P60 pin 4.

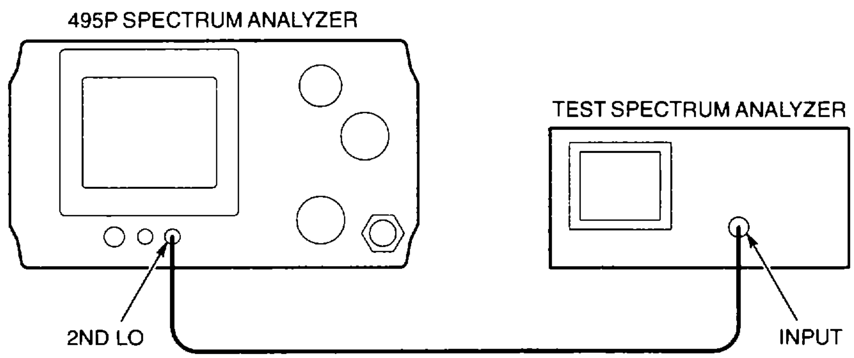
• If correct, perform Step 9.

• If not correct, replace A1A60 Horiz Digital Storage CCA (para 2-137).

18. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-19. 1ST LO OUTPUT FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to the 1ST LO OUTPUT signal.



1. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys. Press **Blue-SHIFT** and **10dB/DIV** keys. Select the following settings.

   VIEW A AND VIEW B .... OFF
   TIME/DIV .... MAN

2. Set MANUAL SCA N knob to position dot on left graticule line.
3. Connect equipment as shown.
4. Select the following test spectrum analyzer settings.

   CENTER FREQUENCY 2.072GHZ
   SPAN/DIV 20MHZ
   REFERENCE LEVEL .... +30DBM
   VERTICAL DISPLAY 10DB/

5. Check CRT of test spectrum analyzer for signal between 2.022 GHz and 2.122 GHz.

   • If frequency correct, perform Step 6.

   • If frequency not correct, perform 1st LO Fault Isolation Test (para 2-20).

6. On 495P Spectrum Analyzer, rotate **MANUAL SCAN** knob until dot is on right graticule line. Check CRT of test spectrum analyzer for signal between 3.822 GHz and 3.922 GHz.

   • If frequency correct, perform Step 7.

   • If frequency not correct, perform 1st LO Fault Isolation Test (para 2-20).

7. Disconnect test spectrum analyzer from 1ST LO OUTPUT connector. Connect power meter to 1ST LO OUTPUT connector.
8. Set **MANUAL SCAN** knob to position dot on left graticule line. Slowly rotate **MANUAL SCAN** knob until dot is on right graticule line. Verify that power meter displays $\geq$ +6 dBm.

   • If power correct, 1ST LO OUTPUT signal is operational.

   • If power not correct, perform 1st LO Fault Isolation Test (para 2-20).

9. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-20. 1ST LO FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to A1A15 Bias Return, A1A16 1st LO Assembly, A1A24 Phase Gate Assembly, A1A25 Harmonic Mixer, A1A44 1st LO Driver CCA, A1A46 Center Freq Control CCA, A1A48 Span Attenuator CCA, A1A72 Sweep CCA, and the following cable assemblies: A1W130, A1W150, A1W167, A1W240, A1W250, A1W1037, and A1W1038.

NOTE

- If power is turned off during this test, power down settings can be restored by pressing **RECALL SETTINGS** key and selecting register 0.

- When testing A1A44 1st LO Driver CCA (para 2-120) and A1A48 Span Attenuator CCA (para 2-122), the assemblies must be placed on circuit card extenders using the extender kit.

1. Perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).

   - If test passes, perform Step 2.

   - If test fails, replace faulty component.

2. Measure power supplies for A1A16 1st LO Assembly (fig FO-2).

   - If voltages correct, perform Step 3.
   - If +5 V not correct, replace A1W1037 (fig FO-1, Sheet 2).
   - If +15 V (A1A16A1P1017 pin 3) or +5 V (A1A16A1P1017 pin 5) not correct, replace A1A44 1st LO Driver CCA (2-120).
   - If-7 V, +17 V, or +15 V (A1A16A1C1016) not correct, perform 1st LO Interface CCA Fault Isolation Test (para 2-24).

POWER SUPPLY/SIGNAL	VOLTAGE LIMITS	TEST POINT
-7 V	-7 V to -8.5 V	A1A16A1P1017 pin 1
+15 V	>+14.5 V	A1A16A1P1017 pin 3
+5 V	+4.84 V to +5.16V	A1A16A1P1017 pin 4
+5 V	>+4.5 V	A1A16A1P1017 pin 5
+17 V	+16.81 V to +18.6 V	A1A16A1P1017 pin 6
+15 V	>+14.5 V	A1A16A1C1016, (+) terminal

3. Perform 1ST LO OUTPUT Fault Isolation Test (para 2-19).

   - If test passes, press **Blue-SHIFT** and **10dB/DIV** keys and perform Step 7.

   - If only signal amplitude not correct, press **Blue-SHIFT** and **10dB/DIV** keys and perform Step 4.

   - If frequency range not correct, perform Step 12.

4. Disconnect cable assembly shown in following table. Start with A1W250 (fig FO-1, Sheet 2) and work sequentially through table.

5. Connect power meter to corresponding connector shown in following table.
6. Measure power while slowly rotating **MANUAL SCAN** knob so that CRT dot aligns on left and right graticule lines. Verify that 1st LO signal power is within limits.

- If power correct, repeat Steps 4-6 to test next component.
- If power not correct, replace component under test shown in table.

CABLE ASSEMBLY	CONNECT POWER METER	POWER LIMITS	COMPONENT UNDER TEST
A1W250 from A1A25P250	A1A25P250 (fig FO-4)	≥+6 dBm	A1W250 (fig FO-1, Sheet 2)
A1W240 from A1A25P253	A1W240 (fig FO-1, Sheet 2)	≥+7 dBm	A1A25 Harmonic Mixer (para 2-189)
A1W240 from A1A24P240	A1A24P240 (fig FO-4)	≥ +7 dBm	A1W240 (fig FO-1, Sheet 2)
A1W167 from A1A24P241	A1W167 (fig FO-1, Sheet 2)	≥+8 dBm	A1A24 Phase Gate Assembly (para 2-192)
A1W167 from A1A16P132	A1A16P132 (fig FO-2)	≥+8 dBm	If correct, replace A1W167 (fig FO-1, Sheet 2); if not correct, replace A1A16 1st LO Assembly (para 2-201)

7. Disconnect A1W150 from A1A12P127. Connect power meter to A1W150.
8. Measure power while slowly rotating **MANUAL SCAN** knob so that CRT dot aligns on left and right graticule lines. Verify that 1st LO signal power is ≥ +7.5 dBm.

- If power correct, 1st LO signal amplitude is operational.
- If power not correct, perform Step 9.

9. Disconnect cable assembly shown in following table. Start with A1W150 and work sequentially through table.
10. Connect power meter to corresponding connector shown in following table.
11. Measure power while slowly rotating **MANUAL SCAN** knob so that CRT dot aligns on left and right graticule lines. Verify that 1st LO signal power is within limits.

- If power correct, repeat Steps 9-11 to test next component.
- If power not correct, replace component under test shown in table.

CABLE ASSEMBLY	CONNECT POWER METER	POWER LIMITS	COMPONENT UNDER TEST
A1W150 from A1A15P134	A1A15P134 (fig FO-2)	≥ +7.5 dBm	A1W150 (fig FO-1, Sheet 2)
A1W130 from A1A15P135	A1W130 (fig FO-1, Sheet 2)	≥ +9.5 dBm	A1A15 Bias Return (para 2-199)
A1W130 from A1A16P130	A1A16P130 (fig FO-2)	≥ +9.5 dBm	If correct, replace A1W130 (fig FO-1, Sheet 2); if not correct, replace A1A16 1st LO Assembly (para 2-201)

12. Adjust Frequency Control System (para2-93). Perform 1ST LO OUTPUT Fault Isolation Test (para 2-19).

  • If test passes, 1st LO system is operational.

  • If able to adjust but test fails, or if not able to adjust, perform Step 13.

13. Perform Frequency Span/Div Accuracy Test (para 2-62). Write on paper the SPAN/DIV settings where fault occurs.

  • If fault only occurs at SPAN/DIV settings $\geq$ 500 kHz and $\leq$ 5 MHz, set SPAN/DIV to 5 MHz and perform Step 14.

  • If test passes, or if fault occurs at SPAN/DIV settings > 5 MHz, press **MAX SPAN** key to turn on MAX SPAN mode and perform Step 18.

14. On 495P Spectrum Analyzer, verify that SPAN/DIV is 5MHz. Make measurement at A1A48A1P48 pin 47 (fig FO-9, waveform 5).

  • If waveform correct, perform Step 15.

  • If waveform not correct, perform Step 16.

15. Make measurement at A1A16A1P1013 pin 1 (fig FO-2, waveform 2).

  • If waveform correct, replace A1A16 1st LO Assembly (para 2-201).

  • If waveform not correct, replace A1W1038 (fig FO-1, Sheet 2).

16. Unplug A1W1038 (fig FO-1, Sheet 2) from A1A28J1038. Press **Blue-SHIFT** and **10dB/DIV** keys.

17. On oscilloscope, set VOLTS/DIV to 10 V. Make measurement at A1A48A1P48 pin 47 (fig FO-9, waveform 5).

  • If waveform correct, replace A1A116 1st LO Assembly (para 2-201).

  • If waveform not correct, replace A1A48 Span Attenuator CCA (para 2-122).

18. Make measurement at A1A72P72 pin 48 (fig FO-19, waveform 7).

  • If waveform correct, perform Step 19.

  • If waveform not correct, replace A1A72 Sweep CCA (para 2-141).

19. With MAX SPAN mode on, make measurement at A1A48A1P48 pin 54 (fig FO-9, waveform 6).

  • If waveform correct, perform Step 20.

  • If waveform not correct, replace A1A48A1 Span Attenuator CCA (para 2-122).

20. Measure between -9.98 V and -10.02 V at A1A44A1TP1059.

  • If voltage correct, perform Step 21.

  • If voltage not correct, replace A1A44 1st LO Driver CCA (para 2-120).

21. Make measurement at A1A44A1P44 pin 56 (fig FO-9, waveform 3).

- If waveform correct, perform Step 22.

- If waveform not correct, perform A1A16 1st LO Assembly Fault Isolation Test (para 2-23).

NOTE

The 1st LO Control Diagnostic Aid should be displayed for Steps 22-25.

22. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 1=1ST LO CONTROL. Compare MIXER FREQ DESIRED and COUNTED values. See example display (fig FO-9).

- If difference between MIXER FREQ DESIRED and COUNTED values is within 1ST LO SETTING ACCURACY, perform Step 24.

- If difference between MIXER FREQ DESIRED and COUNTED values is not within 1ST LO SETTING ACCURACY, perform Step 23.

23. Unplug A1W252 from A1A25P252 (fig FO-4). Using freq uency counter, measure frequency of signal at A1A25P252.

- If frequency within 1ST LO SETTING ACCURACY of MIXER FREQ DESIRED value, plug A1W252 onto A1A25P252 and perform Counter Fault Isolation Test (para 2-38).

- If frequency not within 1ST LO SETTING ACCURACY of MIXER FREQ DESIRED value, or signal is missing, plug A1W252 onto A1A25P252 and perform Step 24.

24. Use DMM to measure TUNE VOLTS at A1A46A1TP8 (fig FO-9).

- If TUNE VOLTS within i 200 mV of displayed DAC SET value, perform Step 25.

- If TUNE VOLTS not correct, replace A1A46 Center Freq Control CCA (para 2-121).

25. Connect (-) DMM lead to left-most lead of A1A44A1R1040. Connect (+) lead to right-most lead of A1A44A1R1040. Compare measured voltage to SENSE VOLTS DAC SET value.

- If SENSE VOLTS DAC SET within 0.5 V of NOMINAL value, perform Auxiliary Synthesizer Fault Isolation Test (para 2-21).

- If SENSE VOLTS DAC SET not within 0.5 V of NOMINAL value, perform A1A16 1st LO Assembly Fault Isolation Test (para 2-23).

26. Disconnect equ ipment from AN/USM-620 and install all removed assemblies and cables.

2-21. AUXILIARY SYNTHESIZER FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to A1A25 Harmonic Mixer, A1A26 Auxiliary Synthesizer CCA, A1A34 3rd Converter Assembly, and A1W252 Cable Assembly.

NOTE

- If power is turned off during this test, power down settings can be restored by pressing **RECALL SETTINGS** key and selecting register 0.

- Before performing test, A1A26 Auxiliary Synthesizer CCA (para 2-133) must be placed on circuit card extenders using the extender kit and coaxial cable assemblies.

1. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys.

2. Measure power supplies for A1A26 Auxiliary Synthesizer CCA (fig FO-4).

- If voltages correct, perform Step 3.

- If voltages not correct, perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+9 V	+8.92 V to +10.1 V	A1A26A1P26 pin 35
+15 V	+14.84 V to +15.16 V	A1A26A1P26 pin 36
+5 V	+4.73 V to +5.23 V	A1A26A1P26 pin 41

3. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 1=1ST LO CONTROL.
4. Unplug A1W1060 from A1A26P1060 (fig FO-4). Connect test spectrum analyzer to A1A26P1060. Make measurement at A1A26P1060 (fig FO-4, waveform 5).

- If amplitude low, replace A1A26 Auxiliary Synthesizer CCA (para 2-133).

- If frequency not within 200-220 MHz range, plug A1W1060 onto A1A26P1060 and perform Step 5.

- If signal correct, plug A1W1060 onto A1A26P1060 and perform Step 8.

5. Unplug A1W347 from A1A34J3011 (fig FO-7). Connect coaxial cable assembly between oscilloscope and A1A34J3011. Make measurement at A1A34J3011 (fig FO-7, waveform 1).

- If waveform correct, plug A1W347 onto A1A34J3011 and perform Step 7.

- If waveform not correct, plug A1W347 onto A1A34J3011 and perform Step 6.

6. Perform 3rd LO Fault Isolation Test (para 2-12).

   • If test passes, replace A1A34 3rd Converter Assembly (para 2-200).

   • If test fails, replace faulty component.

7. Adjust Auxiliary Synthesizer VCO (para 2-104).

   • If VCO can be adjusted and problem clears, A1A25 Harmonic Mixer and A1A26 Auxiliary Synthesizer CCA are operational.

   • If VCO cannot be adjusted, replace A1A26 Auxiliary Synthesizer CCA (para 2-133).

   • If VCO can be adjusted but the problem does not clear, perform Step 8.

NOTE

The 1st LO Control Diagnostic Aid should be displayed for Steps 8-11.

8. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 1=1ST LO CONTROL. Make measurement at A1A26A1P26 pin 48 (fig FO-4, waveform 3).

   • If waveform correct, A1A25 Harmonic Mixer and A1A26 Auxiliary Synthesizer are operational.

   • If waveform not correct, perform Step 9.

9. Unplug A1W252 from A1A25P252 (fig FO-4). Connect coaxial cable between test spectrum analyzer and A1A25P252. Make measurement at A1A25P252 (FO-4, waveform 2).

   • If signal correct, perform Step 10.

   • If signal not correct, perform Step 11.

10. Perform Coaxial Cable Assembly Fault Isolation Test (para 2-22) for A1W252 (fig FO-1, Sheet 2).

    • If test passes, replace A1A26 Auxiliary Synthesizer CCA (para 2-133).

    • If test fails, repair A1W252 (Appendix C).

11. Disconnect A1W240 from A1A25P253. Connect power meter to A1W240. Measure $\geq$ +7 dBm.

    • If power correct, perform Step 12.

    • If power not correct, perform 1st LO Fault Isolation Test (para 2-20).

12. Measure ³ -13 V at A1A25C251 and ³ +13 V at A1A25C253.

    • If voltages correct, replace A1A25 Harmonic Mixer (para 2-189).

    • If voltages not correct, perform Input CCA Fault Isolation Test (para 2-25) for A1A25A3 Input CCA.

13. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-22. COAXIAL CABLE ASSEMBLY FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to the following cable assemblies: A1W100, A1W1011, A1W105, A1W110, A1W150, A1W160, A1W167, A1W182, A1W220, A1W222, A1W224, A1W252, A1W320, A1W340, A1W342, A1W344, A1W346, A1W350, A1W360, A1W370, A1W502, A1W622, A1W682, A1A68W684, A1W694, A1W696, A1W1044, A2W75, A2W85, A2W95, and A2W130.

1. With power off, remove cable under test from equipment.

2. Connect a DMM lead to center conductor at each end of cable assembly. Measure approximately o **W**.

   • If resistance correct, perform Step 3.

   • If resistance not correct and cable is semirigid, replace cable assembly under test (fig FO-1, Sheet 2).

   • If resistance not correct and cable is flexible, repair cable assembly under test (Appendix C).

3. Connect DMM between one center conductor of cable assembly and metal connector on cable assembly. Measure open circuit (infinite resistance).

   • If resistance correct, cable assembly is operational.

   • If resistance not correct and cable is semirigid, replace cable assembly under test (fig FO-1, Sheet 2).

   • If resistance not correct and cable is flexible, repair cable assembly under test (Appendix C).

4. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-23. A1A16 1ST LO ASSEMBLY FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to A1A16A1 1st LO Interface CCA and A1A44 1st LO Driver CCA.

1. With power off, unplug A1W1037 from A1A16A1P1017 (fig FO-2).
2. Connect DMM between A1A16A1P1017 pins 3 and 7. Measure > 5 Ω and < 20 Ω.
   - If resistance correct, perform Step 3.
   - If resistance not correct, perform 1st LO Interface CCA Fault Isolation Test (para 2-24).
3. Connect DMM between A1A16A1P1017 pin 3 and chassis ground. Measure >1 k Ω.
   - If resistance correct, perform Step 4.
   - If resistance not correct, perform 1st LO Interface CCA Fault Isolation Test (para 2-24).
4. Connect DMM between A1A16A1P1017 pins 4 and 5. Measure <1 k Ω.
   - If resistance correct, perform Step 5.
   - If resistance not correct, replace A1A16A1 1st LO Interface CCA (para 2-202).
5. Connect DMM between A1A16A1P1017 pin 4 and chassis ground. Measure > 1 k Ω.
   - If resistance correct, replace A1A44 1st LO Driver CCA (para 2-120).
   - If resistance not correct, replace A1A16A1 1st LO Interface CCA (para 2-202).
6. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-24. 1ST LO INTERFACE CCA FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to A1A16 1st LO Assembly, A1A16A1 1st LO Interface CCA, and A1W1038 Cable Assembly.

1. Measure power supplies for A1A16 1st LO Assembly (fig FO-2).

   • If voltages correct, perform Step 2.
   • If +15 V not correct, replace A1W1038 (fig FO-1, Sheet 2).

   • If -7 V or +17 V not correct, perform Step 3.

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+15 V	+14.84 V to +15.16 V	A1A16A1P1013 pin 2
-7 V	-7 V to -8.5 V	A1A16A1P1017 pin 1
+17 V	+16.81 V to +18.6 V	A1A16A1P1017 pin 6

2. With power off, connect (+) DMM lead to A1A16A1P1013 pin 2. Connect (-) lead to (+) terminal of A1A6A1C1016. Measure approximately 0 **W**.

   • If resistance correct, replace A1A16 1st LO Assembly (para 2-201).

   • If resistance not correct, replace A1A16A1 1st LO Interface CCA (para 2-202).

3. With power off, connect DMM between A1A28J1037 pin 1 (fig FO-5) and A1A16A1P1017 pin 1 (fig FO-2). Measure <5 **W**. Connect DMM between A1A28J1037 pin 5 (fig FO-5) and A1A16A1F1017 pin 6 (fig FO-2). Measure <5 **W**.

   • If resistance correct, perform Step 4.

   • If resistance not correct, replace A1W1037 (fig FO-1, Sheet 2).

4. Connect (+) DMM lead to A1A16A1P1017 pin 1. Connect (-) lead to A1A16A1P1013 pin 3. Measure > 100 **W**.

   • If resistance correct, replace A1A16 1st LO Assembly (para 2-201).

   • If resistance not correct, perform Step 5.

5. Unsolder and lift one lead of A1A16A1C1015. Connect (+) DMM lead to A1A16A1P1017 pin 1. Connect (-) lead to A1A16A1P1013 pin 3. Measure > 100 **W**.

   • If resistance correct, replace A1A6A1 1st LO Interface CCA (para 2-202).

   • If resistance not correct, replace A1A16 1st LO Assembly (para 2-201).

6. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-25. INPUT CCA FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to A1A24 Phase Gate Assembly, A1A24A1 Input CCA, A1A25 Harmonic Mixer, and A1A25A3 Input CCA.

NOTE

This test can be performed to isolate faults on either A1A24A1 Input CCA or A1A25A3 Input CCA.

1. Verify that multiwire cable from A1A24 Phase Gate Assembly is plugged onto A1A28J1025 (fig FO-5).

   • If cable installed, perform Step 2.

   • If cable not installed, plug onto A1A28J1025.

2. Verify that multiwire cable from A1A25 Harmonic Mixer is plugged onto A1A28J1022.

   • If cable installed, perform Step 3.

   • If cable not installed, plug onto A1A28J1022.

3. With power off, unsolder red and brown wires from +15 V and -15 V test points (fig FO-4) on CCA under test.

4. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.

5. Measure +15 V and -15 V at test points (labeled +15 V and -15 V) on CCA being tested.

   • If voltages correct and A1A24A1 Input CCA is being tested, replace A1A24 Phase Gate Assembly (para 2-192).

   • If voltages correct and A1A25A3 Input CCA is being tested, replace A1A25 Harmonic Mixer (para 2-189).

   • If voltages not correct and A1A24A1 Input CCA is being tested, perform Step 6.

   • If voltages not correct and A1A25A3 Input CCA is being tested, perform Step 7.

6. With power off, measure >500 **W** between A1A24C241 and chassis ground. Measure >500 **W** between A1A24C242 and chassis ground.

   • If resistance correct, replace A1A24A1 Input CCA (para 2-193).

   • If resistance not correct, replace A1A24 Phase Gate Assembly (para 2-192).

7. With power off, measure >2 k **W** between A1A25C251 and chassis ground. Measure >2 k **W** between A1A25C253 and chassis ground.

   • If resistance correct, replace A1A25A3 Input CCA (para 2-191).

   • If resistance not correct, replace A1A25 Harmonic Mixer (para 2-189).

8. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-26. VARIABLE RESOLUTION FAULT ISOLATION TEST.

DESCRIPTION

This procedure isolates faults to A1A68A1 Mother #1 CCA, A1A68A2 Mother #2 CCA, A1A68A3 Input CCA, A1A68A7 Band Leveling CCA, A1A68A8 2nd Filter Select CCA, A1A68A9 Amplifier CCA, and A1FL36 Bandpass Filter.

NOTE

• If power is turned off during this test, power down settings can be restored by pressing **RECALL SETTINGS** key and selecting register 0.

• Before performing test, A1A68 Variable Resolution Module (para 2-152) must be placed on circuit card extenders using the extender kit and coaxial cable assemblies.

1. Measure power supplies for A1A68 Variable Resolution Module (fig FO-15).

• If supplies correct, perform Step 2.

• If +5 V, +15 V, +9 V, or -15 V supplies not correct, perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para 2-10).

• If +5 VR, +15 V1, or -15 V1 supplies not correct, perform Variable Resolution Power Supply Fault Isolation Test (para 2-27).

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
-15 V1	-14.84 V to -15.16 V	Junction of A1A68A1C3070 and A1A68A1L1010
-15 V1	-14.84 V to -15.16 V	Junction of A1A68A2C4027 and A1A68A2L4031
-15 V	-14.84 V to -15.16 V	A1A68A1P68A pin 9
+5 VR	≥ +4.9 V	A1A68A1P68A pin 14
+15 V	+14.84 V to +15.16 V	A1A68A1P68A pin 20
+15 V1	+14.84 V to +15.16 V	Junction of A1A68A1C3071 and A1A68A1L1020
+15 V1	+14.84 V to +15.16 V	Junction of A1A68A2C3027 and A1A68A2L4025
+9 V	+8.92 V to +10.1 V	A1A68A2P68B pin 17
+5 V	+4.73 V to +5.23 V	A1A68A2P68B pin 35

2. Adjust Resolution Bandwidth and Shape Factor (para 2-96).

• If resolution bandwidth and shape factor adjusts correctly, perform Step 3.

• If signal amplitude low or high in all RESOLUTION BANDWIDTH settings, perform Step 4.

• If only 3 MHz filter low, replace A1A68A4 1st Filter Select CCA (para 2-159) and associated crystal sets.

• If only 3 MHz filter centering or bandwidth do not adjust, replace A1FL36 Bandpass Filter (para 2-205).

• If one or more filters between 1 MHz and 10 Hz do not adjust, perform Bandpass Filter Fault Isolation Test (para 2-32).

3. Adjust Variable Resolution Gain Steps (para 2-98).

   • If gain steps adjust correctly, A1A68 Variable Resolution Module is operational.

   • If gain steps do not adjust, Variable Resolution Gain Steps Fault Isolation Test (para 2-28).

4. Press **Blue-SHIFT** and **RESET** keys. Select the following settings.

   CENTER/MARKER FREQUENCY 100MHZ
   ZERO SPAN MODE .... ON
   REFERENCE LEVEL .... -20DBM

5. Connect CAL OUT signal to RF INPUT.
6. Measure +5 V at A1A68A3 pin K (fig FO-16, Sheet 1).

   • If voltage correct, perform Step 7.

   • If voltage not correct, replace A1A68A1 Mother #1 CCA (para 2-155).

7. Make measurement at A1A68A3 pin B (fig FO-16, Sheet 1, waveform 1).

   • If waveform correct, perform Step 11.

   • If waveform not correct, perform Step 8.

8. Measure TTL high at A1A68A3 pin Y'.

   • If high, replace A1A68A3 Input CCA (para 2-157).

   • If low, perform Step 9.

9. Measure TTL high at A1A68A1P68A pin 1.

   • If high, replace A1A68A1 Mother #1 CCA (para 2-155).

   • If low, perform Step 10.

10. Connect DMM between A1A68A1 pin Y' and chassis ground. Measure > 9 n.

    • If resistance correct, replace A1A68A2 Mother #2 CCA (para 2-156).

    • If resistance not correct, replace A1A68A1 Mother #1 CCA (para 2-155).

11. Make measurement at A1A68A4 pin K (fig FO-16, Sheet 1). See waveform (fig FO-16, Sheet 4, waveform 4).

    • If waveform correct, perform Step 12.

    • If waveform not correct, perform A1A68A4 Fault Isolation Test (para 2-29).

12. Connect (+) DMM lead to A1A68A5 pin T. Connect (-) lead to chassis ground. Adjust **AMPL CAL** for +1.5 VDC.

    • If able to adjust, perform Step 14.

    • If not able to adjust, perform Step 13.

13. Connect (+) DMM lead to A1A68A1P68A pin 5 (fig FO-15). Connect (-) lead to chassis ground. Measure 0 to + 15 V while rotating **AMPL CAL** through range.

- If voltage range correct, replace A1A68A1 Mother #1 CCA (para 2-155).

- If voltage range not correct, perform Front Panel Potentiometer Fault Isolation Test (para 2-42) for A1A38R6049.

14. Make measurement at A1A68A5 pin P (fig FO-16, Sheet 1, waveform 2).

- If waveform correct, perform Step 15.

- If waveform not correct, perform A1A68A5 Fault Isolation Test (para 2-30).

15. Make measurement at A1A68A6J684 (fig FO-16, Sheet 1, waveform 3).

- If waveform correct, perform Step 16.

- If waveform not correct, perform A1A68A6 Fault Isolation Test (para 2-31).

16. Make measurement at A1A68A7J1048 (fig FO-17, Sheet 1, waveform 1).

- If waveform correct, perform Step 19.

- If waveform not correct, perform Step 17.

17. Perform Coaxial Cable Assembly Fault Isolation Test (para 2-22) for A1A68W684 (fig FO-1, Sheet 3).

- If test passes, perform Step 18.

- If test fails, repair A1A68W684 (Appendix C).

18. Adjust A1A68A2R2031 (fig FO-15) fully counterclockwise. Measure <+0.3 VDC at A1A68A7J2024, and > +3 VDC at A1A68A7J2036.

- If voltages correct, replace A1A68A7 Band Leveling CCA (para 2-161).

- If voltages not correct, replace A1A68A2 Mother #2 CCA (para 2-156).

19. Make measurement at A1A68A8 pin JJ (fig FO-17, Sheet 1). See waveform (fig FO-17, Sheet 3, waveform 2).

- If waveform correct, replace A1A68A9 Amplifier CCA (para 2-164).

- If waveform not correct, replace A1A68A8 2nd Filter Select CCA (para 2-162) and associated crystal sets.

20. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-27. VARIABLE RESOLUTION POWER SUPPLY FAULT ISOLATION TEST.

DESCRIPTION

This procedure isolates faults to A1A68 Variable Resolution Module, A1A68A1 Mother #1 CCA, A1A68A2 Mother #2 CCA, A1A68A3 Input CCA, A1A68A4 1st Filter Select CCA, A1A68A5 10 dB Gain CCA, A1A68A6 20 dB Gain CCA, A1A68A7 Band Leveling CCA, A1A68A8 2nd Filter Select CCA, and A1A68A9 Amplifier CCA.

NOTE

- If power is turned off during this test, power down settings can be restored by pressing **RECALL SETTINGS** key and selecting register 0.

- Before performing test, A1A68 Variable Resolution Module (para 2-152) must be placed on circuit card extenders using the extender kit and coaxial cable assemblies.

1. Measure power su pplies for A1A68 Variable Resolution Module (fig FO-15).

- If +5 VR (A1A68A1P68A pin 14) not correct, perform Step 2.

- If only -15 V1 at junction of A1A68A1C3070 and A1A68A1L1010 not correct, replace A1A68A1 Mother #1 CCA (para 2-155).

- If only -15 V1 at junction of A1A68A2C4027 and A1A68A2L4031 not correct, replace A1A68A2 Mother #2 CCA (para 2-156).

- If only +15 V1 at junction of A1A68A1C3071 and A1A68A1L1020 not correct, replace A1A68A1 Mother #1 CCA (para 2-155).

- If only +15 V1 at junction of A1A68A2C3027 and A1A68A2L4025 not correct, replace A1A68A2 Mother #2 CCA (para 2-156).

- If both -15 V1 supplies not correct, perform Step 8.

- If both +15 V1 supplies not correct, perform Step 13.

- If +5 V (A1A68A2P68B pin 35) not correct, replace A1A68A2 Mother #2 CCA (para 2-156).

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
-15 V1	-14.84 V to -15.16 V	Junction of A1A68A1C3070 and A1A68A1L1010
-15 V1	-14.84 V to -15.16 V	Junction of A1A68A2C4027 and A1A68A2L4031
+5 VR	³ +4.9 V	A1A68A1P68A pin 14
+15 V1	+14.84 V to +15.16 V	Junction of A1A68A1C3071 and A1A68A1L1020
+15 V1	+14.84 V to +15.16 V	Junction of A1A68A2C3027 and A1A68A2L4025
+5 V	+4.73 V to +5.23 V	A1A68A2P68B pin 35

2. With power off, connect DMM leads across A1A68A2R4039. Measure approximately 10 **W**.

   • If resistance correct, perform Step 3.

   • If resistance not correct, replace A1A68A2 Mother #2 CCA (para 2-156).

3. Unsolder and lift one lead of A1A68A2C4039. Connect DMM between A1A68A2R4039 and chas sis ground. Measure >1 k **W**.

   • If resistance correct, perform Step 4.

   • If resistance not correct, replace A1A68 Variable Resolution Module (para 2-152).

4. Remove A1A68 Variable Resolution Module (para 2-152). Connect DMM between A1A68A8 pin FF (fig FO-17, Sheet 1) and chassis ground. Measure >500 **W**.

   • If resistance correct, perform Step 6.

   • If resistance not correct, perform Step 5.

5. Remove A1A68A8 2nd Filter Select CCA (para 2-162). Connect DMM between A1A68A2 pin FF (fig FO-15) and chassis ground. Measure > 500 **W**.

   • If resistance correct, replace A1A68A8 2nd Filter Select CCA (para 2-162) and associated crystal sets.

   • If resistance not correct, replace A1A68A2 Mother #2 CCA (para 2-156).

6. Connect DMM between A1A68A1P68A pin 14 (fig FO-15) and chassis ground. Measure > 700 n.

7. Sequentially remove assemblies listed below and measure resistance between A1A68A1P68A pin 14 and chassis ground until resistance is > 700 **W**.

   • If resistance correct, replace last assembly removed.

   • If resistance not correct, replace A1A68A1 Mother #1 CCA (para 2-155).

REMOVE ASSEMBLY	DMM LEAD	DMM LEAD
A1A68A3 Input CCA (para 2-157)	A1A68A1P68A pin 14	Chassis Ground
A1A68A4 1st Filter Select CCA (para 2-159)	A1A68A1P68A pin 14	Chassis Ground
A1A68A5 10 dB Gain CCA (para 2-158)	A1A68A1P68A pin 14	Chassis Ground
A1A68A6 20 dB Gain CCA (para 2-160)	A1A68A1P68A pin 14	Chassis Ground

8. With power off, measure approximately 0 **W** across A1A68A1L1010 and A1A68A2L4031.

   • If A1A68A1L1010 open, replace A1A68A1 Mother #1 CCA (para 2-155).

   • If A1A68A2L4031 open, replace A1A68A2 Mother #2 CCA (para 2-156).

   • If resistance correct, perform Step 9.

9. Remove A1A68 Variable Resolution Module (para 2-152). Connect DMM between A1A68A2P68B pin 28 (fig FO-15) and chassis ground. Measure >700 **W**.

• If resistance correct, perform Step 11.

• If resistance not correct, perform Step 10.

10. Sequentially remove assemblies listed below and measure resistance between A1A68A2P68B pin 28 and chassis ground until resistance is > 700 **W**.

• If resistance correct, replace last assembly removed.

• If resistance not correct, replace A1A68A2 Mother #2 CCA (para 2-156).

REMOVE ASSEMBLY	DMM LEAD	DMM LEAD
A1A68A7 Band Leveling CCA (para 2-161)	A1A68A2P68B pin 28	Chassis Ground
A1A68A8 2nd Filter Select CCA (para 2-162)	A1A68A2P68B pin 28	Chassis Ground
A1A68A9 Amplifier CCA (para 2-164)	A1A68A2P68B pin 28	Chassis Ground

11. Connect DMM between A1A68A1P68A pin 9 (fig FO-15) and chassis ground. Measure > 700 **W**.
12. Sequentially remove assemblies listed below and measure resistance between A1A68A1P68A pin 9 and chassis ground until resistance is > 700 **W**.

• If resistance correct, replace last assembly removed.

• If resistance not correct, replace A1A68A1 Mother #1 CCA (para 2-155).

REMOVE ASSEMBLY	DMM LEAD	DMM LEAD
A1A68A4 1st Filter Select CCA (para 2-159)	A1A68A1P68A pin 9	Chassis Ground
A1A68A5 10 dB Gain CCA (para 2-158)	A1A68A1P68A pin 9	Chassis Ground
A1A68A6 20 dB Gain CCA (para 2-160)	A1A68A1P68A pin 9	Chassis Ground

13. Remove A1A68 Variable Resolution Module (para 2-152). Connect DMM between A1A68A2P68B pin 20 (fig FO-15) and chassis ground. Measure > 700 **W**.

• If resistance correct, perform Step 15.

• If resistance not correct, perform Step 14.

14. Sequentially remove assemblies listed below and measure resistance between A1A68A2P68B pin 20 and chassis ground until resistance is > 700 **W**.

• If resistance correct, replace last assembly removed.

• If resistance not correct, replace A1A68A2 Mother #2 CCA (para 2-156).

REMOVE ASSEMBLY	DMM LEAD	DMM LEAD
A1A68A7 Band Leveling CCA (para 2-161)	A1A68A2P68B pin 20	Chassis Ground
A1A68A8 2nd Filter Select CCA (para 2-162)	A1A68A2P68B pin 20	Chassis Ground
A1A68A9 Amplifier CCA (para 2-164)	A1A68A2P68B pin 20	Chassis Ground

15. Connect DMM between A1A68A1P68A pin 20 (fig FO-15) and chassis ground. Measure >700 W.
16. Sequentially remove assemblies listed below and measure resistance between A1A68A1P68A pin 20 and chassis ground until resistance is > 700 W.

    - If resistance correct, replace last assembly removed.

    - If resistance not correct, replace A1A68A1 Mother #1 CCA (para 2-155).

REMOVE ASSEMBLY	DMM LEAD	DMM LEAD
A1A68A3 Input CCA (para 2-157)	A1A68A1P68A pin 20	Chassis Ground
A1A68A4 1st Filter Select CCA (para 2-159)	A1A68A1P68A pin 20	Chassis Ground
A1A68A5 10 dB Gain CCA (para 2-158)	A1A68A1P68A pin 20	Chassis Ground
A1A68A6 20 dB Gain CCA (para 2-160)	A1A68A1P68A pin 20	Chassis Ground

17. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-28. VARIABLE RESOLUTION GAIN STEPS FAULT ISOLATION TEST.

DESCRIPTION

This procedure isolates faults to A1A68A1 Mother #1 CCA, A1A68A2 Mother #2 CCA, A1A68A3 Input CCA, and A1A68A6 20 dB Gain CCA.

NOTE

• If power is turned off during this test, power down settings can be restored by pressing **RECALL SETTINGS** key and selecting register 0.

• Before performing test, A1A68 Variable Resolution Module (para 2-152) must be placed on circuit card extenders using the extender kit and coaxial cable assemblies.

1. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys. Select the following settings.

CENTER/MARKER FREQUENCY	100MHZ
ZERO SPAN MODE	ON
REFERENCE LEVEL	-20DBM
MIN RF ATTEN	0 (NORM)

2. Connect CAL OUT signal to RF INPUT.
3. Connect (+) DMM lead to A1A68A5 pin T (fig FO-16, Sheet 1). Connect (-) lead to chassis ground. Adjust **AMPL CAL** for +1.5 VDC.

• If able to adjust, perform Step 5.

• If not able to adjust, perform Step 4.

4. Connect (+) DMM lead to A1A68A1P68A pin 5 (fig FO-15). Connect (-) lead to chassis ground. Measure 0 to + 15 V while rotating **AMPL CAL** through range.

• If voltage range correct, replace A1A68A1 Mother #1 CCA (para 2-155).

• If voltage range not correct, perform Front Panel Potentiometer Fault Isolation Test (para 2-42) for A1A38R6049.

5. Measure and write on paper the waveform at A1A68A6J684 (fig FO-16, Sheet 1, waveform 3).

• If waveform correct, perform Step 6.

• If waveform not correct, perform Variable Resolution Fault Isolation Test (para 2-26).

6. Set MIN RFATTEN to 10 dB. Make measurement at AA68A6J684 (fig FO-16, Sheet 1,waveform 3).

• If waveform amplitude approximately matches waveform from Step 5, perform Step 9.

• If waveform does not match waveform from Step 5, perform Step 7.

7. Measure TTL low at A1A68A5 pin N.

• If low, replace A1A68A5 10 dB Gain CCA (para 2-158).

• If high, perform Step 8.

8. With power off, measure approximately 10 n between A1A68A1P68A pin 3 (fig FO-15) and A1A68A5 pin N (fig FO-16, Sheet 1).

   • If resistance correct, replace A1A68A2 Mother #2 CCA (para 2-156).

   • if resistance not correct, replace A1A68A1 Mother #1 CCA (para 2-155).

9. Set MIN RF ATTEN to 20 dB. Make measurement at A1A68A6J684 (fig FO-16, Sheet 1, waveform 3).

   • If waveform amplitude approximately matches waveform from Step 5, perform Step 12.

   • If waveform does not match waveform from Step 5, perform Step 10.

10. Measure TTL low at A1A68A6 pin V.

   • If low, replace A1A68A6 20 dB Gain CCA (para 2-160).

   • If high, perform Step 11.

11. With power off, measure approximately 10 0 between A1A68A1P68A pin 2 (fig FO-15) and A1A68A6 pin V (fig FO-16, Sheet 1).

   • If resistance correct, replace A1A68A2 Mother #2 CCA (para 2-156).

   • if resistance not correct, replace A1A68A1 Mother #1 CCA (para 2-155).

12. Set MIN RF ATTEN to 40 dB. Make measurement at A1A68A6J684 (fig FO-16, Sheet 1, waveform 3).

   • If waveform amplitude approximately matches waveform from Step 5, A1A68 Variable Resolution gain steps are operational.

   • If waveform does not match waveform from Step 5, perform Step 13.

13. Measure TTL low at A1A68A3 pin Y.

   • If low, replace A1A68A3 Input CCA (para 2-157).

   • If high, perform Step 14.

14. With power off, measure approximately 10 n between A1A68A1P68A pin 1 (fig FO-15) and A1A68A3 pin Y' (fig FO-16, Sheet 1).

   • If resistance correct, replace A1A68A2 Mother #2 CCA (para 2-156).

   • if resistance not correct, replace A1A68A1 Mother #1 CCA (para 2-155).

15. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-29. A1A68A4 FAULT ISOLATION TEST.

DESCRIPTION

This procedure isolates faults to A1A68A1 Mother #1 CCA and A1A68A4 1st Filter Select CCA.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **Before performing test, A1A68 Variable Resolution Module (para. 2-152) must be placed on circuit card extenders using the extender kit and coaxial cable assemblies.**
- **On A1A68A4 1st Filter Select CCA, a short to chassis ground may open a resistor on A1A68A1 Mother #1 CCA. When this occurs, both assemblies must be replaced.**

1. Measure power supplies on A1A68A4 1st Filter Select CCA (fig. FO-16, Sheet 1).
   - If voltages correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.
   - If voltages not correct, perform Step 2.

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+15 V	>+14 V	A1A68A4 pin D
+5 V	>+4.5 V	A1A68A4 pin H
-15 V	>-14 V	A1A68A4 pin J

2. With power off, measure resistance shown in following table.
   - If resistance correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.
   - If resistance only for pins D and J not correct, replace A1A68A1 Mother #1 CCA (para. 2-155).
   - If resistance only for pin H not correct, perform Step 3.

DMM LEAD	DMM LEAD	APPROXIMATE RESISTANCE
A1A68A4 pin D	A1A68A1P68A pin 20	10 **W**
A1A68A4 pin H	A1A68A1P68A pin 14	5 **W**
A1A68A4 pin J	A1A68A1P68A pin 9	10 **W**

3. With power off, remove A1A68A4 1st Filter Select CCA (para. 2-159). Connect DMM between A1A68A1 pin H (fig. FO-15) and chassis ground. Measure >700 **W**.
   - If resistance correct, replace A1A68A1 Mother #1 CCA (para. 2-155) and A1A68A4 1st Filter Select CCA (para. 2-159).
   - If resistance not correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.
4. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-30. A1A68A5 FAULT ISOLATION TEST.

DESCRIPTION

This procedure isolates faults to A1A68A1 Mother #1 CCA, A1A68A2 Mother #2 CCA, A1A68A4 1st Filter Select CCA, and A1A68A5 10 dB Gain CCA.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **Before performing test, A1A68 Variable Resolution Module (para. 2-152) must be placed on circuit card extenders using the extender kit and coaxial cable assemblies.**
- **On A1A68A5 10 dB Gain CCA, a short to chassis ground may open a resistor on A1A68A1 Mother #1 CCA. When this occurs, both assemblies must be replaced.**

1. Measure power supplies on A1A68A5 10 dB Gain CCA (fig. FO-16, Sheet 1).
   - If voltages correct, perform Step 4.
   - If voltages not correct, perform Step 2.

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+15 V	>+14 V	A1A68A5 pin M
TTL high	≥+2.0 V	A1A68A5 pin N
+5 V	>+4.5 V	A1A68A5 pin R
-15 V	>-14 V	A1A68A5 pin S

2. With power off, measure resistance shown in following table.
   - If resistance correct, perform Step 4.
   - If resistance only not correct for pins N, R, or S, replace A1A68A1 Mother #1 CCA (para. 2-155).
   - If resistance only not correct for pin M, perform Step 3.

DMM LEAD	DMM LEAD	APPROXIMATE RESISTANCE
A1A68A5 pin M	A1A68A1P68A pin 20	10 **W**
A1A68A5 pin N	A1A68A1P68A pin 3	10 **W**
A1A68A5 pin R	A1A68A1P68A pin 14	10 **W**
A1A68A5 pin S	A1A68A1P68A pin 9	10 **W**

3. With power off, remove A1A68A5 10 dB Gain CCA (para. 2-158). Connect DMM between A1A68A1 pin M (fig. FO-15) and chassis ground. Measure >700 **W**
   - If resistance correct, replace A1A68A1 Mother #1 CCA (para. 2-155) and A1A68A5 10 dB Gain CCA (para. 2-158).
   - If resistance not correct, replace A1A68A5 10 dB Gain CCA (para. 2-158).

4. With power on, switch RESOLUTION BANDWIDTH setting between 100 Hz and 10 Hz. Measure > +12 V (100 Hz) and TTL low (10 Hz) at A1A68A5 pin L while switching settings.
   - If pin L toggles, replace A1A68A5 10 dB Gain CCA (para. 2-158).
   - If pin L does not toggle, perform Step 5.
5. With power off, measure approximately 20 **W** between A1A68A5 pin L and A1A68A4 pin C.
   - If resistance correct, perform Step 6.
   - If resistance not correct, replace A1A68A1 Mother #1 CCA (para. 2-155).
6. With power on, switch RESOLUTION BANDWIDTH setting between 100 Hz and 10 Hz. Measure TTL signals shown in following table.
   - If levels correct, perform Step 7.
   - If levels not correct, perform Step 8.

RESOLUTION BANDWIDTH	A1A68A4 PIN E	A1A68A4 PIN F	A1A68A4 PIN G
10 Hz	High	High	Low
100 Hz	High	Low	High

7. With power off, remove A1A68A4 1st Filter Select CCA (para. 2-159). Connect DMM between A1A68A1 pin C (fig. FO-15) and chassis ground. Measure >2 k **W**.
   - If resistance correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.
   - If resistance not correct, replace A1A68A1 Mother #1 CCA (para. 2-155).
8. With power off, measure resistance shown in following table.
   - If resistance correct, perform Step 9.
   - If resistance not correct, replace A1A68A1 Mother #1 CCA (para. 2-155).

DMM LEAD	DMM LEAD	APPROXIMATE RESISTANCE
A1A68A4 pin E	A1A68A1P68A pin 8	10 **W**
A1A68A4 pin F	A1A68A1P68A pin 10	10 **W**
A1A68A4 pin G	A1A68A1P68A pin 12	10 **W**

9. Remove A1A68 Variable Resolution Module (para. 2-152). Connect one DMM lead to chassis ground. Measure >2 k**W** between A1A68A1P68A pins 8, 10, and 12 (fig. FO-15) and chassis ground.
   - If resistance correct, replace A1A68A2 Mother #2 CCA (para. 2-156).
   - If resistance not correct, replace A1A68A1 Mother #1 CCA (para. 2-155).
10. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-31. A1A68A6 FAULT ISOLATION TEST.

DESCRIPTION

This procedure isolates faults to A1A68A1 Mother #1 CCA, A1A68A2 Mother #2 CCA, and A1A68A6 20 dB Gain CCA.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **Before performing test, A1A68 Variable Resolution Module (para. 2-152) must be placed on circuit card extenders using the extender kit and coaxial cable assemblies**.

1. Measure power supplies on A1A68A6 20 dB Gain CCA (fig. FO-16, Sheet 1).

   - If voltages correct, replace A1A68A6 20 dB Gain CCA (para. 2-160).
   - If only pins W, U, and X not correct, perform Step 2.
   - If only pin V n ot correct, perform Step 3.

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+5 V	>+4.5 V	A1A68A6 pin U
TTL high	≥ +2.0 V	A1A68A6 pin V
+15 V	>+14 V	A1A68A6 pin W
-15 V	>-14 V	A1A68A6 pin X

2. With power off, measure resistance shown in following table.

   - If resistance correct, replace A1A68A6 20 dB Gain CCA (para. 2-160).
   - If resistance not correct, replace A1A68A1 Mother #1 CCA (para. 2-155).

DMM LEAD	DMM LEAD	APPROXIMATE RESISTANCE
A1A68A6 pin U	A1A68A1P68A pin 14	10 Ω
A1A68A6 pin W	A1A68A1P68A pin 20	10 Ω
A1A68A6 pin X	A1A68A1P68A pin 9	10 Ω

3. With power off, measure approximately 0 Ω between A1A68A6 pin V and A1A68A1P68A pin 2.

   - If resistance correct, perform Step 4.
   - If resistance not correct, replace A1A68A1 Mother #1 CCA (para. 2-155).

4. Connect DMM between A1A68A6 pin V and chassis ground. Measure > 9 Ω.

   - If resistance correct, replace A1A68A2 Mother #2 CCA (para. 2-156).
   - If resistance not correct, replace A1A68A1 Mother #1 CCA (para. 2-155).

5. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-32. BANDPASS FILTER FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A68A1 Mother #1 CCA, A1A68A2 Mother #2 CCA, A1A68A4 1st Filter Select CCA, A1A68A8 2nd Filter Select CCA, A1A68Y2030 Crystal, A1A68Y2040 Crystal, A1A68Y2045 Crystal, A1A68Y5040 Crystal, and A1A68Y6049 Crystal.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **Before performing test, A1A68 Variable Resolution Module (para. 2-152) must be placed on circuit card extenders using the extender kit and coaxial cable assemblies.**

1. Perform Gain Variation Between Resolution Bandwidths Test (para. 2-71). Write on paper which filter is faulty.
2. Verify that outputs on A1A68A4U4035 (fig. FO-16, Sheet 1) and A1A68A8U3070 (fig. FO-17, Sheet 1) switch from high to low when RESOLUTION BANDWIDTH setting is selected. See following table for test points.
   - If TTL levels correct, perform Step 5.
   - If TTL levels for both A1A68A4U4035 and A1A68A8U3070 not correct, replace A1A68A2 Mother #2 CCA (para. 2-156).
   - If only TTL levels for A1A68A4U4035 not correct, perform Step 3.
   - If only TTL levels for A1A68A8U3070 not correct, replace A1A68A8 2nd Filter Select CCA (para. 2-162) and associated crystal sets.

NOTE

Level at A1A68A8U3070 pin 7 switches below +0.7 V (high) and approximately 0 V (low). All other test points switch between TTL levels.

RESOLUTION BANDWIDTH	TEST POINTS ON A1A68A4U4035	TEST POINTS ON A1A68A8U3070
3 MHz	Pin 2	Pin 2
1 MHz	Pin 9	Pin 2
100 kHz	Pin 3	Pin 3
10 kHz	Pin 4	Pin 4
1 kHz	Pin 5	Pin 5
100 Hz	Pin 6	Pin 6
10 Hz	Pin 7	Pin 7

3. With power off, measure resistance shown in following table.

   - If resistance correct, perform Step 9.
   - If resistance not correct, replace A1A68A1 Mother #1 CCA (para. 2-155).

DMM LEAD	DMM LEAD	APPROXIMATE RESISTANCE
A1A68A4 pin E	A1A68A1P68A pin 8	10 **W**
A1A68A4 pin F	A1A68A1P68A pin 10	10 **W**
A1A68A4 pin G	A1A68A1P68A pin 12	10 **W**

4. Remove A1A68 Variable Resolution Module (para. 2-152). Connect one DMM lead to chassis ground. Measure >2 k**W** between A1A68A1P68A pins 8, 10, and 12 (fig. FO-15) and chassis ground.

   - If resistance correct, replace A1A68A2 Mother #2 CCA (para. 2-156).
   - If resistance not correct, replace A1A68A1 Mother #1 CCA (para. 2-155).

5. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys. Select the following settings.

   CENTER/MARKER FREQUENCY 100MHZ
   ZERO SPAN MODE .... ON
   REFERENCE LEVEL .... -20DBM
   MIN RF ATTEN .... 0 (NORM)
   TIME/DIV .... AUTO

6. Connect CAL OUT signal to RF INPUT. Verify which filter is defective (written down during Step 1).

   - If 3 MHz filter is faulty, perform Step 7.
   - If 1 MHz filter is faulty, perform Step 8.
   - If 100 kHz filter is faulty, perform Step 9.
   - If 10 kHz filter is faulty, perform Step 10.
   - If 1 kHz filter is faulty, perform Step 11.
   - If 100 Hz or 10 Hz filter is faulty, perform Step 12.

7. Set RESOLUTION BANDWIDTH to 3 MHz. Make measurement at A1A68A6J684 (fig. FO-16, Sheet 1, waveform 3).

   If waveform correct, replace A1A68A8 2nd Filter Select CCA (para. 2-162) and associated crystal sets.

   If waveform not correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.

8. Set RESOLUTION BANDWIDTH to 1 MHz. Make measurement at A1A68A6J684 (fig. FO-16, Sheet 1, waveform 3).

   - If waveform correct, replace A1A68A8 2nd Filter Select CC A (para. 2-162) and associated crystal sets.
   - If waveform not correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.

9. Set RESOLUTION BANDWIDTH to 100 kHz. Make measurement at A1A68A6J684 (fig. FO-16, Sheet 1, waveform 3).

   - If waveform correct, replace A1A68A8 2nd Filter Select CCA (para. 2-162) and associated crystal sets.
   - If waveform not correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.

10. Set RESOLUTION BANDWIDT H to 10 kHz. Make measurement at A1A68A6J684 (fig. FO-16, Sheet 1, waveform 3).

    - If waveform correct, replace A1A68A8 2nd Filter Select CCA (para. 2-162) and associated crystal sets.
    - If waveform not correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.

11. Set RESOLUTION BANDWIDTH to 1 kHz. Make measurement at A1A68A6J684 (fig. FO-16, Sheet 1, waveform 3).

    - If waveform correct, replace A1A68A8 2nd Filter Select CCA (para. 2-162) and associated crystal sets .
    - If waveform not correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.

12. Set RESOLUTION BANDWIDTH to 100 Hz. Make measurement at A1A68A6J684 (fig. FO-16, Sheet 1, waveform 3).

    - If waveform correct, perform Step 13.
    - If waveform not correct, perform Step 14.

13. Perform A1A68A8FL6015 Fault Isolation Test (para. 2-33).

    - If test passes, perform Step 14.
    - If test fails, replace faulty component.

14. Measure more negative than -2 VDC at A1A68A4P694. Ma ke measurement of waveform at A1A68A4P694 (fig. FO-16, Sheet 1). See waveform (fig. FO-16, Sheet 5, waveform 5).

    - If waveform and DC voltage correct, perform Step 16.
    - If waveform or DC voltage not correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.

NOTE

Waveform amplitude may vary as 495P Spectrum Analyzer drifts. Signal amplitude for Steps 16 and 17 should be measured when signal is at maximum amplitude on the CRT.

15. Carefull y adjust **CENTER/MARKER FREQUENCY** knob for maximum amplitude on CRT.

16. Set RESOLUTION BANDWIDTH to 10 Hz. Measure >+12 VDC at A1A68A4P694. Make measurement of waveform at A1A68A4P694 (fig. FO-16, Sheet 1). See waveform (fig. FO-16, Sheet 5, waveform 5).

    - If waveform and DC voltage correct, perform Step 17.

    - If waveform and DC voltage not correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.

17. Make measurement at A1A68A4P695 (fig. FO-16, Sheet 1). See wav eform (fig. FO-16, Sheet 5, waveform 6).

    - If waveform correct, replace A1A68A4 1st Filter Select CCA (para. 2-159) and associated crystal sets.

    - If waveform not correct, perform Step 18.

18. Perform Coaxial Cable Assembly Fault Isolation Test (para. 2-22) for A1A68W694 (fig. FO-1, Sheet 3) and A1W696 (fig. FO-1, Sheet 2).

    - If test passes, perform 10/100 Hz Filter Fault Isolation Test (para. 2-34).

    - If test fails, replace faulty component.

19. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-33. A1A68A8FL6015 FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A68A8 2nd Filter Select CCA and A1A68A8FL6015 Crystal Filter.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **Before performing test, A1A68 Variable Resolution Module (para. 2-152) must be placed on circuit card extenders using the extender kit and coaxial cable assemblies.**
- **Waveform amplitude may vary as 495P Spectrum Analyzer drifts. Signals should be measured when signal is at maximum amplitude on the CRT.**

1. On 495P Spectrum Analyzer, carefully adjust **CENTER/MARKER FREQUENCY** knob for maximum amplitude on CRT. Make measurement at short lead of A1A68A8R4019 (fig. FO-17, Sheet 1). See waveform (fig. FO-17, Sheet 4, waveform 3).
   - If waveform correct, perform Step 2.
   - If waveform not correct, replace A1A68A8 2nd Filter Select CCA (para. 2-162) and associated crystal sets.
2. Make measurement at junction of A1A68A8C8024 and A1A68A8FL6015 (fig. FO-17, Sheet 1). See waveform (fig. FO-17, Sheet 4, waveform 4).
   - If waveform correct, replace A1A68A8 2nd Filter Select CCA (para. 2-162) and associated crystal sets.
   - If waveform not correct, perform Step 3.
3. Rotate A1A68A8R4025 for largest signal at junction of A1A68A8C8024 and A1A68A8FL6015.
4. Make measurement at junction of A1A68A8C8024 and A1A68A8FL6015 (fig. FO-17, Sheet 1). See waveform (fig. FO-17, Sheet 4, waveform 4).
   - If waveform correct, A1A68A8FL6015 Crystal Filter is operational.
   - If waveform not correct, perform Step 5.
5. Measure > +14 VDC at junction of A1A68A8C8013 and A1A68A8R8010.
   - If voltage correct, perform Step 6.
   - If voltage not correct, replace A1A68A8 2nd Filter Select CCA (para. 2.-162) and associated crystal sets.
6. Measure <+3 V to >+14 V at junction of A1A68A8R6040 and A1A68A8C6041 while rotating A1A68A8R4025 through range.
   - If voltage correct, repl ace A1A68A8FL6015 (para. 2-163).
   - If voltage not correct, replace A1A68A8 2nd Filter Select CCA (para. 2-162) and associated crystal sets.
7. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-34. 10/100 HZ FILTER FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A69A1 1st Mixer CCA, A1A69A2 Filter CCA, A1A69A3 2nd Mixer CCA, A1A69A4 Oscillator CCA, A1A69Y2020 Crystal, and A1A69Y2025 Crystal.

NOTE

- **Allow 495P Spectrum Analyzer to warm up for 15 minutes before doing this test.**
- **U-shaped feed through terminals must be installed (14 total) for assembly to function properly**.

1. Measure power supplies for A1A69 10/100 Hz Filter (fig. FO-18, Sheet 1).
   - If voltages correct, perform Step 7.
   - If +17 V or -15 V not correct, perform Step 2.
   - If +15 V not correct, perform Step 3.

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+17 V	+16.81 V to +18.6 V	A1A69C690
-15 V	-14.84 V to -15.16 V	A1A69C691
+15 V	>+14 V	A1A69A1 pin A

2. Verify that brown/red multiwire cable is plugged onto A1A70P1040 (fig. FO-19).
   - If installed, perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para. 2-10).
   - If not installed, install and repeat Step 1.
3. Remove U-shaped, feedthrough terminal at A1A69A1 pin A (fig. FO-18, Sheet 1). Measure +15 V.
   - If +15 V correct, perform Step 4.
   - If +15 V not correct, replace A1A69A1 1st Mixer CCA (para. 2-149) and associated crystal set.
4. Install jumper at A1A69A1 pin A.
5. Remove U-shaped feedthrough terminals at A1A69A2 pins G and P. Measure +15 V.
   - If +15 V correct, perform Step 6.
   - If +15 V not correct, replace A1A69A2 Filter CCA (para. 2-151).
6. Install U-shaped feedthrough terminal at A1A69A2 pin G. Measure +15 V.
   - If +15 V correct, replace A1A69A3 2nd Mixer CCA (para. 2-150) and associated crystal set.
   - If +15 V not correct, replace A1A69A4 Oscillator CCA (para. 2-148).

7. Adjust 10/100 Hz Filter (para. 2-97).

   - If filter adjus ts correctly, A1A69 10/100 Hz Filter is operational.

   - If filter does not adjust, perform Step 8.

8. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys. Select the following settings.

   CENTER/MARKER FREQUENCY 100MHZ
   ZERO SPAN MODE .... ON
   RESOLUTION BANDWIDTH 100HZ
   REFERENCE LEVEL .... -20DBM

9. Connect CAL OUT signal to RF INPUT.

NOTE

Wave shapes at A1A69A4 pins F, J, and K may vary. Verify that waveform amplitude and frequency match example waveform (fig. FO-18, Sheet 1, waveform 2).

10. Make measurement at A1A69A4 pins F, J, and K.

    - If waveforms correct, perform Step 11.

    - If waveforms not correct, replace A1A69A4 Oscillator CCA (para. 2-148).

11. Make measurement at A1A69A1 pin D (fig. FO-18, Sheet 1). See waveform (fig. FO-18, Sheet 2, waveform 3).

    - If waveform correct, perform Step 12.

    - If waveform not correct, replace A1A69A1 1st Mixer CCA (para. 2-149) and associated crystal set.

12. Measure more negative than -1.8 V at A1A69A1 pin E.

    - If voltage correct, perform Step 14.

    - If voltage not correct, perform Step 13.

13. Remove U-shaped feedthrough terminal at A1A69A1 pin E. Measure more negative than -10 V at A1A69A1 pin E.

    - If voltage correct, replace A1A69A2 Filter CCA (para. 2-151).

    - If voltage not correct, replace A1A69A1 1st Mixer CCA (para. 2-149) and associated crystal set.

14. Set RESOLUTION BANDWIDTH to 10 Hz. Measure > +10 V at A1A69A1 pin E.

    - If voltage correct, perform Step 16.

    - If voltage not correct, perform Step 15.

15. Remove U-shaped feedthrough terminal at A1A69A1 pin E. Measure >+10 V at A1A69A1 pin E.

    - If voltage correct, replace A1A69A2 Filter CCA (para. 2-151).

    - If voltage not correct, replace A1A69A1 1st Mixer CCA (para. 2-149) and associated crystal set.

16. Press **Blue-SHIFT** and **VIDEO FILTER WIDE** keys. Select 3=EOS CORRECTIONS MODE TOGGLE.

NOTE

Waveform amplitude may vary as 495P Spectrum Analyzer drifts. Signal amplitude for Step 18 should be measured when signal is at maximum amplitude on the CRT.

17. Carefully adjust **CENTER/MARKER FREQUENCY** knob for maximum amplitude on CRT.
18. Make measurement at A1A69A2 pin M (fig. FO-18, Sheet 1, waveform 1).

    - If waveform correct, replace A1A69A3 2nd Mixer CCA (para. 2-150) and associated crystal set.

    - If waveform not correct, replace A1A69A2 Filter CCA (para. 2-151).

19. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-35. A1A50 PHASE LOCK ASSEMBLY FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A50A1 Synthesizer CCA, A1A50A2 Strobe Driver CCA, A1A50A3 Mixer CCA, A1A50A4 Error Amplifier CCA, A1A50A5 Oscillator CCA, and A1A51 Counter CCA.

NOTE

If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.

Before performing test, A1A50 Phase Lock Assembly (para. 2-123) must be placed on circuit card extenders using the extender kit and coaxial cable assemblies.

1. Measure power supplies for A1A50 Phase Lock Assembly (fig. FO-10).

   - If voltages correct, perform Step 2.
   - If voltages not correct, perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para. 2-10).

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+9 V	+8.92 V to +10.1 V	A1A50A4P50 pin 35
+15 V	+14.84 V to +15.16 V	A1A50A4P50 pin 36
-5 V	-4.96 V to -5.05 V	A1A50A4P50 pin 43
-15 V	-14.84 V to -15.16 V	A1A50A4P50 pin 44

2. Measure power supplies for A1A50 Phase Lock Assembly.

   - If voltages correct, perform Step 8.
   - If +15 V not correct, perform Step 3.
   - If +12 V not correct, perform Step 4.
   - If +9 V not correct, perform Step 5.
   - If +5 V not correct, perform Step 7.

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+5 V	³ +4.6 V	A1A50A4 pin B
+12 V	³ +11.5 V	A1A50A4 pin C
+15 V	³ +14.5 V	A1A50A4 pin D
+9 V	³ +8.4 V	A1A50A4, pins E, F

3. Remove A1A50A5 Oscillator CCA (para. 2-130) and measure +15 V.

   - If +15 V correct, replace A1A50A5 Oscillator CCA (para. 2-130).
   - If +15 V not correct, replace A1A50A4 Error Amplifier CCA (para. 2-129).

4. Remove U-shaped feedthrough terminal at A1A50A4 pin C and measure +12 V.
   - If +12 V correct, replace A1A50A2 Strobe Driver CCA (para. 2-127).
   - If +12 V not correct, replace A1A50A4 Error Amplifier CCA (para. 2-129).
5. Remove A1A50A3 Mixer CCA (para. 2-128) and measure +9 V.
   - If +9 V correct, replace A1A50A3 Mixer CCA (para. 2-128).
   - If +9 V not correct, perform Step 6.
6. Remove A1A50A1 Synthesizer CCA (para. 2-126) and measure +9 V.
   - If +9 V correct, replace A1A50A1 Synthesizer CCA (para. 2-126).
   - If +9 V not correct, replace A1A50A4 Error Amplifier CCA (para. 2-129).
7. Remove U-shaped feedthrough terminal at A1A50A4 pin B and measure +5 V.
   - If +5 V correct, replace A1A50A2 Strobe Driver CCA (para. 2-127).
   - If +5 V not correct, replace A1A50A4 Error Amplifier CCA (para. 2-129).
8. Adjust Phase Lock Assembly (para. 2-109). Check for normal phase lock operation (para. 2-109, Steps 2-3).
   - If phase lock operation is normal, eq uipment is operational.
   - If phase lock operation is not normal, perform Step 11.
9. With power off, connect jumper between A1A51A1 U3024 pin 1 (fig. FO-11) and chassis ground.
10. With power on, press **Blue-SHIFT** and **10dB/DIV keys**. Measure toggling TTL levels at A1A50P50A4 pins 2, 4, 5, and 6 (fig. FO-10).
    - If signals toggle, remove jumper from A1A51A1 U3024 pin 1 and perform Step 11.
    - If signals do not toggle, replace A1A51 Counter CCA (para. 2-131).
11. Set SPAN/DIV to 200 kHz. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 0=1 ST LO PHASE LOCK.
12. Unplug A1W502 from A1A50J502. Connect coaxial cable between A1A50J502 and oscilloscope. Make measurement at A1A50J502 (fig. FO-10, waveform 3).
    - If waveform correct, plug A1W502 onto A1A50J502 and perform Step 15.
    - If waveform not correct, plug A1W502 onto A1A50J502 and perform Step 13.
13. Make measurement at A1A50A5 pin A (fig. FO-10, waveform 6).
    - If waveform correct, perform Step 14.
    - If waveform not corr ect, perform Step 19.

14. Measure TTL low at A1A50A2 pin A.
    - If low, replace A1A50A2 Strobe Driver CCA (para. 2-127).
    - If not low, replace A1A50A4 Error Amplifier CCA (para. 2-129).
15. Perform A1A24 Phase Gate Assembly Fault Isolation Test (para. 2-37).
    - If test passes, perform Step 16.
    - If test fails, replace faulty component.
16. Set SPAN/DIV to 200 kHz. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 0=1ST LO PHASE LOCK. Press **10dB/DIV** key. CRT will display LOCK ENABLED.
17. Make measurement at A1A50A4P50 pin 47 (fig. FO-10, waveform 5).
    - If waveform correct, perform Step 18.
    - If waveform not correct, replace A1A50A4 Error Amplifier CCA (para. 2-129).
18. Press **10dB/DIV** key. CRT will display LOCK DISABLED. Measure toggling TTL levels at A1A50P50A4 pins 8, 10, and 12.
    - If TTL level signals toggle, perform Step 19.
    - If TTL level signals do not toggle, replace A1A50A4 Error Amplifier CCA (para. 2-129).
19. Perform Phase Lock Synth esizer Fault Isolation Test (para. 2-36).
    - If test passes, perform Step 20.
    - If pass fails, replace faulty component.
20. Measure between +5 and +12 VDC at A1A50A4 pin H.
    - If voltage within range, replace A1A50A5 Oscillator CCA (para. 2-130).
    - If voltage not within range, perform Step 21.
21. Alternately ground A1A50A4 pins L and J. Measure < +5.5 V and > +12 VDC at A1A50A4 pin H.
    - If within range, perform Step 22.
    - If not within range, replace A1A50A4 Error Amplifier CCA (para. 2-129).
22. Make measurement at A1A50A5 pins A and D (fig. FO-10, waveform 6).
    - If waveforms correct, perform Step 23.
    - If waveforms not correct, replace A1A50A5 Oscillator CCA (para. 2-130).
23. Make measurement at A1A50A3 pins L and J (fig. FO-10, waveform 4).
    - If waveforms correct, replace A1A51 Counter CCA (para. 2-131).
    - If waveforms not correct, replace A1A50A3 Mixer CCA (para. 2-128).
24. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-36. PHASE LOCK SYNTHESIZER FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1 A34 3rd Converter Assembly, A1A50A1 Synthesizer CCA, A1A51 Counter CCA, and A1W350 Cable Assembly.

NOTE

- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **Before performing test, A1A50 Phase Lock Assembly (para. 2-123) must be placed on circuit card extenders using the extender kit and coaxial cable assemblies.**

1. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 1=FREQUENCY LOOPS CAL and 5=PHASE LOCK SYNTHESIZER.
2. Make measurement at A1A50A1 pin K (fig. FO-10, waveform 2).
   - If waveform correct, perform Step 6.
   - If waveform not correct, perform Step 3.
3. Unplug A1W350 from A1A34J1032 (fig. FO-7). Connect coaxial cable between oscilloscope and A1A34J1032. Make measurement at A1A34J1032 (fig. FO-7, waveform 1).
   - If signal correct, perform Step 4.
   - If signal not correct, perform Step 5.
4. Perform Coaxial Cable Assembly Fault Isolation Test (para. 2-22) for A1W350 (fig. FO-1, Sheet 2).
   - If test passes, replace A1A50A1 Synthesizer CCA (para. 2-126).
   - If test fails, repair A1W350 (Appendix C).
5. Perform 3rd LO Fault Isolation Test (para. 2-12).
   - If test passes, replace A1A34 3rd Converter Assembly (para. 2-200).
   - If test fails, replace faulty component.
6. Make measurement at A1A50A1TP1040 (fig. FO-10, waveform 1).
   - If waveform correct: perform Step 7.
   - If waveform not corre ct, replace A1A50A1 Synthesizer CCA (para. 2-126).
7. Press **GHz** key. Make measurement at A1A50A1TP1040. Waveform period should increase to approximately 30 µs.
   - If waveform correct, A1A50A1 Synthesizer is operational.
   - If waveform not correct, replace A1A50A1 Synthesizer CCA (para. 2-126).
8. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-37. A1A24 PHASE GATE ASSEMBLY FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A16 1st LO Assembly, A1A24 Phase Gate Assembly, A1A50A2 Strobe Driver CCA, and A1W167 Cable Assembly.

1. Measure power supplies for A1A24 Phase Gate Assembly (fig. FO-4).

   - If correct, perform Step 2.

   - If not correct, perform Input CCA Fault Isolation Test (para. 2-25).

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
-15 V	³ -14 V	A1A24C241
+15 V	³ +14 V	A1A24C242

2. On 495P Spectrum Analyzer, set SPAN/DIV to 200 kHz. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 0=1ST LO PHASE LOCK.

3. Unplug A1W1025 from A1A24P242. Connect coaxial cable between A1A24P242 and oscilloscope. Make measurement at A1A24P242 (fig. FO-4, waveform 1).

   - If waveform < 4 V_{P-P}, plug A1W1025 onto A1A24P242 and perform Step 4.

   - If amplitude of positive and negative peaks differ by > 20%, replace A1A24 Phase Gate Assembly (para. 2-192).

   - If waveform correct, A1A24 Phase Gate Assembly is operational.

4. Perform Coaxial Cable Assembly Fault Isolation Test (para. 2-22) for A1W502 (fig. FO-1, Sheet 2).

   - If test passes, perform Step 5.

   - If test fails, repair A1W502 (Appendix C).

5. Disconnect A1W167 from A1A16P132 (fig. FO-2). Connect power meter to A1A16P132. Measure ³ +8 dBm.

   - If power correct, perform Step 6.

   - If power not correct, replace A1A16 1st LO Assembly (para. 2-201).

6. Perform Coaxial Cable Assembly Fault Isolation Test (para. 2-22) for A1W167.

   - If test passes, replace A1A24 Phase Gate Assembly (para. 2-192).

   - If test fails, replace A1W167 (fig. FO-1, Sheet 2).

7. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-38. COUNTER FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A26 Auxiliary Synthesizer CCA, A1A34 3rd Converter Assembly, A1A51 Counter CCA, A1A62A1 Log Amplifier CCA, A1W347 Cable Assembly, and A1W1044 Cable Assembly.

NOTE

- **Allow 495P Spectrum Analyzer to warm up for 15 minutes before doing this test.**
- **If power is turned off during this test, power down settings can be restored by pressing RECALL SETTINGS key and selecting register 0.**
- **When testing A1A26 Auxiliary Synthesizer CCA (para. 2-133) and A1A51 Counter CCA (para. 2-131), the assemblies must be placed on circuit card extenders using the extender kit and coaxial cable assemblies.**

1. Measure power supplies for A1A51 Counter CCA (fig. FO-11).

    - If voltages correct, perform Step 2.
    - If voltages not correct, perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para. 2-10).

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+15 V	+14.84 V to +15.16 V	A1A51A1P51 pin 36
+5 V	+4.96 V to +5.05 V	A1A51A1P51 pin 41
-15 V	-14.84 V to -15.16 V	A1A51A1P51 pin 44

2. On 495P Spectrum Analyzer, select the following settings.

    FREQUENCY 100MHZ
    ZERO SPAN MODE .... ON
    REFERENCE LEVEL .... -20DBM

3. Connect CAL OUT signal to RF INPUT.
4. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 3=3RD IF COUNTER.

NOTE

- **The COUNTED readout is blank until a count is completed. This takes about five seconds.**
- **The 3RD IF FREQ value changes over time. For most accurate COUNTED 3RD IF FREQ value, the frequency should be read immediately after the diagnostic display is turned on.**

5. Compare 3RD IF FREQ NOMINAL and COUNTED displays. See example display (fig. FO-11).

   - If 3RD IF FREQ NOMINAL and COUNTED values within 200 Hz, perform Step 10.

   - If 3RD IF FREQ NOMINAL and COUNTED values not within 200 Hz, perform Step 6.

6. Unplug A1W622 from A1A62J622. Connect coaxial cable between oscilloscope and A1A62J622. Make measurement at A1A62J622 (fig. FO-13, waveform 2).

   - If waveform correct, connect A1W622 to A1A62J622 and perform Step 7.

   - If waveform not correct, replace A1A62A1 Log Amplifier CCA (para. 2-140).

7. Perform Coaxial Cable Assembly Fault Isolation Test (para. 2-22) for A1W622 (fig. FO-1, Sheet 2).

   - If test passes, perform Step 8.

   - If test fails, repair A1W622 (Appendix C).

8. Unplug A1W1044 from A1A26P1039 (fig. FO-4). Connect coaxial cable between o scilloscope and A1A26P1039. Make measurement at A1A26P1039 (fig. FO-4, waveform 4).

   - If waveform correct, perform Step 9.

   - If waveform not correct, perform Auxiliary Synthesizer Fault Isolation Test (para. 2-21).

9. Perform Coaxial Cable Assembly Fault Isolation Test (para. 2-22) for A1W1044 (fig. FO-1, Sheet 2).

   - If test passes, perform Step 10.

   - If test fails, repair A1W1044 (Appendix C).

10. Press **Blue-SHIFT** key to exit diagnostic display. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 2=2ND LO CONTROL.

NOTE

The OFFSET FREQ COUNTED value changes over time. For most accurate OFFSET FREQ COUNTED value, the frequency should be read immediately after the diagnostic display is turned on.

11. Compare OFFSET FREQ DESIRED and COUNTED values. See example display (fig. FO-3).

    - If difference between OFFSET FREQ DESIRED and COUNTED values is within OFFSET SETTING ACCURACY, perform Step 14.

    - If difference between OFFSET FREQ DESIRED and COUNTED values is not within OFFSET SETTING ACCURACY, perform Step 12.

NOTE

A1W224 should not be disconnected from A1A51J511 when measuring frequency at center conductor of A1A51J511. The oscilloscope can be attached where center conductor solders to CCA.

12. Connect 1X probe between frequency counter and A1A51J511 (fig. FO-11). Measure frequency at A1A51J511.

    - If frequency within OFFSET SETTING ACCURACY, replace A1A51 Counter CCA (para. 2-131).
    - If frequency not within OFFSET SETTING ACCURACY, perform 2nd LO Fault Isolation Test (para. 2-16).
    - If signal is missing, perform Step 13.

13. Perform Coaxial Cable Assembly Fault Isolation Test (para. 2-22) for A1W224 (fig. FO-1, Sheet 2).

    - If test passes, perform 2nd LO Fault Isolation Test (para. 2-16).
    - If test fails, repair A1W224 (Appendix C).

14. Press **Blue-SHIFT** key to exit diagnostic display. Press **MAX SPAN** key to turn on MAX SPAN mode. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Select 3=DIAGNOSTIC AIDS and 1=1ST LO CONTROL.

15. Compare MIXER FREQ DESIRED and COUNTED values. See example display (fig. FO-9).

    - If difference between MIXER FREQ DESIRED and COUNTED values is within 1ST LO SETTING ACCURACY, A1A51 Counter CCA is operational.
    - If difference between MIXER FREQ DESIRED and COUNTED values is not within 1ST LO SETTING ACCURACY, perform Step 16.

NOTE

- **A1W252 should not be disconnected from A1A26J261 when measuring frequency at center conductor of A1A26J261. The oscilloscope can be attached where center conductor solders to CCA.**
- **1st LO Control Diagnostic Aid must be for Steps 16 and 17.**

16. Connect 1X probe between frequency counter and A1A26J261 (fig. FO-4). Measure frequency at A1A26J261.

    - If frequency within 1ST LO SETTING ACCURACY, perform Step 17.
    - If frequency not within OFFSET SETTING ACCURACY, perform 1st LO Fault Isolation Test (para. 2-20).
    - If signal is missing, perform Auxiliary Synthesizer Fault Isolation Test (para. 2-21).

17. Make measurement at A1A26A1P26 pin 48 (fig. FO-4, waveform 3).

    - If waveform correct, replace A1A51 Counter CCA (para. 2-131).
    - If waveform not correct, replace A1A26 Auxiliary Synthesizer CCA (para. 2-133).

18. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-39. STEP ATTENUATOR FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A70 Z-Axis CCA and A1AT10 Step Attenuator.

1. On 495P Spectrum Analyzer, press Blue-SHIFT and RESET keys. Select the following settings.

   REFERENCE LEVEL .... -20DBM

   MIN RF ATTEN .... 0 (NORM)

NOTE

495P Spectrum Analyzer makes switching sound when RF ATTEN is changed.

2. Measure DC voltages in truth table at pins 1-6 of A1AT10 Step Attenuator multiwire connector (fig. FO-2).
   - If levels match table, perform Step 3.
   - If levels do not match table, replace A1A70 Z-Axis CCA (para. 2-142).
3. Select the following settings.

   REFERENCE LEVEL .... -30DBM

   MIN RF ATTEN .... 0 (NORM)
4. Connect CAL OUT to RF INPUT.
5. Disconnect A1W100 from A1AT10P100 (fig. FO-2).
6. Connect test spectrum analyzer to A1 ATI OP100.
7. Select the following test spectrum analyzer settings.

   CENTER FREQUENCY 100MHZ

   SPAN/DIV 1MHZ

   REFERENCE LEVEL .... -20DBM

   VERTICAL DISPLAY 10DB/
8. Verify that -20 dBm signal appears on CRT of test spectrum analyzer.
   - If signal correct, perform Step 10.
   - If signal not correct, perform Step 9.
9. Perform Coaxial Cable Assembly Fault Isolation Test (para. 2-22) for A1W101 (fig. FO-1, Sheet 2).
   - If test passes, replace A1AT10 Step Attenuator (para. 2-212).
   - If test fails, replace A1W101 (fig. FO-1, Sheet 2).
10. Switch MIN RF ATTEN from 0 dB to 60 dB. Verify that signal on CRT of test spectrum analyzer decreases in 10 dB steps.
    - If 10 dB steps correct, A1AT10 Step Attenuator is operational.
    - If 10 dB steps not correct, replace Al AT10 Step Attenuator (para. 2-212).
11. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-40. FRONT PANEL FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A38 Front Panel CCA, A1A77 Graticule Lights CCA, LEDs, and rotary switches mounted on A1A38 Front Panel CCA.

1. Remove A1A40 Video Processor CCA (para. 2-119).
2. Measure power supplies for A1A38 Front Panel CCA (fig. FO-8, Sheet 1).
   - If voltages within limits, install A1A40 Video Processor CCA (para. 2-119) and perform Step 3.
   - If voltages not within limits, perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para. 2-10).

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+15 V	+14.84 V to +15.16 V	A1A38P38 pin 15
-15 V	-14.84 V to -15.16 V	A1A38P38 pin 17
+9 V	+8.92 V to +10.1 V	A1A38P38 pin 37
+5 V	+4.73 V to +5.23 V	A1A38P38 pin 38
-5 V	-4.96 V to -5.05 V	A1A38P38 pin 39

3. Look at LED indicators and operate front panel controls to verify symptoms.
   - If POWER ON indicator not lit, perform Step 5.
   - If any other LED indicator must be tested, perform Step 6.
   - If only GRAT ILLUM mode faulty, perform Step 8.
   - If pushbutton switches must be tested, perform Pushbutton Switch Fault Isolation Test (para. 2-41).
   - If **CENTER/MARKER FREQUENCY** knob must be tested, perform Step 12.
   - If **TIME/DIV, FREQUENCY SPAN/DIV, RESOLUTION BANDWIDTH, REFERENCE LEVEL**, or **MIN RF ATTEN** knobs must be tested, perform Step 15.
4. With power off, remove A1A40 Video Processor CCA (para. 2-119) and A1A44 1st LO Driver CCA (para. 2-120).
5. With power off, connect one DMM lead to A1A38P38 pin 38. Connect second DMM lead to junction of A1A38R5012 and A1A38DS5015. Measure 200-240 **W**.
   - If resistance correct, replace A1A38DS5015.
   - If resistance not correct, replace A1 A38 Front Panel CCA (para. 2-178).
6. Measure TTL level at cathode (long lead) of LED under test while pressing related key to toggle function.
   - If TTL level toggles between high (off) and low (on), perform Step 7.
   - If TTL level does not toggle, replace A1A38 Front Panel CCA (para. 2-178).

7. With power off, connect DMM between A1A38L1045 and anode (short lead) of LED. Measure 215-225 **W**.
   - If resistance correct, replace LED under test.
   - If resistance not correct, replace A1A38 Front Panel CCA (para. 2-178).
8. Press **GRAT ILLUM** key several times to toggle graticule lights on and off. Note failure mode.
   - If graticule lights and LED indicator light, graticule lights are functional.
   - If graticule lights and LED indicator do not light, perform Step 10.
   - If only LED indicator does not light, perform Step 6 to test A1A38DS2122.
   - If only graticule lights do not turn on, perform Step 9.
9. Verify that multiwire cable is plugged onto A1A38P5090 and A1A77P770 (fig. FO-19).
   - If cable installed, perform Step 11.
   - If cable not installed, install and perform Step 8.
10. Perform Pushbutton Switch Fault Isolation Test (para. 2-41) to test A1A38S2122.
    - If test passes, clean or replace A1A38 Front Panel CCA (para. 2-178).
    - If test fails, replace faulty component.
11. Connect DMM between A1A38P5090 pins 1 and 3 (fig. FO-8, Sheet 1). Measure approximately 0 **W**.
    - If resistance correct, replace A1A38 Front Panel CCA (para. 2-178).
    - If resistance not correct, replace A1A77 Graticule Lights CCA (para. 2-186).
12. Verify that A1A38DS1029 Incandescent Lamp is lit.
    - If lit, perform Step 14.
    - If not lit, perform Step 13.
13. Measure +5 V at junction of A1A38DS1029 and A1A38L1045.
    - If voltage correct, replace A1A38S2035 (para. 2-183).
    - If voltage not correct, replace A1A38 Front Panel CCA (para. 2-178).
14. Verify that TTL levels at A1A38U1024 pins 3 and 5 toggle while rotating **CENTER/MARKER FREQUENCY** knob.
    - If TTL level toggles, **CENTER/MARKER FREQUENCY** knob is operational.
    - If TTL level does not toggle, replace A1A38S2035 (para. 2-183).
15. With power off, remove A1A40 Video Processor CCA (para. 2-119) and A1A44 1st LO Driver CCA (para. 2-120).
16. Press **POWER** switch to turn power on.

NOTE

Waveform for Step 17 is an example waveform only. Waveform pulse width and period varies slightly as knob is rotated.

17. Make measurement at A1A38U3039 (fig. FO-8, Sheet 1) while rotating switch under test through range. See waveform (fig. FO-8, Sheet 2, waveform 1). See following table for test point locations.

    - If waveform correct for all settings, switch under test is operational.
    - If readout associated with switch did not change, replace A1A38 Front Panel CCA (para. 2-178).
    - If waveforms not correct for one or more settings, perform Step 18.

SWITCH UNDER TEST	TEST POINT	SWITCH SETTINGS
A1A38S3020 (para. 2-181)	A1A38U3039 pin 33	**FREQUENCY SPAN/DIV** and **RESOLUTION BANDWIDTH** knobs, all positions
A1A38S6035A (para. 2-180)	A1A38U3039 pin 32	**MIN RF ATTEN** knob, all positions
A1A38S6035B (para. 2-180)	A1A38U3039 pin 34	**REFERENCE LEVEL** knob, all positions
A1A38S6118 (para. 2-182)	A1A38U3039 pin 27	**TIME/DIV** knob, 20 **m**s to 20 ms positions
A1A38S6118 (para. 2-182)	A1A38U3039 pin 28	**TIME/DIV** knob, 50 ms to 5s, and AUTO, MNL, and EXT positions

18. Remove A1A38 Front Panel CCA (para. 2-178). Connect DMM between locations for TP1 shown in following table for switch under test. Rotate switch until DMM displays < 10 **W**.

    - If < 10 **W** can be measured, perform Step 19.
    - If < 10 **W** cannot be measured, replace switch under test.

19. With switch in position from Step 18, connect DMM lead between next test points shown in table (TP2, then TP3, etc.). Rotate switch counterclockwise the number of steps shown in top row of table. Measure >2 k **W** when between desired settings and <10 **W** when switch is set to desired setting. Test all switch settings.

    - If resistance correct, switch under test is operational.
    - If resistance not correct, repair switch under test. See SWITCH UNDER TEST column of table.

20. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

NOTE

All test points are located on A1A38 Front Panel CCA (fig. FO-8, Sheet 1).

TEST POINT	FREQUENCY SPAN/DIV A1A38S3020 3 STEPS	RESOLUTION BANDWIDTH A1A38S3020 3 STEPS	MIN RF ATTEN A1A38S6035 1 STEP	REFERENCE LEVEL A1A38S6035 3 STEPS	TIME/DIV A1A38S6118 19 STEPS
TP1	U5021 pin 9 CR4017 cathode	U5021 pin 7 CR4027 cathode	U5021 pin 9 CR6035 cathode	U5021 pin 9 U3039 pin 34	U4021 pin 10 U3039 pin 27
TP2	U5021 pin 10 CR4017 cathode	U5021 pin 6 CR4027 cathode	U5021 pin 10 CR6035 cathode	U5021 pin 10 U3039 pin 34	U4021 pin 9 U3039 pin 27
TP3	U5021 pin 11 CR4017 cathode	U5021 pin 5 CR4027 cathode	U5021 pin 11 CR6035 cathode	U5021 pin 11 U3039 pin 34	U5021 pin 4 U3039 pin 27
TP4	U5021 pin 12 CR4017 cathode	U5021 pin 4 CR4027 cathode	U5021 pin 12 CR6035 cathode	U5021 pin 12 U3039 pin 34	U5021 pin 5 U3039 pin 27
TP5	N/A	N/A	U5021 pin 7 CR6035 cathode	N/A	U5021 pin 6 U3039 pin 27
TP6	N/A	N/A	U5021 pin 6 CR6035 cathode	N/A	U5021 pin 7 U3039 pin 27
TP7	N/A	N/A	U5021 pin 5 CR6035 cathode	N/A	U5021 pin 12 U3039 pin 27
TP8	N/A	N/A	N/A	N/A	U5021 pin 11 U3039 pin 27
TP9	N/A	N/A	N/A	N/A	U5021 pin 10 U3039 pin 27
TP10	N/A	N/A	N/A	N/A	U5021 pin 9 U3039 pin 27
TP11	N/A	N/A	N/A	N/A	U4021 pin 10 U3039 pin 27
TP12	N/A	N/A	N/A	N/A	U4021 pin 9 U3039 pin 27
TP13	N/A	N/A	N/A	N/A	U5021 pin 4 U3039 pin 27
TP14	N/A	N/A	N/A	N/A	U5021 pin 5 U3039 pin 27
TP15	N/A	N/A	N/A	N/A	U5021 pin 6 U3039 pin 27
TP16	N/A	N/A	N/A	N/A	U5021 pin 7 U3039 pin 27
TP17	N/A	N/A	N/A	N/A	U5021 pin 12 U3039 pin 27
TP18	N/A	N/A	N/A	N/A	U5021 pin 11 U3039 pin 27
TP19	N/A	N/A	N/A	N/A	U5021 pin 10 U3039 pin 27
TP20	N/A	N/A	N/A	N/A	U5021 pin 9 U3039 pin 27

2-41. PUSHBUTTON SWITCH FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A38 Front Panel CCA and pushbutton switches mounted on A1A38 Front Panel CCA.

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1. With power off, remove A1A40 Video Processor CCA (para. 2-119) and A1A44 1st LO Driver CCA (para. 2-120).

2. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.

3. Connect oscilloscope to test point in following table for switch under test. Make measurement of toggling TTL level.

   - If signal toggling, perform Step 4.

   - If signal not toggling, replace A1A38 Front Panel CCA (para. 2-178).

4. Remove A1A38 Front Panel CCA (para. 2-178).

5. Connect DMM between points shown in following table. Press pushbutton switch under test several times. Measure < 10 **W** when pressed and > 2 k **W** when not pressed.

   - If resistance correct, switch under test is operational.

   - If resistance not correct, replace switch under test (para. 2-179).

6. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

NOTE

All test points are located on A1A38 Front Panel CCA (fig. FO-8, Sheet 1).

SWITCH UNDER TEST	TEST POINT	DMM LEAD	DMM LEAD
S1023	U3039 pin 30	U4021 pin 9	U3039 pin 30
S1048	U3039 pin 31	U4021 pin 9	U3039 pin 31
S1054	U3039 pin 31	U5021 pin 5	U3039 pin 31
S1121	U3039 pin 31	U5021 pin 9	U3039 pin 31
S2014	U3039 pin 33	U4021 pin 9	CR2018 cathode
S2020	U3039 pin 29	U4021 pin 9	U3039 pin 29
S2048	U3039 pin 32	U4021 pin 9	CR2043 cathode
S2049	U3039 pin 32	U4021 pin 10	CR2043 cathode
S2056	U3039 pin 29	U5021 pin 5	U3039 pin 29
S2058	U3039 pin 32	U5021 pin 4	CR2043 cathode
S2122	U3039 pin 31	U5021 pin 10	U3039 pin 31
S2123	U3039 pin 31	U5021 pin 7	U3039 pin 31
S3035	U3039 pin 31	U5021 pin 4	U3039 pin 31
S3036	U3039 pin 30	U5021 pin 4	U3039 pin 30
S3037	U3039 pin 29	U5021 pin 4	U3039 pin 29
S3038	U3039 pin 30	U5021 pin 5	U3039 pin 30
S3043	U3039 pin 31	U5021 pin 6	U3039 pin 31
S3044	U3039 pin 30	U5021 pin 7	U3039 pin 30
S3045	U3039 pin 29	U5021 pin 7	U3039 pin 29
S3046	U3039 pin 30	U5021 pin 6	U3039 pin 30
S3047	U3039 pin 30	U5021 pin 11	U3039 pin 30
S3048	U3039 pin 29	U5021 pin 11	U3039 pin 29
S3052	U3039 pin 29	U5021 pin 6	U3039 pin 29
S3053	U3039 pin 29	U5021 pin 12	U3039 pin 29
S3055	U3039 pin 30	U5021 pin 12	U3039 pin 30
S3122	U3039 pin 30	U5021 pin 10	U3039 pin 30
S3123	U3039 pin 30	U5021 pin 9	U3039 pin 30
S4046	U3039 pin 31	U5021 pin 11	U3039 pin 31
S4052	U3039 pin 31	U5021 pin 12	U3039 pin 31
S4122	U3039 pin 33	U4021 pin 10	CR2018 cathode
S4123	U3039 pin 29	U5021 pin 9	U3039 pin 29
S5050	U3039 pin 29	U4021 pin 10	U3039 pin 29
S5120	U3039 pin 29	U5021 pin 10	U3039 pin 29
S6052	U3039 pin 30	U4021 pin 10	U3039 pin 30

2-42. FRONT PANEL POTENTIOMETER FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A38 Front Panel CCA and the following potentiometers: A1A38R1121, A1A38R4043, A1A38R4121, A1A38R6049, A1A38R6051, A1A38R6104, and A1A38R6106.

1. Remove AlA40 Video Processor CCA (para. 2-119).

2. Measure power supplies for A1A38 Front Panel CCA (fig. FO-8, Sheet 1).

   - If voltages within limits, perform Step 3.

   - If voltages not within limits, perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para. 2-10).

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+15 V	+14.84 V to +15.16 V	A1A38P38 pin 15
-15 V	-14.84 V to -15.16 V	A1A38P38 pin 17
+9 V	+8.92 V to +10.1 V	A1A38P38 pin 37
+5 V	+4.73 V to +5.23 V	A1A38P38 pin 38
-5 V	-4.96 V to -5.05 V	A1A38P38 pin 39

3. Refer to troubleshooting procedure to verify which potentiometer must be tested.

   - If potentiometer A1A38R6051 must be tested, perform Step 4.

   - If A1A38R1121, A1A38R4043, A1A38R4121, A1A38R6049, A1A38R6104, or A1A38R6106 must be tested, perform Step 7.

NOTE

The metal bracket on A1A62 Log Amplifier CCA does not need to be removed.

4. With power off, remove A1A62A1 Log Amplifier CCA (para. 2-140).

5. Connect one DMM lead to junction of A1A38R6059 (fig. FO-8, Sheet 1) and A1A38R6051. Connect second DMM lead to A1A38P38 pin 26. Measure 800-1.2 k W. Move second DMM lead to center lead of A1A38R6051. Measure 0 W to 800-1.2 k W while rotating A1A38R6051 through range.

   - If resistance correct, perform Step 6.

   - If resistance not correct, replace A1A38R6051 (para. 2-184).

6. Move second DMM lead to chassis ground. Measure 856-875 W.

   - If resistance correct, front panel is operational.
   - If resistance not correct, replace A1A38 Front Panel CCA (para. 2-178).

7. Set potentiometer under test fully clockwise.

8. Connect (+) DMM lead to test point shown in following table. Connect (-) lead to chassis ground.

9. Measure voltage while rotating potentiometer through range. See following table for voltage range.

   - If voltage within range, potentiometer under test is operational.
   - If voltage not within range, replace potentiometer under test (para. 2-184).

POTENTIOMETER	TEST POINT	VOLTAGE RANGE (CLOCKWISE)	VOLTAGE RANGE (COUNTERCLOCKWISE)
A1A38R1121	A1A38P38 pin 2	+4.73 V to +5.23 V	0 V (chassis ground)
A1A38R4043	A1A38P38 pin 4	+14.84 V to +15.16 V	-14.84 V to -15.16 V
A1A38R4121	A1A38P38 pin 1	-14.84 V to -15.16 V	0 V (chassis ground)
A1A38R6049	A1A38P38 pin 5	+14.84 V to +15.16 V	0 V (chassis ground)
A1A38R6104	A1A38P38 pin 3	+14.84 V to +15.16 V	-14.84 V to -15.16 V
A1A38R6106	A1A38P38 pin 24	+14.84 V to +15.16 V	-14.84 V to -15.16 V

10. Disconnect equipment from AN/USM-620 and install all removed assemblies.

2-43. DIGITAL CONTROL FAULT ISOLATION TEST.

DESCRIPTION

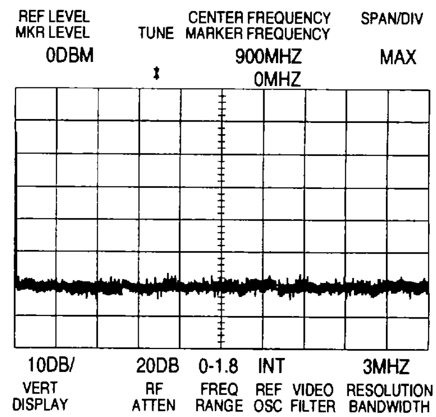
This test isolates faults to A1A30A1 Power Supply CCA, A1A30A76 Accessories Interface CCA, A1A56 GPIB CCA, A1A58 Processor CCA, and A1A70 Z-Axis CCA.

NOTE

- **If power is turned off during this test, there is no need to recall power down settings.**
- **When testing A1A58 Processor CCA (para. 2-136) and A1A70 Z-Axis CCA (para. 2-142), the assemblies must be placed on circuit card extenders using the extender kit. When making measurements on A1A70 Z-Axis CCA, the associated multiwire cables do not need to be installed.**

  - The test will run when A1A58P1035 (fig. FO-12) is disconnected.

1. Perform 495P Spectrum Analyzer Power Supply Fault Isolation Test (para. 2-10).
   - If voltages correct, perform Step 2.
   - If voltages not correct, replace faulty component.
2. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **RESET** keys. Check display on CRT.
   - If display matches example waveform, perform Step 3.
   - If display does not match example waveform, perform Step 4.



3. Exercise front panel controls. Observe CRT and LED indicators for operation of controls.
   - If controls functional, digital control system is operational.
   - If controls not functional, perform Step 4.
4. With power off, remove rear CCA bracket (para. 2-132).
5. Press **POWER** switch to turn power on.
6. Make measurement at A1A58P58 pins 3 and 33 (fig. FO-12, waveforms 3 and 4).
   - If waveforms correct, perform Step 7.
   - If waveforms not correct, replace A1A58 Processor CCA (para. 2-136).
7. Measure TTL high at A1A58P58 pin 35.
   - If high, perform Step 8.
   - If low, replace A1A30A76 Accessories Interface CCA (para. 2-172).

8. Measure TTL high at A1A58P58 pins 6 and 7.

   - If pins 6 and 7 high, perform Step 9.
   - If pin 6 low, replace A1A58 Processor CCA (para. 2-136).
   - If pin 7 low, replace A1A56 GPIB CCA (para. 2-135).

9. Measure toggling TTL level at A1A58P58 pins 1 and 2 while turning power off and then on.

   - If signals toggle, perform Step 10.
   - If either signal does not toggle, replace A1A58 Processor CCA (para. 2-136).

10. Measure TTL high at A1A58P58 pin 34.

    - If high, perform Step 12.
    - If low, perform Step 11.

11. Make measurement at A1A70P70 pin 60 (fig. FO-19, waveform 1).

    - If waveform correct, replace A1A70 Z-Axis CCA (para. 2-142).
    - If waveform not correct, replace A1A30A1 Power Supply CCA (para. 2-169).

12. Press **POWER** switch twice to turn power off and then on.

13. Check CRT for error messages.

    - If error message on CRT, perform malfunction 6.
    - If no message on CRT, perform Step 14.

14. Perform MIPRCS System Fault Isolation Test (para. 2-44).

    - If test passes, perform Step 15.
    - If test fails, replace faulty component.

15. Perform MIPRCS Bus Fault Isolation Test (para. 2-45).

    - If test passes, perform Step 16.
    - If test fails, replace faulty component.

16. Perform Instrument Bus Fault Isolation Test (para. 2-46).

    - If test passes, perform Front Panel Fault Isolation Test (para. 2-40) for front panel controls that do not work.
    - If test fails, replace faulty component.

17. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-44. MIPRCS SYSTEM FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A54 Memory CCA, A1A56 GPIB CCA, and A1A58 Processor CCA.

1. Set A1A54S1050 switch 7 (fig. FO-11) to OPEN.

NOTE

- **When running test, the message "PROCESSOR SYSTEM TEST, PLEASE WAIT" should appear on CRT. The test takes approximately four minutes when no problems are found.**
- **LEDS AA56DS1 047-A1A56DS1054 (fig. FO-11) show test results.**

2. On 495P Spectrum Analyzer turn power off and then on.
3. Look at LEDS A1A56DS1047-A1A56DS1054 to see test results. See following table to locate faulty component.
   - If all tests pass (A1A56 DS1054 blinks) or no LED lights, perform Step 4.
   - If LEDS A1A56DS1047-A1A56DS1053 light or blink, replace faulty component.

LED ON OR BLINKING	FAILED TEST	FAULTY COMPONENT
A1A56DS1047 (On)	A1A54U1030 check sum test	A1A54 Memory CCA (para. 2-134)
A1A56DS1048 (Blinking)	A1A54 RAM storage test	A1A54 Memory CCA (para. 2-134)
A1A56DS1049 (Blinking)	A1A54 and A1A56 ROM tests	If 1, 2, 17, or 18 pulses, replace A1A54 Memory CCA (para. 2-134); if 3-16 pulses, replace A1A56 GPIB CCA (para. 2-135)
A1A56DS1050 (On)	A1A58 Instrument Bus PIA test	A1A58 Processor CCA (para. 2-136)
A1A56DS1051 (N/A)	No test	N/A
A1A56DS1052 (On)	A1A56 GPIA test	A1A56 GPIB CCA (para. 2-135)
A1A56DS1053 (On)	A1A58 Timer tests	A1A58 Processor CCA (para. 2-136)
A1A56DS1054 (Blinking)	All tests pass	N/A

4. Press POWER switch to turn power off.
5. Set Al A54S1050 switch 7 to CLOSED.
6. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-45. MIPRCS BUS FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A54 Memory CCA, A1A56 GPIB CCA, and A1A58 Processor CCA.-

NOTE

- **If power is turned off during this test, there is no need to recall power down settings.**
- **When testing A1A54 Memory CCA (para. 2-134), A1A56 GPIB CCA (para. 2-135), and A1A58 Processor CCA (para. 2-136), the assemblies must be placed on circuit card extenders using the extender kit.**
- **The test will run when A1A58P1035 (fig. FO-12) is disconnected.**
- **When running test, noise and random characters may appear on CRT.**
- **Keep jumper A1A58P3015 installed on pins 2 and 3 throughout this test.**

1. With power off, remove jumper from A1A58P3015 (fig. FO-12). Install jumper onto pins 2 and 3 of A1A58P3015.
2. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.
3. Make measurement at A1A58P58 pins 45-60 (fig. FO-12, waveforms 1 and 2). Use associated tables to select oscilloscope TIME/DIV at each test point.
   - If waveforms correct, perform Step 9.
   - If waveforms not correct, perform Step 4.
4. With power off, remove A1A54 Memory CCA (para. 2-134).
5. With power on, repeat Step 3.
   - If waveforms correct, replace A1A54 Memory CCA (para. 2-134).
   - If waveforms not correct, perform Step 6.
6. With power off, remove A1A56 GPIB CCA (para. 2-135).
7. With power on, repeat Step 3.
   - If waveforms correct, replace A1A56 GPIB.CCA (para. 2-135).
   - If waveforms not correct, perform Step 8.
8. With power off, install A1A54 Memory CCA (para. 2-134) and A1A56 GPIB CCA (para. 2-135).
9. With power on, make measurement at A1A58P58 pin 4 (fig. FO-12, waveform 5).
   - If waveform correct, perform Step 10.
   - If waveform not corre ct, replace A1A54 Memory CCA (para. 2-134).

10. Make measurement at A1A58U3035 pins 7, 10, 14, and 15 (fig. FO-12, waveform 5).

    - If waveforms correct, perform Step 11.
    - If waveforms not correct, replace A1A58 Processor CCA (para. 2-136).

11. Make measurement at A1A54U2045 pins 4, 6, and 7 (fig. FO-11, waveform 5).

    - If waveforms correct, perform Step 12.
    - If waveforms not correct, replace A1A54 Memory CCA (para. 2-134).

12. Make measurement at A1A54U3040 pin 9 (f ig. FO-11, waveform 3).

    - If waveforms correct, perform Step 13.
    - If waveforms not correct, replace A1A54 Memory CCA (para. 2-134).

13. Make measurement at A1A54P54 pin 34 (fig. FO-11, waveform 4).

    - If waveform correct, perform Step 14.
    - If waveform not correct, replace A1A56 GPIB CCA (para. 2-135).

14. Make measurement at A1A54U3025 pins 4, 6, and 9 (fig. FO-11, waveforms 1 and 6).

    - If waveforms correct, perform Step 15.
    - If waveforms not correct, replace A1A54 Memory CCA (para. 2-134).

15. Make measurement at A1A54U3045 pin 12 (fig. FO-11, waveform 4).

    - If waveform correct, perform Step 16.
    - If waveform not correct, replace AlA54 Memory CCA (para. 2-134).

NOTE

Cable A1A30W560 and connector A1A56P1045 may be disconnected during test

16. Make measurement at A1A56U1055 pins 9, 11, and 13 (fig. FO-11, waveform 7).

    - If waveforms correct, perform Step 17.
    - If waveforms not correct, replace A1A56 GPIB CCA (para. 2-135).

17. Remove jumper A1A58P3015 (fig. FO-12). Install jumper A1A58P3015 onto pins 1 and 2.

18. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-46. INSTRUMENT BUS FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A1A26 Auxiliary Synthesizer CCA, A1A38 Front Panel CCA, A1A40 Video Processor CCA, A1A44 1st LO Driver CCA, A1A46 Center Freq Control CCA, A1A48 Span Attenuator CCA, A1A51 Counter CCA, A1A54 Memory CCA, A1A58 Processor CCA, A1A60 Horiz Digital Storage CCA, A1A61 A1 Vert Digital Storage CCA, A1A62A1 Log Amplifier CCA, A1A66A1 CRT Readout CCA, A1A68A2 Mother #2 CCA, A1A70 Z-Axis CCA, and A1A72 Sweep CCA.

NOTE

- **If power is turned off during this test, there is no need to recall power down settings.**
- **When testing A1A58 Processor CCA (para. 2-136), the assembly must be placed on circuit card extenders using the extender kit.**
- **The test will run when A1A58P1035 (fig. FO-12) is disconnected.**
- **When running test, random characters may appear on CRT.**

1. With power off, set A1A54S1050 switches 7 and 8 (fig. FO-11) to OPEN.
2. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.
3. Make measurement at A1A58P58 pins 17-30 and 37-39 (fig. FO-12, waveforms 7-17).
   - If waveforms correct, perform Step 4.
   - If waveforms not correct, perform Step 13.
4. With power off, set A1A54S1050 switches 7 and 8 (fig. FO-11) to CLOSED.
5. Press **POWER** switch to turn power on.
6. Make measurement at A1A58U3020 pin 17 (fig. FO-12, waveform 6).
   - If waveform correct, instrument bus is operational.
   - If waveform not correct, perform Step 7.
7. With power off, remove A1A46 Center Freq Control CCA (para. 2-121).
8. With power on, make measurement at A1A58U3020 pin 17 (fig. FO-12, waveform 6).
   - If waveform correct, replace A1A46 Center Freq Control CCA (para. 2-121).
   - If waveform not correct, perform Step 9.
9. With power off, remove A1A51 Counter CCA (para. 2-131).
10. With power on, make measurement at A1A58U3020 pin 17 (fig. FO-12, waveform 6).
    - If waveform correct, replace A1A51 Counter CCA (para. 2-131).
    - If waveform not correct, perform Step 11.
11. With power off, remove A1A72 Sweep CCA (para. 2-141).

12. With power on, make measurement at A1A58U3020 pin 17 (fig. FO-12, waveform 6).

    - If waveform correct, replace A1A72 Sweep CCA (para. 2-141).
    - If waveform not correct, replace A1A38 Front Panel CCA (para. 2-178).

13. With power off, set A1A54S1050 switches 7 and 8 (fig. FO-11) to CLOSED.

NOTE

- **The following table is used to isolate faulty assembly. The symbol * indicates connections to pins on A1A58P58 for each assembly listed.**
- **495P Spectrum Analyzer can complete power-on sequence with most assemblies removed. Only A1A30 Power Supply, A1A38 Front Panel CCA, A1A54 Memory CCA, A1A56 GPIB CCA, and A1A58 Processor CCA, must be installed.**
- **When 495P Spectrum Analyzer power-on sequence is correct, red indicators for the following keys are lit: FREE RUN, 10DB/DIV, MIN NOISE/MIN DISTORTION, VIEW A, VIEW B, and AUTO RESOLN.**

ASSEMBLY	17–24	25	26	27	28	29	30	31	37	38	39
A1A26	◆	◆	◆	◆	◆		◆	◆			
A1A38	◆	◆	◆	◆	◆	◆	◆	◆			
A1A40	◆	◆	◆	◆	◆		◆	◆			
A1A44	◆	◆	◆	◆	◆		◆	◆			
A1A46	◆	◆	◆	◆	◆	◆	◆	◆			
A1A48	◆	◆	◆	◆	◆		◆	◆			
A1A51	◆	◆	◆	◆	◆	◆	◆	◆			
A1A54		◆	◆	◆	◆		◆	◆			
A1A58	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
A1A60	◆	◆	◆	◆	◆		◆	◆			
A1A61A1	◆	◆	◆	◆	◆		◆				
A1A62A1	◆	◆	◆	◆	◆		◆	◆			
A1A66A1	◆						◆	◆	◆	◆	◆
A1A68A2	◆						◆	◆	◆	◆	◆
A1A70	◆						◆	◆	◆	◆	◆
A1A72	◆					◆	◆	◆	◆	◆	◆

14. With power off, remove one assembly associated with instrument bus failure. See table.

15. Press **POWER** switch to turn power on. Verify that front panel indicators show power on settings.

    - If indicators correct, replace removed assembly.
    - If indicators not correct, perform Step 16.

16. Press **POWER** switch to turn power off.

17. Repeat Steps 14-16 until faulty assembly is removed.

18. Disconnect equipment from AN/USM-620 and install all removed assemblies.

2-47. TRACKING GENERATOR 1ST LO FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A2A6 1st LO Amplifier, A2A7 Isolator, A2A8 Lowpass Filter, A2A9 Bandpass Filter, A2A10 Isolator, A2A11 Mixer, A2A12 Amplifier and Detector, A2A13 Step Attenuator, A2A15 Leveling Loop and Bias CCA, and the following cable assemblies: A2W75, A2W85, A2W95, and A2W130.

CAUTION

To avoid permanent damage to semirigid cables and assemblies, do not bend semirigid cables when connecting test equipment. To connect test equipment, move cables only enough to allow access to connectors.

1. Perform Tracking Generator Power Supply Fault Isolation Test (para. 2-50).
   - If test passes, perform Step 2.
   - If test fails, replace faulty component.
2. Perform 1st LO Output Fault Isolation Test (para. 2-19).
   - If test passes, perform Step 3.
   - If test fails, perform 1 st LO Fault Isolation Test (para. 2-20).
3. With TM 5003 Power Module power off, remove Side Shield (para. 2-218) and Rear Plate (para. 2-219).
4. Perform Initialized Setup (para. 2-56). Select the following settings.

   CENTER/MARKER FREQUENCY 100MHZ
   VERTICAL DISPLAY 2DB/
   ZERO SPAN MODE.............................. .... ON

NOTE

Signal levels within this procedure are approximate values. Components are faulty only when they reduce signal by displayed amount. For example, if 495P Spectrum Analyzer displays signals 20 dB lower than normal, a faulty component will reduce displayed signal by approximately 20 dB.

5. Disconnect semirigid cable (input to A2A12 Amplifier and Detector) from A2A11P109 (fig. FO-21). Connect power meter to A2A11P109.
6. Select the following 495P Spectrum Analyzer settings.

   MAX SPAN MODE .... ON
   TIME/DIV 2S

7. Connect power meter to A2A11P109. Verify that power meter displays ≥ -30 dBm as beam crosses CRT.

   - If power correct, install semirigid cable (input to A2A12 Amplifier and Detector) and perform Step 21.
   - If power not correct, perform Step 8.

8. Remove A2W105.
9. Connect power meter to A2A10P107. Verify that power meter displays > +6 dBm as beam crosses CRT.

   - If signal level correct, reinstall A2W105 and perform Step 10.
   - If signal level not correct, perform Step 11.

10. Disconnect semirigid cable (output from A2A14 Amplitude Control) from A2A11 P110. Connect test spectrum analyzer to semirigid cable (output from A2A14 Amplitude Control). Make measurement at output of A2A14 Amplitude Control (fig. FO-21, waveform 1).

    - If signal correct, replace A2A11 Mixer (para. 2-222).
    - If signal not correct, perform Tracking Generator 2nd LO Fault Isolation Test (para. 2-48).

11. With TM 5003 Power Module power off, remove block retainers (para. 2-220).

NOTE

Install flexible extender into any plug-in slot on TM 5003 Power Module.

12. Connect right module of TR 503 Tracking Generator to flexible extender.
13. Connect cable assembly between 1 ST LO OUT and 1st LO IN.
14. On 495P Spectrum Analyzer, select the following settings.

    MAX SPAN MODE .... ON
    TIME/DIV 2S

15. Remove cable assembly shown in following table. Begin with A2W95 and work sequentially through table.
16. Connect power meter to connector shown in table.
17. On TM 5003 Power Module, press **POWER** switch to turn power on.
18. Measure minimum power level on power meter as sweep crosses CRT of 495P Spectrum Analyzer.

    - If power within limits, perform Step 19.
    - If power not within limits, replace component under test.

19. Perform Coaxial Cable Assembly Fault Isolation Test (para. 2-22) for removed cable assembly (fig. FO-20).
    - If test passes, install removed cable assembly and perform Step 20.
    - If test fails, replace component under test (fig. FO-20).

REMOVE CABLE ASSEMBLY	CONNECT POWER METER	MINIMUM POWER LEVEL	COMPONENTS UNDER TEST
A2W95	A2A9P105	≥ +7 dBm	A2A10 Isolator (para. 2-238)
A2W85	A2A8P103	≥ +8 dBm	A2A9 Bandpass Filter (para. 2-237)
A2W75	A2A7P101	≥ +9 dBm	A2A8 Lowpass Filter (para. 2-236)
Output from A2A6 1st LO Amplifier	Output from A2A6 1st LO Amplifier	≥ +10 dBm	A2A7 Isolator (para. 2-239) and A2A6 1st LO Amplifier (para. 2-240)

20. Repeat Steps 15-19 until fault is located.
    - If test passes for all components under test, replace A2A7 Isolator (para. 2-239).
    - If test fails, replace associated component under test.

21. Disconnect semirigid cable (output from A2A12 Amplifier and Detector) from A2A13 Step Attenuator. Connect power meter to semirigid cable (output from A2A12 Amplifier and Detector). Measure between -0.5 dBm and +0.5 dBm on power meter as sweep crosses CRT of 495P Spectrum Analyzer.
    - If signal correct, perform Step 22.
    - If signal not correct, perform Step 23.

22. Perform Coaxial Cable Assembly Fault Isolation Test (para. 2-22) for A2W130.
    - If test passes, replace A2A13 Step Attenuator (para. 2-223).
    - If test fails, replace A2W130 (fig. FO-20).

23. Measure voltages on A2A15P160 and A2A15P190 (fig. FO-21) against those in following table.
    - If voltages correct, replace r A2A12 Amplifier and Detector (para. 2-227).
    - If voltages not correct, replace A2A15 Leveling Loop and Bias CCA (para. 2-221).

A2A15P160	VOLTAGE LIMITS	A2A15P190	VOLTAGE LIMITS
Pin 1	+0.6 V to +1.2 V	Pin 3	+14.25 V to +15.75 V
Pin 2	+9.0 V to +10.3 V	Pin 4	+9.0 V to +10.3 V
Pin 3	+0.6 V to +1.2 V	Pin 5	+0.6 V to +1.6 V
Pin 4	+9.0 V to +10.3 V	Pin 6	+9.0 V to +10.3 V
N/A	N/A	Pin 7	+0.6 V to +1.2 V

24. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-48. TRACKING GENERATOR 2ND LO FAULT ISOLATION TEST

DESCRIPTION

This test isolates faults to A2A14 Amplitude Control, A2A15 Leveling Loop and Bias CCA, A2A31 Balanced Mixer, and A2A32 2nd LO Filter.

1. Perform 2nd LO Output Fault Isolation Test (para. 2-15).
   - If test passes, perform Step 2.
   - If test fails, perform 2nd LO Fault Isolation Test (para. 2-16).
2. With TM 5003 Power Module power off, remove side shield (para. 2-218) and rear plate (para. 2-219).
3. Perform Initialized Setup (para. 2-56).
4. Perform Tracking Generator Power Supply Fault Isolation Test (para. 2-50).
   - If test passes, perform Step 5.
   - If test fails, replace faulty component.
5. Unplug A2W10 from A2A14P112 (fig. FO-21).
6. Connect signal generator to A2W10.
7. Select the following signal generator settings.

   FREQUENCY 110MHZ
   AMPLITUDE .... -50DBM

NOTE

A ramp waveform may appear at A2A15P210 pin 5 when A2A35 Control Assembly is faulty.

8. Using oscilloscope, measure approximately +18 VDC at A2A15P210 pin 5 (fig. FO-21).
   - If +18 VDC correct, perform Step 9.
   - If +18 VDC not correct, perform Control Assembly Fault Isolation Test (para. 2-49).
9. Perform Coaxial Cable Assembly Fault Isolation Test (para. 2-22) for A2W10 (fig. FO-20).
   - If test passes, plug A2W10 onto A2A14P112 and perform Step 10.
   - If test fails, repair A2W10 (Appendix C).
10. Adjust Four-Cavity Filter/Mixer (para. 2-114).
    - If able to adjust, perform Step 15.
    - If not able to adjust, perform Step 11.

11. RemoveA2A14 Amplitude Control (para 2-228).

12. Connect one DMM lead to center conductor of A2A14P112. Measure approximately 0 Ω between A2A14P112 and center conductor of semirigid cable that connects to A2A31P111. Measure > 100 kΩ between A2A14P112 and chassis ground.

- If resistance correct, perform Step 13.

- If resistance not correct, replace A2A14 Amplitude Control (para 2-228).

13 Remove A2A31Balanced Mixer (para 2-225).

14 Connect (+)DMM lead to center conductor of A2A31P111. Connect (-) lead to metal assembly body. Measure approximately 400 Ω (forward-biased diode junction). Reverse DMM lead connections. Measure approximately 400 Ω (forward-biased diode junction).

- If resistance correct, replace A2A32 2nd LO Filter (para 2-226).

- If resistance not correct, replace A2A31 Balanced Mixer (para 2-225).

15. MeasureA2A1 5P200 pins 1-4 against those in the table below.

- If voltages correct, replace A2A14 Amplitude Control (para 2-228).

- If voltages not correct, replace A2A15 Leveling Loop and Bias CCA (para 2-221).

A2A15P200	VOLTAGE LIMITS
Pin 1	+9.0 V to +10.3 V
Pin 2	+0.6 V to +1.2 V
Pin 3	-0.5 V to -2.5 V
Pin 4	0 V to -2.5 V

16 Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-49. CONTROL ASSEMBLY FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to A2A35A1 Mother Board CCA, A2A35A2 110 MHz Amplifier CCA, A2A35A3 55 MHz Oscillator CCA, A2A35A4 Phase/Freq. Detector CCA, and A2R10.

1. With TM 5003 Power Module power off, remove side shield (para 2-218) and A2A35 Control Assembly cover shield (para 2-229).

2. With power to AN/USM-620 on, perform Initialized Setup (para 2-56).

3. Perform Tracking Generator Power Supply Fault Isolation Test (para 2-50).

 - If test passes, perform Step 4.
 - If test fails, replace faulty component.

4. Make measurement at A2A35A2P510 pins 1 and 2 (fig FO-22, waveform 1).

 - If waveform correct, perform Step 5.
 - If waveform not correct, replace A2A35A2 110 MHz Amplifier CCA (para 2-231).

5. Adjust 55 MHz Oscillator Mode (para 2-111).

 - If circuit adjusts, perform Step 8.
 - If circuit does not adjust, perform Step 6.

6. Measure +3.6 V at A2A35A1 P390 pin 1 and +15 V at A2A35A1 P390 pin 3.

 - If voltages correct, perform Step 7.
 - If voltages not correct, replace A2A35A1 Mother Board CCA (para 2-234).

7. Measure +3.6 to +15 V range at A2A35A1 P390 pin 2 while rotating **TRACKING ADJUST** from stop to stop.

 - If range correct, replace A2A35A3 55 MHz Oscillator CCA (para 2-232).
 - If range not correct, replace A2R10 Tracking Adjust Variable Resistor (para 2-235).

8. Measure +3.6 V at A2A35A4 pins C and E.

 - If voltages correct, replace A2A35A1 Mother Board CCA (para 2-234).
 - If voltages not correct, replace A2A35A4 Phase/Freq. Detector CCA (para 2-233).

9. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

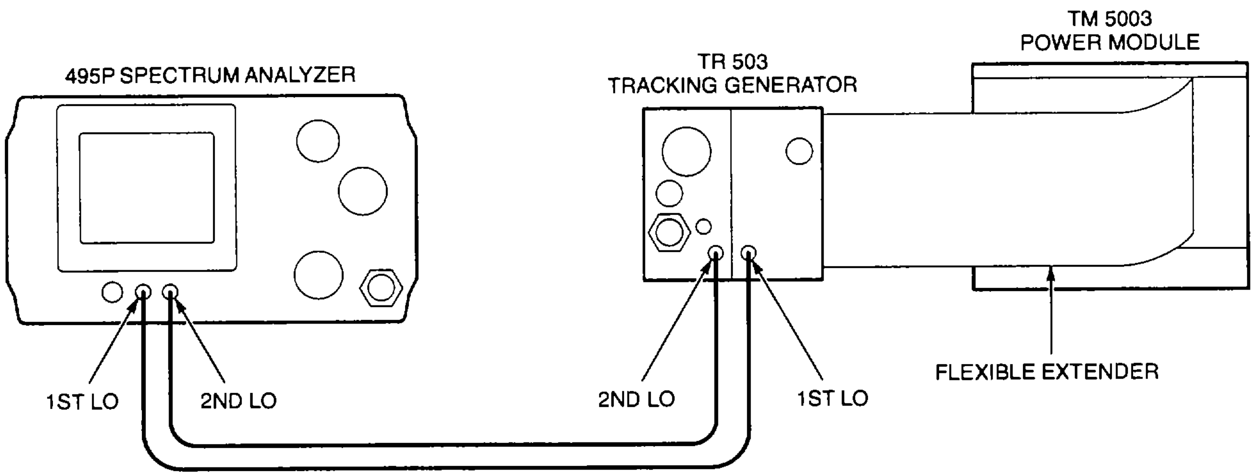
2-50. TRACKING GENERATOR POWER SUPPLY FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A2A6 1st LO Amplifier, A2A15 Leveling Loop and Bias CCA, A2A35A1 Mother Board CCA, A2A35A2 110 MHz Amplifier CCA, A2A35A3 55 MHz Oscillator CCA, A2A35A4 Phase/Freq. Detector CCA, A3Q500, A3Q510, A3Q520, A3Q530, A3Q540, and A3Q550.

1. With TM 5003 Power Module power off, remove A2A35 Control Assembly cover shield (para 2-229).

2. Connect equipment as shown.



3. Measure each voltage on A2A35A1 Mother Board CCA (fig FO-22) against those in the table below. Write on paper which voltages are not within limits.

- If voltages within limits, power supplies are operational.
- If only+5.1 V or +15 V exceed limits, perform Step 4.
- If all voltages missing, perform Power Module Fault Isolation Test (para 2-51).
- If 15 V or +20 V exceed limits, perform Step 6.

NOTE

To access A2A35A1 P384 pin 2, slightly raise the black jumper. Do not remove A2A35A1 P384 unless instructed to do so.

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+15 V	+14 V to +16 V	A2A35A1P370 pin 1
-15 V	-14 V to -16 V	A2A35A1P370 pin 2
+5.1 V	+4.9 V to +5.42 V	A2A35A1P384 pin 2
+20 V	+18.4 V to 20.4 V	A2A35A1U365 pin 8

4. With TM 5003 Power Module power off, plug flexible extender into another plug-in slot within TM 5003 Power Module.

5. With TM 5003 Power Module power on, measure +5.1 V and +15 V supplies. See Step 3 for test point locations and voltage limits.

- If supplies within limits, TM 5003 Power Module is faulty. Use following table to replace faulty component

- If voltages not within limits, perform Step 6.

POWER SUPPLY	FAULTY PLUG-IN SLOT	REPLACE COMPONENT
+5.1 V	A3A10J1000 (fig FO-24, Sheet 1)	A3Q540 (para 2-251)
+5.1 V	A3A10J1200 (fig FO-24, Sheet 1)	A3Q520 (para 2-251)
+5.1 V	A3A10J1300 (fig FO-24, Sheet 1)	A3Q500 (para 2-251)
+15 V	A3A10J1000 (fig FO-24, Sheet 1)	A3Q550 (para 2-252)
+15 V	A3A10J1200 (fig FO-24, Sheet 1)	A3Q530 (para 2-252)
+15 V	A3A10J1300 (fig FO-24, Sheet 1)	A3Q510 (para 2-252)

6. Connect (-) DMM lead to chassis ground. Using (+) lead, measure each voltage on A3A10J1000 (fig FO-24, Sheet 1) against those in table below.

- If voltages within limits, perform Step 7.

- If one or more voltages not within limits, perform Power Module Fault Isolation Test (para 2-51).

POWER SUPPLY	VOLTAGE LIMITS	TEST POINT
+8 V	+7.6 V to +8.5 V	A3A10J1000 pins 2A and 2B
-26 V	-23.7 V to -28.3 V	A3A10J1000 pins 8A and 8B
+26 V	+23.7 V to +28.3 V	A3A10J1000 pins 12A and 12B

7. Isolate each faulty power supply written down from Step 3.

- If -15 V not within limits, perform Step 8.

- If +5.1 V not within limits, perform Step 10.

- If +15 V not within limits, perform Step 16.

- If +20 V not within limits, replace A2A35A1 Mother Board CCA (para 2-234).

8. With TM 5003 Power Module power off, unplug multiwire cable from A2A35A1 P370 (fig FO-22).

9. With TM 5003 Power Module power on, measure -15 V at A2A35A1 P370 pin 2.

- If -15 V within limits, replace A2A15 Leveling Loop and Bias CCA (para 2-221).

- If -15 V not within limits, replace A2A35A1 Mother Board CCA (para 2-234).

10. Remove A2A35A1 P384.

11. Measure +5.1 V at A2A35A1 P384 pin 2.
    - If +5.1 V within limits, replace A2A35A1 P384 and perform Step 12.
    - If +5.1 V not within limits, replace A2A35A1 Mother Board CCA (para 2-234).
12. With TM 5003 Power Module power off, remove A2A35A2 110 MHz Amplifier CCA (para 2-231).
13. With TM 5003 Power Module power on, measure +5.1 V at A2A35A1 P384 pin 2.
    - If +5.1 V within limits, replace A2A35A2 110 MHz Amplifier CCA (para 2-231).
    - If +5.1 V not within limits, perform Step 14.
14. With TM 5003 Power Module power off, remove A2A35A3 55 MHz Oscillator CCA (para 2-232).
15. With TM 5003 Power Module power on, measure +5.1 V at A2A35A1 P384 pin 2.
    - If +5.1 V within limits, replace A2A35A3 55 MHz Oscillator CCA (para 2-232).
    - If +5.1 V not within limits, replace A2A35A4 Phase/Freq. Detector CCA (para 2-233).
16. With TM 5003 Power Module power off, unplug multiwire cable from A2A35A1 P370.
17. With TM 5003 Power Module power on, measure +15 V at A2A35A1 P370 pin 1.
    - If +15 V within limits, replace A2A15 Leveling Loop and Bias CCA (para 2-221).
    - If +15 V not within limits, perform Step 18.
18. Unplug multiwire cable from A2A35A1 P380.
19. Measure +15 V at A2A35A1P370 pin 1.
    - If +15 V within limits, replace A2A6 1st LO Amplifier (para 2-240).
    - If +15 V not within limits, replace A2A35A1 Mother Board CCA (para 2-234).
20. Disconnect equipment from AN/USM-620 and install all removed assemblies and cables.

2-51. POWER MODULE FAULT ISOLATION TEST.

DESCRIPTION

This test isolates faults to A3A13 Primary Supply CCA, A3Q1300, and A3Q1301.

WARNING

*** To avoid injury due to electrical shock, use isolation transformer between AC power source and TM 5003 Power Module power input receptacle. Primary ground potential is different from chassis or earth ground.**

*** Hazardous voltages are present after power is turned off. This voltage is stored in capacitors A3A13C1130 and A3A13C1230 (fig FO-25, Sheet 1). Lamp A3A13DS1320 blinks when stored voltage is >60 V. Always verify that A3A13DS1320 is OFF before handling A3A13 Primary Supply CCA.**

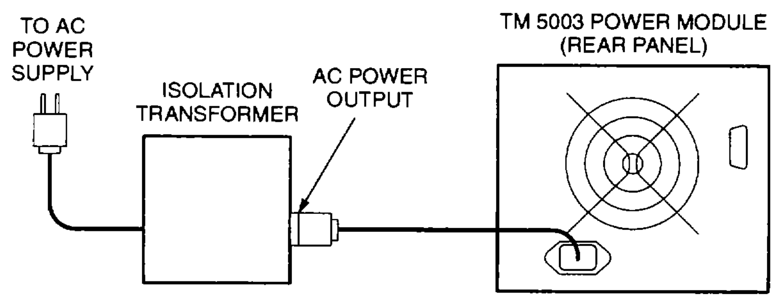
1. Disconnect power cord from AC power source.

2. With power off, plug TR 503 Tracking Generator into TM 5003 Power Module.

3. Unplug multiwire connector from A3A13J1000 (fig FO-25, Sheet 1).

4. With power off, connect oscilloscope probe to A3A14TP3.

5. Connect equipment as shown.



6. Press TM 5003 Power Module **POWER** switch to turn power on.

NOTE

A3A14TP1, A3A14TP2, and A3A14TP3 are pads on A3A14 Line Filter CCA. Wires from multiwire connector unplugged in Step 3 are soldered to the CCA pads.

7. Make measurement at A3A14TP1, A3A14TP2, and A3A14TP3 (fig FO-26, waveforms 1 and 2).

- If waveforms correct, perform Step 8.

- If waveforms not correct, perform Line Filter Fault Isolation Test (para 2-52).

8. On TM 5003 Power Module, press **POWER** switch to turn power off.

9. Disconnect TM 5003 Power Module power cord from AC power source.
10. Plug multiwire connector onto A3A13J1000.
11. With power off, connect oscilloscope probe to A3A13J1420 pin 3 (fig FO-25, Sheet 1).
12. Connect TM 5003 Power Module power cord to isolation transformer.
13. On TM 5003 Power Module, press **POWER** switch to turn power on.

NOTE
Oscilloscope triggering must be carefully adjusted to display waveform 2.

14. Make measurement at A3A13J1420 pin 3 (fig FO-25, Sheet 1, waveform 2).
    - If waveform correct, perform Secondary Supply Fault Isolation Test (para 2-53).
    - If waveform not correct, perform Step 15.
15. On TM 5003 Power Module, press **POWER** switch to turn power off.
16. Disconnect TM 5003 Power Module power cord from AC power.

WARNING
To avoid injury due to electrical shock, verify that A3A13DS1320 is OFF before unplugging A3A11 P1430 from A3A13J1430.

17. Unplug A3A11P1430 from A3A13J1430.
18. Connect TM 5003 Power Module power cord to isolation transformer.
19. On TM 5003 Power Module, press **POWER** switch to turn power on.
20. Make measurement at A3A13J1420 pin 3 (fig FO-25, Sheet 1, waveform 1).
    - If waveform correct, reinstall A3A11P1430 onto A3A13J1430 and perform Secondary Supply Fault Isolation Test (para 2-53).
    - If waveform not correct, perform step 21.
21. Use DMM to test A3Q1300 and A3Q1301 for short or open junctions.
    - If shorted or open, replace A3Q1300 or A3Q1301 (para 2-245).
    - If not shorted or open, replace A3A13 Primary Supply CCA (para 2-244).
22. Disconnect equipment from AN/USM-620 and install all removed connectors.

2-52. LINE FILTER FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to A3A14 Line Filter CCA, A3B500 Fan, A3S500 Power Switch, and A3T500 Power Transformer.

WARNING

To avoid injury due to electrical shock, disconnect TM 5003 Power Module from AC power source before measuring resistance.

1. With power off, disconnect TM 5003 Power Module power cord from AC power source.

NOTE

Line fuse A3F500 will blow when jumpers are installed across connectors A3A14J1103 and A3A14J1104 (fig FO-26) at the same time. Be sure that a jumper is installed across either A3A14J1103 orA3A14J1104.

2. Remove and A3F500 line fuse (TM 11-6625-3278-12, para 3-9). Use DMM to test for open fuse.
   - If fuse blown, perform Step 3.
   - If fuse not blown, perform Step 14.
3. Replace A3F500 line fuse.
4. Unplug A3B500P1105 from A3A14J1105 (fig FO-26).
5. Connect TM 5003 Power Module power cord to AC power source.
6. On TM 5003 Power Module, press **POWER** switch twice to turn power on and then off.
7. Disconnect TM 5003 Power Module power cord from AC power source.
8. Remove and A3F500 line fuse (TM 11-6625-3278-12, para 3-9). Use DMM to test for open fuse.
   - If fuse blown, perform Step 9.
   - If fuse not blown, replace A3B500 Fan (para 2-246).

WARNING

To avoid injury due to electrical shock, verify that A3A13DS1320 is OFF before unplugging multiwire connector from A3A13J1000.

9. Unplug multiwire connector from A3A13J 1000 (fig FO-25, Sheet 1).
10. Repeat Steps 5-7.

11. Remove and A3F500 line fuse (TM 11-6625-3278-12, para 3-9). Use DMM to test for open fuse.
    - If fuse blown, perform Step 12.
    - If fuse not blown, line filter circuits are operational.
12. Remove jumpers A3A1 4P1101 and A3A1 4P1103 (fig FO-26).
13. With power off, measure resistance between locations in following table.
    - If resistance correct, replace A3A14 Line Filter CCA (para 2-249).
    - If resistance not correct, replace A3T500 Power Transformer (para 2-250).

DMM LEAD	DMM LEAD	TYPICAL RESISTANCE
A3A14J1102 pin 1	A3A14J1100 pin 1	1.1 Ω
A3A14J1102 pin 1	A3A14J1101 pin 1	0.7 Ω
A3A14J1102 pin 1	A3A14J1103 pin 8	5 Ω
A3A14J1102 pin 1	A3A14J1104 pin 8	5 Ω
A3A14J1102 pin 8	A3A14J1100 pin 8	1.1 Ω
A3A14J1102 pin 8	A3A14J1101 pin 8	0.7 Ω
A3A14J1102 pin 8	A3A14J1103 pin 1	5 Ω
A3A14J1102 pin 8	A3A14J1104 pin 1	5 Ω

14. On TM 5003 Power Module, set **POWER** switch to on position.
15. Replace A3F500 line fuse (TM 11-6625-3278-12, para 3-9).
16. Measure approximately 2.4 Ω between A3A14 test point L and A3FL500 line terminal (fig FO-24, Sheet 1).
    - If resistance correct, perform Step 17.
    - If resistance not correct, replace faulty component.
17. Measure approximately 2.4 Ω between A3A14 test point N (fig FO-26) and A3FL500 neutral terminal (fig F-24, Sheet 1).
    - If resistance correct, line filter circuit is operational.
    - If resistance not correct, replace A3S500 Power Switch (para 2-254).
18. Disconnect equipment from AN/USM-620 and install all removed connectors.

2-53. SECONDARY SUPPLY FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to components mounted on A3A11 Secondary Supply CCA.

1. With power on, connect (-) DMM lead to A3A11J1260 (fig FO-25, Sheet 1).
2. Check each voltage against those in the table below.
   - If voltages within limits, perform Main Interface Fault Isolation Test (para 2-54).
   - If one or more voltages not within limits, perform Step 3.

POWER SUPPLY	TEST POINT	VOLTAGE LIMITS
+26 V	A3A11J1060	+23.7 V to +28.3 V
-26 V	A3A11J1160	-23.7 V to -28.3 V
+8 V	A3A11J1360	+7.6 V to +8.5 V

3. With power off, unplug A3A11 P1060, A3A11 P1160, and A3A11 P1360.
4. Press **POWER** switch to turn power on. Repeat Steps 1 and 2.
   - If voltages within limits, perform Main Interface Fault Isolation Test (para 2-54).
   - If voltages not within limits, perform Step 5.
5. Press **POWER** switch to turn power off and plug A3A11P1060, A3A11P1160, and A3A11P1360 onto A3A11 Secondary Supply CCA.
6. Adjust Clock Oscillator Frequency (para 2-116). Repeat Steps 1 and 2.
   - If voltages within limits, equipment is operational.
   - If voltage not within limits, perform Step 7.
7. Adjust +8 Volts (para 2-115). Repeat Steps 1 and 2.
   - If voltages within limits, equipment is operational.
   - If voltage not within limits, perform Step 8.
8. Repeat Steps 1 and 2. Write on paper which voltages are not within limits.
   - If only+26 V not within limits, perform Step 9.
   - If only-26 V not within limits, perform Step 10.
   - If only+8 V not within limits, perform Step 11.
   - If all voltages are not within limits, perform Step 12.

9. Make measurement at junction of A3A11CR1010 and A3A11CR1020 (fig FO-25, Sheet 1). See waveform (fig FO-25, Sheet 2, waveform 3).
   - If waveform correct, use DMMtotestA3A11CR1010, A3A11CR1020, A3A11 L1140, A3A11 C1030, and A3A11C1231 for opens and shorts. Replace faulty components.
   - If waveform not correct, replace A3A11T1210.
10. Make measurement at junction of A3A11CR1021 and A3A11CR1120 (fig FO-25, Sheet 1). See waveform (fig FO-25, Sheet 2, waveform 3).
   - If waveform correct, use DMMtotestA3A1 1 CR1021 ,A3A1 1 CR1120, A3A11 L1 141 ,A3All C1230, and A3A11C1240 for opens and shorts. Replace faulty components.
   - If waveform not correct, replace A3A11 T1210.
11. Make measurement at anode leads (red wires) of A3A11CR500 (fig FO-25, Sheet 1). See waveform (fig FO-25, Sheet 2, waveform 4).
   - If waveform correct, use DMM to test A3A11 CR500, A3A11 L1430, A3A11 C1320, A3A11 C1340, and A3A11C1420 for opens and shorts. Replace faulty components.
   - If waveform not correct, replace A3A11T1210.
12. Measure +20 V at A3A11U1550 pin 11 (fig FO-25, Sheet 1).
   - If voltage correct, perform Step 14.
   - If voltage not correct, perform Step 13.
13. Make measurement at A3A11P1463 pin 3 (fig FO-25, Sheet 1). See waveform (fig FO-25, Sheet 3, waveform 6).
   - If waveform correct, use DMM to test A3A11 F1660, A3A11CR1560, and A3A1 1CR1561 for opens and shorts. Replace faulty components.
   - If waveform not correct, use DMM to test A3T500 and multiwire cable that connects between A3A11J1463 and A3A10 J1110 for opens and shorts. Replace faulty components.
14. Measure +10 V at A3A11U1550 pin 10 (fig FO-25, Sheet 1).
   - If voltage correct, perform Step 22.
   - If voltage not correct, perform Step 15.
15. With power off, unsolder and lift one lead of A3A11 CR1550.
16. With power on, measure +10 V at A3A11U1550 pin 10.
   - If voltage correct, perform Step 17.
   - If Voltage not correct, perform Step 22.
17. Press **POWER** switch to turn power off. If necessary, reinstall A3A11CR1550.

NOTE

- **Several ICs connect to +10 V power supply. Locate faulty ICs by disconnecting them from +10 V.**
- **After locating faulty IC, all ICs that have leads cut should be replaced.**

18. Cut lead of suspected IC. See following table.

IC	+10 V PIN NUMBER	IC	+10 V PIN NUMBER
A3A11U1540	3	A3A11U1620	14
A3A11U1600	14	A3A11U1720	16
A3A11U1610	14	A3A11U1850	8

19. Press **POWER** switch to turn power on. Measure +10 V at A3A11U1550 pin 10.
 - If voltage is correct, the suspected IC is faulty.
20. Press **POWER** switch to turn power off.
21. Repeat Steps 18-20 until faulty IC is located.
22. Measure $\leq$ +0.2 V at A3A11 U1550 pin 2.
 - If voltage correct, perform Step 23.
 - If voltage is not correct, replace A3A11Q1650 and A3A11VR1753.
23. Make measurement at A3A11U1720 pin 11 (fig FO-25, Sheet 1). See waveform (fig FO-25, Sheet 3, waveform 8).
 - If waveform correct, perform Step 24.
 - If waveform not correct, replace A3A11 U1620 or associated component.
24. Measure low (0 V) at A3A11U1720 pin 12 (fig FO-25, Sheet 1).
 - If low, perform Step 27.
 - If high, perform Step 25.
25. Measure high (+10 V) at A3A11U1720 pin 4 (fig FO-25, Sheet 1).
 - If low, perform Step 26.
 - If high, perform Step 27.
26. Measure +7.15 V at A3A11 U1550 pin 6 (fig FO-25, Sheet 1).
 - If voltage correct, replace A3A1 U1540 or associated component.
 - If voltage not correct, replace A3A11U1550 or associated component.
27. Make measurement at A3A11U1600 pins 12 and 13 (fig FO-25, Sheet 1). See waveforms (fig FO-25, Sheet 3, waveforms 10 and 11).
 - If waveforms correct, perform Step 29.
 - If only one waveform correct, replace A3A11 U1600.
 - If waveforms not correct, perform Step 28.

28. Make measurement at A3A11U1720 pin 10 (fig FO-25, Sheet 1). See waveform (fig FO-25, Sheet 3, waveform 7).

- If waveform correct, replace A3A11U1600.
- If waveform not correct, replace A3A11 U1720 or associated component.

29. Make measurement at A3A11U1600 pins 1 and 6 (fig FO-25, Sheet 1). See waveform (fig FO-25, Sheet 3, waveform 9).

- If waveforms correct, perform Step 31.
- If only one waveform correct, replace A3A11 U1600.
- If waveforms not correct, perform Step 30.

30. Make measurement at A3A11U1540 pin 4 (fig FO-25, Sheet 1). See waveform (fig FO-25, Sheet 2, waveform 5).

- If waveform correct, replace A3A11 U1540.
- If waveform not correct, replace A3A11 CR1610, A3A1 1 C1450, or associated component.

31. Make measurement at A3A11 U1610 pins 1 and 13 (fig FO-25, Sheet 1). See waveform (fig FO-25, Sheet 3, waveform 12).

- If waveforms correct, perform Step 32.
- If either waveform not correct, replace A3A11 U1610.

32. Make measurement at A3A11J1300 pins 1 and 3 (fig FO-25, Sheet 1). See waveform (fig FO-25, Sheet 3, waveform 13).

- If waveforms correct, secondary supply circuit is operational.
- If waveform at pin 1 not correct, replace A3A11U1620, A3A11Q1400, or associated component.
- If waveform at pin 3 not correct, replace A3A11U1620, A3A11Q1401, or associated component.

33. Disconnect equipment from AN/USM-620 and install all removed connectors.

2-54. MAIN INTERFACE FAULT ISOLATION TEST.

DESCRIPTION
This test isolates faults to components mounted on A3A10 Main Interface CCA.

WARNING
To avoid electrical shock, disconnect TM 5003 Power Module from AC power source before measuring resistance.

1. With power off, unplug TR 503 Tracking Generator from TM 5003 Power Module.
2. Inspect connectors A3A10J1000, A3A10J1200, and A3A10J1300 (fig FO-24, Sheet 1) for bent or discolored contacts.
   - Replace damaged connectors and perform Step 3.
3. Measure resistance shown in following table.
   - If resistance correct, perform Step 4.
   - If resistance not correct, replace connector under test.

DMM LEAD	DMM LEAD	RESISTANCE	CONNECTOR UNDER TEST
A3A10J1000 pin 12A	A3A11J1060	0 Ω	A3A10J1000
A3A10J1000 pin 12B	A3A11J1060	0 Ω	A3A10J1000
A3A10J1200 pin 12A	A3A11J1060	0 Ω	A3A10J1200
A3A10J1200 pin 12B	A3A11J1060	0 Ω	A3A10J1200
A3A10J1300 pin 12A	A3A11J1060	0 Ω	A3A10J1300
A3A10J1300 pin 12B	A3A11J1060	0 Ω	A3A10J1300
A3A10J1000 pin 8A	A3A11J1160	0 Ω	A3A10J1000
A3A10J1000 pin 8B	A3A11J1160	0 Ω	A3A10J1000
A3A10J1200 pin 8A	A3A11J1160	0 Ω	A3A10J1200
A3A10J1200 pin 8B	A3A11J1160	0 Ω	A3A10J1200
A3A10J1300 pin 8A	A3A11J1160	0 Ω	A3A10J1300
A3A10J1300 pin 8B	A3A11J1160	0 Ω	A3A10J1300
A3A10J1000 pin 2A	A3A11J1360	0 Ω	A3A10J1000
A3A10J1000 pin 2B	A3A11J1360	0 Ω	A3A10J1000
A3A10J1200 pin 2A	A3A11J1360	0 Ω	A3A10J1200
A3A10J1200 pin 2B	A3A11J1360	0 Ω	A3A10J1200
A3A10J1300 pin 2A	A3A11J1360	0 Ω	A3A10J1300
A3A10J1300 pin 2B	A3A11J1360	0 Ω	A3A10J1300

4. Unplug A3A11J1060, A3A11J1160, and A3A11J1360.
5. Measure resistance shown in following table.
   - If resistance correct, main interface circuit is operational.
   - If resistance not correct, replace faulty component under test.

DMM LEAD	DMM LEAD	RESISTANCE	COMPONENTS UNDER TEST
A3A10J1000 pin 2A	Chassis Ground	Open	A3A10C1020, A3A10C1220 A3A10C1320, A3A11CR1120
A3A10J1000 pin 8A	Chassis Ground	Open	A3A10C1012, A3A10C1212 A3A10C1312, A3A11CR1011
A3A10J1000 pin 12A	Chassis Ground	Open	A3A10C1011, A3A10C1211 A3A1OC1311, A3A11CR1010

6. Disconnect equipment from AN/USM-620 and install all removed connectors.

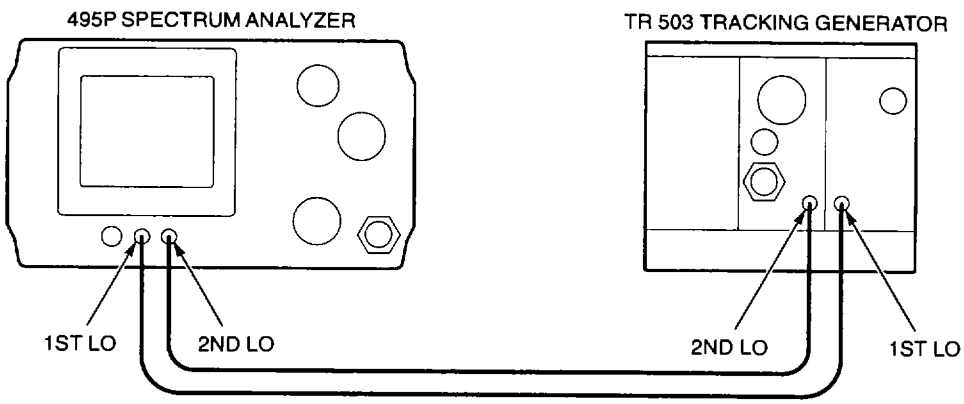
Section IV. MAINTENANCE PROCEDURES

2-55. PERFORMANCE TEST.

NOTE

- Do performance test procedures in the order given.
- Do Initialized Setup (para 2-56) before each performance test to set Spectrum Analyzer System AN/USM-620 controls to defined settings.
- Allow 30minute warm-up period before doing the first performance test. This allows equipment to stabilize.
- Allow Spectrum Analyzer System AN/USM-620 five minutes to stabilize if turned off during performance test.
- Keep cables connected between test equipment as short as possible.

2-56. INITIALIZED SETUP.



1. Connect equipment as shown.
2. On 495P Spectrum Analyzer:
   - Press **POWER** switch to turn power on.
   - Press **Blue-SHIFT** and **RESET** keys.
   - See **TIME/DIV** knob to AUTO.
   - See **MIN RF ATTEN** knob to 0 (NORM).
3. On TM 5003 Power Module, press **POWER** switch to turn power on.
4. On TR 503 Tracking Generator:
   - See **OUTPUT LEVEL** knob to 0 dBm.
   - See **VAR dB** knob to 0.

5. Spectrum Analyzer System AN/USM-620 power on settings are as follows.

READOUT	ON
REFERENCE LEVEL	0DBM
CENTER FREQUENCY	900MHZ
MARKER FREQUENCY	0MHZ
SPAN/DIV	MAX
VERTICAL DISPLAY	10DB/
RF ATTEN	20DB
FREQ RANGE	0-1.8
RESOLUTION BANDWIDTH	3MHZ
TRIGGERING	FREE RUN
AUTO RESOLN	ON
VIEWAAND VIEW B	ON
MIN NOISE/MIN DISTORTION	MIN NOISE
ALL OTHER MODES	INACTIVE OR OFF

2-57. CAL OUT SIGNAL FREQUENCY TEST.

1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.
3. Check frequency counter display for CAL OUT frequency.

- CA OUT frequency must be 100 MHz ($\pm$ 20 Hz).

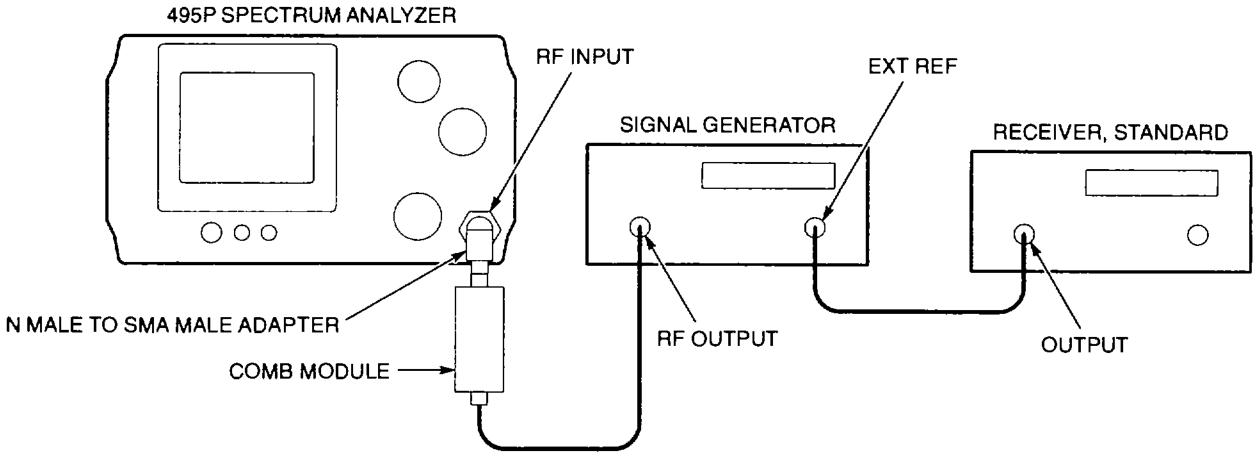
4. Calculate measured reference frequency error using the following formula. Write on paper for future reference.

REF = MEASURED ERROR (Hz) + 1,000,000,000

- For example, if measured frequency is 99.999,995 MHz or 100.000,005 MHz, REF = 5 Hz ÷ 1,000,000,000 = 5×10^{-9}.
- Express reference frequency error (REF) using engineering notation (for example, 5×10^{-9}).

5. Disconnect equipment from AN/USM-620.

2-58. CENTER/MARKER FREQUENCY TEST (1ST LO LOCKED).



1. Perform Initialized Setup (para 2-56).

2. Connect equipment as shown.

3. Select the following AN/USM-620 settings.

   CENTER/MARKER FREQUENCY 500MHZ
   REFERENCE LEVEL .... -10DBM
   SPAN/DIV 100HZ
   VERT DISPLAY 10DB/

4. Select the following signal generator settings.

   FREQUENCY 500MHZ
   LEVEL .... ODBM

5. On AN/USM-620, press Green-SHIFT and PEAK FIND keys.

6. Observe CRT for Marker Frequency readout.

   • Readout must be 500 MHz ± 135 Hz.

7. Press Blue-SHIFT and FREQ keys. Use DATA ENTRY to enter 1 GHz.

8. Press Green-SHIFT and PEAK FIND keys.

9. Observe CRT for Marker Frequency readout.

   • Readout must be 1 GHz ± 235 Hz.

10. Press Blue-SHIFT and FREQ keys. Use DATA ENTRY to enter 1.5 GHz.

11. Press Green-SHIFT and PEAK FIND keys.

12. Observe CRT for Marker Frequency readout.

    • Readout must be 1.5 GHz ± 335 Hz.

13. Disconnect equipment from AN/USM-620.

2-59. COUNTER ACCURACY TEST.

NOTE

Before doing this test, CAL OUT Signal Frequency Test (para 2-57) must be performed. The CAL OUT Signal Frequency Test provides a value for REF (Frequency Reference Error) that is needed to calculate counter accuracy.

1. Perform Initialized Setup (para 2-56).

2. Connect equipment as shown.

3. Select the following AN/USM-620 settings.

   CENTER/MARKER FREQUENCY 500MHZ
   REFERENCE LEVEL .... -10DBM
   SPAN/DIV 1MHZ

4. Select the following signal generator settings.

   FREQUENCY 500MHZ
   LEVEL .... ODBM

5. On AN/USM-620, press **Green-SHIFT** and **PEAK FIND** keys.

6. Press **COUNT** key.

7. Check counted frequency display.

- Frequency must be within ± [(5 x 10^{8}) x (REF) + 12 Hz].
- For example, if measured reference frequency error (REF) is 5 x 10^{-9}, maximum error is ±14.5 Hz.

8. Press **Blue-SHIFT** and **FREQ** keys. Use **DATA ENTRY** to enter 1 GHz.

9. Press **Green-SHIFT** and **PEAK FIND** keys.

10. Check counted frequency display.

- Frequency must be within ± [(1 x 10^{9}) X (REF) + 12 Hz].
- For example, if measured reference frequency error (REF) is 5 x 10^{-9}, maximum error is ± 17 Hz.

11. Press **Blue-SHIFT** and **FREQ** keys. Use **DATA ENTRY** to enter 1.5 GHz.

12. Press **Green-SHIFT** and **PEAK FIND** keys.

13. Check counted frequency display.

- Frequency must be within ± [(1.5 x 10^9) x (REF)+ 12 Hz].

- For example, if measured reference frequency error (REF) is 5 x 10^{-9}, maximum error is ±19.5 Hz.

14. Press **Blue-SHIFT** and **COUNT RESOLN** keys. Use **DATA ENTRY** to enter 1 kHz.

15. Check counted frequency display over several counts.

- Error must not exceed ± 1 kHz.

16. Disconnect equipment from AN/USM-620.

2-60. CENTER FREQUENCY STABILITY TEST.

1. Perform Initialized Setup (para 2-56).

2. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY	100MHZ
REFERENCE LEVEL	-20DBM
SPAN/DIV	50HZ
RESOLUTION BANDWIDTH	100HZ
VERT DISPLAY	2DB/

3. Connect CAL OUT signal to RF INPUT.

4. Press **Blue-SHIFT** and **PULSE STRETCHER** keys.

5. Use **DATA ENTRY** to select 6=DISABLE/ENABLE FREQUENCY CORRECTIONS.

6. Press **SAVE A** key to save the trace.

7. Wait 60 seconds.

8. Note frequency difference between active and SAVE A traces.

- Check that frequency drift is $\leq$ 1 major division.

9. Disconnect equipment from AN/USM-620.

2-61. RESIDUAL FM TEST.

1. Perform Initialized Setup (para 2-56).

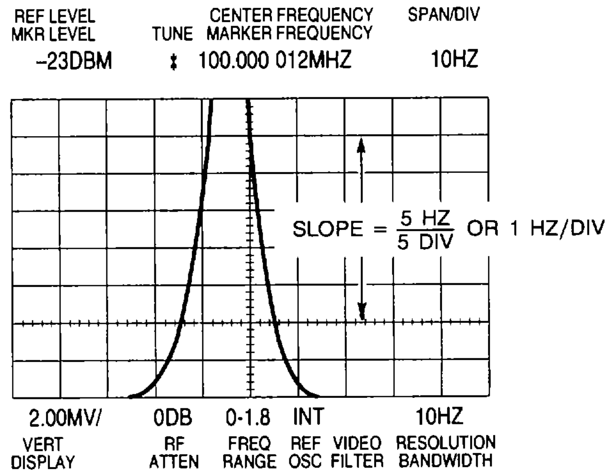
2. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY 100MHZ
REFERENCE LEVEL .... -23DBM
SPAN/DIV 10HZ
VERTICAL DISPLAY .... LIN

3. Connect CAL OUT signal to RF INPUT.

NOTE

Use CENTER/MARKER FREQUENCY knob as needed to move signal to center of CRT.



4. Press **AUTO RESOLN** key to turn off AUTO RESOLN mode.

5. Use **CENTER/MARKER FREQUENCY** knob to place signal on CRT. See example waveform.

NOTE

Signal should cross center of CRT one division below top graticule line.

6. Measure and write on paper the frequency range covered by five divisions of signal. Example waveform shows five vertical divisions where slope is measured.

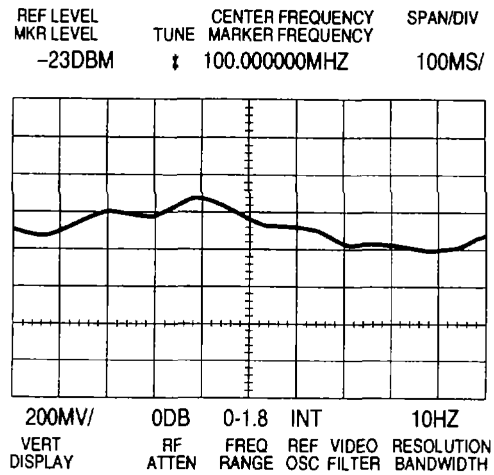
7. Calculate slope of signal using the following formula. Typical slope is 1 Hz/division.

$$Slope = \frac{\text{MEASURED FREQUENCY RANGE}}{5}$$

8. Press **ZERO SPAN** key.

9. Set **TIME/DIV** to 0.1 s.

10. Use **CENTER/MARKER FREQUENCY** knob to move trace near center of CRT. See example waveform.



11. Measure peak-to-peak amplitude of signal within any horizontal minor division.

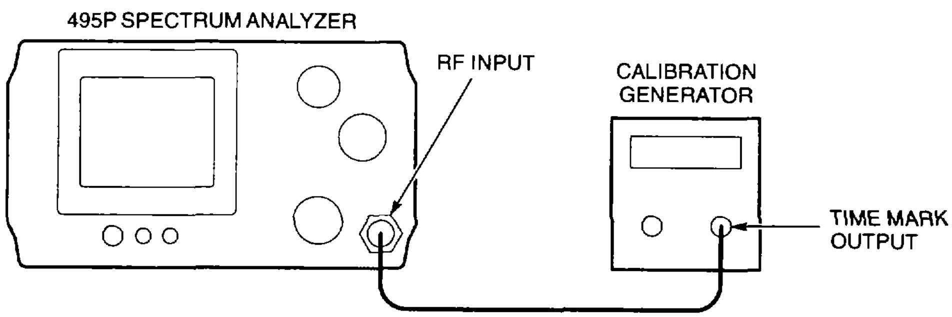
12. Calculate residual FM using the following formula.

    Residual F =AMPLITUDE X SLOPE

    - Amplitude is major divisions. Slope is value calculated from Step 7.
    - Residual FM must not exceed 5 Hz.

13. Disconnect equipment from AN/USM-620.

2-62. FREQUENCY SPAN/DIV ACCURACY TEST.



1. Perform Initialized Setup (para 2-56).

2. Connect equipment as shown.

3. Set calibration generator for 10 ns time mark output.

4. On AN/USM-620, press **Blue-SHIFT** and **RESET** keys. Select the following settings.

    CENTER/MARKER FREQUENCY 1GHZ
    SPAN/DIV .... 10 MHZ
    REFERENCE LEVEL .... +20DBM

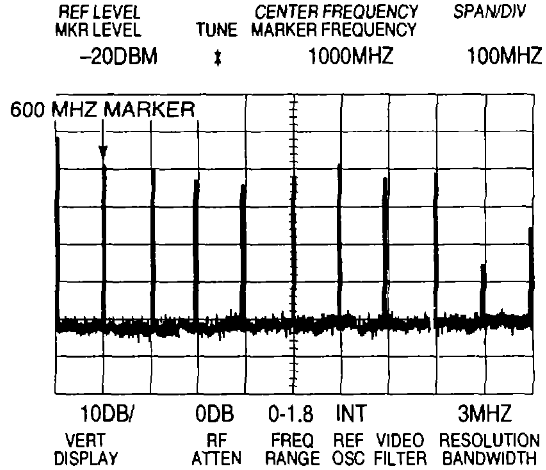
NOTE

Within this test, change REFERENCE LEVEL as needed so markers appear above noise.

5. Use CENTER/MARKER FREQUENCY knob to align 600 MHz marker on graticule line. See example waveform.

   • Cheek alignment of markers to graticule lines.

   • Error must not exceed ±2 minor divisions over center eight divisions of CRT.



6. Select the following settings.

CENTER/MARKER FREQUENCY 300MHZ
SPAN/DIV 50MHZ

7. Set calibration generator for 20 ns time mark output.

8. On AN/USM-620, use **CENTER/MARKER FREQUENCY** knob to align markers on graticule lines.

   • Check alignment of markers to graticule lines.

   • Error must not exceed ± 2 minor divisions over center eight divisions of CRT.

9. Select the following settings.

   CENTER/MARKER FREQUENCY 100MHZ
   SPAN/DIV 20MHZ

10. Set calibration generator for 50 ns time mark output.

11. On AN/USM-620, use **CENTER/MARKER FREQUENCY** knob to align markers on graticule lines.

    • Check alignment of markers to graticule lines.

    • Error must not exceed ± 2 minor divisions over center eight divisions of CRT.

12. Set CENTER FREQUENCY to O MHz.

13. Set SPAN/DIV as shown in following table. Begin with 10 MHz and work sequentially through table.

14. Set calibration generator for corresponding setting in following table.

15. On AN/USM-620, use **CENTER/MARKER FREQUENCY** knob to align markers on graticule lines.

    • Check alignment of markers to graticule lines.

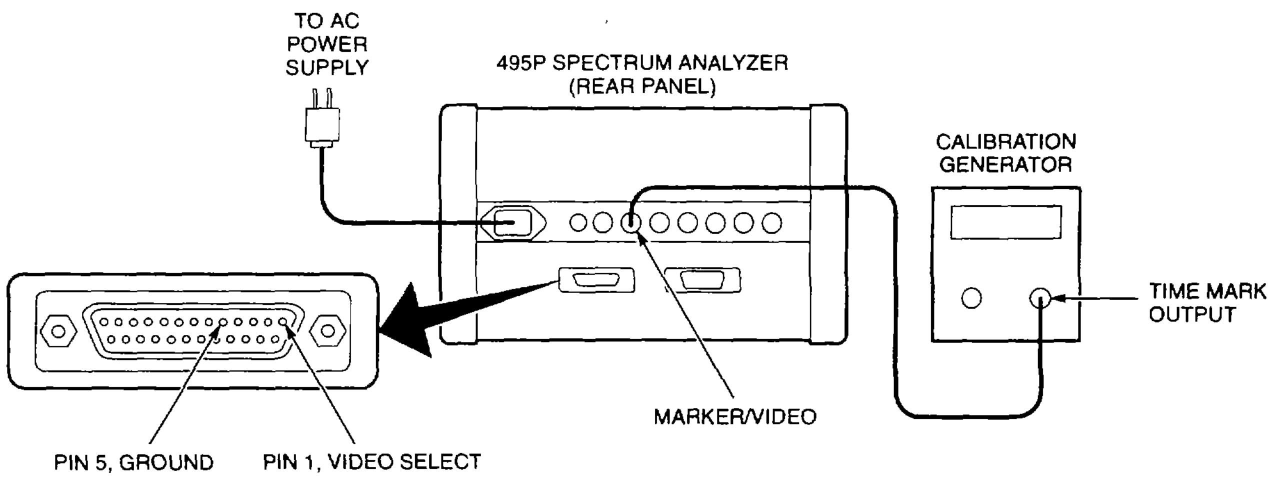
    • Error must not exceed ± 2 minor divisions over center eight divisions of CRT.

16. Repeat Steps 13-15 to check all settings.

17. Disconnect equipment from AN/USM-620.

FREQUENCY SPAN/DIV SETTING	CALIBRATION GENERATOR SETTING	MAXIMUM ERROR
10 MHz	0.1 µs	±2 minor divisions
5 MHz	0.2 µs	±2 minor divisions
2 MHz	0.5 µs	±2 minor divisions
1 MHz	1 µs	±2 minor divisions
500 kHz	2 µs	+2 minor divisions
200 kHz	5 µs	±2 minor divisions
100 kHz	10 µs	±2 minor divisions
50 kHz	20 µs	±2 minor divisions
20 kHz	50 µs	+2 minor divisions
10 kHz	100 µs	±2 minor divisions
5 kHz	200 µs	±2 minor divisions
2 kHz	500 µs	±2 minor divisions
1 kHz	1 ms	±2 minor divisions
500 Hz	2 ms	±2 minor divisions
200 Hz	5 ms	±2 minor divisions
100 Hz	10 ms	±2 minor divisions
50 Hz	20 ms	±2 minor divisions

2-63. SWEEP TIME ACCURACY TEST.



1. Perform Initialized Setup (para 2-56).

2. Connect equipment as shown.

- Generator connects to MARKER I VIDEO input.

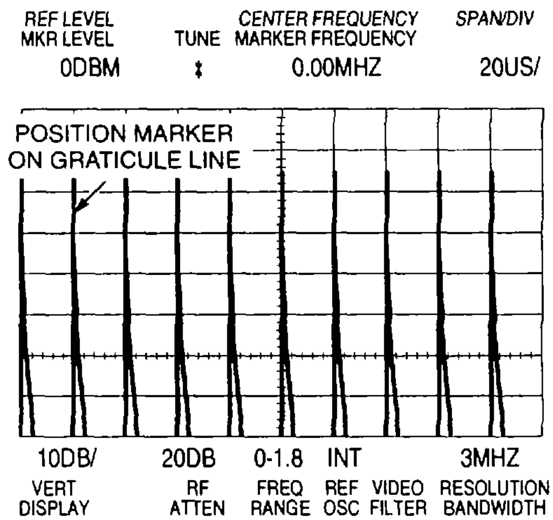
- Ground pin1 of J104 ACCESSORY connector (connect pin 1 to pin 5).

3. Select the following AN/USM-620 settings.

ZERO SPAN ....ON
TRIGGERING .... INT
VIEW A AND VIEW B .... OFF

NOTE
Digital storage may be turned on (press VIEW A key) for sweep times slower than 5 ms per division.

4. Set TIME/DIV to setting shown in following table. Begin with 20 ps and work sequentially through table.



5. Set calibration generator for corresponding setting in following table.

6. Use **HORIZONTAL POSITION** to align marker on first graticule line. See example waveform.

- Check alignment of markers to graticule lines.
- Error must not exceed ±2 minor divisions over center eight divisions on CRT.

7. Repeat Steps 4-6 to check all settings.

TIME/DIV SETTING	CALIBRATION GENERATOR SETTING	MAXIMUM ERROR
20 µs	20 µs	±2 minor divisions
50 µs	50 µs	±2 minor divisions
100 µs	100 µs	±2 minor divisions
200 µs	200 µs	±2 minor divisions
500 µs	500 µs	±2 minor divisions
1 ms	1 ms	±2 minor divisions
2 ms	2 ms	±2 minor divisions
5 ms	5 ms	±2 minor divisions
10 ms	10 ms	±2 minor divisions
20 ms	20 ms	±2 minor divisions
50 ms	50 ms	±2 minor divisions
100 ms	100 ms	±2 minor divisions
200 ms	200 ms	±2 minor divisions
500 ms	500 ms	±2 minor divisions
1 s	1 s	±2 minor divisions
2 s	2 s	±2 minor divisions
5 s	5 s	±2 minor divisions

8. Press **Blue-SHIFT** and **RESET** keys. Select the following settings.

RESOLUTION BANDWIDTH	10 HZ
VIDEO FILTER NARROW	ON
TIME/DIV	AUTO
PEAK/AVERAGE	FULLY CLOCKWISE

9. Set calibration generator for 5 s time mark output signal.

10. On AN/USM-620, use **HORIZONTAL POSITION** to align marker on first graticule line.

- Check alignment of markers to graticule lines. There will be two markers per division on CRT.
- Error must not exceed ± 2 minor divisions over center eight divisions on CRT.

11. Set SPAN/DIV to 100 MHz.

12. Set **HORIZONTAL POSITION** to realign dot to center graticule of CRT.

13. Disconnect equipment from AN/USM-620.

2-64. RESOLUTION BANDWIDTH AND SHAPE FACTOR TEST.

1. Perform Initialized Setup (para 2-56).

2. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY	100MHZ
SPANIDIV	1 MHZ
RESOLUTION BANDWIDTH	3MHZ
REFERENCE LEVEL	-20DBM
VERTICAL DISPLAY	2DB/
PEAK/AVERAGE	FULLY CLOCKWISE

3. Connect CAL OUT signal to RF INPUT.

4. Press **Green-SHIFT** and **BANDWIDTH** to turn on BANDWIDTH mode.

5. Press **MARKER MENU** key.

6. Use **DATA ENTRY** to select 7=ENTER BANDWIDTH NUMBER.

7. Use **DATA ENTRY** to enter 6 dB.

8. Select RESOLUTION BANDWIDTH and SPAN/DIV settings shown in following table. Begin with 3 MHz RESOLUTIONBANDWIDTH and work sequentially through table.

9. Press **Green-SHIFT** and **PEAK FIND** keys.

10. Measure and write on paper the 6 dB bandwidth for selected filter.

- Verify that bandwidth is within limits.

11. Repeat Steps 8-10 until 6 dB bandwidth has been measured for all filters.

RESOLUTION BANDWIDTH SETTING	SPAN/DIV SETTING	6 DB BANDWIDTH LIMITS
3 MHz	1 MHz	3 MHz ±600 kHz
1 MHz	200 kHz	1 MHz ±200 kHz
100 kHz	20 kHz	100 kHz ±20 kHz
10 kHz	2 kHz	10 kHz ±2 kHz
1 kHz	200 Hz	1 kHz ±200 Hz
100 Hz	20 Hz	100 Hz ±20 Hz

12. Press 10dB/DIV and **MARKER MENU** keys.

13. Use **DATA ENTRY** to select 7=ENTER BANDWIDTH NUMBER.

14. Use **DATA ENTRY** to enter 60 dB.

15. Select the following AN/USM-620 settings.

    SPAN/DIV 50HZ
    RESOLUTION BANDWIDTH 10HZ
    VIDEO FILTER WIDE .... ON

16. After sweep crosses CRT, press **Green-SHIFT** and **PEAK FIND** keys.

17. Measure 60 dB bandwidth for 10 Hz filter.

- Bandwidth must be $\leq$ 150 Hz.

18. Select RESOLUTION BANDWIDTH and SPAN/DIV settings shown in following table. Begin with 3 MHz RESOLUTION BANDWIDTH and work sequentially through table.

19. Press **Green-SHIFT** and **PEAK FIND** keys.

20. Measure and write on paper the 60 dB bandwidth for selected filter.

- Verify that bandwidth is within limits.

21. Repeat Steps 18-20 until 60 dB bandwidth has been measured for all filters.

RESOLUTION BANDWIDTH SETTING	SPAN/DIV SETTING
3 MHz	2 MHz
1 MHz	2 MHz
100 kHz	200 kHz
10 kHz	10 kHz
1 kHz	2 kHz
100 Hz	200 Hz

22. Calculate shape factor for each filter using the following formula. Use measured 6 dB values from Step 10 and 60 dB values from Step 20.

    SHAPE FACTOR = 60 DB BANDWIDTH ÷ 6 DB BANDWIDTH

- Shape factor must be <7.5:1.

23. Disconnect equipment from AN/USM-620.

2-65. NOISE SIDEBAND AMPLITUDE TEST.

NOTE

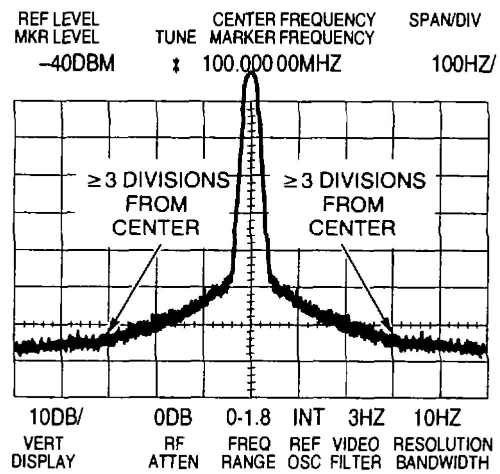
Noise sidebands for resolution bandwidth settings >100 kHz are not checked. Phase noise in these settings is hidden by system noise.

1. Perform Initialized Setup (para 2-56).

2. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY 100MHZ
SPAN/DIV.............................. .... 100HZ
RESOLUTION BANDWIDTH 10HZ
REFERENCE LEVEL .... -40DBM
WIDE VIDEO FILTER .... ON
PEAK/AVERAGE............................... ....FULLY CLOCKWISE

3. Connect CAL OUT signal to RF INPUT.



4. Check amplitude of noise sidebands three divisions or more from center of CRT. See example waveform.

- Sidebands must be $\geq$5 divisions below top graticule line.

5. Select RESOLUTION BANDWIDTH and SPAN/DIV settings shown in following table. Begin with 100 Hz RESOLUTION BANDWIDTH and work sequentially through table.

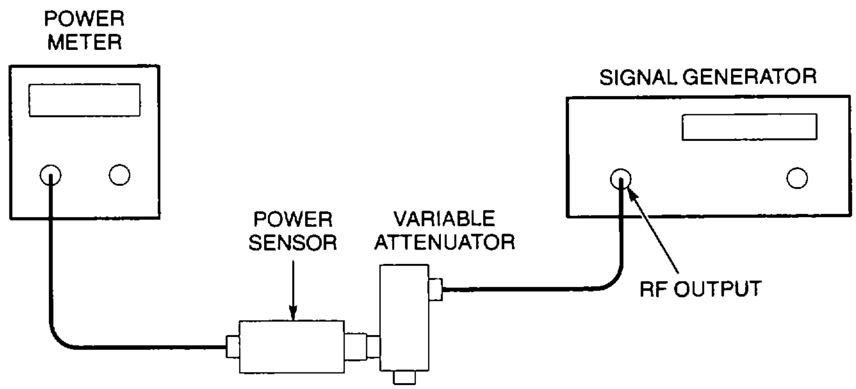
6. Check amplitude of noise sidebands three divisions or more from center of CRT.

- Sidebands must be within limits shown in table.

RESOLUTION BANDWIDTH SETTING	SPAN/DIV SETTING	SIDEBAND AMPLITUDE LIMITS
100 Hz	1 kHz	$\geq$5 divisions below top graticule line
1 kHz	10 kHz	$\geq$5.5 divisions below top graticule line
10 kHz	100 kHz	$\geq$5.5 divisions below top graticule line
100 kHz	1 MHz	$\geq$5.5 divisions below top graticule line

7. Disconnect equipment from AN/USM-620.

2-66. CAL OUT AMPLITUDE TEST.



1. Perform Initialized Setup (para 2-56).

2. Connect equipment as shown.

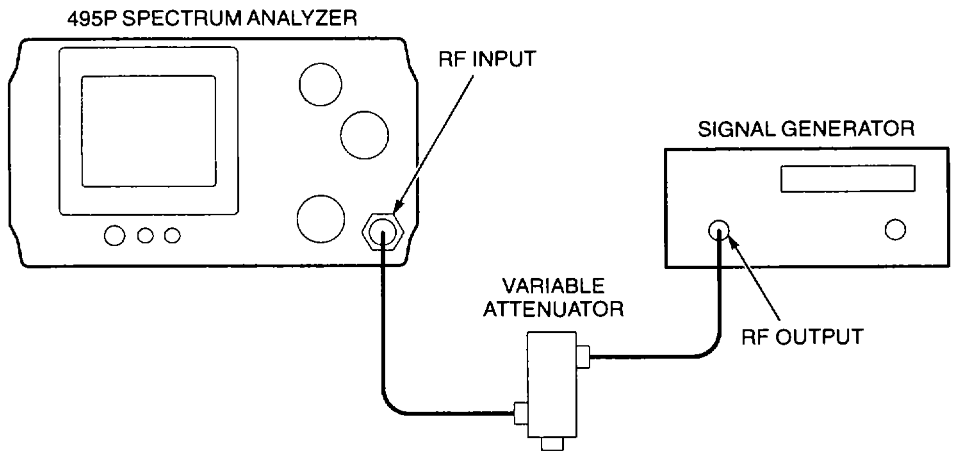
- Use variable attenuator with 1 dB steps.

3. Set variable attenuator to 3 dB.

4. Set signal generator frequency to 100 MHz.

5. Set signal generator output level for -20 dBm power meter reading.

6. Disconnect power sensor from variable attenuator.



7. Connect equipment as shown.

8. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY	100MHZ
SPAN/DIV	100KHZ
RESOLUTION BANDWIDTH	1MHZ
REFERENCE LEVEL	-18DBM
VERTICAL DISPLAY (Using data entry keys)	1 DB/

9. Press **SAVE A** key.

10. Disconnect cable assembly between RF INPUT and variable attenuator.

11. Using cable assembly disconnected in Step 10, connect CAL OUT signal to RF INPUT.

12. Check amplitude difference between VIEW B (CAL OUT) and SAVE A waveforms.

- Difference must not exceed ± 1.5 minor divisions.

13. Disconnect equipment from AN/USM-620.

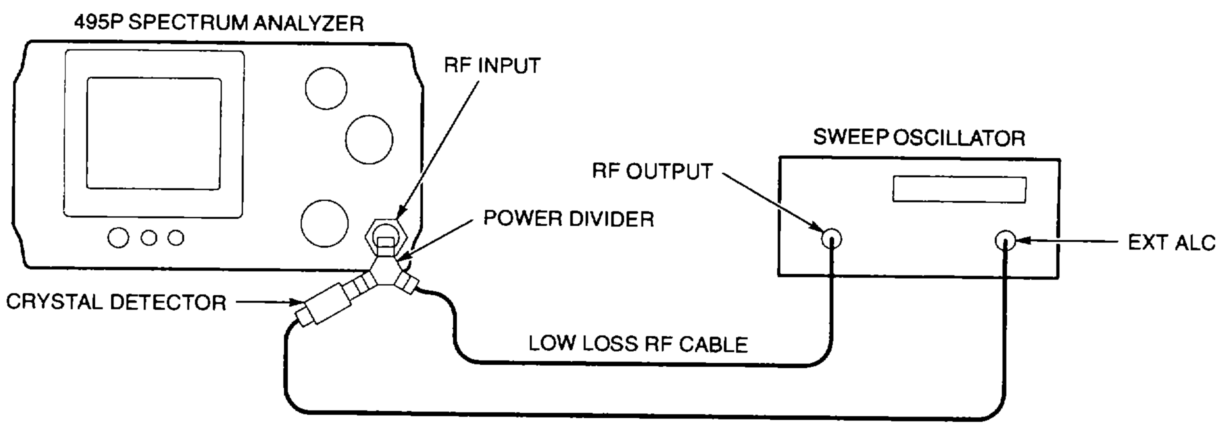
2-67. FREQUENCY RESPONSE TEST (495P SPECTRUM ANALYZER).

1. Perform Initialized Setup (para 2-56).

2. On AN/USM-620, connect CAL OUT signal to RF INPUT.

3. Press **Blue-SHIFT** and **CAL** keys to begin CAL function.

4. Use **FINE** key and follow on-screen prompts to complete CAL function.



5. Connect equipment as shown.

- Sweep oscillator may consist of RF plug-in and oscillator mainframe.
- Connect low loss RF cable between power divider and sweep oscillator.

6. Select the following AN/USM-620 settings.

REFERENCE LEVEL .... -18DBM
VERTICAL DISPLAY .... 1 DB/
PEAK/AVERAGE .... FULLY COUNTERCLOCKWISE

7. Select the following sweep oscillator settings.

FREQUENCY 900MHZ
RF AMPLITUDE .... -20DBM
MODE.............................. .... CW

8. On AN/USM-620, set **AMPL CAL** for five-division signal level on CRT.

9. Press the **MAX HOLD** key.

10. Select the following sweep oscillator settings.

SWEEP RANGE .... 0.01GHZ TO 1.8GHZ
SWEEP TIME .... MAXIMUM
TRIGGER MODE............................... .... SINGLE SWEEP

11. On sweep oscillator, begin a sweep.

NOTE
Ignore 0 Hz response when measuring highest and lowest points on CRT.

12. Write on paper the level of highest and lowest points on CRT for later comparison.

- Frequency response must be within two divisions.

13. Select the following sweep oscillator settings.

MODE.............................. .... CW
FREQUENCY 10MHZ

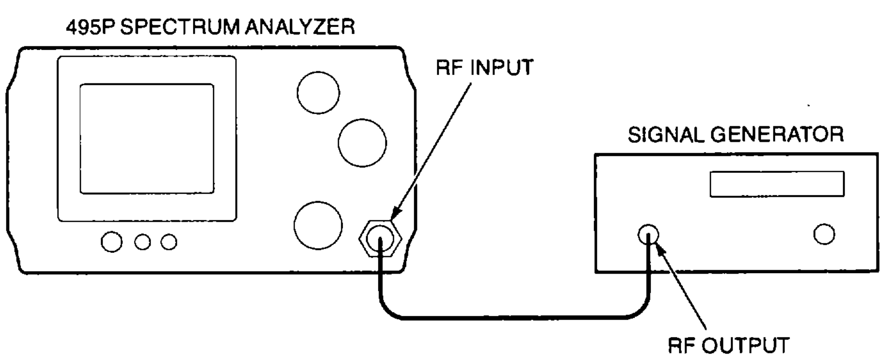
14. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY 10MHZ
SPAN/DIV 2MHZ
MAX HOLD ....OFF

15. Tune sweep oscillator to place signal at center of CRT.

16. On AN/USM-620, press **SAVE A** key.

17. Disconnect sweep oscillator from AN/USM-620.



18. Connect equipment as shown.

19. Select the following signal generator settings.

FREQUENCY 10MHZ
RF AMPLITUDE.................... MATCH SAVE A TRACE ON CRT

20. Tune signal generator from 10 MHz to 1 MHz. Use 100 kHz tuning steps.

- On A/USM-620, keep signal near center of CRT with **CENTER/MARKER FREQUENCY** knob.

21. Write on paper the level of highest and lowest points on CRT for later comparison.

- Frequency response must be within two divisions.

22. Select the following AN/USM-620 settings.

    CENTER/MARKER FREQUENCY 1MHZ
    SPAN/DIV 200KHZ

23. Tune signal generator from 1 MHz to 50 kHz in 10 kHz steps.
24. Write on paper the level of highest and lowest points on CRT for later comparison.
    * Frequency response must be within two divisions.
25. Select the following AN/USM-620 settings.

    CENTER/MARKER FREQUENCY 50KHZ
    SPAN/DIV 10KHZ

26. Tune signal generator from 50 kHz to 2 kHz in 1 kHz steps.
27. Write on paper the level of highest and lowest points on CRT for later comparison.
    * Frequency response must be within two divisions.
28. Select the following AN/USM-620 settings.

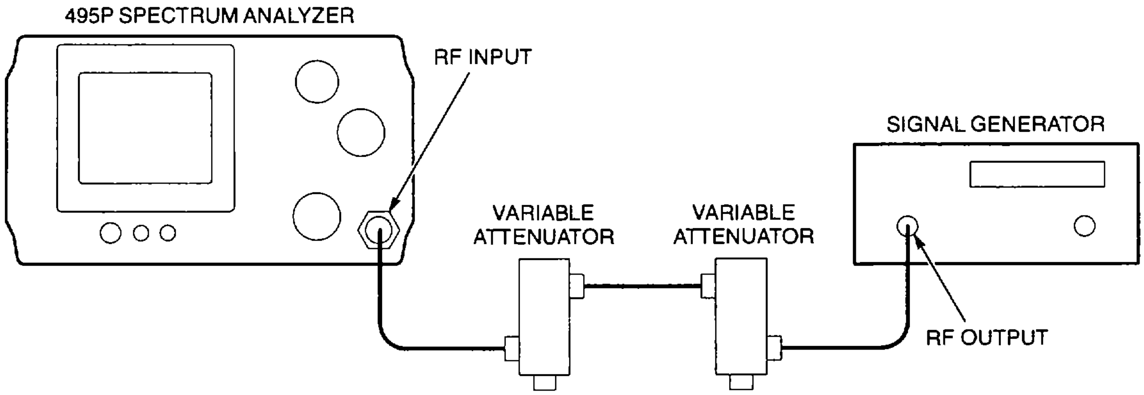
    CENTER/MARKER FREQUENCY 1KHZ
    SPAN/DIV 200HZ

29. Tune signal generator from 2 kHz to 200 Hz. Use 100 Hz tuning steps. Wait for 495P Spectrum Analyzer sweep to complete between each 100 Hz step.
30. Write on paper the level of highest and lowest points on CRT for later comparison.
    * Frequency response must be within two divisions.
31. Select the following AN/USM-620 settings.

    CENTER/MARKER FREQUENCY 150HZ
    SPAN/DIV 10HZ

32. Tune signal generator from 200 Hz to 100 Hz. Use 10 Hz tuning steps. Wait for 495P Spectrum Analyzer sweep to complete between each 10 Hz step.
33. Write on paper the level of highest and lowest points on CRT for later comparison.
    * Frequency response must be within two divisions.
34. Compare highest and lowest levels from Steps 12, 21, 24, 27, 30, and 33.
    * Frequency response must be within two divisions from 100 Hz to 1.8 GHz.
35. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7).
36. Disconnect equipment from AN/USM-620.

2-68. DYNAMIC RANGE AND ACCURACY TEST.



1. Perform Initialized Setup (para 2-56).

2. Connect equipment as shown.

   • Use one variable attenuator with 10 dB steps and one with 1 dB steps.

3. Set variable attenuator to 0 dB.

4. Select the following AN/USM-620 settings.

   CENTER/MARKER FREQUENCY 100MHZ
   SPAN/DIV 2KHZ
   REFERENCE LEVEL 10DBM
   WIDE VIDEO FILTER .... ON
   PEAK/AVERAGE .... FULLY CLOCKWISE

5. Select the following signal generator settings.

   FREQUENCY .... 100 MHZ
   AMPLITUDE .... +10DBM

6. Carefully adjust generator level to place signal peak at top graticule line.

7. Set variable attenuator to first setting in following table.

   • Check that signal level on CRT decreases below top graticule line. See following table for limits.

8. On AN/USM-620, press **SAVE A** key to save trace.

9. Set variable attenuator to next setting in following table.

   • Check that signal level on CRT decreases below top graticule line. See following table for limits.

   • Check that signal level is 1 division ±0.5 minor division below SAVE A trace.

10. On AN/USM-620, press **SAVE A** to turn SAVE A mode off.

11. Repeat Steps 8-10 to test the 10 dB to 80 dB range. See following table for variable attenuator setting and test limits. For each variable attenuator setting:

    • Check that signal level on CRT decreases below top graticule line. See following table for limits.

    • Check that signal level is 1 division ±0.5 minor division below SAVE A trace.

VARIABLE ATTENUATOR SETTING	DIVISIONS BELOW TOP GRATICULE LINE	DIVISIONS BELOW SAVE A TRACE
10 dB	1 division ± 0.5 minor division	N/A
20 dB	2 divisions ± 1.0 minor division	1 division ± 0.5 minor division
30 dB	3 divisions ± 1.0 minor division	1 division ± 0.5 minor division
40 dB	4 divisions ± 1.0 minor division	1 division ± 0.5 minor division
50 dB	5 divisions ± 1.0 minor division	1 division ± 0.5 minor division
60 dB	6 divisions ± 1.0 minor division	1 division ± 0.5 minor division
70 dB	7 divisions ± 1.0 minor division	1 division ± 0.5 minor division
80 dB	8 divisions ± 1.0 minor division	1 division ± 0.5 minor division

NOTE

When testing 2 dB/DIV settings (Steps 12-19), wait for sweep to cross CRT before pressing SAVE A key. This ensures that SAVE A trace contains new data.

12. Set variable attenuator to 0 dB.

13. On AN/USM-620, select the following settings.

    SPAN/DIV 200HZ
    VERTICAL DISPLAY 2DB/

14. Carefully adjust signal generator level to place signal peak at top graticule line.

15. Set variable attenuator to first setting in following table.

- Check that signal level on CRT decreases below top graticule line. See following table for limits.

16. After sweep crosses CRT, on AN/USM-620 press **SAVE A** key to save trace.

17. Set variable attenuator to next setting in following table. See table for test limits.

- Check that signal level on CRT decreases below top graticule line.
- Check that signal level is 1 division ± 1.0 minor division below SAVE A trace.

18. On AN/USM-620, press **SAVE A** to turn SAVE A mode off.

19. Repeat Steps 16-18 to test the 2 dB to 16 dB range. See following table for variable attenuator setting and test limits. For each variable attenuator setting: * Check that signal level on CRT decreases below top graticule line.

- Check that signal level is 1 division ± 1.0 minor division below SAVE A trace.

VARIABLE ATTENUATOR SETTING	DIVISIONS BELOW TOP GRATICULE LINE	DIVISIONS BELOW SAVE A TRACE
2 dB	1 division ± 1.0 minor division	N/A
4 dB	2 division ± 2.0 minor divisions	1 division ± 1.0 minor division
6 dB	3 division ± 2.5 minor divisions	1 division ± 1.0 minor division
8 dB	4 division ± 2.5 minor divisions	1 division ± 1.0 minor division
10 dB	5 division ± 2.5 minor divisions	1 division ± 1.0 minor division
12 dB	6 division ± 2.5 minor divisions	1 division ± 1.0 minor division
14 dB	7 division ± 2.5 minor divisions	1 division ± 1.0 minor division
16 dB	8 division ± 2.5 minor divisions	1 division ± 1.0 minor division

20. Set variable attenuator to 0 dB.

21. On AN/USM-620, press **LIN** key.

22. Carefully adjust signal generator level to place signal peak at top graticule line.

23. Set variable attenuator to 6 dB.

- Check that signal level on CRT is four divisions ±2.0 minor divisions below top graticule line.

24. Set variable attenuator to 12 dB.

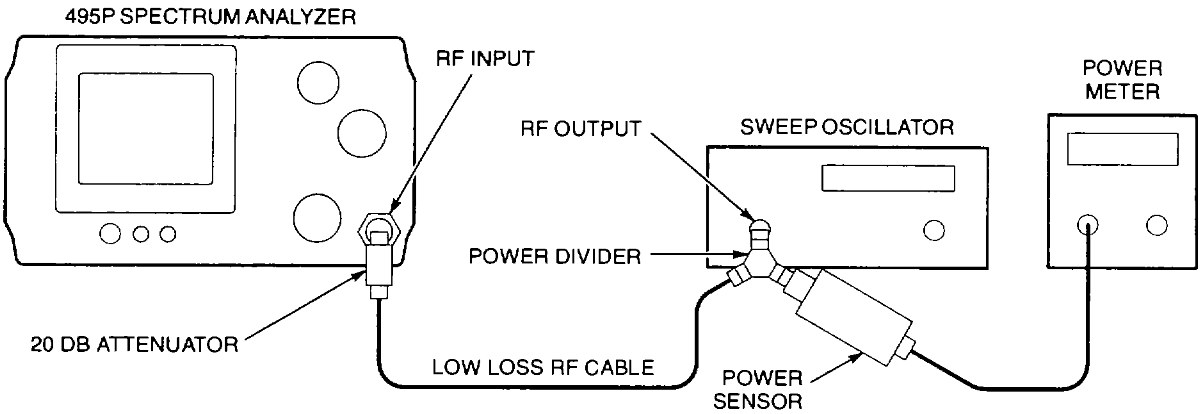
- Check that signal level on CRT is six divisions ± 2.0 minor divisions below top graticule line.

25. Set variable attenuator to 18 dB.

- Check that signal level on CRT is seven divisions ± 2.0 minor divisions below top graticule line.

26. Disconnect equipment from AN/USM-620.

2-69. RF ATTENUATOR ACCURACY TEST.



NOTE

RF Attenuator Accuracy Test can be performed at any frequency between 100 Hz and 1.8 GHz.

1. Perform Initialized Setup (para 2-56).

2. Connect equipment as shown.

- Sweep oscillator may consist of RF plug-in and oscillator mainframe.

- 20 dB attenuator is part of variable attenuator kit.

- Connect low loss RF cable between power divider and 20 dB attenuator.

3. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY	TEST FREQUENCY
SPAN/DIV	200KHZ
RESOLUTION BANDWIDTH	100KHZ
REFERENCE LEVEL	-30DBM
VERTICAL DISPLAY	2DB/
NARROW VIDEO FILTER	ON
PEAK/AVERAGE	FULLY CLOCKWISE

4. Disconnect power sensor from power divider.

5. Zero the power meter.

6. Calibrate power meter for best accuracy.

7. Disconnect power sensor from POWER REF output and connect it to power divider.

8. Select the following power meter settings.

CAL FACTOR	TEST FREQUENCY
MODE	DBM

9. Select the following sweep oscillator settings.

   FREQUENCY MODE .... CW
   FREQUENCY .... TEST FREQUENCY
   OUTPUT LEVEL .... -5DBM

10. Carefully set sweep oscillator output for-15.0 dBm power meter reading.

11. On AN/USM-620, move signal to center of CRT with **CENTER/MARKER FREQUENCY** knob.

12. Adjust **AMPL CAL** to align signal peak on a graticule line.

13. Set power meter to dB REL mode. This establishes a 0 dB reference.

NOTE

After initial setup, this test first measures 10 dB MIN RF ATTEN setting (see following table). 20-60 dB settings are then tested sequentially.

14. On AN/USM-620, press **SAVE A** key.

15. Select REFERENCE LEVEL and MIN RF ATTEN settings shown in following table for RF ATTEN SETTING UNDER TEST.

16. Carefully set sweep oscillator output for +10.0 dBm power meter reading. This is a 10 dB increase.

17. Verify that signal peak is within 0.25 major division of SAVE A trace. Write on paper the error measured from this step for future reference.

18. On AN/USM-620, press **SAVE A** key to turn SAVE A mode off.

RF ATTEN SETTING UNDER TEST	REFERENCE LEVEL	MIN RF ATTEN SETTING	EXTERNAL ATTENUATOR
10 dB	-20 dBm	10 dB	20 dB
20 dB	-10 dBm	20 dB	10 dB
30 dB	0 dBm	30 dB	0 dB
40 dB	-15 dBm	40 dB	20 dB
50 dB	-5 dBm	50 dB	10 dB
60 dB	+5 dBm	60 dB	0 dB

19. Replace 20 dB attenuator with 10 dB attenuator.

20. Carefully set sweep oscillator output for O dB power meter reading.

21. Repeat Steps 14 through 18 to check 20 dB RF ATTEN setting. See table for set up information.

22. Remove 10 dB attenuator and connect low loss RF cable directly to RF INPUT.

23. Carefully set sweep oscillator output for 0 dB power meter reading.

24. Repeat Steps 14 through 18 to check 30 dB RF ATTEN setting. See table for set up information.

25. Install 20 dB attenuator between low loss RF cable and RF INPUT.

26. Carefully set sweep oscillator output for 0 dB power meter reading.

27. On AN/USM-620, set REFERENCE LEVEL to -25 dBm.

28. Repeat Steps 14 through 18 to check 40 dB RF ATTEN setting. See table for set up information.

29. Replace 20 dB attenuator with 10 dB attenuator.

30. Carefully set sweep oscillator output for 0 dB power meter reading.

31. Repeat Steps 14 through 18 to check 50 dB RF ATTEN setting. See table for set up information.

32. Remove 10 dB attenuator and connect low loss RF cable directly to RF INPUT.

33. Carefully set sweep oscillator output for 0 dB power meter reading.

34. Repeat Steps 14 through 18 to check 60 dB RF ATTEN setting. See table for set up information.

35. Check error from Step 17 for each MIN RF ATTEN setting. Total error over 60 dB range must be **£** 0.5 major division.

36. On AN/USM-620, set MIN RF ATTEN to 0 (NORM).

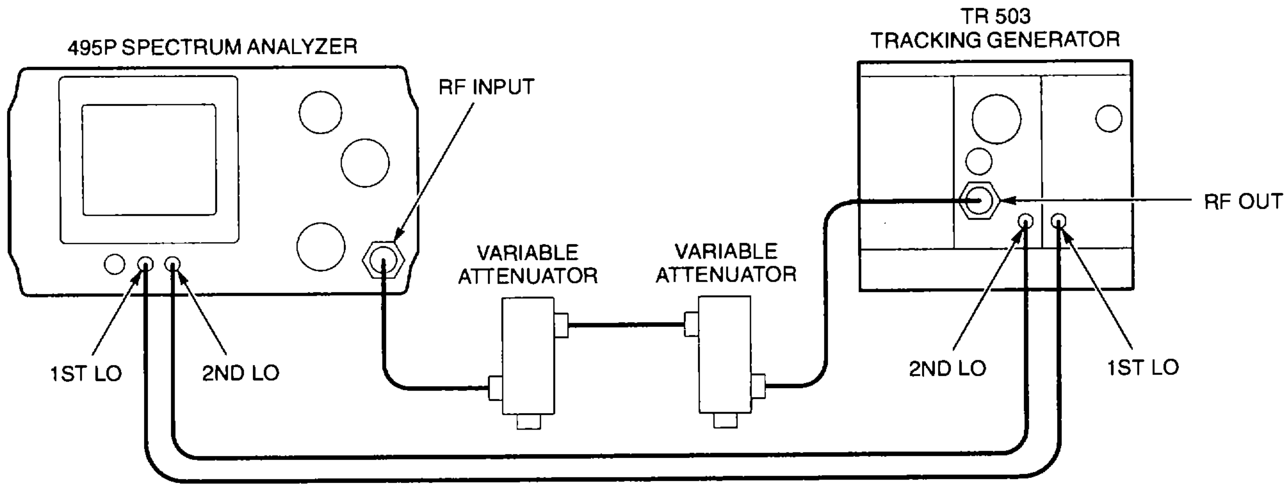
37. Connect CAL OUT signal to RF INPUT.

38. Press **Blue-SHIFT** and **CAL** keys to begin CAL function.

39. Use **FINE** key and follow on-screen prompts to complete CAL function.

40. Disconnect equipment from AN/USM-620.

2-70. IF GAIN ACCURACY TEST.



1. Perform Initialized Setup (para 2-56).

2. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7).

3. Connect equipment as shown.

4. Set variable attenuator to 0 dB.

5. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY	100MHZ
ZERO SPAN	ON
RESOLUTION BANDWIDTH	10HZ
REFERENCE LEVEL	-20DBM
VERTICAL DISPLAY	1 DB/
VIDEO FILTER NARROW	ON
PEAK/AVERAGE	FULLY CLOCKWISE
OUTPUT LEVEL	-20DBM

6. Adjust **VAR dB** knob to align signal two divisions below top graticule line.

NOTE

- Sweep must complete after each new variable attenuator setting, and when SAVE A mode is turned off and then on.

- REFERENCE LEVEL should be set to more negative value when AN/USM-620 REFERENCE LEVEL is increased by 1 dB. For example, if setting is -34 dBm, select -35 dBm.

- Variable attenuator should be set to more positive value when increased by 1 dB. For example, if setting is 7 dB, select 8 dB.

- Step 7-21 test one 10 dB group of REFERENCE LEVEL settings. For example, settings between -21 dBm and -30 dBm are tested first. The steps are then repeated to test settings between -31 dBm and -40 dBm. This pattern repeats until all settings are tested.

7. Press **SAVE A** key to turn SAVE A mode on.

8. Increase REFERENCE LEVEL by 1 dB.

9. Increase variable attenuator setting by 1 dB.
   - Verify that signal is within one minor division of SAVE A trace.
10. On AN/USM-620, press **SAVE A** key twice to turn SAVE A mode off and on again.
11. Increase REFERENCE LEVEL by 1 dB.
12. Increase variable attenuator setting by 1 dB.
   - Verify that signal is within one minor division of SAVE A trace.
   - Verify that signal is within two minor divisions of sixth graticule line.
13. On AN/USM-620, press **SAVE A** key twice to turn SAVE A mode off and on again.
14. Increase REFERENCE LEVEL by 1 dB.
15. Increase variable attenuator setting by 1 dB.
   - Verify that signal is within one minor division of SAVE A trace.
   - Verify that signal is within 2.5 minor divisions of sixth graticule line.
16. Repeats Steps 13-15 until REFERENCE LEVEL readout ends with the number 9. For example, -29 dBm.
17. On AN/USM-620, press **SAVE A** key twice to turn SAVE A mode off and on again.
18. Increase REFERENCE LEVEL by 1 dB.
19. Increase variable attenuator setting by 1 dB.
   - Verify that signal is within 2.5 minor divisions of SAVE A trace.
   - Verify that signal is within 5 minor divisions of sixth graticule line.
20. On AN/USM-620, press **SAVE A** key to turn SAVE A mode off.
21. Adjust **VAR dB** knob to align signal two divisions below top graticule line.
22. Repeat Steps 7-21 until REFERENCE LEVEL settings through -117 dBm are tested.
23. On AN/USM-620, set REFERENCE LEVEL to -20 dBm.
24. Set variable attenuator to 0 dB.
25. On AN/USM-620, adjust **VAR dB** knob to align signal two divisions below top graticule line.
26. Set REFERENCE LEVEL to -40 dBm.
27. Increase variable attenuator setting by 20 dB.
   - Verify that signal is within two divisions of sixth graticule line.
28. On AN/USM-620,increase REFERENCE LEVEL by 1 dB.
29. Increase variable attenuator setting by 1 dB.
   - Verify that signal is within two divisions of sixth graticule line.
30. Repeat Steps 28 and 29 until REFERENCE LEVEL settings through -117 dBm are tested.
31. Disconnect equipment from AN/USM-620.

2-71. GAIN VARIATION BETWEEN RESOLUTION BANDWIDTHS TEST.

1. Perform Initialized Setup (para 2-56).
2. On AN/USM-620, connect CAL OUT signal to the RF INPUT.
3. Press **Blue-SHIFT** and **CAL** keys to begin CAL function.
4. Use **FINE** key and follow on-screen prompts to complete CAL function.
5. Select the following settings.

   CENTER/MARKER FREQUENCY 100MHZ
   SPAN/DIV 1MHZ
   RESOLUTION BANDWIDTH 3MHZ
   REFERENCE LEVEL .... -18DBM
   VERTICAL DISPLAY .... 1 DB/
   WIDE VIDEO FILTER .... ON
   PEAK/AVERAGE .... FULLY CLOCKWISE

6. Adjust **AMPL CAL** to place signal peak two divisions below top graticule line.
7. Press **SAVE A** key. This stores 3 MHz filter reference.
8. Select SPAN/DIV and RESOLUTION BANDWIDTH settings shown in table for filter to be tested.

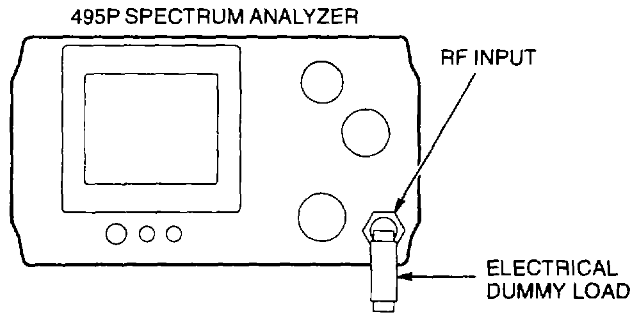
RESOLUTION BANDWIDTH SETTING	SPAN/DIV SETTING	AMPLITUDE DIFFERENCE BETWEEN SAVE A AND ACTIVE TRACE
1 MHz	200 kHz	**£** 2 minor divisions
100 kHz	20 kHz	**£** 2 minor divisions
10 kHz	2 kHz	**£** 2 minor divisions
1 kHz	200 Hz	**£** 2 minor divisions
100 Hz	20 Hz	**£** 2 minor divisions
10 Hz	10 Hz	**£** 2 minor divisions

9. Check amplitude difference between SAVE A trace and active trace.

   • Difference must be **£** 2 minor divisions.

10. Repeat Steps 8 and 9 until all settings have been tested.
11. Repeat Steps 2-4.
12. Disconnect equipment from AN/USM-620.

2-72. SENSITIVITY TEST.



NOTE

Sensitivity is tested within frequency ranges for RESOLUTION BANDWIDTH settings shown in table.

FREQUENCY RANGE	RESOLUTION BANDWIDTH SETTINGS	PROCEDURE STEPS
1 MHz to 1.8 GHz	All	Steps 6-11
100 kHz to 1 MHz	10 Hz, 100 Hz, 1 kHz, and 10 kHz	Steps 12-16
10 kHz to 100 kHz	10 Hz, 100 Hz, and 1 kHz	Steps 17-21
1 kHz to 10 kHz	10 Hz and 100 Hz	Steps 22-26

1. Perform Initialized Setup (para 2-56).
2. Connect electrical dummy load as shown.
3. Select the following AN/USM-620 settings.

REFERENCE LEVEL .... -85DBM
VERTICAL DISPLAY 2DB/
NARROW VIDEO FILTER ....ON
TIME/DIV.............................. ....1S
PEAK/AVERAGE.......................... FULLY CLOCKWISE

4. Press **TUNE** key.
5. Place marker on highest noise location with **CENTER/MARKER FREQUENCY** knob. This is usually near right edge of CRT.
6. Press **ZERO SPAN** key.
7. Press **AUTO RESOLN** key to turn off AUTO RESOLUTION mode.
8. Select RESOLUTION BANDWIDTH and VERTICAL DISPLAY settings from following table.
9. Move trace to center of CRT with **REFERENCE LEVEL** knob.

10. Measure average noise amplitude at marker.
    • Verify that noise amplitude is within limits shown in following table.
11. Repeat Steps8 -10 until 3 MHz through 10 Hz settings have been tested.

RESOLUTION BANDWIDTH SETTING	VERTICAL DISPLAY SETTING	NOISE AMPLITUDE AT MARKER
3 MHz	2 dB per division	£-80 dBm
1 MHz	2 dB per division	£-85 dBm
100 kHz	2 dB per division	£-95 dBm
10 kHz	2 dB per division	£-105 dBm
1 kHz	2 dB per division	£-115 dBm
100 Hz	5 dB per division	£-125 dBm
10 Hz	5 dB per division	£-131 dBm

12. Set CENTER/MARKER FREQUENCY to 100 kHz.
13. Select RESOLUTION BANDWIDTH and VERTICAL DISPLAY settings from following table.
14. Move trace to center of CRT with **REFERENCE LEVEL**knob.
15. Measure average noise amplitude at marker.
    • Verify that noise amplitude is within limits shown in following table.
16. Repeat Steps 13-15 until 10 kHz through 10 Hz settings have been tested.

RESOLUTION BANDWIDTH SETTING	VERTICAL DISPLAY SETTING	NOISE AMPLITUDE AT MARKER
10 kHz	2 dB per division	£-85 dBm
1 kHz	2 dB per division	£-95 dBm
100 Hz	5 dB per division	£-105 dBm
10 Hz	5 dB per division	£-115 dBm

17. Set CENTER/MARKER FREQUENCY to 10 kHz.
18. Select RESOLUTION BANDWIDTH and VERTICAL DISPLAY settings from following table.
19. Move trace to center of CRT with **REFERENCE LEVEL** knob.
20. Measure average noise amplitude at marker.

    • Verify that noise amplitude is within limits shown in following table.

21. Repeat Steps 18-20 until 1 kHz through 10 Hz settings have been tested.

RESOLUTION BANDWIDTH SETTING	VERTICAL DISPLAY SETTING	NOISE AMPLITUDE AT MARKER
1 kHz	2 dB per division	**£**-80 dBm
100 Hz	5 dB per division	**£**-90 dBm
10 Hz	5 dB per division	**£**-100 dBm

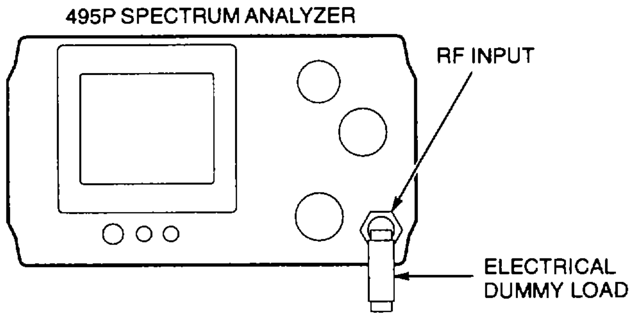
22. Set CENTER/MARKER FREQUENCY to 1 kHz.
23. Select RESOLUTION BANDWIDTH and VERTICAL DISPLAY settings from following table.
24. Move trace to center of CRT with **REFERENCE LEVEL** knob.
25. Measure average noise amplitude at marker.
    - Verify that noise amplitude is within limits shown in following table.

26. Repeat Steps 23-25 until 100 Hz and 10 Hz settings have been tested.

RESOLUTION BANDWIDTH SETTING	VERTICAL DISPLAY SETTING	NOISE AMPLITUDE AT MARKER
100 Hz	5 dB per division	**£**-85 dBm
10 Hz	5 dB per division	**£**-95 dBm

27. Remove electrical dummy load from RF INPUT.

2-73. RESIDUAL SPURIOUS RESPONSE TEST.



1. Perform Initialized Setup (para 2-56).
2. Connect electrical dummy load as shown.
3. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY	50MHZ
SPAN/DIV	10MHZ
RESOLUTION BANDWIDTH	10KHZ
REFERENCE LEVEL	-50DBM
VIDEO FILTER WIDE	ON
PEAK/AVERAGE	FULLY COUNTERCLOCKWISE

4. Wait for sweep to cross CRT.
5. Check for spurious signals on CRT.

   - Disregard zero hertz response.
   - Spurious signal amplitudes must be - 5 divisions below top graticule line.

6. Press **Blue-SHIFT** and **STEP ENTRY** keys.
7. Use **DATA ENTRY** to enter step value of 100 MHz.

NOTE

CENTER FREQUENCY will increase 100 MHz when +STEP key is pressed.

8. Press **+STEP** key.
9. Wait for sweep to cross CRT.
10. Check for spurious signals on CRT.

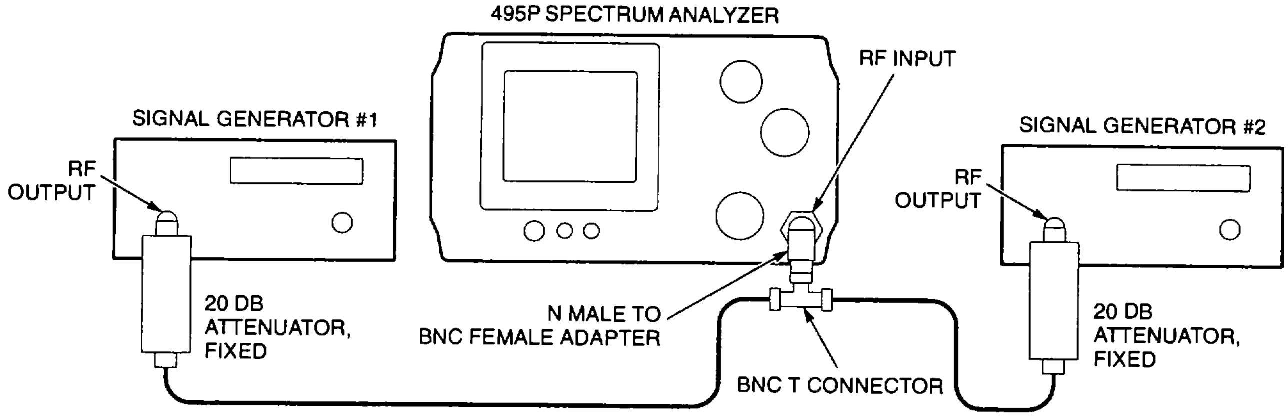
    - Spurious signal amplitudes must be ³ 5 divisions below top graticule line.

11. Repeat Steps 8-10 until CENTER FREQUENCY is 1750 MHz.

    - Spurious signal amplitudes must be ³ 5 divisions below top graticule line.

12. Remove electrical dummy load from RF INPUT.

2-74. INTERMODULATION DISTORTION TEST.



1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.
3. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY 200MHZ
SPAN/DIV 500KHZ
REFERENCE LEVEL ....-30DBM
PEAK/AVERAGE...................... FULLY COUNTERCLOCKWISE

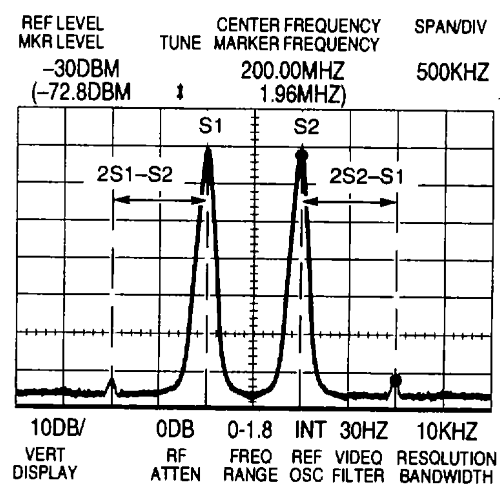
4. Select the following settings for signal generator #1.

FREQUENCY 199.5MHZ
AMPLITUDE ....-10DBM

5. Select the following settings for signal generator #2.

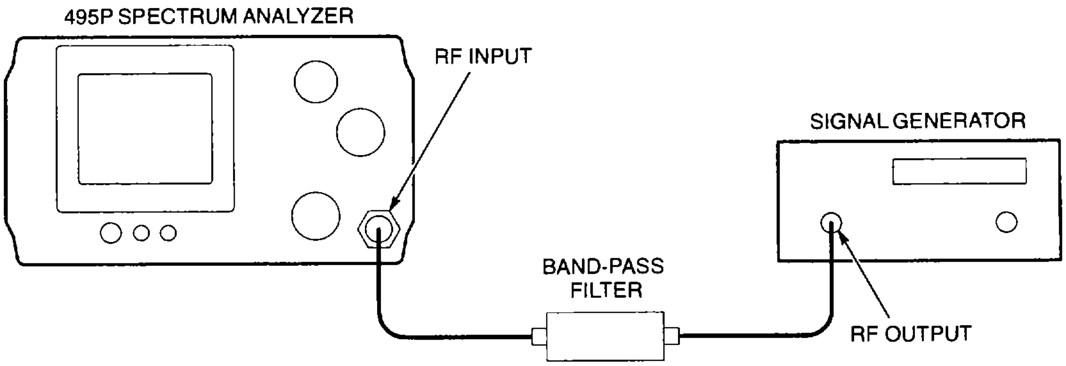
FREQUENCY 200.5MHZ
AMPLITUDE ....-10DBM

6. Adjust output level of each generator to place signal peak at top graticule line of CRT.
7. On AN/USM-620, press **AUTO RESOLN** key to turn AUTO RESOLN mode off.
8. Set RESOLUTION BANDWIDTH to 10 kHz.
9. Press **VIDEO FILTER NARROW** key to turn on NARROW VIDEO FILTER.
10. Check CRT for third-order IM products (2S1 - S2 and 2S2 - S1). See example waveform.
    - Distortion products must be ³ 7 divisions below top graticule line.



11. Disconnect equipment from AN/USM-620.

2-75. HARMONIC DISTORTION TEST.



1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.
3. Select the following AN/USM-620 settings.

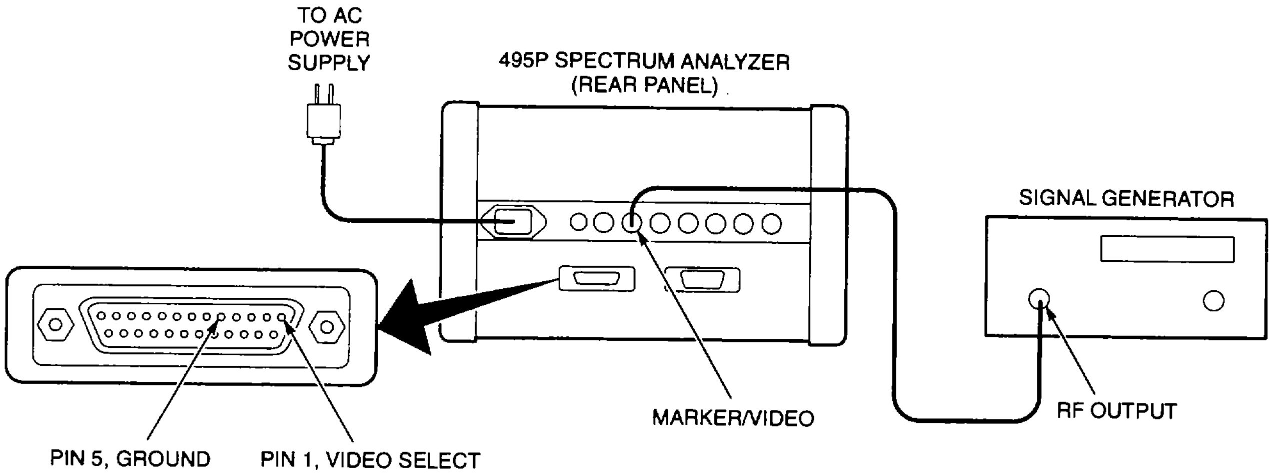
CENTER/MARKER FREQUENCY 11OMHZ
SPAN/DIV 500KHZ
REFERENCE LEVEL ....-30DBM
WIDE VIDEO FILTER .... ON
MIN NOISE/MIN DISTORTION .... MIN DISTORTION
PEAK/AVERAGE...................... FULLY COUNTERCLOCKWISE

4. Select the following signal generator settings.

FREQUENCY 110MHZ
AMPLITUDE ....-30DBM

5. Slowly adjust signal generator frequency for maximum amplitude on CRT.
6. Adjust output level of generator to place signal peak at top graticule line of CRT.
7. On AN/USM-620, press **Green-SHIFT** and **PEAK FIND** keys. This places marker on signal peak.
8. Press **Blue-SHIFT** and **MKR→CENTER** keys.
9. Press **Green-SHIFT** and **STEP SIZE** keys. This sets **+STEP** key value to marker frequency.
10. Press **+STEP** key.
    - Check for second harmonic signal (frequency is two times filter frequency).
    - Check that second harmonic is ≥ 6 divisions below top graticule line.
11. Press +STEP key.
    - Check for third harmonic signal (frequency is three times filter frequency).
    - Check that third harmonic is ≥ 6 divisions below top graticule line.
12. Disconnect equipment from AN/USM-620.

2-76. INTERNAL TRIGGER OPERATION TEST.



1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.

   • Signal generator connects to MARKER I VIDEO input.

   • On J104 ACCESSORY connector, connect pin 1 to pin 5.

3. Select the following AN/USM-620 settings.

   CENTER/MARKER FREQUENCY 100MHZ
   SPAN/DIV 10KHZ
   RESOLUTION BANDWIDTH 1MHZ
   REFERENCE LEVEL ....-30DBM
   VERTICAL DISPLAY .... LIN
   VIEW A AND B .... OFF
   TIME/DIV 0.2MS

4. Select the following signal generator settings.

   FREQUENCY.............................. .... 1KHZ
   AMPLITUDE .... MID RANGE
   SIGNAL TYPE ....SINEWAVE

5. On AN/USM-620, press **ZERO SPAN** key.

NOTE

Signal on CRT of AN/USM-620 will resemble positive peaks of sinewave.

6. Adjust signal generator output level for two-division signal amplitude on CRT of AN/USM-620.
7. On AN/USM-620, press **INT** key.

   • Check that sinewave on CRT of AN/USM-620 is stable.

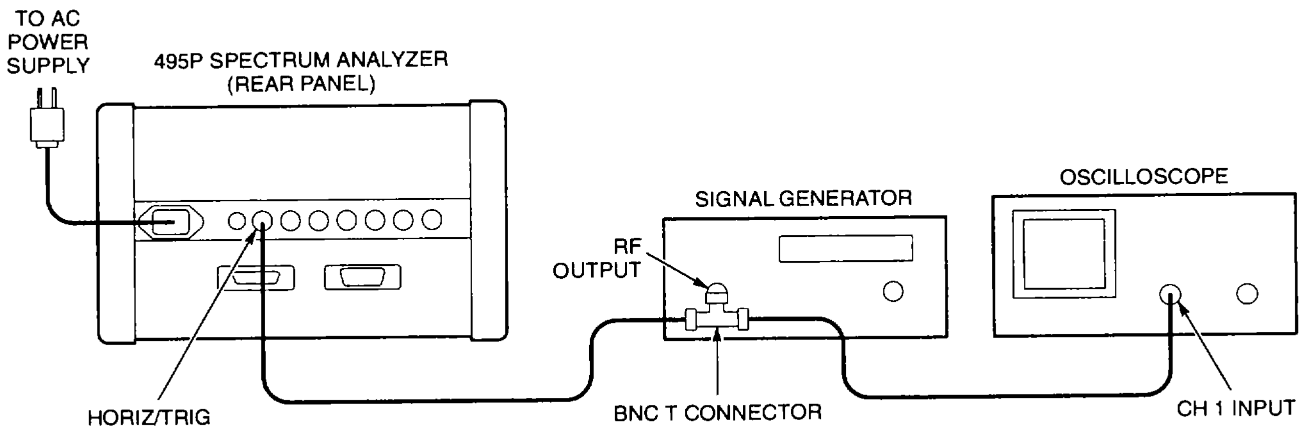
NOTE

Amplitude of trigger signal on CRT of AN/USM-620 will decrease at high signal generator frequencies.

8. Slowly adjust signal generator frequency from 15 Hz to 500 kHz. Change TIME/DIV of AN/USM-620 as needed to view display.
   - Check that trace on CRT of AN/USM-620 is stable.

9. Disconnect equipment from AN/USM-620.

2-77. EXTERNAL TRIGGER OPERATION TEST.



1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.
3. On AN/USM-620, verify that TIME/DIV is set to AUTO.
4. Select the following signal generator settings.

FREQUENCY	KHZ
LEVEL	$2V_{p-p}$
SIGNAL TYPE	SINEWAVE

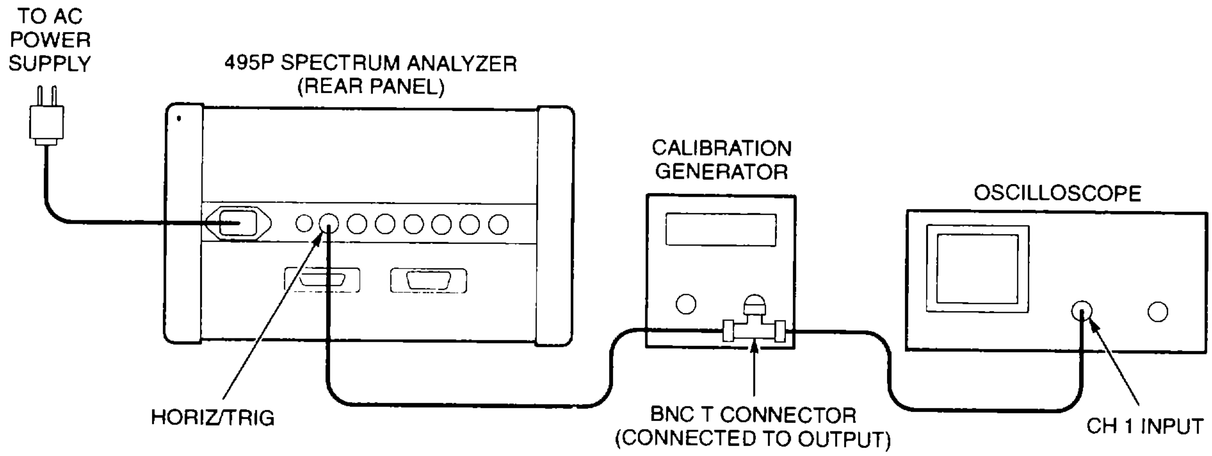
5. Select the following oscilloscope settings.

VOLTS/DIV	0.5V
TIME/DIV	1MS

6. Adjust signal generator output for exactly 2 V_{p-p} on oscilloscope CRT.

7. On AN/USM-620, press **EXT** key.
   - Check that trace on CRT of AN/USM-620 is sweeping (triggered).
8. Slowly adjust signal generator frequency from 15 Hz to 500 kHz.
   - Check that trace on CRT of AN/USM-620 is sweeping (triggered).
9. Disconnect equipment from AN/USM-620.

2-78. EXTERNAL SWEEP OPERATION TEST.



1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.
3. Select the following AN/USM-620 settings.

   VERTICAL DISPLAY 2DB/
   VIEW A AND VIEW B .... OFF
   TIME/DIV .... EXT

4. Select the following oscilloscope settings.

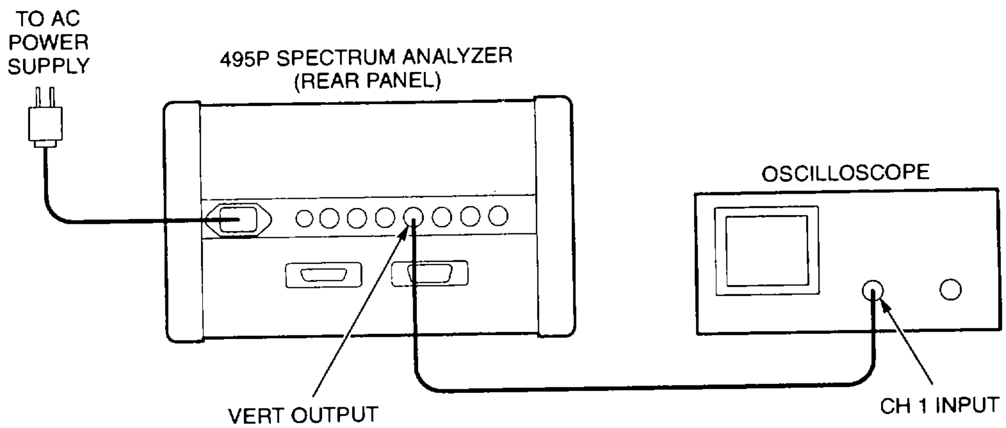
   VOLTS/DIV 5V
   TIME/DIV 500µS

5. Set calibration generator controls for no output (O V).
6. On AN/USM-620, use **HORIZONTAL POSITION** to place CRT beam on left edge of CRT.
7. Set calibration generator frequency to 1 kHz.
8. Adjust calibration generator output level until trace touches right graticule line on CRT of AN/USM-620.
9. Check calibration generator output level on oscilloscope CRT.

   • Amplitude must be 0 to +10 V (DC + Peak) ± 1 V for a full-screen deflection.

10. On AN/USM-620, set SPAN/DIV to 100 MHz.
11. Adjust HORIZONTAL POSITION to align display to center of CRT.
12. Disconnect equipment from AN/USM-620.

2-79. VERT OUTPUT SIGNAL TEST.



1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.
3. On oscilloscope, set COUPLING to GROUND.
4. Establish ground reference point on CRT of oscilloscope.
5. Select the following oscilloscope controls.

VERTICAL SCALE	1 V/DIV
TIME/DIV	10 MS
COUPLING	DC
TRIGGER SLOPE	+
TRIGGERING	AUTO

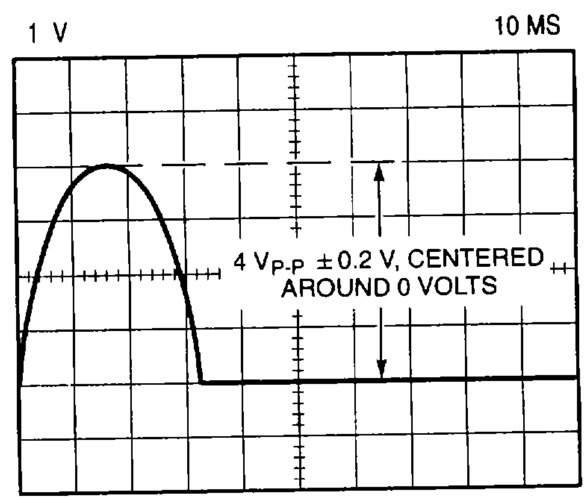
6. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY	100MHZ
SPAN/DIV	50KHZ
RESOLUTION BANDWIDTH	100KHZ
REFERENCE LEVEL	-20DBM
VERTICAL DISPLAY	2DB/
VIEW A AND VIEW B	OFF

7. Connect CAL OUT signal to RF INPUT.
8. Adjust **AMPL CAL** to align signal peak with top graticule line on CRT of AN/USM-620.
9. Check VERT OUTPUT signal on CRT of oscilloscope.

   • Limits are 4 V_{p-p} ± 0.2 V, centered around 0 Volts. See example waveform.

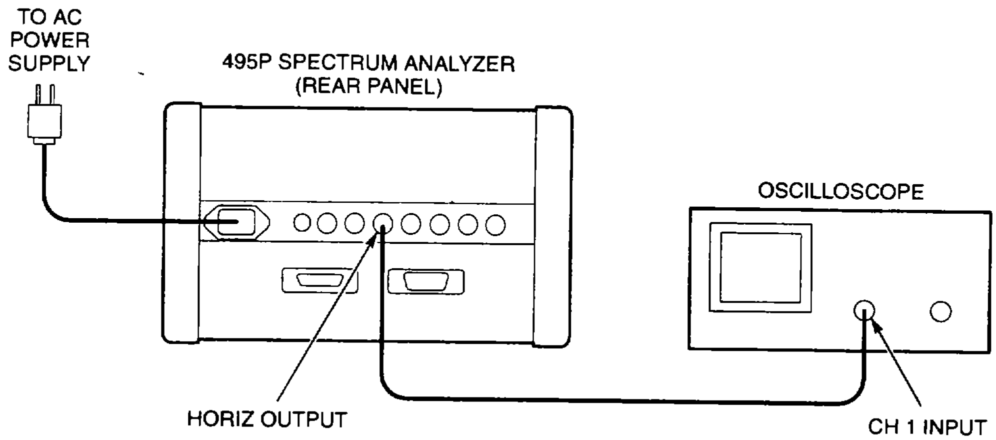
10. Disconnect equipment from AN/USM-620.



2-80. HORIZ OUTPUT SIGNAL TEST.

NOTE

HORIZ OUTPUT signal limits are approximate values only.



1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.
3. On oscilloscope, set COUPLING to GROUND.
4. Establish ground reference point on CRT of oscilloscope.
5. Select the following oscilloscope settings.

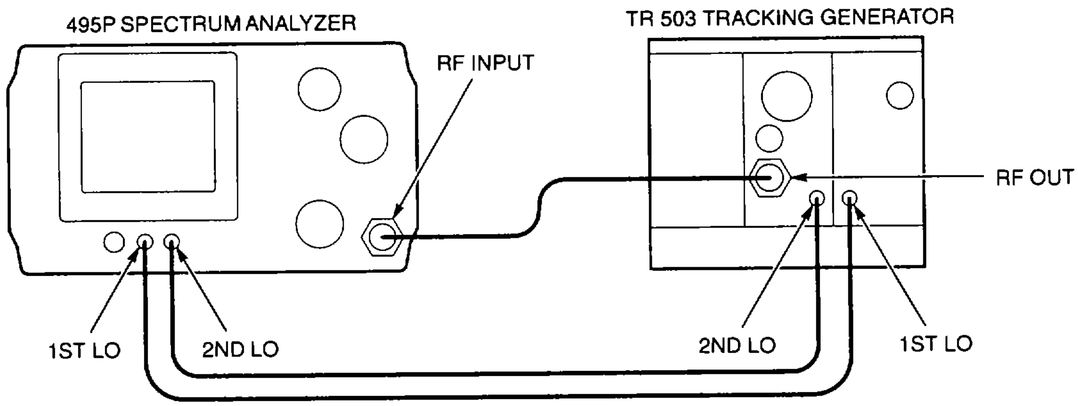
   VOLTS/DIV .... 1 V
   TIME/DIV 1MS
   COUPLING.............................. .... DC

6. Select the following AN/USM-620 settings.

   TIME/DIV .... MNL
   VIEW A AND VIEW B .... OFF

7. On AN/USM-620, use **MANUAL SCAN** knob to align beam with left graticule line on CRT.
8. Check voltage on oscilloscope CRT.
   - Voltage should be approximately -2.5 V.
9. On AN/USM-620, use **MANUAL SCAN** knob to align beam with right graticule line on CRT.
10. Check voltage on oscilloscope CRT.
    - Voltage should be approximately +2.5 V.
11. Disconnect equipment from AN/USM-620.

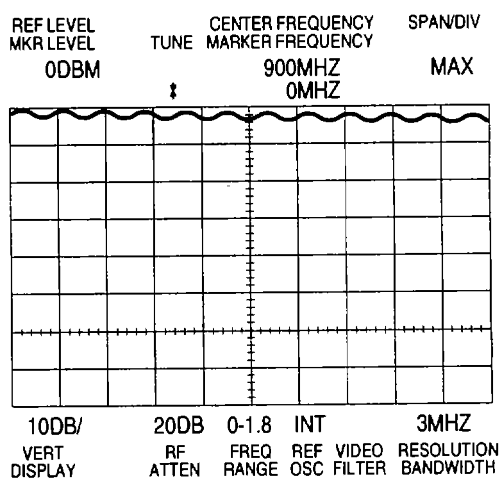
2-81. CHECK FREQUENCY RANGE TEST.



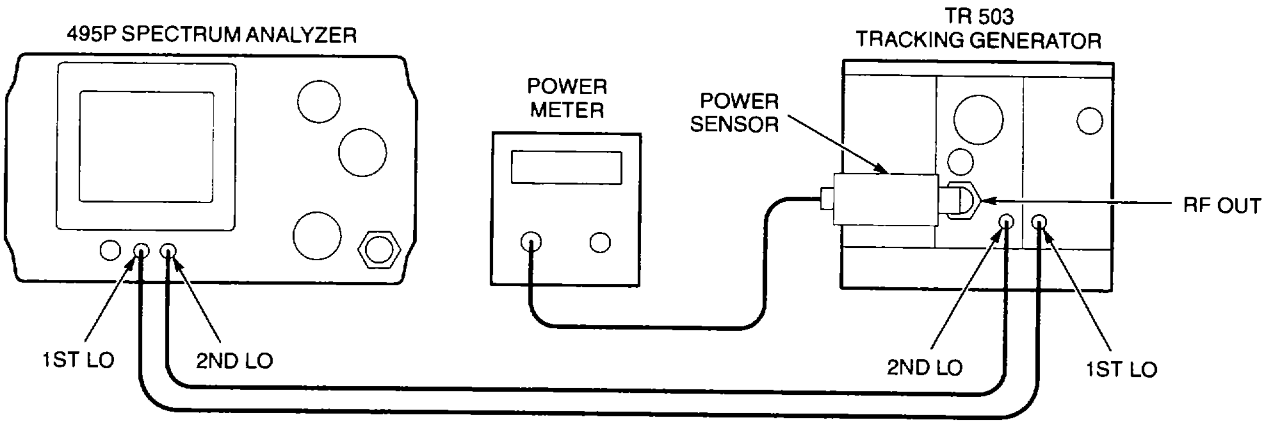
1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.
3. On AN/USM-620, set OUTPUT LEVEL to 0 dB.
4. Check CRT for tracking generator output range.

   - Trace must begin at left edge of CRT (100 kHz) and extend to right edge of CRT (1.8 GHz). See example waveform.

5. Disconnect equipment from AN/USM-620.



2-82. CHECK OUTPUT LEVEL TEST.



1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.
3. Select the following AN/USM-620 settings.

CENTER/MARKER FREQUENCY	100MHZ
ZERO SPAN	ON
OUTPUT LEVEL	O DB
VAR DB	0

NOTE

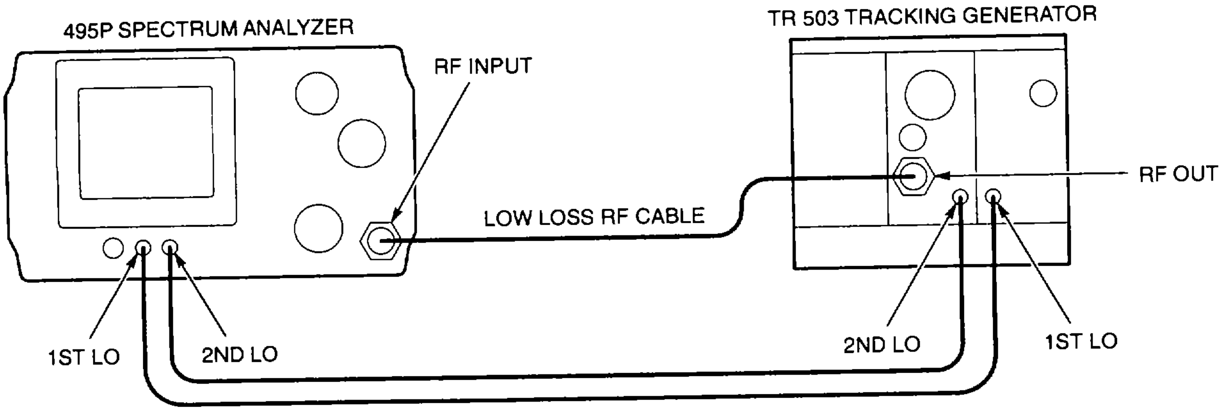
Disregard 0 Hz response.

4. Check power meter for RF OUTPUT level.

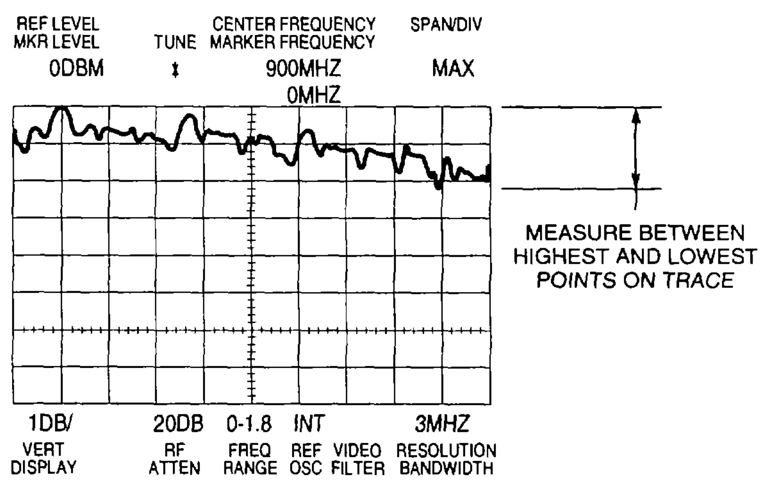
   • RF OUTPUT must be 0 dBm +0.5 dB.

5. Disconnect equipment from AN/USM-620.

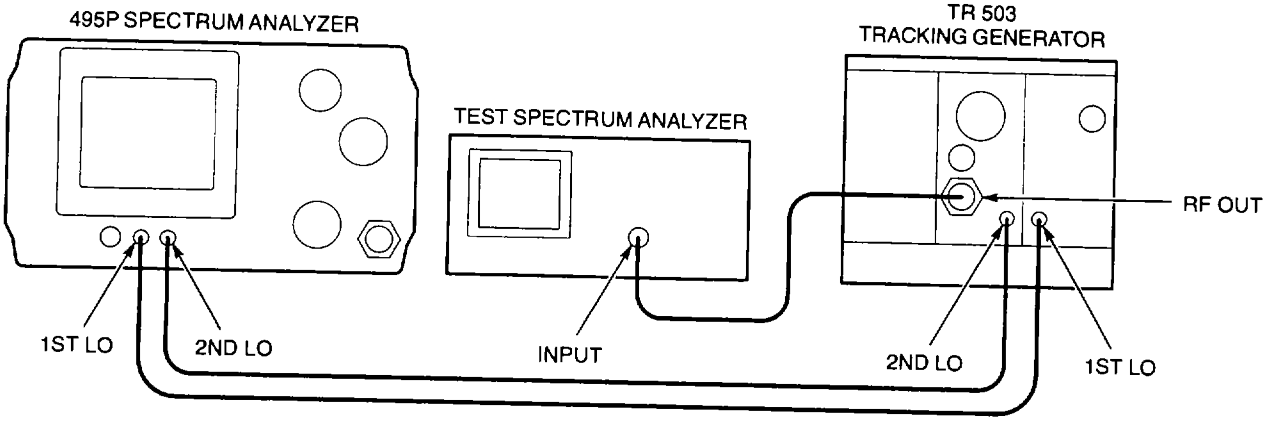
2-83. CHECK SYSTEM FLATNESS TEST.



1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.
   - Connect Low Loss RF Cable between RF OUTPUT and RF INPUT connectors.
3. On AN/USM-620, set VERTICAL DISPLAY to 1 dB.
4. Verify that OUTPUT LEVEL is set to 0 dB.
5. Use **REFERENCE LEVEL** knob to move trace within graticule area.
6. Check CRT for flat trace. See example waveform.
   - Disregard 0 Hz response.
   - System flatness must be within 4.5 major divisions.
7. Disconnect equipment from AN/USM-620.



2-84. CHECK FOR SPURIOUS SIGNALS TEST.



1. Perform Initialized Setup (para 2-56).
2. Connect equipment as shown.
3. On AN/USM-620, select the following settings.

VIEW A AND B .... OFF
TIME/DIV .... MANUAL SCAN

NOTE

Test spectrum analyzer will measure 0 dBm signals within 100 kHz to 1.8 GHz frequency range.

4. Select the following test spectrum analyzer settings.

CENTER FREQUENCY................................ .... 900MHZ
SPAN/DIV 180MHZ
REFERENCE LEVEL 0DBM
VERTICAL DISPLAY 10DB/

NOTE

- **Spurious signals may appear when displayed dot is not between left and right graticule lines. These signals should be ignored.**
- **When dot is at center of CRT on 495P Spectrum Analyzer, the test spectrum analyzer will display the O dBm output from TR 503 Tracking Generator. This is not a spurious signal.**
- **Harmonic spurious signals tune from left to right on CRT of 495P Spectrum Analyzer as MANUAL SCAN is rotated clockwise.**
- **Non-harmonic spurious signals tune from right to left on CRT of 495P Spectrum Analyzer as MANUAL SCAN is rotated clockwise.**

5. On AN/USM-620, use **MANUAL SCAN** knob to align displayed dot on left graticule line of CRT.

6. Slowly rotate **MANUAL SCAN** knob clockwise until displayed dot aligns with right graticule line of CRT. Check CRT of test spectrum analyzer for spurious signals.

   • Harmonic spurious signals must be ³ 2 divisions below level of related fundamental signal.

   • Non-harmonic spurious signals must be ³ 4 divisions below level of output signal.

NOTE

Test spectrum analyzer will measur❍ 0 dBm signals within 1.8 GHz to 3.6 GHz frequency range. If there are no spurious signals, test spectrum analyzer will not display any signals.

7. Set the test spectrum analyzer center frequency to 2.7 GHz.
8. Repeat Steps 5 and 6.
9. Disconnect equipment from AN/USM-620.

2-85. ADJUSTMENTS.

NOTE

- **Specific adjustments may be needed after repair or replacement of assemblies within Spectrum Analyzer System AN/USM-620, or when a performance test fails.**
- **Never perform all adjustments from para 2-87 to para 2-116 at one time.**
- **Do not adjust components unless instructed to do so in the procedures. Some components are not adjustable.**
- **Table 2-2 shows adjustments needed after repair or replacement of specific assemblies.**

Table 2-2. Post Repair/Replacement Adjustments

REPAIRED/REPLACED ASSEMBLY	ADJUST
A1AT10 Step Attenuator	110 MHz IF Gain (para 2-100)
A1AT12 Attenuator	110 MHz IF Gain (para 2-100)
A1AT124 Attenuator	0 Hz Response (para 2-102) Baseline Leveling (para 2-106)
A1AT126 Variable Load Assembly	0 Hz Response (para 2-102) Baseline Leveling (para 2-106)
A1FL10 Lowpass Filter	110 MHz IF Gain (para 2-100) Baseline Leveling (para 2-106)
A1FL11 Lowpass Filter	110 MHz IF Gain (para 2-100)
A1FL16 Directional Filter	0 Hz Response (para 2-102) Baseline Leveling (para 2-106) 110 MHz IF Gain (para 2-100)
A1FL36 Bandpass Filter	Resolution Bandwidth and Shape Factor (para 2-96) 110 MHz IF Gain (para 2-100)
A1FL37 Lowpass Filter	110 MHz IF Gain (para 2-100) Resolution Bandwidth and Shape Factor (para 2-96)
A1A12 Mixer	0 Hz Response (para 2-102) Baseline Leveling (para 2-106) 110 MHz IF Gain (para 2-100)
A1A15 Bias Return	0 Hz Response (para 2-102) Baseline Leveling (para 2-106) 110 MHz IF Gain (para 2-100)
A1A16 1st LO Assembly	Frequency Control System (para 2-93) Frequency Span/Div and Dot Marker Position (para 2-94) Phase Lock Assembly (para 2-109) 0 Hz Response (para 2-102) Baseline Leveling (para 2-106) 110 MHz IF Gain (para 2-100)
A1A16A1 1st LO Interface CCA	Frequency Control System (para 2-93) Frequency Span/Div and Dot Marker Position (para 2-94)
A1A18 2nd Converter Assembly	110 MHz IF Gain (para 2-100)

Table 2-2. Post Repair/Replacement Adjustments - continued

REPAIRED/REPLACED ASSEMBLY	ADJUST
A1A22 Phase Locked 2nd LO	Frequency Control System (para 2-93)
	Frequency Span/Div and Dot Marker Position (para 2-94)
A1A22A1 16-20 MHz Phase Lock CCA	2182 MHz Second LO Frequency (para 2-110)
	Frequency Control System (para 2-93)
	Frequency Span/Div and Dot Marker Position (para 2-94)
A1A22A2A1 Oscillator CCA	2182 MHz Second LO Frequency (para 2-110)
	Frequency Control System (para 2-93)
	Frequency Span/Div and Dot Marker Position (para 2-94)
A1A22A2A2 Reference CCA	Frequency Control System (para 2-93)
	Frequency Span/Div and Dot Marker Position (para 2-94)
A1A22A2A3 Mixer CCA	Frequency Control System (para 2-93)
	Frequency Span/Div and Dot Marker Position (para 2-94)
A1A24 Phase Gate Assembly	Phase Lock Assembly (para 2-109)
A1A24A1 Input CCA	N/A
A1A25 Harmonic Mixer	N/A
A1A25A3 Input CCA	N/A
A1A26 Auxiliary Synthesizer CCA	Auxiliary Synthesizer VCO (para 2-104)
	Frequency Control System (para 2-93)
A1A28 Mother Board CCA	N/A
A1A30 Power Supply	Check and Low-Voltage Power Supply (para 2-87)
	Power Supply Oscillator Frequency (495P Spectrum Analyzer) (para 2-88)
A1A30A1 Power Supply CCA	Check and Low-Voltage Power Supply (para 2-87)
	Power Supply Oscillator Frequency (495P Spectrum Analyzer) (para 2-88)
A1A30A2 Fan Driver CCA	N/A
A1A30A57 GPIB Interface CCA	N/A
A1 A30A76 Accessories Interface CCA	N/A
A1A32 110 MHz IF Amplifier	110 MHz IF Assembly Return Loss (para 2-103)
	110 MHz IF Gain (para 2-100)
A1A34 3rd Converter Assembly	10 MHz Reference Oscillator (para 2-107)
	CAL OUT Level (para 2-99)
A1A36 Reference Lock	Reference Lock (para 2-108)
A1A37 10 MHz Reference	10 MHz Reference Oscillator (para 2-107)
A1A38 Front Panel CCA	N/A
A1A40 Video Processor CCA	Baseline Leveling (para 2-106)
A1A44 1st LO Driver CCA	Frequency Control System (para 2-93)
A1A46 Center Freq Control CCA	Frequency Control System (para 2-93)
A1A48 Span Attenuator CCA	Frequency Control System (para 2-93)
	Frequency Span/Div and Dot Marker Position (para 2-94)
A1A50 Phase Lock Assembly	Phase Lock Assembly (para 2-109)
A1A50A1 Synthesizer CCA	Phase Lock Assembly (para 2-109)

Table 2-2. Post Repair/Replacement Adjustments - continued

REPAIRED/REPLACED ASSEMBLY	ADJUST
A1A50A2 Strobe Driver CCA	Phase Lock Assembly (para 2-109)
A1A50A3 Mixer CCA	Phase Lock Assembly (para 2-109)
A1A50A4 Error Amplifier CCA	Phase Lock Assembly (para 2-109)
A1A50A5 Oscillator CCA	Phase Lock Assembly (para 2-109)
A1A51 Counter CCA	N/A
A1A54 Memory CCA	N/A
A1A56 GPIB CCA	N/A
A1 A58 Processor CCA	N/A
A1A60 Horiz Digital Storage CCA	Digital Storage (para 2-91)
A1A61 Vert Digital Storage CCA	Digital Storage (para 2-91)
A1A62 Log Amplifier CCA	Log Amplifier (para 2-95)
A1A64 Deflection Amplifiers CCA	Deflection Amplifier Gain and Frequency Response (para 2-90) Digital Storage (para 2-91)
A1A66 CRT Readout CCA	Deflection Amplifier Gain and Frequency Response (para 2-90) Digital Storage (para 2-91)
A1A68 Variable Resolution Module	Resolution Bandwidth and Shape Factor (para 2-96) Variable Resolution Gain Steps (para 2-98) 10/100 Hz Filter (para 2-97)
A1A68A1 Mother #1 CCA	N/A
A1A68A2 Mother #2 CCA	Variable Resolution Gain Steps (para 2-98)
A1A68A3 Input CCA	Variable Resolution Gain Steps (para 2-98)
A1A68A4 1st Filter Select CCA	Resolution Bandwidth and Shape Factor (para 2-96) Variable Resolution Gain Steps (para 2-98)
A1A68A5 10 dB Gain CCA	Variable Resolution Gain Steps (para 2-98)
A1A68A6 20 dB Gain CCA	Variable Resolution Gain Steps (para 2-98)
A1A68A7 Band Leveling CCA	Variable Resolution Gain Steps (para 2-98)
A1A68A8 2nd Filter Select CCA	Resolution Bandwidth and Shape Factor (para 2-96) Variable Resolution Gain Steps (para 2-98) 10/100 Hz Filter (para 2-97)
A1A68A9 Amplifier CCA	Variable Resolution Gain Steps (para 2-98)
A1A69 10/100 Hz Filter	Resolution Bandwidth and Shape Factor (para 2-96) 10/100 Hz Filter (para 2-97)
A1A69A1 1st Mixer CCA	Resolution Bandwidth and Shape Factor (para 2-96) 10/100 Hz Filter (para 2-97)
A1A69A2 Filter CCA	Resolution Bandwidth and Shape Factor (para 2-96) 10/100 Hz Filter (para 2-97)
A1A69A3 2nd Mixer CCA	Resolution Bandwidth and Shape Factor (para 2-96) 10/100 Hz Filter (para 2-97)
A1A69A4 Oscillator CCA	Resolution Bandwidth and Shape Factor (para 2-96) 10/100 Hz Filter (para 2-97)
A1A70 Z-Axis CCA	Z-Axis and High-Voltage (para 2-89)

Table 2-2. Post Repair/Replacement Adjustments - continued

REPAIRED/REPLACED ASSEMBLY	ADJUST
A1A72 Sweep CCA	Deflection Amplifier Gain and Frequency Response (para 2-90)
	Digital Storage (para 2-91)
	Sweep Timing (para 2-92)
	Frequency Span/Div and Dot Marker Position (para 2-94)
A1A74 High Voltage CCA	Z-Axis and High-Voltage (para 2-89)
A1A77 Graticule lights CCA	N/A
A2A6 1st LO Amplifier	Output Level (para 2-113)
A2A7 Isolator	Output Level (para 2-113)
A2A8 Lowpass Filter	Output Level (para 2-113)
A2A9 Bandpass Filter	Output Level (para 2-113)
A2A10 Isolator	Output Level (para 2-113)
A2A11 Mixer	Output Level (para 2-113)
A2A12 Amplifier and Detector	Output Level (para 2-113)
	Normalizing Attenuator (para 2-112)
A2A13 Step Attenuator	Output Level (para 2-113)
	Normalizing Attenuator (para 2-112)
A2A14 Amplitude Control	Output Level (para 2-113)
	Normalizing Attenuator (para 2-112)
	Four-Cavity Filter/Mixer (para 2-114)
A2A15 Leveling Loop and Bias CCA	Output Level (para 2-113)
	Normalizing Attenuator (para 2-112)
A2A31 Balanced Mixer	Output Level (para 2-113)
	Normalizing Attenuator (para 2-112)
	Four-Cavity Filter/Mixer (para 2-114)
A2A32 2nd LO Filter	Output Level (para 2-113)
	Normalizing Attenuator (para 2-112)
	Four-Cavity Filter/Mixer (para 2-114)
A2A35 Control Assembly	55 MHz Oscillator Mode (para 2-111)
A2A35A1 Mother Board CCA	55 MHz Oscillator Mode (para 2-111)
A2A35A2 110 MHz Amplifier CCA	N/A
A2A35A3 55 MHz Oscillator CCA	55 MHz Oscillator Mode (para 2-111)
A2A35A4 Phase/Freq Detector CCA	N/A
A3A10 Main Interface CCA	N/A
A3A11 Secondary Supply CCA	+8 Volts (para 2-115)
	Clock Oscillator Frequency (para 2-116)
A3A13 Primary Supply CCA	N/A
A3A14 Line Filter CCA	N/A
A3A16 GPIB Interface CCA	N/A

2-86. INITIAL SETUP.

WARNING

Hazardous voltages are present when covers are removed. Where maintenance can be performed without having power applied, power cord should be disconnected.

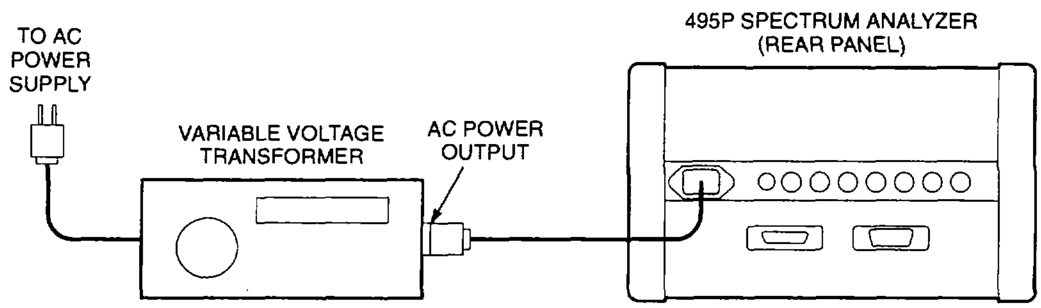
1. With power off, remove cabinet (para 2-118).
2. Verify that rear panel line voltage indicator on 495P Spectrum Analyzer is set for voltage in your area.

   • Perform Preliminary Servicing and Adjustment of Equipment (para 2-5) if voltage setting must be changed.

3. Connect power cord between 495P Spectrum Analyzer and AC power source.
4. Press **POWER** switch to turn power on.
5. Select the following settings.

   TIME/DIV ....AUTO
   MIN RF ATTEN .... 0 (NORM)

2-87. CHECK AND ADJUST LOW-VOLTAGE POWER SUPPLY (495P SPECTRUM ANALYZER).



1. Perform Initial Setup (para 2-86).
2. With power off, remove front CCA bracket (para 2-139).
3. Connect equipment as shown.
4. Set variable autotransformer for 110 VAC.
5. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.
6. Connect (+) DMM lead to A1A70TP1046 (fig FO-19). Connect (-) lead to chassis ground.

NOTE

A screw in A1A30 Power Supply housing is removed to gain access to+15 V adjustment A 1A30A1 R6028.

7. Remove screw (fig FO-6, Sheet 1) to access +15 V adjustment A1A30A1 R6028.
8. Insert adjustment tool through screw mounting hole.
9. Adjust A1A30A1 R6028 for +14.99 V to +15.01 V on DMM display.
10. Connect (+) DMM lead to A1A70TP1047.
11. On variable autotransformer, adjust input voltage to 90 VAC.

    - Check that +17 V supply is within limits. See the following table for voltage limits.

    - Check that input power is **£** 210 W.

12. Check remaining voltages. See the following table for test point locations and limits.

POWER SUPPLY	TEST POINT	VOLTAGE LIMITS
-5 V	A1A70TP1036	-4.96 V to -5.05 V
-7 V	A1A70TP1037	-7 V to -8.5 V
-15 V	A1A70TP1035	-14.84 V to -15.16 V
+5 V	A1A70TP1044	+4.73 V to +5.23 V
+9 V	A1A70TP1011	+8.92 V to +10.1 V
+15 V	A1A70TP1046	+14.90 V to +15.10 V
+17 V	A1A70TP1047	+16.81 V to +18.6 V
+100 V	A1A70TP1048	+95 V to +105 V
+300 V	A1A70TP1052	+280 V to +310 V

13. On variable autotransformer, adjust input voltage to 132 VAC.

    - Check that +17 V supply is within limits. See table for voltage limits.

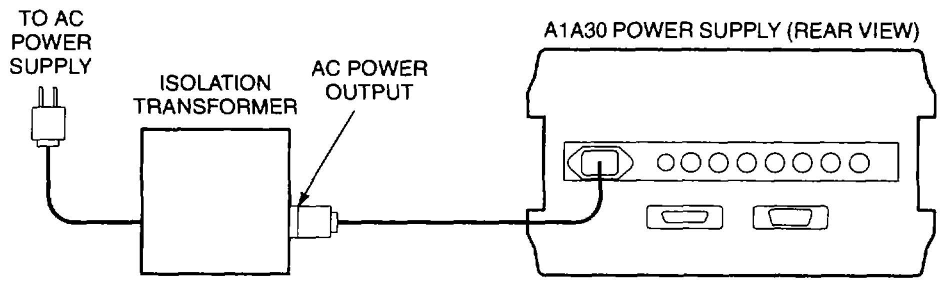
    - Check that input power is **£** 210 W.

14. Check remaining voltages. See table for test point locations and limits.
15. Disconnect equipment from AN/USM-620.
16. Press **POWER** switch to turn power off and install front CCA bracket (para 2-139).
17. Install screw removed to adjust +15 V (fig FO-6, Sheet 1).

2-88. ADJUST POWER SUPPLY OSCILLATOR FREQUENCY (495P SPECTRUM ANALYZER).

WARNING

- **To avoid electrical shock, use isolation transformer between power source and 495P Spectrum Analyzer power input receptacle. Primary ground potential is different from chassis or earth ground.**
- **Hazardous voltages are present after power is turned off. This voltage is stored in capacitors A1A30A1C6101 and A1A30A1C6111 (fig FO-6, Sheet 1). Lamp A1A30A1DS5112 turns on and off when stored voltage is > 80 V. Always verify that A1A30A1 DS5112 is OFF before handling A1A30A1 Power Supply CCA.**



1. Perform Initial Setup (para 2-86).
2. With power off, remove A1A30 Power Supply (para2-165) and A1A30 Power Supply shield (para 2-166).
3. Connect equipment as shown.
4. Connect jumper between anode terminal of A1A30A1 CR2063 (fig FO-6, Sheet 1)and chassis ground.
5. Slide plastic tool between power switches A1A30S300 and A1A30S303 until clicking sound occurs. Both switches must close to turn power on.
6. On an oscilloscope, select the following settings.

   VOLTS/DIV 5
   TIME/DIV 5µS
   INPUT COUPLING .... DC

7. Connect oscilloscope probe to A1A30A1TP6053.
   - Check for 10 V_{p-p} waveform.
8. Adjust A1A30A1R6061 for 15 µs waveform period.
9. Remove plastic tool from power switch.
10. Disconnect equipment from A1A30 Power Supply.
11. With power cord removed, install A1A30 Power Supply shield (para 2-166) and A1A30 Power Supply (para 2-165).

2-89. ADJUST Z-AXIS AND HIGH-VOLTAGE CIRCUITS.

1. Perform Initial Setup (para 2-86).
2. With power off, remove front CCA bracket (para 2-139).
3. Select the following 495P Spectrum Analyzer settings.

INTENSITY .... FULLY COUNTERCLOCKWISE
TIME/DIV.............................. .... MNL
MANUAL SCAN .... MIDRANGE

4. Adjust A1A70R1027 (fig FO-19) fully counterclockwise.

WARNING

To avoid personal injury due to electrical shock or damage to the instrument, use plastic or insulated tool to adjust A1A74R2040.

5. Adjust A1A74R2040 fully clockwise.
6. Press **POWER** switch to turn power on.
7. Select the following 495P Spectrum Analyzer settings.

VERTICAL DISPLAY 2DB/DIV
READOUT.............................. .... OFF
VIEW A AND VIEW B .... OFF

NOTE

- **DMM must be connected to A1A70Q4058 for Steps 9-20.**
- **FREQUENCY CORRECTIONS DISABLED will appear on CRT.**

8. Press **Blue-SHIFT** and **10dB/DIV** keys.
9. Connect (+) DMM lead to metal tab of A1A70Q4058. Connect (-) lead to chassis ground.
   - Write on paper the measured voltage for future reference.
10. Turn **INTENSITY** knob clockwise until dot appears on CRT.
11. Adjust A1A74R3033 for smallest dot.
12. Set **INTENSITY** knob for DMM reading that is 5.75 V higher than voltage measured in Step 9.
   - Write on paper the measured voltage for future reference.
13. Adjust A1A74R2040 until CRT beam is just visible. If no CRT beam appears, set A1A74R2040 fully counterclockwise and perform Step 15.
14. Adjust A1A74R2040 until CRT beam just disappears.

15. Turn **INTENSITY** clockwise until CRT beam appears.
16. Adjust A1A74R3033 fully clockwise.
17. Adjust A1A70R1058 until CRT beam is round.
18. Adjust A1A74R3033 for best focus (smallest and sharpest dot).
19. Turn **INTENSITY** counterclockwise until CRT beam just disappears.
20. Check voltage reading on DMM display. Voltage must equal or exceed voltage from Step 12.

    - If voltage is too low, repeat Steps 3-20.

21. Press POWER switch to turn power off.
22. Remove jumper A1A74P4036.
23. Select the following settings.

    INTENSITY .... FULLY CLOCKWISE
    MANUAL SCAN .... FULLY COUNTERCLOCKWISE
    TIME/DIV .... MNL

24. Adjust A1A70R1027 fully clockwise.
25. Connect (+) DMM lead to A1A74TP4028. Connect (-) lead to chassis ground.
26. Press **POWER** switch to turn power on.
27. Press **Blue-SHIFT** and 1**0dB/DIV** keys.
28. Select the following 495P Spectrum Analyzer settings.

    VERTICAL DISPLAY 2DB/DIV
    VIEW A AND VIEW B .... OFF
    READOUT .... OFF

29. Adjust A1A70R1027 for 0.89 V to +0.91 V on DMM display.
30. Press **POWER** switch to turn power off.
31. Remove (+) DMM lead and install jumper A1A74P4036.
32. Press **POWER** switch to turn power on.
33. Set **INTENSITY** for normal CRT brightness.
34. Connect CAL OUT signal to RF INPUT.
35. Select the following settings.

    CENTER/MARKER FREQUENCY 100MHZ
    SPAN/DIV 1OMHZ
    REFERENCE LEVEL .... -20DBM
    VERTICAL DISPLAY 2DB/DIV
    NARROW VIDEO FILTER .... ON
    TIME/DIV ....AUTO

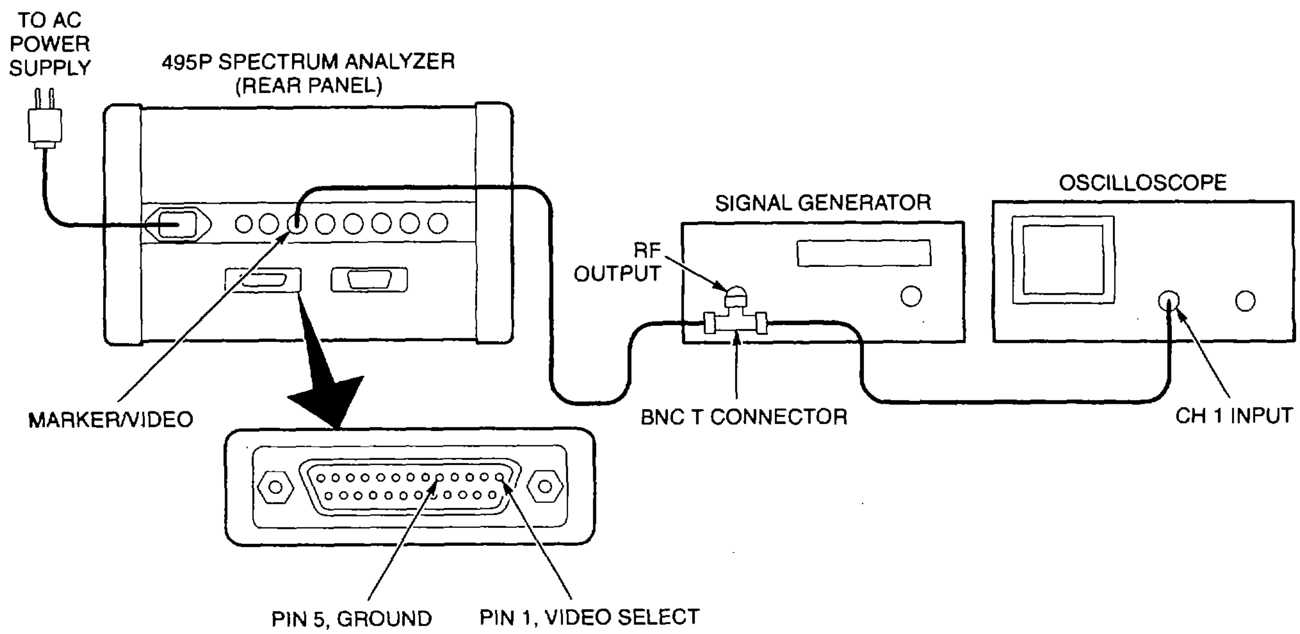
36. Press **ZERO SPAN** key.
37. Use **REFERENCE LEVEL** knob to move trace near center of CRT.
38. Adjust A1A70R1021 (FO-19) to align trace with graticule lines.
39. Use **PEAK/AVERAGE** knob to place cursor near top of CRT.
40. Remove CAL OUT signal from RF INPUT.
41. Adjust A1A70R1051 for straightest traces at top and bottom of CRT.
42. Connect CAL OUT signal to RF INPUT.
43. Use **REFERENCE LEVEL** knob to move trace near center of CRT.
44. Set **INTENSITY** for dim CRT brightness.

NOTE

When A1A70R1030 is adjusted properly, readout is just visible after trace disappears when turning INTENSITY knob.

45. Adjust A1A70R1030 so readout is slightly brighter than trace.
46. Adjust A1A70R1 065 fully counterclockwise.
    - Check that LED A1A70DS1062 is red.
47. Turn A1A70R1065 fully clockwise.
    - Check that LED A1A70DS1062 is red.
48. Connect (+) DMM lead to A1A70TP1068. Connect (-) lead to A1A70TP1069.
49. Adjust A1A70R1065 for +190 mV to +210 mV on DMM display.
    - Check that LED A1A70DS1062 is green.
50. Disconnect equipment from AN/USM-620.
51. Press **POWER** switch to turn power off and install front CCA bracket (para 2-139).

2-90. ADJUST DEFLECTION AMPLIFIER GAIN AND FREQUENCY RESPONSE.



1. Perform Initial Setup (para 2-86).
2. With power off, remove front CCA bracket (para 2-139).
3. Connect equipment as shown.
4. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.
5. Select the following 495P Spectrum Analyzer settings.

   TIME/DIV .... MS
   TRIGGERING.............................. ....INT
   VIEW A AND VIEW B .... OFF

6. Set **VERTICAL POSITION** fully counterclockwise.
7. Select the following signal generator settings.

   SIGNAL TYPE .... SINEWAVE
   FREQUENCY.............................. ....500HZ

8. Select the following oscilloscope settings.

   VOLTS/DIV 1V
   TIME/DIV 1MS

9. Adjust signal generator level and offset until oscilloscope CRT displays 4 V_{p-p} sinewave.
10. On J104 ACCESSORY connector, connect pin 1 to pin 5.

11. Adjust A1A64A1R1066 (fig FO-14) and signal generator offset control for eight division vertical display on CRT of AN/USM-620.

    - Positive sinewave peak should touch top graticule line.

    - Negative sinewave peak should touch bottom graticule line.

12. Disconnect equipment and jumper from 495P Spectrum Analyzer.
13. Select the following settings.

    TRIGGERING............................. .... FREE RUN
    TIME/DIV............................. .... MNL

14. Connect (+) DMM lead to A1A72TP2 (fig FO-19). Connect (-) lead to chassis ground.
15. Set **MANUAL SCAN** for 0.0 V on DMM display.
16. Set **HORIZONTAL POSITION** to move beam (dot) to center of CRT.
17. Set **MANUAL SCAN** for +5.0 V on DMM display.
18. Adjust A1A64A1 R1055 (fig FO-14) to place beam on right-most graticule line of CRT.
19. Set MANUAL SCAN to place beam on left-most graticule line of CRT.

    - Check for -4.8 V to -5.2 V on DMM display.

20. Select the following settings.

    SPAN/DIV 100MHZ
    VERTICAL DISPLAY .... LIN
    TIME/DIV............................. ....AUTO
    VIEW A AND VIEW B .... ON

21. Adjust **VERTICAL POSITION** to align trace with bottom graticule line.
22. Adjust **HORIZONTAL POSITION** to align frequency dot to center of CRT.
23. Press **TUNE** key to turn marker on.
24. Adjust A1A64A1 R5020 and A1A64A1 R5030 for best placement of readout characters on CRT.
    - Place two top readout rows just above top graticule line.

    - Place bottom row just beneath bottom graticule line.
25. Read CENTER FREQUENCY readout.

    - Check appearance of letter "Z."

    - Adjust A1A64A1 C3060 and A1A64A1 C3080 for straight top on letter "Z."
26. Read VERTICAL DISPLAY readout.
    - Check appearance of letter "V."

    - Adjust A1A64A1 C1030 and A1A64A1 C1040 for straight top on letter "V."
27. Disconnect equipment from AN/USM-620.
28. Press **POWER** switch to turn power off. Install front CCA bracket (para 2-139).

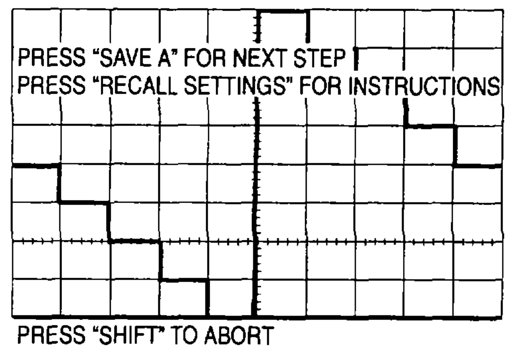
2-91. ADJUST DIGITAL STORAGE.

1. Perform Initial Setup (para 2-86).
2. Select the following 495P Spectrum Analyzer settings.

SPAN/DIV	100MHZ
VERTICAL DISPLAY	2DB/

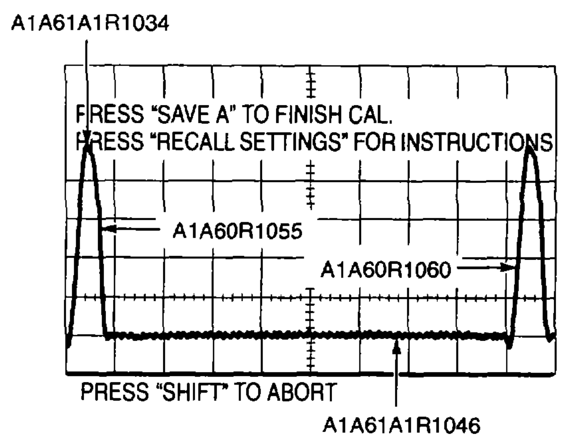
3. Adjust **VERTICAL POSITION** to align trace with bottom graticule line.
4. Adjust **HORIZONTAL POSITION** to align frequency dot to center of CRT.
5. Press **Blue-SHIFT** and **PULSE STRETCHER** keys.
6. Use **DATA ENTRY** to select 2=DIGITAL STORAGE CAL.
7. Press **SAVE A** key to display test pattern.
8. Adjust A1A61A1 R1033, A1A61A1 R1045 (fig FO-13), A1A60R1040, and A1A60R1050 (fig FO-12) to match test pattern with example waveform.

   - Use A1A60R1040 and A1A60R1050 to align pattern with vertical graticule lines.
   - Use A1A61A1 R1033 and A1A61AIR1045 to align pattern with horizontal graticule lines.



9. Press **SAVE A** key to continue.
10. Connect CAL OUT signal to RF INPUT.
11. Press **SAVE A** key.
12. Adjust A1A60R1055 and A1A60R1060 to match horizontal position of alternate sweeps. See example waveform.

   - Verify that traces match at right and left edges of CRT.
   - A1A60R1055 and A1A60R1060 interact. Repeat adjustments until alternate sweeps match.

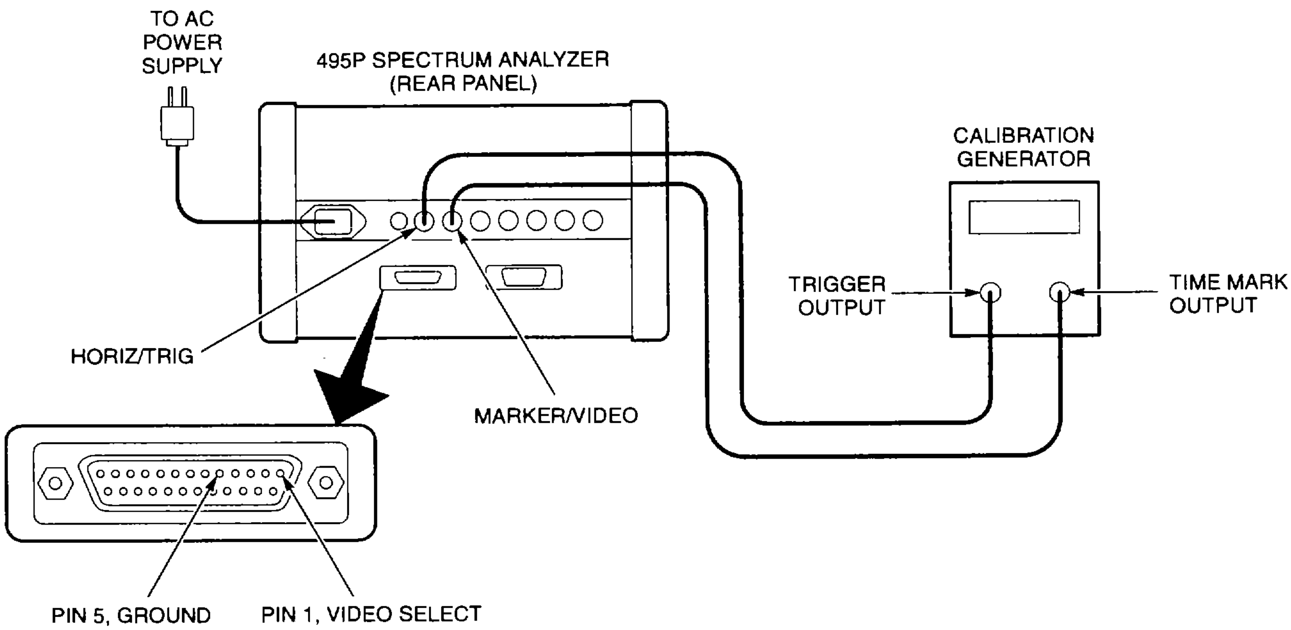


13. Adjust A1A61A1R1034 and A1A61A1R1046 to match vertical position of alternate sweeps. See example waveform.

   - Verify that traces match at signal peak (top of CRT) and position of noise (bottom of CRT).
   - A1A61A1R1034andA1A61A1R1046interact. Repeat adjustments until alternate sweeps match.

14. Disconnect equipment from AN/USM-620.

2-92. ADJUST SWEEP TIMING.



1. Perform Initial Setup (para 2-86).
2. Connect equipment as shown.
3. On J104 ACCESSORY connector, connect pin 1 to pin 5.
4. Select the following 495P Spectrum Analyzer settings.

SPAN/DIV	10MHZ
TIME/DIV	10MS
TRIGGERING	EXT

5. Set calibration generator for 10 ms time mark output.
6. Adjust A1 A72R1062 (fig FO-19) for one marker per division on the CRT.
7. Disconnect equipment from AN/USM-620.

2-93. ADJUST FREQUENCY CONTROL SYSTEM.

NOTE

When the message "CALIBRATION STEP CANNOT BE COMPLETED" appears on CRT during this procedure, the step must be skipped. Steps are skipped by pressing the kHz key. If a step must be bypassed during adjustment, the OVERALL SYSTEM adjustment should be repeated.

1. Perform Initial Setup (para 2-86).
2. Select the following 495P Spectrum Analyzer settings.

   CENTER/MARKER FREQUENCY 0.0MHZ
   SPAN/DIV 5MHZ

3. Connect jumper from A1A48A1TP1035 (fig FO-9) to chassis ground.
4. Connect (+) DMM lead to A1A48A1TP1073. Connect (-) lead to chassis ground.
5. Adjust A1A48A1 R 1063 for 0.00 V on DMM display.
6. Remove jumper from A1A48A1TP1035.
7. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **PULSE STRETCHER** keys.
8. Use **DATA ENTRY** to select 1=FREQUENCY LOOPS CAL.
9. Use **DATA ENTRY** to select 0=OVERALL SYSTEM.
10. Connect (+) DMM lead to A1A44A1TP1058. Read all instructions on CRT.
11. Adjust **CENTER/MARKER FREQUENCY** knob for 0 V on DMM display. Refer to CRT for instructions.
12. Press **GHz** key for next step.
13. Read instructions on CRT and adjust A1A46A1 R1032.
14. Press **GHz** key for next step.
15. Read all instructions on CRT and adjust A1A44A1 R1034.
16. Press **GHz** key for next step.
17. Read all instructions on CRT and adjust A1A44A1 R1032.
18. Press **GHz** key for next step.
19. Read all instructions on CRT and adjust A1A44A1 R1 031.
20. Press **GHz** key for next step.
21. Read all instructions on CRT and adjust A1A46A1 R1028.
22. Press **GHz** key for next step.

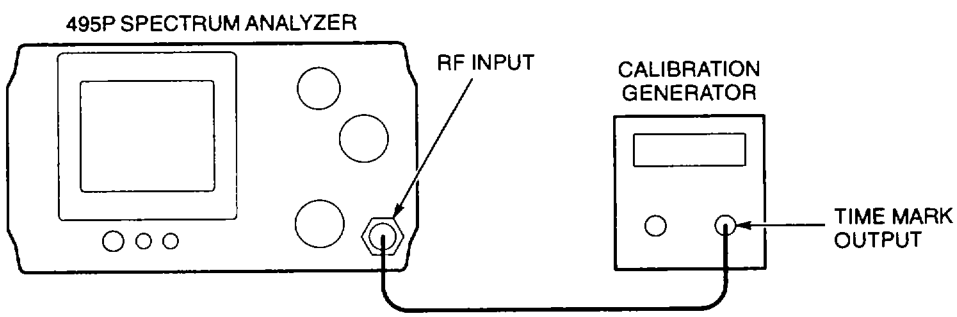
23. Read all instructions on CRT and adjust A1A46A1 R4040.
24. Press **GHz** key for next step.
25. Read all instructions on CRT and adjust A1A46A1 R3040.
26. Press **GHz** key for next step.

NOTE

Pressing kHz key skips adjustment steps for A1A50A5C1013 and A1A50A5C2011. These adjustments are not made during this procedure.

27. Press **kHz** key two times.
28. Disconnect equipment from AN/USM-620.

2-94. ADJUST FREQUENCY SPAN/DIV AND DOT MARKER POSITION.



1. Perform Initial Setup (para 2-86).
2. Connect equipment as shown.
3. Set calibration generator for 10 ns time mark output.
4. Select the following 495P Spectrum Analyzer settings.

CENTER/MARKER FREQUENCY................................ .600MHZ
SPAN/DIV 100MHZ

5. Adjust A1A48A1 R1065 (fig FO-9) for one marker per division over center eight divisions of CRT.
6. Set calibration generator for 0.2 µs time mark output.
7. Select the following 495P Spectrum Analyzer settings.

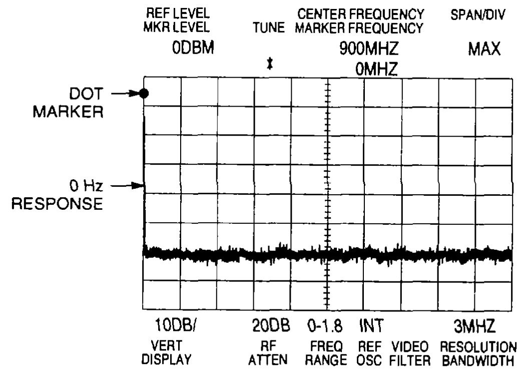
CENTER/MARKER FREQUENCY............................... ...50MHZ
SPAN/DIV 5MHZ
REFERENCE LEVEL 20DBM

8. Adjust A1A48A1 R1071 for one marker per division over center eight divisions of CRT.
9. Set calibration generator for 50 µs time mark output.

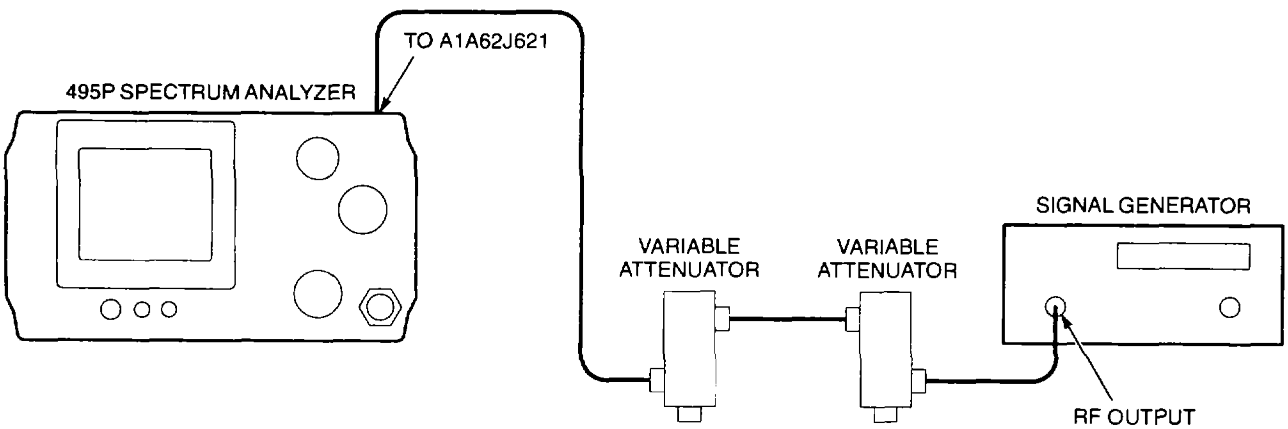
10. Select the following 495P Spectrum Analyzer settings.

CENTER/MARKER FREQUENCY................................ ..200KHZ
SPAN/DIV 20KHZ

11. Adjust A1A48A1R1067 for one marker per division over center eight divisions of CRT.
12. Disconnect equipment from 495P Spectrum Analyzer.
13. Press **Blue-SHIFT** and **RESET** keys.
14. Adjust A1A72R1052 (fig FO-19) to place dot marker over 0 Hz response. See example waveform.



2-95. ADJUST LOG AMPLIFIER.



1. Perform Initial Setup (para 2-86).
2. Connect equipment as shown.
   - One variable attenuator must have 10 dB steps and one must have 1 dB steps.
   - Unplug A1W682 (fig FO-1, Sheet 2) from A1A62J621 (fig FO-13).
   - Connect variable attenuator to A A62J621.
3. On 495P Spectrum Analyzer, press **Blue-SHIFT** and **PULSE STRETCHER** keys.
4. Use **DATA ENTRY** to select 5=DISABLE/ENABLE USE OF CAL FACTORS.
5. Use **DATA ENTRY** to select 0=DO NOT USE RESULTS.

NOTE

CAL factors are now set to zero.

6. Select the following settings.

CENTER/MARKER FREQUENCY 100MHZ
SPAN/DIV 2MHZ
REFERENCE LEVEL ....-60DBM
PEAK/AVERAGE.............................. .... FULLY CLOCKWISE

7. Select the following signal generator settings.

FREQUENCY.............................. ....10MHZ
AMPLITUDE.............................. ....+6DBM

8. Set variable attenuator to 50 dB.

NOTE

Steps 9-14 adjust LOG CAL control.

9. On 495P Spectrum Analyzer, adjust **LOG CAL** to center of range.
10. Adjust A1A62A1 R1030 to place trace five divisions below top graticule line.
11. Set REFERENCE LEVEL to -110 dBm.
12. Adjust **LOG CAL** for a five division (50 dB) change on CRT.
13. Select -60 dBm REFERENCE LEVEL.

    - Check that trace moves five divisions (50 dB) on CRT.

14. Repeat Steps 10-13 until trace moves exactly five divisions between -60 dBm and -110 dBm REFERENCE LEVEL settings.

NOTE

- **Steps 15-21 adjust A1A62A1R1025.**
- **When A1A62A1R1025 is adjusted correctly, the trace moves one division on CRT each time the variable attenuator setting changes by 10 dB.**

15. Set REFERENCE LEVEL to -20 dBm.
16. Set variable attenuator to 0 dB.
17. On 495P Spectrum Analyzer, adjust A1A62A1 R1025 to align trace with top graticule line.
18. Set variable attenuator to 50 dB.
19. Adjust A1A62A1 R1030 for a five division (50 dB) change on CRT.
20. Set variable attenuator to 0 dB.

    - Check that trace moves five divisions (50 dB) on CRT.

21. Repeat Steps 17 through 20 until trace moves exactly five divisions between 0 dB and 50 dB variable attenuator settings.

NOTE

Steps 22-26 adjust A1A62A1R1037, A1A62A1R1030, and VERTICAL POSITION.

22. Set variable attenuator to 0 dB.
23. On 495P Spectrum Analyzer, press **2dB/DIV** key and note trace location on CRT.
24. Press **10dB/DIV** key and note trace location on CRT.
25. Adjust A1A62A1 R1037 to match level of traces for 10DB/ and 2DB/ settings.
26. Repeat Steps 23-25 until traces match for 10DB/ and 2DB/ settings.
27. Disconnect cable assembly between A1A62J621 and variable attenuator.
28. Adjust **VERTICAL POSITION** to align trace with bottom graticule line.
29. Connect cable assembly between variable attenuator and A1 A62J621.
30. Adjust A1A62A1 R1030 to align trace with top graticule line.

NOTE

Steps 31-35 adjust A1A62A1R1060.

31. Set variable attenuator to 40 dB.
32. Adjust A1A62A1 R1060 to position trace four divisions (40 dB) below top graticule line.
33. Set variable attenuator to 30 dB.
    - Check trace position. Trace should be three divisions (30 dB) below top graticule line.
34. Set variable attenuator to 50 dB.
    - Check trace position. Trace should be five divisions (50 dB) below top graticule line.
35. Adjust A1A62A1 R1060 for best display at 30 dB, 40 dB, and 50 dB variable attenuator settings.
36. Repeat Steps 15-35 if large change to A1 A62A1 R1060 setting is required.

NOTE

- **Steps 37-41 verify 10 dB per division step accuracy.**
- **When A1A62 Log Amplifier CCA is adjusted correctly, the trace moves one division on CRT each time variable attenuator setting changes by 10 dB. The trace will align with top graticule line when variable attenuator is set to 0 dB.**

37. Set variable attenuator to O dB.
38. On 495P Spectrum Analyzer, press **SAVE A** key.
39. Set variable attenuator to 10 dB.
    - Check that trace is between 0.9 and 1.1 divisions below SAVE A trace.
40. On 495P Spectrum Analyzer, press **SAVE A** key to turn SAVE A mode off.
41. Repeat Steps 38-40 to check remaining seven divisions. Use following table as a guide for variable attenuator settings and test limits.

    - Repeat Steps 636 if 10 dB per division step accuracy is not within limits.

VARIABLE ATTENUATOR SETTING	DIVISIONS BELOW SAVE A TRACE
20 dB	0.9 to 1.1 divisions
30 dB	0.9 to 1.1 divisions
40 dB	0.9 to 1.1 divisions
50 dB	0.9 to 1.1 divisions
60 dB	0.9 to 1.1 divisions
70 dB	0.9 to 1.1 divisions
80 dB	0.9 to 1.1 divisions

NOTE

- **Steps 42-45 verify 10 dB per division cumulative step accuracy.**
- **The trace will align with top graticule line when variable attenuator is set to 0 dB.**

42. Press **SAVE A** key to turn SAVE A mode off.
43. Set variable attenuator to 10 dB.

    - Check that trace is between 0.9 to 1.1 divisions below top graticule line.

44. Set variable attenuator to 20 dB.

    - Check that trace is between 1.8 and 2.2 divisions below top graticule line.

45. Repeat Step 44 to check remaining six divisions. See following table for variable attenuator settings and test limits.

    - Repeat Steps 6-36 if 10 dB per division cumulative accuracy is not within limits.

VARIABLE ATTENUATOR SETTING	DIVISIONS BELOW TOP GRATICULE LINE
30 dB	2.8 to 3.2 divisions
40 dB	3.8 to 4.2 divisions
50 dB	4.8 to 5.2 divisions
60 dB	5.8 to 6.2 divisions
70 dB	6.8 to 7.2 divisions
80 dB	7.8 to 8.2 divisions

NOTE

- **Steps 46-51 verify 2 dB per division step accuracy.**
- **When A1A62 Log Amplifier CCA is adjusted correctly, the trace moves one division on CRT each time variable attenuator setting changes by 2 dB. The trace will align with top graticule line when variable attenuator is set to 0 dB.**

46. Set variable attenuator to O dB.
47. On 495P Spectrum Analyzer, press 2DB/ key.
48. Press **SAVE A** key.
49. Set variable attenuator to 2 dB.

    - Check that trace is between 0.8 and 1.2 divisions below SAVE A trace.

50. On 495P Spectrum Analyzer, press **SAVE A** key to turn SAVE A mode off.
51. Repeat Steps 48-50 to check remaining seven divisions. See following table for variable attenuator settings and test limits.

    - Repeat Steps 6-36 if 2 dB per division step accuracy is not within limits.

VARIABLE ATTENUATOR SETTING	DIVISIONS BELOW SAVE A TRACE
4 dB	0.8 to 1.2 divisions
6 dB	0.8 to 1.2 divisions
8 dB	0.8 to 1.2 divisions
10 dB	0.8 to 1.2 divisions
12 dB	0.8 to 1.2 divisions
14 dB	0.8 to 1.2 divisions
16 dB	0.8 to 1.2 divisions

NOTE

- **Steps 52-55 verify 2 dB per division cumulative step accuracy.**
- **The trace will align with top graticule line when variable attenuator is set to 0 dB.**

52. Press **SAVE A** key to turn SAVE A mode off.
53. Set variable attenuator to 2 dB.

    - Check that trace is between 0.8 and 1.2 divisions below top graticule line.

54. Set variable attenuator to 4 dB.

    - Check that trace is between 1.6 and 2.4 divisions below top graticule line.

55. Repeat Step 54 to check remaining six divisions. See following table for variable attenuator settings and test limits.

    - Repeat Steps 6-36 if 2 dB per division cumulative accuracy is not within limits.

VARIABLE ATTENUATOR SETTING	DIVISIONS BELOW TOP GRATICULE LINE
6 dB	2.5 to 3.5 divisions
8 dB	3.5 to 4.5 divisions
10 dB	4.5 to 5.5 divisions
12 dB	5.5 to 6.5 divisions
14 dB	6.5 to 7.5 divisions
16 dB	7.5 to 8.5 divisions

NOTE

- **Steps 56-58 adjust A1A62A1 R1012.**
- **Steps 56-62 verify LIN mode accuracy.**
- **After A1A62A1R1012 is adjusted, trace should align with top graticule line when LIN, 2 dB per division, and 10 dB per division modes are selected.**

56. Set variable attenuator to 0 dB.
57. On 495P Spectrum Analyzer, press **LIN** key.
58. Adjust A1 A62A1 R1 012 to align trace with top graticule line.
59. Press **SAVE A** key.
60. Set variable attenuator to 6 dB.

    - Check that trace is between 3.6 and 4.4 divisions below SAVE A trace.

61. Set variable attenuator to 12 dB.

    - Check that trace is between 5.6 and 6.4 divisions below SAVE A trace.

62. Set variable attenuator to 18 dB.

    - Check that trace is between 6.6 and 7.4 divisions below SAVE A trace.

63. Disconnect equipment from 495P Spectrum Analyzer.
64. Connect A1W682 to A1 A62J621 (fig FO-13).
65. On 495P Spectrum Analyzer, connect CAL OUT signal to RF INPUT.
66. Press **Blue-SHIFT** and **CAL** keys to begin CAL function.
67. Use **FINE** key and follow on-screen prompts to complete CAL function.
68. Disconnect equipment from AN/USM-620.

2-96. ADJUST RESOLUTION BANDWIDTH AND SHAPE FACTOR.

1. Perform Initial Setup (para 2-86).
2. With power off, remove A1A68 Variable Resolution Module (para 2-152) and reinstall using extender kit.

    - Install cable assembly between A1A68J682 (fig FO-15) and A1A62J621 (fig FO-13).
    - Unplug cable assembly from A1A68J683 (fig FO-15).
    - Install cable assembly between A1W344 (fig FO-1, Sheet 2) and A1A68J683 (fig FO-15).
    - Install cable assembly between A1A68J694 (fig FO-15) and A1A69J697 (fig FO-18, Sheet 1).
    - Plug A1W696 (fig FO-1, Sheet 2) onto A1A69P696 (fig FO-18, Sheet 1).
    - Secure A1A69 10/100 Hz Filter to chassis by installing one mounting screw. Verify that multiwire cable from A1A69 10/100 Hz Filter is plugged onto A1A70P1040 (fig FO-19).

3. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.
4. Press **Blue-SHIFT** and **PULSE STRETCHER** keys.
5. Use **DATA ENTRY** to select 5=DISABLE/ENABLE USE OF CAL FACTORS.
6. Use **DATA ENTRY** to select 0=DO NOT USE RESULTS.

NOTE

CAL factors are now set to zero.

7. Connect CAL OUT signal to RF INPUT.

8. Select the following settings.

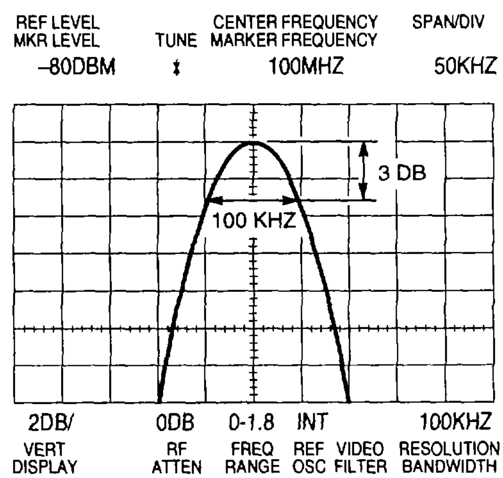
CENTER/MARKER FREQUENCY	100MHZ
SPAN/DIV	50KHZ
RESOLUTION BANDWIDTH	100KHZ
REFERENCE LEVEL	-80DBM
VERTICAL DISPLAY	2DB/

NOTE

- **Be careful to make small changes during filter alignment. Due to interaction, it is possible to offset one filter because other filters are not aligned.**
- **Throughout this procedure, filter response should be adjusted for best centering and maximum amplitude on CRT. Signal amplitude may be reduced from maximum in order to achieve bandwidth.**
- **Filter shapes may vary from those shown in example waveforms.**

9. Use REFERENCE LEVEL knob to move signal near top of CRT.

10. Adjust A1A68A8C3041, A1A68A8C5048, and A1A68A8C5055 (fig FO-17, Sheet 1) for best filter response. See example waveform.
    - A1A68A8C5048 adjusts filter for 100 kHz bandwidth 1.5 divisions below signal peak.
    - A1A68A8C3041 and A1A68A8C5055 adjust filter frequency to align with center of CRT.



11. Connect A1W344 (fig FO-1, Sheet 2) to A1A68J693 (fig FO-15) as follows.
    - Unplug At W344 with associated cable assembly from A1A68J683 (fig FO-15).
    - Connect A1W344 with associated cable assembly to A1A68J693.
    - Connect cable assembly Al A68W684 to A1A68J683. A1A68W684 was unplugged in Step 2.

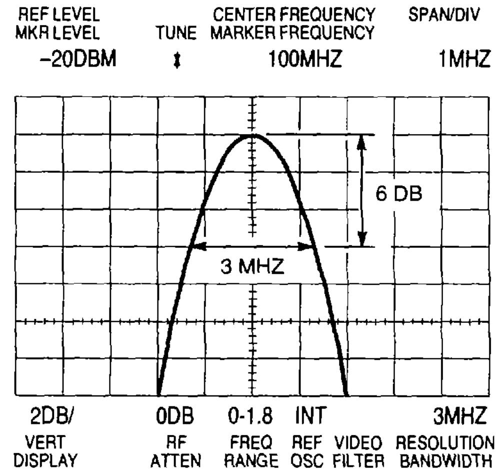
12. Use REFERENCE LEVEL knob to move signal near top of CRT.

13. Adjust A1A68A4C3030, A1A68A4C3039, and A1A68A4C3045 (fig FO-16, Sheet 1) for best filter response.
    - A1A68A4C3039 adjusts filter for 100 kHz (±20 kHz) bandwidth three divisions below signal peak.
    - A1A68A4C3030 and A1A68A4C3045 adjust filter frequency to align with center of CRT.

14. Select the following settings.

SPAN/DIV	1MHZ
RESOLUTION BANDWIDTH	3MHZ

15. Adjust four tuning screw adjustments on A1FL36 (fig FO-7) for best amplitude and filter response. See example waveform.
    - Adjust filter for 3 MHz (± 600 kHz) bandwidth three divisions below signal peak.
    - Adjust filter frequency to align with center of CRT.



16. Select the following settings.
    SPAN/DIV 200KHZ
    RESOLUTION BANDWIDTH.... 1MHZ

17. Adjust A1A68A4C1034, A1A68A4C1044, and A1A68A4C1046 (fig FO-16, Sheet 1) for best filter response.
    - Adjust filter for 1 MHz (± 200 kHz) bandwidth three divisions below signal peak.
    - Adjust filter frequency to align with center of CRT.

18. Select the following settings.
    SPAN/DIV 2KHZ
    RESOLUTION BANDWIDTH............................. 10KHZ

19. Adjust A1A68A4C2030 for best filter response.
    - Adjust filter for 10 kHz (+ 2 kHz) bandwidth three divisions below signal peak.
    - Adjust filter frequency to align with center of CRT.

20. Select the following settings.
    SPAN/DIV 50KHZ
    RESOLUTION BANDWIDTH............................. 100KHZ

21. Repeat Steps 12-19.
    - Check shape, bandwidth, and centering of each filter.
    - If necessary, make fine adjustments.

22. Select the following settings.
    SPAN/DIV 20KHZ
    RESOLUTION BANDWIDTH............................. 100KHZ
    REFERENCE LEVEL .... -18DBM

23. Press **SAVE A** key.

24. Select the following settings.
    SPAN/DIV 200KHZ
    RESOLUTION BANDWIDTH............................. 3MHZ

25. Adjust A1A68A8R1065 (fig FO-17, Sheet 1) to match 3 MHz filter level to SAVE A trace.

26. Repeat Steps 24 and 25 to match remaining filters to SAVE A trace. See following table for settings and adjustment locations.

RESOLUTION BANDWIDTH	SPAN/DIV	ADJUSTMENT	LOCATION
1 MHz	200 kHz	A1A68A4R1027	fig FO-16, Sheet 1
10 kHz	2 kHz	A1A68A8R3033	fig FO-17, Sheet 1
1 kHz	200 Hz	A1A68A8R3029	fig FO-17, Sheet 1
100 Hz	20 Hz	A1A68A8R3015	fig FO-17, Sheet 1
10 Hz	10 Hz	A1A68A5R2025	fig FO-16, Sheet 1

27. Press POWER switch to turn power off and install A1A68 Variable Resolution Module (para 2-152).

28. Press POWER switch to turn power on.

29. Connect CAL OUT signal to RF INPUT.

30. Press Blue-SHIFT and CAL keys to begin CAL function.

31. Use FINE key and follow on-screen prompts to complete CAL function.

32. Disconnect equipment from AN/USM-620.

2-97. ADJUST 10/100 HZ FILTER.

1. Perform Initial Setup (para 2-86).

2. With power off, remove A1A68 Variable Resolution Module (para2-152) and reinstall using extender kit.
   - Install cable assembly between A1W344 (fig FO-1, Sheet 2) and A1A68J693 (fig FO-15).
   - Install cable assembly between A1A68J682 and A1A62J621 (fig FO-13).
   - Install cable assembly between A1A68W694 (fig FO-1, Sheet 2) and A1A68J694 (fig FO-15).

3. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.

4. Press **Blue-SHIFT and PULSE STRETCHER** keys.

5. Use **DATA ENTRY** to select 5=DISABLE/ENABLE USE OF CAL FACTORS.

6. Use **DATA ENTRY** to select O=DO NOT USE RESULTS.

NOTE

CAL factors are now set to zero.

7. Connect CAL OUT signal to RF INPUT.

8. Adjust A1A68A8R4025 (fig FO-17, Sheet 1), A1A69A1R3010 (fig FO-18, Sheet 1), and A1A69A3R3025 to center of range.

9. Install jumpers at A1A69A2J3015, A1A69A2J3038, and A1A69A2J3052.

10. Select the following settings.

CENTER/MARKER FREQUENCY..................... 100MHZ
SPAN/DIV 100HZ
RESOLUTION BANDWIDTH............................. 100HZ
REFERENCE LEVEL .... -20DBM
TIME/DIV.............................. .... 50MS
VERTICAL DISPLAY............................... .... 2DB/

NOTE

- **Throughout this procedure, REFERENCE LEVEL may be set as needed to keep signal peak near top of CRT.**
- **When filter is badly misaligned, set the following adjustments to center of range: A1A69A2C4015, A1A69A2C4028, A1A69A2C4036, A1A69A2C4045, A1A69A2C4051, and A1A69A2C4060.**

11. Adjust A1A68A8R4025 (fig FO-17, Sheet 1) for maximum signal level.

12. Adjust A1A69A1 R3010 (fig FO-18, Sheet 1) for maximum signal level.

13. Adjust A1A69A3R3025 for maximum signal level.

14. Remove jumper from A1A69A2J3015.

15. Adjust A1A69A4C1032 for maximum signal level.

16. Select the following settings.

SPAN/DIV 10HZ
RESOLUTION BANDWIDTH............................. 10HZ
VERTICAL DISPLAY............................... .... 5DB/
TIME/DIV.............................. .... AUTO

17. Press **Blue-SHIFT and VIDEO FILTER WIDE** keys.

18. Use **DATA ENTRY** to select 3=EOS CORRECTIONS MODE TOGGLE.

19. Use **CENTER/MARKER FREQUENCY** knob to center signal on CRT.

20. Press **SAVE A** key.

21. Store settings in register #1 as follows:
    - Press **Blue-SHIFT and STORE** keys.
    - Use **DATA ENTRY** to enter 1. This stores current settings in register #1.

22. Select the following settings.

SPAN/DIV 100HZ
RESOLUTION BANDWIDTH............................. 100HZ
VERTICAL DISPLAY............................... .... 10DB/
VIEW A .... OFF

23. Store settings in register #2 as follows:
    - Press **Blue-SHIFT and STORE** keys.
    - Use **DATA ENTRY** to enter 2. This stores current settings in register #2.
24. Adjust A1A69A2C4015 for best filter shape.
25. Recall settings from register #1 as follows:
    - Press **RECALL SETTINGS** key.
    - Use **DATA ENTRY** to enter 1. This recalls settings from register #1.
26. Adjust A1A69A2C4028 to align peak of active trace with SAVE A trace.
27. Repeat adjustment of A1A69A2C4015 and A1A69A2C4028 to cancel interaction.
    - Recall settings from register #2 to adjust A1A69A2C4015.
    - Recall settings from register #1 to adjust A1A69A2C4028.
28. Remove jumper from A1A69A2J3038.
29. Install jumper at A1A69A2J3015.
30. Recall settings from register #1 as follows:
    - Press **RECALL SETTINGS** key.
    - Use **DATA ENTRY** to enter 1. This recalls settings from register #1.
31. Adjust A1A69A2C4036 to align peak of active trace with SAVE A trace.
32. Recall settings from register #2 as follows:
    - Press **RECALL SETTINGS** key.
    - Use **DATA ENTRY** to enter 2. This recalls settings from register #2.
33. Adjust A1A69A2C4045 for best filter shape.
34. Repeat adjustment of A1A69A2C4036 and A1A69A2C4045 to cancel interaction.
    - Recall settings from register #2 to adjust A1A69A2C4045.
    - Recall settings from register #1 to adjust A1A69A2C4036.
35. Remove jumper from A1A69A2J3052.
36. Install jumper at A1A69A2J3038.
37. Recall settings from register #1 as follows:
    - Press **RECALL SETTINGS** key.
    - Use **DATA ENTRY** to enter 1. This recalls settings from register #1.

38. Adjust A1A69A2C4051 to align peak of active trace with SAVE A trace.

39. Recall settings from register #2 as follows:
   - Press **RECALL SETTINGS** key.
   - Use **DATA ENTRY** to enter 2. This recalls settings from register #2.

40. Adjust A1A69A2C4060 for best filter shape.

41. Repeat adjustment of A1A69A2C4051 and A1A69A2C4060 to cancel interaction.
   - Recall settings from register #1 to adjust A1A69A2C4051.
   - Recall settings from register #2 to adjust A1A69A2C4060.

42. Remove all jumpers from A69 10/100 Hz Filter.

43. Adjust A1A69A4C1032 for maximum signal level.

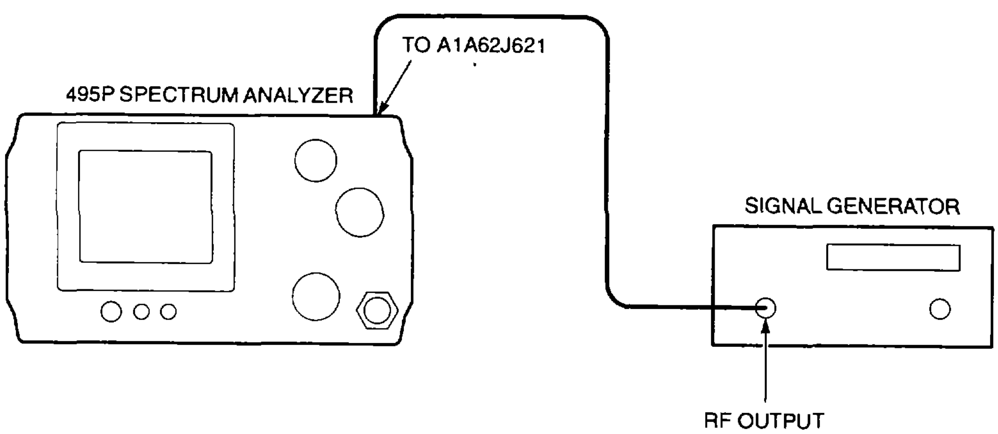
44. Adjust Resolution Bandwidth and Shape Factor (para 2-96).

45. Disconnect equipment from AN/USM-620.

2-98. ADJUST VARIABLE RESOLUTION GAIN STEPS.

1. Perform Initial Setup (para 2-86).

2. With power off, remove A1A68 Variable Resolution Module (para 2-152) and reinstall using extender kit.
   - Install cable assembly between A1W344 (fig FO-1, Sheet 2) and A1A68J693 (fig FO-15).
   - Install cable assembly between A1A68J682 and A1A62J621 (fig FO-13).



3. Connect equipment as shown.
   - Unplug A1W682 (fig FO-1, Sheet 2) from A1A62J621 (fig FO-13).
   - Connect signal generator to A1A62J621.

4. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.

5. Press **Blue-SHIFT and PULSE STRETCHER** keys.

6. Use **DATA ENTRY** to select 5=DISABLE/ENABLE USE OF CAL FACTORS.

7. Use **DATA ENTRY** to select O=DO NOT USE RESULTS.

NOTE

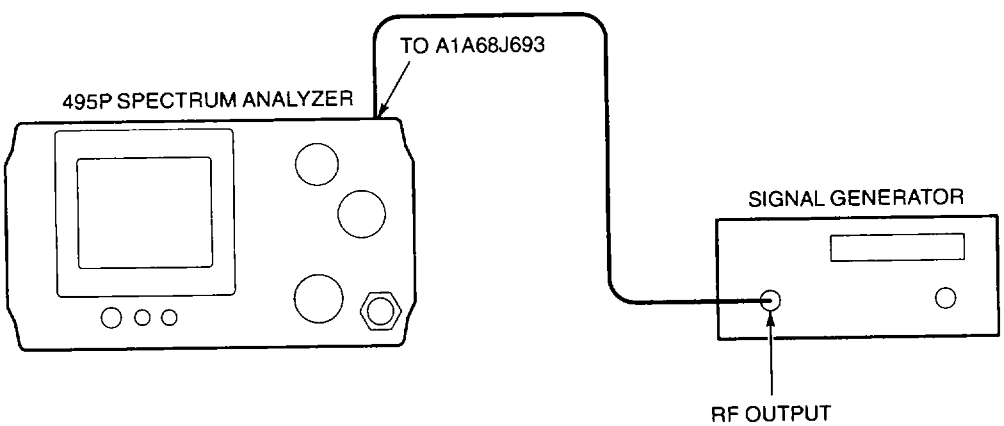
- CAL factors are now set to zero.

- Steps 8-10 verify that A1A62 Log Amplifier CCA is adjusted properly.

8. Set REFERENCE LEVEL to -20 dBm.

9. Select the following signal generator settings.
   FREQUENCY.............................. .... 10MHZ
   AMPLITUDE............................ .... +6DBM

10. Verify that signal is within 0.5 minor division of top graticule line on CRT.
    - If signal is not within limits, adjust A1A62 Log Amplifier (para 2-95) before proceeding.



NOTE

A1A68 Variable Resolution Module should remain on extender kit.

11. Connect equipment as shown.
    - Disconnect signal generator from A1A62J621 (fig FO-13).
    - Install cable assembly between A1A68J682 (fig FO-15) and A1A62J621 (fig FO-13).
    - Unplug A1W344 (fig FO-1, Sheet 2).
    - Connect signal generator to A1A68J693 (fig FO-15).

12. Select the following 495P Spectrum Analyzer settings.

CENTER/MARKER FREQUENCY.....................	0MHZ
SPAN/DIV	1MHZ
REFERENCE LEVEL	-20DBM
VERTICAL DISPLAY...............................	2DB/

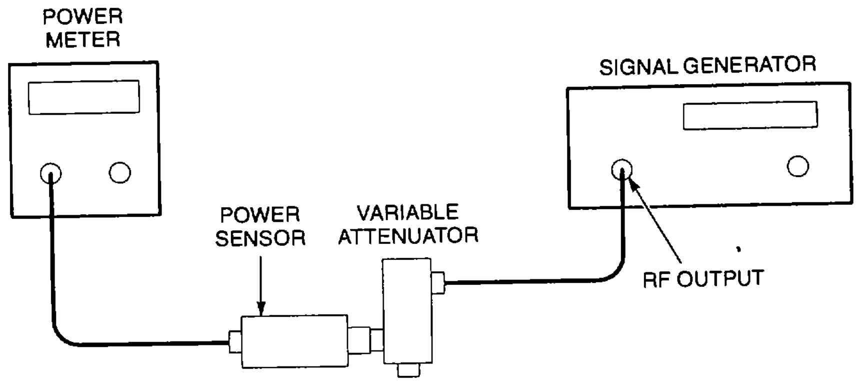
13. Select the following signal generator settings.

FREQUENCY...............................	10MHZ
AMPLITUDE...............................	-25DBM

14. On 495P Spectrum Analyzer, set **AMPL CAL** fully counterclockwise.
15. Adjust A1A68A2R2031 fully counterclockwise.
16. Adjust A1A68A9R1030 (fig FO-17, Sheet 1) to place signal three divisions below top graticule line.
17. Set **AMPL CAL** to place signal one division below top graticule line.
18. Press **SAVE A** key.
19. Set signal generator output level to -35 dBm.
20. On 495P Spectrum Analyzer, set REFERENCE LEVEL to -30 dBm.
21. Adjust A1A68A5R3035 (fig FO-16, Sheet 1) to match trace with SAVE A display.
22. Set signal generator output level to -45 dBm.
23. On 495P Spectrum Analyzer, set REFERENCE LEVEL to -40 dBm.
24. Adjust A1A68A6R2023 to match trace with SAVE A display.
25. Set signal generator output level to -65 dBm.
26. On 495P Spectrum Analyzer, set REFERENCE LEVEL to -60 dBm.
27. Adjust A1A68A3R2045 to match trace with SAVE A display.
28. Repeat Steps 19 through 27 to check for interaction.
29. Disconnect equipment from 495P Spectrum Analyzer.
30. Press **POWER** switch to turn power off and install A1A68 Variable Resolution Module (para 2-152).
31. Press **POWER** switch to turn power on.
32. Connect CAL OUT signal to RF INPUT.
33. Press **Blue-SHIFT and CAL** keys to begin CAL function.
34. Use **FINE** key and follow on-screen prompts to complete CAL function.
35. Disconnect equipment from AN/USM-620.

2-99. ADJUST CAL OUT LEVEL.

1. Perform Initial Setup (para 2-86).



2. Connect equipment as shown.
   - Variable attenuator should have 1 dB steps.

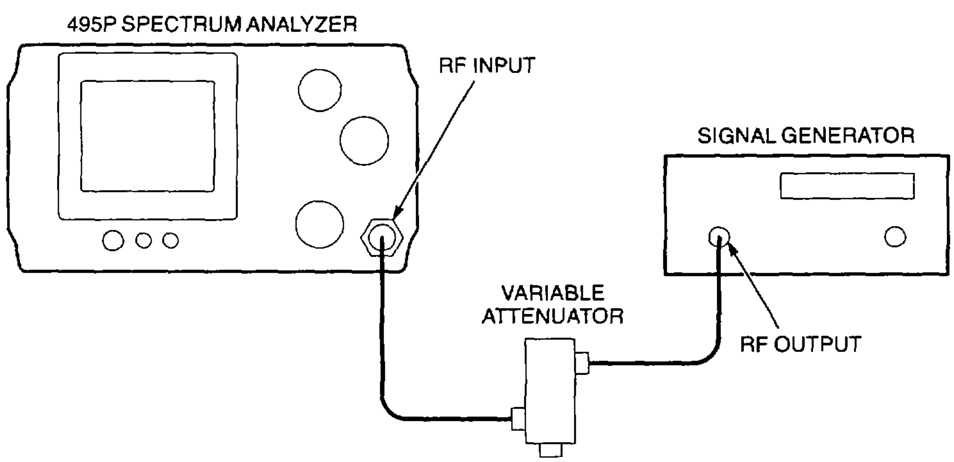
3. Set variable attenuator to 3 dB.

4. Select the following signal generator settings.

   FREQUENCY .... 10 MHZ
   AMPLITUDE .... -20DBM

5. Adjust signal generator output level for -20.0 dBm power meter display.

6. Disconnect power sensor from variable attenuator.



7. Connect equipment as shown.

8. Select the following 495P Spectrum Analyzer settings.

   CENTER/MARKER FREQUENCY 100MHZ
   SPAN/DIV 200KHZ
   RESOLUTION BANDWIDTH 1MHZ
   REFERENCE LEVEL .... -18DBM
   VERTICAL DISPLAY 2DB/

9. Press SAVE A key.

10. Disconnect cable assembly between RF INPUT and variable attenuator.

11. Using cable assembly disconnected in Step 10, connect CAL OUT signal to RF INPUT.

12. Use CENTER/MARKER FREQUENCY knob to align CAL OUT signal with SAVE A trace.

13. Adjust A1A34R1041 (fig FO-7) to match CAL OUT signal level to SAVE A trace.

14. Disconnect equipment from AN/USM-620.

2-100. ADJUST 110 MHZ IF GAIN.

1. Perform Initial Setup (para 2-86).

2. Select the following 495P Spectrum Analyzer settings.

   CENTER/MARKER FREQUENCY 100MHZ
   SPAN/DIV 200KHZ
   RESOLUTION BANDWIDTH 1MHZ
   REFERENCE LEVEL .... -20DBM
   VERTICAL DISPLAY 2DB/

3. Connect CAL OUT signal to RF INPUT.

4. Adjust AMPL CAL fully counterclockwise.

5. Adjust A1A32R1015 (fig FO-7) to place signal three divisions below top graticule line.

6. Adjust AMPL CAL to place signal at top graticule line.

7. Disconnect equipment from AN/USM-620.

2-101. B-SAVE A REFERENCE LEVEL.

NOTE

- **Within procedure, B-SAVE A reference level is a horizontal line on the CRT**
- **B-SAVE A reference level is normally set to center of CRT.**

1. Perform Initial Setup (para 2-86).

2. With power off, remove rear CCA bracket (para 2-132).

3. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.

4. Select the following settings.

   VERTICAL DISPLAY 2DB/
   B-SAVE A .... ON

5. Estimate amount and direction B-SAVE A reference level must move to align with center graticule line.

6. Close or open switches on A1A61A1S1015 (fig FO-13) to move B-SAVE A reference on CRT of AN/USM-620. See table (fig FO-13) for switch values.

7. On 495P Spectrum Analyzer, press POWER switch to turn power off.

8. Install rear CCA bracket (para 2-132).

9. Disconnect equipment from AN/USM-620.

2-102. ADJUST 0 HZ RESPONSE.

1. Perform Initial Setup (para 2-86).

2. Select the following 495P Spectrum Analyzer settings.

   CENTER/MARKER FREQUENCY 0MHZ
   FREQUENCY SPAN/DIV 200KHZ
   REFERENCE LEVEL .... -10DBM
   RESOLUTION BANDWIDTH 100KHZ

3. Press **Blue-SHIFT** and **VIDEO FILTER WIDE** keys.

4. Select 2=REDUCED GAIN MODE TOGGLE.

5. Connect electrical dummy load to RF INPUT.

6. Use **CENTER/MARKER FREQUENCY** knob to center 0 Hz response on CRT.

CAUTION

Be careful when adjusting 0 Hz Response adjustment. A1A12 Mixer may be damaged when too much force is applied.

7. Adjust 0 Hz Response adjustment on A1A12 Mixer (fig FO-2) for lowest amplitude of 0 Hz response.

8. Remove end cap from A1AT126 Variable Load Assembly.

9. Adjust A1AT126 Variable Load Assembly to place peak of 0 Hz response three minor divisions below top graticule line.

10. Replace end cap on A1AT126 Variable Load Assembly.

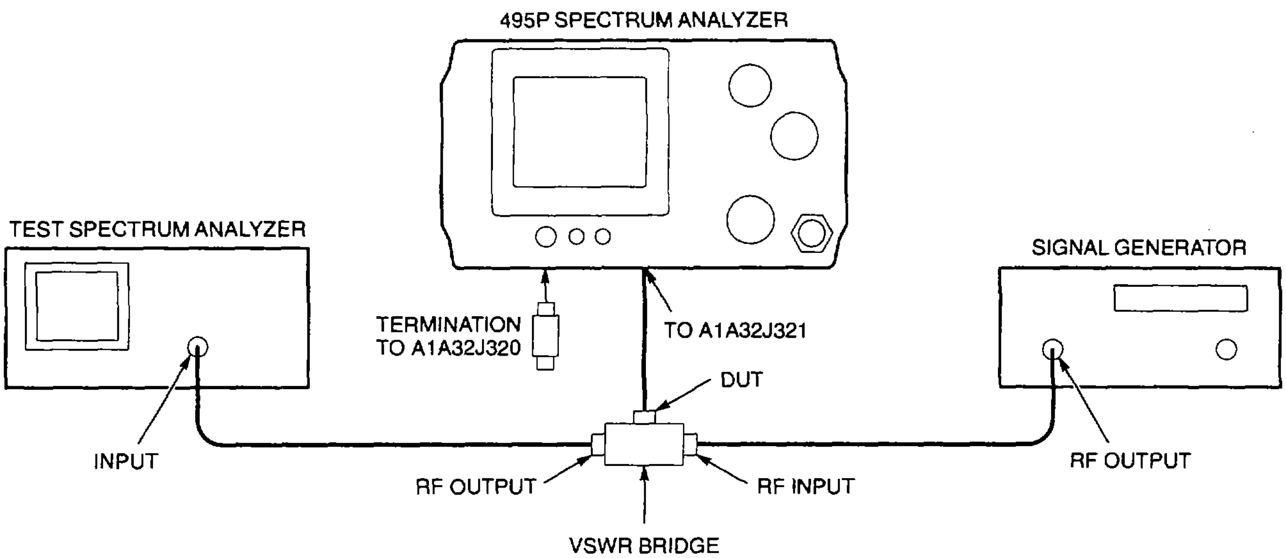
11. Disconnect equipment from AN/USM-620.

2-103. ADJUST 110 MHZ IF ASSEMBLY RETURN LOSS.

1. Perform Initial Setup (para 2-86).

2. Adjust A32R1015 (fig FO-7) to center of range.

3. With power off, remove A1A32 IF Amplifier (para 2-203).



4. Connect equipment as shown.
   - Connect A1A32J321 to VSWR bridge DUT output.
   - Connect termination to A1A32J320.
   - Plug multiwire cable from A1A32 IF Amplifier onto A1A28J3045 (fig FO-5).

5. Select the following signal generator settings.

FREQUENCY	110MHZ
LEVEL	-7DBM

6. Select the following test spectrum analyzer control settings.

CENTERFREQUENCY	110MHZ
SPAN/DIV	5MHZ
REFERENCE LEVEL	-20DBM
VERTICAL DISPLAY	10DB/

7. With power on, adjust A1A32C2047 and A1A32C1054 (fig FO-7) for lowest signal amplitude on CRT of test spectrum analyzer.

8. Disconnect equipment from AN/USM-620.

9. With power off, install A1A32 IF Amplifier (para 2-203).

10. Adjust A1A32R1015 (para 2-100).

2-104. ADJUST AUXILIARY SYNTHESIZER VCO.

1. Perform Initial Setup (para 2-86).

2. Connect (+) DMM lead to A1A26A1TP1066 (fig FO-4). Connect (-) lead to chassis ground.

3. Set CENTER FREQUENCY to 100 MHz.

4. Press **Blue-SHIFT and 10dB/DIV** keys.

NOTE

The message FREQUENCY CORRECTIONS DISABLED appears on CRT.

5. Press **Blue-SHIFT and PULSE STRETCHER** keys.

6. Use **DATA ENTRY** to select 4=DIS/ENABLE AUX SYNTHESIZER TURN OFF.

7. Adjust A1A26AlC1070 for +5 V on DMM display.

8. Disconnect equipment from AN/USM-620.

2-105. ADJUST 110 MHZ FOUR CAVITY FILTER.

1. Perform Initial Setup (para 2-86).

2. Select the following 495P Spectrum Analyzer settings.

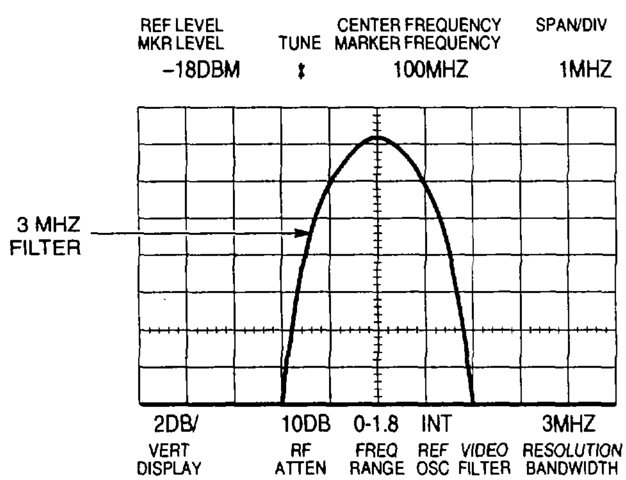
CENTER/MARKER FREQUENCY	100MHz
SPAN/DIV	1MHZ
REFERENCE LEVEL	-18DBM
AUTO RESOLN	OFF
RESOLUTION BANDWIDTH	3MHZ
VERTICAL DISPLAY	2DB/

3. Connect CAL OUT signal to RF INPUT.

4. Press **Blue-SHIFT** and **PULSE STRETCHER** keys. Then select 5=DISABLE/ENABLE USE OF CAL FACTORS and O=DO NOT USE RESULTS.

5. Adjust four tuning screw adjustments on A1 FL36 (fig FO-7) for best response shape. See example waveform.
   - Align center of 3 MHz filter response with center of CRT.
   - Adjust for 3 MHz (±600 kHz) bandwidth at three divisions below signal peak.

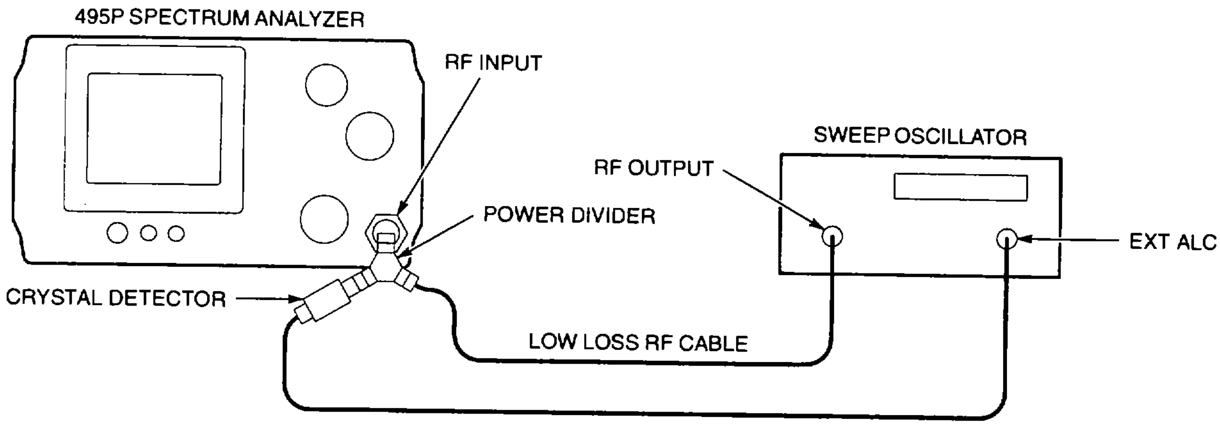
6. Adjust Resolution Bandwidth and Shape Factor (para 2-96).



7. Disconnect equipment from AN/USM-620.

2-106. ADJUST BASELINE LEVELING.

1. Perform Initial Setup (para 2-86).



2. Connect equipment as shown.
   - Sweep oscillator may consist of RF plug-in and oscillator mainframe.
   - Connect low loss RF cable between power divider and sweep oscillator.

3. Select the following 495P Spectrum Analyzer settings.

   REFERENCE LEVEL .... -10DBM
   VERTICAL DISPLAY 1DB/
   PEAK/AVERAGE... COUNTERCLOCKWISE

4. Select the following sweep oscillator settings.

   FREQUENCY.. 900MHZ
   MODE .... CW

5. Adjust sweep oscillator amplitude control until signal peak is four divisions below top graticule line on CRT of 495P Spectrum Analyzer.

6. Select the following sweep oscillator settings.

   FREQUENCY RANGE .... 10 MHZ TO 1.8GHZ
   SWEEP TIME.. MAXIMUM

7. On 495P Spectrum Analyzer, press **MAX HOLD** key.

8. On sweep oscillator, trigger a sweep. Allow sweep oscillator to run for approximately ten minutes.

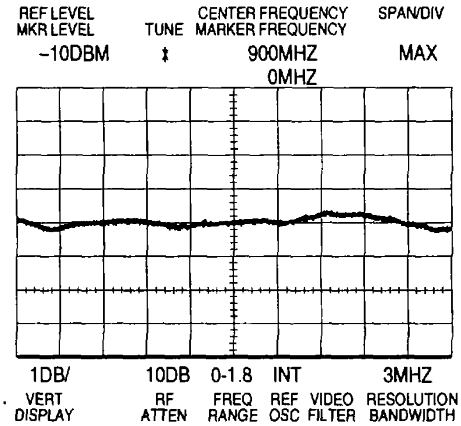
9. On 495P Spectrum Analyzer, press **SAVE A** key to turn on SAVE A mode.

10. Press **MAX HOLD** key to turn off MAX HOLD mode.

NOTE

When measuring amplitude of trace, vertical lines on trace should be ignored.

11. Measure peak-to-peak amplitude of SAVE A trace on the CRT. See example waveform.
    - If trace amplitude measures ≤2 divisions, no adjustment is needed. Perform Step 28.
    - If trace amplitude measures >2 divisions, perform Step 12.



12. Adjust A1A40R1013-A1A40R1034 (fig FO-9) fully counterclockwise.
13. Adjust A1A40R1036 fully clockwise.
14. Adjust A1A40R1038-A1A40R1061 fully counterclockwise
15. Select the following 495P Spectrum Analyzer settings.

    VERTICAL DISPLAY 10DB/
    SAVE A .... OFF

16. Adjust AIA40R1069 to place top of V-shaped trace at center of CRT. The amplitude of V-shaped notch is approximately one division.
17. Adjust A1A40R1036 fully counterclockwise.
18. Repeats Steps 3-11.

NOTE

The reference point established in Step 19 is reference line used for Steps 20-27.

19. Adjust VERTICAL POSITION to align highest point on SAVE A trace with a graticule line.
20. Write on paper the point(s) on CRT of 495P Spectrum Analyzer that is >2 divisions below reference line.
21. Select the following sweep oscillator settings.

FREQUENCY	10MHZ
SWEEP TIME	MANUAL

22. Adjust sweep oscillator frequency until signal aligns with left most point that is > 2 divisions below reference line.
23. Using following table, determine which adjustment will affect frequency that is closest to sweep oscillator frequency.
24. Adjust potentiometer selected in Step 23 to move signal peak within two divisions of reference line.
25. Tune sweep oscillator frequency ± 1 division on 495P Spectrum Analyzer CRT.
    - Verify that signal peak remains within two divisions of reference line.
    - Verify that amplitude of signals within ± 1 division are below reference line.

26. If part of trace checked in Step 25 is not within limits, repeat Steps 24 and 25.

NOTE

A1A40R1013-A1A40R1061 offset the trace by up to 8 dB at given frequencies. The following table shows the frequency where each adjustment affects the trace when A1A40R1036 is adjusted (Steps 12-16).

ADJUSTMENT	FREQUENCY	ADJUSTMENT	FREQUENCY	ADJUSTMENT	FREQUENCY
A1A40R1013	1800 MHz	A1A40R1032	1100 MHz	A1A40R1051	400 MHz
A1A40R1015	1700 MHz	A1A40R1034	1000 MHz	A1A40R1053	300 MHz
A1A40R1019	1600 MHz	A1A40R1036	900 MHz	A1A40R1057	200 MHz
A1A40R1022	1500 MHz	A1A40R1038	800 MHz	A1A40R1059	100 MHz
A1A40R1024	1400 MHz	A1A40R1043	700 MHz	A1A40R1061	000 MHz
A1A40R1026	1300 MHz	A1A40R1045	600 MHz	N/A	N/A
A1A40R1028	1200 MHz	A1A40R1047	500 MHz	N/A	N/A

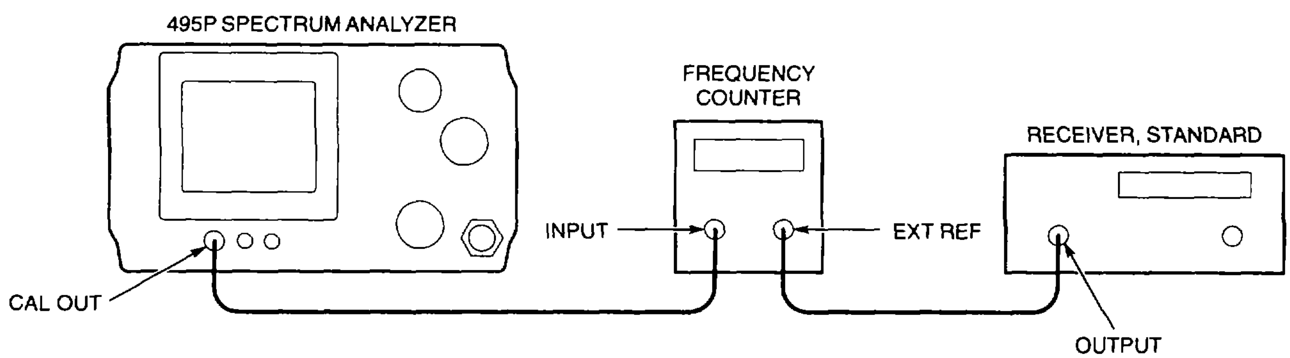
27. Repeat Steps 22-26 to adjust other parts of trace that are not within two divisions of reference line.

28. Disconnect equipment from AN/USM-620.

2-107. ADJUST 10 MHZ REFERENCE OSCILLATOR.

NOTE

Before adjusting, oscillator should warm up for 24 hours to stabilize.



1. Connect equipment as shown.

2. Remove access screw from A1A37 10 MHz Reference Oscillator (fig FO-7).

3. Slowly adjust oscillator for 100,000,000 Hz frequency counter display.

4. Replace access screw.

5. Disconnect equipment from AN/USM-620.

2-108. ADJUST REFERENCE LOCK.

1. Perform Initial Setup (para 2-86).

2. With power off, remove A1A36 Reference Lock (para 2-190).

3. Remove A1A36 Reference Lock cover (fig FO-7).

4. Connect cable assemblies to A1A36 Reference Lock.
   - Connect A1W342 (fig FO-1, Sheet 2) to A1A36P1025 (fig FO-7).
   - Connect A1W361 toA1A36P2026.
   - Connect A1 W260 to A1A36P2025.
   - Reconnect multiwire cables to A1A36P1017, A1A36P1021, and A1A36P1026.

5. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.

6. Select the following oscilloscope settings.

   OLTS/DIV 2V
   IME/DIV.............................. .... 20NS
   NPUT COUPLING .... DC
   RIGGER SOURCE .... CHANNEL 2
   RIGGER SLOPE .... -

7. Connect A1A36TP1044 to Channel 1 of oscilloscope.

8. Connect A1A36TP2046 to Channel 2 of oscilloscope.

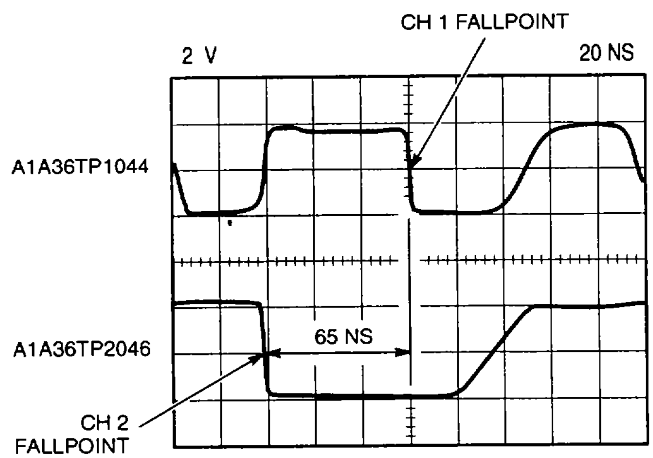
9. Adjust A1A36R2042 for 65 ns time difference between signals. See example waveform.

10. On 495P Spectrum Analyzer, press **POWER** switch to turn power off.

11. Disconnect equipment from 495P Spectrum Analyzer.

12. Install A1A36 Reference Lock cover (fig FO-7).

13. Install A1A36 Reference Lock (para 2-190).



2-109. ADJUST PHASE LOCK ASSEMBLY.

1. Perform Initial Setup (para 2-86).

NOTE

Steps 2 and 3 verify normal phase lock operation.

2. Perform Noise Sideband Amplitude Test (para 2-65).
3. Check CRT for error messages and active sweep.
   - Phase lock operation is normal if Steps 2 and 3 can be completed.
   - Error messages should not appear on CRT.
4. With power off, remove A1A50 Phase Lock Assembly (para 2-123).
5. Remove A1A50 Phase Lock Assembly front cover (para 2-124).
6. Remove A1A50 Phase Lock Assembly rear cover (para 2-125).
7. Place A1A50 Phase Lock Assembly on CCA extender cards.
   - Install cable assembly between A1W350 (fig FO-1, Sheet 2) and A1A50J501 (fig FO-10).
   - Install cable assembly between A1W502 and A1A50J502.
8. On 495P Spectrum Analyzer, press POWER switch to turn power on.
9. Connect CAL OUT signal to RF INPUT.
10. Press Blue-SHIFT and CAL keys to start CAL function.
11. Use FINE key and follow on-screen prompts to complete CAL function.
12. Select the following settings.

CENTER/MARKER FREQUENCY 100MHZ
SPAN/DIV 200KHZ
REFERENCE LEVEL .... -20DBM

NOTE

Steps 13-21 adjust A1A50A5 Oscillator CCA.

13. Press Blue-SHIFT and PULSE STRETCHER keys.
14. Use DATA ENTRY to select 1=FREQUENCY LOOPS CAL.
15. Use DATA ENTRY to select 5=PHASE LOCK SYNTHESIZER.
16. Connect (+) DMM lead to A1A50A5 Oscillator CCA pin B. Connect (-) lead to chassis ground.

17. Adjust A1A50A5C2011 for +11.2 V to +11.4 V on DMM display.

18. Press GHz key.

19. Adjust Al A50A5C1013 for +5.8 V to +6.0 V on DMM display.

20. Press MHz key.

21. Press Blue-SHIFT key.

NOTE

Steps 22-32 adjust A1A50A4R3082 and A1A50A4R1061.

22. Remove termination or coaxial cable from 1 ST LO OUTPUT.

23. Set A1A50A4R3082 fully counterclockwise, then adjust it clockwise 210 degrees.

24. Set A1A50A4R1061 fully clockwise.

25. Press **Blue-SHIFT** and **RESET** keys.

26. Select the following settings.

SPAN/DIV 200KHZ
AUTO RESOLN .... OFF
RESOLUTION BANDWIDTH 100KHZ

27. Press **Blue-SHIFT** and **STEP ENTRY** keys.

28. Enter 25 MHz using **DATA ENTRY** keypad. This sets **STEP** ENTRY key to 25 MHz.

29. Press **STEP ENTRY** key.

30. Verify that CRT does not display error messages.

31. Repeat Steps 29 and 30 until frequency range to 1.8 GHz has been tested.

32. If error messages are displayed at any time, adjust A1A50A4R3082 slightly counterclockwise and repeat Steps 25-31.

33. Install termination or coaxial cable from 1 ST LO OUTPUT.

34. Press **POWER** switch to turn power off.

35. Install A1A50 Phase Lock Assembly front cover (para 2-124).

36. Install A1A50 Phase Lock Assembly rear cover (para 2-125).

37. Install A1A50 Phase Lock Assembly (para 2-123).

38. Perform Steps 2 and 3 to verify normal phase lock operation.

39. Disconnect equipment from AN/USM-620.

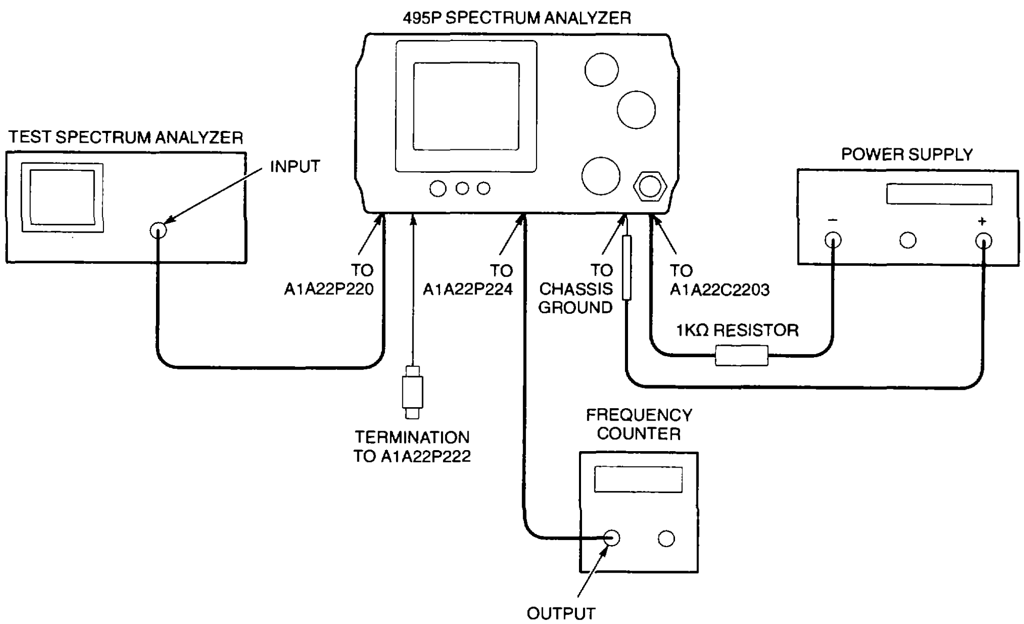
2-110. ADJUST 2182 MHZ SECOND LO FREQUENCY.

1. Perform Initial Setup (para 2-86).

2. With power off, remove A1A22 Phase Locked 2nd LO (para 2-206).

3. Remove 2nd LO bottom cover (para 2-208).

4. Remove 2nd LO top cover (para 2-207, Steps 2 and 3).



5. Connect equipment as shown. Use the following list as a guide for equipment connections.

   - Unsolder wire lead attached to feed-through capacitor A1A22C2203 (fig FO-3).
   - Replace top cover (para 2-207, Steps 6 and 7). Use three screws to hold cover in place.
   - Turn module over so top cover faces 495P Spectrum Analyzer.
   - Plug A1A22W1 048 onto A1A28J1046 and A1A28J1048 (fig FO-5).
   - Connect termination to A1A22P222 (fig FO-3).
   - Connect power supply (+) lead to chassis ground.
   - Connect 1 kW resistor between power supply (-) lead and junction of A1A22C2203 and A1A22A2A1L2031.
   - Install cable assembly between A1A34J3019 (fig FO-7) and A1A22P221 (fig FO-3).
   - Install cable assembly between A1A22P220 and test spectrum analyzer.
   - Install cable assembly between A1A22P224 and frequency counter.

NOTE

- **Keep test cables away from A1A2A2A1 Oscillator CCA. Test signals may affect oscillator frequency.**
- **Be careful to keep 1 kΩ resistor from shorting to chassis or other components. Oscillator frequency will change if resistor shorts to other circuits.**

6. On 495P Spectrum Analyzer, press POWER switch to turn power on.

7. On test spectrum analyzer, select the following control settings.

   FREQUENCY 2182MHZ
   SPAN/DIV 2MHZ
   REF LEVEL............................... .... +10DBM

8. Set DC power supply to 5 V.

   - Voltage at A1A22C2203 (fig FO-3) should be -5 V.
   - Verify that 2182 MHz signal appears on CRT of test spectrum analyzer.

NOTE

- **Touching A1A22A2A1C1023 when measuring voltage at A1A22A2A1TP1015 will vary oscillator frequency and measured voltage.**
- **A1A22A2A1TP1015 is solder pad that connects to open end of A1A22A2A1R1015.**

9. Connect (+) DMM lead to A1A22A2A1TP1015. Connect (-) lead to chassis ground.

10. Adjust A1A22A2A1C1023 for +145 mV to +155 mV on DMM display.

    - Push tab down for more negative voltage.
    - Move tab away from CCA for more positive voltage.

11. Check CRT of test spectrum analyze to measure 2182 MHz LO frequency.

    - If frequency between 2.181 GHz and 2.183 GHz, perform Step 17.
    - If frequency not within limits, perform Step 12.

12. Adjust A1A22A2A1C1022 for frequency between 2.181 GHz and 2.183 GHz on CRT of test spectrum analyzer.

    - Bend tab up to increase frequency. Bend down to decrease frequency.
    - If frequency adjusts within limits, perform Step 17. Complete Steps 13-16 only when oscillator frequency will not adjust using A1A22A2A1C1022.

NOTE

- **Steps 13-16 change the frequency range of A1A22A2A1 C1022.**
- **Tuning stub length changes oscillator frequency. Marks along stub show frequency scale. Each minor mark changes frequency by 35 MHz.**

13. Bend A1A22A2A1C1022 so it is 45 degrees above A1A2A2A1 Oscillator CCA surface.

14. Estimate amount and direction frequency must change to set frequency near 2180 MHz.

15. Change tuning stub length and adjust oscillator frequency.

    - If frequency is high, make stub longer. Solder across cut and use cutting tool to trim stub length as needed.
    - If frequency is low, use cutting tool to trim stub length.

16. Adjust tab A1A22A2A1C1022 to set oscillator frequency.

    - Frequency must be between 2.181 GHz and 2.183 GHz.
    - Bend tab up to increase frequency. Bend down to decrease frequency.

17. Hold bottom cover in place over A22A2A1 Oscillator CCA and check frequency counter display.

    - Frequency must be between 17.5 MHz and 18.5 MHz.

18. Adjust A1A22A2A1C1023 for +145 mV to +155 mV on DMM display.

    - Push tab down for more negative voltage.
    - Move tab away from CCA for more positive voltage.

19. Repeat Steps 16, 17, and 18 until frequency and voltage are within limits.

20. Press **POWER** switch to turn power off.

21. Disconnect test equipment from AN/USM-620.

22. Remove three screws fastening top cover and remove cover.

23. Solder wire lead to feed-through capacitor A1A22C2203.

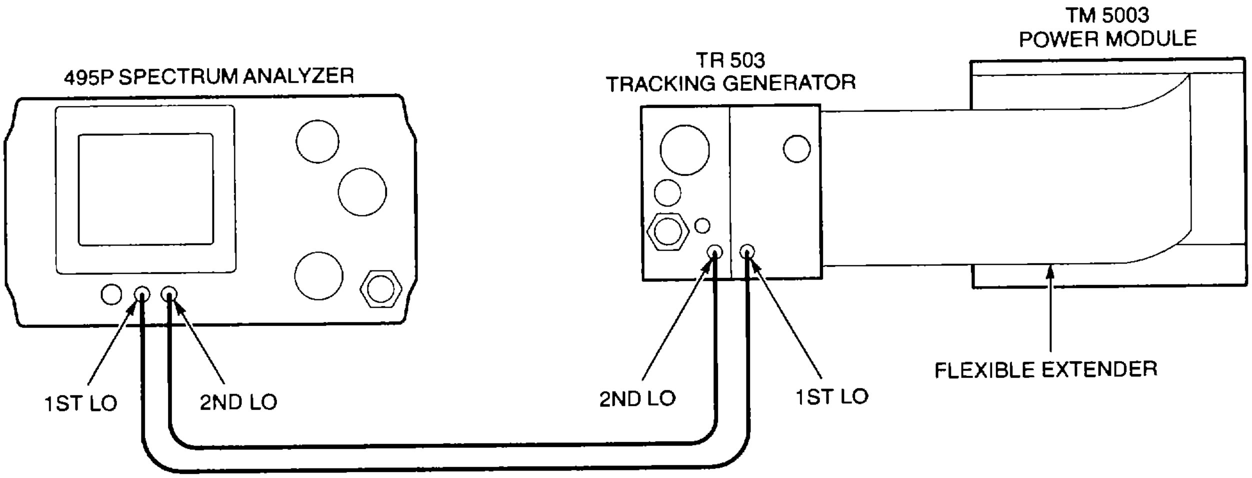
24. Install 2nd LO bottom cover (para 2-208).

25. Install 2nd LO top cover (para 2-207, Steps 2 and 3).

26. Install A1A22 Phase Locked 2nd LO (para 2-206).

2-111. ADJUST 55 MHZ OSCILLATOR MODE.

1. With TM 5003 Power Module power off, remove A2A35 Control Assembly cover (para 2-229).



2. Connect equipment as shown.

3. On AN/USM-620, press **POWER** switches to turn power on. Select the following settings.

MIN RF ATTEN.................................... 0 (NORM)
TIME/DIV 20NS
OUTPUT LEVEL .... ODB
VAR DB .... ODB

4. Connect 1X probe between A2A35A3 pin K (fig FO-22) and frequency counter.

5. Connect oscilloscope to A2A35A3 pin K.

6. Select the following oscilloscope settings.

VOLTS/DIV 0.2V
TIME/DIV 20NS
INPUT COUPLING................................ AC

7. Check oscilloscope CRT for correct waveform. See fig FO-22, waveform 2.

8. Adjust **TRACKING ADJUST** knob fully counterclockwise.

- Check oscilloscope CRT for ≥ 800 mVp.p waveform.
- Write on paper the frequency counter display for future reference.

9. Adjust **TRACKING ADJUST** knob fully clockwise.

- Check oscilloscope CRT for ≥ 800 mVp-p waveform.
- Write on paper the frequency counter display for future reference.

10. Check range of **TRACKING ADJUST** knob. See written values from Steps 8 and 9 for measured range.

- Range must be ≤ 54.998 MHz and ≥ 55.002 MHz.

11. If necessary, carefully adjust A2A35A3C524 to set **TRACKING ADJUST** knob range.

12. Repeat Steps 8-10 to check range after adjustment.

13. Install A2A35 Control Assembly cover (para 2-218).

14. On TM 5003 Power Module, press **POWER** switch to turn on TR 503 Tracking Generator.

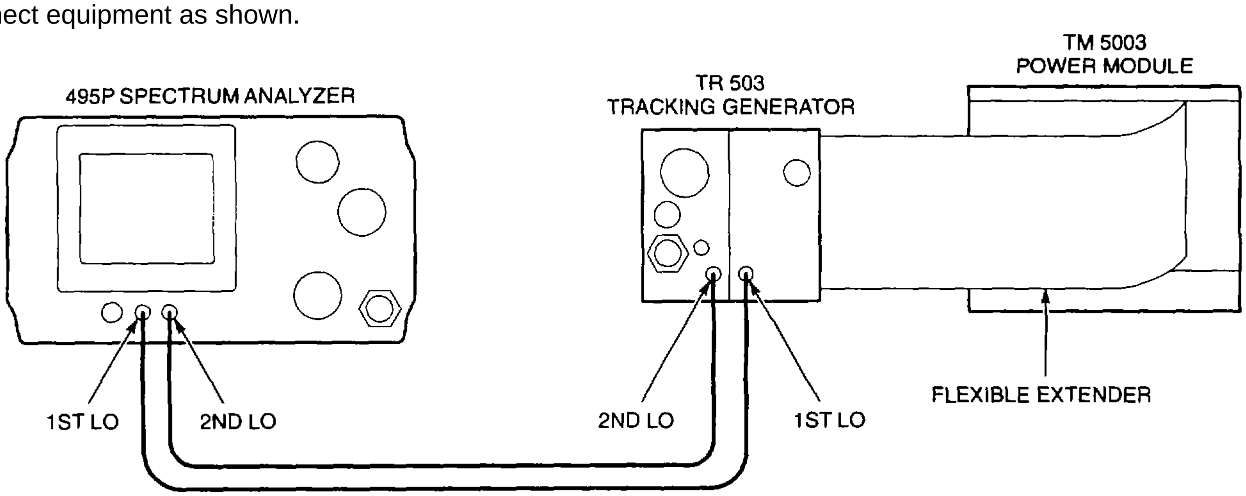
15. Perform Alignment (CAL) Procedure (TM 11-6625-3278-12, para 2-7) to verify that **TRACKING ADJUST** knob tracks 495P Spectrum Analyzer.

16. Disconnect equipment from AN/USM-620.

2-112. ADJUST NORMALIZING ATTENUATOR.

1. With TM 5003 Power Module power off, remove side shield (para 2-218).

2. Connect equipment as shown.



3. On AN/USM-620, press POWER switches to turn power on. Select the following settings.

   MIN RF ATTEN .... 0 (NORM)
   TIME/DIV 20MS
   OUTPUT LEVEL .... ODB
   VAR DB .... ODB

4. Connect RF OUT to RF INPUT.

5. Set VERTICAL SCALE to 1 DB/.

6. Adjust A2A15R215 (fig FO-21) for flattest trace.

   - Peak-to-peak amplitude of trace must be $\leq$ 2.25 divisions.

7. Disconnect equipment from AN/USM-620.

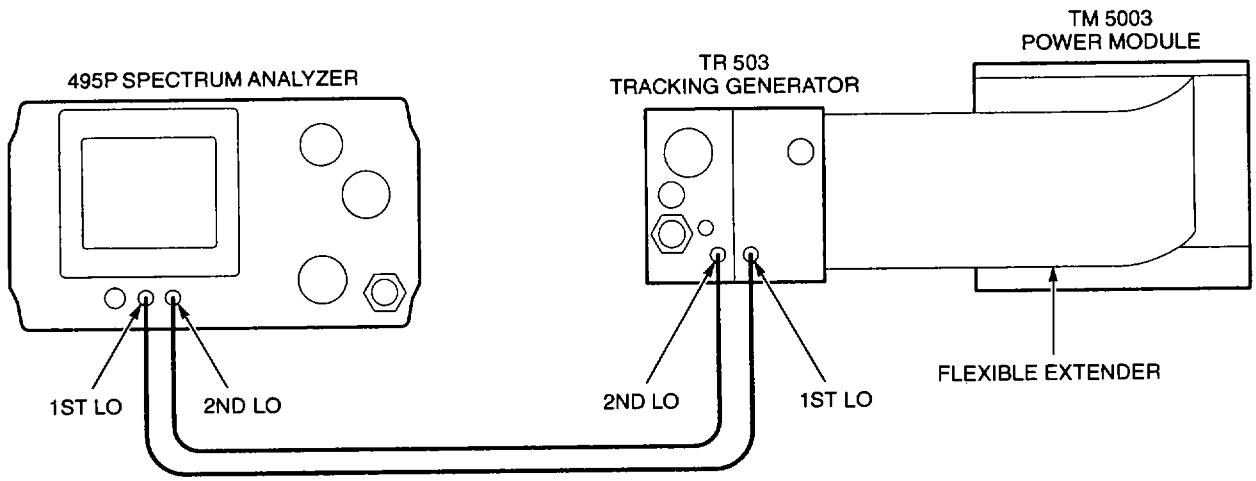
8. Press **POWER** switch to turn power off. Install side shield (para 2-218).

2-113. ADJUST OUTPUT LEVEL.

1. With TM 5003 Power Module power off, remove side shield (para 2-218).

2. Select the following TR 503 Tracking Generator settings.

    OUTPUT LEVEL .... ODBM
    VAR DB 0



3. Connect equipment as shown.

4. Connect CAL OUT signal to RF INPUT.

5. Select the following 495P Spectrum Analyzer settings.

    CENTER/MARKER FREQUENCY 100MHZ
    SPAN/DIV 50KHZ
    TIME/DIV .... AUTO
    MIN RF ATTEN .... 0 (NORM)

6. Press **Green-SHIFT** and **PEAK FIND** keys.

7. Press **Blue-SHIFT** and **MKR-CENTER** keys.

8. Press **ZERO SPAN** key.

9. Disconnect CAL OUT signal from RF INPUT.

NOTE

Power meter should be calibrated to measure 100 MHz signal.

10. Connect power meter to RF OUT.

11. Set **VAR dB** knob to -2.

12. Adjust A2A1 5R225 (fig FO-21) for -2 dBm power meter display.

13. Set **VAR dB** knob to 0.

14. Adjust A2A15R220 for 0 dBm power meter display.

15. Set **VAR dB** knob to -1.

16. Adjust A2A1 5R222 for -1 dBm power meter display.

17. Repeat Steps 11 through 16 for best tracking of **VAR dB** knob.

18. Disconnect equipment from AN/USM-620.

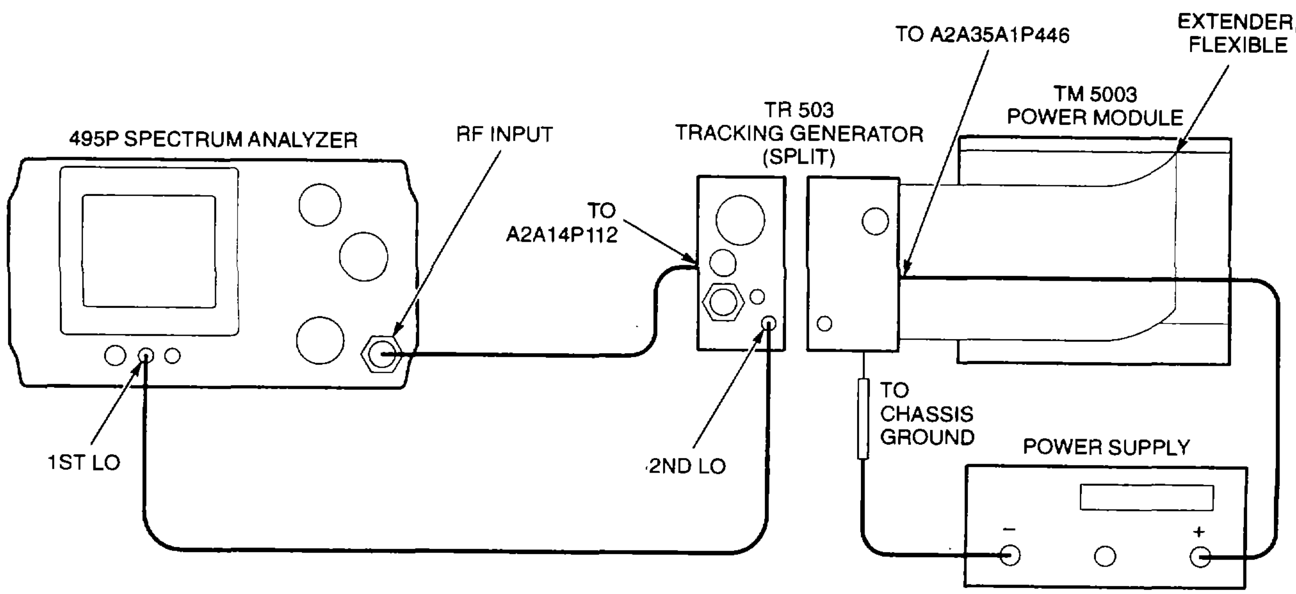
19. Press **POWER** switch to turn power off. Install side shield (para 2-218).

2-114. ADJUST FOUR-CAVITY FILTER/MIXER.

1. With TM 5003 Power Module power off, remove side shield (para 2-218).

2. Remove block retainers (para 2-220). This procedure divides TR 503 Tracking Generator into two modules.

3. Remove jumper from A2A35A1 P446 (fig FO-22).



4. With TM 5003 Power Module power off, connect equipment as shown.

- Connect semirigid cable A2W105 (fig FO-20) between A2A1 OP107 and A2A11 P108 (fig FO-21).
- Connect multiwire cable between A2A35A1 P370 (fig FO-22) and A2A15P210 (fig FO-21).
- Connect (+) power supply lead to A2A35A1 P446 pin 2 (fig FO-22). Connect the (-) lead to chassis ground.
- Connect cable assembly between 1 ST LO OUTPUT and 2nd LO INPUT.
- Connect cable assembly between A2A14P112 (fig FO-21) and RF INPUT.

5. On TM 5003 Power Module, press **POWER** switch to turn power on.

6. Adjust power supply output for +8 V at A2A35A1 P446 pin 2 (fig FO-22).

7. On 495P Spectrum Analyzer, press **POWER** switch to turn power on.

8. Select the following settings.

CENTER/MARKER FREQUENCY 110MHZ
SPAN/DIV 5MHZ
REF LEVEL............................... .... -15DBM

9. Carefully adjust power supply voltage for maximum signal amplitude on CRT.

10. Press **2dB/DIV** key.

11. Loosen three screws on A2A31 BA1Anced Mixer and two screws on A2A32 2nd LO Filter (fig FO-21).

CAUTION

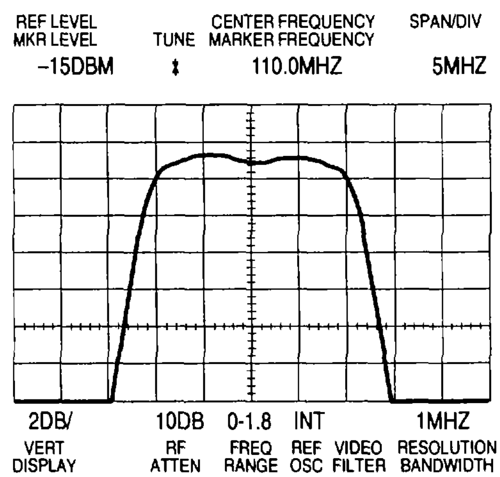
Move left and right modules of TR 503 Tracking Generator only far enough apart to access adjustments. Cable assembly A2W105 will be bent if modules are moved too far.

12. Carefully move left and right modules of TR 503 apart to access filter adjustments.

NOTE

Typical gap between bracket on A2A32 2nd LO Filter and six-sided part of A2A31 Balanced Mixer is 0.1 to 0.2 inch.

13. Rotate A2A31 BA1Anced Mixer, and slide or out of A2A32 2nd LO Filter to achieve flattest top on trace. See example waveform.



14. Adjust four tuning screw adjustments on A2A32 2nd LO Filter for the best response.

    - Center of waveform should be 110 MHz (± 1 MHz).
    - Bandwidth must be ≥13 MHz at location three divisions below top of response.

15. Tighten three screws on A2A31 Balanced Mixer and two screws on A2A32 2nd LO Filter.

16. Disconnect equipment from AN/USM-620.

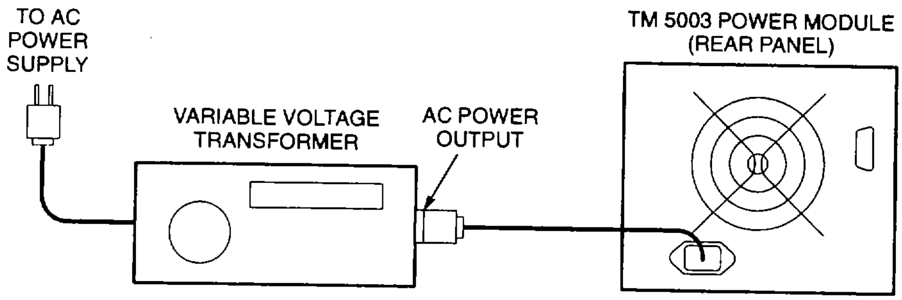
17. Install jumper at A2A35A1 P446 (fig FO-22).

18. Press **POWER** switch to turn TR 503 Tracking Generator off.

19. Install block retainers (para 2-220).

20. Install side shield (para 2-218).

2-115. ADJUST +8 VOLTS.



WARNING

Hazardous voltages are present when covers are removed. Where maintenance can be performed without having power applied, power cord should be disconnected.

1. With power off, remove TM 5003 Power Module top cover(para 2-241).
2. Verify that rear panel line voltage indicator is set for voltage in your area.
   - Perform Preliminary Servicing and Adjustment of Equipment (para 2-5) if voltage setting must be changed.
3. Plug TR 503 Tracking Generator into TM 5003 Power Module.
4. Connect equipment as shown.
5. Press **POWER** switch to turn TM 5003 Power Module on.
6. Connect (+) DMM lead to A3A11J1360 (fig FO-25, Sheet 1). Connect (-) lead to A3A11J1260.
7. Set A3A11 R1830 fully clockwise.
8. Set variable autotransformer AC power output to nominal value for selected range on TM 5003 Power Module.
9. Adjust A3A11 R1530 for +8.2 V on DMM display.
10. Disconnect equipment from AN/USM-620.
11. Press POWER switch to turn power off.
12. Install TM 5003 Power Module top cover (para 2-241).

2-116. ADJUST CLOCK OSCILLATOR FREQUENCY.

WARNING

Hazardous voltages are present when covers are removed. Where maintenance can be performed without having power applied, power cord should be disconnected.

1. With power off, remove TM 5003 Power Module top cover (para 2-241).
2. Verify that rear panel line voltage indicator is set for voltage in your area.
   - Perform Preliminary Servicing and Adjustment of Equipment (para 2-5) if voltage setting must be changed.
3. Plug TR 503 Tracking Generator into TM 5003 Power Module.
4. Press **POWER** switch to turn TM 5003 Power Module on.
5. Connect frequency counter to All U1720 pin 5 (fig FO-25, Sheet 1).
6. Adjust A3A11 R1615 for between 40 kHz and 42 kHz on frequency counter display.
7. Disconnect equipment from AN/USM-620.
8. Press **POWER** switch to turn power off.
9. Install TM 5003 Power Module top cover (para 2-241).

2-117. CLEANING.

Spectrum Analyzer System AN/USM-620 should be cleaned as often as operating conditions require. Dirt and grease accumulation may cause overheating and component failures.

CAUTION

- To avoid damage to plastic parts, do not use chemical cleaning agents that may damage plastics. Use a non-residue-type cleaner such as mild, liquid detergent (Appendix B, Item 3).
- Do not clean enclosed and sealed RF modules shown below. Exposure to moisture may cause permanent damage.

A1AT10 Step Attenuator
A1AT12 Attenuator
A1AT16 Attenuator
A1AT124 Attenuator
A1AT126 Variable Load Assembly
A1A12 Mixer
A1A15 Bias Return
A1A16 1st LO Assembly
A1A18 2nd Converter Assembly
A1A22 Phase Locked 2nd LO
A1A24 Phase Gate Assembly
A1A25 Harmonic Mixer
A1A32 IF Amplifier
A1A34 3rd Converter Assembly
A1A36 Reference Lock
A1A37 10 MHz Reference
A1A50 Phase Lock Assembly
A2A6 1st LO Amplifier
A2A7 Isolator
A2A8 Lowpass Filter
A2A9 Bandpass Filter
A2A10 Isolator
A2A11 Mixer
A2A12 Amplifier and Detector
A2A13 Step Attenuator
A2A14 Amplitude Control

2-118. REPLACE CABINET.

DESCRIPTION
This procedure covers: Remove and Install

WARNING

To avoid electrical shock, disconnect the power cord before proceeding.

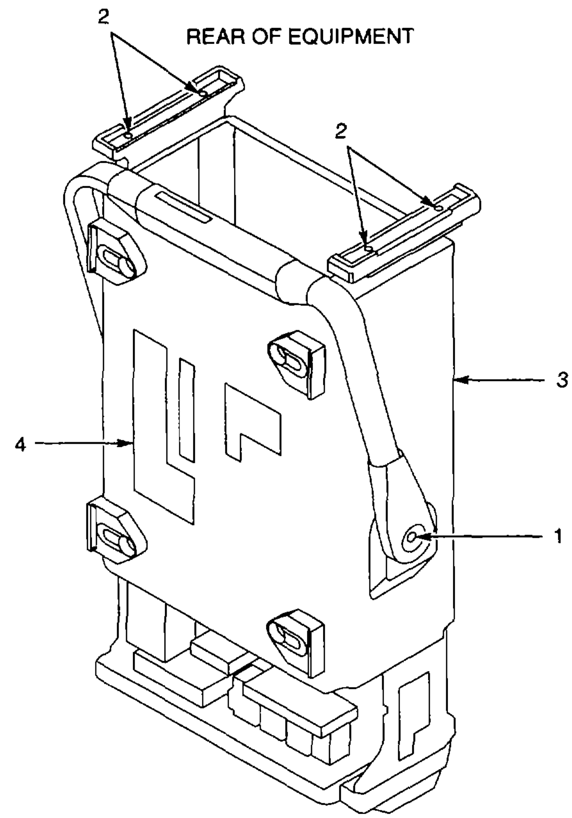
REMOVE

1. Hold in button (1) on each side of handle, and rotate handle to rear.

2. Set 495P Spectrum Analyzer on its front surface.

3. Loosen four screws (2) at rear of cabinet (3).

4. Slide cabinet (3) up, and remove it from chassis.



INSTALL

1. Hold in button (1) on each side of handle, and rotate handle to rear.

2. Set chassis on its front surface.

3. Align air holes (4) in cabinet (3) with bottom of chassis" and slide cabinet onto chassis.

4. Tighten four screws (2) on rear of cabinet.

5. Set 495P Spectrum Analyzer on its feet.

END OF TASK

2-119. REPLACE A1A40 VIDEO PROCESSOR CCA.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).

2., Remove two screws (1), nut (2), and bracket (3).

3. Pull up A1A40 Video Processor CCA (4), and remove from chassis.

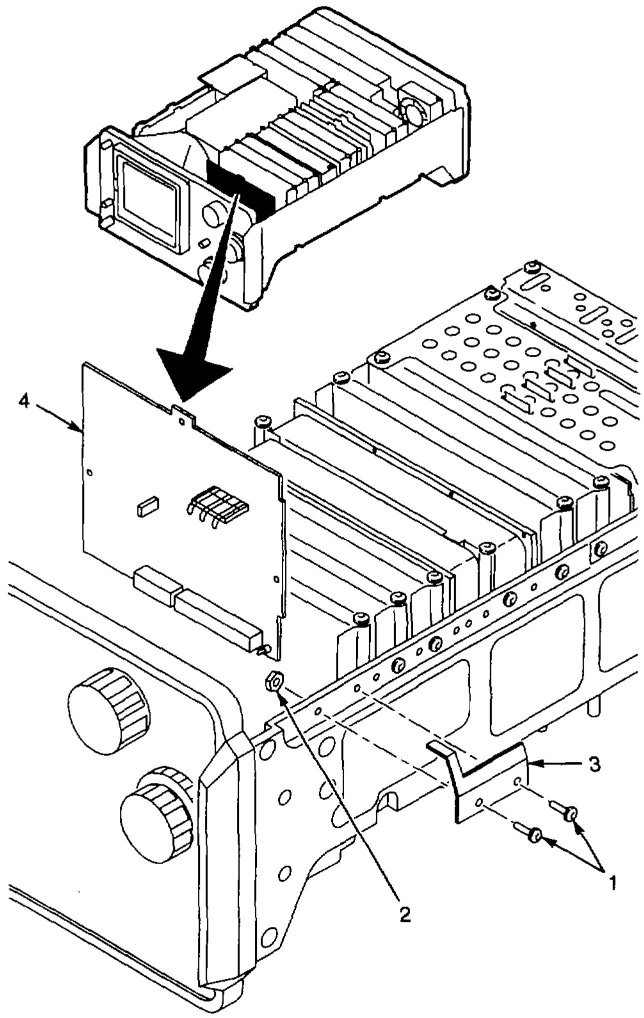
INSTALL

1. Place A1A40 Video Processor CCA (4) in CCA guides with component side towards front of chassis.

2. Press down A1A40 Video Processor CCA (4) to seat connectors onto pins on A1A28 Mother Board CCA.

3. Secure bracket (3) with two screws (1) and nut (2).

4. Install cabinet (para 2-118).



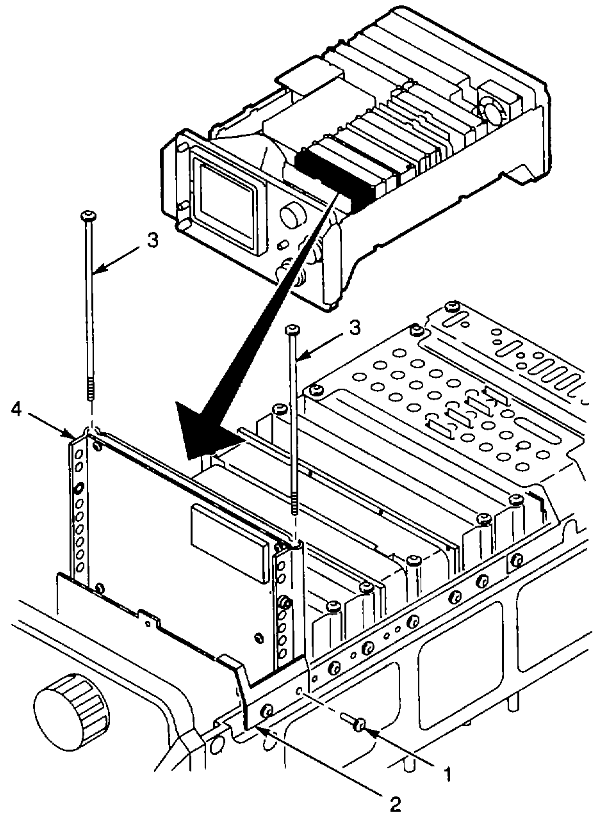
END OF TASK

2-120. REPLACE A1A44 1ST LO DRIVER CCA.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove screw (1) that secures rear of bracket (2) to side frame.
3. Remove two screws (3) from top of A1A44 1 st LO Driver CCA (4).
4. Pull up A1A44 1 st LO Driver CCA (4), and remove from chassis.



INSTALL

1. Align A1A44 1st LO Driver CCA (4) with pins on A1A28 Mother Board CCA.
2. Press down A1A44 1st LO Driver CCA (4) to seat connectors onto pins.
3. Install screw (1) in rear of bracket (2).
4. Install two screws (3) to secure A1A44 1 st LO Driver CCA (4) to chassis.
5. Install cabinet (para 2-118).

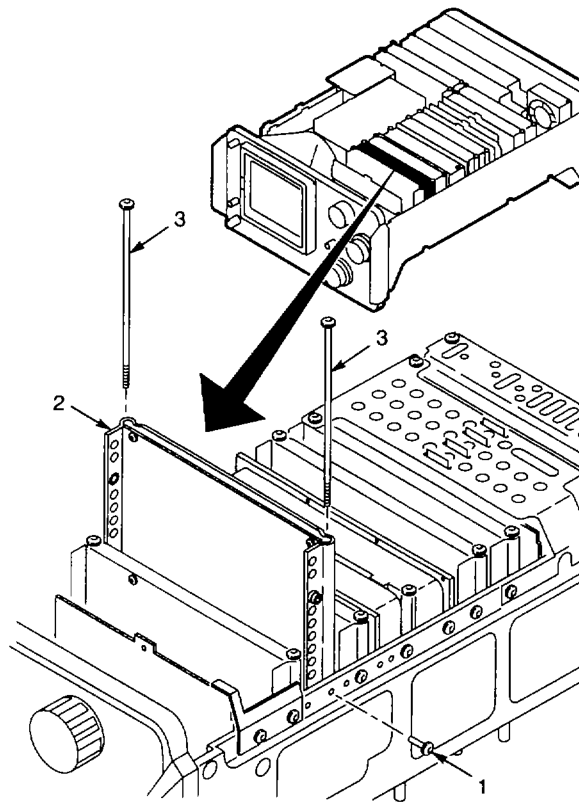
END OF TASK

2-121. REPLACE A1A46 CENTER FREQ CONTROL CCA.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove screw (1) that secures A1A46 Center Freq Control CCA (2) to side frame.
3. Remove two screws (3) from top of A1A46 Center Freq Control CCA (2).
4. Pull up A1A46 Center Freq Control CCA (2), and remove from chassis.



INSTALL

1. Align A1A46 Center Freq Control CCA (2) with pins on A1A28 Mother Board CCA.
2. Press down A1A46 Center Freq Control CCA (2) to seat connectors onto pins.
3. Install screw (1) to secure A1A46 Center Freq Control CCA (2) to side frame.
4. Install two screws (3) to secure A1A46 Center Freq Control CCA (2) to chassis.
5. Install cabinet (para 2-118).

END OF TASK

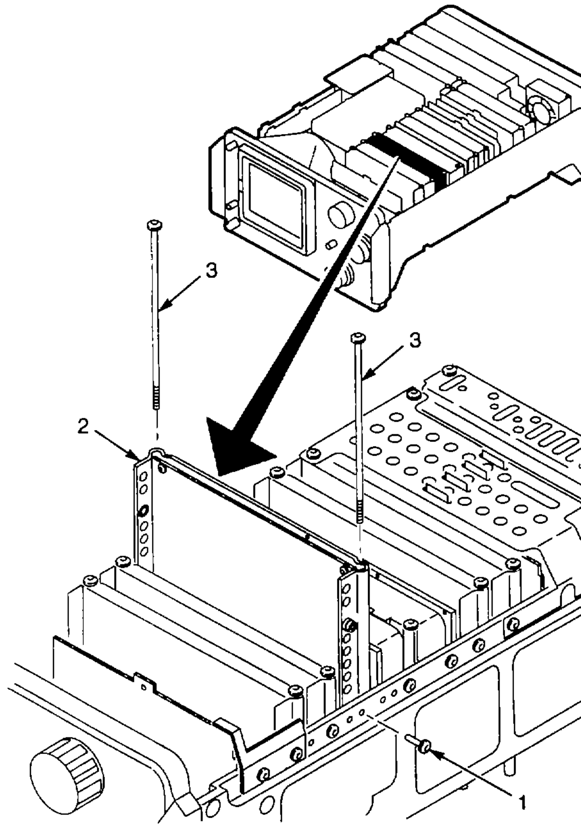
2-122. REPLACE A1A48 SPAN ATTENUATOR CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove screw (1) that secures A1A48 Span Attenuator CCA (2) to side frame.
3. Remove two screws (3) from top of A1A48 Span Attenuator CCA (2).
4. Pull up A1A48 Span Attenuator CCA (2), and remove it from chassis.



INSTALL

1. Align A1A48 Span Attenuator CCA (2) with pins on A1A28 Mother Board CCA.
2. Press down A1A48 Span Attenuator CCA (2) to seat connectors onto pins.
3. Install screw (1) to secure A1A48 Span Attenuator CCA (2) to side frame.
4. Install two screws (3) to secure A1A48 Span Attenuator CCA (2) to chassis.
5. Install cabinet (para 2-118).

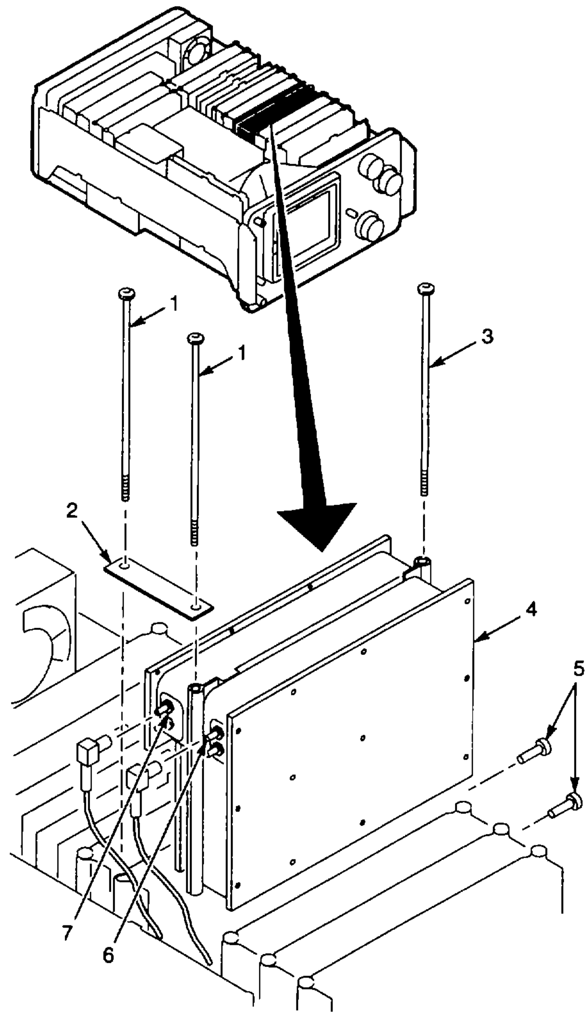
END OF TASK

2-123. REPLACE A1A50 PHASE LOCK ASSEMBLY.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove two screws (1) that secure ground plate (2), and remove ground plate.
3. Remove screw (3) from top of A1A50 Phase Lock Assembly (4).
4. Remove two screws (5) that secure A1A50 Phase Lock Assembly (4) to side frame.
5. Pull up A1A50 Phase Lock Assembly (4), and unplug cables from A1A50J501 (6) and A1A50J502 (7).
6. Lift A1A50 Phase Lock Assembly (4) from chassis.



INSTALL

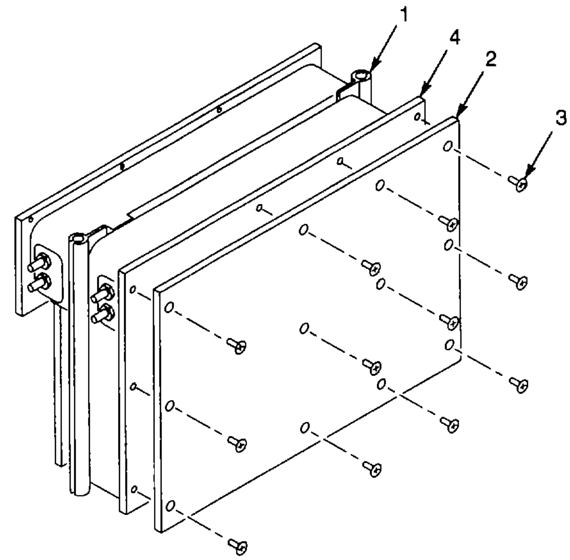
1. Plug cable labeled J501 onto connector A1A50J501 (6).
2. Plug cable labeled J502 to connector A1A50J502 (7).
3. Align connectors on A1A50 Phase Lock Assembly (4) with pins on A1A28 Mother Board CCA.
4. Press down A1A50 Phase Lock Assembly (4) to seat connectors onto pins.
5. Install two screws (5) to secure A1A50 Phase Lock Assembly (4) to side frame.
6. Install screw (3) in top of A1A50 Phase Lock Assembly (4).
7. Install two screws (1) to secure ground plate (2).
8. Install cabinet (para 2-118).

END OF TASK

2-124. REPLACE A1A50 PHASE LOCK ASSEMBLY FRONT COVER.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE



1. Remove A1A50 Phase Lock Assembly (para 2-123).
2. Set A1A50 Phase Lock Assembly (1) on work surface with front cover (2) up.
3. Remove 12 screws (3) that secure front cover (2).
4. Remove front cover (2).

INSTALL

1. Set A1A50 Phase Lock Assembly (1) on work surface with front shield (4) up.
2. Place front cover (2) on front shield (4), aligning holes in cover with holes in shield.
3. Install 12 screws (3) to secure front cover (2) to front shield (4).
4. Install A1A50 Phase Lock Assembly (para 2-123).

END OF TASK

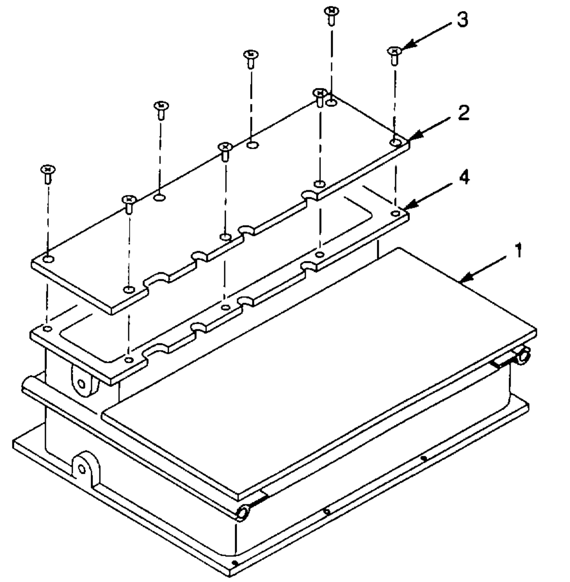
2-125. REPLACE A1A50 PHASE LOCK ASSEMBLY REAR COVER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A1A50 Phase Lock Assembly (para 2-123).
2. Set A1A50 Phase Lock Assembly (1) on work surface with rear cover (2) up.
3. Remove eight screws (3) from rear cover (2).
4. Remove rear cover (2).



INSTALL

1. Set A1A50 Phase Lock Assembly (1) on work surface with rear shield (4) up.
2. Place rear cover (2) on rear shield (4), aligning holes in cover with holes in shield.
3. Install eight screws (3) to secure rear cover (2) to rear shield (4).
4. Install A1A50 Phase Lock Assembly (para 2-123).

END OF TASK

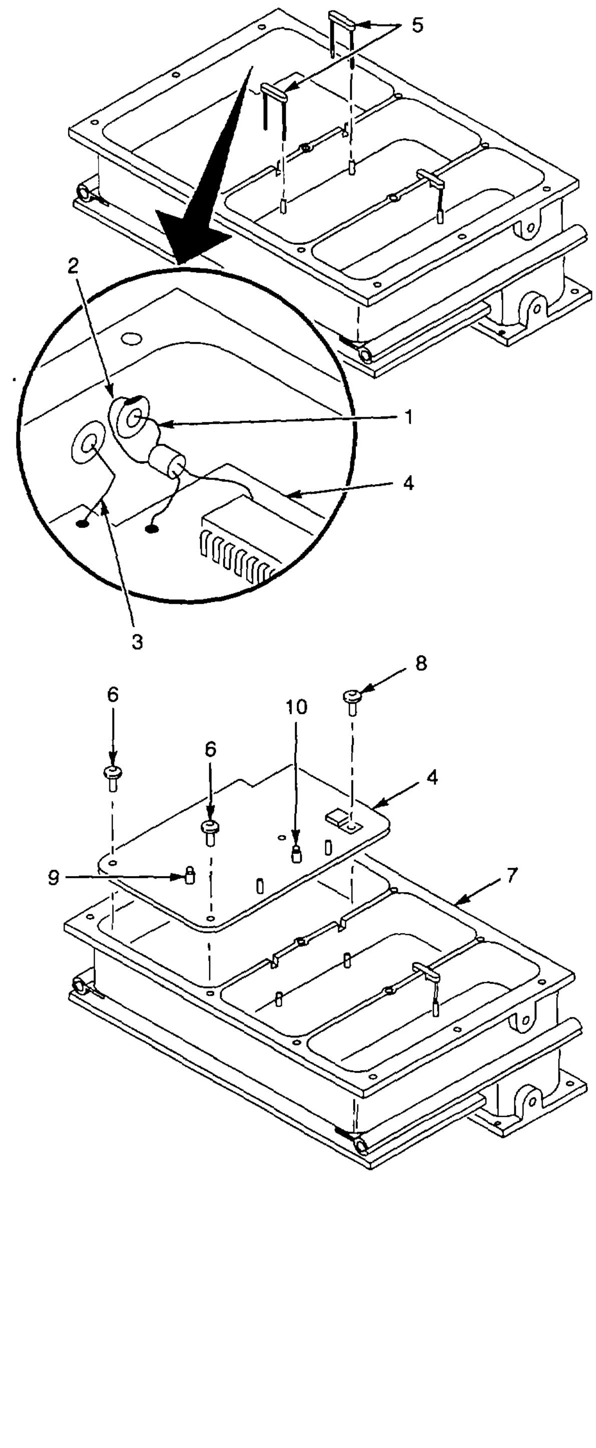
2-126. REPLACE A1A50A1 SYNTHESIZER CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A1A50 Phase Lock Assembly front cover (para 2-124).
2. Unsolder red wire (1) from center conductor of SMB connector A1A50J501.
3. Unsolder green wire (2) from case of SMB connector A1A50J501.
4. Unsolder wire (3) from A1A50A1 Synthesizer CCA (4).
5. Remove two U-shaped feedthrough terminals (5).
6. Remove two screws (6) that secure A1A5OA1 Synthesizer CCA (4) to A1A50 Phase Lock Assembly front shield (7).
7. Remove screw (8) that secures metal tab of A1A50U1010.
8. Pull up on A1A50A1TP2040 (9) and then A1A50A1TP1040 (10) with needle-nose pliers until A1A5OA1 Synthesizer CCA (4) is clear of pins.
9. Lift A1A5OA1 Synthesizer CCA (4) from A1A50 Phase Lock Assembly front shield (7).



INSTALL

1. Set A1A50 Phase Lock Assembly on work surface with front shield (7) up.
2. Align A1A50A1 Synthesizer CCA (4) with pins in A1A50 Phase Lock Assembly front shield (7).
3. Press down A1A5OA1 Synthesizer CCA (4) to seat it.
4. Install two screws (6) to secure A1A50A1 Synthesizer CCA (4) in A1A50 Phase Lock Assembly front shield (7).
5. Install screw (8) to secure metal tab of A1A50A1 U1010.
6. Solder red wire (1) to center conductor of SMB connector A1A50J501.
7. Solder green wire (2) to case of SMB connector A1A50J501.
8. Solder wire (3) to solder pad on A1A50A1 Synthesizer CCA (4).
9. Install two U-shaped feedthrough terminals (5).
10. Install A1A50 Phase Lock Assembly front cover (para 2-124).

END OF TASK

2-127. REPLACE AIA50A2 STROBE DRIVER CCA.

DESCRIPTION

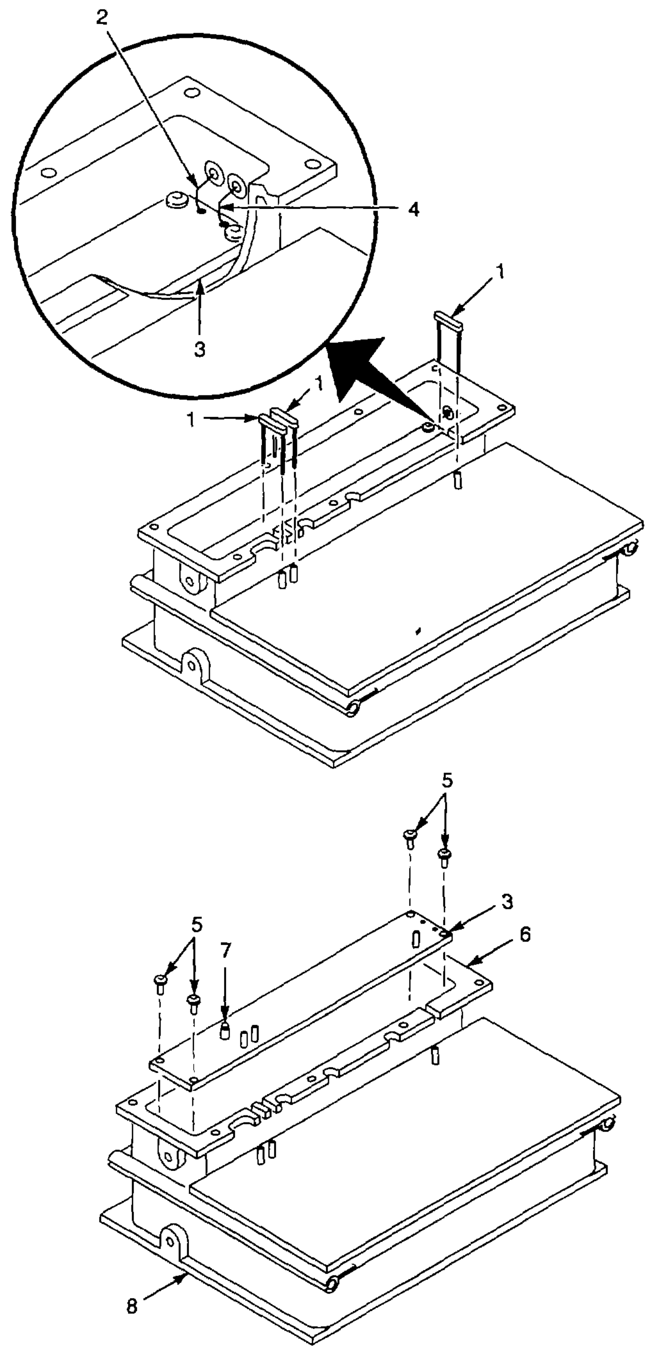
This procedure covers: Remove and Install

REMOVE

1. Remove A1A50 Phase Lock Assembly rear cover (para 2-125).
2. Remove three U-shaped feedthrough terminals (1).
3. Unsolder wire (2) from A1A50A2 Strobe Driver CCA (3).
4. Unsolder wire (4) from A1A50A2 Strobe Driver CCA (3).
5. Remove four screws (5) that secure A1A50A2 Strobe Driver CCA (3) in rear shield (6).
6. Pull up on A1A50A2TP1012 (7) with needle-nose pliers until A1A50A2 Strobe Driver CCA (3) clears pins.
7. Lift A1A50A2 Strobe Driver CCA (3) from rear shield (6).

INSTALL

1. Set A1A50 Phase Lock Assembly (8) on work surface with rear shield (6) up.
2. Align A1A50A2 Strobe Driver CCA (3) with pin in A1A50 Phase Lock rear shield (6).
3. Press down on A1A50A2 Strobe Driver CCA (3) to seat it.
4. Install four screws (5) to secure A1A50A2 Strobe Driver CCA (3) in rear shield (6).
5. Solder wire (2) to A1A50A2 Strobe Driver CCA (3).
6. Solder wire (4) to A1A50A2 Strobe Driver CCA (3).
7. Install three U-shaped feedthrough terminals (1).
8. Install A1A50 Phase Lock Assembly rear cover (para 2-125).



END OF TASK

2-128. REPLACE A1A50A3 MIXER CCA.

DESCRIPTION

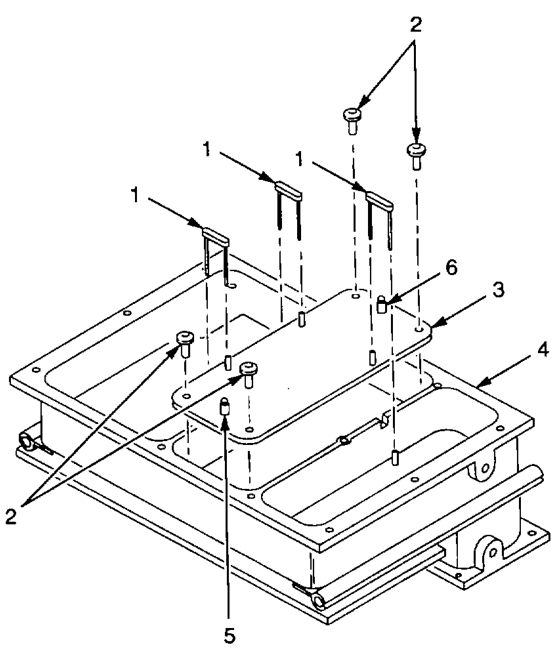
This procedure covers: Remove and Install

REMOVE

1. Remove A1A50 Phase Lock Assembly front cover (para 2-124).
2. Remove three U-shaped feedthrough terminals (1).
3. Remove four screws (2) that secure A1A50A3 Mixer CCA (3) to A1A50 Phase Lock Assembly front shield (4).
4. Pull up on A1A50A3TP2012 (5) and then A1A50A3TP1058 (6) with needle-nose pliers until A1A50A3 Mixer CCA (3) is clear of pins.
5. Lift A1A50A3 Mixer CCA (3) from A1A50 Phase Lock Assembly front shield (4).

INSTALL

1. Set A1A50 Phase Lock Assembly on work surface with front shield (4) up.
2. Align A1A50A3 Mixer CCA (3) with pins in A1A50 Phase Lock Assembly front shield (4).
3. Press down A1A50A3 Mixer CCA (3) to seat connectors on pins.
4. Install four screws (2) to secure A1A50A3 Mixer CCA (3) to A1A50 Phase Lock Assembly front shield (4).
5. Install three U-shaped feedthrough terminals (1).
6. Install A1A50 Phase Lock Assembly front cover (para 2-124).



END OF TASK

2-129. REPLACE A1A50A4 ERROR AMPLIFIER CCA.

DESCRIPTION

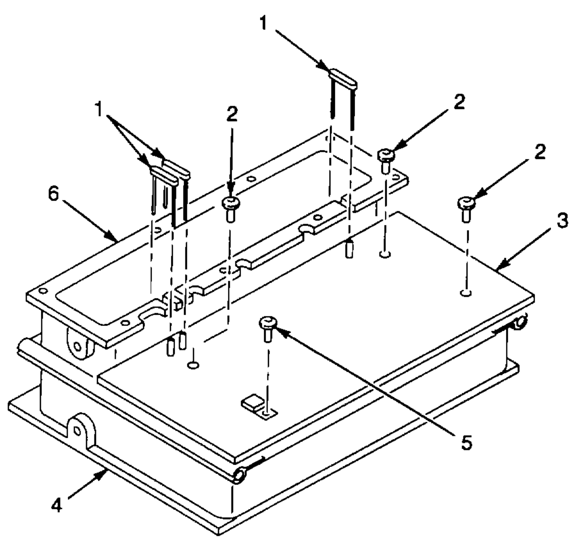
This procedure covers: Remove and Install

REMOVE

1. Remove A1A50 Phase Lock Assembly rear cover (para 2-125).
2. Remove three U-shaped feedthrough terminals (1).
3. Remove three screws (2) that secure A1A50A4 Error Amplifier CCA (3) to A1A50 Phase Lock Assembly (4).
4. Remove screw (5) from metal tab of A1A50A4U2075.
5. Lift A1A50A4 Error Amplifier CCA (3) until clear of pins, and remove it.

INSTALL

1. Set A1A50 Phase Lock Assembly (4) on work surface with rear shield (6) up.
2. Align A1A50A4 Error Amplifier CCA (3) with pins on A1A50 Phase Lock Assembly front shield (4).
3. Press down on A1A50A4 Error Amplifier CCA (3) to seat it.
4. Secure metal tab of A1A50A4U2075 with screw (5).
5. Install three screws (2) that secure A1A50A4 Error Amplifier CCA (3) to front shield (4).
6. Install three U-shaped feedthrough terminals (1).
7. Install A1A50 Phase Lock Assembly rear cover (para 2-125).



END OF TASK

2-130. REPLACE A1A50A5 OSCILLATOR CCA.

DESCRIPTION

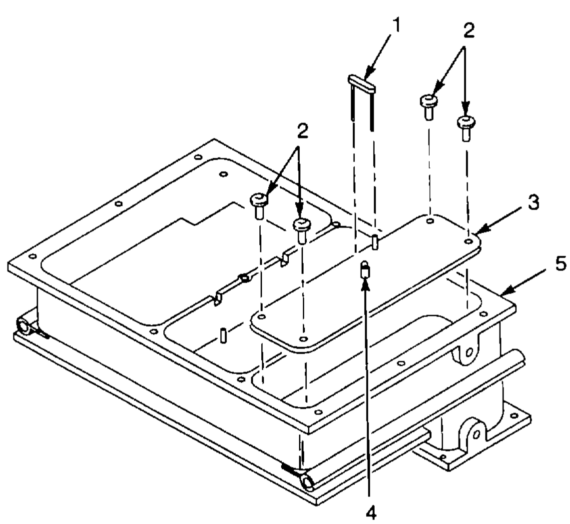
This procedure covers: Remove and Install

REMOVE

1. Remove A1A50 Phase Lock Assembly front cover (para 2-124).
2. Remove U-shaped feedthrough terminal (1).
3. Remove four screws (2) from A1A50A5 Oscillator CCA (3).
4. Pull up on A1A50A5TP1027 (4) with needle-nose pliers until A1A50A5 Oscillator CCA (3) is clear of pins.
5. Lift A1A50A5 Oscillator CCA (3) from A1A50 Phase Lock Assembly front shield (5).

INSTALL

1. Set A1A50 Phase Lock Assembly (1) on work surface with front shield (5) up.
2. Align A1A50A5 Oscillator CCA (3) with pins in A1A50 Phase Lock Assembly front shield (5).
3. Press down on A1A50A5 Oscillator CCA (3) to seat it.
4. Install four screws (2) to secure A1A50A5 Oscillator CCA (3) to A1A50 Phase Lock Assembly front shield (5).
5. Install U-shaped feedthrough terminal (1).
6. Install A1A50 Phase Lock Assembly front cover (para 2-124).



END OF TASK

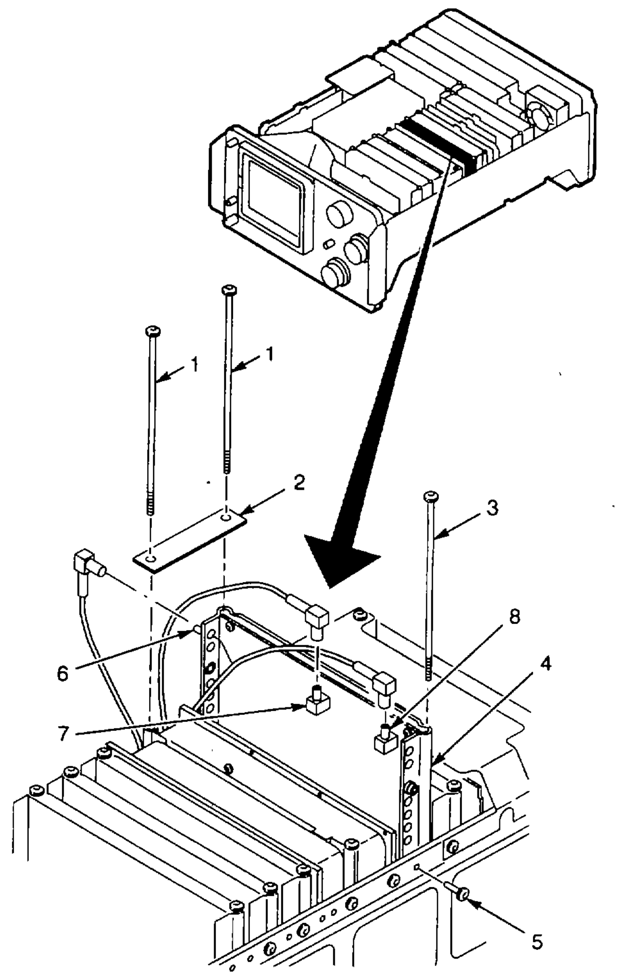
2-131. REPLACE A1A51 COUNTER CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove two screws (1) that secure ground plate (2), and remove ground plate.
3. Remove screw (3) from top of A1A51 Counter CCA (4).
4. Remove screw (5) that secures A1A51 Counter CCA (4) to side frame.
5. Pull up A1A51 Counter CCA (4), and unplug cables from following connectors:
   - A1A51J511 (6).
   - A1A51P1036 (7).
   - A1A51P1056 (8).
6. Lift A1A51 Counter CCA (4) from chassis.



INSTALL

1. Plug following cables onto A1A51 Counter CCA (4):
   - Cable labeled P511 to A1A51J511 (6).
   - Cable labeled P1036 to A1A51P1036 (7).
   - Cable labeled P1056 to A1A51P1056 (8).
2. Align A1A51 Counter CCA (4) with pins on A1A28 Mother Board CCA.
3. Press down A1A51 Counter CCA (4) to seat connectors onto pins.
4. Set ground plate (2) in place and secure with two screws (1).
5. Install screw (3) in top of A1A51 Counter CCA (4).
6. Install screw (5) to secure A1A51 Counter CCA (4) to side frame.
7. Install cabinet (para 2-118).

END OF TASK

2-132. REPLACE REAR CCA BRACKET.

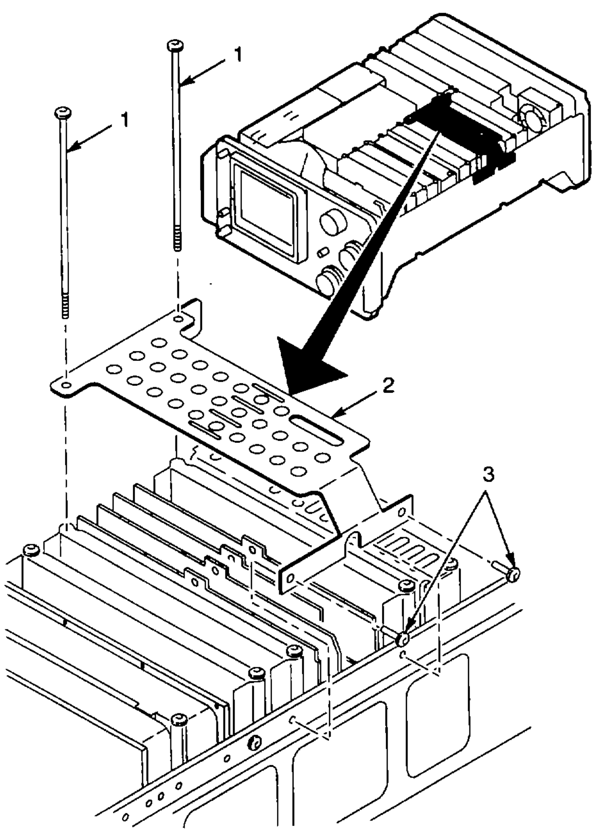
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove two screws (1) from top of rear CCA bracket (2).
3. Remove two screws (3) from side of rear CCA bracket (2).
4. Lift rear CCA bracket (2) from chassis.

INSTALL

1. Set rear CCA bracket (2) in place, aligning CCA tabs with slots in rear CCA bracket.
2. Install two screws (1) in top of rear CCA bracket (2).
3. Install two screws (3) to secure rear CCA bracket (2) to side frame.
4. Install cabinet (para 2-118).



END OF TASK

2-133. REPLACE A1A26 AUXILIARY SYNTHESIZER CCA.

DESCRIPTION

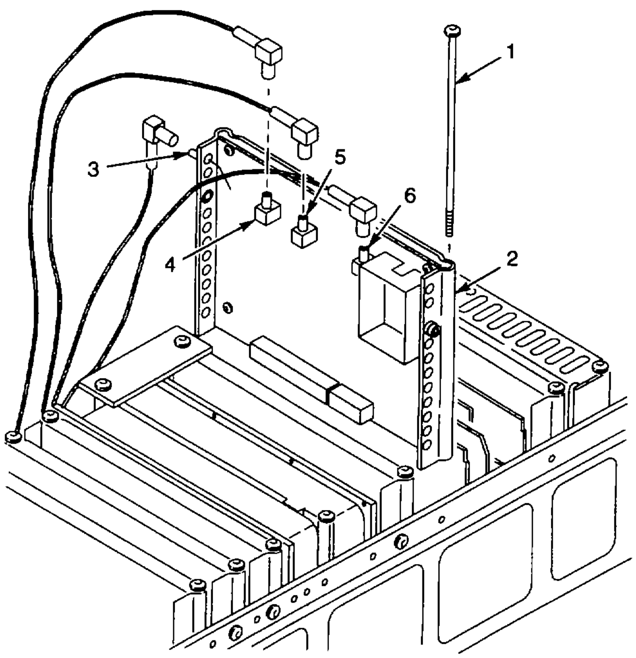
This procedure covers: Remove and Install

REMOVE

1. Remove rear CCA bracket (para 2-132).
2. Remove screw (1) from top of A1A26 Auxiliary Synthesizer CCA (2).
3. Pull up A1A26 Auxiliary Synthesizer CCA (2) far enough to unplug cables from following connectors:
   - A1A26J261 (3).
   - A1A26P1028(4).
   - A1A26P1039(5).
   - A1A26P1060(6).
4. Lift A1A26 Auxiliary Synthesizer CCA (2) from chassis.

INSTALL

1. Install A1A26 Auxiliary Synthesizer CCA (2) far enough to connect cables to following:
   - Cable labeled P261 to A1A26J261 (3).
   - Cable labeled P1028 to A1A26P1028 (4).
   - Cable labeled P1039 to A1A26P1039 (5).
   - Cable labeled P1060 to A1A26P1060 (6).
2. Align A1A26 Auxiliary Synthesizer CCA (2) with pins on A1A28 Mother Board CCA.
3. Press down on A1A26 Auxiliary Synthesizer CCA (2) to seat connectors onto pins.
4. Install screw (1) in top of A1A26 Auxiliary Synthesizer CCA (2).
5. Install rear CCA bracket (para 2-132).



END OF TASK

2-134. REPLACE AIA54 MEMORY CCA.

DESCRIPTION

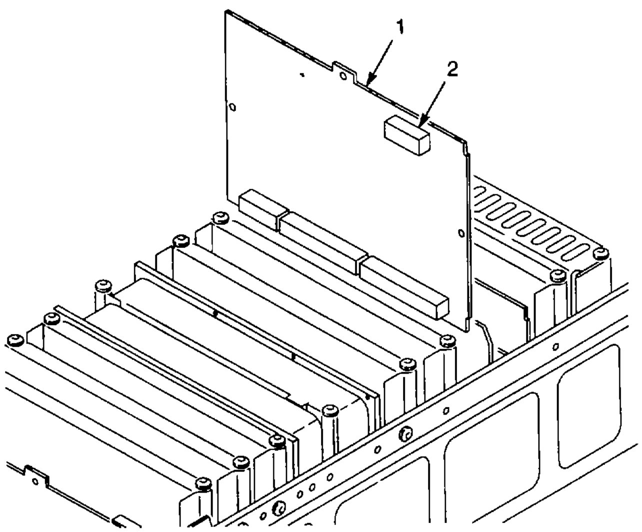
This procedure covers: Remove and Install

REMOVE

1. Remove rear CCA bracket (para 2-132).
2. Pull up A1A54 Memory CCA (1), and remove from chassis.

INSTALL

1. Set A1A54S1050 (2) switches to match switch settings on old A1A54 Memory CCA (1).
2. Install A1A54 Memory CCA (1) in CCA guide slots, and align with pins on A1A28 Mother Board CCA.
3. Press down on A1A54 Memory CCA (1) to seat connectors onto pins.
4. Install rear CCA bracket (para 2-132).



END OF TASK

2-135. REPLACE A1A56 GPIB CCA.

DESCRIPTION

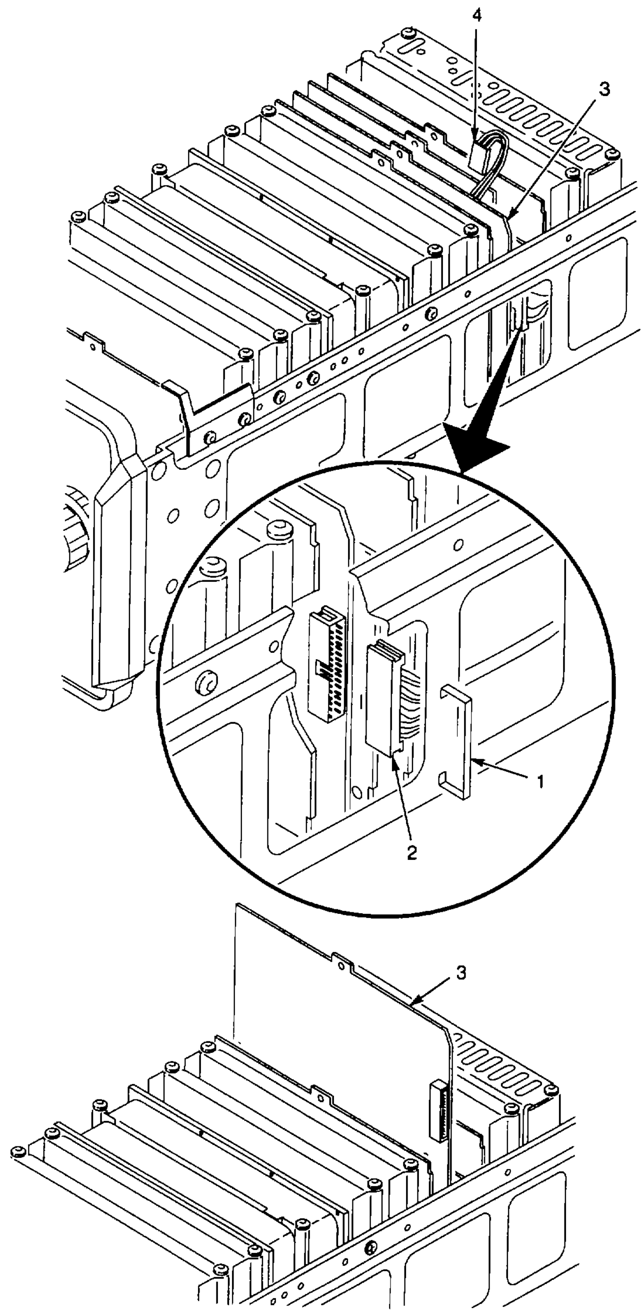
This procedure covers: Remove and Install

REMOVE

1. Remove rear CCA bracket (para 2-132).
2. Pry up one end of retaining clip (1) on connector A1A56P566 (2), and remove retaining clip.
3. Unplug A1A56P566 (2) from A1A56 GPIB CCA (3).
4. Pull up on A1A56 GPIB CCA (3), and unplug connector A1A56P1045 (4) from back side.
5. Remove A1A56 GPIB CCA (3) from chassis.

INSTALL

1. Install A1A56 GPIB CCA (3) in CCA guide slots.
2. Lower A1A56 GPIB CCA (3) in guide slots, and connect A1A56P1045 (4) to back side.
3. Align A1A56 GPIB CCA (3) with pins on A1A28 Mother Board CCA.
4. Press down A1A56 GPIB CCA (3) to seat connectors onto pins.
5. Plug A1A56P566 (2) onto A1A56 GPIB CCA (3) with red wire (pin 1) at top of connector.
6. Install retaining clip (1) on connector A1A56P566 (2).
7. Install rear CCA bracket (para 2-132).



END OF TASK

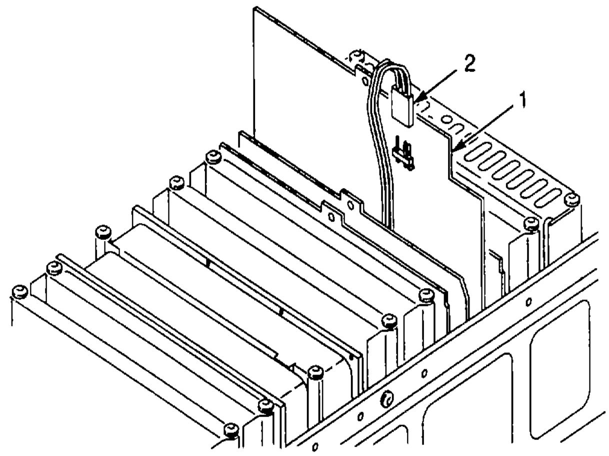
2-136. REPLACE A1A58 PROCESSOR CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove rear CCA bracket (para 2-132).
2. Pull up A1A58 Processor CCA (1), and unplug A1A58P1035 (2) from front side of CCA.
3. Remove A1A58 Processor CCA (1) from chassis.



INSTALL

1. Install A1A58 Processor CCA (1) in CCA guide slots.
2. Lower A1A58 Processor CCA (1) in guide slots, and plug A1A58P1035 (2) onto front side.
3. Align A1A58 Processor CCA (1) with pins on A1A28 Mother Board CCA.
4. Press down A1A58 Processor CCA (1) to seat connectors onto pins.
5. Install rear CCA bracket (para 2-132).

END OF TASK

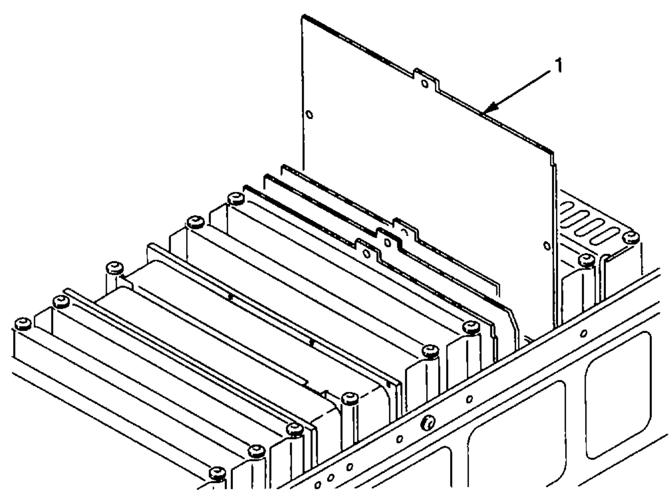
2-137. REPLACE A1A60 HORIZ DIGITAL STORAGE CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove rear CCA bracket (para 2-132).
2. Pull up A1A60 Horiz Digital Storage CCA (1), and remove from chassis.



INSTALL

1. Install A1A60 Horiz Digital Storage CCA (1) in CCA guide slots, and align with pins on A1A28 Mother Board CCA.
2. Press down A1A60 Horiz Digital Storage CCA (1) to seat connectors onto pins.
3. Install rear CCA bracket (para 2-132).

END OF TASK

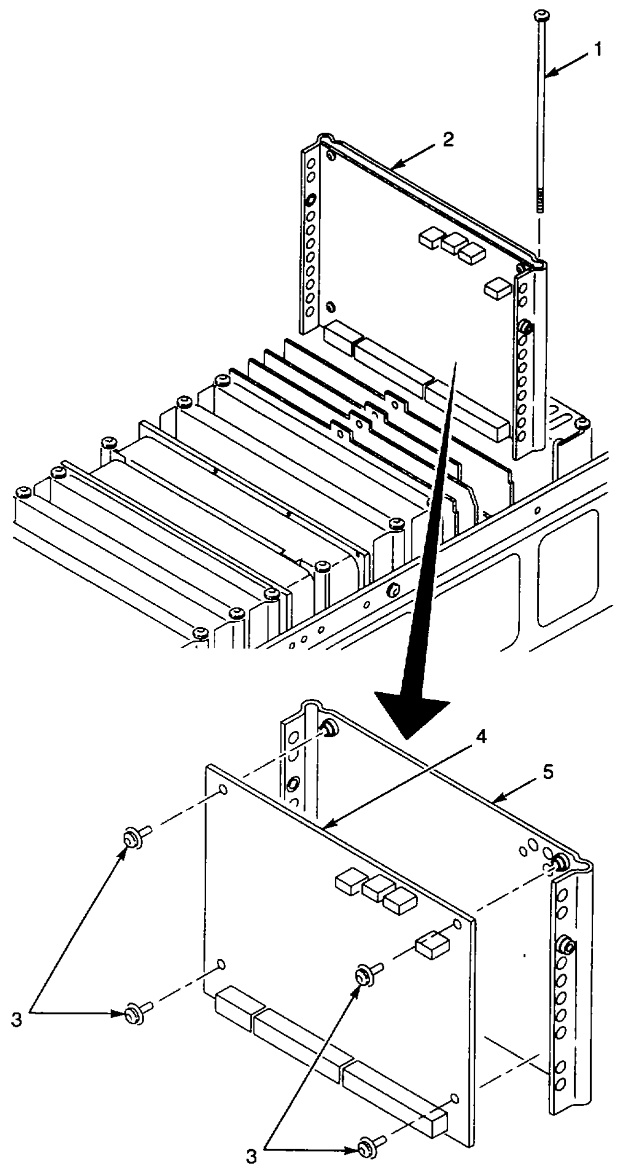
2-138. REPLACE A1A61Al VERT DIGITAL STORAGE CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove rear CCA bracket (para 2-132).
2. Remove screw (1) from top of A1A61 Vert Digital Storage CCA (2).
3. Pull up A1A61 Vert Digital Storage CCA (2), and remove it from chassis.
4. Remove four screws (3) from A1A61A1 Vert Digital Storage CCA (4).
5. Lift AA61 A1Vert Digital Storage CCA (4) from circuit card holder (5).



INSTALL

1. Set circuit card holder (5) with its sides up on flat, work surface.
2. Turn circuit card holder (5) so that group of four holes is in right rear corner.
3. Set AA61 A1 Vert Digital Storage CCA (4) with connectors towards bottom front onto circuit card holder (5).
4. Install four screws (3) to secure A1A61A1 Vert Digital Storage CCA (4) to circuit card holder (5).
5. Align A1A61 Vert Digital Storage CCA (2) with pins on A1 A28 Mother Board CCA.
6. Press down A1A61 Vert Digital Storage CCA (2) to seat connectors onto pins.
7. Install screw (1) in top of A1A61 Vert Digital Storage CCA (2).
8. Install rear CCA bracket (para 2-132).

END OF TASK

2-139. REPLACE FRONT CCA BRACKET.

DESCRIPTION

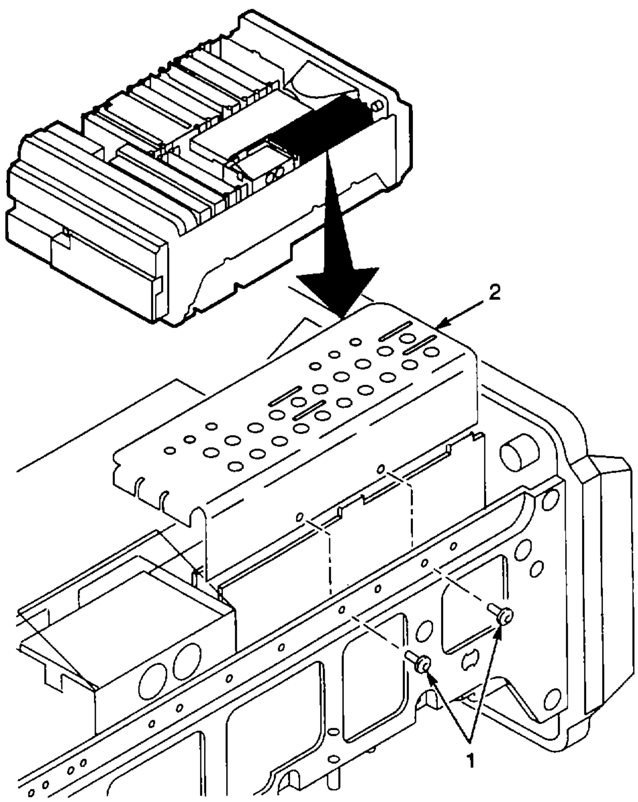
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove two screws (1) that secure front CCA bracket (2) to side frame.
3. Remove front CCA bracket (2) from chassis.

INSTALL

1. Set front CCA bracket (2) in place, aligning CCA tabs with slots in front CCA bracket.
2. Install two screws (1) to secure front CCA bracket (2) to side frame.
3. Install cabinet (para 2-118).



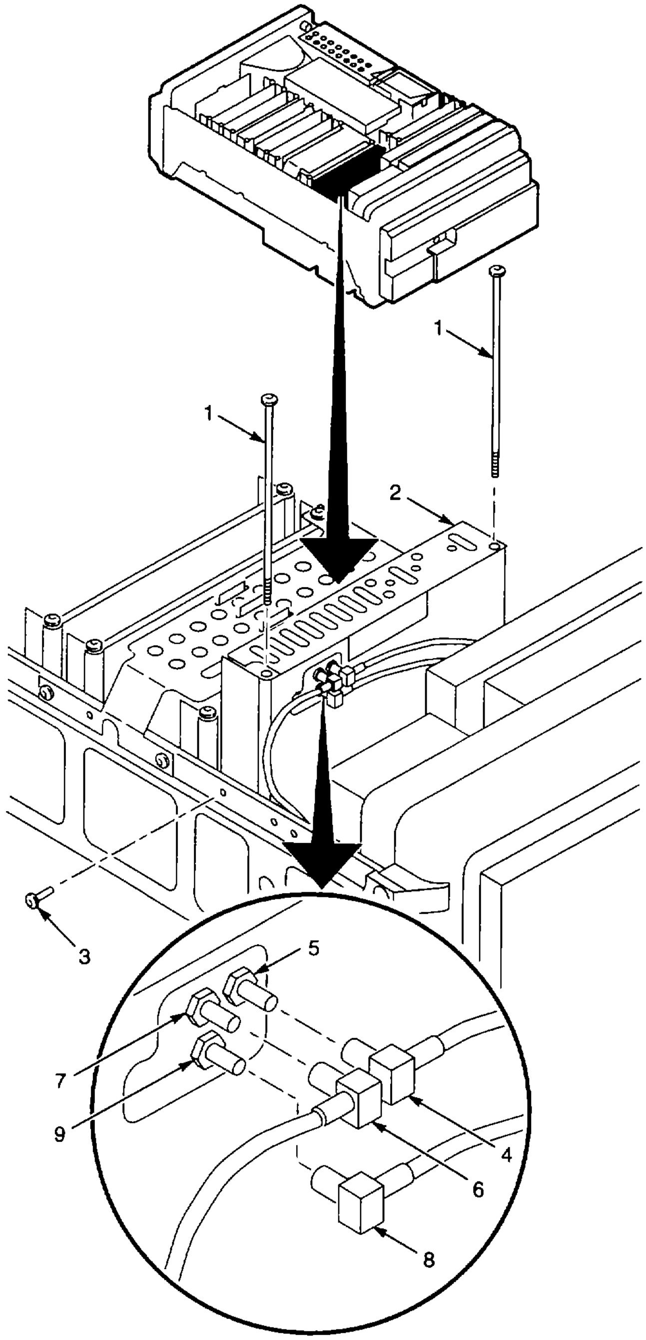
END OF TASK

2-140. REPLACE A1A62A1 LOG AMPLIFIER CCA.

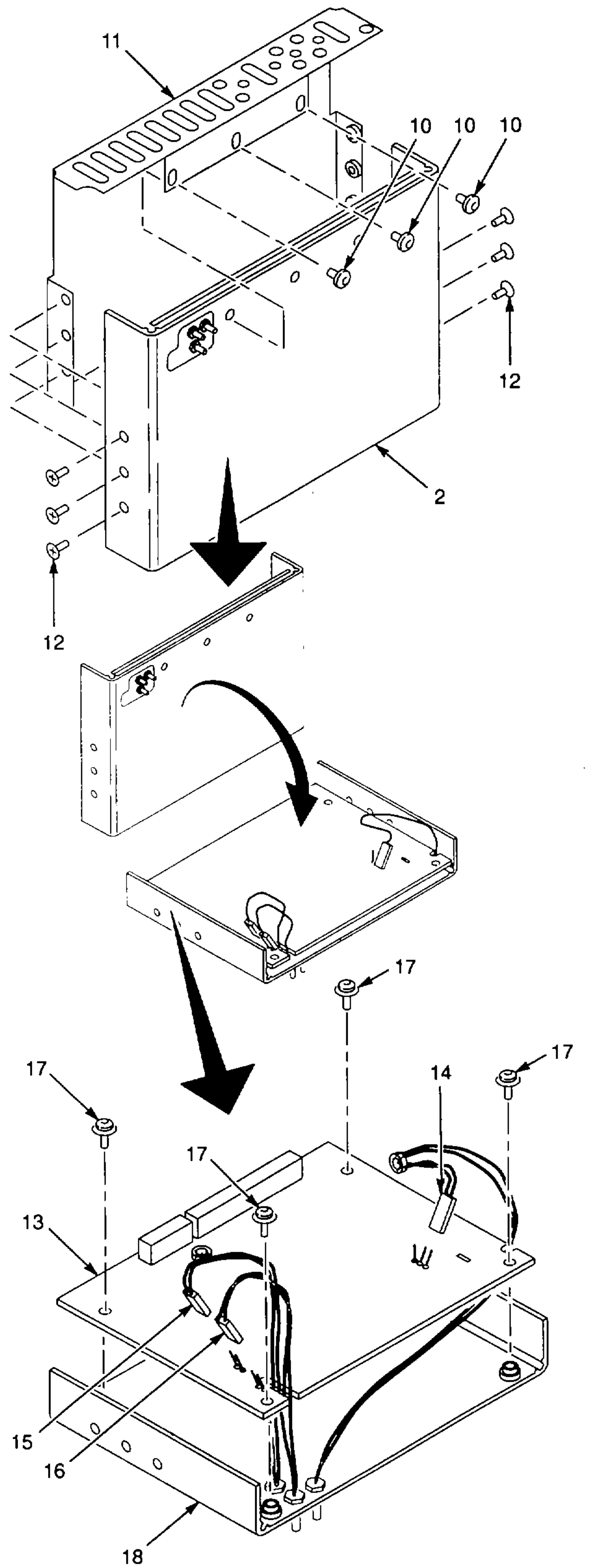
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove two screws (1) from top of A1A62 Log Amplifier CCA (2).
3. Remove screw (3) that secures A1A62 Log Amplifier CCA (2) to side frame.
4. Unplug following connectors from rear of A1A62 Log Amplifier CCA (2), tagging them for later reassembly:
   - A1A62P622 (4) from A1A62J622 (5).
   - A1A62P620 (6) from A1A62J620 (7).
   - A1A62P621 (8) from A1A62J621 (9).
5. Pull up A1A62 Log Amplifier CCA (2), and remove from chassis.
6. Remove three screws (10) that secure shield (11) to rear of A1A A62 Log Amplifier CCA (2).
7. Remove six screws (12) from A1AA62 Log Amplifier CCA (2).
8. Slide shield (11) up until it clears rear of A1A62 Log Amplifier CCA (2).
9. Lift shield (11) from A1A A62 Log Amplifier CCA (2).
10. Unplug following connectors from A1A A62A1 Log Amplifier CCA (13):
    - A1A62A1P2020 (14).
    - A1A62A1P2070 (15).
    - A1A62A1P1075 (16).
11. Remove four screws (17) from A1A62A1 Log Amplifier CCA (13).
12. Lift A1A62A1 Log Amplifier CCA (13) from circuit card holder (18).



INSTALL



1. Set circuit card holder (18) with its sides up on flat, work surface.
2. Turn circuit card holder (18) so that group of three SMB connectors is in left front corner.
3. Set A1A62A1 Log Amplifier CCA (13) with connectors towards rear onto circuit card holder (18).
4. Dress cables through cutouts in A1A62A1 Log Amplifier CCA (13).
5. Install four screws (17) to secure A1A62A1 Log Amplifier CCA (13) to circuit card holder (18).
6. Plug following connectors onto A1A62A1 Log Amplifier CCA (13):

   - A1A62A1P2020 (14).
   - A1A62A1P2070 (15).
   - A1A62A1P1075 (16).

7. Position shield (11) on A1A62 Log Amplifier CCA (2).
8. Install three screws (12) in each side of AlA62 Log Amplifier CCA (2) to secure shield (11).
9. Install three screws (10) to secure shield (11) to rear of A1A62 Log Amplifier CCA (2).
10. Align A1A62 Log Amplifier CCA (2) with pins on A1A28 Mother Board CCA.
11. Press down A1A62 Log Amplifier CCA (2) to seat connectors onto pins.
12. Plug following connectors onto rear of A1A62 Log Amplifier CCA (2):

   - A1A62P621 (8) to A1A62J622 (9).
   - A1A62P620 (6) to A1A62J620 (7).
   - A1A62P622 (4) to A1A62J622 (5).

13. Install two screws (1) in top of A1A62 Log Amplifier CCA (2).
14. Install screw (3) to secure A1A62 Log Amplifier CCA (2) to side frame.
15. Install cabinet (para 2-118).

END OF TASK

2-141. REPLACE A1A72 SWEEP CCA.

DESCRIPTION

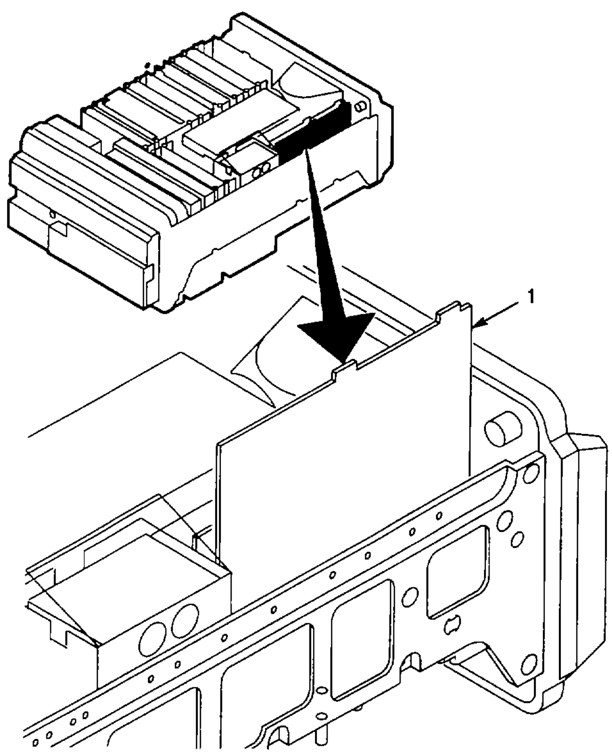
This procedure covers: Remove and Install

REMOVE

1. Remove front CCA bracket (para 2-139).
2. Pull up A1A72 Sweep CCA (1), and remove from chassis.

INSTALL

1. Align A1A72 Sweep CCA (1) with pins on A1 A28 Mother Board CCA.
2. Press down A1A72 Sweep CCA (1) to seat connectors onto pins.
3. Install front CCA bracket (para 2-139).



END OF TASK

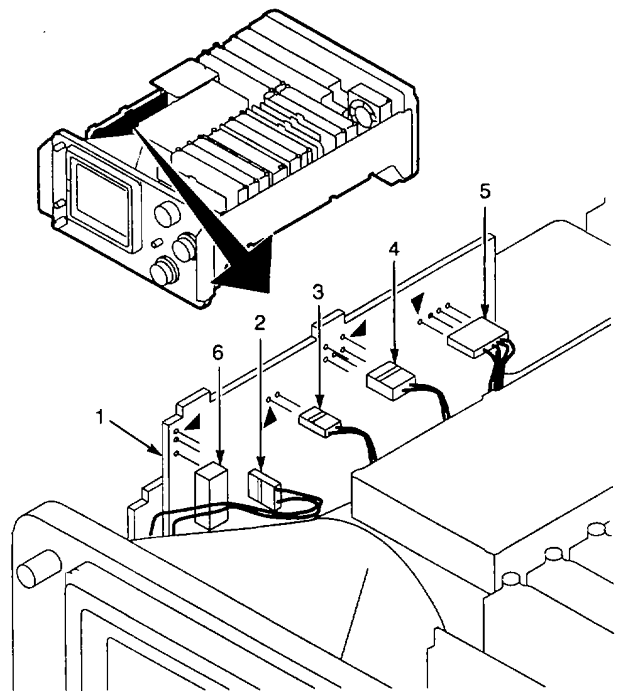
2-142. REPLACE A1A70 Z-AXIS CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove front CCA bracket (para 2-139).
2. Pull up A1A70 Z-Axis CCA (1), and unplug following connectors:
   - A1A70P1011 (2).
   - A1A70P1015 (3).
   - A1A70P1040(4).
   - A1A70P1056(5).
3. Lift A1A70 Z-Axis CCA (1) from chassis.



INSTALL

1. Set A1A70S1010 (6) switches to match switch settings on removed A1A70 Z-Axis CCA (1).
2. Position the A1A70 Z-Axis CCA (1) in chassis.
3. Plug following connectors onto AlA70 Z-Axis CCA (1):
   - A1A70P1011 (2).
   - A1A70P1015 (3).
   - A1A70P1040 (4).
   - A1A70P1056 (5).
4. Align A1A70 Z-Axis CCA (1) with pins on A1 A28 Mother Board CCA.
5. Press down A1A70 Z-Axis CCA (1) to seat connectors onto pins.
6. Install front CCA bracket (para 2-139).

END OF TASK

2-143. REPLACE A1A74 HIGH VOLTAGE CCA.

DESCRIPTION

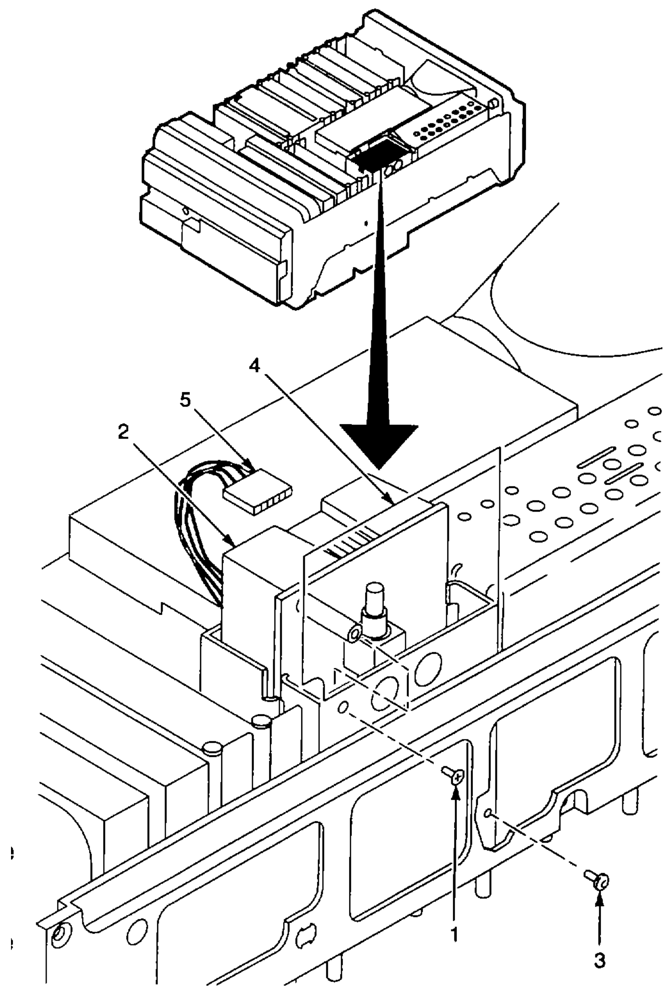
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove screw (1) that secures A1A74 High Voltage CCA (2) to chassis.
3. Remove screw (3) that secures A1A74 High Voltage CCA to chassis (2).
4. Hold up plastic shield (4) to access top of A1A74 High Voltage CCA (2).
5. Unplug connector A1A74P742 (5) from upper edge of A1A74 High Voltage CCA (2).
6. Pull up A1A74 High Voltage CCA (2), and remove it from the chassis.

INSTALL

1. Hold up plastic shield (4), and position A1A74 High Voltage CCA (2) in chassis guides.
2. Press down A1A74 High Voltage CCA (2) to seat connectors onto pins.
3. Plug A1 A74P742 (5) onto pins on upper edge of A1A74 High Voltage CCA (2).
4. Install screw (3) to secure A1A74 High Voltage CCA to chassis (2).
5. Install screw (1) to secure A1A74 High Voltage CCA (6) to chassis.
6. Install cabinet (para 2-118).



END OF TASK

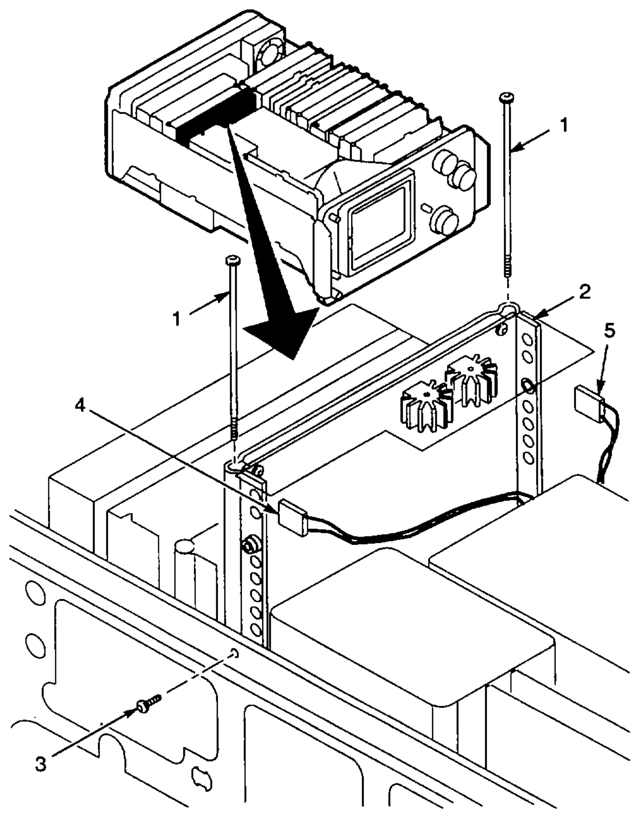
2-144. REPLACE A1A64 DEFLECTION AMPLIFIERS CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove two screws (1) from top of A1A64 Deflection Amplifiers CCA (2).
3. Remove screw (3) that secures A1A64 Deflection Amplifiers CCA (2) to side frame.
4. Pull up A1A64 Deflection Amplifiers CCA (2), and unplug following connectors:
   - A1A64A1P10 (4).
   - A1A64A1P210 (5).
5. Lift A1A64 Deflection Amplifiers CCA (2) fr om chassis.



INSTALL

1. Position the A1A64 Deflection Amplifiers CCA (2) in chassis.
2. Plug following connectors onto A1 A64 Deflection Amplifiers CCA (2):
   - A1A64A1P101 (4).
   - AlA64A1P210 (5).
3. Align A1A64 Deflection Amplifiers CCA (2) with pins on A1A28 Mother Board CCA.
4. Press down A1A64 Deflection Amplifiers CCA (2) to seat connectors onto pins.
5. Install two screws (1) in top of A1A64 Deflection Amplifiers CCA (2).
6. Install screw (3) to secure A1A64 Deflection Amplifiers CCA (2) to side frame.
7. Install cabinet (para 2-118).

END OF TASK

2-145. REPLACE A1A66A1 CRT READOUT CCA.

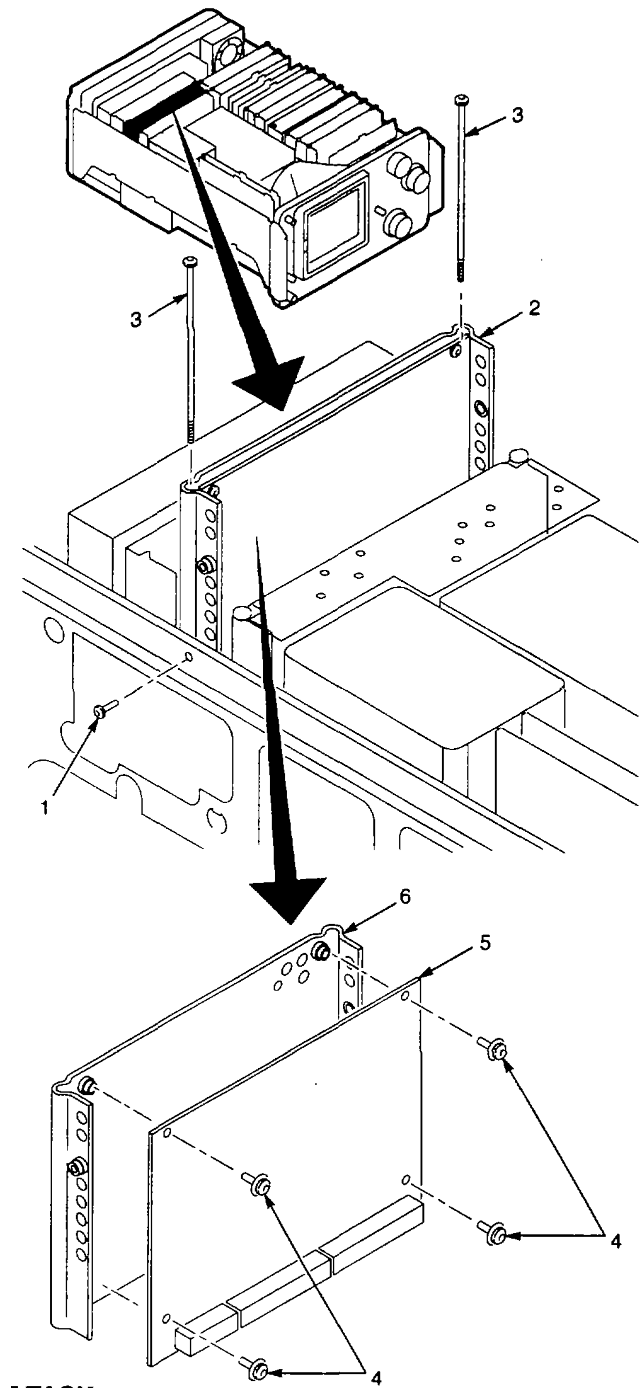
DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove screw (1) that secures A1A66 CRT Readout CCA (2) to side frame.
3. Remove two screws (3) from top of A66 CRT Readout CCA (2).
4. Pull up A1A66 CRT Readout CCA (2), and remove from chassis.
5. Remove four screws (4) from A1A66A1 CRT Readout CCA (5).
6. Lift A1A66A1 CRT Readout CCA (5) from circuit card holder (6).

1. Set circuit card holder (6) with its sides up on flat surface.
2. Turn circuit card holder (6) so that group of four holes is in right rear corner.
3. Set A1A66A1 CRT Readout CCA (5) with connectors towards bottom front onto circuit card holder (6).
4. Install four screws (4) to secure A1A66A1 CRT Readout CCA (5) to circuit card holder (6).
5. Align A1A66 CRT Readout CCA (2) with pins on A1A28 Mother Board CCA.
6. Press down A1A66 CRT Readout CCA (2) to seat connectors onto pins.
7. Secure A1A66 CRT Readout CCA (2) to side frame with screw (1).
8. Install two screws (3) to secure A1A66 CRT Readout CCA (2) to chassis.
9. Install cabinet (para 2-118).



END OF TASK

2-146. REPLACE A1A69 10/100 HZ FILTER COVER.

DESCRIPTION

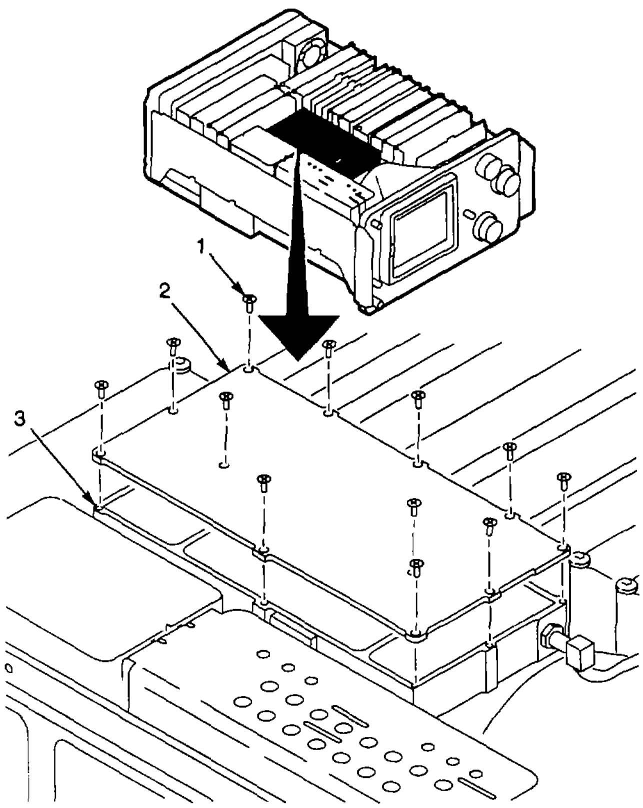
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove 12 screws (1) that secure cover (2) to A1A69 10/100 Hz Filter (3).
3. Remove cover (2).

INSTALL

1. Align cover (2) on A1A69 10/100 Hz Filter (3).
2. Install 12 screws (1) to secure cover to A1A69 10/100 Hz Filter (3).
3. Install cabinet (para 2-118).



END OF TASK

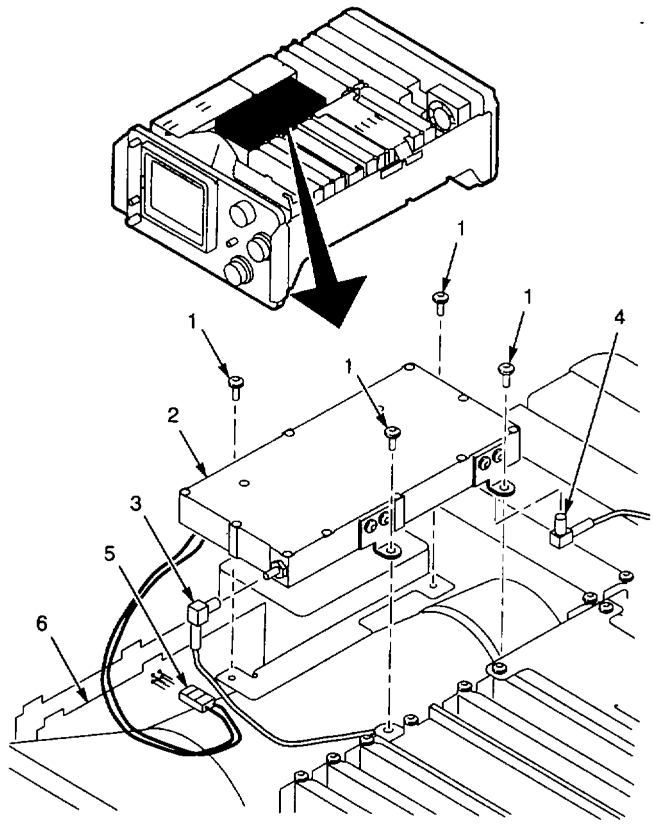
2-147. REPLACE A1A69 10/100 HZ FILTER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove front CCA bracket (para 2-139).
2. Remove four screws (1) that secure A1A69 10/100 Hz Filter (2) to chassis.
3. Lift A1A69 10/100 Hz Filter (2), and unplug following connectors:
   - A1A69P69 (3) from front of A1A69 10/100 Hz Filter (2).
   - A1A69J69 (4) from bottom rear of A1A69 10/100 Hz Filter (2).
   - A1A70P1040 (5) from A1A70 Z-Axis CCA (6).
4. Remove A1A69 10/100 Hz Filter (2) from chassis.



INSTALL

1. Position A1A69 10/100 Hz Filter (2) in place with connector on bottom towards rear of chassis.
2. Plug in following connectors:
   - A1A69P696 (3) to front of A1A69 10/100 Hz Filter (2).
   - A1A69J697 (4) to bottom rear of A1A69 10/100 Hz Filter (2).
   - A1A70P1040 (5) to A1A70 Z-Axis CCA (6).
3. Align mounting brackets for A1A69 10/100 Hz Filter with mounting brackets in chassis.
4. Install four screws (1) to secure Al A69 10/100 Hz Filter mounting brackets to chassis.
5. Install front CCA bracket (para 2-139).

END OF TASK

2-148. REPLACE A1A69A4 OSCILLATOR CCA.

DESCRIPTION

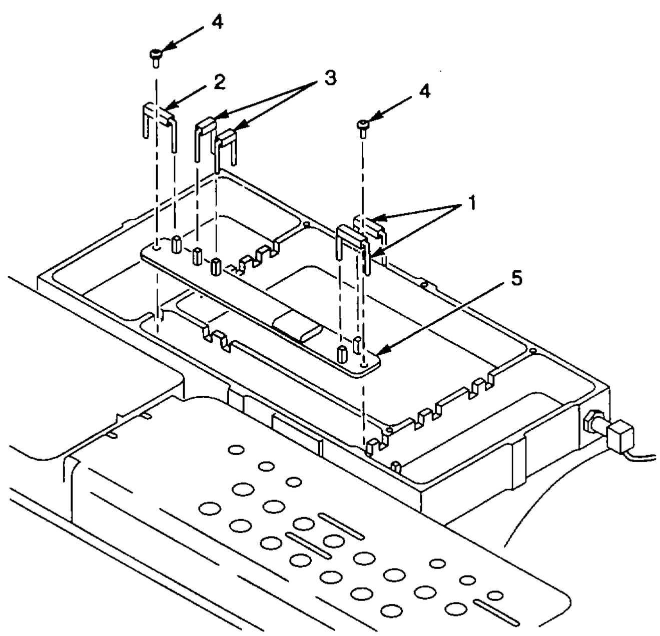
This procedure covers: Remove and Install

REMOVE

1. Remove A1A69 10/100 Hz Filter cover (para 2-146).
2. Remove following U-shaped feedthrough terminals:
   - Two wide-width terminals (1).
   - One medium-width terminal (2).
   - Two narrow-width terminals (3).
3. Remove two screws (4) that secure A1A69A4 Oscillator CCA (5) to filter housing.
4. Lift A1A69A4 Oscillator CCA (5) from filter housing.

INSTALL

1. Set A1A69A4 Oscillator CCA (5) in filter housing so that end with two pin terminals is toward front of chassis.
2. Install two screws (4) that secure A1A69A4 Oscillator CCA (5) in filter housing.
3. Install following U-shaped feedthrough terminals:
   - Two wide-width terminals (1).
   - One medium-width terminal (2).
   - Two narrow-width terminals (3).
4. Install A1 A69 10/100 Hz Filter cover (para 2-146).



END OF TASK

2-149. REPLACE A1A69A1 1ST MIXER CCA.

DESCRIPTION

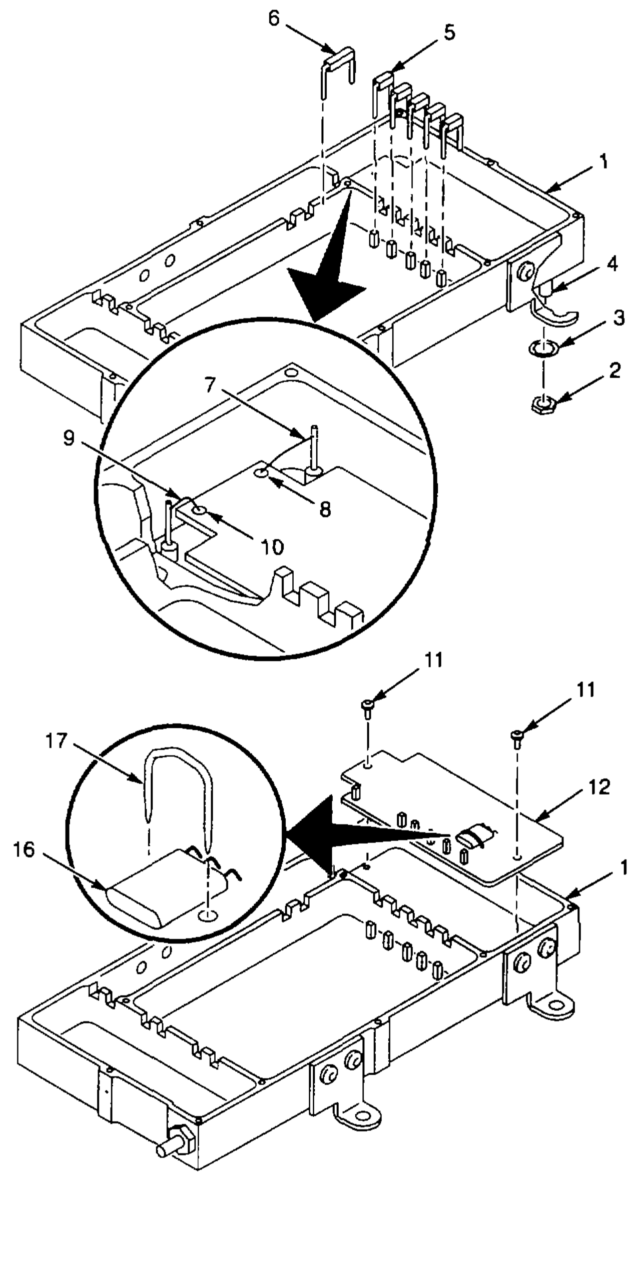
This procedure covers: Remove and Install

NOTE

A1A69Y2025 crystal onA1A69Al 1st Mixer CCA is matched with A1A69Y2020 crystal on A1A69A3 2nd Mixer CCA. When replacing A1A69A1 1st Mixer CCA, A1A69A3 2nd Mixer CCA also must be removed so that new crystals can be installed on both CCAs.

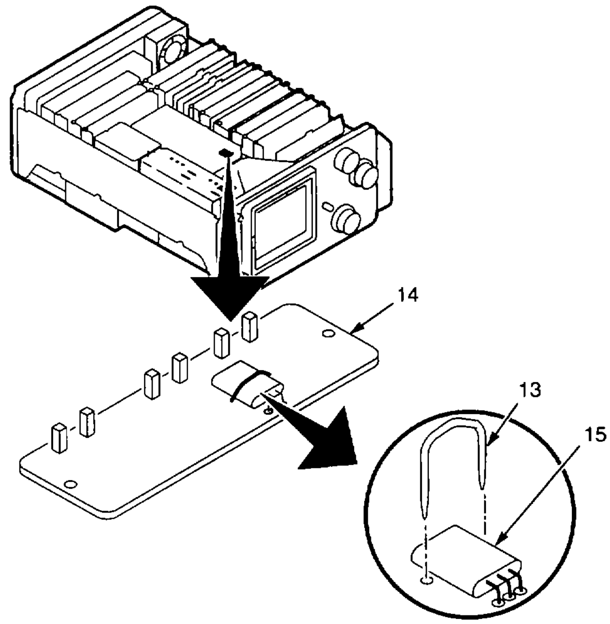
REMOVE

1. RemoveA1A69 10/100 Hz Filter (para 2-147).
2. Set A1A69 10/100 Hz Filter (1) bottom side up on work surface.
3. Remove nut (2) and lock washer (3) from SMB connector A1A69J697 (4).
4. Set A1A69 10/100 Hz Filter (1) top side up on work surface.
5. Remove A1A69 10/100 Hz Filter cover (para 2-146).
6. Remove five narrow U-shaped feedthrough terminals (5).
7. Remove wide U-shaped feedthrough terminal (6).
8. Unsolder 17 V lead (7) from solder pad (8).
9. Unsolder -15 V lead (9) from solder pad (10).
10. Remove two screws (11) that secure A1A69A1 1st Mixer CCA (12) to filter housing.
11. Lift A1A69A1 1st Mixer CCA (12) from filter housing.
12. Remove A1A69A3 2nd Mixer CCA (para 2-150).
13. Use needle-nose pliers to pull crystal retaining strap (13) from A1A69A3 2nd Mixer CCA (14).
14. Unsolder A1A69Y2020 crystal (15) and remove from A1A69A3 2nd Mixer CCA (14).



INSTALL

1. Place new AIA69Y2025 crystal (16) on new A1A69A1 1st Mixer CCA (12), and solder crystal to pads.
2. Install new crystal retaining strap (17), (Appendix B, Item 10).
3. Set A1A69A1 1st Mixer CCA (12) in filter housing.
4. Install two screws (11) to secure A1A69A1 1st Mixer CCA (12) to filter housing.
5. Solder -15 V lead (9) to solder pad (10).
6. Solder 17 V lead (7) to solder pad (8).
7. Install wide U-shaped feedthrough terminal (6).
8. Install five narrow U-shaped feedthrough terminals (5).
9. Place new A1A69Y2020 crystal (15) on A1A69A1 2nd Mixer CCA (14), and solder crystal to pads.
10. Install crystal retaining strap (13), (Appendix B, Item 10).
11. Install A1A69A3 2nd Mixer CCA (para 2-150).
12. Set A1A69 10/100 Hz Filter (1) bottom side up on work surface.
13. Install lock washer (3) and nut (2) on SMB connector A1A69J697 (4).
14. Set A1A69 10/100 Hz Filter (1) top side up on work surface.
15. Install A1A69 10/100 Hz Filter cover (para 2-146).
16. Install A1A69 10/100 Hz Filter (para 2-147).



END OF TASK

2-150. REPLACE AIA69A3 2ND MIXER CCA.

DESCRIPTION

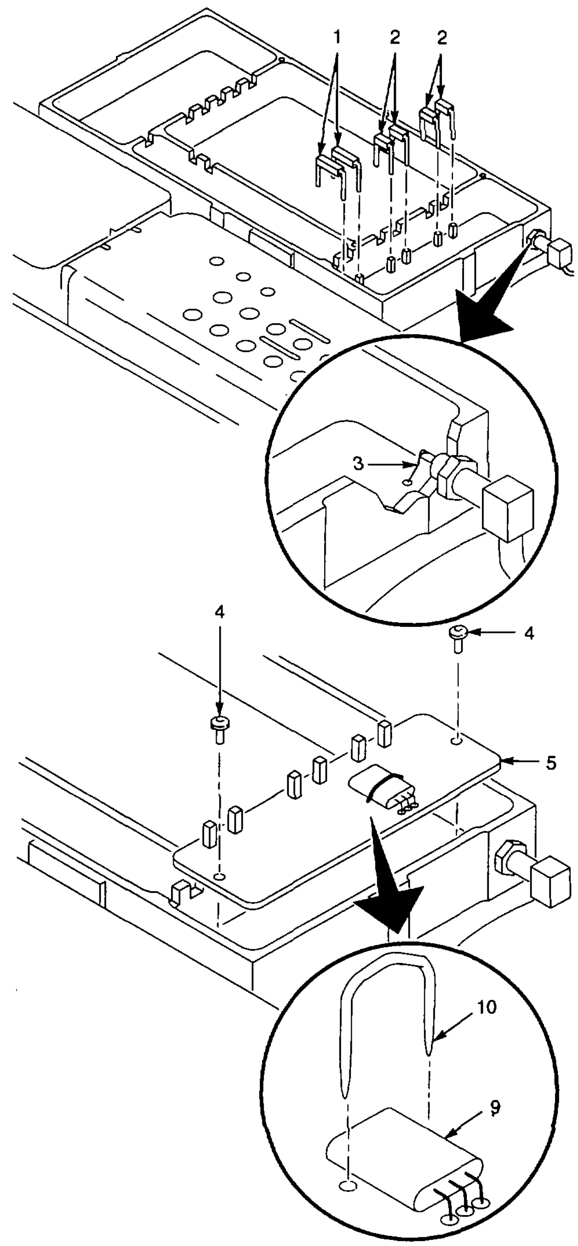
This procedure covers: Remove and Install

NOTE

A1A69Y2020 crystal on A1A69A3 2nd Mixer CCA is matched with A1A69Y2025 crystal on A1A69A1 1st Mixer CCA. When replacing A1A69A3 2nd Mixer CCA, A1A69A1 1st Mixer CCA also must be removed so that new crystals can be installed on both CCAs.

REMOVE

1. Remove A1A69 10/100 Hz Filter cover (para 2-146).
2. Remove following U-shaped feedthrough terminals:
   - Two wide-width terminals (1).
   - Four narrow-width terminals (2).
3. Unsolder wire (3) from center conductor of SMB connector A1A69P696.
4. Remove two screws (4) that secure A1A69A3 2nd Mixer CCA (5) to filter housing.
5. Lift A1A69A3 2nd Mixer CCA (5) from filter housing.
6. Remove A1A69A1 1st Mixer CCA (para 2-149).
7. Use needle-nose pliers to pull crystal retaining strap (6) from A1A69A1 1st Mixer CCA (7).
8. Unsolder A1A69Y2025 crystal (8) and remove from A1A69A1 1st Mixer CCA (7).



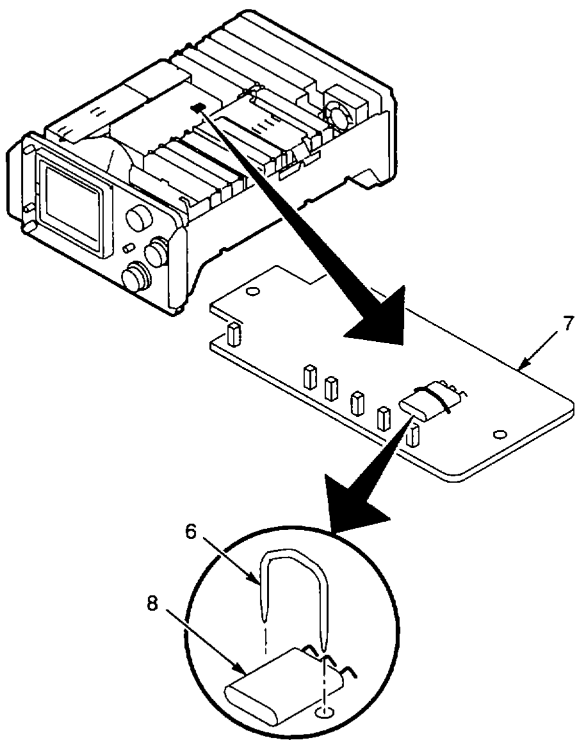
INSTALL

1. Place new A1A69Y2020 crystal (9) on new A1A69A3 2nd Mixer CCA (5), and solder crystal to pads.
2. Install new crystal retaining strap (10), (Appendix B, Item 10).
3. Set A1A69A3 2nd Mixer CCA (5) in filter housing.
4. Install two screws (4) to secure A1A69A3 2nd Mixer CCA (5) in filter housing.
5. Solder wire (3) to center conductor of SMB connector A1A69P696.

6. Remove following U-shaped feedthrough terminals:

   - Two wide-width terminals (1).
   - Four narrow-width terminals (2).

7. Place new A1A69Y2025 crystal (8) on AlA69A1 1 st Mixer CCA (7), and solder crystal to pads.
8. Install crystal retaining strap (6), (Appendix B, Item 10).
9. Install AlA69A1 1st Mixer CCA (para 2-150).
10. Install A1A69 10/100 Hz Filter cover (para 2-146).



END OF TASK

2-151. REPLACE AIA69A2 FILTER CCA.

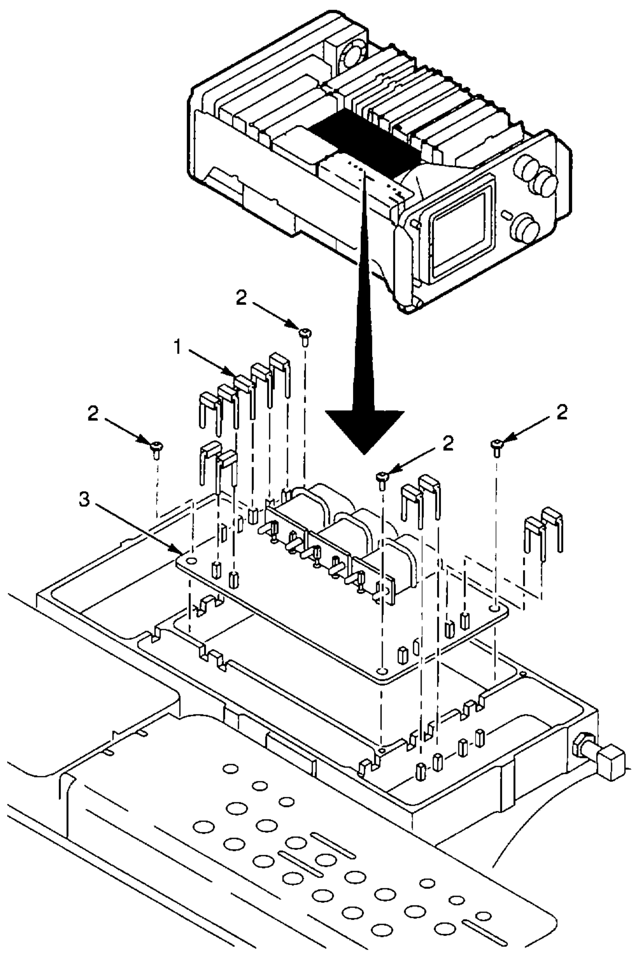
DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A1A69 10/100 Hz Filter cover (para 2-146).
2. Remove eleven U-shaped feedthrough terminals (1).
3. Remove four screws (2) that secure A1A69A2 Filter CCA (3) to filter housing.
4. Lift A1A69A2 Filter CCA (3) from filter housing.

1. Set A1A69A2 Filter CCA (3) in filter housing.
2. Install four screws (2) to secure A1A69A2 Filter CCA (3) to filter housing.
3. Install eleven U-shaped feedthrough terminals (1).
4. Install A1A69 10/100 Hz Filter cover (para 2-146).



END OF TASK

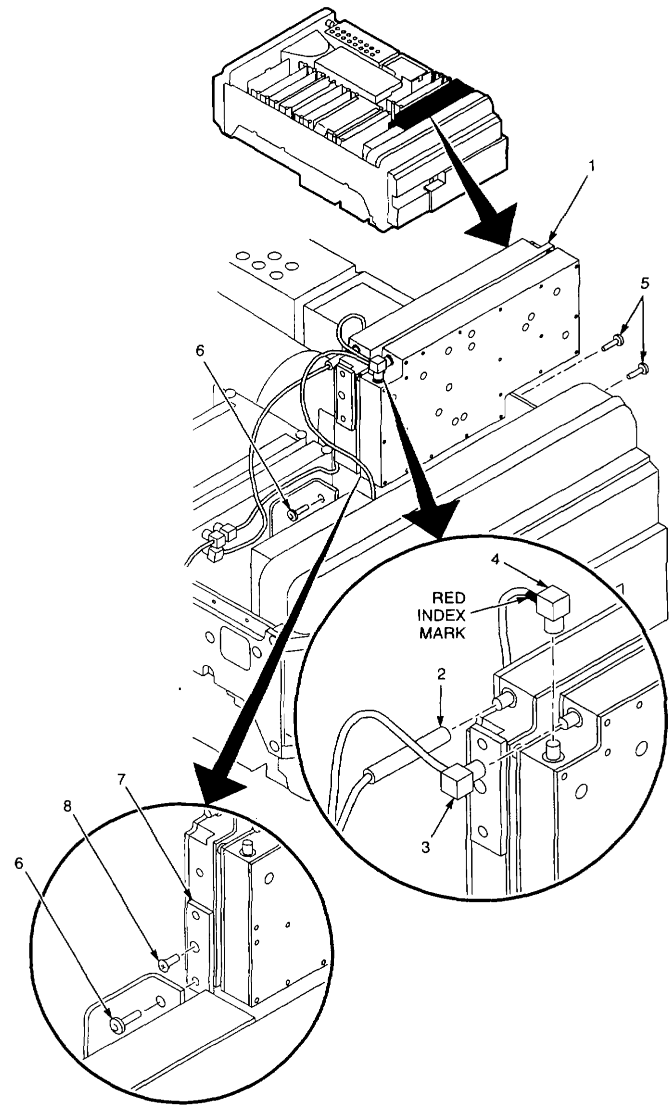
2-152. REPLACE A1A68 VARIABLE RESOLUTION MODULE.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove front CCA bracket (para 2-139).
2. Do the following (para 2-147, Steps 2-4):
   - Disconnect A1A69P696 from A1A6910/100 Hz Filter.
   - Remove four screws that secure A1A6910/100 Hz Filter to chassis.
   - Lift A1A69 10/100 Hz Filter, and move cable disconnected from A1A69P696 clear of filter.
3. Unplug following connectors from A1A68 Variable Resolution Module (1):
   - A1A68J682 (2).
   - A1A68J694 (3).
   - A1A68J693 (4).
4. Remove two screws (5) that secure A1A68 Variable Resolution Module (1) to side frame.
5. Remove screw (6) that secures A1A68 Variable Resolution Module (1) to bracket.
6. Lift up A1A68 Variable Resolution Module (1), and remove from chassis.



INSTALL

1. Set A1A68 Variable Resolution Module (1) in place, and press to seat connectors onto pins
2. Install screw (6) to secure A1A68 Variable Resolution Module (1) to mounting bracket.
3. Install two screws (5) to secure A1A68 Variable Resolution Module (1) to side frame.

NOTE

When servicing A1A68 Variable Resolution Module using extender cards, plate (7) is in the lower position secured with screws (6) and (8).

4. Dress long cable from A1A68 Variable Resolution Module (1) under A1A69 10/100 Hz Filter and connect to A1 A69P696 (para 2-147, Step 2).
5. Plug following connectors onto A1A68 Variable Resolution Module (1):
   - A1A68J682 (2).
   - A1A68J694 (3).
   - A1A68J693 (4).
6. Install four screws that secure A1A69 10/100 Hz Filter to chassis (para 2-147, Step 4).
7. Install front CCA bracket (para 2-139).

END OF TASK

2-153. REPLACE A1A68 VARIABLE RESOLUTION MODULE FRONT COVER.

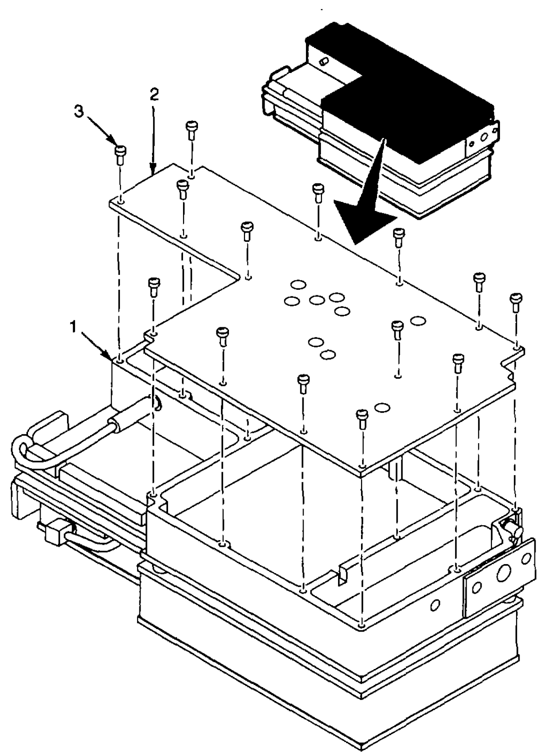
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove A1A68 Variable Resolution Module (para 2-152).
2. Set AlA68 Variable Resolution Module (1) on work surface with front cover (2) up.
3. Remove 14 screws (3) that secure front cover (2) to housing.
4. Remove front cover (2).

INSTALL

1. Set front cover (2) in place on A1A68 Variable Resolution Module (1).
2. Install 14 screws (3) to secure front cover (2) to housing.
3. Install A1A68 Variable Resolution Module (para 2-152).



END OF TASK

2-154. REPLACE A1A68 VARIABLE RESOLUTION MODULE REAR COVER.

DESCRIPTION

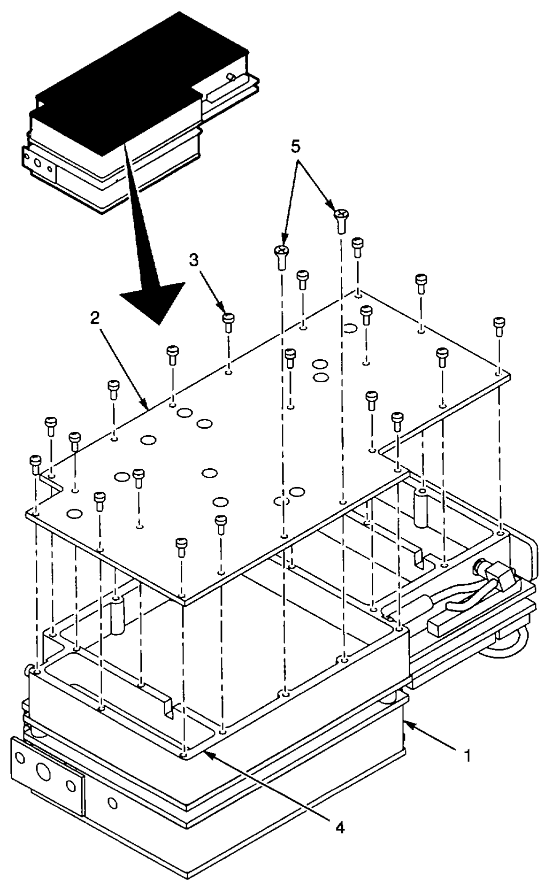
This procedure covers: Remove and Install

REMOVE

1. Remove A1A68 Variable Resolution Module (para 2-152).
2. Set A1A68 Variable Resolution Module (1) on work surface with rear cover (2) up.
3. Remove 19 screws (3) that secure rear cover (2) to housing (4).
4. Remove two flat head screws (5) that secure rear cover (2) to housing (4).
5. Remove rear cover (2).

INSTALL

1. Set rear cover (2) in place on A1A68 Variable Resolution Module (1).
2. Install two flat head screws (5) to secure rear cover (2) to housing (4).
3. Install 19 screws (3) to secure rear cover (2) to housing (4).
4. Install A1A68 Variable Resolution Module (para 2-152).



END OF TASK

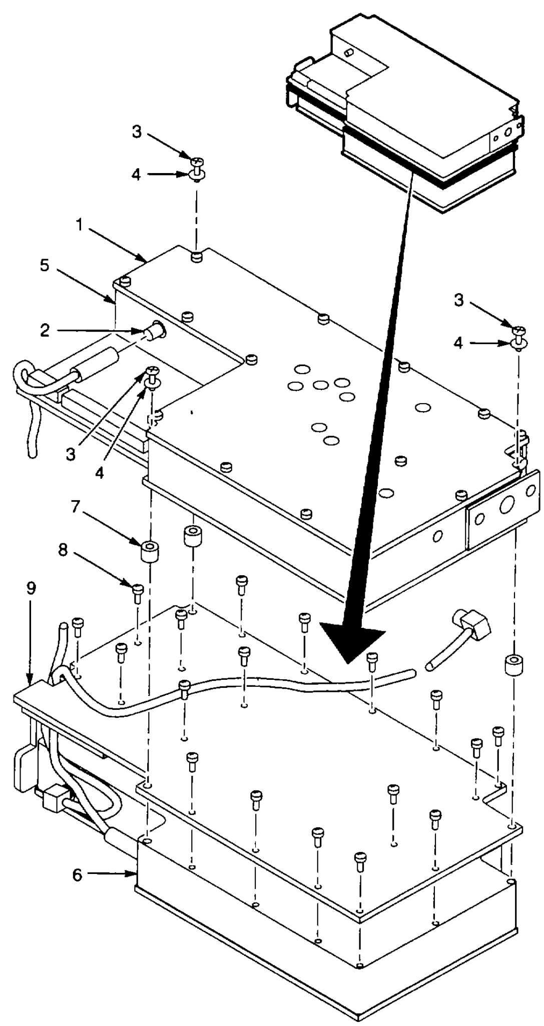
2-155. REPLACE A1A68A1 MOTHER #1 CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A1A68 Variable Resolution Module (para 2-152).
2. Set A1A68 Variable Resolution Module on work surface with front cover (1) up.
3. Unplug cable from SMB connector A1A68J683 (2).
4. Remove three screws (3) and three washers (4) from front housing (5).
5. Lift front housing (5) from rear housing (6).
6. Remove three spacers (7) separating housings. Spacers are held in place by screws (3).
7. Remove 18 screws (8) that secure A1A68A1 Mother #1 CCA (9) to rear housing (6).
8. Hold rear housing (6), and pull A1A68A1 Mother #1 CCA (9) from rear housing until clear of pins.



INSTALL

1. Align pins on A1A68A1 Mother #1 CCA (9) with connectors in bottom of rear housing (6).

NOTE
Be sure cables are aligned with notch in A1A68A1 Mother #1 CCA.

2. Press down on A1A68A1 Mother CCA (9) to seat pins into connectors.
3. Install 18 screws (8) to secure A1A68A1 Mother #1 CCA (9) to rear housing (6).
4. Set three spacers (7) in place on rear housing (6).
5. Position longer cable between spacers (7) at top of rear housing (6).
6. Set front housing (5) on spacers (7). Be sure that short cable is positioned in notch in A1A68A2 Mother #2 CCA (9).
7. Install three screws (3) and three washers (4) in front housing (5). Make sure screws (3) go through spacers (7).
8. Plug short cable onto SMB connector A1A68J683 (2).
9. Install A1A68 Variable Resolution Module (para 2-152).

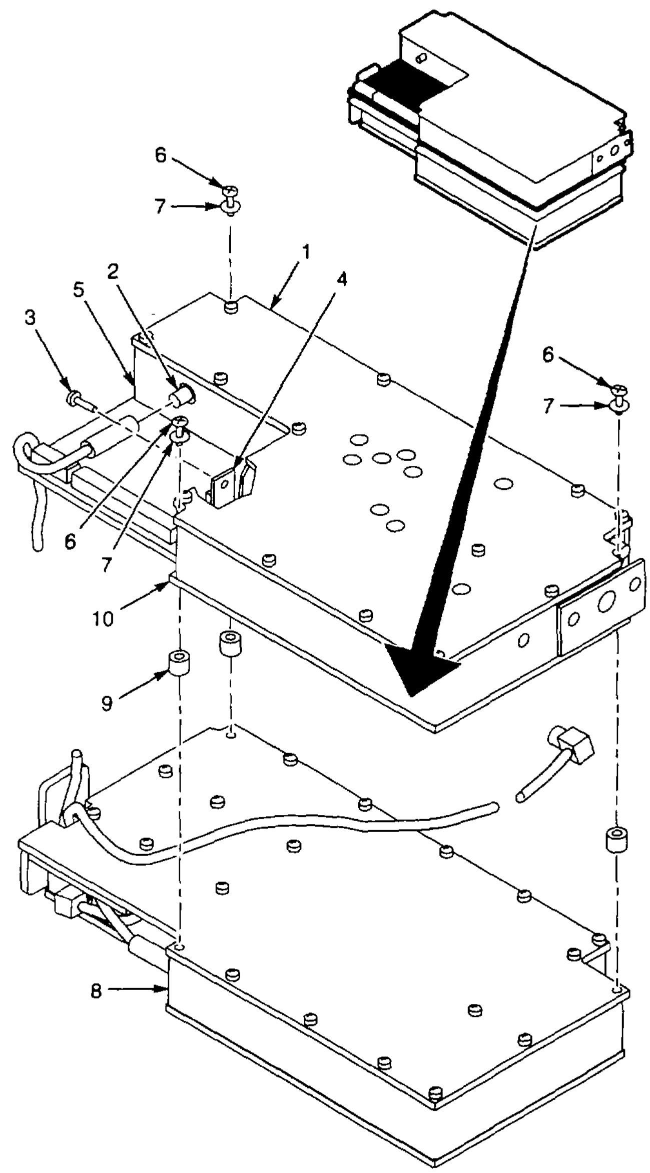
END OF TASK

2-156. REPLACE A1A68A2 MOTHER #2 CCA.

DESCRIPTION

This procedure covers: Remove and Install

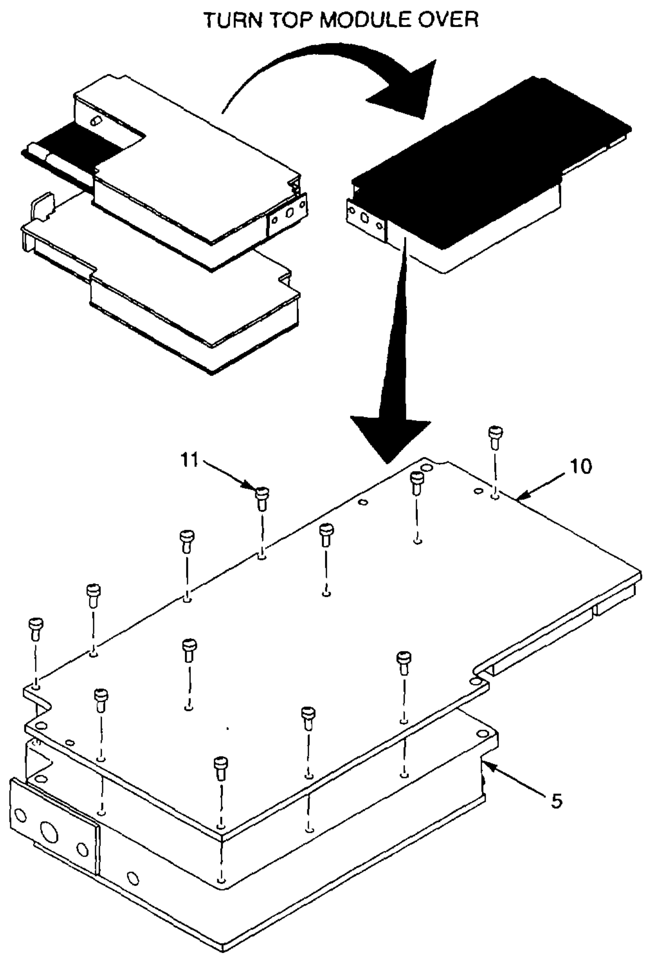
REMOVE



1. Remove A1A68 Variable Resolution Module (para 2-152).
2. Set A1A68 Variable Resolution Module on work surface with front cover (1) up.
3. Unplug cable from SMB connector A1A68J683 (2).
4. Remove screw (3) that secures A1A68U3041 (4) to front housing (5).
5. Remove three screws (6) and three washers (7) from front housing (5).
6. Lift front housing (5) from rear housing (8).
7. Remove spacers (9) that separate housings. Spacers were held in place by screws (6).
8. Set front housing (5) on work surface with A1A68A2 Mother #2 CCA (10) up.
9. Remove 12 screws (11) that secure A1A68A2 Mother #2 CCA (10) to front housing (5).
10. Hold front housing (5), and pull A1A68A2 Mother #2 CCA (10) away from front housing until clear of interconnect pins.

INSTALL

1. Align interconnect pins on A1A68A2 Mother #2 CCA (10) with connectors in bottom of front housing (5).
2. Press down A1A68A2 Mother #2 CCA (10) to seat pins into connectors.
3. Install 12 screws (11) to secure A1A68A2 Mother #2 CCA (10) to front housing (5).
4. Set spacers (9) in place on rear housing (8).
5. Position longer cable between spacers (9) at top of rear housing (8).
6. Set front housing (6) on spacers (9). Be sure that short cable is positioned in notch in A1A68A2 Mother #2 CCA (10).
7. Install three screws (6) and three washers (7) in front housing (5). Make sure screws (6) go through spacers (9).
8. Install screw (3) to secure A1A68U3041 (4) to front housing (5).
9. Plug short cable onto SMB connector A1A68J683 (2).
10. Install A1A68 Variable Resolution Module (para 2-152).



END OF TASK

2-157. REPLACE A1A68A3 INPUT CCA.

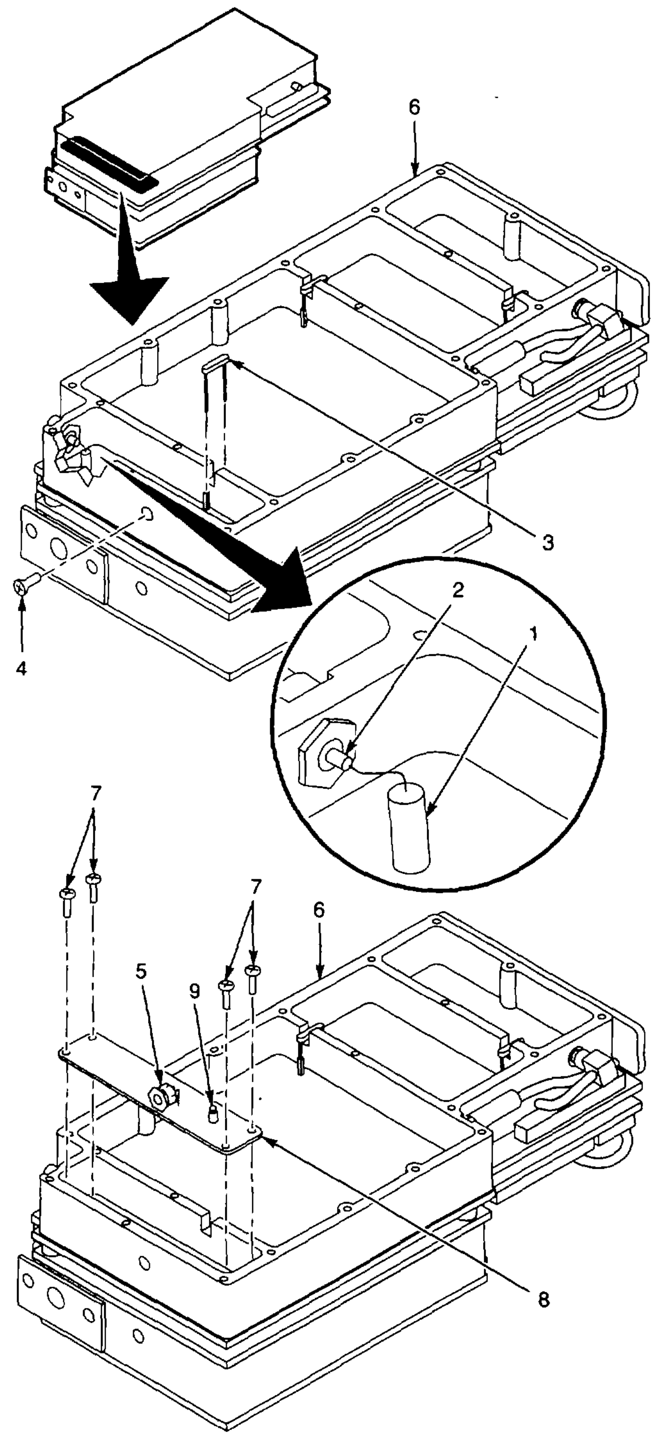
DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A1A68 Variable Resolution Module rear cover (para 2-154).
2. Unsolder resistor (1) from center conductor of SMB connector A1A68J693 (2).
3. Remove U-shaped feedthrough terminal (3).
4. Remove screw (4) that secures transistor A1A68A3Q1020 (5) to housing (6).
5. Remove four screws (7) that secure A1A68A3 Input CCA (8) to housing (6).
6. Pull up on test point A1A68A3TP1010 (9) with needle-nose pliers until A1A68A3 Input CCA (8) clears pins in housing (6).
7. Remove A1A68A3 Input CCA (8) from housing (6).

1. Align A1A68A3 Input CCA (8) with pins in housing (6).
2. Press down A1A68A3 Input CCA (8) to seat connectors onto pins.
3. Install four screws (7) to secure A1A68A3 Input CCA (8) to housing (6).
4. Install screw (4) to secure transistor A1A68A3Q1020 (5) to housing (6).
5. Install U-shaped feedthrough terminal (3).
6. Solder resistor (1) to center conductor of SMB connector A1A68J693 (2).
7. Install A1A68 Variable Resolution Module rear cover (para 2-154).



END OF TASK

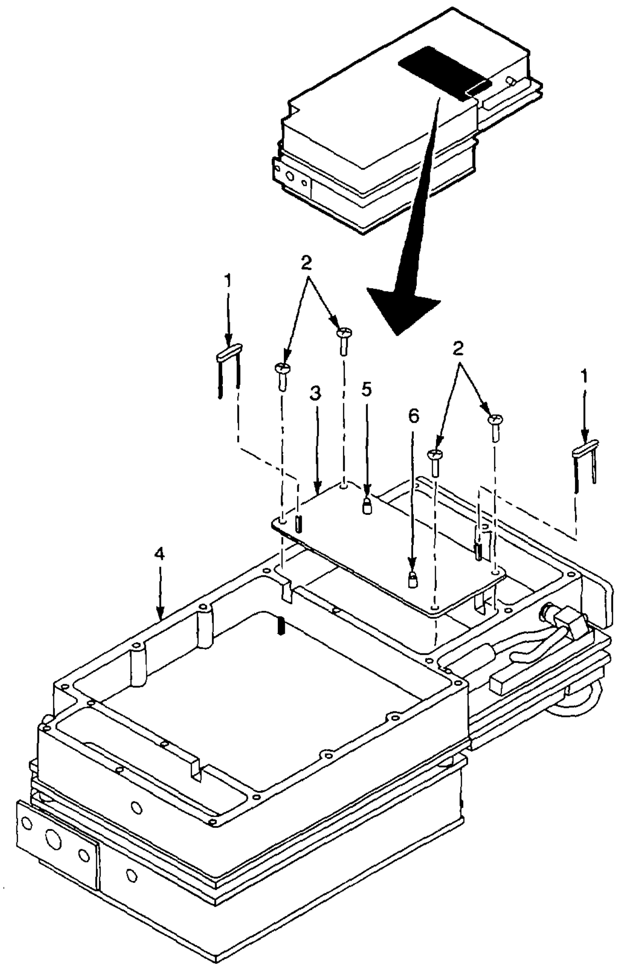
2-158. REPLACE A1A68A5 10 DB GAIN CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A1A68 Variable Resolution Module rear cover (para 2-154).
2. Remove two U-shaped feedthrough terminals (1).
3. Remove four screws (2) that secure A1A68A5 10 dB Gain CCA (3) in housing (4).
4. Pull up alternately on A1A68A5TP1020 (5) and A1A68A5TP4055 (6) with needle-nose pliers until A1A68A5 10 dB Gain CCA (3) is clear of pins in housing (4).
5. Remove A1A68A5 10 dB Gain CCA (3) from housing (4).



INSTALL

1. Align A1A68A5 10 dB Gain CCA (3) with pins in housing (4).
2. Press down A1A68A5 10 dB Gain CCA (3) to seat connectors onto pins.
3. Install four screws (2) to secure A1A68A5 10 dB Gain CCA (3) in housing (4).
4. Install two U-shaped feedthrough terminals (1).
5. Install A1A68 Variable Resolution Module rear cover (para 2-154).

END OF TASK

2-159. REPLACE A1A68A4 1ST FILTER SELECT CCA.

DESCRIPTION

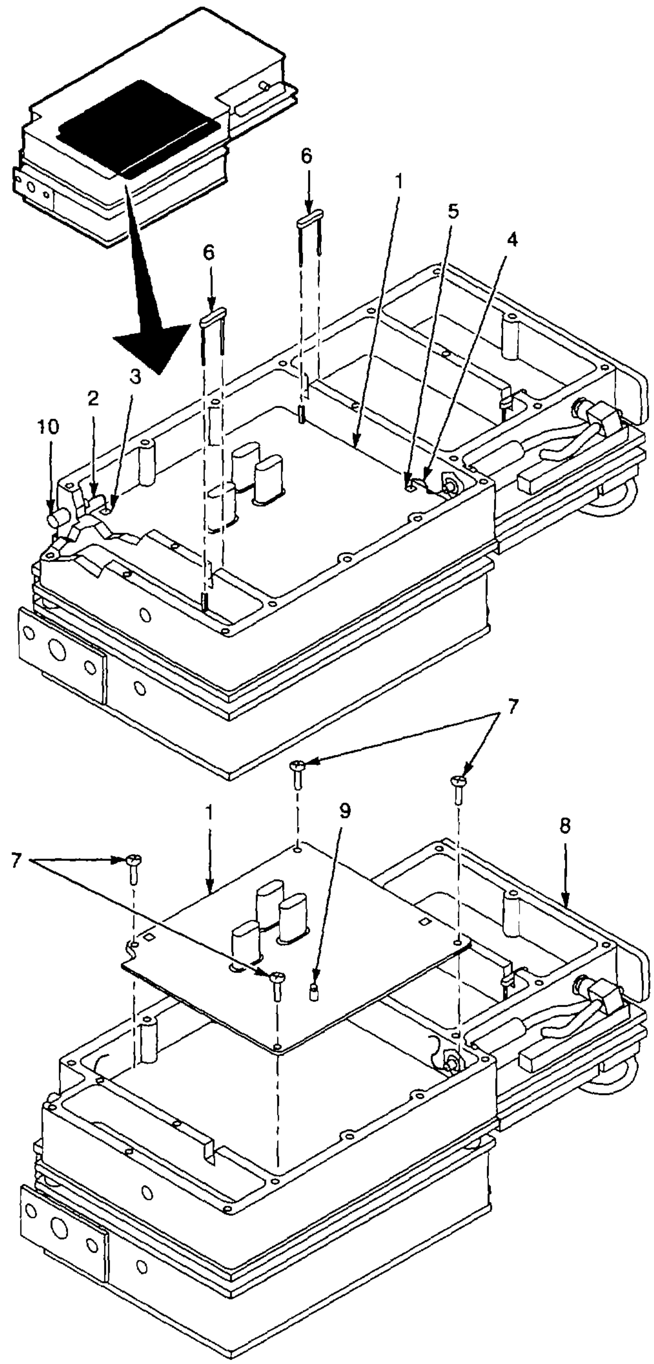
This procedure covers: Remove and Install

NOTE

A1A68Y2030 and A1A68Y2045 crystals on A1A68A4 1st Filter Select CCA are matched with A1A68Y6049 crystal on A1A68A8 2nd Filter Select CCA. Also, A1A68Y2040 crystal on A1A68A4 1st Filter Select CCA is matched with A1A68Y5040 on A1A68A8 2nd Filter Select CCA. When replacing A1A68A4 1st Filter Select CCA, A1A68A8 2nd Filter Select CCA also must be removed so that new crystals can be installed on both CCAs.

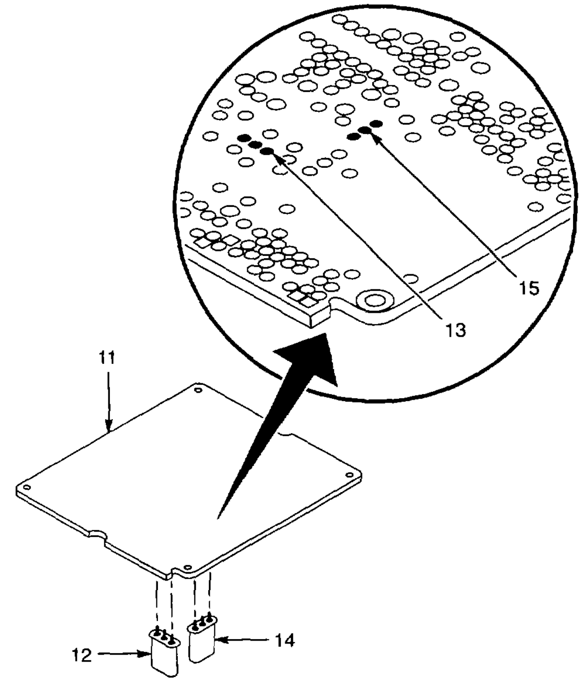
REMOVE

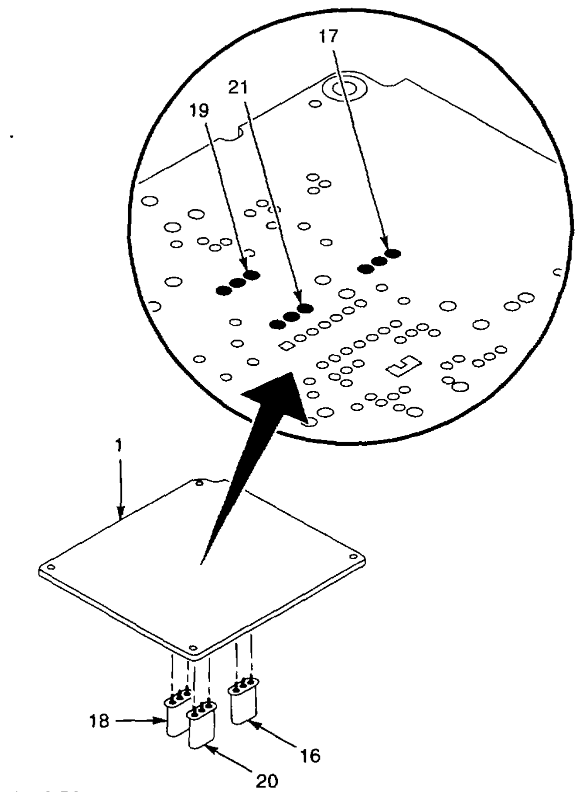
1. Remove A1A68 Variable Resolution Module rear cover (para 2-154).
2. Unsolder following wires from A1A68A4 1st Filter Select CCA (1):
   - Wire (2) from pad labeled P694 (3).
   - Wire (4) from pad labeled P695 (5).
3. Remove two U-shaped feedthrough terminals (6).
4. Remove four screws (7) that secure A1A68A4 1st Filter Select CCA (1) in housing (8).
5. Pull up on test point (9) with needle-nose pliers until A1A68A4 1st Filter Select CCA (1) clears pins in housing (8).
6. Tip left edge of A1A68A4 1st Filter Select CCA (1) up until clear of SMB connector A1A68J694 (10).
7. Remove A1A68A4 1st Filter Select CCA (1) from housing (8).
8. Remove A1A68A8 2nd Filter Select CCA from housing (para 2-162).
9. Turn A1A68A8 2nd Filter Select CCA (11).bottom side up, and unsolder crystals from indicated solder pads.
   - A1A68Y6049 crystal (12) from pads (13).
   - A1A68Y5040 crystal (14) from pads (15).



INSTALL

1. Solder new crystals to following solder pads on A1A68A8 2nd Filter Select CCA (1):
   - A1A68Y6049 crystal (12) to pads (13).
   - A1A68Y5040 crystal (14) to pads (15).
2. Install A1 A68A8 2nd Filter Select CCA (para 2-162).
3. Solder new crystals to following solder pads on A1A68A4 1st Filter Select CCA (1):
   - A1A68Y2030 crystal (16) to pads (17).
   - A1A68Y2040 crystal (18) to pads (19).
   - A1A68Y2045 crystal (20) to pads (21).
4. Align A1A68A4 1st Filter Select CCA (1) with pins in housing (8).
5. Press down A1 A68A4 1st Filter Select CCA (1) to seat connectors onto pins.
6. Install four screws (7) to secure A1A68A4 1st Filter Select CCA (1) to housing (8).
7. Install two U-shaped feedthrough terminals (6)
8. Solder following wires to A1A68A4 1st Filter Select CCA (1):
   - Wire (2) to pad labeled P694 (3).
   - Wire (4) to pad labeled P695 (5).
9. Install A1A68 Variable Resolution Module rear cover (para 2-154).





END OF TASK

2-160. REPLACE A1A68A6 20 DB GAIN CCA.

DESCRIPTION

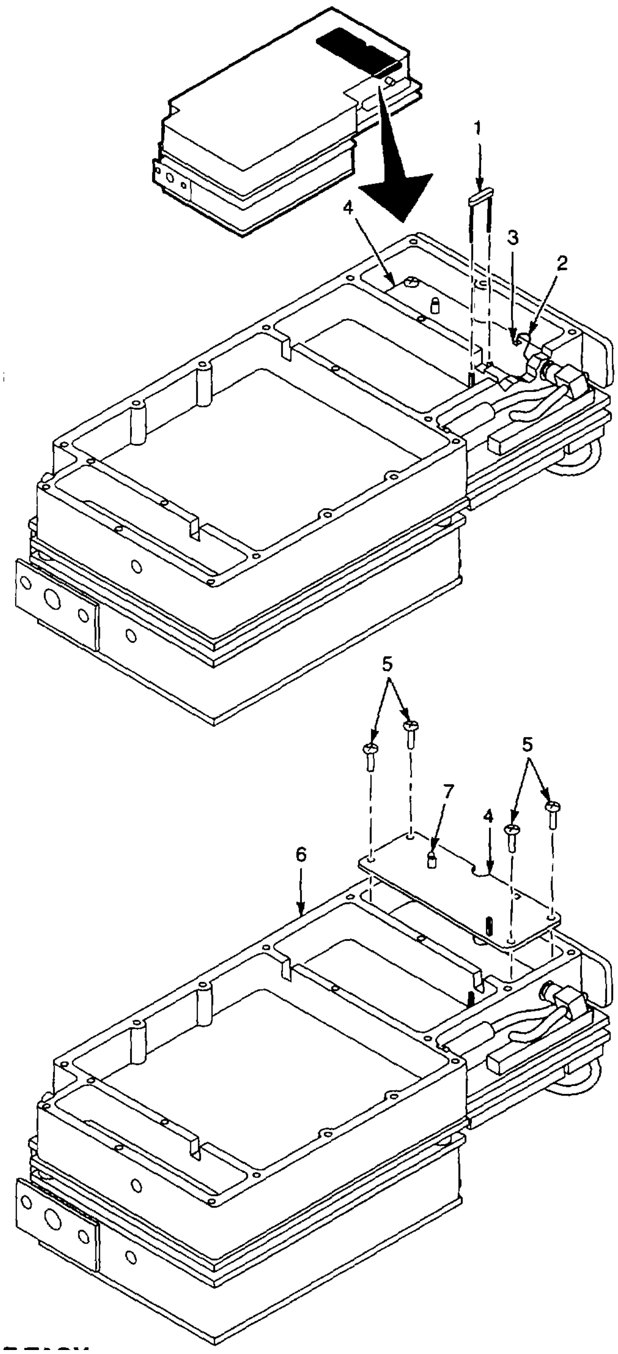
This procedure covers: Remove and Install

REMOVE

1. Remove A1A68 Variable Resolution Module rear cover (para 2-154).
2. Remove U-shaped feedthrough terminal (1).
3. Unsolder wire (2) from pad (3) on A1A68A6 20 dB Gain CCA (4).
4. Remove four screws (5) that secure A1A68A6 20 dB Gain CCA (4) in housing (6).
5. Pull up on test point (7) with needle-nose pliers until A1A68A6 20 dB Gain CCA (4) is clear of pins in housing (6).
6. Remove A1A68A6 20 dB Gain CCA (4) from housing (6).

INSTALL

1. Align A1A68A6 20 dB Gain CCA (4) with interconnect pins in housing (6).
2. Press down A1A68A6 20 dB Gain CCA (4) to seat connectors onto pins.
3. Install four screws (5) to secure A1A68A6 20 dB Gain CCA (4) in housing (6).
4. Solder wire (2) to pad (3) on A1A68A6 20 dB Gain CCA (4).
5. Install U-shaped feedthrough terminal (1).
6. Install A1A68 Variable Resolution Module rear cover (para 2-154).



END OF TASK

2-161. REPLACE A1A68A7 BAND LEVELING CCA.

DESCRIPTION

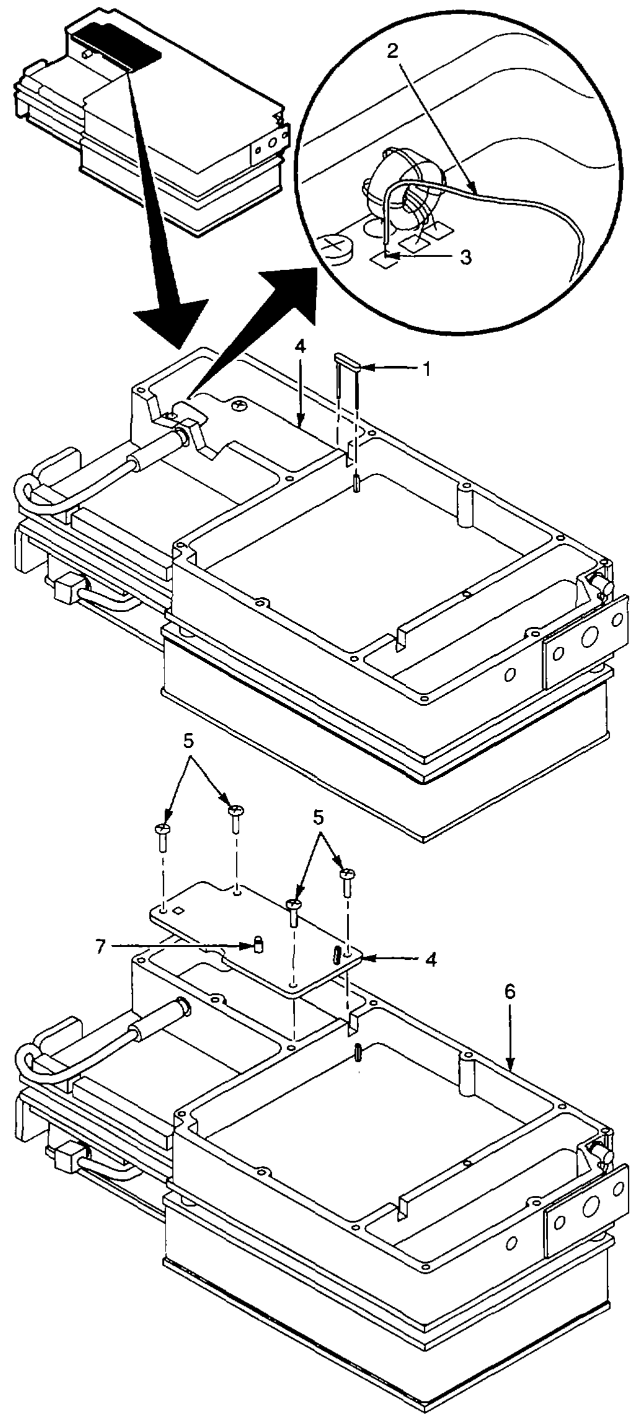
This procedure covers: Remove and Install

REMOVE

1. Remove A1A68 Variable Resolution Module front cover (para 2-153).
2. Remove U-shaped feedthrough terminal (1).
3. Unsolder wire (2) from pad (3) on A1A68A7 Band Leveling CCA (4).
4. Remove four screws (5) that secure A1A68A7 Band Leveling CCA (4) in housing (6).
5. Pull up on test point (7) with needle-nose pliers until A1A68A7 Band Leveling CCA (4) clears pins in housing (6).
6. Remove A1A68A7 Band Leveling CCA (4) from housing (6).

INSTALL

1. Align A1A68A7 Band Leveling CCA (4) with pins in housing (6).
2. Press down A1A68A7 Band Leveling CCA (4) to seat connectors onto pins.
3. Install four screws (5) to secure A1A68A7 Band Leveling CCA (4) in housing (6).
4. Solder wire (2) to pad (3) on A1A68A7 Band Leveling CCA (4).
5. Install U-shaped feedthrough terminal (1).
6. Install A1A68 Variable Resolution Module front cover (para 2-153).



END OF TASK

2-162. REPLACE A1A68A8 2ND FILTER SELECT CCA.

DESCRIPTION

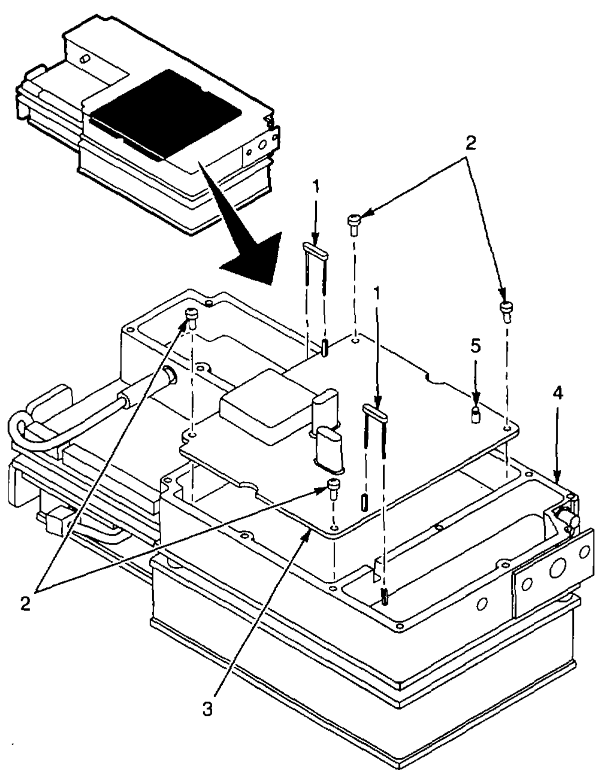
This procedure covers: Remove and Install

NOTE

A1A68Y5040 crystal on A1A68A8 2nd Filter Select CCA is matched with A1A68Y2040 crystal on A1A68A4 1st Filter Select CCA. Also, A1A68Y6049 crystal on A1A68A8 2nd Filter Select CCA is matched with A1A68Y2030 and A1A68Y2045 crystals on A1A68A4 1st Filter Select CCA. When replacing A1A68A8 2nd Filter Select CCA, A1A68A4 1st Filter Select CCA also must be removed so that new crystals can be installed on both CCAs.

REMOVE

1. Remove AIA68 Variable Resolution Module front cover (para 2-153).
2. Remove two U-shaped feedthrough terminals (1).
3. Remove four screws (2) that secure A1A68A8 2nd Filter Select CCA (3) in housing (4).
4. Pull up on test point (5) with needle-nose pliers until A1A68A8 2nd Filter Select CCA (3) clears pins in housing (4).
5. Remove A1A68A8 2nd Filter Select CCA (3) from housing (4).
6. Remove A1A68A4 1st Filter Select CCA from housing (para 2-159).
7. Turn A1A68A4 1st Filter Select CCA (6).bottom side up, and unsolder crystals from indicated solder pads.
   - A1A68Y2030 crystal (7) from pads (8).
   - A1A68Y2040 crystal (9) from pads (10).
   - A1A68Y2045 crystal (11) from pads (12).



INSTALL

1. Turn A1A68A4 1 st Filter Select CCA (6) bottom side up, and solder new crystals to indicated solder pads.

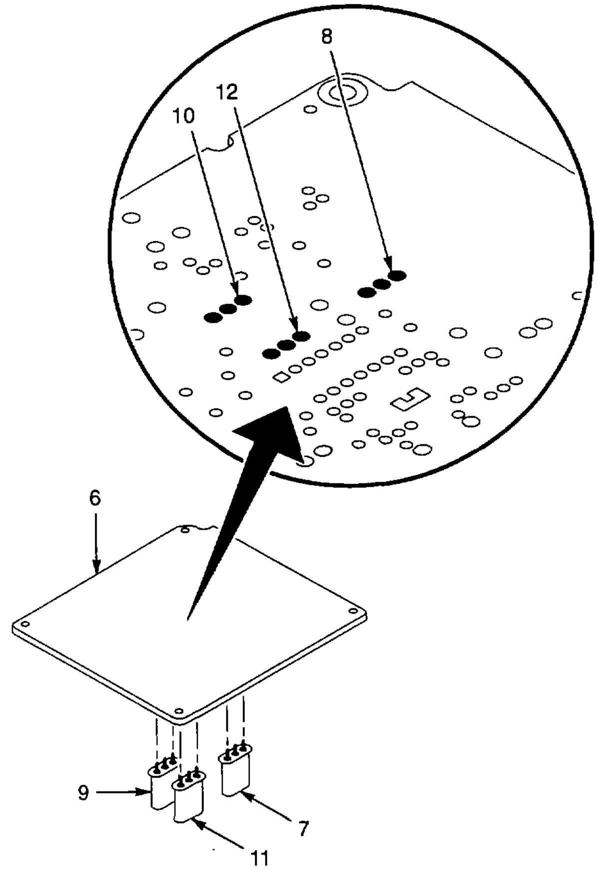
- A1A68Y2030 crystal (7) to pads (8).
- A1A68Y2040 crystal (9) to pads (10).
- A1A68Y2045 crystal (11) to pads (12).

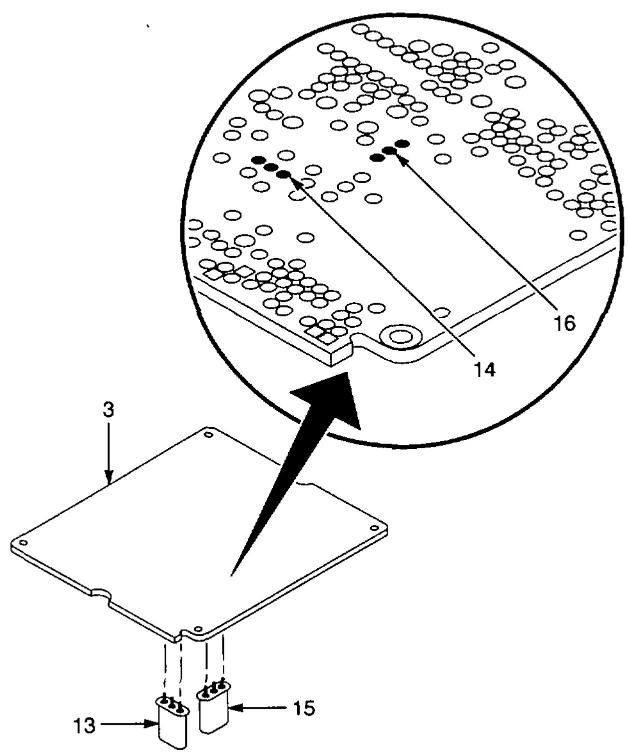
2. Install A1A68A4 1 st Filter Select CCA in housing (para 2-159).

3. Solder new crystals to following solder pads on A1A68A8 2nd Filter Select CCA (3):

- A1A68Y6049 crystal (13) to pads (14).
- A1A68Y5040 crystal (15) to pads (16).

4. Align Al A68A8 2nd Filter Select CCA (3) with pins in housing (4).
5. Press down Al A68A8 2nd Filter Select CCA (3) to seat connectors onto pins.
6. Install four screws (2) to secure A1A68A8 2nd Filter Select CCA (3) in housing (4).
7. Install two U-shaped feedthrough t erminals (1).
8. Install Al A68 Variable Resolution Module front cover (para 2-153).





END OF TASK

2-163. REPLACE A1A68A8FL6015 CRYSTAL FILTER.

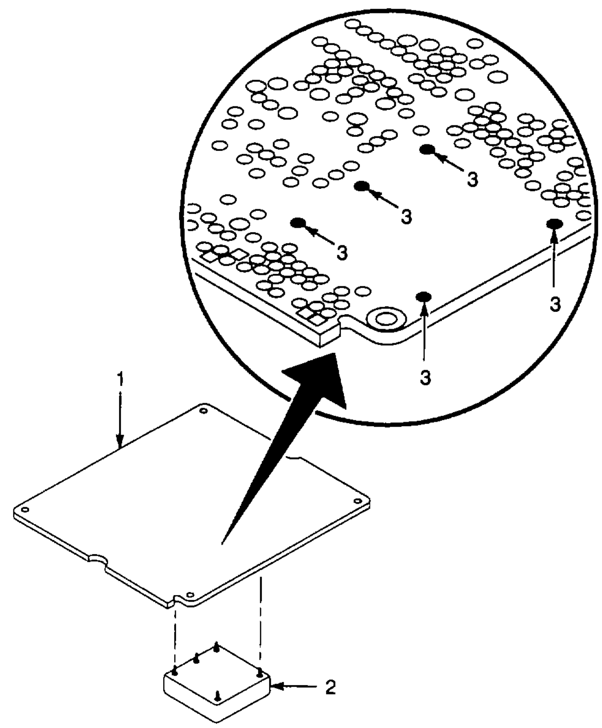
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove A1A68A8 2nd Filter Select CCA (para 2-162).
2. Turn A1A68A8 2nd Filter Select CCA (1) bottom side up.
3. Unsolder A1A68A8FL6015 Crystal Filter (2) leads from solder pads (3) on A1A68A8 2nd Filter Select CCA (1).
4. Remove A1 A68A8FL6015 Crystal Filter (2) from A1A68A8 2nd Filter Select CCA (1).

INSTALL

1. Install A1A68A8FL6015 Crystal Filter (2) on A1A68A8 2nd Filter Select CCA (1), aligning pins with solder pads (3).
2. Solder pins from A1 A68A8FL6015 Crystal Filter (2) to solder pads (3).
3. Install A1A68A8 2nd Filter Select CCA (para 2-162).

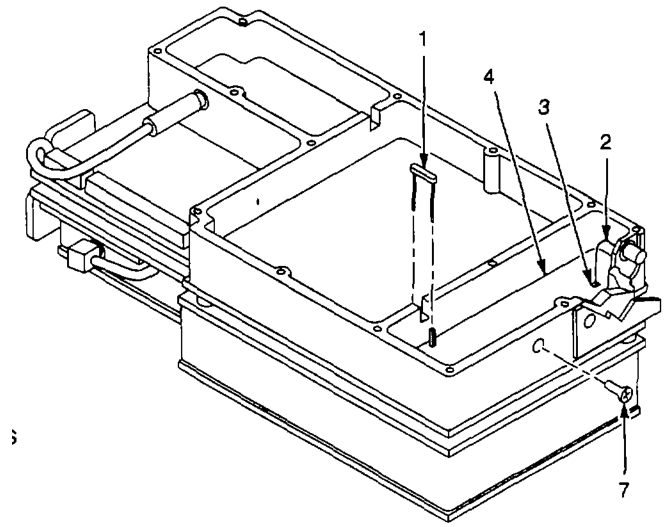


END OF TASK

2-164. REPLACE A1A68A9 AMPLIFIER CCA.

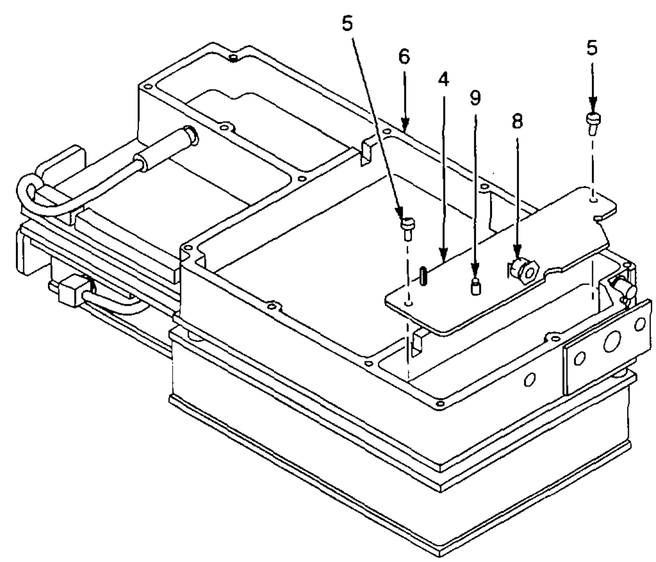
DESCRIPTION
This procedure covers: Remove and Install

REMOVE



1. Remove A1A68 Variable Resolution Module front cover (para 2-153).
2. Remove U-shaped feedthrough terminal (1).
3. Unsolder wire (2) from pad (3) labeled P682 on A1A68A9 Amplifier CCA (4).
4. Remove two screws (5) that secure Al A68A9 Amplifier CCA (4) in housing (6).
5. Remove screw (7) that secures transistor A1 A68A9Q1030 (8) to housing (6).
6. Pull up on test point (9) with n eedle-nose pliers, until Al A68A9 Amplifier CCA (4) is clear of pins in housing (6).
7. Remove A1A68A9 Amplifier CCA (4) from housing (6).

INSTALL



1. Align A1 A68A9 Amplifier CCA (4) with pins in housing 6)
2. Press down Al A68A9 Amplifier CCA (4) to seat connectors onto pins.
3. Install screw (7) to secure transistor A1A68A9Q1030 (8) to housing (6).
4. Install two screws (5) to secure A1A68A9 Amplifier CCA (4) in housing (6).
5. Solder wire (2) to pad (3) labeled P682 on A1A68A9 Amplifier CCA (4).
6. Install U-shaped feedthrough terminal (1).
7. Install A1 A68 Variable Resolution Module front cover (para 2-153).

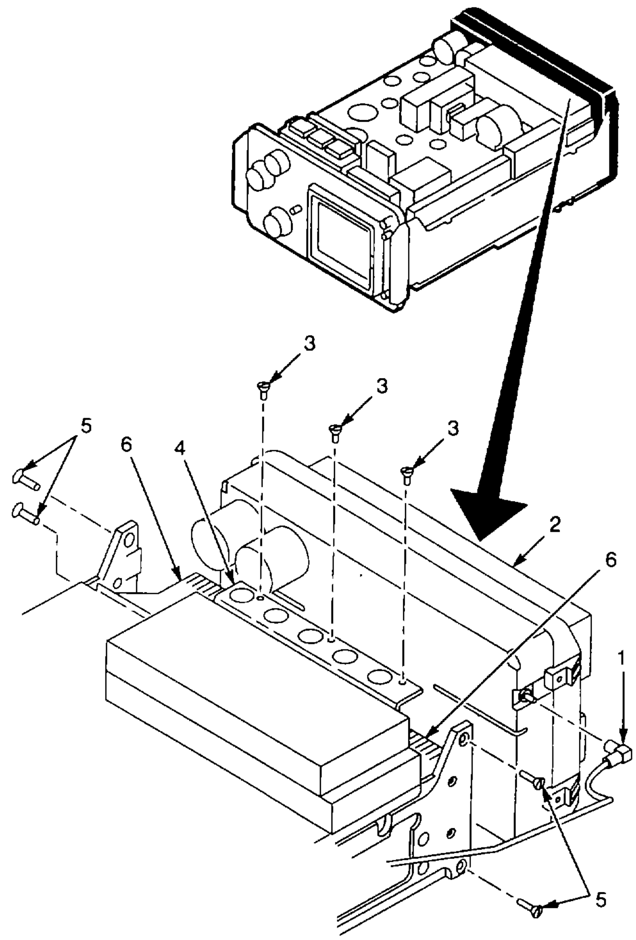
END OF TASK

2-165. REPLACE A1A30 POWER SUPPLY.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Pry up one end of retaining clip on connector P566 (para 2-135, Step 2), and remove retaining clip.
3. Unplug A1A5 6P566 from Al1A56 GPIB CCA (para 2-135, Step 3).
4. Unplug connector Al A62P620 from A1A62J620 on A1A62 Log Amplifier CCA (para 2-140, Step 4).
5. Set 495P Spectrum Analyzer bottom side up.
6. Disconnect SMB connector (1) from A1A30 Power Supply (2).
7. Remove three screws (3) that secure RF deck (4) to A1 A30 Power Supply (2).
8. Remove four screws (5) that secure Al A30 Power Supply (2) to side frames.

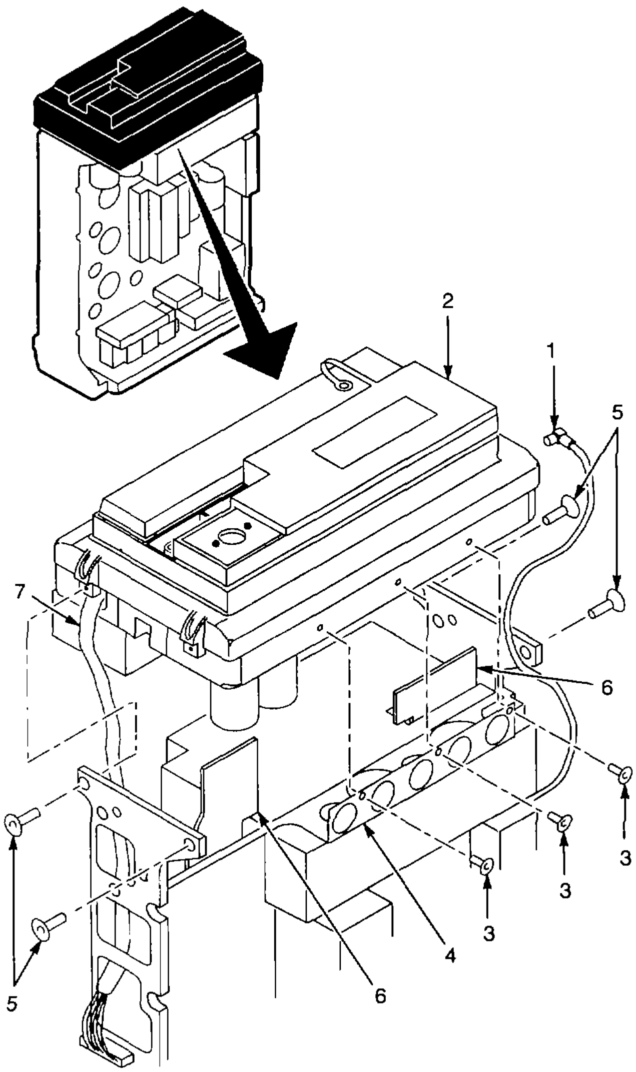


NOTE
When removing A1A30 Power Supply, be sure to guide cables and connectors so they do not catch on chassis and component parts.

9. Pull AIA30 Power Supply (2) back until clear of edge connectors on A1A28 Mother Board CCA (6).
10. Remove A1A30 Power Supply (2) from chassis.

INSTALL

1. Set 495P Spectrum Analyzer on front surface.
2. Hold A1A30 Power Supply (2) in position over edge connectors on A1A28 Mother Board CCA (6).
3. Position cable (7) (attached to P566) be tween CCAs and side frame.
4. Align slots in Al A30 Power Supply (2) with edge connectors on A1 A28 Mother Board CCA (6).
5. Press A1A30 Power Supply (2) onto edge connectors of A1 A28 Mother Board CCA (6) while guiding cable (7) between CCAs and side frame.
6. Install four screws (5) to secure A1 A30 Power Supply (2) to side frames.
7. Install three screws (3) to secure RF deck (4) to A1 A30 Power Supply (2).
8. Connect A1 A56P566 to A1 A56 GPIB CCA (para 2-135, Step 5).
9. Install retaining clip on connector A1A56P566 (para 2-135, Step 6).
10. Connect A1A62P620 to A1A62J620 on A1A62 Log Amplifier CCA (para 2-140, Step 6).
11. Connect SMB connector (1) to A1A30 Power Supply (2).
12. Install cabinet (para 2-118).



END OF TASK

2-166. REPLACE A1A30 POWER SUPPLY SHIELD.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove A1A30 Power Supply (para 2-165).

2. Remove two screws (1) that secure SMB connector bracket (2) to A1A30 Power Supply shield (3).

3. Remove six screws (4) that secure the A1A30 Power Supply shield (3) to rear frame (5).

4. Lift A1 A30 Power Supply shield (3) high enough to unplug connector AlA30A1 P3045 (6) from A1A30A1 Power Supply CCA (7).

5. Remove the Al A30 Power Supply shield (3).

INSTALL

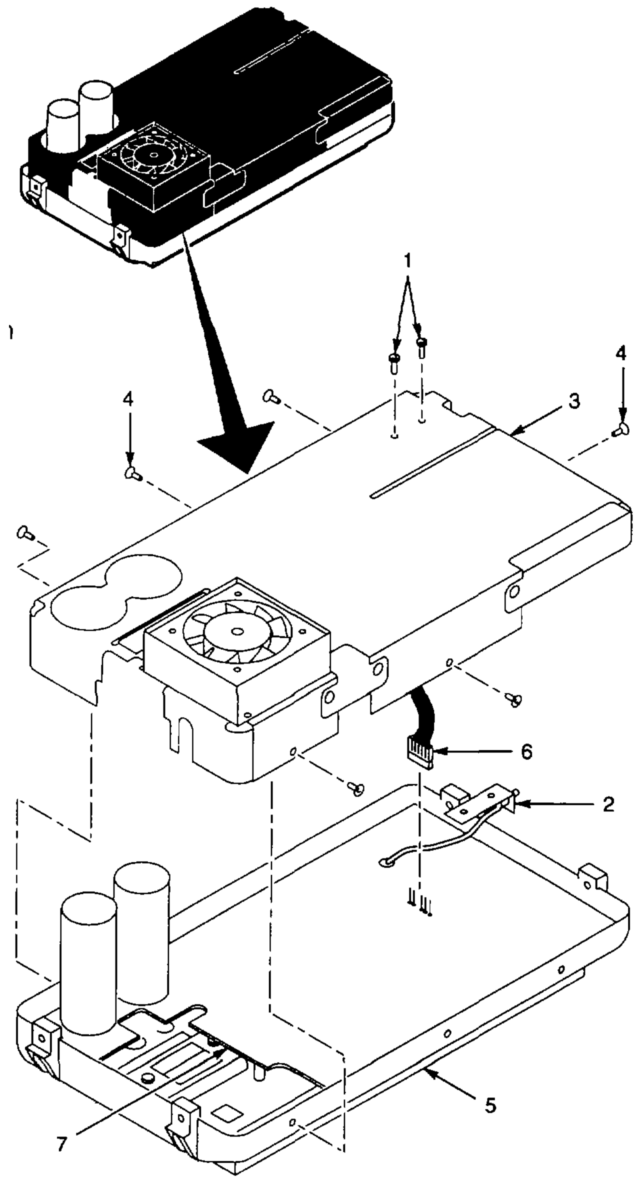
1. Place A1A30 Power Supply shield (3) in position on rear frame (5).

2. Lift shield high enough to plug connector A1 A30A1 P3045 (6) onto A1 A30A1 Power Supply CCA (7).

3. Install two screws (1) to secure SMB connector bracket (2) to A1 A30 Power Supply shield (3).

4. Install six screws (4) to secure the A1A30 Power Supply shield (3) to rear frame (5).

5. Install A1 A30 Power Supply (para 2-165).



END OF TASK

2-167. REPLACE A1A30B100 FAN.

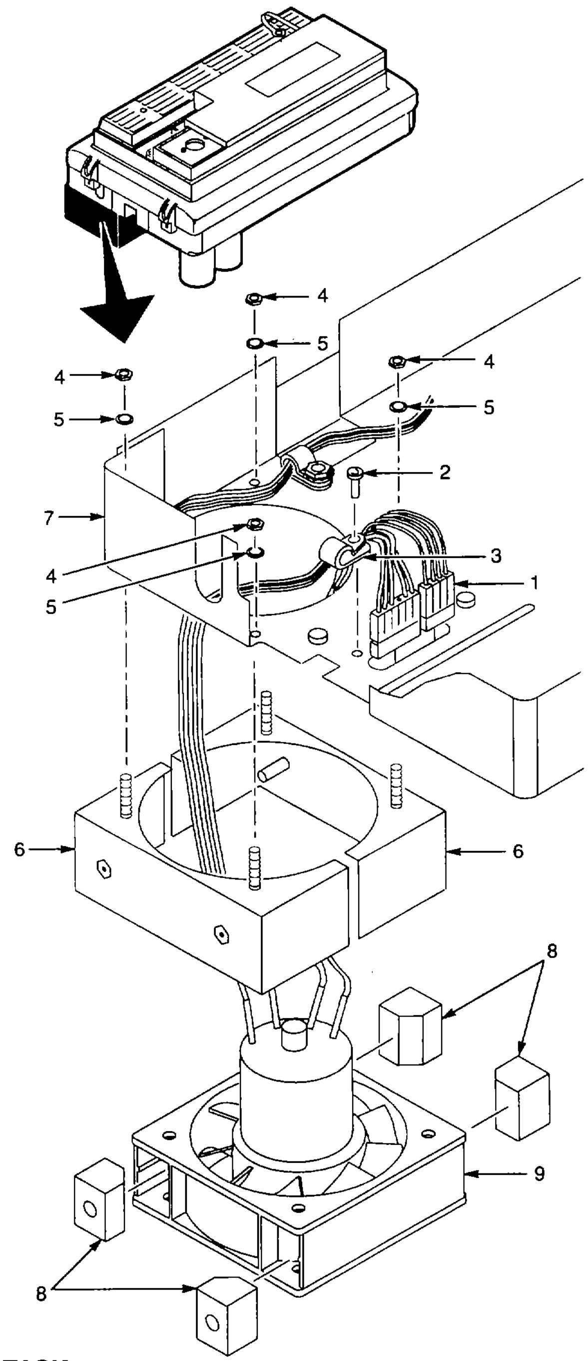
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove A1 A30 Power Supply shield (para 2-166).
2. Unplug connector Al A30A2P2020 (1).
3. Remove screw (2) that secures cable clamp (3).
4. Remove fan cable from cable clamp (3).
5. Remove four nuts (4) and four lock washers (5) that secure fan brackets (6) to A1A30 Power Supply shield (7).
6. Lift A1A30 Power Supply shield (7) from fan assembly.
7. Remove fan brackets (6).
8. Use flat-blade screwdriver to pry out rubber fan mounts (8), located at each corner of A1A30B100 fan (9).

INSTALL

1. Install rubber fan mounts (8) at each corner of A1 A30B100 fan (9).
2. Set A1A30B100 fan (9) on flat work surface with motor up.
3. Set fan brackets (6) in place.
4. Set the Al A30 Power Supply shield (7) in place on fan assembly, guiding fan cable through cutout for fan.
5. Install four lock washers (5) and four nuts (4) to secure fan brackets (6) to Al 1A30 Power Supply shield (7).
6. Insert fan cable in cable clamp (3).
7. Install screw (2) to secure cable clamp (3).
8. Plug connector Al A30 A2P2020 (1) onto pins.
9. Install A1 A30 Power Supply shield (para 2-166).



END OF TASK

2-168. REPLACE A1A30A2 FAN DRIVER CCA.

DESCRIPTION

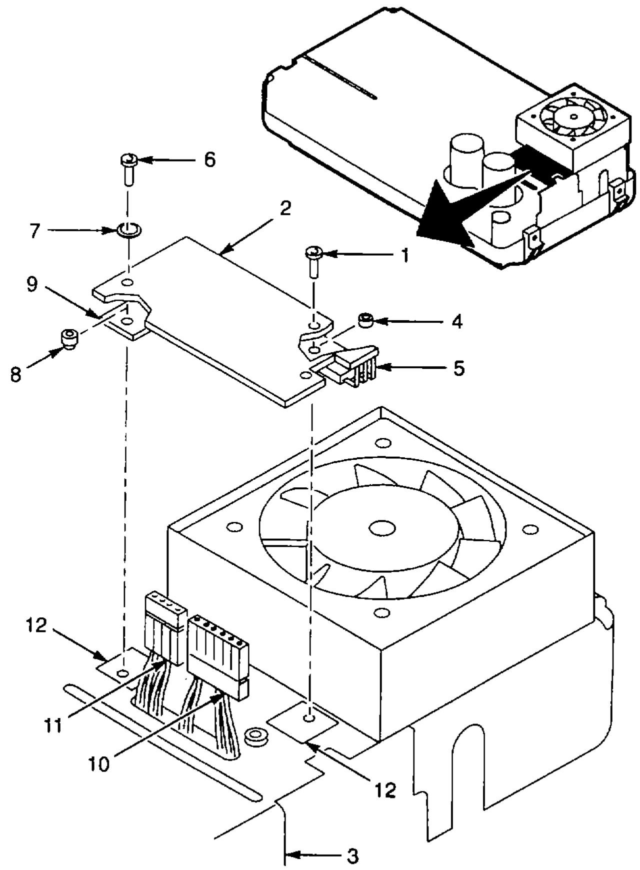
This procedure covers: Remove and Install

REMOVE

1. Remove A1A30 Power Supply (para 2-165).
2. Remove screw (1) that secures Al A30A2 Fan Driver CCA (2) to A1 A30 Power Supply shield (3).
3. Remove spacer (4), located between Al A30A2 Fan Driver CCA (2) and body of A1A30A2Q1044 (5).
4. Remove screw (6) and washer (7) that secure A1 A30A2 Fan Driver CCA (2) to Al A30 Power Supply shield (3).
5. Remove spacer (8), located between Al A30A2 Fan Driver CCA (2) and body of A1A30A2Q1010 (9).
6. Lift Al A30A2 Fan Driver CCA (2) far enough to unplug following connectors:

- A1A30A2P2040 (10).
- A1A30A2P2020 (11).

7. Remove A1A30A2 Fan Driver CCA (2).
8. Take care not to lose transistor insulators (12).



INSTALL

1. Plug following connectors onto A1A30A2 Fan Driver CCA (2):

- A1A30A2P2040 (10).
- A1A30A2P2020 (11).

2. Be sure transistor insulators (12) are positioned on A1 A30 Power Supply shield (3) under AlA30A2Q1010 and AlA30A2Q1044.
3. Install spacer (4) between A1A30A2 Fan Driver CCA (2) and body of A1A30A2Q1044 (5).
4. Install screw (1) to secure AlA30A2 Fan Driver CCA (2) to A1 A30 Power Supply shield (3).
5. Install spacer (8) between A1A30A2 Fan Driver CCA (2) and body of A1A30A2Q1010 (9). Be sure small end of spacer goes through transistor tab.
6. Install washer (7) and screw (6) to secure Al A30A2 Fan Driver CCA (2) to Al A30 Power Supply shield (3).
7. Install Al A30 Power Supply (para 2-165).

END OF TASK

2-169. REPLACE A1A30A1 POWER SUPPLY CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

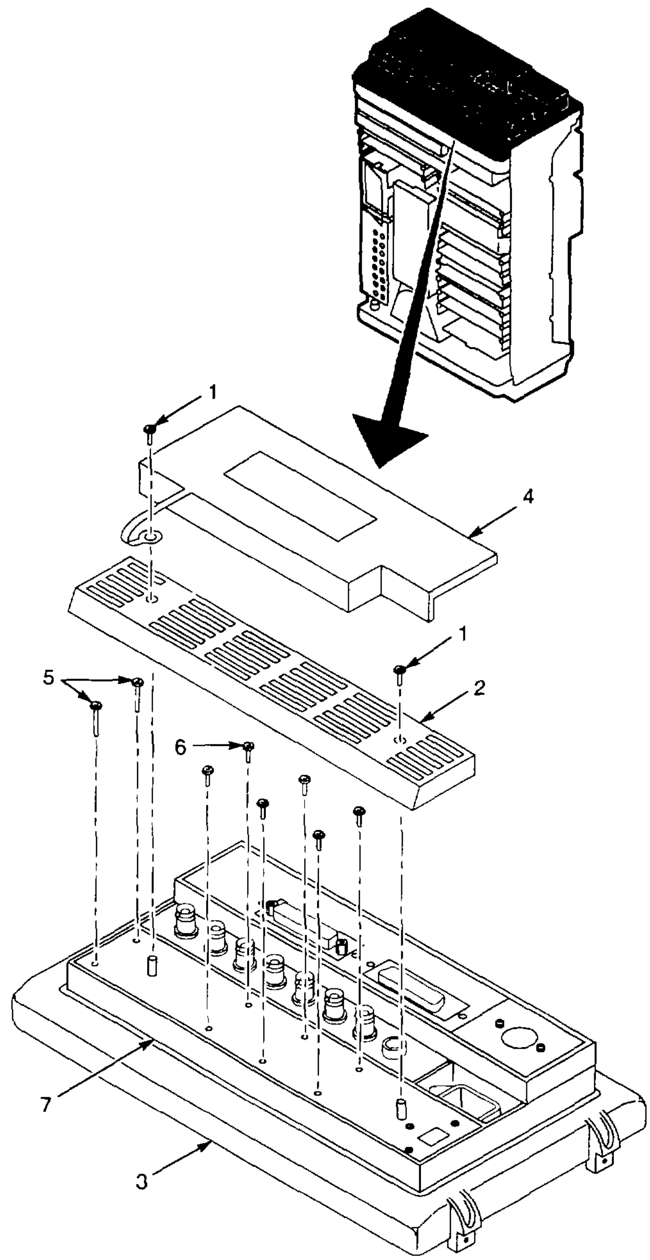
1. Remove A1A30 Power Supply (para 2-165).
2. Remove two screws (1) that secure plastic grill (2) to Al A30 Power Supply (3).
3. Remove rear cover (4).
4. Remove plastic grille (2).
5. Remove two long screws (5) and six shorter screws (6) from rear panel (7).
6. Remove A1 A30 Power Supply shield (para 2-166).
7. Remove nut (8) and washer (9) from SMB connector (10).
8. Remove SMB mounting bracket (11).
9. Unplug following connectors from Al A30A1 Power Supply CCA (12):

- A1A30A1P1091 (13).
- A1A30A1P5033 (14).
- A1A30A1 P5042 (15).

10. Remove following screws from A 1A30A1 Power Supply CCA (12):

QTY	LENGTH	ITEM NUMBER
3	**0.375 in**	**(16)**
2	**0.750 in**	**(17)**
2	**0.500 in**	**(18)**

11. Lift Al A30A1 Power Supply CCA (12) from frame (19), guiding cables so that they do not catch on parts.
12. Remove two spacers (20) and rubber insulator (21).



INSTALL

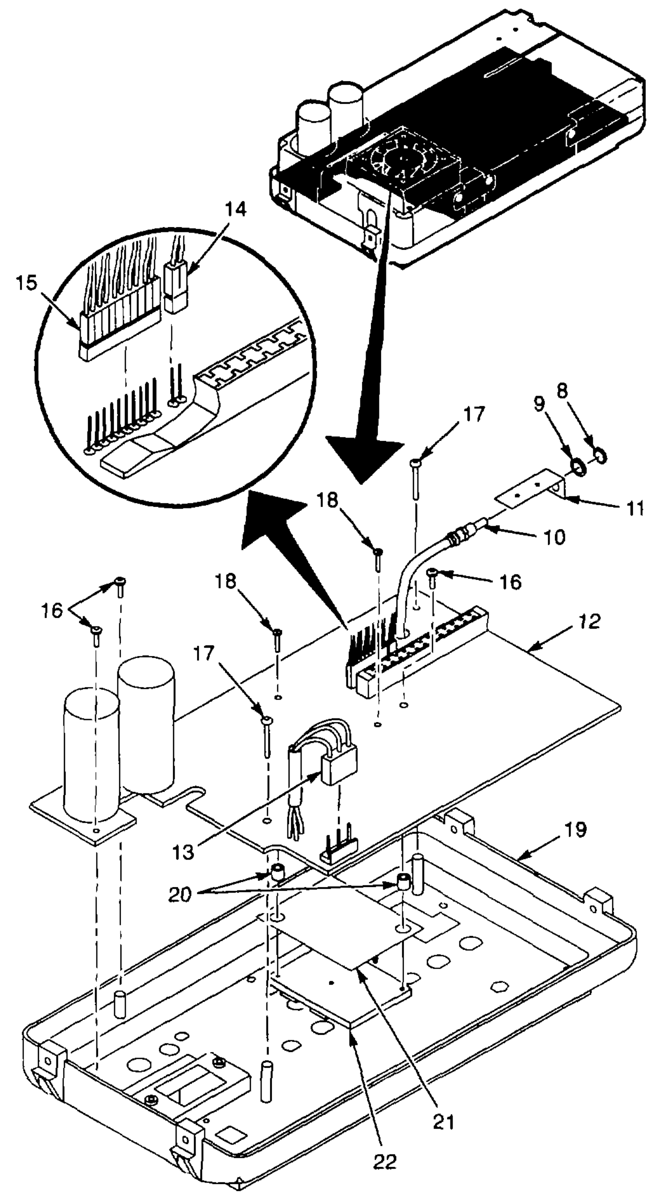
1. Place rubber insulator (21) on diode heat sink (22).
2. Place spacers (20) over screw holes in diode heat sink (22).
3. Carefully set A1A30A1 Power Supply CCA (12) in place, guiding cable with SMB connector (10) through hole in CCA.
4. Install following screws in A1A30A1 Power Supply CCA (12):

QTY	LENGTH	ITEM NUMBER
2	0.500 in	(18)
2	0.750 in	(17)
3	0.375 in	(16)

5. Plug following connectors onto A1A30A1 Power Supply CCA (12):

- A1A30AlP1091 (13).
- A1A30A1P5033 (14).
- A1A30A1P5042 (15).

6. Place SMB mounting bracket (11) on SMB connector (10).
7. Install washer (9) and nut (8) on SMB connector (1 0).
8. Install Al A30 Power Supply shield (para 2-166).
9. Install two long screws (5) and six shorter screws (6) in rear panel (7).
10. Set plastic grille (2) in place on rear panel (7).
11. Install one screw (1) to secure rear cover(4) and one end of plastic grill (2) to the AlA30 Power Supply (3).
12. Install two screws (1) to secure plastic grill (2) to the Al A30 Power Supply (3).
13. Install A1 A30 Power Supply (para 2-165).
14. Install rear cover (4).

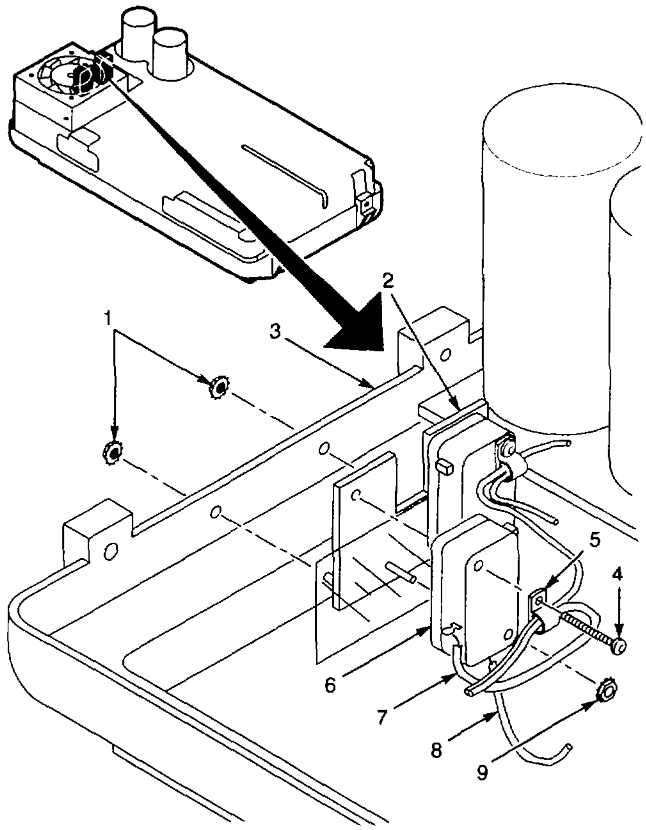


END OF TASK

2-170. REPLACE A1A30S300 OR A1A30S303 POWER SWITCH.

DESCRIPTION

This procedure covers: Remove and Install



REMOVE

1. Remove Al A30 Power Supply shield (para 2-166).
2. Remove two nuts (1) that secure power switch mounting plate (2) to power supply chassis (3).
3. Pull back on power switch mounting plate (2) until threaded studs clear chassis.
4. Remove screw (4) securing cable clamp (5) to power switch (6) being replaced.
5. Unsolder following wires from power switch (6) being replaced:

- Gray wire (7) from side contact.
- Wire (8) from bottom contact (wire is brown or yellow, depending on which switch is being replaced).

6. Remove nut (9) that secures bottom of power switch (6) to power switch mounting plate (2).
7. Remove power supply switch (6).

INSTALL

1. Place power switch (6) on power switch mounting plate (2) with threaded stud through bottom hole in power switch.
2. Solder following wires to power switch (6) being replaced:

- Gray wire (7) to side contact.
- Wire (8) to bottom contact (wire is brown or yellow, depending on which switch is being replaced).

3. Install screw (4) to secure cable clamp (5) to power switch (6).

4. Install nut (9) to secure bottom of power switch (6) to power switch mounting plate (2).
5. Set power switch mounting plate (2) in place with threaded studs inserted through holes in power supply chassis (3).
6. Install two nuts (1) to secure power switch mounting plate (2) to power supply chassis (3).
7. Install AIA30 Power Supply shield (para 2-166).

END OF TASK

2-171. REPLACE AIA30 POWER SUPPLY REAR HOUSING.

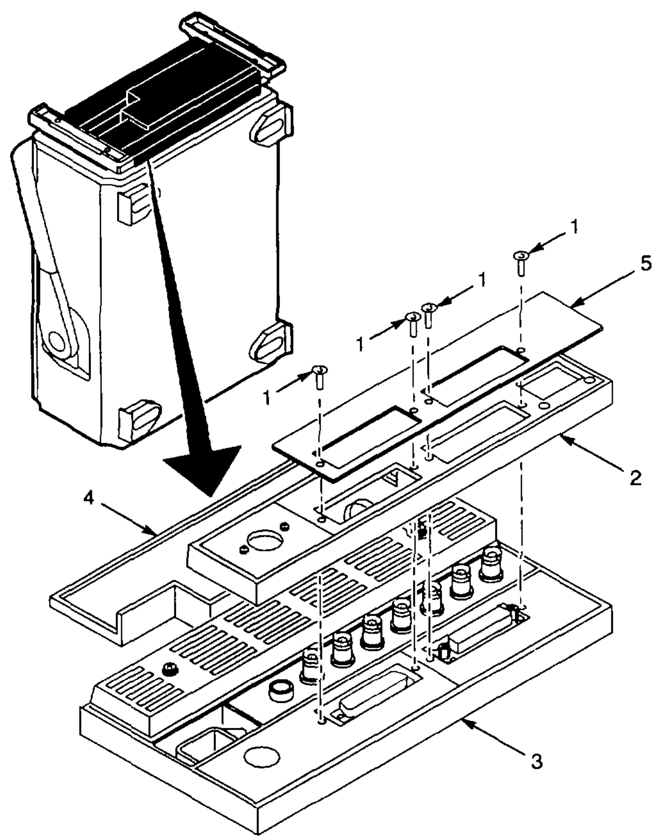
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Set 495P Spectrum Analyzer on front surface.
2. Remove four screws (1) securing Al A30 Power Supply rear housing (2) to rear frame section (3).
3. Unsnap re ar cover (4) and position away from rear housing (2).
4. Remove rear housing (2) and rear panel (5).

INSTALL

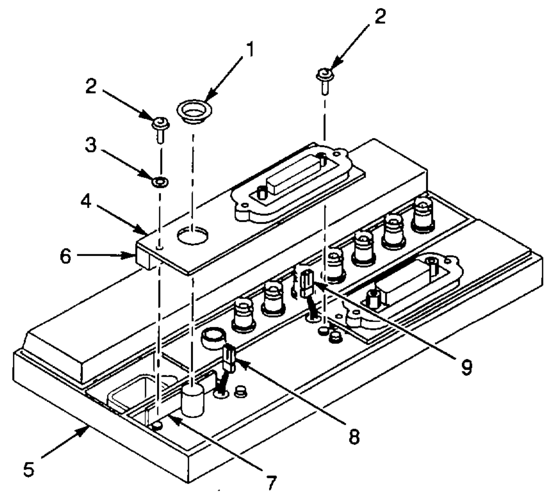
1. Set 495P Spectrum Analyzer on front surface.
2. Set A1A30 Power Supply rear housing (2) in place on rear frame section (3).
3. Set rear panel (5) in place in rear housing (2).
4. Install four screws (1) to secure rear housing (2) to rear frame section (3).
5. Snap rear cover (4) into place.



END OF TASK

2-172. REPLACE AIA30A76 ACCESSORIES INTERFACE CCA.

DESCRIPTION
This procedure covers: Remove and Install



REMOVE

1. Remove A1 A30 Power Supply rear housing (para 2-171).
2. Pull fuse seal (1) from fuseholder.
3. Remove two screws (2) and one fiber washer (3) that secure Al A30A76 Accessories Interface CCA (4) to the rear frame section (5).
4. Lift A1A30A76 Accessories Interface CCA (4) far enough to unplug A1A30A76J1034 (6) from A1 A28 Mother Board CCA (7).
5. Unplug following connectors from A1A30A76 Accessories Interface CCA (4):

- A1A30A76P1021 (8).
- A1A30A76P2012 (9).

6. Remove A1A30A76 Accessories Interface CCA (4).

INSTALL

1. Set 495P Spectrum Analyzer on front surface.
2. Plug following connectors onto A1A30A76 Accessories Interface CCA (4):

- A1A30A76P1021 (8).
- A1A30A76P2012 (9).

3. Align A1A30A76J1034 (6) with edge connector on A1 A28 Mother Board CCA (7).
4. Press down A1A30A76 Accessories Interface CCA (4) to seat on edge connector.
5. Install two screws (2) sand one fiber washer (3) to secure Al A30A76 Accessories Interface CCA (4) to rear frame section (5).
6. Install fuse seal (1) on fuseholder.
7. Install A1A30 Power Supply rear housing (para 2-171).

END OF TASK

2-173. REPLACE A1A30A57 GPIB INTERFACE CCA.

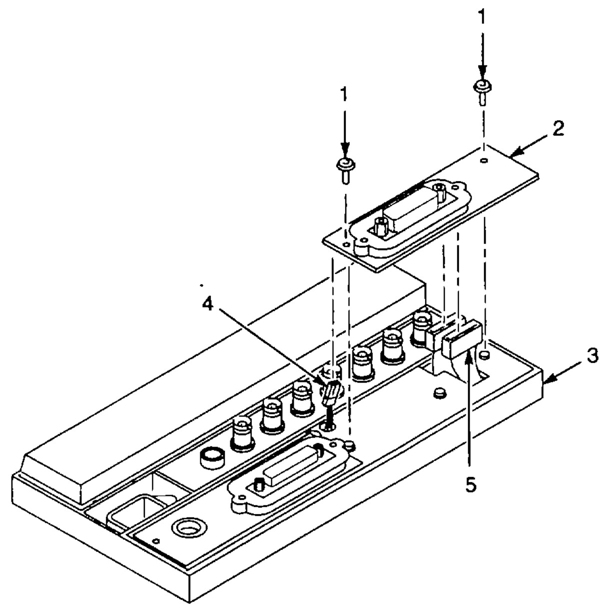
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove A1 A30 Power Supply rear housing (pa ra 2-171).
2. Remove two screws (1) that secure A1A30A57 GPIB Interface CCA (2) to the rear frame section (3).
3. Lift A1A30A57 GPIB Interface CCA (2) far enough to unplug following connectors:

- A1A30A57P1011 (4).
- A1A30A57P1013(5).

4. Remove A1A30A57 GPIB Interface CCA (2).



INSTALL

1. Set 495P Spectrum Analyzer on front surface.
2. Plug following connectors onto A1A30A57 GPIB Interface CCA (2):

- A1A30A57P1011 (4).
- A1A30A57P1013 (5).

3. Install two screws (1) to secure A1A30A57 GPIB Interface CCA (2) to the rear frame section (3).
4. Install A1A30 Power Supply rear housing (para 2-171).

END OF TASK

2-174. REPLACE BNC (PLUG-TYPE).

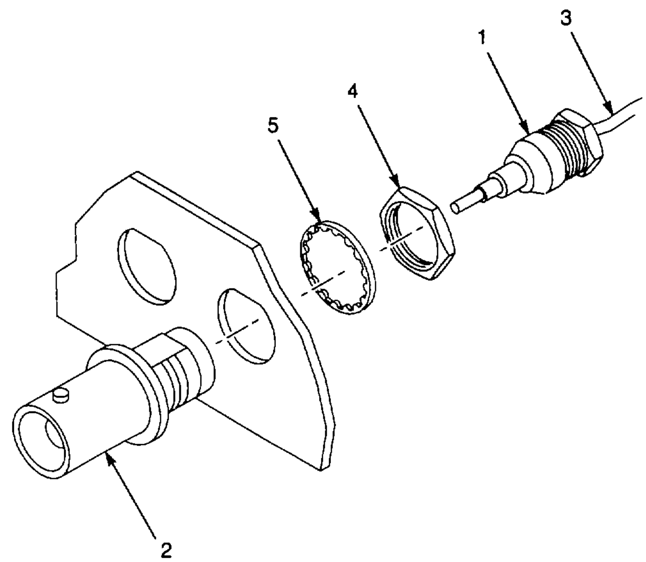
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Loosen nut (1) that secures cable in BNC (2).
2. Pull cable assembly (3) from BNC (2).
3. Remove nut (4) and lock washer (5) that secure BNC (2) to chassis.
4. Remove B NC (2) from chassis.

INSTALL

1. Install BNC (2) in chassis hole.
2. Secure BNC with lock washer (5) and nut (4).
3. Install cable assembly (3) in BNC (2).
4. Secure cable assembly (3) in BNC (2) with nut (1).



END OF TASK

2-175. REPLACE BNC (SOLDER-TYPE).

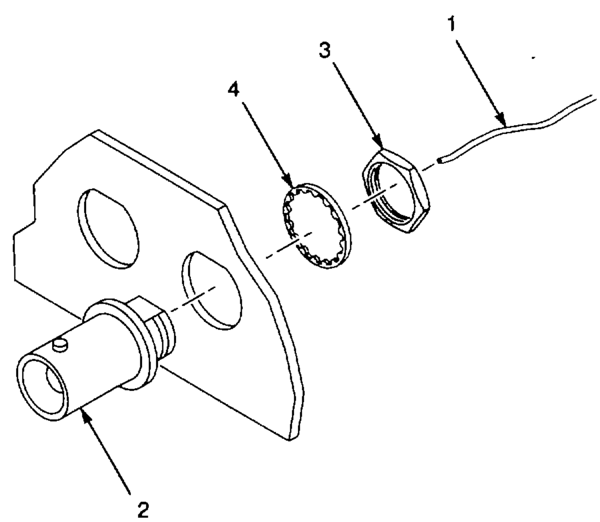
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Unsolder wire(s) (1) from rear of BNC (2).
2. Remove nut (3) and lock washer (4) that secure BNC (2) to chassis.
3. Remove BNC (2) from chassis.

INSTALL

1. Install BNC (2) in chassis hole.
2. Secure BNC (2) with lock washer (4) and nut (3).
3. Solder wire(s) to rear of BNC (2).



END OF TASK

2-176. REPLACE A1A30A1F1013, A1A30A1F1017, A1A30A1F1033, A1A30A1F1035, OR A1A30A1F2013 FUSE.

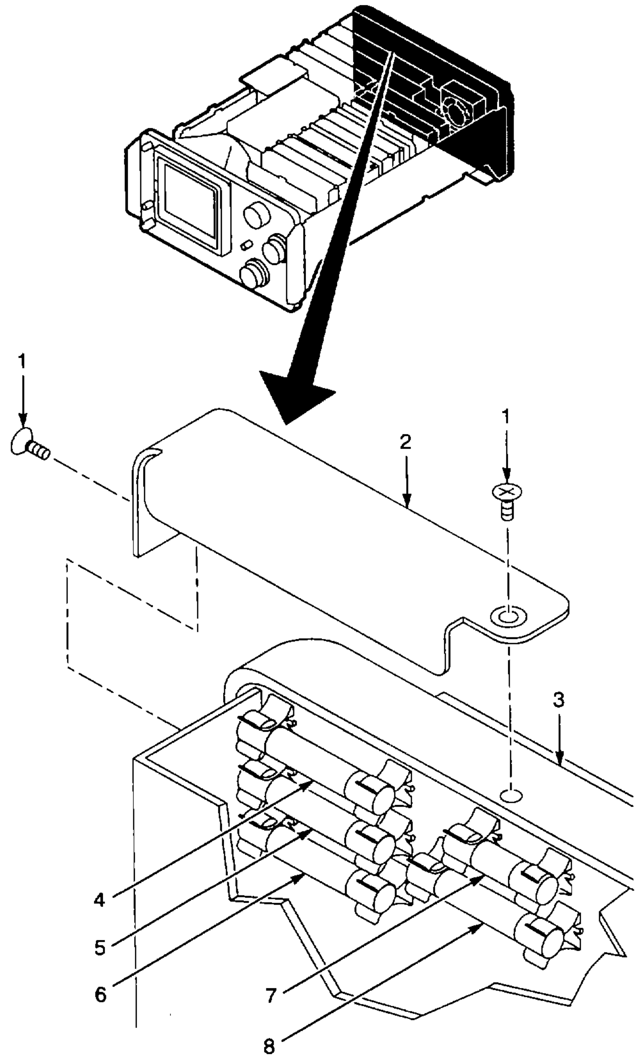
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove two screws (1) that secure access cover (2) to A1 A30 Power Supply (3).
3. Remove access cover (2).
4. With access cover removed, these fuses can be reached:

- A1A30A1F1013 (4).
- A1A30A1F1017 (5).
- A1A30A1F2013 (6).
- AlA30A1F1033 (7).
- A1A30A1F1035(8).

5. Use large tweezers or needle-nose pliers to remove fuse(s).



INSTALL

1. Use large tweezers or needle-nose pliers to install fuse(s).
2. Place access cover (2) in place on AlA30 Power Supply (3).
3. Install two screws (1) that secure access cove r to A1 A30 Power Supply (3).
4. Install cabinet (para 2-118).

END OF TASK

2-177. REPLACE A1A30A1S2103 THERMAL FUSE.

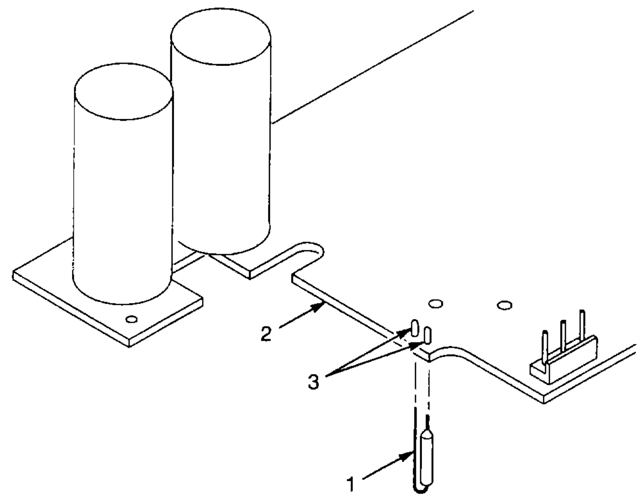
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove A1A30A1 Power Supply CCA (para 2-169).
2. Remove A1A30A1 S2103 thermal fuse (1) from A1A30A1 Power Supply CCA (2).

INSTALL

1. Install Al A30A1 S2103 thermal fuse (1) into sockets (3) on A1A30A1 Power Supply CCA (2).
2. Install A1A30A1 Power Supply CCA (para 2-169).



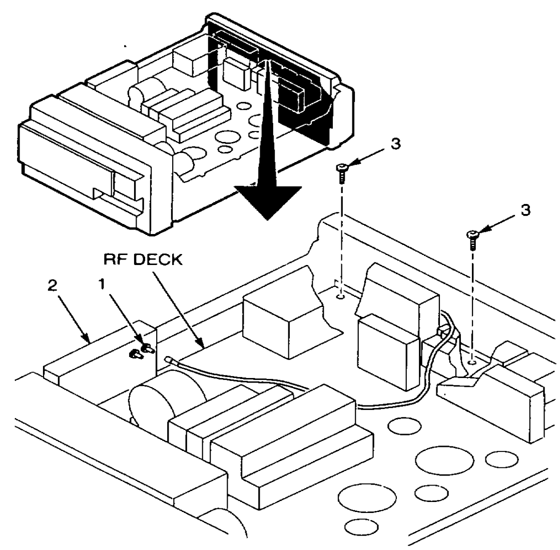
END OF TASK

2-178. REPLACE A1A38 FRONT PANEL CCA.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Set chassis on work surface bottom side up.
3. Unplug RF coaxial cable from Al A34J1011 Calibrator connector (1) on Al A34 3rd Converter Assembly (2). Note cable position for reassembly, then pull cable free of components on RF deck.
4. Remove two screws (3) that secure front subpanel to RF deck.
5. Set chassis top side up.



6. Remove following hardware from 1st LO and 2nd LO OUTPUT SMA connectors (4):

- 50 W terminators (5).
- Nuts (6).
- Washers (7).

7. Remove nut (8), lock washer (9), and flat washer (10) from RF INPUT Type N connector (11).

8. Turn following knobs counterclockwise, note location of position indicator, loosen setscrew, and remove knob:

- INTENSITY (12)
- MANUALSCAN(13)
- PEAK/AVERAGE (14)

9. Remove TIME/DIV knob (15) as follows:

- Turn TIME/DIV knob (15) to 5 ms, and loosen setscrew at top of knob.
- Turn TIME/DIV knob (15) to EXT, and loosen second setscrew at top of knob.
- Remove TIME/DIV knob (15).

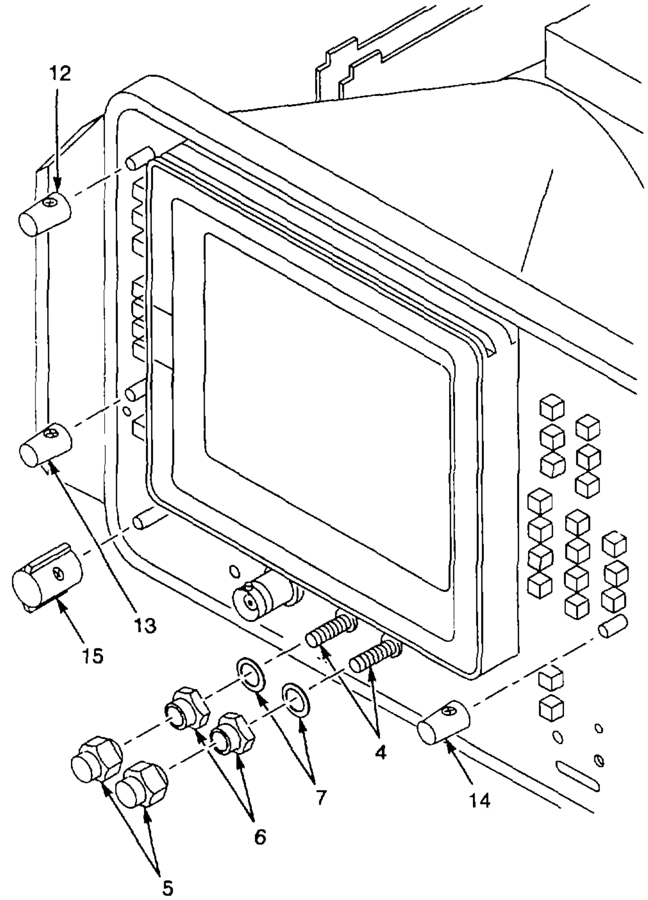
10. Loosen two setscrews and remove CENTER/MARKER FREQUENCY knob (16).

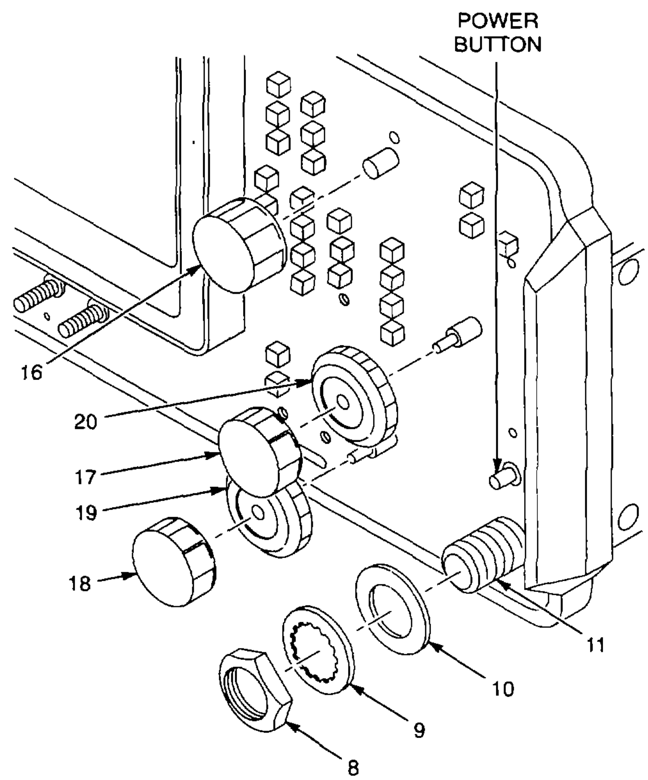
11. Loosen setscrews in FREQUENCY SPAN/DIV knob (17) and REFERENCE LEVEL knob (18), and remove knobs.

12. Turn MIN RF ATTEN dB knob (19) to 0, loosen setscrews, and remove knob.

13. Loosen setscrews in RESOLUTION BANDWIDTH knob (20), and remove knob.

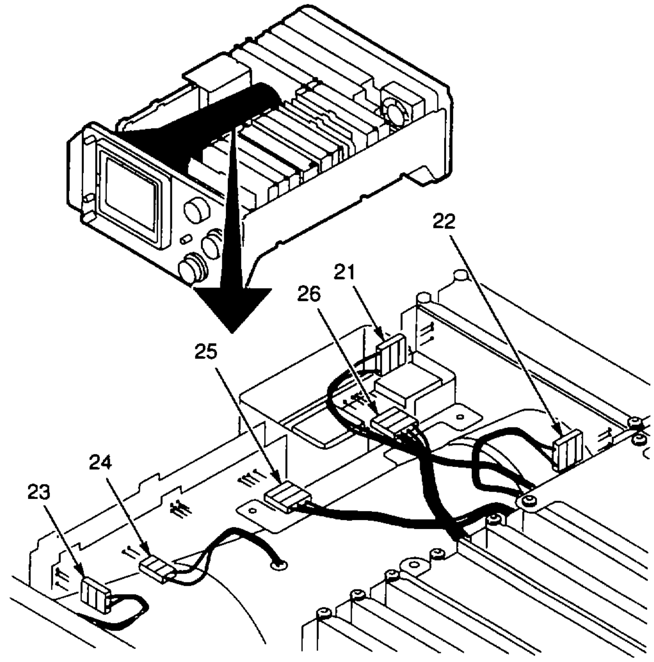
14. Remove A1 A69 10/100 Hz Filter (para 2-147).



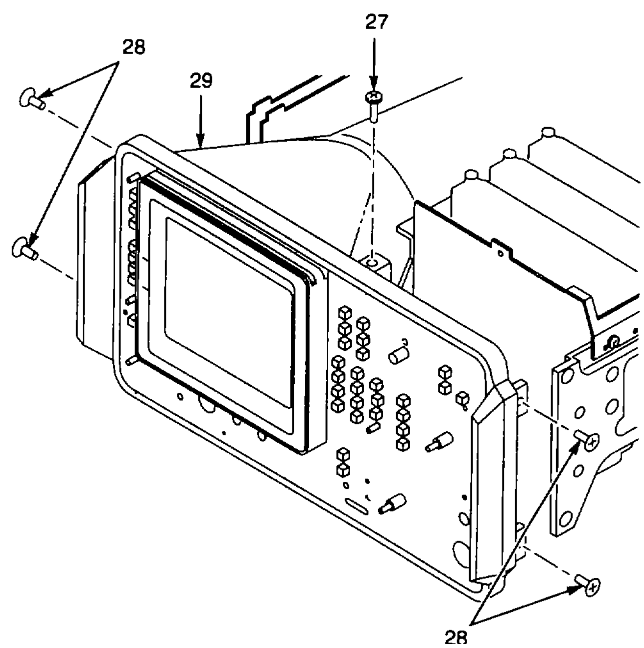


15. Unplug listed connectors from following CCAs:

CCA	CONNECTOR	ITEM NO.
A1A64 Deflection Amplifiers	A1A64P1010 (Black)	21
	A1A64P2100 (Orange)	22
A1A70 Z-Axis	A1A70J1011	23
	A1A70P1015	24
	A1A70P1056	25
A1A74 High Voltage	A1A74P742	26



16. Remove screw (27) that secures front panel assembly to chassis.
17. Remove four screws (28) that secure front panel assembly to side frames.
18. Pull the front subpanel with attached CRT shield (29) straight out from the chassis, guiding cables so that they do not catch on components.
19. Set front subpanel with attached CRT shield (29) on flat work surface with CRT shield up.
20. Unplug A1A3 8P5090 (30) from A1A38 Front Panel CCA (31).
21. Remove 11 screws (32) that secure A1A38 Front Panel CCA (31).
22. Remove screw (33) and shoulder washer (34) that secure heat sink of A1A38U6090 (35).
23. Remove plate insulator (36) and washer (37).



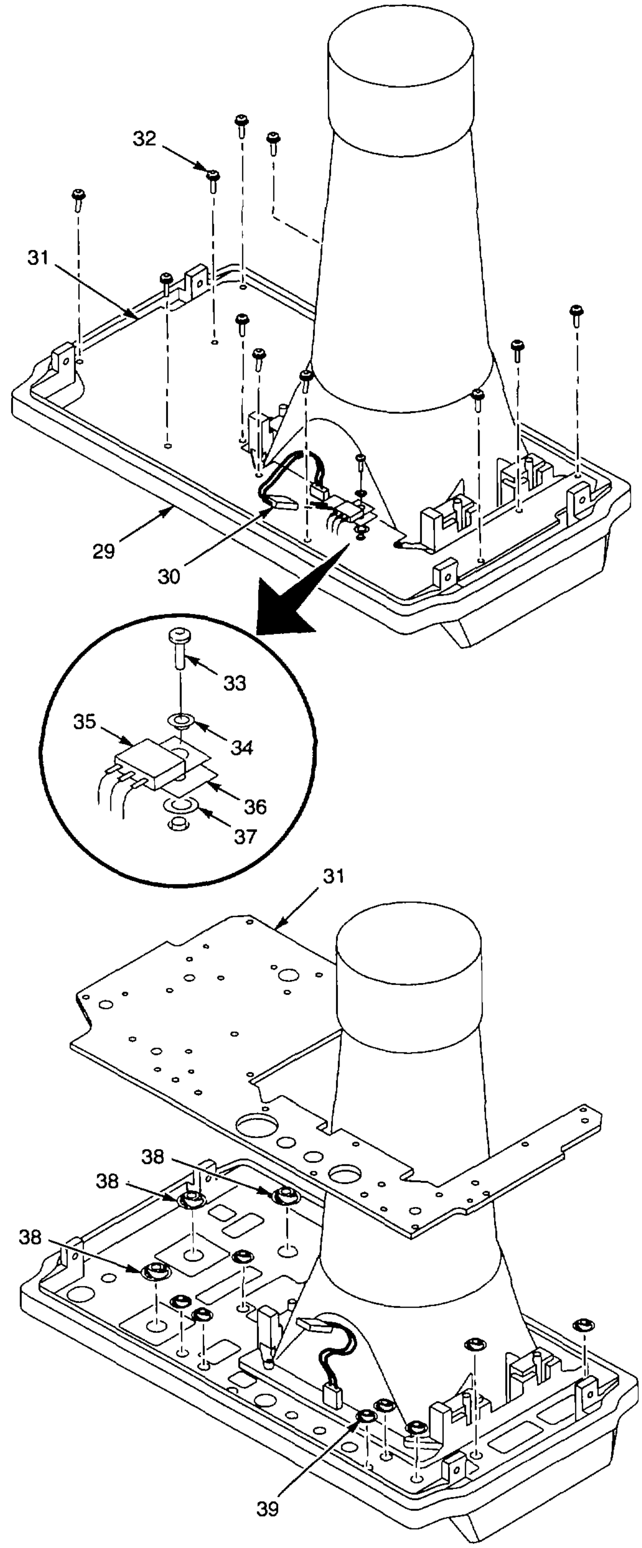
NOTE

Grounding contacts are mounted on metal shafts of rotary controls, between front subpanel and controls. Do not lose grounding contacts when removing A1A38 Front Panel CCA.

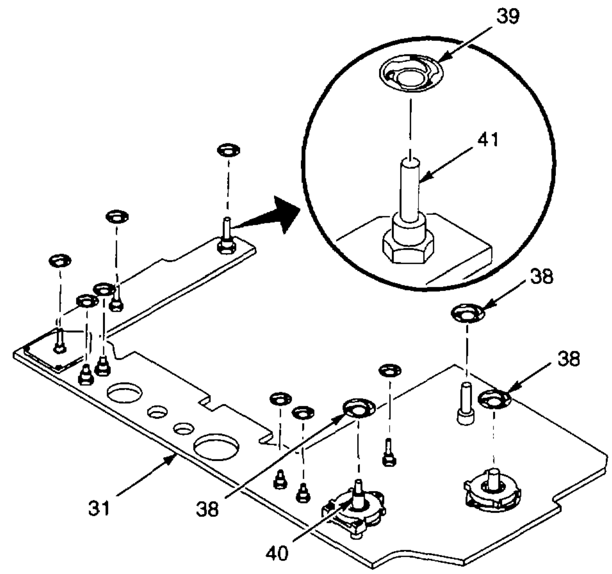
24. Lift A1 A38 Front Panel CCA (31) straight up, and remove from front subpanel.
25. Remove three large grounding contacts (38) and eight small grounding contacts (39) from subpanel.

INSTALL

1. Place three large grounding contacts (38) on large diameter rotary control shafts (40).
2. Place the eight small grounding contacts (39) on the remaining rotary control shafts (41).
3. Set front subpanel with attached CRT shield (29) on flat work surface on base of CRT shield (front subpanel and CRT faceplate up).
4. Hold A1 A38 Front Panel CCA (31) level and insert RF cable through cutout (42).
5. Carefully lift A1A38 Front Panel CCA (31) into place, aligning front panel controls with cutouts in front subpanel.
6. Hold A1A38 Front Panel CCA (31) in place, and turn assembly so that front subpanel is down. Set assembly on flat work surface with CRT shield up.
7. Install washer (37) and plate insulator (36) under heat sink of A1A38U6090 (35).



8. Install shoulder washer (34) and screw (33) to secure heat sink of A1A38U6090 (35).
9. Install 11 screws (32) that secure A1A38 Front Panel CCA (31).
10. Plug A1A38P5090 (30) onto A1 A38 Front Panel CCA (31).
11. Set chassis on side.
12. Position front subpanel with attached CRT shield (29) between the side frames.



NOTE
Make sure 1 st LO and 2nd LO OUTPUT SMA connectors (4), RF INPUT connector (11), and POWER button are aligned with holes in front subpanel.

13. Carefully push the front panel with attached CRT shield (29) straight into chassis, guiding cables so that they do not catch on components.

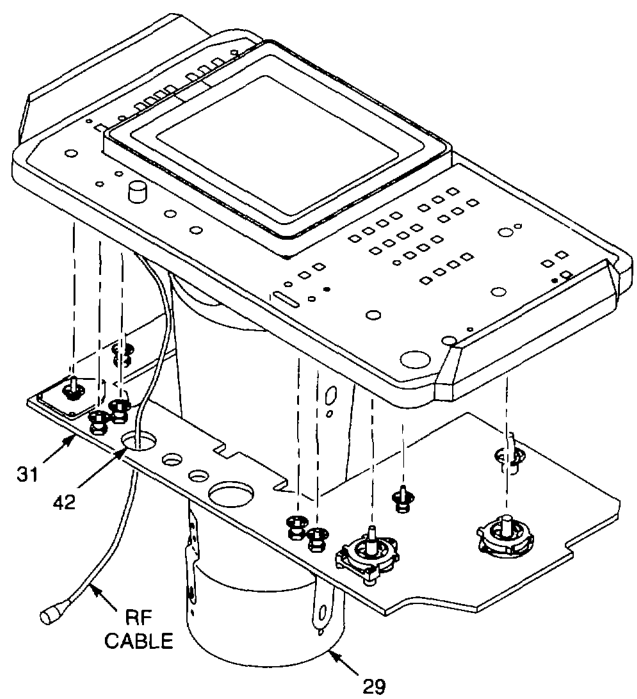
14. Plug RF coaxial cable onto A1A34J1011 Calibrator connector (1) on Al A34 3rd Converter Assembly (2). Position cable as noted in Remove procedure, Step 3.

15. Install two screws (3) to secure front subpanel to RF deck.

16. Set chassis top side up.

17. Install screw (27) to secure fr ont panel assembly to chassis.

18. Install four screws (28) that secure front panel assembly to side frames.



19. Plug in following connectors:

CCA	CONNECTOR	ITEM NO.
A1A64 Deflection Amplifiers	A1A64P1010	21
	A1A64P2100	22
A1A70 Z-Axis	A1A70J1011	23
	A1A70P1015	24
	A1A70P1056	25
A1A74 High Voltage	A1A74P742	26

20. Install A1A69 10/100 Hz Filter (para 2-147).

21. Install following hardware on 1st LO and 2nd LO OUTPUT SMA connectors (4):

- Washers (7).
- Nuts (6).
- 50 W terminators (5).

22. Install flat washer (10), lock washer (9), and nut (8) on RF INPUT Type N connector (11).

23. Install MIN RFATTEN dB knob (19) on shaft, set to 0, and tighten setscrews.

24. Install RESOLUTION BANDWIDTH knob (20), and tighten setscrews.

25. Install FREQUENCY SPAN/DIV knob (17) and REFERENCE LEVEL knob (18), and tighten setscrews.

26. Install CENTER/MARKER FREQUENCY knob (16), and ti ghten two setscrews.

27. Install TIME/DIV knob (15) as follows:

- Place TIME/DIV knob (15) on shaft.
- Set TIME/DIV knob (15) to EXT, and tighten setscrew at top of knob,
- Turn TIME/DIV knob (15) to 5 ms, and tighten second setscrew at top of knob.

28. Install following knobs, set position indicators as noted in Remove procedure, Step 8, and tighten setscrews.

- INTENSITY (12).
- MANUAL SCAN (13).
- PEAK/AVERAGE (14).

29. Install cabinet (para 2-118).

END OF TASK

2-179. REPLACE A1A38 FRONT PANEL PUSHBUTTON SWITCHES.

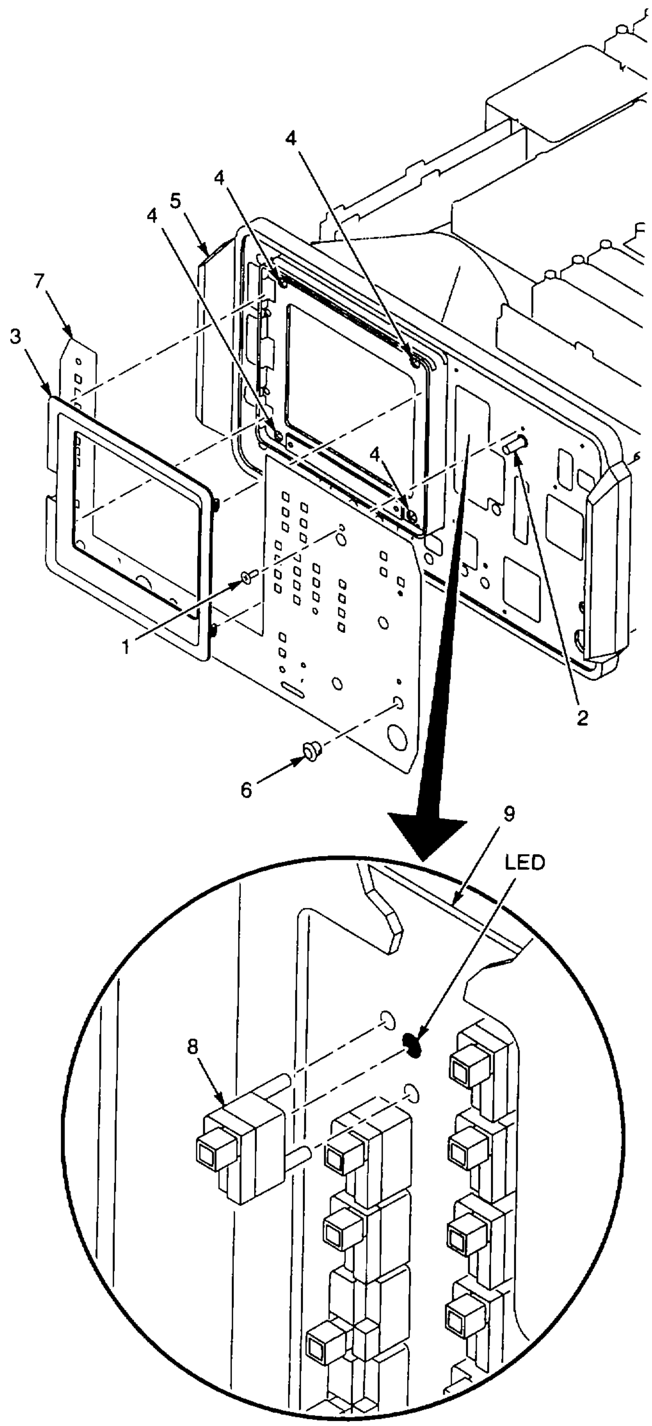
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove hardware from 1st LO and 2nd LO OUTPUT SMA connectors (para 2-178, Step 6).
2. Remove hardware from RF INPUT Type N connector (para 2-178, Step 7).
3. Remove front panel knobs (para 2-178, Steps 8-13).
4. Remove screw (1) above shaft of CENTER/MARKER FREQUENCY control (2).
5. Remove mask frame (3) by pulling straight out below Center Marker label.
6. Loosen (do not remove) four recess ed screws (4) that secure CRT retainer (5) to front subpanel.
7. Pull out and remove plastic grommet (6) from around POWER pushbutton.
8. Carefully pull out on edges of front panel (7) to release front panel from double-backed tape.
9. Remove front panel (7).

NOTE
Switch can be damaged when removed. Do not remove switch unless switch is defective.

10. Use pliers to pull defective switch (8) from A1A38 Front Panel CCA (9).



INSTALL

NOTE

On lighted switches, pushbutton must be aligned directly over light-emitting diode (LED). Unlighted switches are mounted with pushbutton towards top of 495P Spectrum Analyzer.

1. Align switch (8) with mounting holes in A1A38 Front Panel CCA (9).
2. Press switch (8) into place with a blunt tool, alternately applying pressure over each leg until switch is seated.
3. Install front panel (7).
4. Install plastic grommet (6) around POWER pushbutton.
5. Tighten four recessed screws (4) to secure CRT retainer (5) to front subpanel.
6. Install mask frame (3).
7. Install screw (1) above shaft of CENTER/MARKER FREQUENCY control (2).
8. Install front panel knobs (para 2-178, Steps 23-28).
9. Install hardware to secure RF INPUT Type N connector (para 2-178, Step 22).
10. Install hardware to secure 1 st LO and 2nd LO OUTPUT SMA connectors (para 2-178, Step 21).

END OF TASK

2-180. REPLACE A1A38S6035 SWITCH.

DESCRIPTION

This procedure covers: Remove and Install

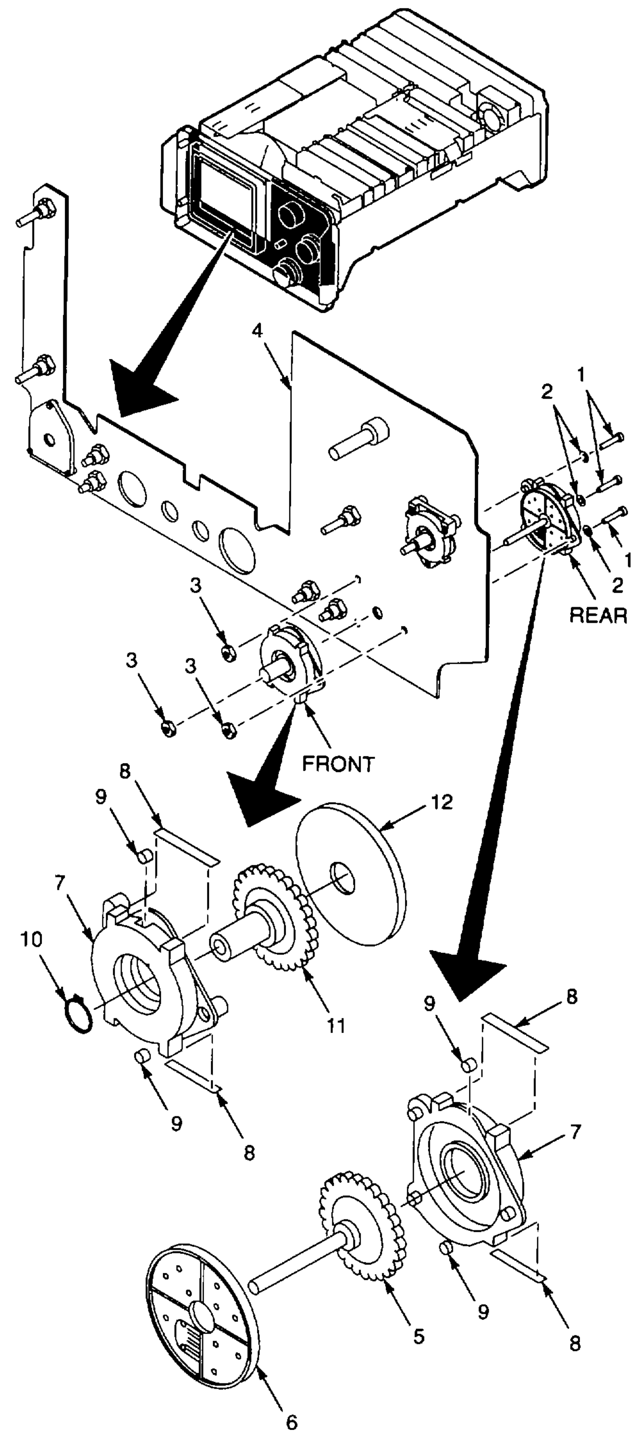
REMOVE

1. Remove A1 A38 Front Panel CCA (para 2-178).
2. Remove three screws (1), three washers (2), and three nuts (3).
3. Remove rear rotary switch assembly from A1A38 Front Panel CCA (4).
4. Remove front rotary switch assembly from A1A38 Front Panel CCA (4).

NOTE

Instructions follow for complete disassembly of A1A38S6035 switch.

5. Separate rear rotary shaft (5) and contact holder (6) from rotary switch bearing (7).
6. Separate rear rotar y shaft (5) from contact holder (6).
7. Use needle-nose pliers to remove flat spring (8) and detent roller (9) from each side of switch bearing (7).
8. Remove retaining ring (10) from front rotary shaft (11).
9. Separate front rotary shaft (11) and contact holder (12) from rotary switch bearing (7).
10. Separate front rotary shaft (11) from contact holder (12).
11. Use needle-nose pliers to remove flat spring (8) and detent roller (9) from each side of rotary switch bearing (7).



INSTALL

1. Install detent roller (9) and flat spring (8) in each side of two switch bearings (7).
2. Install rear rotary shaft (5) in switch bearing (7).
3. Install contact holder with four contacts (6) on rear rotary shaft (5), aligning keyhole in contact holder with key on rear rotary shaft.
4. Set aside assembled rear rotary switch.
5. Install front rotary shaft (11) in switch bearing (7).
6. Install contact holder with two contacts (12) on front rotary shaft (11), aligning keyhole in contact holder with key on front rotary shaft.
7. Install retaining ring (10) on front rotary shaft (11).
8. Set assembled rear rotary switch in position on A1A38 Front Panel CCA (4), aligning mounting holes in switch with mounting holes in CCA.
9. Hold rear rotary switch in position, and set front rotary switch in place on A1A38 Front Panel CCA (4).
10. Install three screws (1), three washers (2), and three nuts (3) to secure front and rear rotary switches to A1A38 Front Panel CCA (4).
11. Turn outer shaft fully counterclockwise. Then turn shaft clockwise one detent position.
12. Install A1A38 Front Panel CCA (para 2-178).

END OF TASK

2-181. REPLACE A1A38S3020 SWITCH.

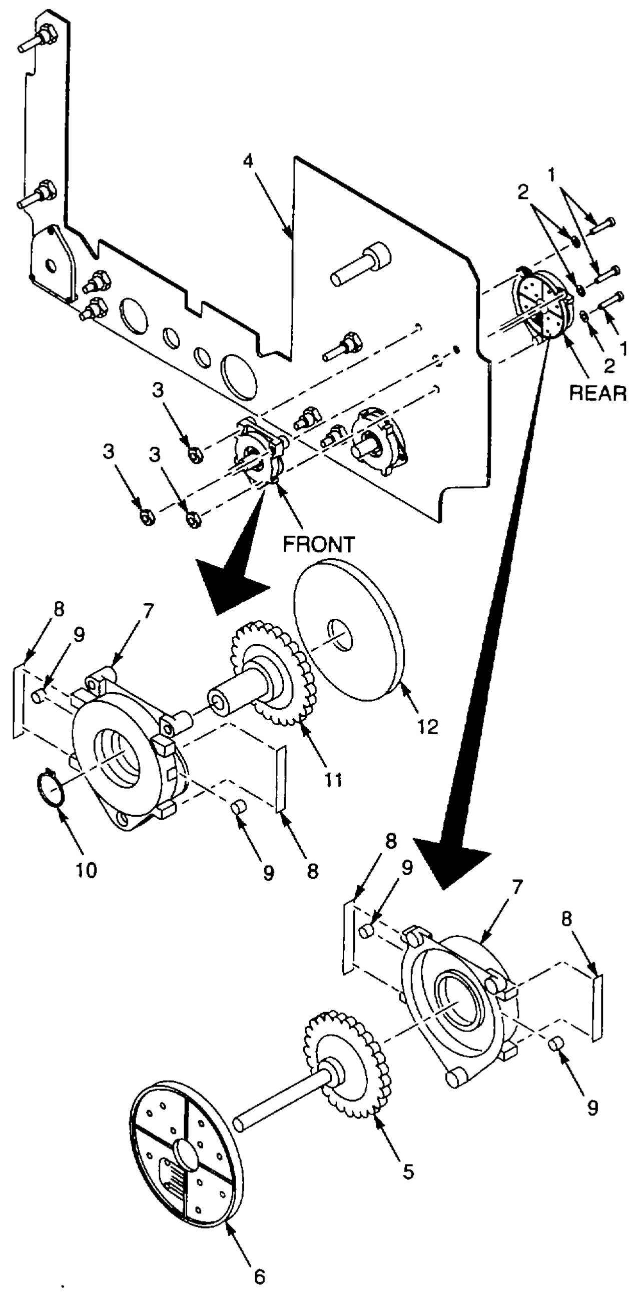
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove A1A38 Front Panel CCA (para 2-178).
2. Remove three screws (1), three washers (2), and three nuts (3).
3. Remove rear rot ary switch assembly from A1A38 Front Panel CCA (4).
4. Remove front rotary switch assembly from A1A38 Front Panel CCA (4).

NOTE
Instructions follow for complete disassembly of A1A38S3020 switch.

5. Separate rear rotary shaft (5) and contact holder (6) from rotary switch bearing (7).
6. Separate rear rotary shaft (5) from contact holder (6).
7. Use needle-nose pliers to remove flat spring (8) and detent roller (9) from each side of switch bearing (7).
8. Remove retaining ring (10) from front rotary sh aft (11).
9. Separate front rotary shaft (11) and contact holder (12) from rotary switch bearing (7).
10. Separate front rotary shaft (11) from contact holder (12).
11. Use needle-nose pliers to remove flat spring (8) and detent roller (9) from each side of rotary switch bearing (7).



INSTALL

1. Install detent roller (9) and flat spring (8) in each side of two switch bearings (7).
2. Install rear rotary shaft (5) in switch bearing (7).
3. Install contact holder (6) on rear rotary shaft (5), aligning keyhole in contact holder with key on rear rotary shaft.
4. Set aside assembled rear rotary switch.
5. Install front rotary shaft (11) in switch bearing (7).
6. Install contact holder (12) on front rotary shaft (11), aligning keyhole in contact holder with key on front rotary shaft.
7. Install retaining ring (10) on front rotary shaft (11).
8. Set assembled rear rotary switch in position on A1A38 Front Panel CCA (4), aligning mounting holes in switch with mounting holes in CCA.
9. Hold rear rotary switch in position, and set front rotary switch in place on A1 A38 Front Panel CCA (4).
10. Install three screws (1), three washers (2), and three nuts (3) to secure front and rear rotary switches to A1A38 Front Panel CCA (4).
11. Install A1A38 Front Panel CCA (para 2-178).

END OF TASK

2-182. REPLACE A1A38S6118 SWITCH.

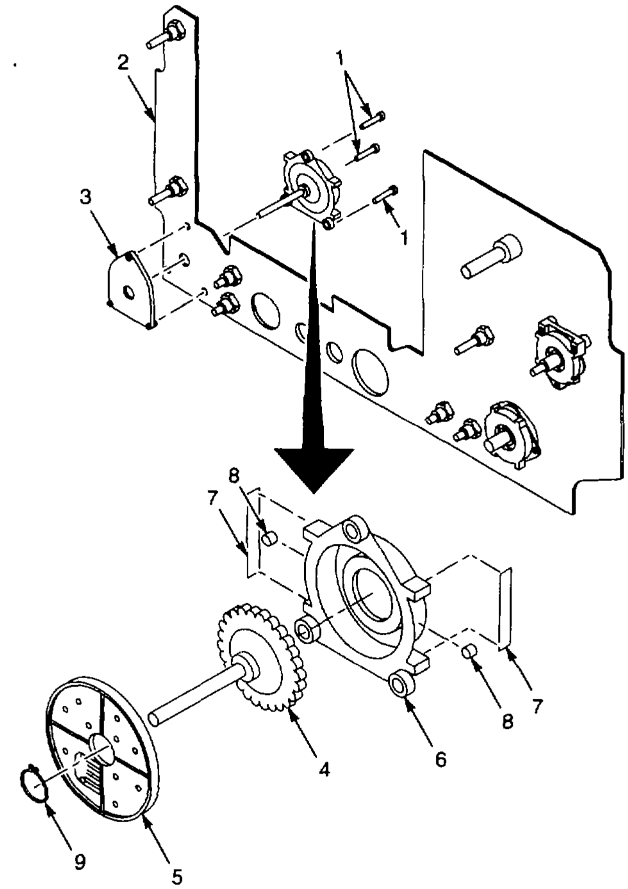
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove AlA38 Front Panel CCA (para 2-178)
2. Remove three screws (1).
3. Remove rotary switch assembly from AlA38 Front Panel CCA (2).
4. Remove front rotary switch bearing (3).

NOTE
Instructions follow for complete disassembly of A1A38S6118 switch.

5. Separate rotary shaft (4) and contact holder (5) from rear rotary switch bearing (6).
6. Use needle-nose pliers to remove flat spring (7) and detent roller (8) from each side of rear switch bearing (6).
7. Remove retaining ring (9) from rotary shaft (4).
8. Separate rotary shaft (4) from contact holder (5).



INSTALL

1. Install detent roller (8) and flat spring (7) in each side of rear switch bearing (6).
2. Install rotary shaft (4) in switch bearing (6).
3. Install contact holder (5) on rotary shaft (4), aligning keyhole in contact holder with key on rotary shaft.
4. Install retaining ring (9) on r otary shaft (4).
5. Set assembled rotary switch on A1 A38 Front Panel CCA (2), aligning mounting holes in switch with mounting holes in CCA.
6. Hold rotary switch in position, and set front rotary switch bearing (3) on AlA38 Front Panel CCA (2).
7. Install three screws (1) to secure front and rear rotary switches to A1 A38 Front Panel CCA (2).
8. Install A1A38 Front Panel CCA (para 2-178).

9. Adjust TIME/DIV knob as follows:

- Power on 495P Spectrum Analyzer.
- Press **ZERO SPAN** button.
- Turn TIME/DIV knob until readout in upper right corner of screen is EXT.
- Loosen setscrews in TIME/DIV knob and adjust knob so that indicator is at EXT.
- Tighten setscrews in knob.
- Power off 495P Spectrum Analyzer.

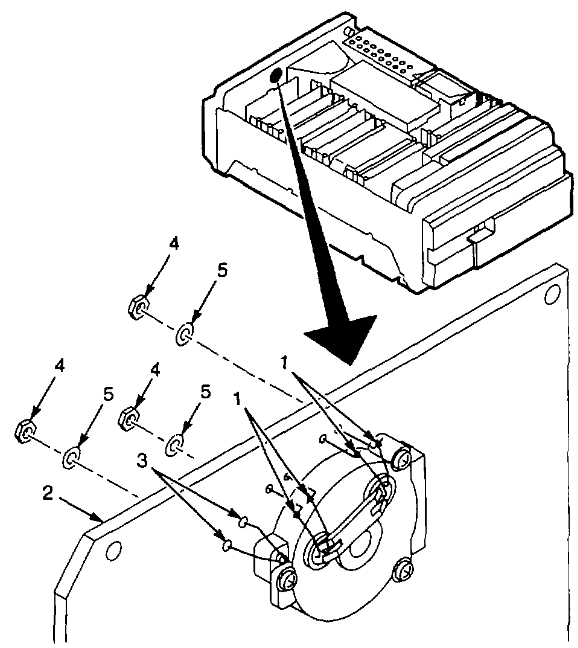
END OF TASK

2-183. REPLACE AlA38S2035 SWITCH.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove A1A38 Front Panel CCA (para 2-178).
2. Unsolder four leads of A1A38S2035 switch (1) from pins on A1 A38 Front Panel CCA (2).
3. Unsolder two leads (3) from A1A38 Front Panel CCA (2).
4. Remove three nuts (4) and three washers (5) that secure A1A38S2035 switch (1) to Al A38 Front Panel CCA (2).
5. Remove A1A38S2035 switch from A1A38 Front Panel CCA (2).



INSTALL

1. Install A1A38S2035 switch (1) in mounting holes in A1A38 Front Panel CCA (2).
2. Install three washers (5) and three nuts (4).
3. Solder four leads of A1A38S2035 switch (1) to pins on A1A38 Front Panel CCA (2).
4. Solder two leads of Al A38S2035 switch (1) to A1 A38 Front Panel CCA (2).
5. Install A1A38 Front Panel CCA (para 2-178).

END OF TASK

2-184. REPLACE AIA38 FRONT PANEL CCA POTENTIOMETERS.

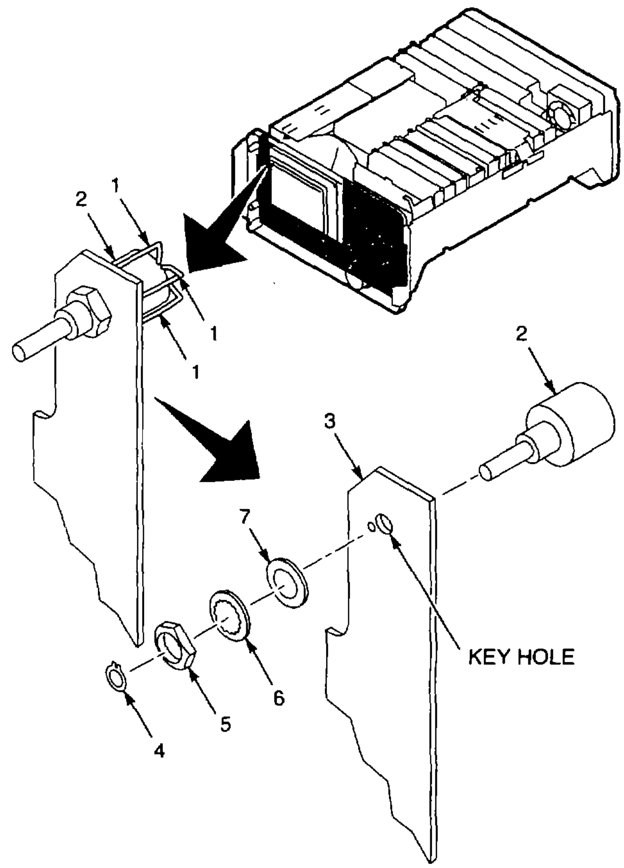
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove Al A38 Front Panel CCA (para 2-178).
2. Unsolder three leads (1) from defective potentiometer (2).
3. Remove the following hardware that attaches potentiometer (2) to A1A38 Front Panel CCA (3).

- Retaining ring (4).
- Nut (5).
- Lock washer (6).
- Flat washer (7).

4. Remove potentiometer (2) from AlA38 Front Panel CCA (3).



INSTALL

1. Install potentiometer (2) in mounting hole, aligning key with keyhole in A1A38 Front Panel CCA (3).
2. Attach potentiometer (2) to A1A38 Front Panel CCA (3) with following hardware:

- Flat washer (7).
- Lock washer (6).
- Nut (5).
- Retaining ring (4).

3. Solder three leads (1) to potentiometer (2).
4. Turn potentiometer shaft fully counterclockwise.
5. Install A1A38 Front Pa nel CCA (para 2-178).

END OF TASK

2-185. REPLACE A1P800 OR A1P900 50 Ω COAXIAL TERMINATOR.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

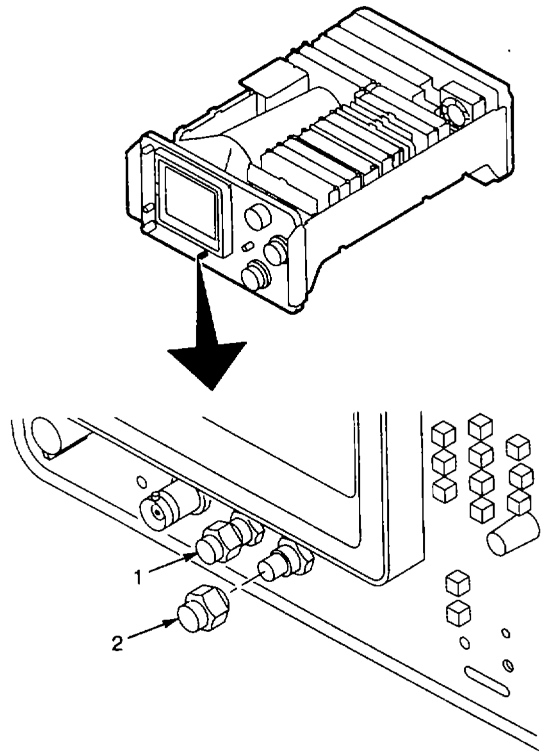
1. Remove whichever 50 Ω coaxial terminator is being replaced:

- AlP800 50 Ω coaxial terminator (1) from 1 ST LO SMA connector
- Al P900 50 Ω coaxial terminator (2) from 2ND LO SMA connector.

INSTALL

1. Install whichever 50 Ω coaxial terminator is being replaced:

- Al P800 50 Ω coaxial terminator (1) from 1 ST LO SMA connector
- A1P900 50 Ω coaxial terminator (2) from 2ND LO SMA connector.



END OF TASK

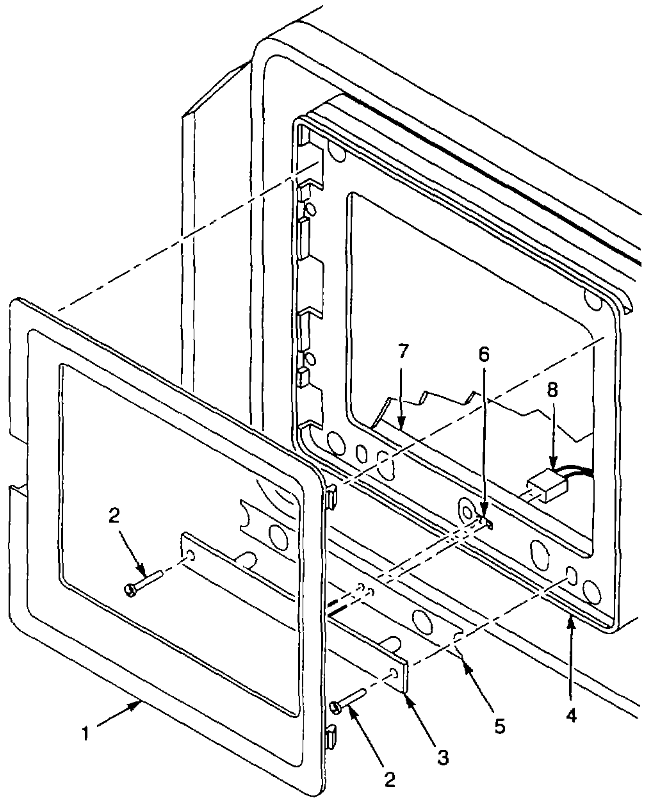
2-186. REPLACE A1A77 GRATICULE LIGHTS CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove mask frame (1) by pulling straight out below Center Marker label.
3. Remove two screws (2) that secure A1 A77 Graticule Lights CCA (3) to CRT retainer (4).
4. Pull out A1 A77 Graticule Lights CCA (3), and remove from CRT retainer (4).
5. Remove shield (5) from A1A77 Graticule Lights CCA (3).



INSTALL

1. Install shield (5) onto A1A77 Graticule Lights CCA (3).
2. Align pins on A1 A77 Graticule Lights CCA (3) with holes (6) in plastic light reflector (7), and push A1A77 Graticule Lights CCA into position.
3. Plug connector (8) onto pins o n A1A77 Graticule Lights CCA (3). Connector can be reached from bottom side of chassis.
4. Install two screws (2) to secure AlA77 Graticule Lights CCA (3) to CRT retainer (4).
5. Align mask frame (1) with CRT retainer (4), and press in on mask frame to snap into place.
6. Install cabinet (para 2-118).

END OF TASK

2-187. REPLACE A1V100 CATHODE RAY TUBE.

DESCRIPTION
This procedure covers: Remove and Install

WARNING

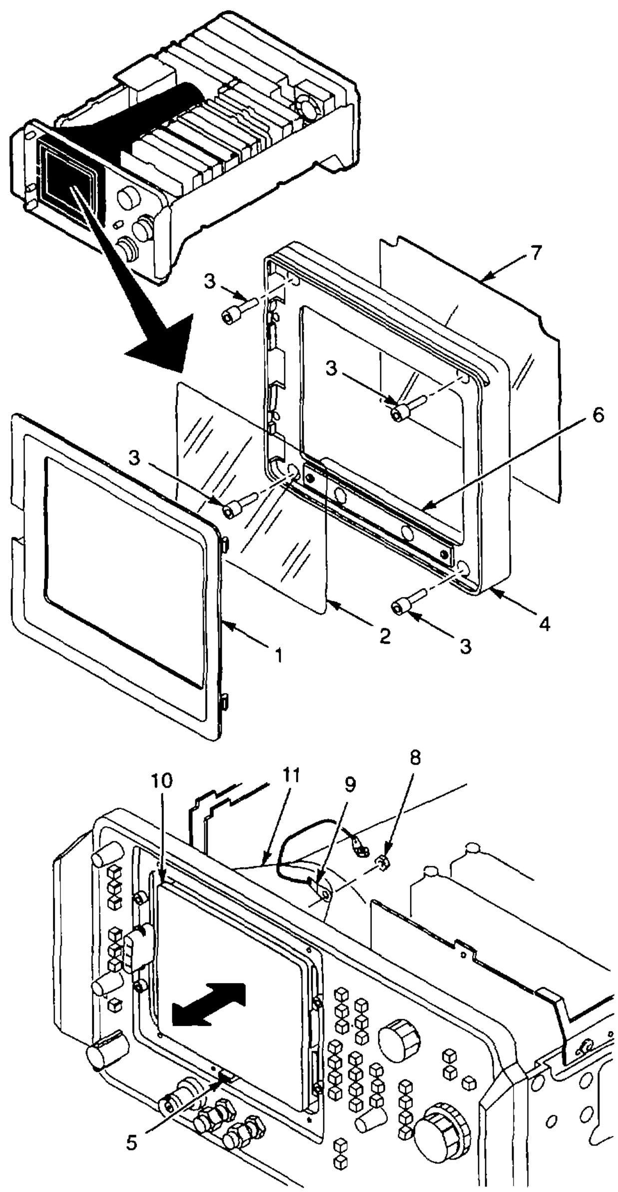
To avoid personal injury, avoid bumping the cathode ray tube (CRT) against objects that may cause it to crack and implode. When handling a CRT, wear protective clothing and safety glasses. Place the CRT in a protective carton or face down on a smooth surface in a protected location with a soft mat under the face plate.

REMOVE

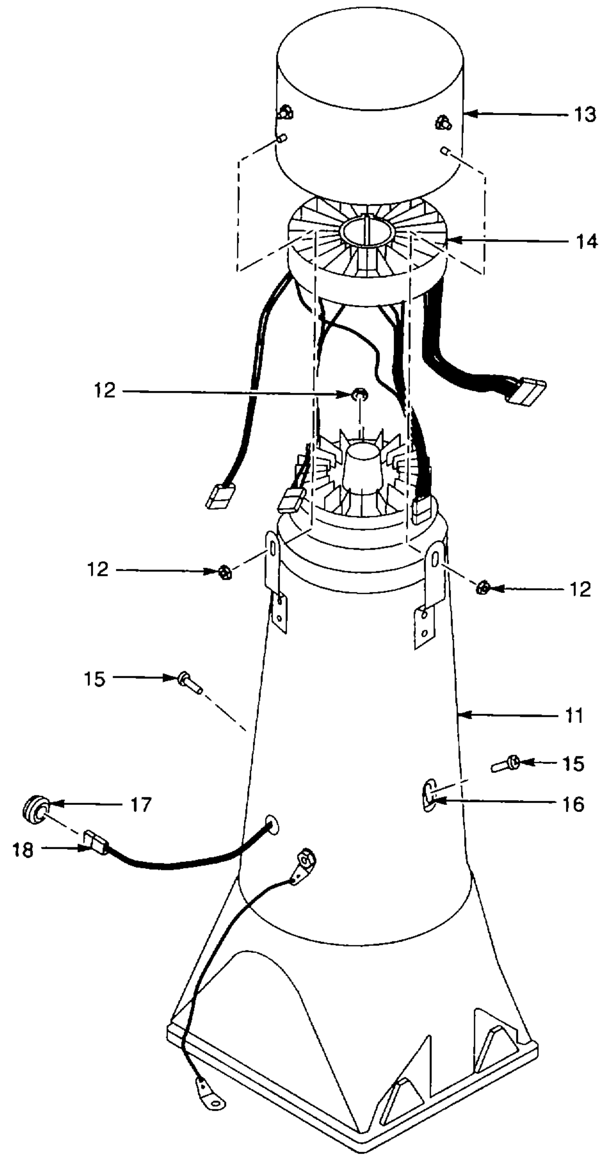
1. Remove A1 A69 10/100 Hz Filter (para 2-147).
2. Remove mask frame (1) by pulling straight out below Center Marker label.
3. Remove CRT light filter (2).
4. Remove four screws (3) that secure CRT retainer (4) to front subpanel.
5. Pull CRT retainer (4) out and unplug connector (5) from Al A77 Graticule Lights CCA (6).
6. Remove CRT retainer (4) and implosion shield (7).
7. Remove nut (8) that secures lug terminal (9) to front subpanel.
8. Unplug connectors from following CCAs (para 2-178):

- A1A64 Deflection Amplifiers CCA.
- A1A70 Z-Axis CCA.
- A1A74 High Voltage CCA.

9. Slide CRT (10) and CRT shield (11) out through front panel opening, guiding cables so they do not catch on components.



10. Remove three nuts (12) that secure rear CRT shield (13) to front CRT shield (11).
11. Remove rear CRT shield (13).
12. Unplug the CRT socket (14).
13. Remove screw (15) from CRT shield spacer (16) on each side of front CRT shield (11).
14. Pull grommet (17) from hole in front CRT shield (11), and slide grommet off cable (18).
15. Remove front CRT shield (11) from CRT (10).
16. Loosen two screws (19) in CRT clamp (20), and remove CRT clamp from CRT (10).



INSTALL

1. Set CRT clamp (20) in place on CRT (10).
2. Position CRT clamp (20) 5.07 inches from rear connector (21) with screw hole centered on each side of CRT (10).

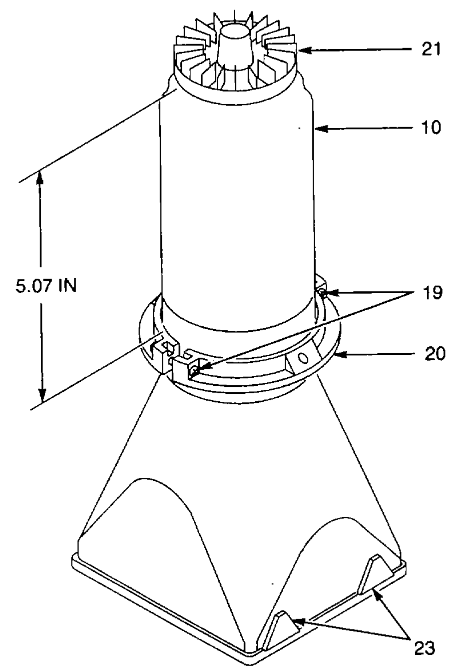
NOTE
Screw holes in CRT clamp must align with holes in CRT shield spacers, which are mounted inside front CRT shield.

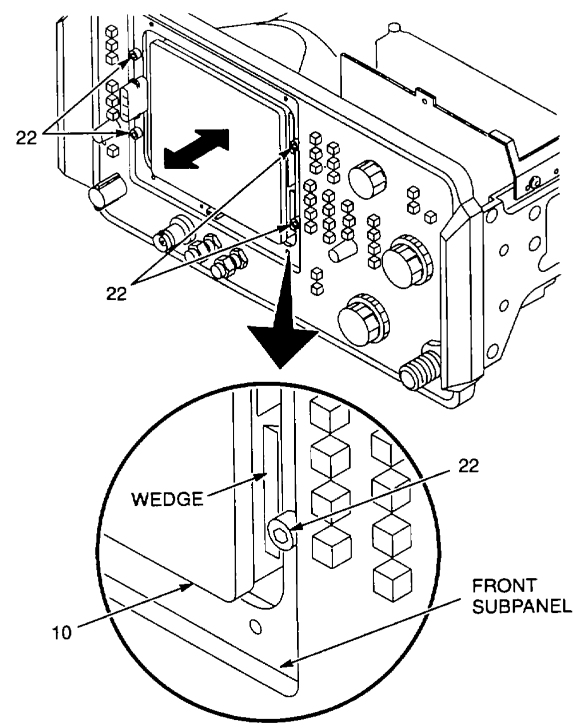
3. Position front CRT shield (11) on CRT (10), guiding cable assembly through cutout.
4. Verify that holes in CRT shield spacers (16) align with screw holes in CRT clamp (20). If not, remove front CRT shield (11), and repeat step 2 through step 4, adjusting alignment of screw holes as necessary.
5. Install screw (15) in CRT shield spacer (16) on each side of front CRT shield (11).
6. Slide grommet (17) onto cable (18). Seat grommet (17) into hole in front CRT shield (11).
7. Plug the CRT socket (14) onto CRT (10).
8. Set rear CRT shield (13) in place on front CRT shield (11).

9. Install three nuts (12) that secure rear CRT shield (13) to front CRT shield (11).
10. Set 495P Spectrum Analyzer on its rear surface.
11. Wrap wires around CRT shield (11) to top side.
12. Lower CRT (10) and CRT shield (11) into chassis through opening in front panel, guiding cables so that they do not catch on components.
13. While pressing on CRT faceplate, tight en or loosen screws (22) until front edges of wedge-shaped pads (23) on sides of CRT (10) are slightly below surface of front subpanel.
14. Remove the protective covering from the CRT faceplate.
15. Set the implosion shield (7) and CRT retainer (4) in place, plugging connector (5) to pins on A1 A77 Graticule Lights CCA (6).
16. Install four screws (3) that secure CRT retainer (4) to front subpanel, tightening screws alternately in a diagonal pattern.
17. Access screws (22) through holes in CRT retainer (4) and alternately tighten screws to eight in-lbs in a diagonal pattern.
18. Set CRT light filter (2) in place over implosion shield (7).
19. Set mask frame (1) in place and press to snap into CRT retainer (4).
20. Install nut (8) to secure lug terminal (9) to front subpanel.
21. Plug connectors onto following CCA (para 2-178):

- A1A64 Deflection Amplifiers CCA.
- A1A70Z-Axis CCA.
- A1A74 High Voltage CCA.

22. Install A1A69 10/100 Hz Filter (para 2-147).



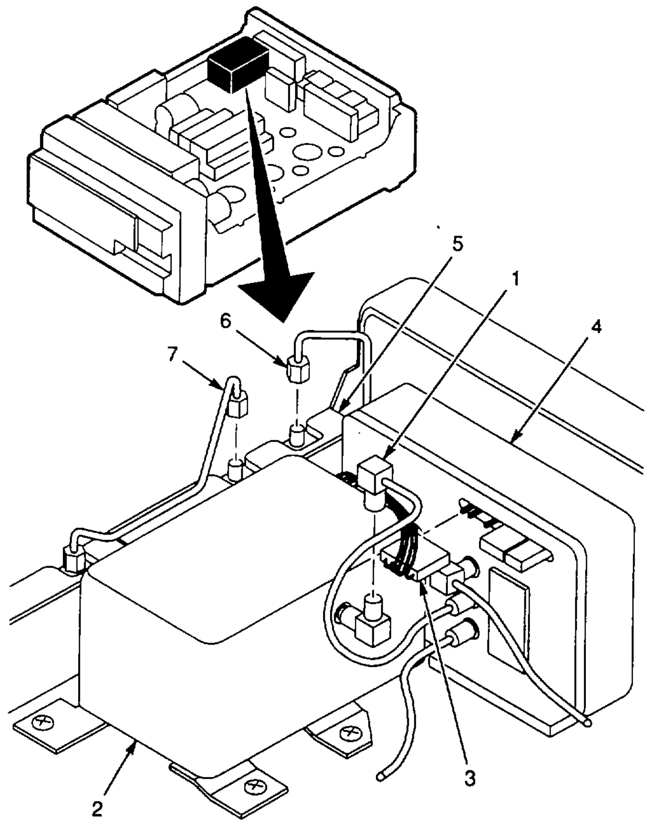


END OF TASK

2-188. REPLACE A1A37 10 MHZ REFERENCE.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE



1. Remove cabinet (para 2-118).
2. Unplug SMB connector (1) from A1A37 10 MHz Reference (2).
3. Unplug A1A36P1026 (3) from A1A36 Reference Lock (4).
4. Disconnect following semirigid cables from A1A25 Harmonic Mixer (5):

- RFOUT (6).
- RF IN (7).

5. Remove following screws that secure A1A37 10 MHz Reference (2) to RF deck:

- Two screws (8).
- Two screws (9).

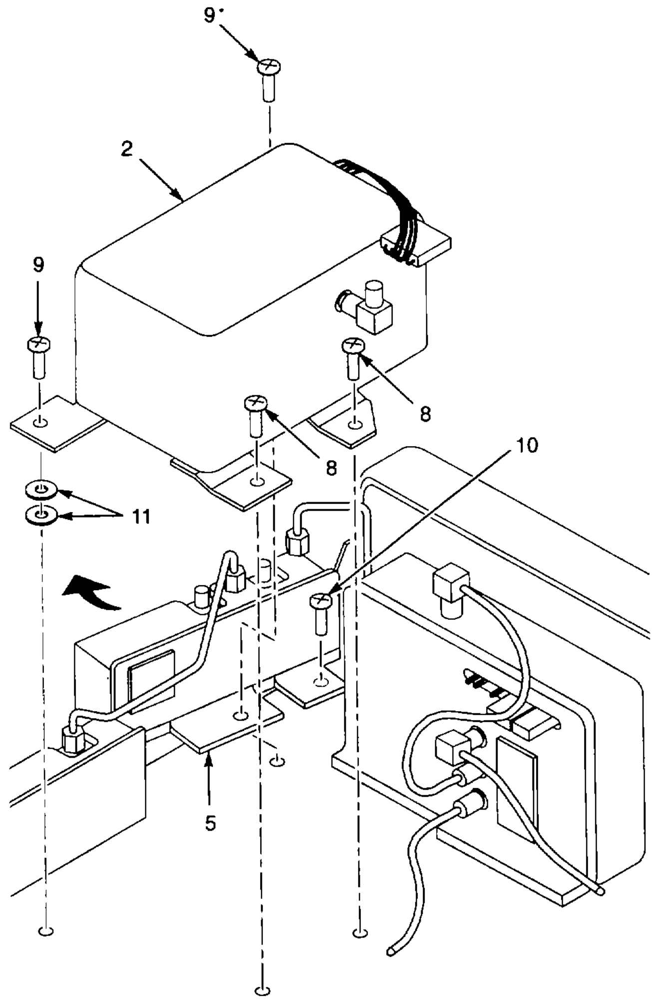
6. Remove screw (10) that secures A1A25 Harmonic Mixer (5) to RF deck.
7. Move A1A25 Harmonic Mixer (5) out to allow removal of A1A37 10 MHz Reference (2).
8. Remove A1A37 10 MHz Reference (2) from chassis.
9. Remove two washers (11) that were under rear mounting tab of A1A37 10 MHz Reference (2).

INSTALL

1. Place two washers (11) over mounting hole in RF deck for rear tab of A1A37 10 MHz Reference (2).
2. Set A1A37 10 MHz Reference (2) in chassis, aligning holes in mounting tabs with holes in RF deck.
3. Install screw (9) in rear mounting tab of Al A37 10 MHz Reference (2). Ensure screw goes through two washers (11).
4. Move AlA25 Harmonic Mixer (5) into place, slipping rear mounting tab under front mounting tab of A1A37 10 MHz Reference (2).
5. Install screw (9) to secure A1A25 Harmonic Mixer (5) and A1 A37 10 MHz Reference (2) to RF deck.
6. Install two screws (8) in A1 A37 10 MHz Reference (2).
7. Install screw (10) in A1A25 Harmonic Mixer (5).
8. Connect following semirigid cables to Al A25 Harmonic Mixer (5), tightening connectors to eight in-lbs.

- RF OUT (6).
- RF IN (7).

9. Plug SMB connector (1) onto A1A37 10 MHz Reference (2).
10. Plug A1A36P1026 (3) onto A1A36 Reference Lock (4).
11. Install cabinet (para 2-118).



END OF TASK

2-189. REPLACE A1A25 HARMONIC MIXER.

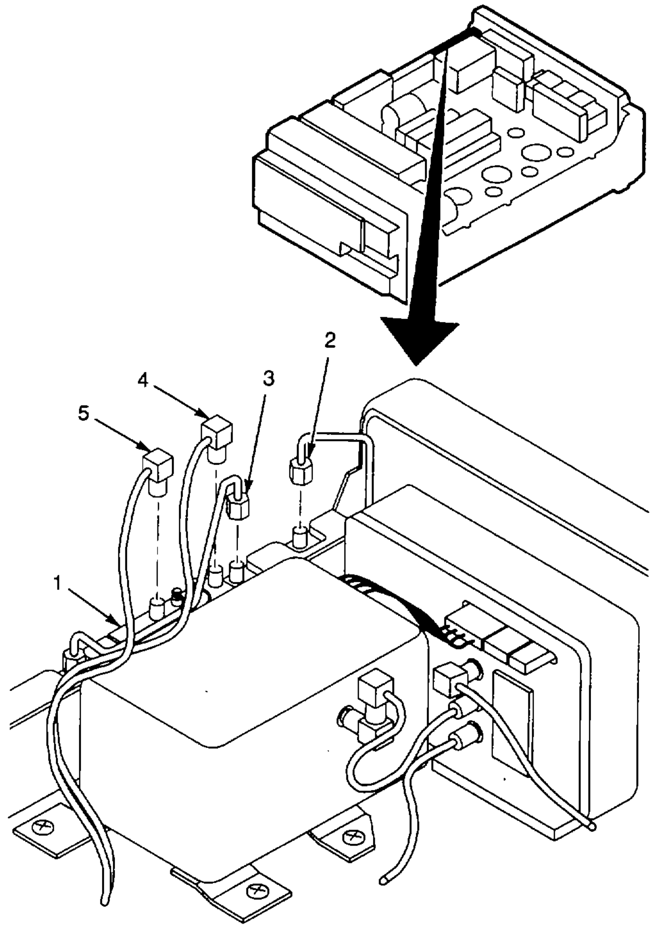
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Disconnect cables from following connectors on A1A25 Harmonic Mixer (1):

- RFOUT(2).
- RF IN (3).
- 200 MHz (4).
- OUTPUT (5).

3. Remove screw (6) that secures front of AlA25 Harmonic Mixer (1) to RF deck.
4. Remove screw (7) that secures rear of A1A25 Harmonic Mixer (1) to RF deck.
5. Pull A1A25 Harmonic Mixer (1) out and unplug A1A25A3P245 (8) from A1A25A3 Input CCA (9).
6. Remove A1A25 Harmonic Mixer (1) from chassis.



INSTALL

1. Plug A1A25A3P245 (8) onto A1A25A3 Input CCA (9).

2. Set A1A25 Harmonic Mixer (1) in place, slipping rear mounting tab under front mounting tab of A1A37 10 MHz Reference (10).

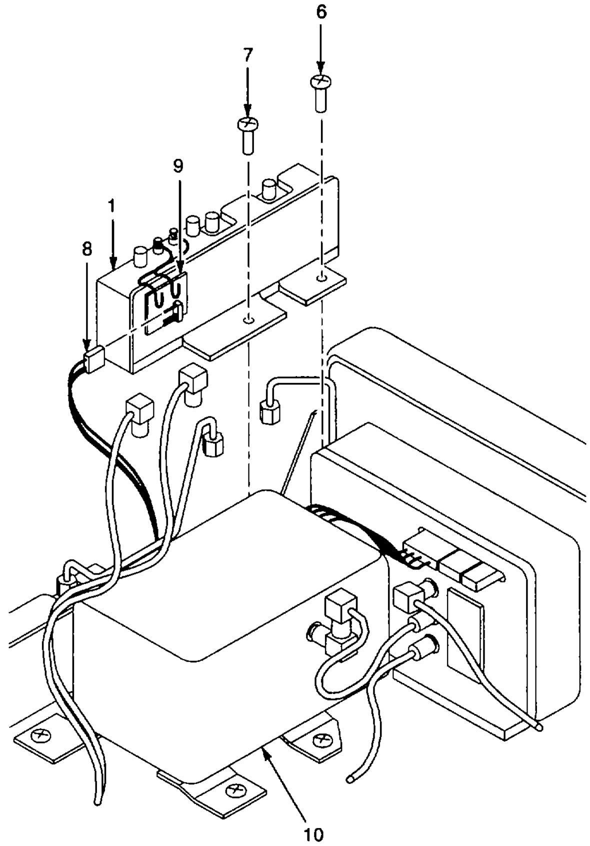
3. Install screw (6) that secures front of A1A25 Harmonic Mixer (1) to RF deck.

4. Install screw (7) that secures rear of A1A25 Harmonic Mixer (1) to RF deck.

5. Connect following cables to A1A25 Harmonic Mixer (1):

   - RF OUT (2), tighten connection to eight in-lbs.
   - RF IN (3), tighten connection to eight in-lbs.
   - 200 MHz (4), labeled P251.
   - OUTPUT (5), labeled P252.

6. Install cabinet (para 2-118).



END OF TASK

2-190. REPLACE A1A36 REFERENCE LOCK.

DESCRIPTION

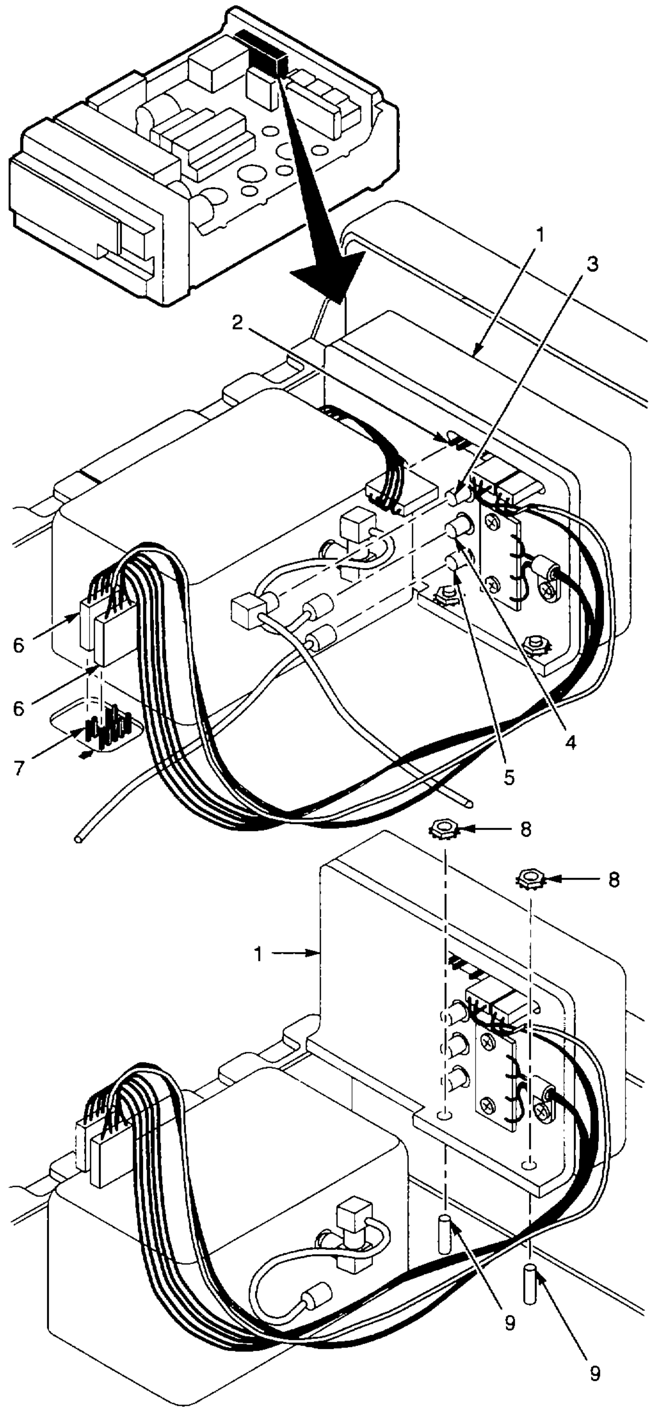
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Set chassis on work surface bottom side up.
3. Unplug cables from following connectors on A1 A36 Reference Lock (1):
   - A1A36P1026 (2).
   - A1A36P1025 (3).
   - A1A36P2025 (4).
   - A1A36P2026 (5).
4. Unplug two connectors (6) from A1A28J2025 (7).
5. Remove two nuts (8) that secure A1 A36 Re ference Lock (1).
6. Lift A1A36 Reference Lock (1) from chassis.

INSTALL

1. Set A1 A36 Reference Lock (1) onto threaded studs (9) on RF deck.
2. Install two nuts (8) that secure A1A36 Reference Lock (1) to RF deck.
3. Plug cables onto following connectors on A1A36 Reference Lock (1):
   - A1A36P2026 (5), cable labeled P2026 RLM
   - A1A36P2025 (4), cable labeled REF OSC.
   - A1A36P1025 (3), cable marked with yellow band.
   - A1A36P1026 (2), multiwire cable.
4. Plug two connectors (6) onto A1A28J2025 (7).
5. Install cabinet (para 2-118).



END OF TASK

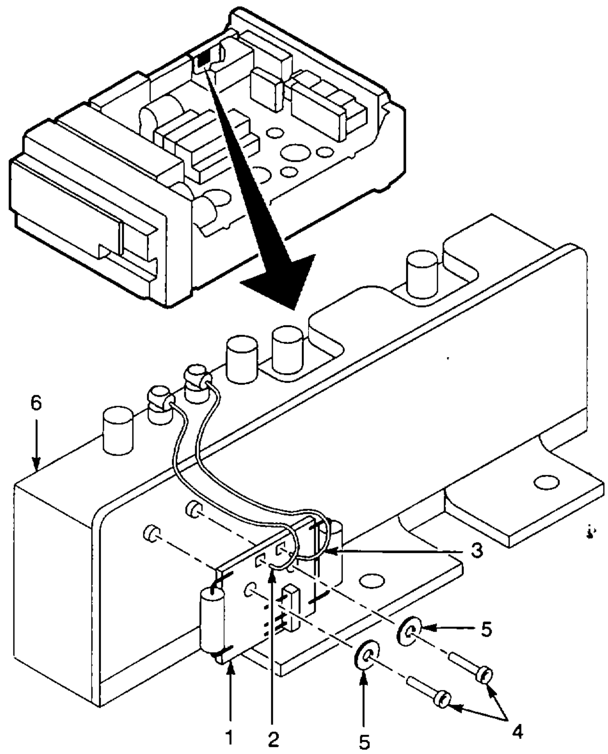
2-191. REPLACE A1A25A3 INPUT CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A1A25 Harmonic Mixer (para 2-189).
2. Unsolder following wires from A1A25A3 Input CCA (1):
   - Red wire (2) from pad labeled +15.
   - Brown wire (3) from pad labeled -15.
3. Remove two screws (4) and two washers (5) that secure A1A25A3 Input CCA (1) to A1A25 Harmonic Mixer (6).
4. Remove A1A25A3 Input CCA (1).



INSTALL

1. Align A1A25A3 Input CCA (1) with spacers on A1A25 Harmonic Mixer (6).
2. Install two screws (4) and two washers (5) that secure A1A25A3 Input CCA (1).
3. Solder following wires to A1A25A3 Input CCA (1):
   - Red wire (2) to pad labeled +15.
   - Brown wire (3) to pad labeled -15.
4. Install A1A25 Harmonic Mixer (para 2-189).

END OF TASK

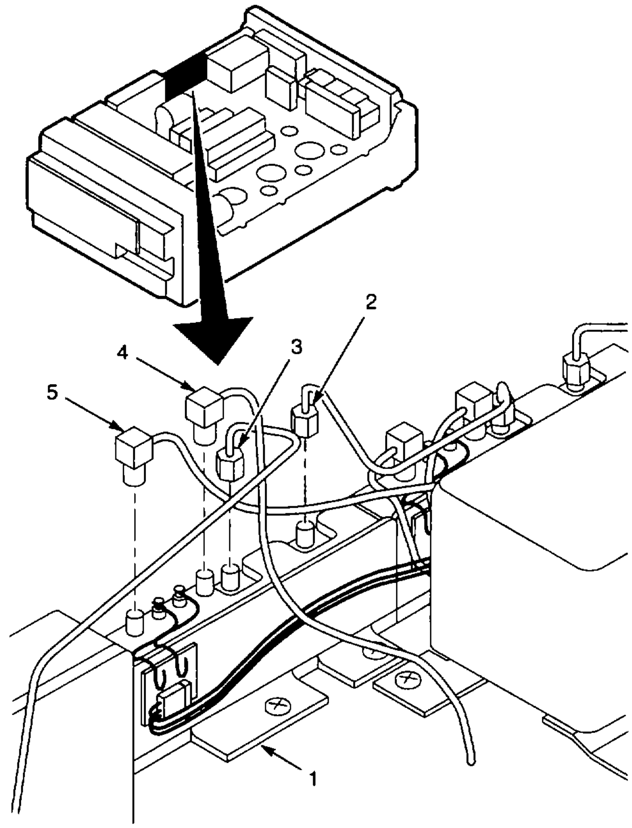
2-192. REPLACE AIA24 PHASE GATE ASSEMBLY.

DESCRIPTION

This procedure covers: Remove and Install

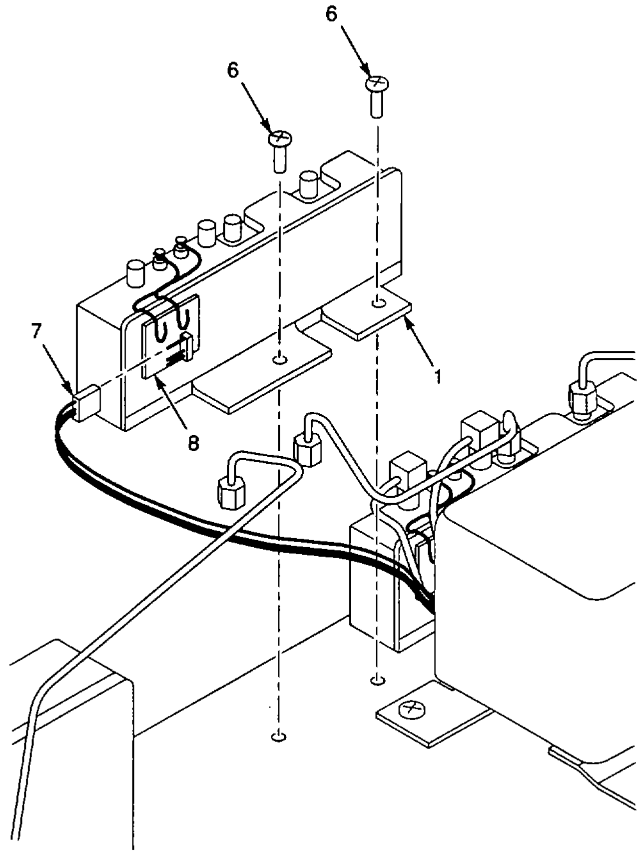
REMOVE

1. Remove cabinet (para 2-118).
2. Disconnect cables from following connectors on A1A24 Phase Gate Assembly (1):
   - LO OUT (2).
   - LO IN (3).
   - STROBE (4).
   - OUTPUT (5).
3. Remove two screws (6) that secure A1 A24 Phase Gate Assembly (1) to RF deck.
4. Pull A1A24 Phase Gate Assembly (1) out and unplug A1A24A1 P245 (7) from A1A24A1 Input CCA (8).
5. Remove A1A24 Phase Gate Assembly (1) from chassis.



INSTALL

1. Plug A1A24A1P245 (7) onto A1A24A1 Input CCA (8).
2. Set A1A24 Phase Gate Assembly (1) into place.
3. Install two screws (6) that secure A1A24 Phase Gate Assembly (1) to RF deck.
4. Connect following cables to A1A24 Phase Gate Assembly (1):
   - LO OUT (2), tighten to eight in-lbs.
   - LO IN (3), tighten to eight in-lbs.
   - STROBE (4), labeled P243 PHASE GATE
   - OUTPUT (5).
5. Install cabinet (para 2-118).



END OF TASK

2-193. REPLACE A1A24A1 INPUT CCA.

DESCRIPTION

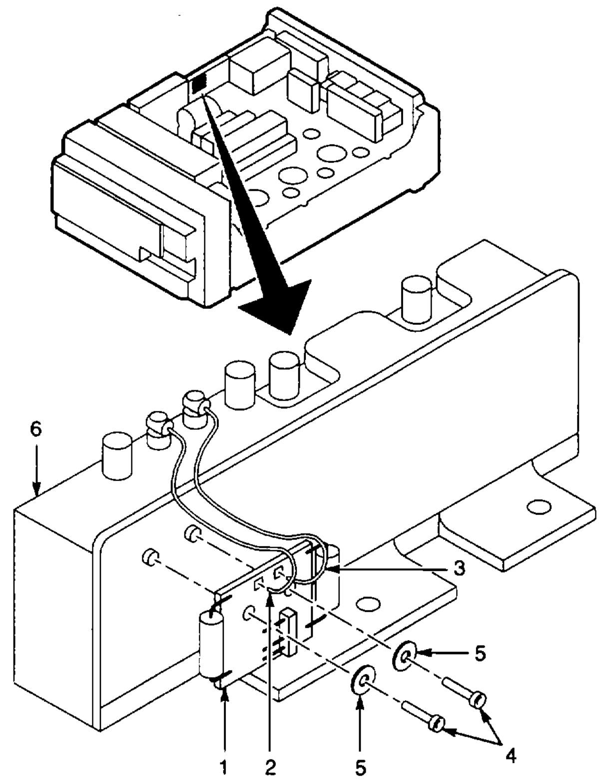
This procedure covers: Remove and Install

REMOVE

1. Remove A1A24 Phase Gate Assembly (para 2-192).
2. Unsolder following wires from A1 A24A1 Input CCA (1):
   - Red wire (2) from pad labeled +15.
   - Brown wire (3) from pad labeled-15.
3. Remove two screws (4) and washers (5) that secure A1A24A1 Input CCA (1) to A1A24 Phase Gate Assembly (6).
4. Remove A1A24A1 Input CCA (1).

INSTALL

1. Align A1A24A1 Input CCA (1) with spacers on A1A24 Phase Gate Assembly (6).
2. Install two screws (4) and two washers (5) to secure A1A24A1 Input CCA (1).
3. Solder following wires to A1 A24A1 Input CCA (1):
   - Red wire (2) to pad labeled +15.
   - brown wire (3) to pad labeled -15.
4. Install A1A24 Phase Gate Assembly (para 2-192).



END OF TASK

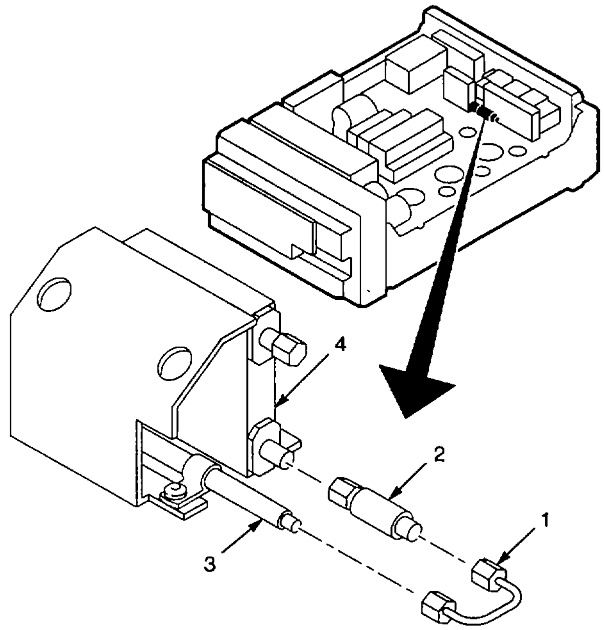
2-194. REPLACE A1AT12 ATTENUATOR.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Disconnect U-shaped semirigid cable (1) from the following components:
   - A1AT12 Attenuator (2).
   - A1FL10 Lowpass Filter (3).
3. Remove U-shaped semirigid cable (1) fr om the chassis.
4. Disconnect A1 AT12 Attenuator (2) from A1 FL16 Directional Filter (4), and remove from chassis.



INSTALL

1. Install A1AT12 Attenuator (2) on A1FL16 Directional Filter (4), and tighten connector to eight in-lbs.
2. Connect U-shaped semirigid cable (1) to the following components, tightening connectors to eight in-lbs:
   - A1AT12 Attenuator (2).
   - A1A1FL10 Lowpass Filter (3).
3. Install cabinet (para 2-118).

END OF TASK

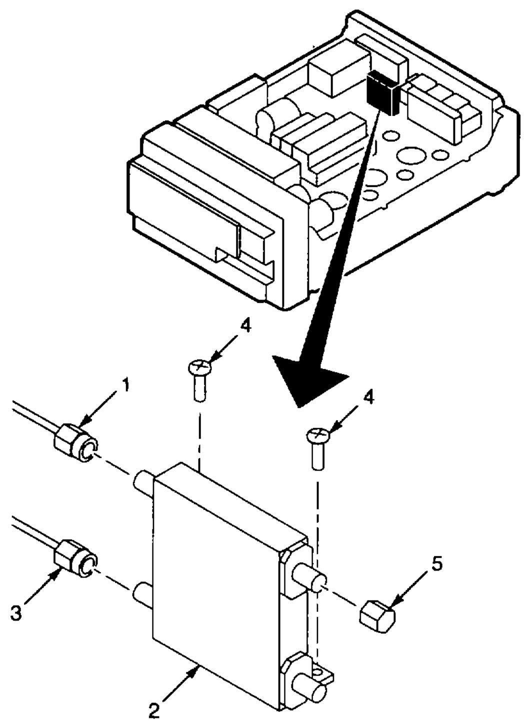
2-195. REPLACE Al FL16 DIRECTIONAL FILTER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A1AT12 Attenuator (para 2-194).
2. Disconnect semirigid cable (1) from upper connector on A1FL16 Directional Filter (2).
3. Disconnect semirigid cable (3) from lower connector on A1FL16 Directional Filter (2).
4. Remove two screws (4) that secure A1FL16 Directional Filter (2) to RF deck.
5. Lift A1FL16 Directional Fi lter (2) from chassis.
6. Remove 50 **W** coaxial terminator (5) from A1FL16 Directional Filter (2).



INSTALL

1. Set A1FL16 Directional Filter (2) into place on RF deck (mounting flange towards front panel).
2. Install two screws (4) that secure A1FL16 Directional Filter (2) to RF deck.
3. Connect semirigid cable (3) to lower connector on A1FL16 Directional Filter (2). Tighten connector to eight in-lbs.
4. Connect semirigid cable (1) to upper connector on A1FL16 Directional Filter (2). Tighten connector to eight in-lbs.
5. Install 50 **W** coaxial terminator (5) on Al FL16 Directional Filter (2).
6. Install A1AT12 Attenuator (para 2-194).

END OF TASK

2-196. REPLACE A1P164 50 Ω COAXIAL TERMINATOR.

DESCRIPTION

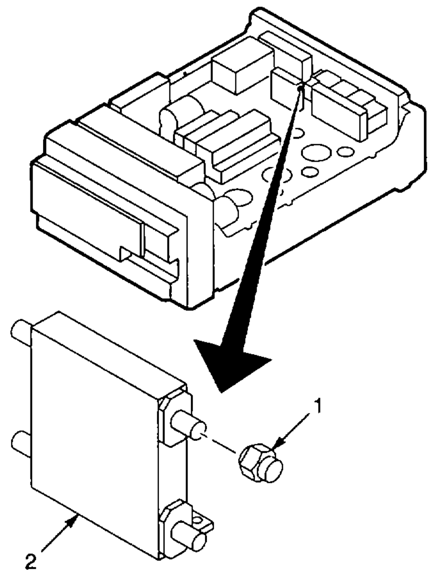
This procedure covers: Remove and Install.

REMOVE

1. Remove cabinet (para 2-118).
2. Remove A1P164 50 W Coaxial Terminator (1) from A1FL16 Directional Filter (2).

INSTALL

1. Install A1P164 50 W Coaxial Terminator (1) on A1FL16 Directional Filter (2).
2. Install cabinet (para 2-118).



END OF TASK

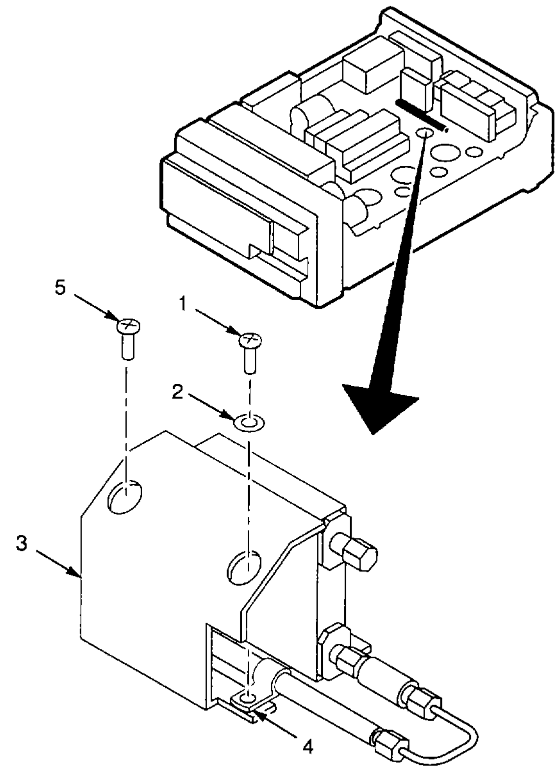
2-197. REPLACE A1FL10 LOWPASS FILTER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove screw (1) and washer (2) that secure shield (3) and clamp (4) to RF deck.
3. Remove screw (5) that secures shield (3) to RF deck.
4. Remove shield (3) from chassis.
5. Disconnect U-shaped semirigid cable (6) from the following components:
   - A1AT12 Attenuator (7).
   - A1FL10 Lowpass Filter (8).
6. Remove U-shaped semirigid cable (6) from the chassis.
7. Disconnect semirigid cable (9) from A1FL10 Lowpass Filter (8).
8. Remove A1FL10 Lowpass Filter (8) from chassis.
9. Remove clamp (4) from A1FL10 Lowpass Filter (8).



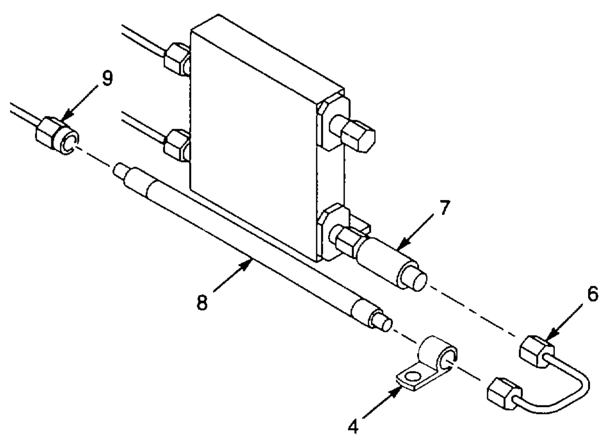
INSTALL

1. Install clamp (4) on A1FL10 Lowpass Filter (8).

NOTE

One end of Al FL10 Lowpass Filter is labeled OUT. Connect semirigid cable to opposite end in following step.

2. Connect semirigid cable (9) to A1FL10 Lowpass Filter (8), and tighten connector to eight in-lbs.
3. Connect U-shaped semirigid cable (6) to following components (tighten connectors to eight in-lbs):
   - A1A1FL10 Lowpass Filter (8).
   - A1AT12 Attenuator (7).



4. Set shield (3) in place in chassis.
5. Install screw (1) and washer (2) to secure shield (3) an d clamp (4) to RF deck.
6. Install screw (5) to secure shield (3) to RF deck.
7. Install cabinet (para 2-118).

END OF TASK

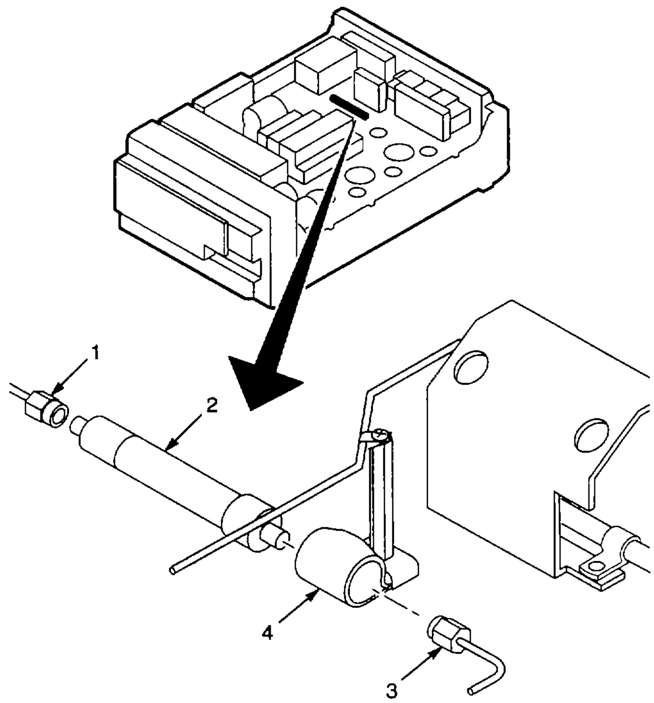
2-198. REPLACE A1FL11 LOWPASS FILTER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Disconnect semirigid cable (1) from A1FL11 Lowpass Filter (2).
3. Disconnect semirigid cable (3) from A1FL11 Lowpass Filter (2).
4. Slide A1FL11 Lowpass F ilter (2) from clamp (4).
5. Remove A1FL11 Lowpass Filter (2) from chassis.



INSTALL

1. Slide large end of Al FL11 Lowpass Filter (2) into clamp (4).
2. Connect semirigid cable (1) to A1FL11 Lowpass Filter (2). Tighten connector to eight in-lbs.
3. Connect semirigid cable (3) to A1FL11 Lowpass Filter (2). Tighten connector to eight in-lbs.
4. Install cabinet (para 2-118).

END OF TASK

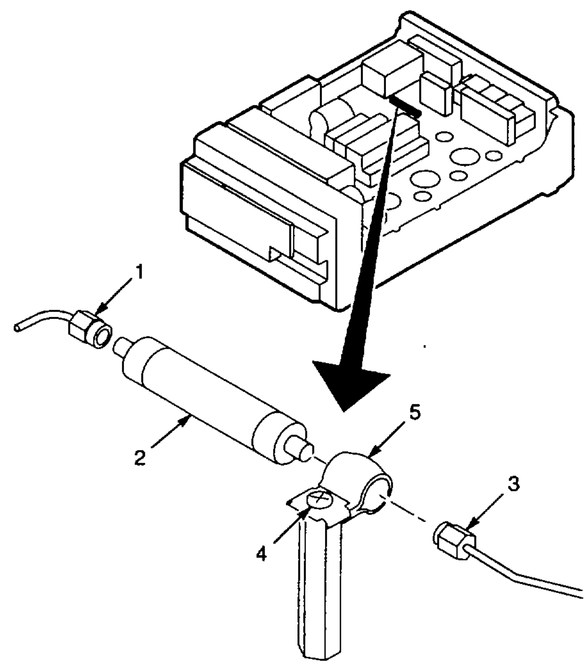
2-199. REPLACE AIA15 BIAS RETURN.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Disconnect semirigid cable (1) from IN connector on A1A15 Bias Return (2).
3. Disconnect semirigid cable (3) from OUT connector on A1A15 Bias Return (2).
4. Loosen screw (4).
5. Slide A1A15 Bias Return (2) out of clamp (5), and remove A1A15 Bias Return from chassis.



INSTALL

NOTE

When installing, orient A1A15 Bias Return so that IN connector is towards semirigid cable connected to A1A16 1st LO Assembly.

1. Slide A1A15 Bias Return (2) into clamp (5).
2. Tighten screw (4).
3. Connect semirigid cable (1) to IN connector on A1A15 Bias Return (2). Tighten connector to eight in-lbs.
4. Connect semirigid cable (3) to OUT connector on A1A15 Bias Return (2). Tighten connector to eight in-lbs.
5. Install cabinet (para 2-118).

END OF TASK

2-200. REPLACE A1A34 3RD CONVERTER ASSEMBLY.

DESCRIPTION

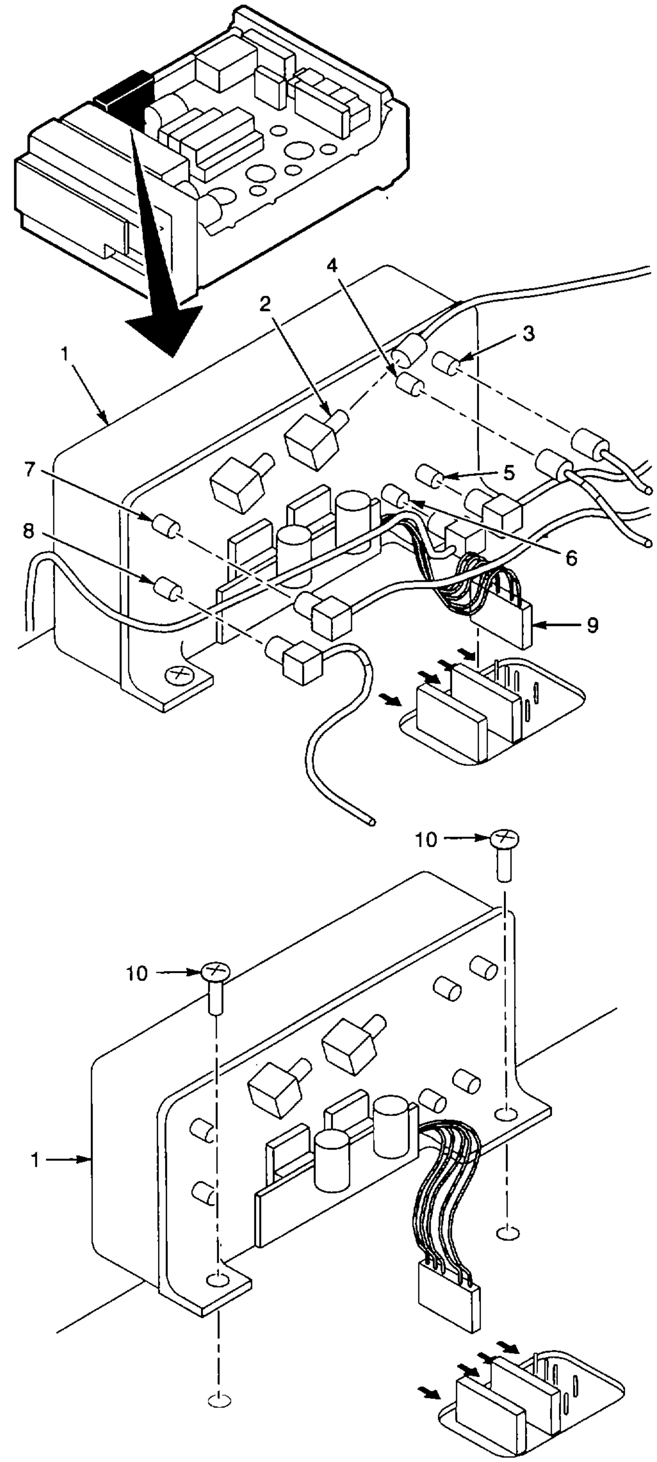
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Disconnect cables from following connectors on A1A34 3rd Converter Assembly (1):
   - A1A34J1032 (2).
   - A1A34J1011 (3).
   - A1A34J1012 (4).
   - A1A34J3011 (5).
   - A1A34J3019 (6).
   - A1A34J3054 (7).
   - A1A34J1054 (8).
3. Unplug A1A28J1036 (9) from AlA28 Mother Board CCA.
4. Remove two screws (10) that secure A1A34 3rd Converter Assembly (1) to RF deck.
5. Lift A 1A34 3rd Converter Assembly (1) from chassis.

INSTALL

1. Set A1A34 3rd Converter Assembly (1) into place on RF deck.
2. Install two screws (10) that secure A1A34 3rd Converter Assembly (1) to RF deck.
3. Plug A1A28J1036 (9) onto Al A28 Mother Board CCA.



4. Connect cables to following connectors on A1A34 3rd Converter Assembly (1):
   - A1A34J3019 (6), cable labeled J3019.
   - A1A34J3011 (5), cable labeled P347.
   - A1A34J1012 (4), cable marked with yellow band.
   - A1A34J1011 (3), cable labeled J1011.
   - A1A34J1032 (2), cable labeled J1032.
   - A1A34J1054 (8), cable marked with red band.
   - A1A34J3054 (7), cable not labeled.
5. Install cabinet (para 2-118).

END OF TASK

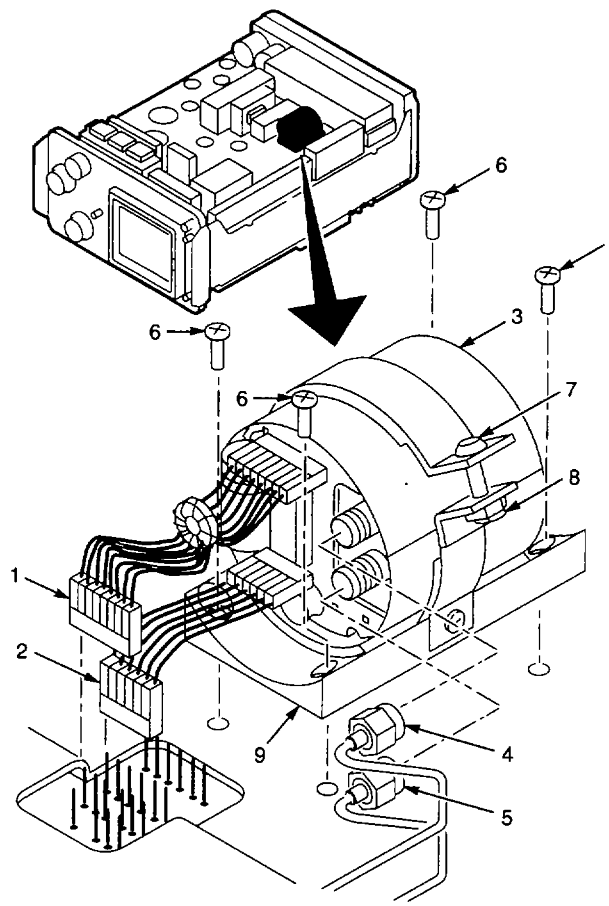
2-201. REPLACE A1A16 1ST LO ASSEMBLY.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Unplug following connectors from A1A28 Mother Board CCA:
   - A1A28J1037 (1).
   - A1A28J1038 (2).
3. Disconnect following semirigid cables from A1A16 1st LO Assembly (3):
   - A1A16P130(4).
   - A1A16P132(5).
4. Remove four screws (6) that secure A1A16 1st LO Assembly (3) to RF deck.
5. Lift A1A16 1st LO Assembly (3) from chassis.
6. Remove screw (7) and nut (8) that fasten retaining strap to A1A16 1st LO Assembly (3).
7. Remove A1A16 1st LO Assembly (3) from mounting plate (9).



INSTALL

1. Transfer two cables from removed A1A1 6 1st LO Assembly (3) to same locations on new A1A16 1st LO Assembly.
2. Set A1A16 1st LO Assembly (3) in place on mounting plate (9).
3. Install screw (7) and nut (8) to secure A1A16 1st LO Assembly (3) to mounting plate (9).
4. Set A1A16 1st LO Assembly (3) in place in chassis.
5. Install four screws (6) that secure A1A16 1st LO Assembly (3) to RF deck.
6. Connect following semirigid cables to A1A16 1st LO Assembly (3), tightening connections to 8 in-lbs:
   - A1A16P132 (5).
   - A1A16P130 (4).
7. Plug following connectors onto A1 A28 Mother Board CCA:
   - A1A28J1037 (1).
   - A1A28J1038 (2).
8. Install cabinet (para 2-118).

END OF TASK

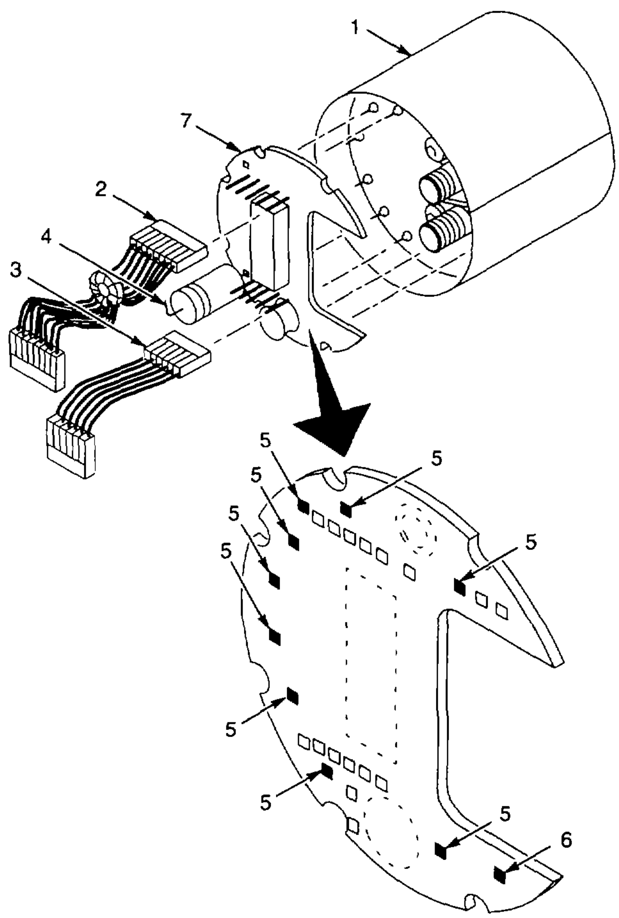
2-202. REPLACE A1A16A1 1ST LO INTERFACE CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A1A16 1st LO Assembly (para 2-201).
2. Unplug the following connectors from A1A16 1st LO Assembly (1):
   - A1A16P1017 (2).
   - A1A16P1013 (3).
3. Unsolder and lift negative lead (4) of A1A16A1C1012 to reach solder pads under A1A16A1C1012.
4. Remove solder from solder pads (5), ensuring leads of feedthrough capacitors are free in holes.
5. Remove solder from solder pad (6), ensuring wire lead is free in hole.
6. Lift A1A16A1 1st LO Interface CCA (7) from A1A16 1st LO Assembly (1).



INSTALL

1. Set A1A16A1 1st LO Interface CCA (7) in place on A1A16 1st LO Assembly (1), aligning leads of feedthrough capacitors with solder pads (5).
2. Solder feedthrough capacitor leads to solder pads (5).
3. Solder wire lead to solder pad (6).
4. Solder negative lead of A1A16A1C1012 to solder pad.
5. Plug following connectors onto A1A16 1st LO Assembly (1):
   - A1A16P1017 (2).
   - A1A16P1013 (3).
6. Install A1A16 1st LO Assembly (para 2-201).

END OF TASK

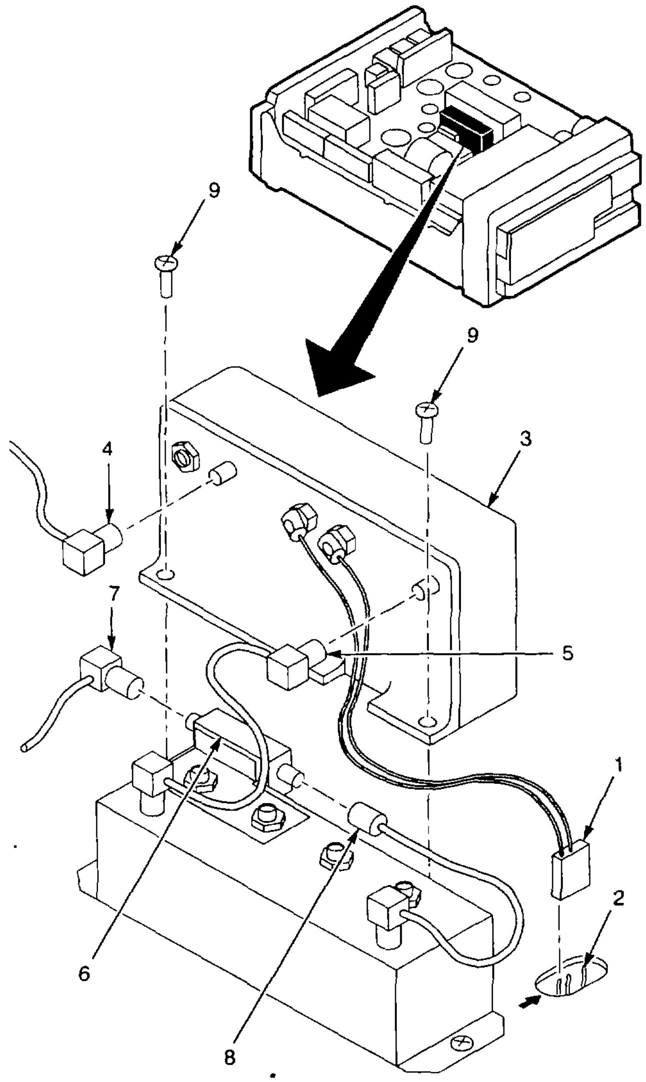
2-203. REPLACE A1A32 IF AMPLIFIER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Unplug connector (1) from A1A28J3045 (2) on A1A28 Mother Board CCA.
3. Unplug following cables from connectors on A1A32 IF Amplifier (3):
   - IN A1A32J321 (4).
   - OUT A1A32J320 (5).
4. Unplug following cables from connectors on A1FL37 Lowpass Filter (6):
   - A1FL37J371 (7).
   - A1FL37J370 (8).
5. Remove two screws (9) that secure A1A32 IF Amplifier (3) to RF deck.
6. Lift A1A32 IF Amplifier (3) from chassis, tipping top towards A1 FL37 Lowpass Filter (6) to allow clearance for mounting flange.



INSTALL

1. Set A1A32 IF Amplifier (3) in place on RF deck, tipping top towards Al FL37 Lowpass Filter (6) to allow clearance for mounting flange.
2. Install two screws (9) that secure A1A32 IF Amplifier (3) to RF deck.
3. Plug following cables onto connectors on Al FL37 Lowpass Filter (6):
   - A1FL3J371 (7).
   - A1FL3J370 (8).
4. Plug cables onto following connectors on A1 A32 IF Amplifier (3):
   - IN A1A32J321 (4).
   - OUT A1A32J320 (5).
5. Plug connector (1) to A1A28J3045 (2) on A1A28 Mother Board CCA.
6. Install cabinet (para 2-118).

END OF TASK

2-204. REPLACE A1FL37 LOWPASS FILTER.

DESCRIPTION

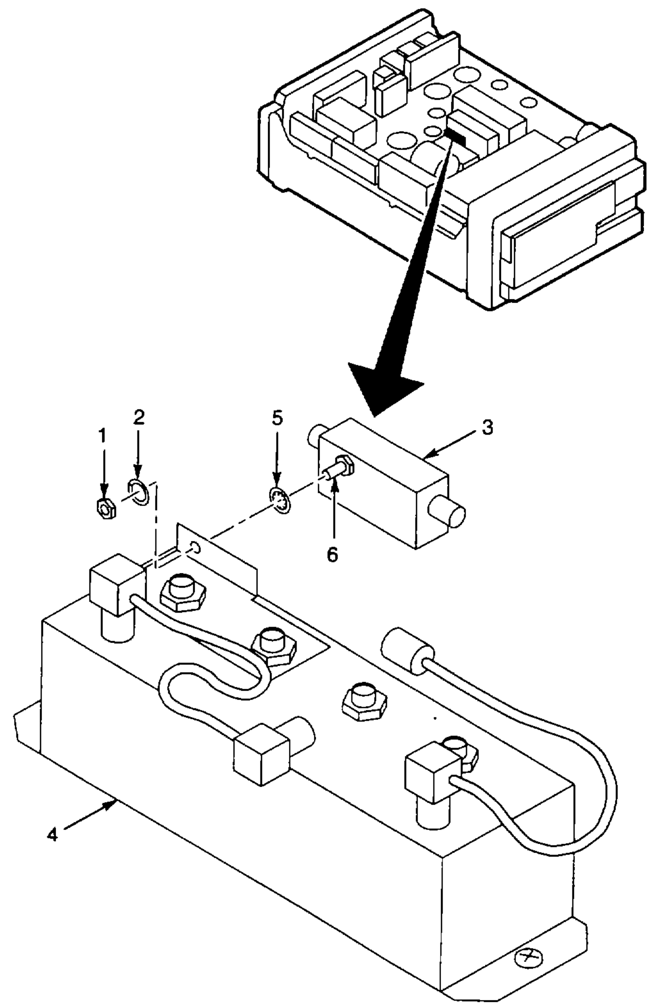
This procedure covers: Remove and Install

REMOVE

1. Remove A1A32 IF Amplifier (para 2-203).
2. Remove nut (1) and washer (2) that secure Al FL37 Lowpass Filter (3) to A1FL36 Bandpass Filter (4).
3. Remove A1FL37 Lowpass Filt er (3) from chassis, taking care not to lose washer (5).
4. Remove washer (5) from stud (6) on A1FL37 Lowpass Filter (3).

INSTALL

1. Install lock washer (5) on stud (6) on A1FL37 Lowpass Filter (3).
2. Insert stud (6) on A1FL37 Lowpass Filter (3) through hole in bracket on Al FL36 Bandpass Filter (4).
3. Install split washer (2) and nut (1) to secure A1FL37 Lowpass Filter (3) to A1FL36 Bandpass Filter (4).
4. Install A1A32 IF Amplifier (para 2-203).



END OF TASK

2-205. REPLACE A1FL36 BANDPASS FILTER.

DESCRIPTION

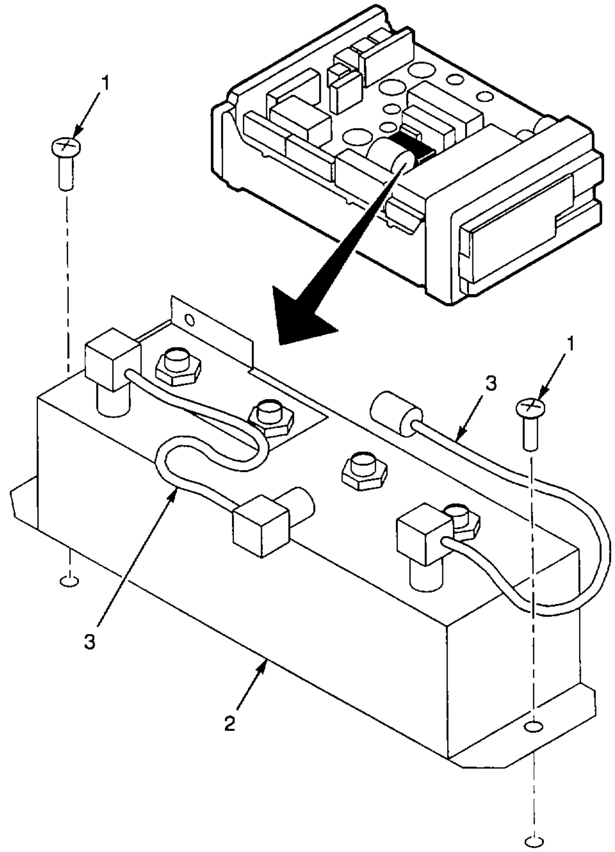
This procedure covers: Remove and Install

REMOVE

1. Remove A1FL37 Lowpass Filter (para 2-204).
2. Remove two screws (1) that secure A1FL36 Bandpass Filter (2) to RF deck.
3. Lift A1FL36 Bandpass Filter (2) and cables from chassis.
4. Transfer cables (3) to same locations on new A1FL36 Bandpass Filter (2).

INSTALL

1. Set A1FL36 Bandpass Filt er (2) in place on RF deck.
2. Install two screws (1) that secure A1FL36 Bandpass Filter (2) to RF deck.
3. Install A1FL37 Lowpass Filter (para 2-204).



END OF TASK

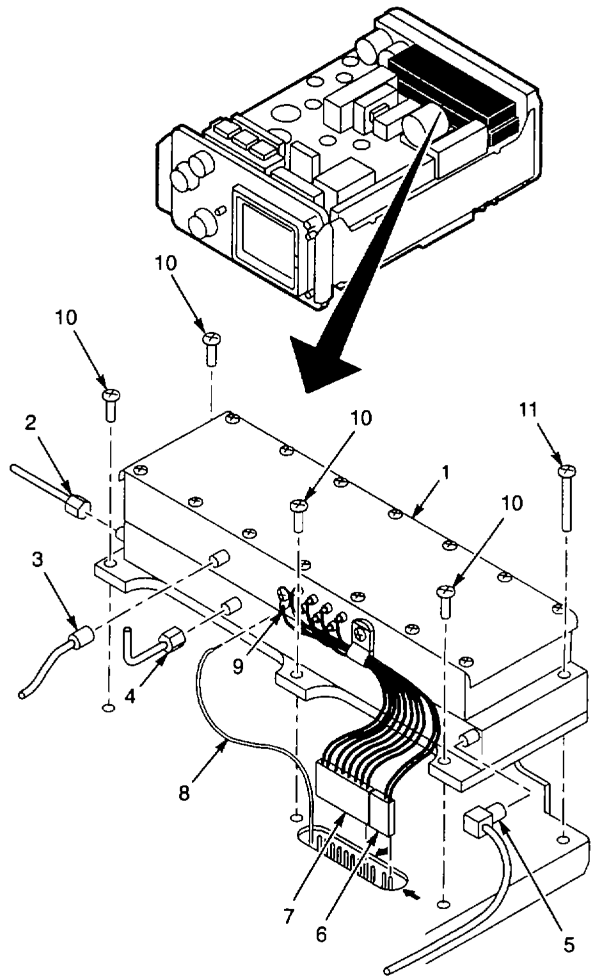
2-206. REPLACE A1A22 PHASE LOCKED 2ND LO.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Disconnect cables from following connectors on A1A2 2 Phase Locked 2nd LO (1):
   - 2182MHz OUT (2).
   - 18MHzOUT (3).
   - 2182MHz OUT (4).
   - 100MHz IN (5).
3. Unplug following connectors from A1A28 Mother Board CCA:
   - A1A28J1046(6).
   - A1A28J1048(7).
4. Unsolder brown wire (8) from lug terminal (9).
5. Remove four short screws (10) and one long screw (11) that secure A1 A22 Phase Locked 2nd LO (1) to RF deck.
6. Slide A1A22 Phase Locked 2nd LO (1) from chassis.



INSTALL

1. Set A1A22 Phase Locked 2nd LO (1) in place on RF deck.
2. Solder brown wire (8) to lug terminal (9).
3. Plug following connectors onto A1A28 Mother Board CCA:
   - A1A28J1046 (6).
   - A1A28J1048 (7).
4. Connect cables to following connectors on A1A22 Phase Locked 2nd LO (1):
   - 2182MHz OUT (2), tighten connection to 8 in-lbs.
   - 18MHz OUT (3), cable labeled P224.
   - 2182MHz OUT (4), tighten connection to 8 in-lbs.
   - 100MHz IN (5), unlabeled cable.
5. Install four short screws (10) and one long screw (11) to secure Al A22 Phase Locked 2nd LO (1) to RF deck.
6. Install cabinet (para 2-118).

END OF TASK

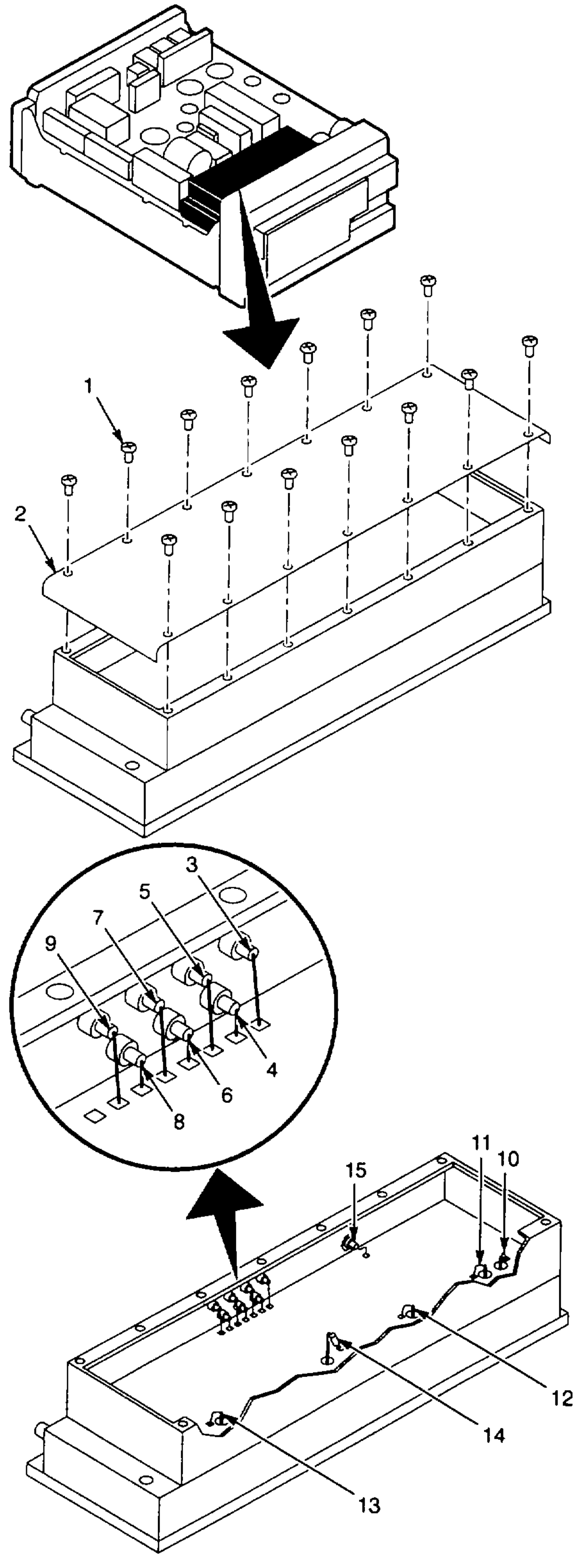
2-207. REPLACE A1A22A1 16-20 MHZ PHASE LOCK CCA.

DESCRIPTION

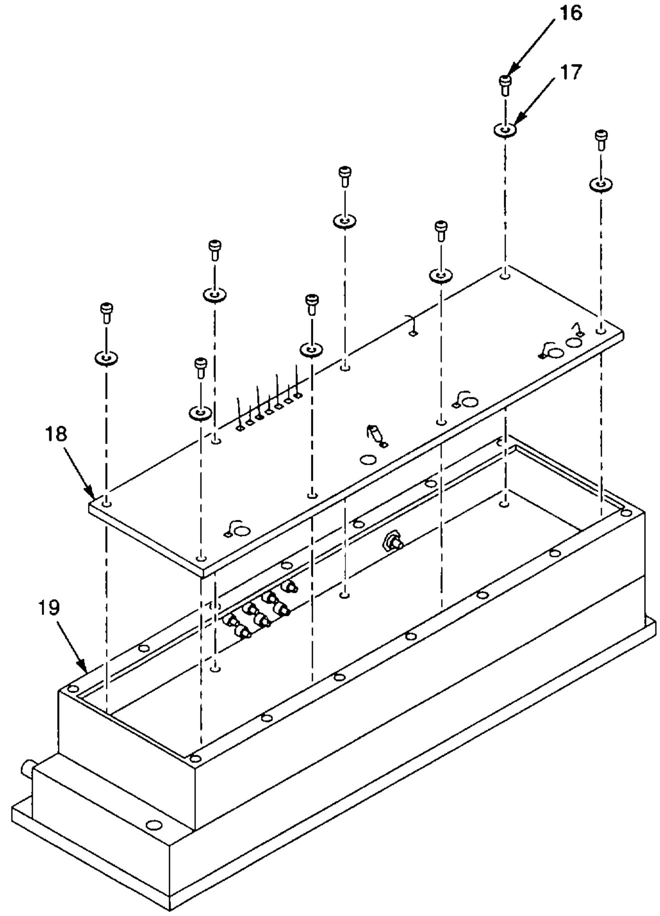
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove 14 screws (1) from cover (2).
3. Remove cover (2).
4. Unsolder following wires from feedthrough capacitors:
   - +15 (3).
   - -15 (4).
   - +9 (5).
   - SWEEP ATTN (6).
   - SWEEP (7).
   - SWEEP GND (8).
   - TUNE (9).
   - -12 (10).
   - +12 (11).
   - 2182TUNE (12).
   - +12 (13).
5. Unsolder A1A22L1060 (14) from 16-20MHZ feedthrough capacitor.
6. Unsolder wire (15) from 18MHz OUT SMA connector.



7. Remove eight screws (16) and eight washers (17) that secure A1A22A1 16-20 MHz Phase Lock CCA (18) to housing (19).
8. Lift A1A22A1 16-20 MHz Phase Lock CCA (18) from housing (19).
9. Transfer wires listed in step 4 to same locations on new A1A22A1 16-20 MHz Phase Lock CCA.
10. Transfer L1060 (14) to same location on new A1A22A1 16-20 MHz Phase Lock CCA.
11. Transfer wire (15) to same location on new A1A22A1 16-20 MHz Phase Lock CCA.



INSTALL

1. Set A1A22A1 16-20 MHz Phase Lock CCA (18) in housing (19), aligning holes in CCA with feedthrough capacitor leads.
2. Install eight screws (16) and eight washers (17) to secure A1A22A1 16-20 MHz Phase Lock CCA (18) to housing (19).
3. Solder following wires to feedthrough capacitors:
   - +15(3).
   - -15 (4).
   - +9 (5).
   - SWEEP ATTN (6).
   - SWEEP (7).
   - SWEEP GND (8).
   - TUNE (9).
   - -12 (10).
   - +12 (11).
   - 2182TUNE (12).
   - +12 (13).
4. Solder A1A22L1060 (14) to 16-20MHZ feedthrough capacitor.
5. Solder wire (15) to 18MHz OUT SMA connector.
6. Set cover (2) on housing (19), aligning labeling with connectors.
7. Install 14 screws (1) to secure cover (2).
8. Install cabinet (para 2-118).

END OF TASK

2-208. REPLACE 2ND LO BOTTOM COVER.

DESCRIPTION

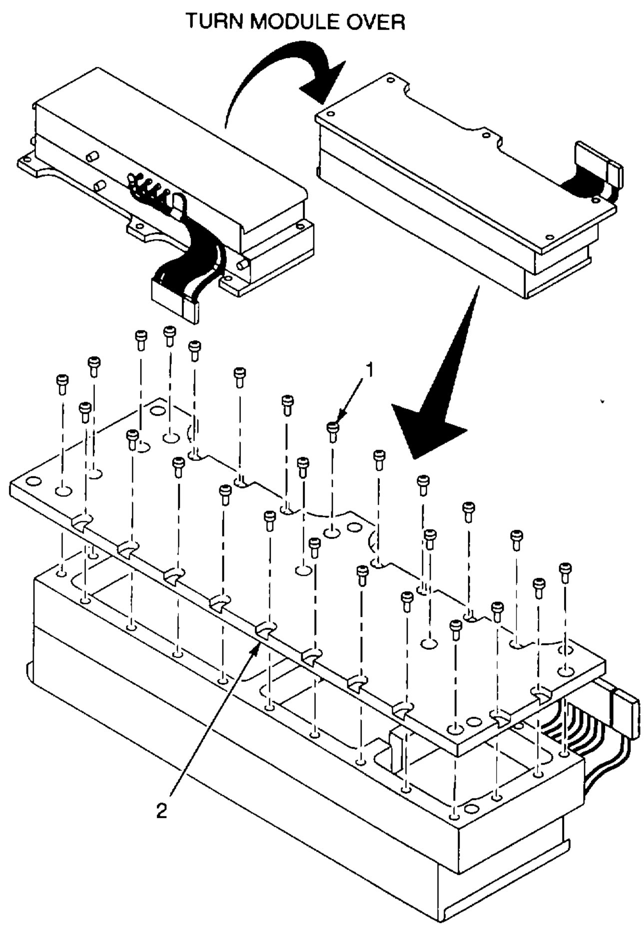
This procedure covers: Remove and Install

REMOVE

1. Remove A1A22 Phase Locked 2nd LO (para 2-206).
2. Set A1A22 Phase Locked 2nd LO bottom side up.
3. Remove 26 screws (1) from 2nd LO bottom cover (2).
4. Remove 2nd LO bottom cover (2).

INSTALL

1. Set 2nd LO bottom cover (2) in place on A1A22 Phase Locked 2nd LO.
2. Install 26 screws (1) in 2nd LO bottom cover (2).
3. Install A1A22 Phase Locked 2nd LO (para 2-206).



END OF TASK

2-209. REPLACE A1A22A2A1 OSCILLATOR CCA.

DESCRIPTION

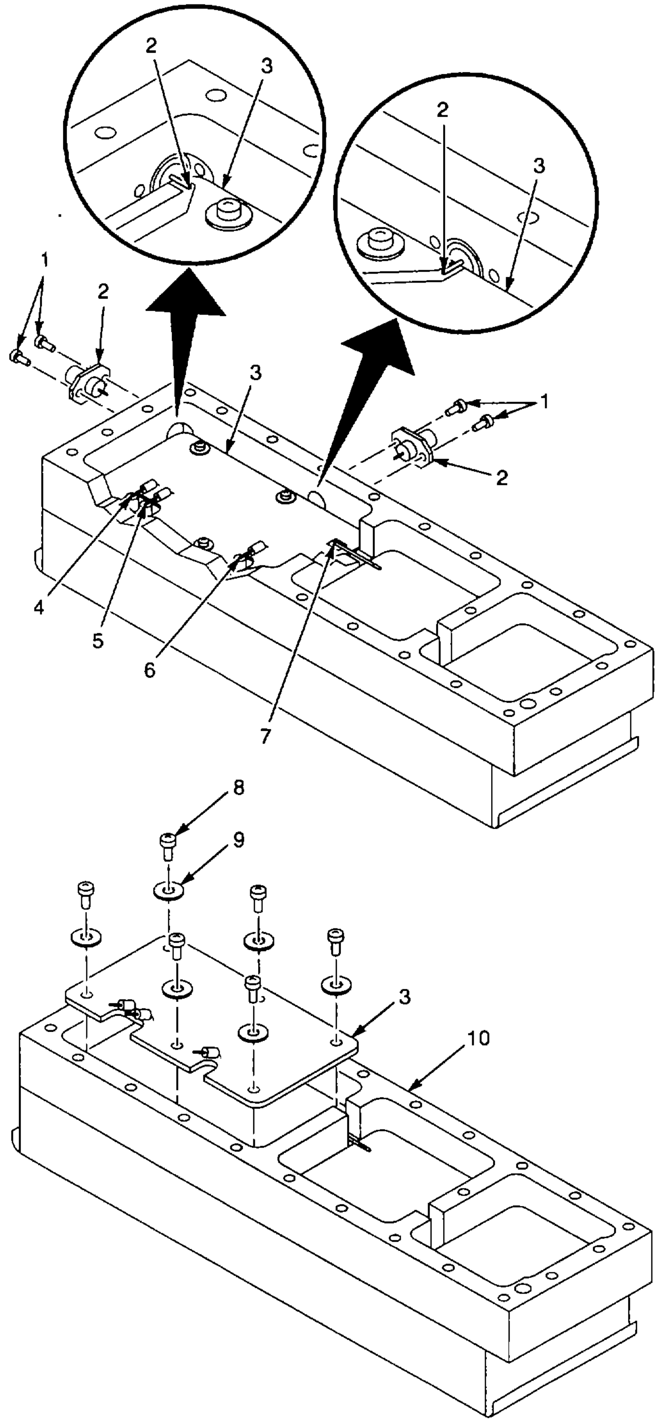
This procedure covers: Remove and Install

REMOVE

1. Remove 2nd LO bottom cover (para 2-208).
2. Remove two screws (1) from each SMA connector (2).
3. Unsolder SMA connector s (2) from A1A22A2A1 Oscillator CCA (3), and remove SMA connector (2)
4. Unsolder following RF coils from feedthrough capacitors:
   - A1A22A2A1L2011 (4).
   - A1A22A2A1L2013 (5).
   - A1A22A2A1L2031 (6).
5. Unsolder wire (7) from A1 A22A2A1 Oscillator CCA (3).
6. Remove six screws (8) and six washers (9) from A1A22A2A1 Oscillator CCA (3).
7. Lift A1A22A2A1 Oscillator CCA (3) from housing (10).

INSTALL

1. Set A1A22A2A1 Oscillator CCA (3) in housing (10).
2. Install six screws (8) and six washers (9) to secure A1A22A2A1 Oscillator CCA (3) in housing (10).
3. Install two screws (1) to secure each SMA connector (2) to housing (10).
4. Solder center conductors of SMA connectors (2) to A1A22A2A1 Oscillator CCA (3).
5. Solder following RF coils to feedthrough capacitors:
   - A1A22A2A1L2011 (4).
   - A1A22A2A1L2013 (5).
   - A1A22A2A1L2031 (6).
6. Solder wire (7) to A1A22A2A1 Oscillator CCA (3).
7. Install 2nd LO bottom cover (para 2-208).

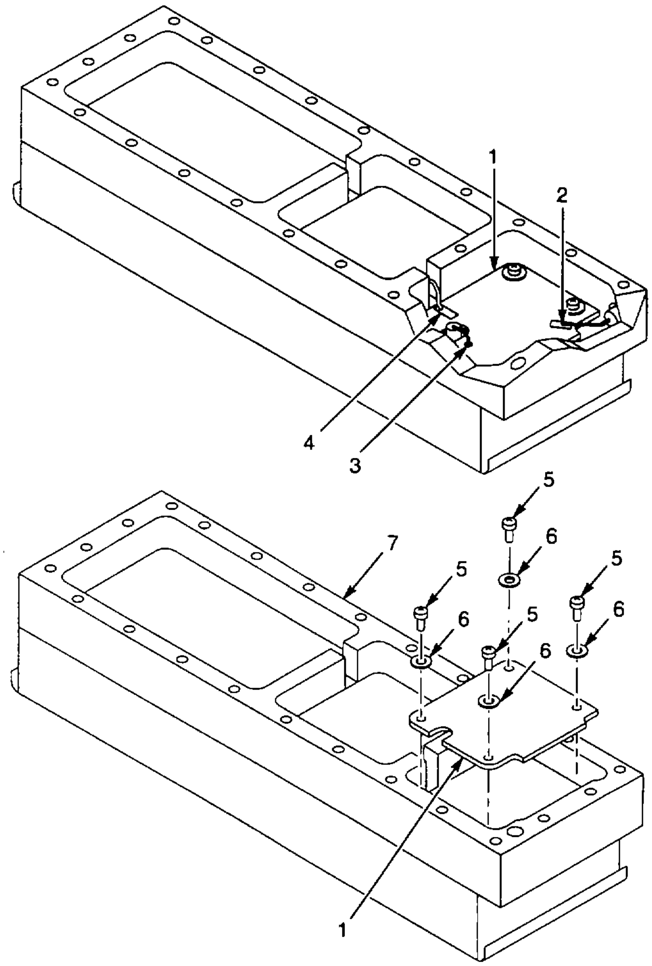


END OF TASK

2-210. REPLACE A1A22A2A2 REFERENCE CCA.

DESCRIPTION

This procedure covers: Remove and Install



REMOVE

1. Remove 2nd LO bottom cover (para 2-208).
2. Unsolder following wires from A1A22A2A2 Reference CCA (1):
   - Wire (2) to 100 MHz IN SMA connector.
   - Wire (3) to +12 volts.
   - Wire (4) to 2200 MHz IN on A1A22A2A3 Mixer CCA.
3. Remove four screws (5) and four washers (6) from A1A22A2A2 Reference CCA (1).
4. Lift A1A22A2A2 Reference CCA (1) from housing (7).

INSTALL

1. Set A1A22A2A2 Reference CCA (1) in housing (7).
2. Install four screws (5) and four washers (6) that secure A1A22A2A2 Reference CCA (1) to housing (7).
3. Solder following wires to A1A22A2A2 Reference CCA (1):
   - Wire (2) to 100 MHz IN SMA connector.
   - Wire (3) to +12 volts.
   - Wire (4) to 2200 MHz IN on A1A22A2A3 Mixer CCA.
4. Install 2nd LO bottom cover (para 2-208).

END OF TASK

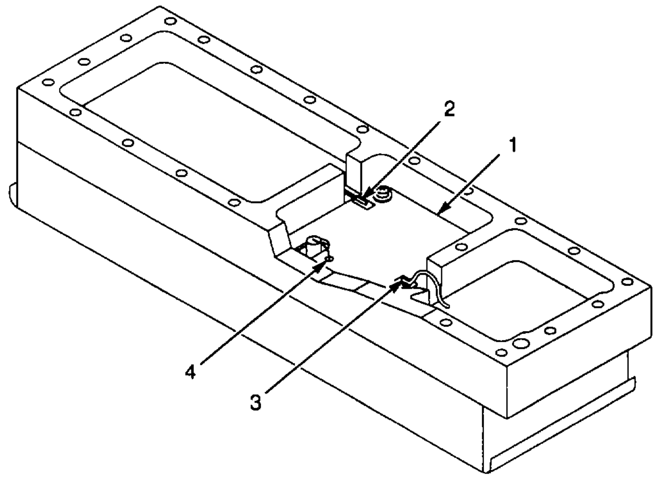
2-211. REPLACE A1A22A2A3 MIXER CCA.

DESCRIPTION

This procedure covers: Remove and Install

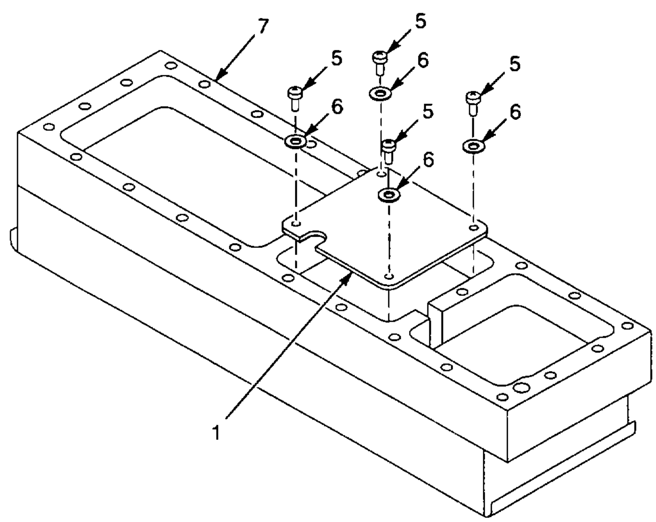
REMOVE

1. Remove 2nd LO bottom cover (para 2-208).
2. Unsolder following wires from A1A22A2A3 Mixer CCA (1):
   - 2182 MHZ IN (2).
   - 2200 MHZ IN (3).
   - 10 MHZ OUT (4).
3. Remove four screws (5) and washers (6) from A1A22A2A3 Mixer CCA (1).
4. Lift A1A22A2A3 Mixer CCA (1) from housing (7).



INSTALL

1. Set A1A22A2A3 Mixer CCA (1) in housing (7).
2. Install four sc rews (5) and washers (6) that secure A1A22A2A3 Mixer CCA (1) to housing (7).
3. Solder following wires to A1A22A2A3 Mixer CCA (1):
   - 2182 MHZ IN (2).
   - 2200 MHZ IN (3).
   - 10 MHZ OUT (4).
4. Install 2nd LO bottom cover (para 2-208).



END OF TASK

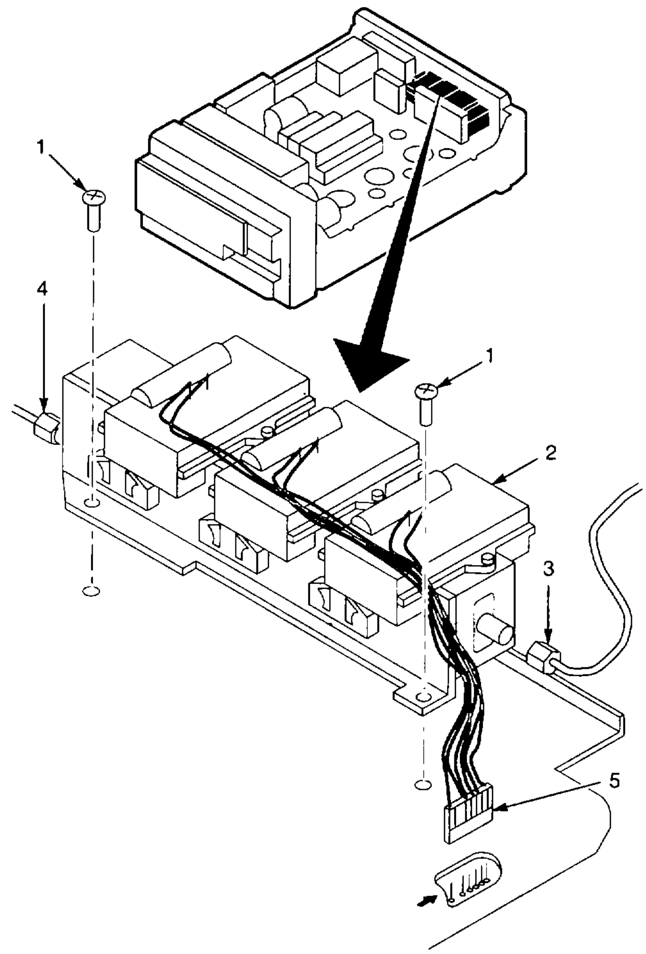
2-212. REPLACE A1AT10 STEP ATTENUATOR.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove two screws (1) that secure A1AT10 Step Attenuator (2) to RF deck.
3. Disconnect semirigid cable (3) from input and semirigid cable (4) from output.
4. Unplug connector (5) from A1A28J4018 on A1A28 Mother Board CCA.
5. Lift A1AT10 Step Attenuator (2) from chassis.



INSTALL

1. Set A1AT10 Step Attenuator (2) in place on RF deck.
2. Connect semirigid cable (3) to input and semirigid cable (4) to output. Tighten connections to 8 in-lbs.
3. Plug connector (5) onto A1A28J4018 on A1 A28 Mother Board CCA.
4. Install two screws (1) that secure A1AT10 Step Attenuator (2) to RF deck.
5. Install cabinet (para 2-118).

END OF TASK

2-213. REPLACE A1A12 MIXER.

DESCRIPTION

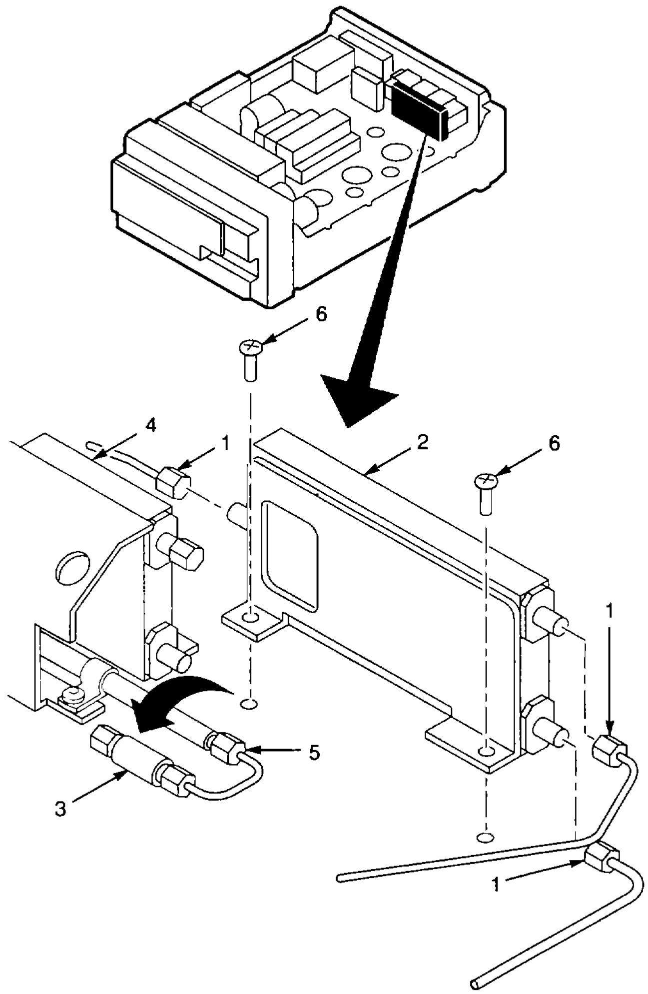
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Disconnect three semirigid cables (1) from A1A12 Mixer (2).
3. Disconnect A1AT12 Attenua tor (3) from A1FL16 Directional Filter (4).
4. Loosen semirigid cable connection at A1FL10 (5).
5. Turn A1AT12 Attenuator (3) out of way, and remove two screws (6) that secure A1A12 Mixer (2) to RF deck.
6. Lift A1A12 Mixer (2) from chassis.

INSTALL

1. Set A1A12 Mixer (2) in place on RF deck.
2. Install two screws (6) that secure A1A12 Mixer (2) to RF deck.
3. Connect A1AT12 Attenuator (3) to A1FL16 Directional Filter (4), and tighten connector to eight in-lbs.
4. Tighten semirigid cable connection at A1FL10 (5) to eight in-lbs.
5. Connect three semirigid cables (1) to A1A12 Mixer (2), and tighten connectors to eight in-lbs.
6. Install cabinet (para 2-118).



END OF TASK

2-214. REPLACE A1AT126 VARIABLE LOAD ASSEMBLY.

DESCRIPTION

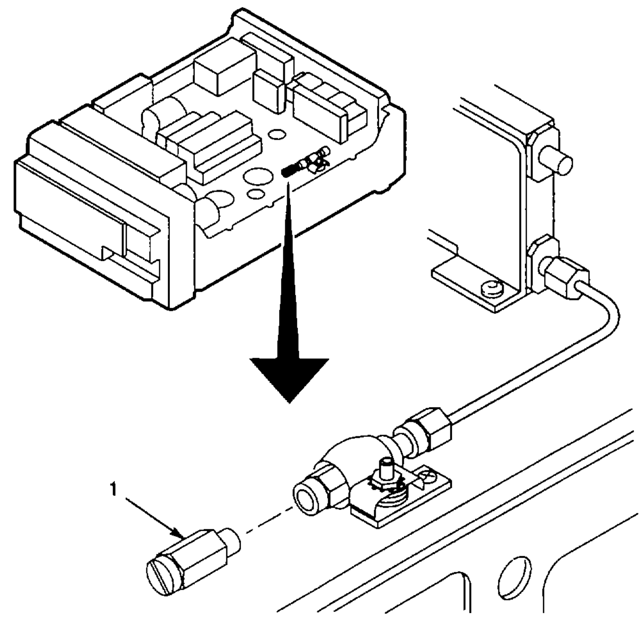
This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Remove A1AT126 Variable Load Assembly (1).

INSTALL

1. Install A1AT126 Variable Load Assembly (1), and tighten connection to eight in-lbs.
2. Install cabinet (para 2-118).



END OF TASK

2-215. REPLACE A1AT124 ATTENUATOR.

DESCRIPTION

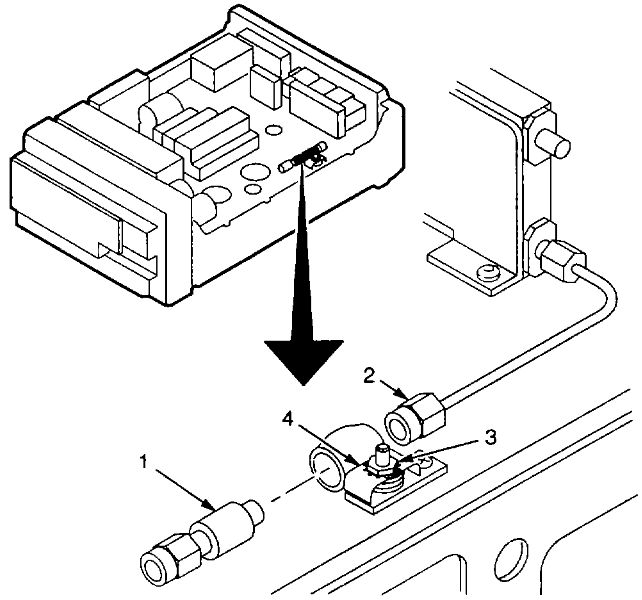
This procedure covers: Remove and Install

REMOVE

1. Remove A1AT126 Variable Load Assembly (para 2-214).
2. Disconnect A1AT124 Attenuator (1) from semirigid cable (2).
3. Loosen nut (3) that secures clamp (4) to RF deck.
4. Slide A1AT124 Attenuator (1) from clamp (4), and remove A1AT124 Attenuator.

INSTALL

1. Slide A1AT124 Attenuator (1) into clamp (4).
2. Connect A1AT124 Attenuator (1) to semirigid cable (2). Tighten connection to eight in-lbs.
3. Tighten nut (3) that secures clamp (4) to RF deck.
4. Install A1AT126 Variable Load Assembly (para 2-214).



END OF TASK

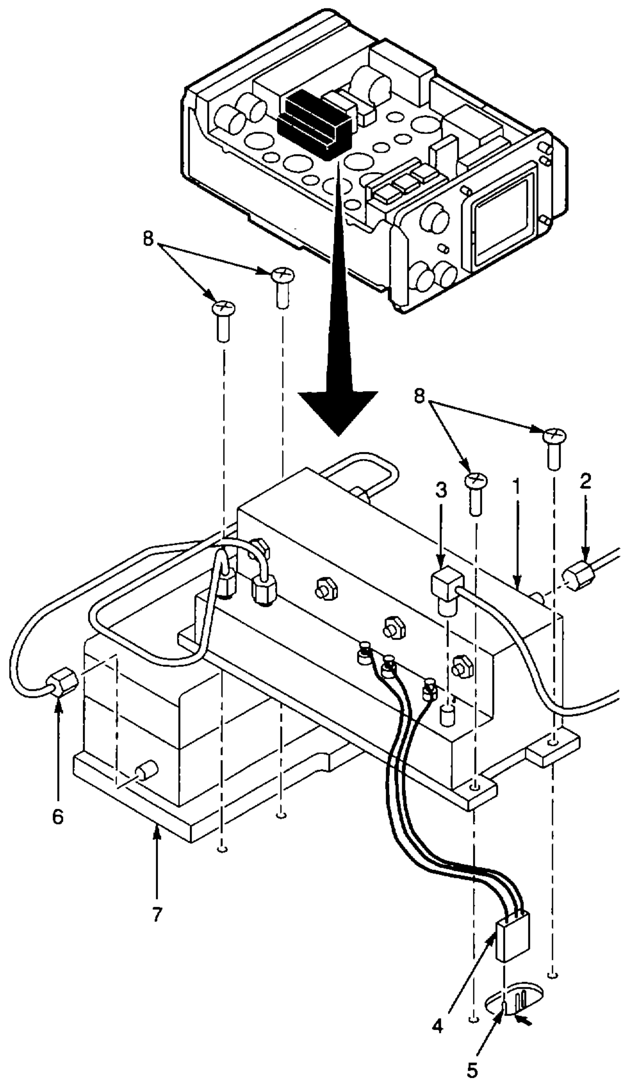
2-216. REPLACE A1A18 2ND CONVERTER ASSEMBLY.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove cabinet (para 2-118).
2. Disconnect following cables from A1A18 2nd Converter Assembly (1):
   - RF (2).
   - IF (3).
3. Unplug connector (4) from A1A28J3035 (5) or A1A28 Mother Board CCA.
4. Disconnect 2182MHz OUT cable (6) from A1A22 Phase Locked 2nd LO (7).
5. Remove four screws (8) that secure A1A18 2nd Converter Assembly (1) to RF deck.
6. Lift A1A18 2nd Converter Assembly (1) from chassis.



INSTALL

1. Set A1A18 2nd Converter Assembly (1) in place on RF deck.
2. Plug connector (4) onto A1A28J3035 (5) on A1A28 Mother Board CCA.
3. Connect following cables to A1A18 2nd Converter Assembly (1):
   - RF (2), tighten connection to eight in-lbs.
   - IF (3).
4. Connect 2182MHz OUT cable (6) to A1A22 Phase Locked 2nd LO (7), tightening connection to eight in-lbs.
5. Install four screws (8) that secure A1A18 2nd Converter Assembly (1) to RF deck.
6. Install cabinet (para 2-118).

END OF TASK

2-217. REPLACE A1A28 MOTHER BOARD CCA.

DESCRIPTION

This procedure covers: Remove and Install

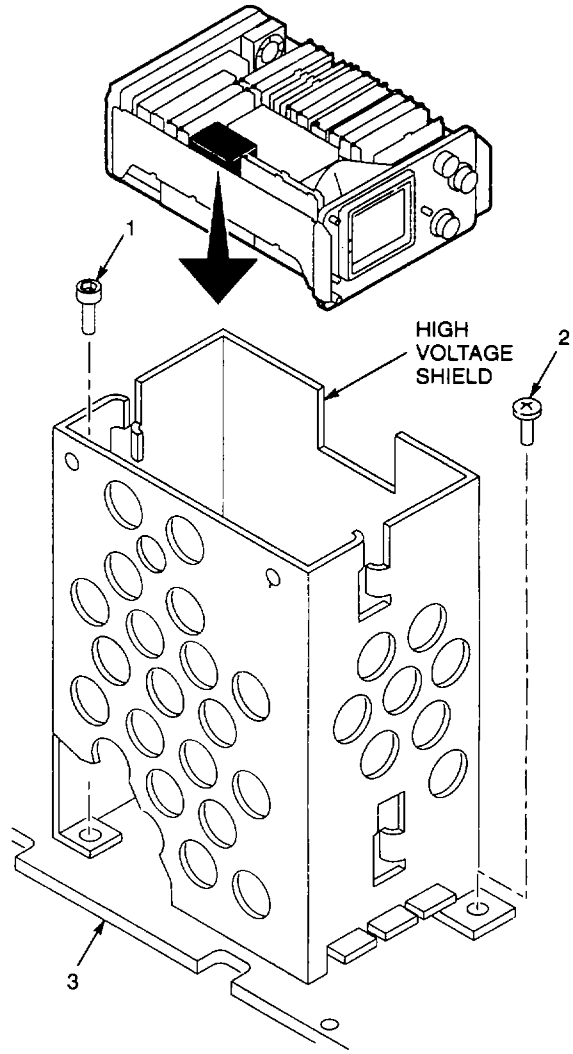
REMOVE

1. Remove rear CCA bracket (para 2-132).
2. Remove front CCA bracket (para 2-139).
3. Remove A1A40 Video Processor CCA (para 2-119).
4. Remove A1A44 1st LO Driver CCA (para 2-120).
5. Remove A1A46 Center Freq Control CCA (para 2-121).
6. Remove A1A48 Span Attenuator CCA (para 2-122).
7. Remove A1A50 Phase Lock Assemb ly (para 2-123).
8. Remove A1A51 Counter CCA (para 2-131).
9. Remove A1A26 Auxiliary Synthesizer CCA (para 2-133). Do not disconnect A1A26P1039, since other end of cable was unplugged when A1 A51 Counter CCA was removed.
10. Remove A1A54 Memory CCA (para 2-134).
11. Remove A1A56 GPIB CCA (para 2-135).
12. Remove A1A58 Processor CCA (para 2-136). Do not unplug A1A58P1035 from front side of CCA, since other end of cable was disconnected from A1A56 GPIB CCA.
13. Remove A1A60 Horiz Digital Storage CCA (para 2-137).
14. Remove A1A61 Vert Digital Storage CCA (para 2-138).
15. Remove A1A62 Log Amplifier CCA (para 2-140).
16. Remove A1A72 Sweep CCA (para 2-141).
17. Remove A1A70 Z-Axis CCA (para 2-142).

18. Remove A1A74 High Voltage CCA (para 2-143).
19. Remove screw (1) and screw (2) that secure high voltage shield to A1A28 Mother Board (3).
20. Remove A1A64 Deflection Amplifiers CCA (para 2-144).
21. Remove A1A66 CRT Readout CCA (para 2-145).
22. Remove A1A69 10/100 Hz Filter (para 2-147).
23. Remove A1A68 Variable Resolution Module (para 2-152). Do not disconnect cable from A1A68J682, since other end of cable was disconnected from A1A62 Log Amplifier CCA.
24. Remove A1A30 Power Supply (para 2-165).
25. Unplug following RF coaxial cables from listed units:

UNIT	CONNECTOR	CABLE LABEL	REFER TO
A1A25	200MHz IN	P251	para 2-189
	OUTPUT	P252	para 2-189
A1A24	STROBE	P243	para 2-192
A1A34	J1032	J1032	para 2-200
	J1011	J1011	para 2-200
	J3011	P347	para 2-200
A1A22	18MHz OUT	P224	para 2-206

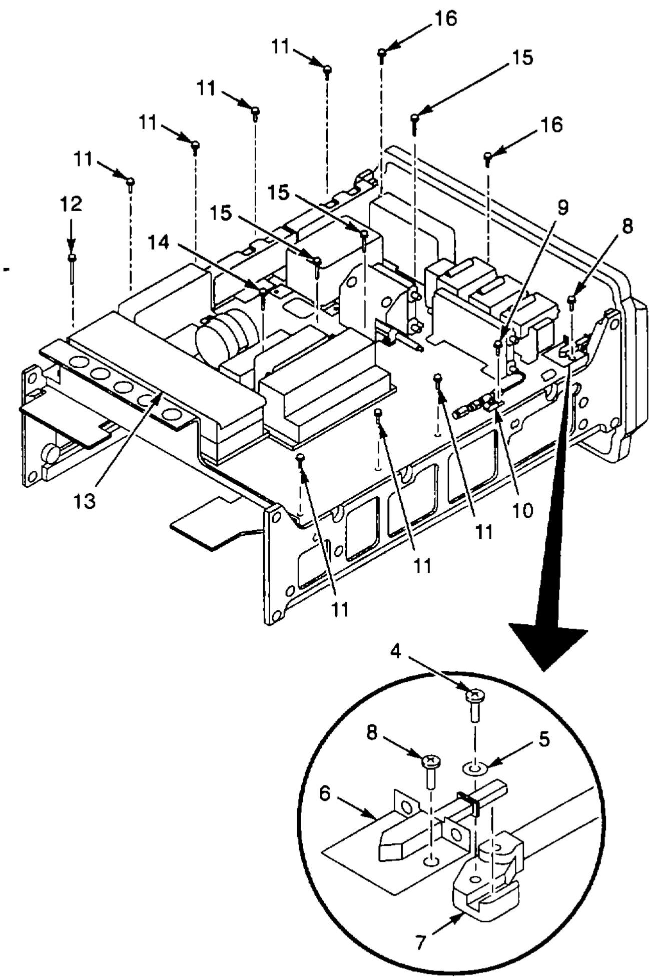
26. Pull cable unplugged from A1A34J1011 free of RF deck and components. Ensure RF coaxial cables (unplugged in Step 25) are free to slide through cutout in RF deck.



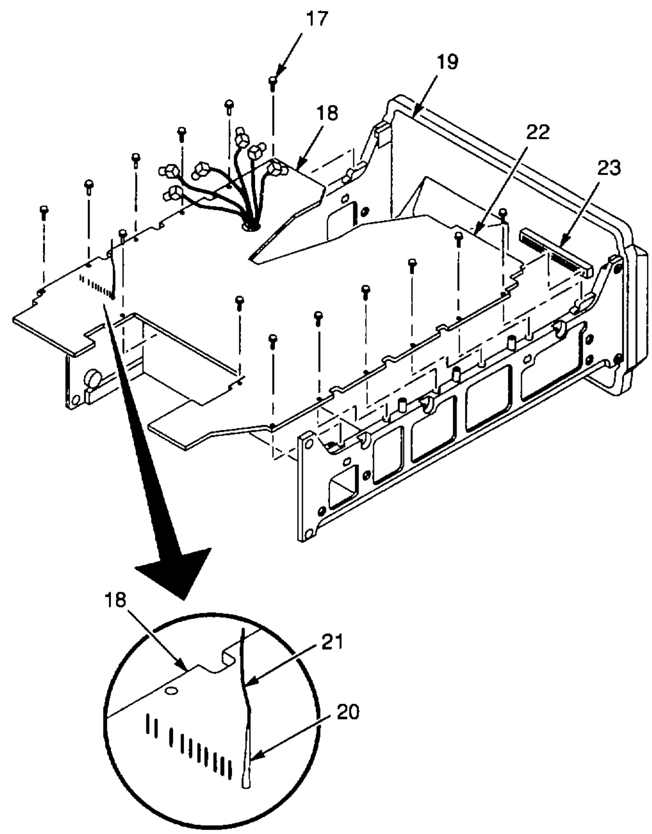
27. Unplug cables from the following multipin connectors on A1 A28 Mother Board CCA:

A1A28 CONNECTOR	CABLE FROM	REFER TO
J1022	A1A25	para 2-189
J1025	A1A24	para 2-192
J2025	A1A36	para 2-190
J1036	A1A34	para 2-200
J1037	A1A16	para 2-201
J1038	A1A16	para 2-201
J1046	A1A22	para 2-206
J1048	A1A22	para 2-206
J3045	A1A32	para 2-203
J3035	A1A18	para 2-216
J4018	AlAT10	para 2-212

28. Unsolder brown wire from lug terminal on A1A22 Phase Locked 2nd LO (para 2-206).
29. Remove following hardware from 1st LO and 2nd LO OUTPUT SMA connectors (para 2-178):
    - 50 W terminator.
    - Nut.
    - Washer.
30. Remove fol lowing hardware from RF INPUT Type N connector (para 2-178):
    - Nut.
    - Lockwasher.
    - Flat washer.
31. Remove screw (4) and washer(5) that secure latch actuator (6) to POWER push button (7).
32. Remove screw (8) that secures latch actuator (6) to chassis, and remove latch actuator.
33. Remove screw (9) that secures retainer bracket (10) for loop clamp to RF deck.
34. Remove seven screws (11) that secure RF deck to chassis.



35. Remove screw (12) that secures rear corner of A1A22 Phase Locked 2nd LO (13).
36. Unplug cable from A1FL37J370 on A1FL37 Lowpass Filter (para 2-203), and remove screw (14).
37. Remove three screws (15) from center of RF deck.
38. Remove two screws (16) that secure front of RF deck to front subpanel.
39. Carefully lift RF deck up and towards the rear, guiding front panel connectors and RF coaxial cables through their cutouts; remove RF deck from chassis.
40. Remove 14 screws (17) that secure A1A28 Mother Board CCA (18) to chassis.
41. Lift rear of A1A28 Mother Board CCA (18) enough to clear mounting posts for RF deck.
42. Slide A1A28 Mother Board CCA (18) to rear until unplugged from connector on A1A38 Front Panel CCA (19) and remove from chassis.



INSTALL

1. Cut heat shrink tubing (20) from brown wire (21) on removed A1A28 Mother Board CCA (18).
2. Unsolder brown wire and transfer to same location on new A1A28 Mother Board CCA (18).
3. Cover solder con nection and pin to which brown wire is soldered with heat shrink tubing (Appendix B, Item 7).
4. Dress six RF coaxial cables through cutout in A1A28 Mother Board CCA (18).
5. Place A1A28 Mother Board CCA (18) on chassis.
6. Align edge connector (22) on A1A28 Mother Board CCA (18) with connector (23) on A1A38 Front Panel CCA (19).
7. Press rear of A1A28 Mother Board CCA (18) to seat edge connector (22).

8. Install 14 screws (17) that secure A1A28 Mother Board CCA (18) to chassis.
9. Hold RF deck above A1A28 Mother Board CCA (18), and dress six RF coaxial cables through cutout in RF deck with label J2025 next to it.
10. Align RF INPUT, 1st LO, and 2nd LO connectors with respective holes in the A1A38 Front Panel CCA (19).
11. Set RF deck in place, guiding front panel connectors and cables through cutouts. When seating rear of RF deck, make sure brown wire is dressed through cutout with label J1046 next to it.
12. Install two screws (16) to secure front of RF deck to front subpanel.
13. Install three screws (15) in center of RF deck.
14. Install screw (14), and plug cable onto A1FL37J370 on Al FL37 Lowpass Filter (para 2-203).
15. Install screw (12) that secures rear corner of A1A22 Phase Locked 2nd LO (13).
16. Install seven screws (11) to secure RF deck to chassis.
17. Install screw (9) to secure retainer bracket (10) for loop clamp to RF deck.
18. Install screw (8) to secure latch actuator (6) to chassis.
19. Install screw (4) and washer (5) to secure latch actuator (6) to POWER push button (7).
20. Install following hardware on RF INPUT Type N connector (para 2-178):
    - Flat washer.
    - Lock washer.
    - Nut.
21. Install following hardware on 1st LO and 2nd LO OUTPUT SMA connectors (para 2-178):
    - Washers.
    - Nuts.
    - 50 Ω terminators.

22. Solder brown wire to lug terminal on A1A22 Phase Locked 2nd LO (para 2-206).
23. Plug cables onto following multipin connectors on A1A28 Mother Board CCA:

A1A28 CONNECTOR	CABLE FROM	REFER TO
J1022	A1A25	para 2-189
J1025	A1A24	para 2-192
J2025	A1A36	para 2-190
J1036	A1A34	para 2-200
J1037	A1A16	para 2-201
J1038	A1A16	para 2-201
J1046	A1A22	para 2-206
J1048	A1A22	para 2-206
J3045	A1A32	para 2-203
J3035	A1A18	para 2-216
J4018	A1AT10	para 2-212

24. Plug following RF coaxial cables onto listed units:

UNIT	CONNECTOR	CABLE LABEL	REFER TO
A1A25	200MHz IN	P251	para 2-189
	OUTPUT	P252	para 2-189
A1A24	STROBE	P243	para 2-192
A1A34	J3011	P347	para 2-200
	J1011	J1011	para 2-200
	J1032	J1032	para 2-200
A1A22	18MHz OUT	P224	para 2-206

25. Install A1A30 Power Supply (para 2-165).
26. Install A1A68 Variable Resolution Module (para 2-152).
27. Install A1A69 10/100 Hz Filter (para 2-147).
28. Install A1A66 CRT Readout CCA (para 2-145).

29. Install A1A64 Deflection Amplifiers CCA (para 2-144).
30. Install screw (1) and screw (2) to secure high voltage shield to A1A28 Mother Board (3).
31. Install A1A74 High Voltage CCA (para 2-143).
32. Install A1A70 Z-Axis CCA (para 2-142).
33. Install A1A72 Sweep CCA (para 2-141).
34. Install A1A62 Log Amplifier CCA (para 2-140).
35. Install A1A61 Vert Digital Storage CCA (para 2-138).
36. Install A1A60 Horiz Digital Storage CCA (para 2-137).
37. Install A1A58 Processor CCA (para 2-136).
38. Install A1A56 GPIB CCA (para 2-135).
39. Install A1A54 Memory CCA (para 2-134).
40. Install A1A26 Auxiliary Synthesizer CCA (para 2-133).
41. Install A1A51 Counter CCA (para 2-131).
42. Install A1A50 Phase Lock Assembly (para 2-123).
43. Install A1A48 Span Attenuator CCA (para 2-122).
44. Install A1A46 Center Freq Control CCA (para 2-121).
45. Install A1A44 1st LO Driver CCA (para 2-120).
46. Install A1A40 Video Processor CCA (para 2-119).
47. Install front CCA bracket (para 2-1 39).
48. Install rear CCA bracket (para 2-132).

END OF TASK

2-218. REPLACE SIDE SHIELD.

DESCRIPTION

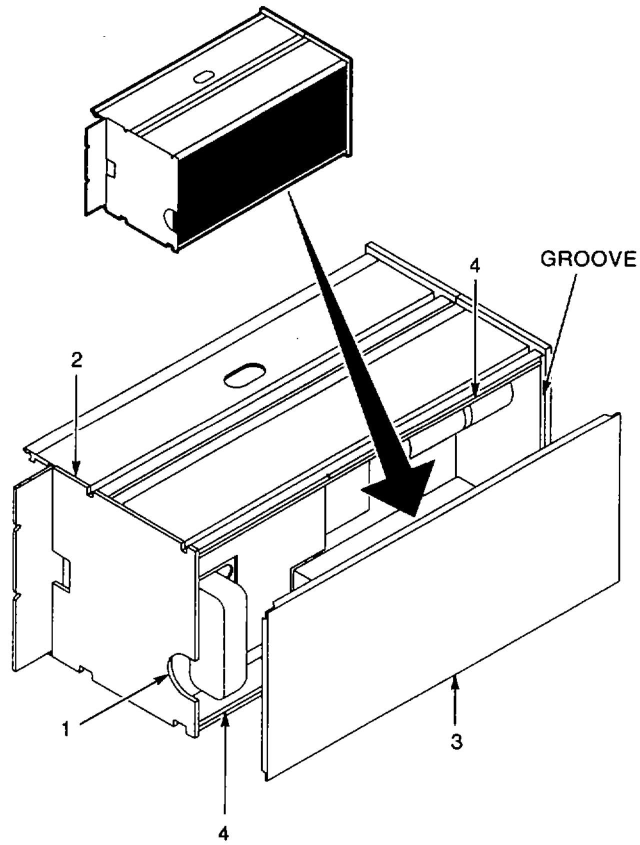
This procedure covers: Remove and Install

REMOVE

1. Insert finger through hole (1) in rear plate (2), and pull side shield (3) outward from TR 503 Tracking Generator.

INSTALL

1. Insert front (no lip) of side shield (3) into groove on front panel, sliding side shield forward as far as possible.
2. Press along upper and lower edges of side shield (3) to snap side shield into channels (4) in top and bottom cabinet frame sections.



END OF TASK

2-219. REPLACE REAR PLATE.

DESCRIPTION

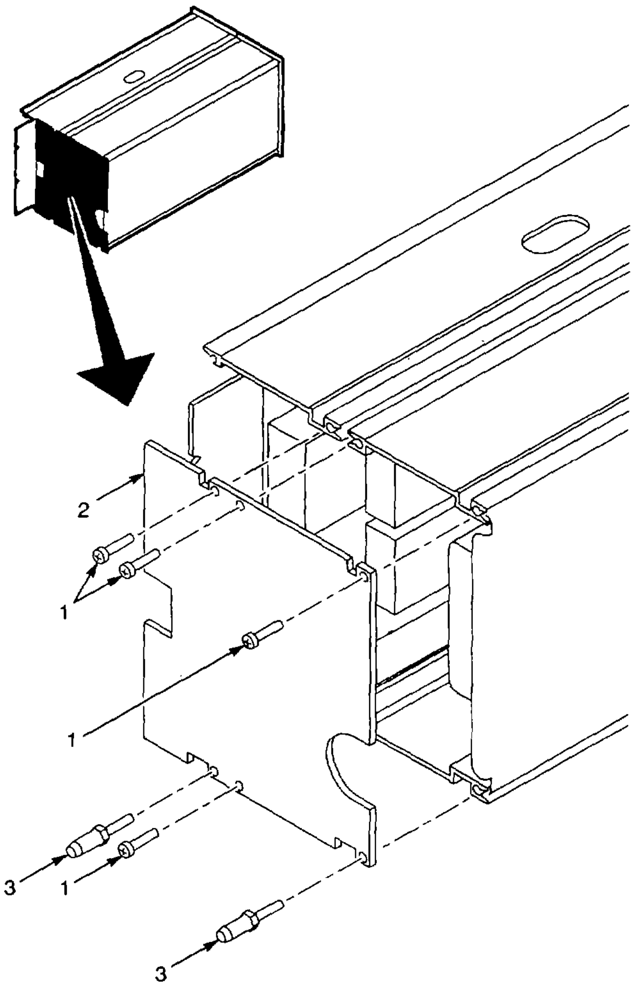
This procedure covers: Remove and Install

REMOVE

1. Remove four screws (1) that secure rear plate (2) to chassis.
2. Remove two guide pins (3) that secure rear plate (2) to chassis.
3. Remove rear plate (2).

INSTALL

1. Align mounting holes and cutouts in rear plate with holes and guides in chassis.
2. Install four screws (1) to secure rear plate (2) to chassis.
3. Install two guide pins (3) to secure rear plate (2) to chassis.



END OF TASK

2-220. REPLACE BLOCK RETAINERS.

DESCRIPTION

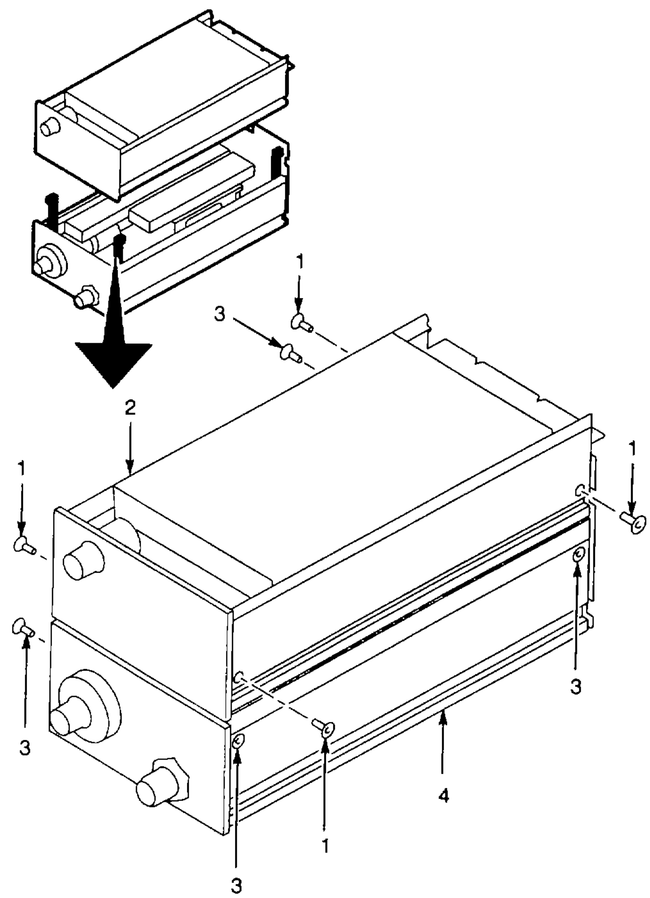
This procedure covers: Remove and Install

REMOVE

1. Set TR 503 Tracking Generator with side shield down.
2. Remove four screws (1) that secure upper module (2) to block retainers.
3. Loosen (do not remove) four screws (3) that secure lower module (4) to block retainers.
4. Remove rear plate (para 2-219).
5. Remove side shield (para 2-218).
6. Disconnect semirigid cable (5) from connector labeled LO on A2A11 Mixer (6).
7. Unplug connector (7) from A2A35A1 P370 on A2A35A1 Mother Board CCA (8).
8. Separate modules to reach RF coaxial cable (9) connected to A2A14 Amplitude Control (10).
9. Unplug RF coaxial cable (9) from IF OUTPUT connector (11) on A2A14 Amplitude Control (10).

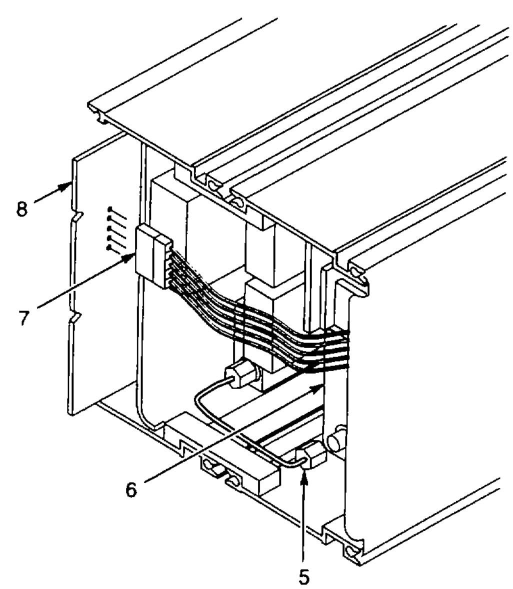
NOTE
Modules are now completely separated.

10. Remove screw (12) securing block retainer (13) to be replaced, and remove block retainer.

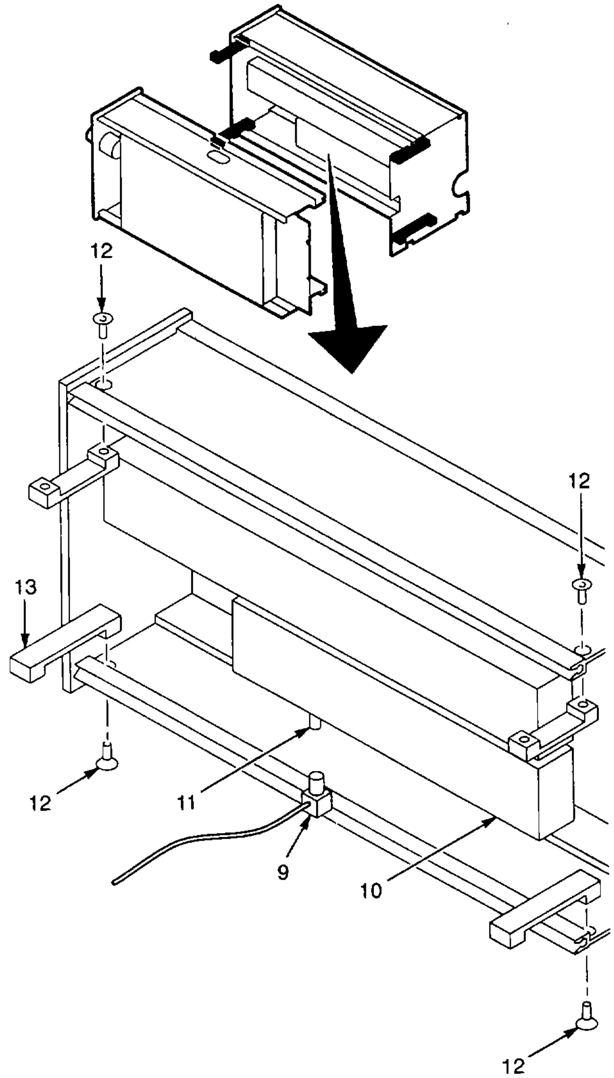


INSTALL

1. Install screw (12) to secure new block retainer (13) to chassis. Do not tighten screw.
2. Set modules side by side, far enough apart to reach RF coaxial cable connector (11) on A14 Amplitude Control (10).
3. Plug RF coaxial cable (9) onto IF OUTPUT connector (11) on A2A14 Amplitude Control (10).



4. Set modules together.
5. Connect semirigid cable (5) to connector labeled LO on A2A11 Mixer (6).
6. Plug connector (7) onto A2A35A1 P370 on A2A35A1 Mother Board CCA (8).
7. Install side shield (para 2-218).
8. Set TR 503 Tracking Generator with side shield down.
9. Install four screws (1) to secure upper module (2) to block retainers. If necessary, tighten screws (3) securing lower module (4) to block retainers to align mounting holes with upper module.
10. Install rear plate (para 2-219).
11. Tighten four screws (3) to secure lower module (4) to block retainers.



END OF TASK

2-221. REPLACE A2A15 LEVELING LOOP AND BIAS CCA.

DESCRIPTION

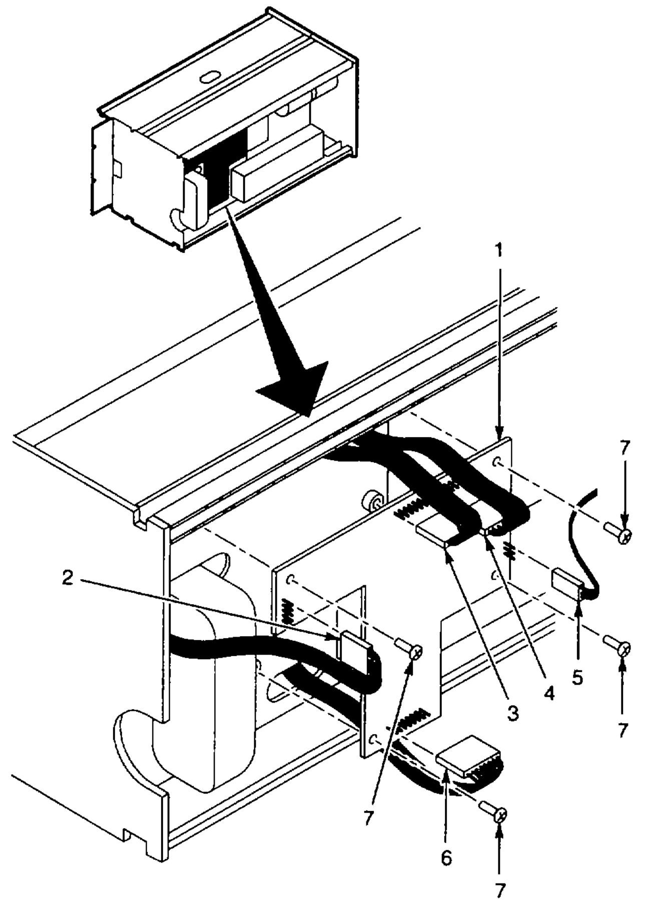
This procedure covers: Remove and Install

REMOVE

1. Remove side shield (para 2-218).
2. Unplug following connectors from A2A15 Leveling Loop and Bias CCA (1):

- A2A15P210 (2).
- A2A15P160(3).
- A2A15P190 (4).
- A2A15P170 (5).
- A2A15P200 (6).
-

3. Remove four screws (7) that secure A2A15 Leveling Loop and Bias CCA (1) to chassis.
4. Remove A2A15 Leveling Loop and Bias CCA (1) from chassis.



INSTALL

1. Set A2A15 Leveling Loop and Bias CCA (1) in chassis.
2. Install four screws (7) to secure A2A15 Leveling Loop and Bias CCA (1) to chassis.
3. Plug following connectors onto A2A15 Leveling Loop and Bias CCA (1):

- A2A15P210 (2).
- A2A15P160 (3).
- A2A15P190 (4).
- A2A15P170 (5).
- A2A15P200 (6).

4. Install side shield (para 2-218).

END OF TASK

2-222. REPLACE A2A11 MIXER.

DESCRIPTION

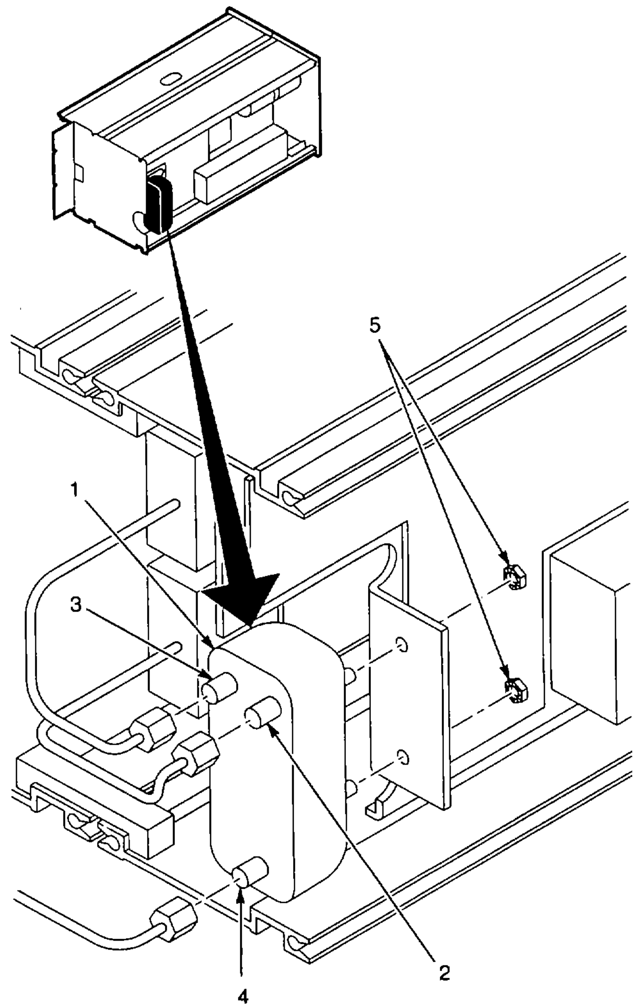
This procedure covers: Remove and Install

REMOVE

1. Remove side shield (para 2-218).
2. Remove rear plate (para 2-219).
3. Disconnect semirigid cables from following connectors on A2A11 Mixer (1):

- RF (2).
- IF (3).
- LO (4).

4. Remove two nuts (5) that secure A2A11 Mixer (1) to chassis.
5. Remove A2A11 Mixer (1) from chassis.



INSTALL

1. Install studs on A2A11 Mixer (1) in mounting holes in chassis.
2. Install two nuts (5) to secure A2A11 Mixer (1) to chassis.
3. Connect semirigid cabl es to following connectors on A2A11 Mixer (1):
   - IF (3).
   - RF (2).
   - LO (4).
4. Install rear plate (para 2-219).
5. Install side shield (para 2-218).

END OF TASK

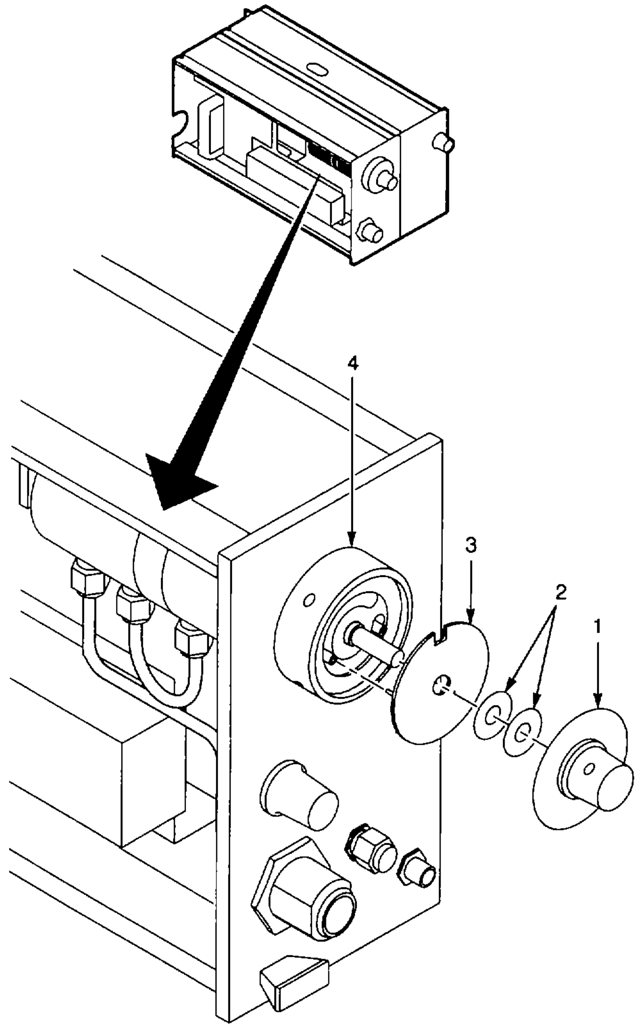
2-223. REPLACE A2A13 STEP ATTENUATOR.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove side shield (para 2-218).
2. Remove OUTPUT LEVEL - dBM knobs as follows:
   - Loosen setscrew in small knob (1), and remove knob.
   - Remove two plastic washers (2).
   - Remove dial mask (3).
   - Loosen two setscrews in large knob (4), and remove knob.
3. Remove two screws (5) that secure bracket (6) to top cabinet frame section (7).
4. Disconnect semirigid cable (8) from rear connector on A2A13 Step Attenuator (9).
5. Disconnect semirigid cable from front connector (10) on A2A13 Step Attenuator (9).
6. Remove A2A13 Step Attenuator (9) from chassis.
7. Remove short screw (11) and long screw (12), and remove bracket (6) from A2A13 Step Attenuator (9).



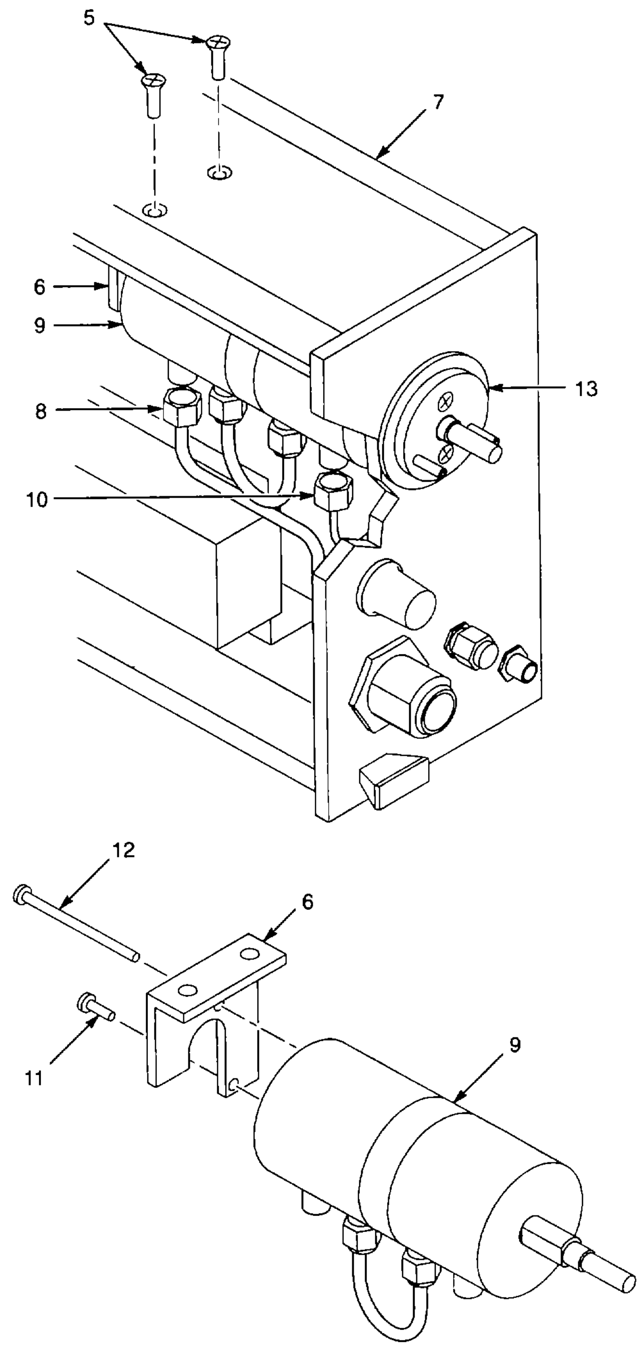
INSTALL

1. Remove short screw (11) and long screw (12) from new A2A13 Step Attenuator (9).
2. Secure bracket (6) to rear of A2A13 Step Attenuator (9) with short screw (11) and long screw (12).
3. Set A2A13 Step Attenuator (9) in chassis.
4. Connect semirigid cable (10) to front connector on A2A13 Step Attenuator (9).
5. Connect semirigid cable (8) to rear connector on A2A13 Step Attenuator (9).
6. Install two screws (5) that secure bracket (6) to top cabinet frame section (7).

7. Install OUTPUT LEVEL dBM knobs as follows:

    - Install large knob (4) with numbers up, and temporarily tighten one setscrew.
    - Turn large knob (4) fully clockwise.
    - Install dial mask (3). Make sure guide pins are inserted into stop pins on knob base (13).
    - Install two plastic washers (2).
    - Install small knob (1), and temporarily tighten setscrew.
    - Turn small knob (1) fully clockwise.
    - Loosen setscrew in large knob (4), and adjust knob so that zero is centered in cutout in dial mask (3).
    - Tighten two setscrews in large knob (4). (After tightening first setscrew, knob can be turned to access second setscrew if necessary.)
    - Loosen setscrew in small knob (1), and adjust knob so that zero is centered in printed black area on dial mask (3).
    - Tighten setscrew in small knob (1).

8. Install side shield (para 2-218).



END OF TASK

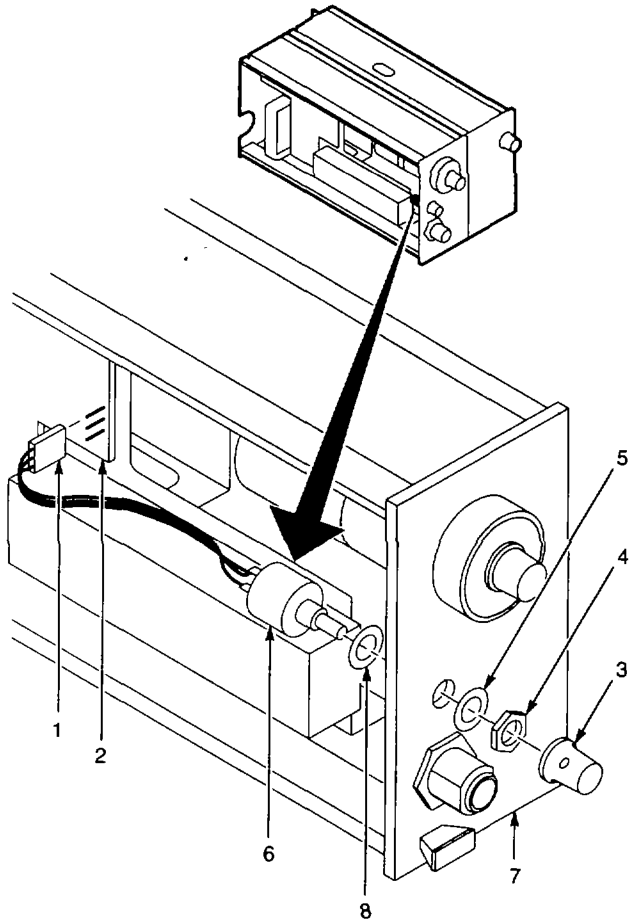
2-224. REPLACE A2R20 VAR DB POTENTIOMETER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove side shield (para 2-218).
2. Unplug A2A15P170 (1) from A2A15 Leveling Loop and Bias CCA (2).
3. Loosen setscrew in VAR dB knob (3), and remove knob.
4. Remove nut (4) and washer (5) that secure A2R20 VAR dB potentiometer (6) to front panel (7).
5. Remove A2R20 VAR dB potentiometer (6) and washer (8) from chassis.



INSTALL

1. Transfer cable from removed A2R20 VAR Db potentiometer (6) to same contacts on new A2R20 VAR dB potentiometer.
2. Install washer (8) on A2R20 VAR dB potentiometer (6).
3. Install A2R20 VAR dB potentiometer (6) through cutout in front panel (7).
4. Install washer (5) and nut (4) to secure A2R20 VAR dB potentiometer (6) to front panel (7).
5. Install VAR dB knob (3), and tighten setscrew temporarily.
6. Turn VAR dB knob (3) fully clockwise, loosen setscrew, adjust knob to indicate 0, and tighten setscrew.
7. Plug A2A15P170 (1) onto A2A15 Leveling Loop and Bias CCA (2).
8. Install side shield (para 2-218).

END OF TASK

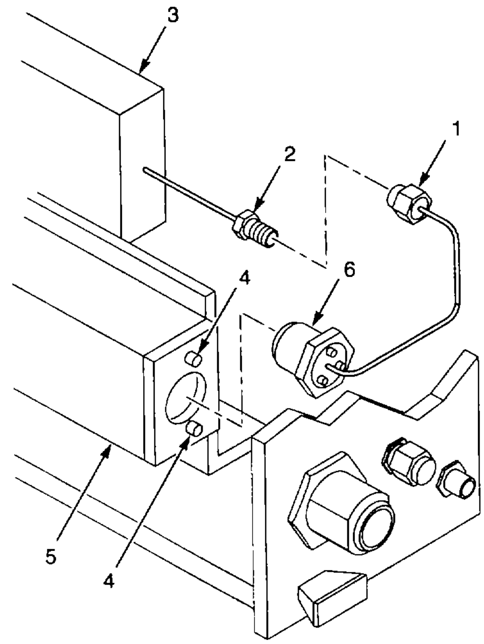
2-225. REPLACE A2A31 BALANCED MIXER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Separate TR 503 Tracking Generator into two modules (para 2-220).
2. Disconnect semirigid cable (1) from connector (2) at front of A2A14 Amplitude Control (3).
3. Loosen two screws (4) at front of A2A32 2nd LO Filter (5), and remove A2A31 Balanced Mixer (6).



INSTALL

1. Install A2A31 Balanced Mixer (6) in A2A32 2nd LO Filter (5); do not tighten screws (4) in front of A2A32 2nd LO Filter.
2. Connect semirigid cable (1) to connector (2) at front of A2A14 Amplitude Control (3).
3. Tighten screws (4) in front of A2A32 2nd LO Filter (5) to secure A2A31 Balanced Mixer (6) in place.
4. Assemble TR 503 Tracking Generator modules (para 2-220).

END OF TASK

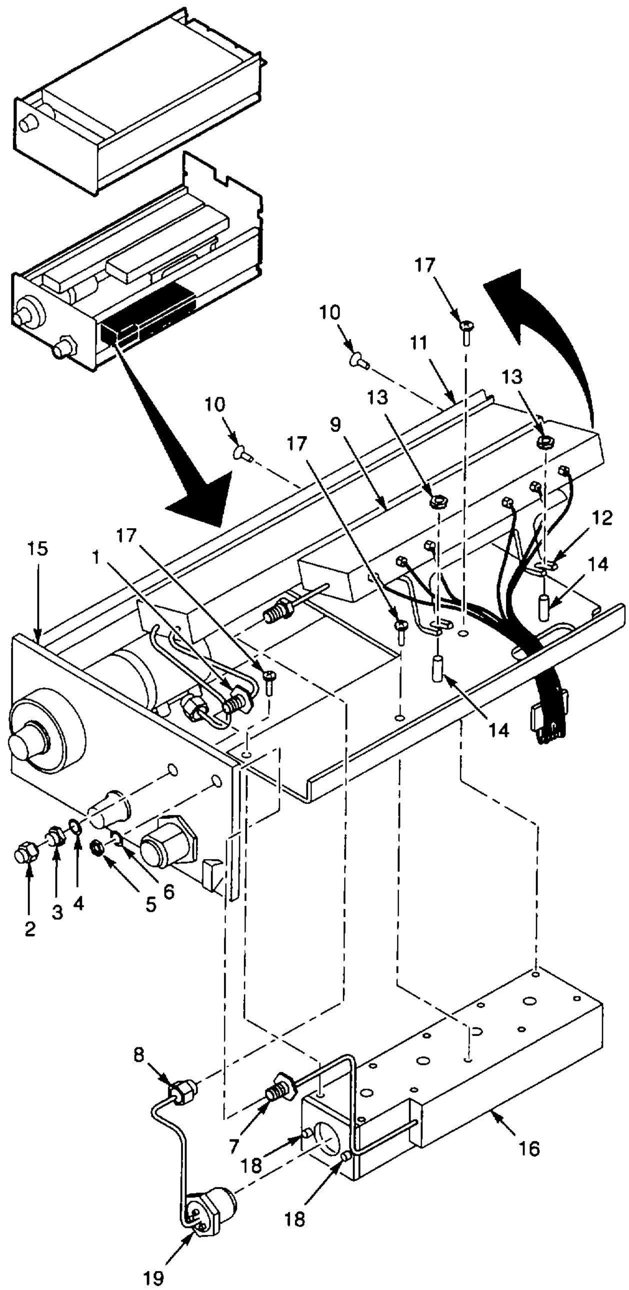
2-226. REPLACE A2A32 2ND LO FILTER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Separate TR 503 Tracking Generator into two modules (para 2-220).
2. Remove following hardware from AUX RF OUT connector (1):
   - 50 Q terminator (2).
   - Nut (3).
   - Washer (4).
3. Remove nut (5) and washer (6) from 2nd LIN connector (7).
4. Unplug A2A1 5P200 from A2A15 L eveling Loop and Bias CCA (para 2-221, Step 2). Push connector through slot in chassis to other side of module.
5. Disconnect semirigid cables from IF and RF connectors oA2A11Mixer (para 2-222, Step). 6. Disconnect semirigid cable from front connector oA2A13Step Attenuator (par-223, Step 5).
7. Disconnect semirigid cable (8) from front of A2A14 Amplitude Control (9).
8. Remove two screws (10) from top cabinet frame section (11) that secure bracket (12).
9. Remove two nuts (13) from studs (14).
10. Lift lower edge of bracket (12) until clear of studs (14), then slide bracket to rear until AUX RF OUT connector (1) clears front subpanel (15).
11. Tip bracket (12) on upper edge to gain access to mounting screws for A2A32 2nd LO Filter (16).
12. Remove three screws (17) that secure A2A32 2nd LO Filter (16) to chassis.
13. Remove A2A32 2nd LO Filter (16) from chassis.
14. Loosen two screws (18) at front of A2A32 2nd LO Filter (16), and remove A2A31 Balanced Mixer (19).



INSTALL

1. Set A2A32 2nd LO Filter (16) in place.
2. Install three screws (17) to secure A2A32 2nd LO Filter (16) to chassis.
3. Set bracket (12) in place with studs (14) in bracket slots.
4. Install two screws (10) in top cabinet frame section (11) to secure bracket (12).
5. Install two nuts (13) on studs (14).
6. Install A2A31 Balanced Mixer (19) in A2A32 2nd LO Filter (16); do not tighten screws in front of A2A32 2nd LO Filter.
7. Connect semirigid cable (8) to A2A14 Amplitude Control (9).
8. Tighten screws in front of A2A32 2nd LO Filter (16) to secure A2A31 Balanced Mixer (19) in place.
9. Connect semirigid cable to front connector on A2A13 Step Attenuator (para 2-223, Step 4).
10. Connect semirigid cables to IF and RF connectors on A2A11 Mixer (para 2-222, step 3).
11. Push connector on cable attached to A2A14 Amplitude Control (9) through slot in chassis to other side of module.
12. Plug A2A1 5P200 on to A2A15 Leveling Loop and Bias CCA (para 2-221, Step 3).
13. Install washer (6) and nut (5) on 2nd LO IN connector (7).
14. Install following hardware on AUX RF OUT connector (1):
    - Washer (4).
    - Nut (3).
    - 50 Ω terminator (2).
15. Assemble TR 503 Tracking Generator modules (para 2-220).

END OF TASK

2-227. REPLACE A2A12 AMPLIFIER AND DETECTOR.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Separate TR 503 Tracking Generator into two modules (para 2-220).
2. Remove hardware from AUX RF OUT connector (para 2-226, Step 2).
3. Disconnect semirigid cable from IF connector on A2A11 Mixer (para 2-222, Step 3).
4. Disconnect semirigid cable from front connector on A2A13 Step Attenuator (para 2-223, Step 5).
5. Unplug A2A1 5P160 and A2A1 5P190 from A2A15 Leveling Loop and Bias CCA (para 2-221, Step 2).
6. Remove four screws (1) that secure A2A12 Amplifier and Detector (2) to bracket (3).
7. Remove A2A12 Amplifier and Detector (2), guiding attached cables throu gh slots (4) in chassis (5) and bracket (3).

INSTALL

1. Install A2A12 Amplifier and Detector (2), guiding attached cables through slots (4) in chassis (5) and bracket (3).
2. Install four screws (1) to secure A2A12 Amplifier and Detector (2) to bracket (3).
3. Plug A2A15P160 and A2A15P190 onto A2A15 Leveling Loop and Bias CCA (para 2-221, Step 3).
4. Connect semirigid cable to front connector on A2A13 Step Attenuator (para 2-223, Step 4).
5. Connect semirigid cable to IF connector on A2A11 Mixer (par a 2-222, Step 3).
6. Install hardware on AUX RF OUT connector (para 2-226, Step 14).
7. Assemble TR 503 Tracking Generator modules (para 2-220).

END OF TASK

2-228. REPLACE A2A14 AMPLITUDE CONTROL.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Separate TR 503 Tracking Generator into two modules (para 2-220).
2. Disconnect semirigid cable (1) from RF connector on A2A11 Mixer (2).
3. Disconnect semirigid cable (3) from front of A2A14 Amplitude Contr ol (4).
4. Unplug A2A15P200 from A2A15 Leveling Loop and Bias CCA (para 2-221, Step 2). Push connector through slot in chassis to other side of module.
5. Remove four screws (5) that secure A2A14 Amplitude Control (4) to chassis.
6. Lift A2A14 Amplitude Control (4) from chassis.

INSTALL

1. Set A2A14 Amplitude Control (4) in place, and install four screws (5) to secure to chassis.
2. Plug A2A1 5P200 onto A2A15 Leveling Loop and Bias CCA (para 2-221, Step 3). (Push connector through slot in chassis to reach A2A15 Leveling Loop and Bias CCA.)
3. Connect semirigid cable (3) to front of A2A14 Amplitude Control (4).
4. Connect semirigid cable (1) to RF connector on A2All11 Mixer (2).
5. Assemble TR 503 Tracking Generator modules (para 2-220).

END OF TASK

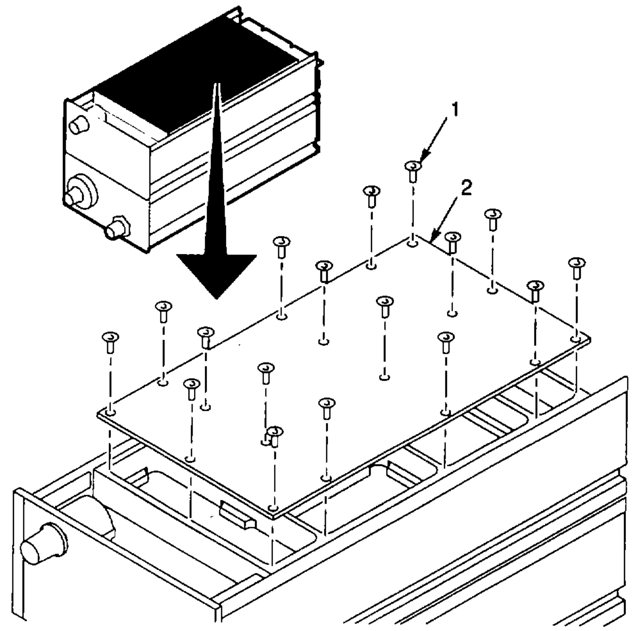
2-229. REPLACE A2A35 CONTROL ASSEMBLY COVER SHIELD.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove 17 screws (1) that secure cover shield (2).
2. Remove A2A35 Control Assembly cover shield (2).



INSTALL

1. Set cover shield (2) in place.
2. Install 17 screws (1) to secure A2A35 Control Assembly cover shield (2).

END OF TASK

2-230. REPLACE A2A35 CONTROL ASSEMBLY.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove four screws (1) that secure A2A35 Control Assembly (2) to chassis.
2. Unplug following connectors from front ed ge of A2A35 Control Assembly (2):
   - A2A35A1P400 (3).
   - A2A35A1 P380 (4).
   - A2A35A1P390 (5).
3. Lift rear of A2A35 Control Assembly (2) slightly, and unplug connector A2A35A1 P370 (6) from bottom rear of A2A35 Control Assembly.
4. Lift A2A35 Control Assembly (2), and unplug RF coaxial cable (7) from connector at bottom front of A2A35 Control Assembly.
5. Remove A2A35 Control Assembly (2) from chassis.

INSTALL

1. Plug RF coaxial cable (7) onto connector at bottom front of A2A35 Control Assembly.
2. Plug connector A2A35A1 P370 (6) onto pins at bottom rear of A2A35 Control Assembly.
3. Set A2A35 Control Assembly (2) in chassis.
4. Plug following connectors onto A2A35 Control Assembly (2):
   - A2A35A1P400 (3).
   - A2A35A1 P380 (4).
   - A2A35A1 P390 (5).
5. Install four screws (1) to secure A2A35 Control Assembly (2) to chassis.

END OF TASK

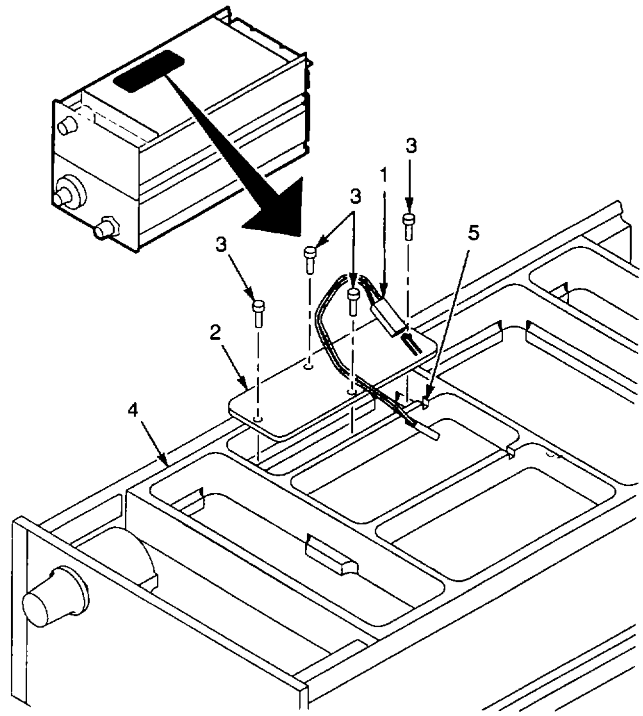
2-231. REPLACE A2A35A2 110 MHZ AMPLIFIER CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A2A35 Control Assembl y cover shield (para 2-229).
2. Unplug A2A35A2P510 (1) from A2A35A2 110 MHz Amplifier CCA (2).
3. Remove four screws (3) that secure A2A35A2 110 MHz Amplifier CCA (2) to honeycomb shield (4).
4. Lift up A2A35A2 110 MHz Amplifier CCA (2) until clear of pins, and remove from chassis.



INSTALL

1. Set A2A35A2 110 MHz Amplifier CCA (2) in place, aligning connectors with pins.
2. Install four screws (3) to secure A2A35A2 110 MHz Amplifier CCA (2) to honeycomb shield (4).
3. Plug A2A35A2P510 (1) onto A2A35A 2 110 MHz Amplifier CCA (2). Be sure cable is positioned in slot (5) in honeycomb shield (4).
4. Install A2A35 Control Assembly cover shield (para 2-229).

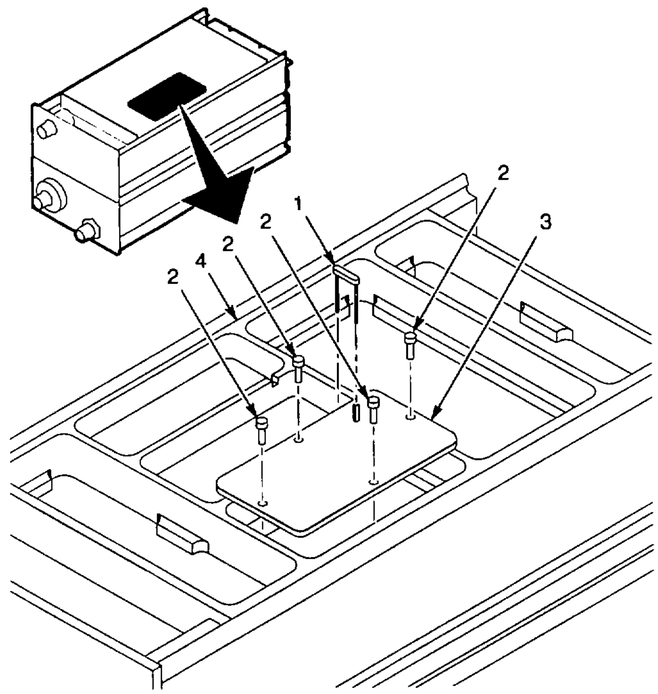
END OF TASK

2-232. REPLACE A2A35A3 55 MHZ OSCILLATOR CCA.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove A2A35 Control Assembly cover shield (para 2-229).
2. Remove U-shaped feedthrough termina l (1).
3. Remove four screws (2) that secure A2A35A3 55 MHz Oscillator CCA (3) to honeycomb shield (4).
4. Lift up A2A35A3 55 MHz Oscillator CCA (3) until clear of pins, and remove from chassis.



INSTALL

1. Set A2A35A3 55 MHz Oscillator CCA (3) in place, aligning connectors with pins.
2. Install four screws (2) to secure A2A35A3 55 MHz Oscillator CCA (3) to honeycomb shield (4).
3. Install U-shaped feedthrough terminal (1).
4. Install A2A35 Control Assembly cover shield (para 2-229).

END OF TASK

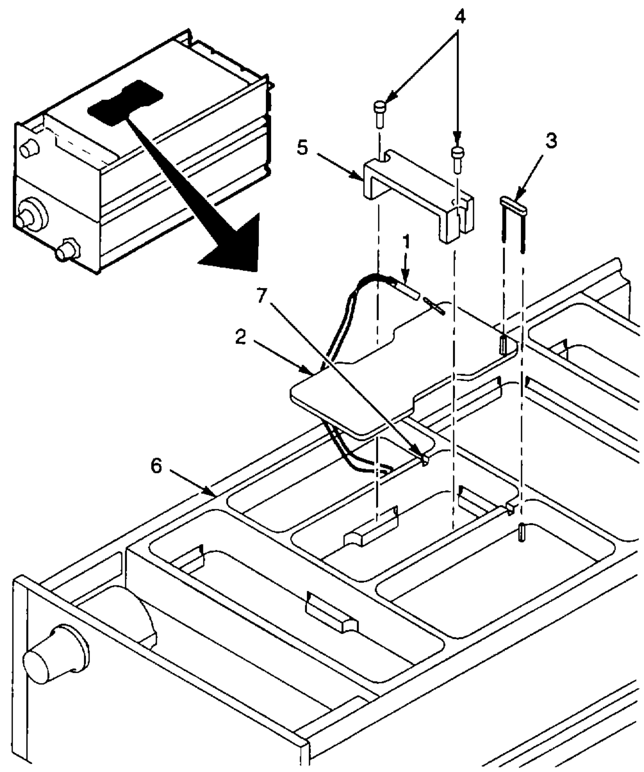
2-233. REPLACE A2A35A4 PHASE/FREQ DETECTOR CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A2A35 Control Assembly cover shield (para 2-229).
2. Unplug A2A35A4P550 (1) from A2A35A4 Phase/Freq Detector CCA (2).
3. Remove U-shaped feedthrough terminal (3).
4. Remove two screws (4) that secure heat sink (5) to honeycomb shield (6).
5. Remove heat s ink (5).
6. Lift up A2A35A4 Phase/Freq Detector CCA (2) until clear of pins, and remove from chassis.



INSTALL

1. Set A2A35A4 Phase/Freq Detector CCA (2) in place, aligning connectors with pins.
2. Set heat sink (5) in place, aligning mounting slots with holes in honeycomb shield (6).
3. Install two screws (4) to secure heat sink (5) to honeycomb shield (6).
4. Install U-shaped feedthrough terminal (3).
5. Plug A2A35A4P550 (1) onto A2A35A4 Phase/Freq Detector CCA (2). Be sure cable is positioned in slot (7) in honeycomb shield.
6. Install A2A35 Control Assembly cover shield (para 2-229).

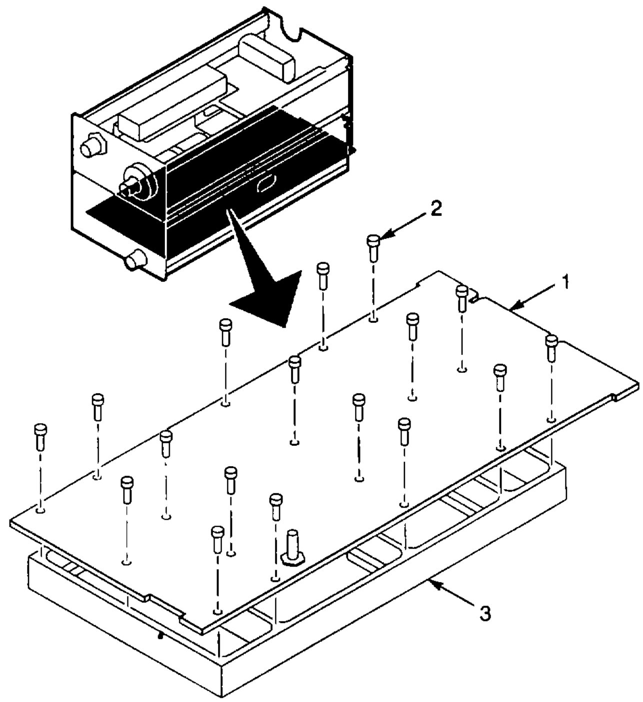
END OF TASK

2-234. REPLACE A2A35A1 MOTHER BOARD CCA.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove A2A35 Control Assembly (para 2-230).
2. Set A2A35 Control Assembly so that A2A35A1 Mother Board CCA (1) is up.
3. Remove 17 screws (2) that secure A2A35A1 Mother Board CCA (1) to honeycomb shield (3).
4. Lift A2A35A1 Mother Board CCA (1) straight up until pins clear honeycomb shield (3) and remove.



INSTALL

1. Align pins on A2A35A1 Mother Board CCA (1) with connectors on CCAs in honeycomb shield (3).
2. Press down A2A35A1 Mother Board CCA (1) to seat on pins.
3. Install 17 screws (4) to secure A2A35A1 Mother Board CCA (1) to honeycomb shield (3).
4. Install A2A35 Control Assembly (para 2-230).

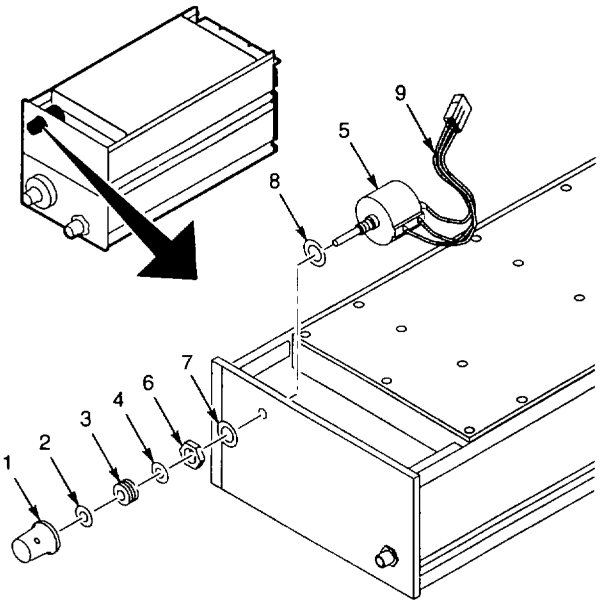
END OF TASK

2-235. REPLACE A2R10 TRACKING ADJUST VARIABLE RESISTOR.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove A2A35 Control Assembly (para 2-230).
2. Loosen setscrew in TRACKING ADJUST knob (1), and remove knob.
3. Remove washer (2), rubber grommet (3), and washer (4) from shaft of A2R10 Tracking Adjust variable resistor (5).
4. Remove nut (6) and washer (7) that secure A2R10 Tracking Adjust variable resistor (5) to front panel.
5. Remove A2R10 Tracking Adjust variable resistor (5) and washer (8).



INSTALL

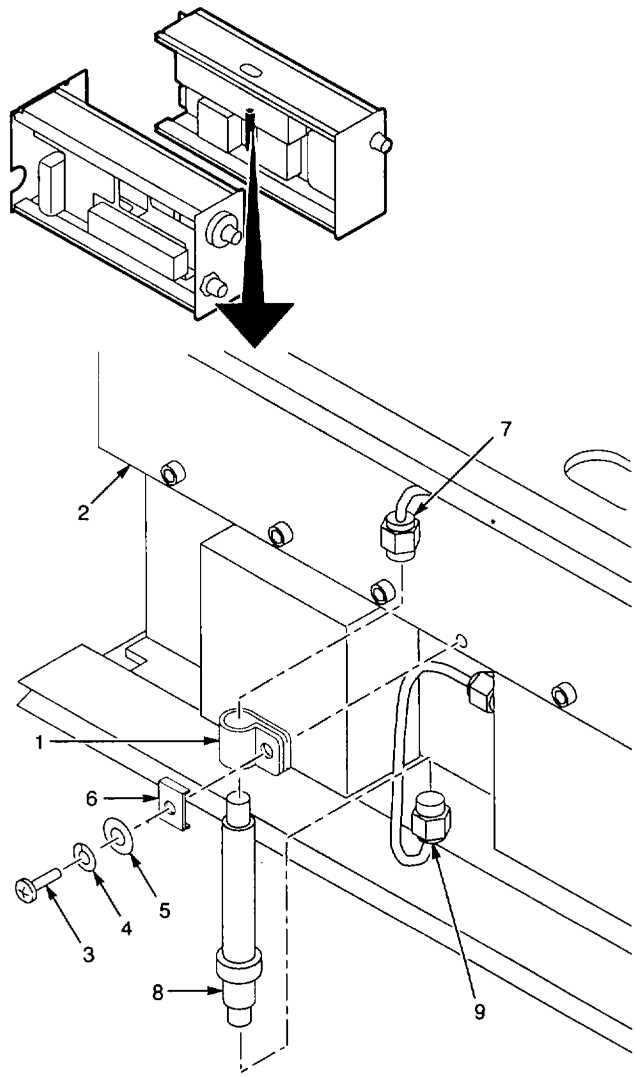
1. Transfer cable (9) from removed A2R10 Tracking Adjust variable resistor (5) to new A2R10 Tracking Adjust variable resistor, soldering wires to same terminals.
2. Install washer (8) on A2R10 Tracking Adjust variable resistor (5).
3. Install A2R10 Tracking Adjust variable resistor (5) in chassis.
4. Install washer (7) and nut (6) to secure A2R10 Tracking Adjust variable resistor (5) to front panel.
5. Install washer (4), rubber grommet (3), and washer (2) on shaft of A2R10 Tracking Adjust variable resistor (5).
6. Install TRACKING ADJUST knob (1), and tighten setscrew.
7. Install A2A35 Control Assembly (para 2-230).

END OF TASK

2-236. REPLACE A2A8 LOWPASS FILTER.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE



1. Separate TR 503 Tracking Generato r into two modules (para 2-220).
2. Remove following hardware that secures loop clamp (1) to A9 Bandpass Filter (2):
   - Screw (3).
   - Lock washer (4).
   - Flat washer (5).
   - Clamp washer (6).
3. Disconnect semirigid cable (7) from upper connector on A2A8 Lowpass Filter (8).
4. Disconnect semirigid cable (9) from lower connector on A2A8 Lowpass Filter (8).
5. Remove A2A8 Lowpass Filter (8) from chassis.
6. Remove loop clamp (1) from A2A8 Lowpass Filter (8).

INSTALL

1. Install loop clamp (1) on A2A8 Lowpass Filt er (8).
2. Set A2A8 Lowpass Filter (8) in chassis with larger knurled end towards bottom of chassis.
3. Connect semirigid cable (9) to lower connector on A2A8 Lowpass Filter (8).
4. Connect semirigid cable (7) to upper connector on A2A8 Lowpass Filter (8).
5. Install following hardware to secure loop clamp (1) to A9 Bandpass Filter (10):
   - Clamp washer (6).
   - Flat washer (5).
   - Lock washer (4).
   - Screw (3).
6. Assemble TR 503 Tracking Generator modules (para 2-220).

END OF TASK

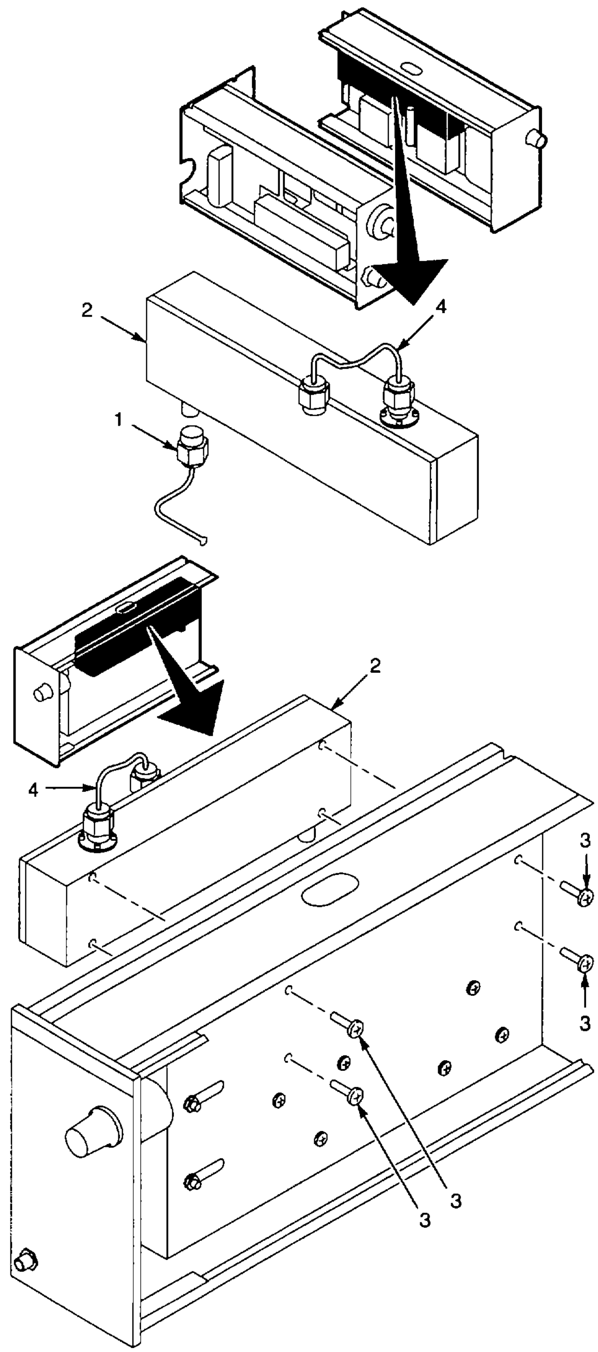
2-237. REPLACE A2A9 BANDPASS FILTER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Separate TR 503 Tracking Generator into two modules (para 2-220).
2. Remove A2A8 Lowpass Filter (para 2-236).
3. Disconnect semirigid cable (1) from rear of A2A9 Bandpass Filter (2).
4. Remove A2A35 Control Assembly (para 2-230).
5. Remove four screws (3) that secure A2A9 Bandpass Filter (2) to chassis.
6. Remove A2A9 Bandpass Filter (2) with attached semirigid cable (4) from chassis.



INSTALL

1. Transfer semirigid cable (4) from removed A2A9 Bandpass Filter (2) to same location on new A2A9 Bandpass Filter (2).
2. Set A2A9 Bandpass Filter (2) in chassis.
3. Install four screws (3) to secure A2A9 Bandpass Filter (2) to chassis.
4. Install A2A35 Control Assembly (para 2-230).
5. Connect semirigid cable (1) to rear of A2A9 Bandpass Filter (2).
6. Install A2A8 Lowpass Filter (para 2-236).
7. Assemble TR 5 03 Tracking Generator modules (para 2-220).

END OF TASK

2-238. REPLACE A2A10 ISOLATOR.

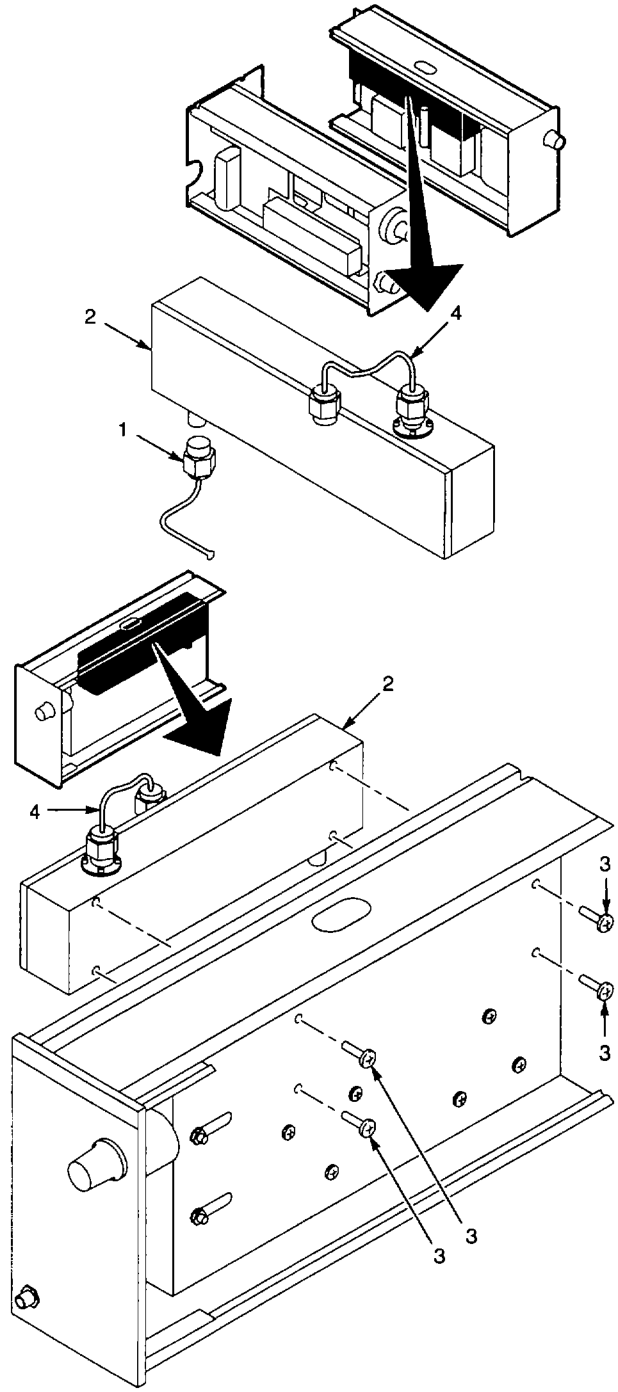
DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Separate TR 503 Tracking Generator into two modules (para 2-220).
2. Remove A2A35 Control Assembly (para 2-230).
3. Remove three screws (1) that secure A2A10 Isolator (3) to chassis.
4. Disconnect semirigid cable (2) from front connector on A2A10 Isolator (3).
5. Remove A2A10 Isolator (3) with attached semirigid cable (4) from chassis.

INSTALL

1. Transfer semirigid cable (4) from removed A2A10 Isolator (3) to same location on new A2A10 Isolator.
2. Set A2A10 Isolator (3) in chassis (label side should be up).
3. Connect semirigid cable (2) to front connector on A2A10 Isolator (3).
4. Install three screws (1) to secure A2A10 Isolator (3) to chassis.
5. Install A2A35 Control Assembly (para 2-230).
6. Assemble TR 503 Tracking Generator modules (para 2-220).



END OF TASK

2-239. REPLACE A2A7 ISOLATOR.

DESCRIPTION

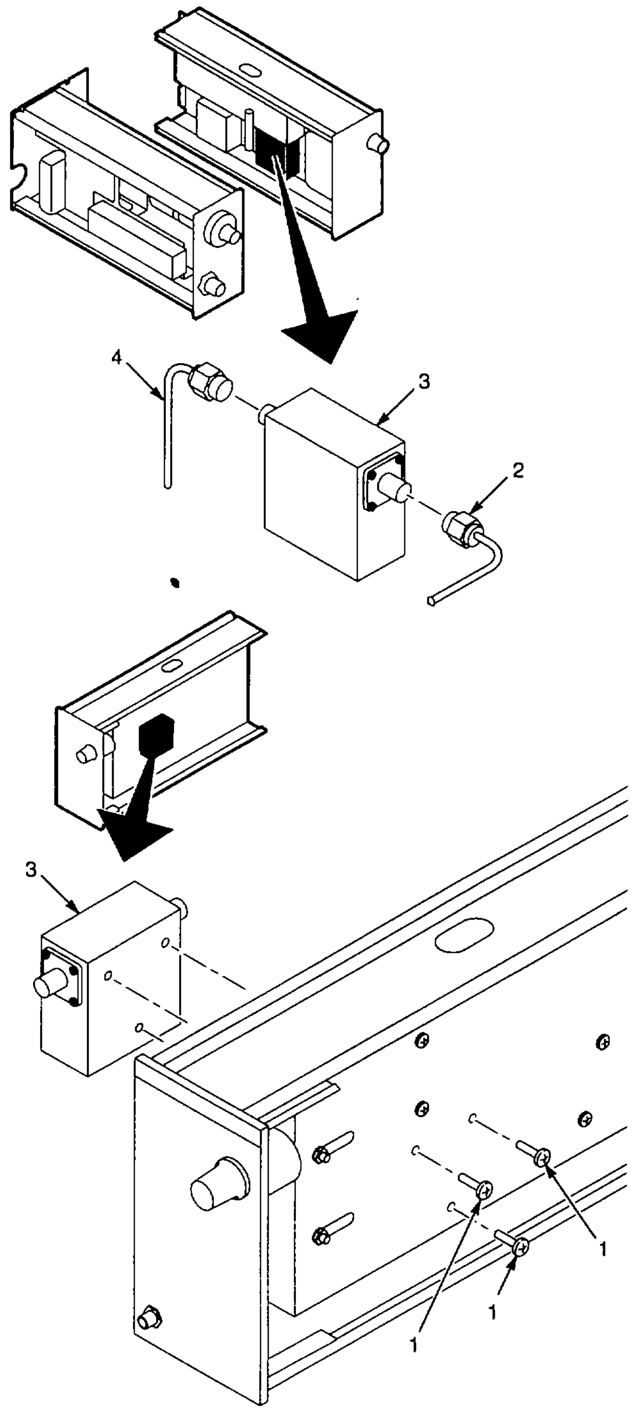
This procedure covers: Remove and Install

REMOVE

1. Separate TR 503 Tracking Generator into two modules (para 2-220).
2. Remove A2A35 Control Assembly (para 2-230).
3. Remove three screws (1) that secure A2A7 Isolator (3) to chassis.
4. Disconnect semirigid cable (2) from front connector on A2A7 Isolator (3).
5. Disconnect semirigid cable (4) from rear connector on A2A7 Isolator (3).
6. Remove A2A7 Isolator (3) from chassis.

INSTALL

1. Set A2A7 Isolator (3) in chassis (label side down).
2. Connect semirigid cable (4) to rear connector on A2A7 Isolator ((3).
3. Connect semirigid cable (2) to front connector on A2A10 Isolator (3).
4. Install three screws (1) to secure A2A7 Isolator (3) to chassis.
5. Install A2A35 Control Assembly (para 2-230).
6. Assemble TR 503 Tracking Generator modul es (para 2-220).



END OF TASK

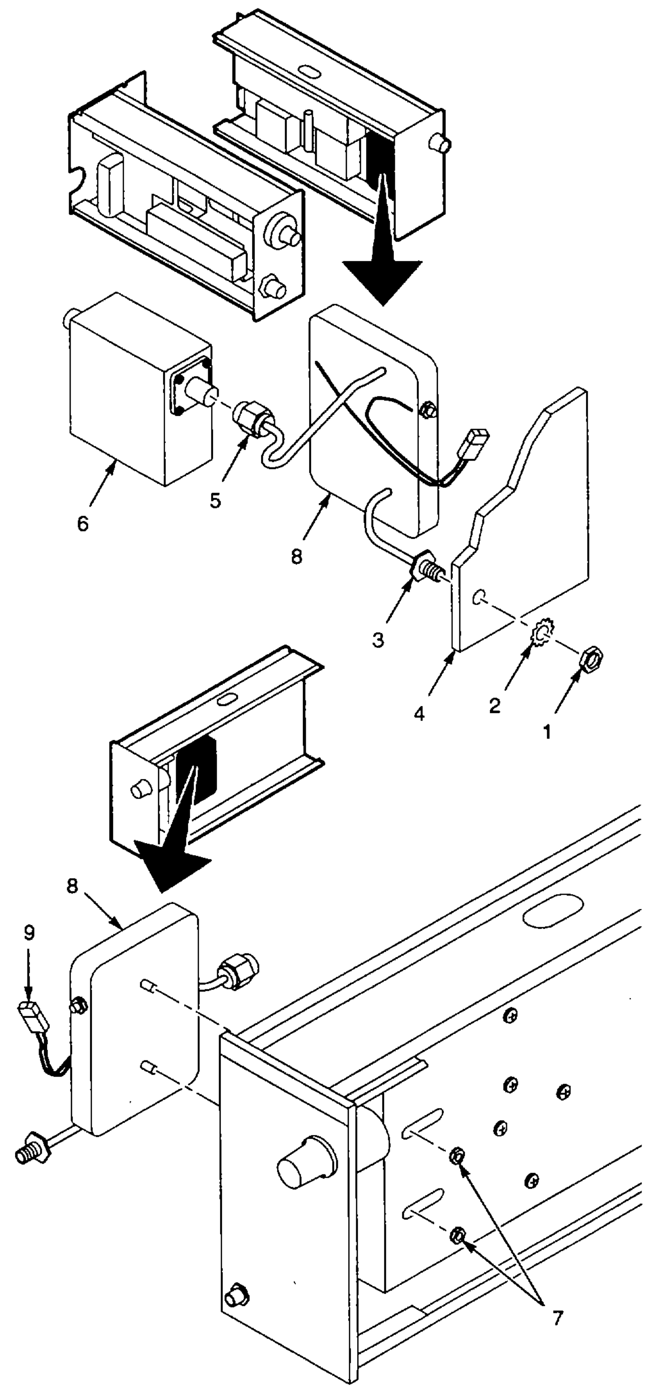
2-240. REPLACE A2A6 1ST LO AMPLIFIER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Separate TR 503 Tracking Generator into two modules (para 2-220).
2. Remove A2A35 Control Assembly (para 2-230).
3. Remove nut (1) and washer (2) from 1st LO IN connector (3) on the front panel (4).
4. Disconnect semirigid cable (5) from front of A2A7 Isolator (6).
5. Remove two nuts (7) that secure A2A6 1 st LO Amplifier (8) to chassis.
6. Remove A2A6 1 st LO Amplifier (8) from chassis.



INSTALL

1. Transfer cable (9) from removed A2A6 1 st LO Amplifier (8) to same connections on new A2A6 1st LO Amplifier.
2. Set A2A6 1 st LO Amplifier (8) in chassis, guiding 1 st LO IN connector (3) through hole in front panel (4).
3. Install washer (2) and nut (1) on 1st LO IN connector (3) on the front panel (4).
4. Connect semirigid cable (5) to front of A2 A7 Isolator (6).
5. Install two nuts (7) to secure A2A6 1st LO Amplifier (8) to chassis.
6. Dress cable (9) between A2A6 1st LO Amplifier (8) and front panel (4) to other side of module.
7. Install A2A35 Control Assembly (para 2-230).
8. Assemble TR 503 Tracking Generator modules (para 2-220).

END OF TASK

2-241. REPLACE TM 5003 POWER MODULE COVERS.

DESCRIPTION

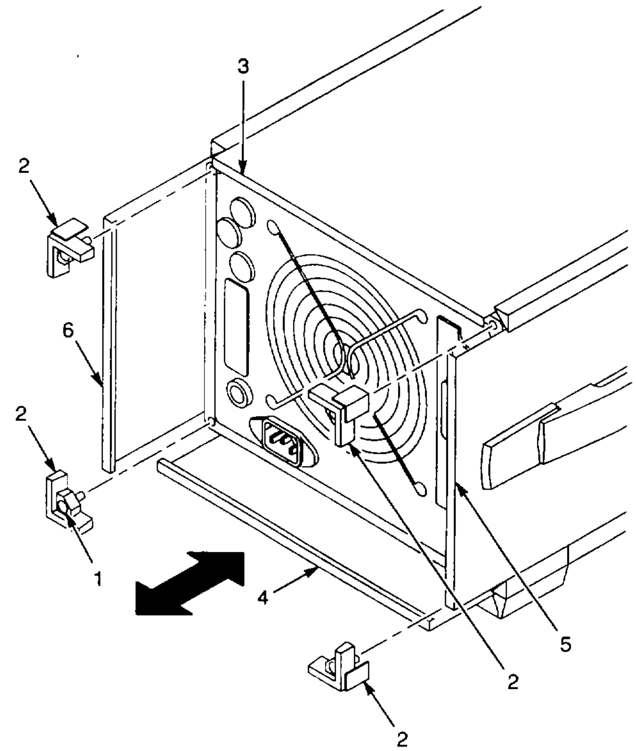
This procedure covers: Remove and Install

WARNING

To avoid electrical shock, disconnect the power cord before proceeding.

REMOVE

1. Loosen captive screw (1) in each corner cover retainer (2), and remove four corner cover retainers.
2. Slide following covers to rear, and remove covers from TM 5003 Power Module:
   - Top cover (3).
   - Bottom cover (4).
   - Left side cover (5).
   - Right side cover (6).



INSTALL

1. Slide following covers into place from rear of TM 5003 Power Supply Module:
   - Top cover (3).
   - Bottom cover (4).
   - Left side cover (5).
   - Right side cover (6).
2. Install corner cover retainer (2) in each corner, securing with captive screw (1).

END OF TASK

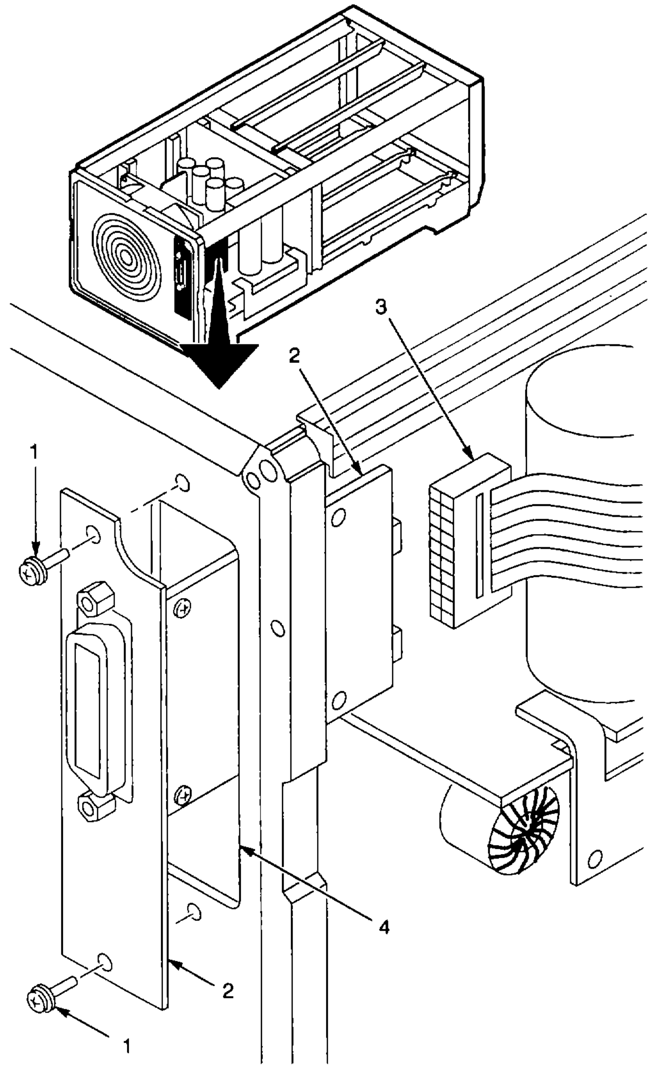
2-242. REPLACE A3A16 GPIB INTERFACE CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove left side cover (para 2-241).
2. Remove two screws (1) that secure A16 GPIB Interface CCA (2) to rear panel.
3. Unplug GPIB cable (3) from A3A16J1010 on A16 GPIB Interface CCA (2).
4. Remove A16 GPIB Interface CCA (2) through cutout (4) in rear panel.



INSTALL

1. Insert A16 GPIB Interface CCA (2) into cutout (4) in rear panel.
2. Install two screws (1) to secure A16 GPIB Interface CCA (2) to rear panel.
3. Plug GPIB cable (3) onto A3A16J1010 on A16 GPIB Interface CCA (2).
4. Install left side cover (para 2-241).

END OF TASK

2-243. REPLACE A3A11 SECONDARY SUPPLY CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

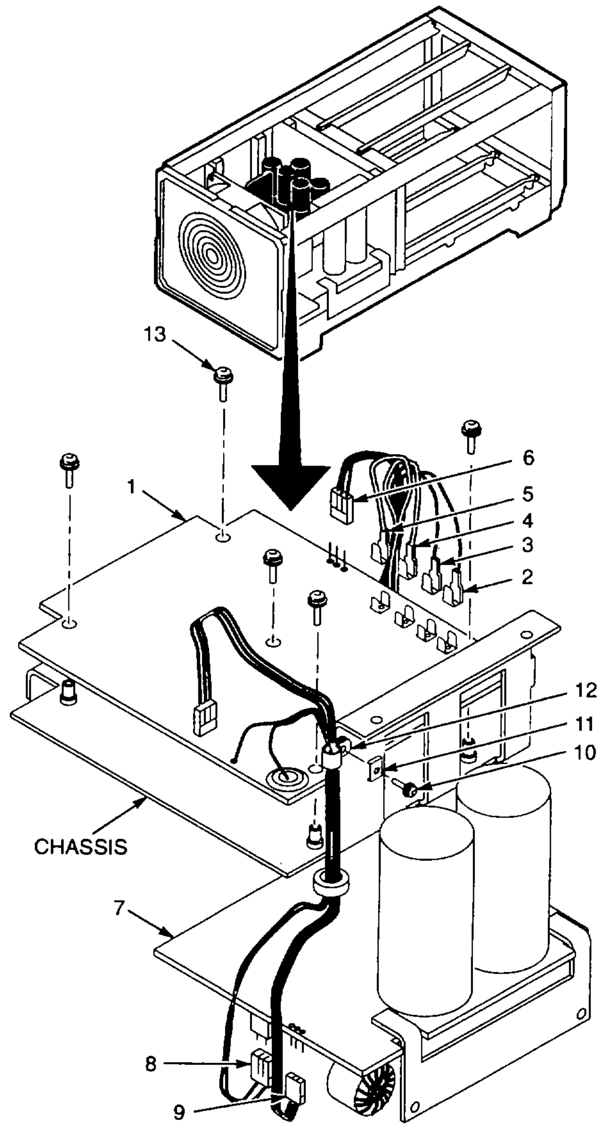
1. Remove top, left side, and bottom covers (para 2-241).
2. Unplug following from A3A11 Secondary Supply CCA (1):

   - Red-brown wire (2) from A3A11J1060.
   - Violet-brown wire (3) from A3A11J1160.
   - Black wire (4) from A3A11J1260.
   - Red wire (5) from A3A11J1360.
   - Multipin connector (6) from A3A11J1463.

3. Unplug following from A3A13 Primary Supply CCA (7):

   - Multipin connector (8) from A3A13J1420.
   - Multipin connector (9) from A3A13J1430.

4. Remove screw (10) and washer (11) that secure loop clamp (12) to chassis.
5. Remove five screws (13) that secure A3A11 Secondary Supply CCA (1) to chassis.
6. Remove A3A11 Secondary Supply CCA (1) from chassis.
7. Remove loop clamp (12) from cables.



INSTALL

1. Set A3A11 Secondary Supply CCA (1) in place in chassis.
2. Install five screws (13) to secure A3A11 Secondary Supply CCA (1) to chassis.
3. Plug following onto A3A11 Secondary Supply CCA (1):

   - Red-brown wire (2) toA3A11J1060.
   - Violet-brown wire (3) to A3A11 J1160.
   - Black wire (4) toA3A11J1260.
   - Red wire (5) toA3A11J1360.
   - Multipin connector (6) to A3A11J1463.

4. Plug following onto A3A13 Primary Supply CCA (7):

   - Multipin connector (8) to A3A13J1420.
   - Multipin connector (9) to A3A13J1430.

5. Install loop clamp (12) onto cables.
6. Install washer (11) and screw (10) to secure loop clamp (12) to chassis.
7. Install top, left side, and bottom covers (para 2-241).

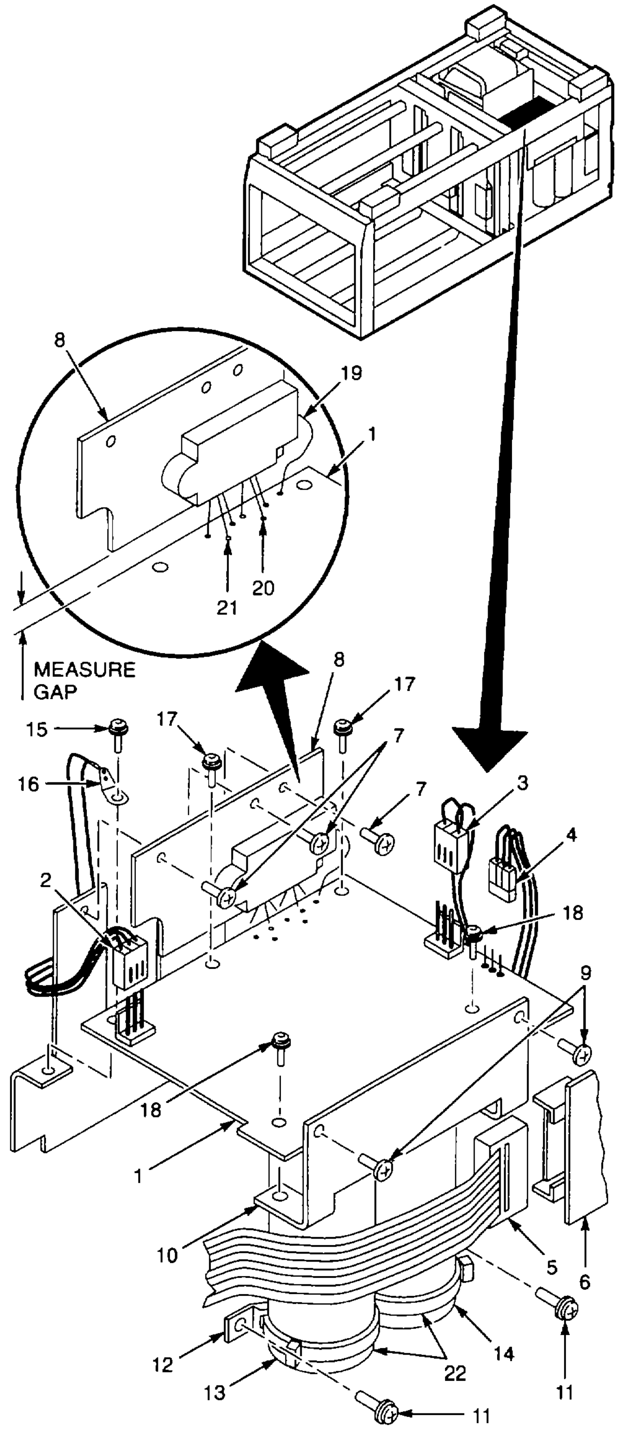
END OF TASK

2-244. REPLACE A3A13 PRIMARY SUPPLY CCA.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove left side and bottom covers (para 2-241).
2. Set TM 5003 Power Module bottom side up on work surface.
3. Unplug following connectors from A3A13 Primary Supply CCA (1):
   - Multipin connector (2) from A3A13J1000.
   - Multipin connector (3) from A3A13J1420.
   - Multipin connector (4) from A3A13J1430.
4. Unplug multipin connector (5) from A3A1 6J1 01 0 on A3A1 6 GPIB Interface CCA (6).
5. Remove following screws:
   - Three screws (7) that secure heat sink (8) to chassis.
   - Two screws (9) that secure bracket (10) to chassis.
   - Two screws (11) that secure tiedown clamps (12) on capacitors A3A13C1130 (13) and A3A13C1230 (14) to chassis.
   - Screw (15) that secures lug terminal (16) to A3A13 Primary Supply CCA (1).
   - Two screws (17) that secure A3A13 Primary Supply CCA (1) to chassis.
6. Remove A3A13 Primary Supply CCA (1) from chassis.
7. Remove two screws (18) that secure bracket (10) to A3A13 Primary Supply CCA (1), and remove bracket.
8. Measure gap between heat sink (8) and surface of A3A13 Primary Supply CCA (1). Note measurement for reassembling.



9. Unsolder following from A3A13 Primary Supply CCA (1):
   - Gray-black wire (19).
   - Three leads (20) of transistor A3Q1300.
   - Three leads (21) of transistor A3Q1301.
10. Remove heat sink (8) and attached transistors.
11. Cut tiedown straps (22) and remove tiedown clamps (12) from capacitors A3A13C1130 (13) and A3A13C1230 (14).

INSTALL

1. Install tiedown clamps (12) on capacitors A3A13C11 30 (13) and A3A13C1230 (14), using new tiedown straps (22), (Appendix B, Item 11).
2. Install leads of transistors A3Q1300 and A3Q1301, mounted on heat sink (8), in solder pads on A3A13 Primary Supply CCA (1).
3. Adjust gap between heat sink (8) and surface of A3A13 Primary Supply CCA (1) to equal measurement noted in Remove procedure, step 8.
4. Solder following to A3A13 Primary Supply CCA (1):
   - Three leads (21) of transistor A3Q1301.
   - Three leads (20) of transistor A3Q1300.
   - Gray-black wire (19).
5. Install two screws (18) to secure bracket (10) to A3A13 Primary Supply CCA (1).
6. Place A3A13 Primary Supply CCA (1) in chassis.
7. Install following screws:
   - Three screws (7) that secure heat sink (8) to chassis. If necessary, add more thermal compound (Appendix B, Item 8) to back of heat sink before fastening with screws.
   - Screw (15) that secures lug terminal (16) to A3A1 3 Primary Supply CCA (1).
   - Two screws (17) that secure A3A13 Primary Supply CCA (1) to chassis.
   - Two screws (9) that secure bracket (10) to chassis.
   - Two screws (11) that secure tiedown clamps (12) on capacitors A3A1 3C1130 (13) and A3A13C1230 (14) to chassis.
8. Plug multipin connector (5) onto A3A16J1010 on A3A16 GPIB Interfac e CCA (6).
9. Plug following connectors onto A3A13 Primary Supply CCA (1):
   - Multipin connector (2) onto A3A13J1000.
   - Multipin connector (3) onto A3A13J1420.
   - Multipin connector (4) onto A3A13J1430.
10. Install left side and bottom covers (para 2-241).

END OF TASK

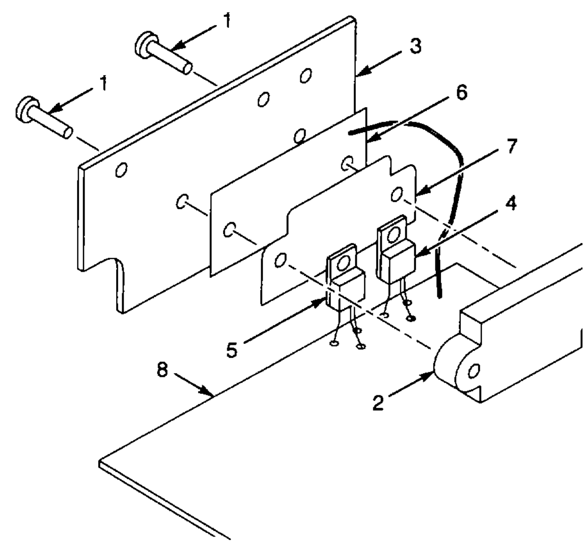
2-245. REPLACE A3Q1300 OR A3Q1301.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove A3A13 Primary Supply CCA (para 2-244).
2. Measure gap between heat sink and surface of A3A13 Primary Supply CCA (para 2-244, Step 8). Note measurement.
3. Remove two screws (1) that secure transistor cover (2) to heat sink (3).
4. Remove transistor cover (2) and heat sink (3).
5. Separate transistors A3Q1300 (4) and A3Q1301 (5) from plate insulator (6) and mica insulator (7).
6. Unsolder transistor to be replaced from A3A13 Primary Supply CCA (8).



INSTALL

1. Coat back of new transistor with insulating compound (Appendix B, Item 8).
2. Install two screws (1) to secure transistor cover (2), plate insulator (6), mica insulator (7), and heat sink (3) together.
3. Solder transistor to A3A13 Primary Supply CCA (8), maintaining gap noted in Remove procedure, Step 2.
4. Install A3A13 Primary Supply CCA (para 2-244)

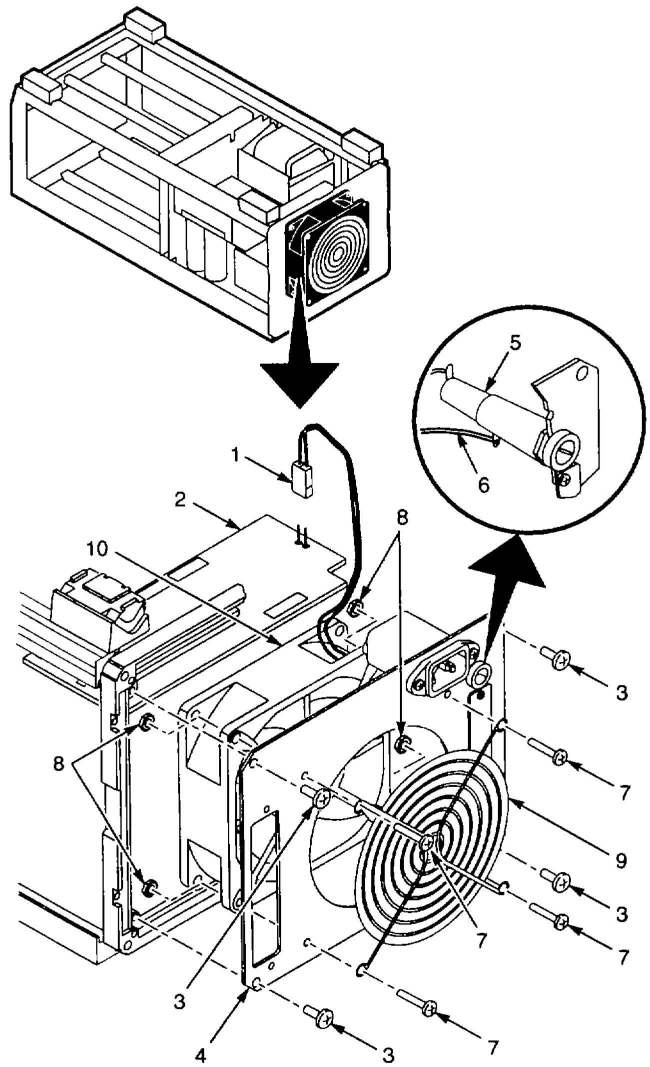
END OF TASK

2-246. REPLACE A3B500 FAN.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove covers (para 2-241).
2. Unplug GPIB cable from A3A16 GPI B Interface CCA (para 2-242, Step 3).
3. Unplug fan cable (1) from A3A14J1105 on A3A14 Line Filter CCA (2).
4. Remove four screws (3) that secure rear panel (4) to chassis.
5. Pull out rear panel (4) to access wires connected to fuseholder (5).
6. Unsolder gray-orange-black wire (6) from lower contact on fuseholder (5).
7. Remove four screws (7) and four nuts (8).
8. Remove fan guard (9) and A3B500 fan (10).



INSTALL

1. Align A3B500 fan (10) with air-flow arrow (marked on fan) pointing to rear panel (4) and fan cable (1) in corner of rear panel where line fuseholder (5) is located.
2. Hold fan guard (9) and A3B500 fan (10) in place on rear panel (4).
3. Install four screws (7) and four nuts (8) to secure fan guard (9) and A3B500 fan (10) to rear panel (4).
4. Solder gray-orange-black wire (6) to lower contact on fuseholder (5).
5. Install four screws (3) to secure rear panel (4) to chassis.
6. Plug fan cable (1) onto A3A14J1105 on A3A14 Line Filter CCA (2).
7. Plug GPIB cable onto A3A16 GPIB Int erface CCA (para 2-242, Step 3).
8. Install covers (para 2-241).

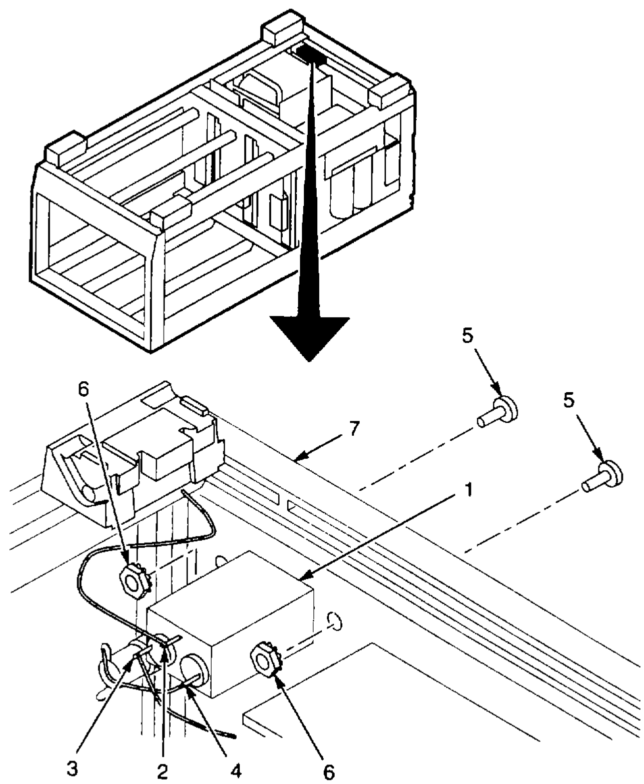
END OF TASK

2-247. REPLACE A3FL500 RFI FILTER.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE



1. Remove bottom cover (para 2-241).
2. Set TM 5003 Power Module bottom side up.
3. Unsolder following from A3FL500 RFI Filter (1):
   - Green-yellow wire (2).
   - Gray-brown-white wire (3).
   - Gray-black wire (4).
4. Remove two screws (5) and two nuts (6) that secure A3FL500 RFI Filter (1) to rear panel (7).
5. Remove A3FL500 RFI Filter (1) from rear panel (7).

INSTALL

1. Turn A3FL500 RFI Filter (1) so that center terminal is up. Install A3FL500 RFI Filter (1) in rear panel (7).
2. Install two screws (5) and two nuts (6) to secure A3FL500 RFI Filter (1) to rear panel (7).
3. Solder following to A3FL500 RFI Filter (1):
   - Green-yellow wire (2).
   - Gray-brown-white wire (3).
   - Gray-black wire (4).
4. Install bottom cover (para 2-241).

END OF TASK

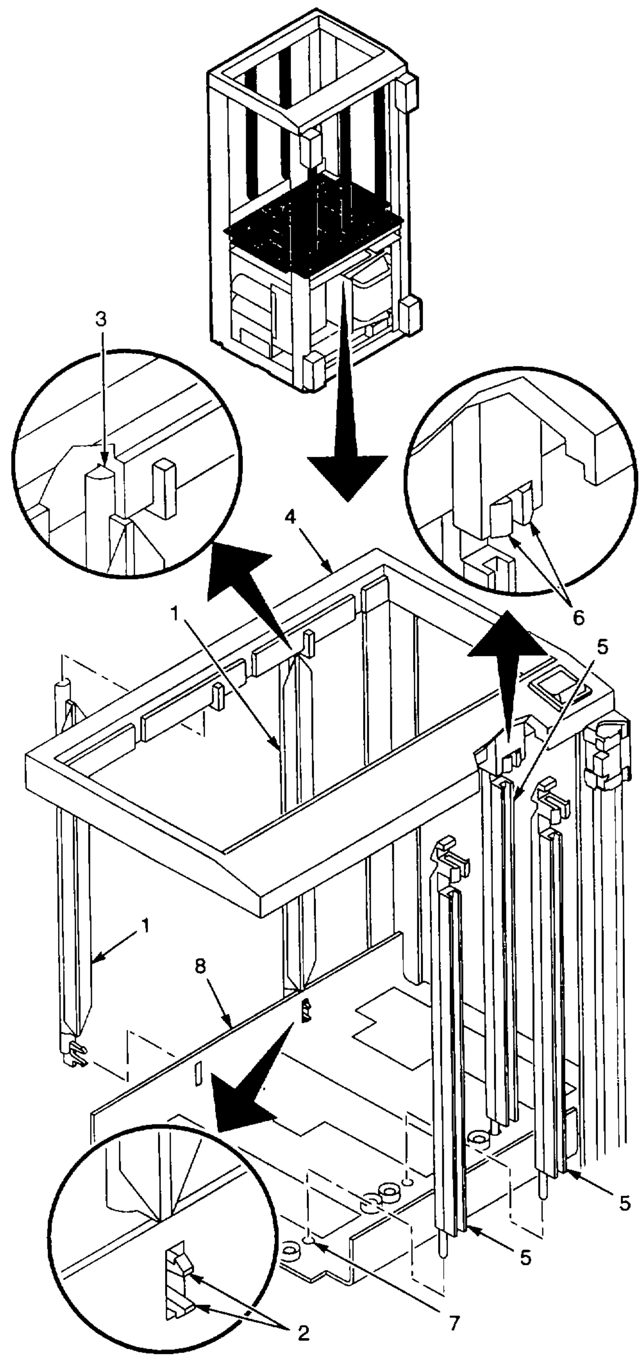
2-248. REPLACE A3A10 MAIN INTERFACE CCA.

DESCRIPTION

This procedure covers: Remove and Install

REMOVE

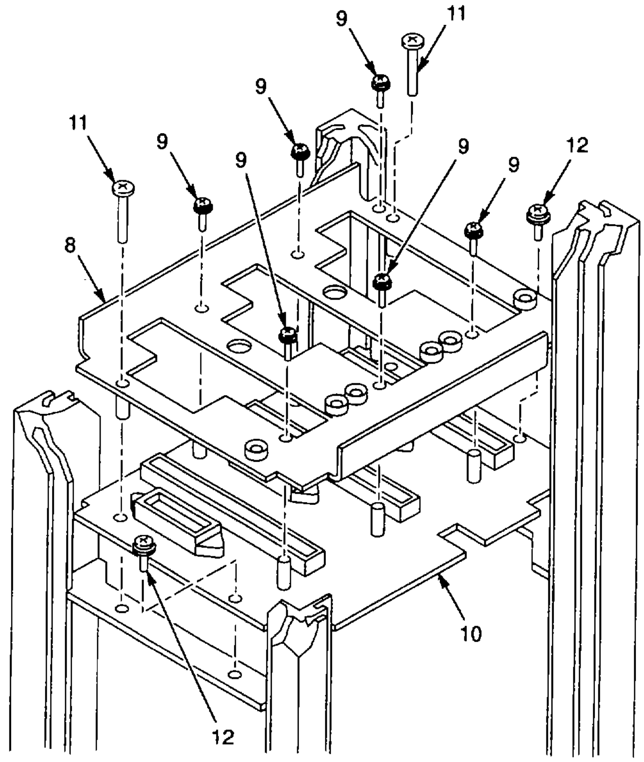
1. Remove covers (para 2-241).
2. Set chassis on rear.
3. Remove two air baffles (1) by gently squeezing together latch tabs (2) with needle-nose pliers and pulling air baffles from slots (3) in front frame panel (4).
4. Remove thr ee bottom guides (5) by squeezing together latch tabs (6) with needle-nose pliers and lifting bottom guides from holes (7) in CCA support (8).
5. Remove six screws (9) that secure CCA support (8) to A3A10 Main Interface CCA (10).
6. Remove two screws (11) that secure CCA support (8) to chassis.
7. Remove CCA support (8) from chassis.
8. Remove two screws (12) that secure A3A10 Main Interface CCA (10) to chassis.
9. Remove A3A13 Primary Supply CCA (para 2-244) from chassis.
10. Label NPN series pass tr ansistors A3Q510 (13), A3Q530 (14), and A3Q550 (15) and their associated connectors for reassembling.
11. Unplug connectors from A3Q510 (13), A3Q530 (14), and A3Q550 (15).
12. Label PNP series pass transistors A3Q500 (16), A3Q520 (17), A3Q540 (18), and their associated connectors for reassembling.
13. Unplug connectors from A3Q500 (16), A3Q520 (17), and A3Q540 (18).
14. Lift end of cable clamp (19) and remove cables.



15. Unplug following from A3A11 Secondary Supply CCA (para 2-243, Step 2):

    - Red-brown wire fromA3A11J1060.
    - Violet-brown wire fromA3A11J1160.
    - Black wire fromA3A11J1260.
    - Red wire fromA3A11J1360.
    - Multipin connector from A3A11J1463.

16. Set chassis on rear panel.
17. Cut retaining strap (20) that holds wires in cutout on A3A10 Main Interface CCA (10).

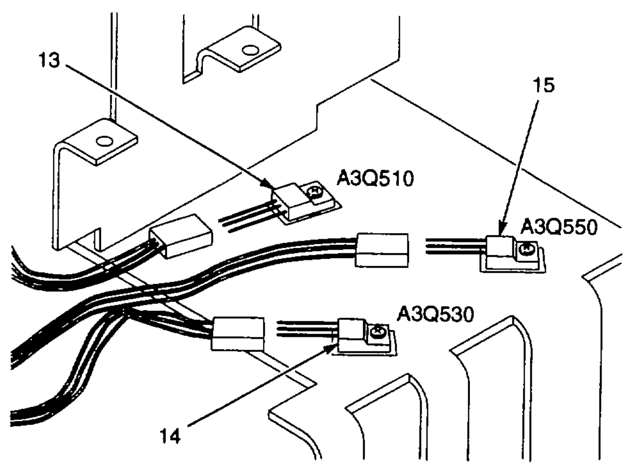


NOTE

Wires on front of A3A10 Main Interface CCA are from transformer A3T500. The wires are grouped into two bundles-a bundle from the bottom side of A3T500 and a bundle from the top side of A3T500.

18. Unsolder following eight wires (from bundle at bottom of A3T500) from A3A10 Main Interface CCA (10):

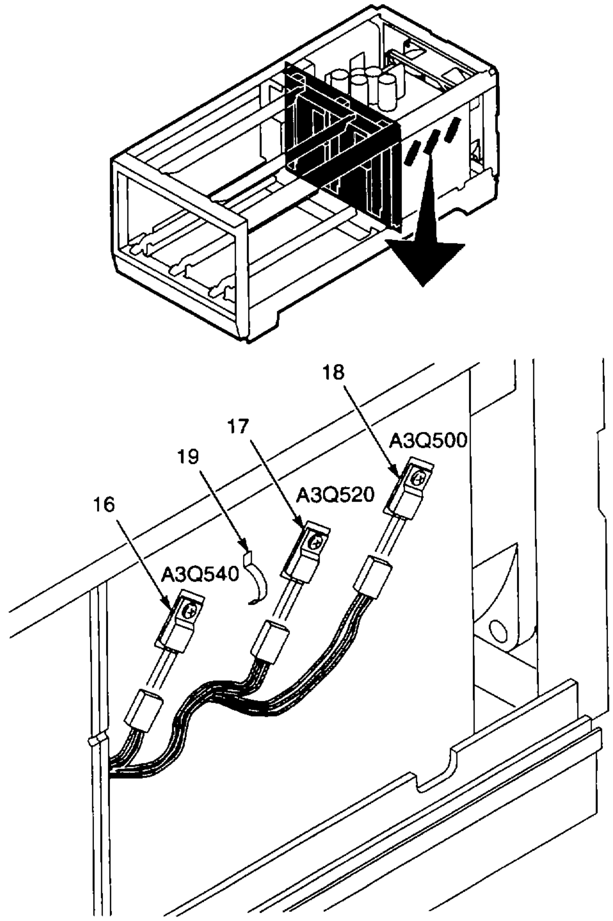
WIRE COLOR	SOLDER PAD ITEM NO.
Blue	21
Green	22
Violet	23
Yellow	24
Black	25
Orange	26
Brown	27
Gray	28



19. Unsolder following ten wires (from bundle at top of A3T500) from A3A10 Main Interface CCA (10):

WIRE COLOR	SOLDER PAD ITEM NO.
Blue	29
Green	30
White	31
Black	32
Violet	33
Red	34
Red	35
Orange	36
Brown	37
Gray	38

20. Remove A3A1 0 Main Interface CCA (10) from chassis.
21. Transfer labels added to connectors in Step 10 and Step 12 to same connectors on new A3A10 Main Interface CCA (10).



INSTALL

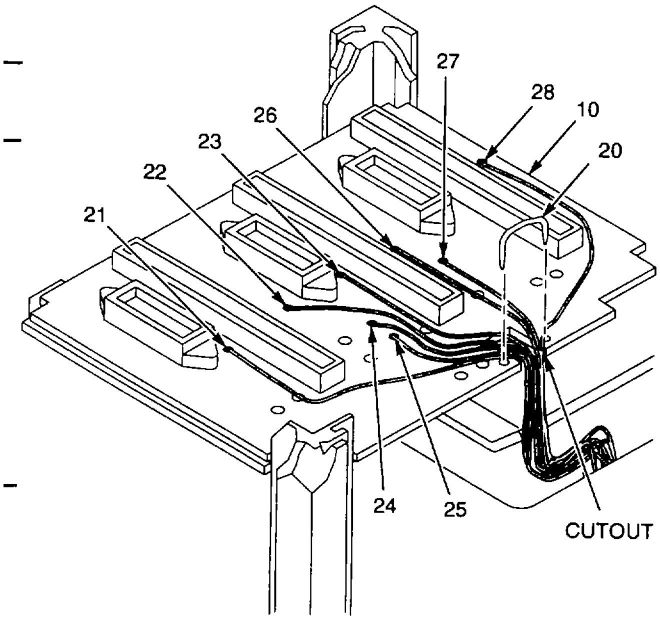
1. Set A3A10 Main Interface CCA (10) in chassis.
2. Solder bundle of ten wires (from top of A3T500) to front of A3A10 Main Interface CCA (10) as follows:

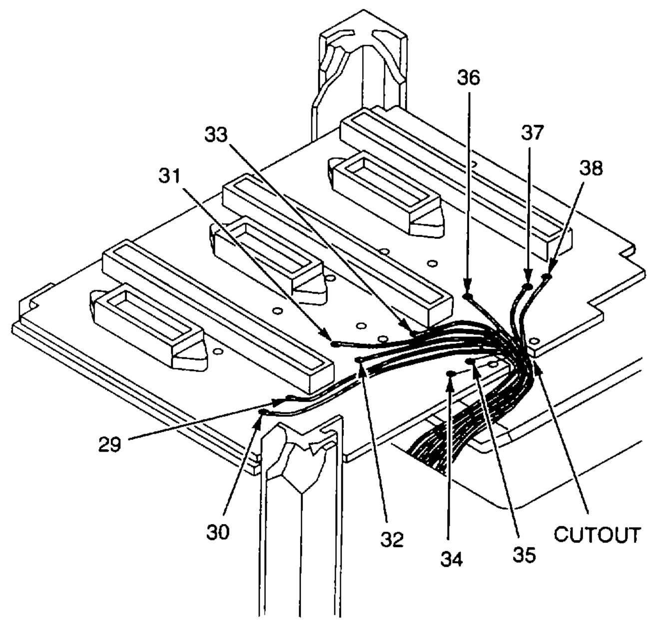
WIRE COLOR	SOLDER PAD ITEM NO.
Blue	29
Green	30
White	31
Black	32
Violet	33
Red	34
Red	35
Orange	36
Brown	37
Gray	38

3. Solder bundle of eight wires (from bottom of A3T500) to front of A3A10 Main Interface CCA (10) as follows:

WIRE COLOR	SOLDER PAD ITEM NO.
Blue	21
Green	22
Violet	23
Yellow	24
Black	25
Orange	26
Brown	27
Gray	28

4. Dress wires soldered to front o f A3A10 Main Interface CCA (10) through cutout.
5. Install new retaining strap (20), (Appendix B, Item 10), to hold wires in cutout.
6. Set chassis right side up.
7. Plug following wires onto A3A11 Secondary Supply CCA (para 2-243, Step 3):
   - Red-brown wire to A3A11J1060.
   - Violet-brown wire to A3A11J1160.
   - Black wire toA3A11J1260.
   - Red wire toA3A11J1360.
   - Multipin connector toA3A11J1463.
8. Plug connectors (labeled in Step 12 of Remove procedure) onto PNP series pass transistors A3Q500 (16), A3Q520 (17), and A30540 (18).
9. Lift end of cable clamp (19) and install cables that connect to A3Q520 and A3Q540.
10. Set chassis bottom side up.
11. Plug connectors (labeled in Step 10 of Remove procedure) onto A3Q510 (13), A3Q530 (14), and A3Q550 (15).





12. Install A3A13 Primary Supply CCA (para 2-244).
13. Set chassis on rear panel.
14. Install two screws (12) to secure A3A10 Main Interfa ce CCA (10) to chassis.
15. Place CCA support (8) in chassis.
16. Install two screws (11) that secure CCA support (8) to chassis.
17. Install six screws (9) to secure CCA support (8) to A3A10 Main Interface CCA (10).
18. Install three bottom guides (5) by inserting tips into round holes (7) in CCA support (8), then snapping other ends into front frame panel (4).
19. Install two air baffles (1) by inserting front ends into slots (3) in front frame panel (4) and squeezing latch tabs (2) with needle-nose pliers while pushing into slots in CCA support (8).
20. Install covers (para 2-241).

END OF TASK

2-249. REPLACE A3A14 LINE FILTER CCA.

DESCRIPTION

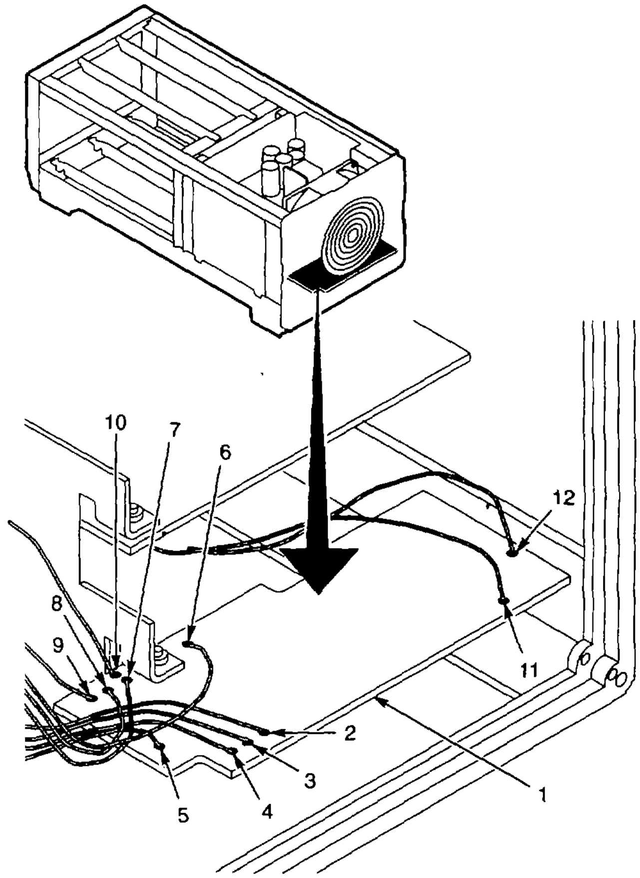
This procedure covers: Remove and Install

REMOVE

1. Remove covers (para 2-241).
2. Pull out rear panel (para 2-246, Steps 3-6) to access bottom side of A3A14 Line Filter CCA (1).
3. Unsolder following eight wires (from primary of A3T500) from A3A14 Line Filter CCA (1):

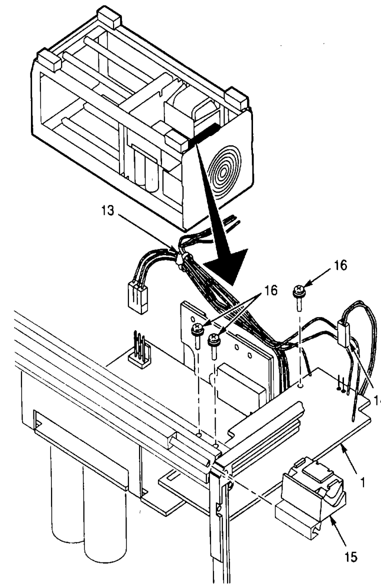
WIRE COLOR	SOLDER PAD ITEM NO.
Gray	2
Gray-red	3
Gray-violet	4
Gray-brown-white	5
Gray-green	6
Gray-orange	7
Gray-blue	8
Gray-black-yellow	9

4. Unsolder gray-orange wire (10) from A3A14 Line Filter CCA (1).
5. Unsolder following two wires (from POWER switch) from A3A14 Line Filter CCA (1):
   - Gray-red-white wire from solder pad (11).
   - Gray-black-red wire from solder pad (12).
6. Set chassis top side down.
7. Unplug multipin connector from A3A1 3J1000 on A3A13 Primary Supply CCA (para 2-244, Step 3).
8. Cut and remove tiedown strap (13).
9. Unplug multipin connector (14) from A3A14J1105 on A3A14 Line Filter CCA (1).
10. Slide cabinet foot (15) to rear of chassis and remove.
11. Remove three screws (16) that secure A3A14 Line Filter CCA (1) to chassis.
12. Remove A3A14 Line Filter CCA (1) from chassis.



INSTALL

1. Set A3A14 Line Filter CCA (1) in place.
2. Install three screws (16) that secure A3A14 Line Filter CCA (1) to chassis.
3. Install cabinet foot (15).
4. Plug multipin connector (14) onto A3A1 4J 1105 on A3A14 Line Filter CCA (1).
5. Plug multipin connector onto A3A1 3J1000 on A3A13 Primary Supply CCA (para 2-244, Step 9).
6. Install new tiedown strap (13), (Appendix B, Item 12).
7. Set chassis top side up.
8. Solder following two wires (from POWER switch) to A3A14 Line Filter CCA (1):
   - Gray red-white wire t o solder pad (11).
   - Gray black-red wire to solder pad (12).
9. Solder following eight wires (from primary of A3T500) to A3A14 Line Filter CCA (1):



WIRE COLOR	SOLDER PAD ITEM NO.
Gray-black-yellow	9
Gray-blue	8
Gray-orange	7
Gray-green	6
Gray-brown-white	5
Gray-violet	4
Gray-red	3
Gray	2

10. Solder gray-orange wire (10) to A3A14 Line Filter CCA (1).
11. Install rear panel (para 2-246, Steps 4-6).
12. Install covers (para 2-241).

END OF TASK

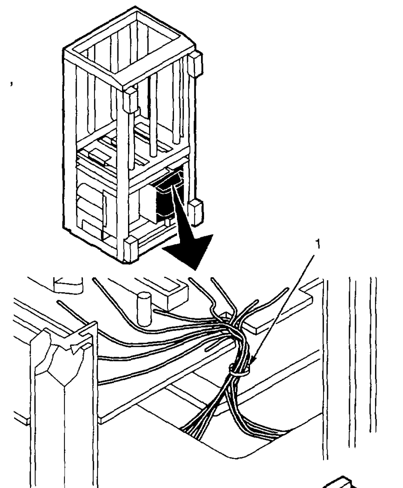
2-250. REPLACE A3T500 POWER TRANSFORMER.

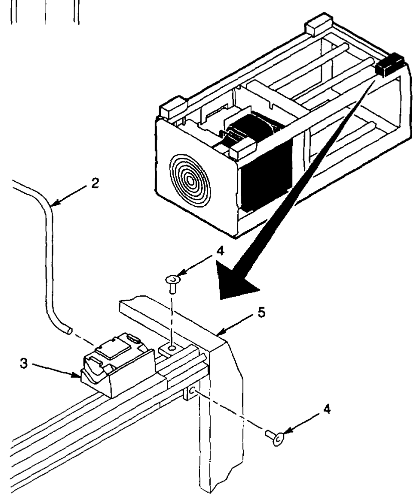
DESCRIPTION

This procedure covers: Remove and Install

REMOVE

1. Remove covers (para 2-241).
2. Remove CCA support from chassis (para 2-248 Steps 2-7).
3. Cut retaining strap, and unsolder two wire bundles (18 wires) from front of A3A10 Main Interface CCA (para 2-248, Steps 17-19).
4. Cut and remove tiedown strap (1).
5. Unsolder eight wires (from primary of A3T500) from A3A14 Line Filter CCA (para 2-249, Steps 2 and 3).
6. Remove screw that secures lug terminal to A3A13 Primary Supply CCA (para 2-244, Step 5).
7. Label PNP series pass transistors A3Q500, A3Q520, A3Q540, and associated connectors; then unplug connectors (para 2-248, Step 12).
8. Set chassis bottom side up.
9. Press in one side of flip stand (2) and remove flip stand.
10. Slide front foot (3) back enough to access screws (4) that secure front frame (5).
11. Remove following screws that secure lower frame section (6) to chassis:
    * Two screws (4) that secure front frame (5).
    * Screw (7) from rear frame (8).
    * Screw (9) that secures CCA support (10).
12. Remove following screws that secure transformer support (11) to chassis:
    * Two screws (12) from lower frame section (6).
    * Two screws (13) from upper frame section (14).
    * Two screws (15) from center of transformer support (11).





13. Pull r ear frame (8) away from lower frame section (6), and lift rear, lower frame section up and out far enough to clear transformer support (11).

14. Lift transformer support (11) with A3T500 power transformer (16) from chassis, guiding wires so they do not catch on components.

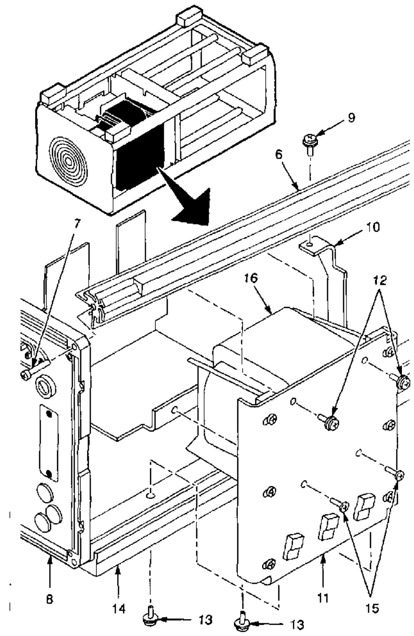
15. Note orientation of A3T500 on transformer support (11).

16. Remove four screws (17) and four nuts (18) that secure transformer bracket (19) to transformer support (11).

17. Lift transformer bracket (19) from A3T500 power trans former (16).

18. Lift A3T500 power transformer (16) from transformer support (11).

19. Transfer lug terminal (20) to same wires on new A3T500 power transformer (16).



INSTALL

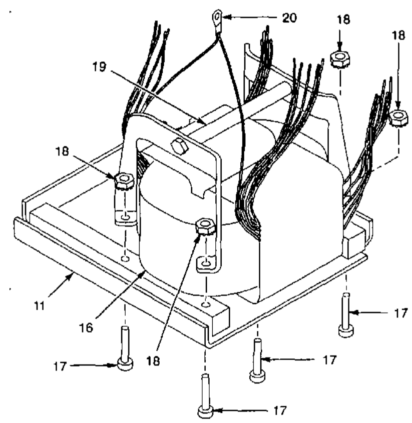
1. .SetA3T500 power transformer (16) in place on transformer support (11), oriented as noted in Step 15 of Remove procedure.

2. Set transformer bracket (19) on A3T500 power transformer (16), aligning holes in bracket with holes in transformer support (11).

3. Install four screws (17) and four nuts (18) to secure transformer bracket (19) to transformer support (11).

4. Set transformer support (11) with A3T500 power transformer (16) in chassis, guiding wires so they do not catch on components.

5. Install following screws to secure transformer support (11) to chassis: * Two screws (12) from lower frame section (6).



- Two screws (13) from upper frame section (14).
- Two screws (15) from center of transformer support (11).

6. Install following screws to secure lower frame section (6) to chassis:

   - Two screws (4) in front frame (5).
   - Screw (7) in rear frame (8).
   - Screw (9) in CCA support (10).

7. Slide front foot (3) forward against front frame (5).
8. Install flip stand (2).
9. Plug connectors labelled in Step 7 of Remove procedure onto associated PNP series pass transistors A3Q500, A3Q520, and A3Q540 (para 2-248, Step 8).
10. Install screw that secures lug terminal to A3A13 Primary Supply CCA (para 2-244, Step 7).
11. Solder eight wires (from primary of A3T500) to A3A14 Line Filter CCA (para 2-249, Step 9).
12. Install new tiedown strap (1), (Appendix B, Item 12).
13. Install rear panel (para 2-246, Steps 4-6).
14. Solder two wire bundles (18 wires) to front of A3A10 Main Interface CCA, and install new retaining strap (para 2-248, Steps 2-5).
15. Install CCA support in chassis (para 2-248, Steps 13-19).
16. Install covers (para 2-241).

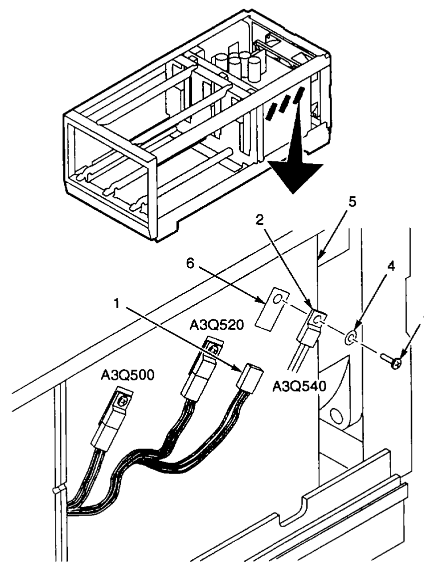
END OF TASK

2-251. REPLACE A3Q500, A3Q520, OR A3Q540 PNP SERIES PASS TRANSISTOR.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE

1. Remove right side cover (para 2-241).
2. Unplug connector (1) from PNP series pass transistor (2) to be replaced.
3. Remove screw (3) and washer (4) that secure PNP series pass transistor (2) to transformer support (5).
4. Remove PNP series pass transistor (2), and if loose, plate insulator (6).



INSTALL

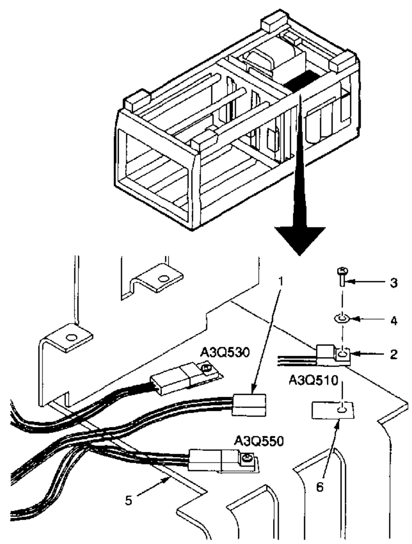
1. Install screw (3) and washer (4) to secure PNP series pa ss transistor (2) and plate insulator (6) to transformer support (5).
2. Plug connector (1) onto series pass transistor (2).
3. Install right side cover (para 2-241).

END OF TASK

2-252. REPLACE A3Q510, A3Q530, OR A30550 NPN SERIES PASS TRANSISTOR.

DESCRIPTION

This procedure covers: Remove and Install



REMOVE

1. Remove A3A13 Primary Supply CCA (para 2-244) from chassis to reach NPN series pass transistors.
2. Unplug connector (1) from NPN series pass transistor (2) to be replaced.
3. Remove screw (3) and washer (4) that secure NPN series pass transistor (2) to chassis (5).
4. Remove NPN series pass transistor (2), and if loose, plate insulator (6).

INSTALL

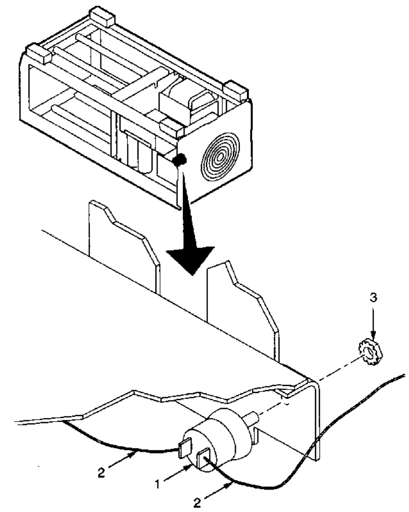
1. Install screw (3) and washer (4) to secure NPN series pass transistor (2) and plateinsulator (6) to chassis (5).
2. Plug connector (1) onto series pass transistor (2).
3. Install A3A13 Primary Supply C CA (para 2-244).

END OF TASK

2-253. REPLACE A3S501 THERMOSTATIC SWITCH

DESCRIPTION

This procedure covers: Remove and Install



REMOVE

1. Pull out rear panel (para 2-246) to reach A3S501 thermostatic switch (1).
2. Unsolder wires (2) from A3S501 thermostatic switch (1).
3. Remove nut (3).
4. Remove A3S501 thermostatic switch (1).

INSTALL

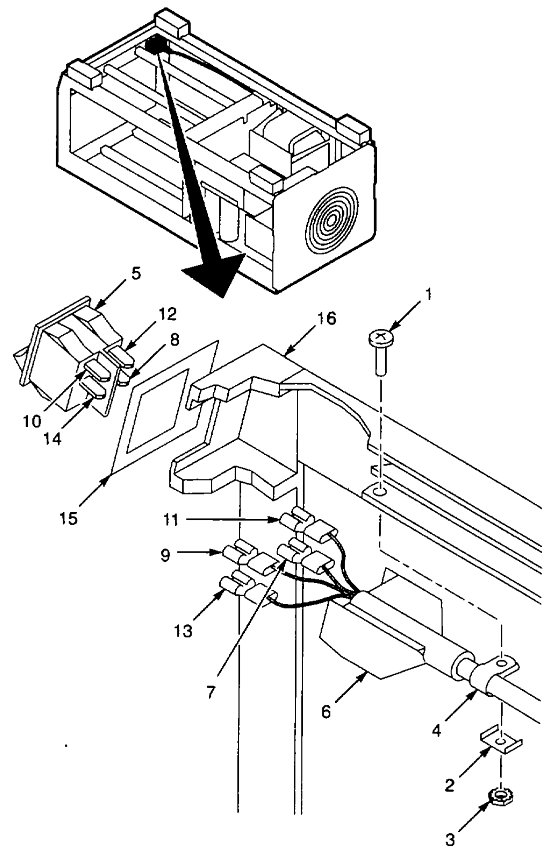
1. Install A3S501 ther mostatic switch (1) in mounting hole in chassis.
2. Install nut (3) to secure A3S501 thermostatic switch (1) to chassis.
3. Solder wires (2) to A3S501 thermostatic switch (1).
4. Install rear panel (para 2-246).

END OF TASK

2-254. REPLACE A3S500 POWER SWITCH.

DESCRIPTION
This procedure covers: Remove and Install

REMOVE



1. Remove TM 5003 module covers (para 2-241).
2. Set chassis bottom side up.
3. Remove screw (1), loop clamp washer (2), and nut (3) that secure loop clamp (4) nearest A3S500 power switch (5).
4. Remove loop clamp (4).
5. Slide switch cover (6) back to expose connections on rear of A3S500 power switch (5).
6. Unplug following four wires from A3S500 power switch (5):
   - Gray-red-white wire (7) from terminal (8).
   - Gray-black-brown wire (9) from terminal (10).
   - Gray-brown-white wire (11) from terminal (12).
   - Gray-black-red wire (13) fr om terminal (14).
7. Press rear of A3S500 power switch (5) to push switch and attached plate (15) from cabinet front panel (16).
8. Remove A3S500 power switch (5) from plate (15).

INSTALL

1. Set A3S500 power switch to position that shows red O indicator.
2. Install plate (15) on A3S500 power switch (5) so that red O indicator is directly below POWER label on plate.
3. Align A3S500 power switch (5) and plate (15) with cutout in cabinet front panel (16). Ensur e labels on plate are oriented correctly.
4. Press in A3S500 power switch (5) to snap into place.
5. Plug following four wires onto A3S500 power switch (5):

   - Gray-red-white wire (7) to terminal (8).
   - Gray-black-brown wire (9) to terminal (10).
   - Gray-brown-white wire (11) to terminal (12).
   - Gray-black-red wire (13) to terminal (14).

6. Slide switch cover (6) over connections on rear of A3S500 power switch (5).
7. Install loop clamp (4).
8. Secure loop clamp (4) to chassis with screw (1), lo op clamp washer (2), and nut (3).
9. Install TM 5003 module covers (para 2-241).

END OF TASK

Section V. PREPARATION FOR STORAGE OR SHIPMENT

2-255. PACKAGING.

If original packing material was saved, pack Spectrum Analyzer System AN/USM-620 as it was received. When using packing materials other than the original, use the following guidelines:

a. Wrap 495P Spectrum Analyzer, TR 503 Tracking Generator, or TM 5003 Power Module in polyethylene sheeting.

b. Select a double-wall cardboard container. Inside dimensions must be at least six inches greater than the equipment. The carton must meet the following test strength requirements:

- 495P Spectrum Analyzer, >375 lbs (170.1 kg).
- TR 503 Tracking Generator, 2 275 lbs (124.7 kg).
- TM 5003 Power Module, 2 350 lbs (158.8 kg).

c. Protect all sides with shock-absorbing material to keep equipment from movement within the container.

d. Seal carton with approved sealing tape.

e. Mark carton "FRAGILE" on all s ides, top, and bottom of shipping container.

2-256. TYPES OF STORAGE.

a. Short-Term (administrative): 1 to 45 days. Refer to TM 740-90-1 for administrative storage procedure

b. Intermediate: 46 to 180 days.

c. Long-Term: Over 180 days.

2-257. ENVIRONMENT.

Spectrum Analyzer System AN/USM-620 should be stored in a clean, dry environment. The following environmental conditions apply for both shipping and storage:

Temperature Range .... -40 to +167 ° F (-40 to +75 ° C)
Altitude .... Up to 40,000 Feet (12 ,192 Meters)

APPENDIX A
REFERENCES

A-1. SCOPE.

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A-2. FORMS.

Product Quality Deficiency Report .... Form SF 368

Recommended Changes to Publications and Blank Forms .... DA Form 2028

Report of Discrepancy Report (ROD) .... Form SF 364

A-3. TECHNICAL MANUALS.

Operator's and Unit Maintenance Manual, for Spectrum Analyzer
System AN/USM-620 .... TM 11-6625-3278-12

Procedures for Destruction of Electronics Materiel to
Prevent Enemy Use (Electronics Command) .... TM 750-244-2

Unit, Direct and General Support Maintenance Repair Parts and
Special Tools List, for Spectrum Analyzer System AN/USM-620 .... TM 11 -6625-3278-24P

A-4.MISCELLANEOUS.

Interactive Electronic Technical Manual for Calibration and Repair
Requirements for the Maintenance of Army Material EM-0022

Consolidated Index of Army Publications and Blank Forms .... DA Pam 25-30

First Aid .... FM 4-25.11

Safety Requirements for Maintenance of Electrical and Electronic
Equipment (This Item is included on EM 0128) .... TB 385-4

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 and durable items that you will need to operate and maintain Spectrum Analyzer System AN/USM-620. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-790, Expendable/Durable Items (except medical, class V repair parts, and heraldic items), or CTA 8-100, Army Medical Department Expendable/Durable 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 item (e.g., "Use cleaning compound, item 5, Appendix B".)

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the item.

C- Operator/Crew
0 - Organizational Maintenance
F - Direct Support Maintenance
H - General Support Maintenance
D- Depot

c. Column (3) - National stock number. This column provides the national stock number assigned to the item which you can use to requisition it.

d. Column 4, Item name, description, Commercial and Government Entity Code (CAGEC), and part number. This column provides the other information you need to identify the item.

e. Column 5, Unit of measure (U/M). This column provides a code that shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION, CAGEC, PART NUMBER	(5) U/M
1	C	8305-00-267-3015	Cloth, Cheesecloth, Cotton, Lintless, CCC-C-440, Type II, Class 2 (81 349)	YD
2	C	6810-00-753-4993	Alcohol, Isopropyl, 8 oz Can, TT-I-735, Grade A (81349) , CN”	CN
3	C	7930-00-068-1669	Detergent, Mild, Liquid	0Z
4	H		Solder, Resin Core, 63% Tin, 37% Lead (091 85) SN63-015-282-50	LB
5	H	3439-00-912-8698	Solder, 60% Tin, 37% Lead, 3% Silver (80009) 251 -0514-00	LB
6	H		Applicator, Cotton Tipped, 6 Inch (52127) 806-WC	EA
7	H		Heat Shrink Tubing, ,093 Diameter (80009) 162-0561 -00	YD
8	H	5970-00-152-3887	Compound, lnsulating 1 oz Tube (1 31 03) 249 Thermalloy	TB
9	H	6850-01-333-1841	Freezing Compound (21267) ES1050, CN”	CN
10	H	5975-00-937-6691	Strap, Retaining (981 59) 2829-75-4	EA
11	H		Strap, Tiedown (80009) 343-01 49-00	EA
12	H	5975-01 -343-1 706	Strap, Tiedown (80009) 006-0531 -00	EA

APPENDIX C
ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I. INTRODUCTION

C-1. SCOPE.

This appendix includes instructions for making items authorized to be manufactured or fabricated at general support maintenance level for Spectrum Analyzer System AN/USM-620.

Bulk materials needed for manufacture of an item are listed by part number. The figure below shows parts required for cable assemblies.

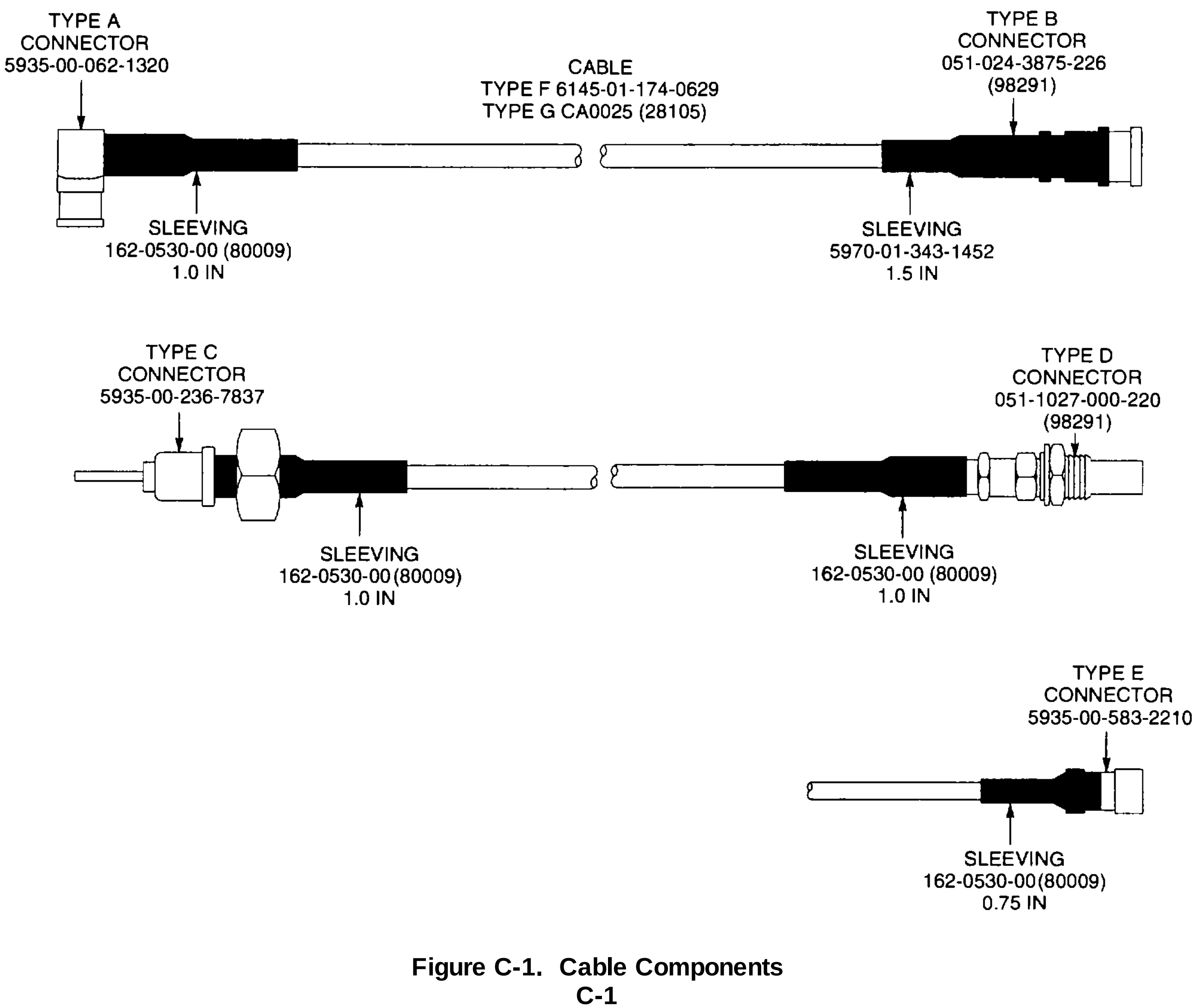


Figure C-1. Cable Components

Refer to the table following this procedure for specific information to build any of the listed cables.

1. Cut cable to length.
2. Trim each end of cable.
3. Slide sleeving onto each end of cable. If installing a Type C connector, also slide large nut onto cable.
4. Install appropriate type connector on each end of cable and crimp.
5. Slide sleeving into place and apply heat to shrink.

CIRCUIT NUMBER	TYPE CABLE	LENGTH (+0.25 IN)	TYPE CONNECTORS	
A1A30W301	F	6.10 in	C	D
A1A68W684	F	7.00 in	A	B
A1A68W694	F	27.00 in	A	A
A1W182	F	5.00 in	A	A
A1W224	F	20.35 in	A	B
A1W252	F	18.35 in	A	A
A1W260	F	3.25 in	A	B
A1W320	F	3.00 in	A	A
A1W340	F	17.52 in	B	C
A1W342	F	13.00 in	A	B
A1W344	F	17.00 in	A	A
A1W346	F	6.25 in	A	A
A1W347	F	18.25 in	A	A
A1W350	F	17.00 in	A	A
A1W360	F	2.50 in	A	B
A1W361	F	20.35 in	A	B
A1W370	F	8.00 in	A	A
A1W502	F	17.00 in	A	A
A1W620	F	16.00 in	A	C
A1W622	F	15.25 in	A	A
A1W682	F	2.50 in	A	B
A1W696	F	27.00 in	A	B
A1W1044	F	8.25 in	A	A
A1W1060	F	13.25 in	A	A
A2W10	G	10.00 in	A	E

GLOSSARY

The following glossary defines terms as they are used in this manual.

Active Trace - Trace displayed on CRT of 495P Spectrum Analyzer that updates with each new sweep.

Cursor- A horizontal line on CRT of 495P Spectrum Analyzer that determines whether the peak or average level of signals are displayed. Peak signal levels are displayed above the cursor. Average signal levels are displayed below the cursor.

Digitize - The process of sampling signals, converting them to digital signals, and storing them in memory.

Display Dynamic Range - The maximum ratio of the levels of two non-harmonically related sinusoidal signals each of which can be simultaneously measured on the screen to a specified accuracy.

NOTE

Display flatness is closely related to frequency response. The main difference is that the spectrum display is not moved to center screen.

Display Flatness - Unwanted variation of displayed amplitude over specified frequency span. Expressed in decibels.

Dot Marker- Dot on CRT of 495P Spectrum Analyzer that indicates CENTER FREQUENCY setting. In MAX SPAN mode, the dot marker moves when CENTER FREQUENCY changes. Dot marker appears at center of CRT for all other SPAN/DIV settings.

Frequency Drift - Gradual shift or change in displayed frequency over the specified time due to internal changes in 495P Spectrum Analyzer. Other conditions must remain constant. Expressed in hertz per second.

Mixer Product - Output frequency from mixer circuit resulting from mathematical sum or difference between the frequency of input signals.

Noise Sidebands - Undesired response caused by noise internal to 495P Spectrum Analyzer. Noise appears on the display around input signals.

Non-volatile RAM (NVRAM) - Storage system within 495P Spectrum Analyzer than retains data when power is off.

Phase Noise - Increased amplitude of noise floor around lower portion of signals displayed on CRT of 495P Spectrum Analyzer.

Residual FM - Short term displayed frequency instability or jitter due to instability in 495P Spectrum Analyzer. Given in terms of peak-to-peak frequency deviation and expressed in hertz.

Retrace - Time period during which the CRT beam moves from right to left on CRT. Retrace must occur before a new sweep can be triggered.

SAVE A Trace - Trace displayed on CRT of 495P Spectrum Analyzer when SAVE A mode is on and VIEW A key is lit. SAVE A trace is static and does not update with the sweep.

Shape Factor- The ratio of the frequency separation of two points (60 dB and 6 dB) on the response curve.

Slope - When testing residual FM, the resulting frequency value when the frequency range measured over five vertical divisions is divided by five.

Spurious Response - A response on CRT of 495P Spectrum Analyzer where the displayed frequency is not related to input frequency.

Stub - Printed lead on CCA surface used to tune resonant frequency of transmission line.

Terminate - To connect a load that equals the impedance of the port to which it is connected. Within AN/USM-620, 50 C **W** terminations are used.

Zero Hertz Response (O Hz Response) - A signal on CRT of 495P Spectrum Analyzer that corresponds to O Hz CENTER FREQUENCY.

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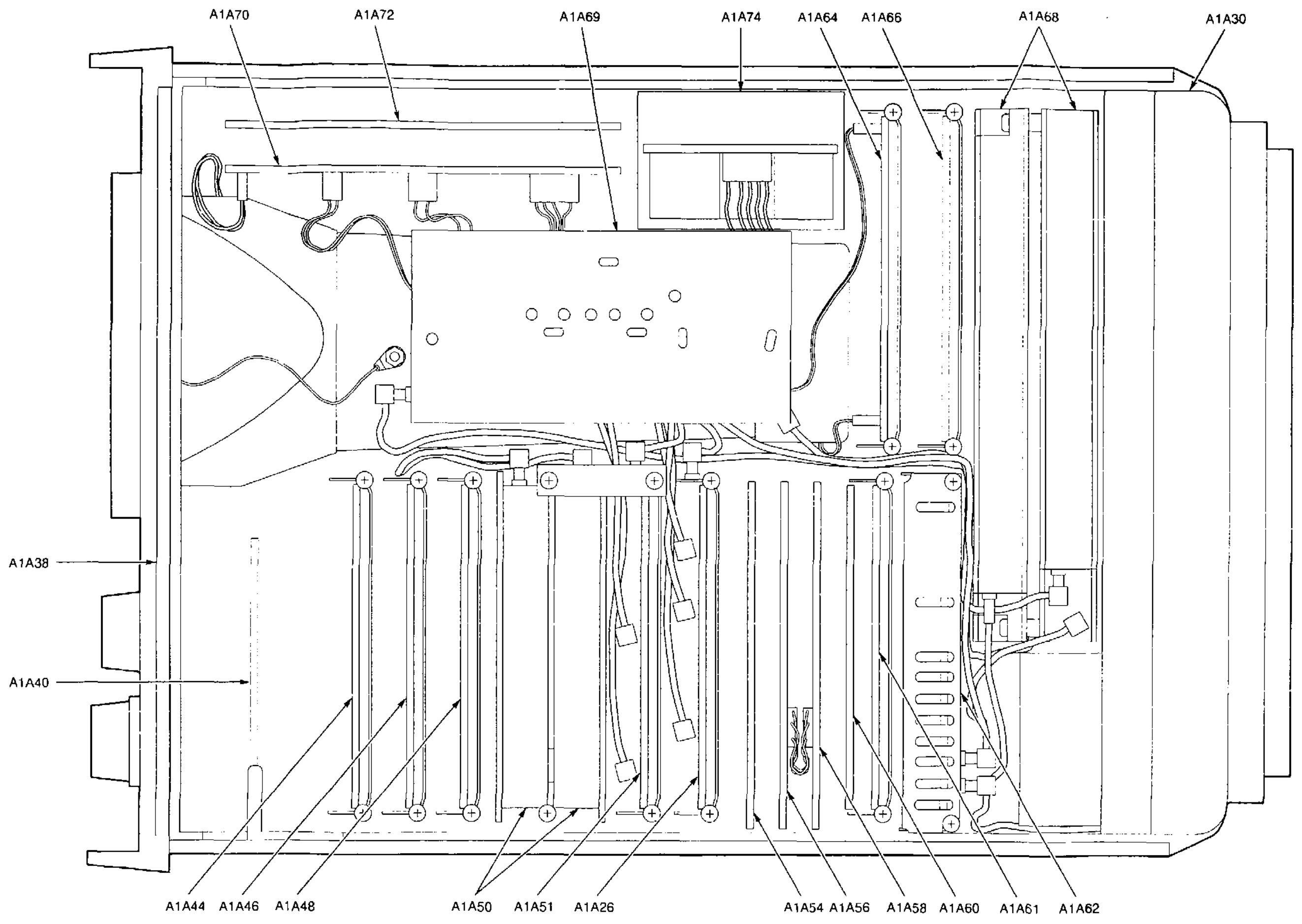
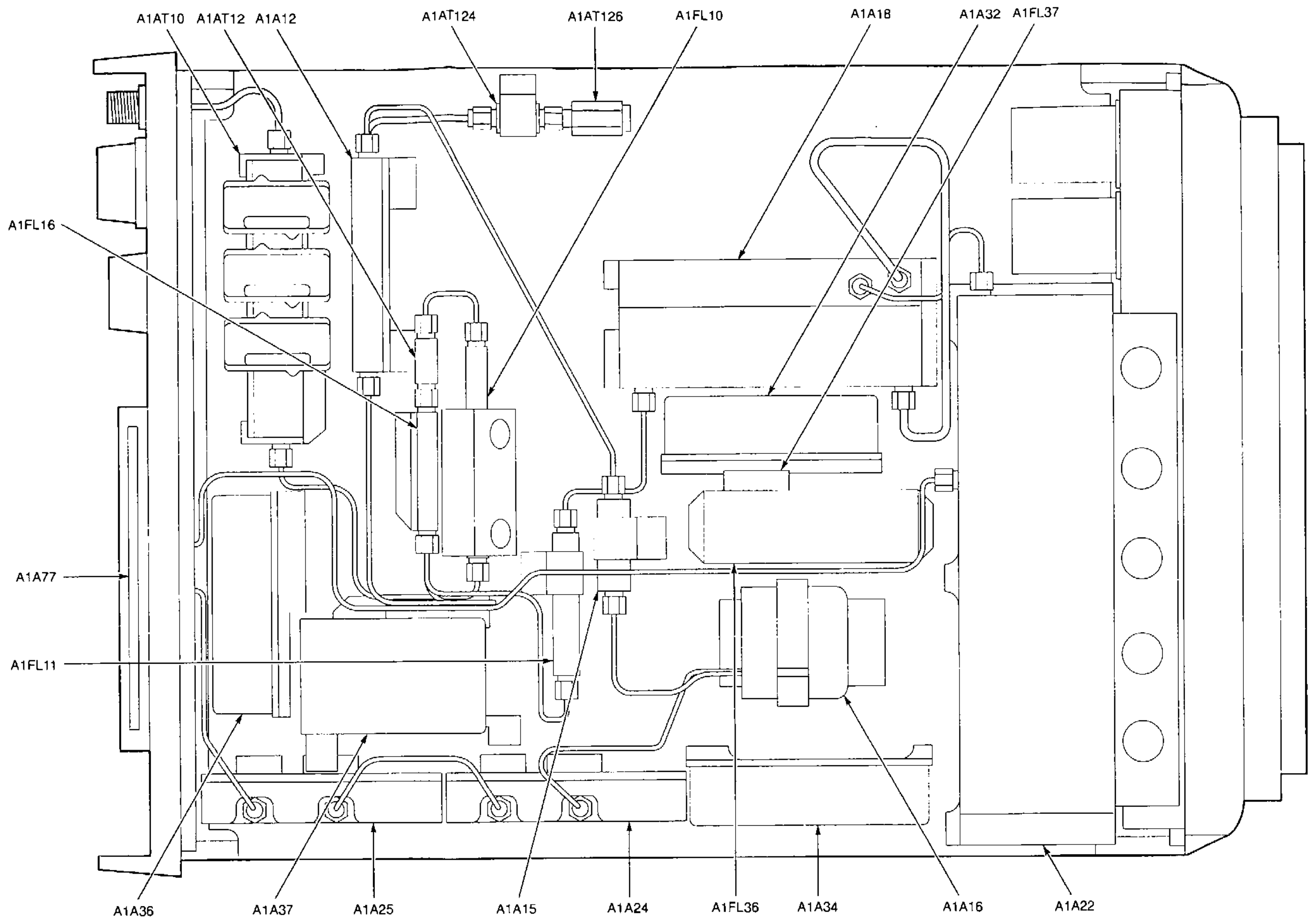
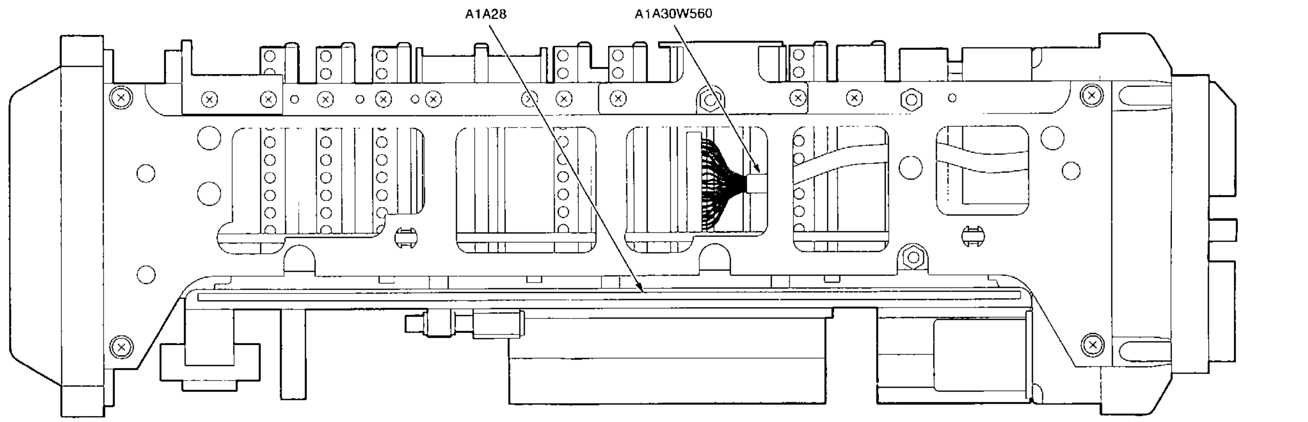


495P SPECTRUM ANALYZER TOP VIEW CCA LOCATOR

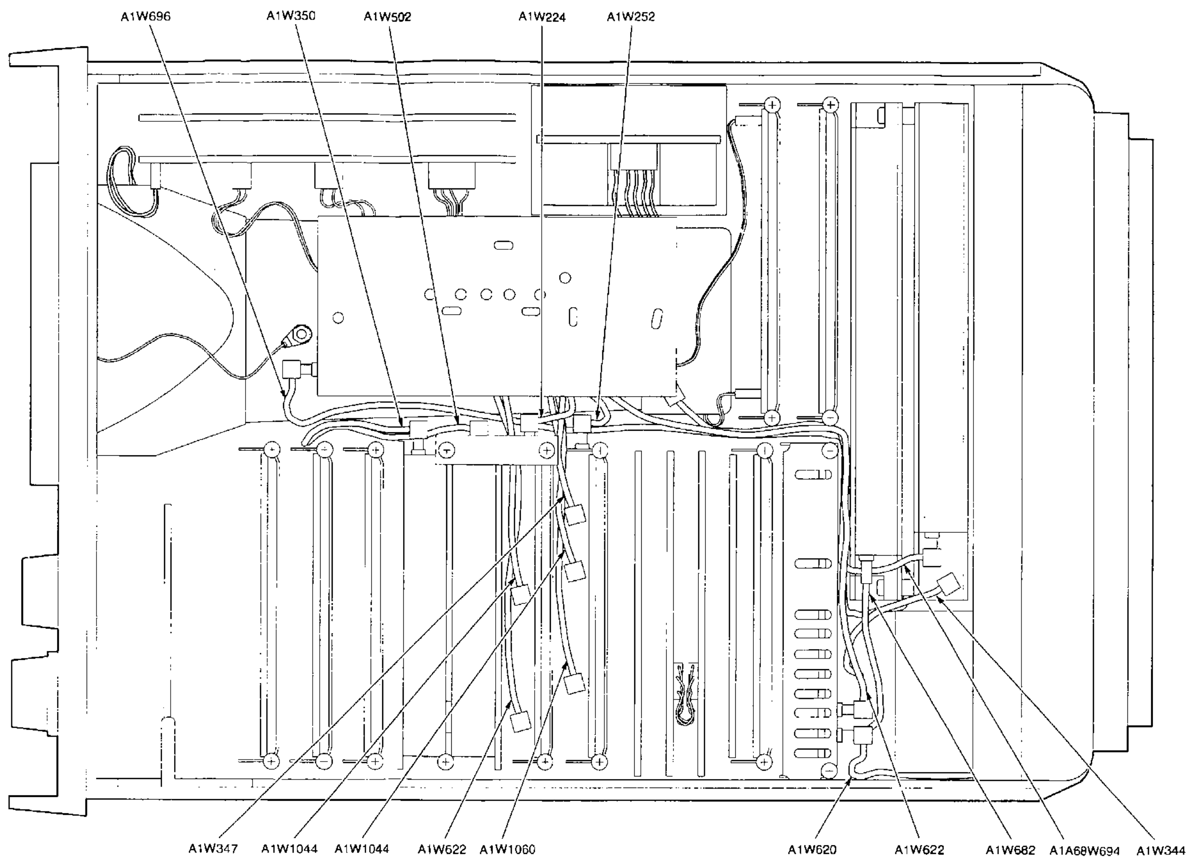


495P SPECTRUM ANALYZER BOTTOM VIEW CCA LOCATOR

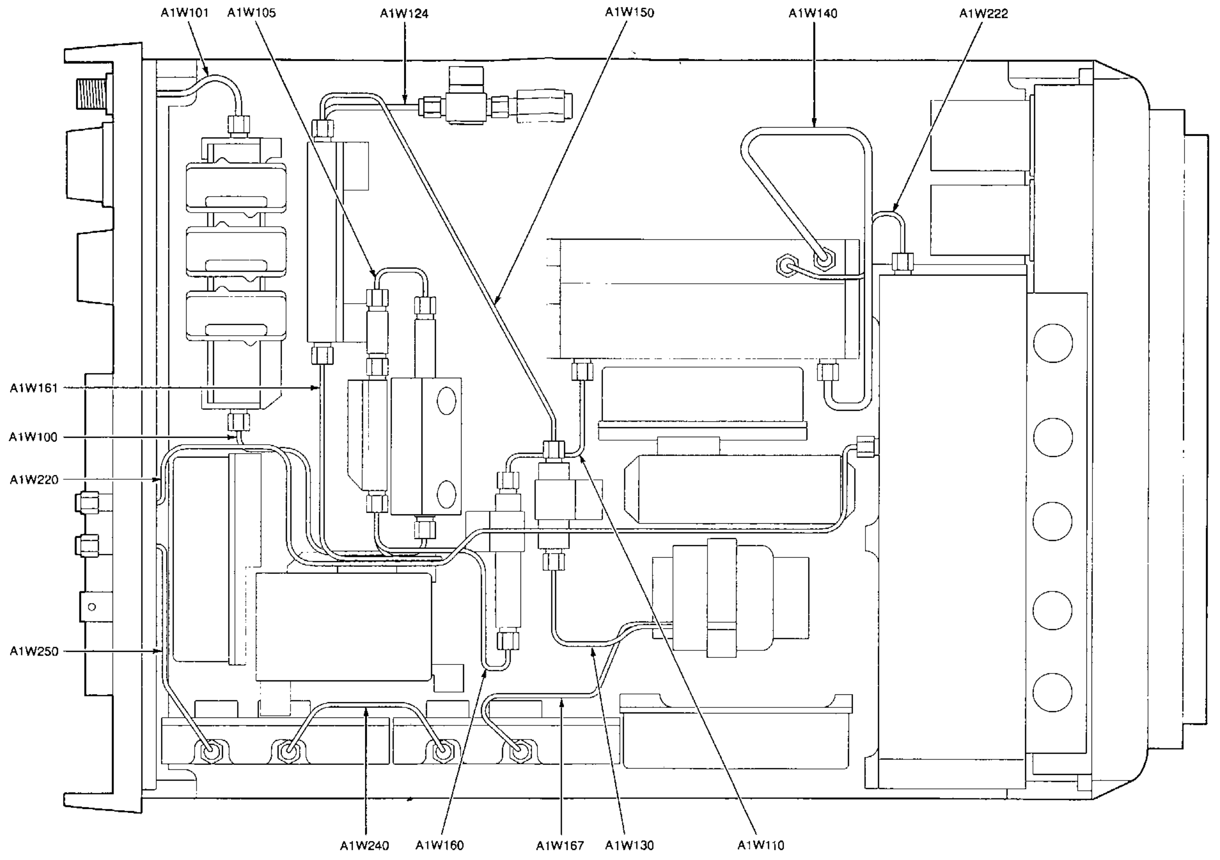


494P SPECTRUM ANALYZER RIGHT SIDE VIEW CCA AND CABLE LOCATOR

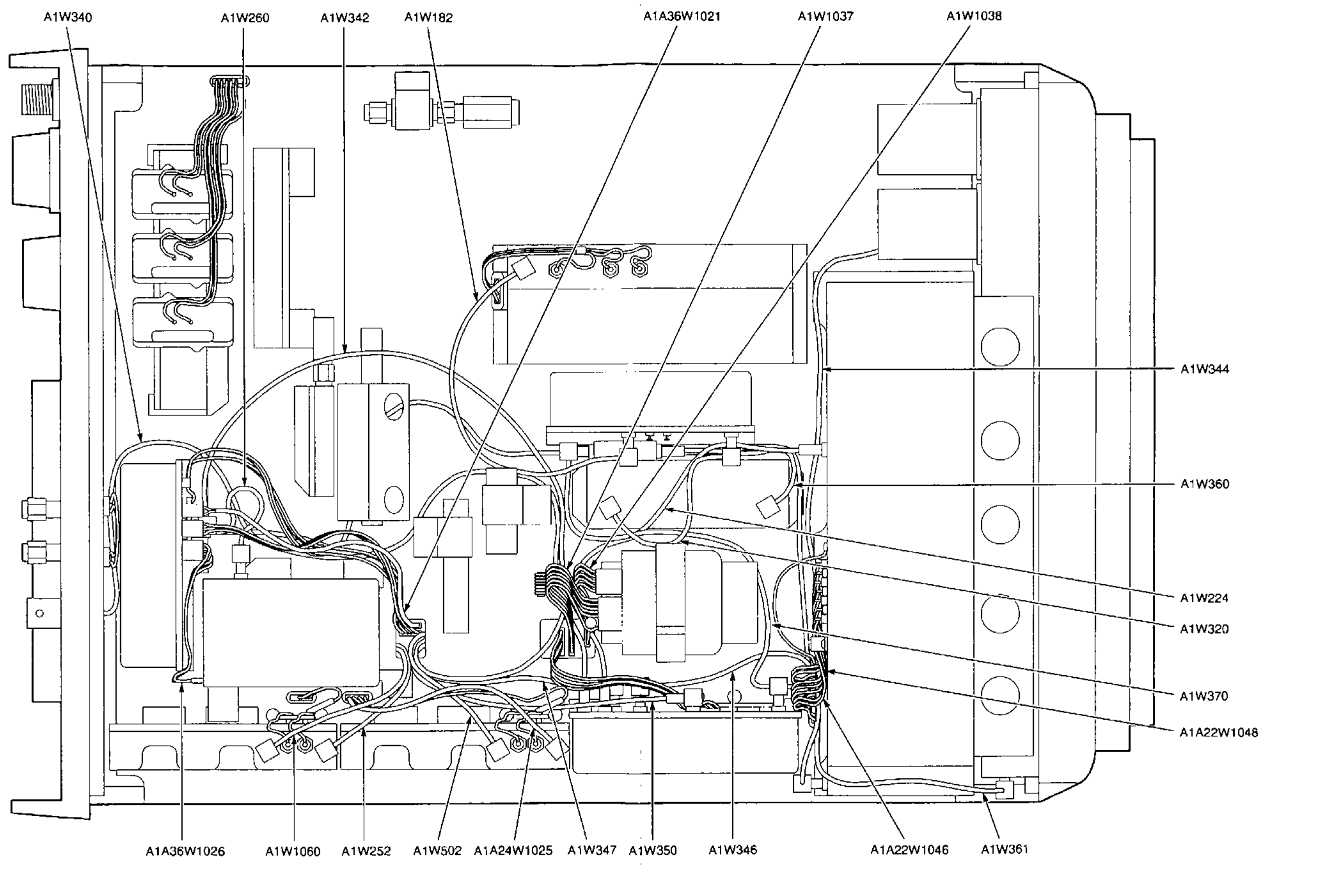
Figure FO-1. 495P Spectrum Analyzer CCA Locator and Interconnect Diagrams (Sheet 1 of 4)



495P SPECTRUM ANALYZER TOP VIEW CABLES

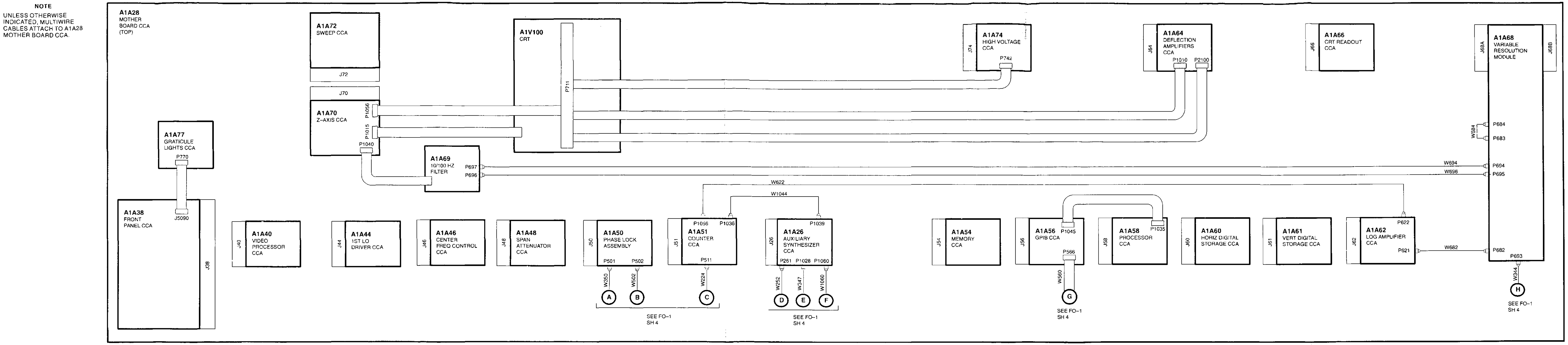


495P SPECTRUM ANALYZER BOTTOM VIEW SEMIRIGID CABLES



494P SPECTRUM ANALYZER BOTTOM VIEW COAXIAL AND MULTIWIRE CABLES

Figure FO-1. 495P Spectrum Analyzer CCA Locator and Interconnect Diagrams (Sheet 2 of 4)

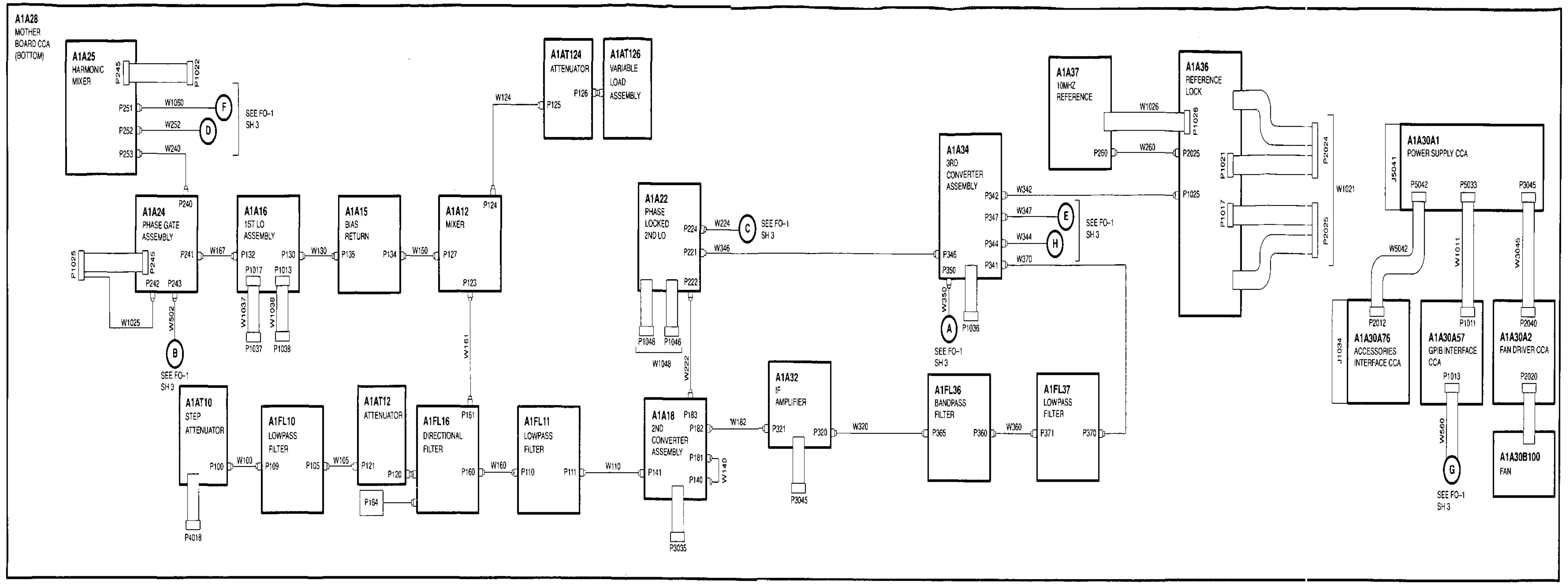


495P SPECTRUM ANALYZER INTERCONNECT DIAGRAM (1 OF 2)

Figure FO-1. 495P Spectrum Analyzer CCA Locator and Interconnect Diagrams (Sheet 3 of 4)

NOTE

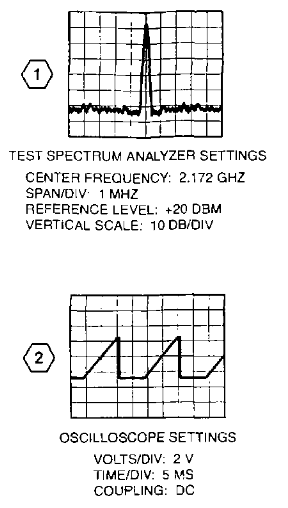
UNLESS OTHERWISE INDICATED, MULTIWIRE CABLES ATTACH TO A1A28 MOTHER BOARD CCA.

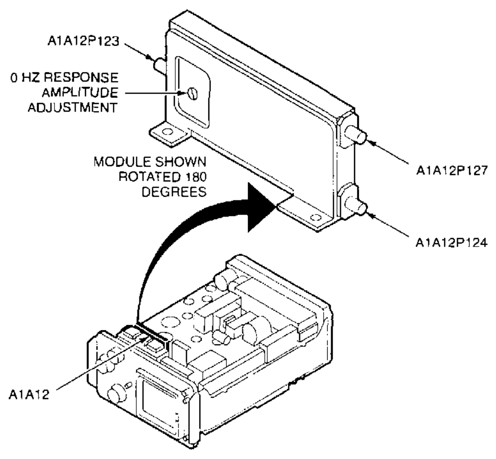


495P SPECTRUM ANALYZER INTERCONNECT DIAGRAM (2 OF 2)

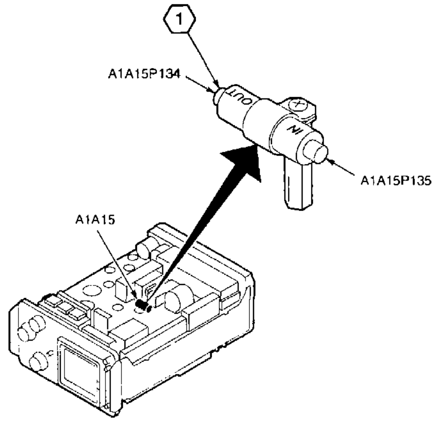
Figure FO-1. 495P Spectrum Analyzer CCA Locator and Interconnect Diagrams (Sheet 4 of 4)

FP-7/(FP-8 Blank)

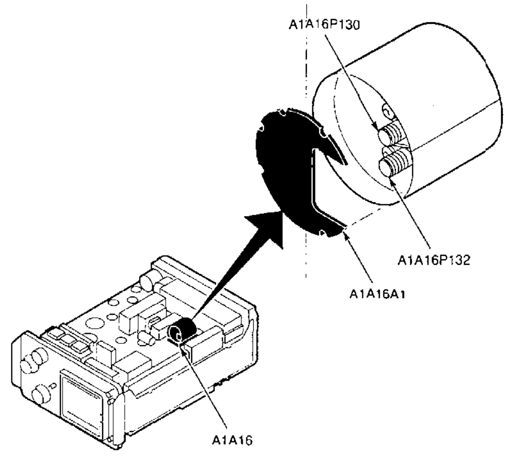




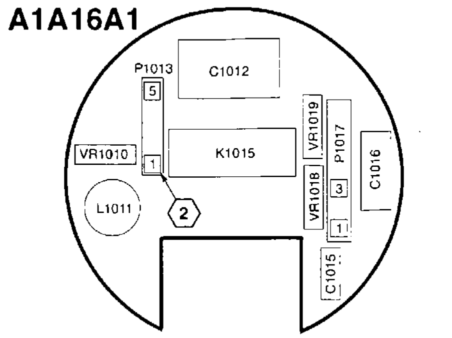
A1A12

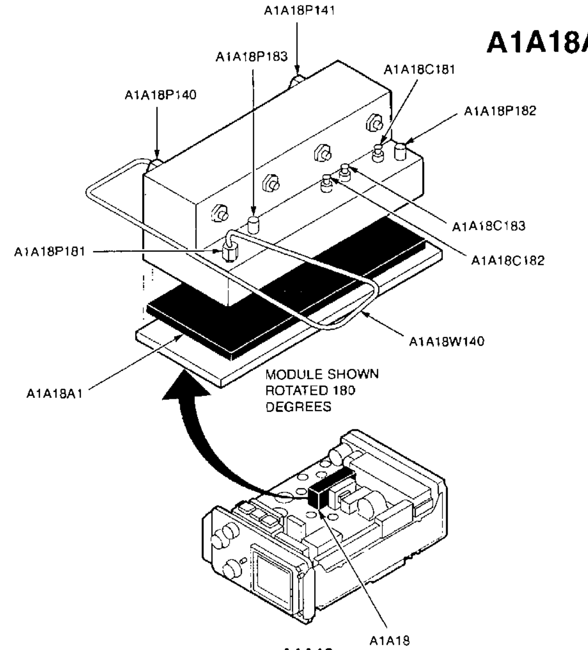


A1A15

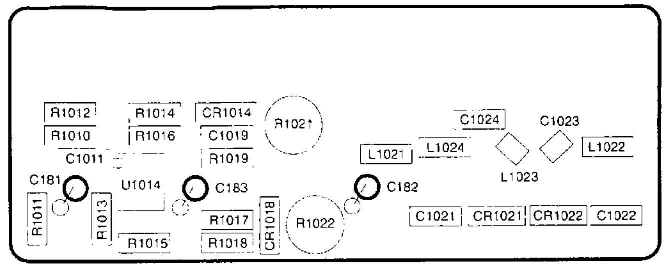


A1A16



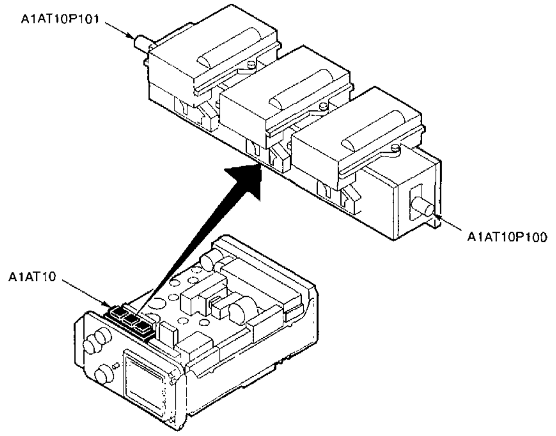


A1A18



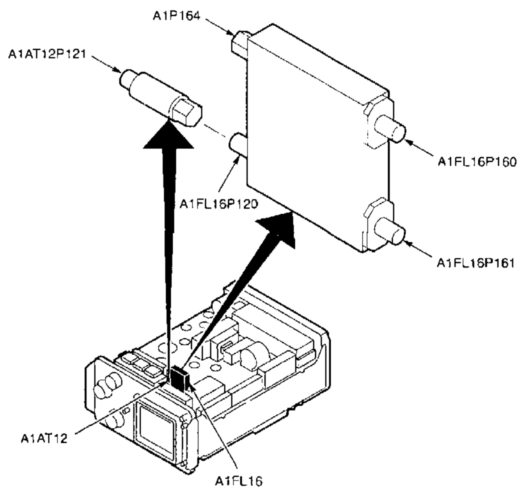
NOTE

C181, C182 AND C183 ARE CHASSIS MOUNTED.

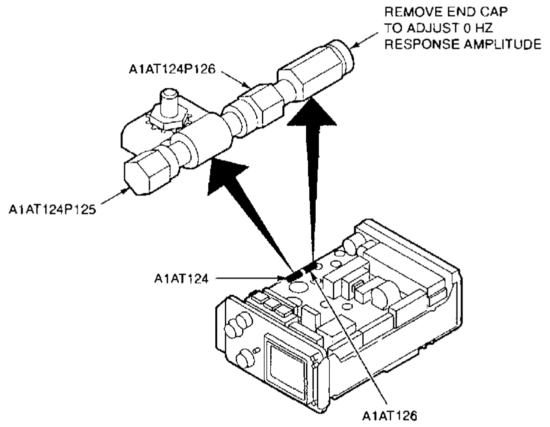


A1AT10

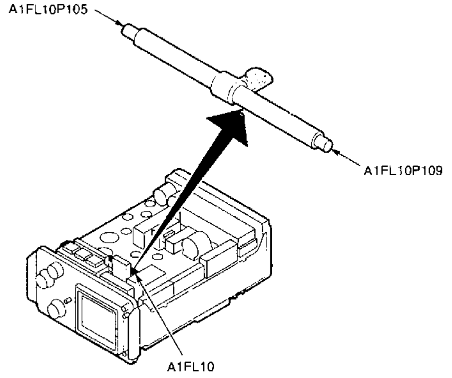
A1AT10 STEP ATTENUATOR SWITCHING MEASURED AT A1A28J4018						
RF ATTEN SETTING	TEST FOR AT PIN 1	TEST FOR AT PIN 2	TEST FOR AT PIN 3	TEST FOR AT PIN 4	TEST FOR AT PIN 5	TEST FOR AT PIN 6
0 DB	L (0 V)	H (+7 V)	L (0 V)	H (+7 V)	L (0 V)	H (+7 V)
10 DB	L (0 V)	H (+7 V)	L (0 V)	H (+7 V)	H (+7 V)	L (0 V)
20 DB	L (0 V)	H (+7 V)	H (+7 V)	L (0 V)	L (0 V)	H (+7 V)
30 DB	L (0 V)	H (+7 V)	H (+7 V)	L (0 V)	H (+7 V)	L (0 V)
40 DB	H (+7 V)	L (0 V)	L (0 V)	H (+7 V)	H (+7 V)	L (0 V)
50 DB	H (+7 V)	L (0 V)	H (+7 V)	L (0 V)	L (0 V)	H (+7 V)
60 DB	H (+7 V)	L (0 V)	H (+7 V)	L (0 V)	H (+7 V)	L (0 V)



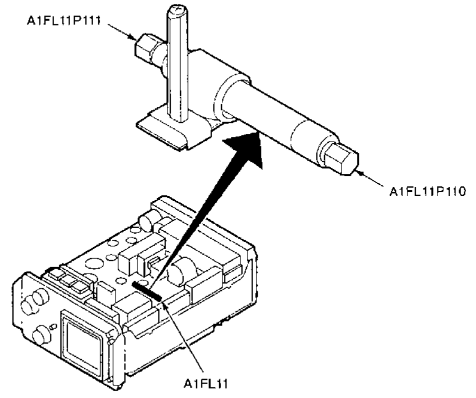
A1AT12 AND A1FL16



A1AT124 AND A1AT126



A1FL10



A1FL11

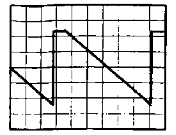
495P SPECTRUM ANALYZER INTERCONNECT DIAGRAM (1 OF 2)

Figure FO-2. A1A12 Mixer, A1A15 Bias Return, A1A16 1ST LO Assembly, A1A16A1 1ST LO Interface CCA, A1A18 2nd Converter Assembly, A1A18A1 2nd Converter CCA, A1AT10 Step Attenuator, A1AT12 Attenuator, A1FL16 Directional Filter, A1AT124 Attenuator, A1AT126 Variable Load Assembly, A1FL10 Lowpass Filter and A1FL11 Lowpass Filter Component Locators

NOTE

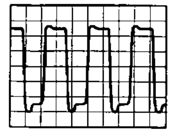
THE SYMBOL * INDICATES PARTS ARE LOCATED ON BOTTOM SIDE OF CCA.

1



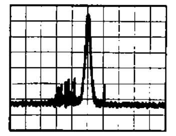
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 5 V
TIME/DIV: 100 MS
COUPLING: DC

2



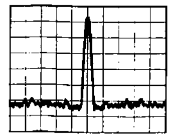
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 50 MV
TIME/DIV: 20 NS
COUPLING: DC
IMPEDANCE: 50 Ω

3



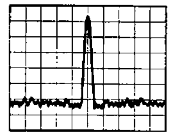
TEST SPECTRUM ANALYZER SETTINGS
CENTER FREQUENCY: 18 MHZ
SPAN/DIV: 1 MHZ
REFERENCE LEVEL: –40 DBM
VERTICAL SCALE: 10 DB/DIV

4



TEST SPECTRUM ANALYZER SETTINGS
CENTER FREQUENCY: 2.182 GHZ
SPAN/DIV: 2 MHZ
REFERENCE LEVEL: –10 DBM
VERTICAL SCALE: 10 DB/DIV

5



TEST SPECTRUM ANALYZER SETTINGS
CENTER FREQUENCY: 2200 MHZ
SPAN/DIV: 2 MHZ
REFERENCE LEVEL: –40 DBM
VERTICAL DIV: 10 DB/DIV

NOTE

THE FOLLOWING IS A TYPICAL EXAMPLE OF THE 2ND LO DIAGNOSTIC DISPLAY.

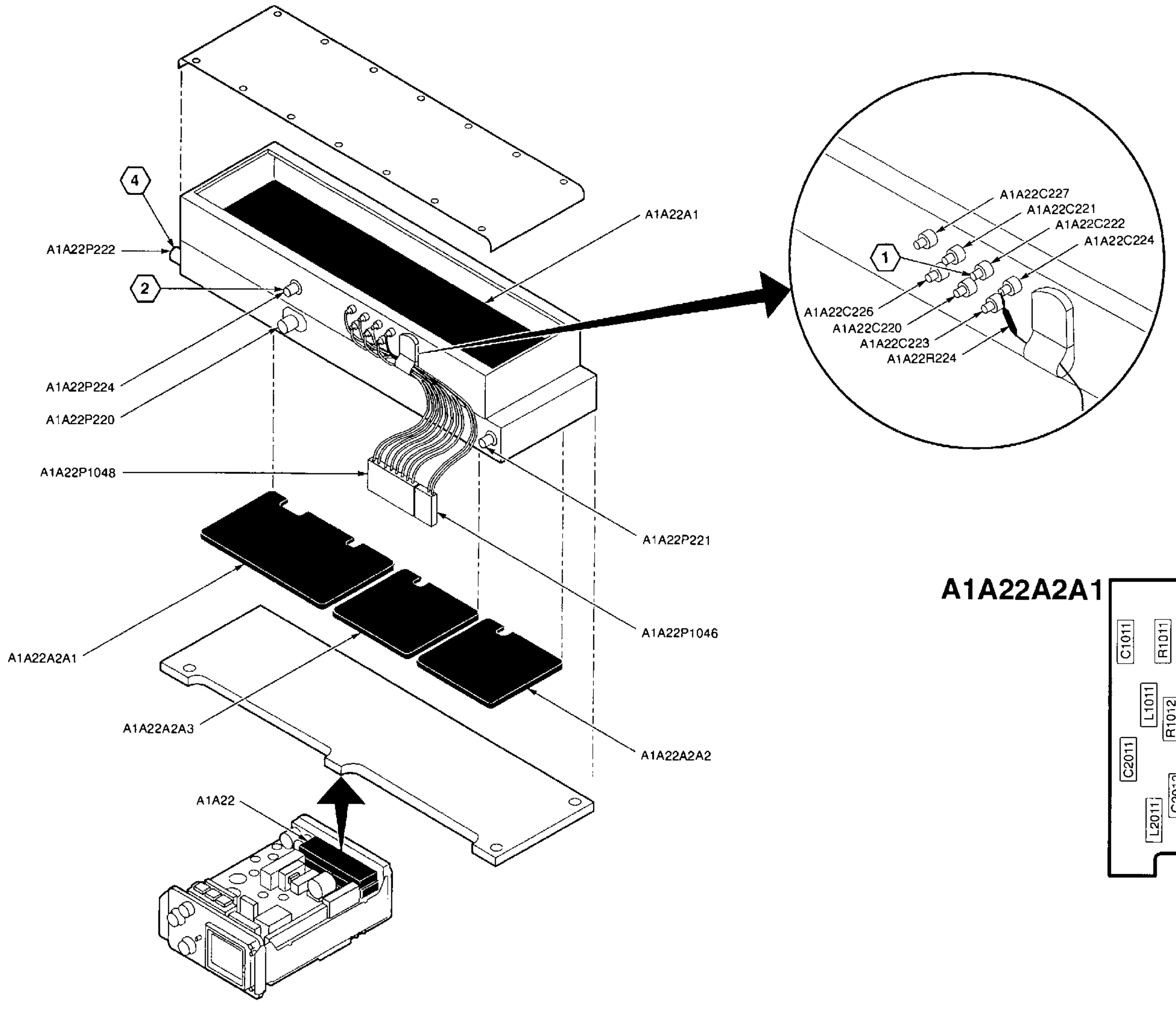
2ND LO CONTROL DIAGNOSTIC AID

	NORMAL	DAC SET
TUNE VOLTS	0.01 V	0.07 V

	DESIRED	COUNTED
2ND LO FREQ	2.182000 GHZ	2.182001 GHZ
OFFSET FREQ	18.000000 MHZ	17.999 MHZ

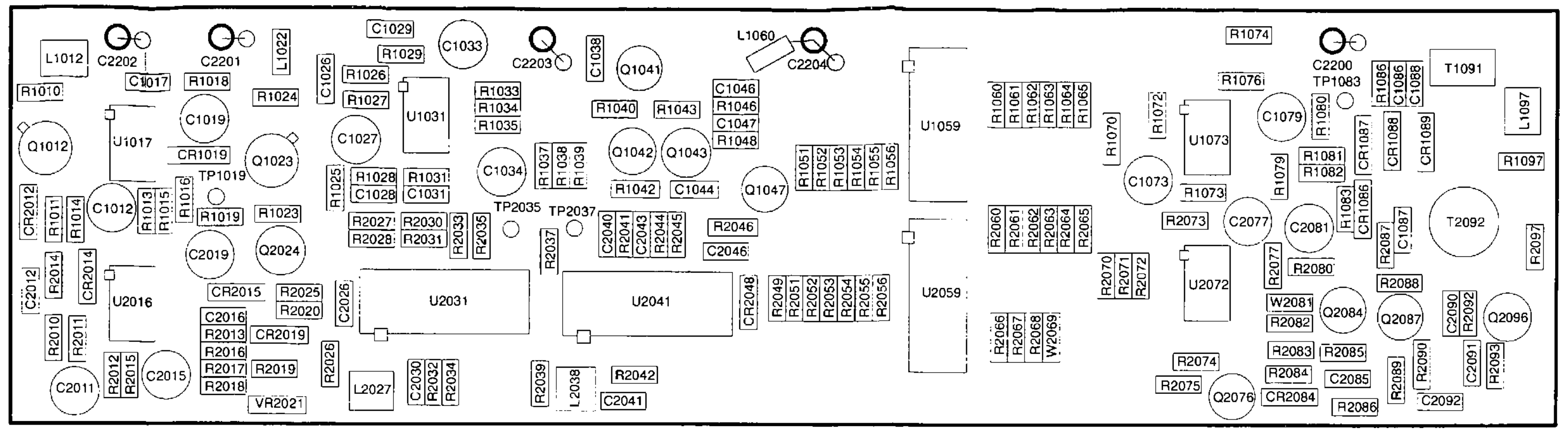
OFFSET SETTING ACCURACY —— 294.912 KHZ

PRESS "SHIFT" TO EXIT.



A1A22

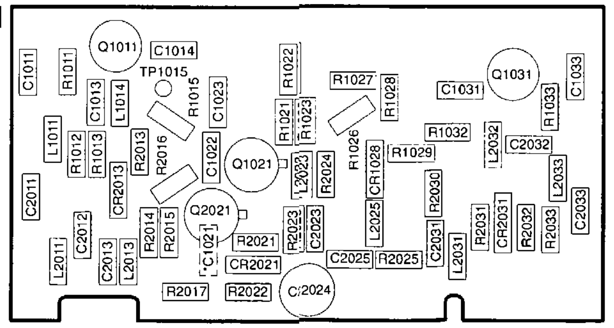
A1A22A1



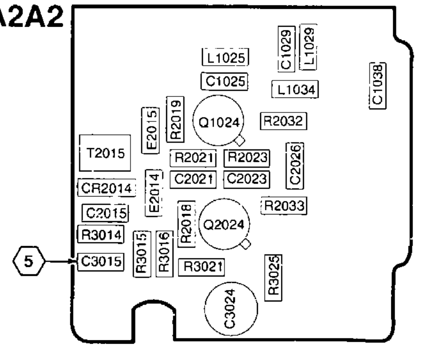
NOTE

C2200, C2201, C2202, C2203, C2204 AND L1060 ARE CHASSIS MOUNTED.

A1A22A2A1



A1A22A2A2



A1A22A2A3

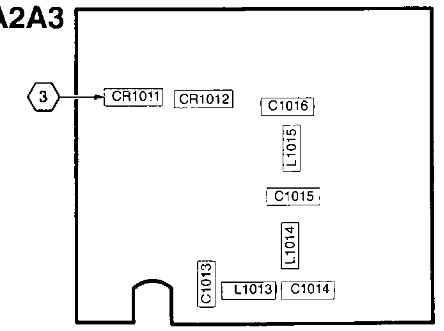
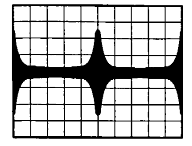


Figure FO-3. A1A2 Phase Locked 2nd LO, A1A22A1 16-20 MHz Phase Lock CCA, A1A22A2A1 Oscillator CCA, A1A22A2A2 Reference CCA and A1A22A2A3 Mixer CCA Component Locators

NOTE

THE SYMBOL * INDICATES PARTS ARE LOCATED ON BOTTOM SIDE OF CCA.

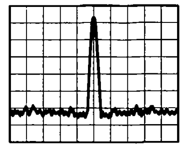
1



OSCILLOSCOPE SETTINGS

VOLTS/DIV: 2 V
TIME/DIV: 10 MS
COUPLING: DC

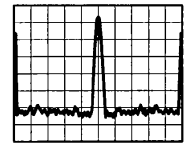
5



TEST SPECTRUM ANALYZER SETTINGS

CENTER FREQUENCY: 210 MHZ
SPAN/DIV: 10 MHZ
REFERENCE LEVEL: +10 DBM
VERTICAL SCALE: 10 DB/DIV

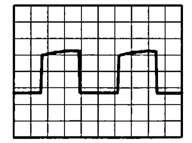
2



TEST SPECTRUM ANALYZER SETTINGS

CENTER FREQUENCY: 45 MHZ
SPAN/DIV: 10 MHZ
REFERENCE LEVEL: 0 DBM
VERTICAL SCALE: 10 DB/DIV

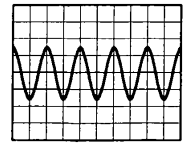
3



OSCILLOSCOPE SETTINGS

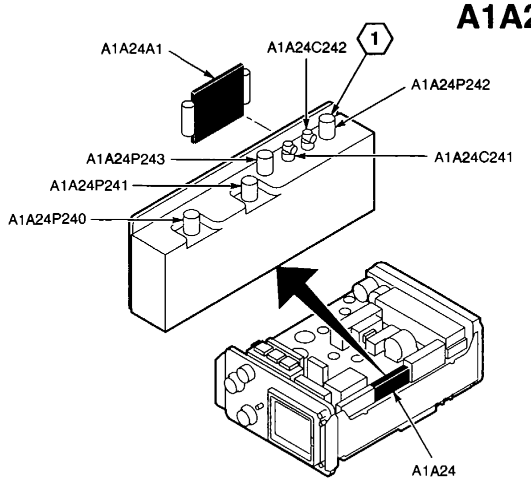
VOLTS/DIV: 2 V
TIME/DIV: 0.5 µS
COUPLING: DC

4



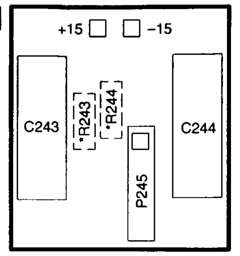
OSCILLOSCOPE SETTINGS

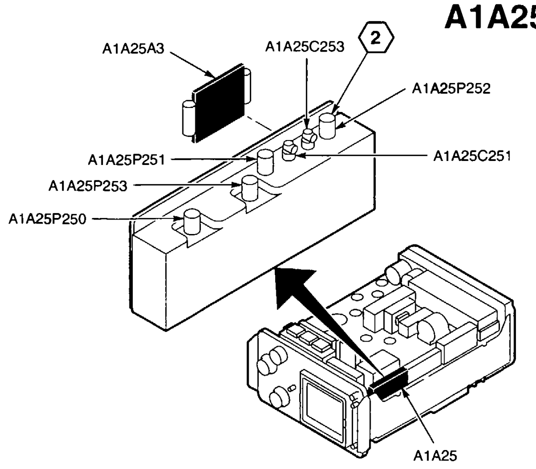
VOLTS/DIV: 0.2 V
TIME/DIV: 5 NS
COUPLING: DC
IMPEDANCE: 50 Ω



A1A24

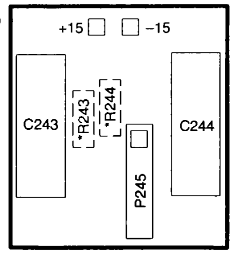
A1A24A1

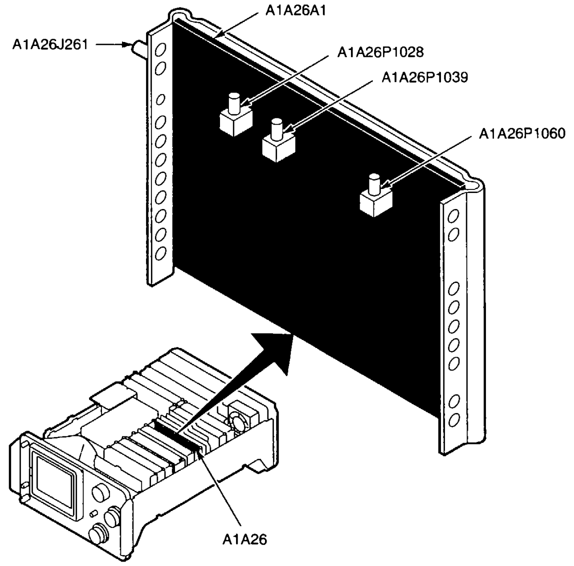




A1A25

A1A25A3





A1A26

A1A26A1

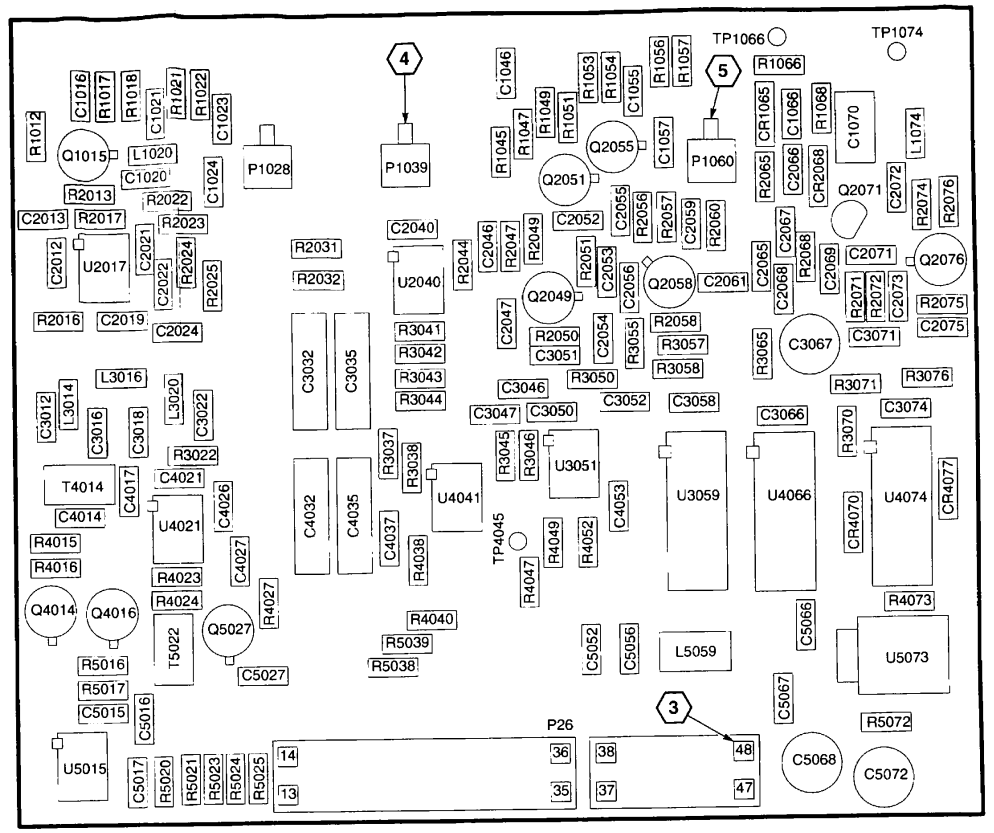


Figure FO-4. A1A24 Phase Gate, A1A24A1 Input CCA, A1A25 Harmonic Mixer , A1A25A3 Input CCA and A1A26 Auxiliary Synthesizer CCA Component Locators

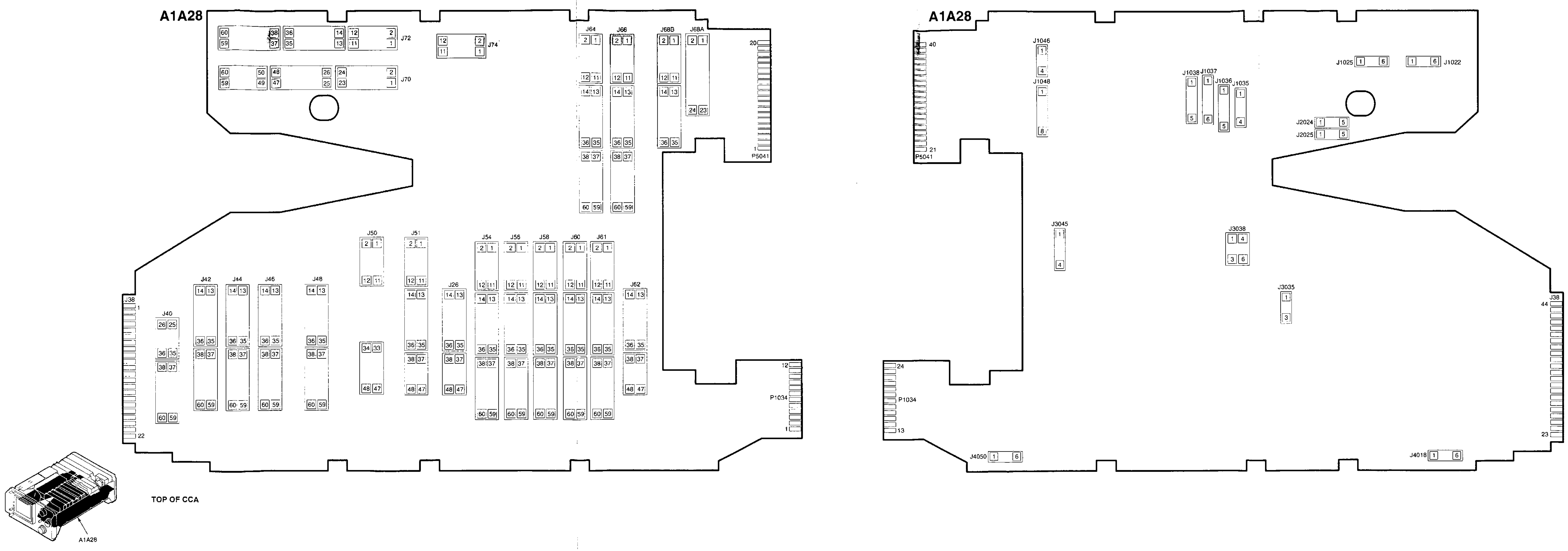
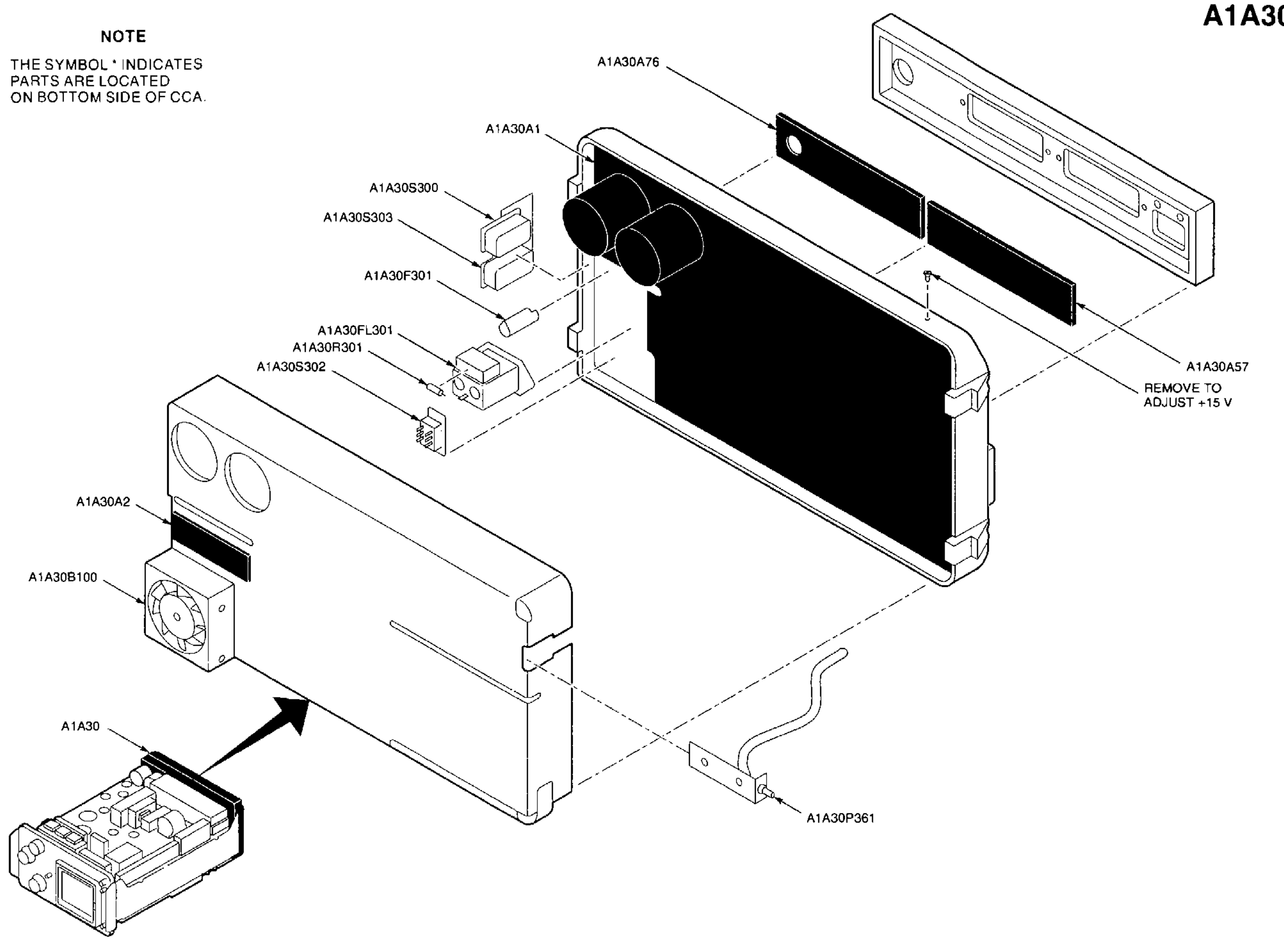
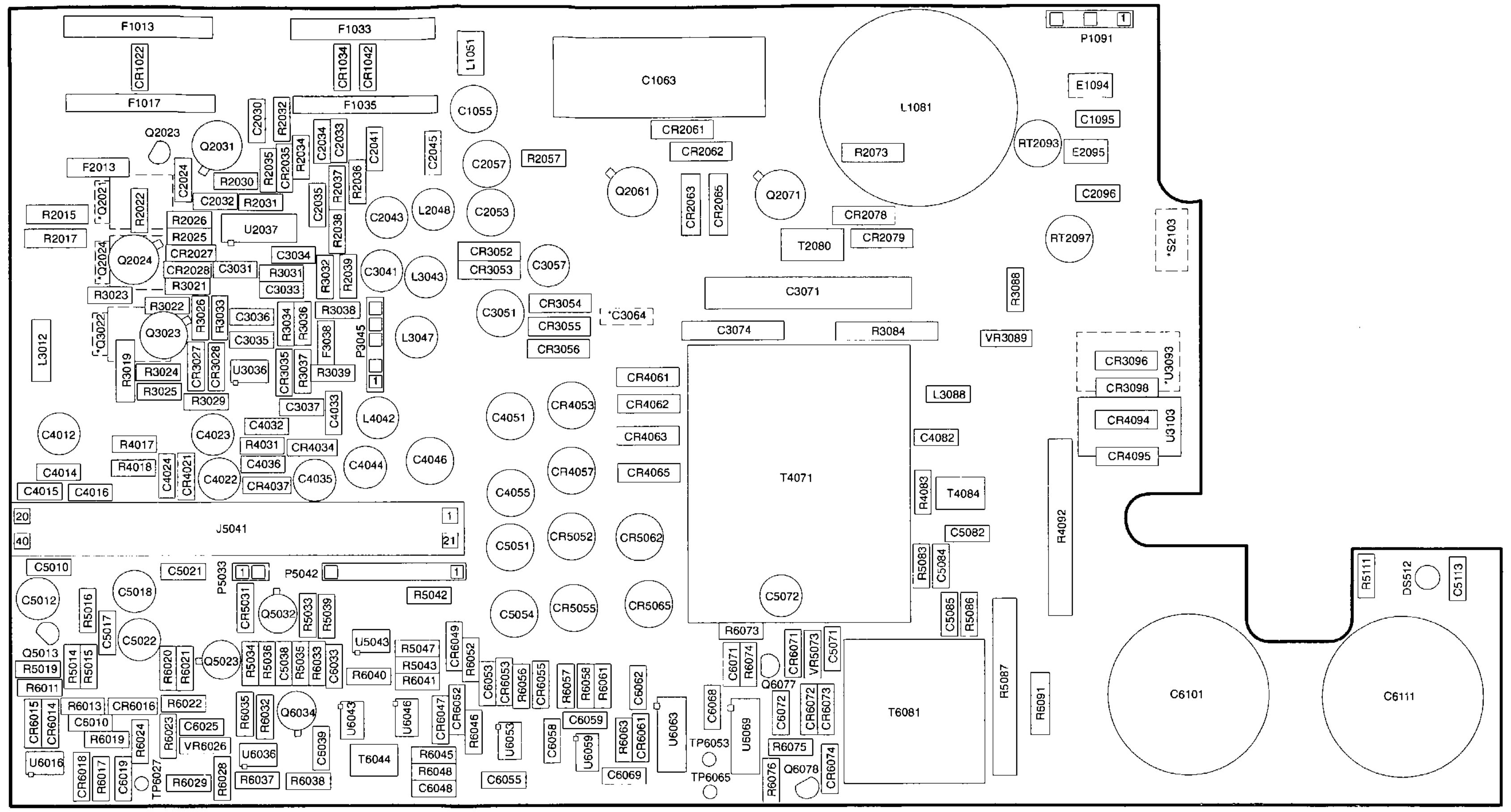


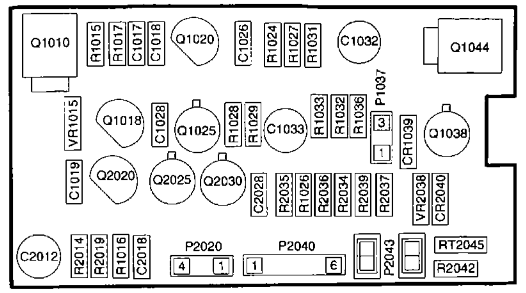
Figure FO-5. A1A28 Mother Board CCA Component Locators



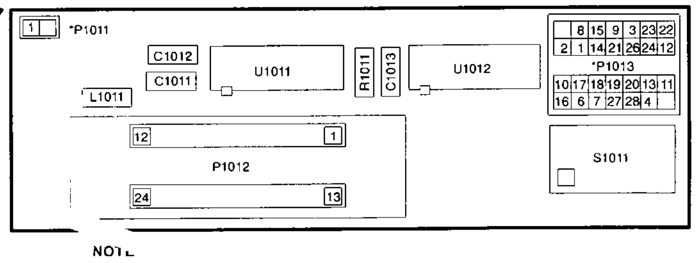
A1A30A1



A1A30A2



A1A30A57



A1A30A76

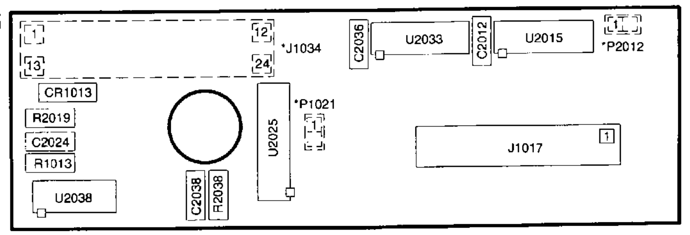


Figure FO-6. A1A30 Power Supply CCA, A1A30A2 Fan Driver CCA, A1A3A57 GPIB Interface CCA and A1A30A76 Accessories Interface CCA Component Locator and Schematic Diagrams (Sheet 1 of 5)

NOTE

UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.

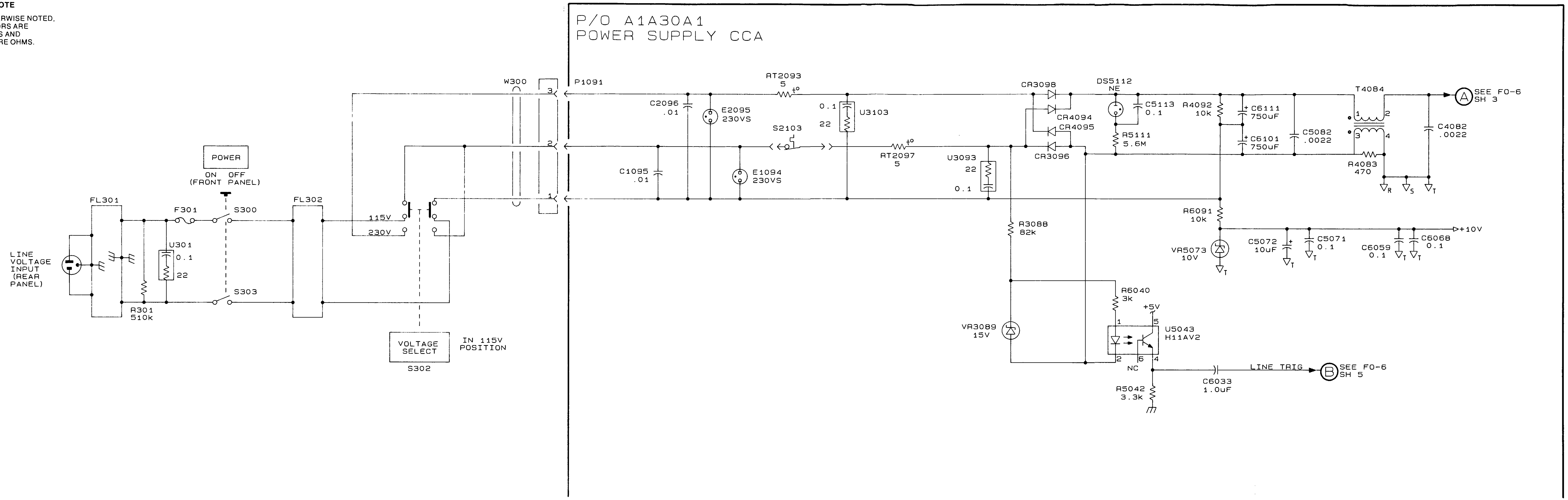


Figure FO-6. A1A30 Power Supply, A1A30A2 Fan Driver CCA, A1A30A57 GPIB Interface CCA and A1A30A76 Accessories Interface CCA Component Locator Factor and Schematic Diagrams (Sheet 2 of 5)

NOTE

UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.

POWER CONNECTIONS		
IC	PIN	TEST FOR
U6036	1, 4	GND
	8	+17 V
U6046	4	GND
	8	+10 V
U6053	1	GND
	8	+10 V
U6059	1	GND
	8	+10 V
U6063	7	GND
	14	+10 V
U6069	7	GND
	14	+10 V

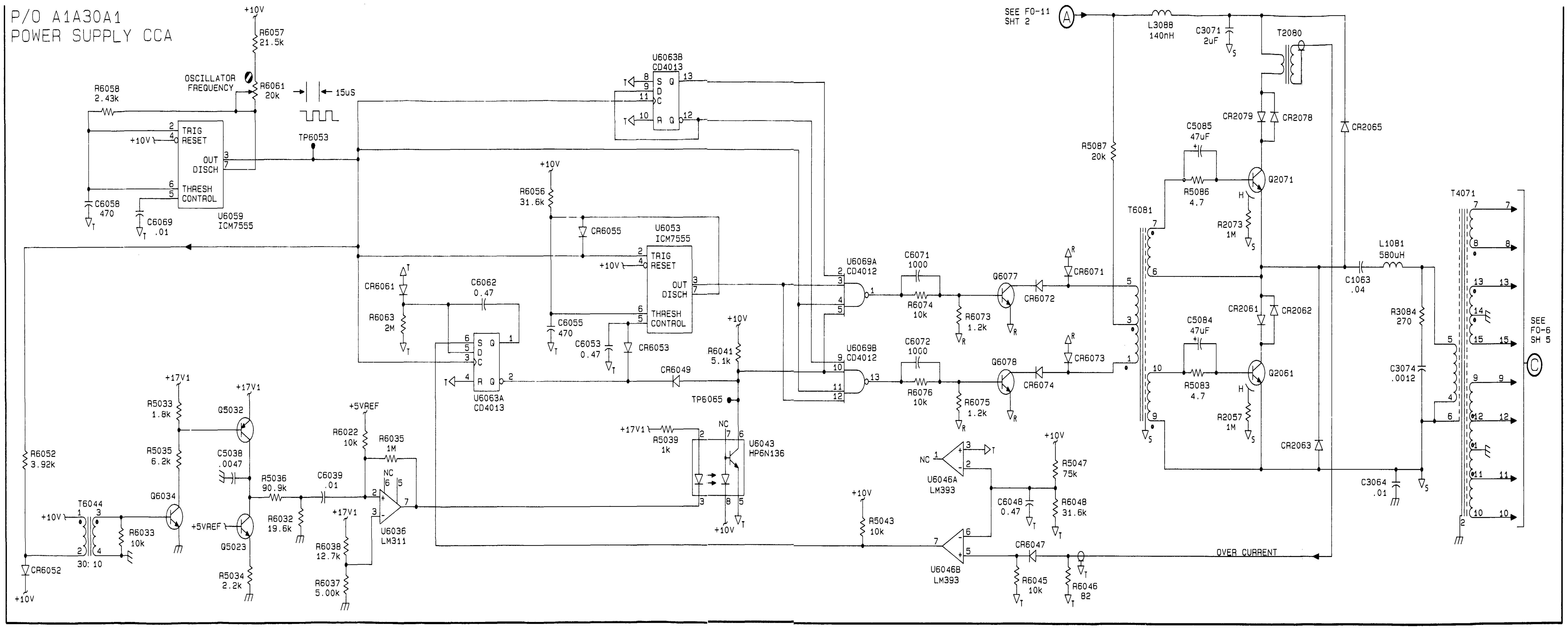


Figure FO-6. A1A30 Power Supply, A1A30A2 Fan Driver CCA, A1A30A57 GPIB Interface CCA and A1A30A76 Accessories Interface CCA Component Locator Factor and Schematic Diagrams (Sheet 3 of 5)

NOTE

UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.

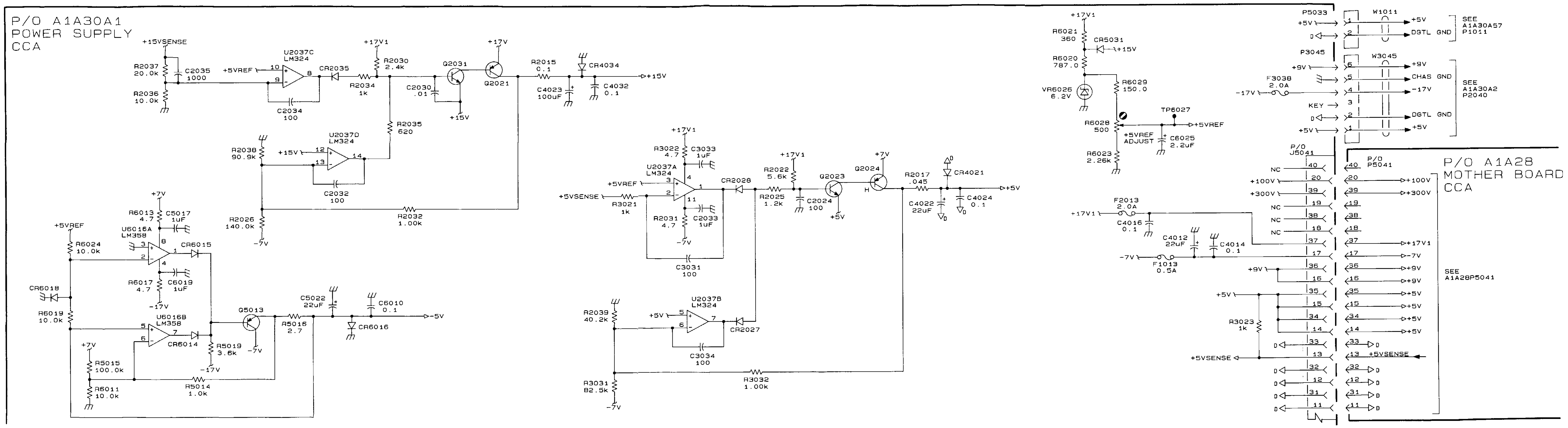


Figure FO-6. A1A30 Power Supply, A1A30A2 Fan Driver CCA, A1A30A57 GPIB Interface CCA and A1A30A76 Accessories Interface CCA Component Locator Factor and Schematic Diagrams (Sheet 4 of 5)

NOTE

UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.

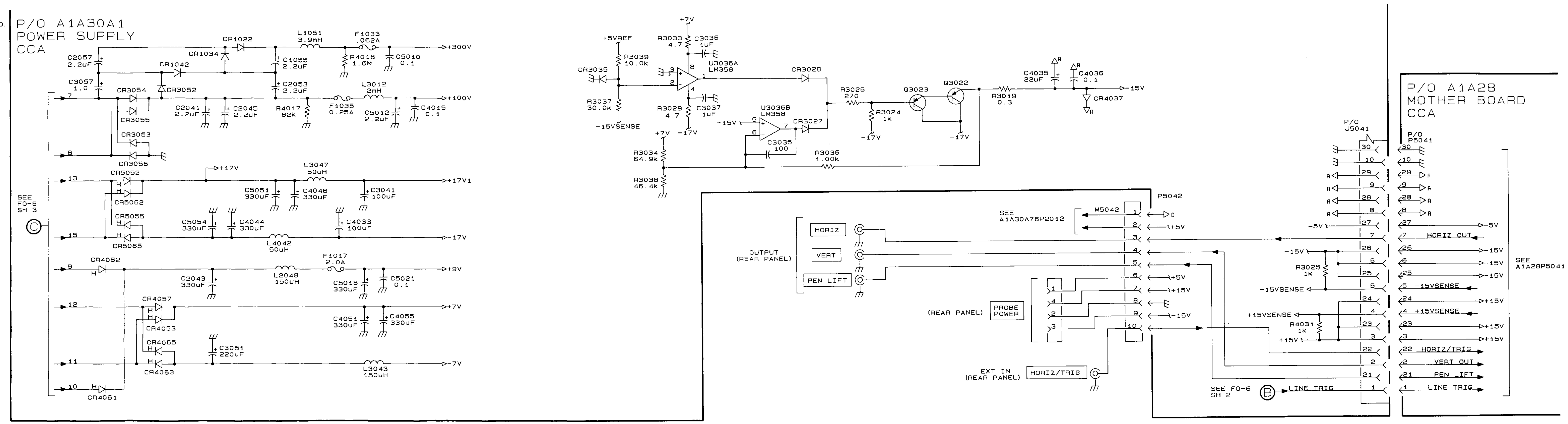
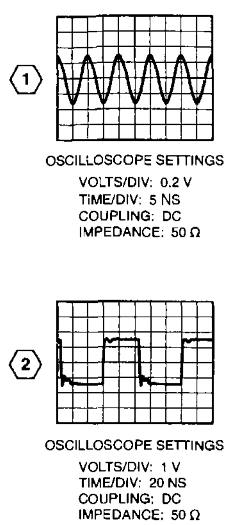
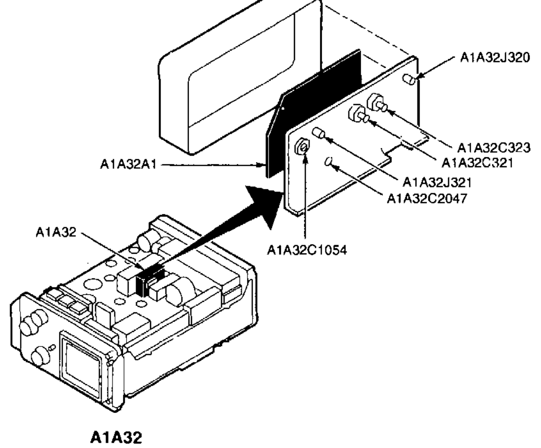


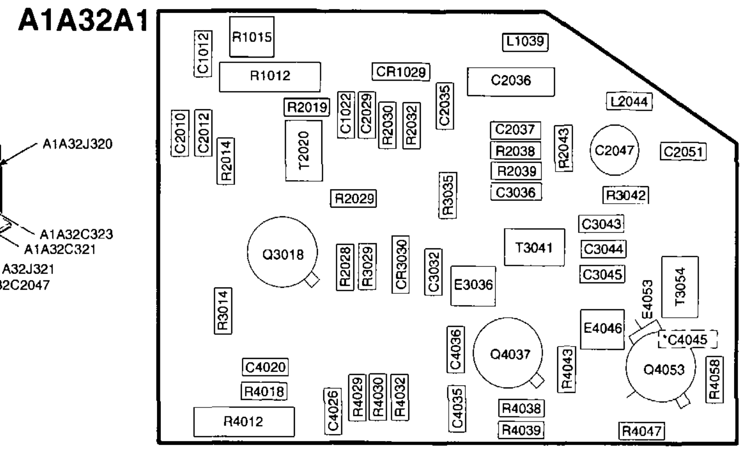
Figure FO-6. A1A30 Power Supply, A1A30A2 Fan Driver CCA, A1A30A57 GPIB Interface CCA and A1A30A76 Accessories Interface CCA Component Locator Factor and Schematic Diagrams (Sheet 5 of 5)

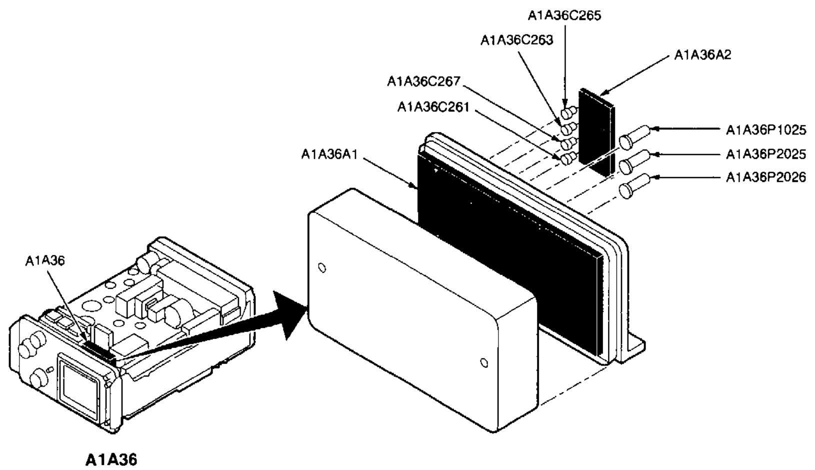
NOTE

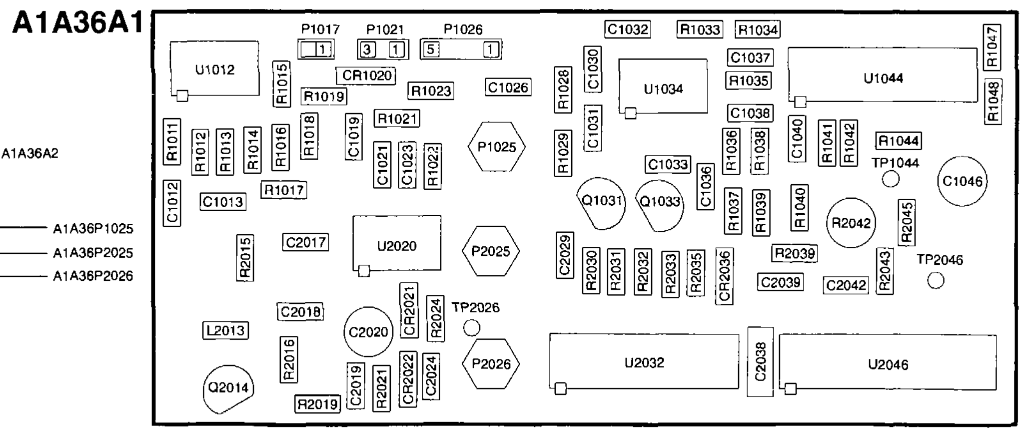
THE SYMBOL * INDICATES PARTS ARE LOCATED ON BOTTOM SIDE OF CCA.

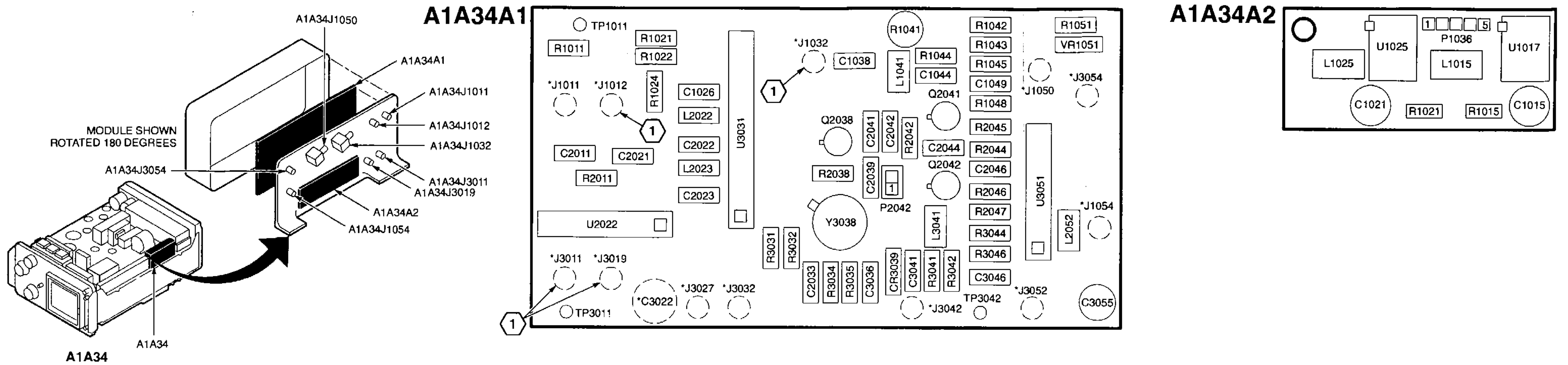


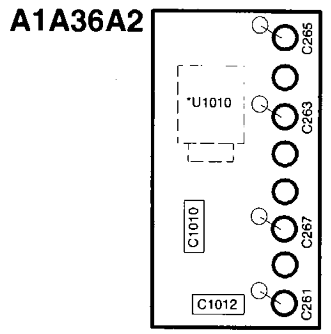












NOTE

C261, C263, C265 AND C267 ARE CHASSIS MOUNTED.

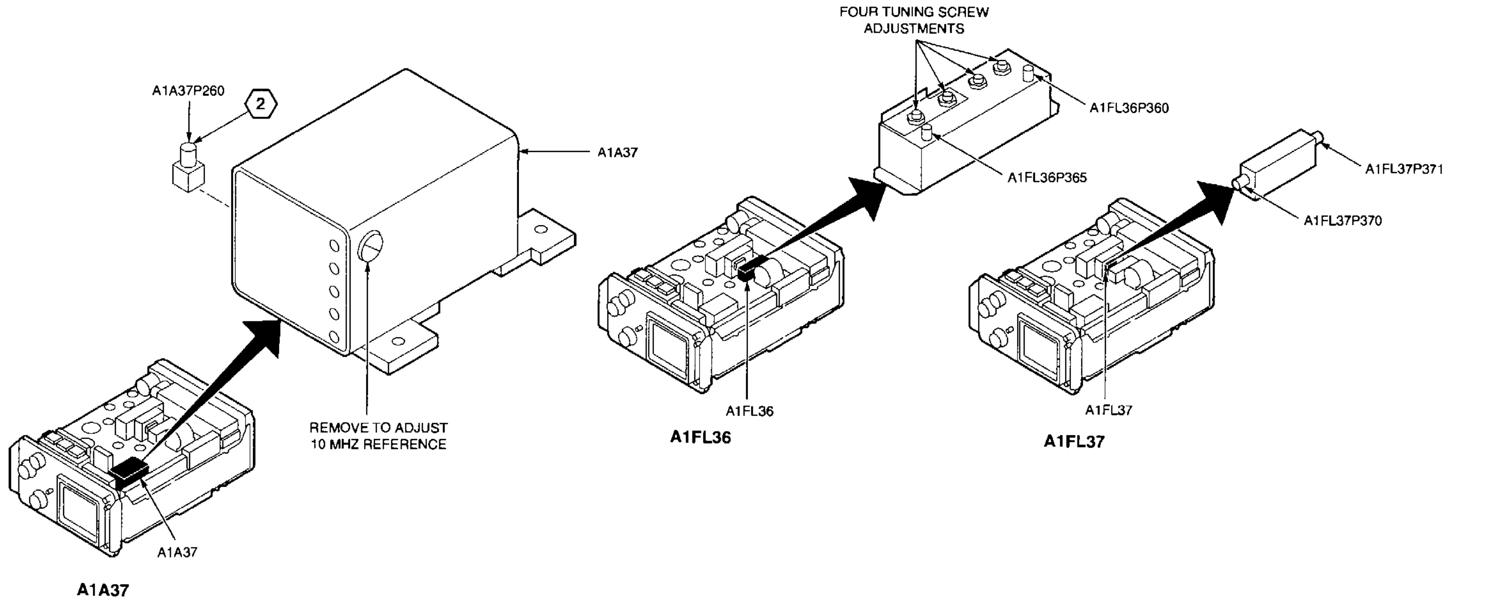
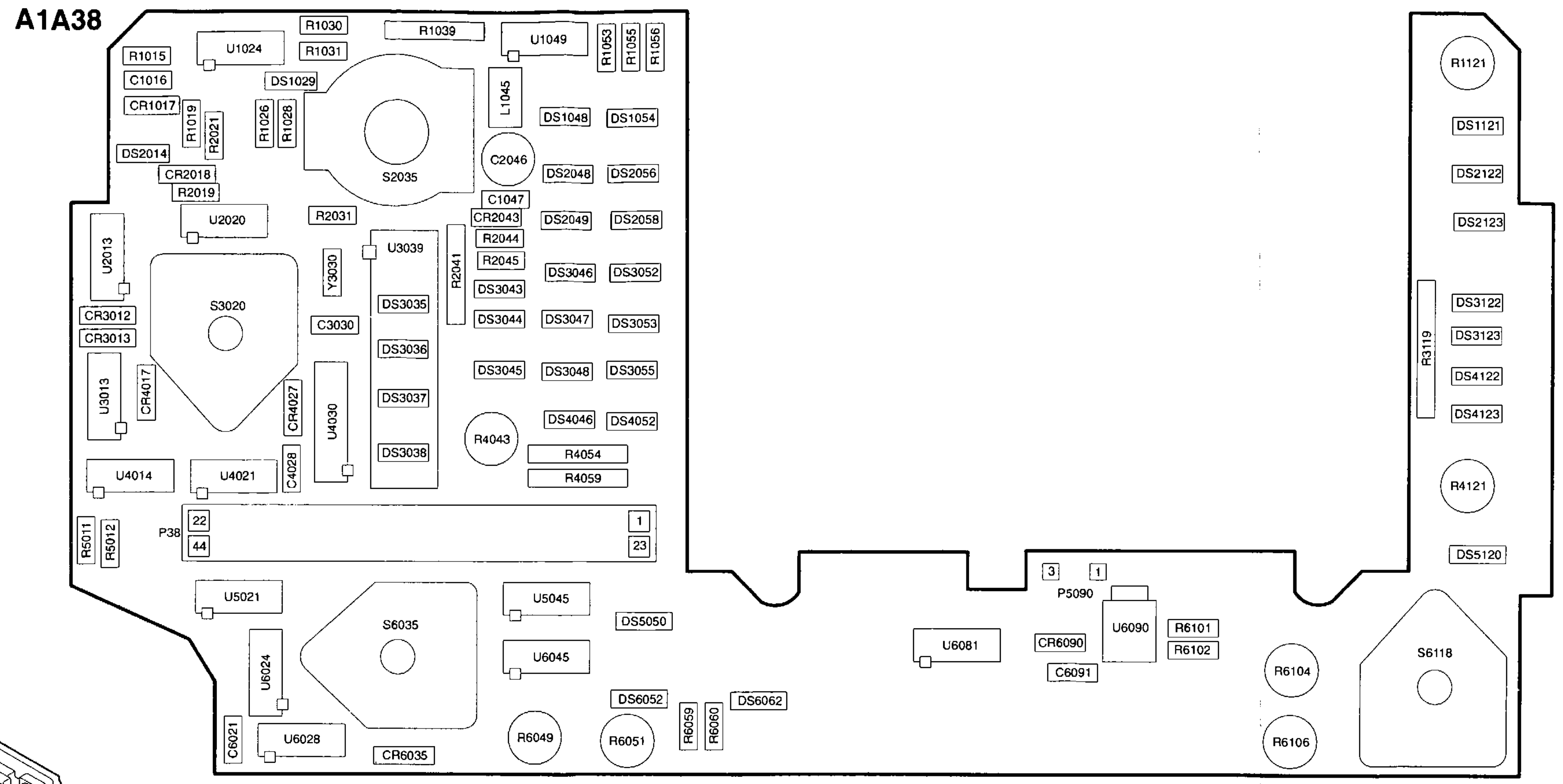
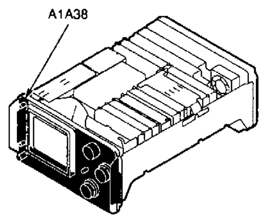
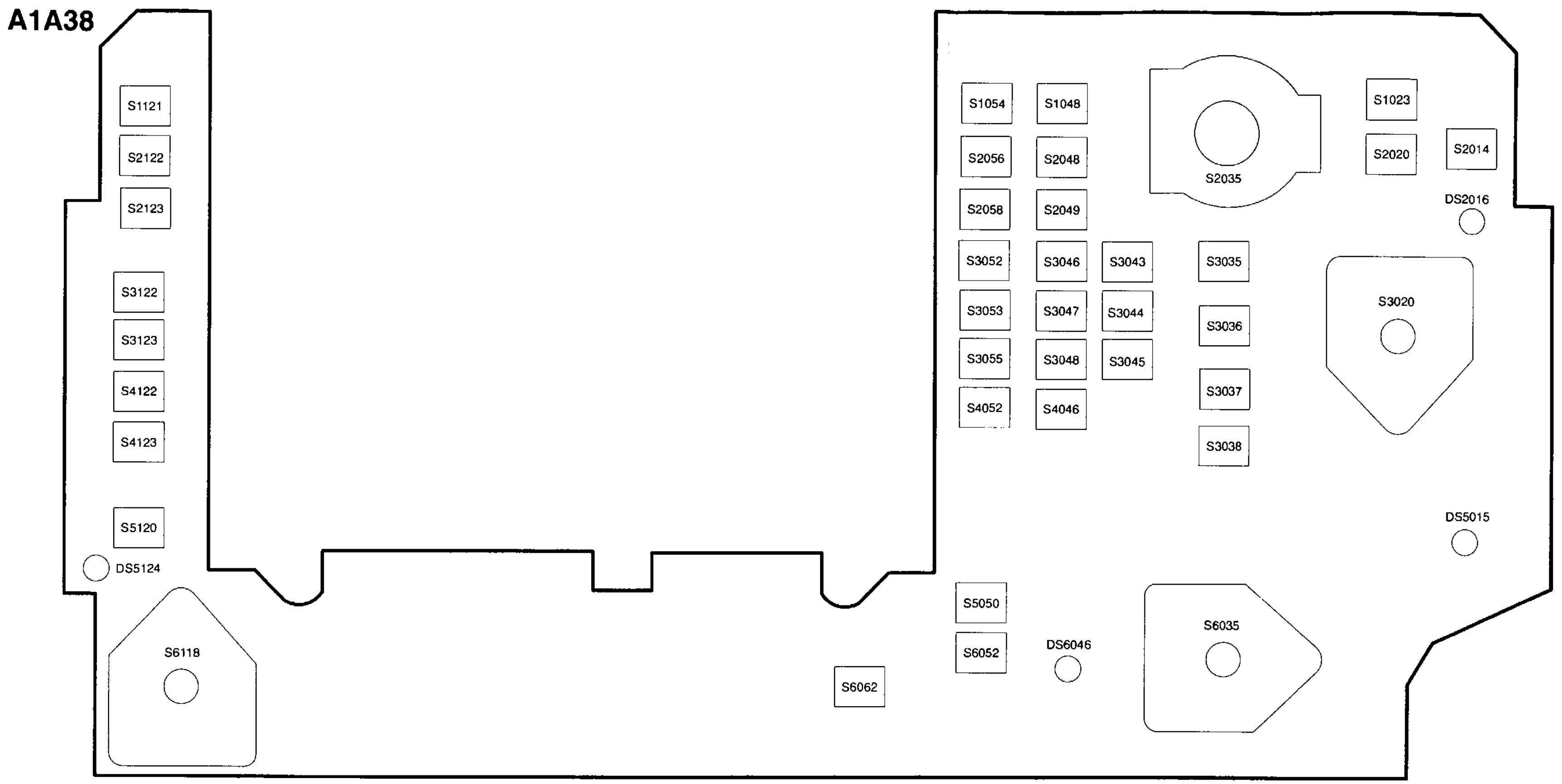


Figure FO-7. A1A32 IF Amplifier, A1A32A1 IF Amplifier CCA, A1A34 3rd Converter Assembly, A1A34A1 3rd Converter CCA, A1A34A2 Regulator CCA, A1A36 Reference Lock, A1A34A1 Reference Lock CCA, A1A36A2 Regulator CCA, A1A37 10 MHz Reference, A1FL36 Bandpass Filter and A1FL37 Lowpass Filter Component Locators





TOP OF CCA

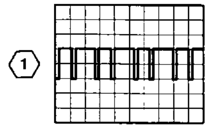


BOTTOM OF CCA

Figure FO-8. A1A38 Front Panel CCA Component Locator and Schematic Diagrams (Sheet 1 of 5)

NOTE

UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.



OSCILLOSCOPE SETTINGS
VOLTS/DIV: 2 V
TIME/DIV: 0.2 MS
COUPLING: DC

POWER CONNECTIONS		
IC	PIN	TEST FOR
U1024	7	GND
	14	+5 V
U2013	7	GND
	14	+5 V
U2020	7	GND
	14	+5 V
U3013	7	GND
	14	+5 V
U4014	7	GND
	14	+5 V
U4021	8	GND
	16	+5 V
U5021	8	GND
	16	+5 V
U6024	8	GND
	16	+5 V

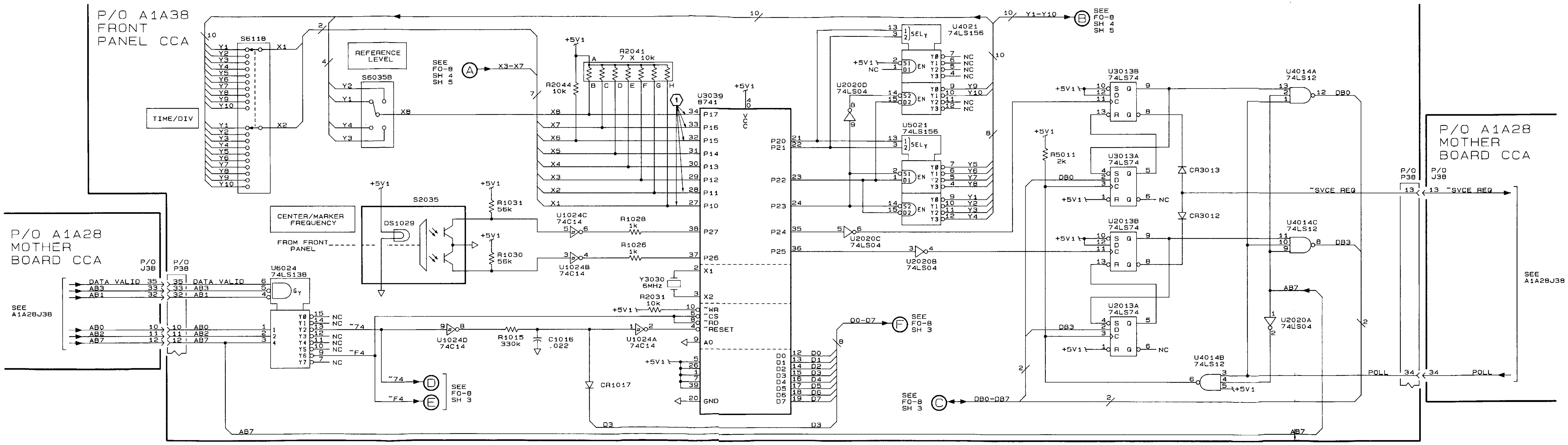


Figure FO-8. A1A38 Front Panel CCA Component Locator and Schematic Diagrams (Sheet 2 of 5)

NOTE

UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.

POWER CONNECTIONS

IC	PIN	TEST FOR
U1049	7	GND
	14	+5 V
U2020	7	GND
	14	+5 V
U4030	10	GND
	20	+5 V
U5045	7	GND
	14	+5 V
U6028	7	GND
	14	+5 V
U6045	7	GND
	14	+5 V
U6081	7	GND
	14	+5 V

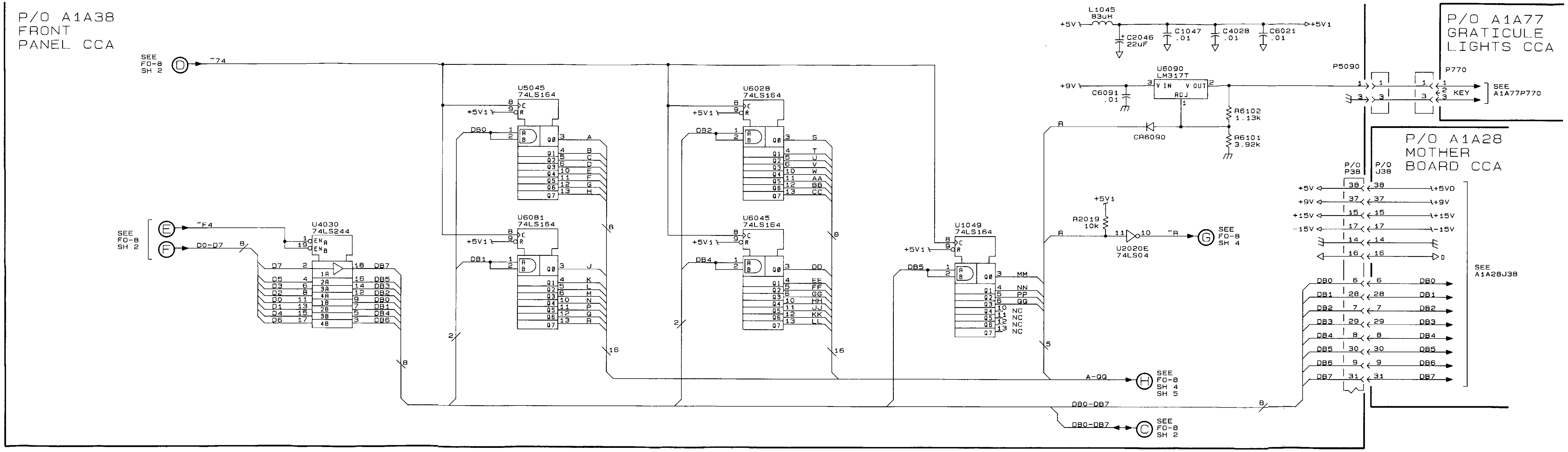


Figure FO-8. A1A38 Front Panel CCA Component Locator and Schematic Diagrams (Sheet 3 of 5)

NOTE

UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.

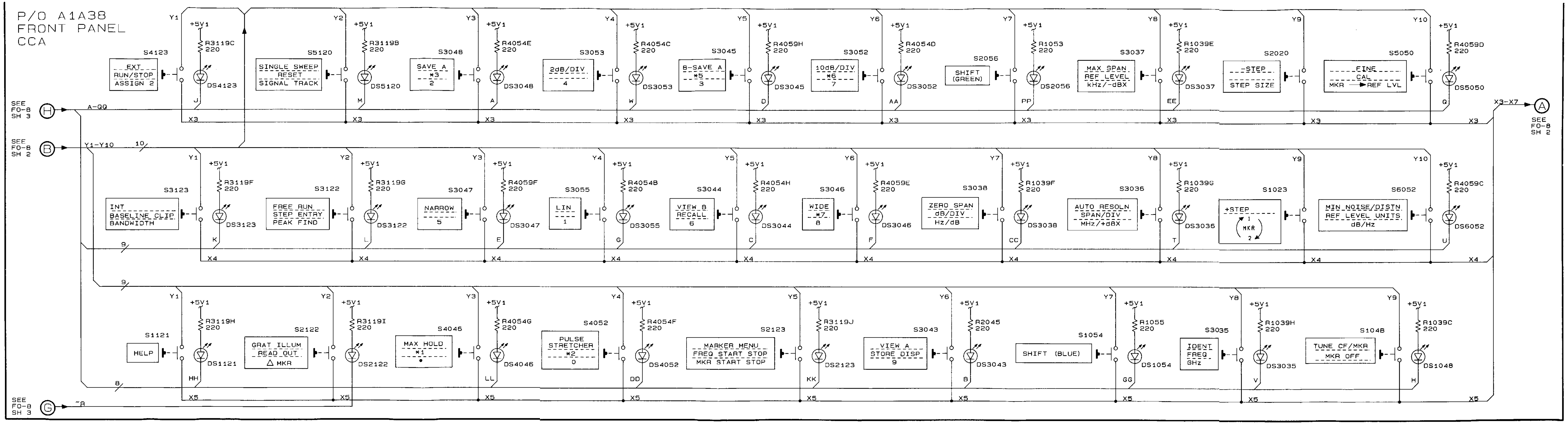
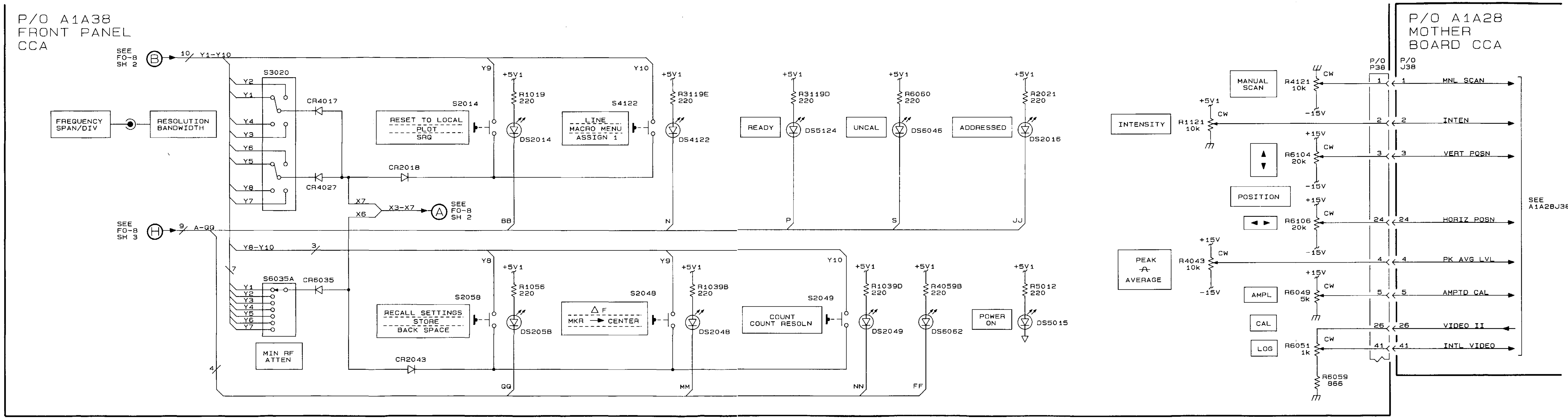


Figure FO-8. A1A38 Front Panel CCA Component Locator and Schematic Diagrams (Sheet 4 of 5)

NOTE

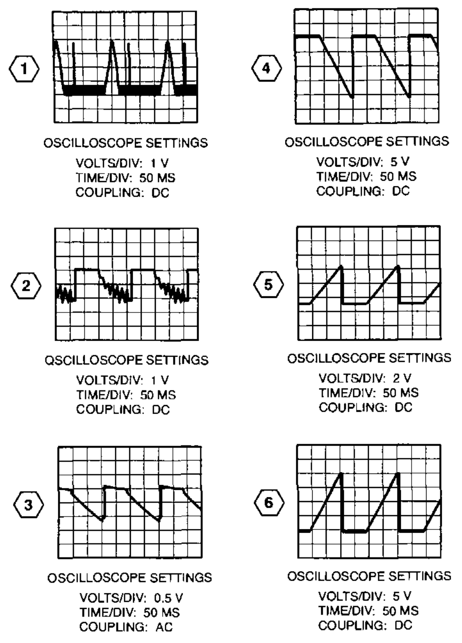
UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.



FO-8. A1A38 Front Panel CCA Component Locator and Schematic Diagrams (Sheet 5 of 5)

NOTE

THE SYMBOL * INDICATES PARTS ARE LOCATED ON BOTTOM SIDE OF CCA.



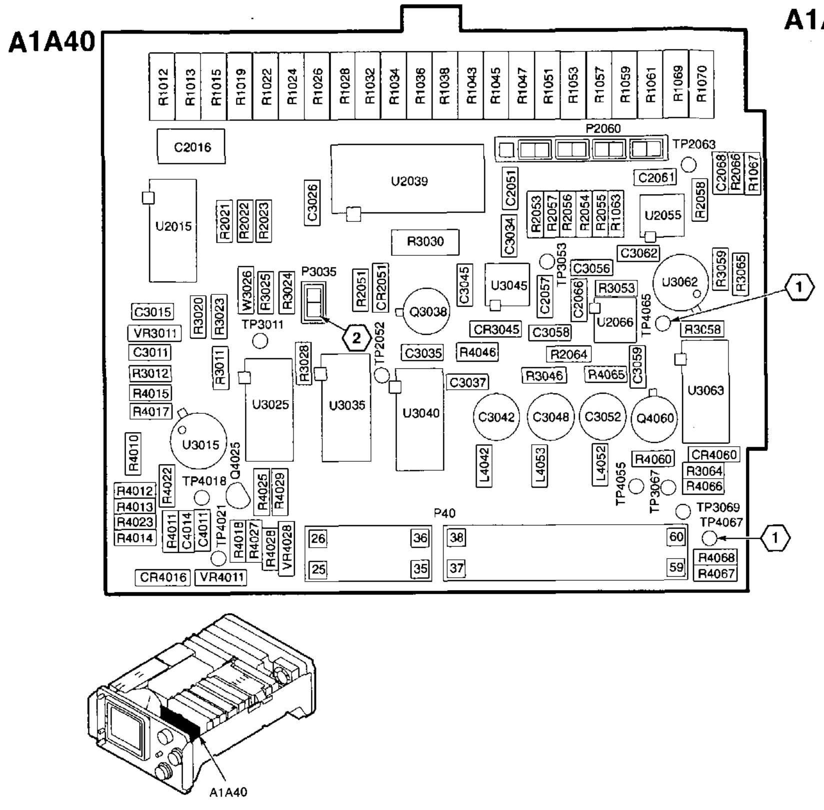
NOTE

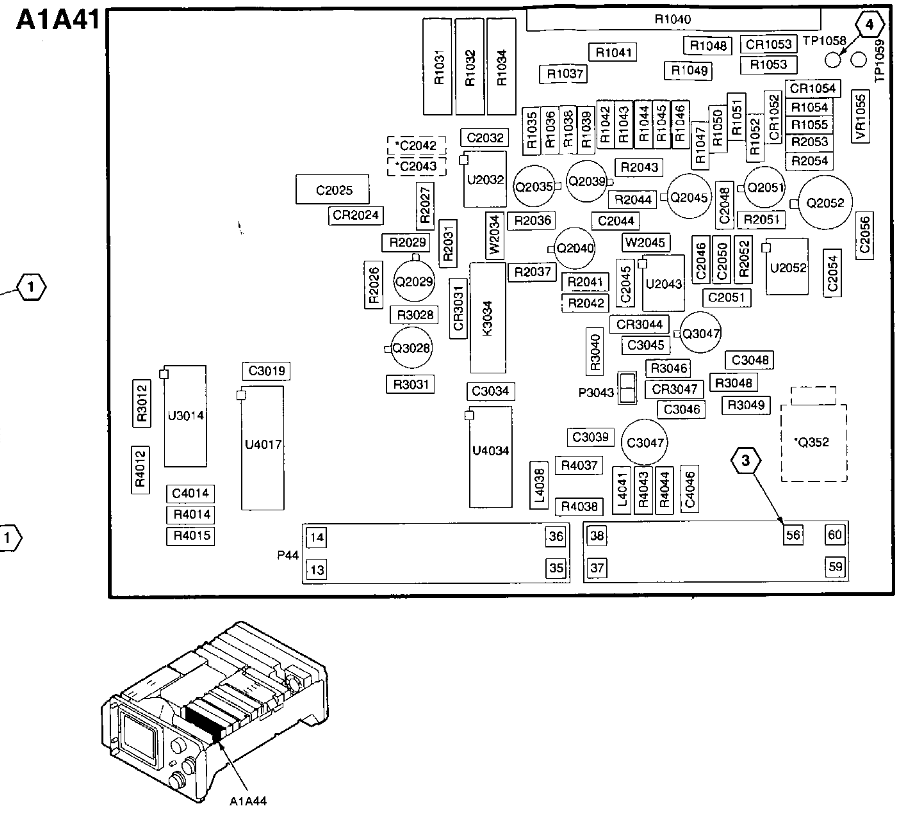
THE FOLLOWING IS A TYPICAL EXAMPLE OF THE 1ST LO DIAGNOSTIC DISPLAY.

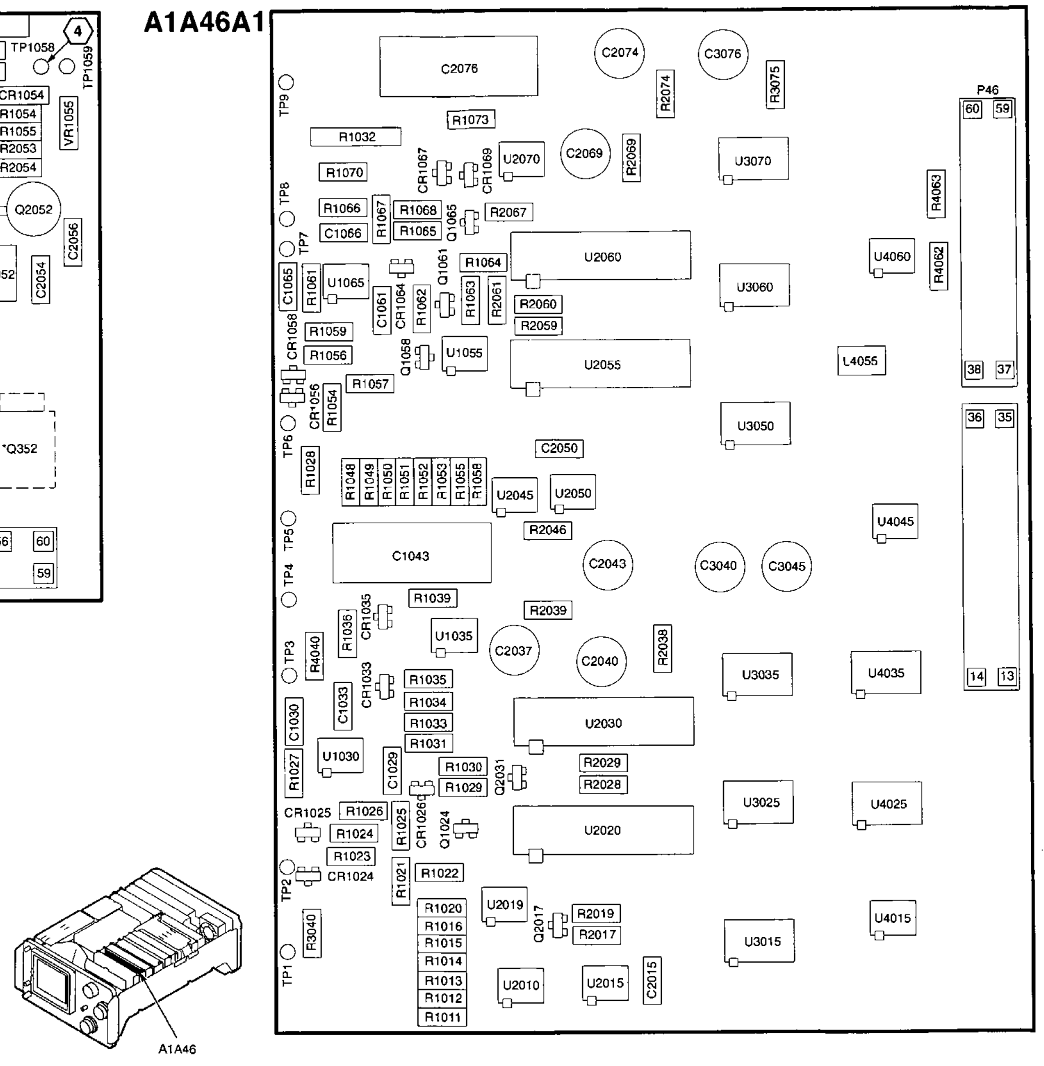
1ST LO CONTROL DIAGNOSTIC AID

	NORMAL	DAC SET
TUNE VOLTS	−6.79 V	−6.80 V
SENSE VOLTS	3.43 V	3.43 V
	DESIRED	COUNTED
1ST LO FREQ	2.720 504 GHZ	2.719 735 GHZ
MIXER FREQ	45.896 MHZ	46.665 MHZ
1ST LO SETTING ACCURACY		4.981 MHZ
AUXILIARY SYNTHESIZER		212.800 MHZ

PRESS "SHIFT" TO EXIT.







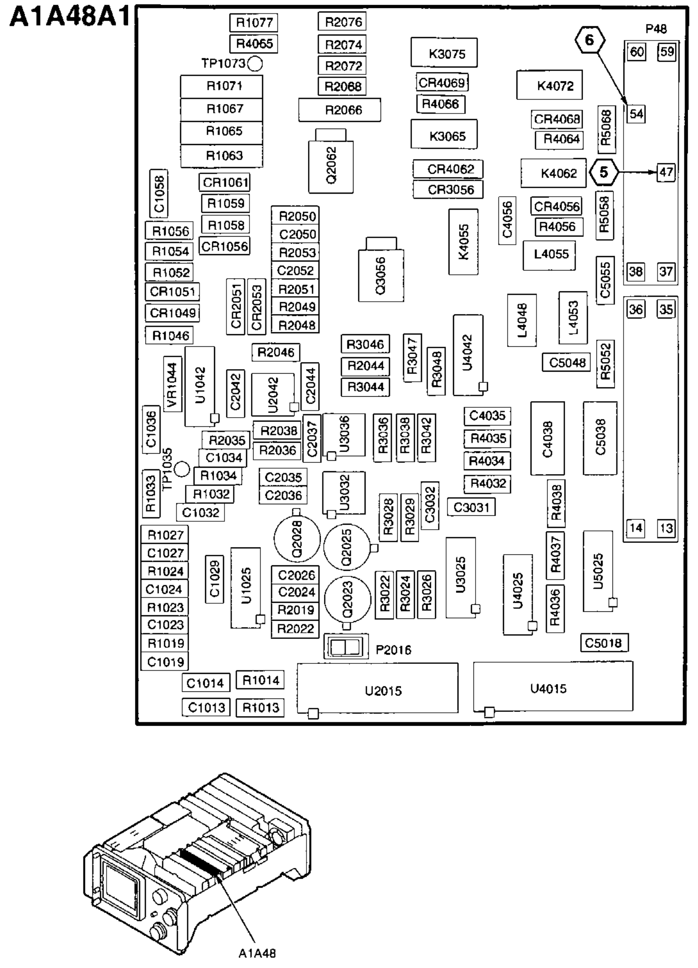


Figure FO-9. A1A40 Video Processor CCA, A1A44 1st LO Driver CCA, A1A46 Center Freq Control CCA and A1A48 Span Attenuator CCA Component Locators

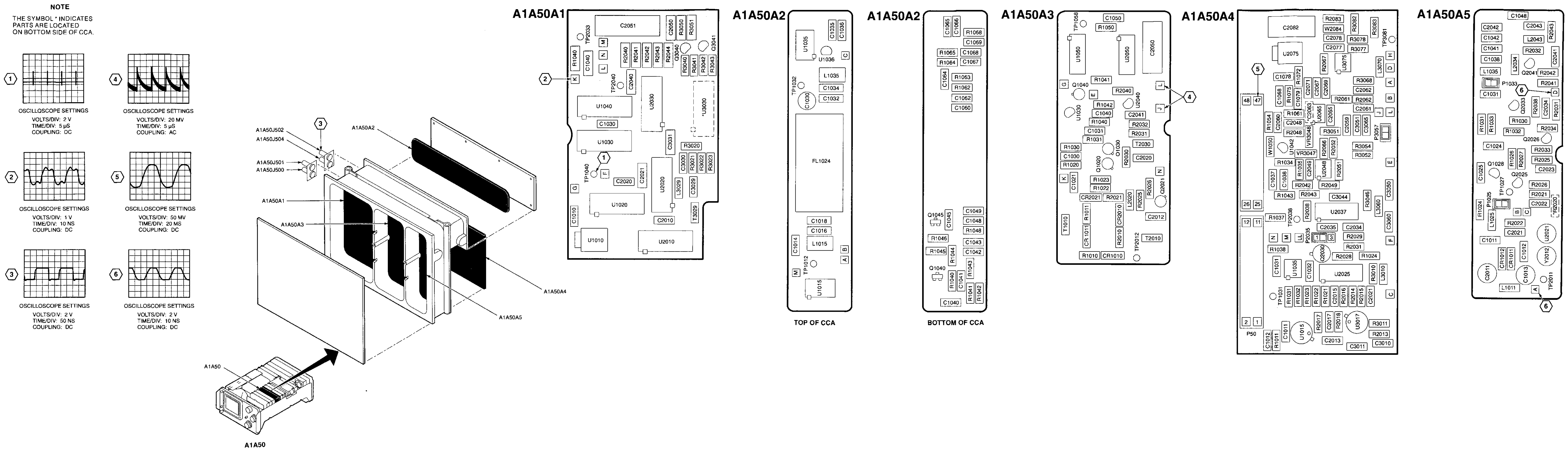
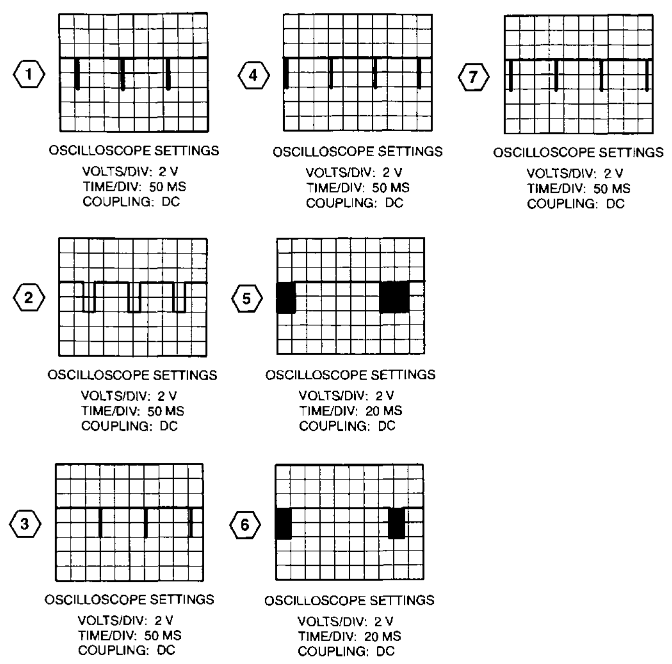
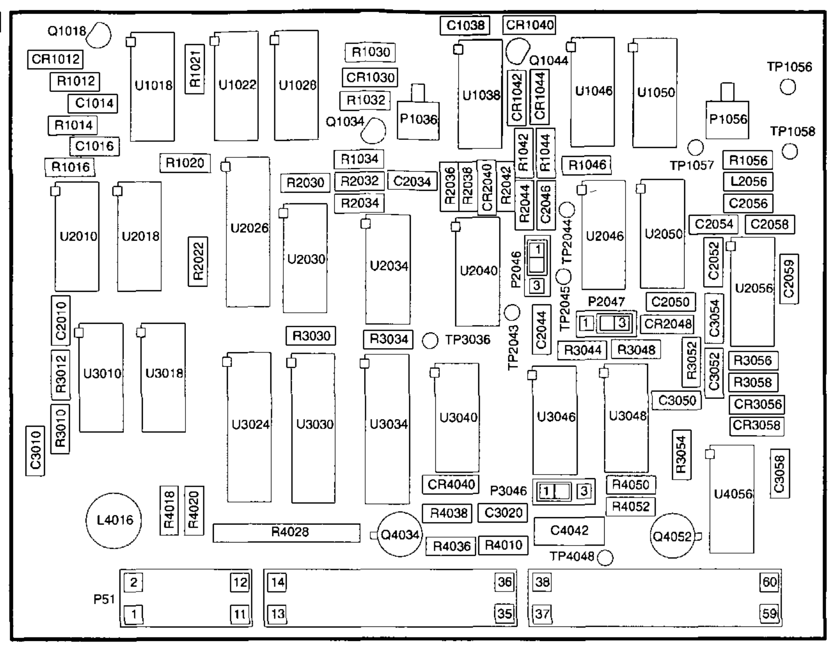


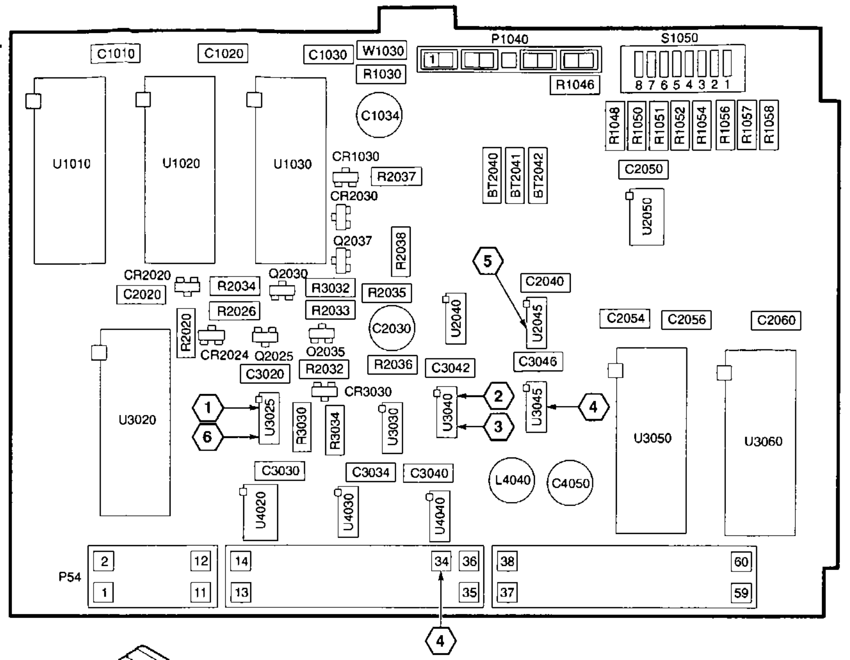
Figure FO-10. A1A50 Phase Lock Assembly, A1A50A1 Synthesizer CCA, A1A50A2 Strobe Driver CCA, A1A50A3 Mixer CCA, A1A50A4 Error Amplifier CCA and A1A50A5 Oscillator CCA Component Locators

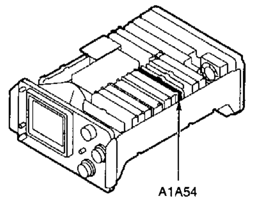


A1A51A1

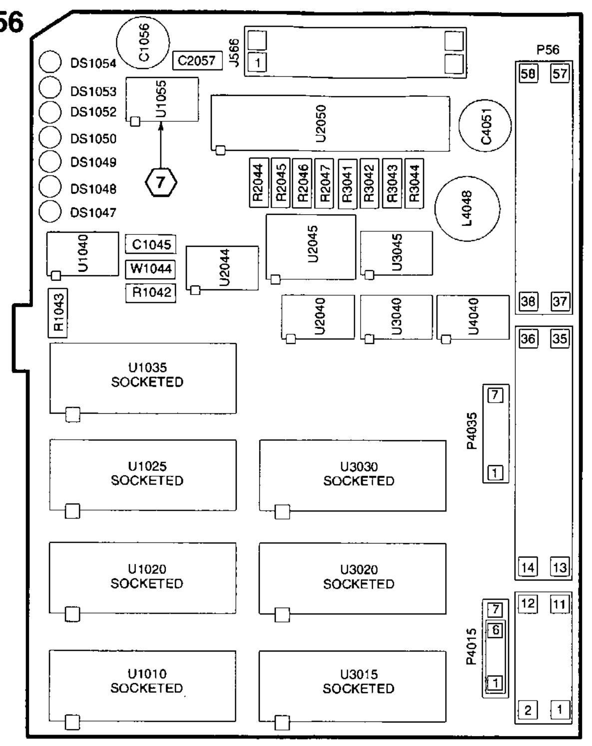


A1A54



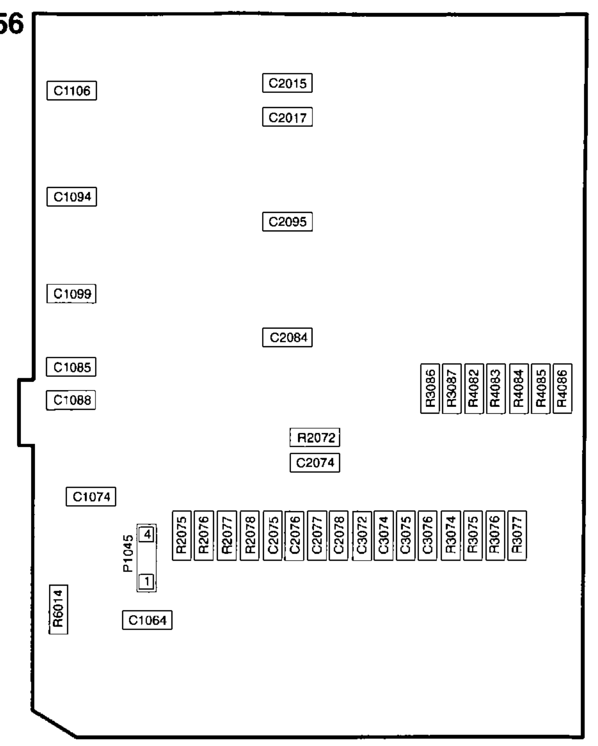


A1A56

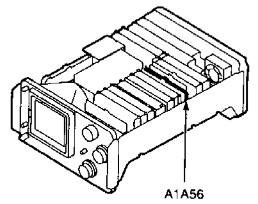


TOP OF CCA

A1A56

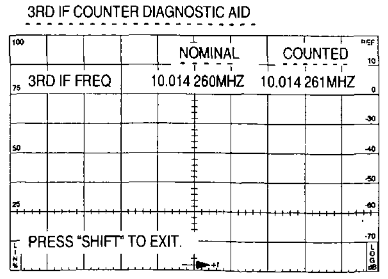


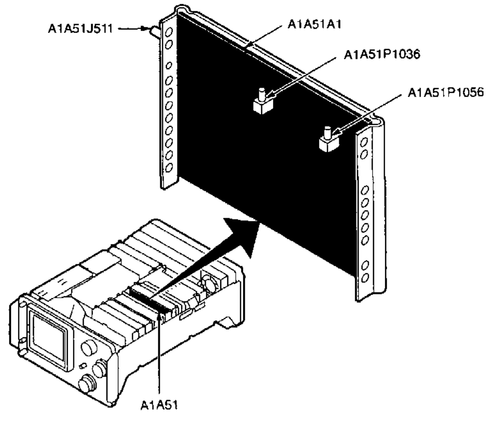
BOTTOM OF CCA



NOTE

THE FOLLOWING IS A TYPICAL EXAMPLE OF THE COUNTER DIAGNOSTIC DISPLAY.

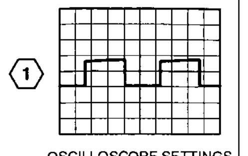




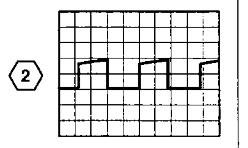
A1A51

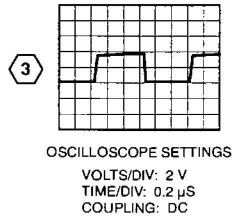
Figure FO-11. A1A51 Counter CCA, A1A54 Memory CCA and A1A56 GPIB CCA Component Locators

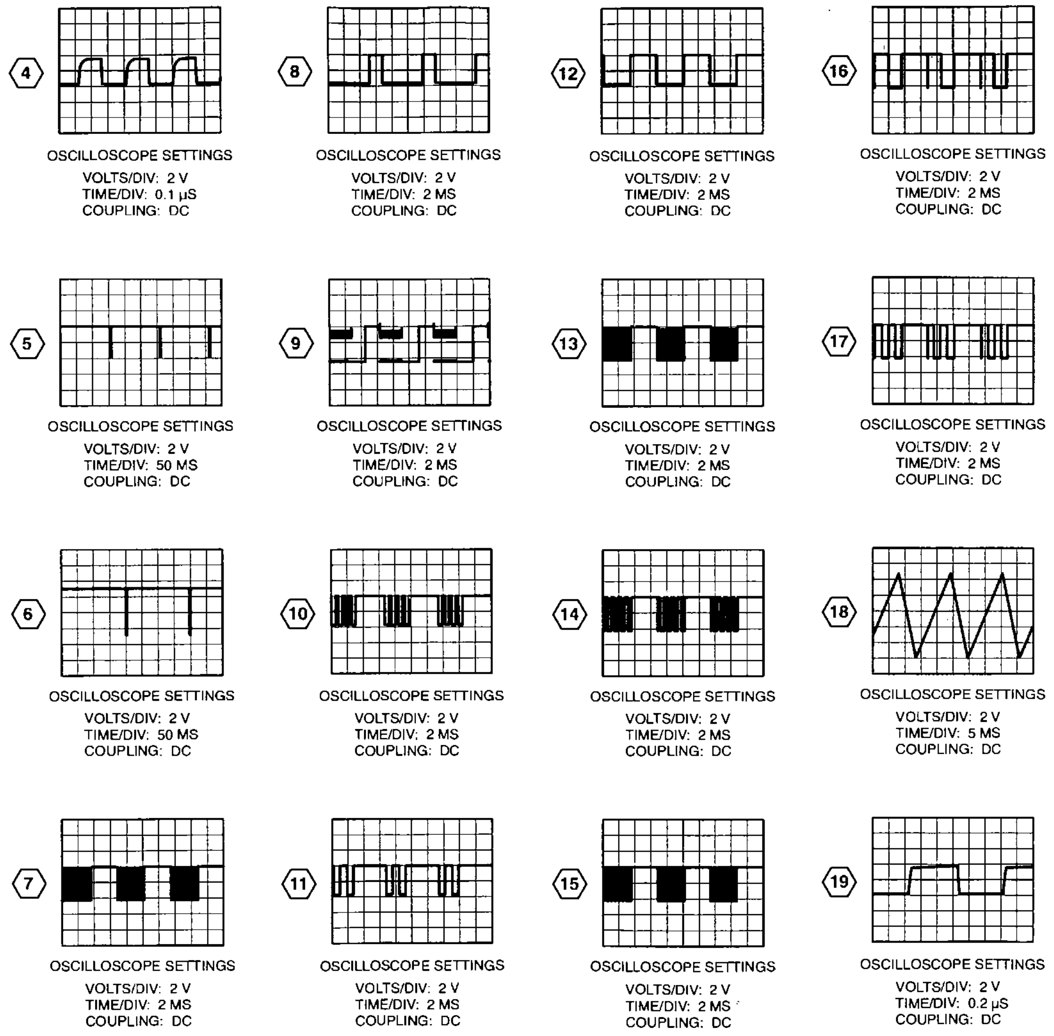
WAVEFORM 1	
A1A58P58	TIME/DIV
PIN 45	2 μS
PIN 46	1 μS
PIN 51	0.1 MS
PIN 53	0.5 MS
PIN 54	0.2 MS
PIN 55	2 MS
PIN 56	1 MS



WAVEFORM 2	
A1A58P58	TIME/DIV
PIN 47	10 μS
PIN 48	5 μS
PIN 49	50 μS
PIN 50	20 μS
PIN 52	0.1 MS
PIN 57	10 MS
PIN 58	5 MS
PIN 59	50 MS
PIN 60	20 MS







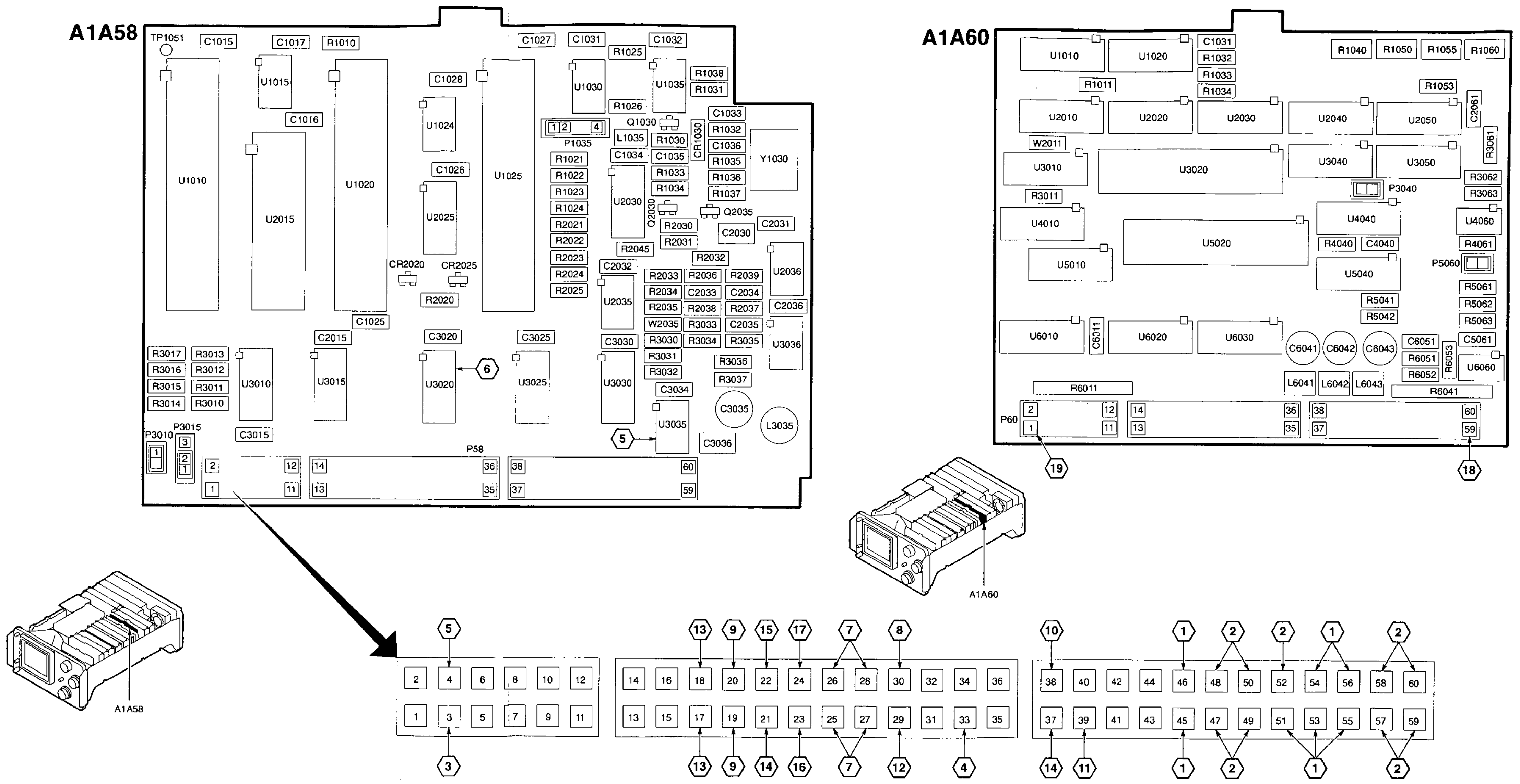
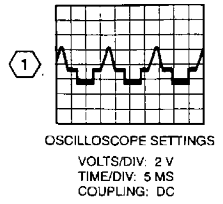
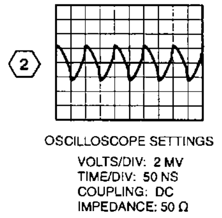
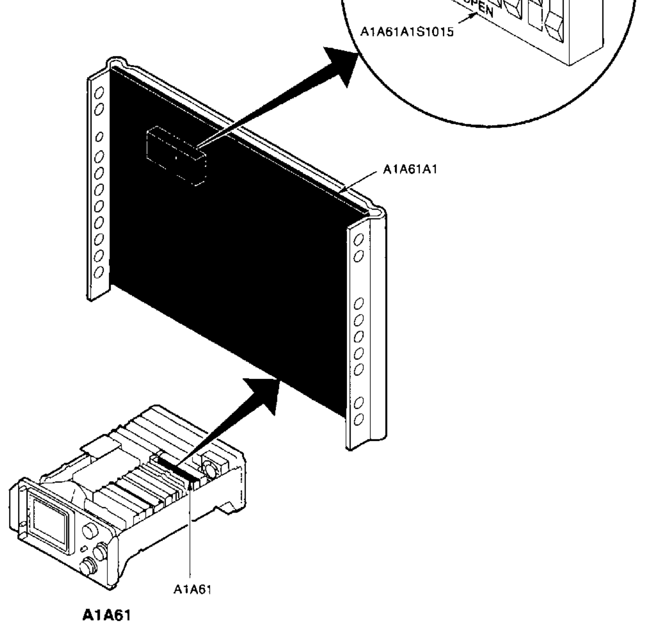


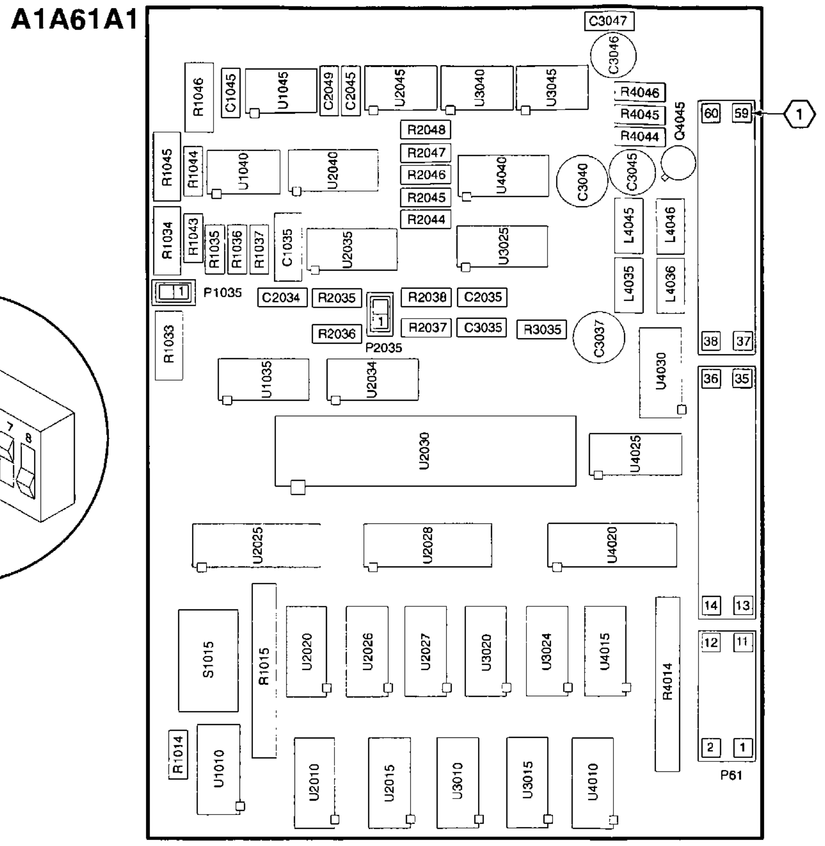
Figure FO-12. A1A58 Processor CCA and A1A60 Horiz Digital Storage CCA Component Locators

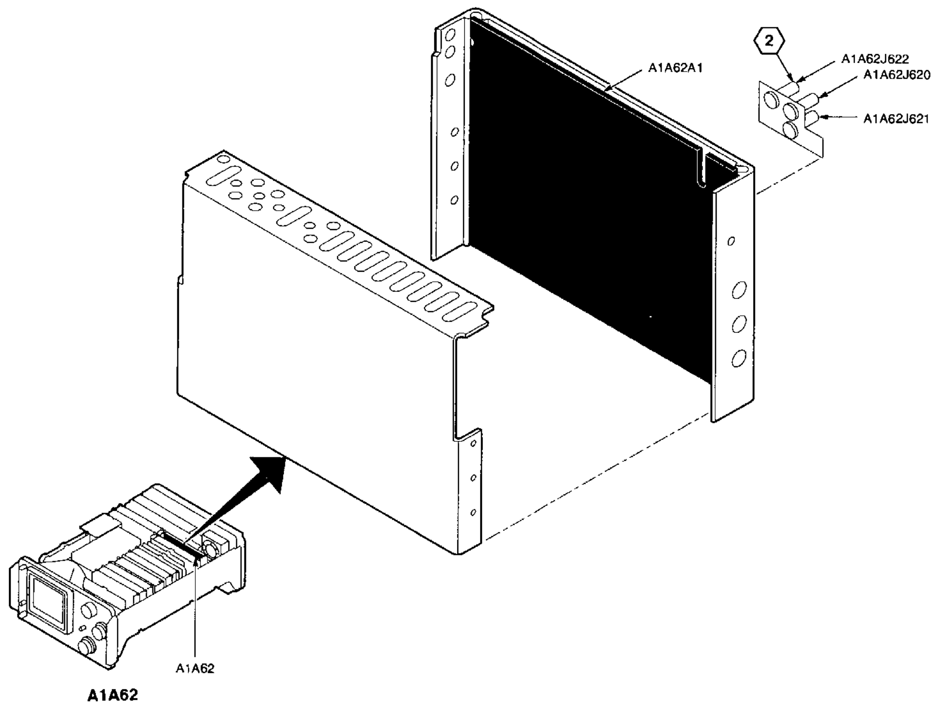


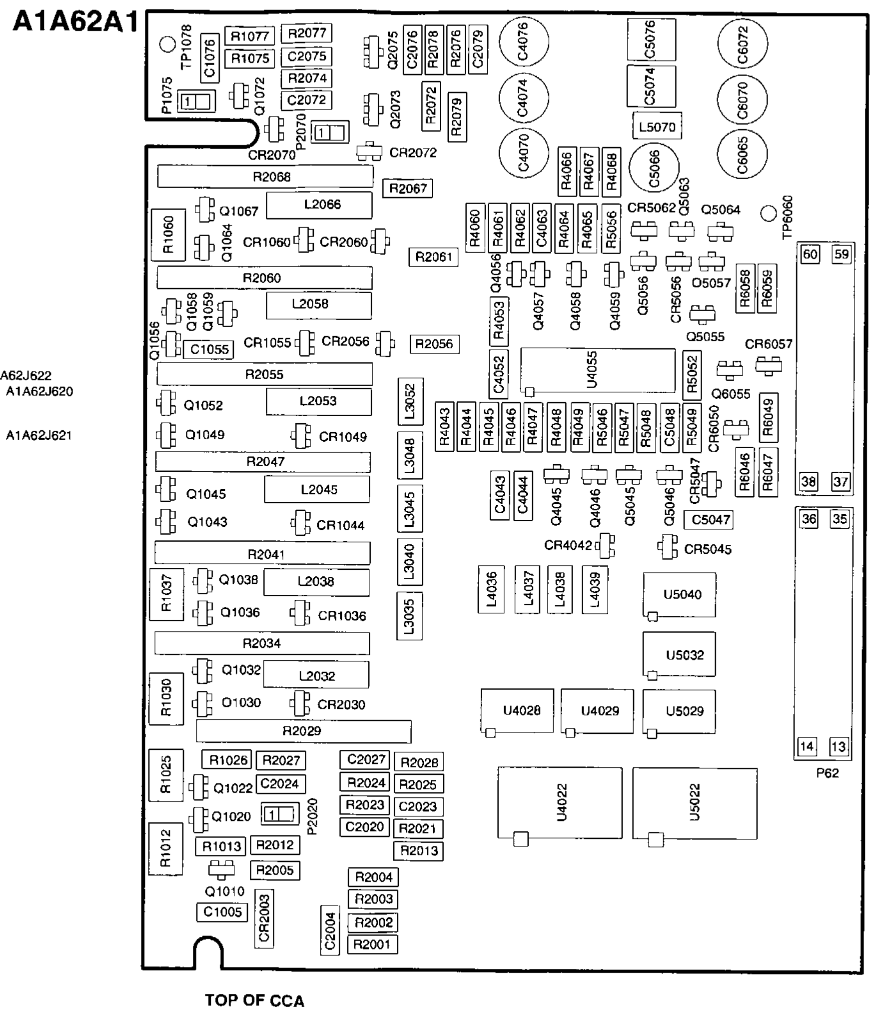


B-SAVE OFFSET SETTINGS	
A1A61A1S1015	DIVISIONS ON CRT
SWITCH 1	0.062
SWITCH 2	0.125
SWITCH 3	0.25
SWITCH 4	0.5
SWITCH 5	1
SWITCH 6	2
SWITCH 7	4
SWITCH 8	0.031









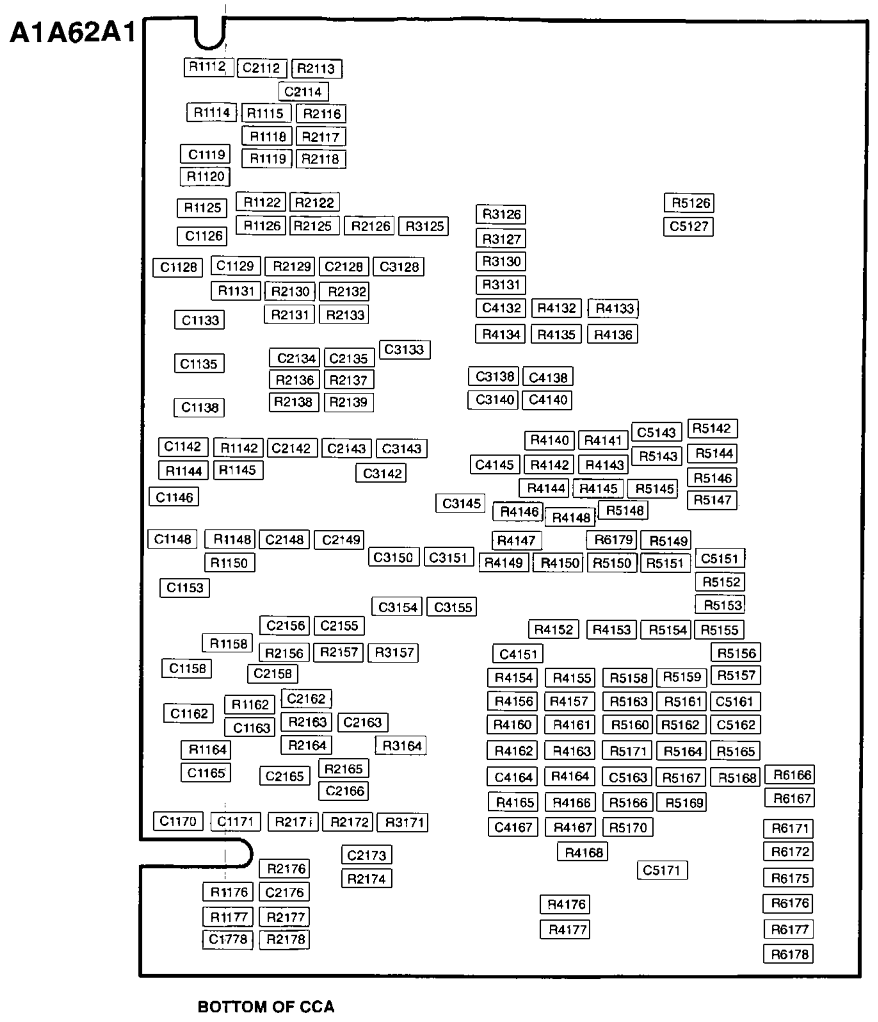
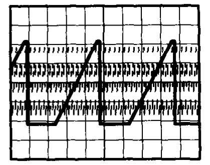


Figure FO-13. A1A61 Vert Digital Storage CCA and A1A62 Log Amplifier CCA Component Locators

NOTE

THE SYMBOL * INDICATES PARTS ARE LOCATED ON BOTTOM SIDE OF CCA.

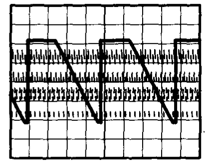
1



OSCILLOSCOPE SETTINGS

VOLTS/DIV: 50 V
TIME/DIV: 50 MS
COUPLING: DC

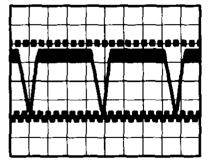
2



OSCILLOSCOPE SETTINGS

VOLTS/DIV: 50 V
TIME/DIV: 50 MS
COUPLING: DC

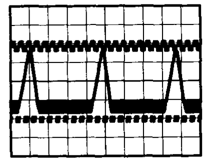
3



OSCILLOSCOPE SETTINGS

VOLTS/DIV: 50 V
TIME/DIV: 50 MS
COUPLING: DC

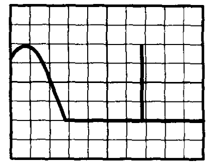
4



OSCILLOSCOPE SETTINGS

VOLTS/DIV: 50 V
TIME/DIV: 50 MS
COUPLING: DC

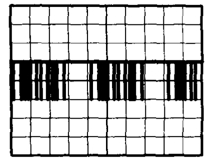
5



OSCILLOSCOPE SETTINGS

VOLTS/DIV: 1 V
TIME/DIV: 10 MS
COUPLING: DC

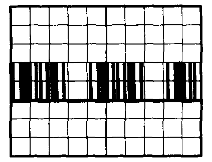
6



OSCILLOSCOPE SETTINGS

VOLTS/DIV: 2 V
TIME/DIV: 5 MS
COUPLING: DC

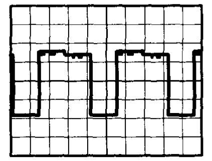
7



OSCILLOSCOPE SETTINGS

VOLTS/DIV: 2 V
TIME/DIV: 5 MS
COUPLING: DC

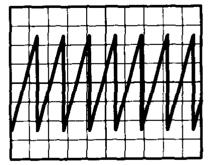
8



OSCILLOSCOPE SETTINGS

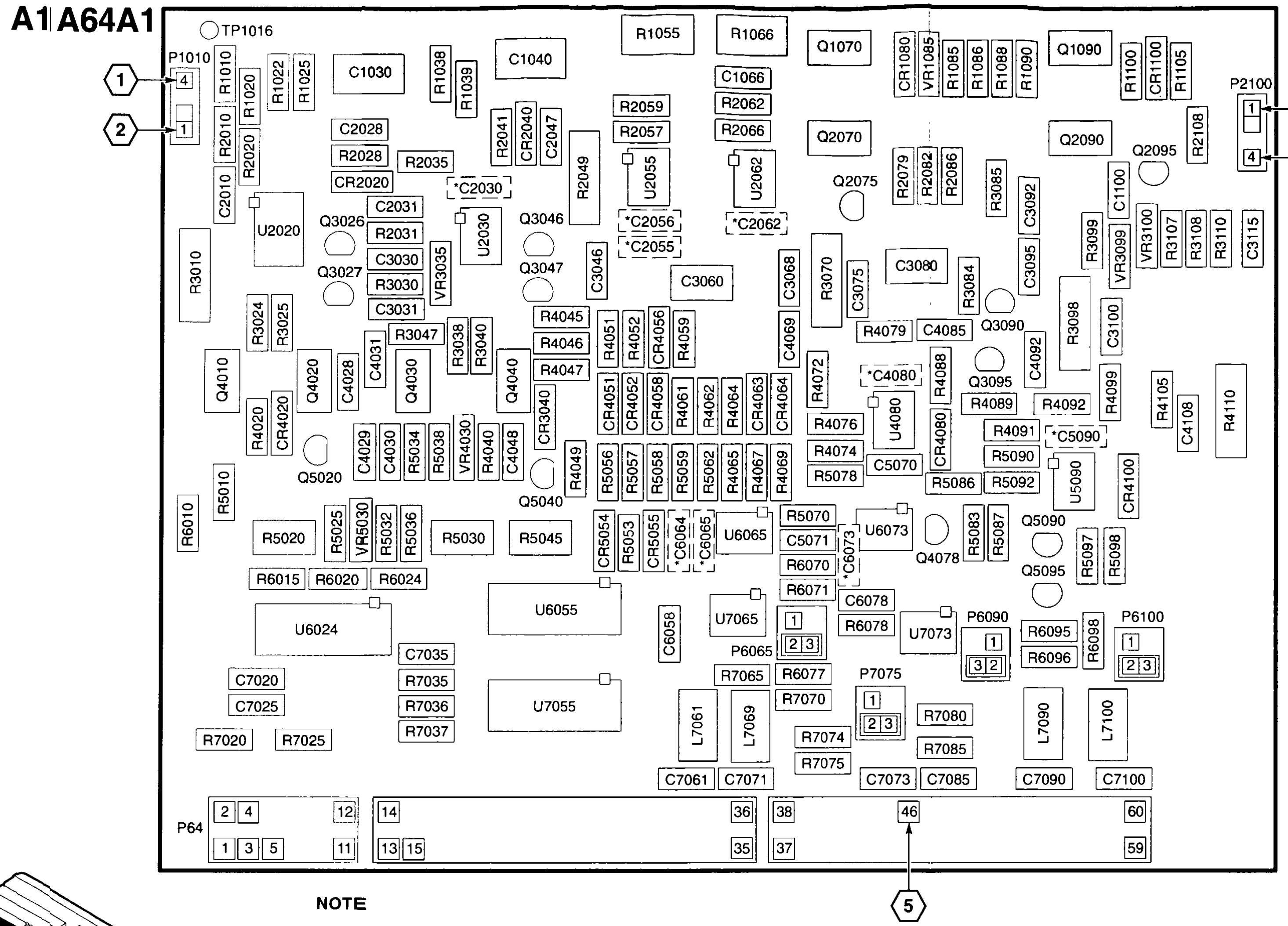
VOLTS/DIV: 1 V
TIME/DIV: 5 MS
COUPLING: DC

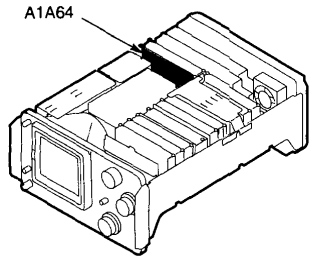
9



OSCILLOSCOPE SETTINGS

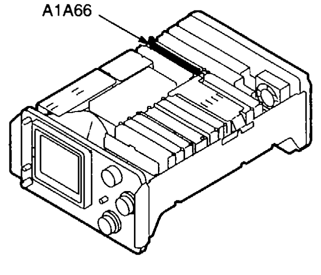
VOLTS/DIV: 1 V
TIME/DIV: 5 MS
COUPLING: DC





NOTE

- MOVE JUMPERS A1A64P6090 AND A1A64P6100 AT SAME TIME TO SELECT DIGITAL OR ANALOG HORIZ OUT SIGNAL.
- MOVE JUMPERS A1A64P6065 AND A1A64P7075 AT SAME TIME TO SELECT DIGITAL OR ANALOG VERT OUT SIGNAL.



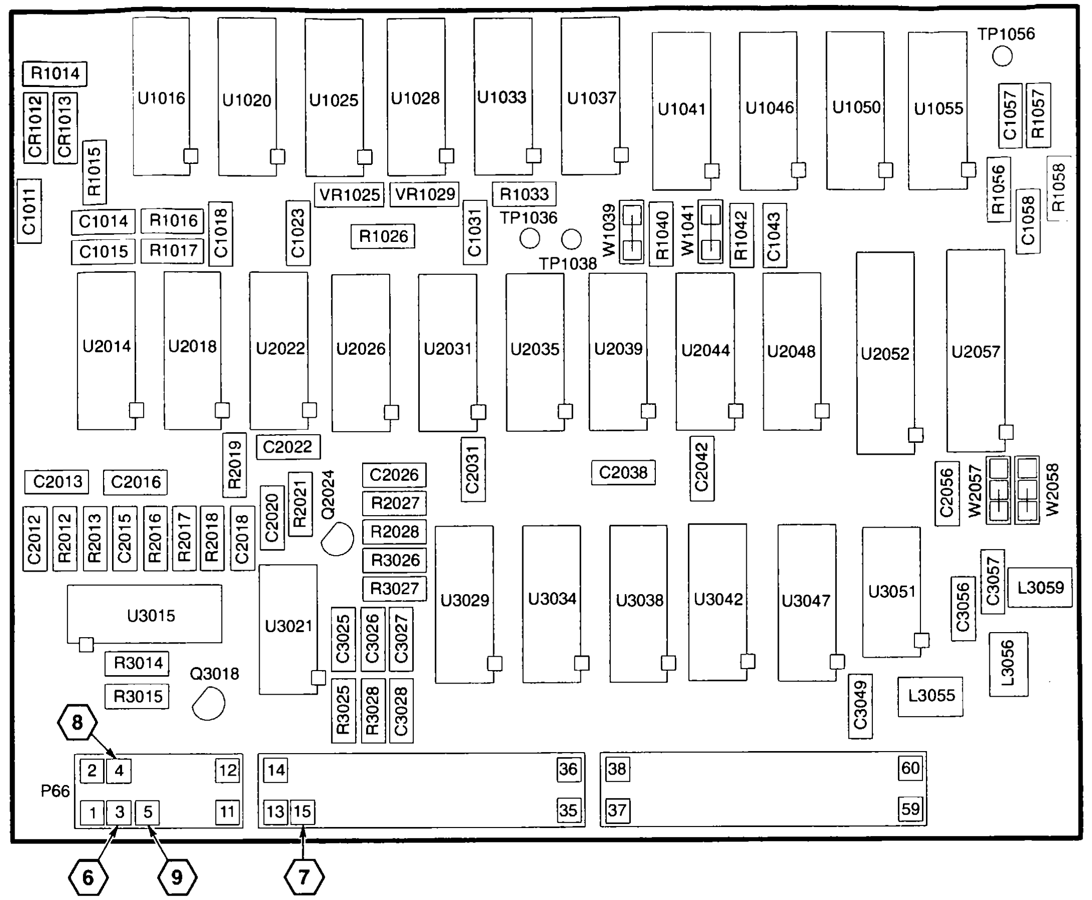
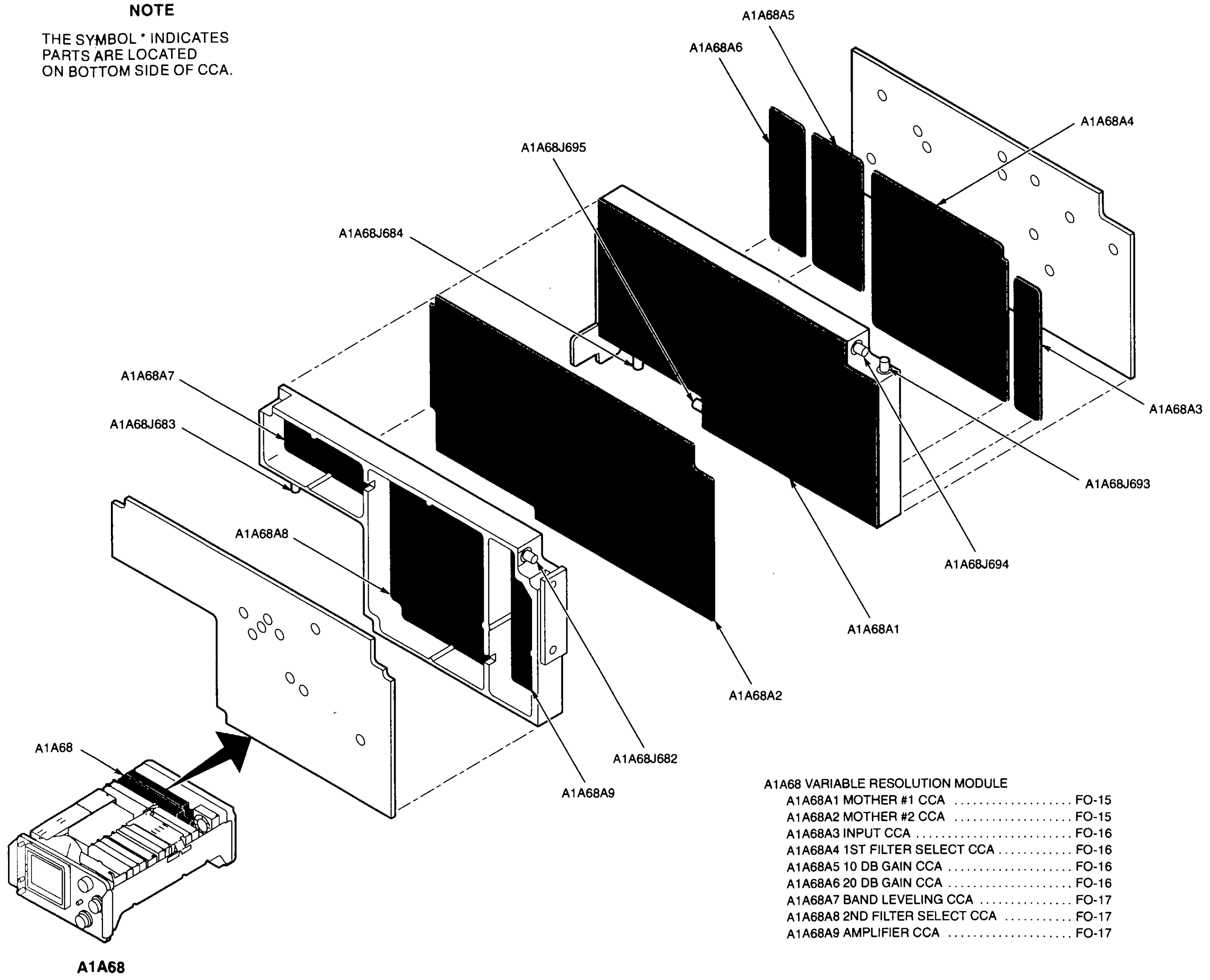
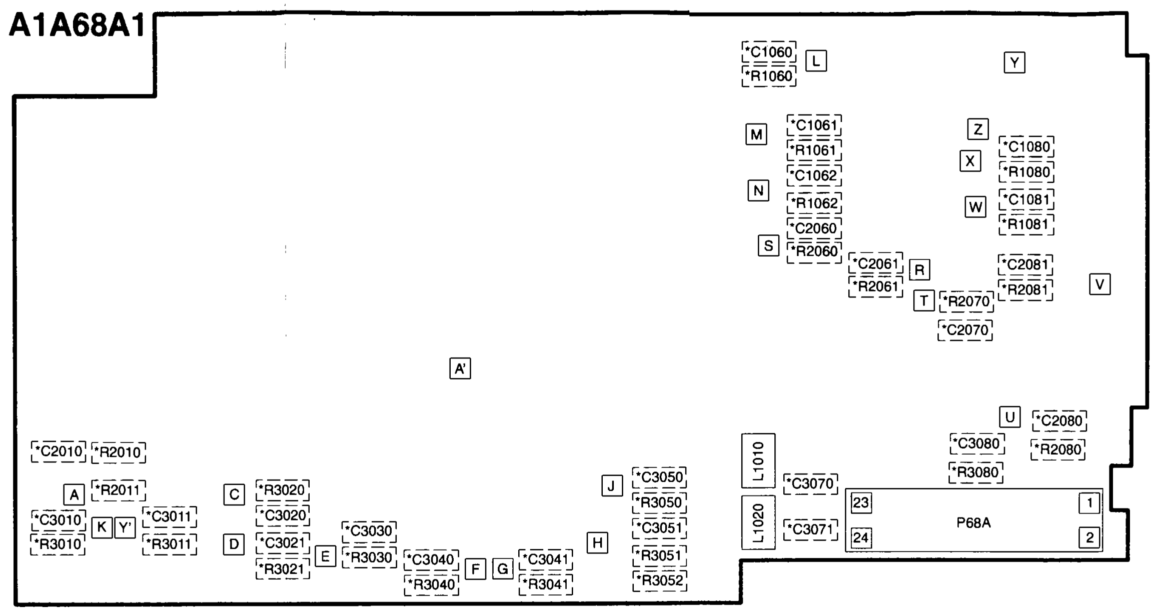


Figure FO-14. A1A64 Deflection Amplifiers CCA and A1A66 CRT Readout CCA Component Locators

NOTE

THE SYMBOL * INDICATES PARTS ARE LOCATED ON BOTTOM SIDE OF CCA.





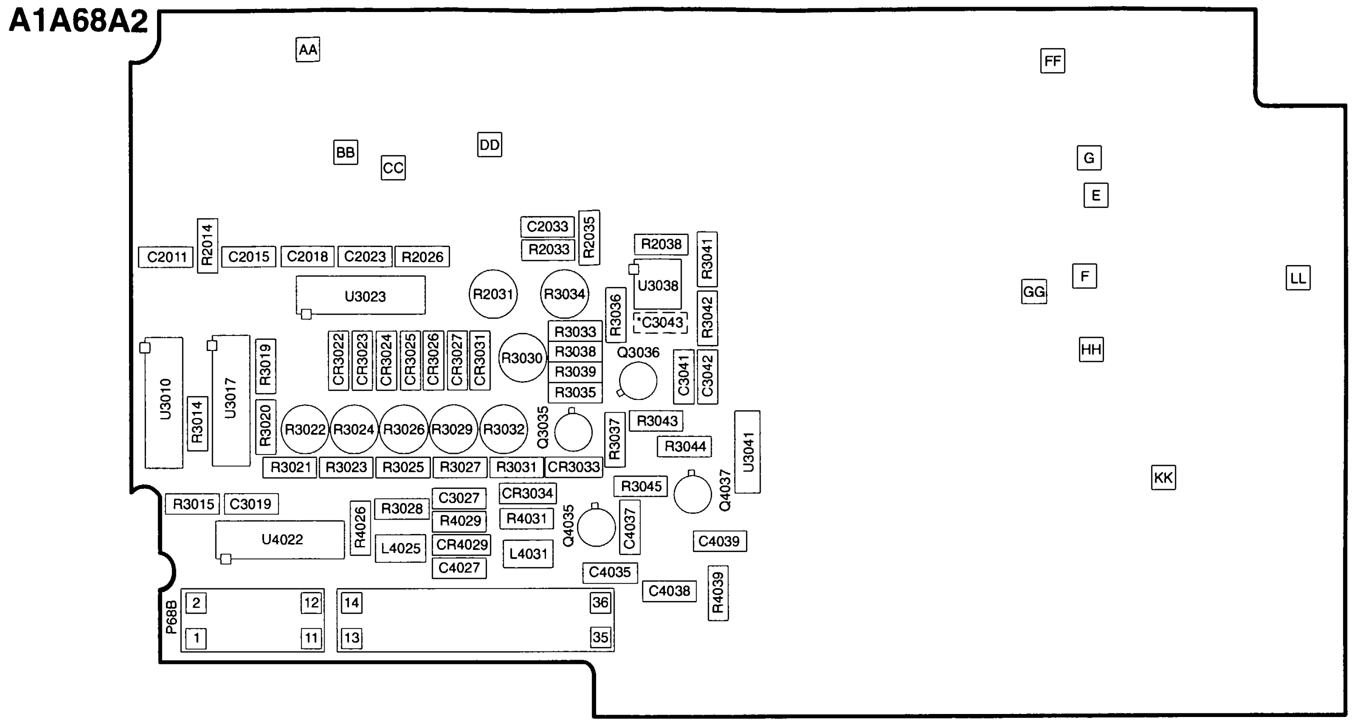
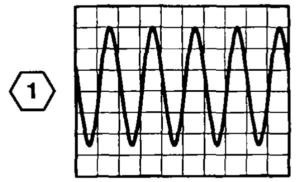


Figure FO-15. A1A68 Variable Resolution Module, A1A68A1 Mother #1 CCA and A1A68A2 Mother #2 CCA Component Locators

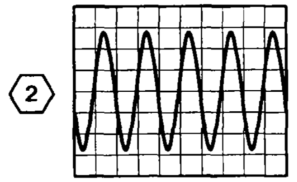
NOTE

SEE FO-15 FOR A1A68 VARIABLE RESOLUTION MODULE CCA LOCATOR.



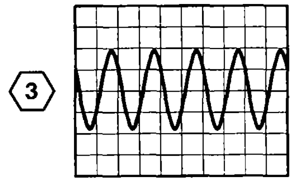
OSCILLOSCOPE SETTINGS

VOLTS/DIV: 50 MV
TIME/DIV: 50 NS
COUPLING: DC



OSCILLOSCOPE SETTINGS

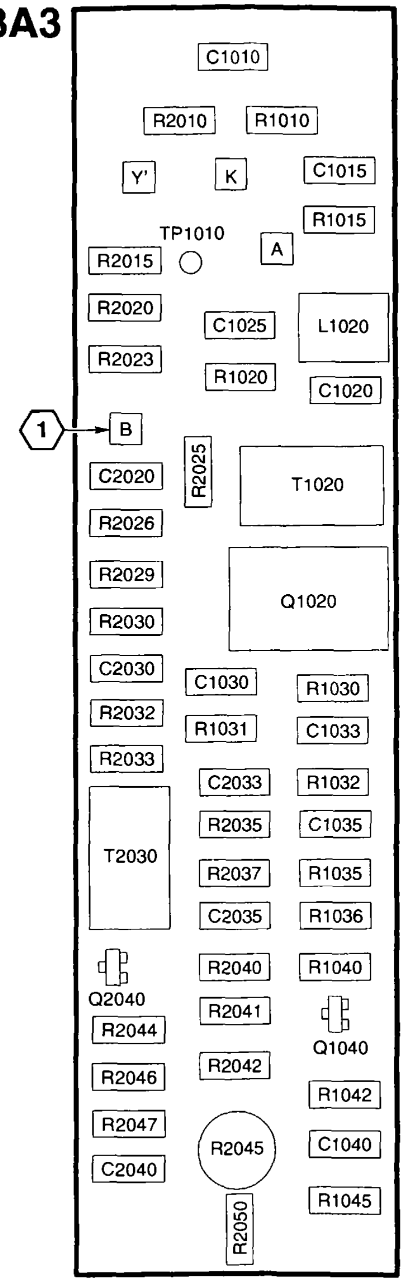
VOLTS/DIV: 0.2 V
TIME/DIV: 50 NS
COUPLING: AC



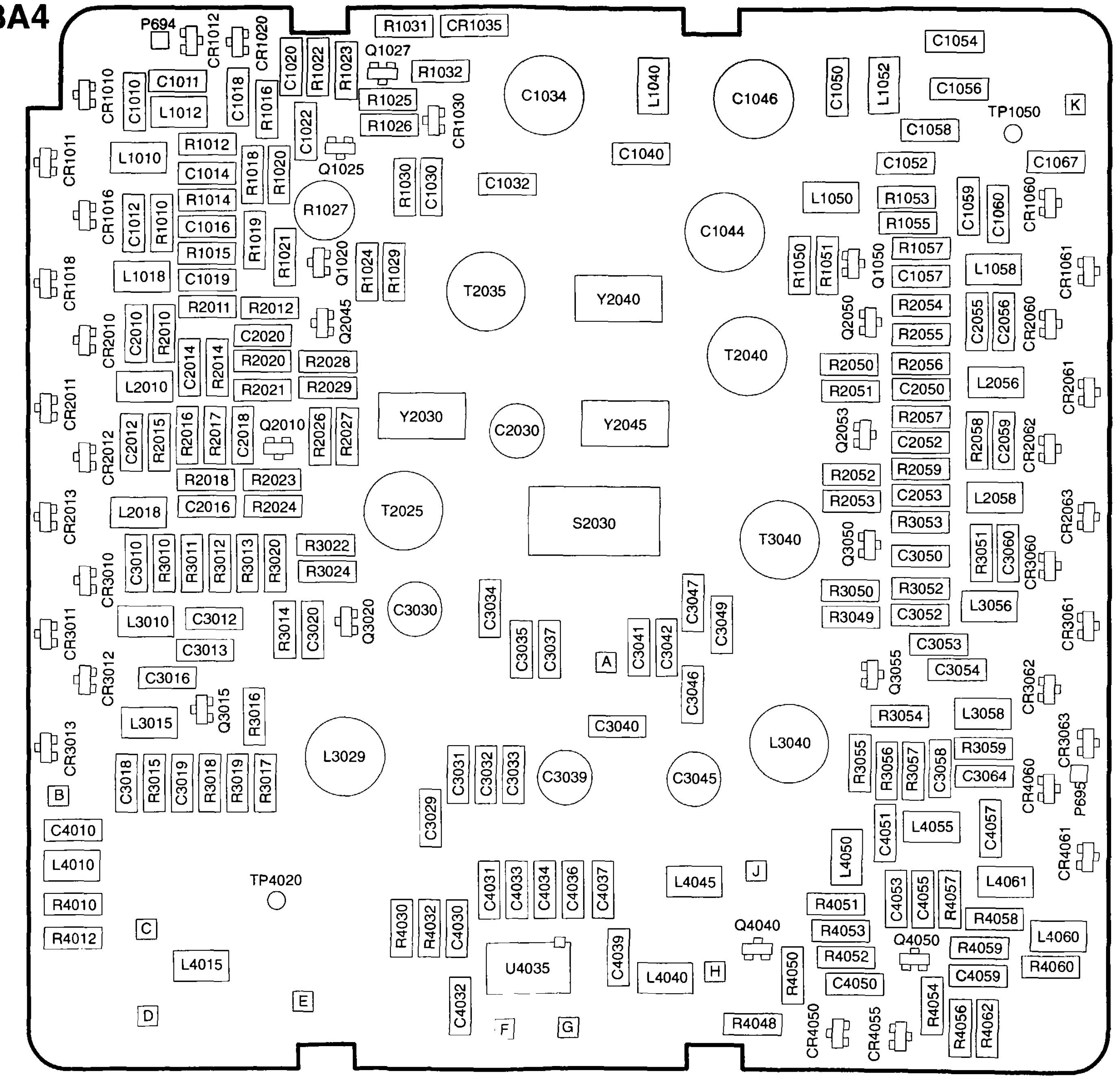
OSCILLOSCOPE SETTINGS

VOLTS/DIV: 50 MV
TIME/DIV: 50 NS
COUPLING: DC

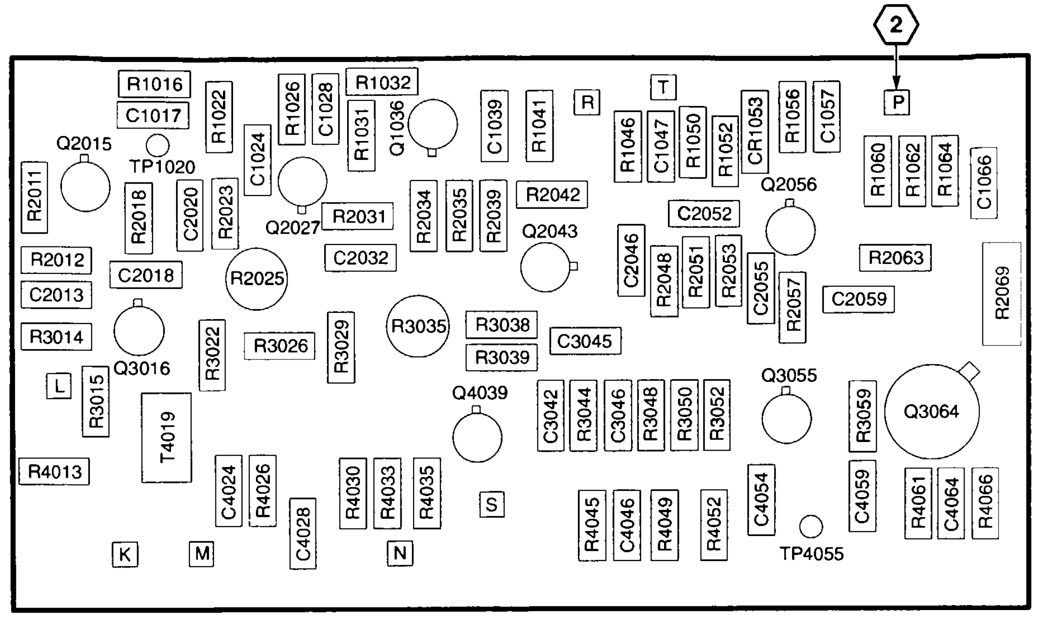
A1A68A3



A1A68A4



A1A68A5



A1A68A6

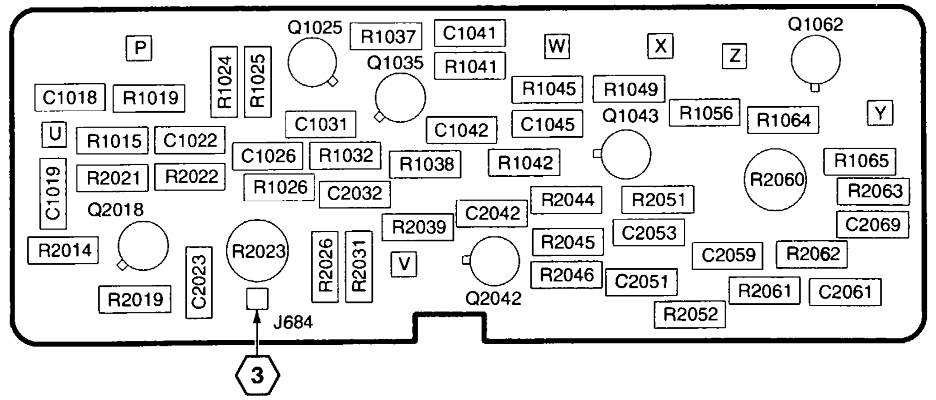


Figure FO-16. A1A68A3 Input CCA, A1A68A4 1st Filter Select CCA, A1A68A5 10 dB Gain CCA and A1A68A6 20 dB Gain CCA Component Locator and Schematic Diagrams (Sheet 1 of 5)

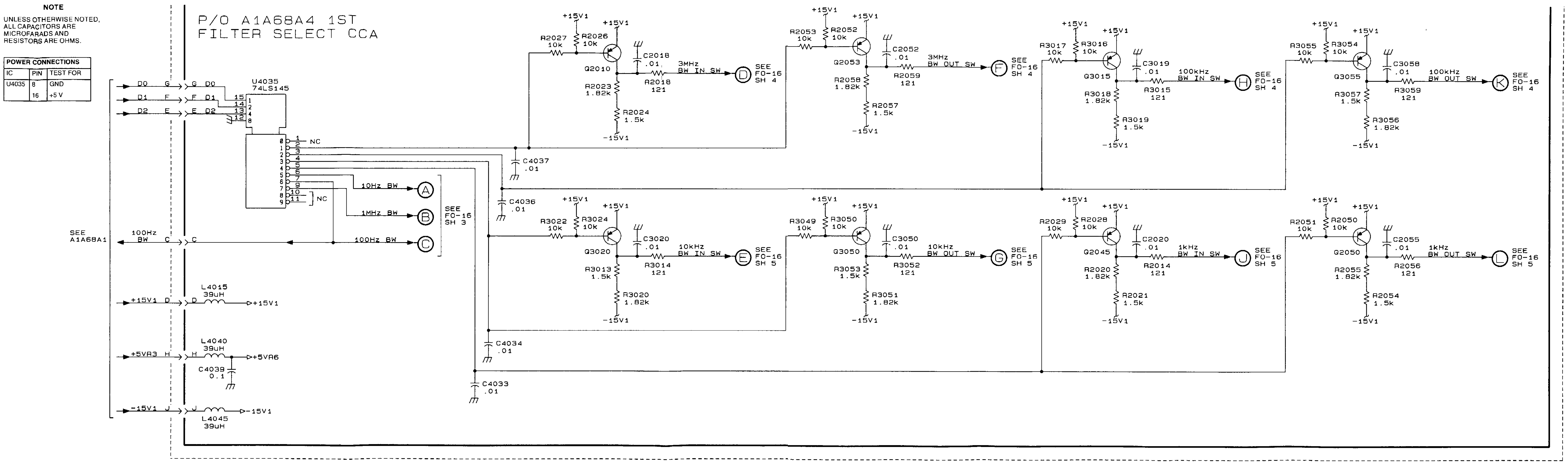


Figure FO-16. A1A68A3 Input CCA, A1A68A4 1st Filter Select CCA, A1A68A5 10 dB Gain CCA and A1A68A6 20 dB Gain CCA Component Locator and Schematic Diagrams (Sheet 2 of 5)

NOTE

UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.

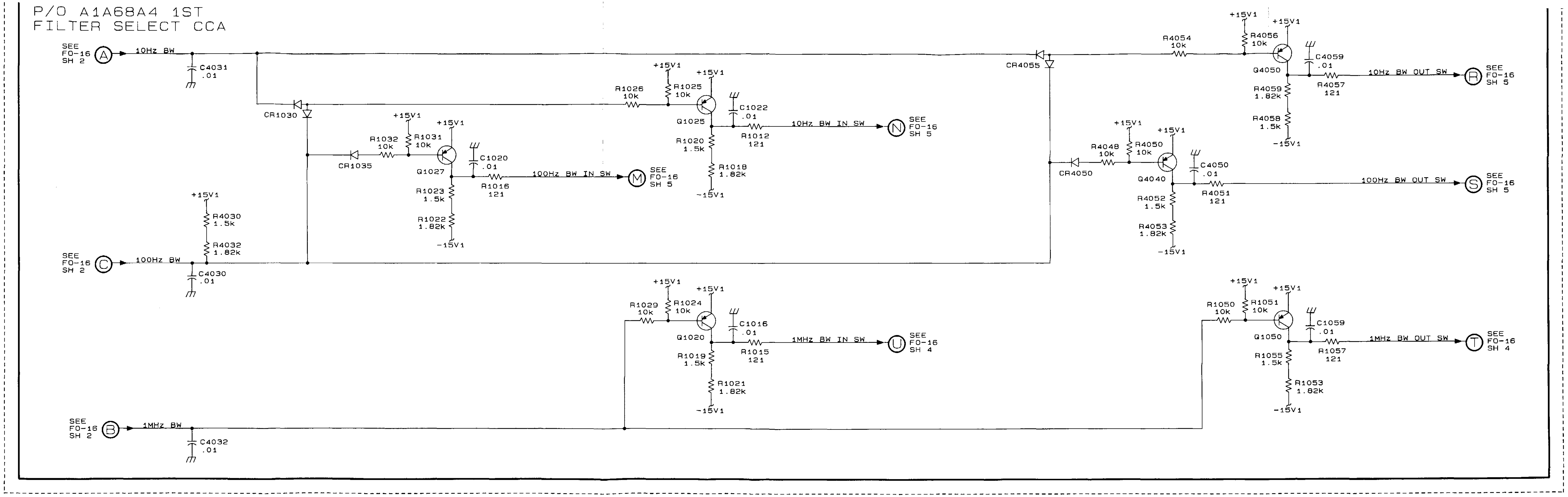


Figure FO-16. A1A68A3 Input CCA, A1A68A4 1[st] Filter Select CCA, A1A68A5 10 dB Gain CCA and A1A68A6 20 dB Gain CCA Component Locator and Schematic Diagrams (Sheet 3 of 5)

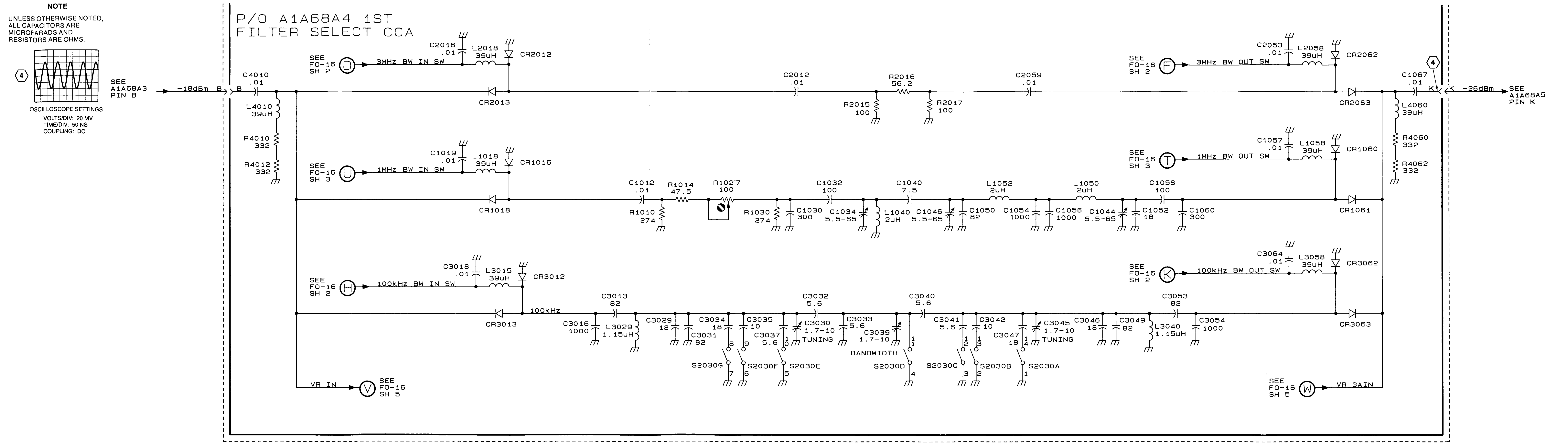
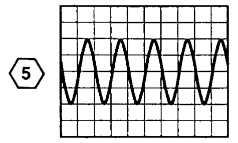


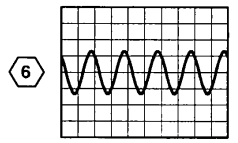
Figure FO-16. A1A68A3 Input CCA, A1A68A4 1st Filter Select CCA, A1A68A5 10 dB Gain CCA and A1A68A6 20 dB Gain CCA Component Locator and Schematic Diagrams (Sheet 4 of 5)

NOTE

- UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.
- CRYSTALS A1A68A4Y2030 AND A1A68A4Y2045 ARE PART OF MATCHED SET WITH CRYSTAL A1A68A8Y6049.
- CRYSTAL A1A68A4Y2040 IS PART OF MATCHED SET WITH CRYSTAL A1A68A8Y5040.



OSCILLOSCOPE SETTINGS
VOLTS/DIV: 50 MV
TIME/DIV: 50 NS
COUPLING: AC



OSCILLOSCOPE SETTINGS
VOLTS/DIV: 20 MV
TIME/DIV: 50 NS
COUPLING: AC

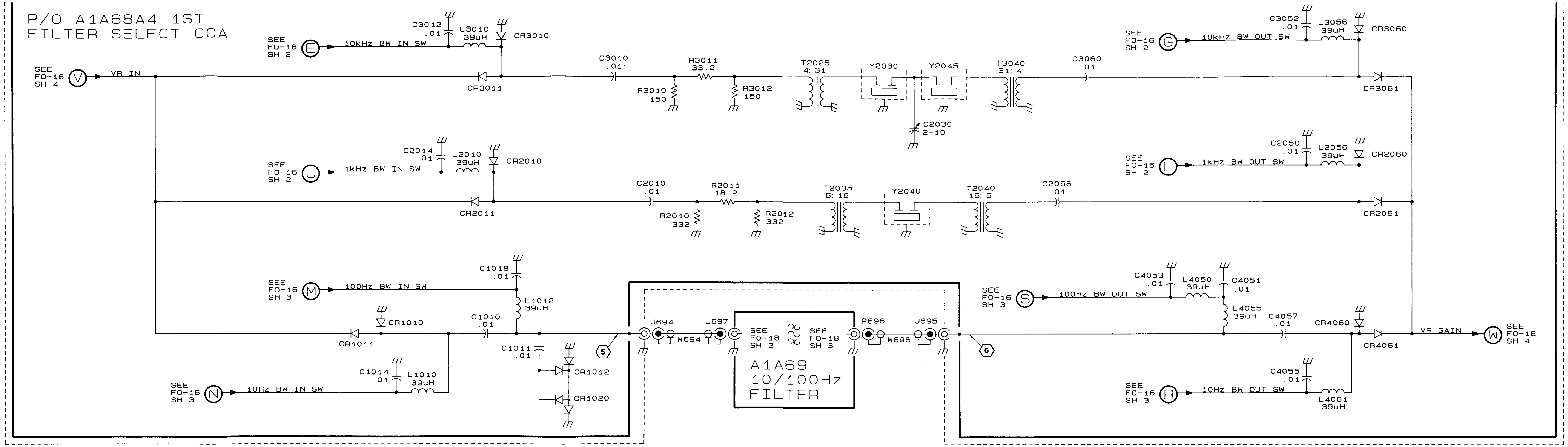
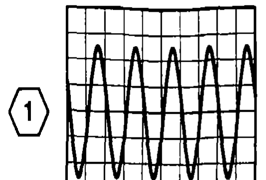


Figure FO-16. A1A68A3 Input CCA, A1A68A4 1st Filter Select CCA, A1A68A5 10 dB Gain CCA and A1A68A6 20 dB Gain CCA Component Locator and Schematic Diagrams (Sheet 5 of 5)

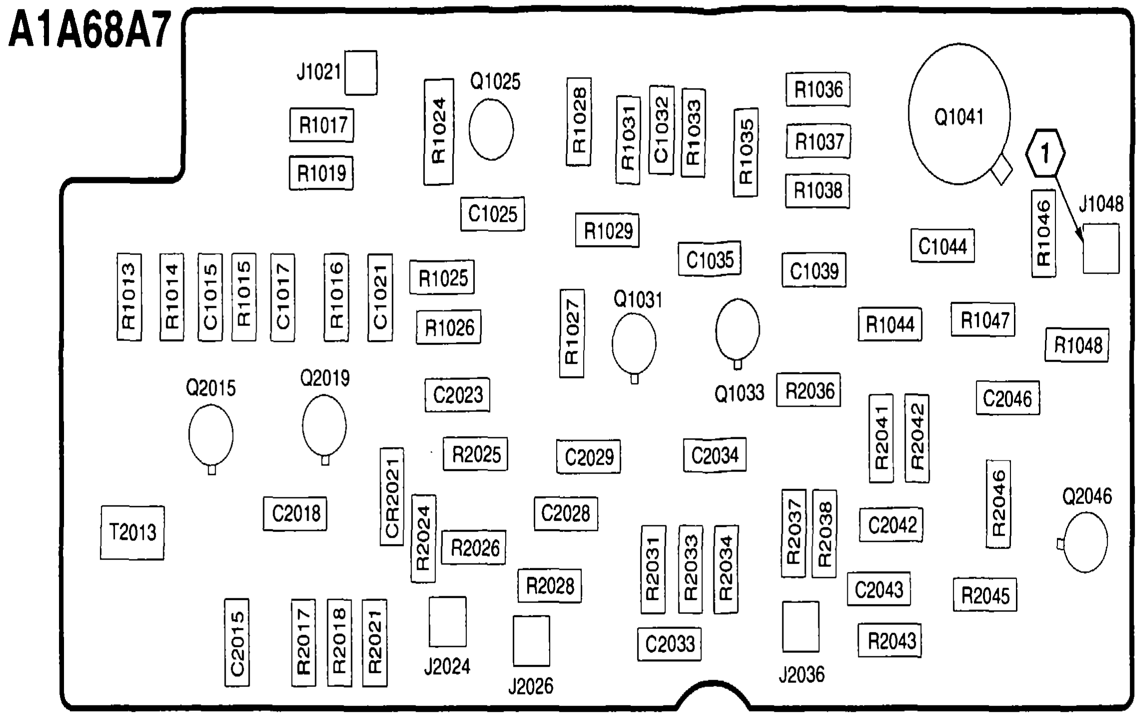
NOTE

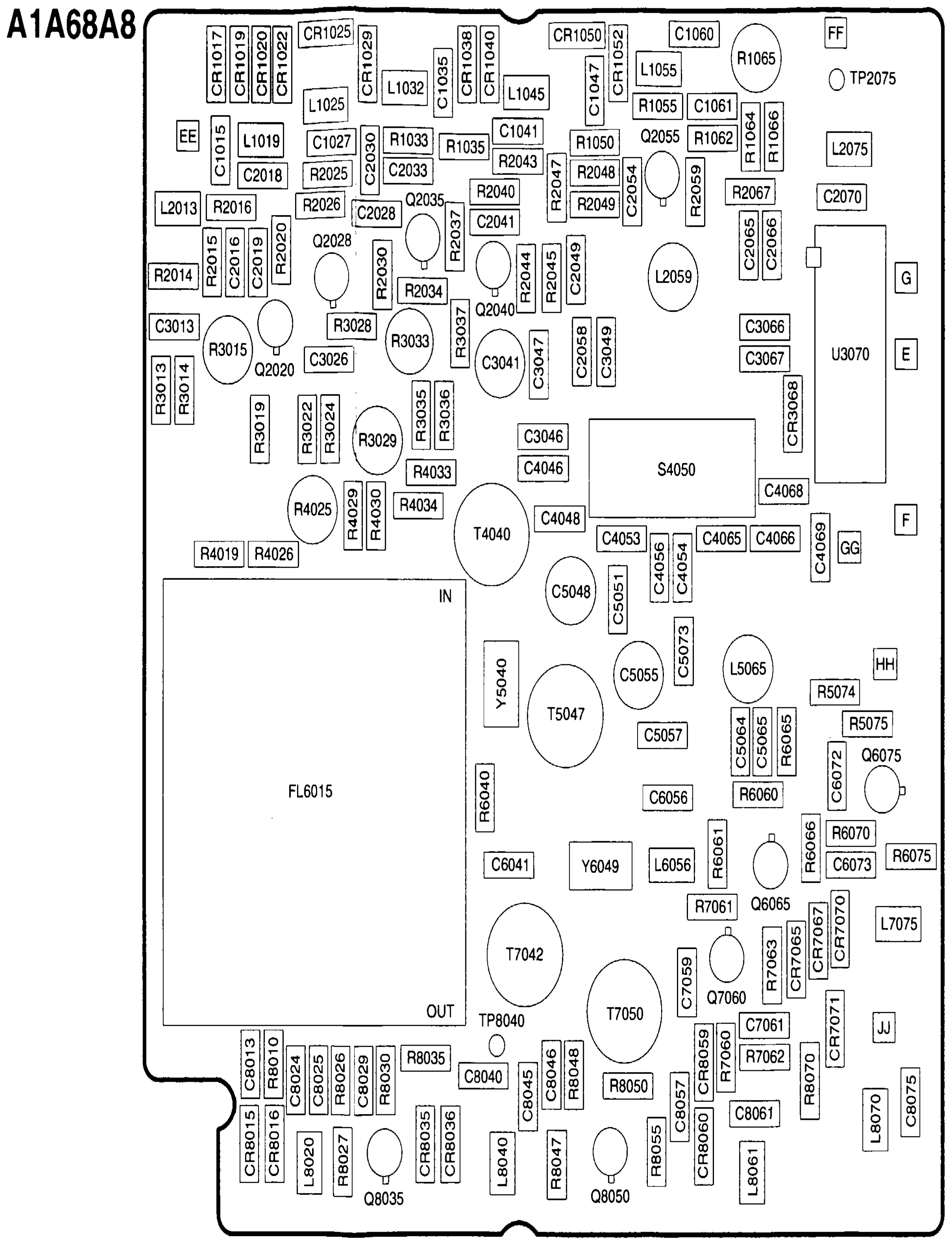
SEE FO-15 FOR A1A68 VARIABLE RESOLUTION MODULE CCA LOCATOR.



OSCILLOSCOPE SETTINGS

VOLTS/DIV: 0.1 V
TIME/DIV: 50 NS
COUPLING: AC





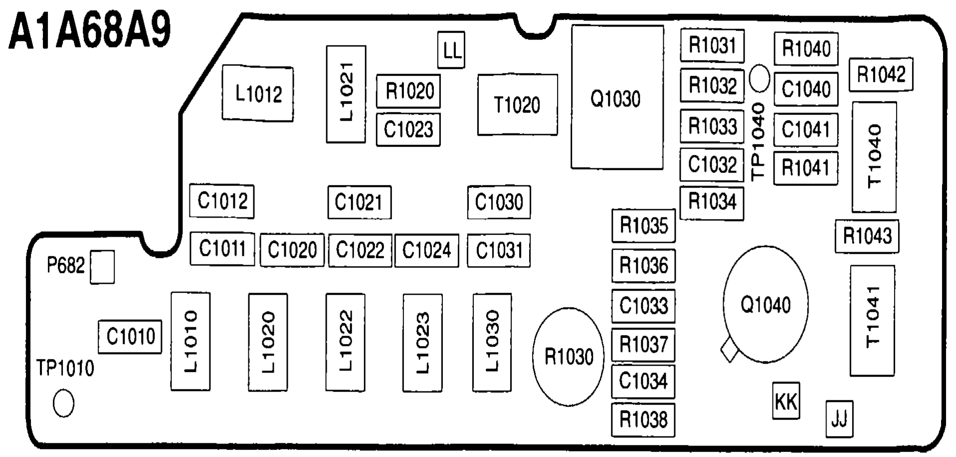


Figure FO-17. A1A68A7 Band Leveling CCA, A1A68A8 2nd Filter Select CCA and A1A68A9 Amplifier CCA Component Locator and Schematic Diagrams (Sheet 1 of 4)

NOTE

UNLESS OTHERWISE NOTED,
ALL CAPACITORS ARE
MICROFARADS AND
RESISTORS ARE OHMS.

POWER CONNECTIONS		
IC	PIN	TEST FOR
U3070	8	GND
	16	+5 V

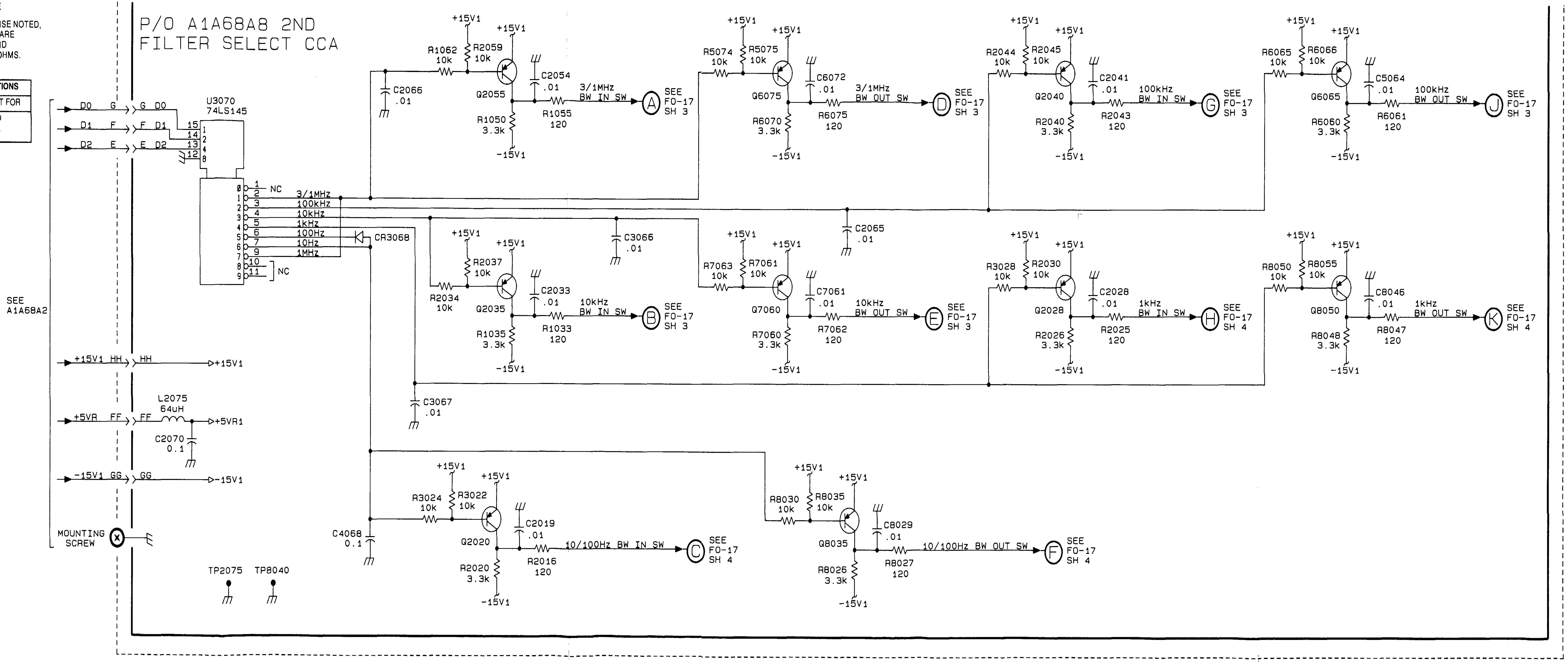


Figure FO-17. A1A68A7 Band Leveling CCA, A1A68A8 2nd Filter Select CCA and A1A68A9 Amplifier CCA Component Locator and Schematic Diagrams (Sheet 2 of 4)

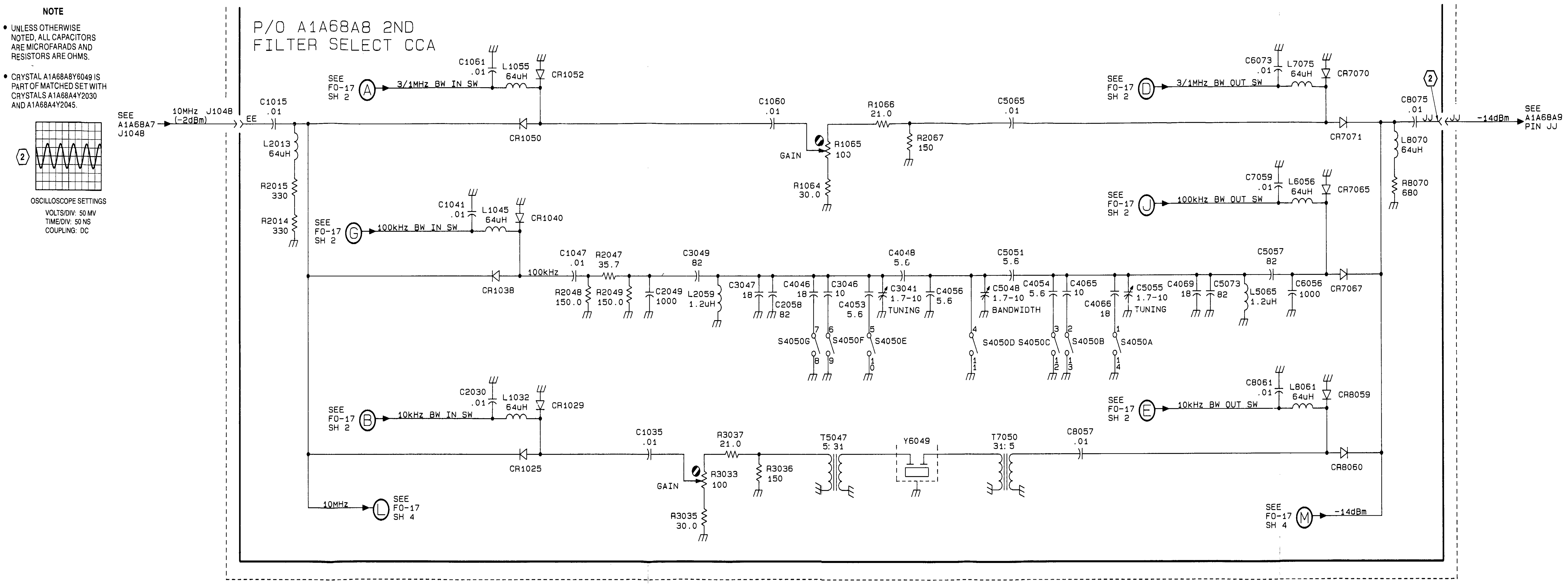
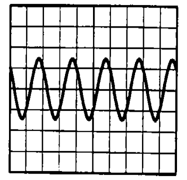


Figure FO-17. A1A68A7 Band Leveling CCA, A1A68A8 2nd Filter Select CCA and A1A68A9 Amplifier CCA Component Locator and Schematic Diagrams (Sheet 3 of 4)

NOTE

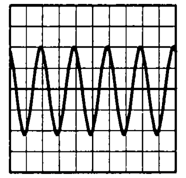
- UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.
- CRYSTAL A1A68A8Y5040 IS PART OF MATCHED SET WITH CRYSTAL A1A68A4Y2040.

3



OSCILLOSCOPE SETTINGS
VOLTS/DIV: 50 MV
TIME/DIV: 50 NS
COUPLING: DC

4



OSCILLOSCOPE SETTINGS
VOLTS/DIV: 50 MV
TIME/DIV: 50 NS
COUPLING: DC

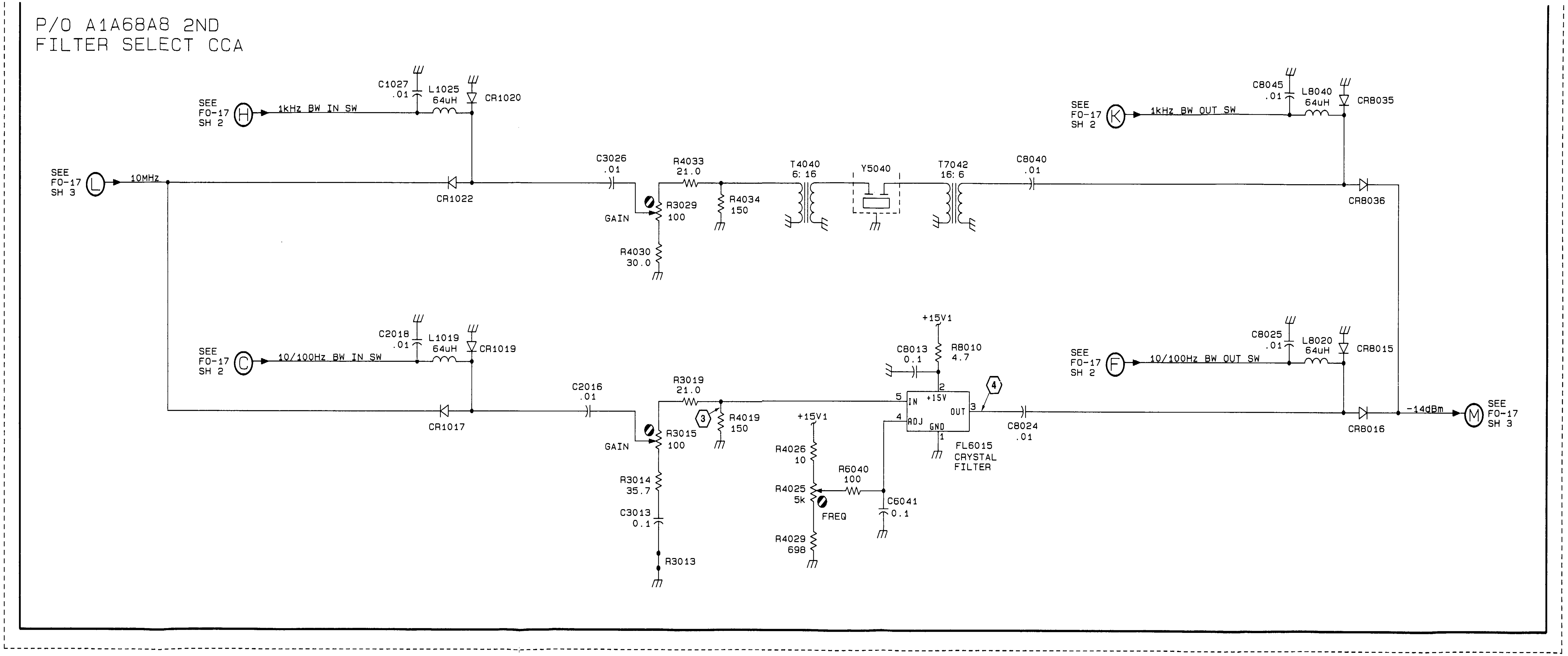


Figure FO-17. A1A68A7 Band Leveling CCA, A1A68A8 2nd Filter Select CCA and A1A68A9 Amplifier CCA Component Locator and Schematic Diagrams (Sheet 4 of 4)

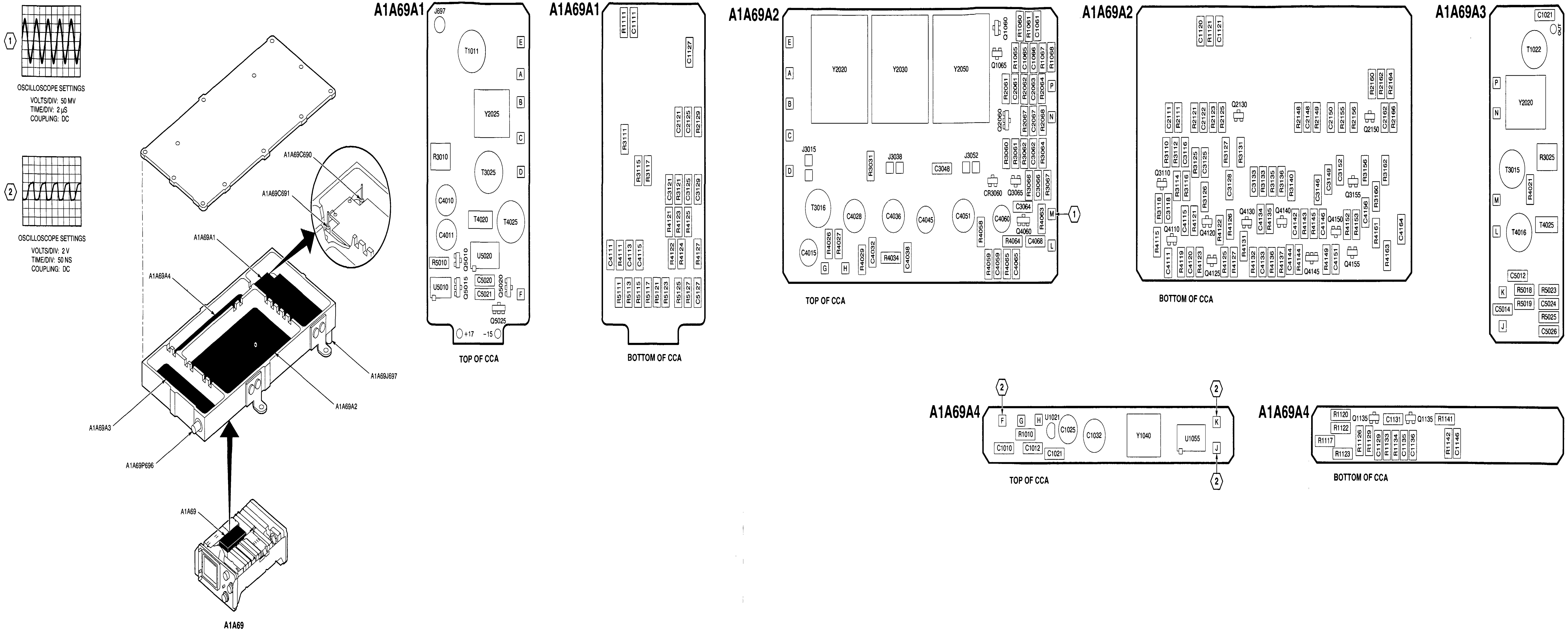


Figure FO-18. A1A69 10/100 Hz Filter, A1A69A1 1st Mixer CCA, A1A69A2, Filter CCA, A1A69A3 2nd Mixer CCA and A1A69A4 Oscillator CCA Component Locators and Schematic Diagrams (Sheet 1 of 3)

NOTE

- UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.
- CRYSTAL A1A69Y2025 IS PART OF MATCHED SET WITH A1A69Y2020.

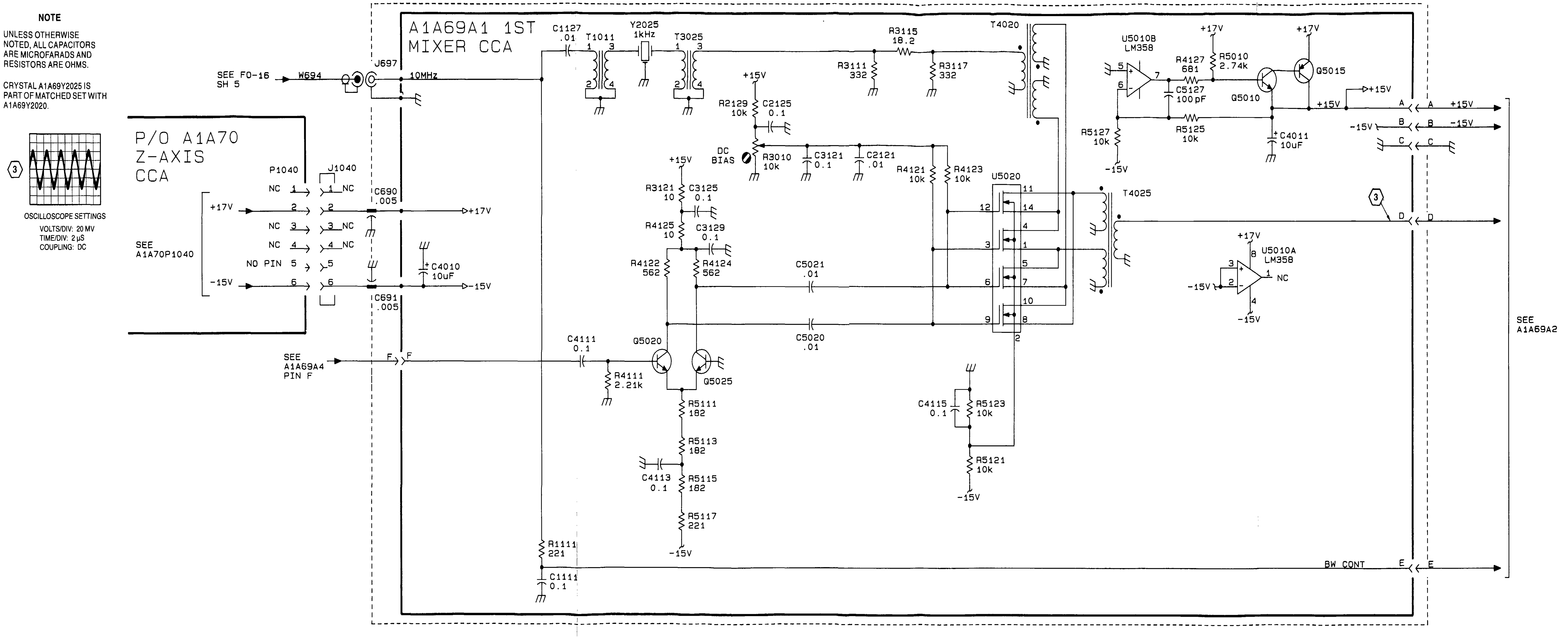


Figure FO-18. A1A69 10/100 Hz Filter, A1A69A1 1st Mixer CCA, A1A69A2, Filter CCA, A1A69A3 2nd Mixer CCA and A1A69A4 Oscillator CCA Component Locators and Schematic Diagrams (Sheet 2 of 3)

NOTE

- UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.
- CRYSTAL A1A69Y2020 IS PART OF MATCHED SET WITH A1A69Y2025.

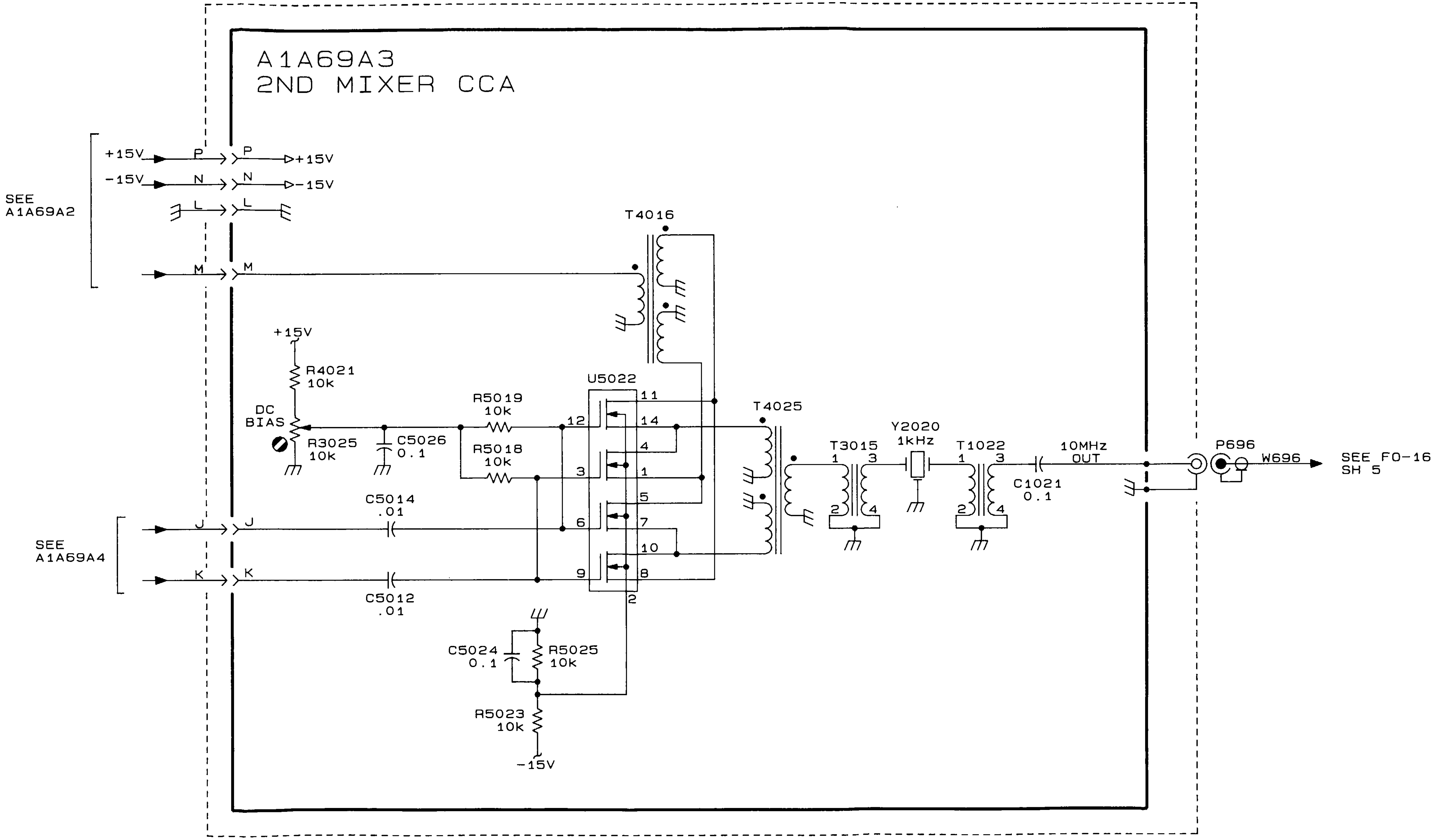
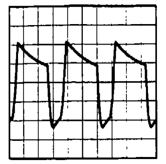


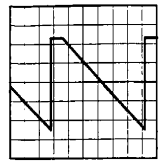
Figure FO-18. A1A69 10/100 Hz Filter, A1A69A1 1st Mixer CCA, A1A69A2, Filter CCA, A1A69A3 2nd Mixer CCA and A1A69A4 Oscillator CCA Component Locators and Schematic Diagrams (Sheet 3 of 3)

NOTE

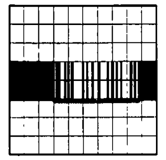
THE SYMBOL * INDICATES PARTS ARE LOCATED ON BOTTOM SIDE OF CCA.

1


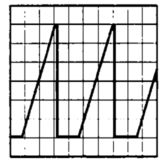
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 1 V
TIME/DIV: 5 MS
COUPLING: DC

5


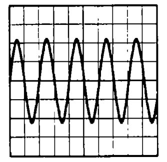
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 5 V
TIME/DIV: 100 MS
COUPLING: DC

2


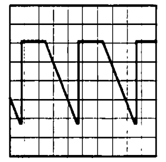
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 20 V
TIME/DIV: 20 MS
COUPLING: DC

6


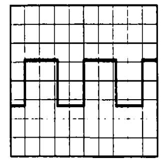
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 2 V
TIME/DIV: 50 MS
COUPLING: DC

3


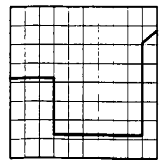
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 0.5 V
TIME/DIV: 0.5 MS
COUPLING: DC

7


OSCILLOSCOPE SETTINGS
VOLTS/DIV: 5 V
TIME/DIV: 50 MS
COUPLING: DC

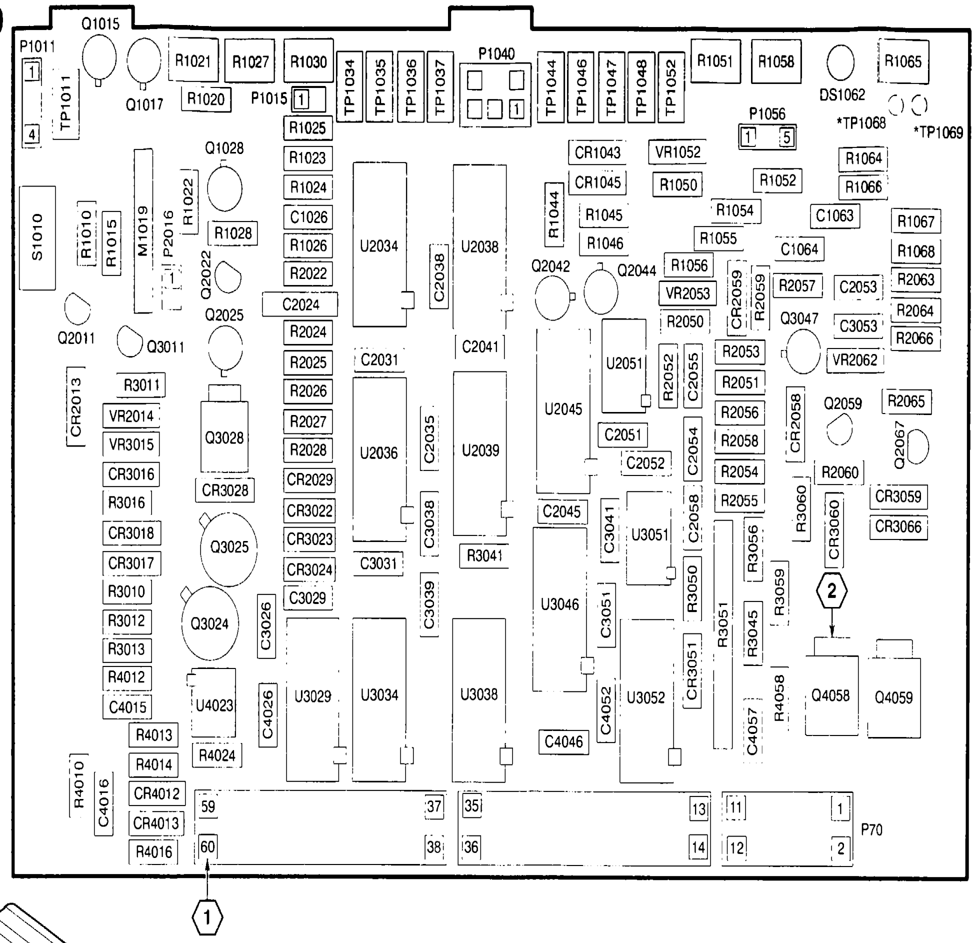
4


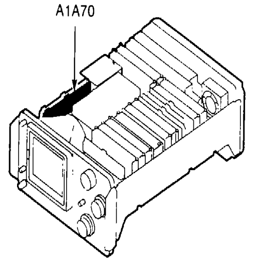
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 2 V
TIME/DIV: 50 MS
COUPLING: DC

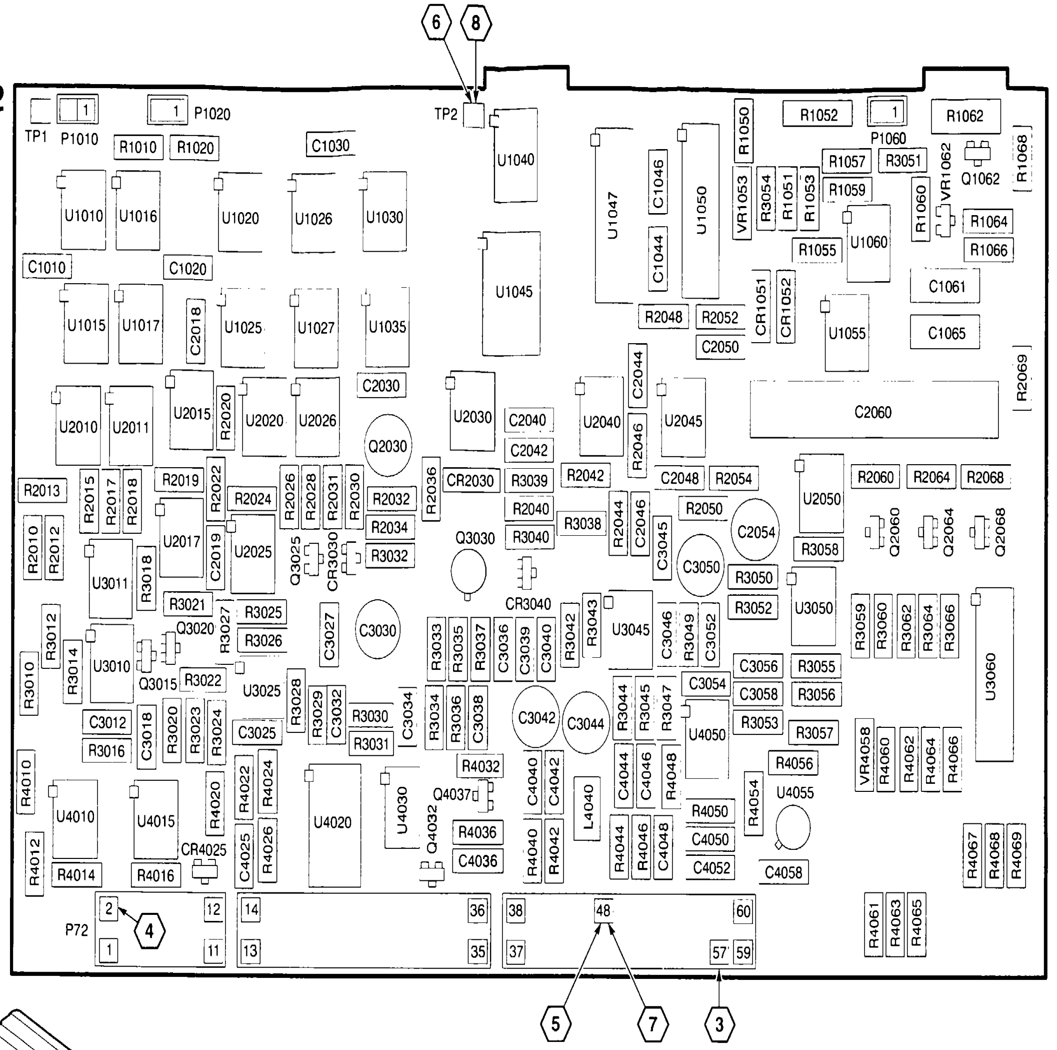
8


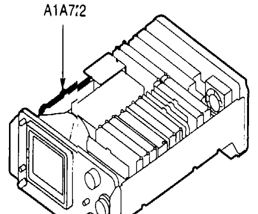
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 2 V
TIME/DIV: 20 MS
COUPLING: DC
TRIGGER MODE: NORM
TRIGGER LEVEL: –

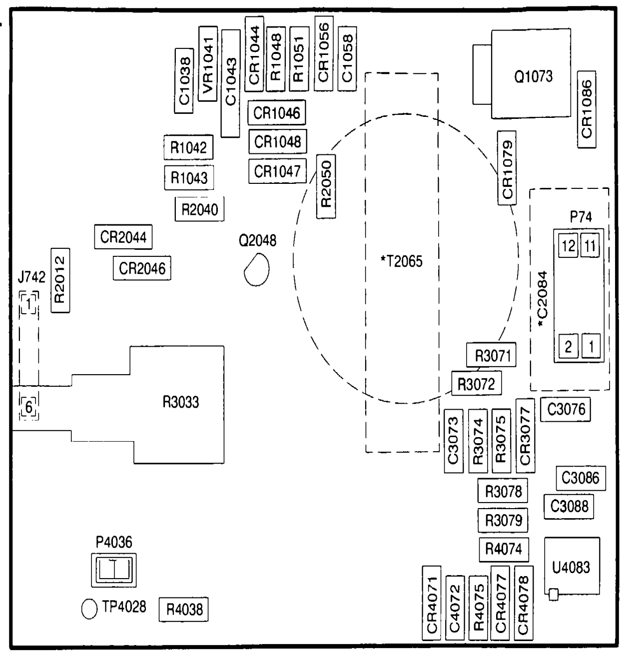
A1A74J742	
PIN	TEST FOR
1	–2550 TO –3550 V
2	N/A
3	–3820 TO –3930 V
4	–3810 TO –3910 V
5	–3810 TO –3910 V
6	–3810 TO –3910 V

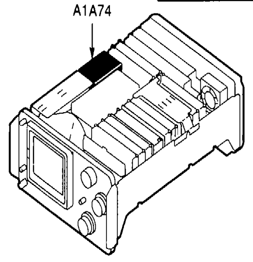
A1A70


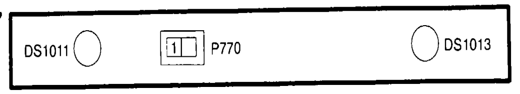
A1A70


A1A72


A1A72


A1A74


A1A74


A1A77


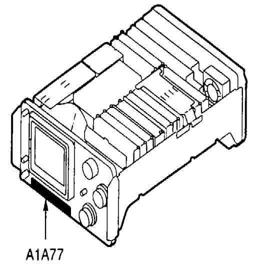
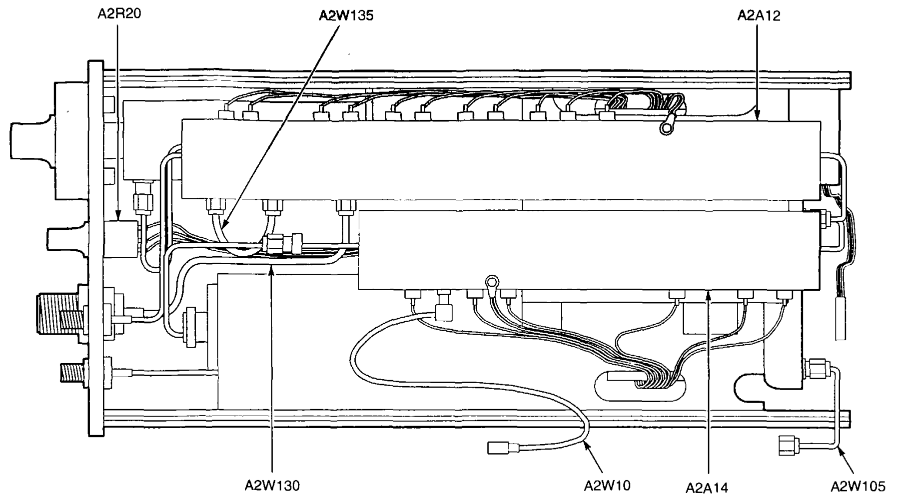
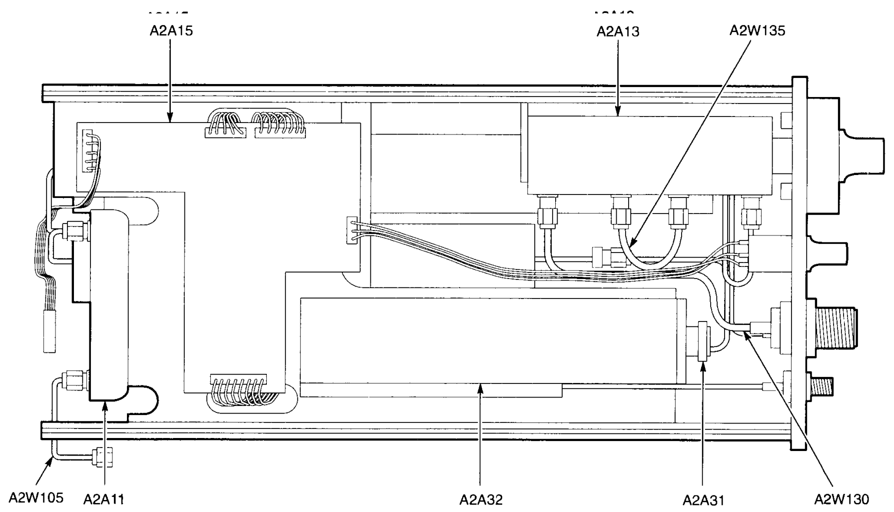
A1A77


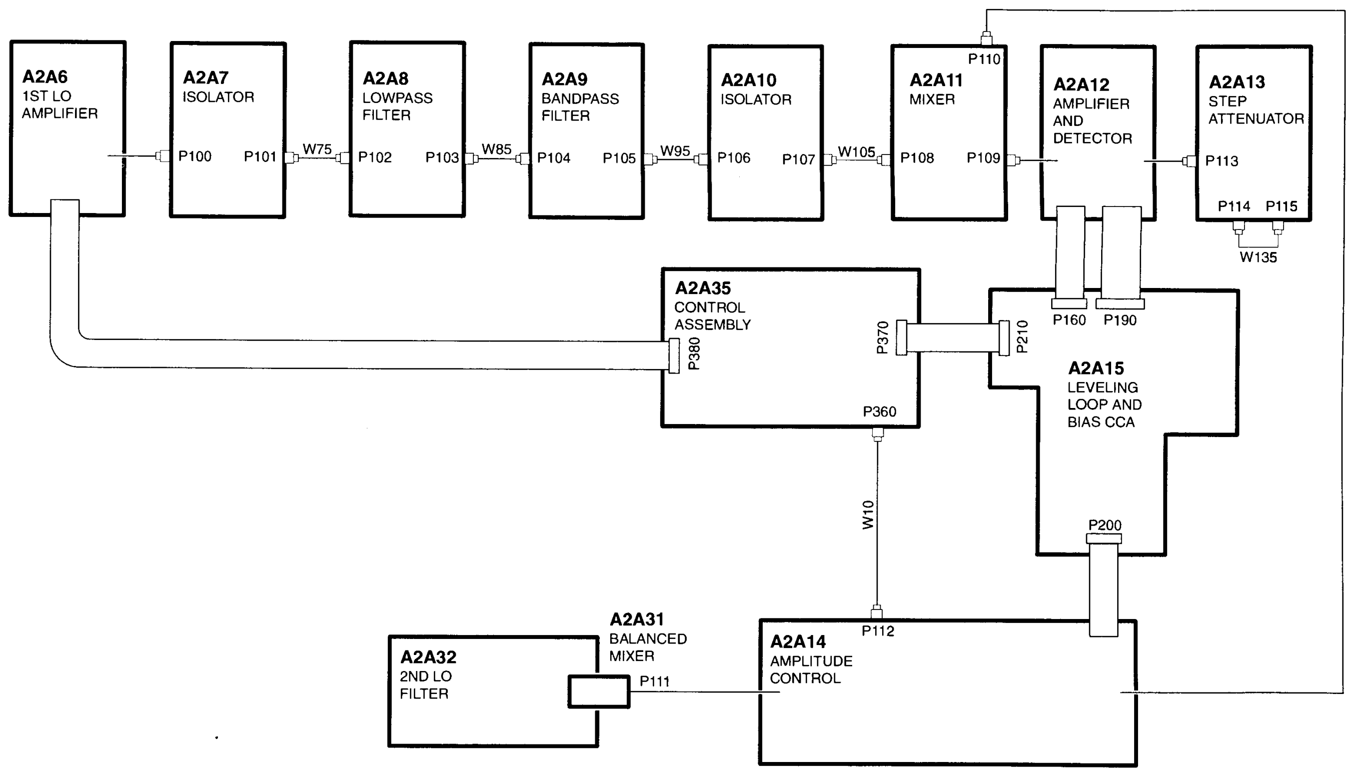
Figure FO-19. A1A70 Z-Axis CCA, A1A72 Sweep CCA, A1A74 High Voltage CCA and A1A77 Graticule Lights CCA Component Locators



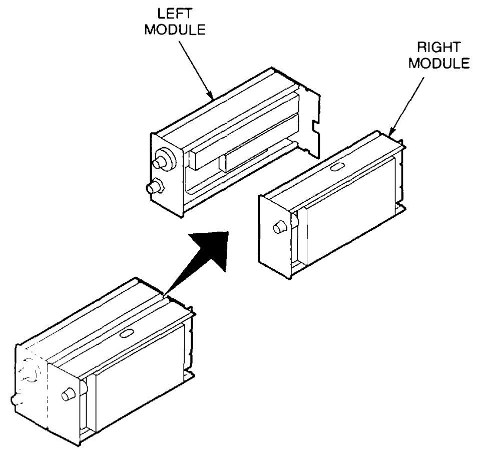
RIGHT SIDE VIEW OF LEFT MODULE OF TR 503

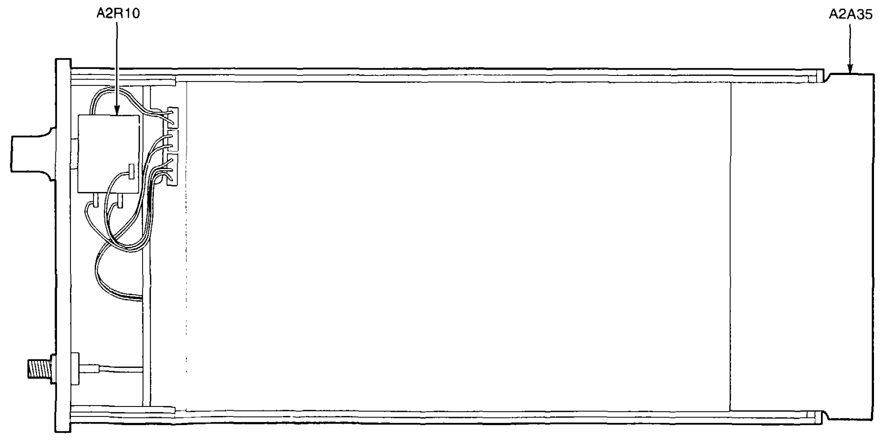


LEFT SIDE VIEW OF LEFT MODULE OF TR 503

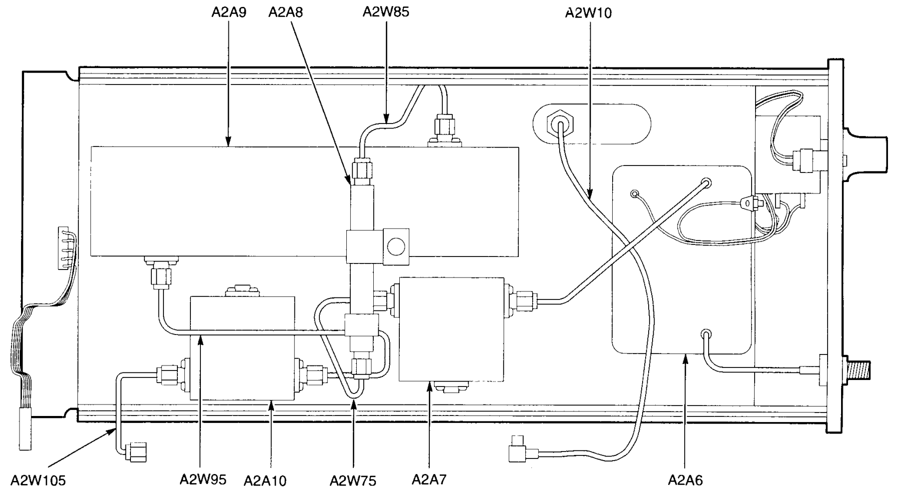


TR 503 TRACKING GENERATOR INTERCONNECT DIAGRAM





RIGHT SIDE VIEW OF RIGHT MODULE OF TR 503



LEFT SIDE VIEW OF RIGHT MODULE OF TR 503

Figure FO-20. TR 503 Tracking Generator CCA Locator and Interconnect Diagrams

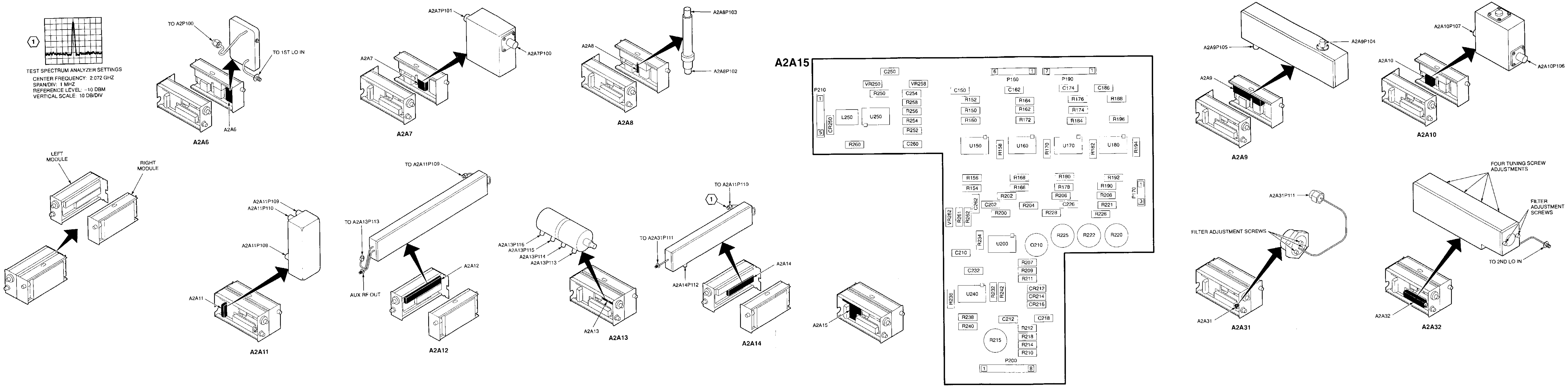


Figure FO-21. A2A6 1st LO Amplifier, A2A7 Isolator, A2A8 Lowpass Filter, A2A9 Bandpass Filter, A2A10 Isolator, A2A11 Mixer, A2A12 Amplifier and Detector, A2A13 Step Attenuator, A2A14 Amplitude Control, A2A15 Leveling Loop and Bias CCA, A2A31 Balanced Mixer and A2A32 2nd LO Filter Component Locators

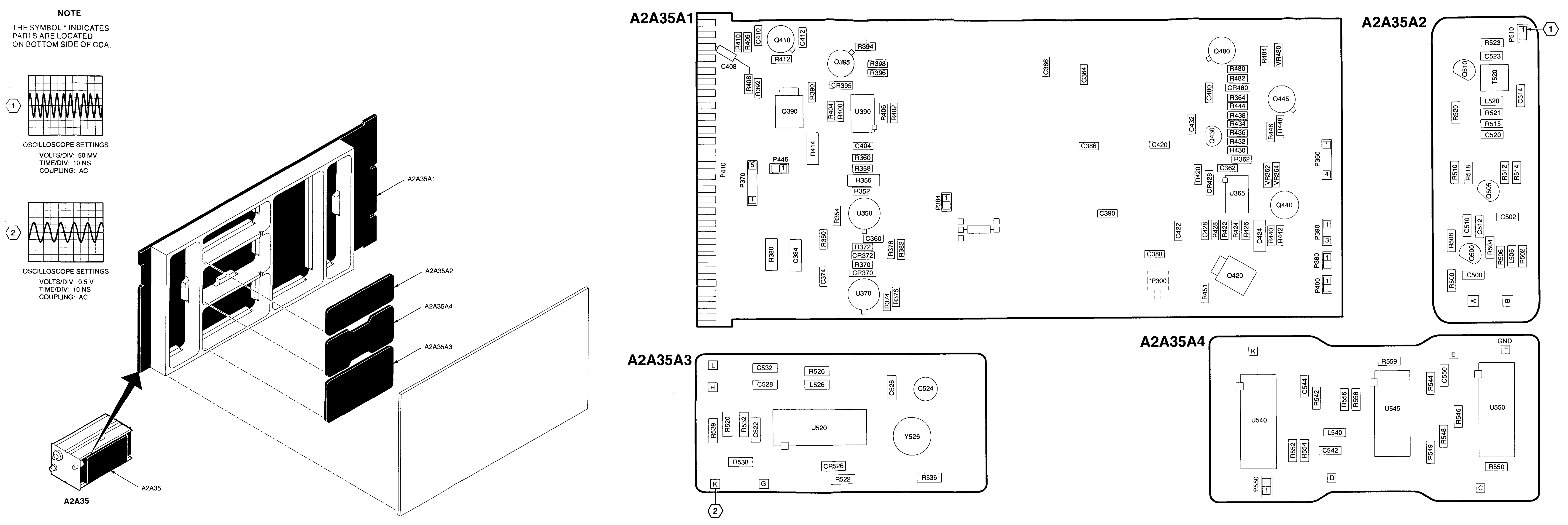
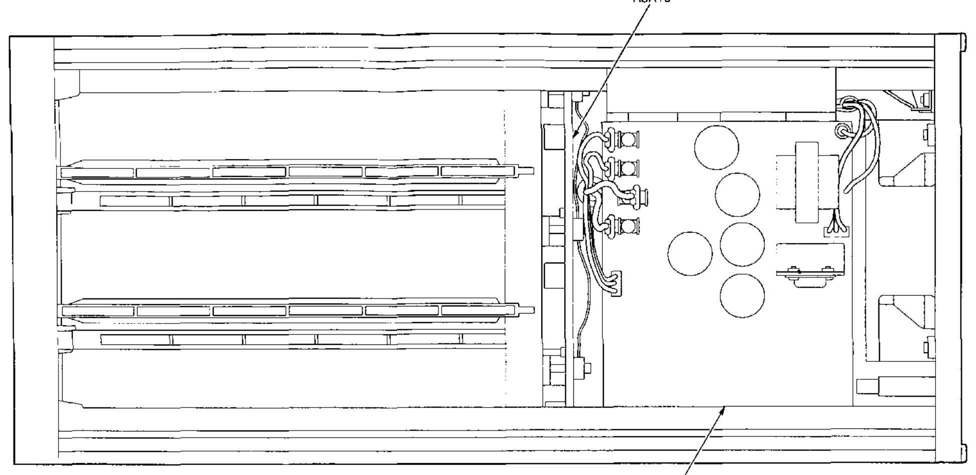
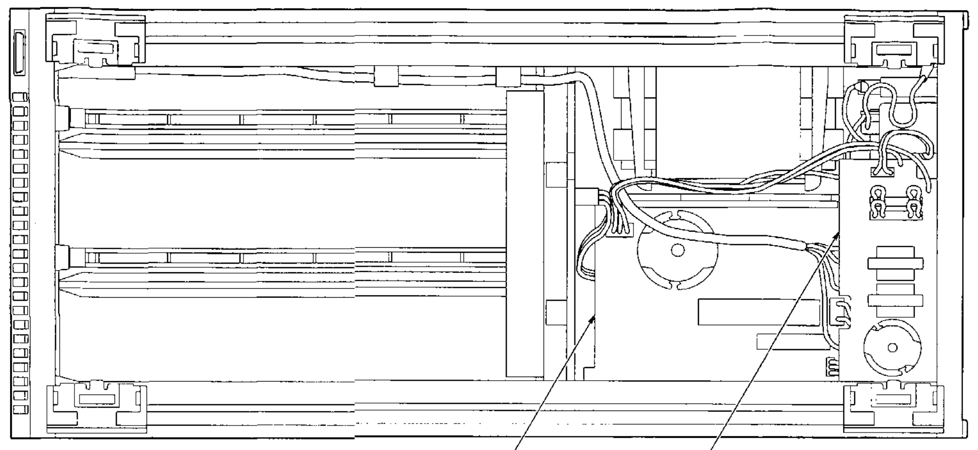


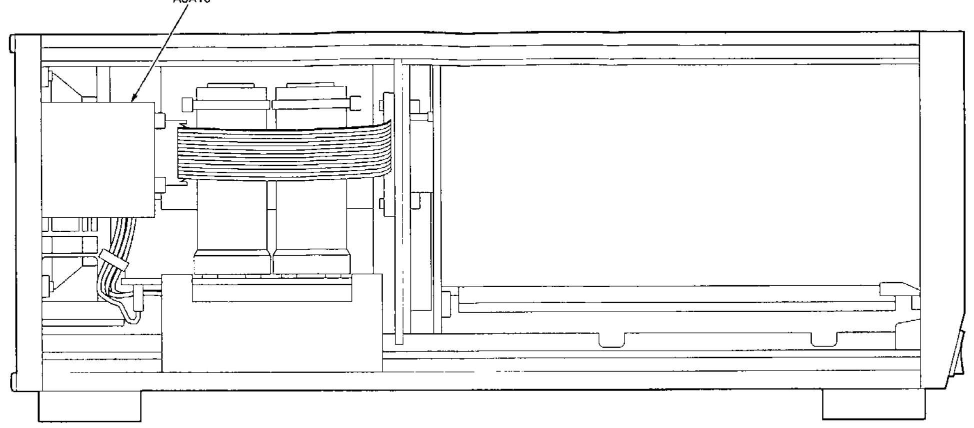
Figure FO-22. A2A35 Control Assembly, A2A35A1 Mother Board CCA, A2A35A2 110 MHZ Amplifier CCA, A2A35A3 55 MHZ Oscillator CCA and A2A35A4 Phase/Freq Detector CCA Component Locators



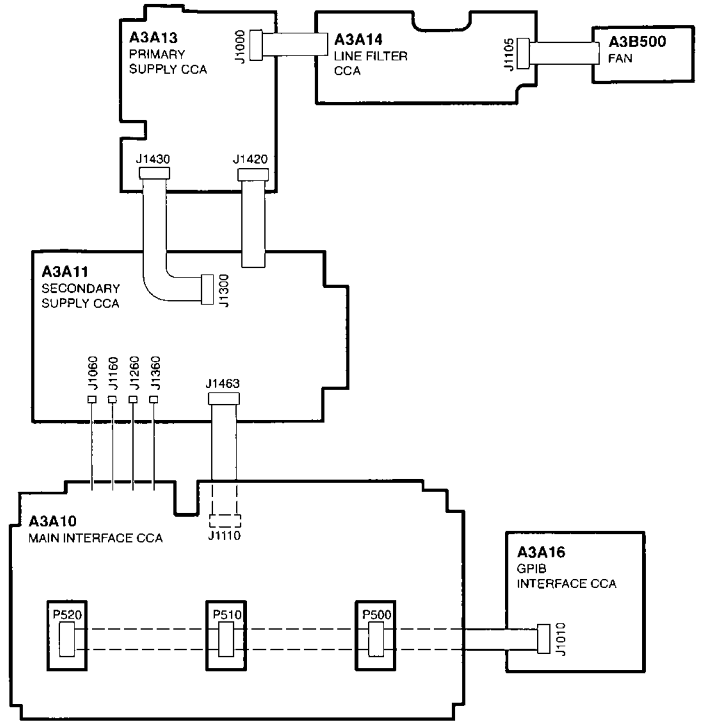
TOP VIEW OF TM 5003 POWER MODULE



BOTTOM VIEW OF TM 5003 POWER MODULE



LEFT SIDE VIEW OF TM 5003 POWER MODULE

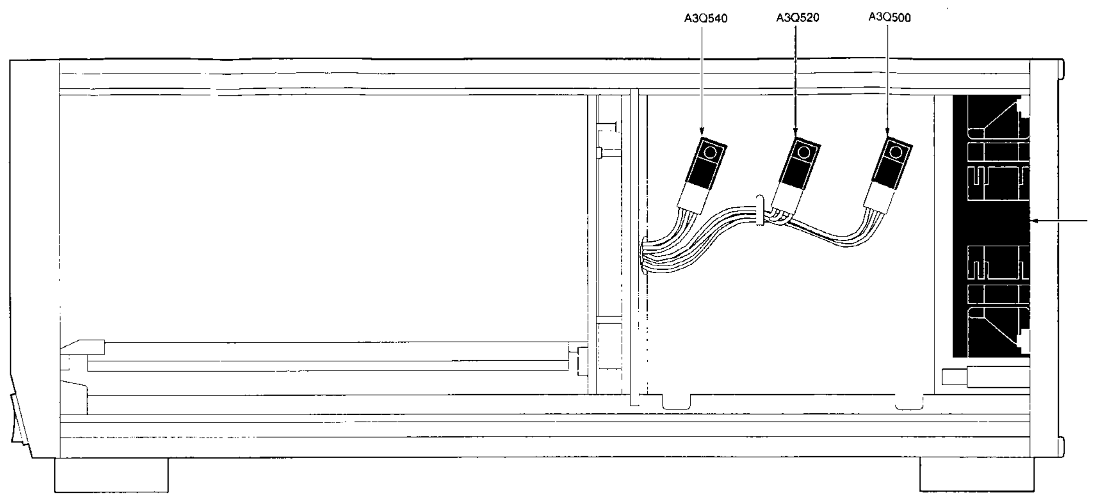


TM 5003 POWER MODULE INTERCONNECT DIAGRAM

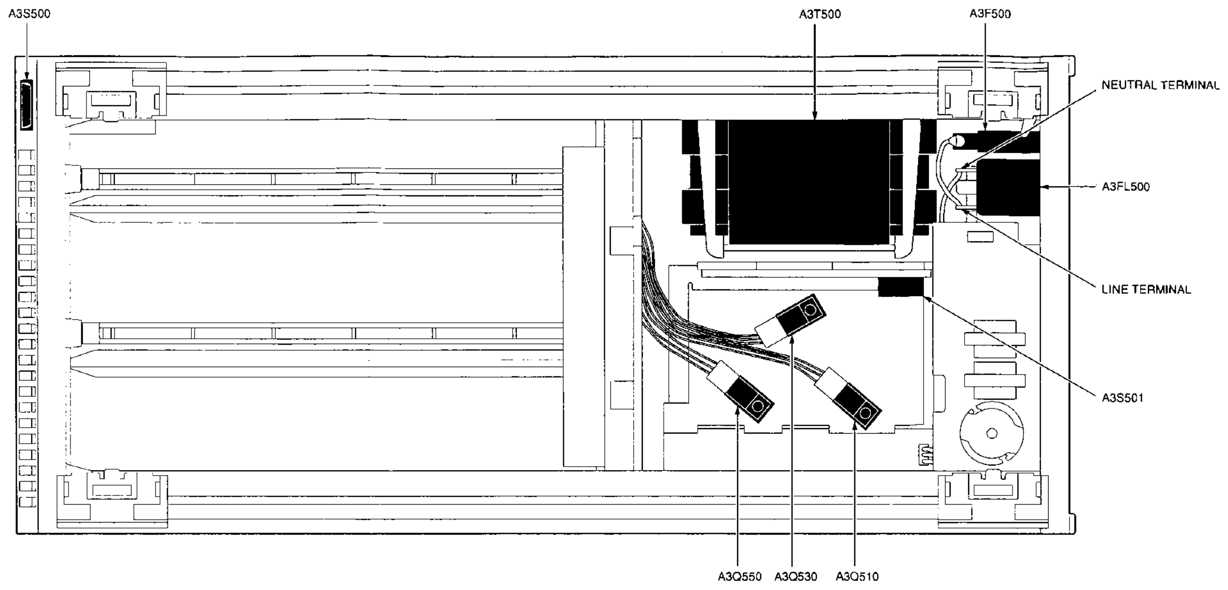
Figure FO-23. TM 5003 Power Module CCA Locator and Interconnect Diagrams

NOTE

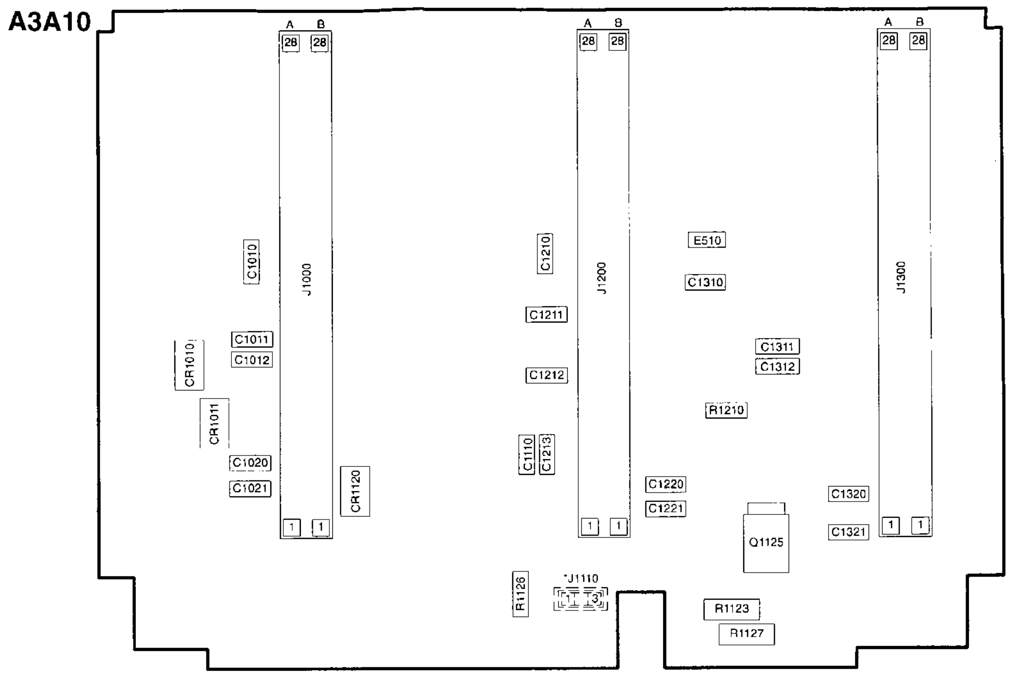
THE SYMBOL * INDICATES PARTS ARE LOCATED ON BOTTOM SIDE OF CCA.



RIGHT SIDE VIEW OF TM 5003 POWER MODULE CHASSIS MOUNTED COMPONENTS



BOTTOM VIEW OF TM 5003 POWER MODULE (A1A13 REMOVED) CHASSIS MOUNTED COMPONENTS



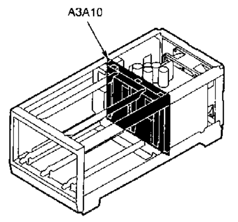


Figure FO-24. Chassis Mounted Components and A3A10 Main Interface CCA Component Locator and Schematic Diagrams (Sheet 1 of 3)

NOTE

- UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.
- Q500, Q520, AND Q540 ARE SERIES-PASS TRANSISTORS MOUNTED TO THE CHASSIS.

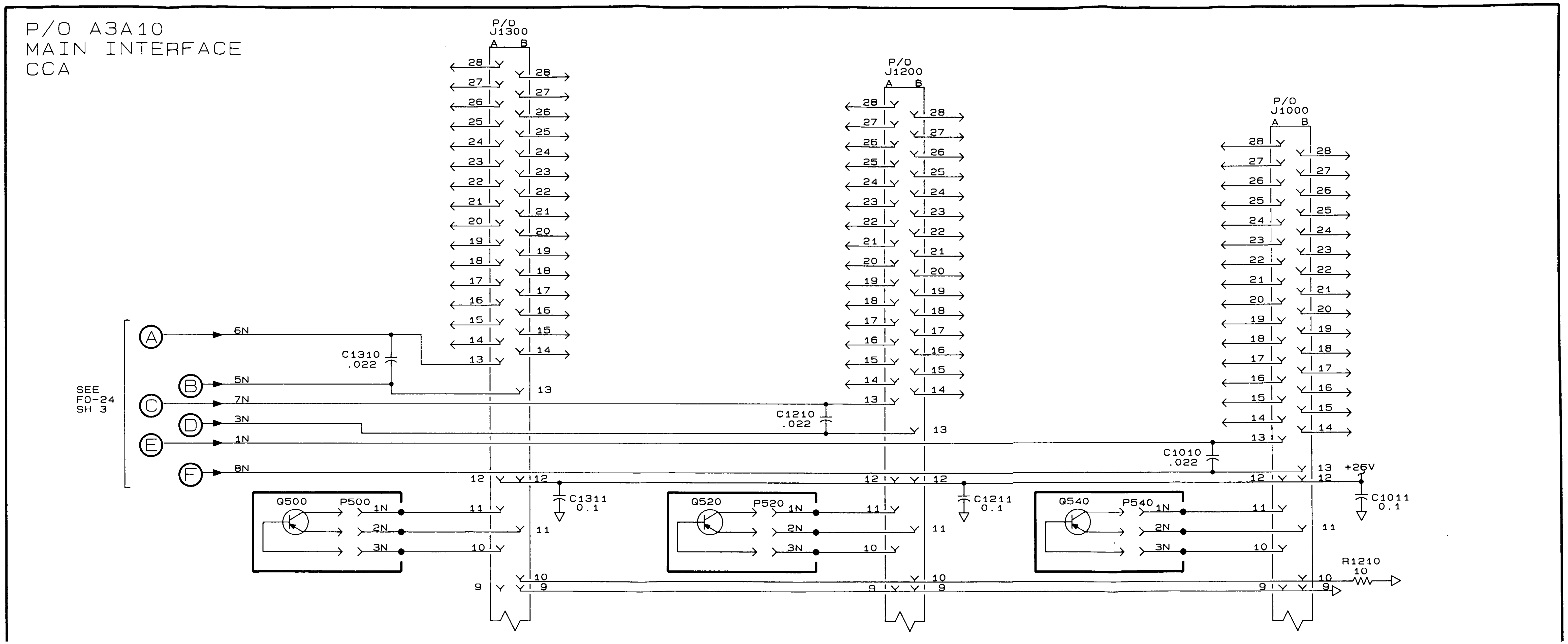


Figure FO-24. Chassis Mounted Components and A3A10 Main Interface CCA Component Locator and Schematic Diagrams (Sheet 2 of 3)

NOTE

- UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.
- Q510, Q530, AND Q550 ARE SERIES-PASS TRANSISTORS MOUNTED TO THE CHASSIS.

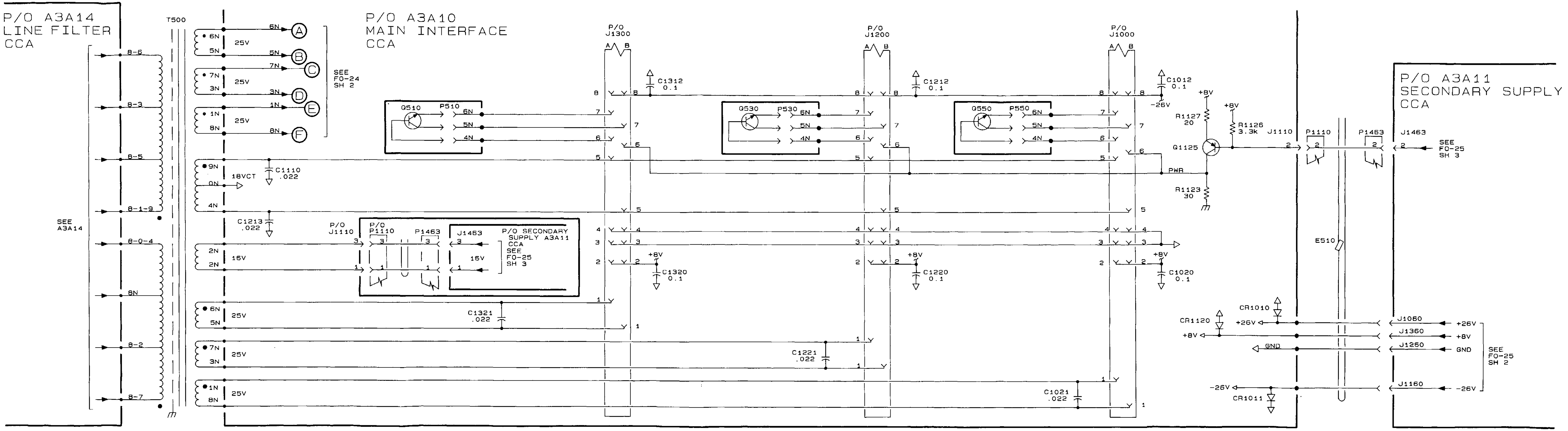
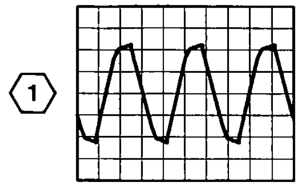


Figure FO-24. Chassis Mounted Components and A3A10 Main Interface CCA Component Locator and Schematic Diagrams (Sheet 3 of 3)

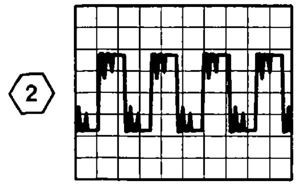
NOTE

- AN/USM-620 FRONT PANEL CONTROL SETTINGS HAVE NO IMPACT ON THESE WAVEFORMS.
- DUTY CYCLE OF WAVEFORMS WILL VARY DEPENDING UPON AC LINE VOLTAGE AND PLUG-IN LOADING.
- GROUND OSCILLOSCOPE PROBE TO CHASSIS WHEN MEASURING WAVEFORMS.
- THE SYMBOL * INDICATES PARTS ARE LOCATED ON BOTTOM SIDE OF CCA.



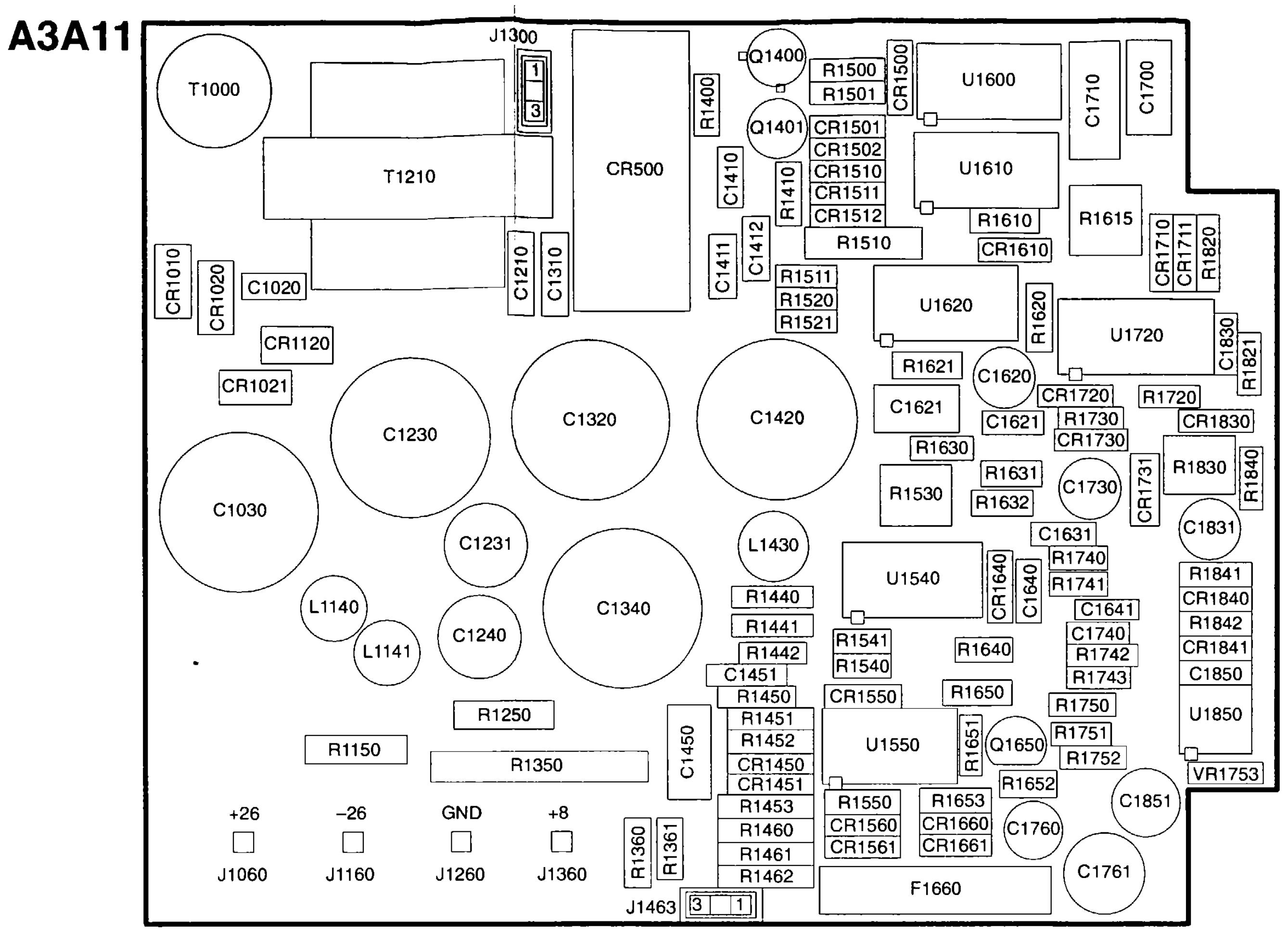
OSCILLOSCOPE SETTINGS

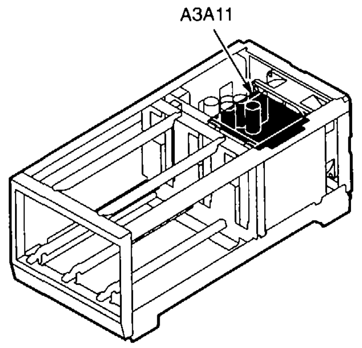
VOLTS/DIV: 50 V
TIME/DIV: 5 MS
COUPLING: DC

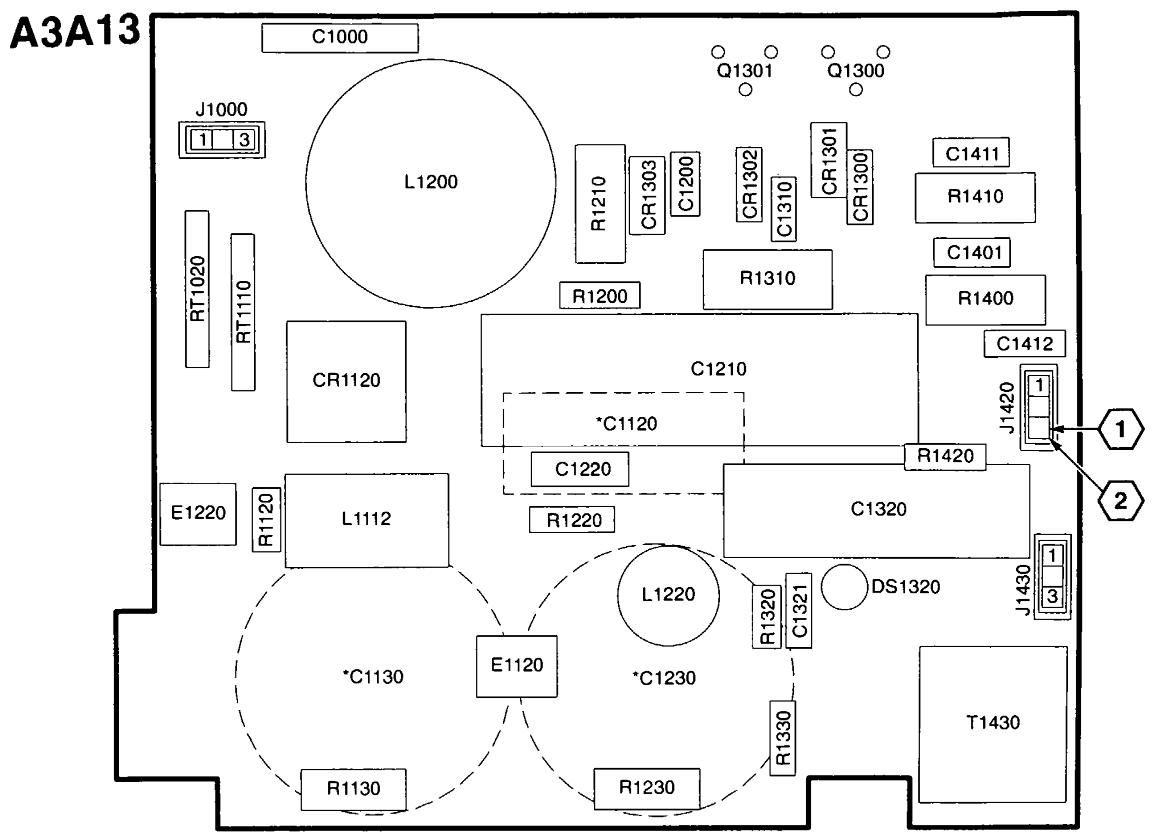


OSCILLOSCOPE SETTINGS

VOLTS/DIV: 50 V
TIME/DIV: 20 µS
COUPLING: AC
TRIGGER LEVEL: –







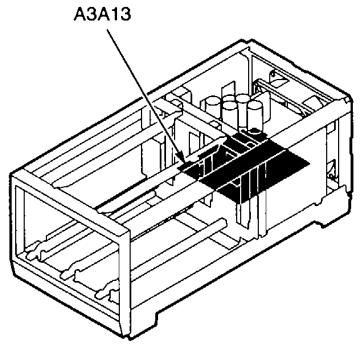
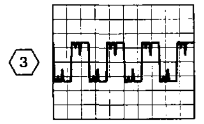


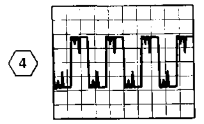
Figure FO-25. A3A11 Secondary Supply CCA and A3A13 Primary Supply CCA Component Locator and Schematic Diagrams (Sheet 1 of 3)

NOTE

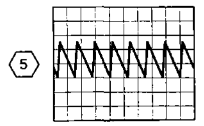
- UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.
- AN/USM-620 FRONT PANEL CONTROL SETTINGS HAVE NO IMPACT ON THESE WAVEFORMS.
- DUTY CYCLE OF WAVEFORMS WILL VARY DEPENDING UPON AC LINE VOLTAGE AND PLUG-IN LOADING.
- GROUND OSCILLOSCOPE PROBE TO CHASSIS WHEN MEASURING WAVEFORMS.



OSCILLOSCOPE SETTINGS
VOLTS/DIV: 20 V
TIME/DIV: 20 µS
COUPLING: DC



OSCILLOSCOPE SETTINGS
VOLTS/DIV: 5 V
TIME/DIV: 20 µS
COUPLING: DC



OSCILLOSCOPE SETTINGS
VOLTS/DIV: 50 MV
TIME/DIV: 20 µS
COUPLING: AC

U1540	
PIN	TEST FOR
1	HIGH (>7 V)
2	WAVEFORM 9
3	+10 V
4	WAVEFORM 5
5	+7.15 V
6	LOW (<3 V)
7	+7.15 V
8	+6 V
9	+7.15 V
10	LOW (<3 V)
11	+0.8 V
12	GND
13	HIGH (>7 V)
14	HIGH (>7 V)

U1620	
PIN	TEST FOR
1	40–42 KHZ CLOCK
2	WAVEFORM 8
3	WAVEFORM 8
4	WAVEFORM 8 INVERTED
5	WAVEFORM 8 INVERTED
6	WAVEFORM 8
7	GND
8	HIGH (>7 V)
9	LOW (<3 V)
10	WAVEFORM 12 INVERTED
11	WAVEFORM 12
12	WAVEFORM 12 INVERTED
13	WAVEFORM 12
14	+10 V

U1720	
PIN	TEST FOR
1	LOW (<3 V)
2	HIGH (>7 V)
3	HIGH (>7 V)
4	HIGH (>7 V)
5	WAVEFORM 8
6	+LOW (<3 V)
7	HIGH (>7 V)
8	GND
9	NC
10	WAVEFORM 7
11	WAVEFORM 8
12	+LOW (<3 V)
13	+10 V
14	40–42 KHZ CLOCK
15	+LOW (<3 V)
16	+10 V

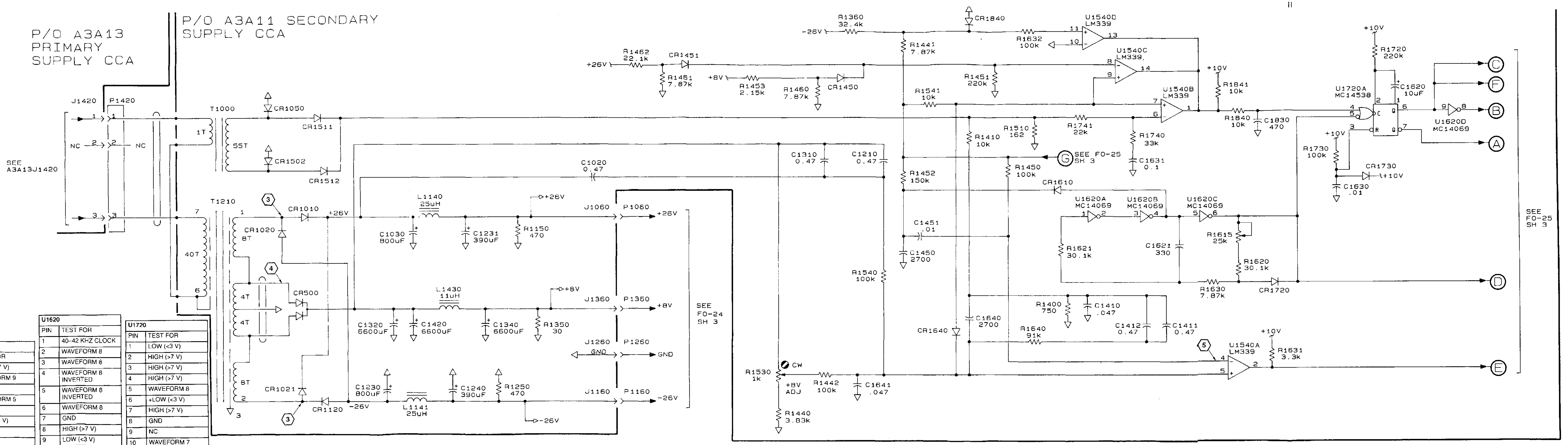
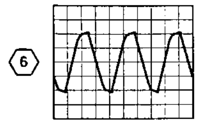


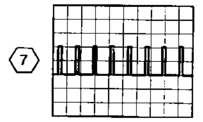
Figure FO-25. A3A11 Secondary Supply CCA and A1A13 Primary Supply CCA Component Locator and Schematic Diagrams (Sheet 2 of 3)

NOTE

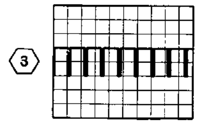
- UNLESS OTHERWISE NOTED, ALL CAPACITORS ARE MICROFARADS AND RESISTORS ARE OHMS.
- AN/USM-620 FRONT PANEL CONTROL SETTINGS HAVE NO IMPACT ON THESE WAVEFORMS.
- DUTY CYCLE OF WAVEFORMS WILL VARY DEPENDING UPON AC LINE VOLTAGE AND PLUG-IN LOADING.
- GROUND OSCILLOSCOPE PROBE TO CHASSIS WHEN MEASURING WAVEFORMS.



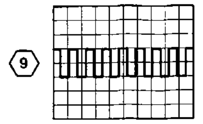
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 10 V
TIME/DIV: 5 MS
COUPLING: DC



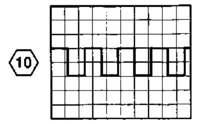
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 5 V
TIME/DIV: 20 µS
COUPLING: DC



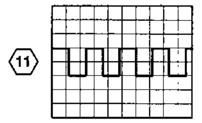
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 5 V
TIME/DIV: 20 µS
COUPLING: DC



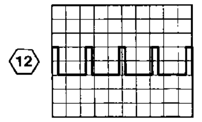
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 5 V
TIME/DIV: 20 µS
COUPLING: DC



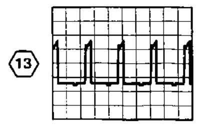
OSCILLOSCOPE SETTINGS
VOLTS/DIV: 5 V
TIME/DIV: 20 µS
COUPLING: DC



OSCILLOSCOPE SETTINGS
VOLTS/DIV: 5 V
TIME/DIV: 20 µS
COUPLING: DC



OSCILLOSCOPE SETTINGS
VOLTS/DIV: 5 V
TIME/DIV: 20 µS
COUPLING: DC



OSCILLOSCOPE SETTINGS
VOLTS/DIV: 5 V
TIME/DIV: 20 µS
COUPLING: DC

U1550	
PIN	TEST FOR
1	NC
2	+0.2 V
3	LOW (<3 V)
4	+7.15 V
5	+7.15 V
6	+7.15 V
7	GND
8	NC
9	NC
10	+10 V
11	+20 V
12	+20 V
13	+12 V
14	NC

U1600	
PIN	TEST FOR
1	WAVEFORM 9
2	NC
3	GND
4	WAVEFORM 7
5	GND
6	WAVEFORM 9
7	GND
8	GND
9	WAVEFORM 10
10	GND
11	WAVEFORM 7
12	WAVEFORM 10
13	WAVEFORM 11
14	+10 V

U1610	
PIN	TEST FOR
1	WAVEFORM 12
2	WAVEFORM 11
3	WAVEFORM 7
4	WAVEFORM 9
5	LOW (<3 V)
6	NC
7	GND
8	NC
9	WAVEFORM 10
10	LOW (<3 V)
11	WAVEFORM 9
12	WAVEFORM 7
13	WAVEFORM 12
14	+10 V

U1620	
PIN	TEST FOR
1	40–42 KHZ CLOCK
2	WAVEFORM 8
3	WAVEFORM 8
4	WAVEFORM 8 INVERTED
5	WAVEFORM 8 INVERTED
6	WAVEFORM 8
7	GND
8	HIGH (>7 V)
9	LOW (<3 V)
10	WAVEFORM 12 INVERTED
11	WAVEFORM 12
12	WAVEFORM 12 INVERTED
13	WAVEFORM 12
14	+10 V

U1720	
PIN	TEST FOR
1	LOW (<3 V)
2	HIGH (>7 V)
3	HIGH (>7 V)
4	HIGH (>7 V)
5	WAVEFORM 8
6	LOW (<3 V)
7	HIGH (>7 V)
8	GND
9	NC
10	WAVEFORM 7
11	WAVEFORM 8
12	LOW (<3 V)
13	+10 V
14	40–42 KHZ CLOCK
15	LOW (<3 V)
16	+10 V

U1850	
PIN	TEST FOR
1	GND
2	+7.15 V
3	NC
4	+10 V
5	+7.15 V
6	+7.15 V
7	LOW (<3 V)
8	+10 V

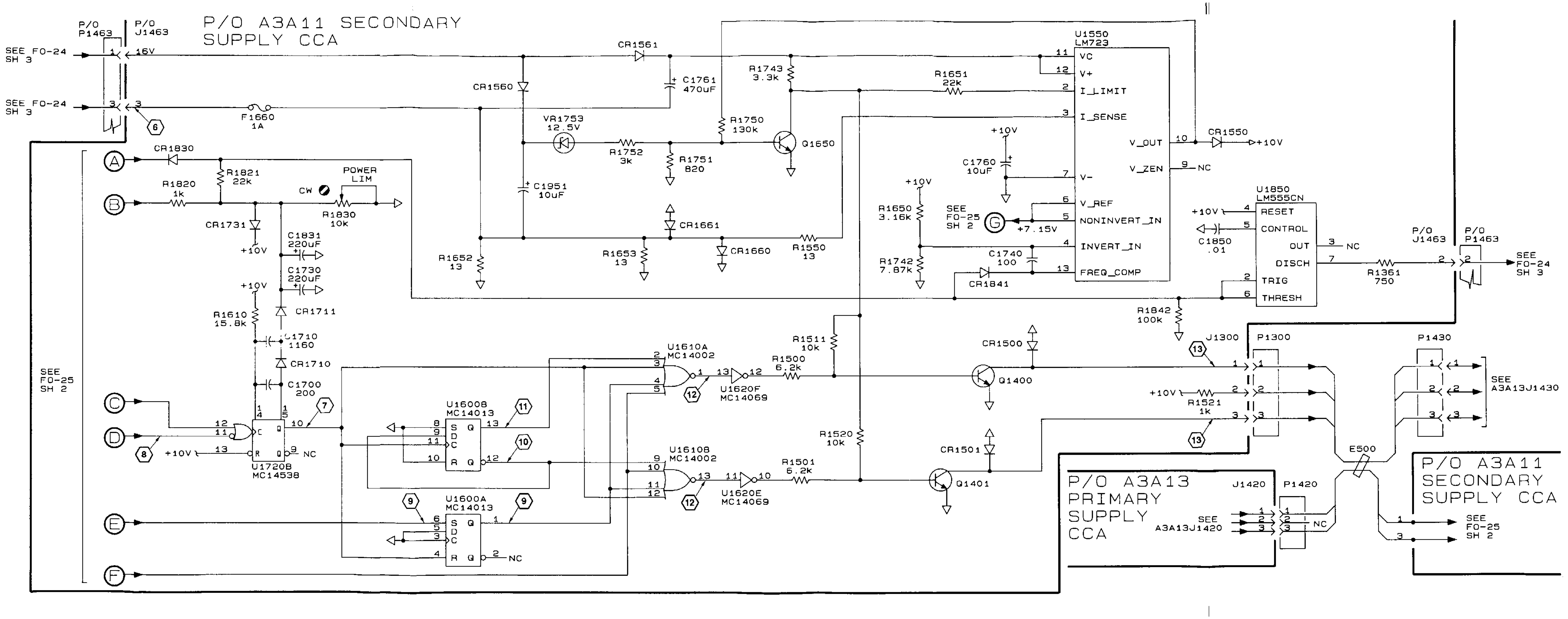


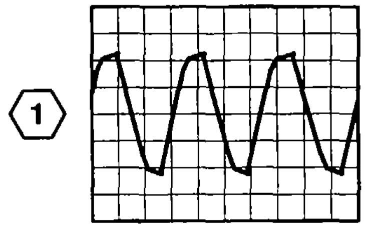
Figure FO-25. A3A11 Secondary Supply CCA and A3A13 Primary Supply CCA
Component Locator and Schematic Diagrams (Sheet 3 of 3)

WARNING

TO AVOID PERSONAL INJURY DUE TO ELECTRIC SHOCK, DISCONNECT AC POWER BEFORE MEASURING RESISTANCE.

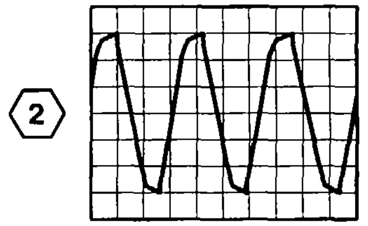
NOTE

GROUND OSCILLOSCOPE PROBE TO CHASSIS WHEN MEASURING WAVEFORMS.



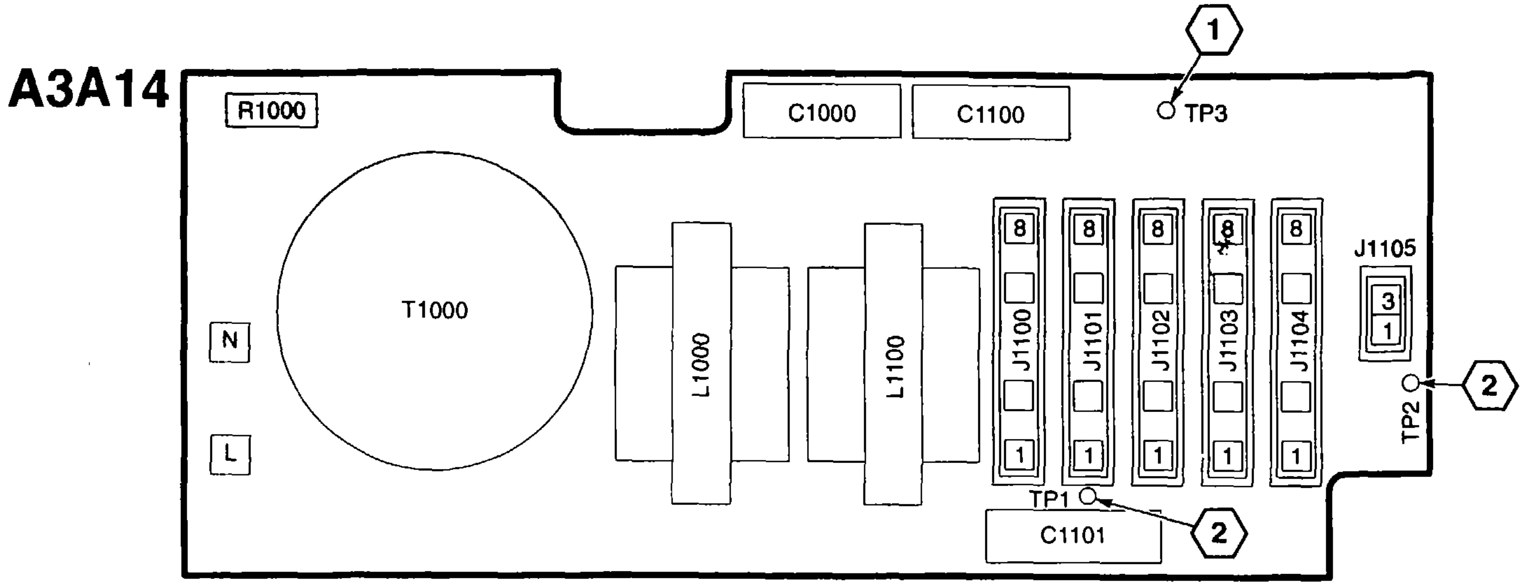
OSCILLOSCOPE SETTINGS

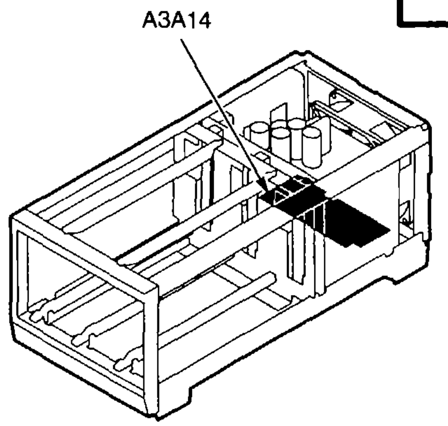
VOLTS/DIV: 10 V
TIME/DIV: 5 MS
COUPLING: DC

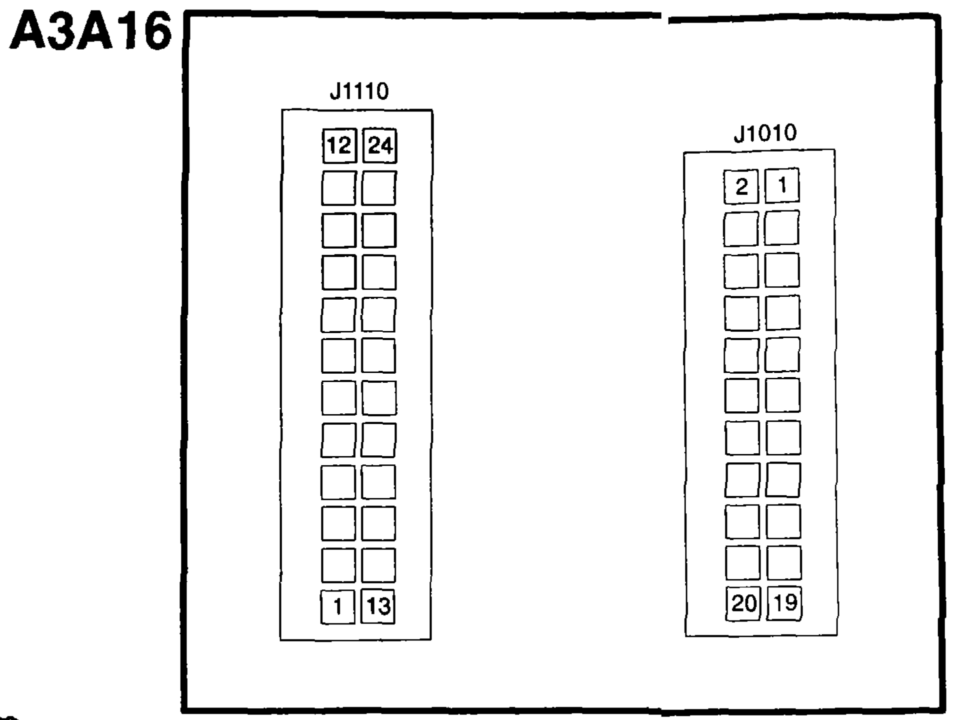


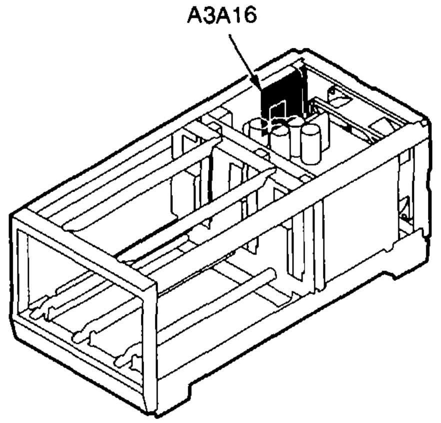
OSCILLOSCOPE SETTINGS

VOLTS/DIV: 50 V
TIME/DIV: 5 MS
COUPLING: DC









NOTE

BOTTOM SIDE OF CCA SHOWN.

Figure FO-26. A3A14 Line Filter CCA and A3A16 GPIB Interface CCA Component Locators

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
07075

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To: 2028@redstone.army.mil

Subject: DA Form 2028

1. ***From:*** Joe Smith
2. *Unit:* home
3. ***Address:*** 4300 Park
4. ***City:*** Hometown
5. ***St:*** MO
6. ***Zip:*** 77777
7. ***Date Sent:*** 19–OCT–93
8. ***Pub no:*** 55–2840–229–23
9. ***Pub Title:*** TM
10. ***Publication Date:*** 04–JUL–85
11. *Change Number:* 7
12. *Submitter Rank:* MSG
13. ***Submitter FName:*** Joe
14. *Submitter MName:* T
15. ***Submitter LName:*** Smith
16. ***Submitter Phone:*** 123–123–1234
17. ***Problem:* 1**
18. *Page:* 2
19. *Paragraph:* 3
20. *Line:* 4
21. *NSN:* 5
22. *Reference:* 6
23. *Figure:* 7
24. *Table:* 8
25. *Item:* 9
26. *Total:* 123
27. ***Text:***

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ITEM NO.	PAGE NO.	PARA–GRAPH	LINE NO. *	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON
1	WP0005 PG 3		2			Test or Corrective Action column should identify a different WP number.

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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

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ITEM NO.	PAGE NO.	PARA–GRAPH	LINE NO. *	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON

** Reference to line numbers within the paragraph or subparagraph.*

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